Master Thesis

Using chemical composition and grain size distribution of a palaeochannel-fill to identify Lower Rhine flood events and their origin in the catchment

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Abstract

At this moment no long-term records are available that reveal the upstream origin of sediment deposited during flood events in the Rhine. Tracing flood deposits in the lower Rhine back to Rhine subcatchments would increase the ability to trace sources of pollution, of flood events, and to reconstruct geomorphological developments throughout the catchment. In this research a data set of fluvial deposits throughout the Rhine catchment was created, covering both the Lower Rhine, the Oberrhein and three main tributaries (Neckar, Main and Moselle rivers). The data set was built up by corings from the lower Rhine and its upstream subcatchments and surface samples from locations throughout the subcatchments. Grain size analysis was performed on these samples to identify flood events. A XRF scan was performed to obtain the chemical composition of the samples. Chemical composition data was used to investigate the distribution and propagation of trace elements. Grain size data and chemical composition data were combined to find a correlation between specific set of elements and grain size fractions. Based on data analysis combined with previous research, the Zr/Rb ratio was found to correlate with the sand fraction of the grain size data, and thus to act as a proxy for flood events. The Zr/Rb ratio was used to identify flood events in the chemical composition data, and to characterize the chemical composition of these flood events. The chemical composition of the corings and surface samples from the subcatchments were used to characterize the chemical composition of the subcatchments. Based on a combination of these characteristics an origin was suggested for some of the flood events. The 1671 and 1682 flood events are likely originate from the Oberrhein area. The 1726 and 1729 flood events are likely to originate from the Moselle area.

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1. Introduction

Discharge records of the Rhine River in the Netherlands and upstream locations go back to 1900 A.D. and before. Descriptions of recent flooding (Disse & Engel, 2001) and historical records (e.g. Buisman, 2000) indicate that the origin of lower Rhine floods is highly variable, with both the High Rhine and the Middle Rhine producing peak discharges. For flood risk assessments it is important to understand the origin of flood pulses, generated throughout the catchment, because this would increase the ability to identify important regions for pollution. It has been suggested that floods in catchments affected by pollution result in the remobilization of contaminated sediment (Foulds et al., 2014). This poses a significant threat for ecology and agriculture along the floodplains. By analyzing (post-industrial revolution) deposits in up- and downstream locations along the Rhine River, pollution propagation throughout the catchment can be monitored, sources of pollution can be traced, and subsequently measures can be taken. Allocating the origin of floods is also of great social importance; resulting information can be used to research flood genesis and source areas in past and present situations. This information can be used to develop a system that predicts the peak discharge of flood events in the Lower Rhine. Moreover these data can be used to determine the most beneficial location to construction local flood reservoirs to intercept peak discharges in both downstream and upstream parts of the catchment. Besides of the above-mentioned applications, the unraveling of the origin of palaeo-floods can also be used; in the reconstruction of (long term) geomorphologic developments, research in flood sensitivity to changing land use, climate research, and in (more accurate) flood risk predictions.

A complex set of factors, including upstream geology, a large-scale catchment, varying flood parameters (discharge, duration) and floodplain storage, determine the chemical composition of flood deposits deposited along the Lower Rhine. The Upper Rhine from the Alpine region, and three main tributaries to the Middle Rhine, the Neckar, Main and Moselle Rivers, mainly determine the chemical composition of sediment transported and deposited by the downstream Rhine River. The relative discharge and sediment contribution of these tributaries during a flood event is thought to determine the chemical composition of the sediments deposited during the same flood event in the Lower Rhine region. Middelkoop (1997; 2002) found that there is a close relation between the amount of sediment transported and deposited, and the discharge and durance of a flood event; the higher the discharge, the more sediment can be transported. Previous research also indicates that the variation in grain size of flood event deposits can be used to identify single flood event layers (Middelkoop et al., 2010; Toonen et al., 2012). Other studies have correlated Lower Rhine flood event layers with historical flood events by making use of historical records (e.g. Winkels, 2011;

Aloserij, 2013; Toonen, 2013). Previous research conclude that chemical composition data can be used to acquire grain size information (e.g. Dypvyk and Harris, 2001). The use of such a geochemical proxy in small scale catchments has shown that the chemical composition of flood layers can be used to trace the upstream origin of sediment by making use of the characteristic chemical composition of tributary rivers (E.g. Passmore and Macklin, 1994; Jones et al., 2009). The same methods have, at this moment not been tested in large river systems with a complex catchment configuration and with considerable mixing of sediments (also with temporarily stored floodplain deposits (e.g. Erkens, 2009)), which may complicate traditional fingerprinting of upstream catchments. No study has yet combined these approaches and applied these on a large catchment, such as that of the Rhine River.

The main goal of this study is to find out whether we can use the relation between the grain size and the chemical composition of floodplain deposits to identify flood events and to trace Lower Rhine River flood events back to upstream Rhine subcatchments. The first objective of this study is the creation of an inventory of flood deposits found in cores from upstream and downstream locations in the Rhine catchment. To enable a catchment-wide correlation, flooding events need to be identified in a sedimentary sequence (and dated) throughout the catchment by performing grain analysis (Winkels, 2011; Aloserij, 2013; Toonen, 2013). The next objective is to find a chemical proxy that can be used to link grain size data with chemical composition data, and subsequently to identify flood events within the chemical composition data (Walling, 2005; Macklin et al., 2006). This chemical proxy will also be used to find a method to correct for the clay content in the flood deposits. The latter is needed to enable a catchment-wide comparison of cores. The next objective involves the construction of a series of fingerprints of each of the subcatchments, and a characterization of a series of flood events. Eventually, the aim is to unravel the contribution (quantitative or qualitative) of each of the subcatchment to the selected flood events.

To achieve our main goal, the following research questions are specified:

- Can flood events be identified in grain size data and chemical composition data?
- Can chemical composition data be corrected for clay content?
- Can a characteristic fingerprint be set up for individual Rhine subcatchments?
- Can the above-mentioned fingerprints be used to trace the (mixed) origin of Lower Rhine flood events?

To answer these questions we applied a series of sedimentary and statistical approaches. First an overview of the study area and its hydrologic background is provided in chapter 2. Here the local settings of the source areas are also described. Chapter 3 describes the processes that occur from the source area towards the deposition of sediment in the floodplains along the Lower Rhine. The local settings of flood depositions also are described here. Chapter 4 describes the process of core selection and present the sampling sites. Samples were collected from suitable locations in both the Lower Rhine (sedimentary sink) and the upstream subcatchments (sedimentary sources). Chapter 5 describes laboratory and analytical methods. Grain size distributions of flood layers and chemical composition data were analyzed and compared to distinguish flood layers and correlate these throughout the Rhine catchment. The latter involved a series of research steps, of which (preliminary) results are provided in the appendices.

2. Study area

2.1. The Rhine River

The Rhine River originates in the Swiss Alps where its headwaters confluence, at Lake Constance these form the Alpine Rhine or High Rhine (Fig 2-1). After the joining of the river Aare and crossing the Swiss-German national border, it is named the Upper Rhine. further downstream, the Rhine River confluences with several tributaries, of which the Neckar (at Mannheim) and the Main (at Mainz) are the most important (Fig. 2-1). In central Germany the Middle Rhine flows through the Rhenish Massif (Schiefergebirge) which is characterized by a narrow bed-rock canyon. At Koblenz the Middle Rhine is joined by the Moselle River. Downstream from Bonn the Rhine River is named the Lower Rhine. The apex of the Rhine delta is roughly located at the Dutch-German national border. A few kilometres downstream, the Rhine River splits into the Waal River and the Pannerdens Kanaal, Nederrijn, and Lek branches. At Arnhem, another distributary, the IJssel River, splits from the Nederrijn River (Fig. 2-1).

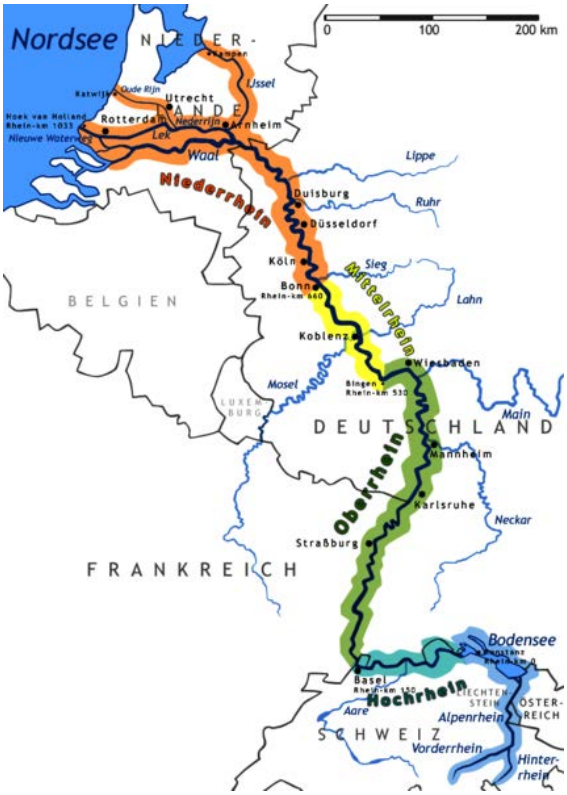

Figure 2-1 Overview of the study area.

Map of the course of the River Rhine, from the Swiss Alps to the North Sea. In blue the High Rhine (Hochrhein, including the Alpine Rhine), in green the Upper Rhine (Upper Rhine), in yellow the Middle Rhine (Mittelrhein, and in orange the Lower Rhine (Niederrhein) and deltaic distributaries.

The Rhine River drains approximately 185000 km2 of NW-Europe and its main river channel stretches ~1320 km (Middelkoop, 1997). Its hydrological regime varies from glacial in the upstream, to pluvial in the downstream parts of the catchment. At the Lower Rhine the mean annual discharge is 2200 m^3/s. Most floodplains are inundated when discharge exceeds 6000 – 7000 m^3/s while largest measured floods occurred in 1926 A.D. and 1995 A.D. with discharges of ~12000 m^3/s (Middelkoop, 1997). Most peak discharges occur between December and April as a results of extensive snow melt and increased precipitation. Highest magnitudes of flood discharges in the Lower Rhine occur when flood pulses from the main tributaries enter the Rhine River simultaneously.

2.2. Lower Rhine

During the Holocene the Lower Rhine developed a meandering course. During the last ~3000 years the Lower Rhine has been transformed into the Rhine delta apex (Berendsen and Stouthamer, 2001). Throughout the Holocene several phases of fluvial activities have resulted in palaeo-channels and meander cut-offs of varying ages. These slack-water environments are located at lower lying areas in embanked floodplains and are characterized high sedimentation rates. Moreover, some dike breach ponds and cut-off channels are currently being filled in.

2.3. Subcatchments

Upper Rhine

In this report we use the name Upper Rhine for the part of the Rhine River upstream from the confluence with the Neckar. Main tributaries confluencing downstream from this point to form the Rhine River include the Neckar, Main and Moselle rivers (Figure 2-1). A large canalization project took place just after the start of the industrial revolution, during the period between 1820 and 1860 (Beeger, 1990; Herget et al, 2005).

The geology of the Upper Rhine region is characterized by the Jurassic source rocks of the Aare and Birs rivers and other tributaries in Switzerland. Both the Aare and the Birs provinces (Appendix 212) are formed by minerals from the Molasse foreland basin (Oligocenen/Miocene) and the Alps. Characterizing minerals are garnet, epidote (silicate of aluminium, iron and calcium), hornblende, staurolite and Rhine-alterites (Van Andel. 1958). The Black Forest-Vosges province, geologically characterized as granite and crystalline schists (Appendix 12) has several mineral associations of which the principles are garnet and hornblende. Furthermore, some typical minerals like augite, sillimanite and barite are found, these are derived from the rocks of the Black Forest (Eocene) and the Vosges mountains (Eocene).

Neckar

The Neckar drains a watershed of about 14.000 km^2 of South-west Germany. It originates in the Black Forest, in the Swabian scarplands. Nearby the city of Mannheim the Neckar confluences with the Upper Rhine (428 km). From here on downstream it is called the Rhine River. In the upstream part, south of Stuttgart, the drainage area of the Neckar is densely populated and highly industrialized. Then, after passing Stuttgart it meanders through a landscape built up of Triassic and Pleistocene limestones; an area built up of carbonates (Hantke, 1993). More mineral associations from the Neckar backland are monazite (phosphate mineral containing rare earth metals), from Bohemia, garnet (Triassic) and tourmalite, zirconium silicates and rutile (titanium), from the Bunter sandstone (Triassic) of the Zorn province (13) (Van Andel, 1950). Moreover, minerals from the volcanic rocks are also found in the south-eastern part of the Neckar catchment.

In 1976 Abadian and Lippman studied heavy metals in the Upper Neckar river to determine the amount of industrial pollution. XRF analysis was used to detect elements and corresponding minerals. The occurrence of brushite was said to be a mineralogical indicator of pollution. Phosphate, one of the components of brushite, is used in fertilizers, detergents, industrial waste waters and more (Abadian, 1976). Moreover, an important industrial signal can be found back in the abundance of Cadmium. Due to the metal working industry along the tributary Enz river, high amounts of Cadmium were emitted and deposited along the Neckar. Cadmium is bound with fine grained sediment. These heavy metals emissions depleted after the 1970's (Gerbersdorf et al, 2005).

Main

The Main confluences with the Rhine River near the city of Mainz (497 km). It originates from the German state of Bavaria, and before it meets the Rhine River, it flows through the industrial zone of Frankfurt am Main. The backland of the Main resembles that of the Neckar. It is also built up from Triassic and Pleistocene limestones. Specific mineral associations are monazite, garnet, tourmalite, zirconium silicates and rutile (titanium) from the Bunter sandstone (Triassic) of the Zorn province (Appendix 213) (Van Andel, 1950). In the Main region there might also be found some minerals from the eastern part of the catchment, these include augite, titanite (including rare earth metals), clinozoisite (calcium and aluminium) and (basaltic) hornblende (Van Andel 1950). These are all derived from the Bohemian, Keuper (Triassic) and Rhaetic (Triassic) massifs (Appendix 12). Moreover, aeolian deposits (loess) is found in this area which will be reflected in the chemical composition signal of the sediment coming from the Main river (Van Andel, 1950). Besides of that, there is the Staurolite province (Appendix 13), which supplies the Rhine and the Main with staurolites, derived from Mayence Basin (Oligocene).

Moselle

In contrast to the other tributaries, the Moselle originates in the area west of the Upper Rhine. It confluences with the Rhine River nearby Koblenz (592 km). The Moselle originates in a Tertiary and Mesozoic carbonate area, and flows through crystalline and Palaeozoïc rocks in the Vosges, where it encounters garnet, blue-green and brown hornblende (Van Andel, 1950). After that it flows through the Eifel and Hunsrück (Appendix 12) where it encounters quaternary volcanic rocks of the Rhenish Massif (Volcanic province, Appendix 13). This results in a signal of specific elements originating from volcanic minerals including augite, basaltic hornblende and titanite (Edel & Fluck, 1989; Van Andel, 1950). In the downstream part of the Moselle River, it is extremely incised into the Rhenish massive. As a result, the floodplains are small and narrow and there are no Holocene cut-off-meanders.

3. Factors controlling sediment deposition and composition in the Rhine River

3.1. Flood events

Patterns of flooding of the Rhine River have been documented throughout the Holocene and through historical records for the past 500-100 years (Brázdil et al., 1999). The last severe floods occurred in December 1993 and January 1995, at these moments the discharge increased up to ~ 12000 m^3/s. Only in 1926 a higher discharge (~ 12600 m^3/s) has been recorded. From the 1950s onward hydraulic modelling has resulted in an design discharge with a recurrence interval of 1/1250 years. Whereas this design discharge was initially forecasted at 15000 m^3/s for the 1990s, this number has been adapted to 16800 m^3/s for the year 2100 (Silva et al., 2001). This forecast of rare events (1/1250 years) is based on a record of only 100 years. Recent research has focused on extending the discharge data set of the Lower Rhine, based on historical and sedimentary information, in order to asses current flood risk (Toonen, 2013). Contributing research mainly includes the construction of a discharge data set throughout the Rhine river catchment. Multiple analytical approaches can consequently be used to identify flood events and their characteristics.

3.2. Sediment deposition

During flood events, sediment, which mainly consists of silt and clay, is deposited in the floodplain areas. Depositional processes during and after flood events are influenced by both upstream and local factors. Upstream factors include flood characteristics, including differences in flood magnitude and frequency, and the characteristics of the suspended sediment in a flood, including differences in composition, grain size, and heavy metal concentration, and are strongly interrelated (Thonon, 2006). The latter are described in section 3.3.

Upstream factors

The sediment yield of a large river as the Rhine River is controlled by several factors. First, it depends on the amount of weathering and soil erosion that takes place in the hinterland. The Rhine River catchment has different erosion characteristics in forest areas, hills with loess, and agricultural areas (for example covered with vineyards). Several models can be used to determine the amount of soil erosion (Asselman, 1997). Another factor is the sediment delivery ratio (SDR), which is the ratio between the amount of transported and eroded soil at the outlet of the catchment. Second, a large part of the flood deposits along the Lower Rhine originates from locally reworked floodplain sediment that has been eroded by lateral fluvial migration; especially bed load sediments are not transported through the entire system during a single flood event (Hoffmann et al, 2007). Moreover, the SDR varies per season, in the summer it is lower, due to the increases surface roughness by crops. In the winter there is low soil cover but the transport capacity also decreases (Walling, 1990;

Asselman, 1997). The third main factor influencing flood characteristics is climate. Climate (change) controls the probability of the duration and frequency of floods (the flooding regime). Processes such as (de)forestation, changing agriculture, and other changes in land use influence the upstream sediment supply (Hoffmann et al. 2007).

Moreover, recent river basin management projects, rehabilitation of floodplains, construction of secondary channels, and restoration projects have changed the flooding regime of the Rhine River (Herget et al. 2005; Lammersen et al., 2002; Vorogushyn and Merz, 2012). In the Upper Rhine a large canalization project took place in between 1820 and 1860, when the Count of Tulla designed a plan to improve the navigability by straightening meanders (Beeger, 1990). Recent projects try to improve the water storage capacity of the river, by giving the river more space in times of high discharges, in order to prevent downstream floods (Lammersen et al., 2002; Herget et al., 2005).

Local factors

On a local scale, the amount of sediment that is deposited and the sedimentary pattern in the floodplains is controlled by two factors; floodplain topography and flood magnitude. Floodplain topography includes (natural) elevation differences and variations in the width of the floodplain. The topography of the floodplain is important as (averaged over multiple floods of varying magnitude) the amount of sand and coarse silt decreases with increasing distance to the river channel, while the content of clay and attached organic matter is relative constant with distance (Middelkoop, 1997). Therefore it is easier to identify an extreme flood event as a rare spike of coarser material at a distal floodplain than at proximal floodplain locations. The magnitude of the flood determines both the total sedimentation and the spatial pattern of deposition. The total deposition increases with flood magnitude. However, this increase is stronger for sand; minor floods are dominated by larger accumulation of fine sediment in lower areas and depressions while major floods are dominated by sand deposits, at least close to the channel (Middelkoop, 1997).

Dike-breach ponds and cut-off meanders within the embanked floodplains are natural traps for sediment during floods; meters of sediment can accumulate at such locations (Middelkoop, 1997; Toonen et al., 2012). Especially in lower lying regions (at slackwater conditions) detailed sequences of sediment record are deposited (Middelkoop, 2000; Thonon, 2006). Deposited sediments in local aquatic environments in the floodplains are generally laminated; deposition during successive floods builts up a sequence of layers with varying coarseness. Previous research concluded that the coarseness of suspended sediment that is transported, increases in the case of a higher discharge (Middelkoop, 1997; Toonen, 2013). Depending on flood magnitude (discharge), flood duration and the amount of sediment that is available, lamination and thickness of the deposits varies between

several mm's to several cm's. The lamination is not regularly annual, but depends on the occurrence of floods roughly exceeding bank-full discharge (Middelkoop, 2011).

3.3. Sediment composition

Once deposited in the floodplains, sediment (especially in the clay fraction) acts as a transport agent for contaminants, nutrients and organic material. This role of fine-grained sediment is due to the binding ability of clay minerals, that allows contaminants to chemically attach to minerals. This way contaminants can be transported to lower river reaches to be deposited in the floodplains. The amount of heavy metals that is deposited depends on the amount of sediment that is deposited and therefore an important influence is the sediment yield. Furthermore the amount of heavy metals depends on the sources and inputs of heavy metals. Heavy metals can be spread in the dissolved phase, as aerosols or attached to soil particles (Vink et al., 1999; Vink & Behrendt, 2002). A distinction between natural and anthropogenic sources can be made when back ground concentrations can be distinguished. This is done using the information that urban area are the main contributors of heavy metals and that the attribution of these areas has declined over the past few decades.

Concentrations of elements and ratios of elements can be measured in order to retrieve a chemical fingerprint (Peart & Walling, 1986; Walling & Woodward, 1992; Støren et al, 2010). The chemical composition of the sediment depends on the source area of the suspended load. Each of the tributaries has a geologically and industrially distinct source area and therefore the sediment from the different sub-catchments has a varying chemical composition (Van Andel, 1950; Vink & Behrendt, 2002).

Disturbing factors, such as natural processes (Middelkoop, 2000; Thonon, 2006) and human activity (Herget et al, 2005) need to be taken into account. A range of chemical and physical processes controls the variation in metal pattern in floodplain deposits (Peart and Walling, 1986; Passmore and Macklin, 1994; Vink et al., 1999; Thonon 2006). Horizontal processes including (changes in) local floodplain topography, floodplain storage, and flow velocity can influence the chemical composition of surface samples. Besides of these horizontal processes, vertical processes can influence the chemical composition of the corings. The latter include hydraulic sorting (re-suspension), metal enrichment and biological activities. An important aspect concerning the chemical composition of sediment from the youngest centuries to millennia is pollution. The basin of the Rhine is densely populated and in the last 300 years has become heavily industrialized with the Ruhr district and agglomerations as Frankfurt am Main, Stuttgart, Mannheim and Nuremberg. Change in the use of land and the environment have their impact on the emission of heavy metals, besides of that the transport of sediment is also affected by these industrialization factors (Thonon, 2006).

4. Fieldwork and core collection

4.1. Site selection

In this study, a core from the Bienener Althrein (along the Lower Rhine), from now on called the Bienen coring, was obtained to reconstruct a detailed record of the flood events along the Lower Rhine. This core is considered the sink of all upstream eroded material. To perform analysis on source areas, subsequently two types of data were needed from all the locations in the subcatchments. At first, for each of the subcatchments a (pre-industrial) record was needed of the local flood deposits; these were obtained by performing a coring (4.1.1). To obtain a post-industrial record for the tributaries, we also needed at least one surface sample from each of the subcatchments (4.1.2).

4.1.1. Cores

The cores on which this study is based were collected both from locations along the Lower Rhine, and from its upstream tributaries. As we want to perform a high resolution comparison, a location was needed that has a constant and rather stable deposition rate. To minimize the impact of grain size fluctuations caused by a varying distance to an active channel, we look for a site that is close a channel with an low migration rate. While selecting the locations of our coring sites, we need to keep in mind these needs to be able to obtain cores with a representative, high resolution, record of the local fluvial deposits. Slack-water environments seem to be the ideal locations for the coring locations along the lower Rhine and its main tributaries. Due to high sedimentation rates, cores collected in slack-water environments are assumed to have a high temporal resolution (Middelkoop, 1997). Another advantage of slack water environments is that they are currently being filled in. The latter is important to be able to make a comparison between recent fill-in the lower Rhine and the sub-catchments, as deposition rates can be calibrated (Middelkoop, 2000). An additional advantage of dike-breach ponds is that the formation date of a pond can often be obtained from historical data.

Suitable locations were selected using palaeogeographic maps (Toonen, 2013), geological maps, historical maps, Google Maps and detailed elevation models (AHN, Rijkswaterstaat, 2005). Residual channels are visible on maps as longitudinal depressions in the landscape, due to relative strong compaction of clay and peat in comparison with coarser clastic materials (Berendsen and Stouthamer, 2001). Historical maps were used to give insight in possible dike breach locations, channel diversions, canalization projects and natural displacements of river systems. The latter was used to check the lateral stability of the channel system; a channel with a low migration rate was needed to best represent the spectrum of grain size classes. In our search for coring locations we avoided areas where sedimentation was disturbed by human activities such as agricultural and industrial activities. Moreover, core samples were inspected visually for identification of bioturbation

and soil-forming processes as these could affect the chemical composition of the sediment (Middelkoop, 2000).

4.1.2. Surface samples

Locations of post-industrial sample sites were determined in the field. Prerequisites for these sites included that the material samples was deposited by recent fluvial floods, and that these deposits had not been affected by any external factor with a possible influence on its chemical composition. We thus took care of pollution from industrial activities (waste, cooling water), pollution from external (natural) sources (other attributing rivers, land run-off), agricultural land use, and digging activities (commercial, recreation).

4.2. Sampling sites

In this subchapter sampling sites (cores and surface samples) are presented. An overview of the catchment of the Rhine River including its tributaries sampling locations is found in Figure 4-1.

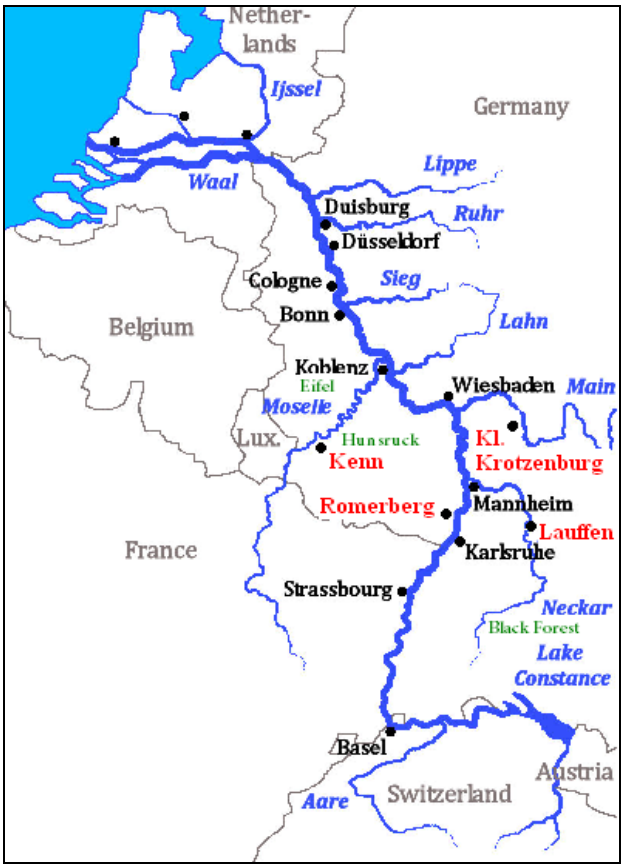

Figure 4-1 Overview of the Rhine River catchment

An overview of the Rhine River, its tributaries (blue) and some major adjacent cities (black) and regions (green). In red are the locations along the main tributaries from which the cores were taken. After Google maps 2011.

4.2.1. Lower Rhine

Close to the Dutch-German border, in between the German towns of Emmerich am Rhein and Xanten, the small town of Bienen is located. Northeast of the present-day path of the Rhine River, two cut-off meanders are located in the subsoil. The Bienener Altrhein, the oldest, has been active from the 14th century A.D. until the Rhine River shifted its course in Western direction (Toonen, 2013). This is when the other palaeochannel, the Grietherother Altrhein, became active (16th century A.D.). The latter remained active until it was artificially cut-off in the 18th century A.D. Due to its proximity to the main channel, the Bienener Altrhein palaeochannel was periodically flood with fluvial sediment from the Rhine River. In the last few centuries, a continuous record of fluvial deposits has been built up in the Bienener Altrhein palaeochannel. A coring was performed at the Bienener Altrhein site (Winkels, 2011; Toonen, 2013).

Figure 4-2 Location of coring site along the Lower Rhine: Bienener Altrhein (Bienen)

Exact location of site Bienener Altrhein (Bienen), Germany. Including present path and palaeochannels of the Rhine River. Source: Google Maps 2011. After Winkels, 2011; Aloserij, 201.

4.2.2. Tributaries

Upper Rhine

Pre-industrial

In the area around Speyer we noticed several cut-off meanders on the map (Figure 4-3). These are of different generations; first there is current Rhine channel, subsequently a first generation meander cut-offs caused by the canalization project, and then a second generation, that have been incised twice, by two new Rhine channel generations. These abandoned meander bends could be dated (relatively) using spatial cross-relations (Berendsen & Stouthamer, 2001). The second generation cut-offs originate from before the canalization project, these meander cut-offs were found at the villages

of Mechtersheim and Binshof, south and north of Speyer. We performed a coring nearby the town of Mechtersheim (Figure 4-3), this location will be referred to as Römerberg.

Post-industrial

Near the village of Römerberg, a recent cut-off meander is located. This has been filled up after the canalization project and therefore we took recent deposits from this location. Sampling sites along the Upper Rhine were located at 465 km, 515 km, 613 km and 655 km along the Rhine River. Exact locations of sampling sites are found in Table 3-2 and Appendix 3.

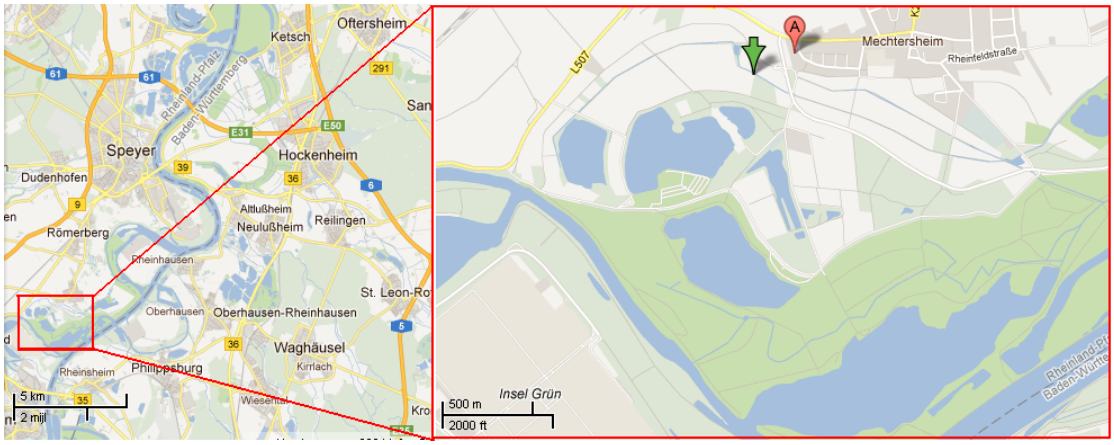

Figure 4-3 Location of coring site along the Upper Rhine: Römerberg.

Exact location (green arrow), Mechtersheim, Römerberg, Speyer, Germany. GPS position: N49 15 49.0 E8 23 12.2. After Google Maps 2011.

Neckar

Pre-industrial

Just to the south of the city of Heilbronn, close to the village of Lauffen am Neckar, a cut-off meander is visible on the map (Figure 4-4). This has been dated to be a Holocene cut-off, which has thus been filled in with floodplain sediment for approximately 6000 years (Hantke, 1993). At this location we performed a coring which can be used to establish a pre-industrial chemical composition signal.

Post-industrial

South of the location mentioned above, we found our coring location of recent deposits. Near the village of Kirchheim a river channel straightening project in the early 19th century took place. After the straightening the cut-off meanders have been filled up with material. From these post-industrial channel fills on the floodplains the post-industrial samples were collected. Sampling sites along the Neckar were located at 311 km, 410 km, and 418 km equivalent to the Rhine River. Exact locations of sampling sites are found in Table 4-2 and Appendix 3.

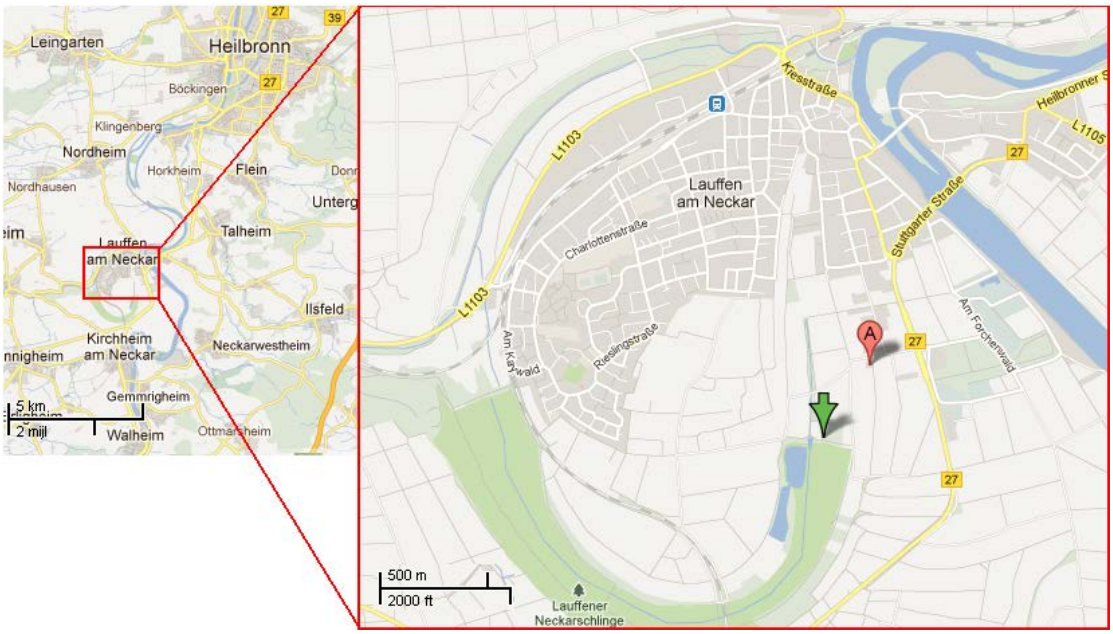

Figure 4-4 Location of coring site along Neckar: Lauffen.

Exact location (green arrow), Lauffen am Neckar, Heilbronn, Germany. GPS position: N49 03 45.0 E9 09 10.5. After Google Maps 2011.

Main

Pre-industrial

As the area around Frankfurt am Main is heavily industrialized, no pre-industrial floodplain deposits were found close to Frankfurt am Main. Therefore, a location had to be found upstream of the industrialized area. Around 50 km upstream of Frankfurt am Main, south of the city of Hanau, we found a palaeo meander (Figure 4-5). The meander shifted to the East, leaving behind remnants of the old meander, which are still visible in the form of a little stream near the village of Klein Krotzenburg. We also found a suitable location west of Frankfurt am Main, Sindlingen, close to Kelsterbach (Figure 4-5).

Post-industrial

On the other side of the Main, nearby the village of Kelsterbach (close to the Rhine-Main Airport) we have found suitable locations to collect post-industrial samples. These were taken from a location parallel to the river stream along an old river channel. Sampling sites along the Main were located at 433 km and 476 km equivalent to the Rhine River. Exact locations of sampling sites are found in Table 4-2 and Appendix 3.

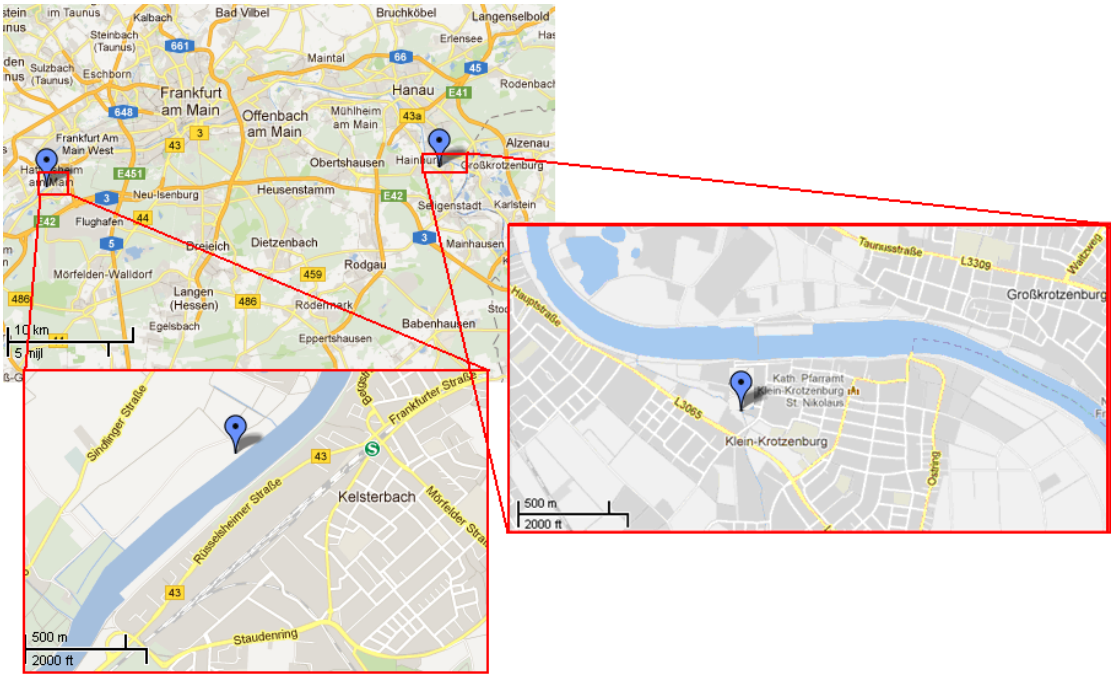

Figure 4-5 Location of coring sites along Main: Sindlingen and Klein Krotzenburg.

Exact locations (blue arrows), (1, left) Sindlingen, West of Frankfurt am Main, Germany. GPS Position: N50 03 45.0 E8 31 11.6. (2, right) Klein Krotzenburg, East of Frankfurt am Main, Germany. GPS position: N50 04 32.1 E8 57 33.6. After Google Maps 2011.

Moselle

Pre-industrial

To be able to find a location to collect Holocene material we looked on geological maps of the Moselle area. As the chemical compositional signal should be specific for the sediment entering the Rhine River at Koblenz, a location close to Koblenz had to be found. However, the only Holocene floodplain deposits that are visible on the geological map, were found close to the city of Kenn (Figure 4-6).

Post-industrial

The floodplains along the lower part of the Moselle are confined in a bedrock valley and the river has been canalized during the last 50 years. We looked for a location close to the mouth of the main at Koblenz (in order to obtain the signal of the complete Moselle), but the possible influence of the backwater of the river Rhine was also taken into account. A location was found somewhat upstream

of Kenn. Sampling sites along the Moselle were located at 412 km and 570 km equivalent to the Rhine River. Exact locations of sampling sites are found in Table 4-2 and Appendix 3.

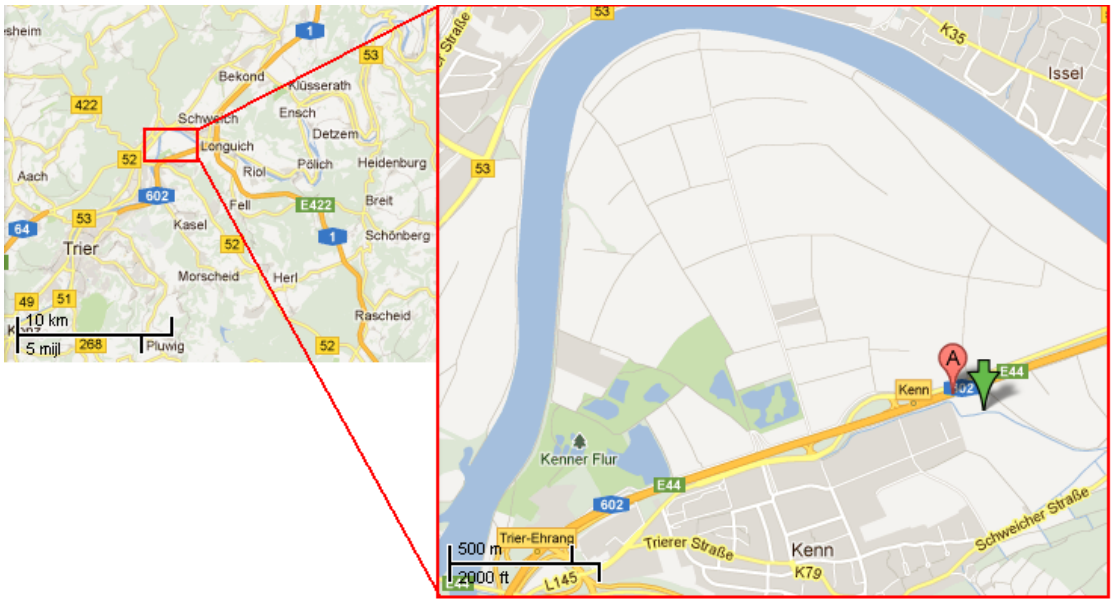

Figure 4-6 Location of coring site along Moselle: Kenn.

Exact location (green arrow), Kenn, North-East of Trier, Germany. GPS position: N49 48 26.3 E6 43 55.8. After Google Maps 2011.

4.3. Sample collection

4.3.1. Corings

The cores were collected using a hand-operated corer which delivers 1 meter long segments of 4.5 cm diameter and they were collected in PVC tubes. Cores were logged in the field; sediment structure, organic matter content, colour, oxidation/reduction zone, carbonate content and plant remains were noted every ten centimetre interval. In the laboratory the core segments were divided into two halves (along the longer axis), logged in detail and photographed. The cores were sealed and packed again and stored in refrigerated storage cells to prevent oxidation of the cores. Both of the sections of each core segment were used; one for grain size analysis, and the other half was transported to the lab of the Aberystwyth University where a XRF scan was performed to retrieve chemical compositional data (chapter 5.1.2).

Lower Rhine site: Bienener Altrhein (Bienen)

In the context of his research about the infill of a cut-off meander of the Rhine River (i.e. Bienener Altrhein palaeochannel), Winkels performed a coring along the Bienener Altrhein (Table 3-1). The core segments were collected with a Bohncke modified piston corer. This coring resulted in a series

of 10 core segments, from now on called Bienen 1 to Bienen 10. In total, the depth covered over 8 meters corresponding to a maximum age of approximately 400 years (Winkels, 2011; Toonen, 2013).

Pre-industrial sites

During a fieldwork campaign (October 2011), cores have been taken at the sites presented in the previous section (Table 4-1). From each of the subcatchments, at least one core was collected with a soil corer. All of the corings resulted in a single core segment with a length of approximately one meter.

4.3.2. Surface samples

Post-industrial sites

Recent depositions are taken along the river channels of the different tributaries (Table 3-1). These samples were taken with an Edelman corer. From each catchment samples are taken from at least two different locations that are not too close to each other. At each location two samples are taken; one from a depth of 10 cm to 20 cm and one of a depth of 20 cm to 30 cm. Samples were collected in a plastic bag to transport them to the lab.

To allow further analysis, the samples were homogenised. First the bulk samples were dried at ambient room temperature and plant remnants were removed. Samples that were too moist were dried in an oven, overnight at 55 ^{o}C. Then, the bulk samples were manually grounded and pulverised in a porcelain mortar. By sieving the samples they were eventually homogenised.

Table 4-1 Overview of the sampling sites (corings)

Site	Location	Catchment Lower Rhine / Tributary	Date of collection (month, year)	Coring depth (cm)
Bienener Altrhein	Bienen	Lower Rhine	June, 2011	156 - 849
Römerberg	Speyer	Upper Rhine	October 2011	148 - 238
Lauffen	Heilbronn	Neckar	October 2011	100 - 190
Sindlingen	Frankfurt (west)	Main	October 2011	120 - 205
Klein Krotzenburg	Frankfurt (east)	Main	October 2011	125 - 215
Kenn	Trier	Moselle	October 2011	10 - 60

Table 4-2 Overview of the samping sites (surface samples)

Site (#)	Setting	Location (exact location (GPS) in Appendix 3)	Catchment (Tributary)	Date of collection (month, year)	Coring depth (cm)
4	Levee	Kenn	Moselle	October 2011	0.10-0.30
5	Pointbar	Kenn	Moselle	October 2011	0.10-0.30
9	Levee	Klein Krotzenburg	Main	October 2011	0.10-0.30
11	Levee/floodplain (high)	Horkheim	Neckar	October 2011	0.10-0.30
12	Levee/floodplain (low)	Horkheim	Neckar	October 2011	0.10-0.30
13	Levee	Edingen/Neckarhausen	Neckar	October 2011	0.10-0.30
14	Floodplain (high)	Mannheim	Neckar	October 2011	0.10-0.30
16	Floodplain (high)	Römerberg	Upper Rhine	October 2011	0.10-0.30
17	Floodplain (low)	Römerberg	Upper Rhine	October 2011	0.10-0.30
18	Palaeochannel	Sindlingen	Main	October 2011	0.10-0.30
19	Floodplain	Rheindürkheim	Upper Rhine	October 2011	0.10-0.30
20	Levee	Rheindürkheim	Upper Rhine	October 2011	0.10-0.30
21	Levee	Ingelheim	Upper Rhine	October 2011	0.10-0.30
22	Levee	Ingelheim	Upper Rhine	October 2011	0.10-0.30
23	Floodplain	Alken	Moselle	October 2011	0.10-0.30
24	Floodplain	Alken	Moselle	October 2011	0.10-0.30
25	Floodplain	Alken	Moselle	October 2011	0.10-0.30
26	Floodplain	Andernach	Upper Rhine	October 2011	0.10-0.30
27	Floodplain (low)	Andernach	Upper Rhine	October 2011	0.10-0.30
28	Levee	Bonn	Upper Rhine	October 2011	0.10-0.30
29	Floodplain (high)	Bonn	Upper Rhine	October 2011	0.10-0.30

5. Laboratory methods and data analysis

5.1. Laboratory methods

5.1.1. Grain size analysis

The cores segments referred to as Bienen 1 to Bienen 10 were collected by Winkels in july 2011 at the Bienener Altrhein location (section 4.3.1). Winkels (2011) made notes of clearly visible transitions and sandy layers within the core segments. Moreover, photographs were taken, which also show the major depositional transitions and some sandy layers could be identified. The results of this visual analysis, including pictures and notes, are found in Appendix 8 and, more extensively, in Winkels (2011).

The Bienen cores were sampled continuously at a semi-regular sample thickness of 1-2 cm's to perform grain size analysis (Winkels, 2011). The upstream cores (Kenn, Klein Krotzenburg, Lauffen, Römerberg and Sindlingen) were sampled with a regular sample thickness of 1 cm per 5 cm. The relative low average sampling resolution can be interpreted in two ways. 1) A constant grain size within the sample results in corresponding mode and average values of the measurement. 2) If the grain size within a sample is not constant (in the case of a sandy layer) mode an average value differ and (minor) sandy layers might not be detected.

Sample intervals were slightly adjusted to correspond with visual flood layering i.e. sandy layers that had been identified during visual analysis were taken into account to be able to separate specific grain size classes in a sample. This was done to avoid the out averaging of grain size results within a sample and obtain an optimal representation of the grain size class for each of the samples. However, during the sampling of the Bienen core segments, Winkels sometimes deviated from the 2 cm sampling interval border instead of sticking to the continuous sampling, without notifying this. Therefore, the exact borders of the sample interval are not always known. The post-industrial samples have been sampled from homogenized material; each sample thus represents a depth of 10 cm.

Before grain size analysis was performed all samples were pre-treated, i.e. all non-siliclastic particles that could affect grain size measurements (e.g. plant or root remains), were removed from the sample (Konert and Vandenberghe, 1997). Organic matter was removed from the samples by adding 10 ml 30% H_2O_2 solution. All carbonates and other ions were removed from the sample by adding 5 ml of 10% HCl solution and boiling the mixture. Flocculates, caused by cohesiveness were separated by adding 300 mgs natriumpyrophosphate ($Na_4P_2O_7 \cdot 10H_2O$).

Grain size was measured using laser diffraction analysis. This method is based on the correlation between (1) the angle of light scattered by particles under influence of a laser beam and

(2) the size distribution of these particles (Jonkers et al., 2009). Based on available time and budget, grain size analysis was performed on 2 cm resolution average.

Grain size analysis was carried out in the lab of the Vrije Universiteit in Amsterdam. Particle size distributions of suspended sediment samples in the range between 0.15 μm and 2000 μm were measured in 56 bins by the HELOS KR (Sympatec) Laser Particle Sizer (LPS) (Jonkers et al, 2009; Witt et al., 2010). Results of the analysis were grouped in a series of logarithmically spaced grain size distribution classes for each of the samples.

5.1.2. Chemical composition analysis

XRF core scanning

All cores were scanned at Aberystwyth University in Wales (UK) using an Itrax XRF scanner (Croudace et al, 2006). X-Ray Fluorescence (XRF) core scanning is a non-destructive characterization of sediment sequences that can be used for material from lacustrine environments (Jenkins & De Vries, 1970; Croudace et al, 2006; Richter et al, 2006). It provides high resolution information about changes in the chemical composition of a core by creating an elemental profile with a range from Aluminium (^{13}Al) to Uranium (^{92}U). Although the quality of elemental data resulting from the scan mainly depends on the quality of the sample, the scanner provides a detailed relative log of the chemical composition of the core.

Under the influence of incoming X-ray radiation, an electron from an inner atom shell is ejected. This results in a vacancy which is filled by an electron falling back from an outer shell. The energy difference between the inner and the outer shell is emitted as electromagnetic radiation, the latter can be detected by the XRF core scanner. Each element has a characteristic wavelength of this emitted radiation, and the amplitudes of the peaks in the detected XRF-spectrum are proportional to the concentration of the elements in the range between Aluminium (^{13}Al) to Uranium (^{92}U) (Croudace et al, 2006; Richter et al, 2006; Jones et al., 2009, 2010).

The XRF scanner performs a continuous XRF analysis on the surface of a split sediment core. Before inserting the core into the scanner, the surface of the core was cleaned and smoothened. Any visible cracks and holes were logged. Before the actual scan, the core was covered with micro-film to prevent desiccation (Lamb et al., 2005; Croudace et al, 2006). All cores were scanned using a molybdenum tube set, the preset voltage was 60 kV and the current varied between 40 mA and 50 mA. Based on available time and budget the scan resolution was either 500 μm or 1000 μm. For the all the Bienen cores, we used a XRF exposure time of 200 ms and a dwelling time of 30 s. Specific (optimal) XRF scan settings varied per core and are reported in Appendix 11. As starting and ending points of the measurements were put in manually, minor shifts in the depth output of the scanned core segments could occur.

Handheld XRF surface samples scanning

To identify the chemical composition of the surface samples, we used a handheld XRF scanning device. Although this device, provided by and operated at the Aberystwyth University, performs a scan on fewer elements, measures the concentration of several elements in the bulk samples. The handheld XRF scan detects the following elements; Sb, Sn, Cd, Ag, Sr, Rb, Pb, Se, As, Hg, Zn, Cu, Ni, Co, Fe, Mn and Cr. The output of the scan is an elemental count for each of these elements in parts per million (ppm). Cores were scanned by hand, applying a scanning time of at least 100 seconds to ensure all elements were detected and to minimize the error percentage of the scans. As these error percentages are relatively stable for each of the elements, a mean error percentage was calculated to determine the usability of the elements. Moreover, the duration of the scan is listed for each of the scans.

5.2. Data Analysis

In order to answer our research questions, a series of analytical steps was performed on the data obtained by grain size analysis and chemical composition analysis (Fig. 5-1). First, the grain size data were combined with historical data to identify flood events in the grain size data. Chemical composition data were normalized, to filter all scan-specific variations, and bulked, to equalize the resolution with that of the grain size data. The normalized and bulked data were combined with previous research to obtain element ratios that were usable to acquire information on grain size. This chemical proxy was consequently used for the first objective; i.e. to identify flood events in grain size data and chemical composition data.

Moreover, the chemical proxy was used to correspond the grain size data set with the chemical composition data set. Subsequently, the correlation of aluminium (^{13}Al) with the clay fraction was tested for its suitability as corrector for the clay content. Also, a series of correlation matrices were set up to acquire information for possible application of additional statistical methods.

Chemical composition data from the subcatchments (cores and surface samples) were used to setup characteristic fingerprints for each of the subcatchments. Also, the chemical proxy was used to obtain the chemical composition of the selected flood deposits from the chemical composition data set. Subsequently the results of the previous objectives were combined to trace the (mixed) origin of Lower Rhine flood events.

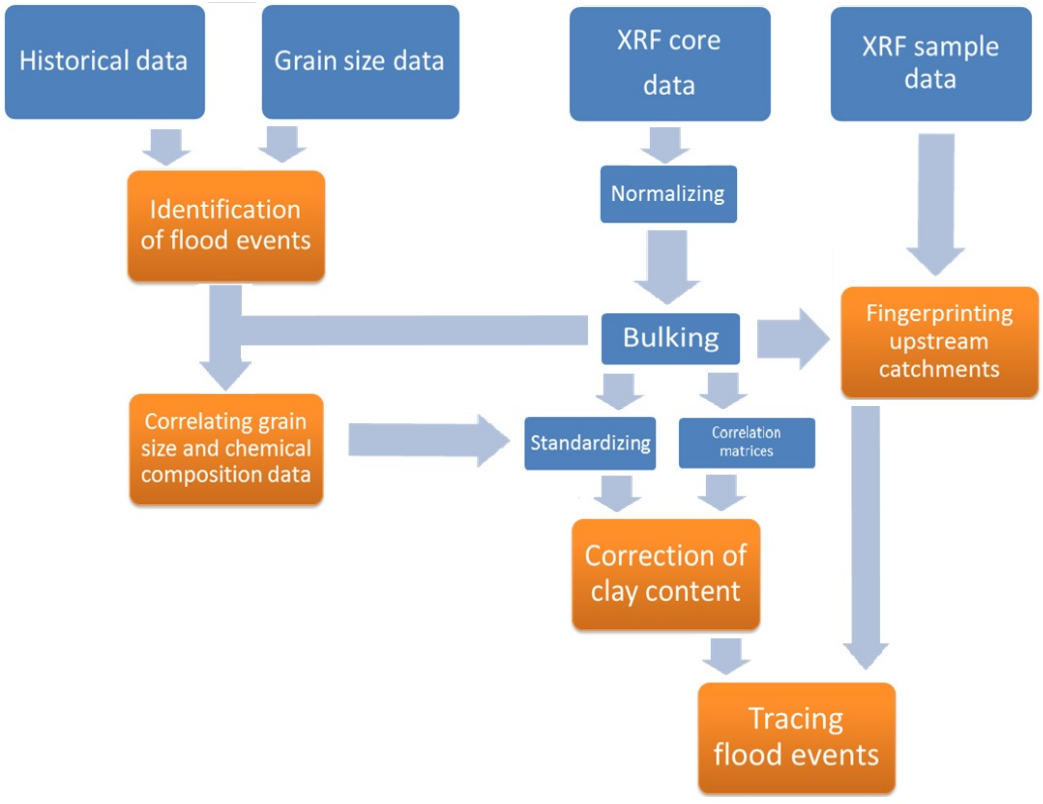

Figure 5-1. Schematic overview of analytical methods used in this study.

5.2.1. Grain size data

The distribution classes resulting from the analysis were bulked to five classes, representing the sand fraction (63 - 2000 μm), the silt fraction (8 - 63 μm), and the clay fraction (subdivided into three classes, < 2 μm, < 4 μm, and < 8 μm). In addition, the 95th percentile (P95) value was calculated for each of the samples (Aloserij, 2013; Toonen, 2013). To enable analysis of the grain size data, grain size distributions of each of the samples were combined to assemble a continuous grain size depth profile. Due to human interference close to the sample location (the construction of a sluice and input of coarse-grained sands), the data retrieved from the upper part of the coring (Bienen 1 and Bienen 2) were not used in this analysis (Winkels, 2011; Aloserij, 2013). Furthermore, because separate core segments might have shrunk or expanded (due to compaction by drilling, transport or storage) causing discontinuities in the sample depth, sample depths were converted to real depth to form a continuous record of all the Bienen cores. In this conversion, it was assumed that the maximum depth of individual core segments resemble true depth, and that the core record was continuous. This way the length of (some) core segments was extended or reduced to fit the contiguous core segment, i.e. the real depth of the deepest point of the contiguous core segment.

From these data flood events were identified from peaks in the sandy grain size classes and higher P95 values. Subsequently, previous theses were used to verify these identified flood events in order to date the flood events. Toonen (2013) used historic sources to identify flood events. However, these data can be incomplete (due to varying source material) and the source of flood events is mostly not known. Aloserij (2013) verified whether these flood events had an upstream origin instead of being caused by local impacts (i.e. the collapse of ice dams or failure of river embankments). This was done by comparing two lower Rhine cores and identifying identical flood events in both cores (Aloserij, 2013). Only the most extreme floods were selected as these events are easier to recognize in distal floodplains, based on the fact that the coarse material and the amount of coarse material in these floods is relatively high.

5.2.2. Chemical composition data

Normalizing elemental data

The XRF core scanner provides counts for each of the elements. The amount of scattering is measured for each sampling point and each element in terms of coherent and incoherent scattering; to account for changes in water content and sediment density, this count-to-scatter ratio is calculated (personal communication with Rassner). To filter the scattering, measurement results had to be normalized by dividing elemental counts by the sum of the corresponding coherent and incoherent counts of molybdenum (a molybdenum tube set was used, see section 4.1.3).

Bulking XRF data

To compare grain size data with chemical composition data (see section 4.2.3), the data have to be uniform in resolution. This is not the case for the data resulting from the different analytical methods; the resolution of the grain size data is 1 cm to 5 cm while the resolution of the chemical composition data is 500 µm or 1000 µm. To set up a combined data set throughout the depth of the cores, the chemical composition data was bulked (continuously) by averaging a consecutive series of chemical composition data points to obtain a resolution that matches with the resolution of the grain size data.

5.2.3. Correlating grain size data and chemical composition data

Chemical proxy for grain size

Previous literature indicates that there are some elements that correlate with certain classes of the grain size of sediment. Previous research indicates that the Zr/Rb ratio can be exploited to acquire information on grain size (Dybvyk and Harris, 2001; Kylander et al., 2011). Zirconium (Zr) is an element that is associated with the relatively coarse grained fraction of sediments (Dypvyk and Harris, 2001). Consequently, the Zr counts can be used as an indicator of the abundance of relatively coarse grained sediment. Rubidium (Rb) on the other hand, shows a positive correlation with fine grained sediments (Dypvyk and Harris, 2001). Rb is normally associated with claystones and siltstones. Therefore Rb can be used as an indicator of the amount of fine grained sediment. Other ratios of elements that can be used to acquire grain size information are the Zr/Ti ratio (Oldfield et al., 2003) and some ratios based on Al, which is supposed to correlate with fine grained sediment and several elements that correlate well with coarse grained sediment (i.e. Si/Al, Ti/Al, and Zr/Al) (Calvert et al., 1996; Schneider et al., 1997; Calvert et al., 2001).

Correlating grain size and chemical composition

After normalizing, bulking and standardizing the chemical composition data were used to calculate the Zr/Rb ratio and other ratios (Zr/Ti, Si/Al, Ti/Al and Zr/Al). For each of the core segments, these ratios were compared with different cumulative grain size classes. For all of these classes the correlation coefficients were calculated. In some cases, results from the grain size analysis and ratios showed similar patterns, although the exact position of the peaks were slightly shifted. In these cases the correlation was improved by applying a minor shift to the depths of the chemical proxy ratio. Subsequently correlation coefficients were calculated for the corrected (i.e. shifted) matched depths.

5.2.4. Correction of the clay content

Correlation matrices

Set of elements that are associated with each other, can be used as an indicator for changes in grain size. To quantify the strength of association between sets of elements, correlation matrices were constructed using the data analysis tool of Microsoft Excel 2010. Sets of elements that are associated well, can be used in statistical methods (linear regression, principal component analysis) to unravel the contribution of a component . Although the XRF scans were standardized, XRF scan settings vary per core segment (due to varying settings). Therefore a separate correlation matrix was constructed for each of the core segments. We made a selection of ten elements of interest for this research, including Si, K, Ca, Ti, Mn, Fe, Rb, Sr, Zr and Pb.

Al-standardizing chemical composition data

To correct the chemical composition data for the variation in clay content, the correlation of ^{13}Al with the clay fraction was tested. Correlation coefficients of ^{13}Al were calculated with the clayey grain size classes (< 2 µm, < 4 µm, and < 8 µm). Correcting the elemental counts for the clay content was done by dividing the elemental count of each sampling point by the corresponding ^{13}Al count. We applied the same standardizing method on the subcatchment cores, to enable a comparison between the elemental counts of all core segments.

5.2.5. Characterizing subcatchments

The next part of the analysis involved the determination of the chemical composition of the subcatchments. The normalized and standardized elemental data of the upstream cores were used to find the chemical characteristics of each of the subcatchment source areas. The elements of the post-industrial samples that exceeded the average error percentage 15 %, were excluded. For each element a catchment-propagation graph was constructed to create a visual overview of the occurrence of these elements throughout the catchment.

Subsequently the data of the cores and the surface samples were used to set up a characteristic fingerprint for each of the subcatchments. To enable a combination of these two data sets, a set of elements was selected that was detected in both the cores and the surface samples. Elements that are sensitive to horizontal or vertical displacements and soil conditions were excluded from this selection. The remaining set of elements was used to identify the origin (source area) of certain downstream (flood event) depositions (i.e. fingerprinting). For each subcatchment a fingerprint was constructed by averaging the elemental occurrence in the pre-industrial core (i.e. throughout depth), and averaging the elemental occurrence of the surface samples.

To be able to use a set of fingerprints to provide information on the relative contribution of potential sediment sources to the sediment deposited of an downstream river, there are three main requirements (Walling et al, 1993);

1. Fingerprints should reflect environmental control and are capable of discriminating potential sediment sources.
2. The selection of fingerprints needs to be statistically tested to confirm that individual sediment sources can be distinguished by their fingerprint(s).
3. A system needs to be developed that is capable of comparing the composition of downstream deposited sediment with the fingerprints of potential upstream sources. This system should also be able to provide an estimate of the relative contributions of those sources.

5.2.6. Tracing flood origin

By linking the peaks in grain size data with flood events, we identified the flood events in the grain size data (5.2.1). Taking into account the shifts that were needed to fit the grain size data with the chemical composition data, the chemical proxy was used to identify the flood events within the chemical composition data (5.2.3). These correlations were used to determine the chemical composition of the flood events. In this process we have only used the flood events that were dated to the same year at which we had identified peaks in our proxy abundance plots. As a consequence, we have only used those of the floods that were recognized with the chemical proxy data.

6. Results and discussion

6.1. Identification of flood events

Figure 5-1 provides plots of the cumulative silt and sand fraction and the P95 plotted against the converted (real) depth for each of the core segments. Appendix 1 provides the raw grain size data and raw XRF data for each of the Bienener Althrein core segments. Below, the processed grain size data are discussed for each of the core segments. Based on the percentage of the sandy fraction, or based on an excessive sum of the silt and sand fraction, layers were identified as a sandy layers. The relative low grain size sampling resolution (4.1.2) and in some cases the unnotified varying sampling interval borders (4.1.2) , can cause some sandy layers (flood events) to remain unidentified.

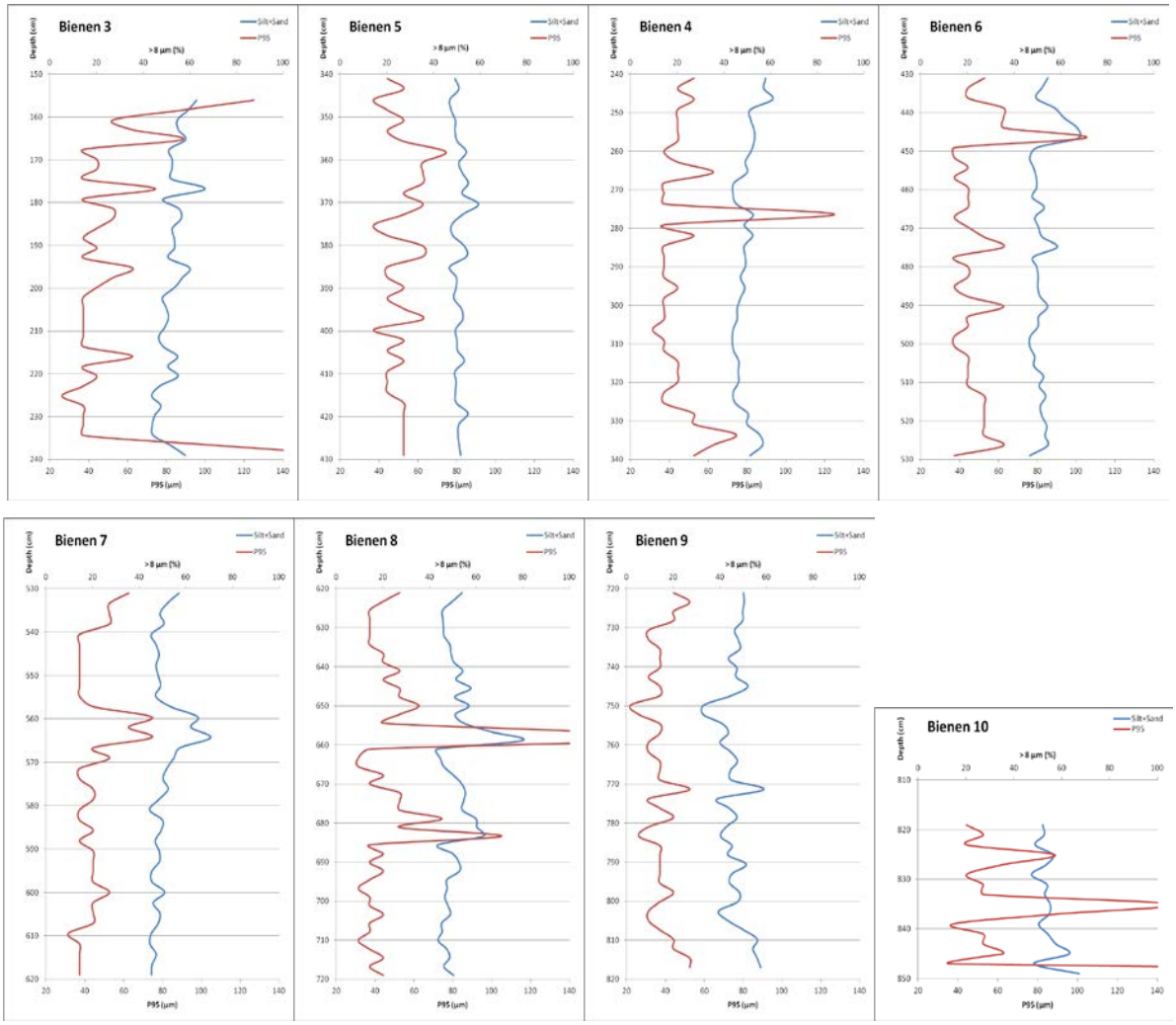

Figure 6-1 Depth plots of Bienener Altrhein core segments 3-10.

Vertical axis represents depth (cm) throughout the core. Horizontal axis represents silt+sand fraction (%, upper axis, blue) and P95 (µm, lower axis, red).

Bienen 3

The original depth of Bienen 3 was 167 cm to 239 cm, we converted these to a real depth of 156 cm to 239 cm. Due to a partial collapse of the coring hole, the sandy upper part (3-4 cm) is not representative. Sandy layers were found at 165 cm, 177 cm, 184 cm, 195 cm, 198 cm, 216 cm, 221 cm and 239 cm.

Bienen 4

The original depth of 267 cm to 339 cm was converted to a real depth of 241 cm to 339 cm. Sandy layers were found at 246 cm, 266 cm, 276 cm, 282 cm, 320 cm. Moreover, two areas were identified as sandy, the first in between 298 cm and 304 cm and the other at the bottom of the core, from 331 cm to 339 cm.

Bienen 5

The original depth of 357 cm to 429 cm was converted to a real depth of 341 cm to 357 cm. Sandy layers were found at 370 cm, 383 cm and 429 cm.

Bienen 6

The original depth of 453 cm to 529 cm was converted to a real depth of 431 cm to 529 cm. We found a relative high average percentage of the sand fraction compared to the other cores. Sandy layers were distinguished at 444 cm to 446 cm, 465 cm, 475 cm, 490 cm and 526 cm.

Bienen 7

The original depth of 545 cm to 619 cm was converted to a real depth of 531 cm to 619 cm. Sandy layers could be distinguished and were found at 560 cm, 564 cm, 576 cm, 600 cm.

Bienen 8

The original depth of 631 cm to 719 cm was converted to a real depth of 621 cm to 719 cm. Sandy layers were found at 645 cm, 650 cm, 659 cm and between 679 cm and 683 cm.

Bienen 9

The original depth of 737 cm to 817 cm was converted to a real depth of 721 cm to 817 cm. We found a relative low average percentage of the sand fraction compared to the other cores. Sandy layers were distinguished at 745 cm, 771 cm, 791 cm and 810 cm.

Bienen 10

The Bienen 10 core was not converted as the original and real depth corresponded, i.e. they were both 819 cm to 849 cm. We found a relative high average percentage of the sand fraction compared to the other cores. No real sandy layers were distinguished, but grain size increased with depth. At the bottom of the core grain size increased rapidly due to coarser sands on which the coring ended.

6.1.1. Selected flood events

The results from Aloserij (2013) were used to link extreme flood events (known from historical flood data) with peaks in the grain size data. Ten major flood events were selected (based on grain size data) from the Bienener Altrhein core segments. Table 6-1 provides an overview of these flood events, their corresponding (cumulative) grain size classes (including sand and silt + sand) and the dates of these flood events.

Table 6-1 Correlation of extreme flood events.

Extreme flood events (based on historical flood data) were correlated with grain size data throughout depth (based on Aloserij, 2013).

Depth (real, cm)	Sand (%)	Silt + Sand (%)	Historical flood data (year A.D.)
156	15.13	62.92	1882/1883
239	15.75	57.95	1850
276	13.69	52.53	1845
446	12.63	67.90	1784
560	7.83	65.04	1729
564	8.48	70.58	1726
659	50.39	79.71	1682
683	16.32	63.03	1671
825	8.48	56.36	1608
835	9.21	55.17	1602

6.1.2. Upstream Rhine cores

Appendix 9 provides the results of the upstream Rhine cores. The sampling resolution of the upstream Rhine cores was 5 cm, which does not allow us to analyze these data in detail. Due to varying floodplain settings (e.g. distance to active river channel) and different core depths average sand fractions varied per subcatchment core. In the Upper Rhine core (Römerberg, 148-238 cm) the sand fraction varies between 40 to 60 percent. The sand fraction remains stable throughout the core, sandy areas were identified around 150 cm, 185 cm and 230 cm. In the Neckar core (Lauffen, 100-190 cm) the sand fraction varies between 70 to 90 percent. The sand fraction increases with depth, a sandy area was identified around 125 cm. In the first Main core (Sindlingen, 120-205 cm) the sand fraction varies between 60 to 80 percent. The sand fraction remains stable throughout the core, a sandy area was identified around 170 cm. In the other Main core (Klein Krotzenburg, 125-215 cm) the sand fraction varies between 50 to 80 percent. The sand fraction remains stable throughout the core, sandy areas were identified around 135 cm, 150 cm and 160 cm. In the Moselle core (Kenn, 10-

60 cm) the sand fraction varies between 40 to 60 percent. The sand fraction decreases with depth, a sandy area was identified around 15 cm.

6.1.3. Discussion

A series of flood events was identified throughout the Bienen coring. However probably not all sandy layers were detected during visual and grain size analysis. Limiting factors as the relative low grain size sampling resolution and unnotified varying sampling interval borders might have caused some minor sandy layers to remain undetected. However, the major sandy layers were identified. The focus of this study is not on the construction of a detailed framework of flood events, in the next part of this research the major sandy layers are used to find a relation with chemical composition data.

6.2. Correlating grain size and chemical composition data

6.2.1. Normalized chemical composition data

Appendix 1 (raw data) and Appendix 2 (selected elements) provide the normalized elemental data for each of the Bienen core segments. These data include the normalized elemental counts at each depth, for the elemental range between Al and Pb. Zr counts vary between 0.040 and 0.060 for all the Bienen core segments and remain stable. Peaks in the Zr counts were identified at 179 cm, 184 cm and 232 cm (Bienen 3), 405 cm (Bienen 5), 441 and 446 cm (Bienen 6), 585 cm (Bienen 7), 663 cm, 674 cm and 681 cm (Bienen 8), 750 cm, 771 cm, and 810 cm (Bienen 9), and 829 cm and 845 cm (Bienen 10). Rb counts vary between 0.030 and 0.040 and remain stable. No peaks were identified in the Rb counts. The continuous record of the combined Bienen core segments does not show any trends. The records of the elemental counts of the combined Bienen core segments are not continuous, each of the separate core segments can be identified in the plots of most of the elemental counts.

6.2.2. Chemical proxy for grain size

Appendix 1 provides comparative data for each of the proposed chemical proxies. For each of the Bienen core segments an overview is given of the correlation coefficients (Zr/Rb, Si/Al, Ti/Al, Zr/Al, and Zr/Ti) with varying grain size classes (> 8 µm, > 16 µm, > 32 µm, and > 64 µm). In some cases a (partial) shift was needed to correlate the grain size data with the chemical composition data. Correlation coefficients were highest (overall > 0.7) with the Zr/Rb ratio in each of the core segments. In most cases there also was a mediocre correlation coefficient (0.3-0.6) with the Zr/Ti ratio. The other proposed chemical proxies had low correlation coefficients with grain size classess and are therefore not usable as a proxy. Due to its high correlation coefficient with particular grain size classes, the Zr/Rb ratio is the most suitable chemical proxy.

6.2.3. Bienen core segments

Appendix 8 provides the comparative data for the Bienen core segments, i.e. the combined plots of the Zr/Rb ratio and the grain size fractions.

Bienen 3

The basis plots of Bienen 3 core segment (Figure 6-2) of the Zr/Rb ratio and the > 8 µm grain size class look similar; peak areas do correspond and the overall trend throughout depth is similar. However when we take a closer look, we find that although the peak show a similar pattern, they are not at the exact same position. The first grain size peak, at 165 cm, has no corresponding Zr/Rb ratio peak. The pattern of the grain size peaks at 177 cm, 184 cm and 195 cm have a corresponding pattern in the Zr/Rb ratio plot. However, these peaks are slightly shifted. The same goes for the grain size peaks at 216 cm and 221 cm, this pattern of peaks, although slightly shifted, is also found in the Zr/Rb ratio plot. The Zr/Rb ratio peak at 233 cm is not found in the grain size plot.

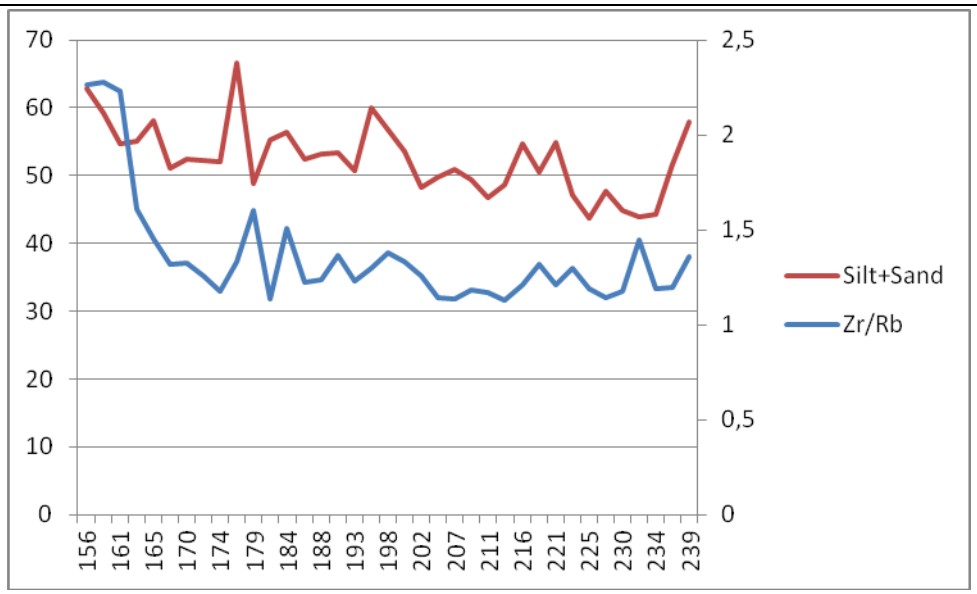

Figure 6-2 Basic correlation plots of Bienen 3

Horizontal axis represents depth (cm), vertical axis represents Silt+Sand (%) and Zr/Rb ratio.

Although the distribution of peaks in both the grain size and the Zr/Rb ratio plots show a similar pattern, the exact position of the peaks are slightly shifted. Therefore all data points were shifted to a new depth, that of 1 cm less deep than the original depth.

Table 6-2 Correlation matrix for Bienen 3. Original and shifted data.

	>8um	>16um	>32um	>64um
Original	0,461224	0,539429	0,578639	0,539442
Shifted	0,644679	0,723982	0,805674	0,834349

Table 6-2 shows the correlation matrix of the different grain size fractions with the Zr/Rb ratio for the shifted data. Although the correlation of the Zr/Rb ratio goes best (r = 0.83) with the coarsest class (> 64 µm), there is a good correlation with all the selected fraction classes. The correlations increase with increasing particle size.

Bienen 4

The basic plots of the Bienen 4 core segment (Figure 6-3) show a similar pattern. Although the peak in the upper part of the core does not correspond, the same trend is visible in both plots. In the bottom of the core (310 cm – 339 cm) the two plots do correspond. The grain size peaks at 246 cm, 276 cm and 282 cm are not found in the Zr/Rb ratio plot. The Zr/Rb ratio peaks at 252 cm and 268 cm are not visible in the grain size plot. The bottom part shows a similar pattern in both of the plots. Overall there is a similar trend, the plots do not correspond well in the upper part whereas they do correspond in the bottom part of the core. Relative to each other, there is no shift that can be applied in order to improve the fit of the two plots.

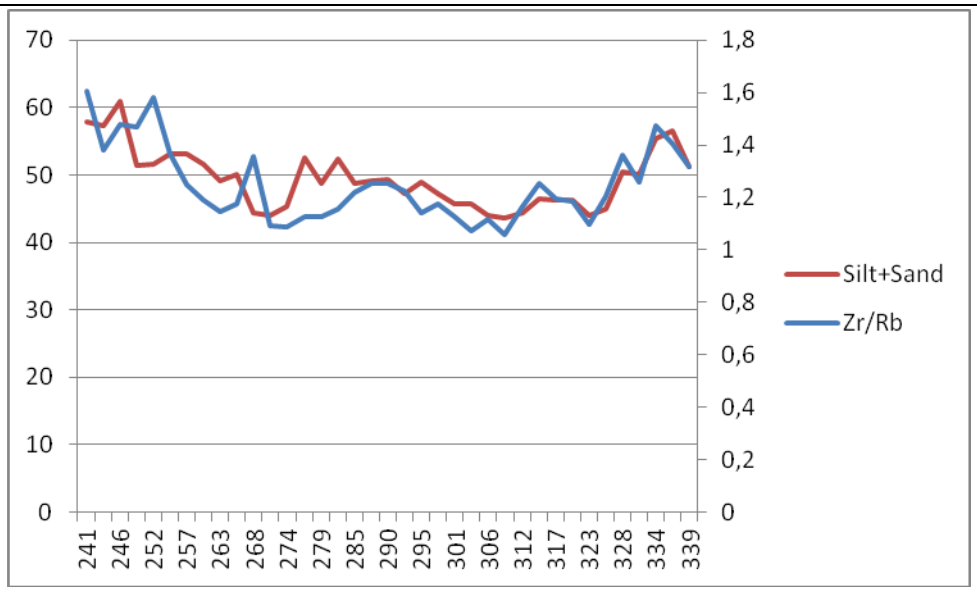

Figure 6-3 Basic correlation plots of Bienen 4

Horizontal axis represents depth (cm), vertical axis represents Silt+Sand (%) and Zr/Rb ratio.

Table 6-3 Correlation matrix for Bienen 4.

	>8um	>16um	>32um	>64um
Original	0,717176	0,700221	0,553047	0,110655

Table 6-3 shows the correlation matrix of the different grain size fractions with the Zr/Rb ratio. The correlation of the Zr/Rb ratio with the class > 8 µm is good (r = 0.72). However, the correlation with the coarsest particle size class (> 64 µm) is rather weak (r = 0.11).

Bienen 5

The basic plots of the Bienen 5 core segment (Figure 6-4) show a similar pattern, except for the extreme Zr/Rb ratio peak at 405 cm which is not visible in the grain size plot. The upper part of the Bienen 5 core shows a similar pattern for both of the plots. Peaks in the grain size data at 358 cm, 370 cm and 383 cm, have their equivalents in the Zr/Rb ratio plot. The extreme Zr/Rb ratio peak at 405 cm is not visible in the grain size plot. The correlations decrease with increasing particle size.

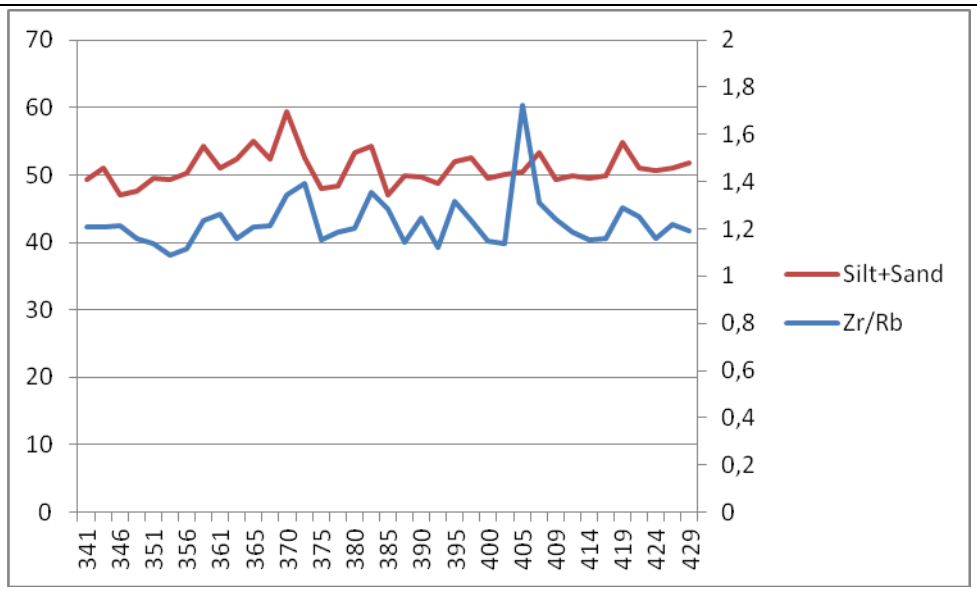

Figure 6-4 Basic correlation plots of Bienen 5

Horizontal axis represents depth (cm), vertical axis represents Silt+Sand (%) and Zr/Rb ratio.

Although the distribution of peaks in both the grain size and the Zr/Rb ratio plots show a similar pattern, the exact position of the peaks are slightly shifted in the upper part of the core segment. For this part (341 cm – 385 cm) a shift of the Zr/Rb ratio data would fit the peak areas of the plots. For this part we recalibrated the Zr/Rb ratio data; these data points are allocated to a new depth, that of 1 cm less deep than the original depth. However, the lower part still does not fit well. This is probably due to the Zr/Rb ratio peak at 405 cm which lacks in the grain size plot.

Table 6-4 Correlation matrix for Bienen 5. Original, shifted and upper part data.

	>8um	>16um	>32um	>64um
Original	0,322911	0,323142	0,276425	0,197411
Shifted	0,319491	0,310755	0,323192	0,361464
Upper part (shifted)	0,731762	0,703849	0,692514	0,581068

Table 6-4 shows the correlation matrix of the different grain size fractions with the Zr/Rb ratio for the shifted data. The correlation values are only based on the upper part of the core segment (341 cm – 385 cm). Although the correlation of the Zr/Rb ratio with the class > 8 µm is good (r = 0.73), there also is a good correlation with the > 16 µm and > 32 µm classes. In the lower part of the core segment, the correlations are weak. The original correlations are weak (r < 0.33) and decrease with increasing particle size for the original. The correlations for the Upper part remain stable (variation < 0.05) with varying particle size.

Bienen 6

The basic plots of the Bienen 6 core segment (Figure 6-5) show a similar pattern. An equal trend is visible in both plots and the peak areas of the two plots do correspond well. The grain size peak area around 446 cm corresponds with the peak area in the Zr/Rb ratio plot. Moreover, the other peaks (around 465 cm, 475 cm, and 490 cm) are found at equal depths in both of the plots. The only area that corresponds less perfectly between the two plots, is the bottom 5 cms. No shift was needed to improve the fit of the two plots.

