Potential of Dutch saltmarshes as deposits of blue carbon

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Preface

This thesis represents the end of my master studies and life as a student (for now). First, I would like to thank Caroline Slomp, Malenthe Teunis, and Karin Didderen for their supervision and guidance during my thesis. Furthermore, I would like to thank Floor Driessen and Udo van Dongen for their additional help during the fieldwork period. Also I thank Robert Middelveld for helping me with R and checking my scripts.

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Abstract

Vegetated coastal areas such as tidal saltmarshes, mangroves and saltmarshes provide benefits such as coastal protection, wave action reduction, and trapping of sediment. Additionally, they provide storage for carbon from the atmosphere and oceans in their living biomass aboveground, and living- and non-living biomass underground. This storage has been termed “blue carbon”. This study aimed to determine the soil carbon pool of the island-, mainland-, and estuarine saltmarshes of Texel, the Eastern and Western Scheldt, and Groningen in the Netherlands. This was done to estimate the blue carbon potential for these areas, and to make estimations for the whole Dutch salt marsh area to make a global comparison. The objective was reached by collecting sedimentary soil samples, analysing the organic carbon content, and compiling and interpreting existing data within the context of the wider literature. Results showed that there is a significant correlation between %LOI and %C_{org} of the soil samples ($p<0.01$) and a significant negative correlation between soil carbon content and soil depth ($p<0.01$). Furthermore, no significant correlation between organic carbon content and salt marsh type ($p>0.05$) and no correlation between organic carbon content and gradient zones was shown ($p>0.05$). The island salt marsh has the highest carbon stock (302 Mg C/ha) and an annual carbon accumulation of ~4 Mg C/ha/yr. Followed by the estuarine salt marsh with a carbon stock of 287 Mg C/ha and an accumulation of 5.3 Mg C/ha/yr, and mainland salt marsh with a carbon stock of 215 Mg C/ha and accumulation of 5.8 Mg C/ha/yr. The observed differences are suggested to be related to differences in salt marsh elevation, accretion and erosion rates, and soil grain size. When compared to average global estimations, the national carbon stock (276 Mg C/ha) and annual carbon accumulation (5.08 Mg C/ha/yr) were higher than global averages (244 Mg C/ha and 2.45 Mg C/ha/yr) and European accumulation rates (3.12 Mg C/ha/yr). However, European average carbon stock estimates were higher than estimations of this study (312 Mg C/ha). It is suggested that the higher carbon stock and accumulation rates are related to the Netherlands latitude being situated in a carbon accumulation peak between 48.5 – 58.5◦ N. Furthermore, it is also suggested that lower temperatures than other European countries resulted in a lower than average carbon stock. Even though the higher marsh gradient zone had fewer measurements, the results are still considered reliable due to the inclusion of pioneer marshes when higher marshes were inaccessible. It is recommended that data collection during further research is done outside of coastal bird breeding seasons, that research includes marsh elevation and soil grain size, and includes $\delta^{13}C$ measurements. Following these recommendations would provide a detailed description of the carbon content in higher marshes, the effect of elevation and grain size on soil carbon content, and the origin of the organic carbon.

1 Introduction

Vegetated coastal ecosystems are well known for their numerous benefits and ecosystems services, such as sediment trapping, reducing wave action, and providing habitat for many marine species (Cullen-Unsworth and Unsworth 2013; Sousa et al. 2012; Beck et al. 2001). Additionally, these ecosystems support mitigation of climate change by storing significant amounts of carbon from the atmosphere and oceans, termed “blue carbon” (Chmura et al. 2003; McLeod et al. 2011; Bouillon et al. 2008). Storage of carbon originates from internal and external sources. An internal source is the biomass of the vegetation within the blue carbon ecosystem. Due to it being autotrophic, vegetation in these ecosystems fixate CO_2 into organic matter by photosynthesis, therefore removing CO_2 from their surrounding atmosphere (Burrows et al. 2014). External sources include phytoplankton, micro-phytobenthos, and suspended organic particles (Burrows et al. 2014; McLeod et al. 2011). These external sources enter the ecosystems as particles in the water column, with vegetation capturing these particles which settle onto the soil (Bakker et al. 2016). In comparison to terrestrial soils, coastal soils have the potential to store carbon for longer time scales (millennia compared to decades) making them a more reliable carbon sink (fig. 1.1) (Nellemann et al. 2009; Duarte, Middelburg, and Caraco 2004). This is related to the low oxygen (anoxic) state of the coastal sediment. Water in blue carbon ecosystems saturates the soil, preventing the oxidation of carbon and release back into the atmosphere. Because oxidation is prevented, carbon storage increases (Schlesinger and Lichter 2001; Chmura et al. 2003; Laffoley and Grimsditch 2009). Vegetated coastal ecosystems capable of a significant amount of blue carbon storage are mangroves, salt marshes, and seagrasses. The distribution of these ecosystems is varied and is partially dependent on climate conditions. Mangroves are distributed along the equator in tropical climates (Pendleton et al. 2012). Salt marshes range from sub-arctic to tropical, but are most extensive in temperate latitudes (Laffoley and Grimsditch 2009). Seagrasses are most common in tropical climates however are also found in more temperate climates (Pendleton et al. 2012).

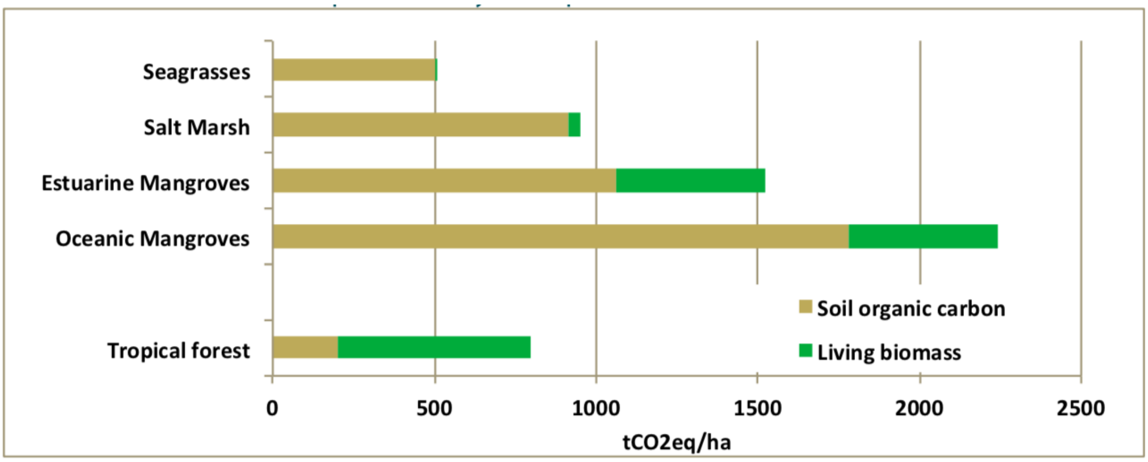

Figure 1.1 Storage of CO_{2e} (equivalent) per hectare in coastal vegetated areas and terrestrial forest areas. Amount of storage in living biomass (green) and soil organic carbon (beige) is displayed (Murray et al. 2011).

Several interactions between biological and physical processes influence the shape and size of salt marshes. Salt marshes grow in area when sedimentation occurs with sediment particles in the water column settling onto the soil either when water retreats or captured by vegetation when the salt marsh is flooded. A higher concentration of sediment particles in the water column causes higher sedimentation rates (Bakker 2014). Vertical accretion increases the height of the salt marsh edge. This is a combination of sedimentation, erosion and accumulation of non-living material and is dependent on flow rate (Bakker 2014). If vertical accretion outpaces sea level rise, the decrease of flooding will cause succession from pioneer vegetation types to higher marsh vegetation types (Adam 2002). If vertical accretion is smaller however, then salt marshes are in danger of being drowned, of increased lateral erosion due to increased wave propagation (Mariotti and Fagherazzi 2013), or for coastal squeezing to occur (i.e. when coastal defence structures prevent salt marshes from moving inland to counter higher water levels) (Doody 2004).

Besides the capturing of sediment, vegetation composition affects the deposition and storage of carbon (Chen et al. 2014). Vertical accretion elevates the salt marsh decreasing the times a certain area is flooded, resulting in gradient zones with different salinity tolerances (fig. 1.2). The pioneer zone is located under the mean high tide (MHT) point and is submerged twice a day. In this gradient zone pioneer vegetation with high salinity tolerances settle (e.g. *Salincornia sp.*). Due to vegetation being present in this zone, wave action is reduced and suspended particles are trapped. The latter includes sediment particles and external organic carbon sources (Burrows et al. 2014; McLeod et al. 2011). Vertical accretion of the pioneer zone above the MHT results in succession to the lower marsh zone. This gradient zone gets flooded during spring tide. Succession of this gradient zone results in the middle to high marsh gradient zones, which only get flooded once a century (Bakker 2014).

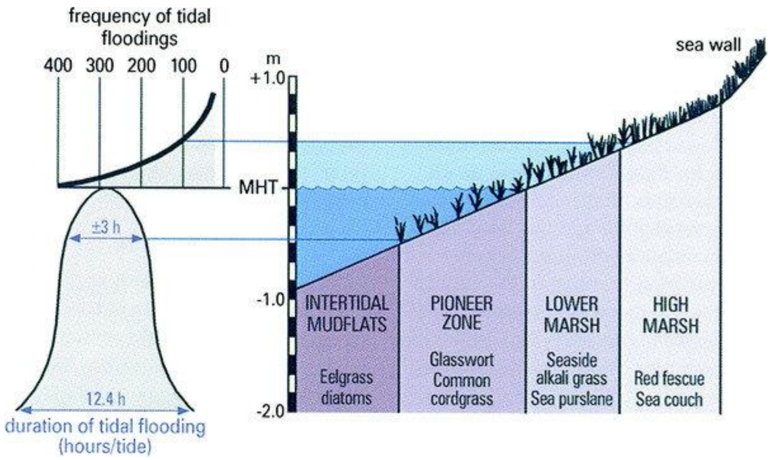

Figure 1.2 Zonation of a salt marsh in relation to marsh elevation and tidal flooding, in the western German Wadden Sea. With MHT indicating mean high tide, and frequency of tidal flooding per year. (adjusted by Bakker et al. 2016 from Erchinger 1985).

Relatively little is known about the blue carbon potential of habitats in Europe compared to for instance North America (Sifleet, Pendleton, and Murray 2011; Ouyang and Lee 2014). Global carbon accretion rates (CAR) are on average 2.45 Mg C/ha/yr. Highest CAR are measured between 48.4 – 58.4 ºN, with a peak in northern Mediterranean marshes (3.15 Mg C/ha/yr) (Ouyang and Lee 2014; Table 1). Estimations of rates for the Dutch salt marsh area are lower than the global average (1.51 Mg C/ha/yr), however these estimations are only based on literature from the Eastern Scheldt and older global averages with a smaller latitude range (Chmura et al. 2003; Tamis and Foekema 2015; Ouyang and Lee 2014).

Dutch salt marshes can be divided into three types: island salt marsh, mainland salt marsh, and estuarine salt marsh. Island salt marshes, also known as back-barrier marshes, are formed on the leeward side of barrier islands and have low sedimentation rates (Bakker et al. 2002). Island salt marshes located in the Dutch Wadden Sea share a total area of 6745 ha (CBS et al. 2012). Mainland salt marshes are formed in low wave energy coastal areas with high sedimentation rates and are (partially) of man-made origin (Bakker et al. 2002). In the Netherlands mainland salt marshes are situated in the north of Friesland and Groningen with an area of 3342 ha (KS Dijkema et al. 2007). Estuarine salt marshes are associated with large rivers that have an open connection to the sea, causing brackish water with high sedimentation rates (Bakker et al. 2002). The Dutch estuarine salt marshes in the Eastern- and Western Scheldt have an area of 3565 ha (CBS et al. 2012).

Table 1 Estimations of global carbon accumulation rates for different regions. USA is divided into three subgroups. Adjusted from Ouyang and Lee (2014).

Region	**Soil CAR, Mg C/ha/yr (mean±SE)**	**Area (km2)**
Australia	2.75	13765
China	2.24	5734
USA		
- Tropic W. Atlantic	2.94 ± 0,61	8596
- NW Atlantic	1.34 ± 0.13	2685
- NE Pacific	1.74 ± 0.45	7984
Europe and Scandinavia	3.12 ± 0.51	2302
Canada	2.14 ± 0.34	328
Northern Africa	3.05 ± 0.86	93
Southern Africa	2.01 ± 0.23	170
Global	**2.45 ± 0.26**	**41657**

Loss of marine vegetated ecosystem area due to anthropogenic and natural effects results in a decrease of blue carbon potential, besides a loss of benefits and services (Nellemann et al. 2009). This not only includes the loss of a carbon sink, it also causes an increase in carbon emissions due to the previously stored carbon forming CO_2 and other greenhouse gases creating a carbon source instead of a carbon sink (Yu and Chmura 2009; Fourqurean et al. 2014; Kauffman et al. 2014; Theuerkauf et al. 2015).

This study aimed to determine the soil carbon pool of three different types of salt marsh in the Netherlands in four areas. This was done to estimate the blue carbon potential for these types and areas, and to make estimations for the whole Dutch salt marsh area. Furthermore, a comparison to other areas was made to obtain further insight in the controls on the retention of carbon. The objective was reached by collecting sedimentary soil samples, analysing the organic carbon content, and compiling and interpreting existing data within the context of the wider literature. The latter includes historical data from Natuurmonumenten. In order to accurately quantify the soil carbon pool soil samples were collected, subsampled, and analysed.

2 Materials and Methods

Methods used for collection and processing of the data were modified from Fourqurean et al. (2014).

2.1 Study area

The total area of salt marshes in the Netherlands is 13652 ha, of which 6745 ha is located in the Wadden Sea, 3565 ha in Delta systems (CBS et al. 2012), and 3342 ha in the north of Friesland and Groningen (Dijkema et al. 2007). Three different types of saltmarsh were sampled (fig 2.1):

(1) Island saltmarshes; with sampling locations in "de Schorren" on Texel (Esselaar 2017).
(2) Mainland saltmarshes; with sampling locations in "Uithuizerwad" at the coast north of Groningen (Alblas 2013).
(3) Estuarine saltmarshes; with sampling locations at the "Zuidgors" (Western Scheldt) and "Verdronken land van Zuid Beveland" (Eastern Scheldt) (Verbeek and Altena 2018; Hannewijk 2016a).

Since the researched areas are under management of Natuurmonumenten, the coring locations were approved by them before collection took place.

Figure 2.1 Research areas indicated by dots (green). With the Groningen salt marsh (northeast), Texel saltmarsh (north), Western Scheldt (far southwest), and the Eastern Scheldt (southwest).

2.2 Data collection

Dead aboveground biomass is most often carried away by tides and thus excluded from measurements, since it does not compromise accuracy (Fourqurean et al. 2014). For each area the gradient boundary of the lower, mid-range, and higher marsh was determined before sampling took place. This was necessary to obtain insight in how the carbon content in the sediment changes between each gradient zone. These gradient zones were determined according to vegetation monitoring services of Rijkswaterstaat (GeoWeb 5.1). Next, each gradient zone was randomly appointed four sample locations using ArcGIS (ArcGIS v. 10.6). The random pattern increases the likelihood of capturing the true variation (Fourqurean et al. 2014). During the data collection some high gradient zones were not accessible (e.g. due to coastal bird breeding season), therefore the pioneer zone was included. Only in the Western Scheldt a section of higher marsh was accessible. In the other research areas samples were collected from the pioneer-, low-, and middle marsh gradient zones.

Field methods

Sediment samples were taken, after organic litter was removed from the surface, by inserting an Eijkelkamp Gouge Auger (max 100 cm). At each of the randomly appointed coring locations, one core was taken. After measuring the depth, five subsamples were taken over the core depth with a thickness of 1 cm. Furthermore, the GPS coordinates were recorded and any relevant observations were noted.

After the corer was brought to the surface, the length of the total sediment sample and depth of the corer were measured. If the depth of corer and length of total sediment sample did not match, the compaction correction factor was taken into account. This was resolved by dividing the length of the sample by the corer depth. Sedimentary samples were collected with a small knife and put in a plastic bag. These samples were archived with a label containing the core ID, depth interval, and sample depth. The sedimentary sample collection resulted in 60 points of measurement per research area, thus 240 points of measurement in total. Lastly, to minimize changes of the soil content, samples were kept cold (4ºC) after collection and frozen within 24 hours (-20ºC). Prior to laboratory analysis, samples were freeze-dried at Utrecht University using a Scala freeze dryer. An example of a fieldwork datasheet can be found in Appendix I.

Additional data

Historical data regarding the size and age of the salt marsh area, vegetation, and other relevant variables was acquired from the literature and from data bases available through Natuurmonumenten (Alblas 2013; Hannewijk 2016b; Esselaar 2017; Verbeek and Altena 2018). Further information was obtained from aerial photographs using Topotijdreis (Topographisch Bureau 2015). This resulted in an estimated average age for “de Schorren” of 75 years, “Uithuizerwad” of 37 years, “Zuidgors” of 70 years, and “Verdronken Land van Zuid-Beveland” of 45 years.

2.3 Laboratory analysis

To determine the soil carbon density accurately the analysis targeted the dry bulk density (DBD) and organic carbon content (%C_{org}). When both values are known, the carbon content of the soil at specific depths can be estimated.

Dry bulk density

The dry bulk density (g/mg^3) of a sample was derived from the mass of dry soil (g) divided by the original volume of the tube of the dried sample (cm^3/g):

$$DBD = \frac{Mass\ of\ dry\ soil}{original\ volume\ of\ sample}$$

To determine the original volume of the pre-dried sample the internal diameter of the coring device (3.35 cm^3) and the length of the sample was recorded. The volume was calculated by determining the volume of a cylinder:

$$Orignial\ volume\ of\ sample\ = [\pi * (radius\ of\ the\ coring\ device)^2] * length\ of\ sample$$

The mass of the dried sample was determined by placing the sample on a Petri dish and placing it into a drying oven at 60ºC until constant weight (i.e. <4% change) was reached. This process took a minimum of 24 hours. After the process was completed, the DBD of the sample was calculated for each sedimentary sample.

Organic carbon content

Measurements for organic carbon content (%C_{org}) of the previously dried samples were performed using two methods: 1) The Loss on ignition (%LOI) method was used for all samples (n=240) to determine the organic matter content, at Bureau Waardenburg. 2) An elemental analyser (CN-analyser) was used to determine the organic carbon content (%C_{org}) for a selection of the samples (n=60), at Utrecht University. Before measurement, the samples were homogenized by removing any non-soil like material and by grinding it to a powder using a pulveriser.

The %LOI is the measure of mass lost during heating to 450 ºC. The %LOI is calculated as follows:

$$\%\ LOI = \frac{(dry\ mass\ before\ combustion - dry\ mass\ after\ combustion)}{dry\ mass\ before\ combustion} * 100$$

For the elemental analysis, a CN-analyser was used at Utrecht University. This process produced a signal that is proportional to the concentration of C (and N) in a given sample. Before insertion the samples were treated to remove inorganic carbonates. This removal ensured that inorganic carbonates were not included when determining blue carbon stocks. A detailed description of the decalcification process and the measurements with the CN-analyser can be found in Appendix II. We note that %LOI not only reflects the loss of organic carbon, but also of other compounds (e.g. nitrogen, hydrogen, oxygen, sulphur). Thus this method only shows the organic matter content of a sample. Therefore, the relationship of organic matter to organic carbon was determined by creating a factor for the LOI treated samples. First, the results of the CN-analyser were compensated for $CaCO_3$ to get the actual organic carbon content. Second, the actual carbon organic carbon content was divided by their %LOI. This resulted in the %LOI to %C_{org} factor of that specific sample. For the samples only analysed with the LOI method, the actual carbon content of samples with the closest variables (i.e. area, gradient zone, and depth) were used to calculate their factor.

2.4 Data analysis

Analysis of the data was done using R v. 3.5.0 (R Core Team 2018) and RStudio Desktop v. 1.1.447 (RStudio Team 2018). In order to make estimations of the blue carbon potential, the total organic carbon (Mg C/ha) and carbon accumulation rate (g C/ha/yr) of the project areas were calculated.

Calculating soil carbon stock and accumulation rate

1) To know the soil carbon stock of each area, first the carbon density (g/cm^3) of each subsample was calculated according to the following formula:

$$Subsample\ carbon\ density = DBD * \left(\frac{\%\ C_{org}}{100}\right)$$

2) Following this, the amount of carbon in the core sections was calculated by multiplying the carbon density of each subsample depth by the subsample interval in cm:

$$Carbon\ in\ core\ section = subsample\ carbon\ density * subsample\ interval\ depth$$

3) With results of the previous step, the amount of carbon density of each core section was summed up per core over depth, and converted to commonly used units for carbon stock assessments:

$$Total\ core\ carbon = \frac{summed\ core\ carbon * 1\ Mg}{1ha^{-1}} * 100$$

Resulting in the total core carbon Mg C/ha. These steps were repeated for each core.

