VLAAMSE OVERHEID

DEPARTEMENT MOBILITEIT EN OPENBARE WERKEN
WATERBOUWKUNDIG LABORATORIUM

Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing

Bestek 16EB/05/04

Survey Vessel De Parel II (left) & Deurganckdok – East terminal (right)

Deelrapport 2.4 13-uursmeting Sediview gemiddeld tij 27/09/2006 Parel II

Report 2.4 Through Tide Measurement Sediview Average Tide 27/09/2006 Parel II

February 5th 2007

I/RA/11283/06.119/MSA

IMDC i.s.m. wl | delft hydraulics en GEMS International

International Marine and Dredging Consultants (IMDC)
Wilrijkstraat 37-45 Bus 4 - 2140 Antwerpen – België
tel: +32.3.270.92.95 - fax: +32.3.235.67.11
E-mail : info@imdc.be

Document Control Sheet

Document Identification

Title:	Deelrapport 2.4
Project:	Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing
Client	Waterbouwkundig Laboratorium
File reference:	I/RA/11283/06.119/MSA
File name	K:\PROJECTS\11\11283 - Opvolging aanslibbing dgd\10-Rap\RA06119_2709_ParelII_PIB\RA06119_2709_ParelII_PIB_v20.doc

Revisions

Version	Date	Author	Description
2.0	07/02/07	JCA	Final report
1.0	20/12/06	PIB	Concept

Distribution List

Name	# ex.	Company/authorities	Position in reference to the project
Joris Vanlede	15	Waterbouwkundig Laboratorium	

Approval

Version	Date	Author	Project manager	Commissioner
2.0	07/02/07	JCA	MBO	MSA
1.0	20/12/06	PIB	MBO	MSA

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

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)'[1].

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.

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 one year
- 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 focusses 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

[1] Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies

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 Scheldt river.

1.3. Overview of the study

1.3.1. Reports

Reports of the project 'Opvolging aanslibbing Deurganckdok' are summarized in Table 1-1.

Reports of the measurement campaign HCBS2 for which the summer campaign has been carried out simultaniously with measurements in this report are listed in APPENDIX I.

Table 1-1: Overview of Deurganckdok Reports

Report	Description
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 average tide 27/09/2006 Parel 2 (I/RA/11283/06.119/MSA)
2.5	Through tide measurement Sediview neap tide (to be scheduled) (I/RA/11283/06.120/MSA)
2.6	Salt-Silt distribution & Frame Measurements Deurganckdok 13/3/2006 – 31/05/2006

Report	Description
	(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 15/01/2007 – 15/03/2007 (I/RA/11283/06.123/MSA)
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)
3.2	Boundary condtions: Annual report (I/RA/11283/06.128/MSA)
Analysis	
4	Analysis of Siltation Processes and Factors (I/RA/11283/06.129/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)

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, Zanvliet 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.

1.4. Structure of the report

This report is the factual data report of the through tide measurements at Deurganckdok on the 27^{th} of September, 2006. 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).

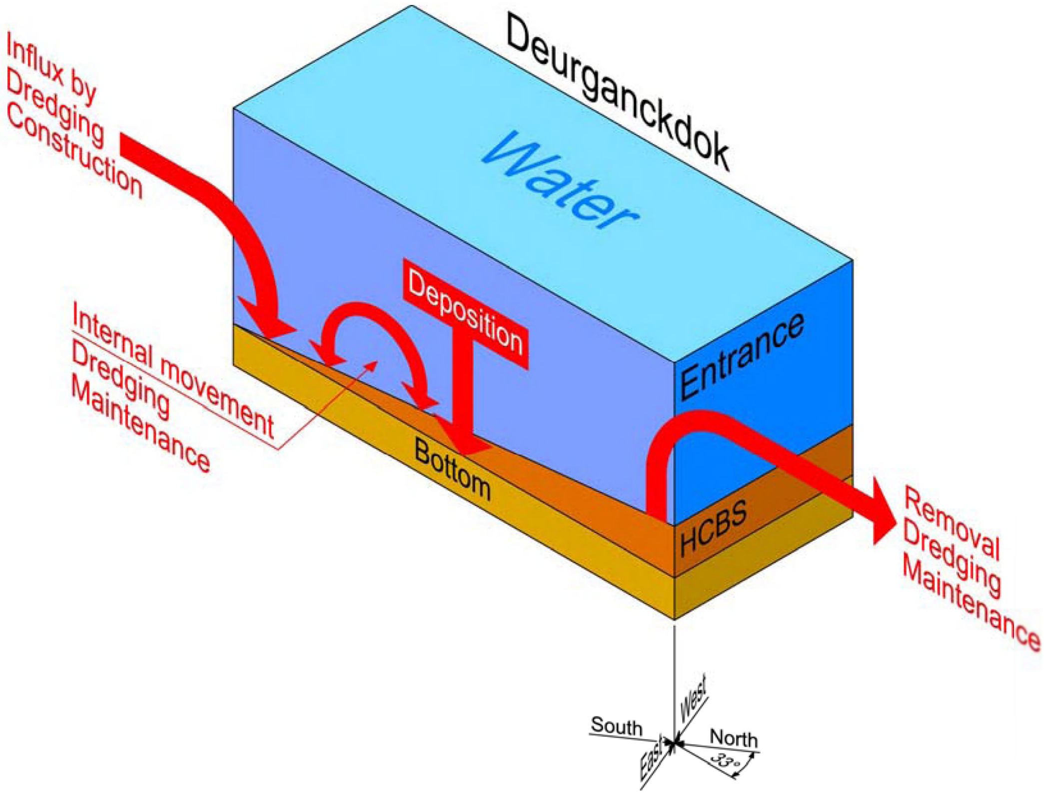


Figure 2-1: Elements of the sediment balance

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.

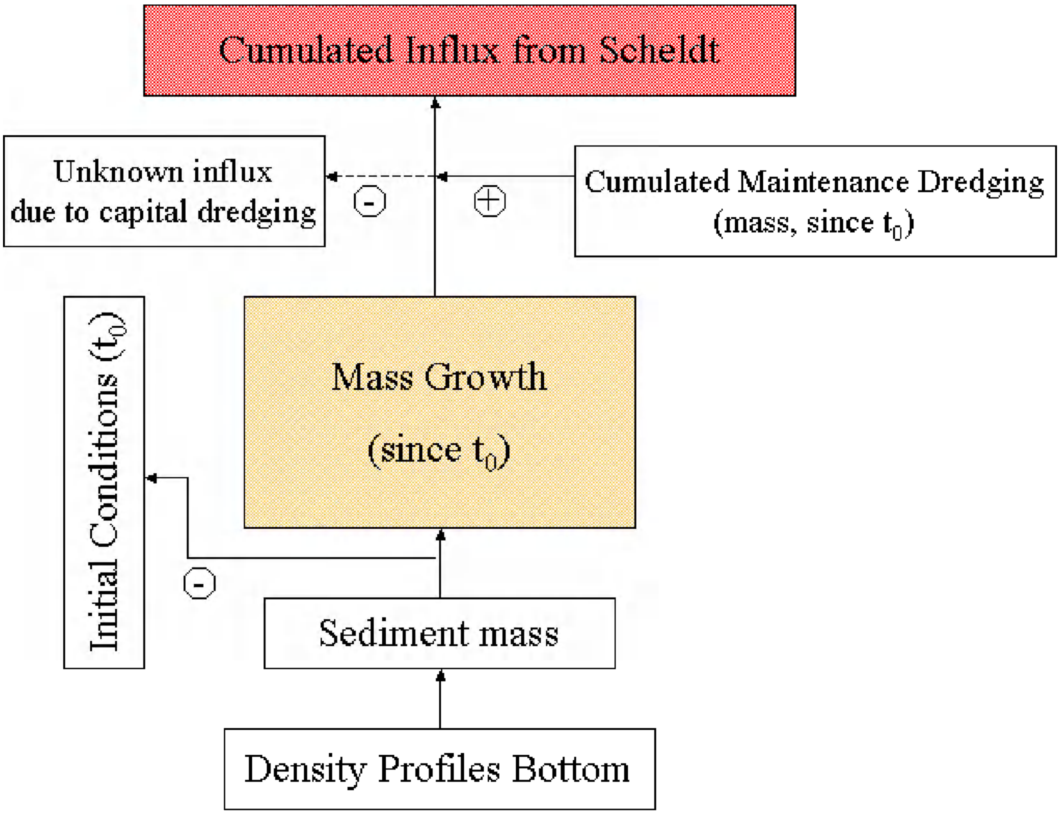


Figure 2-2: Determining a sediment balance

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

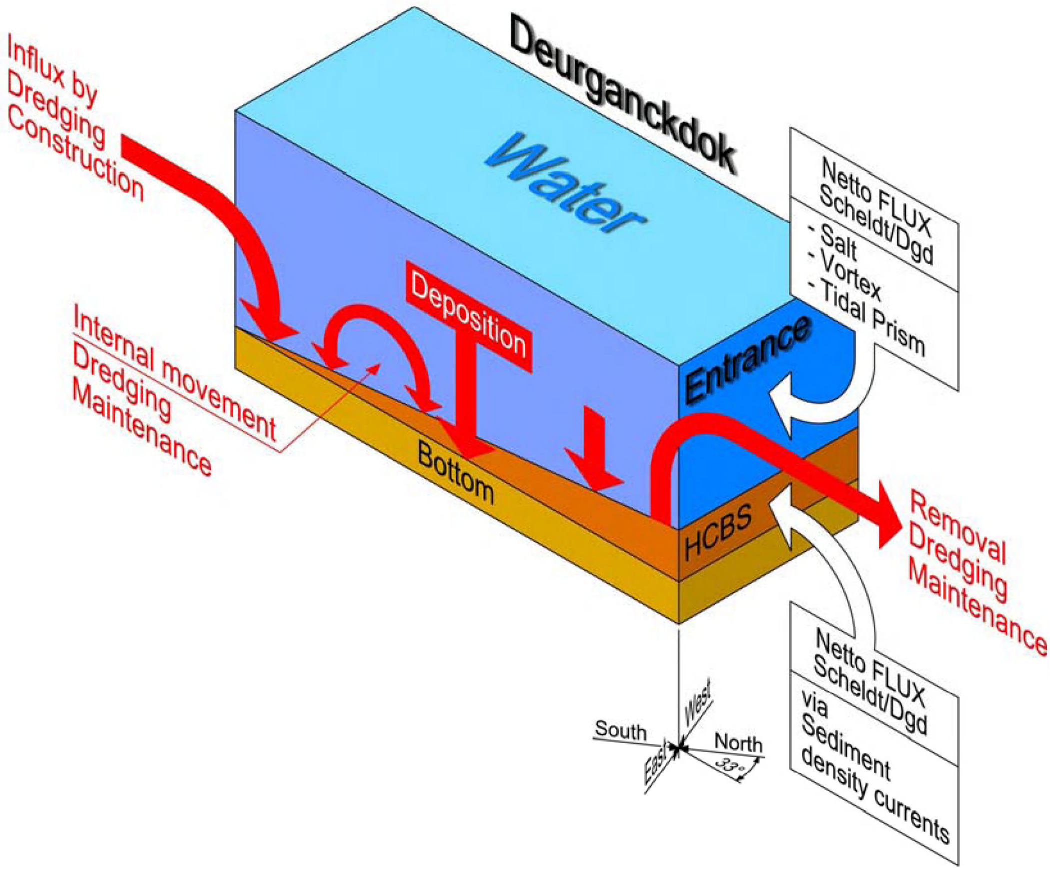


Figure 2-3: Transport mechanisms

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 on September 27th

Flow velocity, Turbidity, Salinity and Temperature measurements were conducted on the 27th of September from 6h10 MET until 19h10 MET.

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.

For measurements in Deurganckddok the terms 'left bank' and 'right bank' will be used to address the North quay wall and South quay wall respectively.

From the survey vessel Parel II a measurement cycle was completed every 30 minutes. The vessel with a mounted ADCP sailed a fixed transect from the left bank to the right bank and vice versa (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 (Left bank during the flood; Right bank during the ebb)
- One after sailing the transect at the bank where the transect ended (Right bank during flood, left bank during the ebb).

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 (between 4 and 7 m from the water surface), and one at 4 meters above the bottom. At these 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 2-1Transect of the Flow Measurements (UTM31 ED50)

Measurement location	Left Bank Easting	Left Bank Northing	Right Bank Easting	Right Bank Northing	Avg Length [m]	Avg Course [degr.]
Transect DGD	588541	5684527	588765	5684056	521	334.6

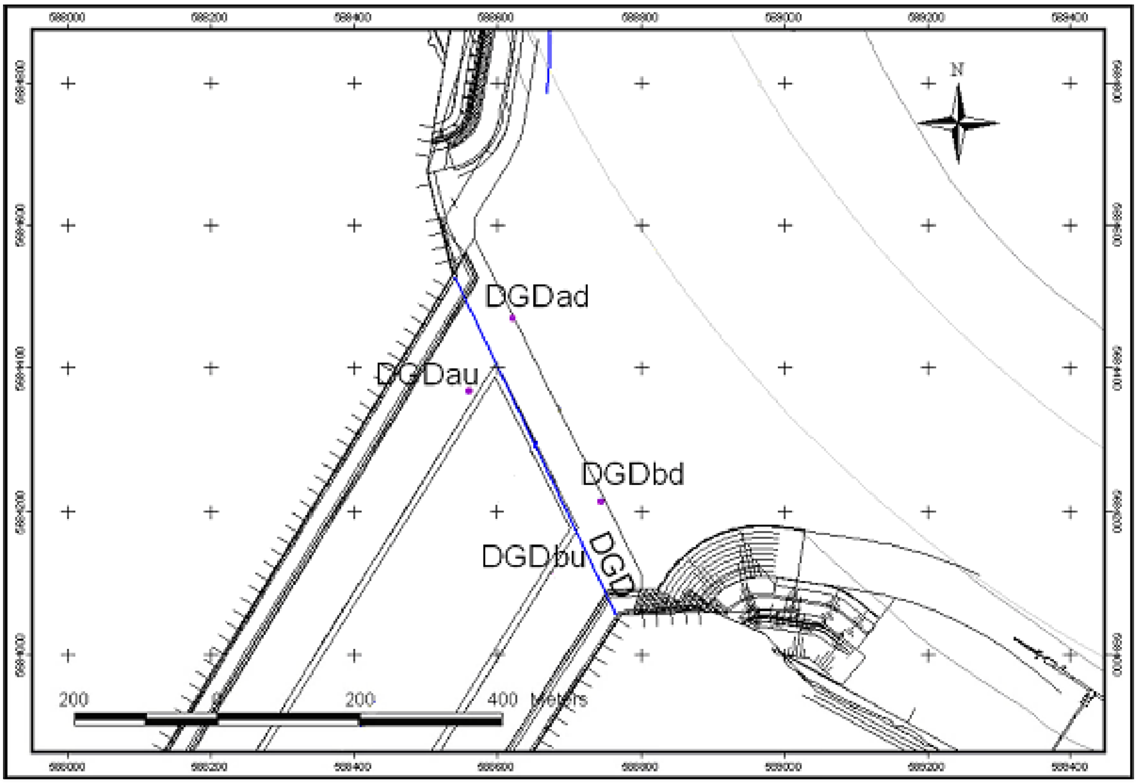


Figure 2-4: Map of sailed transect and calibration points

Table 2-2: Positions of the calibration points for September 27th 2006 at Deurganckdok.

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 dGPS 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 600kHz Workhorse

Main configuration settings:
Cell depth : 0.5 m
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
Salinity 0 psu
3-beam solution: enabled

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 the Parel II, the OBS 3A device was mounted on a towfish. 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 February Survey Reports of the HCBS 1 measurement campaign.

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 32 seconds.

3. COURSE OF THE MEASUREMENTS

3.1. Measurement periods

At Deurganckdok ADCP tracks were sailed once every 30 minutes for 13 hours, in total 27 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 53 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 Hansweert, Liefkenshoek and Schelle tidal gauges. Graphs of the tide at Hansweert, Liefkenshoek and Schelle on the 27th of September 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 27th of September 2006.

Table 3-1: High and low tide at Handsweert, Liefkenshoek and Schelle on 27/09/2006

	Time [hh:mm MET]			**Water level [m TAW]**		
	Hansweert	**Liefkenshoek**	**Schelle**	**Hansweert**	**Liefkenshoek**	**Schelle**
27/09/2006						
LW (1)	23:20	00:20	01:30	0.23	-0.07	-0.03
HW (2)	05:10	05:50	06:50	4.82	5.31	5.54
LW (3)	11:30	12:30	13:30	0.36	0.05	0.11
HW (4)	17:20	18:00	19:00	4.86	5.29	5.55

In Table 3-2 the tidal characteristics of the tide on the 27th of September are compared to the average tide over the decade 1991-2000 (AMT, 2003).

Table 3-2: Comparision of the tidal characteristics of 27/09/2006 with the average tide, the average neap tide and the average spring tide over the decade 1991-2000 for Liefkenshoek (Lie) and Schelle (Sch)

	Neap Tide (1991-2000)			***Avg Tide (1991-2000)***			***Spring Tide (1991-2000)***			***Tide 27/09/2006***		
Water level [mTAW]	**Han**	**Lie**	**Sch**	**Han**	**Lie**	**Sch**	**Han**	**Lie**	**Sch**	**Han**	**Lie**	**Sch**
LW (1)	0.61	0.39	0.34	0.27	0.05	0.03	0.02	-0.18	-0.18	0.23	-0.07	-0.03
HW (2)	4.29	4.63	4.95	4.76	5.19	5.45	5.11	5.63	5.83	4.82	5.31	5.54
LW (3)	-	-	-	-	-	-	-	-	-	0.36	0.05	0.11
HW (4)	-	-	-	-	-	-	-	-	-	4.86	5.29	5.55
Tidal difference [m]	**Han**	**Lie**	**Sch**	**Han**	**Lie**	**Sch**	**Han**	**Lie**	**Sch**	**Han**	**Lie**	**Sch**
Rising (1→2)	3.68	4.24	4.61	4.49	5.14	5.42	5.09	5.81	6.01	4.59	5.38	5.57
Falling (2→3)	3.68	4.24	4.61	4.49	5.14	5.42	5.09	5.81	6.01	4.46	5.26	5.43
Rising (3→4)	-	-	-	-	-	-	-	-	-	4.5	5.24	5.44
Duration [hh:mm]	**Han**	**Lie**	**Sch**	**Han**	**Lie**	**Sch**	**Han**	**Lie**	**Sch**	**Han**	**Lie**	**Sch**
Rising (1→2)	6:14	5:59	5:53	6:02	5:34	5:30	5:54	5:16	5:15	5:50	5:30	5:20
Falling (2→3)	6:25	6:40	6:46	6:23	6:50	6:55	6:26	7:02	7:04	6:20	6:40	6:40
Rising (3→4)	-	-	-	-	-	-		-	-	5:50	5:30	5:30
Tide (1→3)	12:39	12:39	12:39	12:25	12:24	12:25	12:20	12:18	12:19	12:10	12:10	12:00
Tide (2→4)	-	-	-	-	-	-	-	-	-	12:10	12:10	12:10
Tidal coefficient	**Han**	**Lie**	**Sch**	**Han**	**Lie**	**Sch**	**Han**	**Lie**	**Sch**	**Han**	**Lie**	**Sch**
Rising (1→2)	0.82	0.82	0.85	1	1	1	1.11	1.13	1.11	1.02	1.05	1.03
Falling (2→3)	0.82	0.82	0.85	1	1	1	1.11	1.13	1.11	0.99	1.02	1.00
Rising (3→4)	-	-	-	-	-	-	-	-	-	1.00	1.02	1.00

The tidal coefficients from 0.99 up to 1.05 for the measured tide of the 27th of September indicate that this tide has a quite equivalent tidal range as the average tide for the decade of 1991-2000.

3.2.2. Meteorological data

Meteorological data at Antwerpen, Hove meteorological station for 27/09/2006 have been obtained from www.wunderground.com as the monthly report from KMI (Koninklijk Meteorologisch Instituut = Royal Meteorological Institute of Belgium) for September 2006 wasn't available yet.

On the 27th of September 2006, the air temperature varied between 8.6 and 18.6°C. The wind blew from SW at an average velocity of 4.4 km/h. The sky was almost clear and no rainfall occured.

3.3. Navigation information

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

3.4. Remarks on data

Shipwakes were removed from the data. Before transect 6017DGDt_sub a seaship passed with a tugboat (8:32 MET). This is probably the cause of the high parallel velocities (APPENDIX F).

Transects have been sailed just outside of the dock, starting before and ending behind the dock entrance corners (see Appendix A.3). Start and end ensembles of the processed transects have been determined as the first and last ensembles between the projection of the quay walls. This explains that flux and discharge estimations for left and right side close to zero most of the time. For this reason some side estimated concentrations in summarizing table, defined as flux divided by discharge, could not be determined (NaN Values).

4. PROCESSING OF DATASETS

4.1. Calibration of the turbidity sensors

A crucial aspect of the accuracy and reliability of the data concerns the calibration of the instruments before the measurement campaign. These calibration procedure is described in Report 6.2 summer calibration.

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 ADCPs 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 which 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.

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. These OBS SS concentrations were recalibrated using the conversion equations 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 weighed (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. 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 is 6% 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, Sediview will make an estimate of the discharges and suspended sediment concentration. The measured and unmeasured regions in the cross sectoin are shown in Figure 4-1 and Figure 4-2.

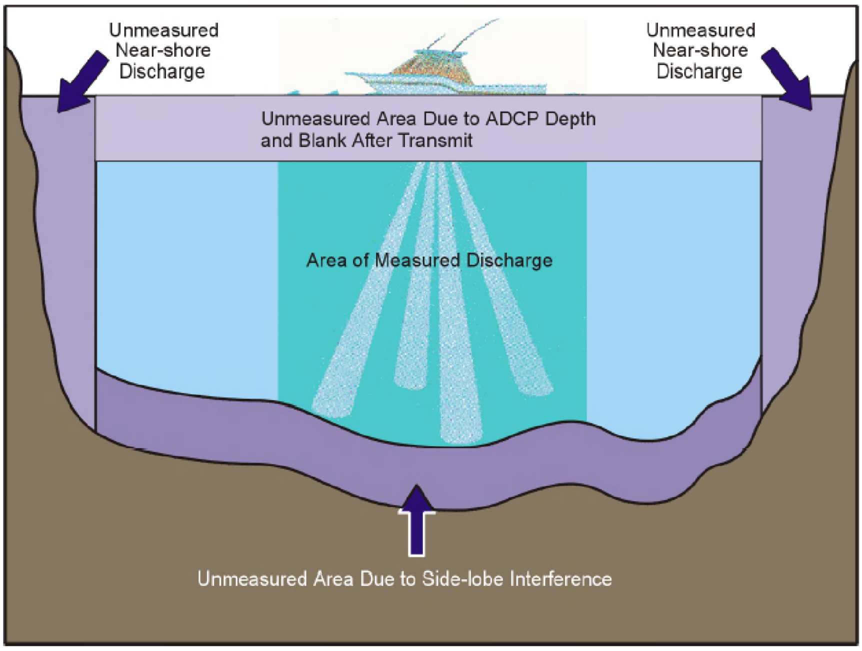


Figure 4-1: Unmeasured regions in the cross section (from RD Instruments, 2003)

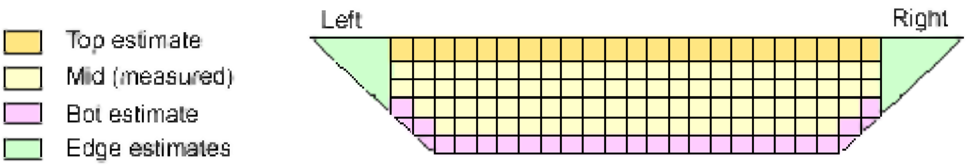


Figure 4-2: Measured and estimated discharges and sediment fluxes within Sediview (DRL, 2005)

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 125% of the lowest valid bin. Siltprofiles taken by the SiltProfiler on board the Stream near Deurganckdok on 26/09/2006 (IMDC, 2007f) show that the bottom value of the SSC is approximately 150% of the SSC-value at 2 meter above the bottom (position of the sidelobe). As the concentration grows approximately linear from the lowest valid bin to the bottom, and as Sediview uses a constant concentration factor for these deepest bins, we use a concentration factor of 125% (Figure 4-3).

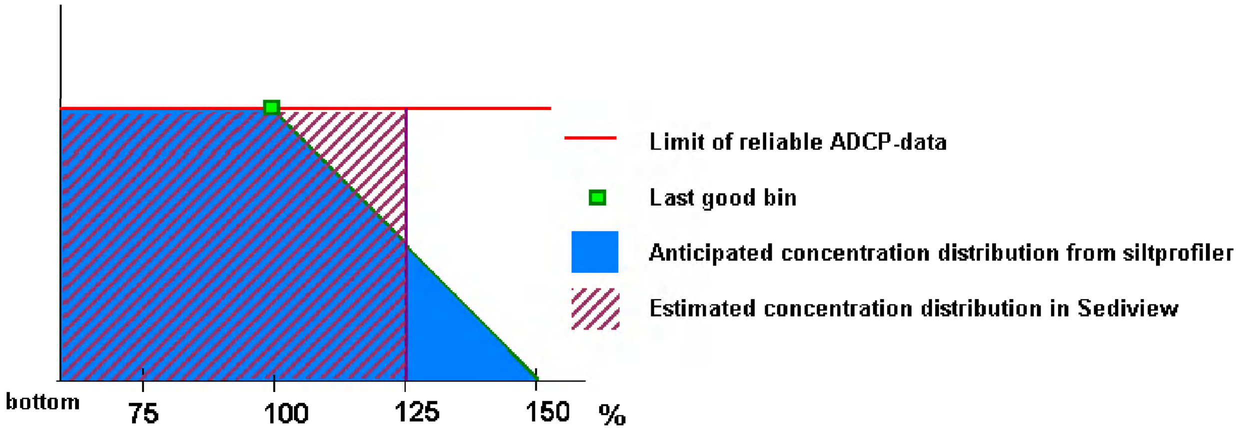


Figure 4-3: Bottom estimate of the sediment concentration

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-rectangular due to the quay walls of Deurganckdok. 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 quay walls

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***
Zandvliet	586906	5688634	587757	5689950

The formula for determining the near shore discharge is:

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

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 (rectangular shape of Deurganckdok quay walls).

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 Deurganckdok, 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 and sediment fluxes 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 and total discharge for the whole through tide measurement at Deurganckdok.

5. PRELIMINARY ANALYSIS OF THE DATA

5.1. September 27th 2006 survey

As Deurganckdok is situated along the part of the Scheldt river under tidal influence, it is subject to complex current fields near its entrance. The measured current field shows a vortex pattern dependend 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 we see 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 we see in general a higher concentration during slack water and during rising tide compared to during ebb tide.

Considering the sediment fluxes (APPENDIX H) shows that incoming transport is dominating. Only during a very short period going from 3 hours before LW to 1 hour before LW a residual outgoing sediment transport can be observed.

5.2. Intercomparison with earlier surveys on November 17th 2005 and March 22nd 2006

On November 17th 2005 and March 22nd 2006 the same transect has been sailed during through tide measurements, a description is given by IMDC (2005) and IMDC (2006c). Conditions near the entrance of Deurganckdok have been simulated in Delft3D and processed by IMDC (2006g) in order to compare simulation with observed data.

It is important to underline that lower fresh water discharges from the tributaries were recorded during the measurement campaigns (Figure 5-1, Figure 5-2 and Figure 5-3,): on 17/11/2005 and 22/03/2006 the discharges prior to the measurements were around 90 m³/s; and on 27/09/2006 around 30 m³/s. All measurement days correspond to the mean discharge -1σ, which is rather low (Figure 5-4).

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, 2006g). The mean discharge is the annual average ten days' discharge, calculated with simulated long-term measurements. The high and low discharges are also annual average ten days' discharges, but with an absolute maximum of mean discharge +2σ and an absolute minimum of mean discharge -2σ.

The same circulation pattern as described above is found to have occurred at those days. In Figure 5-5 and Figure 5-6 the three measurements have been compared for about 3h after high water, sediment distribution as well as current pattern in the cross section are almost identical. The western side of the dock is situated at the left of these figures, the eastern side at the right. Current velocity is about 0.2-0.4 m/s on the right bank side and in the upper part of the water column and about –0.2 m/s on the left bank side. Suspended sediment concentration ranges from 50 to 100 mg/l going up from top right side towards bottom left side.

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 on both days with a salt wedge intruding near the bottom of the dock and compensatory outflow of fresher water near the surface. Sediment distribution ranges for both measurements between 50 and 150 mg/l with a very similar pattern across the cross section at the dock's entrance.

The volume water, crossing the dock's entrance during flood or ebb on a measurement day, was calculated by integrating the discharge curve (Figure 5-9) during flood and ebb respectively. Table 5-1 shows the results. During flood on 27th September of 2006, 5 224 000m³ water crossed the entrance and during ebb 5 914 000m³. Comparing to the other campaigns, the volume during ebb is rather low and for flood rather moderate. This measurement day corresponds to average tide, the other days to neap and spring tide, resulting in a moderate value during flood. The volume during ebb is rather low because the low fresh water volume, combining with average tide. Theoretically, the net volume between flood and ebb is equal to the fresh water volume. The fresh water volume, during the tidal cycle on 27/09/2006, was estimated at 1 473 000m³ and is not similar to the net volume of 690 000m³ (Table 5-1). There is not a straight explanation

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. The flux curve was integrated (Figure 5-10) and Table 5-2 shows the results. During ebb 27th September of 2006, 126 tonnes SS crossed the entrance and during flood 256 tonnes. So 382 tonnes SS was deposited in the dock during the tidal cycle. Comparing with other campaigns, 382 tonnes are rather low (Table 5-2).

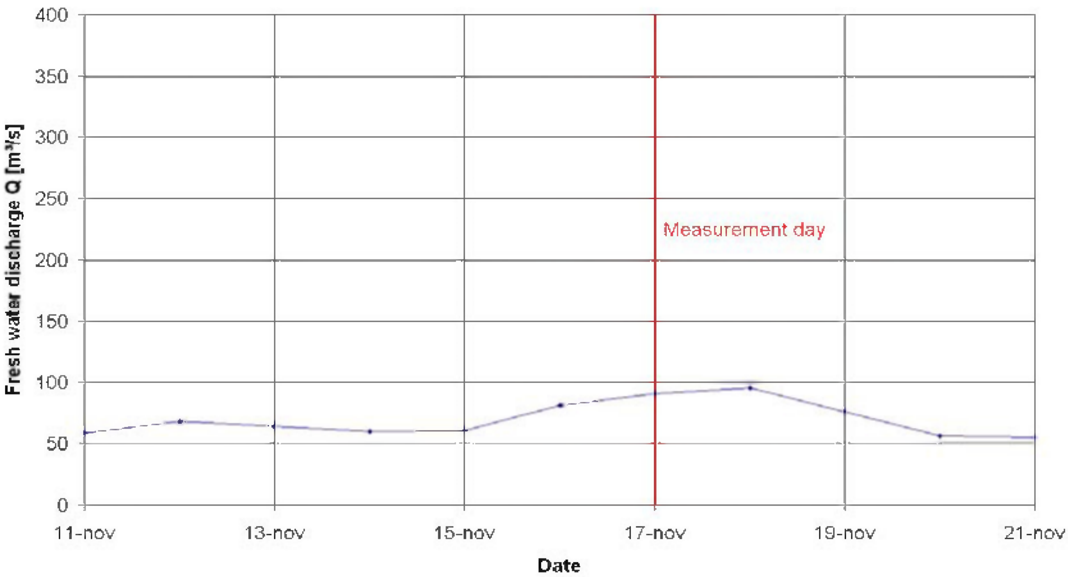


Figure 5-1: Fresh water discharge 11 – 21 November of 2005.

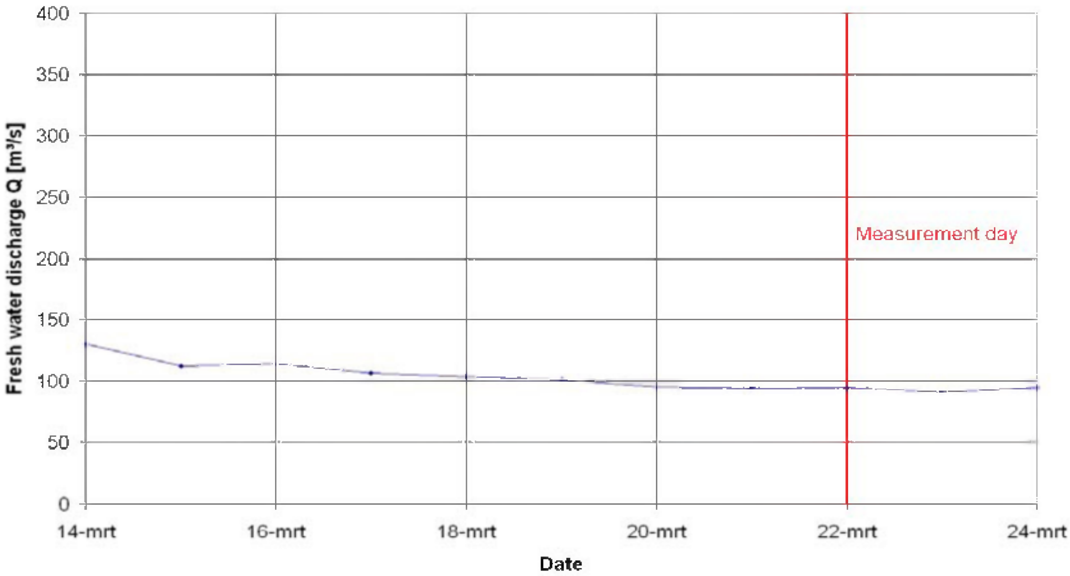


Figure 5-2: Fresh water discharge 14 – 24 March of 2006

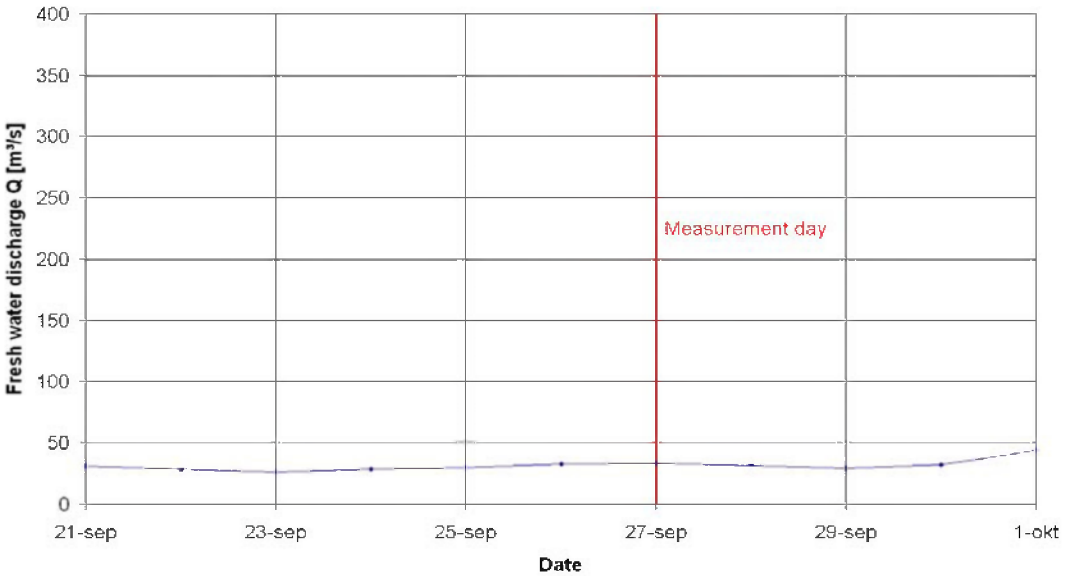


Figure 5-3: Fresh water discharge 21 September – 1 October of 2006

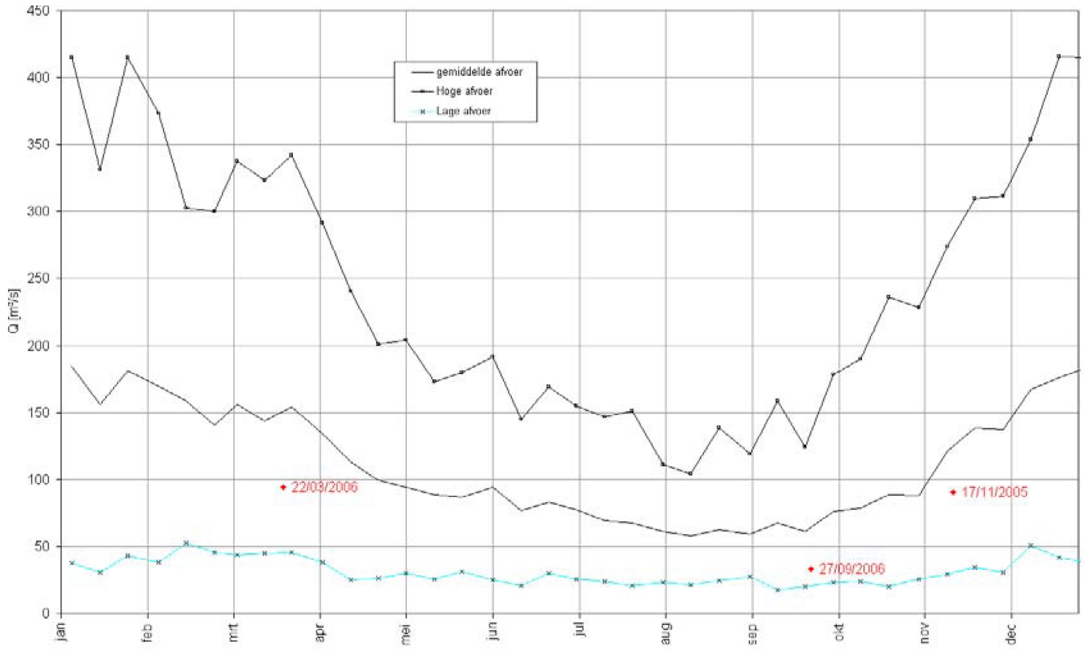
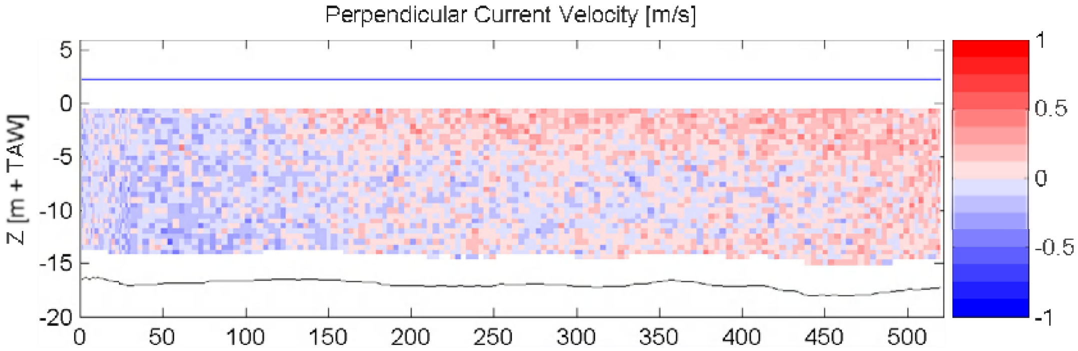
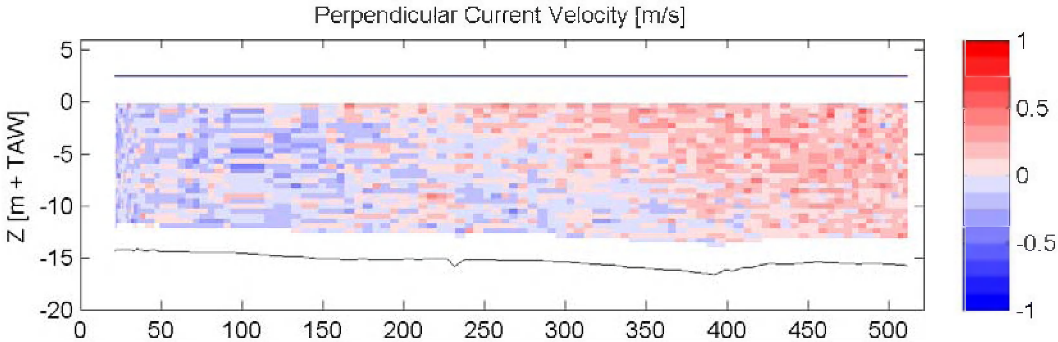


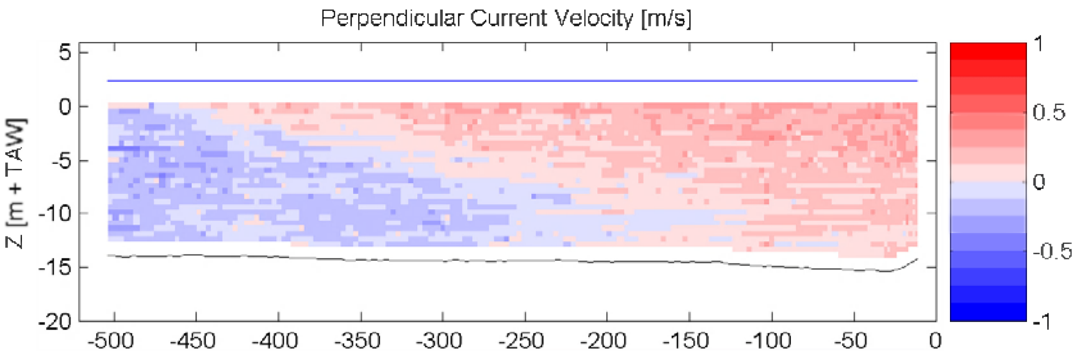
Figure 5-4: Mean fresh water discharge



a)

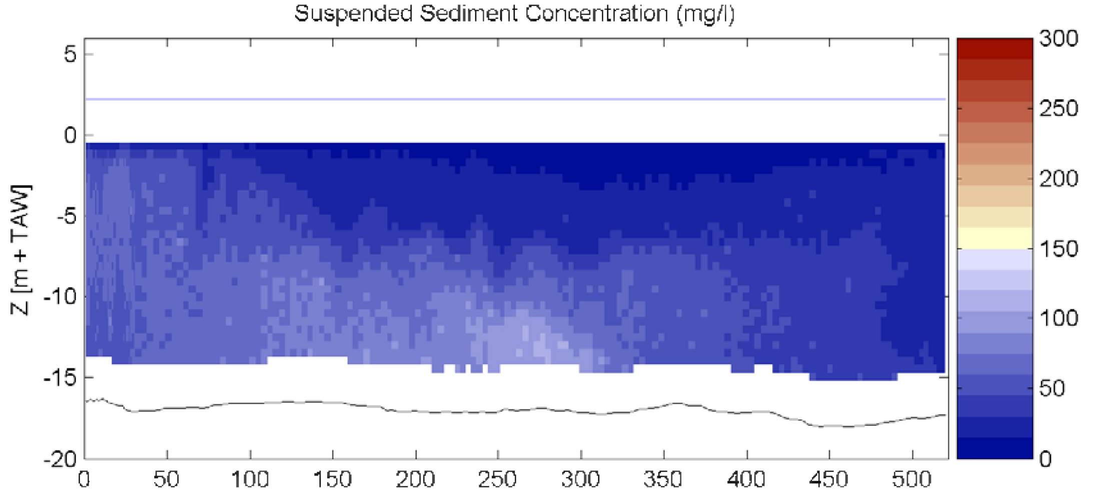


b)

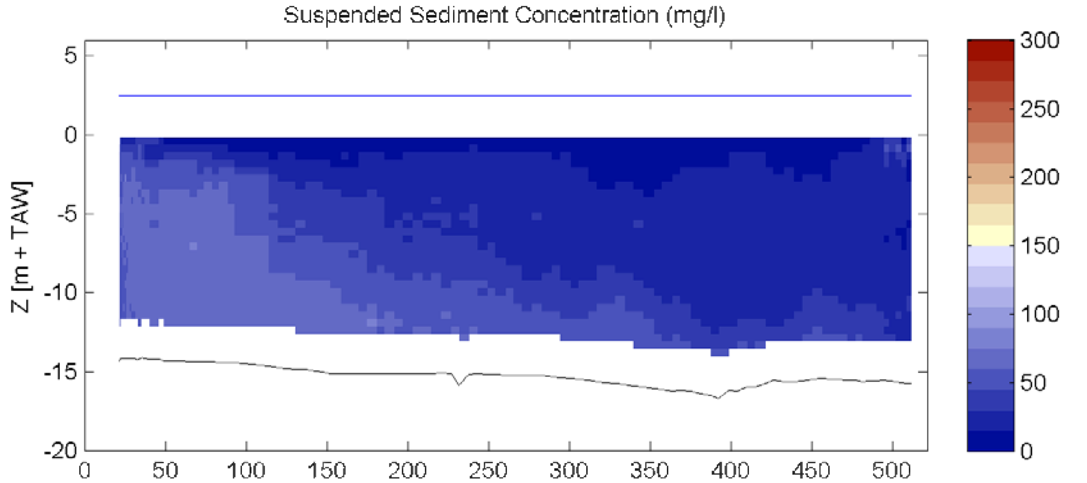


c)

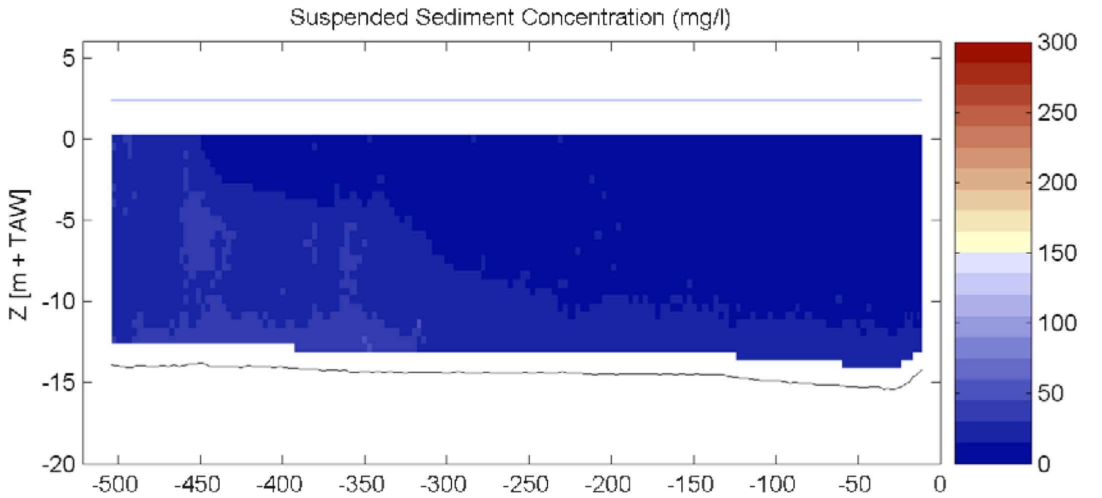
Figure 5-5: a) Perpendicular current velocity on 17/11/2005, b) on 22/03/2006 and c) on 27/09/2006 at 3h after high water



a)

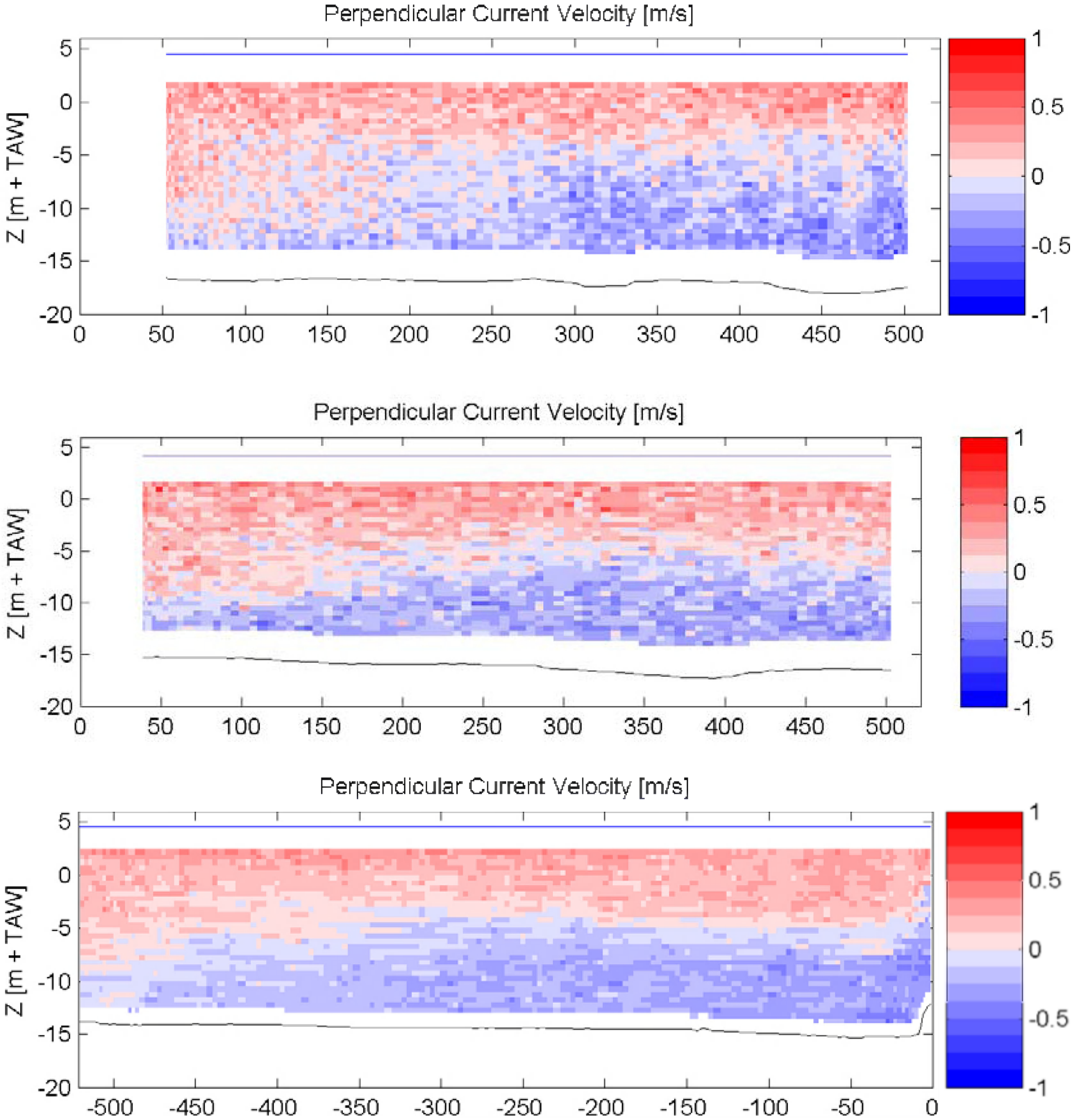


b)