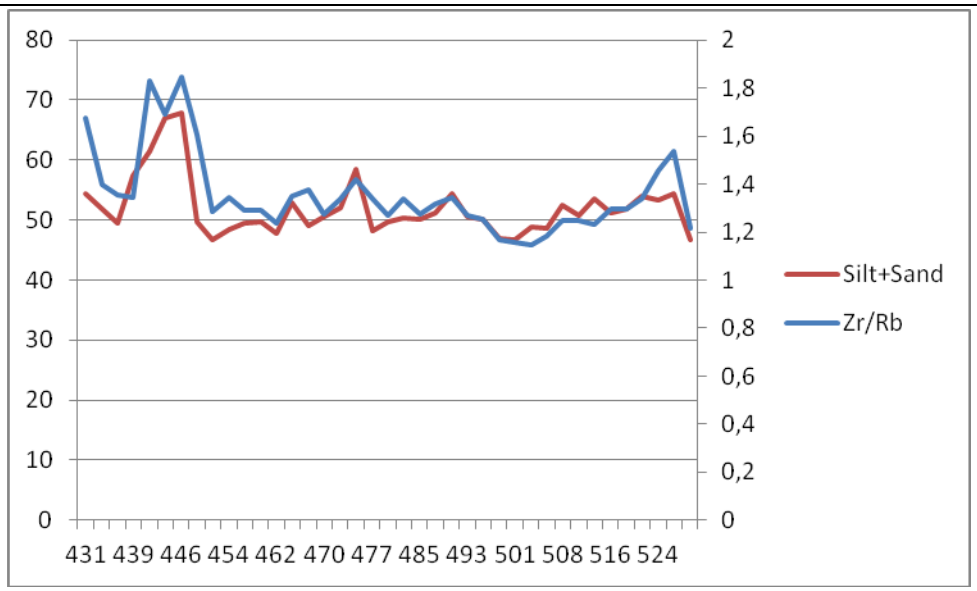

Figure 6-5 Basic correlation plots of Bienen 6

Horizontal axis represents depth (cm), vertical axis represents Silt+Sand (%) and Zr/Rb ratio.

Table 6-5 Correlation matrix for Bienen 6.

	>8um	>16um	>32um	>64um
Original	0,786676	0,759489	0,73804	0,696085

Table 6-5 shows the correlation matrix of the different grain size fractions with the Zr/Rb ratio. The correlation of the Zr/Rb ratio goes best (r = 0.79) with the class > 8 µm. The correlation with the > 16 µm class and the > 32 µm class are also quite good (r = 0.76 and r = 0.74). The correlations decrease with increasing particle size.

Bienen 7

The basic plots of the Bienen 7 core segment (Figure 6-6) of the Zr/Rb ratio and the > 8 µm class look similar; peak areas are corresponding and the overall trend throughout depth is similar. All peaks are found in both the grain size and the Zr/Rb ratio plots, although sometimes minor shifts are visible. No shift was applied to improve the fit of the two plots.

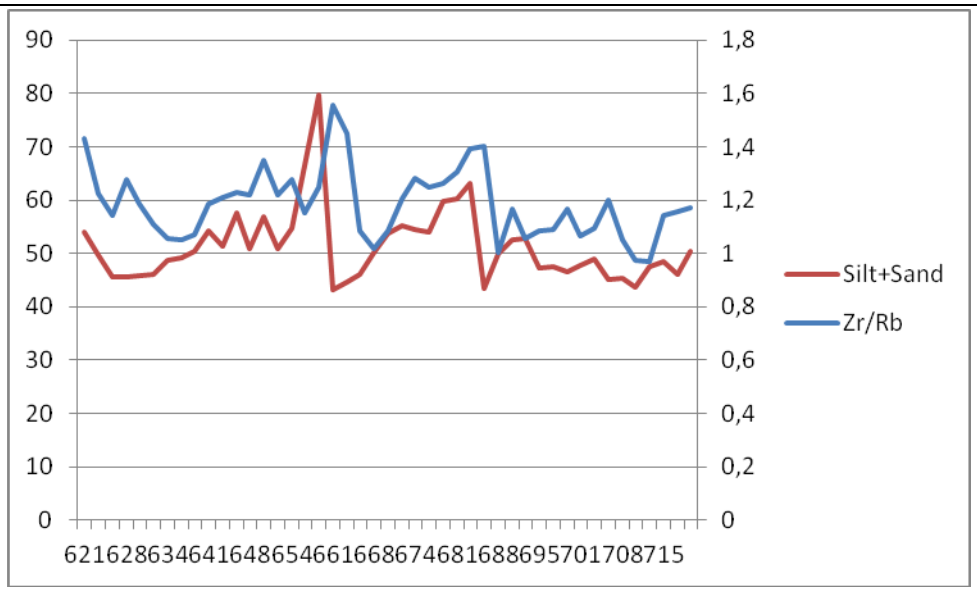

Figure 6-6 Basic correlation plots of Bienen 7

Horizontal axis represents depth (cm), vertical axis represents Silt+Sand (%) and Zr/Rb ratio.

Table 6-6 Correlation matrix for Bienen 7.

	>8um	>16um	>32um	>64um
Original	0,888924	0,918979	0,898392	0,847635

Table 6-6 shows the correlation matrix of the different grain size fractions with the Zr/Rb ratio. The correlation of the Zr/Rb ratio goes best (r = 0.92) with the class > 16 µm. The correlation with the > 8 µm class and the > 32 µm class is also good (r = 0.89 and r = 0.90). The correlations slightly decrease with increasing particle size.

Bienen 8

The basis plots of the Bienen 8 core segment (Figure 6-7) of the Zr/Rb ratio and the > 8 µm class show a similar overall trend and pattern of peak areas throughout depth. However, none of the peak areas are at the exact same depth, they are all shifted. The two major grain size peaks, at 659 cm and at 683 cm both correspond with a slightly shifted Zr/Rb ratio peak. The same shift can be applied to the general pattern of grain size peaks to fit the corresponding Zr/Rb ratio plot.

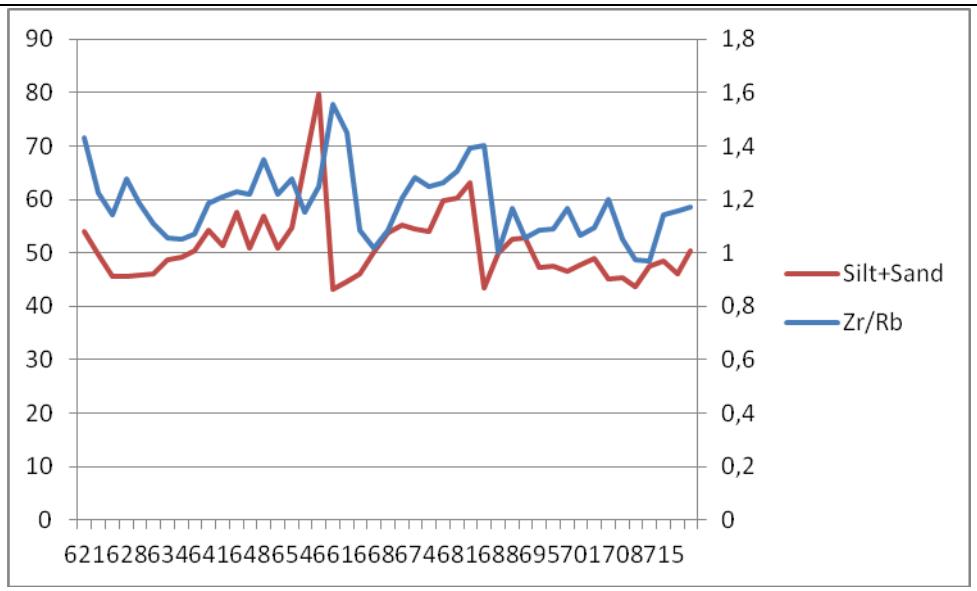

Figure 6-7 Basic correlation plots of Bienen 8

Horizontal axis represents depth (cm), vertical axis represents Silt+Sand (%) and Zr/Rb ratio.

A shift was applied to fit the peak area of the plots. Therefore we recalibrated the Zr/Rb ratio data; all data points are allocated to a new depth, that of 1 cm less deep than the original depth.

Table 6-7 Correlation matrix for Bienen 8. Original and shifted data.

	>8um	>16um	>32um	>64um
Original	0,19721	0,242569	0,227442	0,154496
Shifted	0,667298	0,706786	0,676712	0,581338

Table 5-6 shows the correlation matrix of the different grain size fractions with the Zr/Rb ratio after we performed the recalibration. The correlation of the Zr/Rb ratio goes best (r = 0.71) with the class > 16 µm. The correlations decrease with increasing particle size.

Bienen 9

The basic plots of the Bienen 9 core segment (Figure 6-8) show a similar pattern, although some grain size peak areas (at 745 cm and 791 cm) are dislocated (shifted). The grain size peak at 771 cm and the majority of the minor peaks do correspond quite well with the Zr/Rb ratio plot. However, the Zr/Rb ratio peak at 783 cm does not have its equivalent in the grain size plot.

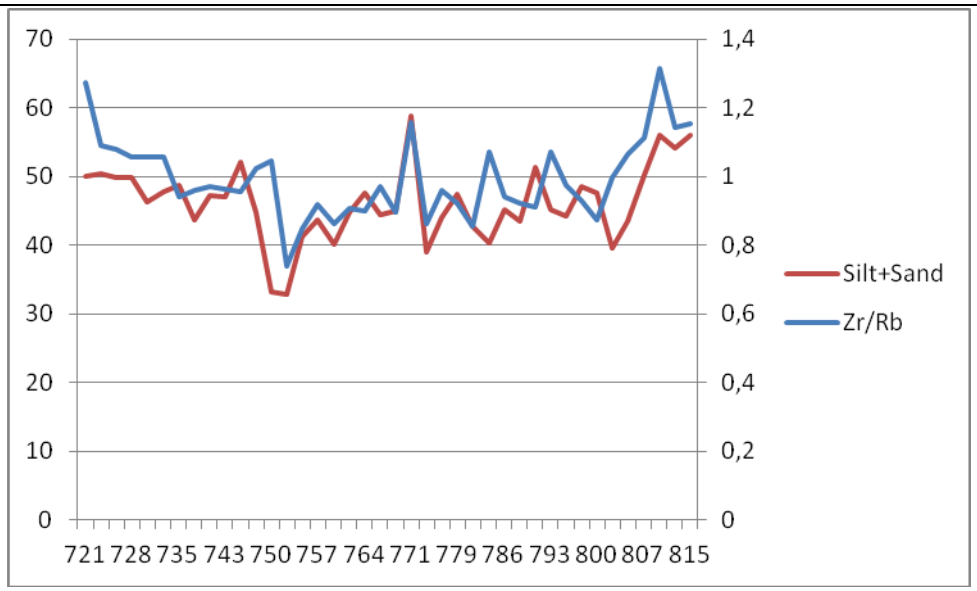

Figure 6-8 Basic correlation plots of Bienen 9

Horizontal axis represents depth (cm), vertical axis represents Silt+Sand (%) and Zr/Rb ratio.

Table 6-8 Correlation matrix for Bienen 9.

	>8um	>16um	>32um	>64um
Original	0,601645	0,630126	0,599367	0,4238

Figure 6-8 shows the correlation matrix of the different grain size fractions with the Zr/Rb ratio after we performed the shift. Although there is no outstanding correlation, the Zr/Rb ratio correlates best (r = 0.63) with the class > 16 µm. The correlations decrease with increasing particle size.

Bienen 10

The basic plots of the Bienen 10 core segment (Figure 6-9) show a similar trend, but the plots of both grain size and the Zr/Rb ratio do not correspond. No equivalent peak areas are visible. One major peak (829 cm) in the Zr/Rb plot does not have an equivalent in the grain size plot. At 845 cm there is a peak in both of the plots. No shift could be used to improve the fit of the two plots.

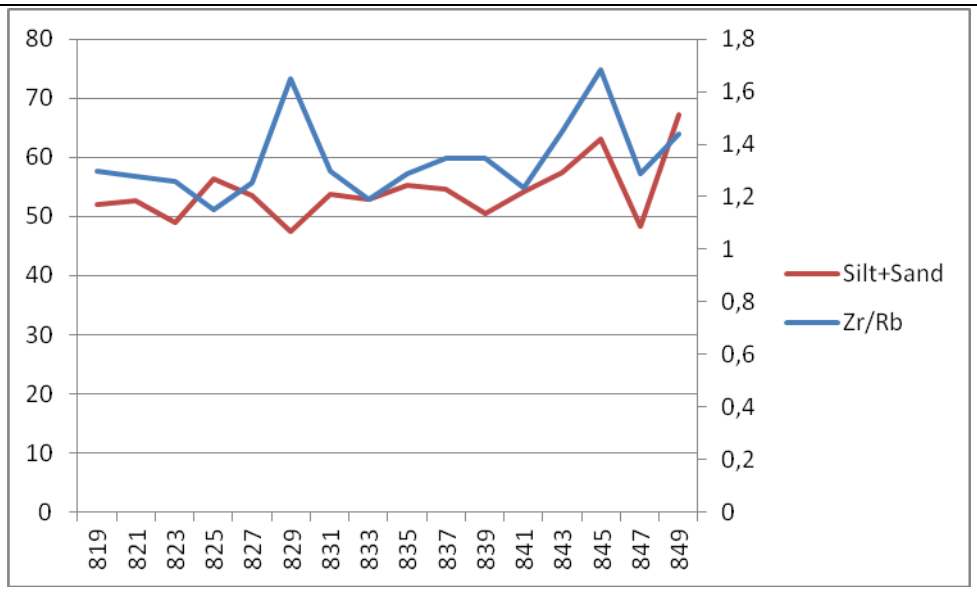

Figure 6-9 Basic correlation plots of Bienen 10

Horizontal axis represents depth (cm), vertical axis represents Silt+Sand (%) and Zr/Rb ratio.

Table 6-9 Correlation matrix for Bienen 10.

	>8um	>16um	>32um	>64um
Original	0,28399	0,274286	0,218542	0,13276

Table 6-9 shows the correlation matrix of the different grain size fractions with the Zr/Rb ratio. The correlations are weak ($r < 0.28$) and decrease with increasing particle size.

6.2.4. Upstream Rhine cores

Appendix 9 provides the combined grain size data and elemental data for the upstream cores. For none of the upstream cores, a good correlation between grain size and Zr/Rb ratio was found.

6.2.5. Discussion

The normalized data show that the elemental counts for each of the Bienen core segments are not continuous. Variations in scan results are caused by the different settings under which each of the core segments were scanned. To set up a relation between the grain size data and the chemical composition data, the separate core segments were consequently used to calculate correlation coefficients. Different chemical proxies were tested for their correlation with the sandy grain size classes (> 8 µm, > 16 µm, > 32 µm, and > 64 µm). The correlation coefficients for the Bienen core segments shows that the Zr/Rb ratio best correlates with the grain size fractions.

Subsequently, the Zr/Rb ratio were correlated with the different grain size fractions by means of plotting the graphs and calculating the correlation coefficients. For some core segments (Bienen 4, Bienen 6, Bienen 7, and Bienen 9), a relation was clearly detectable. For core segments

Bienen 3, Bienen 5, and Bienen 8 the correlation coefficients were increased by shifting the chemical composition data. The shifts were needed to correct for shrinking of the core segments, that might have occurred during transport and storage, or as a result of desiccation or scan settings. After the shifts were applied, good correlation coefficients were also obtained for the remaining core segments.

The resulting correlation coefficients show that in general the Zr/Rb ratio is a good indicator for the sandy grain size fraction. A quantified correlation was set up for each of the core segments. Highest correlations were found with the grain size classes > 8 µm, > 16 µm for most of the Bienen core segments (Bienen 4 - Bienen 10). Although the Zr/Rb ratio is correlated with the sandy class (> 63 µm), a better relation is obtained when the silty grain size fraction is included in the correlation. Correlations coefficients vary per core segment, therefore a statistical relationship significant for the continuous Bienen coring could not be set up.

Anomalies occur between the plots of the silt and sand grain size fractions and the Zr/Rb plots; some peaks in the Zr/Rb plots are not visible in the grain size data. Possible explanations for these anomalies include the grain size sampling strategy (5.1.1) and the fact that small sandy layers could not be identified as these do not stand out in the grain size average (see 6.1.3). However, the corresponding peaks in both data sets represented some of the major sandy layers and could thus be used to match the data sets.

Making use of the Zr/Rb ratio as a chemical proxy for grain size, and taking into account the shifts that were performed, the flood events (detected in the grain size data) were also identified in the chemical composition data. For the upstream cores, no strong relations were found between grain size data and chemical composition data. This could be explained by the relative low sampling resolution on grain size (and, after bulking) chemical composition data; minor layers could not stand out in averages and were thus not reflected in the plots. As a result, no flood events were identified in the upstream cores.

6.3. Correction of clay content

6.3.1. Correlation matrices

Appendix 1 provides the correlation matrices representing the intercorrelation of elements for each of the core segments based on the non-bulked normalized data as well as the bulked normalized data. Although the first version (non-bulked) has a higher resolution, the correlation of elements is better shown in the bulked version. Therefore, we find the latter in the tables below (Figure 6-11), in which strong correlations are highlighted in orange. Elements Si, Ti and K are strongly correlated in most of the core segments. This group of elements also correlate quite well with elements Fe and Rb. Other correlations include Mn and Fe, and Ca and Sr. However these correlations were not strong in all core segments, i.e. they are not continuous throughout depth.

Bienen 3	*Si*	*K*	*Ca*	*Ti*	*Mn*	*Fe*	*Rb*	*Sr*	*Zr*	*Pb*
Si	1,000									
K	0,938	1,000								
Ca	0,758	0,814	1,000							
Ti	0,953	0,992	0,775	1,000						
Mn	0,737	0,769	0,730	0,764	1,000					
Fe	0,890	0,980	0,771	0,974	0,826	1,000				
Rb	0,876	0,959	0,686	0,956	0,653	0,945	1,000			
Sr	0,560	0,589	0,898	0,538	0,564	0,535	0,466	1,000		
Zr	-0,223	-0,495	-0,480	-0,428	-0,384	-0,574	-0,494	-0,348	1,000	
Pb	0,246	0,146	0,070	0,201	0,205	0,111	0,107	0,043	0,483	1,000

Bienen 4	*Si*	*K*	*Ca*	*Ti*	*Mn*	*Fe*	*Rb*	*Sr*	*Zr*	*Pb*
Si	1,000									
K	0,885	1,000								
Ca	0,070	0,009	1,000							
Ti	0,889	0,976	-0,053	1,000						
Mn	0,450	0,427	0,048	0,466	1,000					
Fe	0,660	0,876	0,071	0,832	0,606	1,000				
Rb	0,729	0,889	-0,137	0,860	0,168	0,729	1,000			
Sr	0,206	0,050	0,565	0,032	0,277	0,192	-0,239	1,000		
Zr	0,185	-0,114	-0,274	0,026	0,002	-0,413	-0,101	-0,106	1,000	
Pb	0,255	0,130	-0,535	0,277	0,288	-0,049	0,116	-0,326	0,611	1,000

Bienen 5	*Si*	*K*	*Ca*	*Ti*	*Mn*	*Fe*	*Rb*	*Sr*	*Zr*	*Pb*
Si	1,000									
K	0,723	1,000								
Ca	-0,066	-0,338	1,000							
Ti	0,721	0,920	-0,476	1,000						
Mn	0,138	0,014	0,418	-0,005	1,000					
Fe	0,431	0,645	-0,229	0,678	0,564	1,000				
Rb	0,444	0,692	-0,610	0,746	-0,212	0,435	1,000			
Sr	-0,128	-0,443	0,764	-0,459	0,367	-0,349	-0,588	1,000		
Zr	0,389	-0,051	0,128	0,135	-0,132	-0,302	-0,038	0,303	1,000	
Pb	0,100	0,287	-0,254	0,324	0,130	0,369	0,367	-0,253	-0,235	1,000

Bienen 6	*Si*	*K*	*Ca*	*Ti*	*Mn*	*Fe*	*Rb*	*Sr*	*Zr*	*Pb*
Si	1,000									
K	0,862	1,000								
Ca	0,056	-0,209	1,000							
Ti	0,800	0,974	-0,321	1,000						
Mn	0,148	0,398	-0,068	0,342	1,000					
Fe	0,692	0,924	-0,166	0,895	0,622	1,000				
Rb	0,549	0,797	-0,127	0,823	0,224	0,768	1,000			
Sr	0,368	0,328	0,059	0,298	0,240	0,272	0,048	1,000		
Zr	0,075	-0,130	-0,121	-0,009	-0,578	-0,364	-0,070	0,142	1,000	
Pb	0,426	0,574	-0,398	0,653	0,150	0,475	0,524	0,220	0,232	1,000

Bienen 7	*Si*	*K*	*Ca*	*Ti*	*Mn*	*Fe*	*Rb*	*Sr*	*Zr*	*Pb*
Si	1,000									
K	0,489	1,000								
Ca	0,356	0,071	1,000							
Ti	0,611	0,883	-0,007	1,000						
Mn	-0,258	0,134	0,328	-0,009	1,000					
Fe	-0,134	0,687	0,024	0,486	0,640	1,000				
Rb	0,108	0,718	-0,572	0,615	-0,084	0,544	1,000			
Sr	0,499	0,031	0,916	0,035	0,093	-0,148	-0,537	1,000		
Zr	0,468	-0,371	0,106	-0,012	-0,453	-0,754	-0,442	0,330	1,000	
Pb	-0,107	0,107	-0,285	0,078	-0,016	0,101	0,218	-0,300	-0,138	1,000

Bienen 8	*Si*	*K*	*Ca*	*Ti*	*Mn*	*Fe*	*Rb*	*Sr*	*Zr*	*Pb*
Si	1,000									
K	0,142	1,000								
Ca	0,102	-0,151	1,000							
Ti	-0,119	0,935	-0,174	1,000						
Mn	-0,045	0,530	0,105	0,515	1,000					
Fe	-0,256	0,814	-0,138	0,886	0,708	1,000				
Rb	-0,188	0,688	-0,335	0,735	0,259	0,716	1,000			
Sr	0,371	0,132	0,555	-0,010	0,228	-0,107	-0,359	1,000		
Zr	0,186	0,006	0,343	0,055	-0,286	-0,225	-0,334	0,435	1,000	
Pb	0,104	0,201	-0,192	0,190	0,048	0,122	0,205	-0,222	-0,018	1,000

Bienen 9	*Si*	*K*	*Ca*	*Ti*	*Mn*	*Fe*	*Rb*	*Sr*	*Zr*	*Pb*
Si	1,000									
K	0,814	1,000								
Ca	0,723	0,449	1,000							
Ti	0,790	0,957	0,333	1,000						
Mn	0,479	0,579	0,257	0,643	1,000					
Fe	0,663	0,933	0,327	0,923	0,757	1,000				
Rb	0,741	0,963	0,402	0,949	0,589	0,936	1,000			
Sr	0,859	0,731	0,879	0,665	0,423	0,638	0,740	1,000		
Zr	0,756	0,537	0,460	0,632	0,334	0,396	0,573	0,635	1,000	
Pb	0,388	0,382	0,057	0,497	0,377	0,366	0,361	0,201	0,531	1,000

Bienen 10	*Si*	*K*	*Ca*	*Ti*	*Mn*	*Fe*	*Rb*	*Sr*	*Zr*	*Pb*
Si	1,000									
K	0,384	1,000								
Ca	0,111	0,069	1,000							
Ti	0,108	0,817	-0,467	1,000						
Mn	-0,307	0,268	0,100	0,240	1,000					
Fe	-0,311	0,576	-0,027	0,596	0,867	1,000				
Rb	-0,040	0,645	-0,596	0,936	0,028	0,425	1,000			
Sr	-0,150	0,011	0,933	-0,419	0,005	-0,034	-0,460	1,000		
Zr	0,293	0,176	-0,637	0,502	-0,537	-0,323	0,636	-0,535	1,000	
Pb	-0,164	0,380	-0,293	0,464	-0,005	0,217	0,556	-0,202	0,167	1,000

Figure 6-10 Correlation matrices for the Bienen cores

These correlation matrices show the intercorrelation of the selected elements of each of the Bienen cores (bulked). Elements that correlate well are highlighted (orange). Appendix 1 provides the raw data.

6.3.2. Al-standardized elemental data

Table 6-10 provides the correlation coefficients for ^{13}Al with the clayey grain size classes (< 2 µm, < 4 µm, and < 8 µm)(Appendix 6 provides raw data). Although ^{13}Al does not correlate very well with any of the clayey grain size classes, the highest correlation coefficient is that with the class smaller than 8 µm. Therefore ^{13}Al is used as an indicator for the clay content and subsequently it was used to correct the chemical composition correct for the clay content.

Table 6-10 Correlation coefficients of Al with grain size (clay) classes.

Bienen Core segments	Grain size: clay classess		
	< 2 µm	< 4 µm	< 8 µm
3	0.0120	-0.0189	-0.0300
4	-0.1563	-0.2107	-0.2259
5	0.0637	-0.1222	-0.2004
6	-0.1568	-0.0942	-0.0289
7	0.0383	0.1553	0.2345
8	0.2598	0.2234	0.1714
9	0.1496	0.0905	0.0080
10	-0.0601	0.0041	0.0259
Bienen total:	0.1705	0.21800	0.2137

Figure 6-12 provides the plots of the Zr and Rb counts, corrected by the clay content (i.e. standardized by the Al content), merged to a continuous record of the coring. Appendix 2 provides the raw data of other elemental counts standardized by the Al content (Appendix 5 for the subcatchment cores). The plots are mainly characterized by the amount of Al counts, as we have learned the Zr and Rb counts remain relatively stable in each of the subcatchment cores.

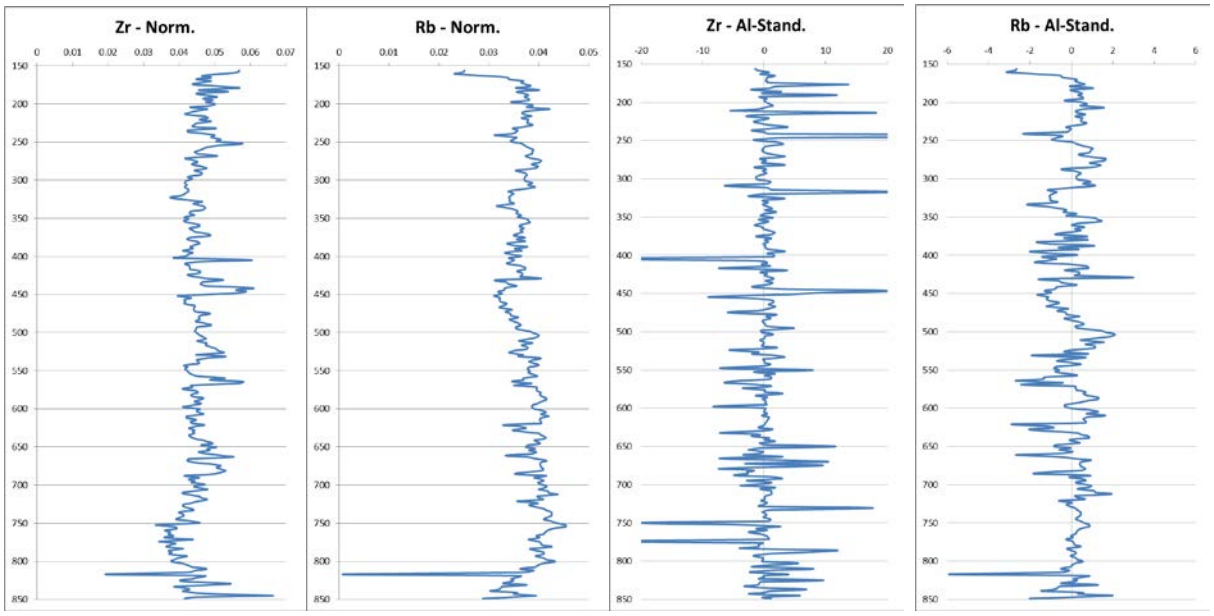

Figure 6-11 Graphs of the Zr and Rb counts.

Plots of element occurrences of Zr and Rb. Left: normalized counts. Right: standardized by Al counts.

6.3.3. Discussion

In this section two methods were applied in order to correct the chemical composition data for clay content. First, correlation matrices for the selected elements for each Bienen core segment indicated that there were no groups of elements that were associated which each other, throughout the Bienen core. Therefore, it was not possible to use such a group of elements in additional statistical methods that can be applied to correct for the clay content (Kylander et al., 2011). Second, the chemical proxy (6.2.2) was used to find the correlation coefficient of Al with the clayey grain size classes. Although Al does not correlate well with the any of the clayey grain size classes, we did use Al to standardize the chemical composition data. No other indicator for the clay content was found, and to be able to trace the origin of flood, the chemical composition of flood events has to be corrected for the clay content.

6.4. Fingerprinting upstream catchments

6.4.1. Handheld XRF data

Appendix 4 provides the data resulting from the handheld XRF scans. Six elements remain usable for further research, these include Sr, Rb, Pb, Zn, Fe and Mn (i.e. these do not the exceed 15% error margin). Elemental occurrence at all locations were plotted on a Rhine kilometers axis and were sorted by subcatchment area.

Figure 6-12 shows the occurrence of the selected elements six elements, Sr, Rb, Pb, Zn, Fe and Mn. The occurrence of Pb shows an interesting trend. The amount of Pb present in the Moselle samples is relatively high compared to the other regions, although there are some variations per location. When the Moselle confluences with the Rhine the amount of Pb present in the Rhine (at 613 km) instantly increases. However, further downstream the amount of Pb decreases. The amount of Pb is influenced by pollution; especially in the catchment of the Moselle the impact of pollution is represented well by an increased occurrence of Pb. The same trend is found in the Zn plots; the amount of Zn in the Moselle is relatively high causing an increase of the Zn level in the Rhine after its confluences with the Moselle. For Zn, we see the same effect (to a lesser extent) after the Main confluences with the Rhine. This might also be due to pollution. The Rb rates remain quite constant throughout the Rhine River course, but the amount of Zr seems to be relatively high in the Upper Rhine while it is relatively low in all of the tributaries. The amount of Zr in the Rhine decreases with Rhine kilometers. The amount of Fe and Mn is too dependent on soil conditions to make any conclusions about changes in presence throughout the Rhine catchment.

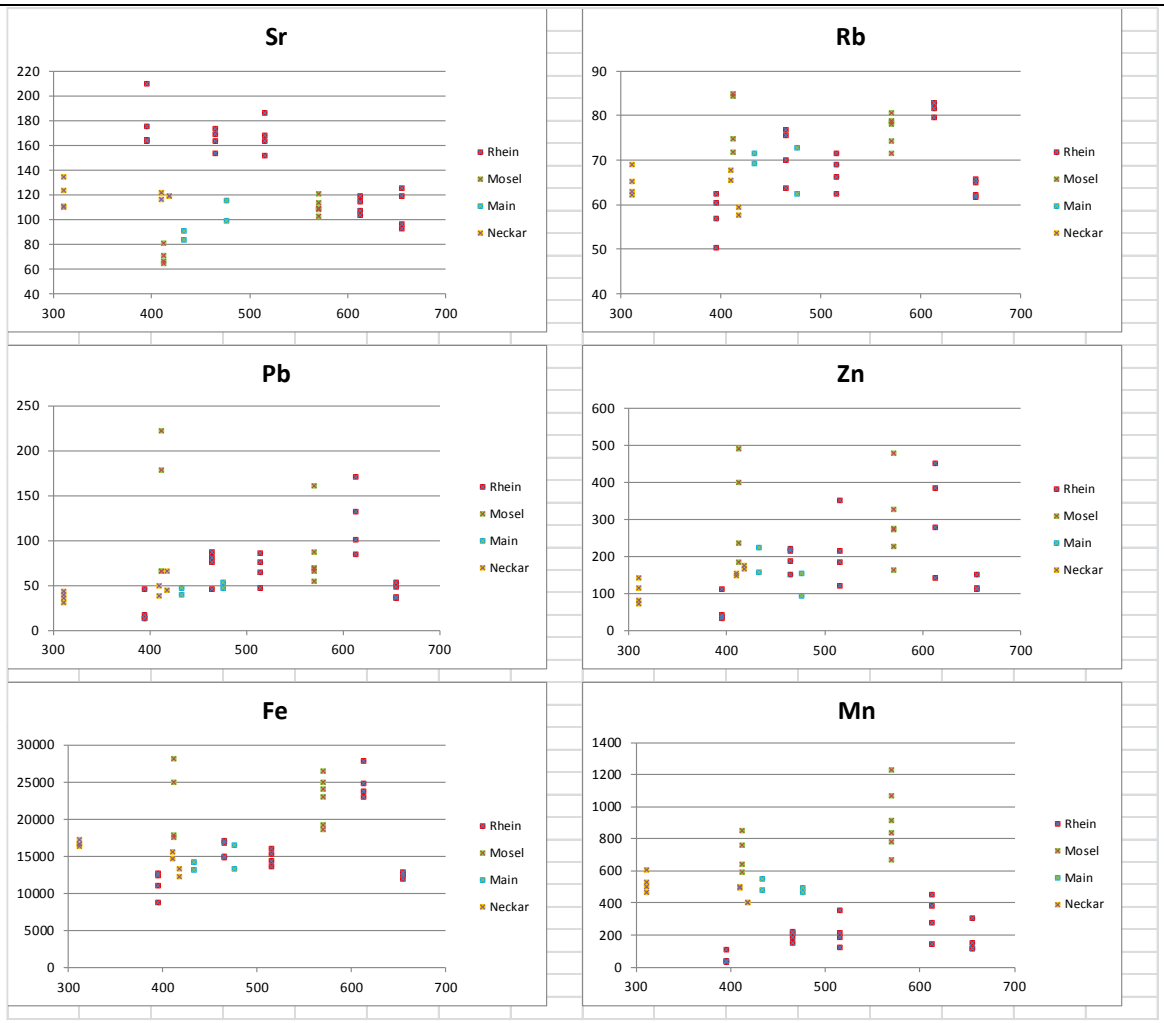

Figure 6-12 Element occurrence versus Rhine kilometers

Graphs representing the occurrence of the selected six elements (Sr, Rb, Pb, Zn, Fe and Mn) versus Rhine kilometers. In red is the Rhine River (Rhein), green the Moselle River, blue the Main River and yellow the Neckar River. On the vertical axis are the occurrences (in ppm) of the elements, on the horizontal axis are the Rhine kilometers. For the tributaries, this axis represents the relative Rhine kilometers.

6.4.2. Characterizing subcatchments

The tables in 5 provide the characteristic elemental composition for each of the subcatchments. The first part is the data obtained from the XRF scan of the pre-industrial cores (Appendix 5), the second part is the data obtained from the handheld XRF scan performed on the post-industrial samples (Appendix 4 and Appendix 5). Fn and Mn were excluded from the fingerprint (section 6.4.3). Table 6-11 provides the occurrences of the remaining set of elements, which includes Sr, Rb, Pb and Zn.

Table 6-11 Occurrences of trace elements in subcatchments

Occurrences of trace elements, grouped per subcatchment, sampling location and sampling method. Pre-industrial cores are in normalized and Al-standardized elemental counts, post-industrial surface samples are in ppm. Raw data are provided in Appendix 5.

		Standardized (Al) element counts			
Subcatchment	XRF data used	Sr	Rb	Pb	Zn
Upper Rhine	Romerberg	413.8	119.3	10.6	33
	Surface samples	145,8	68,3	65,6	179,5
Neckar	Lauffen	212.3	84.7	5.8	18.2
	Surface samples	119,4	63,7	43,2	132,0
Main	Sindlingen	204.8	143.9	29	61.8
	Klein Krotzenburg	109.5	128.4	8.3	29.6
	Surface samples	97,7	69,0	46,4	157,4
Moselle	Kenn	90.5	135.4	16.6	78.7
	Surface samples	94,7	77,7	103,6	305,1

Based on the results shown in figure 6-11 the following remarks can be made:

- The most upstream subcatchments (Upper Rhine and Neckar) are characterized by a relative high amount of Sr, while the amounts of both Zn and Pb are low to average.
- The amount of Zn increases in downstream direction. Whereas Zn counts are low in the Upper Rhine and Neckar, they are high in the Main and Moselle catchments.
- When we compare the two cores from the Main; we see that the downstream core (Sindlingen) is characterized by much higher amounts of both Pb and Zn. Note that Sindlingen is located downstream of Frankfurt am Main while Klein Krotzenburg is located upstream of this industrialized area.
- The Moselle catchment is characterized by a low amount of Sr and average to high amount Rb. More important are the high amounts of Pb and Zn.

6.4.3. Discussion

To construct a fingerprint for each of the subcatchments, a series of requirements should be satisfied. In this study corings and surface samples were used to determine the chemical composition of floodplain depositions. The interpretation of changes in these chemical composition data solely as a result of changes of the chemical composition of sediment (as deposited in the floodplain) and/or as a results of varying grain size, would be an oversimplification. As stated in chapter 3, the complex patterns caused by both horizontal and vertical processes, might have influenced the results of the chemical composition analysis in the study. By carefully selecting suitable sampling sites, and by using multiple surface samples from each subcatchment, the influence of these processes was

minimized. This way the set of elements do reflect the environmental control. However, the resulting set of elements can barely be regarded a fingerprint as it consists of only 4 trace elements making it hard to be discriminating potential sources.

Although on a Rhine River catchment scale the different source area are only subcatchments, in fact the catchment of these area are enormous. Therefore, the composition of material transported by the tributaries may differ per flooding event. Within each subcatchment another layer of tributaries determines the composition of material that is transported to the point of confluence with the Rhine. This might explain the variation and inconsistency of the composition of a series of floods from a subcatchment. Subsequently it is impossible to set up a fingerprint that is characteristic for a subcatchment.

Lacking a set of fingerprints meeting the criteria (5.2.5), a set of elements was selected that is present in all core material and thus reflects a chemical signal of both the pre- and post-industrial composition. This set of elements, including Sr, Rb, Pb and Zn, represents the chemical composition of the source areas and subsequently, it can be used to correlate with the (characteristic) chemical composition of flood events.

6.5. Tracing flood origin

6.5.1. Characterizing flood events

Six of the floods that were identified in the grain size data (section 6.1) were also identified in the chemical composition data. Table 6-12 shows this subselection of cross-correlated flood events. Note that one of the flood events could not be identified in the chemical composition data. The data of the 1850 A.D. flood event (239 cm) were lost in the shifting process (section 6.2), as this layer was at the bottom of the Bienen 3 core segment. Table 6-11 provides the chemical composition data (selected elements) of the remaining five flood events (Appendix 7 provides raw data).

Table 6-12 Selection of flood events..

Depth (cm)	Core (#)	Flood event (year A.D.)	Sand (%)	Silt+Sand (%)	Zr/Rb
446	Bienen 6	1784	12,63	67,9	1,846883
560	Bienen 7	1729	7,83	65,04	1,42952
564	Bienen 7	1726	8,48	70,58	1,673995
659	Bienen 8	1682	50,39	79,71	1,555375
683	Bienen 8	1671	16,32	63,03	1,400364

Table 6-13 Chemical composition of selected flood events. Appendix 7 provides raw data.

Depth (cm) Flood event (year A.D.)		Standardized (Al) element counts.										
		Si	K	Ca	Ti	Mn	Fe	Rb	Sr	Zr	Pb	Zn
446	1784	12,9	142,7	553,5	152,5	95,1	5932,1	135,8	190,9	250,8	15,1	36,5
560	1729	12,6	117,7	314,5	100,7	128,3	4819,8	77,2	87,1	84,5	5,7	21,0
564	1726	19,1	174,0	318,5	159,9	157,9	6868,8	118,1	121,7	133,3	11,2	35,6
659	1682	28,0	296,9	1443,0	249,4	291,3	10020,9	197,2	343,8	306,7	21,0	51,3
683	1671	23,8	276,5	1130,4	243,6	318,9	11027,5	195,4	309,9	273,6	17,0	51,8

When we take a closer look at table 6-13, the following remarks can be made. The 1784 flood event has average occurrences of Sr, Rb and Zn. The flood events from the years 1729 and 1726 sow a similar pattern: both have relatively low Sr occurrence and relatively high Zn occurrence. Rb occurrences are average for these flood events. The last two flood events (1682 and 1671) both have a relatively high Sr occurrence, Rb and Zn occurrences are average.

Table 6-14 Occurrence of trace elements in flood events

Occurrence of trace elements in percentage for each of the historical flood events that we could correlate with the elemental data using the Zr/Rb ratio.

Depth (cm)	Corresponding flood event (year A.D.)	Elemental counts (normalized, Al-standardized)			
		Sr	Rb	Pb	Zn
446	1784	190,9	135,8	15,1	36,5
560	1729	87,1	77,2	5,7	21,0
564	1726	121,7	118,1	11,2	35,6
659	1682	343,8	197,2	21,0	51,3
683	1671	309,9	195,4	17,0	51,8

6.5.2. Allocating flood origins

When we compare the characteristic catchment compositions (table 5-12) with the characteristic flood composition (table 6-14) the following conclusions can be drawn concerning the allocation of flood origins:

- The combination of high values for Sr with low values for Pb and Zn, suggests that both the 1671 and the 1682 floods have an origin high upstream in the Rhine catchment; the sediment is likely to be deposited during floods originating from the Upper Rhine and Neckar.
- The combination of low Sr values and high Zn values suggest that both the 1726 and the 1729 floods are mainly composed by Moselle sediment; this sediment is likely to be deposited by a flood consisting of a high discharge from the Moselle catchment.

6.5.3. Discussion

Making use of a chemical proxy, the chemical compositions of the selected flood events (6.1 and 6.2) were obtained. These data were compared to the specific chemical composition of each of the subcatchments, which was reflected in the occurrences of a selected set of elements. Subsequently an attempt was made to allocate each of the flood events to one of the subcatchments. As no real fingerprints were set up, this comparison was based on the occurrences of a set of only four elements. These sets of elements were not sufficient to make any distinct remarks about the chemical composition of the flood events, only some minor variations were detected (6.4).

The selected trace elements could not characterize the flood events, as the variations of presence in the flood events were too low. Moreover, in some cases an inconsistent amount of these elements were present when the standardized with the normalized data are compared. The latter is due to the standardization method that was used (6.3).

It was thus not possible to quantitatively locate the flood origins. Consequently, it was not possible to unravel the mixed contribution of the subcatchment to each of the floods. However, some remarks were made about the (partial) contribution of tributaries to the flood events. Although a system was developed in which the composition of downstream deposited sediment was compared with “fingerprints” of upstream source areas, both the downstream flood signal, and the upsteam source area signals, could not be characterized distinctively . Therefore this system was not able to provide an estimate of the relative contributions of the source areas (subcatchments).

However, the chemical composition of sediment deposited during flood events along the Lower Rhine, is not only built up by its main tributaries. Although the Upper Rhine, Neckar, Main and Moselle largely determine the chemical composition of the sediment, there also a series of minor tributaries that confluence with the Rhine River on it way downstream. These tributaries dilute the Rhine discharge and can therefore cause additional variations in flood deposits along the Lower Rhine.

7. Conclusions and recommendations

Making use of historical sources and grain size analysis on the Bienener Altrhein palaeo-fill, a series of major flood events was identified. Together with knowledge obtained from previous research, the chemical composition of this core was used to set up a proxy for grain size. Analysis of the Bienener Althrein coring has shown that Zr/Rb is a suitable proxy for grain size in flood plain sediments. When looking at the separate Bienen core segments and taking into account minor shifts, most of the peaks in the grain size data had a corresponding peak area in the Zr/Rb ratio data. These correlations were recorded in correlation coefficients, resulting in a qualitative relationship per core segments. However, to set up a qualitative relation for the whole core, instead of for the separate Bienen segments, a standardization method needs to be found to correct for the varying settings for each of the core segments.

In this study it is proved that chemical composition data can be used to derive grain size peaks from (and flood events, Winkels, 2011; Aloserij, 2013). This relationship was quantified by means of the Zr/Rb ratio as proxy. Combined with previous research (Aloserij, 2011; Toonen, 2013) Zr/Rb profiles can be used to reconstruct a history of flood events at flood plain sites with high resolution deposits (slack water environments). However, a more detailed (higher resolution) grain size analysis needs to be performed to detect all (minor) sandy layers and create a continuous flood record in the data set. Moreover, better results can be obtained by improving the sampling method.

No adequate method was found to standardize the data for clay content. By correcting the chemical composition for clay content, all cores can be filtered by the clayey grain size fractions, enabling a comparison between downstream and upstream flood deposits. Two methods were applied in order to find a way to correct for the clay content. First, the construction of correlation matrices did not results in any group of elements that clustered throughout the Bienen core. The other method, involved the correlation of Al with the clayey grain size fractions and use this relation to correct for the clay content. Although, the relation of Al with clay, qualified with correlation coefficients, was not good, we have used this standardization method. A better standardization method, is of vital importance for the succeeding of the second part of this research. Therefore, additional research is needed to set up an adequate standardization method.

The next part of this research included the characterization of the subcatchments. Based on the corings and surface samples, we characterized each of the subcatchments. Although there were some minor differences in the chemical composition of the different subcatchment, it was not possible to set up characteristic fingerprints for the subcatchments. However, based on set of

elements that occurred in both the scores and the surface samples, some remarks were made regarding the characteristics of the subcatchments. The Upper Rhine and the Neckar are characterized by a high amount of Sr and low to average amounts of Zn and Pb. Moreover, sediment deposited by the Moselle is characterized by a low amount of Sr and high amounts of Pb and Zn.

Making use of the Zr/Rb ratio as a proxy, selected flood events were detected in the normalized and standardized (i.e. corrected for the clay content) chemical composition data. Although the variation of presence of these elements in the flood events was not high, a few remarks could be made regarding the characterization of these flood events. The flood events from the years 1729 and 1726 both have relatively low Sr occurrence, while the two flood events from the years 1682 and 1671 both have a relatively high Sr occurrence.

The combination of the characterizations of the subcatchments and the floods have led to the following suggestions: (1) the 1671 and 1682 floods are likely to have and origin in the Upper Rhine and Neckar catchments (due to high Sr values combined with low Pb and Zn values), and (2) the 1726 and 1729 floods are likely to originate from the Moselle catchment (due to the combination of low Sr values and high Zn values). Whereas we aimed for a quantitative calculation of the contribution to floods from each of the subcatchments, we can conclude that for now only a qualitative contribution can (partially) be obtained.

An additional conclusion can be made regarding pollution, which specifically had its effect on the sediment transported by the Mosell. Pb (and Zn) occurrences in the Moselle are higher than in the other tributaries. These results were found in the data from the cores and in the handheld XRF data. The coring performed at the Sindlingen location, downstream of Frankfurt am Main, has higher amounts of Pb and Zn compared to the coring upstream of Frankfurt am Main (Klein Krotzenburg); the pollution from the industrialized area around the city of Frankfurt is thus reflected in the chemical composition of floodplain deposits.

This study was performed in the floodplains of the Lower Rhine and its tributaries in the Netherlands and Germany. The research area is therefore focused on a moderate to long meandering river with a mixed load and its tributaries, while previous studies on a similar topic (based on the infill of cut-off meanders) were performed on a much smaller scale (Peart and Walling, 1986; Passmore and Macklin, 1994). The results of this study, i.e. the relation between the Zr/Rb ratio and grain size and the (quantitative) relation used to allocate flood origin, have yet to be applied in other study areas. Different results might be expected for sedimentary environments with another drainage basin, climate settings, river valley morphology and sediment transported.

A last recommendation for further research includes the investigation of historic sources. Besides of the historic sources describing flood events in the Rhine River, flood propagation throughout the Rhine catchment should be mapped. Analysis of historic sources from each of the tributaries can be used to map flood events throughout the subcatchments. Combining flood propagation of each of the subcatchments in a model, will create an overview of flood propagation throughout the Rhine catchment.

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Appendices

Appendix 1 (A-H) Raw data from grain size and XRF scans (sorted by segment)

Appendix 2 Normalized counts of selected elements

Appendix 3 Sampling locations

Appendix 4 Handheld XRF elemental counts

Appendix 5 Normalized and standardized data for subcatchment cores

Appendix 6 Al standardization Bienen Cores

Appendix 7 Flood event data

Appendix 8 Correlation of grain size with Zr/Rb ratio (Bienen)

Appendix 9 Correlation of grain size with Zr/Rb ratio (Subcatchments)

Appendix 10 Standardized elemental data Bienen

Appendix 11 XRF settings

Appendix 1 - Bienen 10 B

Depth	Real depth	%Clay	%Very Fine Silt	%Fine Silt	%Coarse Silt	%Very Fine Sand	%Fine Sand	%Middle Sand	%Coarse Sand	%Very Coarse Sand	Sand							Original					Shifted graph				
		< 8 µm	8-16 µm	16-32 µm	32-63 µm	63-125 µm	125-250 µm	250-500 µm	500-1000 µm	1000-2000	Clay	Silt	Sand	>8um	>16um	>32um	>64um	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti
819	819	47.93	20.74	19.09	9.79	2.04	0.41	0	0	0	47.93	49.62	2.45	52.07	31.33	12.24	2.45	1.298183	32.2657	235.343	235.4541	1.000472	1.276342	15.42523	108.8621	110.7734	1.017556
821	821	47.37	20.22	19.16	9.63	2.75	0.87	0	0	0	47.37	49.01	3.62	52.63	32.41	13.25	3.62	1.276342	15.42523	108.8621	110.7734	1.017556	1.259673	16.88146	125.462	122.8967	0.979553
823	823	51.08	22.25	17.09	7.26	1.94	0.38	0	0	0	51.08	46.6	2.32	48.92	26.67	9.58	2.32	1.259673	16.88146	125.462	122.8967	0.979553	1.148672	18.2129	135.2645	126.7097	0.936755
825	825	43.64	18.79	17.91	11.18	4.43	2.49	1.55	0	0	43.64	47.88	8.48	56.35	37.56	19.65	8.48	1.148672	18.2129	135.2645	126.7097	0.936755	1.252195	17.71703	117.1923	114.8132	0.979699
827	827	46.44	18.85	18.09	11.49	4	1.1	0.03	0	0	46.44	48.43	5.13	53.56	34.71	16.62	5.13	1.252195	17.71703	117.1923	114.8132	0.979699	1.650056	25.01639	153.2295	250.0601	1.631932
829	829	52.6	19.89	16.63	7.91	2.55	0.43	0	0	0	52.6	44.42	2.98	47.41	27.52	10.89	2.98	1.650056	25.01639	153.2295	250.0601	1.631932	1.297267	23.209	161.6238	165.4244	1.023515
831	831	46.18	18.75	19.88	12.17	2.91	0.11	0	0	0	46.18	50.8	3.02	53.82	35.07	15.19	3.02	1.297267	23.209	161.6238	165.4244	1.023515	1.187727	18.72619	116.0446	112.9613	0.97343
833	833	47.1	19.77	18.79	10.85	3.32	0.18	0	0	0	47.1	49.4	3.5	52.91	33.14	14.35	3.5	1.187727	18.72619	116.0446	112.9613	0.97343	1.285529	25.292	154.92	162.424	1.048438
835	835	44.84	18.92	16.48	10.55	3.59	1.64	3.83	0.14	0	44.84	45.96	9.21	55.15	36.23	19.75	9.21	1.285529	25.292	154.92	162.424	1.048438	1.344235	21.34146	122.1433	134.8293	1.103861
837	837	45.29	20.49	16.95	9.65	3.02	1.33	3.08	0.19	0	45.29	47.09	7.62	54.71	34.22	17.27	7.62	1.344235	21.34146	122.1433	134.8293	1.103861	1.348158	24.54579	126.0916	144.2381	1.143915
839	839	49.62	21.93	18.29	8.64	1.52	0.01	0	0	0	49.62	48.86	1.53	50.39	28.46	10.17	1.53	1.348158	24.54579	126.0916	144.2381	1.143915	1.232656	15.46953	102.4492	102.7946	1.003371
841	841	45.81	19.34	18.99	11.82	3.63	0.41	0	0	0	45.81	50.15	4.04	54.19	34.85	15.86	4.04	1.232656	15.46953	102.4492	102.7946	1.003371	1.449206	24.16054	145.796	168.2776	1.154199
843	843	42.45	19.86	20.51	13.1	3.77	0.32	0	0	0	42.45	53.46	4.09	57.56	37.7	17.19	4.09	1.449206	24.16054	145.796	168.2776	1.154199	1.682148	23.30435	150.3288	185.6168	1.234739
845	845	36.93	18.43	22.21	17.04	5.01	0.38	0	0	0	36.93	57.68	5.4	63.07	44.64	22.43	5.4	1.682148	23.30435	150.3288	185.6168	1.234739	1.289475	17.80046	104.5092	105.6009	1.010446
847	847	51.59	22.57	16.85	7.14	1.65	0.21	0	0	0	51.59	46.55	1.86	48.42	25.85	9	1.86	1.289475	17.80046	104.5092	105.6009	1.010446	1.438752	30.23396	110.7094	146.0415	1.319142
849	849	32.78	14.11	12.35	7.82	3.38	2.44	12.71	14.05	0.36	32.78	34.28	32.94	67.22	53.11	40.76	32.94	1.438752	30.23396	110.7094	146.0415	1.319142					

		>8um	>16um	>32um	>64um
Original	Original	0.28399	0.274286	0.218542	0.13276
Shifted		0.221663	0.226339	0.236918	0.132516

	Original					Shifted				
	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti
>8um	0.28399	0.352758	-0.05605	-0.00959	0.133732	0.221663	-0.18845	-0.20324	-0.07548	0.009488
>16um	0.274286	0.3675	-0.05816	0.017674	0.182604	0.226339	-0.17165	-0.10618	-0.00532	0.028711
>32um	0.218542	0.399188	-0.13576	-0.01443	0.241181	0.236918	-0.07363	-0.05624	0.055359	0.087992
>64um	0.13276	0.411224	-0.20095	-0.04766	0.27932	0.132516	0.041891	-0.01523	0.061863	0.09155

Appendix 1 - Bienen 10 A

Depth	Real depth	%Clay	%Very Fine	%Fine Silt	%Coarse S	%Very Fine	%Fine San	%Middle C	%Coarse S	%Very Coarse	Sand			
		< 8 µm	8-16 µm	16-32 µm	32-63 µm	63-125 µm	125-250 µm	250-500 µm	500-1000 µm	1000-2000	Clay	Silt	Sand	P95
819	819	47.93	20.74	19.09	9.79	2.04	0.41	0	0	0	47.93	49.62	2.45	44.2
821	821	47.37	20.22	19.16	9.63	2.75	0.87	0	0	0	47.37	49.01	3.62	52.6
823	823	51.08	22.25	17.09	7.26	1.94	0.38	0	0	0	51.08	46.6	2.32	44.2
825	825	43.64	18.79	17.91	11.18	4.43	2.49	1.55	0	0	43.64	47.88	8.48	88.4
827	827	46.44	18.85	18.09	11.49	4	1.1	0.03	0	0	46.44	48.43	5.13	62.5
829	829	52.6	19.89	16.63	7.91	2.55	0.43	0	0	0	52.6	44.42	2.98	44.2
831	831	46.18	18.75	19.88	12.17	2.91	0.11	0	0	0	46.18	50.8	3.02	52.6
833	833	47.1	19.77	18.79	10.85	3.32	0.18	0	0	0	47.1	49.4	3.5	52.6
835	835	44.84	18.92	16.48	10.55	3.59	1.64	3.83	0.14	0	44.84	45.96	9.21	149
837	837	45.29	20.49	16.95	9.65	3.02	1.33	3.08	0.19	0	45.29	47.09	7.62	88.4
839	839	49.62	21.93	18.29	8.64	1.52	0.01	0	0	0	49.62	48.86	1.53	37.2
841	841	45.81	19.34	18.99	11.82	3.63	0.41	0	0	0	45.81	50.15	4.04	52.6
843	843	42.45	19.86	20.51	13.1	3.77	0.32	0	0	0	42.45	53.46	4.09	52.6
845	845	36.93	18.43	22.21	17.04	5.01	0.38	0	0	0	36.93	57.68	5.4	62.5
847	847	51.59	22.57	16.85	7.14	1.65	0.21	0	0	0	51.59	46.55	1.86	37.2
849	849	32.78	14.11	12.35	7.82	3.38	2.44	12.71	14.05	0.36	32.78	34.28	32.94	595

		Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	As
819	819	0.000201	0.006477	6.5E-05	0.001075	1.45E-05	0.003889	0.05333	0.167933	2.04E-05	0.047245	0.001403	0.002853	0.056338	2.089301	0.020132	0.000522	9.02E-05	0.010516	0.00231	0.004685
821	821	0.00041	0.006329	6.23E-05	0.00102	1.44E-05	0.002653	0.050412	0.188939	6.71E-06	0.044665	0.001415	0.002536	0.054269	1.958427	0.018576	0.000706	0	0.010374	0.001823	0.004276
823	823	0.000353	0.005957	8.26E-05	0.000959	3.11E-05	0.001602	0.051351	0.235237	4.29E-05	0.044269	0.001698	0.002439	0.052458	2.013875	0.019069	0.000355	0	0.010294	0.001801	0.005082
825	825	0.000317	0.005766	4.9E-05	0.00118	2.55E-05	0.002017	0.052016	0.363842	5.21E-05	0.04282	0.001776	0.002491	0.061671	2.193707	0.022047	0.000571	4.08E-06	0.010362	0.001952	0.006203
827	827	0.000373	0.006617	9.23E-06	0.001114	9.23E-06	0.001878	0.053789	0.404387	5.23E-05	0.043771	0.001317	0.002663	0.04898	2.00262	0.019811	0.000684	0	0.009895	0.001759	0.005379
829	829	0.000217	0.005436	0.000113	0.000879	5.46E-05	0.002957	0.03904	0.231835	4.63E-05	0.033295	0.001132	0.001914	0.020437	1.255493	0.01437	0.000951	0.000131	0.008175	0.001972	0.003573
831	831	0.000295	0.006841	2.27E-05	0.000995	0	0.002598	0.057558	0.300915	8.25E-05	0.047642	0.001781	0.002752	0.039609	1.836755	0.018829	0.001166	6.73E-05	0.010421	0.002987	0.004409
833	833	0.000344	0.006439	4.2E-05	0.000923	1.74E-05	0.003039	0.054316	0.506875	7.06E-05	0.039901	0.001666	0.002356	0.049257	1.869213	0.01884	0.001111	3.48E-05	0.009551	0.002035	0.003242
835	835	0.000256	0.006479	2.46E-05	0.000971	2.46E-05	0.003257	0.052917	0.503996	8.2E-06	0.039687	0.001593	0.002462	0.051514	1.858582	0.018246	0.001044	0	0.009849	0.001703	0.004433
837	837	0.000318	0.006792	8.73E-06	0.001045	0	0.003208	0.049887	0.365576	3.4E-05	0.03887	0.00149	0.002613	0.054215	1.818751	0.019005	0.001374	2.81E-05	0.009968	0.002614	0.004059
839	839	0.000284	0.006976	1.98E-05	0.00103	1.35E-05	0.002864	0.049074	0.417582	6.77E-05	0.035836	0.001716	0.00203	0.049863	1.788097	0.016962	0.000766	6.25E-06	0.008657	0.002269	0.004562
841	841	0.000428	0.006616	4.15E-05	0.000957	0	0.001932	0.055805	0.379399	5.6E-05	0.043815	0.001437	0.002495	0.040696	1.895825	0.019029	0.001082	0	0.010218	0.002539	0.003476
843	843	0.000301	0.007283	4.34E-05	0.001161	5.04E-06	0.00233	0.054146	0.371387	4.23E-05	0.043952	0.001595	0.002575	0.040812	1.775632	0.018479	0.001081	0	0.010457	0.002098	0.004325
845	845	0.000357	0.00833	6.6E-05	0.000935	0	0.001609	0.059978	0.184125	0	0.053732	0.00186	0.00275	0.03644	1.749882	0.017472	0.000848	3.98E-05	0.010374	0.002551	0.005377
847	847	0.00042	0.007475	5.78E-06	0.001016	2.7E-05	0.002301	0.056643	0.399551	0	0.043886	0.001645	0.00229	0.038514	1.832444	0.01795	0.001138	0	0.010414	0.002039	0.004661
849	849	0.000284	0.008581	6.53E-05	0.006251	1.71E-05	0.003295	0.046844	0.405883	1.61E-05	0.031423	0.001085	0.001926	0.033836	1.375648	0.013627	0.001202	0	0.007559	0.002126	0.005023

		Se	Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh	Zr/Rb
819	819	0.004245	0.000841	0.036411	0.045868	0.047268	0.000327	0.000414	0.000928	0.000683	0	0.00095	0.004815	0.008363	0.001684	0.004511	0.003908	0.003505	0.003712	0.751156	0.248844	1.298183
821	821	0.004968	0.001397	0.035609	0.047473	0.045449	0.000688	0.000284	0.001219	0.00113	0	0.000659	0.005401	0.008445	0.001961	0.004435	0.00394	0.003978	0.003565	0.753818	0.246182	1.276342
823	823	0.004608	0.000494	0.034424	0.054448	0.043364	0.000716	0.000177	0.001454	0.001755	0	0.000464	0.004978	0.00811	0.001602	0.004379	0.003695	0.003328	0.003761	0.74692	0.25308	1.259673
825	825	0.004859	0.001436	0.03492	0.067057	0.040112	0.000433	0.00035	0.002145	0.003328	0	0.000536	0.005298	0.008381	0.001732	0.005159	0.004323	0.003232	0.004586	0.743527	0.256473	1.148672
827	827	0.004985	0.001114	0.034246	0.069705	0.042882	0.000608	0.000317	0.002231	0.003579	0	0.000428	0.005176	0.009108	0.001799	0.005089	0.003926	0.002983	0.004186	0.741706	0.258294	1.252195
829	829	0.00393	0.001041	0.032929	0.062205	0.054335	0.000651	0.000221	0.001143	0.002294	8.31E-06	0.000706	0.004213	0.007366	0.001607	0.004627	0.003827	0.003366	0.002273	0.742686	0.257314	1.650056
831	831	0.004113	0.000682	0.037588	0.061345	0.048762	0.000613	0.000201	0.001652	0.002199	0	0.000907	0.005122	0.010124	0.001136	0.00433	0.004207	0.004083	0.003559	0.746383	0.253617	1.297267
833	833	0.004222	0.001308	0.032702	0.078397	0.038841	0.000581	0.000273	0.002638	0.004301	0	0.00048	0.004593	0.009169	0.001383	0.004349	0.003629	0.003809	0.003349	0.741524	0.258476	1.187727
835	835	0.004931	0.001217	0.032367	0.080483	0.041609	0.000283	0.000423	0.002718	0.004416	0	0.000482	0.004909	0.009114	0.001703	0.005028	0.004191	0.002984	0.003868	0.741073	0.258927	1.285529
837	837	0.004452	0.000508	0.03192	0.062826	0.042908	0.000332	0.000375	0.001802	0.00321	0	0.00091	0.005431	0.00992	0.001261	0.004612	0.0039	0.003684	0.003087	0.744902	0.255098	1.344235
839	839	0.004431	0.000936	0.030407	0.067656	0.040993	0.000204	0.000386	0.00199	0.003397	0	0.000507	0.004978	0.008862	0.000949	0.004848	0.004263	0.003112	0.003629	0.744138	0.255862	1.348158
841	841	0.004362	0.001205	0.035665	0.069352	0.043963	0.000359	0.000348	0.002005	0.003045	0	0.000639	0.004684	0.008804	0.001045	0.004501	0.003932	0.004185	0.002983	0.746315	0.253685	1.232656
843	843	0.004083	0.000773	0.035005	0.066351	0.050729	0.000257	0.000313	0.001823	0.003022	0	0.001032	0.004649	0.009528	0.001051	0.004667	0.003895	0.003151	0.003743	0.743715	0.256285	1.449206
845	845	0.003649	0.000648	0.03944	0.047814	0.066344	0.000498	0.000262	0.000894	0.00084	0	0.001212	0.005011	0.009857	0.001397	0.004381	0.003818	0.003597	0.003465	0.7521	0.2479	1.682148
847	847	0.004662	0.001068	0.034389	0.068279	0.044344	0.000353	0.000308	0.001658	0.003346	0	0.000626	0.004949	0.008863	0.001638	0.004811	0.004527	0.003648	0.004638	0.744958	0.255042	1.289475
849	849	0.004219	0.000523	0.028811	0.060055	0.041451	0.000419	0.00034	0.00193	0.003542	0	0.000687	0.004013	0.008853	0.001335	0.004892	0.004401	0.002782	0.002549	0.743086	0.256914	1.438752

Appendix 1 - Bienen 9 B

Depth	Real depth	%Clay	%Very Fine	%Fine Silt	%Coarse S	%Very Fine	%Fine San	%Middle C	%Coarse S	%Very Coarse	Sand							Original (-last)				
		< 8 µm	8-16 µm	16-32 µm	32-63 µm	63-125 µm	125-250 µn	250-500 µn	500-1000 µ	1000-2000	Clay	Silt	Sand	>8um	>16um	>32um	>64um	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti
737	721	49.88	21.38	17.07	8.25	2.84	0.57	0	0	0	49.88	46.7	3.42	50.11	28.73	11.66	3.42	1.271767	20.48503	156.479	185.2515	1.183874
739	723	49.55	20.81	17.12	8.91	3.06	0.55	0	0	0	49.55	46.84	3.61	50.45	29.64	12.52	3.61	1.090349	13.82236	88.51896	75.27545	0.850388
741	726	50.19	23.57	16.41	7.22	2.27	0.35	0	0	0	50.19	47.19	2.62	49.82	26.25	9.84	2.62	1.080732	31.71176	217.3941	187.9647	0.864626
743	728	50.22	22.64	16.18	7.62	2.76	0.57	0	0	0	50.22	46.44	3.34	49.77	27.13	10.95	3.34	1.055215	15.91922	117.5376	101.1448	0.860532
745	731	53.66	23.62	16.08	5.1	1.2	0.34	0	0	0	53.66	44.79	1.55	46.34	22.72	6.64	1.55	1.056821	18.60526	122.8589	97.311	0.792055
747	733	52.12	24.9	17.05	5.14	0.68	0.1	0	0	0	52.12	47.1	0.78	47.87	22.97	5.92	0.78	1.058496	14.712	108.188	86.568	0.800163
749	735	51.36	25.49	16.06	5.47	1.33	0.29	0	0	0	51.36	47.02	1.62	48.64	23.15	7.09	1.62	0.942748	17.20988	139.758	95.46667	0.683085
751	738	56.27	20.73	14.84	6.26	1.55	0.35	0	0	0	56.27	41.83	1.9	43.73	23	8.16	1.9	0.961294	14.2354	103.8248	73.55657	0.708468
753	740	52.74	23.18	16.04	6.04	1.61	0.4	0	0	0	52.74	45.25	2.01	47.27	24.09	8.05	2.01	0.969979	14.5823	104.3539	79.04527	0.757473
755	743	52.98	23.57	16.73	5.49	1	0.22	0	0	0	52.98	45.79	1.22	47.01	23.44	6.71	1.22	0.964051	18.59211	141.9316	104.0237	0.732914
757	745	47.97	24.33	19.14	6.89	1.36	0.3	0	0	0	47.97	50.36	1.67	52.02	27.69	8.55	1.67	0.956844	16.8186	129.1651	90.85349	0.70339
759	747	55.16	20.74	15.42	6.87	1.6	0.22	0	0	0	55.16	43.03	1.81	44.85	24.11	8.69	1.81	1.022077	14.36257	114.2144	83.02729	0.726942
761	750	66.83	19.77	10.58	2.78	0.04	0	0	0	0	66.83	33.13	0.04	33.17	13.4	2.82	0.04	1.046001	17.95735	139.9882	104.7488	0.748269
763	752	67.1	18.94	10.17	2.79	0.68	0.32	0	0	0	67.1	31.9	1	32.9	13.96	3.79	1	0.739905	15.52902	120.308	72.76339	0.604809
765	755	58.79	21.54	13.1	4.75	1.37	0.45	0	0	0	58.79	39.39	1.82	41.21	19.67	6.57	1.82	0.848911	17.72953	126.4417	89.20099	0.705471
767	757	56.38	22.6	13.81	5.46	1.42	0.32	0	0	0	56.38	41.88	1.74	43.61	21.01	7.2	1.74	0.918139	15.54279	115.3178	88.30073	0.765716
769	759	59.9	21.95	13.04	3.8	0.78	0.53	0	0	0	59.9	38.79	1.31	40.1	18.15	5.11	1.31	0.861406	21.39519	166.6907	120.3333	0.721896
771	762	55.28	23.95	14.51	5.02	1.01	0.23	0	0	0	55.28	43.49	1.23	44.72	20.77	6.26	1.23	0.908895	14.75506	114.9124	82.36629	0.716775
773	764	52.44	22.57	16.19	6.86	1.58	0.35	0	0	0	52.44	45.62	1.94	47.55	24.98	8.79	1.94	0.901318	13.26531	101.4143	73.98163	0.729499
775	767	55.48	22.61	14.73	5.67	1.23	0.27	0	0	0	55.48	43.02	1.5	44.51	21.9	7.17	1.5	0.97168	18.70326	141.4095	110.2611	0.779729
777	769	55.11	21.35	15.89	5.9	1.22	0.54	0	0	0	55.11	43.13	1.77	44.9	23.55	7.66	1.77	0.896982	19.9746	138.8984	106.5302	0.766965
779	771	41.21	19.87	21.69	12.51	3.93	0.79	0	0	0	41.21	54.07	4.72	58.79	38.92	17.23	4.72	1.157215	17.29537	87.41313	81.82046	0.93602
781	774	60.98	21.73	12.01	3.79	1.06	0.43	0	0	0	60.98	37.53	1.49	39.02	17.29	5.28	1.49	0.863146	15.20899	104.3191	77.64045	0.744259
783	776	55.93	21.27	14.59	6.08	1.79	0.35	0	0	0	55.93	41.94	2.14	44.08	22.81	8.22	2.14	0.961182	15.20042	98.13987	79.50522	0.810121
785	779	52.67	20.83	16.22	7.87	2.09	0.32	0	0	0	52.67	44.92	2.42	47.33	26.5	10.28	2.42	0.922463	16.25159	103.7844	77.49471	0.74669
787	781	57.26	22.23	14.74	4.88	0.89	0.01	0	0	0	57.26	41.85	0.89	42.75	20.52	5.78	0.89	0.856417	15.1299	102.9134	72.27629	0.702302
789	783	59.66	22.31	13.97	4.01	0.05	0	0	0	0	59.66	40.29	0.05	40.34	18.03	4.06	0.05	1.070348	15.91105	102.5094	94.61186	0.922958
791	786	54.76	21.16	15.38	6.38	1.9	0.42	0	0	0	54.76	42.91	2.33	45.24	24.08	8.7	2.33	0.940608	17.13333	113.8833	85.06905	0.746984
793	788	56.53	21.57	14.68	5.69	1.36	0.16	0	0	0	56.53	41.94	1.53	43.46	21.89	7.21	1.53	0.923965	16.94272	118.463	86.94749	0.733963
795	791	48.64	25.14	18.44	6.45	1.15	0.19	0	0	0	48.64	50.03	1.33	51.37	26.23	7.79	1.33	0.911503	23.01338	158.5318	118.7057	0.748782
797	793	54.75	21.24	15.63	6.62	1.49	0.26	0	0	0	54.75	43.49	1.76	45.24	24	8.37	1.76	1.070542	18.745	122.47	101.3	0.827141
799	795	55.75	21.1	14.91	6.31	1.67	0.25	0	0	0	55.75	42.32	1.93	44.24	23.14	8.23	1.93	0.973973	16.77488	119.6493	93.109	0.778183
801	798	51.55	20.69	17.26	8.61	1.85	0.04	0	0	0	51.55	46.56	1.89	48.45	27.76	10.5	1.89	0.93043	14.27766	97.58664	73.51566	0.753337
803	800	52.37	21.51	17.37	6.78	1.4	0.57	0	0	0	52.37	45.65	1.97	47.63	26.12	8.75	1.97	0.873183	14.54776	102.115	70.12865	0.686761
805	803	60.5	21.19	13.39	4.38	0.53	0.01	0	0	0	60.5	38.95	0.55	39.5	18.31	4.92	0.55	0.996296	17.63679	123.1415	91.99292	0.74705
807	805	56.59	23.39	14.89	4.51	0.57	0.05	0	0	0	56.59	42.79	0.62	43.41	20.02	5.13	0.62	1.065793	18.1945	112.1818	88.56448	0.789473
809	807	49.77	22.75	18.26	7.38	1.58	0.27	0	0	0	49.77	48.39	1.85	50.24	27.49	9.23	1.85	1.112171	20.70055	127.3599	108.8736	0.85485
811	810	43.95	21.15	21.1	11.32	2.42	0.07	0	0	0	43.95	53.57	2.48	56.06	34.91	13.81	2.48	1.314516	20.06667	101.1379	104.1701	1.029981
813	812	45.8	21.21	20.39	10.44	2.11	0.05	0	0	0	45.8	52.05	2.16	54.2	32.99	12.6	2.16	1.141407	16.41221	94.24618	80.48664	0.854004
815	815	44.01	20.11	20.33	12.5	3.01	0.04	0	0	0	44.01	52.94	3.05	55.99	35.88	15.55	3.05	1.15502	21.38033	114.5213	99.00984	0.864554
817	817	42.47	19.52	20.74	13.82	3.39	0.06	0	0	0	42.47	54.08	3.45	57.53	38.01	17.27	3.45	28.24242	0.642857	0.380952	55.47619	145.625

	>8um	>16um	>32um	>64um
Original	0.326337	0.39212	0.433385	0.277504
Original - last	0.601645	0.630126	0.599367	0.4238
Shifted	0.173047	0.109683	0.069308	0.07333

	Original				
	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti
>8um	0.601645	0.218664	-0.10606	0.165965	0.516456
>16um	0.630126	0.169016	-0.20474	0.10843	0.556532
>32um	0.599367	0.136923	-0.22572	0.103775	0.567165
>64um	0.4238	0.111696	-0.12262	0.166649	0.498668

Appendix 1 - Bienen 9 A

Depth	Real depth	%Clay < 8 µm	%Very Fine 8-16 µm	%Fine Silt 16-32 µm	%Coarse S 32-63 µm	%Very Fine 63-125 µm	%Fine San 125-250 µm	%Middle C 250-500 µm	%Coarse S 500-1000 µm	%Very Coarse Sand 1000-2000	Clay	Silt	Sand	P95
737	721	49.88	21.38	17.07	8.25	2.84	0.57	0	0	0	49.88	46.7	3.42	44.2
739	723	49.55	20.81	17.12	8.91	3.06	0.55	0	0	0	49.55	46.84	3.61	52.6
741	726	50.19	23.57	16.41	7.22	2.27	0.35	0	0	0	50.19	47.19	2.62	44.2
743	728	50.22	22.64	16.18	7.62	2.76	0.57	0	0	0	50.22	46.44	3.34	44.2
745	731	53.66	23.62	16.08	5.1	1.2	0.34	0	0	0	53.66	44.79	1.55	31.3
747	733	52.12	24.9	17.05	5.14	0.68	0.1	0	0	0	52.12	47.1	0.78	31.3
749	735	51.36	25.49	16.06	5.47	1.33	0.29	0	0	0	51.36	47.02	1.62	37.2
751	738	56.27	20.73	14.84	6.26	1.55	0.35	0	0	0	56.27	41.83	1.9	37.2
753	740	52.74	23.18	16.04	6.04	1.61	0.4	0	0	0	52.74	45.25	2.01	37.2
755	743	52.98	23.57	16.73	5.49	1	0.22	0	0	0	52.98	45.79	1.22	31.3
757	745	47.97	24.33	19.14	6.89	1.36	0.3	0	0	0	47.97	50.36	1.67	37.2
759	747	55.16	20.74	15.42	6.87	1.6	0.22	0	0	0	55.16	43.03	1.81	37.2
761	750	66.83	19.77	10.58	2.78	0.04	0	0	0	0	66.83	33.13	0.04	22.1
763	752	67.1	18.94	10.17	2.79	0.68	0.32	0	0	0	67.1	31.9	1	26.3
765	755	58.79	21.54	13.1	4.75	1.37	0.45	0	0	0	58.79	39.39	1.82	37.2
767	757	56.38	22.6	13.81	5.46	1.42	0.32	0	0	0	56.38	41.88	1.74	37.2
769	759	59.9	21.95	13.04	3.8	0.78	0.53	0	0	0	59.9	38.79	1.31	31.3
771	762	55.28	23.95	14.51	5.02	1.01	0.23	0	0	0	55.28	43.49	1.23	31.3
773	764	52.44	22.57	16.19	6.86	1.58	0.35	0	0	0	52.44	45.62	1.94	37.2
775	767	55.48	22.61	14.73	5.67	1.23	0.27	0	0	0	55.48	43.02	1.5	37.2
777	769	55.11	21.35	15.89	5.9	1.22	0.54	0	0	0	55.11	43.13	1.77	37.2
779	771	41.21	19.87	21.69	12.51	3.93	0.79	0	0	0	41.21	54.07	4.72	52.6
781	774	60.98	21.73	12.01	3.79	1.06	0.43	0	0	0	60.98	37.53	1.49	31.3
783	776	55.93	21.27	14.59	6.08	1.79	0.35	0	0	0	55.93	41.94	2.14	37.2
785	779	52.67	20.83	16.22	7.87	2.09	0.32	0	0	0	52.67	44.92	2.42	44.2
787	781	57.26	22.23	14.74	4.88	0.89	0.01	0	0	0	57.26	41.85	0.89	31.3
789	783	59.66	22.31	13.97	4.01	0.05	0	0	0	0	59.66	40.29	0.05	26.3
791	786	54.76	21.16	15.38	6.38	1.9	0.42	0	0	0	54.76	42.91	2.33	37.2
793	788	56.53	21.57	14.68	5.69	1.36	0.16	0	0	0	56.53	41.94	1.53	37.2
795	791	48.64	25.14	18.44	6.45	1.15	0.19	0	0	0	48.64	50.03	1.33	37.2
797	793	54.75	21.24	15.63	6.62	1.49	0.26	0	0	0	54.75	43.49	1.76	37.2
799	795	55.75	21.1	14.91	6.31	1.67	0.25	0	0	0	55.75	42.32	1.93	37.2
801	798	51.55	20.69	17.26	8.61	1.85	0.04	0	0	0	51.55	46.56	1.89	44.2
803	800	52.37	21.51	17.37	6.78	1.4	0.57	0	0	0	52.37	45.65	1.97	37.2
805	803	60.5	21.19	13.39	4.38	0.53	0.01	0	0	0	60.5	38.95	0.55	31.3
807	805	56.59	23.39	14.89	4.51	0.57	0.05	0	0	0	56.59	42.79	0.62	31.3
809	807	49.77	22.75	18.26	7.38	1.58	0.27	0	0	0	49.77	48.39	1.85	37.2
811	810	43.95	21.15	21.1	11.32	2.42	0.07	0	0	0	43.95	53.57	2.48	44.2
813	812	45.8	21.21	20.39	10.44	2.11	0.05	0	0	0	45.8	52.05	2.16	44.2
815	815	44.01	20.11	20.33	12.5	3.01	0.04	0	0	0	44.01	52.94	3.05	52.6
817	817	42.47	19.52	20.74	13.82	3.39	0.06	0	0	0	42.47	54.08	3.45	52.6

		Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	As
737	721	0.000245	0.005012	0.000129	0.002381	3.96E-05	0.007762	0.043146	0.173652	1.32E-05	0.038288	0.001305	0.002407	0.035092	1.593198	0.016715	0.001043	0.000224	0.008666	0.001512	0.003212
739	723	0.000576	0.007964	6.78E-05	0.001923	8.05E-06	0.003567	0.062313	0.233358	2.53E-05	0.051	0.001581	0.003074	0.076165	2.344111	0.022797	0.001531	0.000116	0.011081	0.002171	0.006223
741	726	0.000219	0.006935	4.76E-05	0.006216	1.16E-05	0.002402	0.05779	0.270814	8.36E-05	0.047542	0.001851	0.002833	0.052401	2.129286	0.020657	0.000894	1.42E-05	0.010989	0.002464	0.003823
743	728	0.000408	0.006494	4.2E-05	0.005328	5.68E-06	0.002226	0.056823	0.240685	0	0.04795	0.001957	0.00289	0.05606	2.057781	0.021376	0.001175	7.73E-05	0.012458	0.002028	0.003592
745	731	0.000443	0.008247	0.000115	0.001454	5.3E-06	0.00231	0.065316	0.207154	0	0.05446	0.002198	0.003275	0.056879	2.305637	0.022056	0.001155	7.11E-05	0.013568	0.002704	0.005056
747	733	0.000508	0.007473	7.11E-05	0.001486	0	0.002297	0.063293	0.152625	0	0.054953	0.00225	0.00329	0.060172	2.308946	0.023109	0.001475	0.000116	0.013848	0.002366	0.004733
749	735	0.000419	0.007213	9.52E-05	0.001296	7.24E-06	0.002125	0.064817	0.141809	1.14E-05	0.058573	0.002053	0.003556	0.076733	2.646999	0.024842	0.000659	7.35E-05	0.012893	0.002259	0.005391
751	738	0.000557	0.007925	8.33E-05	0.00117	0	0.002342	0.064571	0.191455	0	0.0578	0.002382	0.003122	0.057765	2.300706	0.02191	0.001261	8.94E-05	0.013344	0.001912	0.00561
753	740	0.000521	0.007603	6.01E-05	0.00099	1.61E-05	0.002038	0.063008	0.192495	0	0.054406	0.00203	0.003529	0.050351	2.318309	0.021847	0.001242	4.51E-05	0.012414	0.002034	0.005261
755	743	0.000385	0.007166	6.9E-05	0.001136	0	0.00262	0.063584	0.183198	0	0.054704	0.001998	0.003621	0.068222	2.530574	0.024075	0.000899	9.13E-05	0.011937	0.002128	0.005393
757	745	0.000432	0.007266	4.32E-05	0.00124	5.02E-06	0.002563	0.062399	0.178299	0	0.055799	0.00205	0.003465	0.072811	2.482486	0.023372	0.00097	8.64E-05	0.012609	0.002328	0.006322
759	747	0.000523	0.007517	5.51E-05	0.001053	0	0.002464	0.06428	0.156964	0	0.059777	0.002209	0.003562	0.066203	2.337966	0.022276	0.001572	8.26E-05	0.013525	0.002288	0.005933
761	750	0.000435	0.007807	4.95E-05	0.001067	4.12E-06	0.001849	0.06723	0.160451	3.71E-05	0.06086	0.00243	0.003571	0.048718	2.391024	0.023536	0.001775	0.000104	0.012856	0.002296	0.004554
763	752	0.000461	0.007159	0.000111	0.000976	1.54E-05	0.002792	0.072968	0.19176	5.15E-06	0.055465	0.002075	0.003418	0.067807	2.799709	0.026723	0.0008	4.53E-05	0.012093	0.001688	0.004854
765	755	0.000431	0.00765	4.71E-05	0.001015	5.35E-06	0.002833	0.072462	0.168818	1.39E-05	0.054555	0.002172	0.003393	0.048744	2.503838	0.023269	0.001022	9.96E-05	0.012003	0.002259	0.005262
767	757	0.000445	0.006919	9.03E-05	0.001021	0	0.003306	0.061423	0.152852	3.37E-05	0.051338	0.00203	0.003154	0.038498	2.20958	0.021277	0.001397	0.000179	0.012239	0.002083	0.005287
769	759	0.000299	0.006401	1.64E-05	0.002246	0	0.002413	0.062738	0.215201	0	0.049868	0.002187	0.003101	0.073723	2.520933	0.024322	0.000765	8.22E-06	0.011701	0.001817	0.005267
771	762	0.000455	0.006718	0.000114	0.004682	1.33E-05	0.001555	0.061401	0.183645	0	0.052316	0.002146	0.002987	0.044189	2.360954	0.023119	0.001032	0	0.012098	0.002001	0.004762
773	764	0.000499	0.006615	9.97E-05	0.002712	0	0.001811	0.059128	0.19639	0	0.050574	0.002138	0.003094	0.063568	2.480954	0.022572	0.000508	4.07E-06	0.011292	0.001412	0.006286
775	767	0.000348	0.006506	7.84E-05	0.005189	0	0.001791	0.057744	0.238337	1.55E-05	0.04919	0.002019	0.003163	0.07023	2.451482	0.024022	0.000539	7.64E-05	0.01095	0.002271	0.005863
777	769	0.000338	0.006745	3.43E-05	0.004199	4.29E-06	0.001564	0.057186	0.269392	0	0.0469	0.001982	0.002626	0.057141	2.170074	0.020675	0.000598	2.68E-05	0.011221	0.001998	0.005321
779	771	0.000536	0.009277	2.8E-05	0.002022	0	0.00188	0.058026	0.315792	0	0.046886	0.00166	0.002833	0.050964	1.915111	0.019531	0.001214	6.32E-05	0.010695	0.002222	0.004922
781	774	0.000443	0.006737	1.79E-05	0.001468	1.29E-05	0.001258	0.058208	0.241374	1.99E-05	0.04621	0.00224	0.002911	0.055824	2.339004	0.022389	0.000553	4.78E-05	0.011479	0.001376	0.00663
783	776	0.000488	0.007425	6.12E-05	0.001049	0	0.001307	0.058773	0.239678	0	0.047938	0.001817	0.003049	0.047819	2.181142	0.021756	0.000731	0	0.011473	0.001585	0.00492
785	779	0.000483	0.007853	4.19E-05	0.001172	1.43E-05	0.001854	0.063145	0.262598	0	0.050149	0.002108	0.002933	0.049547	2.323497	0.022058	0.000708	3.78E-05	0.011997	0.002022	0.004849
787	781	0.000504	0.007629	5.2E-06	0.001165	0	0.002353	0.066883	0.261437	0	0.051894	0.001917	0.003158	0.039473	2.314393	0.022413	0.001206	0.000175	0.012314	0.002186	0.004908
789	783	0.000434	0.006899	5.73E-05	0.000975	1.75E-05	0.004399	0.054863	0.204421	0	0.044448	0.001189	0.002732	0.037447	1.953089	0.019577	0.000906	5.38E-05	0.010766	0.002543	0.004788
791	786	0.000436	0.007467	5.29E-05	0.00123	0	0.002602	0.060039	0.237351	0	0.049633	0.002094	0.003174	0.06839	2.451331	0.023169	0.000905	9.34E-05	0.012202	0.002451	0.005772
793	788	0.000435	0.007371	6.65E-05	0.001246	0	0.002913	0.061298	0.241094	0	0.05154	0.002046	0.003016	0.081119	2.500685	0.02388	0.000795	4.15E-05	0.012905	0.002176	0.005338
795	791	0.000314	0.007224	1.68E-05	0.001194	8.4E-06	0.002985	0.06257	0.279595	0	0.04976	0.001968	0.002971	0.057491	2.312811	0.022086	0.001092	8.5E-05	0.01215	0.001847	0.005129
797	793	0.000416	0.007793	1.46E-05	0.000976	0	0.00322	0.062378	0.247084	0	0.050915	0.001714	0.003014	0.046839	2.179023	0.021892	0.001505	7.38E-05	0.012409	0.002143	0.005165
799	795	0.000428	0.007176	0.000105	0.000938	3.75E-05	0.002096	0.062565	0.237392	0	0.051183	0.001928	0.003226	0.041347	2.255607	0.02192	0.000962	5.27E-05	0.012423	0.002211	0.005689
801	798	0.000526	0.007503	3.84E-05	0.001069	1.21E-05	0.002081	0.06518	0.257655	8.78E-06	0.051284	0.002101	0.003095	0.039279	2.231001	0.021812	0.001261	4.06E-05	0.011386	0.002828	0.005075
803	800	0.000539	0.007834	4.83E-05	0.001098	0	0.001815	0.070428	0.251871	0	0.054992	0.002096	0.003272	0.03909	2.358852	0.022857	0.001146	6.4E-05	0.011733	0.001785	0.00492
805	803	0.000443	0.007819	7.95E-05	0.001096	0	0.002279	0.063283	0.211631	0	0.05459	0.002172	0.003202	0.056757	2.423121	0.022969	0.000638	0	0.012598	0.002172	0.004851
807	805	0.000479	0.008718	2.03E-05	0.001236	5.07E-06	0.002109	0.06368	0.267946	0	0.053753	0.001701	0.003272	0.06591	2.402204	0.023028	0.001147	6.79E-05	0.011989	0.002822	0.00504
809	807	0.000401	0.008308	0.000108	0.001119	0	0.001977	0.059987	0.248118	4.41E-06	0.051117	0.002031	0.003009	0.049805	2.14541	0.020608	0.000707	9.92E-06	0.01131	0.002115	0.005041
811	810	0.000458	0.009181	1.68E-05	0.001118	0	0.002258	0.055885	0.330244	0	0.046273	0.001356	0.002803	0.052974	1.85898	0.018682	0.001157	4.42E-05	0.011098	0.002422	0.004525
813	812	0.000553	0.009074	3.69E-05	0.00118	0	0.003018	0.06214	0.292956	2.22E-05	0.052109	0.001906	0.003227	0.056404	2.129328	0.019402	0.001347	1.58E-05	0.012046	0.002657	0.004672
815	815	0.000423	0.009047	3.75E-05	0.001285	5.55E-05	0.006755	0.06148	0.330276	1.11E-05	0.048457	0.001515	0.00298	0.050528	2.061585	0.019314	0.001473	0.000173	0.015149	0.002515	0.004441
817	817	0.000347	0.000223	0.000198	0.00038	0.000451	0.032593	0.000624	0.000616	2.89E-05	0.000132	4.55E-05	0.000269	0.00038	0.002592	0.001666	0	0	0.030005	0.00019	0.002336

