VLAAMSE OVERHEID

DEPARTEMENT MOBILITEIT EN OPENBARE WERKEN
WATERBOUWKUNDIG LABORATORIUM

Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing

Bestek 16EB/05/04

Survey Vessel Scheldewacht II (left) & Deurganckdok - East terminal (right)

Deelrapport 2.27 : 13-uursmeting Sediview op 12/03/2009 tijdens doodtij - Deurganckdok (transect DGD)

Report 2.27 : Through Tide Measurement Sediview on 12/03/2009 during neap tide - Deurganckdok (transect DGD)

20 August 2009

I/RA/11283/08.088/MSA

i.s.m.

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1. INTRODUCTION

1.1. The assignment

This report is part of the set of reports describing the results of the long-term measurements conducted in Deurganckdok aiming at the monitoring and analysis of silt accretion. This measurement campaign is an extension of the study "Extension of the study about density currents in the Beneden Zeeschelde" as part of the Long Term Vision for the Scheldt estuary. It is complementary to the study 'Field measurements high-concentration benthic suspensions (HCBS 2)'.

The terms of reference for this study were prepared by the 'Departement Mobiliteit en Openbare Werken van de Vlaamse Overheid, Afdeling Waterbouwkundig Laboratorium' (16EB/05/04). The repetition of this study was awarded to International Marine and Dredging Consultants NV in association with WL|Delft Hydraulics and Gems International on 10/01/2006. The project term was prolonged with an extra year from April 2007 till March 2008 and a second time prolonged with one extra year from April 2008 till March 2009.

Waterbouwkundig Laboratorium– Cel Hydrometrie Schelde provided data on discharge, tide, salinity and turbidity along the river Scheldt and provided survey vessels for the long term and through tide measurements. Afdeling Maritieme Toegang provided maintenance dredging data. Agentschap voor Maritieme Dienstverlening en Kust – Afdeling Kust and Port of Antwerp provided depth sounding measurements.

The execution of the study involves a twofold assignment:

- Part 1: Setting up a sediment balance of Deurganckdok covering a period of two years, i.e. 04/2007 – 03/2009
- Part 2: An analysis of the parameters contributing to siltation in Deurganckdok

1.2. Purpose of the study

The Lower Sea Scheldt (Beneden Zeeschelde) is the stretch of the Scheldt estuary between the Belgium-Dutch border and Rupelmonde, where the entrance channels to the Antwerp sea locks are located. The navigation channel has a sandy bed, whereas the shallower areas (intertidal areas, mud flats, salt marshes) consist of sandy clay or even pure mud sometimes. This part of the Scheldt is characterized by large horizontal salinity gradients and the presence of a turbidity maximum with depth-averaged concentrations ranging from 50 to 500 mg/l at grain sizes of 60 - 100 μm. The salinity gradients generate significant density currents between the river and the entrance channels to the locks, causing large siltation rates. It is to be expected that in the near future also the Deurganckdok will suffer from such large siltation rates, which may double the amount of dredging material to be dumped in the Lower Sea Scheldt.

Results from the study may be interpreted by comparison with results from the HCBS and HCBS2 studies covering the whole Lower Sea Scheldt. These studies included through-tide measurement campaigns in the vicinity of Deurganckdok and long term measurements of turbidity and salinity in and near Deurganckdok.

The first part of the study focuses on obtaining a sediment balance of Deurganckdok. Aside from natural sedimentation, the sediment balance is influenced by the maintenance and capital dredging works. This involves sediment influx from capital dredging works in the Deurganckdok, and internal relocation and removal of sediment by maintenance dredging works. To compute a sediment balance an inventory of bathymetric data (depth soundings), density measurements of the deposited material and detailed information of capital and maintenance dredging works will be made up.

The second part of the study is to gain insight in the mechanisms causing siltation in Deurganckdok, it is important to follow the evolution of the parameters involved, and this on a long and short term basis (long term & through-tide measurements). Previous research has shown the importance of water exchange at the entrance of Deurganckdok is essential for understanding sediment transport between the dock and the river Scheldt.

1.3. Overview of the study

1.3.1. Reports

Reports of the project 'Opvolging aanslibbing Deurganckdok' between April 2008 till March 2009 are summarized in Table 1-1. An overview of the HCBS2 and 'Opvolging aanslibbing Deurganckdok' (between April 2006 till March 2008) reports are given in APPENDIX I.

This report 2.27 is one of a set of reports that gains insight in sediment and water transport between Deurganckdok and the river Scheldt, which belongs to the second part of this project.

Table 1-1: Overview of Deurganckdok Reports

Report	Description
Sediment Balance: Bathymetry surveys, Density measurements, Maintenance and construction dredging activities	
1.20	Sediment Balance: Three monthly report 1/4/2008 - 30/6/2008 (I/RA/11283/08.076/MSA)
1.21	Sediment Balance: Three monthly report 1/7/2008 – 30/9/2008 (I/RA/11283/08.077/MSA)
1.22	Sediment Balance: Three monthly report 1/10/2008 – 31/12/2008 (I/RA/11283/08.078/MSA)
1.23	Sediment Balance: Three monthly report 1/1/2009 – 31/03/2009 (I/RA/11283/08.079/MSA)
1.24	Annual Sediment Balance (I/RA/11283/08,080/MSA)
Factors contributing to salt and sediment distribution in Deurganckdok: Salt-Silt (OBS3A) & Frame measurements, Through tide measurements (SiltProfiling & ADCP) & Calibrations	
2.20	Through tide measurement Sediview DGD during average tide Spring 2008 – 19 June 2008 (I/RA/11283/08.081/MSA)
2.21	Through tide measurement Sediview DGD during average tide Spring 2008 –26 June 2008 (I/RA/11283/08.082/MSA)
2.22	Through tide measurement Sediview DGD during neap tide Summer 2008 – 24 September 2008 (I/RA/11283/08.083/MSA)
2.23	Through tide measurement Sediview DGD during spring tide Summer 2008 – 30 September 2008 (I/RA/11283/08.084/MSA)
2.24	Through tide measurement Sediview DGD during neap tide Autumn 2008 (I/RA/11283/08.085/MSA)
2.25	Through tide measurement Sediview DGD during spring tide Autumn 2008 (I/RA/11283/08.086/MSA)
2.26	Through tide measurement Sediview DGD during neap tide Winter 2009 (I/RA/11283/08.087/MSA)
2.27	Through tide measurement Sediview DGD during spring tide Winter 2009 (I/RA/11283/08.088/MSA)

Report	Description
2.28	Through tide measurement ADCP eddy DGD Summer 2008 – 1 October 2008 (I/RA/11283/08.089/MSA)
2.29	Through tide measurement Siltprofiler DGD Summer 2008 – 29 September 2008 (I/RA/11283/08.090/MSA)
2.30	Through tide measurement Siltprofiler DGD Winter 2009 (I/RA/11283/08.091/MSA)
2.31	Through tide measurement Salinity Profiling DGD Winter 2009 (I/RA/11283/08.092/MSA)
2.32	Salt-Silt distribution Deurganckdok: Six monthly report 1/4/2008 - 30/9/2008 (I/RA/11283/08.093/MSA)
2.33	Salt-Silt distribution Deurganckdok: Six monthly report 1/10/2008 – 31/3/2009 (I/RA/11283/08.094/MSA)
2.34	Calibration stationary & mobile equipment Autumn 2008 (I/RA/11283/08.095/MSA)
Boundary Conditions: Upriver Discharge, Salt concentration Scheldt, Bathymetric evolution in access channels, dredging activities in Lower Sea Scheldt and access channels	
3.20	Boundary conditions: Six monthly report 1/4/2008 – 30/09/2008 (I/RA/11283/08.096/MSA)
3.21	Boundary conditions: Six monthly report 1/10/2008 – 31/03/2009 (I/RA/11283/08.097/MSA)
Analysis	
4.20	Analysis of Siltation Processes and Factors 4/’06 – 3/’09 (I/RA/11283/08.098/MSA)

1.3.2. Measurement actions

Following measurements have been carried out during the course of this project:

1. Monitoring upstream discharge in the Scheldt river
2. Monitoring Salt and sediment concentration in the Lower Sea Scheldt taken from on permanent data acquisition sites at Lillo, Oosterweel and up- and downstream of the Deurganckdok.
3. Long term measurement of salt distribution in Deurganckdok.
4. Long term measurement of sediment concentration in Deurganckdok
5. Monitoring near-bed processes in the central trench in the dock, near the entrance as well as near the landward end: near-bed turbidity, near-bed current velocity and bed elevation variations are measured from a fixed frame placed on the dock’s bed.
6. Measurement of current, salt and sediment transport at the entrance of Deurganckdok for which ADCP backscatter intensity over a full cross section are calibrated with the Sediview procedure and vertical sediment and salt profiles are recorded with the SiltProfiler equipment
7. Through tide measurements of vertical sediment concentration profiles -including near bed highly concentrated suspensions- with the SiltProfiler equipment. Executed over a grid of points near the entrance of Deurganckdok.
8. Monitoring dredging activities at entrance channels towards the Kallo, Zandvliet and Berendrecht locks
9. Monitoring dredging and dumping activities in the Lower Sea Scheldt

In situ calibrations were conducted on several dates to calibrate all turbidity and conductivity sensors, a description can be found in IMDC (2006a; 2007a; 2008f; 2008o).

1.4. Structure of the report

This report is the factual data report of the through tide measurements at the entrance of Deurganckdok on the 12th of March 2009. The first chapter comprises an introduction. The second chapter describes the measurement campaign and the equipment. Chapter 3 describes the course of the actual measurements. The results and processed data are presented in Chapter 4, whereas chapter 5 gives a preliminary analysis of the data.

2. THE MEASUREMENT CAMPAIGN

2.1. Overview of the parameters

The first part of the study aims at determining a sediment balance of Deurganckdok and the net influx of sediment. The sediment balance comprises a number of sediment transport modes: deposition, influx from capital dredging works, internal replacement and removal of sediments due to maintenance dredging (Figure 2-1).

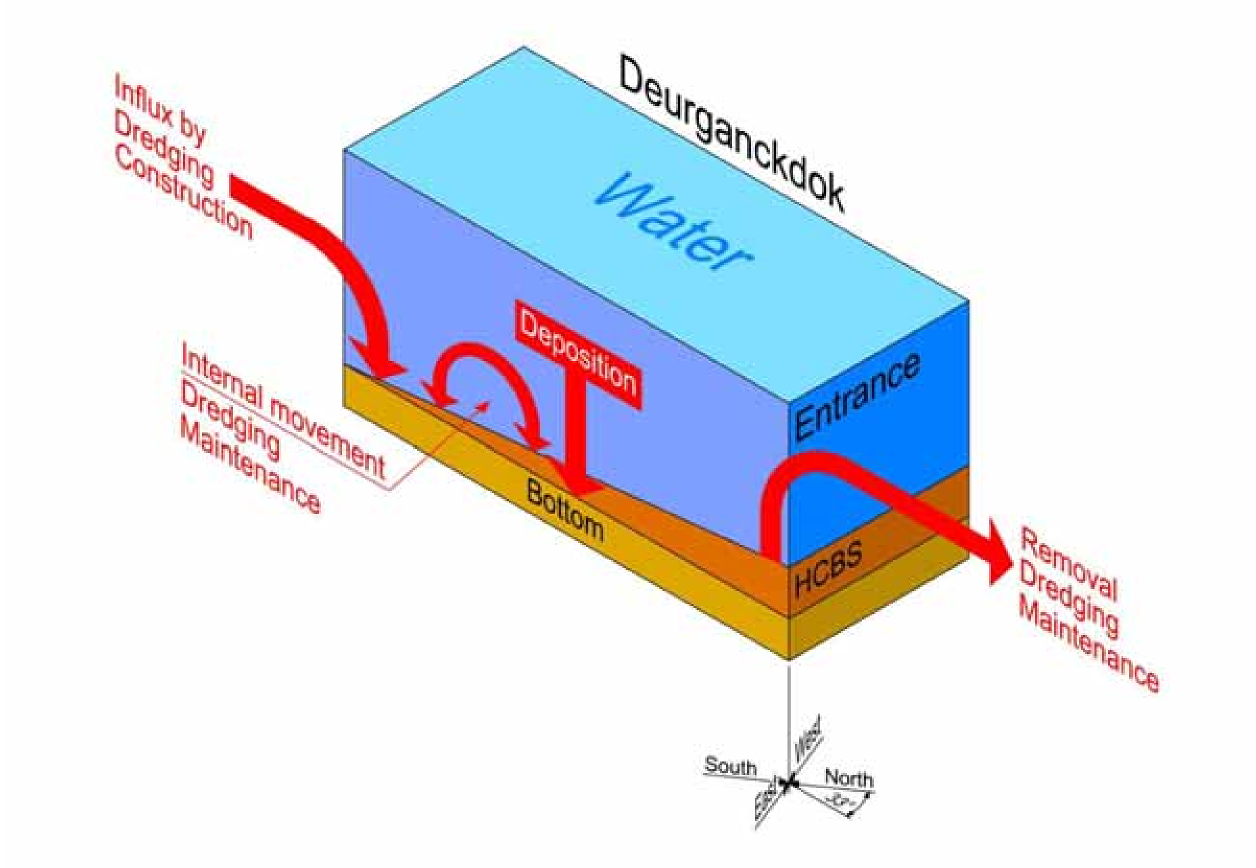


Figure 2-1: Elements of the sediment balance

A net deposition can be calculated from a comparison with a chosen initial condition t_0 (Figure 2-2). The mass of deposited sediment is determined from the integration of bed density profiles recorded at grid points covering the dock. Subtracting bed sediment mass at t_0 leads to the change in mass of sediments present in the dock (mass growth). Adding cumulated dry matter mass of dredged material removed since t_0 and subtracting any sediment influx due to capital dredging works leads to the total cumulated mass entered from the Scheldt river since t_0.

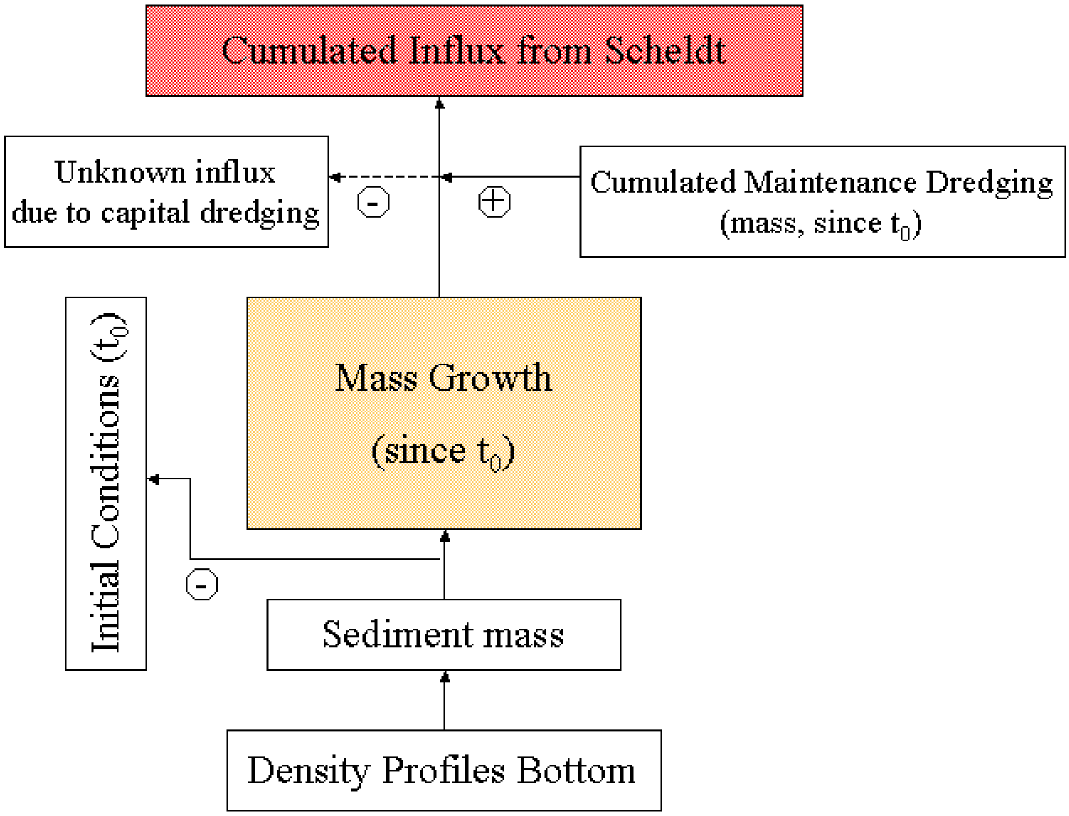


Figure 2-2: Determining a sediment balance

The main purpose of the second part of the study is to gain insight in the mechanisms causing siltation in Deurganckdok. The following mechanisms will be aimed at in this part of the study:

- Tidal prism, i.e. the extra volume in a water body due to high tide
- Vortex patterns due to passing tidal current
- Density currents due to salt gradient between the Scheldt river and the dock
- Density currents due to highly concentrated benthic suspensions

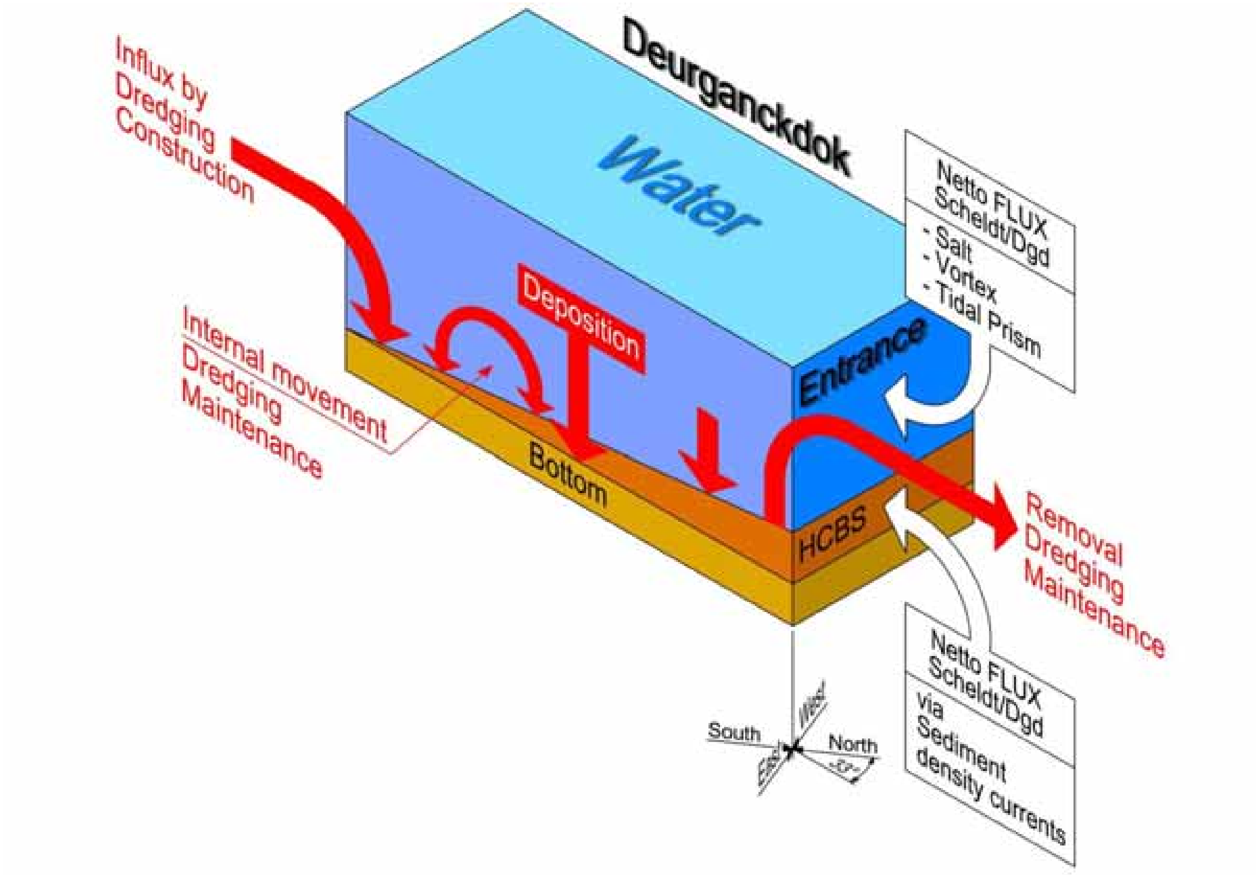


Figure 2-3: Transport mechanisms

These aspects of hydrodynamics and sediment transport have been landmark in determining the parameters to be measured during the project. Measurements will be focussed on three types of timescales: one tidal cycle, one neap-spring cycle and seasonal variation within one year.

Following data are being collected to understand these mechanisms:

- Monitoring the freshwater input (discharge) from the tributaries into the river Scheldt.
- Monitoring salinity and sediment concentration in the Lower Sea Scheldt at permanent measurement locations at Oosterweel, up- and downstream of the Deurganckdok.
- Long term measurement of salinity and suspended sediment distribution in Deurganckdok.
- Monitoring near-bed processes (current velocity, turbidity, and bed elevation variations) in the central trench in the dock, near the entrance as well as near the current deflecting wall location.
- Dynamic measurements of flow pattern, salinity and sediment transport at the entrance of Deurganckdok.
- Through tide measurements of vertical sediment concentration profiles -including near bed high concentrated benthic suspensions.
- Monitoring dredging activities at the entrance channels towards the Kallo, Zandvliet and Berendrecht locks as well as dredging and dumping activities in the Lower Sea Scheldt and Deurganckdok in particular.

In situ calibrations were conducted on several dates to calibrate all turbidity and conductivity sensors.

2.2. Description of the measurement campaign

2.2.1. Purpose of the measurement campaign

The purpose of the measurements was to determine the cross-section distribution of the suspended sediment concentration, the sediment flux and flow velocity during a complete tidal cycle.

Measurements were undertaken on the DGD transect (Figure 2-4), being the cross section between the river Scheldt and the dock itself.

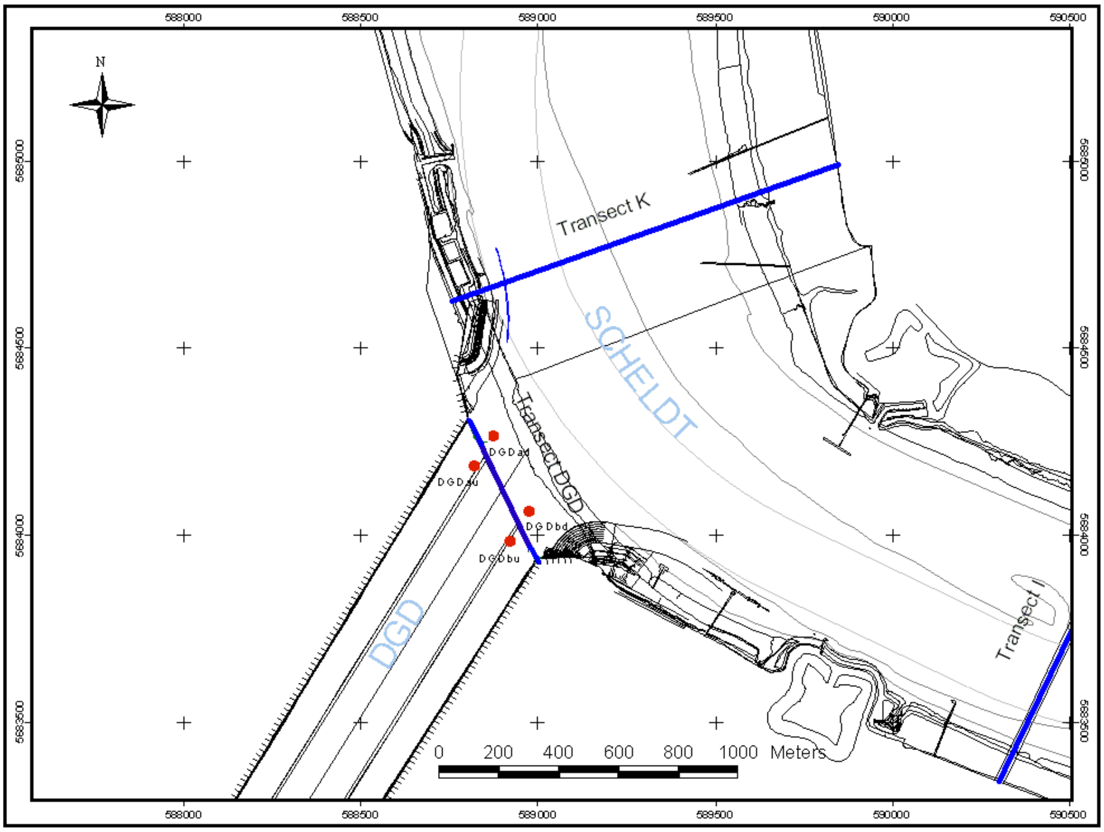


Figure 2-4: Map of sailed transect DGD, calibration points (red) at Deurganckdok (DGD) on 12th of March 2009.

2.2.2. Measurement procedure

Flow velocity, Turbidity, Salinity and Temperature measurements were conducted on the 12th of March from 7h42 MET until 18h52 MET. From the survey vessel Parel II a measurement cycle was completed every 20 minutes. The vessel with a mounted ADCP sailed a fixed transect from the right bank to the left bank and vice versa as a backup transect (Table 2-1). Profiles were gathered to calibrate the ADCP transects for temperature, salinity and suspended sediment concentration to be used in Sediview.

Two calibration profiles were collected for each transect (Table 2-2):

- One before sailing the transect at the bank where the start of the transect was
- One after sailing the transect at the bank where the transect ended

During these calibrations, a fish with a CTD-OBS was lowered to the bottom. The downcast was interrupted at two depths, one in the upper half of the water column (around 4 meters from the water surface) and one at 4 meters above the bottom and the last one at the water bottom (about 10 meters above water surface). At the two first depths samples were taken for calibration, and are used as 'ground truth' for all suspended sediment concentration measurements (OBS and Sediview). The other instruments logged continuously during the downcast. Conductivity, Temperature and Depth was logged by the CTD-probe, while turbidity was recorded by the OBS.

Table 2-1:Transect of the Flow Measurements on 12th of March 2009 (UTM31 ED50)

Measurement location	Left Bank Easting	Left Bank Northing	Right Bank Easting	Right Bank Northing	Avg Length [m]	Avg Course [degr.]
Transect DGD	588 541	5 684 527	588 765	5 684 056	521	335

Table 2-2: Positions of the calibration points for 12th of March 2009 during flood and ebb.

Measurement point	Bank	Easting (UTM31 ED50)	Northing (UTM31 ED50)
Flood			
DGDau	Left	588561	5684369
DGDbu	Right	588682	5684113
Ebb			
DGDad	Left	588623	5684470
DGDbd	Right	588745	5684214

2.3. The equipment

2.3.1. ADCP

The current measurements were conducted using an RD Instruments ADCP 600 kHz Workhorse. For positioning the GPS onboard the vessel Parel II was used. For the measurement of the heading a gyrocompass was installed.

This 600 KHz ADCP system was mounted on a steel pole underneath the central axis of the vessel. The transducer set was looking vertically downwards to the bottom. Transceiver unit and computer system were connected to peripherals such as the differential GPS-receiver, the heave compensator and the gyrocompass.

During the measurements the ADCP constantly measured upstream from the vessel. The acquisition software of Winriver was used. The main settings are given in Table 2-3

Table 2-3: Main Configuration Settings of ADCP

Main configuration settings of ADCP 600kHz Worhhorse:
Cell depth: 0.5 m
Number of cells: 50
Number of Water pings per ensemble: 2
Number of Bottom Track pings per ensemble: 2
Time between ensembles: 0
Averaging: None
Speed of Sound: Fixed 1500 m/s

Main configuration settings of ADCP 600kHz Worhhorse:
Salinity 0 psu
3-beam solution: enabled
Beam angle: 20°

2.3.2. OBS - CTD

A D&A type OBS 3A was used to measure depth, conductivity, temperature and turbidity.

Measured parameters by the OBS 3A sensor: temperature (°C), conductivity (µS/cm), absolute pressure (m), turbidity (NTU).

On Parel II, the OBS 3A device was mounted on a tow fish. The resulting record is filled-up with GPS-time, sample number, and planimetric position of the GPS-receiver. Sampling frequency is 1 reading per second.

The technical details on the OBS 3A are given in the winter calibration Report of the HCBS 1 measurement campaign. (IMDC, 2006a)

2.3.3. Pump Sampler

A water sampler was attached nearby the turbidity sensor taking water samples. Samples were collected in 1 litre sampling bottles. The pumping speed of the water sampler was tested at the start of the measurement campaign on board. Dye was used to time the duration between the intake of the dye and exit at the sampling end of the sampler on board. The duration between intake and exit at the end was 19 seconds.

3. COURSE OF THE MEASUREMENTS

3.1. Measurement periods

At Deurganckdok ADCP tracks were sailed about every 11 minutes for 12 hours, in total 54 cross-sections.

Calibration profiles were taken at 2 locations (left bank, right bank). During every cycle, 1 calibration profile was taken serving as the second calibration of the previous transect and as the first calibration point of the current transect, resulting in a total of 54 profiles. APPENDIX A gives the start and end points of the tracks, the sailed length and the course.

3.2. Hydro-meteorological conditions during the measurement campaign

3.2.1. Vertical tide during the measurements

The vertical tide was measured at the Liefkenshoek tidal gauges. Graphs of the tide at Liefkenshoek on the 12th of March 2009 can be found in APPENDIX B. Table 3-1 gives the most important characteristics (high and low tide) of the tide at those gauges on the 12th of March 2009.

Table 3-1: High and low tide at Liefkenshoek on 12/03/2009

Liefkenshoek Tidal Gauge		
12/03/2009		
	Time [MET]	***Water level [m TAW]***
HW (1)	04:10	5.59
LW (2)	11:30	-0.62
HW (3)	16:20	5.94

In Table 3-2 the tidal characteristics of the tide on the 12th of March 2009 (HMCZ, 2008) are compared to the average tide over the decade 1991-2000 (AMT, 2003).

Table 3-2: Comparison of the tidal characteristics of 12/03/2009 with the average tide, the average neap tide and the average spring tide over the decade 1991-2000 for Liefkenshoek.

	Neap tide (1991 - 2000)	***Avg Tide (1991 - 2000)***	***Spring Tide (1991 - 2000)***	***Tide 12/03/2009***
Water level [m TAW]				
HW (1)	4.63	5.19	5.63	5.59
LW (2)	0.39	0.05	-0.18	-0.62
HW (3)	-	-	-	5.94
Tidal difference [m]				
Falling (1 to 2)	4.24	5.14	5.81	6.21
Rising (2 to 3)	4.24	5.14	5.81	6.56
Duration [hh:mm]				
Falling (1 to 2)	6:40	6:50	7:02	7:20
Rising (2 to 3)	5:59	5:34	5:16	4:50
Tide (1 to 3)	12:39	12:24	12:18	12:10
Tidal coefficient				
Falling (1 to 2)	0.82	1.00	1.13	1.21
Rising (2 to 3)	0.82	1.00	1.13	1.28

The tidal coefficients from 1.21 up to 1.28 for the measured tide of the 12th of March 2009 indicate that this average tide of1.24 has a tidal range even higher as the spring tide for the decade of 1991-2000 and can be classified as such.

3.2.2. Meteorological data

Meteorological data at Woensdrecht (NL) was obtained from the website of the Royal Dutch Weather Institute (KNMI, 2008).

The weather on the 12th of March 2009 was cold, dark and dry. The wind blew from the south west at an average velocity of 5.4 m/s (3 Bft) with maximal gust velocity of 13 m/s. The air temperature varied between 6 and 10.8°C. The sky was 8/9 cloudy without precipitation.

3.3. Navigation information

An overview of the navigation at the measurement location is given in APPENDIX C.

3.4. Remarks on data

Bad data is automaticaly edited but some shipwakes are still visible in the figure set. Some transects start straight from the quay wall.

4. PROCESSING OF DATASETS

4.1. Calibration of the OBS turbidity sensor

A crucial aspect of the accuracy and reliability of the data concerns the calibration of the OBS turbidity sensor. The calibration of the OBS sensor is necessary to convert turbidity into Suspended Sediment Concentration (SSC). An in situ calibration of the OBS3A was performed. At some depths water samples were taken by the pump sampler and were analysed by a laboratory for SSC. These SSC were used as 'ground truth' to calibrate the OBS turbidity sensor. The calibration curve can be found in report 2.34 (IMDC, 2009c).

4.2. Methodology of processing of the ADCP data with Sediview

DRL Software's Sediview was used to process the ADCP data. Sediview is designed to derive estimates of suspended sediment concentration throughout the water column using acoustic backscatter data obtained by ADCP's manufactured by RD Instruments of San Diego, California.

4.2.1. Acoustic backscatter theory

The acoustic theory governing backscatter from particles suspended in the water column is complex, but the following simplified formula serves to introduce the main factors that are relevant:

$$E = SL + SV + Constant - 20\log(R) - 2\alpha_w R$$

Where:

E = echo intensity,

SL = transmitted power,

SV = backscatter intensity due to the particles suspended in the water column,

α_w = a coefficient describing the absorption of energy by the water,

R = the distance from the transducer to the measurement bin.

The term 20log(R) is a simple geometric function that accounts for the spherical spreading of the beam. The constant is required because each ADCP has specific performance characteristics.

In order to measure the suspended sediment concentration in the water column it is necessary to relate the backscattered sound intensity to the mass concentration in the water. For the purposes of measuring solids concentration on site, it can be shown that the relationship is as follows (derived from Thorne and Campbell, 1992 and Hay, 1991 in DRL (2003)):

$$Log_{10} M_r = \{dB + 2r(\alpha_w + \alpha_s) - K_s\} S^{-1}$$

Where:

$M(r)$ = mass concentration per unit volume at range, r

S = relative backscatter coefficient

K_s = site and instrument constant

dB = the measured relative backscatter intensity (corrected for beam spreading)

α_w = water attenuation coefficient

α_s = sediment attenuation coefficient, which is a function of the effective particle size

In this expression there are four unknowns: S, Ks, α_w and α_s. These parameters are to be determined within Sediview (APPENDIX E).

4.2.2. Water sampling and transect sailing

To calibrate Sediview for suspended sediment concentration, two water samples are taken at the beginning and at the end of each transect (see 3.1). Both samples are taken within the range of reliable data of the ADCP. For the near-surface sample this means in bin 3 or 4, for the near-bed sample this means at about one or two meter above the sidelobe.

Water sampling is done together with CTD-OBS measurement in order to have two independent suspended sediment concentration measurements for each sample. OBS measurements were compared to the water samples and recalibrated as mentioned in § 4.1. The water samples were used for Sediview calibration, while cross-calibrated OBS measurements were used as a back up check. The salinity and temperature was used to compute the acoustic water absorption (water attenuation coefficient). All water samples were analysed as is described in 4.2.3.1.

4.2.3. Calibration for suspended sediment concentration within Sediview

4.2.3.1. Calibration workset

The calibration workset consists of ADCP-files, sampling times, sampling depths, SSC obtained from water samples and SSC, temperature and salinity obtained from CTD-OBS readings.

The suspended sediment concentration of the water samples was determined. One-litre samples were filtered over a preweighed desiccated 0.45 micron filter, after which the filter is dried in an oven at 105°C, cooled and weighted (NEN 6484).

4.2.3.2. SSC calibration per ensemble pair

In the Sediview calibration process the following parameters must be defined: the site and instrument constant (Ks), the relative backscatter coefficient (S) and the effective particle size per ensemble-pair (near-surface sample and near-bed sample) in order to fit the Sediview-estimate with the suspended sediment concentration of the water samples. These parameter sets may not differ too much from the previous parameter sets, as the environmental conditions will not change that much over a small time interval. To obtain a smooth progress in time of Ks, S and effective particle size an iterative approach is used.

4.2.4. Sediview configuration

4.2.4.1. Discharge and suspended sediment concentration estimates

The ADCP measures most of the water column from just in front of the ADCP to 6% above the bottom when the beam angle is 20° and to 12% above the bottom when the beam angle is 30°. The shallow layer of water near the bottom is not used to compute discharge and suspended sediment concentration due to side-lobe interference. When the ADCP sends out an acoustic pulse, a small amount of energy is transmitted in side lobes rather than in the direction of the ADCP beam. Side lobe reflection from the bottom can interfere with the water echoes and can give erroneous data. The thickness of the side lobe layer for the ADCP used during this campaign is 12% of the distance from the transducers to the bottom.

Near the banks the water depth is too shallow for the ADCP to profile.

For each of those unmeasured regions, an estimate of the discharges and suspended sediment concentration is made. The measured and unmeasured regions in the cross section are shown in Figure 4-1 and Figure 4-2.

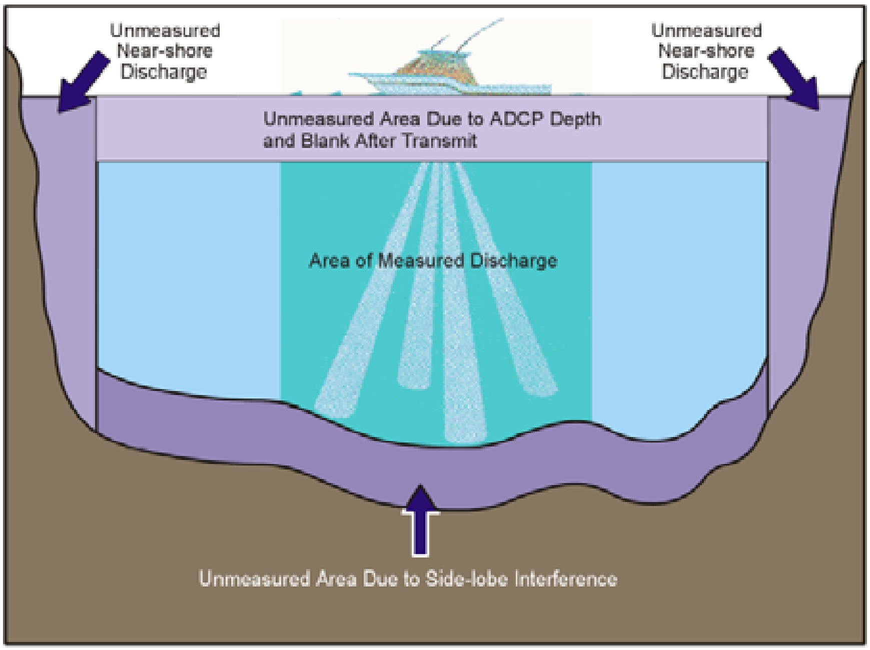


Figure 4-1: Unmeasured regions in the cross section (from RD Instruments, 2003)

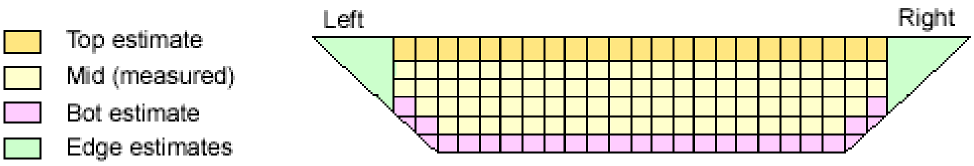


Figure 4-2: Measured and estimated discharges and sediment fluxes within Sediview (DRL, 2005)

4.2.4.1.1 Top/bottom estimates

The sediment concentration and discharge at the top of the water column is assumed to be the same as the concentration and discharge in the first measured bin.

The sediment concentration between the bottom and the lowest valid bin is assumed to be an increase of the lowest valid bin. As the concentration grows approximately linear from the lowest valid bin to the bottom, and as Sediview/Matlab uses a constant concentration factor for these deepest bins, we use a concentration factor of 125% (Figure 4-3). An overview of the used power concentration factor is given in APPENDIX E.

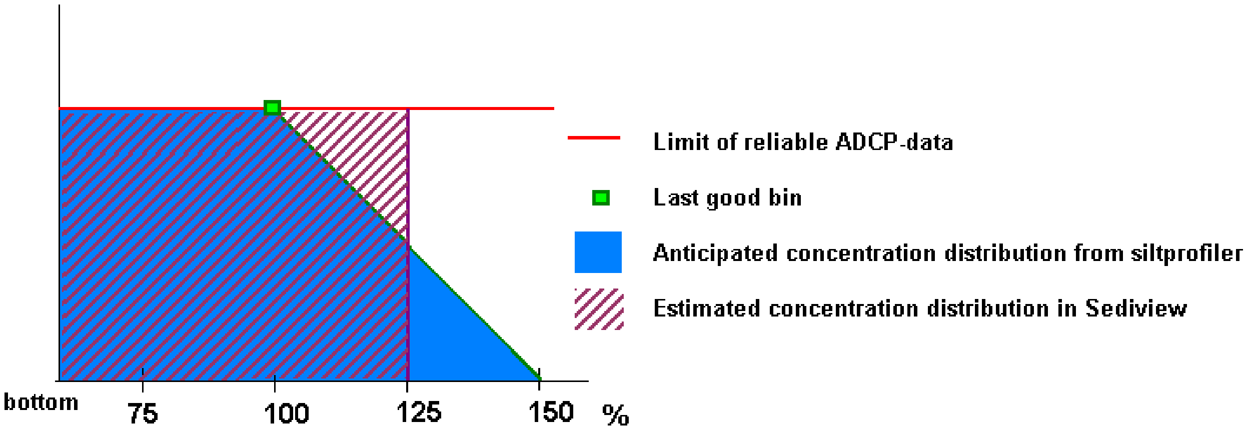


Figure 4-3: Principal of bottom estimate of the sediment concentration in Sediview

Table 4-1: Extrapolation methods for top and bottom variables

Variable	***Top***	***Bottom***
Discharge Method	Constant	Power
Concentration factor	100%	125%

The discharge for the bottom water layer is estimated by using the power method. Chen (1991) discusses the theory of power laws for flow resistance. Simpson and Oltmann (1990) discuss Chen's power law equivalent of Manning's formula for open channels (with b=1/6) (RD Instruments, 2003).

$$u/u* = 9.5(z/z_0)^b$$

Where:

- z = Distance to the channel bed [m]
- u = Velocity at distance z from bed [m/s]
- u* = Shear velocity [m/s]
- z_0 = Bottom roughness height [m]
- b = Exponent (1/6)

4.2.4.1.2 Edge estimates

The shape of the edges of the cross section is assumed to be near triangular due to the banks of the river Scheldt. Five data ensembles are to be averaged to determine the left and right bank mean velocities used for calculation of edge estimates.

The distance from start- and endpoint to the bank is calculated from the theoretical start- and endpoint at the bank to the effective start- and endpoint. The theoretical points are taken at the banks.

Table 4-2: Reference points at the end of the mud flats on left and right bank

Coordinates (UTM31 ED50)	***Easting Left bank***	***Northing Left bank***	***Easting Right bank***	***Northing Right bank***
Transect DGD	588 541	5 684 527	588 765	5 684 056

The formula for determining the near shore discharge is:

$$Q_{shore} = CV_m L d_m \qquad [m^3/s]$$

Where:

C = Coefficient (0.35 for triangular, 0.91 for rectangular shape)

V_m = Mean water velocity in the first or the last segment [m/s]

L = Distance from the shore to the first or the last segment specified by the user [m]

d_m = Depth of the first or the last segment [m]

The coefficient (C) has been set to 0.91 (triangular shape of the banks).

4.2.4.2. Contour plots of the transects

All contour plots show perpendicular and parallel projected values on the straightened sailed transects. The heading of the straightened sailed transect is defined by picking 2 points in the straight part of the line after having corrected the heading of the ADCP compass. The compass offset is derived from a comparison of the ADCPs bottom track with the external GPS data.

4.2.5. Output

General transect information containing start-stop coordinates of each sailed transects with stop time, track length and heading is given in APPENDIX A.

In APPENDIX F, four contourplots were generated for each transect showing the distribution of suspended sediment concentration & sediment flux as well as the flow velocity perpendicular and parallel to the transect. The following conventions were used:

- Distances on the X-axis were referenced to the starting point of the transect, the start of the sailed transect is always at distance equal to zero.
- Left bank is always shown left, right bank on the right side. For transect DGD, left bank was taken to be the western quay wall and the right bank to be the eastern quay wall considering the dock as being a tributuary to the Scheldt river.
- Perpendicular flow velocities and fluxes are positive for downstream flow (ebb, out of Deurganckdok), negative for upstream flow (flood, inbound).
- Parallel flow velocities are positive for flow going from the left bank to the right bank, and negative for flow going from the right bank to the left bank.
- Absolute Depth is given in meters above TAW.

Also a depth-averaged velocity plot was generated for the flow velocity perpendicular to the transect. (see APPENDIX F).

Tables in APPENDIX G give the values for discharges, sediment fluxes and the average measured SSC for the total cross-section.

- Mid = measured part of the cross-section
- Top = top part of the cross-section
- Bottom = bottom part underneath the sidelobe
- Edge (left, right) = edge estimates to left & right bank
- Total = Mid+Top+Bottom+ Edge values

The graph in APPENDIX H gives the temporal variation of the total flux, total discharge and total measured SSC for the whole through tide measurement at Deurganckdok.

5. PRELIMINARY ANALYSIS OF THE DATA

5.1. The survey of March 12th 2009

As Deurganckdok is situated along the part of the river Scheldt under tidal influence, it is subject to complex current fields near its entrance. The measured current field shows a vortex pattern depending on the tidal phase. During ebbing tide the vortex at the entrance of the dock is a counter-clockwise one and during rising tide it is a clockwise one. This is shown in the contour plots by inflow (negative) on the western side (left) and outflow on the eastern side of the entrance during ebbing tide and vice versa for flooding tide. (APPENDIX F).

During slack water we see a current field with opposing current directions in the upper part of the water column compared to the lower part of the water column. For high water, there is an inflow (negative) near the bottom and outflow (positive) near the surface. This particular pattern is probably an example of the expected salt density currents occurring near the entrance of Deurganckdok. The same event is seen at low water when the dock contains waters of higher salinity than the river; here we see an outflow near the bottom and inflow near the surface.

From the backscatter interpretation into suspended sediment concentration, one can notice in general a higher concentration during high water and during rising tide compared to during ebb tide. The highest SS concentrations (incoming and outgoing) occur around HW.

It can also be noticed that during the complete measurement cycle the incoming water has a higher SSC than the outgoing water (see Table 5-1, Figure 5-1). The incoming averaged suspended sediment concentrations range from 54 mg/l up to 149 mg/l during ebb and from 99 mg/l to 175 mg/l during flood, whereas the outgoing concentrations range from 22 to 182 mg/l during ebb and from 52 to 150 mg/l during flood.

Table 5-1 Average SSC's over the sailed transect

Tide	Concentration [mg/l]								
	overall SSC			incoming SSC			outgoing SSC		
	min	average	max	min	average	max	min	average	max
Eb	34	74	166	54	101	149	22	59	182
Flood	99	123	143	99	138	175	52	95	150

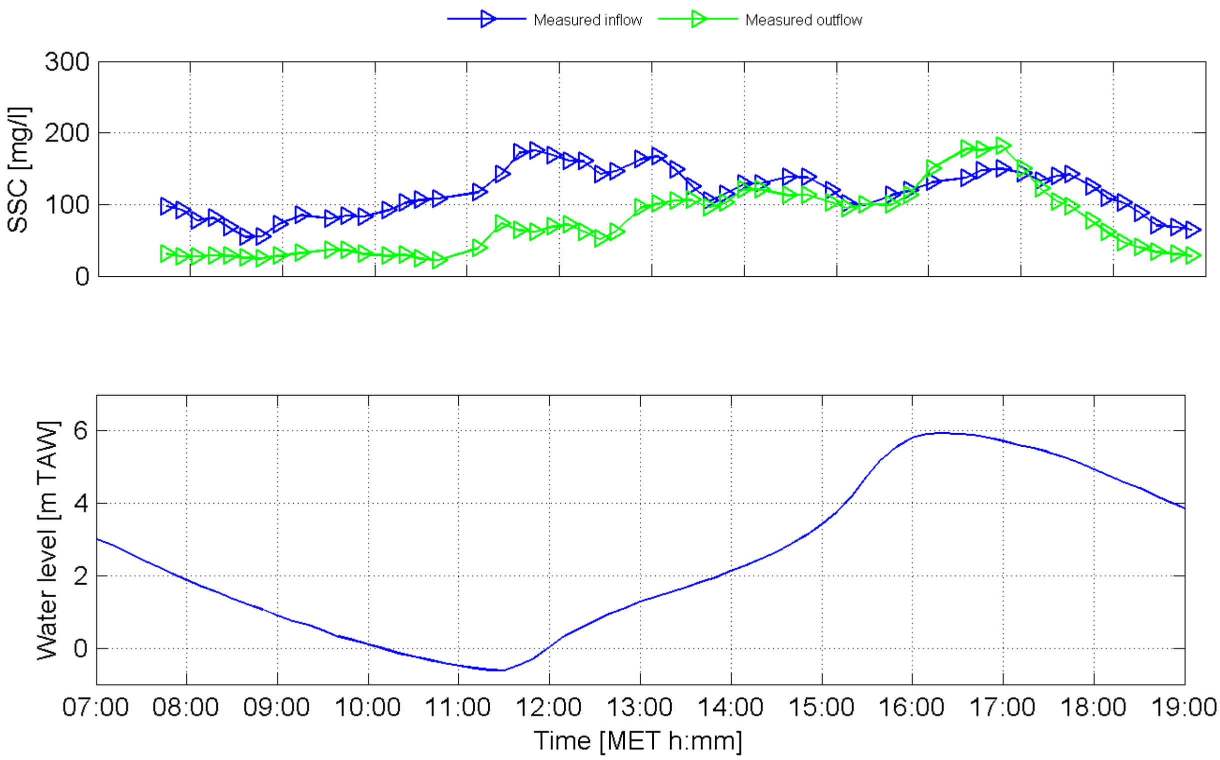


Figure 5-1 Average incoming and outgoing SSC over a complete tidal cycle on 12/03/2009

Considering the sediment fluxes, Figure 5-2-a shows that residual incoming transport is dominating during flood and lasts until approximately HW. Almost no residual outgoing sediment transport can be observed during the measurement campaign (see Figure 5-2-a). During flood there is a residual incoming sediment flux with an outgoing resulting discharge (see Figure 5-2-b). To visualize in- and outflow, the absolute values of the inflow have been used. If the measured total line is negative, it means that measured inflow is greater than measured outflow. Or a negative measured total value means a total inflow/influx, a positive measured total value means a total outflow/outflux.

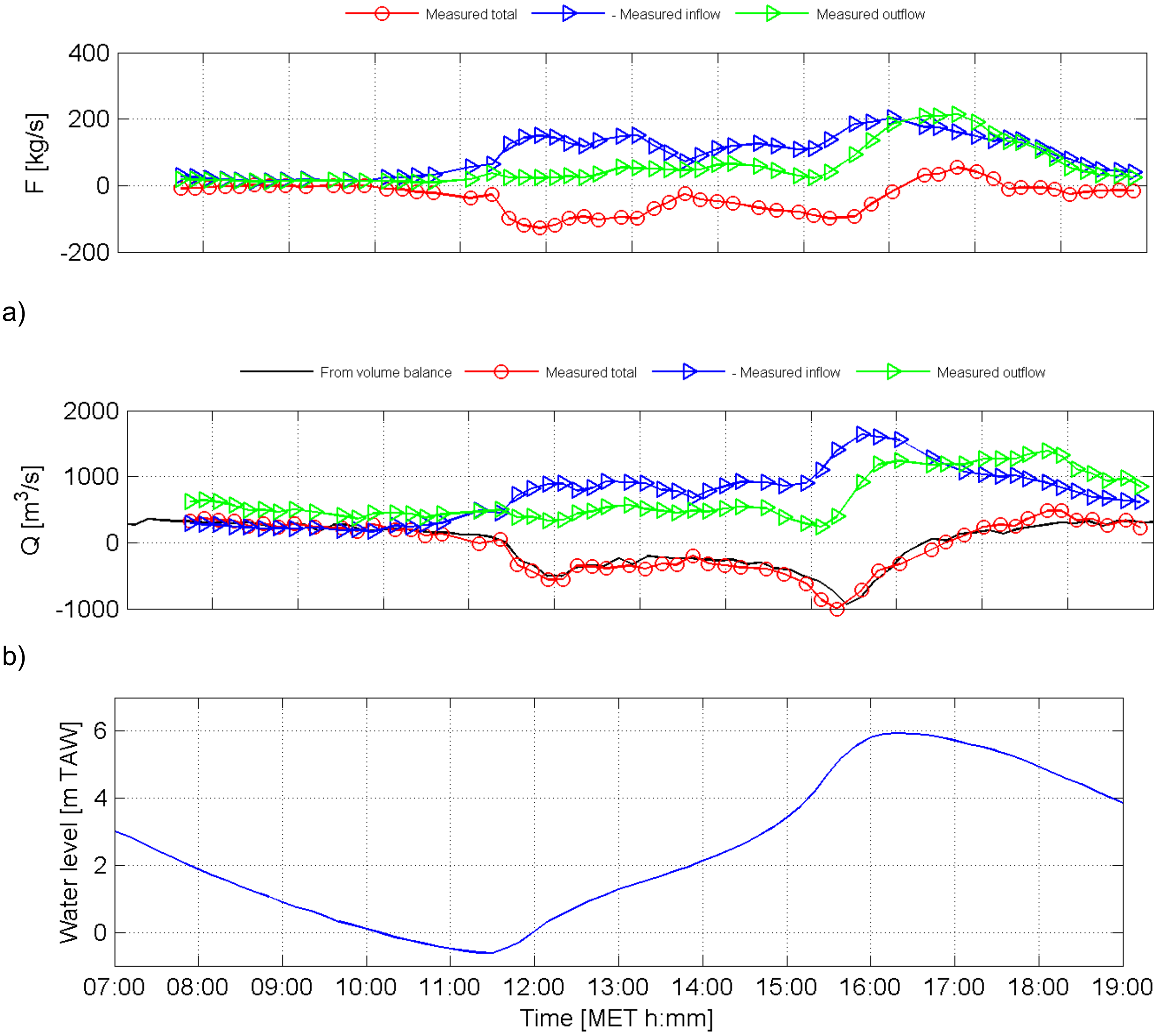


Figure 5-2 Total in/out/net flux a) and in/out/net discharge b) at DGD on March 12th 2009.

During HW the outflow is approximately twice as high (+-1400 m³/s) as during LW (see Figure 5-2-b). Incoming density currents near the bottom due to a higher salinity in the river than in the dock reach their maximum around slack tide on the Scheldt at approximately 1 hour after high water (see Figure 5-7-m).

5.2. Intercomparison with earlier surveys at DGD

Since 2005, IMDC has organised several through tide measurement campaigns at the entrance of Deurganckdok. The course and results of the campaigns were described in IMDC rapports and are listed in Table 5-2. Table 5-2 gives also an overview of the tidal phase during the campaigns. Conditions near the entrance of Deurganckdok have been simulated in Delft3D and processed by IMDC (2006n) in order to compare simulation with observed data.

5.2.1. Fresh water discharge

The fresh water discharges at Schelle were calculated from the tributaries, which were recorded during the measurement campaigns. The calculation procedure is described in AZ (1974) and is based on the use of correction coefficients that take in account the surface of the hydrological basins. The daily fresh water discharges at Schelle are listed in Table 5-2. The evolutions of the fresh water discharge at Schelle for all former campaigns are shown in Figure 5-3.

Table 5-2: Hydrological conditions during through tide ADCP measurements at the entrance of DGD

Tidal Coefficient at tidal gauge: Liefkenshoek				
PROJECT (DESCRIPTION)	***Date***	***Tidal coefficient***	***Tidal phase***	***Daily fresh water discharge at Schelle [m³/s]***
HCBS 1 (IMDC, 2006m)	17/11/2005	1.10	Spring	91
HCBS 2 (IMDC, 2006c)	22/03/2006	0.97	Average	94
HCBS 2 (IMDC, 2007o)	27/09/2006	1.03	Average	33
DGD 1 (IMDC, 2008a)	24/10/2007	1.02	Average	46
DGD 2 (IMDC, 2008k)	11/03/2008	1.17	Spring	286
DGD 3 (IMDC, 2008u)	19/06/2008	1.15	Spring	93
DGD 3 (IMDC, 2008v)	26/06/2008	0.97	Average	69
DGD3 (IMDC 2008x)	24/09/2008	0.81	Neap	75
DGD 3 (IMDC, 2009a)	30/09/2008	1.08	Spring	82
DGD 3 (IMDC, 2009e)	02/12/2008	0.98	Average	154
DGD 3(IMDC,2009f)	10/12/2008	0.97	Average	222
DGD 3(IMDC,2009i)	06/03/2009	0.82	Neap	99
DGD 3(IMDC,2009n)	12/03/2009	1.24	Spring	129

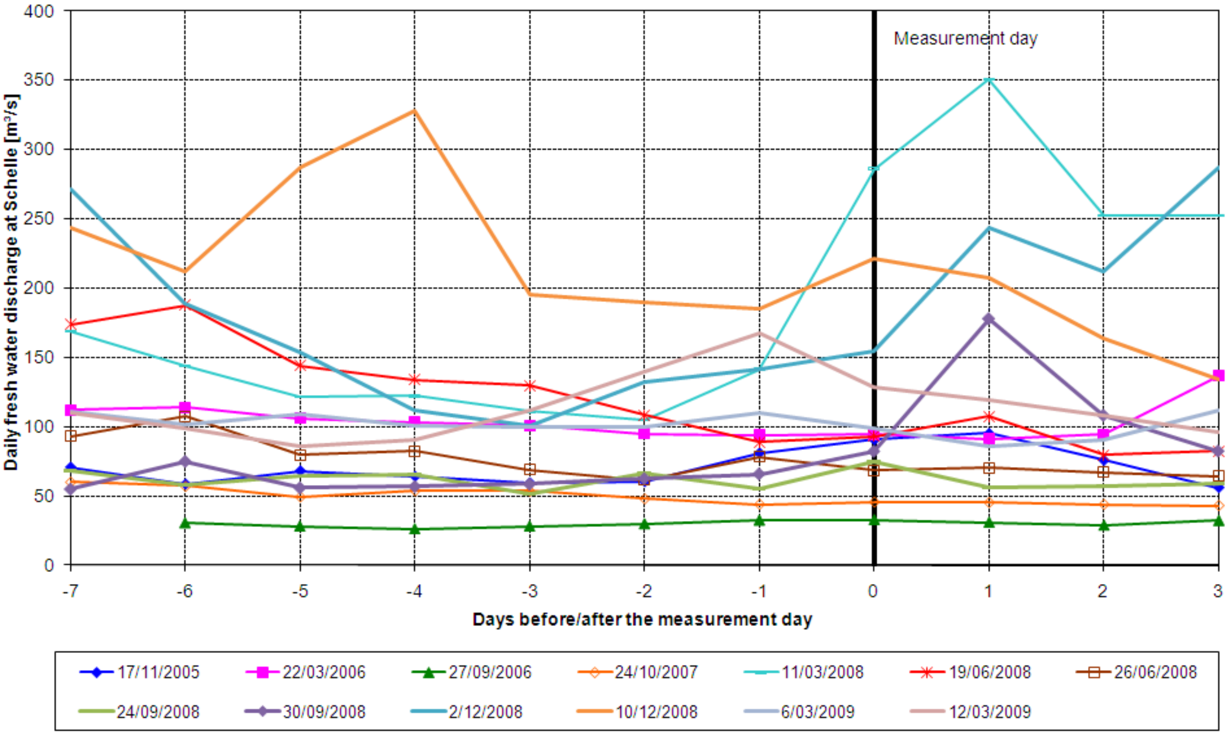


Figure 5-3: The daily fresh water discharge evolution at Schelle before and after a measurement day.

The results presented in Figure 5-4 are based on a long-term simulation over a period of 30 year (1971-2000) with the SIGMA-model for MKBA (IMDC, 2006r). The mean discharge is the annual average ten days' discharge, calculated with simulated long-term measurements. The high and low discharges are also annual ten days' discharges, and are calculated as mean discharge +2σ and mean discharge -2σ.

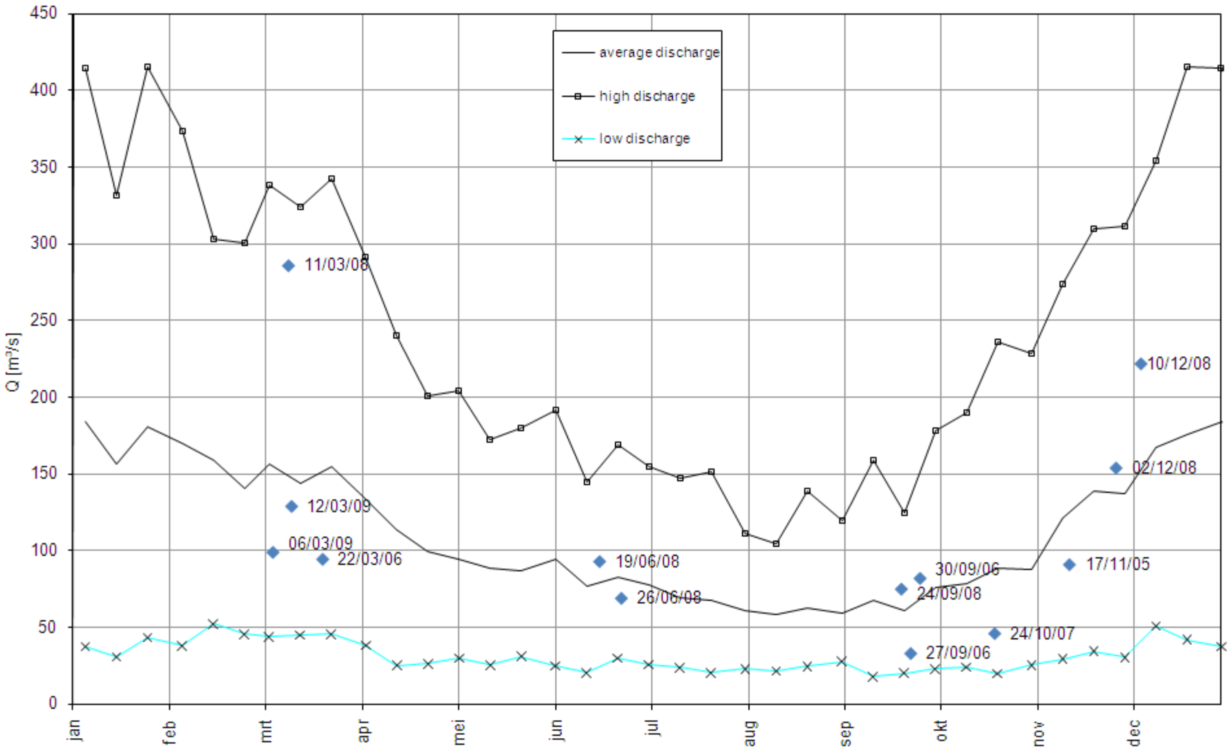


Figure 5-4: Mean fresh water discharge over a period of 30 year (1971-2000) with the monthly discharge of 2008-2009

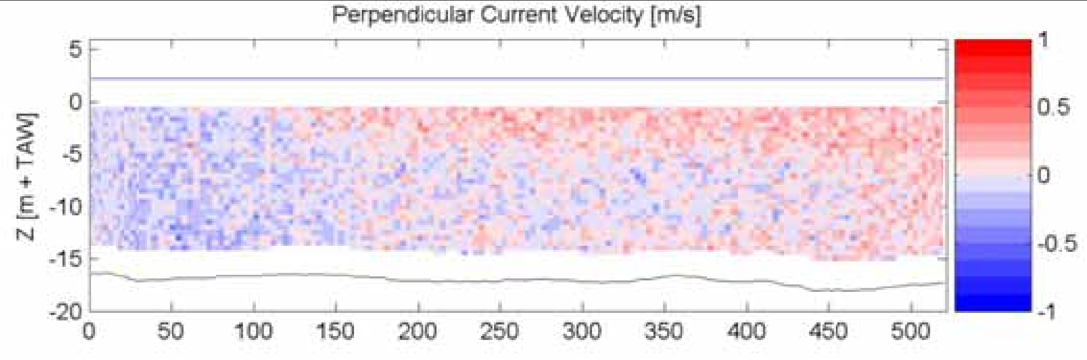
5.2.2. Sediment distributions and current pattern around HW

In Figure 5-5 and Figure 5-6 the 10 different measurement campaigns have been compared for about 3 hours after high water. Sediment distributions as well as current pattern in the cross section are similar for all campaigns. The western side of the dock is situated at the left of these figures, the eastern side at the right. The sediment distribution and current pattern of this neap tide measurement is less pronounced than the patterns during average and spring tide measurements.

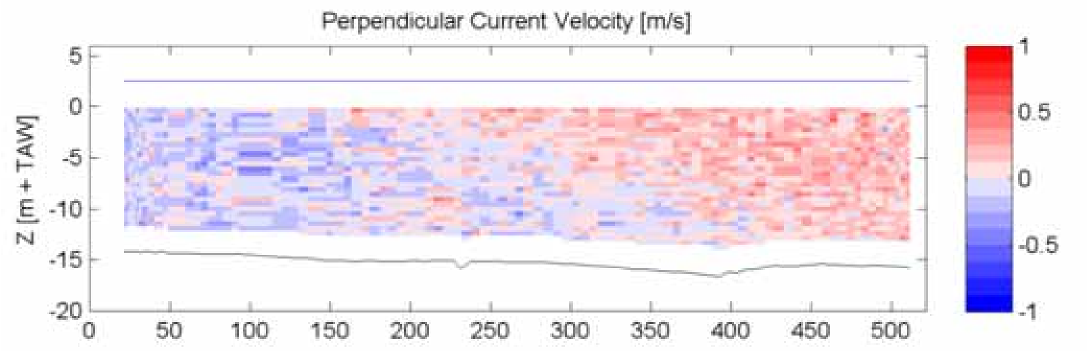
In Figure 5-7 and Figure 5-8 the circulation pattern and sediment concentration have been compared for the same days but at about 1h after high water. Again the current pattern is almost identical between the different days with a salt wedge intruding near the bottom of the dock and compensatory outflow of fresher water near the surface. Except for the measurements at 11/03/2008 and 02/12/2008, the sediment distributions are very similar between the different campaigns.

The measurements around HW on 11/03/2008 show a very different sediment distribution compared to the other measurement days. The sediment concentrations are considerably higher and this almost throughout the whole water column. These high concentrations can also be seen on the other transects on 11/03/2008, so it is very unlikely these concentrations can be attributed to a shipwake.

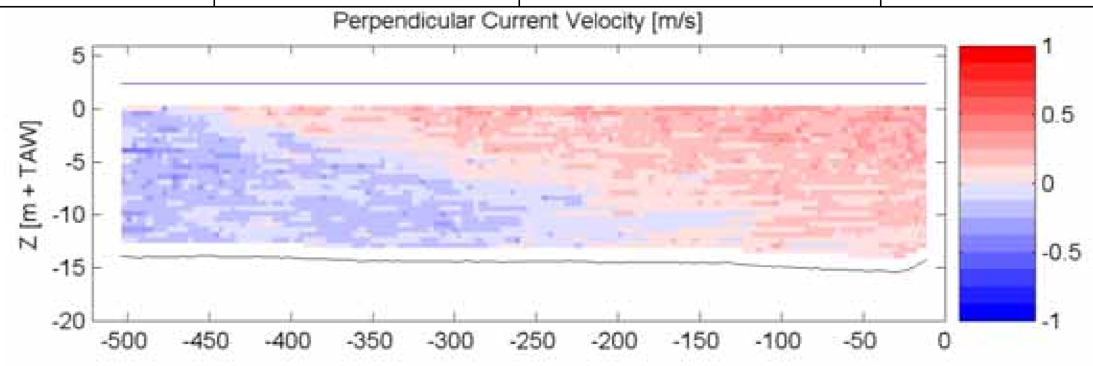
These high concentrations may partly be attributed to the high fresh water discharges, recorded on 11/03/2008 near Schelle (see Figure 5-4), but most particular to the extreme spring tide and stormy weather on that day. Compared to the other tides, the waterlevel at 11/03/2008 increases slower during the first hours of the flood. As a result, there is a huge intake of water during the second part of the flood phase. It is during these last hours of the flood, that those high concentrations were measured.



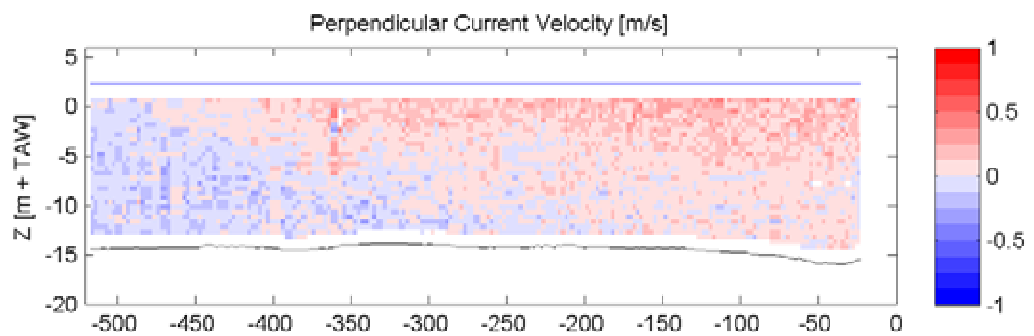
a) 17/11/2005	3 hrs after HW	Tidal coefficient: 1.10	Fresh water: 91 m³/s



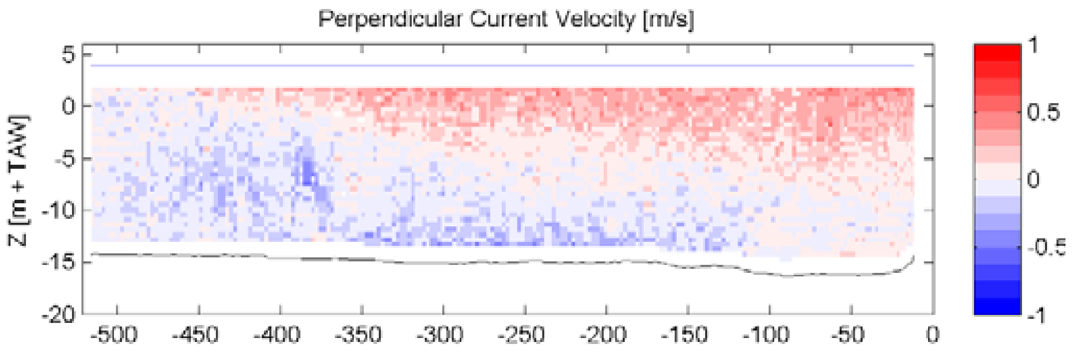
b) 22/03/2006	3 hrs after HW	Tidal coefficient: 0.97	Fresh water: 94 m³/s



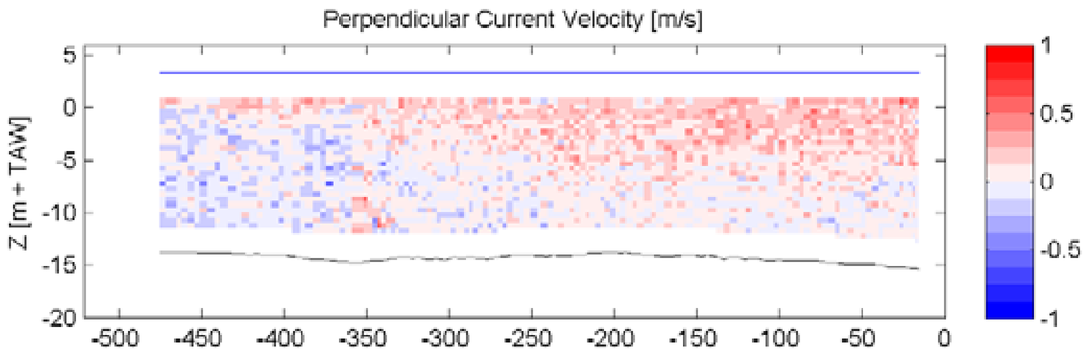
c) 27/09/2006	3 hrs after HW	Tidal coefficient: 1.03	Fresh water: 33 m³/s



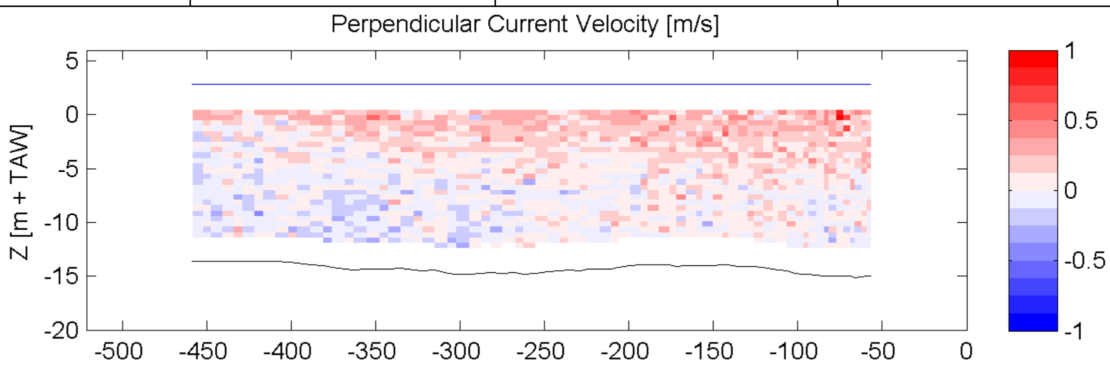
d) 24/10/2007	3 hrs after HW	Tidal coefficient: 1.02	Fresh water: 46 m³/s



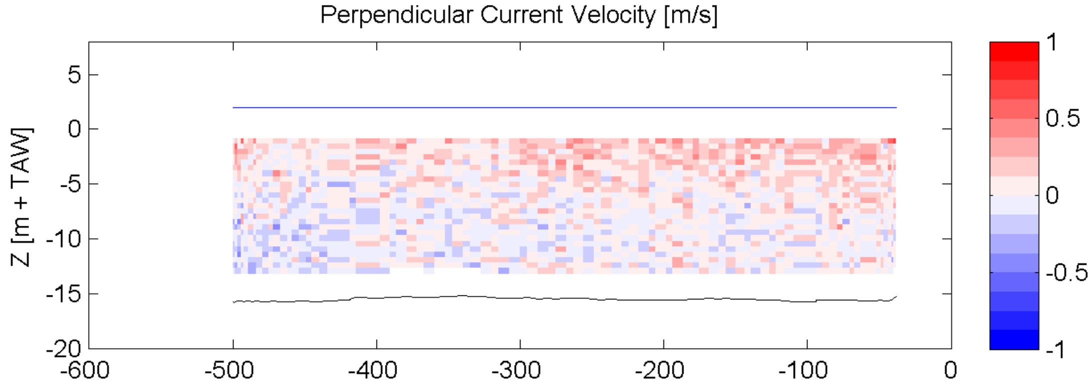
e) 11/03/2008	3 hrs after HW	Tidal coefficient: 1.17	Fresh water: 286 m^3/s



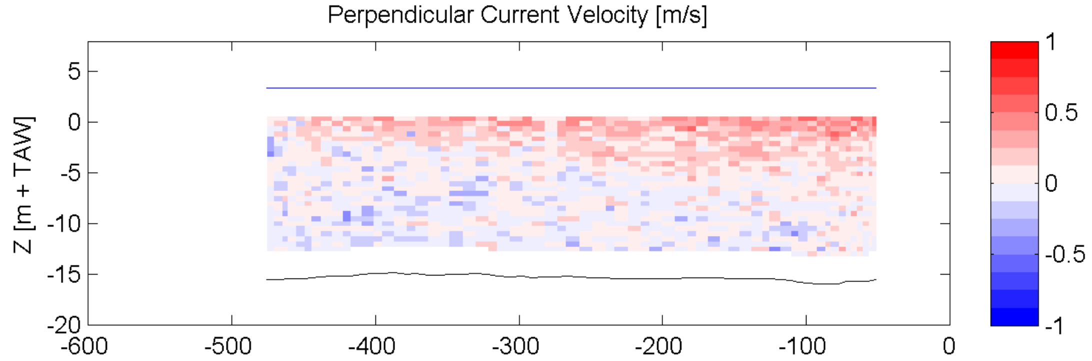
f) 19/06/2008	3 hrs after HW	Tidal coefficient: 1.15	Fresh water: 93 m^3/s



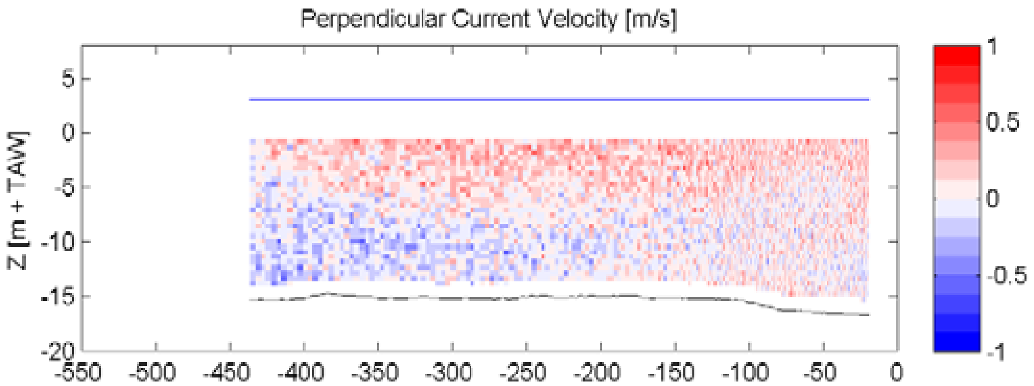
g) 26/06/2008	3 hrs after HW	Tidal coefficient: 0.97	Fresh water: 69 m^3/s



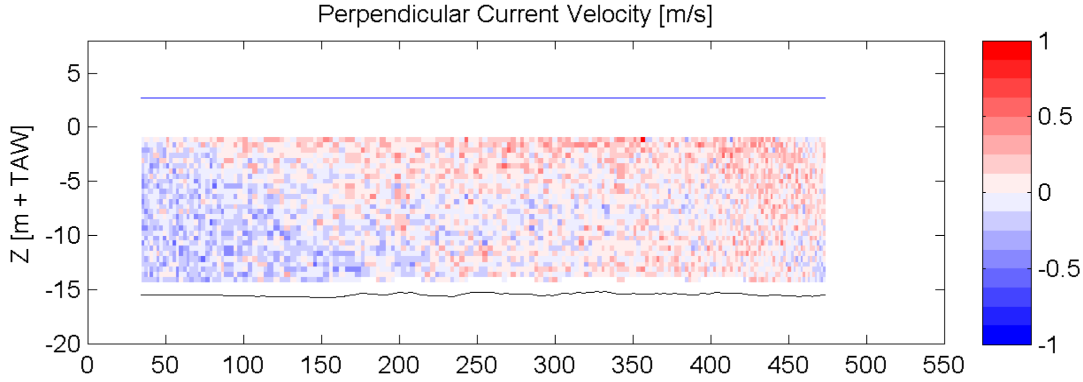
h) 24/09/2008	3 hrs after HW	Tidal coefficient: 0.81	Fresh water: 75 m³/s



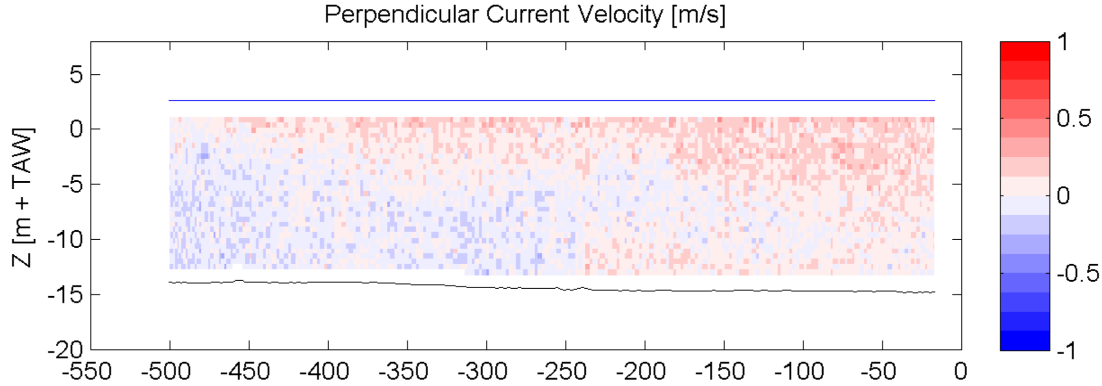
i) 30/09/2008	3 hrs after HW	Tidal coefficient: 1.08	Fresh water: 82 m³/s