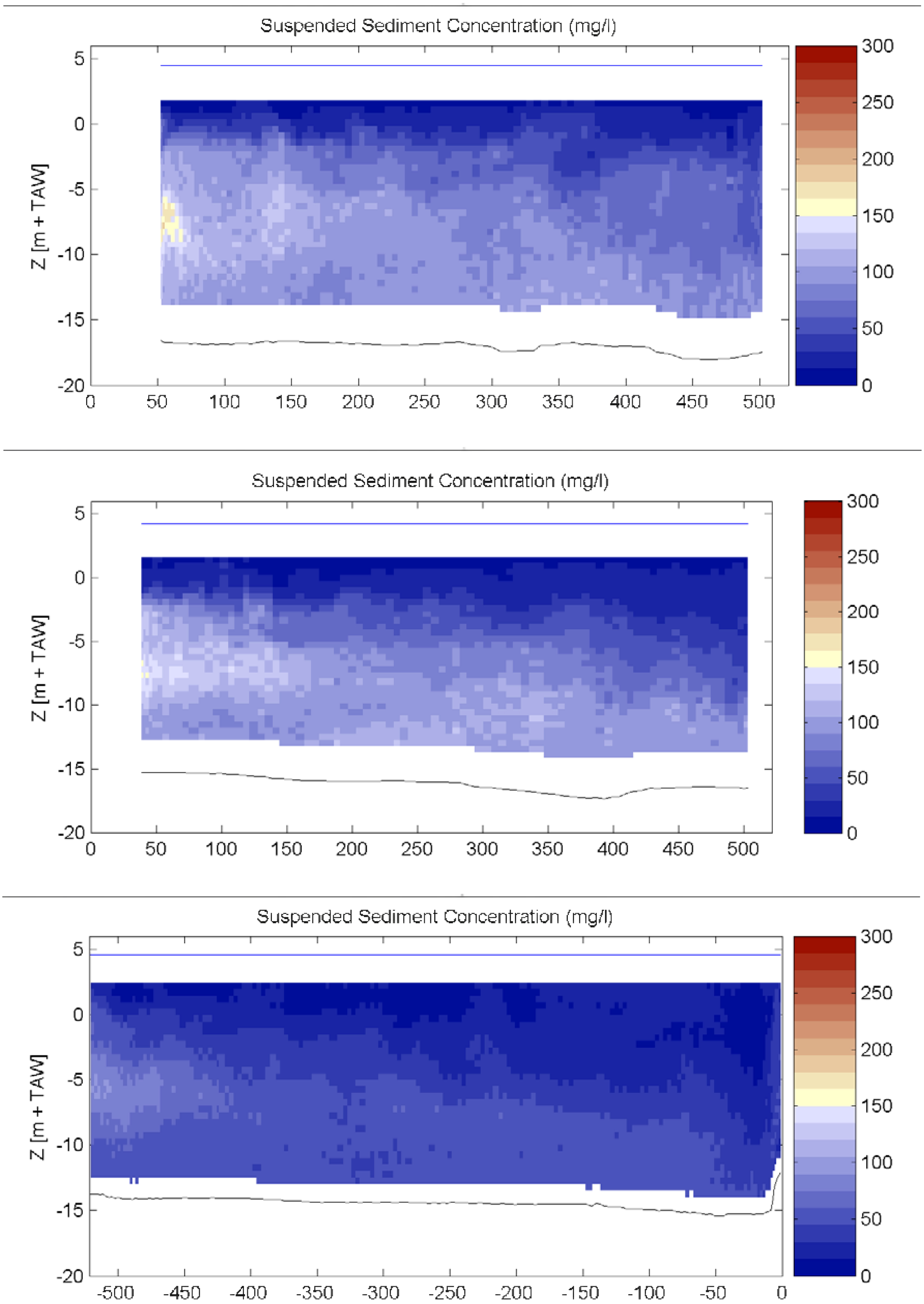
c)

Figure 5-6: a) Suspended sediment concentration on 17/11/2005, b) on 22/03/2006 and c) on 27/09/2006 at 3h after high water



a)
b)
c)

Figure 5-7: a) Perpendicular current velocity on 17/11/2005, b) on 22/03/2006 and c) on 27/09/2006 at 1h after high water



a) b) c)

Figure 5-8: a) Suspended sediment concentration on 17/11/2005, b) on 22/03/2006 and c) on 27/09/2006 at 3h after high water

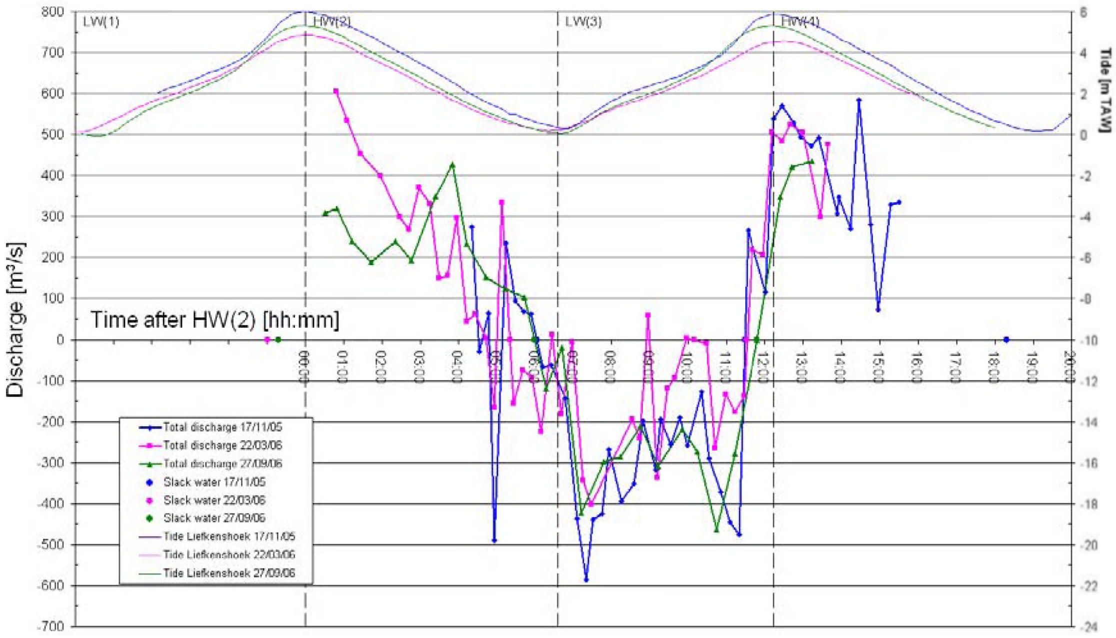


Figure 5-9: Total discharge 17/11/2005, 22/03/2006 & 27/09/2006

Table 5-1: Water volume during ebb, flood and measurement campaign on 17/11/2005 (Spring tide), 22/03/2006 (Neap tide) & 27/09/2006 (Average tide)

Measurement Day		**17/11/2005**	**22/03/2006**	**27/09/2006**
Ebb	Volume [1000x m³]	6 620	7 122	5 914
	Duration [HH:MM]	6:50	6:20	6:40
	Tidal Difference [m]	5.70	4.68	5.26
Flood	Volume [1000x m³]	-5 558	-3 517	-5 224
	Duration [HH:MM]	5:24	6:10	5:48
	Tidal Difference [m]	5.58	4.38	5.24
Net	Volume [1000x m³]	1 062	3 605	690
	Duration [HH:MM]	12:14	12:30	12:28
Fresh water	Volume [1000x m³]	3 987	4 248	1 473
	Duration [HH:MM]	12:14	12:30	12:28
Measurement Campaign	Volume [1000x m³]	-144	3 904	879
	Duration [HH:MM]	11:09	12:51	12:43

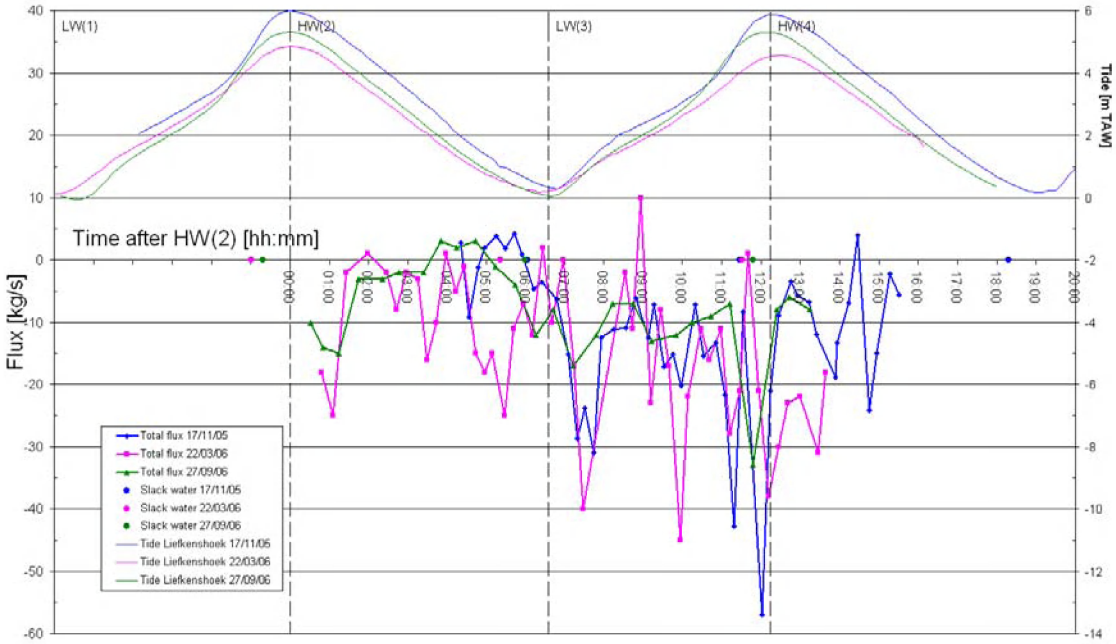


Figure 5-10: Total Flux 17/11/2005, 22/03/2006 & 27/09/2006

Table 5-2: SS Mass during ebb, flood and measurement campaign on 17/11/2005 (Spring tide), 22/03/2006 (Neap tide) & 27/09/2006 (Average tide)

Measurement Day		**17/11/2005**	**22/03/2006**	**27/09/2006**
Ebb	SS Mass [Tonnes]	-210	-267	-126
	Duration [HH:MM]	6:50	6:20	6:40
	Tidal Difference [m]	5.70	4.68	5.26
Flood	SS Mass [Tonnes]	-277	-338	-256
	Duration [HH:MM]	5:24	6:10	5:48
	Tidal Difference [m]	5.58	4.38	5.26
Net	SS Mass [Tonnes]	-487	-605	-382
	Duration [HH:MM]	12:14	12:30	12:28
Measurement Campaign	SS Mass [Tonnes]	-484	-648	-371
	Duration [HH:MM]	11:09	12:51	12:43

6. REFERENCES

AMT (2003). Intern rapport, Getij-informatie Scheldebekken 1991-2000.

DRL (2003). Sediview Procedure Manual – Draft for July ’03 Issue.

IMDC (2002).Studie Densiteitsstroming in het kader van LTV Schelde, Stroom- en saliniteitsmeting t.h.v. Deurganckdok uitgevoerd op 12/06/2002, I/RA/11216/02.042/CMA.

IMDC (2005) Studie van de stromingsvelden en sedimentuitwisseling aan de ingang van Deurganckdok (I/RA/15030/06.021/BDC)

IMDC (2006a) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.6 Sediment balance Bathymetry: 2005 – 3/2006 (I/RA/11283/06.118/MSA)

IMDC (2006b) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.1 Through tide measurement Siltprofiler 21/03/2006 Laure Marie (I/RA/11283/06.087/WGO)

IMDC (2006c) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.3 Through tide measurement Sediview spring tide 22/03/2006 Veremans (I/RA/11283/06.110/BDC)

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

IMDC (2006e) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.6 Salt-Silt distribution & Frame Measurements Deurganckdok 13/3/2006 – 31/05/2006 (I/RA/11283/06.121/MSA)

IMDC (2006f) Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 6.1 Winter Calibration (I/RA/11291/06.092/MSA)

IMDC (2006g) Mer verruiming Westerschelde, Nota Bovenafvoer Scheldebekken, I/NO/11282/06.104/FPE.

IMDC (2007a) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.1 Sediment Balance: Three monthly report 1/4/2006 – 30/06/2006 (I/RA/11283/06.113/MSA)

IMDC (2007b) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.2 Sediment Balance: Three monthly report 1/7/2006 – 30/09/2006 (I/RA/11283/06.114/MSA)

IMDC (2007c) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.3 Sediment Balance: Three monthly report 1/10/2006 – 31/12/2006 (I/RA/11283/06.115/MSA)

IMDC (2007d) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.4 Sediment Balance: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/06.116/MSA)

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

IMDC (2007f) 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 (2007g) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.5 Through tide measurement Sediview neap tide (to be scheduled) (I/RA/11283/06.120/MSA)

IMDC (2007h) 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 (2007i) 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 (2007j) 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)

IMDC (2007k) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 3.2 Boundary condtions: Annual report (I/RA/11283/06.128/MSA)

IMDC (2007l) Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 6.2 Summer Calibration and Final Report (I/RA/11291/06.093/MSA).

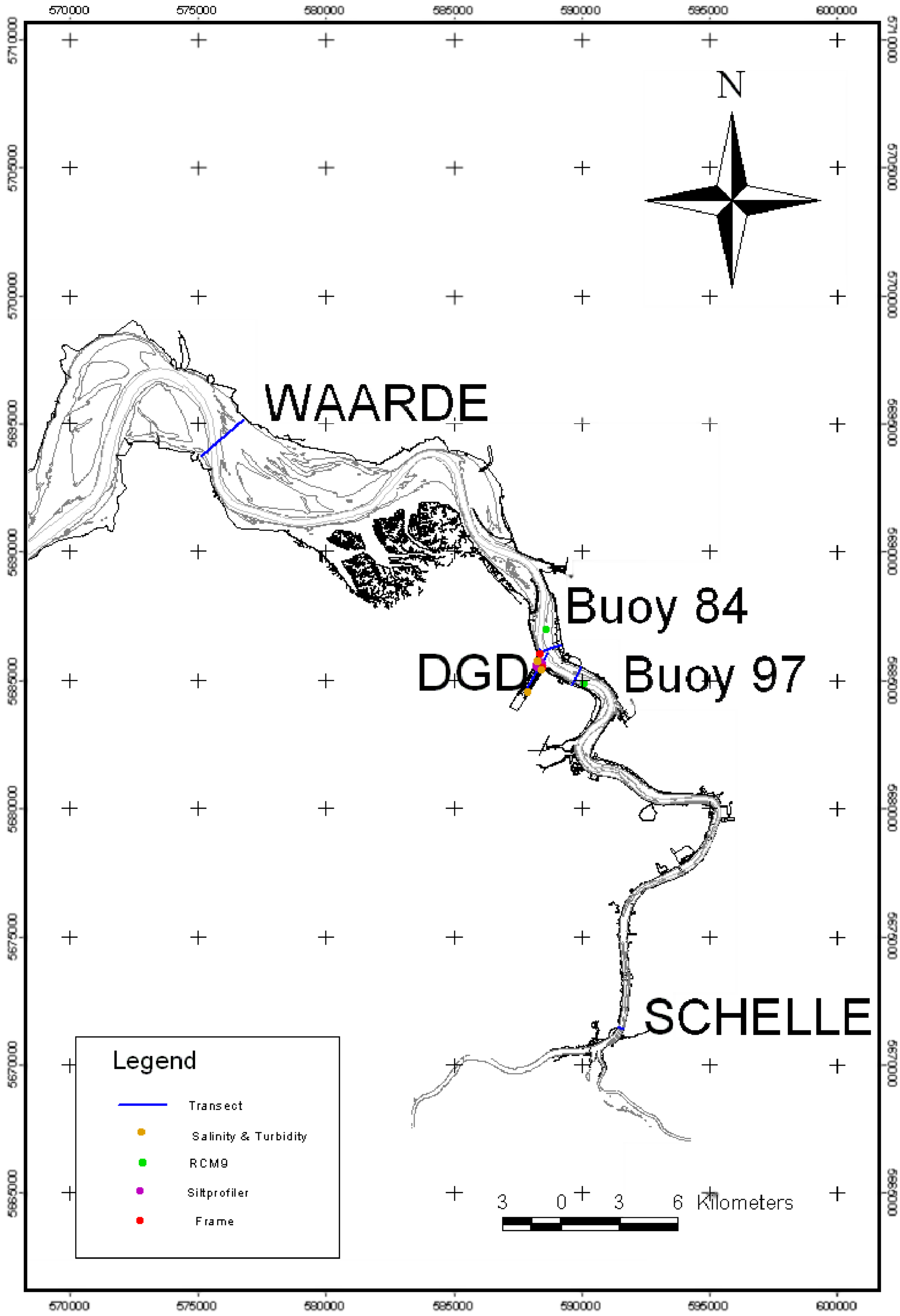
RD Instruments (October 2003). Winriver User’s Guide International Version.

Unesco (1991). Processing of Oceanographic Station Data.

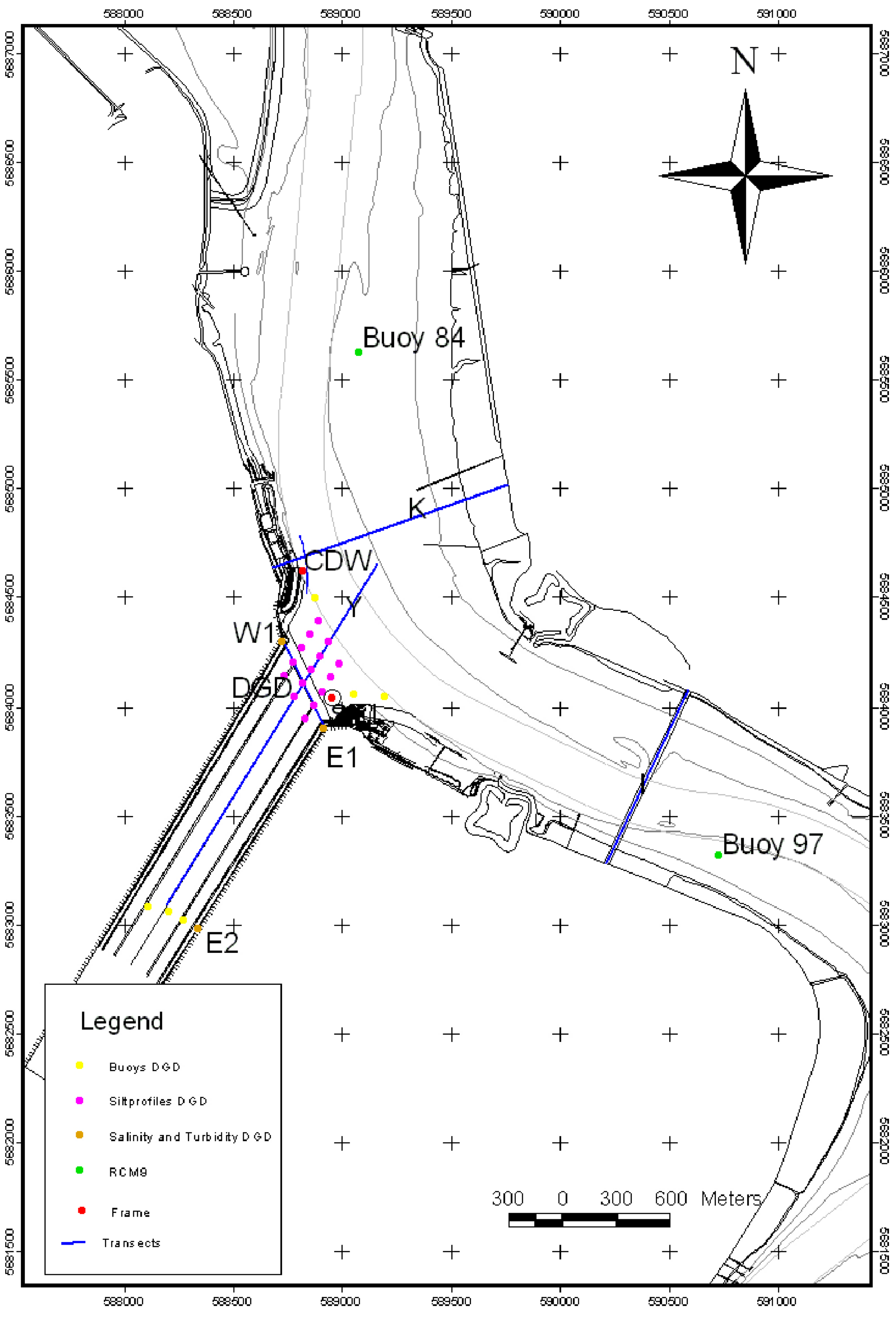
APPENDIX A.

OVERVIEW OF MEASUREMENTS

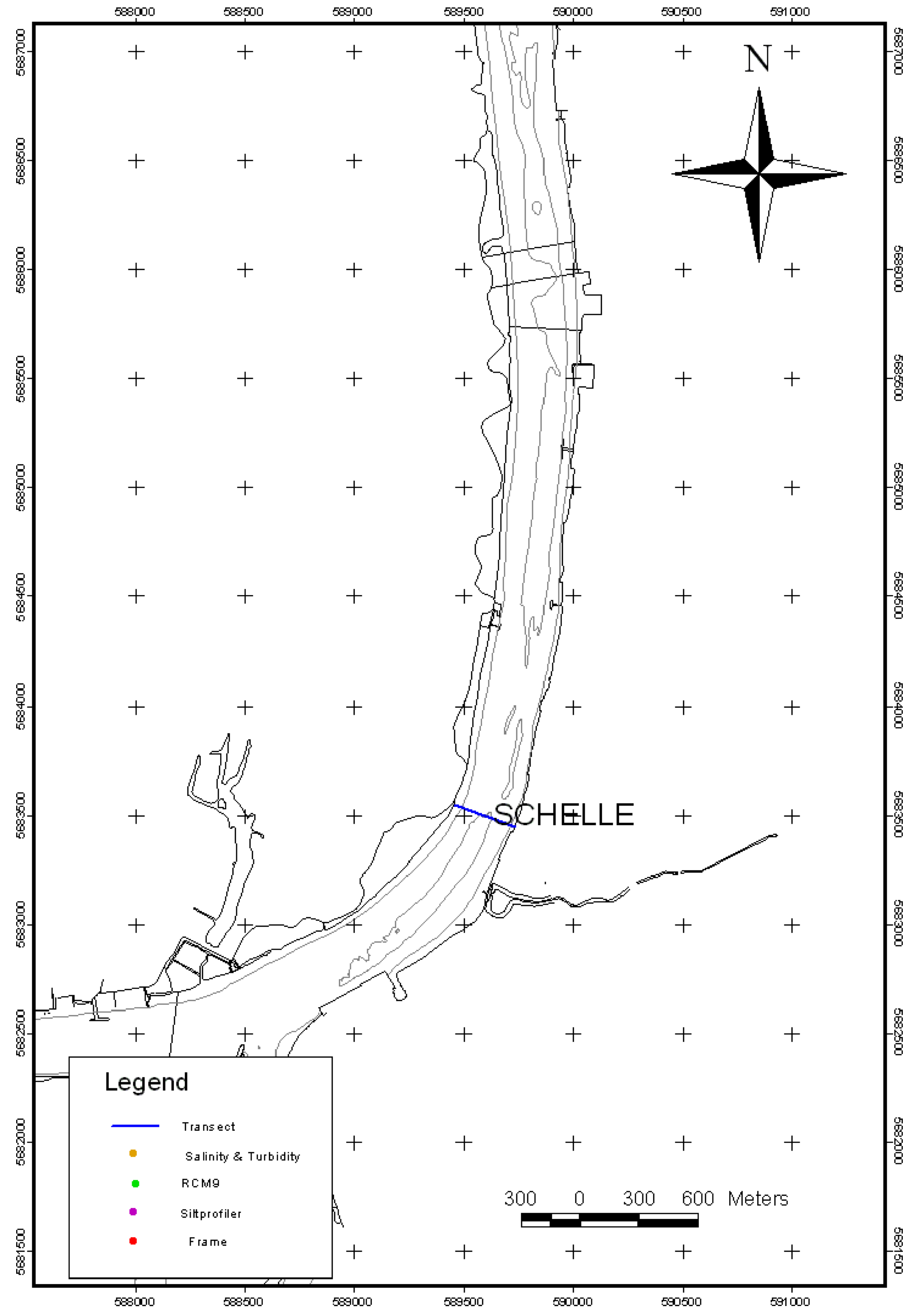
A.1 Overview of the measurement locations for the whole HCBS2 measurement campaign



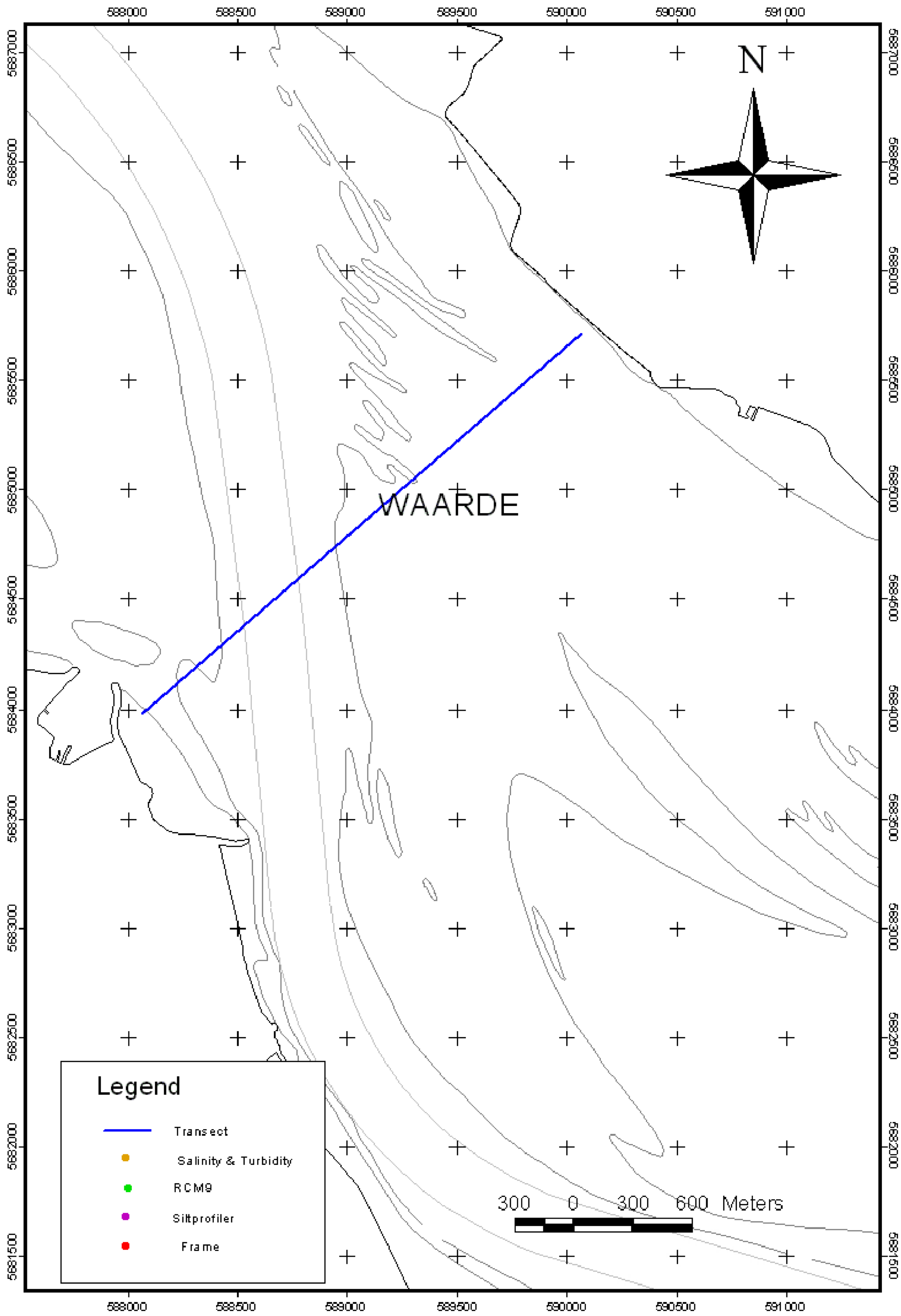
Overview of the measurement locations



Overview of the measurement locations at Deurganckdok



Transect S in Schelle



Transect W in Waarde

A.2 Overview of all measurement locations HCBS measurement summer campaign 26-28/9/2006

Table with coordinates of theoretical transects

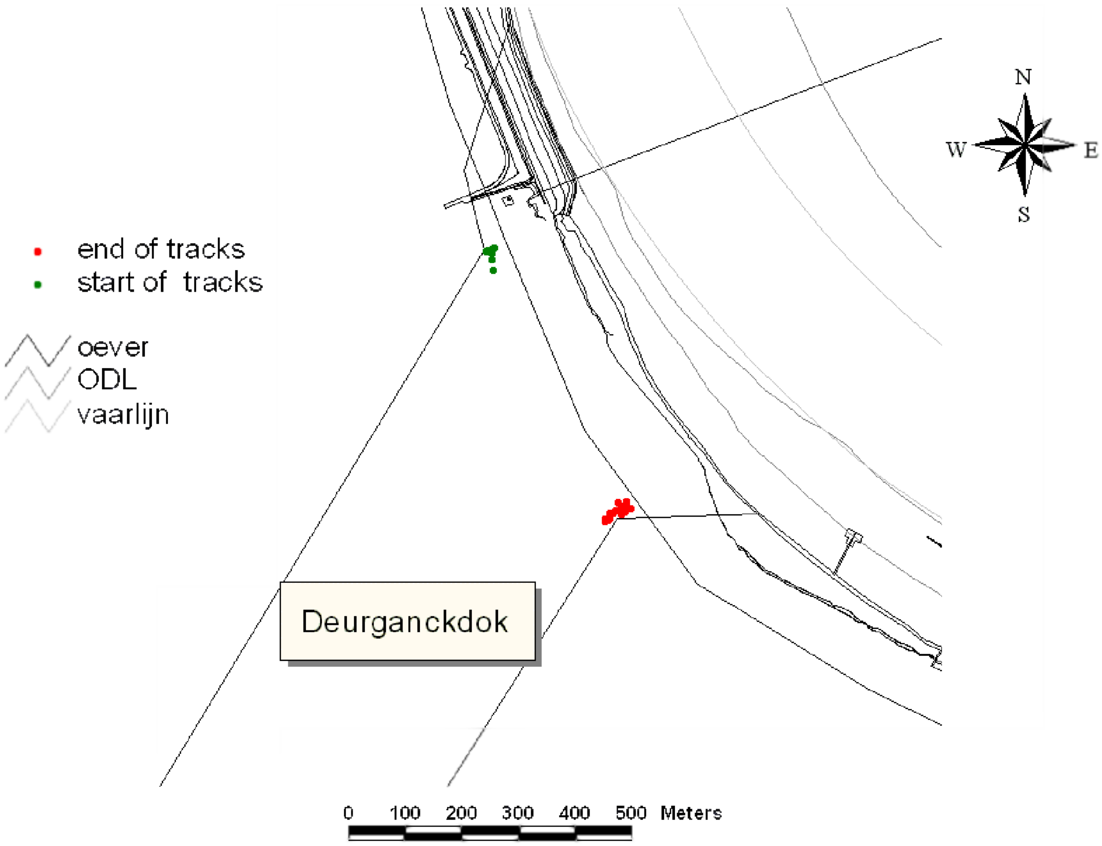
Transect	Start Easting	Start Northing	End Easting	End Northing
I	590318.00	5683302.00	590771.00	5684257.00
K	588484.00	5684924.00	589775.00	5685384.00
SCHELLE	592645.07	5665794.06	592952.68	5665682.28
DGD	588764.88	5684056.49	588540.95	5684526.94
Y	589059.09	5684948.36	587898.76	5683076.56
WAARDE	573541.00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

Table with 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 Deurganckdok 27/09/2006

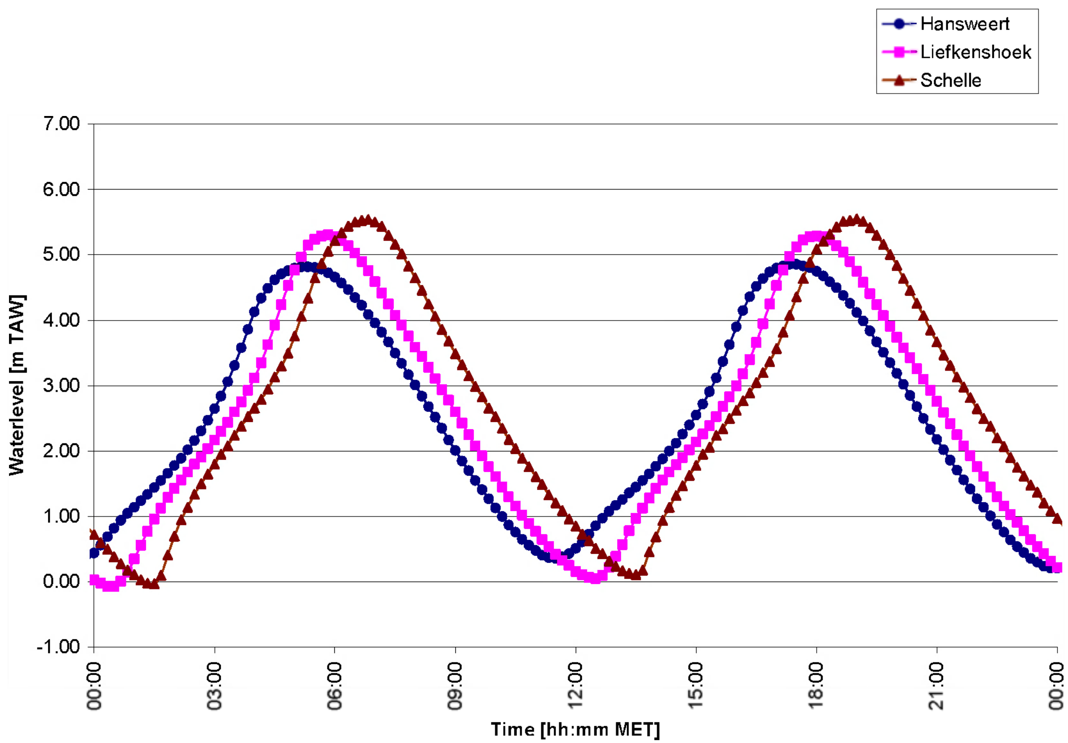
FileName	End time [hh:mm MET]	Time of HW [hh:mm]	Easting start (UTM31 ED50)	Northing start (UTM31 ED50)	Easting end (UTM31 ED50)	Northing end (UTM31 ED50)	Transect length [m]	Transect heading [°]
6002DGDt_sub.csv	5:18	-0:32	588547	5684530	588781	5684066	519	333
6005DGDt_sub.csv	5:36	-0:14	588549	5684530	588782	5684066	519	333
6008DGDt_sub.csv	6:00	0:10	588547	5684529	588780	5684064	520	333
6011DGDt_sub.csv	6:30	0:40	588545	5684527	588786	5684067	520	332
6014DGDt_sub.csv	7:07	1:17	588548	5684528	588779	5684063	518	334
6017DGDt_sub.csv	7:32	1:42	588551	5684522	588774	5684083	493	333
6020DGDt_sub.csv	8:11	2:21	588551	5684513	588779	5684075	493	333
6023DGDt_sub.csv	8:37	2:47	588553	5684531	588797	5684072	520	332
6026DGDt_sub.csv	9:00	3:10	588551	5684529	588789	5684086	503	332
6029DGDt_sub.csv	9:30	3:40	588555	5684533	588779	5684072	513	334
6032DGDt_sub.csv	9:59	4:09	588553	5684532	588770	5684069	511	335
6035DGDt_sub.csv	10:31	4:41	588551	5684529	588787	5684079	509	332
6038DGDt_sub.csv	11:03	5:13	588551	5684530	588782	5684077	509	333
6041DGDt_sub.csv	11:29	5:39	588546	5684529	588765	5684064	515	335
6044DGDt_sub.csv	11:58	6:08	588554	5684494	588758	5684065	476	335
6047DGDt_sub.csv	12:35	-5:25	588546	5684527	588753	5684053	518	337
6050DGDt_sub.csv	13:00	-4:59	588547	5684528	588754	5684053	518	336
6053DGDt_sub.csv	13:31	-4:29	588545	5684528	588750	5684050	520	337
6056DGDt_sub.csv	13:58	-4:02	588544	5684527	588753	5684055	516	336
6059DGDt_sub.csv	14:35	-3:25	588542	5684527	588757	5684056	517	335
6062DGDt_sub.csv	14:59	-3:01	588548	5684529	588758	5684054	520	336
6065DGDt_sub.csv	15:29	-2:31	588547	5684530	588755	5684052	520	336
6068DGDt_sub.csv	15:58	-2:02	588546	5684527	588751	5684054	516	337
6071DGDt_sub.csv	16:33	-1:27	588543	5684528	588754	5684053	519	336
6074DGDt_sub.csv	17:09	-0:51	588548	5684529	588750	5684051	519	337
6077DGDt_sub.csv	17:29	-0:31	588551	5684532	588756	5684053	521	337
6080DGDt_sub.csv	17:59	-0.01	588548	5684529	588754	5684054	518	337



Location of start en end points of the sailed tracks

APPENDIX B. TIDAL DATA

11283 - Winter 2006 SURVEY



Measured tide on 27/09/2006		*Data processed by:* IMDC
Location: River Scheldt	Date: 27/09/2006	*In association with:* wl | delft hydraulics, GEMS International I/RA/11283/06.119/MSA

APPENDIX C.

NAVIGATION INFORMATION AS RECORDED ON SITE

Ship:	**Parel II**
Location:	**Deurganckdok**

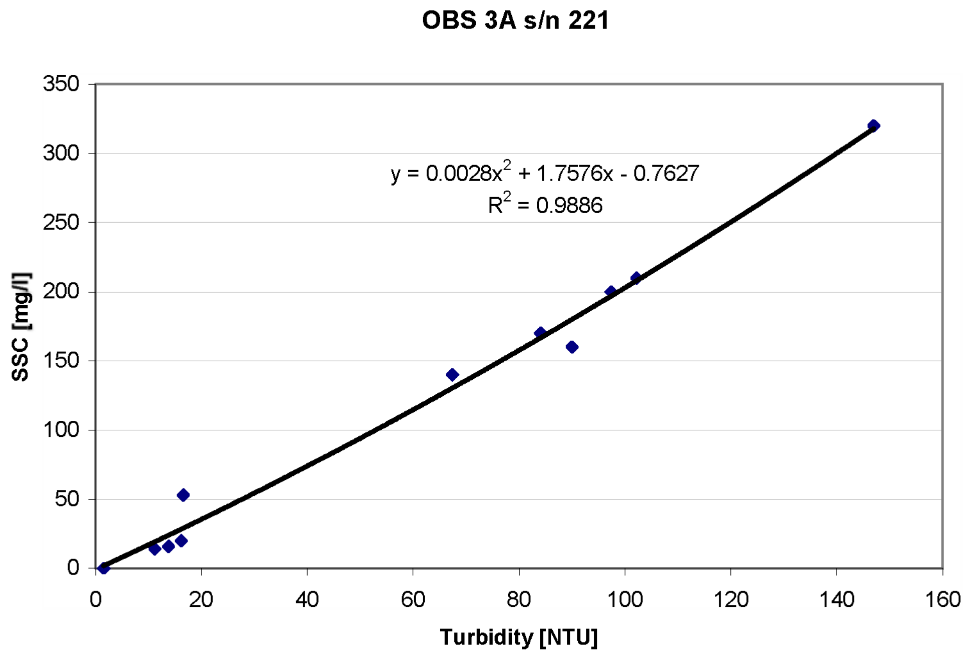
Nr.	***Tijdstip (MET)***	***Type ship***	***Direction (In, Out)***
1	5:39	Inland ship	out
2	6:37	Inland ship	in
3	6:49	Inland ship	out
4	6:58	Inland ship	in
5	7:27	Inland ship	out
6	7:32	Inland ship	out
7	7:45	Inland ship	in
8	8:04	Inland ship	out
9	8:19	Inland ship	in
10	8:32	Sea ship + Tugboat	out
11	8:26	Inland ship	in
12	9:11	Inland ship	out
13	9:20	Inland ship	in
14	9:24	Inland ship	out
15	10:20	Inland ship	in
16	10:50	Inland ship	in
17	10:55	Inland ship	out
18	11:00	Inland ship	in
19	11:01	Inland ship	out
20	11:06	Inland ship	out
21	11:44	Inland ship	in
22	12:25	Inland ship	in
23	12:25	Inland ship	out
24	12:30	Inland ship	in
25	12:35	Inland ship	in
26	12:35	Inland ship	out
27	12:49	Inland ship	out
28	12:49	Inland ship	in
29	12:49	Inland ship	out
30	12:54	Inland ship	in

31	13:06	Inland ship	in
32	13:08	Inland ship	out
33	13:09	Inland ship	in
34	13:41	Inland ship	out
35	13:44	Inland ship	in
36	13:45	Inland ship	out
37	13:46	Inland ship	out
38	13:48	Inland ship	out
39	13:51	Inland ship	in
40	13:55	Inland ship	uit
41	14:29	Inland ship	in
42	14:30	Inland ship	uit
43	14:31	Inland ship	in
44	14:46	Inland ship	in
45	15:06	Inland ship	in
46	15:07	Inland ship	uit
47	15:37	Inland ship	uit
48	16:08	Inland ship	in
49	16:12	Inland ship	in
50	16:36	Inland ship	in
51	17:01	Inland ship	uit
52	17:05	Inland ship	uit
53	17:23	Inland ship	uit
54	17:43	Tugboat	in
55	17:44	Inland ship	uit
56	17:47	Inland ship	uit

APPENDIX D.

CALIBRATION GRAPHS FOR OBS DATA

11283 – September 2006 SURVEY



Calibration Graph of OBS3A		Data processed by: In association with: I/RA/11283/06.119/MSA
Location: Deurganckdok	Date: 23/06/2006	

APPENDIX E.

UNESCO PPS-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	$R = \frac{C}{42.914mS/cm}$
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

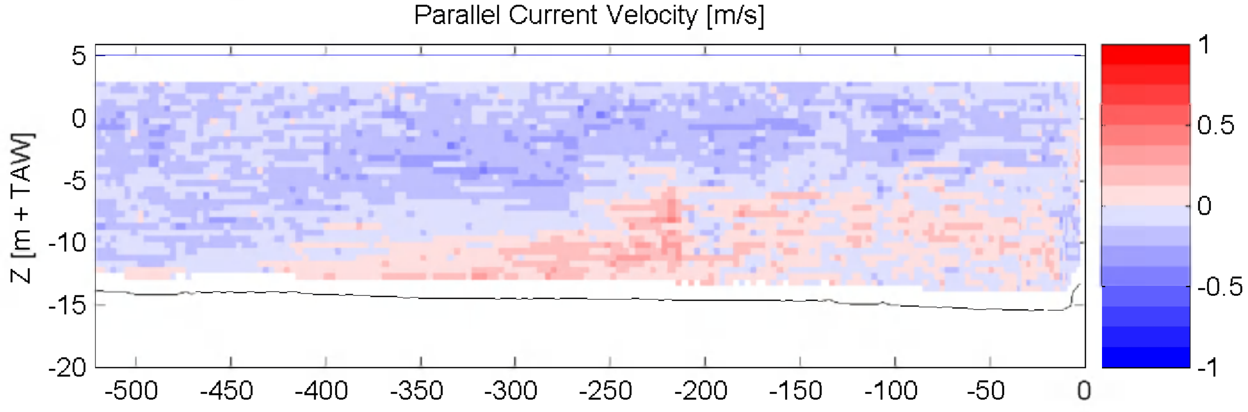
Ocean pressure is usually measured in decibars. 1 dbar = 10^-1 bar = 10^5 dyne/cm^2 = 10^4 Pascal.

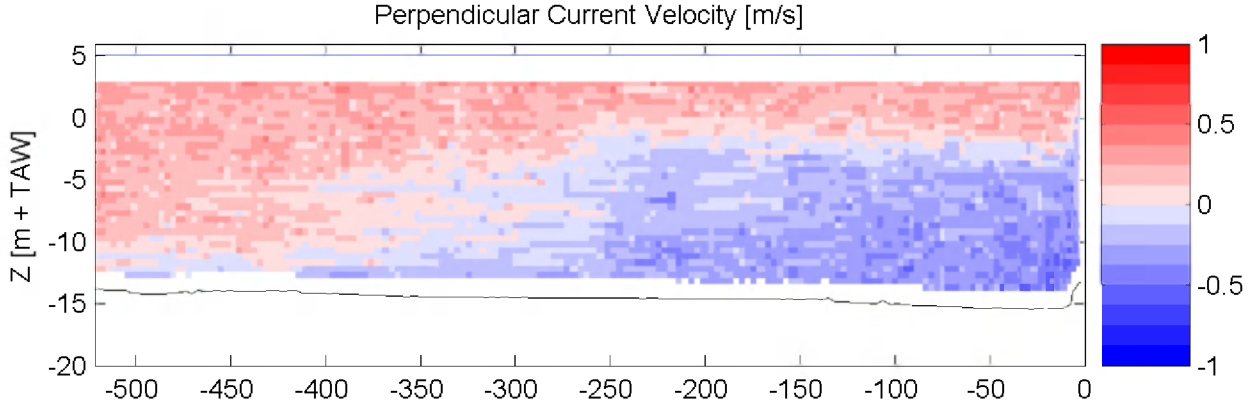
APPENDIX F.CONTOURPLOTS OF FLOW VELOCITIES, SEDIMENT CONCENTRATION AND SEDIMENT FLUX PER SAILED TRANSECT

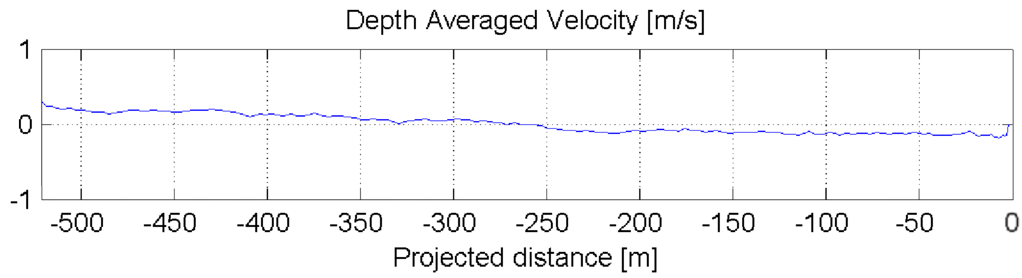
This page is intentionally left blank.