		Se	Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh	Zr/Rb
737	721	0.00464	0.001795	0.035642	0.046696	0.045328	0.000261	0.000592	0.000469	0.000733	0	0.001131	0.004643	0.007711	0.001713	0.004371	0.003234	0.004067	0.002533	0.744575	0.255425	1.271767
739	723	0.004996	0.001321	0.039776	0.050001	0.043369	0.000255	0.000425	0.000646	0.001354	0	0.001273	0.005212	0.008853	0.001764	0.004567	0.003951	0.003643	0.005341	0.74831	0.25169	1.090349
741	726	0.004765	0.001876	0.038036	0.049323	0.041106	0.000718	0.000329	0.001002	0.001623	0	0.001023	0.005242	0.008517	0.001512	0.004921	0.003581	0.004869	0.003834	0.748526	0.251474	1.080732
743	728	0.004644	0.001427	0.039103	0.048961	0.041262	0.000543	0.000306	0.000568	0.001475	0	0.001647	0.004889	0.008367	0.001983	0.004947	0.003974	0.005045	0.004135	0.748473	0.251527	1.055215
745	731	0.004564	0.001474	0.040816	0.049291	0.043136	0.000314	0.000478	0.000549	0.000905	0	0.001344	0.00504	0.008851	0.001154	0.004713	0.003522	0.004733	0.005058	0.749406	0.250594	1.056821
747	733	0.004777	0.001611	0.041542	0.046833	0.043972	0.000438	0.000329	0.00027	0.000445	0	0.002704	0.005313	0.009297	0.001296	0.004389	0.00353	0.005693	0.004422	0.751352	0.248648	1.058496
749	735	0.005668	0.001763	0.04244	0.046899	0.040011	0.00043	0.000256	0.000202	0.000322	0	0.003765	0.005647	0.008771	0.001612	0.004517	0.003655	0.005109	0.005943	0.749274	0.250726	0.942748
751	738	0.005386	0.001461	0.042598	0.049513	0.04095	0.000467	0.000357	0.000291	0.000934	0	0.003118	0.005611	0.009222	0.001602	0.004594	0.003494	0.004339	0.00594	0.751964	0.248036	0.961294
753	740	0.004862	0.001568	0.042486	0.050216	0.041211	0.000511	0.000241	0.000519	0.000697	0	0.001306	0.005659	0.008712	0.001934	0.004905	0.003654	0.004225	0.005221	0.751359	0.248641	0.969979
755	743	0.004741	0.00089	0.041588	0.047382	0.040093	0.000297	0.00033	0.000351	0.000601	0	0.000935	0.005003	0.009084	0.001602	0.004621	0.003827	0.00423	0.005585	0.752781	0.247219	0.964051
757	745	0.005136	0.001644	0.041019	0.046698	0.039248	0.00028	0.000385	0.000366	0.000585	0	0.00164	0.005201	0.008899	0.001779	0.005091	0.003925	0.00414	0.00542	0.753988	0.246012	0.956844
759	747	0.004776	0.001734	0.042516	0.045942	0.043454	0.000463	0.000446	0.000418	0.000697	0	0.001537	0.005519	0.008982	0.001592	0.004264	0.003733	0.004217	0.005149	0.753179	0.246821	1.022077
761	750	0.004979	0.001025	0.043537	0.046806	0.045539	0.000672	0.000179	0.000185	0.000564	0	0.001979	0.005793	0.009505	0.001671	0.00421	0.004101	0.004764	0.005099	0.751114	0.248886	1.046001
763	752	0.005439	0.000925	0.045338	0.04764	0.033546	0.00025	0.000392	0.000432	0.000765	0	0.001586	0.005467	0.008285	0.002651	0.004577	0.004273	0.004099	0.006587	0.750445	0.249555	0.739905
765	755	0.005122	0.001544	0.045337	0.045433	0.038487	0.000547	0.000269	0.00058	0.000648	0	0.001506	0.005387	0.008162	0.001888	0.004314	0.003634	0.003465	0.00525	0.750984	0.249016	0.848911
767	757	0.005332	0.001071	0.042815	0.04617	0.03931	0.000548	0.000332	0.000409	0.000421	0	0.001438	0.005021	0.008608	0.001964	0.004554	0.003834	0.003579	0.00509	0.751335	0.248665	0.918139
769	759	0.004833	0.001363	0.041792	0.052171	0.036	0.000392	0.000493	0.000611	0.001132	0	0.001436	0.005534	0.008699	0.001613	0.004558	0.003897	0.003755	0.005394	0.751032	0.248968	0.861406
771	762	0.004743	0.002226	0.041258	0.050647	0.037499	0.000589	0.000168	0.000534	0.000887	0	0.001532	0.004865	0.008519	0.001813	0.004476	0.003104	0.004273	0.005142	0.75158	0.24842	0.908895
773	764	0.00493	0.001627	0.040933	0.051677	0.036893	0.000241	0.000422	0.000496	0.000739	0	0.001302	0.005519	0.008158	0.001889	0.004679	0.00339	0.003904	0.005869	0.74952	0.25048	0.901318
775	767	0.005322	0.001448	0.039473	0.05197	0.038355	0.000252	0.000247	0.000676	0.00145	0	0.002316	0.005002	0.008496	0.001712	0.004584	0.003847	0.003156	0.004982	0.748223	0.251777	0.97168
777	769	0.005021	0.001432	0.040102	0.056661	0.035971	0.000498	0.00028	0.000986	0.001807	0	0.001378	0.004658	0.008543	0.001625	0.004209	0.003669	0.003168	0.005385	0.749613	0.250387	0.896982
779	771	0.004686	0.000544	0.037924	0.061148	0.043886	0.000529	0.000266	0.001302	0.002148	0	0.001083	0.005097	0.009427	0.001536	0.004546	0.003901	0.003938	0.004133	0.744757	0.255243	1.157215
781	774	0.005145	0.001551	0.039845	0.053919	0.034392	0.00051	0.000217	0.000716	0.001553	0	0.001445	0.005097	0.008191	0.002067	0.0043	0.002874	0.00314	0.005578	0.752612	0.247388	0.863146
783	776	0.005343	0.001435	0.040404	0.055485	0.038836	0.000545	0.000275	0.000741	0.001416	0	0.000959	0.004562	0.008058	0.001712	0.004623	0.003696	0.003789	0.00483	0.747255	0.252745	0.961182
785	779	0.005401	0.00087	0.040593	0.056103	0.037446	0.000424	0.000298	0.001058	0.001798	0	0.000945	0.004845	0.008304	0.001684	0.004777	0.004173	0.004027	0.005548	0.746959	0.253041	0.922463
787	781	0.005538	0.001441	0.042556	0.055848	0.036445	0.00054	0.000139	0.000645	0.001651	0	0.001321	0.004821	0.00867	0.002181	0.004374	0.003728	0.003586	0.005127	0.748289	0.251711	0.856417
789	783	0.004362	0.001255	0.038327	0.052237	0.041023	0.000276	0.000299	0.000596	0.000787	0	0.001215	0.004877	0.007675	0.001408	0.004036	0.003347	0.003664	0.003539	0.748307	0.251693	1.070348
791	786	0.00477	0.00157	0.039416	0.053573	0.037075	0.000449	0.000152	0.00072	0.000964	0	0.001104	0.004873	0.008606	0.001594	0.004636	0.003065	0.004773	0.00502	0.750004	0.249996	0.940608
793	788	0.005249	0.000842	0.040942	0.053774	0.037829	0.000334	0.000498	0.000724	0.001609	0	0.002592	0.004944	0.008096	0.001907	0.004659	0.003984	0.004429	0.005541	0.747173	0.252827	0.923965
795	791	0.00555	0.001349	0.040877	0.058209	0.03726	0.000504	0.000344	0.001088	0.00214	0	0.001718	0.005179	0.008352	0.002109	0.004832	0.004211	0.003835	0.005097	0.746625	0.253375	0.911503
797	793	0.005148	0.001199	0.039339	0.055744	0.042114	0.00045	0.000408	0.000857	0.00148	0	0.001368	0.005495	0.008793	0.001725	0.004946	0.003965	0.004379	0.004808	0.747545	0.252455	1.070542
799	795	0.004857	0.001547	0.040894	0.054525	0.03983	0.000465	0.000305	0.00105	0.001117	0	0.001493	0.005297	0.008811	0.001573	0.004651	0.003537	0.003898	0.005194	0.748801	0.251199	0.973973
801	798	0.004782	0.001297	0.041523	0.056687	0.038634	0.000391	0.000344	0.000939	0.001494	0	0.001023	0.004684	0.008393	0.001115	0.004113	0.003633	0.00385	0.00458	0.746655	0.253345	0.93043
803	800	0.004781	0.001313	0.043252	0.056362	0.037767	0.00069	0.000287	0.000931	0.001624	0	0.001641	0.004876	0.008305	0.001766	0.004576	0.003737	0.003841	0.004786	0.746217	0.253783	0.873183
805	803	0.005261	0.001267	0.040933	0.05128	0.040781	0.00043	0.000189	0.000736	0.001059	0	0.00219	0.00528	0.008901	0.001649	0.004593	0.003956	0.004656	0.005152	0.748239	0.251761	0.996296
807	805	0.004497	0.000605	0.039817	0.056061	0.042437	0.000544	0.000231	0.001083	0.001541	0	0.001739	0.005151	0.00882	0.00146	0.005025	0.004387	0.004298	0.005592	0.746045	0.253955	1.065793
809	807	0.00508	0.002215	0.03929	0.055686	0.043697	0.000753	0.000228	0.001159	0.001668	0	0.002017	0.00489	0.009352	0.001032	0.004747	0.003671	0.003964	0.00438	0.746276	0.253724	1.112171
811	810	0.004889	0.001238	0.036257	0.063625	0.04766	0.00078	0.000255	0.001489	0.002372	0	0.001211	0.00488	0.009031	0.000963	0.004941	0.003635	0.004088	0.003797	0.743198	0.256802	1.314516
813	812	0.005009	0.001213	0.038988	0.060226	0.044502	0.000185	0.000533	0.001217	0.001949	0	0.001489	0.004939	0.008831	0.000769	0.004654	0.003505	0.003788	0.005751	0.74493	0.25507	1.141407
815	815	0.005499	0.001323	0.036271	0.058886	0.041894	0.000598	0.000307	0.001225	0.002131	0	0.002482	0.004715	0.008203	0.001258	0.005043	0.003987	0.004577	0.00522	0.742821	0.257179	1.15502
817	817	0.00671	0.004543	0.000682	0.000947	0.019265	0.001484	0.000298	0.000124	2.48E-05	1.65E-05	2.07E-05	0.001505	0.001753	0.001869	0.008248	0.003282	0.002638	0.002373	0.730886	0.269114	28.24242

Appendix 1 - Bienen 8 B

Depth	Real depth	%Clay	%Very Fine	%Fine Silt	%Coarse S	%Very Fine	%Fine San	%Middle C	%Coarse S	%Very Coarse	Sand							Original					Shifted graph				
		< 8 µm	8-16 µm	16-32 µm	32-63 µm	63-125 µm	125-250 µm	250-500 µm	500-1000 µ	1000-2000	Clay	Silt	Sand	>8um	>16um	>32um	>64um	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti
631	621	46.06	20.6	18.32	10.66	3.78	0.57	0	0	0	46.06	49.59	4.35	53.93	33.33	15.01	4.35	1.432824	9.512097	79.37903	117.6129	1.481662	1.222747	12.45552	99.91103	115.0819	1.151843
633	623	50.25	21.02	16.91	8.09	2.96	0.77	0	0	0	50.25	46.02	3.73	49.75	28.73	11.82	3.73	1.222747	12.45552	99.91103	115.0819	1.151843	1.14217	15.69841	126.496	132.0159	1.043636
635	625	54.39	21.62	15.06	6.59	2.01	0.33	0	0	0	54.39	43.27	2.34	45.61	23.99	8.93	2.34	1.14217	15.69841	126.496	132.0159	1.043636	1.275461	16.96241	142.609	260.5489	1.827015
637	628	54.41	21.59	15.1	6.74	1.92	0.25	0	0	0	54.41	43.43	2.17	45.6	24.01	8.91	2.17	1.275461	16.96241	142.609	260.5489	1.827015	1.185575	14.5614	114.7149	158.3991	1.380807
639	630	54.07	21.67	15.98	6.57	1.41	0.31	0	0	0	54.07	44.21	1.72	45.94	24.27	8.29	1.72	1.185575	14.5614	114.7149	158.3991	1.380807	1.107221	23.67708	194.6927	200.1302	1.027929
641	632	53.82	21.14	15.98	7.49	1.56	0.01	0	0	0	53.82	44.61	1.57	46.18	25.04	9.06	1.57	1.107221	23.67708	194.6927	200.1302	1.027929	1.058321	16.14618	145.1761	124.3123	0.856286
643	634	51.32	21.73	17.3	7.87	1.68	0.09	0	0	0	51.32	46.91	1.77	48.67	26.94	9.64	1.77	1.058321	16.14618	145.1761	124.3123	0.856286	1.049053	11.41304	191.1565	170.0652	0.889665
645	637	50.88	20.7	16.63	8.83	2.59	0.37	0	0	0	50.88	46.16	2.96	49.12	28.42	11.79	2.96	1.049053	11.41304	191.1565	170.0652	0.889665	1.07133	23.03252	376.1789	323.4634	0.859866
647	639	49.59	23.98	15.77	7.72	2.55	0.39	0	0	0	49.59	47.47	2.94	50.41	26.43	10.66	2.94	1.07133	23.03252	376.1789	323.4634	0.859866	1.18683	31.38947	473.3368	434.8421	0.918674
649	641	45.84	20.42	18.93	11.21	3.11	0.5	0	0	0	45.84	50.56	3.6	54.17	33.75	14.82	3.6	1.18683	31.38947	473.3368	434.8421	0.918674	1.211112	14.59447	210.9631	201.106	0.953276
651	643	48.64	21.53	18.05	9.62	2.11	0.05	0	0	0	48.64	49.2	2.16	51.36	29.83	11.78	2.16	1.211112	14.59447	210.9631	201.106	0.953276	1.22814	36.32632	500.1158	463.3579	0.926501
653	645	42.4	19.91	19.85	13.27	4.03	0.55	0	0	0	42.4	53.02	4.57	57.61	37.7	17.85	4.57	1.22814	36.32632	500.1158	463.3579	0.926501	1.219428	17.28659	256.5061	253.061	0.986569
655	648	49.23	19.72	16.77	10.16	3.54	0.58	0	0	0	49.23	46.65	4.12	50.77	31.05	14.28	4.12	1.219428	17.28659	256.5061	253.061	0.986569	1.347488	12.25888	172.2132	226.9594	1.317898
657	650	43.09	20.16	17.37	12.85	5.82	0.72	0	0	0	43.09	50.37	6.54	56.92	36.76	19.39	6.54	1.347488	12.25888	172.2132	226.9594	1.317898	1.218109	29.25217	396.713	372	0.937705
659	652	49.03	21.57	17.08	8.79	3.04	0.5	0	0	0	49.03	47.44	3.54	50.98	29.41	12.33	3.54	1.218109	29.25217	396.713	372	0.937705	1.276869	21.20732	277.6768	255.5061	0.920156
661	654	45.39	21.63	19.74	10.18	2.75	0.31	0	0	0	45.39	51.55	3.06	54.61	32.98	13.24	3.06	1.276869	21.20732	277.6768	255.5061	0.920156	1.151337	12.24908	176.3736	143.8791	0.815763
663	657	33.47	15.15	15.12	11.48	12.81	11.3	0.66	0	0	33.47	41.75	24.78	66.52	51.37	36.25	24.78	1.151337	12.24908	176.3736	143.8791	0.815763	1.246405	32.18421	394.0439	381.7281	0.968745
665	659	20.3	9.18	9.57	10.57	23.75	24.96	1.67	0	0	20.3	29.32	50.39	79.7	70.52	60.95	50.39	1.246405	32.18421	394.0439	381.7281	0.968745	1.555375	27.98693	249.3791	306.6732	1.229747
667	661	56.91	21.54	14.17	5.23	1.7	0.45	0	0	0	56.91	40.94	2.15	43.09	21.55	7.38	2.15	1.555375	27.98693	249.3791	306.6732	1.229747	1.452224	15.14559	159.9464	188.0268	1.175562
669	663	55.48	24.25	15.21	4.57	0.49	0.01	0	0	0	55.48	44.03	0.5	44.53	20.28	5.07	0.5	1.452224	15.14559	159.9464	188.0268	1.175562	1.082503	16.34146	225.6293	189.1951	0.838522
671	666	53.95	24.48	15.89	5	0.59	0.09	0	0	0	53.95	45.38	0.67	46.05	21.57	5.68	0.67	1.082503	16.34146	225.6293	189.1951	0.838522	1.018846	24.58519	365.0222	283.5259	0.776736
673	668	49.75	22.41	17.8	7.72	1.98	0.34	0	0	0	49.75	47.93	2.32	50.25	27.84	10.04	2.32	1.018846	24.58519	365.0222	283.5259	0.776736	1.085905	18.04734	260.0237	213.0237	0.819247
675	670	46.18	23.71	19.92	8.39	1.71	0.09	0	0	0	46.18	52.02	1.8	53.82	30.11	10.19	1.8	1.085905	18.04734	260.0237	213.0237	0.819247	1.207121	19.75595	291.5	251.0595	0.861268
677	672	44.72	20.55	19.04	11.22	3.92	0.54	0	0	0	44.72	50.81	4.47	55.27	34.72	15.68	4.47	1.207121	19.75595	291.5	251.0595	0.861268	1.279903	18.185	232.315	226.53	0.975098
679	674	45.51	20.61	18.8	10.77	3.74	0.58	0	0	0	45.51	50.18	4.31	54.5	33.89	15.09	4.31	1.279903	18.185	232.315	226.53	0.975098	1.247161	14.95434	207.9224	195.5708	0.940595
681	677	46	21	19	10.32	3.16	0.53	0	0	0	46	50.32	3.68	54.01	33.01	14.01	3.68	1.247161	14.95434	207.9224	195.5708	0.940595	1.26191	20.24571	284.1029	266.7029	0.938755
683	679	40.17	19.45	19.59	13.2	5.89	1.7	0	0	0	40.17	52.24	7.59	59.83	40.38	20.79	7.59	1.26191	20.24571	284.1029	266.7029	0.938755	1.307168	33.06061	496.7778	484.101	0.974482
685	681	39.68	18.77	22.33	14.87	3.93	0.42	0	0	0	39.68	55.97	4.35	60.32	41.55	19.22	4.35	1.307168	33.06061	496.7778	484.101	0.974482	1.391672	21.80952	302.2517	318.2857	1.053049
687	683	36.96	14.96	15.58	16.17	12.92	3.4	0.01	0	0	36.96	46.71	16.32	63.04	48.08	32.5	16.32	1.391672	21.80952	302.2517	318.2857	1.053049	1.400364	23.79141	243.6012	273.5951	1.123127
689	686	56.49	21.81	14.21	5.42	1.73	0.33	0	0	0	56.49	41.45	2.06	43.5	21.69	7.48	2.06	1.400364	23.79141	243.6012	273.5951	1.123127	1.002652	13.15929	206.6991	172.3097	0.833626
691	688	50.17	23.41	16.38	7.14	2.48	0.41	0	0	0	50.17	46.94	2.89	49.82	26.41	10.03	2.89	1.002652	13.15929	206.6991	172.3097	0.833626	1.165337	16.28729	260.3481	229.2044	0.880377
693	690	47.48	26.46	18.33	6.06	1.45	0.22	0	0	0	47.48	50.85	1.67	52.52	26.06	7.73	1.67	1.165337	16.28729	260.3481	229.2044	0.880377	1.054073	18.34177	282.8165	241.8165	0.85503
695	692	47.17	23.31	17.63	8.85	2.5	0.54	0	0	0	47.17	49.8	3.04	52.83	29.52	11.89	3.04	1.054073	18.34177	282.8165	241.8165	0.85503	1.082821	13.82791	219.814	190.214	0.865341
697	695	52.63	23.73	15.68	6.03	1.55	0.38	0	0	0	52.63	45.44	1.94	47.37	23.64	7.96	1.94	1.082821	13.82791	219.814	190.214	0.865341	1.091862	22.62791	362.5969	305.0698	0.841347
699	697	52.49	24.11	17.02	5.16	0.8	0.41	0	0	0	52.49	46.3	1.22	47.5	23.39	6.37	1.22	1.091862	22.62791	362.5969	305.0698	0.841347	1.168335	28.10476	444.781	405.6571	0.912038
701	699	53.49	23.17	15.38	6.06	1.6	0.29	0	0	0	53.49	44.62	1.89	46.5	23.33	7.95	1.89	1.168335	28.10476	444.781	405.6571	0.912038	1.063624	13.84689	221.3349	193.3301	0.873473
703	701	52.15	22.35	16.08	7.07	1.92	0.43	0	0	0	52.15	45.5	2.35	47.85	25.5	9.42	2.35	1.063624	13.84689	221.3349	193.3301	0.873473	1.093411	17.23429	264.04	234.7086	0.888913
705	703	51.13	22.41	16.4	7.55	2.19	0.33	0	0	0	51.13	46.36	2.52	48.88	26.47	10.07	2.52	1.093411	17.23429	264.04	234.7086	0.888913	1.199306	21.52713	339.8992	332.124	0.977125
707	706	54.85	23.82	14.11	5.3	1.49	0.43	0	0	0	54.85	43.23	1.92	45.15	21.33	7.22	1.92	1.199306	21.52713	339.8992	332.124	0.977125	1.050253	17.78873	334.4014	286.8521	0.857808
709	708	54.63	22.96	14.78	5.4	1.89	0.33	0	0	0	54.63	43.14	2.22	45.36	22.4	7.62	2.22	1.050253	17.78873	334.4014	286.8521	0.857808	0.974071	32.80769	622.8205	492.7051	0.791087
711	710	56.36	23.83	13.51	4.53	1.42	0.35	0	0	0	56.36	41.87	1.78	43.64	19.81	6.3	1.78	0.974071	32.80769	622.8205	492.7051	0.791087	0.968535	26.90476	468.2286	358.5333	0.765723
713	712	52.57	21.84	16.38	6.66	1.97	0.58	0	0	0	52.57	44.88	2.55	47.43	25.59	9.21	2.55	0.968535	26.90476	468.2286	358.5333	0.765723	1.140937	31.65934	439.5165	379.5934	0.863661
715	715	51.46	21.11	16.41	8.04	2.43	0.54	0	0	0	51.46	45.56	2.97	48.53	27.42	11.01	2.97	1.140937	31.65934	439.5165	379.5934	0.863661	1.156166	10.92105	98.46053	115.2401	1.17042
717	717	53.93	22.44	14.96	6.8	1.78	0.09	0	0	0	53.93	44.2	1.87	46.07	23.63	8.67	1.87	1.156166	10.92105	98.46053	115.2401	1.17042	1.173033	14.1769	92.42506	90.61179	0.980381
719	719	49.69	21.37	17.35	8.54	2.6	0.45	0	0	0	49.69	47.26	3.04	50.31	28.94	11.59	3.04	1.173033	14.1769	92.42506	90.61179	0.980381					

Original	0.19721	0.242569	0.227442	0.154496	
Shifted	0.667298	0.706786	0.676712	0.581338	

	Original					Shifted				
	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti
>8um	0.19721	0.170165	0.14909	0.173848	-0.12093	0.667298	0.282706	0.063752	0.212358	0.148052
>16um	0.242569	0.188457	0.125927	0.172092	-0.05596	0.706786	0.265309	0.011858	0.178495	0.22593
>32um	0.227442	0.189675	0.113673	0.166691	-0.0227	0.676712	0.287195	0.013166	0.179937	0.258092
>64um	0.154496	0.180605	0.100069	0.138287	-0.03404	0.581338	0.298414	0.028059	0.173531	0.238928

Appendix 1- Bienen 8 A

Depth	Real depth	%Clay < 8 µm	%Very Fin 8-16 µm	%Fine Silt 16-32 µm	%Coarse S 32-63 µm	%Very Fin 63-125 µm	%Fine San 125-250 µm	%Middle (250-500 µm	%Coarse S 500-1000 µm	%Very Coarse Sand 1000-2000	Clay	Silt	Sand	P95
631	621	46.06	20.6	18.32	10.66	3.78	0.57	0	0	0	46.06	49.59	4.35	52.6
633	623	50.25	21.02	16.91	8.09	2.96	0.77	0	0	0	50.25	46.02	3.73	44.2
635	625	54.39	21.62	15.06	6.59	2.01	0.33	0	0	0	54.39	43.27	2.34	37.2
637	628	54.41	21.59	15.1	6.74	1.92	0.25	0	0	0	54.41	43.43	2.17	37.2
639	630	54.07	21.67	15.98	6.57	1.41	0.31	0	0	0	54.07	44.21	1.72	37.2
641	632	53.82	21.14	15.98	7.49	1.56	0.01	0	0	0	53.82	44.61	1.57	37.2
643	634	51.32	21.73	17.3	7.87	1.68	0.09	0	0	0	51.32	46.91	1.77	37.2
645	637	50.88	20.7	16.63	8.83	2.59	0.37	0	0	0	50.88	46.16	2.96	44.2
647	639	49.59	23.98	15.77	7.72	2.55	0.39	0	0	0	49.59	47.47	2.94	44.2
649	641	45.84	20.42	18.93	11.21	3.11	0.5	0	0	0	45.84	50.56	3.6	52.6
651	643	48.64	21.53	18.05	9.62	2.11	0.05	0	0	0	48.64	49.2	2.16	44.2
653	645	42.4	19.91	19.85	13.27	4.03	0.55	0	0	0	42.4	53.02	4.57	52.6
655	648	49.23	19.72	16.77	10.16	3.54	0.58	0	0	0	49.23	46.65	4.12	52.6
657	650	43.09	20.16	17.37	12.85	5.82	0.72	0	0	0	43.09	50.37	6.54	62.5
659	652	49.03	21.57	17.08	8.79	3.04	0.5	0	0	0	49.03	47.44	3.54	52.6
661	654	45.39	21.63	19.74	10.18	2.75	0.31	0	0	0	45.39	51.55	3.06	44.2
663	657	33.47	15.15	15.12	11.48	12.81	11.3	0.66	0	0	33.47	41.75	24.78	149
665	659	20.3	9.18	9.57	10.57	23.75	24.96	1.67	0	0	20.3	29.32	50.39	177
667	661	56.91	21.54	14.17	5.23	1.7	0.45	0	0	0	56.91	40.94	2.15	37.2
669	663	55.48	24.25	15.21	4.57	0.49	0.01	0	0	0	55.48	44.03	0.5	31.3
671	666	53.95	24.48	15.89	5	0.59	0.09	0	0	0	53.95	45.38	0.67	31.3
673	668	49.75	22.41	17.8	7.72	1.98	0.34	0	0	0	49.75	47.93	2.32	44.2
675	670	46.18	23.71	19.92	8.39	1.71	0.09	0	0	0	46.18	52.02	1.8	37.2
677	672	44.72	20.55	19.04	11.22	3.92	0.54	0	0	0	44.72	50.81	4.47	52.6
679	674	45.51	20.61	18.8	10.77	3.74	0.58	0	0	0	45.51	50.18	4.31	52.6
681	677	46	21	19	10.32	3.16	0.53	0	0	0	46	50.32	3.68	52.6
683	679	40.17	19.45	19.59	13.2	5.89	1.7	0	0	0	40.17	52.24	7.59	74.3
685	681	39.68	18.77	22.33	14.87	3.93	0.42	0	0	0	39.68	55.97	4.35	52.6
687	683	36.96	14.96	15.58	16.17	12.92	3.4	0.01	0	0	36.96	46.71	16.32	105
689	686	56.49	21.81	14.21	5.42	1.73	0.33	0	0	0	56.49	41.45	2.06	37.2
691	688	50.17	23.41	16.38	7.14	2.48	0.41	0	0	0	50.17	46.94	2.89	44.2
693	690	47.48	26.46	18.33	6.06	1.45	0.22	0	0	0	47.48	50.85	1.67	37.2
695	692	47.17	23.31	17.63	8.85	2.5	0.54	0	0	0	47.17	49.8	3.04	44.2
697	695	52.63	23.73	15.68	6.03	1.55	0.38	0	0	0	52.63	45.44	1.94	37.2
699	697	52.49	24.11	17.02	5.16	0.8	0.41	0	0	0	52.49	46.3	1.22	31.3
701	699	53.49	23.17	15.38	6.06	1.6	0.29	0	0	0	53.49	44.62	1.89	37.2
703	701	52.15	22.35	16.08	7.07	1.92	0.43	0	0	0	52.15	45.5	2.35	37.2
705	703	51.13	22.41	16.4	7.55	2.19	0.33	0	0	0	51.13	46.36	2.52	44.2
707	706	54.85	23.82	14.11	5.3	1.49	0.43	0	0	0	54.85	43.23	1.92	37.2
709	708	54.63	22.96	14.78	5.4	1.89	0.33	0	0	0	54.63	43.14	2.22	37.2
711	710	56.36	23.83	13.51	4.53	1.42	0.35	0	0	0	56.36	41.87	1.78	31.3
713	712	52.57	21.84	16.38	6.66	1.97	0.58	0	0	0	52.57	44.88	2.55	37.2
715	715	51.46	21.11	16.41	8.04	2.43	0.54	0	0	0	51.46	45.56	2.97	44.2
717	717	53.93	22.44	14.96	6.8	1.78	0.09	0	0	0	53.93	44.2	1.87	37.2
719	719	49.69	21.37	17.35	8.54	2.6	0.45	0	0	0	49.69	47.26	3.04	44.2

		Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	As
631	621	0.0004	0.003808	6.46E-05	0.001024	9.36E-05	0.009766	0.036784	0.120697	0	0.031781	0.001048	0.002116	0.033028	1.415409	0.014163	0.000746	0.00046	0.008745	0.001839	0.003602
633	623	0.000386	0.00481	0.000144	0.001843	5.22E-05	0.002481	0.046222	0.165715	4.81E-05	0.038584	0.001472	0.002189	0.036195	1.777628	0.017809	0.000629	0.000144	0.011103	0.001707	0.005213
635	625	0.000324	0.00508	6.93E-05	0.002205	1.67E-05	0.000997	0.048936	0.182296	5.91E-05	0.040936	0.001531	0.002412	0.041876	1.94657	0.021018	0.00042	3.47E-05	0.012155	0.001987	0.006052
637	628	0.00017	0.002881	8.56E-05	0.003237	2.04E-05	0.000664	0.028331	0.135418	1.92E-05	0.024226	0.000851	0.001585	0.027881	1.214218	0.014244	0.00028	1.15E-05	0.008671	0.001293	0.004027
639	630	0.000276	0.004024	7.76E-05	0.003674	1.09E-05	0.00051	0.036833	0.167418	0.000107	0.031699	0.00091	0.001999	0.031847	1.478168	0.015664	0.000335	3.64E-05	0.010481	0.001579	0.005517
641	632	0.000221	0.005232	5.06E-05	0.001498	4.6E-06	0.000514	0.050795	0.171319	3.45E-05	0.04302	0.001454	0.002584	0.04373	1.946311	0.019614	0.000999	0.000133	0.01354	0.00216	0.005022
643	634	0.000344	0.005552	0.000135	0.00353	0	0.001134	0.057016	0.192544	0	0.049921	0.001981	0.003037	0.061668	2.323169	0.022812	0.000728	6.85E-06	0.012835	0.002166	0.006166
645	637	0.000254	0.0029	7.18E-05	0.002562	0	0.001328	0.051707	0.158898	2.76E-05	0.048575	0.002463	0.002996	0.051142	2.342085	0.022846	0.001071	0	0.011699	0.001767	0.006334
647	639	0.000137	0.00315	0.000111	0.001441	2.78E-05	0.000983	0.054628	0.148856	2.22E-05	0.051445	0.002326	0.003211	0.051081	2.371724	0.022891	0.000968	3.89E-05	0.011691	0.002189	0.006121
649	641	0.000107	0.003357	8.78E-05	0.001783	0	0.001361	0.053581	0.151681	3.04E-05	0.050618	0.002203	0.003057	0.071355	2.521093	0.023968	0.00041	4.5E-06	0.011465	0.002133	0.005936
651	643	0.000239	0.00349	7.27E-05	0.003264	0	0.001239	0.052391	0.145426	1.1E-05	0.050447	0.002392	0.003059	0.034217	2.249187	0.021686	0.000576	0.000107	0.010626	0.002071	0.005686
653	645	0.000107	0.003872	8.3E-05	0.001579	0	0.001392	0.05476	0.164809	0	0.053306	0.002386	0.003089	0.03791	2.245284	0.021485	0.001024	0	0.011246	0.002687	0.005366
655	648	0.000182	0.003154	4.23E-05	0.008856	4.12E-05	0.00116	0.048082	0.252405	0	0.046795	0.002023	0.002696	0.043578	2.16016	0.022539	0.00066	0	0.010944	0.002443	0.006274
657	650	0.000222	0.002725	7.67E-05	0.025743	7.9E-06	0.001615	0.039102	0.445842	0	0.038285	0.001847	0.002171	0.046898	1.962517	0.02078	0.000613	0	0.009573	0.00192	0.005114
659	652	0.000129	0.003761	4.92E-05	0.003567	0	0.001734	0.053598	0.194713	0	0.051009	0.002267	0.003133	0.057542	2.424905	0.023007	0.000631	0	0.011191	0.00291	0.007204
661	654	0.00019	0.004028	0.000122	0.001234	0	0.002009	0.055045	0.197091	0	0.052735	0.00213	0.003362	0.074633	2.72927	0.023946	0.000843	0	0.010803	0.002002	0.005355
663	657	0.000316	0.003868	3.35E-05	0.001247	5.78E-06	0.00246	0.058829	0.212561	0	0.055696	0.002075	0.003403	0.079382	2.560932	0.023689	0.000894	7.17E-05	0.011685	0.002604	0.006465
665	659	0.000126	0.00405	3.75E-05	0.000909	0	0.0022	0.054491	0.207278	0	0.049592	0.001857	0.002823	0.048187	2.064542	0.019501	0.001223	8.83E-05	0.010677	0.002694	0.004958
667	661	0.000169	0.004726	3.2E-05	0.000842	5.52E-06	0.002825	0.050135	0.243651	4.41E-06	0.042107	0.001617	0.00232	0.049185	1.691992	0.016752	0.001332	7.73E-06	0.008654	0.002668	0.004781
669	663	0.000292	0.004426	2.24E-05	0.000964	1.01E-05	0.003193	0.053687	0.215274	0	0.046739	0.001986	0.003198	0.047195	2.038911	0.019711	0.001349	9.4E-05	0.010213	0.002816	0.005307
671	666	0.000226	0.003696	7.17E-05	0.001115	0	0.002373	0.056507	0.20006	0	0.05103	0.002476	0.003058	0.086866	2.42766	0.02344	0.00111	0.000179	0.011852	0.001962	0.005073
673	668	0.000149	0.003666	4.2E-05	0.001103	1.21E-05	0.002626	0.057009	0.149998	0	0.05443	0.002154	0.00362	0.07193	2.381761	0.022373	0.001334	5.41E-05	0.01239	0.002477	0.005502
675	670	0.000206	0.003723	0.000104	0.001199	0	0.002991	0.055428	0.175939	0	0.053639	0.001933	0.003138	0.083332	2.551264	0.022815	0.001276	8.67E-05	0.011984	0.002085	0.006363
677	672	0.000194	0.003824	8.64E-05	0.00107	0	0.002682	0.055533	0.163457	1.96E-05	0.056425	0.00221	0.00347	0.069616	2.469328	0.023029	0.001326	0.000184	0.012029	0.002185	0.005133
679	674	0.000228	0.004143	8.2E-05	0.000873	0	0.003692	0.056018	0.163978	3.99E-05	0.052928	0.002217	0.003014	0.040073	2.175683	0.020178	0.001299	2.28E-05	0.011295	0.002906	0.004708
681	677	0.000258	0.003861	7.31E-05	0.000881	0	0.004384	0.05577	0.163106	0	0.05368	0.002088	0.003066	0.043517	2.269444	0.020837	0.0013	0.000118	0.011367	0.003234	0.00491
683	679	0.000193	0.003917	5.86E-05	0.001074	0	0.003057	0.05711	0.146549	1.77E-05	0.054967	0.002258	0.003083	0.034555	2.220438	0.021884	0.000959	0.000147	0.011997	0.002569	0.004909
685	681	0.00011	0.003622	4.54E-05	0.000884	3.87E-05	0.003044	0.055558	0.128429	7.75E-06	0.05442	0.002021	0.003075	0.033779	2.096292	0.020746	0.001498	0.000175	0.011718	0.002364	0.005595
687	683	0.000162	0.003537	0.000105	0.00095	1.21E-05	0.002574	0.048887	0.182236	6.4E-05	0.049017	0.002108	0.003031	0.057001	2.102316	0.02092	0.001126	6.18E-05	0.011133	0.002777	0.004835
689	686	0.000181	0.004305	6.77E-05	0.000903	0.000131	0.002461	0.050033	0.204551	7.77E-06	0.04408	0.001818	0.002895	0.057711	1.995458	0.02026	0.00117	0	0.009377	0.00258	0.005054
691	688	0.000241	0.003167	7.24E-05	0.001055	4.26E-06	0.002428	0.054565	0.093327	0	0.049752	0.002304	0.003279	0.0529	2.435336	0.02255	0.000659	0.000131	0.011971	0.002243	0.005784
693	690	0.000199	0.003239	8.68E-05	0.001207	0	0.002575	0.051875	0.102536	0	0.051767	0.002264	0.003157	0.066996	2.668062	0.023918	0.000517	3.3E-05	0.011215	0.001742	0.005787
695	692	0.000176	0.003233	8.48E-05	0.001079	1E-05	0.002537	0.052636	0.125311	0	0.049849	0.002121	0.002845	0.063125	2.46688	0.022453	0.000518	6.14E-05	0.011139	0.002583	0.005577
697	695	0.000233	0.003221	0.000107	0.001076	1.73E-05	0.002675	0.0514	0.11727	8.67E-06	0.051203	0.002197	0.003148	0.05252	2.367479	0.021936	0.000834	5.53E-05	0.01136	0.002148	0.005645
699	697	0.000143	0.003225	7.18E-05	0.000991	2.54E-05	0.002889	0.053708	0.134599	7.73E-06	0.051677	0.002102	0.003161	0.052504	2.43458	0.022909	0.000491	4.53E-05	0.011483	0.001955	0.006136
701	699	0.000116	0.003272	8.98E-05	0.000939	0	0.003766	0.050912	0.113498	0	0.05179	0.001995	0.002893	0.037646	2.160622	0.02144	0.000885	0.000121	0.01114	0.002626	0.005333
703	701	0.000228	0.003163	8.2E-05	0.000974	5.47E-06	0.00321	0.052908	0.124512	0	0.050566	0.002333	0.003285	0.046421	2.33791	0.02229	0.001	0.000115	0.011426	0.002364	0.005925
705	703	0.000192	0.003312	8.56E-05	0.001032	0	0.00344	0.053389	0.155658	7.69E-06	0.050738	0.002228	0.00318	0.051648	2.335173	0.023334	0.000804	5.38E-05	0.011766	0.002439	0.005106
707	706	0.000144	0.00311	6.5E-05	0.000888	7.84E-06	0.003415	0.050737	0.164178	0	0.049106	0.001769	0.003076	0.046775	2.190373	0.022594	0.001496	7.62E-05	0.011187	0.00279	0.00488
709	708	0.000153	0.002722	6.9E-05	0.000905	0	0.001972	0.053537	0.128734	0	0.051163	0.002031	0.00325	0.051436	2.418057	0.023662	0.000432	6.79E-05	0.011568	0.002904	0.005637
711	710	8.3E-05	0.002722	6.81E-05	0.000854	0	0.001639	0.054545	0.127649	4.26E-06	0.051678	0.002216	0.003169	0.053758	2.46496	0.023854	0.00054	2.13E-05	0.012658	0.001639	0.005916
713	712	0.000118	0.003178	5.4E-05	0.001081	0	0.00244	0.059932	0.163791	2.59E-05	0.055307	0.00216	0.003541	0.062164	2.61068	0.025111	0.001081	0.000186	0.012926	0.002501	0.00607
715	715	0.000119	0.003783	0.000146	0.001078	0	0.005042	0.056186	0.17879	0	0.052519	0.002029	0.002861	0.077994	2.50128	0.023944	0.001225	0.000362	0.012482	0.003484	0.004266
717	717	0.000402	0.004388	0.000135	0.001254	0.000115	0.003731	0.044794	0.119969	1.59E-05	0.039558	0.001501	0.002491	0.043364	1.877545	0.019075	0.000797	0.000194	0.010425	0.00222	0.006094
719	719	0.000528	0.007484	0.000193	0.00156	2.33E-05	0.004252	0.057145	0.174531	2.21E-05	0.048794	0.001935	0.002848	0.051087	2.075091	0.019151	0.000966	0.000135	0.011775	0.001825	0.005288

		Se	Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh	Zr/Rb
631	621	0.003862	0.001274	0.032865	0.041408	0.047089	0.000324	0.00062	0.000304	0.000557	0	0.001104	0.004172	0.007016	0.002322	0.003855	0.003069	0.003734	0.001939	0.747178	0.252822	1.432824
633	623	0.004381	0.000994	0.036347	0.047138	0.044443	0.000371	0.000219	0.000741	0.000691	0	0.000991	0.00419	0.007175	0.002178	0.004009	0.003616	0.003881	0.002242	0.747511	0.252489	1.222747
635	625	0.004822	0.001265	0.037405	0.047504	0.042723	0.000354	0.000243	0.000675	0.001179	0	0.000367	0.004252	0.007665	0.001662	0.004537	0.004035	0.0041	0.002797	0.750451	0.249549	1.14217
637	628	0.004049	0.001058	0.034702	0.044957	0.044261	0.000247	0.000181	0.000315	0.001005	0	0.000232	0.003111	0.005193	0.001473	0.004859	0.003344	0.004124	0.001801	0.74749	0.25251	1.275461
639	630	0.004449	0.000949	0.036919	0.048476	0.043771	0.000398	0.000137	0.0006	0.001353	0	0.000424	0.003196	0.006354	0.001256	0.004121	0.00373	0.003446	0.002343	0.74922	0.25078	1.185575
641	632	0.005356	0.001243	0.039939	0.048966	0.044221	0.000457	0.00011	0.000612	0.000781	0	0.000899	0.004224	0.007331	0.001277	0.004959	0.004227	0.005176	0.003596	0.750989	0.249011	1.107221
643	634	0.004397	0.001668	0.040391	0.047119	0.042747	0.000367	0.000414	0.000426	0.00124	0	0.000693	0.004991	0.00859	0.001518	0.004149	0.003844	0.004117	0.004508	0.754956	0.245044	1.058321
645	637	0.004749	0.000808	0.041195	0.047299	0.043215	0.000166	0.000386	0.000426	0.000647	0	0.001138	0.005542	0.008686	0.001712	0.00506	0.00428	0.003485	0.005429	0.75612	0.24388	1.049053
647	639	0.005982	0.001462	0.04129	0.046836	0.044236	0.000513	0.00017	0.000486	0.000356	0	0.001098	0.005472	0.009037	0.001714	0.004748	0.003894	0.003556	0.004682	0.757489	0.242511	1.07133
649	641	0.005141	0.001333	0.039181	0.045031	0.046501	0.000247	0.000249	0.000334	0.000476	0	0.000698	0.005407	0.009045	0.001801	0.004812	0.003882	0.003569	0.005238	0.755149	0.244851	1.18683
651	643	0.005287	0.000814	0.039707	0.044595	0.04809	0.000585	0.000279	0.000354	0.000607	0	0.000927	0.005383	0.009143	0.001284	0.004385	0.003949	0.003553	0.004185	0.757947	0.242053	1.211112
653	645	0.004969	0.001215	0.040214	0.048077	0.049388	0.000343	0.000237	0.000558	0.000711	0	0.000688	0.005996	0.010245	0.001383	0.004682	0.003676	0.003769	0.004461	0.756251	0.243749	1.22814
655	648	0.004643	0.000859	0.037859	0.048178	0.046167	0.00038	0.000218	0.000851	0.001761	0	0.000596	0.005156	0.008721	0.001352	0.005011	0.004166	0.003164	0.004264	0.75566	0.24434	1.219428
657	650	0.004386	0.00102	0.037444	0.048899	0.050456	0.000739	0.000367	0.001935	0.003736	0	0.000762	0.005263	0.009305	0.001528	0.004867	0.004318	0.003419	0.004059	0.754019	0.245981	1.347488
659	652	0.004778	0.001234	0.039267	0.0489	0.047831	0.000607	0.000436	0.000512	0.00069	0	0.001638	0.005608	0.009685	0.001438	0.004719	0.004061	0.003014	0.005029	0.756028	0.243972	1.218109
661	654	0.005059	0.000893	0.038003	0.050473	0.048525	0.000628	0.000243	0.000659	0.000855	0	0.001551	0.006234	0.010423	0.001364	0.005022	0.004596	0.004395	0.006003	0.753132	0.246868	1.276869
663	657	0.004999	0.000942	0.039462	0.051456	0.045435	0.000545	0.000141	0.000497	0.000938	0	0.002765	0.005928	0.010327	0.001575	0.004771	0.003752	0.00375	0.00536	0.754972	0.245028	1.151337
665	659	0.005096	0.000739	0.038544	0.053086	0.048042	0.000486	0.000247	0.000702	0.000936	0	0.002632	0.005759	0.01062	0.001624	0.004124	0.00418	0.002972	0.004724	0.754538	0.245462	1.246405
667	661	0.004027	0.00135	0.033292	0.058041	0.051781	0.000398	0.000409	0.000874	0.001244	0	0.001919	0.005729	0.011383	0.001055	0.004529	0.003598	0.003551	0.002778	0.754004	0.245996	1.555375
669	663	0.004532	0.001145	0.037835	0.05539	0.054945	0.000414	0.000241	0.000839	0.001398	0	0.001777	0.005733	0.010305	0.001142	0.004607	0.00369	0.003362	0.004303	0.752015	0.247985	1.452224
671	666	0.005158	0.001017	0.039529	0.051295	0.04279	0.000385	0.000145	0.000517	0.001019	0	0.00174	0.005722	0.009275	0.001953	0.004552	0.003817	0.003886	0.005319	0.752557	0.247443	1.082503
673	668	0.005377	0.000888	0.041496	0.047332	0.042278	0.000477	0.000324	0.000501	0.000406	0	0.001888	0.005841	0.009318	0.002188	0.004715	0.004112	0.004046	0.005005	0.75525	0.24475	1.018846
675	670	0.005354	0.001042	0.040467	0.049102	0.043944	0.000624	0.000259	0.00068	0.000614	0	0.002733	0.006695	0.009888	0.002245	0.004269	0.004073	0.003207	0.006267	0.754545	0.245455	1.085905
677	672	0.005377	0.001012	0.040259	0.047854	0.048597	0.000801	0.000221	0.00055	0.00068	0	0.001517	0.006332	0.009648	0.002087	0.005391	0.003907	0.004301	0.005043	0.751728	0.248272	1.207121
679	674	0.005386	0.001277	0.040324	0.047007	0.05161	0.000427	0.000224	0.000455	0.000578	0	0.001534	0.006058	0.010107	0.001725	0.005023	0.00406	0.004691	0.004233	0.753249	0.246751	1.279903
681	677	0.005252	0.001464	0.040485	0.04773	0.050491	0.000355	0.000385	0.000572	0.000483	0	0.001754	0.006319	0.010154	0.001607	0.004203	0.003679	0.004265	0.005193	0.754216	0.245784	1.247161
683	679	0.005333	0.00129	0.040891	0.047298	0.0516	0.00046	0.000261	0.000352	0.00059	0	0.002447	0.006014	0.009948	0.002028	0.004673	0.003853	0.004678	0.004826	0.753968	0.246032	1.26191
685	681	0.004185	0.001073	0.04057	0.04437	0.053032	0.000398	0.000202	0.000412	0.00035	0	0.002022	0.005999	0.010004	0.001706	0.004868	0.003706	0.003929	0.004237	0.754837	0.245163	1.307168
687	683	0.004859	0.000805	0.03709	0.052038	0.051617	0.000474	0.00018	0.000727	0.000731	0	0.001377	0.005421	0.009799	0.001457	0.004588	0.003775	0.004487	0.004109	0.751614	0.248386	1.391672
689	686	0.004583	0.001029	0.035354	0.056074	0.049508	0.000554	0.000163	0.000839	0.001221	0	0.001635	0.005748	0.010587	0.001209	0.004422	0.003918	0.003071	0.004193	0.748711	0.251289	1.400364
691	688	0.004696	0.000965	0.041365	0.043063	0.041474	0.000315	0.000301	0.000257	0.000224	0	0.001537	0.00544	0.008739	0.002172	0.00483	0.003485	0.003825	0.005247	0.757283	0.242717	1.002652
693	690	0.005056	0.001142	0.039108	0.044664	0.045574	0.000475	0.000282	0.000194	0.000272	0	0.001411	0.006122	0.008956	0.002195	0.005395	0.003928	0.003788	0.005431	0.75452	0.24548	1.165337
695	692	0.005501	0.001199	0.040436	0.045471	0.042622	0.000463	0.000272	0.000436	0.000512	0	0.001623	0.005673	0.008624	0.002127	0.004862	0.003541	0.004008	0.005038	0.757406	0.242594	1.054073
697	695	0.004976	0.001186	0.040919	0.045585	0.044308	0.00043	0.000408	0.000375	0.000239	0	0.001472	0.005499	0.009221	0.001967	0.00456	0.003395	0.003472	0.005012	0.75698	0.24302	1.082821
699	697	0.004943	0.001381	0.03982	0.046028	0.043478	0.000394	0.000204	0.000404	0.000589	0	0.001058	0.006229	0.009137	0.00233	0.005031	0.003567	0.00375	0.005007	0.757293	0.242707	1.091862
701	699	0.004427	0.000811	0.040429	0.042834	0.047234	0.000267	0.000352	0.000226	0.000346	0	0.001082	0.005837	0.009649	0.00252	0.004544	0.003867	0.004024	0.004681	0.757267	0.242733	1.168335
703	701	0.00503	0.00109	0.041526	0.045006	0.044168	0.000307	0.000318	0.000397	0.000379	0	0.001069	0.005849	0.008845	0.001797	0.005138	0.003693	0.003747	0.004919	0.7562	0.2438	1.063624
705	703	0.004808	0.001356	0.041249	0.047492	0.045102	0.00045	0.000419	0.000512	0.000553	0	0.001262	0.005754	0.009371	0.002112	0.004422	0.003603	0.004185	0.004694	0.753926	0.246074	1.093411
707	706	0.004591	0.000829	0.040008	0.049443	0.047982	0.00046	0.000232	0.000399	0.000641	0	0.001208	0.005837	0.009874	0.0017	0.004284	0.003715	0.003649	0.004218	0.752605	0.247395	1.199306
709	708	0.004725	0.000843	0.041788	0.046797	0.043888	0.000558	0.000164	0.000483	0.000342	0	0.001028	0.005726	0.008679	0.001425	0.005035	0.004105	0.004111	0.004867	0.755117	0.244883	1.050253
711	710	0.005384	0.001646	0.04197	0.045294	0.040882	0.000537	0.000156	0.00041	0.000466	0	0.000866	0.006282	0.008491	0.002591	0.004421	0.003703	0.003689	0.005557	0.757575	0.242425	0.974071
713	712	0.005814	0.001573	0.043726	0.046023	0.04235	0.000322	0.000214	0.000435	0.000627	0	0.001367	0.006247	0.009455	0.002493	0.005075	0.004053	0.004305	0.005684	0.756854	0.243146	0.968535
715	715	0.005789	0.001161	0.039755	0.046193	0.045358	0.000608	0.000221	0.00089	0.000663	0	0.001631	0.005654	0.009754	0.00253	0.004426	0.004194	0.004964	0.004895	0.753167	0.246833	1.140937
717	717	0.00484	0.000938	0.040046	0.046543	0.046299	0.000345	0.000481	0.000291	0.00051	5.29E-06	0.002288	0.004484	0.00743	0.002033	0.00417	0.003872	0.003036	0.003437	0.748533	0.251467	1.156166
719	719	0.004901	0.000943	0.04078	0.050126	0.047837	0.000608	6.1E-05	0.00073	0.000739	0	0.003401	0.004878	0.008127	0.002273	0.004501	0.003971	0.00371	0.003981	0.747251	0.252749	1.173033

Appendix 1 - Bienen 7 B

Depth	Real depth	%Clay	%Very Fine	%Fine Silt	%Coarse S	%Very Fine	%Fine San	%Middle C	%Coarse S	%Very Coarse	Sand			reversed				Original				
		< 8 µm	8-16 µm	16-32 µm	32-63 µm	63-125 µm	125-250 µm	250-500 µm	500-1000 µ	1000-2000	Clay	Silt	Sand	>8um	>16um	>32um	>64um	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti
545	531	43.03	19.14	19.57	13.31	4.44	0.51	0	0	0	43.03	52.03	4.95	56.97	37.83	18.26	4.95	1.476632	22.01515	146.3232	208.0859	1.422097
547	533	48.06	20.2	17.19	10.2	3.9	0.44	0	0	0	48.06	47.59	4.35	51.93	31.73	14.54	4.35	1.188998	24	169.9226	150.6465	0.88656
549	536	51.14	20.12	15.98	9.07	3.3	0.4	0	0	0	51.14	45.17	3.69	48.87	28.75	12.77	3.69	1.153813	15.53314	118.268	115.7205	0.97846
551	538	49.46	20.22	16.71	9.84	3.41	0.36	0	0	0	49.46	46.77	3.77	50.54	30.32	13.61	3.77	1.195206	18.71071	143.6071	138.55	0.964785
553	541	54.84	23.51	14.56	5.54	1.36	0.19	0	0	0	54.84	43.61	1.55	45.16	21.65	7.09	1.55	1.159216	11.69583	86.49375	79.46667	0.918756
555	543	52.79	22.81	16.62	6.29	1.21	0.27	0	0	0	52.79	45.72	1.48	47.2	24.39	7.77	1.48	1.036847	14.82308	114.4077	90.69487	0.792734
557	545	51.51	21.46	17.27	7.57	1.79	0.4	0	0	0	51.51	46.3	2.18	48.49	27.03	9.76	2.18	1.110693	18.95156	146.7024	126.6574	0.863363
559	548	52.81	21.58	16.7	7	1.57	0.34	0	0	0	52.81	45.28	1.91	47.19	25.61	8.91	1.91	1.103164	23.68644	177.6356	152.0169	0.85578
561	550	51.85	25.29	15.39	5.67	1.47	0.33	0	0	0	51.85	46.35	1.8	48.15	22.86	7.47	1.8	1.108722	14.5288	109.4476	95.14398	0.86931
563	552	50.88	22.09	17.71	7.44	1.53	0.34	0	0	0	50.88	47.24	1.87	49.11	27.02	9.31	1.87	1.12649	16.27005	122.393	102.607	0.83834
565	555	52.96	21.92	15.86	7.04	1.84	0.38	0	0	0	52.96	44.82	2.22	47.04	25.12	9.26	2.22	1.121668	18.58571	157.5071	133.6107	0.848284
567	557	46.65	21.43	19.65	9.57	2.27	0.43	0	0	0	46.65	50.65	2.71	53.35	31.92	12.27	2.71	1.146752	14.13095	109.5095	93.02619	0.84948
569	560	34.95	16.47	21.86	18.88	6.97	0.86	0	0	0	34.95	57.21	7.83	65.04	48.57	26.71	7.83	1.42952	21.85401	157.8212	161.1496	1.02109
571	562	37.85	17.65	21.82	16.68	5.41	0.58	0	0	0	37.85	56.16	5.99	62.14	44.49	22.67	5.99	1.318132	19.1761	136.2358	128.3396	0.94204
573	564	29.43	15.56	24.19	22.35	7.84	0.64	0	0	0	29.43	62.1	8.48	70.58	55.02	30.83	8.48	1.673995	19.49072	111.5358	125.8249	1.128112
575	567	42.6	20.5	21.9	12.29	2.25	0.45	0	0	0	42.6	54.7	2.71	57.39	36.89	14.99	2.71	1.460346	17.0989	131.3929	130.2115	0.991009
577	569	45.23	23.41	18.07	9.17	3.23	0.89	0	0	0	45.23	50.66	4.11	54.77	31.36	13.29	4.11	1.236536	15.32827	121.5532	109.845	0.903678
579	571	48.21	26.09	17.19	6.33	1.95	0.22	0	0	0	48.21	49.62	2.17	51.78	25.69	8.5	2.17	1.10522	16.70755	136.4528	117.327	0.859836
581	574	49.83	26.87	16.11	5.09	1.45	0.64	0	0	0	49.83	48.07	2.09	50.16	23.29	7.18	2.09	1.033475	23.06608	187.978	148.3789	0.789342
583	576	47.69	26.04	16.53	7.13	2.35	0.26	0	0	0	47.69	49.7	2.62	52.31	26.27	9.74	2.62	1.123313	17.7623	123.6585	103.4645	0.836695
585	579	51.61	21.09	16.64	8.33	2.1	0.22	0	0	0	51.61	46.07	2.32	48.38	27.29	10.65	2.32	1.121932	18.73375	141.2724	119.5882	0.846508
587	581	55.57	21.14	15	6.32	1.54	0.44	0	0	0	55.57	42.46	1.97	44.44	23.3	8.3	1.97	1.081368	14.12366	119.4812	99.10215	0.829437
589	583	50.07	27.69	15.52	5.44	1.22	0.06	0	0	0	50.07	48.65	1.28	49.93	22.24	6.72	1.28	1.073478	17.78931	143.8585	116.2327	0.807966
591	586	50.63	22.74	16.21	8.2	2.14	0.08	0	0	0	50.63	47.15	2.22	49.37	26.63	10.42	2.22	1.128898	19.12541	159.8911	133.3366	0.833922
593	588	53.17	22.26	15.79	7.07	1.66	0.06	0	0	0	53.17	45.12	1.72	46.84	24.58	8.79	1.72	1.103875	15.44	117.86	97.5025	0.827274
595	590	51.48	24.61	14.75	6.82	2.02	0.31	0	0	0	51.48	46.19	2.33	48.51	23.9	9.15	2.33	1.095042	12.58391	100.6552	84.49195	0.83942
597	593	51.33	21	15.96	8.62	2.66	0.42	0	0	0	51.33	45.58	3.09	48.66	27.66	11.7	3.09	1.16029	15.64266	118.9972	107.7784	0.905722
599	595	54.7	20.2	14.72	8.13	2.21	0.03	0	0	0	54.7	43.05	2.24	45.29	25.09	10.37	2.24	1.132616	16.33125	126.6188	113.5625	0.896885
601	598	54.48	19.83	14.59	8.08	2.68	0.34	0	0	0	54.48	42.5	3.02	45.52	25.69	11.1	3.02	1.062157	14.79634	110.5849	93.56136	0.846059
603	600	49.11	19.48	16.82	11.28	3.25	0.06	0	0	0	49.11	47.58	3.31	50.89	31.41	14.59	3.31	1.170151	17.36607	127.6101	114.7619	0.899317
605	602	54.03	20.97	15.23	7.94	1.8	0.02	0	0	0	54.03	44.14	1.82	45.96	24.99	9.76	1.82	1.100756	17.14245	128.6154	107.7863	0.838052
607	605	51.18	21.56	16.11	8.9	2.23	0.03	0	0	0	51.18	46.57	2.25	48.83	27.27	11.16	2.25	1.100713	15.81313	116.404	96.67929	0.830549
609	607	51.85	20.69	15.35	9.4	2.67	0.05	0	0	0	51.85	45.43	2.72	48.16	27.47	12.12	2.72	1.153869	23.63504	166.4781	141.1131	0.847638
611	609	54.86	25.06	13.87	5.17	1.03	0.01	0	0	0	54.86	44.1	1.04	45.14	20.08	6.21	1.04	1.003601	14.41667	104.3148	82.57639	0.791607
613	612	55.41	21.89	14.66	6.54	1.45	0.05	0	0	0	55.41	43.09	1.51	44.59	22.7	8.04	1.51	1.039903	14.52798	108.4599	86.67883	0.799179
615	614	52.78	23.79	14.94	6.76	1.69	0.03	0	0	0	52.78	45.49	1.73	47.21	23.42	8.48	1.73	1.113963	15.88298	117.4681	99.1516	0.844073
617	617	54.5	21.58	15.25	6.39	1.85	0.43	0	0	0	54.5	43.22	2.28	45.5	23.92	8.67	2.28	1.070454	16.4322	125.435	102.6215	0.818124
619	619	54.75	21.53	15.01	6.72	1.83	0.15	0	0	0	54.75	43.26	1.99	45.24	23.71	8.7	1.99	1.083377	13.90431	106.2368	89.40191	0.841534

		>8um	>16um	>32um	>64um
Original	Original	0.888924	0.918979	0.898392	0.847635

	Original				
	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti
>8um	0.888924	0.404022	0.179432	0.490025	0.623926
>16um	0.918979	0.409592	0.15759	0.507835	0.676282
>32um	0.898392	0.404882	0.137977	0.496107	0.680155
>64um	0.847635	0.419218	0.168177	0.514968	0.673439

Appendix 1 - Bienen 7 A

Depth	Real depth	%Clay	%Very Fine	%Fine Silt	%Coarse S	%Very Fine	%Fine San	%Middle C	%Coarse S	%Very Coarse	Sand			
		< 8 µm	8-16 µm	16-32 µm	32-63 µm	63-125 µm	125-250 µm	250-500 µm	500-1000 µ	1000-2000	Clay	Silt	Sand	P95
545	531	43.03	19.14	19.57	13.31	4.44	0.51	0	0	0	43.03	52.03	4.95	62.5
547	533	48.06	20.2	17.19	10.2	3.9	0.44	0	0	0	48.06	47.59	4.35	52.6
549	536	51.14	20.12	15.98	9.07	3.3	0.4	0	0	0	51.14	45.17	3.69	52.6
551	538	49.46	20.22	16.71	9.84	3.41	0.36	0	0	0	49.46	46.77	3.77	52.6
553	541	54.84	23.51	14.56	5.54	1.36	0.19	0	0	0	54.84	43.61	1.55	37.2
555	543	52.79	22.81	16.62	6.29	1.21	0.27	0	0	0	52.79	45.72	1.48	37.2
557	545	51.51	21.46	17.27	7.57	1.79	0.4	0	0	0	51.51	46.3	2.18	37.2
559	548	52.81	21.58	16.7	7	1.57	0.34	0	0	0	52.81	45.28	1.91	37.2
561	550	51.85	25.29	15.39	5.67	1.47	0.33	0	0	0	51.85	46.35	1.8	37.2
563	552	50.88	22.09	17.71	7.44	1.53	0.34	0	0	0	50.88	47.24	1.87	37.2
565	555	52.96	21.92	15.86	7.04	1.84	0.38	0	0	0	52.96	44.82	2.22	37.2
567	557	46.65	21.43	19.65	9.57	2.27	0.43	0	0	0	46.65	50.65	2.71	44.2
569	560	34.95	16.47	21.86	18.88	6.97	0.86	0	0	0	34.95	57.21	7.83	74.3
571	562	37.85	17.65	21.82	16.68	5.41	0.58	0	0	0	37.85	56.16	5.99	62.5
573	564	29.43	15.56	24.19	22.35	7.84	0.64	0	0	0	29.43	62.1	8.48	74.3
575	567	42.6	20.5	21.9	12.29	2.25	0.45	0	0	0	42.6	54.7	2.71	44.2
577	569	45.23	23.41	18.07	9.17	3.23	0.89	0	0	0	45.23	50.66	4.11	52.6
579	571	48.21	26.09	17.19	6.33	1.95	0.22	0	0	0	48.21	49.62	2.17	37.2
581	574	49.83	26.87	16.11	5.09	1.45	0.64	0	0	0	49.83	48.07	2.09	37.2
583	576	47.69	26.04	16.53	7.13	2.35	0.26	0	0	0	47.69	49.7	2.62	44.2
585	579	51.61	21.09	16.64	8.33	2.1	0.22	0	0	0	51.61	46.07	2.32	44.2
587	581	55.57	21.14	15	6.32	1.54	0.44	0	0	0	55.57	42.46	1.97	37.2
589	583	50.07	27.69	15.52	5.44	1.22	0.06	0	0	0	50.07	48.65	1.28	37.2
591	586	50.63	22.74	16.21	8.2	2.14	0.08	0	0	0	50.63	47.15	2.22	44.2
593	588	53.17	22.26	15.79	7.07	1.66	0.06	0	0	0	53.17	45.12	1.72	37.2
595	590	51.48	24.61	14.75	6.82	2.02	0.31	0	0	0	51.48	46.19	2.33	44.2
597	593	51.33	21	15.96	8.62	2.66	0.42	0	0	0	51.33	45.58	3.09	44.2
599	595	54.7	20.2	14.72	8.13	2.21	0.03	0	0	0	54.7	43.05	2.24	44.2
601	598	54.48	19.83	14.59	8.08	2.68	0.34	0	0	0	54.48	42.5	3.02	44.2
603	600	49.11	19.48	16.82	11.28	3.25	0.06	0	0	0	49.11	47.58	3.31	52.6
605	602	54.03	20.97	15.23	7.94	1.8	0.02	0	0	0	54.03	44.14	1.82	44.2
607	605	51.18	21.56	16.11	8.9	2.23	0.03	0	0	0	51.18	46.57	2.25	44.2
609	607	51.85	20.69	15.35	9.4	2.67	0.05	0	0	0	51.85	45.43	2.72	44.2
611	609	54.86	25.06	13.87	5.17	1.03	0.01	0	0	0	54.86	44.1	1.04	31.3
613	612	55.41	21.89	14.66	6.54	1.45	0.05	0	0	0	55.41	43.09	1.51	37.2
615	614	52.78	23.79	14.94	6.76	1.69	0.03	0	0	0	52.78	45.49	1.73	37.2
617	617	54.5	21.58	15.25	6.39	1.85	0.43	0	0	0	54.5	43.22	2.28	37.2
619	619	54.75	21.53	15.01	6.72	1.83	0.15	0	0	0	54.75	43.26	1.99	37.2

		Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	As
545	531	0.000489	0.006805	8.2E-05	0.001611	1.05E-05	0.00315	0.061939	0.181406	1.41E-05	0.051995	0.002212	0.003321	0.059057	2.362008	0.023534	0.000729	7.96E-05	0.011779	0.002664	0.006288
547	533	0.000421	0.006919	2.85E-05	0.001317	0	0.002096	0.062193	0.195872	0	0.052817	0.001982	0.003358	0.065318	2.378222	0.022064	0.000491	7.61E-05	0.011865	0.002762	0.005805
549	536	0.000452	0.007172	7.21E-05	0.000969	0	0.002317	0.061772	0.207834	0	0.053043	0.001902	0.003	0.083337	2.400696	0.022236	0.000745	5.76E-05	0.011898	0.002026	0.00623
551	538	0.000486	0.007056	5.79E-05	0.001249	0	0.002184	0.064014	0.201682	0	0.052679	0.001909	0.003244	0.061562	2.381687	0.022578	0.000613	4.85E-05	0.011355	0.001833	0.005107
553	541	0.00051	0.007357	9.33E-05	0.001236	0	0.001761	0.065584	0.200544	0	0.053236	0.001921	0.002959	0.057968	2.359729	0.022581	0.000614	6.85E-05	0.012098	0.002819	0.007461
555	543	0.000331	0.007813	7.84E-05	0.001232	1.09E-05	0.002443	0.064989	0.213225	0	0.055036	0.002054	0.003458	0.072683	2.484766	0.022762	0.00059	0	0.0113	0.002792	0.005651
557	545	0.000471	0.007453	4.4E-05	0.001082	0	0.002741	0.06514	0.201481	0	0.054867	0.002192	0.00304	0.042392	2.266525	0.02066	0.000668	5.95E-05	0.011677	0.003501	0.005266
559	548	0.000416	0.007133	0.000108	0.001209	0	0.001894	0.062617	0.190636	1.42E-05	0.053516	0.001781	0.002977	0.050232	2.332177	0.021663	0.000717	2.13E-05	0.012209	0.002171	0.006272
561	550	0.000399	0.006931	3.92E-05	0.001056	0	0.001879	0.060587	0.192996	0	0.050928	0.001967	0.003316	0.063008	2.235072	0.020589	0.000761	2.85E-05	0.011403	0.002744	0.006112
563	552	0.000439	0.006492	7.79E-05	0.001282	2.98E-05	0.001718	0.060558	0.237261	0	0.048521	0.001883	0.00314	0.08475	2.557139	0.024067	0.000442	2.41E-05	0.010482	0.002137	0.00595
565	555	0.000386	0.006308	0	0.001301	9.66E-06	0.001593	0.059309	0.234784	0	0.048904	0.001897	0.002788	0.080826	2.517826	0.022254	0.00039	0	0.010688	0.002039	0.00753
567	557	0.000428	0.006699	5.34E-05	0.00109	3.44E-05	0.00165	0.061059	0.187239	0	0.050958	0.00199	0.003246	0.044957	2.248352	0.021804	0.000642	5.93E-05	0.011451	0.002676	0.006141
569	560	0.000524	0.006594	0.000111	0.001134	0	0.001646	0.06168	0.164817	0	0.052745	0.002137	0.002949	0.067251	2.525628	0.022936	0.000366	3.37E-05	0.011025	0.00163	0.006436
571	562	0.000469	0.007236	7.03E-05	0.001244	0	0.001627	0.06262	0.167575	0	0.055232	0.002074	0.003409	0.046209	2.359676	0.021834	0.001097	0.000127	0.012676	0.002565	0.00627
573	564	0.000351	0.006703	7.63E-05	0.00108	0	0.001436	0.060991	0.111638	0	0.056042	0.002032	0.003454	0.055358	2.407531	0.022994	0.001105	0	0.012488	0.00247	0.006245
575	567	0.000374	0.006659	9.65E-05	0.001269	9.06E-05	0.001677	0.062409	0.164969	0	0.053847	0.002001	0.003182	0.061166	2.43761	0.022521	0.000439	5.06E-05	0.011439	0.001922	0.006442
577	569	0.000439	0.006193	6.13E-05	0.001064	0	0.001371	0.060771	0.182191	0	0.052395	0.00186	0.003666	0.061579	2.447283	0.023638	0.000552	3.54E-05	0.011716	0.002478	0.006433
579	571	0.000379	0.007096	0.000138	0.001309	2.11E-05	0.001361	0.062354	0.165549	0	0.053508	0.002275	0.003183	0.053368	2.402153	0.021943	0.000714	0	0.011226	0.001861	0.006637
581	574	0.00043	0.007642	4.35E-05	0.001015	0	0.002168	0.062227	0.201092	0	0.053204	0.001776	0.003028	0.06999	2.354352	0.021983	0.00109	8.23E-06	0.011756	0.002428	0.005885
583	576	0.000275	0.006351	6.07E-05	0.001144	1.09E-05	0.001553	0.062574	0.200284	4.12E-05	0.051761	0.001875	0.002946	0.105718	2.639957	0.023979	0.000486	0	0.011297	0.002	0.005878
585	579	0.000373	0.006224	8.2E-05	0.001065	4.92E-05	0.001291	0.059596	0.182018	0	0.050831	0.002023	0.00306	0.099746	2.422016	0.021714	0.000929	0	0.012072	0.002092	0.007528
587	581	0.000394	0.006046	2.4E-05	0.001062	0	0.001693	0.056572	0.275881	0	0.047942	0.001724	0.002775	0.120732	2.494244	0.022727	0.000657	0	0.009957	0.001497	0.006935
589	583	0.000432	0.007384	6.64E-05	0.001035	9.49E-05	0.00125	0.061064	0.193259	0	0.056743	0.002023	0.003164	0.054636	2.104424	0.020081	0.000985	3.68E-05	0.011557	0.002476	0.006564
591	586	0.000461	0.008979	0.000111	0.001118	0	0.001409	0.0569	0.298224	0	0.051381	0.00135	0.002661	0.047759	1.82751	0.017624	0.001205	0	0.010124	0.002423	0.006642
593	588	0.000379	0.007268	9.54E-05	0.00105	0	0.001857	0.059347	0.256994	9.54E-06	0.051638	0.001904	0.003035	0.061136	2.101957	0.020401	0.000981	0	0.010754	0.002116	0.005674
595	590	0.000328	0.007159	0.000117	0.00116	0	0.00225	0.058218	0.240734	0	0.051701	0.002015	0.002843	0.042128	2.016871	0.019096	0.0012	0	0.011441	0.002652	0.006338
597	593	0.000488	0.006903	6.63E-05	0.00113	4.19E-05	0.002369	0.061741	0.182971	0	0.053493	0.001675	0.003383	0.046095	2.291696	0.022056	0.000891	1.28E-05	0.011856	0.002245	0.006304
599	595	0.000326	0.006059	9.08E-05	0.001241	0	0.001292	0.059861	0.190996	0	0.051345	0.001933	0.002859	0.056378	2.375968	0.02148	0.000511	0	0.011439	0.001881	0.006633
601	598	0.000416	0.006767	3.89E-05	0.001139	1.22E-05	0.001932	0.061137	0.227967	0	0.050904	0.001902	0.003188	0.063054	2.395824	0.022739	0.000564	5.34E-05	0.011504	0.002271	0.005528
603	600	0.000445	0.006469	2.45E-05	0.001136	9.32E-06	0.001586	0.058981	0.206235	0	0.048729	0.001901	0.003242	0.047941	2.220108	0.021231	0.000692	0	0.011356	0.002141	0.005824
605	602	0.000274	0.006491	0.000143	0.001053	0	0.001296	0.058994	0.212446	0	0.048677	0.001797	0.003027	0.056067	2.277952	0.021146	0.000505	2.09E-05	0.011069	0.001765	0.005921
607	605	0.000334	0.006331	9.13E-05	0.001137	2.2E-05	0.001313	0.058364	0.214313	0	0.049009	0.001852	0.002966	0.055583	2.220242	0.021831	0.000642	0	0.011309	0.002419	0.006188
609	607	0.000456	0.006766	8.19E-05	0.001104	1.99E-05	0.001387	0.061512	0.191038	0	0.052218	0.002242	0.002957	0.075028	2.443062	0.023343	0.000314	5.85E-06	0.011853	0.0022	0.006547
611	609	0.000572	0.00669	8.7E-05	0.00108	0	0.00135	0.058317	0.171676	0	0.049477	0.001767	0.003037	0.063691	2.234296	0.021636	0.000644	0	0.011518	0.001829	0.006214
613	612	0.000328	0.006134	0.000114	0.001172	3.28E-05	0.001145	0.054663	0.188576	2.11E-05	0.047078	0.001973	0.002623	0.066209	2.273866	0.021454	0.000392	8.55E-05	0.011308	0.001406	0.00725
615	614	0.000389	0.006038	3.02E-05	0.001433	0	0.00104	0.05601	0.180769	0	0.045976	0.001853	0.003138	0.063342	2.180507	0.019492	0.000457	2.8E-05	0.011273	0.001796	0.006864
617	617	0.000318	0.007632	4.18E-05	0.001118	0	0.00135	0.064257	0.174596	0	0.054039	0.002042	0.003387	0.052594	2.233237	0.021043	0.000949	8.24E-05	0.013599	0.002014	0.005858
619	619	0.000255	0.00561	0.000144	0.001884	1.67E-05	0.006793	0.043011	0.119099	3.47E-05	0.037287	0.00118	0.002145	0.02926	1.476137	0.01351	0.001036	0.000366	0.011695	0.002578	0.004215