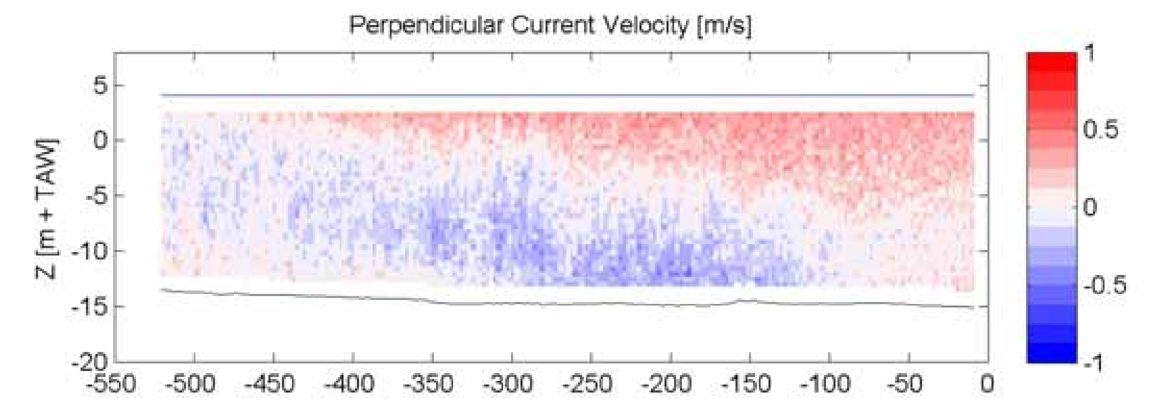
j) 02/12/2008	3 hrs after HW	Tidal coefficient: 0.98	Fresh water: 154 m³/s



k) 10/12/2008	3 hrs after HW	Tidal coefficient: 0.97	Fresh water: 222 m³/s

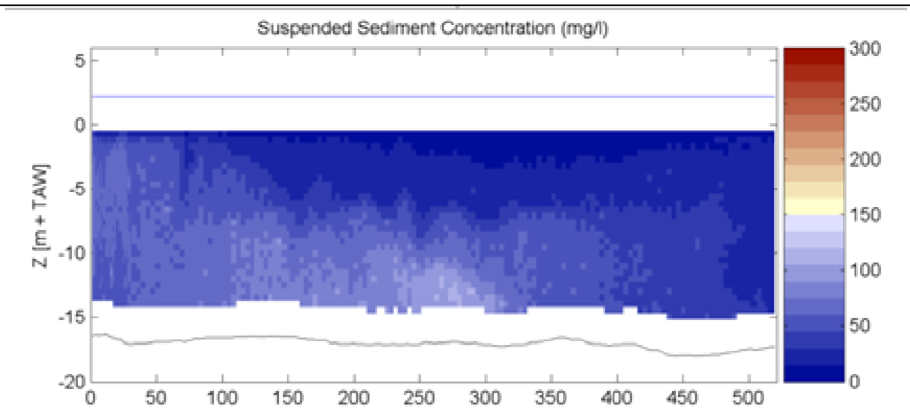


l) 06/03/2009	3 hrs after HW	Tidal coefficient: 0.82	Fresh water: 99m³/s

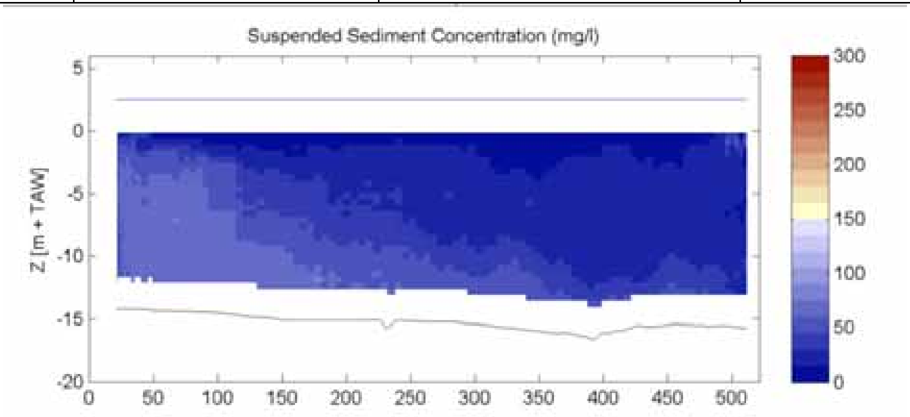


m) 12/03/2009	3 hrs after HW	Tidal coefficient: 1.24	Fresh water: 129m³/s

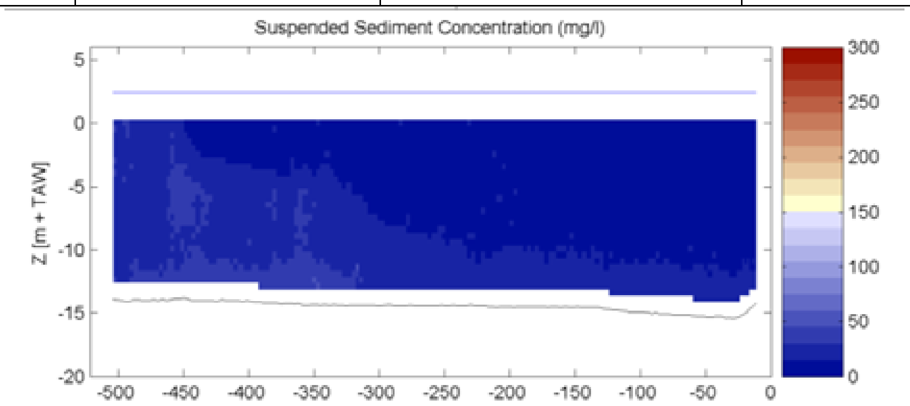
Figure 5-5: a) Perpendicular current velocity on 17/11/2005, b) on 22/03/2006, c) on 27/09/2006, d) on 24/10/2007, e) on 11/03/2008, f) on 19/06/2008, g) on 26/06/2008 h) 24/09/2008, i) on 30/09/2008, j) on 02/12/2008, k) on 10/12/2008, l) on 06/03/2009 and m) on 12/03/2009 at 3h after high water



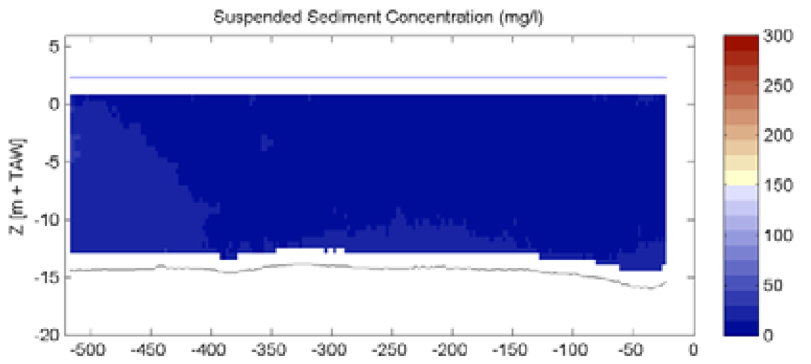
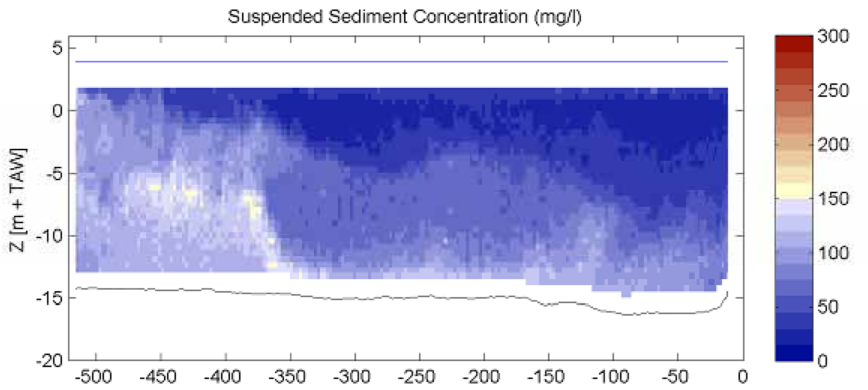
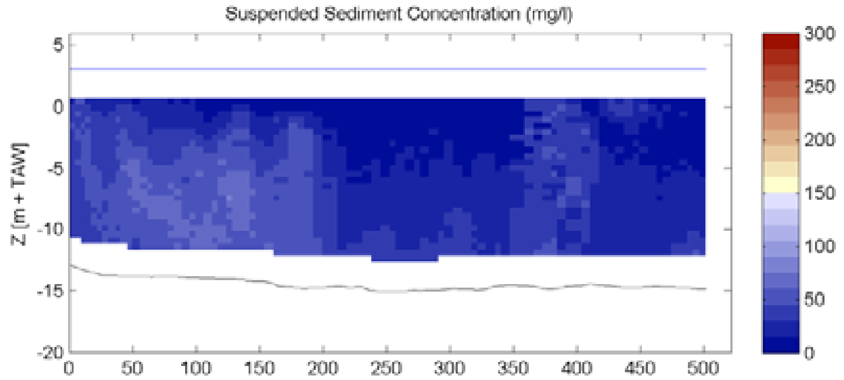
a)	17/11/2005	3 hrs after HW	Tidal coefficient: 1.10	Fresh water: 91 m³/s



b)	22/03/2006	3 hrs after HW	Tidal coefficient: 0.97	Fresh water: 94 m³/s



c)	27/09/2006	3 hrs after HW	Tidal coefficient: 1.03	Fresh water: 33 m³/s

	 			
d)	24/10/2007	3 hrs after HW	Tidal coefficient: 1.02	Fresh water: 46 m³/s
	 			
e)	11/03/2008	3 hrs after HW	Tidal coefficient: 1.17	Fresh water: 286 m³/s
	 			
f)	19/06/2008	3 hrs after HW	Tidal coefficient: 1.15	Fresh water: 93 m³/s

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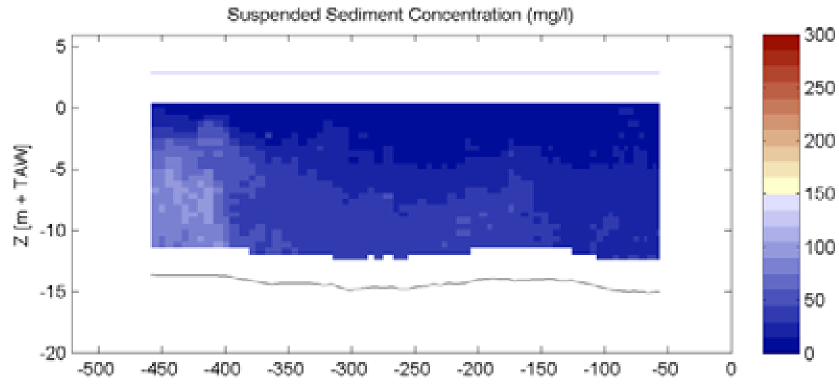
<tr><td></td><td colspan="4">
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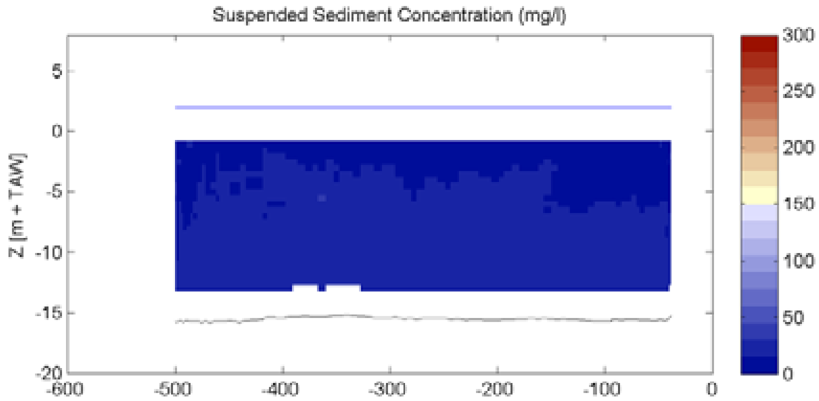
<tr><td>g)</td><td>26/06/2008</td><td>3 hrs after HW</td><td>Tidal coefficient: 0.97</td><td>Fresh water: 69 m³/s</td></tr>
<tr><td></td><td colspan="4">
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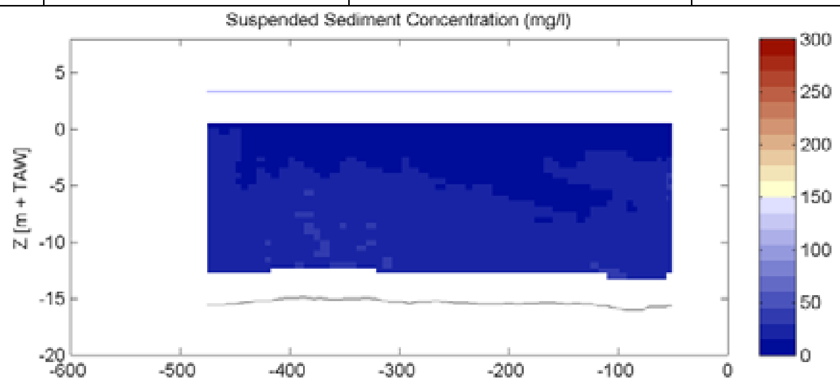
<tr><td>h)</td><td>24/09/2008</td><td>3 hrs after HW</td><td>Tidal coefficient: 0.81</td><td>Fresh water: 75 m³/s</td></tr>
<tr><td></td><td colspan="4">
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<tr><td>i)</td><td>30/09/2008</td><td>3 hrs after HW</td><td>Tidal coefficient: 1.08</td><td>Fresh water: 82 m³/s</td></tr>
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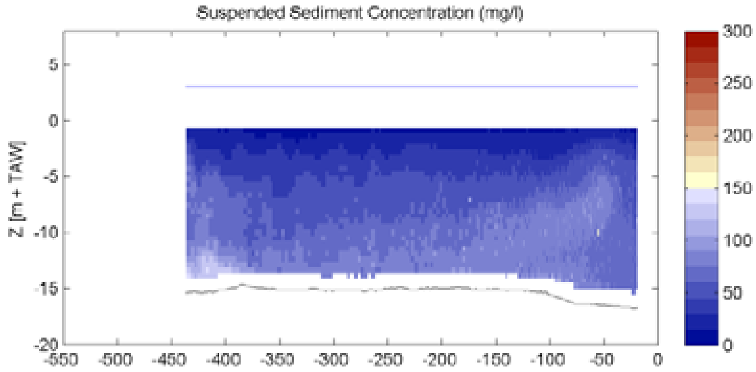
<tr><td></td><td colspan="4">
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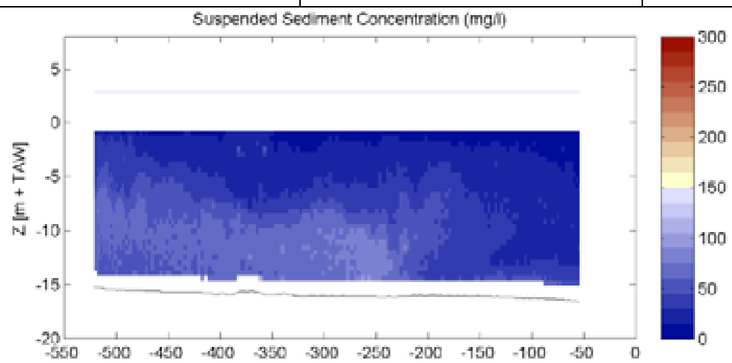
<tr><td>j)</td><td>02/12/2008</td><td>3 hrs after HW</td><td>Tidal coefficient: 0.98</td><td>Fresh water: 154 m^3/s</td></tr>
<tr><td></td><td colspan="4">
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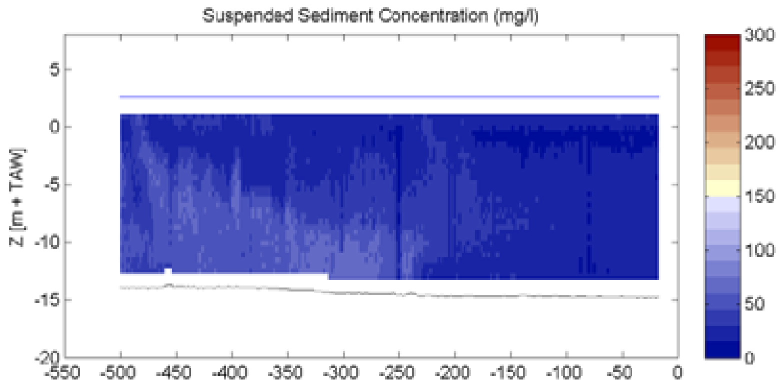
<tr><td>k)</td><td>10/12/2008</td><td>3 hrs after HW</td><td>Tidal coefficient: 0.97</td><td>Fresh water: 222m^3/s</td></tr>
<tr><td></td><td colspan="4">
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<tr><td>l)</td><td>06/03/2009</td><td>3 hrs after HW</td><td>Tidal coefficient: 0.82</td><td>Fresh water: 99m^3/s</td></tr>
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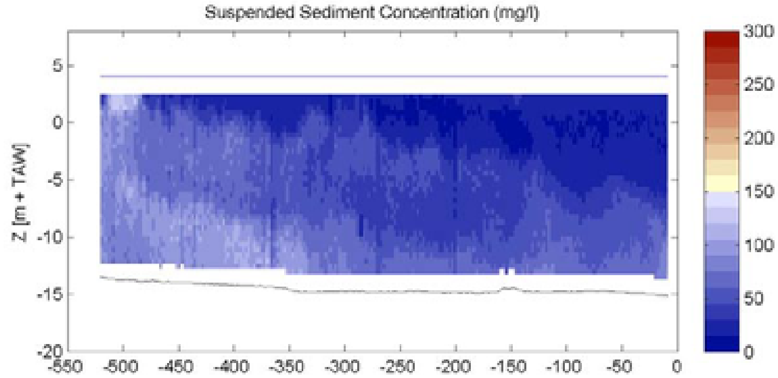
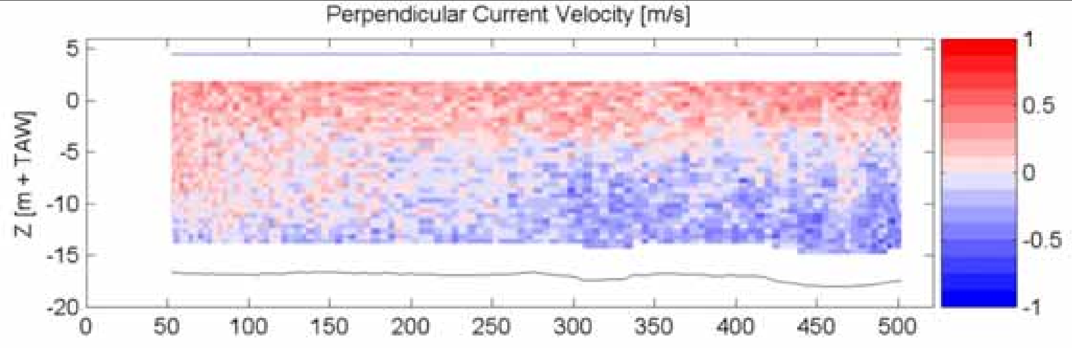
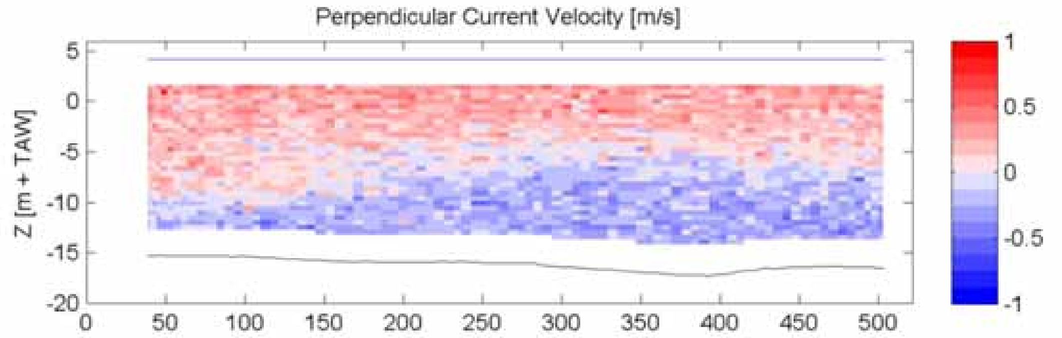


m)	12/03/2009	3 hrs after HW	Tidal coefficient: 1.24	Fresh water: 129m³/s

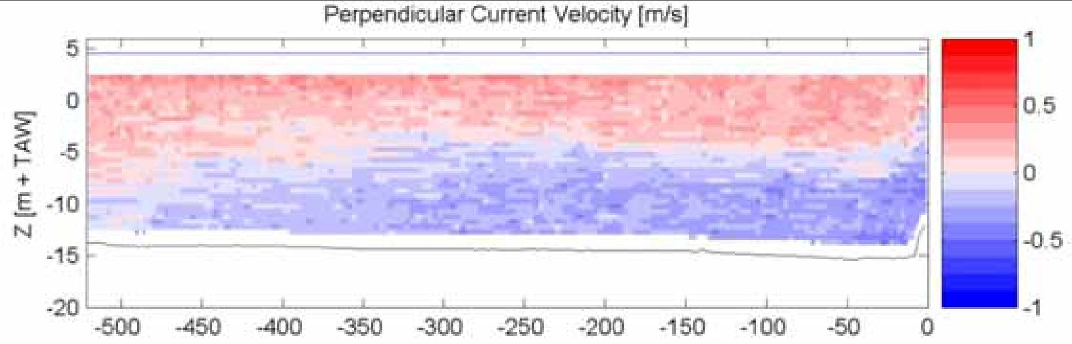
Figure 5-6: a) Suspended sediment concentration on 17/11/2005, b) on 22/03/2006, c) on 27/09/2006, d) on 24/10/2007, e) on 11/03/2008, f) on 19/06/2008, g) on 26/06/2008, h) on 24/09/2008, i) on 30/09/2008, j) on 02/12/2008, k) on 10/12/2008, l) on 06/03/2009 and m) on 12/03/2009 at 3h after high water



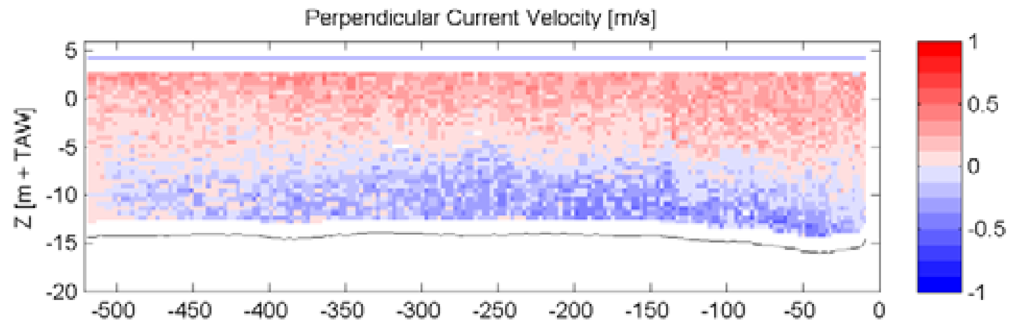
a)	17/11/2005	1 hr after HW	Tidal coefficient: 1.10	Fresh water: 91 m³/s



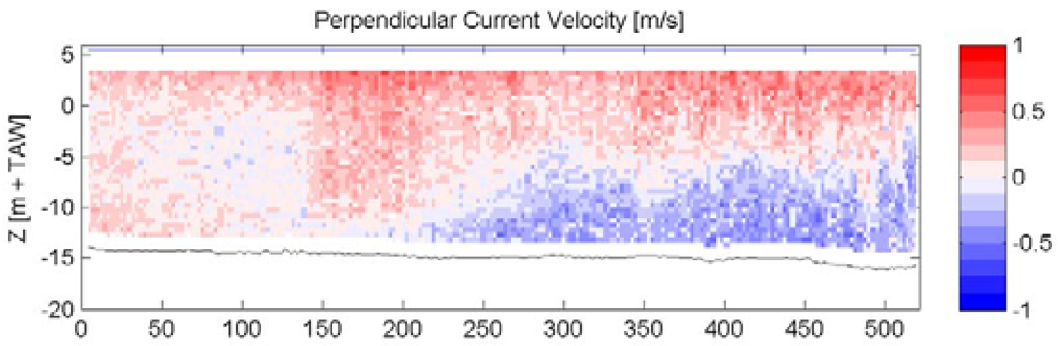
b)	22/03/2006	1 hr after HW	Tidal coefficient: 0.97	Fresh water: 94 m³/s



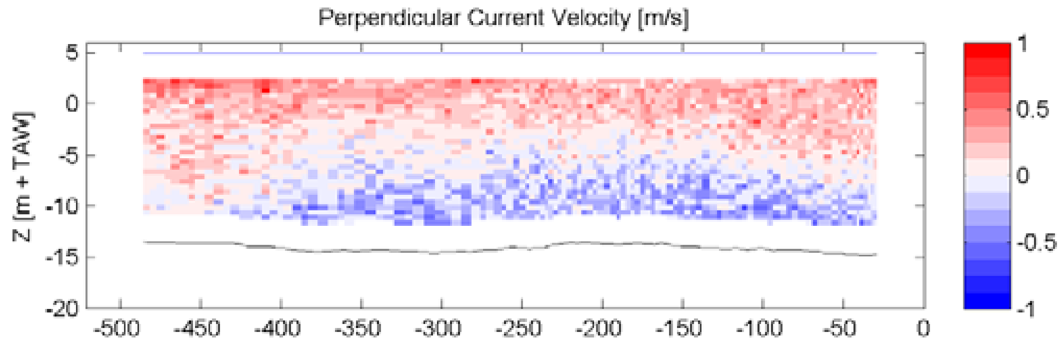
c)	27/09/2006	1 hr after HW	Tidal coefficient: 1.03	Fresh water: 33 m³/s



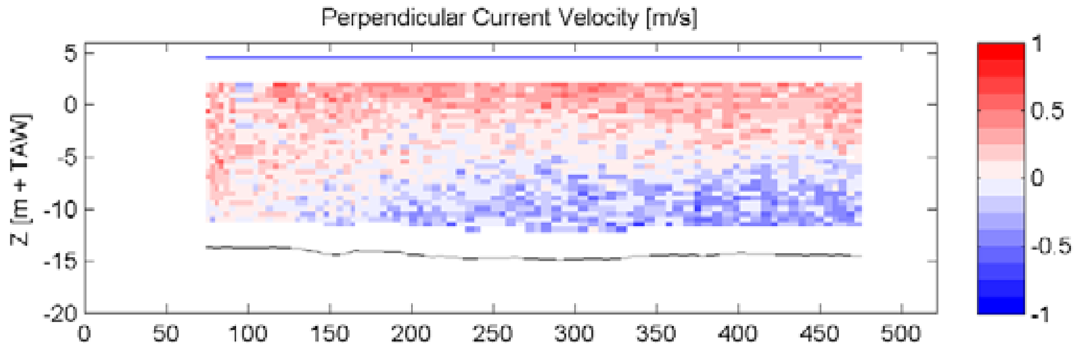
d)	24/10/2007	1 hr after HW	Tidal coefficient: 1.02	Fresh water: 46 m³/s



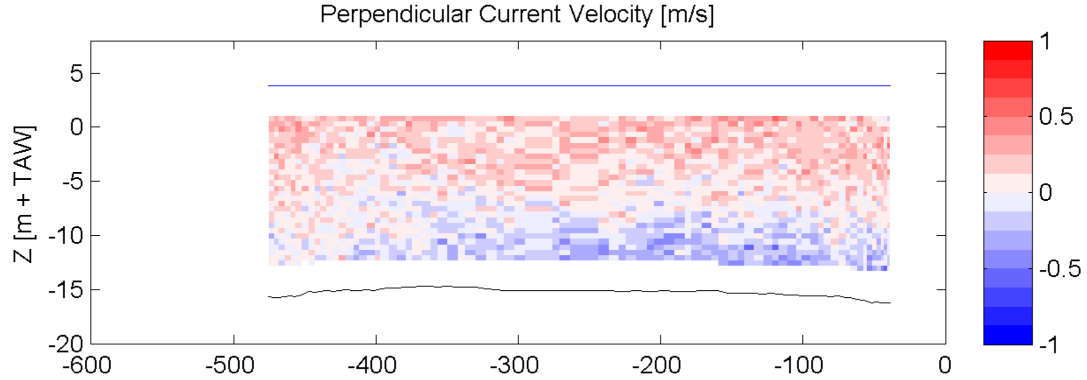
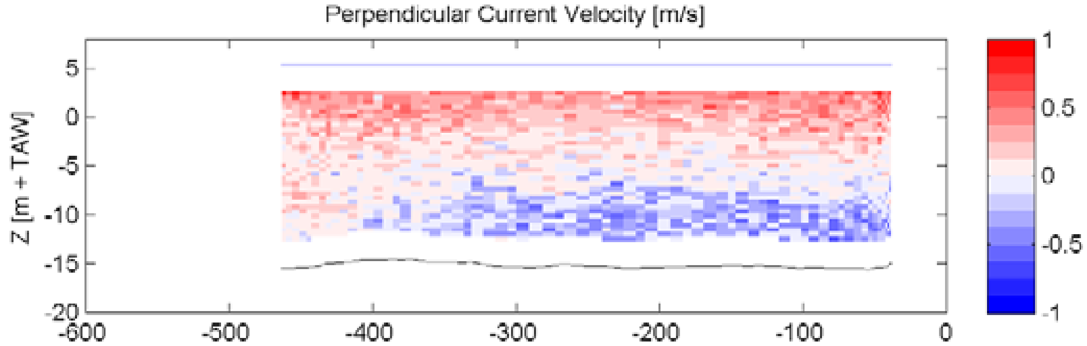
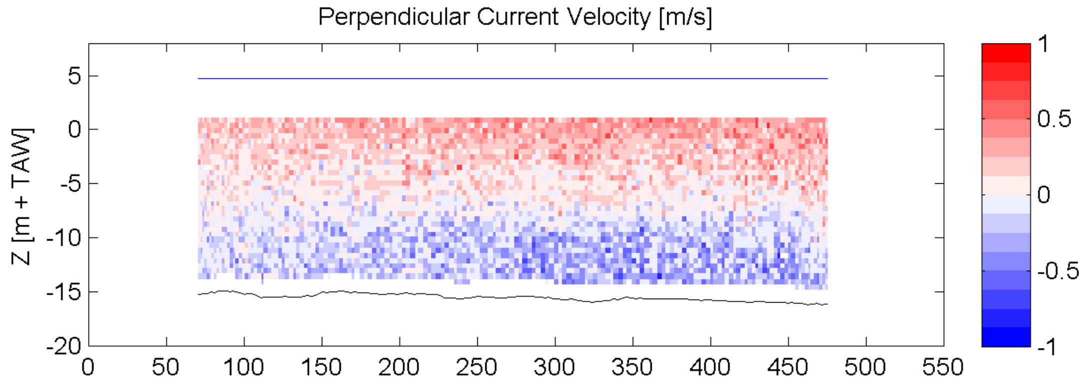
e)	11/03/2008	1 hr after HW	Tidal coefficient: 1.17	Fresh water: 286 m³/s

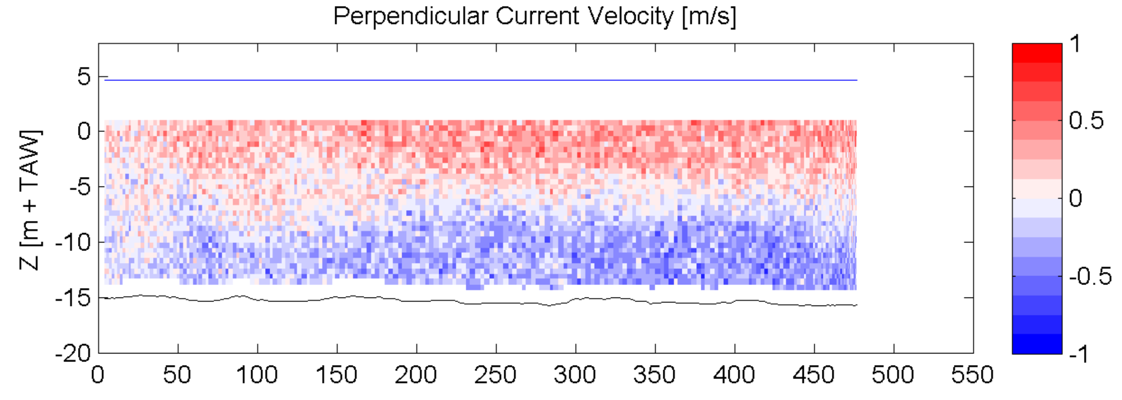


f)	19/06/2008	1 hr after HW	Tidal coefficient: 1.15	Fresh water: 93 m³/s

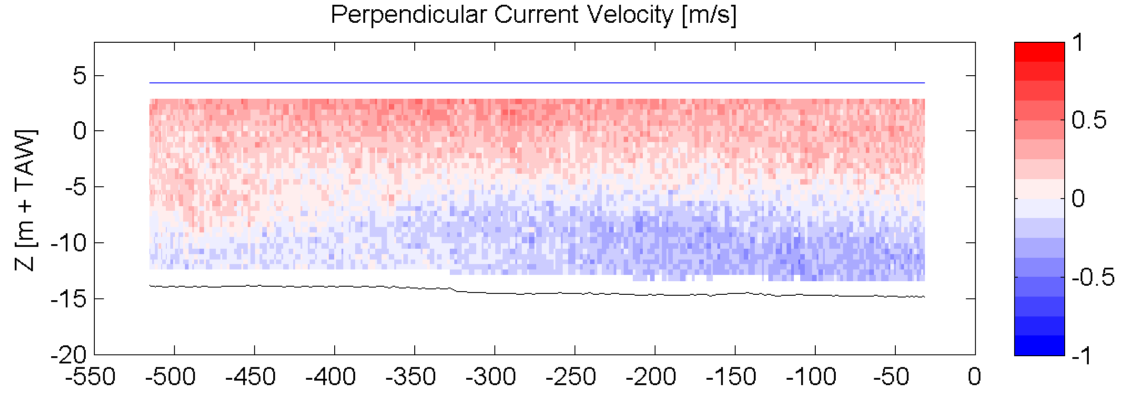


g)	26/06/2008	1 hr after HW	Tidal coefficient: 0.97	Fresh water: 69 m³/s

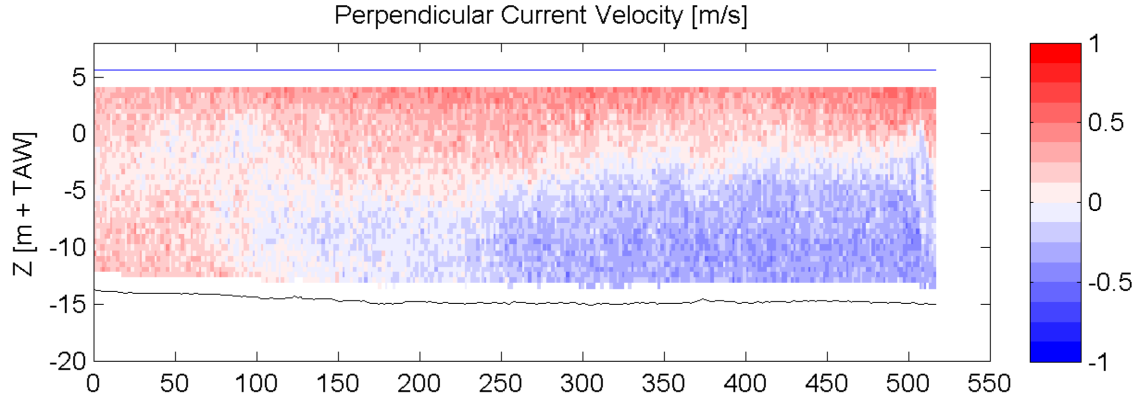
				
h)	24/09/2008	1 hr after HW	Tidal coefficient: 0.81	Fresh water: 75 m³/s
				
i)	30/09/2008	1 hr after HW	Tidal coefficient: 1.08	Fresh water: 82 m³/s
				
j)	02/12/2008	1 hr after HW	Tidal coefficient: 0.98	Fresh water: 154 m³/s



k)	10/12/2008	1 hr after HW	Tidal coefficient: 0.97	Fresh water: 222 m³/s

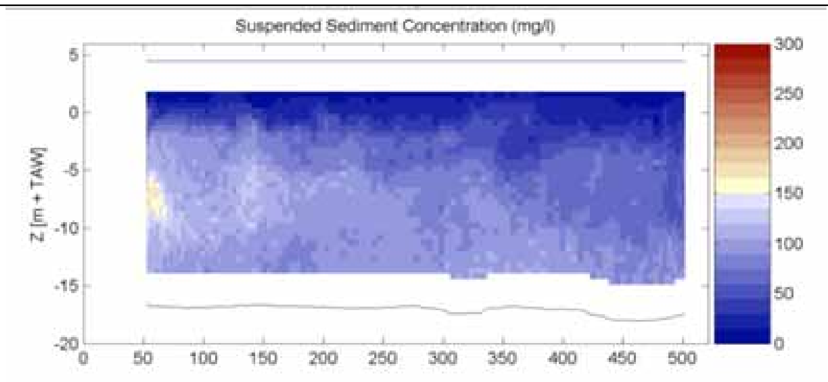
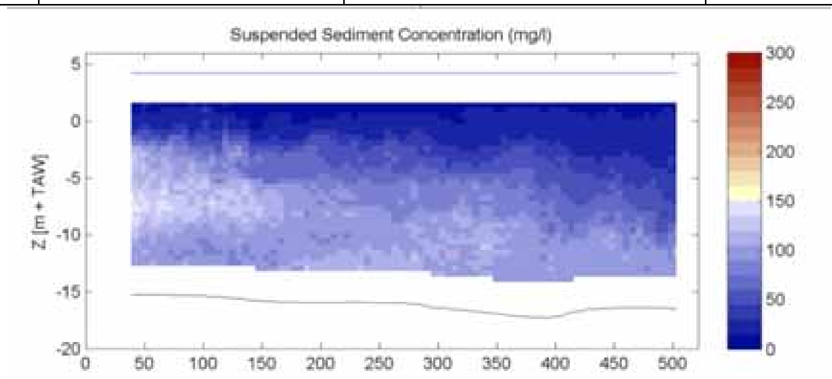
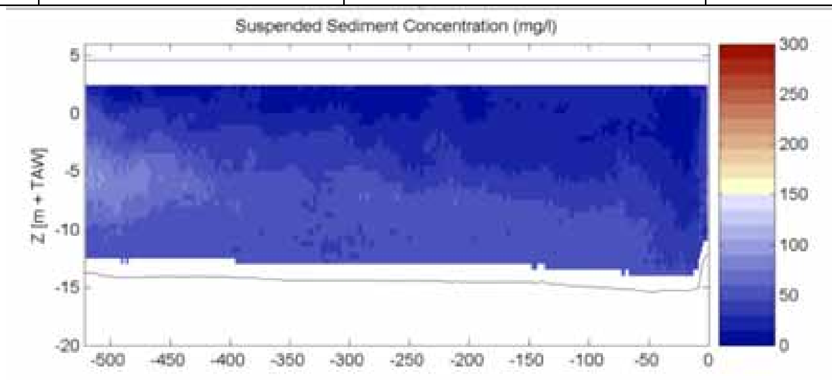


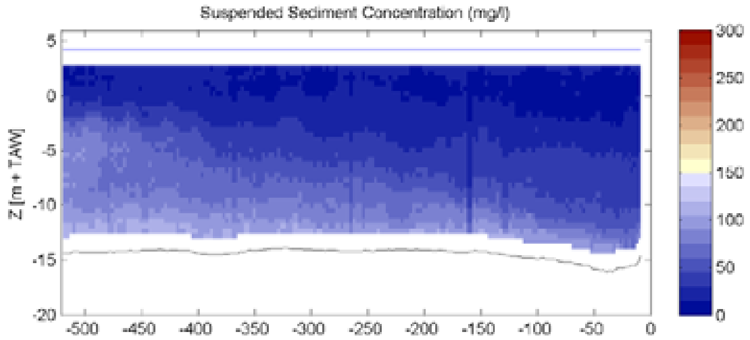
l)	06/03/2009	1 hr after HW	Tidal coefficient: 0.82	Fresh water: 99m³/s



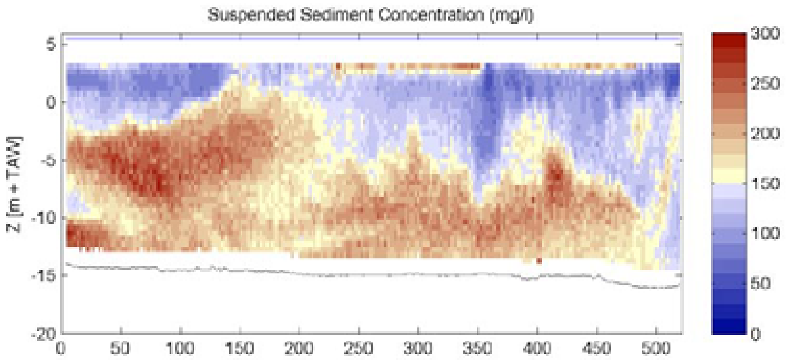
m)	12/03/2009	1 hr after HW	Tidal coefficient: 1.24	Fresh water: 129m³/s

Figure 5-7: a) Perpendicular current velocity on 17/11/2005, b) on 22/03/2006 , c) on 27/09/2006, d) on 24/10/2007, e) on 11/03/2008, f) on 19/06/2008, g) on 26/06/2008, h) on 24/09/2008, i) on 30/09/2008, j) on 02/12/2008, k) on 10/12/2008, l) on 06/03/2009 and m) on 12/03/2009 at 1h after high water

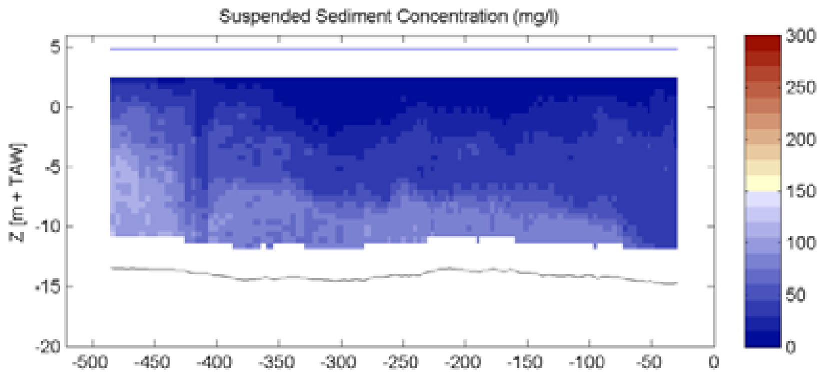
				
a)	17/11/2005	1 hr after HW	Tidal coefficient: 1.10	Fresh water: 91 m³/s
				
b)	22/03/2006	1 hr after HW	Tidal coefficient: 0.97	Fresh water: 94 m³/s
				
c)	27/09/2006	1 hr after HW	Tidal coefficient: 1.03	Fresh water: 33 m³/s



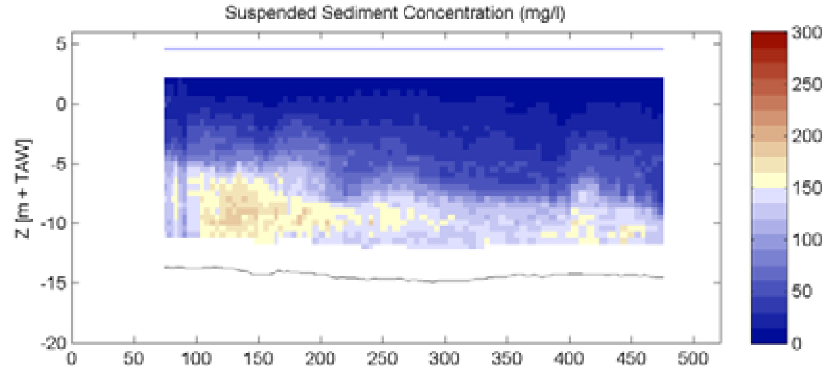
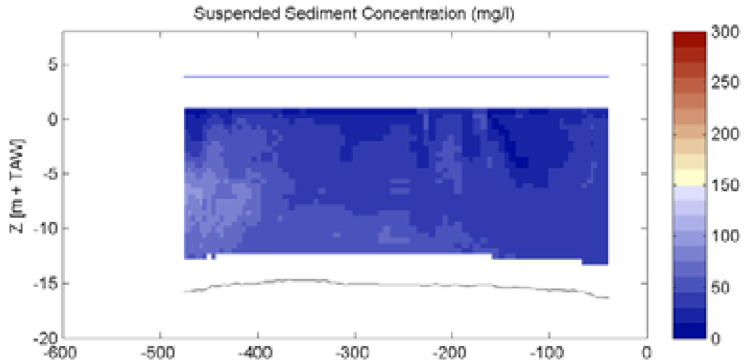
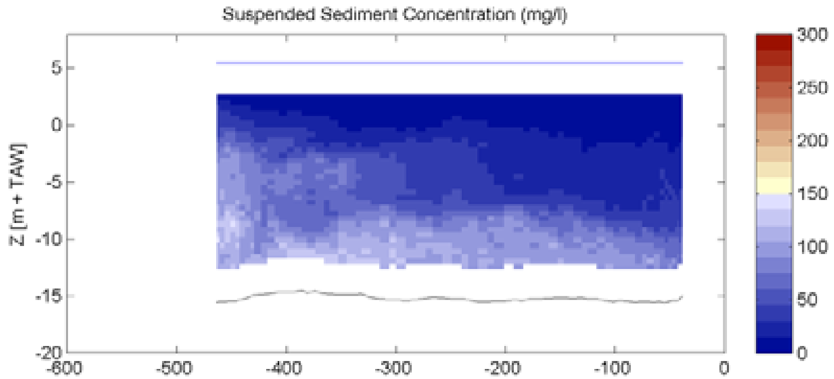
d)	24/10/2007	1 hr after HW	Tidal coefficient: 1.02	Fresh water: 46 m³/s

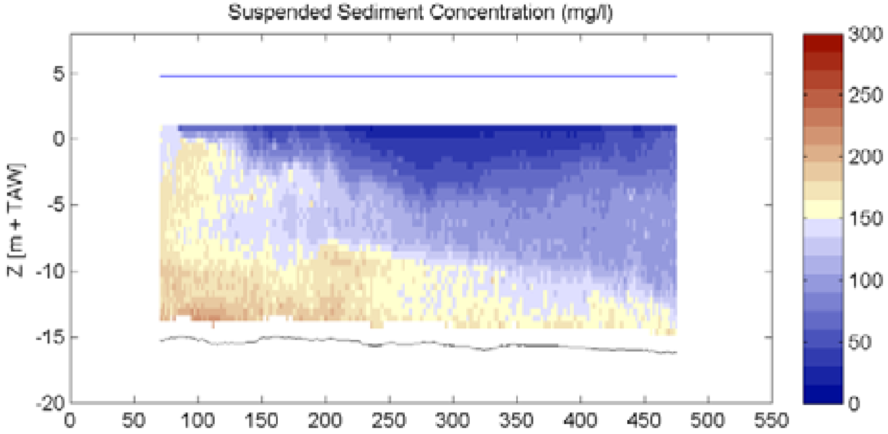


e)	11/03/2008	1 hr after HW	Tidal coefficient: 1.17	Fresh water: 286 m³/s

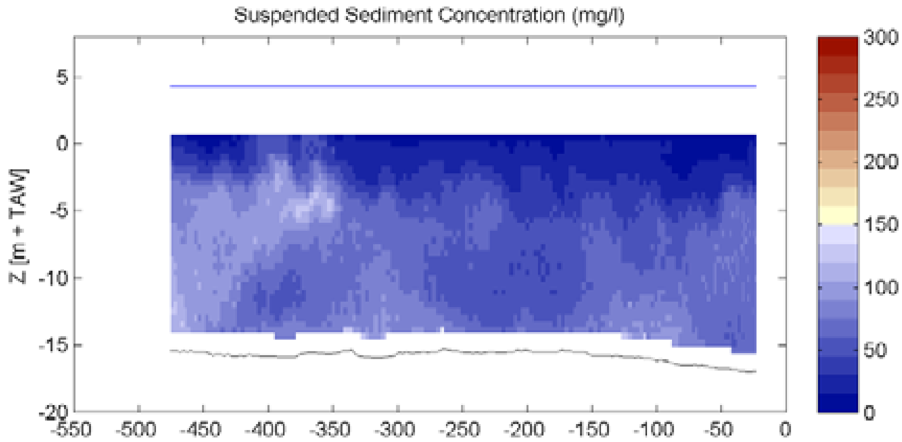


f)	19/06/2008	1 hr after HW	Tidal coefficient: 1.15	Fresh water: 93 m³/s

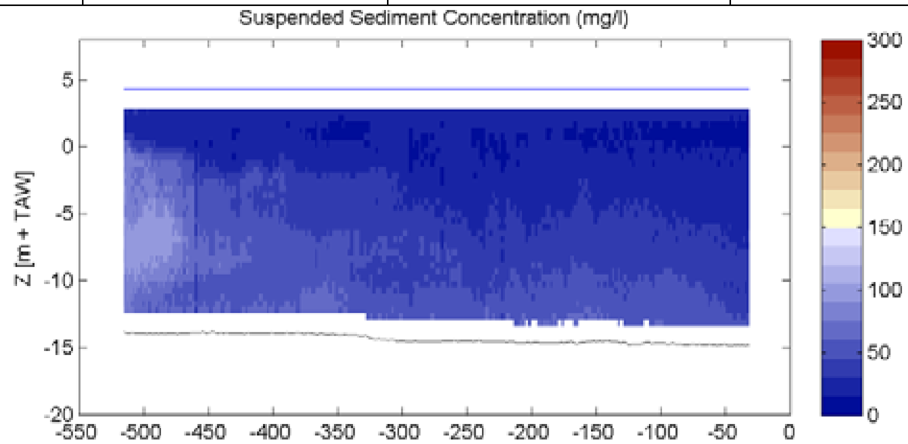
				
g)	26/06/2008	1 hr after HW	Tidal coefficient: 0.97	Fresh water: 69 m³/s
				
h)	24/09/2008	1 hr after HW	Tidal coefficient: 0.81	Fresh water: 75 m³/s
				
i)	30/09/2008	1 hr after HW	Tidal coefficient: 1.08	Fresh water: 82 m³/s



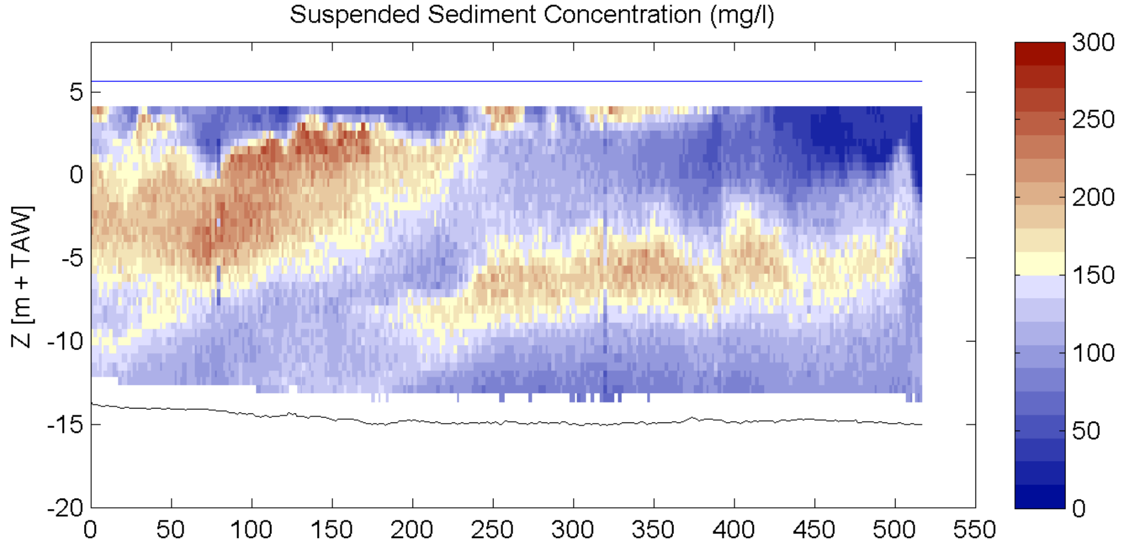
j)	02/12/2008	1 hr after HW	Tidal coefficient: 0.98	Fresh water: 154 m³/s



k)	10/12/2008	1 hr after HW	Tidal coefficient: 0.97	Fresh water: 222 m³/s



l)	06/03/2009	1 hr after HW	Tidal coefficient: 0.82	Fresh water: 99m³/s



m)	12/03/2009	1 hr after HW	Tidal coefficient: 1.24	Fresh water: 129m³/s

Figure 5-8: a) Suspended sediment concentration on 17/11/2005, b) on 22/03/2006 , c) on 27/09/2006, d) on 24/10/2007, e) on 11/03/2008, f) on 19/06/2008, g) on 26/06/2008, h) on 24/09/2008, i) on 30/09/2008, j) on 02/12/2008, k) on 10/12/2008, l) on 06/03/2009 and m) on 12/03/2009 at 1h after high water

5.2.3. Water balance

The volume of water, crossing the dock's entrance during the complete measurement day was calculated by integrating respectively total incoming and total outgoing discharge. The absolute values of both volumes were added up to know the total water exchange through the transect on the 12th of March 2009. Flood and ebb total water exchange were calculated with the same technique.

Next to the measured total water exchange, the theoretical exchanged water volume due to tidal filling was calculated by integrating tidal difference over time multiplied by the surface area of Deurganckdok.

Table 5-3 Total water exchange compared to tidal filling water exchange at transect DGD during ebb, flood and the complete measurement day

	Q Exchanged [m^3]	***source***
Measured Total Ebb	29 149 866	ADCP measurement
Tidal Emptying	4 741 624	Volume balance
Measured Total Flood	27 429 214	ADCP measurement
Tidal Filling	6 626 032	Volume balance
Measured Total	56 579 080	ADCP measurement
Tidal Filling/Emptying Total	11 367 656	Volume balance

During flood on the 12th of March 2009, 27.4 million m³ water crossed the entrance and during ebb even more than 29 million m³ (see Figure 5-9). In total almost 56.6 million m³ water crossed the docks entrance, of which only 20% (11.4 million m³) can be contributed to tidal filling of Deurganckdok (see Figure 5-10). The other 80 % of water displacement at the entrance must be caused by density and eddy currents.

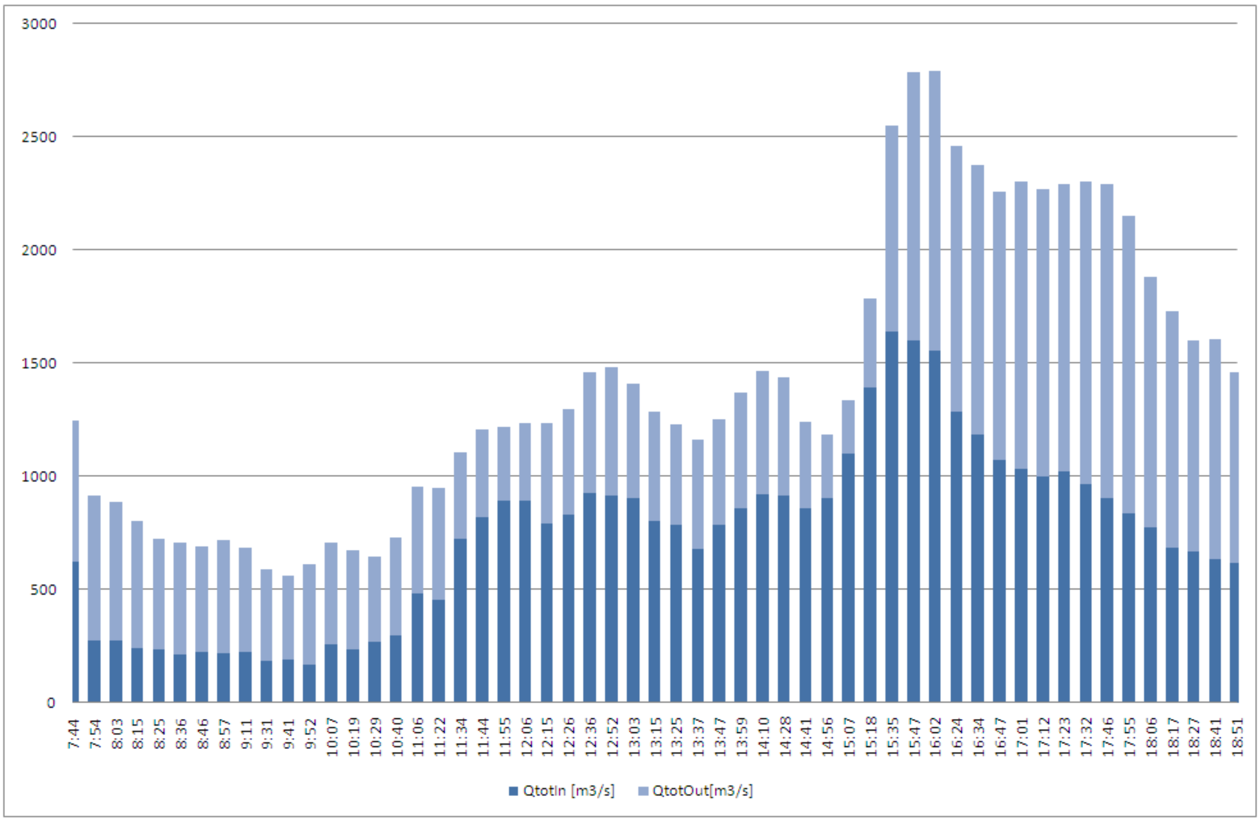


Figure 5-9 Total incoming and outgoing discharge at DGD on 12/03/2009

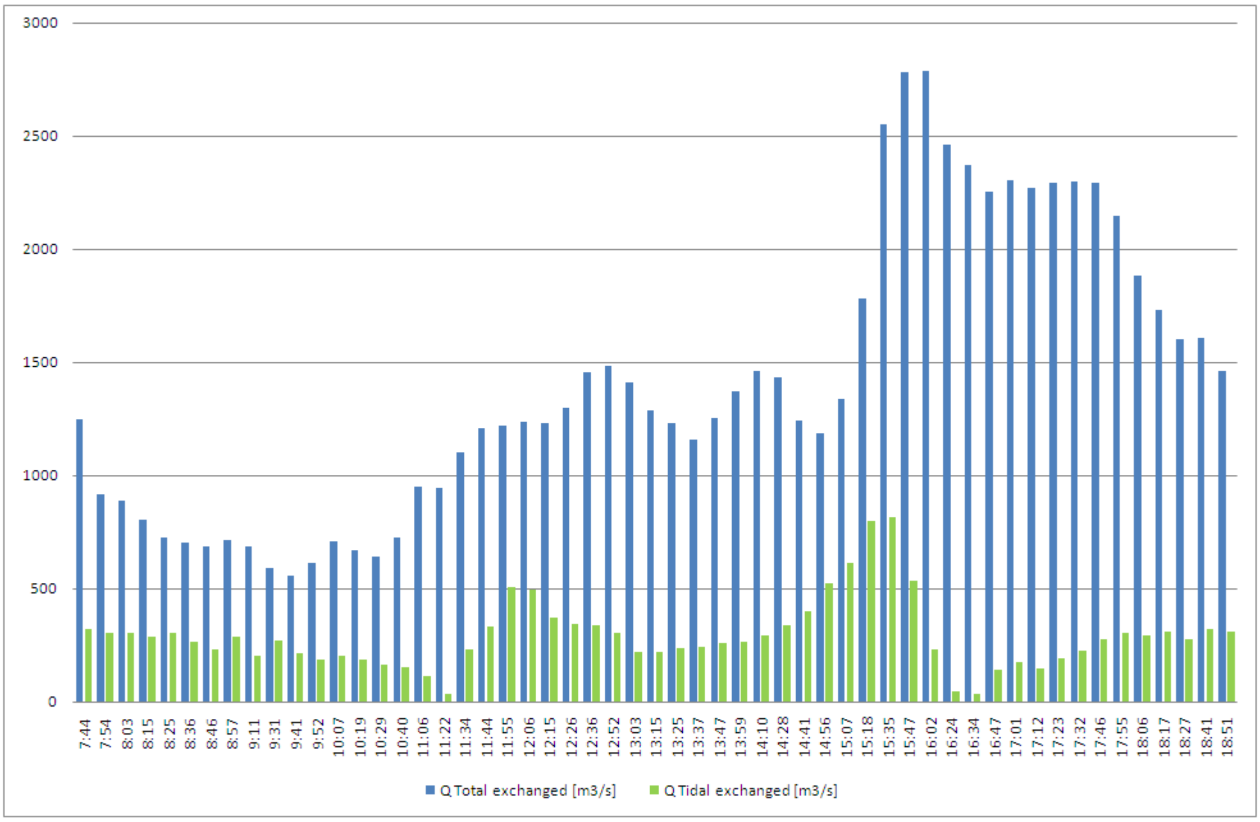


Figure 5-10 Total exchanged discharge versus exchanged discharge due to tidal filling at DGD on 12/03/2009

The measurements on the 12th of March 2009 show comparable results to the mathematical modelling results for Deurganckdok (IMDC, 1998). This 3-D model was used to analyse the different exchange mechanisms between the river and the dock. By comparing the total amount of water leaving or entering the dock with the tidal volume, it was possible to identify that horizontal water exchange, due to density currents and eddy formation, is the dominant factor. The analysis led to the following conclusions:

- During a spring tide ebb or flood the water exchange due to tidal filling is $7x10^6$ m^3, due to eddy effects about $6\text{-}12x10^6$ m^3 depending on the section and about $29x10^6$ m^3due to density effects. With density currents the total water exchange is thus about $42\text{-}48x10^6$ m^3. Without density effects the exchange would reduce to about $13\text{-}19x10^6$ m^3.
- Tidal filling and eddy effects are each responsible for ± 20% of the total water exchange.
- Density currents are responsible for ± 60-67% of the total water exchange.

The water balance doesn’t match; as the measured filling of the dock is 2.8 million m³ over a period where tidal filling (calculated by integrating tide) is 1.9 million m³ (see Table 5-4). The filling of the dock is thus overestimated by the measurements with 0.9 million cubic metres.

In comparison to the 11 million m³ of water exchanged by tidal filling/emptying, this overestimation of 0.9 million m³ seems rather high (see Figure 5-11), but compared to the 56 million cubes, the overestimation error is negligible (only 1.5% of the total exchanged volume ,see Figure 5-12).

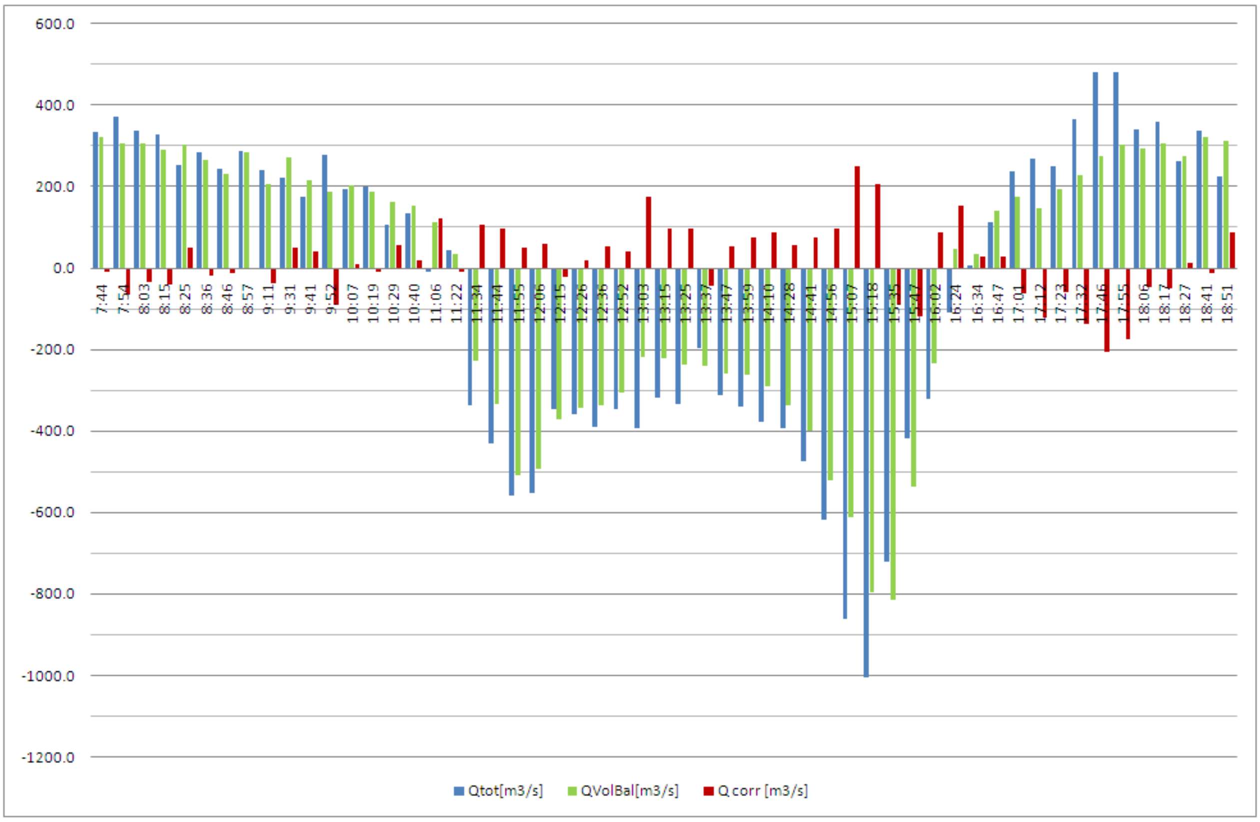


Figure 5-11 Measured residual discharge (Qtot) versus theoretical residual discharge (QVolBal) and correction offset (Qcorr) at DGD on 12/03/09 (negative values represent incoming water)

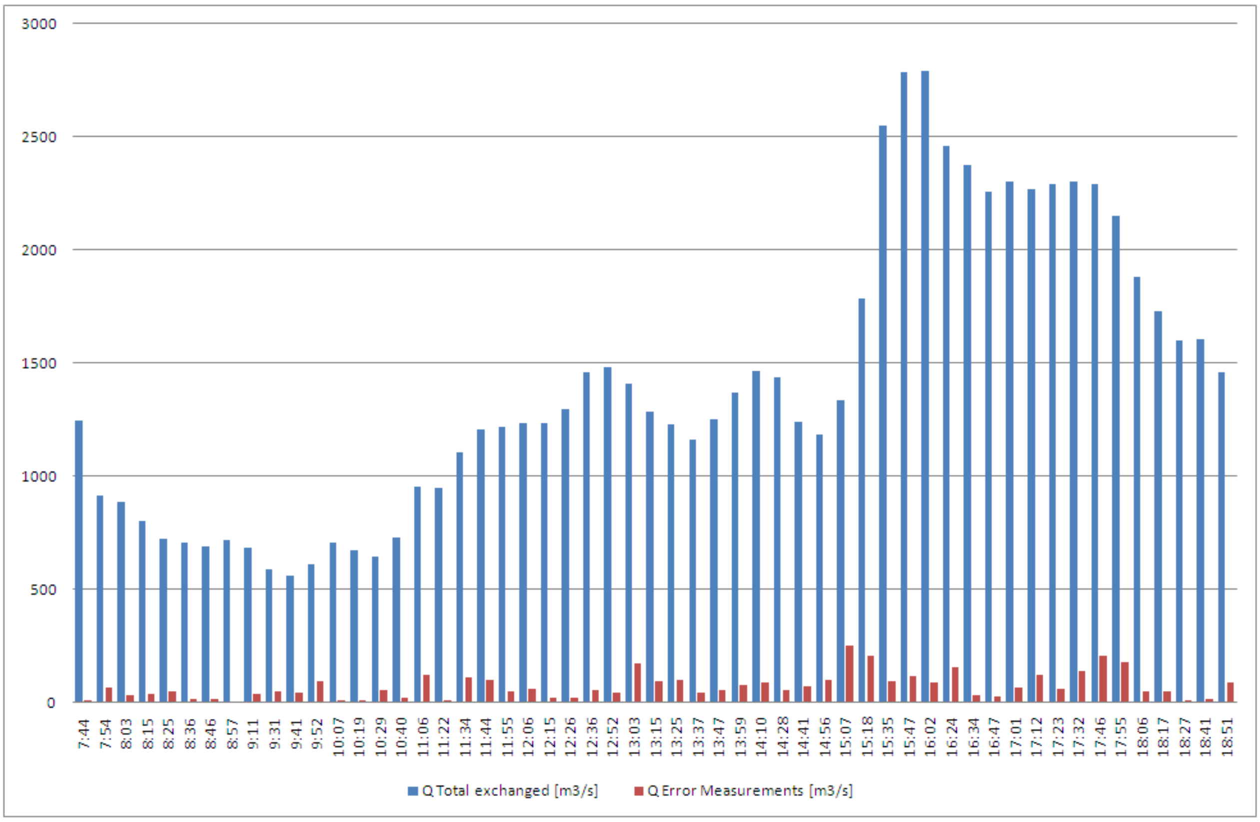


Figure 5-12 Absolute error in total water exchange versus total water exchange at DGD on 12/03/2009

Table 5-4 Total residual, incoming and outgoing water volumes in Deurganckdok during the measurement campaign of 12/03/09 compared to tidal filling/emptying volumes.

	Q Total Net [m^3]	***Q Total In [m^3]***	***Q Total Out [m^3]***
Measured Ebb*	4 990 616	12 079 625	17 070 241
Tidal Emptying**	4 741 624	-	-
Measured Flood*	7 740 770	17 584 992	9 844 222
Tidal Filling**	6 626 032	-	-
Measured Net*	2 750 155	29 664 617	26 914 463
Tidal Filling Net**	1 884 408	-	-

(: data from ADCP measurement, **: data derived from integration of tide)*

One of the reasons of the overestimation can be found in the estimations of the unmeasured regions (the bottom, top and edge estimations). An ADCP cannot measure a complete cross section. Near the banks, near the bottom and near the water surface, no measurements can be executed and the discharges in these unmeasured areas needs to be estimated (see 4.2.4.1).

The errors caused by estimations can be minimised if a good vessel setup and appropriate ADCP and measurement protocol is chosen.

Compared to former campaigns, the effect of the top, bottom and edge estimates seems to be larger. This can be partly explained as a result of the boat setup and the used ADCP.

The uncertainty on the top estimated values should be decreased since the transducer depth of the ADCP was highered from 2.6 meter (setup on the Parel II in December 2008) to 0.5 meter (setup ADCP on the Parel II in March 2009).

The uncertainty on the bottom estimated values for the measurements of 17/11/2005, 22/03/2006, 19/06/2008, 26/06/2008, 24/09/2009 and 30/09/2008 was twice as big because of the beam angle of the used ADCP. In these measurements, the beam angle of the ADCP was 30°, therefore, the area near the bottom that is not be measured is 12% (see 4.2.4.1). During the other measurements, including this measurement, the ADCP had a beam angle of 20°, which implements a much smaller unmeasured area of 6%.

Compared to the first measurement campaigns the effect of estimations caused by interpolating between 2 successive transects is now minimized because the latest measurements were executed at a higher frequency, 5 to 6 measurements per hour, than the first measurements (2 measurements per hour).

As a conclusion, it appears that the water balance fit quite well (see Figure 5-11). The main cause for the unbalanced balance is the uncertainty/accuracy of the estimations and the fact that the total exchanged volume of water at the entrance of DGD is approximately five times bigger than the known resulting volume entering and leaving the dock, i.e. the tidal volume (see Figure 5-10).

In the future, it is important on one hand to minimize these estimates as much as possible by starting and ending the transects close to the quay walls, by minimising the transducer depth and by using an ADCP with a beam angle of 20° instead of 30°. On the second hand, it is important to maintain the high frequency of sailed transects.

5.2.4. Sediment balance

The mass of the suspended sediment, crossing dock's entrance during flood or ebb on a measurement day, was calculated on a similar manner as the volume.

From Figure 5-14 it can be concluded that the residual sediment flux is less than a fourth of the total sediment exchange at the entrance of Deurganckdok and from Figure 5-13 it can be seen that incoming and outgoing flux are always in the same order of magnitude. If these two conclusions are considered together one can see that the water balance has to fit before the sediment balance can be acceptable. An overestimation of outgoing discharge will always lead to an underestimation of the incoming sediment mass.

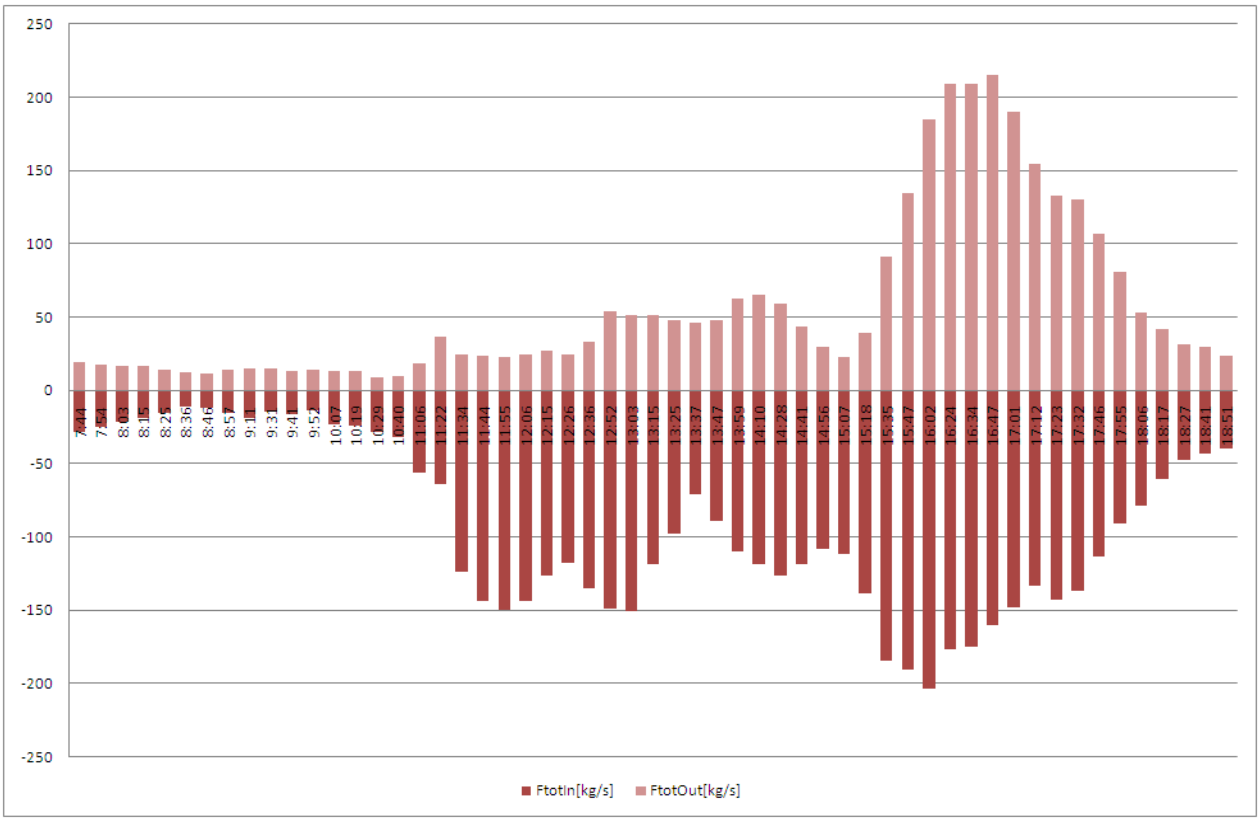


Figure 5-13 Total incoming and outgoing sediment flux at DGD on 12/03/2009 (negative values represent incoming sediment)

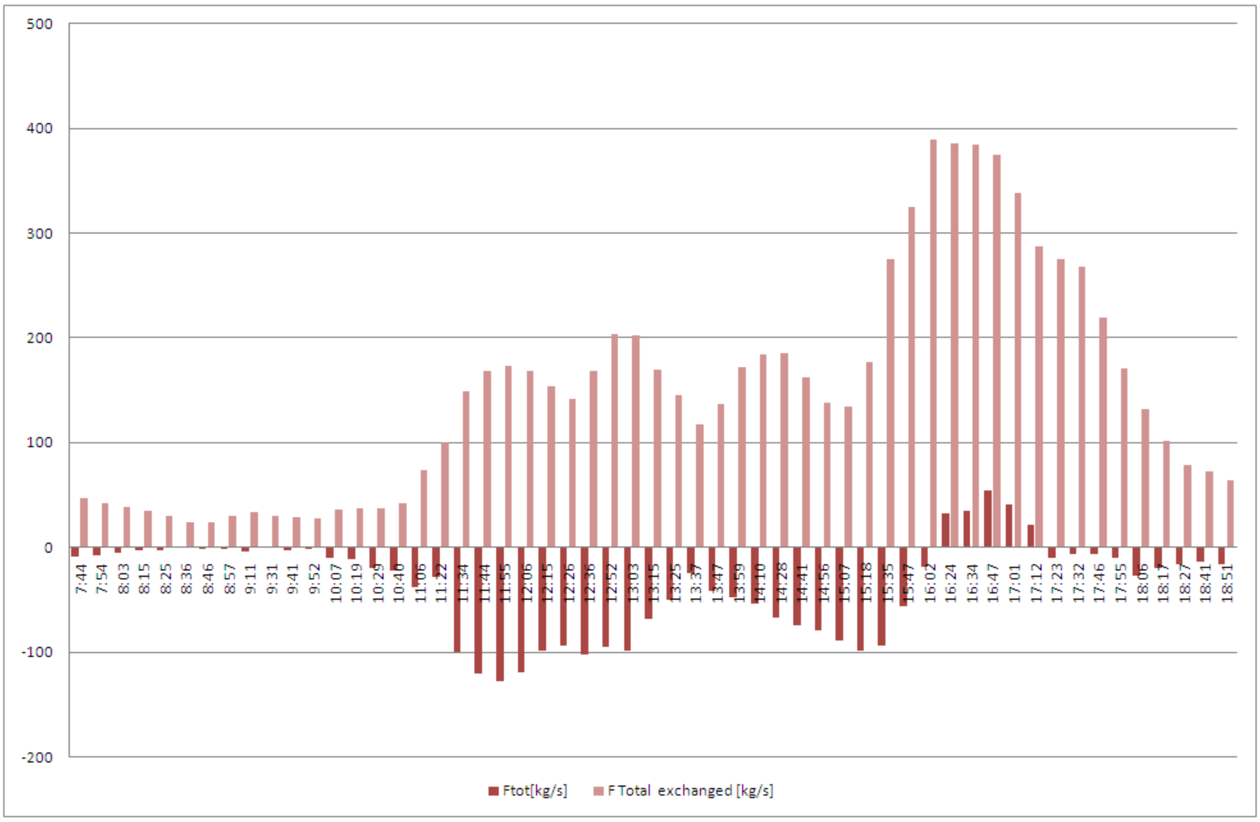


Figure 5-14 Total sediment flux versus total sediment exchange at DGD on 12/03/2009 (negative values represent incoming sediment)

As the error in water discharge is known (difference between total residual discharge and discharge due to tidal filling of the dock), one can try to correct discharges in order to calculate a more realistic sediment deposition in DGD over a tidal cycle. For the correction of the total discharge the following methods were used; in the first case the total incoming measured discharge was retained and the total outgoing discharge was reduced with 0.9 million m^3, in the second case the total outgoing discharge was retained and the total incoming discharge was raised with 0.9 million m^3. In both cases the total settled sediment mass increased. The settled sediment mass, calculated with corrected discharges, was estimated between 1276 and 1299 tonnes over the measurement cycle. During ebb approximately 2700 tonnes of sediment passed the entrance of which 144 tonnes stayed into the dock; during flood approximately 3390 tonnes passed the entrance of which 1140 tonnes stayed into the dock.

Figure 5-15 shows the relation between the amount of suspended sediments passing in the river Scheldt and the amount of sedimentation in the dock. Sediment data is obtained from the long term measurements at buoy 97 and buoy 84 (IMDC 2005l, 2006l, 2006p, 2007b, 2008p, 2008aa, 2009m).

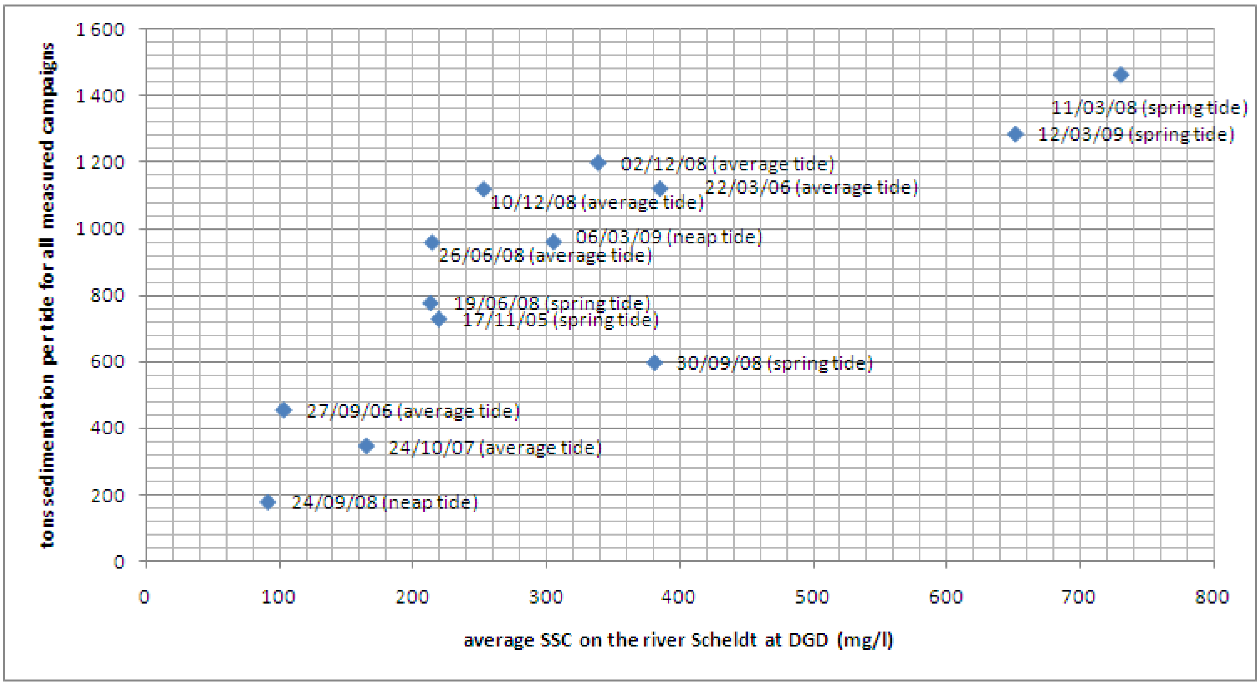


Figure 5-15 Overview of measured sediment deposition in Deurganckdock per tide by means of Sediview technique

In comparison to 3D simulations that were made to analyse the mud deposition in the dock (IMDC, 1998), model results from the empirical model described in report 4.10 (IMDC, 2008s) and former measurement campaigns at transect DGD, this resulting deposition during spring tide is average. The model results from the empirical model described in report 4.10 (IMDC, 2008s) show net siltation rates from 400 to 2000 tonnes per tide, with a yearly average of 1000 tonnes per tide. The model results of the 3D model (IMDC, 1998) simulated siltation rates of ±1200 tonnes during a neap tide and ±1700 tonnes during a spring tide.

Table 5-5: Water volumes during ebb, flood and measurement campaign on 17/11/2005 (Spring tide), 22/03/2006 (Average tide), 27/09/2006 (Average tide), 24/10/2007 (Average tide), 11/03/2008 (Spring tide) and 19/06/2008 (Spring tide), including theoretical expected volumes. The durations are based on ADCP measurement. Tidal data of gauge Liefkenshoek was used.

Measurement Day		***17/11/2005***	***22/03/2006***	***27/09/2006***	***24/10/2007***	***11/03/2008***	***19/06/2008***
DGD surface area [10³ m²]		750	750	750	1 019	1019	1 019
Tidal coefficient		1.1	0.97	1.03	1.02	1.17	1.15
Duration of measurement [hh:mm]		10:57	12:52	12:42	12:24	12:23	12:32
Daily fresh water discharge at Schelle [m³/s]		91	94	33	46	286	93
Ebb	exchanged volume	34 136 616	33 830 522	33 338 727	23 297 626	30 605 480	29 862 615
	incoming volume	18 436 105	14 715 880	14 974 087	8 579 394	10 263 013	10 501 491
	outgoing volume	15 700 511	19 114 642	18 364 640	14 718 232	20 342 466	19 361 124
	residual outgoing volume	-2 735 594	4 398 762	3 390 553	6 138 838	10 061 934	8 859 633
	residual tidal emptying = theoretical residual outgoing volume	2 485 404	3 758 065	4 226 908	5 479 043	5 957 334	5 456 121
	overestimed outgoing volume	-5 220 998	640 696	-836 355	659 795	4 104 600	3 403 512
Flood	exchanged volume	24 304 195	28 058 426	24 938 855	19 611 830	22 983 058	26 368 812
	incoming volume	12 564 681	14 965 302	14 236 036	10 590 072	14 477 186	14 602 453
	outgoing volume	11 739 513	13 093 124	10 702 819	9 021 758	8 505 873	11 766 360
	residual incoming volume	825 168	1 872 179	3 533 217	1 568 313	5 965 867	2 836 093
	residual tidal filling = theoretical residual incoming volume	3 370 067	3 261 295	3 913 928	5 133 774	5 941 019	5 390 972
	underestimated incoming volume	2 544 898	1 389 116	380 711	3 565 461	-24 848	2 554 879
Total	exchanged volume	58 440 811	61 888 948	58 277 582	42 909 456	53 588 538	56 231 427
	incoming volume	31 000 787	29 681 183	29 210 123	19 169 465	24 740 199	25 103 943
	outgoing volume	27 440 024	32 207 765	29 067 459	23 739 990	28 848 339	31 127 483
	residual outgoing volume	-3 560 763	2 526 583	-142 664	4 570 525	4 096 067	6 023 540
	residual tidal emptying = theoretical residual outgoing volume	-884 663	496 771	312 980	345 269	16 315	65 148
	overestimed outgoing volume	-2 676 100	2 029 812	-455 644	4 225 255	4 079 752	5 958 392

Table 5-6: Water volumes during ebb, flood and measurement campaign on 26/06/2008 Average tide, 24/09/2008 (neap tide), 30/09/2008 (Spring tide), 2/12/2008 (average tide),10/12/2008 (average tide) and 06/03/2009 (neap tide) including theoretical expected volumes. The durations are based on ADCP measurement. Tidal data of gauge Liefkenshoek was used.