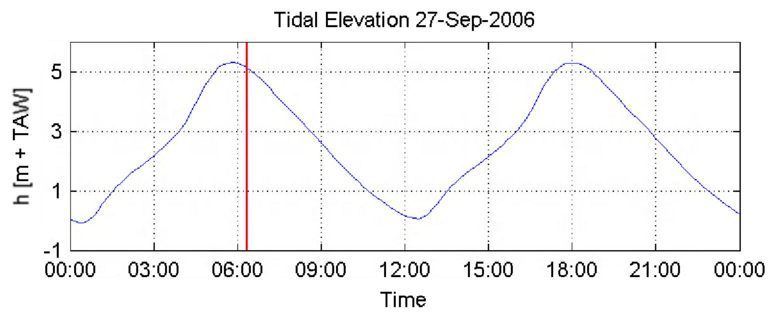
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6002DGDt_sub2.csv	Location: Transect DGD









HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
06:18 - 06:21

Time after HW [HH:MM]
0:29

Data Processed by: IMDC

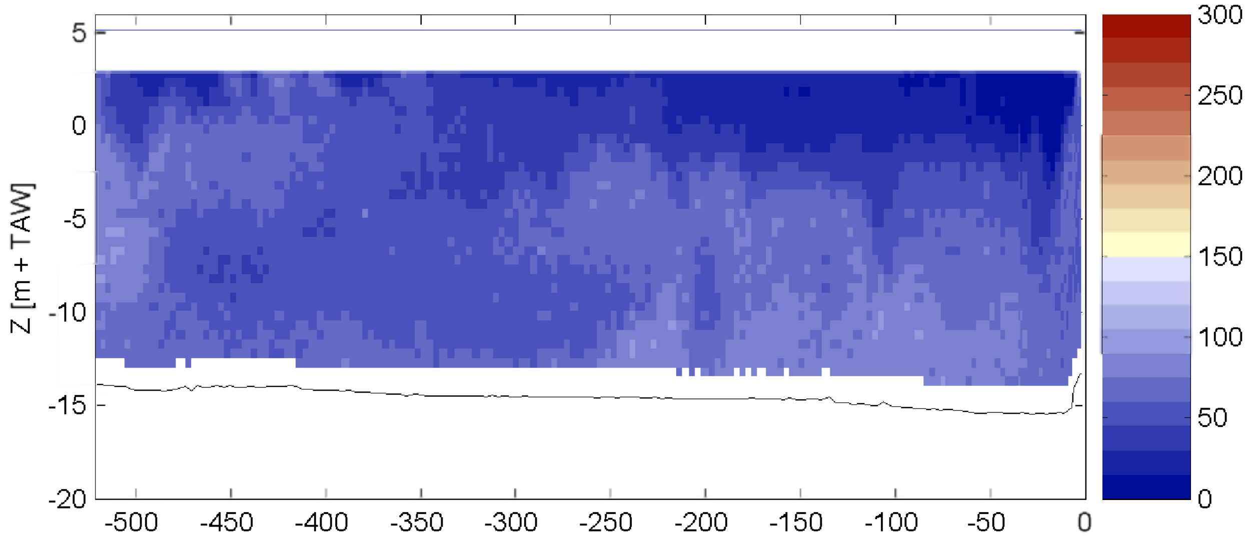
In association with :

I/RA/11283/06.119/MSA

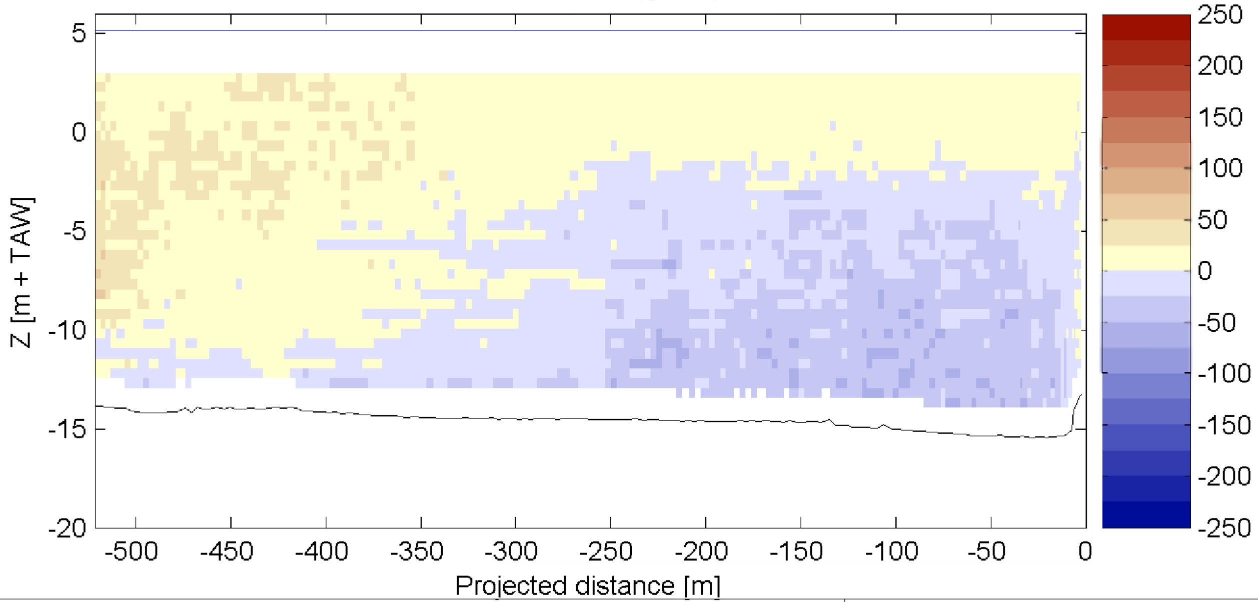
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6002DGDt_sub2.csv	Location: Transect DGD

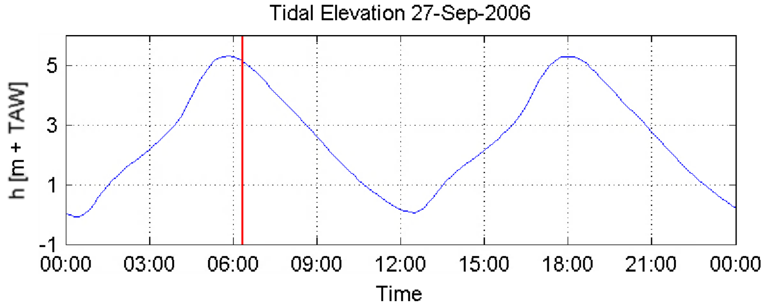
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 27-Sep-2006



HW/LW:

05:50: h = 5.31 m+TAW

12:30: h = 0.05 m+TAW

18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

06:18 - 06:21

Time after HW [HH:MM]

0:29

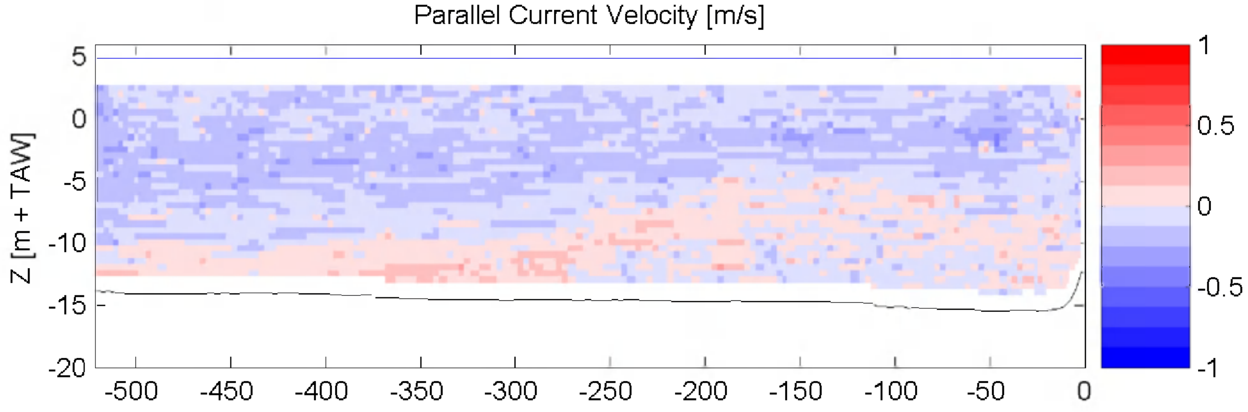
Data Processed by:

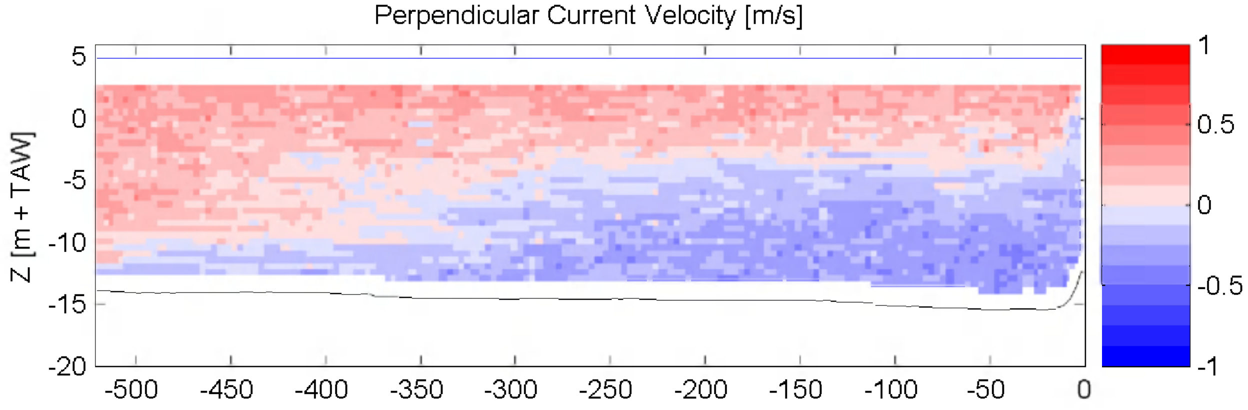
In association with :

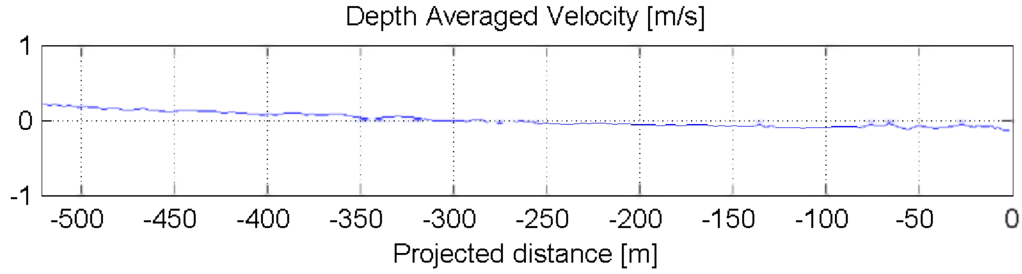
I/RA/11283/06.119/MSA

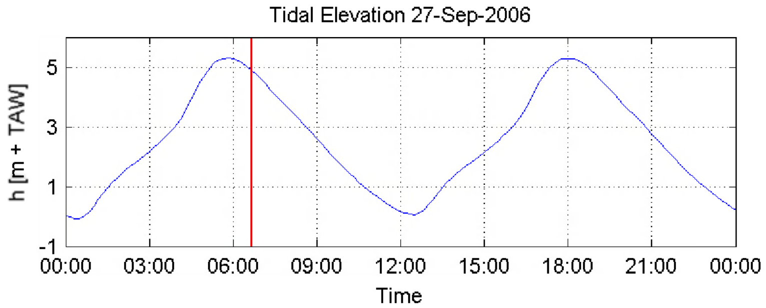
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6005DGDt_sub.csv	Location: Transect DGD









HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
06:36 - 06:40

Time after HW [HH:MM]
0:48

Data Processed by: IMDC

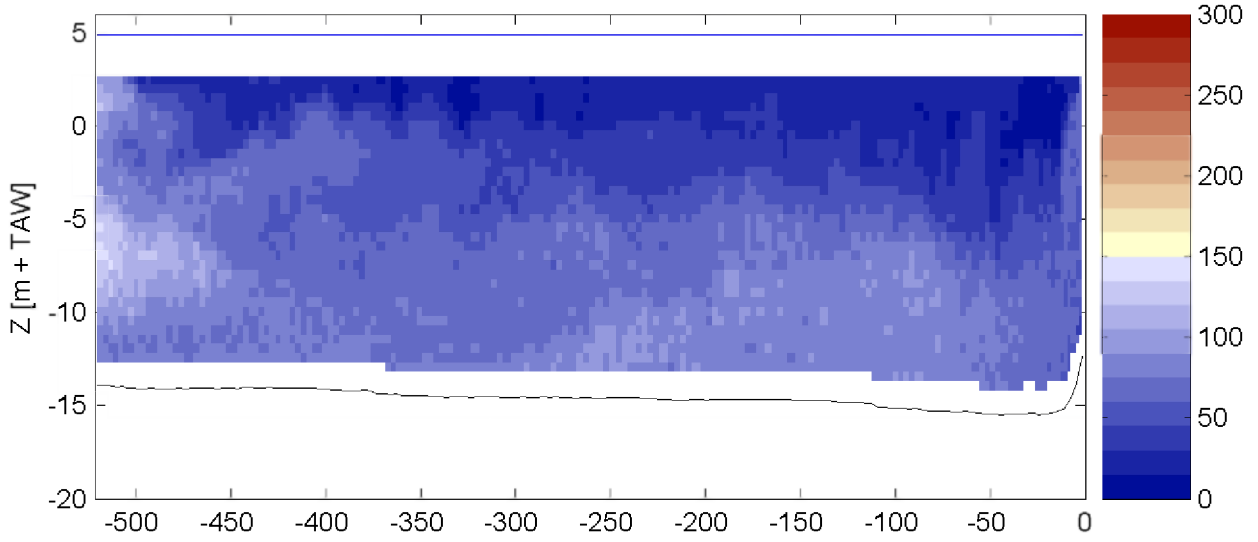
In association with : WL | delft hydraulics, GEMS international

I/RA/11283/06.119/MSA

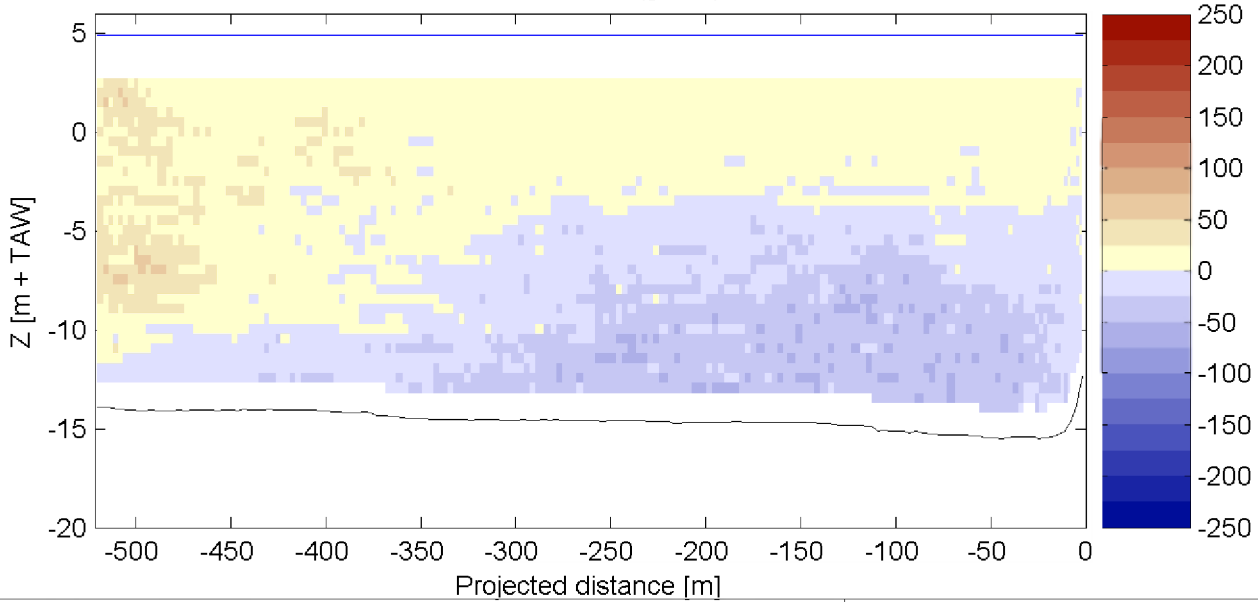
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6005DGDt_sub.csv	Location: Transect DGD

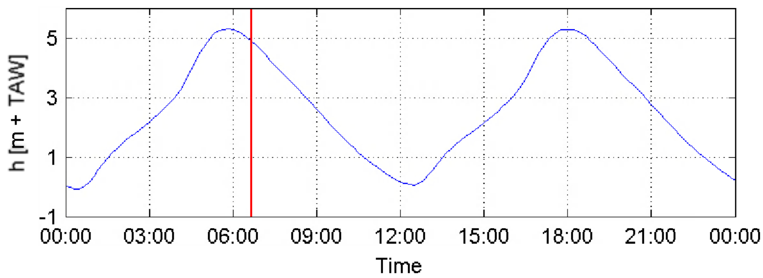
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 27-Sep-2006



HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

06:36 - 06:40

Time after HW [HH:MM]

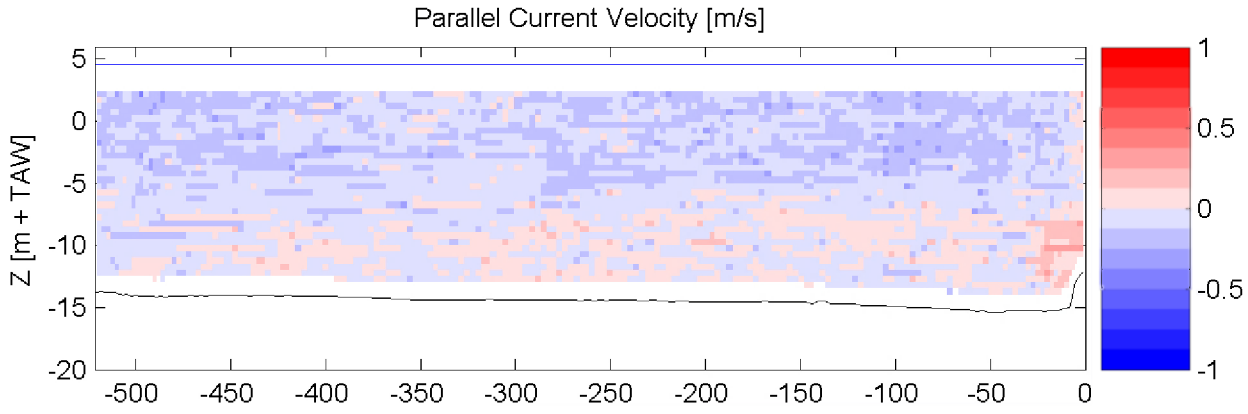
0:48

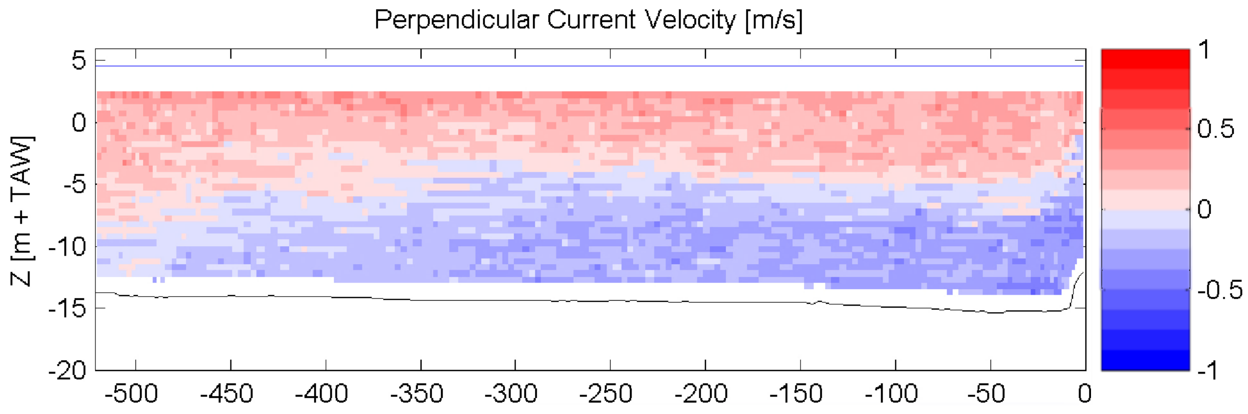
Data Processed by: IMDC

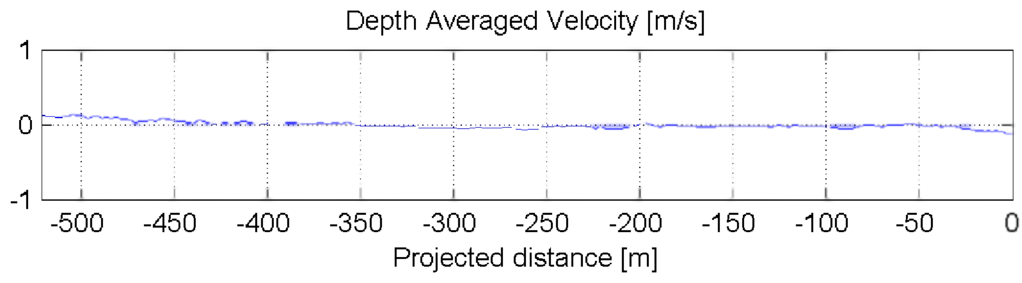
In association with :

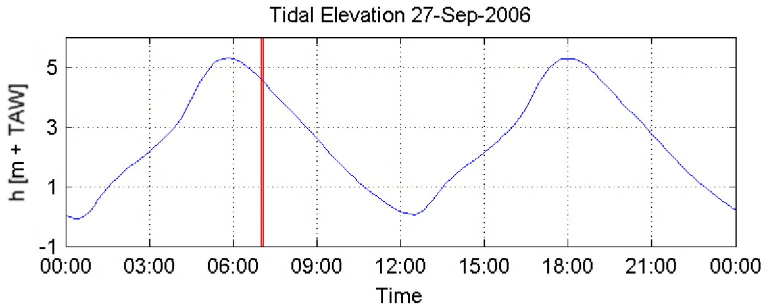
I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok	
11283	Equipment(s): ADCP
Sourcefile: 6008DGDt_sub.csv	Location: Transect DGD









HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
07:01 - 07:04

Time after HW [HH:MM]
1:12

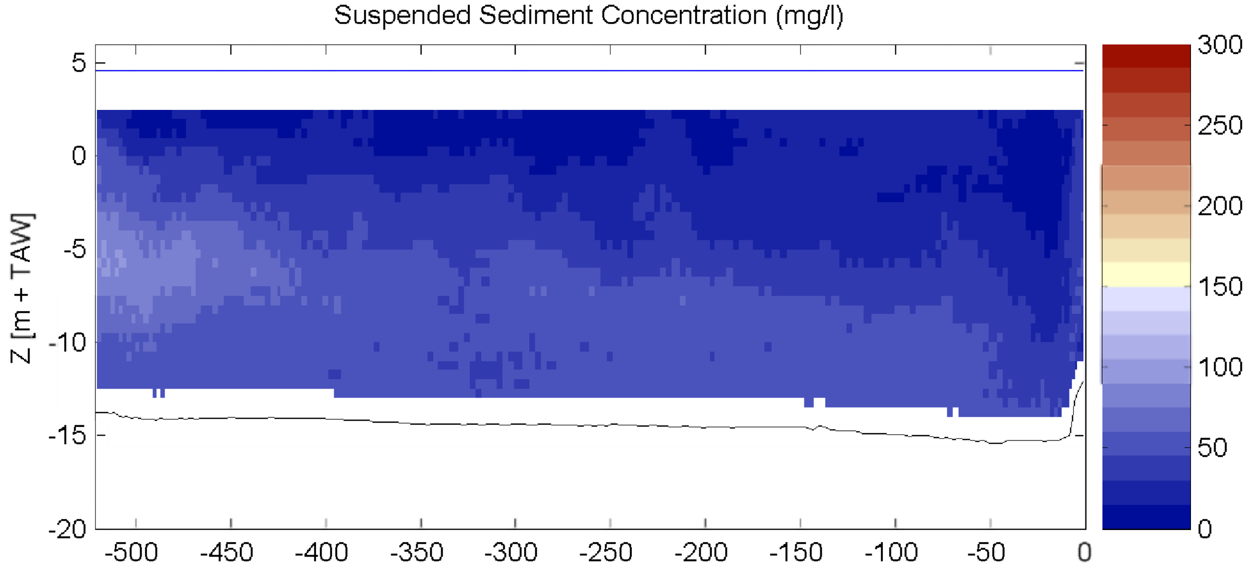
Data Processed by: IMDC

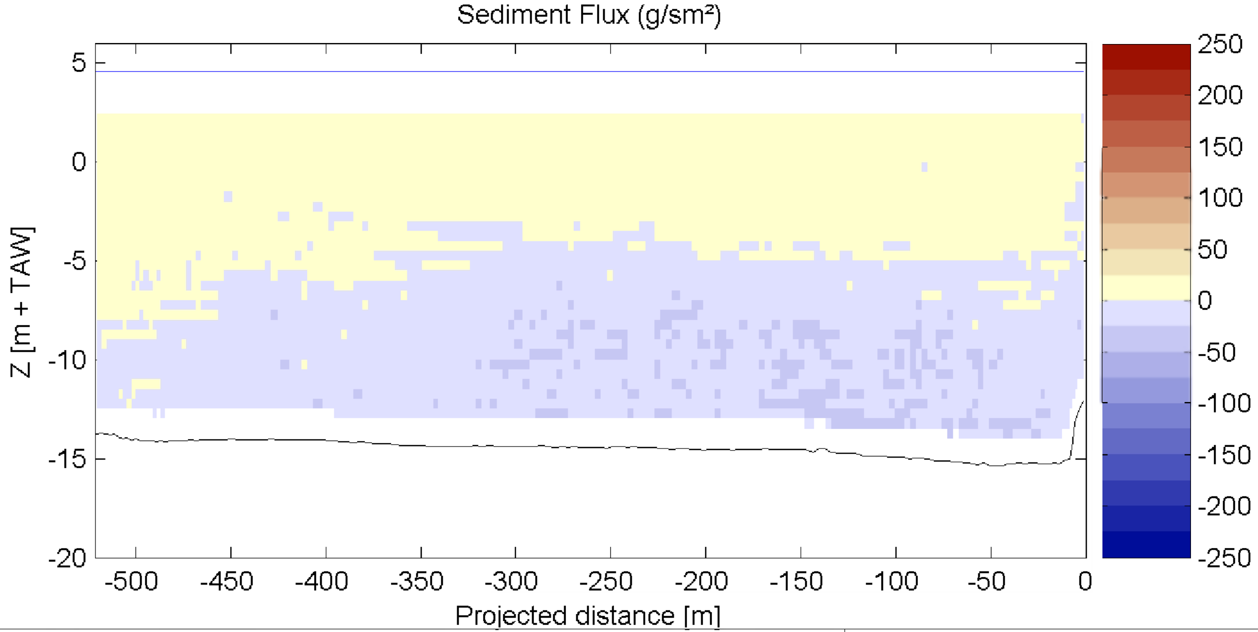
In association with :

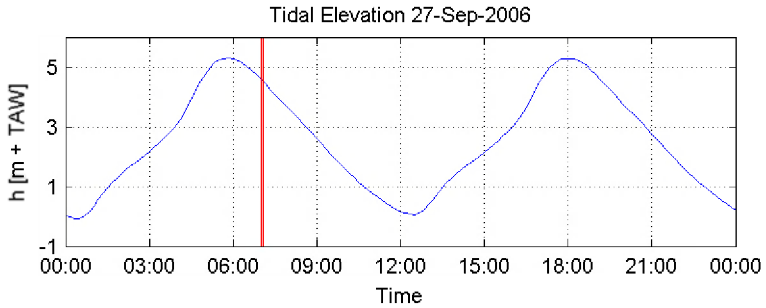
I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6008DGDt_sub.csv	Location: Transect DGD







HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
07:01 - 07:04

Time after HW [HH:MM]
1:12

Data Processed by: IMDC

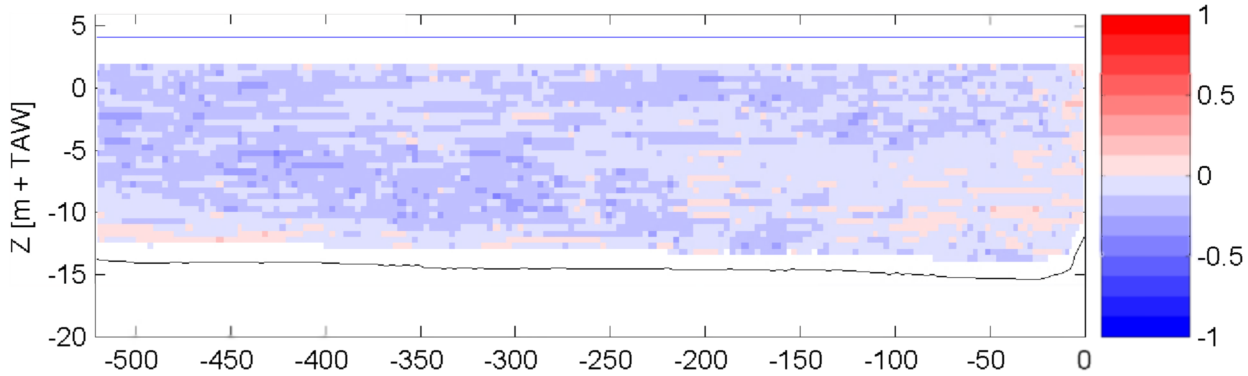
In association with : wl | delft hydraulics, GEMS international

I/RA/11283/06.119/MSA

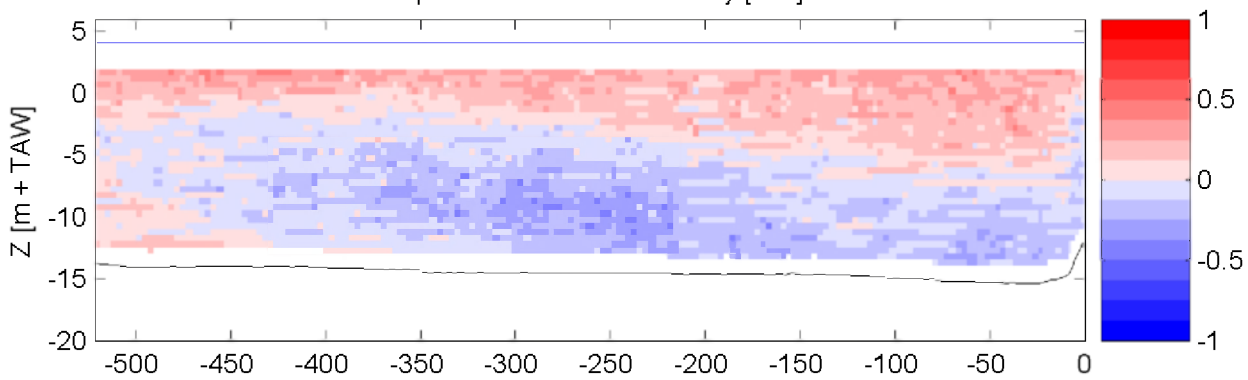
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6011DGDt_sub.csv	Location: Transect DGD

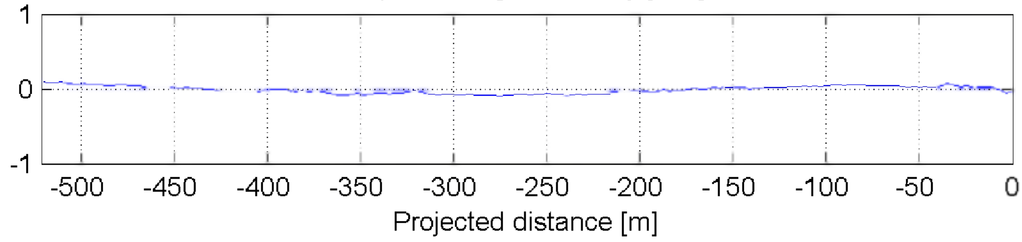
Parallel Current Velocity [m/s]



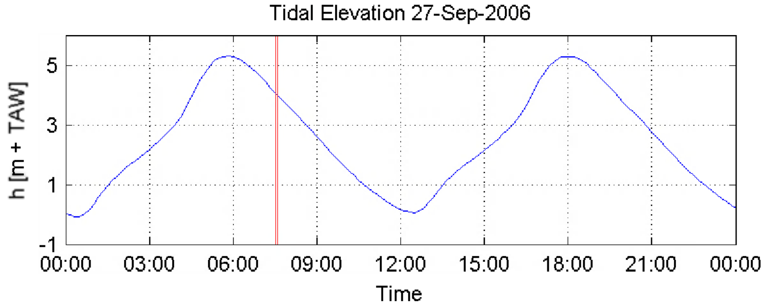
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 27-Sep-2006



HW/LW:

05:50: h = 5.31 m+TAW

12:30: h = 0.05 m+TAW

18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

07:31 - 07:34

Time after HW [HH:MM]

1:42

Data Processed by:

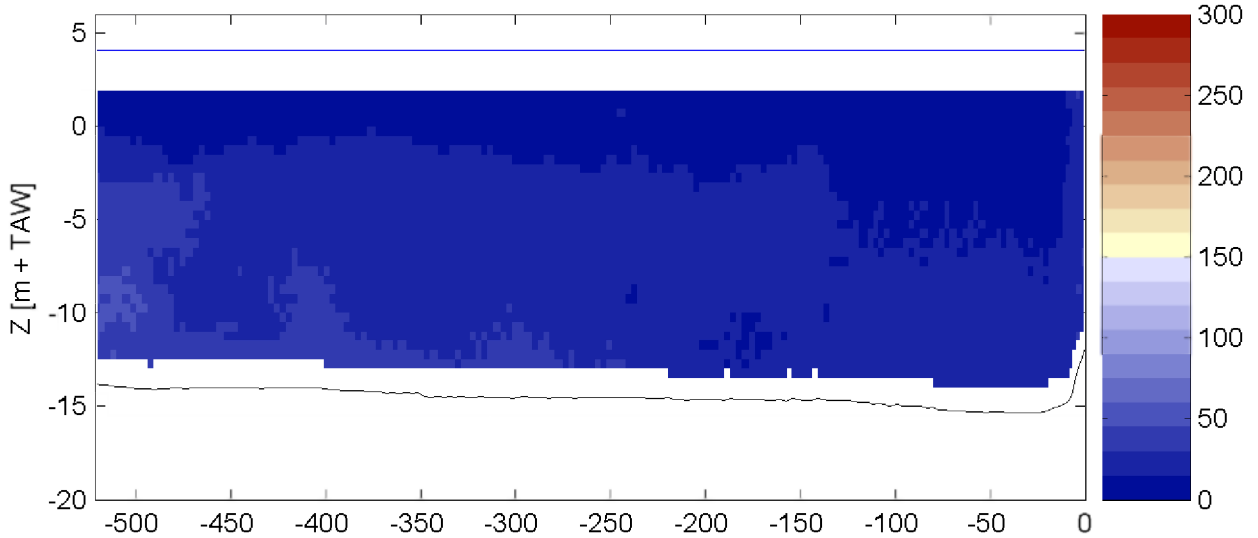
In association with :

I/RA/11283/06.119/MSA

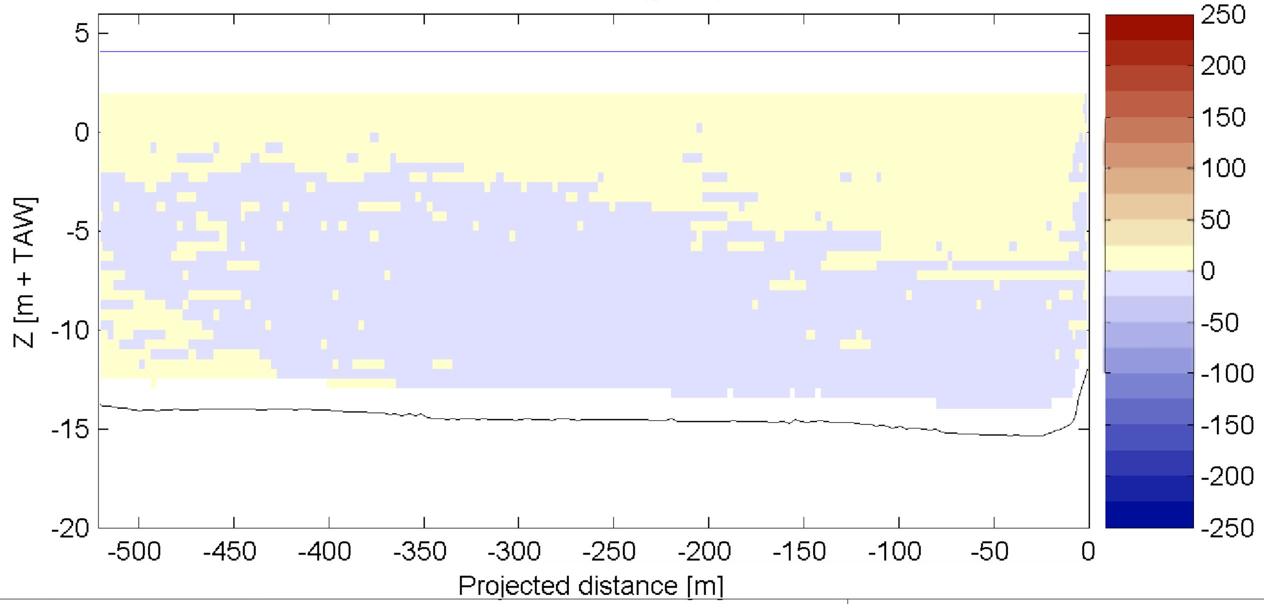
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6011DGDt_sub.csv	Location: Transect DGD

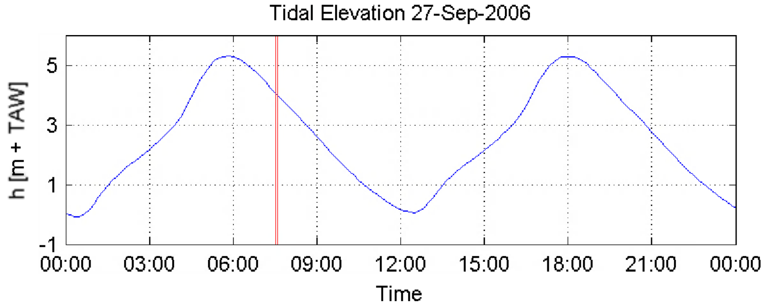
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 27-Sep-2006



HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
07:31 - 07:34

Time after HW [HH:MM]
1:42

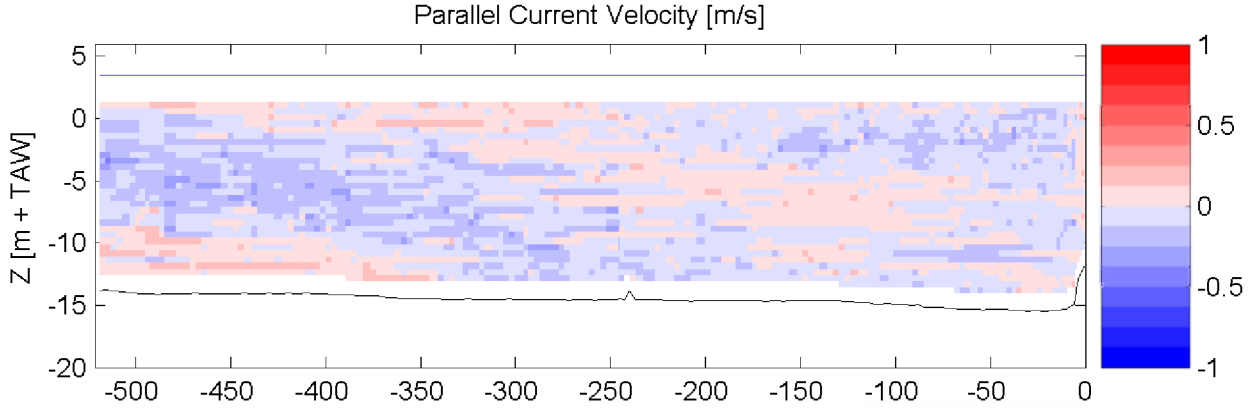
Data Processed by: IMDC

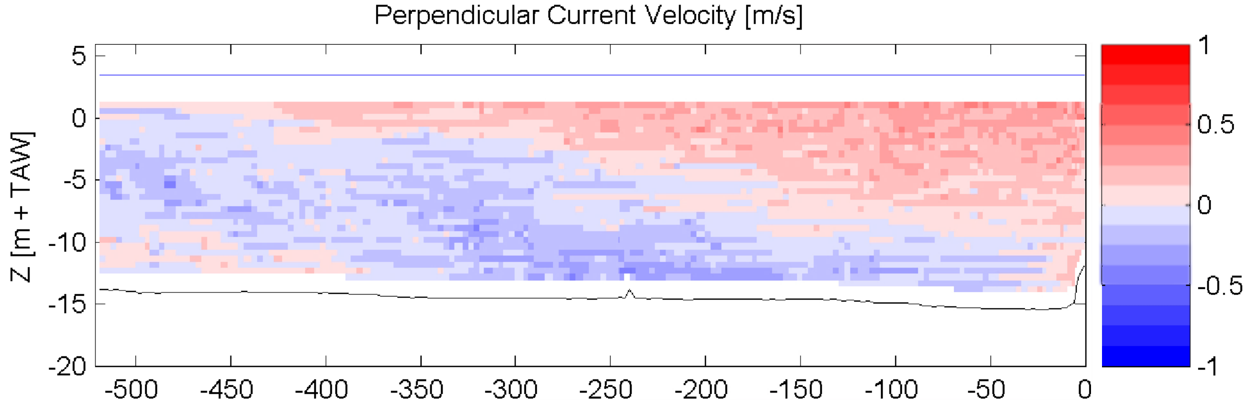
In association with : WL | delft hydraulics, GEMS international

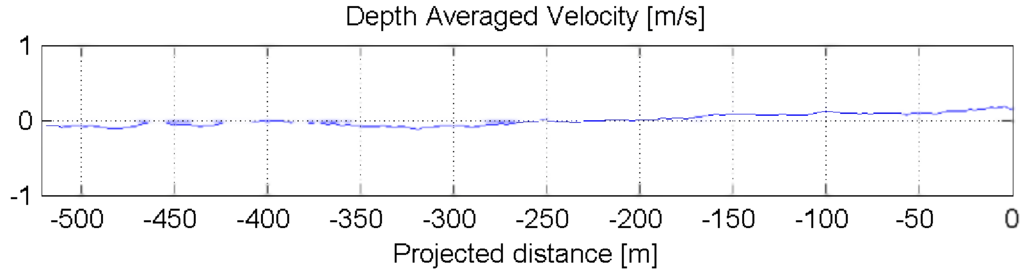
I/RA/11283/06.119/MSA

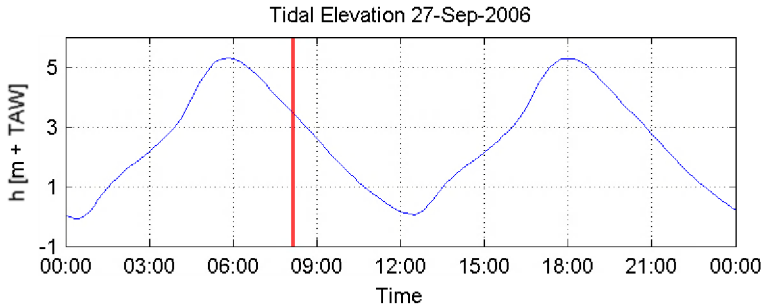
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6014DGDt_sub.csv	Location: Transect DGD









HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

08:07 - 08:11

Time after HW [HH:MM]

2:19

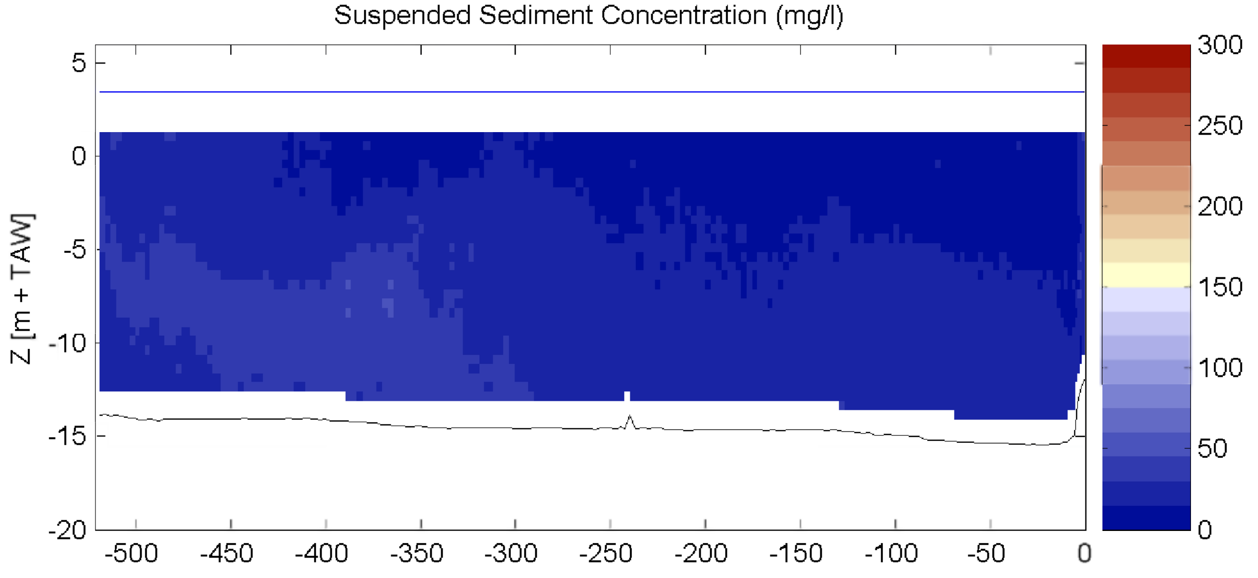
Data Processed by: IMDC

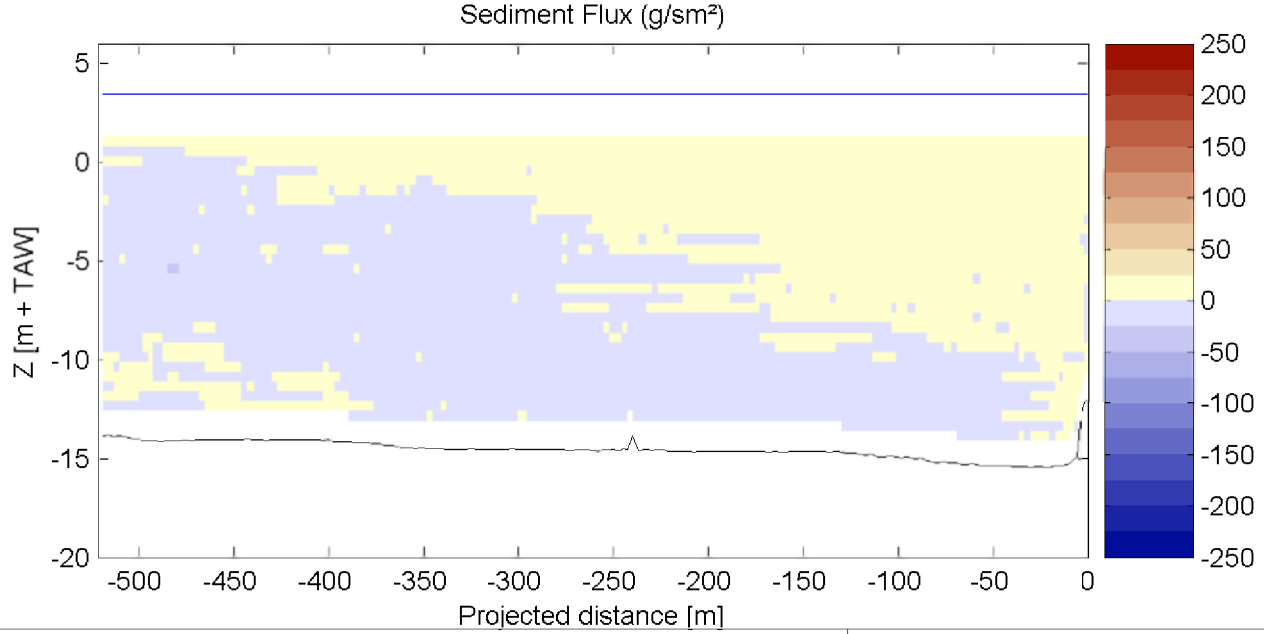
In association with :

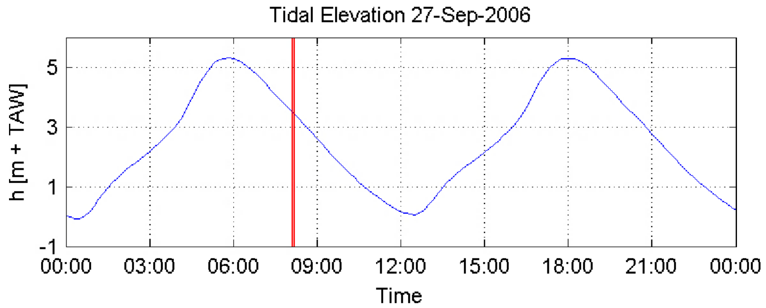
I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6014DGDt_sub.csv	Location: Transect DGD







HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
08:07 - 08:11

Time after HW [HH:MM]
2:19

Data Processed by: IMDC

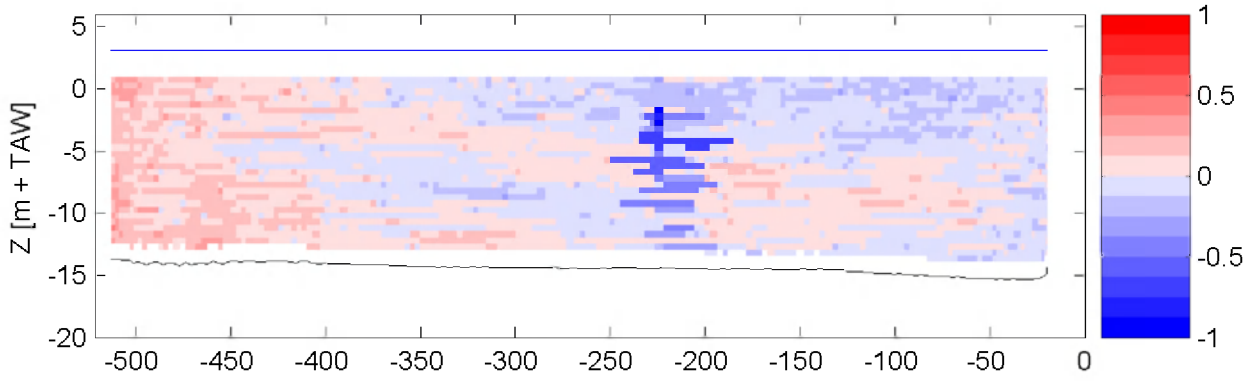
In association with :