		Se	Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh	Zr/Rb
545	531	0.005178	0.001445	0.040388	0.047901	0.043755	0.000336	0.0003	0.000254	0.000241	0	0.00292	0.005925	0.00886	0.002077	0.004729	0.003935	0.002872	0.005377	0.75282	0.24718	1.083377
547	533	0.004664	0.000709	0.040367	0.048508	0.043211	0.000523	0.000194	0.000507	0.000511	0	0.001793	0.005128	0.009219	0.001904	0.00474	0.004129	0.003492	0.004778	0.75392	0.24608	1.070454
549	536	0.004615	0.000913	0.040192	0.049244	0.044772	0.000372	0.000238	0.000549	0.000422	0	0.001082	0.005617	0.009003	0.001743	0.004792	0.004172	0.003285	0.00414	0.753115	0.246885	1.113963
551	538	0.004575	0.001263	0.040484	0.04921	0.0421	0.000487	0.000277	0.000512	0.000498	0	0.001061	0.005527	0.00883	0.002074	0.004667	0.003893	0.004017	0.003919	0.753917	0.246083	1.039903
553	541	0.005362	0.001025	0.04199	0.048774	0.042142	0.000604	0.000185	0.000371	0.00071	0	0.001435	0.005431	0.008835	0.001761	0.00484	0.004223	0.002745	0.005538	0.755369	0.244631	1.003601
555	543	0.005637	0.000937	0.040429	0.050353	0.04665	0.000408	0.00028	0.00067	0.000586	0	0.001005	0.005626	0.009342	0.001548	0.004784	0.004076	0.004014	0.005414	0.751722	0.248278	1.153869
557	545	0.005012	0.001455	0.0414	0.049525	0.04557	0.000284	0.000382	0.000215	0.000412	0	0.001602	0.005002	0.009364	0.001287	0.004856	0.003768	0.003985	0.005213	0.751383	0.248617	1.100713
559	548	0.004485	0.000927	0.040744	0.04775	0.044849	0.000525	0.00026	0.000343	0.00053	0	0.00154	0.005493	0.008937	0.00158	0.005055	0.004757	0.003595	0.004485	0.753108	0.246892	1.100756
561	550	0.004597	0.001341	0.039141	0.049238	0.045801	0.000492	0.000243	0.000436	0.000514	0	0.001045	0.005375	0.008847	0.001412	0.004451	0.003694	0.003307	0.004655	0.753269	0.246731	1.170151
563	552	0.00498	0.001201	0.03865	0.052632	0.041052	0.000364	0.000259	0.00045	0.000741	0	0.000878	0.005216	0.008597	0.001818	0.004568	0.004053	0.004155	0.004768	0.749853	0.250147	1.062157
565	555	0.004664	0.001028	0.038725	0.052554	0.043861	0.000483	6.28E-05	0.000568	0.001015	0	0.000883	0.005462	0.00831	0.001561	0.005208	0.004405	0.002998	0.0053	0.751304	0.248696	1.132616
567	557	0.005237	0.000662	0.039778	0.047626	0.046154	0.000214	0.000255	0.000287	0.000599	0	0.001138	0.005478	0.009127	0.001752	0.004721	0.003907	0.003331	0.004133	0.754574	0.245426	1.16029
569	560	0.005149	0.001547	0.040432	0.04565	0.044275	0.000532	0.000261	0.000151	0.000199	0	0.000959	0.005783	0.008725	0.002527	0.005255	0.004139	0.002995	0.005285	0.752458	0.247542	1.095042
571	562	0.005424	0.00082	0.041392	0.046607	0.045692	0.000485	0.000223	0.000232	0.000191	0	0.001181	0.005551	0.00915	0.001815	0.005048	0.004525	0.003577	0.004896	0.754142	0.245858	1.103875
573	564	0.005577	0.000622	0.041398	0.042662	0.046735	0.000488	9.95E-05	6.36E-05	0.000155	0	0.001416	0.006085	0.009525	0.001786	0.004637	0.004226	0.003928	0.005348	0.756122	0.243878	1.128898
575	567	0.005025	0.00095	0.040528	0.045418	0.043506	0.000372	0.000175	0.000299	0.000167	0	0.001071	0.005624	0.009073	0.002165	0.005007	0.003835	0.003047	0.005839	0.756148	0.243852	1.073478
577	569	0.004852	0.001456	0.040188	0.04871	0.043458	0.000599	0.000189	0.000259	0.000381	0	0.00122	0.005426	0.009049	0.001899	0.004993	0.004158	0.003203	0.005234	0.752148	0.247852	1.081368
579	571	0.004878	0.000741	0.040373	0.046046	0.045295	0.000473	0.000273	0.000226	0.000307	0	0.001395	0.005829	0.009075	0.002111	0.005183	0.004383	0.003173	0.004796	0.753239	0.246761	1.121932
581	574	0.005101	0.000762	0.039629	0.048922	0.044516	0.000366	0.00049	0.000252	0.000511	0	0.001097	0.005493	0.009042	0.001678	0.004586	0.004224	0.004036	0.004656	0.753108	0.246892	1.123313
583	576	0.004868	0.000888	0.039534	0.048153	0.040857	0.000507	0.00037	0.000377	0.000597	0	0.001266	0.00514	0.008471	0.00202	0.005189	0.004369	0.003759	0.005185	0.752978	0.247022	1.033475
585	579	0.005122	0.001122	0.039546	0.045916	0.043707	0.000613	0.000179	0.000414	0.000436	8.2E-06	0.001366	0.005474	0.008769	0.001634	0.00499	0.003786	0.003347	0.005712	0.754992	0.245008	1.10522
587	581	0.004701	0.001687	0.035037	0.051453	0.043324	0.000438	0.000243	0.000573	0.001111	0	0.001122	0.005489	0.008449	0.001948	0.004762	0.004078	0.003192	0.004894	0.749446	0.250554	1.236536
589	583	0.004436	0.001247	0.038506	0.047992	0.056233	0.000688	0.00026	0.000389	0.000481	0	0.001162	0.005561	0.009663	0.00156	0.004669	0.004137	0.003551	0.003131	0.75051	0.24949	1.460346
591	586	0.004029	0.000833	0.034626	0.061358	0.057963	0.000754	0.000222	0.00085	0.001672	0	0.00114	0.005042	0.010009	0.0013	0.004576	0.004205	0.001994	0.003439	0.744268	0.255732	1.673995
593	588	0.004557	0.001442	0.036905	0.055929	0.048645	0.000396	0.000156	0.000855	0.001155	0	0.00095	0.005649	0.01004	0.001802	0.004796	0.004395	0.003894	0.004245	0.750815	0.249185	1.318132
595	590	0.004694	0.000714	0.036929	0.055031	0.052791	0.000262	0.00022	0.000598	0.000913	0	0.000866	0.005278	0.009899	0.001267	0.004922	0.003937	0.003311	0.003798	0.750068	0.249932	1.42952
597	593	0.004559	0.001435	0.039626	0.048064	0.045442	0.000166	0.000455	0.00039	0.000449	0	0.001254	0.005448	0.009028	0.001711	0.004951	0.003737	0.003889	0.004509	0.755054	0.244946	1.146752
599	595	0.00486	0.001056	0.038831	0.048405	0.043556	0.000692	0.000156	0.000375	0.00031	0	0.000756	0.005594	0.008486	0.001808	0.00503	0.00418	0.003767	0.004275	0.755054	0.244946	1.121668
601	598	0.004542	0.001133	0.037883	0.049201	0.042675	0.000353	0.000189	0.000515	0.000648	0	0.001035	0.005378	0.008917	0.00162	0.004528	0.004143	0.003922	0.004765	0.753263	0.246737	1.12649
603	600	0.004539	0.001584	0.038207	0.049171	0.042361	0.000533	0.000375	0.000364	0.000689	0	0.000901	0.005139	0.008156	0.001902	0.004725	0.003817	0.003315	0.003682	0.753032	0.246968	1.108722
605	602	0.005008	0.000748	0.037761	0.048104	0.041657	0.000399	0.000275	0.000478	0.000546	0	0.000997	0.005332	0.008443	0.002017	0.004636	0.003832	0.003142	0.004612	0.754724	0.245276	1.103164
607	605	0.005152	0.001554	0.038096	0.048499	0.042313	0.000474	0.00023	0.000639	0.000675	0	0.000795	0.005551	0.00854	0.001641	0.005365	0.004035	0.003014	0.004416	0.755093	0.244907	1.110693
609	607	0.005031	0.001031	0.039924	0.046363	0.041395	0.000392	0.000197	0.000403	0.000372	0	0.001087	0.00553	0.008659	0.002129	0.004796	0.004057	0.003418	0.004993	0.753958	0.246042	1.036847
611	609	0.004874	0.0012	0.039214	0.047068	0.045457	0.000275	0.000224	0.000375	0.000427	0	0.000994	0.005024	0.008557	0.001753	0.00449	0.004145	0.003486	0.004464	0.750995	0.249005	1.159216
613	612	0.004357	0.001006	0.038002	0.048936	0.04542	0.000421	0.000286	0.000337	0.000533	0	0.001084	0.00489	0.00817	0.002153	0.004931	0.004131	0.003393	0.003964	0.75296	0.24704	1.195206
615	614	0.004722	0.001101	0.038989	0.047441	0.044986	0.000418	0.000294	0.000472	0.000663	0	0.000882	0.004653	0.007733	0.001621	0.004638	0.004101	0.003081	0.004841	0.754469	0.245531	1.153813
617	617	0.005391	0.001123	0.040293	0.046927	0.047909	0.000636	0.000262	0.000274	0.00048	0	0.001583	0.005811	0.009316	0.001563	0.004406	0.00421	0.004049	0.00482	0.757696	0.242304	1.188998
619	619	0.004355	0.001521	0.03591	0.042437	0.053026	0.000607	0.000445	0.000216	0.00014	9.01E-06	0.000986	0.004681	0.008135	0.001731	0.004309	0.003206	0.003978	0.002883	0.754967	0.245033	1.476632

Appendix 1 - Bienen 6 B

Depth	Real depth	%Clay	%Very Fine	%Fine Silt	%Coarse S	%Very Fine	%Fine San	%Middle C	%Coarse S	%Very Coarse	Sand							Original				
		< 8 µm	8-16 µm	16-32 µm	32-63 µm	63-125 µm	125-250 µn	250-500 µn	500-1000 µ	1000-2000	Clay	Silt	Sand	>8um	>16um	>32um	>64um	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti
453	431	45.58	20.26	18.49	11.01	4.06	0.6	0	0	0	45.58	49.76	4.67	54.42	34.16	15.67	4.67	1.673786	3.573529	61.34559	187.8456	3.062088
455	434	48.14	20.92	18.31	9.4	2.9	0.33	0	0	0	48.14	48.63	3.23	51.86	30.94	12.63	3.23	1.396001	13.12	116.45	251.35	2.158437
457	436	50.56	23.25	15.94	7.63	2.21	0.41	0	0	0	50.56	46.82	2.62	49.44	26.19	10.25	2.62	1.356318	12.28906	156.7344	216.5234	1.381467
459	439	42.64	19.8	19.3	13.28	4.58	0.4	0	0	0	42.64	52.38	4.98	57.36	37.56	18.26	4.98	1.345212	10.13636	127.9148	168.8011	1.319638
461	441	38.54	18.68	21.54	15.71	5.12	0.42	0	0	0	38.54	55.92	5.53	61.47	42.79	21.25	5.53	1.82733	24.2987	304.5195	507.2857	1.665856
463	444	32.97	17.76	23.39	19.45	6.02	0.41	0	0	0	32.97	60.6	6.43	67.03	49.27	25.88	6.43	1.692488	9.074286	126.0457	198.0114	1.570949
465	446	32.1	16.35	22.03	16.89	9.22	3.4	0.01	0	0	32.1	55.27	12.63	67.9	51.55	29.52	12.63	1.846883	12.93836	152.4795	250.8219	1.644956
467	449	50.31	22.59	17.24	7.72	1.73	0.41	0	0	0	50.31	47.55	2.14	49.69	27.1	9.86	2.14	1.606679	13.01316	140.7105	223.7829	1.590378
469	452	53.25	22.85	15.53	6.2	1.77	0.39	0	0	0	53.25	44.59	2.16	46.74	23.89	8.36	2.16	1.284672	13.57143	174.1518	221.5714	1.272289
471	454	51.66	21.41	16.67	7.55	2.14	0.58	0	0	0	51.66	45.63	2.71	48.35	26.94	10.27	2.71	1.34495	10.21233	142.5068	186.8836	1.311401
473	457	50.51	26.04	15.64	5.92	1.55	0.35	0	0	0	50.51	47.6	1.89	49.5	23.46	7.82	1.89	1.292456	6.038647	93.77778	126.6232	1.350247
475	459	50.34	22.69	16.74	7.65	2.12	0.45	0	0	0	50.34	47.09	2.57	49.65	26.96	10.22	2.57	1.290331	10.8	182.7238	247.9524	1.356979
477	462	52.18	21.28	16.36	7.83	2.08	0.28	0	0	0	52.18	45.47	2.35	47.83	26.55	10.19	2.35	1.236731	10.11765	186.5	251.7353	1.349787
479	465	47.09	21.73	19.16	9.24	2.27	0.5	0	0	0	47.09	50.14	2.77	52.9	31.17	12.01	2.77	1.34839	9.105769	175.8077	270.1058	1.536371
481	467	51.02	24.45	16.27	6.47	1.47	0.33	0	0	0	51.02	47.18	1.8	48.99	24.54	8.27	1.8	1.376345	7.05303	133.4318	221.0076	1.656333
483	470	49.51	20.72	17.77	9.38	2.43	0.19	0	0	0	49.51	47.88	2.61	50.49	29.77	12	2.61	1.275792	12.32673	209.604	274.9901	1.311951
485	472	47.87	19.95	17.66	11.04	3.36	0.12	0	0	0	47.87	48.65	3.48	52.13	32.18	14.52	3.48	1.338066	8.902299	123.431	161.4138	1.307725
487	475	41.55	18.62	19.14	14.75	5.62	0.32	0	0	0	41.55	52.51	5.94	58.45	39.83	20.69	5.94	1.420341	11.4964	151.9496	219.9281	1.447375
489	477	51.73	22.39	16.43	7.3	1.84	0.31	0	0	0	51.73	46.12	2.16	48.27	25.88	9.45	2.16	1.338621	12.06667	153.0519	213.1481	1.392653
491	480	50.29	21.83	17.42	8.25	2.08	0.14	0	0	0	50.29	47.49	2.22	49.72	27.89	10.47	2.22	1.26715	19.57471	273.9425	329.7356	1.203667
493	483	49.7	22.82	17.53	7.74	1.87	0.33	0	0	0	49.7	48.1	2.2	50.29	27.47	9.94	2.2	1.339688	15.55814	185.2403	223.8837	1.208612
495	485	49.88	24.22	16.61	7.03	1.93	0.33	0	0	0	49.88	47.86	2.26	50.12	25.9	9.29	2.26	1.274814	7.85	96.26538	105.5154	1.096089
497	488	48.8	21.07	17.44	9.39	2.96	0.34	0	0	0	48.8	47.9	3.3	51.2	30.13	12.69	3.3	1.314975	16.64925	196.3209	220.5821	1.123579
499	490	45.64	20.32	17.77	10.75	4.91	0.62	0	0	0	45.64	48.83	5.53	54.37	34.05	16.28	5.53	1.346338	9.430962	109.3305	128.5105	1.175431
501	493	49.47	22.79	16.18	8.39	2.91	0.27	0	0	0	49.47	47.35	3.18	50.54	27.75	11.57	3.18	1.271152	26.82796	295.7527	320.1935	1.08264
503	495	49.76	21.25	16.98	8.84	2.77	0.4	0	0	0	49.76	47.07	3.17	50.24	28.99	12.01	3.17	1.251762	17.26119	205.8209	205.4104	0.998006
505	498	53.05	22.14	15.69	6.88	1.87	0.37	0	0	0	53.05	44.71	2.24	46.95	24.81	9.12	2.24	1.168165	13.17677	148.8636	141.1061	0.947888
507	501	53.3	21.91	16.33	6.52	1.58	0.35	0	0	0	53.3	44.77	1.93	46.69	24.78	8.45	1.93	1.156264	11.73298	153.3717	149.4607	0.9745
509	503	51.24	21.25	16.7	8.01	2.41	0.39	0	0	0	51.24	45.96	2.8	48.76	27.51	10.81	2.8	1.144804	15.2	220.5778	217.1481	0.984452
511	506	51.46	21.96	16.05	7.71	2.34	0.47	0	0	0	51.46	45.73	2.82	48.53	26.57	10.52	2.82	1.181517	17.43925	267.0187	280.0748	1.048896
513	508	47.47	21.52	17.81	10.26	2.87	0.08	0	0	0	47.47	49.58	2.95	52.54	31.02	13.21	2.95	1.249717	9.810945	139.4826	148.2687	1.06299
515	511	49.22	20.88	17.27	9.22	2.84	0.56	0	0	0	49.22	47.37	3.4	50.77	29.89	12.62	3.4	1.250234	9.674033	143.5746	162.558	1.13222
517	514	46.47	20.19	17.78	10.95	3.97	0.64	0	0	0	46.47	48.93	4.6	53.53	33.34	15.56	4.6	1.232159	16.35052	273.8763	312.9175	1.142551
519	516	48.71	21.06	17.16	9.43	3.12	0.52	0	0	0	48.71	47.65	3.64	51.29	30.23	13.07	3.64	1.296384	16	237.7797	254.322	1.06957
521	519	48.1	21.07	17.32	9.63	3.27	0.61	0	0	0	48.1	48.01	3.88	51.9	30.83	13.51	3.88	1.297377	18.37143	273.181	312.8286	1.145133
523	521	45.98	20.68	17.99	11.1	3.89	0.35	0	0	0	45.98	49.77	4.24	54.01	33.33	15.34	4.24	1.338202	9.41358	162.4444	200.2099	1.232482
525	524	46.69	20.62	17.38	10.71	4.13	0.47	0	0	0	46.69	48.71	4.59	53.31	32.69	15.31	4.59	1.456814	9.411348	163.5106	237.2128	1.450748
527	526	45.67	19.36	17.68	12.34	4.52	0.44	0	0	0	45.67	49.37	4.96	54.34	34.98	17.3	4.96	1.537115	15.35632	246.4943	379.6322	1.540126
529	529	53.27	21.65	16.17	7.05	1.68	0.17	0	0	0	53.27	44.87	1.86	46.72	25.07	8.9	1.86	1.215163	10.36943	152.5223	182.8471	1.198822

		>8um	>16um	>32um	>64um
Original	Original	0.786676	0.759489	0.73804	0.696085
NO SHIFT NEEDED					

	Original Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti
>8um	0.786676	0.009322	-0.03262	0.251967	0.344453
>16um	0.759489	0.04078	0.0113	0.280017	0.328198
>32um	0.73804	0.049424	0.022696	0.268831	0.301973
>64um	0.696085	0.039014	-0.0047	0.201959	0.274014

Appendix 1 - Bienen 6 A

Depth	Real depth	%Clay	%Very Fine	%Fine Silt	%Coarse S	%Very Fine	%Fine San	%Middle C	%Coarse S	%Very Coarse	Sand			
		< 8 µm	8-16 µm	16-32 µm	32-63 µm	63-125 µm	125-250 µm	250-500 µm	500-1000 µ	1000-2000	Clay	Silt	Sand	P95
453	431	45.58	20.26	18.49	11.01	4.06	0.6	0	0	0	45.58	49.76	4.67	52.6
455	434	48.14	20.92	18.31	9.4	2.9	0.33	0	0	0	48.14	48.63	3.23	44.2
457	436	50.56	23.25	15.94	7.63	2.21	0.41	0	0	0	50.56	46.82	2.62	44.2
459	439	42.64	19.8	19.3	13.28	4.58	0.4	0	0	0	42.64	52.38	4.98	62.5
461	441	38.54	18.68	21.54	15.71	5.12	0.42	0	0	0	38.54	55.92	5.53	62.5
463	444	32.97	17.76	23.39	19.45	6.02	0.41	0	0	0	32.97	60.6	6.43	62.5
465	446	32.1	16.35	22.03	16.89	9.22	3.4	0.01	0	0	32.1	55.27	12.63	105
467	449	50.31	22.59	17.24	7.72	1.73	0.41	0	0	0	50.31	47.55	2.14	37.2
469	452	53.25	22.85	15.53	6.2	1.77	0.39	0	0	0	53.25	44.59	2.16	37.2
471	454	51.66	21.41	16.67	7.55	2.14	0.58	0	0	0	51.66	45.63	2.71	44.2
473	457	50.51	26.04	15.64	5.92	1.55	0.35	0	0	0	50.51	47.6	1.89	37.2
475	459	50.34	22.69	16.74	7.65	2.12	0.45	0	0	0	50.34	47.09	2.57	44.2
477	462	52.18	21.28	16.36	7.83	2.08	0.28	0	0	0	52.18	45.47	2.35	44.2
479	465	47.09	21.73	19.16	9.24	2.27	0.5	0	0	0	47.09	50.14	2.77	44.2
481	467	51.02	24.45	16.27	6.47	1.47	0.33	0	0	0	51.02	47.18	1.8	37.2
483	470	49.51	20.72	17.77	9.38	2.43	0.19	0	0	0	49.51	47.88	2.61	44.2
485	472	47.87	19.95	17.66	11.04	3.36	0.12	0	0	0	47.87	48.65	3.48	52.6
487	475	41.55	18.62	19.14	14.75	5.62	0.32	0	0	0	41.55	52.51	5.94	62.5
489	477	51.73	22.39	16.43	7.3	1.84	0.31	0	0	0	51.73	46.12	2.16	37.2
491	480	50.29	21.83	17.42	8.25	2.08	0.14	0	0	0	50.29	47.49	2.22	44.2
493	483	49.7	22.82	17.53	7.74	1.87	0.33	0	0	0	49.7	48.1	2.2	44.2
495	485	49.88	24.22	16.61	7.03	1.93	0.33	0	0	0	49.88	47.86	2.26	37.2
497	488	48.8	21.07	17.44	9.39	2.96	0.34	0	0	0	48.8	47.9	3.3	44.2
499	490	45.64	20.32	17.77	10.75	4.91	0.62	0	0	0	45.64	48.83	5.53	62.5
501	493	49.47	22.79	16.18	8.39	2.91	0.27	0	0	0	49.47	47.35	3.18	44.2
503	495	49.76	21.25	16.98	8.84	2.77	0.4	0	0	0	49.76	47.07	3.17	44.2
505	498	53.05	22.14	15.69	6.88	1.87	0.37	0	0	0	53.05	44.71	2.24	37.2
507	501	53.3	21.91	16.33	6.52	1.58	0.35	0	0	0	53.3	44.77	1.93	37.2
509	503	51.24	21.25	16.7	8.01	2.41	0.39	0	0	0	51.24	45.96	2.8	44.2
511	506	51.46	21.96	16.05	7.71	2.34	0.47	0	0	0	51.46	45.73	2.82	44.2
513	508	47.47	21.52	17.81	10.26	2.87	0.08	0	0	0	47.47	49.58	2.95	44.2
515	511	49.22	20.88	17.27	9.22	2.84	0.56	0	0	0	49.22	47.37	3.4	44.2
517	514	46.47	20.19	17.78	10.95	3.97	0.64	0	0	0	46.47	48.93	4.6	52.6
519	516	48.71	21.06	17.16	9.43	3.12	0.52	0	0	0	48.71	47.65	3.64	52.6
521	519	48.1	21.07	17.32	9.63	3.27	0.61	0	0	0	48.1	48.01	3.88	52.6
523	521	45.98	20.68	17.99	11.1	3.89	0.35	0	0	0	45.98	49.77	4.24	52.6
525	524	46.69	20.62	17.38	10.71	4.13	0.47	0	0	0	46.69	48.71	4.59	52.6
527	526	45.67	19.36	17.68	12.34	4.52	0.44	0	0	0	45.67	49.37	4.96	62.5
529	529	53.27	21.65	16.17	7.05	1.68	0.17	0	0	0	53.27	44.87	1.86	37.2

		Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	As
453	431	0.000279	0.000998	0.000265	0.007913	5.34E-05	0.009093	0.014534	0.168878	0.000127	0.017125	0.000936	0.001548	0.020865	1.005977	0.01161	0.000577	0.000269	0.005404	0.001193	0.003309
455	434	0.000186	0.002436	0.000236	0.038046	0.000108	0.007102	0.022147	0.557835	0.000173	0.021617	0.000887	0.00171	0.032802	1.375094	0.015651	0.000488	8.17E-05	0.006521	0.000863	0.003826
457	436	0.000212	0.00261	0.000119	0.00355	0	0.006014	0.034659	0.204641	3.48E-05	0.033293	0.001489	0.002297	0.037024	1.750361	0.017066	0.000906	0.000103	0.008885	0.001927	0.004358
459	439	0.000283	0.00287	8.85E-05	0.002322	7.08E-05	0.005296	0.037627	0.185191	0	0.03622	0.00125	0.002653	0.036562	1.871509	0.017924	0.00079	0.000159	0.009828	0.002228	0.003369
461	441	0.00012	0.00291	0.000177	0.001176	0	0.006274	0.034294	0.157416	9.33E-06	0.036475	0.001321	0.002399	0.028115	1.573688	0.014499	0.000944	0.00021	0.008655	0.002214	0.00219
463	444	0.000283	0.002566	2.1E-05	0.001097	1.78E-05	0.006464	0.033061	0.151002	1.94E-05	0.035643	0.000965	0.0025	0.031111	1.549826	0.015627	0.000816	0.000692	0.008613	0.002031	0.002584
465	446	0.000234	0.003033	7.22E-05	0.000918	0	0.00665	0.033441	0.129732	4.01E-05	0.035742	0.001201	0.002506	0.022297	1.390508	0.013276	0.00106	0.000634	0.008559	0.001602	0.00223
467	449	0.000234	0.003046	0.000102	0.001243	0	0.006019	0.035315	0.161835	4.93E-05	0.03294	0.001409	0.00237	0.032283	1.531051	0.014605	0.001207	0.000265	0.008121	0.002261	0.003305
469	452	0.00018	0.002438	0.000104	0.004209	0	0.006027	0.033294	0.225212	2.89E-05	0.031288	0.0011	0.002352	0.059377	1.808266	0.017656	0.000828	0.000212	0.008813	0.001141	0.004618
471	454	0.000232	0.002369	3.34E-05	0.001093	0	0.007028	0.034127	0.179882	6.99E-05	0.033055	0.001161	0.002275	0.049009	1.722095	0.016257	0.000964	0.000175	0.009137	0.001215	0.003692
473	457	0.000327	0.001976	0.000101	0.001171	9.48E-05	0.006845	0.031359	0.168759	5.22E-05	0.030685	0.001397	0.002314	0.052807	1.72602	0.016218	0.000806	0.000182	0.008623	0.002031	0.003324
475	459	0.000168	0.001818	7.86E-05	0.001105	0.0003	0.006793	0.031397	0.169077	3.69E-05	0.030767	0.001504	0.002426	0.08172	1.747327	0.016355	0.000903	0.00054	0.008186	0.00198	0.004548
477	462	0.000165	0.001666	8.72E-05	0.001174	6.46E-06	0.005966	0.030805	0.158572	1.61E-05	0.030708	0.001348	0.001824	0.083613	1.796201	0.015323	0.000315	0.000253	0.008365	0.001395	0.004296
479	465	0.000164	0.001494	0.000117	0.001877	9.47E-05	0.006527	0.027067	0.136505	8.52E-05	0.028847	0.001175	0.001994	0.03922	1.477465	0.014688	0.000857	0.00035	0.008783	0.001573	0.00252
481	467	0.0002	0.00141	0.000139	0.003722	0	0.006389	0.025166	0.17086	8.48E-05	0.026673	0.001333	0.002031	0.033427	1.461418	0.013436	0.000622	0.000206	0.00777	0.001464	0.003362
483	470	0.00016	0.001975	0.000109	0.001434	1.9E-05	0.006409	0.032568	0.133882	5.08E-05	0.033591	0.001442	0.002171	0.044242	1.836048	0.016512	0.00052	0.000321	0.008589	0.00175	0.004973
485	472	0.000276	0.002456	7.14E-05	0.001527	1.9E-05	0.006506	0.03372	0.144366	7.61E-05	0.034057	0.001319	0.002574	0.031278	1.821808	0.017511	0.000844	0.000281	0.00954	0.002166	0.003393
487	475	0.000221	0.002546	7.49E-05	0.001507	7.97E-06	0.007159	0.032388	0.147868	7.97E-06	0.033648	0.001233	0.002508	0.035374	1.651799	0.015702	0.000854	0.000481	0.009004	0.001913	0.002684
489	477	0.000216	0.002604	4.64E-05	0.001199	4.96E-05	0.006952	0.033535	0.140169	1.44E-05	0.033034	0.001456	0.002839	0.04291	1.687294	0.016405	0.001145	0.000334	0.008373	0.001871	0.003449
491	480	0.000138	0.002699	6.02E-05	0.001563	0	0.006463	0.038764	0.151637	3.01E-05	0.037771	0.001731	0.002818	0.049686	1.894144	0.017102	0.000873	0.000729	0.010455	0.002881	0.004891
493	483	0.000204	0.003178	5.7E-05	0.002127	1.11E-05	0.006264	0.039335	0.174767	0	0.037837	0.001417	0.0026	0.053499	1.840842	0.017057	0.000798	0.000242	0.008913	0.002185	0.003233
495	485	0.000423	0.00332	0.000189	0.001596	0.0006	0.006127	0.043044	0.145874	0	0.04071	0.001825	0.002746	0.062914	2.106777	0.019191	0.000377	0.00426	0.00978	0.002235	0.003266
497	488	0.000214	0.003568	5.76E-05	0.000816	1.28E-05	0.005297	0.047412	0.188156	8.96E-05	0.042076	0.001558	0.003188	0.039775	1.973269	0.018526	0.001011	0.001062	0.011123	0.002306	0.003922
499	490	0.000381	0.003591	7.33E-05	0.001152	5.89E-05	0.005972	0.046258	0.193741	3.35E-05	0.041625	0.001698	0.002891	0.043888	1.966444	0.018885	0.000881	0.000325	0.009714	0.002597	0.00288
501	493	0.00014	0.003767	0.000109	0.001006	1.66E-05	0.005939	0.045934	0.198502	5.74E-05	0.041531	0.00178	0.002686	0.052714	2.069338	0.018962	0.000773	0.000273	0.009976	0.002007	0.003938
503	495	0.000218	0.003759	4.71E-05	0.001061	0	0.005381	0.050029	0.203465	1.3E-05	0.044823	0.001884	0.002908	0.06835	2.397613	0.020988	0.00059	0.000247	0.00962	0.00222	0.003512
505	498	0.000315	0.004149	1.59E-05	0.001199	0	0.004468	0.054077	0.196174	0	0.046868	0.002069	0.003252	0.058286	2.309025	0.020878	0.000795	0.00046	0.011108	0.002552	0.005653
507	501	0.000301	0.003536	7.26E-05	0.00122	9.47E-06	0.00476	0.050179	0.17232	0	0.046217	0.001969	0.003119	0.057126	2.23808	0.021588	0.001123	0.00077	0.010891	0.003304	0.004282
509	503	0.000211	0.003201	6.71E-05	0.00109	0	0.005265	0.049514	0.145325	0	0.046454	0.001835	0.002995	0.039964	2.174706	0.019241	0.001312	0.000424	0.011082	0.002465	0.004527
511	506	0.000167	0.002914	6.25E-05	0.000859	2.19E-05	0.004821	0.046817	0.156238	6.25E-06	0.044615	0.001841	0.003182	0.047566	2.139168	0.019154	0.001315	0.00065	0.011237	0.002641	0.004736
513	508	0.00032	0.003137	0.000105	0.000974	1.11E-05	0.005334	0.046223	0.155249	0	0.044597	0.001425	0.002784	0.05501	2.166864	0.021102	0.000808	0.000773	0.01082	0.002264	0.005467
515	511	0.000277	0.002679	5.81E-05	0.001011	6.27E-05	0.005695	0.039715	0.151133	1.38E-05	0.039759	0.001792	0.002625	0.040391	1.86745	0.017515	0.001149	0.000228	0.009763	0.002136	0.003505
517	514	0.000152	0.00249	3.92E-05	0.000854	9.42E-06	0.005044	0.042428	0.159188	0	0.041708	0.002044	0.002831	0.046831	2.021575	0.019173	0.001328	0.000444	0.010926	0.002732	0.003412
519	516	0.000186	0.002984	8.69E-05	0.000967	9.48E-06	0.00552	0.046687	0.161419	1.9E-05	0.044339	0.00177	0.00275	0.076026	2.357035	0.020474	0.000849	0.000428	0.010849	0.002933	0.004396
521	519	0.000156	0.002867	9.21E-05	0.001173	1.49E-05	0.005084	0.043195	0.157584	5.8E-05	0.042629	0.001502	0.002929	0.050116	1.988029	0.018837	0.001042	0.000207	0.01102	0.001547	0.003076
523	521	0.000252	0.002368	6.37E-05	0.001132	0.00027	0.005128	0.039117	0.141959	1.24E-05	0.04087	0.001997	0.003049	0.050252	1.971985	0.018473	0.001277	0.001006	0.010426	0.002833	0.004481
525	524	0.000215	0.002023	6.1E-05	0.000906	0	0.005562	0.032829	0.154491	1.22E-05	0.035153	0.001323	0.002719	0.036141	1.671128	0.016063	0.001002	0.000396	0.009133	0.002185	0.004899
527	526	0.000138	0.002121	4.13E-05	0.001024	7.94E-06	0.005647	0.032992	0.158759	1.91E-05	0.034046	0.001032	0.002554	0.055899	1.767259	0.017168	0.000727	0.000324	0.009837	0.00195	0.005417
529	529	0.000245	0.002536	9.66E-05	0.001693	7.79E-06	0.005478	0.038895	0.148554	2.49E-05	0.037296	0.001888	0.002553	0.050122	1.870595	0.017861	0.000916	0.00045	0.010368	0.002114	0.004254

		Se	Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh	Zr/Rb
453	431	0.003444	0.001342	0.031329	0.041754	0.052438	0.000425	0.000507	0.000601	0.000942	1.44E-05	0.0007	0.00556	0.008756	0.00267	0.002896	0.002539	0.002122	0.00155	0.742778	0.257222	1.673786
455	434	0.004526	0.000958	0.033424	0.044813	0.04666	0.000226	0.000748	0.002098	0.004038	0	0.000386	0.005862	0.010695	0.00258	0.004283	0.003642	0.002018	0.001853	0.745884	0.254116	1.396001
457	436	0.005043	0.001047	0.033911	0.046055	0.045993	0.000466	0.000453	0.000455	0.000913	0	0.000913	0.007189	0.01169	0.002844	0.003819	0.003523	0.002916	0.002964	0.754098	0.245902	1.356318
459	439	0.005462	0.001108	0.035531	0.04761	0.047797	0.00084	0.000272	0.00045	0.0007	0	0.001377	0.007428	0.012021	0.002841	0.004154	0.00367	0.003765	0.002693	0.750873	0.249127	1.345212
461	441	0.004519	0.000789	0.033252	0.047809	0.060762	0.000551	0.000384	0.000257	0.000591	0	0.00119	0.007196	0.012659	0.002498	0.00404	0.003464	0.003852	0.002929	0.748876	0.251124	1.82733
463	444	0.004652	0.000879	0.033084	0.049999	0.055994	0.00016	0.000307	0.000139	0.000462	0	0.001427	0.007053	0.012824	0.002474	0.003936	0.003715	0.004025	0.002264	0.748808	0.251192	1.692488
465	446	0.003691	0.001127	0.031834	0.044756	0.058793	0.000125	0.000416	0.000191	0.00034	0	0.001116	0.006934	0.012146	0.002895	0.004361	0.002925	0.003545	0.001565	0.751824	0.248176	1.846883
467	449	0.004737	0.001117	0.032606	0.0474	0.052387	0.000216	0.000404	0.000353	0.000558	0	0.001328	0.006382	0.011982	0.002209	0.003475	0.003394	0.003813	0.00248	0.757953	0.242047	1.606679
469	452	0.004669	0.000725	0.030986	0.048641	0.039807	0.000547	0.000253	0.00047	0.001181	0	0.000962	0.006477	0.010181	0.002846	0.004756	0.003813	0.002555	0.003357	0.758354	0.241646	1.284672
471	454	0.004876	0.001295	0.03223	0.047723	0.043348	0.000275	0.000718	0.000461	0.000574	0	0.000855	0.006644	0.010657	0.002753	0.004175	0.003133	0.003147	0.002621	0.7551	0.2449	1.34495
473	457	0.005175	0.001137	0.032057	0.047925	0.041433	6.16E-05	0.000528	0.000334	0.000507	0	0.000795	0.006059	0.010238	0.002309	0.003857	0.003261	0.003418	0.002567	0.757905	0.242095	1.292456
475	459	0.00492	0.001041	0.032356	0.047	0.04175	0.000478	0.000667	0.000119	0.000544	0	0.000989	0.006039	0.011059	0.002802	0.004335	0.003222	0.00314	0.002952	0.755167	0.244833	1.290331
477	462	0.004354	0.000612	0.033516	0.047153	0.04145	0.000647	0.000323	0.00027	0.000208	0	0.001046	0.006559	0.010775	0.002951	0.003836	0.004087	0.003106	0.003053	0.756436	0.243564	1.236731
479	465	0.004115	0.001268	0.032868	0.042492	0.044319	0.000314	0.000432	8.84E-05	0.000494	0	0.000893	0.007106	0.010555	0.002576	0.003211	0.002799	0.003198	0.001363	0.75816	0.24184	1.34839
481	467	0.004304	0.000681	0.032099	0.042763	0.044179	0.000233	0.000365	0.000297	0.000685	0	0.00051	0.00656	0.009943	0.002244	0.004496	0.002687	0.002755	0.0021	0.75965	0.24035	1.376345
483	470	0.004889	0.001338	0.034543	0.044424	0.04407	0.000162	0.000476	8.89E-05	0.000382	0	0.001009	0.00666	0.011526	0.00271	0.003845	0.002893	0.002328	0.003251	0.758507	0.241493	1.275792
485	472	0.004838	0.001024	0.033284	0.043584	0.044537	0.000257	0.000585	0.000165	0.000468	0	0.000982	0.0064	0.010826	0.002612	0.004315	0.003073	0.003119	0.002759	0.757827	0.242173	1.338066
487	475	0.003674	0.000836	0.034289	0.046132	0.048702	0.000266	0.000714	0.000147	0.000384	0	0.001259	0.006132	0.010892	0.002216	0.004019	0.003164	0.00282	0.003256	0.75578	0.24422	1.420341
489	477	0.004707	0.000755	0.034368	0.045498	0.046005	0.000157	0.000534	8.79E-05	0.000587	1.28E-05	0.001022	0.006734	0.010525	0.00231	0.004312	0.0035	0.003485	0.001773	0.758418	0.241582	1.338621
491	480	0.005021	0.001412	0.035879	0.044848	0.045464	0.000445	0.000655	0.000219	0.000566	0	0.001715	0.006645	0.01145	0.001897	0.00423	0.003271	0.003666	0.003691	0.758655	0.241345	1.26715
493	483	0.004646	0.000388	0.034135	0.04441	0.04573	0.000513	0.000372	0.000331	0.00067	0	0.00148	0.006785	0.011245	0.003092	0.004046	0.003731	0.003229	0.002985	0.755034	0.244966	1.339688
495	485	0.005732	0.00107	0.035003	0.042478	0.044622	0.000392	0.000468	0.000197	0.000496	0	0.001204	0.006765	0.011789	0.003303	0.004131	0.003456	0.003765	0.002967	0.75789	0.24211	1.274814
497	488	0.005424	0.000411	0.035952	0.048944	0.047276	0.000611	0.000178	0.000274	0.000606	0	0.001478	0.006647	0.012744	0.002412	0.00357	0.003647	0.003775	0.003298	0.753627	0.246373	1.314975
499	490	0.005284	0.000755	0.036341	0.050249	0.048927	0.000413	0.000558	0.000344	0.000621	0	0.001458	0.007019	0.012984	0.002603	0.004033	0.003629	0.00354	0.003108	0.752368	0.247632	1.346338
501	493	0.005031	0.001126	0.035372	0.050077	0.044963	0.000424	0.00063	0.000254	0.000767	0	0.001155	0.006759	0.012469	0.002469	0.004297	0.00342	0.002843	0.003257	0.755173	0.244827	1.271152
503	495	0.005183	0.001277	0.035737	0.049621	0.044734	0.000548	0.000348	0.000322	0.000575	0	0.000972	0.006639	0.011966	0.002188	0.00438	0.003512	0.004268	0.004058	0.752324	0.247676	1.251762
505	498	0.005147	0.000631	0.03803	0.047297	0.044426	0.000859	0.000188	0.000496	0.000523	0	0.001436	0.006871	0.011945	0.002393	0.004627	0.003722	0.003055	0.003446	0.752413	0.247587	1.168165
507	501	0.004381	0.000615	0.038952	0.044627	0.045039	0.000696	0.000323	0.000112	0.000806	0	0.001448	0.006994	0.011871	0.001911	0.004362	0.004018	0.003984	0.002813	0.754956	0.245044	1.156264
509	503	0.005678	0.001108	0.039947	0.04376	0.045731	0.000513	0.000365	0.000119	0.000354	0	0.001278	0.006944	0.011592	0.002696	0.004775	0.004034	0.003613	0.003867	0.755946	0.244054	1.144804
511	506	0.005467	0.000776	0.039607	0.045955	0.046796	0.000403	0.000283	0.000187	0.000461	0	0.001273	0.007316	0.01256	0.002658	0.004824	0.004218	0.003962	0.003776	0.755941	0.244059	1.181517
513	508	0.004906	0.000703	0.037934	0.047384	0.047406	0.000307	0.000407	6.68E-05	0.0006	0	0.001669	0.007138	0.013031	0.002833	0.004794	0.0039	0.003347	0.003865	0.753262	0.246738	1.249717
515	511	0.00505	0.000826	0.036006	0.045771	0.045016	0.000246	0.000539	0.000135	0.000603	0	0.001036	0.007635	0.012273	0.002234	0.004013	0.003369	0.003654	0.002648	0.757907	0.242093	1.250234
517	514	0.005305	0.000958	0.038675	0.04715	0.047654	0.000479	0.000364	0.000181	0.000473	0	0.001311	0.007018	0.012481	0.002393	0.00452	0.003707	0.003985	0.003085	0.755342	0.244658	1.232159
519	516	0.005425	0.000741	0.036582	0.045647	0.047424	0.000322	0.000409	0.000174	0.000417	0	0.001386	0.007247	0.01225	0.002189	0.00424	0.003794	0.0035	0.003129	0.751365	0.248635	1.296384
521	519	0.005291	0.000826	0.037626	0.047202	0.048816	0.000557	0.000363	0.000282	0.000538	0	0.001207	0.007744	0.012356	0.003164	0.00451	0.003837	0.004594	0.003087	0.754489	0.245511	1.297377
523	521	0.005428	0.000837	0.037641	0.046034	0.050371	0.000416	0.000182	0.000365	0.000317	0	0.001008	0.006807	0.012538	0.002249	0.004276	0.004008	0.004891	0.00346	0.753046	0.246954	1.338202
525	524	0.005456	0.001287	0.035006	0.047119	0.050998	0.000267	0.000369	0.000319	0.000506	0	0.000765	0.007561	0.012907	0.002295	0.003871	0.003132	0.002723	0.002932	0.755647	0.244353	1.456814
527	526	0.00522	0.000818	0.034113	0.05043	0.052435	0.000381	0.000335	0.000333	0.000556	0	0.001181	0.007681	0.012717	0.002623	0.003961	0.003751	0.003028	0.003242	0.751203	0.248797	1.537115
529	529	0.005095	0.001252	0.036794	0.044597	0.044711	0.000389	0.00026	0.000338	0.000793	0	0.001266	0.006939	0.011183	0.002318	0.004489	0.003289	0.00376	0.003042	0.756332	0.243668	1.215163

Appendix 1 - Bienen 5 B

Depth	Real depth	%Clay	%Very Fine	%Fine Silt	%Coarse S	%Very Fine	%Fine San	%Middle C	%Coarse S	%Very Coarse	Sand							Original					Shifted Graph					
		< 8 µm	8-16 µm	16-32 µm	32-63 µm	63-125 µm	125-250 µm	250-500 µm	500-1000 µ	1000-2000	Clay	Silt	Sand	>8um	>16um	>32um	>64um	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti
357	341	50.74	20.26	16.53	9.28	3.09	0.12	0	0	0	50.74	46.06	3.2	49.28	29.02	12.49	3.2	1.209674	27.95862	207.1172	212.8276	1.027571	1.207495	20.42387	152.6749	142.5391	0.933612
359	343	49.06	20.34	17.16	9.92	3.37	0.15	0	0	0	49.06	47.42	3.52	50.94	30.6	13.44	3.52	1.207495	20.42387	152.6749	142.5391	0.933612	1.214384	14.49485	105.9768	105.1005	0.991731
361	346	52.89	21.19	16.46	7.42	1.92	0.12	0	0	0	52.89	45.07	2.04	47.11	25.92	9.46	2.04	1.214384	14.49485	105.9768	105.1005	0.991731	1.159693	15.1493	113.5014	102.6704	0.904574
363	348	52.34	20.55	16.36	8.04	2.39	0.31	0	0	0	52.34	44.95	2.7	47.65	27.1	10.74	2.7	1.159693	15.1493	113.5014	102.6704	0.904574	1.135805	20.01172	161.8125	145.5117	0.899261
365	351	50.56	20.42	16.75	8.85	3.1	0.32	0	0	0	50.56	46.02	3.41	49.44	29.02	12.27	3.41	1.135805	20.01172	161.8125	145.5117	0.899261	1.089273	14.92073	130.3994	111.0793	0.851839
367	353	50.74	21.14	17.15	8.31	2.34	0.32	0	0	0	50.74	46.6	2.66	49.26	28.12	10.97	2.66	1.089273	14.92073	130.3994	111.0793	0.851839	1.115834	21.02917	178.6792	156.8583	0.877877
369	356	49.7	20.48	16.99	9.31	3.22	0.3	0	0	0	49.7	46.78	3.51	50.3	29.82	12.83	3.51	1.115834	21.02917	178.6792	156.8583	0.877877	1.237924	23.31933	184.5882	174.979	0.947942
371	358	45.82	19.02	16.85	11.11	5.75	1.45	0	0	0	45.82	46.98	7.19	54.18	35.16	18.31	7.19	1.237924	23.31933	184.5882	174.979	0.947942	1.264256	21.97308	153.6192	154.5115	1.005809
373	361	48.99	19.54	16.41	9.92	4.16	0.98	0	0	0	48.99	45.87	5.14	51.01	31.47	15.06	5.14	1.264256	21.97308	153.6192	154.5115	1.005809	1.158997	15.23324	126.1749	110.3615	0.874671
375	363	47.64	19.45	16.64	10.35	4.2	1.58	0.14	0	0	47.64	46.43	5.92	52.36	32.91	16.27	5.92	1.158997	15.23324	126.1749	110.3615	0.874671	1.206359	18.79355	138.4806	124.971	0.902444
377	365	45.02	19.39	18.34	12.12	4.59	0.55	0	0	0	45.02	49.84	5.14	54.99	35.6	17.26	5.14	1.206359	18.79355	138.4806	124.971	0.902444	1.214395	20.68641	154.5226	138.4495	0.895982
379	368	47.69	20.18	17.88	10.21	3.58	0.46	0	0	0	47.69	48.27	4.04	52.31	32.13	14.25	4.04	1.214395	20.68641	154.5226	138.4495	0.895982	1.343456	18.48366	132.9673	135.4608	1.018752
381	370	40.71	17.82	18.93	15.57	6.29	0.69	0	0	0	40.71	52.31	6.98	59.3	41.48	22.55	6.98	1.343456	18.48366	132.9673	135.4608	1.018752	1.390087	17.58286	116.2686	126.5257	1.088219
383	373	47.48	20.52	18.17	10.22	3.21	0.4	0	0	0	47.48	48.91	3.61	52.52	32	13.83	3.61	1.390087	17.58286	116.2686	126.5257	1.088219	1.15601	18.58966	146.9793	131.0517	0.891634
385	375	52.11	21.71	16.92	7.72	1.54	0.01	0	0	0	52.11	46.34	1.55	47.9	26.19	9.27	1.55	1.15601	18.58966	146.9793	131.0517	0.891634	1.187209	19.70782	159.5638	149.7984	0.938799
387	378	51.62	20.86	16.43	8.15	2.49	0.45	0	0	0	51.62	45.44	2.94	48.38	27.52	11.09	2.94	1.187209	19.70782	159.5638	149.7984	0.938799	1.202469	16.14763	106.532	107.6964	1.01093
389	380	46.72	19.52	17.06	11.54	4.76	0.41	0	0	0	46.72	48.12	5.17	53.29	33.77	16.71	5.17	1.202469	16.14763	106.532	107.6964	1.01093	1.355241	17.94576	119.7492	127.4983	1.064712
391	383	45.79	18.81	18.01	12.27	4.21	0.92	0	0	0	45.79	49.09	5.12	54.22	35.41	17.4	5.12	1.355241	17.94576	119.7492	127.4983	1.064712	1.282906	19.02024	131.8826	149.004	1.129823
393	385	53.02	21.49	14.97	6.88	2.63	1.01	0	0	0	53.02	43.34	3.64	46.98	25.49	10.52	3.64	1.282906	19.02024	131.8826	149.004	1.129823	1.143311	24.94975	214.8191	195.1558	0.908466
395	387	50.11	20.55	17.02	8.77	2.96	0.59	0	0	0	50.11	46.34	3.55	49.89	29.34	12.32	3.55	1.143311	24.94975	214.8191	195.1558	0.908466	1.245141	19.8412	162.6438	163.867	1.007521
397	390	50.28	19.71	16.9	9.4	3.21	0.5	0	0	0	50.28	46.01	3.71	49.72	30.01	13.11	3.71	1.245141	19.8412	162.6438	163.867	1.007521	1.123378	22	180.0571	174.7762	0.970671
399	392	51.23	21.74	15.72	8.64	2.53	0.13	0	0	0	51.23	46.1	2.67	48.76	27.02	11.3	2.67	1.123378	22	180.0571	174.7762	0.970671	1.314298	16.11355	133.8352	140.8755	1.052604
401	395	47.99	21.56	17.14	9.51	3.24	0.56	0	0	0	47.99	48.21	3.8	52.01	30.45	13.31	3.8	1.314298	16.11355	133.8352	140.8755	1.052604	1.233094	16.25862	155.944	167.8017	1.076039
403	397	47.41	20.46	17.57	9.55	3.55	1.46	0	0	0	47.41	47.58	5.02	52.59	32.13	14.56	5.02	1.233094	16.25862	155.944	167.8017	1.076039	1.147404	17.81008	150.1318	145.876	0.971653
405	400	50.45	21.82	17.81	8.04	1.75	0.13	0	0	0	50.45	47.67	1.87	49.55	27.73	9.92	1.87	1.147404	17.81008	150.1318	145.876	0.971653	1.135415	20.04265	167.1611	158.7536	0.949704
407	402	49.89	20.86	16.75	7.96	2.9	1.62	0.03	0	0	49.89	45.56	4.55	50.12	29.26	12.51	4.55	1.135415	20.04265	167.1611	158.7536	0.949704	1.724387	19.41729	144.5188	198.4925	1.373472
409	405	49.6	20.81	17.69	8.83	2.64	0.42	0	0	0	49.6	47.33	3.06	50.39	29.58	11.89	3.06	1.724387	19.41729	144.5188	198.4925	1.373472	1.310461	18.47692	131.1462	151.3885	1.154349
411	407	46.76	19.22	17.75	11.36	4.19	0.72	0	0	0	46.76	48.33	4.91	53.24	34.02	16.27	4.91	1.310461	18.47692	131.1462	151.3885	1.154349	1.238813	22.12435	178.5492	186.0466	1.041991
413	409	50.76	20.43	16.78	8.53	2.88	0.62	0	0	0	50.76	45.75	3.49	49.24	28.81	12.03	3.49	1.238813	22.12435	178.5492	186.0466	1.041991	1.188719	14.52924	112.652	115.9766	1.029512
415	412	50.19	22.73	16.59	7.8	2.2	0.49	0	0	0	50.19	47.12	2.69	49.81	27.08	10.49	2.69	1.188719	14.52924	112.652	115.9766	1.029512	1.154966	19.33721	152.4884	150.7364	0.988511
417	414	50.6	21.11	17.25	8.95	2.06	0.03	0	0	0	50.6	47.31	2.1	49.4	28.29	11.04	2.1	1.154966	19.33721	152.4884	150.7364	0.988511	1.156567	17.08127	137.8657	136.5689	0.990594
419	417	50.21	20.86	16.5	8.58	3.04	0.81	0	0	0	50.21	45.94	3.85	49.79	28.93	12.43	3.85	1.156567	17.08127	137.8657	136.5689	0.990594	1.286926	20.99298	143.5088	142.6456	0.993985
421	419	45.21	19.86	18.56	11.64	4.21	0.53	0	0	0	45.21	50.06	4.74	54.8	34.94	16.38	4.74	1.286926	20.99298	143.5088	142.6456	0.993985	1.250047	24.09649	174.5789	174.9956	1.002387
423	422	48.89	20.8	17.33	9.26	3.29	0.44	0	0	0	48.89	47.38	3.73	51.12	30.32	12.99	3.73	1.250047	24.09649	174.5789	174.9956	1.002387	1.157522	26.58571	189.2762	174.1905	0.920298
425	424	49.41	20.8	16.75	8.88	3.5	0.66	0	0	0	49.41	46.43	4.16	50.59	29.79	13.04	4.16	1.157522	26.58571	189.2762	174.1905	0.920298	1.220151	16.95641	110.2821	96.69231	0.876773
427	427	48.93	21.7	15.99	8.88	3.66	0.84	0	0	0	48.93	46.57	4.5	51.07	29.37	13.38	4.5	1.220151	16.95641	110.2821	96.69231	0.876773	1.190826	21.90671	141.7085	127.9913	0.903201
429	429	48.29	22.62	15.94	8.37	3.85	0.93	0	0	0	48.29	46.93	4.78	51.71	29.09	13.15	4.78	1.190826	21.90671	141.7085	127.9913	0.903201					

		>8um	>16um	>32um	>64um
Original	Original	0.322911	0.323142	0.276425	0.197411
Shifted	Upper part	0.319491	0.310755	0.323192	0.361464
	part 2	0.731762	0.703849	0.692514	0.581068
	part 1	-0.05433	-0.02547		0.262926

	Original					Shifted				
	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti
>8um	0.322911	-0.00287	-0.14744	-0.10094	0.089799	0.319491	0.088393	-0.12957	0.00648	0.238375
>16um	0.323142	0.032624	-0.09852	-0.04975	0.099016	0.310755	0.070914	-0.14974	-0.02315	0.220627
>32um	0.276425	0.061952	-0.08964	-0.05782	0.063247	0.323192	0.073123	-0.15812	-0.04124	0.202523
>64um	0.197411	0.101228	-0.03247	-0.02572	0.015103	0.361464	0.129007	-0.10359	0.013989	0.201267

	Upper part (shifted)				
	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti
>8um	0.731762	-0.05189	-0.3197	-0.10985	0.562768
>16um	0.728455	-0.07115	-0.34173	-0.12946	0.570099
>32um	0.719153	-0.03656	-0.31064	-0.098	0.56302
>64um	0.598501	0.068642	-0.18451	-0.00808	0.441699

Appendix 1 - Bienen 5 A

Depth	Real depth	%Clay	%Very Fine	%Fine Silt	%Coarse S	%Very Fine	%Fine San	%Middle C	%Coarse S	%Very Coarse	Sand		AVG STDEV	
		< 8 µm	8-16 µm	16-32 µm	32-63 µm	63-125 µm	125-250 µm	250-500 µm	500-1000 µ	1000-2000	Clay	Silt	Sand	P95
357	341	50.74	20.26	16.53	9.28	3.09	0.12	0	0	0	50.74	46.06	3.2	44.2
359	343	49.06	20.34	17.16	9.92	3.37	0.15	0	0	0	49.06	47.42	3.52	52.6
361	346	52.89	21.19	16.46	7.42	1.92	0.12	0	0	0	52.89	45.07	2.04	37.2
363	348	52.34	20.55	16.36	8.04	2.39	0.31	0	0	0	52.34	44.95	2.7	44.2
365	351	50.56	20.42	16.75	8.85	3.1	0.32	0	0	0	50.56	46.02	3.41	52.6
367	353	50.74	21.14	17.15	8.31	2.34	0.32	0	0	0	50.74	46.6	2.66	44.2
369	356	49.7	20.48	16.99	9.31	3.22	0.3	0	0	0	49.7	46.78	3.51	52.6
371	358	45.82	19.02	16.85	11.11	5.75	1.45	0	0	0	45.82	46.98	7.19	74.3
373	361	48.99	19.54	16.41	9.92	4.16	0.98	0	0	0	48.99	45.87	5.14	62.5
375	363	47.64	19.45	16.64	10.35	4.2	1.58	0.14	0	0	47.64	46.43	5.92	62.5
377	365	45.02	19.39	18.34	12.12	4.59	0.55	0	0	0	45.02	49.84	5.14	62.5
379	368	47.69	20.18	17.88	10.21	3.58	0.46	0	0	0	47.69	48.27	4.04	52.6
381	370	40.71	17.82	18.93	15.57	6.29	0.69	0	0	0	40.71	52.31	6.98	62.5
383	373	47.48	20.52	18.17	10.22	3.21	0.4	0	0	0	47.48	48.91	3.61	52.6
385	375	52.11	21.71	16.92	7.72	1.54	0.01	0	0	0	52.11	46.34	1.55	37.2
387	378	51.62	20.86	16.43	8.15	2.49	0.45	0	0	0	51.62	45.44	2.94	44.2
389	380	46.72	19.52	17.06	11.54	4.76	0.41	0	0	0	46.72	48.12	5.17	62.5
391	383	45.79	18.81	18.01	12.27	4.21	0.92	0	0	0	45.79	49.09	5.12	62.5
393	385	53.02	21.49	14.97	6.88	2.63	1.01	0	0	0	53.02	43.34	3.64	44.2
395	387	50.11	20.55	17.02	8.77	2.96	0.59	0	0	0	50.11	46.34	3.55	44.2
397	390	50.28	19.71	16.9	9.4	3.21	0.5	0	0	0	50.28	46.01	3.71	52.6
399	392	51.23	21.74	15.72	8.64	2.53	0.13	0	0	0	51.23	46.1	2.67	44.2
401	395	47.99	21.56	17.14	9.51	3.24	0.56	0	0	0	47.99	48.21	3.8	52.6
403	397	47.41	20.46	17.57	9.55	3.55	1.46	0	0	0	47.41	47.58	5.02	62.5
405	400	50.45	21.82	17.81	8.04	1.75	0.13	0	0	0	50.45	47.67	1.87	37.2
407	402	49.89	20.86	16.75	7.96	2.9	1.62	0.03	0	0	49.89	45.56	4.55	52.6
409	405	49.6	20.81	17.69	8.83	2.64	0.42	0	0	0	49.6	47.33	3.06	44.2
411	407	46.76	19.22	17.75	11.36	4.19	0.72	0	0	0	46.76	48.33	4.91	52.6
413	409	50.76	20.43	16.78	8.53	2.88	0.62	0	0	0	50.76	45.75	3.49	44.2
415	412	50.19	22.73	16.59	7.8	2.2	0.49	0	0	0	50.19	47.12	2.69	44.2
417	414	50.6	21.11	17.25	8.95	2.06	0.03	0	0	0	50.6	47.31	2.1	44.2
419	417	50.21	20.86	16.5	8.58	3.04	0.81	0	0	0	50.21	45.94	3.85	52.6
421	419	45.21	19.86	18.56	11.64	4.21	0.53	0	0	0	45.21	50.06	4.74	52.6
423	422	48.89	20.8	17.33	9.26	3.29	0.44	0	0	0	48.89	47.38	3.73	52.6
425	424	49.41	20.8	16.75	8.88	3.5	0.66	0	0	0	49.41	46.43	4.16	52.6
427	427	48.93	21.7	15.99	8.88	3.66	0.84	0	0	0	48.93	46.57	4.5	52.6
429	429	48.29	22.62	15.94	8.37	3.85	0.93	0	0	0	48.29	46.93	4.78	52.6

		Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	As
357	341																				
359	343	0.000203	0.005682	5.75E-05	0.003274	2.38E-05	0.006157	0.05144	0.231043	6.59E-05	0.042093	0.001816	0.002692	0.043898	1.970676	0.019196	0.0009	6.87E-05	0.010141	0.001793	0.004293
361	346	0.000301	0.006148	5.45E-05	0.002013	4.95E-06	0.002325	0.054411	0.202253	3.84E-05	0.045956	0.001848	0.002974	0.038152	2.093014	0.020083	0.001137	8.55E-05	0.010903	0.00179	0.005267
363	348	0.000421	0.006103	8.79E-05	0.005191	4.99E-05	0.002025	0.053196	0.202834	4.45E-05	0.044624	0.002109	0.002938	0.035382	2.046219	0.018968	0.000924	0.000174	0.009346	0.001702	0.005153
365	351	0.000404	0.006117	4.21E-05	0.002952	1.82E-05	0.002625	0.054394	0.208181	1.14E-05	0.045829	0.001894	0.002857	0.038385	2.147032	0.020856	0.001062	9.33E-05	0.010114	0.001497	0.004912
367	353	0.000293	0.005869	7.56E-05	0.00133	1.37E-05	0.002115	0.054698	0.192568	6.87E-06	0.047459	0.002061	0.003265	0.041464	2.219632	0.020648	0.001139	6.3E-05	0.011567	0.002392	0.004889
369	356	0.000372	0.005546	0.000162	0.001243	0	0.001971	0.0546	0.136469	1.13E-05	0.048468	0.002047	0.003359	0.043438	2.326195	0.022493	0.001041	0.000155	0.010931	0.001979	0.004506
371	358	0.000272	0.005711	7.81E-05	0.001205	0	0.001987	0.055717	0.18555	0	0.048521	0.001996	0.003224	0.04564	2.271703	0.022108	0.00107	3.51E-05	0.011369	0.002059	0.005769
373	361	0.000259	0.006047	2.94E-05	0.00108	0	0.00211	0.056356	0.232629	0	0.04787	0.001904	0.003058	0.049508	2.117058	0.020907	0.001256	0	0.011466	0.002181	0.004728
375	363	0.000295	0.006491	0.00012	0.001093	0	0.002205	0.055018	0.234505	0	0.045381	0.002012	0.00281	0.043949	1.973297	0.020173	0.001074	2.05E-05	0.01057	0.002164	0.005276
377	365	0.000388	0.005916	1.36E-05	0.000995	0	0.002378	0.057125	0.189529	7.93E-06	0.049005	0.001973	0.003144	0.045558	2.121661	0.020101	0.001265	7.13E-05	0.011244	0.002328	0.004173
379	368	0.000351	0.006589	5.77E-05	0.001221	6.79E-06	0.001925	0.055476	0.124718	0	0.048553	0.001991	0.003383	0.058437	2.312465	0.021754	0.001152	0.000126	0.010329	0.001613	0.005033
381	370	0.000322	0.006663	8.53E-05	0.001206	5.61E-06	0.002166	0.056528	0.15923	0	0.049773	0.001939	0.003065	0.03848	2.207202	0.021797	0.001226	6.06E-05	0.010833	0.002645	0.004936
383	373	0.000354	0.006541	5.2E-05	0.001074	2.31E-05	0.001791	0.054919	0.233293	0	0.047056	0.002194	0.003027	0.037337	1.991923	0.021166	0.001746	3.35E-05	0.010513	0.002396	0.004713
385	375	0.000385	0.006761	5.49E-06	0.001101	0	0.001835	0.051882	0.24342	0	0.044709	0.001686	0.002854	0.040822	1.980441	0.018895	0.001194	0	0.010143	0.001848	0.005311
387	378	0.000328	0.0061	6.45E-05	0.001051	9.05E-06	0.001461	0.055058	0.200344	0	0.04823	0.002082	0.003094	0.0459	2.187119	0.021309	0.001225	7.35E-05	0.012027	0.001839	0.00504
389	380	0.000282	0.005553	6.38E-05	0.00107	3.36E-05	0.001241	0.053431	0.247461	0	0.044959	0.001914	0.002938	0.077411	2.2619	0.0214	0.000979	1.16E-05	0.010843	0.002296	0.005052
391	383	0.000415	0.006706	1.85E-05	0.001076	0	0.001342	0.053158	0.238371	5.78E-05	0.044245	0.001895	0.002755	0.05539	1.952927	0.019667	0.001305	0	0.010872	0.001388	0.005245
393	385	0.000358	0.006433	4.13E-05	0.00097	0	0.001314	0.051735	0.255658	0	0.042927	0.001837	0.002694	0.065667	1.955924	0.019246	0.000865	0	0.010235	0.001995	0.004302
395	387	0.000297	0.005655	5.54E-05	0.000971	8.43E-06	0.00139	0.047691	0.233496	3.25E-05	0.039214	0.001642	0.002363	0.044856	1.786678	0.018144	0.000473	0	0.009846	0.001779	0.004861
397	390	0.000221	0.005508	8.43E-05	0.00206	0	0.001109	0.055611	0.202786	5.55E-06	0.047421	0.002433	0.00317	0.049098	2.157289	0.021367	0.001074	0.000182	0.010712	0.001887	0.004866
399	392	0.000267	0.005302	3.56E-05	0.001137	0	0.00126	0.052212	0.236157	2.29E-05	0.043464	0.001874	0.002797	0.054857	2.001506	0.02035	0.000826	0	0.010769	0.001621	0.004082
401	395	0.000235	0.005172	7.95E-05	0.00206	0	0.001185	0.052136	0.219568	1.12E-05	0.042327	0.001991	0.002907	0.039813	2.058546	0.020307	0.00075	5.93E-05	0.010341	0.00195	0.004332
403	397	0.00031	0.005002	5.69E-06	0.001042	9.1E-06	0.001029	0.047135	0.265461	0	0.041546	0.001619	0.002769	0.04691	1.972471	0.019927	0.000856	2.05E-05	0.010603	0.001763	0.004792
405	400	0.000253	0.004115	5.78E-05	0.001153	0	0.000831	0.043854	0.19862	1.31E-05	0.039472	0.001567	0.002522	0.048009	1.952996	0.019548	0.00053	1.96E-05	0.009762	0.001071	0.004186
407	402	0.000287	0.005115	3.45E-05	0.001114	5.57E-06	0.000881	0.049687	0.21221	0	0.043117	0.001594	0.002977	0.045793	2.040229	0.020501	0.000933	3.56E-05	0.010929	0.001377	0.005065
409	405	0.000244	0.004883	6E-05	0.001141	4.62E-06	0.000841	0.047917	0.272782	0	0.040727	0.001778	0.002473	0.077277	2.153371	0.021718	0.00051	0	0.010533	0.001741	0.005122
411	407	0.000304	0.005908	4.12E-05	0.001178	1.83E-05	0.00066	0.045788	0.227834	1.49E-05	0.043974	0.00175	0.002682	0.046951	1.808467	0.017899	0.000812	4.69E-05	0.009798	0.001669	0.004708
413	409	0.000297	0.005495	5.49E-05	0.001224	0	0.000884	0.045354	0.239381	0	0.039003	0.001767	0.002511	0.049819	1.860823	0.018761	0.000908	0	0.010378	0.001605	0.004949
415	412	0.000224	0.004947	4.4E-05	0.001109	5.79E-06	0.000931	0.045978	0.255562	3.59E-05	0.03992	0.001801	0.002588	0.087163	2.217691	0.021257	0.000705	7.07E-05	0.009781	0.001631	0.005304
417	414	0.000369	0.005359	2.05E-05	0.001173	1.83E-05	0.001062	0.047252	0.216219	1.94E-05	0.041553	0.001536	0.002881	0.063731	1.96017	0.019845	0.000921	0	0.010605	0.001797	0.005293
419	417	0.000285	0.005505	3.2E-05	0.001159	1.99E-05	0.000919	0.049265	0.186472	0	0.04341	0.001814	0.002763	0.056654	2.057769	0.02108	0.000602	0	0.011138	0.001657	0.004817
421	419	0.000315	0.005389	2.23E-05	0.001147	2.12E-05	0.001049	0.049983	0.188815	0	0.043492	0.001974	0.002753	0.043314	2.041709	0.020406	0.000861	2.23E-05	0.011168	0.001507	0.004857
423	422	0.000321	0.006749	4.4E-05	0.00135	0	0.001656	0.052034	0.237372	1.35E-05	0.046135	0.002007	0.002769	0.053622	2.161766	0.019764	0.000834	0	0.010882	0.00159	0.005178
425	424	0.000261	0.006298	2.75E-05	0.00239	4.59E-06	0.00176	0.052601	0.228924	6.65E-05	0.045628	0.002081	0.002877	0.04845	2.169326	0.020407	0.000962	5.96E-05	0.011408	0.001416	0.005314
427	427	0.000244	0.006475	0	0.001215	1.86E-05	0.002372	0.052943	0.207454	3.13E-05	0.0461	0.001971	0.003071	0.047778	2.218722	0.021279	0.001079	0	0.011008	0.001543	0.004758
429	429	0.000459	0.007776	9.41E-06	0.001573	1.29E-05	0.002934	0.059516	0.260022	0	0.050574	0.002033	0.003342	0.126105	2.795288	0.024147	0.000954	4.47E-05	0.011153	0.002342	0.005124
		0.000376	0.008226	1.42E-05	0.002668	0	0.003675	0.06042	0.194657	0	0.053213	0.002167	0.003458	0.051913	2.319492	0.021471	0.001327	9.42E-05	0.01185	0.001606	0.003986

		Se	Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh	Zr/Rb
357	341	0.004826	0.001194	0.035756	0.049568	0.043254	0.000214	0.000335	0.00082	0.001627	1.26E-05	0.001374	0.005109	0.008216	0.002146	0.00468	0.003944	0.003332	0.004589	0.754177	0.245823	1.209674
359	343	0.004252	0.000855	0.035532	0.048203	0.042905	0.000604	0.000208	0.00079	0.001176	0	0.001166	0.005521	0.008524	0.001583	0.005058	0.003802	0.003109	0.003981	0.75333	0.24667	1.207495
361	346	0.004048	0.000718	0.036443	0.04501	0.044255	0.000451	0.000145	0.000857	0.00122	0	0.00109	0.005465	0.008635	0.001332	0.00441	0.003544	0.002962	0.003997	0.756862	0.243138	1.214384
363	348	0.004725	0.000894	0.035747	0.046083	0.041456	0.000181	0.000394	0.000863	0.001439	0	0.000959	0.005159	0.008561	0.001967	0.004802	0.003427	0.003569	0.003897	0.757531	0.242469	1.159693
365	351	0.00409	0.001004	0.037575	0.051004	0.042678	0.000207	0.000339	0.000725	0.001155	0	0.001216	0.005018	0.008872	0.001316	0.004592	0.003856	0.003867	0.004275	0.755933	0.244067	1.135805
367	353	0.005087	0.001057	0.037904	0.046956	0.041287	0.000377	0.000121	0.000486	0.000456	0	0.001209	0.005528	0.009203	0.001847	0.004259	0.003657	0.003574	0.004435	0.75634	0.24366	1.089273
369	356	0.003998	0.001672	0.038174	0.047322	0.042596	0.000316	0.000161	0.000566	0.000895	0	0.001762	0.005772	0.009057	0.001619	0.003837	0.003692	0.002592	0.004003	0.756408	0.243592	1.115834
371	358	0.004795	0.000866	0.036656	0.05152	0.045378	0.000332	0.000221	0.000799	0.001383	0	0.00164	0.005682	0.009218	0.001363	0.004477	0.004027	0.003403	0.004465	0.754224	0.245776	1.237924
373	361	0.004568	0.001215	0.036104	0.051271	0.045644	0.000273	0.00024	0.000668	0.001557	0	0.001186	0.005796	0.009796	0.001393	0.004063	0.003556	0.002851	0.004489	0.754516	0.245484	1.264256
375	363	0.00445	0.001429	0.036983	0.050919	0.042863	0.000377	0.000179	0.000551	0.001025	0	0.001855	0.005391	0.0089	0.001719	0.004352	0.003606	0.00339	0.003717	0.756646	0.243354	1.158997
377	365	0.004406	0.000883	0.036321	0.046129	0.043816	0.000487	0.000269	0.000321	0.00049	0	0.002296	0.005826	0.009627	0.001749	0.004124	0.003477	0.003403	0.004224	0.756269	0.243731	1.206359
379	368	0.004258	0.001475	0.036722	0.046626	0.044595	0.000345	0.000299	0.000378	0.000718	0	0.001726	0.005096	0.009874	0.001558	0.003939	0.003426	0.00335	0.004203	0.756028	0.243972	1.214395
381	370	0.003207	0.001263	0.035683	0.054195	0.047938	0.00029	0.000165	0.000884	0.001728	0	0.001385	0.00534	0.009659	0.001359	0.003812	0.003399	0.003064	0.00377	0.752	0.248	1.343456
383	373	0.004951	0.001067	0.035	0.054956	0.048653	0.000231	0.000397	0.00082	0.001927	0	0.000982	0.00552	0.00915	0.001528	0.004732	0.003913	0.002822	0.004796	0.750343	0.249657	1.390087
385	375	0.004684	0.001325	0.0372	0.050965	0.043003	0.000319	0.000327	0.000648	0.001368	0	0.001244	0.005393	0.00873	0.001584	0.004486	0.003806	0.003528	0.004833	0.754874	0.245126	1.15601
387	378	0.004338	0.001378	0.035552	0.053121	0.042208	0.000601	0.000243	0.000879	0.001591	0	0.000867	0.004996	0.008387	0.001329	0.004404	0.003779	0.003273	0.004117	0.751355	0.248645	1.187209
389	380	0.003856	0.001144	0.037197	0.053778	0.044728	0.000371	0.000251	0.000686	0.001727	0	0.001123	0.005058	0.008335	0.00145	0.004792	0.003913	0.003246	0.004064	0.751742	0.248258	1.202469
391	383	0.003941	0.00115	0.033725	0.055817	0.045705	0.000446	0.000175	0.00079	0.002338	0	0.001	0.004705	0.008703	0.001049	0.00427	0.003405	0.003472	0.003252	0.749161	0.250839	1.355241
393	385	0.004407	0.001105	0.034535	0.054544	0.044305	0.000222	0.000388	0.00089	0.001848	0	0.00087	0.003876	0.007827	0.001365	0.004485	0.003589	0.003075	0.003561	0.748868	0.251132	1.282906
395	387	0.003814	0.001208	0.03768	0.050748	0.04308	0.000529	0.000232	0.000747	0.001231	0	0.001553	0.004853	0.0092	0.001765	0.004211	0.003529	0.003697	0.004405	0.754305	0.245695	1.143311
397	390	0.003879	0.001236	0.035169	0.052035	0.043791	0.000251	0.000265	0.000781	0.001707	0	0.000998	0.005133	0.008383	0.001694	0.004151	0.004003	0.003393	0.003061	0.75301	0.24699	1.245141
399	392	0.003742	0.001506	0.036573	0.049102	0.041086	0.000334	0.000148	0.000748	0.001502	0	0.001185	0.00486	0.00798	0.001404	0.004134	0.003154	0.003234	0.004396	0.756133	0.243867	1.123378
401	395	0.004396	0.00162	0.033274	0.0529	0.043732	0.000412	0.000015	0.001014	0.002166	0	0.00111	0.004794	0.008369	0.001424	0.004289	0.003606	0.003584	0.003328	0.753069	0.246931	1.314298
403	397	0.003992	0.001831	0.034445	0.050747	0.042474	0.000332	0.000147	0.000585	0.001426	0	0.001225	0.004527	0.007669	0.001418	0.004446	0.003469	0.003833	0.003318	0.754214	0.245786	1.233094
405	400	0.004369	0.000789	0.036512	0.050546	0.041895	0.000483	0.000273	0.00063	0.001532	0	0.001001	0.004952	0.008375	0.001686	0.004171	0.00425	0.003799	0.00384	0.755505	0.244495	1.147404
407	402	0.004371	0.001629	0.034066	0.056475	0.038679	0.000581	0.000154	0.000925	0.002535	0	0.000874	0.004418	0.008021	0.00169	0.004462	0.003315	0.003203	0.003406	0.751157	0.248843	1.135415
409	405	0.00439	0.001393	0.035025	0.055467	0.060397	0.000493	0.000165	0.000752	0.001804	0	0.0008	0.004433	0.0079	0.001159	0.004318	0.003735	0.002871	0.002994	0.751509	0.248491	1.724387
411	407	0.004644	0.001136	0.034356	0.055546	0.045023	0.000448	0.000218	0.00089	0.00226	0	0.000885	0.004349	0.008176	0.001343	0.00427	0.003741	0.002912	0.003874	0.751327	0.248673	1.310461
413	409	0.004467	0.000996	0.033577	0.056204	0.041596	0.000436	0.000164	0.000688	0.002055	0	0.0008	0.00429	0.008074	0.001266	0.004304	0.003834	0.002851	0.00471	0.751125	0.248875	1.238813
415	412	0.004439	0.001087	0.035988	0.052468	0.042779	0.00029	0.000279	0.000632	0.001743	0	0.000889	0.00497	0.008098	0.001473	0.003964	0.003667	0.002966	0.003484	0.753064	0.246936	1.188719
417	414	0.004487	0.00144	0.037153	0.047246	0.042911	0.000306	0.000185	0.00069	0.001198	0	0.001183	0.004832	0.008138	0.001342	0.00391	0.003691	0.003712	0.003598	0.756219	0.243781	1.154966
419	417	0.004487	0.001383	0.037251	0.047892	0.043083	0.000402	0.000254	0.000742	0.001066	0	0.001188	0.00469	0.008349	0.001771	0.004138	0.003317	0.003426	0.003178	0.757457	0.242543	1.156567
421	419	0.004586	0.001195	0.035633	0.051733	0.045858	0.000413	0.000387	0.000937	0.001715	0	0.001341	0.004999	0.008642	0.001907	0.004615	0.00367	0.002998	0.004304	0.754125	0.245875	1.286926
423	422	0.004082	0.000929	0.036588	0.050184	0.045737	0.000586	0.000332	0.000547	0.001615	0	0.001117	0.005117	0.008996	0.001744	0.0043	0.003391	0.003027	0.004072	0.753513	0.246487	1.250047
425	424	0.004575	0.001376	0.036652	0.047471	0.042426	0.000427	0.000372	0.000719	0.001249	0	0.002141	0.004768	0.008351	0.002189	0.00392	0.003446	0.003341	0.00431	0.754874	0.245126	1.157522
427	427	0.005147	0.001225	0.036341	0.051662	0.044342	0.000302	0.000368	0.000775	0.001804	0	0.003535	0.005002	0.009129	0.001598	0.004621	0.003769	0.003838	0.005798	0.74836	0.25164	1.220151
429	429	0.004911	0.002024	0.04036	0.049842	0.048062	0.000307	0.000412	0.00072	0.000937	0	0.003114	0.005673	0.00945	0.002092	0.003955	0.003812	0.004205	0.004888	0.754569	0.245431	1.190826

Appendix 1- Bienen 4 - B

Depth	Real depth	%Clay	%Very Fine	%Fine Silt	%Coarse S	%Very Fine	%Fine San	%Middle	C %Coarse S	%Very Coarse	Sand							Original					Shifted Graph				
		< 8 µm	8-16 µm	16-32 µm	32-63 µm	63-125 µm	125-250 µm	250-500 µm	500-1000 µ	1000-2000	Clay	Silt	Sand	>8um	>16um	>32um	>64um	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti
267	241	42.04	20.29	20.77	12.9	3.76	0.24	0	0	0	42.04	53.95	4	57.96	37.67	16.9	4	1.606415	3.593333	43.74667	99.83333	2.282079	1.380133	13.46995	126.1366	150.7814	1.195382
269	244	42.79	21.68	22.12	11.09	2.21	0.1	0	0	0	42.79	54.89	2.32	57.2	35.52	13.4	2.32	1.380133	13.46995	126.1366	150.7814	1.195382	1.479459	6.717172	89.4697	140.7727	1.573412
271	246	39.03	20.77	23.35	13.27	3.06	0.51	0	0	0	39.03	57.4	3.57	60.96	40.19	16.84	3.57	1.479459	6.717172	89.4697	140.7727	1.573412	1.468896	19.03871	179.1677	194.9935	1.08833
273	249	48.54	22.41	18.5	8.61	1.86	0.07	0	0	0	48.54	49.53	1.94	51.45	29.04	10.54	1.94	1.468896	19.03871	179.1677	194.9935	1.08833	1.580784	11.11945	102.4608	123.0853	1.201292
275	252	48.36	22.24	18.92	8.23	1.84	0.41	0	0	0	48.36	49.38	2.25	51.64	29.4	10.48	2.25	1.580784	11.11945	102.4608	123.0853	1.201292	1.365692	14.38767	137.2159	139.9383	1.019841
277	255	46.91	22.45	19.4	8.72	2.06	0.46	0	0	0	46.91	50.57	2.52	53.09	30.64	11.24	2.52	1.365692	14.38767	137.2159	139.9383	1.019841	1.248697	11.06803	109.6735	104.2959	0.950968
279	257	46.92	22.21	19.2	8.91	2.52	0.25	0	0	0	46.92	50.32	2.77	53.09	30.88	11.68	2.77	1.248697	11.06803	109.6735	104.2959	0.950968	1.188192	29.37864	307.7184	292.699	0.951191
281	260	48.36	23.16	19.1	7.12	1.75	0.51	0	0	0	48.36	49.38	2.26	51.64	28.48	9.38	2.26	1.188192	29.37864	307.7184	292.699	0.951191	1.147691	10.64479	118.6641	113.1429	0.953472
283	263	50.79	21.87	17.05	7.19	2.57	0.54	0	0	0	50.79	46.1	3.11	49.22	27.35	10.3	3.11	1.147691	10.64479	118.6641	113.1429	0.953472	1.177483	12.5	133.5134	127	0.951215
285	266	49.97	20.18	15.47	8.36	4.58	1.46	0	0	0	49.97	44	6.03	50.05	29.87	14.4	6.03	1.177483	12.5	133.5134	127	0.951215	1.354623	12.9304	116.7436	123.0623	1.054124
287	268	55.57	21.65	14.97	6.16	1.56	0.08	0	0	0	55.57	42.78	1.64	44.42	22.77	7.8	1.64	1.354623	12.9304	116.7436	123.0623	1.054124	1.090083	17	159.608	139.3116	0.872835
289	271	56.01	21.91	14.89	5.04	1.6	0.56	0	0	0	56.01	41.83	2.16	44	22.09	7.2	2.16	1.090083	17	159.608	139.3116	0.872835	1.088847	14.27309	129.8795	117.2369	0.902659
291	274	54.6	22.15	15.37	5.06	2.16	0.67	0	0	0	54.6	42.58	2.83	45.41	23.26	7.89	2.83	1.088847	14.27309	129.8795	117.2369	0.902659	1.124359	17.90244	162.6878	146.4244	0.900033
293	276	47.47	19.34	13.31	6.19	7.68	5.94	0.06	0	0	47.47	38.84	13.69	52.52	33.18	19.87	13.69	1.124359	17.90244	162.6878	146.4244	0.900033	1.126776	12.49495	110.4916	97.70707	0.884294
295	279	51.17	22.31	16.97	7.19	1.93	0.43	0	0	0	51.17	46.47	2.36	48.83	26.52	9.55	2.36	1.126776	12.49495	110.4916	97.70707	0.884294	1.157386	16.89352	152.6806	140.3009	0.918918
297	282	47.57	22.17	17.94	8.23	2.8	1.27	0.03	0	0	47.57	48.33	4.09	52.44	30.27	12.33	4.09	1.157386	16.89352	152.6806	140.3009	0.918918	1.219799	17.71579	162.4421	164.2684	1.011243
299	285	51.2	22.34	17.14	7.41	1.77	0.13	0	0	0	51.2	46.89	1.9	48.79	26.45	9.31	1.9	1.219799	17.71579	162.4421	164.2684	1.011243	1.251441	16.92547	158.2112	182.1118	1.151068
301	287	50.82	22.6	17.29	6.93	2.08	0.29	0	0	0	50.82	46.81	2.37	49.19	26.59	9.3	2.37	1.251441	16.92547	158.2112	182.1118	1.151068	1.252251	18.74675	189.3701	198.7013	1.049275
303	290	50.78	22.49	17.29	7.38	1.88	0.19	0	0	0	50.78	47.16	2.06	49.23	26.74	9.45	2.06	1.252251	18.74675	189.3701	198.7013	1.049275	1.22522	12.87755	128.9347	125.4776	0.973187
305	293	52.81	21.94	16.64	6.79	1.49	0.33	0	0	0	52.81	45.37	1.82	47.19	25.25	8.61	1.82	1.22522	12.87755	128.9347	125.4776	0.973187	1.140241	10.53737	107.605	102.1388	0.949201
307	295	50.98	21.51	17.16	7.78	2.1	0.47	0	0	0	50.98	46.44	2.57	49.02	27.51	10.35	2.57	1.140241	10.53737	107.605	102.1388	0.949201	1.176808	12.21097	125.135	123.962	0.990626
309	298	52.84	21.78	16.31	6.58	2.13	0.36	0	0	0	52.84	44.67	2.49	47.16	25.38	9.07	2.49	1.176808	12.21097	125.135	123.962	0.990626	1.128471	10.66415	117.3585	107.9585	0.919904
311	301	54.25	22.05	15.78	5.85	1.46	0.61	0	0	0	54.25	43.68	2.07	45.75	23.7	7.92	2.07	1.128471	10.66415	117.3585	107.9585	0.919904	1.072459	16.8303	190.5576	171.6909	0.900992
313	304	54.25	22.39	15.72	5.67	1.46	0.5	0	0	0	54.25	43.79	1.96	45.74	23.35	7.63	1.96	1.072459	16.8303	190.5576	171.6909	0.900992	1.114485	19.92857	224.4571	202.9	0.903959
315	306	55.94	24.02	14.7	4.06	0.76	0.51	0	0	0	55.94	42.79	1.26	44.05	20.03	5.33	1.26	1.114485	19.92857	224.4571	202.9	0.903959	1.058657	11.66667	132.193	123.0921	0.931155
317	309	56.3	21.18	14.76	6.12	1.45	0.19	0	0	0	56.3	42.06	1.64	43.7	22.52	7.76	1.64	1.058657	11.66667	132.193	123.0921	0.931155	1.163431	17.48201	189.7194	204.8058	1.079519
319	312	55.69	21.02	14.88	6.58	1.69	0.13	0	0	0	55.69	42.48	1.82	44.3	23.28	8.4	1.82	1.163431	17.48201	189.7194	204.8058	1.079519	1.25563	10.96629	127.8371	152.5449	1.193276
321	315	53.57	20.82	15.91	7.11	2.23	0.36	0	0	0	53.57	43.84	2.59	46.43	25.61	9.7	2.59	1.25563	10.96629	127.8371	152.5449	1.193276	1.196213	11.3271	120.2196	130.1916	1.082948
323	317	53.78	21.04	15.19	6.87	2.49	0.64	0	0	0	53.78	43.09	3.13	46.23	25.19	10	3.13	1.196213	11.3271	120.2196	130.1916	1.082948	1.183179	22.49057	239.6509	252.0283	1.051647
325	320	53.66	21.09	15.35	6.97	2.39	0.54	0	0	0	53.66	43.4	2.94	46.34	25.25	9.9	2.94	1.183179	22.49057	239.6509	252.0283	1.051647	1.099335	9.311538	102.3462	95.30385	0.931191
327	323	55.95	21.35	14.99	5.6	1.63	0.49	0	0	0	55.95	41.94	2.11	44.06	22.71	7.72	2.11	1.099335	9.311538	102.3462	95.30385	0.931191	1.206817	11.28125	128.6406	139.4063	1.083688
329	325	54.99	24.2	13.05	5.28	2.22	0.25	0	0	0	54.99	42.53	2.47	45	20.8	7.75	2.47	1.206817	11.28125	128.6406	139.4063	1.083688	1.360539	16.15385	201.6077	237.4769	1.177916
331	328	49.62	20.6	16.41	9.34	3.61	0.43	0	0	0	49.62	46.34	4.04	50.39	29.79	13.38	4.04	1.360539	16.15385	201.6077	237.4769	1.177916	1.259185	13.1989	141.4586	160.1878	1.132401
333	331	49.98	20.31	16.29	9.12	3.9	0.4	0	0	0	49.98	45.72	4.3	50.02	29.71	13.42	4.3	1.259185	13.1989	141.4586	160.1878	1.132401	1.472492	13.45652	155.2826	215.6667	1.388866
335	334	44.67	19.05	17.15	11.72	6.42	1	0	0	0	44.67	47.92	7.41	55.34	36.29	19.14	7.41	1.472492	13.45652	155.2826	215.6667	1.388866	1.403233	11.56627	98.249	117.8434	1.199436
337	336	43.38	18.79	18.3	12.88	5.76	0.89	0	0	0	43.38	49.97	6.65	56.62	37.83	19.53	6.65	1.403233	11.56627	98.249	117.8434	1.199436	1.316693	14.31193	114.656	135.3899	1.180836
339	339	48.71	20.22	17.11	10.03	3.68	0.25	0	0	0	48.71	47.36	3.93	51.29	31.07	13.96	3.93	1.316693	14.31193	114.656	135.3899	1.180836					