Measurement Day		***26/06/2008***	***24/09/2008***	***29/09/2008***	***02/12/2008***	***10/12/2008***	***06/03/2009***
DGD surface area [10³ m²]		1 019	1 019	1 019	1 019	1 019	1 019
Tidal coefficient		0.97	0.81	1.08	0.98	0.97	0.82
Duration of measurement [hh:mm]		12:20	12:38	12:49	12:19	12:38	12:47
Daily fresh water discharge at Schelle [m³/s]		69	75	82	154	222	99
Ebb	exchanged volume	25 668 407	25 792 421	32 789 767	36 715 558	33 823 289	26 728 208
	incoming volume	8 246 217	9 556 269	10 949 298	14 953 928	14 465 653	9 940 416
	outgoing volume	17 422 189	16 236 153	21 840 470	21 761 630	19 357 636	16 787 791
	residual outgoing volume	9 175 972	6 679 884	10 891 172	6 807 701	4 891 983	6 847 375
	residual tidal emptying = theoretical residual outgoing volume	4 805 274	4 099 889	6 208 764	5 225 432	5 166 327	4 339 262
	overestimated outgoing volume	4 370 698	2 579 995	4 682 408	1 582 269	-274 344	2 508 114
Flood	exchanged volume	24 109 880	26 619 095	25 215 597	33 852 955	33 660 183	26 075 575
	incoming volume	11 817 853	14 615 500	14 186 274	20 099 000	19 741 042	15 476 158
	outgoing volume	12 292 027	12 003 595	11 029 323	13 753 955	13 919 141	10 599 417
	residual incoming volume	474 174	2 611 905	3 156 951	6 345 046	5 821 901	4 876 740
	residual tidal filling = theoretical residual incoming volume	5 211 112	3 620 075	5 767 856	5 090 483	4 950 425	3 860 364
	underestimated incoming volume	4 736 938	1 008 169	2 610 905	-1 254 562	-871 476	-1 016 376
Total	exchanged volume	49 778 287	52 411 517	58 005 364	70 568 513	67 483 472	52 803 783
	incoming volume	20 064 071	24 171 769	25 135 572	35 515 584	34 206 695	25 416 574
	outgoing volume	29 714 217	28 239 748	32 869 792	35 052 929	33 276 777	27 387 209
	residual outgoing volume	9 650 146	4 067 979	7 734 220	462 656	-929 918	1 970 635
	residual tidal emptying = theoretical residual outgoing volume	-405 838	479 814	440 908	134 948	215 902	478 898
	overestimated outgoing volume	10 055 984	3 588 164	7 293 313	327 707	-1 145 820	1 491 737

Table 5-7: Water volumes during ebb, flood and measurement campaign on 12/03/2009 (spring tide) including theoretical expected volumes. The durations are based on ADCP measurement. Tidal data of gauge Liefkenshoek was used.

Measurement Day		***12/03/2009***
DGD surface area [10^3 m²]		1 019
Tidal coefficient		1.24
Duration of measurement [hh:mm]		12:10
Daily fresh water discharge at Schelle [m³/s]		129
Ebb	exchanged volume	29 457 403
	incoming volume	12 387 162
	outgoing volume	17 070 241
	residual outgoing volume	4 683 079
	residual tidal emptying = theoretical residual outgoing volume	4 741 624
	overestimated outgoing volume	-58 545
Flood	exchanged volume	26 278 501
	incoming volume	16 434 279
	outgoing volume	9 844 222
	residual incoming volume	6 590 057
	residual tidal filling = theoretical residual incoming volume	6 626 032
	underestimated incoming volume	35 975
Total	exchanged volume	55 735 904
	incoming volume	28 821 441
	outgoing volume	26 914 463
	residual outgoing volume	-1 906 978
	residual tidal emptying = theoretical residual outgoing volume	-1 884 408
	overestimated outgoing volume	-22 570

Table 5-8 Range of sediment deposition during ebb, flood and measurement campaign on 17/11/2005 (Spring tide), 22/03/2006 (Average tide), 27/09/2006 (Average tide) and 24/10/2007 (Average tide), calculated with forced fitting water balances for those days. The duration is based on ADCP measurements.

Measurement Day		***17/11/2005***		***22/03/2006***		***27/09/2006***		***24/10/2007***	
DGD surface area [10^3 m^2]		750		750		750		1 019	
Tidal coefficient		1.1		0.97		1.03		1.02	
Duration of measurement [hh:mm]		10:57		12:52		12:42		12:24	
Daily fresh water discharge at Schelle [m^3/s]		91		94		33		46	
Ebb	exchanged mass [kg]	1 703 926	2 367 275	1 780 460	1 867 483	1 056 448	1 090 019	619 806	584 893
	incoming mass [kg]	1 087 233	1 488 674	1 160 142	1 217 874	635 375	656 454	335 783	316 828
	outgoing mass [kg]	616 692	878 601	620 317	649 609	421 074	433 565	284 023	268 065
	residual incoming mass [kg]	470 541	610 073	539 825	568 265	214 301	222 890	51 760	48 763
Flood	exchanged mass [kg]	1 804 593	1 498 429	2 092 190	2 328 688	683 915	663 551	1 015 320	714 273
	incoming mass [kg]	999 502	841 383	1 319 543	1 459 070	462 843	448 383	661 872	500 923
	outgoing mass [kg]	805 091	657 046	772 648	869 618	221 073	215 168	353 448	213 350
	residual incoming mass [kg]	194 411	184 337	546 895	589 452	241 770	233 215	308 424	287 573
Total	exchanged mass [kg]	3 508 519	3 865 704	3 872 650	4 196 170	1 740 364	1 753 570	1 635 126	1 299 166
	incoming mass [kg]	2 086 735	2 330 057	2 479 685	2 676 943	1 098 217	1 104 837	997 655	817 751
	outgoing mass [kg]	1 421 783	1 535 647	1 392 965	1 519 227	642 146	648 733	637 470	481 415
	residual incoming mass [kg]	664 952	794 410	1 086 720	1 157 717	456 071	456 105	360 185	336 337

Table 5-9 Range of sediment deposition during ebb, flood and measurement campaign on 11/03/2008 (Spring tide), 19/06/2008 (Spring tide), 26/06/2008 (Average tide) and 24/09/2008 (neap tide) calculated with forced fitting water balances for those days. The duration is based on ADCP measurements.

Measurement Day		***11/03/2008***		***19/06/2008***		***26/06/2008***		***24/09/2008***	
DGD surface area [10³ m²]		1 019		1 019		1 019		1 019	
Tidal coefficient		1.17		1.15		0.97		0.81	
Duration of measurement [hh:mm]		12:23		12:32		12:20		12:38	
Daily fresh water discharge at Schelle [m³/s]		286		93		69		75	
Ebb	exchanged mass [kg]	2 589 128	3 641 521	1 087 599	1 375 505	1 040 509	1 471 199	701 869	674 344
	incoming mass [kg]	1 387 950	1 989 942	668 861	865 152	694 822	1 008 047	402 477	316 469
	outgoing mass [kg]	1 201 178	1 651 579	418 737	510 353	345 687	463 151	299 392	357 875
	residual incoming mass [kg]	186 772	338 362	250 124	354 799	349 135	544 896	17 077	44 602
Flood	exchanged mass [kg]	2 928 327	2 956 105	1 710 175	2 039 419	1 173 483	1 884 440	993 459	991 306
	incoming mass [kg]	2 058 036	2 086 840	1 087 813	1 262 679	815 210	1 226 949	590 065	550 302
	outgoing mass [kg]	870 291	869 265	622 362	776 740	358 272	657 490	403 394	441 004
	residual incoming mass [kg]	1 187 745	1 217 575	465 450	485 939	456 938	569 459	146 908	149 061
Total	exchanged mass [kg]	5 517 455	6 597 625	2 797 774	3 414 924	2 213 992	3 355 639	1 695 328	1 665 650
	incoming mass [kg]	3 445 986	4 076 781	1 756 674	2 127 831	1 510 032	2 234 997	992 542	866 771
	outgoing mass [kg]	2 071 469	2 520 844	1 041 100	1 287 093	703 960	1 120 642	702 786	798 879
	residual incoming mass [kg]	1 374 517	1 555 937	715 574	840 738	806 073	1 114 355	163 986	193 663

Table 5-10 Range of sediment deposition during ebb, flood and measurement campaign on 30/09/2008 (Spring tide), 2/12/2008 (Average tide) and 06/03/2009 (Neap tide), calculated with forced fitting water balances for those days. The duration is based on ADCP measurements.

Measurement Day		***30/09/2008***		***02/12/2008***		***10/12/2008***		***6/03/2009***	
DGD surface area [10³ m²]			1 019		1 019		1 019		1 019
Tidal coefficient			1.08		0.98		0.97		0.82
Duration of measurement [hh:mm]			12:49		12:19		12:38		12:47
Daily fresh water discharge at Schelle [m³/s]			82		154		222		99
Ebb	exchanged mass [kg]	915 211	1 205 171	3 118 503	2 890 820	1 927 002	2 003 483	1 372 839	1 205 314
	incoming mass [kg]	558 775	768 792	1 853 641	1 723 816	1 143 975	1 194 154	846 780	744 568
	outgoing mass [kg]	356 437	436 379	1 264 862	1 167 004	783 026	809 330	526 059	460 746
	residual incoming mass [kg]	202 338	332 413	588 780	519 110	360 949	384 824	320 720	283 821
Flood	exchanged mass [kg]	1 135 260	1 341 907	4 151 712	4 500 008	3 402 375	3 573 339	1 736 134	1 926 814
	incoming mass [kg]	726 957	843 357	2 398 108	2 573 951	2 072 622	2 163 174	1 195 399	1 295 662
	outgoing mass [kg]	408 303	498 550	1 753 604	1 926 057	1 329 753	1 410 165	540 735	631 152
	residual incoming mass [kg]	318 655	344 807	644 504	647 894	742 868	753 009	654 664	664 509
Total	exchanged mass [kg]	2 050 471	2 547 078	7 270 216	7 428 530	5 329 377	5 576 822	3 108 973	3 132 128
	incoming mass [kg]	1 285 732	1 612 149	4 251 750	4 297 767	3 216 597	3 357 328	2 042 178	2 040 229
	outgoing mass [kg]	764 739	934 929	3 018 466	3 130 763	2 112 780	2 219 495	1 066 795	1 091 899
	residual incoming mass [kg]	520 993	677 220	1 233 284	1 167 004	1 103 817	1 137 833	975 384	948 330

Table 5-11 Range of sediment deposition during ebb, flood and measurement campaign on 12/03/2009 (Spring tide) calculated with forced fitting water balances for those days. The duration is based on ADCP measurements.

Measurement Day		***12/03/2009***	
DGD surface area [10^3 m²]		1 019	
Tidal coefficient		1.24	
Duration of measurement [hh:mm]		11:09	
Daily fresh water discharge at Schelle [m³/s]		129	
Ebb	exchanged mass [kg]	2 726 729	2 669 308
	incoming mass [kg]	1 438 590	1 403 523
	outgoing mass [kg]	1 288 140	1 265 785
	residual incoming mass [kg]	150 450	137 738
Flood	exchanged mass [kg]	3 253 326	3 531 232
	incoming mass [kg]	2 189 352	2 346 084
	outgoing mass [kg]	1 063 973	1 185 147
	residual incoming mass [kg]	1 125 379	1 160 937
Total	exchanged mass [kg]	5 980 055	6 200 540
	incoming mass [kg]	3 627 942	3 749 607
	outgoing mass [kg]	2 352 113	2 450 933
	residual incoming mass [kg]	1 275 829	1 298 675

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IMDC (2007c). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 11.1 Through tide Measurement Sediview & Siltprofiler 27/9 Stream - Liefkenshoek (I/RA/11291/06.104/MSA), in opdracht van AWZ.

IMDC (2007d). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 11.2 Through tide Measurement Sediview 27/9 Veremans - Raai K (I/RA/11291/06.105/MSA), in opdracht van AWZ.

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IMDC (2007f). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 11.4 Through tide Measurement Sediview 28/9 Veremans - Waarde(I/RA/11291/06.107/MSA), in opdracht van AWZ.

IMDC (2007g). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 11.5 Through tide Measurement Sediview 28/9 Parel 2 - Schelle (I/RA/11291/06.108/MSA), in opdracht van AWZ.

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IMDC (2007m) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.5 Annual Sediment Balance (I/RA/11283/06.117/MSA)

IMDC (2007n) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.2 Through tide measurement SiltProfiler 26/09/2006 Stream (I/RA/11283/06.068/MSA)

IMDC (2007o) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.4 Through tide measurement Sediview spring tide 27/09/2006 Parel 2 (I/RA/11283/06.119/MSA)

IMDC (2007p) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.7 Salt-Silt distribution & Frame Measurements Deurganckdok 15/07/2006 – 31/10/2006 (I/RA/11283/06.122/MSA)

IMDC (2007q) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.8 Salt-Silt distribution & Frame Measurements Deurganckdok 15/01/2007 – 15/03/2007 (I/RA/11283/06.123/MSA)

IMDC (2007r) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 3.1 Boundary conditions: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/06.127/MSA)

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IMDC (2008a) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.5: Through tide measurement Sediview average tide 24/10/2007 (I/RA/11283/06.120/MSA)

IMDC (2008b) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 4.1: Analysis of siltation Processes and Factors (I/RA/11283/06.129/MSA)

IMDC (2008c) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.12: Sediment Balance: Four monthly report 1/9/2007 – 31/12/2007 (I/RA/11283/07.083/MSA)

IMDC (2008d) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.13: Sediment Balance: Four monthly report 1/01/2007 – 31/03/2007 (I/RA/11283/07.084/MSA)

IMDC (2008e) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.14: Annual Sediment Balance. (I/RA/11283/07.085/MSA)

IMDC (2008f) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.09: Calibration stationary equipment autumn (I/RA/11283/07.095/MSA)

IMDC (2008g) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.10: Through tide measurement SiltProfiler 23 October 2007 (I/RA/11283/07.086/MSA)

IMDC (2008h) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.11: Through tide measurement Salinity Profiling winter 12 March 2008 (I/RA/11283/07.087/MSA)

IMDC (2008i) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.12: Through tide measurement Sediview winter 11 March 2008 – Transect I (I/RA/11283/07.088/MSA)

IMDC (2008j) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.13: Through tide measurement Sediview winter 11 March 2008 – Transect K (I/RA/11283/07.089/MSA)

IMDC (2008k) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.14: Through tide measurement Sediview winter 11 March 2008 – Transect DGD (I/RA/11283/07.090/MSA)

IMDC (2008l) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.15: Through tide measurement SiltProfiler winter 12 March 2008 (I/RA/11283/07.091/MSA)

IMDC (2008m) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.17: Salt-Silt distribution & Frame Measurements Deurganckdok autumn (17/9/2007-10/12/2007) (I/RA/11283/07.093/MSA)

IMDC (2008n) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.18: Salt-Silt distribution & Frame Measurements Deurganckdok winter (18/02/2007-31/03/2008) (I/RA/11283/07.094/MSA)

IMDC (2008o) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.19: Calibration stationary & mobile equipment winter (I/RA/11283/07.096/MSA)

IMDC (2008p) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 3.12: Boundary conditions: Three monthly report 1/9/2007 – 31/12/2007 (I/RA/11283/07.099/MSA)

IMDC (2008q) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 3.13: Boundary conditions: Three monthly report 1/1/2008 – 31/3/2007 (I/RA/11283/07.100/MSA)

IMDC (2008r) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 3.14: Boundary conditions: Annual report (I/RA/11283/07.101/MSA)

IMDC (2008s) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 4.10: Analysis of siltation Processes and Factors (I/RA/11283/07.102/MSA)

IMDC (2008t) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing Deelrapport 1.20: Sediment Balance: Three monthly report 1/4/2008 – 30/06/2008 (I/RA/11283/08.076/MSA)

IMDC (2008u) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.20: Through tide measurement Sediview during average tide Spring 2008 – 19 June 2008 (I/RA/11283/08.081/MSA)

IMDC (2008v) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.21: Through tide measurement Sediview during average tide Spring 2008 – 26 June 2008 (I/RA/11283/08.082/MSA)

IMDC (2008w) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing Deelrapport 1.21: Sediment Balance: Three monthly report 1/7/2008 – 30/09/2008 (I/RA/11283/08.077/MSA)

IMDC (2008x) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.22: Through tide measurement Sediview during neap tide Summer 2008 – 24 September 2008 (I/RA/11283/08.083/MSA)

IMDC (2008y) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.28: Through tide measurement ADCP eddy Summer 2008 – 1 October 2008 (I/RA/11283/08.089/MSA)

IMDC (2008z) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.32: Salt-Silt distribution Deurganckdok: six monthly report 1/4/2008 – 30/9/2008 (I/RA/11283/08.093/MSA)

IMDC (2008aa) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 3.20: Boundary conditions: Six monthly report 1/4/2008 – 30/09/2008 (I/RA/11283/08.096/MSA)

IMDC (2009a) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.23: Through tide measurement Sediview during spring tide Summer 2008 – 30 September 2008 (I/RA/11283/08.084/MSA)

IMDC (2009b) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.29: Through tide measurement SiltProfiler summer 2008 – 29 September 2008 (I/RA/11283/07.090/MSA)

IMDC (2009c) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.34: Calibration stationary & mobile equipment autumn 2008 (I/RA/11283/08.095/MSA)

IMDC (2009d) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing Deelrapport 1.22: Sediment Balance: Three monthly report 1/10/2008 – 31/12/2008 (I/RA/11283/08.078/MSA)

IMDC (2009e) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.24: Through tide measurement Sediview during neap tide Autumn 2008 (I/RA/11283/08.085/MSA)

IMDC (2009f) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.25: Through tide measurement Sediview during spring tide Autumn 2008 (I/RA/11283/08.086/MSA)

IMDC (2009g) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing Deelrapport 1.23: Sediment Balance: Three monthly report 1/01/2009 – 31/03/2009 (I/RA/11283/08.079/MSA)

IMDC (2009h) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing Deelrapport 1.24: Annual Sediment Balance (I/RA/11283/08.080/MSA)

IMDC (2009i) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.26: Through tide measurement Sediview during neap tide Winter 2009 (I/RA/11283/08.087/MSA)

IMDC (2009j) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.30: Through tide measurement SiltProfiler winter 2009 (I/RA/11283/08.091/MSA)

IMDC (2009k) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.31: Through tide measurement Salinity Profiling winter 2009 (I/RA/11283/08.092/MSA)

IMDC (2009l) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.33: Salt-Silt distribution Deurganckdok: six monthly report 1/10/2008 – 31/3/2009 (I/RA/11283/08.094/MSA)

IMDC (2009m) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 3.21: Boundary conditions: Six monthly report 1/10/2008 – 31/03/2009 (I/RA/11283/08.097/MSA)

IMDC (2009n) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.27: Through tide measurement Sediview during spring tide Winter 2009 (I/RA/11283/08.088/MSA)

IMDC (2009o) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 4.20: Analysis of siltation Processes and Factors (I/RA/11283/08.098/MSA)

TV SAM (2006a) Langdurige stationaire ADCP stroommetingen te Oosterweel dukdalf 01/2005-06/2005. 42SR S032PIB 2A.

TV SAM (2006b) Langdurige stationaire ADCP stroommetingen te Oosterweel dukdalf 07/2005-12/2005. 42SR S033PIB 2A.

TV SAM (2006c) Langdurige stationaire ADCP stroommetingen te Oosterweel dukdalf 01/2006-06/2006. 42SR S032PIB 2A.

Unesco (1983). Algorithms for computation of fundamental properties of seawater, UNESCO Technical Papers in Marine Science, 44. UNESCO, France.

Van Maren DS (2006) 3D Mud transport model Zeeschelde, Scenario 4, Effect CDW on sedimentation Deurganckdok, WL Delft Hydraulics, Report Z3824, November 2006.

Wunderground (2008). Weather Underground: www.wunderground.com

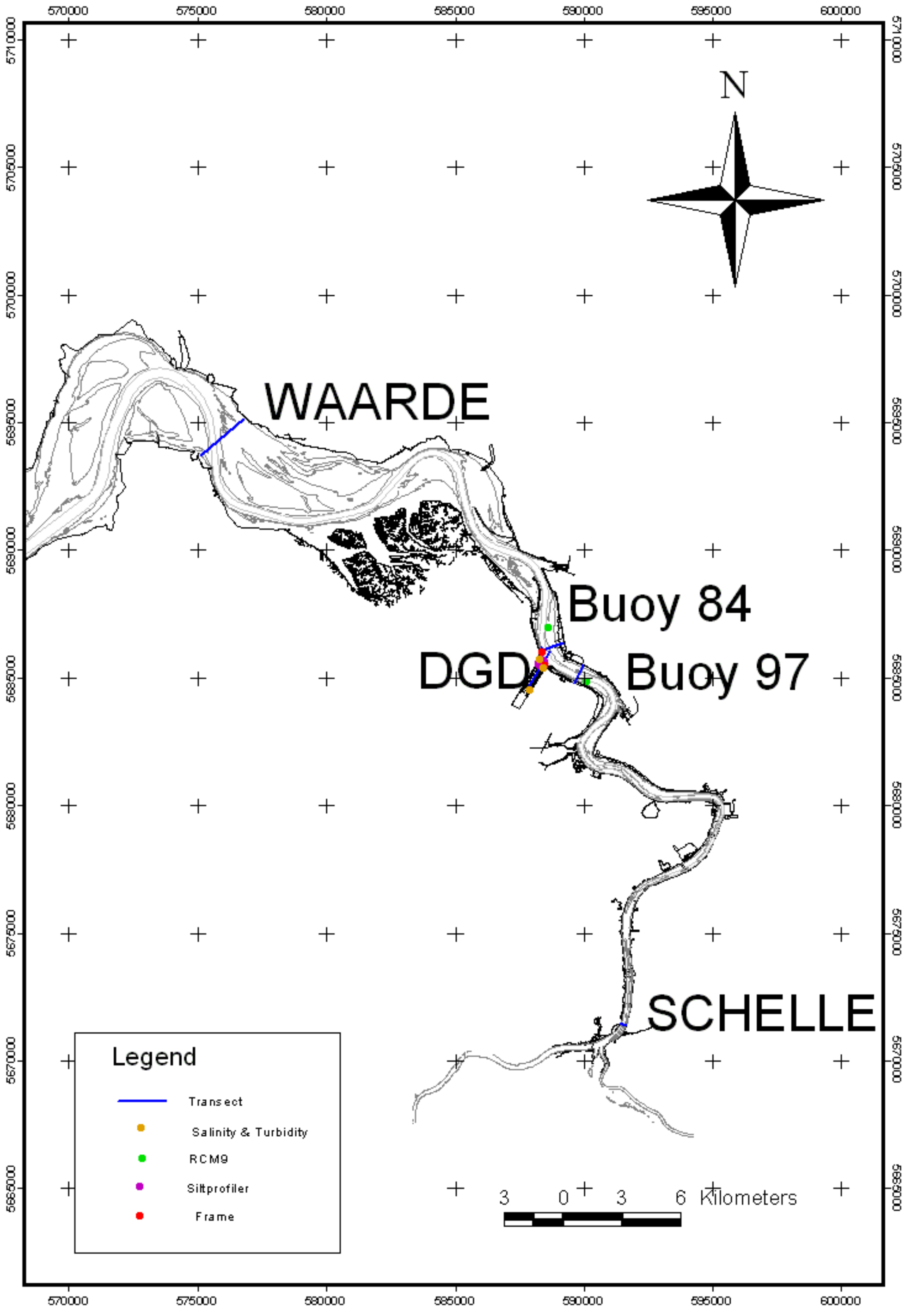
KNMI (2008) Royal Dutch Meteorological Institute www.knmi.nl

HMCZ (2008) Hydro Meteo Centrum Zeeland: www.hmcz.nl

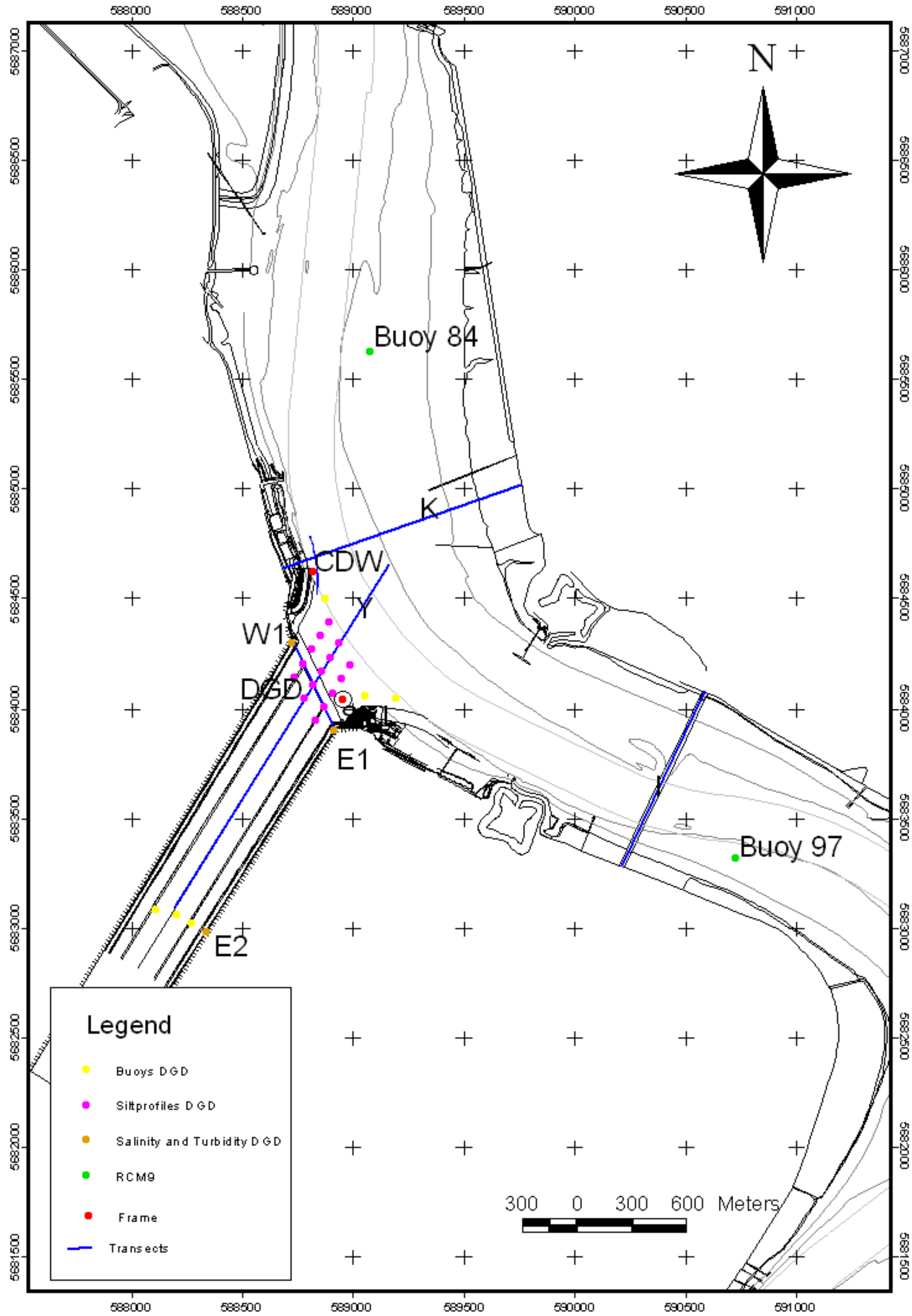
APPENDIX A.

OVERVIEW OF MEASUREMENT

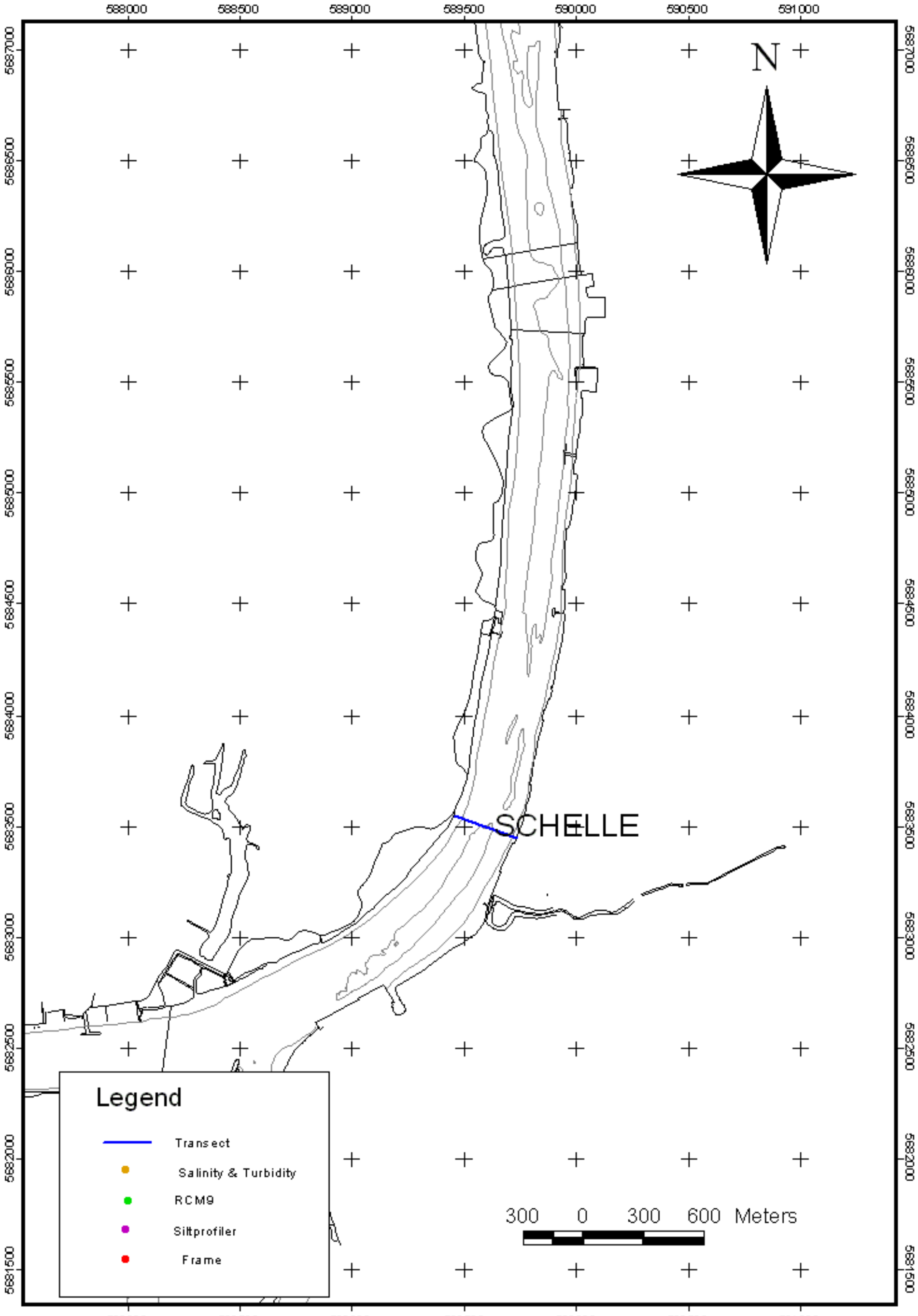
A.1 Overview of the measurement locations for the whole HCBS2 and Deurganckdok measurement campaigns



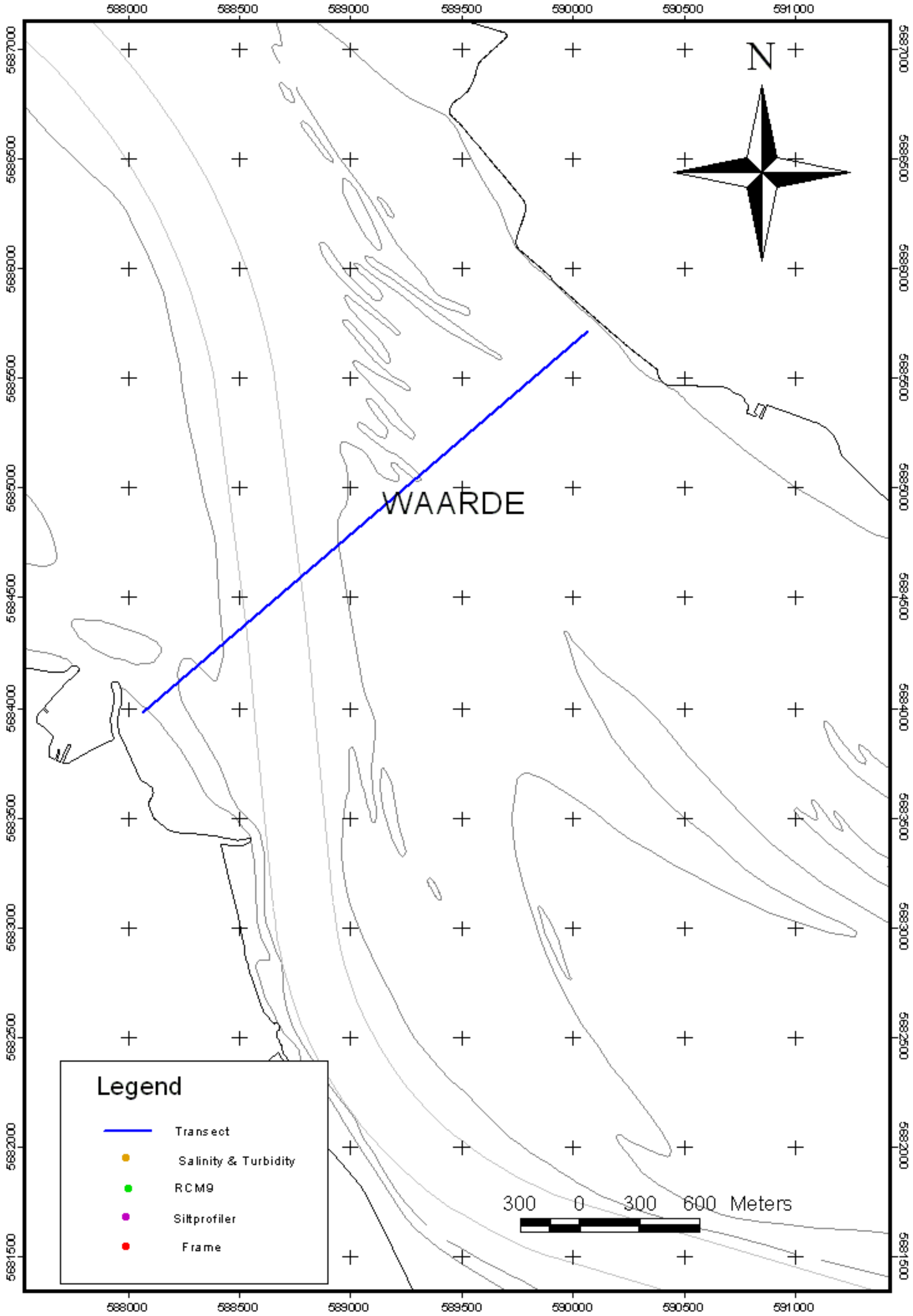
Annex Figure A-1: Overview of the measurement locations



Annex Figure A-2: Overview of the measurement locations at Deurganckdok



Annex Figure A-3: Transect S in Schelle



Annex Figure A-4: Transect W in Waarde

A.2 Overview of all measurement locations HCBS and Deurganckdok measurement campaigns

Annex Table A-1: coordinates of theoretical transects

Transect	Start Easting	Start Northing	End Easting	End Northing
I	590318.00	5683302.00	590771.00	5684257.00
K	588484.00	5684924.00	589775.00	5685384.00
SCHELLE	592645.07	5665794.06	592952.68	5665682.28
DGD	588764.88	5684056.49	588540.95	5684526.94
Y	589059.09	5684948.36	587898.76	5683076.56
WAARDE	573541.00	5696848.20	571318.00	5694932.90

Annex Table A-2: coordinates of SiltProfiler gauging locations

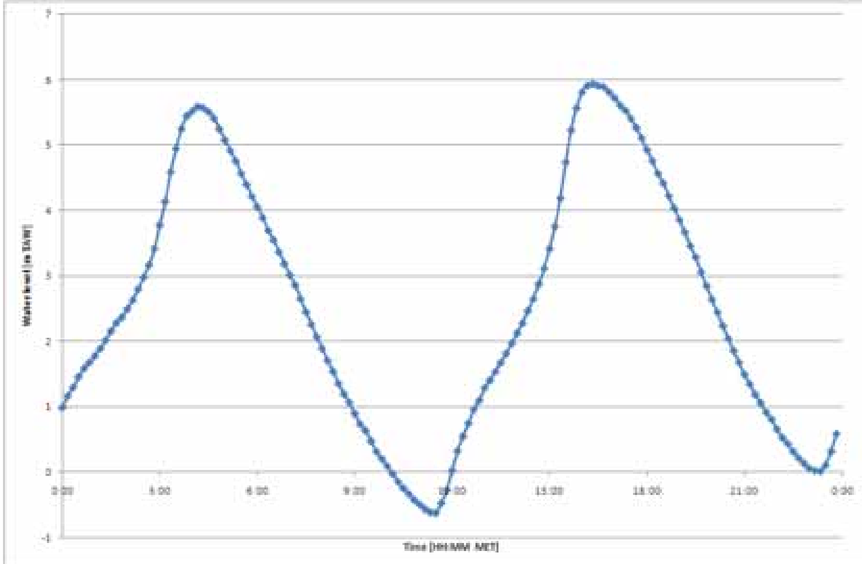
SP	EASTING	NORTHING
1	588737	5684638
2	588690	5684562
3	588643	5684486
4	588596	5684411
5	588549	5684335
6	588606	5684217
7	588653	5684293
8	588700	5684368
9	588747	5684444
10	588793	5684520
11	588850	5684402
12	588803	5684326
13	588756	5684250
14	588709	5684174
15	588662	5684099

A.3 Measurement overview at Transect DGD on 12/03/2009

FileName	*Time after HW [hh:mm]*	*End time [hh:mm MET]*	*Easting Start (UTM31 ED50)*	*Northing Start (UTM31 ED50)*	*Easting Stop (UTM31 ED50)*	*Northing Stop (UTM31 ED50)*	*Transect length [m]*	*Transect heading [°]*
5001DGDtrl_sub.csv	3:34	7:44	588548	5684520	588768	5684074	497	296
5003DGDtlr_sub.csv	3:44	7:54	588548	5684528	588771	5684070	510	116
5005DGDtrl_sub.csv	3:53	8:03	588549	5684530	588766	5684073	506	295
5007DGDtlr_sub.csv	4:05	8:15	588552	5684503	588770	5684067	488	117
5009DGDtrl_sub.csv	4:15	8:25	588550	5684529	588766	5684070	507	295
5011DGDtlr_sub.csv	4:26	8:36	588559	5684502	588774	5684070	483	116
5013DGDtrl_sub.csv	4:36	8:46	588550	5684531	588749	5684067	505	293
5015DGDtlr_sub.csv	4:47	8:57	588559	5684514	588774	5684067	497	116
5017DGDtrl_sub.csv	5:01	9:11	588552	5684508	588770	5684070	490	297
5019DGDtlr_sub.csv	5:21	9:31	588546	5684529	588780	5684069	516	117
5021DGDtrl_sub.csv	5:31	9:41	588548	5684529	588761	5684072	504	295
5023DGDtlr_sub.csv	5:42	9:52	588566	5684503	588762	5684061	483	114
5025DGDtrl_sub.csv	5:57	10:07	588551	5684531	588771	5684069	513	295
5027DGDtlr_sub.csv	6:09	10:19	588546	5684527	588763	5684073	504	116
5029DGDtrl_sub.csv	6:19	10:29	588550	5684529	588772	5684068	512	296
5031DGDtlr_sub.csv	6:30	10:40	588560	5684504	588768	5684065	486	115
5033DGDtrl_sub.csv	6:56	11:06	588552	5684528	588761	5684070	504	295
5035DGDtlr_sub.csv	7:12	11:22	588548	5684510	588763	5684063	497	116
5037DGDtrl_sub.csv	-4:45	11:34	588544	5684510	588759	5684070	489	296
5039DGDtlr_sub.csv	-4:35	11:44	588547	5684500	588764	5684066	485	117
5041DGDtrl_sub.csv	-4:24	11:55	588542	5684507	588754	5684064	492	296
5043DGDtlr_sub.csv	-4:13	12:06	588554	5684500	588762	5684065	482	116
5045DGDtrl_sub.csv	-4:04	12:15	588548	5684514	588757	5684069	492	295
5047DGDtlr_sub.csv	-3:53	12:26	588552	5684501	588761	5684064	484	116
5049DGDtrl_sub.csv	-3:43	12:36	588548	5684518	588757	5684065	499	295
5051DGDtlr_sub.csv	-3:27	12:52	588553	5684531	588757	5684053	520	113
5053DGDtrl_sub.csv	-3:16	13:03	588547	5684519	588755	5684065	499	295
5055DGDlr_sub.csv	-3:04	13:15	588561	5684505	588755	5684059	486	114
5057DGDtrl_sub.csv	-2:54	13:25	588548	5684513	588759	5684069	492	295
5059DGDtlr_sub.csv	-2:42	13:37	588557	5684500	588759	5684057	486	115
5061DGDtrl_sub.csv	-2:32	13:47	588549	5684526	588758	5684064	507	294
5063DGDtlr_sub.csv	-2:20	13:59	588549	5684529	588764	5684058	518	115
5065DGDtrl_sub.csv	-2:09	14:10	588549	5684530	588765	5684068	509	295
5067DGDtlr_sub.csv	-1:51	14:28	588578	5684505	588760	5684056	485	112
5069DGDtrl_sub.csv	-1:38	14:41	588550	5684510	588747	5684052	499	293
5071DGDtlr_sub.csv	-1:23	14:56	588559	5684535	588761	5684055	521	113
5073DGDtrl_sub.csv	-1:12	15:07	588545	5684520	588760	5684063	505	295
5075DGDtlr.csv	-1:01	15:18	588552	5684532	588752	5684073	500	114
5077DGDtrl_sub.csv	-0:44	15:35	588548	5684520	588738	5684070	488	293
5079DGDtlr_sub.csv	-0:32	15:47	588565	5684537	588764	5684067	510	113

FileName	Time after HW [hh:mm]	End time [hh:mm MET]	Easting Start (UTM31 ED50)	Northing Start (UTM31 ED50)	Easting Stop (UTM31 ED50)	Northing Stop (UTM31 ED50)	Transect length [m]	Transect heading [°]
5081DGDtrl_sub.csv	-0:17	16:02	588549	5684523	588744	5684054	508	293
5083DGDtlr.csv	0:04	16:24	588563	5684530	588761	5684072	499	113
5085DGDtrl_sub.csv	0:14	16:34	588548	5684528	588770	5684070	509	296
5087DGDtlr_sub.csv	0:27	16:47	588552	5684531	588762	5684067	510	114
5089DGDtrl_sub.csv	0:41	17:01	588552	5684531	588754	5684088	487	294
5091DGDtlr_sub.csv	0:52	17:12	588556	5684533	588768	5684063	516	114
5093DGDtrl_sub.csv	1:03	17:23	588553	5684531	588765	5684072	505	295
5095DGDtlr_sub.csv	1:12	17:32	588550	5684530	588766	5684066	512	115
5097DGDtrl_sub.csv	1:26	17:46	588553	5684528	588766	5684070	506	295
5099DGDtlr.csv	1:35	17:55	588550	5684531	588760	5684054	521	114
5101DGDtrl_sub.csv	1:46	18:06	588553	5684532	588763	5684064	514	294
5103DGDtlr_sub.csv	1:57	18:17	588548	5684529	588762	5684056	520	114
5105DGDtrl_sub.csv	2:07	18:27	588551	5684530	588769	5684066	512	295
5107DGDtlr.csv	2:21	18:41	588547	5684528	588770	5684068	511	116
5109DGDtrl_sub.csv	2:31	18:51	588550	5684531	588763	5684064	512	294

APPENDIX B. TIDAL DATA

<table>
<tr><td colspan="3">11283 – Winter 2009 SURVEY</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td colspan="2">Measured tide 12/03/2009 at Liefkenshoek</td><td>Data processed by: IMDC</td></tr>
<tr><td>Location:
River Scheldt</td><td>Date:
12/03/2009</td><td>In association with: wl | delft hydraulics
I/RA/11283/08.088/MSA</td></tr>
</table>

APPENDIX C.

NAVIGATION INFORMATION AS RECORDED ON SITE

Ship: Parel II			**Date: 12/03/2009**
Location: Deurganckdok (transect DGD)			
Nr.	**Time (MET)**	**Type ship**	**Direction (Inbound, Outbound)**
1	7:55	binnenschip	outbound
2	8:30	binnenschip	inbound
3	9:22	zeeschip	outbound
4	9:59	binnenschip	inbound
5	10:00	binnenschip	inbound
6	10:03	binnenschip	inbound
7	11:26	zeeschip + sleep	inbound
8	11:28	politieboot	inbound
9	11:37	binnenschip	outbound
10	11:50	sleep	outbound
11	12:20	binnenschip	inbound
12	12:44	binnenschip	inbound
13	12:46	binnenschip	inbound
14	12:47	binnenschip	inbound
15	13:23	binnenschip	outbound
16	14:40	binnenschip	inbound
17	14:51	binnenschip	inbound
18	15:31	binnenschip	outbound
19	15:53	binnenschip	inbound
20	15:55	binnenschip	outbound
21	15:56	binnenschip	inbound
22	15:59	binnenschip	outbound
23	16:06	zeeschip + sleep	inbound
24	16:16	binnenschip	inbound
25	16:43	binnenschip	outbound
26	16:56	binnenschip	outbound
27	16:56	sleepboot	outbound
28	17:40	binnenschip	outbound

APPENDIX D.

UNESCO PSS-78 FORMULA FOR CALCULATING SALINITY

Practical Salinity Scale (PPS 78) Salinity in the range of 2 to 42

Constants from the 19th Edition of Standard Methods

R cond.ratio	0.0117	$R = \frac{C}{42.914 mS/cm}$
C Cond at t	**0.5**	**Input conductivity in mS/cm of sample**
t deg. C	**22.00**	**Input temperature of sample solution**
P dBar	**20**	**Input pressure at which sample is measured in decibars**
Rp	1.0020845	$R_p = 1 + \frac{p(e_1 + e_2 p + e_3 p^2)}{1 + d_1 t + d_2 t^2 + (d_3 + d_4 t)R}$
rt	1.1641102	$r_t = c_0 + c_1 t + c_2 t^2 + c_3 t^3 + c_4 t^4$
Rt	0.0099879	$R_t = \frac{R}{R_p \times r_t}$
Delta S	-0.0010	$\text{Delta S} = \frac{(t-15)}{1+k(t-15)}(b_0 + b_1 R_t^{1/2} + b_2 R_t + b_3 R_t^{3/2} + b_4 R_t^2 + b_5 R_t^{5/2})$
S = Salinity	**0.257**	$S = a_0 + a_1 R_t^{1/2} + a_2 R_t + a_3 R_t^{3/2} + a_4 R_t^2 + a_5 R_t^{5/2} + \text{delta S}$

a0	0.0080	b0	0.0005	c0	0.6766097	d1	3.426E-02	e1	2.070E-04
a1	-0.1692	b1	-0.0056	c1	2.00564E-02	d2	4.464E-04	e2	-6.370E-08
a2	25.3851	b2	-0.0066	c2	1.104259E-04	d3	4.215E-01	e3	3.989E-12
a3	14.0941	b3	-0.0375	c3	-6.9698E-07	d4	-3.107E-03		
a4	-7.0261	b4	0.0636	c4	1.0031E-09				
a5	2.7081	b5	-0.0144						
		k	0.0162						

R = ratio of measured conductivity to the conductivity of the Standard Seawater Solution

Conductivity Ratio R is a function of salinity, temperature, and hydraulic pressure. So that we can factor R into three parts i.e.

R = Rt x Rp x rt

R = C(S,t,p)/C(35,15,0)

C = 42.914 mS/cm at 15 deg C and 0 dbar pressure ie C(35,15,0) where 35 is the salinity

Ocean pressure is usually measured in decibars. 1 dbar = 10^-1 bar = 10^5 dyne/cm^2 = 10^4 Pascal.

APPENDIX E. OVERVIEW OF SEDIVIEW SETTINGS

Ship:		***Parel II***	
Location:		***Deurganckdok (transect DGD)***	
Date		***06/03/2009***	
Parameters	***Value***	***Parameters***	***Value***
Inst. Depth (m)	0.5	*Compass offset (°)*	-7.5
Force depth (m)	0	*Beam 3 misalignment (°)*	45
Velocity reference	BT	*Effective particle size (µm)*	20
Speed of sound algorithm	Urick	*Beam1 scale factor*	0.445
Error velocity	YES	*Beam2 scale factor*	0.410
External heading	NO	*Beam3 scale factor*	0.430
External Depth	NO	*Beam4 scale factor*	0.445
SSC factor top (%)	100	*Discharge factor top*	Constant
SSC factor bottom (%)	125	*Discharge factor bottom*	Power
Shape factor left bank	0.91	*Shape factor right bank*	0.91

Filename	***Calibration const (Ks)***	***Backscatter coefficient (S)***	***Distance to the left bank (m)***	***Distance to the right bank (m)***
5001 DGDtrl	60	19.75	9.8	14.6
5003 DGDtlr	60	20.00	1.6	9.6
5005 DGDtrl	60	19.75	0.6	15.0
5007 DGDtlr	60	19.00	26.4	7.7
5009 DGDtrl	60	19.00	2.3	12.2
5011 DGDtlr	60	19.00	30.1	8.8
5013 DGDtrl	60	18.75	0.0	17.0
5015 DGDtlr	60	18.75	19.5	5.6
5017 DGDtrl	60	19.25	21.4	10.7
5019 DGDtlr	60	19.00	0.5	5.0
5021 DGDtrl	60	19.00	1.3	16.1
5023 DGDtlr	60	19.00	32.5	6.0
5025 DGDtrl	60	18.50	0.2	8.6
5027 DGDtlr	60	18.50	1.7	16.3
5029 DGDtrl	60	18.50	1.6	8.0
5031 DGDtlr	60	19.00	29.0	6.7
5033 DGDtrl	60	19.00	3.7	14.1
5035 DGDtlr	60	19.50	18.0	6.7
5037 DGDtrl	60	19.00	16.7	15.5
5039 DGDtlr	60	18.50	27.2	9.6
5041 DGDtrl	60	18.50	18.3	11.7
5043 DGDtlr	60	18.25	30.1	9.7

Filename	***Calibration const (Ks)***	***Backscatter coefficient (S)***	***Distance to the left bank (m)***	***Distance to the right bank (m)***
5045 DGDtrl	60	18.75	14.5	15.1
5047 DGDtlr	60	19.50	28.5	8.6
5049 DGDtrl	60	19.50	11.3	11.8
5051 DGDtlr	60	19.00	1.3	0.5
5053 DGDtrl	60	19.25	9.7	12.8
5055 DGDtlr	60	19.00	28.5	7.0
5057 DGDtrl	60	19.00	15.4	14.4
5059 DGDtlr	60	19.50	31.4	3.7
5061 DGDtrl	60	19.50	4.4	10.2
5063 DGDtlr	60	19.00	1.6	2.0
5065 DGDtrl	60	19.00	1.2	11.0
5067 DGDtlr	60	19.00	35.7	1.8
5069 DGDrl	60	18.75	19.2	3.9
5071 DGDtlr	60	19.25	0.5	1.1
5073 DGDtrl	60	19.75	7.7	8.6
5075 DGDtlr	60	19.50	0.4	21.1
5077 DGDtrl	60	19.25	9.9	23.8
5079 DGDtlr	60	19.00	1.0	10.6
5081 DGDtrl	60	18.75	7.3	7.2
5083 DGDtlr	60	18.50	6.4	16.2
5085 DGDtrl	60	18.25	2.4	10.7
5087 DGDtlr	60	18.00	0.8	11.1
5089 DGDtrl	60	18.25	0.8	33.3
5091 DGDtlr	60	18.75	1.0	4.8
5093 DGDtrl	60	18.50	1.8	14.7
5095 DGDtlr	60	18.50	0.9	8.9
5097 DGDtrl	60	19.00	4.3	11.8
5099 DGDtlr	60	19.25	0.4	0.0
5101 DGDtrl	60	19.25	0.3	7.8
5103 DGDtlr	60	19.25	0.8	1.1
5105 DGDtrl	60	19.50	1.7	7.6
5107 DGDtlr	60	19.50	1.8	9.1
5109 DGDtrl	60	19.00	0.7	8.6

APPENDIX F. CONTOURPLOTS OF FLOW VELOCITIES, SEDIMENT CONCENTRATION AND SEDIMENT FLUX PER SAILED TRANSECT

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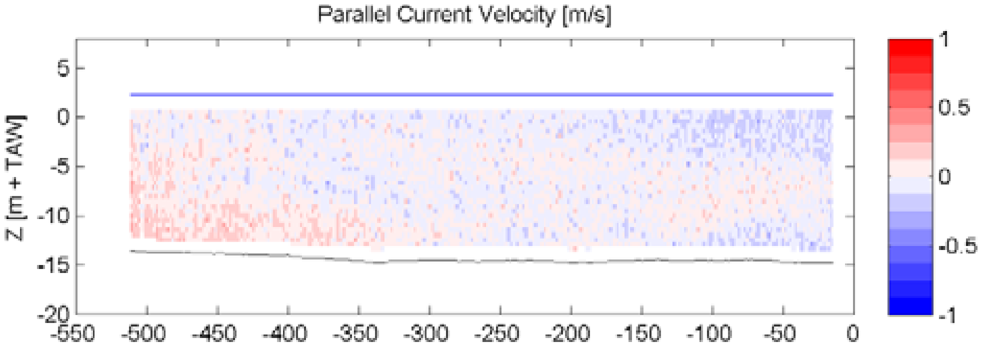
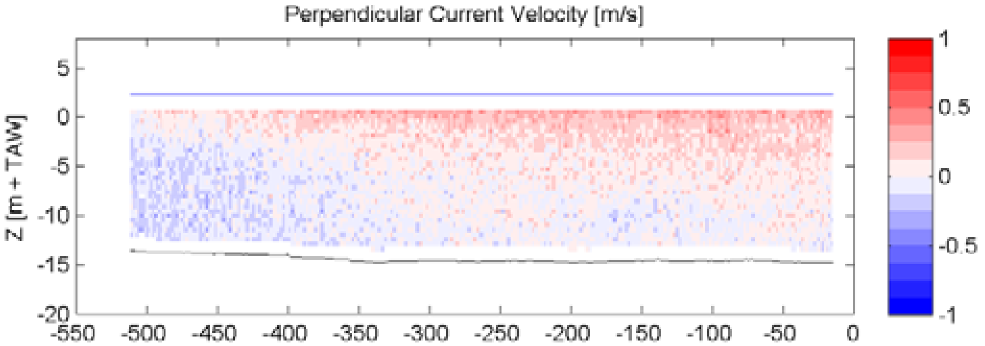
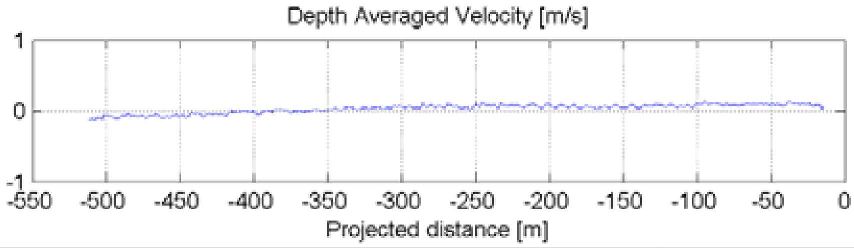
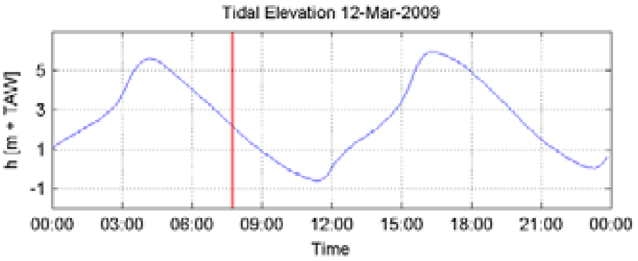
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5001DGDtrl_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

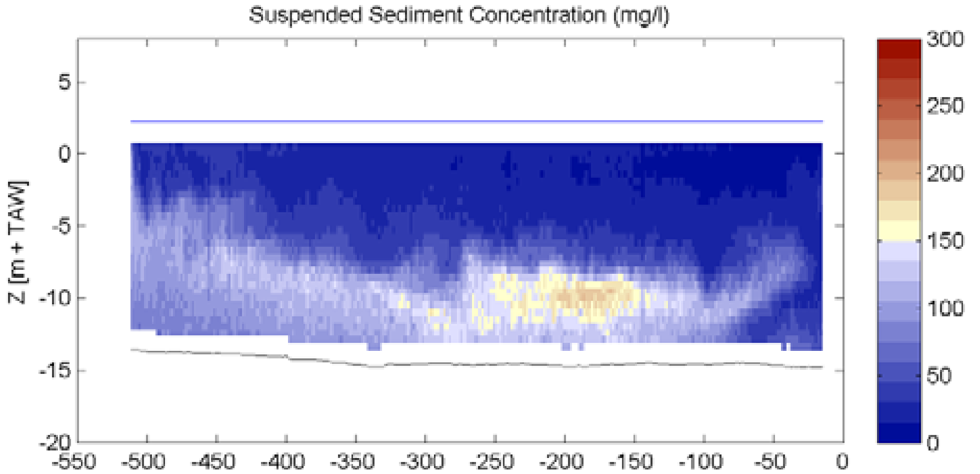
Date / Time [MET] :
12-Mar-2009
07:42 - 07:46

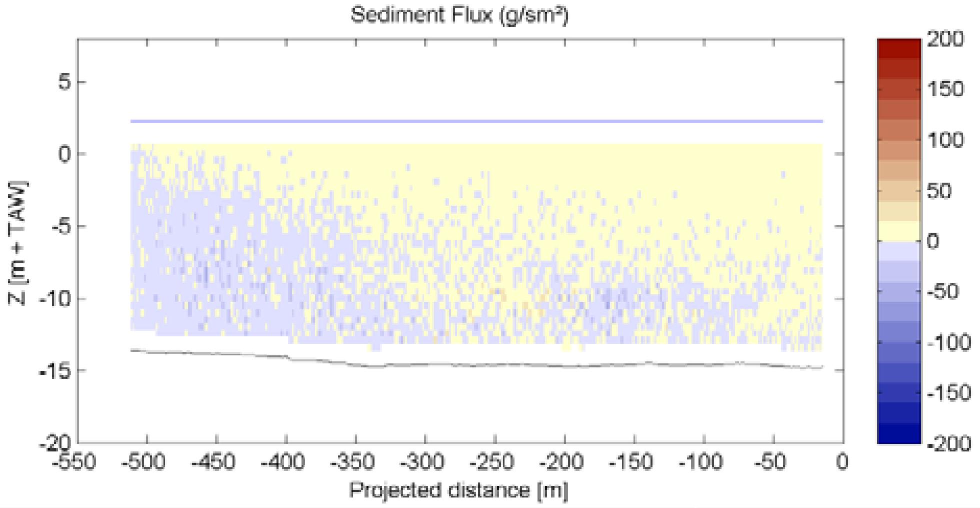
Time after HW [HH:MM]
3:34

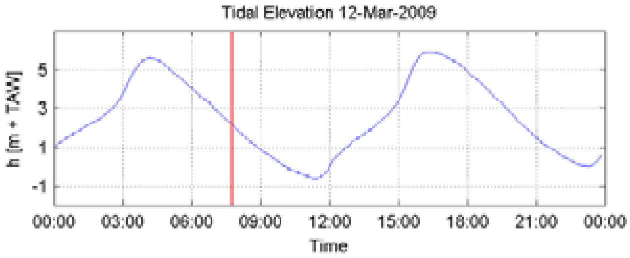
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5001DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

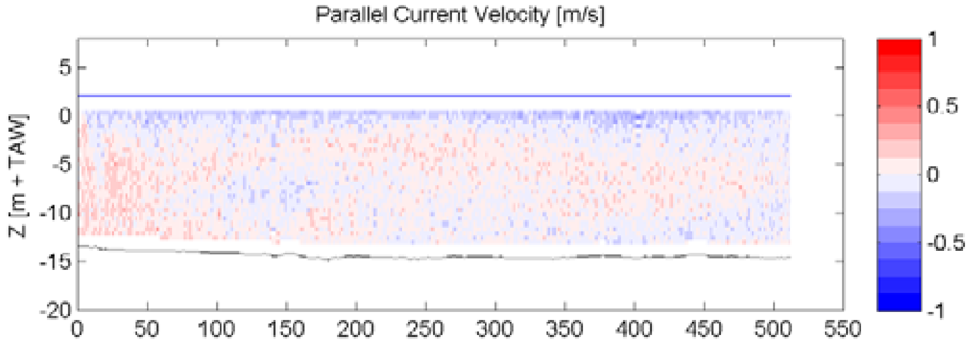
Date / Time [MET] :
12-Mar-2009
07:42 - 07:46

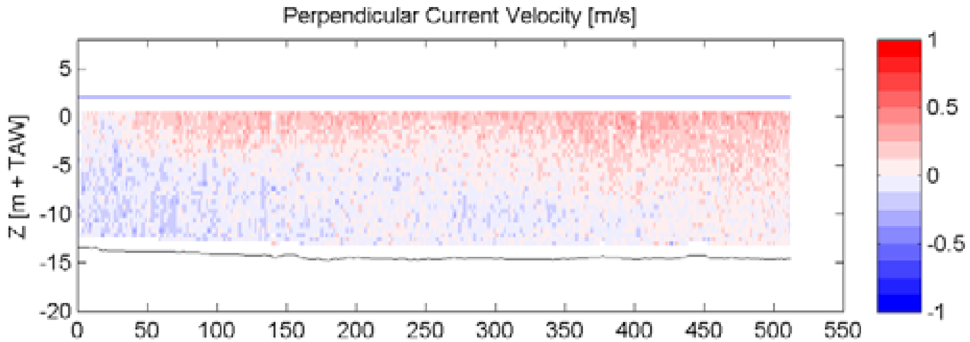
Time after HW [HH:MM]
3:34

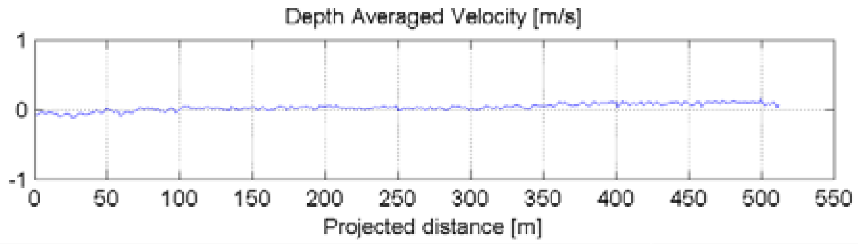
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

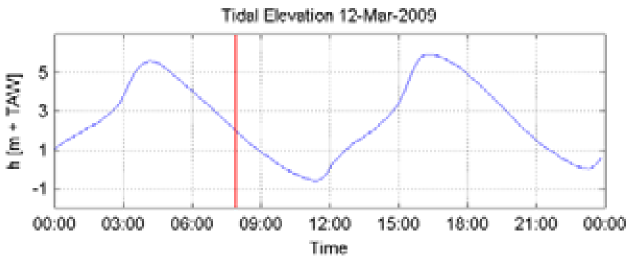
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5003DGDtlr_sub.csv	Location: Deurganckdok









HW/LW:
04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

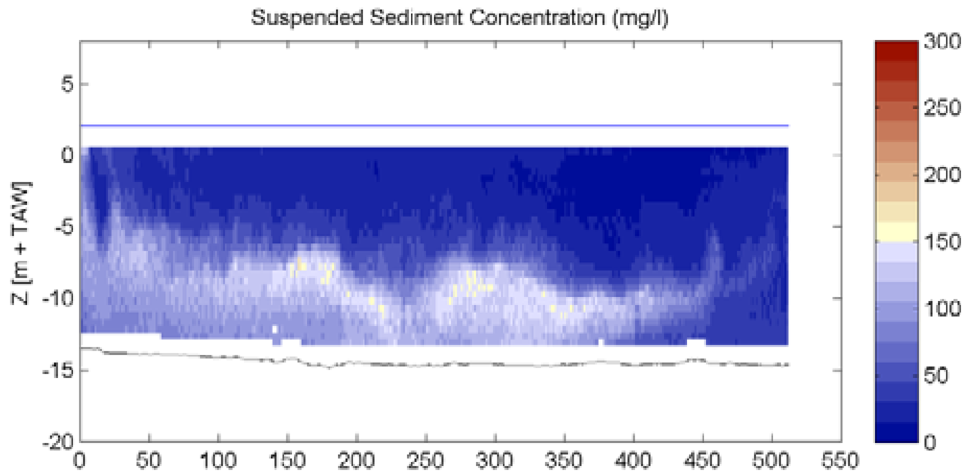
Date / Time [MET] :
12-Mar-2009
07:52 - 07:56

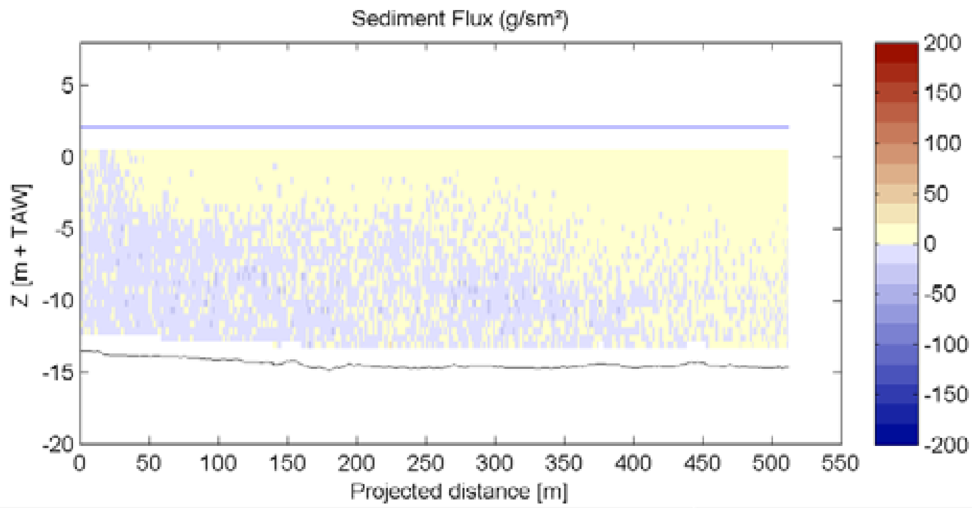
Time after HW [HH:MM]
3:44

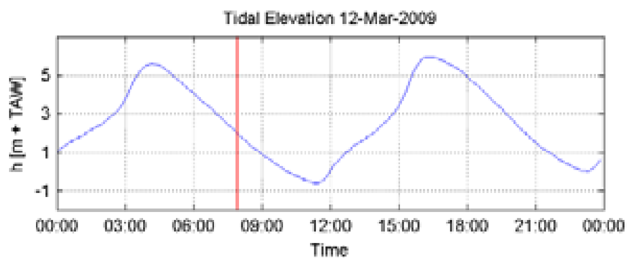
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5003DGDtlr_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
07:52 - 07:56

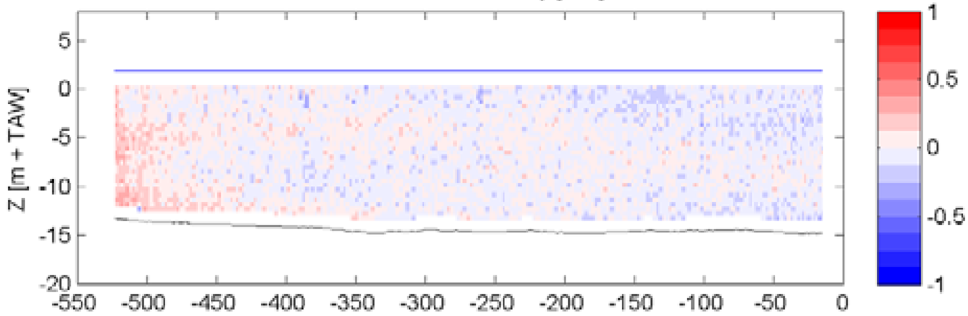
Time after HW [HH:MM]
3:44

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

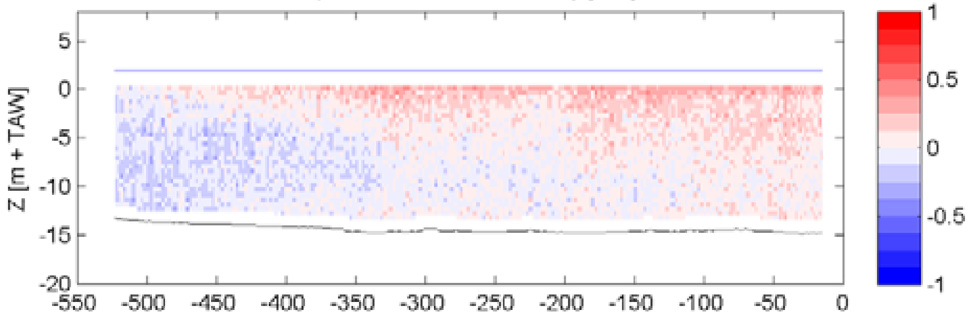
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5005DGDtrl_sub.csv	Location: Deurganckdok

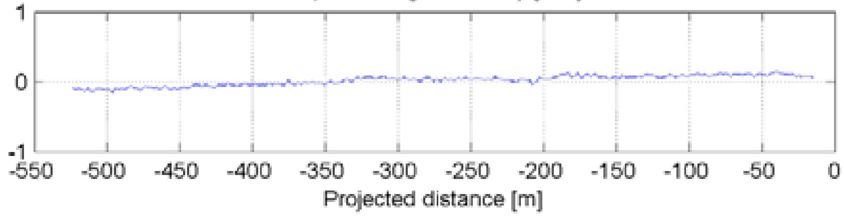
Parallel Current Velocity [m/s]



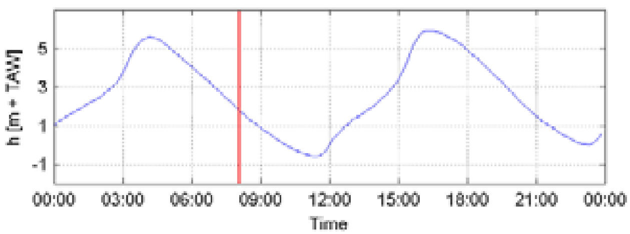
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 12-Mar-2009



HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

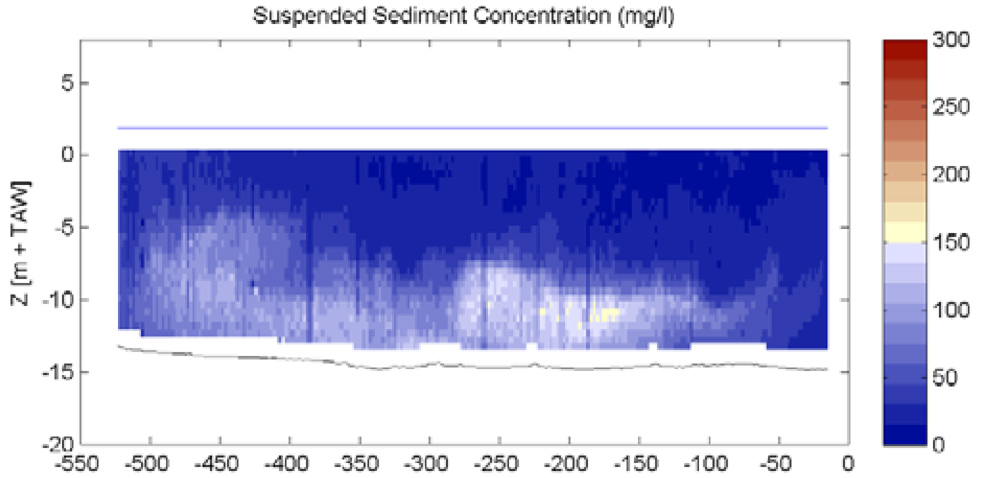
Date / Time [MET] :
12-Mar-2009
08:02 - 08:05

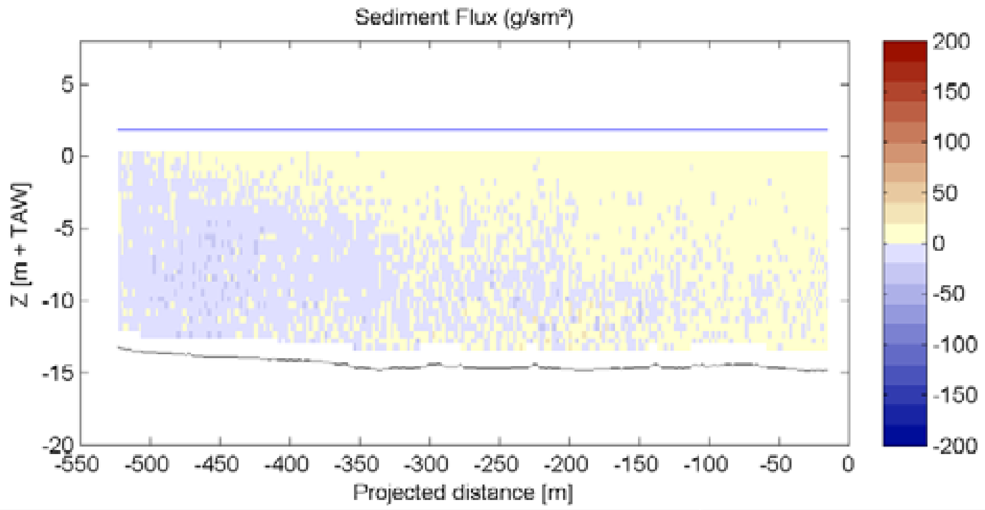
Time after HW [HH:MM]
3:53

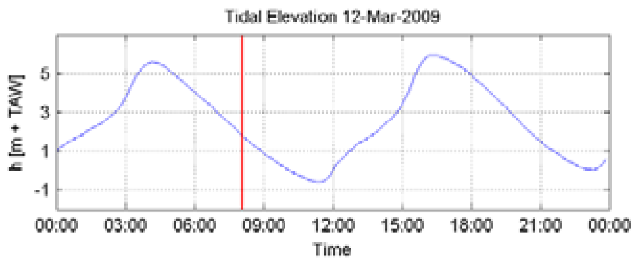
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5005DGDtrl_sub.csv	Location: Deurganckdok







HW/LW:
04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

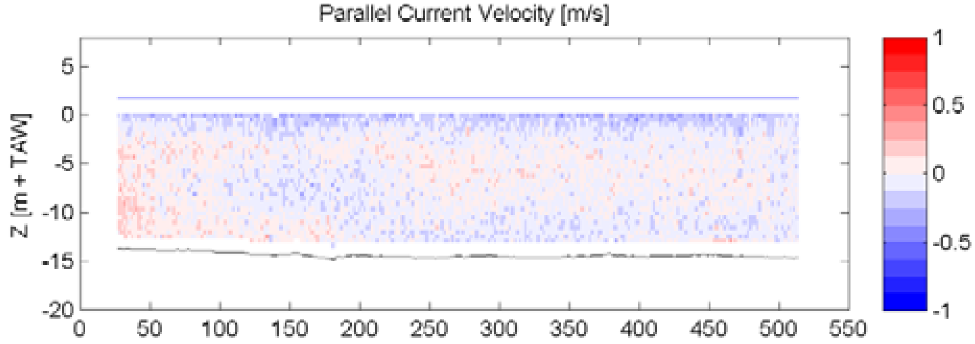
Date / Time [MET] :
12-Mar-2009
08:02 - 08:05

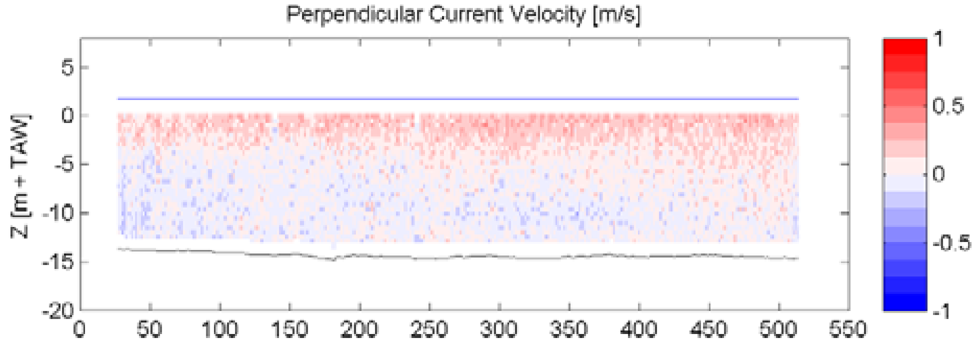
Time after HW [HH:MM]
3:53

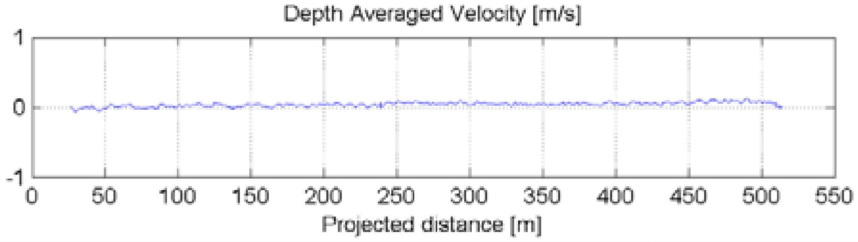
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

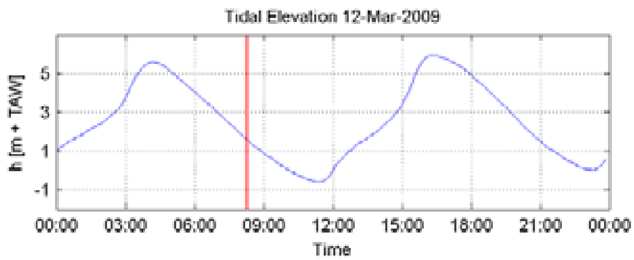
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5007DGDtlr_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

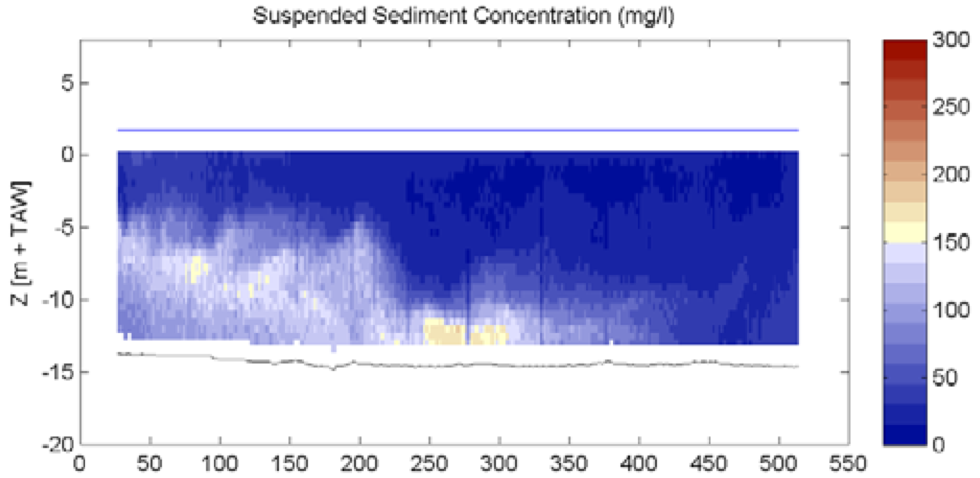
Date / Time [MET] :
12-Mar-2009
08:13 - 08:17

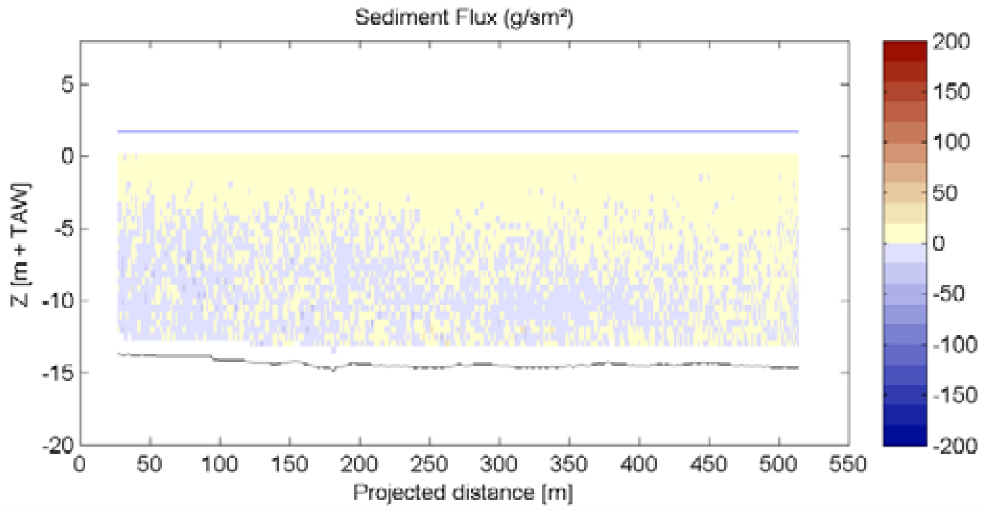
Time after HW [HH:MM]
4:05

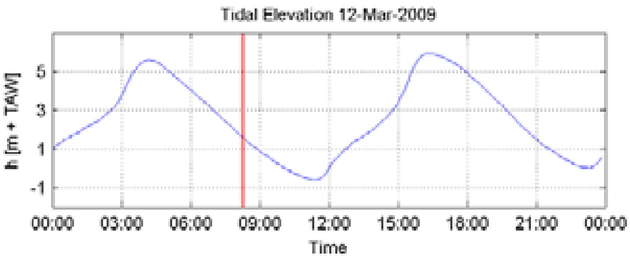
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5007DGDtlr_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
08:13 - 08:17