I/RA/11283/06.119/MSA

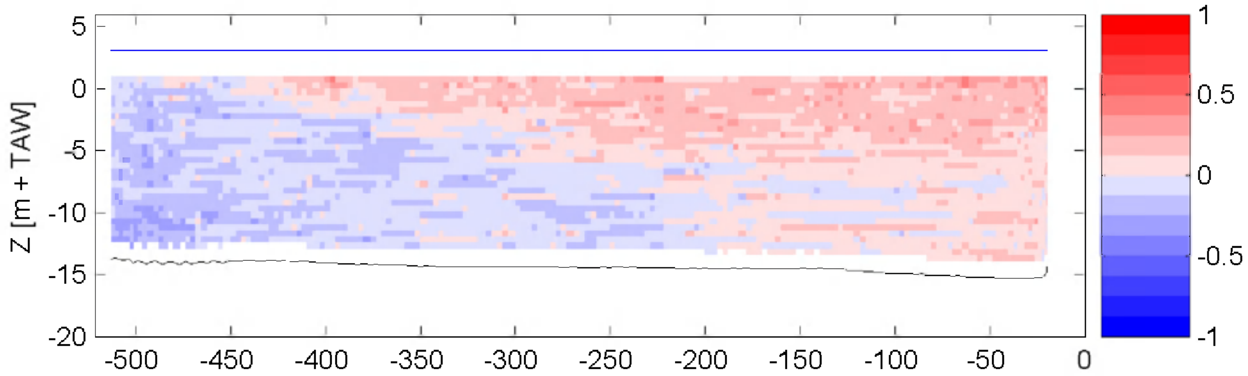
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6017DGDt_sub.csv	Location: Transect DGD

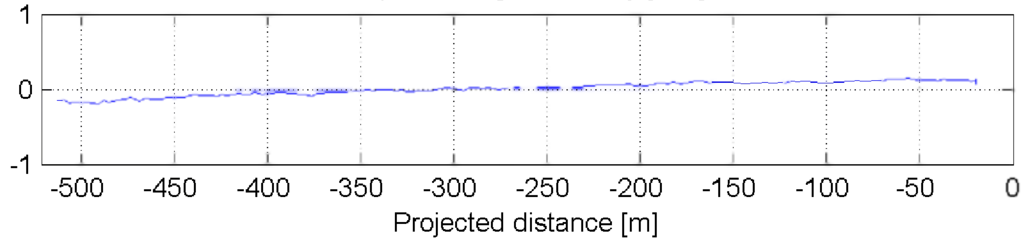
Parallel Current Velocity [m/s]



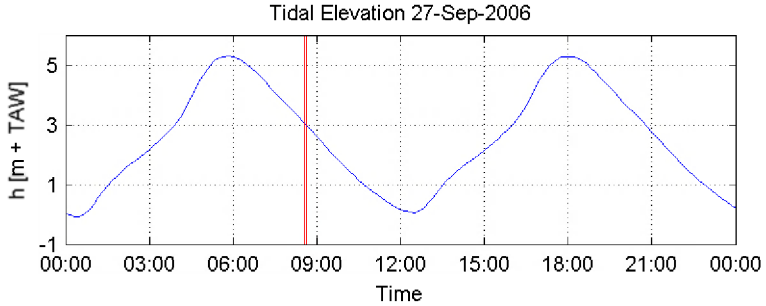
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 27-Sep-2006



HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

08:32 - 08:36

Time after HW [HH:MM]

2:44

Data Processed by: IMDC

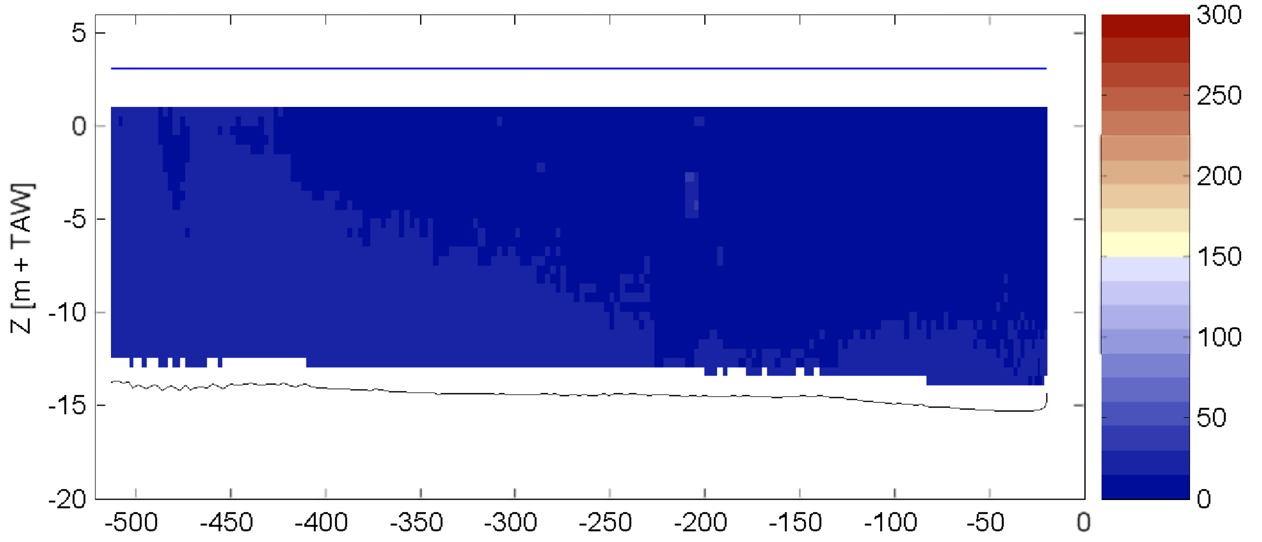
In association with :

I/RA/11283/06.119/MSA

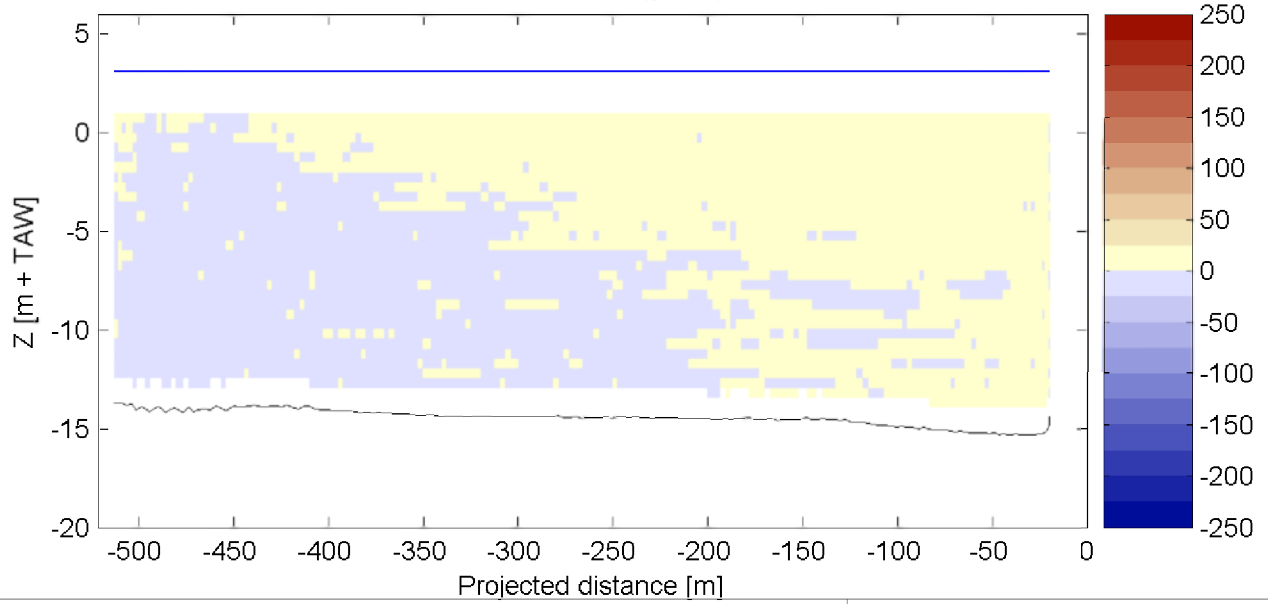
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6017DGDt_sub.csv	Location: Transect DGD

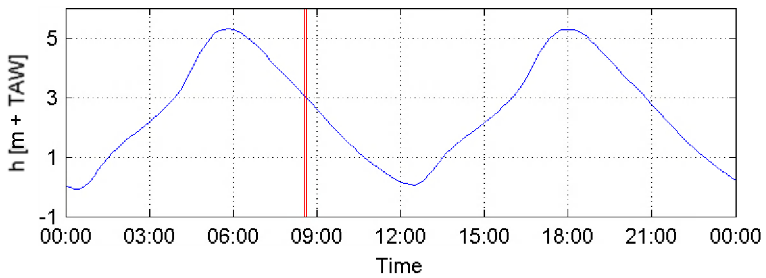
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 27-Sep-2006



HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

08:32 - 08:36

Time after HW [HH:MM]

2:44

Data Processed by: IMDC

In association with : wl | delft hydraulics, GEMS international

I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

11283

Equipment(s):

ADCP

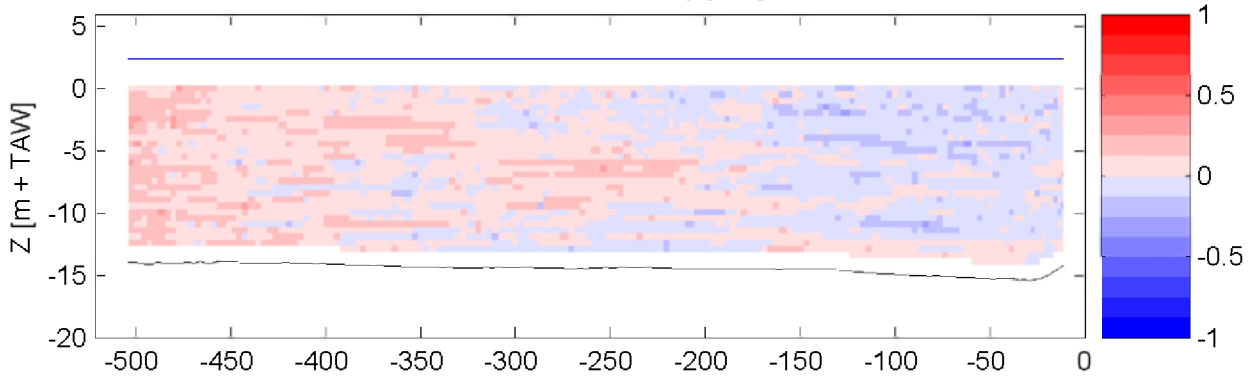
Sourcefile:

6020DGDt_sub.csv

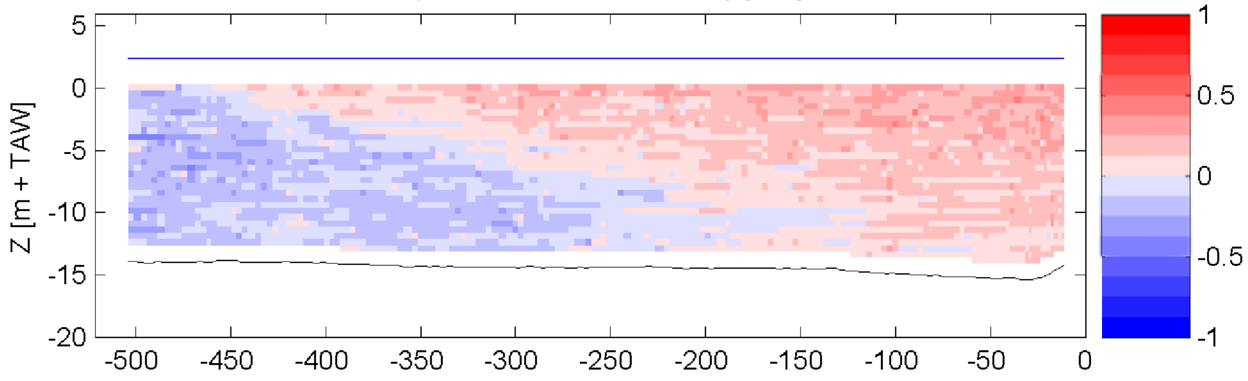
Location:

Transect DGD

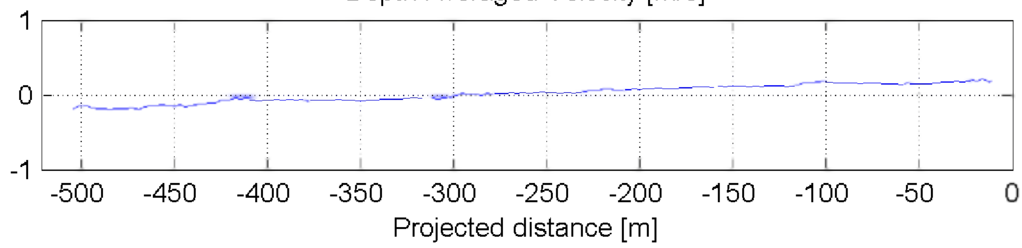
Parallel Current Velocity [m/s]



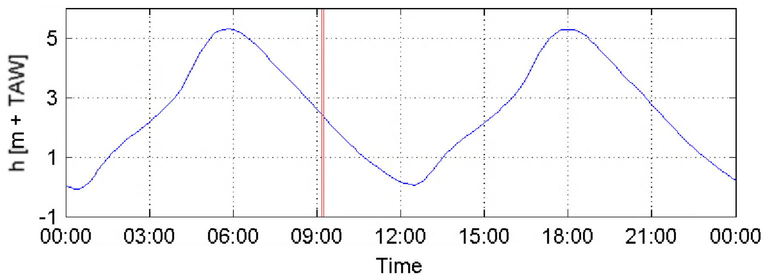
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 27-Sep-2006



HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

09:11 - 09:14

Time after HW [HH:MM]

3:22

Data Processed by:

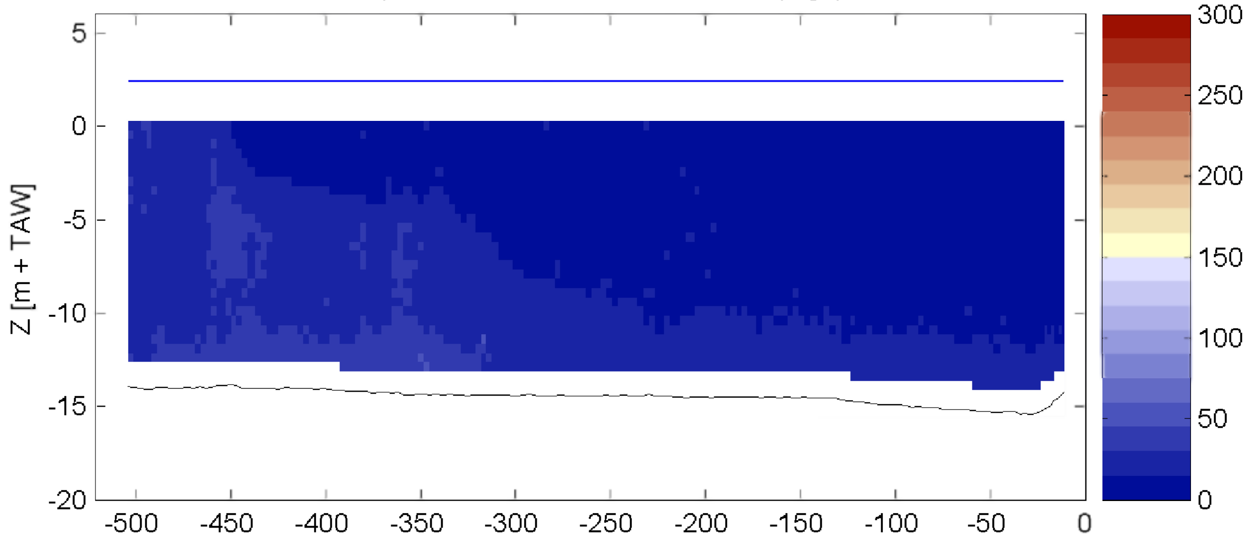
In association with :

I/RA/11283/06.119/MSA

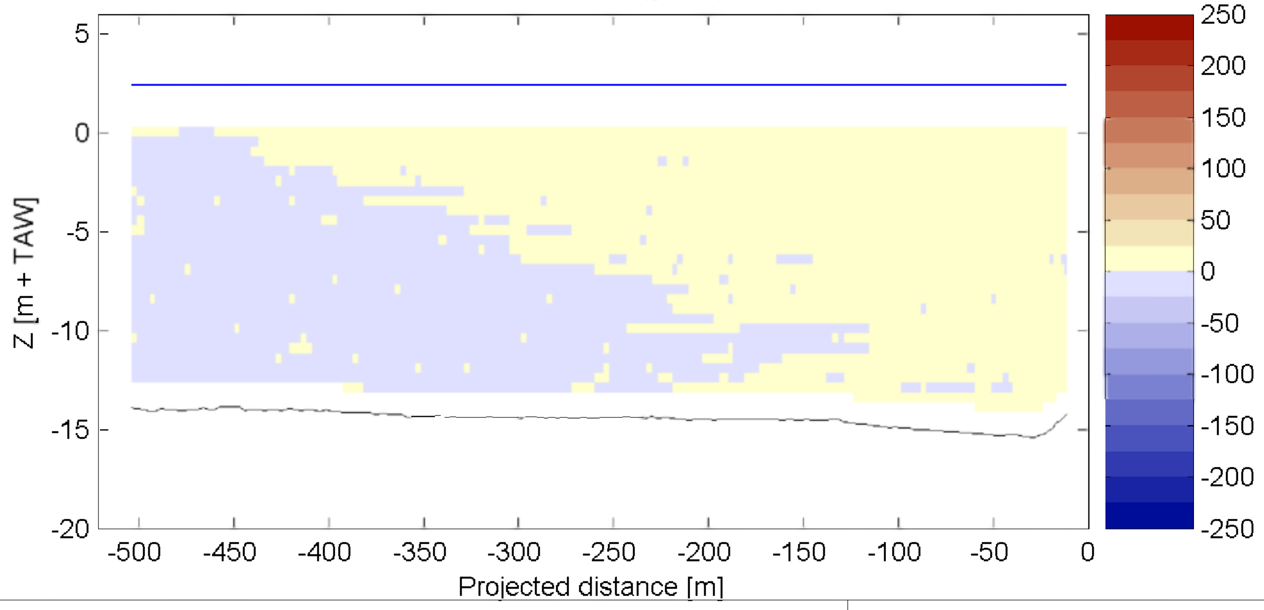
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6020DGDt_sub.csv	Location: Transect DGD

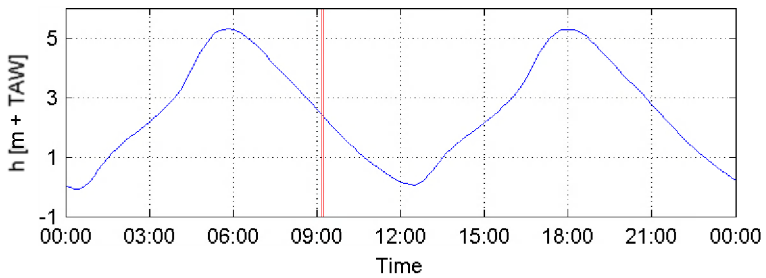
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 27-Sep-2006



HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
09:11 - 09:14

Time after HW [HH:MM]
3:22

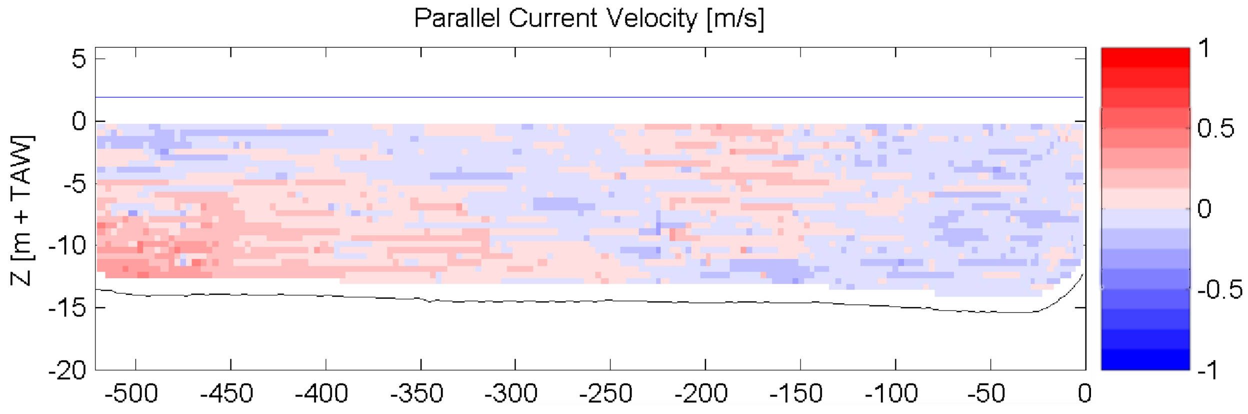
Data Processed by:

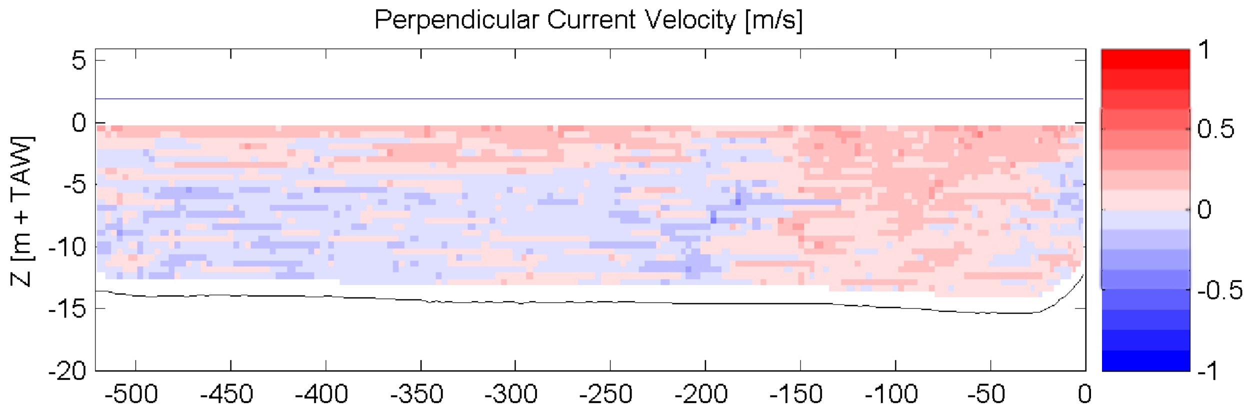
In association with :

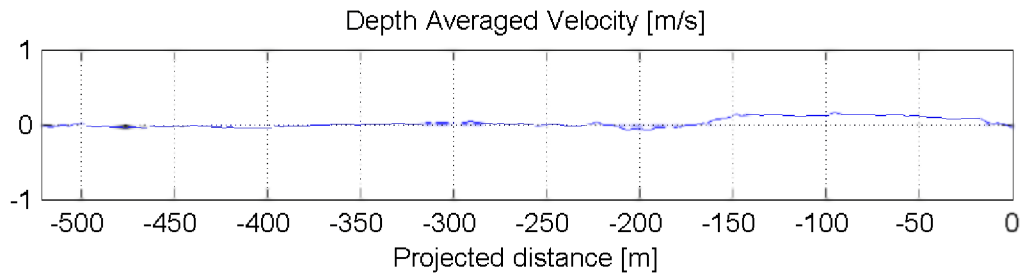
I/RA/11283/06.119/MSA

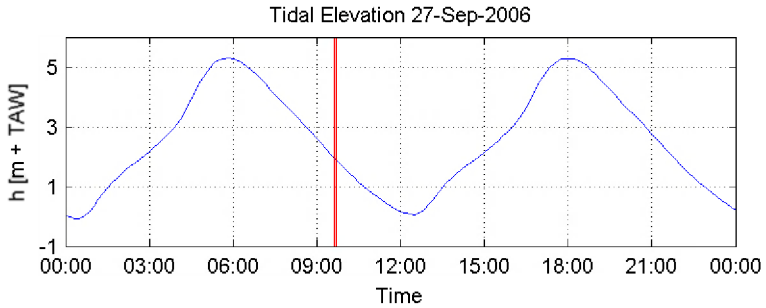
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6023DGDt_sub.csv	Location: Transect DGD









HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

09:37 - 09:41

Time after HW [HH:MM]

3:49

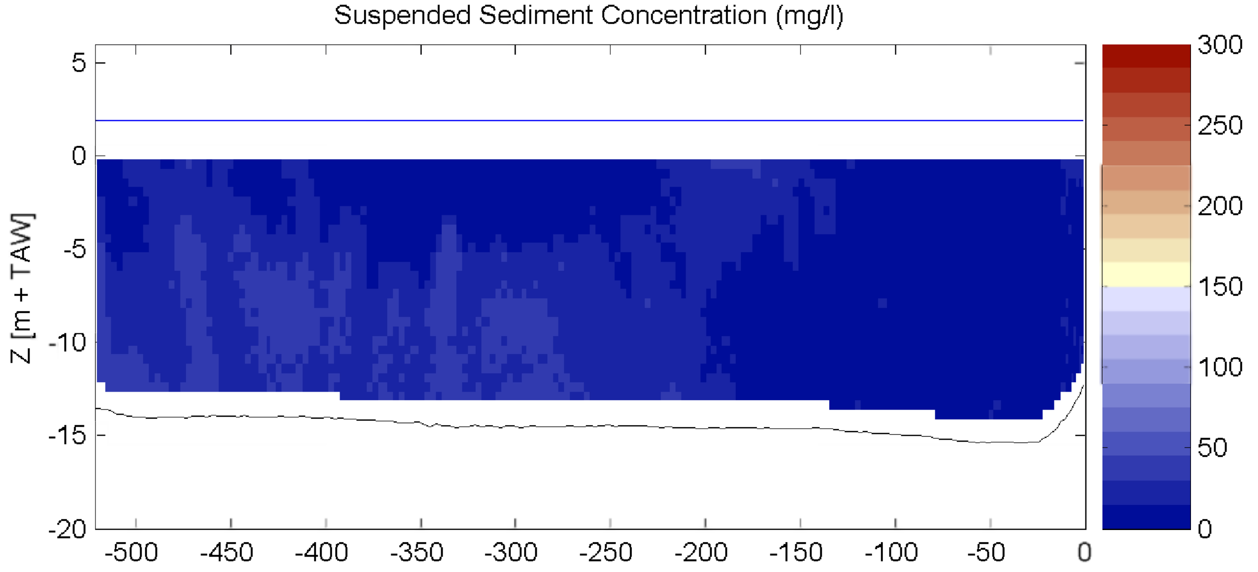
Data Processed by:

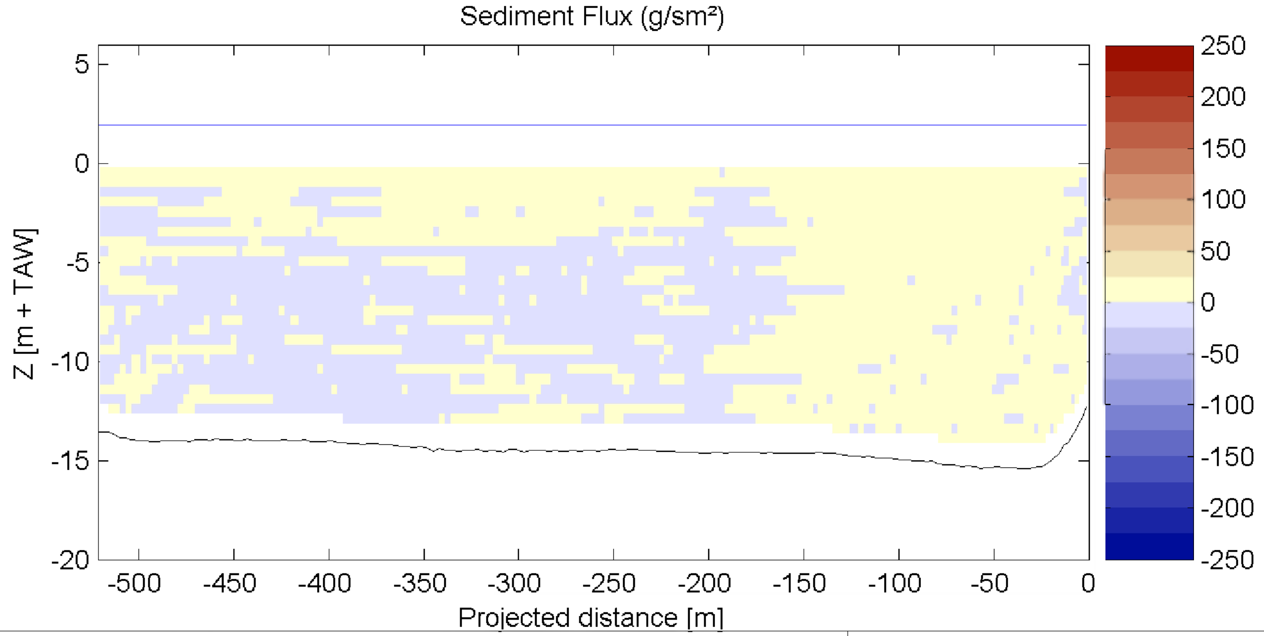
In association with :

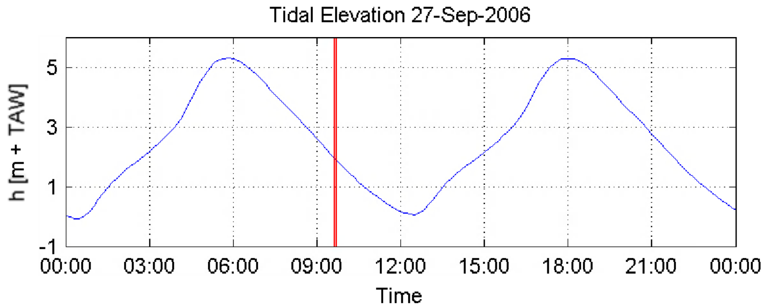
I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6023DGDt_sub.csv	Location: Transect DGD







HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
09:37 - 09:41

Time after HW [HH:MM]
3:49

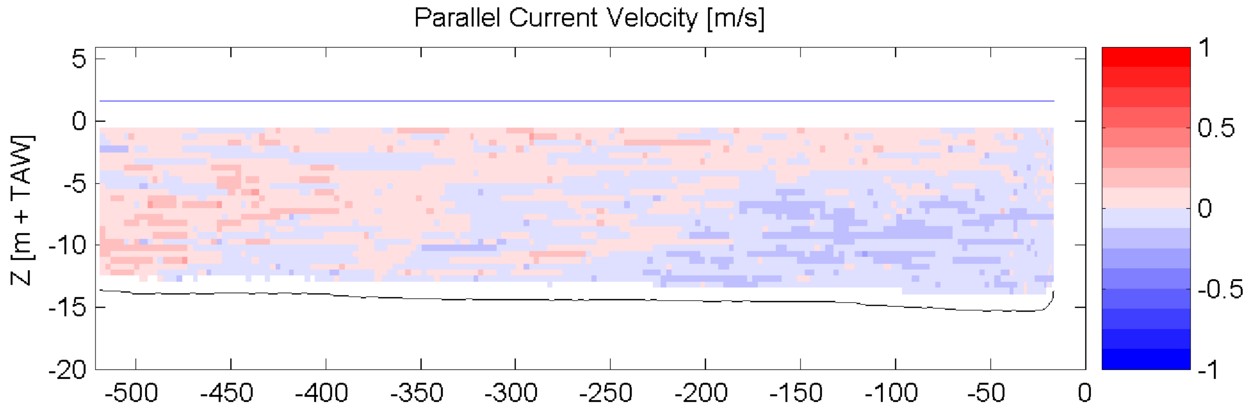
Data Processed by: IMDC

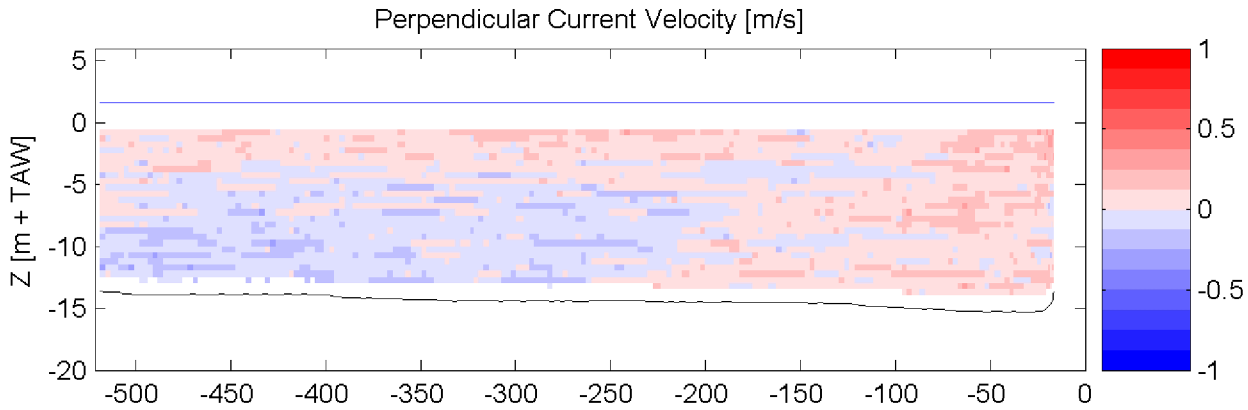
In association with :

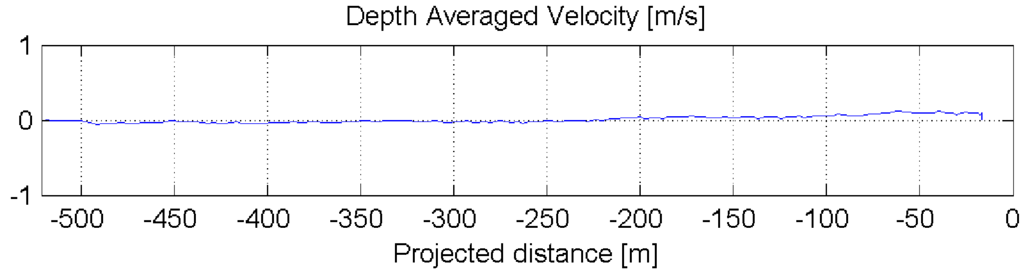
I/RA/11283/06.119/MSA

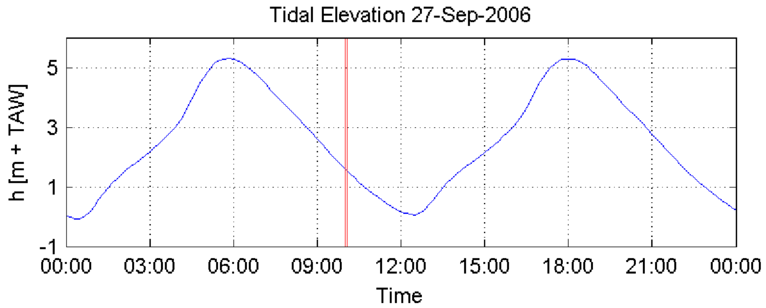
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6026DGDt_sub.csv	Location: Transect DGD









HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
10:00 - 10:04

Time after HW [HH:MM]
4:12

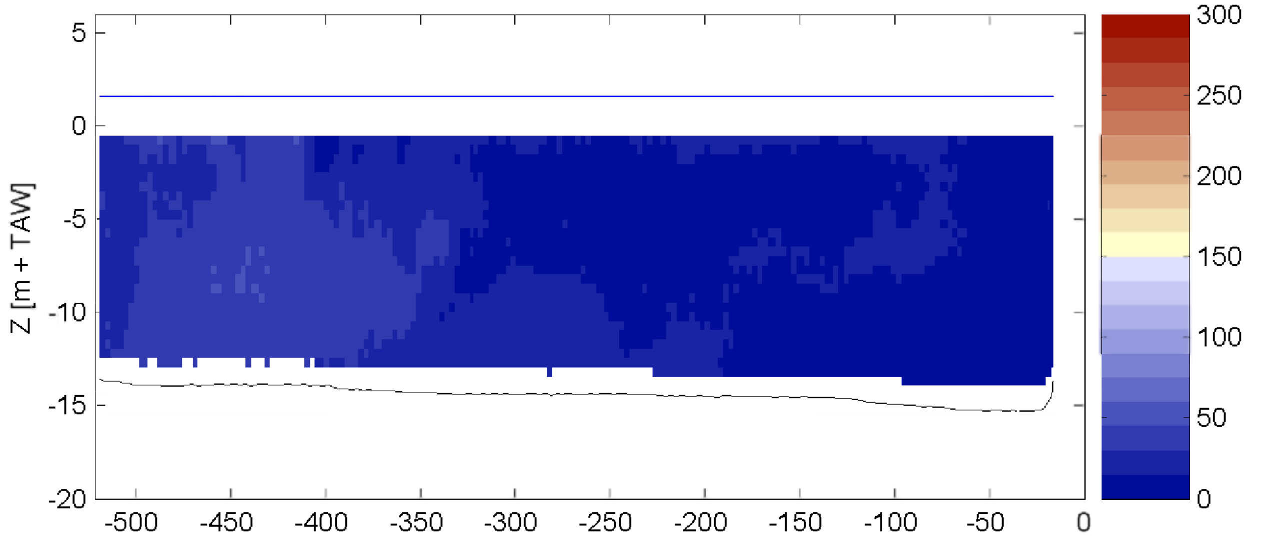
Data Processed by: IMDC
In association with : wl | delft hydraulics, GEMS international

I/RA/11283/06.119/MSA

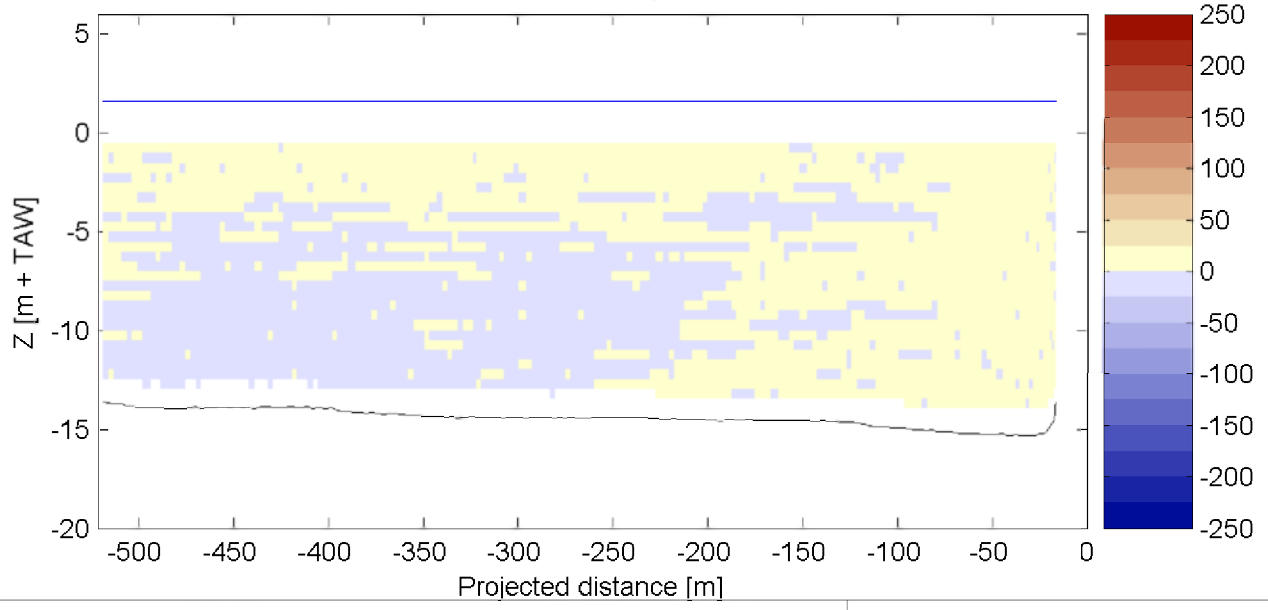
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6026DGDt_sub.csv	Location: Transect DGD

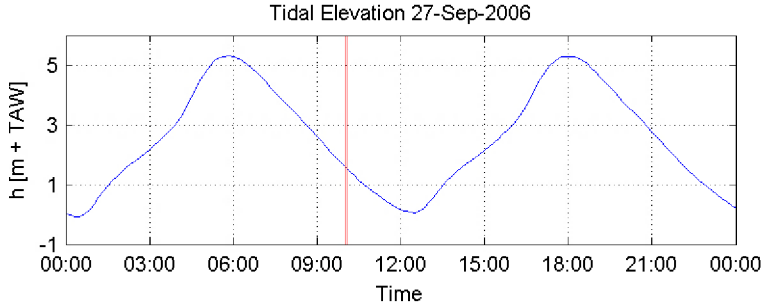
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 27-Sep-2006



HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

10:00 - 10:04

Time after HW [HH:MM]

4:12

Data Processed by: IMDC

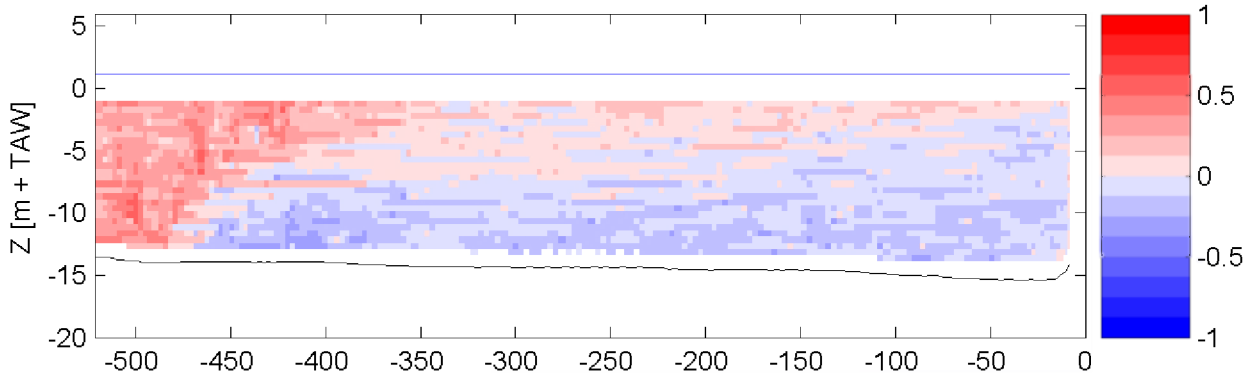
In association with : WL | delft hydraulics, GEMS international

I/RA/11283/06.119/MSA

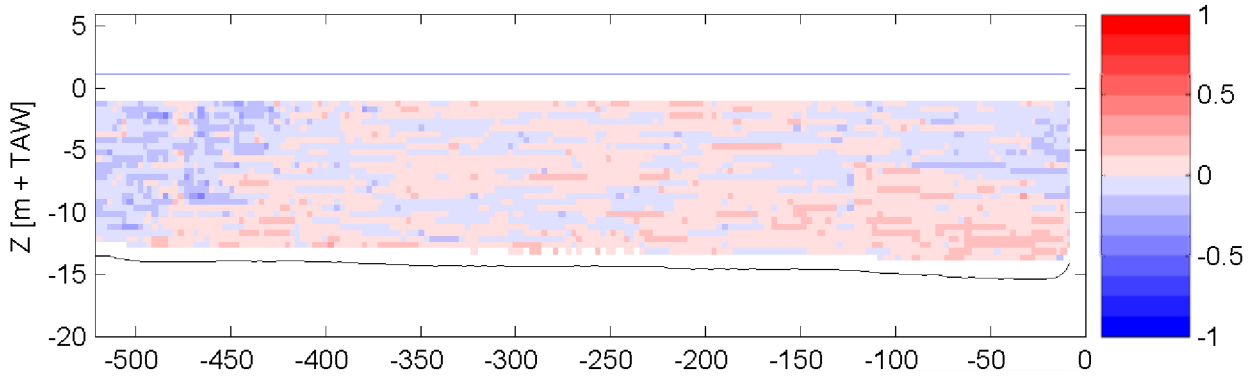
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6029DGDt_sub.csv	Location: Transect DGD

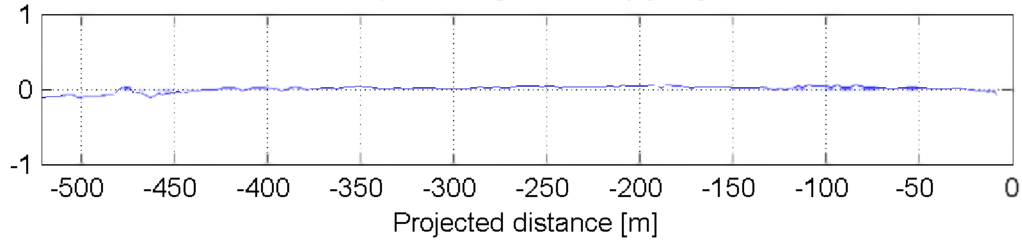
Parallel Current Velocity [m/s]



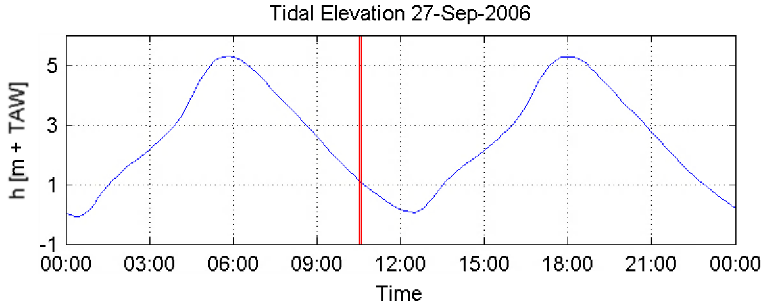
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 27-Sep-2006



HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
10:30 - 10:34

Time after HW [HH:MM]
4:42

Data Processed by: IMDC

In association with :

I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

11283

Equipment(s):

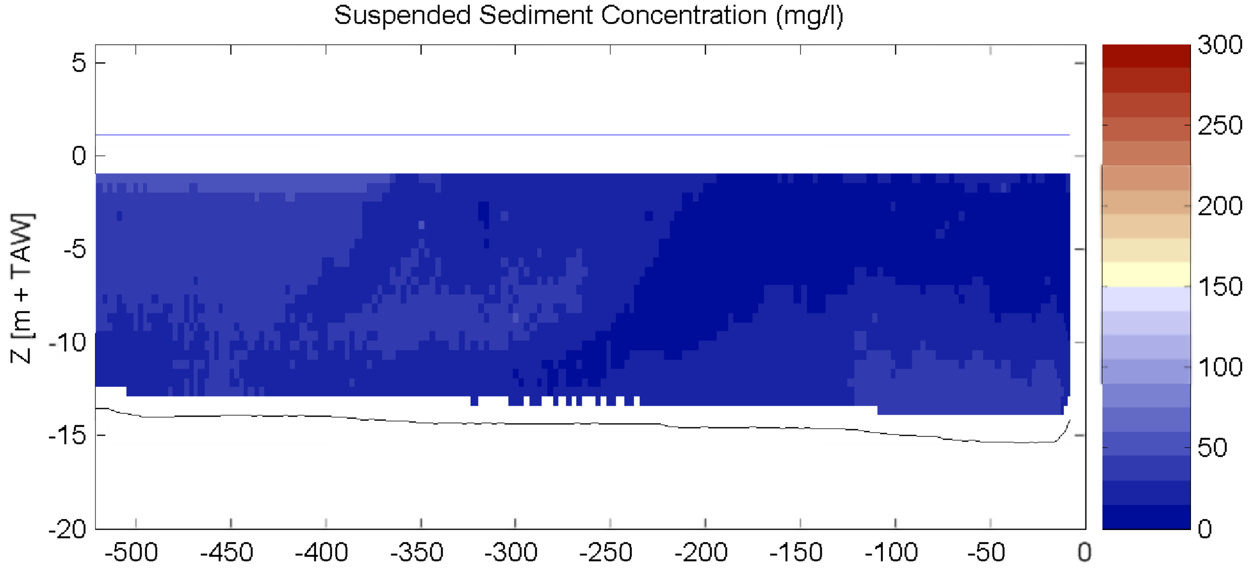
ADCP

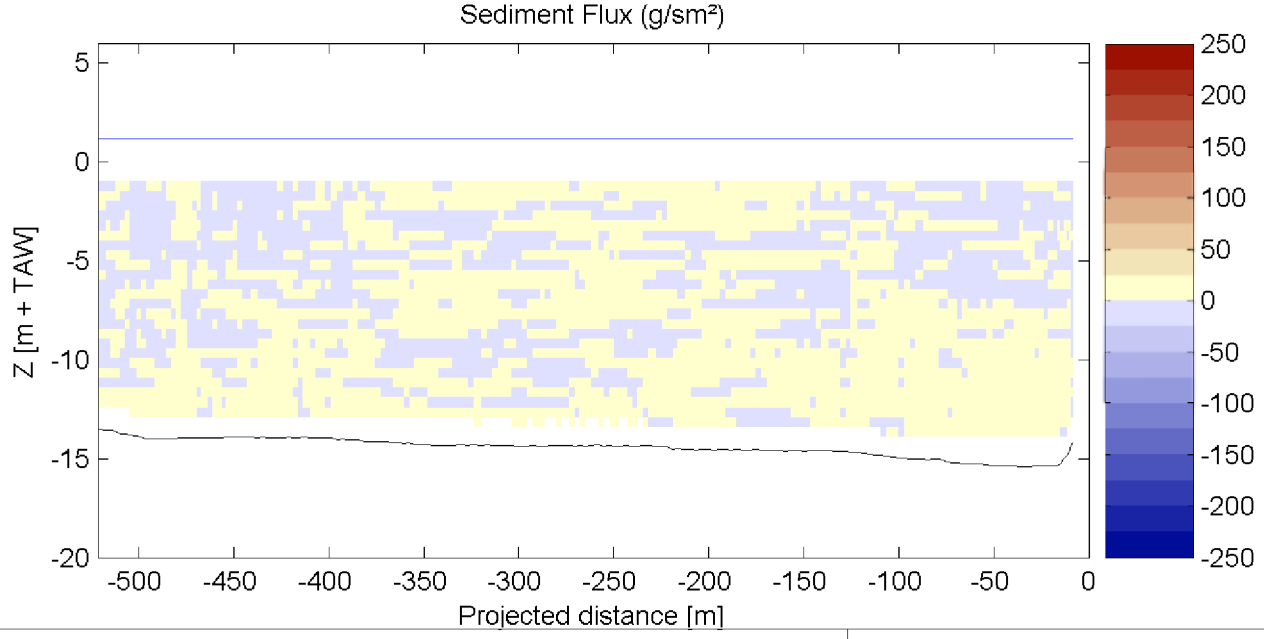
Sourcefile:

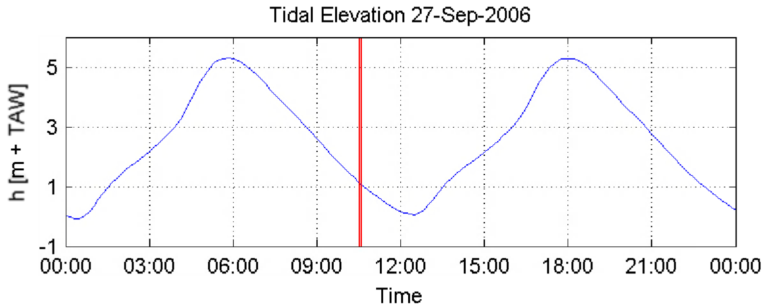
6029DGDt_sub.csv

Location:

Transect DGD







HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

10:30 - 10:34

Time after HW [HH:MM]

4:42

Data Processed by:

In association with :

I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

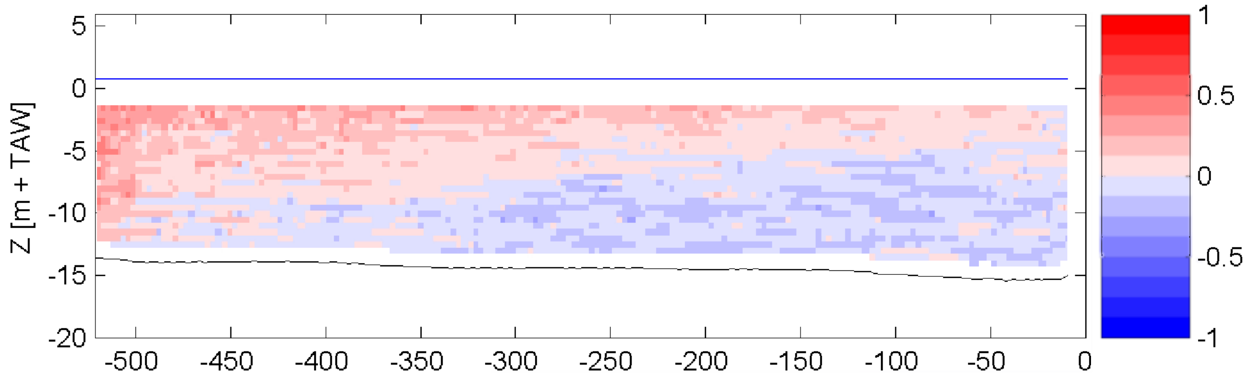
11283

Equipment(s): ADCP

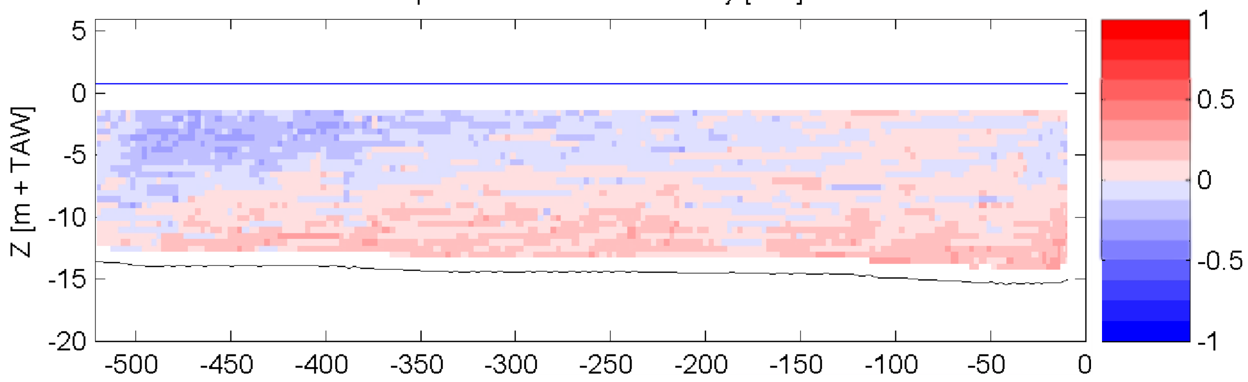
Sourcefile: 6032DGDt_sub.csv

Location: Transect DGD

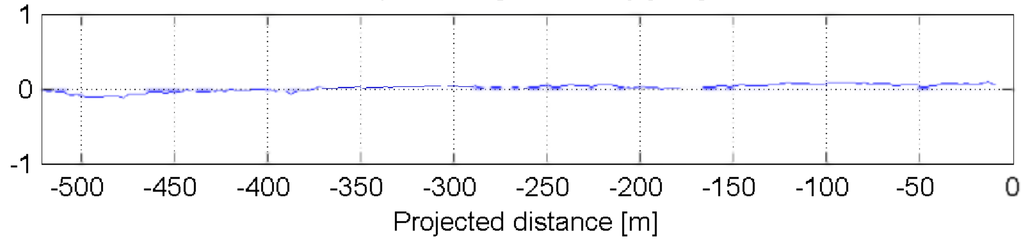
Parallel Current Velocity [m/s]



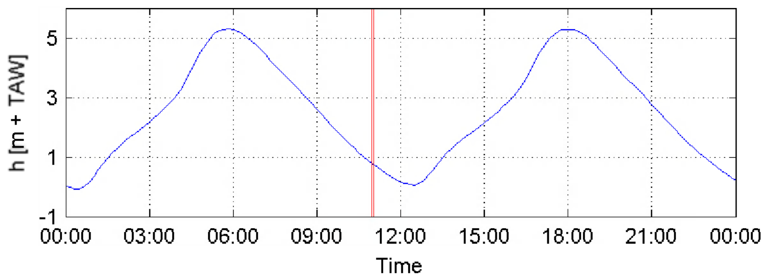
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 27-Sep-2006



HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

10:59 - 11:02

Time after HW [HH:MM]

5:10

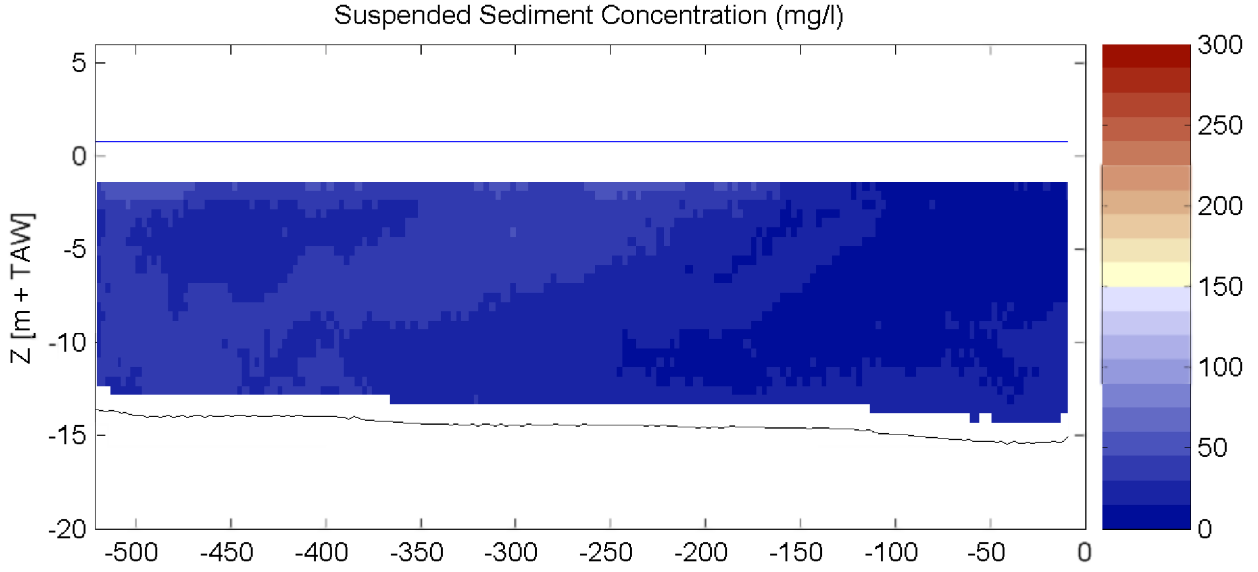
Data Processed by:

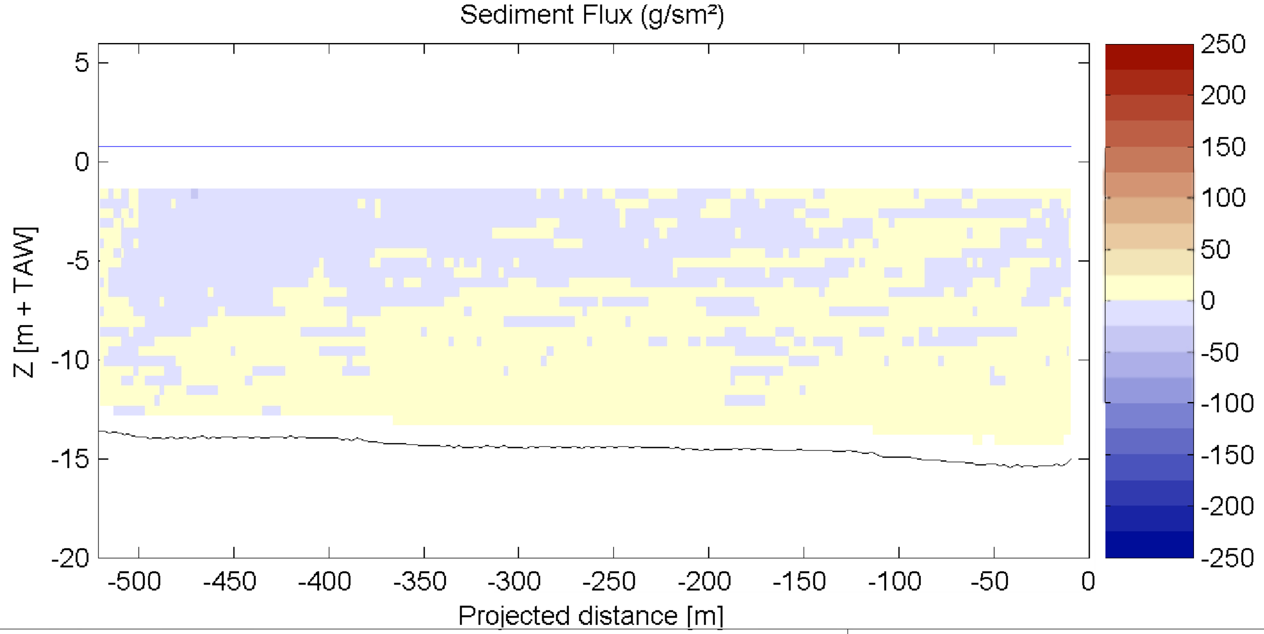
In association with :

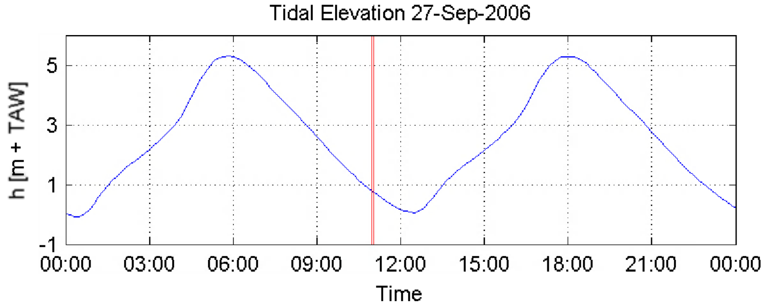
I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6032DGDt_sub.csv	Location: Transect DGD







HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
10:59 - 11:02

Time after HW [HH:MM]
5:10

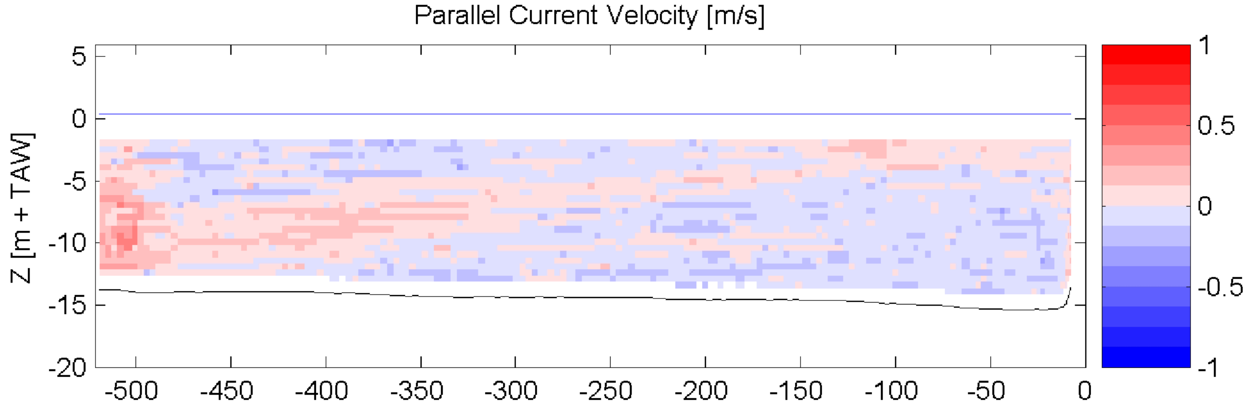
Data Processed by: IMDC

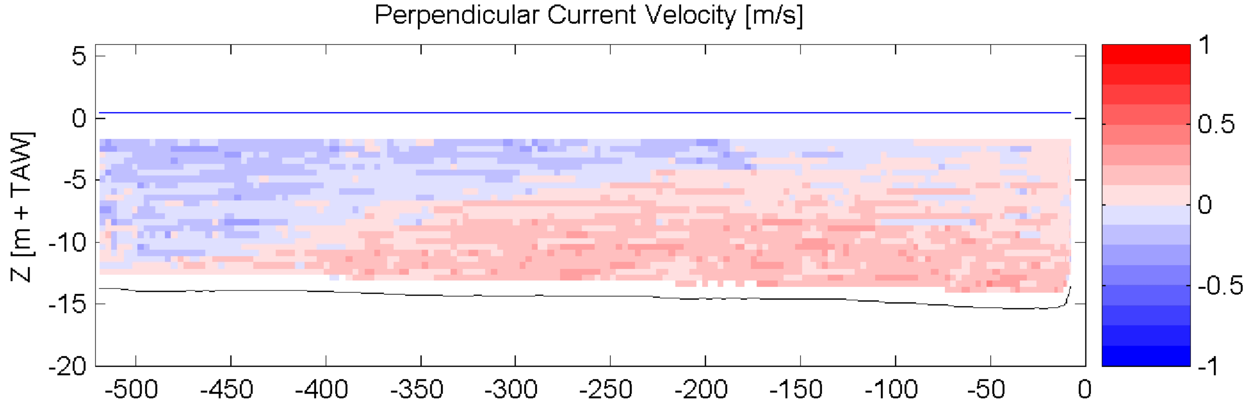
In association with : WL | delft hydraulics, GEMS international

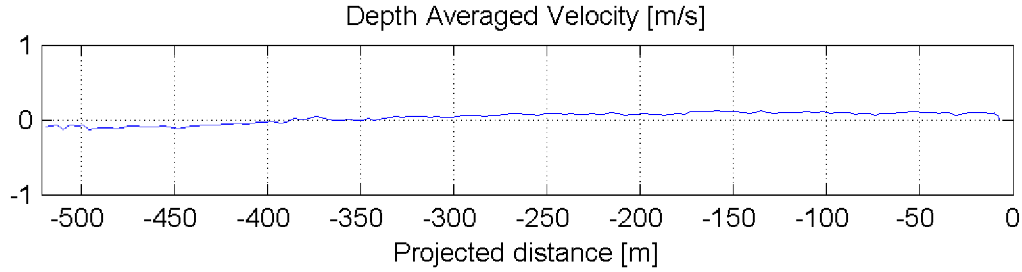
I/RA/11283/06.119/MSA

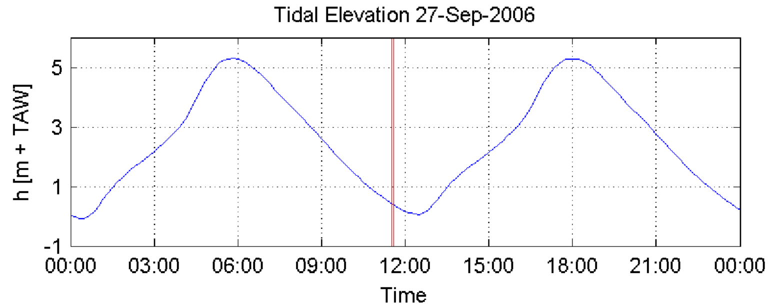
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6035DGDt_sub.csv	Location: Transect DGD









HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

11:31 - 11:34

Time after HW [HH:MM]

5:42

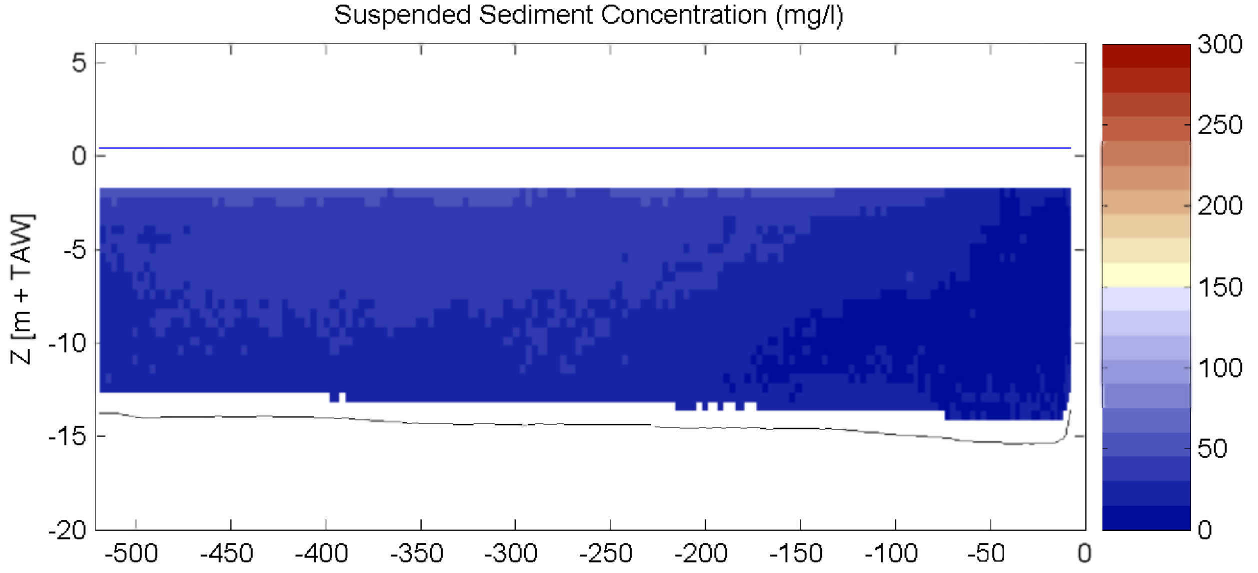
Data Processed by:

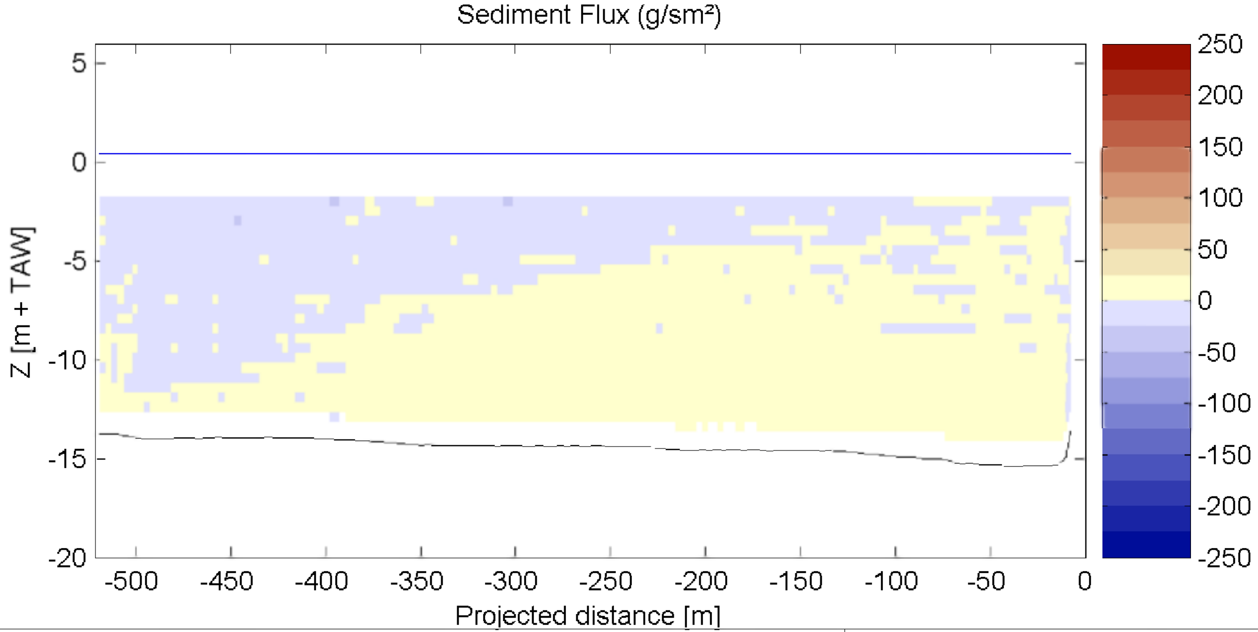
In association with :

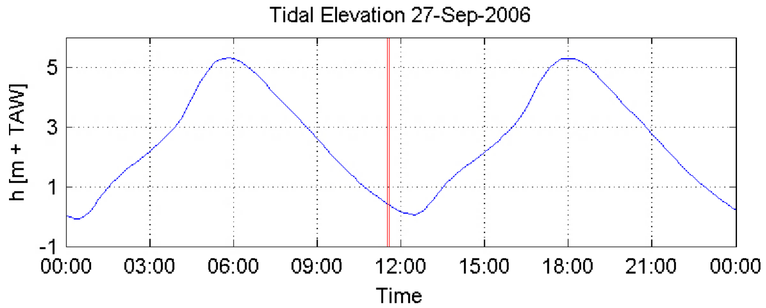
I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6035DGDt_sub.csv	Location: Transect DGD







HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
11:31 - 11:34

Time after HW [HH:MM]
5:42

Data Processed by: IMDC

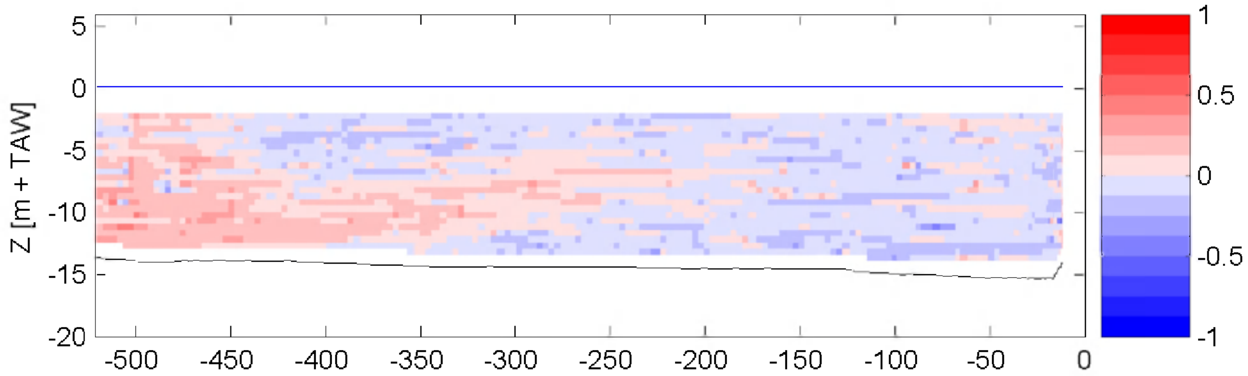
In association with : wl | delft hydraulics, GEMS international

I/RA/11283/06.119/MSA

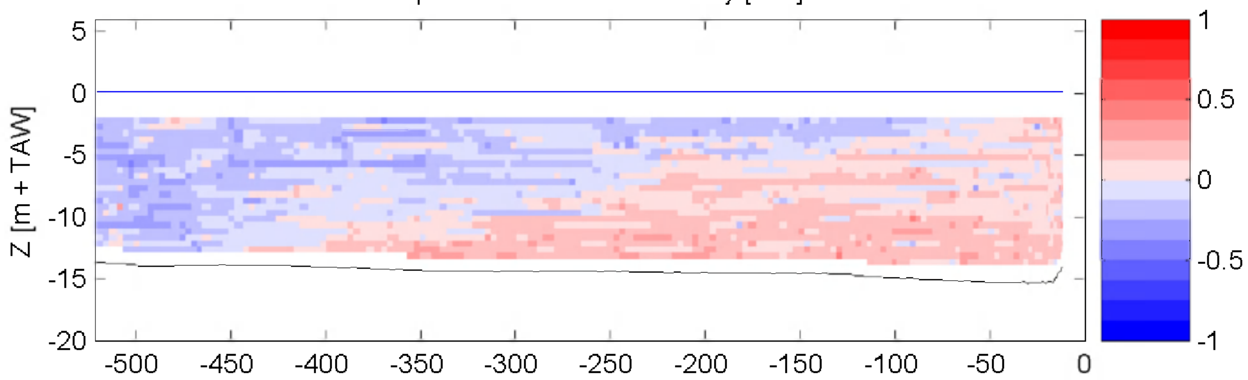
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6038DGDt_sub.csv	Location: Transect DGD

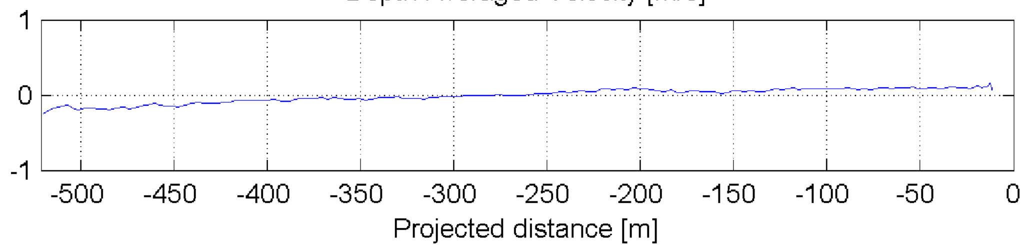
Parallel Current Velocity [m/s]



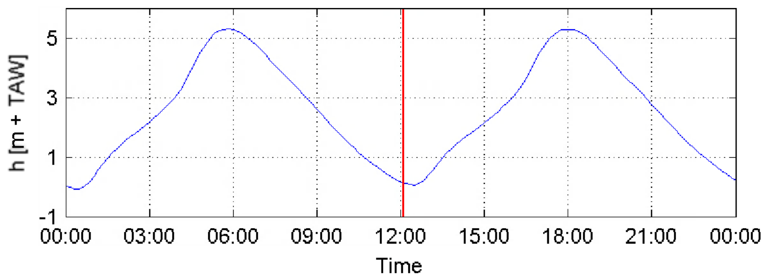
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 27-Sep-2006



HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

12:03 - 12:06

Time after HW [HH:MM]

6:15

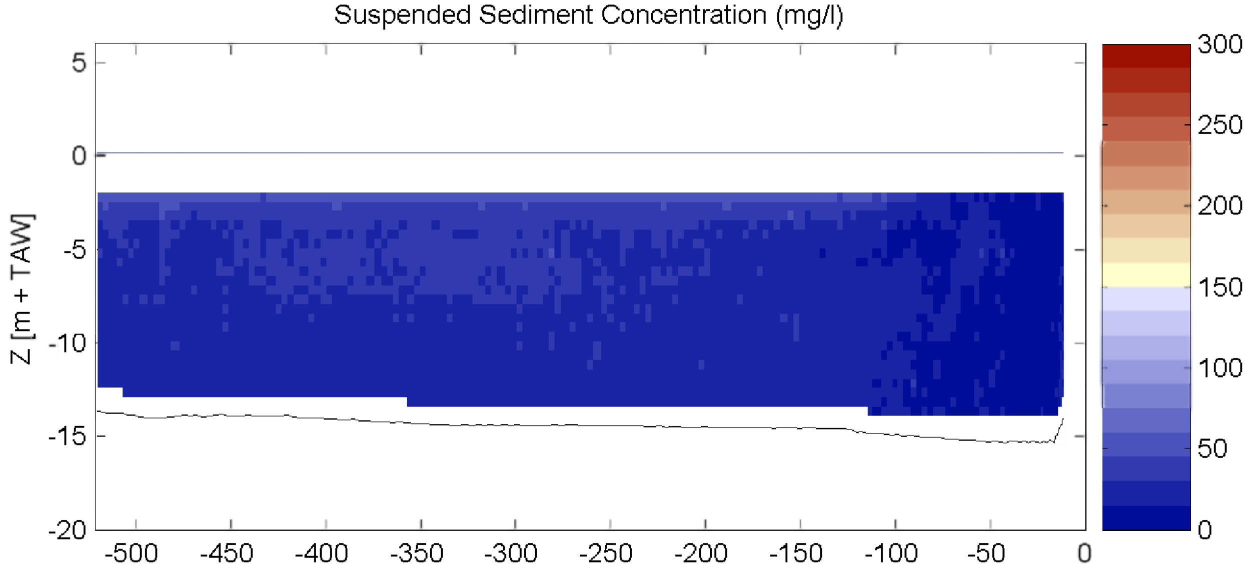
Data Processed by: IMDC

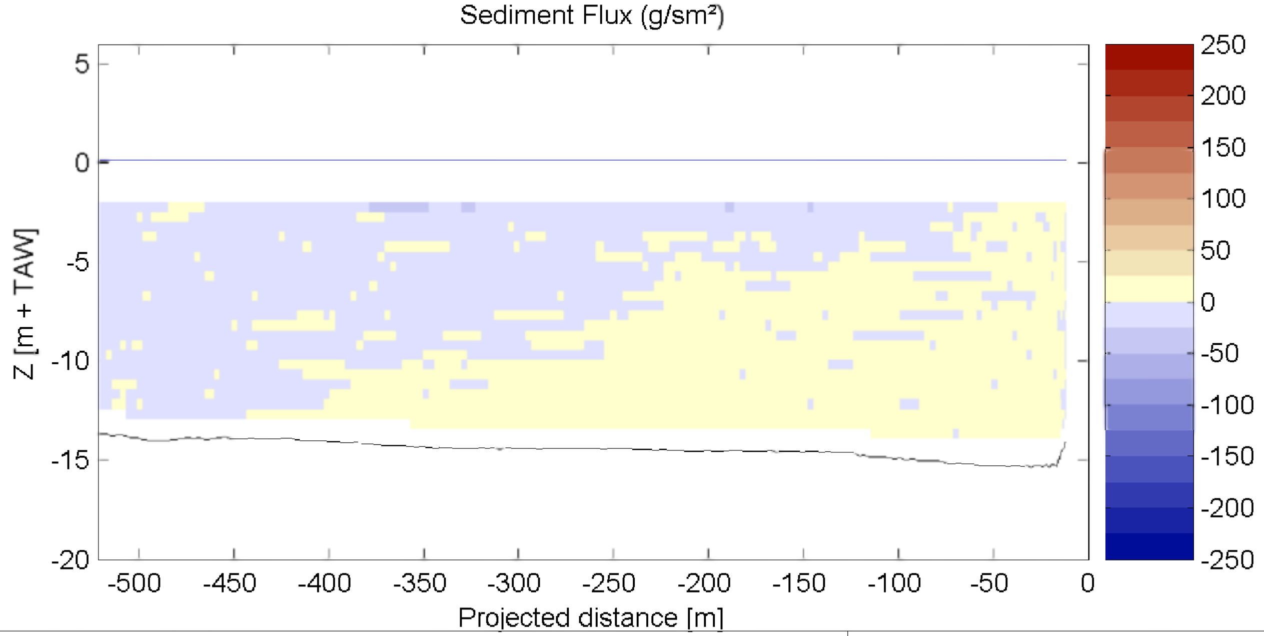
In association with :

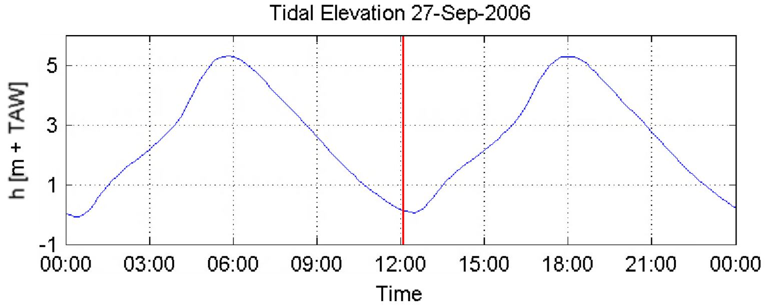
I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6038DGDt_sub.csv	Location: Transect DGD







HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

12:03 - 12:06

Time after HW [HH:MM]

6:15

Data Processed by:

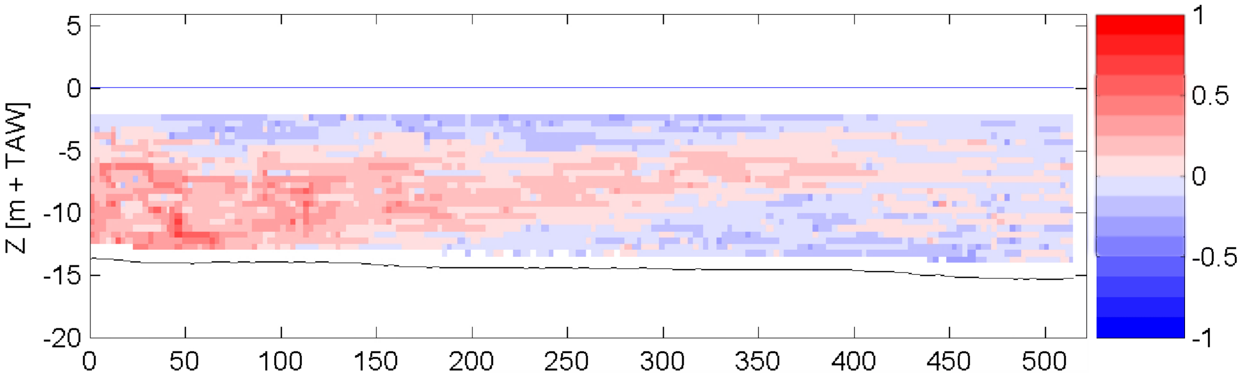
In association with :

I/RA/11283/06.119/MSA

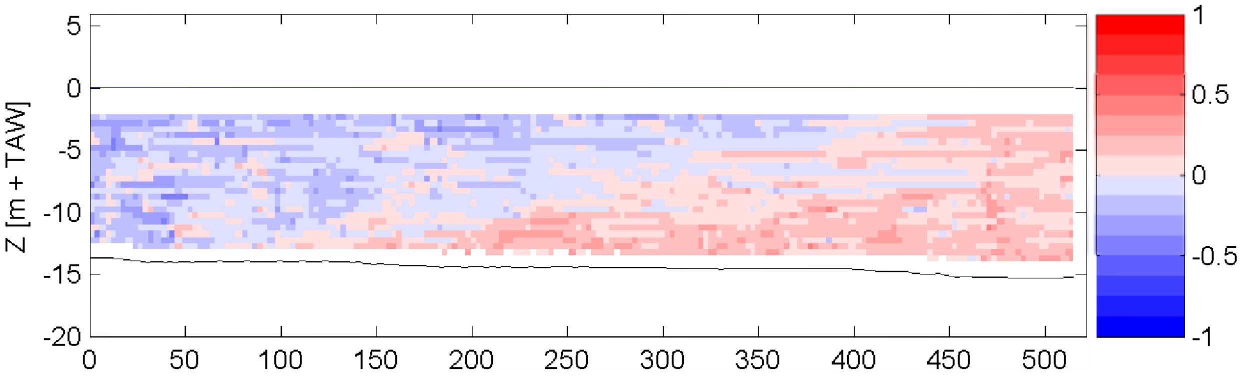
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6041DGDt_sub.csv	Location: Transect DGD

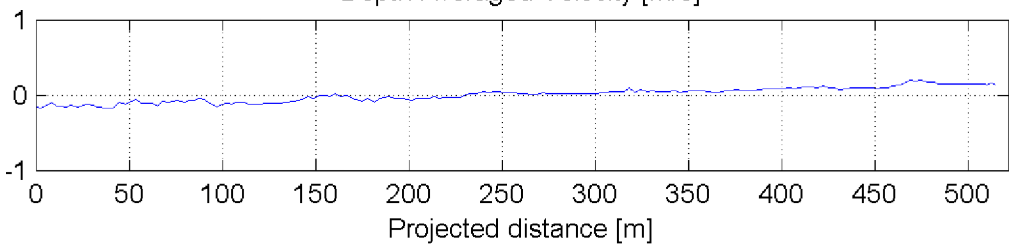
Parallel Current Velocity [m/s]



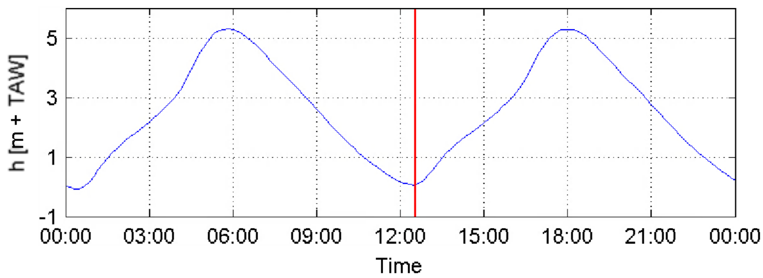
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 27-Sep-2006



HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

12:30 - 12:33

Time after HW [HH:MM]

-5:27

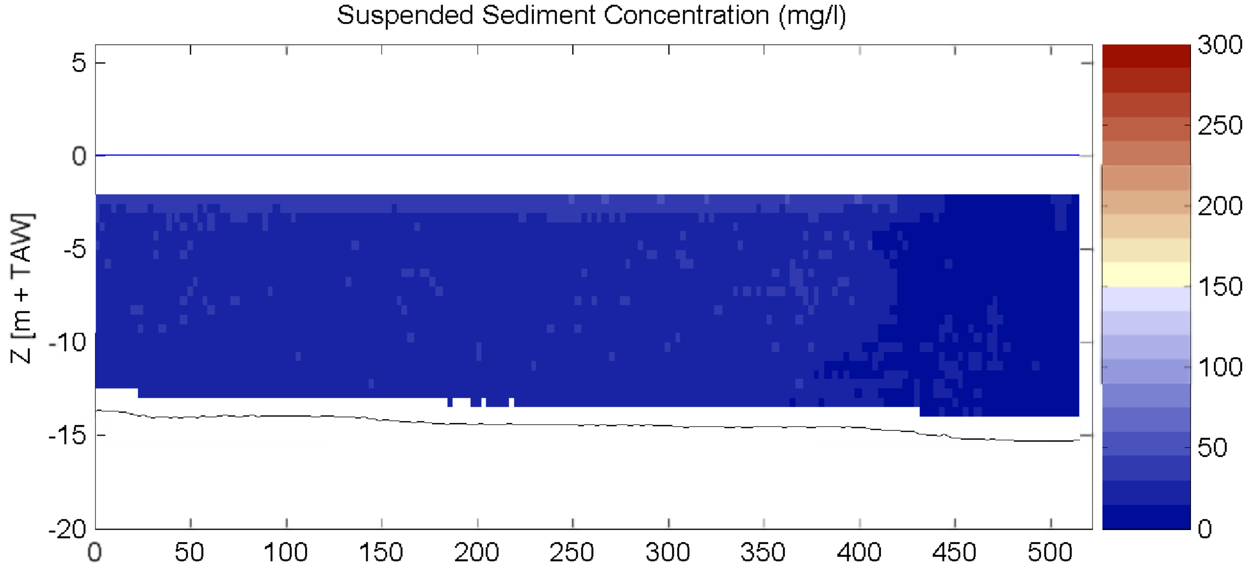
Data Processed by:

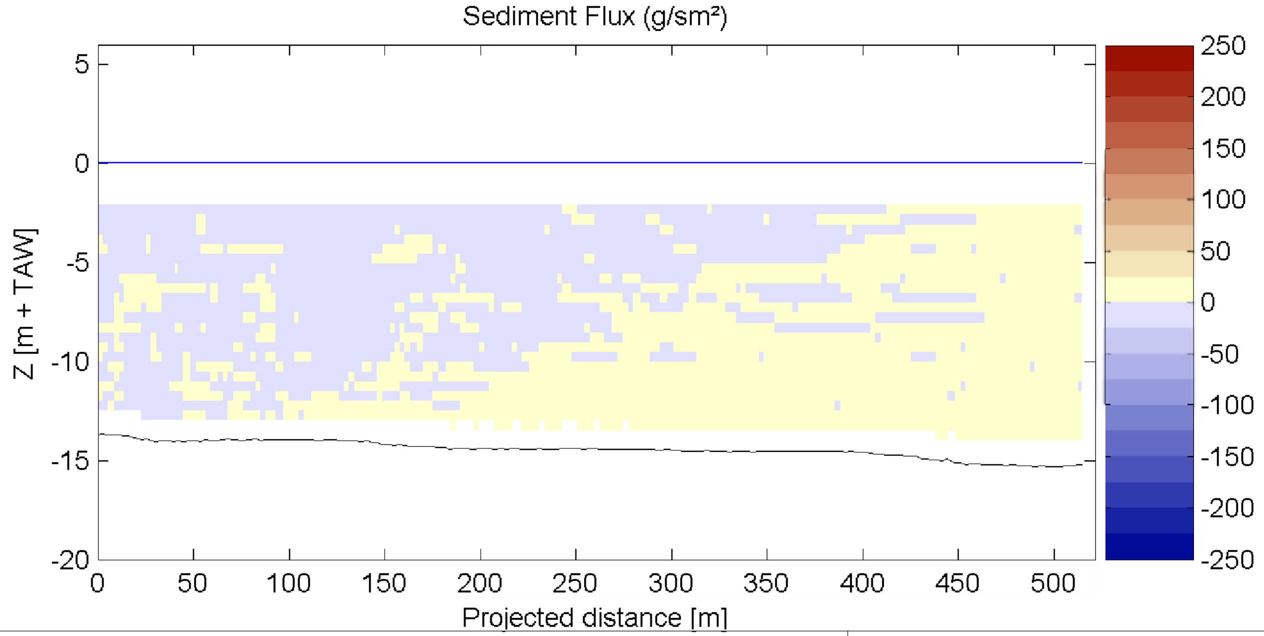
In association with :

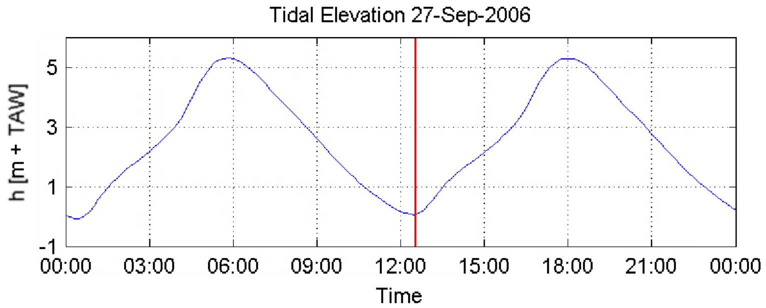
I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6041DGDt_sub.csv	Location: Transect DGD







HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

12:30 - 12:33

Time after HW [HH:MM]

-5:27

Data Processed by: IMDC

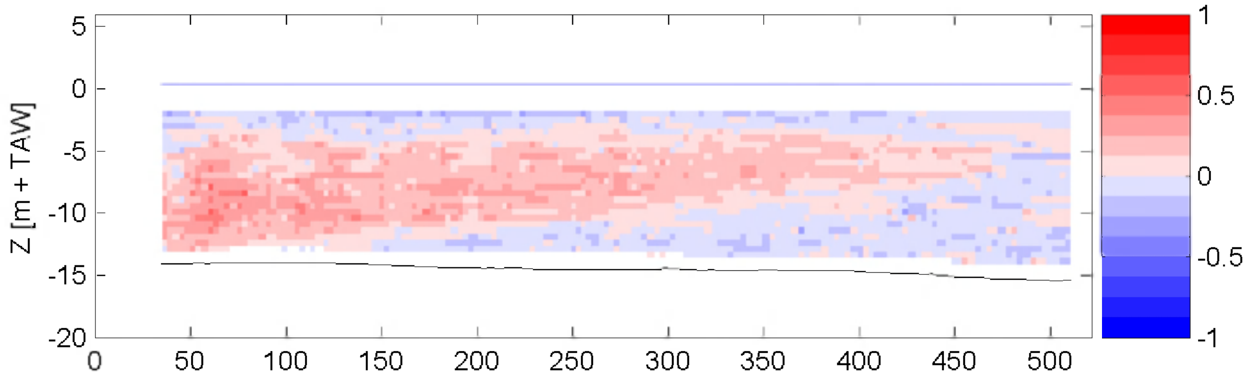
In association with :

I/RA/11283/06.119/MSA

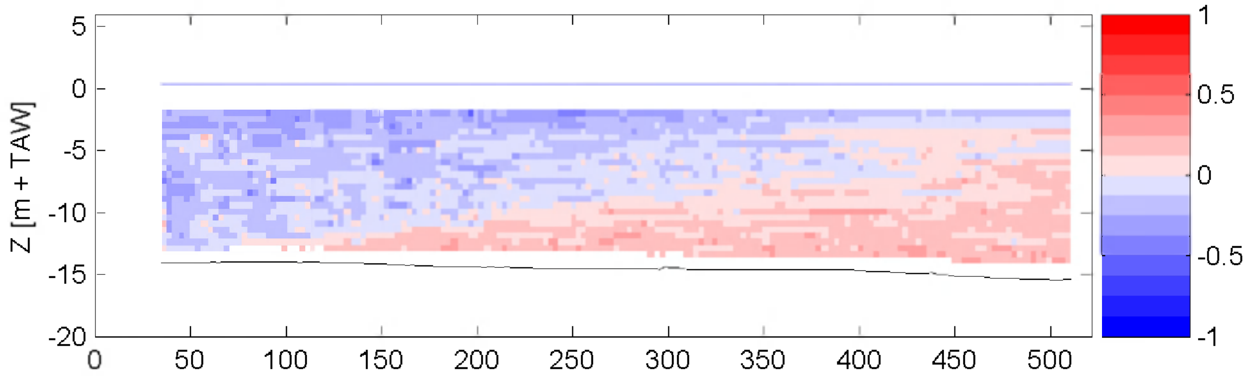
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6044DGDt_sub.csv	Location: Transect DGD

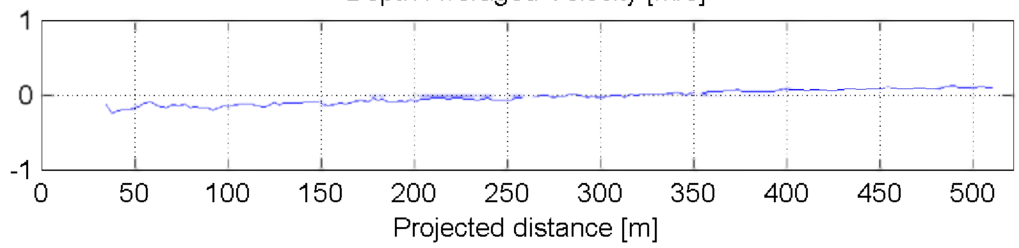
Parallel Current Velocity [m/s]



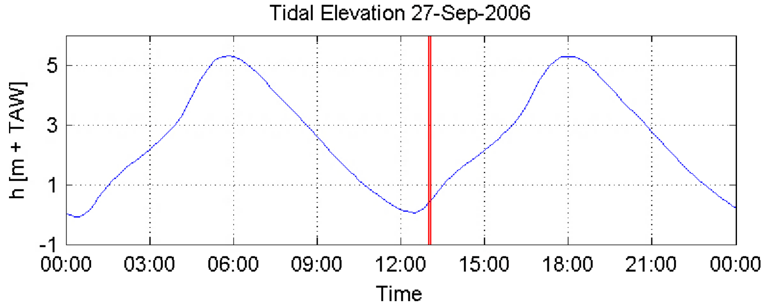
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 27-Sep-2006



HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

12:59 - 13:03

Time after HW [HH:MM]

-4:58

Data Processed by: IMDC

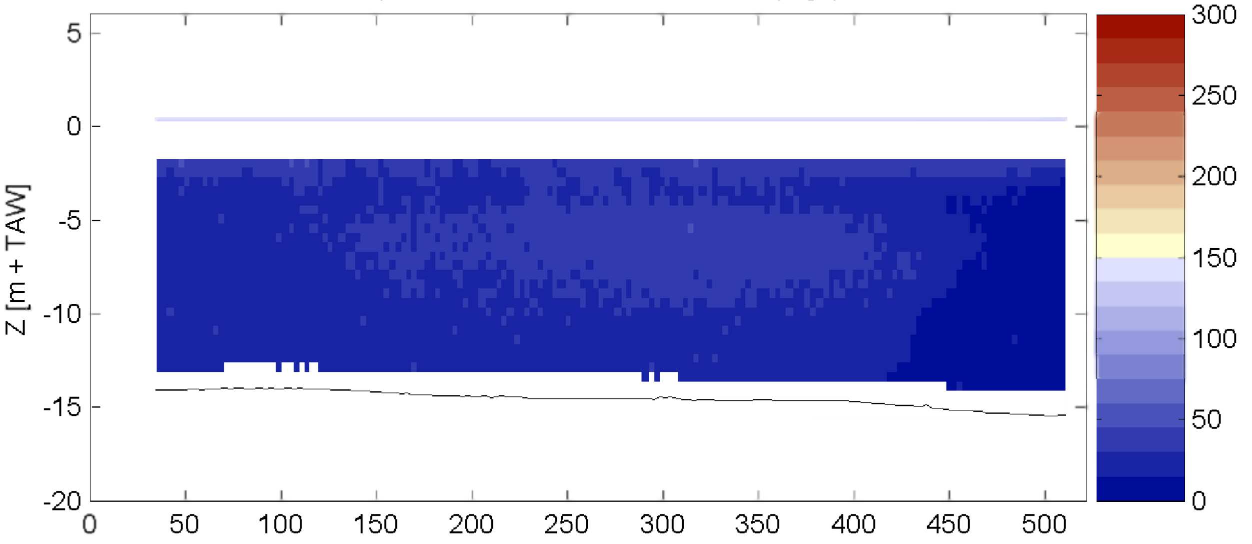
In association with :