4) Next the average amount of carbon of a gradient zone in depth was determined by adding up carbon content from each core and dividing this by the total number of cores taken (n). Using this the standard deviation of the cores was calculated via:

$$Standard\ deviation = \left[\frac{(X_1 - A)^2 + (X_2 - A)^2 + \cdots}{N - 1}\right]^{1/2}$$

A = Average carbon core
X_1, X_2 = carbon core #1, carbon core #2, …
N = total # cores

5) In order to calculate the total amount of carbon in the area, the average carbon value from each core was multiplied by the area of every gradient zone (ha). The sum of all strata determined the total soil carbon stock. The final unit was Mg C over depth for each replica.

$$Total\ organic\ carbon\ in\ area = (average\ carbon\ gradient\ zone\ A * area\ gradient\ zone\ A) + (average\ carbon\ gradient\ zone\ B * area\ gradient\ zone\ B) + \cdots$$

6) The standard error of each area was calculated by; standard deviation of each core * area of gradient zone. By adding up the deviation of each gradient zone the total variability of the area was calculated:

$$Total\ variabillity = deviation\ core\ A^2 + deviation\ core\ B^2 + \cdots$$

This ultimately resulted in a soil carbon pool (Mg C ± total variability), and a soil carbon stock (Mg C/ha). The estimations for the soil carbon pool of the research areas were based on the combined areas (ha) of the studied gradient zones. To determine the carbon accumulation rate (g C/ha/yr), the TOC of the area was divided by the age of the salt marsh:

$$Carbon\ accumulation\ rate = \frac{tonnes\ C/ha}{age\ of\ saltmarsh}$$

Additionally, equivalent stored CO_2 emissions (CO_{2e}) were estimated with a conversion factor of 3.67 based on the ratio of the molecular weights of CO_2 (44) and carbon (12) (Fourqurean et al., 2014).

Shapiro test for normality of data showed that the distribution of data differs from a normal distribution ($p < 0.05$). Therefore, the non-parametric functions were used. The Spearmans' rank correlation coefficient was used to assess the possible correlation between the %LOI and $\%C_{org}$ of the samples, and between carbon content of the samples and location, gradient zone, and soil depth. The difference in carbon content between locations and gradient zones was tested using One-way ANOVA. The false positive rate was only little affected by violation of the normality assumption for ANOVA therefore still reliable (Schmider et al. 2010).

3 Results

3.1 Organic matter & Organic carbon content

The weight percentage of samples treated with LOI represent the organic matter content of the samples (%LOI.) The highest organic matter content was measured at the Eastern Scheldt (11.2%), followed up by 10% at Groningen, 8.8% at Western Scheldt and 8.5% at Texel (fig. 3.1 left). The weight percentage of organic carbon ($\%C_{org}$) is also highest at the Eastern Scheldt (4.2%), followed by 2.9% at Texel, 2.6% at Western Scheldt, and lastly 2.4% at Groningen. With these average organic carbon content percentages, the researched soils can be considered rich in organic carbon (Donato et al. 2011). The Spearman rank correlation coefficient between the %LOI and $\%C_{org}$ showed that there is a significant correlation between organic matter content and organic carbon content in the soil samples ($p<0.01$). The following equation was constructed from the linear model between $\%C_{org}$ and %LOI (fig. 3.2):

$$\%\ C_{org} = 1.27 * \%LOI - 5.83$$

Furthermore, the Spearman rank correlation coefficient showed that there is no correlation between the carbon content of the soil samples and location ($p >0.05$), and the gradient zones ($p >0.05$). However, the correlation coefficient showed a strong correlation between depth and carbon content of subsamples

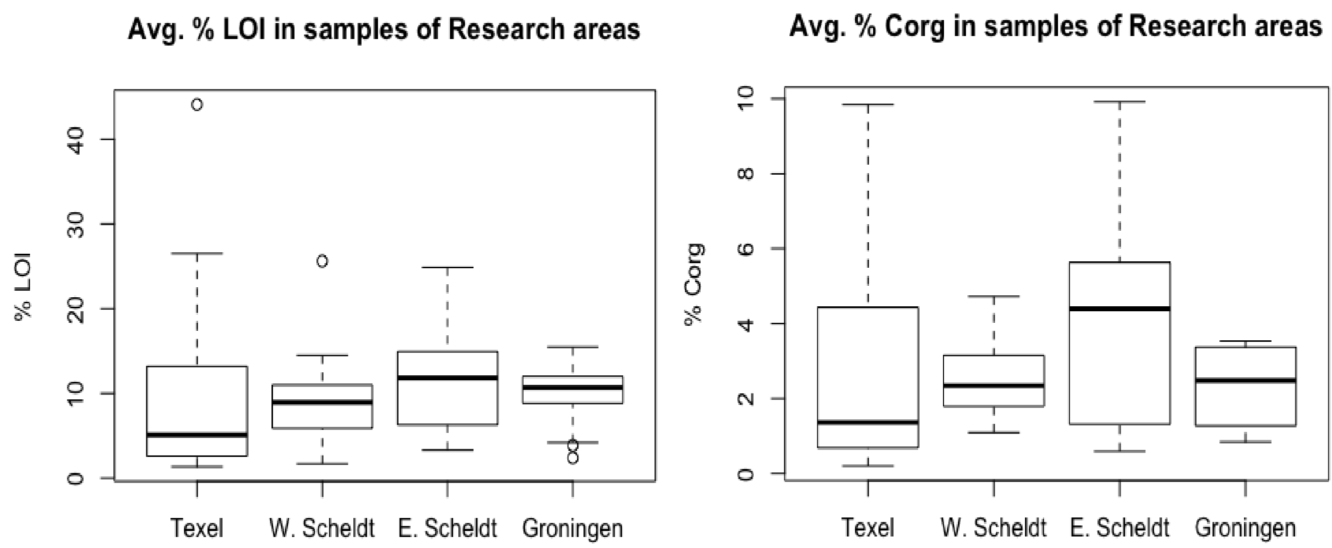

Figure 3.1 The average weight %LOI in soil samples per research area (left) and the average weight $\%C_{org}$ in soil samples per research area.

(p <0.01) with carbon content decreasing as depth increases. This is further supported by the one-way ANOVA test showing a difference between depth, but no difference between the research locations or gradient zones. When displayed the average carbon content of a sample over depth seems to follow this decreasing pattern as depth increases. However, when separated by research area the average carbon content of the Eastern Scheldt soil increases with depth (fig. 3.3 left). Furthermore, the "Pioneer" gradient zone also displayed an increase in carbon content over depth (fig. 3.3 right).

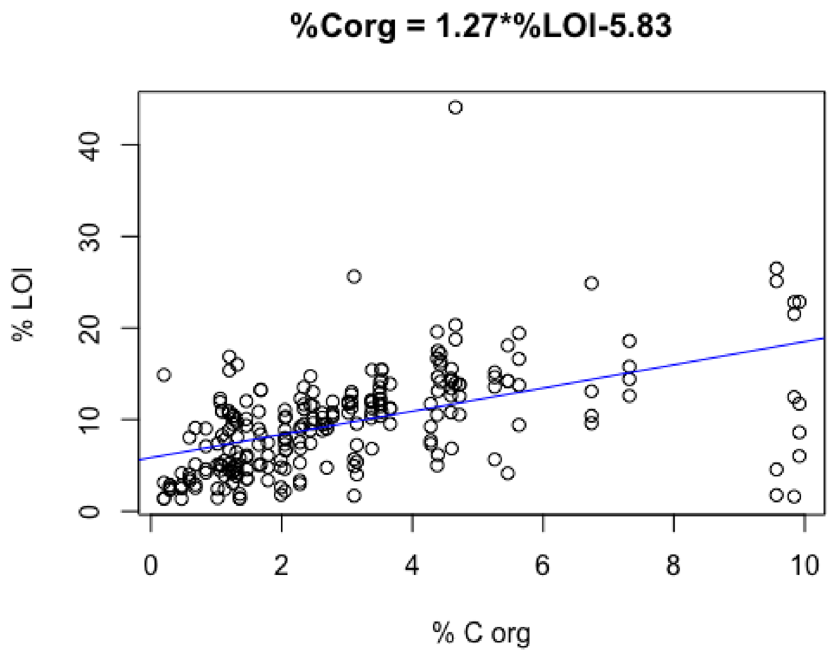

Figure 3.2 %LOI against $\%C_{org}$ with their corresponding linear regression line. The equation is based on a linear model between %LOI and $\%C_{org}$.

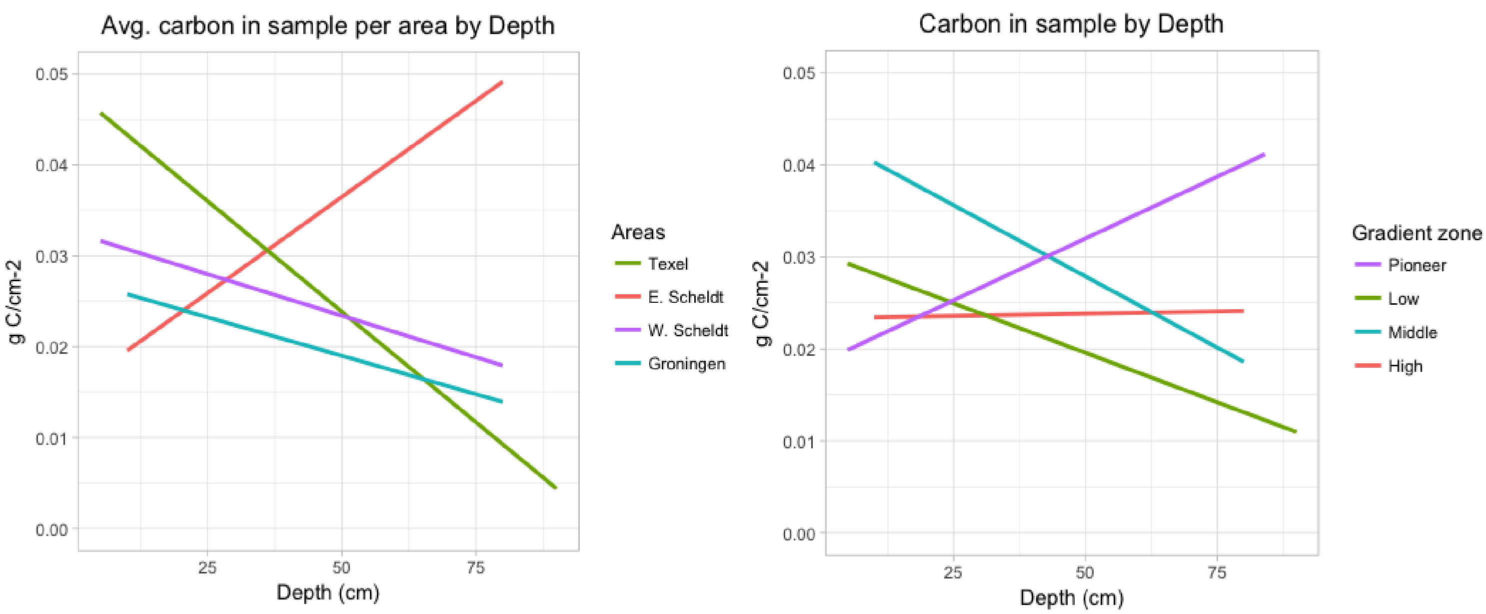

Figure 3.3 The average carbon content over depth (left). The average carbon content of each gradient zone over depth (right). Displayed is that for all, but pioneer, the carbon content decreases with depth.

3.2 Carbon Pool & Carbon stock

The total organic carbon pool of each research area was based on the total area of each gradient zone where samples were taken (fig. 3.4A). The highest carbon pool was found at the research area in Groningen. With a total of 6.6*10e3 (± 1.2*10e3) Mg C, based on the total research area of ~322 ha. The second highest soil carbon pool was the Eastern Scheldt research area, with 5.6*10e3 (± 2.4*10e3) Mg C, based on the total research area of ~41 ha. Followed by the Western Scheldt research area, 10.4*10e3 (± 1.8*10e3) Mg C based on the total research area of ~157 ha. And lastly the Texel research area comes to 8.4*10e3 (± 2.9*10e3) Mg C based on the total research area of ~26 ha. Based on the carbon stock of the research areas, estimations for all Dutch salt marsh types and area resulted in an average carbon stock of 276 Mg C/ha, and a soil carbon pool of 3.8*10e6 (± 1.3*10e6) Mg C (table 2). Of the research areas, the highest carbon stock was measured at the island salt marsh with ~302 Mg C/ha. These measurements were followed by the average of both estuarine salt marshes with a stock of ~287 Mg/ha (Eastern Scheldt ~314 Mg/ha and Western Scheldt ~259 Mg/ha), and the mainland saltmarsh with a stock of ~215 Mg/ha (fig. 3.4B).

3.3 Carbon accumulation & Equivalent CO_2 emissions

The average annual carbon accumulation (Mg C/ha/yr) estimations of the research area shows highest accumulation rates in the Eastern Scheldt (6.9 Mg C/ha/yr). Followed by Groningen (5.8 Mg C/ha/yr), Texel (4.02 Mg C/ha/yr), and the Western Scheldt (3.7 Mg C/ha/yr) (fig. 3.4C: table 2). Based on the Soil Carbon Stock and Carbon pool of the research areas, CO_2 equivalent emissions have been estimated. These estimations showed; 1*10e3 Mg CO_{2e} /ha and 30.9*10e3 ± 10.6*10e3 Mg CO_{2e} for the research area on Texel. ~792 Mg CO_{2e} /ha and 2.4*10e3 ± 4.5*10e3 Mg CO_{2e} for the research area in Groningen. ~951 Mg CO_{2e} /ha and 38.2*10e3 ± 6.5*10e3 Mg CO_{2e} for the Western Scheldt, and 1.2*10e3 Mg CO_{2e} /ha and 207.1*10e3 ± 88.9*10e3 Mg CO_{2e} for the Eastern Scheldt (table 2).

Table 2 The area in hectares, average carbon stock (Mg C/ha), total carbon pool (Mg C), average annual carbon accumulation, average CO_{2e} per hectare and total CO_{2e} of the three salt marsh types and for the total Dutch salt marsh area.

Marsh type	ha	Mg C/ha	Mg C/ha/yr	Total Mg C	Mg CO_{2e}/ha	Total Mg CO_{2e}
Island	6745	302	4.02	2 036 990 (± 899 461)	1007	6 792 215 (± 3 301 021)
Mainland	3342	287	5.8	766 475 (± 145 216)	792	2 646 864 (± 232 942)
Estuary	3565	215	5.3	959 154 (± 286 280)	1051	3 746 815 (± 1 050 647)
Netherlands	**13652**	**276**	**5.04**	**3 762 619 (± 1 254 206)**	**950**	**12 969 400 (± 4 602 936)**

3.4 Carbon stock per gradient zone

Dividing the Mg C/ha of each research area by its corresponding gradient zone reveals that for the island and mainland salt marsh areas the Mg C/ha is higher in the more developed gradient zones compared to less developed zones (fig. 3.5). For the salt marsh on Texel, highest carbon content was found in the "Middle" gradient zone (406 Mg C/ha). Followed by "Middle" (315 Mg C/ha) and "Pioneer" (184 Mg C/ha) (fig. 3.5A). The salt marsh in Groningen showed highest carbon content in more developed gradient zone; "Middle" (247 Mg C/ha), "Pioneer" (209 Mg C/ha), and "Low" (190 Mg C/ha) (fig. 3.5B). However, the estuarine salt marshes showed the opposite. With the Western Scheldt highest carbon content in the "Low" zone (278 Mg C/ha), followed by "Middle" zone (263 Mg C/ha) and "High" (237 Mg C/ha) (fig. 3.5C). For the Eastern Scheldt salt marsh highest carbon content was measured at the "Pioneer" gradient zone (477 Mg C/ha), followed by "Middle" zone (354 Mg C/ha) and "Low" (110 Mg C/ha) (fig. 3.5D).

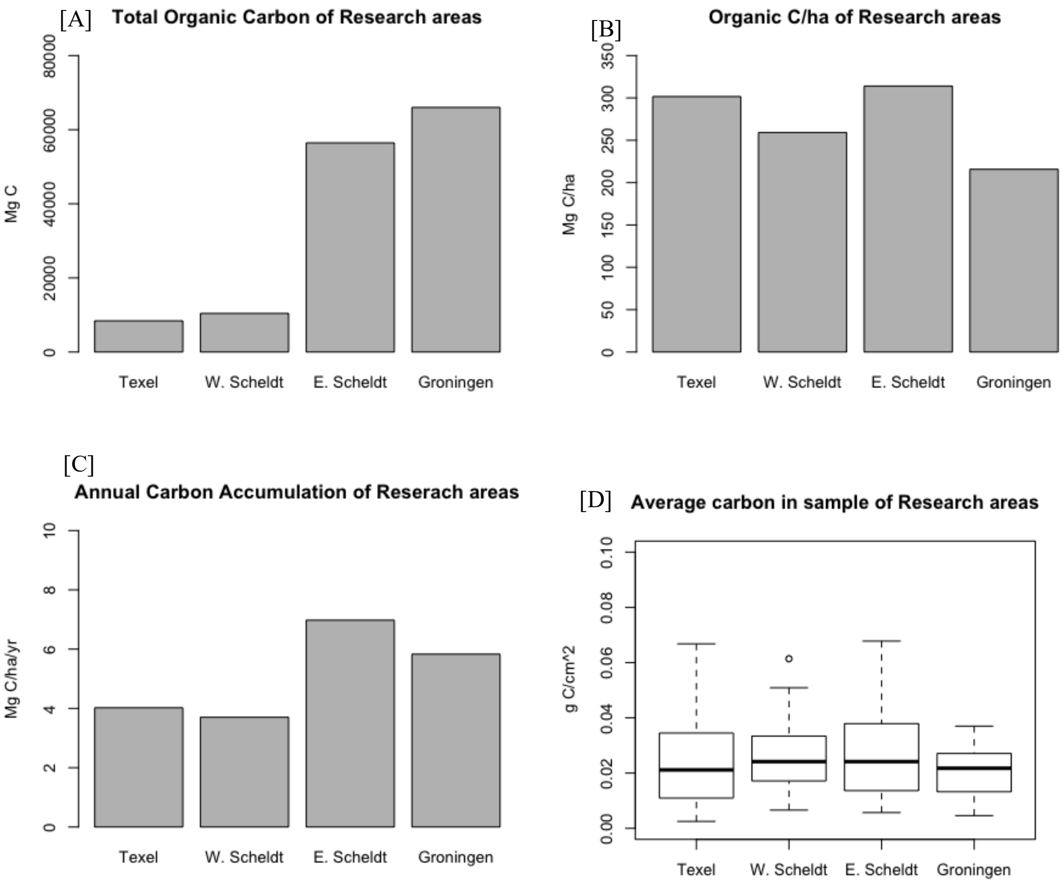

Figure 3.4 The total organic carbon pool (Mg C) per research area (A), organic carbon stock (MgC/ha) per research area (B), the average annual accumulation of carbon (Mg C/ha/yr) per research area (C), and the average carbon (g) in sample per research area.

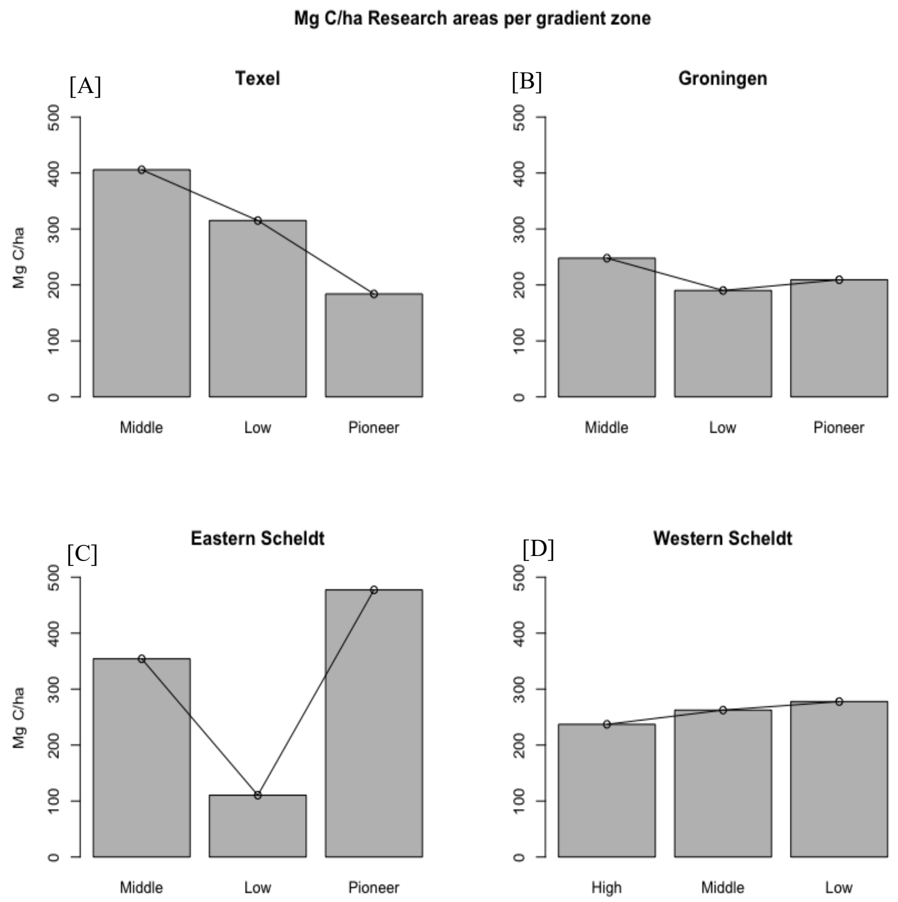

Figure 3.5 Organic carbon stock (Mg C/ha) of research areas, divided by gradient zones. With lines indicating the changes in concentration between zones. For Texel (A), Groningen (B), Eastern Scheldt (C), and Western Scheldt (D).