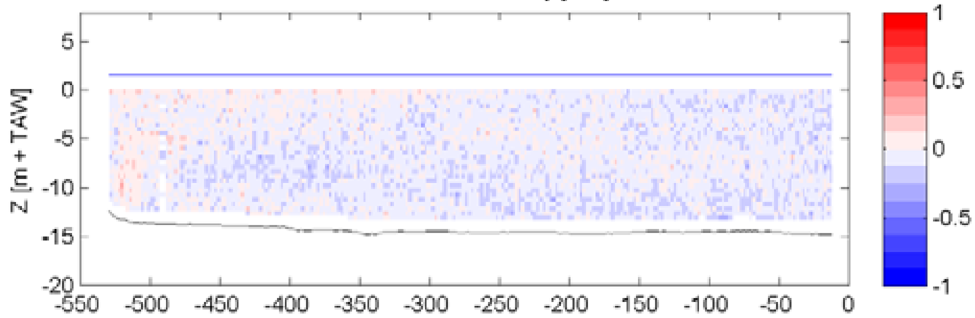
Time after HW [HH:MM]
4:05

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

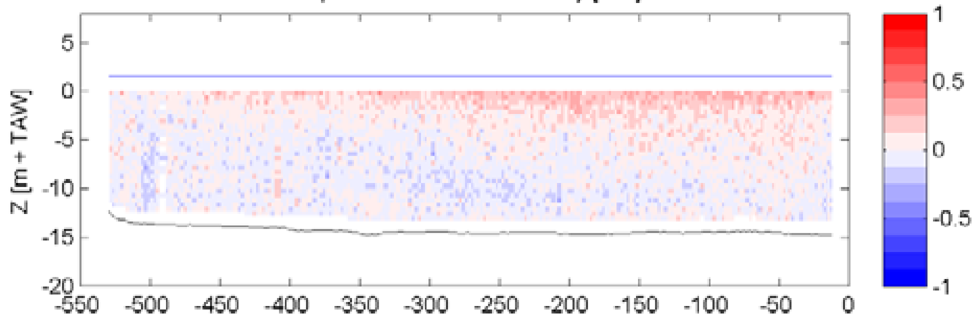
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5009DGDtrl_sub.csv	Location: Deurganckdok

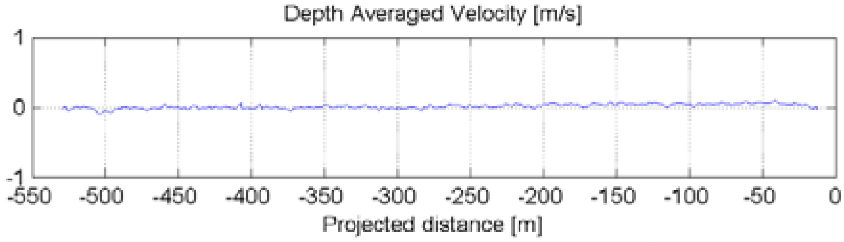
Parallel Current Velocity [m/s]



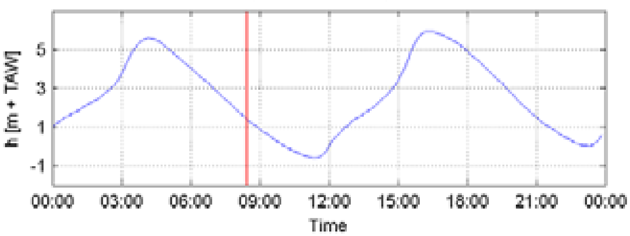
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 12-Mar-2009



HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

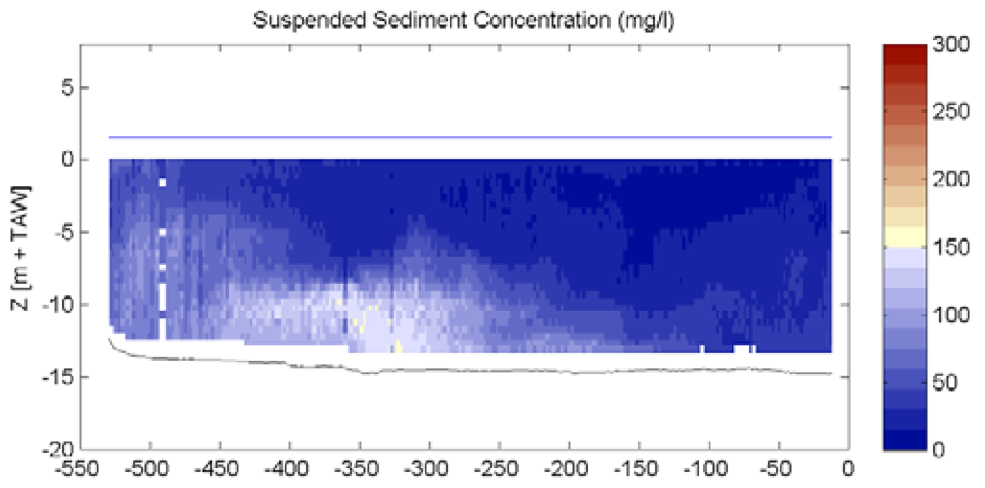
Date / Time [MET] :
12-Mar-2009
08:23 - 08:27

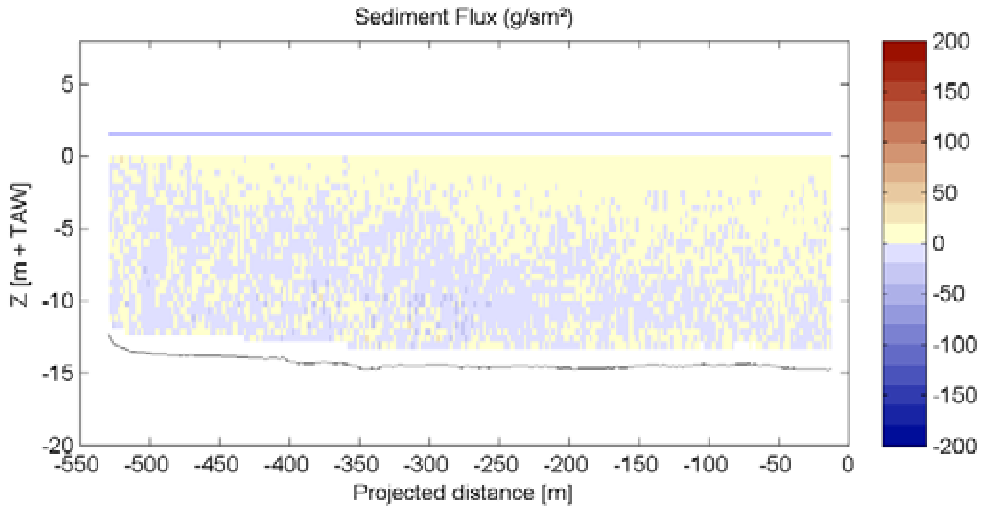
Time after HW [HH:MM]
4:15

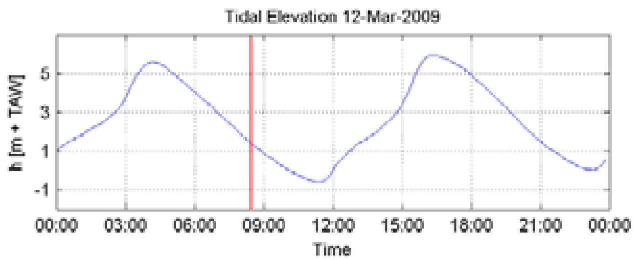
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5009DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

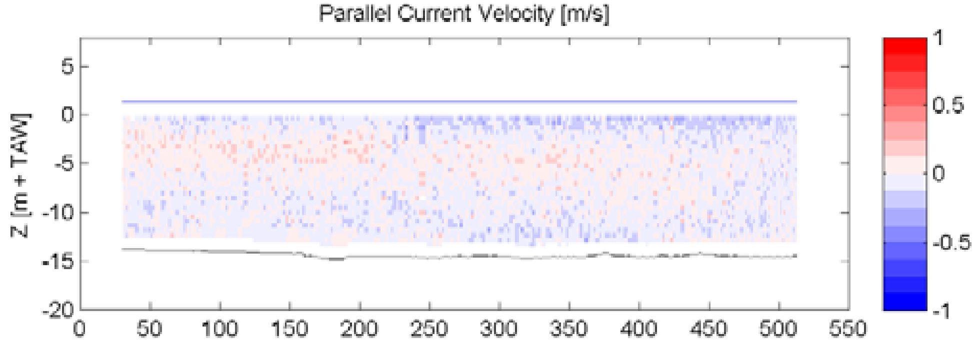
Date / Time [MET] :
12-Mar-2009
08:23 - 08:27

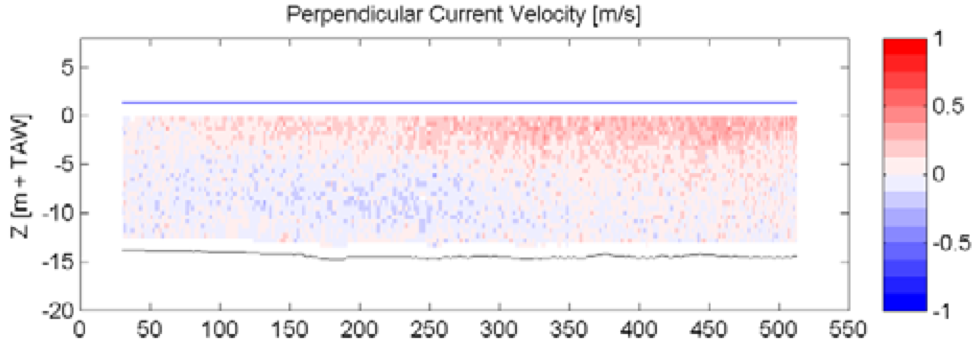
Time after HW [HH:MM]
4:15

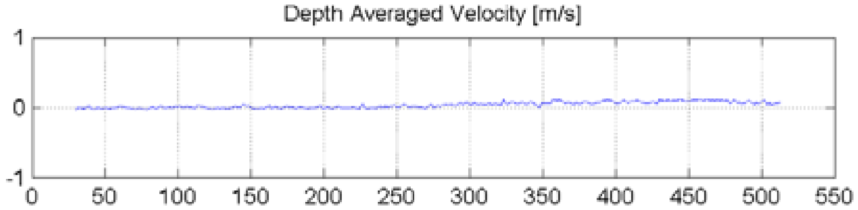
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

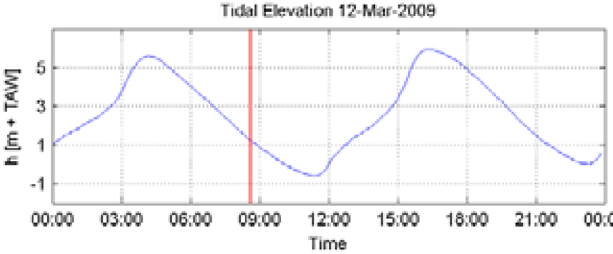
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5011DGDtlr_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

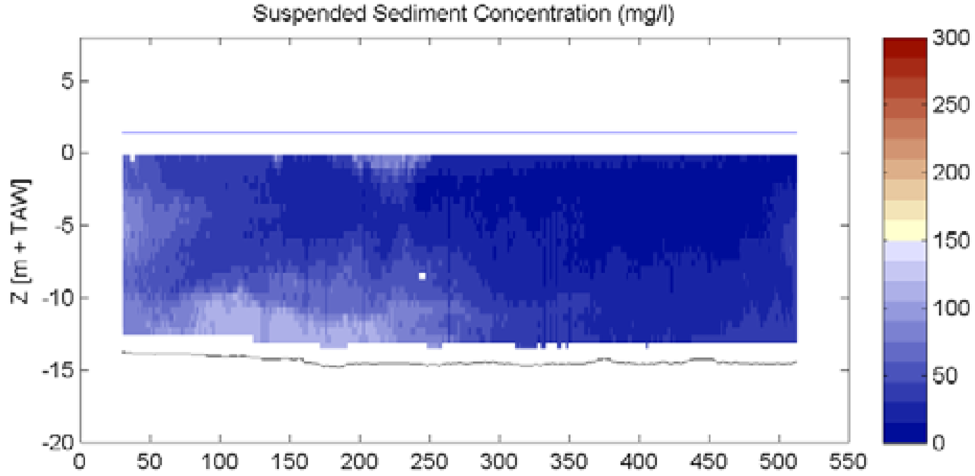
Date / Time [MET] :
12-Mar-2009
08:34 - 08:37

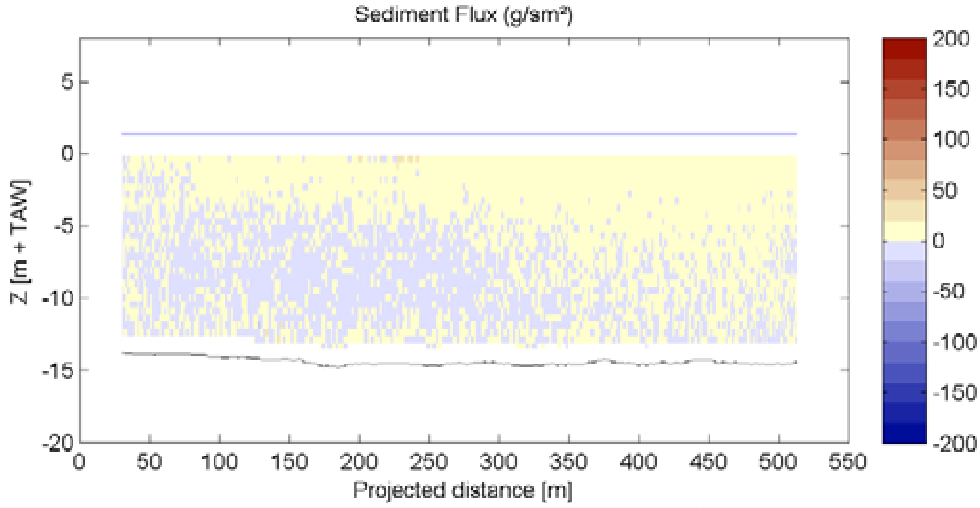
Time after HW [HH:MM]
4:26

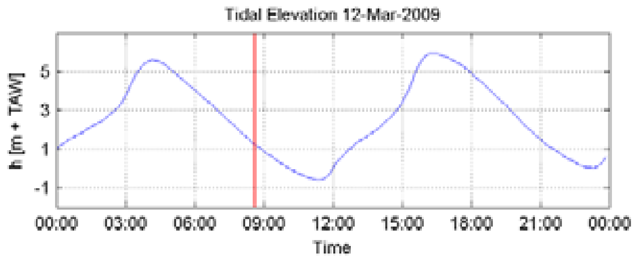
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5011DGDtlr_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

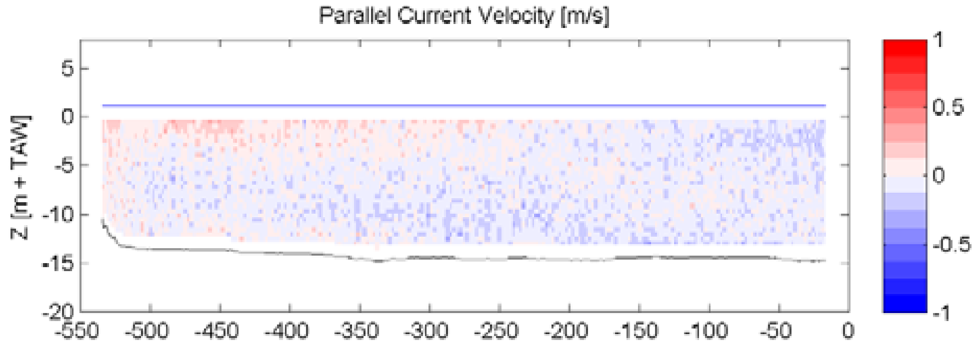
Date / Time [MET] :
12-Mar-2009
08:34 - 08:37

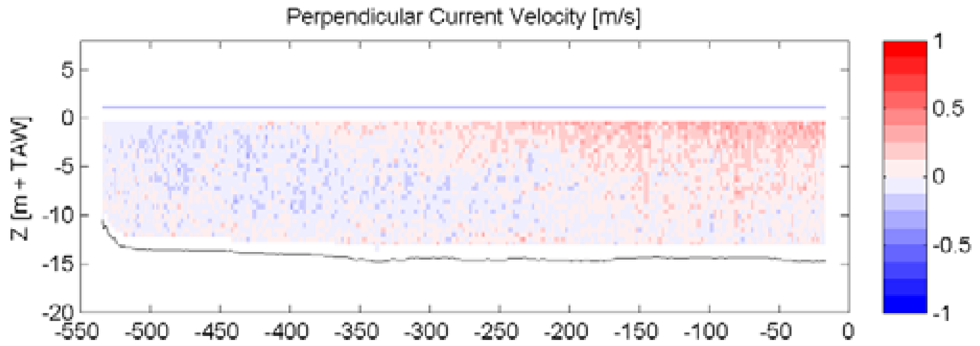
Time after HW [HH:MM]
4:26

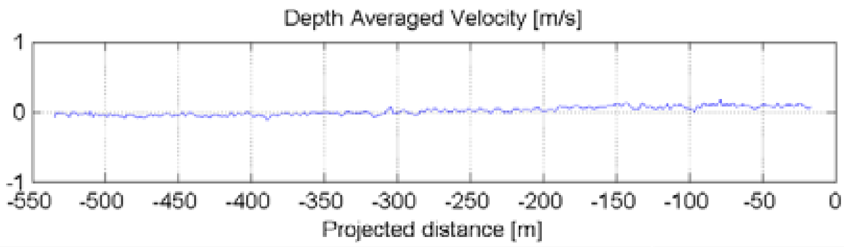
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

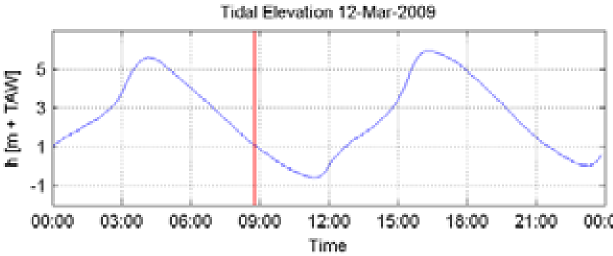
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5013DGDtrl_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

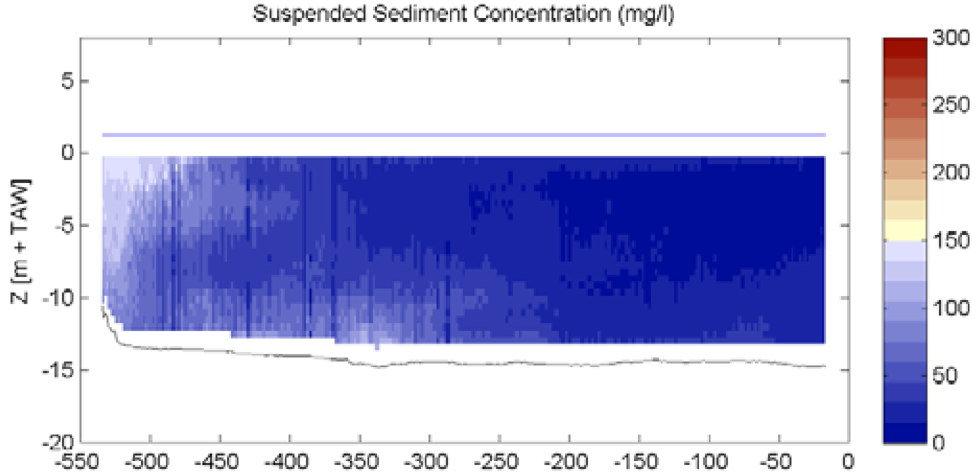
Date / Time [MET] :
12-Mar-2009
08:44 - 08:47

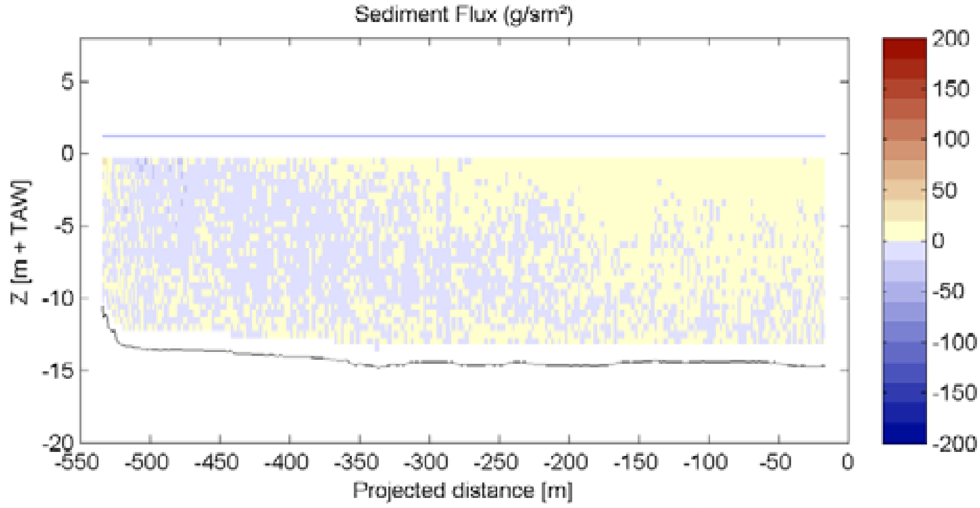
Time after HW [HH:MM]
4:36

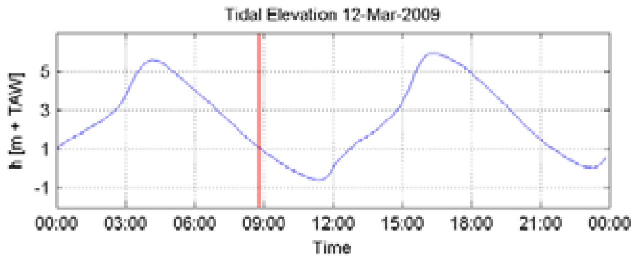
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5013DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

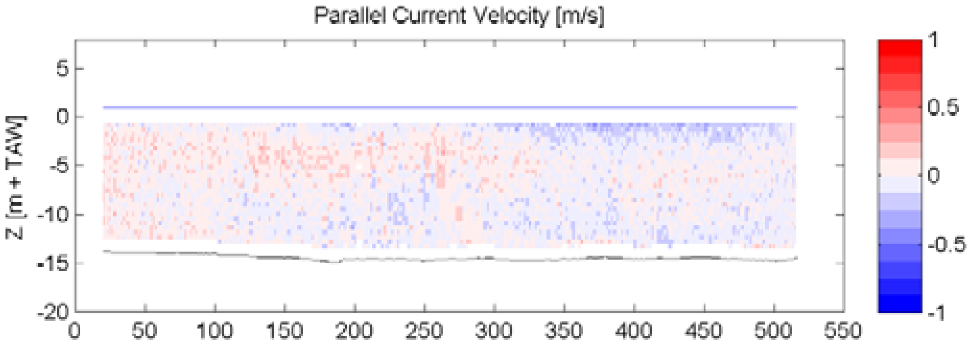
Date / Time [MET] :
12-Mar-2009
08:44 - 08:47

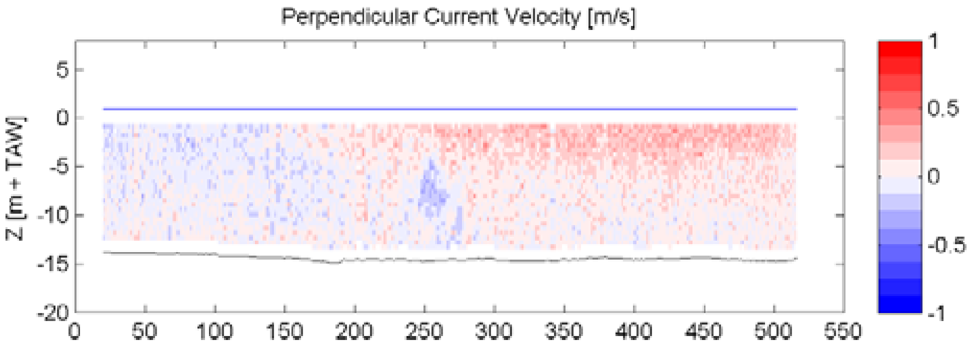
Time after HW [HH:MM]
4:36

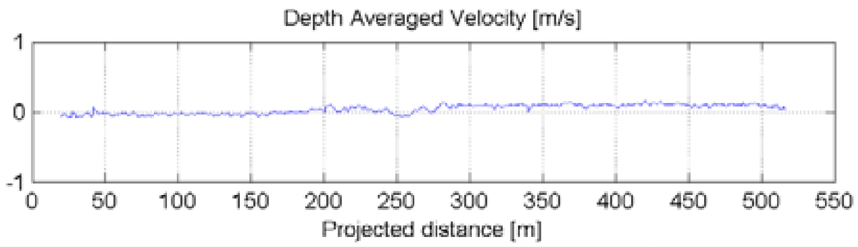
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

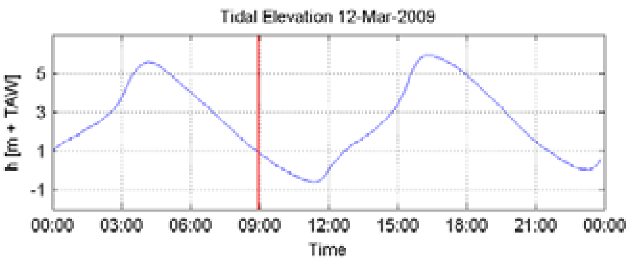
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5015DGDtlr_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

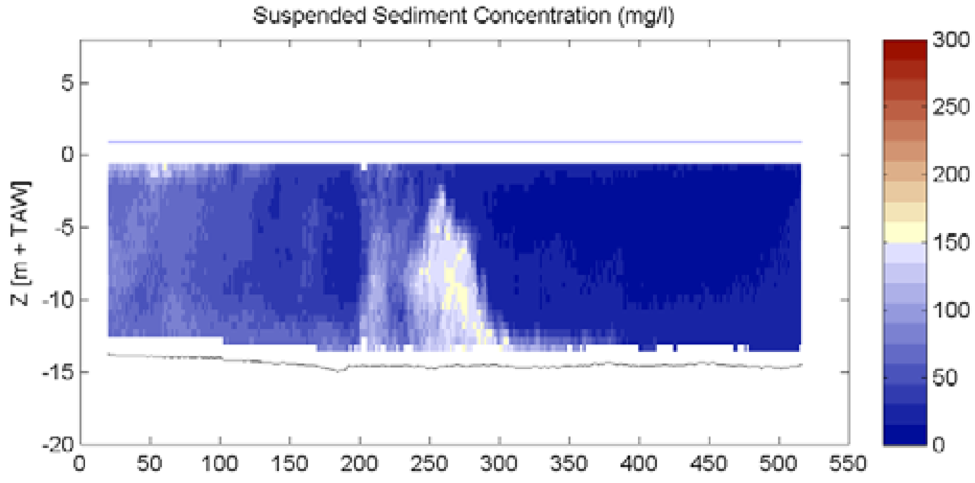
Date / Time [MET] :
12-Mar-2009
08:55 - 08:59

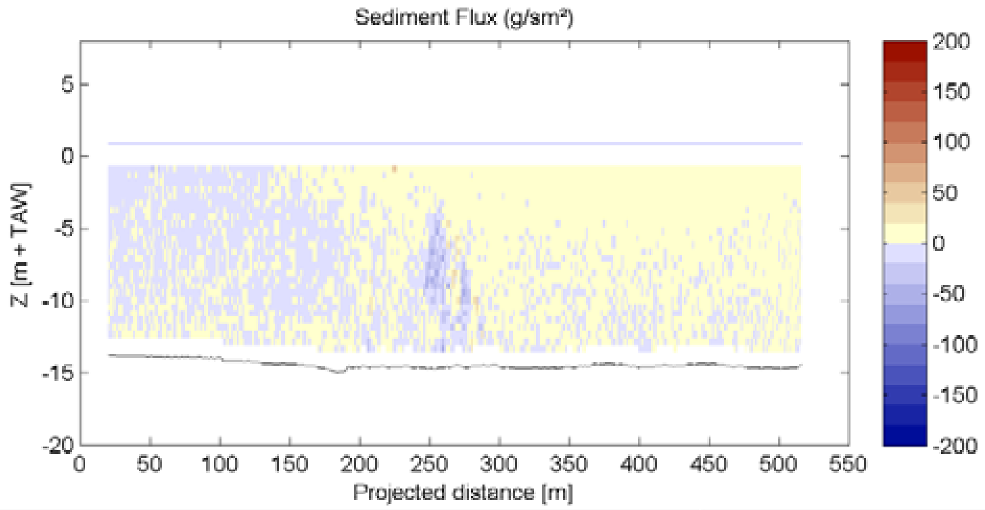
Time after HW [HH:MM]
4:47

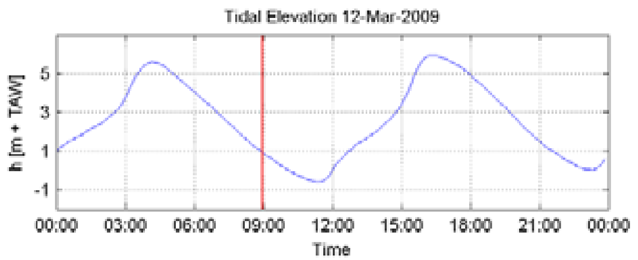
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5015DGDtlr_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

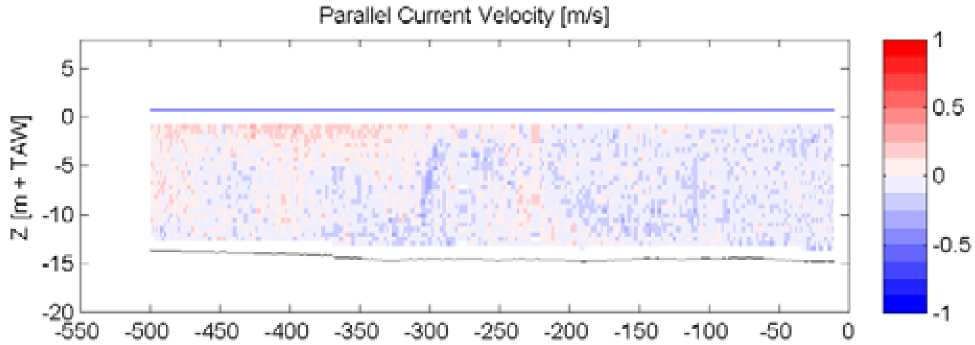
Date / Time [MET] :
12-Mar-2009
08:55 - 08:59

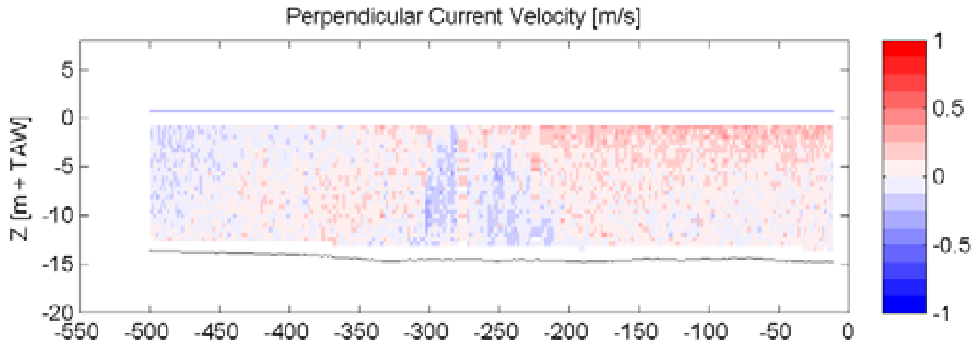
Time after HW [HH:MM]
4:47

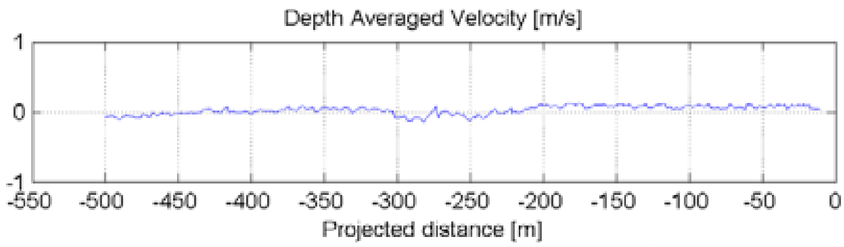
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

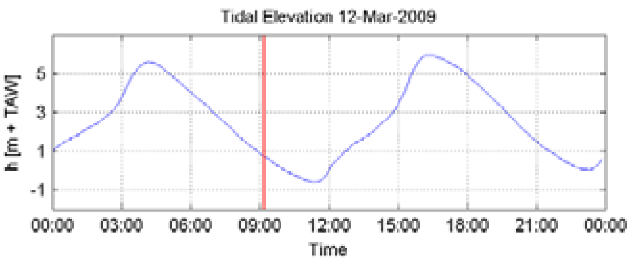
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5017DGDtrl_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

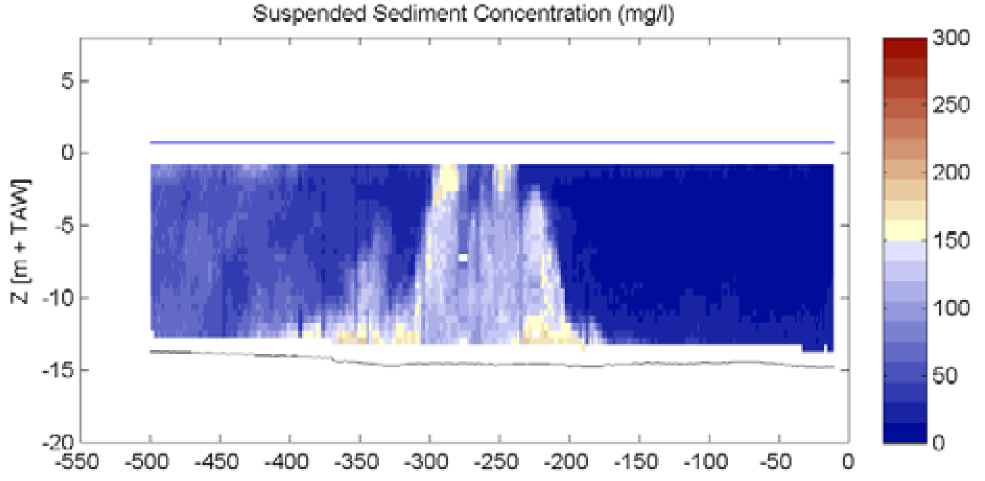
Date / Time [MET] :
12-Mar-2009
09:10 - 09:13

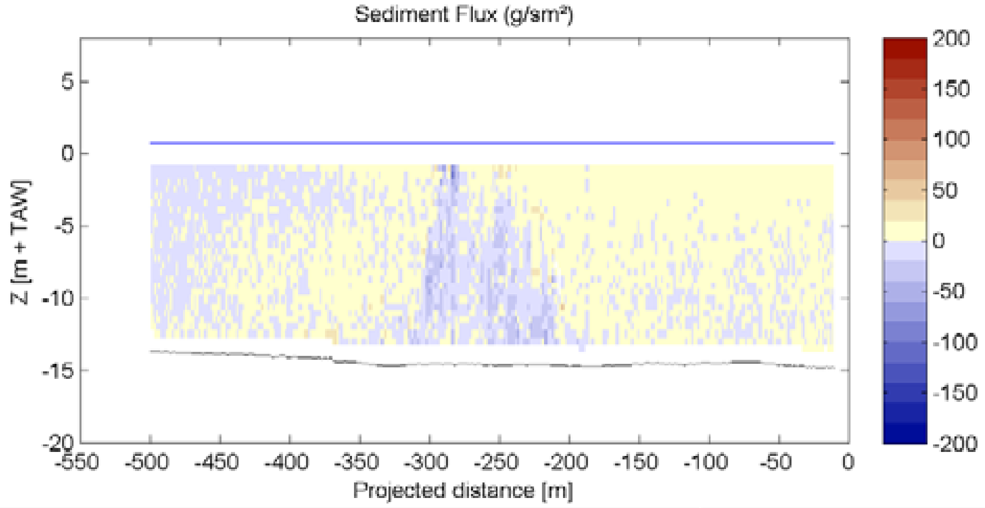
Time after HW [HH:MM]
5:01

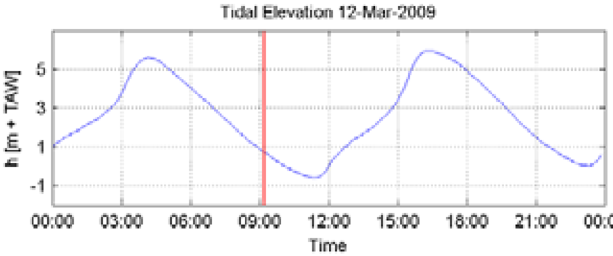
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5017DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

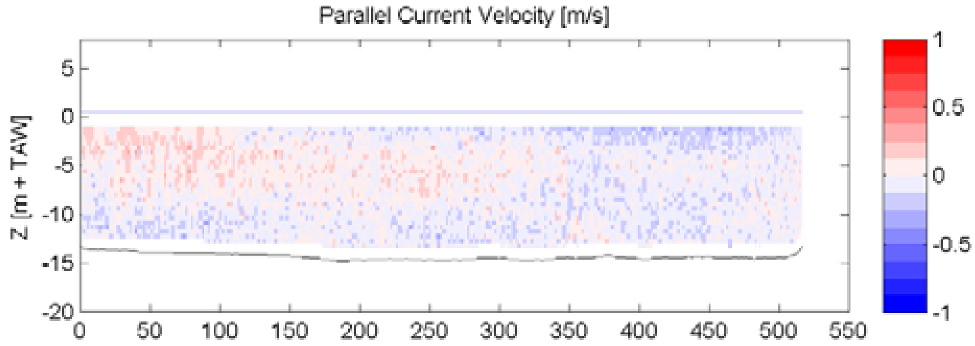
Date / Time [MET] :
12-Mar-2009
09:10 - 09:13

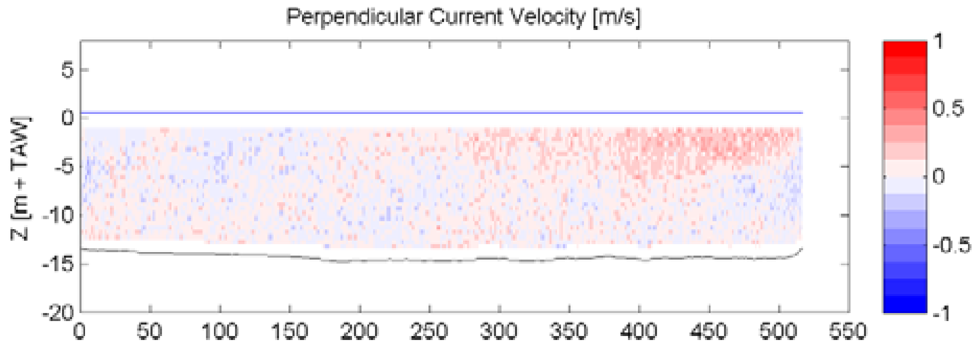
Time after HW [HH:MM]
5:01

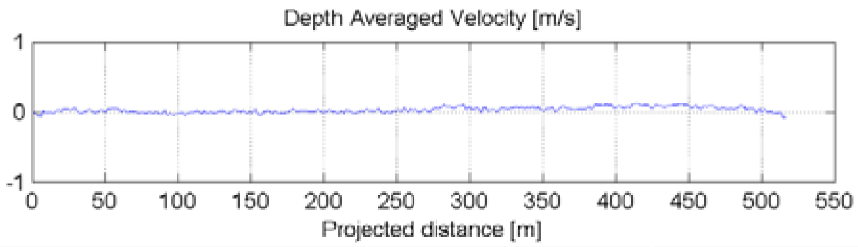
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

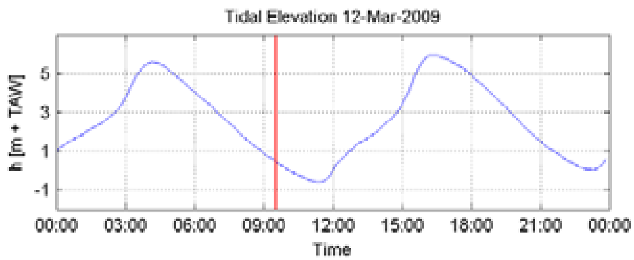
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5019DGDtlr_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
09:29 - 09:32

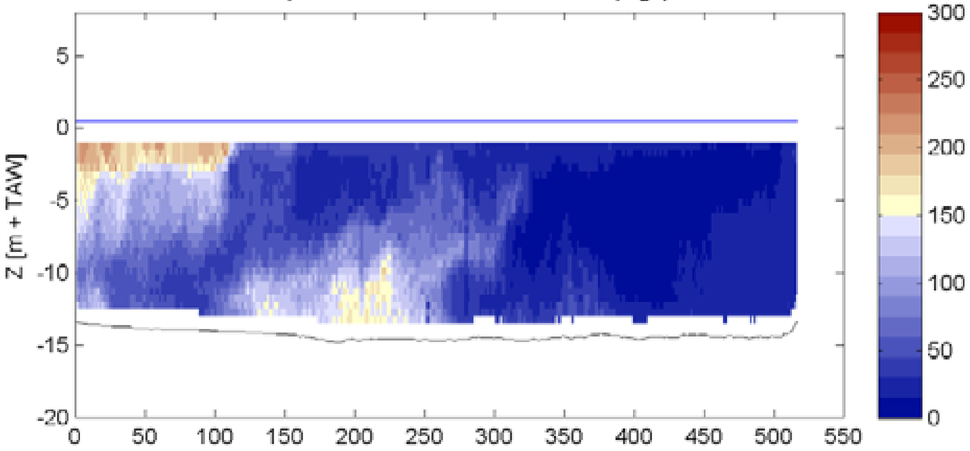
Time after HW [HH:MM]
5:21

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

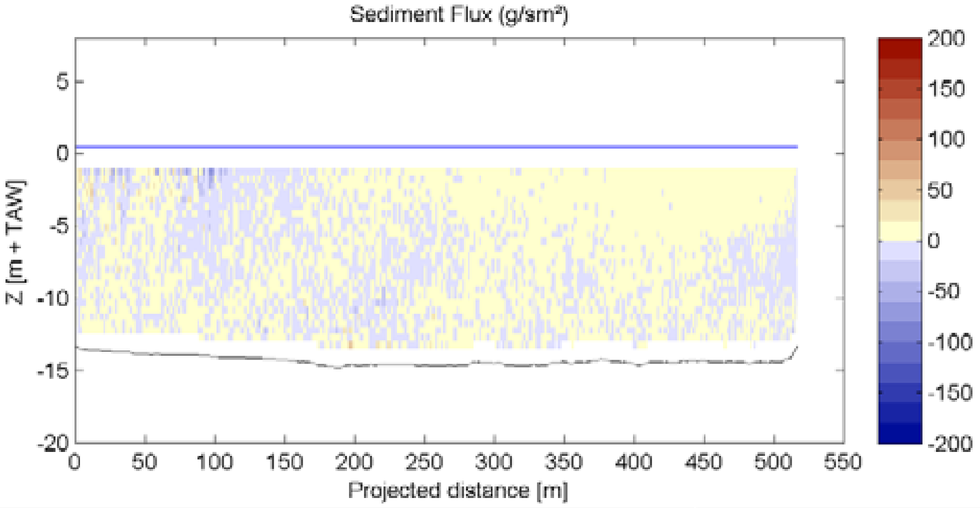
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5019DGDtlr_sub.csv	Location: Deurganckdok

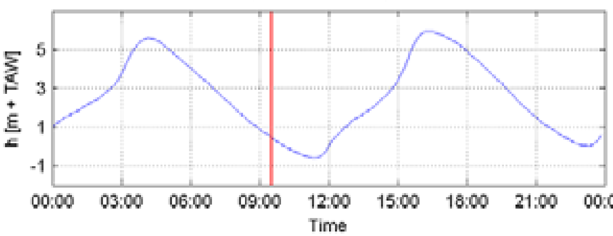
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 12-Mar-2009



HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

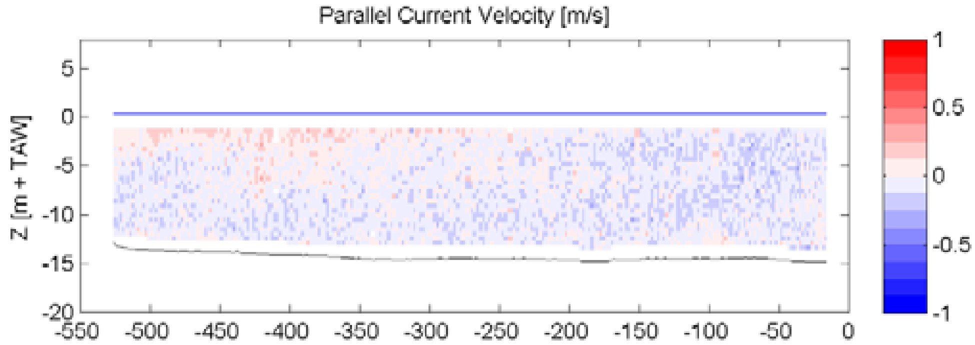
Date / Time [MET] :
12-Mar-2009
09:29 - 09:32

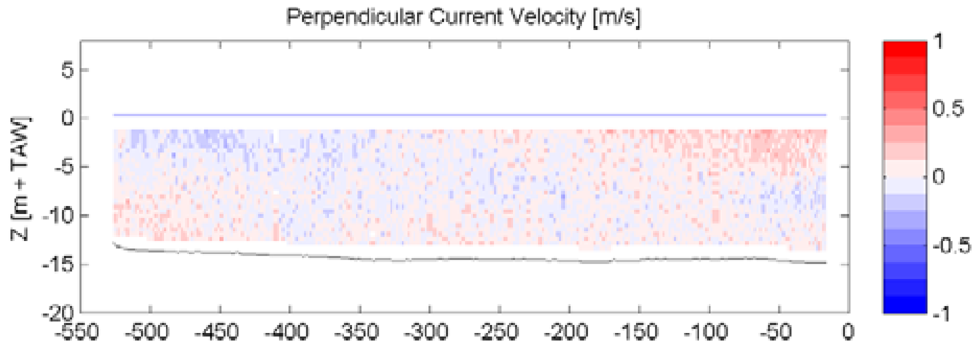
Time after HW [HH:MM]
5:21

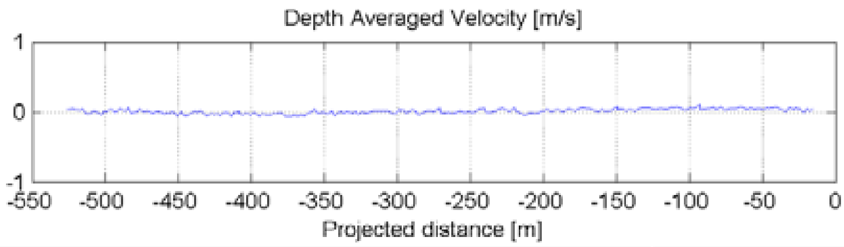
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

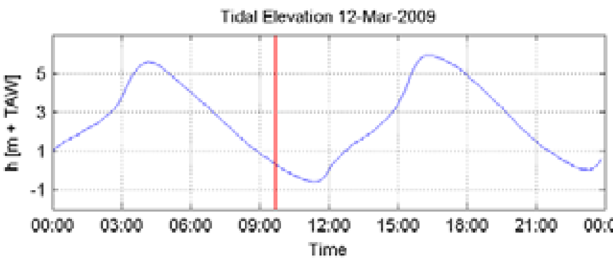
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5021DGDtrl_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

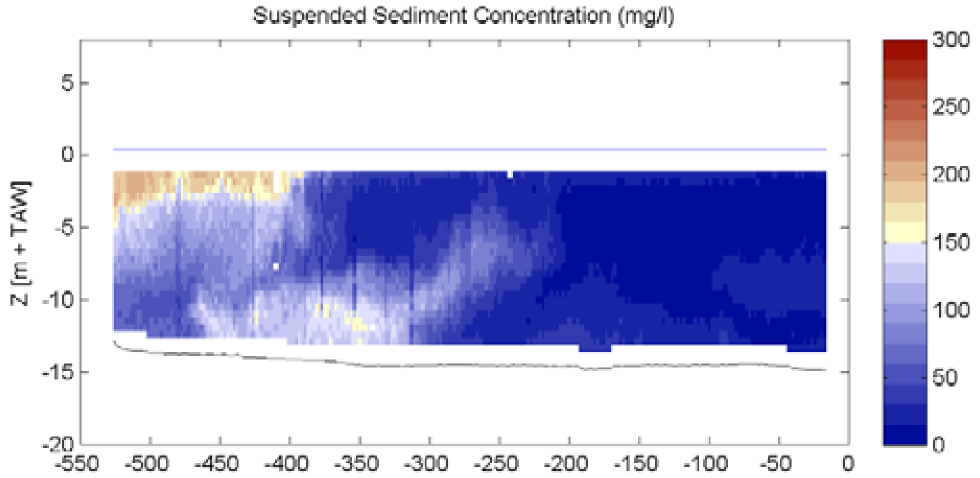
Date / Time [MET] :
12-Mar-2009
09:39 - 09:43

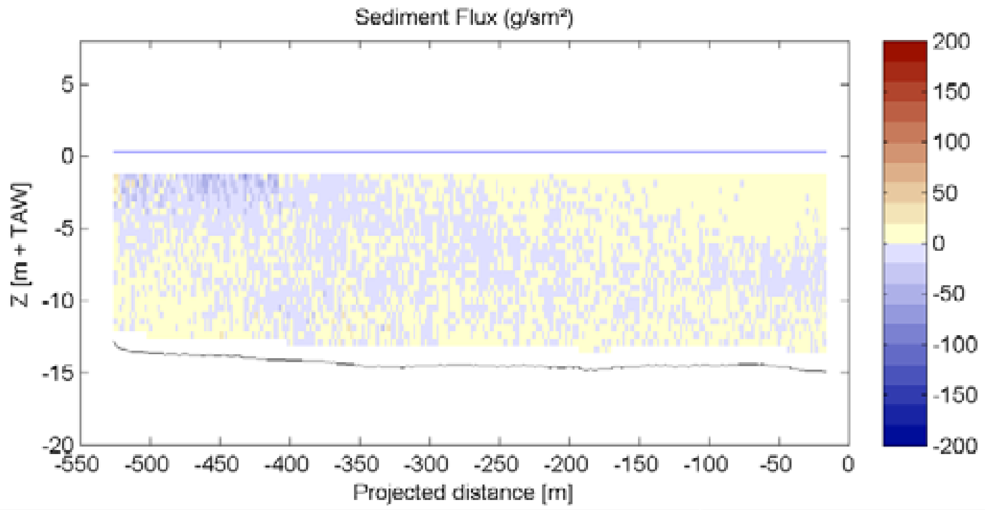
Time after HW [HH:MM]
5:31

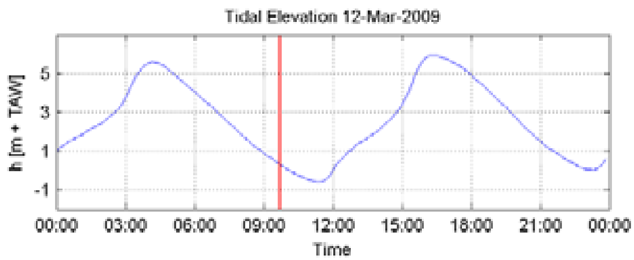
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5021DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

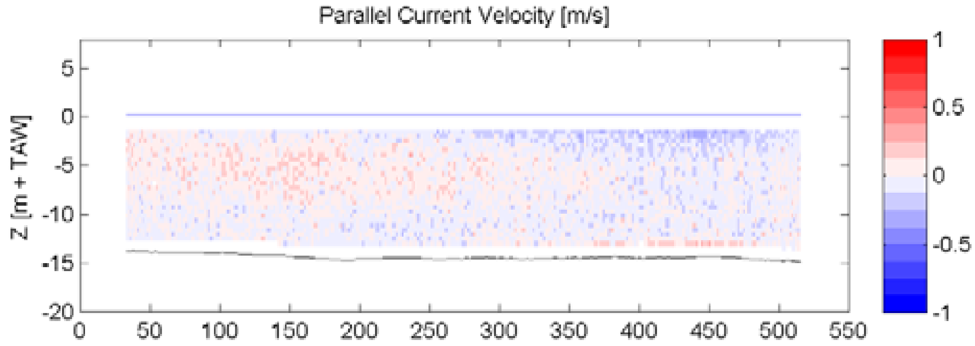
Date / Time [MET] :
12-Mar-2009
09:39 - 09:43

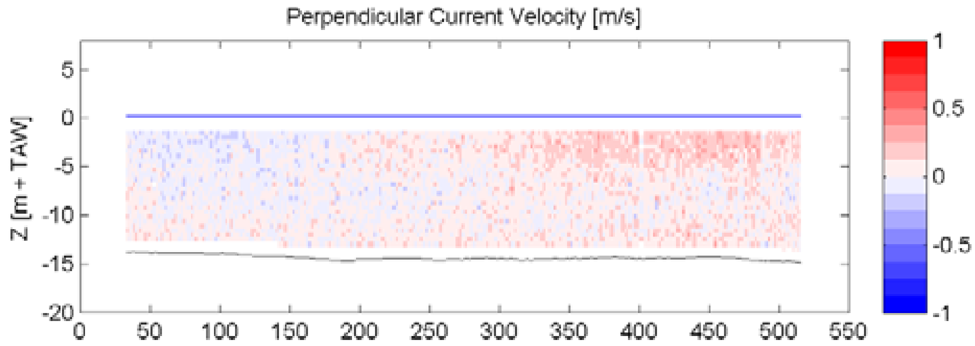
Time after HW [HH:MM]
5:31

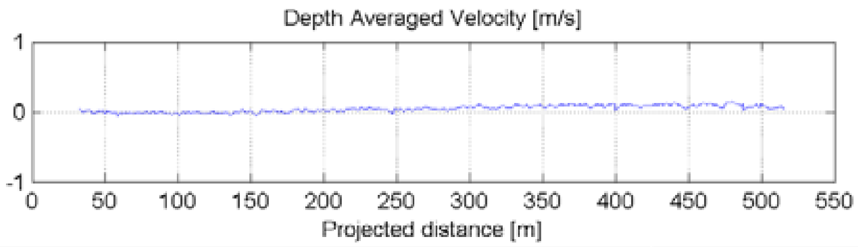
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

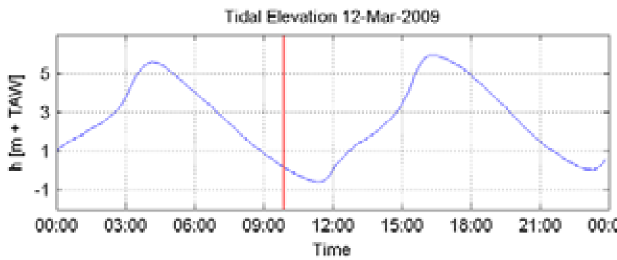
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5023DGDtlr_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
09:50 - 09:54

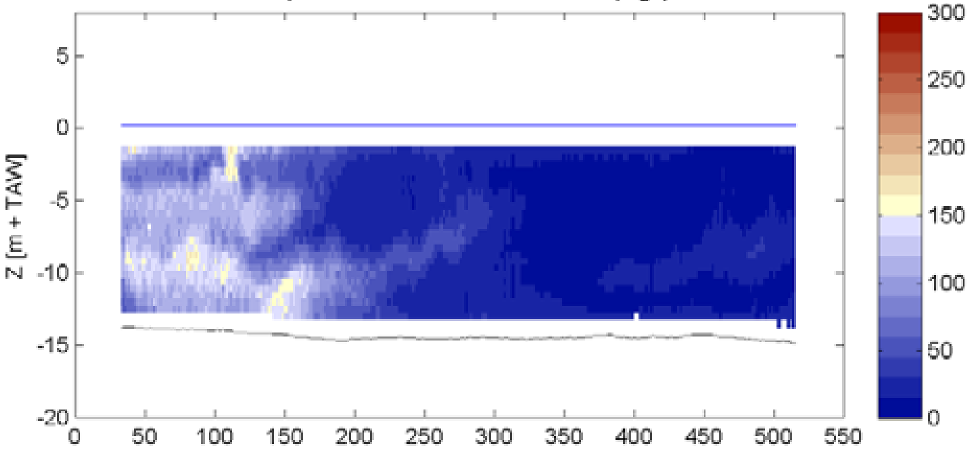
Time after HW [HH:MM]
5:42

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

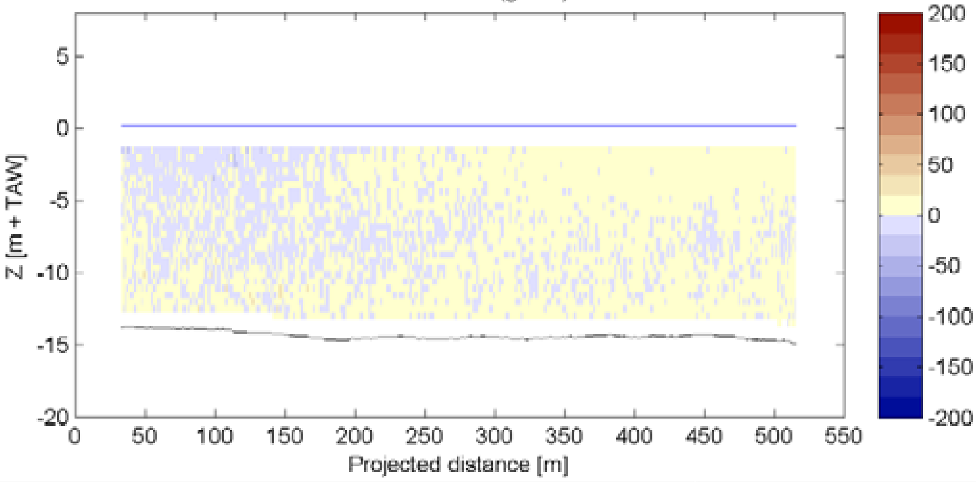
Opvolging aanslibbing DGD

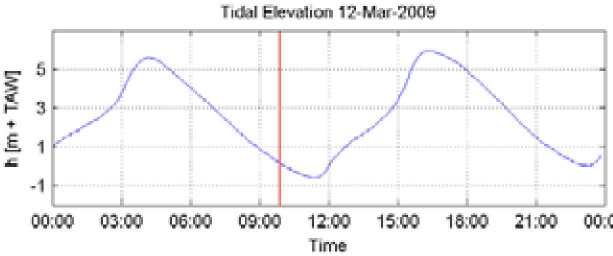
11283	Equipment(s): ADCP
Sourcefile: 5023DGDtlr_sub.csv	Location: Deurganckdok

Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)





HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

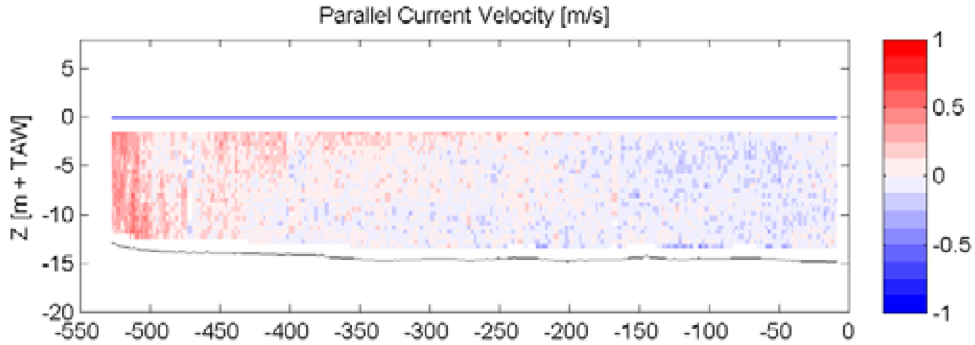
Date / Time [MET] :
12-Mar-2009
09:50 - 09:54

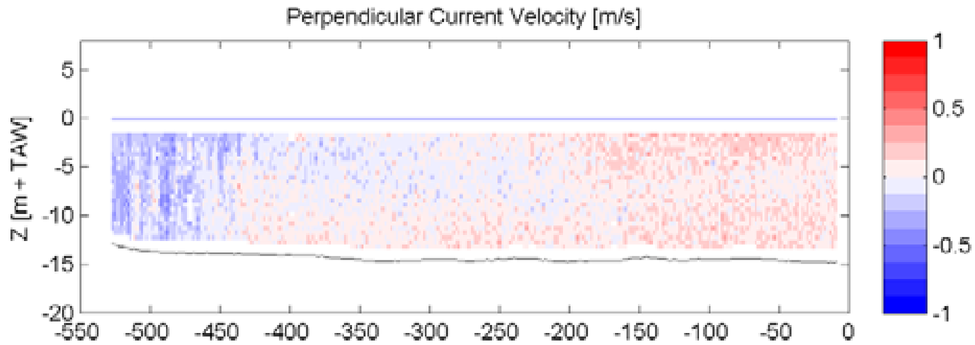
Time after HW [HH:MM]
5:42

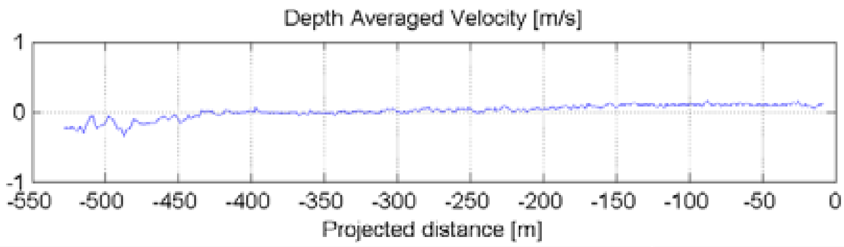
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

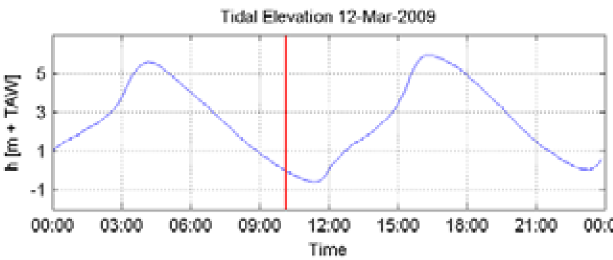
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5025DGDtrl_sub.csv	Location: Deurganckdok









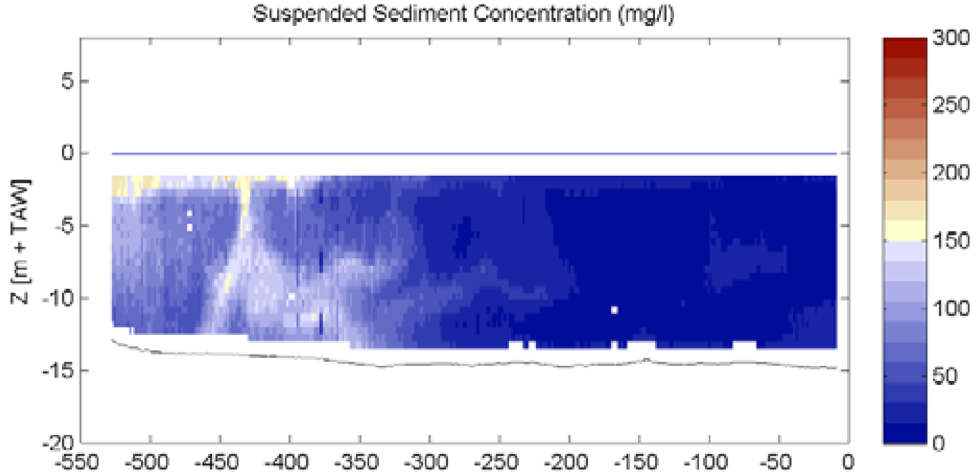
HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

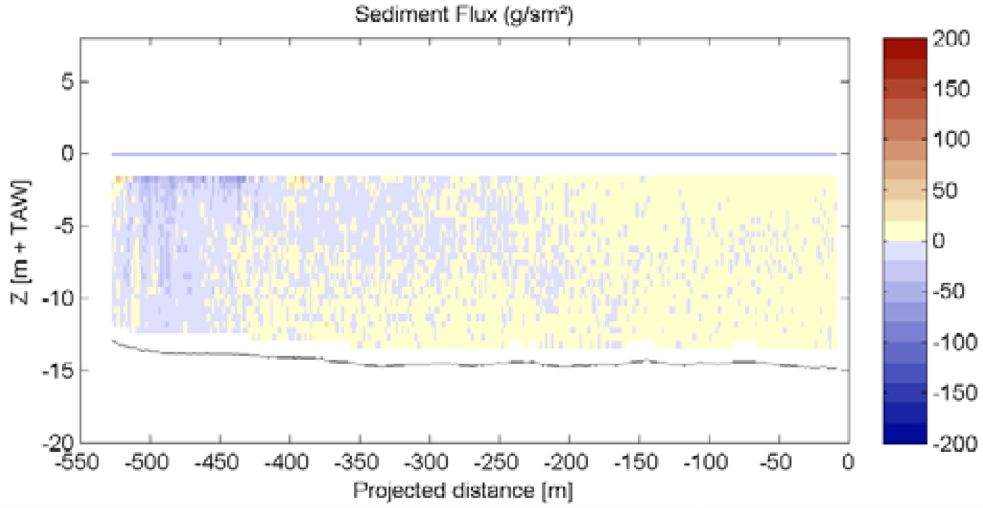
Date / Time [MET] :
12-Mar-2009
10:06 - 10:09

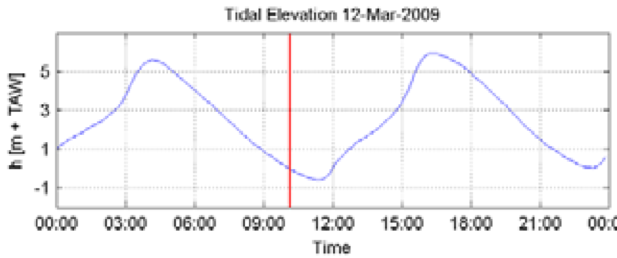
Time after HW [HH:MM]
5:57

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD	
11283	Equipment(s): ADCP
Sourcefile: 5025DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

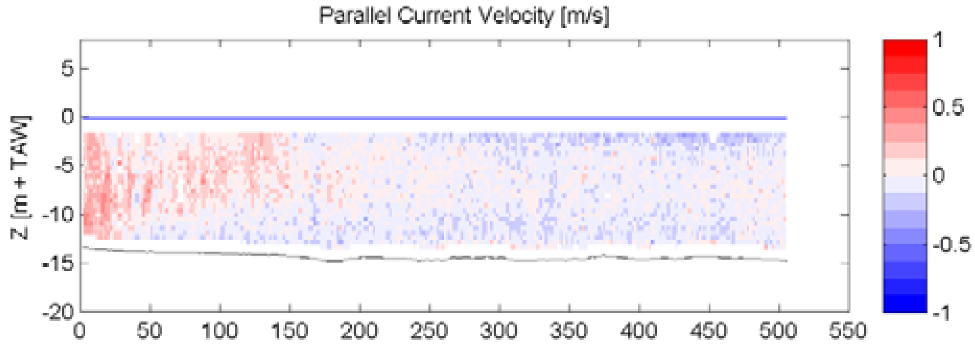
Date / Time [MET] :
12-Mar-2009
10:06 - 10:09

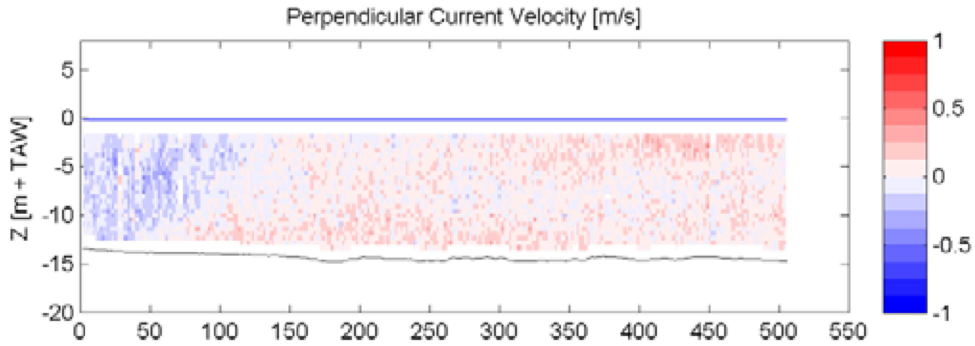
Time after HW [HH:MM]
5:57

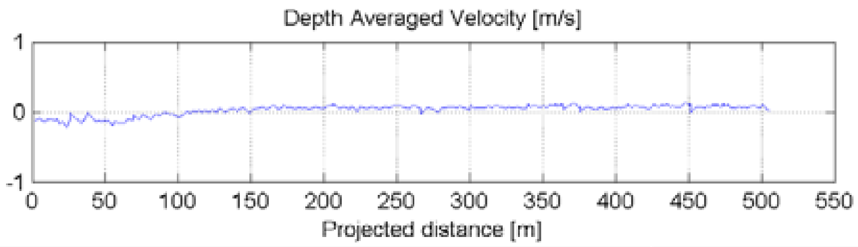
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

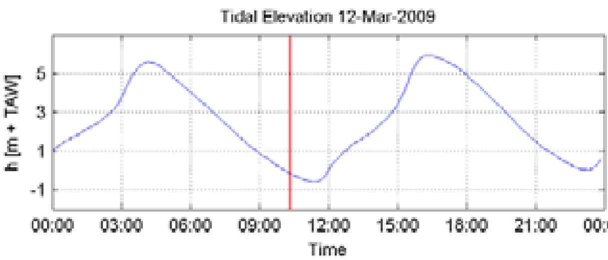
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5027DGDtlr_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

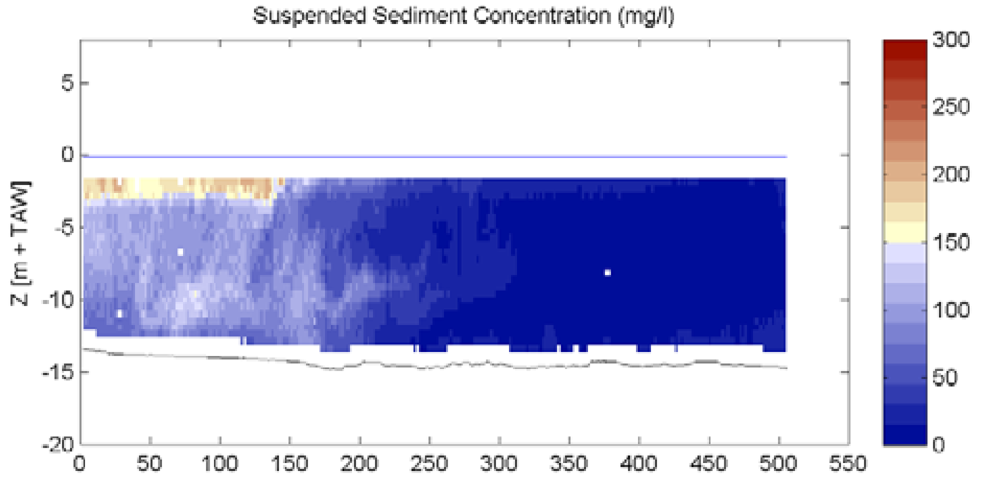
Date / Time [MET] :
12-Mar-2009
10:17 - 10:21

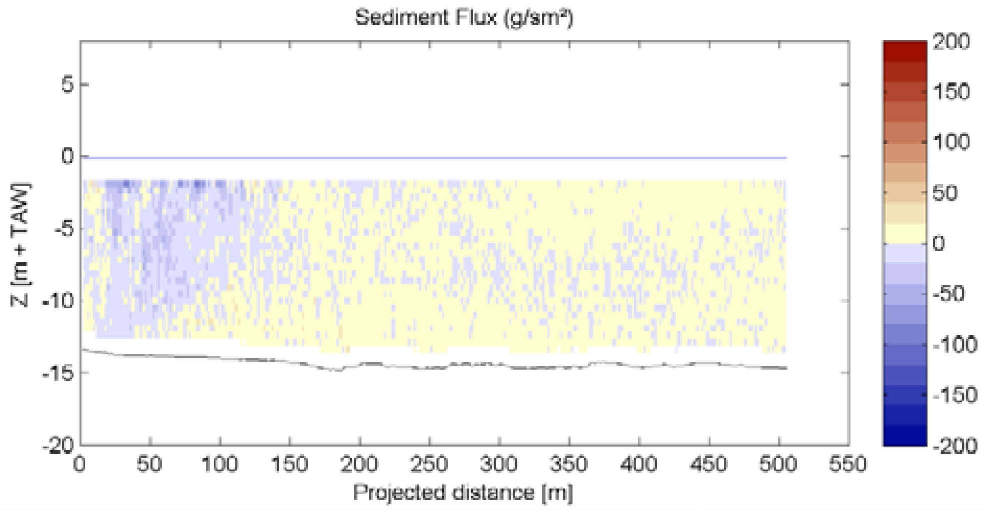
Time after HW [HH:MM]
6:09

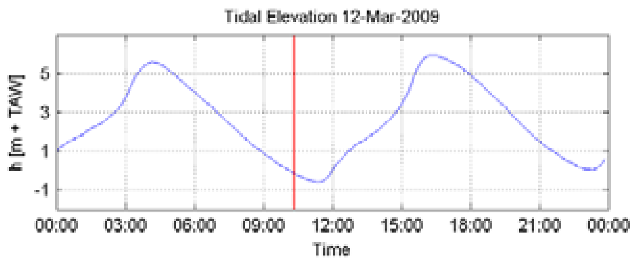
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5027DGDtlr_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

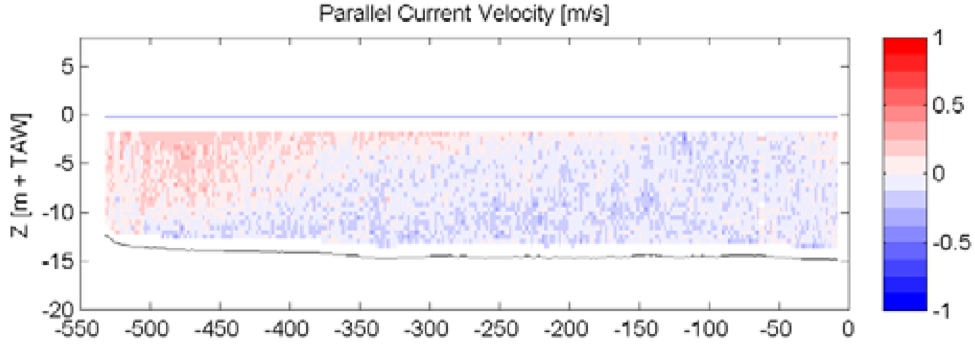
Date / Time [MET] :
12-Mar-2009
10:17 - 10:21

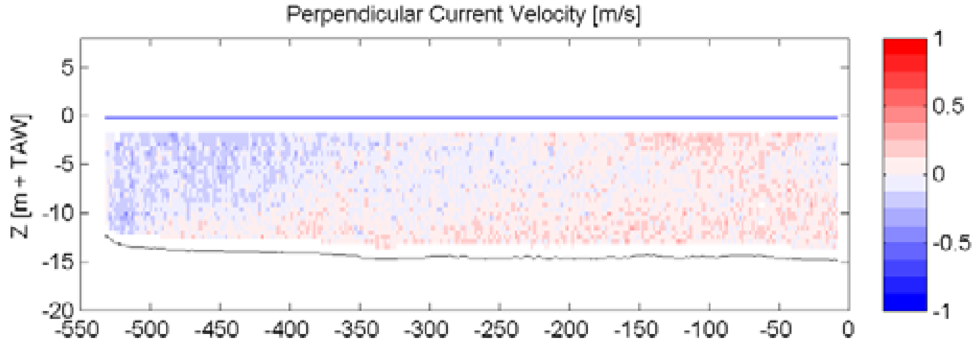
Time after HW [HH:MM]
6:09

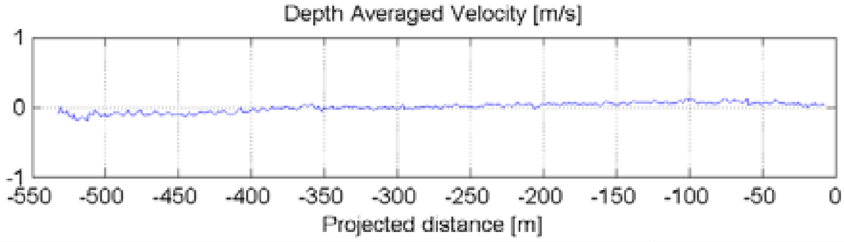
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

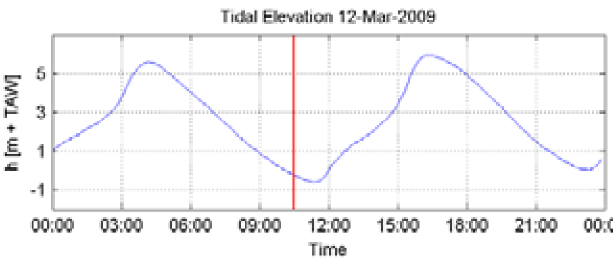
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5029DGDtrl_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

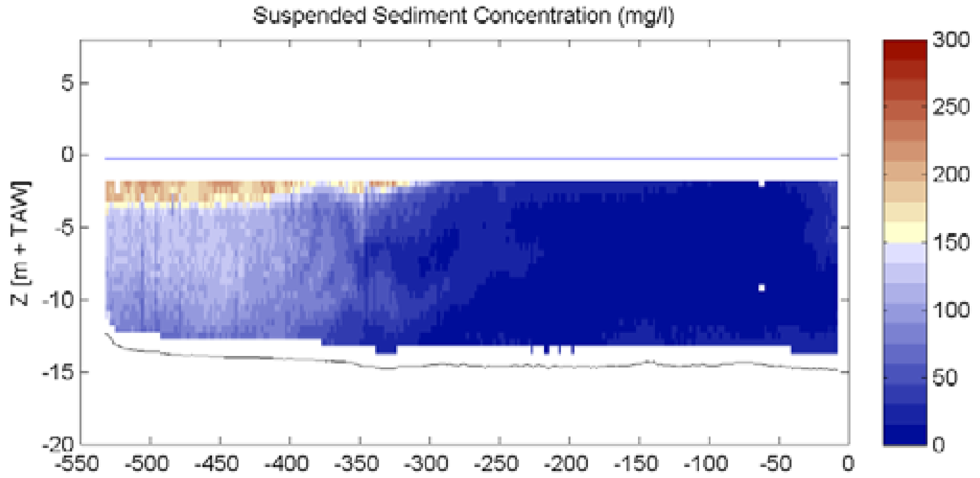
Date / Time [MET] :
12-Mar-2009
10:27 - 10:31

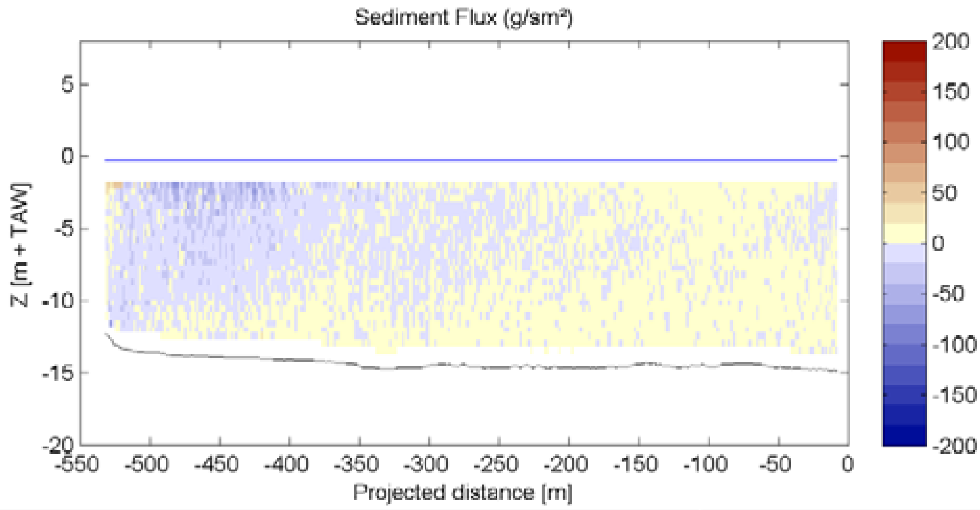
Time after HW [HH:MM]
6:19

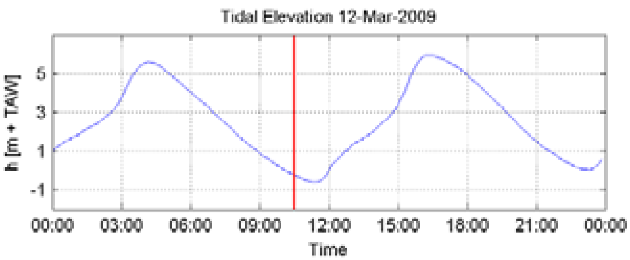
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5029DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
10:27 - 10:31

Time after HW [HH:MM]
6:19

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

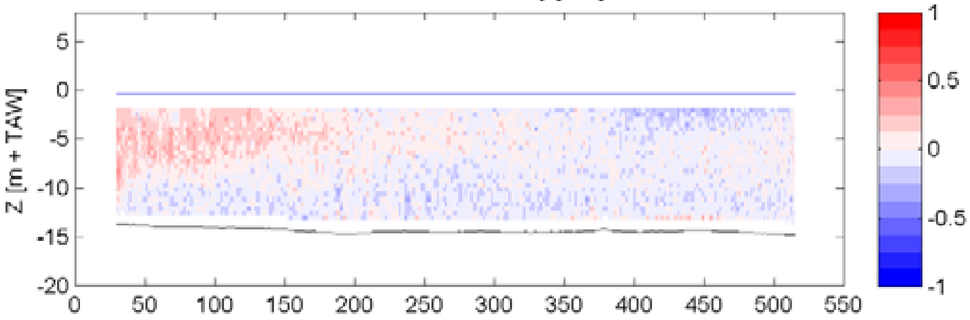
11283

Equipment(s):
ADCP

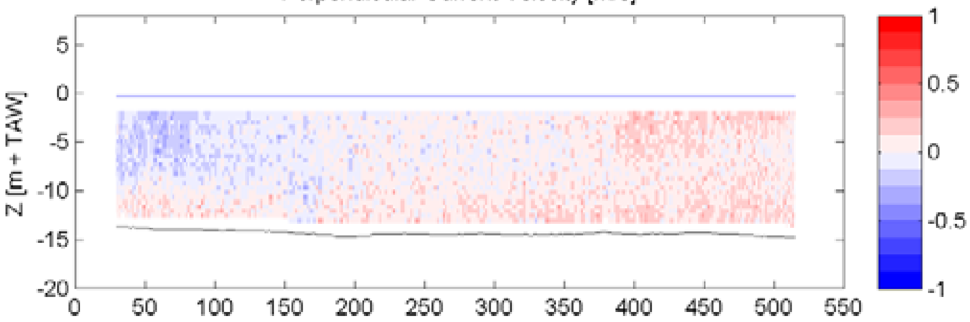
Sourcefile:
5031DGDtlr_sub.csv

Location:
Deurganckdok

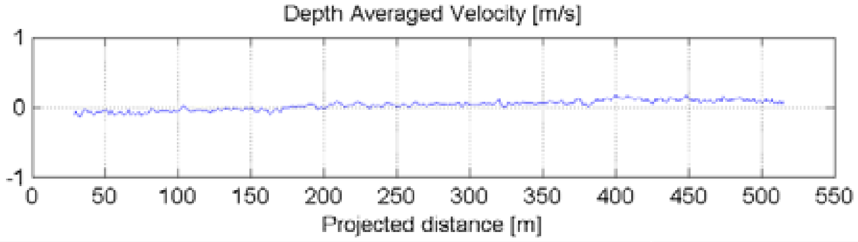
Parallel Current Velocity [m/s]



