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WATERBOUWKUNDIG LABORATORIUM

Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing

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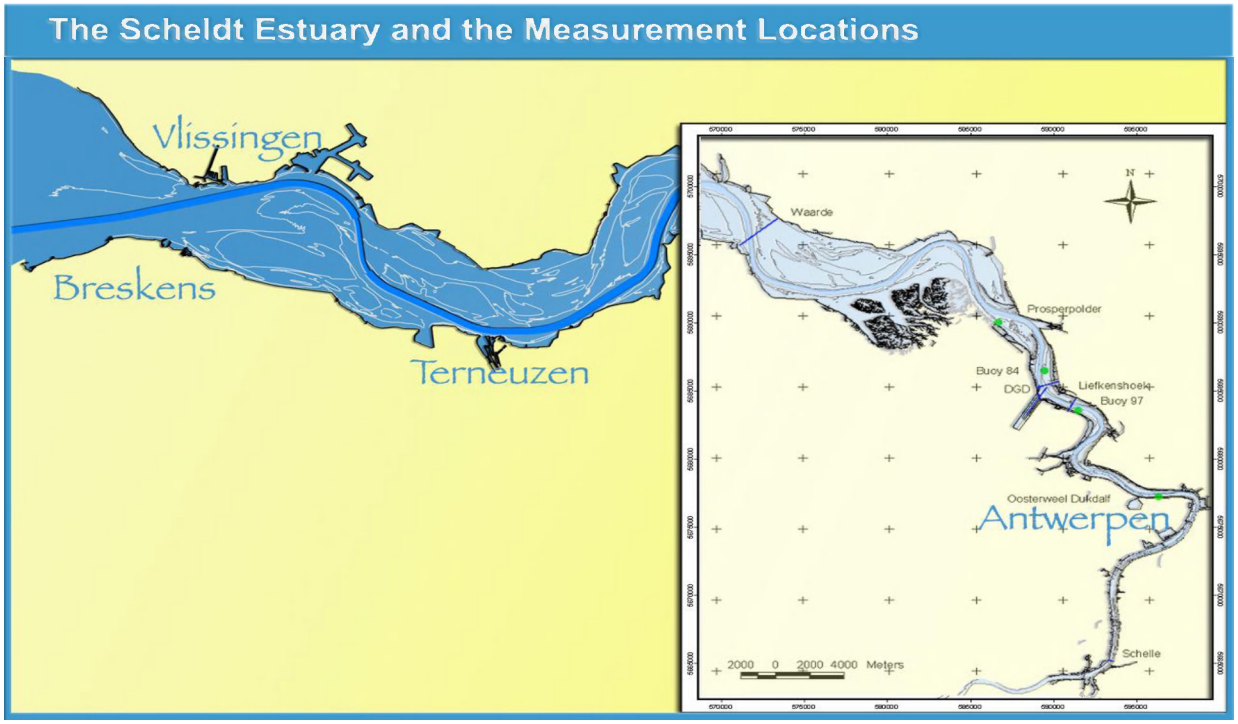

Deelrapport 3.21: Omgevingscondities in de Schelde
oktober 2008 – maart 2009

Report 3.21: Overview of boundary conditions in the river Scheldt
October 2008 – March 2009

31 July 2009
I/RA/11283/08.097/MSA

i.s.m.

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1. INTRODUCTION

1.1. The assignment

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

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

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

The execution of the study involves a twofold assignment:

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

1.2. Purpose of the study

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

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

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

deposited material and detailed information of capital and maintenance dredging works will be made up.

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

1.3. Overview of the study

1.3.1. Reports

Reports of the project 'Opvolging aanslibbing Deurganckdok' between April 2008 till March 2009 are summarized in Table 1-1.

This report, report 3.21, is one of set of reports for understanding the sediment transport between Deurganckdok and the river Scheldt, which belongs to the second part of this project.

The report is also a continuation of the set of ambient conditions reports of HCBS2 (IMDC, 2005k; 2005l; 2006l; 2006p) and 'Opvolging aanslibbing Deurganckdok' (IMDC, 2007b; 2007u; 2007w; 2008p; 2008q; 2008aa). This new ambient conditions report gives an overview of the ambient conditions from October till March 2009 in the river Scheldt. An overview of the HCBS2 and 'Opvolging aanslibbing Deurganckdok' (between April 2006 till March 2008) reports are given in APPENDIX A.

Table 1-1: Overview of Deurganckdok reports between April 2008 till March 2009

Report	Description
Sediment Balance: Bathymetry surveys, Density measurements, Maintenance and construction dredging activities	
1.20	Sediment Balance: Three monthly report 1/4/2008 - 30/6/2008 (I/RA/11283/08.076/MSA)
1.21	Sediment Balance: Three monthly report 1/7/2008 – 30/9/2008 (I/RA/11283/08.077/MSA)
1.22	Sediment Balance: Three monthly report 1/10/2008 – 31/12/2008 (I/RA/11283/08.078/MSA)
1.23	Sediment Balance: Three monthly report 1/1/2009 – 31/03/2009 (I/RA/11283/08.079/MSA)
1.24	Annual Sediment Balance (I/RA/11283/08.080/MSA)
Factors contributing to salt and sediment distribution in Deurganckdok: Salt-Silt (OBS3A) & Frame measurements, Through tide measurements (SiltProfiling & ADCP) & Calibrations	
2.20	Through tide measurement Sediview DGD during average tide Spring 2008 – 19 June 2008 (I/RA/11283/08.081/MSA)
2.21	Through tide measurement Sediview DGD during average tide Spring 2008 –26 June 2008 (I/RA/11283/08.082/MSA)
2.22	Through tide measurement Sediview DGD during neap tide Summer 2008 – 24 September 2008 (I/RA/11283/08.083/MSA)
2.23	Through tide measurement Sediview DGD during spring tide Summer 2008 – 30 September 2008 (I/RA/11283/08.084/MSA)
2.24	Through tide measurement Sediview DGD during neap tide Autumn 2008 – 02 December 2008 (I/RA/11283/08.085/MSA)

Report	Description
2.25	Through tide measurement Sediview DGD during spring tide Autumn 2008 – 10 December 2008 (I/RA/11283/08.086/MSA)
2.26	Through tide measurement Sediview DGD during neap tide Winter 2009 – 06 March 2009 (I/RA/11283/08.087/MSA)
2.27	Through tide measurement Sediview DGD during spring tide Winter 2009 – 12 March 2009 (I/RA/11283/08.088/MSA)
2.28	Through tide measurement ADCP eddy DGD Summer 2008 – 1 October 2008 (I/RA/11283/08.089/MSA)
2.29	Through tide measurement Siltprofiler DGD Summer 2008 – 29 September 2008 (I/RA/11283/08.090/MSA)
2.30	Through tide measurement Siltprofiler DGD Winter 2009 – 13 March 2009 (I/RA/11283/08.091/MSA)
2.31	Through tide measurement Salinity Profiling DGD Winter 2009 – 11 March 2009 (I/RA/11283/08.092/MSA)
2.32	Salt-Silt distribution Deurganckdok: Six monthly report 1/4/2008 - 30/9/2008 (I/RA/11283/08.093/MSA)
2.33	Salt-Silt distribution Deurganckdok: Six monthly report 1/10/2008 – 31/3/2009 (I/RA/11283/08.094/MSA)
2.34	Calibration stationary & mobile equipment Autumn 2008 – 27 & 28 October 2008 (I/RA/11283/08.095/MSA)
Boundary Conditions: Upriver Discharge, Salt concentration Scheldt, Bathymetric evolution in access channels, dredging activities in Lower Sea Scheldt and access channels	
3.20	Boundary conditions: Six monthly report 1/4/2008 – 30/09/2008 (I/RA/11283/08.097/MSA)
3.21	Boundary conditions: Six monthly report 1/10/2008 – 31/03/2009 (I/RA/11283/08.097/MSA)
Analysis	
4.20	Analysis of Siltation Processes and Factors (I/RA/11283/08.098/MSA)

1.3.2. Measurement actions

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

1. Monitoring upstream discharge in the river Scheldt.
2. Monitoring Salt and sediment concentration in the Lower Sea Scheldt taken from on permanent data acquisition sites at Oosterweel, Prosperpolder and up- and downstream of the Deurganckdok.
3. Long term measurement of salt distribution in Deurganckdok.
4. Long term measurement of sediment concentration in Deurganckdok
5. Monitoring near-bed processes in the central trench in the dock, near the entrance as well as near the landward end: near-bed turbidity, near-bed current velocity and bed elevation variations are measured from a fixed frame placed on the dock's bed.
6. Measurement of current, salt and sediment transport at the entrance of Deurganckdok for which ADCP backscatter intensity over a full cross section are calibrated with the Sediview procedure and vertical sediment and salt profiles are recorded with the SiltProfiler equipment

7. Through tide measurements of vertical sediment concentration profiles -including near bed highly concentrated suspensions- with the SiltProfiler equipment. Executed over a grid of points near the entrance of Deurganckdok.
8. Monitoring dredging activities at entrance channels towards the Kallo, Zandvliet and Berendrecht locks
9. Monitoring dredging and dumping activities in the Lower Sea Scheldt

In situ calibrations were conducted on several dates to calibrate all turbidity and conductivity sensors (IMDC, 2006a; 2007a; 2008f; 2008o, 2009c).

1.4. Structure of this report

This report is the factual data report for two measurement actions during the period between October and March 2009:

- Monitoring salinity and sediment concentration in the Lower Sea Scheldt taken from on permanent data acquisition sites at Oosterweel, Prosperpolder and downstream (buoy 84) of Deurganckdok.
- Monitoring dredging and dumping activities in the Lower Sea Scheldt.

Beside these actions, navigation and meteorological conditions are also reported.

The first chapter comprises an introduction. The second chapter describes the project. Chapter 3 summarizes the measurement campaigns, while the ambient conditions are discussed in Chapter 4.

2. SEDIMENTATION IN DEURGANCKDOK

2.1. Project Area: Deurganckdok

Deurganckdok is a tidal dock situated at the left bank in the Lower Sea Scheldt, between Liefkenshoek and Doel. Deurganckdok has the following characteristics:

1. the dock has a total length of 2750 m and is 450 m wide at the Scheldt end and 400 m wide at the inward end of the dock
2. The bottom of Deurganckdok is provided at a depth of –17m TAW in the transition zones between the quay walls and the central trench and of –19m TAW in the central trench.
3. the quay walls reach up to +9m TAW

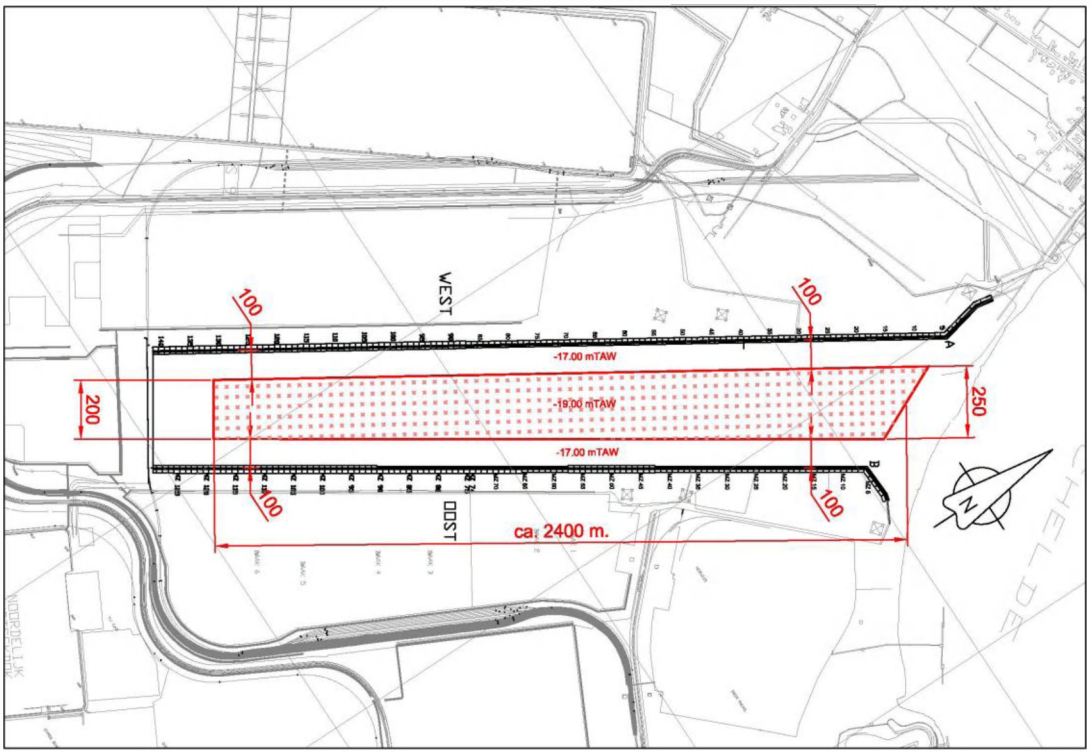

Figure 2-1: Overview of Deurganckdok

The dredging of the dock is performed in 3 phases. On 18 February 2005 the dike between the Scheldt and the Deurganckdok was breached. On 6 July 2005 Deurganckdok was officially opened. The second dredging phase was finalized a few weeks later. The first terminal operations have started since.

2.2. Overview of the studied 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 2-2).

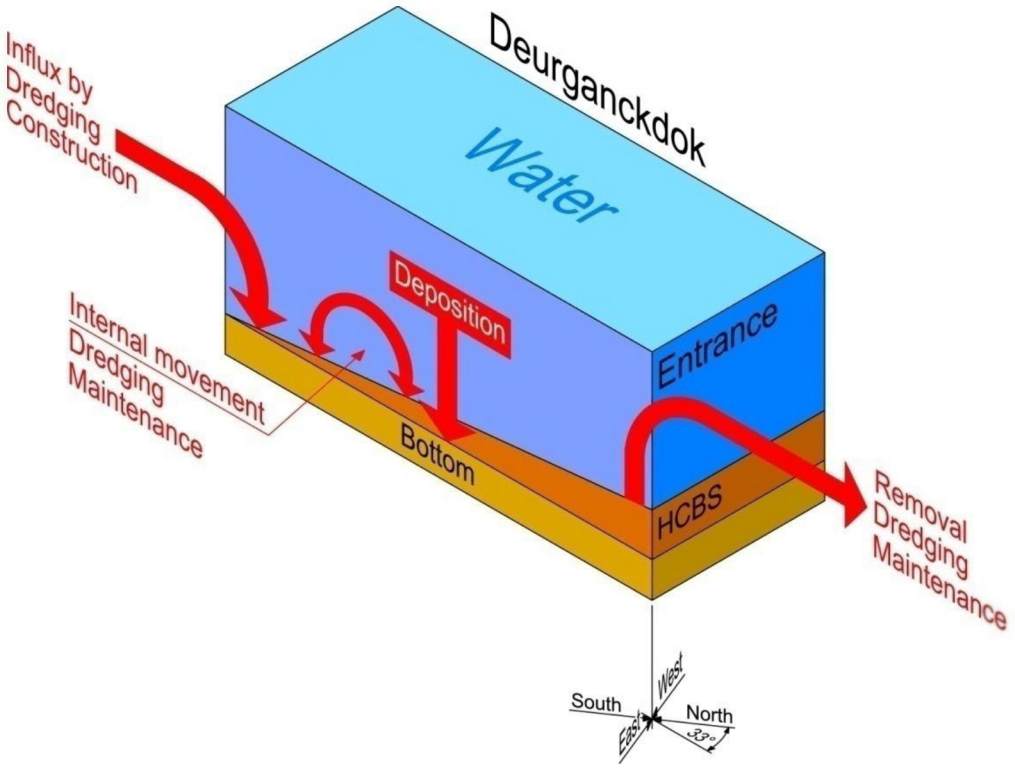

Figure 2-2: Elements of the sediment balance

A net deposition can be calculated from a comparison with a chosen initial condition t_0 (Figure 2-3). 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 river Scheldt since t_0.

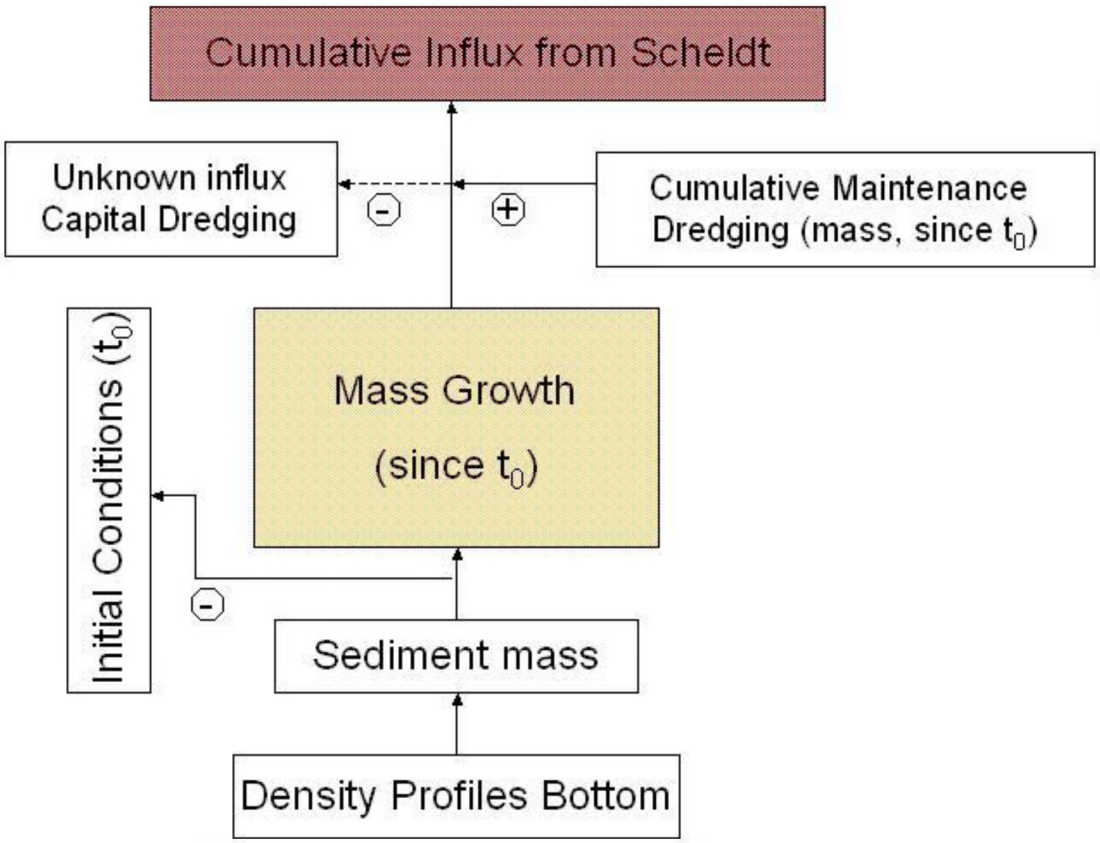

Figure 2-3: Determining a sediment balance

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

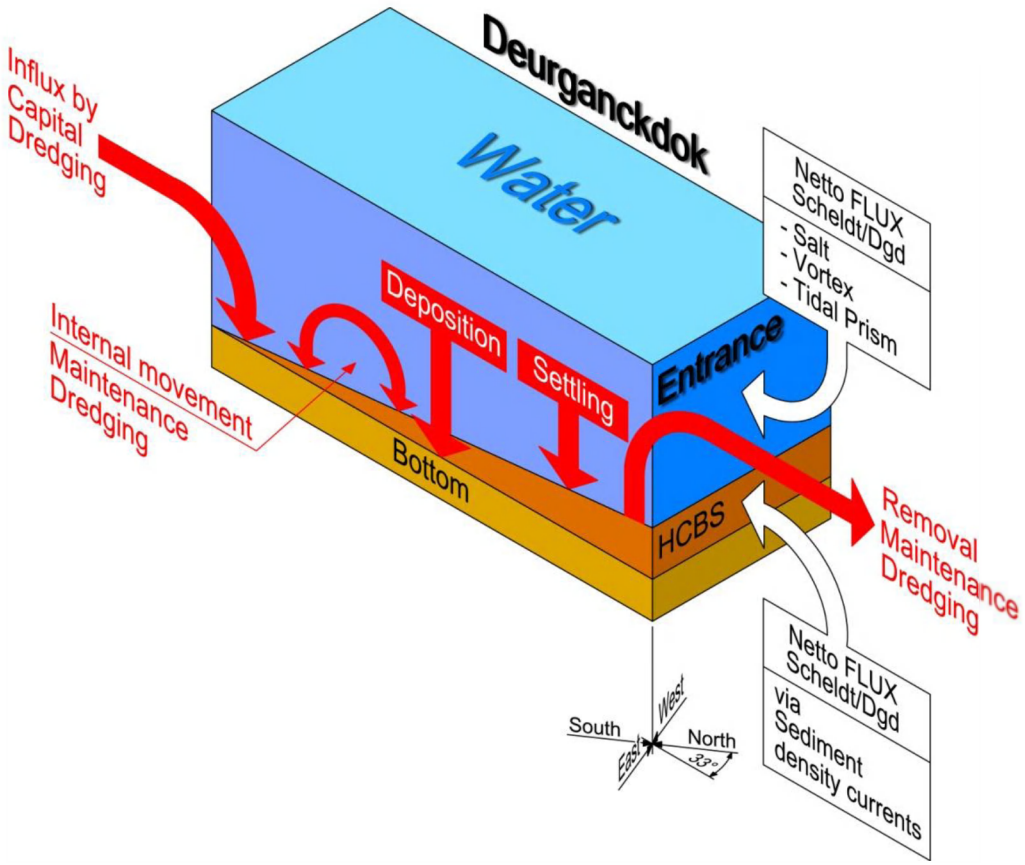

Figure 2-4: Transport mechanisms

These aspects of hydrodynamics and sediment transport have been landmark in determining the parameters to be measured during the project. Measurements will be focused 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 upstream discharge in the river Scheldt.
- Monitoring Salt and sediment concentration in the Lower Sea Scheldt at permanent measurement locations at Oosterweel, up- and downstream of the Deurganckdok.
- Long term measurement of salt 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 current, salt 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 entrance channels towards the Kallo, Zandvliet and Berendrecht locks as well as dredging and dumping activities in the Lower Sea Scheldt.
- In situ calibrations were conducted on several dates to calibrate all turbidity and conductivity sensors.

2.3. Specific objectives of this report

The natural ambient conditions in the Scheldt estuary change from the mouth near Vlissingen to the upstream boundaries near Ghent and the tributaries. Furthermore navigation and dredging activities are important human activities in the Lower Sea Scheldt.

These natural and human conditions can help to gain insight in the mechanisms causing siltation in Deurganckdok. For this reason this report summarises the following data for the period between October and March 2009:

- Ambient characteristics in the Lower Sea Scheldt:
    - Tide
    - Current
    - Salinity
    - Temperature
    - Turbidity/Suspended sediment concentration
    - Salinity downstream

- Fresh water inflow from the tributaries
- Meteorological conditions
- Human activities
    - Dredging/disposal
    - Navigation

3. OVERVIEW OF THE MEASUREMENT CAMPAIGNS

In the scope of this project, IMDC organized several measurements campaigns at the entrance, down- and upstream of Deurganckdok, and in the dock itself. During this reporting period, from 1st of October 2008 till the 31st of March 2009, through tide measurement campaigns took place on 01/10/2008, 02/12/2008, 10/12/2008, 06/03/2009 and 11-13/03/2009 and long-term salinity measurements in Deurganckdok from 01/10/2008 till 31/03/2009. A detailed description of through tide measurement campaigns and long-term salinity measurements during this reporting period can be found in IMDC reports (2008y, 2009e, 2009f, 2009i, 2009j, 2009k, 2009n).

Table 3-1 gives a global overview from the beginning of project of the coordinates of the measurement locations and the periods when data was gathered. Also the coordinates and periods for project HCBS2 is given in Table 3-1. Considering the through tide measurements coordinates are given for the sailed transects (i.e. left bank and right bank position). Figure 3-1 shows the Lower Sea Scheldt with the several measurement locations of projects HCBS2 and Deurganckdok. A sketch of each measurement campaign can be found from Figure 3-2 to Figure 3-17. Table 3-2 gives an overview of the measured parameters during these measurement campaigns.

Table 3-1: Measurement locations and periods for the HCBS2 and Deurganckdok measurements (01/01/2006 – 31/03/2009)

Through tide measurements: Siltprofiler gauging points			
Location	***Easting (UTM ED 50)***	***Northing (UTM ED 50)***	***Period***
Location 1: Xa	588549	5684335	21/03/2006, 26/09/2006, 23/10/2007, 12/03/2008, 29/09/2008 & 13/03/2009
Location 2: Xb	588596	5684411	
Location 3: Xc	588643	5684486	
Location 4: Xd	588690	5684562	
Location 5: Xe	588737	5684638	
Location 6: Ya	588606	5684217	
Location 7: Yb	588653	5684293	
Location 8: Yc	588700	5684368	
Location 9: Yd	588747	5684444	
Location 10: Ye	588793	5684520	
Location 11: Za	588662	5684099	
Location 12: Zb	588709	5684174	
Location 13: Zc	588756	5684250	
Location 14: Zd	588803	5684326	
Location 15: Ze	588850	5684402	

Through tide measurements: Transects					
Location	***Easting (UTM ED 50)***		***Northing (UTM ED 50)***		***Period***
Deurganckdok (in dock) (transect Y)	Left Bank	Right Bank	Left Bank	Right Bank	21/03/2006, 26/09/2006, 12/03/2008 & 11/03/09
	589059	591298	5684948	5683077	
Liefkenshoek (transect I)	Left Bank	Right Bank	Left Bank	Right Bank	22/03/2006, 27/09/2006 & 11/03/2008
	590318	590771	5684257	5683302	
Deurganckdok (downstream) (transect K)	Left Bank	Right Bank	Left Bank	Right Bank	22 - 23/03/2006, 27 - 28/09/2006 & 11/03/2008
	588484	589775	5684924	5685384	
Deurganckdok (entrance) (transect DGD)	Left Bank	Right Bank	Left Bank	Right Bank	22/03/2006, 27/09/2006, 24/10/2007, 11/03/2008, 19-26/06/2008, 24-30/09/2008 2-10/12/2009 6-12/03/2009
	588765	588541	5684056	5684527	
Schelle (transect S)	Left Bank	Right Bank	Left Bank	Right Bank	23/03/2006 & 28/09/2006
	592645	592953	5665794	5665682	
Waarde (transect W)	Left Bank	Right Bank	Left Bank	Right Bank	23/03/2006 & 28/09/2006
	573541	571318	5696848	5694933	
Deurganckdok (in dock) (Transect X, transect Y, transect Z)	North Side	North Side	South Side	South Side	01/10/2008
	588737 588793 588850	5684638 5684520 5684402	588408 588465 588521	5684107 5683989 5683871	

Near bed continuous monitoring			
Location	***Easting (UTM ED 50)***	***Northing (UTM ED 50)***	***Period***
Deurganckdok CDW	588653	5684906	14/03/2006 – 05/04/2006
Deurganckdok CDW	588685	5684880	19/04/2006 – 23/05/2006
Deurganckdok Sill	588805	5684170	19/04/2006 – 23/05/2006
Deurganckdok CDW	588685	5684880	18/07/2006 – 11/10/2006
Deurganckdok Sill	588805	5684170	19/07/2006 – 11/10/2006
Deurganckdok CDW	588685	5684880	15/03/2007 – 12/04/2007
Deurganckdok Sill	588805	5684170	09/02/2007 – 18/04/2007
Deurganckdok CDW	588685	5684880	26/09/2007 – 05/12/2007
Deurganckdok Sill	588805	5684170	10/10/2007 – 28/11/2007
Deurganckdok CDW	588685	5684880	20/02/2008 – 02/04/2008
Deurganckdok Sill	588805	5684170	27/02/2008 – 09/04/2008
Salt Silt measurements Deurganckdok			
Location	***Easting (UTM ED 50)***	***Northing (UTM ED 50)***	***Period***
P&O 1	588074	5682942	17/03/2006 – 28/04/2006
P&O 2	588767	5684045	17/03/2006 – 28/04/2006
PSA	588536	5684523	17/03/2006 – 28/04/2006

P&O 1	588074	5682942	20/07/2006 – 12/10/2006
P&O 2	588767	5684045	20/07/2006 – 12/10/2006
PSA	588536	5684523	20/07/2006 – 12/10/2006
P&O 1	588074	5682942	12/02/2007 – 27/03/2007
P&O 2	588767	5684045	12/02/2007 – 27/03/2007
PSA	588536	5684523	12/02/2007 – 27/03/2007
P&O 1	588074	5682942	20/06/2007 – 31/07/2007
P&O 2	588767	5684045	20/06/2007 – 31/07/2007
PSA	588536	5684523	20/06/2007 – 31/07/2007
P&O 1	588074	5682942	17/09/2007 – 10/12/2007
P&O 2	588767	5684045	17/09/2007 – 10/12/2007
PSA	588536	5684523	17/09/2007 – 10/12/2007
N entrance (PSA HNN)	588536	5684523	20/02/2008 – 28/04/2008
S entrance (DB Ports)	588767	5684045	20/02/2008 – 28/04/2008
S middle (DB Ports)	588074	5682942	20/02/2008 – 28/04/2008
S back (DB Ports)	587760	5682449	20/02/2008 – 28/04/2008
N entrance (PSA HNN)	588536	5684523	14/05/2008 – 26/09/2008
S entrance (DB Ports)	588767	5684045	14/05/2008 – 26/09/2008
S middle (DB Ports)	588074	5682942	14/05/2008 – 26/09/2008
S back (DB Ports)	587760	5682449	14/05/2008 – 26/09/2008
Settling velocity – INSSEV			
Location	***Easting (UTM ED 50)***	***Northing (UTM ED 50)***	***Period***
Deurganckdok CDW	588717	5684898	05/09/2006
Deurganckdok SILL	588800	5684250	06/09/2006
Deurganckdok Western quay wall	588452	5684355	07/09/2006

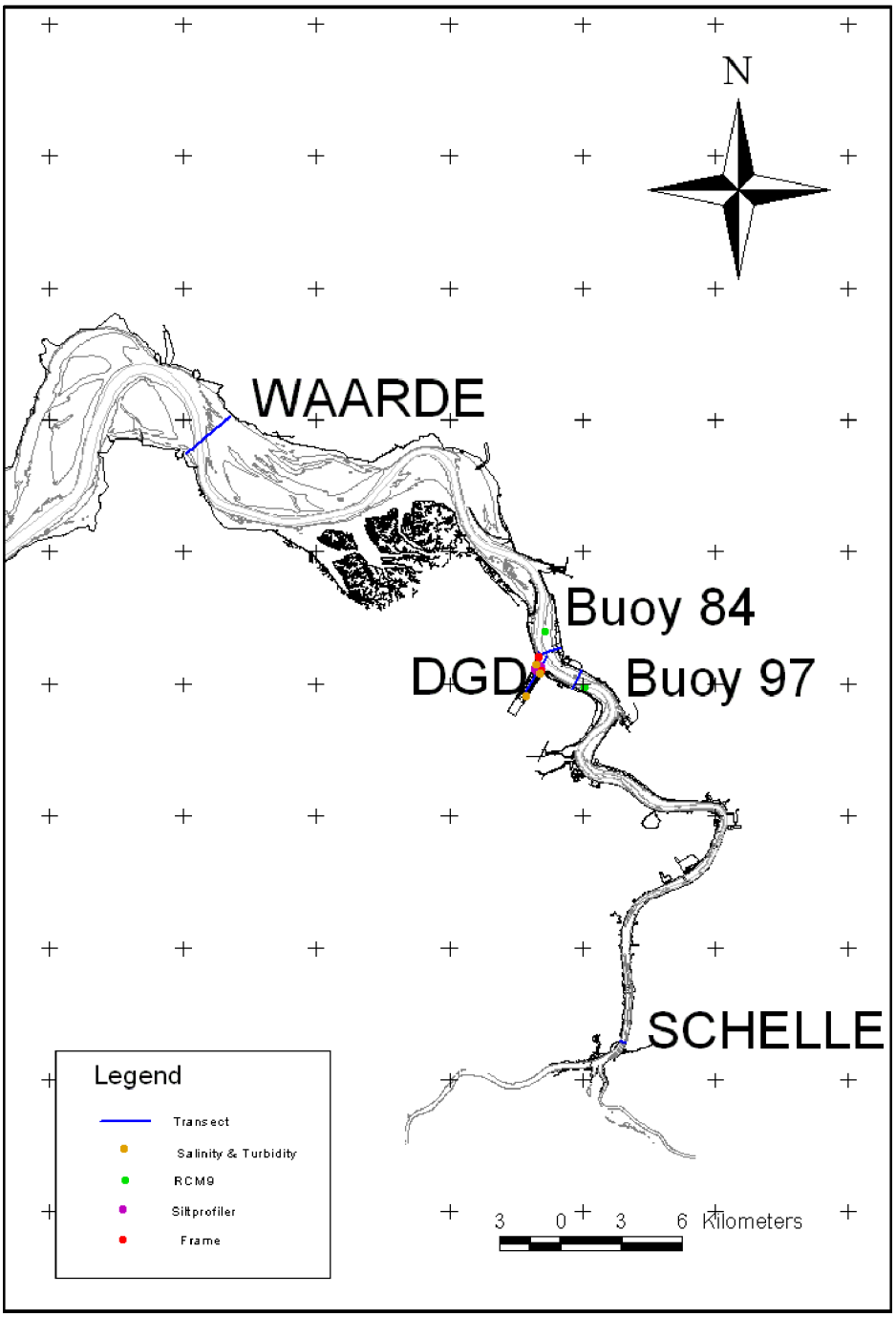

Figure 3-1: The measurement locations in the Lower Sea Scheldt and Deurganckdok (01/01/2006 – 31/03/2009)

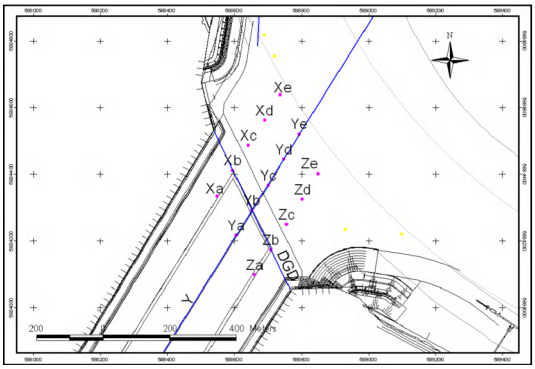

Figure 3-2: Through tide SiltProfiler measurements – Entrance Deurganckdok

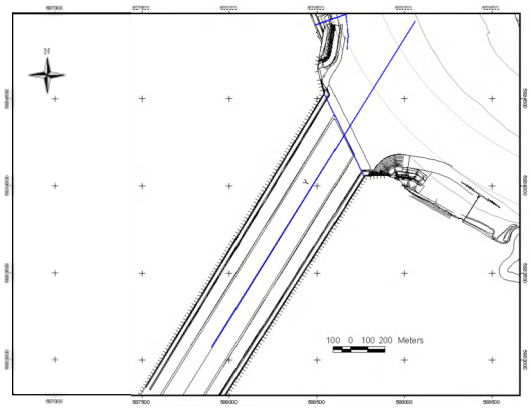

Figure 3-3: Through tide Salinity measurements – Deurganckdok (transect Y)

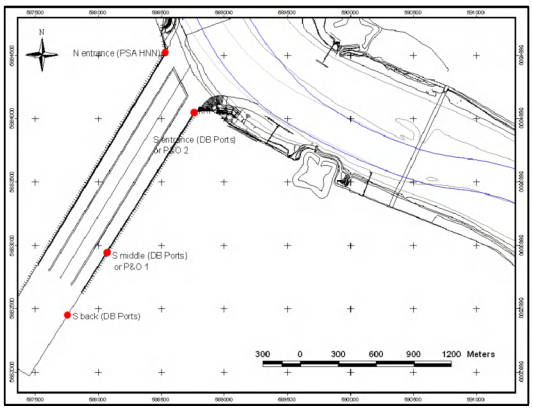

Figure 3-4: Long-term salinity measurements Deurganckdok

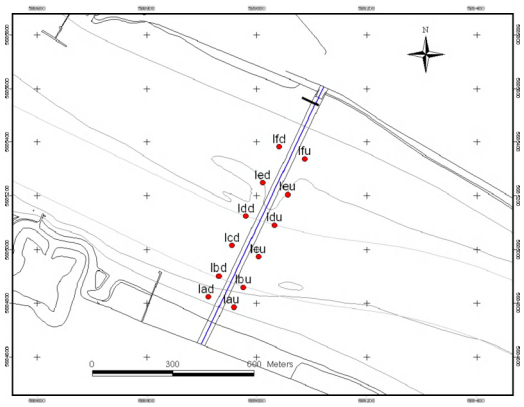

Figure 3-5: Through tide ADCP & SiltProfiler measurements – Upstream Deurganckdok (transect I)

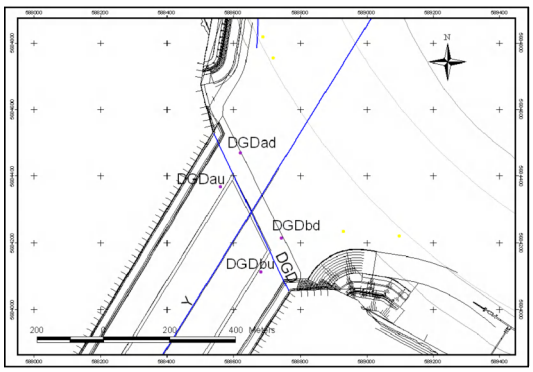

Figure 3-6: Through tide ADCP measurements – Entrance Deurganckdok (transect DGD)

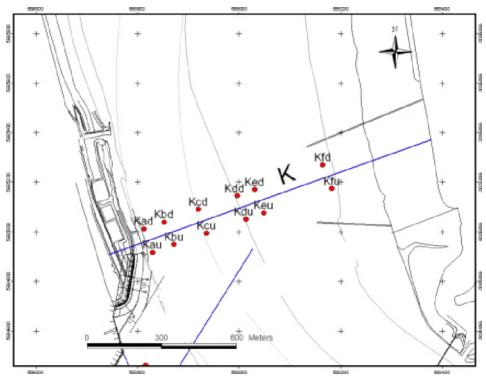

Figure 3-7: Through tide ADCP & SiltProfiler measurements – Downstream Deurganckdok (Transect K)

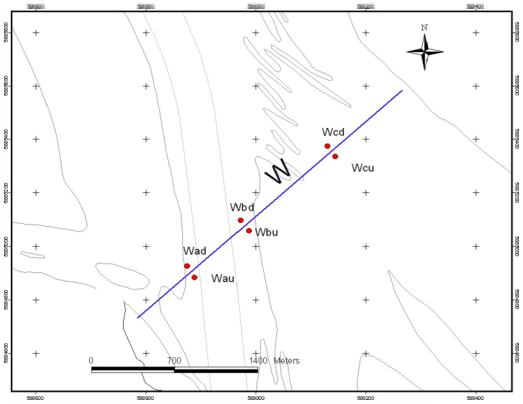

Figure 3-8: Through tide ADCP measurements - Waarde (transect W)

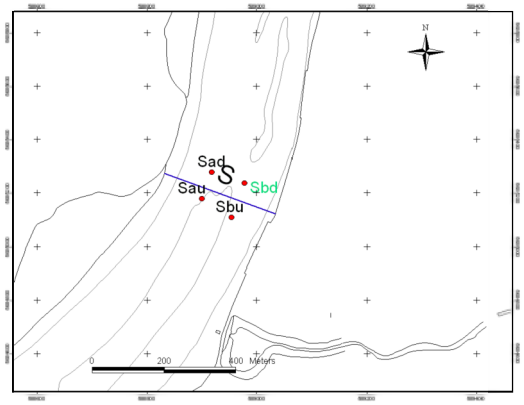

Figure 3-9: Through tide ADCP measurements - Schelle (transect S)

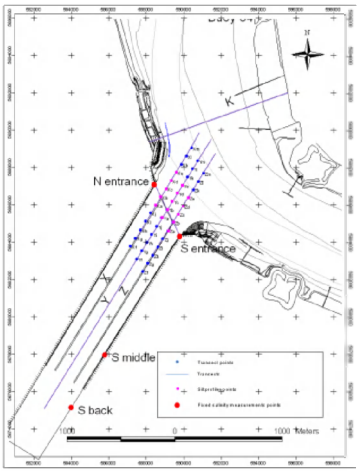

Figure 3-10: Through tide measurment ADCP eddy

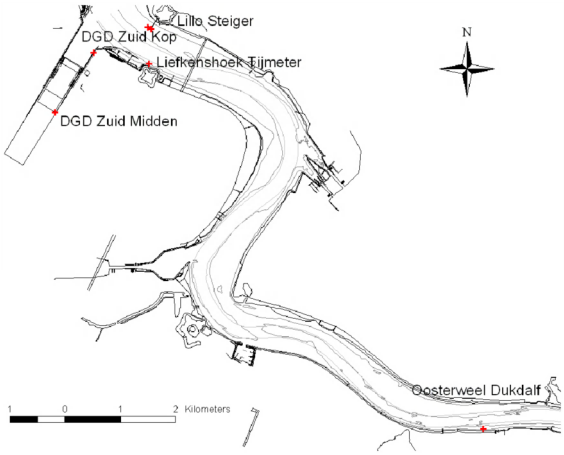

Figure 3-11: Calibration measurements - 15/03/2006 & 14/04/2006

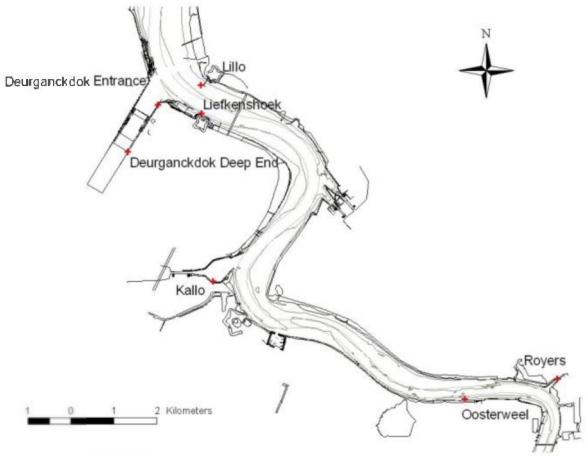

Figure 3-12: Calibration measurements – 23/06/2006 & 18/09/2006

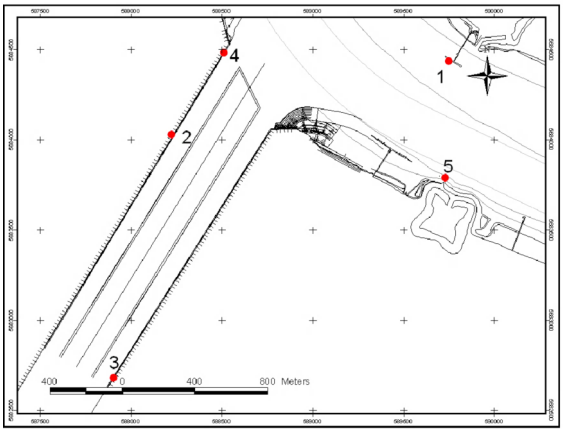

Figure 3-13:Calibration measurements – 10/09/2008

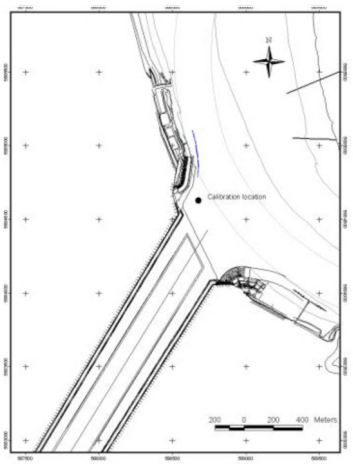

Figure 3-14:Calibration measurements – 04-05/02/2008 & 27-28/10/2009

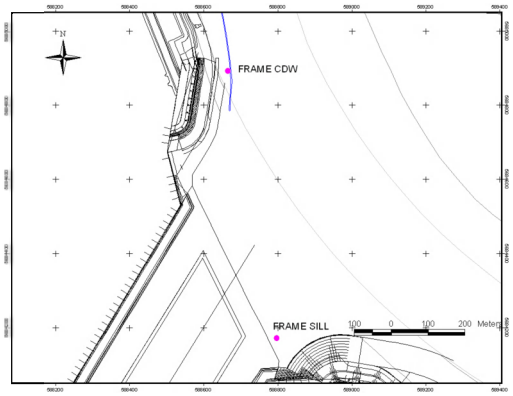

Figure 3-15:Near bed continuous monitoring

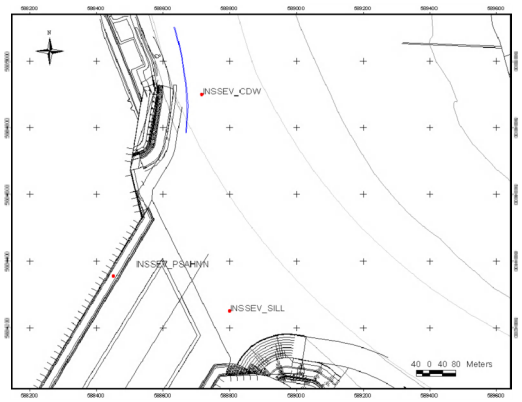

Figure 3-16: Settling velocity (INSSEV) 05/09/2006 – 07/09/2006

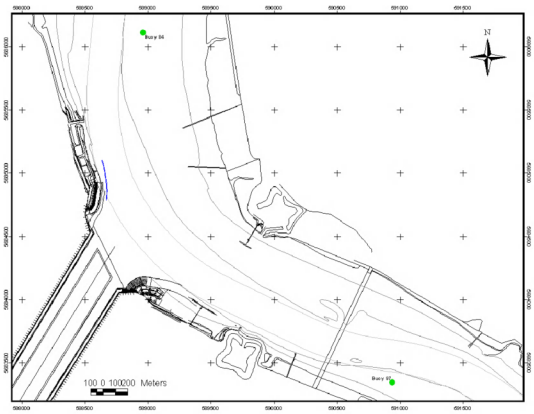

Figure 3-17: Long-term measurements nearby buoys 84 and 97

Table 3-2: The equipment and measured parameters per location (01/01/2006 – 31/03/2009)

Through tide measurements									
Location	***Period***	***Instrument***	***Velocity***	***Direction***	***Temperature***	***Pressure***	***Conductivity***	***Turbidity***	***Depth***
Deurganckdok (in dock, transect Y	21/03/06, 26/09/06 12/03/08, 29/09/09 & 11/03/09, 13/03/09	SiltProfiler			X	X	X	X	
		Echosounder							X
		AADI RCM 9			X	X	X		
		CTD			X	X	X		
Liefkenshoek (transect I)	22/03/06, 27/09/06 & 11/03/08	ADCP	X	X					
		OBS			X	X	X	X	
		CTD			X	X	X		
		Pump Sampler							
		SiltProfiler			X	X	X	X	
		Echosounder							X
Deurganckdok (transect DGD)	22/03/06, 27/09/06, 24/10/07, 11/03/08, 19/06/08, 26/06/08, 24/09/08, 30/09/08, 02/12/08, 10/12/08, 06/03/09 & 12/03/09	ADCP	X	X					
		OBS			X	X	X	X	
		CTD			X	X	X		
		Pump Sampler							
Deurganckdok (transect K)	22/03/06, 27/09/06 & 11/03/08	ADCP	X	X					
		OBS			X	X	X	X	
		CTD			X	X	X		
		Pump Sampler							
	23/03/06 & 28/09/06	SiltProfiler			X	X	X	X	
		Echosounder							X

Schelle (transect S)	23/03/06 & 28/09/06	ADCP	X	X					
		OBS			X	X	X	X	
		CTD			X	X	X		
		Pump Sampler							
Waarde (Transect W)	23/03/06 & 28/09/06	Same as Schelle (transect S)							
Deurganckdok (Transect X, Y & Z)	01/10/08	ADCP	X	X					
		CTD			X	X	X		
Near bed continuous monitoring									
Location	***Period***	***Instrument***	***Velocity***	***Direction***	***Temperature***	***Pressure***	***Conductivity***	***Turbidity***	***Depth***
Deurganckdok CDW	14/03/2006 – 05/04/2006	Valeport MIDAS OBS3+	X	X	X	X	X	X	
		AADI RCM9	X	X	X	X	X	X	
		ALTUS							X
		ARGUS			X	X	X	X	
Deurganckdok CDW	19/04/2006 – 23/05/2006	Idem	Idem						
Deurganckdok Sill	19/04/2006 – 23/05/2006	Idem	Idem						
Deurganckdok CDW	18/07/2006 – 11/10/2006	Idem	Idem						
Deurganckdok Sill	19/07/2006 – 11/10/2006	Idem	Idem						
Deurganckdok CDW	15/03/2007 – 12/04/2007	Idem	Idem						
Deurganckdok Sill	09/02/2007 – 18/04/2007	Idem	Idem						
Deurganckdok CDW	26/09/2007 – 05/12/2007	Idem	Idem						
Deurganckdok Sill	10/10/2007 – 28/11/2007	Idem	Idem						

Deurganckdok CDW	20/02/2008 – 02/04/2008	Idem	Idem
Deurganckdok Sill	27/02/2008 – 09/04/2008	Idem	Idem

Long-term salinity measurements

Location	***Period***	***Instrument***	***Velocity***	***Direction***	***Temperature***	***Pressure***	***Conductivity***	***Turbidity***
Deurganckdok (Quay wall)	17/03/2006 – 28/04/2006	AADI RCM9	X	X	X	X	X	X
		OBS 3A			X	X	X	X
Deurganckdok (Quay wall)	20/07/2006 – 12/10/2006	OBS 3A			X	X	X	X
Deurganckdok (Quay wall)	12/02/2007 – 27/03/2007	OBS 3A			X	X	X	X
Deurganckdok (Quay wall)	20/06/2007 – 31/07/2007	OBS 3A			X	X	X	X
Deurganckdok (Quay wall)	19/09/2007 – 10/12/2007	OBS 3A			X	X	X	X
Deurganckdok (Quay wall)	20/02/2008 – 28/04/2008	OBS 3A			X	X	X	X

Deurganckdok (Quay wall)	28/04/2008 – 30/09/2008	OBS 3A			X	X	X	X
Deurganckdok (Quay wall)	01/10/2008 – 31/03/2009	OBS 3A			X	X	X	X

Long-term measurements

Location	***Period***	***Instrument***	***Depth sensor***
Buoy 84	01/01/2006 – 30/06/2006	AADI RCM 9	-5.6m TAW
		AADI RCM 9	-8.1m TAW
Buoy 97	01/01/2006 – 30/06/2006	AADI RCM 9	-5.3m TAW
		AADI RCM 9	-7.8m TAW
Buoy 84	01/07/2006 – 31/12/2006	AADI RCM 9	-5.6m TAW
		AADI RCM 9	-8.1m TAW
Buoy 97	01/07/2006 – 31/12/2006	AADI RCM 9	-5.3m TAW
		AADI RCM 9	-7.8m TAW
Buoy 84	01/01/2007 – 31/03/2007	AADI RCM 9	-5.6m TAW
		AADI RCM 9	-8.1m TAW
Buoy 97	01/01/2007 – 31/03/2007	AADI RCM 9	-5.3m TAW
		AADI RCM 9	-7.8m TAW
Buoy 84	01/04/2007 – 30/06/2007	AADI RCM 9	-5.6m TAW
		AADI RCM 9	-8.1m TAW
Buoy 97	01/04/2007 – 30/06/2007	AADI RCM 9	-5.3m TAW
		AADI RCM 9	-7.8m TAW

Buoy 84	01/07/2007 – 30/09/2007	AADI RCM 9	-5.6m TAW
		AADI RCM 9	-8.1m TAW
Buoy 97	01/07/2007 – 30/09/2007	AADI RCM 9	-5.3m TAW
		AADI RCM 9	-7.8m TAW
Buoy 84	01/10/2007 – 31/12/2007	AADI RCM 9	-5.6m TAW
		AADI RCM 9	-8.1m TAW
Buoy 97	01/10/2007 – 31/12/2007	AADI RCM 9	-5.3m TAW
		AADI RCM 9	-7.8m TAW
Buoy 84	01/01/2008 – 31/03/2008	AADI RCM 9	-5.6m TAW
		AADI RCM 9	-8.1m TAW
Buoy 97	01/01/2008 – 31/03/2008	AADI RCM 9	-5.3m TAW
		AADI RCM 9	-7.8m TAW
Buoy 84	01/04/2008 – 12/04/2008	AADI RCM 9	-5.6m TAW
		AADI RCM 9	-8.1m TAW
Buoy 97	01/04/2008 – 02/07/2008	AADI RCM 9	-5.3m TAW
		AADI RCM 9	-7.8m TAW

4. AMBIENT CONDITIONS

4.1. Environmental characteristics in the Lower Sea Scheldt

4.1.1. Long-term turbidity, salinity and current measurements

Long-term measurements were executed in the Lower Sea Scheldt on fixed locations at Oosterweel, buoy 84 and Prosperpolder (Figure 4-1). The measured data on these locations is current velocity, current direction, temperature, pressure, conductivity and turbidity using AADI (AADI Data Instruments) RCM-9 units. The RCM-9 instruments were set up to measure every 10 minutes. These measurements were maintained by WL – Cel Hydrometrie Schelde. More information about the AADI RCM-9 can be found in report of IMDC (2005l).