		>8um	>16um	>32um	>64um
Original	Original	0.717176	0.700221	0.5530465	0.110655
Shifted	Shifted	0.638443	0.622511	0.5205392	0.138961

	Original					Shifted				
	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti	Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti
>8um	0.717176	-0.22125	-0.26113	-0.00085	0.609866	0.638443	-0.03146	-0.17068	-0.02397	0.415501
>16um	0.700221	-0.27019	-0.30398	-0.02648	0.626561	0.622511	-0.06013	-0.2152	-0.05768	0.433535
>32um	0.553047	-0.24633	-0.27488	-0.0258	0.529087	0.520539	-0.08084	-0.24394	-0.09313	0.372565
>64um	0.110655	-0.03018	-0.07523	-0.00968	0.127846	0.138961	-0.0791	-0.21674	-0.18611	0.043038

Appendix 1- Bienen 4 - Raw data

Depth	Real depth	%Clay < 8 µm	%Very Fine 8-16 µm	%Fine Silt 16-32 µm	%Coarse S 32-63 µm	%Very Fine 63-125 µm	%Fine San 125-250 µm	%Middle C 250-500 µm	%Coarse S 500-1000 µ	%Very Coarse 1000-2000	Sand	Silt	AVG STDEV Sand	P95
267	241	42.04	20.29	20.77	12.9	3.76	0.24	0	0	0	42.04	53.95	4	52.6
269	244	42.79	21.68	22.12	11.09	2.21	0.1	0	0	0	42.79	54.89	2.32	44.2
271	246	39.03	20.77	23.35	13.27	3.06	0.51	0	0	0	39.03	57.4	3.57	52.6
273	249	48.54	22.41	18.5	8.61	1.86	0.07	0	0	0	48.54	49.53	1.94	44.2
275	252	48.36	22.24	18.92	8.23	1.84	0.41	0	0	0	48.36	49.38	2.25	44.2
277	255	46.91	22.45	19.4	8.72	2.06	0.46	0	0	0	46.91	50.57	2.52	44.2
279	257	46.92	22.21	19.2	8.91	2.52	0.25	0	0	0	46.92	50.32	2.77	44.2
281	260	48.36	23.16	19.1	7.12	1.75	0.51	0	0	0	48.36	49.38	2.26	37.2
283	263	50.79	21.87	17.05	7.19	2.57	0.54	0	0	0	50.79	46.1	3.11	44.2
285	266	49.97	20.18	15.47	8.36	4.58	1.46	0	0	0	49.97	44	6.03	62.5
287	268	55.57	21.65	14.97	6.16	1.56	0.08	0	0	0	55.57	42.78	1.64	37.2
289	271	56.01	21.91	14.89	5.04	1.6	0.56	0	0	0	56.01	41.83	2.16	37.2
291	274	54.6	22.15	15.37	5.06	2.16	0.67	0	0	0	54.6	42.58	2.83	37.2
293	276	47.47	19.34	13.31	6.19	7.68	5.94	0.06	0	0	47.47	38.84	13.69	125
295	279	51.17	22.31	16.97	7.19	1.93	0.43	0	0	0	51.17	46.47	2.36	37.2
297	282	47.57	22.17	17.94	8.23	2.8	1.27	0.03	0	0	47.57	48.33	4.09	52.6
299	285	51.2	22.34	17.14	7.41	1.77	0.13	0	0	0	51.2	46.89	1.9	37.2
301	287	50.82	22.6	17.29	6.93	2.08	0.29	0	0	0	50.82	46.81	2.37	37.2
303	290	50.78	22.49	17.29	7.38	1.88	0.19	0	0	0	50.78	47.16	2.06	37.2
305	293	52.81	21.94	16.64	6.79	1.49	0.33	0	0	0	52.81	45.37	1.82	37.2
307	295	50.98	21.51	17.16	7.78	2.1	0.47	0	0	0	50.98	46.44	2.57	44.2
309	298	52.84	21.78	16.31	6.58	2.13	0.36	0	0	0	52.84	44.67	2.49	37.2
311	301	54.25	22.05	15.78	5.85	1.46	0.61	0	0	0	54.25	43.68	2.07	37.2
313	304	54.25	22.39	15.72	5.67	1.46	0.5	0	0	0	54.25	43.79	1.96	37.2
315	306	55.94	24.02	14.7	4.06	0.76	0.51	0	0	0	55.94	42.79	1.26	31.3
317	309	56.3	21.18	14.76	6.12	1.45	0.19	0	0	0	56.3	42.06	1.64	37.2
319	312	55.69	21.02	14.88	6.58	1.69	0.13	0	0	0	55.69	42.48	1.82	37.2
321	315	53.57	20.82	15.91	7.11	2.23	0.36	0	0	0	53.57	43.84	2.59	44.2
323	317	53.78	21.04	15.19	6.87	2.49	0.64	0	0	0	53.78	43.09	3.13	44.2
325	320	53.66	21.09	15.35	6.97	2.39	0.54	0	0	0	53.66	43.4	2.94	44.2
327	323	55.95	21.35	14.99	5.6	1.63	0.49	0	0	0	55.95	41.94	2.11	37.2
329	325	54.99	24.2	13.05	5.28	2.22	0.25	0	0	0	54.99	42.53	2.47	37.2
331	328	49.62	20.6	16.41	9.34	3.61	0.43	0	0	0	49.62	46.34	4.04	52.6
333	331	49.98	20.31	16.29	9.12	3.9	0.4	0	0	0	49.98	45.72	4.3	52.6
335	334	44.67	19.05	17.15	11.72	6.42	1	0	0	0	44.67	47.92	7.41	74.3
337	336	43.38	18.79	18.3	12.88	5.76	0.89	0	0	0	43.38	49.97	6.65	62.5
339	339	48.71	20.22	17.11	10.03	3.68	0.25	0	0	0	48.71	47.36	3.93	52.6

		Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	As	Se
267	241	0.0005	0.001797	0.00016	0.001154	0.00016	0.015633	0.023562	0.08944	0.000173	0.021878	0.000827	0.002034	0.022048	0.976278	0.010369	0.001057	0.000827	0.007778	0.001817	0.001694	0.003871
269	244	0.000325	0.004376	6.92E-05	0.002549	1.24E-05	0.006267	0.045735	0.189212	2.66E-05	0.040979	0.001584	0.002556	0.033156	1.723056	0.015351	0.000698	0.000486	0.011806	0.0025	0.003528	0.004381
271	246	0.000366	0.002462	0.000117	0.001512	5.37E-05	0.006947	0.033467	0.126356	3.89E-05	0.03279	0.001136	0.002427	0.033843	1.509011	0.013521	0.000879	0.000652	0.011676	0.002673	0.003537	0.004779
273	249	0.000259	0.00493	9.86E-05	0.001201	1.5E-05	0.006193	0.04891	0.180713	1.34E-05	0.046396	0.001492	0.002728	0.060377	1.950086	0.017911	0.000952	0.000421	0.015002	0.002322	0.003229	0.004793
275	252	0.00047	0.005225	6.25E-05	0.001198	4.81E-05	0.006279	0.050677	0.166662	0	0.048147	0.001639	0.002803	0.051715	1.871563	0.01585	0.00093	0.000678	0.014735	0.002301	0.003342	0.005296
277	255	0.000363	0.005221	7.99E-05	0.001247	0	0.006422	0.055738	0.177138	0	0.049796	0.001434	0.003028	0.062447	2.248271	0.019776	0.000756	0.000496	0.014649	0.00317	0.00448	0.004998
279	257	0.000455	0.005031	0.000124	0.001067	2.63E-05	0.006214	0.05593	0.156249	0	0.049854	0.001749	0.003092	0.049718	2.174358	0.019095	0.000719	0.000379	0.014542	0.002649	0.0052	0.004802
281	260	0.000158	0.004638	9.2E-05	0.000923	0.00025	0.006043	0.053252	0.133563	9.2E-06	0.048584	0.001728	0.002935	0.041721	2.097581	0.01869	0.000406	0.000425	0.012986	0.002589	0.003631	0.005245
283	263	0.000393	0.004179	0.000124	0.001211	1.06E-05	0.005737	0.05221	0.134425	0	0.046585	0.001698	0.003071	0.037976	2.124903	0.01938	0.000662	0.000377	0.012635	0.002045	0.004158	0.005646
285	266	0.000358	0.004472	0.000139	0.001115	6.39E-06	0.005448	0.053413	0.146028	2.08E-05	0.047771	0.001468	0.002763	0.036893	2.133111	0.019714	0.000749	0.000423	0.013467	0.002	0.004551	0.005504
287	268	0.000411	0.005318	6.18E-05	0.001186	1.66E-05	0.005731	0.054386	0.162478	0	0.048017	0.001709	0.002851	0.039146	2.028293	0.018513	0.001044	0.000431	0.012422	0.00212	0.004448	0.005124
289	271	0.000301	0.005109	2.42E-05	0.000976	3.02E-05	0.005389	0.056636	0.183147	0	0.047969	0.001723	0.002947	0.046981	2.303221	0.020988	0.00039	0.000414	0.01252	0.002179	0.003984	0.005278
291	274	0.000375	0.00535	8.28E-05	0.00109	1.05E-05	0.005967	0.058629	0.169743	2.56E-05	0.04868	0.001636	0.002813	0.045534	2.269989	0.020374	0.000531	0.000262	0.011505	0.002243	0.005294	0.005026
293	276	0.000308	0.005523	4.97E-05	0.001205	0	0.005344	0.059847	0.159419	0	0.050188	0.001646	0.002959	0.046188	2.337813	0.021608	0.000581	0.000488	0.011845	0.002423	0.005189	0.005944
295	279	0.000445	0.00556	0.000114	0.001166	1.65E-05	0.00544	0.058819	0.178698	0	0.049166	0.001626	0.003269	0.044989	2.265623	0.0209	0.000812	0.000556	0.011031	0.00233	0.004922	0.005344
297	282	0.000329	0.005551	6.24E-05	0.001534	2.59E-05	0.004944	0.057952	0.169818	0	0.050173	0.001608	0.003175	0.046563	2.225074	0.020476	0.000939	0.000173	0.011593	0.002509	0.003365	0.005039
299	285	0.00029	0.005143	3.82E-05	0.0039	0	0.005458	0.053752	0.212509	0	0.047161	0.001595	0.002993	0.04211	2.013878	0.017945	0.00068	0.000593	0.010942	0.002457	0.005009	0.004957
301	287	0.000244	0.004122	0	0.014913	0	0.006041	0.044065	0.350755	1.82E-05	0.038529	0.001466	0.00242	0.032894	1.774389	0.016638	0.000827	0.000316	0.009112	0.002345	0.00555	0.004836
303	290	0.000233	0.004365	4.69E-05	0.006922	3.02E-05	0.005348	0.050416	0.265083	3.63E-05	0.044098	0.001615	0.002548	0.034829	1.936139	0.018755	0.000541	0.000497	0.010308	0.00217	0.003777	0.005205
305	293	0.000367	0.004727	7.34E-05	0.001587	1.65E-05	0.005799	0.053964	0.176505	0	0.047324	0.001491	0.00274	0.043428	2.174478	0.019143	0.000502	0.000751	0.010428	0.002198	0.004066	0.00487
307	295	0.000416	0.004382	5.92E-05	0.003127	2.37E-05	0.004906	0.051041	0.210017	0.000118	0.044747	0.001672	0.002748	0.044207	2.096427	0.018752	0.000459	0.000265	0.009499	0.002053	0.00399	0.005234
309	298	0.000352	0.004298	4.01E-05	0.002587	0	0.005807	0.049854	0.1872	3.86E-05	0.044047	0.001606	0.002869	0.045412	2.125642	0.020389	0.00064	0.000434	0.010132	0.003048	0.004629	0.005385
311	301	0.000389	0.004151	0.000109	0.00207	4.99E-05	0.004388	0.052146	0.18334	8.81E-06	0.045687	0.001755	0.002909	0.044973	2.205407	0.019459	0.000524	0.000219	0.010191	0.002198	0.005086	0.004899
313	304	0.000242	0.004068	7.03E-05	0.00208	7.32E-06	0.005278	0.052315	0.15472	0	0.046061	0.001749	0.00286	0.037367	2.21915	0.019277	0.000435	7.47E-05	0.009776	0.002126	0.004972	0.005552
315	306	0.000208	0.00414	0.00011	0.001999	1.78E-05	0.005182	0.052792	0.159175	2.52E-05	0.046634	0.001903	0.003004	0.033965	2.134899	0.017954	0.00043	0.000447	0.010078	0.002369	0.003836	0.005156
317	309	0.000337	0.003934	0.000124	0.002652	7.39E-06	0.005584	0.051199	0.164868	2.66E-05	0.044574	0.001908	0.002585	0.034112	2.124526	0.018371	0.000476	0.000297	0.010762	0.002198	0.003665	0.005321
319	312	0.000207	0.003627	7.61E-05	0.005996	0	0.006275	0.045166	0.221452	4.63E-05	0.03936	0.001545	0.002315	0.038802	1.966498	0.017839	0.000425	0.000355	0.009278	0.001693	0.004213	0.005151
321	315	0.000279	0.00306	5.96E-05	0.00611	0	0.00558	0.041573	0.228451	3.13E-05	0.035667	0.001288	0.002373	0.036118	1.89507	0.017936	0.000522	0.000408	0.008807	0.001415	0.005414	0.004657
323	317	0.00032	0.00363	0.000103	0.00208	4.04E-05	0.005816	0.045233	0.201255	0	0.038526	0.001569	0.00246	0.043699	1.96054	0.018963	0.00035	0.000304	0.00949	0.002007	0.004552	0.005499
325	320	0.000161	0.003631	4.27E-05	0.001042	0	0.005088	0.045522	0.194588	0	0.038695	0.001199	0.00255	0.038463	1.958833	0.01848	0.000431	0.000174	0.009156	0.001552	0.005094	0.005542
327	323	0.000393	0.003658	7.71E-05	0.001605	1.21E-05	0.004954	0.045065	0.220653	9.37E-05	0.040211	0.001476	0.00262	0.05619	2.075638	0.017874	0.000488	0.000369	0.008967	0.002017	0.003648	0.004618
329	325	0.000296	0.003342	0.000117	0.001163	0	0.005613	0.043234	0.194787	9.26E-06	0.038108	0.001609	0.002618	0.068577	2.34395	0.019404	0.0005	9.26E-06	0.008355	0.001936	0.003772	0.006309
331	328	0.000196	0.003161	0	0.001141	7.53E-06	0.005613	0.044452	0.203284	0	0.039447	0.001513	0.002187	0.039503	1.93254	0.01759	0.000572	0.000509	0.009145	0.002681	0.003966	0.005063
333	331	0.000275	0.003624	7.28E-05	0.000874	5.46E-05	0.006131	0.043845	0.197542	2.12E-05	0.038835	0.001473	0.002272	0.031644	1.88618	0.016916	0.000358	0.000326	0.009674	0.00175	0.003043	0.00513
335	334	0.000215	0.002899	9.37E-05	0.001168	0.000161	0.006722	0.035106	0.164535	9.37E-06	0.033451	0.001116	0.002075	0.029216	1.618065	0.013714	0.000431	0.000209	0.007231	0.001786	0.003128	0.004813
337	336	0.000402	0.004646	0.00015	0.001652	4.19E-05	0.006338	0.043707	0.189466	0	0.039462	0.001203	0.002399	0.045648	1.876758	0.016534	0.000819	0.000252	0.008483	0.001353	0.003415	0.004368
339	339	0.000343	0.004915	5.83E-05	0.00348	3.15E-05	0.007071	0.045069	0.22959	0	0.039379	0.001052	0.002623	0.037698	1.853006	0.016861	0.000619	0.00026	0.009672	0.003496	0.003964	0.004912

		Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh	Zr/Rb
267	241	0.000387	0.03108	0.038912	0.049928	0.00051	0.00059	0.00023	8E-05	3.33E-05	0.000663	0.004791	0.008789	0.002357	0.003007	0.003044	0.005518	0.001357	0.749154	0.250846	1.606415
269	244	0.000907	0.035494	0.046632	0.048986	0.000476	0.000415	0.000486	0.000442	0	0.001005	0.00589	0.010927	0.002317	0.003602	0.003419	0.004357	0.002707	0.750515	0.249485	1.380133
271	246	0.00095	0.034872	0.044114	0.051592	0.0005	0.000296	0.000278	0.000244	0	0.000661	0.004888	0.009394	0.002399	0.004135	0.003393	0.004726	0.002423	0.749575	0.250425	1.479459
273	249	0.000996	0.034375	0.047979	0.050494	0.000234	0.000272	0.000378	0.000227	0	0.001452	0.006836	0.012117	0.00214	0.003974	0.003796	0.007204	0.00298	0.747735	0.252265	1.468896
275	252	0.000593	0.036588	0.046479	0.057838	0.000348	0.000316	0.000346	0.000374	0	0.002117	0.006991	0.01267	0.002693	0.004229	0.003841	0.00655	0.002847	0.747909	0.252091	1.580784
277	255	0.001081	0.037186	0.047253	0.050784	0.000275	0.000687	0.000269	0.000249	0	0.002986	0.006932	0.011858	0.002448	0.004796	0.003909	0.005747	0.0036	0.749806	0.250194	1.365692
279	257	0.000736	0.037967	0.045174	0.04741	0.000237	0.000611	0.000189	0.000133	0	0.002712	0.006781	0.011578	0.002652	0.00501	0.004046	0.005112	0.00396	0.753508	0.246492	1.248697
281	260	0.001062	0.038893	0.043892	0.046213	0.000414	0.000498	0.000296	5.52E-05	0	0.003089	0.006604	0.01102	0.002515	0.004758	0.00361	0.005046	0.003527	0.752056	0.247944	1.188192
283	263	0.001128	0.038702	0.044369	0.044418	0.000326	0.000531	0.000138	0.000259	0	0.002375	0.006972	0.011264	0.002972	0.004173	0.003844	0.005214	0.003009	0.753937	0.246063	1.147691
285	266	0.001554	0.038591	0.046011	0.04544	0.000465	0.000449	0.000238	0.000391	0	0.002348	0.006581	0.011349	0.003091	0.004931	0.003781	0.005872	0.003227	0.75598	0.24402	1.177483
287	268	0.000902	0.037366	0.048884	0.050616	0.000253	0.00049	0.000173	0.000467	0	0.002194	0.006935	0.012907	0.002775	0.004029	0.003919	0.005136	0.00417	0.751634	0.248366	1.354623
289	271	0.001312	0.038409	0.048402	0.041869	0.000299	0.000489	0.00047	0.000385	0	0.001649	0.006863	0.011884	0.00274	0.004591	0.004331	0.005029	0.004244	0.754073	0.245927	1.090083
291	274	0.001066	0.040356	0.046597	0.043942	0.000272	0.000757	0.000119	0.000309	0	0.001967	0.006778	0.012038	0.003125	0.004796	0.003644	0.00381	0.004206	0.754276	0.245724	1.088847
293	276	0.000965	0.040175	0.045664	0.045171	0.000509	0.000704	0.00014	0.000266	0	0.003017	0.006603	0.012126	0.002232	0.004487	0.003851	0.003667	0.003395	0.753383	0.246617	1.124359
295	279	0.000641	0.038585	0.046309	0.043477	0.000405	0.00043	0.000237	0.0003	0	0.003885	0.006664	0.011695	0.002556	0.004763	0.0039	0.003307	0.003805	0.754697	0.245303	1.126776
297	282	0.000774	0.039835	0.047844	0.046105	0.000843	0.000462	0.000262	0.000327	0	0.003583	0.007086	0.011649	0.002626	0.004654	0.004051	0.004759	0.003694	0.75422	0.24578	1.157386
299	285	0.000911	0.039098	0.047701	0.047692	0.000382	0.000306	0.000494	0.000553	0	0.003887	0.006907	0.011683	0.002251	0.00502	0.004136	0.00322	0.004323	0.751172	0.248828	1.219799
301	287	0.000962	0.035438	0.04841	0.044349	0.00028	0.000788	0.00093	0.001844	0	0.001679	0.006421	0.011278	0.002239	0.003488	0.003583	0.002404	0.00301	0.752821	0.247179	1.251441
303	290	0.000974	0.03695	0.047909	0.046271	0.00034	0.000352	0.000785	0.001031	0	0.001568	0.006597	0.01213	0.002624	0.004845	0.003773	0.003918	0.003369	0.75363	0.24637	1.252251
305	293	0.000742	0.03759	0.047197	0.046055	0.000163	0.000526	0.000168	0.000361	0	0.001652	0.006755	0.011768	0.00236	0.003994	0.00394	0.003748	0.003742	0.755048	0.244952	1.22522
307	295	0.001132	0.03725	0.046581	0.042474	0.000441	0.000459	0.000376	0.000435	0	0.000949	0.006594	0.011275	0.00232	0.004533	0.003281	0.004176	0.003655	0.756606	0.243394	1.140241
309	298	0.001141	0.037078	0.047043	0.043634	0.000206	0.000744	0.000232	0.000367	0	0.001169	0.006954	0.011806	0.002415	0.004517	0.003752	0.003615	0.003832	0.754794	0.245206	1.176808
311	301	0.000658	0.037243	0.046886	0.042028	0.000677	0.000278	0.000326	0.000247	0	0.001357	0.006838	0.011441	0.002452	0.004401	0.004122	0.003577	0.003445	0.75568	0.24432	1.128471
313	304	0.001746	0.038697	0.044634	0.041501	0.000473	0.000393	0.000202	0.000237	0	0.001913	0.00691	0.011258	0.00282	0.004212	0.003424	0.003299	0.004136	0.758193	0.241807	1.072459
315	306	0.001131	0.037825	0.045006	0.042156	0.000326	0.000261	0.000368	0.000289	5.94E-06	0.001839	0.006472	0.010795	0.001963	0.004917	0.003191	0.004284	0.003262	0.756322	0.243678	1.114485
317	309	0.001109	0.039205	0.044038	0.041505	0.000266	0.000484	0.000109	0.000306	0	0.002038	0.006618	0.01107	0.002715	0.004382	0.003836	0.003992	0.003094	0.755621	0.244379	1.058657
319	312	0.001137	0.036521	0.047429	0.04249	6.42E-05	0.000661	0.000528	0.000622	0	0.001231	0.006581	0.010806	0.003143	0.004396	0.003672	0.002757	0.003415	0.756524	0.243476	1.163431
321	315	0.001277	0.033896	0.046556	0.04256	0.000224	0.000453	0.000409	0.000831	0	0.001179	0.006784	0.010836	0.003307	0.004652	0.003375	0.002655	0.00264	0.754396	0.245604	1.25563
323	317	0.001285	0.034878	0.048438	0.041721	0.000225	0.000651	0.000403	0.00062	0	0.001065	0.006595	0.011149	0.003115	0.004227	0.003777	0.002755	0.00317	0.756376	0.243624	1.196213
325	320	0.001031	0.034393	0.047979	0.040693	0.00046	0.000378	0.000294	0.000504	0	0.001887	0.006743	0.01037	0.00225	0.00421	0.00363	0.002657	0.003133	0.756613	0.243387	1.183179
327	323	0.00191	0.034061	0.049147	0.037444	0.000351	0.000481	0.000511	0.000642	0	0.002264	0.006498	0.010366	0.001862	0.004275	0.00295	0.003899	0.003436	0.755494	0.244506	1.099335
329	325	0.000662	0.03422	0.049523	0.041297	0.000281	0.000583	0.00031	0.000381	0	0.003129	0.006667	0.01064	0.002587	0.004087	0.004332	0.003976	0.003203	0.752551	0.247449	1.206817
331	328	0.000771	0.034152	0.051049	0.046466	0.000399	0.000456	0.000321	0.000461	0	0.001737	0.006076	0.01146	0.002455	0.004533	0.003844	0.003091	0.003889	0.75438	0.24562	1.360539
333	331	0.000714	0.034925	0.050845	0.043977	0.000384	0.000625	0.000567	0.000517	0	0.001045	0.006018	0.011181	0.002871	0.004816	0.004229	0.003802	0.002474	0.753422	0.246578	1.259185
335	334	0.001177	0.031551	0.049325	0.046459	0.000329	0.00051	0.000409	0.000225	0	0.000545	0.005846	0.010008	0.002315	0.004465	0.003323	0.0035	0.002251	0.752719	0.247281	1.472492
337	336	0.00109	0.033731	0.052974	0.047332	0.000286	0.000456	0.000308	0.000463	0	0.001287	0.006633	0.010833	0.002676	0.004065	0.003373	0.003278	0.002868	0.747353	0.252647	1.403233
339	339	0.000789	0.035316	0.053314	0.0465	0.000285	0.000707	0.000534	0.000646	0	0.002075	0.006114	0.01079	0.002031	0.003997	0.003496	0.003794	0.001805	0.749794	0.250206	1.316693

Appendix 1 - Bienen 3 B

Depth	Real depth	%Clay < 8 µm	%Very Fine Silt 8-16 µm	%Fine Silt 16-32 µm	%Coarse S 32-63 µm	%Very Fine 63-125 µm	%Fine San 125-250 µn	%Middle C 250-500 µn	%Coarse S 500-1000 µ	%Very Coarse 1000-2000	Clay	Silt	Sand	>8um	>16um	>32um	>64um	Original Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti	Shifted graphs Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti
167	156	37.07	16.28	17.17	14.35	9.7	4.88	0.56	0	0	37.07	47.79	15.13	62.94	46.66	29.49	15.13	2.267076	1	0.42953	253.0604	589.1563	2.276946	0.919463	0.57047	273.6309	479.6588
169	158	40.71	16.92	16.82	13.68	8.67	3.16	0.05	0	0	40.71	47.42	11.87	59.3	42.38	25.56	11.87	2.276946	0.919463	0.57047	273.6309	479.6588	2.227606	0.658537	0.45935	150.626	327.9115
171	161	45.3	18.89	19.99	12.66	3.06	0.1	0	0	0	45.3	51.54	3.16	54.7	35.81	15.82	3.16	2.227606	0.658537	0.45935	150.626	327.9115	1.608038	5.677524	59.70358	151.5798	2.538873
173	163	44.92	20.45	18.81	9.96	3.5	2.1	0.25	0	0	44.92	49.23	5.85	55.07	34.62	15.81	5.85	1.608038	5.677524	59.70358	151.5798	2.538873	1.454148	15.88398	130.3591	165.1823	1.267133
175	165	41.83	19.88	19.3	11.19	4.31	2.84	0.65	0	0	41.83	50.36	7.8	58.17	38.29	18.99	7.8	1.454148	15.88398	130.3591	165.1823	1.267133	1.318156	16.39931	174.3194	196.7257	1.128536
177	168	48.87	22.76	18.69	7.24	1.77	0.67	0	0	0	48.87	48.69	2.44	51.13	28.37	9.68	2.44	1.318156	16.39931	174.3194	196.7257	1.128536	1.327495	12.91367	136.3621	151.5827	1.111619
179	170	47.6	22.05	19.36	9.24	1.72	0.05	0	0	0	47.6	50.64	1.76	52.42	30.37	11.01	1.76	1.327495	12.91367	136.3621	151.5827	1.111619	1.256725	21.22993	203.8796	215.0146	1.054616
181	172	47.7	22.45	19.44	7.87	1.79	0.75	0	0	0	47.7	49.76	2.54	52.3	29.85	10.41	2.54	1.256725	21.22993	203.8796	215.0146	1.054616	1.175155	17.18266	176.3313	177.5975	1.007181
183	174	47.87	23.4	19.9	7.65	1.15	0.03	0	0	0	47.87	50.95	1.18	52.13	28.73	8.83	1.18	1.175155	17.18266	176.3313	177.5975	1.007181	1.32949	18.24934	165.2175	175.2493	1.060719
185	177	33.47	17.29	21.83	19.09	7.71	0.6	0	0	0	33.47	58.22	8.31	66.52	49.23	27.4	8.31	1.32949	18.24934	165.2175	175.2493	1.060719	1.604662	18.31604	136.4481	171.7783	1.258928
187	179	51.24	23	17.36	7.05	1.32	0.03	0	0	0	51.24	47.4	1.36	48.76	25.76	8.4	1.36	1.604662	18.31604	136.4481	171.7783	1.258928	1.136858	16.83657	177.2548	170.9917	0.964666
189	181	44.69	21.2	19.27	11.62	3.17	0.06	0	0	0	44.69	52.09	3.22	55.32	34.12	14.85	3.22	1.136858	16.83657	177.2548	170.9917	0.964666	1.509341	20.79885	171.7443	208.0115	1.21117
191	184	43.68	19.04	19.55	13.65	3.98	0.1	0	0	0	43.68	52.24	4.08	56.32	37.28	17.73	4.08	1.509341	20.79885	171.7443	208.0115	1.21117	1.223319	16.54865	160.8297	161.4351	1.003764
193	186	47.5	21.62	19.33	9.68	1.84	0.03	0	0	0	47.5	50.63	1.87	52.5	30.88	11.55	1.87	1.223319	16.54865	160.8297	161.4351	1.003764	1.238907	14.20815	133.133	136.4313	1.024774
195	188	46.72	22.45	20.18	8.82	1.52	0.3	0	0	0	46.72	51.46	1.82	53.27	30.82	10.64	1.82	1.238907	14.20815	133.133	136.4313	1.024774	1.365843	19.02865	165.9115	174.1094	1.049411
197	191	46.57	22.52	19.83	8.92	1.84	0.32	0	0	0	46.57	51.27	2.16	53.43	30.91	11.08	2.16	1.365843	19.02865	165.9115	174.1094	1.049411	1.230675	18.07073	156.0659	154.7829	0.99178
199	193	49.22	22.16	18.45	8.79	1.38	0	0	0	0	49.22	49.4	1.39	50.78	28.62	10.17	1.39	1.230675	18.07073	156.0659	154.7829	0.99178	1.300381	16.95269	140.5957	145.886	1.037628
201	195	40.05	20.06	20.38	13.28	5.53	0.69	0	0	0	40.05	53.73	6.22	59.94	39.88	19.5	6.22	1.300381	16.95269	140.5957	145.886	1.037628	1.380082	17.67391	144.4565	153.5024	1.06262
203	198	43.15	21.41	20.62	11.23	3.24	0.35	0	0	0	43.15	53.26	3.59	56.85	35.44	14.82	3.59	1.380082	17.67391	144.4565	153.5024	1.06262	1.329841	14.80754	130.8313	135.248	1.033758
205	200	46.52	21.82	19.43	9.32	2.39	0.52	0	0	0	46.52	50.57	2.91	53.48	31.66	12.23	2.91	1.329841	14.80754	130.8313	135.248	1.033758	1.256648	16.70283	158.5024	161.1533	1.016725
207	202	51.66	23.15	17.19	6.28	1.4	0.31	0	0	0	51.66	46.63	1.71	48.33	25.18	7.99	1.71	1.256648	16.70283	158.5024	161.1533	1.016725	1.144192	17.683	154.9193	168.3314	1.086575
209	204	50.2	23.35	17.52	6.85	1.7	0.38	0	0	0	50.2	47.72	2.08	49.8	26.45	8.93	2.08	1.144192	17.683	154.9193	168.3314	1.086575	1.135542	18.16782	162.8897	147.0828	0.902959
211	207	49.12	22.38	18.67	7.89	1.6	0.34	0	0	0	49.12	48.94	1.94	50.88	28.5	9.83	1.94	1.135542	18.16782	162.8897	147.0828	0.902959	1.181963	17.24885	145.47	141.871	0.975259
213	209	50.67	23.44	18.23	6.17	1.17	0.33	0	0	0	50.67	47.84	1.49	49.34	25.9	7.67	1.49	1.181963	17.24885	145.47	141.871	0.975259	1.171474	15.067	152.6873	144.129	0.943949
215	211	53.28	22.66	16.69	6.29	1.05	0.04	0	0	0	53.28	45.63	1.09	46.73	24.07	7.38	1.09	1.171474	15.067	152.6873	144.129	0.943949	1.129714	14.5232	158.8866	146.3737	0.921246
217	214	51.39	21.98	17.28	7.61	1.68	0.06	0	0	0	51.39	46.87	1.74	48.61	26.63	9.35	1.74	1.129714	14.5232	158.8866	146.3737	0.921246	1.212236	21.36392	192.9684	193.6203	1.003378
219	216	45.31	19.66	17.15	11.11	5.95	0.82	0	0	0	45.31	47.93	6.77	54.69	35.03	17.88	6.77	1.212236	21.36392	192.9684	193.6203	1.003378	1.316982	17.91957	152.9303	167.7828	1.09712
221	218	49.38	23.36	19	7.08	1.13	0.04	0	0	0	49.38	49.44	1.18	50.61	27.25	8.25	1.18	1.316982	17.91957	152.9303	167.7828	1.09712	1.207283	16.87576	178.3788	178.2242	0.999134
223	221	45.09	22.43	20.4	10.04	2	0.04	0	0	0	45.09	52.87	2.04	54.91	32.48	12.08	2.04	1.207283	16.87576	178.3788	178.2242	0.999134	1.295924	20.64983	192.9461	206.0606	1.06797
225	223	52.91	23.19	16.74	6.08	1.04	0.04	0	0	0	52.91	46.01	1.08	47.09	23.9	7.16	1.08	1.295924	20.64983	192.9461	206.0606	1.06797	1.192314	15.79082	144.3316	147.926	1.024904
227	225	56.25	24.11	15.6	4.01	0.03	0	0	0	0	56.25	43.72	0.03	43.75	19.64	4.04	0.03	1.192314	15.79082	144.3316	147.926	1.024904	1.14197	12.29343	127.561	130.0023	1.019138
229	227	52.39	21.61	16.35	7.55	1.84	0.26	0	0	0	52.39	45.51	2.1	47.61	26	9.65	2.1	1.14197	12.29343	127.561	130.0023	1.019138	1.179101	16.85032	162.6561	177.6274	1.092043
231	230	55.06	21.87	15.18	6.11	1.61	0.17	0	0	0	55.06	43.16	1.78	44.94	23.07	7.89	1.78	1.179101	16.85032	162.6561	177.6274	1.092043	1.448841	15.92562	132.7052	170.3526	1.283692
233	232	56.07	21.92	14.94	5.82	1.2	0.05	0	0	0	56.07	42.68	1.24	43.93	22.01	7.07	1.24	1.448841	15.92562	132.7052	170.3526	1.283692	1.188961	16.09059	158.9373	181.1777	1.139932
235	234	55.64	21.55	14.48	5.8	2.17	0.36	0	0	0	55.64	41.83	2.53	44.36	22.81	8.33	2.53	1.188961	16.09059	158.9373	181.1777	1.139932	1.199894	11.17277	116.7173	135.6728	1.162405
237	237	48.28	20.09	15.53	7.79	3.77	3.44	1.1	0	0	48.28	43.41	8.31	51.72	31.63	16.1	8.31	1.199894	11.17277	116.7173	135.6728	1.162405	1.35873	13.15953	145.1518	218.2374	1.503512
239	239	42.04	17.41	14.62	10.17	7.14	6.68	1.94	0	0	42.04	42.2	15.75	57.96	40.55	25.93	15.75	1.35873	13.15953	145.1518	218.2374	1.503512					

		>8um	>16um	>32um	>64um
Original	Original	0.46	0.54	0.58	0.54
Shifted	Shifted	0.64	0.72	0.81	0.83
zonder bovenstuk:		0.631805	0.684728	0.691671	0.559718
/al + shift		0.427794	0.504796	0.625023	0.758034

	Original Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti	Shifted Zr/Rb	Si/Al	Ti/Al	Zr/Al	Zr/Ti
>8um	0.461224	-0.29373	-0.33379	0.361666	0.412453	0.644679	-0.19678	-0.34452	0.337021	0.427794
>16um	0.539429	-0.3863	-0.4211	0.425641	0.49444	0.723982	-0.30849	-0.45094	0.362854	0.504796
>32um	0.578639	-0.46452	-0.48621	0.519166	0.563077	0.805674	-0.44371	-0.57204	0.41232	0.625023
>64um	0.539442	-0.51009	-0.50386	0.575667	0.566567	0.834349	-0.58763	-0.66298	0.484758	0.758034

Appendix 1 - Bienen 3 A

BienenIII			is naval															
Depth	Real depth	%Clay	%Very Fine	%Fine Silt	%Coarse S	%Very Fine	%Fine San	%Middle C	%Coarse S	%Very Coarse	Sand							
		< 8 µm	8-16 µm	16-32 µm	32-63 µm	63-125 µm	125-250 µm	250-500 µm	500-1000 µ	1000-2000	Clay	Silt	Sand	Silt +Sand	P95			
167	156	*37.07*	*16.28*	*17.17*	*14.35*	*9.7*	*4.88*	*0.56*	*0*	*0*	*37.07*	*47.79*	*15.13*		125			
169	158	*40.71*	*16.92*	*16.82*	*13.68*	*8.67*	*3.16*	*0.05*	*0*	*0*	*40.71*	*47.42*	*11.87*		88.4			
171	161	*45.3*	*18.89*	*19.99*	*12.66*	*3.06*	*0.1*	*0*	*0*	*0*	*45.3*	*51.54*	*3.16*		52.6			
173	163	44.92	20.45	18.81	9.96	3.5	2.1	0.25	0	0	44.92	49.23	5.85		62.5			
175	165	41.83	19.88	19.3	11.19	4.31	2.84	0.65	0	0	41.83	50.36	7.8		88.4			
177	168	48.87	22.76	18.69	7.24	1.77	0.67	0	0	0	48.87	48.69	2.44		37.2			
179	170	47.6	22.05	19.36	9.24	1.72	0.05	0	0	0	47.6	50.64	1.76		44.2			
181	172	47.7	22.45	19.44	7.87	1.79	0.75	0	0	0	47.7	49.76	2.54		44.2			
183	174	47.87	23.4	19.9	7.65	1.15	0.03	0	0	0	47.87	50.95	1.18		37.2			
185	177	33.47	17.29	21.83	19.09	7.71	0.6	0	0	0	33.47	58.22	8.31		74.3			
187	179	51.24	23	17.36	7.05	1.32	0.03	0	0	0	51.24	47.4	1.36		37.2			
189	181	44.69	21.2	19.27	11.62	3.17	0.06	0	0	0	44.69	52.09	3.22		52.6			
191	184	43.68	19.04	19.55	13.65	3.98	0.1	0	0	0	43.68	52.24	4.08		52.6			
193	186	47.5	21.62	19.33	9.68	1.84	0.03	0	0	0	47.5	50.63	1.87		44.2			
195	188	46.72	22.45	20.18	8.82	1.52	0.3	0	0	0	46.72	51.46	1.82		37.2			
197	191	46.57	22.52	19.83	8.92	1.84	0.32	0	0	0	46.57	51.27	2.16		44.2			
199	193	49.22	22.16	18.45	8.79	1.38	0	0	0	0	49.22	49.4	1.39		37.2			
201	195	40.05	20.06	20.38	13.28	5.53	0.69	0	0	0	40.05	53.73	6.22		62.5			
203	198	43.15	21.41	20.62	11.23	3.24	0.35	0	0	0	43.15	53.26	3.59		52.6			
205	200	46.52	21.82	19.43	9.32	2.39	0.52	0	0	0	46.52	50.57	2.91		44.2			
207	202	51.66	23.15	17.19	6.28	1.4	0.31	0	0	0	51.66	46.63	1.71		37.2			
209	204	50.2	23.35	17.52	6.85	1.7	0.38	0	0	0	50.2	47.72	2.08		37.2			
211	207	49.12	22.38	18.67	7.89	1.6	0.34	0	0	0	49.12	48.94	1.94		37.2			
213	209	50.67	23.44	18.23	6.17	1.17	0.33	0	0	0	50.67	47.84	1.49		37.2			
215	211	53.28	22.66	16.69	6.29	1.05	0.04	0	0	0	53.28	45.63	1.09		37.2			
217	214	51.39	21.98	17.28	7.61	1.68	0.06	0	0	0	51.39	46.87	1.74		37.2			
219	216	45.31	19.66	17.15	11.11	5.95	0.82	0	0	0	45.31	47.93	6.77		62.5			
221	218	49.38	23.36	19	7.08	1.13	0.04	0	0	0	49.38	49.44	1.18		37.2			
223	221	45.09	22.43	20.4	10.04	2	0.04	0	0	0	45.09	52.87	2.04		44.2			
225	223	52.91	23.19	16.74	6.08	1.04	0.04	0	0	0	52.91	46.01	1.08		37.2			
227	225	56.25	24.11	15.6	4.01	0.03	0	0	0	0	56.25	43.72	0.03		26.3			
229	227	52.39	21.61	16.35	7.55	1.84	0.26	0	0	0	52.39	45.51	2.1		37.2			
231	230	55.06	21.87	15.18	6.11	1.61	0.17	0	0	0	55.06	43.16	1.78		37.2			
233	232	56.07	21.92	14.94	5.82	1.2	0.05	0	0	0	56.07	42.68	1.24		37.2			
235	234	55.64	21.55	14.48	5.8	2.17	0.36	0	0	0	55.64	41.83	2.53		37.2			
237	237	48.28	20.09	15.53	7.79	3.77	3.44	1.1	0	0	48.28	43.41	8.31		105			
239	239	42.04	17.41	14.62	10.17	7.14	6.68	1.94	0	0	42.04	42.2	15.75		177			

BienenIII

Depth	Real depth	Normalized counts																			
		Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	As
167	156	0.000225	0.000225	0.00016	0.000484	0.000118	0.014034	0.000198	0.000157	0.000104	9.65E-05	0.000133	0.000534	0.000173	0.021934	0.001674	2.86E-05	7.39E-05	0.002519	0.001046	0.001185
169	158	0.000207	0.00019	0.000227	0.000611	5.27E-05	0.013006	0.000162	0.000377	4.16E-05	0.000118	8.87E-05	0.000376	0.000227	0.016086	0.001249	0.000202	0.000128	0.00304	0.000835	0.001192
171	161	0.000343	0.000226	0.000325	0.000597	5.58E-05	0.013317	0.000303	0.000461	5.72E-05	0.000158	7.82E-05	0.000476	0.000247	0.022018	0.000958	0.000193	0.000174	0.001341	0.000705	0.00148
173	163	0.000306	0.001739	0.000111	0.000802	7.58E-05	0.009104	0.019531	0.095571	4.39E-05	0.018292	0.000706	0.00137	0.014941	0.907153	0.009488	0.001041	0.000485	0.00703	0.001648	0.002859
175	165	0.000297	0.004714	7.62E-05	0.000956	2.46E-05	0.005979	0.044273	0.155801	3.12E-05	0.038691	0.001225	0.002591	0.032193	1.568047	0.0147	0.001052	0.000588	0.011562	0.002236	0.003843
177	168	0.000227	0.003731	6.64E-05	0.001001	1.58E-05	0.005282	0.046066	0.175555	0	0.039656	0.001758	0.002526	0.031966	1.81788	0.016809	0.000964	0.000598	0.012931	0.001935	0.00402
179	170	0.000322	0.004163	0.000129	0.000947	3.71E-05	0.005059	0.048121	0.155807	2.4E-05	0.043963	0.001454	0.002721	0.0282	1.847786	0.016995	0.001358	0.000797	0.014949	0.003073	0.003854
181	172	0.000213	0.004526	4.82E-05	0.000857	7.78E-06	0.004811	0.049414	0.188828	3.11E-06	0.043467	0.001553	0.002777	0.033969	1.9022	0.017462	0.001152	0.000591	0.012975	0.002268	0.003746
183	174	0.000247	0.004252	0.00014	0.000958	2.22E-05	0.004821	0.050462	0.183089	2.45E-05	0.043636	0.001675	0.002821	0.035648	1.957914	0.017787	0.001397	0.000491	0.013143	0.002146	0.004704
185	177	0.000291	0.005308	0.000111	0.001052	7.71E-06	0.004841	0.052301	0.170615	1E-05	0.048053	0.00144	0.002977	0.033274	1.922396	0.017797	0.001353	0.000876	0.014089	0.002664	0.00346
187	179	0.000331	0.006064	8.36E-05	0.000959	3.59E-05	0.005361	0.048474	0.163638	1.64E-05	0.045176	0.001431	0.002888	0.061017	1.921397	0.017351	0.001481	0.000773	0.014159	0.003195	0.003132
189	181	0.000266	0.004481	7.52E-05	0.000924	5.16E-06	0.005368	0.052386	0.111691	3.17E-05	0.04718	0.001916	0.00294	0.047325	2.247678	0.020955	0.001032	0.000615	0.01385	0.002902	0.004576
191	184	0.000259	0.005384	3.94E-05	0.000913	0	0.005132	0.045966	0.136029	5.21E-06	0.044457	0.001445	0.002861	0.039909	1.830354	0.017685	0.001554	0.000526	0.016692	0.002304	0.003565
193	186	0.000279	0.004613	6.1E-05	0.000868	0	0.005071	0.053019	0.176571	1.96E-05	0.044828	0.001836	0.002889	0.059097	2.281702	0.020994	0.000802	0.000334	0.014795	0.002141	0.004813
195	188	0.000344	0.004887	0.000132	0.000973	1.62E-05	0.004498	0.053467	0.174982	0	0.045792	0.001786	0.002786	0.042726	2.057891	0.018474	0.000964	0.000699	0.013921	0.002095	0.004342
197	191	0.000291	0.005537	0.000108	0.000992	1.59E-05	0.00523	0.05325	0.167231	9.85E-06	0.048277	0.001597	0.002948	0.043161	2.040737	0.018462	0.001193	0.000702	0.013645	0.002775	0.00467
199	193	0.000302	0.005449	6.1E-05	0.00094	1.62E-05	0.004502	0.054446	0.182151	0	0.047058	0.001414	0.002859	0.046589	2.093762	0.019034	0.001085	0.000479	0.012684	0.001827	0.004335
201	195	0.000339	0.005742	0.000125	0.0009	9.47E-06	0.004763	0.05372	0.168881	0	0.047624	0.001614	0.002936	0.033927	1.951515	0.0192	0.001364	0.000465	0.014074	0.002472	0.004932
203	198	0.000309	0.00547	6.73E-05	0.001006	7.48E-06	0.004553	0.050545	0.194367	0	0.044708	0.001532	0.002777	0.049758	2.057551	0.01885	0.001014	0.000372	0.013337	0.002727	0.003983
205	200	0.00037	0.00548	0.000146	0.000994	2.28E-05	0.004918	0.05094	0.108336	0	0.048422	0.001707	0.002961	0.038029	2.084441	0.019442	0.001262	0.000617	0.013255	0.002822	0.004864
207	202	0.000302	0.005052	0.000153	0.001001	2.57E-05	0.004409	0.052158	0.084012	0	0.047943	0.001513	0.003017	0.027868	2.070496	0.018533	0.000962	0.00074	0.014183	0.002507	0.003999
209	204	0.000256	0.004525	0.000118	0.000883	2.36E-05	0.00435	0.04749	0.186099	0	0.039646	0.001512	0.002529	0.031782	1.860552	0.017597	0.000901	0.000406	0.011299	0.002184	0.004837
211	207	0.000326	0.005915	0.000173	0.000965	7.48E-06	0.004838	0.058659	0.111104	0	0.05303	0.001884	0.003182	0.022928	2.220044	0.020709	0.001009	0.000742	0.01274	0.002797	0.004871
213	209	0.000317	0.005461	0.000111	0.001062	1.46E-05	0.004716	0.051511	0.142689	0	0.046057	0.001719	0.002992	0.033044	2.113249	0.019524	0.001143	0.000396	0.014072	0.001768	0.004733
215	211	0.000298	0.004486	0.000109	0.000895	1.77E-05	0.004195	0.050743	0.130113	0	0.045463	0.001631	0.002954	0.04316	2.221644	0.020041	0.001056	0.000511	0.013498	0.002313	0.006152
217	214	0.000285	0.00414	7.35E-05	0.000991	9.55E-06	0.004563	0.051225	0.125102	0	0.045294	0.001758	0.002934	0.056975	2.377886	0.021118	0.00063	0.000328	0.012452	0.002375	0.004923
219	216	0.000241	0.00515	7.48E-05	0.000996	1.68E-05	0.004986	0.053286	0.153862	1.68E-05	0.046516	0.001504	0.002829	0.034499	2.069559	0.019374	0.00109	0.000604	0.013109	0.002839	0.004871
221	218	0.000287	0.005137	9.22E-05	0.001035	2.08E-05	0.005196	0.051931	0.179028	4.61E-06	0.043842	0.001674	0.00264	0.034098	1.973985	0.018005	0.000832	0.000589	0.013037	0.002248	0.004103
223	221	0.000257	0.00433	7.62E-05	0.000894	3.89E-06	0.005105	0.050266	0.156937	1.71E-05	0.045771	0.001482	0.002815	0.034328	2.038649	0.018779	0.001013	0.000606	0.013885	0.00216	0.004313
225	223	0.000237	0.004897	0.000102	0.000957	1.92E-05	0.00552	0.052469	0.170863	0	0.045759	0.001914	0.002593	0.0357	1.978362	0.016843	0.001062	0.000509	0.012702	0.002614	0.003651
227	225	0.000304	0.004799	0.00015	0.000986	3.95E-05	0.005486	0.051681	0.163273	6.75E-05	0.043868	0.001648	0.002688	0.035971	2.023383	0.018202	0.00093	0.000353	0.012942	0.002475	0.004754
229	227	0.00034	0.004183	0.000103	0.001048	0.001243	0.005503	0.052201	0.138605	1.2E-05	0.043404	0.001423	0.00278	0.028039	2.042378	0.018717	0.000751	0.000546	0.011896	0.002325	0.004291
231	230	0.000246	0.004152	0.000104	0.000945	1.8E-05	0.005546	0.04857	0.165448	1.65E-05	0.040077	0.001384	0.00255	0.031963	1.880988	0.016686	0.000862	0.000493	0.011377	0.00231	0.004
233	232	0.000296	0.004708	7.57E-05	0.001019	1.71E-05	0.005901	0.045266	0.195757	2.52E-05	0.039233	0.001222	0.00257	0.037981	1.691564	0.015192	0.000994	0.000491	0.011079	0.001881	0.00395
235	234	0.000234	0.003773	8.25E-05	0.000944	2.78E-05	0.006153	0.044759	0.182549	1.31E-05	0.037269	0.00137	0.002469	0.044621	1.906113	0.01687	0.000956	0.000632	0.010843	0.001896	0.003709
237	237	0.000313	0.0035	8.2E-05	0.001014	3.28E-06	0.005781	0.043265	0.151651	3.2E-05	0.036563	0.00148	0.002534	0.041545	1.853367	0.016203	0.00059	0.000408	0.009792	0.001815	0.003872
239	239	0.000216	0.002845	0.000104	0.001023	5.05E-06	0.006657	0.03455	0.105803	1.68E-05	0.031384	0.001336	0.002097	0.030788	1.585643	0.013698	0.000585	0.000469	0.008178	0.002	0.00271

		Se	Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh	Zr/Rb
167	156	0.003269	0.001383	0.025076	0.037866	0.05685	0.000387	0.000467	9.95E-05	9.05E-06	5.28E-05	8.29E-05	0.001716	0.001818	0.001331	0.003798	0.002399	0.005307	0.001372	0.753406	0.246594	2.267076
169	158	0.003379	0.000933	0.024825	0.040478	0.056524	0.000291	0.000563	8.32E-05	3.05E-05	3.33E-05	9.98E-05	0.001492	0.001562	0.001314	0.00333	0.001992	0.005921	0.001192	0.744457	0.255543	2.276946
171	161	0.002443	0.000963	0.023219	0.034091	0.051723	0.000515	0.000469	0.000158	3.35E-05	2.65E-05	9.91E-05	0.001473	0.001901	0.001103	0.002494	0.001579	0.003166	0.001139	0.745717	0.254283	2.227606
173	163	0.003541	0.001034	0.028881	0.042798	0.046441	0.0003	0.000714	0.000123	0.000225	4.29E-05	0.000753	0.003689	0.006281	0.001752	0.002966	0.002304	0.003744	0.000986	0.749428	0.250572	1.608038
175	165	0.004071	0.000761	0.033715	0.044948	0.049026	0.00033	0.000551	0.000293	0.000453	0	0.002097	0.005342	0.01008	0.002208	0.00359	0.003175	0.004747	0.001981	0.75311	0.24689	1.454148
177	168	0.004162	0.000979	0.033951	0.044993	0.044753	0.000464	0.000299	0.000285	0.000668	0	0.001222	0.005704	0.009304	0.002261	0.003804	0.003081	0.005684	0.003056	0.755494	0.244506	1.318156
179	170	0.004252	0.001068	0.036814	0.044272	0.048871	0.000479	0.000322	0.000181	0.000438	3.87E-06	0.001561	0.005492	0.009797	0.001876	0.003911	0.003202	0.006758	0.003004	0.754695	0.245305	1.327495
181	172	0.004373	0.000921	0.036476	0.047638	0.045841	0.00058	0.000311	0.000254	0.000534	0	0.00123	0.005963	0.009867	0.002169	0.003981	0.003767	0.004854	0.003244	0.753456	0.246544	1.256725
183	174	0.004686	0.000849	0.037399	0.04763	0.043949	0.000398	0.000391	0.000171	0.000687	0	0.001427	0.006273	0.009555	0.00244	0.003886	0.00352	0.004367	0.003547	0.755687	0.244313	1.175155
185	177	0.004887	0.0007	0.038339	0.045263	0.050971	0.00053	0.000487	0.000314	0.000514	0	0.001869	0.005782	0.010325	0.002516	0.004079	0.0039	0.006139	0.002759	0.753164	0.246836	1.32949
187	179	0.004576	0.000483	0.035443	0.044215	0.056873	0.000375	0.000536	0.000101	0.000494	0	0.001766	0.005559	0.011158	0.00178	0.004148	0.003562	0.00655	0.003291	0.749728	0.250272	1.604662
189	181	0.005242	0.001044	0.040034	0.041051	0.045513	0.000337	0.000607	3.47E-05	0.000267	0	0.001833	0.005805	0.00936	0.00223	0.003976	0.003591	0.005315	0.004049	0.754161	0.245839	1.136858
191	184	0.004853	0.000812	0.035674	0.04205	0.053845	0.000266	0.000469	0.000164	0.00038	0	0.00145	0.006395	0.010477	0.002366	0.004675	0.003643	0.00634	0.003396	0.753784	0.246216	1.509341
193	186	0.005018	0.000894	0.036783	0.046712	0.044997	0.000268	0.000378	0.00017	0.000445	0	0.001536	0.005988	0.009809	0.002511	0.00449	0.003758	0.005718	0.003792	0.753983	0.246017	1.223319
195	188	0.004445	0.001186	0.037877	0.046669	0.046926	0.000727	0.000494	0.000304	0.00041	0	0.001438	0.005644	0.009665	0.002346	0.004614	0.003524	0.005393	0.003123	0.754726	0.245274	1.238907
197	191	0.005075	0.000646	0.037092	0.04638	0.050663	0.000438	0.000514	0.000198	0.000477	0	0.001561	0.005967	0.01067	0.002135	0.004456	0.003544	0.004914	0.003737	0.752828	0.247172	1.365843
199	193	0.004803	0.000769	0.037923	0.048465	0.046671	0.000541	0.00046	0.000114	0.000491	0	0.001328	0.005907	0.009992	0.002883	0.004326	0.004049	0.004733	0.003414	0.75274	0.24726	1.230675
201	195	0.004491	0.000987	0.038001	0.045896	0.049416	0.000439	0.000546	0.000222	0.000556	0	0.001337	0.005974	0.010114	0.002282	0.004285	0.003676	0.004995	0.003483	0.756076	0.243924	1.300381
203	198	0.005105	0.000904	0.034424	0.048369	0.047507	0.000523	0.000288	0.000466	0.000618	0	0.001201	0.005764	0.010614	0.002112	0.004201	0.003751	0.005276	0.003473	0.753269	0.246731	1.380082
205	200	0.00481	0.001025	0.037641	0.04	0.050056	0.000352	0.000565	0.000137	0.000204	0	0.001599	0.006137	0.009895	0.00205	0.004491	0.003291	0.00528	0.003967	0.757644	0.242356	1.329841
207	202	0.004531	0.001109	0.038789	0.040157	0.048745	0.000403	0.000287	7.92E-05	0.000154	0	0.001457	0.006053	0.009764	0.002297	0.004407	0.003523	0.005513	0.003062	0.75675	0.24325	1.256648
209	204	0.004617	0.001283	0.037649	0.047605	0.043078	0.000495	0.000475	0.000395	0.000682	0	0.001246	0.005232	0.008885	0.002307	0.00434	0.003377	0.003844	0.003595	0.755139	0.244861	1.144192
211	207	0.004919	0.001053	0.042169	0.041553	0.047884	0.000363	0.000463	0.000225	0.000312	0	0.00242	0.006165	0.010043	0.00242	0.004439	0.003579	0.004236	0.003922	0.753022	0.246978	1.135542
213	209	0.005529	0.001138	0.038003	0.044749	0.044918	0.000473	0.000425	0.000273	0.000417	0	0.001921	0.006196	0.009734	0.002769	0.004169	0.00378	0.004578	0.00446	0.757492	0.242508	1.181963
215	211	0.005272	0.000939	0.036633	0.042393	0.042914	0.000564	0.000348	0.000144	0.000257	0	0.001201	0.006271	0.009422	0.002623	0.004589	0.003912	0.004381	0.004485	0.758183	0.241817	1.171474
217	214	0.004983	0.001038	0.036936	0.041929	0.041727	0.000381	0.000307	0.000118	0.000213	0	0.001274	0.006081	0.008992	0.00224	0.004275	0.00342	0.004286	0.004839	0.757642	0.242358	1.129714
219	216	0.004612	0.000838	0.038502	0.04487	0.046673	0.000352	0.000394	0.000172	0.000285	0	0.001742	0.005746	0.009514	0.002218	0.004151	0.003923	0.004611	0.003636	0.7558	0.2442	1.212236
221	218	0.004616	0.000741	0.036523	0.046306	0.0481	0.000354	0.000461	0.000323	0.000301	0	0.001271	0.00572	0.009941	0.002352	0.004126	0.003515	0.004737	0.00309	0.75436	0.24564	1.316982
223	221	0.004588	0.000995	0.03788	0.043429	0.045732	0.000322	0.00044	0.000218	0.000266	0	0.001227	0.00592	0.009824	0.002487	0.004155	0.00344	0.005313	0.003403	0.754501	0.245499	1.207283
225	223	0.004629	0.000789	0.03771	0.045659	0.048869	0.000331	0.000501	0.000405	0.000499	0	0.001675	0.005341	0.009921	0.002386	0.004126	0.003792	0.004655	0.003014	0.7508	0.2492	1.295924
227	225	0.004301	0.000813	0.037709	0.043921	0.04496	0.000394	0.000414	0.000219	0.000575	0	0.001448	0.005728	0.009274	0.002427	0.004199	0.003046	0.004472	0.003546	0.753493	0.246507	1.192314
229	227	0.004578	0.000863	0.038735	0.042229	0.044235	0.000517	0.000347	0.000212	0.000466	0	0.001847	0.005572	0.008878	0.002529	0.00434	0.003639	0.004324	0.00341	0.754025	0.245975	1.14197
231	230	0.004481	0.000814	0.037118	0.045191	0.043766	0.000511	0.000541	0.000333	0.000574	0	0.001254	0.005292	0.008639	0.002065	0.003894	0.003364	0.004547	0.003123	0.755996	0.244004	1.179101
233	232	0.004328	0.000968	0.034761	0.049884	0.050363	0.000396	0.000502	0.000507	0.000599	0	0.001731	0.005762	0.00961	0.002692	0.003609	0.003077	0.003991	0.00323	0.750044	0.249956	1.448841
235	234	0.004319	0.001392	0.035732	0.047756	0.042484	0.000407	0.000452	0.000324	0.000563	0	0.001273	0.005529	0.008596	0.002681	0.003935	0.003195	0.004416	0.003078	0.751276	0.248724	1.188961
237	237	0.0044	0.000954	0.035421	0.043779	0.042501	0.000554	0.000335	0.000416	0.000523	0	0.001275	0.005103	0.008281	0.002255	0.003794	0.002835	0.003893	0.003103	0.754536	0.245464	1.199894
239	239	0.003742	0.000985	0.034728	0.042178	0.047187	0.00033	0.000487	0.000109	0.000231	0	0.000788	0.004701	0.007701	0.002139	0.003461	0.002635	0.003909	0.001652	0.753295	0.246705	1.35873

Appendix 11
XRF settings

XRF settings	Bienen X is missing! (no document.txt)

Base path:	Sample name:	Section name	User ID		
C:\Data\Utrecht\Bien	Bien I 0-100	Bien I 0-100	sif		
Year	Month	Day	Time		
2012	3	6	6		
Voltage	60	kV			
Current	42	mA			
Exposure time	200	ms			
line camera signal leve	117521	at 25 ms			
Step size	500	microns			
XRF	ON				
XRF exp. time	30	seconds			
Start coordinate	3	Stop coordinate	770		
XRF voltage and curre	30		30		
Tube	Mo				
Optical Start	0.5	Optical End	789.5		

Base path:	Sample name:	Section name	User ID		
C:\Data\Utrecht\Bien	Bien VI 4.3-5.30	Bien VI 4.30-5.30	sif		
Year	Month	Day	Time		
2012	4	3	23		
Voltage	60	kV			
Current	40	mA			
Exposure time	200	ms			
line camera signal leve	110027	at 25 ms			
Step size	1000	microns			
XRF	ON				
XRF exp. time	30	seconds			
Start coordinate	1	Stop coordinate	786		
XRF voltage and curre	30		30		
Tube	Mo				
Optical Start	0.6	Optical End	805.6		

Base path:	Sample name:	Section name	User ID		
C:\Data\Utrecht\Bien	Bien VII 5.3-6.2	Bien VII 5.30-6.20	sif		
Year	Month	Day	Time		
2012	1	24	23		
Voltage	60	kV			
Current	40	mA			
Exposure time	200	ms			
line camera signal leve	105795	at 25 ms			
Step size	1000	microns			
XRF	ON				
XRF exp. time	30	seconds			
Start coordinate	2	Stop coordinate	765		
XRF voltage and curre	30		30		
Tube	Mo				
Optical Start	0.5	Optical End	784.5		

Base path:	Sample name:	Section name	User ID		
C:\Data\Utrecht\Bien	Bien II 0.80-1.55	Bien II 0.80-1.55	sif		
Year	Month	Day	Time		
2012	1	25	23		
Voltage	60	kV			
Current	50	mA			
Exposure time	200	ms			
line camera signal leve	125256	at 25 ms			
Step size	1000	microns			
XRF	ON				
XRF exp. time	30	seconds			
Start coordinate	3	Stop coordinate	713		
XRF voltage and curre	30		30		
Tube	Mo				
Optical Start	0.6	Optical End	732.6		

Base path:	Sample name:	Section name	User ID		
C:\Data\Utrecht\Bien	Bien IV 2.4-3.4	Bien IV 2.4-3.4	sif3		
Year	Month	Day	Time		
2012	4	12	23		
Voltage	60	kV			
Current	41	mA			
Exposure time	200	ms			
line camera signal leve	112126	at 25 ms			
Step size	1000	microns			
XRF	ON				
XRF exp. time	30	seconds			
Start coordinate	1	Stop coordinate	777		
XRF voltage and curre	30		30		
Tube	Mo				
Optical Start	0.5	Optical End	796.5		

Base path:	Sample name:	Section name	User ID		
C:\Data\Utrecht\Bien	Bien VIII	Bien VIII 6.2-7.2	sif		
Year	Month	Day	Time		
2012	1	17	1		
Voltage	60	kV			
Current	50	mA			
Exposure time	200	ms			
line camera signal leve	127963	at 25 ms			
Step size	1000	microns			
XRF	ON				
XRF exp. time	30	seconds			
Start coordinate	5	Stop coordinate	950		
XRF voltage and curre	30		30		
Tube	Mo				
Optical Start	0.5	Optical End	966.5		

Base path:	Sample name:	Section name	User ID		
C:\Data\Utrecht\Bien	Bien III 155-240	Bien III 155-240	sif		
Year	Month	Day	Time		
2012	3	2	5		
Voltage	60	kV			
Current	50	mA			
Exposure time	200	ms			
line camera signal leve	136750	at 25 ms			
Step size	500	microns			
XRF	ON				
XRF exp. time	30	seconds			
Start coordinate	4	Stop coordinate	730		
XRF voltage and curre	30		30		
Tube	Mo				
Optical Start	0.5	Optical End	749.5		

Base path:	Sample name:	Section name	User ID		
C:\Data\Utrecht\Bien	Bien V3.4-4.3	Bien V 3.4-4.3	sif		
Year	Month	Day	Time		
2012	1	18	16		
Voltage	60	kV			
Current	40	mA			
Exposure time	200	ms			
line camera signal leve	104902	at 25 ms			
Step size	1000	microns			
XRF	ON				
XRF exp. time	30	seconds			
Start coordinate	3	Stop coordinate	751		
XRF voltage and curre	30		30		
Tube	Mo				
Optical Start	0.6	Optical End	770.6		

Base path:	Sample name:	Section name	User ID		
C:\Data\Utrecht\Bien	Bien IX 7.2-8.2	Bien IX 7.2-8.2	sif		
Year	Month	Day	Time		
2012	1	18	0		
Voltage	60	kV			
Current	50	mA			
Exposure time	200	ms			
line camera signal leve	127789	at 25 ms			
Step size	1000	microns			
XRF	ON				
XRF exp. time	30	seconds			
Start coordinate	3	Stop coordinate	940		
XRF voltage and curre	30		30		
Tube	Mo				
Optical Start	0.6	Optical End	959.6		

Appendix 10

Bienen III - Bienen X

Depth	Real Depth	Si	K	Ca	Ti	Mn	Fe	Rb	Sr	Zr	Pb
		Al-Standardized (normalized elemental count/ Al count)									
167	156	1	0.879195	0.697987	0.42953	0.771812	97.63758	111.6242	168.557	253.0604	23.62416
169	158	0.919463	0.785235	1.825503	0.57047	1.100671	77.87248	120.1745	195.953	273.6309	28.66443
171	161	0.658537	0.882114	1.341463	0.45935	0.719512	64.12195	67.61789	99.28049	150.626	9.219512
173	163	5.677524	63.74593	311.9349	59.70358	48.76547	2960.85	94.26384	139.6873	151.5798	12.2215
175	165	15.88398	149.1685	524.9337	130.3591	108.4669	5283.163	113.5939	151.442	165.1823	15.99448
177	168	16.39931	202.4965	771.7014	174.3194	140.5174	7991.01	149.2431	197.7813	196.7257	24.98611
179	170	12.91367	149.259	483.271	136.3621	87.46763	5731.319	114.1871	137.3189	151.5827	20.96163
181	172	21.22993	231.7774	885.6934	203.8796	159.3321	8922.241	171.0912	223.4453	215.0146	22.76642
183	174	17.18266	203.9133	739.8545	176.3313	144.0526	7911.839	151.1269	192.4706	177.5975	17.64706
185	177	18.24934	179.8223	586.6101	165.2175	114.4032	6609.592	131.817	155.6233	175.2493	21.1061
187	179	18.31604	146.408	494.2476	136.4481	184.2925	5803.316	107.0495	133.5448	171.7783	19.78302
189	181	16.83657	196.8116	419.6205	177.2548	177.8006	8444.465	150.4072	154.2271	170.9917	19.96953
191	184	20.79885	177.5747	525.5029	171.7443	154.1753	7070.974	137.8161	162.4483	208.0115	24.49425
193	186	16.54865	190.2162	633.4784	160.8297	212.0216	8186.014	131.9649	167.5892	161.4351	20.51351
195	188	14.20815	155.4485	508.7339	133.133	124.2189	5983.013	110.1223	135.6845	136.4313	15.68026
197	191	19.02865	183	574.7135	165.9115	148.3281	7013.299	127.474	159.3932	174.1094	16.88802
199	193	18.07073	180.5683	604.1	156.0659	154.5098	6943.9	125.7707	160.7341	154.7829	15.69756
201	195	16.95269	158.5914	498.5699	140.5957	100.1591	5761.267	112.1871	135.4946	145.886	14.74624
203	198	17.67391	163.3164	628.0242	144.4565	160.7754	6648.196	111.2271	156.2874	153.5024	17.04589
205	200	14.80754	137.6349	292.7143	130.8313	102.75	5631.974	101.7024	108.0774	135.248	14.26587
207	202	16.70283	172.4387	277.75	158.5024	92.13443	6845.208	128.2406	132.7618	161.1533	18.22642
209	204	17.683	185.5706	727.2017	154.9193	124.1902	7270.291	147.1182	186.0202	168.3314	15.02017
211	207	18.16782	180.1793	341.269	162.8897	70.42759	6819.147	129.5264	127.6345	147.0828	13.01149
213	209	17.24885	162.6935	450.6751	145.47	104.3664	6674.585	120.03	141.3364	141.871	14.45853
215	211	15.067	170.4218	436.9876	152.6873	144.9553	7461.462	123.0323	142.3797	144.129	14.71464
217	214	14.5232	179.6907	438.8402	158.8866	199.8608	8341.294	129.567	147.0825	146.3737	15.03351
219	216	21.36392	221.0538	638.2816	192.9684	143.1139	8585.377	159.7215	186.1392	193.6203	19.12975
221	218	17.91957	181.1475	624.4933	152.9303	118.9437	6885.74	127.3995	161.5255	167.7828	16.52279
223	221	16.87576	195.897	611.6121	178.3788	133.7818	7944.994	147.6242	169.2515	178.2242	20.70606
225	223	20.64983	221.2424	720.4613	192.9461	150.532	8341.973	159.0067	192.5253	206.0606	19.62626
227	225	15.79082	170.0383	537.1888	144.3316	118.3495	6657.204	124.0663	144.5051	147.926	14.71429
229	227	12.29343	153.4155	407.3498	127.561	82.40376	6002.387	113.8404	124.108	130.0023	12.70657
231	230	16.85032	197.1242	671.4777	162.6561	129.7229	7634.086	150.6465	183.4108	177.6274	18.45541
233	232	15.92562	153.1129	662.1543	132.7052	128.4711	5721.763	117.5785	168.7328	170.3526	13.49862
235	234	16.09059	190.878	778.4948	158.9373	190.2892	8128.774	152.3833	203.6585	181.1777	18.83275
237	237	11.17277	138.1126	484.1047	116.7173	132.6204	5916.385	113.0707	139.7539	135.6728	12.4267
239	239	13.15953	159.7938	489.3385	145.1518	142.393	7333.588	160.6187	195.0739	218.2374	18.07782
267	241	3.593333	47.11333	178.84	43.74667	44.08667	1952.12	62.14667	77.80667	99.83333	11.03333
269	244	13.46995	140.776	582.4044	126.1366	102.0546	5303.661	109.2514	143.5355	150.7814	13.40984
271	246	6.717172	91.31818	344.7727	89.4697	92.34343	4117.449	95.15152	120.3687	140.7727	12.89394
273	249	19.03871	188.8774	697.8645	179.1677	233.1613	7530.716	132.7484	185.2839	194.9935	27.81935
275	252	11.11945	107.8464	354.6724	102.4608	110.0546	3982.87	77.86348	98.91126	123.0853	13.93857
277	255	14.38767	153.5903	488.1145	137.2159	172.0749	6195.233	102.467	130.207	139.9383	15.837
279	257	11.06803	123.0408	343.7313	109.6735	109.3741	4783.35	83.52381	99.37755	104.2959	11.2449
281	260	29.37864	337.2816	845.9515	307.7184	264.2524	13285.5	246.3398	278	292.699	31.96117
283	263	10.64479	132.9923	342.4131	118.6641	96.73359	5412.66	98.58301	113.0193	113.1429	13.28185
285	266	12.5	149.2813	408.1295	133.5134	103.1116	5961.768	107.8571	128.5938	127	16.41071
287	268	12.9304	132.2271	395.0293	116.7436	95.17582	4931.344	90.84615	118.8498	123.0623	12.48718
289	271	17	188.4472	609.392	159.608	156.3216	7663.593	127.799	161.0503	139.3116	16.73367
291	274	14.27309	156.4217	452.8755	129.8795	121.4859	6056.357	107.6707	124.3213	117.2369	10.16466
293	276	17.90244	194	516.7707	162.6878	149.722	7578.22	130.2293	148.0244	146.4244	11.8878
295	279	12.49495	132.1852	401.5926	110.4916	101.1044	5091.603	86.7138	104.0707	97.70707	7.430976
297	282	16.89352	176.3519	516.7731	152.6806	141.6944	6771.106	121.2222	145.5926	140.3009	14.48148
299	285	17.71579	185.1421	731.9632	162.4421	145.0421	6936.568	134.6684	164.3	164.2684	11.08947
301	287	16.92547	180.9441	1440.317	158.2112	135.0745	7286.224	145.5217	198.7888	182.1118	9.869565
303	290	18.74675	216.5	1138.344	189.3701	149.5649	8314.357	158.6753	205.7338	198.7013	16.82468
305	293	12.87755	147.0245	480.8857	128.9347	118.3184	5924.335	102.4122	128.5878	125.4776	10.21224
307	295	10.53737	122.7402	505.0356	107.605	106.306	5041.363	89.57651	112.0142	102.1388	10.0427
309	298	12.21097	141.6329	531.8228	125.135	129.0127	6038.814	105.3376	133.6456	123.962	10.27004
311	301	10.66415	133.9509	470.9547	117.3585	115.5245	5665.132	95.66792	120.4377	107.9585	9.188679
313	304	16.8303	216.4303	640.0848	190.5576	154.5879	9180.758	160.0909	184.6545	171.6909	13.64848
315	306	19.92857	254.0929	766.1286	224.4571	163.4786	10275.53	182.0571	216.6214	202.9	20.62143
317	309	11.66667	151.8421	488.9518	132.193	101.1667	6300.728	116.2719	130.6053	123.0921	11.83772
319	312	17.48201	217.705	1067.417	189.7194	187.0288	9478.691	176.036	228.6115	204.8058	13.28777
321	315	10.96629	149.0056	818.8146	127.8371	129.4551	6792.303	121.4888	166.8652	152.5449	9.516854
323	317	11.3271	141.1495	628.0187	120.2196	136.3645	6117.874	108.8364	151.1495	130.1916	8.598131
325	320	22.49057	281.934	1205.16	239.6509	238.217	12131.81	213.0094	297.1509	252.0283	16.45283
327	323	9.311538	114.7	561.6077	102.3462	143.0154	5282.931	86.69231	125.0885	95.30385	9.923077
329	325	11.28125	145.9427	657.5365	128.6406	231.4948	7912.406	115.5156	167.1719	139.4063	13.42188
331	328	16.15385	227.1846	1038.946	201.6077	201.8923	9876.823	174.5462	260.9	237.4769	15.8
333	331	13.1989	159.7072	719.558	141.4586	115.2652	6870.53	127.2155	185.2044	160.1878	13.85083
335	334	13.45652	162.9638	763.7826	155.2826	135.6232	7511.174	146.4638	228.971	215.6667	16.24638
337	336	11.56627	108.8193	471.7189	98.249	113.6506	4672.622	83.97992	131.8916	117.8434	8.160643
339	339	14.31193	131.2248	668.4771	114.656	109.7615	5395.239	102.8257	155.2294	135.3899	11.04587
357	341	27.95862	253.1103	1136.841	207.1172	216	9696.648	175.9379	243.8966	212.8276	16.3931
359	343	20.42387	180.7654	671.9259	152.6749	126.749	6953.424	118.0453	160.1399	142.5391	10.32922
361	346	14.49485	126.3325	481.7036	105.9768	84.02835	4859.495	86.54639	106.8918	105.1005	7.033505
363	348	15.1493	134.7127	515.5859	113.5014	95.06479	5317.394	88.53239	114.1296	102.6704	8.839437
365	351	20.01172	186.4922	656.5625	161.8125	141.3711	7567.852	128.1133	173.8984	145.5117	13.18359
367	353	14.92073	146.8963	367.1555	130.3994	116.8659	6258.387	101.9756	126.3293	111.0793	9.615854
369	356	21.02917	205.1792	683.2875	178.6792	168.0708	8365.538	140.575	174.2625	156.8583	9.545833
371	358	23.31933	217.3109	897.0294	184.5882	190.9076	8163.5	141.3487	198.6639	174.979	13.12185
373	361	21.97308	186.2423	793.8269	153.6192	148.7731	6679.831	122.2154	173.5577	154.5115	9.65
375	363	15.23324	147.0816	487.9883	126.1749	117.3003	5462.72	95.22157	131.102	110.3615	8.728863
377	365	18.79355	158.2258	355.7161	138.4806	166.671	6595.523	103.5935	131.5677	124.971	9.706452
379	368	20.68641	175.4948	494.3415	154.5226	119.4634	6852.425	114.007	144.7526	138.4495	10.4007
381	370	18.48366	155.1863	659.2222	132.9673	105.5033	5628.641	100.8301	153.1405	135.4608	8.656863
383	373	17.58286	134.9229	633.0314	116.2686	106.16	5150.271	91.02	142.9171	126.5257	7.34
385	375	18.58966	167.7862	610.5414	146.9793	139.8793	6665.176	113.3655	155.3138	131.0517	10.75172
387	378	19.70782	189.6296	878.2551	159.5638	274.7366	8027.642	126.177	188.5309	149.7984	11.61728
389	380	16.14763	127.9944	573.9499	106.532	133.3677	4702.256	89.56267	129.4875	107.6964	7.816156
391	383	17.94576	144.3186	713.1763	119.7492	183.1831	5456.2	94.07797	155.7051	127.4983	9.684746
393	385	19.02024	160.3927	785.2834	131.8826	150.8583	6008.874	116.1457	183.4413	149.004	10.34008
395	387	24.94975	251.9196	918.6332	214.8191	222.4171	9772.638	170.6935	229.8894	195.1558	16.74874
397	390	19.8412	195.3777	883.7039	162.6438	205.2747	7489.687	131.6052	194.7167	163.867	12.69528
399	392	22	221.7857	934.0333	180.0571	169.3619	8756.957	155.581	208.8762	174.7762	13.75714
401	395	16.11355	151.8388	855.1429	133.8352	151.1136	6354.007	107.1868	170.4103	140.8755	11.54579
403	397	16.25862	173.2543	784.694	155.944	189.6724	7715.767	136.0819	200.4871	167.8017	15.14224
405	400	17.81008	173.0078	738.9109	150.1318	159.4496	7104.039	127.1357	176	145.876	13.22868
407	402	20.04265	196.6682	1119.602	167.1611	317.1754	8838.261	139.8199	231.7962	158.7536	13.14692
409	405	19.41729	150.4812	748.7669	144.5188	154.3008	5943.44	115.109	182.2895	198.4925	9.43609
411	407	18.47692	152.5038	804.9192	131.1462	167.5154	6257.023	115.5231	186.7731	151.3885	9.792308
413	409	22.12435	205.6477	1143.057	178.5492	389.8549	9919.098	150.1813	251.3834	186.0466	12.7513
415	412	14.52924	128.1023	586.1784	112.652	172.7778	5314.096	97.56433	142.2427	115.9766	8.040936
417	414	19.33721	173.0581	655.0349	152.4884	199.0116	7228.481	130.5116	165.9651	150.7364	13.03876
419	417	17.08127	158.4417	598.523	137.8657	137.3004	6471.986	118.0813	151.8127	136.5689	10.85866
421	419	20.99298	161.8596	738.3754	143.5088	166.7965	6724.442	110.8421	160.9228	142.6456	9.326316
423	422	24.09649	201.2588	875.8991	174.5789	185.3772	8300.167	139.9912	192.0132	174.9956	11.58333
425	424	26.58571	217.3714	851.7619	189.2762	196.1667	9109.586	150.4857	194.9048	174.1905	13.71905
427	427	16.95641	129.7795	567.0026	110.2821	274.9846	6095.397	79.24615	112.6538	96.69231	8.369231
429	429	21.90671	160.9009	518.379	141.7085	138.2449	6176.889	107.481	132.7318	127.9913	11.19825
453	431	3.573529	52.06618	604.9632	61.34559	74.74265	3603.669	112.2279	149.5735	187.8456	7.602941
455	434	13.12	119.3	3004.97	116.45	176.7	7407.41	180.05	241.4	251.35	10.87
457	436	12.28906	163.1641	963.3906	156.7344	174.2969	8240.18	159.6406	216.8125	216.5234	13.72656
459	439	10.13636	132.8864	654.0284	127.9148	129.125	6609.511	125.483	168.142	168.8011	13.29545
461	441	24.2987	286.3117	1314.221	304.5195	234.7273	13138.27	277.6104	399.1429	507.2857	32.15584
463	444	9.074286	116.9143	533.9886	126.0457	110.0171	5480.663	116.9943	176.8114	198.0114	14.23429
465	446	12.93836	142.6644	553.4589	152.4795	95.12329	5932.144	135.8082	190.9384	250.8219	15.12329
467	449	13.01316	150.8553	691.3092	140.7105	137.9013	6540.197	139.2829	202.4803	223.7829	16.28947
469	452	13.57143	185.3214	1253.563	174.1518	330.5	10065.08	172.4732	270.7411	221.5714	14.22321
471	454	10.21233	147.1301	775.5137	142.5068	211.2877	7424.363	138.9521	205.7466	186.8836	13.56849
473	457	6.038647	95.83575	515.7488	93.77778	161.3865	5274.942	97.97101	146.4638	126.6232	10.44444
475	459	10.8	186.4667	1004.143	182.7238	485.3333	10377.32	192.1619	279.1333	247.9524	18.64762
477	462	10.11765	187.0882	963.049	186.5	507.8039	10908.78	203.549	286.3725	251.7353	18.86275
479	465	9.105769	164.9615	831.9327	175.8077	239.0288	9004.452	200.3173	258.9712	270.1058	19.49038
481	467	7.05303	125.8939	854.7273	133.4318	167.2197	7310.765	160.5758	213.9242	221.0076	13.7803
483	470	12.32673	203.2178	835.396	209.604	276.0594	11456.59	215.5446	277.198	274.9901	14.52475
485	472	8.902299	122.2126	523.2241	123.431	113.3621	6602.764	120.6322	157.9598	161.4138	11.3046
487	475	11.4964	146.259	667.7482	151.9496	159.741	7459.237	154.8417	208.3237	219.9281	12.73381
489	477	12.06667	155.3704	649.4222	153.0519	198.8074	7817.459	159.2296	210.8	213.1481	16.14815
491	480	19.57471	281.1379	1099.77	273.9425	360.3563	13737.55	260.2184	325.2644	329.7356	26.58621
493	483	15.55814	192.5736	855.6124	185.2403	261.9147	9012.248	167.1163	217.4186	223.8837	15.8062
495	485	7.85	101.7846	344.9423	96.26538	148.7692	4981.815	82.76923	100.4462	105.5154	8.903846
497	488	16.64925	221.2164	877.903	196.3209	185.5821	9206.903	167.7463	228.3657	220.5821	17.61194
499	490	9.430962	121.5021	508.8787	109.3305	115.2762	5165.042	95.45188	131.9833	128.5105	9.297071
501	493	26.82796	327.1075	1413.581	295.7527	375.3871	14736.27	251.8925	356.6129	320.1935	20.24731
503	495	17.26119	229.7239	934.2761	205.8209	313.8507	11009.43	164.097	227.8507	205.4104	19.59701
505	498	13.17677	171.7626	623.096	148.8636	185.1313	7334.01	120.7929	150.2273	141.1061	9.70202
507	501	11.73298	166.5183	571.8429	153.3717	189.5707	7427.052	129.2618	148.0942	149.4607	13.2199
509	503	15.2	235.1111	690.0519	220.5778	189.763	10326.23	189.6815	207.7852	217.1481	17.15556
511	506	17.43925	280.1963	935.0748	267.0187	284.6822	12802.82	237.0467	275.0374	280.0748	23.71028
513	508	9.810945	144.5672	485.5572	139.4826	172.0498	6777.109	118.6418	148.199	148.2687	10.46766
515	511	9.674033	143.4144	545.7569	143.5746	145.8564	6743.536	130.0221	165.2818	162.558	13.19337
517	514	16.35052	278.5979	1045.299	273.8763	307.5155	13274.56	253.9588	309.6082	312.9175	26.16495
519	516	16	250.3729	865.6525	237.7797	407.7119	12640.22	196.178	244.7966	254.322	18.77119
521	519	18.37143	276.8095	1009.857	273.181	321.1619	12740.03	241.1238	302.4857	312.8286	29.4381
523	521	9.41358	155.4753	564.2407	162.4444	199.7346	7837.994	149.6111	182.9691	200.2099	19.43827
525	524	9.411348	152.7021	718.6028	163.5106	168.1064	7773.113	162.8298	219.1702	237.2128	12.66667
527	526	15.35632	238.8621	1149.425	246.4943	404.7126	12795.08	246.977	365.1149	379.6322	21.91954
529	529	10.36943	159.0637	607.5159	152.5223	204.9745	7649.828	150.4713	182.3822	182.8471	15.3758