4 Discussion

The following section will discuss the findings of this research, compare the results to global estimations, and give possible implications of this research.

4.1 Blue carbon potential

Differences between carbon content and gradient zone were not significant ($p>0,05$), with a few outliers that caused higher values at the "High" zone of Texel (10cm depth) and the "High" zone of Western Scheldt (80cm depth). Yet, even excluding these outliers showed no change in significance. This suggests that vegetation has no effect on the soil carbon content. There is uncertainty around the effect of vegetation on carbon accumulation: several studies focused on sediment deposition found a positive effect from vegetation (Baustian, Mendelssohn, and Hester 2012; Peralta et al. 2008; Pont et al. 2002). Whilst others show similar findings to this study, that there is no effect of vegetation on sediment deposition (Brown et al. 1999; Elschot et al. 2013). It could be possible that spatial variation of sediment deposition is more related to topographical variables than to vegetation structure. Such variables include climate, surface elevation relative to mean high tide, and distance from mudflat or creek edge (Suchrow et al. 2012; Coulombier, Neumeier, and Bernatchez 2012; Temmerman et al. 2003). Furthermore, no significant difference was found between the carbon content of the samples and location ($p>0.05$). Grain size of soils in salt marshes has been found to affect preservation of organic matter. With smaller grain sizes, such as muddy and silt soils, having a greater positive effect on preservation of organic matter compared to larger grain sizes (Saintilan et al. 2013). Although this study did not focus on soil grain size, coastal sections in the Wadden Sea generally have higher clay content than estuarine areas of the Netherlands (Ofori 2009; Mikkelsen et al. 2011). Additionally, during fieldwork it was noted that the research area in the Eastern Scheldt had swampier characteristics, with more fine grained and silty sediment in higher gradient zones compared to the other research areas. This could suggest a highly saturated soil in Eastern Scheldt research area, providing even less decomposition of organic carbon than in the researched areas.

Annual carbon accumulation rates from the Eastern Scheldt are only slightly lower than previous findings in the area, with previous findings suggesting an accumulation between 5.87 – 6.5 Mg C/ha/yr for the Eastern Scheldt (Buth 1987; Oenema and DeLaune 1988). Lower accumulation rates in the Western Scheldt compared to other research areas are suggested to be linked to dredging. Dredging caused a higher export than import of sediment, meaning less accumulation of sediment particles that can settle on salt marshes in the Western Scheldt (Ofori 2009). The research area on Texel has remained stable since 1995. This is suggested to be related to the placing of man-made structures in the early 1980s, working as a boundary that the salt marsh cannot grow beyond due to unsuitable conditions (Esselaar 2017). Therefore, the area was expected to have a lower carbon accumulation since little sediment accumulation occurs. A monitoring study of 50 years focused on the changes of mainland salt marshes showed that a large increase of new salt marsh between 2007 – 2009. This increase is said to be related to replacement of brushwood dams reducing wave action and stimulating sediment deposition leading to a growth of salt marsh area including the research area north of Groningen (Dijkema et al. 2011).

The organic carbon content of the soil depended on soil depth, decreasing as depth increased ($p<0,01$). An exception in this research was the "pioneer" gradient zone, which displayed an increase in carbon content over depth. It has been a general observation in relevant research that depth has a negative effect on the organic carbon content of soils (Drake et al. 2015; Bai et al. 2016; Williams and Rosenheim 2015). However, higher carbon accumulation rates and greater carbon stocks are measured at gradient zones closer to the coast line, due to high primary productivity and input from phytoplankton and benthic algae (Sanders et al. 2014). Due to this higher accumulation rate there is a possibility that the higher accumulation accelerates carbon burial, causing the weight of the top layer of sediment to compress deeper in the soil (Bartholdy, Pedersen, and Bartholdy 2010; Elschot et al. 2013). This could cause higher levels of carbon storage in deeper layers of the pioneer soil.

Previous estimations of the Dutch carbon stock show higher estimations with a mean carbon stock of 328 Mg C/ha for the Dutch Wadden Sea and Delta area compared to 276 Mg C/ha in this study(Tamis and Foekema 2015; Sifleet, Pendleton, and Murray 2011; Chmura et al. 2003). However, these estimations are based on accretion rates from the Eastern Scheldt originating from 1987 and 1988 (Oenema and DeLaune 1988; Buth 1987). Besides research in the Eastern Scheldt, this study included areas at Texel, Groningen, and the Western Scheldt. It is suggested that estimations from this research reflect the Dutch salt marsh carbon stock and carbon pool more realistically. When compared to global averages, the estimated carbon stock for the Netherlands is slightly higher (276 Mg C/ha compared to 244 Mg C/ha globally). When compared to European and Scandinavian averages however the Netherland scores lower (276 Mg C/ha compared to 312 Mg C/ha) (Ouyang and Lee 2014). Results from this study suggests accumulation rates higher than global and European averages (5.02 Mg C/ha/yr compared to 2.44 Mg C/ha/yr globally and 3.12 Mg C/ha/yr in Europe and Scandinavia). Research by Ouyang and Lee (2014) suggests that carbon accumulation and carbon storage of a salt marsh is significantly dependent on its tidal range, latitude, and elevation, with latitude being a proxy for drivers such as temperature, evaporation and rainfall, and salinity (Ouyang and Lee 2014). Peaks of carbon accumulation rates were suggested between ~ 48.5 and 58.5◦ N and decreases towards the poles and equator (Ouyang and Lee 2014). Since the Netherlands' latitude is roughly between 51 and 53.5◦ N it falls within the area of high carbon accumulation. This would also support the results that the carbon stock of salt marshes in the Netherlands is higher than the global average. It is suggested that the carbon stock of the Netherlands is lower than European averages due to lower temperatures providing less stimulation of primary production than warmer Southern European countries. However, the effect of temperature is not a positive linear trend, since higher temperature also increase degradation rates of organic matter in soils (Ouyang and Lee 2014).

It is known that in order for salt marshes to survive in the future their vertical accretion rates have to match or be higher than the expected sea level rise. If not, then salt marshes are in danger of being drowned, to suffer from coastal squeezing, or to suffer from increased lateral erosion due to increased wave propagation (Mariotti and Fagherazzi 2013; Doody 2004). Due to anthropogenic changes focused on coastal protection, the coast of the Netherlands has become more streamlined leaving less sheltered areas. This resulted in higher flow velocities, causing increased erosion of salt marsh areas. This has caused a decrease of mainland and island salt marshes (Dijkema et al. 2005). Further protection and dredging in the Dutch delta area caused a shift in the balance of erosion and accretion in the area. Estimations based on current trends predict that a vast majority of the salt marshes in the Eastern Scheldt will disappear by 2060 and that sand depletion in the Western Scheldt will prevent growth of new salt marsh in the estuary (Jacobse, Scholl, and van de Koppel 2008) (Ministerie van Landbouw Natuur en Voedselkwaliteit, n.d.).

It is a common practise for areas with high potential carbon storage to be incorporated into carbon markets. These markets are based on the idea that carbon stored in vegetated ecosystems can be scientifically quantified and then sold as "carbon credits" which buyers can use to offset emissions (Wylie, Sutton-Grier, and Moore 2016). Carbon credits have to be verified by a certain standard covering accounting, monitoring, and registration. These credits are then sold on a voluntary market at which buyers voluntarily buy in order to be more sustainable, or on the compliance market, with buyers who are required to reduce emissions under a treaty or regulations (Kollmuss, Zink, and Polycarp 2008). The European Union Emissions Trading Scheme (ETS) was launched in 2005 to counter anthropogenic carbon emissions in the European Union, reducing nearly 40% of its greenhouse gas emissions by 2008. The price of carbon in the ETS was set in 2017 at €4.80 per tonnes CO_2 (Kachi 2017). With the knowledge of how much carbon and equivalent CO_2 emissions can potentially be stored in Dutch salt marshes, it is estimated that the salt marsh area of the Netherlands could produce a monetary value of €4 560.00/ha and €62 253 120.00 for the area as a whole. This could be a stimulus for organisations whom manage salt marshes to put sections on the carbon market as voluntary carbon credits. By doing so the money that companies invest in the salt marsh can then be used for conservation and possible expansion of the salt marsh area.

Similar to any other research, limitations occurred during this study. Due to the data collection taking place during the breeding season of several coastal bird species at the Texel, Groningen, and Eastern Scheldt research areas, higher marshes were not accessible. However, with the inclusion of their pioneer gradient zones it is believed that the results regarding the effect of gradient zones of this study are still reliable. Still, it is recommended that data collection during further studies should be done outside of (local) coastal bird breeding season to get more detail about carbon in higher marsh soils. Furthermore, since it has been noted that the soil of Eastern Scheldt research area had different characteristics than the other research areas, it is recommended that future research includes marsh elevation and grain size measurements in its study. This could provide an indication of what the effects of grain size and marsh elevation are on the carbon content of Dutch salt marsh soils. Lastly, it is advised into research the origin of the organic carbon using $\delta^{13}C$ measurements of the organic matter to provide an insight into internal and external carbon input of salt marshes in the Netherlands.

4.2 Conclusion

In conclusion, this study estimated the potential blue carbon storage of the Dutch island-, mainland-, and estuarine salt marshes by collecting sedimentary soil samples, analysing the organic carbon content, and compiling and interpreting existing data within the context of the wider literature. Results showed that the researched soils can be considered organic rich. Correlation tests showed a significant correlation between organic matter- (%LOI) and organic carbon (%C_{org}) content of the salt marsh areas ($p<0.01$) and showed a significant negative correlation between soil carbon content and soil depth ($p<0.01$). Further correlation tests showed that the soil carbon content did not significantly differ between the saltmarsh types ($p>0.05$) and between gradient zones ($p>0.05$). Estimates showed the highest carbon stock at the island salt marsh (302 Mg C/ha) and the highest carbon accumulation rate at the mainland salt marsh (5.8 Mg C/ha/yr). When compared to average global estimations, the national carbon stock and carbon accumulation were higher than global averages and European accumulation rates. However, European average carbon stock estimates were higher than estimations of this study (312 Mg C/ha compared to 276 Mg C/ha). It is suggested that the higher carbon stock is related to the Netherlands latitude being situated in a carbon accumulation peak between 48.5 – 58.5◦ N. The estimated carbon stock of this study being lower than average European estimations is possibly caused by lower temperatures providing less stimulation of primary production compared to other European countries. Even though the higher marsh gradient zone had fewer measurements, the results are still considered reliable due to the inclusion of pioneer marshes when higher marshes were inaccessible. It is recommended that data during further research is collected outside of coastal bird breeding seasons, and research includes marsh elevation and soil grain size and $\delta^{13}C$ measurements of the organic matter to provide a more detailed description of carbon content in higher marshes, the effect of elevation and grain size on soil carbon content, and the origin of the organic carbon.

References

Adam, P. 2002. "Saltmarshes in a Time of Change." *Environmental Conservation* 29 (01). https://doi.org/10.1017/S0376892902000048.

Alblas, W.F.G. 2013. "Kwaliteitstoets Uithuizerwad 2013."

Bai, Junhong, Guangliang Zhang, Qingqing Zhao, Qiongqiong Lu, Jia Jia, Baoshan Cui, and Xinhui Liu. 2016. "Depth-Distribution Patterns and Control of Soil Organic Carbon in Coastal Salt Marshes with Different Plant Covers." *Scientific Reports* 6 (1):34835. https://doi.org/10.1038/srep34835.

Bakker, J.P. 2014. "Ecology of Salt Marshes - 40 Years of Research in the Wadden Sea," 99. https://doi.org/10.1007/978-94-009-2255-6.

Bakker, J.P., A.C.W. Baas, J. Bartholdy, L. Jones, G. Ruessink, S. Temmerman, and M. van de Pol. 2016. "Environmental Impacts—Coastal Ecosystems." In , 275–314. https://doi.org/10.1007/978-3-319-39745-0_9.

Bakker, J.P., P. Esselink, K.S. Dijkema, W.E. van Duin, and D.J. de Jong. 2002. "Restoration of Salt Marshes in the Netherlands." *Hydrobiologia*, no. 478:29–51.
Bartholdy, J., J.B.T. Pedersen, and A.T. Bartholdy. 2010. "Autocompaction of Shallow Silty Salt Marsh Clay." *Sedimentary Geology* 223 (3–4):310–19. https://doi.org/10.1016/j.sedgeo.2009.11.016.
Baustian, Joseph J., Irving A. Mendelssohn, and Mark W. Hester. 2012. "Vegetation's Importance in Regulating Surface Elevation in a Coastal Salt Marsh Facing Elevated Rates of Sea Level Rise." *Global Change Biology* 18 (11):3377–82. https://doi.org/10.1111/j.1365-2486.2012.02792.x.
Beck, M. W., K. L. Heck, K. W. Able, D. L. Childers, D. B. Eggleston, B. M. Gillanders, B. Halpern, et al. 2001. "The Identification, Conservation, and Management of Estuarine and Marine Nurseries for Fish and Invertebrates." *BioScience* 51 (8):633. https://doi.org/10.1641/0006-3568(2001)051[0633:TICAMO]2.0.CO;2.
Bouillon, Steven, Alberto V. Borges, Edward Castañeda-Moya, Karen Diele, Thorsten Dittmar, Norman C. Duke, Erik Kristensen, et al. 2008. "Mangrove Production and Carbon Sinks: A Revision of Global Budget Estimates." *Global Biogeochemical Cycles* 22 (2):1–12. https://doi.org/10.1029/2007GB003052.
Brown, S.L., E.A. Warman, S. McGrorty, M. Yates, R.J. Pakeman, L.A. Boorman, J.D. Goss-Custard, and A.J. Gray. 1999. "Sediment Fluxes in Intertidal Biotopes: BIOTA II." *Marine Pollution Bulletin* 37 (3–7):173–81. https://doi.org/10.1016/S0025-326X(99)00093-4.
Burrows, M T, N.A A Kamenos, D J Hughes, H Stahl, J A Howe, and P Tett. 2014. "Assessment of Carbon Budgets and Potential Blue Carbon Stores in Scotland ' s Coastal and Marine Environment. Scottish Natural Heritage Commissioned Report N," no. 7.
Buth, G.J.C. 1987. "Decomposition of Roots of Three Plant Communities in a Dutch Salt Marsh." *Aquatic Botany* 29 (2):123–38. https://doi.org/10.1016/0304-3770(87)90091-X.
CBS, PBL, RIVM, and WUR. 2012. "Kwelders En Schorren, circa 1800 - 2009 (Indicator 1230, Versie 03 , 10 Juli 2012)." 2012. http://www.clo.nl/indicatoren/nl1230-kwelders-en-schorren.
Chen, G., G. L. Chmura, S. Crooks, J. G. Kairo, B. Liao, and G. Lin. 2014. "Chapter 4 Coastal Wetlands, in '2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands.'" *Institute for Global Environmental Strategies, Hayama, Japan*, no. June.
Chmura, Gail L., Shimon C. Anisfeld, Donald R. Cahoon, and James C. Lynch. 2003. "Global Carbon Sequestration in Tidal, Saline Wetland Soils." *Global Biogeochemical Cycles* 17 (4):n/a-n/a. https://doi.org/10.1029/2002GB001917.
Coulombier, Thibault, Urs Neumeier, and Pascal Bernatchez. 2012. "Sediment Transport in a Cold Climate Salt Marsh (St. Lawrence Estuary, Canada), the Importance of Vegetation and Waves." *Estuarine, Coastal and Shelf Science* 101 (April):64–75. https://doi.org/10.1016/j.ecss.2012.02.014.
Cullen-Unsworth, Leanne, and Richard Unsworth. 2013. "Seagrass Meadows, Ecosystem Services, and Sustainability." *Environment: Science and Policy for Sustainable Development* 55 (3):14–28. https://doi.org/10.1080/00139157.2013.785864.
Dijkema, K., W.E. van Duin, E.M. Dijkman, A. Nicolai, H. Jongerius, H. Keegstra, L. Van Egmond, H .J. Venema, and J.J. Jongsma. 2011. "Vijftig Jaar Monitoring En Beheer van de Friese En Groninger Kwelderwerken: 1960-2009." *Wettelijk Onderzoekstaken Natuur & Milieu* WOt-werkdo:96.
Dijkema, K.S., D.J. de Jong, M.J. Vreeken-Buijs, and W.E. van Duin. 2005. "Kwelders En Schorren in de Kaderrichtlijn Water." *ALTERRA, Rijkswaterstaat RIKZ/2005.020*, 62.
Dijkema, KS, WE Van Duin, EM Dijkman, and PW van Leeuwen. 2007. "Monitoring van Kwelders in de Waddenzee." *Rapport in Het Kader …*, 1–66. http://www.waddenzee.nl/fileadmin/content/Dossiers/Natuur_en_Landschap/pdf/Alterra_Kwelder_WOT_Rapport1574.pdf.
Donato, Daniel C., J. Boone Kauffman, Daniel Murdiyarso, Sofyan Kurnianto, Melanie Stidham, and Markku Kanninen. 2011. "Mangroves among the Most Carbon-Rich Forests in the Tropics." *Nature Geoscience* 4 (5). Nature Publishing Group:293–97. https://doi.org/10.1038/ngeo1123.
Doody, J.P. 2004. "'Coastal Squeeze' – an Historical Perspective." *Journal of Coastal Conservation* 10 (1):129. https://doi.org/10.1652/1400-0350(2004)010[0129:CSAHP]2.0.CO;2.

Drake, Katherine, Holly Halifax, Susan C. Adamowicz, and Christopher Craft. 2015. "Carbon Sequestration in Tidal Salt Marshes of the Northeast United States." *Environmental Management* 56 (4):998–1008. https://doi.org/10.1007/s00267-015-0568-z.

Duarte, C. M., J. J. Middelburg, and N. Caraco. 2004. "Major Role of Marine Vegetation on the Oceanic Carbon Cycle." *Biogeosciences Discussions* 1 (1):659–79. https://doi.org/10.5194/bgd-1-659-2004.

Elschot, Kelly, Tjeerd J. Bouma, Stijn Temmerman, and Jan P. Bakker. 2013. "Effects of Long-Term Grazing on Sediment Deposition and Salt-Marsh Accretion Rates." *Estuarine, Coastal and Shelf Science* 133 (November):109–15. https://doi.org/10.1016/j.ecss.2013.08.021.

Erchinger, H.F. 1985. "Ostfrieslands Naturlandschaften Dünen, Watt Und Salzwiesen Schutz Und Erhaltung von Küste Und Inseln, Tier- Und Pflanzenwelt." Hannover: Das Niedersäch-sische Ministerium für Ernährung, Landwirtschaft und Forsten.

Esselaar, J. 2017. "Kwaliteitstoets de Schorren En de Volharding 2017."

Fourqurean, James W., B. Johnson, J. Boone Kauffman, H. Kennedy, Catherine E. Lovelock, J. Patrick Megonigal, A.F. Rahman, N. Saintilan, and M. Simard. 2014. "Coastal Blue Carbon: Methods for Assessing Carbon Stocks and Emissions Factors in Mangroves, Tidal Salt Marshes, and Seagrasses." Arlington, Virginia, USA.

Hannewijk, A. 2016a. "Kwaliteitstoets Westerschelde 2015 Zuidgors En Biezelingse Ham." Rotterdam.

———. 2016b. "Kwaliteitstoets Westerschelde 2015 Zuidgors En Biezelingse Ham."

Jacobse, S, O Scholl, and J van de Koppel. 2008. "Prognose van Schor- En Slikontwikkelingen in de Oosterschelde. Een Analyse Naar de Te Verwachten Ontwikkelingen Tot 2060," no. november 2006.

Kachi, Aki. 2017. "Pricing Carbon to Achieve the Paris Goals," no. September:7. https://carbonmarketwatch.org/wp-content/uploads/2017/09/CMW-PRICING-CARBON-TO-ACHIEVE-THE-PARIS-GOALS_Web_spread_FINAL.pdf.