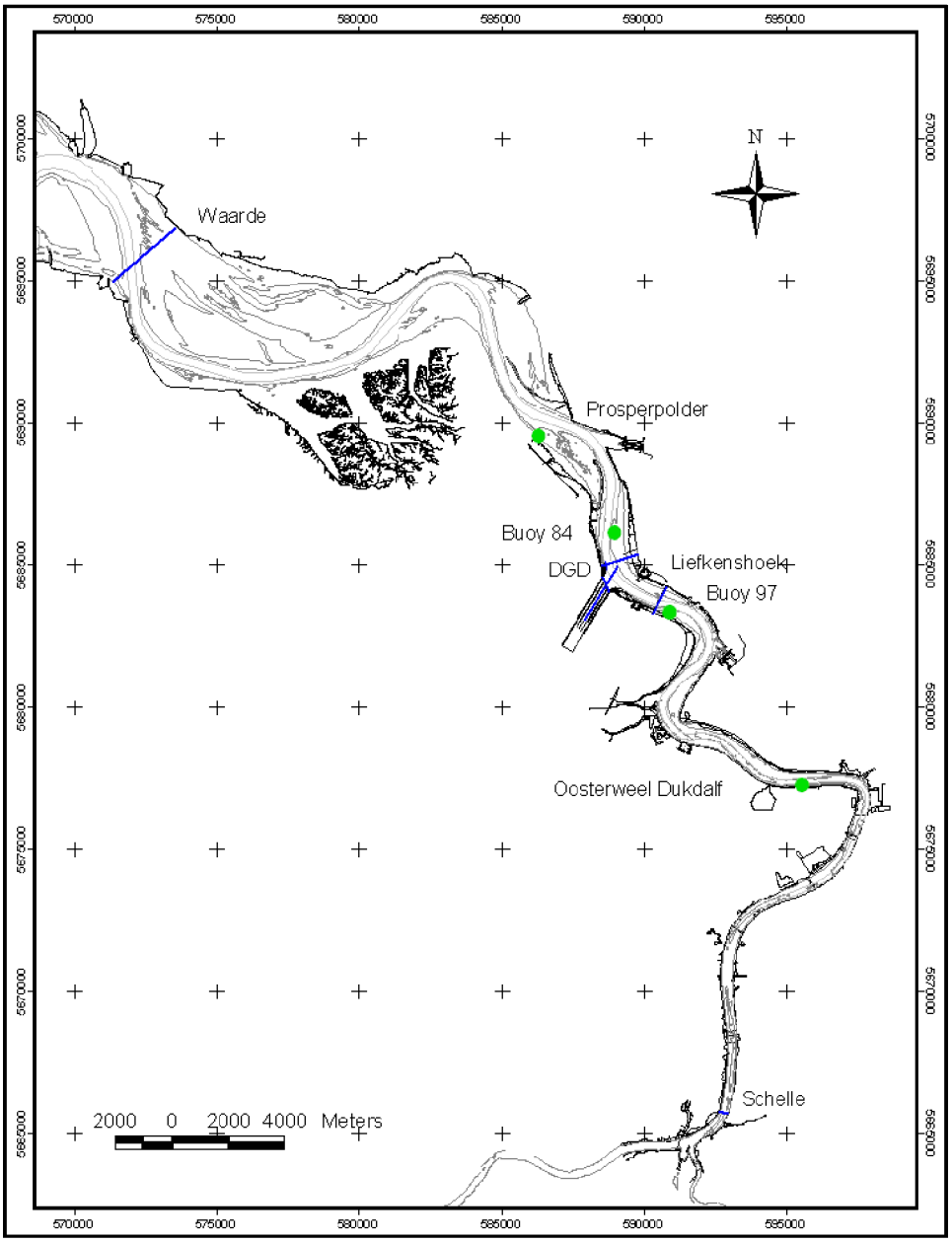

Figure 4-1: All measurement locations 01/2007 – 03/2009

At the left bank on the River Scheldt at Oosterweel (Figure 4-1), measurements were conducted by 2 RCM-9 units and at Prosperpolder by 1 RCM-9 unit. These instruments were suspended from a dukdalf at fixed distances from the bottom (Table 4-1). The RCM-9 unit used at Prosperpolder measured only reliable temperature, conductivity and pressure.

Table 4-1: Measurement locations and periods at Oosterweel (left bank) & Prosperpolder .

Location	***Depth sensor***	***Easting (UTM ED50)***	***Northing (UTM ED50)***
Oosterweel (top)	4.5m above bottom (-2.3m TAW)	595 574	5 677 278
Oosterweel (bottom)	1m above bottom (-5.8m TAW)	595 574	5 677 278
Buoy 84 (top)	3.3m above bottom (-5.6m TAW)	588 884	5 685 934
Buoy 84 (bottom)	0.8m above bottom (-8.1m TAW)	588 884	5 685 934
Prosperpolder	2.5m above bottom (-1.5m TAW)	586 307	5 689 501

The long-term measurement at buoy 84 (and 97) was set up by IMDC. IMDC started the measurements on the 21st of September 2005 and was stopped on the 12th of April 2007. WL – Cel Hydrometrie Schelde continued these measurements at buoy 84 on 9th of May 2007. A fixed set up was used in which a steel frame was placed on the bottom, with 2 RCM-9 units suspended and held upright by subsurface buoys. The lower RCM-9 was placed at 0.80m above the bottom, while the upper one was placed at a distance of 2.5m above the lower one (Table 4-1). More detailed information about the set up can be found in previous ambient conditions reports (IMDC, 2005k; 2005l; 2006l; 2006p; 2007b; 2007u; 2007w; 2008p; 2008q; 2008aa).

During whole measurement period, inclusive the IMDC period, there were short interruptions to calibrate the instruments: 13/04/2006 – 18/04/2006; 05/09/2007 – 13/09/2007, 30/01/2008 – 06/02/2008 and 22/10/2008 – 30/10/2008.

4.1.1.1. Methodology of Processing

The data of these measurements was processed by IMDC and is presented in APPENDIX C. The collected data was validated and outliers were removed. Erroneous measurements because of malfunction of sensors, growth on sensors, instrument failure were also removed from the dataset and are documented in Table 4-2.

Salinity was calculated using the temperature, conductivity and pressure in the pss-78 formula (Unesco, 1991 & IMDC, 2002).

Turbidity values were converted to suspended sediment concentration (SSC) using an equation of calibration curve. The calibration curve was set up after in-site calibration campaign by IMDC. Further details of the calibration procedure and graphs can be found in IMDC (2006a, 2007a, 2008f, 2008o and 2009c).

During this reporting period new type of AADI instrument was used for the long-term measurements. The AADI Seaguard RCM instrument has comparable sensors as a RCM-9. More

technical details can be found in APPENDIX B. These new instruments were not calibrated yet for SSC and is reported in turbidity.

Table 4-2: Chronological overview of missing and faulty data for period 01/10/2008 - 31/03/2009 at measurement locations Oosterweel, buoy84 and Prosperpolder.

Oosterweel left bank – 4.5 m above bottom				
Period	***Serial number***	***No data***	***Faulty data***	***Comment***
01/07/2004				Start measurement period
01/10/2008	0152			Start reporting period
22/10/2008 – 30/10/2008	0152	X		Calibration period
31/03/2009	0152			End reporting period
Oosterweel left bank – 1 m above bottom				
Period	***Serial number***	***No data***	***Faulty data***	***Comment***
01/07/2004				Start measurement period
01/10/2008	0149			Start reporting period
22/10/2008 – 30/10/2008	0149	X		Calibration period
15/01/2009 – 22/01/2009	0072			Testing period with AADI Seaguard RCM (s/n 0072)
15/01/2009 – 22/01/2009	0072	X		Technical problem with the turbidity sensor
31/03/2009	0149			End reporting period
Buoy 84 top – 3.3 m above bottom				
Period	***Serial number***	***No data***	***Faulty data***	***Comment***
20/09/2005				Start measurement period
01/10/2008	0579			Start reporting period
01/10/2008 – 04/03/2009	0579	X		Technical problem with the conductivity sensor
11/10/2008 – 14/10/2008	-	X		No tidal data
22/10/2008 – 29/10/2009	0579	X		Calibration period
04/03/2009	0065			Replacement instrument by AADI Seaguard RCM 0065
31/10/2009	0065			End reporting period
Buoy 84 bottom – 0.8 m above bottom				
Period	***Serial number***	***No data***	***Faulty data***	***Comment***
20/09/2005				Start measurement period
01/04/2008	0248			Start reporting period

11/10/2008 – 14/10/2008	-	X		No tidal data
22/10/2008 – 29/10/2008	0248	X		Calibration period
30/09/2008	0248			End reporting period
Prosperpolder – 2.5 m above bottom				
Period	***Serial number***	***No data***	***Faulty data***	***Comment***
15/06/2006	0117			Start measurement period
01/04/2008	0117			Start reporting period
23/10/2008 – 30/10/2008	0117	X		Calibration period
11/12/2008 – 08/01/2009	0117	X		No data available
30/09/2008	0117			End reporting period

4.1.1.2. Results (weekly)

The data gathered during these long-term measurements is current velocity, current direction, temperature, pressure and turbidity. In APPENDIX C the processed data is visualized per location and per week in some plots:

- The title shows the week number followed by the year
- The first graph shows the current velocity and the current direction. The direction is scaled from 0 to 360
- The second graph depicts the salinity and temperature
- The third and last graph shows the waterlevel at the nearest tidal gauge and the suspended sediment concentration

All times are given in CET (Dutch: MET).

4.1.1.3. Results (monthly)

Monthly results (minimum, maximum and average) are shown in APPENDIX C. The minimum, maximum and average value for velocity magnitude, temperature and suspended sediment concentration is given for every month. For salinity the minimum, maximum and mean are calculated for both high water slack and low water slack.

4.1.1.4. Results (deployment period)

An overview of the evolution of the monthly minimum, maximum and average values for velocity magnitude, temperature and suspended sediment concentration is given in APPENDIX C. For salinity the minimum, maximum and mean are given for both high water slack and low water slack. Notice that for the suspended sediment concentration the graphs are only given since 2006. The graphs are given for the whole deployment period (September 2005 – March 2009).

4.1.1.5. Total results (October 2008 – March 2009)

The results for the whole deployment period are also given in APPENDIX C. The minimum, maximum and average value for velocity magnitude, temperature and suspended sediment

concentration is given for the period from October 2008 till March 2009. For salinity the minimum, maximum and mean are calculated for both high water slack and low water slack is given.

4.1.2. Vertical tide

WL – Cel Hydrometrie Schelde, delivered tidal data for the period from 01/10/2008 till 31/03/2009. It is reported together with the processed data of the long-term measurement campaigns and those at Oosterweel and Prosperpolder in APPENDIX C.

4.1.3. Salinity downstream

Salinity data of Baalhoek and Hoofdplaat was collected from the Hydro Meteo Centrum Zeeland (HMCZ, 2009) and processed by IMDC. Outliers were screened and removed. Monthly results (minimum, maximum and average values for salinity) are reported in APPENDIX D.

4.2. Fresh water inflow from the tributaries

The fresh water discharge of the Kleine Nete (Grobbendonk), the Grote Nete (Hulshout), the Dijle (Wijgmaal), The Demer (Wilsele), the Dender (Dendermonde), the Zenne (Eppegem) and the Bovenschelde (Melle) are provided by the Hydrologische Informatie Centrum of the Ministerie van de Vlaamse Gemeenschap – Departement Leefmilieu en Infrastructuur Afdeling Waterbouwkundig Laboratorium. The gauging stations are not influenced by the tide. The calculated discharges at the gauging stations are converted to discharges at the mouth of the tributaries and then to a total fresh water discharge at Schelle. This procedure is described in AZ (1974) and is based on the use of correction coefficients that take in account the surface of the hydrological basins.

In APPENDIX E a graph of the evolution of the fresh water discharge is given just as a table with the decade averages of the fresh water discharge. Also the monthly averages are compared to the expected discharges in a graph. Notice that the given values are only temporary since no influence of possible growth is taken in to account yet. This will be done at the end of the year by the Hydrologische Informatie Centrum of the Ministerie van Mobiliteit en Openbare Werken - Departement Mobiliteit en Openbare Werken - Afdeling Waterbouwkundig Laboratorium.

4.3. Meteorological data

The meteorological conditions for the measurement station Deurne for the period 01/10/2008 - 31/03/2009 is only partially reported in APPENDIX F. This data have been obtained from the KMI (Royal Meteorological Institute of Belgium) but the data of the last 3 months are not published yet. *[The meteorological data of these months would be reported in the final version of this report.]*

4.4. Human Activities

4.4.1. Dredging activities

Afdeling Maritieme Toegang provided information about the dates, times, volumes and locations of dredging activities. In APPENDIX G an overview is given of all the dredging activities from 01/10/2008 till 31/03/2009. Weekly volumes are given per location.

4.4.2. Navigation

Weekly data of navigation was delivered by Afdeling Scheepvaartbegeleiding – Schelde Rader Keten for the period of 01/10/2008 till 31/03/2009. To order the data a splitting up of the Beneden Zeeschelde was done in 4 areas. The first area is from de Belgian border up to locks of Zandvliet – Berendrecht (sluizencomplex Zandvliet – Berendrecht), the second goes from this point forward up to Deurganckdok. The third area is from Deurganckdok up to the lock of Kallo (Kallosluis) and finally the fourth goes up to the lock of Royers (Royerssluis). A more detailed description of the areas can be found in APPENDIX H. Also a distinction is made between the draughts. In APPENDIX H a total number is given which refers to the total of passing ships registered by Afdeling Scheepvaartbegeleiding - Schelde Radar Keten. In addition a difference was made between inland navigation and seagoing ships, just as between arrival and departure. Notice that for a certain area and certain draught, the total may deviate from the sum of inland navigation and seagoing. This can be explained by the presence of ships like dredgers, which were only counted in the column 'total'. Also a difference may occur between the total number and the sum of the arrival and departure number. This is due to vessels that have the same entry and exit point.

Finally it should be mentioned that not all inland shipping is observed by the system, which means that the actual number of inland shipping will be higher.

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

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

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

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

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IMDC (2009f) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.25: Through tide measurement Sediview during spring tide Autumn 2008 – 10 December 2008 (I/RA/11283/08.086/MSA)

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

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

IMDC (2009i) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.26: Through tide measurement Sediview during neap tide Winter 2009 – 6 March 2009 (I/RA/11283/08.087/MSA)

IMDC (2009j) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.30: Through tide measurement SiltProfiler winter 2009 – 13 March 2009 (I/RA/11283/08.091/MSA)

IMDC (2009k) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.31: Through tide measurement Salinity Profiling winter 2009 – 11 March 2009 (I/RA/11283/08.092/MSA)

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

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

IMDC (2009n) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.27: Through tide measurement Sediview during spring tide Winter 2009 – 12 March 2009 (I/RA/11283/08.088/MSA)

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

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

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

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

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

APPENDIX A.

OVERVIEW OF HCBS2 AND OPVOLGING AANSLIBBING DEURGANCKDOK REPORTS

Report	Description of HCBS2
Ambient Conditions Lower Sea Scheldt	
5.3	Overview of ambient conditions in the river Scheldt – January-June 2006 (I/RA/11291/06.088/MSA)
5.4	Overview of ambient conditions in the river Scheldt – July-December 2006 (I/RA/11291/06.089/MSA)
~~5.5~~	~~Overview of ambient conditions in the river Scheldt : RCM 9 buoy 84 & 97 (1/1/2007 - 31/3/2007) (I/RA/11291/06.090/MSA)~~[1]
5.6	Analysis of ambient conditions 21/09/05 - 31/3/2007 (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)

[1] The data, foreseen for Report 5.5 is reported in report 3.1. Boundary conditions: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/06.127/MSA) including HCBS 2 report 5.5 (Deurganckdok).

Report	Description of HCBS2
Ambient Conditions Lower Sea Scheldt	
11.6	Through Tide measurement Longitudinal Salinity Distribution 26/9 Scheldewacht – Deurganckdok (I/RA/11291/06.161/MSA)
Analysis	
12	Report concerning the presence of HCBS layers in the Scheldt river (I/RA/11291/06.109/MSA)

Report	Description of Opvolging aanslibbing Deurganckdok between April 2006 till March 2007
Sediment Balance: Bathymetry surveys, Density measurements, Maintenance and construction dredging activities	
1.1	Sediment Balance: Three monthly report 1/4/2006 – 30/06/2006 (I/RA/11283/06.113/MSA)
1.2	Sediment Balance: Three monthly report 1/7/2006 – 30/09/2006 (I/RA/11283/06.114/MSA)
1.3	Sediment Balance: Three monthly report 1/10/2006 – 31/12/2006 (I/RA/11283/06.115/MSA)
1.4	Sediment Balance: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/06.116/MSA)
1.5	Annual Sediment Balance (I/RA/11283/06.117/MSA)
1.6	Sediment balance Bathymetry: 2005 – 3/2006 (I/RA/11283/06.118/MSA)
Factors contributing to salt and sediment distribution in Deurganckdok: Salt-Silt (OBS3A) & Frame measurements, Through tide measurements (SiltProfiling & ADCP)	
2.1	Through tide measurement Siltprofiler 21/03/2006 Laure Marie (I/RA/11283/06.087/WGO)
2.2	Through tide measurement Siltprofiler 26/09/2006 Stream (I/RA/11283/06.068/MSA)
2.3	Through tide measurement Sediview spring tide 22/03/2006 Veremans (I/RA/11283/06.110/BDC)
2.4	Through tide measurement Sediview average tide 27/09/2006 Parel 2 (I/RA/11283/06.119/MSA)
2.5	Through tide measurement Sediview average tide (I/RA/11283/06.120/MSA)
2.6	Salt-Silt distribution & Frame Measurements Deurganckdok 13/3/2006 – 31/05/2006 (I/RA/11283/06.121/MSA)
2.7	Salt-Silt distribution & Frame Measurements Deurganckdok 15/07/2006 – 31/10/2006 (I/RA/11283/06.122/MSA)
2.8	Salt-Silt distribution & Frame Measurements Deurganckdok 12/02/2007 – 18/04/2007

Report	Description of Opvolging aanslibbing Deurganckdok between April 2006 till March 2007
	(I/RA/11283/06.123/MSA)
2.9	Calibration stationary equipment autumn (I/RA/11283/07.095/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) including HCBS 2 report 5.5
~~3.2~~	~~Boundary conditions: Annual report (I/RA/11283/06.128/MSA)~~[2]
Analysis	
4.1	Analysis of Siltation Processes and Factors (I/RA/11283/06.129/MSA)

Report	Description of Opvolging aanslibbing Deurganckdok between April 2007 till March 2008
Sediment Balance: Bathymetry surveys, Density measurements, Maintenance and construction dredging activities	
1.10	Sediment Balance: Three monthly report 1/4/2007 - 30/06/2007 (I/RA/11283/07.081/MSA)
1.11	Sediment Balance: Three monthly report 1/7/2007 – 30/09/2007 (I/RA/11283/07.082/MSA)
1.12	Sediment Balance: Three monthly report 1/10/2007 – 31/12/2007 (I/RA/11283/07.083/MSA)
1.13	Sediment Balance: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/07.084/MSA)
1.14	Annual Sediment Balance (I/RA/11283/07.085/MSA)
Factors contributing to salt and sediment distribution in Deurganckdok: Salt-Silt (OBS3A) & Frame measurements, Through tide measurements (SiltProfiling & ADCP) & Calibrations	
2.09	Calibration stationary equipment autumn (I/RA/11283/07.095/MSA)
2.10	Through tide measurement Siltprofiler 23 October 2007 (I/RA/11283/07.086/MSA)
2.11	Through tide measurement Salinity Profiling winter (I/RA/11283/07.087/MSA)
2.12	Through tide measurement Sediview winter 11 March 2008 Transect I (I/RA/11283/07.088/MSA)
2.13	Through tide measurement Sediview winter 11 March 2008 Transect K (I/RA/11283/07.089/MSA)
2.14	Through tide measurement Sediview winter 11 March 2008 Transect DGD (I/RA/11283/07.090/MSA)
2.15	Through tide measurement Siltprofiler 12 March 2008 (I/RA/11283/07.091/MSA)
2.16	Salt-Silt distribution Deurganckdok summer (21/6/2007 – 30/07/2007)

[2] considered in report 5.6 'Analysis of ambient conditions during 2006' (I/RA/11291/06.091/MSA) in the framework of the study 'Extension of the study about density currents in the Beneden Zeeschelde'

Report	Description of Opvolging aanslibbing Deurganckdok between April 2007 till March 2008
	(I/RA/11283/07.092/MSA)
2.17	Salt-Silt distribution & Frame Measurements Deurganckdok autumn (17/09/2007 - 10/12/2007) (I/RA/11283/07.093/MSA)
2.18	Salt-Silt distribution & Frame Measurements Deurganckdok winter (18/02/2008 - 31/3/2008) (I/RA/11283/07.094/MSA)
2.19	Calibration stationary & mobile equipment winter (I/RA/11283/07.096/MSA)
Boundary Conditions: Upriver Discharge, Salt concentration Scheldt, Bathymetric evolution in access channels, dredging activities in Lower Sea Scheldt and access channels	
3.10	Boundary conditions: Three monthly report 1/4/2007 – 30/06/2007 (I/RA/11283/07.097/MSA)
3.11	Boundary conditions: Three monthly report 1/7/2007 – 30/09/2007 (I/RA/11283/07.098/MSA)
3.12	Boundary conditions: Three monthly report 1/10/2007 – 31/12/2007 (I/RA/11283/07.099/MSA)
3.13	Boundary conditions: Three monthly report 1/1/2008 – 31/03/2008 (I/RA/11283/08.097/MSA)
3.14	Boundary conditions: Annual report (I/RA/11283/07.101/MSA)
Analysis	
4.10	Analysis of Siltation Processes and Factors (I/RA/11283/07.102/MSA)

APPENDIX B.

PRODUCT SHEET OF AADI SEAGUARD RCM

SEAGUARD RCM®
Recording Current Meter

D368 - July 2007

SEAGUARD® Recording Current Meter

The SEAGUARD® RCM series is a completely new generation of current meters based on the SEAGUARD® datalogger platform and the ZPulse™ Doppler Current Sensor[1]. Modern computer technology combined with advanced digital signal processing provides accurate and detailed measurements with almost unlimited resolution. Optional parameters are available through a new range of smart sensors that include temperature, pressure and conductivity. The new SEAGUARD® RCM series come in 300m, 2000m and 6000m depth ranges.

SEAGUARD® RCM advantages:

- *Large storage capacity on SD card*
- *Broadband ZPulse™ multi-frequency technology reduces power consumption and improves quality*
- *Down to 2 seconds recording interval*
- *Low current drain*
- *Smart sensor topology based on a reliable semi-high speed CANbus interface (AiCaP)*
- *Windows CE based datalogger with TFT based color touch panel for local configuration*
- *SEAGUARD Studio visualization software*
- *For use in sea and fresh water*

1 Patent Pending

The new SEAGUARD® RCM series replaces the industry standard RCM 9 and RCM 11 series. It has been completely redesigned from bottom up and employs modern technology in the datalogger section and in the different sensor solutions.

The SEAGUARD® architecture is based on a general datalogger unit and a set of autonomous smart sensors. The datalogger and the smart sensors are interfaced by means of a reliable CANbus interface using an XML based protocol (AiCaP). During power-up, each of the sensors that are connected to the bus will report their capabilities and specifications to the datalogger. The datalogger then assembles the information and provides the user with the possibility to configure the instrument based on the present nodes. The solution provides for great flexibility in both use and design of the different elements within the system.

The autonomous sensor topology also gives the sensor designer flexibility and opportunities where each sensor type may be optimized with regard to its operation, each sensor may now provide several parameters without increasing the total system load.

Data storage takes place on a Secure Digital (SD) card. The current capacity for this card type is up to 1000 MBytes, which is far adequate for most applications.

Sensor Capability

The SEAGUARD® RCM comes standard with the ZPulse™ multi-frequency Doppler current sensor. The new current sensor employs acoustic pulses comprising several frequency components to lower the statistical variance in the Doppler shift estimate. The advantage of this is reduced statistical error with fewer pings, hence increased sampling speed and less power consumption. The new Doppler Current Sensor also incorporates a robust fully electronic compass and a tilt sensor.

The SEAGUARD® RCM may also be delivered with new smart sensor solutions for temperature, pressure and conductivity. All sensors have increased resolution compared with the older models. The temperature sensor also has decreased settling time to utilize the increased sampling speed provided by the SEAGUARD® platform. AiCaP Turbidity Sensor and Oxygen Optode will follow.

AADI SEAGUARD®
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Reliable Solutions !

Specifications

D368 - July 2007

SEAGUARD® RCM Specifications	
Top-end Plate capability: Up to 6 sensors can be fitted onto the Top-end Plate, of which 4 can be analogue sensors (0-5V)	
Recording System:	Data Storage on SD card
Storage Capacity:	512 MB
Battery Alkaline 3614: or Lithium 3677:	 9V, 15Ah (nominal 12.5Ah; 20W down to 6V at 4°C) 7.2V, 30Ah
Recording Interval:	From 2s, depending on the node configuration for each instrument
Recording settings:	Fixed interval settings Customized Sequence setting
Protocol:	AiCaP CANbus based protocol
Depth Capacity:	300m/2000m/6000m
Platform Dimensions: 300m version (SW): 2000m version (IW): 6000m version (DW):	 H: 356mm OD: 139mm H: 352mm OD: 140mm H: 368mm OD: 143mm
External Materials 300m version: 2000/6000m version:	 PET, Titanium, Stainless Steel 316, Durotong DT322 polyurethane Stainless steel 316, Titanium, OSNISIL, Durotong DT322 polyurethane
Weight:	Depends on node configuration
Packing:	Depends on node configuration
Accessories Included:	SEAGUARD Studio Alkaline Battery 3614 SD card: 512 MB Standard cable 4299 Power Calculator
Optional Accessories:	Recommended Spares In-line mooring frame 4044[1]/3824A/3910 Lithium Battery 3677 Maintenance Kit 3813/3813B Tools kit 3986 Bottom mooring frame 3438R/3448 Base Brackets 3627 (2) for frame Protecting Rods 3783 Vane Plate 3681

1) In-line Mooring Frame 4044: breaking strength 800 kg
2) Based on 300 pings
3) Extended range available on request.
4) Available on request
5) 9600 baud, 8 data bits, 1 stop bit, No parity, Xon/Xoff Handshake
6) Dependent on flow through cell bore

ZPulse™ Doppler Current Sensor (DCS) Specifications	
Current Speed: Range: Resolution: Mean Accuracy: Relative: Statistic variance (std)	(Vector averaged) 0-300 cm/s 0.1 mm/s ± 0.15 cm/s ± 1% of reading 0.3 cm/s (ZPulse mode), 0.45 cm/s [2]
Current Direction: Range: Resolution: Accuracy:	 0 – 360° magnetic 0.01° ±5° for 0-15° tilt ±7.5° for 15-35° tilt
Tilt Circuitry: Range: Resolution: Accuracy:	 0-35° 0.01° ±1.5°
Compass Circuitry: Resolution: Accuracy:	 0.01° ±3°
Acoustics: Frequency: Power: Beam angle (main lobe):	 1.9 to 2.0 MHz 25 Watts in 1ms pulses 2°
Installation distance: From surface: From bottom:	 0.75m 0.5m
Supply Voltage:	6– 14 Volts
Operating Temperature:	-5 to +50°C

Optional Sensors Specifications	
Temperature Sensor 4060 Range: Resolution: Accuracy: Response Time 63%):	 0-36°C (32-96.8°F) [3] 0.001°C (0.0018°F) ±0.03°C (0.054°F) < 2 seconds
Pressure Sensor **4117A/B/C** Resolution: Accuracy: 4117 A Range: 4117 B Range: 4117 C Range:	 <0.002% FSO ±0.04° FSO 0-1000 kPa (0-145 psia)[4][5] 0-4000 kPa (0-580 psia)[4][5] 0-10000kPa (0-1450 psia)[4][5]
Conductivity Sensor 4319 Range: Resolution: Accuracy 4319 A: 4319 B: Response Time:	 0-7.5 S/m 0.0002 S/m ±0.005 S/m ±0.0018 S/m <3s[6]

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Reliable Solutions 2

APPENDIX C.

LONG-TERM MEASUREMENTS AT OOSTERWEEL, BUOY 84 AND PROSPERPOLDER (WL – CEL HYDROMETRIE)

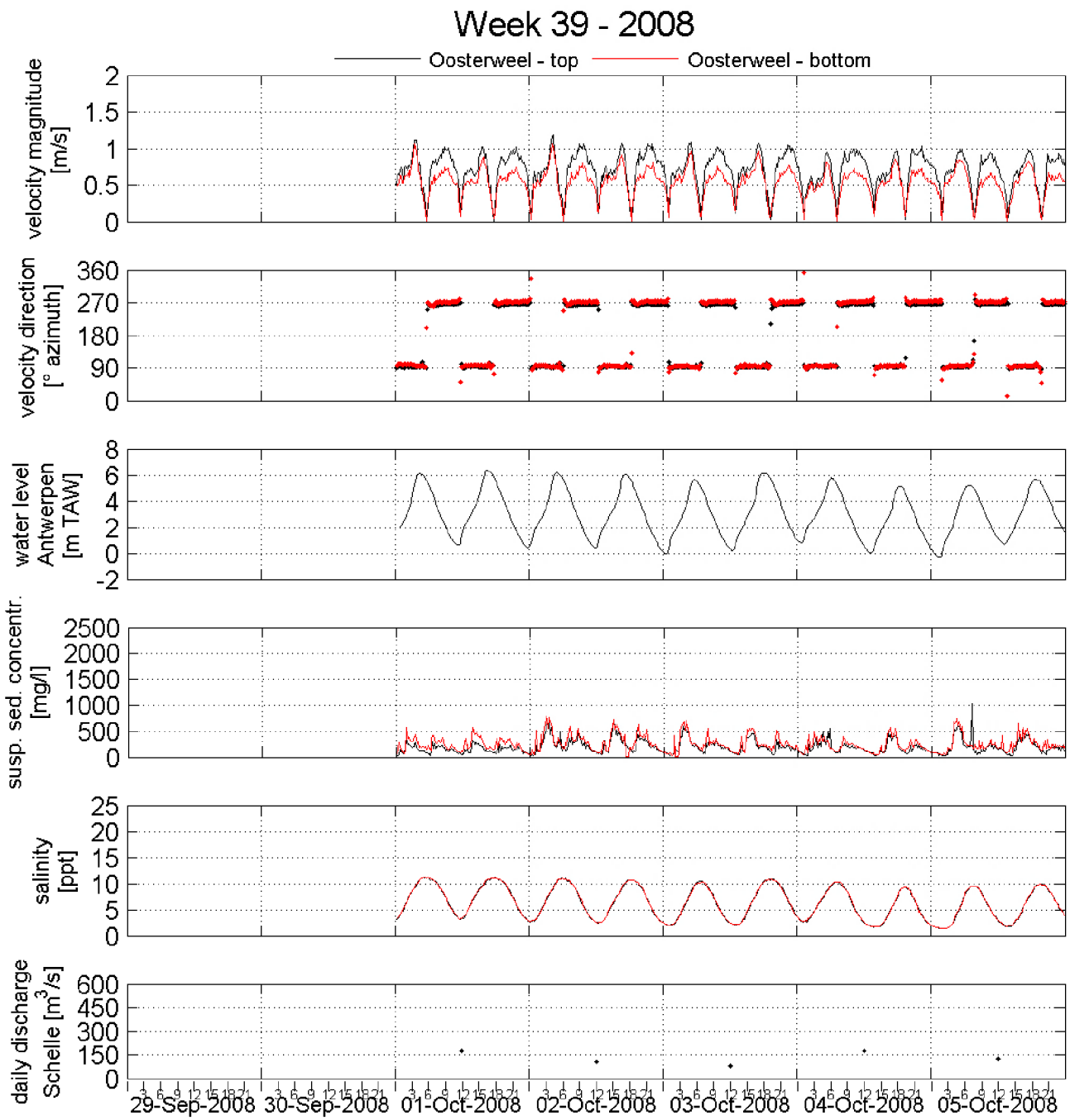
C.1 Datasheets week series

Datasheet order

Nr	*Location*	*Depth of Instrument*		*Serial number instrument*	*Period*
		[m] above bottom	*[m TAW]*		
1	Oosterweel (top)	4.5	-2.0	AADI RCM-9 0152	01/10/2008 – 31/03/2009
2	Oosterweel (bottom)	1.0	-5.5	AADI RCM-9 0149	01/10/2008 – 15/01/2009
				AADI Seaguard 0072	15/01/2009 – 22/01/2009
				AADI RCM-9 0149	22/01/2009 – 31/03/2009
3	Buoy 84 (top)	3.3	-6.0	AADI RCM-9 0579	01/10/2008 – 04/03/2009
				AADI Seaguard 0065	04/03/2009 – 31/03/2009
4	Buoy 84 (bottom)	0.8	-8.0	AADI RCM-9 0248	01/10/2008 – 31/03/2009
5	Prosperpolder	2.5	-1.5	AADI RCM-9 0117	01/10/2008 – 31/03/2009

C.1.1. Oosterweel

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

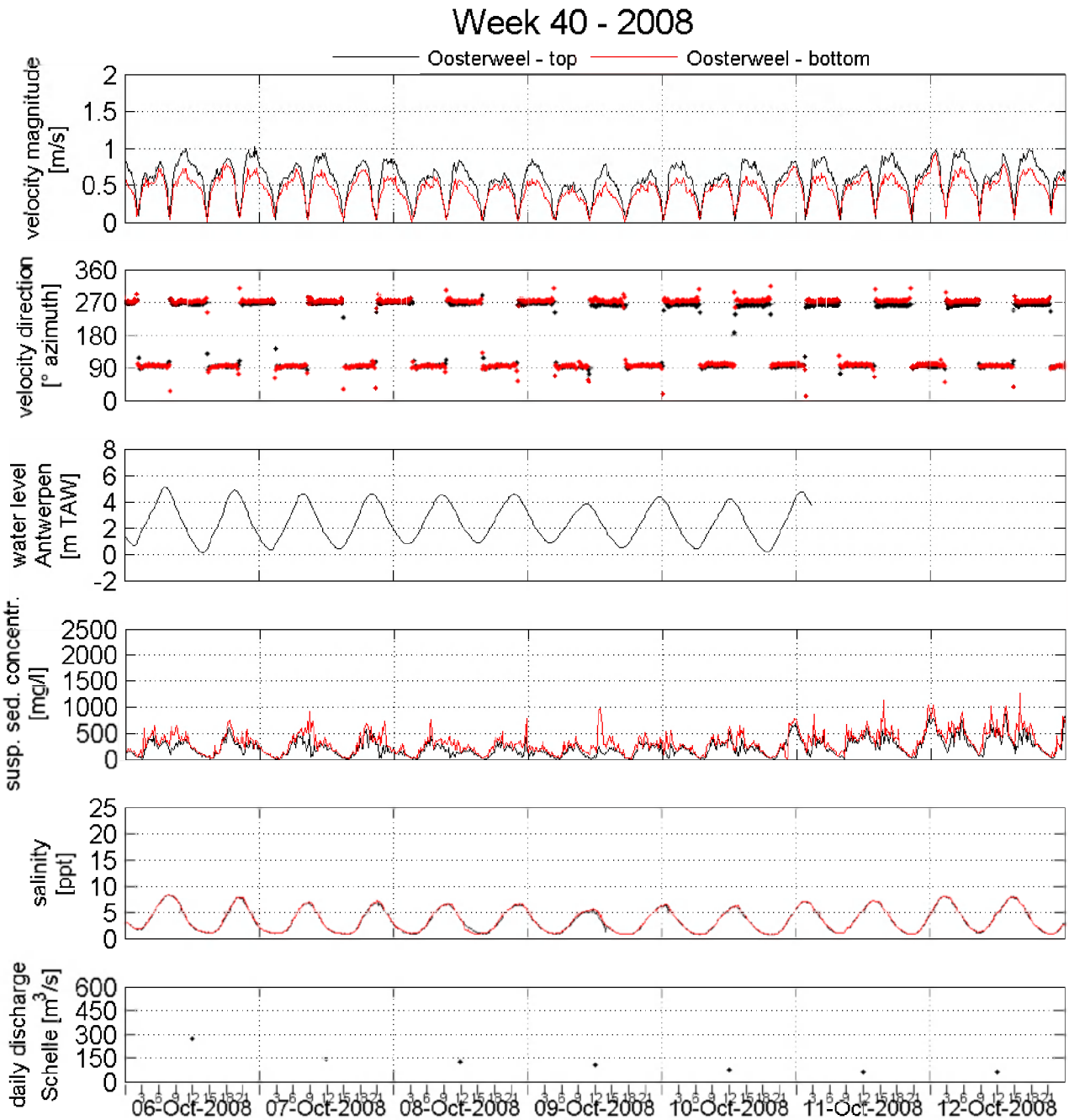
Oosterweel (top & bottom)

Processed by: IMDC International Marine & Dredging Consultants

In Association with: WL | delft hydraulics

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

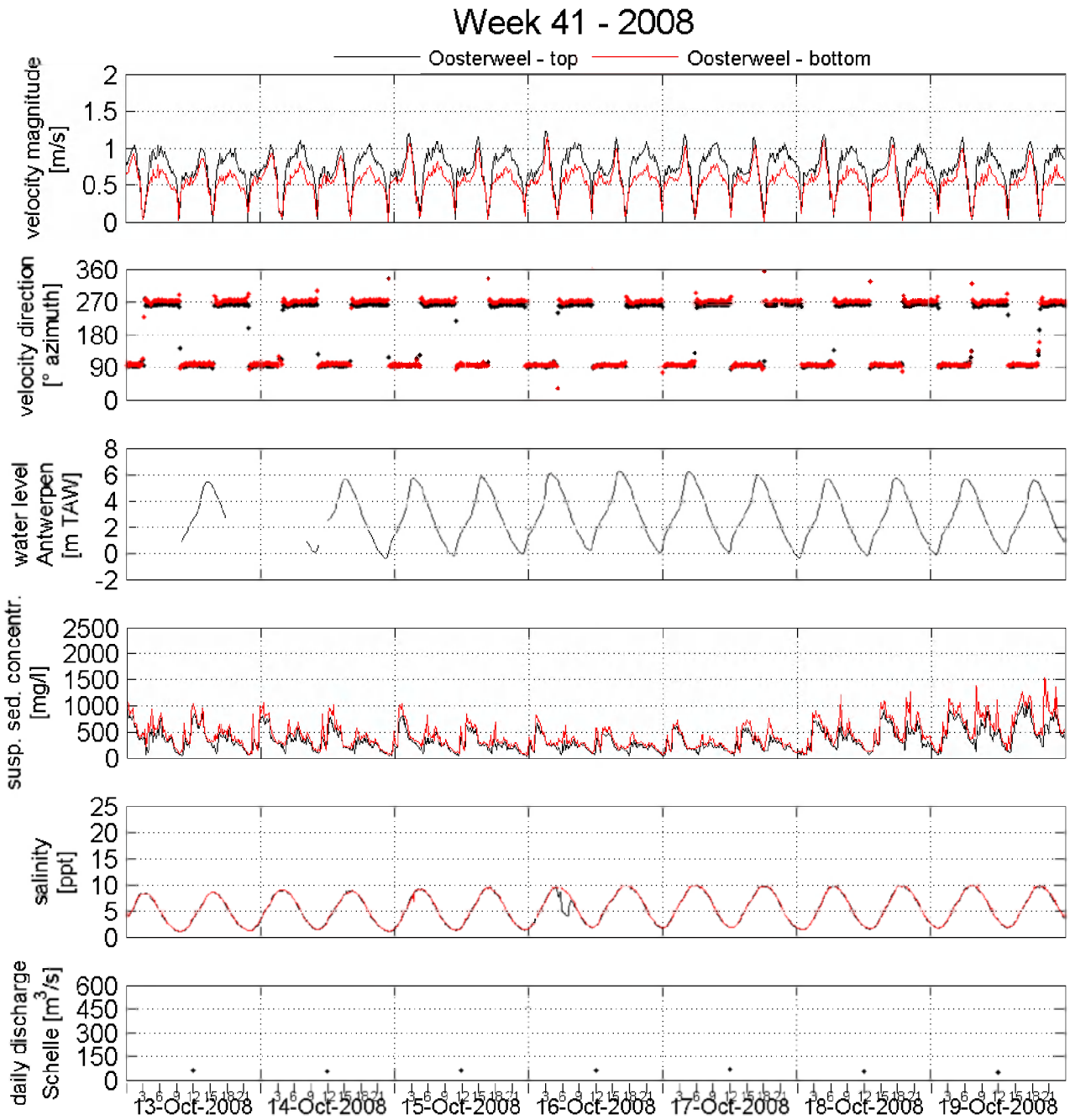
Oosterweel (top & bottom)

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Oosterweel (top & bottom)

Processed by:

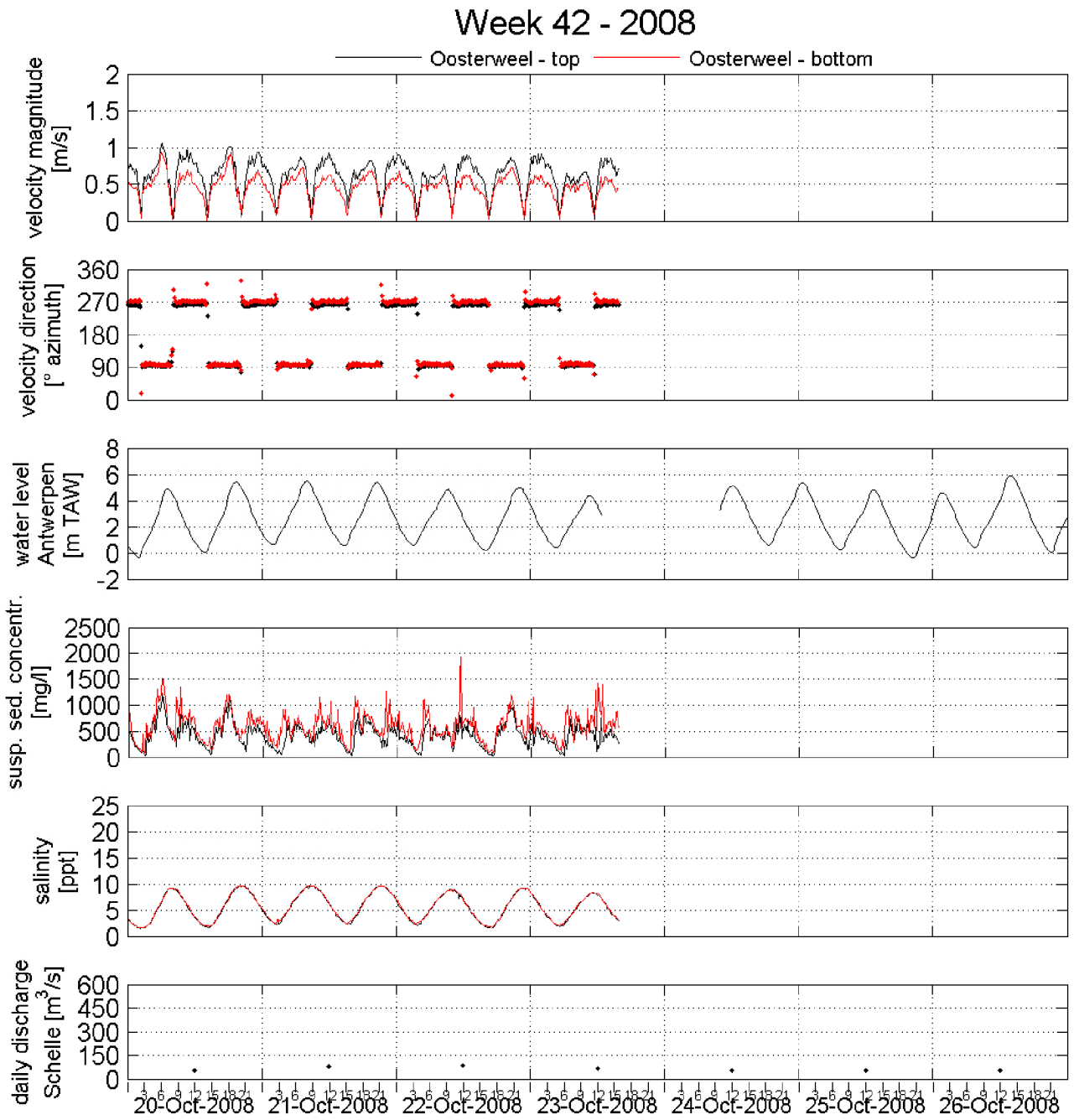
IMDC International Marine & Dredging Consultants

In Association with:

WL | delft hydraulics

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Oosterweel (top & bottom)

Processed by:

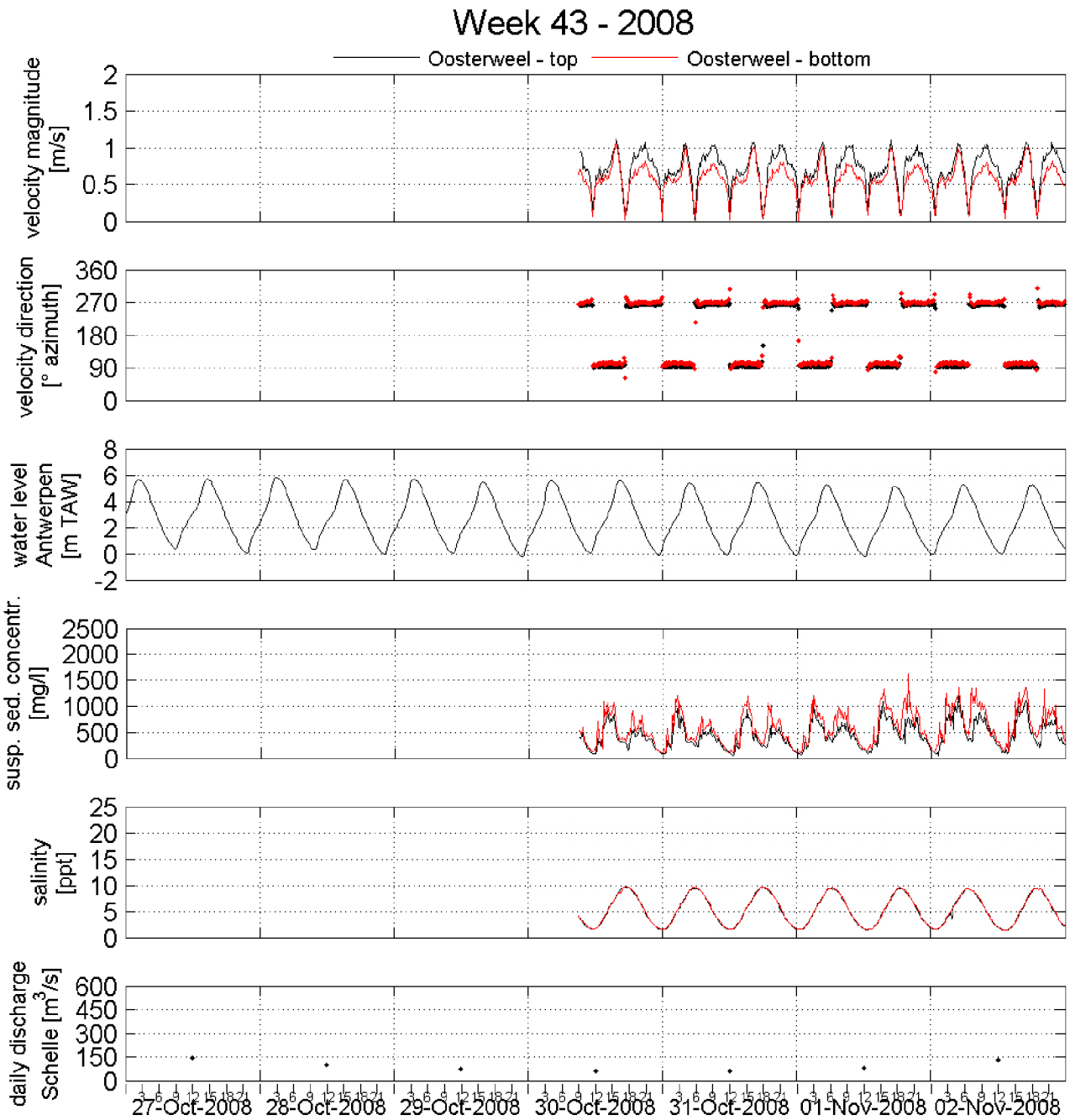
IMDC International Marine & Dredging Consultants

In Association with:

WL | delft hydraulics

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Oosterweel (top & bottom)

Processed by:

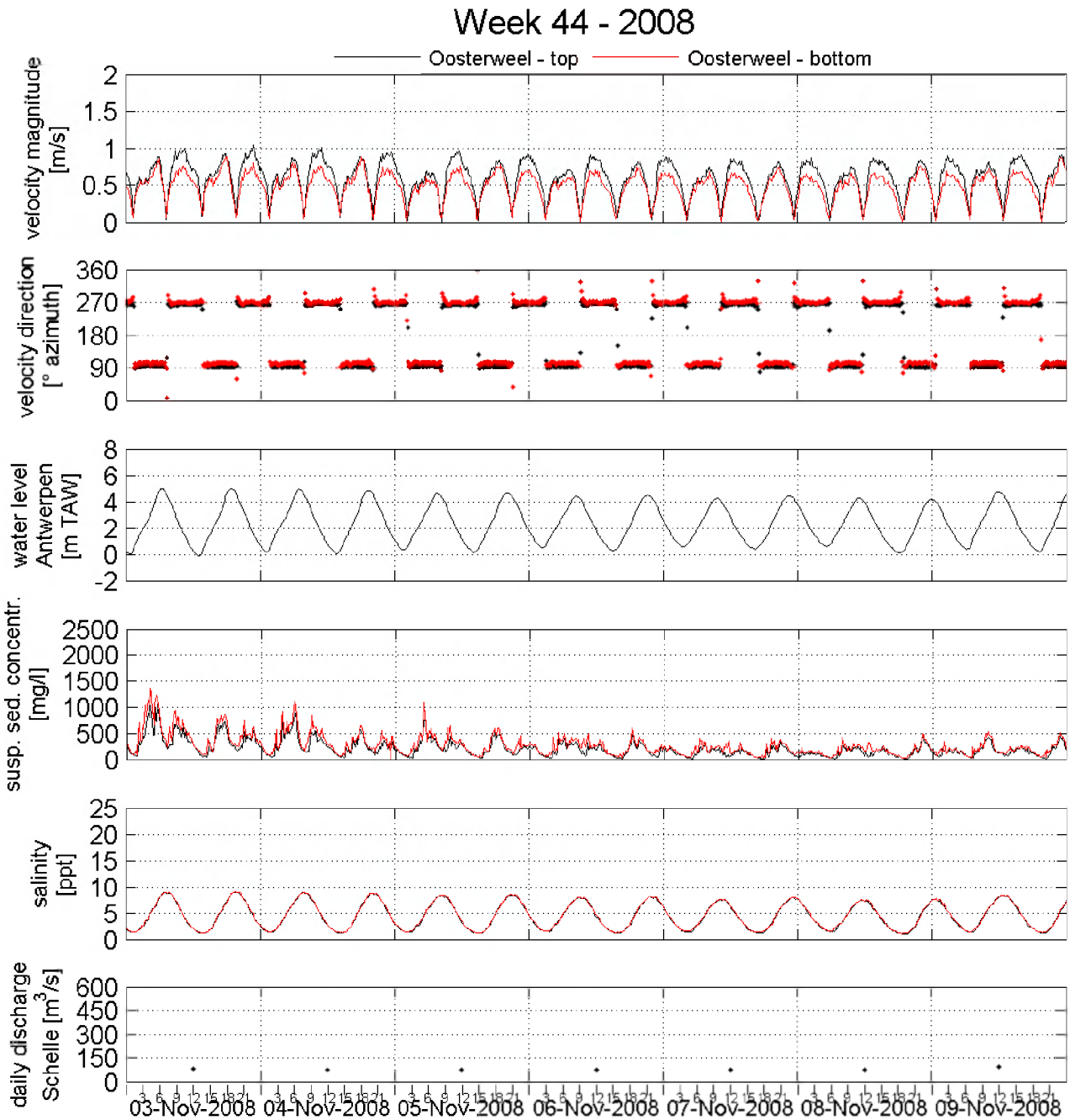
IMDC International Marine & Dredging Consultants

In Association with:

WL | delft hydraulics

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

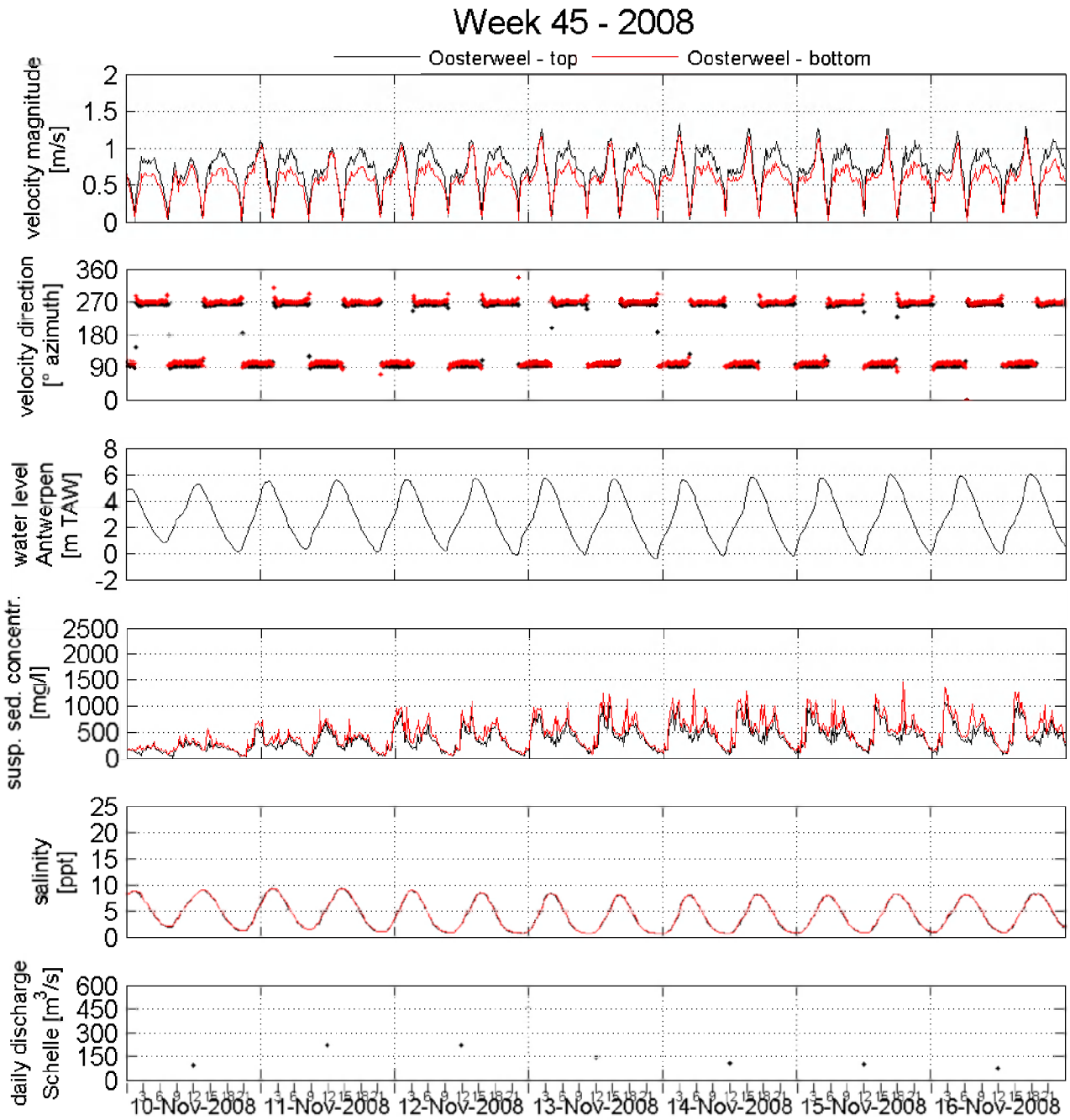
Oosterweel (top & bottom)