Bienen III - Bienen X

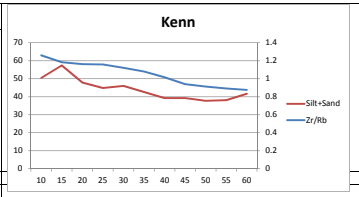
Depth	Real Depth	Si	K	Ca	Ti	Mn	Fe	Rb	Sr	Zr	Pb
		Al-Standardized (normalized elemental count/ Al count)									
545	531	22.01515	168.7828	467.3687	146.3232	114.8232	5792.646	140.9192	166.5303	208.0859	15.61111
547	533	24	202.0539	549.0101	169.9226	165.3805	7022.327	126.7003	147.5589	150.6465	12.73064
549	536	15.53314	144.0778	465.0058	118.268	162.9395	5609.069	100.2939	122.0346	115.7205	7.925072
551	538	18.71071	166.7464	575.2357	143.6071	201.9643	6936.25	115.9214	149.275	138.55	10.35
553	541	11.69583	101.9479	300.1188	86.49375	111.3417	3905.917	68.55208	82.28333	79.46667	6.09375
555	543	14.82308	134.7692	418.5538	114.4077	164.3821	5352.618	87.47179	101.5795	90.69487	7.489744
557	545	18.95156	174.7059	641.519	146.7024	166.3806	6646.014	114.0346	145.1765	126.6574	9.020761
559	548	23.68644	215.2839	775.2669	177.6356	204.6017	8312.805	137.8008	175.5424	152.0169	11.4661
561	550	14.5288	132.4738	463.212	109.4476	107.678	4986.445	85.81414	110.4398	95.14398	7.445026
563	552	16.27005	146.9973	548.123	122.393	151.607	5760.521	91.08556	118.2995	102.607	9.430481
565	555	18.58571	183.6286	585.9	157.5071	172.9464	7288.511	119.1179	148.4857	133.6107	11.55714
567	557	14.13095	126.3929	374.5714	109.5095	94.36429	4691.467	81.12143	98.39524	93.02619	7.961905
569	560	21.85401	177.7153	734.865	157.8212	128.5985	6156.704	112.7299	167.9891	161.1496	10.10584
571	562	19.1761	156.5723	678.0189	136.2358	161.2925	5545.519	97.36478	147.5566	128.3396	10.27358
573	564	19.49072	123.5172	647.374	111.5358	103.6737	3967.098	75.16446	133.1936	125.8249	4.328912
575	567	17.0989	141.3984	447.5055	131.3929	126.5137	4872.962	89.16484	111.1291	130.2115	8.222527
577	569	15.32827	143.4316	699.4681	121.5532	306.1033	6323.909	88.83283	130.4529	109.845	8.094225
579	571	16.70755	159.9811	488.6132	136.4528	267.761	6501.695	106.1572	123.2579	117.327	8.984277
581	574	23.06608	227.2467	727.3568	187.978	383.9295	9587.335	143.5727	174.8722	148.3789	13.65198
583	576	17.7623	144.6284	467.3825	123.6585	162.6721	5472.036	92.10656	113.7049	103.4645	9.379781
585	579	18.73375	164.6254	437.0805	141.2724	140.9009	6342.146	106.5913	121.5697	119.5882	8.377709
587	581	14.12366	138.5833	415.4704	119.4812	140.4247	5580.798	91.64516	111.078	99.10215	7.303763
589	583	17.78931	166.7327	440.7358	143.8585	163.4119	6512.374	108.2767	121.3396	116.2327	8.141509
591	586	19.12541	174.0099	318.5083	159.8911	157.9406	6868.822	118.1122	121.7162	133.3366	11.20792
593	588	15.44	133.625	357.59	117.86	98.605	5035.33	88.3275	99.455	97.5025	7.6325
595	590	12.58391	117.7057	314.5264	100.6552	128.3379	4819.763	77.15862	87.11494	84.49195	5.714943
597	593	15.64266	142.5845	437.241	118.9972	104.9834	5250.357	92.8892	111.2161	107.7784	7.778393
599	595	16.33125	153.5594	607.8875	126.6188	209.2688	6519.006	100.2656	136.0688	113.5625	7.7625
601	598	14.79634	138.0183	540.7415	110.5849	193.154	5827.974	88.08616	119.953	93.56136	9.469974
603	600	17.36607	151.8125	483.5863	127.6101	157.878	5600.378	98.0744	123.375	114.7619	8.285714
605	602	17.14245	150.4872	458.1567	128.6154	120.7236	5604.946	97.92023	114.7578	107.7863	8.641026
607	605	15.81313	138.1995	427.4571	116.404	89.93687	4808.604	87.83333	105.0707	96.67929	8.454545
609	607	23.63504	196.5876	644.9891	166.4781	219.8613	7516.219	122.2956	152.3139	141.1131	12.14234
611	609	14.41667	128.5116	392.9653	104.3148	113.588	4623.877	82.28009	95.57176	82.57639	5.37963
613	612	14.52798	131.7981	415.2433	108.4599	126.7494	4903.657	83.3528	101.3187	86.67883	8.270073
615	614	15.88298	136.8005	460.2686	117.4681	184.5585	5316.572	89.00798	109.0559	99.1516	7.273936
617	617	16.4322	147.7034	465.1808	125.435	155.1243	5648.082	95.86723	115.2034	102.6215	8.293785
619	619	13.90431	126.555	370.6531	106.2368	120.6675	4826.103	82.52153	97.87321	89.40191	5.868421
631	621	9.512097	91.875	301.4597	79.37903	82.49194	3535.206	82.08468	103.4234	117.6129	9.326613
633	623	12.45552	119.6868	429.1032	99.91103	93.72242	4603.007	94.11744	122.0605	115.0819	10.04982
635	625	15.69841	151.2143	563.3056	126.496	129.4008	6015.032	115.5833	146.7897	132.0159	12.67063
637	628	16.96241	166.7744	797.1654	142.609	164.1278	7147.737	204.2782	264.6466	260.5489	24.2782
639	630	14.5614	133.2939	605.8596	114.7149	115.25	5349.25	133.6053	175.4254	158.3991	12.4693
641	632	23.67708	229.8802	775.3333	194.6927	197.9063	8808.354	180.75	221.6042	200.1302	23.42708
643	634	16.14618	165.8073	559.9369	145.1761	179.3355	6756	117.4618	137.0266	124.3123	11.97342
645	637	11.41304	203.4826	625.3087	191.1565	201.2565	9216.778	162.113	186.1348	170.0652	13.71304
647	639	23.03252	399.4553	1088.48	376.1789	373.5203	17342.7	301.9268	342.4797	323.4634	26
649	641	31.38947	501.0421	1418.4	473.3368	667.2526	23575.22	366.3895	421.0947	434.8421	33.37895
651	643	14.59447	219.0922	608.1521	210.9631	143.0922	9405.788	166.0507	186.4885	201.106	14.85714
653	645	36.32632	513.7579	1546.232	500.1158	355.6737	21065.12	377.2842	451.0526	463.3579	35.35789
655	648	17.28659	263.561	1383.543	256.5061	238.872	11840.8	207.5244	264.0854	253.061	17.34146
657	650	12.25888	175.8883	2005.487	172.2132	210.9543	8827.792	168.4315	219.9594	226.9594	15.38071
659	652	29.25217	416.8522	1514.348	396.713	447.5217	18859.33	305.3913	380.313	372	23.44348
661	654	21.20732	289.8354	1037.774	277.6768	392.9756	14370.87	200.1037	265.7622	255.5061	23.14024
663	657	12.24908	186.2967	673.1245	176.3736	251.381	8109.795	124.967	162.9487	143.8791	11.87546
665	659	32.18421	432.9737	1646.991	394.0439	382.886	16404.41	306.2632	421.807	381.7281	23.61404
667	661	27.98693	296.9281	1443.026	249.3791	291.3007	10020.86	197.1699	343.7516	306.6732	21.03268
669	663	15.14559	183.7241	736.6935	159.9464	161.5057	6977.387	129.4751	189.5517	188.0268	11.50575
671	666	16.34146	249.8439	884.561	225.6293	384.078	10733.86	174.7756	226.8	189.1951	17.18049
673	668	24.58519	382.3185	1005.933	365.0222	482.3852	15972.79	278.2815	317.4222	283.5259	27.13333
675	670	18.04734	268.6982	852.8935	260.0237	403.9645	12367.65	196.1716	238.0296	213.0237	15.54438
677	672	19.75595	286.8929	844.4464	291.5	359.6488	12756.96	207.9821	247.2202	251.0595	22.22024
679	674	18.185	245.875	719.74	232.315	175.89	9549.585	176.99	206.325	226.53	20.59
681	677	14.95434	216.0183	631.7671	207.9224	168.5571	8790.356	156.8128	184.8767	195.5708	16.52055
683	679	20.24571	295.1771	757.4571	284.1029	178.6	11476.58	211.3486	244.4629	266.7029	24.17714
685	681	33.06061	507.1616	1172.364	496.7778	308.3535	19136.03	370.3434	405.0303	484.101	35.86869
687	683	21.80952	301.449	1123.714	302.2517	351.483	12963.42	228.7075	320.8776	318.2857	27.66667
689	686	23.79141	276.4969	1130.411	243.6012	318.9264	11027.49	195.3742	309.8834	273.5951	16.96933
691	688	13.15929	226.6991	387.7389	206.6991	219.7788	10117.91	171.854	178.9115	172.3097	15.88938
693	690	16.28729	260.8895	515.6796	260.3481	336.9392	13418.3	196.6851	224.6243	229.2044	19.04972
695	692	18.34177	298.6266	710.9494	282.8165	358.1392	13995.77	229.4114	257.981	241.8165	22.74051
697	695	13.82791	220.6605	503.4419	219.814	225.4698	10163.64	175.6651	195.6977	190.214	14.90698
699	697	22.62791	376.8527	944.4341	362.5969	368.4031	17082.62	279.4031	322.9612	305.0698	26.31008
701	699	28.10476	437.2381	974.7429	444.781	323.3143	18555.81	347.2095	367.8667	405.6571	34.5619
703	701	13.84689	231.5837	545.0048	221.3349	203.1914	10233.33	181.7656	196.9952	193.3301	16.40191
705	703	17.23429	277.8343	810.04	264.04	268.7771	12152.17	214.6571	247.1486	234.7086	21.77714
707	706	21.52713	351.1938	1136.403	339.8992	323.7674	15161.3	276.9302	342.2326	332.124	25.25581
709	708	17.78873	349.9155	841.4014	334.4014	336.1831	15804.35	273.1268	305.8662	286.8521	26.8662
711	710	32.80769	657.3718	1538.41	622.8205	647.8846	29707.38	505.8205	545.8718	492.7051	44.46154
713	712	26.90476	507.381	1386.638	468.2286	526.2762	22101.82	370.181	389.6286	358.5333	36.44762
715	715	31.65934	470.2088	1496.253	439.5165	652.7143	20932.64	332.7033	386.5824	379.5934	41.53846
717	717	10.92105	111.4934	298.6053	98.46053	107.9342	4673.24	99.67434	115.8454	115.2401	7.555921
719	719	14.1769	108.2432	330.5946	92.42506	96.76904	3930.609	77.2457	94.9484	90.61179	7.027027
737	721	20.48503	176.3353	709.7006	156.479	143.4192	6511.257	145.6647	190.8443	185.2515	16.62275
739	723	13.82236	108.1557	405.0359	88.51896	132.1976	4068.633	69.03792	86.78643	75.27545	6.323353
741	726	31.71176	264.2529	1238.335	217.3941	239.6118	9736.459	173.9235	225.5353	187.9647	22.26471
743	728	15.91922	139.2869	589.9805	117.5376	137.4178	5044.148	95.85237	120.0167	101.1448	12.36769
745	731	18.60526	147.3493	467.3254	122.8589	128.3158	5201.352	92.07895	111.1962	97.311	10.67703
747	733	14.712	124.606	300.476	108.188	118.462	4545.682	81.784	92.202	86.568	11.208
749	735	17.20988	154.6543	338.3605	139.758	183.0864	6315.825	101.2642	111.9037	95.46667	12.19012
751	738	14.2354	115.9872	343.9051	103.8248	103.7609	4132.693	76.51825	88.93796	73.55657	7.793796
753	740	14.5823	120.8539	369.2181	104.3539	96.57613	4446.669	81.49177	96.31687	79.04527	8.102881
755	743	18.59211	164.9711	475.3132	141.9316	177.0053	6565.674	107.9026	122.9342	104.0237	10.97368
757	745	16.8186	144.4419	412.7326	129.1651	168.5442	5746.528	94.95116	108.0977	90.85349	9.583721
759	747	14.36257	122.8187	299.9064	114.2144	126.4932	4467.092	81.23392	87.77973	83.02729	8.05653
761	750	17.95735	154.6422	369.0664	139.9882	112.0592	5499.787	100.1422	107.6611	104.7488	10.95735
763	752	15.52902	158.2723	415.942	120.308	147.0781	6072.788	98.34152	103.3348	72.76339	8.890625
765	755	17.72953	167.9454	391.268	126.4417	112.9727	5803.139	105.0769	105.3002	89.20099	8.029777
767	757	15.54279	137.9707	343.3423	115.3178	86.47677	4963.252	96.17359	103.709	88.30073	8.03912
769	759	21.39519	209.7113	719.3402	166.6907	246.4296	8426.56	139.6942	174.3883	120.3333	12.55326
771	762	14.75506	134.8674	403.373	114.9124	97.06067	5185.807	90.62247	111.2449	82.36629	9.386517
773	764	13.26531	118.5673	393.8163	101.4143	127.4714	4975.006	82.08163	103.6265	73.98163	7.828571
775	767	18.70326	166	685.1632	141.4095	201.8961	7047.442	113.4748	149.4006	110.2611	9.074184
777	769	19.9746	169.3619	797.8286	138.8984	169.2286	6426.863	118.7651	167.8063	106.5302	9.380952
779	771	17.29537	108.1815	588.7548	87.41313	95.01544	3570.481	70.70463	114.0019	81.82046	7.341699
781	774	15.20899	131.4045	544.9011	104.3191	126.0225	5280.299	89.95056	121.7213	77.64045	7.08764
783	776	15.20042	120.3215	490.6743	98.13987	97.89562	4465.29	82.71608	113.5908	79.50522	7.757829
785	779	16.25159	130.6808	543.4524	103.7844	102.5391	4808.524	84.00846	116.1057	77.49471	8.334038
787	781	15.1299	132.6392	518.468	102.9134	78.28041	4589.779	84.39381	110.7546	72.27629	7.11134
789	783	15.91105	126.531	471.4555	102.5094	86.36388	4504.407	88.39353	120.4744	94.61186	8.450135
791	786	17.13333	137.7595	544.6024	113.8833	156.9214	5624.59	90.44048	122.9238	85.06905	10.95238
793	788	16.94272	140.8902	554.1456	118.463	186.4487	5747.726	94.10263	123.5967	86.94749	10.179
795	791	23.01338	199.3411	890.7625	158.5318	183.1605	7368.391	130.2308	185.4482	118.7057	12.21739
797	793	18.745	150.0425	594.3275	122.47	112.665	5241.34	94.625	134.085	101.3	10.5325
799	795	16.77488	146.2559	554.9455	119.6493	96.6564	5272.882	95.59716	127.4621	93.109	9.111374
801	798	14.27766	124.0292	490.286	97.58664	74.74322	4245.33	79.01253	107.8685	73.51566	7.325678
803	800	14.54776	130.7778	467.6979	102.115	72.58674	4380.144	80.31384	104.6589	70.12865	7.132554
805	803	17.63679	142.7524	477.3892	123.1415	128.0307	5465.983	92.33491	115.6745	91.99292	10.50236
807	805	18.1945	132.8985	559.2008	112.1818	137.5539	5013.37	83.09725	116.9979	88.56448	8.970402
809	807	20.70055	149.4615	618.2005	127.3599	124.0907	5345.407	97.89286	138.7445	108.8736	9.876374
811	810	20.06667	122.1471	721.8069	101.1379	115.7839	4063.129	79.24598	139.0644	104.1701	8.935632
813	812	16.41221	112.3874	529.8454	94.24618	102.0134	3851.141	70.51527	108.9256	80.48664	6.851145
815	815	21.38033	145.2984	780.5574	114.5213	119.4164	4872.243	85.72131	139.1672	99.00984	10.81639
817	817	0.642857	1.797619	1.77381	0.380952	1.095238	7.464286	1.964286	2.72619	55.47619	7.595238
819	819	32.2657	265.6522	836.5266	235.343	280.6377	10407.44	181.372	228.4831	235.4541	17.45894
821	821	15.42523	122.8715	460.5047	108.8621	132.271	4773.322	86.78972	115.7079	110.7734	9.696262
823	823	16.88146	145.535	666.6839	125.462	148.6717	5707.517	97.56231	154.31	122.8967	9.431611
825	825	18.2129	164.3129	1149.342	135.2645	194.8129	6929.716	110.3097	211.8258	126.7097	10.20968
827	827	17.71703	144.0165	1082.712	117.1923	131.1401	5361.838	91.68956	186.6291	114.8132	7.986264
829	829	25.01639	179.6667	1066.945	153.2295	94.05464	5778	151.5464	286.2787	250.0601	15.4918
831	831	23.209	195.2669	1020.855	161.6238	134.373	6231.19	127.5177	208.1125	165.4244	13.85209
833	833	18.72619	157.9673	1474.155	116.0446	143.256	5436.271	95.10714	228.003	112.9613	11.07738
835	835	25.292	206.564	1967.376	154.92	201.088	7255.072	126.348	314.168	162.424	11.648
837	837	21.34146	156.7622	1148.756	122.1433	170.3598	5715.098	100.3018	197.4207	134.8293	11.57622
839	839	24.54579	172.6703	1469.293	126.0916	175.4469	6291.553	106.989	238.0513	144.2381	10.94872
841	841	15.46953	130.4831	887.1174	102.4492	95.15576	4432.847	83.39278	162.1603	102.7946	9.785553
843	843	24.16054	179.612	1231.963	145.796	135.3813	5890.12	116.1171	220.1003	168.2776	10.45151
845	845	23.30435	167.8043	515.1413	150.3288	101.9511	4895.774	110.3451	133.7717	185.6168	10.0625
847	847	17.80046	134.8899	951.4839	104.5092	91.7156	4363.755	81.8945	162.5986	105.6009	8.688073
849	849	30.23396	165.0415	1430.004	110.7094	119.2113	4846.679	101.5057	211.5849	146.0415	9.8

Appendix 9 May '14

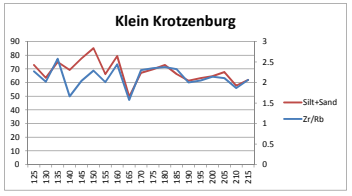
Correlation of grain size with Zr/Rb ratio (Subcatchment cores)

Depth (cm)	%Fine Silt	%Coarse S	%Very Fin	%Fine San	%Middle S	%Coarse S	%Very Coarse	Sand								
Kenn	16-32 µm	32-63 µm	63-125 µm	125-250 µm	250-500 µm	500-1000 µ	1000-2000	Clay	Silt	Sand	>8um	>16um	>32um	>64um	Zr/Rb	
10	13.94	10.76	6.69	2.68	0.06	0	0	49.53	41.03	9.43	50.46	34.13	20.19	9.43	1.260812	
15	12.22	10.15	7.05	4.7	6.42	2.8	0	42.6	36.44	20.96	57.41	43.34	31.12	20.96	1.18384	
20	13.14	10.61	6.35	1.67	0	0	0	52.09	39.89	8.02	47.91	31.77	18.63	8.02	1.162335	
25	13.15	9.6	4.85	0.44	0	0	0	55.15	39.57	5.29	44.85	28.04	14.89	5.29	1.158955	
30	13.71	10.21	4.74	0.35	0	0	0	53.97	40.95	5.08	46.04	29.01	15.3	5.08	1.121288	
35	13.62	8.1	2.7	0.29	0	0	0	57.39	39.61	3	42.6	24.71	11.09	3	1.080812	
40	12.9	6.38	1.43	0.05	0	0	0	60.7	37.82	1.48	39.29	20.76	7.86	1.48	1.017096	
45	12.83	6.36	1.49	0.06	0	0	0	60.74	37.7	1.56	39.25	20.74	7.91	1.56	0.939349	
50	11.53	5.62	2.26	0.8	0	0	0	62.31	34.63	3.06	37.7	20.21	8.68	3.06	0.913574	
55	12.14	5.97	1.7	0.36	0	0	0	61.92	36.02	2.06	38.08	20.17	8.03	2.06	0.892513	
60	11.86	8.04	4.46	0.67	0	0	0	58.35	36.52	5.13	41.66	25.03	13.17	5.13	0.87594	
											0.81909	0.787306	0.725028	0.602864		
Klein Krotzenburg																
125	17.94	25.52	14.75	4.02	0.08	0	0	27.16	53.99	18.85	72.83	62.31	44.37	18.85	2.272236	
130	18.04	21.62	9.91	0.98	0	0	0	36.59	52.52	10.89	63.41	50.55	32.51	10.89	2.015957	
135	20	28.42	14.49	1.43	0	0	0	24.92	59.16	15.92	75.08	64.34	44.34	15.92	2.578443	
140	16.98	21.31	13.43	6.37	0.25	0	0	30.81	49.14	20.05	69.19	58.34	41.36	20.05	1.662665	
145	13.97	13.85	8.89	22.29	10.29	0.02	0	22.35	36.16	41.49	77.66	69.31	55.34	41.49	2.041123	
150	16.21	32.75	25.53	4.4	0	0	0	14.91	55.15	29.94	85.07	78.89	62.68	29.94	2.292467	
155	20.11	23.27	8.82	0.67	0	0	0	33.89	56.62	9.49	66.1	52.87	32.76	9.49	2.009371	
160	25.78	32.95	9.73	0.49	0	0	0	20.63	69.15	10.22	79.37	68.95	43.17	10.22	2.444199	
165	15.11	13.76	4.91	0.47	0	0	0	50.35	44.27	5.38	49.65	34.25	19.14	5.38	1.575048	
170	18.76	24.2	11.31	1.32	0	0	0	32.91	54.47	12.63	67.1	55.59	36.83	12.63	2.301642	
175	23.01	24.52	8.15	0.5	0	0	0	30.38	60.97	8.64	69.63	56.18	33.17	8.64	2.34884	
180	21.91	27.82	10.43	1.51	0	0	0	27.21	60.85	11.94	72.79	61.67	39.76	11.94	2.378085	
185	21.33	24.84	7.61	0.38	0	0	0	33.86	58.15	7.99	66.14	54.16	32.83	7.99	2.324923	
190	20.41	20.48	6.11	0.36	0	0	0	38.71	54.82	6.47	61.3	47.36	26.95	6.47	2.002297	
195	21.62	22.23	5.75	0.22	0	0	0	36.72	57.31	5.97	63.28	49.82	28.2	5.97	2.047946	
200	23.4	20.4	5.12	0.3	0	0	0	35.43	59.15	5.42	64.58	49.22	25.82	5.42	2.144204	
205	24.29	23.92	5.48	0.17	0	0	0	32.28	62.07	5.66	67.72	53.86	29.57	5.66	2.105788	
210	21.91	12.66	2.52	0.33	0	0	0	42.34	54.82	2.84	57.67	37.42	15.51	2.84	1.867225	
215	18.56	16.06	7.23	2.74	1.77	0.89	0	38	49.36	12.63	61.99	47.25	28.69	12.63	2.063737	
											0.665082	0.625977	0.468473	0.114204		
Lauffen																
100	11.79	15.19	17.28	16.79	5.42	0.02	0	24.82	35.67	39.51	75.17	66.49	54.7	39.51	2.394886	
105	11.26	14.86	17.28	17.78	9.5	0.9	0	20.8	33.75	45.45	79.21	71.58	60.32	45.45	2.389468	
110	12.05	15.92	17.3	14.82	5.95	0.15	0	25.26	36.52	38.22	74.73	66.19	54.14	38.22	2.418663	
115	12.38	17.06	18.42	14.72	5.83	0.09	0	23.34	37.6	39.06	76.66	68.5	56.12	39.06	2.501277	
120	13.2	18.17	18.06	11.68	3.48	0.06	0	26.61	40.12	33.27	73.4	64.65	51.45	33.27	2.536601	
125	11.98	16.67	18.79	17.83	6.28	0.15	0	20.72	36.23	43.05	79.27	71.7	59.72	43.05	2.569767	
130	16.85	20.46	14.03	4.73	0.05	0	0	32.61	48.57	18.82	67.38	56.12	39.27	18.82	2.664953	
135	17.77	21.63	14.91	5.91	0.29	0	0	28.7	50.19	21.11	71.3	60.51	42.74	21.11	2.491577	
140	18.17	22.75	14.14	4.84	0.25	0	0	29.15	51.62	19.23	70.84	60.15	41.98	19.23	2.603208	
145	18.32	23.66	14.53	4.92	0.42	0	0	27.77	52.35	19.88	72.21	61.85	43.53	19.88	2.456138	
150	15.8	20.31	17.2	7.71	0.34	0	0	28.5	46.24	25.25	71.49	61.36	45.56	25.25	2.460227	
155	16.92	18.68	13.78	6.02	0.5	0	0	32.1	47.6	20.3	67.9	55.9	38.98	20.3	2.303282	
160	14.87	19.05	16.95	12.97	4.39	0.07	0	22.56	43.07	34.38	77.45	68.3	53.43	34.38	2.660952	
165	12.67	17.03	18.29	17.5	6.53	0.41	0	19.65	37.61	42.74	80.34	72.43	59.76	42.74	2.477068	
170	12.94	19.06	21.27	13.98	3.4	0.28	0	20.88	40.19	38.93	79.12	70.93	57.99	38.93	2.457931	
175	7.88	11.58	19.29	28.45	11.78	0.43	0	15.13	24.93	59.95	84.88	79.41	71.53	59.95	2.453688	
180	4.08	6.61	16.36	39.42	20.97	0.32	0	9.29	13.65	77.06	90.71	87.76	83.68	77.06	2.406705	
185	7.71	15.15	28.38	24.68	7.63	0.54	0	11.7	27.07	61.23	88.3	84.09	76.38	61.23	2.547751	
190	3.15	3.79	8.28	27.31	43.47	5.99	0	5.84	9.12	85.05	94.16	91.99	88.84	85.05	2.728846	
											0.200299	0.198197	0.167021	0.145906		
Romerberg																
148	12.7	9.6	5.62	1.15	0	0	0	48.44	44.79	6.77	51.56	29.07	16.37	6.77	1.419046	
153	11.87	10.04	7.49	4.91	0.97	0	0	46.75	39.87	13.38	53.24	35.28	23.41	13.38	1.385106	
158	11.28	10.81	7.82	3.46	0.08	0	0	50.5	38.14	11.36	49.5	33.45	22.17	11.36	1.445302	
163	10.89	12.31	9.32	5.21	0.59	0	0	49.01	35.86	15.13	50.98	38.32	27.43	15.13	1.356289	
168	9.44	9.13	6.94	4.05	0.28	0	0	57.51	31.21	11.27	42.48	29.84	20.4	11.27	1.413598	
173	8.79	8.96	7.71	5.64	0.67	0	0	56.96	29.02	14.02	43.05	31.77	22.98	14.02	1.336268	
178	8.87	8.53	6.44	3.06	0.07	0	0	60.7	29.72	9.57	39.3	26.97	18.1	9.57	1.397109	
183	12.37	9.56	7.52	6.13	4.3	0.9	0	42.49	38.65	18.85	57.51	40.78	28.41	18.85	1.446983	
188	9.54	9.65	9.02	9.11	6.66	0.34	0	44.97	29.89	25.14	55.02	44.32	34.78	25.14	1.375558	
193	9.49	9.22	8.33	6.82	1.68	0	0	52.38	30.79	16.83	47.62	35.54	26.05	16.83	1.308221	
198	8.83	6.82	5.16	3.01	0.29	0	0	62.71	28.83	8.46	37.29	24.11	15.28	8.46	1.302697	
203	9.04	7.36	5.46	2.6	0.06	0	0	60.74	31.14	8.12	39.25	24.52	15.48	8.12	1.311207	
208	9.23	7.53	5.78	3.29	0.14	0	0	60.47	30.32	9.21	39.53	25.97	16.74	9.21	1.333333	
213	9.27	7.5	5.56	2.6	0.05	0	0	60.77	31.02	8.21	39.23	24.98	15.71	8.21	1.363481	
218	10.91	8.23	6.14	3.1	0.08	0	0	54.81	35.88	9.31	45.2	28.46	17.55	9.31	1.384473	
223	10.47	8.46	6.41	2.89	0.05	0	0	57.74	32.89	9.36	42.25	28.28	17.81	9.36	1.56877	
228	9.87	7.79	5.66	2.74	0.06	0	0	59.81	31.74	8.45	40.2	26.12	16.25	8.45	1.667433	
233	11.21	8.84	6.7	5.3	1.71	0	0	51.97	34.32	13.7	48.03	33.76	22.55	13.7	1.971221	
238	12.63	9.33	5.87	2.54	0.06	0	0	55.56	35.97	8.47	44.44	30.43	17.8	8.47	1.89471	
											0.052141	0.028362	-0.08948	-0.11609		
Sindlingen																
120	13.2	14.28	11.05	11.2	9	2.88	0	28.21	37.67	34.12	71.8	61.61	48.41	34.12	1.897486	
125	14.78	16.48	11.99	10.4	6.9	2.21	0	26.83	41.67	31.5	73.16	62.76	47.98	31.5	1.870947	
130	15.85	16.93	11.77	9.51	3.41	0.49	0	30.27	44.56	25.18	69.73	57.96	42.11	25.18	1.660077	
135	14.03	15.9	12.61	12.32	6.96	1.63	0	26.26	40.22	33.52	73.73	63.45	49.42	33.52	1.74856	
140	17.44	18.71	11.58	6.63	0.72	0	0	32.25	48.82	18.93	67.74	55.08	37.64	18.93	1.800062	
145	19.29	17.08	7.17	2.65	0.06	0	0	38.26	51.87	9.87	61.75	46.25	26.96	9.87	1.832547	
150	19.29	19.38	8.79	3.23	0.06	0	0	35.59	52.33	12.08	64.41	50.75	31.46	12.08	1.869996	
155	20.47	19.81	8.39	3.2	0.06	0	0	33.83	54.52	11.65	66.17	51.93	31.46	11.65	1.946514	
160	20.12	17.38	7.41	3.02	0.07	0	0	36.1	53.4	10.5	63.9	48	27.88	10.5	2.10354	
165	19.55	20.36	9.27	4.93	0.61	0	0	32.16	53.04	14.8	67.85	54.72	35.17	14.8	2.042807	
170	16.93	19.25	12.12	13.17	6.37	0.1	0	22.26	45.97	31.76	77.73	67.94	51.01	31.76	2.164677	
175	21.27	16.87	6.46	4.18	0.49	0	0	34.2	54.66	11.14	65.79	49.27	28	11.14	2.066168	
180	16.83	17.33	10.53	10.47	5.41	0.13	0	28.18	45.28	26.54	71.82	60.7	43.87	26.54	1.957195	
185	15.3	16.59	11.65	11.44	3.11	0	0	30.1	43.69	26.2	69.89	58.09	42.79	26.2	2.01556	
190	18.01	15.86	9.32	8.4	3.71	0.07	0	30.18	48.33	21.49	69.84	55.37	37.36	21.49	1.983233	
195	20.17	20.04	9.2	4.85	0.55	0	0	30.92	54.47	14.61	69.08	54.81	34.64	14.61	2.177844	
200	17.13	19.95	11.75	10.62	3.1	0	0	26.66	47.86	25.47	73.34	62.55	45.42	25.47	1.943111	
205	12.24	11.26	6.57	7.7	18.91	5.15	0	27.72	33.94	38.34	72.27	61.83	49.59	38.34	1.482265	
											-0.0663	-0.17588	-0.33157	-0.44325		

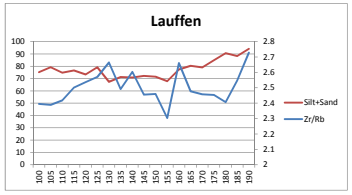
Correlation (Al vs GS fractions)



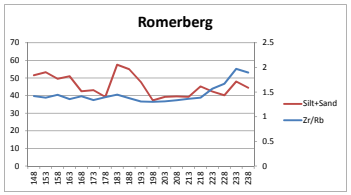
Coring: Kenn	>8um	>16um	>32um	>64um
Depth (cm)	Al			
	-0.71995	-0.71204	-0.68076	-0.60742
10	0.000208			
15	0.000261			
20	0.000283			
25	0.000329			
30	0.00035			
35	0.000403			
40	0.00052			
45	0.000563			
50	0.000422			
55	0.000373			
60	0.000599			



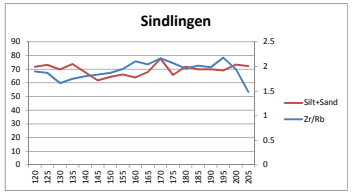
Coring: Klein Krotzenburg				
Depth (cm)	Al			
	0.121625	0.116887	0.077395	0.17694
125	0.000327			
130	0.000344			
135	0.000262			
140	0.000274			
145	0.000408			
150	0.000228			
155	0.00029			
160	0.000438			
165	0.000298			
170	0.000281			
175	0.000236			
180	0.000388			
185	0.000347			
190	0.000296			
195	0.000284			
200	0.000204			
205	0.000227			
210	0.00022			
215	0.000391			



Coring: Lauffen				
Depth (cm)	Al			
	0.327517	0.353133	0.413369	0.44204
100	0.0003			
105	0.000078			
110	0.000341			
115	0.000448			
120	0.000292			
125	0.000422			
130	0.000368			
135	0.000311			
140	0.00027			
145	0.000192			
150	0.000272			
155	0.000329			
160	0.00025			
165	0.000368			
170	0.00026			
175	0.000265			
180	0.000459			
185	0.000423			
190	0.000484			



Coring: Romerberg				
Depth (cm)	Al			
	0.25422	0.269998	0.253538	0.328053
148	0.000136			
153	0.00023			
158	0.000136			
163	0.000136			
168	0.000163			
173	0.000198			
178	0.000168			
183	0.000249			
188	0.000151			
193	0.000223			
198	0.000158			
203	0.000275			
208	0.000244			
213	0.000296			
218	0.000275			
223	0.000197			
228	0.000261			
233	0.000108			
238	0.000181			



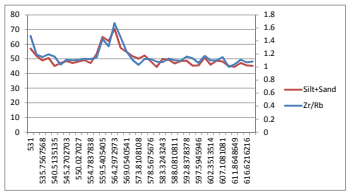
Coring: Sindlingen				
Depth (cm)	Al			
	0.514547	0.473103	0.446411	0.44118
120	0.000312			
125	0.000198			
130	0.00033			
135	0.000258			
140	0.000246			
145	0.000152			
150	0.000116			
155	0.000285			
160	0.000301			
165	0.000225			
170	0.000335			
175	0.00035			
180	0.000301			
185	0.000214			
190	0.000306			
195	0.00028			
200	0.000232			
205	0.000349			

Appendix 8 B

Correlation of grain size with Zr/Rb ratio (Bienen)

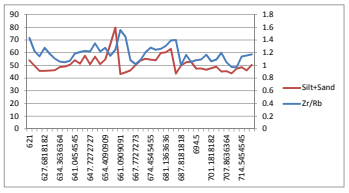
	Depth	Realdepth	Clay	Silt	Sand	Silt+Sand	Zr/Rb	Comments Winkels (gebaseerd op foto's)
B7	545	531	43.03	52.03	4.95	56.98	1.476632	
reverse!	547	533.3784	48.06	47.59	4.35	51.94	1.188998	
	549	535.7568	51.14	45.17	3.69	48.86	1.153813	
	551	538.1351	49.46	46.77	3.77	50.54	1.195206	
	553	540.5135	54.84	43.61	1.55	45.16	1.159216	
	555	542.8919	52.79	45.72	1.48	47.2	1.036847	
	557	545.2703	51.51	46.3	2.18	48.48	1.110693	
	559	547.6486	52.81	45.28	1.91	47.19	1.103164	
	561	550.027	51.85	46.35	1.8	48.15	1.108722	
	563	552.4054	50.88	47.24	1.87	49.11	1.12649	
	565	554.7838	52.96	44.82	2.22	47.04	1.121668	
	567	557.1622	46.65	50.65	2.71	53.36	1.146752	
	569	559.5405	34.95	57.21	7.83	65.04	1.42952	
	571	561.9189	37.85	56.16	5.99	62.15	1.318132	
	573	564.2973	29.43	62.1	8.48	70.58	1.673995	
	575	566.6757	42.6	54.7	2.71	57.41	1.460346	
	577	569.0541	45.23	50.66	4.11	54.77	1.236536	
	579	571.4324	48.21	49.62	2.17	51.79	1.10522	lam
	581	573.8108	49.83	48.07	2.09	50.16	1.033475	
	583	576.1892	47.69	49.7	2.62	52.32	1.123313	zandbandje
	585	578.5676	51.61	46.07	2.32	48.39	1.121932	
	587	580.9459	55.57	42.46	1.97	44.43	1.081368	
	589	583.3243	50.07	48.65	1.28	49.93	1.073478	
	591	585.7027	50.63	47.15	2.22	49.37	1.128898	
	593	588.0811	53.17	45.12	1.72	46.84	1.103875	
	595	590.4595	51.48	46.19	2.33	48.52	1.095042	
	597	592.8378	51.33	45.58	3.09	48.67	1.16029	
	599	595.2162	54.7	43.05	2.24	45.29	1.132616	
	601	597.5946	54.48	42.5	3.02	45.52	1.062157	
	603	599.973	49.11	47.58	3.31	50.89	1.170151	
	605	602.3514	54.03	44.14	1.82	45.96	1.100756	
	607	604.7297	51.18	46.57	2.25	48.82	1.100713	
	609	607.1081	51.85	45.43	2.72	48.15	1.153869	
	611	609.4865	54.86	44.1	1.04	45.14	1.003601	
	613	611.8649	55.41	43.09	1.51	44.6	1.039903	
	615	614.2432	52.78	45.49	1.73	47.22	1.113963	
	617	616.6216	54.5	43.22	2.28	45.5	1.070454	
	619	619	54.75	43.26	1.99	45.25	1.083377	
B8	631	621	46.06	49.59	4.35	53.94	1.432824	
	633	623.2273	50.25	46.02	3.73	49.75	1.222747	
	635	625.4545	54.39	43.27	2.34	45.61	1.14217	
	637	627.6818	54.41	43.43	2.17	45.6	1.275461	
	639	629.9091	54.07	44.21	1.72	45.93	1.185575	
	641	632.1364	53.82	44.61	1.57	46.18	1.107221	
	643	634.3636	51.32	46.91	1.77	48.68	1.058321	
	645	636.5909	50.88	46.16	2.96	49.12	1.049053	
	647	638.8182	49.59	47.47	2.94	50.41	1.07133	
	649	641.0455	45.84	50.56	3.6	54.16	1.18683	
	651	643.2727	48.64	49.2	2.16	51.36	1.211112	
	653	645.5	42.4	53.02	4.57	57.59	1.22814	zandbandje
	655	647.7273	49.23	46.65	4.12	50.77	1.219428	
	657	649.9545	43.09	50.37	6.54	56.91	1.347488	zandbandje
	659	652.1818	49.03	47.44	3.54	50.98	1.218109	zandbandje
	661	654.4091	45.39	51.55	3.06	54.61	1.276869	
	663	656.6364	33.47	41.75	24.78	66.53	1.151337	zandband
	665	658.8636	20.3	29.32	50.39	79.71	1.246405	
	667	661.0909	56.91	40.94	2.15	43.09	1.555375	
	669	663.3182	55.48	44.03	0.5	44.53	1.452224	
	671	665.5455	53.95	45.38	0.67	46.05	1.082503	
	673	667.7727	49.75	47.93	2.32	50.25	1.018846	
	675	670	46.18	52.02	1.8	53.82	1.085905	zandbandje
	677	672.2273	44.72	50.81	4.47	55.28	1.207121	
	679	674.4545	45.51	50.18	4.31	54.49	1.279903	
	681	676.6818	46	50.32	3.68	54	1.247161	
	683	678.9091	40.17	52.24	7.59	59.83	1.26191	
	685	681.1364	39.68	55.97	4.35	60.32	1.307168	
	687	683.3636	36.96	46.71	16.32	63.03	1.391672	zandbandje
	689	685.5909	56.49	41.45	2.06	43.51	1.400364	
	691	687.8182	50.17	46.94	2.89	49.83	1.002652	
	693	690.0455	47.48	50.85	1.67	52.52	1.165337	
	695	692.2727	47.17	49.8	3.04	52.84	1.054073	
	697	694.5	52.63	45.44	1.94	47.38	1.082821	
	699	696.7273	52.49	46.3	1.22	47.52	1.091862	
	701	698.9545	53.49	44.62	1.89	46.51	1.168335	
	703	701.1818	52.15	45.5	2.35	47.85	1.063624	
	705	703.4091	51.13	46.36	2.52	48.88	1.093411	
	707	705.6364	54.85	43.23	1.92	45.15	1.199306	
	709	707.8636	54.63	43.14	2.22	45.36	1.050253	
	711	710.0909	56.36	41.87	1.78	43.65	0.974071	
	713	712.3182	52.57	44.88	2.55	47.43	0.968535	
	715	714.5455	51.46	45.56	2.97	48.53	1.140937	
	717	716.7727	53.93	44.2	1.87	46.07	1.156166	
	719	719	49.69	47.26	3.04	50.3	1.173033	
B9	737	721	49.88	46.7	3.42	50.12	1.271767	
	739	723.4	49.55	46.84	3.61	50.45	1.090349	
	741	725.8	50.19	47.19	2.62	49.81	1.080732	
	743	728.2	50.22	46.44	3.34	49.78	1.055215	
	745	730.6	53.66	44.79	1.55	46.34	1.056821	
	747	733	52.12	47.1	0.78	47.88	1.058496	
	749	735.4	51.36	47.02	1.62	48.64	0.942748	
	751	737.8	56.27	41.83	1.9	43.73	0.961294	
	753	740.2	52.74	45.25	2.01	47.26	0.969979	
	755	742.6	52.98	45.79	1.22	47.01	0.964051	
	757	745	47.97	50.36	1.67	52.03	0.956844	
	759	747.4	55.16	43.03	1.81	44.84	1.022077	
	761	749.8	66.83	33.13	0.04	33.17	1.046001	
	763	752.2	67.1	31.9	1	32.9	0.739905	
	765	754.6	58.79	39.39	1.82	41.21	0.848911	
	767	757	56.38	41.88	1.74	43.62	0.918139	
	769	759.4	59.9	38.79	1.31	40.1	0.861406	
	771	761.8	55.28	43.49	1.23	44.72	0.908895	
	773	764.2	52.44	45.62	1.94	47.56	0.901318	
	775	766.6	55.48	43.02	1.5	44.52	0.97168	
	777	769	55.11	43.13	1.77	44.9	0.896982	
	779	771.4	41.21	54.07	4.72	58.79	1.157215	fijn zand bandje
	781	773.8	60.98	37.53	1.49	39.02	0.863146	
	783	776.2	55.93	41.94	2.14	44.08	0.961182	
	785	778.6	52.67	44.92	2.42	47.34	0.922463	
	787	781	57.26	41.85	0.89	42.74	0.856417	
	789	783.4	59.66	40.29	0.05	40.34	1.070348	
	791	785.8	54.76	42.91	2.33	45.24	0.940608	
	793	788.2	56.53	41.94	1.53	43.47	0.923965	
	795	790.6	48.64	50.03	1.33	51.36	0.911503	
	797	793	54.75	43.49	1.76	45.25	1.070542	
	799	795.4	55.75	42.32	1.93	44.25	0.973973	
	801	797.8	51.55	46.56	1.89	48.45	0.93043	
	803	800.2	52.37	45.65	1.97	47.62	0.873183	
	805	802.6	60.5	38.95	0.55	39.5	0.996296	
	807	805	56.59	42.79	0.62	43.41	1.065793	
	809	807.4	49.77	48.39	1.85	50.24	1.112171	
	811	809.8	43.95	53.57	2.48	56.05	1.314516	
	813	812.2	45.8	52.05	2.16	54.21	1.141407	
	815	814.6	44.01	52.94	3.05	55.99	1.15502	
	817	817	42.47	54.08	3.45	57.53	28.24242	
B10	819	819	47.93	49.62	2.45	52.07	1.298183	
	821	821	47.37	49.01	3.62	52.63	1.276342	
	823	823	51.08	46.6	2.32	48.92	1.259673	
	825	825	43.64	47.88	8.48	56.36	1.148672	gat
	827	827	46.44	48.43	5.13	53.56	1.252195	
	829	829	52.6	44.42	2.98	47.4	1.650056	
	831	831	46.18	50.8	3.02	53.82	1.297267	
	833	833	47.1	49.4	3.5	52.9	1.187727	
	835	835	44.84	45.96	9.21	55.17	1.285529	
	837	837	45.29	47.09	7.62	54.71	1.344235	lam MZ
	839	839	49.62	48.86	1.53	50.39	1.348158	
	841	841	45.81	50.15	4.04	54.19	1.232656	
	843	843	42.45	53.46	4.09	57.55	1.449206	
	845	845	36.93	57.68	5.4	63.08	1.682148	
	847	847	51.59	46.55	1.86	48.41	1.289475	
	849	849	32.78	34.28	32.94	67.22	1.438752	zand+grind

	Clay	Silt	Sand	Silt+Sand	Si	Zr/Rb
Clay	1					
Silt	-0.98537	1				
Sand	-0.89316	0.803443	1			
Silt+Sand	-1	0.985399	0.893083	1		
Si	-0.39606	0.404596	0.316584	0.396262	1	
Zr/Rb	-0.88882	0.855642	0.847635	0.888954	0.331434	1



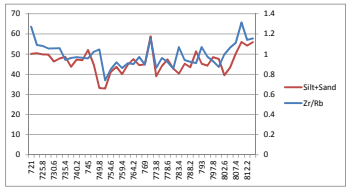
	>8um	>16um	>32um	>64um
Original	0.888924	0.918979	0.898392	0.847635

	Clay	Silt	Sand	Silt+Sand	Si	Zr/Rb
Clay	1					
Silt	-0.01195	1				
Sand	-0.84423	-0.52585	1			
Silt+Sand	-1	0.011738	0.844347	1		
Si	0.019289	-0.07581	0.02403	-0.01951	1	
Zr/Rb	-0.19701	0.024349	0.154496	0.196961	0.219907	1



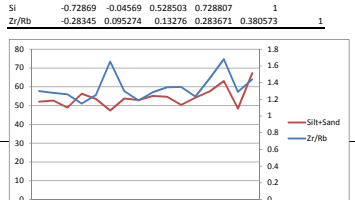
	>8um	>16um	>32um	>64um
Original	0.19721	0.242569	0.227442	0.154496
Shifted	0.667298	0.706786	0.676712	0.581338

	Clay	Silt	Sand	Silt+Sand	Si	Zr/Rb
Clay	1					
Silt	-0.99177	1				
Sand	-0.73541	0.642618	1			
Silt+Sand	-1	0.991767	0.735442	1		
Si	0.040879	-0.02141	-0.13084	-0.0408	1	
Zr/Rb	-0.32634	0.316532	0.277504	0.32631	-0.79885	1



	>8um	>16um	>32um	>64um
Original	0.601645	0.630126	0.599367	0.4238

	Clay	Silt	Sand	Silt+Sand	Si	Zr/Rb
Clay	1					
Silt	0.130247	1				
Sand	-0.76875	-0.73423	1			
Silt+Sand	-1	-0.13001	0.768594	1		
Si	-0.72869	-0.04569	0.528503	0.728807	1	
Zr/Rb	-0.28345	0.095274	0.13276	0.283671	0.380573	1



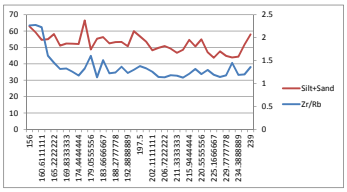
	>8um	>16um	>32um	>64um
Original	0.28399	0.274286	0.218542	0.13276

Appendix 8

Correlation of grain size with Zr/Rb ratio (Bienen)

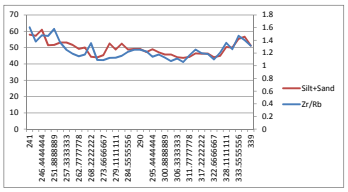
	Depth	Realdepth	Clay	Silt	Sand	Silt+Sand	Zr/Rb	Comments Winkels (gebaseerd op foto's)
B3	167	156	37.07	47.79	15.13	62.92	2.267076	naval
	169	158.3056	40.71	47.42	11.87	59.29	2.276946	
	171	160.6111	45.3	51.54	3.16	54.7	2.227606	
	173	162.9167	44.92	49.23	5.85	55.08	1.608038	
	175	165.2222	41.83	50.36	7.8	58.16	1.454148	
	177	167.5278	48.87	48.69	2.44	51.13	1.318156	gelamineerd, (zandlaagjes)
	179	169.8333	47.6	50.64	1.76	52.4	1.327495	
	181	172.1389	47.7	49.76	2.54	52.3	1.256725	
	183	174.4444	47.87	50.95	1.18	52.13	1.175155	
	185	176.75	33.47	58.22	8.31	66.53	1.32949	2 zandbandjes
	187	179.0556	51.24	47.4	1.36	48.76	1.604662	
	189	181.3611	44.69	52.09	3.22	55.31	1.136858	
	191	183.6667	43.68	52.24	4.08	56.32	1.509341	zandbandjes
	193	185.9722	47.5	50.63	1.87	52.5	1.223319	
	195	188.2778	46.72	51.46	1.82	53.28	1.238907	
	197	190.5833	46.57	51.27	2.16	53.43	1.365843	
	199	192.8889	49.22	49.4	1.39	50.79	1.230675	
	201	195.1944	40.05	53.73	6.22	59.95	1.300381	
	203	197.5	43.15	53.26	3.59	56.85	1.380082	zandbandje
	205	199.8056	46.52	50.57	2.91	53.48	1.329841	
	207	202.1111	51.66	46.63	1.71	48.34	1.256648	
	209	204.4167	50.2	47.72	2.08	49.8	1.144192	
	211	206.7222	49.12	48.94	1.94	50.88	1.135542	
	213	209.0278	50.67	47.84	1.49	49.33	1.181963	
	215	211.3333	53.28	45.63	1.09	46.72	1.171474	
	217	213.6389	51.39	46.87	1.74	48.61	1.129714	
	219	215.9444	45.31	47.93	6.77	54.7	1.212236	zandbandje
	221	218.25	49.38	49.44	1.18	50.62	1.316982	
	223	220.5556	45.09	52.87	2.04	54.91	1.207283	
	225	222.8611	52.91	46.01	1.08	47.09	1.295924	
	227	225.1667	56.25	43.72	0.03	43.75	1.192314	
	229	227.4722	52.39	45.51	2.1	47.61	1.14197	gelamineerd, z bandjes
	231	229.7778	55.06	43.16	1.78	44.94	1.179101	
	233	232.0833	56.07	42.68	1.24	43.92	1.448841	mzl/lk laagje
	235	234.3889	55.64	41.83	2.53	44.36	1.188961	
	237	236.6944	48.28	43.41	8.31	51.72	1.199894	
	239	239	42.04	42.2	15.75	57.95	1.35873	
B4	267	241	42.04	53.95	4	57.95	1.606415	bioturbatie hele kern
	269	243.7222	42.79	54.89	2.32	57.21	1.380133	
	271	246.4444	39.03	57.4	3.57	60.97	1.479459	
	273	249.1667	48.54	49.53	1.94	51.47	1.468896	
	275	251.8889	48.36	49.38	2.25	51.63	1.580784	
	277	254.6111	46.91	50.57	2.52	53.09	1.365692	
	279	257.3333	46.92	50.32	2.77	53.09	1.248697	
	281	260.0556	48.36	49.38	2.26	51.64	1.188192	
	283	262.7778	50.79	46.1	3.11	49.21	1.147691	
	285	265.5	49.97	44	6.03	50.03	1.177483	
	287	268.2222	55.57	42.78	1.64	44.42	1.354623	
	289	270.9444	56.01	41.83	2.16	43.99	1.090083	
	291	273.6667	54.6	42.58	2.83	45.41	1.088847	
	293	276.3889	47.47	38.84	13.69	52.53	1.124359	
	295	279.1111	51.17	46.47	2.36	48.83	1.126776	
	297	281.8333	47.57	48.33	4.09	52.42	1.157386	
	299	284.5556	51.2	46.89	1.9	48.79	1.219799	
	301	287.2778	50.82	46.81	2.37	49.18	1.251441	
	303	290	50.78	47.16	2.06	49.22	1.252251	
	305	292.7222	52.81	45.37	1.82	47.19	1.22522	
	307	295.4444	50.98	46.44	2.57	49.01	1.140241	
	309	298.1667	52.84	44.67	2.49	47.16	1.176808	
	311	300.8889	54.25	43.68	2.07	45.75	1.128471	
	313	303.6111	54.25	43.79	1.96	45.75	1.072459	
	315	306.3333	55.94	42.79	1.26	44.05	1.114485	
	317	309.0556	56.3	42.06	1.64	43.7	1.058657	
	319	311.7778	55.69	42.48	1.82	44.3	1.163431	lichter laagje
	321	314.5	53.57	43.84	2.59	46.43	1.25563	
	323	317.2222	53.78	43.09	3.13	46.22	1.196213	
	325	319.9444	53.66	43.4	2.94	46.34	1.183179	schelp
	327	322.6667	55.95	41.94	2.11	44.05	1.099335	zandig laagje
	329	325.3889	54.99	42.53	2.47	45	1.206817	
	331	328.1111	49.62	46.34	4.04	50.38	1.360539	
	333	330.8333	49.98	45.72	4.3	50.02	1.259185	
	335	333.5556	44.67	47.92	7.41	55.33	1.472492	
	337	336.2778	43.38	49.97	6.65	56.62	1.403233	
	339	339	48.71	47.36	3.93	51.29	1.316693	
B5	357	341	50.74	46.06	3.2	49.26	1.209674	
	359	343.4444	49.06	47.42	3.52	50.94	1.207495	
	361	345.8889	52.89	45.07	2.04	47.11	1.214384	
	363	348.3333	52.34	44.95	2.7	47.65	1.159693	
	365	350.7778	50.56	46.02	3.41	49.43	1.135805	
	367	353.2222	50.74	46.6	2.66	49.26	1.089273	
	369	355.6667	49.7	46.78	3.51	50.29	1.115834	
	371	358.1111	45.82	46.98	7.19	54.17	1.237924	
	373	360.5556	48.99	45.87	5.14	51.01	1.264256	
	375	363	47.64	46.43	5.92	52.35	1.158997	
	377	365.4444	45.02	49.84	5.14	54.98	1.206359	
	379	367.8889	47.69	48.27	4.04	52.31	1.214395	
	381	370.3333	40.71	52.31	6.98	59.29	1.343456	
	383	372.7778	47.48	48.91	3.61	52.52	1.390087	
	385	375.2222	52.11	46.34	1.55	47.89	1.15601	
	387	377.6667	51.62	45.44	2.94	48.38	1.187209	
	389	380.1111	46.72	48.12	5.17	53.29	1.202469	
	391	382.5556	45.79	49.09	5.12	54.21	1.355241	
	393	385	53.02	43.34	3.64	46.98	1.282906	
	395	387.4444	50.11	46.34	3.55	49.89	1.143311	
	397	389.8889	50.28	46.01	3.71	49.72	1.245141	
	399	392.3333	51.23	46.1	2.67	48.77	1.123378	
	401	394.7778	47.99	48.21	3.8	52.01	1.314298	
	403	397.2222	47.41	47.58	5.02	52.6	1.233094	
	405	399.6667	50.45	47.67	1.87	49.54	1.147404	
	407	402.1111	49.89	45.56	4.55	50.11	1.135415	
	409	404.5556	49.6	47.33	3.06	50.39	1.724387	
	411	407	46.76	48.33	4.91	53.24	1.310461	
	413	409.4444	50.76	45.75	3.49	49.24	1.238813	
	415	411.8889	50.19	47.12	2.69	49.81	1.188719	
	417	414.3333	50.6	47.31	2.1	49.41	1.154966	
	419	416.7778	50.21	45.94	3.85	49.79	1.156567	
	421	419.2222	45.21	50.06	4.74	54.8	1.286926	
	423	421.6667	48.89	47.38	3.73	51.11	1.250047	
	425	424.1111	49.41	46.43	4.16	50.59	1.157522	
	427	426.5556	48.93	46.57	4.5	51.07	1.220151	
	429	429	48.29	46.93	4.78	51.71	1.190826	
B6	453	431	45.58	49.76	4.67	54.43	1.673786	
	455	433.5789	48.14	48.63	3.23	51.86	1.396001	
	457	436.1579	50.56	46.82	2.62	49.44	1.356318	
	459	438.7368	42.64	52.38	4.98	57.36	1.345212	zandbandjes
	461	441.3158	38.54	55.92	5.53	61.45	1.82733	zandbandjes
	463	443.8947	32.97	60.6	6.43	67.03	1.692488	lam
	465	446.4737	32.1	55.27	12.63	67.9	1.846883	lam
	467	449.0526	50.31	47.55	2.14	49.69	1.606679	
	469	451.6316	53.25	44.59	2.16	46.75	1.284672	
	471	454.2105	51.66	45.63	2.71	48.34	1.34495	
	473	456.7895	50.51	47.6	1.89	49.49	1.292456	zandbandjes
	475	459.3684	50.34	47.09	2.57	49.66	1.290331	
	477	461.9474	52.18	45.47	2.35	47.82	1.236731	
	479	464.5263	47.09	50.14	2.77	52.91	1.34839	
	481	467.1053	51.02	47.18	1.8	48.98	1.376345	
	483	469.6842	49.51	47.88	2.61	50.49	1.275792	
	485	472.2632	47.87	48.65	3.48	52.13	1.338066	
	487	474.8421	41.55	52.51	5.94	58.45	1.420341	lam
	489	477.4211	51.73	46.12	2.16	48.28	1.338621	
	491	480	50.29	47.49	2.22	49.71	1.26715	
	493	482.5789	49.7	48.1	2.2	50.3	1.339688	
	495	485.1579	49.88	47.86	2.26	50.12	1.274814	
	497	487.7368	48.8	47.9	3.3	51.2	1.314975	zandbandjes
	499	490.3158	45.64	48.83	5.53	54.36	1.346338	
	501	492.8947	49.47	47.35	3.18	50.53	1.271152	zandbandjes
	503	495.4737	49.76	47.07	3.17	50.24	1.251762	
	505	498.0526	53.05	44.71	2.24	46.95	1.168165	
	507	500.6316	53.3	44.77	1.93	46.7	1.156264	
	509	503.2105	51.24	45.96	2.8	48.76	1.144804	
	511	505.7895	51.46	45.73	2.82	48.55	1.181517	
	513	508.3684	47.47	49.58	2.95	52.53	1.249717	
	515	510.9474	49.22	47.37	3.4	50.77	1.250234	
	517	513.5263	46.47	48.93	4.6	53.53	1.232159	
	519	516.1053	48.71	47.65	3.64	51.29	1.296384	
	521	518.6842	48.1	48.01	3.88	51.89	1.297377	
	523	521.2632	45.98	49.77	4.24	54.01	1.338202	
	525	523.8421	46.69	48.71	4.59	53.3	1.456814	
	527	526.4211	45.67	49.37	4.96	54.33	1.537115	
	529	529	53.27	44.87	1.86	46.73	1.215163	

	Clay	Silt	Sand	Silt+Sand	Si	Zr/Rb
Clay	1					
Silt	-0.67787	1				
Sand	-0.71741	-0.02585	1			
Silt+Sand	-1	0.678131	0.717163	1		
Si	0.273913	0.19874	-0.56075	-0.27371	1	
Zr/Rb	-0.46096	0.092061	0.539442	0.46077	-0.75591	1



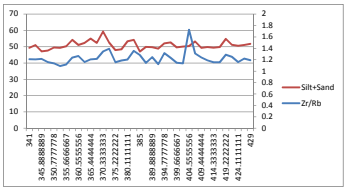
	>8um	>16um	>32um	>64um
Original	0.461224	0.539429	0.578639	0.539442
Shifted	0.644679	0.723982	0.805674	0.834349

	Clay	Silt	Sand	Silt+Sand	Si	Zr/Rb
Clay	1					
Silt	-0.86105	1				
Sand	-0.42909	-0.08986	1			
Silt+Sand	-1	0.861004	0.429168	1		
Si	0.159865	-0.19086	0.026281	-0.15967	1	
Zr/Rb	-0.7174	0.728515	0.110655	0.717194	-0.29346	1



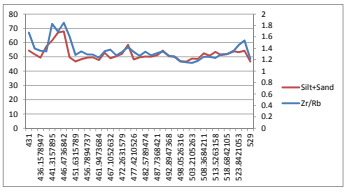
	>8um	>16um	>32um	>64um
Original	0.717176	0.700221	0.553047	0.110655
Shifted	0.638443	0.622511	0.520539	0.138961

	Clay	Silt	Sand	Silt+Sand	Si	Zr/Rb
Clay	1					
Silt	-0.88845	1				
Sand	-0.81627	0.460096	1			
Silt+Sand	-1	0.888643	0.816038	1		
Si	-0.33466	0.278902	0.296195	0.334554	1	
Zr/Rb	-0.32344	0.339815	0.197411	0.323184	0.138792	1



	>8um	>16um	>32um	>64um
Original	0.322911	0.323142	0.276425	0.197411
Upper part	0.319491	0.310755	0.323192	0.361464

	Clay	Silt	Sand	Silt+Sand	Si	Zr/Rb
Clay	1					
Silt	-0.96323	1				
Sand	-0.8949	0.742096	1			
Silt+Sand	-1	0.963218	0.894923	1		
Si	0.0381	-0.08468	0.045373	-0.03818	1	
Zr/Rb	-0.78653	0.762376	0.696085	0.786583	-0.23363	1



	>8um	>16um	>32um	>64um
Original	0.786676	0.759489	0.73804	0.696085

Appendix 7
Flood event data

may 2014

Depth (cm)	Core (#)	Flood event	Clay	Silt	Sand	Silt+Sand	Zr/Rb	
446	Bienen 6	1784	32.1	55.27	12.63	67.9	1.846883	
560	Bienen 7	1729	34.95	57.21	7.83	65.04	1.42952	
564	Bienen 7	1726	29.43	62.1	8.48	70.58	1.673995	
659	Bienen 8	1682	20.3	29.32	50.39	79.71	1.555375	*shifted*
683	Bienen 8	1671	36.96	46.71	16.32	63.03	1.400364	*shifted*

Normalized (elemental count / (Mo inc count + Mo coh count))

Depth (cm)	Flood even	Si	K	Ca	Ti	Mn	Fe	Rb	Sr	Zr	Pb	Zn
446	1784	0.003033	0.033441	0.129732	0.035742	0.022297	1.390508	0.031834	0.044756	0.058793	0.003545	0.008559
560	1729	0.007159	0.058218	0.240734	0.051701	0.042128	2.016871	0.036929	0.055031	0.052791	0.003311	0.011441
564	1726	0.008979	0.0569	0.298224	0.051381	0.047759	1.82751	0.034626	0.061358	0.057963	0.001994	0.010124
659	1682	0.004726	0.050135	0.243651	0.042107	0.049185	1.691992	0.033292	0.058041	0.051781	0.003551	0.008654
683	1671	0.004305	0.050033	0.204551	0.04408	0.057711	1.995458	0.035354	0.056074	0.049508	0.003071	0.009377

Al-Standardized (normalized count/ Al count)

Depth (cm)	Flood even	Si	K	Ca	Ti	Mn	Fe	Rb	Sr	Zr	Pb	Zn
446	1784	12.9	142.7	553.5	152.5	95.1	5932.1	135.8	190.9	250.8	15.1	36.5
560	1729	12.6	117.7	314.5	100.7	128.3	4819.8	77.2	87.1	84.5	5.7	21.0
564	1726	19.1	174.0	318.5	159.9	157.9	6868.8	118.1	121.7	133.3	11.2	35.6
659	1682	28.0	296.9	1443.0	249.4	291.3	10020.9	197.2	343.8	306.7	21.0	51.3
683	1671	23.8	276.5	1130.4	243.6	318.9	11027.5	195.4	309.9	273.6	17.0	51.8

Appendix 6 — Al-standardization

Italic = not used

Bienen III - Bienen X

Depth	Real Depth	Clay			Normalized		
		< 2 µm	< 4 µm	< 8 µm	Al	Al shifted	
167	156	10.55	22.77	37.07	*0.000225*	0.000207	
169	158	11.73	25.44	40.71	*0.000207*	0.000343	
171	161	12.92	28.49	45.3	*0.000343*	0.000306	
173	163	12.41	27.29	44.92	*0.000306*	0.000297	
175	165	11.38	25.17	41.83	*0.000297*	0.000227	
177	168	13.05	29.01	48.87	*0.000227*	0.000322	
179	170	12.67	28.36	47.6	*0.000322*	0.000213	
181	172	12.73	28.41	47.7	*0.000213*	0.000247	
183	174	12.87	28.46	47.87	*0.000247*	0.000291	
185	177	9.51	20.37	33.47	*0.000291*	0.000331	
187	179	13.45	30.4	51.24	*0.000331*	0.000266	
189	181	11.96	26.57	44.69	*0.000266*	0.000259	
191	184	12.3	26.94	43.68	*0.000259*	0.000279	
193	186	12.97	28.67	47.5	*0.000279*	0.000344	
195	188	12.33	27.74	46.72	*0.000344*	0.000291	
197	191	12.23	27.55	46.57	*0.000291*	0.000302	
199	193	13.14	29.38	49.22	*0.000302*	0.000339	
201	195	11.02	24.11	40.05	*0.000339*	0.000309	
203	198	11.71	25.91	43.15	*0.000309*	0.00037	
205	200	12.68	28.06	46.52	*0.00037*	0.000302	
207	202	13.81	30.94	51.66	*0.000302*	0.000256	
209	204	13.3	29.73	50.2	*0.000256*	0.000326	
211	207	13.37	29.66	49.12	*0.000326*	0.000317	
213	209	13.58	30.3	50.67	*0.000317*	0.000298	
215	211	14.39	32.3	53.28	*0.000298*	0.000285	
217	214	13.92	31.24	51.39	*0.000285*	0.000241	
219	216	12.07	27.3	45.31	*0.000241*	0.000287	
221	218	13.06	29.32	49.38	*0.000287*	0.000257	
223	221	12.04	26.86	45.09	*0.000257*	0.000237	
225	223	13.86	31.48	52.91	*0.000237*	0.000304	
227	225	14.57	33.18	56.25	*0.000304*	0.00034	
229	227	13.71	31.31	52.39	*0.00034*	0.000246	
231	230	14.47	33.08	55.06	*0.000246*	0.000296	
233	232	14.78	33.68	56.07	*0.000296*	0.000234	
235	234	14.65	33.48	55.64	*0.000234*	0.000313	
237	237	12.55	28.69	48.28	*0.000313*	0.000216	
239	239	11.29	25.3	42.04	*0.000216*		
267	241	11.34	25.24	42.04	0.0005	*0.000325*	
269	244	11.41	25.45	42.79	0.000325	*0.000366*	
271	246	10.44	23.23	39.03	0.000366	*0.000259*	
273	249	12.55	28.62	48.54	0.000259	*0.00047*	
275	252	12.96	29.06	48.36	0.00047	*0.000363*	
277	255	12.3	27.68	46.91	0.000363	*0.000455*	
279	257	12.5	27.92	46.92	0.000455	*0.000158*	
281	260	12.67	28.53	48.36	0.000158	*0.000393*	
283	263	13.21	30.08	50.79	0.000393	*0.000358*	
285	266	13.43	30.28	49.97	0.000358	*0.000411*	
287	268	14.92	33.66	55.57	0.000411	*0.000301*	
289	271	14.74	33.56	56.01	0.000301	*0.000375*	
291	274	14.25	32.52	54.6	0.000375	*0.000308*	
293	276	12.49	28.4	47.47	0.000308	*0.000445*	
295	279	13.44	30.41	51.17	0.000445	*0.000329*	
297	282	12.5	28.05	47.57	0.000329	*0.00029*	
299	285	13.6	30.65	51.2	0.00029	*0.000244*	
301	287	13.48	30.33	50.82	0.000244	*0.000233*	
303	290	13.4	30.2	50.78	0.000233	*0.000367*	
305	293	13.99	31.75	52.81	0.000367	*0.000416*	
307	295	13.55	30.65	50.98	0.000416	*0.000352*	
309	298	14.03	31.88	52.84	0.000352	*0.000389*	
311	301	14.35	32.73	54.25	0.000389	*0.000242*	
313	304	14.38	32.56	54.25	0.000242	*0.000208*	
315	306	14.43	32.82	55.94	0.000208	*0.000337*	
317	309	15.29	34.55	56.3	0.000337	*0.000207*	
319	312	15.23	34.26	55.69	0.000207	*0.000279*	
321	315	14.55	32.69	53.57	0.000279	*0.00032*	
323	317	14.74	32.93	53.78	0.00032	*0.000161*	
325	320	14.53	32.71	53.66	0.000161	*0.000393*	
327	323	15.13	34.06	55.95	0.000393	*0.000296*	
329	325	8.88	28.7	54.99	0.000296	*0.000196*	
331	328	13.43	30.16	49.62	0.000196	*0.000275*	
333	331	13.57	30.34	49.98	0.000275	*0.000215*	
335	334	12.3	27.34	44.67	0.000215	*0.000402*	
337	336	11.99	26.56	43.38	0.000402	*0.000343*	
339	339	13.27	29.61	48.71	0.000343		
357	341	14.01	31.31	50.74	*0.000203*	0.000301	
359	343	13.49	30.05	49.06	*0.000301*	0.000421	
361	346	14.4	32.26	52.89	*0.000421*	0.000404	
363	348	14.38	32.21	52.34	*0.000404*	0.000293	
365	351	13.78	30.93	50.56	*0.000293*	0.000372	
367	353	13.78	30.9	50.74	*0.000372*	0.000272	
369	356	13.47	30.18	49.7	*0.000272*	0.000259	
371	358	12.64	28.01	45.82	*0.000259*	0.000295	
373	361	13.4	29.98	48.99	*0.000295*	0.000388	
375	363	13	29.09	47.64	*0.000388*	0.000351	
377	365	12.27	27.26	45.02	*0.000351*	0.000322	
379	368	12.99	29	47.69	*0.000322*	0.000354	
381	370	11.74	25.37	40.71	*0.000354*	0.000385	
383	373	13.26	29.05	47.48	*0.000385*	0.000328	
385	375	14.6	32.09	52.11	*0.000328*	0.000282	
387	378	14.3	31.69	51.62	*0.000282*	0.000415	
389	380	13.01	28.71	46.72	*0.000415*	0.000358	
391	383	12.96	28.38	45.79	*0.000358*	0.000297	
393	385	12.64	31.08	53.02	*0.000297*	0.000221	
395	387	13.91	30.83	50.11	*0.000221*	*0.000267*	
397	390	14.64	31.81	50.28	*0.000267*	*0.000235*	
399	392	11.67	29.35	51.23	*0.000235*	*0.00031*	
401	395	11.77	27.88	47.99	*0.00031*	*0.000253*	
403	397	13.1	28.89	47.41	*0.000253*	*0.000287*	
405	400	13.94	30.72	50.45	*0.000287*	*0.000244*	
407	402	13.76	30.39	49.89	*0.000244*	*0.000304*	
409	405	13.9	30.45	49.6	*0.000304*	*0.000297*	
411	407	13.28	28.94	46.76	*0.000297*	*0.000224*	
413	409	14.09	31.13	50.76	*0.000224*	*0.000369*	
415	412	12.01	28.73	50.19	*0.000369*	*0.000285*	
417	414	14.13	30.92	50.6	*0.000285*	*0.000315*	
419	417	13.38	30.21	50.21	*0.000315*	*0.000321*	
421	419	12.73	27.86	45.21	*0.000321*	*0.000261*	
423	422	13.53	29.89	48.89	*0.000261*	*0.000244*	
425	424	13.67	30.28	49.41	*0.000244*	*0.000459*	
427	427	11.48	28.1	48.93	*0.000459*	*0.000376*	
429	429	10.83	27.02	48.29	*0.000376*		
453	431	12.76	27.93	45.58	0.000279		
455	434	13.57	29.67	48.14	0.000186		
457	436	11.23	28.25	50.56	0.000212		
459	439	11.15	25.47	42.64	0.000283		
461	441	10.96	23.7	38.54	0.00012		
463	444	8.53	19.42	32.97	0.000283		
465	446	9.49	20.02	32.1	0.000234		
467	449	12.64	29.45	50.31	0.000234		
469	452	13.6	31.51	53.25	0.00018		
471	454	14.27	31.66	51.66	0.000232		
473	457	10.79	27.25	50.51	0.000327		
475	459	12.36	29.22	50.34	0.000168		
477	462	14.38	31.92	52.18	0.000165		
479	465	12.98	28.49	47.09	0.000164		
481	467	11.71	28.68	51.02	0.0002		
483	470	13.85	30.38	49.51	0.00016		
485	472	13.36	29.45	47.87	0.000276		
487	475	11.7	25.51	41.55	0.000221		
489	477	13.17	30.49	51.73	0.000216		
491	480	13.75	30.53	50.29	0.000138		
493	483	12.84	29.3	49.7	0.000204		
495	485	11.56	28.17	49.88	0.000423		
497	488	13.16	29.51	48.8	0.000214		
499	490	12.76	27.94	45.64	0.000381		
501	493	11.26	27.99	49.47	0.00014		
503	495	13.4	30.11	49.76	0.000218		
505	498	13.31	31.38	53.05	0.000315		
507	501	14.75	32.72	53.3	0.000301		
509	503	14.27	31.43	51.24	0.000211		
511	506	12.89	30.36	51.46	0.000167		
513	508	12.42	28.28	47.47	0.00032		
515	511	13.74	30.17	49.22	0.000277		
517	514	12.9	28.36	46.47	0.000152		
519	516	13.23	29.46	48.71	0.000186		
521	519	13.22	29.26	48.1	0.000156		
523	521	12.37	27.51	45.98	0.000252		
525	524	11.91	27.55	46.69	0.000215		
527	526	12.62	27.8	45.67	0.000138		
529	529	14.63	32.49	53.27	0.000245		

Bienen 3

	< 2 µm	< 4 µm	< 8 µm
norm	0.012028	-0.01888	-0.02996

Bienen 4

	< 2 µm	< 4 µm	< 8 µm
norm	-0.15626	-0.21068	-0.22591

Bienen 5

	< 2 µm	< 4 µm	< 8 µm
norm	0.063728	-0.12218	-0.20039

Bienen 6

	< 2 µm	< 4 µm	< 8 µm
norm	-0.15681	-0.09422	-0.0289

Normalized

Bienen	Grain size: clay fractions		
Core segme	< 2 µm	< 4 µm	< 8 µm
3	0.012027852	-0.01888	-0.02996
4	-0.156256	-0.21068	-0.22591
5	0.06372823	-0.12218	-0.20039
6	-0.156808251	-0.09422	-0.0289
7	0.038270775	0.155302	0.234507
8	0.259833762	0.223374	0.1714
9	0.149566219	0.09052	0.007951
10	-0.060135849	0.004081	0.025937
BIENEN ALI	0.161530465	0.225872	0.232432
Bienen all s	0.179474165	0.216459	0.242525

Depth	Real Depth	Clay			Normalized	
		< 2 µm	< 4 µm	< 8 µm	Al	Al shifted
545	531	12.22	26.47	43.03	0.000255	
547	533	13.38	29.4	48.06	0.000318	
549	536	14.21	31.48	51.14	0.000389	
551	538	13.57	30.17	49.46	0.000328	
553	541	12.54	31.08	54.84	0.000572	
555	543	14.3	31.7	52.79	0.000456	
557	545	14.47	31.68	51.51	0.000334	
559	548	15.01	32.74	52.81	0.000274	
561	550	10.63	28.08	51.85	0.000445	
563	552	14.17	31.17	50.88	0.000416	
565	555	13.18	31.34	52.96	0.000326	
567	557	13.18	28.56	46.65	0.000488	
569	560	10.48	22.18	34.95	0.000328	
571	562	11.32	23.96	37.85	0.000379	
573	564	9.01	18.66	29.43	0.000461	
575	567	10.68	25.03	42.6	0.000432	
577	569	10.14	25.06	45.23	0.000394	
579	571	9.51	25.28	48.21	0.000373	
581	574	9.77	26.06	49.83	0.000275	
583	576	9.1	24.86	47.69	0.00043	
585	579	14.18	31.38	51.61	0.000379	
587	581	15.03	33.8	55.57	0.000439	
589	583	9.38	25.64	50.07	0.000374	
591	586	11.67	28.66	50.63	0.000351	
593	588	13.51	31.42	53.17	0.000469	
595	590	10.41	27.61	51.48	0.000524	
597	593	13.88	31.23	51.33	0.000428	
599	595	14.72	33.71	54.7	0.000386	
601	598	15.14	33.83	54.48	0.000439	
603	600	14.01	30.51	49.11	0.000399	
605	602	14.21	32.7	54.03	0.000416	
607	605	13.88	30.85	51.18	0.000471	
609	607	13.78	31.39	51.85	0.000331	
611	609	12.01	30.59	54.86	0.00051	
613	612	14.68	33.58	55.41	0.000486	
615	614	11.77	29.55	52.78	0.000452	
617	617	15.24	33.6	54.5	0.000421	
619	619	15.25	33.67	54.75	0.000489	
631	621	12.88	28.14	46.06	*0.0004*	0.000386
633	623	13.94	30.87	50.25	*0.000386*	0.000324
635	625	14.76	33.2	54.39	*0.000324*	0.00017
637	628	15.22	33.49	54.41	*0.00017*	0.000276
639	630	15.02	33.15	54.07	*0.000276*	0.000221
641	632	15.37	33.58	53.82	*0.000221*	0.000344
643	634	14.4	31.47	51.32	*0.000344*	0.000254
645	637	14.02	31.06	50.88	*0.000254*	0.000137
647	639	10.7	27.29	49.59	*0.000137*	0.000107
649	641	12.99	28.09	45.84	*0.000107*	0.000239
651	643	13.6	29.68	48.64	*0.000239*	0.000107
653	645	11.92	25.82	42.4	*0.000107*	0.000182
655	648	14.14	30.74	49.23	*0.000182*	0.000222
657	650	10.75	25.11	43.09	*0.000222*	0.000129
659	652	13.14	29.44	49.03	*0.000129*	0.00019
661	654	12.58	27.32	45.39	*0.00019*	0.000316
663	657	9.63	20.68	33.47	*0.000316*	0.000126
665	659	5.64	12.41	20.3	*0.000126*	0.000169
667	661	15.83	35.01	56.91	*0.000169*	0.000292
669	663	13.01	31.83	55.48	*0.000292*	0.000226
671	666	12.69	30.85	53.95	*0.000226*	0.000149
673	668	13.49	30.05	49.75	*0.000149*	0.000206
675	670	10.76	26.26	46.18	*0.000206*	0.000194
677	672	12.56	27.32	44.72	*0.000194*	0.000228
679	674	12.74	27.76	45.51	*0.000228*	0.000258
681	677	12.86	27.98	46	*0.000258*	0.000193
683	679	9.97	23.49	40.17	*0.000193*	0.00011
685	681	11.7	24.94	39.68	*0.00011*	0.000162
687	683	10.75	23.23	36.96	*0.000162*	0.000181
689	686	14.29	33.88	56.49	*0.000181*	0.000241
691	688	13.37	30.94	50.17	*0.000241*	0.000199
693	690	9.36	24.88	47.48	*0.000199*	0.000176
695	692	11.24	26.98	47.17	*0.000176*	0.000233
697	695	12.42	30.42	52.63	*0.000233*	0.000143
699	697	14.51	31.78	52.49	*0.000143*	0.000116
701	699	14.53	32.19	53.49	*0.000116*	0.000228
703	701	14.29	31.55	52.15	*0.000228*	0.000192
705	703	14.04	31.04	51.13	*0.000192*	0.000144
707	706	12.51	30.85	54.85	*0.000144*	0.000153
709	708	14.82	32.86	54.63	*0.000153*	8.3E-05
711	710	12.55	31.72	56.36	*8.3E-05*	0.000118
713	712	14.65	32.27	52.57	*0.000118*	0.000119
715	715	13.59	30.95	51.46	*0.000119*	0.000402
717	717	13.23	31.4	53.93	*0.000402*	0.000528
719	719	13.65	30.16	49.69	*0.000528*	
737	721	13.44	29.97	49.88	0.000245	
739	723	13.7	30.22	49.55	0.000576	
741	726	11.42	28.21	50.19	0.000219	
743	728	11.89	28.84	50.22	0.00048	
745	731	13.95	31.92	53.66	0.000443	
747	733	12.32	29.67	52.12	0.000508	
749	735	10.81	27.78	51.36	0.000419	
751	738	15.87	35.15	56.27	0.000557	
753	740	12.72	30.52	52.74	0.000521	
755	743	14.56	32.12	52.98	0.000385	
757	745	12.58	28.16	47.97	0.000432	
759	747	15.01	34.08	55.16	0.000523	
761	750	18.32	42.35	66.83	0.000435	
763	752	17.11	41.78	67.1	0.000461	
765	755	15.15	35.32	58.79	0.000431	
767	757	13.11	32.5	56.38	0.000445	
769	759	16.51	36.85	59.9	0.000299	
771	762	12.01	30.91	55.28	0.000455	
773	764	12.22	30.04	52.44	0.000499	
775	767	13.31	32.53	55.48	0.000348	
777	769	15.48	34.19	55.11	0.000338	
779	771	11.85	25.42	41.21	0.000536	
781	774	14.4	36.18	60.98	0.000443	
783	776	14.71	34.22	55.93	0.000488	
785	779	15.14	32.9	52.67	0.000483	
787	781	14.76	34.95	57.26	0.000504	
789	783	16.79	37.09	59.66	0.000434	
791	786	15.59	34.2	54.76	0.000436	
793	788	16.02	35.36	56.53	0.000435	
795	791	10.31	26.48	48.64	0.000314	
797	793	15.29	33.75	54.75	0.000416	
799	795	14.2	33.74	55.75	0.000428	
801	798	14	31.77	51.55	0.000526	
803	800	15.21	32.84	52.37	0.000539	
805	803	16	37.36	60.5	0.000443	
807	805	15.62	34.48	56.59	0.000479	
809	807	13.93	30.37	49.77	0.000401	
811	810	12.57	27.01	43.95	0.000458	
813	812	13.14	28.35	45.8	0.000553	
815	815	12.57	27.19	44.01	0.000423	
817	817	12.14	26.28	42.47	0.000347	
819	819	12.73	29.09	47.93	0.000201	
821	821	13.75	29.62	47.37	0.00041	
823	823	13.2	30.89	51.08	0.000353	
825	825	12.61	27.44	43.64	0.000317	
827	827	13.6	29.57	46.44	0.000373	
829	829	14.86	33.2	52.6	0.000217	
831	831	14.01	29.91	46.18	0.000295	
833	833	13.93	29.99	47.1	0.000344	
835	835	12.59	27.61	44.84	0.000256	
837	837	11.33	26.77	45.29	0.000318	
839	839	13.75	30.35	49.62	0.000284	
841	841	11.98	28.21	45.81	0.000428	
843	843	11.22	25.66	42.45	0.000301	
845	845	9.76	22.15	36.93	0.000357	
847	847	13.1	30.92	51.59	0.00042	
849	849	9.36	20.3	32.78	0.000284	