Kauffman, J. Boone, Chris Heider, Jennifer Norfolk, and Frederick Payton. 2014. "Carbon Stocks of Intact Mangroves and Carbon Emissions Arising from Their Conversion in the Dominican Republic." *Ecological Applications* 24 (3):518–27. https://doi.org/10.1890/13-0640.1.

Kollmuss, A., H. Zink, and C. Polycarp. 2008. "Making Sense of the Voluntary Carbon Market." *Sustainable Development* 51 (2):105. http://www.wwf.de/fileadmin/fm-wwf/pdf_neu/A_Comparison_of_Carbon_Offset_Standards_lang.pdf.

Laffoley, D. d'A., and G Grimsditch. 2009. "The Management of Natural Coastal Carbon Sinks." Gland, Switzerland. https://lirias.kuleuven.be/bitstream/123456789/251136/1/carbon_managment_report_final_printed_version.pdf.

Mariotti, G., and S. Fagherazzi. 2013. "Critical Width of Tidal Flats Triggers Marsh Collapse in the Absence of Sea-Level Rise." *Proceedings of the National Academy of Sciences* 110 (14):5353–56. https://doi.org/10.1073/pnas.1219600110.

McLeod, Elizabeth, Gail L. Chmura, Steven Bouillon, Rodney Salm, Mats Björk, Carlos M. Duarte, Catherine E. Lovelock, William H. Schlesinger, and Brian R. Silliman. 2011. "A Blueprint for Blue Carbon: Toward an Improved Understanding of the Role of Vegetated Coastal Habitats in Sequestering CO2." *Frontiers in Ecology and the Environment* 9 (10):552–60. https://doi.org/10.1890/110004.

Mikkelsen, J. H., J. Dillen, A. Van Braeckel, G. Genouw, and E. Van de Bergh. 2011. "Tidal Marsh and Mudflat Soils in the Inner Scheldt Estuary : Technical Report." *INBO Report 2011 (INBO.R.2011.46). Research Institute for Nature and Forest, Brussels, Belgium* 32 (0).

Ministerie van Landbouw Natuur en Voedselkwaliteit. n.d. "Natura 2000."

Murray, B.C., L. Pendleton, W.A. Jenkins, and S. Sifleet. 2011. "Green Payments for Blue Carbon: Economic Incentives for Protecting Threatened Coastal Habitats." *Nicholas Institute for Environmental …*, no. April:52. http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Green+Payments+for+Blue+Carbon+Economic+Incentives+for+Protecting+Threatened+Coastal+Habitats#0%5Cnhttp://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Green+payments+for+blue+carbon:+Ec.

Nellemann, C, E Corcoran, C M Duarte, L Valdés, C De Young, L Fonseca, and G Grimsditch. 2009. *Blue Carbon: A Rapid Response Assessment. Environment*. http://www.grida.no/files/publications/blue-carbon/BlueCarbon_screen.pdf.
Oenema, O., and R. D. DeLaune. 1988. "Accretion Rates in Salt Marshes in the Eastern Scheldt, South-West Netherlands." *Estuarine, Coastal and Shelf Science* 26 (4):379–94. https://doi.org/10.1016/0272-7714(88)90019-4.
Ofori, K. 2009. "Investigating the Long-Term Sediment Import-Export Trends of the Western Scheldt Estuary."
Ouyang, X., and S. Y. Lee. 2014. "Updated Estimates of Carbon Accumulation Rates in Coastal Marsh Sediments." *Biogeosciences* 11 (18):5057–71. https://doi.org/10.5194/bg-11-5057-2014.
Pendleton, Linwood, Daniel C. Donato, Brian C. Murray, Stephen Crooks, W. Aaron Jenkins, Samantha Sifleet, Christopher Craft, et al. 2012. "Estimating Global 'Blue Carbon' Emissions from Conversion and Degradation of Vegetated Coastal Ecosystems." Edited by Simon Thrush. *PLoS ONE* 7 (9):e43542. https://doi.org/10.1371/journal.pone.0043542.
Peralta, G, LA van Duren, EP Morris, and TJ Bouma. 2008. "Consequences of Shoot Density and Stiffness for Ecosystem Engineering by Benthic Macrophytes in Flow Dominated Areas: A Hydrodynamic Flume Study." *Marine Ecology Progress Series* 368 (September):103–15. https://doi.org/10.3354/meps07574.
Pont, Didier, John W. Day, Philippe Hensel, Evelyne Franquet, Frank Torre, Patrick Rioual, Carles Ibànez, and Eric Coulet. 2002. "Response Scenarios for the Deltaic Plain of the Rhône in the Face of an Acceleration in the Rate of Sea-Level Rise with Special Attention ToSalicornia-Type Environments." *Estuaries* 25 (3):337–58. https://doi.org/10.1007/BF02695978.
R Core Team. 2018. "R: An Integrated Suite of Software Facilities for Data Manipulation, Calculation and Graphical Display."
RStudio Team. 2018. "RStudio Desktop."
Saintilan, N., K. Rogers, D. Mazumder, and C. Woodroffe. 2013. "Allochthonous and Autochthonous Contributions to Carbon Accumulation and Carbon Store in Southeastern Australian Coastal Wetlands." *Estuarine, Coastal and Shelf Science* 128 (August):84–92. https://doi.org/10.1016/j.ecss.2013.05.010.
Sanders, Christian J., Bradley D. Eyre, Isaac R. Santos, Wilson Machado, Wanilson Luiz-Silva, Joseph M. Smoak, Joshua L. Breithaupt, et al. 2014. "Elevated Rates of Organic Carbon, Nitrogen, and Phosphorus Accumulation in a Highly Impacted Mangrove Wetland." *Geophysical Research Letters* 41 (7):2475–80. https://doi.org/10.1002/2014GL059789.
Schlesinger, William H., and John Lichter. 2001. "Limited Carbon Storage in Soil and Litter of Experimental Forest Plots under Increased Atmospheric CO2." *Nature* 411 (6836):466–69. https://doi.org/10.1038/35078060.
Schmider, Emanuel, Matthias Ziegler, Erik Danay, Luzi Beyer, and Markus Bühner. 2010. "Is It Really Robust?" *Methodology* 6 (4):147–51. https://doi.org/10.1027/1614-2241/a000016.
Sifleet, Samantha, L Pendleton, and Bc Murray. 2011. "State of the Science on Coastal Blue Carbon A Summary for Policy Makers." *Nicholas Institute Report. NI*, no. May 2011:43. http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:State+of+the+Science+on+Coastal+Blue+Carbon+A+Summary+for+Policy+Makers#0.
Sousa, Ana I., Ana I. Lillebø, Nils Risgaard-Petersen, Miguel A. Pardal, and Isabel Caçador. 2012. "Denitrification: An Ecosystem Service Provided by Salt Marshes." *Marine Ecology Progress Series* 448:79–92. https://doi.org/10.3354/meps09526.
Suchrow, Sigrid, Nina Pohlmann, Martin Stock, and Kai Jensen. 2012. "Long-Term Surface Elevation Changes in German North Sea Salt Marshes." *Estuarine, Coastal and Shelf Science* 98 (February):71–83. https://doi.org/10.1016/j.ecss.2011.11.031.
Tamis, J.E., and E.M. Foekema. 2015. "A Review of Blue Carbon in the Netherlands." Den Helder, NL.
Temmerman, S., G. Govers, S. Wartel, and P. Meire. 2003. "Spatial and Temporal Factors Controlling Short-Term Sedimentation in a Salt and Freshwater Tidal Marsh, Scheldt Estuary, Belgium, SW Netherlands." *Earth Surface Processes and Landforms* 28 (7):739–55. https://doi.org/10.1002/esp.495.
Theuerkauf, Ethan J., J. Drew Stephens, Justin T. Ridge, F. Joel Fodrie, and Antonio B. Rodriguez.

2015. “Carbon Export from Fringing Saltmarsh Shoreline Erosion Overwhelms Carbon Storage across a Critical Width Threshold.” *Estuarine, Coastal and Shelf Science* 164 (October):367–78. https://doi.org/10.1016/j.ecss.2015.08.001.

Topographisch Bureau. 2015. “TopoTijdreis.” 2015. https://www.topotijdreis.nl.

Verbeek, R., and N. Altena. 2018. “Kwaliteitstoets Oosterschelde (Verdronken Land van Zuid-Beveland, Katse Plaat) 2017.”

Williams, Elizabeth K., and Brad E. Rosenheim. 2015. “What Happens to Soil Organic Carbon as Coastal Marsh Ecosystems Change in Response to Increasing Salinity? An Exploration Using Ramped Pyrolysis.” *Geochemistry, Geophysics, Geosystems* 16 (7):2322–35. https://doi.org/10.1002/2015GC005839.

Wylie, Lindsay, Ariana E. Sutton-Grier, and Amber Moore. 2016. “Keys to Successful Blue Carbon Projects: Lessons Learned from Global Case Studies.” *Marine Policy* 65 (March):76–84. https://doi.org/10.1016/j.marpol.2015.12.020.

Yu, O.T., and Gail L. Chmura. 2009. “Soil Carbon May Be Maintained under Grazing in a St Lawrence Estuary Tidal Marsh.” *Environmental Conservation* 36 (04):312–20. https://doi.org/10.1017/S0376892910000184.

Appendices

I. Example of worksheets

Quality procedures include:
- Collecting field data using predetermined worksheets
- Collecting laboratory data and recording it in a notebook
- Entering data into computer using predetermined program (in this case Excel)

Example of a field data worksheet:

Recorder		
Date		
Hour and tide information		
Core ID		
Area		
Gradient zone		
GPS position	N:	E:
Internal diameter of the core		
Total length of corer (cm)		
Total length of corer into sediment (cm)		
Total length of soil core sample (cm)		
Subsample interval		
Total number of subsamples		
Notes/Comments		
Issues/plant density coverage:		
Visual description of coring process:		

II. Total Nitrogen and Organic Carbon determination (CN-Analyser)

Principle of analysis
The sample is placed in a tin vial and the vial is closed. It is then placed in the combustion tube which has been filled with a catalyst (chromoxide with silver-plated cobaltoxide, Cr_2O_3, Co_3O_4, Ag) at a temperature of 1010ºC. After the sample has fallen in the tube, a quantity of oxygen is injected and, under these conditions, this ensures a very exothermic oxidation at 1800ºC, so that the sample and also any non-flammable sample, ignite totally. This oxidation is called dynamic flash combustion. The combustion gas CO_2, N_2, N_xO_y, H_2O and the rest of the O_2 then flow through a Cu column where the nitrogen oxides are reduced to elementary nitrogen and O_2 to CuO. Then, they pass through a magnesium-perchlorate column, on which H_2O is absorbed. The gases go to the oven of the GC, where N_2 and CO_2 are separated on a Porapak Qs-kolom (2 m length - ID 4 mm) and then flow to the TCD (Thermal Conductivity Detector), which produces a signal that is proportional to the concentrations of N and C.

Method
Carbon in a sediment sample is found in two separate components, organic matter and calcite ($CaCO_3$). Samples must first be decalcified before the organic carbon can be determined: $C_{total} = C_{calcite} + C_{organic}$

Decalcification & preparation for CN-analyser
Calcite is removed from your sample by adding hydrochloric acid (HCl). If too little acid is used the determined C_{org} will be too high. When too much acid is used, you may dissolve some organic material. For this reason, the following decalcification method must be followed carefully.

1. Weigh approximately 1 g of powdered sample into a pre-weighed 50 ml centrifuge tube.
2. Slowly add 25 ml of 1M HCl. On addition of acid the sample will start fizzing. The calcite in the sample reacts with the acid releasing CO_2.
3. When the sample stops fizzing (sometimes after one day), put it into a shaking machine and shake for approximately 4 hours.
4. Centrifuge the tube for 10 minutes (at 2800 rpm) and pour the overlying clear solution into waste container. (**All sediment samples have to be prepared in the same way, with a maximum deviation of ± 0.1g**. This can be done using the Mettler balance).
5. Add another 25 ml of 1M HCl to the sediment sample. Mix the acid and sediment using a vortex genie.
6. Place in shaking machine for 24hrs.
7. Centrifuge the tube for 10 minutes (at 2800 rpm) and pour the overlying clear solution carefully into the waste container.
8. Add 30 ml of demiwater and shake using the vortex. Centrifuge again for 15 min at 2000 rpm. Pour the overlying clear solution into waste container. Repeat this process again with another 30 ml of demiwater (you want to rinse all the acid from your sample).
9. Set tube with sediment in oven at 50°C to dry (at least 3 days).
10. Weigh the centrifuge tube with the sediment sample precisely, so that you know the loss of weight during the decalcification step.
11. Crush the sediment in an agate mortar and place the decalcified sample in a 15 ml glass vial.

CN-Analyser
Weigh precisely ± 10 mg of the decalcified sample in a tin vial. Fold the sample to a pellet with a pincer and put the pellet into the auto sampler. Each set of samples is preceded by an empty tin barrel to determine the blank. A standard is used (acetanilide) to calculate the calibration factor which is checked by using an international standard and a "house-standard" with a well-known concentration of nitrogen and organic carbon. Given the measured concentrations of the standards, the analysis can start. After 12 samples, the calibration factor is determined again and compared to the previous one. If the new calibration factor is acceptable, then 12 new samples can be analysed. The concentration of both the acetanilide and the international standard can be used to determine the correctness and the precision of the run.

III. Decalcification results

SampleID	weight greiner with lid (g)	weight sample greiner with lid (g)	weight sample before decal (g)	weight sample grenier with lid after decal (g)	weight sample after decal (g)	Depth sample	Delta weight	% IOC	CaCo3	IC	%IC
Tx_Kp_01_84	13,2188	14.2823	1.0635	14.2001	0.9813	84	0.08	1.01	0.08	0.01	0.93
Tx_Kp_01_54	13.1508	14.101	0.9502	13.9359	0.7851	54	0.17	2.52	0.17	0.02	2.09
Tx_Kp_01_34	13.206	14.337	1.131	14.1992	0.9932	34	0.14	1.66	0.14	0.02	1.46
Tx_Kp_01_24	13.1888	14.3447	1.1559	14.2613	1.0725	24	0.08	0.93	0.08	0.01	0.87
Tx_Kp_01_14	13.2118	14.2635	1.0517	14.0379	0.8261	14	0.23	3.28	0.23	0.03	2.57
Tx_Kb_01_90	13.2846	14.3336	1.049	14.2422	0.9576	90	0.09	1.15	0.09	0.01	1.05
Tx_Kb_01_50	13.1884	14.2899	1.1015	14.1905	1.0021	50	0.10	1.19	0.10	0.01	1.08
Tx_Kb_01_30	13.1152	14.148	1.0328	13.9299	0.8147	30	0.22	3.21	0.22	0.03	2.53
Tx_Kb_01_20	13.1891	14.2065	1.0174	13.9474	0.7583	20	0.26	4.10	0.26	0.03	3.06
Tx_Kb_01_10	13.2529	14.289	1.0361	14.0734	0.8205	10	0.22	3.15	0.22	0.03	2.50
Tx_Km_01_70	13.1654	14.1962	1.0308	14.1188	0.9534	70	0.08	0.97	0.08	0.01	0.90
Tx_Km_01_50	13.183	14.2551	1.0721	14.2152	1.0322	50	0.04	0.46	0.04	0.00	0.45
Tx_Km_01_30	13.1899	14.1598	0.9699	14.0694	0.8795	30	0.09	1.23	0.09	0.01	1.12
Tx_Km_01_20	13.0985	14.0289	0.9304	13.8678	0.7693	20	0.16	2.51	0.16	0.02	2.08
Tx_Km_01_10	13.2091	14.1338	0.9247	13.9531	0.744	10	0.18	2.91	0.18	0.02	2.34
Ws_Kl_01_50	13.2851	14.3275	1.0424	14.0501	0.765	50	0.28	4.35	0.28	0.03	3.19
Ws_Kl_01_30	13.2452	14.3516	1.1064	14.0821	0.8369	30	0.27	3.86	0.27	0.03	2.92
Ws_Kl_01_20	13.1934	14.1776	0.9842	13.8903	0.6969	20	0.29	4.95	0.29	0.03	3.50
Ws_Kl_01_10	13.1198	14.1457	1.0259	13.856	0.7362	10	0.29	4.72	0.29	0.03	3.39
Ws_Kl_01_05	13.2484	14.2909	1.0425	14.0138	0.7654	5	0.28	4.34	0.28	0.03	3.19
Ws_Km_01_70	13.1868	14.2772	1.0904	14.1107	0.9239	70	0.17	2.16	0.17	0.02	1.83
Ws_Km_01_50	13.1975	14.1528	0.9553	13.9601	0.7626	50	0.19	3.03	0.19	0.02	2.42
Ws_Km_01_30	13.3439	14.3599	1.016	14.1486	0.8047	30	0.21	3.15	0.21	0.03	2.50

SampleID	weight greiner with lid (g)	weight sample greiner with lid (g)	weight sample before decal (g)	weight sample grenier with lid after decal (g)	weight sample after decal (g)	Depth sample	Delta weight	% IOC	CaCo3	IC	%IC
Ws_Km_01_20	13.1825	14.2533	1.0708	13.9746	0.7921	20	0.28	4.22	0.28	0.03	3.12
Ws_Km_01_10	13.1844	14.2796	1.0952	13.9695	0.7851	10	0.31	4.74	0.31	0.04	3.40
Ws_Kh_01_80	13.1928	14.3565	1.1637	14.033	0.8402	80	0.32	4.62	0.32	0.04	3.34
Ws_Kh_01_50	13.2055	14.3225	1.117	14.0601	0.8546	50	0.26	3.68	0.26	0.03	2.82
Ws_Kh_01_30	13.1813	14.1773	0.996	13.949	0.7677	30	0.23	3.57	0.23	0.03	2.75
Ws_Kh_01_20	13.0543	14.0761	1.0218	13.8323	0.778	20	0.24	3.76	0.24	0.03	2.86
Ws_Kh_01_10	13.1977	14.235	1.0373	13.9789	0.7812	10	0.26	3.93	0.26	0.03	2.96
Os_Kp_01_80	13.2095	14.1872	0.9777	13.9741	0.7646	80	0.21	3.34	0.21	0.03	2.62
Os_Kp_01_50	13.2743	14.2647	0.9904	14.1375	0.8632	50	0.13	1.77	0.13	0.02	1.54
Os_Kp_01_30	13.1278	14.0721	0.9443	13.9416	0.8138	30	0.13	1.92	0.13	0.02	1.66
Os_Kp_01_20	13.2093	14.2569	1.0476	14.1066	0.8973	20	0.15	2.01	0.15	0.02	1.72
Os_Kp_01_10	13.2277	14.2622	1.0345	14.1047	0.877	10	0.16	2.16	0.16	0.02	1.83
Os_Kl_01_80	13.274	14.3154	1.0414	14.1968	0.9228	80	0.12	1.54	0.12	0.01	1.37
Os_Kl_01_50	13.235	14.3161	1.0811	14.1919	0.9569	50	0.12	1.56	0.12	0.01	1.38
Os_Kl_01_30	13.3229	14.4203	1.0974	14.3233	1.0004	30	0.10	1.16	0.10	0.01	1.06
Os_Kl_01_20	13.1605	14.3782	1.2177	14.2931	1.1326	20	0.09	0.90	0.09	0.01	0.84
Os_Kl_01_10	13.0825	14.0364	0.9539	13.9807	0.8982	10	0.06	0.74	0.06	0.01	0.70
Os_Km_01_80	13.3323	14.3351	1.0028	14.1385	0.8062	80	0.20	2.93	0.20	0.02	2.35
Os_Km_01_50	13.1673	14.1703	1.003	13.9708	0.8035	50	0.20	2.98	0.20	0.02	2.39
Os_Km_01_30	13.1331	14.1067	0.9736	13.9626	0.8295	30	0.14	2.08	0.14	0.02	1.78
Os_Km_01_20	13.1803	14.2187	1.0384	14.0649	0.8846	20	0.15	2.09	0.15	0.02	1.78
Os_Km_01_10	13.1432	14.1291	0.9859	13.9473	0.8041	10	0.18	2.71	0.18	0.02	2.21
Uw_Kp_01_80	13.2477	14.3832	1.1355	14.2049	0.9572	80	0.18	2.24	0.18	0.02	1.88
Uw_Kp_01_50	13.2238	14.3505	1.1267	14.1957	0.9719	50	0.15	1.91	0.15	0.02	1.65
Uw_Kp_01_30	13.1649	14.0386	0.8737	13.8244	0.6595	30	0.21	3.90	0.21	0.03	2.94