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

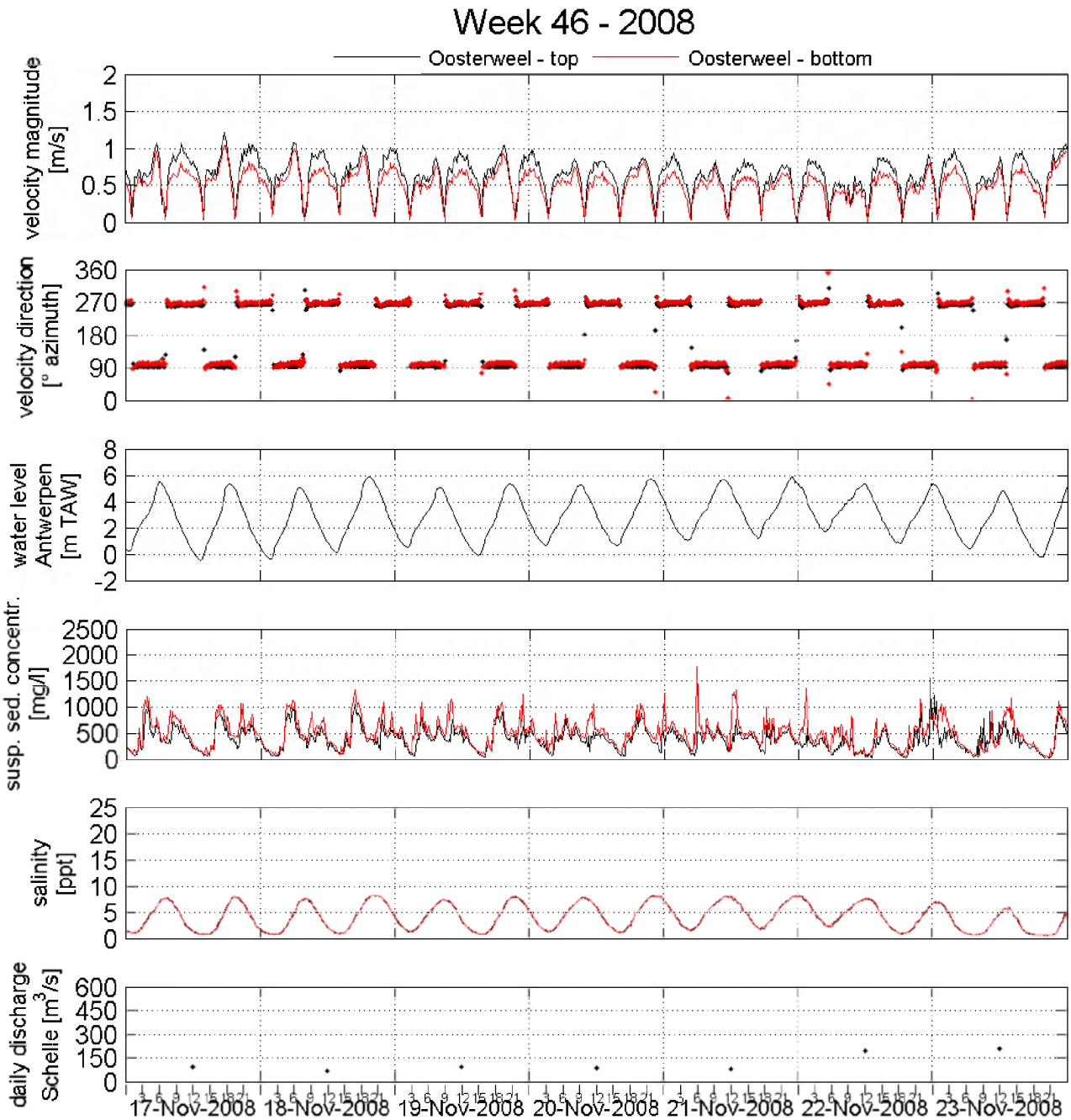
Oosterweel (top & bottom)

Processed by: IMDC International Marine & Dredging Consultants

In Association with: WL | delft hydraulics

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

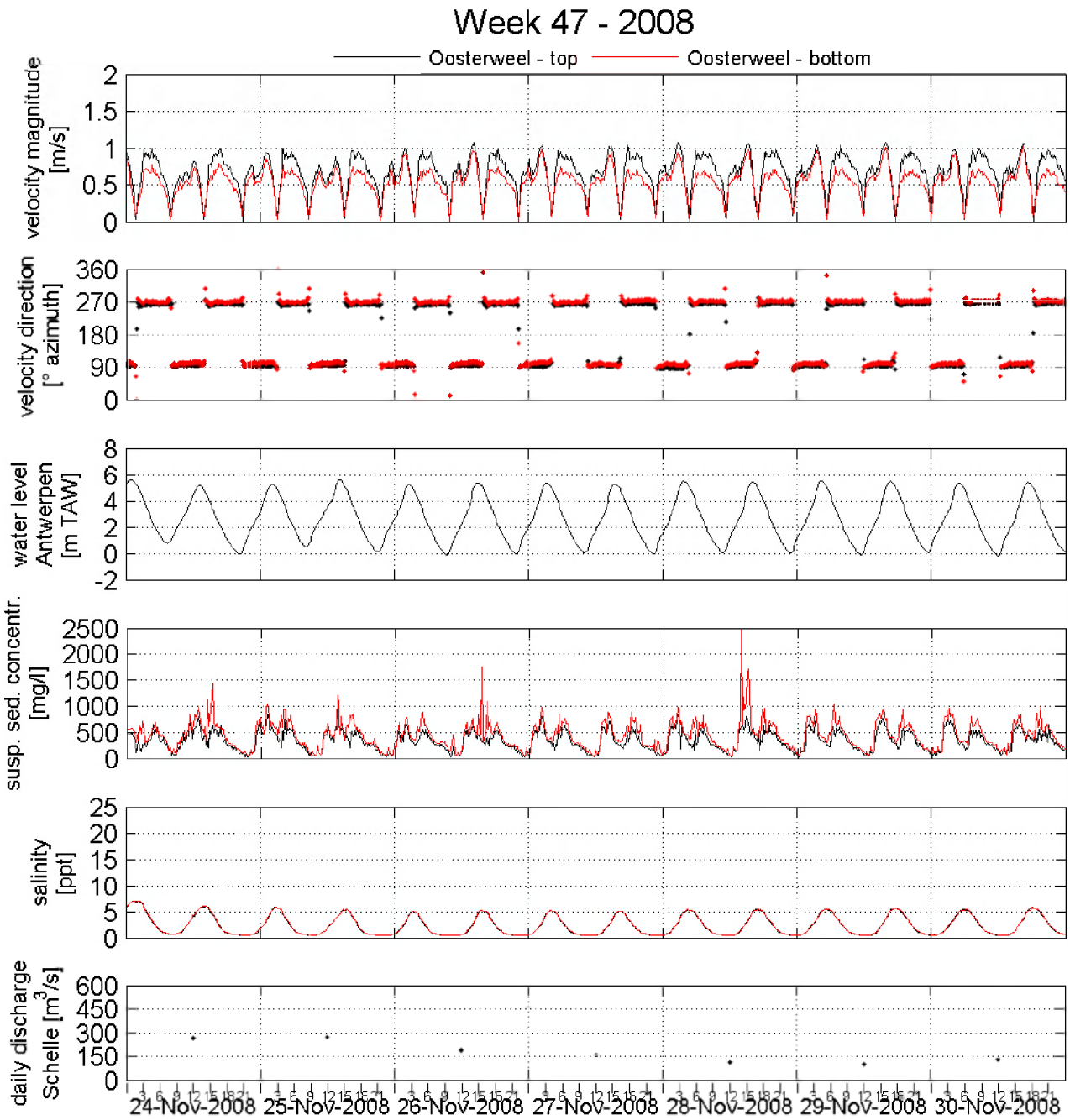
Oosterweel (top & bottom)

Processed by: IMDC International Marine & Dredging Consultants

In Association with: WL | delft hydraulics

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

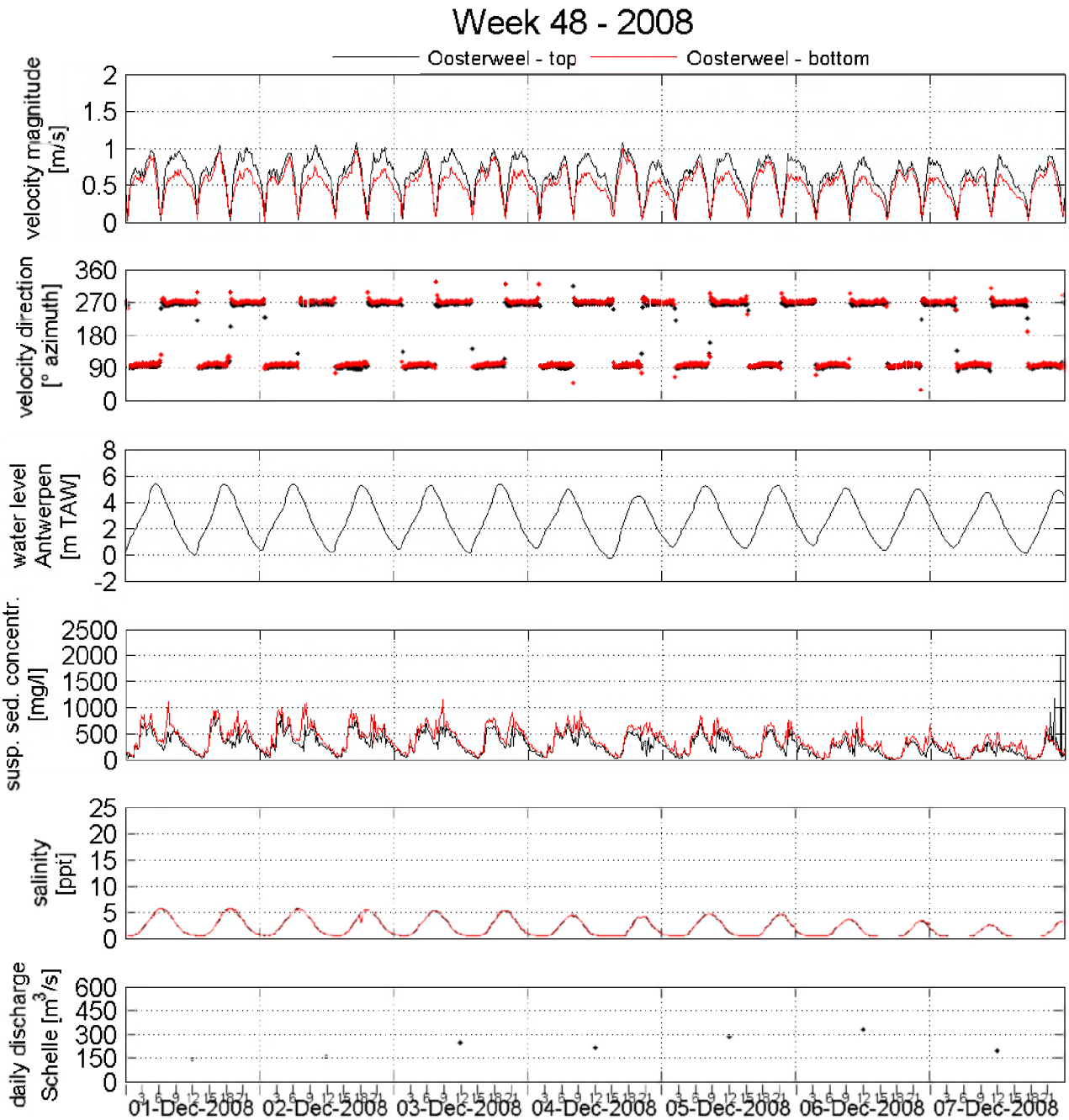
Oosterweel (top & bottom)

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

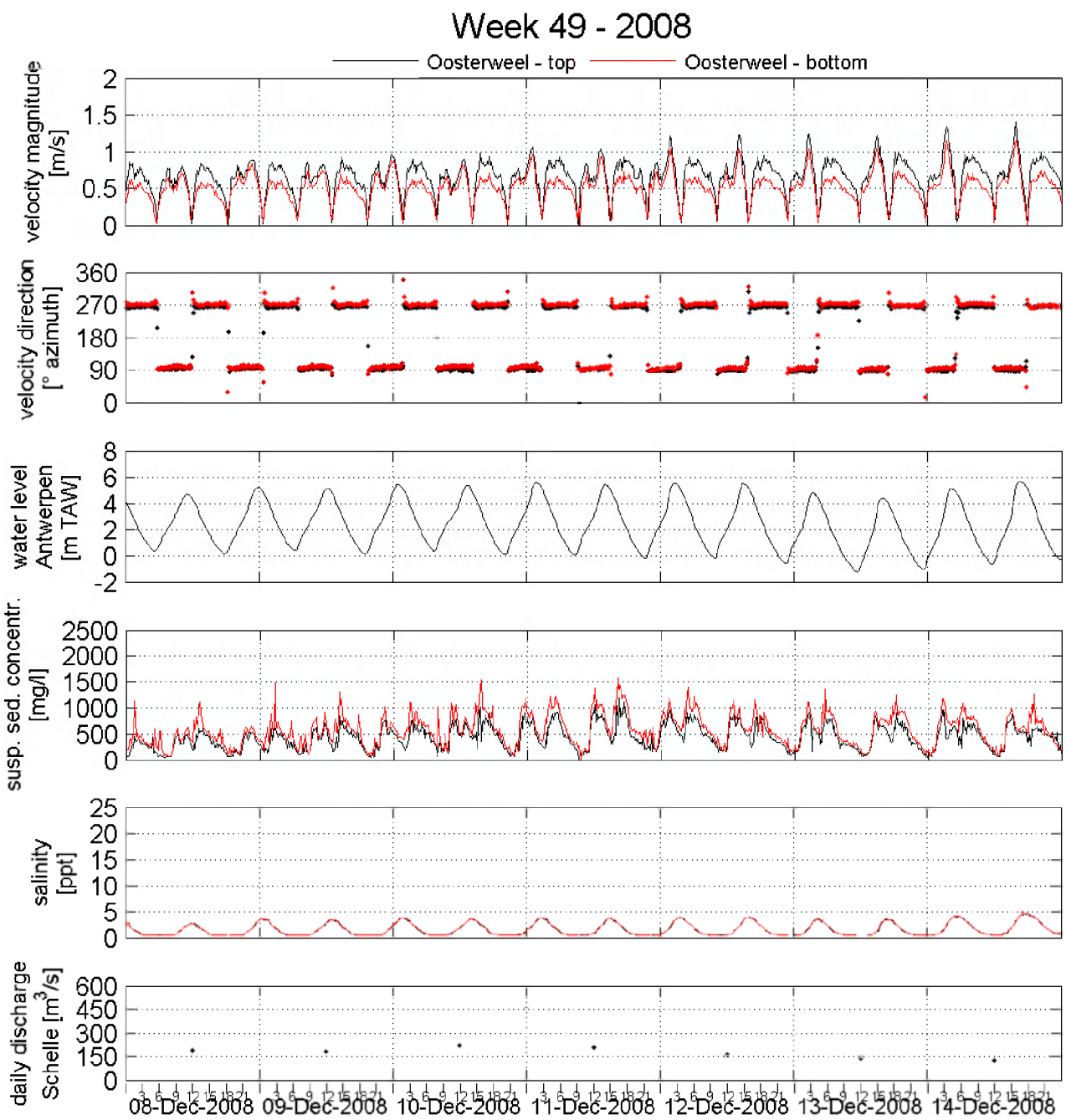
Oosterweel (top & bottom)

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

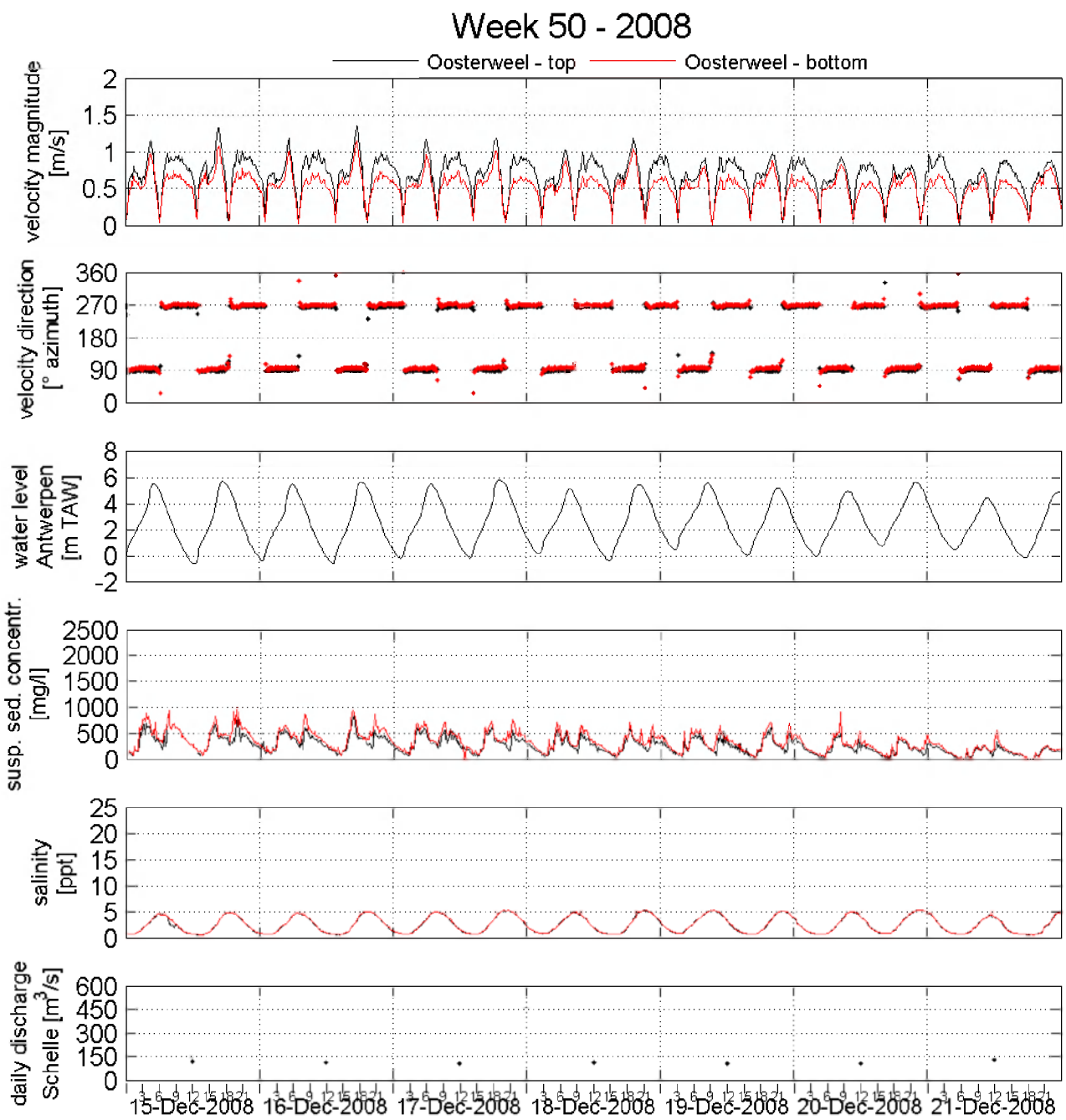
Oosterweel (top & bottom)

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

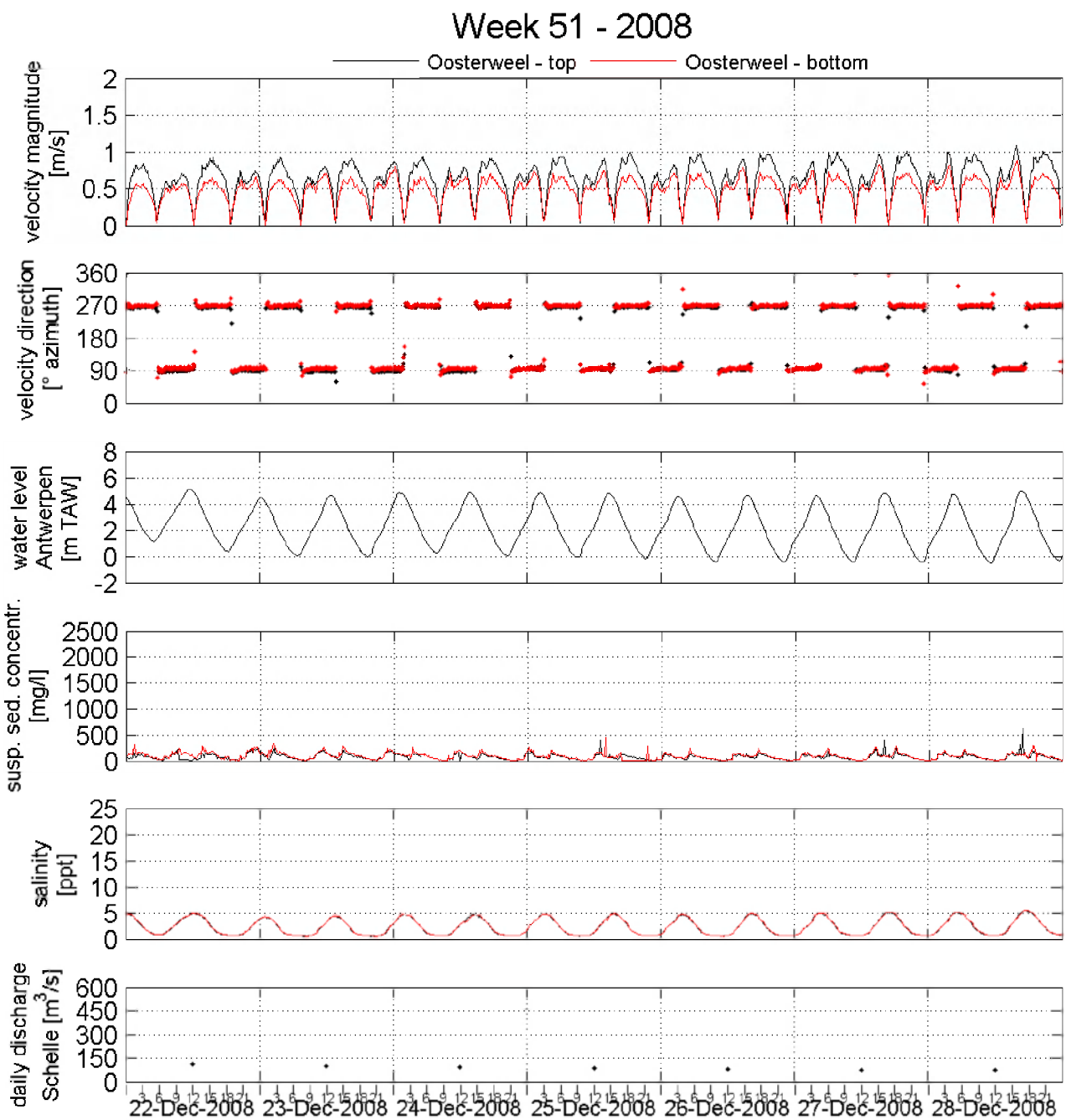
Oosterweel (top & bottom)

Processed by: IMDC International Marine & Dredging Consultants

In Association with: WL | delft hydraulics

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

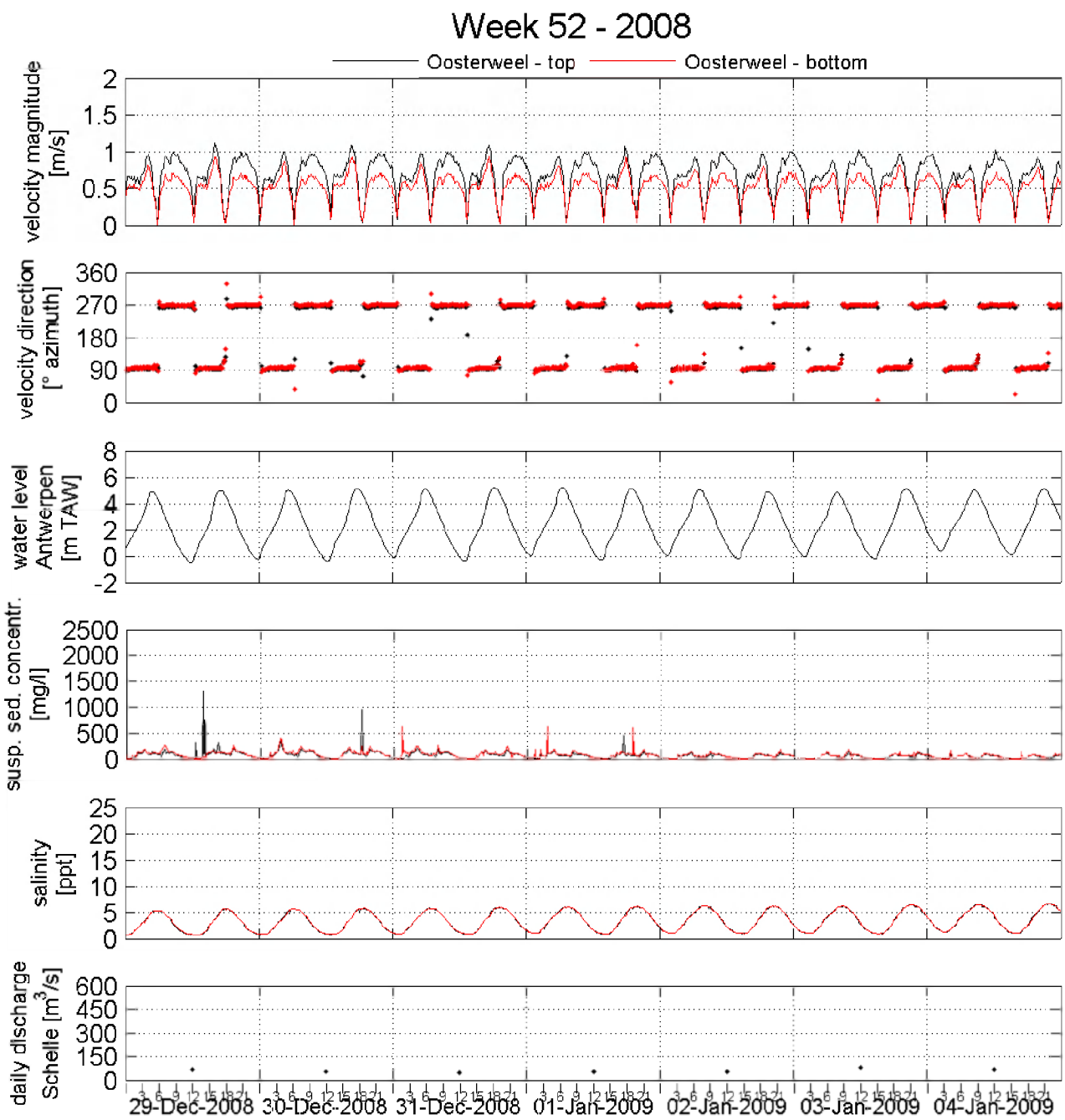
Oosterweel (top & bottom)

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

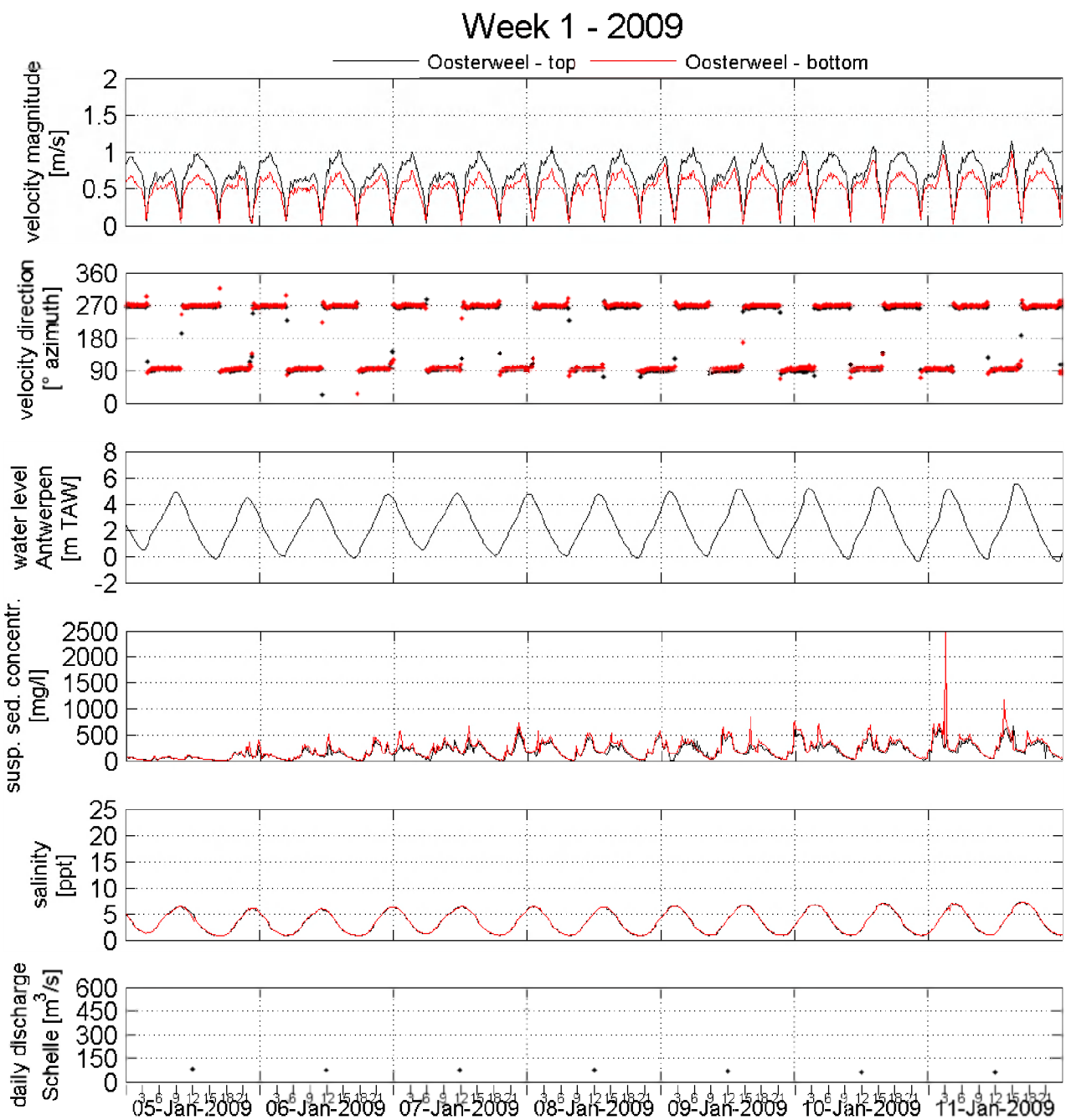
Oosterweel (top & bottom)

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

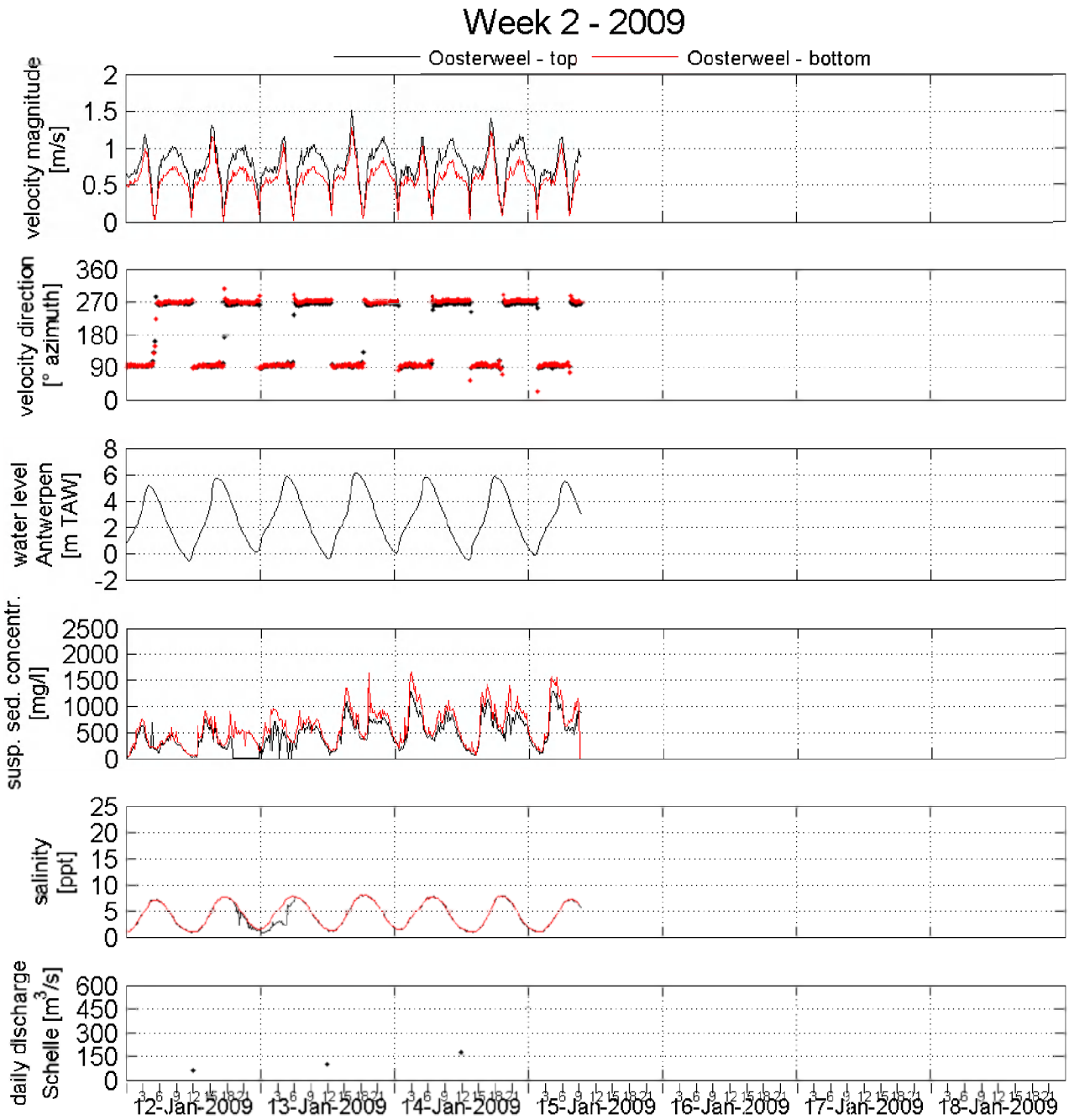
Oosterweel (top & bottom)

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

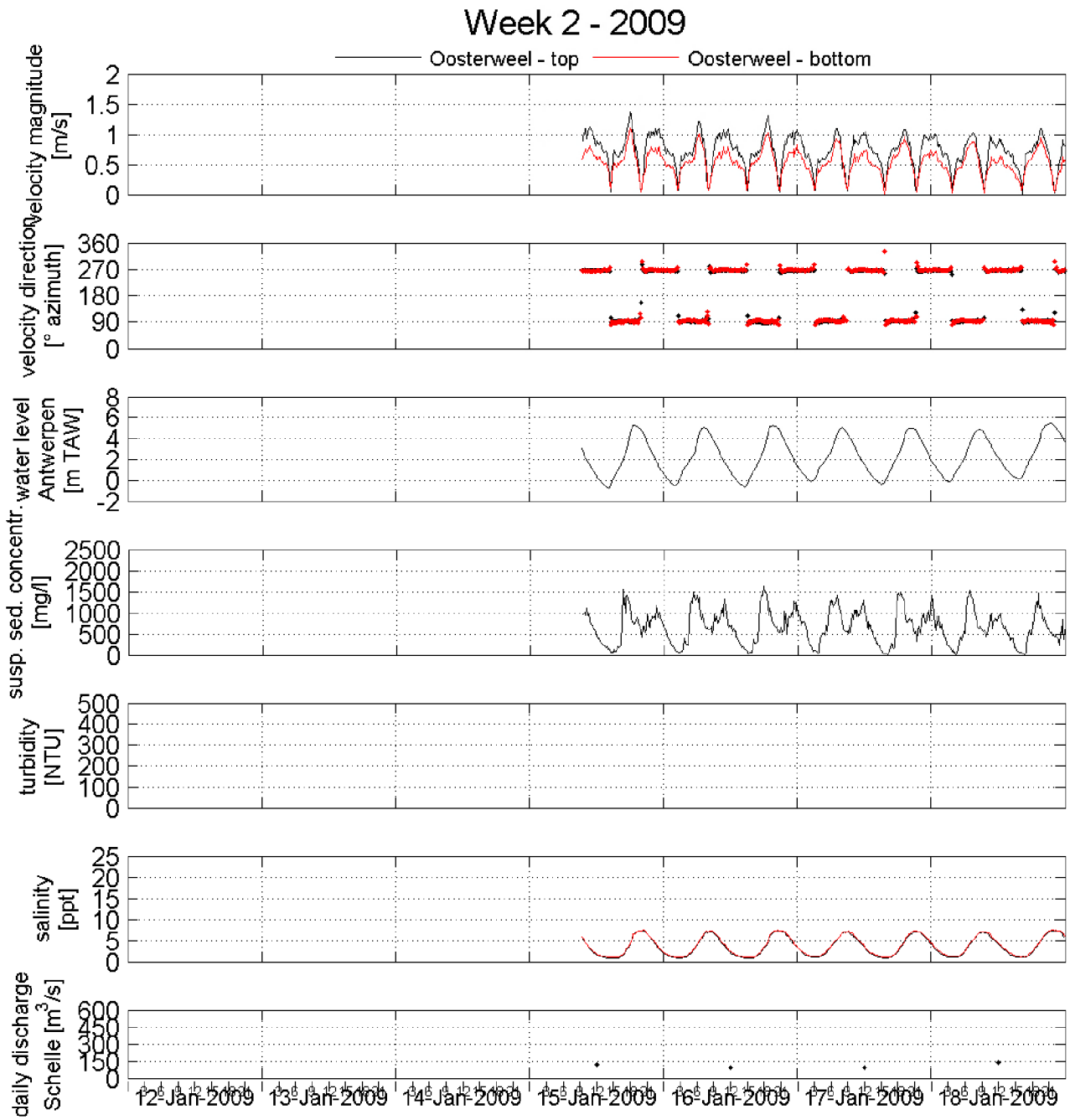
Oosterweel (top & bottom)

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Oosterweel (top & bottom)

Processed by:

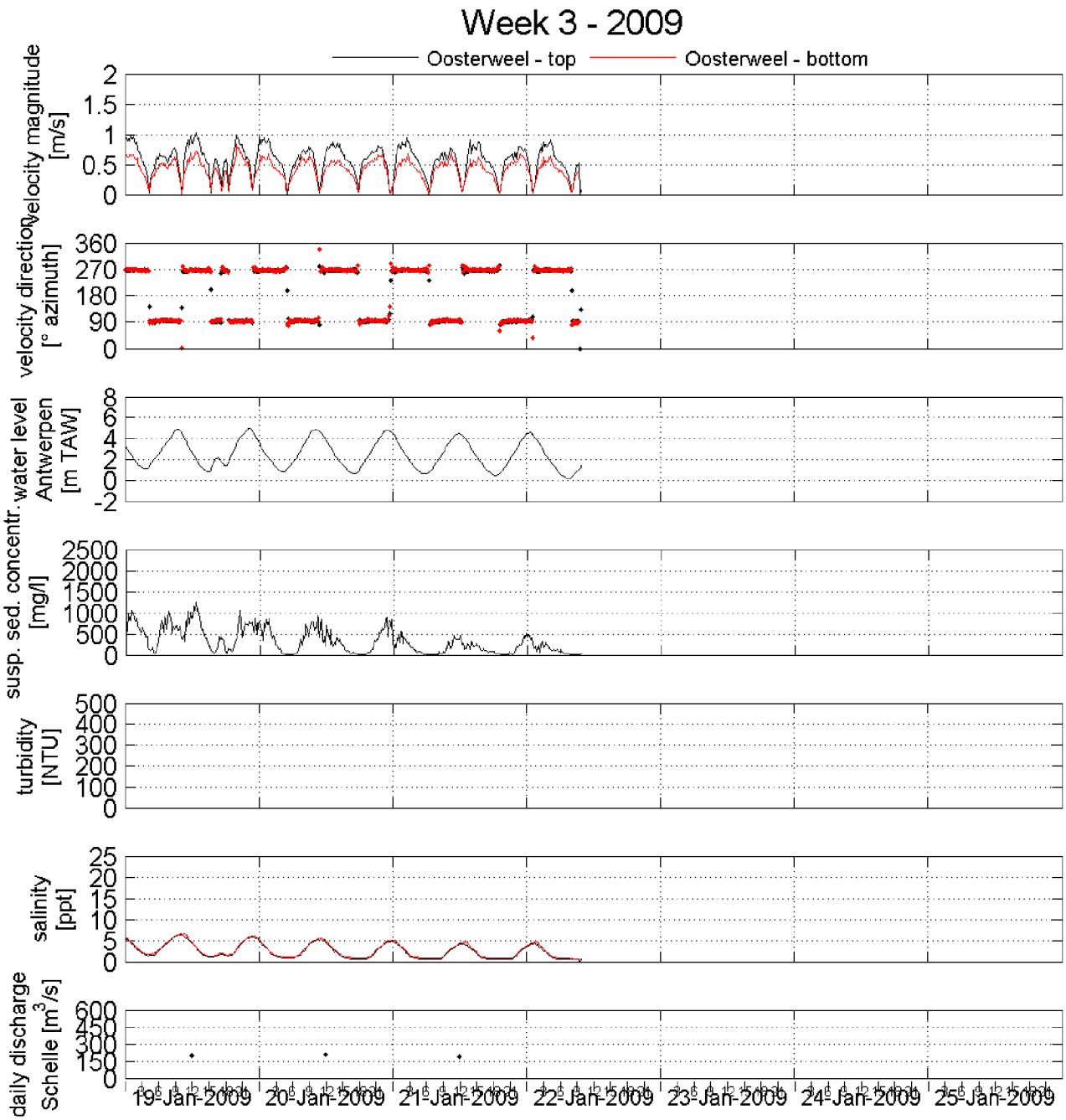
IMDC International Marine & Dredging Consultants

WL | delft hydraulics

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Oosterweel (top & bottom)

Processed by:

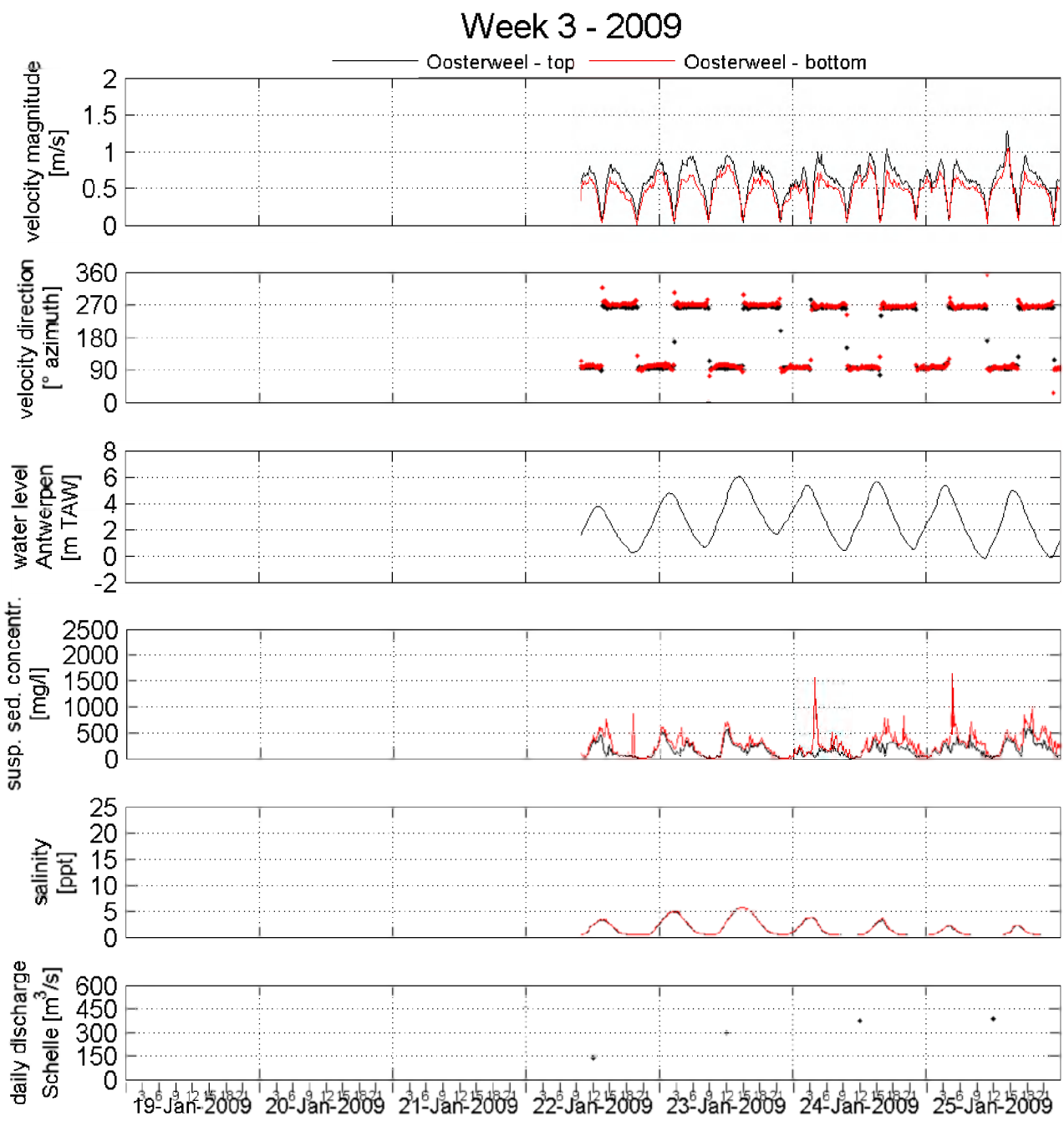
IMDC International Marine & Dredging Consultants

In Association with:

WL | delft hydraulics

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

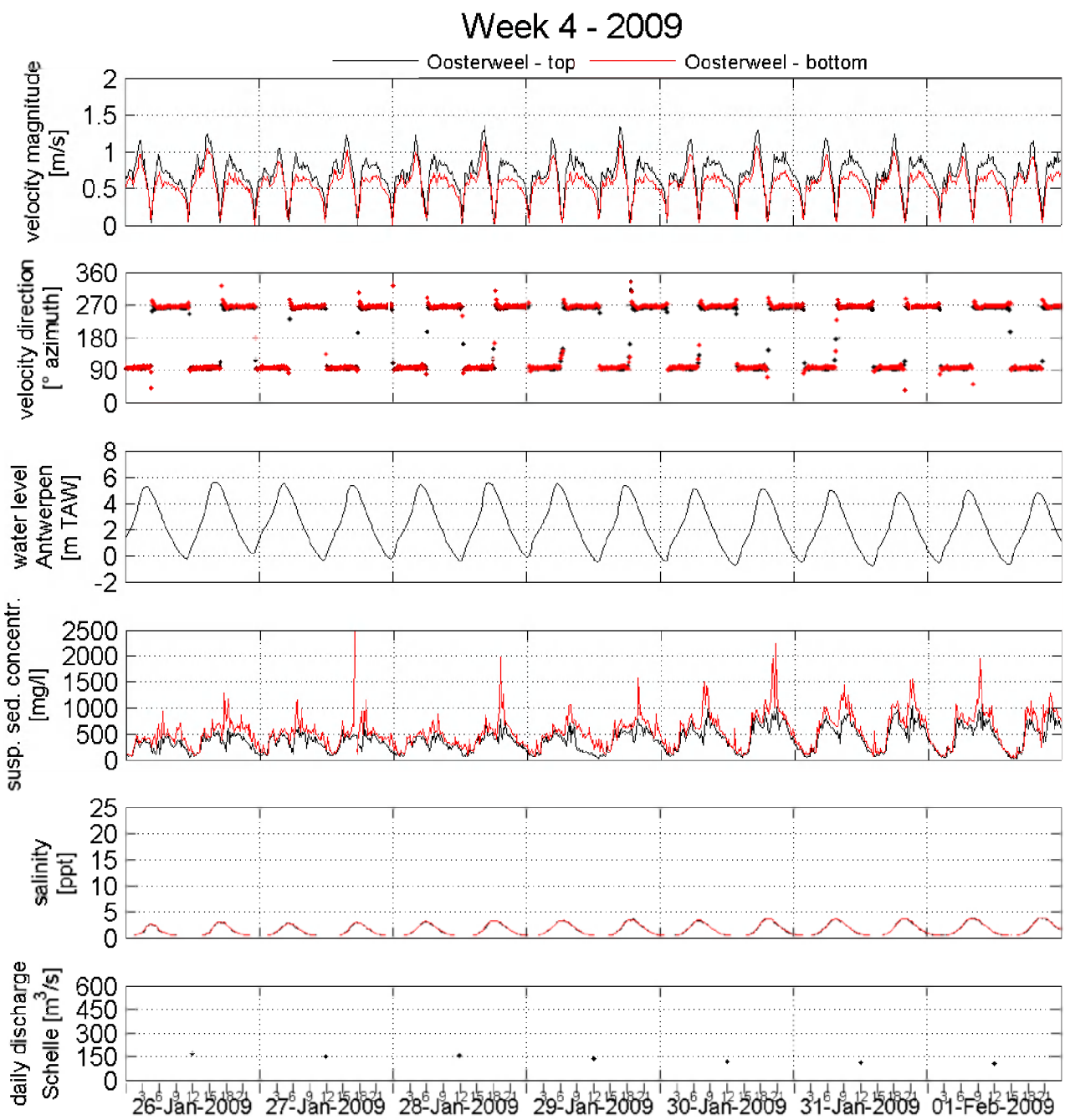
Oosterweel (top & bottom)

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

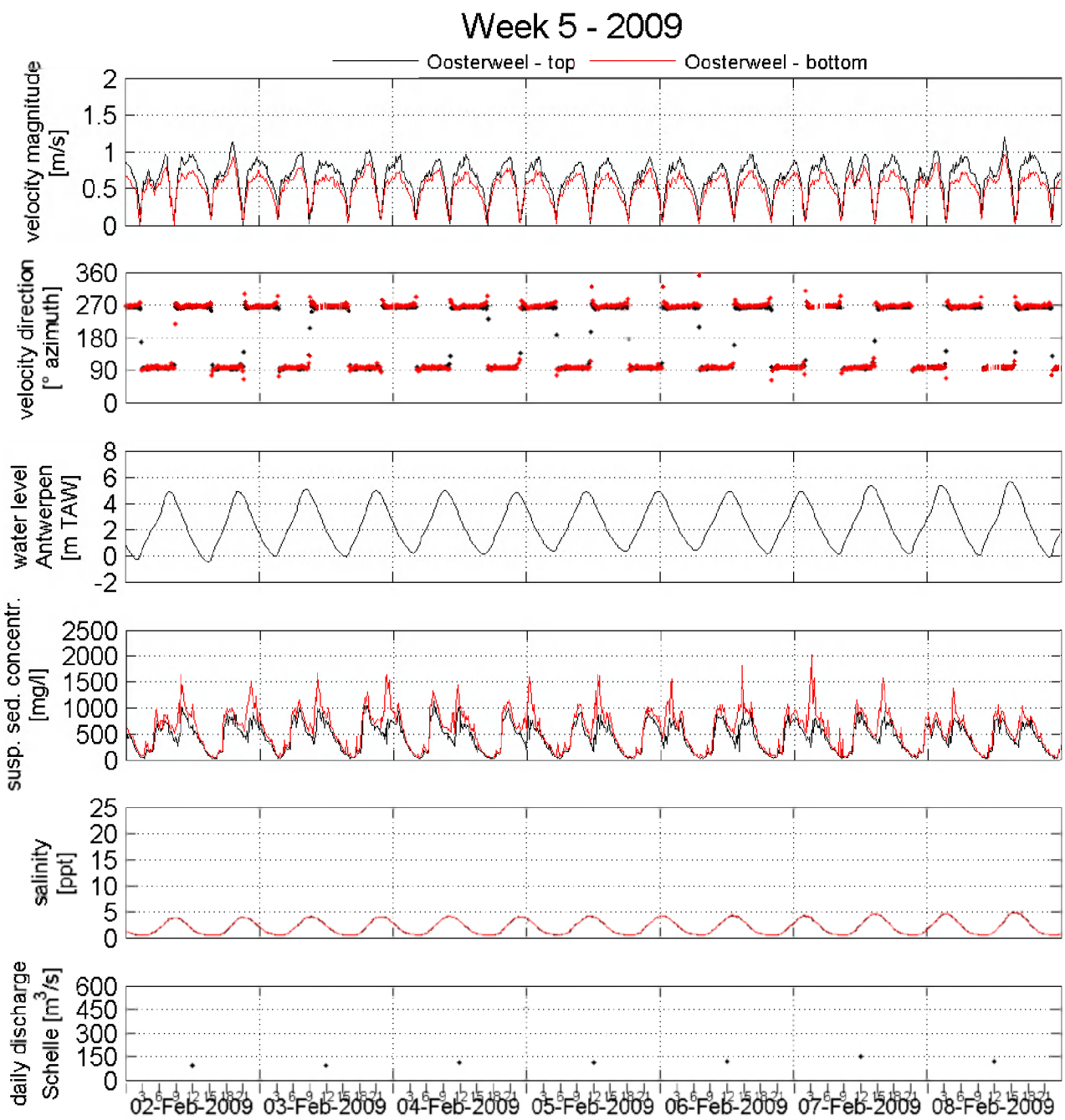
Oosterweel (top & bottom)