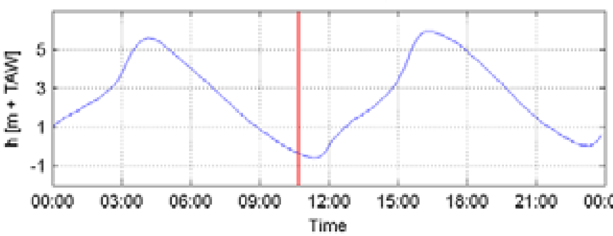
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 12-Mar-2009



HW/LW:
04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

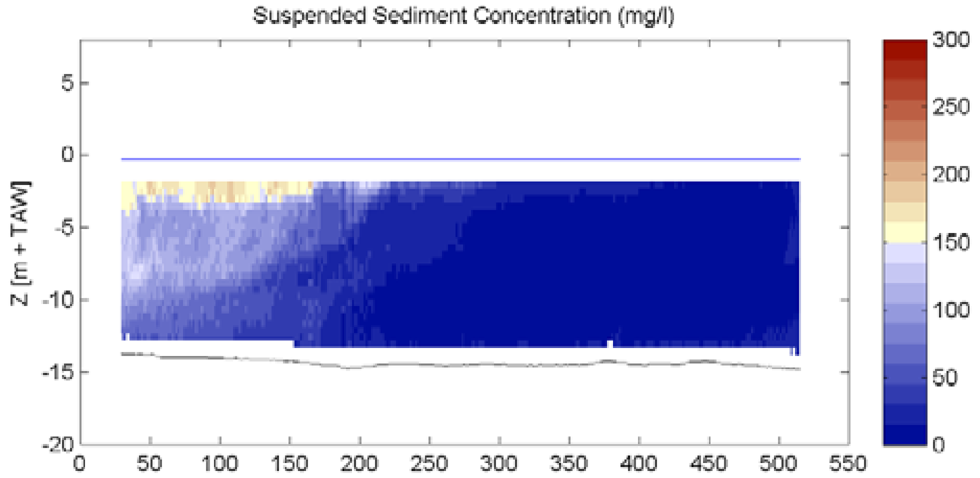
Date / Time [MET] :
12-Mar-2009
10:39 - 10:42

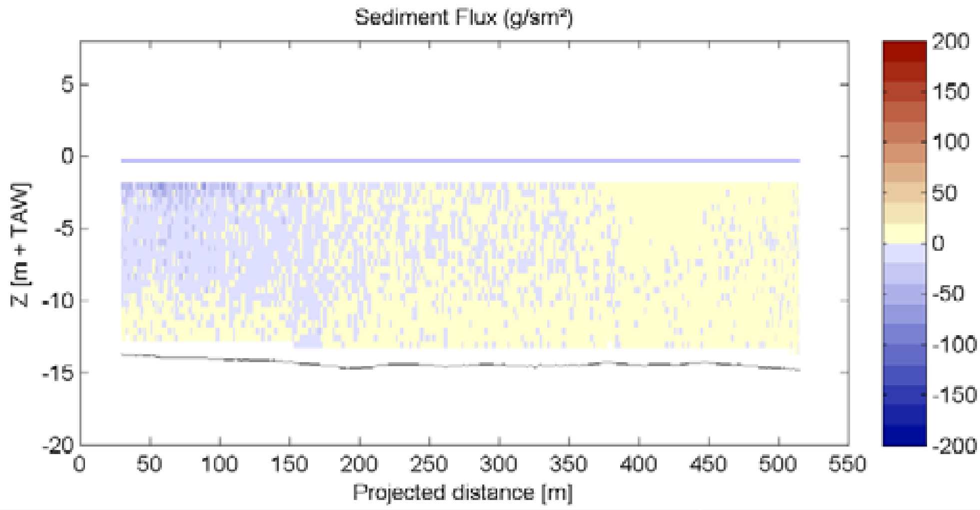
Time after HW [HH:MM]
6:30

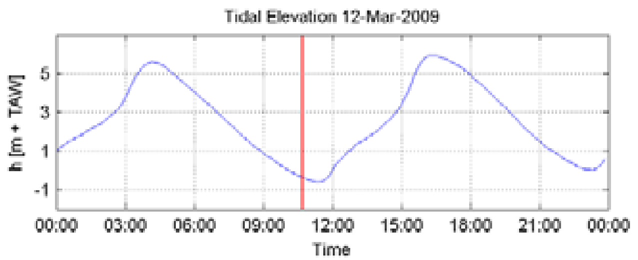
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5031DGDtlr_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

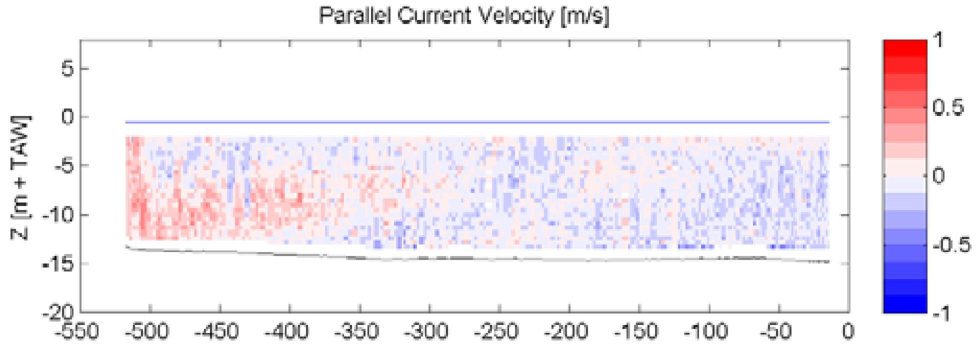
Date / Time [MET] :
12-Mar-2009
10:39 - 10:42

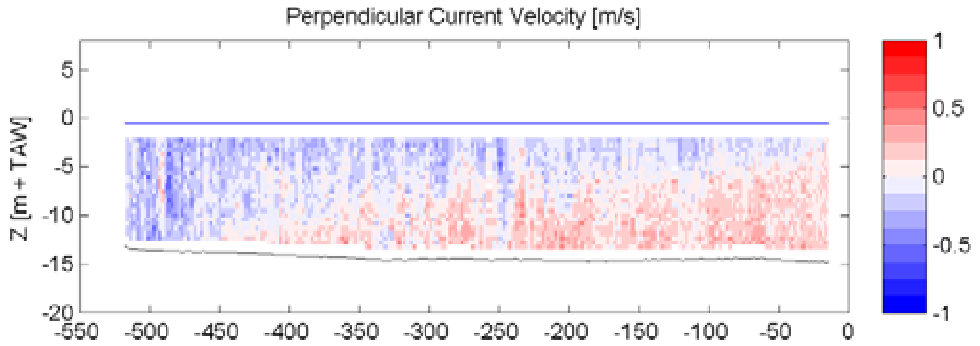
Time after HW [HH:MM]
6:30

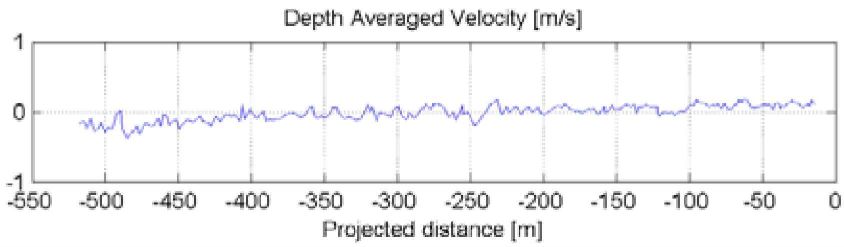
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

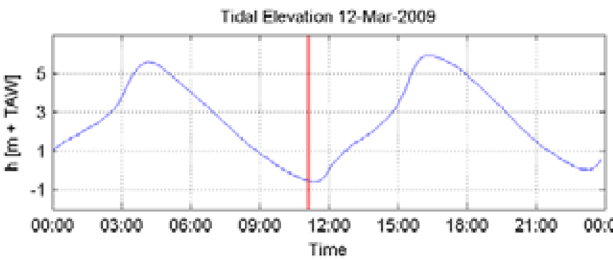
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5033DGDtrl_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

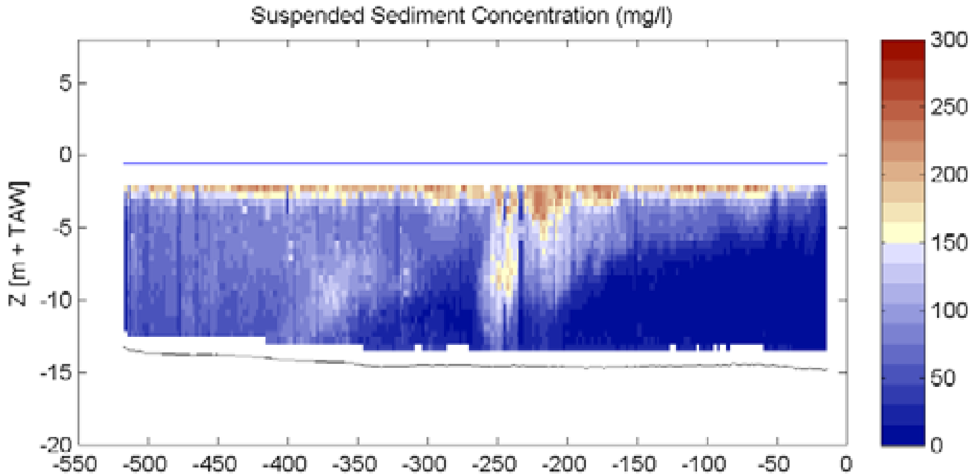
Date / Time [MET] :
12-Mar-2009
11:05 - 11:08

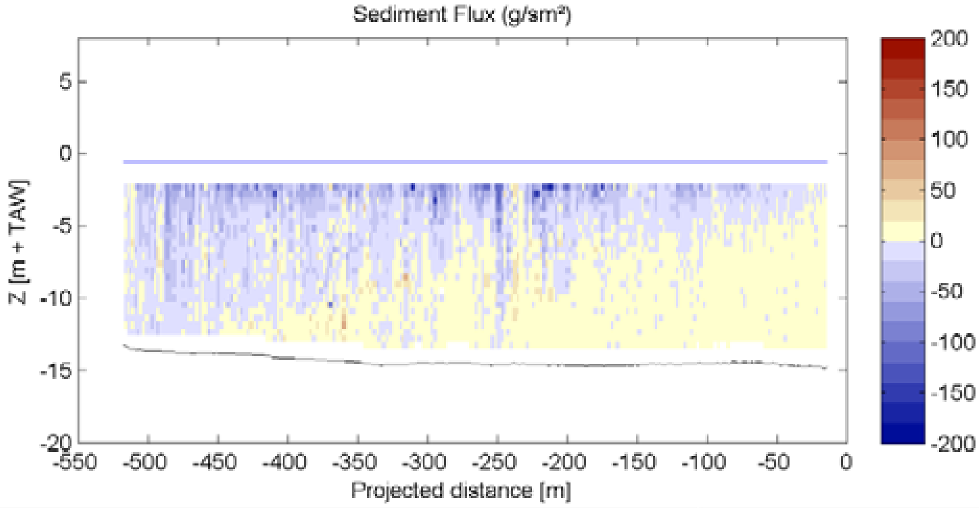
Time after HW [HH:MM]
6:56

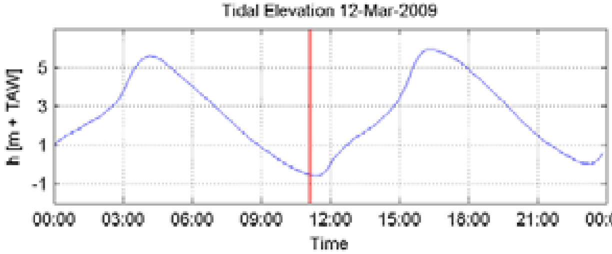
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5033DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

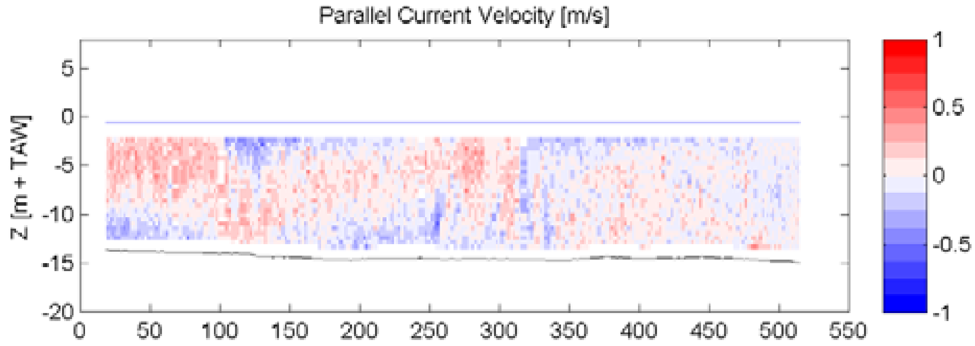
Date / Time [MET] :
12-Mar-2009
11:05 - 11:08

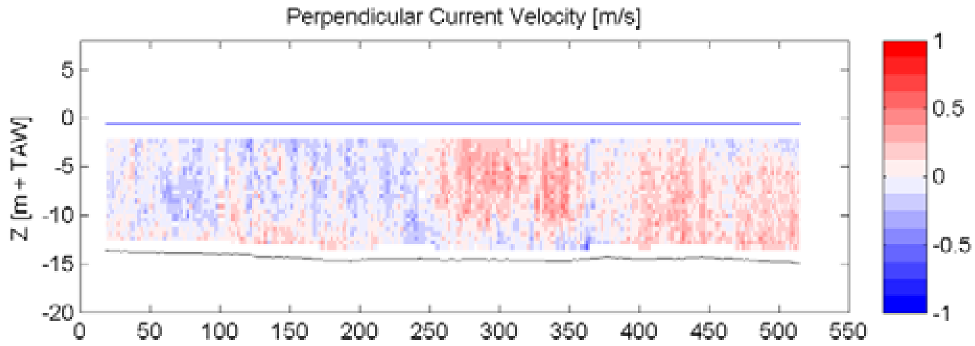
Time after HW [HH:MM]
6:56

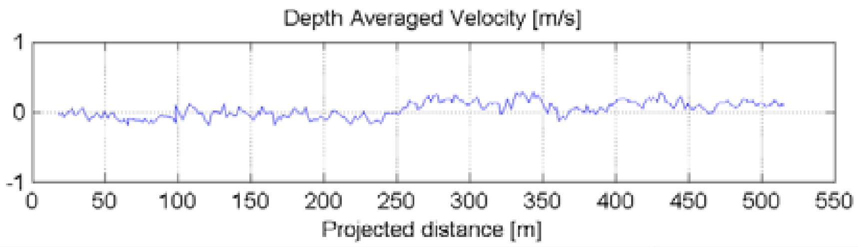
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

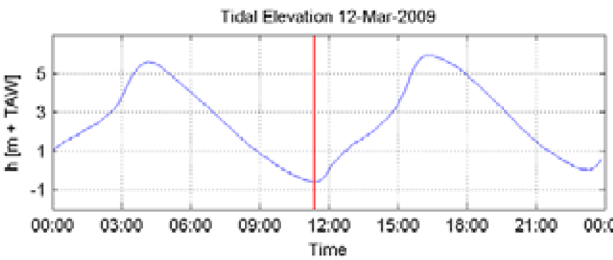
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5035DGDtlr_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

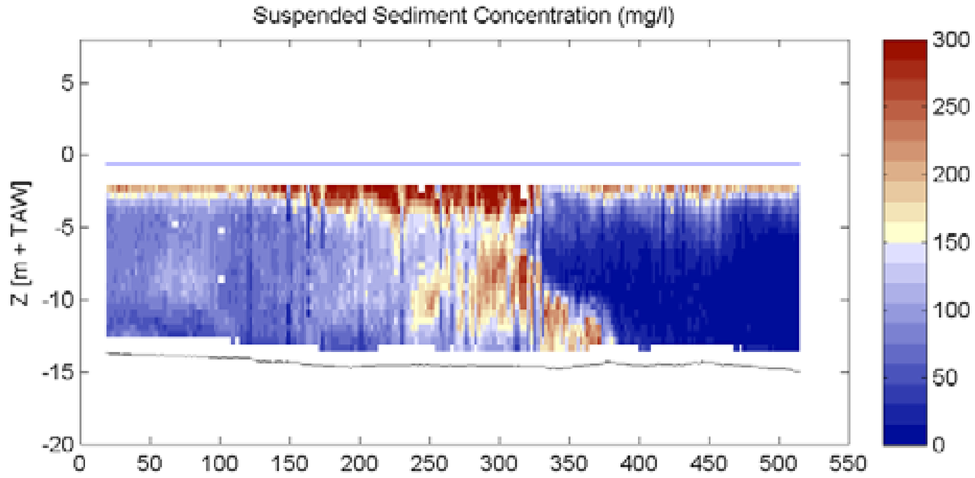
Date / Time [MET] :
12-Mar-2009
11:20 - 11:23

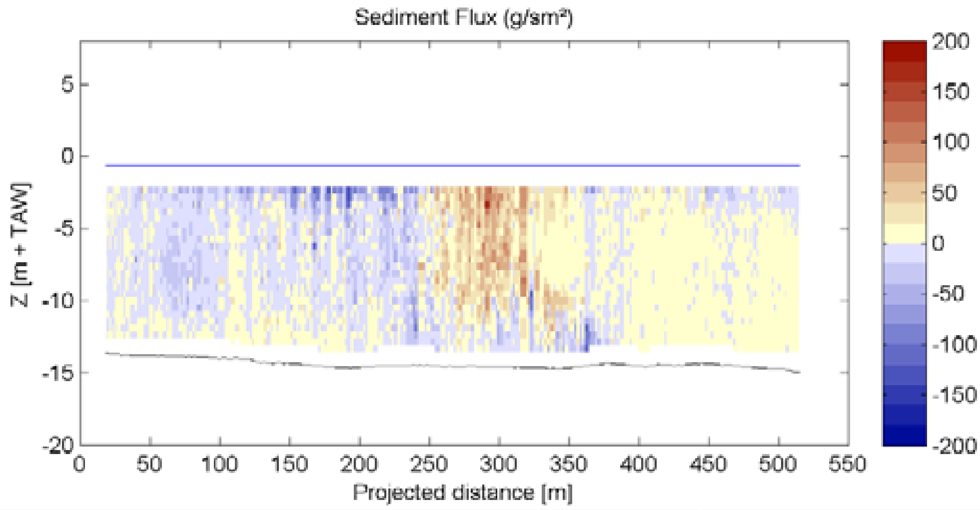
Time after HW [HH:MM]
7:12

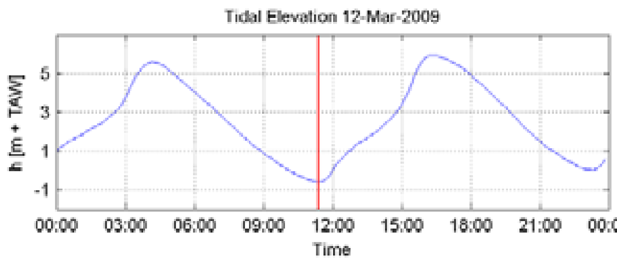
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5035DGDtlr_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
11:20 - 11:23

Time after HW [HH:MM]
7:12

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

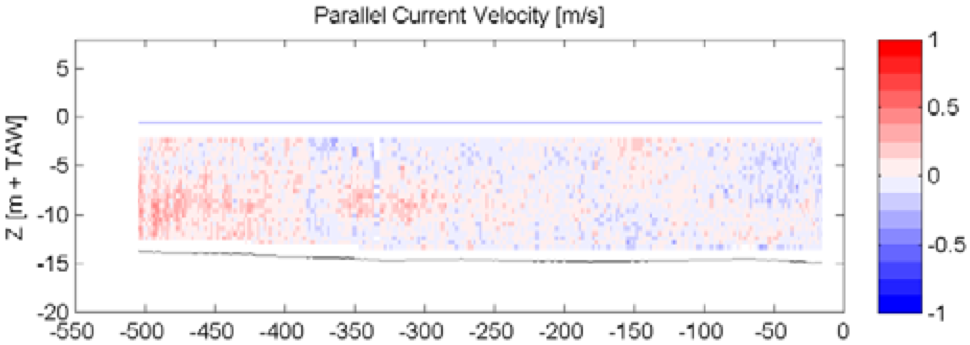
Opvolging aanslibbing DGD

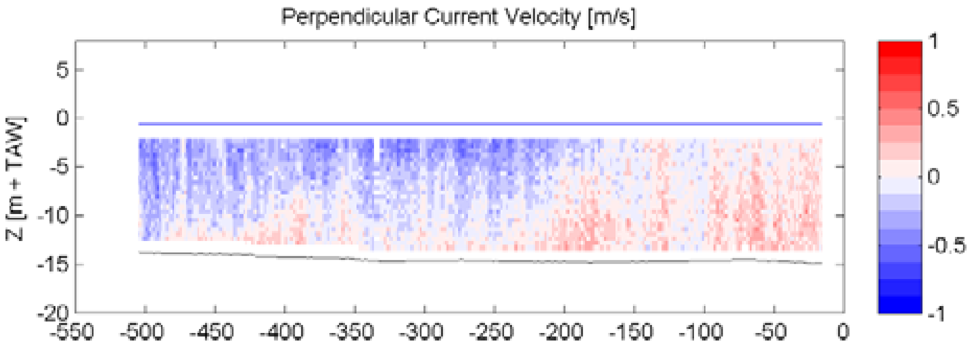
11283

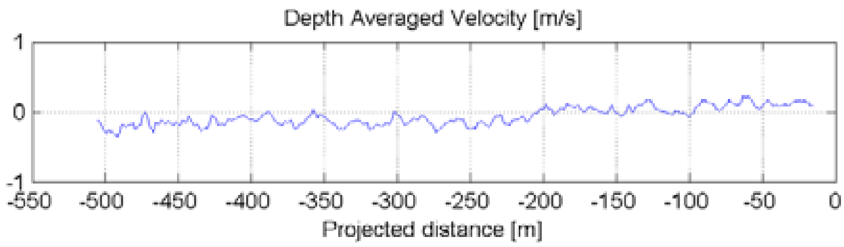
Equipment(s):
ADCP

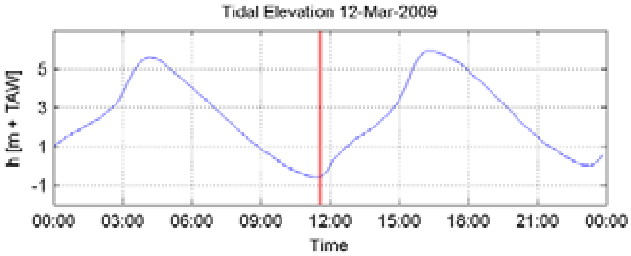
Sourcefile:
5037DGDtrl_sub.csv

Location:
Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

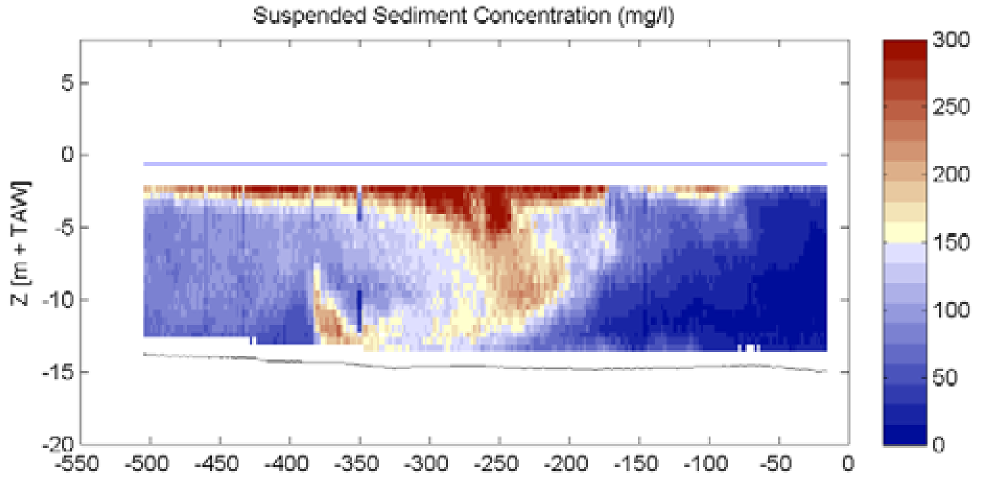
Date / Time [MET] :
12-Mar-2009
11:32 - 11:35

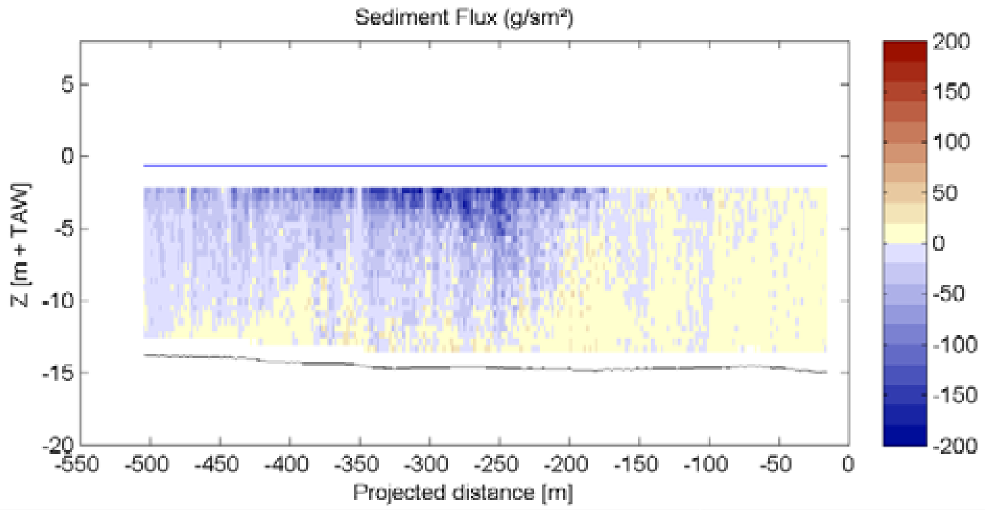
Time after HW [HH:MM]
-4:45

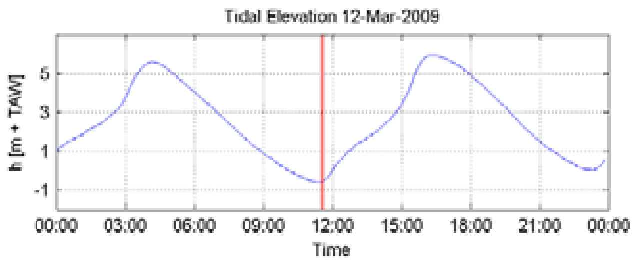
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5037DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

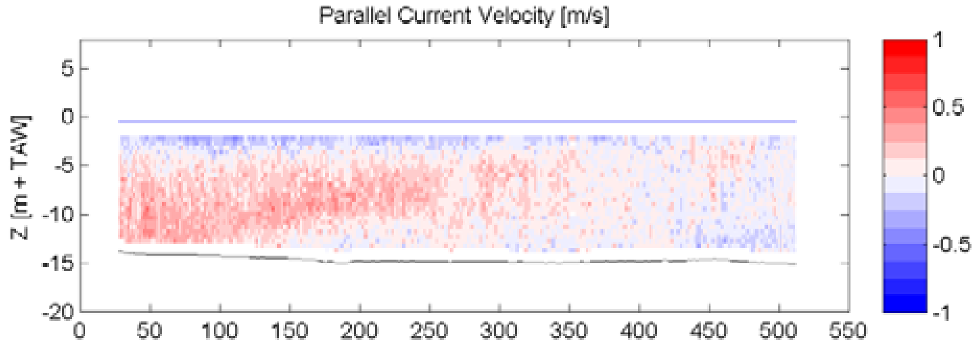
Date / Time [MET] :
12-Mar-2009
11:32 - 11:35

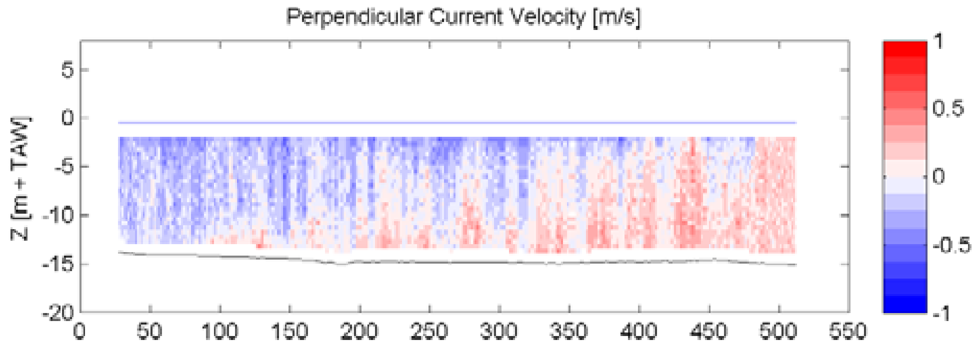
Time after HW [HH:MM]
-4:45

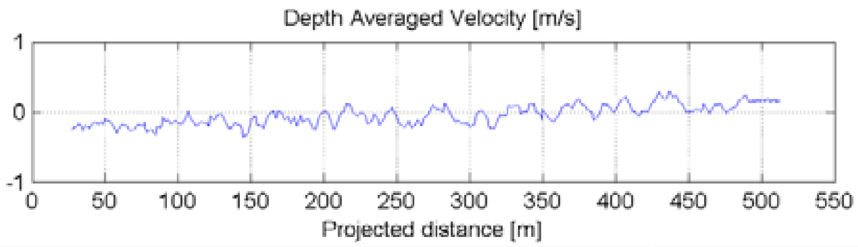
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

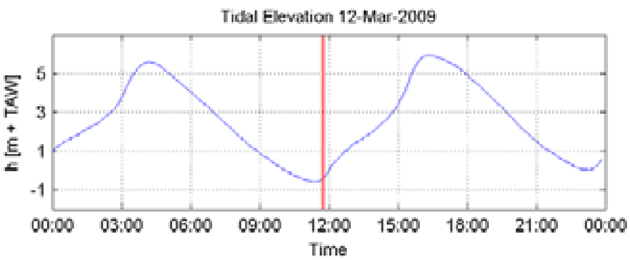
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5039DGDtlr_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

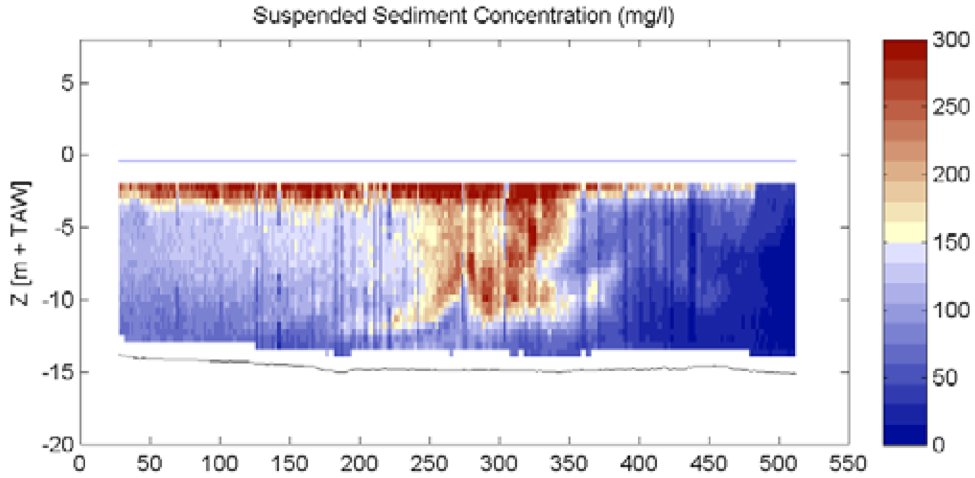
Date / Time [MET] :
12-Mar-2009
11:42 - 11:45

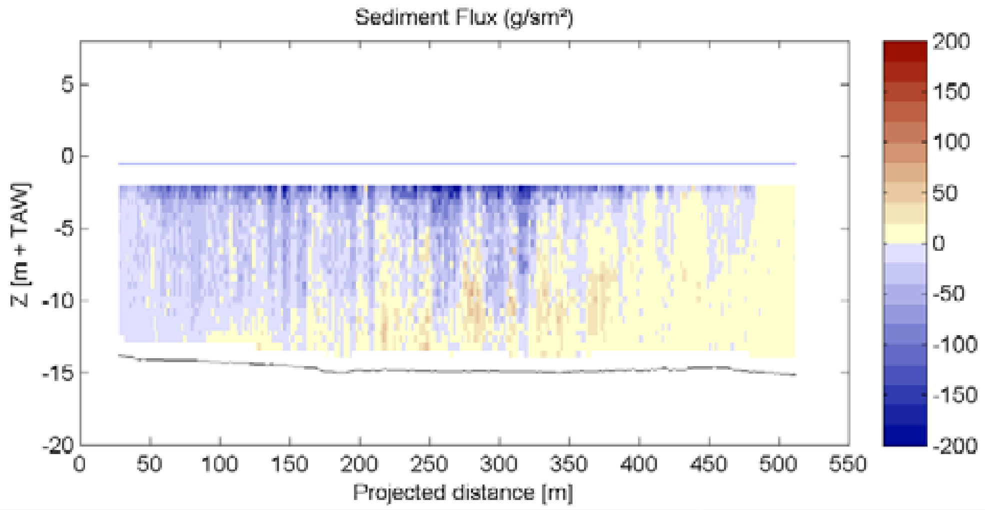
Time after HW [HH:MM]
-4:35

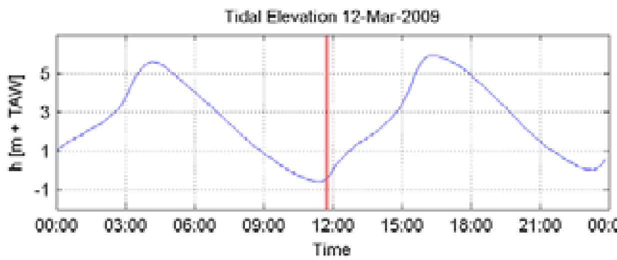
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5039DGDtlr_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

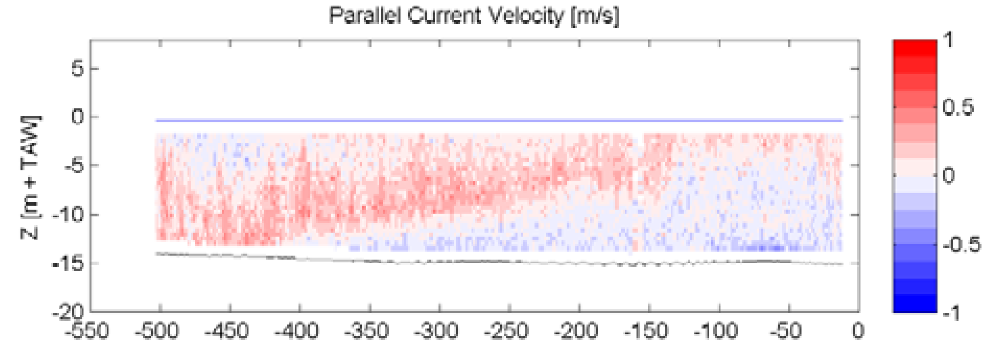
Date / Time [MET] :
12-Mar-2009
11:42 - 11:45

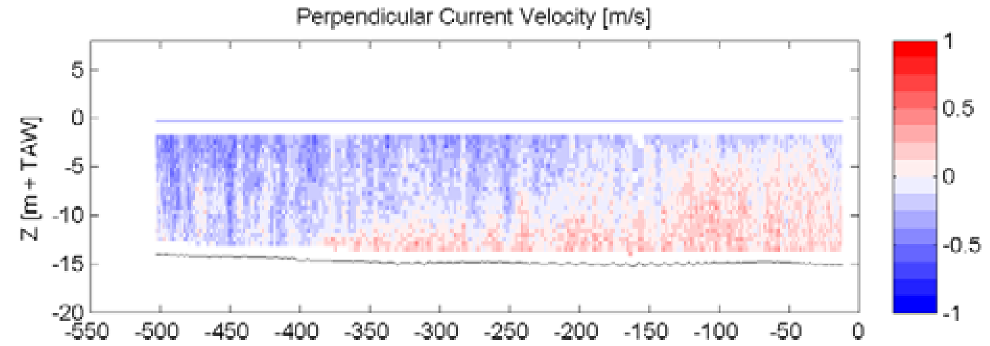
Time after HW [HH:MM]
-4:35

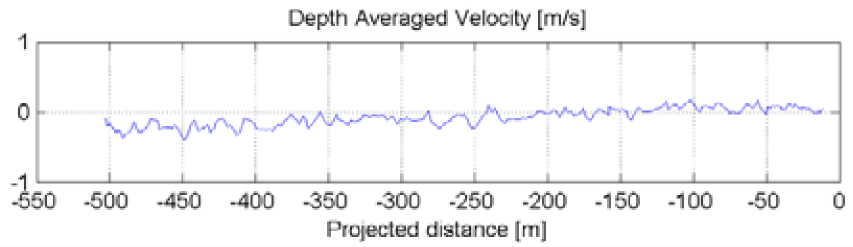
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

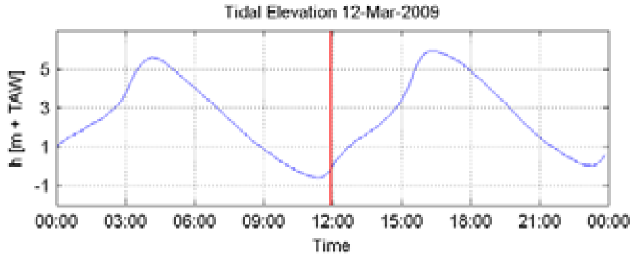
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5041DGDtrl_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

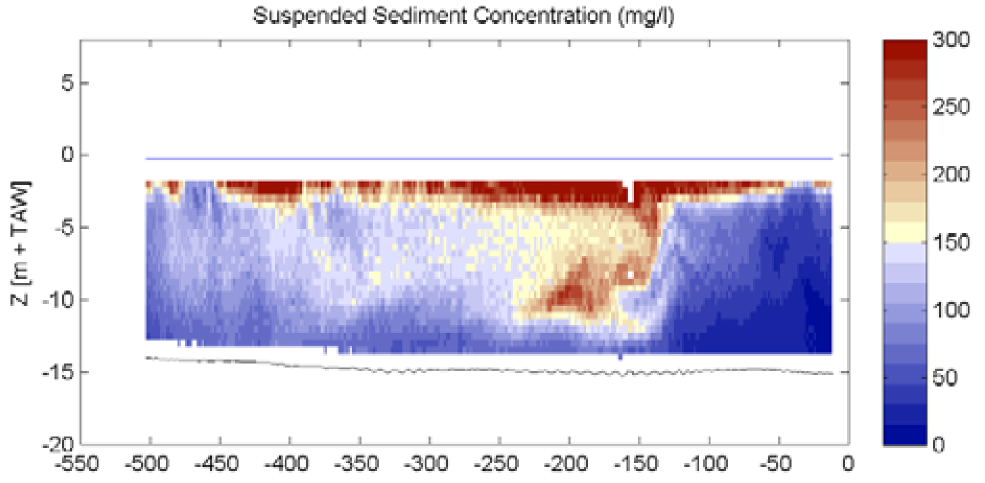
Date / Time [MET] :
12-Mar-2009
11:53 - 11:57

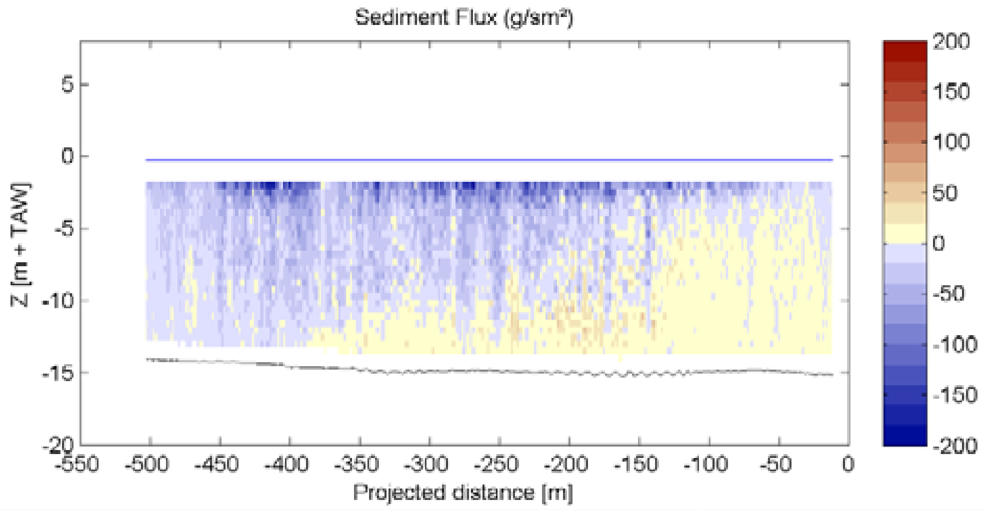
Time after HW [HH:MM]
-4:24

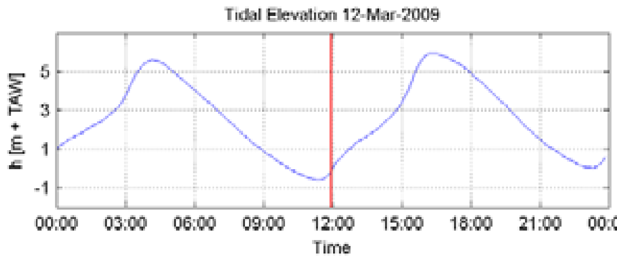
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5041DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

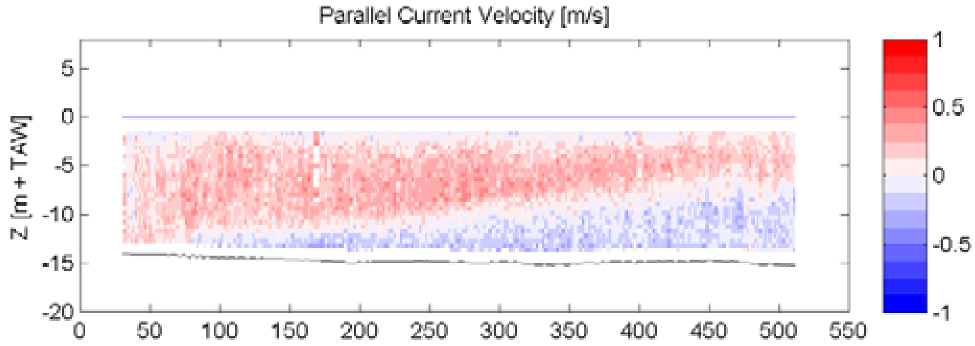
Date / Time [MET] :
12-Mar-2009
11:53 - 11:57

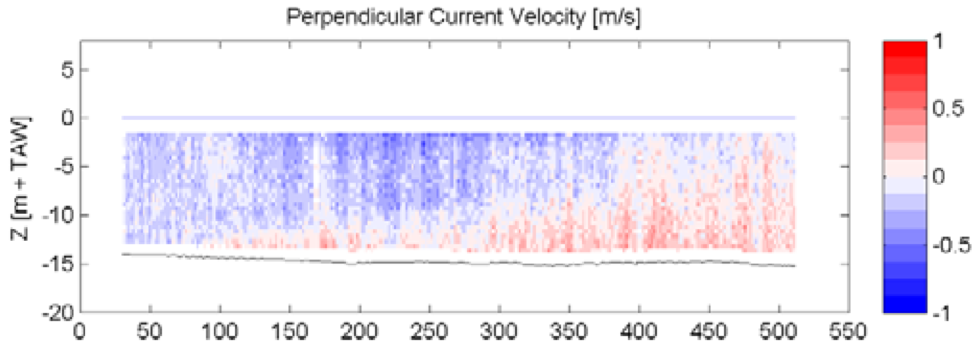
Time after HW [HH:MM]
-4:24

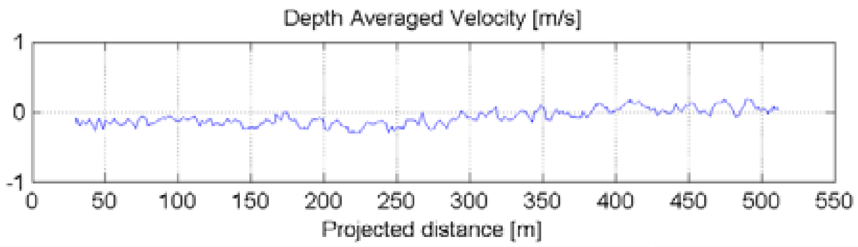
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

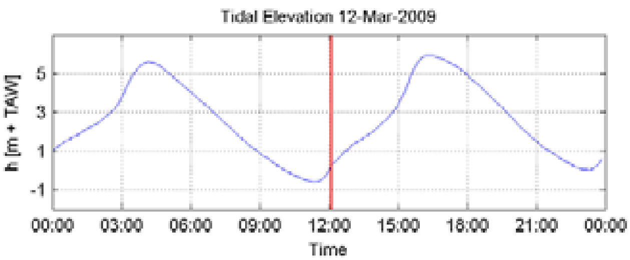
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5043DGDtlr_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

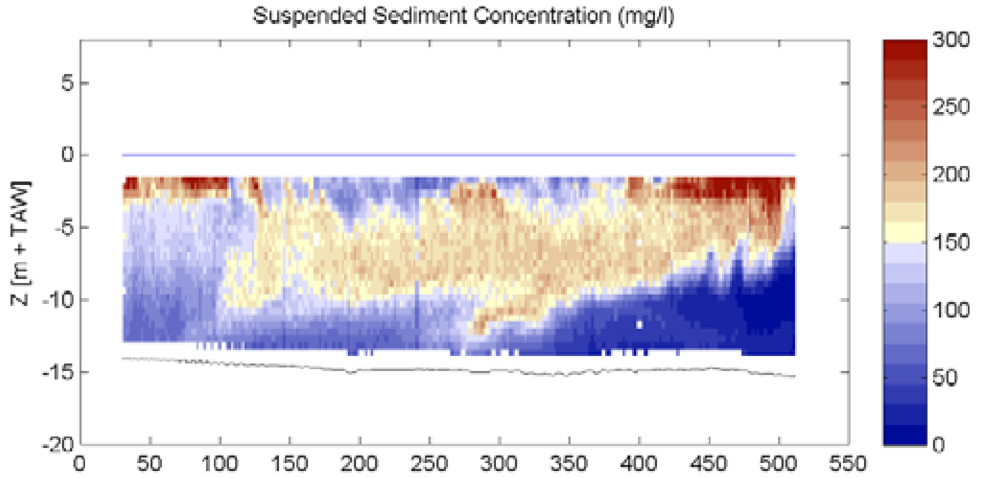
Date / Time [MET] :
12-Mar-2009
12:04 - 12:07

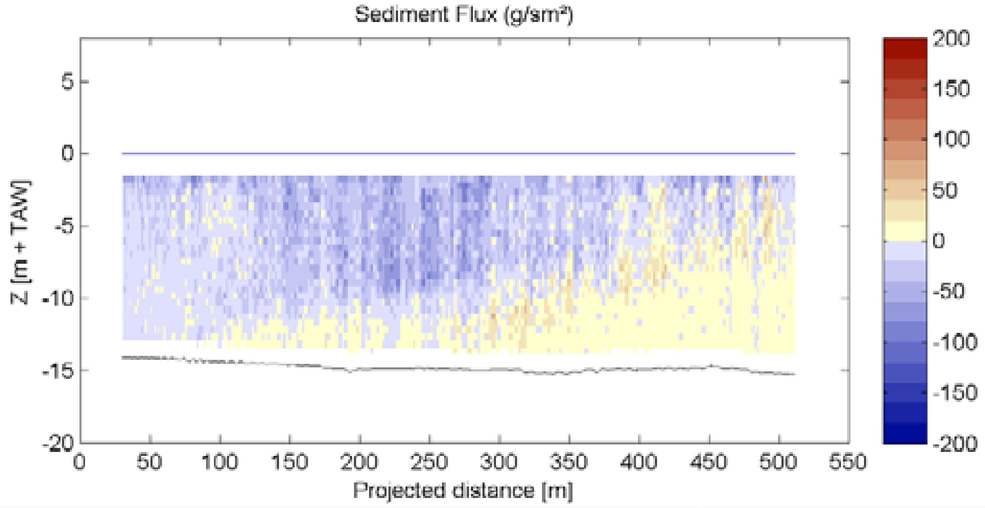
Time after HW [HH:MM]
-4:13

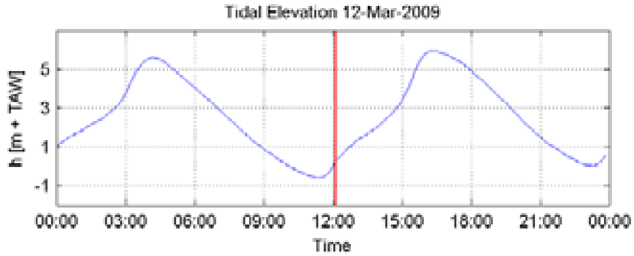
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5043DGDtlr_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
12:04 - 12:07

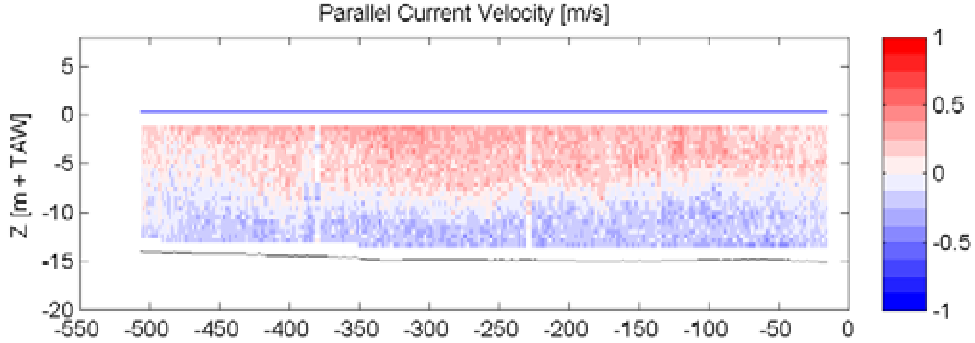
Time after HW [HH:MM]
-4:13

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

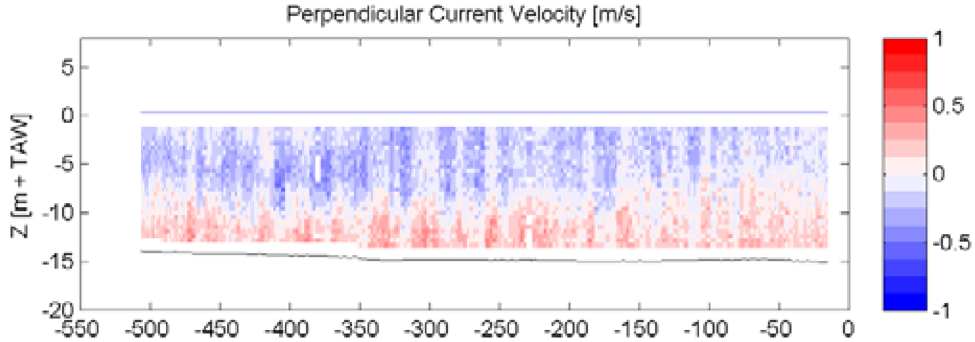
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5045DGDtrl_sub.csv	Location: Deurganckdok

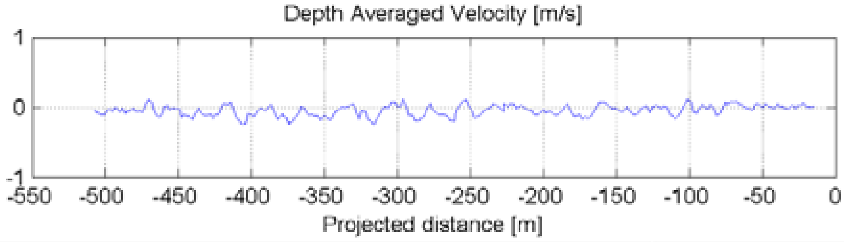
Parallel Current Velocity [m/s]



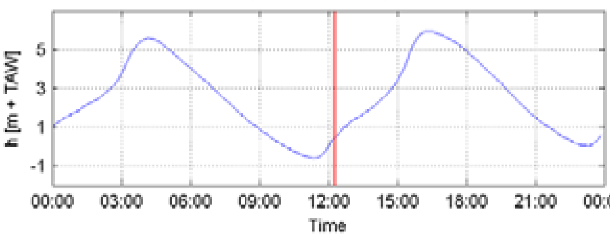
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 12-Mar-2009



HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

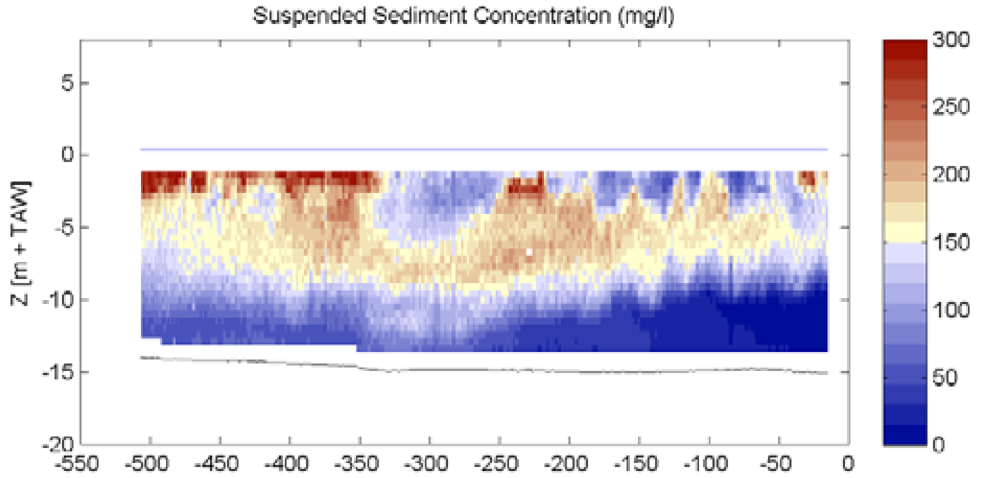
Date / Time [MET] :
12-Mar-2009
12:14 - 12:17

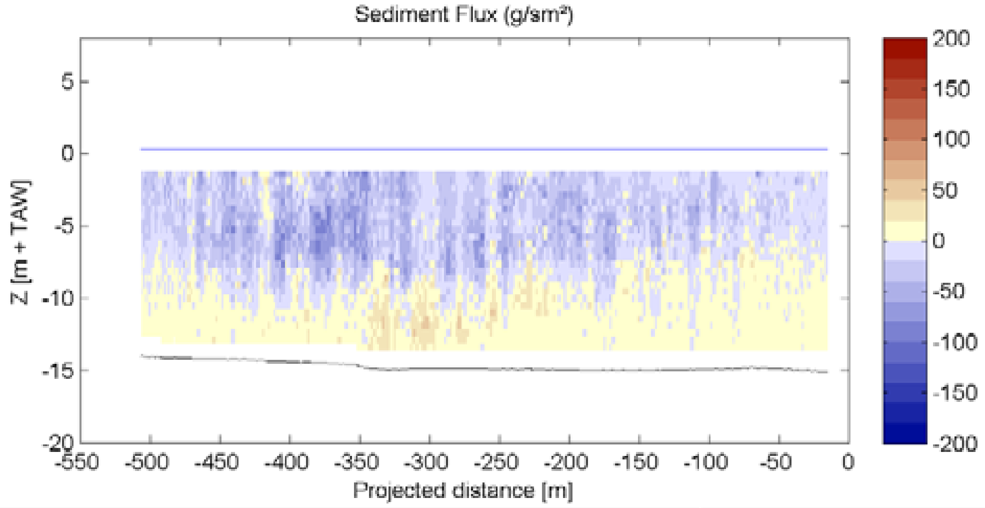
Time after HW [HH:MM]
-4:04

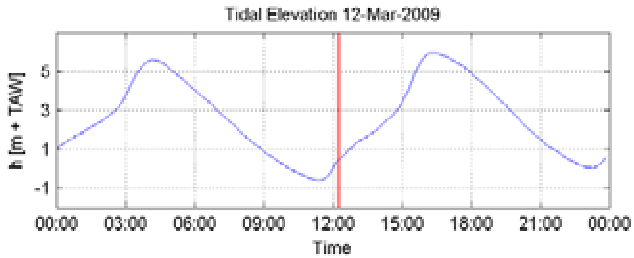
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5045DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
12:14 - 12:17

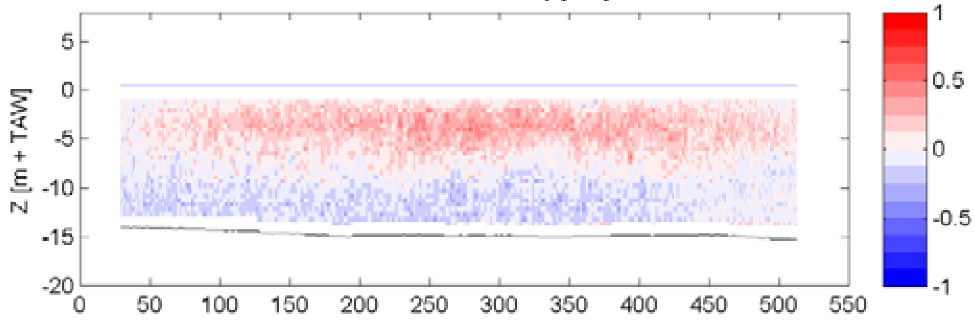
Time after HW [HH:MM]
-4:04

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

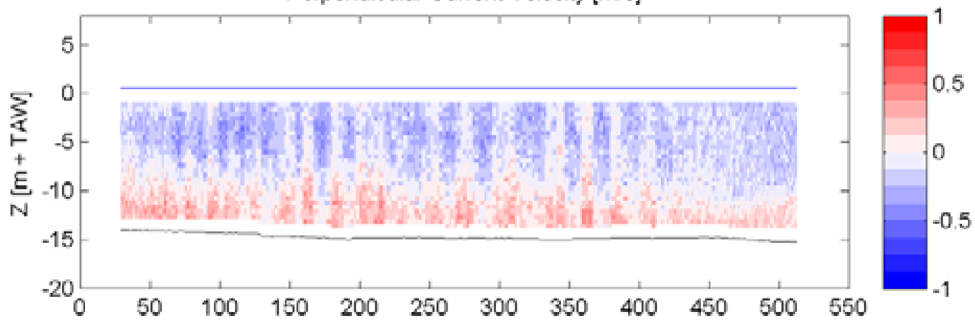
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5047DGDtlr_sub.csv	Location: Deurganckdok

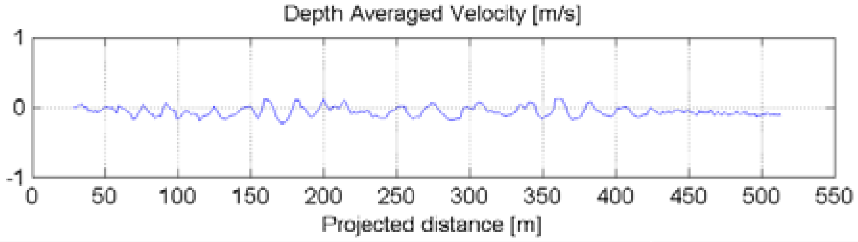
Parallel Current Velocity [m/s]



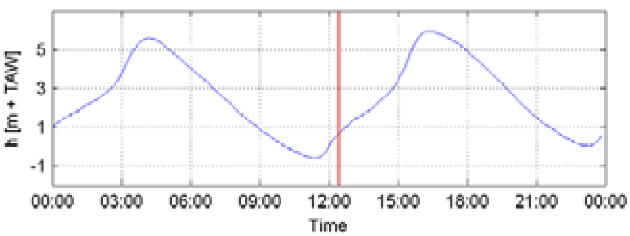
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 12-Mar-2009



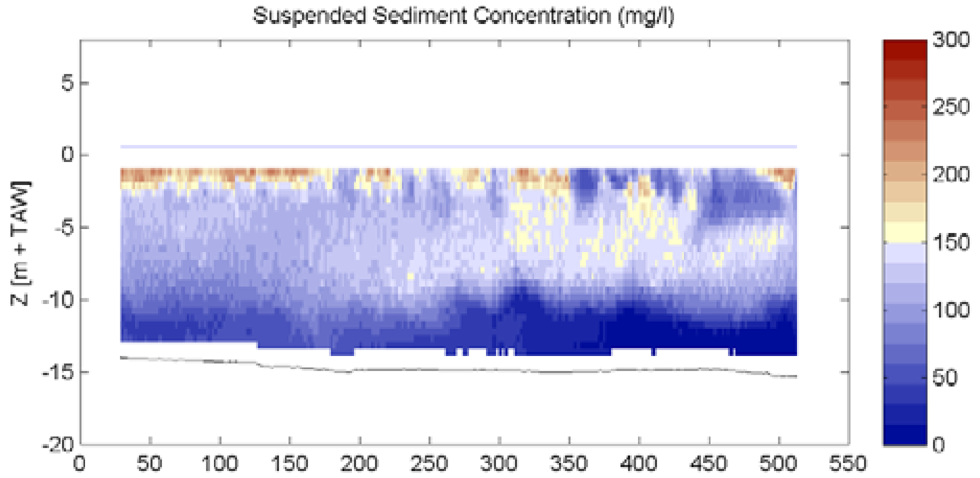
HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

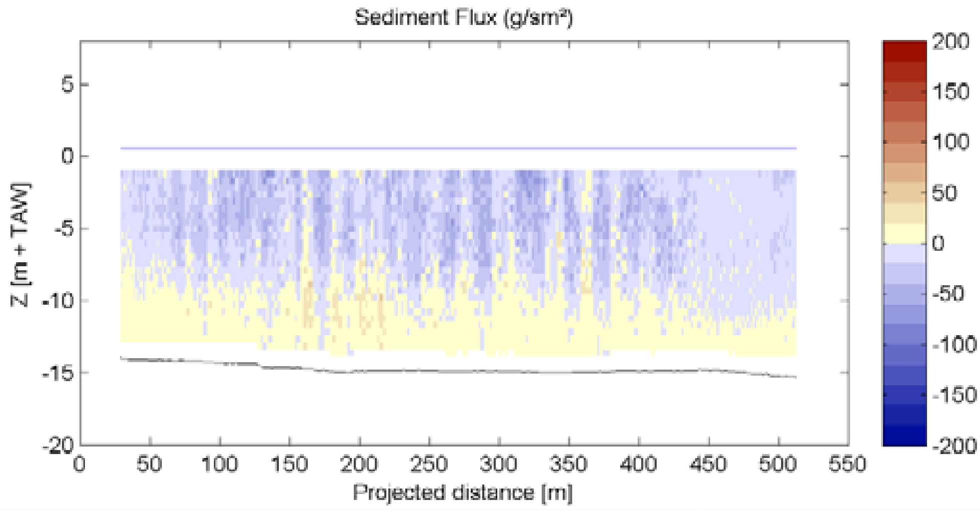
Date / Time [MET] :
12-Mar-2009
12:24 - 12:28

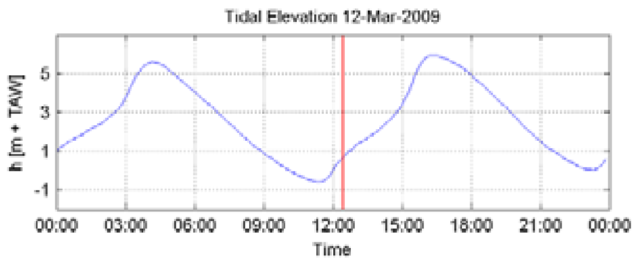
Time after HW [HH:MM]
-3:53

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD	
11283	Equipment(s): ADCP
Sourcefile: 5047DGDtlr_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
12:24 - 12:28

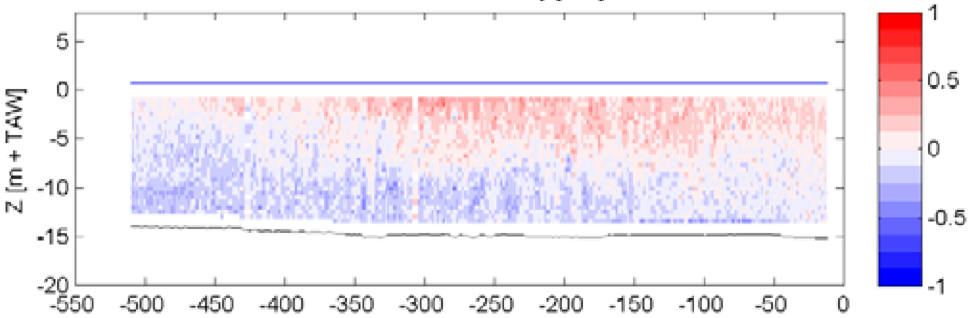
Time after HW [HH:MM]
-3:53

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

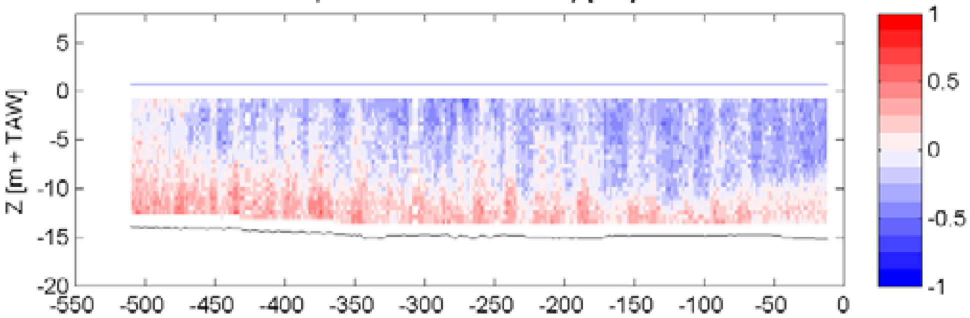
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5049DGDtrl_sub.csv	Location: Deurganckdok

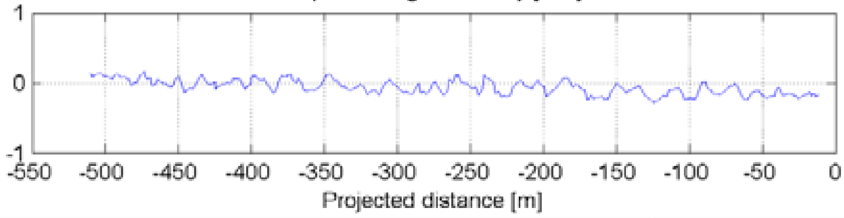
Parallel Current Velocity [m/s]



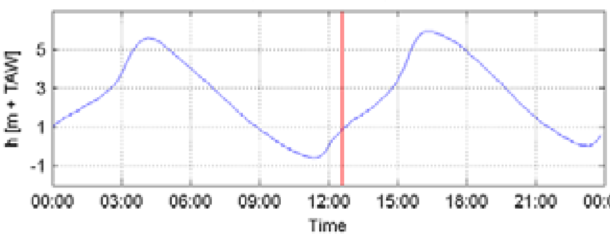
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 12-Mar-2009



HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

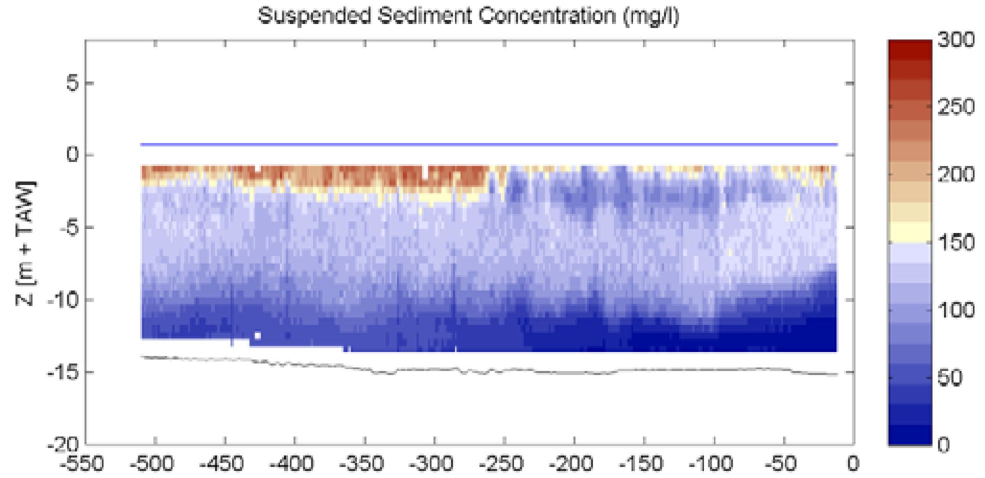
Date / Time [MET] :
12-Mar-2009
12:34 - 12:38

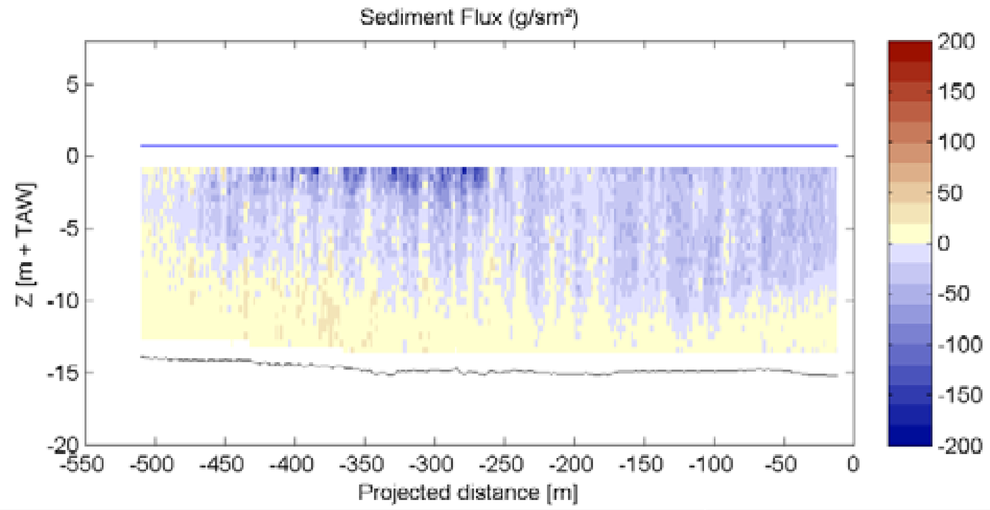
Time after HW [HH:MM]
-3:43

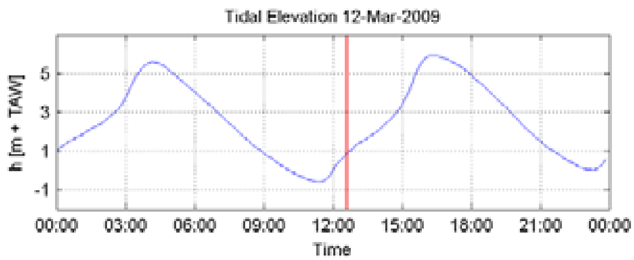
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5049DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

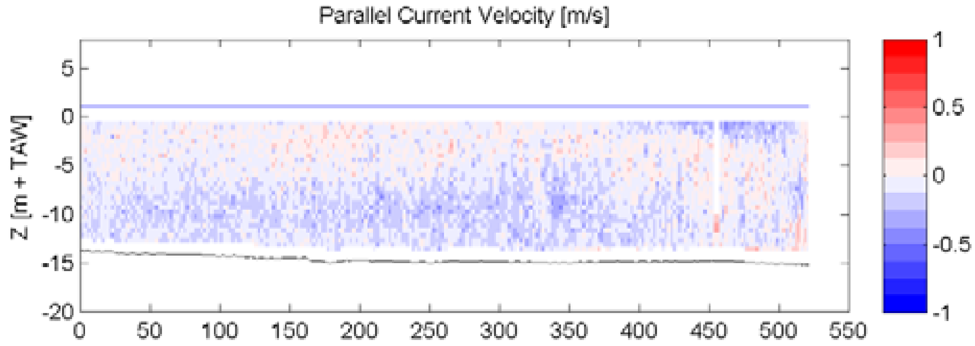
Date / Time [MET] :
12-Mar-2009
12:34 - 12:38

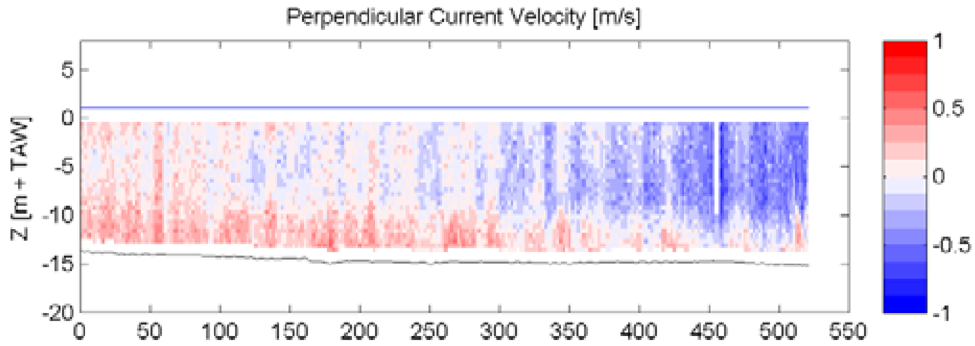
Time after HW [HH:MM]
-3:43

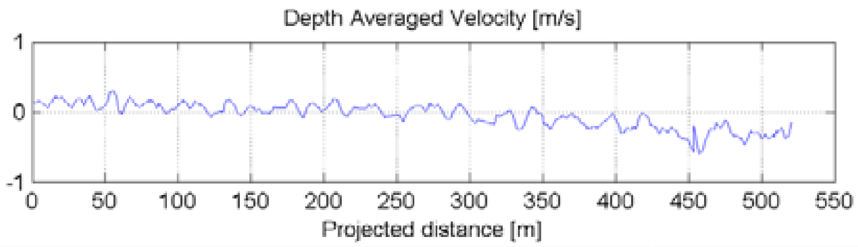
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

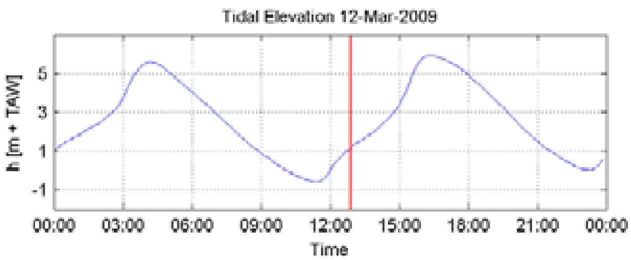
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5051DGDtlr_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

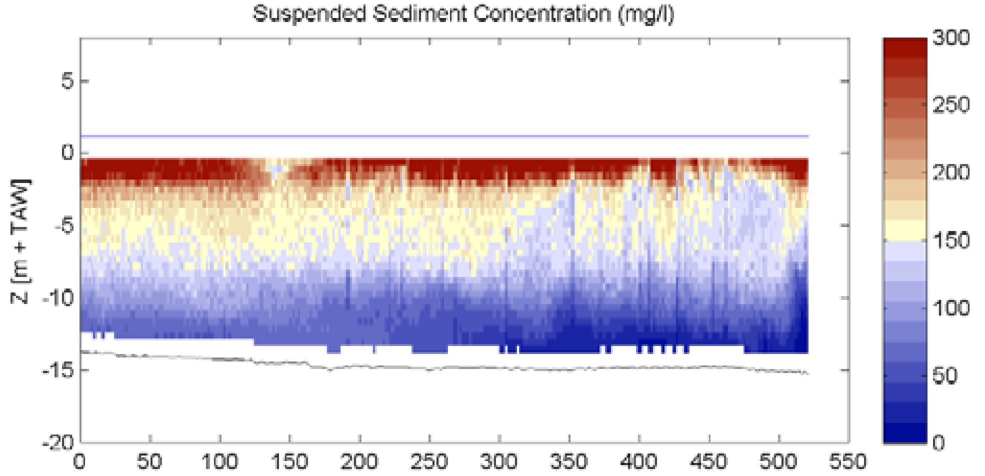
Date / Time [MET] :
12-Mar-2009
12:51 - 12:54

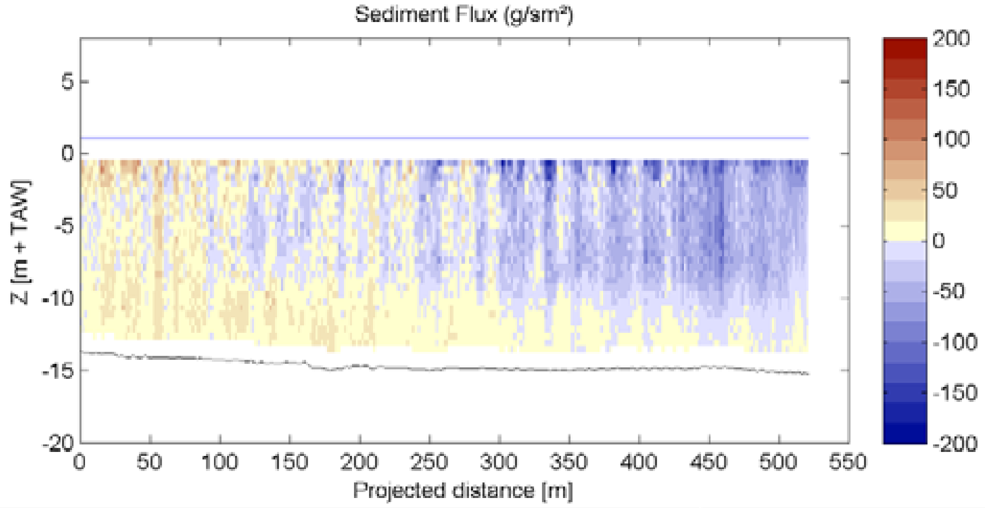
Time after HW [HH:MM]
-3:27

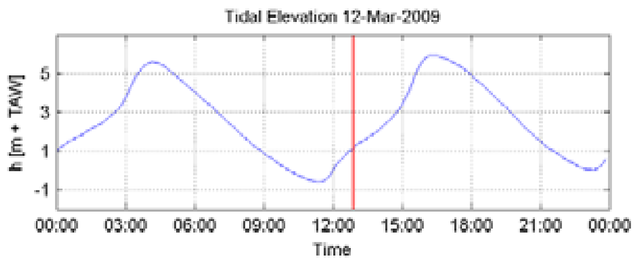
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5051DGDtlr_sub.csv	Location: Deurganckdok







HW/LW:
04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

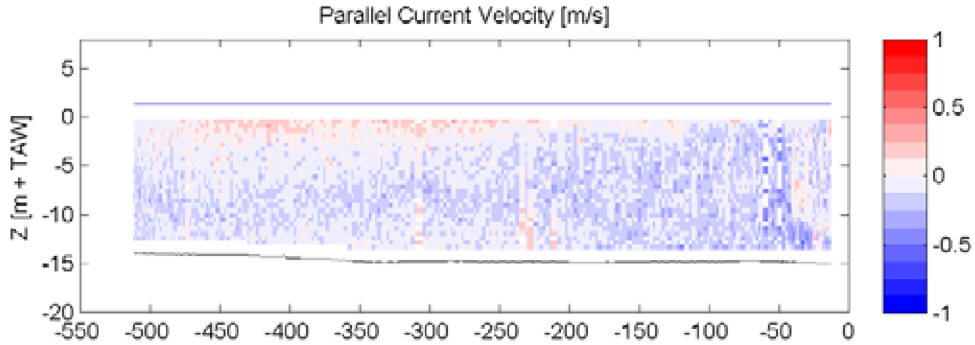
Date / Time [MET] :
12-Mar-2009
12:51 - 12:54

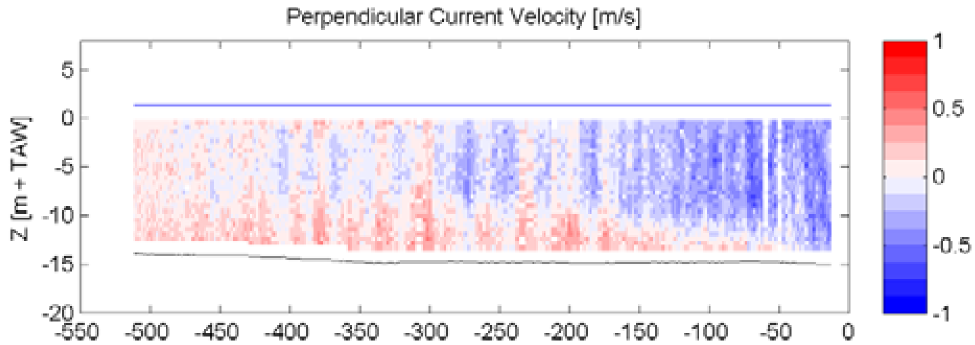
Time after HW [HH:MM]
-3:27

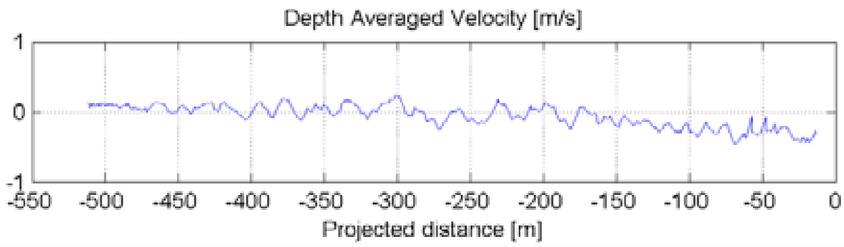
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

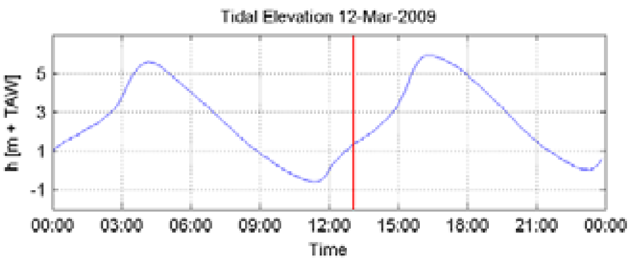
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5053DGDtrl_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