SampleID	weight greiner with lid (g)	weight sample greiner with lid (g)	weight sample before decal (g)	weight sample grenier with lid after decal (g)	weight sample after decal (g)	Depth sample	Delta weight	% IOC	CaCo3	IC	%IC
Uw_Kp_01_20	13.2073	14.2604	1.0531	14.028	0.8207	20	0.23	3.40	0.23	0.03	2.65
Uw_Kp_01_10	13.1287	14.1723	1.0436	13.9187	0.79	10	0.25	3.85	0.25	0.03	2.92
Uw_Kl_01_80	13.1355	14.131	0.9955	14.0003	0.8648	80	0.13	1.81	0.13	0.02	1.58
Uw_Kl_01_50	13.2207	14.3475	1.1268	14.1661	0.9454	50	0.18	2.30	0.18	0.02	1.93
Uw_Kl_01_30	12.991	14.0632	1.0722	13.8866	0.8956	30	0.18	2.37	0.18	0.02	1.98
Uw_Kl_01_20	13.0951	13.978	0.8829	13.7714	0.6763	20	0.21	3.67	0.21	0.02	2.81
Uw_Kl_01_10	13.2617	14.39	1.1283	14.1435	0.8818	10	0.25	3.35	0.25	0.03	2.62
Uw_Km_01_80	13.0642	14.0856	1.0214	13.8922	0.828	80	0.19	2.80	0.19	0.02	2.27
Uw_Km_01_50	12.9808	13.9612	0.9804	13.7515	0.7707	50	0.21	3.27	0.21	0.03	2.57
Uw_Km_01_30	13.09	14.068	0.978	13.846	0.756	30	0.22	3.52	0.22	0.03	2.72
Uw_Km_01_20	13.2614	14.2436	0.9822	14.0179	0.7565	20	0.23	3.58	0.23	0.03	2.76
Uw_Km_01_10	13.1435	14.1119	0.9684	13.8711	0.7276	10	0.24	3.97	0.24	0.03	2.98

IV. CN- analyser results

Sample	Sample ID	%N	%C
IVA2		0.075	0.73
WD1	Tx_Kp_01_84	0.054	0.48
WD2	Tx_Kp_01_54	0.119	2.04
WD3	Tx_Kp_01_34	0.061	0.69
WD4	Tx_Kp_01_24	0.042	0.20
WD5	Tx_Kp_01_14	0.292	2.34
WD6	Tx_Kb_01_90	0.099	1.26
WD7	Tx_Kb_01_50	0.108	1.33
WD8	Tx_Kb_01_30	0.345	3.75
WD9	Tx_Kb_01_20	0.420	4.57
WD10	Tx_Kb_01_10	0.454	4.78
WD11	Tx_Km_01_70	0.118	1.37
WD12	Tx_Km_01_50	0.034	0.29
IVA2		0.064	0.73
WD13	Tx_Km_01_30	0.086	1.03
WD14	Tx_Km_01_20	0.709	9.77
WD15	Tx_Km_01_10	0.901	10.08
WD16	Ws_Kl_01_50	0.191	2.12
WD17	Ws_Kl_01_30	0.240	2.78
WD18	Ws_Kl_01_20	0.133	1.52
WD19	Ws_Kl_01_10	0.268	3.22
WD20	Ws_Kl_01_05	0.153	1.85
WD21	Ws_Km_01_70	0.075	1.11
WD22	Ws_Km_01_50	0.241	2.85
WD23	Ws_Km_01_30	0.188	2.40
WD24	Ws_Km_01_20	0.457	4.74
IVA2		0.056	0.72
WD25	Ws_Km_01_10	0.476	4.89
WD26	Ws_Kh_01_80	0.249	3.26
WD27	Ws_Kh_01_50	0.153	1.73
WD28	Ws_Kh_01_30	0.175	2.11
WD29	Ws_Kh_01_20	0.188	2.12
WD30	Ws_Kh_01_10	0.396	4.41
WD31	Os_Kp_01_80	0.470	10.19
WD32	Os_Kp_01_50	0.207	3.44
WD33	Os_Kp_01_30	0.337	4.46
WD34	Os_Kp_01_20	0.408	5.56
WD35	Os_Kp_01_10	0.476	5.73
WD36	Os_Kl_01_80	0.054	0.60
IVA2		0.059	0.72
Nicotinamide		22.413	58.26
IVA2		0.058	0.74
WD37	Os_Kl_01_50	0.088	1.33
WD38	Os_Kl_01_30	0.083	1.07
WD39	Os_Kl_01_20	0.100	1.66
WD40	Os_Kl_01_10	0.087	1.20
WD41	Os_Km_01_80	0.569	6.90
WD42	Os_Km_01_50	0.327	4.49
WD43	Os_Km_01_30	0.381	5.35
WD44	Os_Km_01_20	0.337	4.69

Sample	Sample ID	%N	%C
WD45	Os_Km_01_10	0.630	7.48
WD46	Uw_Kp_01_80	0.109	1.15
WD47	Uw_Kp_01_50	0.092	0.85
WD48	Uw_Kp_01_30	0.236	2.35
IVA2		0.059	0.73
WD49	Uw_Kp_01_20	0.240	2.51
WD50	Uw_Kp_01_10	0.384	3.64
WD51	Uw_Kl_01_80	0.112	1.29
WD52	Uw_Kl_01_50	0.093	1.21
WD53	Uw_Kl_01_30	0.140	1.49
WD54	Uw_Kl_01_20	0.332	3.10
WD55	Uw_Kl_01_10	0.363	3.61
WD56	Uw_Km_01_80	0.218	2.53
WD57	Uw_Km_01_50	0.256	2.69
WD58	Uw_Km_01_30	0.338	3.47
WD59	Uw_Km_01_20	0.318	3.16
WD60	Uw_Km_01_10	0.379	3.61
IVA2		0.055	0.73

V. Compensated C org

SampleID	Weight before decal (g)	weight after decal (g)	EA results (%C)	Corg from EA (g)	CaCO3 (g)	Mass C comp. of CaCO3	IC%	CaCO3 from EA	Actual C org (g)	Actual Corg %	LOI	Factor
Tx_Kp_01_84	1.0635	0.9813	0.48	0.005	0.082	0.010	0.93	4.71E-05	5.03E-03	0.47	2.50	5.29
Tx_Kp_01_54	0.9502	0.7851	2.04	0.019	0.165	0.020	2.09	4.03E-04	1.89E-02	1.99	4.79	2.40
Tx_Kp_01_34	1.131	0.9932	0.69	0.008	0.138	0.017	1.46	1.14E-04	7.68E-03	0.68	2.90	4.27
Tx_Kp_01_24	1.1559	1.0725	0.20	0.002	0.083	0.010	0.87	1.97E-05	2.25E-03	0.20	1.42	7.27
Tx_Kp_01_14	1.0517	0.8261	2.34	0.025	0.226	0.027	2.57	6.35E-04	2.40E-02	2.28	5.28	2.31
Tx_Kb_01_90	1.049	0.9576	1.26	0.013	0.091	0.011	1.05	1.39E-04	1.31E-02	1.25	4.24	3.39
Tx_Kb_01_50	1.1015	1.0021	1.33	0.015	0.099	0.012	1.08	1.59E-04	1.45E-02	1.32	4.14	3.14
Tx_Kb_01_30	1.0328	0.8147	3.75	0.039	0.218	0.026	2.53	9.82E-04	3.78E-02	3.66	11.25	3.07
Tx_Kb_01_20	1.0174	0.7583	4.57	0.047	0.259	0.031	3.06	1.42E-03	4.51E-02	4.43	14.13	3.19
Tx_Kb_01_10	1.0361	0.8205	4.78	0.050	0.216	0.026	2.50	1.24E-03	4.83E-02	4.66	13.98	3.00
Tx_Km_01_70	1.0308	0.9534	1.37	0.014	0.077	0.009	0.90	1.27E-04	1.40E-02	1.36	5.78	4.25
Tx_Km_01_50	1.0721	1.0322	0.29	0.003	0.040	0.005	0.45	1.38E-05	3.08E-03	0.29	2.30	8.01
Tx_Km_01_30	0.9699	0.8795	1.03	0.010	0.090	0.011	1.12	1.12E-04	9.92E-03	1.02	2.45	2.39
Tx_Km_01_20	0.9304	0.7693	9.77	0.091	0.161	0.019	2.08	1.89E-03	8.90E-02	9.57	26.50	2.77
Tx_Km_01_10	0.9247	0.744	10.08	0.093	0.181	0.022	2.34	2.19E-03	9.10E-02	9.84	22.82	2.32
Ws_Kl_01_50	1.0424	0.765	2.12	0.022	0.277	0.033	3.19	7.04E-04	2.14E-02	2.05	17.00	8.30
Ws_Kl_01_30	1.1064	0.8369	2.78	0.031	0.269	0.032	2.92	8.98E-04	2.98E-02	2.69	18.09	6.71
Ws_Kl_01_20	0.9842	0.6969	1.52	0.015	0.287	0.034	3.50	5.25E-04	1.45E-02	1.47	19.18	13.06
Ws_Kl_01_10	1.0259	0.7362	3.22	0.033	0.290	0.035	3.39	1.12E-03	3.19E-02	3.11	20.27	6.52
Ws_Kl_01_05	1.0425	0.7654	1.85	0.019	0.277	0.033	3.19	6.17E-04	1.87E-02	1.79	21.36	11.90
Ws_Km_01_70	1.0904	0.9239	1.11	0.012	0.167	0.020	1.83	2.23E-04	1.19E-02	1.09	22.45	20.53
Ws_Km_01_50	0.9553	0.7626	2.85	0.027	0.193	0.023	2.42	6.59E-04	2.66E-02	2.78	23.53	8.46
Ws_Km_01_30	1.016	0.8047	2.40	0.024	0.211	0.025	2.50	6.10E-04	2.38E-02	2.34	24.62	10.50

SampleID	Weight before decal (g)	weight after decal (g)	EA results (%C)	Corg from EA (g)	CaCO3 (g)	Mass C comp. of CaCO3	IC%	CaCO3 from EA	Actual C org (g)	Actual Corg %	LOI	Factor
Ws_Km_01_20	1.0708	0.7921	4.74	0.051	0.279	0.033	3.12	1.58E-03	4.92E-02	4.59	25.71	5.60
Ws_Km_01_10	1.0952	0.7851	4.89	0.054	0.310	0.037	3.40	1.82E-03	5.17E-02	4.72	26.80	5.67
Ws_Kh_01_80	1.1637	0.8402	3.26	0.038	0.324	0.039	3.34	1.26E-03	3.66E-02	3.15	27.89	8.86
Ws_Kh_01_50	1.117	0.8546	1.73	0.019	0.262	0.031	2.82	5.44E-04	1.87E-02	1.68	28.98	17.26
Ws_Kh_01_30	0.996	0.7677	2.11	0.021	0.228	0.027	2.75	5.77E-04	2.04E-02	2.05	30.06	14.68
Ws_Kh_01_20	1.0218	0.778	2.12	0.022	0.244	0.029	2.86	6.21E-04	2.11E-02	2.06	31.15	15.10
Ws_Kh_01_10	1.0373	0.7812	4.41	0.046	0.256	0.031	2.96	1.36E-03	4.44E-02	4.28	32.24	7.53
Os_Kp_01_80	0.9777	0.7646	10.19	0.100	0.213	0.026	2.62	2.60E-03	9.70E-02	9.92	33.33	3.36
Os_Kp_01_50	0.9904	0.8632	3.44	0.034	0.127	0.015	1.54	5.24E-04	3.35E-02	3.38	34.42	10.17
Os_Kp_01_30	0.9443	0.8138	4.46	0.042	0.131	0.016	1.66	6.98E-04	4.14E-02	4.38	35.51	8.10
Os_Kp_01_20	1.0476	0.8973	5.56	0.058	0.150	0.018	1.72	1.00E-03	5.72E-02	5.46	36.59	6.70
Os_Kp_01_10	1.0345	0.877	5.73	0.059	0.158	0.019	1.83	1.08E-03	5.82E-02	5.63	37.68	6.70
Os_Kl_01_80	1.0414	0.9228	0.60	0.006	0.119	0.014	1.37	8.53E-05	6.16E-03	0.59	38.77	65.57
Os_Kl_01_50	1.0811	0.9569	1.33	0.014	0.124	0.015	1.38	1.98E-04	1.41E-02	1.31	39.86	30.46
Os_Kl_01_30	1.0974	1.0004	1.07	0.012	0.097	0.012	1.06	1.25E-04	1.17E-02	1.06	40.95	38.54
Os_Kl_01_20	1.2177	1.1326	1.66	0.020	0.085	0.010	0.84	1.70E-04	2.01E-02	1.65	42.04	25.48
Os_Kl_01_10	0.9539	0.8982	1.20	0.011	0.056	0.007	0.70	8.05E-05	1.14E-02	1.20	43.12	36.04
Os_Km_01_80	1.0028	0.8062	6.90	0.069	0.197	0.024	2.35	1.63E-03	6.76E-02	6.74	44.21	6.56
Os_Km_01_50	1.003	0.8035	4.49	0.045	0.199	0.024	2.39	1.08E-03	4.40E-02	4.39	45.30	10.33
Os_Km_01_30	0.9736	0.8295	5.35	0.052	0.144	0.017	1.78	9.26E-04	5.12E-02	5.26	46.39	8.82
Os_Km_01_20	1.0384	0.8846	4.69	0.049	0.154	0.018	1.78	8.65E-04	4.78E-02	4.60	47.48	10.31
Os_Km_01_10	0.9859	0.8041	7.48	0.074	0.182	0.022	2.21	1.63E-03	7.21E-02	7.32	48.57	6.64
Uw_Kp_01_80	1.1355	0.9572	1.15	0.013	0.178	0.021	1.88	2.47E-04	1.28E-02	1.13	49.65	43.93
Uw_Kp_01_50	1.1267	0.9719	0.85	0.010	0.155	0.019	1.65	1.58E-04	9.42E-03	0.84	50.74	60.71
Uw_Kp_01_30	0.8737	0.6595	2.35	0.021	0.214	0.026	2.94	6.05E-04	2.00E-02	2.29	51.83	22.68
Uw_Kp_01_20	1.0531	0.8207	2.51	0.026	0.232	0.028	2.65	7.00E-04	2.57E-02	2.44	52.92	21.67
Uw_Kp_01_10	1.0436	0.79	3.64	0.038	0.254	0.030	2.92	1.11E-03	3.69E-02	3.53	54.01	15.28
Uw_Kl_01_80	0.9955	0.8648	1.29	0.013	0.131	0.016	1.58	2.02E-04	1.26E-02	1.27	55.10	43.52
Uw_Kl_01_50	1.1268	0.9454	1.21	0.014	0.181	0.022	1.93	2.64E-04	1.34E-02	1.19	56.18	47.21
Uw_Kl_01_30	1.0722	0.8956	1.49	0.016	0.177	0.021	1.98	3.15E-04	1.56E-02	1.46	57.27	39.32
Uw_Kl_01_20	0.8829	0.6763	3.10	0.027	0.207	0.025	2.81	7.69E-04	2.66E-02	3.02	58.36	19.35
Uw_Kl_01_10	1.1283	0.8818	3.61	0.041	0.247	0.030	2.62	1.07E-03	3.96E-02	3.51	59.45	16.92
Uw_Km_01_80	1.0214	0.828	2.53	0.026	0.193	0.023	2.27	5.88E-04	2.53E-02	2.48	60.54	24.45
Uw_Km_01_50	0.9804	0.7707	2.69	0.026	0.210	0.025	2.57	6.76E-04	2.57E-02	2.62	61.62	23.55
Uw_Km_01_30	0.978	0.756	3.47	0.034	0.222	0.027	2.72	9.24E-04	3.30E-02	3.37	62.71	18.60
Uw_Km_01_20	0.9822	0.7565	3.16	0.031	0.226	0.027	2.76	8.56E-04	3.02E-02	3.07	63.80	20.76
Uw_Km_01_10	0.9684	0.7276	3.61	0.035	0.241	0.029	2.98	1.04E-03	3.39E-02	3.50	64.89	18.53

VI. Area of gradient zones in hectare

Area	Year	ZONEcod	Surface_m2	Circumference	Hectare
Texel	2011	Kp_tot	165989.37	34848.26	16.60
Texel	2011	Km_tot	85659.73	22141.62	8.57
Texel	2011	Kb_tot	3137.60	913.65	0.31
Westerschelde	2010	tot_Kh	203590.65	21674.15	20.36
Westerschelde	2010	tot_Km	136771.38	19568.63	13.68
Westerschelde	2010	tot_Kl	72235.05	8843.58	7.22
Oosterschelde	2013	tot_Km	712268.88	124625.00	71.23
Oosterschelde	2013	tot_Kl	270639.59	48400.03	27.06
Oosterschelde	2013	tot_Kp	591099.65	67529.99	59.11
Noord-Groningen	2014	tot_Km	298924.44	17234.41	29.89
Noord-Groningen	2014	tot_Kl	1318192.57	89394.31	131.82
Noord-Groningen	2014	tot_Kp	1602799.25	82674.91	160.28

VII. Coordinates of coring locations

Latitude	Longitude	CoreID
122574.5876	571147.5705	Tx_Km_01
122549.7192	571119.4179	Tx_Km_02
122555.4512	571135.4552	Tx_Km_03
122608.8429	571174.002	Tx_Km_04
122595.9393	571275.9542	Tx_Kp_01
122621.8988	571217.312	Tx_Kp_02
122632.8911	571239.8821	Tx_Kp_03
122655.4603	571327.7707	Tx_Kp_04
122551.0411	571598.7081	Tx_Kb_01
122494.9236	571505.726	Tx_Kb_02
122534.6335	571579.1869	Tx_Kb_03
122486.9747	571549.3582	Tx_Kb_04
46499.8316	378840.519	Ws_Kh_01
46529.2058	378836.4118	Ws_Kh_02
46497.386	378800.3717	Ws_Kh_03
46430.1837	378826.1277	Ws_Kh_04
46356.175	378805.7508	Ws_km_01
46334.2994	378772.0009	Ws_km_02
46358.1682	378795.8057	Ws_km_03
46332.5951	378791.922	Ws_km_04
46447.5726	378735.6229	Ws_kl_01
46315.7412	378701.649	Ws_kl_02
46342.2544	378708.5005	Ws_kl_03
46381.8649	378737.8147	Ws_kl_04
73321.3018	383753.3698	Os_Kp_01
73824.9764	383654.2411	Os_Kp_02
73618.4934	383605.7671	Os_Kp_03
73393.5702	383605.6781	Os_Kp_04
73593.4424	383725.1246	Os_Kl_01
73401.4474	383744.2684	Os_Kl_02
73716.274	383719.8273	Os_Kl_03
73445.1453	383648.5592	Os_Kl_04
73527.565	383474.6356	Os_Km_01
73459.1889	383490.2478	Os_Km_02
73395.7456	383554.5459	Os_Km_03
73635.9613	383480.4821	Os_Km_04
238139.7745	608163.3429	Uw_Kp_01
237873.9107	608053.3412	Uw_Kp_02
238011.9351	608048.8364	Uw_Kp_03
238039.8581	608094.7855	Uw_Kp_04

238235.943	607994.6219	Uw_Kl_01
Latitude	**Longitude**	**CoreID**
238308.877	607895.233	Uw_Kl_02
238197.159	607850.8869	Uw_Kl_03
238036.0992	607787.7274	Uw_Kl_04
237901.8651	607748.6929	Uw_Km_01
237751.1563	607760.4935	Uw_Km_02
237773.2502	607743.9722	Uw_Km_03
237806.6319	607678.838	Uw_Km_04