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Oosterweel (top & bottom)

Processed by:

In Association with:

I/RA/11283/08.097/MSA

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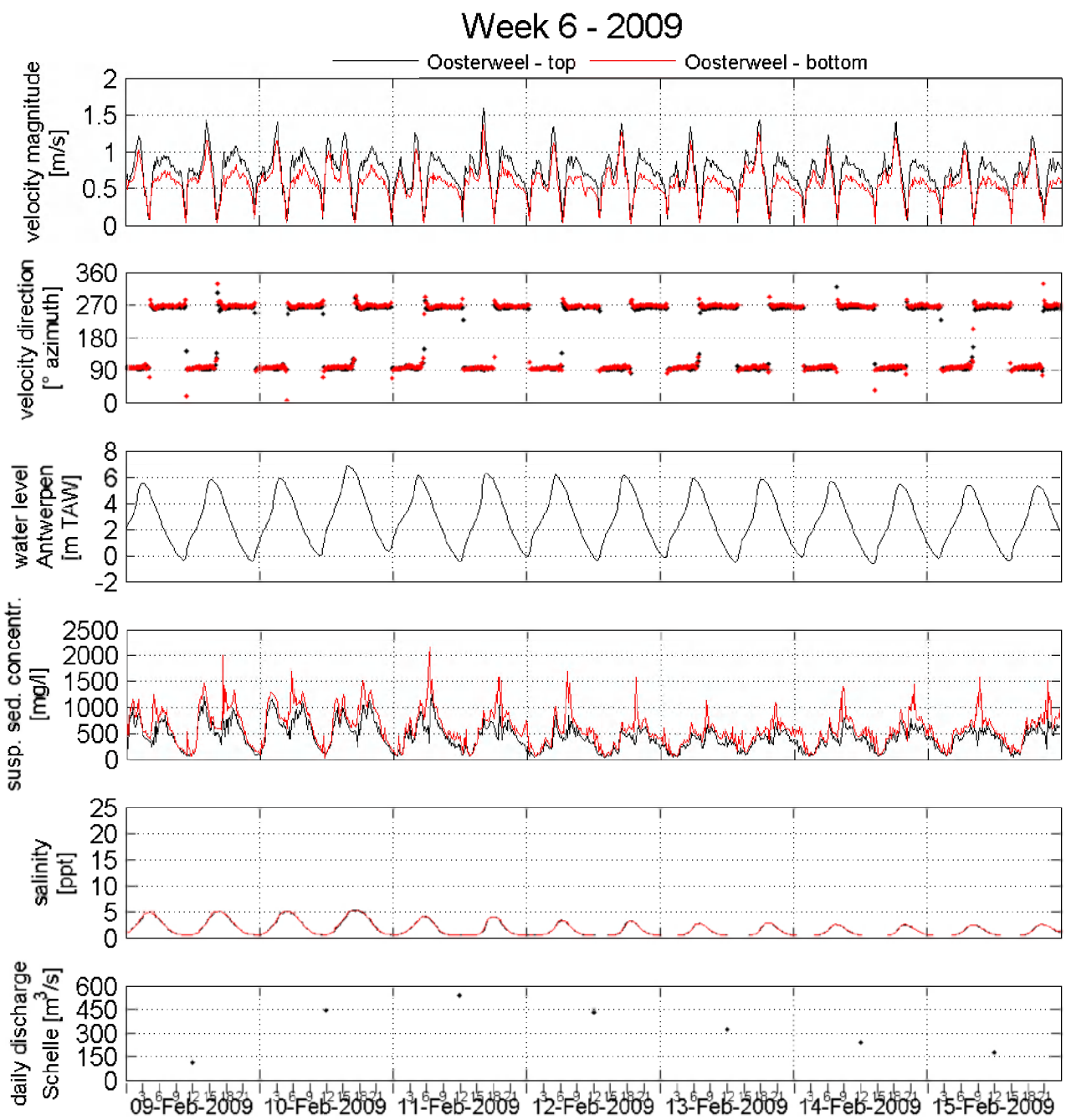

Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Oosterweel (top & bottom)

Processed by:

In Association with:

I/RA/11283/08.097/MSA

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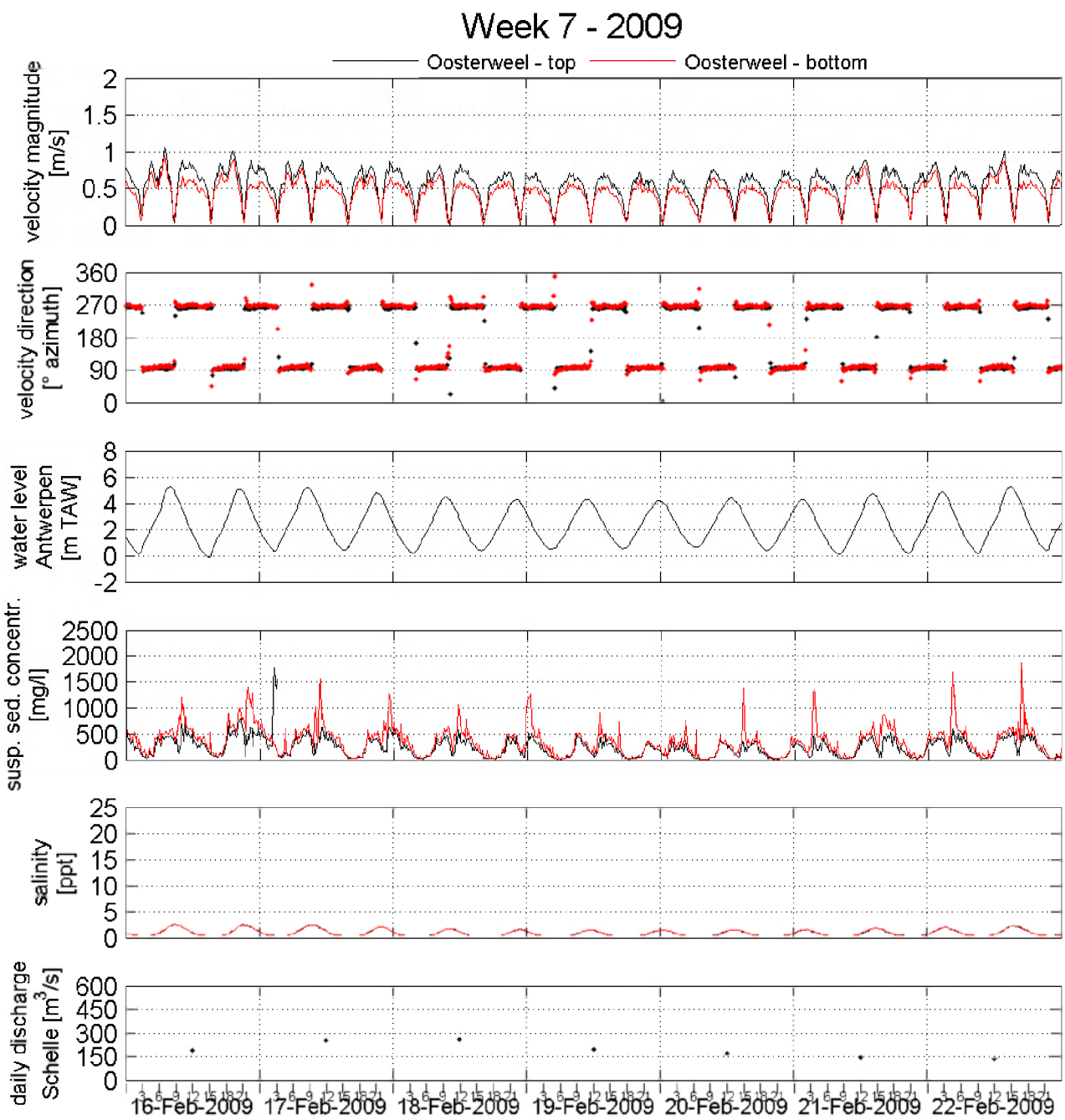

Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Oosterweel (top & bottom)

Processed by:

In Association with:

I/RA/11283/08.097/MSA

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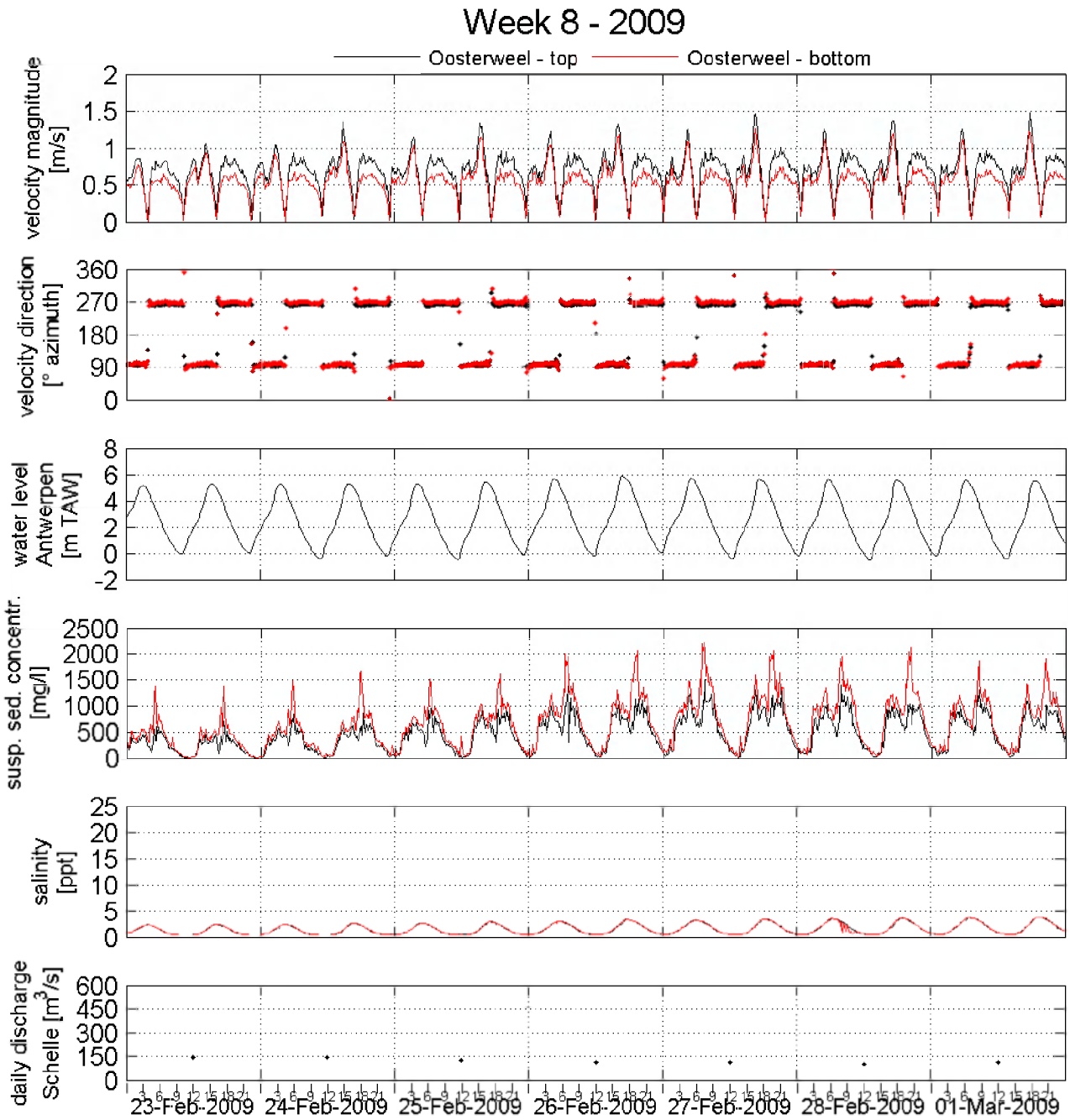

Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Oosterweel (top & bottom)

Processed by:

In Association with:

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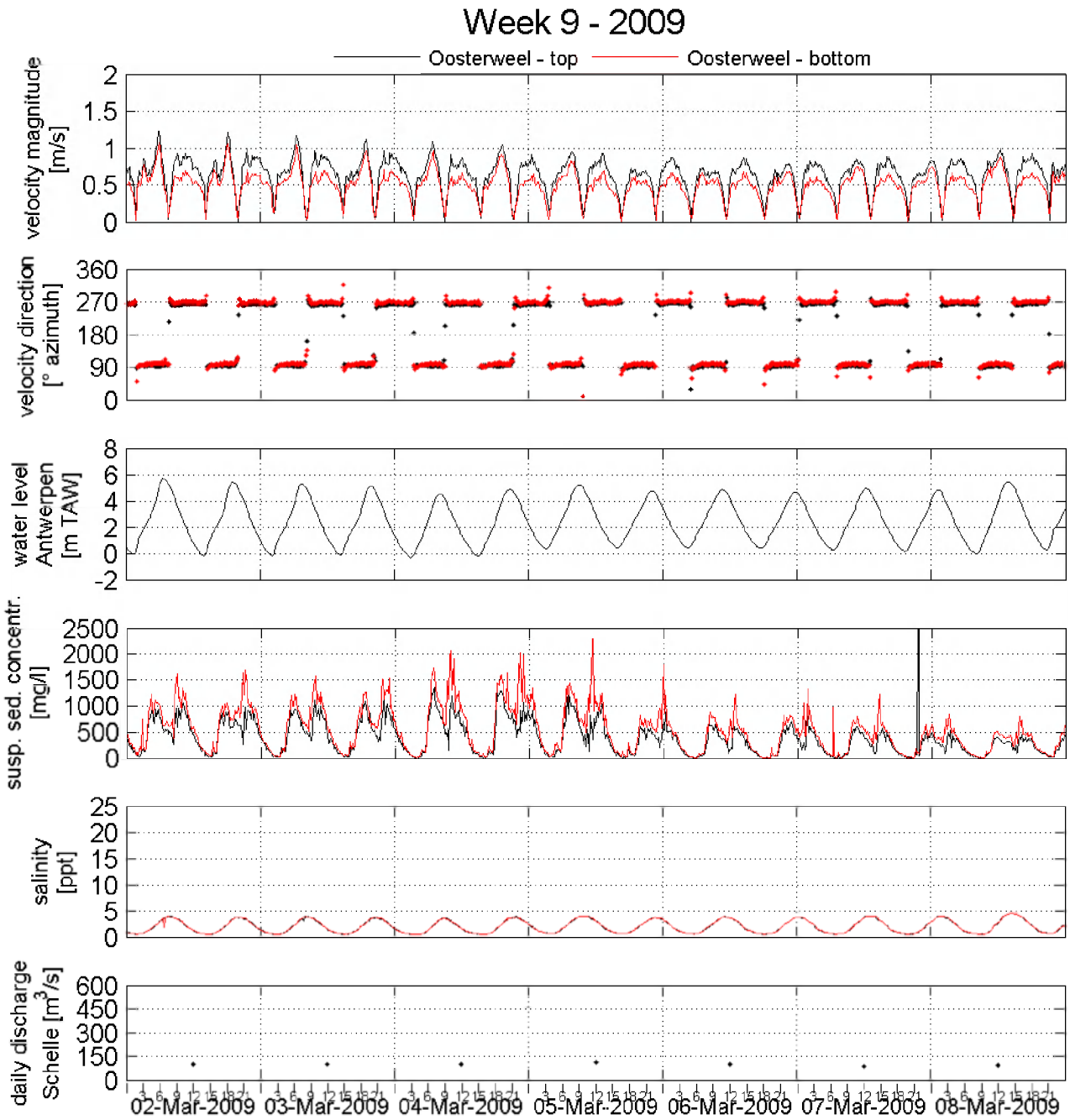
Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

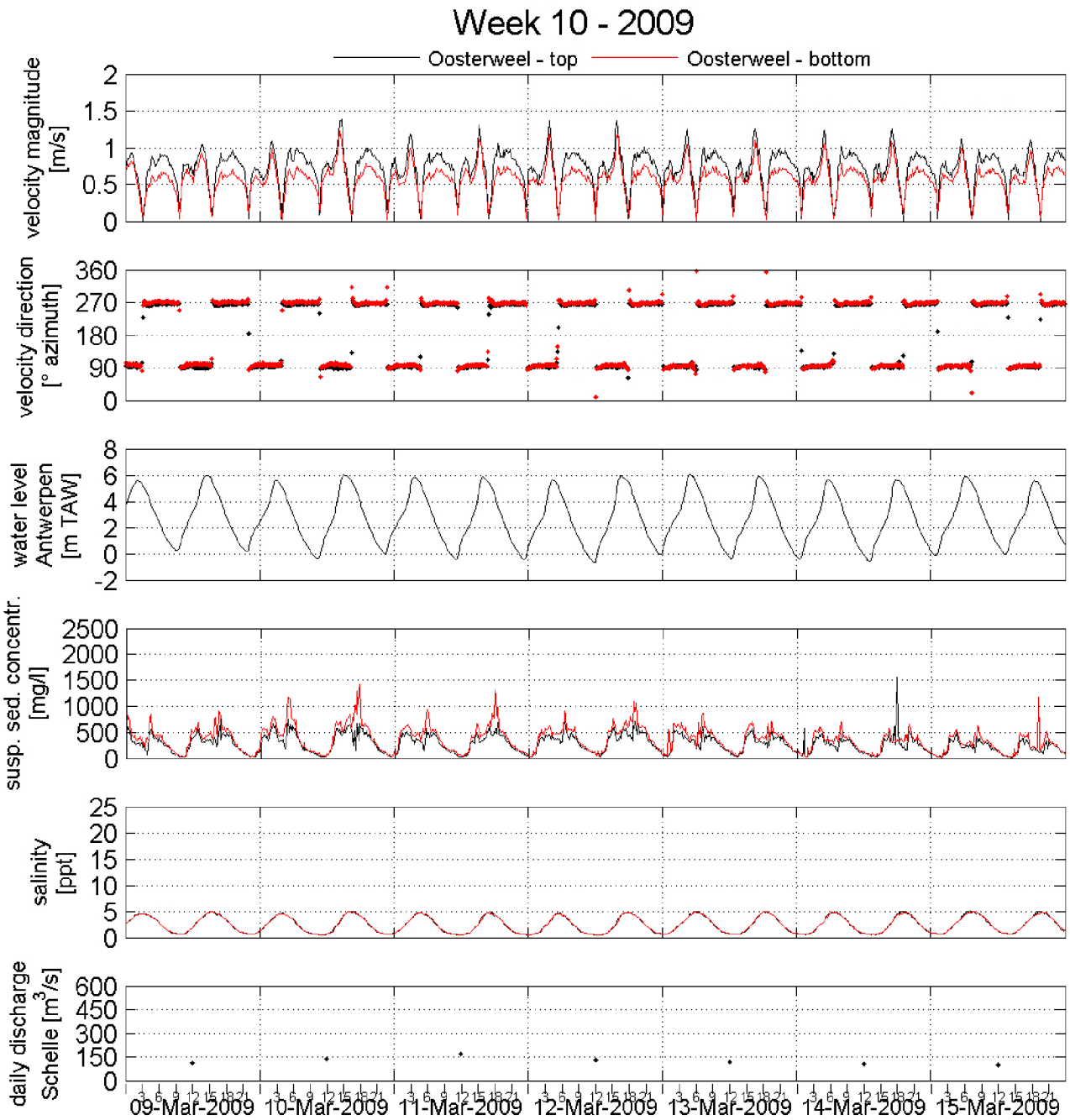
Oosterweel (top & bottom)

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Oosterweel (top & bottom)

Processed by:

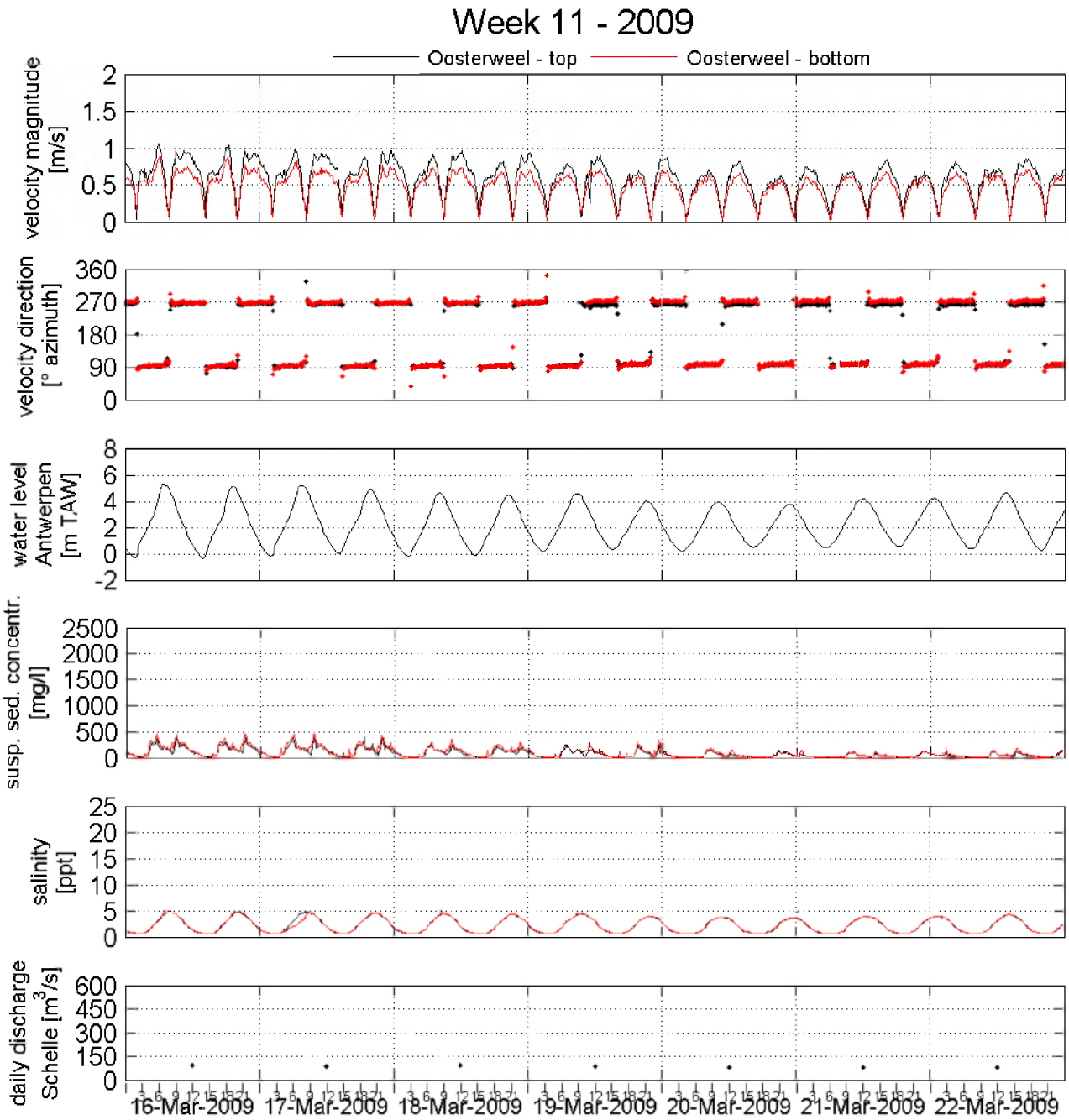
IMDC International Marine & Dredging Consultants

In Association with:

WL | delft hydraulics

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

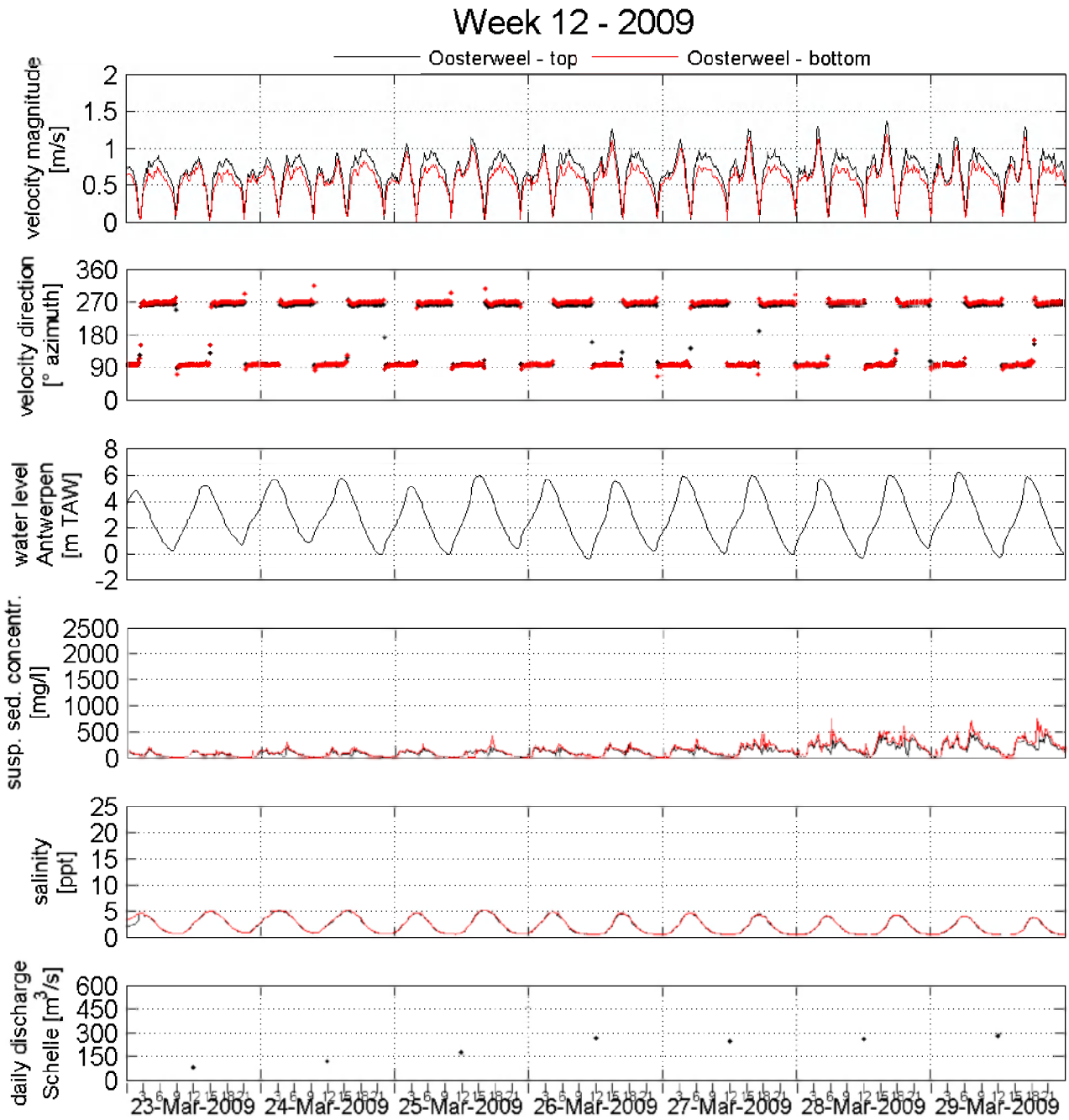
Oosterweel (top & bottom)

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

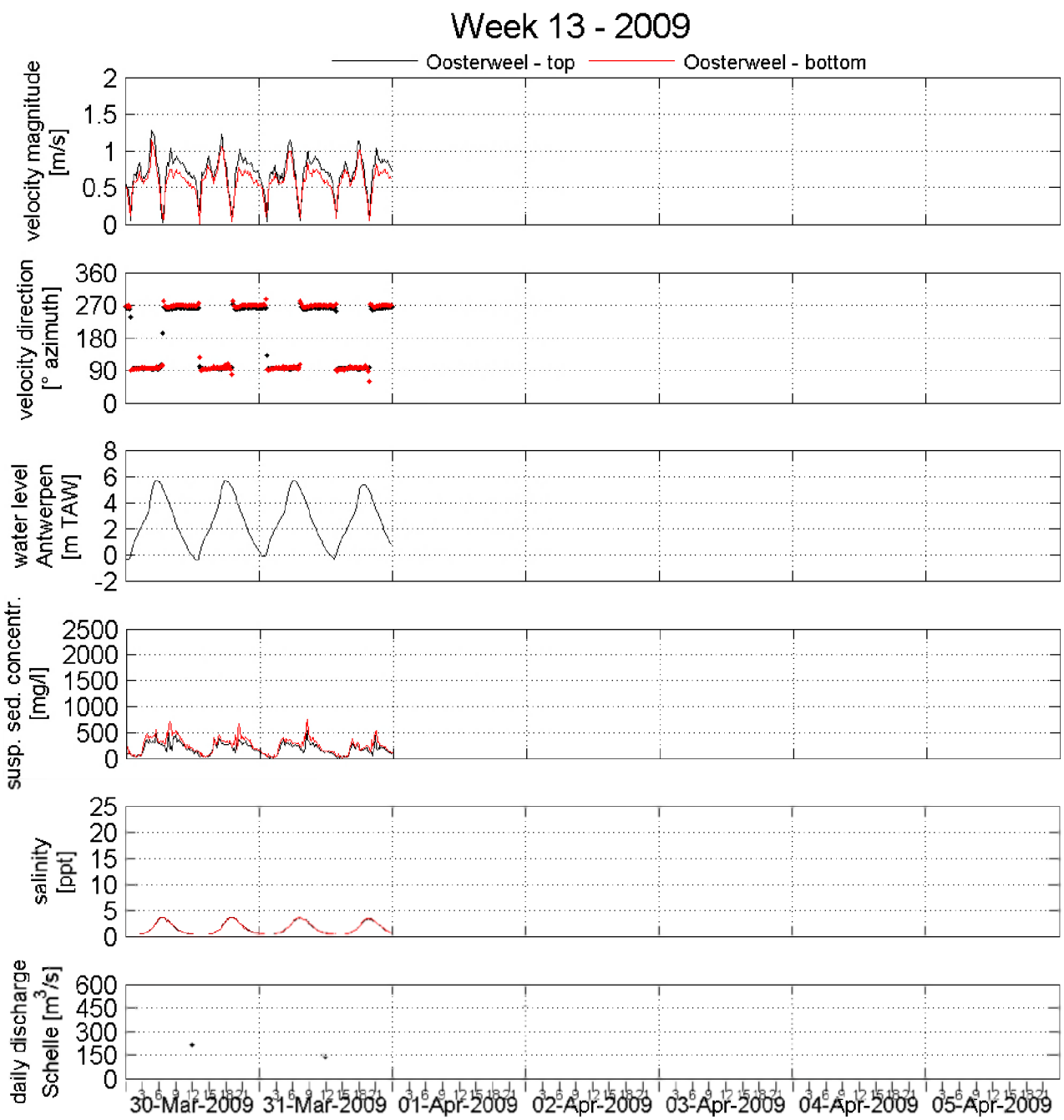
Oosterweel (top & bottom)

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Oosterweel (top & bottom)

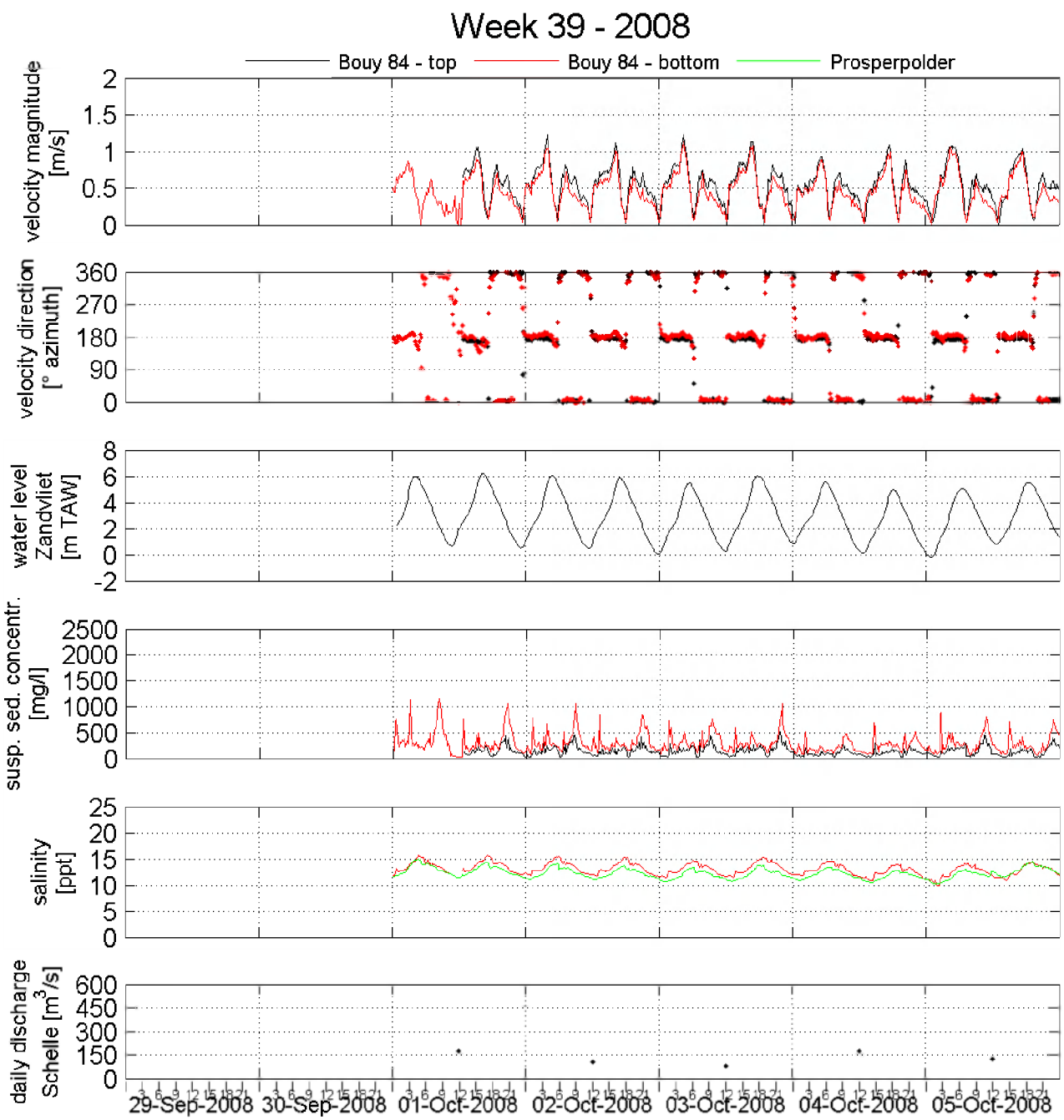
Processed by:

In Association with:

I/RA/11283/08.097/MSA

C.1.2. Buoy 84 and Prosperpolder

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

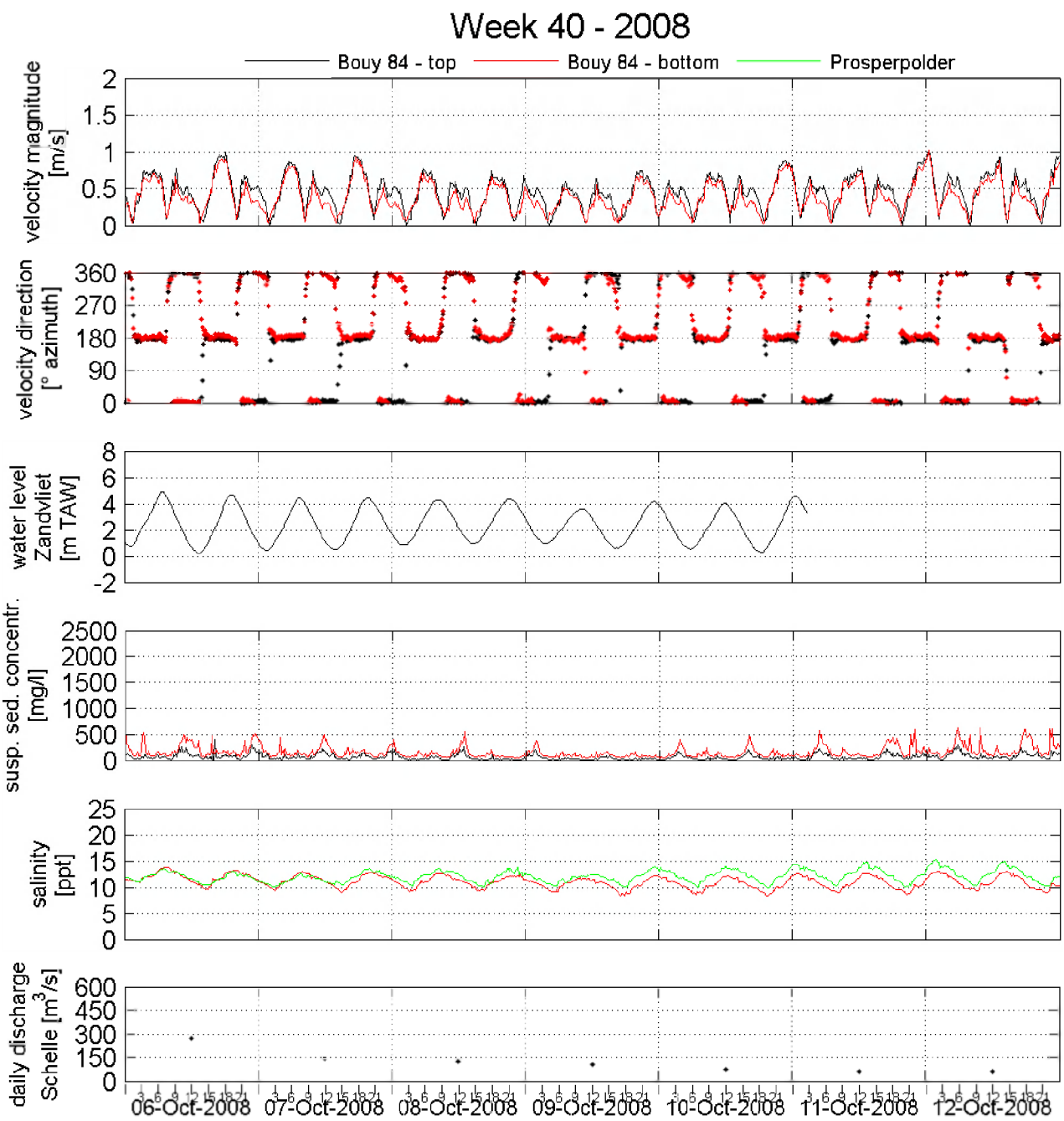
Bouy 84 (top & bottom) & Prosperpolder

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

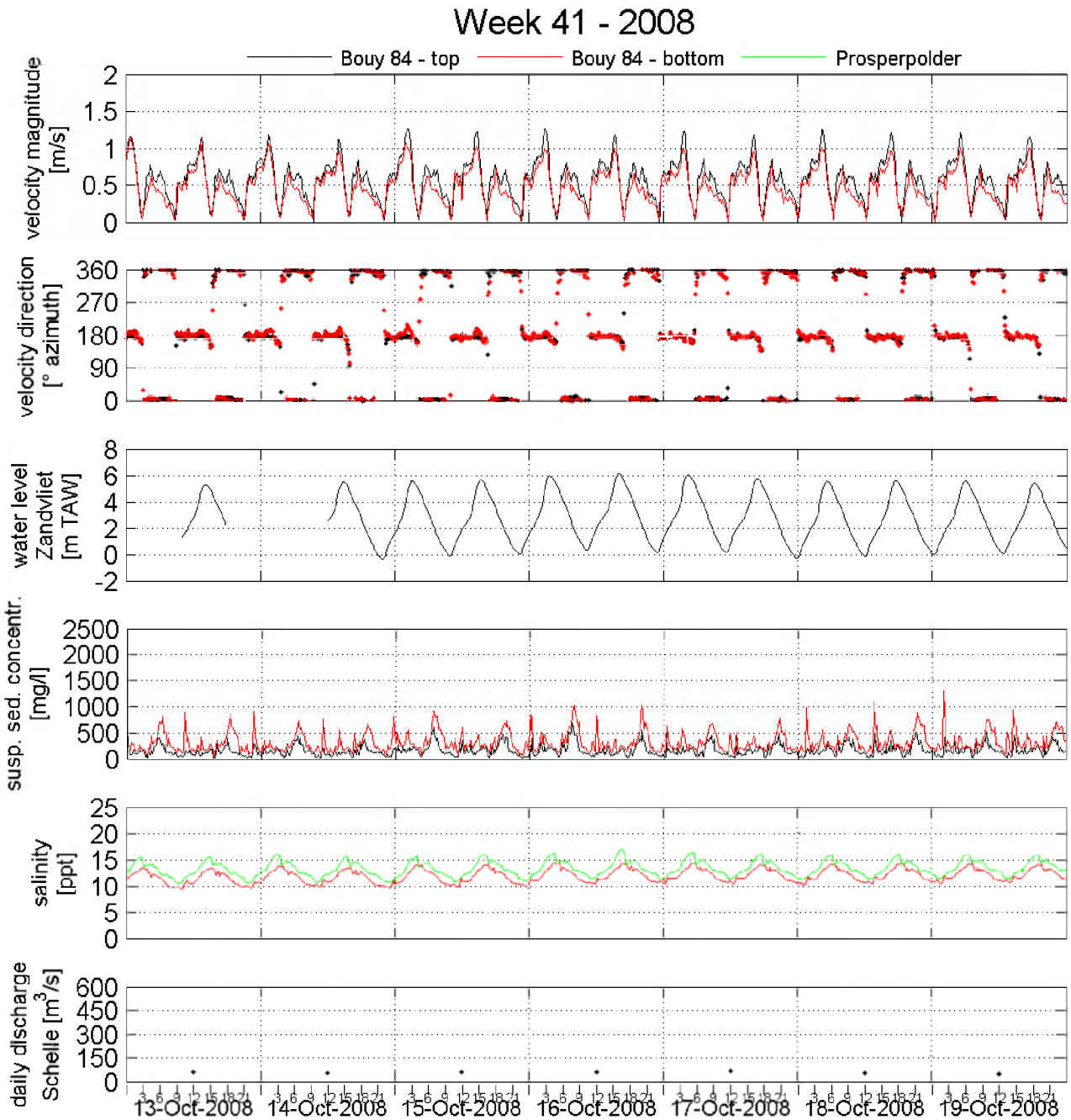
Bouy 84 (top & bottom) & Prosperpolder

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Bouy 84 (top & bottom) & Prosperpolder

Processed by:

In Association with:

I/RA/11283/08.097/MSA

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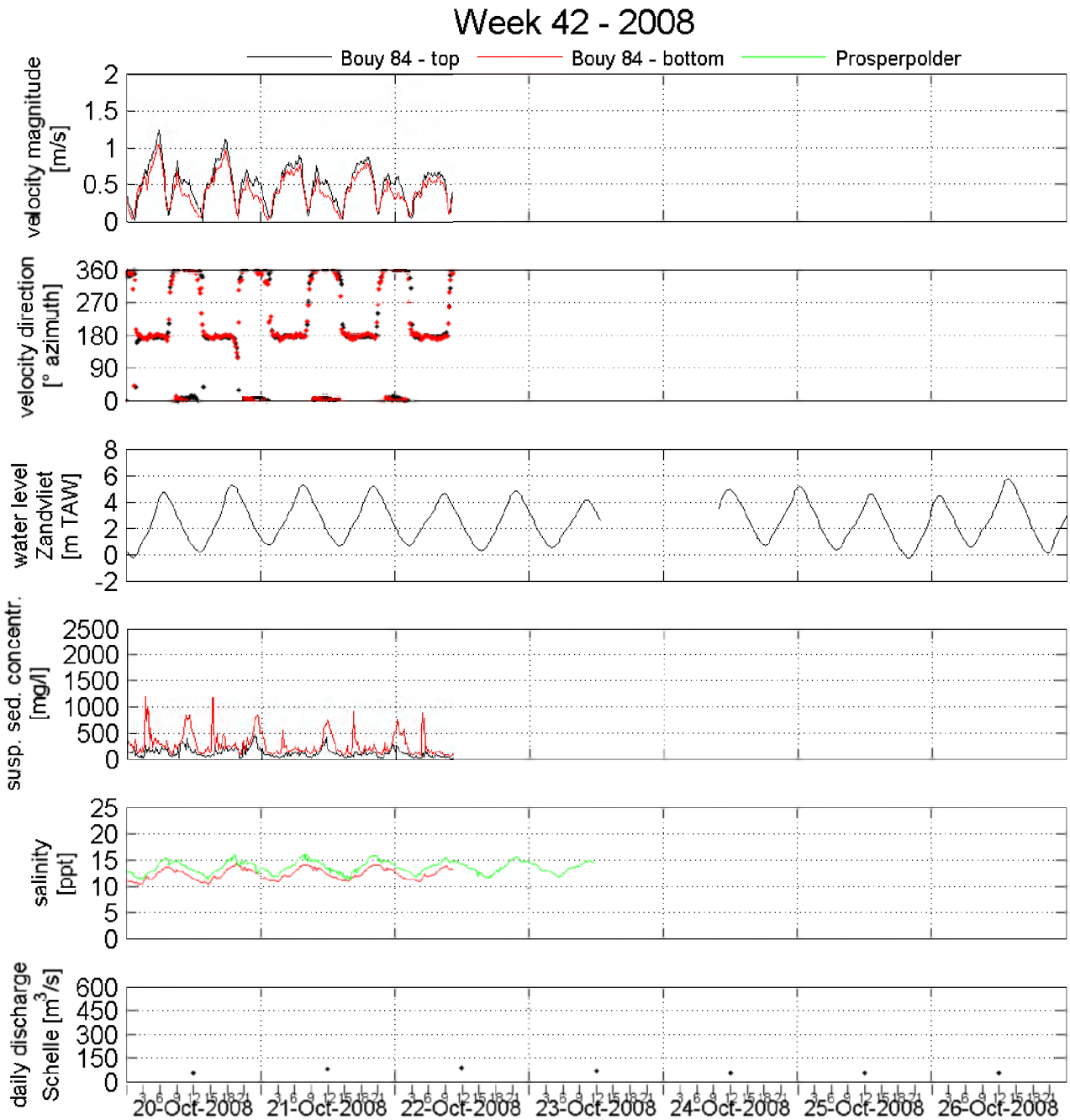


Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

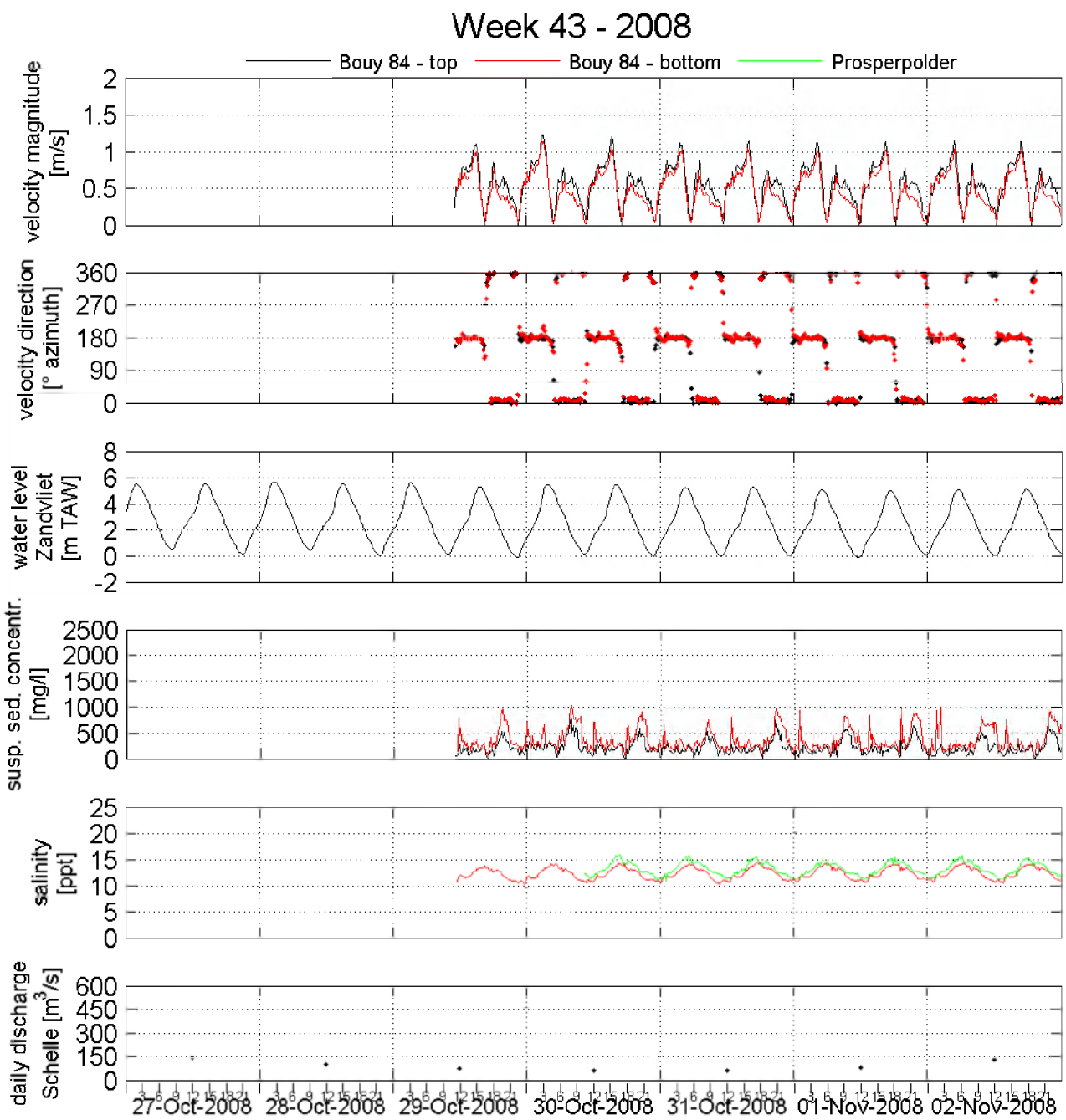
Bouy 84 (top & bottom) & Prosperpolder

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Bouy 84 (top & bottom) & Prosperpolder

Processed by:

In Association with:

I/RA/11283/08.097/MSA

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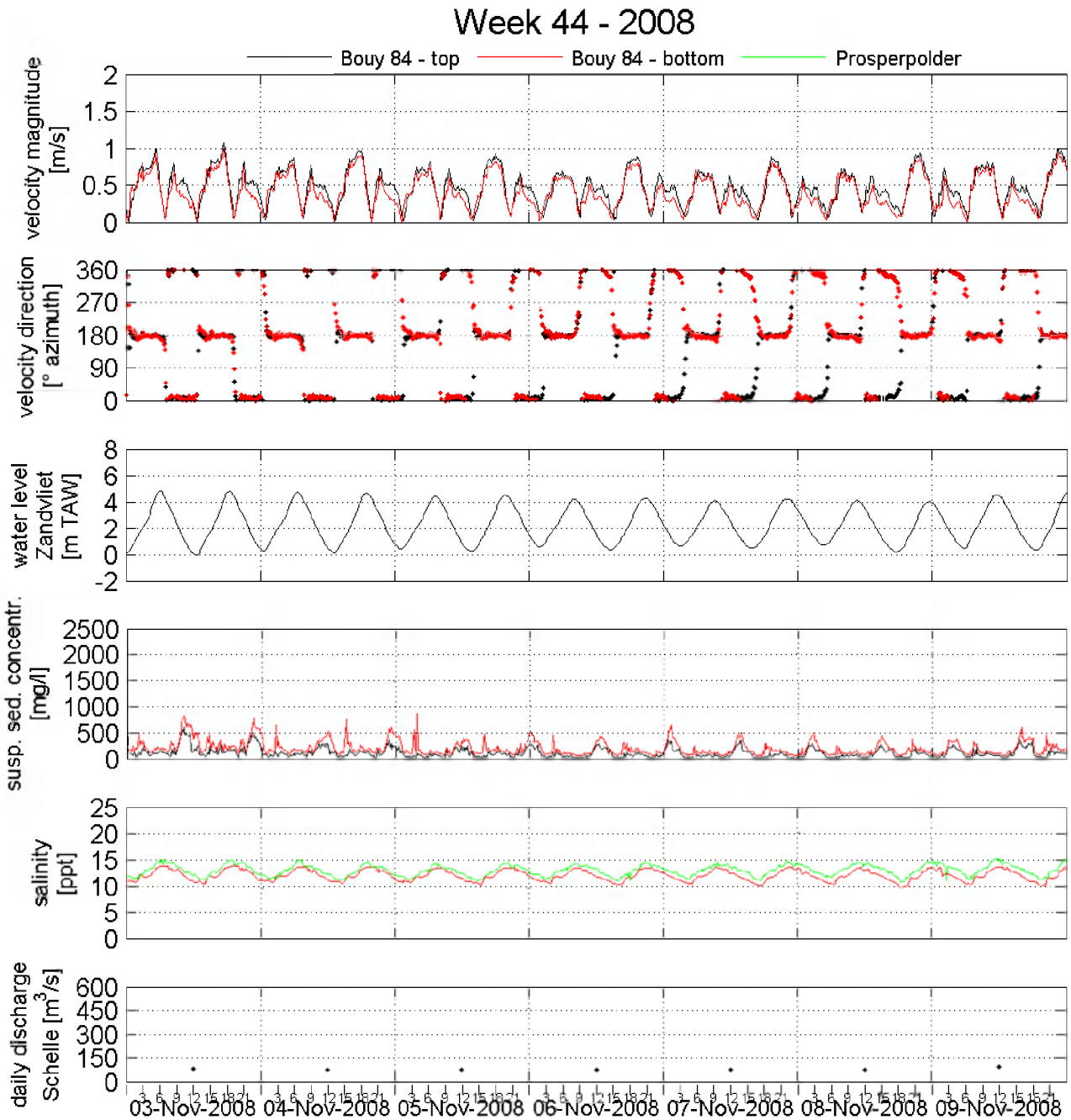


Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

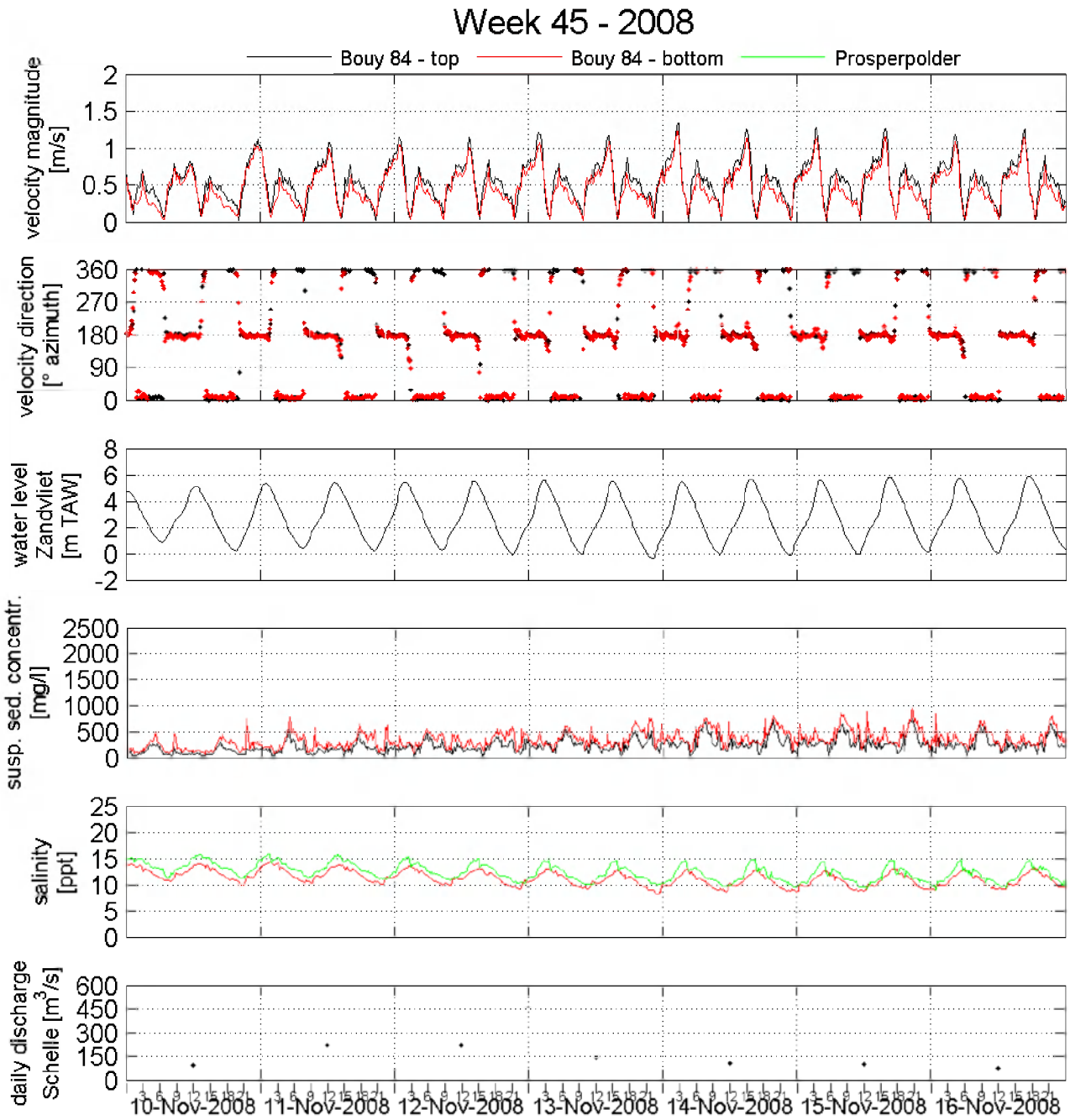
Bouy 84 (top & bottom) & Prosperpolder

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

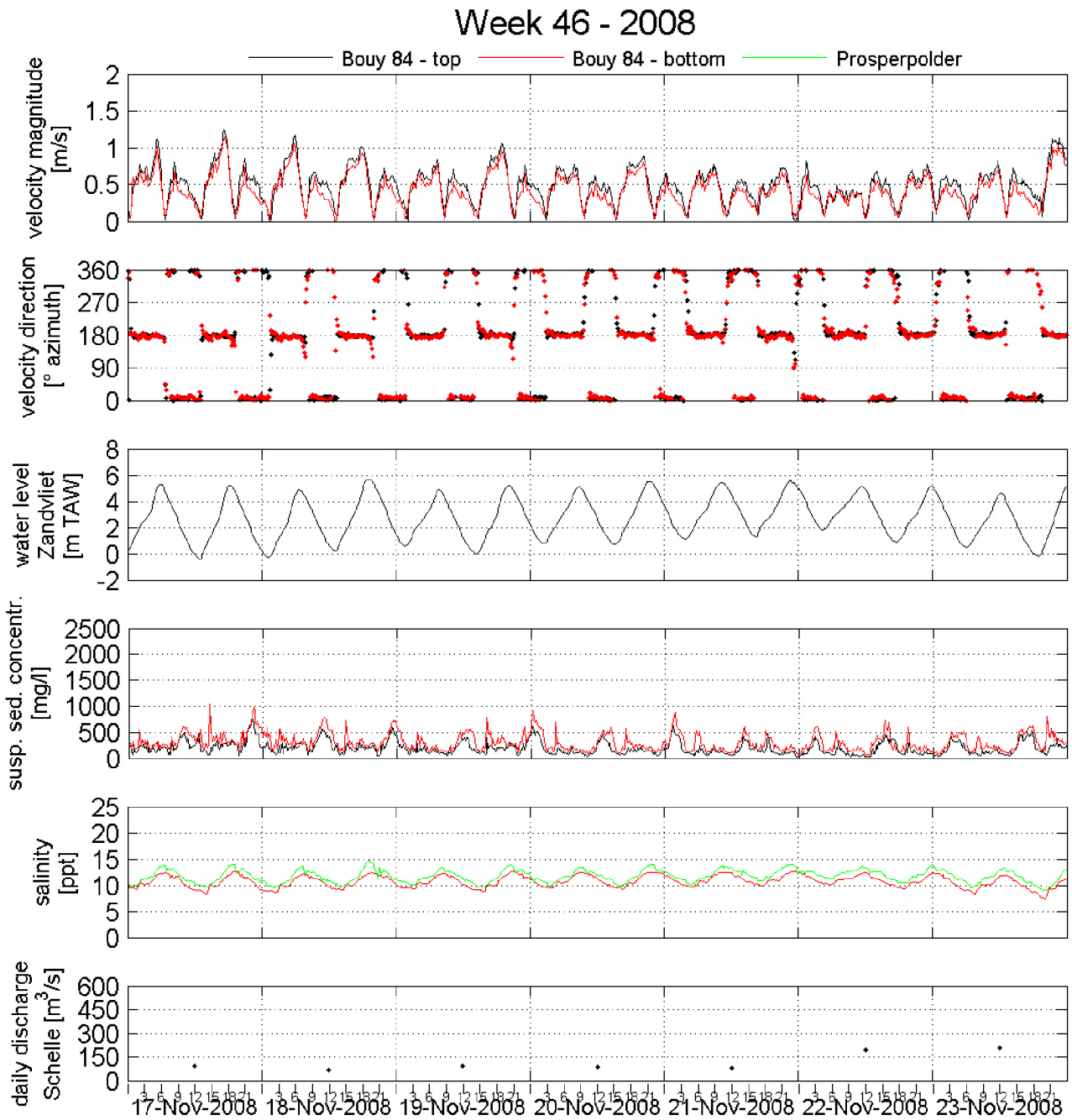
Bouy 84 (top & bottom) & Prosperpolder

Processed by: IMDC International Marine & Dredging Consultants

In Association with: WL | delft hydraulics

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Bouy 84 (top & bottom) & Prosperpolder

Processed by: IMDC International Marine & Dredging Consultants

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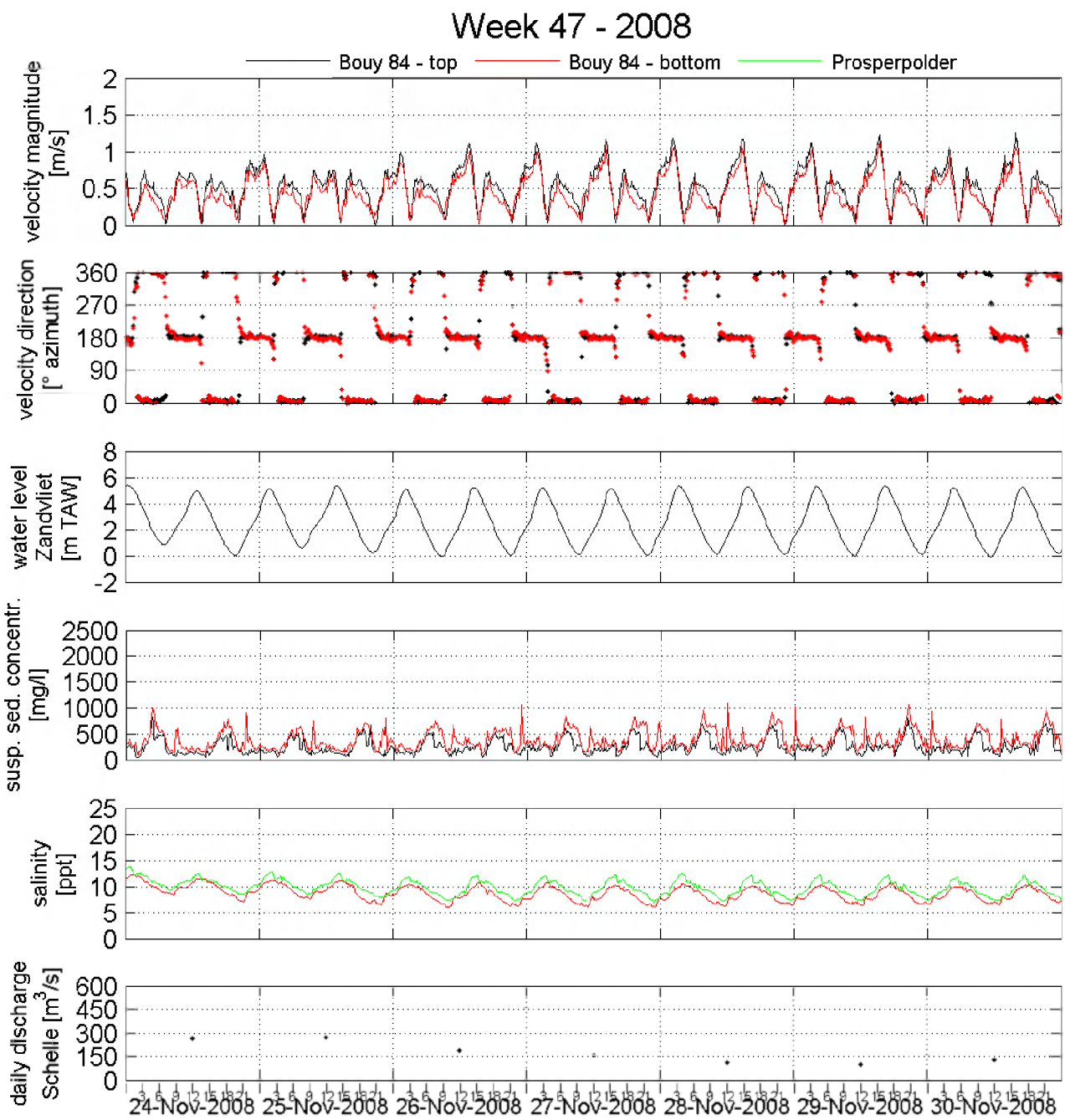

Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Bouy 84 (top & bottom) & Prosperpolder

Processed by:

In Association with:

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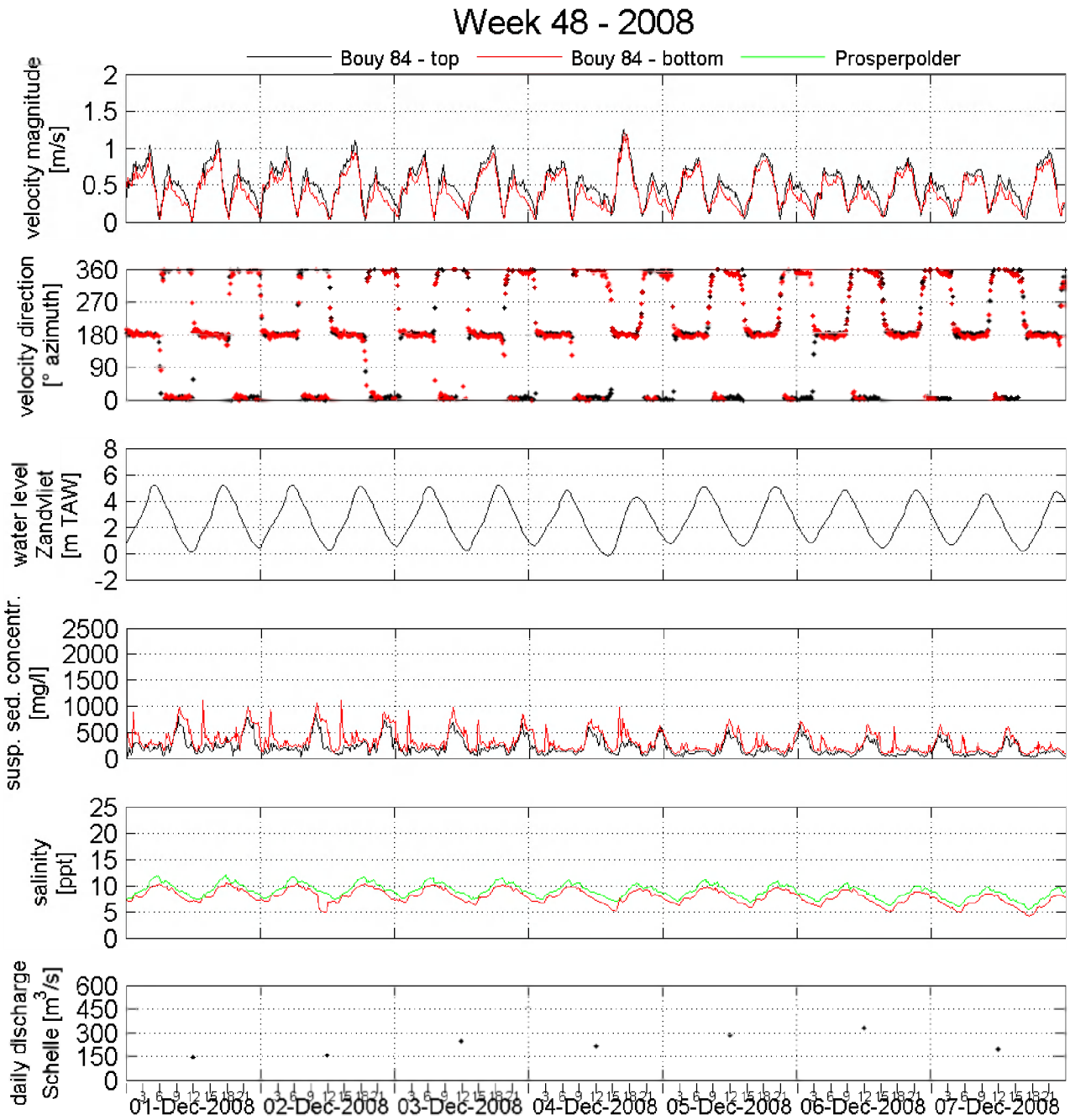
Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Bouy 84 (top & bottom) & Prosperpolder

Processed by:

In Association with:

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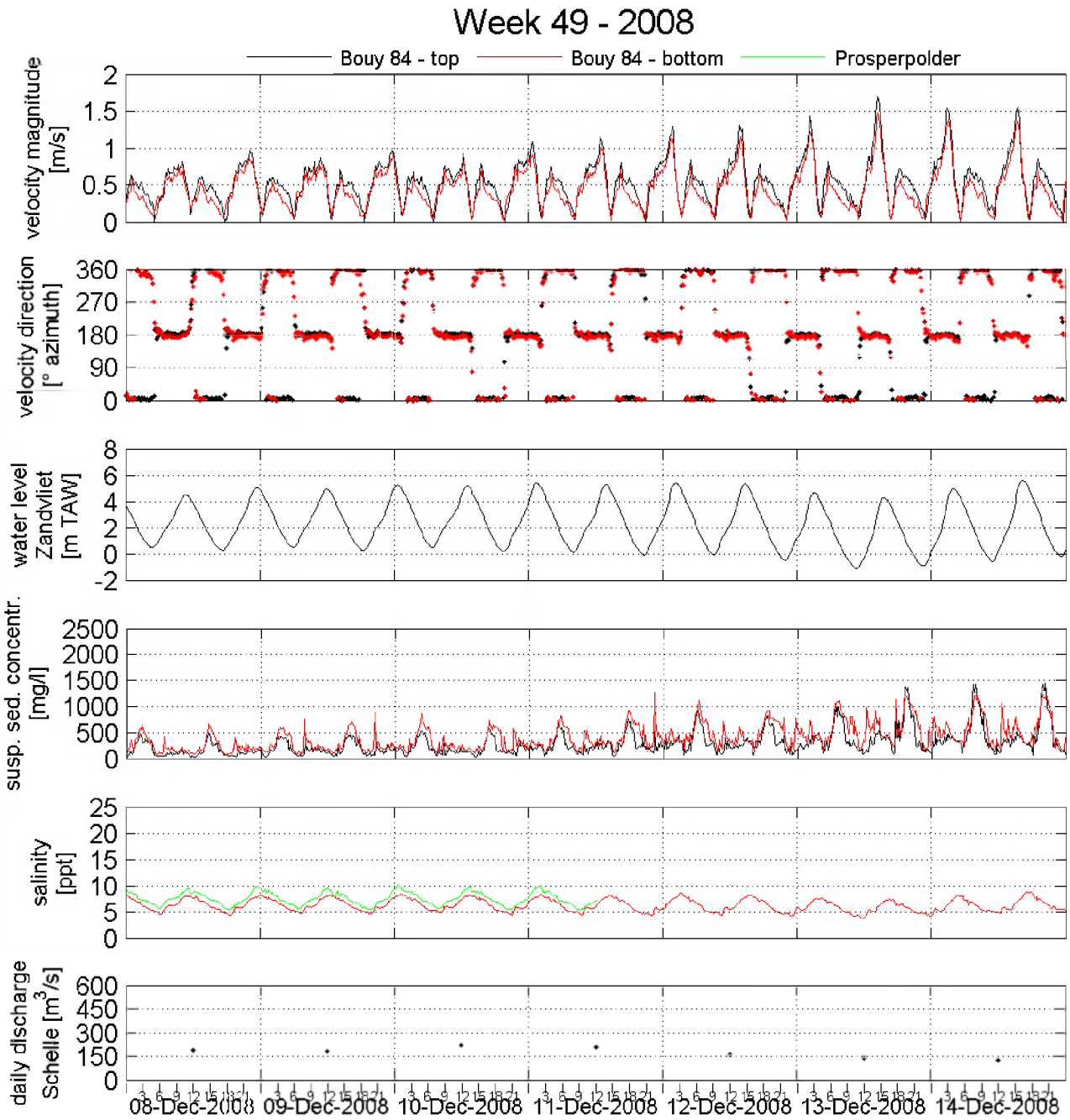

Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Bouy 84 (top & bottom) & Prosperpolder

Processed by:

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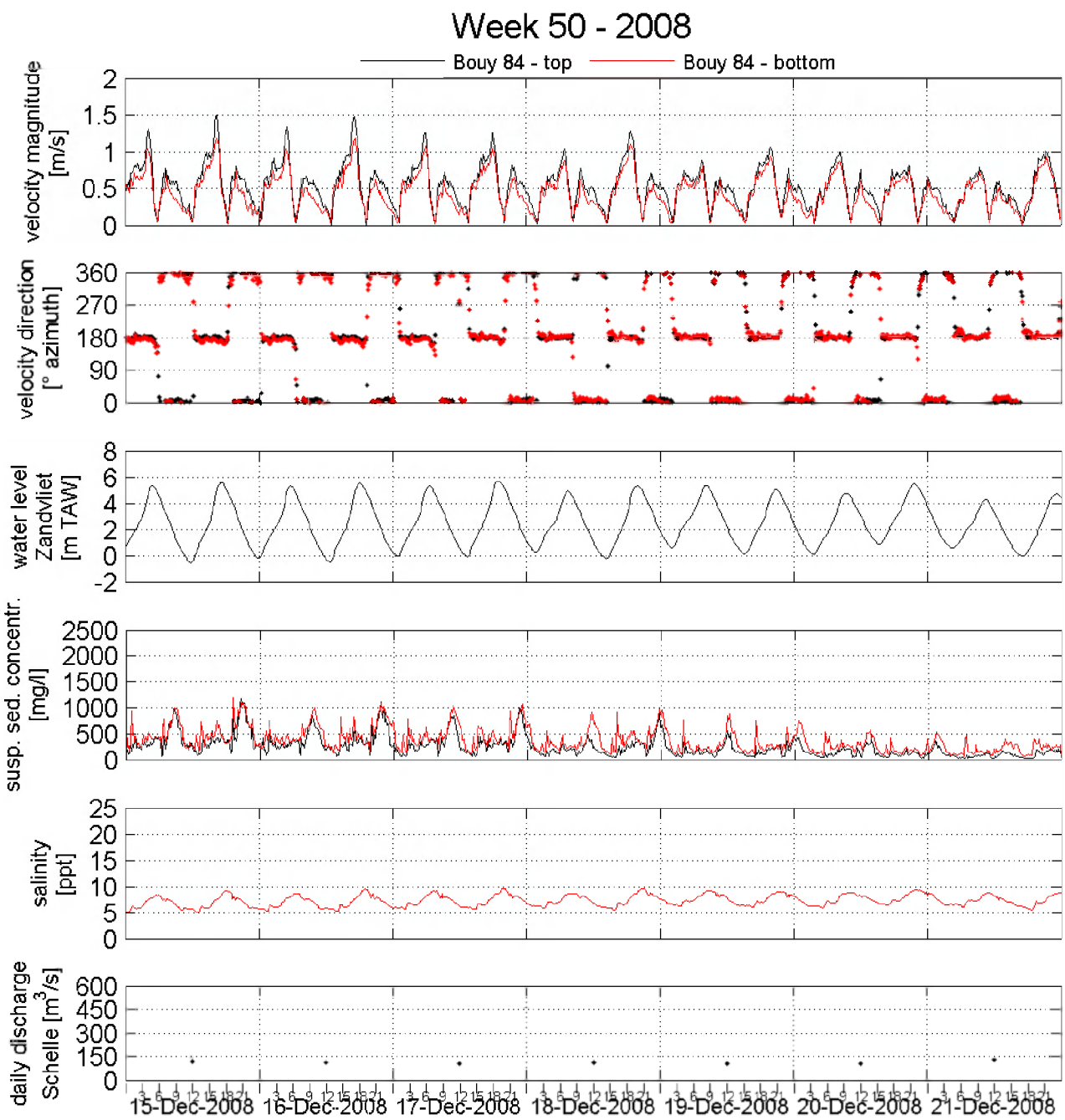

Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Bouy 84 (top & bottom) & Prosperpolder

Processed by: IMDC International Marine & Dredging Consultants

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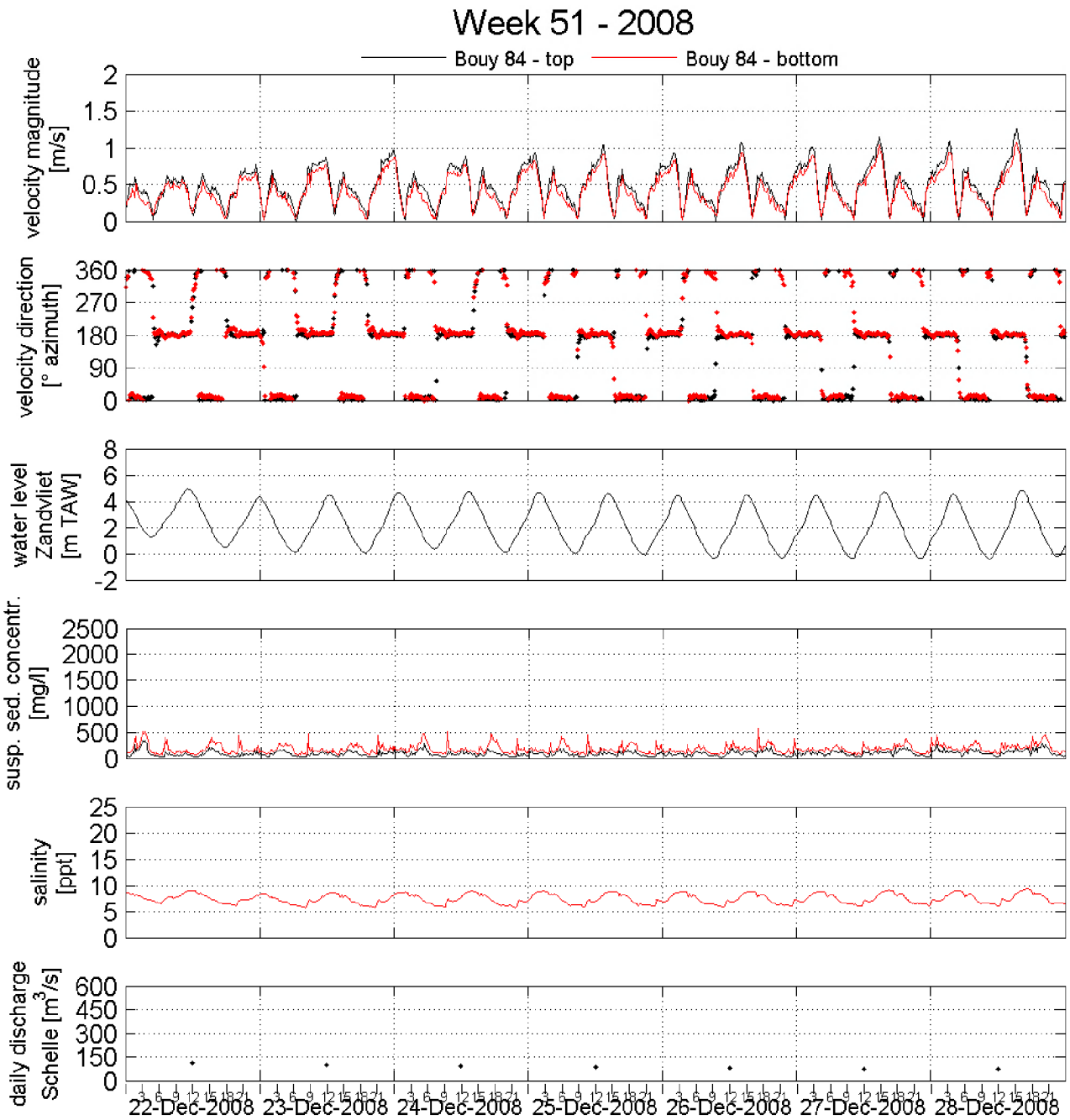

Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Bouy 84 (top & bottom) & Prosperpolder

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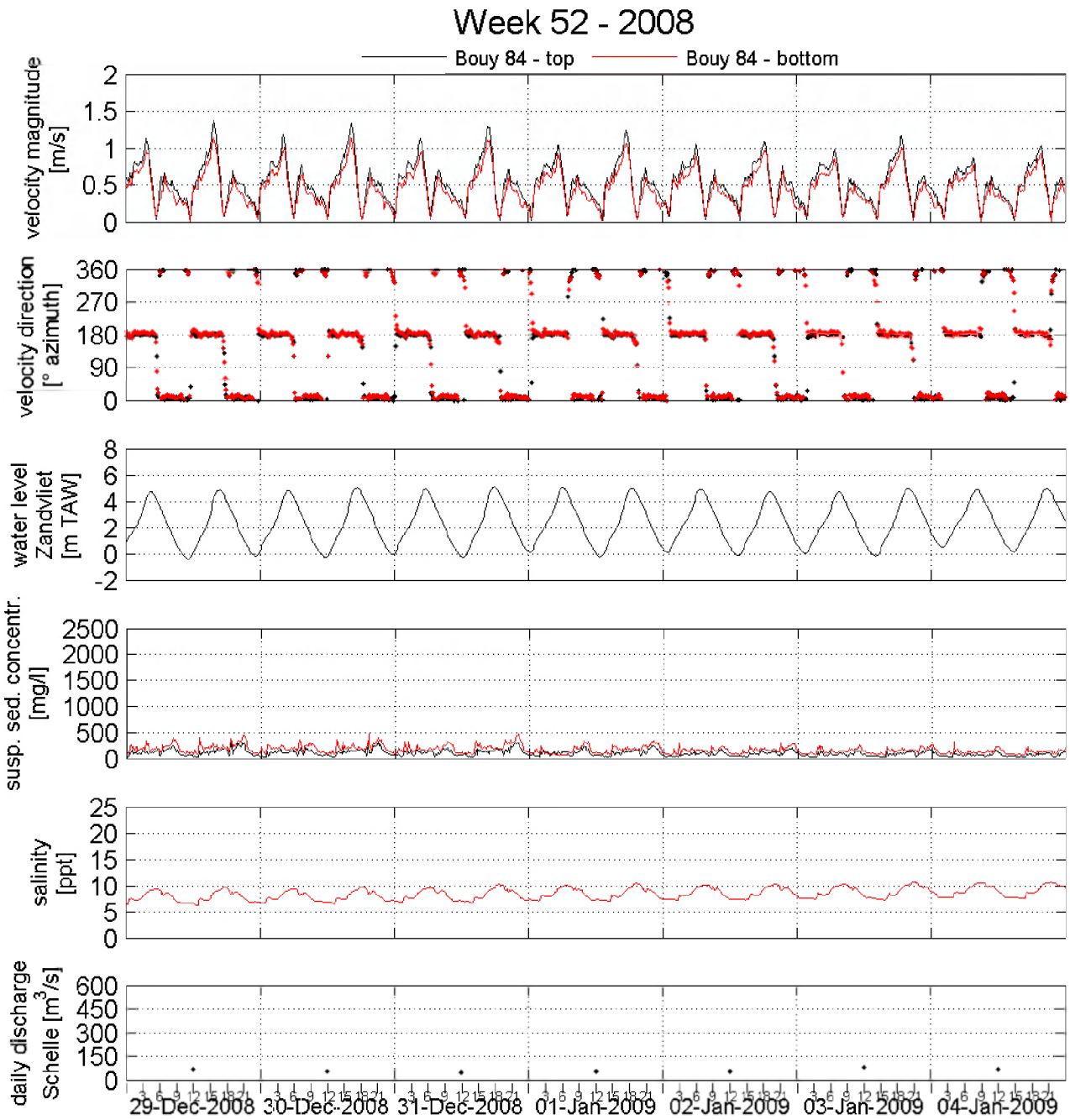

Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Bouy 84 (top & bottom) & Prosperpolder

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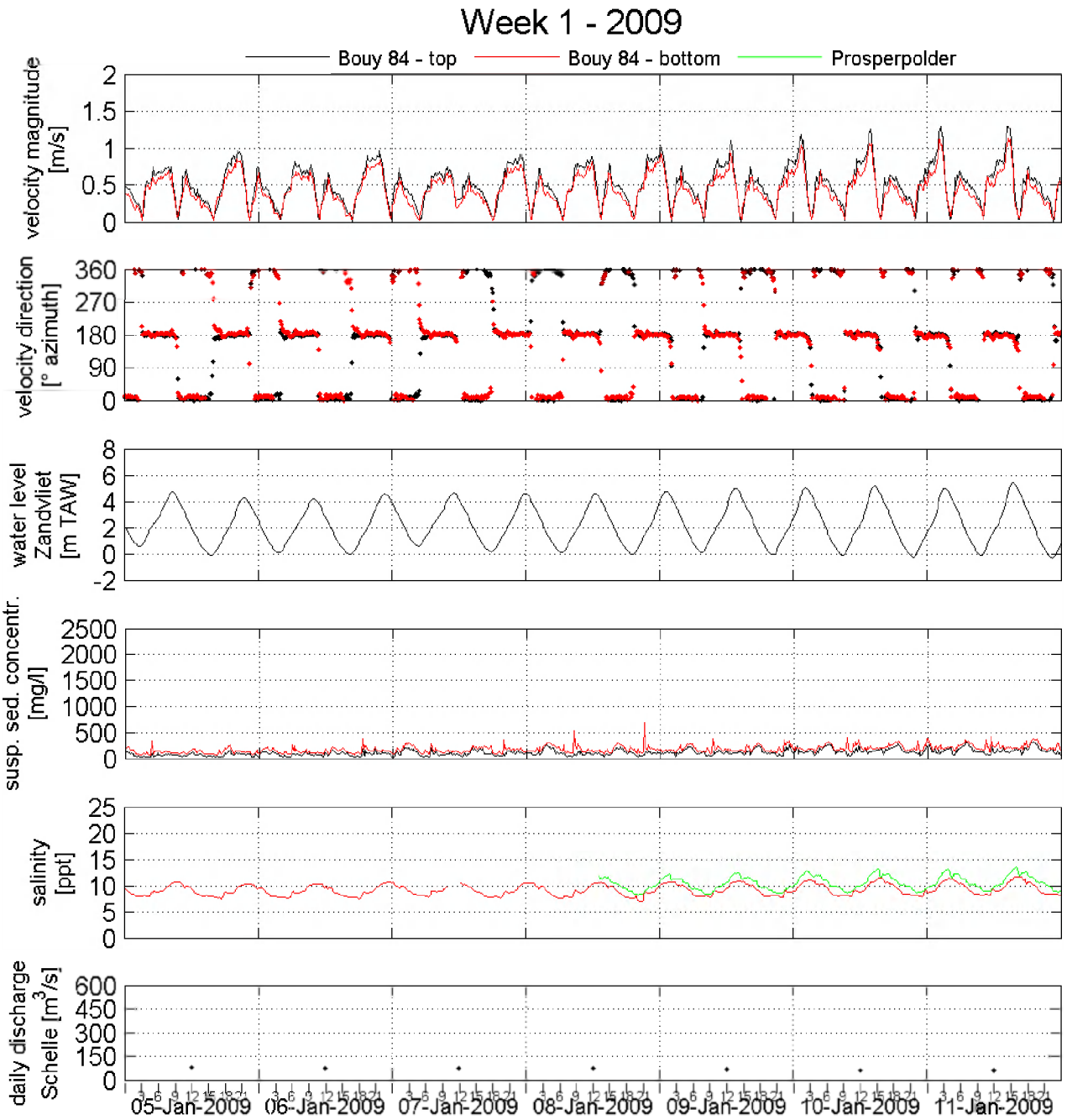

Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Bouy 84 (top & bottom) & Prosperpolder

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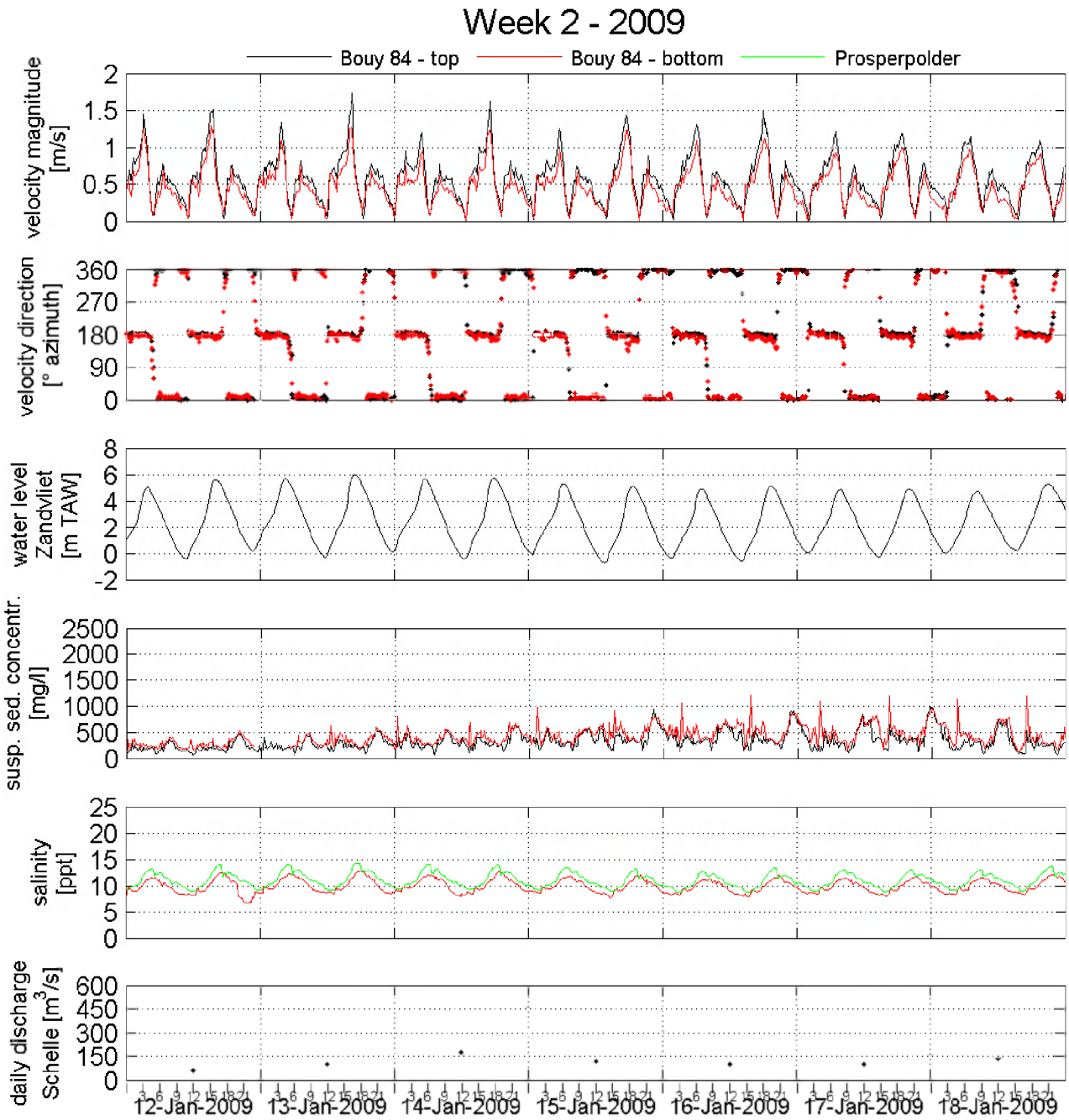

Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Bouy 84 (top & bottom) & Prosperpolder

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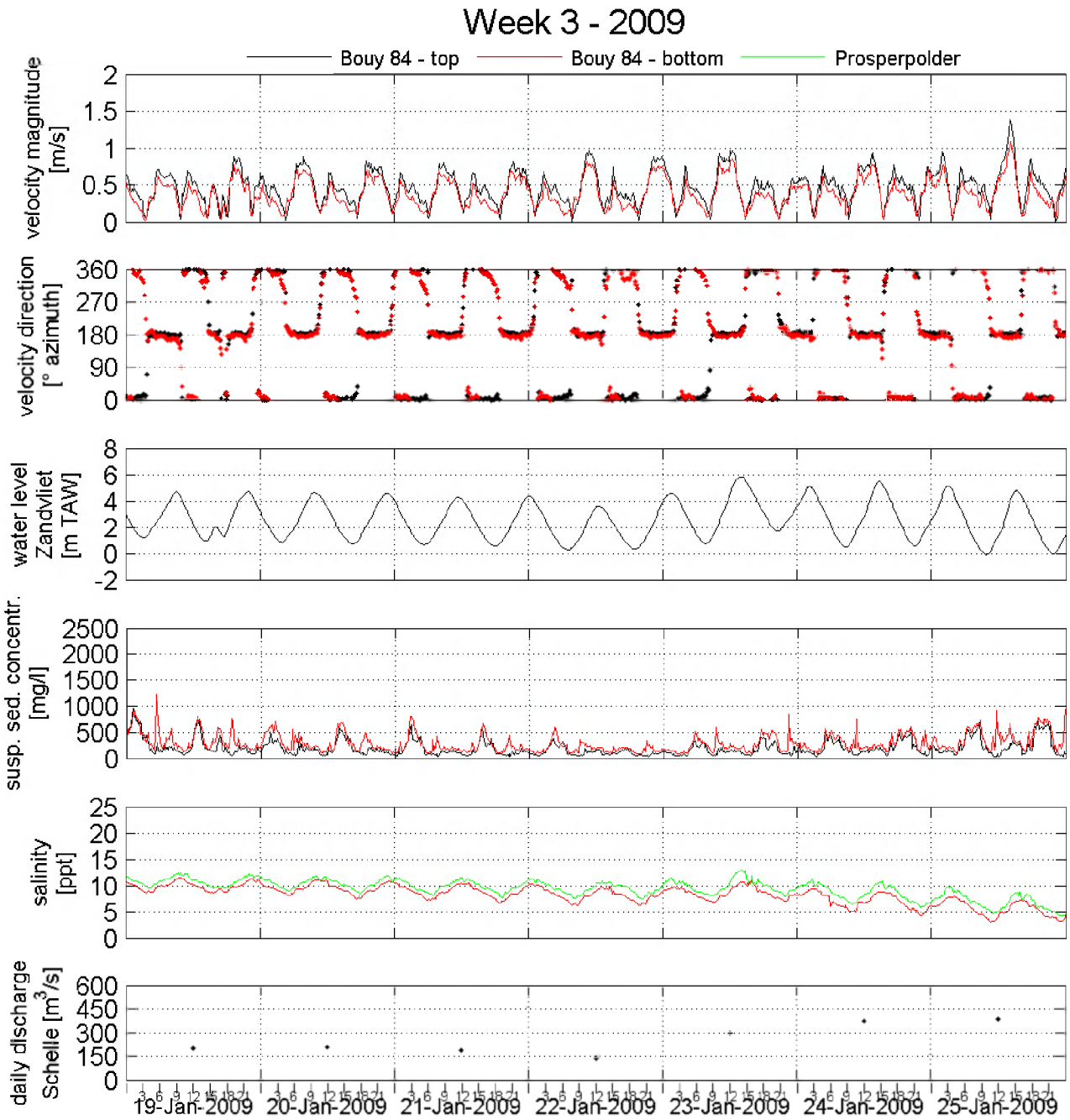


Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

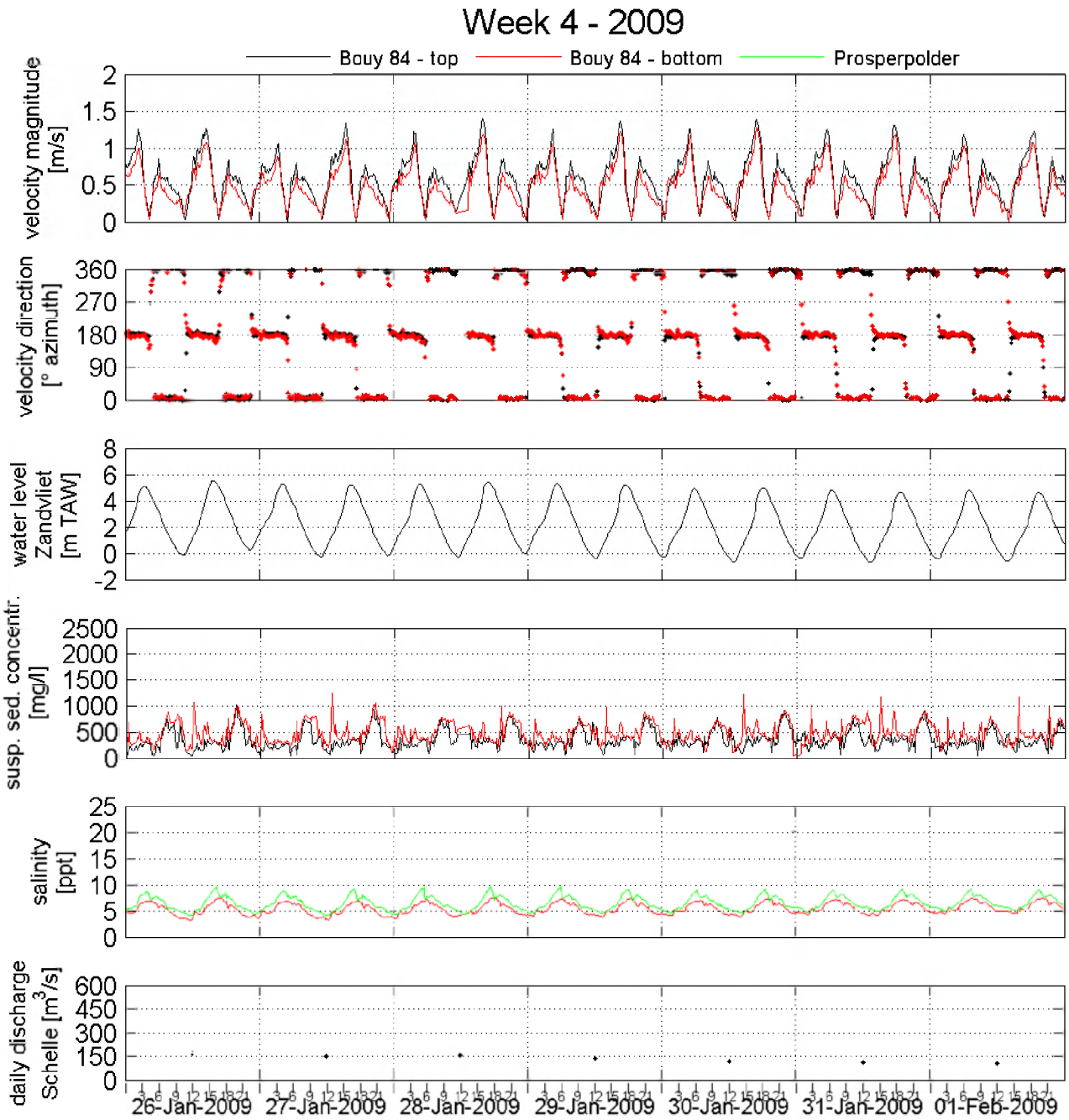
Bouy 84 (top & bottom) & Prosperpolder

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

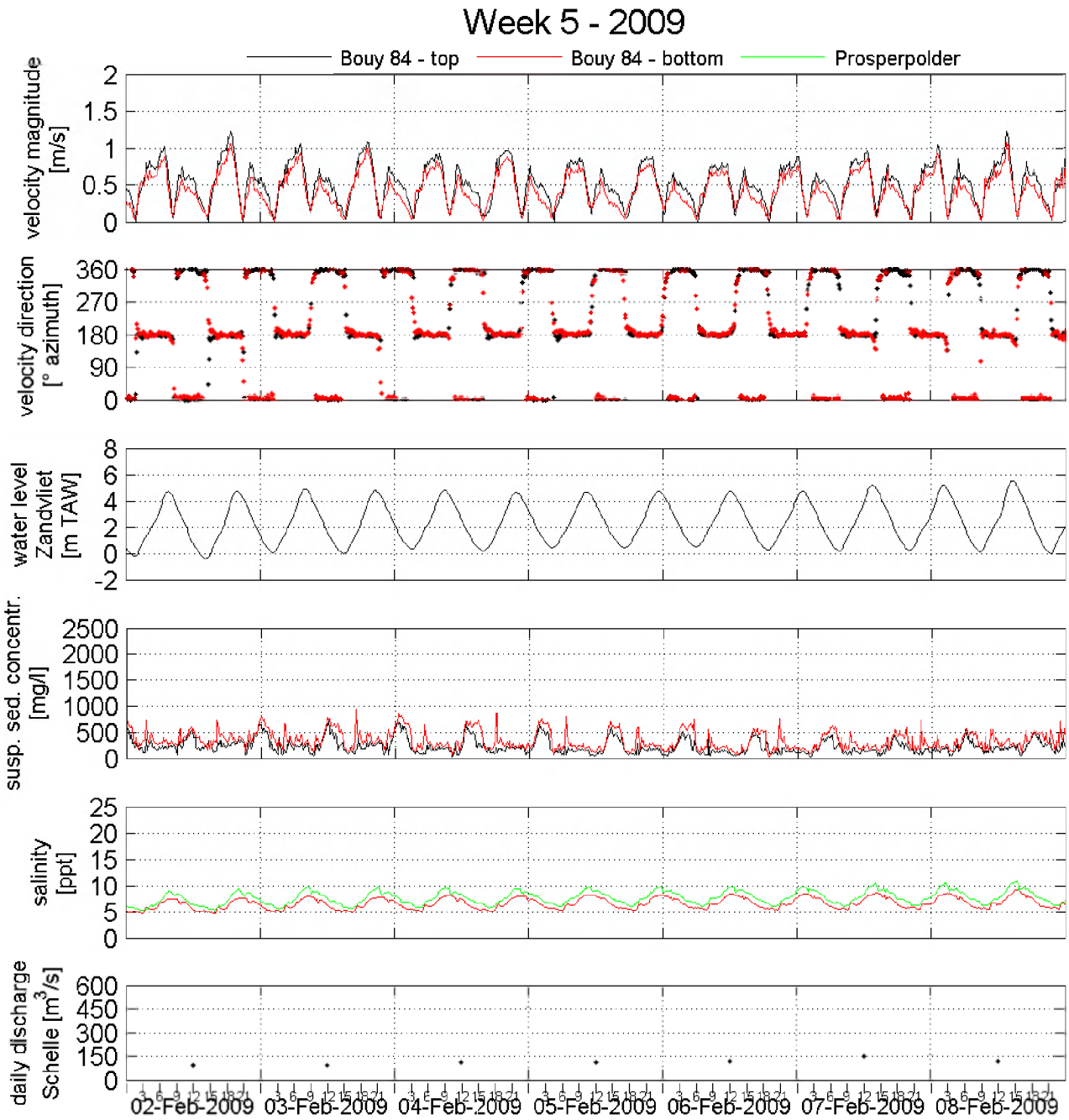
Bouy 84 (top & bottom) & Prosperpolder

Processed by: IMDC International Marine & Dredging Consultants

In Association with: WL | delft hydraulics

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

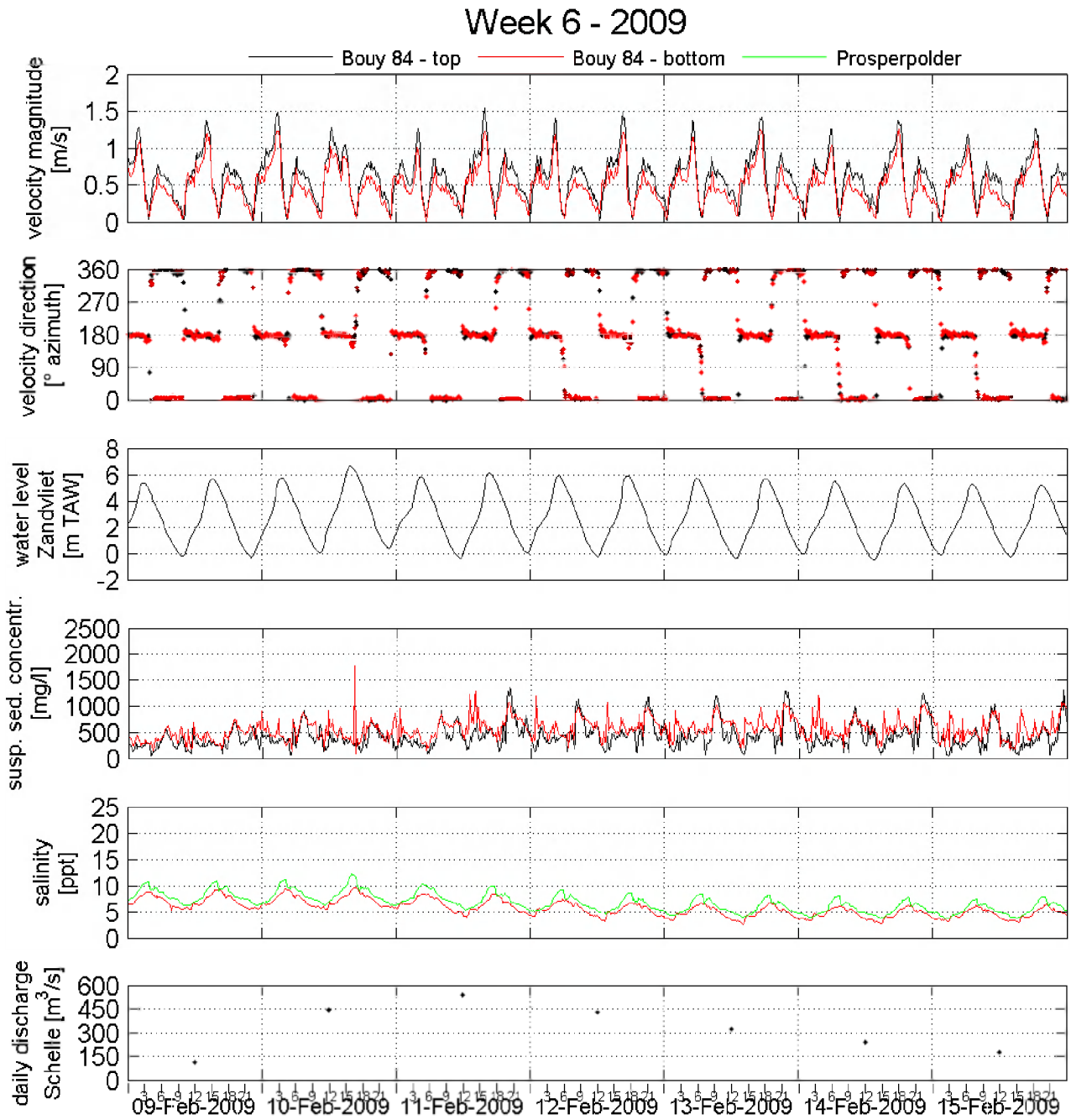
Bouy 84 (top & bottom) & Prosperpolder

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

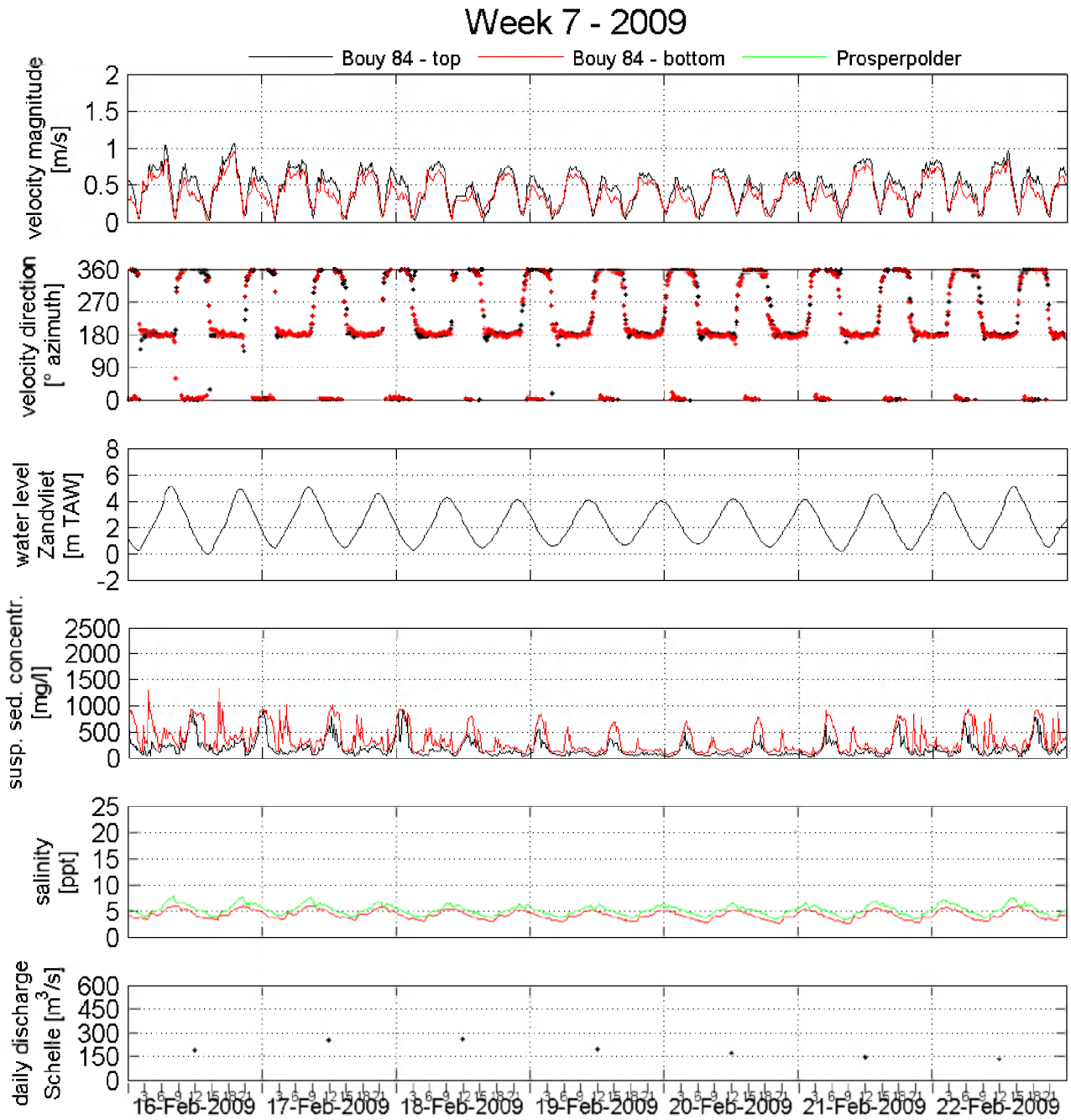
Bouy 84 (top & bottom) & Prosperpolder

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

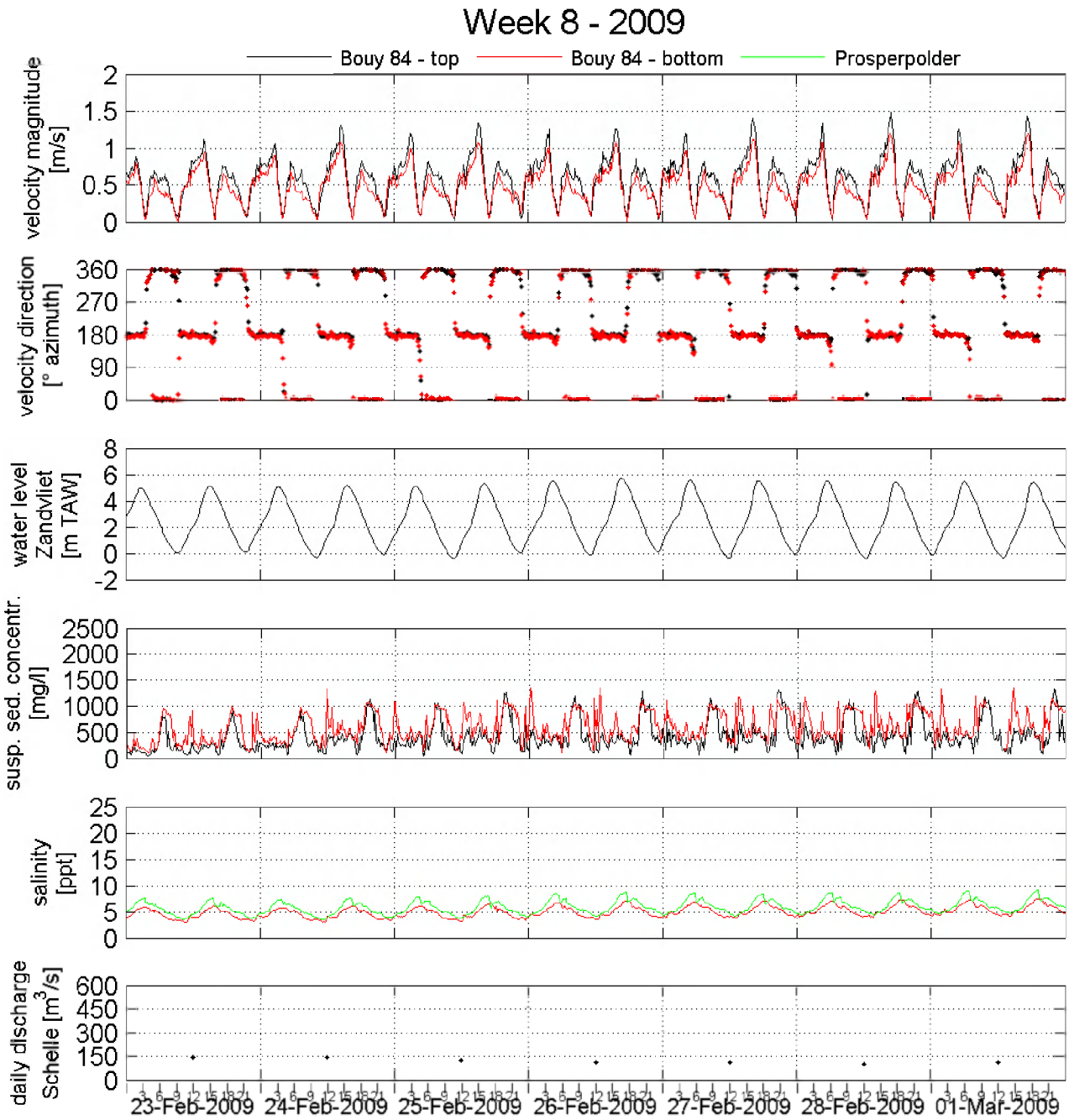
Bouy 84 (top & bottom) & Prosperpolder

Processed by: IMDC International Marine & Dredging Consultants

In Association with: WL | delft hydraulics

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

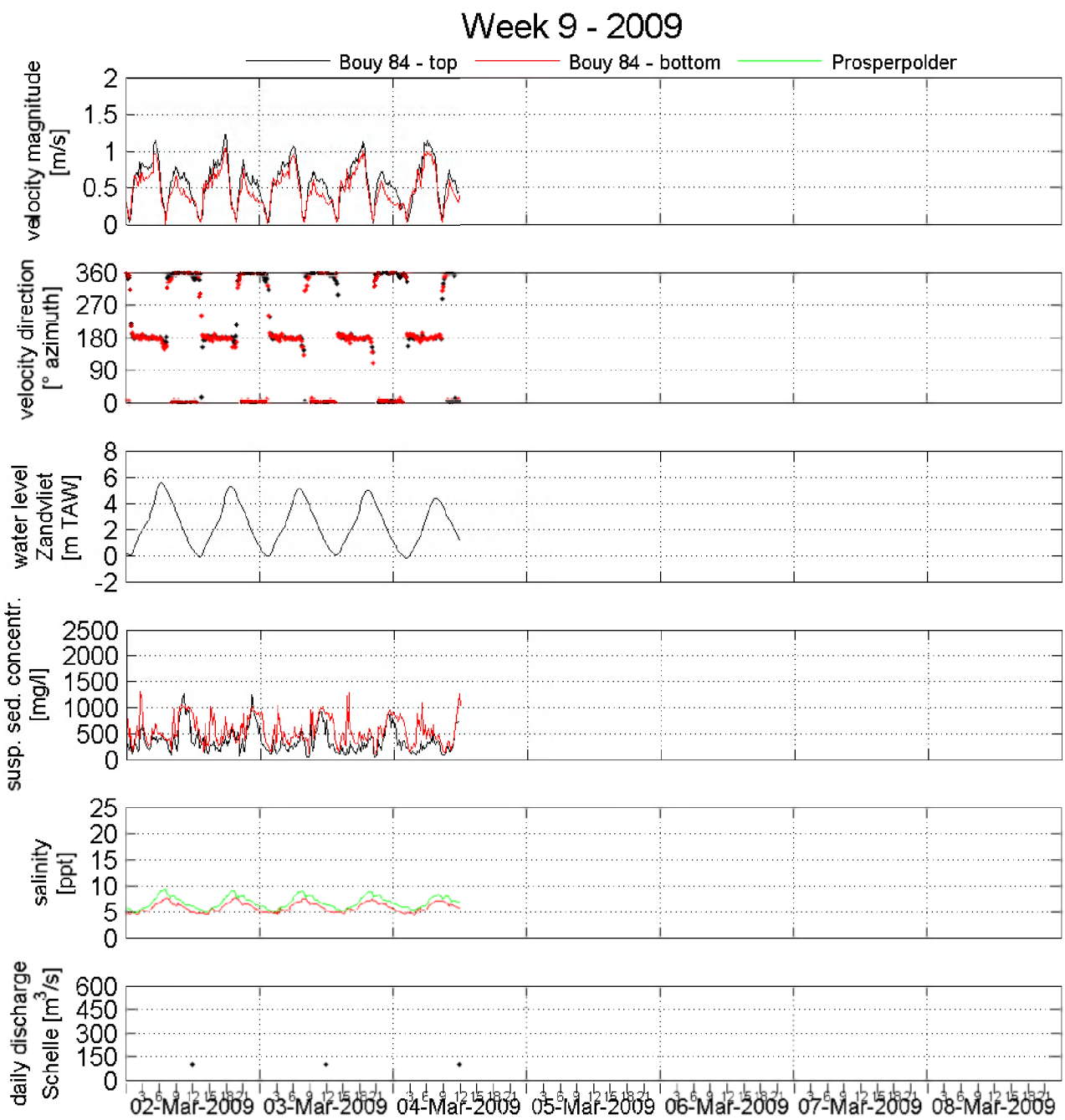
Bouy 84 (top & bottom) & Prosperpolder

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

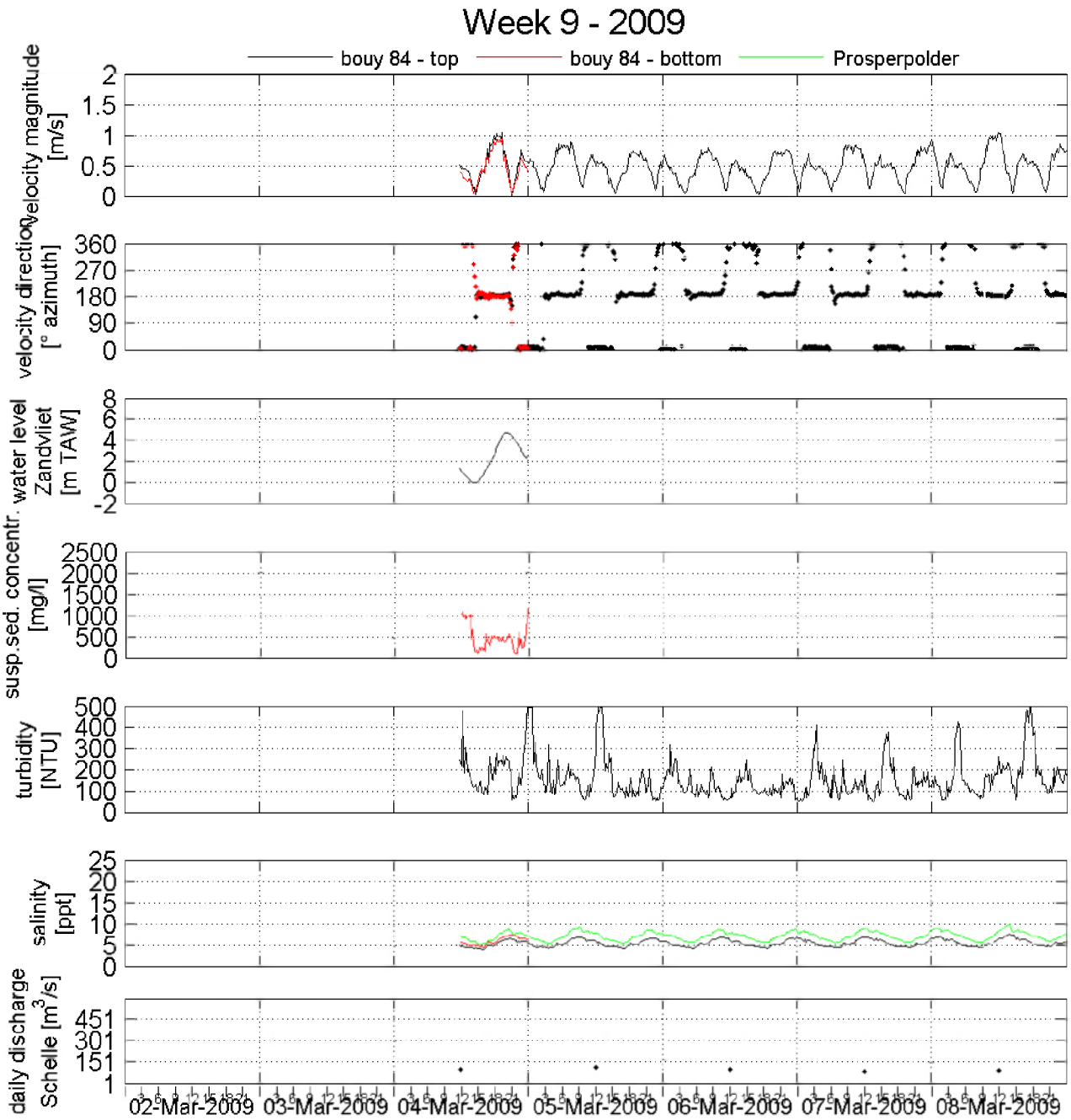
Bouy 84 (top & bottom) & Prosperpolder

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

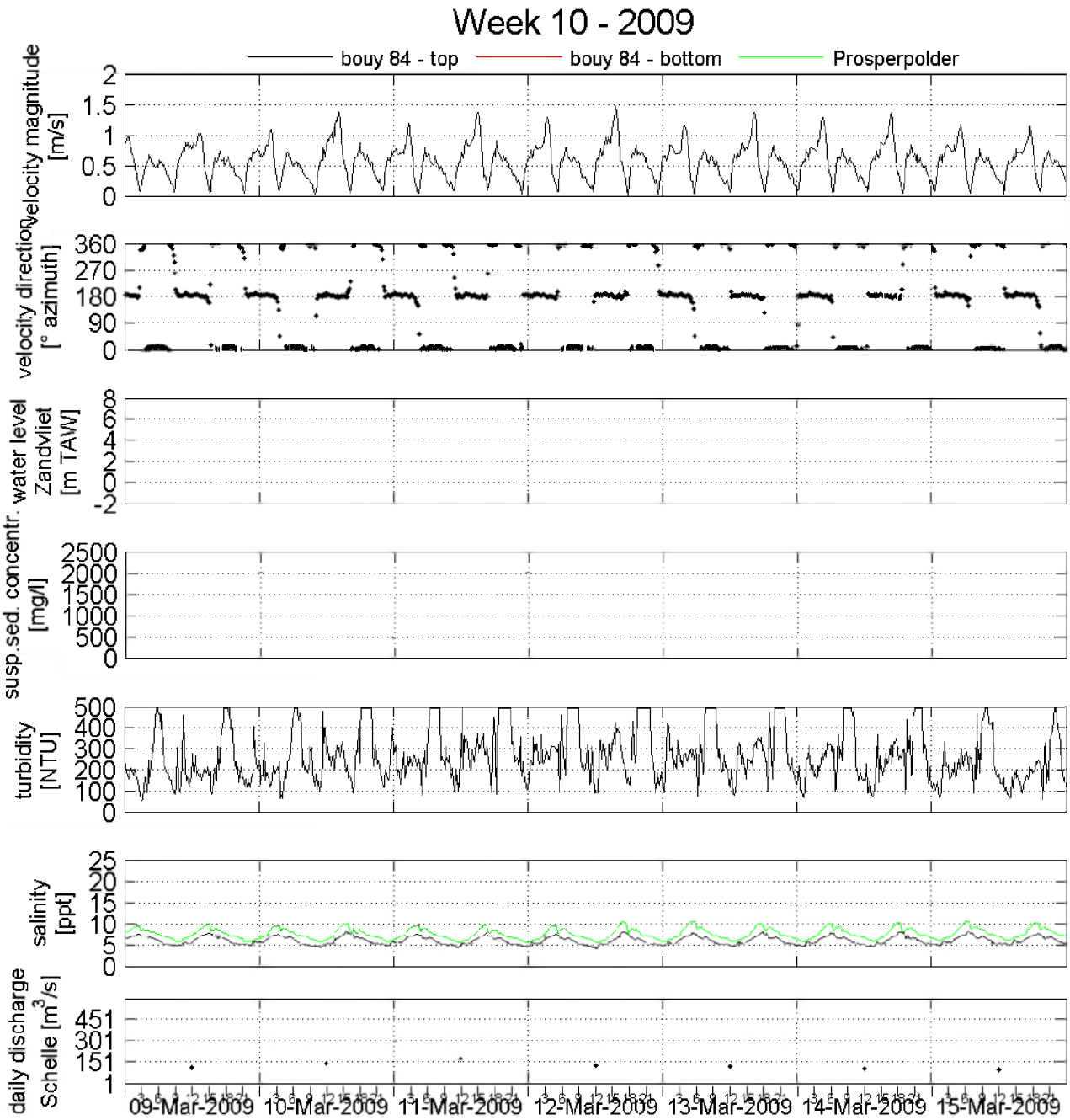
Bouy 84 (top & bottom) & Prosperpolder

Processed by:

In Association with:

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

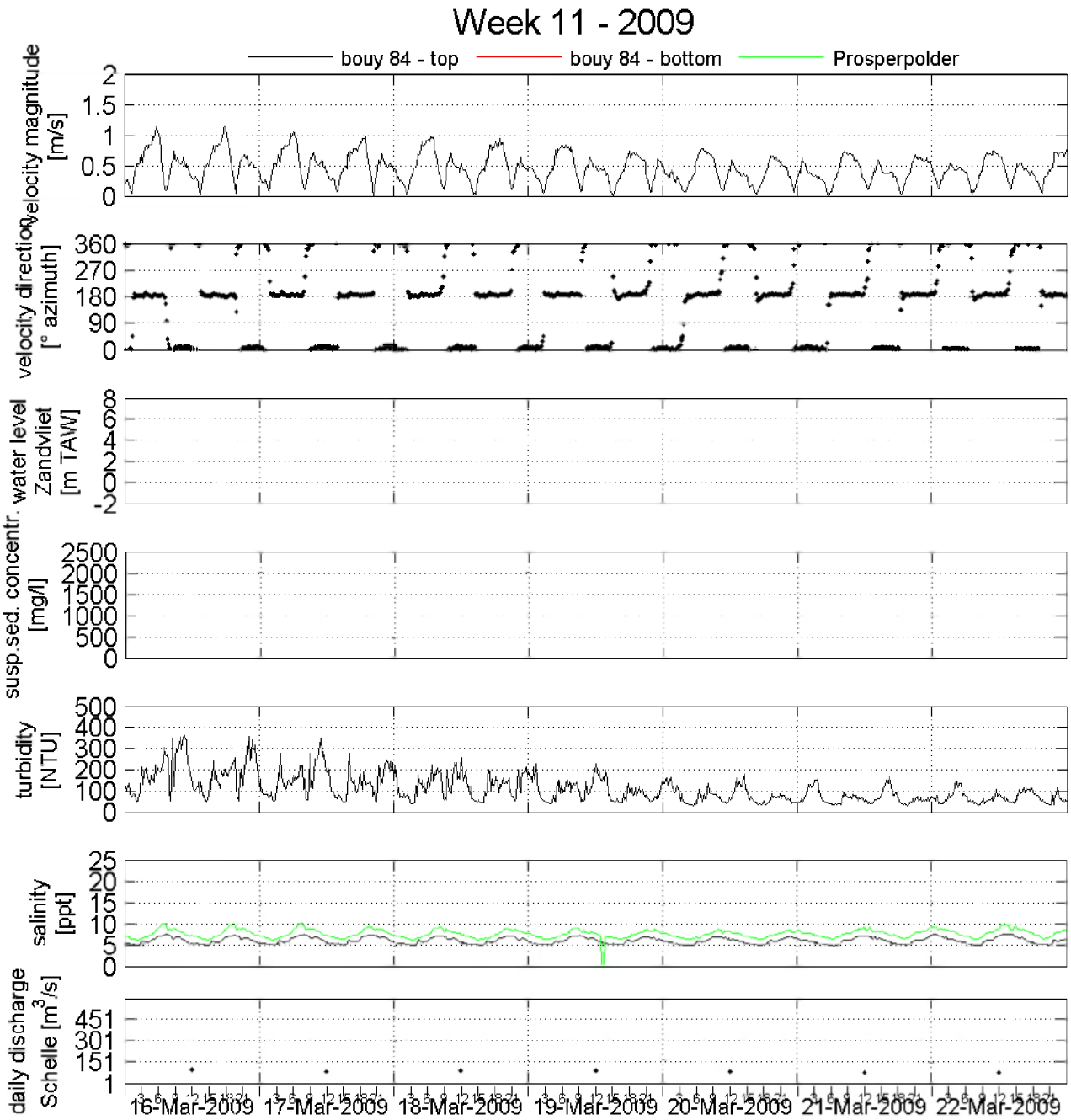
Bouy 84 (top & bottom) & Prosperpolder

Processed by: IMDC International Marine & Dredging Consultants

In Association with: WL | delft hydraulics

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

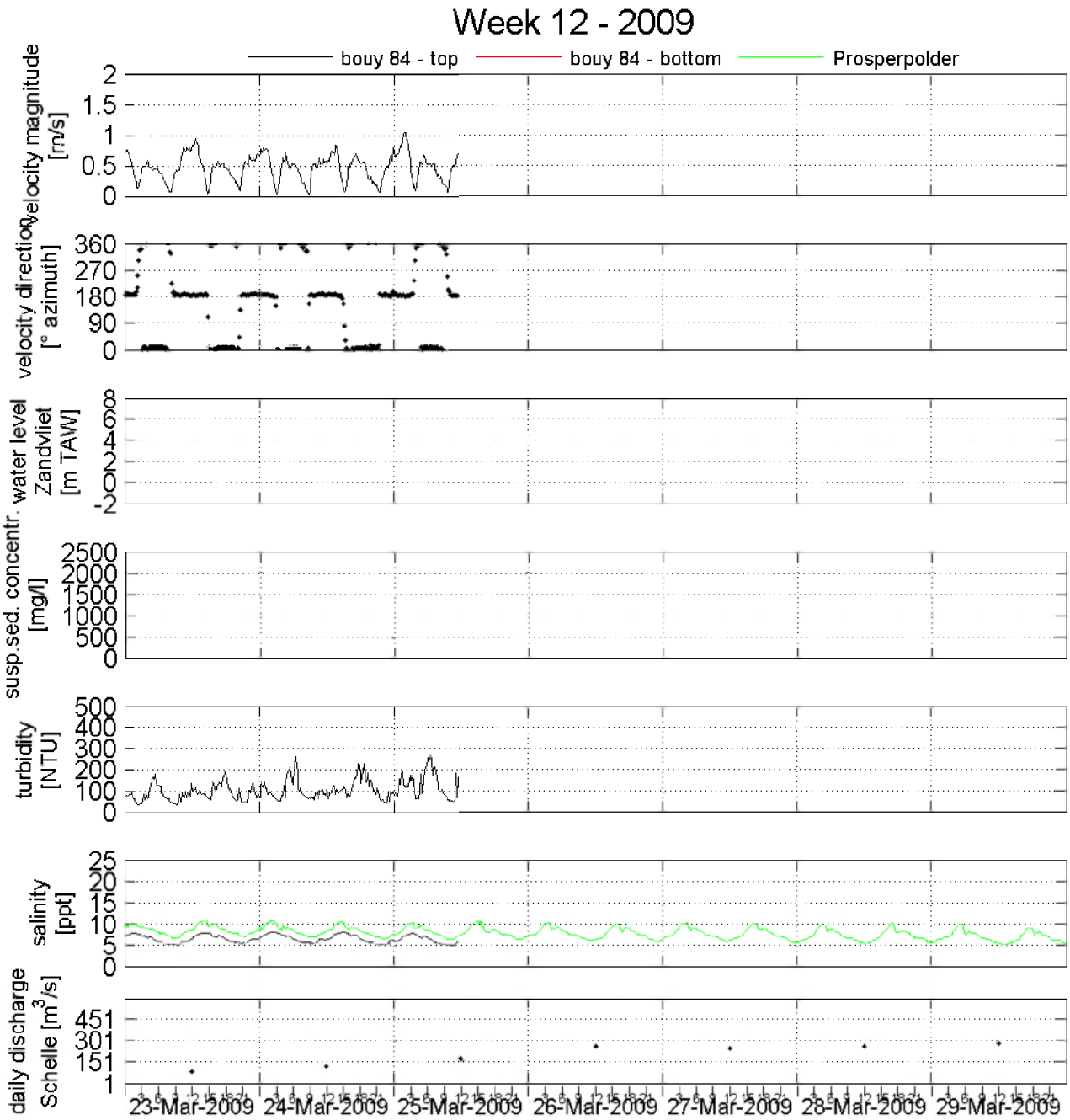
Bouy 84 (top & bottom) & Prosperpolder

Processed by: IMDC International Marine & Dredging Consultants

In Association with: WL | delft hydraulics

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

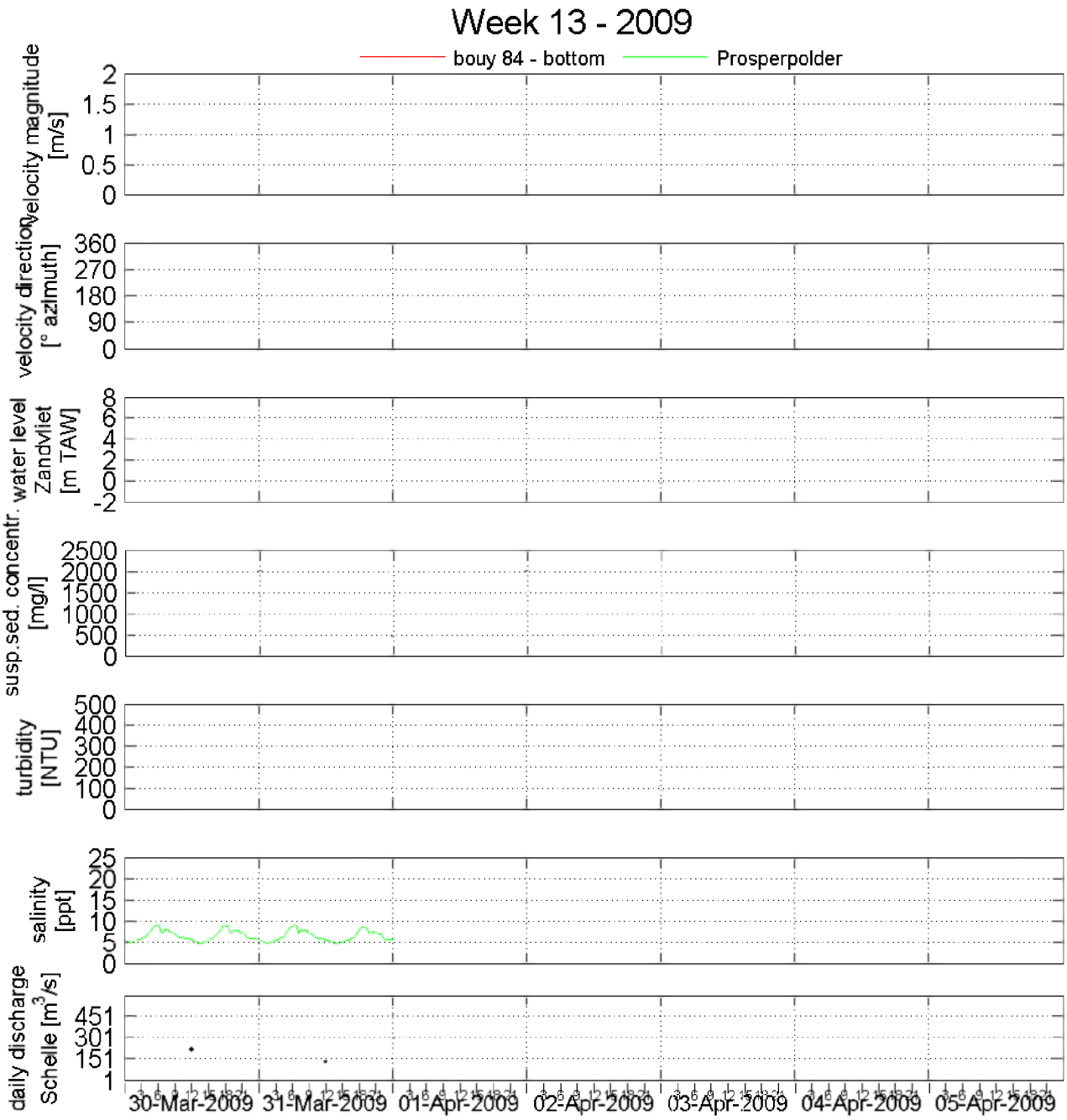
Bouy 84 (top & bottom) & Prosperpolder

Processed by: IMDC International Marine & Dredging Consultants

In Association with: WL | delft hydraulics

I/RA/11283/08.097/MSA

Boundary conditions: six monthly report 1/10/2008 - 31/3/2009



Week series: velocity magnitude & direction, tide , suspended sediment concentration, salinity & discharge

Location:

Bouy 84 (top & bottom) & Prosperpolder

Processed by:

In Association with:

I/RA/11283/08.097/MSA

C.2 Monthly results Minimum, Maximum and Average Velocity Magnitude, Temperature, Salinity & Suspended Sediment Concentration

Location: Oosterweel left bank
4.5 meter above bottom [-2.0 m TAW]

Velocity magnitude [m/s]			
Month	***Minimum***	***Maximum***	***Average***
April 2008	0.01	1.57	0.64
May 2008	0.01	1.42	0.66
June 2008	0.00	1.18	0.66
July 2008	0.01	1.26	0.66
August 2008	0.00	1.34	0.66
September 2008	0.00*	1.31*	0.68*
October 2008	0.01	1.23	0.67
November 2008	0.00	1.33	0.67
December 2008	0.00	1.40	0.66
January 2009	0.01	1.52	0.68
February 2009	0.01	1.60	0.66
March 2009	0.00	1.47	0.67
Temperature [°C]			
Month	***Minimum***	***Maximum***	***Average***
April 2008	7.8	14.0	10.5
May 2008	13.0	18.9	16.8
June 2008	17.9	20.1	19.0
July 2008	18.7	22.0	20.1
August 2008	19.1	22.3	20.8
September 2008	15.8*	20.1*	18.2*
October 2008	11.2	17.0	14.7
November 2008	6.2	12.6	10.2
December 2008	4.1	8.1	5.8
January 2009	1.2	5.1	3.4
February 2009	2.8	6.2	4.3
March 2009	6.0	9.3	7.8

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Salinity [ppt]						
Month	***Minimum***		***Maximum***		***Average***	
	HW	***LW***	***HW***	***LW***	***HW***	***LW***
April 2008	0.6	0.4	4.5	0.9	3	0.6
May 2008	3.8	0.5	6.3	1.5	5.6	1
June 2008	4.6	0.4	7.1	1.4	5.9	0.8
July 2008	6.8	1.2	8.3	2.5	7.7	1.7
August 2008	5.6	0.6	8.7	2.4	7.4	1.5
September 2008	7.6*	1.3*	11*	3.3*	9.1*	2.1*
October 2008	5.0	0.8	11.2	8.7	8.9	2.2
November 2008	4.9	0.4	9.3	2.1	7.5	1.0
December 2008	2.6	0.4	5.9	0.9	4.6	0.6
January 2009	2.0	0.5	7.9	1.5	5.5	0.9
February 2009	1.4	0.4	5.3	0.6	3.2	0.5
March 2009	3.3	0.4	5.1	0.9	4.3	0.6

Suspended sediment concentration [mg/l]			
Month	**Minimum**	**Maximum**	**Average**
April 2008	1	1858	81
May 2008	3	1211	320
June 2008	3	995	152
July 2008	6	1936	265
August 2008	7	1619	298
September 2008	8*	906*	190*
October 2008	7	1225	296
November 2008	11	1551	341
December 2008	1	1976	253
January 2009	1	1628	307
February 2009	8	1782	398
March 2009	3	3630	228

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Location: Oosterweel left bank
1.0 meter above bottom [-5.5 m TAW]

Velocity magnitude [m/s]			
Month	***Minimum***	***Maximum***	***Average***
April 2008	0.00	1.32	0.52
May 2008	0.01	1.18	0.51
June 2008	0.00	1.07	0.52
July 2008	0.01	1.16	0.51
August 2008	0.00	1.18	0.51
September 2008	0.00	1.19	0.52
October 2008	0.01	1.14	0.51
November 2008	0.00	1.18	0.54
December 2008	0.00	1.15	0.52
January 2009	0.00	1.28	0.53
February 2009	0.00	1.36	0.53
March 2009	0.00	1.23	0.55
Temperature [°C]			
Month	***Minimum***	***Maximum***	***Average***
April 2008	7.8	13.9	10.5
May 2008	12.9	18.9	16.8
June 2008	17.9	20.1	19.0
July 2008	18.7	22.0	20.1
August 2008	19.1	22.3	20.8
September 2008	15.9	20.1	18.0
October 2008	11.3	17.0	14.7
November 2008	6.2	12.7	10.2
December 2008	4.1	8.2	5.8
January 2009	1.3	10.4	3.6
February 2009	2.8	6.2	4.3
March 2009	6.0	9.3	7.8

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Salinity [ppt]						
Month	***Minimum***		***Maximum***		***Average***	
	HW	***LW***	***HW***	***LW***	***HW***	***LW***
April 2008	0.7	0.4	4.5	0.9	3.0	0.6
May 2008	3.1	0.6	6.3	1.7	5.6	1.1
June 2008	4.7	0.5	7.2	1.5	5.9	0.8
July 2008	6.8	1.2	8.3	2.5	7.7	1.7
August 2008	5.6	0.7	8.7	2.6	7.5	1.6
September 2008	7.7	1.4	10.9	3.3	9.2	2.2
October 2008	5.3	0.8	11.1	9.0	8.9	2.2
November 2008	4.9	0.4	9.4	2.3	7.5	1.1
December 2008	2.5	0.4	5.9	0.9	4.6	0.6
January 2009	2.2	0.5	7.9	1.4	5.4	1.0
February 2009	1.4	0.4	5.1	0.6	3.1	0.5
March 2009	3.3	0.4	5.1	0.9	4.2	0.6

Suspended sediment concentration [mg/l]			
Month	***Minimum***	***Maximum***	***Average***
April 2008	1	2111	104
May 2008	3	2288	460
June 2008	1	2369	201
July 2008	6	1923	365
August 2008	1	2057	421
September 2008	16	1118	242
October 2008	2	1934	397
November 2008	1	2792	446
December 2008	1	1585	326
January 2009	1	2792	337
February 2009	8	2220	548
March 2009	1	2300	301

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Location: Buoy 84
3.3 meter above bottom [-6.0 m TAW]

Velocity magnitude [m/s]			
Month	***Minimum***	***Maximum***	***Average***
April 2008	0.00	1.48	0.55
May 2008	0.00	1.40	0.56
June 2008	0.01	1.31	0.56
July 2008	0.01	1.26	0.53
August 2008	0.00	1.27	0.52
September 2008	0.01	1.27	0.50
October 2008	0.00	1.27	0.53
November 2008	0.01	1.34	0.52
December 2008	0.01	1.69	0.52
January 2009	0.00	1.73	0.53
February 2009	0.00	1.54	0.55
March 2009	-	-	-
Temperature [°C]			
Month	***Minimum***	***Maximum***	***Average***
April 2008	8.1	13.09	10.41
May 2008	12.59	18.49	16.3
June 2008	17.89	20.41	19.05
July 2008	18.75	22.25	20.15
August 2008	19.19	23	20.8
September 2008	16.91	20.47	18.41
October 2008	12.4	16.9	15.3
November 2008	8.1	12.9	11.0
December 2008	4.5	8.5	6.6
January 2009	2.6	5.1	3.9
February 2009	3.4	6.5	4.5
March 2009	-	-	-

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Salinity [ppt]						
Month	***Minimum***		***Maximum***		***Average***	
	HW	***LW***	***HW***	***LW***	***HW***	***LW***
April 2008	3.1	1.5	8.3	5.7	6.3	3.8
May 2008	7.5	4.9	10.5	7.8	9.6	6.8
June 2008	9.2	6.1	11.5	8	10.1	7
July 2008	10.3	7.8	17.1	12.8	11.9	9.2
August 2008	14.1	10.2	17.8	13.6	16.1	12.2
September 2008	16*	13.4*	18.1*	14.3*	17.2*	13.8*
October 2008	-	-	-	-	-	-
November 2008	-	-	-	-	-	-
December 2008	-	-	-	-	-	-
January 2009	-	-	-	-	-	-
February 2009	-	-	-	-	-	-
March 2009	-	-	-	-	-	-

Suspended sediment concentration [mg/l]			
Month	***Minimum***	***Maximum***	***Average***
April 2008	0	852	143
May 2008	0	1052	163
June 2008	0	888	116
July 2008	0	926	145
August 2008	0	1194	146
September 2008	0	1275	155
October 2008	1	788	136
November 2008	13	830	201
December 2008	16	1443	201
January 2009	22	1011	223
February 2009	24	1367	308
March 2009	-	-	-

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Location: Buoy 84
0.8 meter above bottom [-8.0 m TAW]

Velocity magnitude [m/s]			
Month	***Minimum***	***Maximum***	***Average***
April 2008	0.01	1.25	0.46
May 2008	0.00	1.13	0.48
June 2008	0.00	1.10	0.47
July 2008	0.01	0.98	0.46
August 2008	0.01	1.03	0.44
September 2008	0.00	1.02	0.42
October 2008	0.00	1.15	0.45
November 2008	0.00	1.23	0.44
December 2008	0.01	1.47	0.44
January 2009	0.00	1.30	0.44
February 2009	0.01	1.26	0.46
March 2009	0.00	1.33	0.45
Temperature [°C]			
Month	***Minimum***	***Maximum***	***Average***
April 2008	8.2	13.1	10.4
May 2008	12.6	18.5	16.3
June 2008	17.9	20.4	19.0
July 2008	18.6	22.6	20.1
August 2008	19.2	22.7	20.8
September 2008	16.4	20.4	18.3
October 2008	12.0	17.1	15.3
November 2008	8.2	12.9	11.0
December 2008	4.5	8.5	6.7
January 2009	2.6	5.2	4.0
February 2009	3.4	6.7	4.6
March 2009	5.7	9.6	7.8

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Salinity [ppt]						
Month	***Minimum***		***Maximum***		***Average***	
	HW	***LW***	***HW***	***LW***	***HW***	***LW***
April 2008	3	1.5	8	5.5	6.1	3.8
May 2008	7.2	5	10.2	7.7	9.4	6.8
June 2008	9.2	6.1	11.1	7.9	10	7.1
July 2008	10.5	7.9	12.5	9.4	11.5	9
August 2008	10	7.8	12.8	9.8	11.5	8.9
September 2008	12.1	9.8	15.6	12.2	13.4	10.6
October 2008	11.7	8.9	15.5	13.6	13.7	10.8
November 2008	9.8	6.3	14.2	11.1	12.5	9.3
December 2008	7.3	4.5	10.3	7.3	8.9	6.1
January 2009	6.7	3.5	12.6	9.3	10.0	7.1
February 2009	5.0	3.1	9.6	6.0	6.9	4.3
March 2009	6.7	4.2	8.9	6.3	7.9	5.5

Suspended sediment concentration [mg/l]			
Month	***Minimum***	***Maximum***	***Average***
April 2008	48	1991	279
May 2008	46	1384	385
June 2008	37	2469	291
July 2008	44	1321	313
August 2008	47	1377	349
September 2008	48	1442	322
October 2008	26	1301	272
November 2008	58	1091	319
December 2008	68	1274	309
January 2009	43	1241	316
February 2009	38	1772	457
March 2009	60	1349	399

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

Location: Prosperpolder[3]
2.5 meter above bottom [-1.5 m TAW]

Temperature [°C]			
Month	**Minimum**	**Maximum**	**Average**
April 2008	8.47	13.74	10.39
May 2008	12.48	18.56	16.26
June 2008	17.74	20.89	18.93
July 2008	18.4	22.87	20.06
August 2008	18.97	22.94	20.69
September 2008	16.16	20.12	18.2
October 2008	12.1	17.3	15.3
November 2008	8.0	13.4	10.9
December 2008	6.5*	9.0*	7.7*
January 2009	2.2	6.0	3.8
February 2009	3.1	6.8	4.5
March 2009	5.4	10.6	7.7

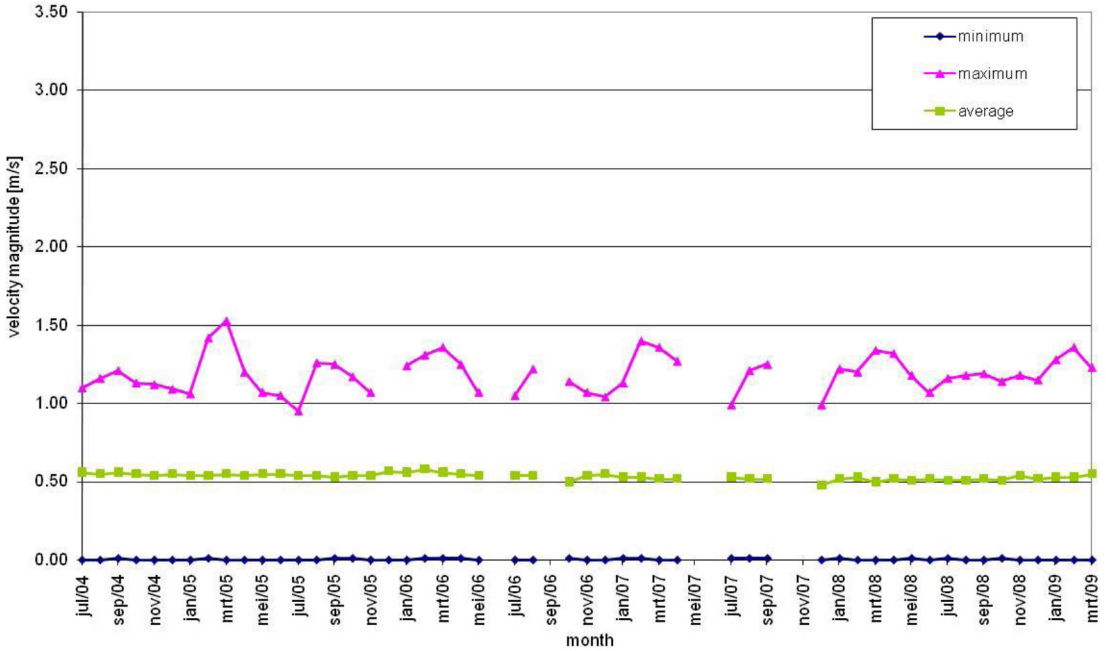
Salinity [ppt]						
Month	**Minimum**		**Maximum**		**Average**	
	HW	**LW**	**HW**	**LW**	**HW**	**LW**
April 2008	4.1	2.2	9.5	7.0	7.5	4.6
May 2008	9.2	5.7	11.2	8.2	10.2	7.3
June 2008	8.9	6.6	11.9	8.7	10.3	7.7
July 2008	10.6	8.4	13.9	10.5	12.2	9.5
August 2008	10.4	8.2	13.8	10.7	11.7	9.2
September 2008	12.0	9.3	15.4	12.5	13.6	11.0
October 2008	11.2	10.4	16.6	15.9	14.1	11.9
November 2008	11.4	7.5	15.5	12.9	13.8	10.5
December 2008	9.2*	5.9*	11.7*	8.5*	10.4*	7.2*
January 2009	8.3	4.6	13.9	10.3	11.3	8.0
February 2009	5.7	3.8	11.8	6.9	8.3	5.2
March 2009	8.1	5.2	10.5	7.8	9.3	6.3

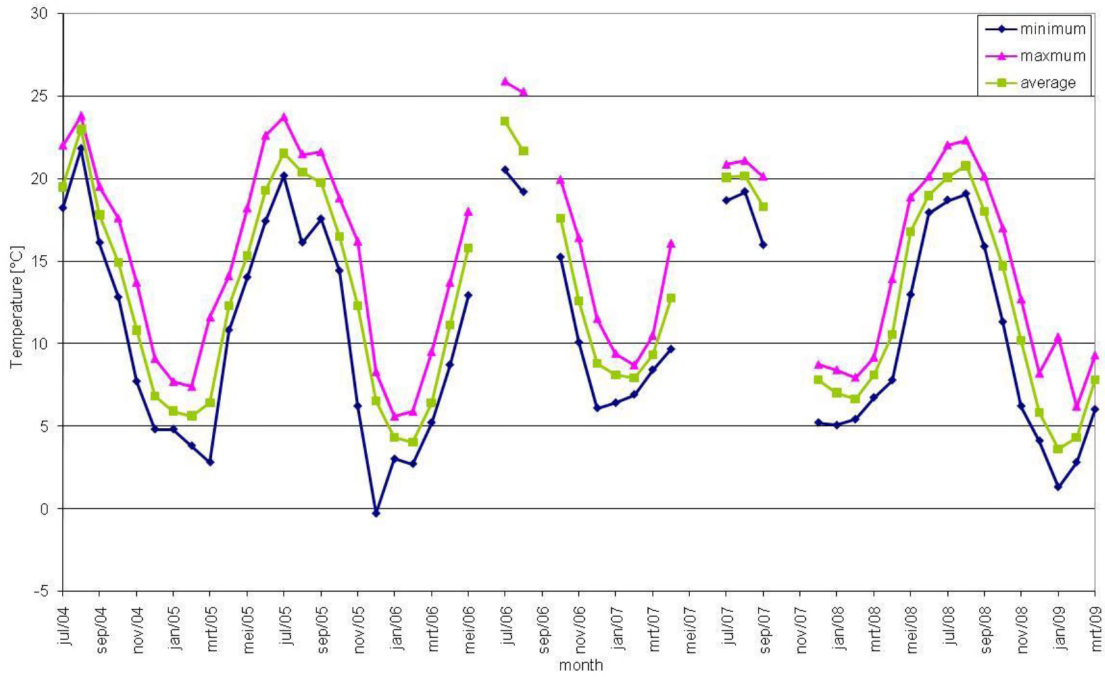
-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

[3] Current velocity and suspended sediment were not measured at Prosperpolder.