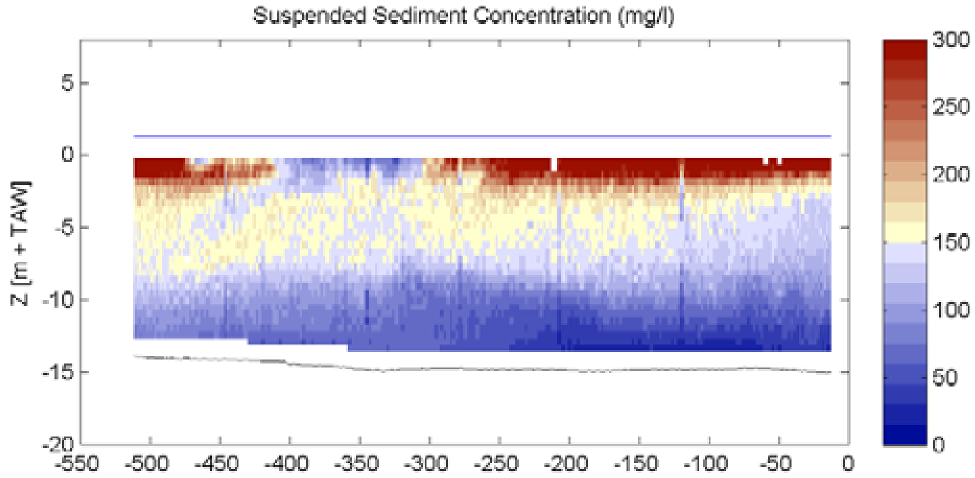
Date / Time [MET] :
12-Mar-2009
13:02 - 13:05

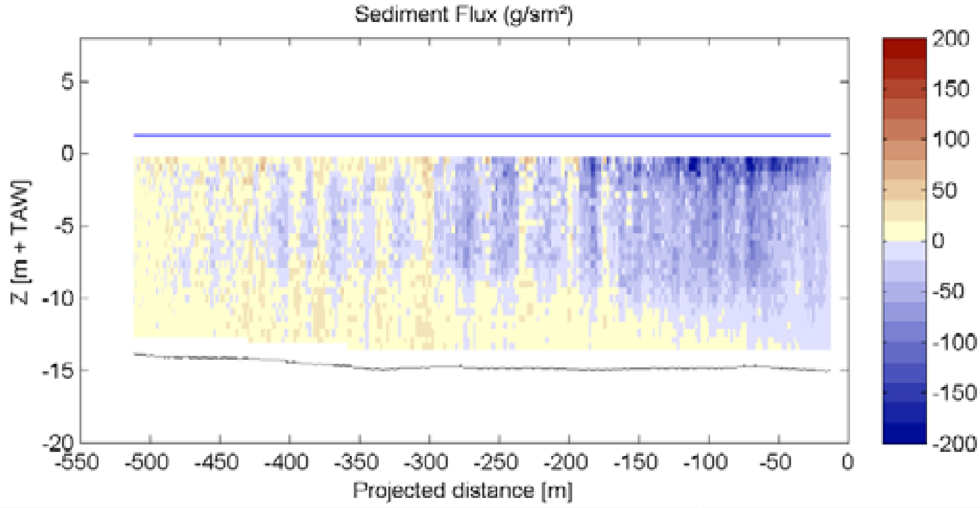
Time after HW [HH:MM]
-3:16

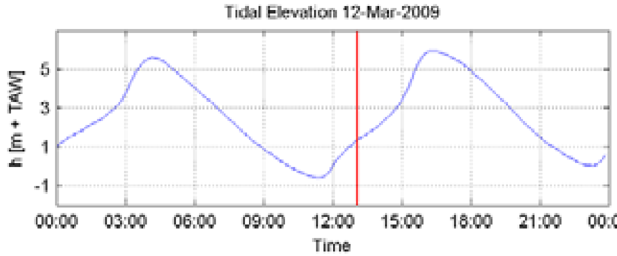
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5053DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

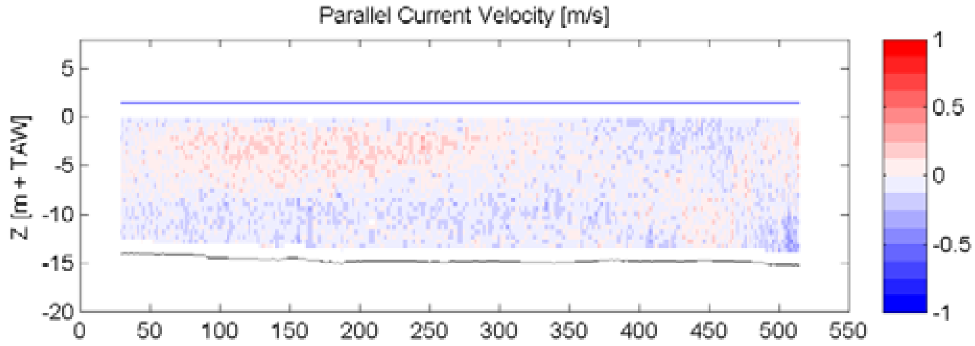
Date / Time [MET] :
12-Mar-2009
13:02 - 13:05

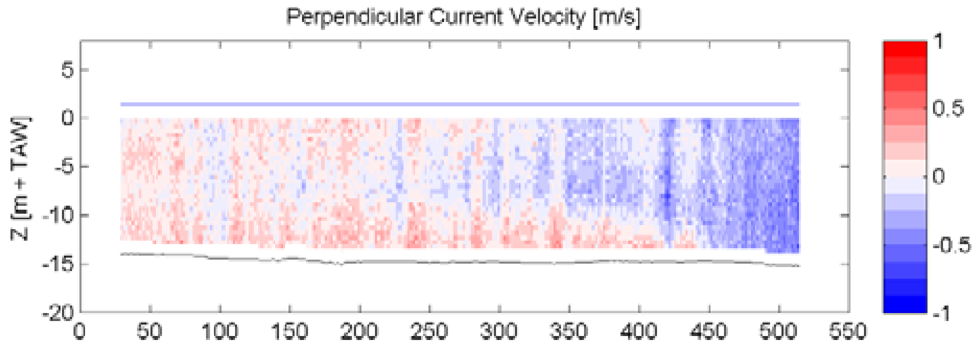
Time after HW [HH:MM]
-3:16

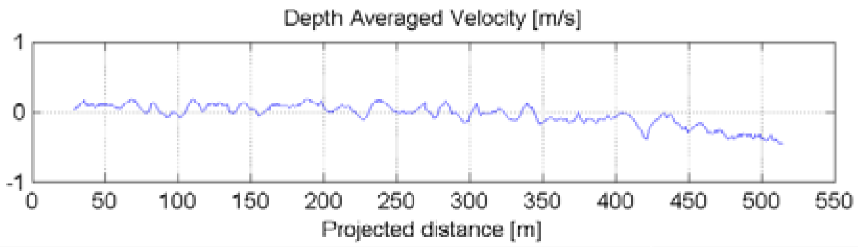
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

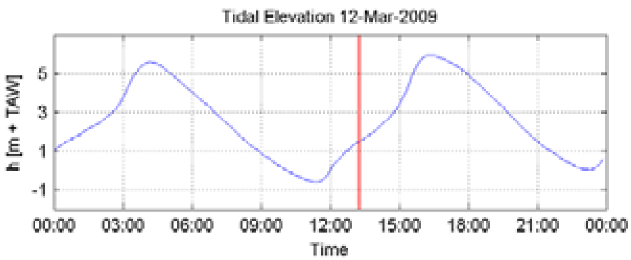
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5055DGDlr_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

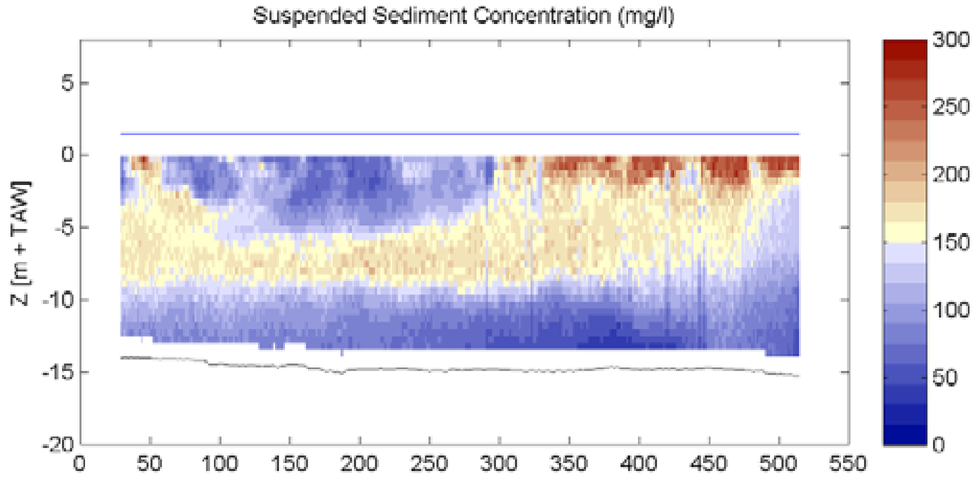
Date / Time [MET] :
12-Mar-2009
13:13 - 13:17

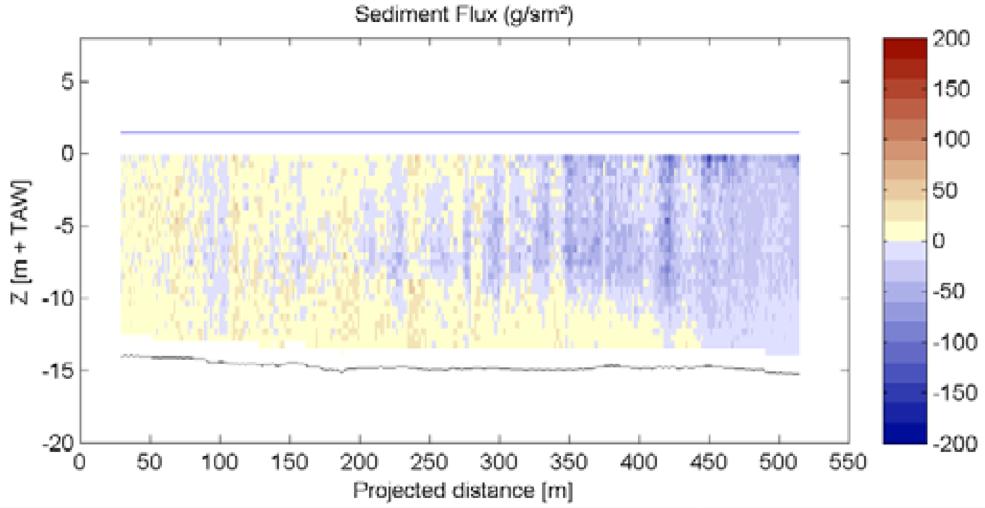
Time after HW [HH:MM]
-3:04

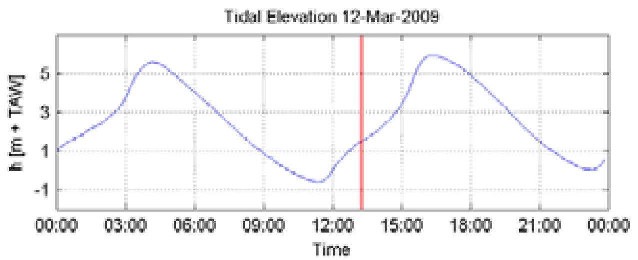
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5055DGDlr_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

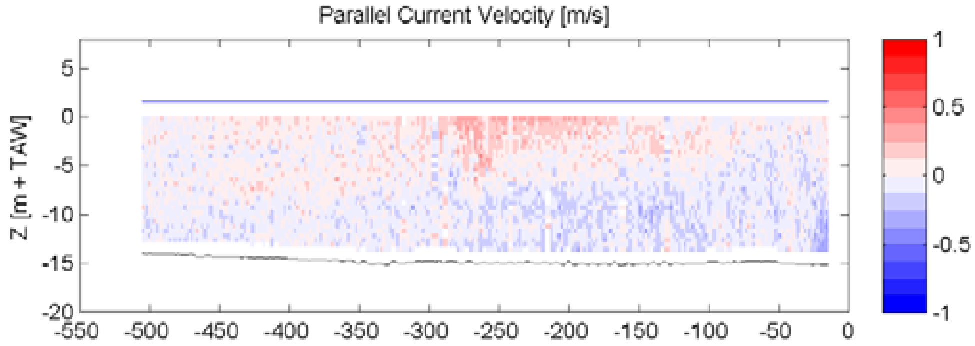
Date / Time [MET] :
12-Mar-2009
13:13 - 13:17

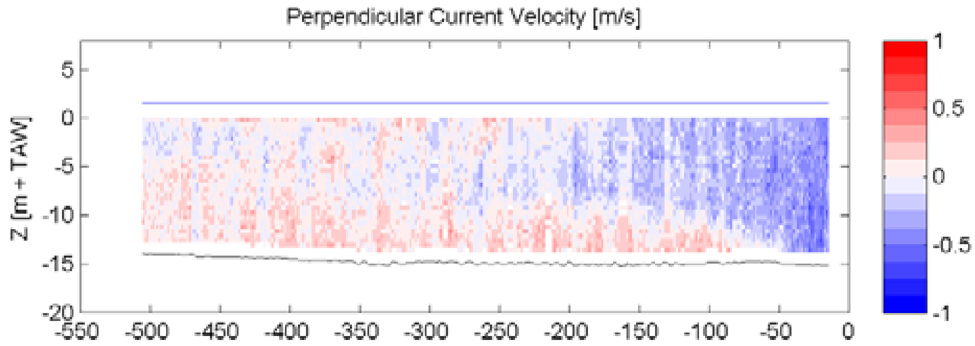
Time after HW [HH:MM]
-3:04

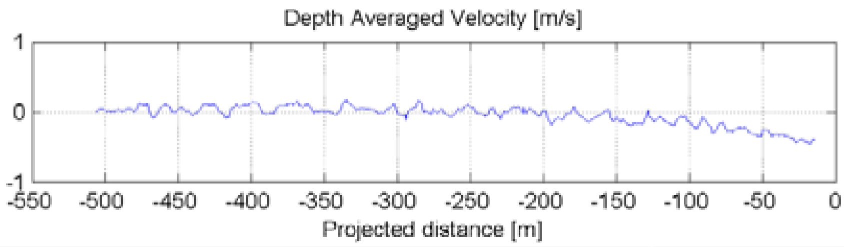
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

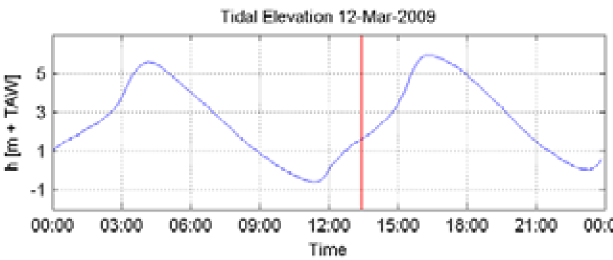
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5057DGDtrl_sub.csv	Location: Deurganckdok









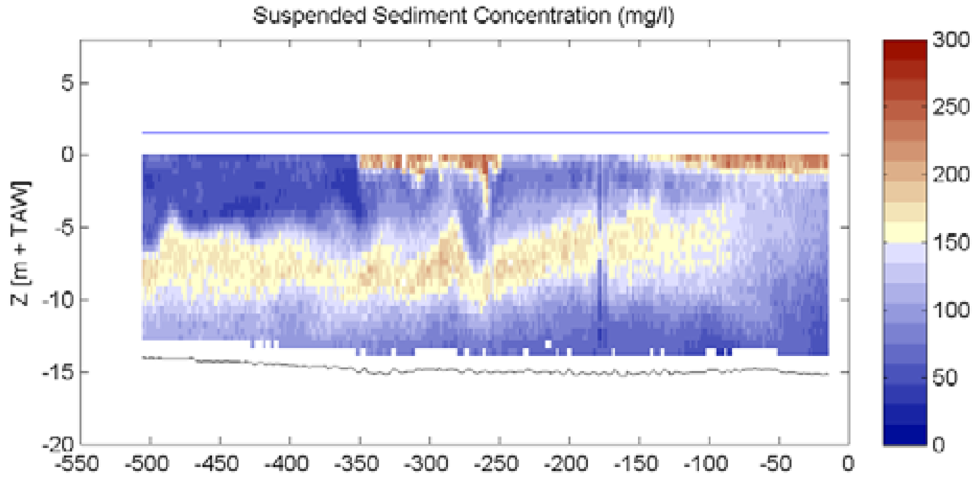
HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

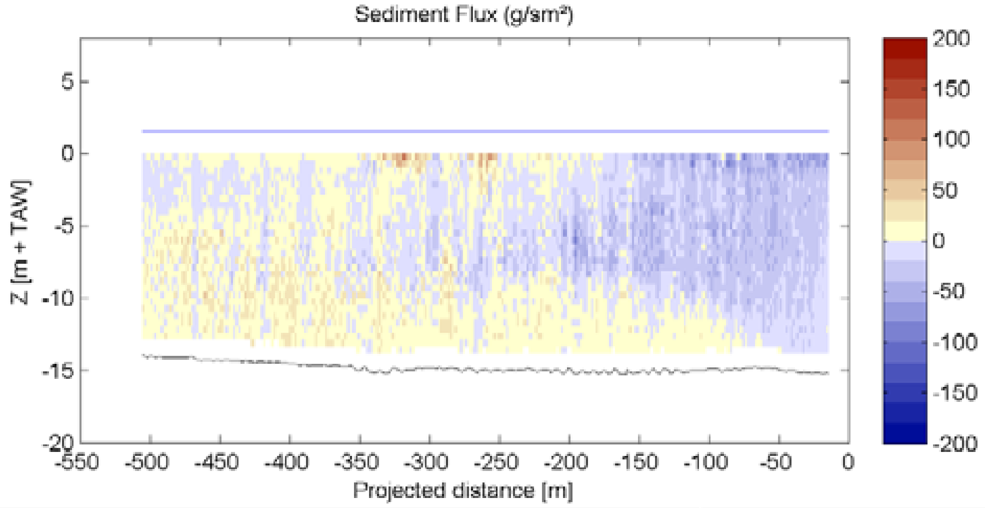
Date / Time [MET] :
12-Mar-2009
13:24 - 13:27

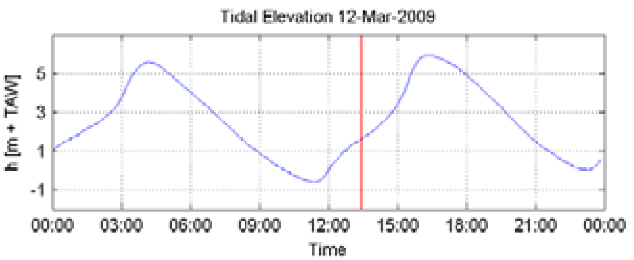
Time after HW [HH:MM]
-2:54

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD	
11283	Equipment(s): ADCP
Sourcefile: 5057DGDtrl_sub.csv	Location: Deurganckdok







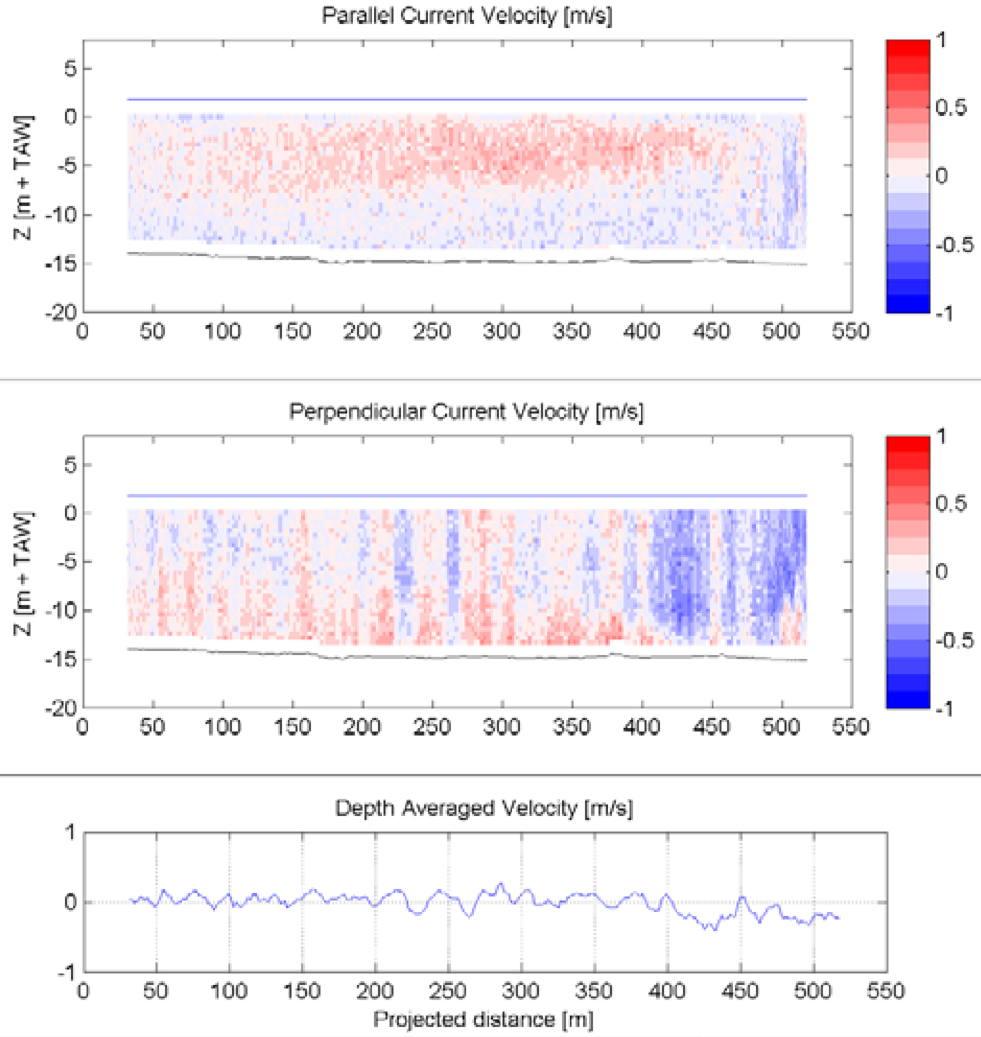
HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

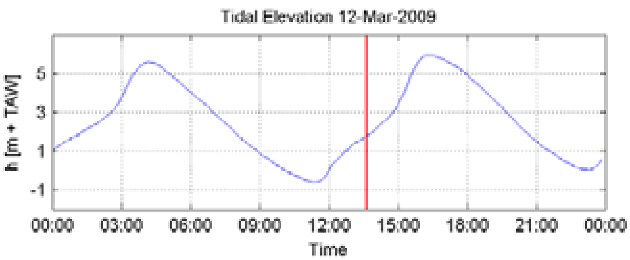
Date / Time [MET] :
12-Mar-2009
13:24 - 13:27

Time after HW [HH:MM]
-2:54

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD	
11283	Equipment(s): ADCP
Sourcefile: 5059DGDtlr_sub.csv	Location: Deurganckdok





HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

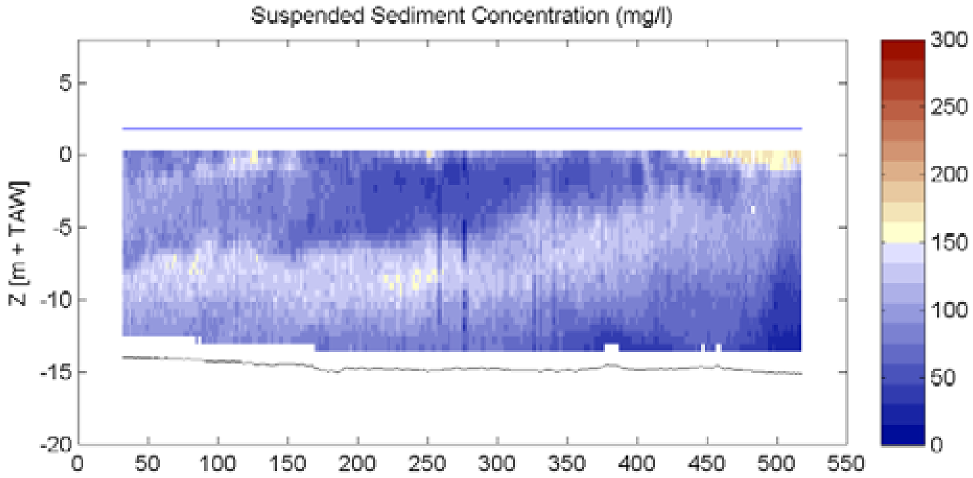
Date / Time [MET] :
12-Mar-2009
13:35 - 13:38

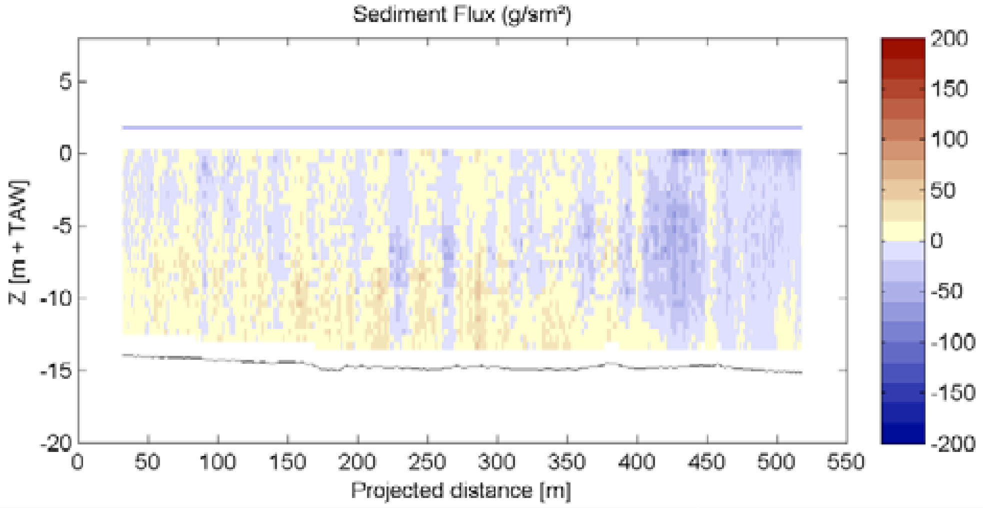
Time after HW [HH:MM]
-2:42

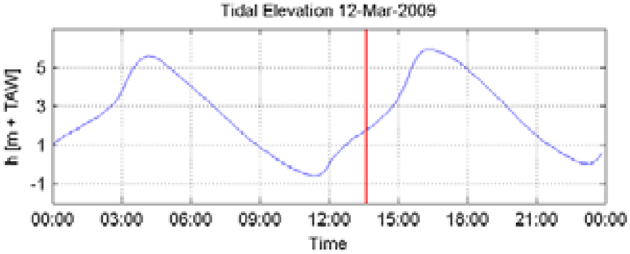
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5059DGDtlr_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

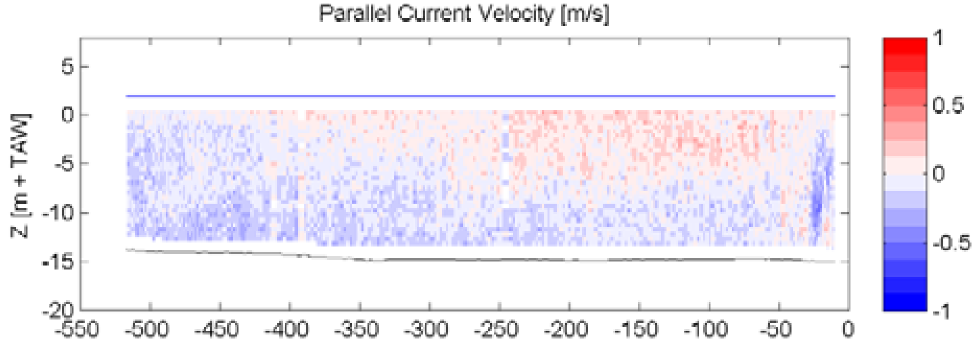
Date / Time [MET] :
12-Mar-2009
13:35 - 13:38

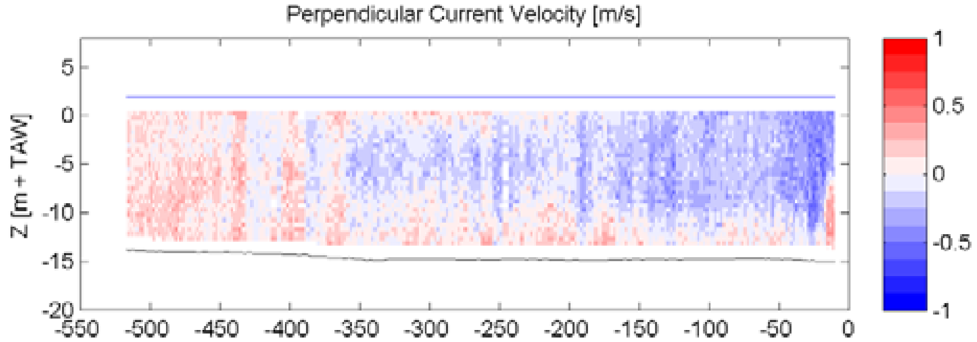
Time after HW [HH:MM]
-2:42

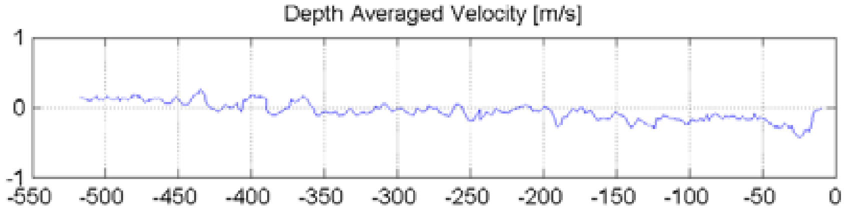
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

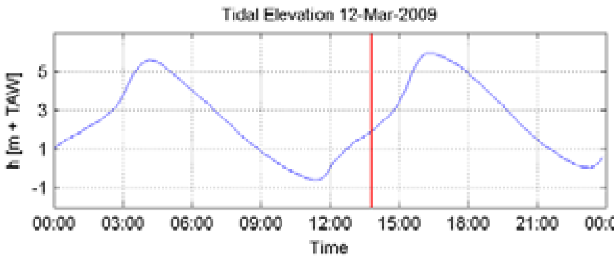
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5061DGDtrl_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

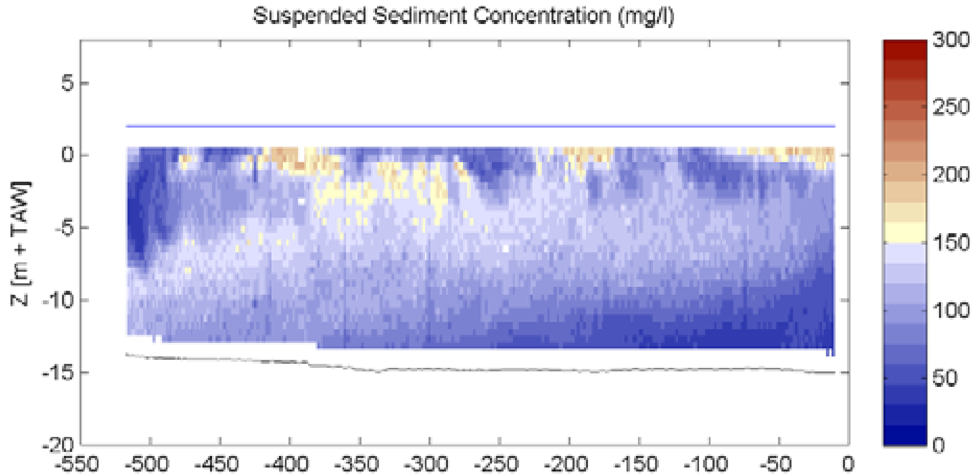
Date / Time [MET] :
12-Mar-2009
13:46 - 13:49

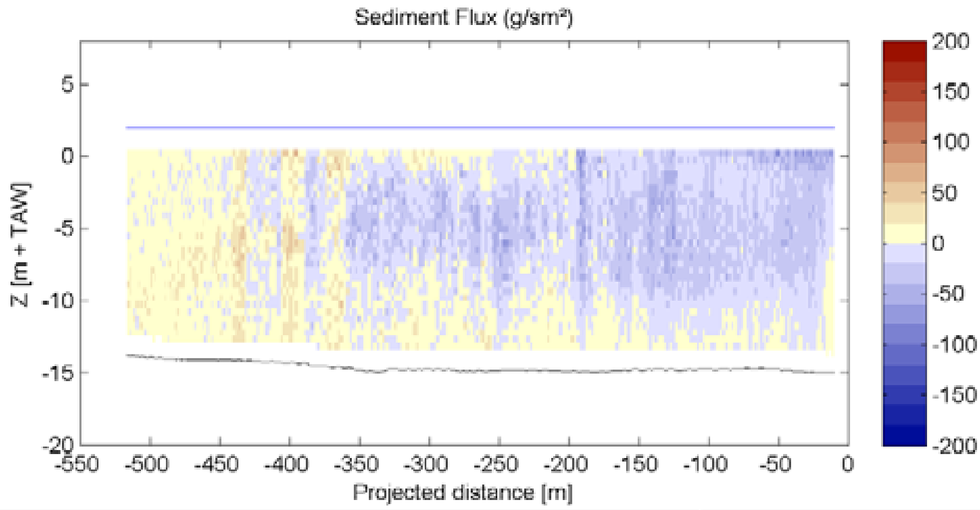
Time after HW [HH:MM]
-2:32

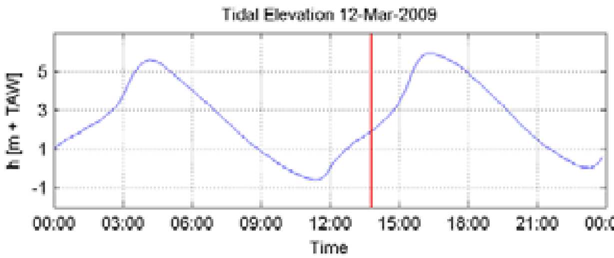
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5061DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

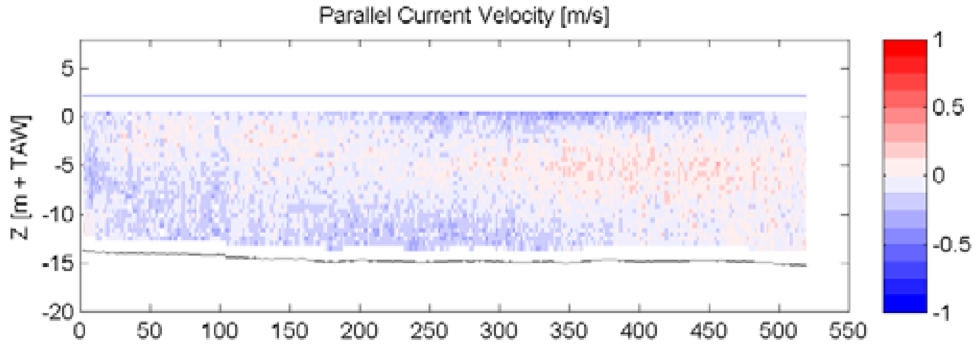
Date / Time [MET] :
12-Mar-2009
13:46 - 13:49

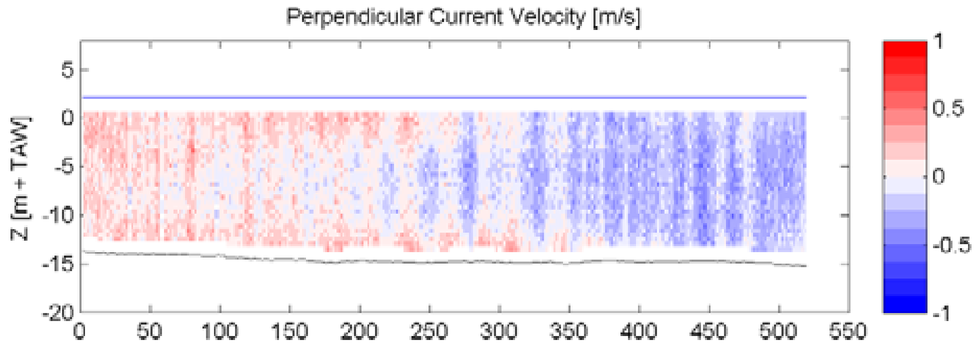
Time after HW [HH:MM]
-2:32

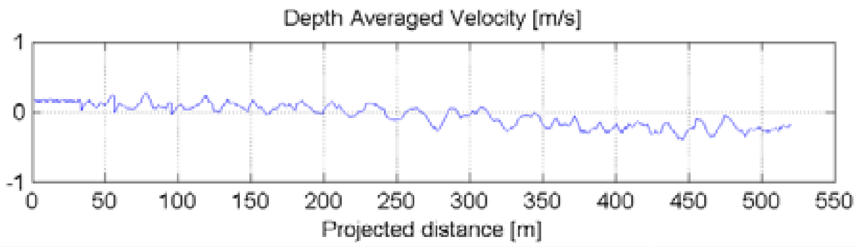
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

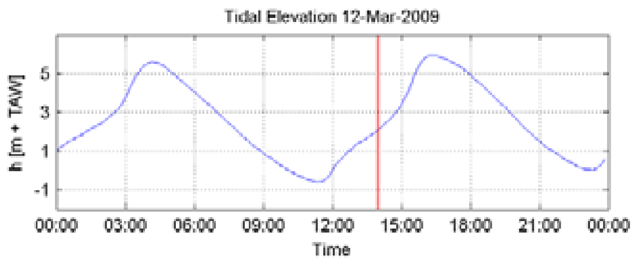
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5063DGDtlr_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

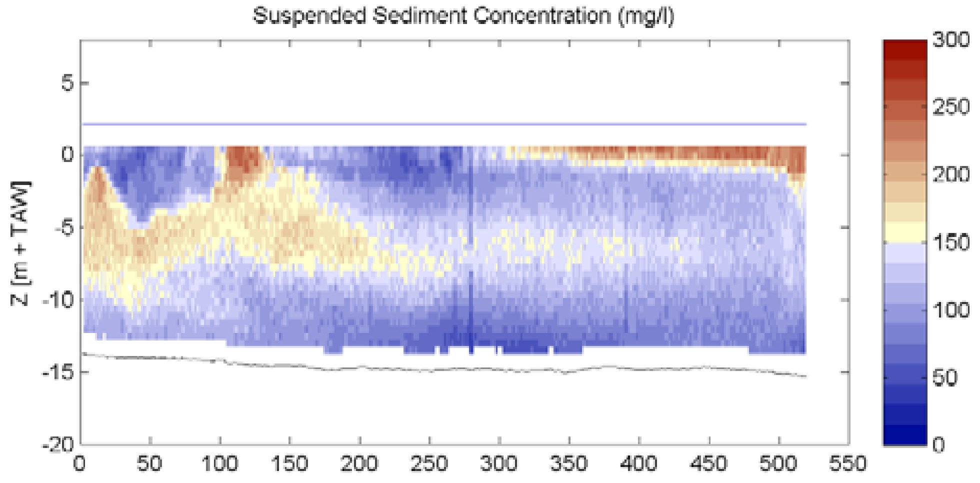
Date / Time [MET] :
12-Mar-2009
13:57 - 14:01

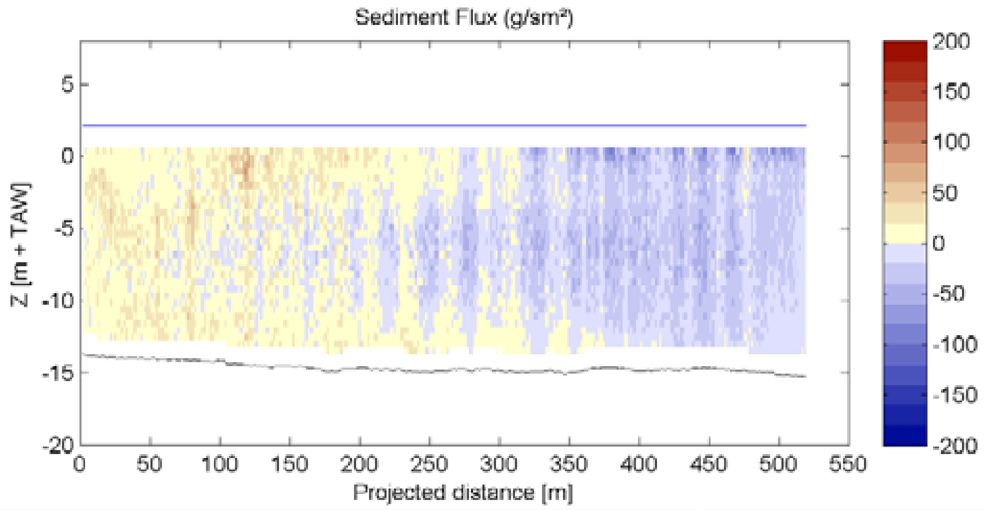
Time after HW [HH:MM]
-2:20

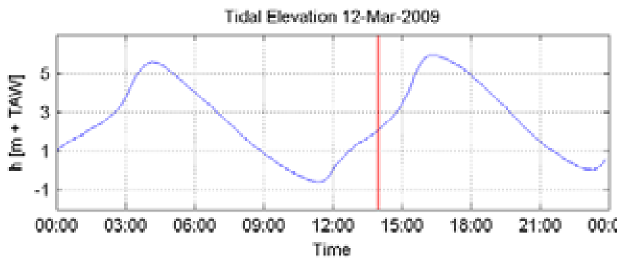
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5063DGDtlr_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

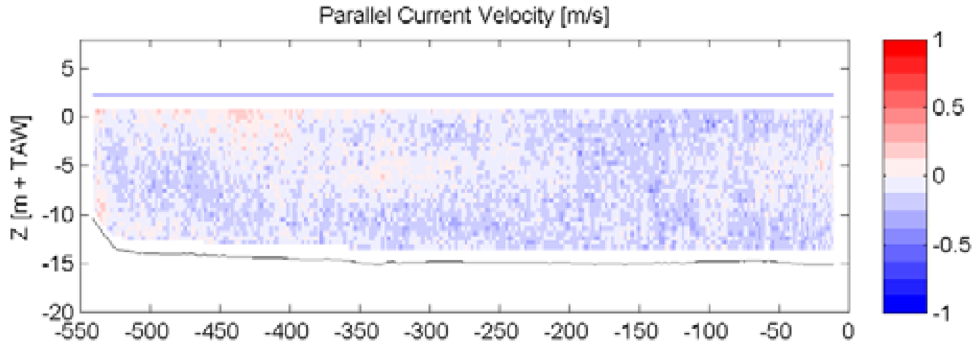
Date / Time [MET] :
12-Mar-2009
13:57 - 14:01

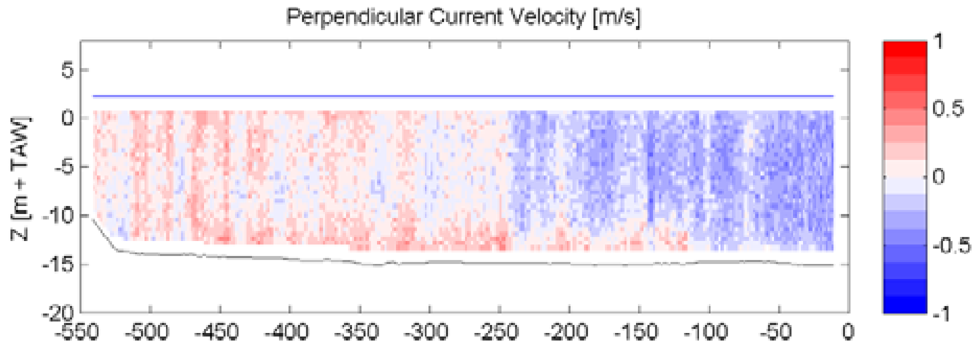
Time after HW [HH:MM]
-2:20

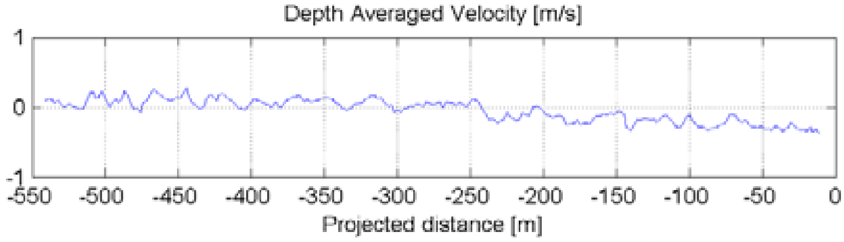
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

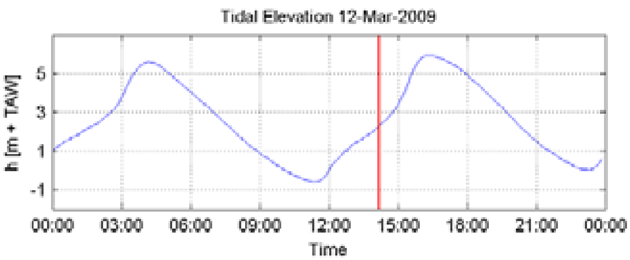
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5065DGDtrl_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
14:08 - 14:12

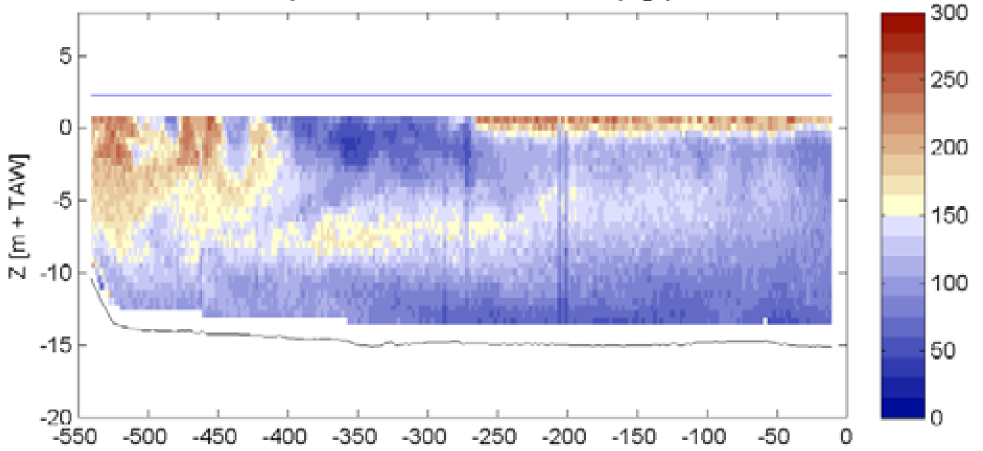
Time after HW [HH:MM]
-2:09

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

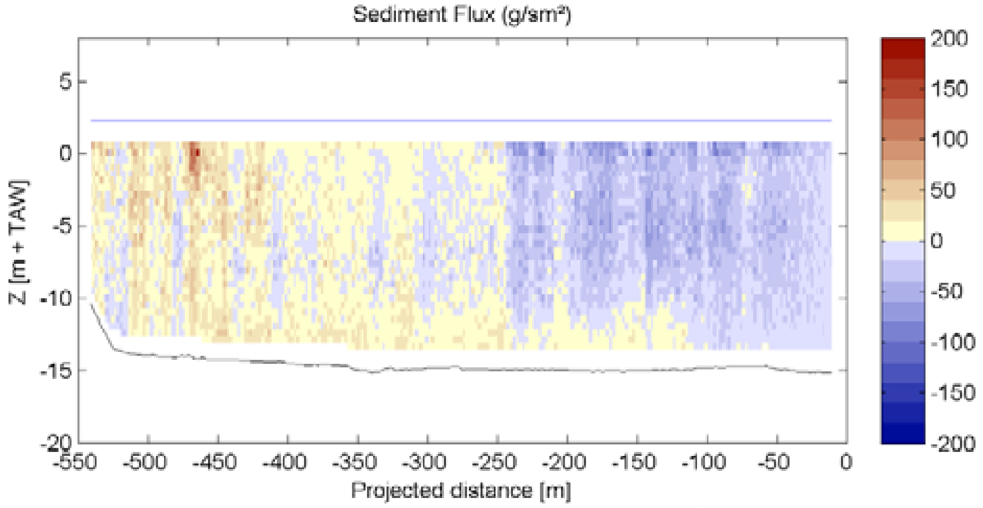
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5065DGDtrl_sub.csv	Location: Deurganckdok

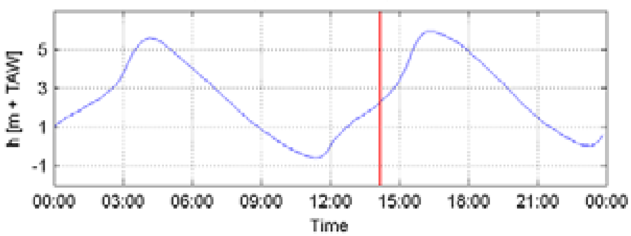
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 12-Mar-2009



HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

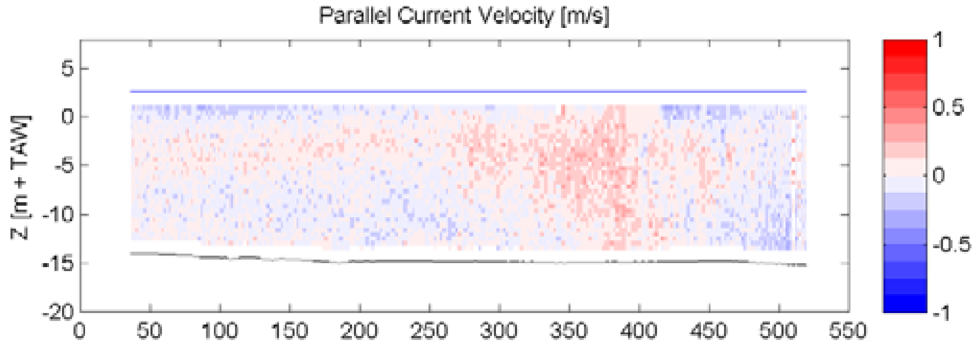
Date / Time [MET] :
12-Mar-2009
14:08 - 14:12

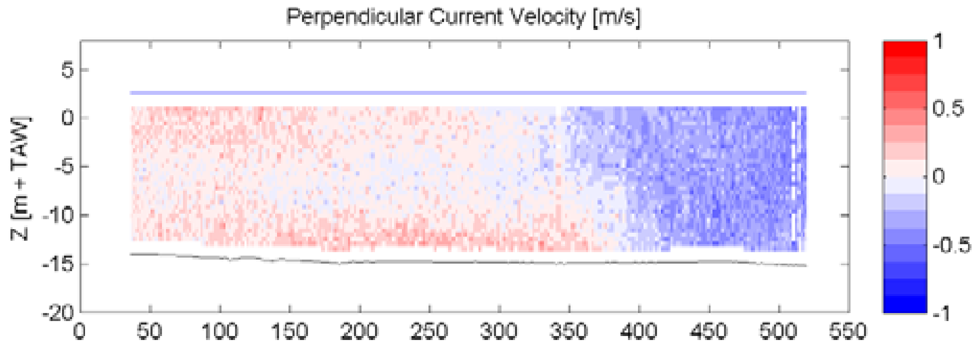
Time after HW [HH:MM]
-2:09

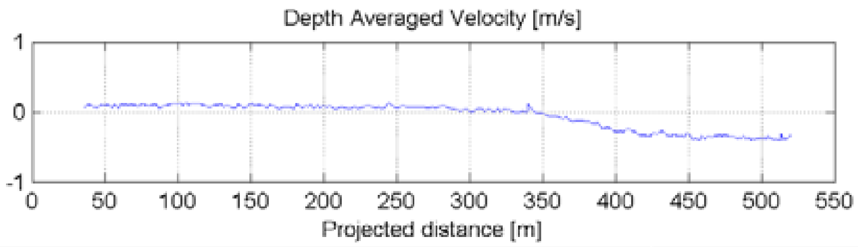
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

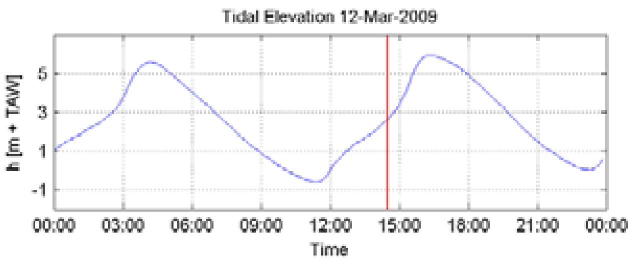
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5067DGDtlr_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
14:27 - 14:30

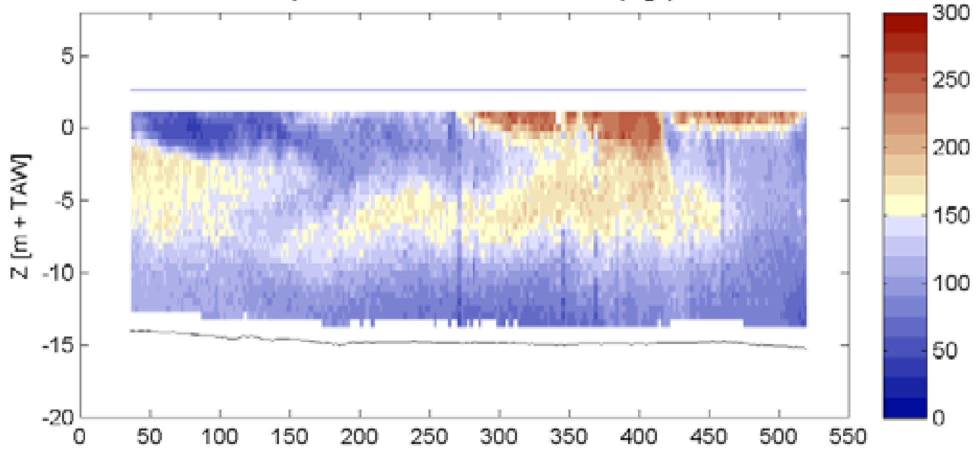
Time after HW [HH:MM]
-1:51

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

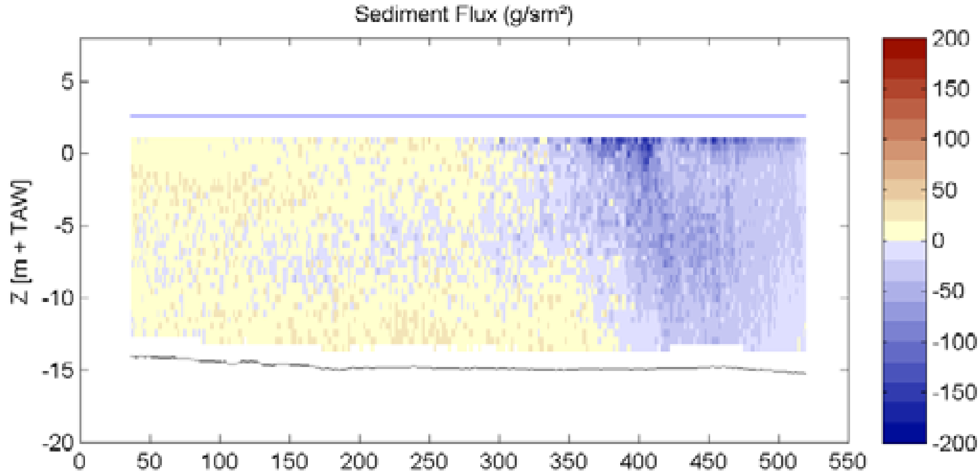
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5067DGDtlr_sub.csv	Location: Deurganckdok

Suspended Sediment Concentration (mg/l)

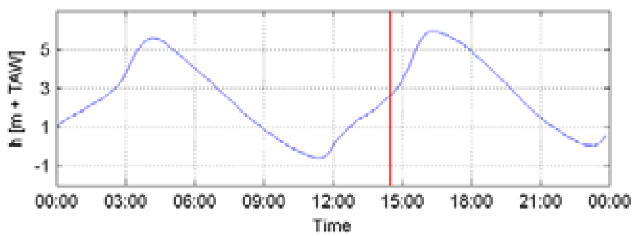


Sediment Flux (g/sm²)



Projected distance [m]

Tidal Elevation 12-Mar-2009



HW/LW:
04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
14:27 - 14:30

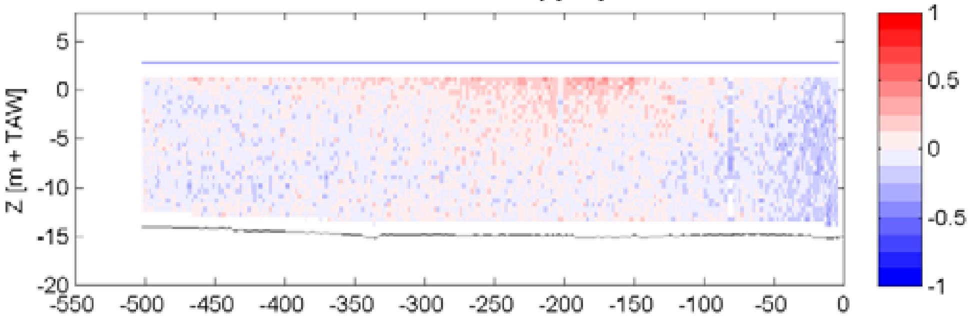
Time after HW [HH:MM]
-1:51

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

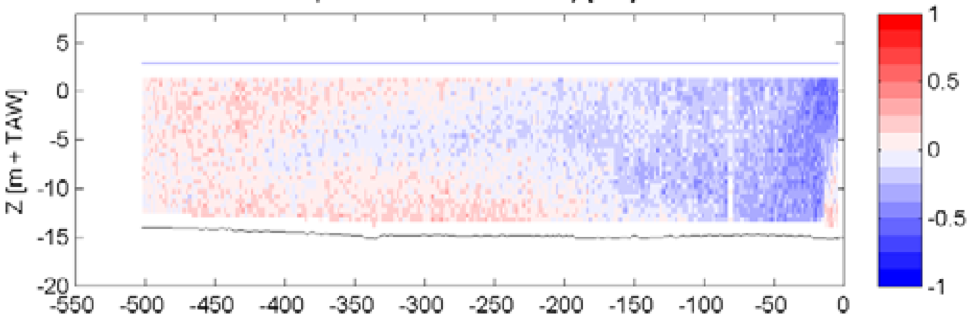
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5069DGDtrl_sub.csv	Location: Deurganckdok

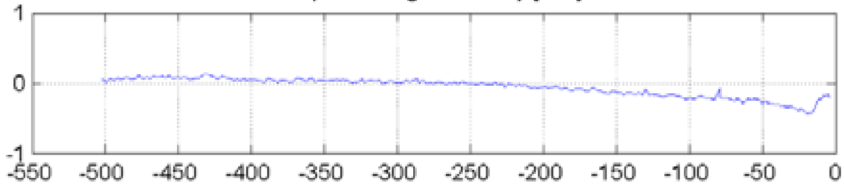
Parallel Current Velocity [m/s]



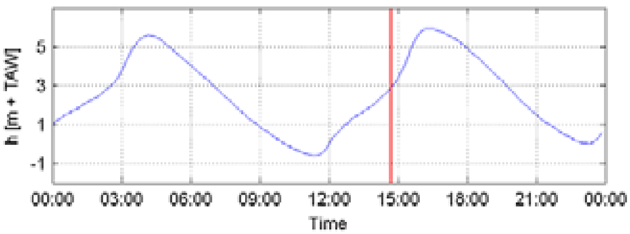
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 12-Mar-2009



HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

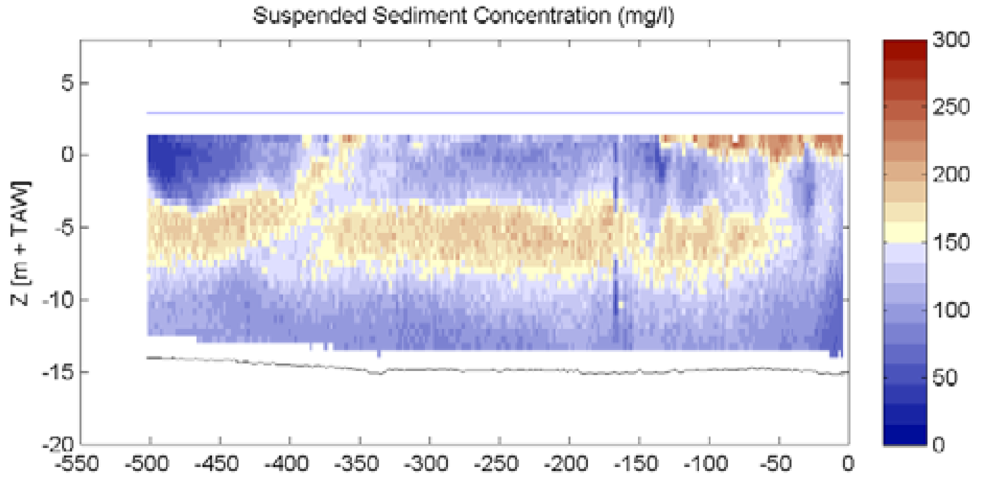
Date / Time [MET] :
12-Mar-2009
14:39 - 14:42

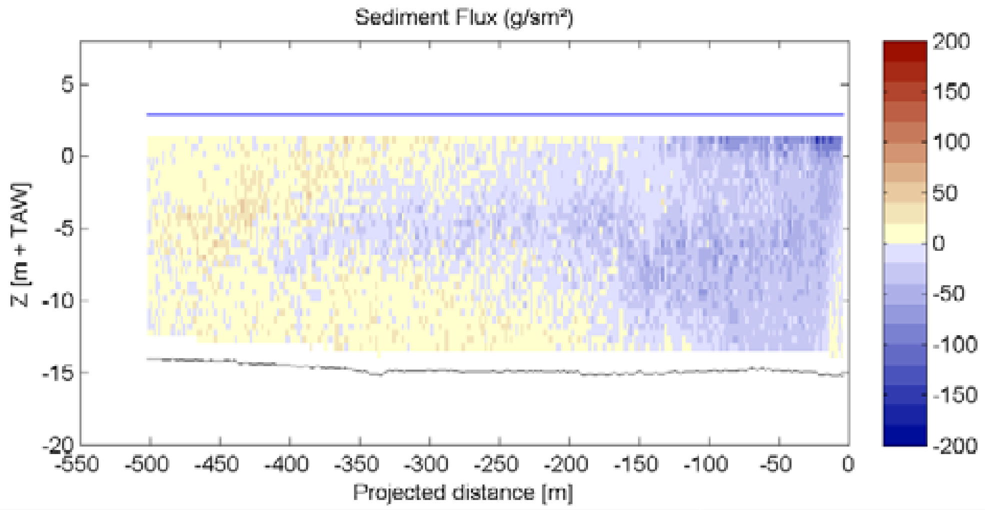
Time after HW [HH:MM]
-1:38

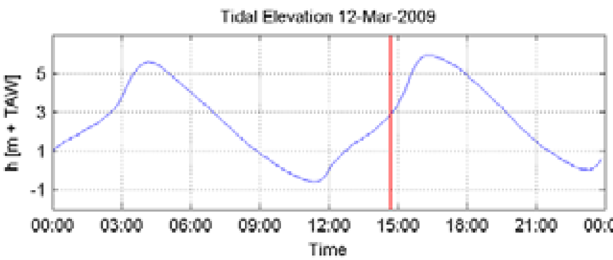
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5069DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

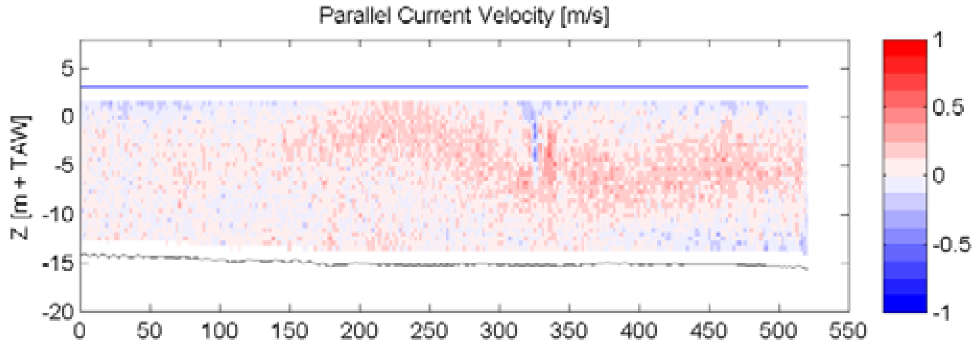
Date / Time [MET] :
12-Mar-2009
14:39 - 14:42

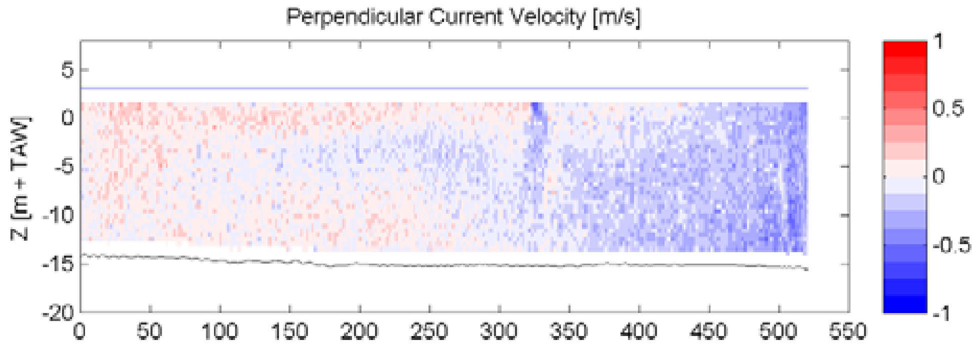
Time after HW [HH:MM]
-1:38

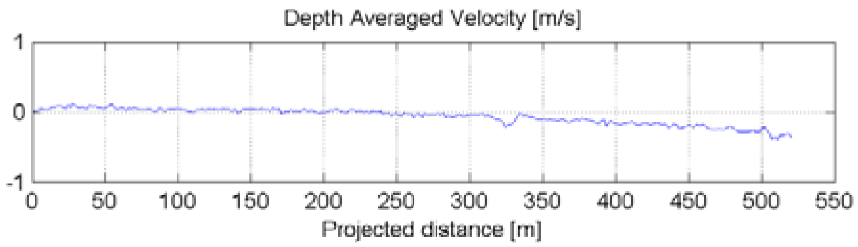
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

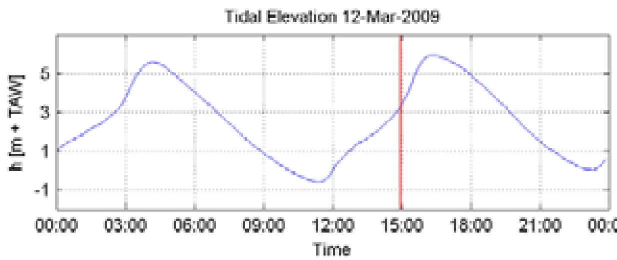
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5071DGDtlr_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

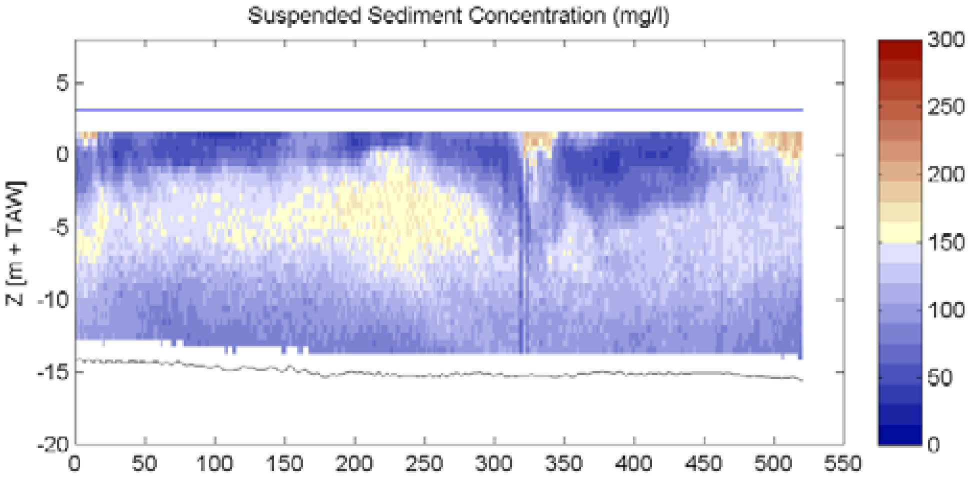
Date / Time [MET] :
12-Mar-2009
14:54 - 14:58

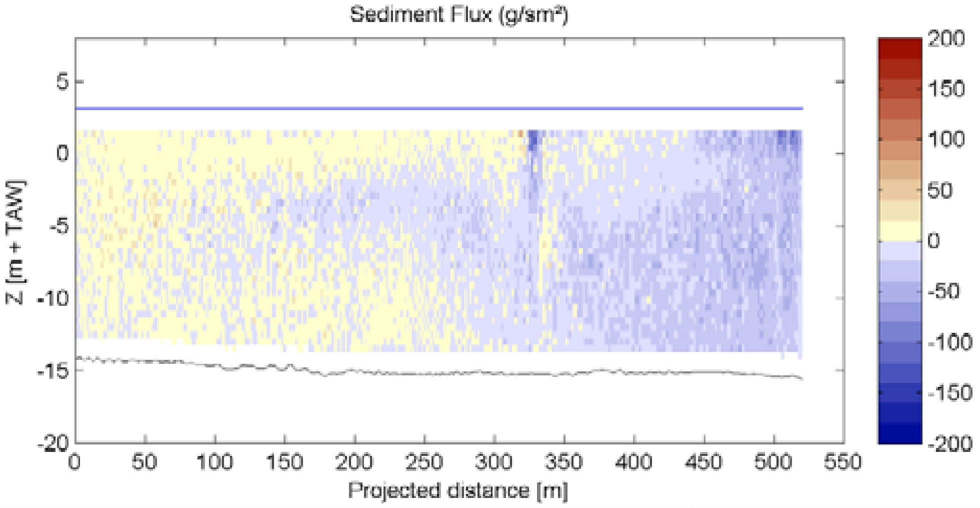
Time after HW [HH:MM]
-1:23

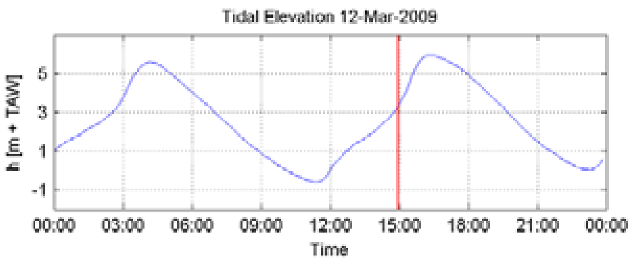
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5071DGDtlr_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

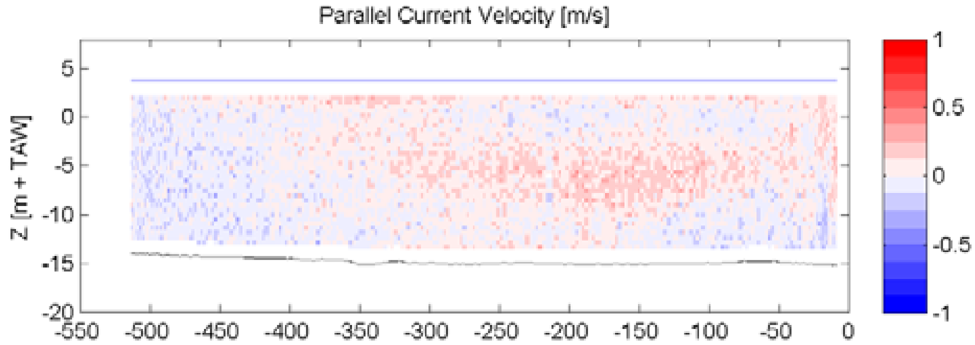
Date / Time [MET] :
12-Mar-2009
14:54 - 14:58

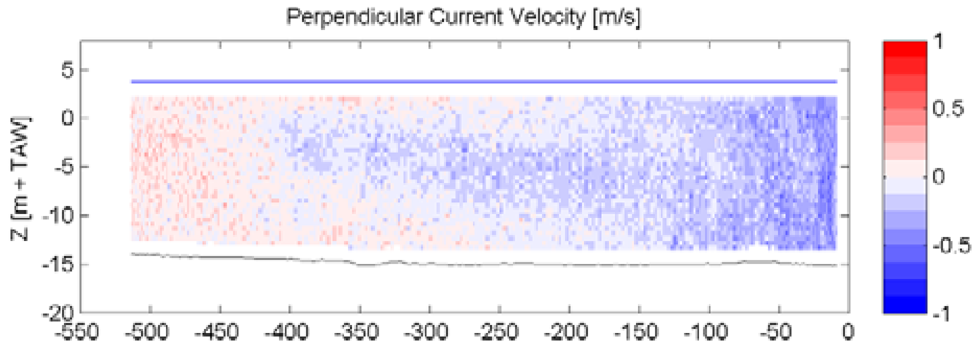
Time after HW [HH:MM]
-1:23

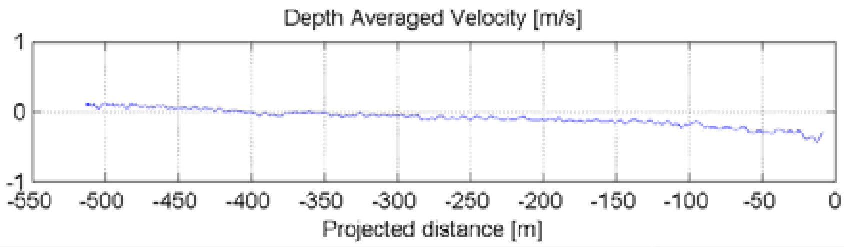
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

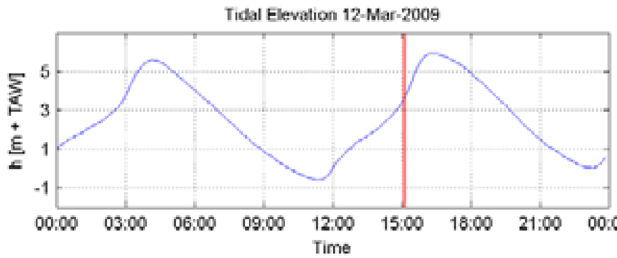
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5073DGDtrl_sub.csv	Location: Deurganckdok









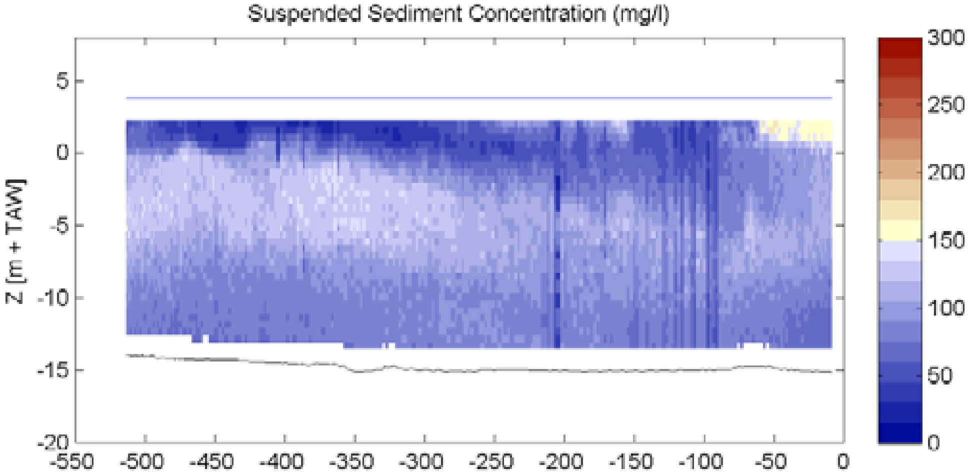
HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

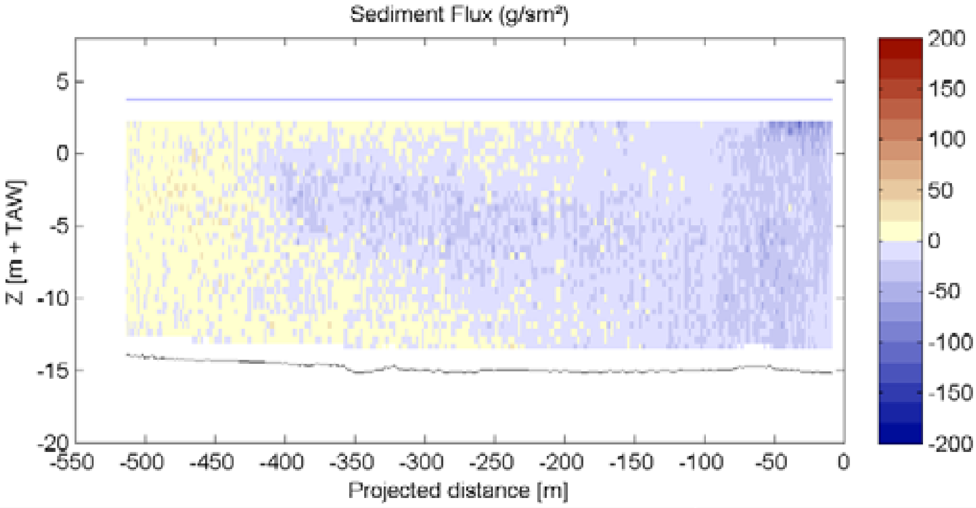
Date / Time [MET] :
12-Mar-2009
15:05 - 15:08

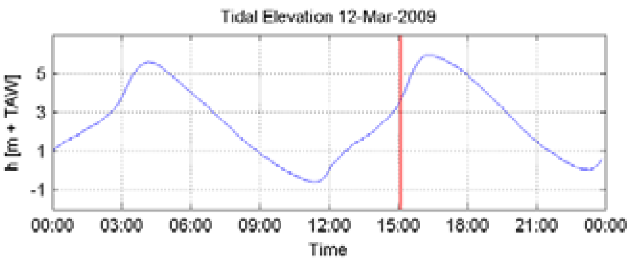
Time after HW [HH:MM]
-1:12

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD	
11283	Equipment(s): ADCP
Sourcefile: 5073DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

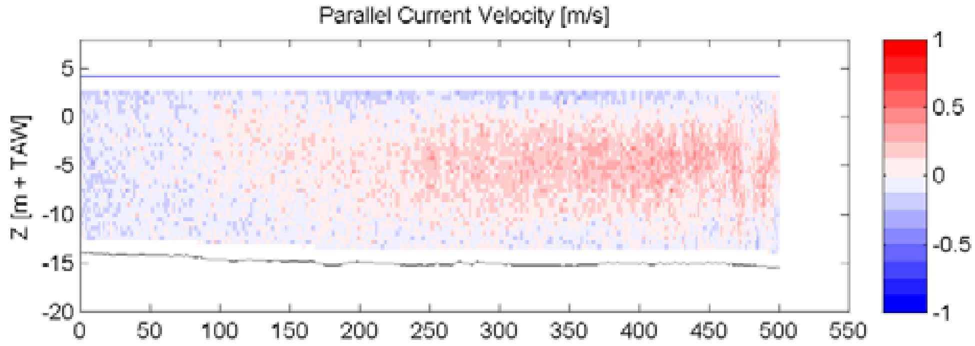
Date / Time [MET] :
12-Mar-2009
15:05 - 15:08

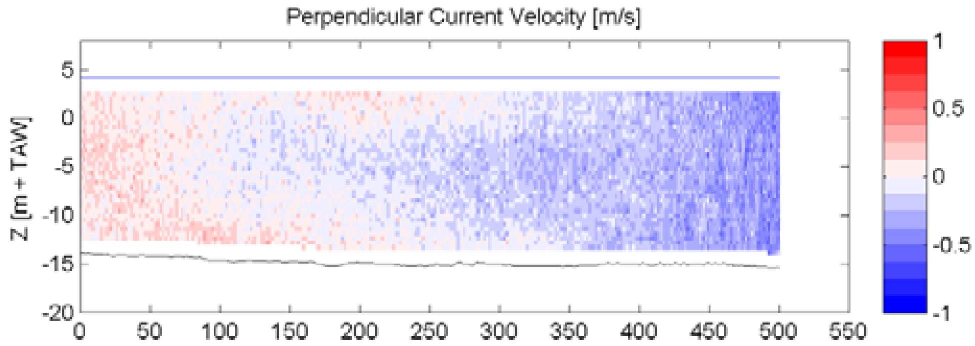
Time after HW [HH:MM]
-1:12

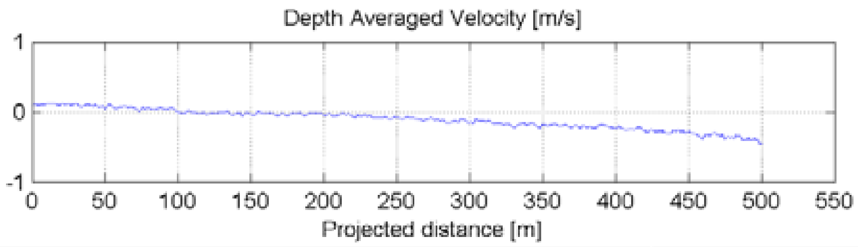
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

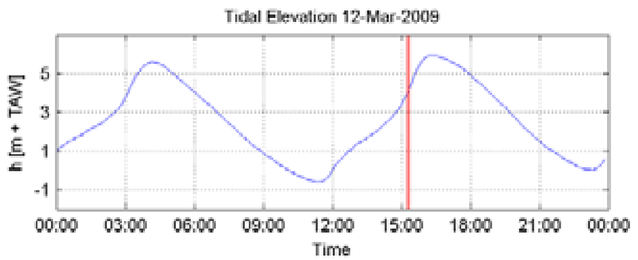
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5075DGDtlr.csv	Location: Deurganckdok









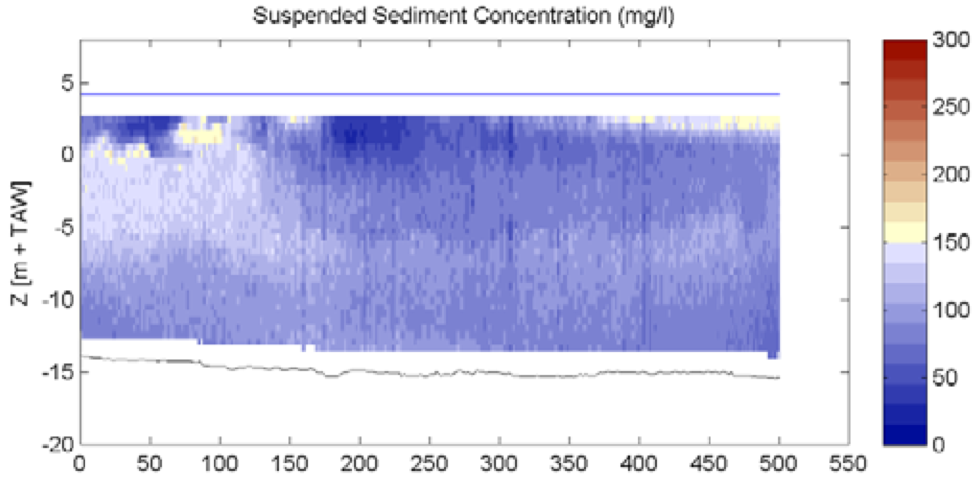
HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