VIII. Organic matter and Organic carbon data

Date	Location	Gradient zone	Time h	CoreID	Depth Corer cm	Depth Sample cm	Depth Subsample cm	SampleID	Weight sample in bag	Tot. Sample weight	Weight of crucible	Weight sample in crucible pre LOI	Weight sample pre LOI	Weight sample in crucible post LOI	Weight of sample post LOI	Weight delta LOI	LOI %	LOI to Corg factor	Corg %	DBD (g/cm3)	Soil C Density (g/cm3)	C/sample
18/05/2018	Schorren	Middle	17:06	Tx_Km_01	83	83	70	Tx_Km_01_70	3.22	3.6	9.09	10.19	1.09	10.12	1.03	0.06	5.78	4.25	1.36	1.02	0.01383	0.0138
18/05/2018	Schorren	Middle	17:06	Tx_Km_01	83	83	50	Tx_Km_01_50	3.52	3.86	8.94	9.98	1.05	9.96	1.02	0.02	2.3	8.01	0.29	1.09	0.00314	0.0031
18/05/2018	Schorren	Middle	17:06	Tx_Km_01	83	83	30	Tx_Km_01_30	2.52	2.83	9.28	10.31	1.03	10.28	1	0.03	2.45	2.39	1.02	0.8	0.00819	0.0082
18/05/2018	Schorren	Middle	17:06	Tx_Km_01	83	83	20	Tx_Km_01_20	0.71	0.48	9.31	9.79	0.48	9.66	0.35	0.13	26.5	2.77	9.57	0.14	0.01299	0.013
18/05/2018	Schorren	Middle	17:06	Tx_Km_01	83	83	10	Tx_Km_01_10	0.71	0.27	10.56	10.83	0.27	10.77	0.21	0.06	22.82	2.32	9.84	0.08	0.00746	0.0075
18/05/2018	Schorren	Middle	17:30	Tx_Km_02	75	75	70	Tx_Km_02_70	7.54	6.83	9.17	10.2	1.03	10.19	1.02	0.01	1.44	1.06	1.36	1.93	0.02622	0.0262
18/05/2018	Schorren	Middle	17:30	Tx_Km_02	75	75	50	Tx_Km_02_50	4.5	3.79	9.28	10.33	1.05	10.3	1.02	0.03	2.77	9.65	0.29	1.07	0.00308	0.0031
18/05/2018	Schorren	Middle	17:30	Tx_Km_02	75	75	30	Tx_Km_02_30	7.25	6.54	9.48	10.54	1.05	10.48	1	0.05	5.08	4.97	1.02	1.85	0.01892	0.0189
18/05/2018	Schorren	Middle	17:30	Tx_Km_02	75	75	20	Tx_Km_02_20	6.12	5.41	9.54	10.55	1.01	10.53	1	0.02	1.75	0.18	9.57	1.53	0.14629	0.1463
18/05/2018	Schorren	Middle	17:30	Tx_Km_02	75	75	10	Tx_Km_02_10	7.25	6.54	9.08	10.09	1.01	10.08	0.99	0.02	1.59	0.16	9.84	1.85	0.18213	0.1821
18/05/2018	Schorren	Middle	17:21	Tx_Km_03	80	80	70	Tx_Km_03_70	7.06	6.35	9.09	10.17	1.08	10.15	1.06	0.02	1.87	1.38	1.36	1.8	0.02439	0.0244
18/05/2018	Schorren	Middle	17:21	Tx_Km_03	80	80	50	Tx_Km_03_50	6.7	5.99	8.94	9.95	1.01	9.92	0.98	0.03	2.85	9.91	0.29	1.69	0.00487	0.0049
18/05/2018	Schorren	Middle	17:21	Tx_Km_03	80	80	30	Tx_Km_03_30	5.8	5.09	9.28	10.41	1.12	10.39	1.11	0.02	1.44	1.41	1.02	1.44	0.01472	0.0147
18/05/2018	Schorren	Middle	17:21	Tx_Km_03	80	80	20	Tx_Km_03_20	5.3	4.59	9.31	10.35	1.04	10.3	0.99	0.05	4.56	0.48	9.57	1.3	0.12428	0.1243
18/05/2018	Schorren	Middle	17:21	Tx_Km_03	80	80	10	Tx_Km_03_10	3.11	2.4	10.56	11.59	1.02	11.46	0.89	0.13	12.46	1.27	9.84	0.68	0.06682	0.0668
18/05/2018	Schorren	Middle	16:52	Tx_Km_04	80	80	70	Tx_Km_04_70	7.88	7.17	8.91	9.93	1.03	9.92	1.01	0.01	1.36	1.00	1.36	2.03	0.02752	0.0275
18/05/2018	Schorren	Middle	16:52	Tx_Km_04	80	80	50	Tx_Km_04_50	7.37	6.66	9.81	10.83	1.02	10.8	0.99	0.03	2.49	8.67	0.29	1.88	0.00542	0.0054
18/05/2018	Schorren	Middle	16:52	Tx_Km_04	80	80	30	Tx_Km_04_30	5.24	4.53	8.86	9.86	1.01	9.79	0.93	0.07	7.37	7.21	1.02	1.28	0.01312	0.0131
18/05/2018	Schorren	Middle	16:52	Tx_Km_04	80	80	20	Tx_Km_04_20	2.42	1.71	9.35	10.35	1	10.1	0.75	0.25	25.11	2.62	9.57	0.49	0.04641	0.0464
18/05/2018	Schorren	Middle	16:52	Tx_Km_04	80	80	10	Tx_Km_04_10	2.93	2.22	9.25	10.25	1	10.03	0.78	0.21	21.52	2.19	9.84	0.63	0.06187	0.0619
18/05/2018	Schorren	Pionier	16:17	Tx_Kp_01	100	94	84	Tx_Kp_01_84	3.62	3.92	8.91	9.92	1.01	9.89	0.99	0.03	2.5	5.29	0.47	1.11	0.00524	0.0052
18/05/2018	Schorren	Pionier	16:17	Tx_Kp_01	100	94	54	Tx_Kp_01_54	5.38	5.64	9.81	10.78	0.97	10.73	0.92	0.05	4.79	2.40	1.99	1.59	0.03178	0.0318
18/05/2018	Schorren	Pionier	16:17	Tx_Kp_01	100	94	34	Tx_Kp_01_34	5.32	5.62	8.86	9.87	1.01	9.84	0.98	0.03	2.9	4.27	0.68	1.59	0.01081	0.0108
18/05/2018	Schorren	Pionier	16:17	Tx_Kp_01	100	94	24	Tx_Kp_01_24	4.24	4.54	9.35	10.36	1.01	10.35	0.99	0.01	1.42	7.27	0.2	1.29	0.00251	0.0025
18/05/2018	Schorren	Pionier	16:17	Tx_Kp_01	100	94	14	Tx_Kp_01_14	3	3.31	9.25	10.27	1.02	10.22	0.97	0.05	5.28	2.31	2.28	0.94	0.02138	0.0214
18/05/2018	Schorren	Pionier	16:40	Tx_Kp_02	105	105	80	Tx_Kp_02_80	9.09	8.38	9.2	10.21	1	10.16	0.96	0.04	4.14	8.76	0.47	2.37	0.0112	0.0112
18/05/2018	Schorren	Pionier	16:40	Tx_Kp_02	105	105	40	Tx_Kp_02_40	6.89	6.18	9.07	10.11	1.04	10.1	1.02	0.02	1.78	0.90	1.99	1.75	0.03485	0.0349
18/05/2018	Schorren	Pionier	16:40	Tx_Kp_02	105	105	25	Tx_Kp_02_25	5.97	5.26	9.28	10.28	1	10.19	0.91	0.09	9.09	13.38	0.68	1.49	0.01012	0.0101
18/05/2018	Schorren	Pionier	16:40	Tx_Kp_02	105	105	15	Tx_Kp_02_15	6.58	5.87	9.64	10.65	1.01	10.62	0.98	0.03	3.12	15.98	0.2	1.66	0.00324	0.0032
18/05/2018	Schorren	Pionier	16:40	Tx_Kp_02	105	105	5	Tx_Kp_02_05	6.11	5.4	8.89	9.97	1.08	9.94	1.05	0.03	2.97	1.30	2.28	1.53	0.03486	0.0349
18/05/2018	Schorren	Pionier	16:29	Tx_Kp_03	90	90	65	Tx_Kp_03_65	7.72	7.01	9.11	10.13	1.02	10.1	0.99	0.03	2.8	5.91	0.47	1.98	0.00937	0.0094
18/05/2018	Schorren	Pionier	16:29	Tx_Kp_03	90	90	50	Tx_Kp_03_50	6.54	5.83	9.43	10.5	1.07	10.47	1.04	0.03	2.6	1.30	1.99	1.65	0.03289	0.0329
18/05/2018	Schorren	Pionier	16:29	Tx_Kp_03	90	90	25	Tx_Kp_03_25	6.48	5.77	9.43	10.47	1.04	10.44	1.01	0.03	2.55	3.76	0.68	1.63	0.01109	0.0111
18/05/2018	Schorren	Pionier	16:29	Tx_Kp_03	90	90	15	Tx_Kp_03_15	5.47	4.76	9.34	10.47	1.13	10.3	0.97	0.17	14.87	76.24	0.2	1.35	0.00263	0.0026
18/05/2018	Schorren	Pionier	16:29	Tx_Kp_03	90	90	5	Tx_Kp_03_05	6.96	6.25	9.14	10.14	1	10.07	0.93	0.08	7.52	3.29	2.28	1.77	0.04037	0.0404
18/05/2018	Schorren	Pionier	16:02	Tx_Kp_04	85	85	65	Tx_Kp_04_65	9.05	8.34	9.31	10.31	1	10.3	0.99	0.01	1.34	2.83	0.47	2.36	0.01116	0.0112
18/05/2018	Schorren	Pionier	16:02	Tx_Kp_04	85	85	45	Tx_Kp_04_45	6.76	6.05	9.24	10.3	1.06	10.24	1	0.06	5.56	2.79	1.99	1.71	0.03412	0.0341

Date	Location	Gradient zone	Time h	CoreID	Depth Corer cm	Depth Sample cm	Depth Subsample cm	SampleID	Weight sample in bag	Tot. Sample weight	Weight of crucible	Weight sample in crucible pre LOI	Weight sample pre LOI	Weight sample in crucible post LOI	Weight of sample post LOI	Weight delta LOI	LOI %	LOI to Corg factor	Corg %	DBD (g/cm3)	Soil C Density (g/cm3)	C/sample
18/05/2018	Schorren	Pionier	16:02	Tx_Kp_04	85	85	35	Tx_Kp_04_35	7.29	6.58	9.27	10.31	1.04	10.26	0.99	0.05	5.09	7.49	0.68	1.86	0.01264	0.0126
18/05/2018	Schorren	Pionier	16:02	Tx_Kp_04	85	85	15	Tx_Kp_04_15	7.44	6.73	9.14	10.15	1.01	10.14	1	0.01	1.36	6.95	0.2	1.9	0.00371	0.0037
18/05/2018	Schorren	Pionier	16:02	Tx_Kp_04	85	85	5	Tx_Kp_04_05	7.55	6.84	9.25	10.28	1.03	10.25	0.99	0.03	3.32	1.45	2.28	1.94	0.0442	0.0442
18/05/2018	Schorren	Low	15:36	Tx_Kb_01	110	100	90	Tx_Kb_01_90	4.12	4.43	9.17	10.19	1.02	10.14	0.97	0.04	4.24	3.39	1.25	1.25	0.01568	0.0157
18/05/2018	Schorren	Low	15:36	Tx_Kb_01	110	100	50	Tx_Kb_01_50	4.69	5.11	9.28	10.41	1.13	10.37	1.08	0.05	4.14	3.14	1.32	1.45	0.01904	0.019
18/05/2018	Schorren	Low	15:36	Tx_Kb_01	110	100	30	Tx_Kb_01_30	2.88	3.14	9.48	10.45	0.96	10.34	0.86	0.11	11.25	3.07	3.66	0.89	0.03247	0.0325
18/05/2018	Schorren	Low	15:36	Tx_Kb_01	110	100	20	Tx_Kb_01_20	2.34	2.65	9.54	10.55	1.01	10.41	0.87	0.14	14.13	3.19	4.43	0.75	0.03318	0.0332
18/05/2018	Schorren	Low	15:36	Tx_Kb_01	110	100	10	Tx_Kb_01_10	1.55	1.82	9.08	10.07	0.99	9.93	0.85	0.14	13.98	3.00	4.66	0.52	0.02403	0.024
18/05/2018	Schorren	Low	14:40	Tx_Kb_02	110	100	90	Tx_Kb_02_90	6.91	6.2	8.69	9.68	0.99	9.65	0.96	0.03	3.08	2.46	1.25	1.75	0.02195	0.022
18/05/2018	Schorren	Low	14:40	Tx_Kb_02	110	100	50	Tx_Kb_02_50	3.58	2.87	9.09	10.09	1	9.93	0.84	0.16	16	12.15	1.32	0.81	0.01067	0.0107
18/05/2018	Schorren	Low	14:40	Tx_Kb_02	110	100	30	Tx_Kb_02_30	4.73	4.02	9.36	10.35	0.99	10.24	0.88	0.11	11.16	3.05	3.66	1.14	0.0416	0.0416
18/05/2018	Schorren	Low	14:40	Tx_Kb_02	110	100	20	Tx_Kb_02_20	3.34	2.63	9.08	10.09	1.01	9.93	0.85	0.16	15.99	3.61	4.43	0.74	0.03298	0.033
18/05/2018	Schorren	Low	14:40	Tx_Kb_02	110	100	10	Tx_Kb_02_10	3.05	2.34	10.1	11.09	0.99	10.89	0.79	0.2	20.32	4.36	4.66	0.66	0.03088	0.0309
18/05/2018	Schorren	Low	15:18	Tx_Kb_03	110	100	90	Tx_Kb_03_90	4.52	3.81	9.71	10.72	1.01	10.62	0.91	0.11	10.36	8.27	1.25	1.08	0.01348	0.0135
18/05/2018	Schorren	Low	15:18	Tx_Kb_03	110	100	50	Tx_Kb_03_50	5.43	4.71	9.2	10.19	0.99	10.11	0.91	0.08	8.1	6.15	1.32	1.33	0.01756	0.0176
18/05/2018	Schorren	Low	15:18	Tx_Kb_03	110	100	30	Tx_Kb_03_30	4.7	3.99	9.28	10.26	0.98	10.17	0.89	0.09	9.53	2.61	3.66	1.13	0.04132	0.0413
18/05/2018	Schorren	Low	15:18	Tx_Kb_03	110	100	20	Tx_Kb_03_20	2.86	2.15	9.21	10.23	1.02	10.06	0.84	0.17	17.18	3.88	4.43	0.61	0.02694	0.0269
18/05/2018	Schorren	Low	15:18	Tx_Kb_03	110	100	10	Tx_Kb_03_10	10.31	9.6	9.31	10.81	1.5	10.15	0.84	0.66	44.09	9.46	4.66	2.72	0.12664	0.1266
18/05/2018	Schorren	Low	14:55	Tx_Kb_04	110	100	90	Tx_Kb_04_90	5.87	5.16	9.15	10.19	1.04	10.09	0.94	0.1	9.54	7.62	1.25	1.46	0.01828	0.0183
18/05/2018	Schorren	Low	14:55	Tx_Kb_04	110	100	50	Tx_Kb_04_50	6.33	5.62	9.33	10.36	1.04	10.26	0.94	0.1	9.71	7.37	1.32	1.59	0.02094	0.0209
18/05/2018	Schorren	Low	14:55	Tx_Kb_04	110	100	30	Tx_Kb_04_30	4.11	3.4	9.24	10.26	1.03	10.12	0.88	0.14	13.9	3.80	3.66	0.96	0.03514	0.0351
18/05/2018	Schorren	Low	14:55	Tx_Kb_04	110	100	20	Tx_Kb_04_20	2.85	2.14	9.26	10.25	0.99	10.08	0.83	0.16	16.38	3.70	4.43	0.6	0.02679	0.0268
18/05/2018	Schorren	Low	14:55	Tx_Kb_04	110	100	10	Tx_Kb_04_10	3.79	3.08	9.24	10.23	0.99	10.05	0.8	0.19	18.75	4.02	4.66	0.87	0.04059	0.0406
01/06/2018	Zuidgors	High	08:33	Ws_Kh_01	100	100	80	Ws_Kh_01_80	1.61	1.85	9.24	10.25	0.94	10.13	0.89	0.05	5.39	1.71	3.15	0.52	0.01644	0.0164
01/06/2018	Zuidgors	High	08:33	Ws_Kh_01	100	100	50	Ws_Kh_01_50	2.37	2.74	9.31	10.31	1.08	10.25	0.93	0.14	13.2	7.86	1.68	0.78	0.01301	0.013
01/06/2018	Zuidgors	High	08:33	Ws_Kh_01	100	100	30	Ws_Kh_01_30	2.84	3.15	9.27	10.29	1.02	10.21	0.94	0.08	7.91	3.86	2.05	0.89	0.01822	0.0182
01/06/2018	Zuidgors	High	08:33	Ws_Kh_01	100	100	20	Ws_Kh_01_20	3.24	3.52	9.14	10.14	1	10.07	0.93	0.07	6.62	3.21	2.06	1	0.02056	0.0206
01/06/2018	Zuidgors	High	08:33	Ws_Kh_01	100	100	10	Ws_Kh_01_10	2.3	2.59	9.25	10.26	1	10.16	0.91	0.09	9.24	2.16	4.28	0.73	0.03133	0.0313
01/06/2018	Zuidgors	High	08:51	Ws_Kh_02	98	98	80	Ws_Kh_02_80	5.15	4.44	9.23	10.23	1	10.19	0.96	0.04	4	1.27	3.15	1.26	0.03959	0.0396
01/06/2018	Zuidgors	High	08:51	Ws_Kh_02	98	98	50	Ws_Kh_02_50	3.12	2.41	9.08	10.07	0.99	9.94	0.86	0.13	13.26	7.90	1.68	0.68	0.01143	0.0114
01/06/2018	Zuidgors	High	08:51	Ws_Kh_02	98	98	30	Ws_Kh_02_30	3.4	2.69	9.02	10	0.99	9.9	0.89	0.1	10.18	4.97	2.05	0.76	0.01557	0.0156
01/06/2018	Zuidgors	High	08:51	Ws_Kh_02	98	98	20	Ws_Kh_02_20	3.32	2.61	9.33	10.35	1.02	10.24	0.92	0.11	10.32	5.00	2.06	0.74	0.01521	0.0152
01/06/2018	Zuidgors	High	08:51	Ws_Kh_02	98	98	10	Ws_Kh_02_10	3.03	2.32	9.15	10.15	1	10.03	0.88	0.12	11.72	2.74	4.28	0.66	0.02814	0.0281
01/06/2018	Zuidgors	High	09:06	Ws_Kh_03	96	96	80	Ws_Kh_03_80	5.07	4.36	9.05	10.04	0.99	9.97	0.92	0.07	7.22	2.29	3.15	1.23	0.03884	0.0388
01/06/2018	Zuidgors	High	09:06	Ws_Kh_03	96	96	50	Ws_Kh_03_50	5.21	4.5	9.03	10.33	1.29	10.26	1.23	0.07	5.09	3.03	1.68	1.27	0.02138	0.0214
01/06/2018	Zuidgors	High	09:06	Ws_Kh_03	96	96	30	Ws_Kh_03_30	4.81	4.1	9.78	10.78	1	10.71	0.93	0.07	7.31	3.57	2.05	1.16	0.02374	0.0237
01/06/2018	Zuidgors	High	09:06	Ws_Kh_03	96	96	20	Ws_Kh_03_20	6.85	6.14	9.85	10.83	0.99	10.77	0.92	0.07	6.7	3.25	2.06	1.74	0.03586	0.0359
01/06/2018	Zuidgors	High	09:06	Ws_Kh_03	96	96	10	Ws_Kh_03_10	3.97	3.26	9.2	10.19	0.99	10.12	0.92	0.08	7.7	1.80	4.28	0.92	0.03952	0.0395
01/06/2018	Zuidgors	High	09:33	Ws_Kh_04	90	90	80	Ws_Kh_04_80	3.96	3.25	0.41	1.43	1.02	1.33	0.92	0.1	9.55	3.03	3.15	0.92	0.02898	0.029
01/06/2018	Zuidgors	High	09:33	Ws_Kh_04	90	90	50	Ws_Kh_04_50	3.45	2.74	0.41	1.4	0.99	1.31	0.91	0.08	8.39	5.00	1.68	0.77	0.013	0.013