C.3 Graphs monthly results for the whole deployment period

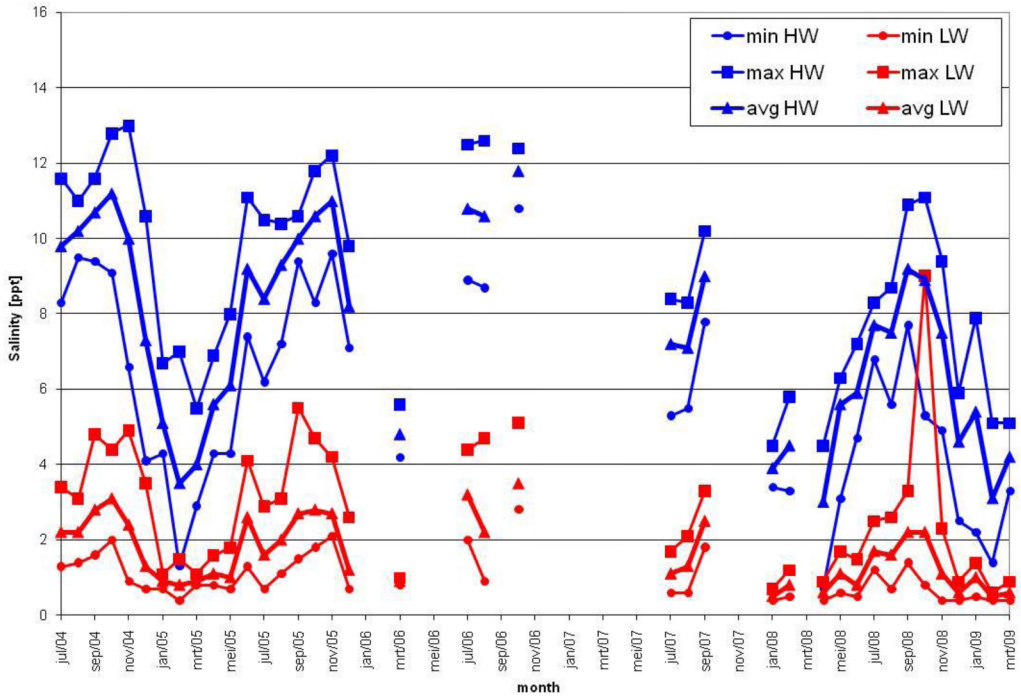
Velocity magnitude & temperature

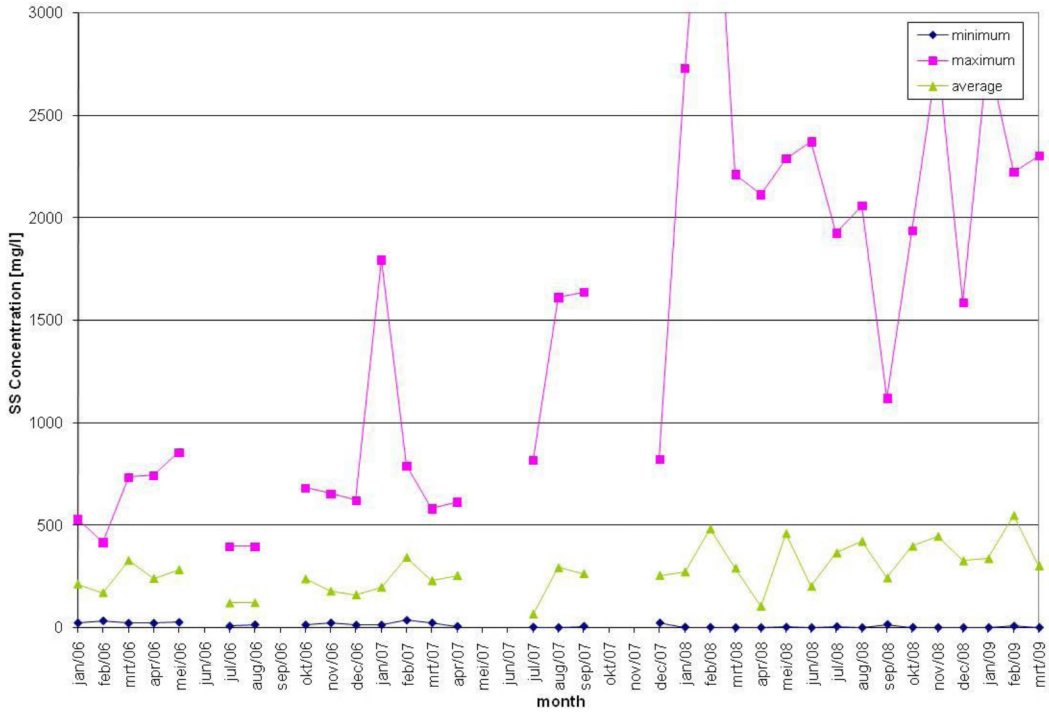




Oosterweel left bank **4.5m above bottom (-2.0m TAW)**	*Data processed by:* IMDC International Marine & Dredging Consultants *In association with:* WL | delft hydraulics *I/RA/11283/08.097/MSA*

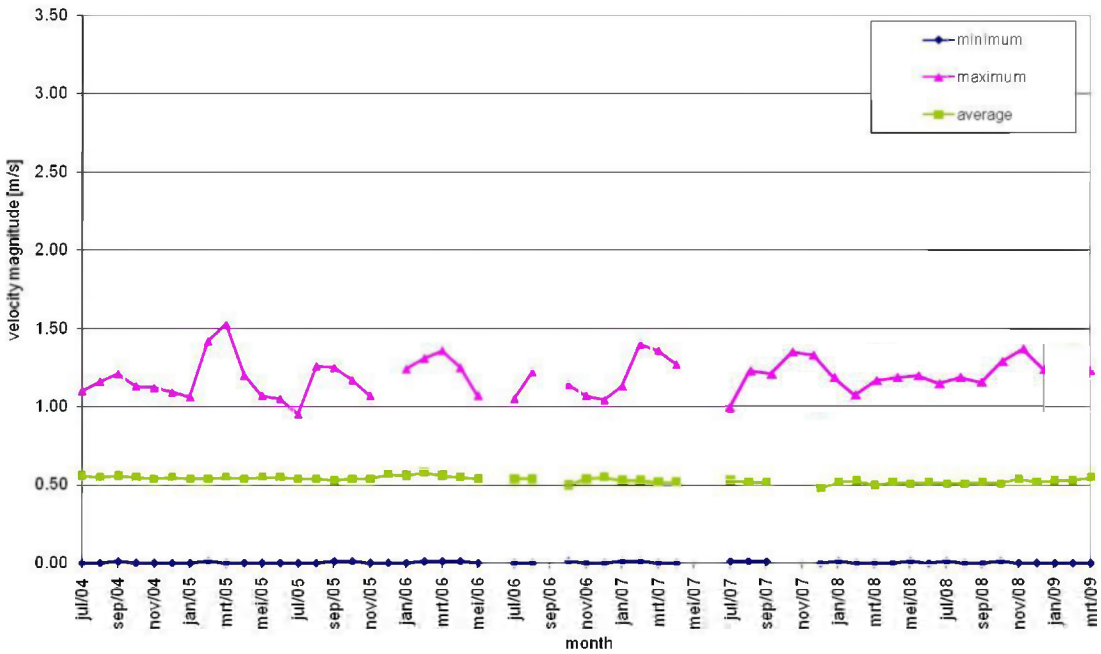
Salinity & SS Concentration

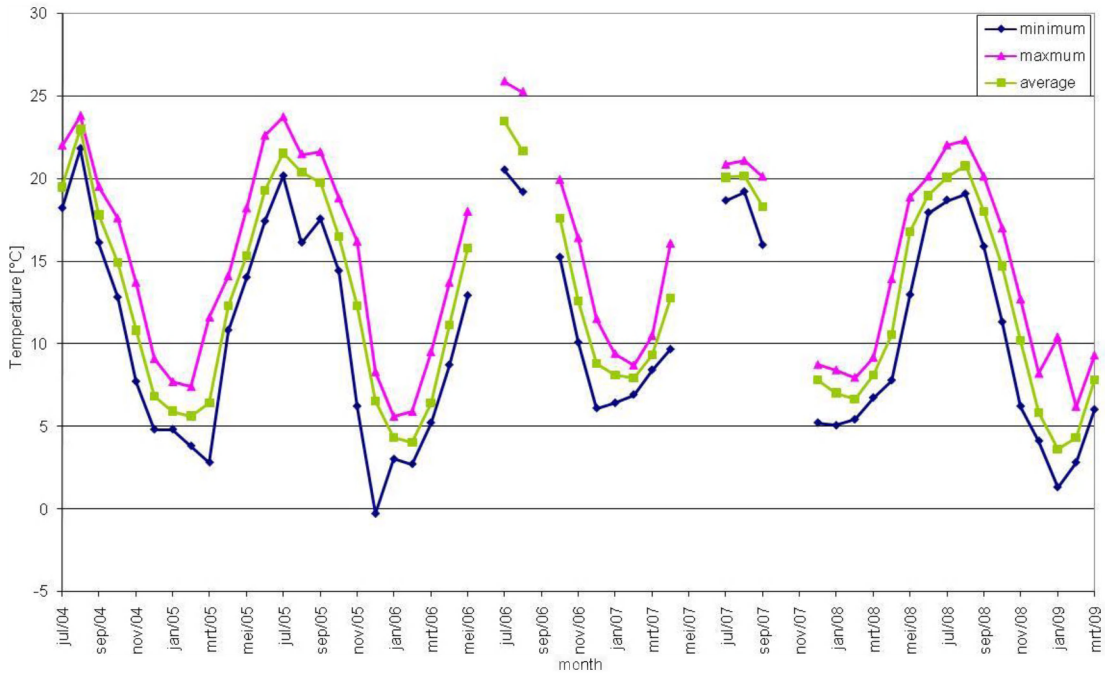




Oosterweel left bank **4.5m above bottom (-2.0m TAW)**	*Data processed by:* IMDC International Marine & Dredging Consultants *In association with:* wl	delft hydraulics *I/RA/11283/08.097/MSA*

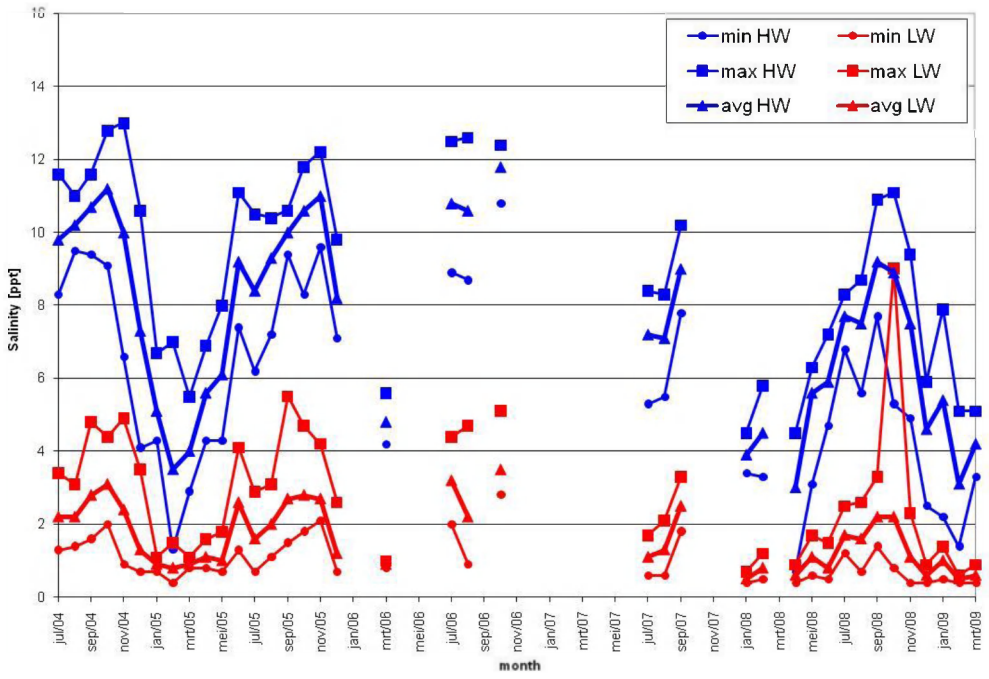
Velocity magnitude & temperature

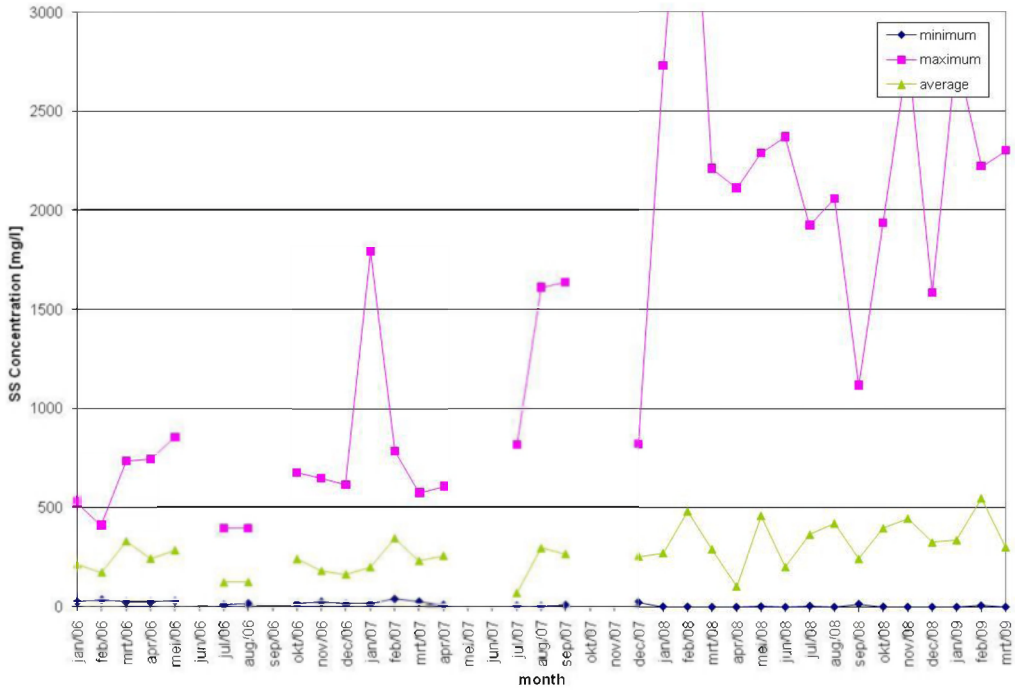




Oosterweel left bank **1m above bottom (-5.5m TAW)**	*Data processed by:* IMDC International Marine & Dredging Consultants *In association with:* wl | delft hydraulics *I/RA/11283/08.097/MSA*

Salinity & SS Concentration





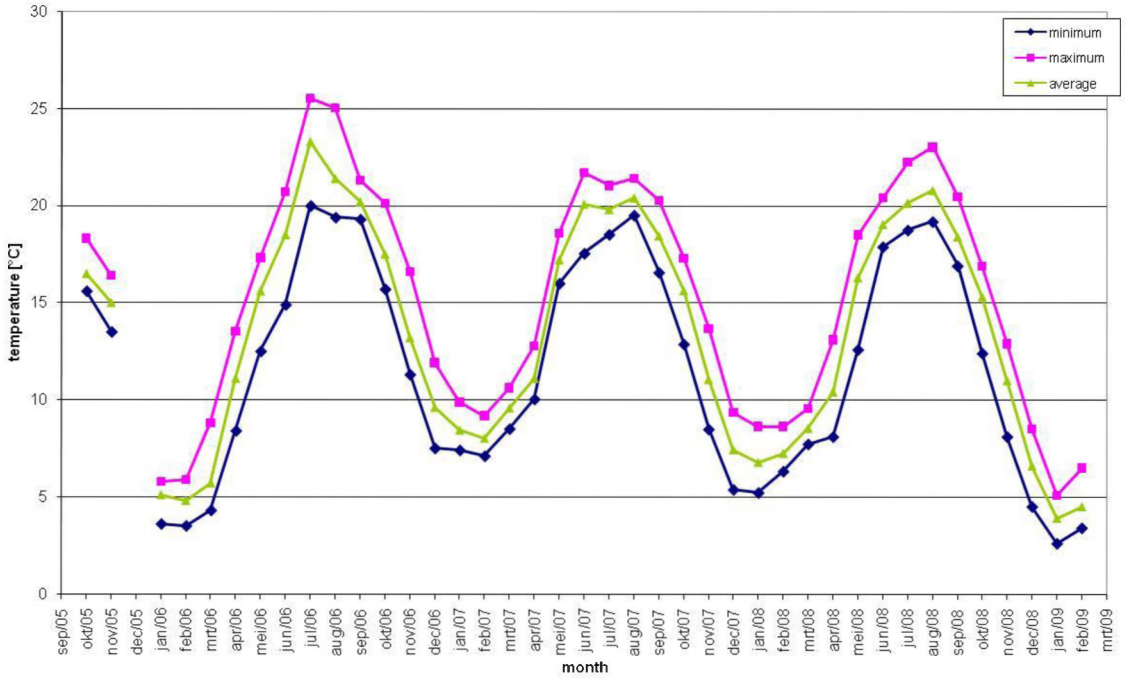
Oosterweel left bank
1m above bottom (-5.5m TAW)

Data processed by: IMDC International Marine & Dredging Consultants

In association with: WL | delft hydraulics

I/RA/11283/08.097/MSA

Velocity magnitude & temperature



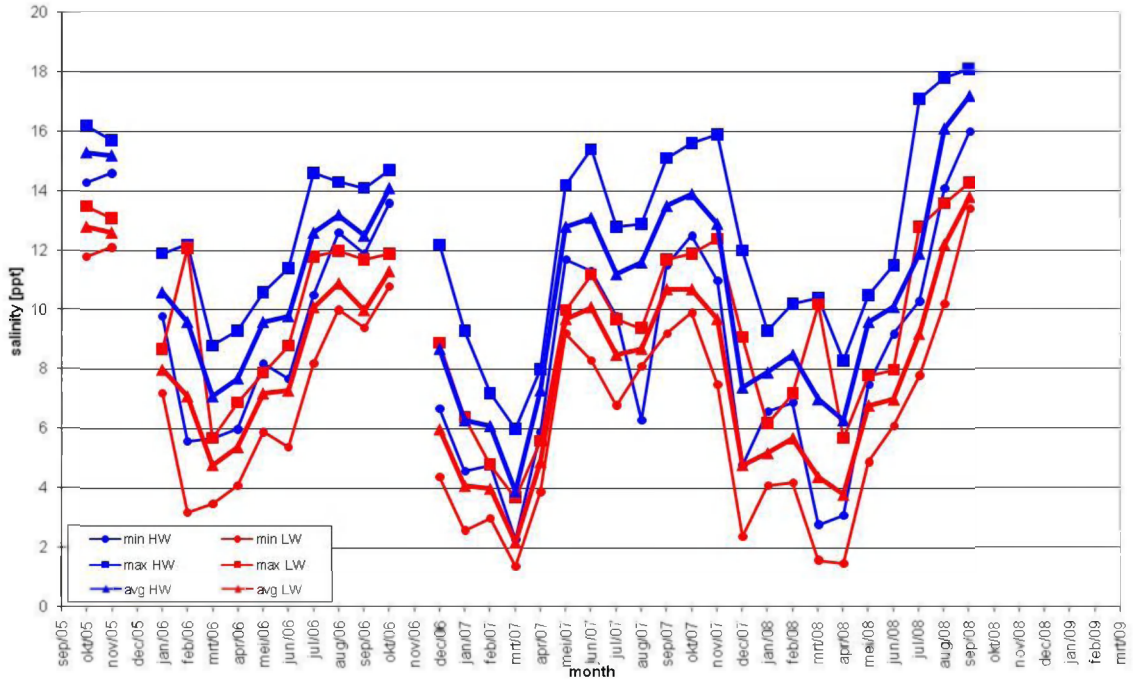
Buoy 84
3.3 m above bottom (-4.8 m TAW)

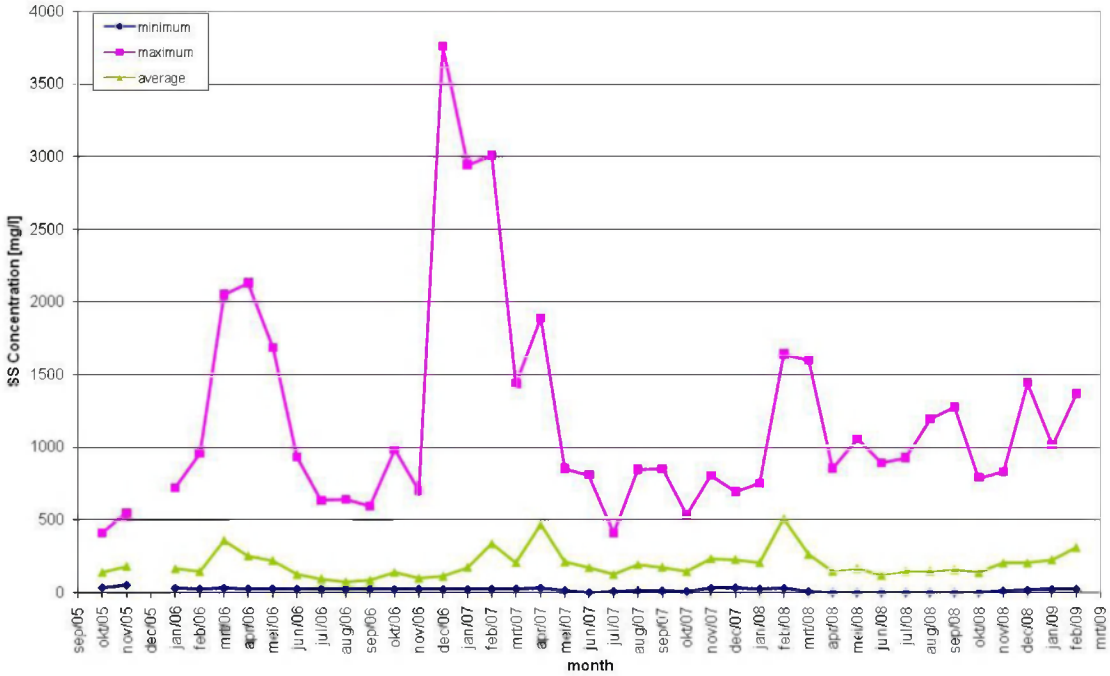
Data processed by: IMDC International Marine & Dredging Consultants

In association with: WL | delft hydraulics

I/RA/11283/08.097/MSA

Salinity & SS Concentration





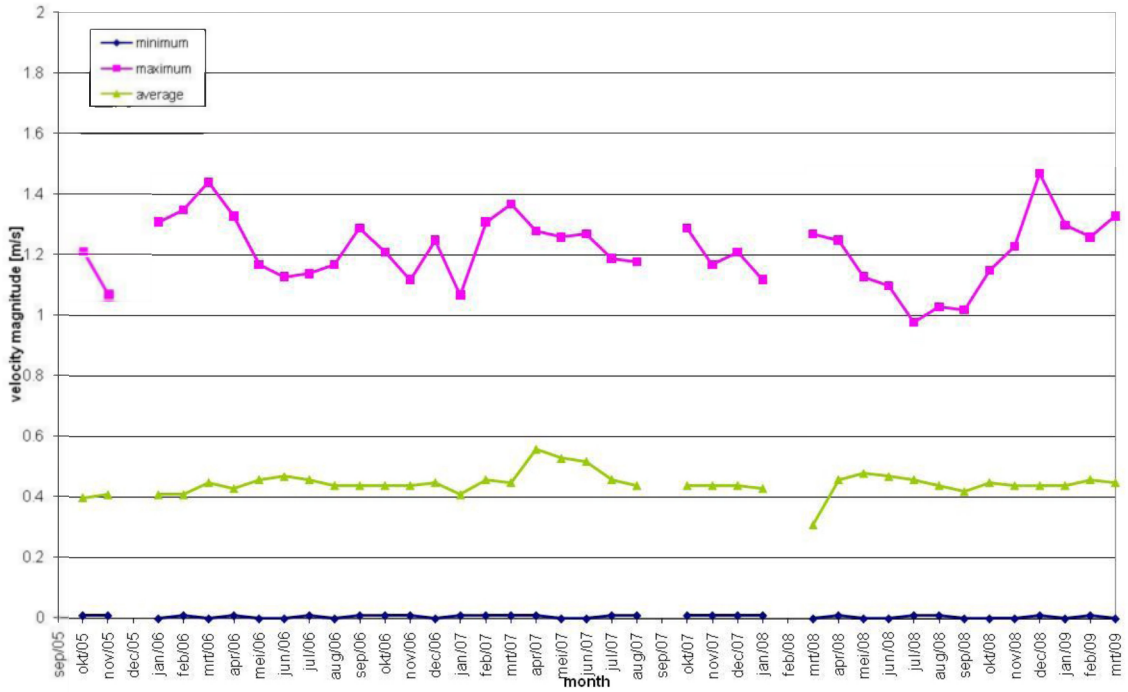
Buoy 84
3.3m above bottom (-4.8m TAW)

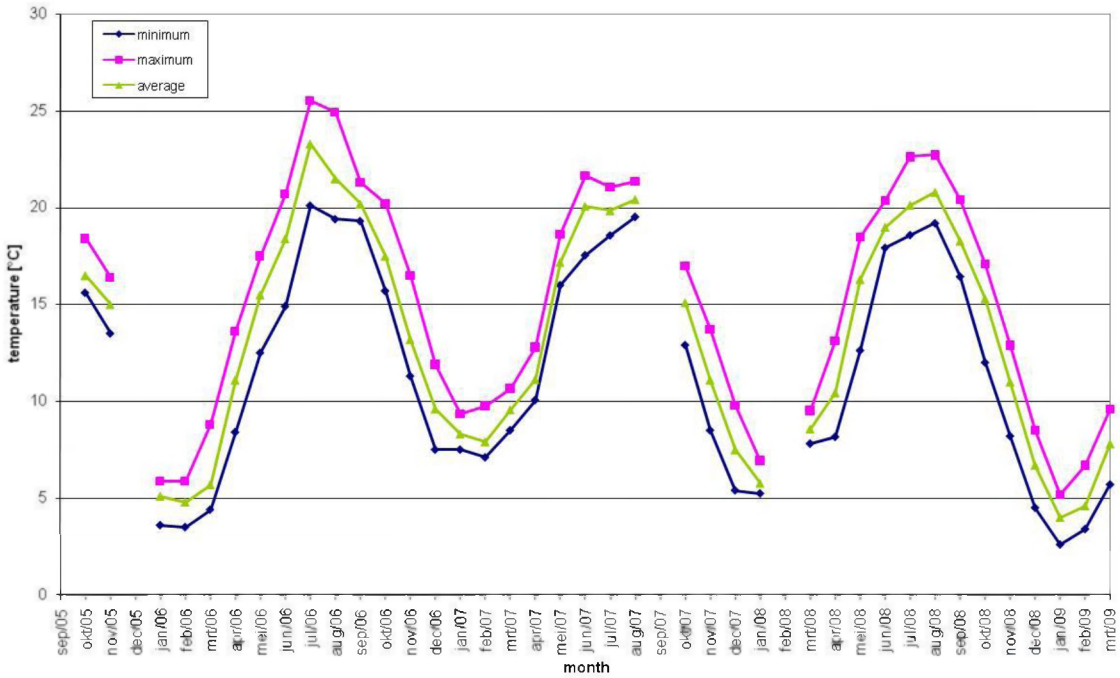
Data processed by: IMDC International Marine & Dredging Consultants

In association with: WL | delft hydraulics

I/RA/11283/08.097/MSA

Velocity magnitude & temperature





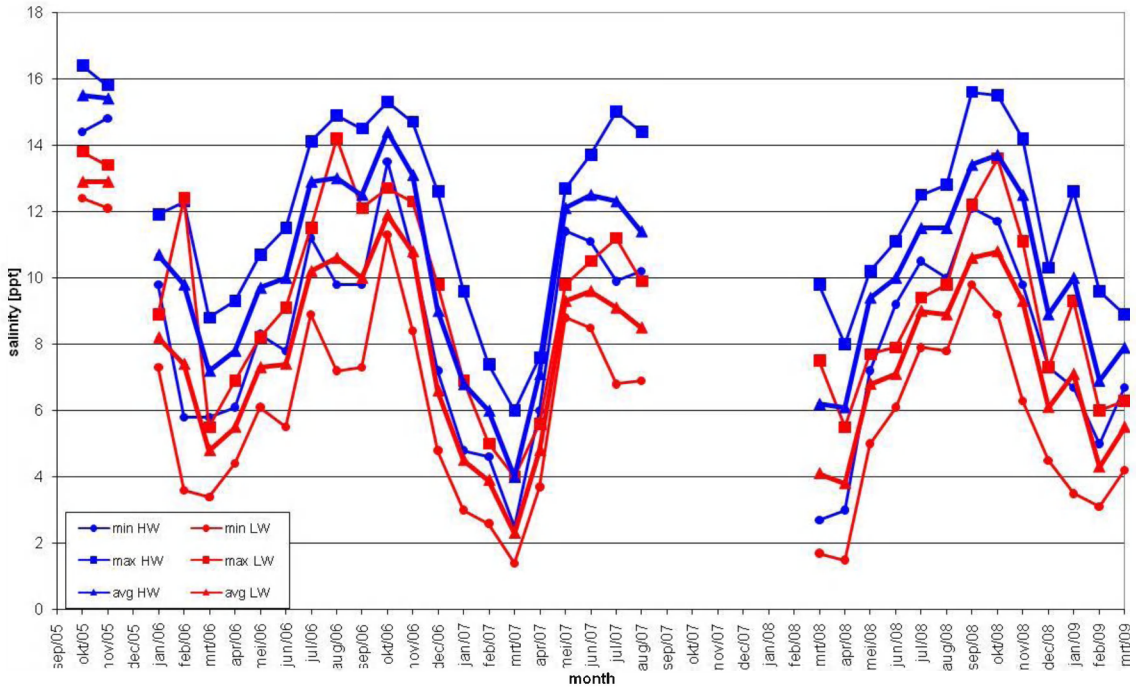
Buoy 84
0.8m above bottom (-8m TAW)

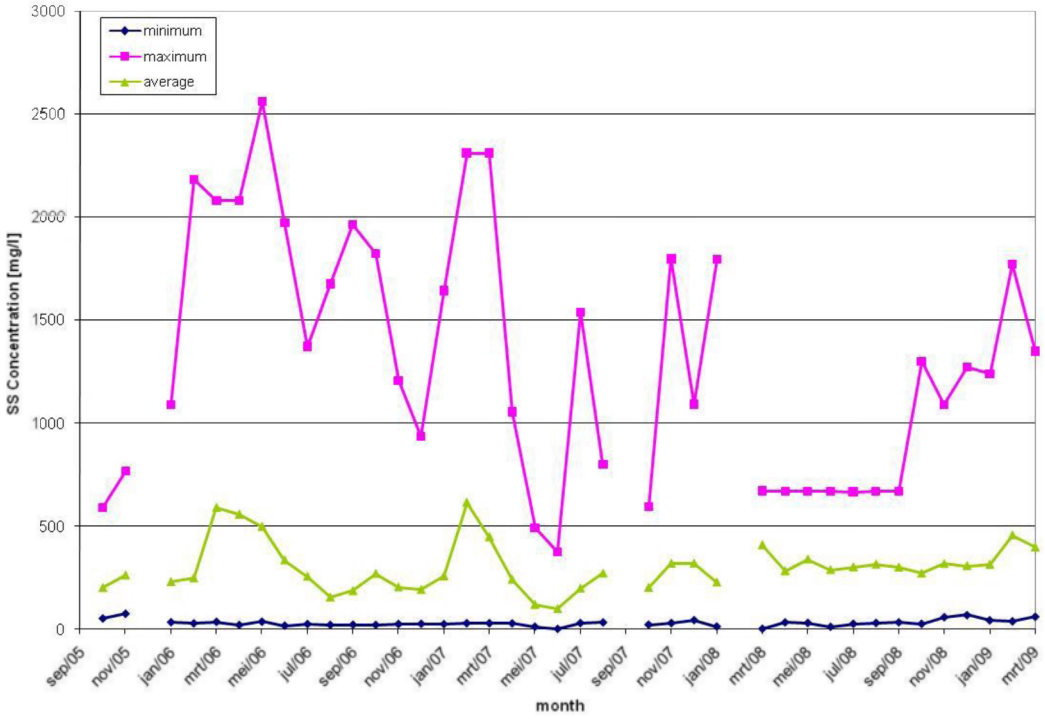
Data processed by: IMDC International Marine & Dredging Consultants

In association with: WL | delft hydraulics

I/RA/11283/08.097/MSA

Salinity & SS Concentration





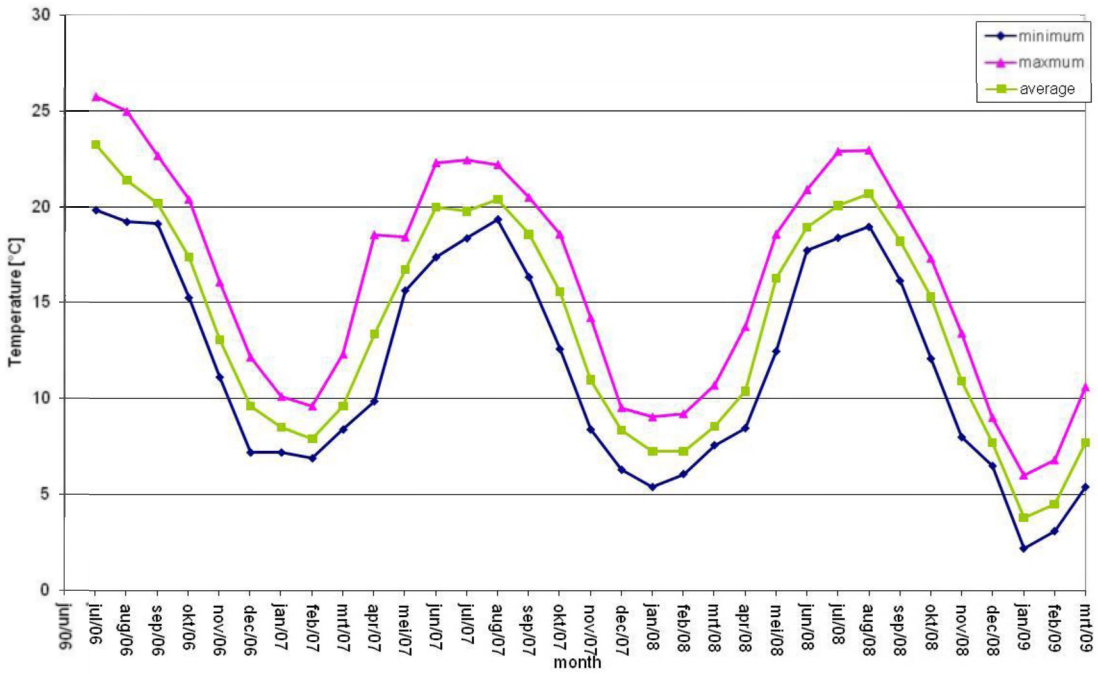
Buoy 84
0.8m above bottom (-8m TAW)

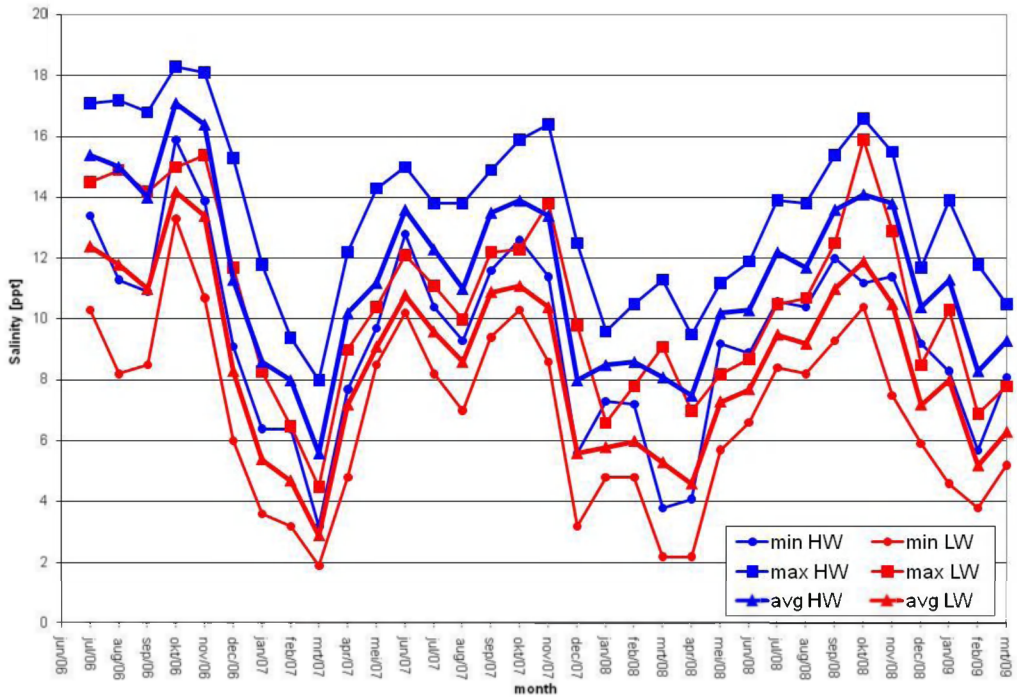
Data processed by:

In association with:

I/RA/11283/08.097/MSA

Temperature & Salinity





Propsperpolder
2.5m above bottom (-1.5m TAW)

Data processed by: IMDC International Marine & Dredging Consultants

In association with: WL | delft hydraulics

I/RA/11283/08.097/MSA

C.4 Total result from October 2008 till March 2009 of velocity magnitude, temperature, salinity and suspended sediment concentration

Averages for the whole deployment period of each instrument [October 2008 – March 2009]

Location	***Depth [m TAW]***	***Velocity [m/s]***			***Temperature [°C]***			***SS concentration [mg/l]***		
		Min	***Max***	***Avg***	***Min***	***Max***	***Avg***	***Min***	***Max***	***Avg***
Oosterweel left bank	-2.0	0.00	1.60	0.67	1.2	17.0	7.5	1	3630	303
Oosterweel left bank	-5.5	0.00	1.36	0.53	1.3	17.0	7.7	1	2792	392
Buoy84 top	-6.0	0.00	1.73	0.53	2.6	16.9	7.9	1	1443	220
Buoy84 bottom	-8.0	0.00	1.47	0.45	2.6	17.1	8.0	26	1772	347
Prosperpolder	-1.5	-	-	-	2.2	17.3	8.4	-	-	-

Salinity [ppt]

Location	**Depth [m TAW]**	**Minimum**		**Maximum**		**Average**	
		Slack HW	***Slack LW***	***Slack HW***	***Slack LW***	***Slack HW***	***Slack LW***
Oosterweel left bank	-2.0	1.4	0.4	11.2	8.7	5.5	1.0
Oosterweel left bank	-5.5	1.4	0.4	11.1	9.0	5.5	1.0
Buoy84 top	-6.0	-	-	-	-	-	-
Buoy84 bottom	-8.0	5.0	3.1	15.5	13.6	9.8	7.1
Prosperpolder	-1.5	5.7	3.8	16.6	15.9	11.2	8.2

-: No data or less than 30% of the monthly data available.
*: Less than 70% of the monthly data available.

APPENDIX D.

MONTHLY RESULTS: MINIMUM, MAXIMUM AND AVERAGE SALINITY AT BAALHOEK AND HOOFDPLAAT

Location: Baalhoek

Upper cell: floating at water surface

Lower cell: 4.7 meter above bottom [-3.1m TAW]

Salinity [ppt] (upper cell)			
Month	***Minimum***	***Maximum***	***Average***
October	12.21	21.24	16.48
November	9.77	20.48	15.78
December	8.49*	16.24*	12.08*
January	5.93	18.28	12.48
February	5.57	16.50	9.91
March	7.28	15.65	10.99
Salinity [ppt] (lower cell)			
Month	***Minimum***	***Maximum***	***Average***
October	12.54	21.70	17.09
November	10.84	20.95	16.36
December	8.86	17.80	13.12
January	7.36	19.01	13.66
February	5.85	16.99	10.75
March	7.41	16.24	11.66

-: No data or less than 30% of monthly data available
*: Less than 70% of monthly data

Location: Hoofdplaat

Floating at water surface

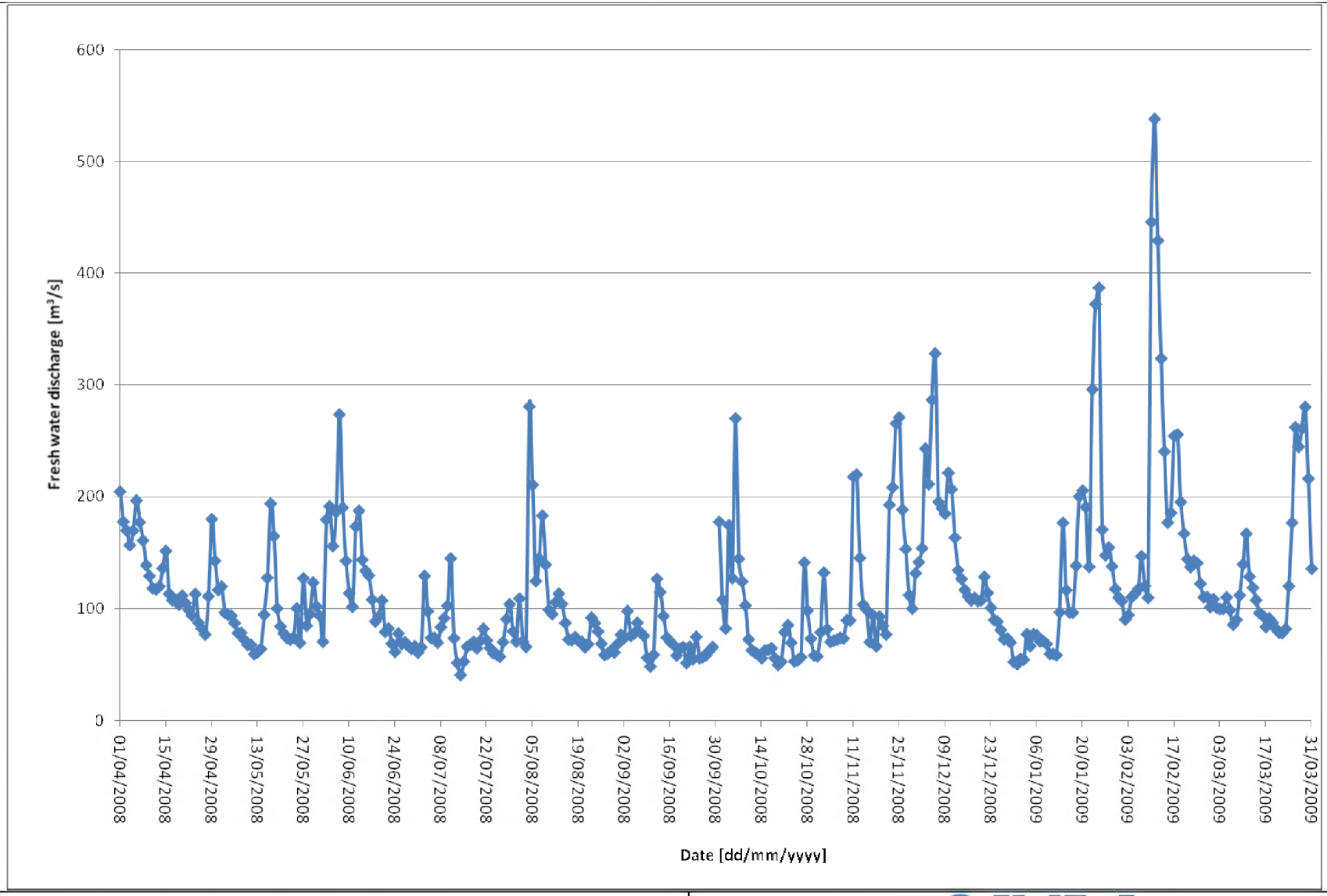
Salinity [ppt]			
Month	***Minimum***	***Maximum***	***Average***
October	-	-	-
November	-	-	-
December	-	-	-
January	-	-	-
February	-	-	-
March	-	-	-

-: No data or less than 30% of monthly data available
*: Less than 70% of monthly data

APPENDIX E.

FRESH WATER DISCHARGE

11283 Opvolging aanslibbing Deurganckdok – Omgevingscondities oktober '08- maart '09

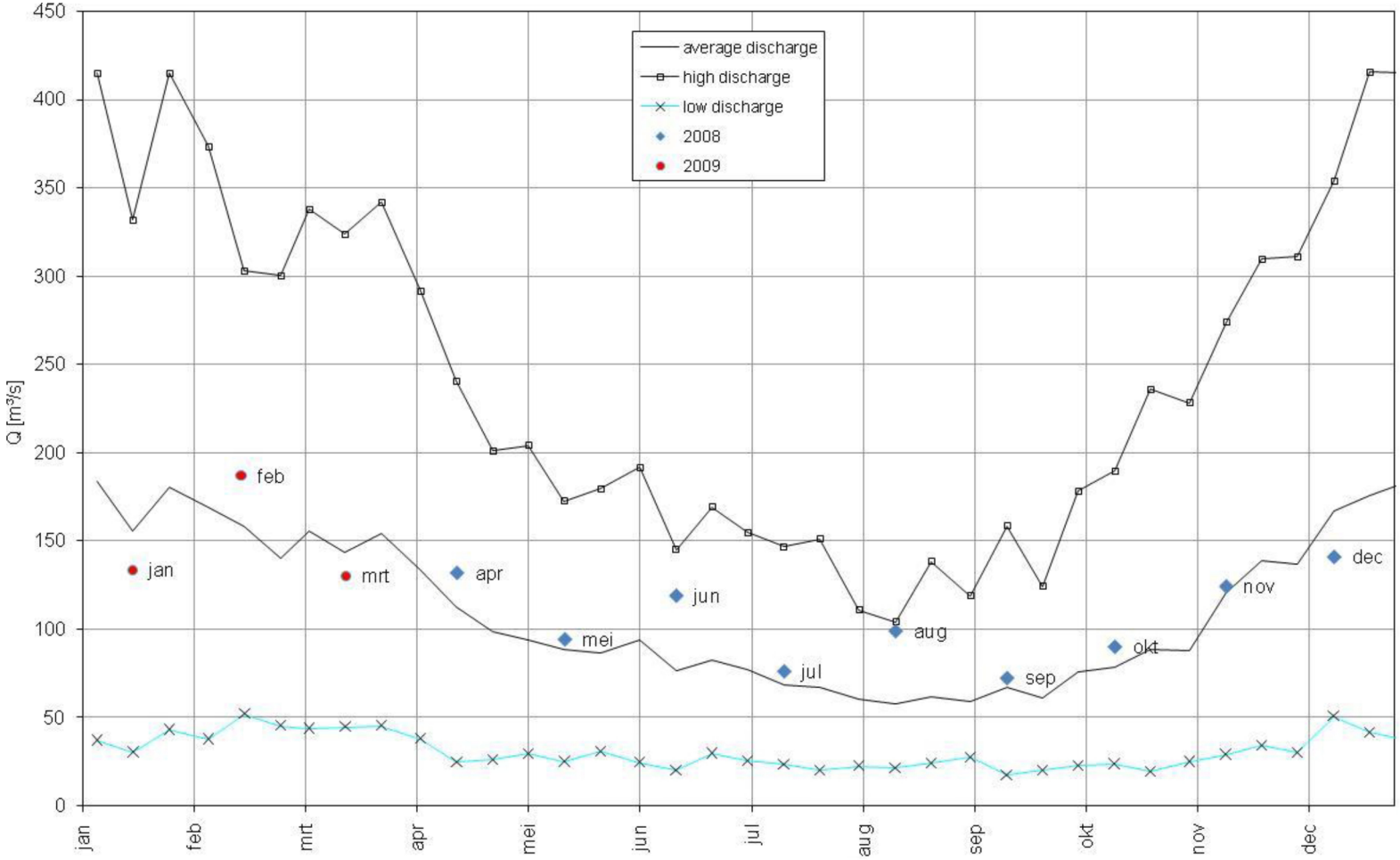


Fresh water discharge		Data processed by: IMDC International Marine & Dredging Consultants
Location: Schelle	Date: 01/04/2008 – 31/03/2009	In association with: WL | delft hydraulics
		I/RA/11283/08.097/MSA

Decade averages of the fresh water discharge [m³/s] of the Scheldt at Schelle (April 2008 – March 2009)

	First Decade	*Second Decade*	*Third Decade*
April 2008	168	119	109
May 2008	91	102	90
June 2008	160	127	71
July 2008	85	70	74
August 2008	143	87	70
September 2008	75	80	63
October 2008	138	59	77
November 2008	84	120	170
December 2008	216	129	87
January 2009	68	125	211
February 2009	146	277	126
March 2009	105	106	180

Average monthly discharge during project period compared to the long-term discharge curve (based on a long-term simulation over a period of 30 year; 1971-2000)



APPENDIX F. MONTHLY RESULTS METEOROLOGICAL MEASUREMENTS AT DEURNE

Terminology

Nederlands:	*English:*
Druk:	Pressure
Bewolking:	Cloudiness
Zon duur:	Duration of Sunshine
Temperaturen:	Temperatures
Lucht:	Air
Gras:	Grass
Minimum onder naakte grond:	Minimum under bare soil
Bewolking: 9 = bovenlucht niet zichtbaar	Cloudiness 9 = upper atmosphere invisible
Ontbrekend gegeven:	Missing data
Gem.:	Average
Min. :	Minimum
Max.:	Maximum
Rel. vocht.:	Relative Humidity
Mist:	Fog
Duur in minuten:	Duration in minutes
Neerslag:	Precipitation
Dag met:	Day with
Wind:	Wind
Snelheid (km/h) en richting:	Velocity (km/h) and direction
* = Sneeuw:	* = Snow
▲ = Hagel:	▲ = Hail
:reewnO = ק	mrotsrednuht = ק
Neerslag te wijten aan mist of dauw:	Precipitation due to fog or dew

DEURNE 04°28' 18'' E 51°11' 31'' N 10 m Periode 00-24 h W.T. OKTOBER 2008

	DRUK hPa	BEWOLKING Octas				ZON DUUR	TEMPERATUREN °C LUCHT			GRAS	MINIMUM ONDER NAAKTE GROND					
	GEM.	0h	6	12	18	h min	GEM.	MAX.	MIN.	MIN.	-2cm	-5cm	-10cm	-20cm	-50cm	-100cm
1	999.5	8	7	4	7	/ /	13.0	15.9	9.6	8.9	12.4	12.9	12.8	13.2	14.4	15.1
2	1003.0	9	1	5	7	/ /	9.8	13.9	7.0	7.2	11.6	12.1	11.9	12.4	14.0	14.9
3	1007.6	1	6	7	7	/ /	7.8	10.8	6.1	6.4	10.9	11.4	11.2	11.7	13.6	14.8
4	1015.0	8	4	6	7	/ /	9.6	12.4	5.8	5.6	10.5	11.0	10.8	11.3	13.3	14.6
5	1002.8	8	8	8	8	/ /	11.9	14.5	10.4	10.1	11.5	11.7	11.6	11.9	13.1	14.4
6	1012.6	8	8	6	7	/ /	13.2	15.9	10.8	11.2	12.4	12.5	12.5	12.5	13.1	14.2
7	1012.3	8	1	8	7	/ /	15.0	18.1	10.4	9.9	12.7	12.9	12.8	13.0	13.4	14.2
8	1017.9	8	7	5	6	/ /	13.9	16.9	9.8	9.6	12.8	13.3	13.1	13.5	13.7	14.2
9	1031.5	9	1	6	3	/ /	10.5	17.3	4.0	0.0	11.4	12.0	11.7	12.3	13.7	14.2
10	1032.5	9	5	5	5	/ /	10.9	17.3	4.1	5.8	11.0	11.6	11.3	11.8	13.4	14.2
11	1028.7	9	2	2	7	/ /	13.1	18.3	6.4	7.4	11.4	11.8	11.6	12.0	13.3	14.1
12	1025.8	8	7	1	3	/ /	13.8	20.8	8.3	10.1	13.2	13.3	13.3	13.4	13.5	14.0
13	1019.2	9	3	1	7	/ /	15.9	22.7	8.2	9.5	12.6	12.9	12.8	13.0	13.8	14.0
14	1020.8	8	7	6	7	/ /	15.3	18.1	13.3	12.8	14.2	14.3	14.2	14.3	13.9	14.0
15	1014.6	8	7	8	8	/ /	14.2	15.8	12.1	11.7	14.1	14.2	14.2	14.3	14.3	14.1
16	1013.3	8	6	7	2	/ /	11.3	13.9	8.1	7.5	12.1	12.7	12.5	12.9	14.2	14.2
17	1019.8	8	1	5	1	/ /	9.1	13.7	3.5	5.6	10.6	11.3	11.1	11.6	13.6	14.2
18	1020.2	9	2	7	1	/ /	8.8	13.3	3.0	4.6	9.9	10.6	10.3	10.9	13.0	14.1
19	1021.0	9	5	7	3	/ /	11.0	15.6	8.3	7.7	10.3	10.7	10.6	10.9	12.7	13.8
20	1012.3	9	4	1	5	/ /	13.3	18.2	4.4	4.9	10.0	10.5	10.2	10.7	12.5	13.7
21	1011.8	8	8	8	6	/ /	11.2	15.6	8.8	8.2	11.2	11.6	11.4	11.7	12.5	13.5
22	1022.7	9	6	6	1	/ /	9.5	13.3	7.2	6.8	10.1	10.6	10.4	10.9	12.5	13.4
23	1025.9	9	0	1	4	/ /	9.7	14.3	6.4	5.9	9.6	10.1	9.8	10.3	12.1	13.3
24	1024.0	0	6	7	7	/ /	10.4	11.4	8.8	7.7	10.2	10.5	10.4	10.6	12.0	13.2
25	1030.3	8	1	5	5	/ /	8.9	13.7	2.0	4.6	9.3	9.9	9.7	10.1	11.8	13.0
26	1017.9	9	8	8	8	/ /	12.0	13.3	10.7	9.9	10.4	10.6	10.5	10.7	11.8	12.9
27	1009.2	8	5	4	2	/ /	9.5	12.4	2.8	4.8	9.4	10.1	9.8	10.3	11.8	12.8
28	1010.0	9	1	4	3	/ /	5.5	10.4	-1.2	2.6	7.9	8.7	8.4	9.0	11.4	12.7
29	1007.9	9	1	3	1	/ /	2.3	9.8	-2.6	0.4	7.0	7.7	7.4	8.1	10.7	12.5
30	999.4	8	8	8	8	/ /	2.1	4.4	-1.7	1.8	6.7	7.3	7.0	7.6	10.1	12.3
31	1005.3	8	7	6	6	/ /	5.1	6.6	3.3	4.1	7.2	7.6	7.4	7.8	9.9	12.0
M	1016.0					/ /	10.6	14.5	6.4							

Bewolking : 9 = bovenlucht niet zichtbaar / = Ontbrekend gegeven

DEURNE 04°28' 18'' E 51°11' 31'' N 10 m Periode 00-24 h W.T. OKTOBER 2008

	REL.VOCHT. %		MIST DUUR IN MINUTEN			NEERSLAG	DUUR		* (cm)		DAG MET			WIND SNELHEID (km/h) en RICHTING						
	GEM.	MIN.	<1000m	<500m	<200m	1/m2	h min	%	6h	18	*	▲	⌀	GEM.	MAX.		0h	6h	12h	18h
1	81	53	-	-	-	5.9	2 45	11	/	/	-	-	-	25	65	WSW	WSW	WSW	W	WSW
2	80	54	-	-	-	3.4	2 1	8	/	/	-	-	X	18	47	SW	SW	SW	WSW	W
3	89	71	-	-	-	4.8	7 32	31	/	/	-	-	-	11	36	NNW	SSW	SSW	WSW	W
4	68	46	-	-	-	0.1	2 1	8	/	/	-	-	-	18	54	SSW	NW	SW	WSW	SSW
5	89	70	-	-	-	20.8	18 33	77	/	/	-	-	-	25	65	SW	SSW	SSW	SSW	S
6	85	59	-	-	-	1.2	6 14	26	/	/	-	-	-	7	22	WSW	WNW	W	NW	SSE
7	89	80	-	-	-	1.2	2 57	12	/	/	-	-	-	11	25	S	S	SSE	S	SE
8	81	63	-	-	-	2.0	3 25	14	/	/	-	-	-	14	36	WNW	SSW	W	NNW	NNW
9	82	54	234	141	5	-	-	-	/	/	-	-	-	4	18	WNW	NW	SSW	N	ENE
10	79	54	-	-	-	-	-	-	/	/	-	-	-	7	25	SSW	SE	SSE	SW	SW
11	87	70	-	-	-	-	-	-	/	/	-	-	-	11	25	SSW	ESE	SSE	SSW	S
12	90	67	277	147	112	-	-	-	/	/	-	-	-	7	18	SW	SW	S	SE	E
13	81	57	1125	1106	34	<0.1	0 18	1	/	/	-	-	-	11	36	W	E	S	SSW	W
14	81	61	-	-	-	-	-	-	/	/	-	-	-	11	22	W	WSW	WSW	SW	S
15	87	79	-	-	-	2.3	7 9	30	/	/	-	-	-	18	43	SW	SSW	SW	SSW	SW
16	80	59	-	-	-	0.7	2 32	11	/	/	-	X	-	18	50	WNW	WSW	WSW	WNW	W
17	79	53	-	-	-	-	-	-	/	/	-	-	-	11	32	W	WSW	WSW	WNW	W
18	81	61	-	-	-	-	-	-	/	/	-	-	-	11	25	WSW	S	SW	SW	SSW
19	78	55	-	-	-	-	-	-	/	/	-	-	-	14	36	SSW	SW	SSW	SW	S
20	72	55	-	-	-	0.2	0 28	2	/	/	-	-	-	18	54	SW	S	SSW	SSW	SSW
21	82	65	-	-	-	6.7	8 40	36	/	/	-	-	-	14	43	WNW	SW	WSW	WSW	W
22	75	53	-	-	-	-	-	-	/	/	-	-	-	11	32	WSW	WSW	SW	WSW	SW
23	78	59	-	-	-	-	-	-	/	/	-	-	-	14	40	SSW	SSW	SSW	SW	S
24	81	67	65	41	5	1.1	5 26	23	/	/	-	-	-	14	32	SSW	SSW	SSW	SSW	SW
25	86	63	454	370	83	-	-	-	/	/	-	-	-	11	36	SSW	-	SSE	S	SSW
26	89	83	-	-	-	12.7	9 51	41	/	/	-	-	-	22	47	SW	SSW	SW	SW	SSW
27	82	61	-	-	-	1.6	1 50	8	/	/	-	-	-	14	43	W	SW	WSW	WSW	W
28	83	58	118	104	17	1.3	0 52	4	/	/	-	-	-	11	36	W	WSW	SW	WSW	E
29	89	56	478	430	119	-	-	-	/	/	-	-	-	4	14	SSE	SE	E	S	E
30	95	89	612	524	282	0.2	1 24	6	/	/	-	-	-	7	22	NE	-	E	ESE	ENE
31	87	80	-	-	-	-	-	-	/	/	-	-	-	11	25	ENE	ENE	E	ENE	NNE
M	83		3363	2863	657	66.2	83 58				-	1	1	13						