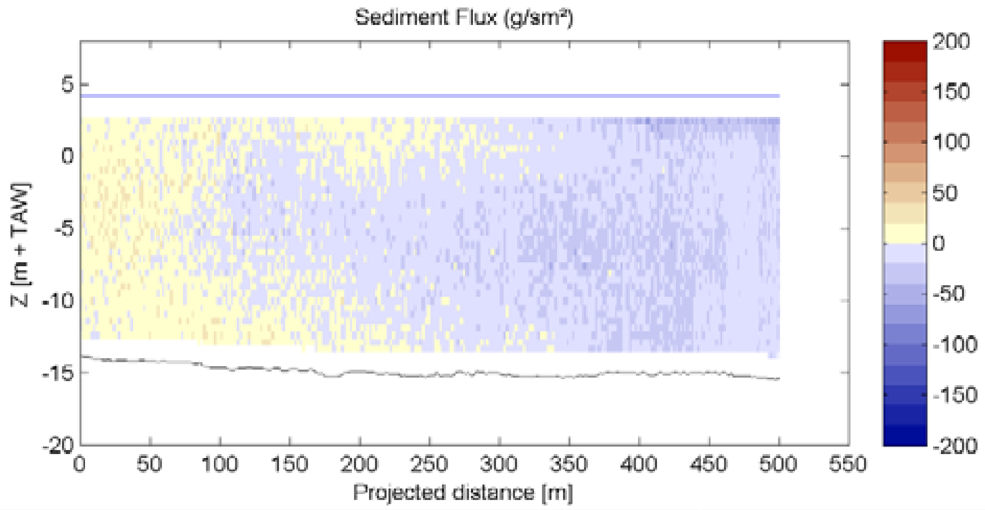
Date / Time [MET] :
12-Mar-2009
15:16 - 15:20

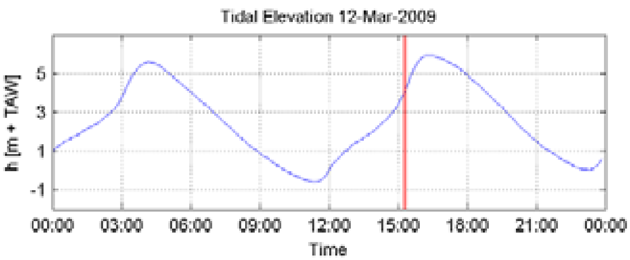
Time after HW [HH:MM]
-1:01

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD	
11283	Equipment(s): ADCP
Sourcefile: 5075DGDtlr.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

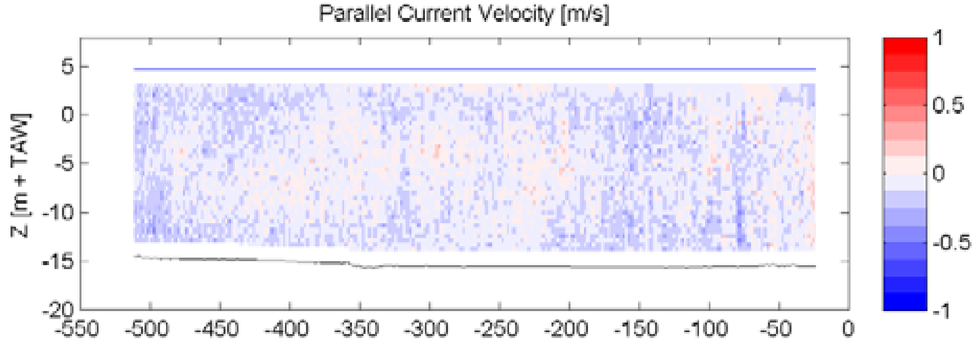
Date / Time [MET] :
12-Mar-2009
15:16 - 15:20

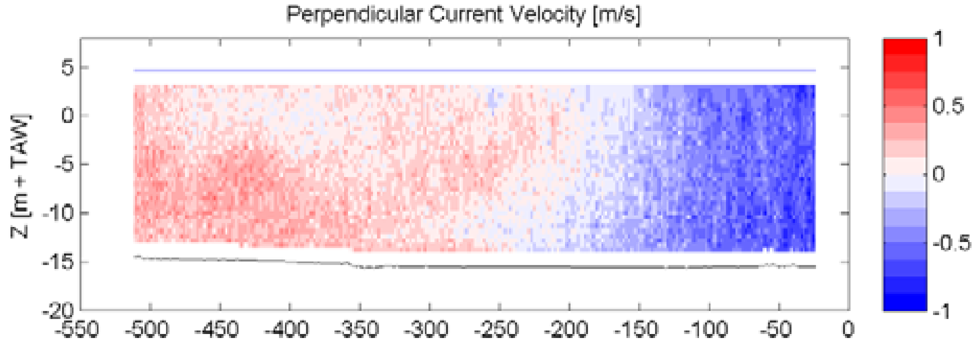
Time after HW [HH:MM]
-1:01

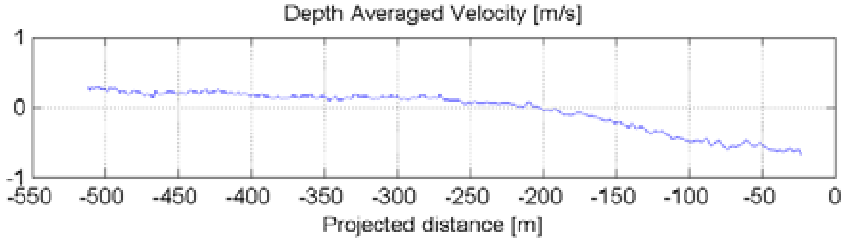
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

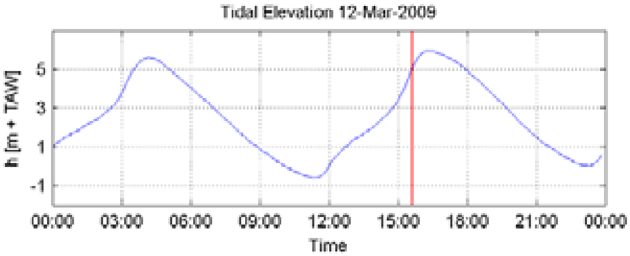
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5077DGDtrl_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
15:34 - 15:37

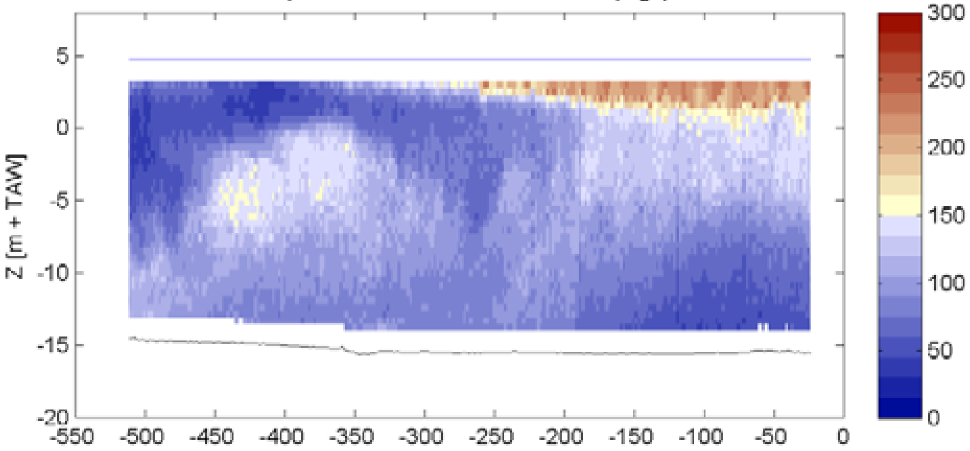
Time after HW [HH:MM]
-0:44

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

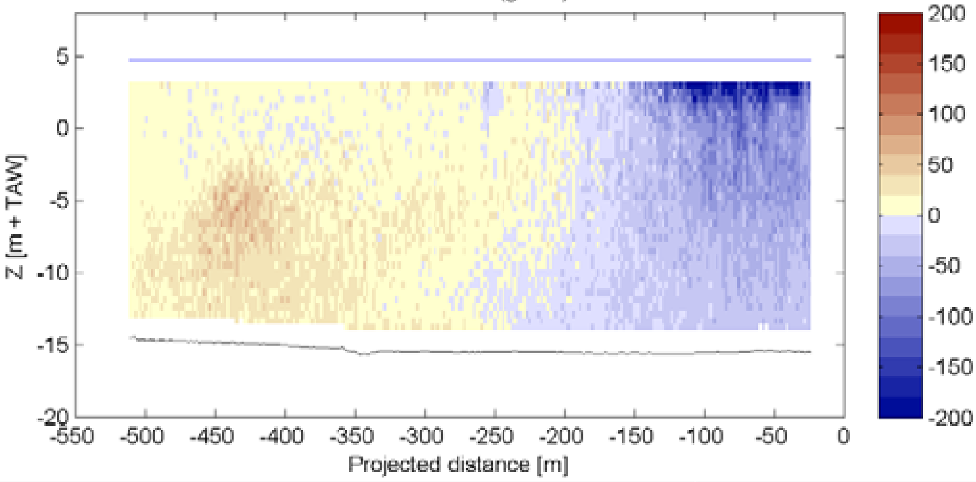
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5077DGDtrl_sub.csv	Location: Deurganckdok

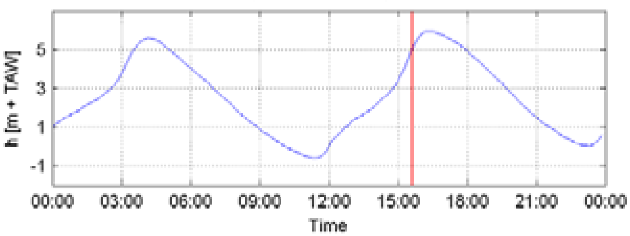
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 12-Mar-2009



HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

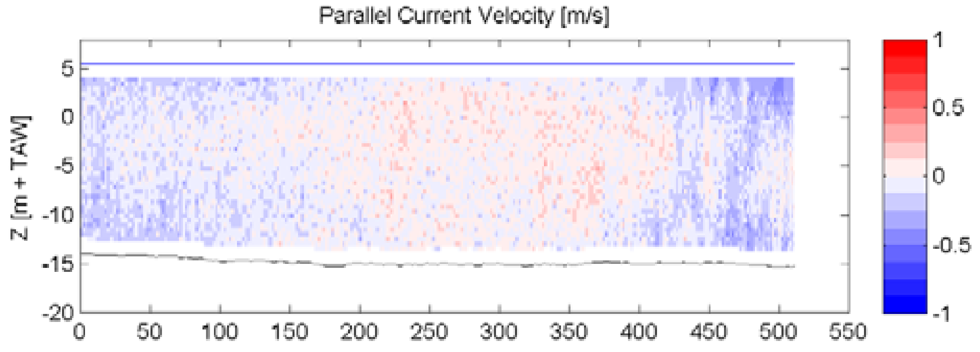
Date / Time [MET] :
12-Mar-2009
15:34 - 15:37

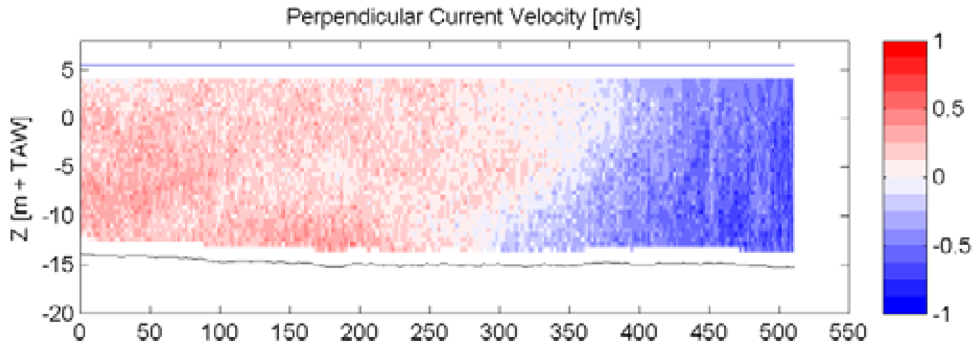
Time after HW [HH:MM]
-0:44

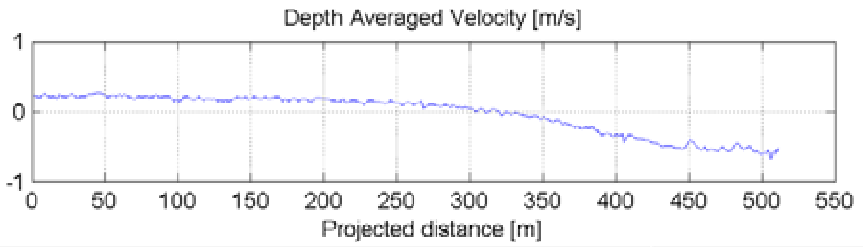
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

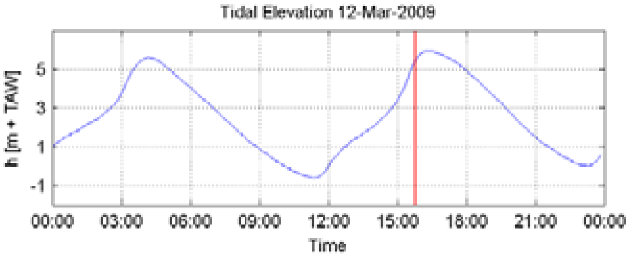
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5079DGDtlr_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

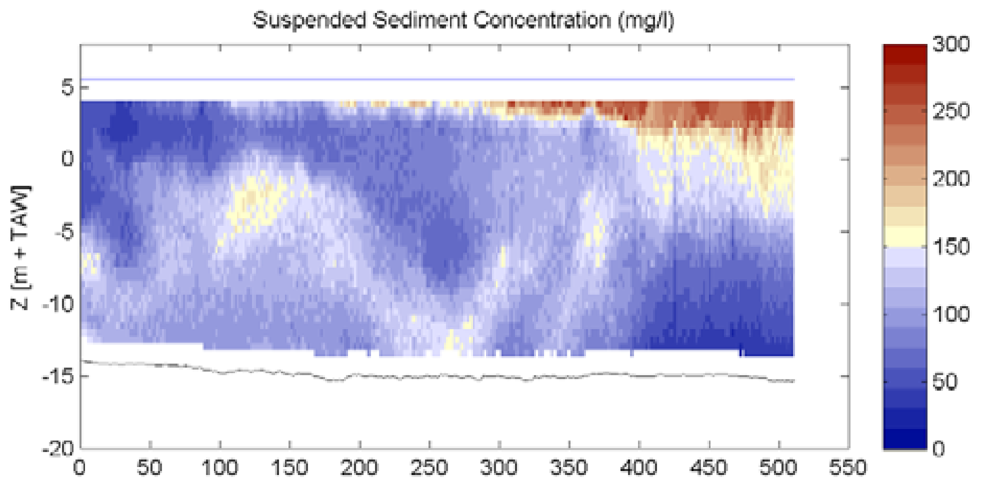
Date / Time [MET] :
12-Mar-2009
15:45 - 15:49

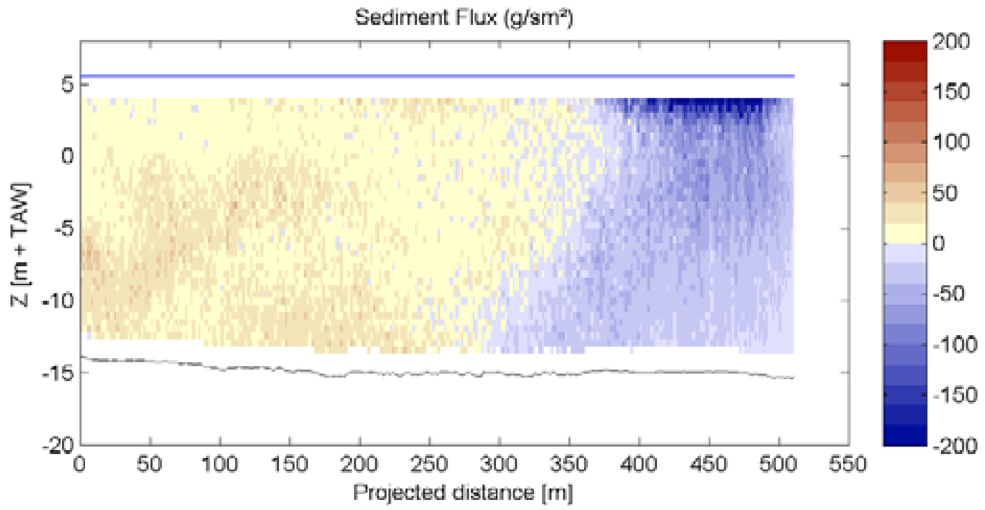
Time after HW [HH:MM]
-0:32

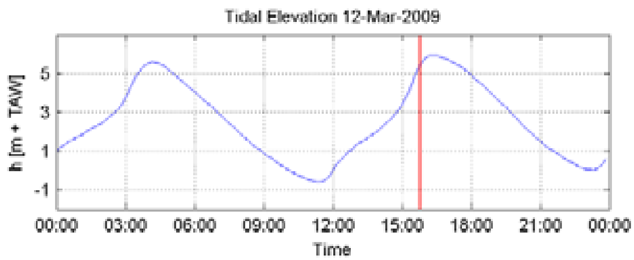
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5079DGDtlr_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
15:45 - 15:49

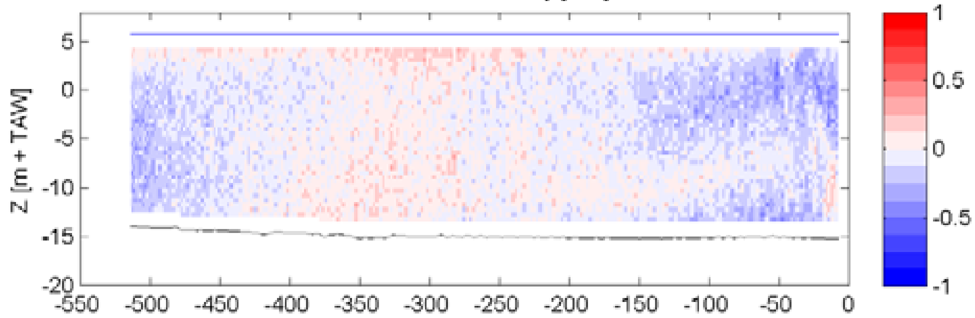
Time after HW [HH:MM]
-0:32

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

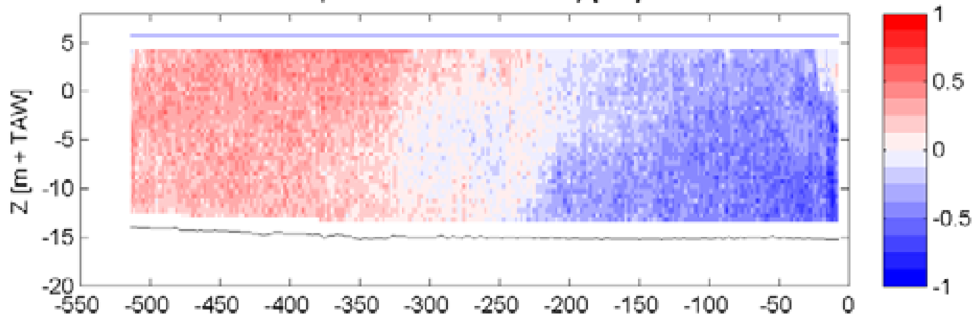
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5081DGDtrl_sub.csv	Location: Deurganckdok

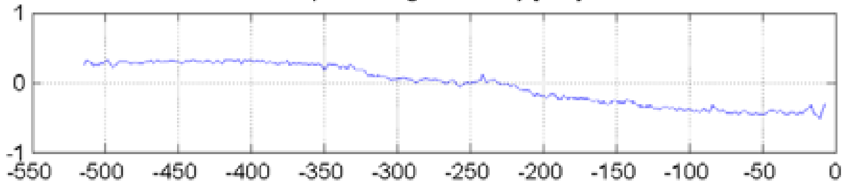
Parallel Current Velocity [m/s]



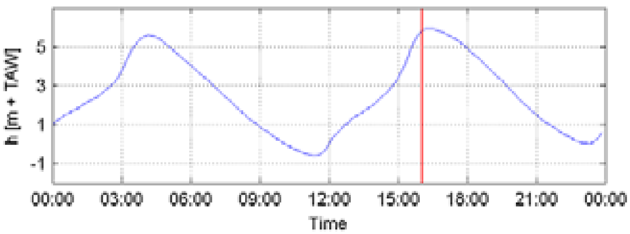
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 12-Mar-2009



HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
16:00 - 16:03

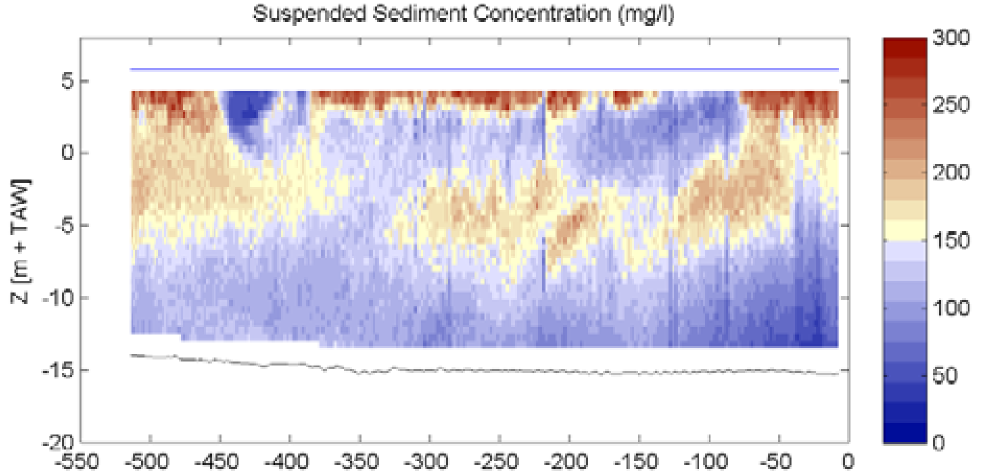
Time after HW [HH:MM]
-0:17

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

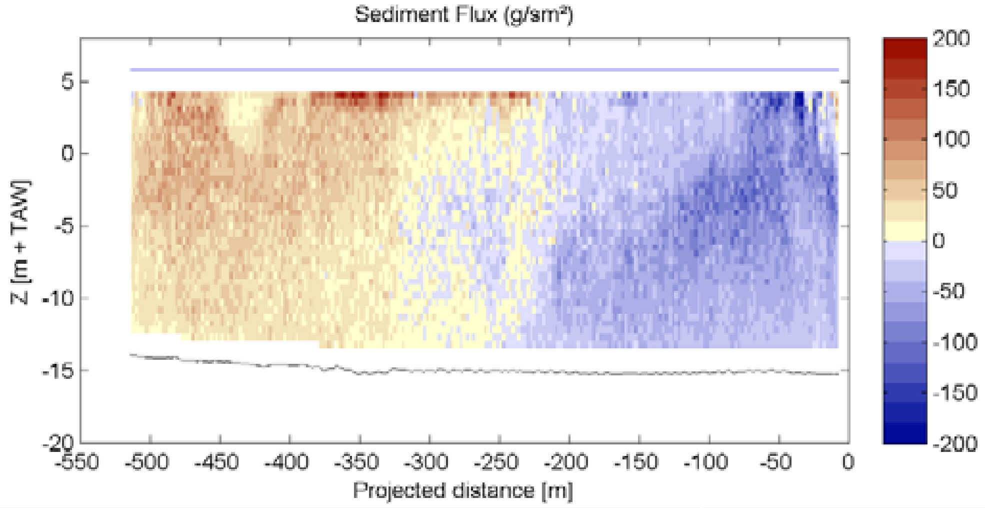
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5081DGDtrl_sub.csv	Location: Deurganckdok

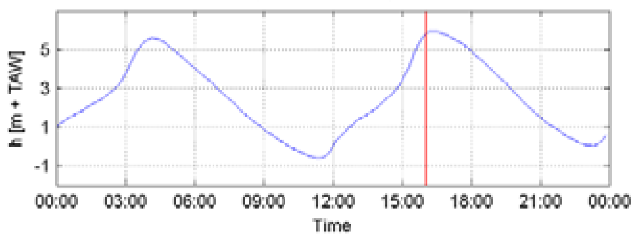
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 12-Mar-2009



HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

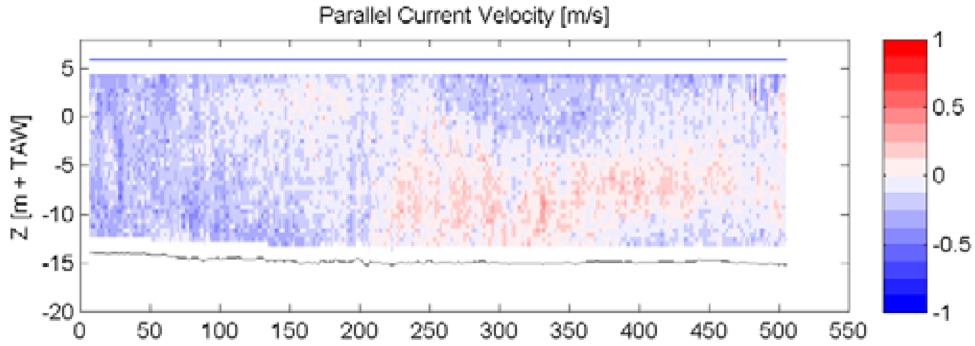
Date / Time [MET] :
12-Mar-2009
16:00 - 16:03

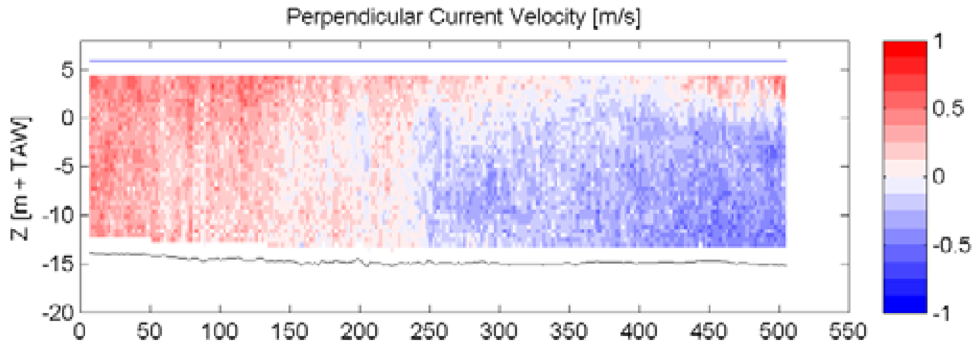
Time after HW [HH:MM]
-0:17

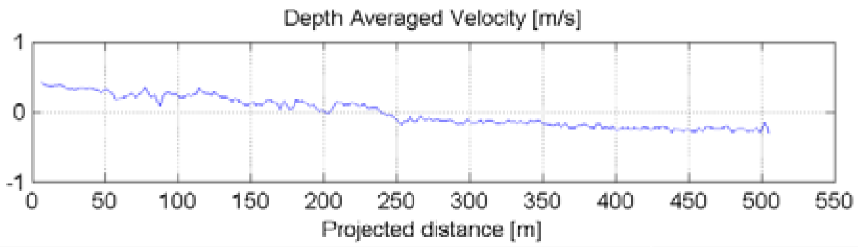
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

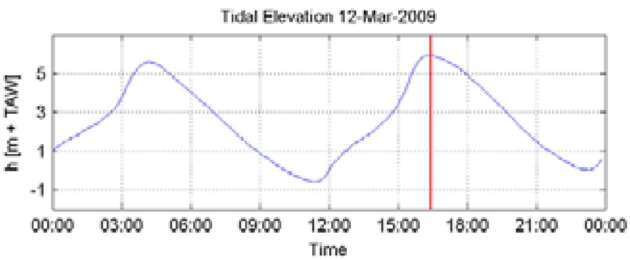
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5083DGDtlr.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
16:22 - 16:26

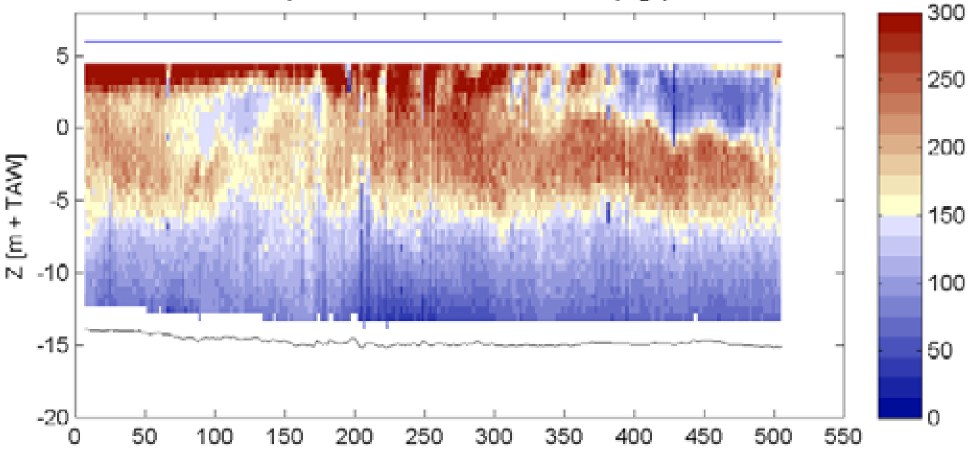
Time after HW [HH:MM]
0:04

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

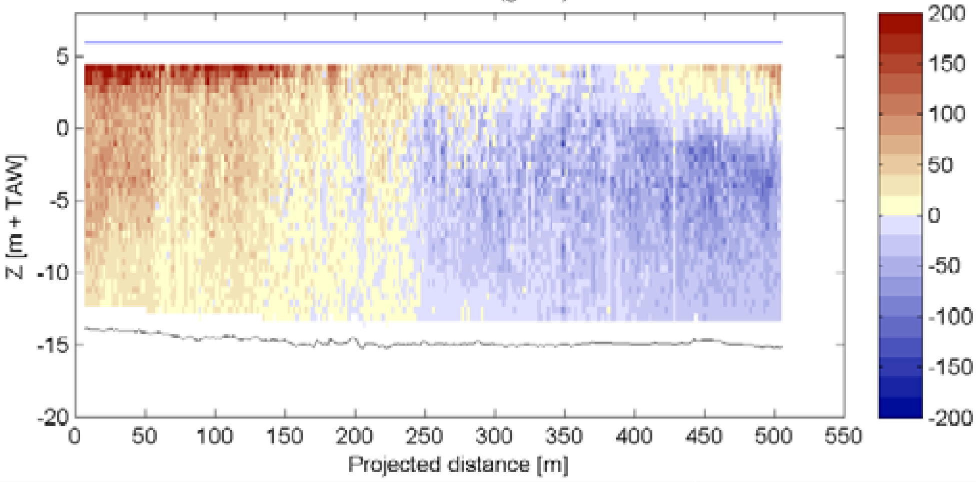
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5083DGDtlr.csv	Location: Deurganckdok

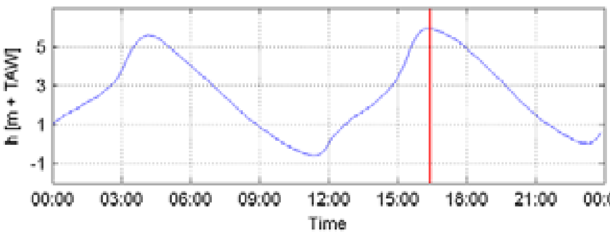
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 12-Mar-2009



HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
16:22 - 16:26

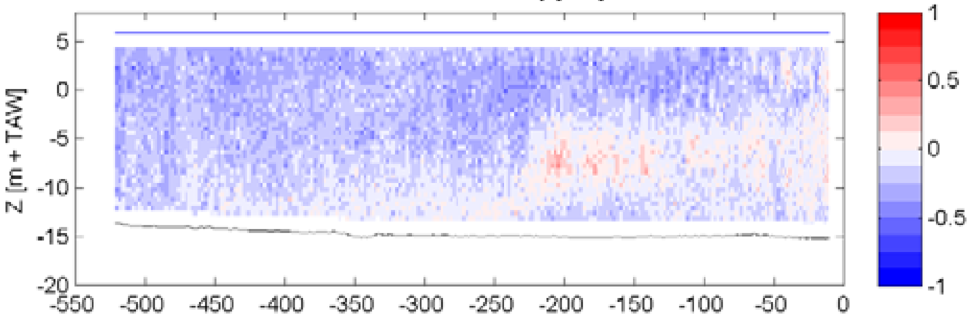
Time after HW [HH:MM]
0:04

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

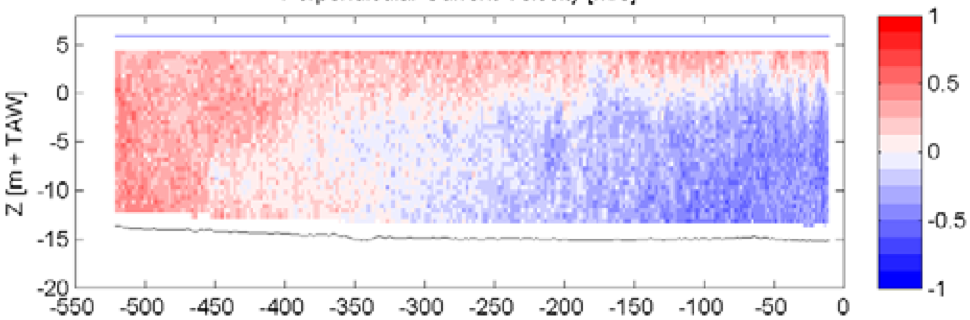
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5085DGDtrl_sub.csv	Location: Deurganckdok

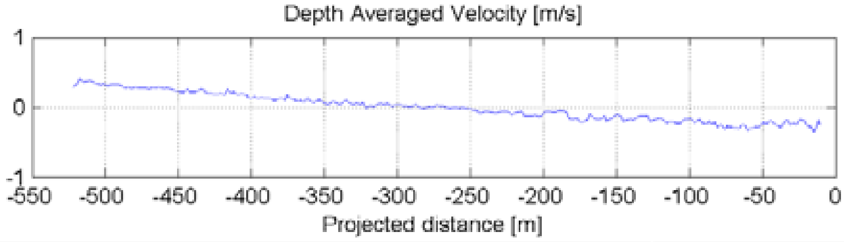
Parallel Current Velocity [m/s]



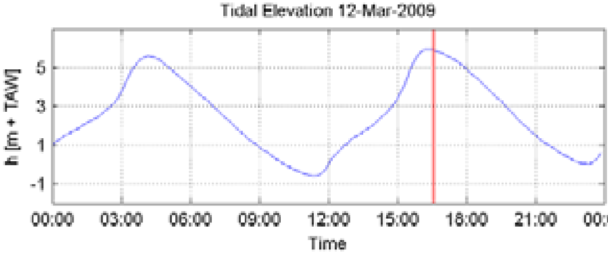
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 12-Mar-2009



HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

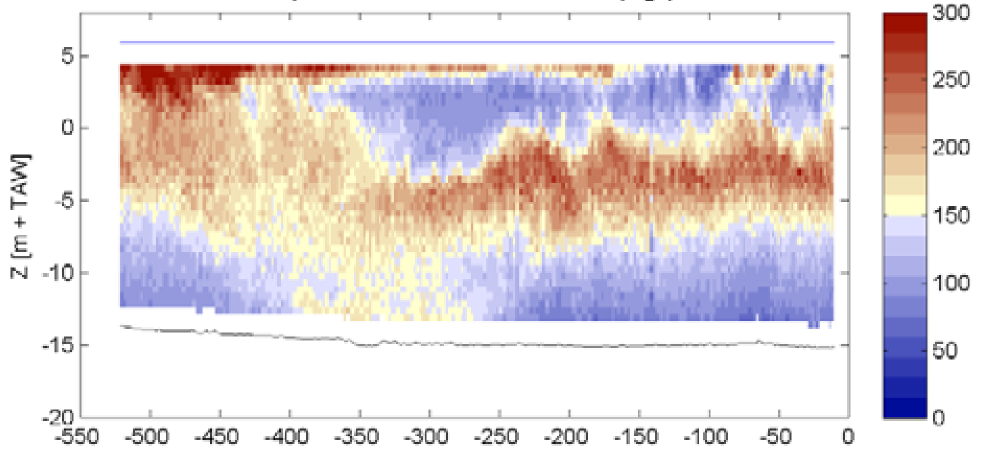
Date / Time [MET] :
12-Mar-2009
16:33 - 16:36

Time after HW [HH:MM]
0:14

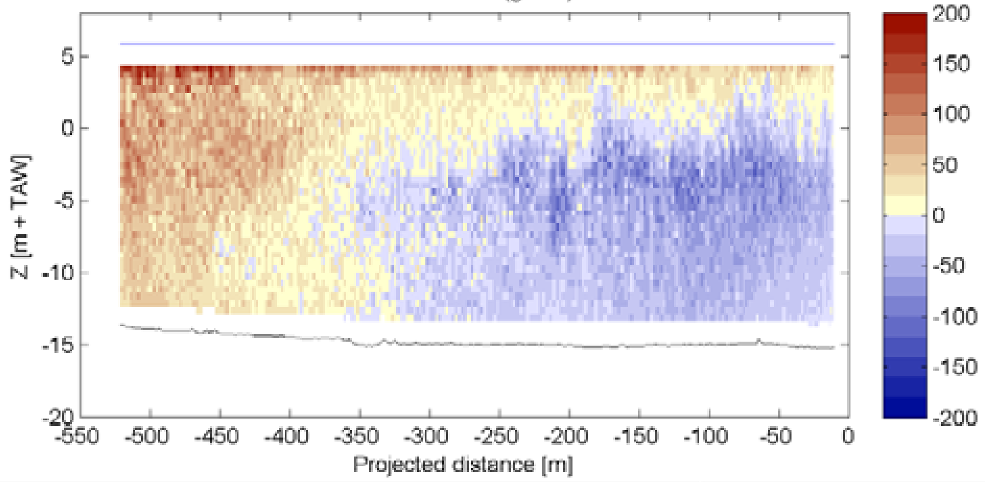
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD	
11283	Equipment(s): ADCP
Sourcefile: 5085DGDtrl_sub.csv	Location: Deurganckdok

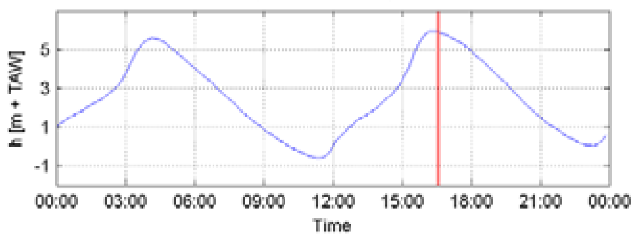
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 12-Mar-2009



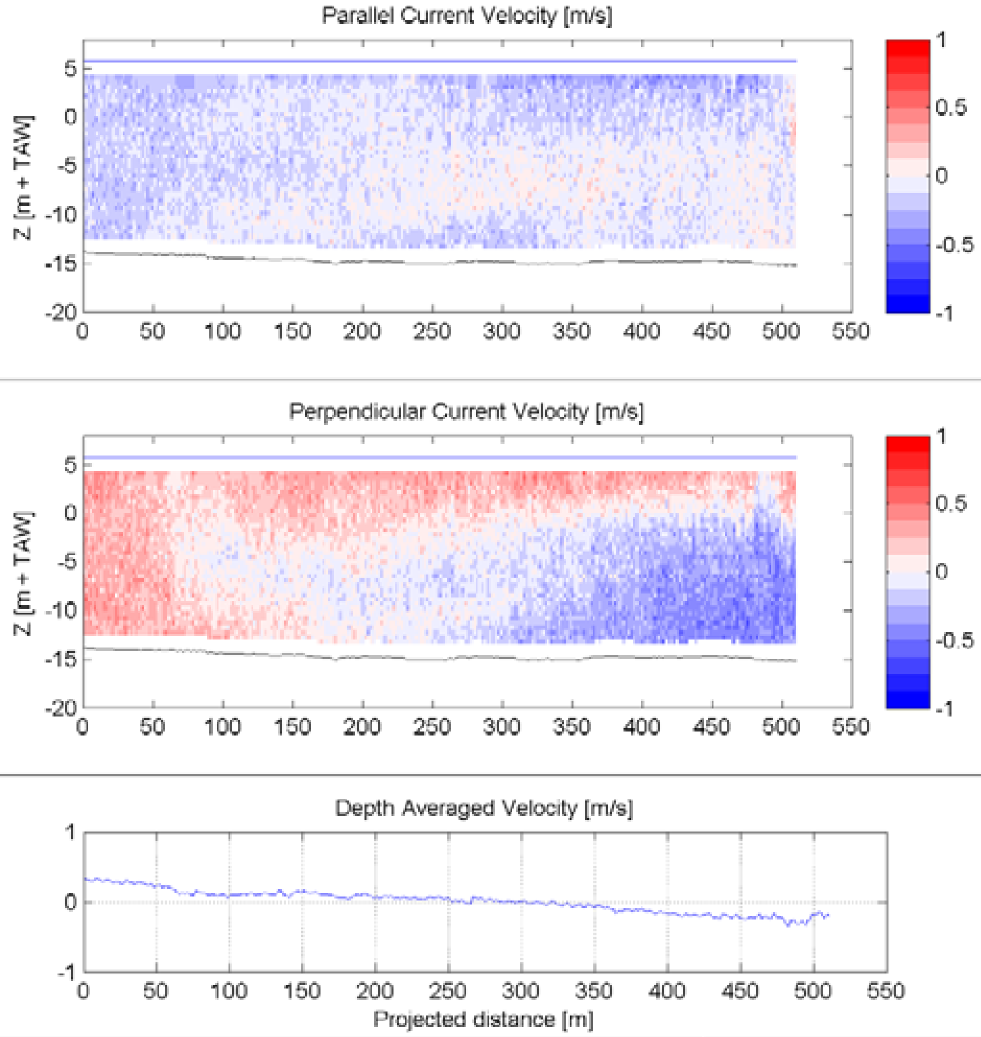
HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

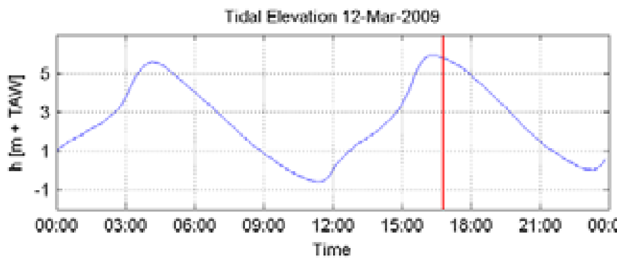
Date / Time [MET] :
12-Mar-2009
16:33 - 16:36

Time after HW [HH:MM]
0:14

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD	
11283	Equipment(s): ADCP
Sourcefile: 5087DGDtlr_sub.csv	Location: Deurganckdok





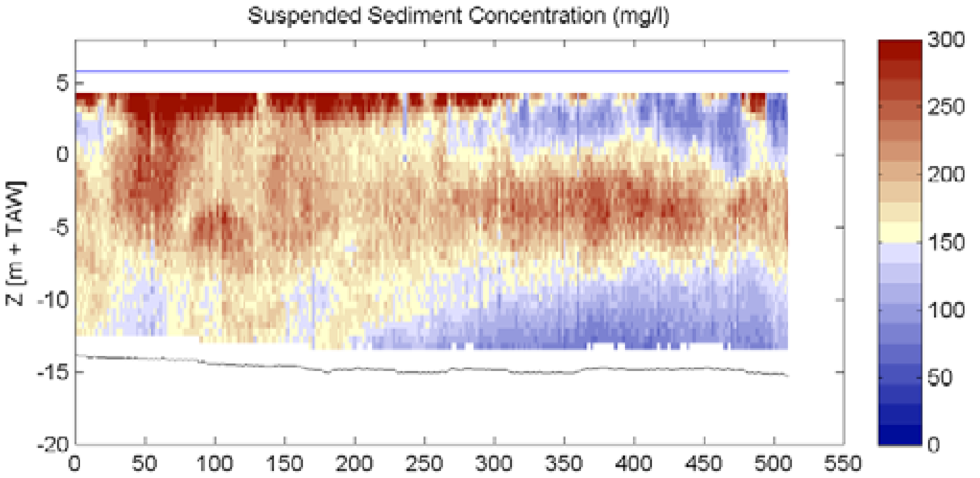
HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

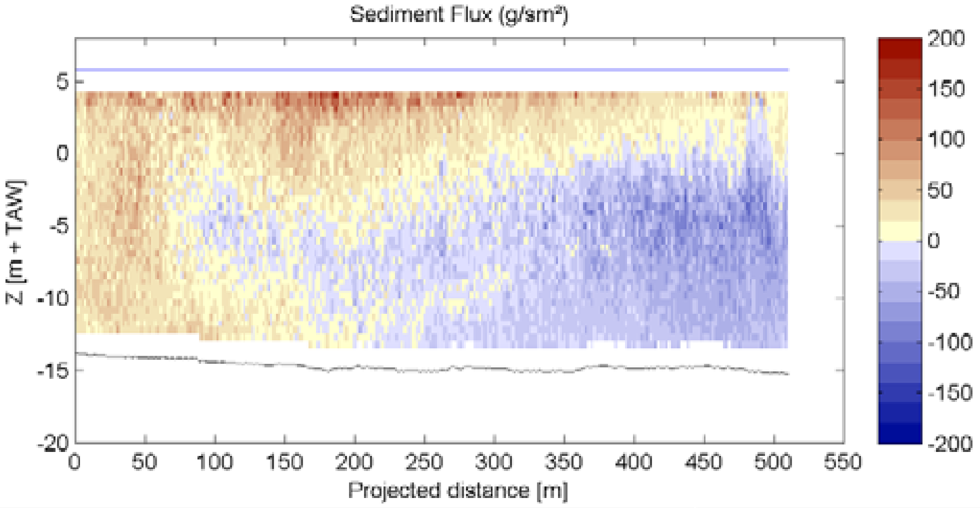
Date / Time [MET] :
12-Mar-2009
16:45 - 16:49
Time after HW [HH:MM]
0:27

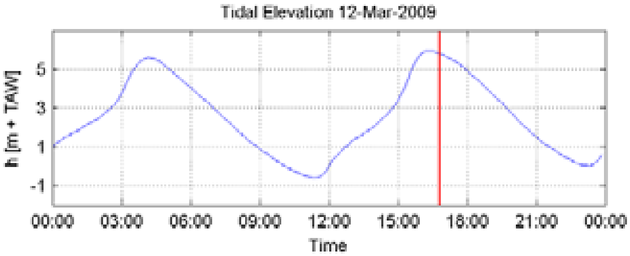
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5087DGDtlr_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
16:45 - 16:49

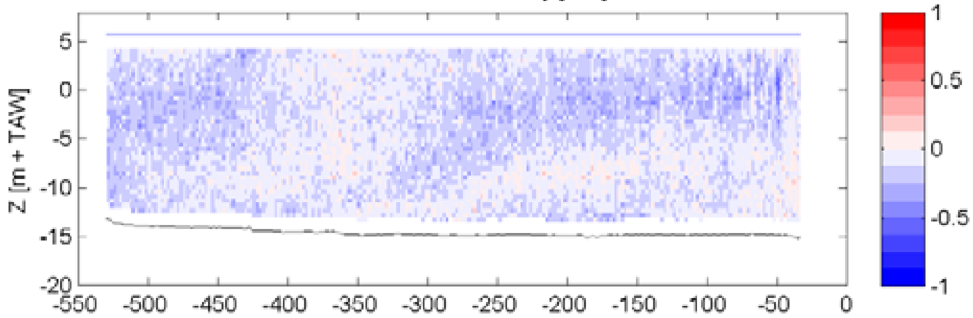
Time after HW [HH:MM]
0:27

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

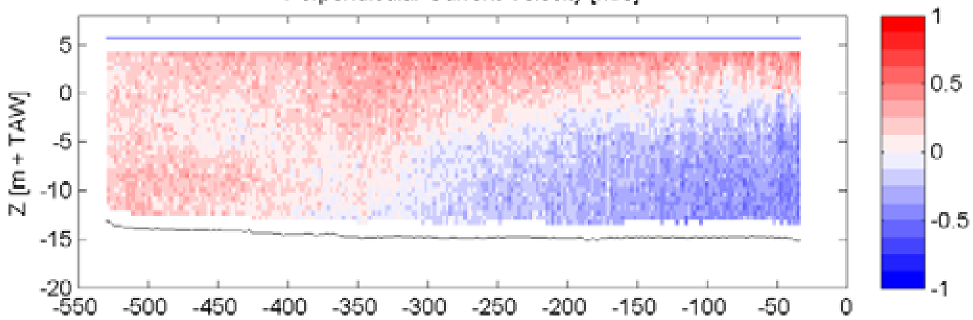
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5089DGDtrl_sub.csv	Location: Deurganckdok

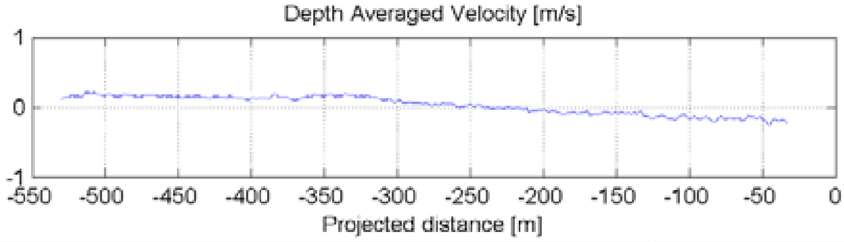
Parallel Current Velocity [m/s]



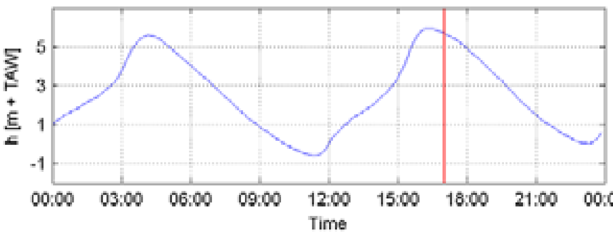
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 12-Mar-2009



HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
16:59 - 17:03

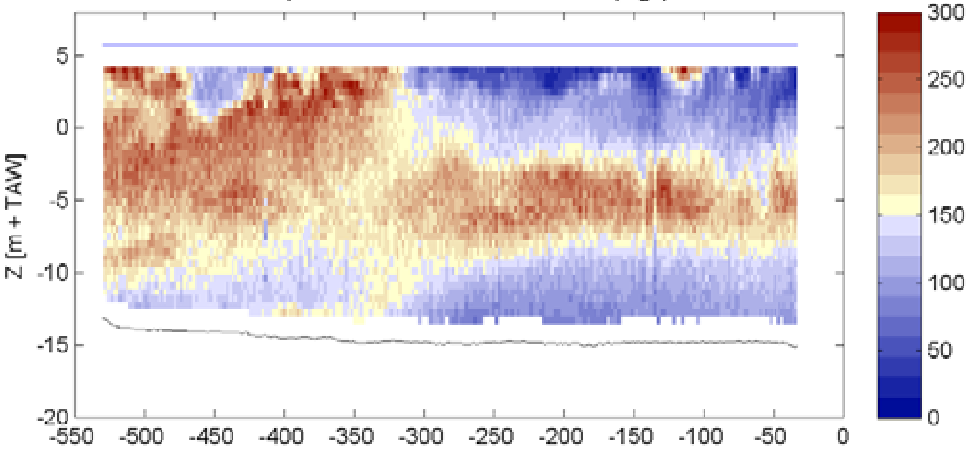
Time after HW [HH:MM]
0:41

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

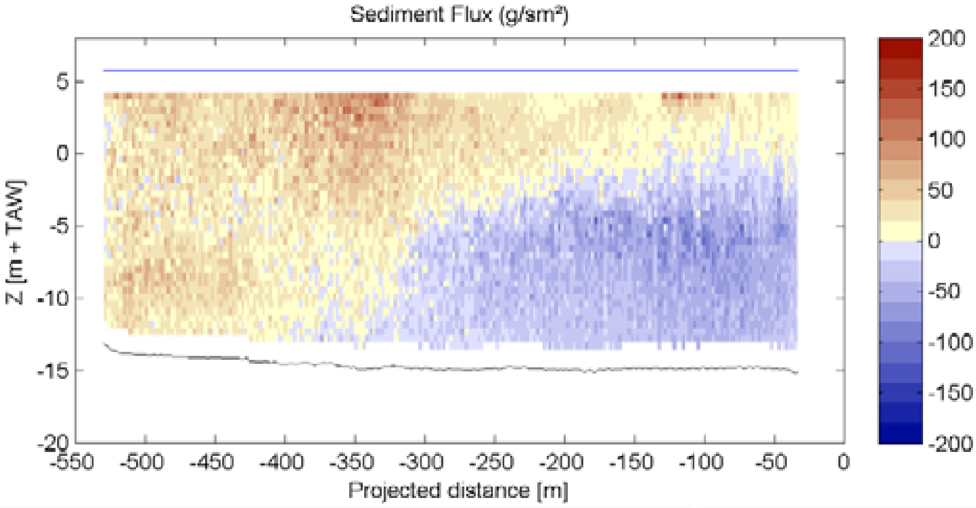
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5089DGDtrl_sub.csv	Location: Deurganckdok

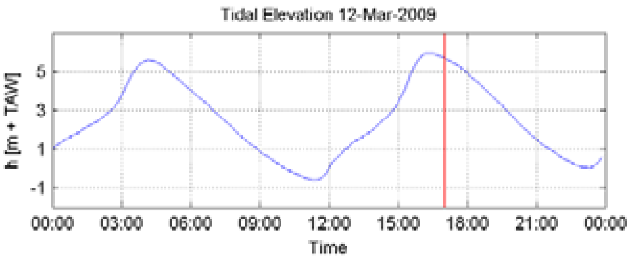
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 12-Mar-2009



HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

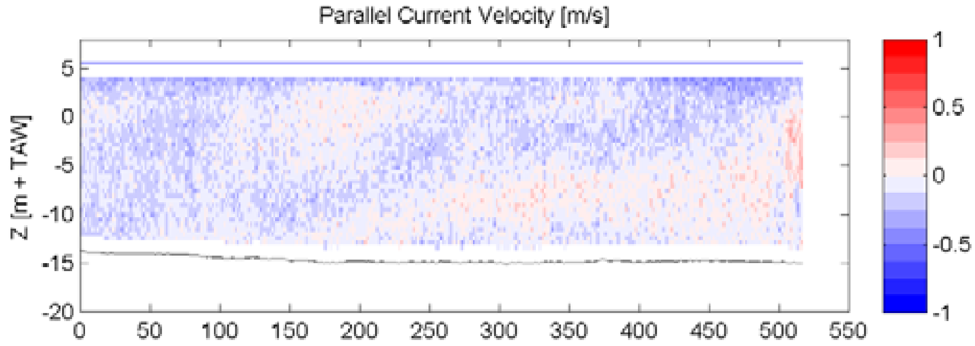
Date / Time [MET] :
12-Mar-2009
16:59 - 17:03

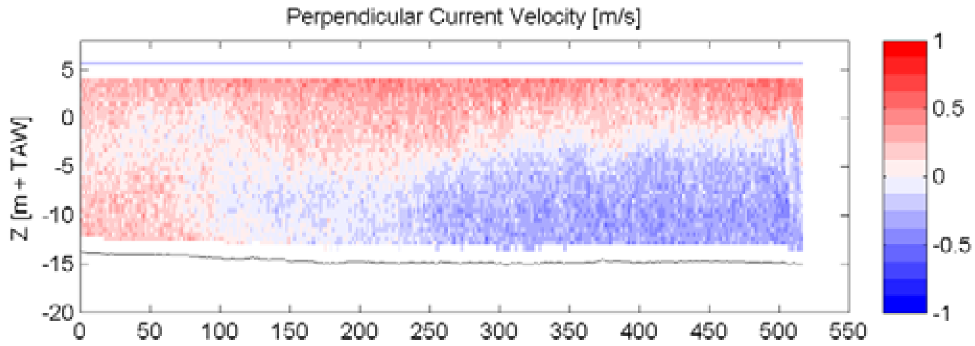
Time after HW [HH:MM]
0:41

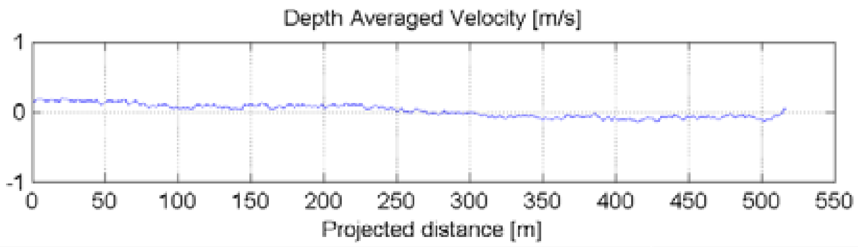
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

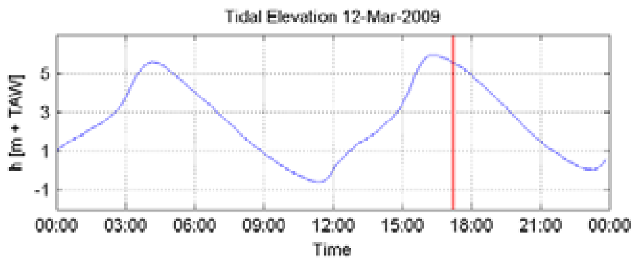
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5091DGDtlr_sub.csv	Location: Deurganckdok









HW/LW:
04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
17:10 - 17:14

Time after HW [HH:MM]
0:52

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

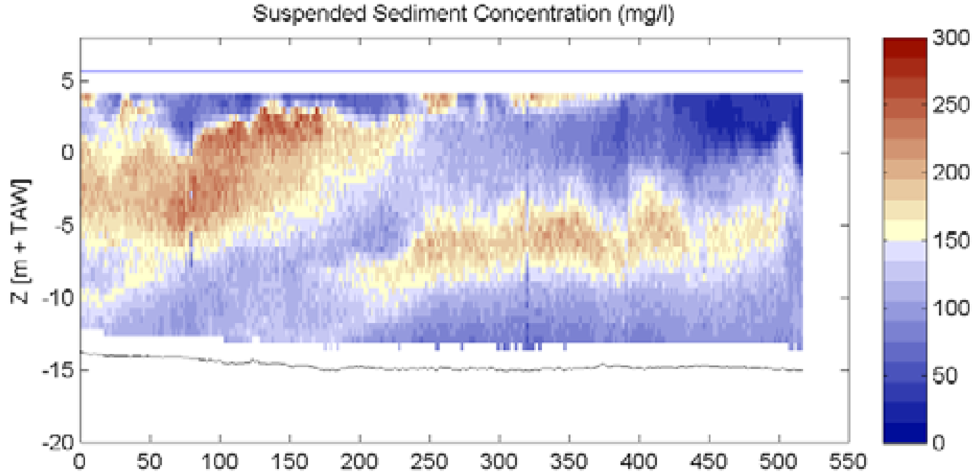
Opvolging aanslibbing DGD

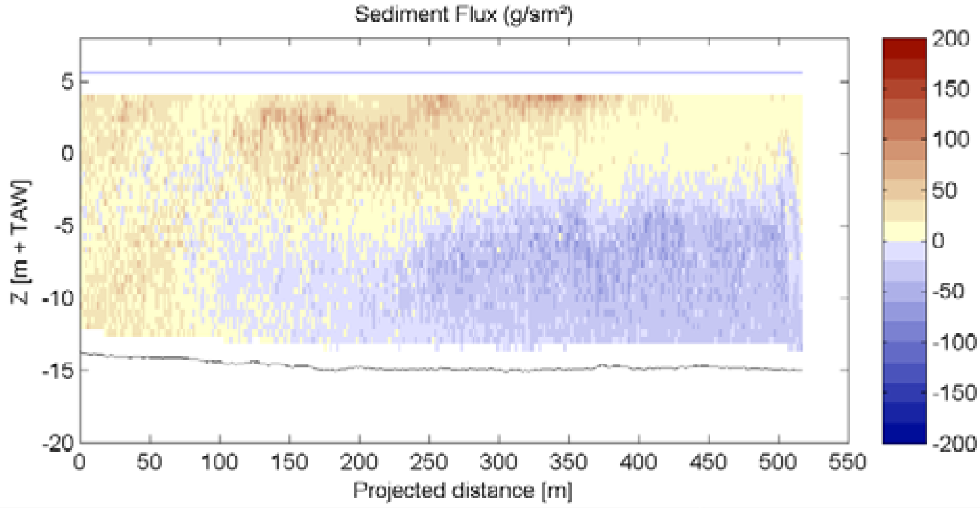
11283

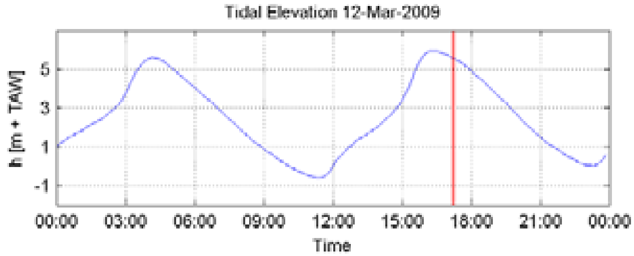
Equipment(s):
ADCP

Sourcefile:
5091DGDtlr_sub.csv

Location:
Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
17:10 - 17:14

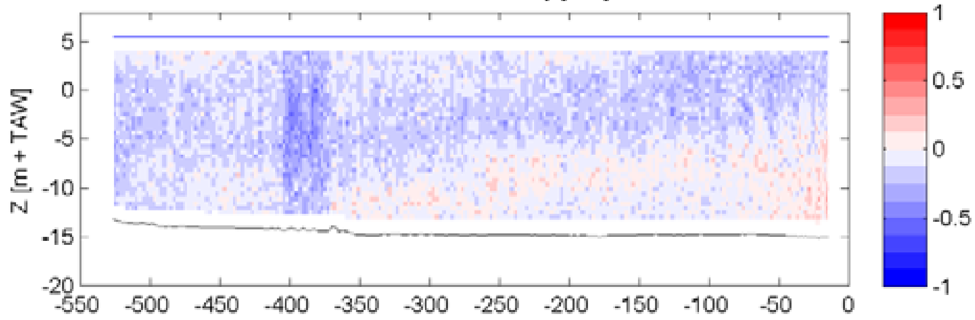
Time after HW [HH:MM]
0:52

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

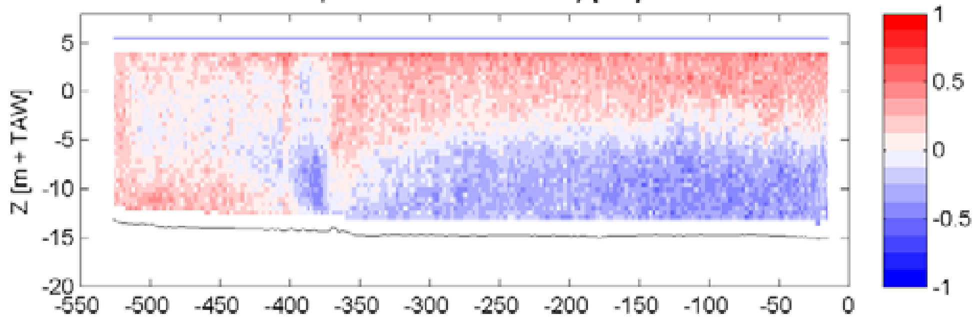
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5093DGDtrl_sub.csv	Location: Deurganckdok

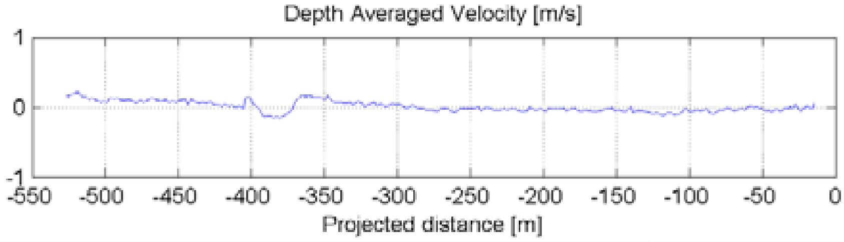
Parallel Current Velocity [m/s]



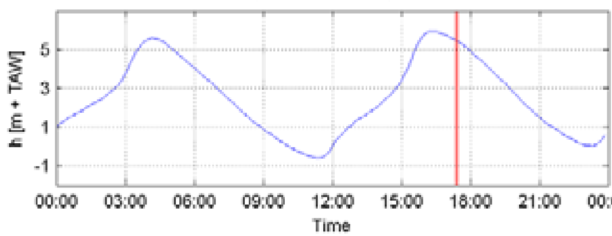
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 12-Mar-2009



HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

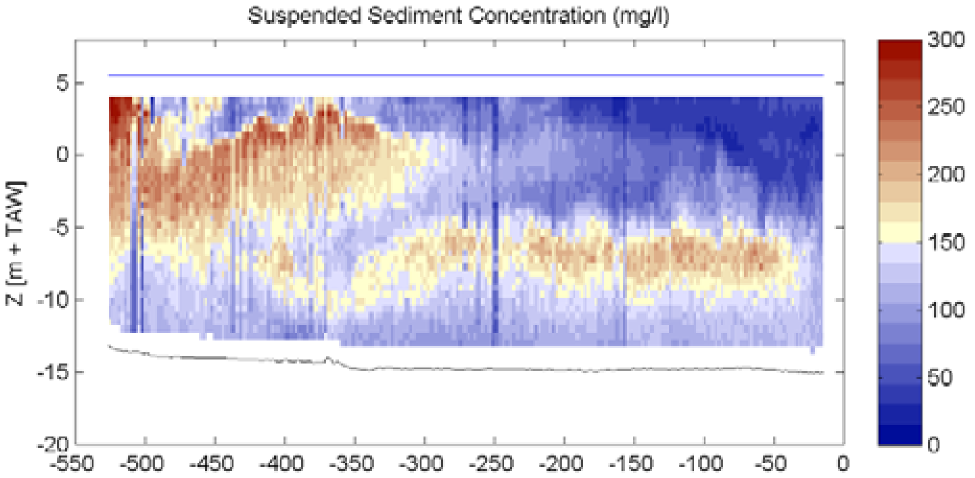
Date / Time [MET] :
12-Mar-2009
17:22 - 17:24

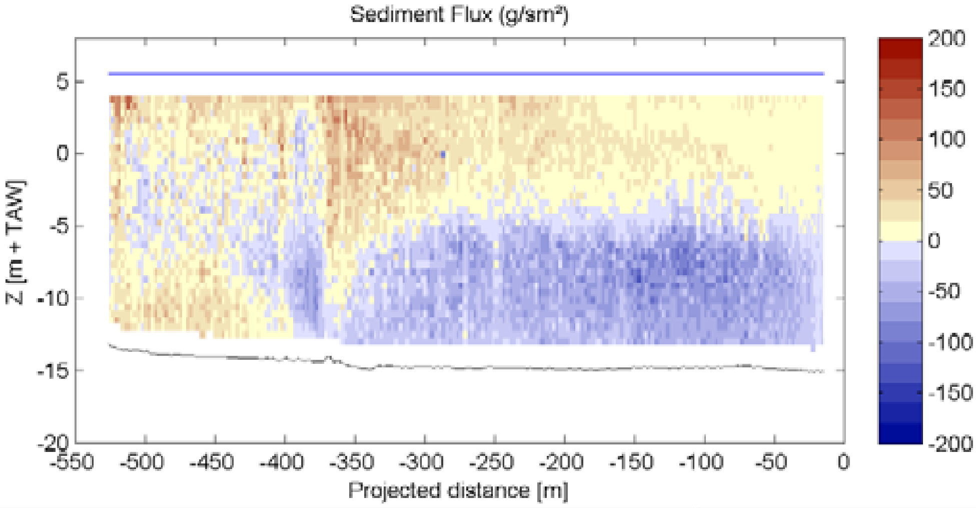
Time after HW [HH:MM]
1:03

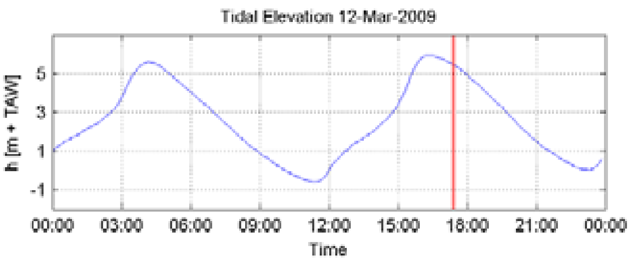
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5093DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

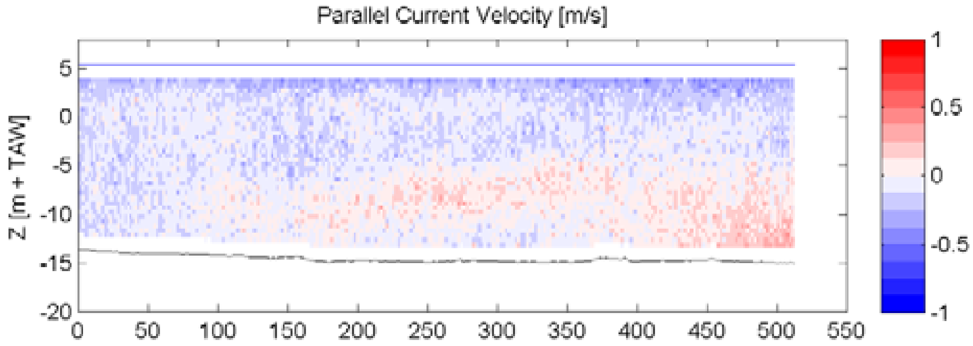
Date / Time [MET] :
12-Mar-2009
17:22 - 17:24

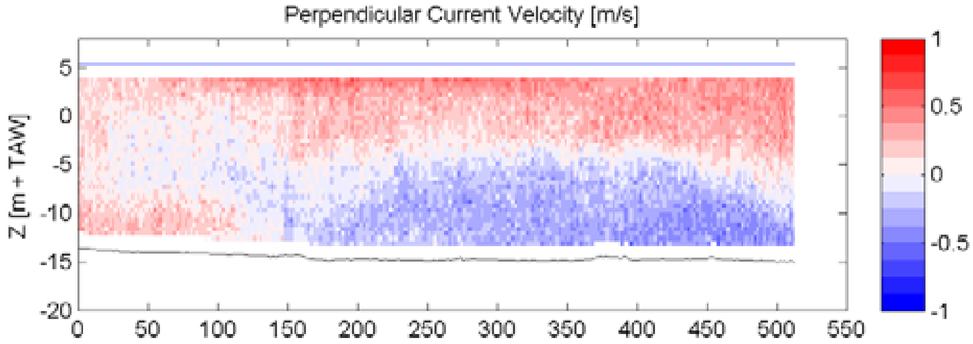
Time after HW [HH:MM]
1:03

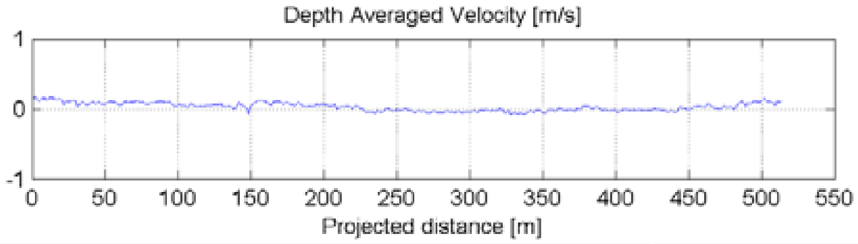
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

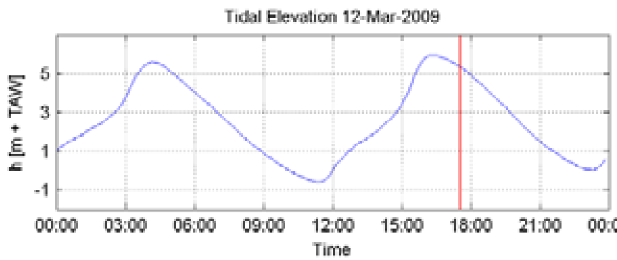
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5095DGDtlr_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

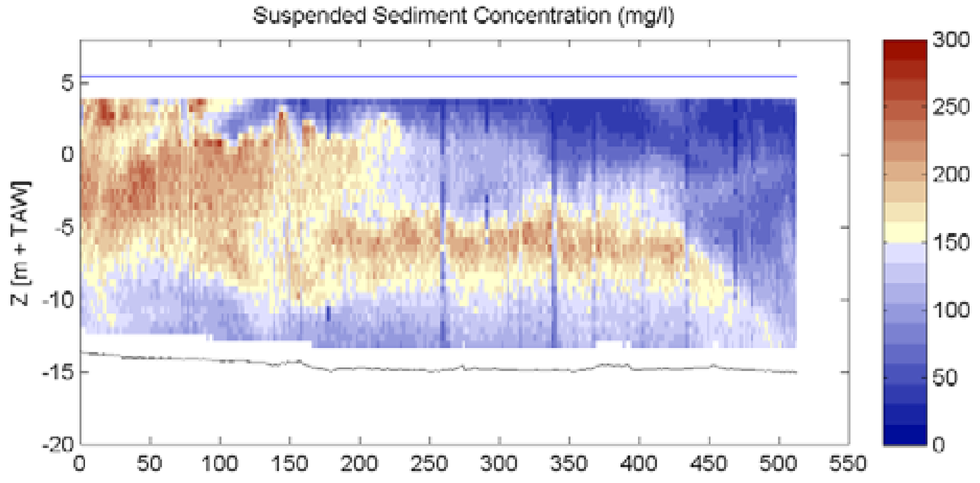
Date / Time [MET] :
12-Mar-2009
17:30 - 17:33

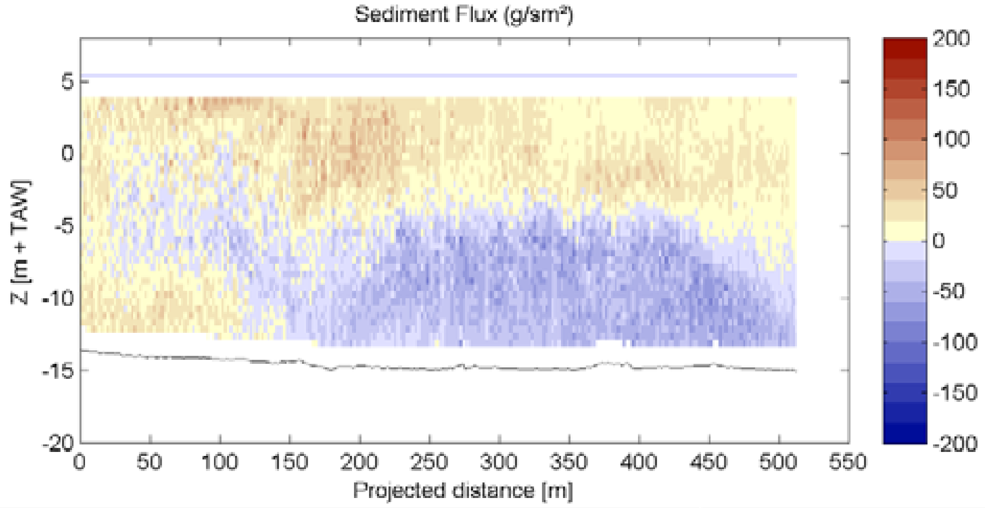
Time after HW [HH:MM]
1:12

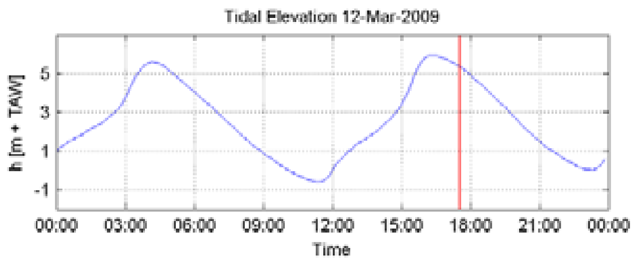
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5095DGDtlr_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

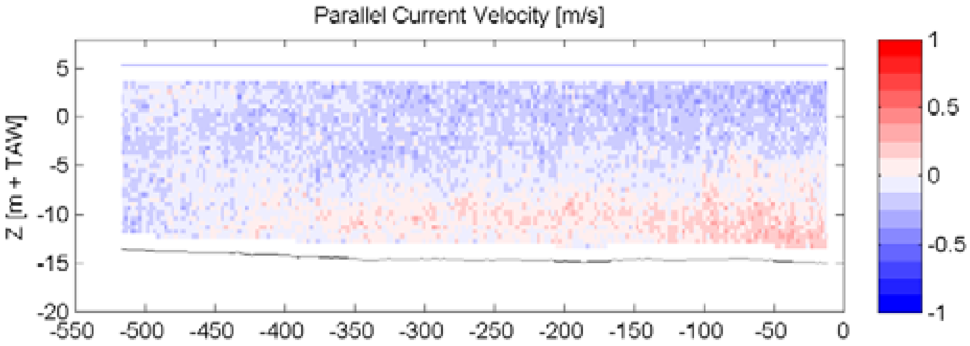
Date / Time [MET] :
12-Mar-2009
17:30 - 17:33

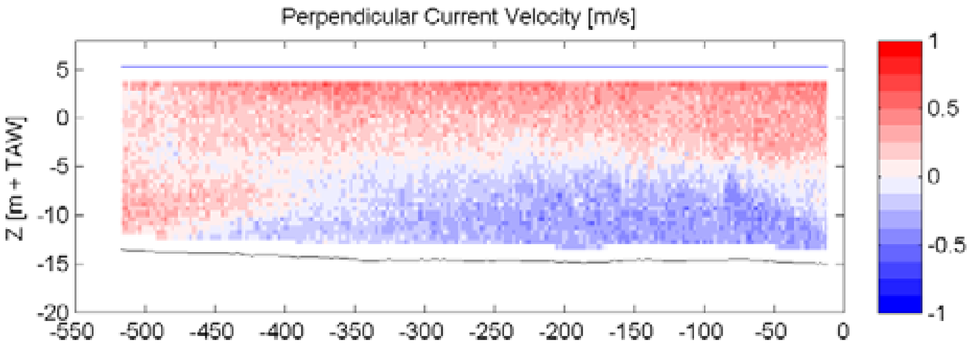
Time after HW [HH:MM]
1:12

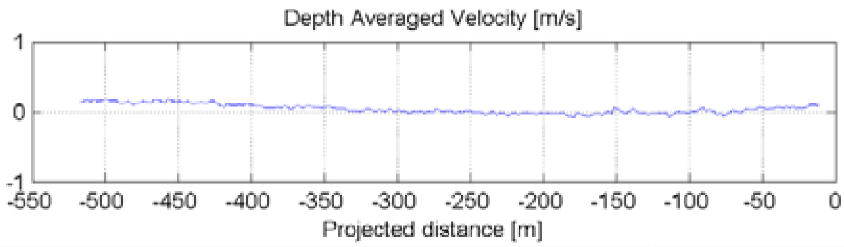
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

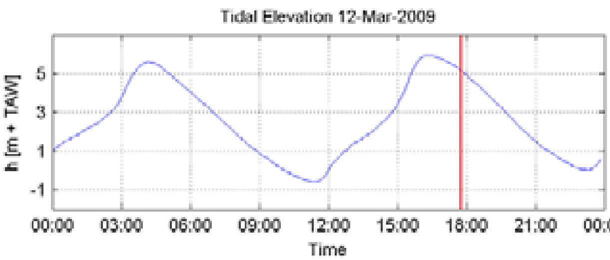
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5097DGDtrl_sub.csv	Location: Deurganckdok









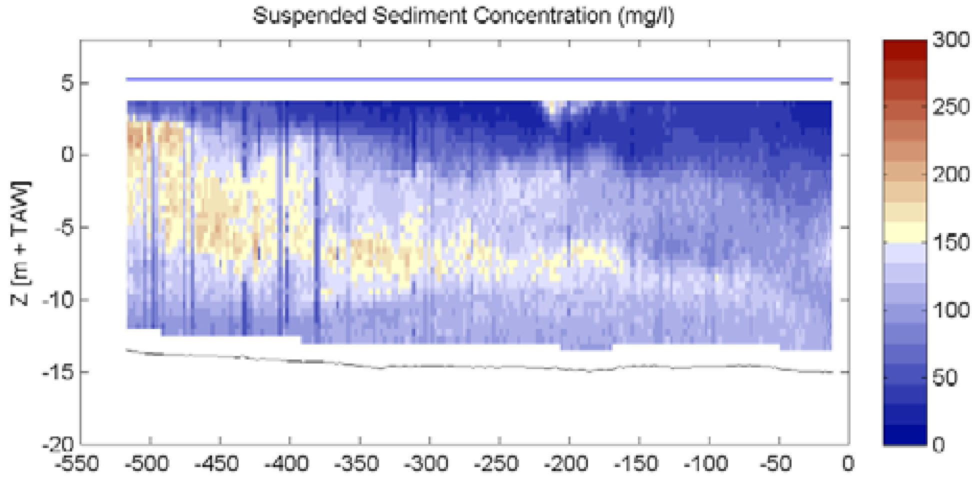
HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

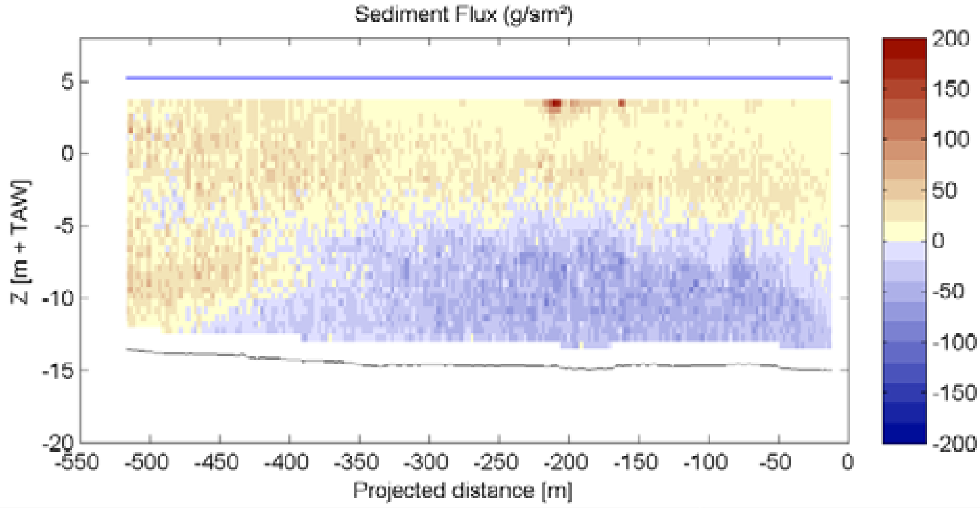
Date / Time [MET] :
12-Mar-2009
17:44 - 17:47

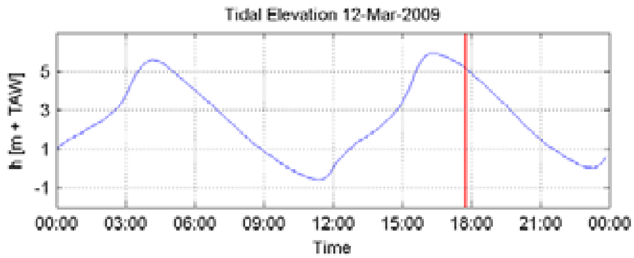
Time after HW [HH:MM]
1:26

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD	
11283	Equipment(s): ADCP
Sourcefile: 5097DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
17:44 - 17:47