Date	Location	Gradient zone	Time h	CoreID	Depth Corer cm	Depth Sample cm	Depth Subsample cm	SampleID	Weight sample in bag	Tot. Sample weight	Weight of crucible	Weight sample in crucible pre LOI	Weight sample pre LOI	Weight sample in crucible post LOI	Weight of sample post LOI	Weight delta LOI	LOI %	LOI to Corg factor	Corg %	DBD (g/cm3)	Soil C Density (g/cm3)	C/sample
01/06/2018	Zuidgors	High	09:33	Ws_Kh_04	90	90	30	Ws_Kh_04_30	3.66	2.95	0.41	1.42	1.01	1.33	0.92	0.09	8.87	4.33	2.05	0.84	0.0171	0.0171
01/06/2018	Zuidgors	High	09:33	Ws_Kh_04	90	90	20	Ws_Kh_04_20	3.62	2.91	0.41	1.4	0.99	1.32	0.91	0.08	7.82	3.79	2.06	0.82	0.01697	0.017
01/06/2018	Zuidgors	High	09:33	Ws_Kh_04	90	90	10	Ws_Kh_04_10	3.13	2.42	0.41	1.39	0.98	1.32	0.91	0.07	7.33	1.71	4.28	0.68	0.02931	0.0293
01/06/2018	Zuidgors	Middle	11:15	Ws_km_01	86	86	70	Ws_Km_01_70	2.8	3.1	9.11	10.12	1.01	10.07	0.96	0.05	4.97	4.54	1.09	0.88	0.0096	0.0096
01/06/2018	Zuidgors	Middle	11:15	Ws_km_01	86	86	50	Ws_Km_01_50	2.73	3.04	9.43	10.44	1.02	10.34	0.91	0.1	10.32	3.71	2.78	0.86	0.02388	0.0239
01/06/2018	Zuidgors	Middle	11:15	Ws_km_01	86	86	30	Ws_Km_01_30	3.45	3.74	9.43	10.43	1	10.33	0.9	0.09	9.5	4.05	2.34	1.06	0.02479	0.0248
01/06/2018	Zuidgors	Middle	11:15	Ws_km_01	86	86	20	Ws_Km_01_20	2.32	2.54	9.34	10.26	0.93	10.13	0.79	0.13	14.24	3.10	4.59	0.72	0.03298	0.033
01/06/2018	Zuidgors	Middle	11:15	Ws_km_01	86	86	10	Ws_Km_01_10	1.77	2.05	9.14	10.13	0.99	9.99	0.86	0.14	13.86	2.93	4.72	0.58	0.02739	0.0274
01/06/2018	Zuidgors	Middle	10:52	Ws_km_02	96	96	80	Ws_Km_02_80	4.31	3.6	0.4	1.44	1.04	1.33	0.92	0.11	10.89	9.96	1.09	1.02	0.01113	0.0111
01/06/2018	Zuidgors	Middle	10:52	Ws_km_02	96	96	50	Ws_Km_02_50	3.87	3.16	0.41	1.43	1.02	1.32	0.91	0.11	10.48	3.77	2.78	0.89	0.02483	0.0248
01/06/2018	Zuidgors	Middle	10:52	Ws_km_02	96	96	40	Ws_Km_02_40	3.44	2.73	0.41	1.41	1	1.29	0.89	0.11	11.15	4.76	2.34	0.77	0.0181	0.0181
01/06/2018	Zuidgors	Middle	10:52	Ws_km_02	96	96	30	Ws_Km_02_30	3.31	2.6	0.41	1.41	1	1.3	0.89	0.11	10.79	2.35	4.59	0.74	0.03379	0.0338
01/06/2018	Zuidgors	Middle	10:52	Ws_km_02	96	96	10	Ws_Km_02_10	5.31	4.6	0.41	1.41	1	1.31	0.9	0.11	10.54	2.23	4.72	1.3	0.06143	0.0614
01/06/2018	Zuidgors	Middle	11:25	Ws_km_03	80	80	70	Ws_Km_03_70	4.55	3.84	0.41	1.42	1.01	1.34	0.92	0.08	8.29	7.58	1.09	1.09	0.01188	0.0119
01/06/2018	Zuidgors	Middle	11:25	Ws_km_03	80	80	50	Ws_Km_03_50	3.73	3.02	0.41	1.41	1	1.29	0.88	0.12	11.96	4.30	2.78	0.85	0.02377	0.0238
01/06/2018	Zuidgors	Middle	11:25	Ws_km_03	80	80	30	Ws_Km_03_30	3.82	3.11	0.41	1.43	1.01	1.31	0.89	0.12	11.66	4.97	2.34	0.88	0.02065	0.0206
01/06/2018	Zuidgors	Middle	11:25	Ws_km_03	80	80	20	Ws_Km_03_20	3.7	2.99	0.41	1.4	0.99	1.28	0.87	0.13	12.61	2.75	4.59	0.85	0.03888	0.0389
01/06/2018	Zuidgors	Middle	11:25	Ws_km_03	80	80	10	Ws_Km_03_10	3.95	3.24	0.42	1.44	1.02	1.31	0.89	0.13	12.56	2.66	4.72	0.92	0.04331	0.0433
01/06/2018	Zuidgors	Middle	11:03	Ws_km_04	96	96	80	Ws_Km_04_80	2.86	2.15	0.42	1.4	0.99	1.3	0.88	0.11	10.92	9.99	1.09	0.61	0.00664	0.0066
01/06/2018	Zuidgors	Middle	11:03	Ws_km_04	96	96	50	Ws_Km_04_50	3.59	2.88	0.41	1.44	1.03	1.33	0.92	0.11	10.76	3.87	2.78	0.82	0.02267	0.0227
01/06/2018	Zuidgors	Middle	11:03	Ws_km_04	96	96	30	Ws_Km_04_30	2.82	2.11	0.41	1.39	0.98	1.26	0.85	0.13	13.54	5.78	2.34	0.6	0.01399	0.014
01/06/2018	Zuidgors	Middle	11:03	Ws_km_04	96	96	20	Ws_Km_04_20	3.79	3.08	0.41	1.41	1	1.26	0.85	0.14	14.5	3.16	4.59	0.87	0.04002	0.04
01/06/2018	Zuidgors	Middle	11:03	Ws_km_04	96	96	10	Ws_Km_04_10	3.39	2.68	0.42	1.46	1.04	1.31	0.9	0.14	13.79	2.92	4.72	0.76	0.03575	0.0357
01/06/2018	Zuidgors	Low	09:51	Ws_kl_01	62	62	50	Ws_Kl_01_50	2.77	3.04	9.2	10.18	0.98	10.11	0.9	0.08	8	3.90	2.05	0.86	0.01764	0.0176
01/06/2018	Zuidgors	Low	09:51	Ws_kl_01	62	62	30	Ws_Kl_01_30	2.87	3.33	9.07	10.24	1.17	10.13	1.06	0.11	9.55	3.55	2.69	0.94	0.02538	0.0254
01/06/2018	Zuidgors	Low	09:51	Ws_kl_01	62	62	20	Ws_Kl_01_20	3.58	3.88	9.28	10.29	1.01	10.23	0.95	0.06	6.1	4.15	1.47	1.1	0.01613	0.0161
01/06/2018	Zuidgors	Low	09:51	Ws_kl_01	62	62	10	Ws_Kl_01_10	5.06	4.64	9.64	9.94	0.3	9.86	0.22	0.08	25.62	8.24	3.11	1.31	0.04085	0.0409
01/06/2018	Zuidgors	Low	09:51	Ws_kl_01	62	62	5	Ws_Kl_01_05	4.02	5.14	8.89	10.73	1.84	10.66	1.78	0.06	3.36	1.87	1.79	1.46	0.02612	0.0261
01/06/2018	Zuidgors	Low	10:40	Ws_kl_02	76	76	70	Ws_Kl_02_70	4.87	4.16	0.4	1.43	1.03	1.38	0.98	0.05	4.62	2.25	2.05	1.18	0.02412	0.0241
01/06/2018	Zuidgors	Low	10:40	Ws_kl_02	76	76	50	Ws_Kl_02_50	3.89	3.18	0.41	1.41	1	1.32	0.91	0.09	9	3.34	2.69	0.9	0.02422	0.0242
01/06/2018	Zuidgors	Low	10:40	Ws_kl_02	76	76	30	Ws_Kl_02_30	5.43	4.72	0.41	1.4	0.99	1.37	0.96	0.04	3.57	2.43	1.47	1.34	0.01962	0.0196
01/06/2018	Zuidgors	Low	10:40	Ws_kl_02	76	76	20	Ws_Kl_02_20	5.25	4.54	0.41	1.39	0.98	1.34	0.93	0.06	5.69	1.83	3.11	1.29	0.03997	0.04
01/06/2018	Zuidgors	Low	10:40	Ws_kl_02	76	76	10	Ws_Kl_02_10	4.11	3.4	0.39	1.37	0.98	1.3	0.9	0.07	7.48	4.17	1.79	0.96	0.01727	0.0173
01/06/2018	Zuidgors	Low	10:26	Ws_kl_03	75	75	70	Ws_Kl_03_70	3.62	2.91	0.42	1.42	1	1.31	0.89	0.11	11.06	5.40	2.05	0.82	0.01684	0.0168
01/06/2018	Zuidgors	Low	10:26	Ws_kl_03	75	75	50	Ws_Kl_03_50	4.07	3.36	0.41	1.42	1.01	1.33	0.92	0.09	9.03	3.35	2.69	0.95	0.0256	0.0256
01/06/2018	Zuidgors	Low	10:26	Ws_kl_03	75	75	30	Ws_Kl_03_30	5.66	4.95	0.43	1.45	1.03	1.4	0.98	0.05	4.54	3.09	1.47	1.4	0.02057	0.0206
01/06/2018	Zuidgors	Low	10:26	Ws_kl_03	75	75	20	Ws_Kl_03_20	6.49	5.78	0.41	1.43	1.02	1.38	0.97	0.05	4.91	1.58	3.11	1.64	0.05085	0.0509
01/06/2018	Zuidgors	Low	10:26	Ws_kl_03	75	75	10	Ws_Kl_03_10	5.91	5.2	0.41	1.41	1	1.35	0.94	0.06	6.08	3.39	1.79	1.47	0.02642	0.0264
01/06/2018	Zuidgors	Low	10:18	Ws_kl_04	79	79	70	Ws_Kl_04_70	5.49	4.78	0.41	1.4	0.99	1.38	0.97	0.02	2.19	1.07	2.05	1.35	0.02771	0.0277
01/06/2018	Zuidgors	Low	10:18	Ws_kl_04	79	79	50	Ws_Kl_04_50	6.72	6.01	0.41	1.42	1	1.37	0.95	0.05	4.76	1.77	2.69	1.7	0.04577	0.0458

Date	Location	Gradient zone	Time h	CoreID	Depth Corer cm	Depth Sample cm	Depth Subsample cm	SampleID	Weight sample in bag	Tot. Sample weight	Weight of crucible	Weight sample in crucible pre LOI	Weight sample pre LOI	Weight sample in crucible post LOI	Weight of sample post LOI	Weight delta LOI	LOI %	LOI to Corg factor	Corg %	DBD (g/cm3)	Soil C Density (g/cm3)	C/sample
01/06/2018	Zuidgors	Low	10:18	Ws_kl_04	79	79	30	Ws_Kl_04_30	4.84	4.13	0.42	1.4	0.98	1.37	0.95	0.03	3.48	2.37	1.47	1.17	0.01717	0.0172
01/06/2018	Zuidgors	Low	10:18	Ws_kl_04	79	79	20	Ws_Kl_04_20	5.99	5.28	0.41	1.41	0.99	1.39	0.98	0.02	1.68	0.54	3.11	1.49	0.04642	0.0464
01/06/2018	Zuidgors	Low	10:18	Ws_kl_04	79	79	10	Ws_Kl_04_10	6.09	5.38	0.4	1.42	1.02	1.37	0.98	0.05	4.79	2.67	1.79	1.52	0.02731	0.0273
12/06/2018	Beveland	Pionier	10:23	Os_Kp_01	100	100	80	Os_Kp_01_80	0.74	1.02	9.17	10.17	0.99	9.94	0.77	0.23	22.86	2.30	9.92	0.29	0.02872	0.0287
12/06/2018	Beveland	Pionier	10:23	Os_Kp_01	100	100	50	Os_Kp_01_50	1.39	1.67	9.28	10.28	1	10.17	0.88	0.11	11.23	3.32	3.38	0.47	0.01602	0.016
12/06/2018	Beveland	Pionier	10:23	Os_Kp_01	100	100	30	Os_Kp_01_30	1.55	1.85	9.48	10.49	1.01	10.39	0.9	0.11	10.51	2.40	4.38	0.52	0.02292	0.0229
12/06/2018	Beveland	Pionier	10:23	Os_Kp_01	100	100	20	Os_Kp_01_20	0.72	0.56	9.54	10.09	0.55	10.01	0.47	0.08	14.19	2.60	5.46	0.16	0.00863	0.0086
12/06/2018	Beveland	Pionier	10:23	Os_Kp_01	100	100	10	Os_Kp_01_10	0.72	0.91	9.08	9.98	0.9	9.86	0.77	0.12	13.76	2.44	5.63	0.26	0.01447	0.0145
01/06/2018	Beveland	Pionier	13:21	Os_Kp_02	100	100	80	Os_Kp_02_80	8.11	7.4	0.42	1.41	0.99	1.29	0.88	0.12	11.74	1.18	9.92	2.09	0.20752	0.2075
01/06/2018	Beveland	Pionier	13:21	Os_Kp_02	100	100	50	Os_Kp_02_50	4.19	3.48	0.41	1.42	1.01	1.3	0.89	0.12	11.95	3.53	3.38	0.98	0.03327	0.0333
01/06/2018	Beveland	Pionier	13:21	Os_Kp_02	100	100	30	Os_Kp_02_30	5.39	4.68	0.41	1.37	0.96	1.32	0.91	0.05	5	1.14	4.38	1.32	0.05797	0.058
01/06/2018	Beveland	Pionier	13:21	Os_Kp_02	100	100	20	Os_Kp_02_20	4.35	3.64	0.41	1.4	0.98	1.36	0.94	0.04	4.13	0.76	5.46	1.03	0.0563	0.0563
01/06/2018	Beveland	Pionier	13:21	Os_Kp_02	100	100	10	Os_Kp_02_10	3.77	3.06	0.44	1.42	0.98	1.33	0.89	0.09	9.41	1.67	5.63	0.86	0.04868	0.0487
12/06/2018	Beveland	Pionier	12:01	Os_Kp_03	100	100	80	Os_Kp_03_80	3.9	4.18	9.17	10.17	0.99	10.08	0.91	0.09	8.6	0.87	9.92	1.18	0.11729	0.1173
12/06/2018	Beveland	Pionier	12:01	Os_Kp_03	100	100	50	Os_Kp_03_50	2.29	2.6	9.28	10.3	1.01	10.14	0.86	0.16	15.42	4.56	3.38	0.73	0.02486	0.0249
12/06/2018	Beveland	Pionier	12:01	Os_Kp_03	100	100	30	Os_Kp_03_30	1.68	1.98	9.48	10.49	1.01	10.3	0.81	0.2	19.59	4.47	4.38	0.56	0.02455	0.0246
12/06/2018	Beveland	Pionier	12:01	Os_Kp_03	100	100	20	Os_Kp_03_20	1.25	1.57	9.54	10.57	1.03	10.38	0.84	0.19	18.09	3.31	5.46	0.44	0.0242	0.0242
12/06/2018	Beveland	Pionier	12:01	Os_Kp_03	100	100	10	Os_Kp_03_10	1.37	1.67	9.08	10.09	1.01	9.9	0.81	0.2	19.43	3.45	5.63	0.47	0.02663	0.0266
12/06/2018	Beveland	Pionier	10:39	Os_Kp_04	100	100	80	Os_Kp_04_80	3.56	3.85	9.09	10.09	1	10.03	0.94	0.06	6.02	0.61	9.92	1.09	0.10796	0.108
12/06/2018	Beveland	Pionier	10:39	Os_Kp_04	100	100	50	Os_Kp_04_50	3.61	3.91	8.94	9.94	1.01	9.88	0.94	0.07	6.81	2.01	3.38	1.11	0.03741	0.0374
12/06/2018	Beveland	Pionier	10:39	Os_Kp_04	100	100	30	Os_Kp_04_30	1.53	1.84	9.28	10.3	1.02	10.13	0.85	0.17	16.68	3.81	4.38	0.52	0.02281	0.0228
12/06/2018	Beveland	Pionier	10:39	Os_Kp_04	100	100	20	Os_Kp_04_20	2.23	2.53	9.31	10.32	1.01	10.18	0.87	0.14	14.22	2.60	5.46	0.72	0.03914	0.0391
12/06/2018	Beveland	Pionier	10:39	Os_Kp_04	100	100	10	Os_Kp_04_10	1.93	2.22	10.56	11.57	1.01	11.41	0.84	0.17	16.62	2.95	5.63	0.63	0.03541	0.0354
12/06/2018	Beveland	Low	09:56	Os_Kl_01	90	90	80	Os_Kl_01_80	3.28	3.57	9.09	10.1	1	10.06	0.97	0.03	3.3	5.57	0.59	1.01	0.00598	0.006
12/06/2018	Beveland	Low	09:56	Os_Kl_01	90	90	50	Os_Kl_01_50	3.85	4.15	8.94	9.95	1.01	9.9	0.96	0.05	4.56	3.49	1.31	1.18	0.01538	0.0154
12/06/2018	Beveland	Low	09:56	Os_Kl_01	90	90	30	Os_Kl_01_30	3.64	3.95	9.28	10.31	1.03	10.26	0.98	0.05	4.45	4.18	1.06	1.12	0.01188	0.0119
12/06/2018	Beveland	Low	09:56	Os_Kl_01	90	90	20	Os_Kl_01_20	2.66	2.96	9.31	10.32	1.01	10.27	0.96	0.05	5.03	3.05	1.65	0.84	0.0138	0.0138
12/06/2018	Beveland	Low	09:56	Os_Kl_01	90	90	10	Os_Kl_01_10	3.03	3.33	10.56	11.57	1.01	11.53	0.97	0.04	4.45	3.72	1.2	0.94	0.01125	0.0113
12/06/2018	Beveland	Low	10:12	Os_Kl_02	93	93	80	Os_Kl_02_80	4.61	4.89	8.91	9.9	0.99	9.86	0.95	0.04	4.05	6.84	0.59	1.38	0.00818	0.0082
12/06/2018	Beveland	Low	10:12	Os_Kl_02	93	93	50	Os_Kl_02_50	3.69	3.98	9.81	10.81	1	10.75	0.94	0.06	6.42	4.90	1.31	1.13	0.01472	0.0147
12/06/2018	Beveland	Low	10:12	Os_Kl_02	93	93	30	Os_Kl_02_30	1.83	2.13	8.86	9.87	1.01	9.75	0.89	0.12	11.9	11.20	1.06	0.6	0.00642	0.0064
12/06/2018	Beveland	Low	10:12	Os_Kl_02	93	93	20	Os_Kl_02_20	3.1	3.4	9.35	10.36	1	10.25	0.89	0.11	10.87	6.59	1.65	0.96	0.01585	0.0158
12/06/2018	Beveland	Low	10:12	Os_Kl_02	93	93	10	Os_Kl_02_10	1.46	1.76	9.25	10.27	1.02	10.11	0.86	0.16	15.37	12.85	1.2	0.5	0.00596	0.006
12/06/2018	Beveland	Low	09:36	Os_Kl_03	94	94	80	Os_Kl_03_80	4.7	5	9.2	10.21	1.01	10.18	0.97	0.04	3.58	6.06	0.59	1.42	0.00837	0.0084
12/06/2018	Beveland	Low	09:36	Os_Kl_03	94	94	50	Os_Kl_03_50	4.28	4.56	9.07	10.06	0.99	10.03	0.96	0.04	3.82	2.92	1.31	1.29	0.01689	0.0169
12/06/2018	Beveland	Low	09:36	Os_Kl_03	94	94	30	Os_Kl_03_30	4.55	4.84	9.28	10.28	1	10.23	0.95	0.05	5.05	4.75	1.06	1.37	0.01456	0.0146
12/06/2018	Beveland	Low	09:36	Os_Kl_03	94	94	20	Os_Kl_03_20	2.28	2.58	9.64	10.65	1.02	10.58	0.94	0.07	7.3	4.43	1.65	0.73	0.01206	0.0121
12/06/2018	Beveland	Low	09:36	Os_Kl_03	94	94	10	Os_Kl_03_10	3.17	3.45	8.89	9.88	0.99	9.82	0.93	0.07	6.67	5.58	1.2	0.98	0.01168	0.0117
12/06/2018	Beveland	Low	10:50	Os_Kl_04	100	100	80	Os_Kl_04_80	3.09	3.38	9.11	10.11	1	10.03	0.92	0.08	8.05	13.62	0.59	0.96	0.00566	0.0057
12/06/2018	Beveland	Low	10:50	Os_Kl_04	100	100	50	Os_Kl_04_50	3.4	3.7	9.43	10.43	1.01	10.38	0.96	0.05	4.96	3.79	1.31	1.05	0.01369	0.0137