Bienen 7

	< 2 µm	< 4 µm	< 8 µm
norm	0.242097	0.347369	0.374181

Bienen 8

	< 2 µm	< 4 µm	< 8 µm
norm	0.135849	0.229548	0.269946

Bienen 9

	< 2 µm	< 4 µm	< 8 µm
norm	0.028844	0.082415	0.105357

Bienen 10

	< 2 µm	< 4 µm	< 8 µm
norm	0.019394	0.128134	0.227333

Appendix 5C

Neckar

Coring: Lauffen (normalized counts)

Depth (cm)	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu
100	0.0003	0.006925	0	0.000699	8.47E-06	0.000966	0.044447	0.453598	6.02E-05	0.036814	0.00108	0.001876	0.009302	0.953438	0.010323	0.000998	0
105	0.000278	0.006228	0	0.000654	4.68E-05	0.001209	0.044083	0.478437	6.09E-05	0.036192	0.001197	0.001812	0.010133	0.945865	0.010391	0.001043	0
110	0.000341	0.006766	0	0.000721	4.64E-05	0.001588	0.045404	0.497644	2.18E-05	0.035817	0.001471	0.001743	0.010441	0.935114	0.010096	0.000914	0
115	0.000448	0.008621	0	0.00066	1.89E-05	0.001373	0.050063	0.54084	9.44E-06	0.039462	0.001231	0.001516	0.011028	1.004882	0.011033	0.001535	0
120	0.000292	0.008771	0	0.000718	2.84E-05	0.002272	0.049235	0.534847	5.88E-06	0.039378	0.0011	0.00176	0.01453	1.063487	0.009941	0.001229	0
125	0.000422	0.007644	5.74E-06	0.000785	1.05E-05	0.001907	0.045886	0.498953	2.87E-05	0.037006	0.001458	0.001687	0.010347	0.888471	0.008984	0.001164	0
130	0.000368	0.007294	0	0.000701	1.72E-05	0.001273	0.046633	0.436773	0	0.040448	0.001275	0.001777	0.018956	1.396186	0.013974	0.00034	0
135	0.000311	0.007134	1.67E-05	0.000789	2.16E-05	0.001603	0.048127	0.422256	0	0.043209	0.001501	0.002273	0.027611	1.951687	0.018275	0.000381	0
140	0.00027	0.006809	4.33E-05	0.000767	2.39E-05	0.001252	0.045832	0.356786	1.29E-05	0.043628	0.001668	0.002034	0.013117	1.297415	0.012679	0.000449	0
145	0.000192	0.00605	2.09E-05	0.000642	0	0.001533	0.043836	0.402728	0	0.039791	0.00173	0.001897	0.01149	1.091987	0.011728	0.000638	0
150	0.000272	0.005358	0	0.000887	4.41E-05	0.001356	0.04146	0.460903	6.75E-05	0.037106	0.001472	0.001958	0.012001	1.151757	0.012362	0.000699	0
155	0.000329	0.005619	0	0.000835	2.99E-05	0.000905	0.042114	0.481749	8.33E-05	0.035969	0.001172	0.001749	0.010848	0.976991	0.011428	0.000874	0
160	0.00025	0.006091	0	0.001068	1.25E-05	0.000956	0.037885	0.469199	0	0.030273	0.00116	0.001595	0.013412	0.819711	0.00921	0.000459	0
165	0.000368	0.007581	0	0.00104	2.47E-05	0.000939	0.042913	0.504995	0	0.032486	0.001241	0.001324	0.014581	0.819678	0.009692	0.000712	0
170	0.00026	0.007435	0	0.001157	3.95E-05	0.00129	0.043975	0.538153	0	0.033485	0.001223	0.001615	0.023159	0.925137	0.010282	0.001022	9.86E-06
175	0.000265	0.007524	0	0.001188	2.3E-05	0.001436	0.048686	0.593069	0	0.03788	0.001151	0.001873	0.012931	0.987405	0.010437	0.000903	0
180	0.000459	0.010223	1.68E-05	0.001406	4.11E-05	0.002092	0.049541	0.673417	8.41E-06	0.030041	0.000993	0.001161	0.011606	0.789207	0.008716	0.000991	0
185	0.000423	0.011132	2.73E-05	0.001742	4.78E-05	0.002121	0.046584	0.68165	0	0.023481	0.000836	0.001289	0.011152	0.682902	0.007704	0.001688	0
190	0.000484	0.012	0	0.001528	2.41E-05	0.002684	0.045969	0.594515	0	0.02477	0.000752	0.001006	0.008631	0.63359	0.007867	0.002084	0

Depth (cm)	Zn	Ga	As	Se	Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh
100	0.005851	0.001413	0.003974	0.003294	0.000521	0.027242	0.065108	0.065242	0.000473	0.000162	0.002097	0.002916	0	0.000636	0.003768	0.009456	0.000762	0.004679	0.004452	0.001595	0.002869	0.730484	0.269516
105	0.005489	0.001208	0.004261	0.002737	0.000914	0.026616	0.066783	0.063599	0.000487	0.000301	0.002196	0.003683	0	0.000442	0.004002	0.010825	0.000582	0.003667	0.00397	0.001699	0.002482	0.730515	0.269485
110	0.005578	0.001846	0.003753	0.003004	0.000786	0.026798	0.065471	0.064815	0.00024	0.000232	0.002402	0.003516	0	0.000874	0.003946	0.010934	0.000441	0.003573	0.004161	0.001403	0.002784	0.731434	0.268566
115	0.006054	0.002056	0.003314	0.002678	0.000774	0.026618	0.066752	0.066579	0.000602	0.000126	0.002533	0.003554	0	0.000426	0.004621	0.011263	0.000573	0.003949	0.003859	0.00198	0.002585	0.728663	0.271337
120	0.005233	0.00162	0.003697	0.003036	0.001031	0.026386	0.06675	0.066931	0.000325	0.000384	0.002848	0.003104	0	0.000577	0.004404	0.010968	0.000804	0.004358	0.00429	0.001848	0.00271	0.73184	0.26816
125	0.005477	0.002287	0.003703	0.003222	0.000937	0.02623	0.067592	0.067406	0.00039	0.00048	0.002378	0.003406	0	0.000366	0.00424	0.010493	0.000326	0.004467	0.004366	0.002438	0.001978	0.730236	0.269764
130	0.006332	0.002064	0.005048	0.003471	0.000567	0.027393	0.066916	0.073002	0.000624	0.000319	0.002047	0.00348	0	0.000544	0.004251	0.010717	0.00061	0.004183	0.004327	0.001807	0.002927	0.729169	0.270831
135	0.006195	0.001284	0.004861	0.003829	0.00081	0.027291	0.064362	0.067999	0.000406	0.000406	0.001785	0.0027	0	0.000494	0.004771	0.010041	0.001109	0.004729	0.005079	0.002704	0.004714	0.726777	0.273223
140	0.006424	0.001702	0.004769	0.003523	0.000741	0.029393	0.064153	0.076516	0.000535	0.000233	0.001562	0.002311	0	0.000389	0.004784	0.010671	0.000873	0.004658	0.004588	0.001327	0.003603	0.733329	0.266671
145	0.005945	0.001336	0.003511	0.003227	0.000519	0.029292	0.067639	0.071945	0.000384	0.000304	0.001735	0.002486	0	0.000635	0.004559	0.010603	0.000544	0.003961	0.00394	0.002045	0.002573	0.734961	0.265039
150	0.006082	0.001613	0.00369	0.003311	0.000576	0.026793	0.071755	0.065916	0.00034	0.000279	0.002137	0.00362	0	0.00048	0.003703	0.009533	0.000798	0.004442	0.004215	0.00192	0.002994	0.729375	0.270625
155	0.006279	0.00168	0.002707	0.003528	0.001303	0.026992	0.072383	0.06217	0.000675	0.000268	0.002378	0.004167	0	0.000392	0.003672	0.009009	0.000918	0.004241	0.004043	0.002028	0.002229	0.731144	0.268856
160	0.005403	0.000932	0.003869	0.00368	0.001443	0.024014	0.067075	0.063899	0.000529	0.000269	0.002337	0.004186	0	0.000328	0.00338	0.008288	0.00081	0.004224	0.003856	0.001423	0.002736	0.7341	0.2659
165	0.005355	0.001076	0.002084	0.002494	0.000976	0.02611	0.067067	0.064676	0.000483	0.000311	0.002195	0.003563	0	0.00023	0.00304	0.008922	0.000483	0.004119	0.003847	0.00224	0.001845	0.727534	0.272466
170	0.005949	0.00135	0.003855	0.003	0.000719	0.026752	0.068893	0.065754	0.00039	0.000479	0.002514	0.004112	0	0.000467	0.003724	0.009464	0.000387	0.004256	0.004552	0.001549	0.002415	0.726683	0.273317
175	0.006484	0.001809	0.004056	0.003324	0.001065	0.026651	0.069308	0.065393	0.00063	0.000249	0.002944	0.005162	0	0.000708	0.004075	0.010482	0.000717	0.004715	0.004195	0.001674	0.003034	0.730034	0.269966
180	0.004983	0.002001	0.002864	0.002655	0.000558	0.024954	0.063832	0.060057	0.000259	0.000601	0.003303	0.004868	0	0.000401	0.003435	0.01083	0.000136	0.00476	0.004295	0.00215	0.002533	0.730281	0.269719
185	0.003764	0.001786	0.003401	0.002264	0.000667	0.02336	0.061434	0.059517	0.000411	0.000559	0.003703	0.004319	0	0.000283	0.00401	0.011306	0.000117	0.004374	0.004194	0.001733	0.002275	0.731109	0.268891
190	0.004114	0.002092	0.00369	0.002602	0.000319	0.023684	0.059442	0.064631	0.000163	0.000539	0.00281	0.004204	0	0.000491	0.004389	0.011479	0.000385	0.004815	0.004742	0.00136	0.00246	0.732488	0.267512

Coring: Lauffen (normalized counts + Al standardized)

Depth (cm)	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu
100	1	23.0627	0	2.329154	0.028213	3.216301	148.0157	1510.561	0.200627	122.5987	3.595611	6.247649	30.97806	3175.119	34.37618	3.322884	0
105	1	22.38047	0	2.350168	0.16835	4.343434	158.4209	1719.343	0.218855	130.0606	4.30303	6.511785	36.41414	3399.128	37.34007	3.747475	0
110	1	19.85	0	2.113889	0.136111	4.658333	133.2028	1459.939	0.063889	105.075	4.316667	5.113889	30.63056	2743.347	29.61944	2.680556	0
115	1	19.22737	0	1.471579	0.042105	3.063158	111.6526	1206.2	0.021053	88.00842	2.745263	3.381053	24.59579	2241.122	24.60632	3.423158	0
120	1	30.02013	0	2.456376	0.097315	7.775168	168.5101	1830.554	0.020134	134.7752	3.765101	6.02349	49.73154	3639.866	34.02349	4.204698	0
125	1	18.12472	0.013605	1.861678	0.024943	4.521542	108.7959	1183.029	0.068027	87.7415	3.455782	4	24.53288	2106.587	21.30159	2.759637	0
130	1	19.8292	0	1.906336	0.046832	3.460055	126.7713	1187.353	0	109.9559	3.465565	4.831956	51.53168	3795.488	37.98898	0.92562	0
135	1	22.95584	0.053628	2.539432	0.069401	5.157729	154.8675	1358.763	0	139.041	4.829653	7.315457	88.84858	6280.265	58.80757	1.227129	0
140	1	25.23208	0.16041	2.843003	0.088737	4.641638	169.8498	1322.218	0.047782	161.6826	6.180887	7.539249	48.61092	4808.113	46.98635	1.665529	0
145	1	31.57426	0.108911	3.351485	0	8	228.7822	2101.861	0	207.6733	9.029703	9.90099	59.96535	5699.149	61.20792	3.331683	0
150	1	19.69655	0	3.262069	0.162069	4.986207	152.4069	1694.283	0.248276	136.4034	5.410345	7.196552	44.11724	4233.869	45.44138	2.568966	0
155	1	17.0625	0	2.536932	0.090909	2.747159	127.8835	1462.872	0.252841	109.2216	3.559659	5.3125	32.94034	2966.719	34.7017	2.653409	0
160	1	24.38996	0	4.277992	0.050193	3.826255	151.7027	1878.819	0	121.2239	4.644788	6.3861	53.70656	3282.378	36.88031	1.837838	0
165	1	20.59432	0	2.824289	0.067183	2.550388	116.5814	1371.922	0	88.25581	3.372093	3.596899	39.6124	2226.822	26.33075	1.935401	0
170	1	28.55303	0	4.443182	0.151515	4.954545	168.8788	2066.682	0	128.5947	4.69697	6.200758	88.93939	3552.826	39.48485	3.924242	0.037879
175	1	28.38542	0	4.482639	0.086806	5.416667	183.6701	2237.385	0	142.9028	4.34375	7.065972	48.78472	3725.038	39.375	3.40625	0
180	1	22.27291	0.03666	3.063136	0.089613	4.558045	107.9369	1467.21	0.01833	65.45214	2.162933	2.529532	25.28717	1719.487	18.98982	2.158859	0
185	1	26.29263	0.064516	4.115207	0.112903	5.009217	110.0323	1610.058	0	55.46313	1.974654	3.043779	26.34101	1613.014	18.19585	3.986175	0
190	1	24.79151	0	3.156827	0.049815	5.54428	94.96863	1228.212	0	51.17343	1.553506	2.077491	17.83026	1308.937	16.25277	4.306273	0
													43.33677	**3290.383**			

Depth (cm)	Zn	Ga	As	Se	Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh
100	19.48589	4.705329	13.23511	10.96865	1.736677	90.721	216.8213	217.2665	1.576803	0.539185	6.984326	9.711599	0	2.119122	12.54859	31.48903	2.539185	15.58307	14.82445	5.310345	9.554859	2432.643	897.5361
105	19.72391	4.340067	15.31313	9.835017	3.286195	95.64983	239.9966	228.5522	1.750842	1.080808	7.892256	13.23569	0	1.589226	14.38047	38.90236	2.090909	13.17845	14.26599	6.104377	8.919192	2625.229	968.4411
110	16.36389	5.416667	11.01111	8.813889	2.305556	78.61667	192.0722	190.1472	0.702778	0.680556	7.047222	10.31389	0	2.563889	11.575	32.07778	1.294444	10.48333	12.20833	4.116667	8.166667	2145.811	787.8917
115	13.50105	4.585263	7.391579	5.972632	1.726316	59.36421	148.8716	148.4863	1.343158	0.282105	5.648421	7.926316	0	0.949474	10.30526	25.12	1.277895	8.806316	8.606316	4.416842	5.764211	1625.088	605.1453
120	17.9094	5.543624	12.65436	10.38926	3.530201	90.30872	228.4564	229.0772	1.110738	1.315436	9.748322	10.62416	0	1.97651	15.07383	37.54027	2.751678	14.91611	14.68456	6.325503	9.275168	2504.779	917.7987
125	12.98639	5.421769	8.780045	7.639456	2.222222	62.19274	160.263	159.8209	0.92517	1.138322	5.639456	8.07483	0	0.868481	10.05215	24.87982	0.773243	10.59184	10.35147	5.780045	4.689342	1731.408	639.6168
130	17.21212	5.61157	13.72176	9.435262	1.5427	74.46832	181.9091	198.4545	1.69697	0.867769	5.564738	9.460055	0	1.479339	11.55647	29.13499	1.658402	11.3719	11.76309	4.911846	7.955923	1982.223	736.2452
135	19.93375	4.132492	15.64353	12.32177	2.605678	87.82019	207.1073	218.8107	1.305994	1.305994	5.744479	8.687697	0	1.589905	15.35331	32.30915	3.567823	15.21767	16.34385	8.700315	15.17035	2338.669	879.1956
140	23.80546	6.307167	17.67235	13.05461	2.74744	108.9283	237.744	283.5631	1.982935	0.863481	5.788396	8.56314	0	1.440273	17.73038	39.54608	3.235495	17.2628	17.00341	4.918089	13.35154	2717.659	988.2594
145	31.0297	6.970297	18.32178	16.84158	2.707921	152.8762	353.0099	375.4851	2.00495	1.584158	9.054455	12.97525	0	3.311881	23.79208	55.33663	2.841584	20.67327	20.56436	10.67327	13.43069	3835.807	1383.257
150	22.35862	5.931034	13.56552	12.17241	2.117241	98.48966	263.7724	242.3069	1.248276	1.024138	7.855172	13.3069	0	1.765517	13.61379	35.04483	2.934483	16.32759	15.4931	7.058621	11.0069	2681.19	994.8207
155	19.06818	5.102273	8.21875	10.71307	3.957386	81.96307	219.7983	188.7841	2.051136	0.8125	7.221591	12.65341	0	1.190341	11.15057	27.35511	2.786932	12.87784	12.27557	6.159091	6.767045	2220.185	816.4034
160	21.63707	3.733591	15.49421	14.73745	5.779923	96.1583	268.5907	255.8726	2.119691	1.07722	9.359073	16.76062	0	1.312741	13.53282	33.18919	3.243243	16.91506	15.44015	5.698842	10.95753	2939.568	1064.745
165	14.5478	2.922481	5.661499	6.775194	2.651163	70.93282	182.2016	175.7054	1.312661	0.844961	5.963824	9.679587	0	0.625323	8.258398	24.23773	1.312661	11.19121	10.4522	6.085271	5.01292	1976.494	740.2093
170	22.8447	5.185606	14.80303	11.52273	2.761364	102.7348	264.572	252.5152	1.496212	1.840909	9.655303	15.79167	0	1.791667	14.30303	36.3447	1.484848	16.3447	17.48106	5.94697	9.272727	2790.697	1049.625
175	24.46181	6.826389	15.30208	12.54167	4.017361	100.5417	261.4688	246.6979	2.375	0.9375	11.10764	19.47222	0	2.670139	15.375	39.54514	2.704861	17.78819	15.82639	6.315972	11.44444	2754.09	1018.462
180	10.85743	4.360489	6.240326	5.784114	1.215886	54.36864	139.0733	130.8493	0.564155	1.309572	7.195519	10.60692	0	0.873727	7.484725	23.59674	0.295316	10.37067	9.358452	4.684318	5.519348	1591.102	587.6517
185	8.891705	4.218894	8.032258	5.347926	1.576037	55.17742	145.106	140.5783	0.970046	1.320276	8.746544	10.20046	0	0.668203	9.47235	26.70507	0.276498	10.3318	9.90553	4.092166	5.373272	1726.88	635.1198
190	8.5	4.321033	7.623616	5.376384	0.658672	48.92989	122.8026	133.5221	0.335793	1.112546	5.804428	8.684502	0	1.01476	9.068266	23.71402	0.795203	9.946494	9.797048	2.809963	5.081181	1513.251	552.655
	18.16415					**84.74961**	**212.2967**													**5.795185**			

Surface Samples (ppm)

SAMPLE	Sr	Rb	Pb	Zn	Fe	Mn
11a	134.55	63.02	39	81.64	16601.45	464.38
11b	123.9	62.19	30.94	73.73	16351.25	503.29
12a	110.19	68.92	42.72	113.65	17245.48	603.92
12b	110.81	65.15	35.01	141.33	16608.46	527.38
13a	115.87	67.65	38.28	149.57	15578.21	494.86
13b	121.98	65.49	49.19	154.55	14626.23	500.5
14a	119.32	57.7	44.85	167.07	12249.27	405.32
14b	118.81	59.49	65.24	174.67	13385.82	400.53
AVG	**119.4288**	**63.70125**	**43.15375**	**132.0263**	**15330.77**	**487.5225**

Oberrhein

Coring: Romerberg (normalized counts)

Depth (cm)	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu
148	0.000136	0.001664	3.38E-05	0.001199	2.01E-05	0.000871	0.018725	0.257853	5.18E-05	0.012279	0.000614	0.001144	0.00831	0.838293	0.010314	0.000104	0
153	0.00023	0.002367	6.43E-06	0.001423	1.77E-05	0.001015	0.023414	0.309828	2.17E-05	0.014601	0.00073	0.00119	0.00994	0.907321	0.010728	0.000142	7.23E-06
158	0.000136	0.00264	0	0.001401	1.46E-05	0.001683	0.0251	0.375291	6.78E-05	0.014848	0.000852	0.00127	0.010377	0.866245	0.010596	0.000434	5.63E-05
163	0.000136	0.002668	8.48E-06	0.001548	0	0.002068	0.026967	0.401601	2.46E-05	0.016584	0.000778	0.001174	0.011601	0.973609	0.010353	0.000364	0
168	0.000163	0.003053	9.83E-06	0.001269	2.87E-05	0.002216	0.028359	0.402479	4.09E-05	0.017249	0.000743	0.001199	0.012239	0.950717	0.010694	0.000244	0
173	0.000198	0.003009	0	0.00224	9.54E-06	0.002226	0.028258	0.414468	9.71E-05	0.017449	0.00082	0.001207	0.012866	1.098907	0.011759	0.000391	0
178	0.000168	0.003073	0	0.001295	2.25E-05	0.0025	0.028799	0.482206	2.58E-05	0.017569	0.000738	0.001165	0.013292	0.906994	0.010183	0.000478	0
183	0.000249	0.003189	0	0.001301	9.16E-06	0.002437	0.028185	0.446671	1.75E-05	0.017789	0.000928	0.001232	0.013152	0.913751	0.010696	0.000642	5.16E-05
188	0.000151	0.003897	0	0.000967	2.39E-05	0.002746	0.033867	0.493066	3.03E-05	0.022111	0.000994	0.001606	0.013188	0.967812	0.011032	0.000779	0
193	0.000223	0.004498	0	0.001111	1.35E-05	0.00233	0.037356	0.558088	6.65E-05	0.023368	0.000936	0.001422	0.013459	0.97433	0.011055	0.001194	8.2E-05
198	0.000158	0.005543	0	0.00086	1.29E-05	0.002194	0.040453	0.677191	1.19E-05	0.025614	0.001335	0.00165	0.014933	0.977452	0.011162	0.001392	0
203	0.000275	0.005732	0	0.000766	3.41E-05	0.002303	0.042186	0.771958	6.4E-06	0.027322	0.001416	0.00132	0.016063	0.994602	0.011519	0.00104	0
208	0.000244	0.006342	0	0.001014	5.18E-05	0.001818	0.043306	0.772513	0	0.027647	0.001142	0.001496	0.015801	0.996158	0.011691	0.001381	0
213	0.000296	0.006342	0	0.001011	3.46E-05	0.002505	0.042334	0.754332	1.9E-05	0.027906	0.001513	0.001558	0.015279	0.999845	0.011509	0.00121	0
218	0.000275	0.006386	0	0.001023	4.62E-05	0.002329	0.042739	0.769245	3.25E-05	0.028089	0.001223	0.001618	0.015818	0.985078	0.011191	0.001336	0
223	0.000197	0.005719	0	0.000928	3.48E-05	0.001594	0.039324	0.743238	0	0.026656	0.001175	0.001428	0.014491	0.939837	0.010899	0.001134	0
228	0.000261	0.005178	0	0.00078	2.04E-05	0.001871	0.037153	0.702151	6.45E-06	0.026247	0.000989	0.00153	0.013976	0.876658	0.010554	0.001261	0
233	0.000108	0.004854	0	0.000788	1.13E-05	0.002223	0.034606	0.710722	9.37E-05	0.026392	0.00132	0.001519	0.013578	0.842631	0.010307	0.001521	0
238	0.000181	0.006107	0	0.0009	4.38E-05	0.002455	0.037944	0.685244	1.04E-05	0.026671	0.001244	0.00189	0.013349	0.835724	0.0105	0.002872	0

Depth (cm)	Zn	Ga	As	Se	Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh
148	0.004167	0.000352	0.005075	0.004153	0.002046	0.018159	0.049028	0.025768	0.000195	0.000121	0.001147	0.002988	0	1.51E-05	0.004186	0.004848	0.001015	0.004114	0.002673	0.001886	0.002125	0.78587	0.21413
153	0.005012	0.000503	0.005145	0.004484	0.002502	0.019137	0.052763	0.026507	0.000352	0.000198	0.001509	0.003765	0	1.53E-05	0.00401	0.005552	0.000998	0.00398	0.002792	0.001626	0.002375	0.783311	0.216689
158	0.005209	0.000348	0.004948	0.003972	0.002317	0.018374	0.055102	0.026556	0.000299	0.000271	0.001877	0.004027	0	3.39E-05	0.004336	0.005753	0.001447	0.003849	0.002598	0.001908	0.002442	0.782645	0.217355
163	0.005184	0.000766	0.005799	0.004156	0.002356	0.020439	0.060723	0.027721	0.00028	0.000184	0.002139	0.004251	0	2.37E-05	0.004434	0.006066	0.001018	0.004012	0.002524	0.002161	0.002761	0.775919	0.224081
168	0.005382	0.000592	0.004837	0.004429	0.002086	0.019681	0.057495	0.027821	0.000299	0.000357	0.001893	0.004926	0	3.6E-05	0.004411	0.006266	0.001124	0.003906	0.003376	0.002061	0.002489	0.77886	0.22114
173	0.005181	0.000568	0.005536	0.004189	0.002267	0.020585	0.06001	0.027508	0.000393	0.000202	0.001946	0.005177	0	4.07E-05	0.004554	0.006435	0.001255	0.004345	0.00297	0.001963	0.003511	0.775766	0.224234
178	0.005209	0.000905	0.004987	0.00424	0.002383	0.019665	0.065162	0.027474	0.000457	0.000199	0.002595	0.006072	0	0	0.004488	0.006595	0.001091	0.003749	0.002984	0.001675	0.002358	0.774844	0.225156
183	0.005455	0.001117	0.00489	0.004286	0.002457	0.01986	0.063745	0.028737	0.000287	0.000172	0.002185	0.005104	0	7.83E-05	0.004827	0.006676	0.00125	0.004022	0.002931	0.00173	0.002252	0.774259	0.225741
188	0.006092	0.000717	0.004003	0.003535	0.001703	0.022634	0.070097	0.031134	0.000323	0.000399	0.002383	0.006138	0	5.14E-05	0.004384	0.007344	0.001057	0.003871	0.002918	0.002382	0.002197	0.763061	0.236939
193	0.006546	0.001332	0.004506	0.003619	0.001536	0.023858	0.075952	0.031211	0.000377	0.000327	0.00245	0.006946	0	4.15E-05	0.004224	0.007664	0.001017	0.004303	0.003206	0.002264	0.002928	0.757411	0.242589
198	0.007297	0.00092	0.002465	0.003627	0.001456	0.024147	0.089412	0.031456	0.000697	0.000287	0.003561	0.008388	0	2.49E-05	0.004206	0.007948	0.001177	0.004035	0.003526	0.002166	0.00262	0.74467	0.25533
203	0.007905	0.001175	0.003274	0.003579	0.001041	0.024847	0.099263	0.032579	0.000353	0.000609	0.003888	0.009369	0	5.23E-05	0.004143	0.008138	0.000869	0.004584	0.003921	0.001239	0.00293	0.734495	0.265505
208	0.007548	0.001522	0.002518	0.003863	0.000671	0.02538	0.097457	0.03384	0.000521	0.000325	0.004146	0.009977	0	0.000132	0.003756	0.007958	0.000796	0.004321	0.003921	0.001884	0.002979	0.735886	0.264114
213	0.007463	0.000906	0.002741	0.003689	0.000748	0.025525	0.096811	0.034803	0.000205	0.000741	0.003908	0.009355	0	0.000122	0.004039	0.00799	0.000651	0.004427	0.003687	0.002373	0.002159	0.734953	0.265047
218	0.007549	0.001309	0.00216	0.003526	0.000847	0.025024	0.099631	0.034645	0.000269	0.000632	0.003956	0.009349	0	0.00012	0.00367	0.008229	0.000783	0.004782	0.003719	0.002609	0.002383	0.734766	0.265234
223	0.00725	0.001683	0.004056	0.003525	0.000733	0.024319	0.097466	0.038151	0.000544	0.000339	0.003849	0.009749	0	8.23E-05	0.0039	0.007973	0.000618	0.003888	0.003365	0.001309	0.002638	0.734292	0.265708
228	0.006613	0.00105	0.00384	0.003939	0.001131	0.024328	0.096841	0.040566	0.000334	0.000439	0.003454	0.009026	0	9.14E-05	0.003984	0.008334	0.001267	0.004487	0.004035	0.00159	0.003651	0.734615	0.265385
233	0.006581	0.001431	0.003622	0.003869	0.000822	0.022677	0.098428	0.044702	0.00039	0.000379	0.003727	0.008945	0	7E-05	0.004351	0.009152	0.000743	0.004621	0.003533	0.001875	0.002869	0.7343	0.2657
238	0.006488	0.001606	0.003174	0.004233	0.000779	0.024685	0.095322	0.046771	0.000295	0.000398	0.00369	0.008	0	0.000136	0.004424	0.009675	0.000618	0.003746	0.003387	0.001961	0.001933	0.734894	0.265106

Coring: Romerberg (normalized counts + Al standardized)

Depth (cm)	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu
148	1	12.24339	0.248677	8.825397	0.148148	6.407407	137.7884	1897.455	0.380952	90.35979	4.518519	8.417989	61.15344	6168.725	75.89418	0.767196	0
153	1	10.3007	0.027972	6.192308	0.076923	4.416084	101.9091	1348.531	0.094406	63.54895	3.178322	5.178322	43.26224	3949.129	46.69231	0.618881	0.031469
158	1	19.46023	0	10.32955	0.107955	12.40341	185.0341	2766.648	0.5	109.4602	6.284091	9.363636	76.5	6385.96	78.11364	3.198864	0.414773
163	1	19.6625	0.0625	11.4125	0	15.24375	198.7688	2960.156	0.18125	122.2375	5.7375	8.65	85.5125	7176.363	76.3125	2.68125	0
168	1	18.73367	0.060302	7.788945	0.175879	13.59799	174.0251	2469.774	0.251256	105.8442	4.557789	7.356784	75.1005	5833.975	65.62312	1.497487	0
173	1	15.22368	0	11.33333	0.048246	11.25877	142.9474	2096.684	0.491228	88.27193	4.149123	6.105263	65.08333	5559.079	59.48684	1.97807	0
178	1	18.34328	0	7.731343	0.134328	14.9204	171.9005	2878.264	0.154229	104.8706	4.40796	6.955224	79.33831	5413.806	60.78109	2.855721	0
183	1	12.80936	0	5.227425	0.036789	9.789298	113.2074	1794.087	0.070234	71.45151	3.729097	4.949833	52.82609	3670.147	42.96321	2.578595	0.207358
188	1	25.73333	0	6.387879	0.157576	18.13333	223.6485	3256.073	0.2	146.0182	6.563636	10.60606	87.09091	6391.17	72.85455	5.145455	0
193	1	20.19481	0	4.987013	0.060606	10.45887	167.7056	2505.485	0.298701	104.9091	4.203463	6.385281	60.42424	4374.169	49.63203	5.359307	0.367965
198	1	35.01258	0	5.433962	0.081761	13.86164	255.5283	4277.572	0.075472	161.7925	8.433962	10.42138	94.32704	6174.214	70.50943	8.792453	0
203	1	20.82558	0	2.782946	0.124031	8.368217	153.2674	2804.647	0.023256	99.26357	5.143411	4.794574	58.36047	3613.547	41.84884	3.77907	0
208	1	25.98701	0	4.155844	0.212121	7.450216	177.4545	3165.502	0	113.29	4.679654	6.12987	64.74892	4081.922	47.90476	5.658009	0
213	1	21.43774	0	3.418868	0.116981	8.467925	143.1057	2549.913	0.064151	94.33208	5.113208	5.267925	51.64906	3379.834	38.90566	4.090566	0
218	1	23.22519	0	3.721374	0.167939	8.469466	155.4275	2797.519	0.118321	102.1527	4.446565	5.885496	57.52672	3582.439	40.69847	4.858779	0
223	1	28.99465	0	4.705882	0.176471	8.080214	199.3583	3767.984	0	135.139	5.957219	7.240642	73.46524	4764.684	55.25668	5.748663	0
228	1	19.81481	0	2.983539	0.078189	7.160494	142.1811	2687.099	0.024691	100.4444	3.786008	5.855967	53.4856	3354.93	40.39095	4.82716	0
233	1	44.78125	0	7.270833	0.104167	20.51042	319.2604	6556.74	0.864583	243.4792	12.17708	14.01042	125.2604	7773.667	95.08333	14.03125	0
238	1	33.64943	0	4.95977	0.241379	13.52874	209.0862	3775.937	0.057471	146.9655	6.856322	10.41379	73.55747	4605.132	57.85632	15.82759	0
													70.45645	**5065.942**			

Depth (cm)	Zn	Ga	As	Se	Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh
148	30.66667	2.587302	37.34392	30.56085	15.0582	133.6243	360.7778	189.619	1.433862	0.888889	8.439153	21.98942	0	0.111111	30.80423	35.67196	7.470899	30.27513	19.67196	13.87831	15.63492	5782.963	1575.709
153	21.81469	2.188811	22.3951	19.51748	10.89161	83.29371	229.6538	115.3706	1.531469	0.86014	6.56993	16.38811	0	0.066434	17.45455	24.16434	4.342657	17.32517	12.15385	7.076923	10.33916	3409.374	943.1434
158	38.40341	2.5625	36.47727	29.27841	17.07955	135.4545	406.2159	195.7727	2.204545	1.994318	13.83523	29.6875	0	0.25	31.96591	42.41477	10.67045	28.375	19.15341	14.06818	18	5769.665	1602.341
163	38.2125	5.64375	42.74375	30.63125	17.36875	150.65	447.5813	204.325	2.0625	1.35625	15.76875	31.33125	0	0.175	32.68125	44.7125	7.50625	29.56875	18.60625	15.925	20.35	5719.213	1651.675
168	33.02513	3.633166	29.68342	27.1809	12.79899	120.7688	352.8141	170.7186	1.834171	2.190955	11.61809	30.22613	0	0.221106	27.07035	38.45226	6.899497	23.96985	20.71357	12.64824	15.27136	4779.397	1357
173	26.21053	2.872807	28.00439	21.1886	11.4693	104.136	303.5746	139.1535	1.986842	1.02193	9.846491	26.1886	0	0.20614	23.03947	32.55263	6.350877	21.97807	15.02632	9.929825	17.76316	3924.395	1134.342
178	31.09453	5.402985	29.76617	25.30846	14.22388	117.3781	388.9502	163.99	2.726368	1.189055	15.48756	36.24378	0	0	26.78607	39.36816	6.512438	22.37811	17.81095	9.995025	14.07463	4625.01	1343.945
183	21.9097	4.488294	19.64214	17.21405	9.869565	79.76923	256.0368	115.4247	1.153846	0.692308	8.77592	20.50167	0	0.314381	19.38796	26.81271	5.020067	16.15385	11.77258	6.949833	9.043478	3109.866	906.7057
188	40.2303	4.733333	26.43636	23.34545	11.24848	149.4667	462.903	205.6	2.133333	2.636364	15.73939	40.53333	0	0.339394	28.95152	48.49697	6.981818	25.56364	19.26667	15.72727	14.50909	5039.048	1564.679
193	29.38961	5.978355	20.22944	16.24675	6.896104	107.1082	340.9784	140.1212	1.692641	1.467532	11	31.18182	0	0.186147	18.96537	34.40693	4.5671	19.31602	14.39394	10.1645	13.14286	3400.329	1089.082
198	46.09434	5.811321	15.57233	22.91195	9.194969	152.5283	564.7862	198.6981	4.402516	1.811321	22.49057	52.98113	0	0.157233	26.56604	50.20755	7.433962	25.49057	22.27044	13.67925	16.54717	4703.811	1612.83
203	28.72093	4.267442	11.89535	13.00388	3.782946	90.27132	360.6395	118.3643	1.282946	2.213178	14.12403	34.03876	0	0.189922	15.05039	29.56589	3.158915	16.65504	14.24419	4.5	10.64341	2668.539	964.6202
208	30.93074	6.238095	10.31602	15.83117	2.748918	104	399.3463	138.6667	2.134199	1.333333	16.98701	40.88312	0	0.541126	15.38961	32.61039	3.25974	17.70563	16.06494	7.718615	12.20779	3015.416	1082.251
213	25.22642	3.064151	9.264151	12.4717	2.528302	86.28302	327.2566	117.6453	0.69434	2.50566	13.21132	31.62264	0	0.411321	13.65283	27.00755	2.2	14.96604	12.46415	8.022642	7.298113	2484.404	895.9547
218	27.4542	4.759542	7.854962	12.82443	3.080153	91.00382	362.3282	125.9924	0.977099	2.29771	14.3855	34	0	0.435115	13.34733	29.92748	2.847328	17.38931	13.52672	9.48855	8.667939	2672.13	964.5763
223	36.75401	8.534759	20.5615	17.87166	3.716578	123.2888	494.123	193.4118	2.759358	1.716578	19.51337	49.42246	0	0.417112	19.77005	40.42246	3.13369	19.71123	17.05882	6.636364	13.37433	3722.631	1347.059
228	25.30864	4.016461	14.69547	15.07407	4.329218	93.10288	370.6049	155.2428	1.279835	1.679012	13.21811	34.54321	0	0.349794	15.24691	31.893	4.847737	17.17284	15.44033	6.08642	13.97119	2811.337	1015.617
233	60.70833	13.19792	33.41667	35.69792	7.583333	209.2083	908.0417	412.3958	3.59375	3.5	34.38542	82.52083	0	0.645833	40.13542	84.42708	6.854167	42.63542	32.59375	17.30208	26.46875	6774.26	2451.208
238	35.75287	8.850575	17.48851	23.32759	4.293103	136.023	525.2586	257.7241	1.626437	2.195402	20.33333	44.08046	0	0.747126	24.37931	53.31034	3.408046	20.64368	18.66092	10.8046	10.64943	4049.523	1460.828
	33.04776					**119.3347**	**413.7827**													**10.55798**			

Surface Samples (ppm)

SAMPLE	Sr	Rb	Pb	Zn	Fe	Mn
16a	162.99	56.81	12.72	37.63	12463.3	307.83
16b	164.12	60.32	13.54	41.97	12709.89	295.39
17a	175.52	62.54	46.19	111.65	11011.39	208.65
17b	209.3	50.46	17.43	34.45	8745.63	182.33
19a	173.13	75.53	86.36	219.97	17134.88	449.73
19b	163.62	63.74	80.56	187.43	14923.18	438.07
20a	153.58	69.89	45.81	151.27	14769.63	459.41
20b	168.79	76.82	75.46	214.07	16851.41	516.38
21a	151.8	71.49	75.8	184.1	16016.21	522.99
21b	163.04	66.13	85.73	215.97	15247.48	367.34
22a	167.94	69.1	64.16	119.86	14351.13	384.29
22b	185.97	62.38	47.09	83.34	13681.2	431.88
26a	103.35	79.58	100.69	350.83	23742.51	924.59
26b	107.08	82.96	171.11	452.07	27750.67	957.34
27a	114.2	82.96	84.01	279.47	23052.74	824.26
27b	118.79	81.64	132.48	384.48	24777.59	873.81
28a	119.24	62.24	48.41	141.26	11910.16	426.31
28b	125.18	64.85	52.64	152.91	12433.61	450.55
29a	92.64	65.6	35.68	114.55	12771.07	553.11
29b	96.09	61.57	36.51	112.86	12836.37	522.18
AVG	**145.8185**	**68.3305**	**65.619**	**179.507**	**15859**	**504.822**

Appendix 5B

Main

Coring: Sindlingen (normalized counts)

Depth (cm)	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	As	Se
120	0.000312	0.004978	5.52E-05	0.000984	0	0.002222	0.046293	0.134773	0	0.043862	0.001651	0.005627	0.026091	1.536569	0.015242	0.000737	0.001545	0.029599	0.001913	0.010786	0.004746
125	0.000198	0.004607	4.16E-05	0.000899	1.33E-05	0.002278	0.049205	0.153705	2.21E-05	0.046811	0.001341	0.006444	0.022883	1.530522	0.015489	0.001123	0.00137	0.028831	0.002189	0.008933	0.00392
130	0.00033	0.005592	9.2E-06	0.001044	0	0.001531	0.056683	0.170328	1.93E-05	0.052143	0.001752	0.007905	0.023523	1.757757	0.016843	0.000864	0.000832	0.023128	0.002095	0.012112	0.004743
135	0.000258	0.003788	0.000107	0.000816	4.36E-06	0.001146	0.043013	0.135007	0	0.042647	0.001555	0.004625	0.026173	1.567141	0.015877	0.000442	0.000403	0.019364	0.001482	0.008963	0.004147
140	0.000246	0.003002	2.4E-05	0.000747	3.69E-06	0.00066	0.04019	0.134183	0	0.041295	0.001602	0.003317	0.027386	1.595692	0.016323	0.000289	0.000378	0.016209	0.002227	0.009466	0.004417
145	0.000152	0.002967	5.25E-05	0.000764	7.25E-06	0.001166	0.036112	0.124194	0	0.038251	0.001406	0.002758	0.025819	1.457443	0.015564	0.000333	0.000132	0.014514	0.002155	0.011519	0.004486
150	0.000116	0.004063	4.77E-05	0.000717	4.42E-06	0.001523	0.04665	0.153891	0	0.049017	0.001568	0.003554	0.031729	1.732548	0.017624	0.000752	0.000154	0.015421	0.002067	0.010302	0.003866
155	0.000285	0.004321	6.9E-05	0.000861	0	0.001608	0.045311	0.155644	0	0.047143	0.001493	0.003055	0.029671	1.621371	0.016608	0.000714	0.000195	0.013842	0.00264	0.011698	0.004484
160	0.000301	0.005165	0.00011	0.000884	0	0.002036	0.044415	0.147344	0	0.046211	0.001589	0.002529	0.025209	1.517201	0.015078	0.000644	3.56E-05	0.011049	0.002001	0.008724	0.00432
165	0.000225	0.003295	4.4E-05	0.000763	7.92E-06	0.002195	0.039408	0.121676	0	0.043953	0.001364	0.002686	0.021167	1.481792	0.014427	0.000861	7.3E-05	0.011499	0.002461	0.007587	0.004121
170	0.000335	0.004722	2.67E-05	0.000904	6.45E-06	0.002797	0.045456	0.123557	0	0.047825	0.001561	0.002524	0.021831	1.443864	0.014072	0.001125	7.28E-05	0.010457	0.002614	0.007549	0.003672
175	0.00035	0.005518	9.45E-05	0.000791	0	0.0019	0.04679	0.127678	4.26E-06	0.050844	0.001392	0.002885	0.028887	1.573366	0.015113	0.001096	8.43E-05	0.011745	0.002285	0.007525	0.003795
180	0.000301	0.00454	9.47E-05	0.000787	0	0.001838	0.04543	0.108954	0	0.049611	0.001527	0.002651	0.027159	1.59001	0.015464	0.00084	2.28E-05	0.010362	0.002405	0.006838	0.003935
185	0.000214	0.003404	6.7E-05	0.000754	0	0.00189	0.039878	0.101913	0	0.045066	0.001702	0.002464	0.029584	1.500747	0.015487	0.000979	1.34E-05	0.010528	0.002694	0.006507	0.003943
190	0.000306	0.004485	3.39E-05	0.000824	6.96E-06	0.002822	0.043969	0.10157	0	0.045791	0.001338	0.002406	0.023924	1.472806	0.014238	0.000944	0	0.00962	0.002735	0.006904	0.003778
195	0.00028	0.004996	8.09E-05	0.000749	0	0.002195	0.045245	0.085622	0	0.052508	0.001773	0.002875	0.024507	1.636667	0.015224	0.000942	0	0.010981	0.002341	0.006545	0.00414
200	0.000232	0.004626	4.84E-05	0.000803	1.41E-05	0.001956	0.048449	0.100224	0	0.05053	0.001691	0.002968	0.025606	1.655221	0.016343	0.000696	5.28E-06	0.011273	0.002634	0.006374	0.004403
205	0.000349	0.005222	7.1E-05	0.000803	1.8E-05	0.001996	0.053692	0.125157	0	0.045995	0.001706	0.002504	0.051076	1.841024	0.017538	0.000426	1.89E-05	0.010022	0.001845	0.007232	0.004506

Depth (cm)	Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh
120	0.000816	0.032684	0.050672	0.062018	0.000386	0.000147	0.000536	0.000223	0	0.001199	0.005688	0.010002	0.000886	0.004268	0.00328	0.010789	0.00259	0.757262	0.242738
125	0.001207	0.034123	0.052719	0.063842	0.000325	0.00021	0.000625	0.000343	0	0.001217	0.005416	0.010536	0.001238	0.004348	0.004504	0.011779	0.001815	0.754863	0.245137
130	0.000889	0.037174	0.053812	0.061712	0.000686	0.000123	0.000764	0.000522	0	0.001224	0.005869	0.010176	0.001065	0.004488	0.004058	0.008625	0.003417	0.755254	0.244746
135	0.000793	0.035149	0.053638	0.06146	0.000388	0.000213	0.000597	0.000433	0	0.000868	0.004669	0.00894	0.000911	0.004717	0.004032	0.008348	0.003002	0.755384	0.244616
140	0.000891	0.035539	0.055061	0.063973	0.000543	6.73E-05	0.00045	0.000355	0	0.000771	0.004405	0.008442	0.000864	0.004504	0.00404	0.007573	0.002836	0.751433	0.248567
145	0.000879	0.034957	0.052979	0.06406	0.000215	0.000193	0.000438	0.000466	0	0.000701	0.004296	0.008073	0.000938	0.004231	0.003473	0.007344	0.002816	0.751873	0.248127
150	0.001215	0.035487	0.055054	0.06636	0.000572	0.000269	0.000712	0.000475	0	0.001258	0.005393	0.009668	0.00139	0.004455	0.003499	0.007614	0.00351	0.751864	0.248136
155	0.000814	0.033891	0.052148	0.06597	0.000315	0.000157	0.00067	0.000563	0	0.000847	0.005253	0.009384	0.000595	0.004392	0.003946	0.007218	0.003252	0.756403	0.243597
160	0.001019	0.03354	0.051954	0.070554	0.000292	0.000329	0.000645	0.000314	0	0.000968	0.0051	0.01	0.00102	0.004322	0.003644	0.006818	0.003215	0.754837	0.245163
165	0.000737	0.033839	0.049502	0.069127	0.00041	0.00012	0.000366	0.000416	0	0.001045	0.005922	0.010518	0.00082	0.004206	0.003633	0.007207	0.002512	0.754912	0.245088
170	0.000181	0.033648	0.046918	0.072836	0.000368	0.000263	0.000331	0.000364	0	0.001048	0.005417	0.010902	0.00078	0.004425	0.004302	0.005833	0.002558	0.752484	0.247516
175	0.000675	0.034806	0.048943	0.071915	0.00035	0.000229	0.000393	0.0003	0	0.001014	0.005742	0.010608	0.000785	0.004873	0.004323	0.005671	0.00311	0.751831	0.248169
180	0.000292	0.035876	0.046131	0.070216	0.00041	0.0002	0.000399	0.000137	0	0.001005	0.005443	0.010893	0.000577	0.00452	0.004145	0.005625	0.002335	0.75237	0.24763
185	0.000499	0.03554	0.046338	0.071633	0.000363	0.000296	0.000444	0.000252	0	0.001068	0.005584	0.0105	0.000913	0.004183	0.003914	0.00527	0.003022	0.753486	0.246514
190	0.000551	0.035287	0.044191	0.069981	0.000306	0.000351	0.000381	0.000263	0	0.001098	0.005744	0.011062	0.001059	0.004484	0.004041	0.004467	0.002791	0.752957	0.247043
195	0.000818	0.035415	0.042918	0.077129	0.000303	0.000166	0.000314	8.74E-05	0	0.001125	0.005665	0.009917	0.001088	0.004956	0.004482	0.004903	0.00307	0.753998	0.246002
200	0.000475	0.037884	0.044551	0.073612	0.000516	0.000242	0.000265	0.000179	0	0.001139	0.005316	0.010653	0.000997	0.004418	0.004005	0.004993	0.003099	0.752923	0.247077
205	0.000682	0.039608	0.043962	0.05871	0.000536	0.000238	0.000499	0.000276	0	0.000795	0.005672	0.01001	0.001675	0.004382	0.004374	0.004861	0.004024	0.749918	0.250082

Coring: Sindlingen (normalized counts + Al standardized)

Depth (cm)	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	As	Se
120	1	15.94663	0.176966	3.151685	0	7.117978	148.2921	431.7247	0	140.5056	5.289326	18.02528	83.57865	4922.166	48.82584	2.36236	4.949438	94.81742	6.129213	34.55056	15.20225
125	1	23.21429	0.209821	4.53125	0.066964	11.47768	247.9643	774.5848	0.111607	235.9018	6.758929	32.47321	115.317	7712.955	78.05357	5.660714	6.90625	145.2902	11.03125	45.01786	19.75446
130	1	16.93315	0.027855	3.16156	0	4.635097	171.6546	515.8134	0.058496	157.9081	5.306407	23.93872	71.23677	5323.106	51.00557	2.615599	2.518106	70.039	6.345404	36.67967	14.36212
135	1	14.66554	0.415541	3.158784	0.016892	4.435811	166.5101	522.6351	0	165.0946	6.02027	17.90541	101.3209	6066.682	61.46284	1.709459	1.560811	74.96284	5.736486	34.69595	16.05405
140	1	12.19476	0.097378	3.033708	0.014981	2.681648	163.2846	545.161	0	167.7753	6.509363	13.47566	111.2659	6483.015	66.31835	1.172285	1.535581	65.85393	9.048689	38.46067	17.94382
145	1	19.5	0.345238	5.017857	0.047619	7.660714	237.3333	816.2143	0	251.3869	9.238095	18.125	169.6845	9578.446	102.2857	2.190476	0.869048	95.3869	14.16071	75.70238	29.48214
150	1	35.08397	0.412214	6.19084	0.038168	13.15267	402.8473	1328.939	0	423.2901	13.54198	30.68702	274	14961.6	152.1908	6.496183	1.328244	133.1679	17.84733	88.96183	33.38931
155	1	15.17702	0.242236	3.024845	0	5.645963	159.1398	546.6429	0	165.5714	5.242236	10.72981	104.2081	5694.463	58.32919	2.509317	0.68323	48.61491	9.273292	41.08385	15.74845
160	1	17.1568	0.366864	2.934911	0	6.763314	147.5325	489.432	0	153.5	5.278107	8.399408	83.73669	5039.68	50.0858	2.139053	0.118343	36.70118	6.647929	28.97929	14.34911
165	1	14.625	0.195313	3.386719	0.035156	9.742188	174.9219	540.0859	0	195.0977	6.054688	11.92188	93.95313	6577.273	64.03906	3.820313	0.324219	51.04297	10.92188	33.67578	18.29297
170	1	14.08242	0.07967	2.695055	0.019231	8.340659	135.5632	368.4808	0	142.6264	4.656593	7.527473	65.1044	4305.986	41.96703	3.354396	0.217033	31.18681	7.796703	22.51374	10.95055
175	1	15.77372	0.270073	2.260341	0	5.430657	133.764	365.0097	0.012165	145.3528	3.978102	8.248175	82.58394	4497.978	43.20681	3.13382	0.240876	33.57664	6.532847	21.51338	10.84915
180	1	15.10606	0.315152	2.618182	0	6.115152	151.1455	362.4879	0	165.0545	5.078788	8.821212	90.35758	5289.93	51.44848	2.793939	0.075758	34.47576	8	22.75152	13.09091
185	1	15.875	0.3125	3.516667	0	8.8125	185.9875	475.3125	0	210.1833	7.9375	11.49167	137.975	6999.329	72.22917	4.566667	0.0625	49.1	12.56667	30.35	18.3875
190	1	14.64489	0.110795	2.690341	0.022727	9.215909	143.5682	331.6506	0	149.517	4.369318	7.855114	78.11648	4809.06	46.49148	3.082386	0	31.41193	8.931818	22.54261	12.33523
195	1	17.875	0.289474	2.680921	0	7.851974	161.8651	306.3191	0	187.852	6.342105	10.28618	87.67434	5855.266	54.46382	3.371711	0	39.28618	8.375	23.41447	14.8125
200	1	19.92803	0.208333	3.458333	0.060606	8.424242	208.7121	431.75	0	217.6742	7.284091	12.78409	110.3068	7130.447	70.4053	2.996212	0.022727	48.56439	11.34848	27.45833	18.96591
205	1	14.95935	0.203252	2.300813	0.051491	5.718157	153.8049	358.523	0	131.7561	4.886179	7.173442	146.3117	5273.77	50.23848	1.219512	0.054201	28.71003	5.284553	20.71545	12.90786
													111.4851	**6473.397**				**61.78828**			

Depth (cm)	Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh
120	2.615169	104.6994	162.3202	198.6657	1.235955	0.47191	1.716292	0.713483	0	3.839888	18.22191	32.03933	2.837079	13.67135	10.50843	34.5618	8.297753	2425.772	777.5758
125	6.080357	171.9598	265.6741	321.7277	1.638393	1.058036	3.151786	1.727679	0	6.133929	27.29464	53.09375	6.241071	21.91071	22.69643	59.36161	9.147321	3804.08	1235.348
130	2.693593	112.5766	162.961	186.8858	2.077994	0.373259	2.314763	1.582173	0	3.707521	17.77437	30.81616	3.225627	13.59053	12.28969	26.11978	10.34819	2287.175	741.1755
135	3.070946	136.0676	207.6419	237.9223	1.503378	0.824324	2.310811	1.675676	0	3.361486	18.07432	34.60811	3.527027	18.26014	15.60811	32.31757	11.62162	2924.226	946.9527
140	3.617978	144.3895	223.7041	259.9101	2.205993	0.273408	1.827715	1.441948	0	3.131086	17.89513	34.29963	3.509363	18.29963	16.41573	30.76779	11.5206	3052.94	1009.884
145	5.77381	229.7381	348.1845	421.006	1.410714	1.267857	2.880952	3.059524	0	4.607143	28.23214	53.05357	6.166667	27.80952	22.82738	48.26786	18.50595	4941.375	1630.714
150	10.49618	306.4504	475.4275	573.0611	4.938931	2.320611	6.152672	4.099237	0	10.8626	46.57252	83.48855	12.00763	38.47328	30.21374	65.75573	30.31298	6492.802	2142.802
155	2.860248	119.0311	183.1491	231.6957	1.10559	0.552795	2.354037	1.978261	0	2.975155	18.45031	32.95652	2.090062	15.42547	13.85714	25.35093	11.42236	2656.584	855.5435
160	3.384615	111.4112	172.5769	234.358	0.970414	1.091716	2.142012	1.04142	0	3.215976	16.94083	33.21598	3.387574	14.35503	12.10355	22.64793	10.68047	2507.337	814.358
165	3.269531	150.2031	219.7266	306.8359	1.820313	0.53125	1.625	1.847656	0	4.636719	26.28516	46.6875	3.640625	18.66797	16.125	31.98828	11.14844	3350.852	1087.879
170	0.538462	100.3462	139.9231	217.217	1.096154	0.782967	0.986264	1.085165	0	3.126374	16.15385	32.51374	2.326923	13.19505	12.82967	17.3956	7.629121	2244.107	738.1593
175	1.92944	99.50365	139.9197	205.5912	1	0.654501	1.124088	0.856448	0	2.900243	16.41606	30.32603	2.243309	13.93187	12.3601	16.21168	8.890511	2149.353	709.472
180	0.972727	119.3576	153.4758	233.6061	1.363636	0.666667	1.327273	0.454545	0	3.342424	18.10909	36.24242	1.918182	15.03636	13.79091	18.71515	7.769697	2503.118	823.8606
185	2.329167	165.7542	216.1167	334.0875	1.691667	1.379167	2.070833	1.175	0	4.983333	26.04167	48.97083	4.258333	19.50833	18.25417	24.57917	14.09583	3514.179	1149.717
190	1.798295	115.2188	144.2955	228.5057	1	1.147727	1.244318	0.857955	0	3.585227	18.75568	36.11932	3.457386	14.64205	13.19602	14.58523	9.113636	2458.582	806.6534
195	2.927632	126.7007	153.5428	275.9342	1.085526	0.595395	1.125	0.3125	0	4.026316	20.26645	35.48026	3.891447	17.73026	16.03618	17.53947	10.98355	2697.47	880.0855
200	2.045455	163.197	191.9205	317.1098	2.223485	1.041667	1.140152	0.772727	0	4.905303	22.90152	45.89015	4.295455	19.03409	17.25379	21.50758	13.34848	3243.481	1064.371
205	1.95393	113.4607	125.9322	168.1789	1.536585	0.682927	1.428184	0.791328	0	2.276423	16.24661	28.6748	4.799458	12.55285	12.52846	13.92412	11.52575	2148.203	716.3821
		143.8925	**204.8051**													**28.97763**			

Coring: Klein Krotz (normalized counts)

Depth (cm)	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	As	Se
125	0.000327	0.007503	0.000137	0.001116	8.8E-06	0.001247	0.055582	0.02404	0	0.056471	0.001682	0.002611	0.009088	2.044956	0.019152	0.000107	0	0.006753	0.00219	0.004765	0.004932
130	0.000344	0.006556	0.000129	0.000859	2.18E-05	0.001812	0.057085	0.021614	0	0.060798	0.002109	0.002867	0.01075	2.644309	0.02348	3.86E-05	0	0.007534	0.002871	0.004819	0.00474
135	0.000262	0.007114	0.000177	0.000698	3.15E-05	0.00246	0.05281	0.017639	0	0.055916	0.001856	0.002895	0.009675	2.000964	0.019012	0.000192	0	0.006583	0.002714	0.004657	0.003986
140	0.000274	0.005989	0.000119	0.000876	0	0.002085	0.060526	0.019102	0	0.061213	0.002365	0.002925	0.010508	2.405274	0.021234	4E-05	0	0.008052	0.002059	0.004636	0.005028
145	0.000408	0.008374	0.000123	0.000705	4E-06	0.002303	0.060253	0.019358	0	0.057323	0.001665	0.002849	0.008481	1.613136	0.015227	0.000949	0	0.007383	0.002957	0.004068	0.004233
150	0.000228	0.00641	0.00011	0.000733	2.64E-05	0.002149	0.053835	0.01895	0	0.055194	0.002016	0.002648	0.008784	1.576623	0.014484	0.000543	0	0.008201	0.002998	0.005121	0.004509
155	0.00029	0.00624	0.000174	0.000825	0	0.001446	0.052965	0.019467	0	0.056008	0.001805	0.002834	0.009184	1.663309	0.015705	0.00046	0	0.008313	0.002706	0.004672	0.004211
160	0.000438	0.007913	8.74E-05	0.000748	6.96E-06	0.002144	0.054472	0.021686	0	0.056508	0.001925	0.002702	0.009735	1.398134	0.014318	0.000964	0	0.007777	0.003311	0.005191	0.003737
165	0.000298	0.005324	6.11E-05	0.000827	3.64E-06	0.001525	0.048515	0.023123	0	0.05256	0.001852	0.002564	0.011057	1.629354	0.016185	0.000314	2.84E-05	0.010445	0.002535	0.004497	0.004854
170	0.000281	0.005806	8.95E-05	0.000727	1.05E-05	0.001438	0.049731	0.020799	0	0.055674	0.001885	0.003164	0.010389	1.456236	0.015378	0.001079	0	0.009356	0.002699	0.003983	0.003716
175	0.000236	0.00553	0.000125	0.000636	0	0.001989	0.049281	0.018411	0	0.054669	0.001844	0.002759	0.008889	1.583812	0.015454	0.000523	6.4E-06	0.008823	0.002884	0.004973	0.003838
180	0.000388	0.007128	0.000113	0.00071	0	0.001056	0.052305	0.019538	0	0.0564	0.00179	0.002758	0.009078	1.599201	0.016009	0.0005	0	0.008929	0.002325	0.004297	0.004206
185	0.000347	0.00758	0.000157	0.000635	0	0.002055	0.054407	0.020624	0	0.058505	0.001834	0.00278	0.010298	1.688527	0.016344	0.000446	0	0.008854	0.002791	0.004437	0.003974
190	0.000296	0.006605	0.000142	0.00073	0	0.001253	0.052236	0.019467	0	0.05678	0.002103	0.002697	0.010664	1.86298	0.018995	0.000249	0	0.009712	0.002335	0.004161	0.004269
195	0.000284	0.004955	0.000151	0.000808	3.33E-06	0.000884	0.045251	0.0166	0	0.052982	0.00219	0.002665	0.010297	2.002438	0.019432	5.16E-05	0	0.008686	0.002047	0.00538	0.004692
200	0.000204	0.004729	6.04E-05	0.000682	0	0.00061	0.042831	0.017064	0	0.050841	0.001836	0.002448	0.010713	1.928597	0.018437	0.000116	0	0.00881	0.001871	0.004806	0.004611
205	0.000227	0.004873	0.000136	0.000842	5.86E-06	0.000445	0.039538	0.015715	0	0.047306	0.001889	0.002365	0.010698	2.016443	0.020499	0	0	0.008553	0.001652	0.005026	0.004038
210	0.00022	0.003992	0.00014	0.000827	0	0.0005	0.037817	0.0166	0	0.046347	0.001819	0.002633	0.010941	2.459442	0.0239	8.02E-06	0	0.009257	0.001159	0.005937	0.005044
215	0.000391	0.006153	0.00016	0.000882	0	0.000571	0.043596	0.018991	0	0.048331	0.001472	0.002172	0.009409	1.935824	0.01831	0	0	0.009309	0.002105	0.005074	0.004145

Depth (cm)	Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh
125	0.000459	0.0366	0.032335	0.083165	0.000633	5.84E-05	3.04E-05	0	0	0.001503	0.005712	0.011369	0.001029	0.004881	0.004685	0.002842	0.004155	0.750753	0.249247
130	0.000618	0.039747	0.031609	0.080129	0.000544	0.000102	7.39E-05	0	0	0.001187	0.005523	0.011297	0.001521	0.005101	0.004629	0.002894	0.007188	0.748278	0.251722
135	0.000142	0.037937	0.032858	0.097819	0.000332	0.00023	4.64E-05	0	0	0.00151	0.005948	0.011894	0.001021	0.00494	0.004512	0.002557	0.00495	0.746836	0.253164
140	0.000668	0.042687	0.031128	0.070974	0.000552	0.000173	6.08E-05	0	0	0.001145	0.006019	0.010946	0.001559	0.004955	0.003886	0.0026	0.006151	0.748803	0.251197
145	0.000155	0.041511	0.032674	0.084728	0.000365	0.000169	0.000113	4.8E-06	0	0.001916	0.006071	0.012523	0.001345	0.004161	0.004842	0.002681	0.003249	0.750464	0.249536
150	0.00052	0.039642	0.032309	0.090877	0.00043	0.000297	0.000122	0	0	0.00136	0.005759	0.011082	0.001121	0.004592	0.00408	0.001966	0.003691	0.753328	0.246672
155	0.000655	0.038265	0.031116	0.076888	0.000583	0.000143	0.000102	0	0	0.001632	0.005889	0.01107	0.000878	0.004124	0.00403	0.002499	0.003443	0.756872	0.243128
160	0.000138	0.036704	0.033685	0.089713	0.000397	0.000333	0.000106	0	0	0.001752	0.005899	0.012232	0.000651	0.004303	0.004303	0.00162	0.002871	0.753516	0.246484
165	0.001477	0.0362	0.0277	0.057016	0.000439	0.000181	7.27E-05	0	0	0.001451	0.005516	0.008873	0.00153	0.004137	0.003345	0.002592	0.003168	0.769699	0.230301
170	0.000791	0.036795	0.032296	0.08469	0.000568	0.000106	0.00014	0	0	0.001811	0.005608	0.011336	0.001371	0.004199	0.003757	0.002605	0.00298	0.756544	0.243456
175	0.000284	0.037008	0.0326	0.086926	0.000269	0.000274	9.36E-05	9.6E-06	0	0.001378	0.005601	0.011619	0.001025	0.00418	0.004188	0.002197	0.003496	0.753056	0.246944
180	0.0003	0.036789	0.033087	0.087488	0.000555	9.86E-05	3.93E-05	0	0	0.001521	0.00572	0.011282	0.001375	0.004406	0.004433	0.002153	0.003049	0.751608	0.248392
185	0.000279	0.036729	0.032655	0.085391	0.000418	0.000159	0.00012	0	0	0.001817	0.005752	0.011433	0.001343	0.00436	0.004251	0.002288	0.003059	0.752105	0.247895
190	0.000318	0.03783	0.030872	0.075747	0.000374	0.000103	9.17E-05	0	0	0.001556	0.005624	0.010743	0.001245	0.00429	0.003864	0.002637	0.003704	0.75345	0.24655
195	0.000365	0.037127	0.033218	0.076035	0.00033	0.000141	7.57E-05	0	0	0.000981	0.00518	0.010307	0.001039	0.004512	0.004476	0.001761	0.004235	0.747985	0.252015
200	0.000519	0.034713	0.031654	0.074431	0.000531	7.06E-05	6.21E-05	0	0	0.000851	0.004922	0.009889	0.001233	0.004303	0.004313	0.002455	0.003924	0.750452	0.249548
205	0.000193	0.032825	0.03043	0.069122	0.000601	5.95E-05	8.04E-05	0	0	0.000819	0.004324	0.009753	0.001651	0.004889	0.004398	0.002227	0.004257	0.750178	0.249822
210	0.000601	0.033246	0.028902	0.062077	0.000282	6.9E-05	1.84E-05	0	0	0.001055	0.004487	0.008533	0.00203	0.005166	0.004771	0.002398	0.005749	0.753762	0.246238
215	0.000551	0.033033	0.030166	0.068171	0.000463	0.000162	5.75E-05	0	0	0.001085	0.004273	0.008493	0.001374	0.004785	0.004108	0.002359	0.003643	0.761391	0.238609

Coring: Klein Krotzenburg (normalized counts + Al standardized)

Depth (cm)	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	As	Se
125	1	22.98039	0.419118	3.416667	0.026961	3.818627	170.2353	73.6299	0	172.9583	5.151961	7.997549	27.83578	6263.208	58.65686	0.328431	0	20.68382	6.708333	14.59314	15.10539
130	1	19.08068	0.374083	2.501222	0.06357	5.273839	166.1467	62.90709	0	176.9511	6.136919	8.344743	31.28851	7696.244	68.33741	0.112469	0	21.92665	8.356968	14.02445	13.79462
135	1	27.15823	0.677215	2.664557	0.120253	9.392405	201.6076	67.33861	0	213.4652	7.085443	11.05063	36.93671	7638.858	72.57911	0.734177	0	25.12975	10.36076	17.77848	15.21519
140	1	21.81962	0.433544	3.193038	0	7.598101	220.5253	69.5981	0	223.0253	8.617089	10.65823	38.28481	8763.5	77.36392	0.14557	0	29.33544	7.503165	16.88924	18.31962
145	1	20.50784	0.301961	1.727451	0.009804	5.639216	147.5569	47.40784	0	140.3804	4.078431	6.976471	20.77059	3950.478	37.2902	2.323529	0	18.08039	7.241176	9.962745	10.36667
150	1	28.16197	0.482394	3.221831	0.116197	9.440141	236.5176	83.25352	0	242.4894	8.855634	11.6338	38.59155	6926.736	63.6338	2.383803	0	36.02817	13.17254	22.49648	19.80986
155	1	21.50407	0.598916	2.842818	0	4.98374	182.5393	67.09214	0	193.0271	6.222222	9.766938	31.65041	5732.434	54.12466	1.585366	0	28.65041	9.325203	16.10298	14.5122
160	1	18.04586	0.199295	1.705467	0.015873	4.890653	124.231	49.45855	0	128.873	4.389771	6.162257	22.20106	3188.619	32.65432	2.197531	0	17.73545	7.552028	11.83774	8.52381
165	1	17.85366	0.204878	2.773171	0.012195	5.112195	162.6829	77.53659	0	176.2463	6.209756	8.597561	37.07561	5463.595	54.27073	1.053659	0.095122	35.02439	8.5	15.08049	16.27561
170	1	20.68966	0.318966	2.591954	0.037356	5.123563	177.204	74.11207	0	198.3822	6.715517	11.27299	37.02011	5188.96	54.79598	3.844828	0	33.33908	9.617816	14.19253	13.24138
175	1	23.44407	0.528814	2.694915	0	8.430508	208.9186	78.05085	0	231.7593	7.816949	11.69492	37.68475	6714.275	65.51525	2.216949	0.027119	37.40339	12.22712	21.08136	16.27119
180	1	18.37603	0.291322	1.830579	0	2.72314	134.845	50.36983	0	145.4029	4.613636	7.109504	23.40496	4122.862	41.27273	1.289256	0	23.02066	5.993802	11.07851	10.84298
185	1	21.86449	0.453271	1.831776	0	5.92757	156.9346	59.48832	0	168.7547	5.28972	8.018692	29.70327	4870.474	47.14486	1.287383	0	25.53972	8.049065	12.79907	11.46262
190	1	22.3125	0.480978	2.467391	0	4.230978	176.4457	65.75815	0	191.7962	7.103261	9.111413	36.02174	6292.908	64.16304	0.839674	0	32.80435	7.888587	14.05435	14.4212
195	1	17.46041	0.533724	2.847507	0.01173	3.11437	159.4545	58.4956	0	186.6979	7.715543	9.390029	36.28446	7056.229	68.47507	0.181818	0	30.60704	7.214076	18.95894	16.53372
200	1	23.17083	0.295833	3.341667	0	2.9875	209.8792	83.61667	0	249.1333	8.995833	11.99583	52.49583	9450.558	90.34583	0.566667	0	43.17083	9.166667	23.55	22.59583
205	1	21.47601	0.601476	3.712177	0.02583	1.95941	174.2399	69.25461	0	208.4686	8.324723	10.42066	47.14391	8886.166	90.33579	0	0	37.69373	7.280443	22.1476	17.79336
210	1	18.17153	0.635036	3.762774	0	2.277372	172.1241	75.55474	0	210.9489	8.281022	11.9854	49.79562	11194.11	108.781	0.036496	0	42.13139	5.273723	27.0219	22.9562
215	1	15.73929	0.409683	2.256983	0	1.459963	111.514	48.57728	0	123.6276	3.765363	5.554935	24.06704	4951.669	46.83426	0	0	23.81192	5.383613	12.97952	10.60149
													34.64509	**6544.836**				**29.58508**			

Depth (cm)	Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh
125	1.406863	112.098	99.03431	254.7132	1.938725	0.178922	0.093137	0	0	4.602941	17.4951	34.82108	3.151961	14.94853	14.34804	8.705882	12.72549	2299.377	763.3824
130	1.799511	115.6846	91.99756	233.2152	1.581907	0.298289	0.215159	0	0	3.454768	16.07335	32.8802	4.425428	14.84597	13.47188	8.422983	20.92176	2177.858	732.6357
135	0.541139	144.8291	125.4399	373.4335	1.265823	0.879747	0.177215	0	0	5.762658	22.7057	45.40823	3.898734	18.86076	17.22468	9.762658	18.89557	2851.111	966.4778
140	2.433544	155.5285	113.4146	258.5918	2.012658	0.629747	0.221519	0	0	4.170886	21.93038	39.88291	5.68038	18.0538	14.15823	9.471519	22.41139	2728.228	915.2247
145	0.378431	101.6569	80.01765	207.4941	0.894118	0.413725	0.276471	0.011765	0	4.692157	14.86667	30.66863	3.294118	10.1902	11.85882	6.566667	7.956863	1837.843	611.1
150	2.285211	174.162	141.9472	399.2606	1.890845	1.306338	0.535211	0	0	5.975352	25.30282	48.68662	4.926056	20.17606	17.92606	8.637324	16.21479	3309.673	1083.729
155	2.257453	131.8753	107.2385	264.9864	2.00813	0.493225	0.352304	0	0	5.626016	20.29539	38.15176	3.0271	14.21409	13.88889	8.612466	11.86721	2608.485	837.9187
160	0.313933	83.70899	76.82363	204.6014	0.906526	0.758377	0.241623	0	0	3.994709	13.45326	27.89594	1.485009	9.813051	9.813051	3.694885	6.548501	1718.487	562.1376
165	4.95122	121.3854	92.88537	191.1878	1.470732	0.607317	0.243902	0	0	4.865854	18.49756	29.75366	5.129268	13.87317	11.21707	8.690244	10.62439	2580.976	772.2512
170	2.818966	131.1121	115.0805	301.773	2.022989	0.37931	0.5	0	0	6.454023	19.98276	40.39368	4.885057	14.96264	13.38793	9.281609	10.61782	2695.77	867.4971
175	1.20339	156.8881	138.2	368.5051	1.138983	1.162712	0.39661	0.040678	0	5.840678	23.74237	49.25763	4.345763	17.72203	17.75254	9.315254	14.82034	3192.441	1046.871
180	0.772727	94.84504	85.30165	225.5496	1.431818	0.254132	0.10124	0	0	3.921488	14.74587	29.08678	3.545455	11.3595	11.42769	5.549587	7.86157	1937.702	640.374
185	0.803738	105.9416	94.19159	246.3061	1.205607	0.457944	0.345794	0	0	5.240654	16.59112	32.97664	3.873832	12.57477	12.26168	6.600467	8.82243	2169.411	715.0397
190	1.07337	127.7853	104.2826	255.8641	1.263587	0.347826	0.309783	0	0	5.255435	18.99728	36.28804	4.206522	14.49185	13.05163	8.907609	12.51087	2545.057	832.8152
195	1.284457	130.8299	117.0528	267.9326	1.164223	0.498534	0.266862	0	0	3.457478	18.2522	36.31965	3.662757	15.90029	15.77419	6.205279	14.92375	2635.762	888.0557
200	2.541667	170.1	155.1125	364.7292	2.604167	0.345833	0.304167	0	0	4.170833	24.11667	48.45833	6.041667	21.0875	21.13333	12.02917	19.22917	3677.383	1222.842
205	0.852399	144.6531	134.0996	304.6089	2.649446	0.261993	0.354244	0	0	3.608856	19.05535	42.97786	7.276753	21.54613	19.38007	9.815498	18.76015	3305.923	1100.93
210	2.737226	151.3175	131.5474	282.5438	1.284672	0.313869	0.083942	0	0	4.80292	20.42336	38.83577	9.240876	23.51095	21.71533	10.91606	26.16423	3430.734	1120.748
215	1.409683	84.49534	77.16201	174.3762	1.184358	0.41527	0.147114	0	0	2.776536	10.92924	21.72439	3.513966	12.23836	10.50838	6.03352	9.318436	1947.572	610.3408
		128.363	**109.5173**													**8.274667**			

Surface Samples (ppm)

SAMPLE	Sr	Rb	Pb	Zn	Fe	Mn
9a	83.93	71.62	38.9	157.89	13209.57	479.38
9b	90.8	69.13	46.75	222.75	14174.58	550.84
18a	115.42	72.68	47.14	153.98	16452.15	493.14
18b	99.32	62.38	52.96	95	13313.63	462.91
AVG	**97.3675**	**68.9525**	**46.4375**	**157.405**	**14287.48**	**496.5675**

Appendix 5A

Moselle

Coring: Kenn (normalized counts)

Depth (cm)	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	As	Se	Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh
10	0.000208	0.002231	0.000168	0.000905	0	0.000654	0.032573	0.014141	0	0.03412	0.001496	0.002544	*0.018427*	*1.523494*	0.015727	0.000182	0.001408	*0.047371*	0.000915	0.00397	0.004433	0.002064	*0.033343*	*0.02578*	0.042039	0.000211	9.62E-05	8.37E-05	1.02E-05	0	0.000664	0.00502	0.006501	0.00135	0.004717	0.00271	*0.007612*	0.00296	0.782105	0.217895
15	0.000261	0.003861	0.000211	0.00098	2.55E-06	0.000954	0.046159	0.012509	0	0.045012	0.001792	0.002707	*0.025642*	*1.829588*	0.01829	0.000399	0.000796	*0.036032*	0.001827	0.005508	0.005084	0.001997	*0.039662*	*0.028712*	0.046954	0.00031	0.000112	7.77E-05	0	0	0.000699	0.005392	0.007695	0.00166	0.005053	0.003612	*0.00699*	0.00401	0.771014	0.228986
20	0.000283	0.004344	0.000183	0.000868	0	0.001502	0.053366	0.012508	0	0.050316	0.002104	0.003174	*0.026995*	*2.033477*	0.018742	0.000814	0.00068	*0.03332*	0.00209	0.005436	0.004858	0.001677	*0.042317*	*0.029878*	0.049187	0.000534	0.000122	0.000106	0	0	0.001019	0.006058	0.008674	0.001315	0.00479	0.003796	*0.006856*	0.004736	0.76545	0.23455
25	0.000329	0.005903	0.000182	0.000923	0	0.001801	0.063669	0.012859	0	0.054689	0.002297	0.003241	*0.024867*	*2.043517*	0.018689	0.000866	0.000742	*0.02674*	0.003259	0.005752	0.004914	0.000762	*0.044433*	*0.030889*	0.051496	0.000596	0.000138	8.37E-05	0	0	0.001111	0.005363	0.010165	0.001067	0.004974	0.004626	*0.006283*	0.003774	0.75738	0.24262
30	0.00035	0.006788	0.000227	0.001021	4.25E-06	0.002295	0.072883	0.01133	0	0.062754	0.002277	0.003761	*0.027571*	*2.322807*	0.021722	0.001247	0.001111	*0.024884*	0.003439	0.006501	0.005289	0.000921	*0.049185*	*0.032778*	0.055151	0.000573	0.000297	8.49E-05	0	0	0.001582	0.005925	0.010085	0.001463	0.005765	0.004484	*0.005699*	0.005389	0.75436	0.24564
35	0.000403	0.006907	0.000157	0.000942	6.47E-06	0.002355	0.076743	0.01095	0	0.067953	0.002694	0.003824	*0.027768*	*2.679204*	0.024327	0.000741	0.000495	*0.019928*	0.00288	0.006892	0.005548	0.000671	*0.052793*	*0.033461*	0.057059	0.000765	0.000303	8.05E-05	0	0	0.001732	0.006116	0.009579	0.001879	0.005434	0.004542	*0.00551*	0.006528	0.750221	0.249779
40	0.00052	0.007441	0.000222	0.001023	3.81E-06	0.002006	0.082839	0.010007	0	0.073331	0.002896	0.004226	*0.024944*	*2.864377*	0.025986	0.000648	2.06E-05	*0.017122*	0.003039	0.008689	0.005791	0.000556	*0.056179*	*0.0346*	0.057139	0.000551	0.000247	0.000107	0	0	0.001832	0.006148	0.009757	0.001684	0.005334	0.004515	*0.00398*	0.00723	0.747988	0.252012
45	0.000563	0.008344	0.000149	0.000931	7.74E-06	0.002046	0.089463	0.009927	0	0.080084	0.003304	0.004394	*0.021967*	*3.131638*	0.028003	0.000741	1.7E-05	*0.018168*	0.003187	0.0074	0.006067	0.000759	*0.06004*	*0.03654*	0.056399	0.000501	0.000241	9.75E-05	0	0	0.001752	0.005987	0.009591	0.002116	0.005622	0.004693	*0.004659*	0.007764	0.744	0.256
50	0.000422	0.007056	0.000135	0.000881	0	0.002168	0.085943	0.00927	0	0.07761	0.003249	0.004498	*0.020821*	*3.210773*	0.03047	0.001157	0	*0.016675*	0.003189	0.007462	0.006024	0.000657	*0.060639*	*0.03685*	0.055398	0.000494	0.000187	3.37E-05	0	0	0.001676	0.006051	0.00961	0.00219	0.005857	0.004469	*0.004547*	0.008546	0.743751	0.256249
55	0.000373	0.006885	0.000185	0.000858	0	0.002272	0.084629	0.009291	0	0.077188	0.002978	0.004407	*0.019932*	*3.148108*	0.028189	0.000358	3.88E-06	*0.017477*	0.002588	0.007992	0.007089	0.000412	*0.059414*	*0.036469*	0.053028	0.000537	0.000287	9.94E-05	0	0	0.001765	0.006068	0.009551	0.002877	0.00567	0.004807	*0.004091*	0.008605	0.745045	0.254955
60	0.000599	0.008687	0.000247	0.00105	0	0.001976	0.094887	0.011142	0	0.08313	0.003359	0.004827	*0.022467*	*3.746324*	0.033771	0.000326	0	*0.017156*	0.003477	0.010135	0.006485	0.000805	*0.061741*	*0.038363*	0.054082	0.000515	0.000233	1.65E-05	0	0	0.001996	0.006107	0.009715	0.001894	0.005723	0.00454	*0.00492*	0.010466	0.73867	0.26133

Coring: Kenn (normalized counts + Al standardized)

Depth (cm)	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	As	Se	Br	Rb	Sr	Zr	Ag	Cd	Sn	Sb	Cs	Ba	Ta	W	Ir	Au	Hg	Pb	D1	Mo inc	Mo coh
10	1	10.71311	0.808743	4.346995	0	3.142077	156.3825	67.89344	0	163.8115	7.18306	12.21585	*88.46995*	*7314.363*	75.5082	0.874317	6.759563	*227.429*	4.393443	19.06011	21.28142	9.909836	*160.082*	*123.7705*	201.8333	1.010929	0.461749	0.401639	0.04918	0	3.185792	24.10109	31.21311	6.480874	22.64481	13.01093	*36.54645*	14.21038	3754.918	1046.126
15	1	14.78537	0.807317	3.75122	0.009756	3.653659	176.7756	47.90732	0	172.3829	6.860976	10.36585	*98.20244*	*7006.805*	70.04634	1.529268	3.04878	*137.9927*	6.997561	21.09268	19.47073	7.64878	*151.8951*	*109.9585*	179.8195	1.187805	0.429268	0.297561	0	0	2.678049	20.64878	29.46829	6.356098	19.35122	13.83415	*26.76829*	15.35854	2952.766	876.9512
20	1	15.34732	0.645688	3.067599	0	5.305361	188.5268	44.18648	0	177.7506	7.433566	11.21445	*95.36597*	*7183.667*	66.20979	2.876457	2.403263	*117.7086*	7.382284	19.20513	17.16317	5.925408	*149.4942*	*105.5501*	173.7622	1.885781	0.431235	0.375291	0	0	3.601399	21.40093	30.64103	6.645688	16.92308	13.41026	*24.21911*	16.73193	2704.107	828.5944
25	1	17.95789	0.553684	2.808421	0	5.48	193.6884	39.11789	0	166.3705	6.987368	9.861053	*75.64842*	*6216.653*	56.85474	2.635789	2.256842	*81.34737*	9.915789	17.49684	14.94947	2.317895	*135.1726*	*93.96842*	156.6589	1.812632	0.418947	0.254737	0	0	3.378947	16.31368	30.92421	3.246316	15.13263	14.07368	*19.11368*	11.48	2304.053	738.0821
30	1	19.41498	0.649798	2.921053	0.012146	6.564777	208.4615	32.40688	0	179.4899	6.512146	10.75709	*78.8583*	*6643.698*	62.12955	3.566802	3.178138	*71.17206*	9.836032	18.59514	15.12753	2.635628	*140.6802*	*93.75304*	157.7429	1.637652	0.850202	0.242915	0	0	4.524291	16.94534	28.84413	4.184211	16.48785	12.82389	*16.2996*	15.41296	2157.621	702.581
35	1	17.12478	0.390374	2.335116	0.016043	5.83779	190.2709	27.14973	0	168.4777	6.679144	9.481283	*68.84492*	*6642.617*	60.31551	1.836007	1.228164	*49.4082*	7.14082	17.08734	13.75579	1.663102	*130.8913*	*82.96078*	141.4688	1.896613	0.752228	0.199643	0	0	4.294118	15.16399	23.75045	4.657754	13.47237	11.26203	*13.66132*	16.18538	1860.041	619.2834
40	1	14.30352	0.426686	1.966276	0.007331	3.856305	159.2302	19.2346	0	140.9531	5.565982	8.123167	*47.94575*	*5505.774*	49.94868	1.244868	0.039589	*32.91056*	5.841642	16.70088	11.1305	1.068915	*107.9839*	*66.50587*	109.8299	1.058651	0.475073	0.205279	0	0	3.520528	11.81672	18.75513	3.237537	10.25367	8.678886	*7.64956*	13.89736	1437.748	484.4062
45	1	14.81181	0.26511	1.652473	0.013736	3.631868	158.8104	17.62225	0	142.1621	5.865385	7.800824	*38.99451*	*5559.152*	49.71016	1.31456	0.03022	*32.25137*	5.657967	13.13599	10.76923	1.347527	*106.581*	*64.86401*	100.1168	0.888736	0.427198	0.173077	0	0	3.10989	10.62775	17.02473	3.756868	9.980769	8.331044	*8.270604*	13.78297	1320.718	454.4396
50	1	16.7119	0.319703	2.085502	0	5.133829	203.5539	21.95539	0	183.816	7.695167	10.65428	*49.31413*	*7604.615*	72.16729	2.739777	0	*39.49442*	7.553903	17.67286	14.26766	1.555762	*143.6208*	*87.27881*	131.2082	1.171004	0.442379	0.079926	0	0	3.97026	14.33086	22.76208	5.185874	13.87175	10.58364	*10.76952*	20.24164	1761.55	606.9182
55	1	18.46875	0.495833	2.302083	0	6.09375	227.0167	24.92292	0	207.0563	7.989583	11.82292	*53.46667*	*8444.827*	75.61667	0.960417	0.010417	*46.88333*	6.941667	21.4375	19.01667	1.104167	*159.3792*	*97.82708*	142.2479	1.441667	0.76875	0.266667	0	0	4.735417	16.27708	25.62083	7.716667	15.21042	12.89375	*10.975*	23.08333	1998.59	683.9188
60	1	14.50986	0.412615	1.754271	0	3.30092	158.4875	18.60972	0	138.8502	5.611038	8.061761	*37.52562*	*6257.38*	56.40604	0.545335	0	*28.6544*	5.806833	16.92773	10.8318	1.344284	*103.1248*	*64.07622*	90.33114	0.86071	0.388962	0.027595	0	0	3.333771	10.19974	16.22733	3.162943	9.558476	7.583443	*8.218134*	17.48095	1233.779	436.4928
													45.79667	***4649.728***				***54.08366***					***93.07519***	***61.91851***													***11.40709***			