I/RA/11283/06.119/MSA

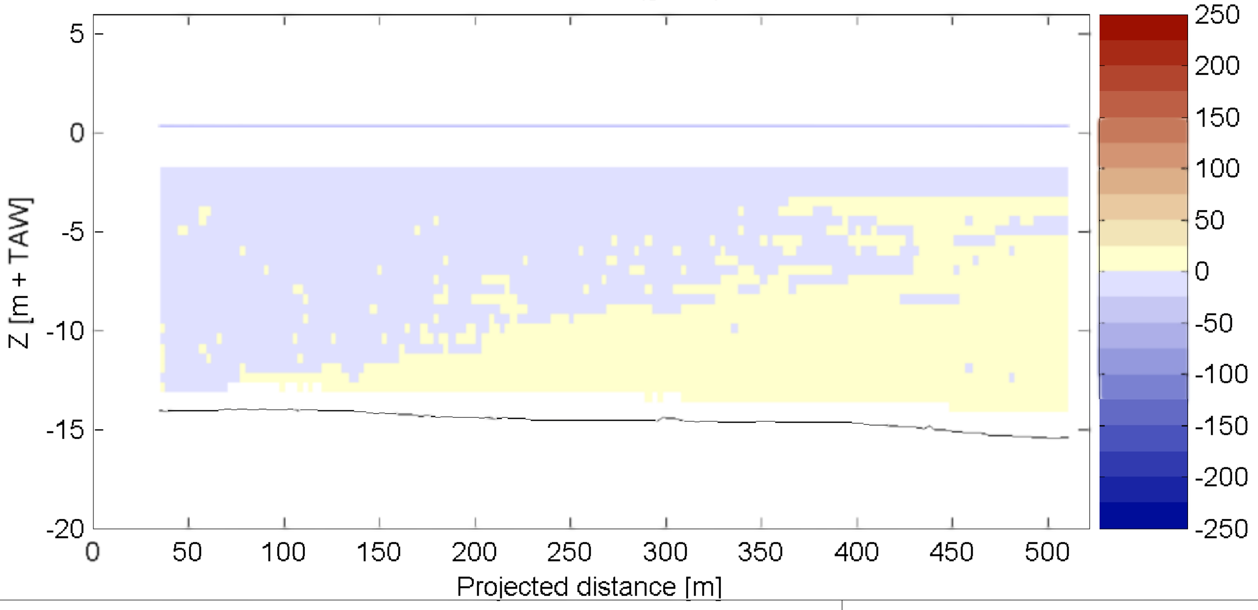
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6044DGDt_sub.csv	Location: Transect DGD

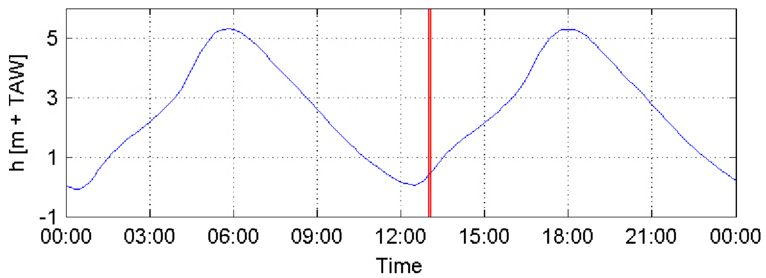
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 27-Sep-2006



HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
12:59 - 13:03

Time after HW [HH:MM]
-4:58

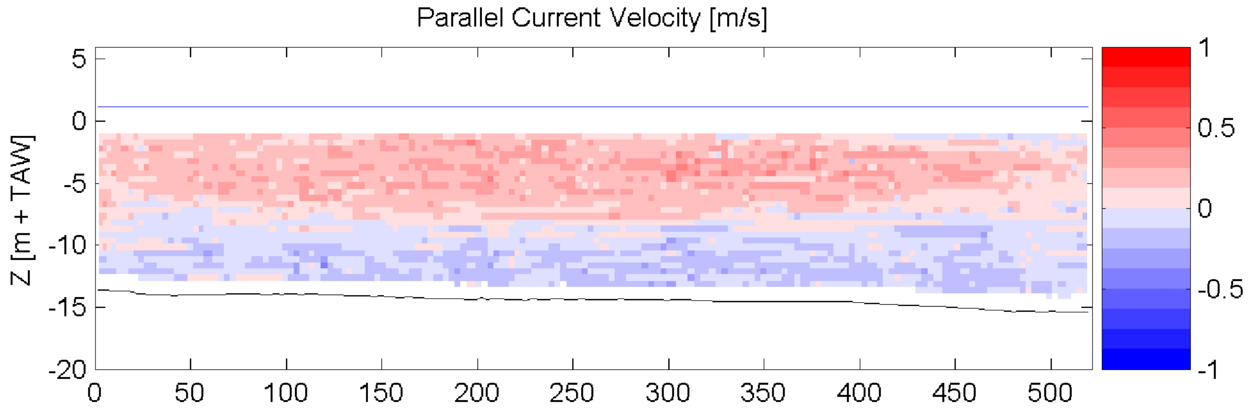
Data Processed by:

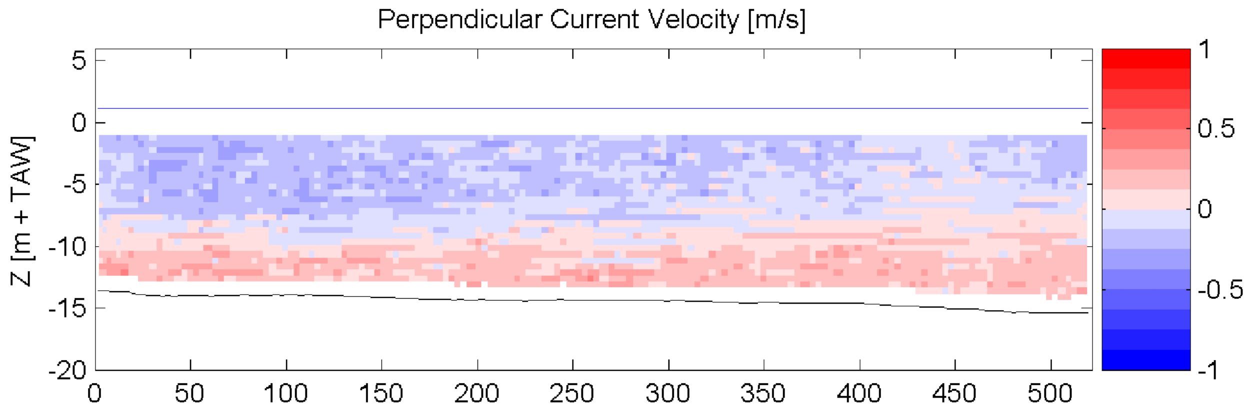
In association with :

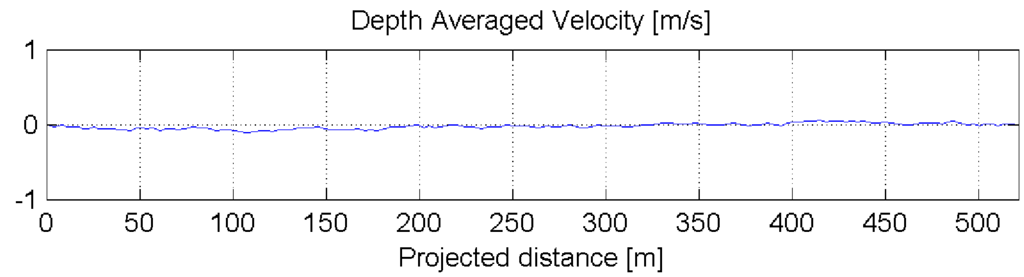
I/RA/11283/06.119/MSA

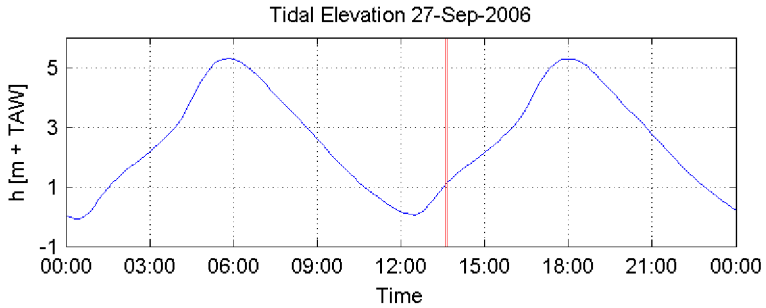
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6047DGDt_sub.csv	Location: Transect DGD









HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

13:35 - 13:38

Time after HW [HH:MM]

-4:23

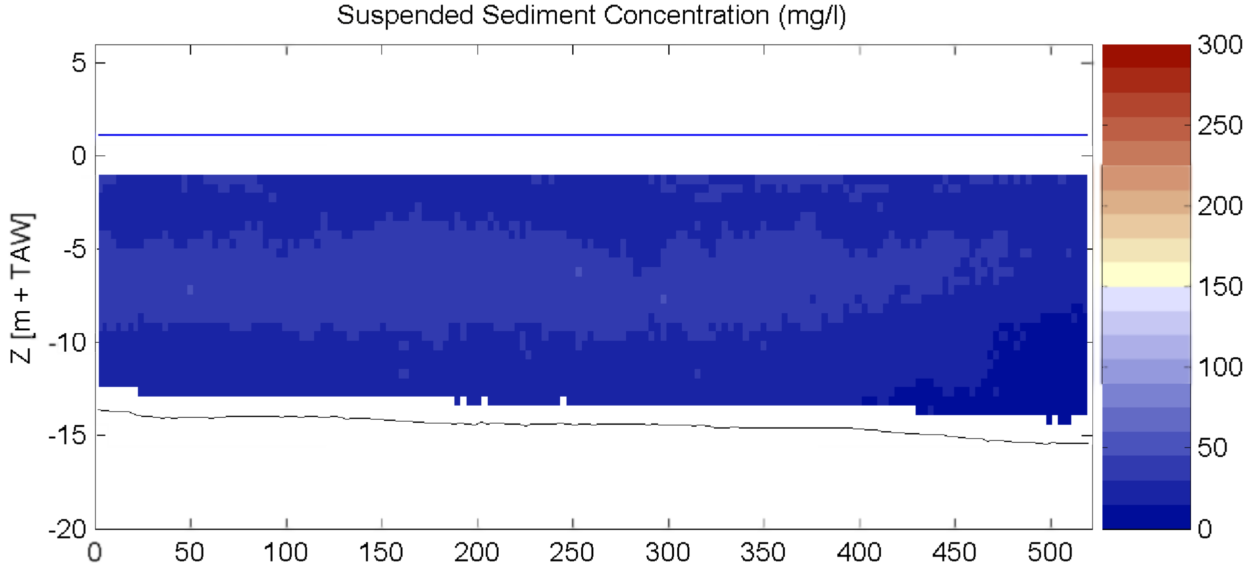
Data Processed by:

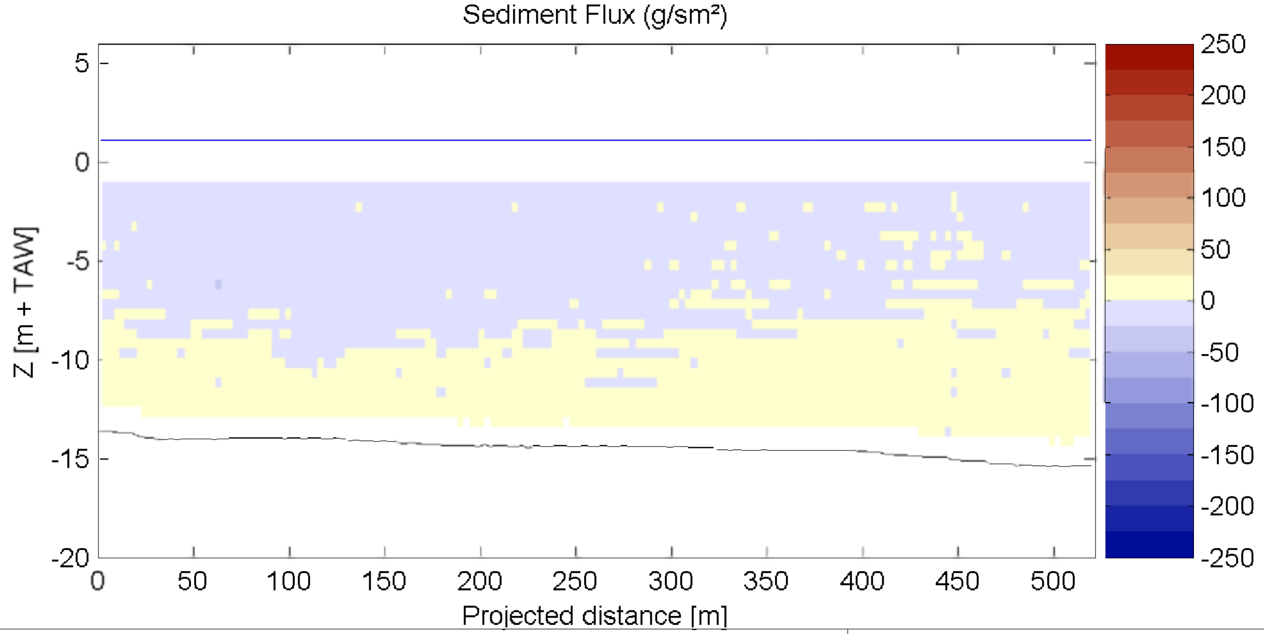
In association with :

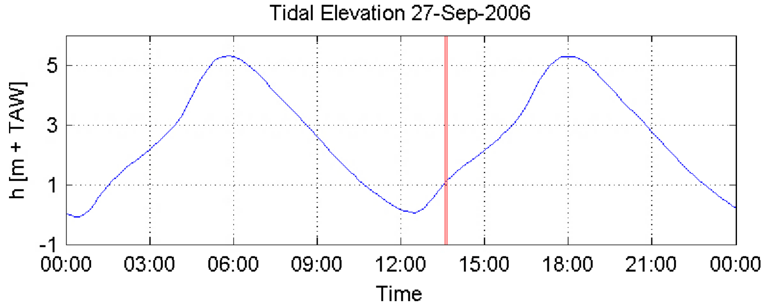
I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6047DGDt_sub.csv	Location: Transect DGD







HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
13:35 - 13:38

Time after HW [HH:MM]
-4:23

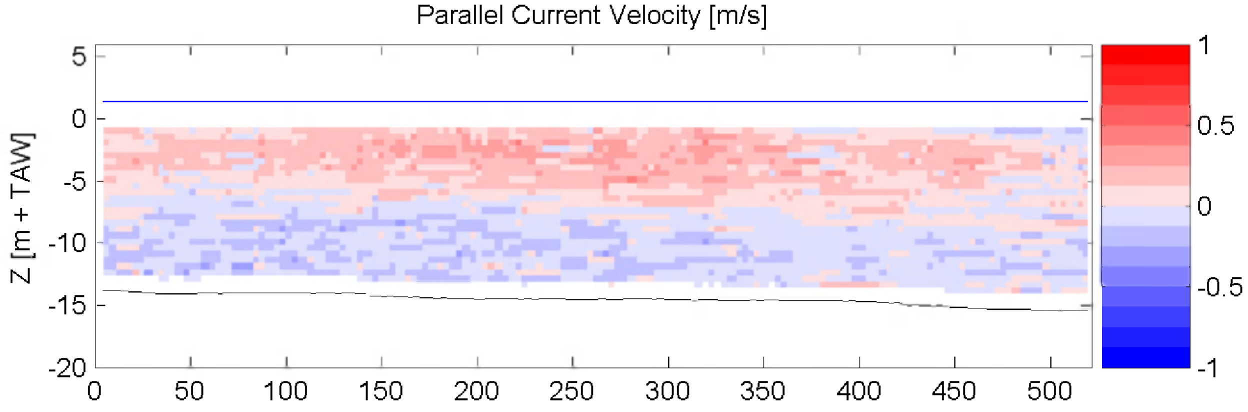
Data Processed by: IMDC

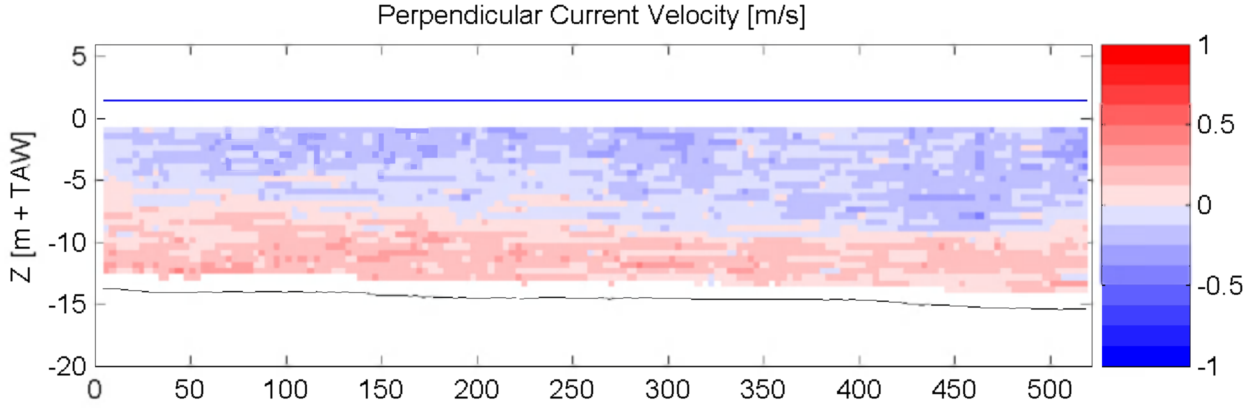
In association with : WL | delft hydraulics, GEMS International

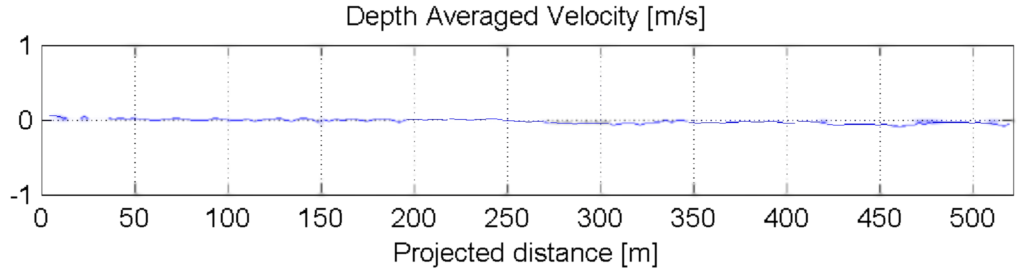
I/RA/11283/06.119/MSA

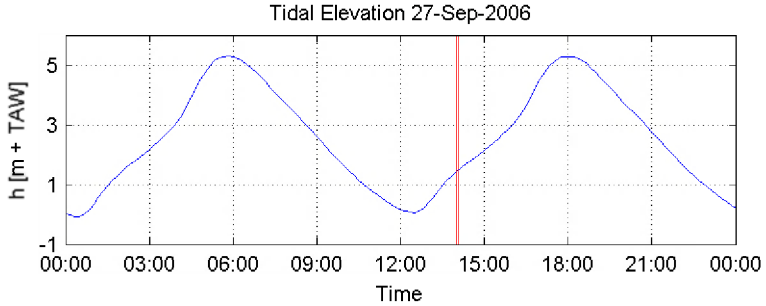
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6050DGDt_sub.csv	Location: Transect DGD









HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

14:00 - 14:04

Time after HW [HH:MM]

-3:57

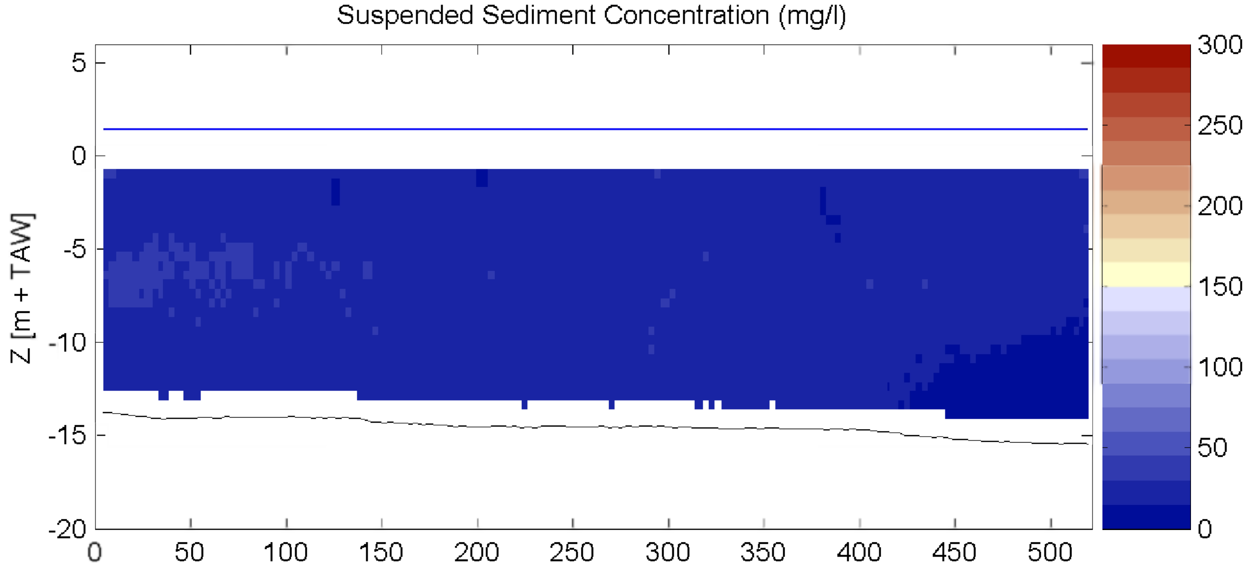
Data Processed by: IMDC

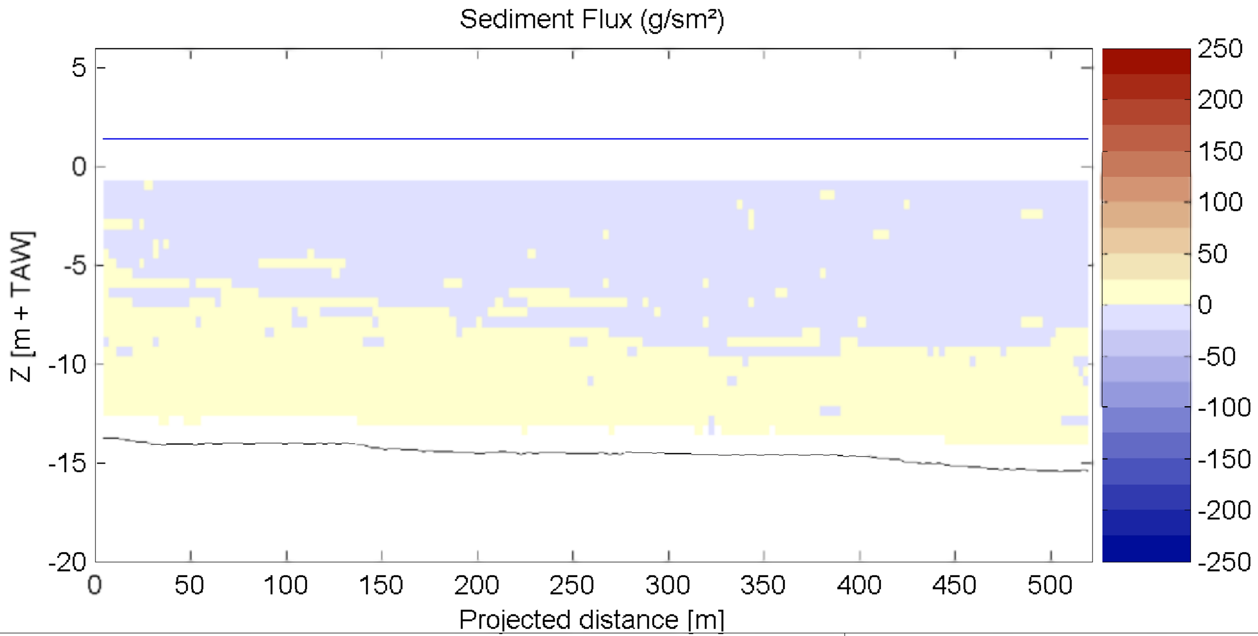
In association with :

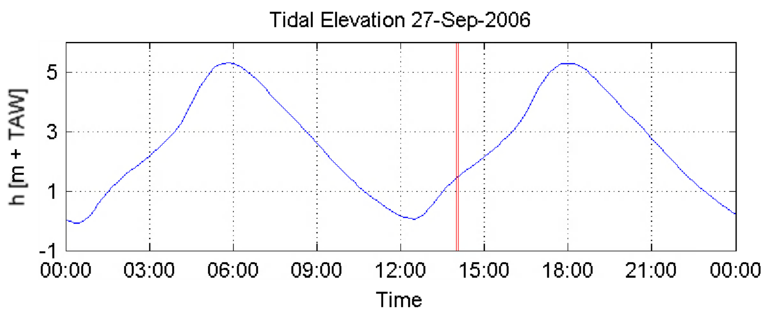
I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6050DGDt_sub.csv	Location: Transect DGD







HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

14:00 - 14:04

Time after HW [HH:MM]

-3:57

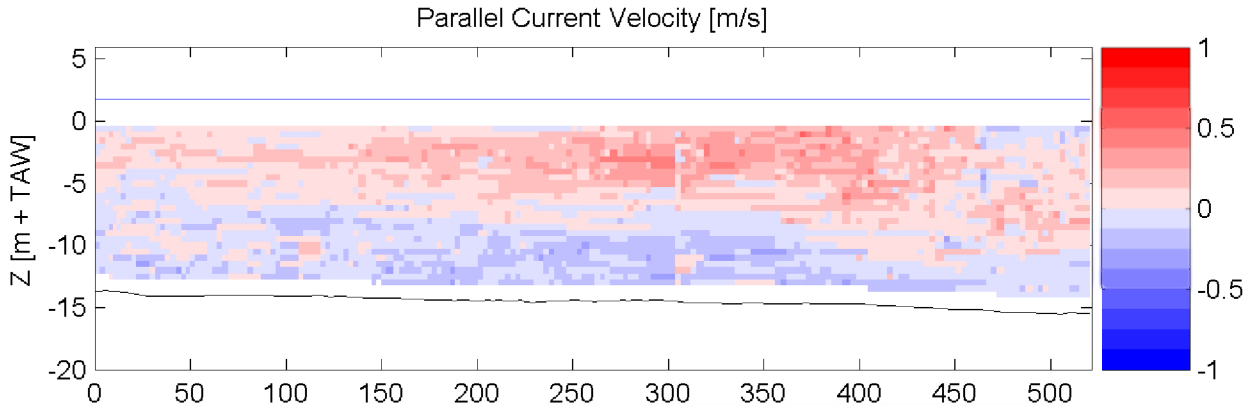
Data Processed by: IMDC

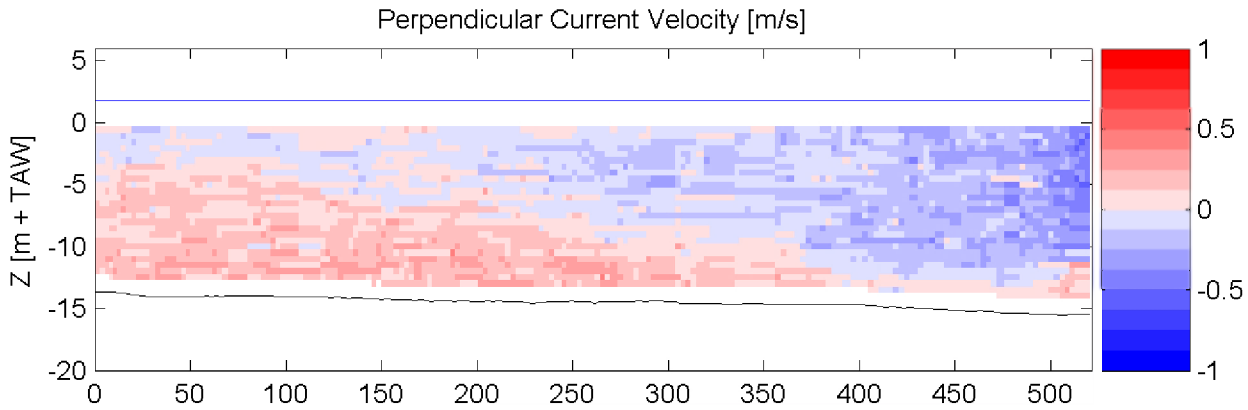
In association with : WL | delft hydraulics, GEMS international

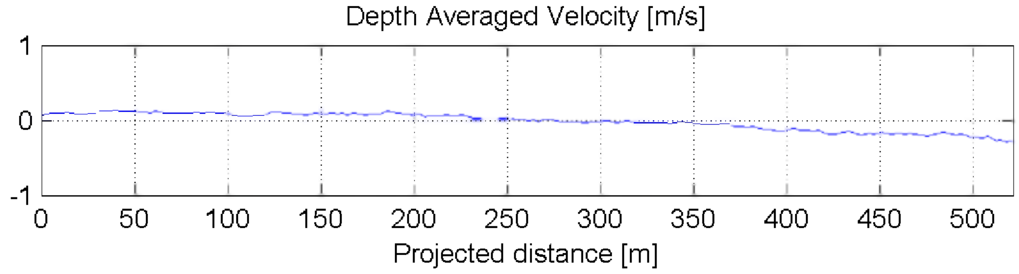
I/RA/11283/06.119/MSA

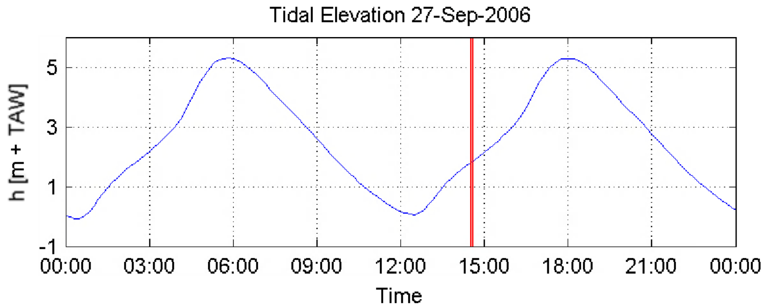
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6053DGDt_sub.csv	Location: Transect DGD









HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

14:31 - 14:35

Time after HW [HH:MM]

-3:26

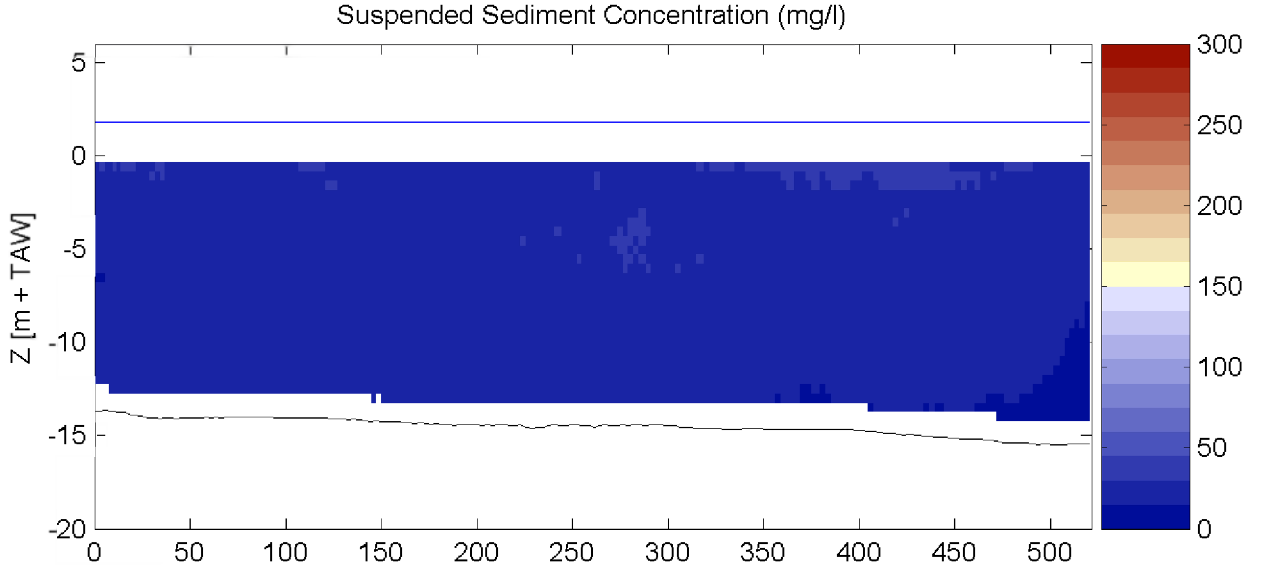
Data Processed by: IMDC

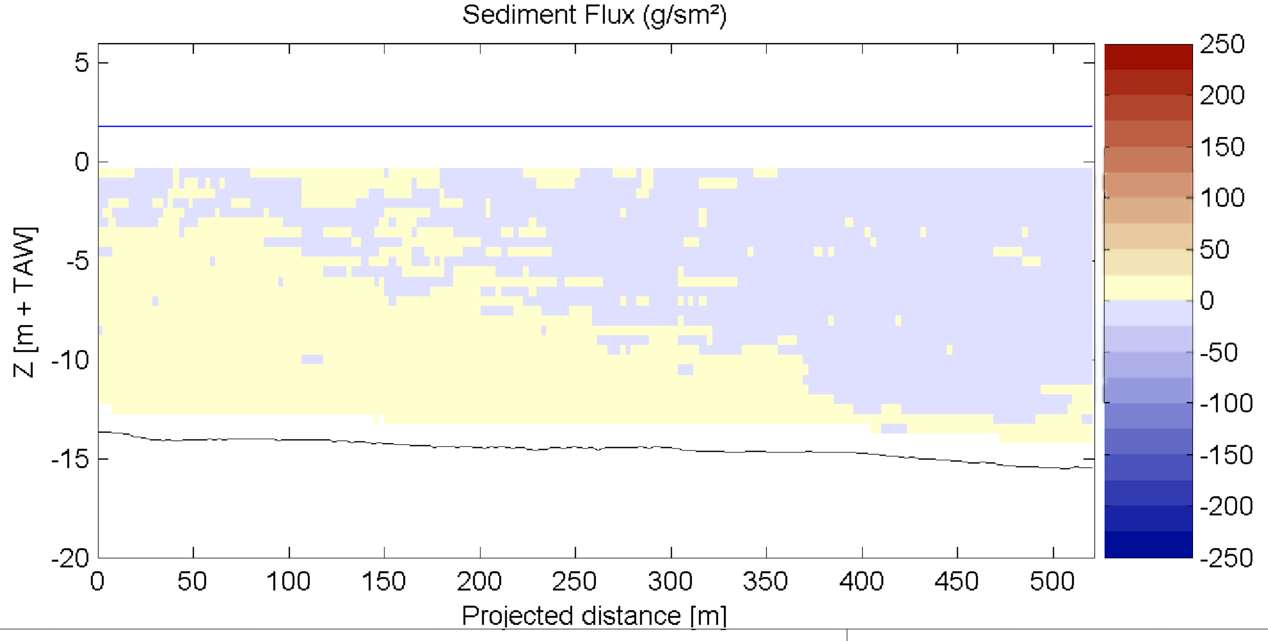
In association with :

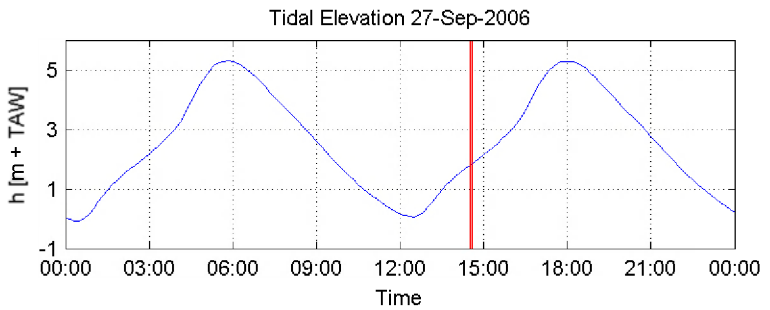
I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6053DGDt_sub.csv	Location: Transect DGD







HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
14:31 - 14:35

Time after HW [HH:MM]
-3:26

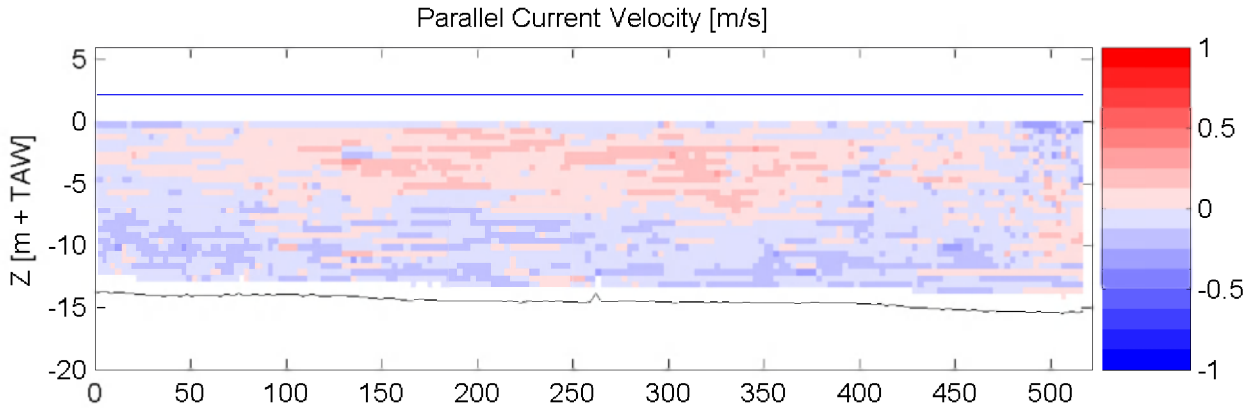
Data Processed by: IMDC

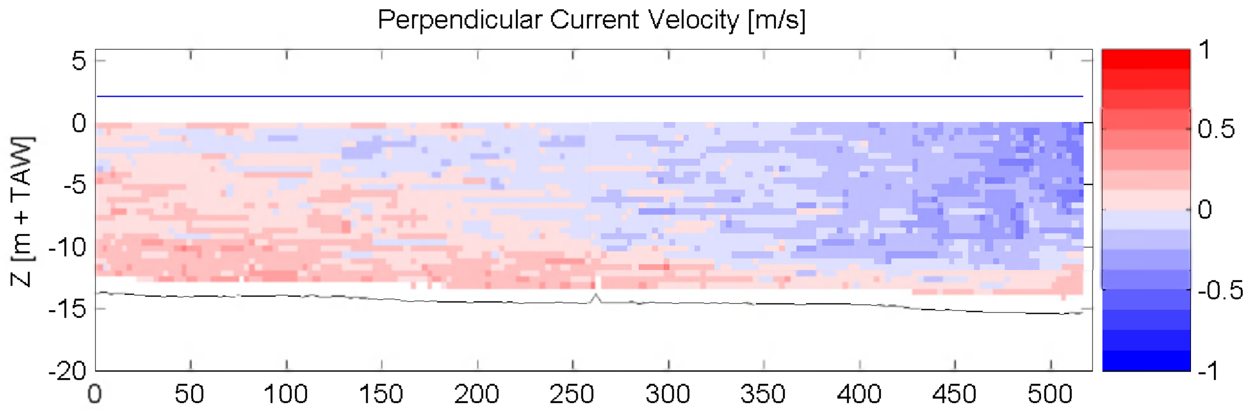
In association with :

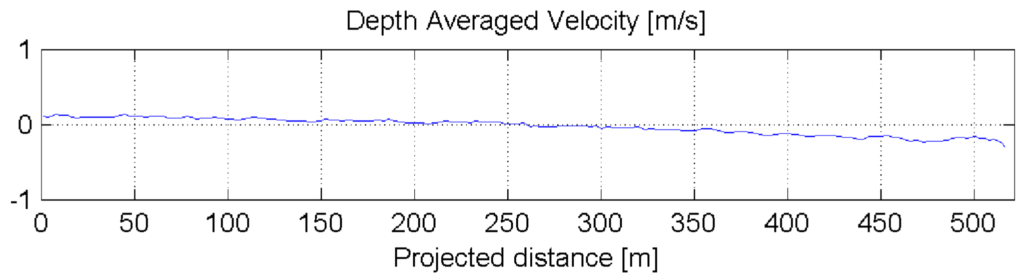
I/RA/11283/06.119/MSA

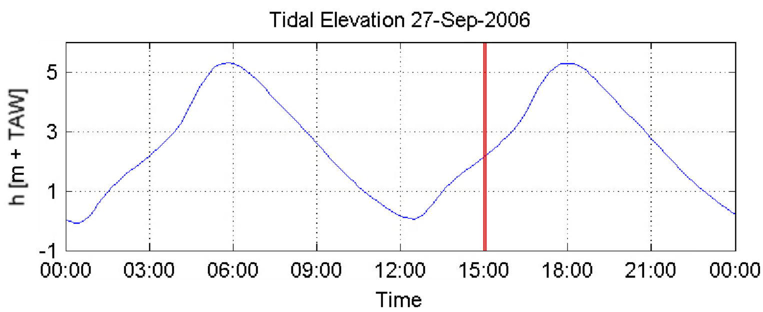
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6056DGDt_sub.csv	Location: Transect DGD









HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
14:59 - 15:02

Time after HW [HH:MM]
-2:58

Data Processed by:

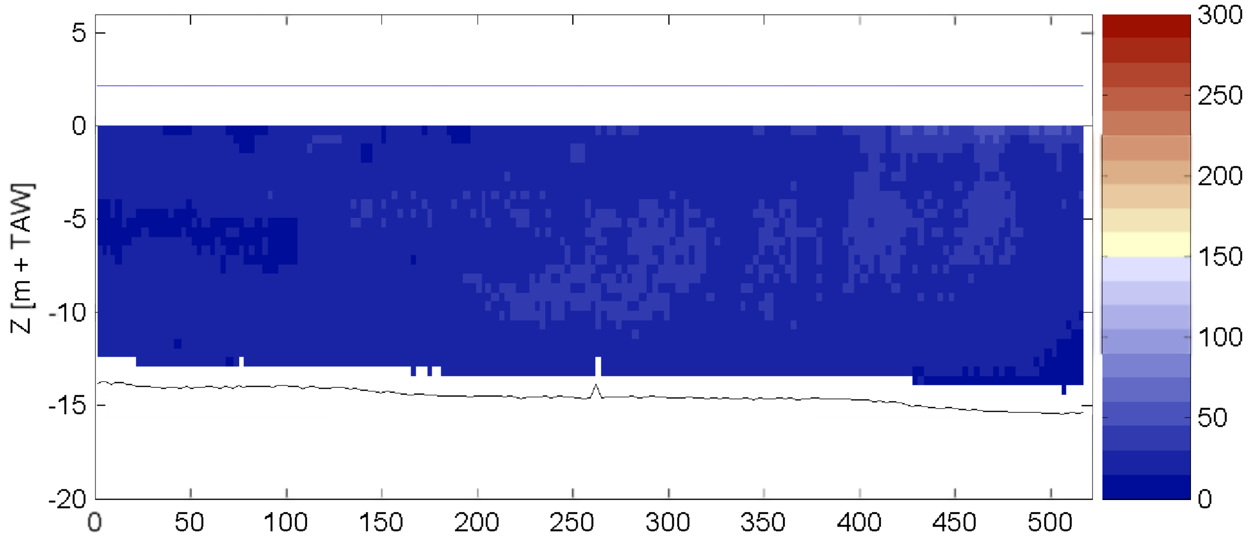
In association with :

I/RA/11283/06.119/MSA

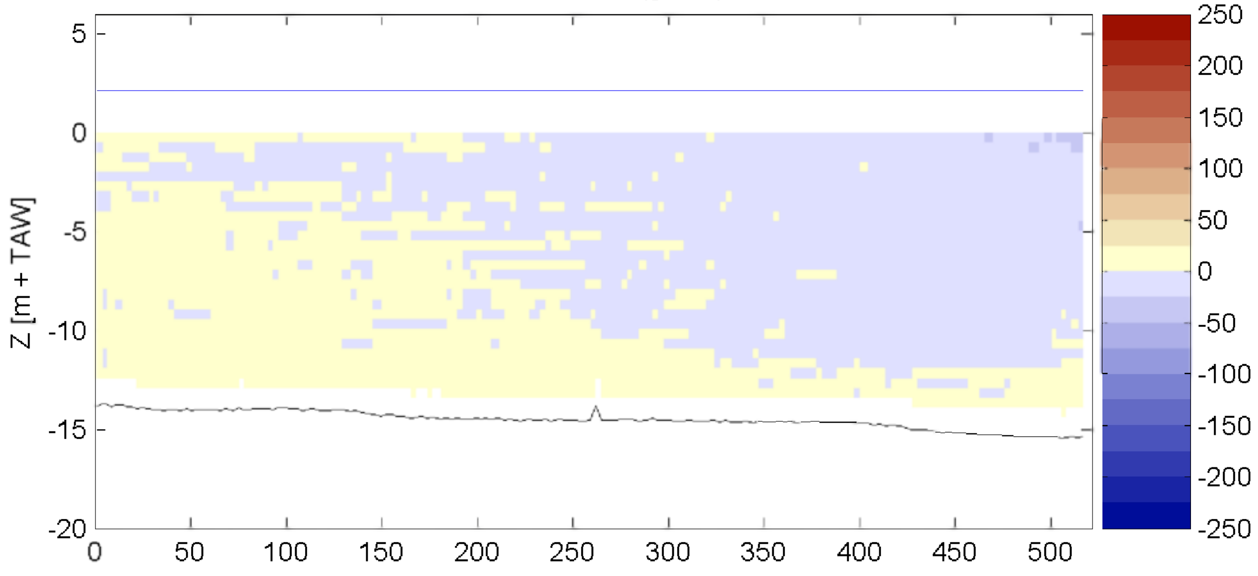
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6056DGDt_sub.csv	Location: Transect DGD

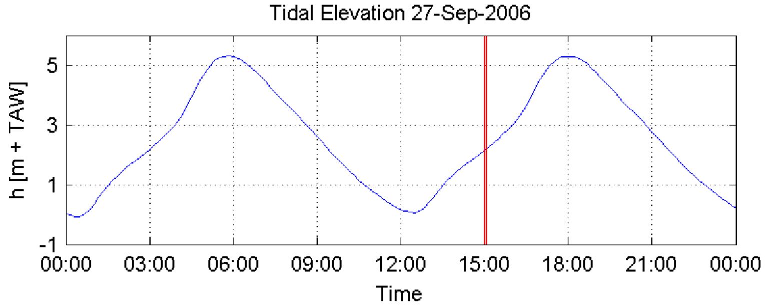
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 27-Sep-2006



HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

14:59 - 15:02

Time after HW [HH:MM]

-2:58

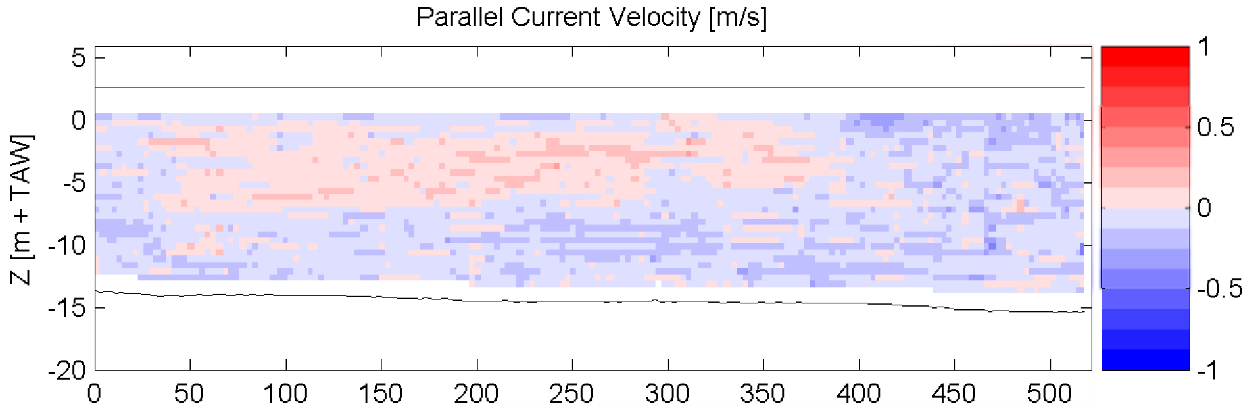
Data Processed by: IMDC

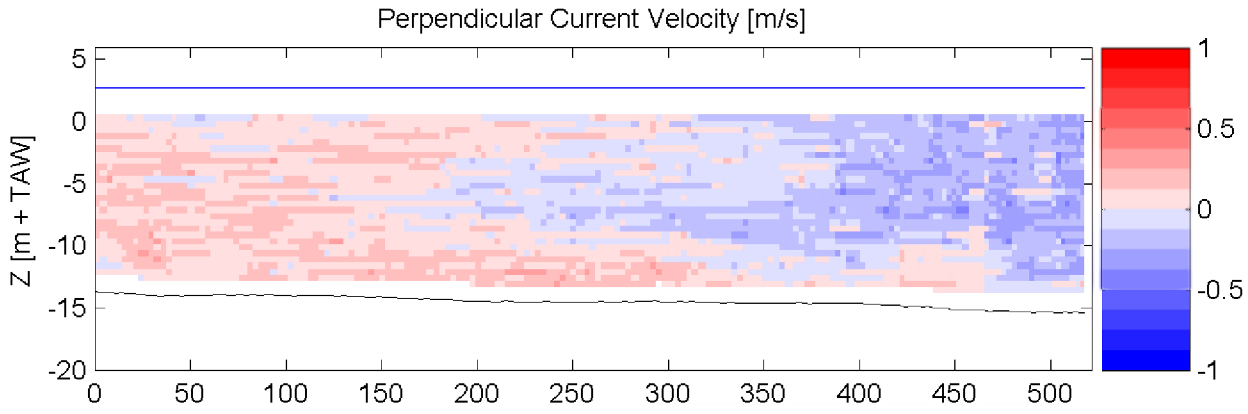
In association with :