Date	Location	Gradient zone	Time h	CoreID	Depth Corer cm	Depth Sample cm	Depth Subsample cm	SampleID	Weight sample in bag	Tot. Sample weight	Weight of crucible	Weight sample in crucible pre LOI	Weight sample pre LOI	Weight sample in crucible post LOI	Weight of sample post LOI	Weight delta LOI	LOI %	LOI to Corg factor	Corg %	DBD (g/cm3)	Soil C Density (g/cm3)	C/sample
12/06/2018	Beveland	Low	10:50	Os_Kl_04	100	100	30	Os_Kl_04_30	2.29	2.6	9.43	10.45	1.02	10.33	0.9	0.13	12.3	11.57	1.06	0.74	0.00781	0.0078
12/06/2018	Beveland	Low	10:50	Os_Kl_04	100	100	20	Os_Kl_04_20	2.62	2.92	9.34	10.35	1.01	10.26	0.92	0.09	8.97	5.44	1.65	0.83	0.01364	0.0136
12/06/2018	Beveland	Low	10:50	Os_Kl_04	100	100	10	Os_Kl_04_10	1.82	2.12	9.14	10.15	1.01	9.98	0.84	0.17	16.87	14.10	1.2	0.6	0.00718	0.0072
12/06/2018	Beveland	Middle	11:33	Os_Km_01	100	100	80	Os_Km_01_80	0.71	0.77	8.91	9.67	0.76	9.48	0.57	0.19	24.88	3.69	6.74	0.22	0.0146	0.0146
12/06/2018	Beveland	Middle	11:33	Os_Km_01	100	100	50	Os_Km_01_50	0.99	1.29	9.81	10.82	1	10.64	0.83	0.18	17.51	3.99	4.39	0.36	0.01597	0.016
12/06/2018	Beveland	Middle	11:33	Os_Km_01	100	100	30	Os_Km_01_30	1.33	1.64	8.86	9.88	1.02	9.73	0.87	0.15	14.63	2.78	5.26	0.46	0.02434	0.0243
12/06/2018	Beveland	Middle	11:33	Os_Km_01	100	100	20	Os_Km_01_20	1.55	1.85	9.35	10.36	1.01	10.22	0.86	0.14	14.25	3.09	4.6	0.52	0.02411	0.0241
12/06/2018	Beveland	Middle	11:33	Os_Km_01	100	100	10	Os_Km_01_10	0.71	0.53	9.25	9.78	0.53	9.68	0.43	0.1	18.58	2.54	7.32	0.15	0.01088	0.0109
12/06/2018	Beveland	Middle	11:18	Os_Km_02	100	100	80	Os_Km_02_80	2.67	2.98	9.31	10.32	1.01	10.19	0.88	0.13	13.09	1.94	6.74	0.84	0.05675	0.0567
12/06/2018	Beveland	Middle	11:18	Os_Km_02	100	100	50	Os_Km_02_50	2.26	2.55	9.24	10.24	1.01	10.11	0.87	0.13	13.11	2.99	4.39	0.72	0.03169	0.0317
12/06/2018	Beveland	Middle	11:18	Os_Km_02	100	100	30	Os_Km_02_30	2.36	2.67	9.27	10.29	1.02	10.15	0.88	0.14	13.59	2.58	5.26	0.76	0.03973	0.0397
12/06/2018	Beveland	Middle	11:18	Os_Km_02	100	100	20	Os_Km_02_20	2.04	2.33	9.14	10.15	1	10.01	0.87	0.13	13.4	2.91	4.6	0.66	0.03038	0.0304
12/06/2018	Beveland	Middle	11:18	Os_Km_02	100	100	10	Os_Km_02_10	2.01	2.33	9.25	10.28	1.03	10.12	0.86	0.16	15.78	2.16	7.32	0.66	0.04813	0.0481
12/06/2018	Beveland	Middle	11:05	Os_Km_03	100	100	80	Os_Km_03_80	2.49	2.8	8.69	9.71	1.02	9.6	0.91	0.11	10.42	1.55	6.74	0.79	0.05333	0.0533
12/06/2018	Beveland	Middle	11:05	Os_Km_03	100	100	50	Os_Km_03_50	2.46	2.67	9.09	10.01	0.92	9.95	0.87	0.06	6.15	1.40	4.39	0.75	0.03309	0.0331
12/06/2018	Beveland	Middle	11:05	Os_Km_03	100	100	30	Os_Km_03_30	3.38	3.67	9.36	10.36	1	10.3	0.95	0.06	5.65	1.08	5.26	1.04	0.05457	0.0546
12/06/2018	Beveland	Middle	11:05	Os_Km_03	100	100	20	Os_Km_03_20	2.65	2.95	9.08	10.09	1.01	10.02	0.94	0.07	6.84	1.49	4.6	0.83	0.03842	0.0384
12/06/2018	Beveland	Middle	11:05	Os_Km_03	100	100	10	Os_Km_03_10	1.99	2.28	10.1	11.1	1	10.98	0.88	0.13	12.6	1.72	7.32	0.65	0.04724	0.0472
12/06/2018	Beveland	Middle	11:45	Os_Km_04	100	90	80	Os_Km_04_80	2.88	3.55	9.71	11.09	1.39	10.96	1.25	0.13	9.6	1.42	6.74	1.01	0.06775	0.0678
12/06/2018	Beveland	Middle	11:45	Os_Km_04	100	90	50	Os_Km_04_50	1.82	2.13	9.2	10.22	1.02	10.07	0.87	0.15	14.66	3.34	4.39	0.6	0.02645	0.0265
12/06/2018	Beveland	Middle	11:45	Os_Km_04	100	90	30	Os_Km_04_30	2.09	2.4	9.28	10.31	1.03	10.15	0.87	0.16	15.17	2.89	5.26	0.68	0.03577	0.0358
12/06/2018	Beveland	Middle	11:45	Os_Km_04	100	90	20	Os_Km_04_20	1.42	1.72	9.21	10.22	1.01	10.07	0.85	0.16	15.53	3.37	4.6	0.49	0.02247	0.0225
12/06/2018	Beveland	Middle	11:45	Os_Km_04	100	90	10	Os_Km_04_10	1.27	1.57	9.31	10.33	1.02	10.18	0.87	0.15	14.42	1.97	7.32	0.45	0.03256	0.0326
19/06/2018	Uithuizerwad	Pionier	10:07	Uw_Kp_01	110	100	80	Uw_Kp_01_80	2.17	2.48	9.08	10.1	1.02	10.04	0.96	0.06	5.51	4.88	1.13	0.7	0.00792	0.0079
19/06/2018	Uithuizerwad	Pionier	10:07	Uw_Kp_01	110	100	50	Uw_Kp_01_50	1.59	1.93	10.1	11.15	1.05	11.1	1	0.05	4.57	5.46	0.84	0.55	0.00457	0.0046
19/06/2018	Uithuizerwad	Pionier	10:07	Uw_Kp_01	110	100	30	Uw_Kp_01_30	2.4	2.77	9.36	10.43	1.07	10.33	0.97	0.1	9.22	4.04	2.29	0.78	0.01788	0.0179
19/06/2018	Uithuizerwad	Pionier	10:07	Uw_Kp_01	110	100	20	Uw_Kp_01_20	3.14	3.45	9.09	10.1	1.02	10.01	0.93	0.09	8.83	3.62	2.44	0.97	0.0238	0.0238
19/06/2018	Uithuizerwad	Pionier	10:07	Uw_Kp_01	110	100	10	Uw_Kp_01_10	1.44	1.73	8.69	9.69	1	9.53	0.84	0.15	15.47	4.38	3.53	0.49	0.01726	0.0173
19/06/2018	Uithuizerwad	Pionier	10:39	Uw_Kp_02	110	85	80	Uw_Kp_02_80	4.91	5.19	9.15	10.14	0.99	10.12	0.97	0.02	2.39	2.12	1.13	1.47	0.01658	0.0166
19/06/2018	Uithuizerwad	Pionier	10:39	Uw_Kp_02	110	85	50	Uw_Kp_02_50	3.4	3.69	9.33	10.33	1.01	10.24	0.92	0.09	9.02	10.79	0.84	1.04	0.00873	0.0087
19/06/2018	Uithuizerwad	Pionier	10:39	Uw_Kp_02	110	85	30	Uw_Kp_02_30	2.75	3.05	9.24	10.25	1.01	10.12	0.89	0.12	12.28	5.37	2.29	0.86	0.01971	0.0197
19/06/2018	Uithuizerwad	Pionier	10:39	Uw_Kp_02	110	85	20	Uw_Kp_02_20	2.32	2.63	9.26	10.28	1.02	10.13	0.87	0.15	14.74	6.04	2.44	0.74	0.01814	0.0181
19/06/2018	Uithuizerwad	Pionier	10:39	Uw_Kp_02	110	85	10	Uw_Kp_02_10	2.27	2.58	9.24	10.26	1.01	10.1	0.86	0.16	15.41	4.36	3.53	0.73	0.02575	0.0258
19/06/2018	Uithuizerwad	Pionier	10:30	Uw_Kp_03	110	85	80	Uw_Kp_03_80	4.72	5.01	9.23	10.23	1	10.19	0.96	0.04	3.85	3.41	1.13	1.42	0.01601	0.016
19/06/2018	Uithuizerwad	Pionier	10:30	Uw_Kp_03	110	85	50	Uw_Kp_03_50	4.43	4.72	9.08	10.09	1	10.04	0.96	0.04	4.19	5.02	0.84	1.34	0.01117	0.0112
19/06/2018	Uithuizerwad	Pionier	10:30	Uw_Kp_03	110	85	30	Uw_Kp_03_30	3.71	4.01	9.02	10.03	1.01	9.94	0.92	0.09	8.95	3.92	2.29	1.13	0.02592	0.0259
19/06/2018	Uithuizerwad	Pionier	10:30	Uw_Kp_03	110	85	20	Uw_Kp_03_20	3.47	3.76	9.33	10.33	1	10.21	0.89	0.12	11.58	4.74	2.44	1.06	0.02598	0.026
19/06/2018	Uithuizerwad	Pionier	10:30	Uw_Kp_03	110	85	10	Uw_Kp_03_10	3.11	3.41	9.15	10.16	1.01	10.01	0.86	0.14	14.32	4.05	3.53	0.96	0.03408	0.0341
19/06/2018	Uithuizerwad	Pionier	10:25	Uw_Kp_04	110	100	80	Uw_Kp_04_80	2.59	2.88	9.05	10.05	1	9.97	0.92	0.08	7.84	6.93	1.13	0.81	0.0092	0.0092
19/06/2018	Uithuizerwad	Pionier	10:25	Uw_Kp_04	110	100	50	Uw_Kp_04_50	3.02	3.59	9.03	10.31	1.28	10.22	1.19	0.09	7.09	8.48	0.84	1.01	0.00848	0.0085

Date	Location	Gradient zone	Time h	CoreID	Depth Corer cm	Depth Sample cm	Depth Subsample cm	SampleID	Weight sample in bag	Tot. Sample weight	Weight of crucible	Weight sample in crucible pre LOI	Weight sample pre LOI	Weight sample in crucible post LOI	Weight of sample post LOI	Weight delta LOI	LOI %	LOI to Corg factor	Corg %	DBD (g/cm3)	Soil C Density (g/cm3)	C/sample
19/06/2018	Uithuizerwad	Pionier	10:25	Uw_Kp_04	110	100	30	Uw_Kp_04_30	4.02	4.33	9.78	10.79	1.02	10.72	0.95	0.07	6.86	3.00	2.29	1.22	0.02796	0.028
19/06/2018	Uithuizerwad	Pionier	10:25	Uw_Kp_04	110	100	20	Uw_Kp_04_20	4.12	4.43	9.85	10.86	1.01	10.78	0.94	0.07	7.4	3.03	2.44	1.25	0.03058	0.0306
19/06/2018	Uithuizerwad	Pionier	10:25	Uw_Kp_04	110	100	10	Uw_Kp_04_10	3.38	3.68	9.2	10.21	1.01	10.1	0.9	0.11	10.84	3.07	3.53	1.04	0.03676	0.0368
19/06/2018	Uithuizerwad	Low	12:25	Uw_Kl_01	110	100	80	Uw_Kl_01_80	2.9	3.24	9.2	10.26	1.06	10.21	1.01	0.05	4.84	3.82	1.27	0.92	0.01161	0.0116
19/06/2018	Uithuizerwad	Low	12:25	Uw_Kl_01	110	100	50	Uw_Kl_01_50	2.04	2.4	9.2	10.27	1.07	10.22	1.02	0.05	5.11	4.30	1.19	0.68	0.00809	0.0081
19/06/2018	Uithuizerwad	Low	12:25	Uw_Kl_01	110	100	30	Uw_Kl_01_30	2.71	3.01	9.31	10.32	1.01	10.26	0.95	0.06	5.89	4.05	1.46	0.85	0.0124	0.0124
19/06/2018	Uithuizerwad	Low	12:25	Uw_Kl_01	110	100	20	Uw_Kl_01_20	2.69	3.01	9.21	10.25	1.03	10.12	0.91	0.12	11.77	3.90	3.02	0.85	0.02572	0.0257
19/06/2018	Uithuizerwad	Low	12:25	Uw_Kl_01	110	100	10	Uw_Kl_01_10	1.67	1.96	9.71	10.7	1	10.6	0.89	0.1	10.39	2.96	3.51	0.55	0.01949	0.0195
19/06/2018	Uithuizerwad	Low	12:30	Uw_Kl_02	110	90	80	Uw_Kl_02_80	2.57	2.88	0.41	1.43	1.02	1.32	0.92	0.1	10.09	7.97	1.27	0.81	0.0103	0.0103
19/06/2018	Uithuizerwad	Low	12:30	Uw_Kl_02	110	90	50	Uw_Kl_02_50	2.27	2.58	0.42	1.44	1.02	1.33	0.91	0.11	10.68	8.97	1.19	0.73	0.00869	0.0087
19/06/2018	Uithuizerwad	Low	12:30	Uw_Kl_02	110	90	30	Uw_Kl_02_30	3.75	4.04	0.41	1.42	1.01	1.32	0.91	0.1	10.07	6.91	1.46	1.14	0.01665	0.0167
19/06/2018	Uithuizerwad	Low	12:30	Uw_Kl_02	110	90	20	Uw_Kl_02_20	2.72	3.02	0.41	1.42	1.01	1.3	0.89	0.12	11.8	3.91	3.02	0.85	0.02574	0.0257
19/06/2018	Uithuizerwad	Low	12:30	Uw_Kl_02	110	90	10	Uw_Kl_02_10	2.71	3	0.41	1.42	1	1.29	0.88	0.12	12.21	3.48	3.51	0.85	0.02984	0.0298
19/06/2018	Uithuizerwad	Low	11:04	Uw_Kl_03	110	100	80	Uw_Kl_04_80	3.29	3.6	0.41	1.43	1.02	1.33	0.91	0.11	10.43	8.24	1.27	1.02	0.0129	0.0129
19/06/2018	Uithuizerwad	Low	11:04	Uw_Kl_03	110	100	50	Uw_Kl_04_50	3.23	3.54	0.41	1.43	1.02	1.34	0.93	0.09	8.84	7.43	1.19	1	0.01192	0.0119
19/06/2018	Uithuizerwad	Low	11:04	Uw_Kl_03	110	100	30	Uw_Kl_04_30	4	4.31	0.42	1.43	1.01	1.31	0.89	0.12	12.02	8.25	1.46	1.22	0.01775	0.0177
19/06/2018	Uithuizerwad	Low	11:04	Uw_Kl_03	110	100	20	Uw_Kl_04_20	2.35	2.65	0.41	1.42	1.01	1.3	0.88	0.12	11.97	3.97	3.02	0.75	0.02258	0.0226
19/06/2018	Uithuizerwad	Low	11:04	Uw_Kl_03	110	100	10	Uw_Kl_04_10	3.41	3.72	0.41	1.44	1.03	1.29	0.88	0.15	14.13	4.02	3.51	1.05	0.03699	0.037
19/06/2018	Uithuizerwad	Low	10:48	Uw_Kl_04	110	98	80	Uw_Kl_03_80	5.66	5.96	0.41	1.42	1.01	1.38	0.97	0.04	4.35	3.44	1.27	1.69	0.02136	0.0214
19/06/2018	Uithuizerwad	Low	10:48	Uw_Kl_04	110	98	50	Uw_Kl_03_50	3.28	3.58	0.42	1.43	1.02	1.32	0.9	0.11	10.94	9.20	1.19	1.01	0.01206	0.0121
19/06/2018	Uithuizerwad	Low	10:48	Uw_Kl_04	110	98	30	Uw_Kl_03_30	2.49	2.78	0.43	1.44	1.01	1.35	0.91	0.09	9.34	6.41	1.46	0.79	0.01147	0.0115
19/06/2018	Uithuizerwad	Low	10:48	Uw_Kl_04	110	98	20	Uw_Kl_03_20	3.76	4.06	0.41	1.43	1.01	1.32	0.9	0.11	10.74	3.56	3.02	1.15	0.03464	0.0346
19/06/2018	Uithuizerwad	Low	10:48	Uw_Kl_04	110	98	10	Uw_Kl_03_10	2.7	2.99	0.42	1.43	1.01	1.31	0.89	0.12	11.45	3.26	3.51	0.85	0.02975	0.0297
19/06/2018	Uithuizerwad	Middle	11:30	Uw_Km_01	110	90	80	Uw_Km_01_80	1.84	2.1	9.26	10.22	0.96	10.13	0.87	0.09	9.6	3.88	2.48	0.59	0.0147	0.0147
19/06/2018	Uithuizerwad	Middle	11:30	Uw_Km_01	110	90	50	Uw_Km_01_50	2.69	2.99	9.24	10.25	1.02	10.16	0.92	0.1	9.47	3.62	2.62	0.85	0.02214	0.0221
19/06/2018	Uithuizerwad	Middle	11:30	Uw_Km_01	110	90	30	Uw_Km_01_30	2.01	2.33	9.33	10.36	1.04	10.25	0.92	0.11	10.68	3.17	3.37	0.66	0.02225	0.0222
19/06/2018	Uithuizerwad	Middle	11:30	Uw_Km_01	110	90	20	Uw_Km_01_20	1.32	1.57	9.15	10.11	0.96	10	0.86	0.11	11.29	3.67	3.07	0.44	0.01365	0.0136
19/06/2018	Uithuizerwad	Middle	11:30	Uw_Km_01	110	90	10	Uw_Km_01_10	1.84	2.13	9.15	10.15	1	10.02	0.87	0.13	12.84	3.67	3.5	0.6	0.02113	0.0211
19/06/2018	Uithuizerwad	Middle	11:00	Uw_Km_02	110	90	80	Uw_Km_02_80	4.21	4.5	0.41	1.41	1	1.3	0.89	0.12	11.51	4.65	2.48	1.27	0.03155	0.0316
19/06/2018	Uithuizerwad	Middle	11:00	Uw_Km_02	110	90	50	Uw_Km_02_50	2.9	3.2	0.41	1.42	1.02	1.31	0.91	0.11	10.72	4.10	2.62	0.91	0.0237	0.0237
19/06/2018	Uithuizerwad	Middle	11:00	Uw_Km_02	110	90	30	Uw_Km_02_30	3.49	3.8	0.41	1.42	1.02	1.32	0.91	0.1	10.17	3.02	3.37	1.07	0.03623	0.0362
19/06/2018	Uithuizerwad	Middle	11:00	Uw_Km_02	110	90	20	Uw_Km_02_20	2.99	3.28	0.42	1.42	1	1.3	0.88	0.12	11.87	3.86	3.07	0.93	0.02851	0.0285
19/06/2018	Uithuizerwad	Middle	11:00	Uw_Km_02	110	90	10	Uw_Km_02_10	2.46	2.77	0.42	1.44	1.02	1.3	0.88	0.14	13.52	3.86	3.5	0.78	0.02748	0.0275
19/06/2018	Uithuizerwad	Middle	11:05	Uw_Km_03	110	90	80	Uw_Km_03_80	3.96	4.26	0.42	1.42	1.01	1.32	0.9	0.1	10.06	4.06	2.48	1.2	0.02982	0.0298
19/06/2018	Uithuizerwad	Middle	11:05	Uw_Km_03	110	90	50	Uw_Km_03_50	4	4.3	0.4	1.41	1.01	1.32	0.92	0.09	8.81	3.37	2.62	1.22	0.03185	0.0318
19/06/2018	Uithuizerwad	Middle	11:05	Uw_Km_03	110	90	30	Uw_Km_03_30	2.31	2.61	0.41	1.43	1.01	1.3	0.89	0.12	12.13	3.60	3.37	0.74	0.02493	0.0249
19/06/2018	Uithuizerwad	Middle	11:05	Uw_Km_03	110	90	20	Uw_Km_03_20	2.14	2.43	0.41	1.41	1	1.28	0.87	0.13	13.03	4.24	3.07	0.69	0.02109	0.0211
19/06/2018	Uithuizerwad	Middle	11:05	Uw_Km_03	110	90	10	Uw_Km_03_10	3.03	3.34	0.43	1.44	1.01	1.32	0.89	0.12	11.75	3.35	3.5	0.94	0.03306	0.0331
19/06/2018	Uithuizerwad	Middle	11:20	Uw_Km_04	110	95	80	Uw_Km_04_80	2.29	2.59	0.41	1.42	1	1.29	0.87	0.13	13.02	5.26	2.48	0.73	0.01813	0.0181
19/06/2018	Uithuizerwad	Middle	11:20	Uw_Km_04	110	95	50	Uw_Km_04_50	2.68	2.99	0.39	1.42	1.02	1.31	0.92	0.1	10.22	3.90	2.62	0.85	0.02217	0.0222

Date	Location	Gradient zone	Time h	CoreID	Depth Corer cm	Depth Sample cm	Depth Subsample cm	SampleID	Weight sample in bag	Tot. Sample weight	Weight of crucible	Weight sample in crucible pre LOI	Weight sample pre LOI	Weight sample in crucible post LOI	Weight of sample post LOI	Weight delta LOI	LOI %	LOI to Corg factor	Corg %	DBD (g/cm3)	Soil C Density (g/cm3)	C/sample
19/06/2018	Uithuizerwad	Middle	11:20	Uw_Km_04	110	95	30	Uw_Km_04_30	2.49	2.8	0.4	1.42	1.02	1.3	0.9	0.12	11.87	3.52	3.37	0.79	0.02669	0.0267
19/06/2018	Uithuizerwad	Middle	11:20	Uw_Km_04	110	95	20	Uw_Km_04_20	2.29	2.6	0.4	1.42	1.02	1.29	0.89	0.13	12.72	4.14	3.07	0.73	0.02258	0.0226
19/06/2018	Uithuizerwad	Middle	11:20	Uw_Km_04	110	95	10	Uw_Km_04_10	2.12	2.43	0.41	1.43	1.02	1.3	0.89	0.12	12.24	3.49	3.5	0.69	0.02404	0.024