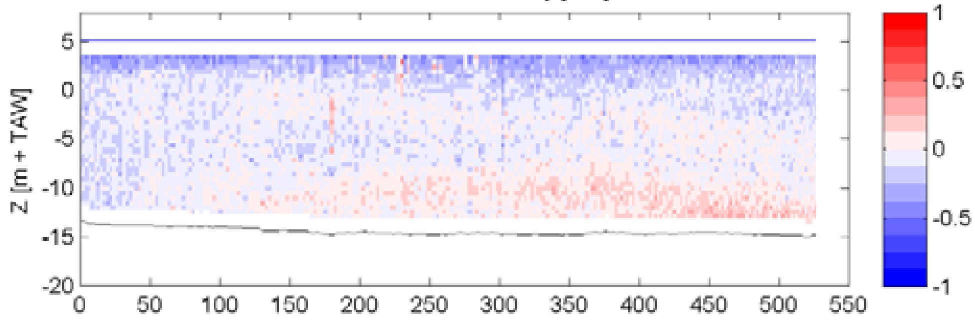
Time after HW [HH:MM]
1:26

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

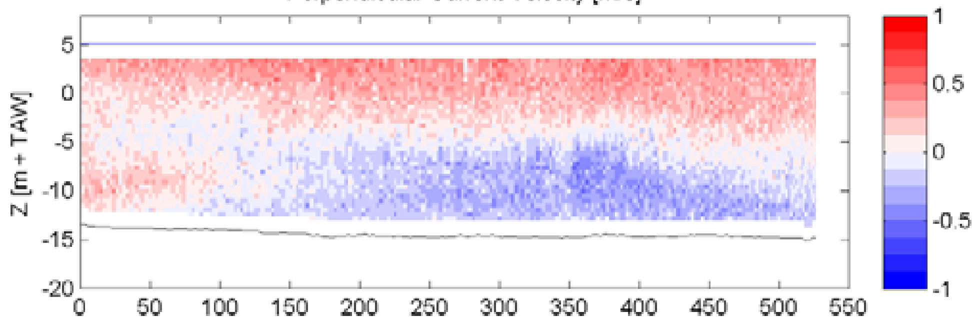
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5099DGDtlr.csv	Location: Deurganckdok

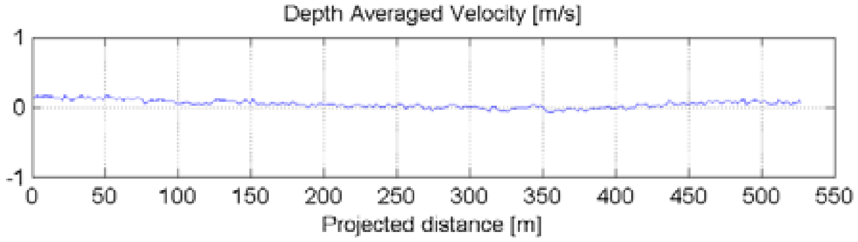
Parallel Current Velocity [m/s]



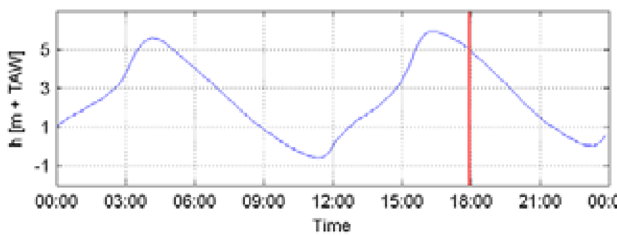
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 12-Mar-2009



HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

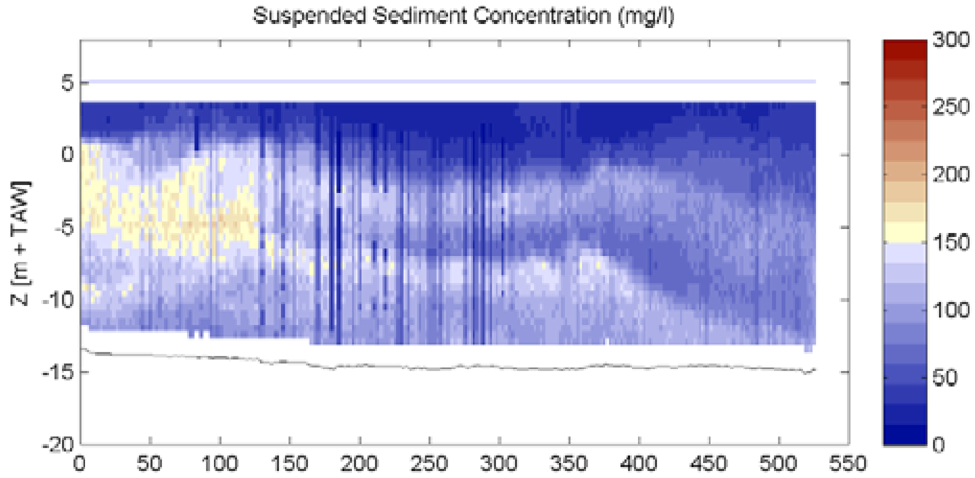
Date / Time [MET] :
12-Mar-2009
17:54 - 17:57

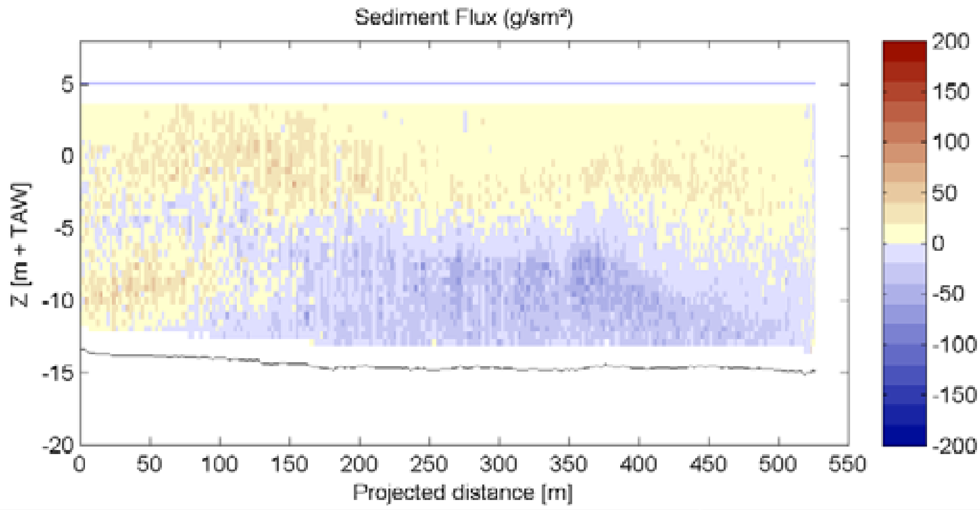
Time after HW [HH:MM]
1:35

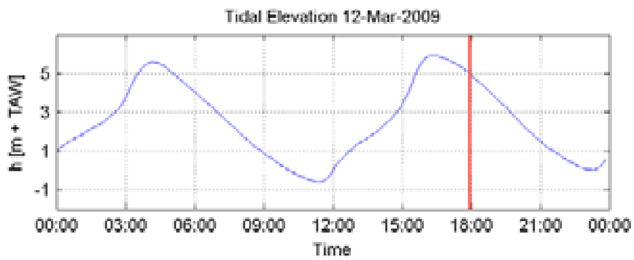
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5099DGDtlr.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

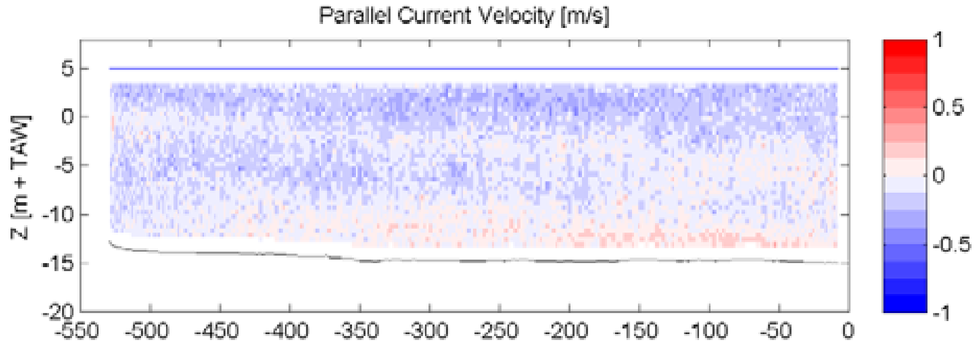
Date / Time [MET] :
12-Mar-2009
17:54 - 17:57

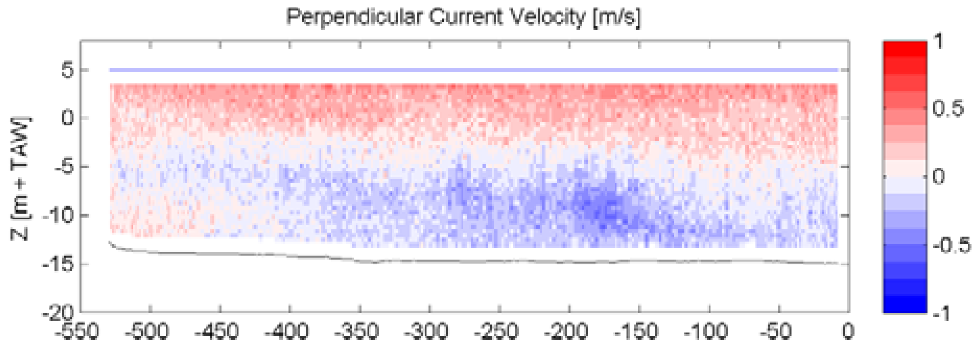
Time after HW [HH:MM]
1:35

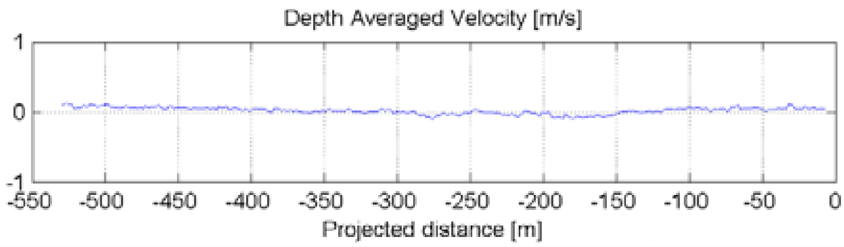
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

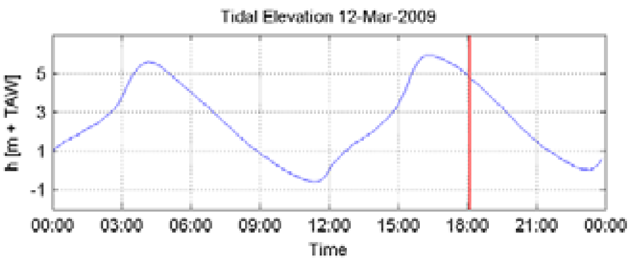
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5101DGDtrl_sub.csv	Location: Deurganckdok









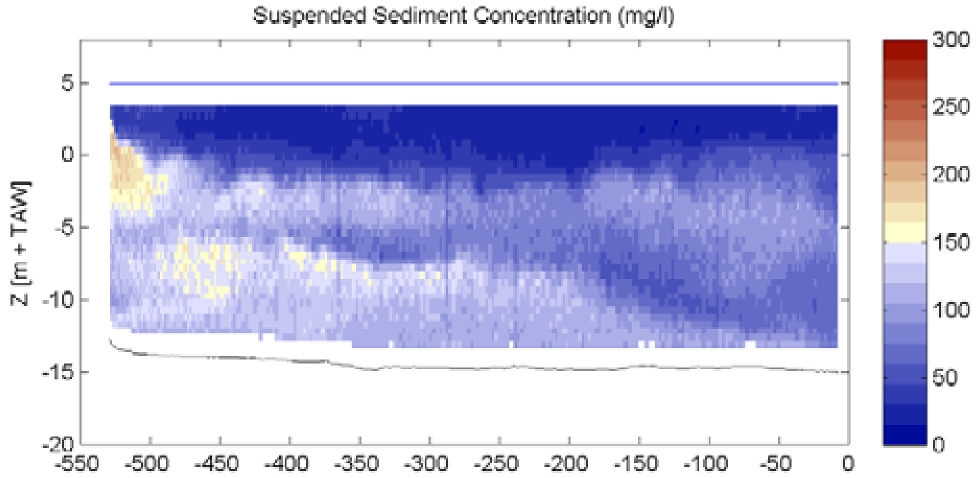
HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

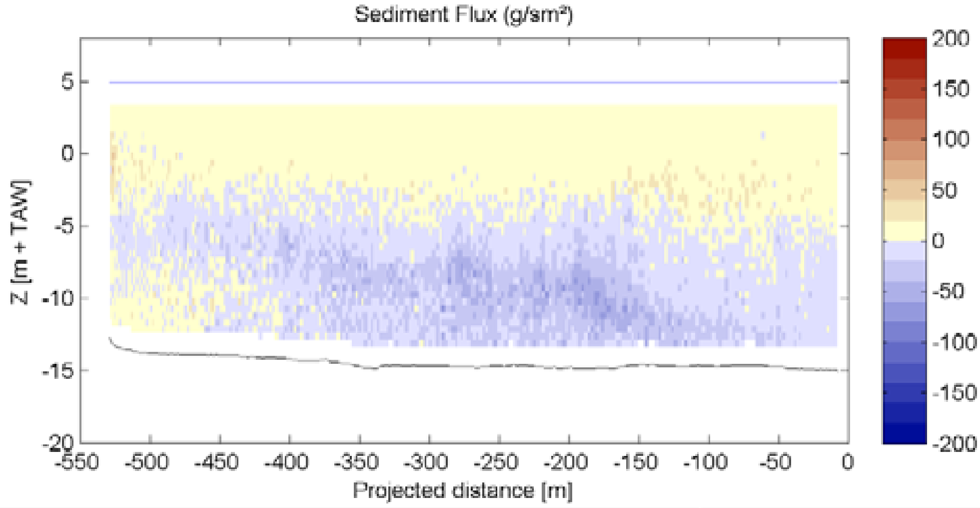
Date / Time [MET] :
12-Mar-2009
18:04 - 18:07

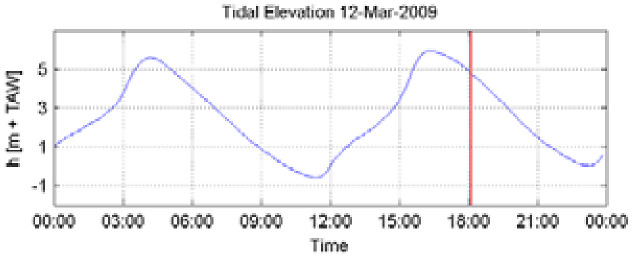
Time after HW [HH:MM]
1:46

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD	
11283	Equipment(s): ADCP
Sourcefile: 5101DGDtrl_sub.csv	Location: Deurganckdok







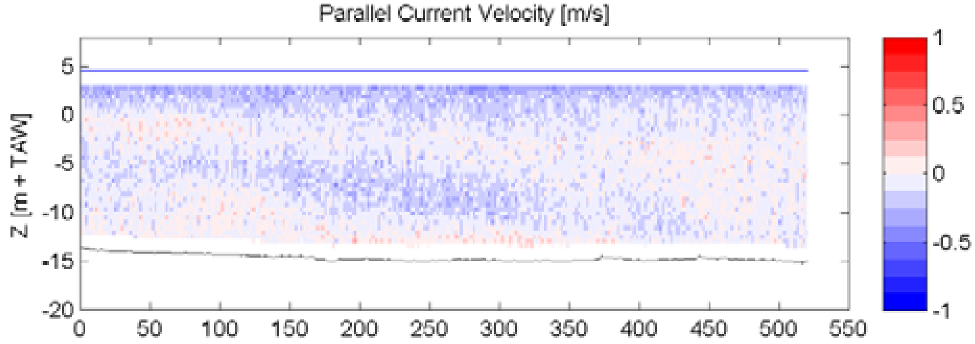
HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

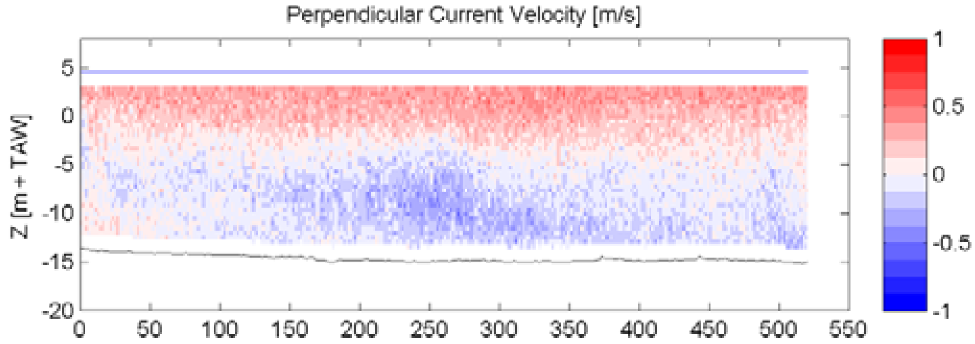
Date / Time [MET] :
12-Mar-2009
18:04 - 18:07

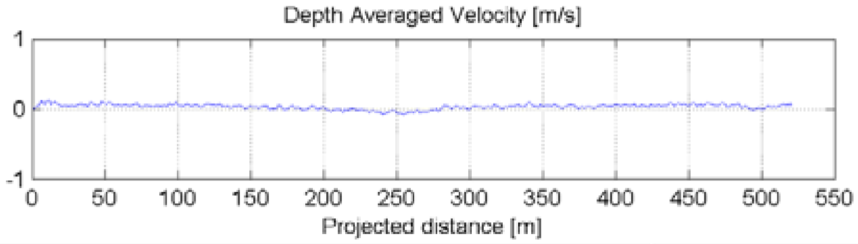
Time after HW [HH:MM]
1:46

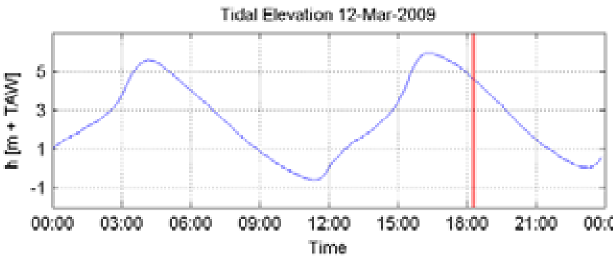
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD	
11283	Equipment(s): ADCP
Sourcefile: 5103DGDtlr_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

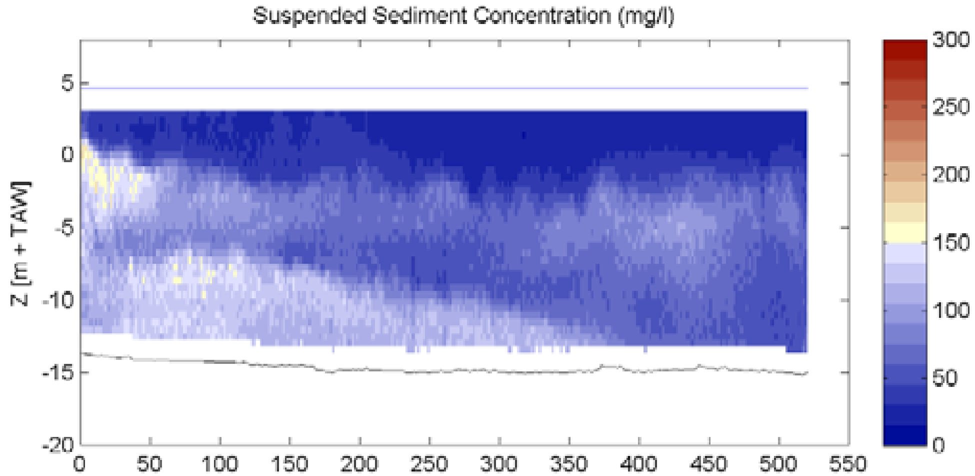
Date / Time [MET] :
12-Mar-2009
18:15 - 18:19

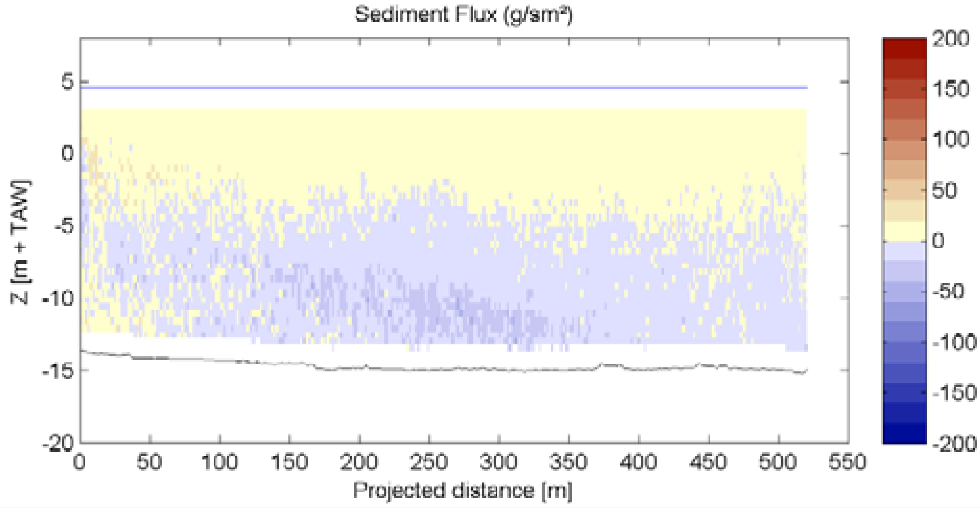
Time after HW [HH:MM]
1:57

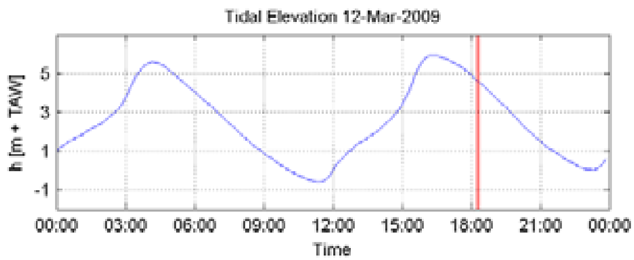
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5103DGDtlr_sub.csv	Location: Deurganckdok







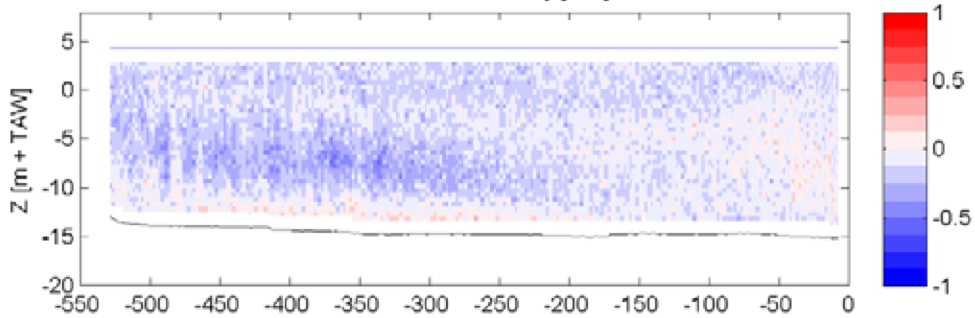
HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

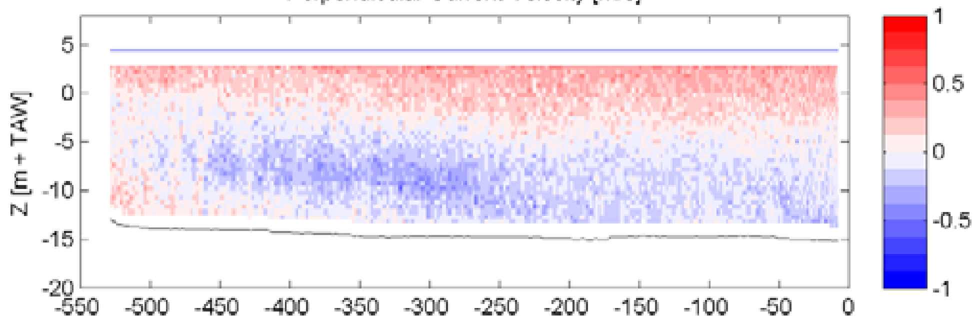
Date / Time [MET] :
12-Mar-2009
18:15 - 18:19

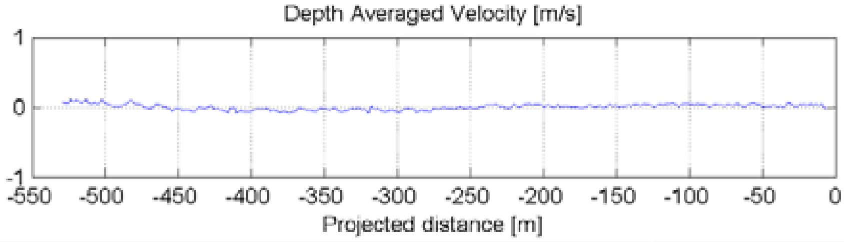
Time after HW [HH:MM]
1:57

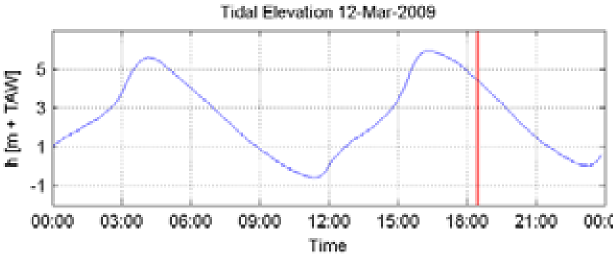
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD	
11283	Equipment(s): ADCP
Sourcefile: 5105DGDtrl_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

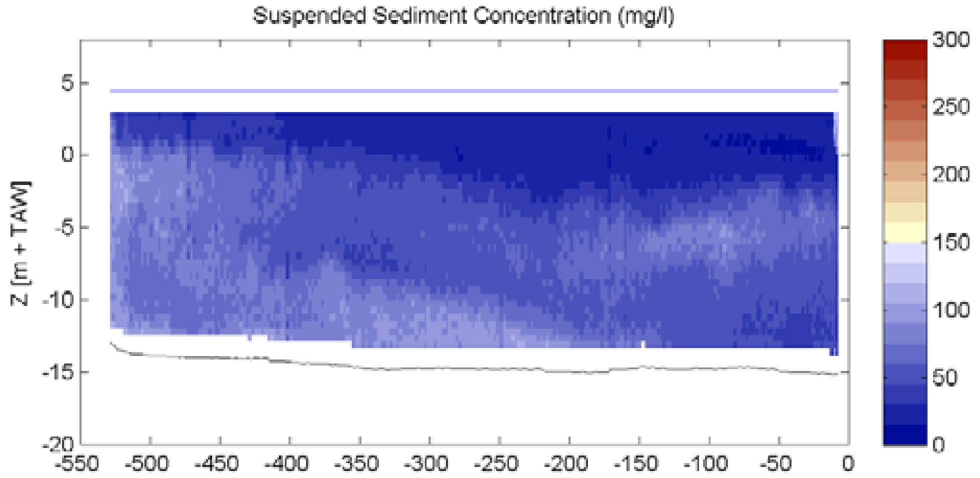
Date / Time [MET] :
12-Mar-2009
18:26 - 18:29

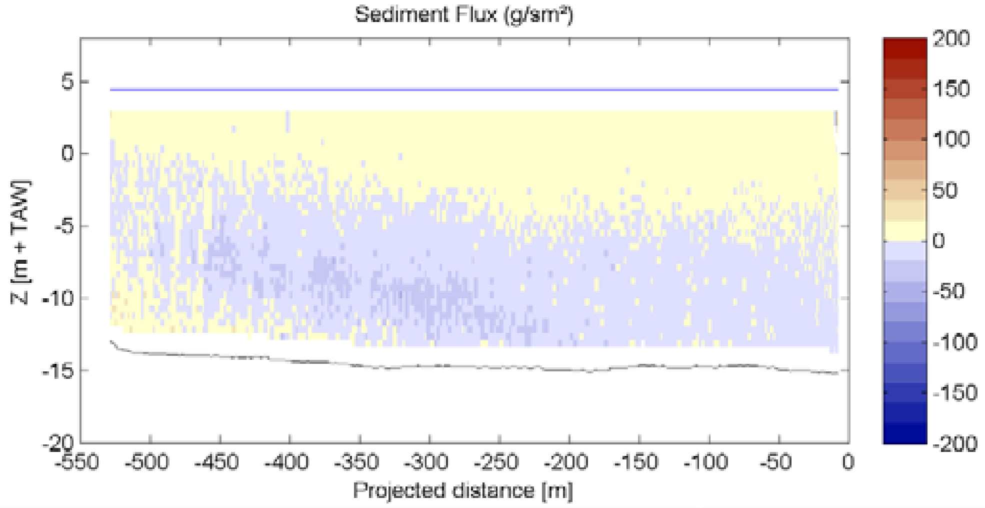
Time after HW [HH:MM]
2:07

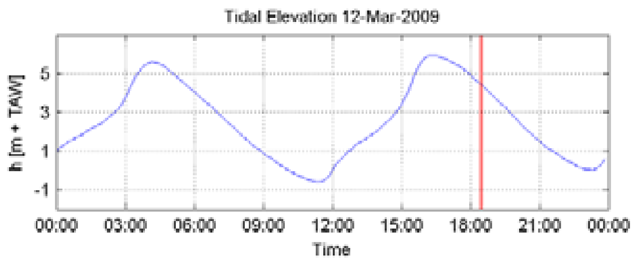
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5105DGDtrl_sub.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

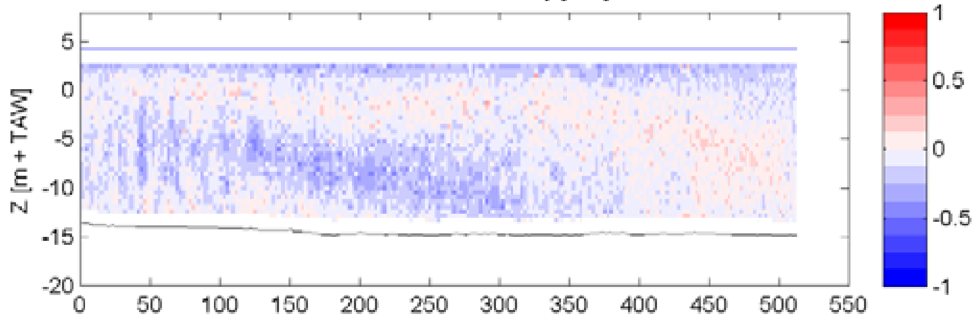
Date / Time [MET] :
12-Mar-2009
18:26 - 18:29

Time after HW [HH:MM]
2:07

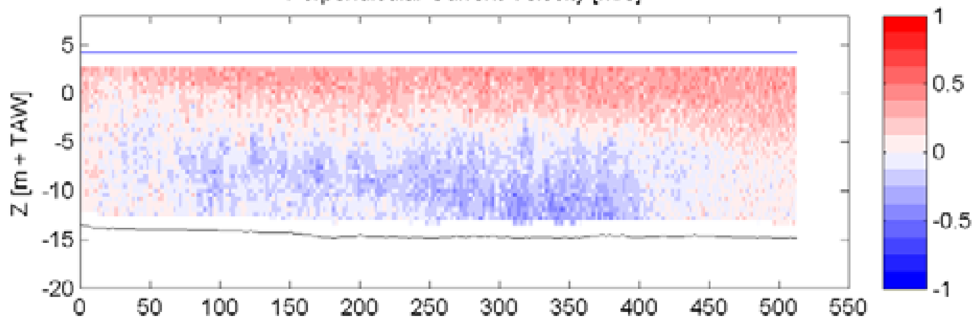
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD	
11283	Equipment(s): ADCP
Sourcefile: 5107DGDtlr.csv	Location: Deurganckdok

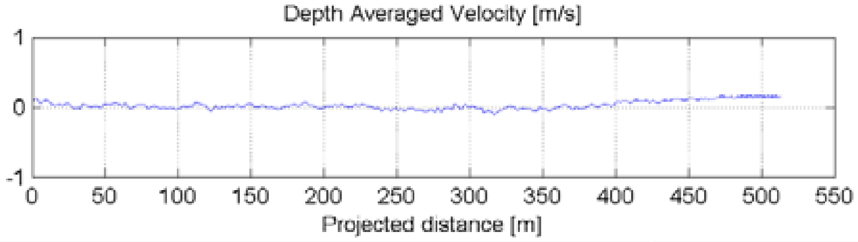
Parallel Current Velocity [m/s]



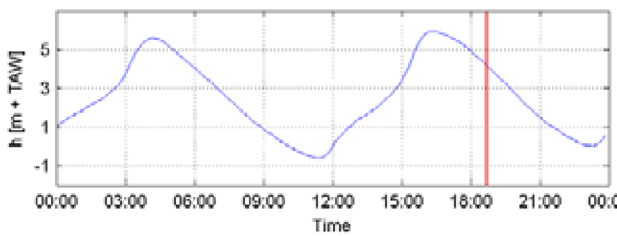
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 12-Mar-2009



HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

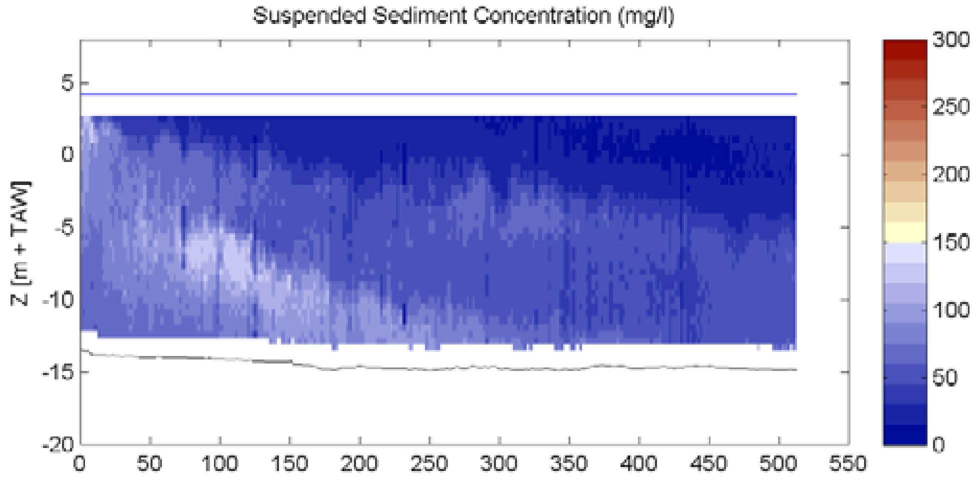
Date / Time [MET] :
12-Mar-2009
18:39 - 18:42

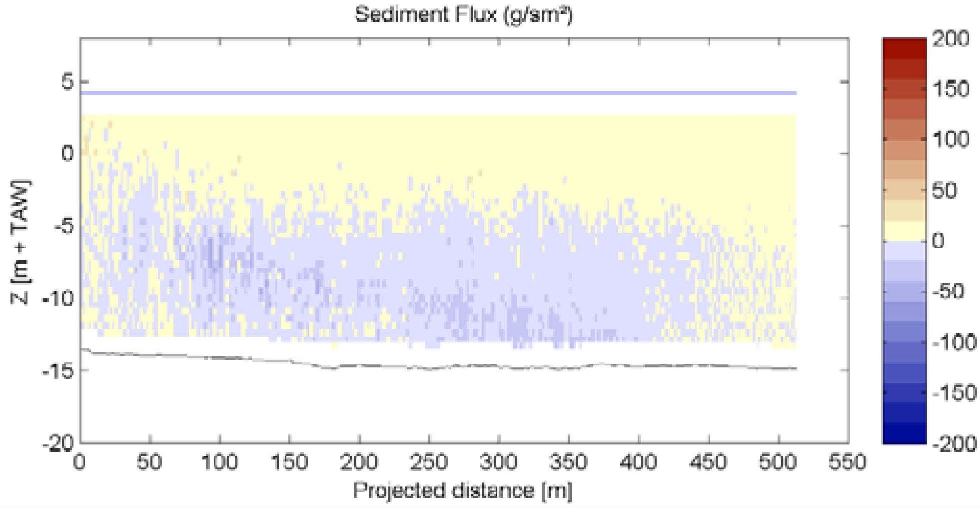
Time after HW [HH:MM]
2:21

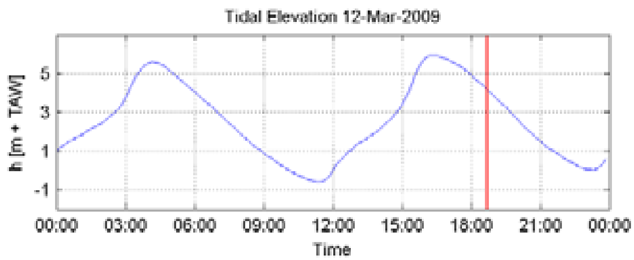
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5107DGDtlr.csv	Location: Deurganckdok







HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

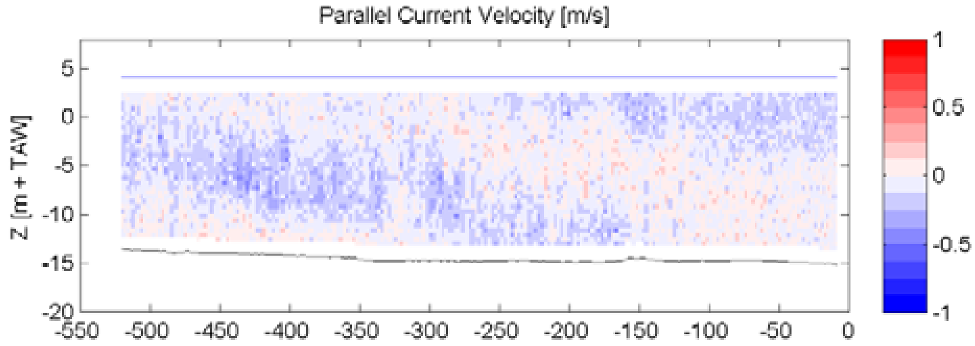
Date / Time [MET] :
12-Mar-2009
18:39 - 18:42

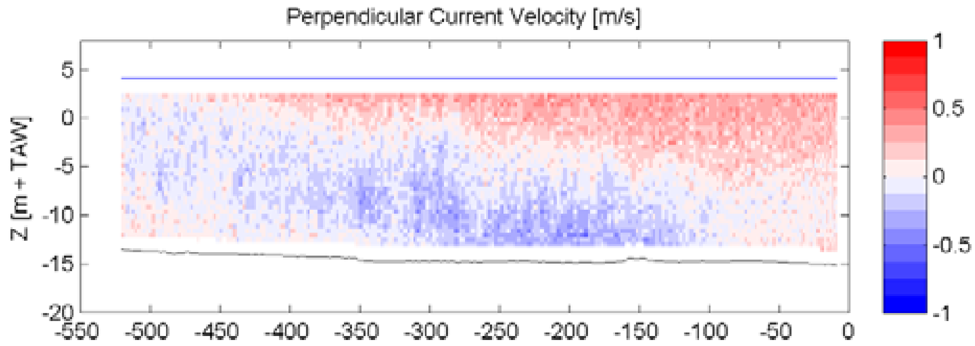
Time after HW [HH:MM]
2:21

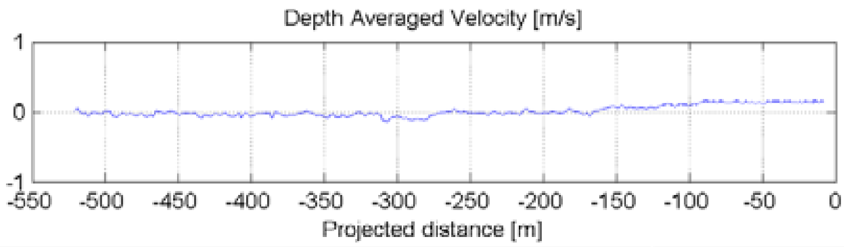
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

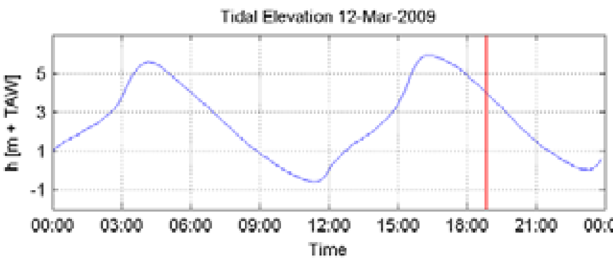
Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5109DGDtrl_sub.csv	Location: Deurganckdok









HW/LW: 04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

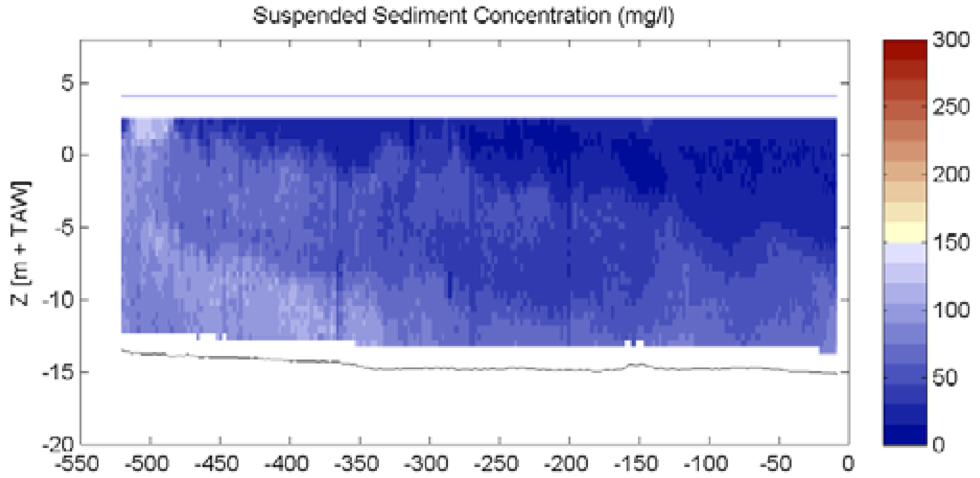
Date / Time [MET] :
12-Mar-2009
18:49 - 18:52

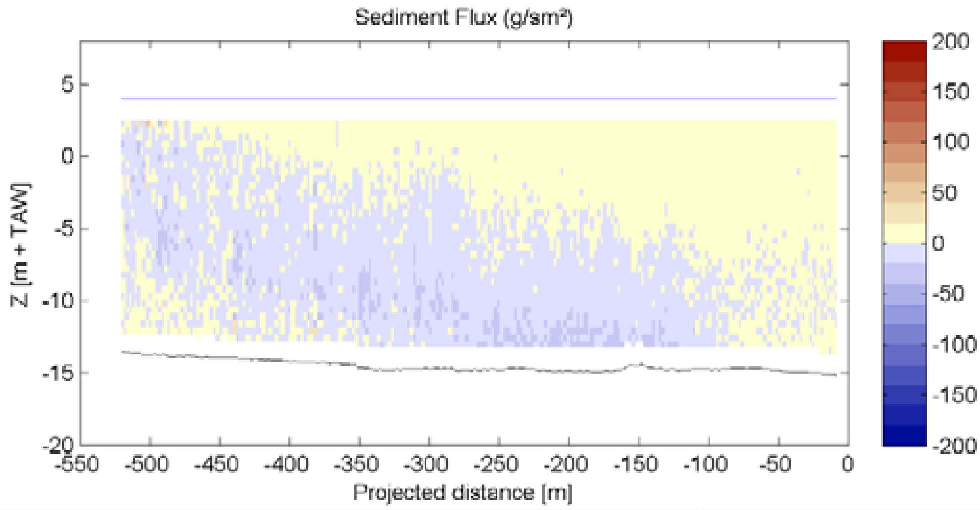
Time after HW [HH:MM]
2:31

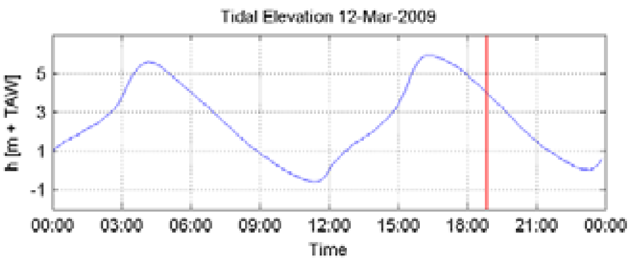
Data Processed by:
In association with :
I/RA/11283/08.088/MSA

Opvolging aanslibbing DGD

11283	Equipment(s): ADCP
Sourcefile: 5109DGDtrl_sub.csv	Location: Deurganckdok







HW/LW:
04:10: h = 5.59 m+TAW
11:30: h = -0.62 m+TAW
16:20: h = 5.94 m+TAW

Date / Time [MET] :
12-Mar-2009
18:49 - 18:52

Time after HW [HH:MM]
2:31

Data Processed by:
In association with :
I/RA/11283/08.088/MSA

APPENDIX G. DISCHARGE, SEDIMENT FLUX AND AVERAGE SEDIMENT CONCENTRATION FOR THE TOTAL CROSS-SECTION

Discharge distribution over the cross section: positive is from dock to river

Filename	*Time after HW [hh:mm]*	*Time [hh:mm]*	*Qmid [m3/s]*	*Qtop [m3/s]*	*Qbot [m3/s]*	*Qleft [m3/s]*	*Qright [m3/s]*	*Qtot [m3/s]*	*QVolBal [m3/s]*
5001DGDtrl_sub.csv	3:34	7:44	238	129	-34	-16	15	333	323
5003DGDtlr_sub.csv	3:44	7:54	278	136	-30	-1	11	372	307
5005DGDtrl_sub.csv	3:53	8:03	155	118	26	-1	21	339	306
5007DGDtlr_sub.csv	4:05	8:15	262	122	-14	-11	2	329	289
5009DGDtrl_sub.csv	4:15	8:25	111	103	-2	0	-1	254	304
5011DGDtlr_sub.csv	4:26	8:36	220	105	-1	-10	10	284	266
5013DGDtrl_sub.csv	4:36	8:46	99	65	17	0	19	242	230
5015DGDtlr_sub.csv	4:47	8:57	245	77	13	-13	5	287	285
5017DGDtrl_sub.csv	5:01	9:11	147	61	14	-13	8	241	205
5019DGDtlr_sub.csv	5:21	9:31	187	48	18	0	-3	222	272
5021DGDtrl_sub.csv	5:31	9:41	57	16	28	0	10	175	216
5023DGDtlr_sub.csv	5:42	9:52	260	41	42	5	6	278	187
5025DGDtrl_sub.csv	5:57	10:07	86	7	34	-1	12	193	204
5027DGDtlr_sub.csv	6:09	10:19	177	28	46	-2	5	199	188
5029DGDtrl_sub.csv	6:19	10:29	1	-10	49	-1	3	106	163
5031DGDtlr_sub.csv	6:30	10:40	168	12	64	-30	6	133	153
5033DGDtrl_sub.csv	6:56	11:06	-105	-110	75	-4	21	-10	112
5035DGDtlr_sub.csv	7:12	11:22	193	-13	31	-7	7	44	35
5037DGDtrl_sub.csv	-4:45	11:34	-347	-140	50	-44	20	-336	-228
5039DGDtlr_sub.csv	-4:35	11:44	-252	-139	62	-77	21	-432	-334
5041DGDtrl_sub.csv	-4:24	11:55	-442	-164	50	-38	3	-560	-509
5043DGDtlr_sub.csv	-4:13	12:06	-446	-157	56	-63	-2	-552	-493
5045DGDtrl_sub.csv	-4:04	12:15	-293	-110	133	-10	4	-347	-370
5047DGDtlr_sub.csv	-3:53	12:26	-377	-115	130	7	-12	-360	-342

Filename	***Time after HW [hh:mm]***	***Time [hh:mm]***	***Qmid [m3/s]***	***Qtop [m3/s]***	***Qbot [m3/s]***	***Qleft [m3/s]***	***Qright [m3/s]***	***Qtot [m3/s]***	***QVolBal [m3/s]***
5049DGDtrl_sub.csv	-3:43	12:36	-397	-154	150	10	-28	-391	-338
5051DGDtlr_sub.csv	-3:27	12:52	-368	-68	132	3	-2	-346	-304
5053DGDtrl_sub.csv	-3:16	13:03	-418	-63	90	6	-64	-393	-219
5055DGDlr_sub.csv	-3:04	13:15	-274	-26	61	26	-48	-317	-221
5057DGDtrl_sub.csv	-2:54	13:25	-334	-39	58	-3	-93	-334	-238
5059DGDtlr_sub.csv	-2:42	13:37	-144	-25	73	8	-13	-196	-241
5061DGDtrl_sub.csv	-2:32	13:47	-403	-32	69	7	-6	-313	-260
5063DGDtlr_sub.csv	-2:20	13:59	-355	3	34	4	-6	-340	-264
5065DGDtrl_sub.csv	-2:09	14:10	-354	-29	49	1	-60	-378	-292
5067DGDtlr_sub.csv	-1:51	14:28	-401	-39	30	46	-11	-394	-338
5069DGDtrl_sub.csv	-1:38	14:41	-429	-31	4	-2	-11	-474	-401
5071DGDtlr_sub.csv	-1:23	14:56	-524	-2	-61	0	-6	-618	-521
5073DGDtrl_sub.csv	-1:12	15:07	-716	-28	-80	6	-50	-863	-612
5075DGDtlr.csv	-1:01	15:18	-851	-39	-51	0	-168	-1004	-797
5077DGDtrl_sub.csv	-0:44	15:35	-344	-51	-67	35	-290	-722	-814
5079DGDtlr_sub.csv	-0:32	15:47	-189	-6	-44	1	-115	-419	-537
5081DGDtrl_sub.csv	-0:17	16:02	-260	53	-139	26	-59	-322	-234
5083DGDtlr.csv	0:04	16:24	-113	134	-64	47	-72	-108	46
5085DGDtrl_sub.csv	0:14	16:34	-60	171	-82	15	-45	5	34
5087DGDtlr_sub.csv	0:27	16:47	40	182	-83	4	-40	112	140
5089DGDtrl_sub.csv	0:41	17:01	247	217	-97	2	-110	239	175
5091DGDtlr_sub.csv	0:52	17:12	169	240	-126	3	-1	269	147
5093DGDtrl_sub.csv	1:03	17:23	68	202	-65	6	2	251	193
5095DGDtlr_sub.csv	1:12	17:32	261	230	-133	3	11	366	228
5097DGDtrl_sub.csv	1:26	17:46	360	231	-128	13	20	482	276
5099DGDtlr.csv	1:35	17:55	426	241	-140	1	0	480	304

Filename	*Time after HW [hh:mm]*	*Time [hh:mm]*	*Qmid [m3/s]*	*Qtop [m3/s]*	*Qbot [m3/s]*	*Qleft [m3/s]*	*Qright [m3/s]*	*Qtot [m3/s]*	*QVolBal [m3/s]*
5101DGDtrl_sub.csv	1:46	18:06	157	215	-107	1	5	339	292
5103DGDtlr_sub.csv	1:57	18:17	278	242	-99	0	1	358	307
5105DGDtrl_sub.csv	2:07	18:27	28	193	-37	3	0	262	274
5107DGDtlr.csv	2:21	18:41	248	208	-83	3	24	336	323
5109DGDtrl_sub.csv	2:31	18:51	97	165	-62	0	24	225	312

Sediment flux distribution over the cross section: positive is from dock to river

Filename	Time to HW [hh:mm]	Time [hh:mm]	Fmid [kg/s]	Ftop [kg/s]	Fbot [kg/s]	Fleft [kg/s]	Fright [kg/s]	Ftot [kg/s]
5001DGDtrl_sub.csv	3:34	7:44	-6.6	2.9	-4.2	-1.5	0.3	-9.2
5003DGDtlr_sub.csv	3:44	7:54	-7.0	3.2	-3.8	-0.1	0.3	-7.3
5005DGDtrl_sub.csv	3:53	8:03	-6.8	2.5	-0.6	0.0	0.4	-4.7
5007DGDtlr_sub.csv	4:05	8:15	-1.9	3.1	-1.7	-1.9	0.0	-2.9
5009DGDtrl_sub.csv	4:15	8:25	-4.4	2.5	-1.5	0.0	-0.1	-2.2
5011DGDtlr_sub.csv	4:26	8:36	1.0	2.9	-0.1	-0.8	0.2	1.1
5013DGDtrl_sub.csv	4:36	8:46	-3.6	0.6	0.6	0.0	0.2	-0.9
5015DGDtlr_sub.csv	4:47	8:57	-0.5	0.9	0.7	-1.1	0.1	-1.5
5017DGDtrl_sub.csv	5:01	9:11	-5.7	0.8	-1.4	-1.0	0.1	-4.2
5019DGDtlr_sub.csv	5:21	9:31	2.1	0.6	1.0	0.0	-0.1	0.1
5021DGDtrl_sub.csv	5:31	9:41	-4.6	-3.5	1.6	0.0	0.1	-2.8
5023DGDtlr_sub.csv	5:42	9:52	3.2	-0.3	2.1	0.3	0.1	-0.1
5025DGDtrl_sub.csv	5:57	10:07	-11.5	-4.7	0.6	-0.1	0.2	-10.7
5027DGDtlr_sub.csv	6:09	10:19	-5.8	-1.7	1.0	-0.2	-0.6	-11.4
5029DGDtrl_sub.csv	6:19	10:29	-17.7	-6.9	1.1	-0.1	0.0	-19.4
5031DGDtlr_sub.csv	6:30	10:40	-7.8	-3.2	0.8	-4.5	0.0	-22.6
5033DGDtrl_sub.csv	6:56	11:06	-33.8	-21.1	1.6	-0.3	0.2	-37.7
5035DGDtlr_sub.csv	7:12	11:22	6.0	-2.1	-1.2	-0.6	-0.1	-27.7
5037DGDtrl_sub.csv	-4:45	11:34	-77.7	-41.1	3.0	-5.1	0.4	-99.5
5039DGDtlr_sub.csv	-4:35	11:44	-69.5	-41.1	3.7	-10.5	0.4	-119.9
5041DGDtrl_sub.csv	-4:24	11:55	-83.5	-45.5	3.3	-5.0	-0.6	-127.4
5043DGDtlr_sub.csv	-4:13	12:06	-83.7	-29.2	1.6	-9.1	-1.8	-119.3
5045DGDtrl_sub.csv	-4:04	12:15	-76.5	-21.8	7.9	-4.1	-1.3	-99.1
5047DGDtlr_sub.csv	-3:53	12:26	-69.6	-21.3	5.5	-2.1	-1.7	-93.7
5049DGDtrl_sub.csv	-3:43	12:36	-78.7	-33.2	6.1	0.5	-4.2	-102.3
5051DGDtlr_sub.csv	-3:27	12:52	-74.8	-20.8	9.1	0.4	-0.4	-94.6
5053DGDtrl_sub.csv	-3:16	13:03	-82.9	-26.3	5.2	0.1	-8.5	-99.2
5055DGDlr_sub.csv	-3:04	13:15	-51.6	-11.0	5.3	3.5	-5.6	-68.0
5057DGDtrl_sub.csv	-2:54	13:25	-44.2	-9.3	6.1	-0.7	-9.8	-50.4
5059DGDtlr_sub.csv	-2:42	13:37	-13.3	-4.6	7.0	1.0	-1.2	-25.0
5061DGDtrl_sub.csv	-2:32	13:47	-47.2	-5.7	6.5	0.7	-2.5	-41.6
5063DGDtlr_sub.csv	-2:20	13:59	-45.7	-4.7	4.3	0.5	-1.0	-47.5
5065DGDtrl_sub.csv	-2:09	14:10	-39.6	-8.6	3.2	0.1	-5.8	-53.2
5067DGDtlr_sub.csv	-1:51	14:28	-63.6	-14.9	3.4	6.1	-1.0	-67.7
5069DGDtrl_sub.csv	-1:38	14:41	-64.1	-9.1	0.1	-0.5	-2.0	-74.9
5071DGDtlr_sub.csv	-1:23	14:56	-65.3	-4.2	-7.2	0.0	-0.8	-79.0
5073DGDtrl_sub.csv	-1:12	15:07	-68.0	-5.0	-10.7	0.0	-5.4	-89.1
5075DGDtlr.csv	-1:01	15:18	-73.6	-7.3	-4.6	0.0	-15.3	-99.1
5077DGDtrl_sub.csv	-0:44	15:35	-46.8	-20.6	-3.7	2.0	-33.3	-93.8
5079DGDtlr_sub.csv	-0:32	15:47	-31.1	-11.8	4.6	0.1	-13.8	-56.4
5081DGDtrl_sub.csv	-0:17	16:02	-15.9	11.6	-20.8	3.4	-6.1	-18.9
5083DGDtlr.csv	0:04	16:24	10.2	43.4	-4.9	8.7	-7.4	32.4
5085DGDtrl_sub.csv	0:14	16:34	-5.0	38.5	-7.8	2.7	-6.4	34.2

Filename	Time to HW [hh:mm]	Time [hh:mm]	Fmid [kg/s]	Ftop [kg/s]	Fbot [kg/s]	Fleft [kg/s]	Fright [kg/s]	Ftot [kg/s]
5087DGDtlr_sub.csv	0:27	16:47	31.1	47.1	-5.2	0.8	-6.9	54.8
5089DGDtrl_sub.csv	0:41	17:01	39.0	31.4	-10.3	0.4	-22.0	41.5
5091DGDtlr_sub.csv	0:52	17:12	12.5	28.9	-13.5	0.5	-0.9	21.1
5093DGDtrl_sub.csv	1:03	17:23	-26.5	20.3	-14.6	1.1	-2.1	-10.4
5095DGDtlr_sub.csv	1:12	17:32	-4.9	21.8	-19.7	0.4	-0.4	-6.9
5097DGDtrl_sub.csv	1:26	17:46	-0.7	12.6	-21.4	1.5	-0.1	-6.8
5099DGDtlr.csv	1:35	17:55	2.3	9.5	-17.3	0.1	0.0	-10.6
5101DGDtrl_sub.csv	1:46	18:06	-26.9	6.7	-14.0	0.1	-0.2	-26.5
5103DGDtlr_sub.csv	1:57	18:17	-12.4	7.9	-11.6	0.0	0.0	-19.3
5105DGDtrl_sub.csv	2:07	18:27	-18.0	5.6	-4.9	0.2	0.3	-15.9
5107DGDtlr.csv	2:21	18:41	-11.6	6.1	-7.7	0.3	0.6	-13.7
5109DGDtrl_sub.csv	2:31	18:51	-15.3	4.2	-6.0	0.0	0.8	-16.2

Sediment concentration distribution over the cross section

Transect name	***Time [hh:mm MET]***	***Time after HW [hh:mm]***	***Average measured SS Concentration [mg/l]***	***Average measured incoming SS Concentration [mg/l]***	***Average measured outgoing SS Concentration [mg/l]***
5001DGDtrl_sub.csv	7:44	3:34	52	98	31
5003DGDtlr_sub.csv	7:54	3:44	47	92	28
5005DGDtrl_sub.csv	8:03	3:53	43	78	27
5007DGDtlr_sub.csv	8:15	4:05	44	81	29
5009DGDtrl_sub.csv	8:25	4:15	41	67	28
5011DGDtlr_sub.csv	8:36	4:26	34	54	25
5013DGDtrl_sub.csv	8:46	4:36	34	55	24
5015DGDtlr_sub.csv	8:57	4:47	41	72	28
5017DGDtrl_sub.csv	9:11	5:01	49	85	32
5019DGDtlr_sub.csv	9:31	5:21	50	80	37
5021DGDtrl_sub.csv	9:41	5:31	53	84	36
5023DGDtlr_sub.csv	9:52	5:42	45	83	31
5025DGDtrl_sub.csv	10:07	5:57	51	91	28
5027DGDtlr_sub.csv	10:19	6:09	55	102	29
5029DGDtrl_sub.csv	10:29	6:19	59	106	24
5031DGDtlr_sub.csv	10:40	6:30	57	108	22
5033DGDtrl_sub.csv	11:06	6:56	78	116	39
5035DGDtlr_sub.csv	11:22	7:12	106	142	74
5037DGDtrl_sub.csv	11:34	-4:45	135	172	64
5039DGDtlr_sub.csv	11:44	-4:35	139	175	62
5041DGDtrl_sub.csv	11:55	-4:24	142	169	69
5043DGDtlr_sub.csv	12:06	-4:13	136	161	71
5045DGDtrl_sub.csv	12:15	-4:04	125	160	62
5047DGDtlr_sub.csv	12:26	-3:53	110	142	52
5049DGDtrl_sub.csv	12:36	-3:43	116	146	62
5051DGDtlr_sub.csv	12:52	-3:27	137	163	96
5053DGDtrl_sub.csv	13:03	-3:16	143	167	101
5055DGDlr_sub.csv	13:15	-3:04	132	148	105
5057DGDtrl_sub.csv	13:25	-2:54	118	125	106
5059DGDtlr_sub.csv	13:37	-2:42	101	105	96
5061DGDtrl_sub.csv	13:47	-2:32	110	114	102
5063DGDtlr_sub.csv	13:59	-2:20	126	128	121
5065DGDtrl_sub.csv	14:10	-2:09	126	129	121
5067DGDtlr_sub.csv	14:28	-1:51	129	138	113
5069DGDtrl_sub.csv	14:41	-1:38	130	138	113
5071DGDtlr_sub.csv	14:56	-1:23	116	120	103
5073DGDtrl_sub.csv	15:07	-1:12	100	101	94
5075DGDtlr.csv	15:18	-1:01	99	99	100
5077DGDtrl_sub.csv	15:35	-0:44	108	113	99
5079DGDtlr_sub.csv	15:47	-0:32	117	119	114
5081DGDtrl_sub.csv	16:02	-0:17	139	131	150
5083DGDtlr.csv	16:24	0:04	157	137	178

Transect name	***Time [hh:mm MET]***	***Time after HW [hh:mm]***	***Average measured SS Concentration [mg/l]***	***Average measured incoming SS Concentration [mg/l]***	***Average measured outgoing SS Concentration [mg/l]***
5085DGDtrl_sub.csv	16:34	0:14	162	148	176
5087DGDtlr_sub.csv	16:47	0:27	166	149	182
5089DGDtrl_sub.csv	17:01	0:41	147	144	149
5091DGDtlr_sub.csv	17:12	0:52	127	133	122
5093DGDtrl_sub.csv	17:23	1:03	120	140	104
5095DGDtlr_sub.csv	17:32	1:12	116	142	98
5097DGDtrl_sub.csv	17:46	1:26	96	125	77
5099DGDtlr.csv	17:55	1:35	80	109	61
5101DGDtrl_sub.csv	18:06	1:46	70	103	47
5103DGDtlr_sub.csv	18:17	1:57	59	88	40
5105DGDtrl_sub.csv	18:27	2:07	49	71	34
5107DGDtlr.csv	18:41	2:21	45	68	31
5109DGDtrl_sub.csv	18:51	2:31	44	65	28

	Concentration [mg/l]								
	overall SSC			***incoming SSC***			***outgoing SSC***		
Tide	***min***	***average***	***max***	***min***	***average***	***max***	***min***	***average***	***max***
Eb	34	74	166	54	101	149	22	59	182
Flood	99	123	143	99	138	175	52	95	150

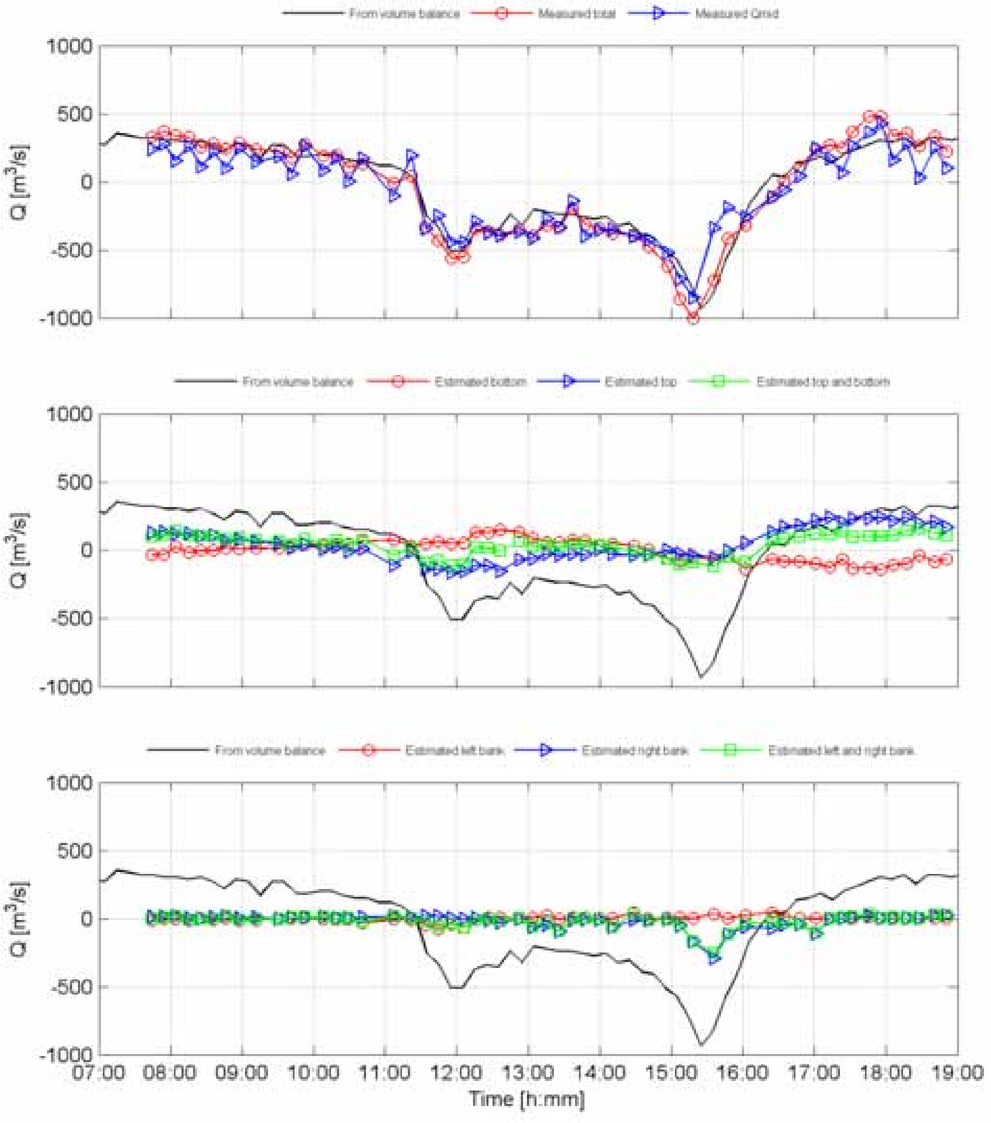
APPENDIX H.

TEMPORAL VARIATION OF TOTAL FLUX, TOTAL DISCHARGE AND SUSPENDED SEDIMENT CONCENTRATION

Total discharge through the measured cross section, positive is from dock to river

11283: Opvolging aanslibbing DGD

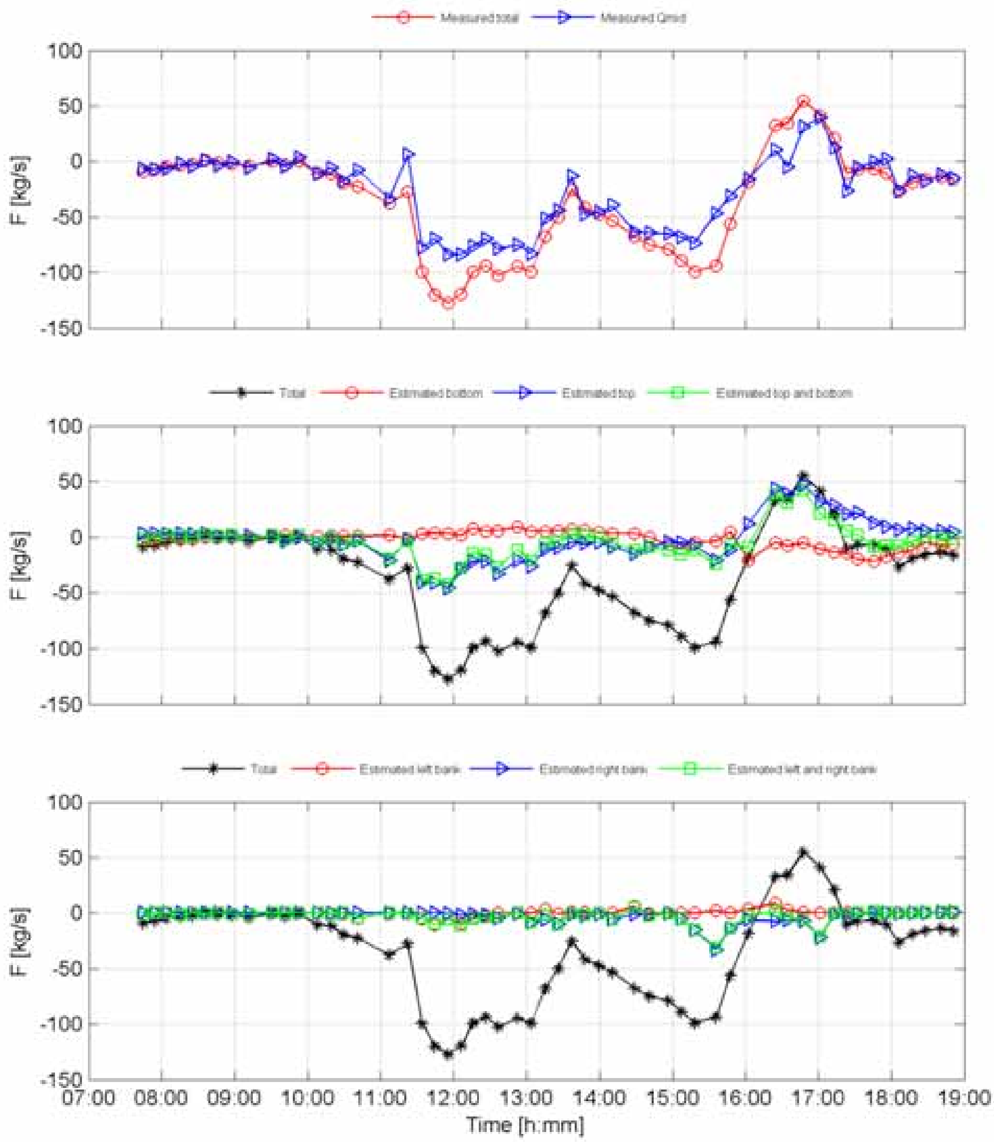
	Equipment(s): ADCP
Sourcefile(s): 5003DGDtlr_sub.csv 5109DGDtrl_sub.csv	Location: Deurganckdok



Date : 12-Mar-2009	Data Processed by: IMDC In association with : WL | delft hydraulics

Total flux through the measured cross section, positive is from dock to river

11283: Opvolging aanslibbing DGD	
	Equipment(s): ADCP
Sourcefile(s): 5003DGDtlr_sub.csv 5109DGDtrl_sub.csv	Location: Deurganckdok

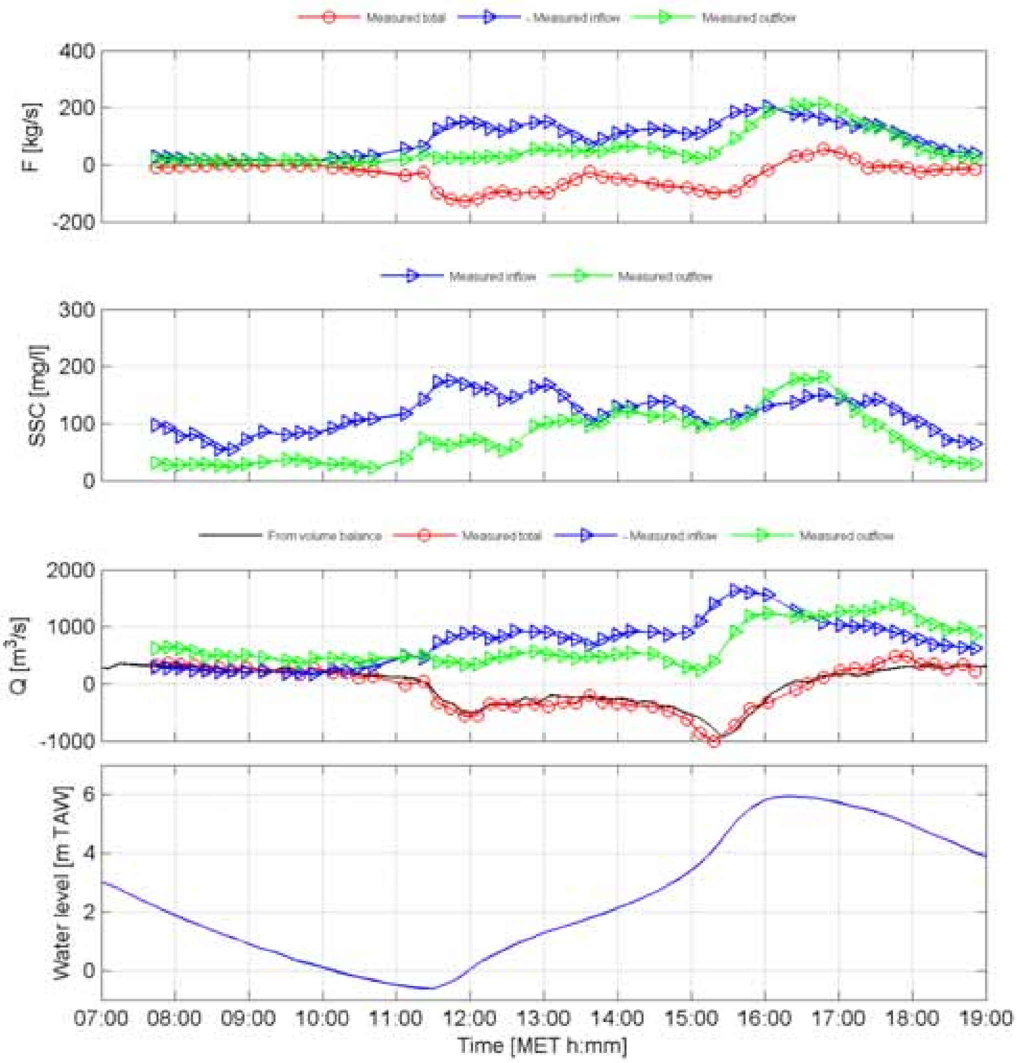


Date : 12-Mar-2009	Data Processed by: In association with :

Suspended sediment concentration through the measured cross section

11283: Opvolging aanslibbing DGD

	Equipment(s): ADCP
Sourcefile(s): 5003DGDtlr_sub.csv 5109DGDtrl_sub.csv	Location: Deurganckdok



Date : 12-Mar-2009	Data Processed by: In association with :

APPENDIX I.

OVERVIEW OF HCBS2 AND AANSLIBBING DEURGANCKDOK REPORTS

Report	Description of HCBS2
Ambient Conditions Lower Sea Scheldt	
5.3	Overview of ambient conditions in the river Scheldt – January-June 2006 (I/RA/11291/06.088/MSA)
5.4	Overview of ambient conditions in the river Scheldt – July-December 2006 (I/RA/11291/06.089/MSA)
5.5	Overview of ambient conditions in the river Scheldt : RCM-9 buoy 84 & 97 (1/1/2007 -31/3/2007) (I/RA/11291/06.090/MSA)
5.6	Analysis of ambient conditions during 2006 (I/RA/11291/06.091/MSA)
Calibration	
6.1	Winter Calibration (I/RA/11291/06.092/MSA)
6.2	Summer Calibration and Final Report (I/RA/11291/06.093/MSA)
Through tide Measurements Winter 2006	
7.1	21/3 Scheldewacht – Deurganckdok – Salinity Distribution (I/RA/11291/06.094/MSA)
7.2	22/3 Parel 2 – Deurganckdok (I/RA/11291/06.095/MSA)
7.3	22/3 Laure Marie – Liefkenshoek (I/RA/11291/06.096/MSA)
7.4	23/3 Parel 2 – Schelle (I/RA/11291/06.097/MSA)
7.5	23/3 Laure Marie – Deurganckdok (I/RA/11291/06.098/MSA)
7.6	23/3 Veremans Waarde (I/RA/11291/06.099/MSA)
HCBS Near bed continuous monitoring (Frames)	
8.1	Near bed continuous monitoring winter 2006 (I/RA/11291/06.100/MSA)
INSSEV	
9	Settling Velocity - INSSEV summer 2006 (I/RA/11291/06.102/MSA)
Cohesive Sediment	
10	Cohesive sediment properties summer 2006 (I/RA/11291/06.103/MSA)
Through tide Measurements Summer 2006	
11.1	Through Tide Measurement Sediview and Siltprofiler 27/9 Stream - Liefkenshoek (I/RA/11291/06.104/MSA)
11.2	Through Tide Measurement Sediview 27/9 Veremans - Raai K (I/RA/11291/06.105/MSA)
11.3	Through Tide Measurement Sediview and Siltprofiler 28/9 Stream - Raai K (I/RA/11291/06.106/MSA)
11.4	Through Tide Measurement Sediview 28/9 Veremans - Waarde(I/RA/11291/06.107/MSA)
11.5	Through Tide Measurements Sediview 28/9 Parel 2 - Schelle (I/RA/11291/06.108/MSA)
11.6	Through Tide measurement 26/9 Scheldewacht – Deurganckdok – Salinity Distribution (I/RA/11291/06.161/MSA)

Analysis	
12	Report concerning the presence of HCBS layers in the Scheldt river (I/RA/11291/06.109/MSA)

Report	**Description of Opvolging aanslibbing Deurganckdok between April 2006 till March 2007**
Sediment Balance: Bathymetry surveys, Density measurements, Maintenance and construction dredging activities	
1.1	Sediment Balance: Three monthly report 1/4/2006 – 30/06/2006 (I/RA/11283/06.113/MSA)
1.2	Sediment Balance: Three monthly report 1/7/2006 – 30/09/2006 (I/RA/11283/06.114/MSA)
1.3	Sediment Balance: Three monthly report 1/10/2006 – 31/12/2006 (I/RA/11283/06.115/MSA)
1.4	Sediment Balance: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/06.116/MSA)
1.5	Annual Sediment Balance (I/RA/11283/06.117/MSA)
1.6	Sediment balance Bathymetry: 2005 – 3/2006 (I/RA/11283/06.118/MSA)
Factors contributing to salt and sediment distribution in Deurganckdok: Salt-Silt (OBS3A) & Frame measurements, Through tide measurements (SiltProfiling & ADCP)	
2.1	Through tide measurement Siltprofiler 21/03/2006 Laure Marie (I/RA/11283/06.087/WGO)
2.2	Through tide measurement Siltprofiler 26/09/2006 Stream (I/RA/11283/06.068/MSA)
2.3	Through tide measurement Sediview spring tide 22/03/2006 Veremans (I/RA/11283/06.110/BDC)
2.4	Through tide measurement Sediview spring tide 27/09/2006 Parel 2 (I/RA/11283/06.119/MSA)
2.5	Through tide measurement Sediview average tide 24/10/2007 Parel 2 (I/RA/11283/06.120/MSA)
2.6	Salt-Silt distribution & Frame Measurements Deurganckdok 13/3/2006 – 31/05/2006 (I/RA/11283/06.121/MSA)
2.7	Salt-Silt distribution & Frame Measurements Deurganckdok 15/07/2006 – 31/10/2006 (I/RA/11283/06.122/MSA)
2.8	Salt-Silt distribution & Frame Measurements Deurganckdok 12/02/2007 – 18/04/2007 (I/RA/11283/06.123/MSA)
2.9	Calibration stationary equipment autumn (I/RA/11283/07.095/MSA)

Report	Description of Opvolging aanslibbing Deurganckdok between April 2006 till March 2007
Boundary Conditions: Upriver Discharge, Salt concentration Scheldt, Bathymetric evolution in access channels, dredging activities in Lower Sea Scheldt and access channels	
3.1	Boundary conditions: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/06.127/MSA) including HCBS 2 report 5.5
~~3.2~~	~~Boundary condtions: Annual report (I/RA/11283/06.128/MSA)~~[1]
Analysis	
4.1	Analysis of Siltation Processes and Factors 4/’06 – 3/’07 (I/RA/11283/06.129/MSA)

Report	Description of Opvolging aanslibbing Deurganckdok between April 2007 till March 2008
Sediment Balance: Bathymetry surveys, Density measurements, Maintenance and construction dredging activities	
1.10	Sediment Balance: Three monthly report 1/4/2007 - 30/06/2007 (I/RA/11283/07.081/MSA)
1.11	Sediment Balance: Three monthly report 1/7/2007 – 30/09/2007 (I/RA/11283/07.082/MSA)
1.12	Sediment Balance: Three monthly report 1/10/2007 – 31/12/2007 (I/RA/11283/07.083/MSA)
1.13	Sediment Balance: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/07.084/MSA)
1.14	Annual Sediment Balance (I/RA/11283/07.085/MSA)
Factors contributing to salt and sediment distribution in Deurganckdok: Salt-Silt (OBS3A) & Frame measurements, Through tide measurements (SiltProfiling & ADCP) & Calibrations	
2.09	Calibration stationary equipment autumn (I/RA/11283/07.095/MSA)
2.10	Through tide measurement Siltprofiler 23 October 2007 (I/RA/11283/07.086/MSA)
2.11	Through tide measurement Salinity Profiling winter (I/RA/11283/07.087/MSA)
2.12	Through tide measurement Sediview winter 11 March 2008 Transect I (I/RA/11283/07.088/MSA)
2.13	Through tide measurement Sediview winter 11 March 2008 Transect K (I/RA/11283/07.089/MSA)
2.14	Through tide measurement Sediview winter 11 March 2008 Transect DGD (I/RA/11283/07.090/MSA)
2.15	Through tide measurement Siltprofiler 12 March 2008 (I/RA/11283/07.091/MSA)
2.16	Salt-Silt distribution Deurganckdok summer (21/6/2007 – 30/07/2007) (I/RA/11283/07.092/MSA)
2.17	Salt-Silt distribution & Frame Measurements Deurganckdok autumn (17/09/2007 - 10/12/2007) (I/RA/11283/07.093/MSA)
2.18	Salt-Silt distribution & Frame Measurements Deurganckdok winter (18/02/2008 - 31/3/2008) (I/RA/11283/07.094/MSA)

[1] considered in report 5.6 ‘Analysis of ambient conditions during 2006’ (I/RA/11291/06.091/MSA) in the framework of the study ‘Extension of the study about density currents in the Beneden Zeeschelde’

Report	Description of Opvolging aanslibbing Deurganckdok between April 2007 till March 2008
2.19	Calibration stationary & mobile equipment winter (I/RA/11283/07.096/MSA)
Boundary Conditions: Upriver Discharge, Salt concentration Scheldt, Bathymetric evolution in access channels, dredging activities in Lower Sea Scheldt and access channels	
3.10	Boundary conditions: Three monthly report 1/4/2007 – 30/06/2007 (I/RA/11283/07.097/MSA)
3.11	Boundary conditions: Three monthly report 1/7/2007 – 30/09/2007 (I/RA/11283/07.098/MSA)
3.12	Boundary conditions: Three monthly report 1/10/2007 – 31/12/2007 (I/RA/11283/07.099/MSA)
3.13	Boundary conditions: Three monthly report 1/1/2008 – 31/03/2008 (I/RA/11283/07.100/MSA)
3.14	Boundary conditions: Annual report (I/RA/11283/07.101/MSA)
Analysis	
4.10	Analysis of Siltation Processes and Factors 4/’07 – 3/’08 (I/RA/11283/07.102/MSA)