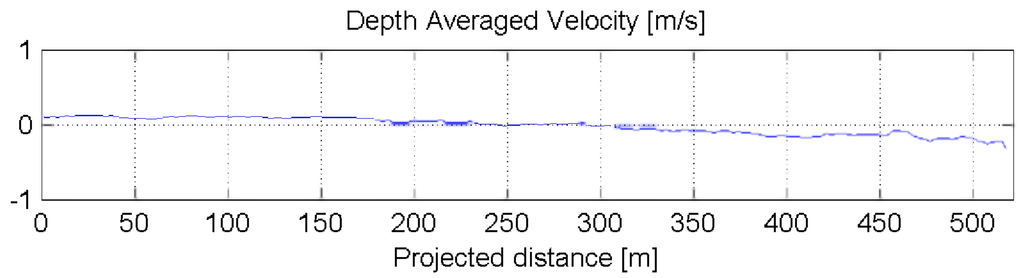
I/RA/11283/06.119/MSA

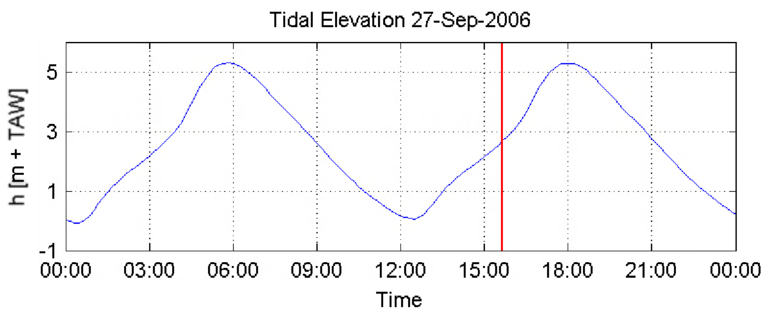
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6059DGDt_sub.csv	Location: Transect DGD









HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
15:36 - 15:39

Time after HW [HH:MM]
-2:22

Data Processed by:

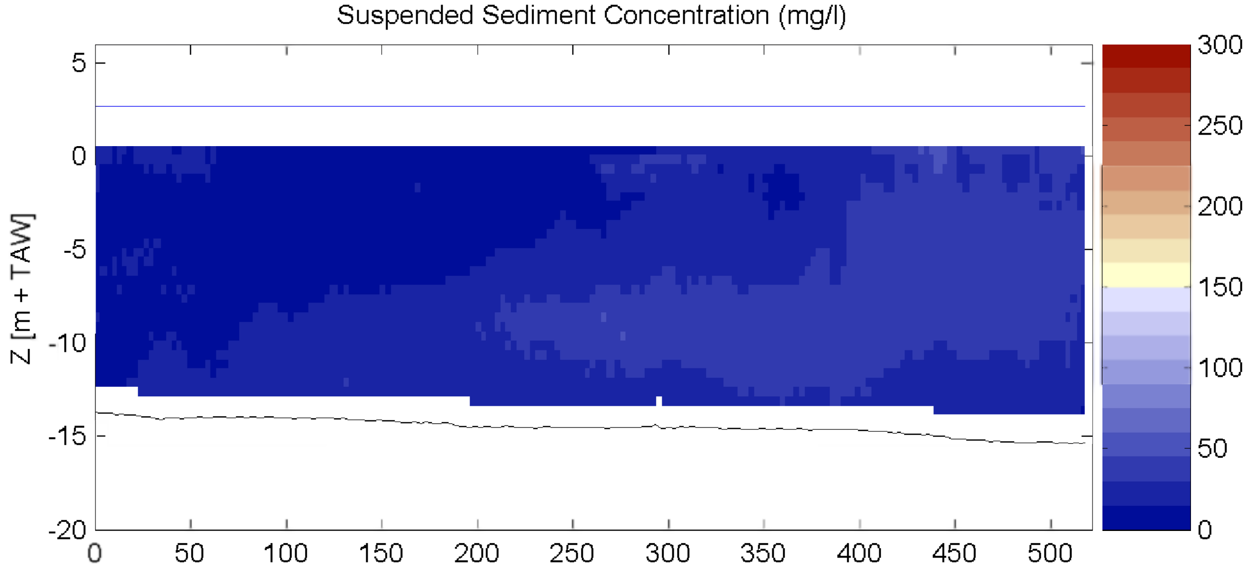
In association with :

I/RA/11283/06.119/MSA

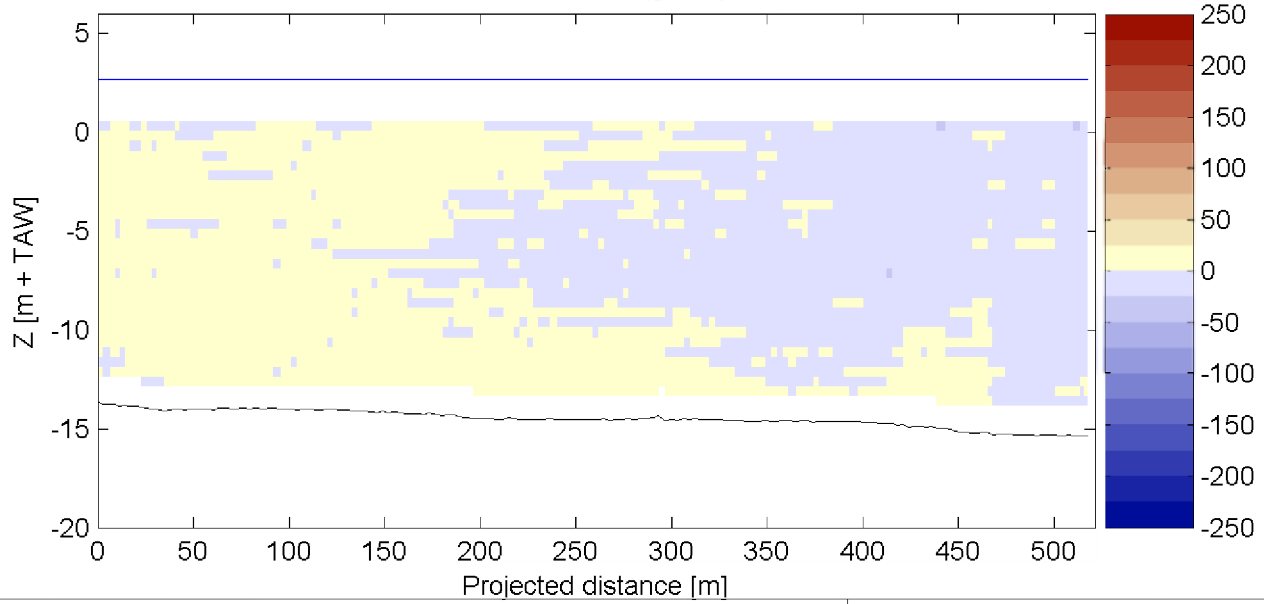
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6059DGDt_sub.csv	Location: Transect DGD

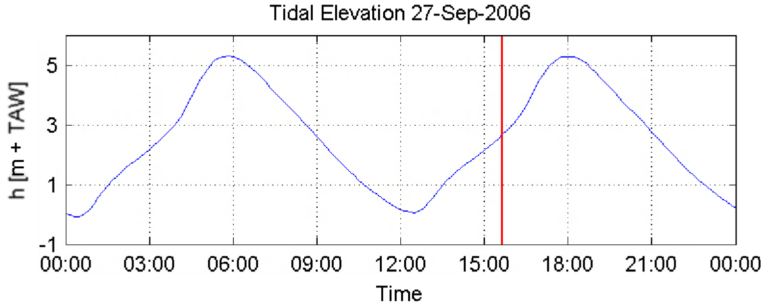
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 27-Sep-2006



HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

15:36 - 15:39

Time after HW [HH:MM]

-2:22

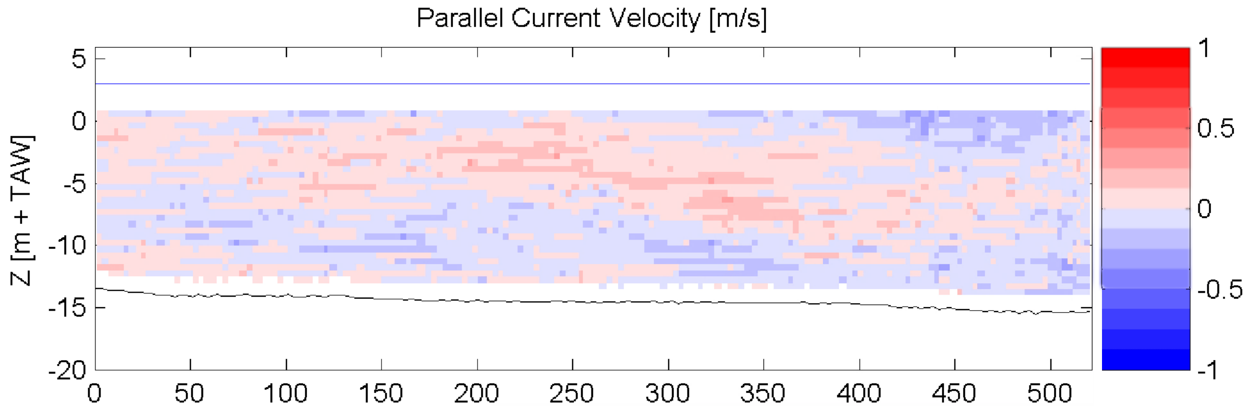
Data Processed by: IMDC

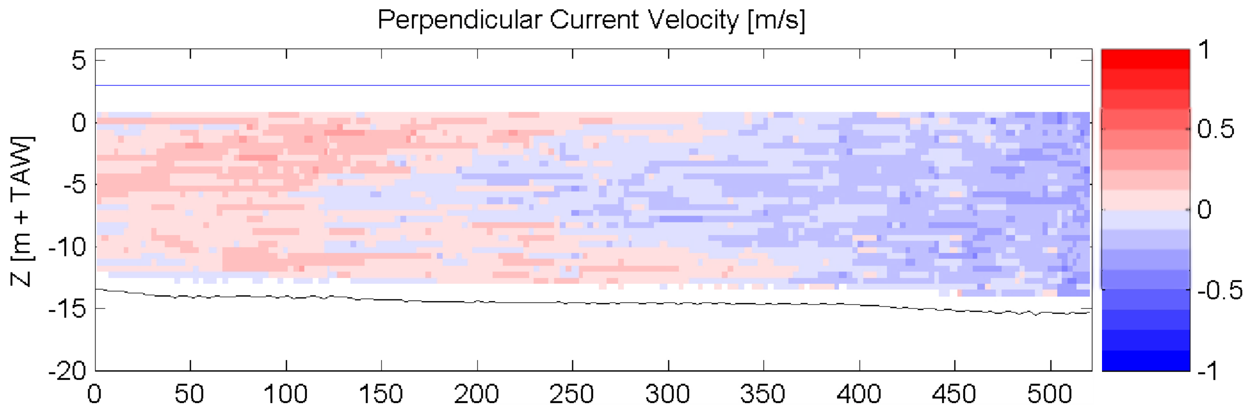
In association with :

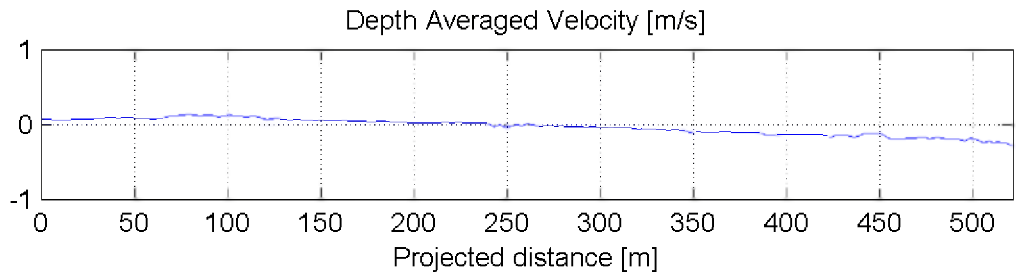
I/RA/11283/06.119/MSA

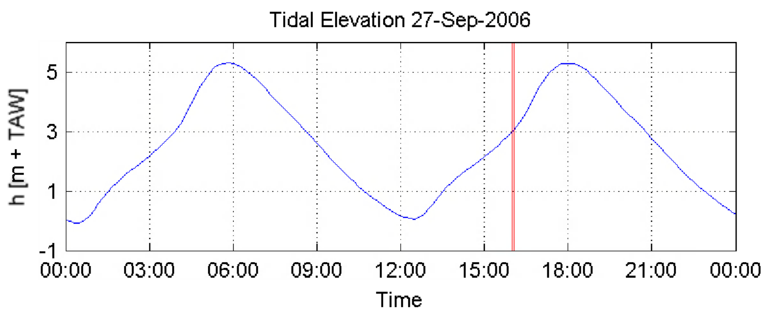
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6062DGDt_sub.csv	Location: Transect DGD









HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
16:00 - 16:04

Time after HW [HH:MM]
-1:57

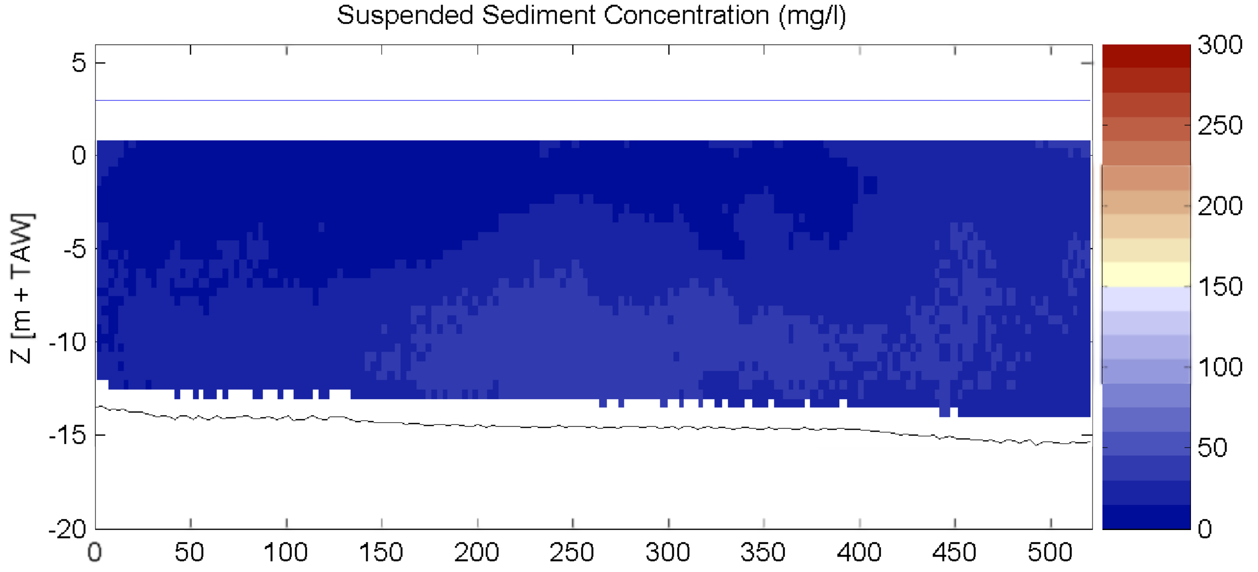
Data Processed by:

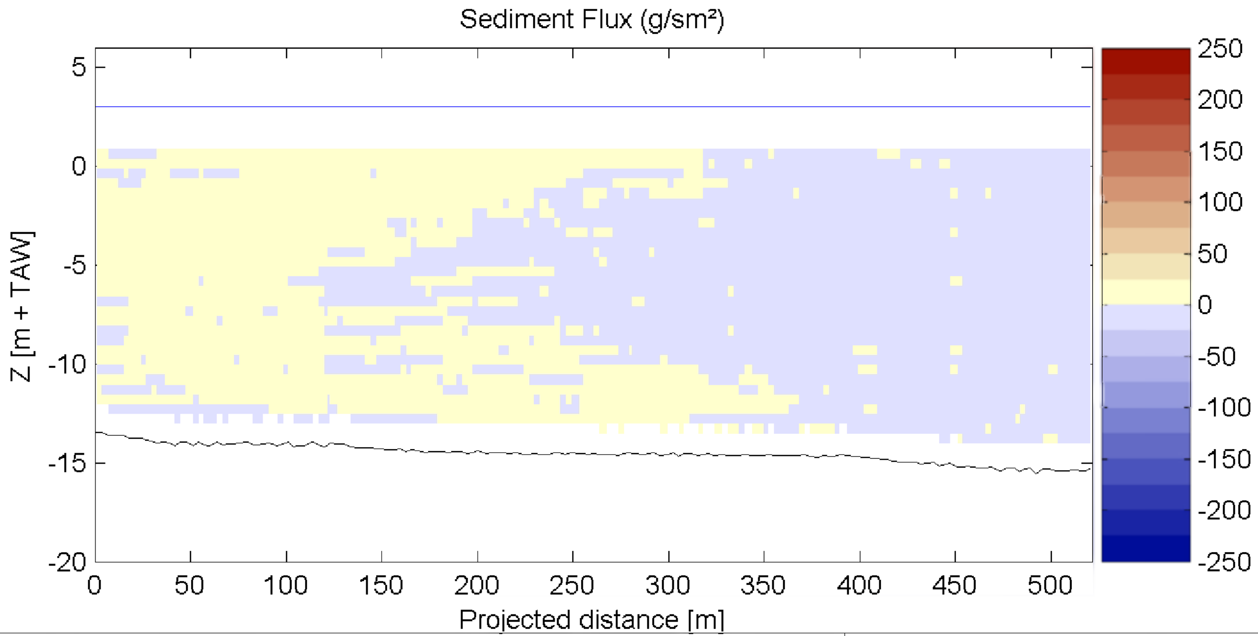
In association with :

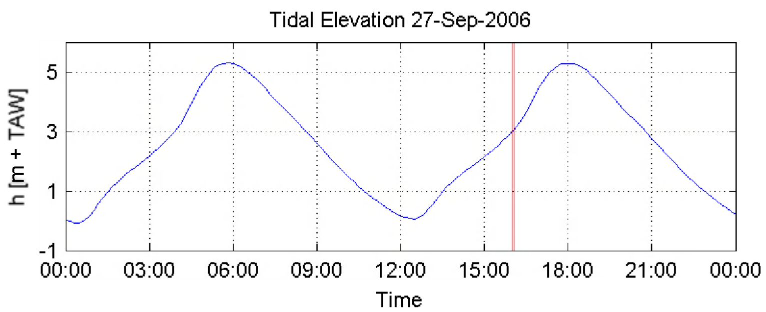
I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6062DGDt_sub.csv	Location: Transect DGD







HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
16:00 - 16:04

Time after HW [HH:MM]
-1:57

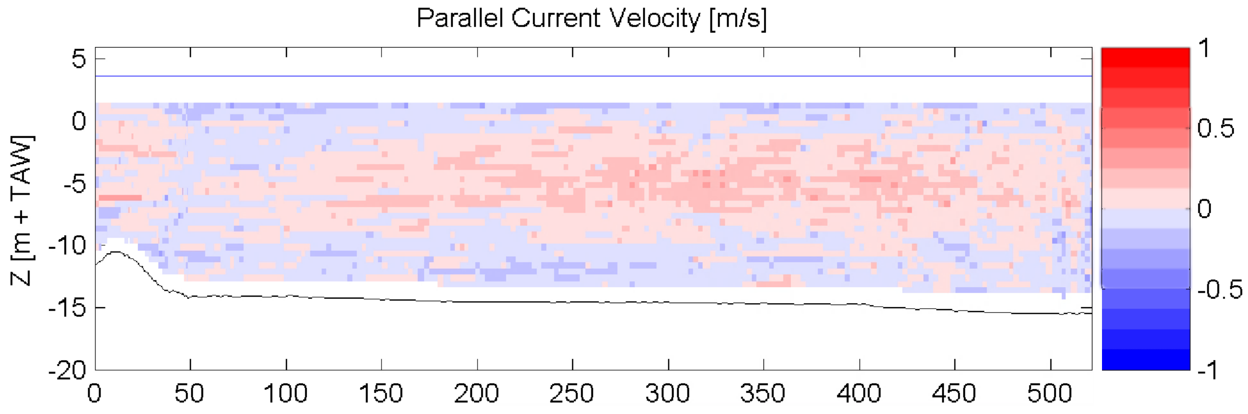
Data Processed by: IMDC

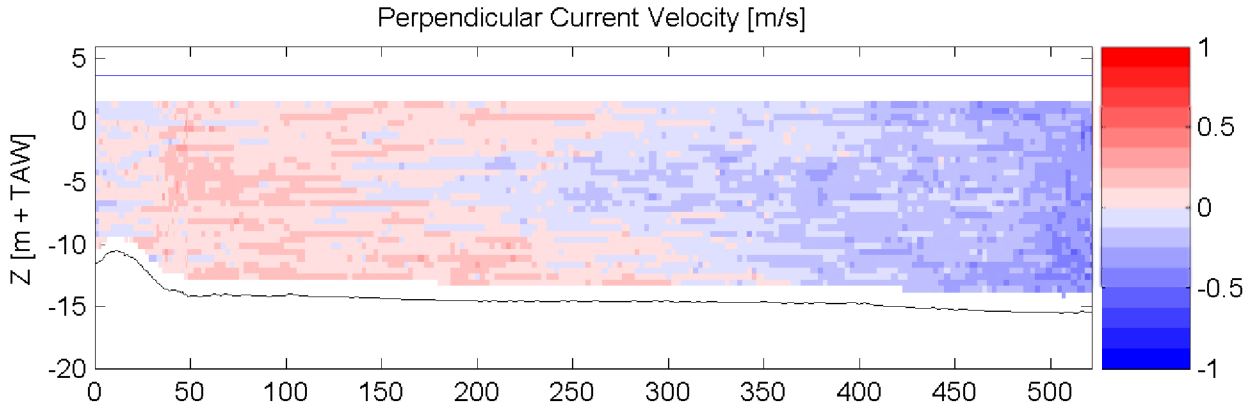
In association with :

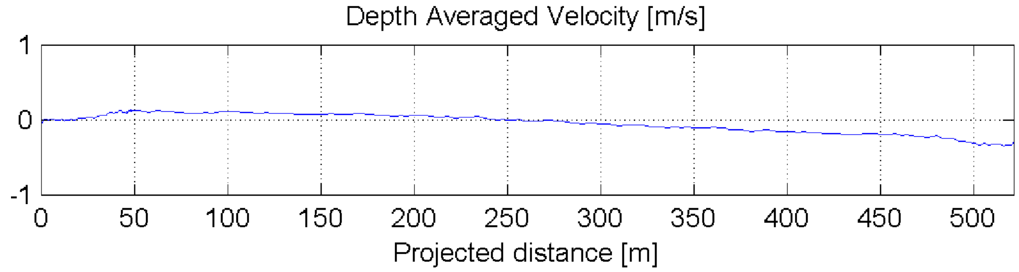
I/RA/11283/06.119/MSA

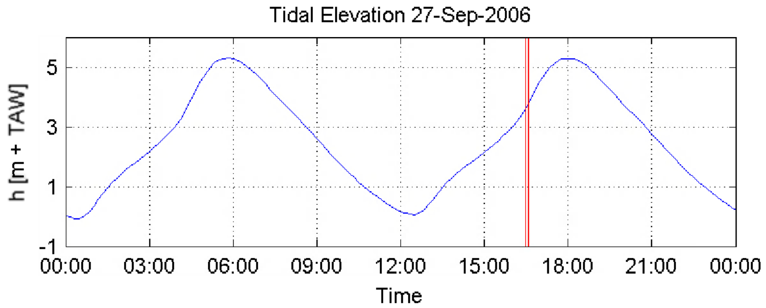
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6065DGDt_sub.csv	Location: Transect DGD









HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

16:29 - 16:34

Time after HW [HH:MM]

-1:28

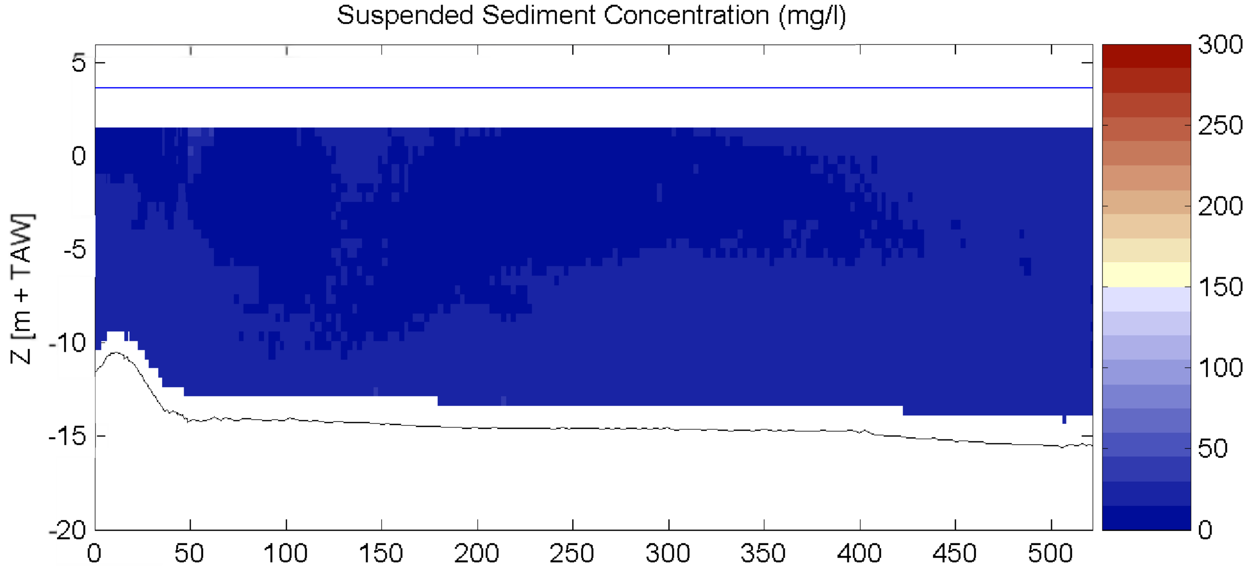
Data Processed by: IMDC

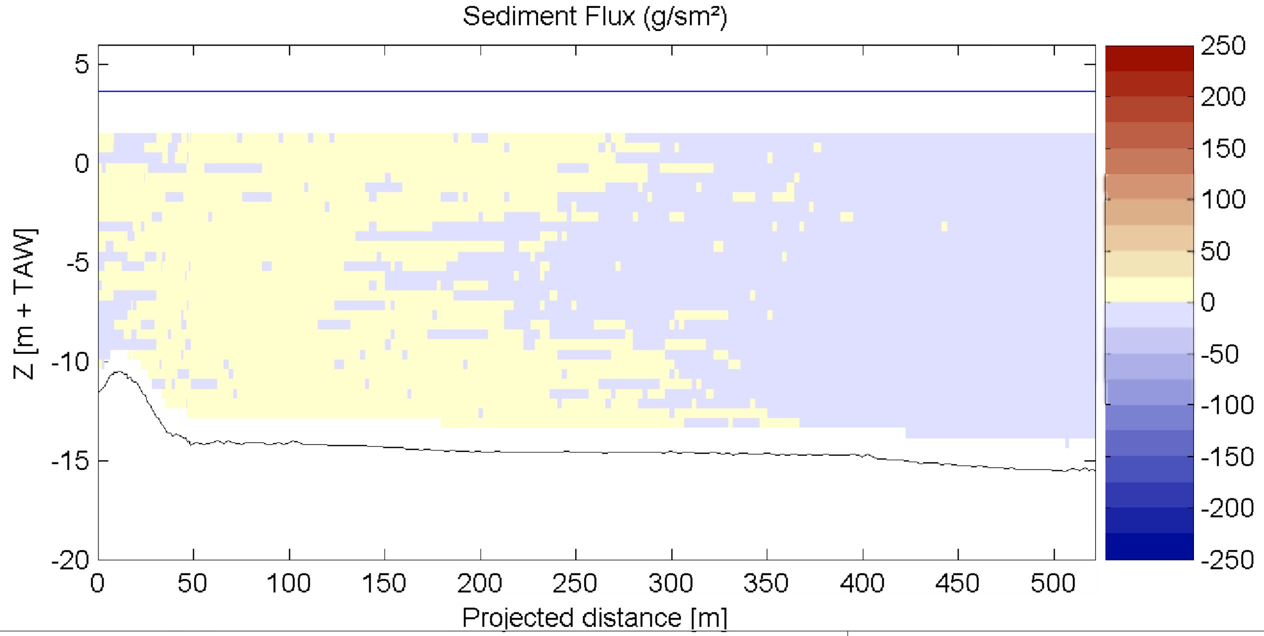
In association with :

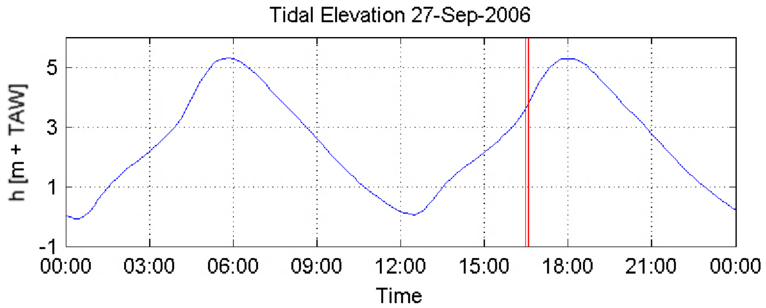
I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6065DGDt_sub.csv	Location: Transect DGD







HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

16:29 - 16:34

Time after HW [HH:MM]

-1:28

Data Processed by: IMDC

In association with : wl | delft hydraulics, GEMS International

I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

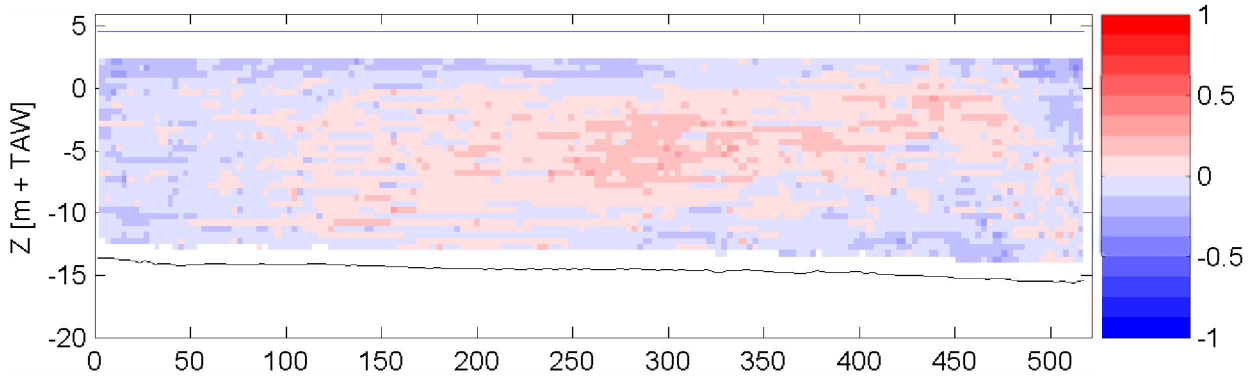
11283

Equipment(s): ADCP

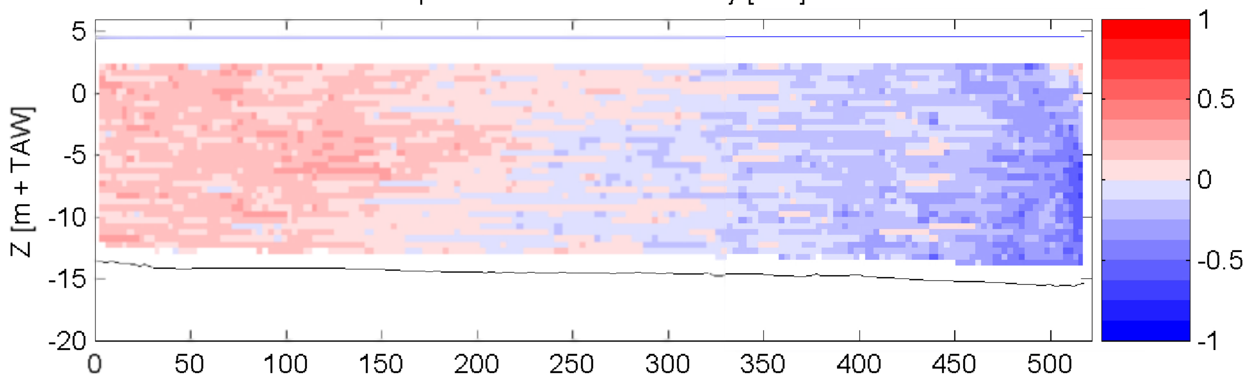
Sourcefile: 6068DGDt_sub.csv

Location: Transect DGD

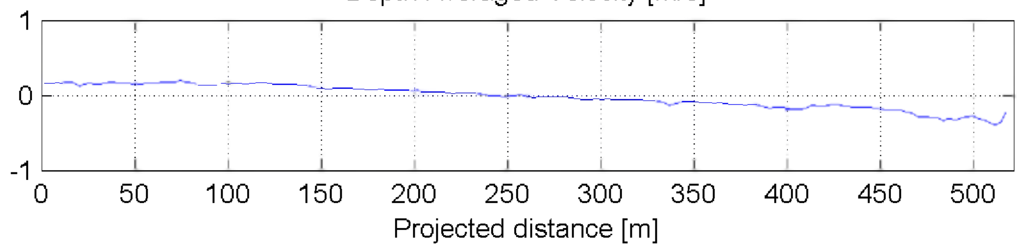
Parallel Current Velocity [m/s]



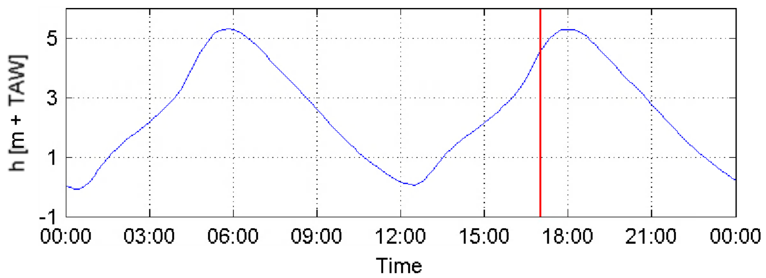
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 27-Sep-2006



HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

16:59 - 17:02

Time after HW [HH:MM]

-0:59

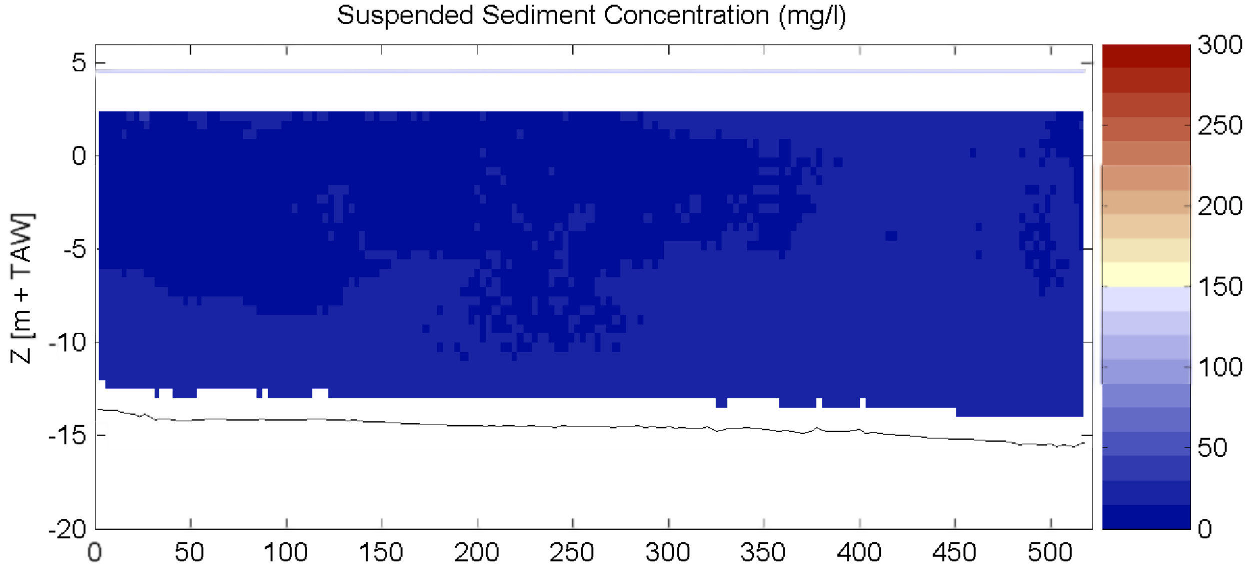
Data Processed by: IMDC

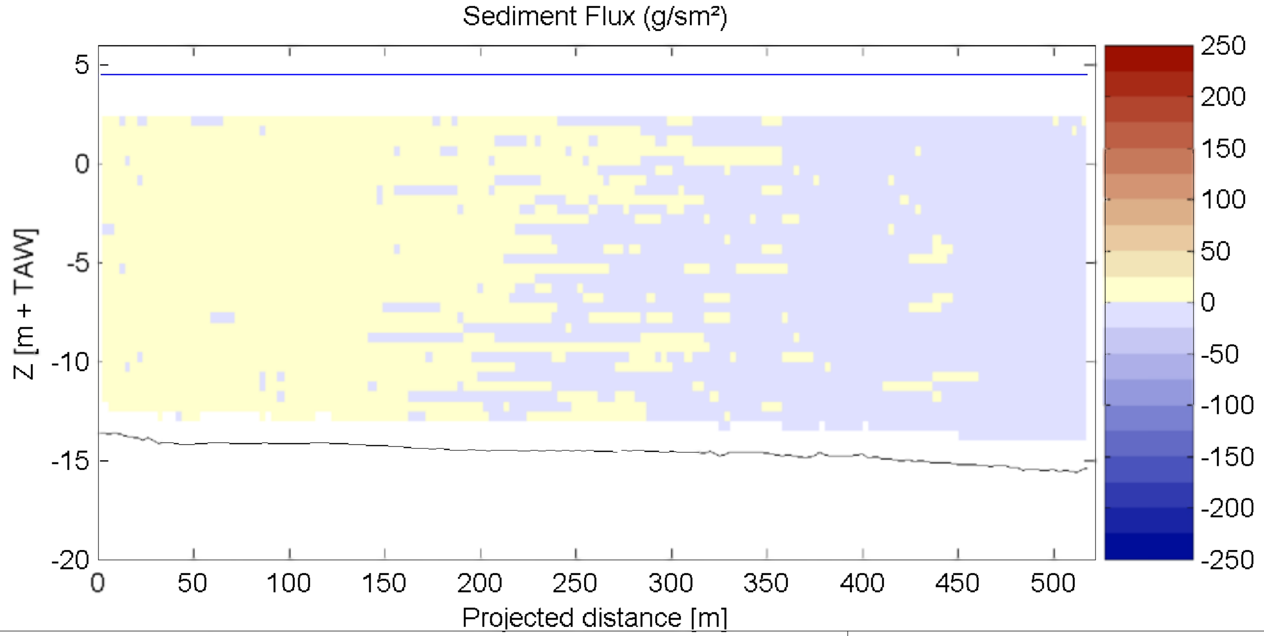
In association with :

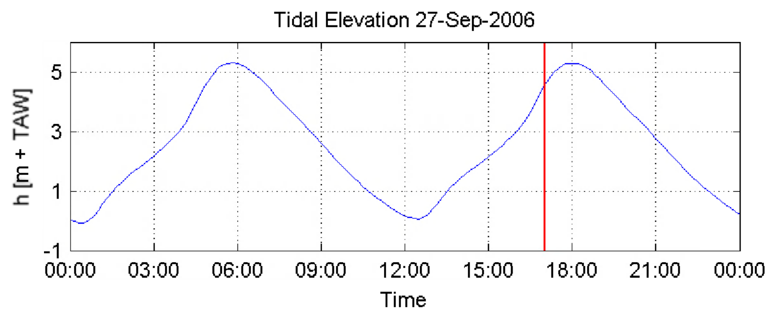
I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6068DGDt_sub.csv	Location: Transect DGD







HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
16:59 - 17:02

Time after HW [HH:MM]
-0:59

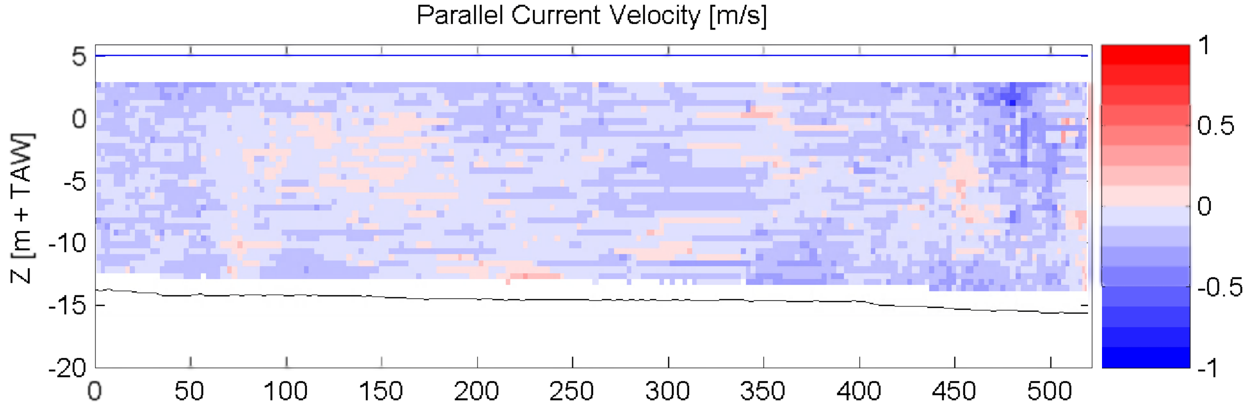
Data Processed by: IMDC

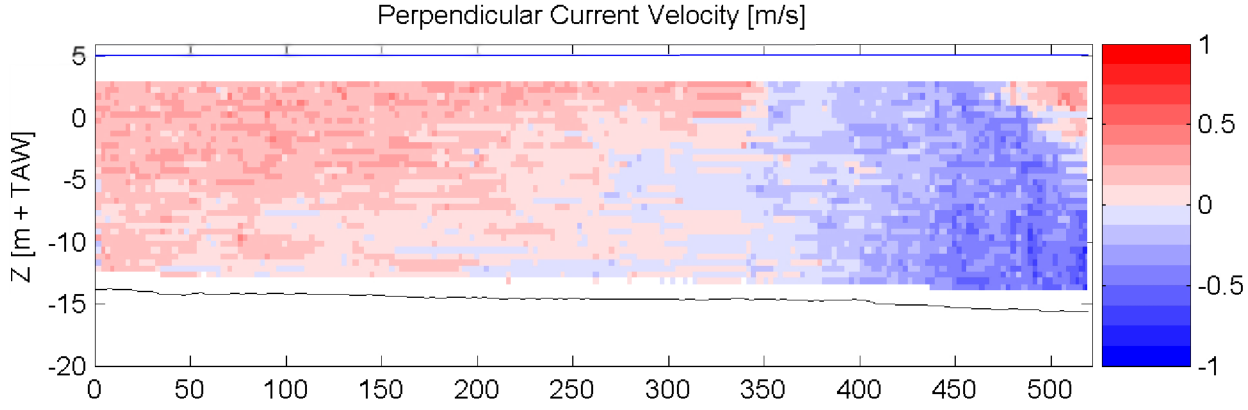
In association with :

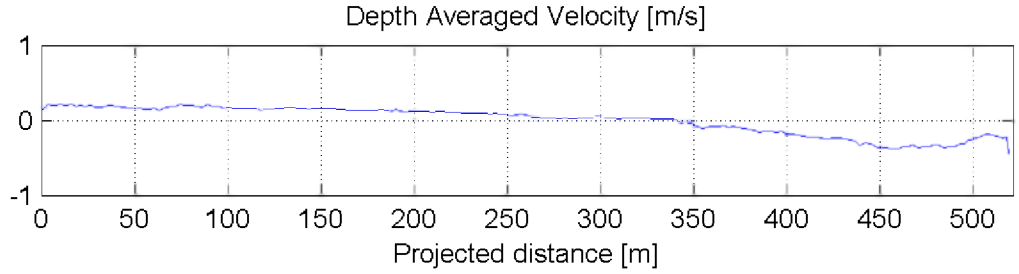
I/RA/11283/06.119/MSA

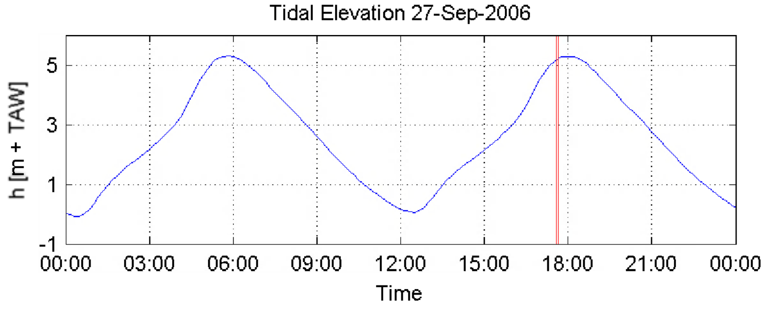
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6071DGDt_sub.csv	Location: Transect DGD









HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
17:33 - 17:37

Time after HW [HH:MM]
-0:24

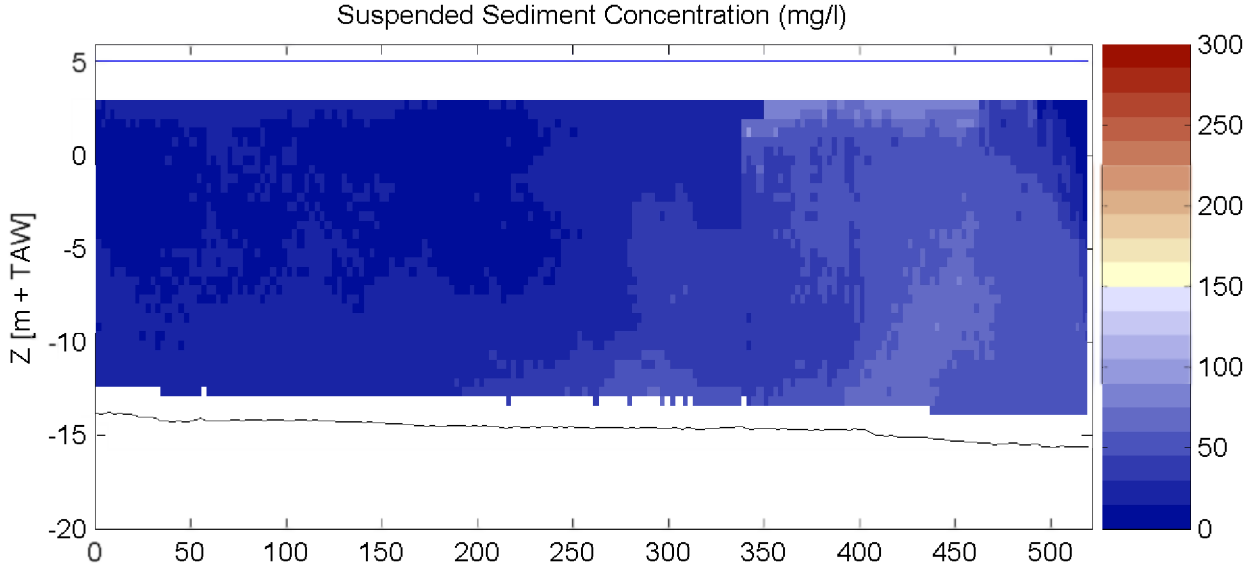
Data Processed by: IMDC

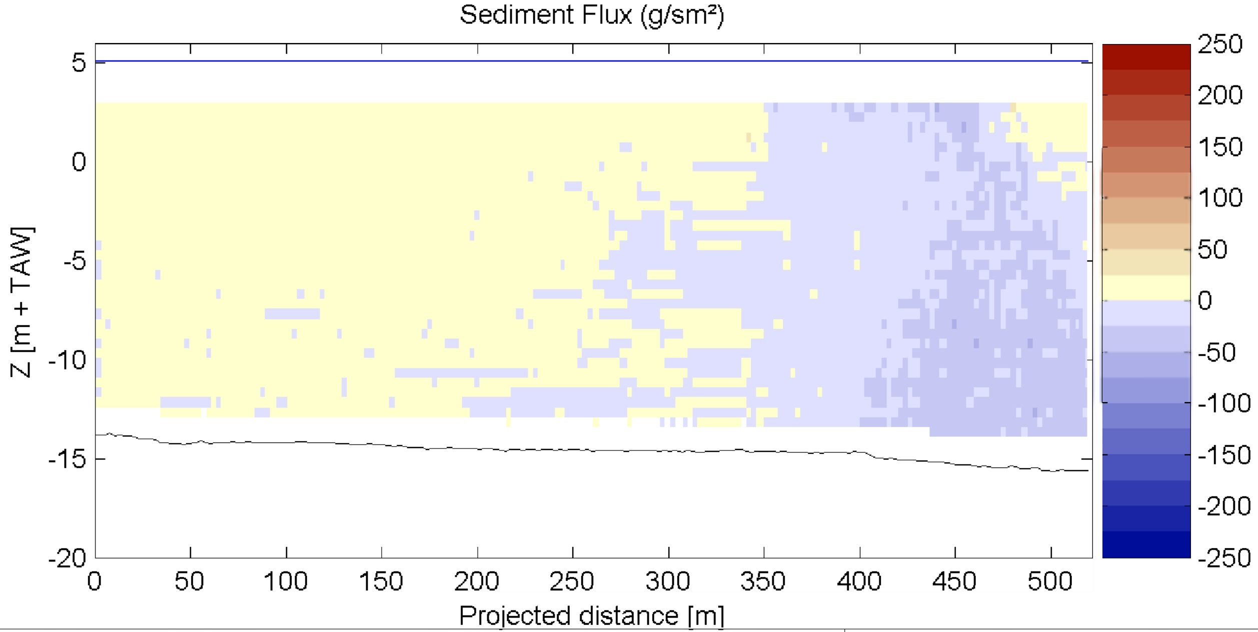
In association with :