Surface Samples (ppm)

SAMPLE	Sr	Rb	Pb	Zn	Fe	Mn
4a	70.82	71.41	177.62	400.76	24922.02	762.55
4b	80.85	74.19	221.26	489.89	28117.29	849.7
5a	65.01	78.49	65.87	235.18	17857.47	591.98
5b	66.25	78.04	65.86	183.58	17507.35	641.65
23a	109.44	74.86	54.89	164.58	18596.54	666.18
23b	102.59	71.85	68.38	226.04	19197.68	783.69
24a	108.68	84.45	86.6	327.72	24903.32	838.78
24b	113.81	84.78	160.74	478.42	26497.6	911.58
25a	120.73	80.6	65.6	271.18	24013.7	1230.35
25b	108.35	78.8	69.57	274.04	22998.68	1070.6
AVG	**94.653**	**77.747**	**103.639**	**305.139**	**22461.17**	**834.706**

Appendix 4

Handheld XRF elemental counts of surface samples

Surface samples Location is given in relative Rhine kilometers

Moselle Exact sampling locations are in Appendix 3

Neckar In the most right column are the calculated mean error percentages (in bold the percentages < 15 %)

Main

Oberrhein

SAMPLE	4a	4b	5a	5b	9a	9b	11a	11b	12a	12b	13a	13b	14a	14b	16a	16b	17a	17b	18a	18b	19a	19b	20a	20b	21a	21b	22a	22b	23a	23b	24a	24b	25a	25b	26a	26b	27a	27b	28a	28b	29a	29b	MEAN ERROR%
LOCATION	412	412	412	412	433	433	311	311	311	311	410	410	418	418	395	395	395	395	476	476	465	465	465	465	515	515	515	515	570	570	570	570	570	570	613	613	613	613	655	655	655	655	
Sb	-146.85	-139.77	-144.55	-95.35	-113.07	-81.26	-79.85	-80.84	-98.45	-66.78	-101.8	-108.47	-95.33	-84.2	-94.12	-128.08	-128.98	-123.17	-139.06	-130.7	-155.28	-112.32	-113.83	-136.92	-147.18	-146.08	-122.88	-103.11	-74.28	-136.17	-134.32	-105.54	-128.45	-135.84	-119.89	-88.04	-128.43	-134.76	-95.56	-80.99	-87.56	-98.93	
Sb Error	24.08	25.15	25.08	25.37	23.95	25.41	27.36	27.16	27.07	27.64	25.95	25.24	25.85	25.94	26.38	25.43	26.5	26.08	24.84	24.75	26.12	26.37	24.7	25.94	25.16	26.85	25.37	25.91	26.46	24.91	25.93	26.15	26.1	25.65	25.52	27.65	25.91	25.87	24.56	27.39	26.11	25.01	
%error	-16.3977	-17.9938	-17.3504	-26.6072	-21.1816	-31.27	-34.2642	-33.5972	-27.4962	-41.3896	-25.4912	-23.2691	-27.1163	-30.8076	-28.028	-19.8548	-20.5458	-21.174	-17.8628	-18.9365	-16.8212	-23.4776	-21.699	-18.9454	-17.0947	-18.3803	-20.6462	-25.1285	-35.622	-18.2933	-19.3046	-24.7773	-20.3192	-18.8825	-21.2862	-31.4062	-20.1744	-19.1971	-25.7011	-33.819	-29.8196	-25.2805	23.96929
Sn	-94.09	-83.54	-86.08	-75.3	-86.85	-78.28	-60.09	-60.88	-66.99	-66.9	-73.19	-97.71	-58.9	-61.12	-66.53	-75.78	-68.35	-65.75	-108.92	-84.48	-84.15	-80.91	-77.27	-81.51	-104.46	-91.81	-86.76	-80.5	-54.95	-99.36	-93.76	-78.06	-112.26	-96.4	-90.06	-59.71	-74.71	-81.81	-65.43	-71.06	-52.86	-64.67	
Sn Error	20.98	21.98	21.87	21.89	20.67	21.81	23.61	23.45	23.45	23.73	22.45	21.66	22.39	22.41	22.81	22.09	23.09	22.71	21.44	21.47	22.84	22.8	21.38	22.59	21.78	23.34	21.94	22.34	22.88	21.57	22.53	22.68	22.47	22.26	22.09	24.01	22.59	22.54	21.25	23.55	22.64	21.64	
%error	-22.2978	-26.3107	-25.4066	-29.0704	-23.7997	-27.8615	-39.2911	-38.5184	-35.0052	-35.4709	-30.6736	-22.1676	-38.0136	-36.6656	-34.2853	-29.1502	-33.782	-34.5399	-19.6842	-25.4143	-27.142	-28.1795	-27.6692	-27.7144	-20.8501	-25.4221	-25.2882	-27.7516	-41.6379	-21.7089	-24.0294	-29.0546	-20.016	-23.0913	-24.5281	-40.211	-30.2369	-27.5516	-32.4775	-33.141	-42.8301	-33.4622	29.55719
Cd	-38.64	-28.85	-36.49	-30.55	-33.13	-27.59	-17.74	-27.46	-30.17	-19.24	-31.84	-30.59	-21.13	-26.05	-36.58	-35.96	-29.94	-44.14	-37.22	-31.86	-40.68	-37.31	-22.19	-34.04	-31.6	-33.53	-33.54	-30.81	-22	-34.85	-37.01	-32.42	-26.34	-28.29	-35.2	-22.83	-28.39	-29.09	-27.24	-23.26	-25.57	-25.37	
Cd Error	8.13	8.58	8.49	8.54	8.07	8.55	9.3	9.13	9.11	9.35	8.73	8.51	8.8	8.75	8.79	8.57	9	8.68	8.38	8.39	8.8	8.82	8.44	8.78	8.57	9.11	8.56	8.72	8.95	8.43	8.74	8.79	8.9	8.75	8.59	9.36	8.81	8.81	8.3	9.27	8.83	8.48	
%error	-21.0404	-29.74	-23.2666	-27.9542	-24.2124	-30.5466	-52.4239	-33.2484	-30.1956	-48.5967	-27.4183	-27.4605	-41.6469	-33.5893	-24.0295	-23.832	-30.0601	-19.6647	-22.5148	-26.334	-21.6323	-23.6398	-38.0352	-25.7932	-27.1203	-27.1697	-25.5218	-28.3025	-40.6818	-24.1894	-23.6152	-27.1129	-33.7889	-30.9297	-24.4034	-40.9987	-31.0321	-30.2853	-30.4699	-39.8538	-34.5327	-33.4253	30.00735
Ag	-25.72	-16.5	-17.72	-22.72	-16.13	-16.34	-16.57	-16.65	-13.78	-13.95	-16.39	-19.97	-16.26	-12.96	-15.94	-27.17	-16.93	-20.06	-20.96	-17.22	-23.43	-20.31	-16.1	-17.69	-21.08	-17.7	-21.41	-18.34	-10.88	-20.85	-19.46	-15.73	-16.68	-13.85	-21.28	-11.41	-18.49	-21.86	-10.14	-16.53	-14.34	-18.64	
Ag Error	5.09	5.46	5.43	5.33	5.17	5.43	5.82	5.79	5.84	5.91	5.57	5.37	5.54	5.6	5.65	5.31	5.71	5.56	5.31	5.34	5.56	5.6	5.32	5.59	5.39	5.8	5.39	5.52	5.73	5.33	5.56	5.63	5.63	5.6	5.42	5.99	5.56	5.51	5.36	5.84	5.62	5.33	
%error	-19.79	-33.0909	-30.6433	-23.4595	-32.0521	-33.2313	-35.1237	-34.7748	-42.3803	-42.3656	-33.9841	-26.8903	-34.0713	-43.2099	-35.4454	-19.5436	-33.7271	-27.7168	-25.334	-31.0105	-23.7303	-27.5726	-33.0435	-31.5998	-25.5693	-32.7684	-25.1752	-30.0981	-52.6654	-25.5635	-28.5714	-35.7915	-33.753	-40.4332	-25.4699	-52.4978	-30.0703	-25.2059	-52.86	-35.3297	-39.1911	-28.5944	32.69997
Sr	70.82	80.85	65.01	66.25	83.93	90.8	134.55	123.9	110.19	110.81	115.87	121.98	119.32	118.81	162.99	164.12	175.52	209.3	115.42	99.32	173.13	163.62	153.58	168.79	151.8	163.04	167.94	185.97	109.44	102.59	108.68	113.81	120.73	108.35	103.35	107.08	114.2	118.79	119.24	125.18	92.64	96.09	
Sr Error	3.46	3.79	3.47	3.48	3.63	3.94	4.96	4.76	4.54	4.6	4.48	4.46	4.5	4.49	5.25	5.14	5.51	5.87	4.33	4.04	5.45	5.3	4.83	5.32	4.95	5.43	5.19	5.49	4.41	4.13	4.39	4.47	4.61	4.34	4.22	4.58	4.47	4.55	4.28	4.85	4.09	3.98	
%error	4.885626	4.687693	5.33764	5.25283	4.3250333	4.3392027	3.686362	3.841808	4.1201565	4.155125	3.866402	3.6560337	3.771371	3.779143	3.221057	3.131855	3.139243	2.804587	3.7515516	4.06766	3.147924	3.239213	3.144941	3.151845	3.26087	3.330471	3.090389	2.952089	4.029605	4.025734	4.039382	3.927599	3.818438	4.005538	4.083212	4.277176	3.914186	3.830289	3.5894	3.874421	4.41494	4.14199	**3.835866**
Rb	71.41	74.19	78.49	78.04	71.62	69.13	63.02	62.19	68.92	65.15	67.65	65.49	57.7	59.49	56.81	60.32	62.54	50.46	72.68	62.38	75.53	63.74	69.89	76.82	71.49	66.13	69.1	62.38	74.86	71.85	84.45	84.78	80.6	78.8	79.58	82.96	82.96	81.64	62.24	64.85	65.6	61.57	
Rb Error	3.55	3.75	3.82	3.8	3.48	3.6	3.69	3.65	3.82	3.77	3.66	3.52	3.4	3.44	3.44	3.45	3.65	3.28	3.66	3.4	3.94	3.65	3.55	3.91	3.7	3.8	3.65	3.54	3.86	3.65	4.07	4.07	4	3.91	3.89	4.23	4.02	4	3.34	3.77	3.62	3.38	Rb
%error	4.971293	5.05459	4.866862	4.869298	4.858978	5.20758	5.855284	5.869111	5.542658	5.786646	5.4102	5.374866	5.892548	5.782484	6.055272	5.719496	5.836265	6.500198	5.035773	5.450465	5.21647	5.726388	5.079411	5.08982	5.175549	5.746257	5.2822	5.674896	5.156292	5.080028	4.81942	4.800661	4.962779	4.961929	4.888163	5.098843	4.845709	4.899559	5.366324	5.813416	5.518293	5.489687	**5.34838**
Pb	177.62	221.26	65.87	65.86	38.9	46.75	39	30.94	42.72	35.01	38.28	49.19	44.85	65.24	12.72	13.54	46.19	17.43	47.14	52.96	86.36	80.56	45.81	75.46	75.8	85.73	64.16	47.09	54.89	68.38	86.6	160.74	65.6	69.57	100.69	171.11	84.01	132.48	48.41	52.64	35.68	36.51	
Pb Error	11.05	12.68	7.71	7.7	6.1	6.81	6.94	6.44	7.06	6.74	6.57	6.99	6.85	7.8	5.15	5.03	7.17	5.48	6.79	7.05	8.87	8.64	6.68	8.32	8.15	9.05	7.68	7.03	7.48	7.74	8.82	11.3	7.96	8.01	9.18	12.17	8.65	10.4	6.68	7.69	6.48	6.26	Pb
%error	6.221146	5.730814	11.70487	11.69147	15.68123	14.56684	17.79487	20.81448	16.52622	19.25164	17.16301	14.21021	15.27313	11.95586	40.48742	37.14919	15.52284	31.44005	14.4039	13.31193	10.27096	10.72493	14.58197	11.02571	10.75198	10.5564	11.97007	14.92886	13.62725	11.3191	10.18476	7.029986	12.13415	11.51358	9.117092	7.112384	10.29639	7.850242	13.7988	14.60866	18.16143	17.14599	**14.51457**
Se	-0.42	2.31	1.65	2.48	-0.21	0.69	2.87	1.73	0.82	1.09	0.52	3.77	0.47	1.49	0.71	-1.02	1.14	1.21	1.1	3.44	-0.58	1.06	3.13	-0.35	1.09	-0.07	0.99	2.21	2.04	1.29	4.08	2.24	2.23	1.66	3.54	0.76	0.96	1.98	0.72	3.28	1.76	2.37	
Se Error	2.13	2.47	2.29	2.35	2	2.18	2.54	2.43	2.37	2.42	2.23	2.42	2.22	2.32	2.26	2.05	2.35	2.3	2.2	2.36	2.25	2.36	2.33	2.22	2.26	2.35	2.26	2.38	2.39	2.25	2.57	2.51	2.42	2.34	2.49	2.54	2.32	2.44	2.12	2.58	2.32	2.27	
%error	-507.143	106.9264	138.7879	94.75806	-952.381	315.942	88.50174	140.4624	289.0244	222.0183	428.8462	64.19098	472.3404	155.7047	318.3099	-200.98	206.1404	190.0826	200	68.60465	-387.931	222.6415	74.44089	-634.286	207.3394	-3357.14	228.2828	107.6923	117.1569	174.4186	62.9902	112.0536	108.5202	140.9639	70.33898	334.2105	241.6667	123.2323	294.4444	78.65854	131.8182	95.78059	296.837
As	22.78	14.64	13.24	10.57	11.38	7.09	4.5	10.55	9.13	11.44	11.53	12.67	6.05	9.34	8.56	11.21	6.43	2.57	10.45	13.64	12.55	19.06	11.66	9.22	13.59	17.1	20.24	15.98	6.19	10.44	15.12	18.2	5.09	9.25	13.37	20.13	5.63	8.57	6.39	9.25	10.07	8.89	
As Error	7.84	8.73	5.53	5.44	4.46	4.77	4.77	4.71	5.04	4.95	4.81	5.06	4.77	5.48	3.84	3.88	4.99	3.73	4.87	5.12	6.28	6.32	4.83	5.82	5.82	6.55	5.75	5.23	5.18	5.47	6.29	7.94	5.45	5.62	6.46	8.58	5.91	7.12	4.65	5.43	4.69	4.48	
%error	34.41615	59.63115	41.76737	51.46641	39.19156	67.27786	106	44.64455	55.20263	43.26923	41.71726	39.93686	78.84298	58.67238	44.85981	34.61195	77.60498	145.1362	46.60287	37.53666	50.03984	33.15845	41.42367	63.12364	42.82561	38.30409	28.40909	32.72841	83.68336	52.39464	41.60053	43.62637	107.0727	60.75676	48.31713	42.62295	104.9734	83.08051	72.76995	58.7027	46.57398	50.3937	56.54691
Hg	1.62	3.35	4.28	2.18	0.06	-0.2	0.7	-1.01	4.44	3.12	2.12	3.5	4.35	1.82	-1.3	0.98	-2.77	3	-0.47	0.45	3.99	0.72	3.12	-0.1	-0.71	3.34	3.9	-0.36	-1.26	4.74	-0.28	2.17	0.12	2.44	3.46	4.34	0.83	1.43	0.83	1.66	2.35	-1.35	
Hg Error	3.01	3.28	3.25	3.13	2.82	2.98	3.3	3.16	3.49	3.47	3.19	3.18	3.3	3.17	3.05	3.06	3	3.27	2.93	2.95	3.42	3.21	3.12	3.13	2.98	3.48	3.24	3.06	3.05	3.24	3.14	3.34	3.16	3.24	3.28	3.65	3.18	3.24	2.93	3.32	3.19	2.85	
%error	185.8025	97.91045	75.93458	143.578	4700	-1490	471.4286	-312.871	78.6036	111.2179	150.4717	90.85714	75.86207	174.1758	-234.615	312.2449	-108.303	109	-623.404	655.5556	85.71429	445.8333	100	-3130	-419.718	104.1916	83.07692	-850	-242.063	68.35443	-1121.43	153.9171	2633.333	132.7869	94.79769	84.10138	383.1325	226.5734	353.012	200	135.7447	-211.111	510.9697
Zn	400.76	489.89	235.18	183.58	157.89	222.75	81.64	73.73	113.65	141.33	149.57	154.55	167.07	174.67	37.63	41.97	111.65	34.45	153.98	95	219.97	187.43	151.27	214.07	184.1	215.97	119.86	83.34	164.58	226.04	327.72	478.42	271.18	274.04	350.83	452.07	279.47	384.48	141.26	152.91	114.55	112.86	
Zn Error	20.15	22.88	16.74	15.21	13.6	16.26	12.68	12.25	13.87	15.01	14.53	14.29	14.91	15.18	10.24	10.08	13.46	9.92	14.18	12	17.11	16.02	13.9	16.7	15.36	17.37	13.24	12.07	15.19	16.38	19.79	23.2	18.44	18.24	19.98	23.81	18.49	21.1	13.33	15.21	13.21	12.62	Zn
%error	5.027947	4.670436	7.117952	8.285216	8.613592	7.299663	15.5316	16.61468	12.20414	10.62053	9.714515	9.246199	8.924403	8.690674	27.21233	24.01716	12.05553	28.79536	9.208988	12.63158	7.778333	8.547191	9.188868	7.801187	8.343292	8.042784	11.04622	14.48284	9.229554	7.246505	6.038692	4.849296	6.799911	6.655963	5.695066	5.266883	6.616095	5.487932	9.4365	9.947028	11.53208	11.182	**10.18325**
Cu	46.73	60.98	36.62	23.03	35.71	46.65	34.01	29.79	36.03	31.76	62.78	61.3	43.91	51.58	30.76	15.25	41.45	27.5	44.76	34.1	74.1	56.83	49.72	70.4	56.47	67.85	35.16	37.56	25.28	33.14	41.71	50.12	47.79	53.56	55.25	53.87	39.25	58.4	32.68	18.42	21.44	26.26	
Cu Error	12.41	13.69	12.3	11.65	11.51	12.71	13.3	12.93	13.33	13.26	13.85	13.42	12.96	13.3	12.63	11.34	13.28	12.34	12.6	11.92	14.84	13.96	12.72	14.48	13.47	14.99	12.42	12.77	12.27	12.13	13.2	13.7	13.6	13.59	13.5	14.66	13.02	13.96	11.64	12.18	11.71	11.51	
%error	26.55682	22.44998	33.5882	50.58619	32.23187	27.24544	39.10615	43.40383	36.99695	41.75063	22.06117	21.89233	29.51492	25.78519	41.05982	74.36066	32.0386	44.87273	28.15013	34.95601	20.02699	24.56449	25.58327	20.56818	23.85337	22.09285	35.32423	33.99894	48.53639	36.60229	31.64709	27.3344	28.45784	25.37341	24.43439	27.21366	33.17197	23.90411	35.61812	66.12378	54.61754	43.83092	33.8449
Ni	61.41	37.71	25.75	45.47	22.42	27.05	60.77	45.27	67.52	42.36	30.75	31.73	76.15	53.07	41.43	36.9	18.12	44.96	60.85	46.53	34.09	22.43	32.58	35.49	81.49	40.48	60.68	48.86	35.07	64.15	47.65	42.53	88.31	66.6	35.65	35.73	56.45	44.55	16.16	15.71	20.56	24.83	
Ni Error	27.08	28.23	25.97	26.54	23.91	25.54	29.28	28.68	29.71	28.97	26.5	26.17	27.55	26.96	27	26.35	26.41	26.58	26.9	25.76	27.63	26.76	25.32	27.45	28.46	28.68	27.23	27.07	27.37	27.57	29.15	28.89	30.13	28.93	28.03	30.33	29.12	29.07	24.06	26.72	25.74	24.94	
%error	44.09705	74.86078	100.8544	58.36815	106.6459	94.41774	48.18167	63.35321	44.00178	68.38999	86.17886	82.47715	36.17859	50.80083	65.17017	71.40921	145.7506	59.11922	44.20707	55.36213	81.05016	119.3045	77.71639	77.34573	34.92453	70.8498	44.87475	55.40319	78.04391	42.9774	61.17524	67.92852	34.11845	43.43844	78.62553	84.88665	51.58547	65.25253	148.8861	170.0827	125.1946	100.443	74.14124
Co	68.39	223.69	84.45	29.86	82.65	87.4	54.5	139.08	114.84	130.86	72.7	176.67	-41.13	22.84	53.44	137.12	121.63	34.82	49.36	50.28	96.69	101.65	68.36	132.09	123.55	160.33	64.71	57.61	64	100.94	226.85	142.52	35.78	101.71	249.43	160.27	197.18	254.05	92.72	73.54	77.52	83.69	
Co Error	106.44	118.99	94.08	92.05	77.53	84.18	95.94	96.23	98.31	97.97	90.06	86.97	77.71	82.33	81.69	82.04	79.72	68.88	89.09	80.21	96.51	90.4	83.74	95.16	90.65	94.64	85.23	84.24	98.58	96.88	115.28	117.39	111.24	108.47	111.14	126.08	110.5	115.11	75.49	84.99	82.4	79.39	
%error	155.6368	53.19415	111.4032	308.2719	93.8052	96.31579	176.0367	69.19039	85.60606	74.86627	123.879	49.22737	-188.938	360.4641	152.863	59.83081	65.54304	197.8173	180.4903	159.5267	99.81384	88.93261	122.4985	72.04179	73.3711	59.02825	131.7107	146.2246	154.0313	95.97781	50.81772	82.36739	310.8999	106.6463	44.55759	78.66725	56.04017	45.30998	81.41717	115.5698	106.2951	94.86199	118.5711
Fe	24922.02	28117.29	17857.47	17507.35	13209.57	14174.58	16601.45	16351.25	17245.48	16608.46	15578.21	14626.23	12249.27	13385.82	12463.3	12709.89	11011.39	8745.63	16452.15	13313.63	17134.88	14923.18	14769.63	16851.41	16016.21	15247.48	14351.13	13681.2	18596.54	19197.68	24903.32	26497.6	24013.7	22998.68	23742.51	27750.67	23052.74	24777.59	11910.16	12433.61	12771.07	12836.37	
Fe Error	270.4	297.87	236.94	233.91	193.76	210.62	242.41	239.48	246.14	244.29	226.53	214.05	199.5	208.41	205.1	202.25	195.91	171.97	225.31	201.91	242.24	225.83	210.53	237.34	226.09	233.94	214.23	211.84	249.37	243.89	287.48	296.02	283.86	274.24	276.02	317.69	275.88	286.09	187.55	212.42	206.01	198.22	Fe
%error	1.084984	1.059384	1.32684	1.336067	1.466815	1.485899	1.460174	1.464598	1.427273	1.470877	1.454147	1.463467	1.628668	1.556946	1.645632	1.59128	1.779158	1.966353	1.369487	1.516566	1.413725	1.513283	1.425425	1.408428	1.411632	1.534286	1.492774	1.548402	1.340948	1.270414	1.154384	1.117158	1.182075	1.192416	1.162556	1.144801	1.196734	1.154632	1.574706	1.708434	1.613099	1.544206	**1.420456**
Mn	762.55	849.7	591.98	641.65	479.38	550.84	464.38	503.29	603.92	527.38	494.86	500.5	405.32	400.53	307.83	295.39	208.65	182.33	493.14	462.91	449.73	438.07	459.41	516.38	522.99	367.34	384.29	431.88	666.18	783.69	838.78	911.58	1230.35	1070.6	924.59	957.34	824.26	873.81	426.31	450.55	553.11	522.18	
Mn Error	78.05	85.37	72.49	73.98	62.75	68.88	71.34	72.53	76.98	74.74	69.29	67.44	63.77	64.46	60.8	58.78	55.77	52.48	67.96	64.5	70.15	68.26	64.65	71.3	69.43	67.18	63.67	65.82	77.63	78.65	85.96	88.65	97.4	91.26	86.57	94.78	84.64	86.57	61.41	69.34	70.16	66.71	Mn
%error	10.23539	10.04708	12.24535	11.52965	13.08982	12.50454	15.36242	14.41117	12.74672	14.17194	14.00194	13.47453	15.73325	16.09368	19.75116	19.89912	26.72897	28.78298	13.78108	13.93359	15.59825	15.58198	14.0724	13.80766	13.27559	18.28823	16.56822	15.24034	11.65301	10.03586	10.24822	9.724873	7.916447	8.524192	9.363069	9.900349	10.2686	9.907188	14.40501	15.39008	12.68464	12.77529	**13.8989**
Cr	42.61	123.42	87.86	109.2	63.56	32.61	56.87	74.73	92.18	108.85	52.16	64.39	70.46	114.96	63.33	50.22	10.78	55.89	151.66	54.37	121.87	82.15	85.48	47.54	46.58	83.34	108.5	58.59	58.95	37.1	118.49	95.17	52.77	58.03	92.94	61.36	135.94	61.62	71.05	54.33	-3.17	83.13	
Cr Error	60.6	69.05	62.13	63.04	55.27	56.87	64.06	64.6	66.24	67.73	60.28	59.02	59.34	62.57	60.31	57.83	56.9	57.58	64.23	56.83	66.73	63.15	59.17	61.44	59.19	65.19	62.01	59.75	63.11	59.45	69.29	68.95	65.7	64.47	66.12	71.26	69.15	66.04	56.25	61.73	55.52	58.43	
%error	142.2201	55.94717	70.71477	57.67612	86.95721	174.3944	112.6429	86.44453	71.85941	62.22324	115.5675	91.6602	84.218	54.41816	95.23133	115.1533	527.8293	103.0238	42.35131	104.5246	54.75507	76.87158	69.22087	129.2385	127.0717	78.22174	57.15207	101.9799	107.0568	160.2426	58.47751	72.4493	124.5026	111.136	71.14267	116.1343	50.86803	107.173	79.1696	113.6205	-4745.3	70.30442	212.7892

Appendix 3
Exact coring and sampling locations

Name	Date	Position	N dd	E dd	Altitude	Boring	Kernen	Losse monsters	Opmerking
1	24-10-11 1:54 PM	N49 48 24.5 E6 44 26.9	49.8068	6.74079	123 m	voor boring: zie boorstaat zie loc. 2			Zelfde als 2
2	24-10-11 1:54 PM	N49 48 24.5 E6 44 26.9	49.8068	6.74079	124 m	boring			Palaeo restgeul van Moezel; Geen kern genomen vanwege veel inspoelingsmateriaal (bontzandsteen) vanaf nabijgelegen helling
3	24-10-11 4:50 PM	N49 48 26.3 E6 43 55.8	49.8073	6.73217	117 m	boring	KENN1 (0 - 0.6 m); KENN2-3-4; KENN13	KENN 5 (1.1-1.2 m); KENN6 (1.2-1.3 m); KENN7 (1.4-1.5 m); KENN8 (1.5-1.6 m); KENN9 (1.6-1.7 m); KENN10 (1.7-1.8 m); KENN11 (1.9-2.0 m); KENN12 (2.0 -2.2 m)	Palaeo restgeul van Moezel; Losse monsters KENN5 - 12 zijn genomen omdat het door de hardheid van het bodemmateriaal niet mogelijk was de brede guts meer dan ca. 10 cm de bodem in te krijgen. KENN12 en KENN13 zijn met de smalle guts bemonsterd.
4	24-10-11 5:15 PM	N49 48 45.8 E6 44 27.3	49.81272	6.7409	120 m			KENN levee 1 (0.1-0.2 m); KENN levee 2 (0.2-0.3 m)	Oeverafzettingen in rietveld nabij oever van Moezel; alleen opp. Monster
5	24-10-11 5:34 PM	N49 48 47.4 E6 44 11.1	49.81316	6.7364	121 m			KENN pointbar 1 (0.1-0.2 m); KENN pointbar 2 (0.2-0.3 m)	Pointbarafzettingen op iets grotere afstand van de Moezel dan loc. 4; alleen opp. Monsters
6	25-10-11 11:51 AM	N50 03 34.2 E8 57 22.6	50.05951	8.95627	109 m	boring			Palaeo restgeul van de Main; Monstername afgebroken op bevel van boswachter (geen vergunning om in Naturschtutzgebiet te boren)
7	25-10-11 12:43 PM	N50 03 43.4 E8 57 33.9	50.06204	8.95941	104 m	boring			Palaeo restgeul van de Main; Geen kern gestoken omdat de restgeulopvulling vrijwel uit niet-klastisch materiaal bestond (veen en gyttja)
8	25-10-11 3:28 PM	N50 04 32.1 E8 57 33.6	50.07557	8.95932	103 m	boring	KK1 (1.2-2.2 m); KK1 (2.2-3.2 m)		Palaeo restgeul van de Main bij Klein Krotzenburg;
9	25-10-11 3:56 PM	N50 04 41.3 E8 58 33.3	50.07813	8.97593	99 m			KK2 (0.1-0.2 m); KK2 (0.2-0.3 m)	Oeverafzetting van de Main bij Klein Krotzenburg; ca 30 m vanaf oever
10	26-10-11 11:43 AM	N49 03 45.0 E9 09 10.5	49.06251	9.15291	161 m	boring	Lauffen I (1.0-1.9 m)		Palaeo restgeul (Holoceen) van de Neckar
11	26-10-11 1:57 PM	N49 05 44.4 E9 09 27.8	49.09566	9.15772	163 m			Neckar floodplain hoog (0.1-0.2 m) (0.2-0.3 m)	hooggelegen recente overbank/floodplain afzettingen langs de Neckar nabij Horkheim
12	26-10-11 2:05 PM	N49 05 43.4 E9 09 36.4	49.09538	9.16011	160 m			Neckar floodplain laag (0.1-0.2 m) (0.2-0.3 m)	laaggelegen recente overbank/floodplain afzettingen (geul langs de Neckar nabij Horkheim; In de Geul grondwaterputten (t.b.v. oeverinfiltratie?)
13	26-10-11 4:53 PM	N49 28 15.4 E8 35 54.7	49.47095	8.59852	93 m			Edingen (0.1-0.2 m) (0.2-0.3 m)	overbank afzettingen ca. 15 m vanaf oever Neckar bij Neckarhausen (naam Edingen zou eigenlijk Neckarhausen moeten zijn)
14	26-10-11 5:31 PM	N49 28 36.7 E8 32 45.0	49.47685	8.54582	90 m			Mannheim (0.1-0.2 m) (0.2-0.3 m)	floodplainafzetting van de Neckar bij Mannheim. Floodplain is hooggelegen (ca.4-5 m) boven waterniveau van Neckar/ rivier ligt diep t.o.v. floodplain
15	27-10-11 10:55 AM	N49 15 49.0 E8 23 12.2	49.2636	8.38674	90 m	boring	Römerberg1 (1.4-2.4 m) (2.4-3.1 m)		Palaeo restgeul van Oberrhein bij Mechtersheim/Römerberg
16	27-10-11 12:24 PM	N49 15 29.1 E8 25 33.5	49.2581	8.42596	98 m			Römerberg2 (0.1-0.2 m) (0.2-0.3 m)	recente floodplainafzetting langs de Oberrhein; relatief hooggelegen en zandig/zavelig sediment
17	27-10-11 12:28 PM	N49 15 29.3 E8 25 35.3	49.25814	8.42648	97 m			Römerberg3 (0.1-0.2 m) (0.2-0.3 m)	recente floodplainafzetting langs de Oberrhein; relatief laaggelegen en kleiig sediment uit moerasbosje langs waterkant
18	27-10-11 3:04 PM	N50 03 45.0 E8 31 11.6	50.06251	8.5199	85 m	boring	Sindlingen (1.2-1.8)	Sindlingen1 (0.1-0.2 m) (0.2-0.3 m)	Oude geul langs huidige loop Main op ca. 70 m van oever. Op ca. 80 cm -mv humeus materiaal ruikt olie-achtig (zie boorstaat). Op ca. 1 m -mv grindlaag (gestort of fluviatiel afgezet?)
19	28-10-11 9:28 AM	N49 42 11.2 E8 21 58.6	49.70311	8.36628	85 m			Rheindürkheim1 (0.1-0.2 m) (0.2-0.3 m)	laagte op floodplain tussen levee en kade/terrasrand
20	28-10-11 9:32 AM	N49 42 12.3 E8 22 04.1	49.70342	8.3678	86 m			Rheindürkheim2 (0.1-0.2 m) (0.2-0.3 m)	levee
21	28-10-11 10:57 AM	N49 59 48.0 E8 01 46.6	49.99667	8.02961	75 m			Ingelheim1 (0.1-0.2 m) (0.2-0.3 m)	net over levee
22	28-10-11 11:05 AM	N49 59 39.5 E8 01 31.2	49.99429	8.02532	76 m			Ingelheim2 (0.1-0.2 m) (0.2-0.3 m)	zandiger sediment da Ingelheim1
23	28-10-11 12:35 PM	N50 16 47.6 E7 27 34.4	50.2799	7.45955	64 m			Alken1 (0.1-0.2 m) (0.2-0.3 m)	Smalle strook floodplain langs Moezel
24	28-10-11 12:40 PM	N50 16 57.2 E7 27 29.3	50.28256	7.45814	63 m			Alken2 (0.1-0.2 m) (0.2-0.3 m)	Smalle strook floodplain langs Moezel
25	28-10-11 12:43 PM	N50 16 58.0 E7 27 28.6	50.28279	7.45796	63 m			Alken3 (0.1-0.2 m) (0.2-0.3 m)	Smalle strook floodplain langs Moezel; op ca 10 m van oever; maaiveld ca. 3 m dan waterpeil Moezel
26	28-10-11 1:35 PM	N50 26 18.6 E7 26 23.1	50.4385	7.43974	56 m			Andernach1 (0.1-0.2 m) (0.2-0.3 m)	Locatie aan het einde van smalle floodplain langs Rijn
27	28-10-11 1:41 PM	N50 26 10.4 E7 26 31.6	50.43623	7.44211	55 m			Andernach2 (0.1-0.2 m) (0.2-0.3 m)	Laagte (ca. 20 cm lager dan omgeving) midden in smaale strook floodplain
28	28-10-11 4:10 PM	N50 46 10.6 E7 03 52.8	50.76962	7.06468	43 m			Bonn1 (0.1-0.2 m) (0.2-0.3 m)	Levee ca. 5 m boven waterpeil Rijn
29	28-10-11 4:14 PM	N50 46 09.2 E7 03 46.7	50.76923	7.06297	44 m			Bonn2 (0.1-0.2 m) (0.2-0.3 m)	Hoger gelegen distaler deel van floodplain halfweg tussen oever en dijk. Op 0.2-0.3 m duideljk zandiger sediment dan toplaag.

Appendix 2

Bienen cores: Normalized counts of selected elements (with plots)

Bienen III - Bienen X

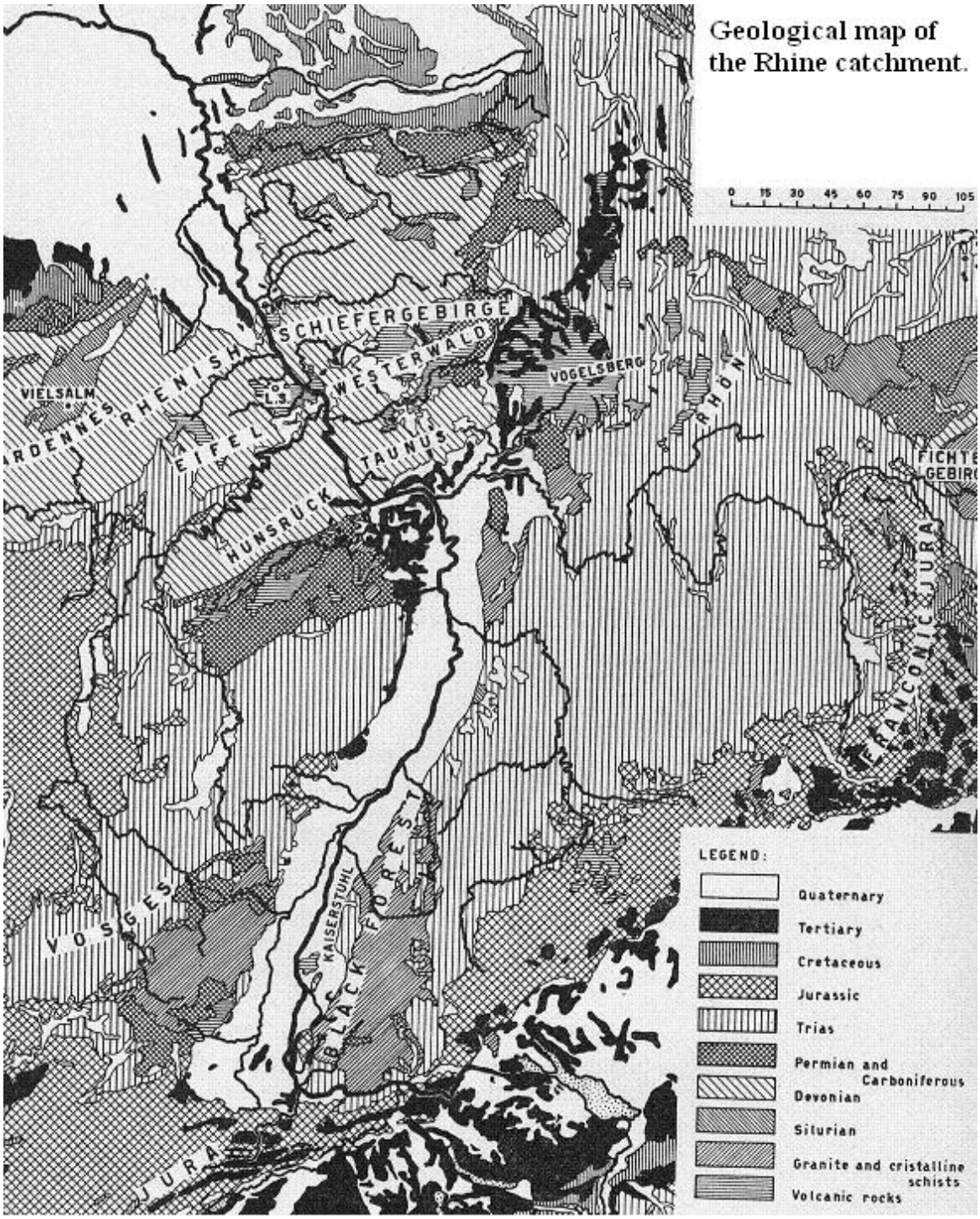
Depth	Real Depth	Si	K	Ca	Ti	Mn	Fe	Rb	Sr	Zr	Pb	Zn	Al
167	156	0.000225	0.000198	0.000157	9.65E-05	0.000173	0.021934	0.025076	0.037866	0.05685	0.005307	0.002519	0.000225
169	158	0.00019	0.000162	0.000377	0.000118	0.000227	0.016086	0.024825	0.040478	0.056524	0.005921	0.00304	0.000207
171	161	0.000226	0.000303	0.000461	0.000158	0.000247	0.022018	0.023219	0.034091	0.051723	0.003166	0.001341	0.000343
173	163	0.001739	0.019531	0.095571	0.018292	0.014941	0.907153	0.028881	0.042798	0.046441	0.003744	0.00703	0.000306
175	165	0.004714	0.044273	0.155801	0.038691	0.032193	1.568047	0.033715	0.044948	0.049026	0.004747	0.011562	0.000297
177	168	0.003731	0.046066	0.175555	0.039656	0.031966	1.81788	0.033951	0.044993	0.044753	0.005684	0.012931	0.000227
179	170	0.004163	0.048121	0.155807	0.043963	0.0282	1.847786	0.036814	0.044272	0.048871	0.006758	0.014949	0.000322
181	172	0.004526	0.049414	0.188828	0.043467	0.033969	1.9022	0.036476	0.047638	0.045841	0.004854	0.012975	0.000213
183	174	0.004252	0.050462	0.183089	0.043636	0.035648	1.957914	0.037399	0.04763	0.043949	0.004367	0.013143	0.000247
185	177	0.005308	0.052301	0.170615	0.048053	0.033274	1.922396	0.038339	0.045263	0.050971	0.006139	0.014089	0.000291
187	179	0.006064	0.048474	0.163638	0.045176	0.061017	1.921397	0.035443	0.044215	0.056873	0.00655	0.014159	0.000331
189	181	0.004481	0.052386	0.111691	0.04718	0.047325	2.247678	0.040034	0.041051	0.045513	0.005315	0.01385	0.000266
191	184	0.005384	0.045966	0.136029	0.044457	0.039909	1.830354	0.035674	0.04205	0.053845	0.00634	0.016692	0.000259
193	186	0.004613	0.053019	0.176571	0.044828	0.059097	2.281702	0.036783	0.046712	0.044997	0.005718	0.014795	0.000279
195	188	0.004887	0.053467	0.174982	0.045792	0.042726	2.057891	0.037877	0.046669	0.046926	0.005393	0.013921	0.000344
197	191	0.005537	0.05325	0.167231	0.048277	0.043161	2.040737	0.037092	0.04638	0.050663	0.004914	0.013645	0.000291
199	193	0.005449	0.054446	0.182151	0.047058	0.046589	2.093762	0.037923	0.048465	0.046671	0.004733	0.012684	0.000302
201	195	0.005742	0.05372	0.168881	0.047624	0.033927	1.951515	0.038001	0.045896	0.049416	0.004995	0.014074	0.000339
203	198	0.00547	0.050545	0.194367	0.044708	0.049758	2.057551	0.034424	0.048369	0.047507	0.005276	0.013337	0.000309
205	200	0.00548	0.05094	0.108336	0.048422	0.038029	2.084441	0.037641	0.04	0.050056	0.00528	0.013255	0.00037
207	202	0.005052	0.052158	0.084012	0.047943	0.027868	2.070496	0.038789	0.040157	0.048745	0.005513	0.014183	0.000302
209	204	0.004525	0.04749	0.186099	0.039646	0.031782	1.860552	0.037649	0.047605	0.043078	0.003844	0.011299	0.000256
211	207	0.005915	0.058659	0.111104	0.05303	0.022928	2.220044	0.042169	0.041553	0.047884	0.004236	0.01274	0.000326
213	209	0.005461	0.051511	0.142689	0.046057	0.033044	2.113249	0.038003	0.044749	0.044918	0.004578	0.014072	0.000317
215	211	0.004486	0.050743	0.130113	0.045463	0.04316	2.221644	0.036633	0.042393	0.042914	0.004381	0.013498	0.000298
217	214	0.00414	0.051225	0.125102	0.045294	0.056975	2.377886	0.036936	0.041929	0.041727	0.004286	0.012452	0.000285
219	216	0.00515	0.053286	0.153862	0.046516	0.034499	2.069559	0.038502	0.04487	0.046673	0.004611	0.013109	0.000241
221	218	0.005137	0.051931	0.179028	0.043842	0.034098	1.973985	0.036523	0.046306	0.0481	0.004737	0.013037	0.000287
223	221	0.00433	0.050266	0.156937	0.045771	0.034328	2.038649	0.03788	0.043429	0.045732	0.005313	0.013885	0.000257
225	223	0.004897	0.052469	0.170863	0.045759	0.0357	1.978362	0.03771	0.045659	0.048869	0.004655	0.012702	0.000237
227	225	0.004799	0.051681	0.163273	0.043868	0.035971	2.023383	0.037709	0.043921	0.04496	0.004472	0.012942	0.000304
229	227	0.004183	0.052201	0.138605	0.043404	0.028039	2.042378	0.038735	0.042229	0.044235	0.004324	0.011896	0.00034
231	230	0.004152	0.04857	0.165448	0.040077	0.031963	1.880988	0.037118	0.045191	0.043766	0.004547	0.011377	0.000246
233	232	0.004708	0.045266	0.195757	0.039233	0.037981	1.691564	0.034761	0.049884	0.050363	0.003991	0.011079	0.000296
235	234	0.003773	0.044759	0.182549	0.037269	0.044621	1.906113	0.035732	0.047756	0.042484	0.004416	0.010843	0.000234
237	237	0.0035	0.043265	0.151651	0.036563	0.041545	1.853367	0.035421	0.043779	0.042501	0.003893	0.009792	0.000313
239	239	0.002845	0.03455	0.105803	0.031384	0.030788	1.585643	0.034728	0.042178	0.047187	0.003909	0.008178	0.000216
267	241	0.001797	0.023562	0.08944	0.021878	0.022048	0.976278	0.03108	0.038912	0.049928	0.005518	0.007778	0.0005
269	244	0.004376	0.045735	0.189212	0.040979	0.033156	1.723056	0.035494	0.046632	0.048986	0.004357	0.011806	0.000325
271	246	0.002462	0.033467	0.126356	0.03279	0.033843	1.509011	0.034872	0.044114	0.051592	0.004726	0.011676	0.000366
273	249	0.00493	0.04891	0.180713	0.046396	0.060377	1.950086	0.034375	0.047979	0.050494	0.007204	0.015002	0.000259
275	252	0.005225	0.050677	0.166662	0.048147	0.051715	1.871563	0.036588	0.046479	0.057838	0.00655	0.014735	0.00047
277	255	0.005221	0.055738	0.177138	0.049796	0.062447	2.248271	0.037186	0.047253	0.050784	0.005747	0.014649	0.000363
279	257	0.005031	0.05593	0.156249	0.049854	0.049718	2.174358	0.037967	0.045174	0.04741	0.005112	0.014542	0.000455
281	260	0.004638	0.053252	0.133563	0.048584	0.041721	2.097581	0.038893	0.043892	0.046213	0.005046	0.012986	0.000158
283	263	0.004179	0.05221	0.134425	0.046585	0.037976	2.124903	0.038702	0.044369	0.044418	0.005214	0.012635	0.000393
285	266	0.004472	0.053413	0.146028	0.047771	0.036893	2.133111	0.038591	0.046011	0.04544	0.005872	0.013467	0.000358
287	268	0.005318	0.054386	0.162478	0.048017	0.039146	2.028293	0.037366	0.048884	0.050616	0.005136	0.012422	0.000411
289	271	0.005109	0.056636	0.183147	0.047969	0.046981	2.303221	0.038409	0.048402	0.041869	0.005029	0.01252	0.000301
291	274	0.00535	0.058629	0.169743	0.04868	0.045534	2.269989	0.040356	0.046597	0.043942	0.00381	0.011505	0.000375
293	276	0.005523	0.059847	0.159419	0.050188	0.046188	2.337813	0.040175	0.045664	0.045171	0.003667	0.011845	0.000308
295	279	0.00556	0.058819	0.178698	0.049166	0.044989	2.265623	0.038585	0.046309	0.043477	0.003307	0.011031	0.000445
297	282	0.005551	0.057952	0.169818	0.050173	0.046563	2.225074	0.039835	0.047844	0.046105	0.004759	0.011593	0.000329
299	285	0.005143	0.053752	0.212509	0.047161	0.04211	2.013878	0.039098	0.047701	0.047692	0.00322	0.010942	0.00029
301	287	0.004122	0.044065	0.350755	0.038529	0.032894	1.774389	0.035438	0.04841	0.044349	0.002404	0.009112	0.000244
303	290	0.004365	0.050416	0.265083	0.044098	0.034829	1.936139	0.03695	0.047909	0.046271	0.003918	0.010308	0.000233
305	293	0.004727	0.053964	0.176505	0.047324	0.043428	2.174478	0.03759	0.047197	0.046055	0.003748	0.010428	0.000367
307	295	0.004382	0.051041	0.210017	0.044747	0.044207	2.096427	0.03725	0.046581	0.042474	0.004176	0.009499	0.000416
309	298	0.004298	0.049854	0.1872	0.044047	0.045412	2.125642	0.037078	0.047043	0.043634	0.003615	0.010132	0.000352
311	301	0.004151	0.052146	0.18334	0.045687	0.044973	2.205407	0.037243	0.046886	0.042028	0.003577	0.010191	0.000389
313	304	0.004068	0.052315	0.15472	0.046061	0.037367	2.21915	0.038697	0.044634	0.041501	0.003299	0.009776	0.000242
315	306	0.00414	0.052792	0.159175	0.046634	0.033965	2.134899	0.037825	0.045006	0.042156	0.004284	0.010078	0.000208
317	309	0.003934	0.051199	0.164868	0.044574	0.034112	2.124526	0.039205	0.044038	0.041505	0.003992	0.010762	0.000337
319	312	0.003627	0.045166	0.221452	0.03936	0.038802	1.966498	0.036521	0.047429	0.04249	0.002757	0.009278	0.000207
321	315	0.00306	0.041573	0.228451	0.035667	0.036118	1.89507	0.033896	0.046556	0.04256	0.002655	0.008807	0.000279
323	317	0.00363	0.045233	0.201255	0.038526	0.043699	1.96054	0.034878	0.048438	0.041721	0.002755	0.00949	0.00032
325	320	0.003631	0.045522	0.194588	0.038695	0.038463	1.958833	0.034393	0.047979	0.040693	0.002657	0.009156	0.000161
327	323	0.003658	0.045065	0.220653	0.040211	0.05619	2.075638	0.034061	0.049147	0.037444	0.003899	0.008967	0.000393
329	325	0.003342	0.043234	0.194787	0.038108	0.068577	2.34395	0.03422	0.049523	0.041297	0.003976	0.008355	0.000296
331	328	0.003161	0.044452	0.203284	0.039447	0.039503	1.93254	0.034152	0.051049	0.046466	0.003091	0.009145	0.000196
333	331	0.003624	0.043845	0.197542	0.038835	0.031644	1.88618	0.034925	0.050845	0.043977	0.003802	0.009674	0.000275
335	334	0.002899	0.035106	0.164535	0.033451	0.029216	1.618065	0.031551	0.049325	0.046459	0.0035	0.007231	0.000215
337	336	0.004646	0.043707	0.189466	0.039462	0.045648	1.876758	0.033731	0.052974	0.047332	0.003278	0.008483	0.000402
339	339	0.004915	0.045069	0.22959	0.039379	0.037698	1.853006	0.035316	0.053314	0.0465	0.003794	0.009672	0.000343
357	341	0.005682	0.05144	0.231043	0.042093	0.043898	1.970676	0.035756	0.049568	0.043254	0.003332	0.010141	0.000203
359	343	0.006148	0.054411	0.202253	0.045956	0.038152	2.093014	0.035532	0.048203	0.042905	0.003109	0.010903	0.000301
361	346	0.006103	0.053196	0.202834	0.044624	0.035382	2.046219	0.036443	0.04501	0.044255	0.002962	0.009346	0.000421
363	348	0.006117	0.054394	0.208181	0.045829	0.038385	2.147032	0.035747	0.046083	0.041456	0.003569	0.010114	0.000404
365	351	0.005869	0.054698	0.192568	0.047459	0.041464	2.219632	0.037575	0.051004	0.042678	0.003867	0.011567	0.000293
367	353	0.005546	0.0546	0.136469	0.048468	0.043438	2.326195	0.037904	0.046956	0.041287	0.003574	0.010931	0.000372
369	356	0.005711	0.055717	0.18555	0.048521	0.04564	2.271703	0.038174	0.047322	0.042596	0.002592	0.011369	0.000272
371	358	0.006047	0.056356	0.232629	0.04787	0.049508	2.117058	0.036656	0.05152	0.045378	0.003403	0.011466	0.000259
373	361	0.006491	0.055018	0.234505	0.045381	0.043949	1.973297	0.036104	0.051271	0.045644	0.002851	0.01057	0.000295
375	363	0.005916	0.057125	0.189529	0.049005	0.045558	2.121661	0.036983	0.050919	0.042863	0.00339	0.011244	0.000388
377	365	0.006589	0.055476	0.124718	0.048553	0.058437	2.312465	0.036321	0.046129	0.043816	0.003403	0.010329	0.000351
379	368	0.006663	0.056528	0.15923	0.049773	0.03848	2.207202	0.036722	0.046626	0.044595	0.00335	0.010833	0.000322
381	370	0.006541	0.054919	0.233293	0.047056	0.037337	1.991923	0.035683	0.054195	0.047938	0.003064	0.010513	0.000354
383	373	0.006761	0.051882	0.24342	0.044709	0.040822	1.980441	0.035	0.054956	0.048653	0.002822	0.010143	0.000385
385	375	0.0061	0.055058	0.200344	0.04823	0.0459	2.187119	0.0372	0.050965	0.043003	0.003528	0.012027	0.000328
387	378	0.005553	0.053431	0.247461	0.044959	0.077411	2.2619	0.035552	0.053121	0.042208	0.003273	0.010843	0.000282
389	380	0.006706	0.053158	0.238371	0.044245	0.05539	1.952927	0.037197	0.053778	0.044728	0.003246	0.010872	0.000415
391	383	0.006433	0.051735	0.255658	0.042927	0.065667	1.955924	0.033725	0.055817	0.045705	0.003472	0.010235	0.000358
393	385	0.005655	0.047691	0.233496	0.039214	0.044856	1.786678	0.034535	0.054544	0.044305	0.003075	0.009846	0.000297
395	387	0.005508	0.055611	0.202786	0.047421	0.049098	2.157289	0.03768	0.050748	0.04308	0.003697	0.010712	0.000221
397	390	0.005302	0.052212	0.236157	0.043464	0.054857	2.001506	0.035169	0.052035	0.043791	0.003393	0.010769	0.000267
399	392	0.005172	0.052136	0.219568	0.042327	0.039813	2.058546	0.036573	0.049102	0.041086	0.003234	0.010341	0.000235
401	395	0.005002	0.047135	0.265461	0.041546	0.04691	1.972471	0.033274	0.0529	0.043732	0.003584	0.010603	0.00031
403	397	0.004115	0.043854	0.19862	0.039472	0.048009	1.952996	0.034445	0.050747	0.042474	0.003833	0.009762	0.000253
405	400	0.005115	0.049687	0.21221	0.043117	0.045793	2.040229	0.036512	0.050546	0.041895	0.003799	0.010929	0.000287
407	402	0.004883	0.047917	0.272782	0.040727	0.077277	2.153371	0.034066	0.056475	0.038679	0.003203	0.010533	0.000244
409	405	0.005908	0.045788	0.227834	0.043974	0.046951	1.808467	0.035025	0.055467	0.060397	0.002871	0.009798	0.000304
411	407	0.005495	0.045354	0.239381	0.039003	0.049819	1.860823	0.034356	0.055546	0.045023	0.002912	0.010378	0.000297
413	409	0.004947	0.045978	0.255562	0.03992	0.087163	2.217691	0.033577	0.056204	0.041596	0.002851	0.009781	0.000224
415	412	0.005359	0.047252	0.216219	0.041553	0.063731	1.96017	0.035988	0.052468	0.042779	0.002966	0.010605	0.000369
417	414	0.005505	0.049265	0.186472	0.04341	0.056654	2.057769	0.037153	0.047246	0.042911	0.003712	0.011138	0.000285
419	417	0.005389	0.049983	0.188815	0.043492	0.043314	2.041709	0.037251	0.047892	0.043083	0.003426	0.011168	0.000315
421	419	0.006749	0.052034	0.237372	0.046135	0.053622	2.161766	0.035633	0.051733	0.045858	0.002998	0.010882	0.000321
423	422	0.006298	0.052601	0.228924	0.045628	0.04845	2.169326	0.036588	0.050184	0.045737	0.003027	0.011408	0.000261
425	424	0.006475	0.052943	0.207454	0.0461	0.047778	2.218722	0.036652	0.047471	0.042426	0.003341	0.011008	0.000244
427	427	0.007776	0.059516	0.260022	0.050574	0.126105	2.795288	0.036341	0.051662	0.044342	0.003838	0.011153	0.000459
429	429	0.008226	0.06042	0.194657	0.053213	0.051913	2.319492	0.04036	0.049842	0.048062	0.004205	0.01185	0.000376
453	431	0.000998	0.014534	0.168878	0.017125	0.020865	1.005977	0.031329	0.041754	0.052438	0.002122	0.005404	0.000279
455	434	0.002436	0.022147	0.557835	0.021617	0.032802	1.375094	0.033424	0.044813	0.04666	0.002018	0.006521	0.000186
457	436	0.00261	0.034659	0.204641	0.033293	0.037024	1.750361	0.033911	0.046055	0.045993	0.002916	0.008885	0.000212
459	439	0.00287	0.037627	0.185191	0.03622	0.036562	1.871509	0.035531	0.04761	0.047797	0.003765	0.009828	0.000283
461	441	0.00291	0.034294	0.157416	0.036475	0.028115	1.573688	0.033252	0.047809	0.060762	0.003852	0.008655	0.00012
463	444	0.002566	0.033061	0.151002	0.035643	0.031111	1.549826	0.033084	0.049999	0.055994	0.004025	0.008613	0.000283
465	446	0.003033	0.033441	0.129732	0.035742	0.022297	1.390508	0.031834	0.044756	0.058793	0.003545	0.008559	0.000234
467	449	0.003046	0.035315	0.161835	0.03294	0.032283	1.531051	0.032606	0.0474	0.052387	0.003813	0.008121	0.000234
469	452	0.002438	0.033294	0.225212	0.031288	0.059377	1.808266	0.030986	0.048641	0.039807	0.002555	0.008813	0.00018
471	454	0.002369	0.034127	0.179882	0.033055	0.049009	1.722095	0.03223	0.047723	0.043348	0.003147	0.009137	0.000232
473	457	0.001976	0.031359	0.168759	0.030685	0.052807	1.72602	0.032057	0.047925	0.041433	0.003418	0.008623	0.000327
475	459	0.001818	0.031397	0.169077	0.030767	0.08172	1.747327	0.032356	0.047	0.04175	0.00314	0.008186	0.000168
477	462	0.001666	0.030805	0.158572	0.030708	0.083613	1.796201	0.033516	0.047153	0.04145	0.003106	0.008365	0.000165
479	465	0.001494	0.027067	0.136505	0.028847	0.03922	1.477465	0.032868	0.042492	0.044319	0.003198	0.008783	0.000164
481	467	0.00141	0.025166	0.17086	0.026673	0.033427	1.461418	0.032099	0.042763	0.044179	0.002755	0.00777	0.0002
483	470	0.001975	0.032568	0.133882	0.033591	0.044242	1.836048	0.034543	0.044424	0.04407	0.002328	0.008589	0.00016
485	472	0.002456	0.03372	0.144366	0.034057	0.031278	1.821808	0.033284	0.043584	0.044537	0.003119	0.00954	0.000276
487	475	0.002546	0.032388	0.147868	0.033648	0.035374	1.651799	0.034289	0.046132	0.048702	0.00282	0.009004	0.000221
489	477	0.002604	0.033535	0.140169	0.033034	0.04291	1.687294	0.034368	0.045498	0.046005	0.003485	0.008373	0.000216
491	480	0.002699	0.038764	0.151637	0.037771	0.049686	1.894144	0.035879	0.044848	0.045464	0.003666	0.010455	0.000138
493	483	0.003178	0.039335	0.174767	0.037837	0.053499	1.840842	0.034135	0.04441	0.04573	0.003229	0.008913	0.000204
495	485	0.00332	0.043044	0.145874	0.04071	0.062914	2.106777	0.035003	0.042478	0.044622	0.003765	0.00978	0.000423
497	488	0.003568	0.047412	0.188156	0.042076	0.039775	1.973269	0.035952	0.048944	0.047276	0.003775	0.011123	0.000214
499	490	0.003591	0.046258	0.193741	0.041625	0.043888	1.966444	0.036341	0.050249	0.048927	0.00354	0.009714	0.000381
501	493	0.003767	0.045934	0.198502	0.041531	0.052714	2.069338	0.035372	0.050077	0.044963	0.002843	0.009976	0.00014
503	495	0.003759	0.050029	0.203465	0.044823	0.06835	2.397613	0.035737	0.049621	0.044734	0.004268	0.00962	0.000218
505	498	0.004149	0.054077	0.196174	0.046868	0.058286	2.309025	0.03803	0.047297	0.044426	0.003055	0.011108	0.000315
507	501	0.003536	0.050179	0.17232	0.046217	0.057126	2.23808	0.038952	0.044627	0.045039	0.003984	0.010891	0.000301
509	503	0.003201	0.049514	0.145325	0.046454	0.039964	2.174706	0.039947	0.04376	0.045731	0.003613	0.011082	0.000211
511	506	0.002914	0.046817	0.156238	0.044615	0.047566	2.139168	0.039607	0.045955	0.046796	0.003962	0.011237	0.000167
513	508	0.003137	0.046223	0.155249	0.044597	0.05501	2.166864	0.037934	0.047384	0.047406	0.003347	0.01082	0.00032
515	511	0.002679	0.039715	0.151133	0.039759	0.040391	1.86745	0.036006	0.045771	0.045016	0.003654	0.009763	0.000277
517	514	0.00249	0.042428	0.159188	0.041708	0.046831	2.021575	0.038675	0.04715	0.047654	0.003985	0.010926	0.000152
519	516	0.002984	0.046687	0.161419	0.044339	0.076026	2.357035	0.036582	0.045647	0.047424	0.0035	0.010849	0.000186
521	519	0.002867	0.043195	0.157584	0.042629	0.050116	1.988029	0.037626	0.047202	0.048816	0.004594	0.01102	0.000156
523	521	0.002368	0.039117	0.141959	0.04087	0.050252	1.971985	0.037641	0.046034	0.050371	0.004891	0.010426	0.000252
525	524	0.002023	0.032829	0.154491	0.035153	0.036141	1.671128	0.035006	0.047119	0.050998	0.002723	0.009133	0.000215
527	526	0.002121	0.032992	0.158759	0.034046	0.055899	1.767259	0.034113	0.05043	0.052435	0.003028	0.009837	0.000138
529	529	0.002536	0.038895	0.148554	0.037296	0.050122	1.870595	0.036794	0.044597	0.044711	0.00376	0.010368	0.000245

Bienen III - Bienen X

Depth	Real Depth	Si	K	Ca	Ti	Mn	Fe	Rb	Sr	Zr	Pb	Zn	Al
545	531	0.00561	0.043011	0.119099	0.037287	0.02926	1.476137	0.03591	0.042437	0.053026	0.003978	0.011695	0.000255
547	533	0.007632	0.064257	0.174596	0.054039	0.052594	2.233237	0.040293	0.046927	0.047909	0.004049	0.013599	0.000318
549	536	0.006038	0.05601	0.180769	0.045976	0.063342	2.180507	0.038989	0.047441	0.044986	0.003081	0.011273	0.000389
551	538	0.006134	0.054663	0.188576	0.047078	0.066209	2.273866	0.038002	0.048936	0.04542	0.003393	0.011308	0.000328
553	541	0.00669	0.058317	0.171676	0.049477	0.063691	2.234296	0.039214	0.047068	0.045457	0.003486	0.011518	0.000572
555	543	0.006766	0.061512	0.191038	0.052218	0.075028	2.443062	0.039924	0.046363	0.041395	0.003418	0.011853	0.000456
557	545	0.006331	0.058364	0.214313	0.049009	0.055583	2.220242	0.038096	0.048499	0.042313	0.003014	0.011309	0.000334
559	548	0.006491	0.058994	0.212446	0.048677	0.056067	2.277952	0.037761	0.048104	0.041657	0.003142	0.011069	0.000274
561	550	0.006469	0.058981	0.206235	0.048729	0.047941	2.220108	0.038207	0.049171	0.042361	0.003315	0.011356	0.000445
563	552	0.006767	0.061137	0.227967	0.050904	0.063054	2.395824	0.037883	0.049201	0.042675	0.003922	0.011504	0.000416
565	555	0.006059	0.059861	0.190996	0.051345	0.056378	2.375968	0.038831	0.048405	0.043556	0.003767	0.011439	0.000326
567	557	0.006903	0.061741	0.182971	0.053493	0.046095	2.291696	0.039626	0.048064	0.045442	0.003889	0.011856	0.000488
569	560	0.007159	0.058218	0.240734	0.051701	0.042128	2.016871	0.036929	0.055031	0.052791	0.003311	0.011441	0.000328
571	562	0.007268	0.059347	0.256994	0.051638	0.061136	2.101957	0.036905	0.055929	0.048645	0.003894	0.010754	0.000379
573	564	0.008979	0.0569	0.298224	0.051381	0.047759	1.82751	0.034626	0.061358	0.057963	0.001994	0.010124	0.000461
575	567	0.007384	0.061064	0.193259	0.056743	0.054636	2.104424	0.038506	0.047992	0.056233	0.003551	0.011557	0.000432
577	569	0.006046	0.056572	0.275881	0.047942	0.120732	2.494244	0.035037	0.051453	0.043324	0.003192	0.009957	0.000394
579	571	0.006224	0.059596	0.182018	0.050831	0.099746	2.422016	0.039546	0.045916	0.043707	0.003347	0.012072	0.000373
581	574	0.006351	0.062574	0.200284	0.051761	0.105718	2.639957	0.039534	0.048153	0.040857	0.003759	0.011297	0.000275
583	576	0.007642	0.062227	0.201092	0.053204	0.06999	2.354352	0.039629	0.048922	0.044516	0.004036	0.011756	0.00043
585	579	0.007096	0.062354	0.165549	0.053508	0.053368	2.402153	0.040373	0.046046	0.045295	0.003173	0.011226	0.000379
587	581	0.006193	0.060771	0.182191	0.052395	0.061579	2.447283	0.040188	0.04871	0.043458	0.003203	0.011716	0.000439
589	583	0.006659	0.062409	0.164969	0.053847	0.061166	2.43761	0.040528	0.045418	0.043506	0.003047	0.011439	0.000374
591	586	0.006703	0.060991	0.111638	0.056042	0.055358	2.407531	0.041398	0.042662	0.046735	0.003928	0.012488	0.000351
593	588	0.007236	0.06262	0.167575	0.055232	0.046209	2.359676	0.041392	0.046607	0.045692	0.003577	0.012676	0.000469
595	590	0.006594	0.06168	0.164817	0.052745	0.067251	2.525628	0.040432	0.04565	0.044275	0.002995	0.011025	0.000524
597	593	0.006699	0.061059	0.187239	0.050958	0.044957	2.248352	0.039778	0.047626	0.046154	0.003331	0.011451	0.000428
599	595	0.006308	0.059309	0.234784	0.048904	0.080826	2.517826	0.038725	0.052554	0.043861	0.002998	0.010688	0.000386
601	598	0.006492	0.060558	0.237261	0.048521	0.08475	2.557139	0.03865	0.052632	0.041052	0.004155	0.010482	0.000439
603	600	0.006931	0.060587	0.192996	0.050928	0.063008	2.235072	0.039141	0.049238	0.045801	0.003307	0.011403	0.000399
605	602	0.007133	0.062617	0.190636	0.053516	0.050232	2.332177	0.040744	0.04775	0.044849	0.003595	0.012209	0.000416
607	605	0.007453	0.06514	0.201481	0.054867	0.042392	2.266525	0.0414	0.049525	0.04557	0.003985	0.011677	0.000471
609	607	0.007813	0.064989	0.213225	0.055036	0.072683	2.484766	0.040429	0.050353	0.04665	0.004014	0.0113	0.000331
611	609	0.007357	0.065584	0.200544	0.053236	0.057968	2.359729	0.04199	0.048774	0.042142	0.002745	0.012098	0.00051
613	612	0.007056	0.064014	0.201682	0.052679	0.061562	2.381687	0.040484	0.04921	0.0421	0.004017	0.011355	0.000486
615	614	0.007172	0.061772	0.207834	0.053043	0.083337	2.400696	0.040192	0.049244	0.044772	0.003285	0.011898	0.000452
617	617	0.006919	0.062193	0.195872	0.052817	0.065318	2.378222	0.040367	0.048508	0.043211	0.003492	0.011865	0.000421
619	619	0.006805	0.061939	0.181406	0.051995	0.059057	2.362008	0.040388	0.047901	0.043755	0.002872	0.011779	0.000489
631	621	0.003808	0.036784	0.120697	0.031781	0.033028	1.415409	0.032865	0.041408	0.047089	0.003734	0.008745	0.0004
633	623	0.00481	0.046222	0.165715	0.038584	0.036195	1.777628	0.036347	0.047138	0.044443	0.003881	0.011103	0.000386
635	625	0.00508	0.048936	0.182296	0.040936	0.041876	1.94657	0.037405	0.047504	0.042723	0.0041	0.012155	0.000324
637	628	0.002881	0.028331	0.135418	0.024226	0.027881	1.214218	0.034702	0.044957	0.044261	0.004124	0.008671	0.00017
639	630	0.004024	0.036833	0.167418	0.031699	0.031847	1.478168	0.036919	0.048476	0.043771	0.003446	0.010481	0.000276
641	632	0.005232	0.050795	0.171319	0.04302	0.04373	1.946311	0.039939	0.048966	0.044221	0.005176	0.01354	0.000221
643	634	0.005552	0.057016	0.192544	0.049921	0.061668	2.323169	0.040391	0.047119	0.042747	0.004117	0.012835	0.000344
645	637	0.0029	0.051707	0.158898	0.048575	0.051142	2.342085	0.041195	0.047299	0.043215	0.003485	0.011699	0.000254
647	639	0.00315	0.054628	0.148856	0.051445	0.051081	2.371724	0.04129	0.046836	0.044236	0.003556	0.011691	0.000137
649	641	0.003357	0.053581	0.151681	0.050618	0.071355	2.521093	0.039181	0.045031	0.046501	0.003569	0.011465	0.000107
651	643	0.00349	0.052391	0.145426	0.050447	0.034217	2.249187	0.039707	0.044595	0.04809	0.003553	0.010626	0.000239
653	645	0.003872	0.05476	0.164809	0.053306	0.03791	2.245284	0.040214	0.048077	0.049388	0.003769	0.011246	0.000107
655	648	0.003154	0.048082	0.252405	0.046795	0.043578	2.16016	0.037859	0.048178	0.046167	0.003164	0.010944	0.000182
657	650	0.002725	0.039102	0.445842	0.038285	0.046898	1.962517	0.037444	0.048899	0.050456	0.003419	0.009573	0.000222
659	652	0.003761	0.053598	0.194713	0.051009	0.057542	2.424905	0.039267	0.0489	0.047831	0.003014	0.011191	0.000129
661	654	0.004028	0.055045	0.197091	0.052735	0.074633	2.72927	0.038003	0.050473	0.048525	0.004395	0.010803	0.00019
663	657	0.003868	0.058829	0.212561	0.055696	0.079382	2.560932	0.039462	0.051456	0.045435	0.00375	0.011685	0.000316
665	659	0.00405	0.054491	0.207278	0.049592	0.048187	2.064542	0.038544	0.053086	0.048042	0.002972	0.010677	0.000126
667	661	0.004726	0.050135	0.243651	0.042107	0.049185	1.691992	0.033292	0.058041	0.051781	0.003551	0.008654	0.000169
669	663	0.004426	0.053687	0.215274	0.046739	0.047195	2.038911	0.037835	0.05539	0.054945	0.003362	0.010213	0.000292
671	666	0.003696	0.056507	0.20006	0.05103	0.086866	2.42766	0.039529	0.051295	0.04279	0.003886	0.011852	0.000226
673	668	0.003666	0.057009	0.149998	0.05443	0.07193	2.381761	0.041496	0.047332	0.042278	0.004046	0.01239	0.000149
675	670	0.003723	0.055428	0.175939	0.053639	0.083332	2.551264	0.040467	0.049102	0.043944	0.003207	0.011984	0.000206
677	672	0.003824	0.055533	0.163457	0.056425	0.069616	2.469328	0.040259	0.047854	0.048597	0.004301	0.012029	0.000194
679	674	0.004143	0.056018	0.163978	0.052928	0.040073	2.175683	0.040324	0.047007	0.05161	0.004691	0.011295	0.000228
681	677	0.003861	0.05577	0.163106	0.05368	0.043517	2.269444	0.040485	0.04773	0.050491	0.004265	0.011367	0.000258
683	679	0.003917	0.05711	0.146549	0.054967	0.034555	2.220438	0.040891	0.047298	0.0516	0.004678	0.011997	0.000193
685	681	0.003622	0.055558	0.128429	0.05442	0.033779	2.096292	0.04057	0.04437	0.053032	0.003929	0.011718	0.00011
687	683	0.003537	0.048887	0.182236	0.049017	0.057001	2.102316	0.03709	0.052038	0.051617	0.004487	0.011133	0.000162
689	686	0.004305	0.050033	0.204551	0.04408	0.057711	1.995458	0.035354	0.056074	0.049508	0.003071	0.009377	0.000181
691	688	0.003167	0.054565	0.093327	0.049752	0.0529	2.435336	0.041365	0.043063	0.041474	0.003825	0.011971	0.000241
693	690	0.003239	0.051875	0.102536	0.051767	0.066996	2.668062	0.039108	0.044664	0.045574	0.003788	0.011215	0.000199
695	692	0.003233	0.052636	0.125311	0.049849	0.063125	2.46688	0.040436	0.045471	0.042622	0.004008	0.011139	0.000176
697	695	0.003221	0.0514	0.11727	0.051203	0.05252	2.367479	0.040919	0.045585	0.044308	0.003472	0.01136	0.000233
699	697	0.003225	0.053708	0.134599	0.051677	0.052504	2.43458	0.03982	0.046028	0.043478	0.00375	0.011483	0.000143
701	699	0.003272	0.050912	0.113498	0.05179	0.037646	2.160622	0.040429	0.042834	0.047234	0.004024	0.01114	0.000116
703	701	0.003163	0.052908	0.124512	0.050566	0.046421	2.33791	0.041526	0.045006	0.044168	0.003747	0.011426	0.000228
705	703	0.003312	0.053389	0.155658	0.050738	0.051648	2.335173	0.041249	0.047492	0.045102	0.004185	0.011766	0.000192
707	706	0.00311	0.050737	0.164178	0.049106	0.046775	2.190373	0.040008	0.049443	0.047982	0.003649	0.011187	0.000144
709	708	0.002722	0.053537	0.128734	0.051163	0.051436	2.418057	0.041788	0.046797	0.043888	0.004111	0.011568	0.000153
711	710	0.002722	0.054545	0.127649	0.051678	0.053758	2.46496	0.04197	0.045294	0.040882	0.003689	0.012658	8.3E-05
713	712	0.003178	0.059932	0.163791	0.055307	0.062164	2.61068	0.043726	0.046023	0.04235	0.004305	0.012926	0.000118
715	715	0.003783	0.056186	0.17879	0.052519	0.077994	2.50128	0.039755	0.046193	0.045358	0.004964	0.012482	0.000119
717	717	0.004388	0.044794	0.119969	0.039558	0.043364	1.877545	0.040046	0.046543	0.046299	0.003036	0.010425	0.000402
719	719	0.007484	0.057145	0.174531	0.048794	0.051087	2.075091	0.04078	0.050126	0.047837	0.00371	0.011775	0.000528
737	721	0.005012	0.043146	0.173652	0.038288	0.035092	1.593198	0.035642	0.046696	0.045328	0.004067	0.008666	0.000245
739	723	0.007964	0.062313	0.233358	0.051	0.076165	2.344111	0.039776	0.050001	0.043369	0.003643	0.011081	0.000576
741	726	0.006935	0.05779	0.270814	0.047542	0.052401	2.129286	0.038036	0.049323	0.041106	0.004869	0.010989	0.000219
743	728	0.006494	0.056823	0.240685	0.04795	0.05606	2.057781	0.039103	0.048961	0.041262	0.005045	0.012458	0.000408
745	731	0.008247	0.065316	0.207154	0.05446	0.056879	2.305637	0.040816	0.049291	0.043136	0.004733	0.013568	0.000443
747	733	0.007473	0.063293	0.152625	0.054953	0.060172	2.308946	0.041542	0.046833	0.043972	0.005693	0.013848	0.000508
749	735	0.007213	0.064817	0.141809	0.058573	0.076733	2.646999	0.04244	0.046899	0.040011	0.005109	0.012893	0.000419
751	738	0.007925	0.064571	0.191455	0.0578	0.057765	2.300706	0.042598	0.049513	0.04095	0.004339	0.013344	0.000557
753	740	0.007603	0.063008	0.192495	0.054406	0.050351	2.318309	0.042486	0.050216	0.041211	0.004225	0.012414	0.000521
755	743	0.007166	0.063584	0.183198	0.054704	0.068222	2.530574	0.041588	0.047382	0.040093	0.00423	0.011937	0.000385
757	745	0.007266	0.062399	0.178299	0.055799	0.072811	2.482486	0.041019	0.046698	0.039248	0.00414	0.012609	0.000432
759	747	0.007517	0.06428	0.156964	0.059777	0.066203	2.337966	0.042516	0.045942	0.043454	0.004217	0.013525	0.000523
761	750	0.007807	0.06723	0.160451	0.06086	0.048718	2.391024	0.043537	0.046806	0.045539	0.004764	0.012856	0.000435
763	752	0.007159	0.072968	0.19176	0.055465	0.067807	2.799709	0.045338	0.04764	0.033546	0.004099	0.012093	0.000461
765	755	0.00765	0.072462	0.168818	0.054555	0.048744	2.503838	0.045337	0.045433	0.038487	0.003465	0.012003	0.000431
767	757	0.006919	0.061423	0.152852	0.051338	0.038498	2.20958	0.042815	0.04617	0.03931	0.003579	0.012239	0.000445
769	759	0.006401	0.062738	0.215201	0.049868	0.073723	2.520933	0.041792	0.052171	0.036	0.003755	0.011701	0.000299
771	762	0.006718	0.061401	0.183645	0.052316	0.044189	2.360954	0.041258	0.050647	0.037499	0.004273	0.012098	0.000455
773	764	0.006615	0.059128	0.19639	0.050574	0.063568	2.480954	0.040933	0.051677	0.036893	0.003904	0.011292	0.000499
775	767	0.006506	0.057744	0.238337	0.04919	0.07023	2.451482	0.039473	0.05197	0.038355	0.003156	0.01095	0.000348
777	769	0.006745	0.057186	0.269392	0.0469	0.057141	2.170074	0.040102	0.056661	0.035971	0.003168	0.011221	0.000338
779	771	0.009277	0.058026	0.315792	0.046886	0.050964	1.915111	0.037924	0.061148	0.043886	0.003938	0.010695	0.000536
781	774	0.006737	0.058208	0.241374	0.04621	0.055824	2.339004	0.039845	0.053919	0.034392	0.00314	0.011479	0.000443
783	776	0.007425	0.058773	0.239678	0.047938	0.047819	2.181142	0.040404	0.055485	0.038836	0.003789	0.011473	0.000488
785	779	0.007853	0.063145	0.262598	0.050149	0.049547	2.323497	0.040593	0.056103	0.037446	0.004027	0.011997	0.000483
787	781	0.007629	0.066883	0.261437	0.051894	0.039473	2.314393	0.042556	0.055848	0.036445	0.003586	0.012314	0.000504
789	783	0.006899	0.054863	0.204421	0.044448	0.037447	1.953089	0.038327	0.052237	0.041023	0.003664	0.010766	0.000434
791	786	0.007467	0.060039	0.237351	0.049633	0.06839	2.451331	0.039416	0.053573	0.037075	0.004773	0.012202	0.000436
793	788	0.007371	0.061298	0.241094	0.05154	0.081119	2.500685	0.040942	0.053774	0.037829	0.004429	0.012905	0.000435
795	791	0.007224	0.06257	0.279595	0.04976	0.057491	2.312811	0.040877	0.058209	0.03726	0.003835	0.01215	0.000314
797	793	0.007793	0.062378	0.247084	0.050915	0.046839	2.179023	0.039339	0.055744	0.042114	0.004379	0.012409	0.000416
799	795	0.007176	0.062565	0.237392	0.051183	0.041347	2.255607	0.040894	0.054525	0.03983	0.003898	0.012423	0.000428
801	798	0.007503	0.06518	0.257655	0.051284	0.039279	2.231001	0.041523	0.056687	0.038634	0.00385	0.011386	0.000526
803	800	0.007834	0.070428	0.251871	0.054992	0.03909	2.358852	0.043252	0.056362	0.037767	0.003841	0.011733	0.000539
805	803	0.007819	0.063283	0.211631	0.05459	0.056757	2.423121	0.040933	0.05128	0.040781	0.004656	0.012598	0.000443
807	805	0.008718	0.06368	0.267946	0.053753	0.06591	2.402204	0.039817	0.056061	0.042437	0.004298	0.011989	0.000479
809	807	0.008308	0.059987	0.248118	0.051117	0.049805	2.14541	0.03929	0.055686	0.043697	0.003964	0.01131	0.000401
811	810	0.009181	0.055885	0.330244	0.046273	0.052974	1.85898	0.036257	0.063625	0.04766	0.004088	0.011098	0.000458
813	812	0.009074	0.06214	0.292956	0.052109	0.056404	2.129328	0.038988	0.060226	0.044502	0.003788	0.012046	0.000553
815	815	0.009047	0.06148	0.330276	0.048457	0.050528	2.061585	0.036271	0.058886	0.041894	0.004577	0.015149	0.000423
817	817	0.000223	0.000624	0.000616	0.000132	0.00038	0.002592	0.000682	0.000947	0.019265	0.002638	0.030005	0.000347
819	819	0.006477	0.05333	0.167933	0.047245	0.056338	2.089301	0.036411	0.045868	0.047268	0.003505	0.010516	0.000201
821	821	0.006329	0.050412	0.188939	0.044665	0.054269	1.958427	0.035609	0.047473	0.045449	0.003978	0.010374	0.00041
823	823	0.005957	0.051351	0.235237	0.044269	0.052458	2.013875	0.034424	0.054448	0.043364	0.003328	0.010294	0.000353
825	825	0.005766	0.052016	0.363842	0.04282	0.061671	2.193707	0.03492	0.067057	0.040112	0.003232	0.010362	0.000317
827	827	0.006617	0.053789	0.404387	0.043771	0.04898	2.00262	0.034246	0.069705	0.042882	0.002983	0.009895	0.000373
829	829	0.005436	0.03904	0.231835	0.033295	0.020437	1.255493	0.032929	0.062205	0.054335	0.003366	0.008175	0.000217
831	831	0.006841	0.057558	0.300915	0.047642	0.039609	1.836755	0.037588	0.061345	0.048762	0.004083	0.010421	0.000295
833	833	0.006439	0.054316	0.506875	0.035901	0.049257	1.869213	0.032702	0.078397	0.038841	0.003809	0.009551	0.000344
835	835	0.006479	0.052917	0.503996	0.039687	0.051514	1.858582	0.032367	0.080483	0.041609	0.003269	0.009849	0.000256
837	837	0.006792	0.049887	0.365576	0.03887	0.054215	1.818751	0.03192	0.062826	0.042908	0.003684	0.009968	0.000318
839	839	0.006976	0.049074	0.417582	0.035836	0.049863	1.788097	0.030407	0.076656	0.040993	0.003112	0.008657	0.000284
841	841	0.006616	0.055805	0.379399	0.043815	0.040696	1.895825	0.035665	0.069352	0.043963	0.004185	0.010218	0.000428
843	843	0.007283	0.054146	0.371387	0.043952	0.040812	1.775632	0.035005	0.065351	0.050729	0.003151	0.010457	0.000301
845	845	0.00833	0.059978	0.184125	0.053732	0.03644	1.749882	0.03944	0.047814	0.066344	0.003597	0.010374	0.000357
847	847	0.007475	0.056643	0.399551	0.043886	0.038514	1.832444	0.034389	0.068279	0.044544	0.003648	0.010414	0.00042
849	849	0.008581	0.046844	0.405883	0.031423	0.033836	1.375648	0.028811	0.060055	0.041451	0.002782	0.007559	0.000284

Appendix 12 Geological map of the Rhine catchment

Geological map of the Rhine catchment. After Van Andel, 1950



Appendix 13 Distributive regions of the Rhine catchment

Map of the distributive regions of mineral assemblages of the Rhine catchment. After Van Andel, 1950