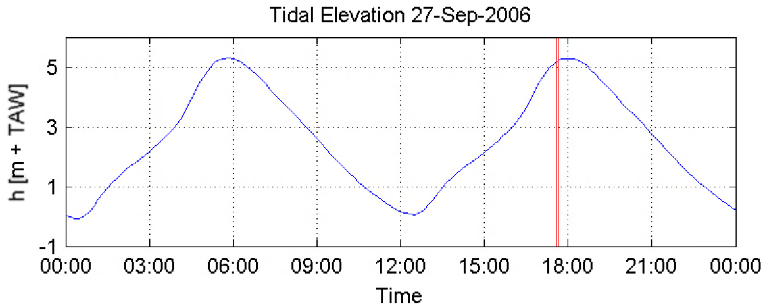
I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6071DGDt_sub.csv	Location: Transect DGD







HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
17:33 - 17:37

Time after HW [HH:MM]
-0:24

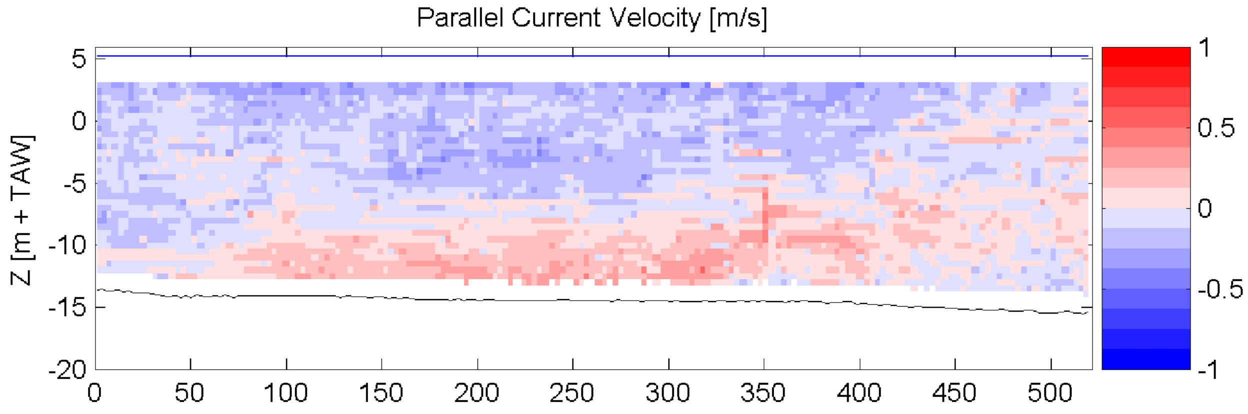
Data Processed by: IMDC

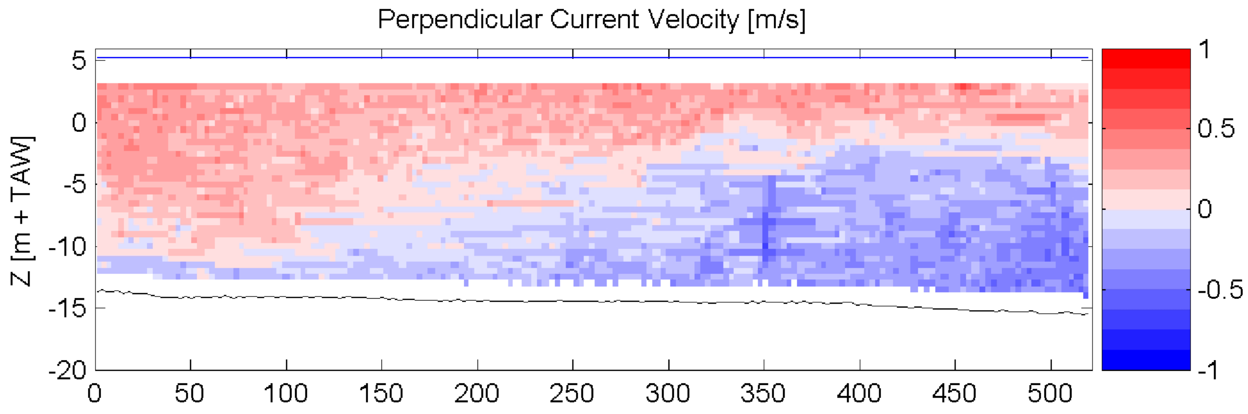
In association with :

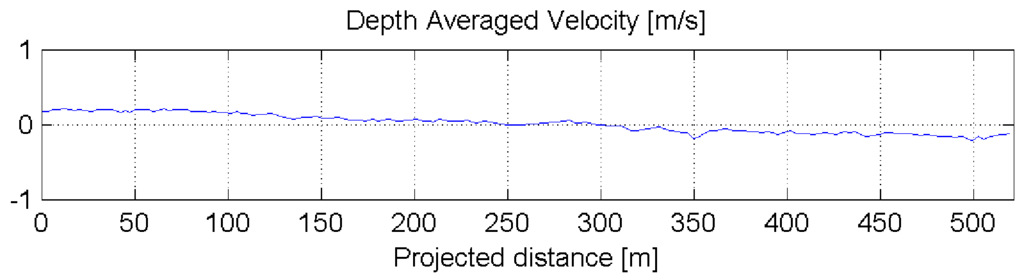
I/RA/11283/06.119/MSA

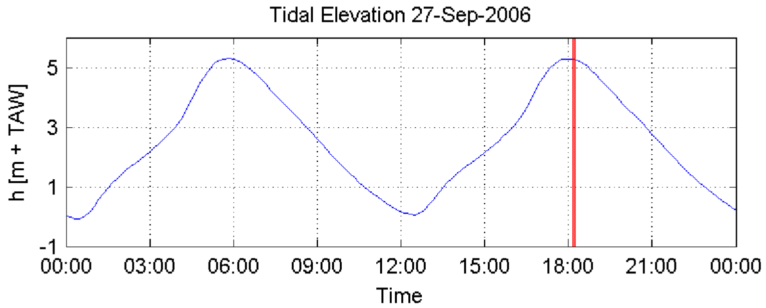
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6074DGDt_sub.csv	Location: Transect DGD









HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

18:09 - 18:13

Time after HW [HH:MM]

0:11

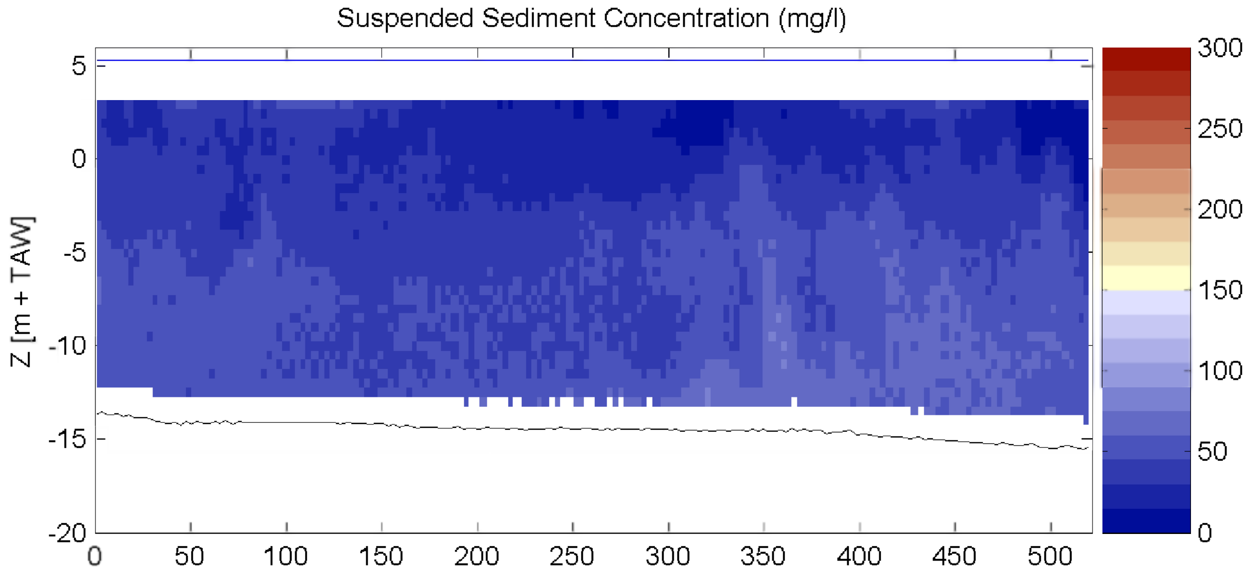
Data Processed by: IMDC

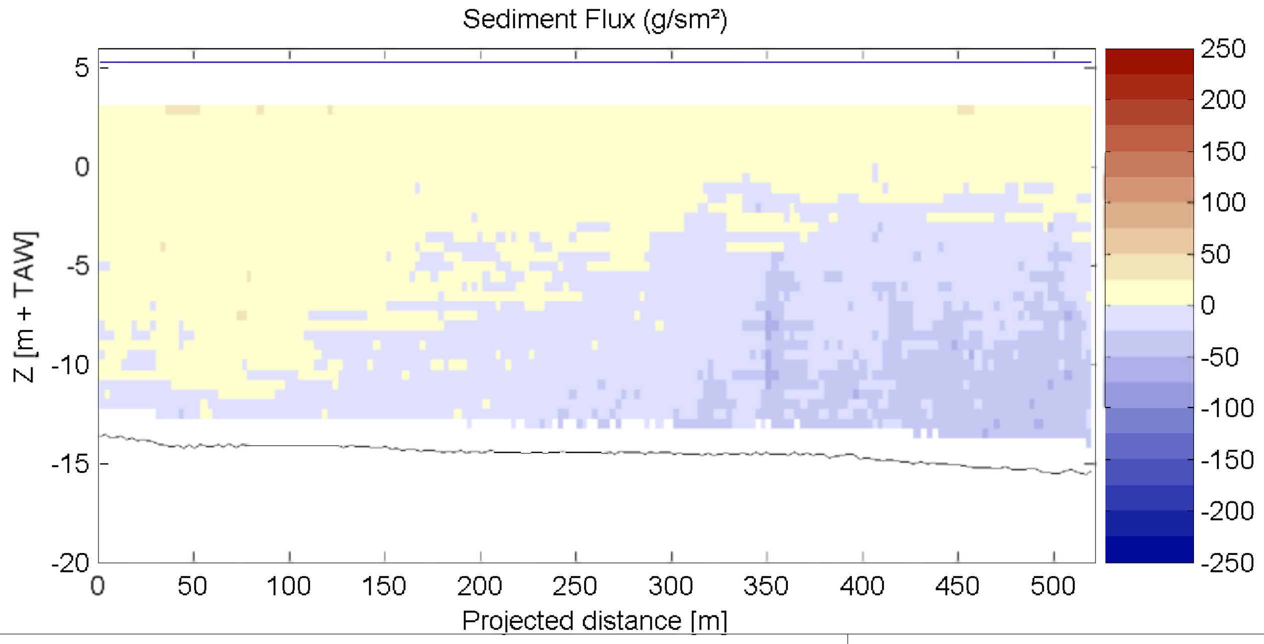
In association with : WL | delft hydraulics, GEMS international

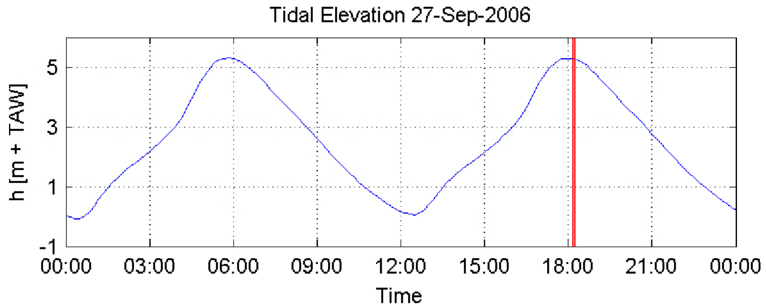
I/RA/11283/06.119/MSA

Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6074DGDt_sub.csv	Location: Transect DGD







HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
18:09 - 18:13

Time after HW [HH:MM]
0:11

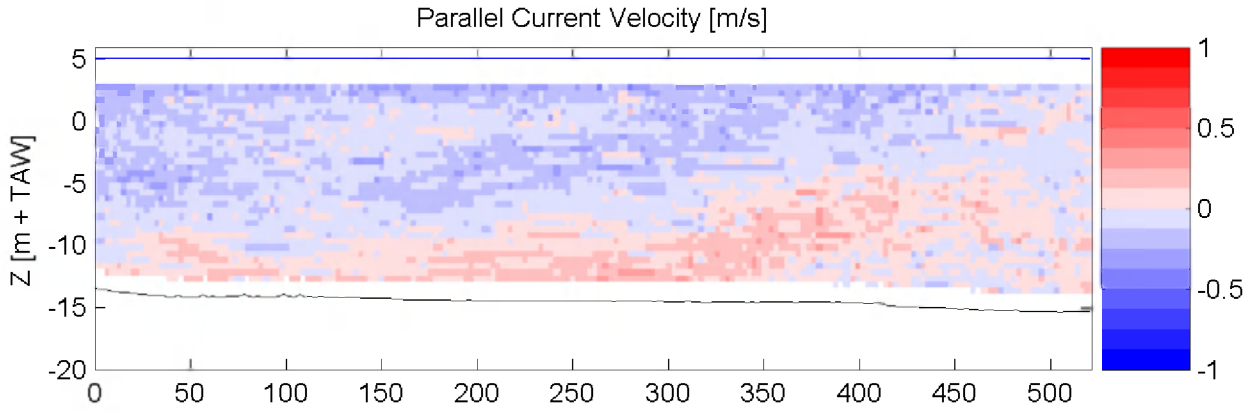
Data Processed by: IMDC

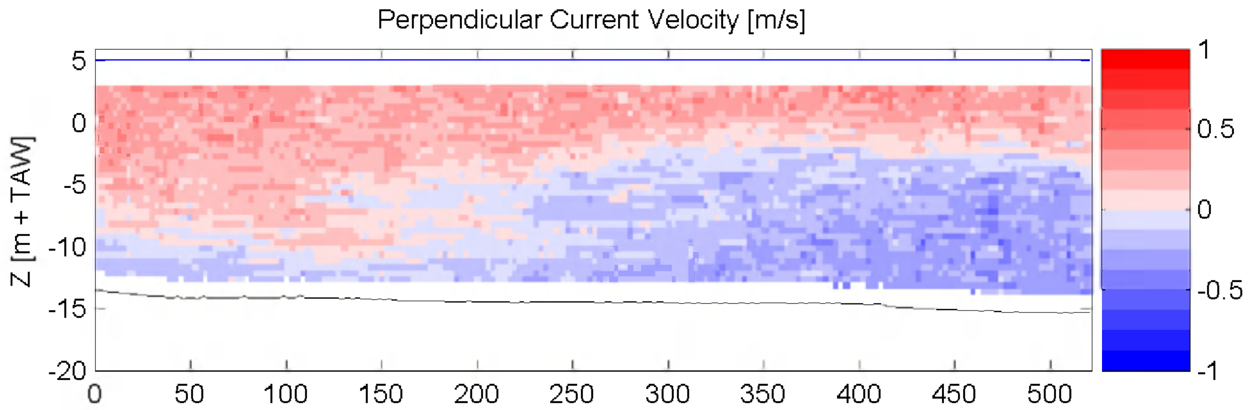
In association with :

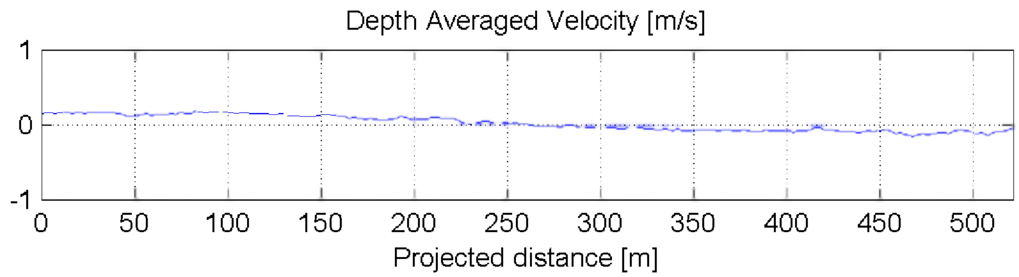
I/RA/11283/06.119/MSA

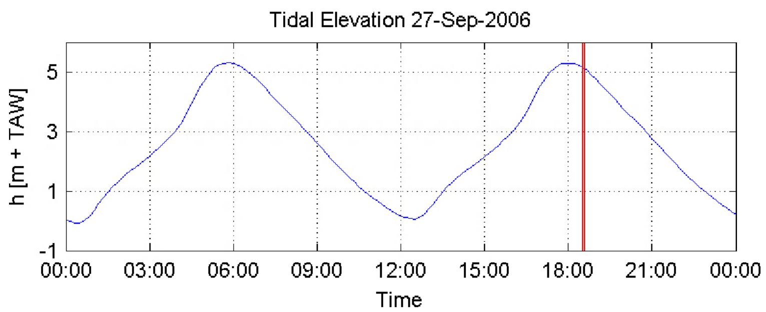
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6077DGDt_sub.csv	Location: Transect DGD









HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

18:29 - 18:33

Time after HW [HH:MM]

0:31

Data Processed by:

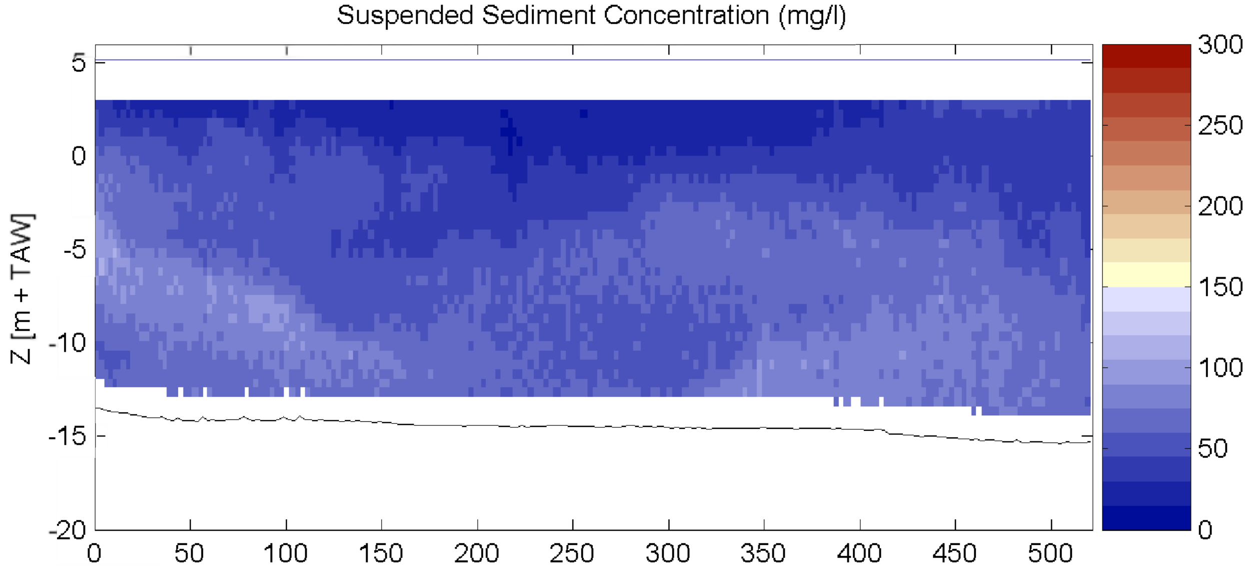
In association with :

I/RA/11283/06.119/MSA

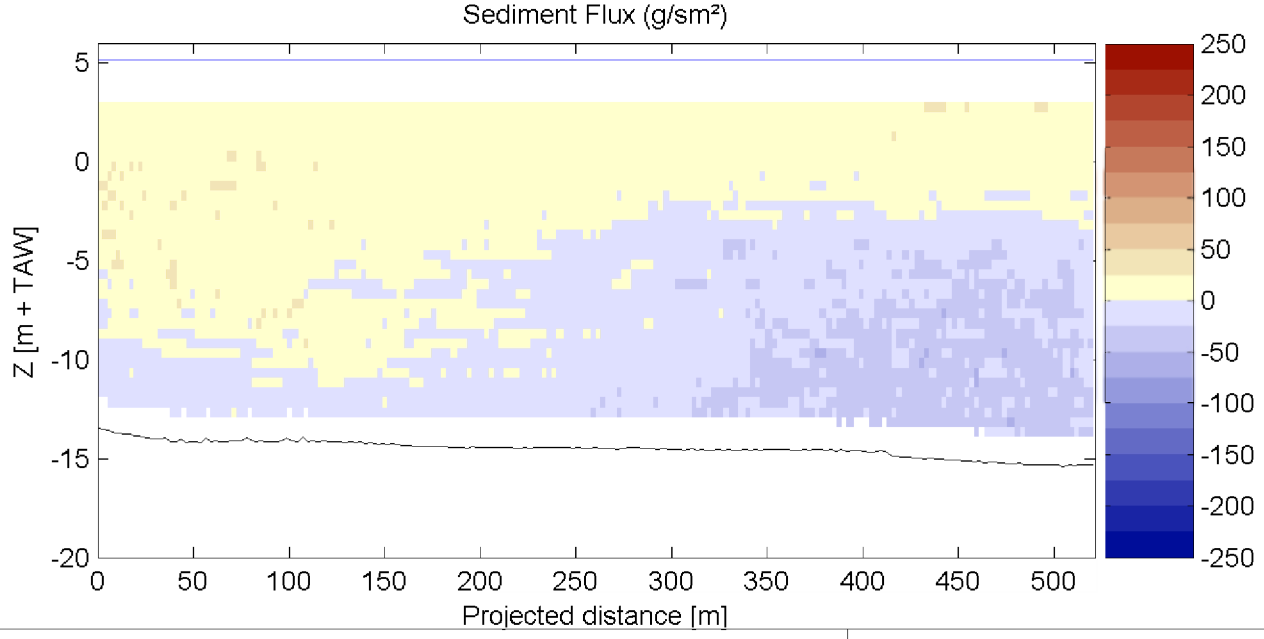
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6077DGDt_sub.csv	Location: Transect DGD

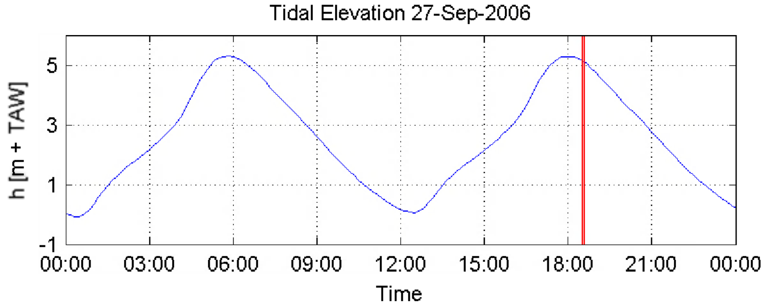
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 27-Sep-2006



HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
18:29 - 18:33

Time after HW [HH:MM]
0:31

Data Processed by:

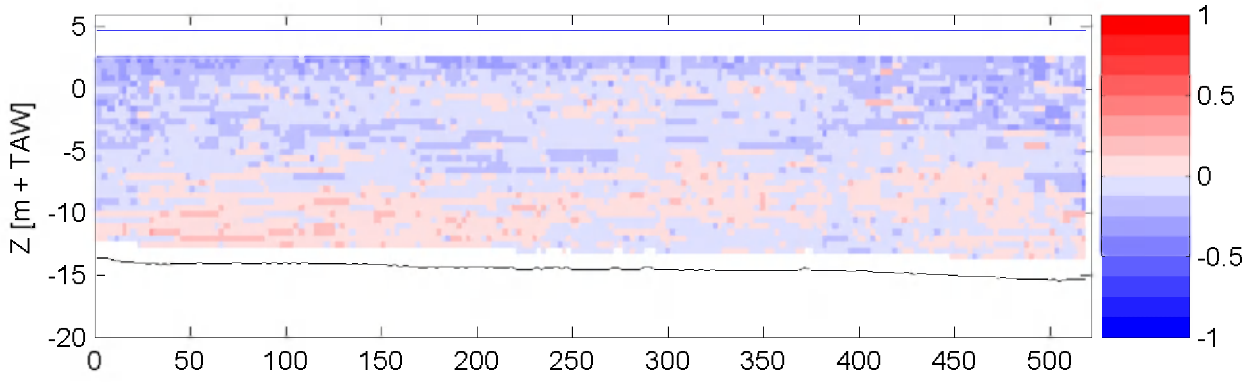
In association with :

I/RA/11283/06.119/MSA

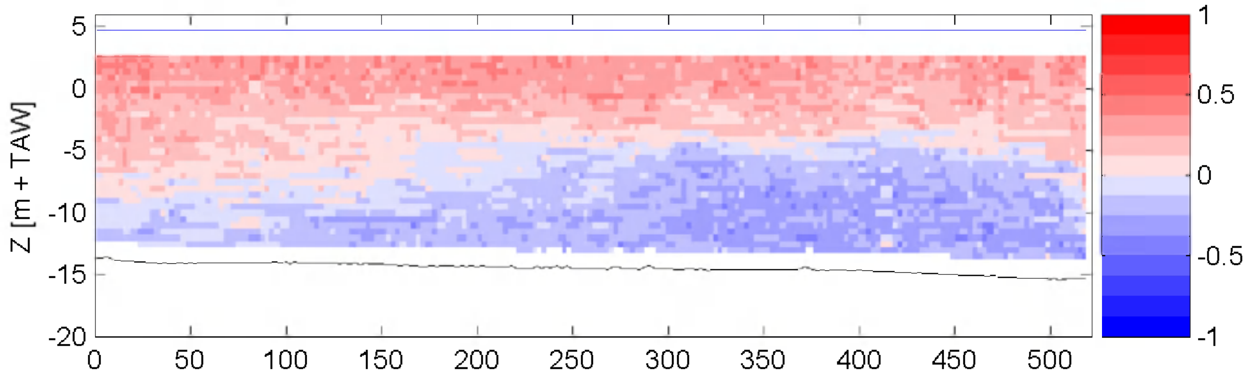
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6080DGDt_sub.csv	Location: Transect DGD

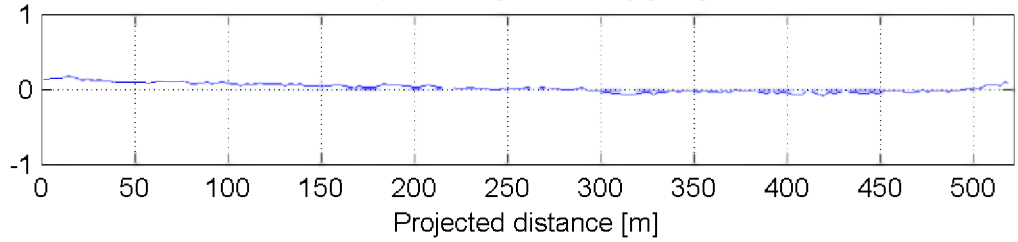
Parallel Current Velocity [m/s]



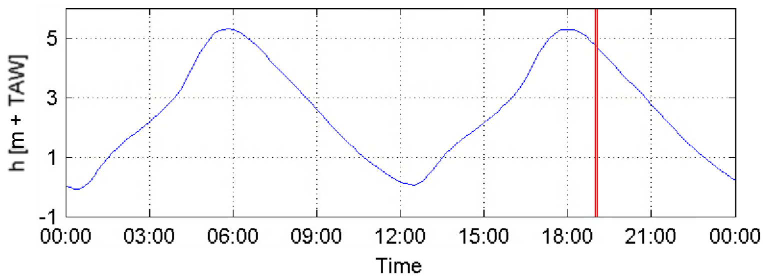
Perpendicular Current Velocity [m/s]



Depth Averaged Velocity [m/s]



Tidal Elevation 27-Sep-2006



HW/LW: 05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :

27-Sep-2006

18:59 - 19:03

Time after HW [HH:MM]

1:01

Data Processed by:

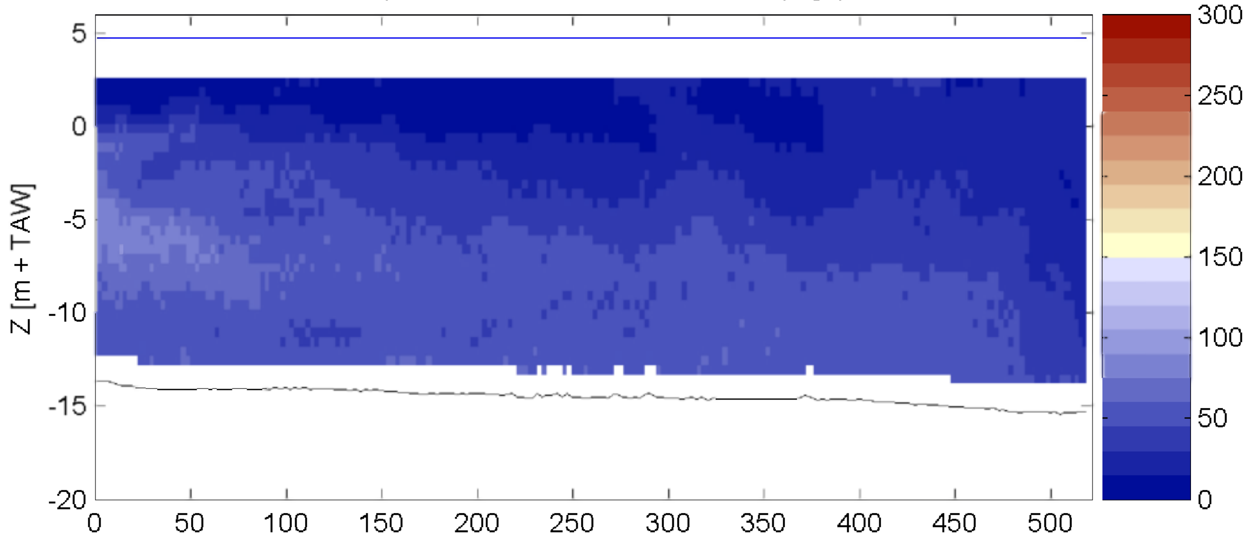
In association with :

I/RA/11283/06.119/MSA

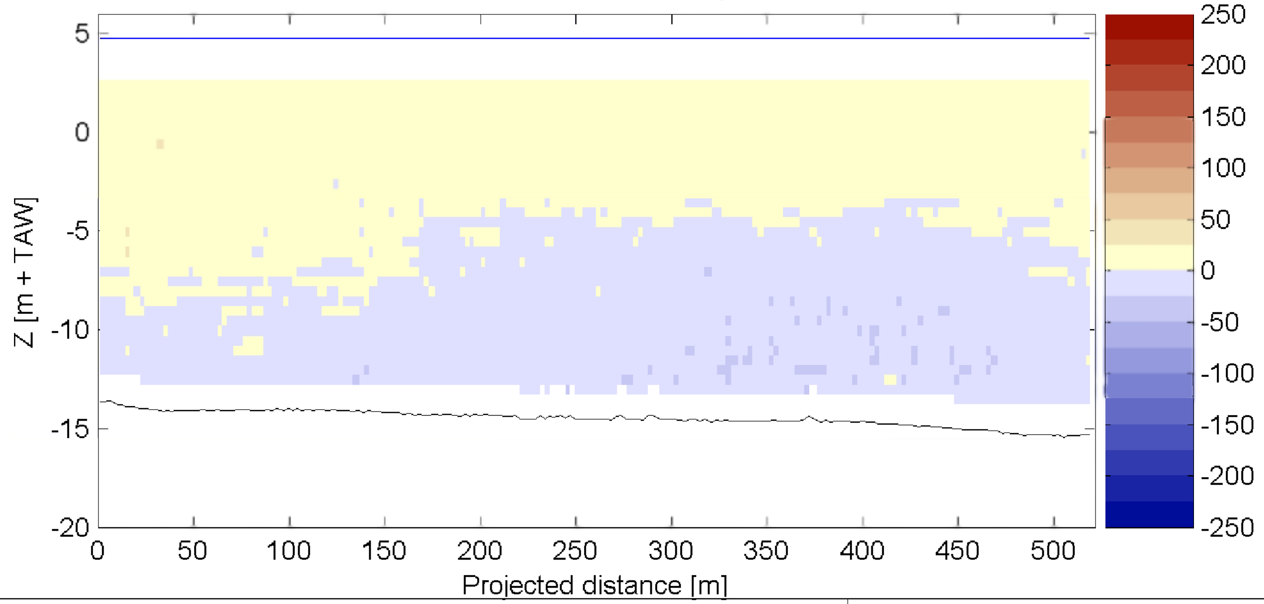
Aanslibbing Deurganckdok

11283	Equipment(s): ADCP
Sourcefile: 6080DGDt_sub.csv	Location: Transect DGD

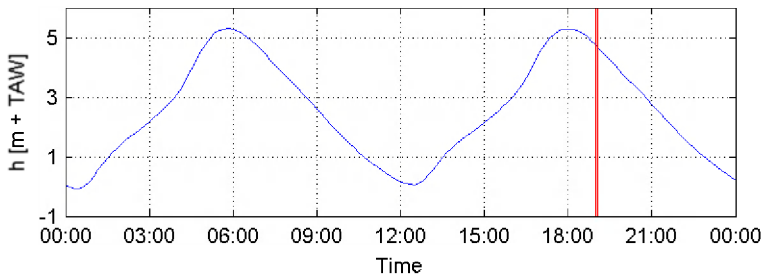
Suspended Sediment Concentration (mg/l)



Sediment Flux (g/sm²)



Tidal Elevation 27-Sep-2006



HW/LW:
05:50: h = 5.31 m+TAW
12:30: h = 0.05 m+TAW
18:00: h = 5.29 m+TAW

Date / Time [MET] :
27-Sep-2006
18:59 - 19:03

Time after HW [HH:MM]
1:01

Data Processed by:

In association with :

I/RA/11283/06.119/MSA

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

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

Filename	Time to HW [hh:mm]	Qmid [m³/s]	Qtop [m³/s]	Qbottom [m³/s]	Qleft [m³/s]	Qright [m³/s]	Qtotal [m³/s]
6002DGDt_sub2.csv	0:31	23	283	3	0	-2	309
6005DGDt_sub.csv	0:50	26	289	1	3	1	320
6008DGDt_sub.csv	1:14	-75	319	-4	1	0	240
6011DGDt_sub.csv	1:44	-81	274	-7	1	0	188
6014DGDt_sub.csv	2:21	15	226	0	-2	0	239
6017DGDt_sub.csv	2:46	95	154	6	-65	2	193
6020DGDt_sub.csv	3:24	167	182	11	-28	17	350
6023DGDt_sub.csv	3:51	220	191	16	1	0	428
6026DGDt_sub.csv	4:14	105	120	7	-1	3	234
6029DGDt_sub.csv	4:44	122	19	10	-1	1	151
6032DGDt_sub.csv	5:13	138	-31	10	2	4	123
6035DGDt_sub.csv	5:44	198	-103	14	-3	-3	103
6038DGDt_sub.csv	6:17	3	-128	1	-1	5	-120
6041DGDt_sub.csv	-5:27	55	-127	5	0	47	-20
6044DGDt_sub.csv	-4:57	-140	-227	-12	-49	7	-422
6047DGDt_sub.csv	-4:22	-134	-154	-10	-1	0	-298
6050DGDt_sub.csv	-3:56	-129	-156	-10	11	-1	-286
6053DGDt_sub.csv	-3:25	-131	-71	-9	0	-1	-211
6056DGDt_sub.csv	-2:57	-218	-64	-17	1	-10	-308
6059DGDt_sub.csv	-2:20	-138	-63	-12	0	-7	-220
6062DGDt_sub.csv	-1:56	-243	-14	-15	0	-2	-274
6065DGDt_sub.csv	-1:26	-373	-55	-35	0	0	-463
6068DGDt_sub.csv	-0:57	-233	-23	-15	-1	-7	-279
6071DGDt_sub.csv	-0:22	-92	107	-6	0	-8	0
6074DGDt_sub.csv	0:14	54	290	4	2	-3	348
6077DGDt_sub.csv	0:33	121	294	7	0	-1	421
6080DGDt_sub.csv	1:04	119	302	8	2	3	435

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

Filename	Time to HW [hh:mm]	Fmid [kg/s]	Ftop [kg/s]	Fbottom [kg/s]	Fleft [kg/s]	Fright [kg/s]	Ftotal [kg/s]
6002DGDt_sub2.csv	0:31	-18	8	0	0	0	-10
6005DGDt_sub.csv	0:50	-21	7	0	0	0	-14
6008DGDt_sub.csv	1:14	-20	5	0	0	0	-15
6011DGDt_sub.csv	1:44	-6	3	0	0	0	-3
6014DGDt_sub.csv	2:21	-6	3	0	0	0	-3
6017DGDt_sub.csv	2:46	-2	1	0	-1	0	-2
6020DGDt_sub.csv	3:24	-3	2	0	-1	0	-2
6023DGDt_sub.csv	3:51	0	3	0	0	0	3
6026DGDt_sub.csv	4:14	-1	2	0	0	0	2
6029DGDt_sub.csv	4:44	3	0	0	0	0	3
6032DGDt_sub.csv	5:13	1	-2	0	0	0	-1
6035DGDt_sub.csv	5:44	1	-5	0	0	0	-4
6038DGDt_sub.csv	6:17	-5	-7	0	0	0	-12
6041DGDt_sub.csv	-5:27	-2	-6	0	0	0	-8
6044DGDt_sub.csv	-4:57	-7	-8	-1	-1	0	-17
6047DGDt_sub.csv	-4:22	-7	-4	0	0	0	-12
6050DGDt_sub.csv	-3:56	-4	-3	0	0	0	-7
6053DGDt_sub.csv	-3:25	-5	-2	0	0	0	-7
6056DGDt_sub.csv	-2:57	-9	-3	0	0	0	-13
6059DGDt_sub.csv	-2:20	-9	-2	0	0	0	-12
6062DGDt_sub.csv	-1:56	-8	-1	-1	0	0	-10
6065DGDt_sub.csv	-1:26	-7	-1	-1	0	0	-9
6068DGDt_sub.csv	-0:57	-6	-1	-1	0	0	-7
6071DGDt_sub.csv	-0:22	-30	-1	-2	0	0	-33
6074DGDt_sub.csv	0:14	-16	8	0	0	0	-8
6077DGDt_sub.csv	0:33	-14	8	0	0	0	-6
6080DGDt_sub.csv	1:04	-13	5	1	0	0	-8

Concentration distribution over the cross section.

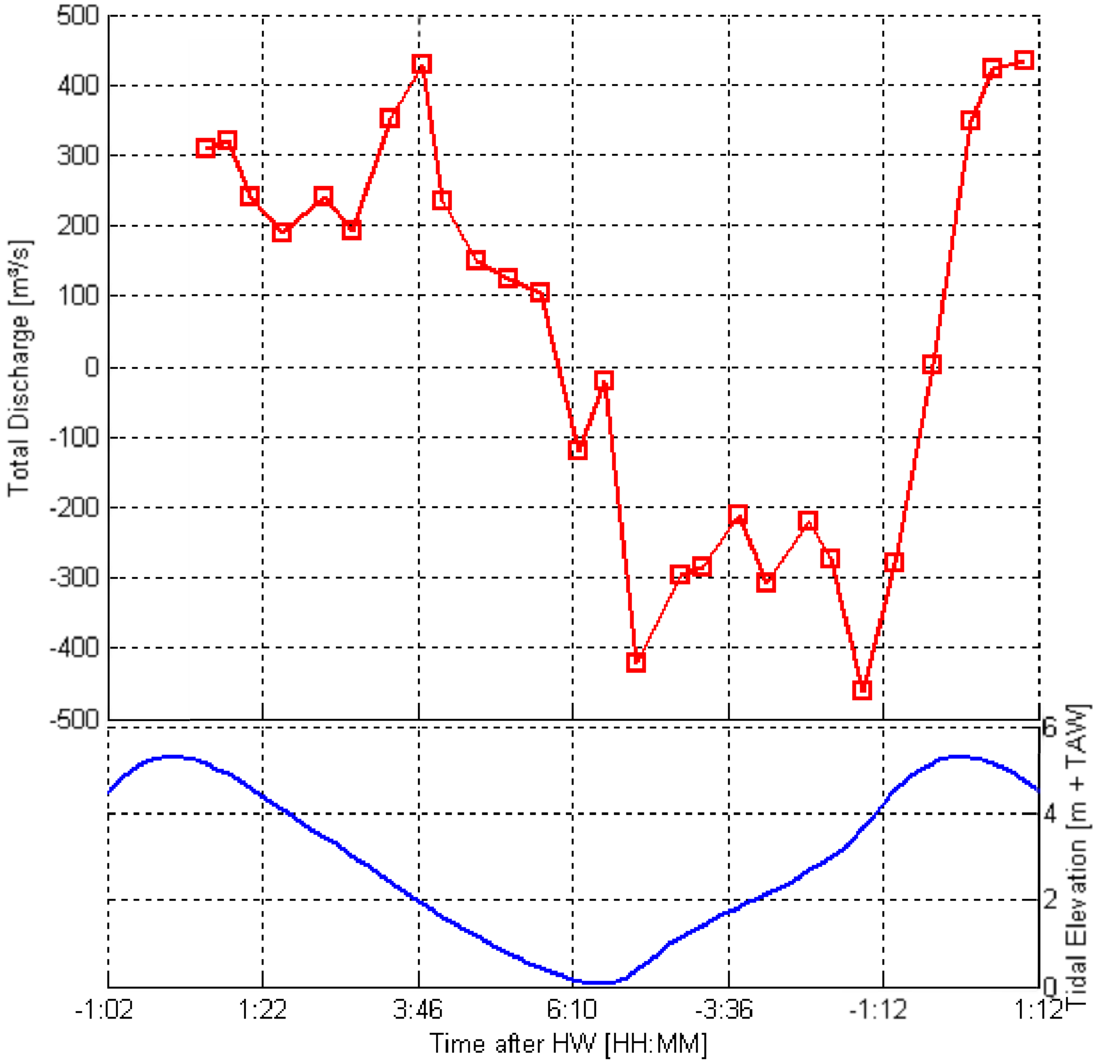
Filename	Time to HW [hh:mm]	Cmid [mg/l]	Ctop [mg/l]	Cbottom [mg/l]	Cleft [mg/l]	Cright [mg/l]	Ctotal [mg/l]
6002DGDt_sub2.csv	0:31	NaN	28	0	NaN	0	NaN
6005DGDt_sub.csv	0:50	NaN	24	0	0	0	NaN
6008DGDt_sub.csv	1:14	267	16	0	0	NaN	NaN
6011DGDt_sub.csv	1:44	74	11	0	0	NaN	NaN
6014DGDt_sub.csv	2:21	NaN	13	NaN	0	NaN	NaN
6017DGDt_sub.csv	2:46	NaN	6	0	15	0	NaN
6020DGDt_sub.csv	3:24	NaN	11	0	36	0	NaN
6023DGDt_sub.csv	3:51	0	16	0	0	NaN	7
6026DGDt_sub.csv	4:14	NaN	17	0	0	0	9
6029DGDt_sub.csv	4:44	25	0	0	0	0	20
6032DGDt_sub.csv	5:13	7	65	0	0	0	NaN
6035DGDt_sub.csv	5:44	5	49	0	0	0	NaN
6038DGDt_sub.csv	6:17	NaN	55	0	0	0	100
6041DGDt_sub.csv	-5:27	NaN	47	0	NaN	0	400
6044DGDt_sub.csv	-4:57	50	35	83	20	0	40
6047DGDt_sub.csv	-4:22	52	26	0	0	NaN	40
6050DGDt_sub.csv	-3:56	31	19	0	0	0	24
6053DGDt_sub.csv	-3:25	38	28	0	NaN	0	33
6056DGDt_sub.csv	-2:57	41	47	0	0	0	42
6059DGDt_sub.csv	-2:20	65	32	0	NaN	0	55
6062DGDt_sub.csv	-1:56	33	71	67	NaN	0	36
6065DGDt_sub.csv	-1:26	19	18	29	NaN	NaN	19
6068DGDt_sub.csv	-0:57	26	43	67	0	0	25
6071DGDt_sub.csv	-0:22	326	NaN	333	NaN	0	NaN
6074DGDt_sub.csv	0:14	NaN	28	0	0	0	NaN
6077DGDt_sub.csv	0:33	NaN	27	0	NaN	0	NaN
6080DGDt_sub.csv	1:04	NaN	17	125	0	0	NaN

APPENDIX H.

TEMPORAL VARIATION OF TOTAL FLUX AND TOTAL DISCHARGE

Aanslibbing Deurganckdok

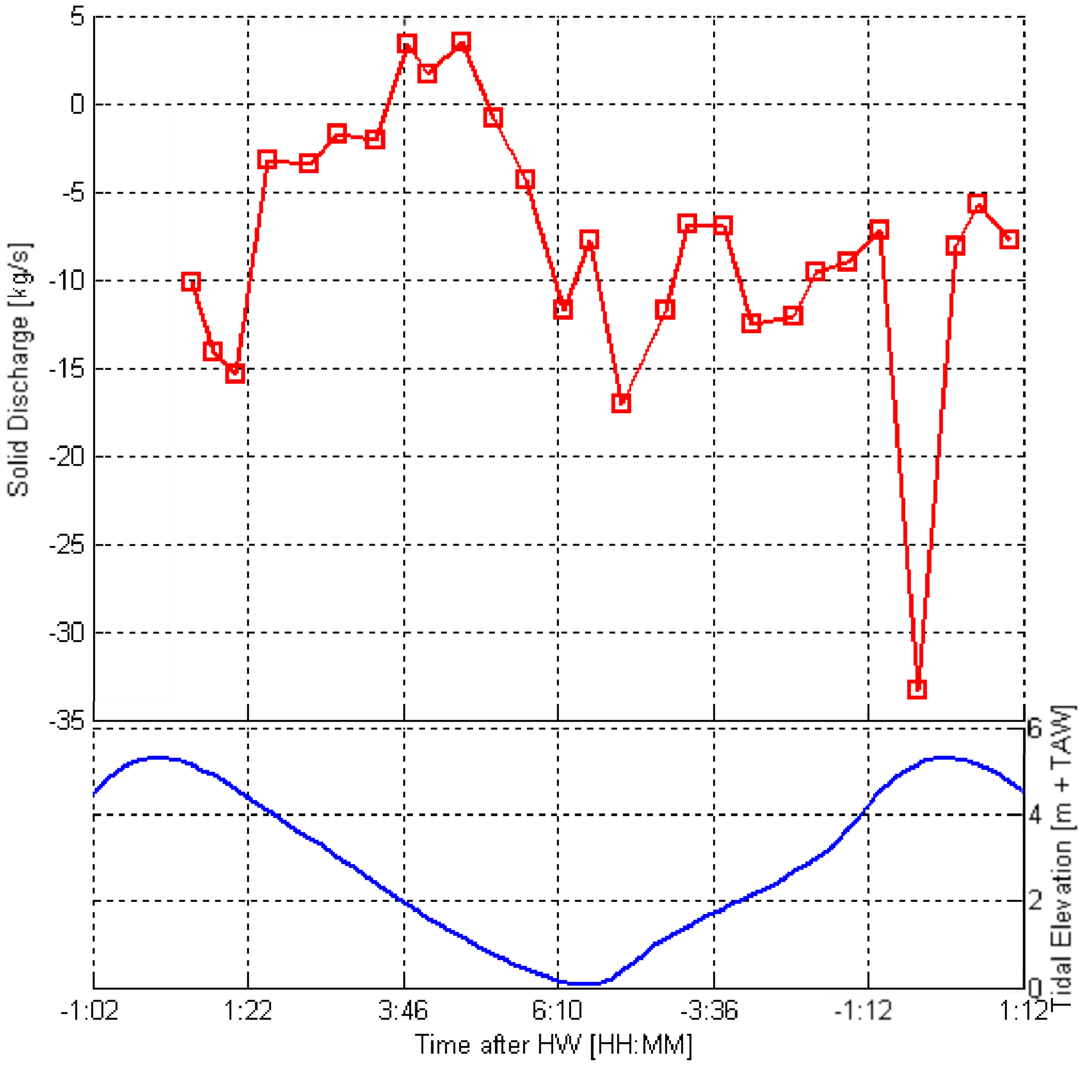
11283	Equipment(s): ADCP
	Location: Transect DGD



Data Processed by:

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

Aanslibbing Deurganckdok	
11283	Equipment(s): ADCP
	Location: Transect DGD



Data Processed by:

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

APPENDIX I. HCBS2 REPORTS

Report	Description
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)