* = Sneeuw ▲ = Hagel ⌀ = Onweer <0.1 = Neerslag te wijten aan mist of dauw

DEURNE 04°28' 18'' E 51°11' 31'' N 10 m Periode 00-24 h W.T. NOVEMBER 2008

	DRUK hPa	BEWOLKING Octas				ZON DUUR	TEMPERATUREN °C LUCHT			GRAS	MINIMUM ONDER NAAKTE GROND					
	GEM.	0h	6	12	18	h min	GEM.	MAX.	MIN.	MIN.	-2cm	-5cm	-10cm	-20cm	-50cm	-100cm
1	1006.5	8	8	8	7	/ /	6.6	8.3	3.8	4.2	7.6	8.0	7.9	8.2	9.8	11.7
2	1014.6	9	2	5	6	/ /	7.9	10.8	2.0	3.0	6.9	7.4	7.2	7.6	9.6	11.5
3	1013.5	9	8	8	7	/ /	8.5	10.4	5.1	5.7	8.2	8.3	8.3	8.5	9.7	11.4
4	1018.7	9	9	1	8	/ /	7.2	12.6	3.9	5.1	8.3	8.4	8.4	8.6	9.8	11.3
5	1014.9	8	7	8	8	/ /	8.9	10.3	7.4	7.8	9.0	9.1	9.1	9.2	9.9	11.2
6	1015.0	8	6	3	6	/ /	9.4	13.6	5.2	6.1	9.0	9.2	9.2	9.4	10.0	11.2
7	1013.1	9	7	7	8	/ /	9.4	13.5	4.2	4.3	8.3	8.7	8.5	8.9	10.1	11.2
8	1016.7	9	0	2	6	/ /	9.4	12.7	4.6	4.1	8.2	8.6	8.5	8.8	10.1	11.2
9	1013.8	8	8	8	3	/ /	10.8	12.4	9.6	8.3	9.3	9.3	9.3	9.4	10.1	11.2
10	1009.4	7	7	7	8	/ /	13.8	15.7	11.7	10.5	9.3	9.4	9.4	9.5	10.2	11.2
11	1008.1	8	6	6	1	/ /	10.6	15.6	7.8	6.9	9.2	9.6	9.4	9.8	10.4	11.2
12	1016.7	9	2	4	7	/ /	8.7	11.3	6.8	6.1	8.6	9.0	8.8	9.1	10.3	11.2
13	1024.5	8	7	2	4	/ /	8.8	12.4	7.2	6.6	8.7	9.0	8.9	9.1	10.2	11.2
14	1025.6	8	8	8	8	/ /	9.0	11.2	7.6	7.7	8.8	9.0	8.9	9.1	10.1	11.1
15	1027.0	8	8	8	8	/ /	11.5	12.2	10.9	10.1	9.7	9.7	9.7	9.7	10.1	11.0
16	1029.2	8	8	8	5	/ /	10.1	12.3	2.6	4.6	8.7	9.2	9.1	9.5	10.3	11.0
17	1030.6	9	5	6	7	/ /	6.2	9.0	0.8	3.4	8.0	8.5	8.3	8.7	10.1	11.1
18	1015.2	8	7	7	1	/ /	8.0	9.8	5.8	5.7	8.4	8.6	8.5	8.7	9.9	11.0
19	1018.9	8	5	8	7	/ /	8.8	9.9	7.3	6.5	8.3	8.5	8.4	8.6	9.8	10.9
20	1013.8	8	8	6	8	/ /	10.4	12.3	8.9	8.6	8.8	8.9	8.9	9.0	9.8	10.8
21	1008.1	3	7	5	7	/ /	7.1	10.3	2.8	3.0	7.2	7.8	7.6	8.0	9.8	10.8
22	1009.9	6	7	7	6	/ /	2.8	5.1	0.8	1.3	5.8	6.3	6.1	6.6	9.1	10.7
23	999.9	3	1	8	8	/ /	1.0	3.3	-0.1	0.4	5.0	5.4	5.3	5.7	8.4	10.4
24	995.1	8	6	8	0	/ /	1.8	3.9	-1.8	-1.4	3.8	4.4	4.2	4.7	7.7	10.1
25	1014.4	5	6	6	6	/ /	4.2	7.3	0.8	-0.2	3.8	4.3	4.1	4.5	7.3	9.8
26	1025.4	9	2	7	8	/ /	4.8	7.5	-0.1	-0.4	4.0	4.4	4.3	4.7	7.0	9.5
27	1017.7	8	8	8	8	/ /	5.6	6.6	3.7	3.9	5.8	5.8	5.8	5.9	7.1	9.2
28	1003.5	8	7	7	7	/ /	3.7	4.9	2.5	2.9	5.6	5.9	5.8	6.0	7.3	9.1
29	995.4	8	7	7	7	/ /	1.9	5.0	-1.8	-0.4	4.3	4.9	4.7	5.1	7.2	9.0
30	993.2	9	8	8	7	/ /	2.1	4.4	-0.9	-0.7	4.0	4.5	4.3	4.7	6.8	8.9
M	1013.6					/ /	7.3	9.8	4.3							

Bewolking : 9 = bovenlucht niet zichtbaar / = Ontbrekend gegeven

DEURNE 04°28' 18'' E 51°11' 31'' N 10 m Periode 00-24 h W.T. NOVEMBER 2008

	REL.VOCHT. %		MIST DUUR IN MINUTEN			NEERSLAG	DUUR		* (cm)		DAG MET			WIND SNELHEID (km/h) en RICHTING						
	GEM.	MIN.	<1000m	<500m	<200m	1/m2	h min	%	6h	18	*	▲	⁎	GEM.	MAX.		0h	6h	12h	18h
1	95	91	10	-	-	5.8	9 21	39	/	/	-	-	-	14	32	E	NE	NE	E	E
2	88	74	-	-	-	<0.1	0 2	0	/	/	-	-	-	11	22	NE	ESE	SE	SSE	NNE
3	94	89	374	207	128	0.2	(1)	-	/	/	-	-	-	7	25	ENE	NE	NE	E	E
4	95	83	1147	666	407	-	-	-	/	/	-	-	-	7	29	NNE	ENE	ENE	NE	NNE
5	92	86	-	-	-	0.5	3 57	16	/	/	-	-	-	11	32	NE	NNE	NE	NE	NE
6	92	77	90	66	16	-	-	-	/	/	-	-	-	7	14	E	SSE	SW	E	E
7	86	62	49	48	20	0.7	4 14	18	/	/	-	-	-	11	36	S	SE	SSE	S	S
8	82	66	-	-	-	<0.1	0 18	1	/	/	-	-	-	18	47	S	SSW	S	S	SSE
9	77	69	-	-	-	4.1	3 44	16	/	/	-	-	-	22	61	SW	S	SW	SSW	S
10	80	69	-	-	-	4.6	7 46	32	/	/	-	-	-	29	63	SSW	SSW	SW	SSW	SSW
11	81	67	-	-	-	8.0	7 6	30	/	/	-	-	-	25	76	SSW	SSW	WSW	SW	WSW
12	83	65	-	-	-	0.1	0 35	2	/	/	-	-	-	14	32	SW	SSW	SSW	SW	W
13	81	51	-	-	-	0.1	0 6	0	/	/	-	-	-	11	29	SSW	SW	SW	WSW	SSW
14	92	80	-	-	-	0.3	16 9	67	/	/	-	-	-	14	32	SSW	SSW	SSW	SW	SSW
15	88	83	-	-	-	<0.1	2 14	9	/	/	-	-	-	14	32	WSW	SW	WSW	W	W
16	89	76	-	-	-	2.1	5 41	24	/	/	-	-	-	11	32	NW	WSW	W	NNW	NNW
17	77	59	10	-	-	<0.1	0 45	3	/	/	-	-	-	7	29	SSW	-	SSW	SW	S
18	85	70	-	-	-	1.1	5 36	23	/	/	-	-	-	14	47	WNW	SSW	SSW	SW	NNW
19	88	81	-	-	-	<0.1	3 26	14	/	/	-	-	-	14	32	WSW	W	WSW	WSW	WSW
20	83	73	-	-	-	0.3	3 12	13	/	/	-	-	-	22	54	WNW	WSW	WSW	WNW	NW
21	75	47	-	-	-	3.2	7 13	30	/	/	X	X	-	29	83	NW	W	WNW	NW	WNW
22	81	62	-	-	-	2.8	6 19	26	/	/	X	-	-	18	58	NW	N	N	NW	NW
23	91	78	-	-	-	12.6	8 22	35	/	/	X	-	-	14	50	SSW	WSW	W	S	S
24	91	82	-	-	-	4.1	6 20	26	/	/	X	-	-	11	36	NE	WSW	WSW	NE	N
25	85	67	-	-	-	0.3	1 49	8	/	/	X	-	-	11	29	NNW	W	NNW	NNW	NW
26	89	74	28	50	-	0.4	2 46	12	/	/	-	-	-	11	25	WSW	NNW	WSW	WSW	SW
27	89	83	-	-	-	0.2	3 5	13	/	/	-	-	-	22	40	SSW	SW	SSW	SSW	SSW
28	85	79	-	-	-	-	-	-	/	/	-	-	-	14	36	SSW	S	SSW	SSW	S
29	88	78	36	27	10	-	-	-	/	/	-	-	-	7	18	S	SSE	SE	SSW	ESE
30	93	91	-	-	-	3.0	12 54	54	/	/	X	-	-	7	22	ENE	E	E	ESE	E
M	87		1744	1064	581	54.5	123 0				6	1	-	14						

* = Sneeuw ▲ = Hagel ⁎ = Onweer

<0.1 = Neerslag te wijten aan mist of dauw

DEURNE 04°28' 18'' E 51°11' 31'' N 10 m Periode 00-24 h W.T. DECEMBER 2008

	DRUK hPa	BEWOLKING Octas				ZON DUUR	TEMPERATUREN °C LUCHT			GRAS	MINIMUM ONDER NAAKTE GROND					
	GEM.	0h	6	12	18	h min	GEM.	MAX.	MIN.	MIN.	-2cm	-5cm	-10cm	-20cm	-50cm	-100cm
1	999.3	8	7	8	8	/ /	4.5	6.4	2.4	2.3	4.9	5.1	5.0	5.3	6.8	8.8
2	1004.7	6	7	7	6	/ /	4.3	5.7	3.0	2.4	5.0	5.4	5.2	5.5	6.9	8.7
3	999.1	1	8	3	7	/ /	3.3	5.3	1.0	0.8	4.2	4.7	4.5	4.9	6.7	8.6
4	990.8	9	8	8	4	/ /	3.3	6.8	0.8	0.8	4.0	4.4	4.3	4.6	6.4	8.4
5	987.9	8	7	8	7	/ /	5.9	7.0	4.8	3.8	4.7	4.8	4.7	4.9	6.4	8.3
6	1008.2	7	2	6	2	/ /	5.8	8.5	3.6	2.8	4.7	5.0	4.9	5.1	6.5	8.2
7	1026.4	4	1	1	0	/ /	5.3	8.9	0.5	0.9	4.1	4.5	4.4	4.7	6.5	8.1
8	1025.0	9	0	8	8	/ /	0.8	2.4	-1.1	-0.4	3.5	4.0	3.8	4.2	6.2	8.0
9	1015.5	8	7	8	7	/ /	2.4	5.1	0.2	1.0	3.7	4.0	3.9	4.2	6.0	7.9
10	1014.1	7	7	5	7	/ /	3.1	4.6	1.7	0.5	3.3	3.7	3.5	3.9	5.8	7.8
11	1011.3	8	7	7	7	/ /	2.9	4.5	1.7	1.1	3.7	4.0	3.9	4.2	5.8	7.7
12	1016.7	8	8	7	5	/ /	1.5	2.6	-0.7	-1.1	3.0	3.5	3.3	3.7	5.6	7.5
13	1003.0	9	2	4	3	/ /	-0.4	2.0	-2.8	-3.0	2.1	2.6	2.4	2.8	5.2	7.4
14	1000.3	8	6	7	7	/ /	3.4	7.2	0.8	0.5	2.2	2.6	2.4	2.8	5.0	7.2
15	1014.9	9	8	8	8	/ /	2.2	3.3	0.4	-0.2	2.4	2.8	2.6	3.0	4.9	7.1
16	1016.5	8	8	8	8	/ /	2.3	3.0	0.4	1.3	3.4	3.6	3.5	3.6	4.9	6.9
17	1013.9	8	8	8	8	/ /	2.9	6.2	0.1	1.0	3.5	3.7	3.6	3.8	5.0	6.9
18	1018.9	9	4	8	7	/ /	4.8	9.0	1.2	0.9	3.0	3.4	3.2	3.6	5.1	6.9
19	1022.9	8	6	2	3	/ /	7.3	9.0	5.3	3.6	4.6	4.6	4.7	4.7	5.1	6.8
20	1023.9	8	8	8	8	/ /	9.4	11.8	6.7	5.9	4.9	4.9	4.9	4.9	5.5	6.8
21	1030.7	8	8	8	1	/ /	9.6	10.6	8.1	7.5	6.5	6.4	6.5	6.4	5.9	6.9
22	1033.4	8	8	8	7	/ /	9.3	10.8	2.9	3.7	6.4	6.6	6.5	6.7	6.5	7.0
23	1036.5	8	2	7	8	/ /	5.0	8.1	-0.3	1.7	5.1	5.5	5.4	5.7	6.7	7.2
24	1033.9	8	8	8	8	/ /	7.1	7.8	4.9	4.0	5.9	6.2	6.1	6.3	6.7	7.3
25	1034.2	1	1	8	9	/ /	3.9	5.5	0.5	-0.3	4.4	4.9	4.7	5.2	6.6	7.4
26	1037.8	9	0	0	0	/ /	-0.2	2.2	-2.0	-2.4	2.4	3.0	2.8	3.3	6.0	7.4
27	1035.8	9	0	1	1	/ /	-2.1	0.6	-4.1	-3.8	1.4	2.0	1.8	2.3	5.2	7.3
28	1030.9	9	0	0	0	/ /	-2.3	0.2	-5.6	-5.4	0.9	1.4	1.2	1.7	4.5	7.0
29	1030.5	9	1	0	0	/ /	-4.0	-0.1	-7.1	-5.7	0.5	0.9	0.8	1.2	4.1	6.7
30	1031.0	9	1	1	1	/ /	-4.0	1.1	-8.7	-5.7	0.3	0.7	0.6	0.9	3.7	6.4
31	1027.7	9	2	1	9	/ /	-3.3	1.3	-7.7	-5.2	0.3	0.6	0.5	0.9	3.4	6.2
M	1018.6					/ /	3.0	5.4	0.4							

Bewolking : 9 - bovenlucht niet zichtbaar / = Ontbrekend gegeven

DEURNE 04°28' 18'' E 51°11' 31'' N 10 m Periode 00-24 h W.T. DECEMBER 2008

	REL.VOCHT. %		MIST DUUR IN MINUTEN			NEERSLAG					DAG MET			WIND SNELHEID (km/h) en RICHTING						
							DUUR		* (cm)											
	GEM.	MIN.	<1000m	<500m	<200m	1/m2	h min	%	6h	18	*	▲	R	GEM.	MAX.		0h	6h	12h	18h
1	93	83	65	38	6	0.8	7 4	29	/	/	-	-	-	4	14	W	ESE	E	S	N
2	88	75	-	-	-	4.6	8 28	35	/	/	X	-	-	14	43	SSW	W	W	SW	S
3	90	76	-	-	-	0.1	1 4	4	/	/	-	-	-	11	25	W	SW	W	WSW	W
4	90	80	-	-	-	7.2	6 22	27	/	/	X	-	-	18	47	SW	SW	SSE	SSE	SW
5	89	82	-	-	-	1.1	6 34	27	/	/	-	-	-	14	32	SW	SSW	SW	SSW	WSW
6	88	79	-	-	-	2.3	4 19	18	/	/	-	-	-	11	32	WNW	SW	W	W	WNW
7	86	66	-	-	-	0.1	0 37	3	/	/	-	-	-	7	29	NW	W	WNW	W	SW
8	93	89	121	-	-	-	-	-	/	/	-	-	-	11	25	WSW	SW	SW	SW	S
9	91	87	-	-	-	3.2	5 10	22	/	/	X	-	-	11	29	NW	WSW	SW	VR	WNW
10	91	84	-	-	-	2.4	4 17	18	/	/	-	-	-	11	22	W	WNW	W	W	SW
11	90	82	-	-	-	1.6	5 4	21	/	/	-	-	-	14	25	SW	SW	SSW	SW	SSW
12	88	82	-	-	-	-	-	-	/	/	-	-	-	14	32	SSE	WSW	SSW	SSW	S
13	82	73	-	-	-	<0.1	1 5	5	/	/	X	-	-	18	47	SE	SSE	SE	SE	ESE
14	81	69	-	-	-	<0.1	0 19	1	/	/	-	-	-	11	29	ENE	ESE	ESE	E	ENE
15	91	87	-	-	-	-	-	-	/	/	-	-	-	11	29	NE	NE	NE	ENE	NE
16	88	86	-	-	-	-	-	-	/	/	-	-	-	11	18	WSW	E	E	SSE	SSE
17	94	87	105	27	-	0.4	4 15	18	/	/	-	-	-	11	22	W	WSW	S	WSW	W
18	93	87	-	-	-	<0.1	2 31	10	/	/	-	-	-	14	29	SW	WSW	S	SW	SSW
19	80	67	-	-	-	2.7	3 17	14	/	/	-	-	-	18	36	WNW	SW	WNW	WNW	SW
20	90	85	-	-	-	6.6	14 31	60	/	/	-	-	-	18	43	W	SW	W	W	NNW
21	86	77	-	-	-	0.1	0 49	3	/	/	-	-	-	18	36	WSW	SSW	W	W	SW
22	88	80	81	34	-	<0.1	1 54	8	/	/	-	-	-	14	40	W	WSW	WSW	WNW	WNW
23	94	83	385	246	63	-	-	-	/	/	-	-	-	4	11	S	SW	S	S	SSE
24	87	76	-	-	-	<0.1	0 19	1	/	/	-	-	-	11	25	WNW	S	SW	WNW	NNW
25	88	78	-	-	-	-	-	-	/	/	-	-	-	14	32	ENE	N	NE	NNE	ENE
26	74	59	-	-	-	-	-	-	/	/	-	-	-	18	36	ENE	E	ENE	ENE	ENE
27	80	66	-	-	-	-	-	-	/	/	-	-	-	14	32	E	ENE	ENE	E	ENE
28	78	66	-	-	-	-	-	-	/	/	-	-	-	14	36	E	ENE	ENE	E	ENE
29	84	69	-	-	-	-	-	-	/	/	-	-	-	7	22	ESE	E	ENE	E	E
30	86	67	-	-	-	-	-	-	/	/	-	-	-	4	14	NNE	E	ENE	-	NE
31	88	68	192	40	7	-	-	-	/	/	-	-	-	4	18	SSW	N	SSE	VR	N
M	87		949	385	76	33.2	77 59				4	-	-	12						

* = Sneeuw ▲ = Hagel R = Onweer <0.1 = Neerslag te wijten aan mist of dauw

APPENDIX G. OVERVIEW OF MAINTENANCE - DREDGING ACTIVITIES

Dredging and dumping volumes [10^3 m^3] from October '08 till March '09

Dredging locations									
	Week 40	*Week 41*	*Week 42*	*Week 43*	*Week 44*	*Week 45*	*Week 46*	*Week 47*	*Week 48*
Drempel van Vlissingen	-	-	-	-	-	-	-	-	-
Drempel van Borssele	-	-	-	-	-	-	-	50.58	19.51
Pas van Terneuzen	-	-	-	-	-	-	-	-	-
Put van Terneuzen	8.70	-	-	-	-	-	-	-	-
Gat van Ossensisse	-	-	-	-	-	-	-	-	-
Drempel van Walsoorden	-	-	-	-	33.10	-	-	-	-
Overloop Hansweert	-	-	-	-	-	-	-	-	-
Drempel van Hansweert	40.72	-	-	-	-	-	-	123.33	106.18
Overloop van Valkenisse (B 56-62)	162.01	76.78	66.43	-	-	90.75	-	-	64.32
Drempel van Valkenisse	-	83.38	38.16	-	8.03	62.91	-	-	-
Drempel van Bath	-	-	-	-	-	-	-	117.94	52.47
Nauw van Bath (B 75)	-	-	65.00	48.50	18.82	94.61	133.69	-	-
Vaarwater Bath (B72-76)	-	-	-	-	-	-	-	-	-
Noordzeeterminal	-	-	-	-	-	-	-	-	-
Containerkaai noord	-	-	-	-	-	-	-	-	-
Containerkaai zuid	-	-	-	-	-	-	-	-	-
Vaarwater Oudendijk	-	-	-	-	-	-	-	-	-
Drempel van Zandvliet	186.47	5.77	-	-	-	-	-	-	-
Zandvliet+Berendrecht sluis	-	-	-	18.25	-	-	-	-	-
Drempel van Frederik	-	-	-	-	-	49.94	59.22	70.12	62.42
Drempel van Lillo	-	-	-	-	53.74	-	-	-	-
Lillo vaarwater plaat	-	-	-	-	-	-	-	-	-
Toeg Boud+Calew sluis	-	-	-	-	29.79	-	-	-	-
Deurganckdok	-	-	-	49.45	-	-	-	-	-
De Parel	-	-	-	-	-	-	-	-	-
Ketelplaat	-	-	-	-	-	-	-	-	-
Kallo sluis	13.46	40.60	47.13	-	-	-	35.35	38.19	27.92
Krankeloon	-	-	-	-	-	-	-	-	24.30
Kaaien 23-27	-	-	-	-	-	-	-	-	-

Dumping locations									
	Week 40	*Week 41*	*Week 42*	*Week 43*	*Week 44*	*Week 45*	*Week 46*	*Week 47*	*Week 48*
Spijkerplaat	-	-	-	-	-	-	-	26.09	9.04
Everingen	-	-	-	-	-	-	-	24.49	10.47
Ellewoutsdijk	8.70	-	-	-	-	-	-	-	-
Biezelingse Ham	166.90	148.85	87.41	-	41.13	115.87	-	103.35	76.21
Gat van Ossenisse	35.83	11.31	17.18	-	-	37.79	-	19.98	29.97
Schaar van Waarde	-	-	65.00	48.50	18.82	-	-	-	-
Schaar Ouden Doel	186.47	5.77	-	-	43.43	40.34	0.23	0.05	46.69
Opspuitingen Deurganckdok	-	-	-	-	-	-	-	-	-
Oosterweel	5.12	18.93	22.44	34.23	17.06	-	16.80	16.63	15.94
Plaat van Boomke	-	-	-	-	-	-	-	-	-
Punt van Melsele	8.34	21.67	24.69	33.47	23.04	-	18.55	21.55	17.06
Opspuitingen Kruibeke	-	-	-	-	-	-	-	-	-
Opspuitingen Doeldok	-	-	-	-	-	104.20	192.69	188.01	151.74

Dredging locations									
	Week 49	*Week 50*	*Week 51*	*Week 52*	*Week 01*	*Week 02*	*Week 03*	*Week 04*	*Week 05*
Drempel van Vlissingen	-	-	71.99	-	-	-	-	-	-
Drempel van Borssele	-	75.07	39.12	-	-	-	-	69.-8	-
Pas van Terneuzen	100.78	-	-	-	-	-	-	-	-
Put van Terneuzen	-	-	-	-	-	-	-	-	-
Gat van Ossensisse	-	-	-	-	-	-	-	-	-
Drempel van Walsoorden	-	-	-	-	-	34.68	79.62	-	-
Overloop Hansweert	-	-	-	-	-	-	-	-	-
Drempel van Hansweert	-	82.37	-	-	-	-	-	-	-
Overloop van Valkenisse (B 56-62)	-	-	-	-	-	-	-	146.24	-
Drempel van Valkenisse	-	54.14	53.90	-	-	-	-	-	-
Drempel van Bath	24.55	19.76	-	-	-	-	-	-	47.9-8
Nauw van Bath (B 75)	-	-	-	-	-	-	-	-	5-.942
Vaarwater Bath (B72-76)	-	-	-	-	-	-	-	-	27.75
Noordzeeterminal	-	-	-	-	-	-	-	-	-
Containerkaai noord	-	-	-	-	-	-	-	-	-
Containerkaai zuid	-	-	-	-	-	-	-	-	-
Vaarwater Oudendijk	-	-	-	-	-	-	-	-	-
Drempel van Zandvliet	16.02	-	-	-	-	-	71.65	1-.761	-
Zandvliet+Berendrecht sluis	5.57	57.48	-	-	-	-	-	18.79	61.91
Drempel van Frederik	51.35	5.19	-	-	-	-	-	-	-
Drempel van Lillo	-	-	-	-	-	16.80	-	-	-
Lillo vaarwater plaat	-	-	-	-	-	-	-	-	-
Toeg Boud+Calew sluis	-	-	-	-	-	-	-	-	-
Deurganckdok	-	-	-	-	-	-	-	-	-
De Parel	12.07	18.55	-	-	-	-	-	-	-
Ketelplaat	-	-	-	-	-	-	-	-	-
Kallo sluis	18.35	-	-	-	-	28.66	82.90	7.27	-
Krankeloon	-	-	-	-	-	-	-	-	-
Kaaien 23-27	-	-	-	-	-	-	-	-	-

Dumping locations									
	Week 49	*Week 50*	*Week 51*	*Week 52*	*Week 01*	*Week 02*	*Week 03*	*Week 04*	*Week 05*
Spijkerplaat	-	75.07	95.58	-	-	-	69.-8	-	-
Everingen	-	-	-	-	-	-	-	-	-
Ellewoutsdijk	100.78	-	15.53	-	-	-	-	-	-
Biezelingse Ham	-	105.07	42.20	-	25.78	65.14	1-7.581	95.55	25.78
Gat van Ossenisse	-	31.44	11.70	-	8.9-2	14.48	38.66	31.-57	8.9-2
Schaar van Waarde	-	-	-	-	-	-	-	-	-
Schaar Ouden Doel	59.43	-	-	-	16.80	71.65	1-.761	-	16.80
Opspuitingen Deurganckdok	-	-	-	-	-	-	-	-	-
Oosterweel	13.42	32.68	-	-	13.28	41.-24	13.69	29.31	13.28
Plaat van Boomke	-	-	-	-	-	-	-	-	-
Punt van Melsele	18.44	24.80	-	-	15.38	41.87	12.37	32.6-3	15.38
Opspuitingen Kruibeke	-	-	-	-	-	-	-	-	-
Opspuitingen Doeldok	36.62	43.50	-	-	-	-	-	-	-

Dredging locations									
	Week 06	*Week 07*	*Week 08*	*Week 09*	*Week 10*	*Week 11*	*Week 12*	*Week 13*	*Week 14*
Drempel van Vlissingen	-	-	-	-	-	-	63.26	4-.767	-
Drempel van Borssele	-	86.96	139.53	45.78	-	-	-	-	-
Pas van Terneuzen	-	-	-	-	-	-	-	82.16	2.30
Put van Terneuzen	-	-	-	-	-	12.17	217.87	2-.168	-
Gat van Ossensisse	-	-	-	-	-	-	-	-	-
Drempel van Walsoorden	-	-	-	-	-	-	-	-	-
Overloop Hansweert	-	-	-	-	-	-	167.79	-	-
Drempel van Hansweert	-	-	-	-	42.43	-	-	172.4-2	187.77
Overloop van Valkenisse (B 56-62)	-	-	-	-	-	58.78	-	-	-
Drempel van Valkenisse	-	55.77	94.62	4.-37	-	-	-	-	-
Drempel van Bath	59.77	67.68	4-.257	19.9-1	-	-	-	-	-
Nauw van Bath (B 75)	39.50	4.-37	-	-	-	-	-	-	-
Vaarwater Bath (B72-76)	3-.949	19.66	-	-	-	-	-	-	-
Noordzeeterminal	-	-	-	-	-	-	-	-	-
Containerkaai noord	-	-	-	-	-	-	-	-	-
Containerkaai zuid	-	-	-	-	-	-	-	-	-
Vaarwater Oudendijk	-	-	-	-	-	-	-	-	-
Drempel van Zandvliet	-	-	-	113.23	9.46	13.97	-	-	122.46
Zandvliet+Berendrecht sluis	66.67	15.18	-	-	21.94	-	-	-	-
Drempel van Frederik	-	-	-	-	83.-45	61.83	-	33.79	9-.125
Drempel van Lillo	-	-	-	-	-	-	-	8-.446	-
Lillo vaarwater plaat	-	-	-	-	-	9.85	-	-	-
Toeg Boud+Calew sluis	-	28.96	-	-	-	-	-	-	-
Deurganckdok	-	25.82	63.44	64.85	3.52	-	-	-	-
De Parel	-	-	-	-	44.35	-	-	-	-
Ketelplaat	-	-	-	-	-	-	-	-	-
Kallo sluis	-	-	-	-	-	-	-	22.-29	2.60
Krankeloon	-	-	-	-	-	-	-	-	-
Kaaien 23-27	-	-	-	-	-	-	-	-	-

Dumping locations									
	Week 06	*Week 07*	*Week 08*	*Week 09*	*Week 10*	*Week 11*	*Week 12*	*Week 13*	*Week 14*
Spijkerplaat	-	86.96	139.53	45.78	-	12.17	281.13	143.-94	2.30
Everingen	-	-	-	-	-	-	-	-	-
Ellewoutsdijk	-	-	-	-	-	-	-	-	-
Biezelingse Ham	95.64	1-8.325	92.52	23.94	36.99	44.25	167.79	172.4-2	54.74
Gat van Ossenisse	34.57	38.83	42.37	-	5.44	14.53	-	-	53.29
Schaar van Waarde	-	-	-	-	-	-	-	-	79.73
Schaar Ouden Doel	-	-	-	113.23	1-2.719	75.80	-	114.23	2-8.174
Opspuitingen Deurganckdok	-	-	-	-	-	-	-	-	-
Oosterweel	35.20	37.19	28.70	34.70	24.00	4.58	-	12.23	1.61
Plaat van Boomke	-	-	-	-	35.60	-	-	-	-
Punt van Melsele	31.48	32.77	34.75	3-.158	-	5.27	-	9.80	5.39
Opspuitingen Kruibeke	-	-	-	-	-	-	-	-	-
Opspuitingen Doeldok	-	-	-	-	-	-	-	-	-

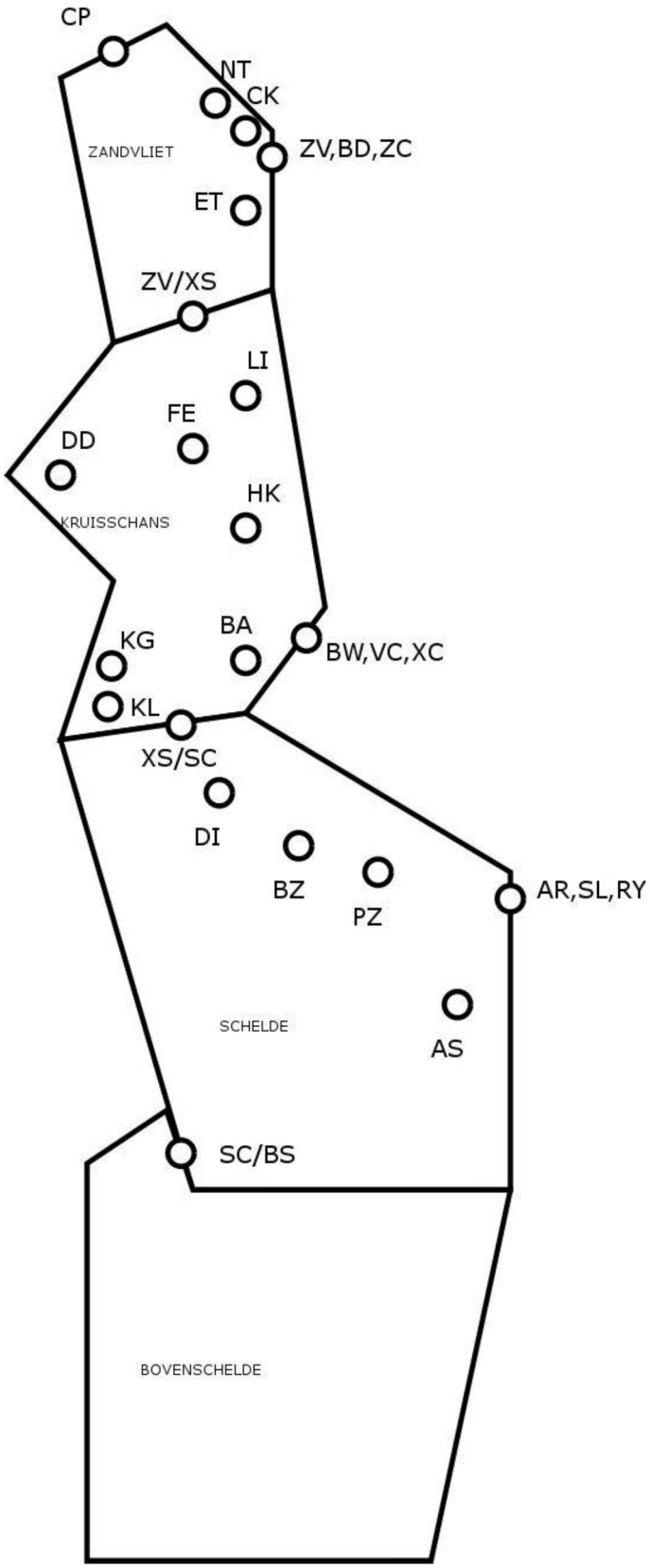
APPENDIX H.

NAVIGATION

H.1 Description of the areas

Area	*Global description*	*Detailed description*
1	Belgian border → Locks of Zandvliet – Berendrecht	Transit point CP → exit/entry point ZC, BD, ZV, NT, CK, ET or transit point ZV/XS
2	Locks of Zandvliet – Berendrecht → Deurganckdok	Transit point CP or entry/exit point ZC, BD, ZV, NT, CK, ET → transit point ZV/XS
3	Deurganckdok → Lock of Kallo	Transit point ZV/XS or entry/exit point DD → exit/entry point BA, BW, FE, HK, KG, KL, LI, VC, XC or transit point XS/SC
4	Lock of Kallo → Lock of Royers	Transit point XS/SC or entry/exit point DD, BA, BW, FE, HK, KG, KL, LI, VC, XC → entry/exit point AR, AS, BZ, DI, KT, PZ, RY, SL or transit point SC/BS

	CID	MEANING	TYPE
GA	GEBIED ANTWERPEN		
SA	Saeftinge		
	CP	Coordinatiepunt (blokgrens SA/ZV)	P
	CP2	Coordinatiepunt (blokgrens SA/ZV)	P
SC	Schelde		
	AR	Antwerpen Rede	E
	AS	Antwerpen Scheldekade/steiger	E
	AX	Antwerpen zonder detaillering	E
	BZ	BP Zwijndrecht	E
	DI	Haven Dredging International	E
	PZ	Polysar Zwijndrecht	E
	RY	Royerssluis	E
	SC/BS	Blokgrens SC/BS (boveneinde rede Antwerpen)	P
	SL	Sluizen Antwerpen Rechteroever	E
XS	Kruisschans		
	BA	Bayer Kallo	E
	BW	Boudewijnsluis	E
	DD	Deurganckdok	E
	FE	Steiger Fenol	E
	HK	Steiger Haltermann	E
	KG	Kallo geul	E
	KL	Kallosluis	E
	LI	Steiger Lillo	E
	VC	Van Cauwelaertsluis	E
	XC	Kruisschanssluiscomplex	E
	XS/SC	Blokgrens Kruisschans / Schelde	P
	XS/SC2	Blokgrens Kruisschans / Schelde	P
ZV	Zandvliet		
	BD	Berendrechtsluis	E
	CK	Containerkade Antwerpen	E
	ET	Europaterminal	E
	NT	Noordzeeterminal	E
	ZC	Zandvliet / Berendrecht sluiszencomplex	E
	ZV	Zandvliet sluis	E
	ZV/XS	Blokgrens Zandvliet / Kruisschans	P
	ZV/XS2	Blokgrens Zandvliet / Kruisschans	P



Sketch of the different areas of navigation

H.2 Weekly data

Week 40 (29/09/2008 – 05/10/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	90	89	1	23	67
	0 – 8 m	753	404	348	363	386
	8 – 12 m	197	0	197	66	131
	> 12 m	39	0	39	9	30
2	Unknown	87	83	4	25	62
	0 – 8 m	555	342	212	305	246
	8 – 12 m	79	0	79	42	37
	> 12 m	10	0	10	4	6
3	Unknown	85	83	2	22	63
	0 – 8 m	520	328	191	286	230
	8 – 12 m	46	0	46	24	22
	> 12 m	1	0	1	1	0
4	Unknown	27	26	1	11	16
	0 – 8 m	137	98	38	100	36
	8 – 12 m	1	0	1	1	0
	> 12 m	0	0	0	0	0
Week 41 (06/10/2008 – 12/10/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	108	107	1	20	88
	0 – 8 m	838	479	359	418	415
	8 – 12 m	229	0	229	70	159
	> 12 m	25	0	25	4	21
2	Unknown	98	90	8	23	75
	0 – 8 m	642	409	233	360	277
	8 – 12 m	94	0	94	46	48
	> 12 m	7	0	7	2	5
3	Unknown	94	91	3	20	73
	0 – 8 m	599	387	212	338	256
	8 – 12 m	53	0	53	25	28
	> 12 m	0	0	0	0	0
4	Unknown	163	107	56	122	40
	0 – 8 m	25	24	1	9	16
	8 – 12 m	163	107	56	122	40
	> 12 m	0	0	0	0	0

Week 42 (13/10/2008 – 19/10/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	75	67	8	20	54
	0 – 8 m	906	496	410	413	492
	8 – 12 m	225	0	225	80	145
	> 12 m	23	0	23	4	19
2	Unknown	66	56	10	19	46
	0 – 8 m	668	426	242	350	317
	8 – 12 m	94	0	94	53	41
	> 12 m	4	0	4	1	3
3	Unknown	65	56	9	19	45
	0 – 8 m	629	414	215	331	297
	8 – 12 m	54	0	54	31	23
	> 12 m	0	0	0	0	0
4	Unknown	16	13	3	6	10
	0 – 8 m	157	114	43	114	43
	8 – 12 m	1	0	1	1	0
	> 12 m	0	0	0	0	0
Week 43 (20/10/2008 – 26/10/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	81	79	1	16	65
	0 – 8 m	857	482	375	393	461
	8 – 12 m	207	0	207	65	142
	> 12 m	28	1	27	5	23
2	Unknown	80	76	4	17	63
	0 – 8 m	632	408	224	324	306
	8 – 12 m	73	0	73	40	33
	> 12 m	7	1	6	3	4
3	Unknown	77	76	1	14	63
	0 – 8 m	596	395	201	304	290
	8 – 12 m	42	0	42	22	20
	> 12 m	2	1	1	2	0
4	Unknown	19	19	0	7	12
	0 – 8 m	152	114	38	105	47
	8 – 12 m	0	0	0	1	0
	> 12 m	1	1	0	1	0

Week 44 (27/10/2008 – 02/11/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	109	107	2	17	90
	0 – 8 m	832	418	413	394	435
	8 – 12 m	237	1	236	73	164
	> 12 m	28	0	28	4	24
2	Unknown	105	101	4	16	87
	0 – 8 m	611	368	242	329	280
	8 – 12 m	96	1	95	47	49
	> 12 m	7	0	7	3	4
3	Unknown	106	103	3	16	85
	0 – 8 m	566	349	216	304	260
	8 – 12 m	58	1	57	28	30
	> 12 m	0	0	0	0	0
4	Unknown	17	16	1	5	11
	0 – 8 m	137	104	33	106	31
	8 – 12 m	3	0	3	2	1
	> 12 m	0	0	0	0	0
Week 45 (03/11/2008 – 09/11/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	70	62	7	21	47
	0 – 8 m	814	444	369	357	453
	8 – 12 m	190	0	190	61	129
	> 12 m	24	0	24	4	20
2	Unknown	69	57	11	18	49
	0 – 8 m	586	372	213	296	287
	8 – 12 m	75	0	75	38	37
	> 12 m	6	0	6	3	3
3	Unknown	63	55	7	18	43
	0 – 8 m	548	356	192	272	272
	8 – 12 m	44	0	44	24	20
	> 12 m	0	0	0	0	0
4	Unknown	21	16	5	8	13
	0 – 8 m	135	96	39	95	40
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0

Week 46 (10/11/2008 – 16/11/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	60	57	3	11	49
	0 – 8 m	762	424	338	369	390
	8 – 12 m	238	0	238	77	161
	> 12 m	26	0	26	3	23
2	Unknown	56	51	5	10	46
	0 – 8 m	582	367	215	318	261
	8 – 12 m	104	0	104	51	53
	> 12 m	3	0	3	2	1
3	Unknown	54	50	4	8	46
	0 – 8 m	544	348	196	300	241
	8 – 12 m	66	0	66	31	35
	> 12 m	1	0	1	1	0
4	Unknown	11	10	1	2	9
	0 – 8 m	129	88	41	99	30
	8 – 12 m	3	0	3	1	2
	> 12 m	0	0	0	0	0
Week 47 (17/11/2008 – 23/11/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	75	75	0	7	65
	0 – 8 m	761	421	338	366	386
	8 – 12 m	190	0	190	45	145
	> 12 m	29	0	29	7	22
2	Unknown	73	71	2	12	58
	0 – 8 m	589	372	215	312	269
	8 – 12 m	74	0	74	33	41
	> 12 m	4	0	4	3	1
3	Unknown	78	77	1	14	60
	0 – 8 m	551	356	193	293	251
	8 – 12 m	41	0	41	17	24
	> 12 m	1	0	1	1	0
4	Unknown	15	15	0	6	9
	0 – 8 m	153	112	41	111	41
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0

Week 48 (24/11/2008 – 30/11/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	96	92	3	11	83
	0 – 8 m	805	433	370	404	399
	8 – 12 m	249	0	249	65	184
	> 12 m	15	0	15	1	14
2	Unknown	91	84	6	11	78
	0 – 8 m	603	381	220	333	270
	8 – 12 m	96	0	96	45	51
	> 12 m	3	0	3	0	3
3	Unknown	88	82	5	12	74
	0 – 8 m	553	361	190	305	248
	8 – 12 m	56	0	56	23	33
	> 12 m	0	0	0	0	0
4	Unknown	35	34	1	10	24
	0 – 8 m	172	131	40	115	57
	8 – 12 m	3	0	3	1	2
	> 12 m	0	0	0	0	0
Week 49 (01/12/2008 – 07/12/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	78	74	3	16	62
	0 – 8 m	780	435	344	356	417
	8 – 12 m	235	0	235	73	162
	> 12 m	14	0	14	3	11
2	Unknown	67	63	3	12	55
	0 – 8 m	588	378	210	295	288
	8 – 12 m	95	0	95	43	52
	> 12 m	3	0	3	1	2
3	Unknown	70	66	3	14	56
	0 – 8 m	555	366	189	279	270
	8 – 12 m	60	0	60	26	34
	> 12 m	0	0	0	0	0
4	Unknown	26	24	2	9	17
	0 – 8 m	134	91	43	84	50
	8 – 12 m	5	0	5	3	2
	> 12 m	0	0	0	0	0

Week 50 (08/12/2008 – 14/12/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	70	68	1	4	66
	0 – 8 m	810	443	364	395	410
	8 – 12 m	214	0	214	69	145
	> 12 m	18	0	18	1	17
2	Unknown	63	61	1	6	57
	0 – 8 m	593	385	205	329	259
	8 – 12 m	86	0	86	45	41
	> 12 m	4	0	4	0	4
3	Unknown	65	63	1	8	57
	0 – 8 m	560	370	187	315	240
	8 – 12 m	47	0	47	23	24
	> 12 m	0	0	0	0	0
4	Unknown	13	13	0	2	11
	0 – 8 m	149	112	36	115	34
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0
Week 51 (15/12/2008 – 21/12/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	82	80	1	16	65
	0 – 8 m	773	393	378	370	402
	8 – 12 m	230	0	230	69	161
	> 12 m	12	0	12	3	9
2	Unknown	75	70	4	17	57
	0 – 8 m	582	340	240	310	272
	8 – 12 m	84	0	84	43	41
	> 12 m	1	0	1	0	1
3	Unknown	77	73	3	18	59
	0 – 8 m	535	320	213	285	250
	8 – 12 m	48	0	48	26	22
	> 12 m	0	0	0	0	0
4	Unknown	20	18	2	7	13
	0 – 8 m	154	100	52	106	48
	8 – 12 m	2	0	2	2	0
	> 12 m	0	0	0	0	0

Week 52 (22/12/2008 – 28/12/2008)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	22	21	1	5	17
	0 – 8 m	599	266	332	275	324
	8 – 12 m	199	0	199	57	142
	> 12 m	17	0	17	2	15
2	Unknown	24	19	5	7	17
	0 – 8 m	444	227	216	232	212
	8 – 12 m	72	0	72	37	35
	> 12 m	3	0	3	0	3
3	Unknown	21	17	4	8	13
	0 – 8 m	409	215	193	214	195
	8 – 12 m	45	0	45	20	25
	> 12 m	0	0	0	0	0
4	Unknown	5	3	2	3	2
	0 – 8 m	87	49	37	58	29
	8 – 12 m	1	0	1	1	0
	> 12 m	0	0	0	0	0
Week 01 (29/12/2008 – 04/01/2009)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	24	23	1	5	19
	0 – 8 m	520	260	260	254	263
	8 – 12 m	162	0	162	53	109
	> 12 m	9	0	9	3	5
2	Unknown	21	21	0	4	17
	0 – 8 m	381	226	155	206	173
	8 – 12 m	70	0	70	33	37
	> 12 m	3	0	3	1	1
3	Unknown	21	21	0	4	17
	0 – 8 m	358	220	138	195	161
	8 – 12 m	39	0	39	18	21
	> 12 m	1	0	1	0	0
4	Unknown	4	4	0	2	2
	0 – 8 m	88	63	25	62	25
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0

Week 02 (05/01/2009 – 11/01/2009)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	60	58	2	15	45
	0 – 8 m	655	356	299	320	332
	8 – 12 m	167	0	167	43	124
	> 12 m	13	0	13	2	11
2	Unknown	57	53	4	15	42
	0 – 8 m	485	304	181	258	224
	8 – 12 m	56	0	56	28	28
	> 12 m	0	0	0	0	0
3	Unknown	56	53	3	14	41
	0 – 8 m	447	285	162	239	205
	8 – 12 m	22	0	22	11	11
	> 12 m	0	0	0	0	0
4	Unknown	19	17	2	7	12
	0 – 8 m	102	69	33	69	33
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0
Week 03 (12/01/2009 – 18/01/2009)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	78	72	6	19	59
	0 – 8 m	720	401	318	356	363
	8 – 12 m	210	1	209	57	153
	> 12 m	6	0	6	2	4
2	Unknown	69	62	7	17	52
	0 – 8 m	515	325	189	297	217
	8 – 12 m	78	0	78	35	43
	> 12 m	1	0	1	0	1
3	Unknown	66	61	5	17	48
	0 – 8 m	463	298	164	268	193
	8 – 12 m	48	0	48	21	27
	> 12 m	0	0	0	0	0
4	Unknown	20	16	4	8	12
	0 – 8 m	124	85	39	92	31
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0

Week 04 (19/01/2009 – 25/01/2009)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	58	54	3	18	37
	0 – 8 m	730	392	338	351	374
	8 – 12 m	196	0	196	61	135
	> 12 m	11	0	11	1	10
2	Unknown	51	44	6	16	32
	0 – 8 m	530	334	196	291	235
	8 – 12 m	71	0	71	39	32
	> 12 m	4	0	4	1	3
3	Unknown	50	45	4	14	33
	0 – 8 m	496	317	179	272	218
	8 – 12 m	36	0	36	19	17
	> 12 m	0	0	0	0	0
4	Unknown	18	15	2	10	7
	0 – 8 m	131	95	36	104	27
	8 – 12 m	1	0	1	1	0
	> 12 m	0	0	0	0	0
Week 05 (26/01/2009 – 01/02/2009)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	65	61	3	11	53
	0 – 8 m	763	432	328	345	415
	8 – 12 m	176	0	176	46	130
	> 12 m	22	2	20	7	15
2	Unknown	78	73	4	17	60
	0 – 8 m	581	368	211	298	280
	8 – 12 m	52	0	52	24	28
	> 12 m	9	2	7	5	4
3	Unknown	77	74	2	14	61
	0 – 8 m	531	347	182	277	251
	8 – 12 m	33	0	33	14	19
	> 12 m	3	2	1	2	1
4	Unknown	26	23	3	14	12
	0 – 8 m	153	110	42	105	48
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0

Week 06 (02/02/2009 – 08/02/2009)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	64	59	5	13	50
	0 – 8 m	771	429	342	368	400
	8 – 12 m	207	1	206	74	133
	> 12 m	22	0	22	3	19
2	Unknown	68	60	8	14	53
	0 – 8 m	580	368	212	311	267
	8 – 12 m	90	1	89	49	41
	> 12 m	6	0	6	1	5
3	Unknown	71	62	9	17	53
	0 – 8 m	530	343	187	288	240
	8 – 12 m	53	1	52	28	25
	> 12 m	0	0	0	0	0
4	Unknown	22	18	4	10	12
	0 – 8 m	124	82	42	81	42
	8 – 12 m	1	0	1	0	1
	> 12 m	0	0	0	0	0
Week 07 (09/02/2009 – 15/02/2009)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	67	66	1	9	57
	0 – 8 m	777	414	362	385	384
	8 – 12 m	214	0	214	57	157
	> 12 m	21	0	21	4	17
2	Unknown	61	58	3	9	51
	0 – 8 m	589	367	222	316	266
	8 – 12 m	76	0	76	37	39
	> 12 m	5	0	5	2	3
3	Unknown	59	57	2	9	49
	0 – 8 m	548	346	202	291	250
	8 – 12 m	43	0	43	21	22
	> 12 m	0	0	0	0	0
4	Unknown	12	11	1	3	9
	0 – 8 m	133	85	48	99	33
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0

Week 08 (16/02/2009 – 22/02/2009)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	45	41	4	11	31
	0 – 8 m	817	444	373	376	439
	8 – 12 m	196	0	196	61	135
	> 12 m	22	0	22	6	16
2	Unknown	48	41	7	12	33
	0 – 8 m	624	386	238	323	299
	8 – 12 m	69	0	69	39	30
	> 12 m	7	0	7	3	4
3	Unknown	48	43	5	13	32
	0 – 8 m	579	371	208	301	276
	8 – 12 m	42	0	42	25	17
	> 12 m	0	0	0	0	0
4	Unknown	12	10	2	6	6
	0 – 8 m	148	106	42	96	52
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0
Week 09 (23/02/2009 – 01/03/2009)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	65	59	5	15	49
	0 – 8 m	795	432	363	354	431
	8 – 12 m	205	0	205	61	144
	> 12 m	22	0	22	6	16
2	Unknown	61	55	5	17	43
	0 – 8 m	600	367	233	303	289
	8 – 12 m	81	0	81	36	45
	> 12 m	6	0	6	3	3
3	Unknown	58	52	5	17	40
	0 – 8 m	563	355	208	288	267
	8 – 12 m	46	0	46	19	27
	> 12 m	0	0	0	0	0
4	Unknown	17	14	2	7	9
	0 – 8 m	133	96	37	91	40
	8 – 12 m	1	0	1	1	0
	> 12 m	0	0	0	0	0

Week 10 (02/03/2009 – 08/03/2009)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	93	88	5	18	73
	0 – 8 m	710	393	316	356	349
	8 – 12 m	166	0	166	47	119
	> 12 m	19	1	18	4	15
2	Unknown	85	77	8	18	66
	0 – 8 m	545	333	211	310	230
	8 – 12 m	60	0	60	27	33
	> 12 m	7	1	6	4	3
3	Unknown	82	77	5	17	63
	0 – 8 m	504	313	190	290	209
	8 – 12 m	35	0	35	15	20
	> 12 m	1	1	0	1	0
4	Unknown	17	14	3	6	11
	0 – 8 m	142	101	41	114	28
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0
Week 11 (09/03/2009 – 15/03/2009)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	52	51	1	6	46
	0 – 8 m	848	498	349	377	466
	8 – 12 m	194	0	194	52	142
	> 12 m	20	1	19	4	16
2	Unknown	43	42	1	6	37
	0 – 8 m	629	423	205	317	307
	8 – 12 m	57	0	57	30	27
	> 12 m	6	1	5	2	4
3	Unknown	40	40	0	5	35
	0 – 8 m	595	407	187	301	289
	8 – 12 m	35	0	35	18	17
	> 12 m	1	1	0	1	0
4	Unknown	9	9	0	1	8
	0 – 8 m	152	124	28	105	46
	8 – 12 m	1	0	1	1	0
	> 12 m	0	0	0	0	0

Week 12 (16/03/2009 – 22/03/2009)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	86	83	3	7	77
	0 – 8 m	793	459	334	381	409
	8 – 12 m	193	0	193	62	131
	> 12 m	22	0	22	3	19
2	Unknown	81	78	3	8	71
	0 – 8 m	623	406	217	334	286
	8 – 12 m	72	0	72	37	35
	> 12 m	4	0	4	1	3
3	Unknown	82	79	3	8	72
	0 – 8 m	586	388	198	315	268
	8 – 12 m	39	0	39	19	20
	> 12 m	25	25	0	4	20
4	Unknown	162	113	49	116	46
	0 – 8 m	86	83	3	7	77
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0
Week 13 (23/03/2009 – 29/03/2009)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	37	36	1	7	30
	0 – 8 m	816	497	317	396	417
	8 – 12 m	198	0	198	63	135
	> 12 m	26	0	26	6	20
2	Unknown	30	29	1	5	25
	0 – 8 m	641	434	205	343	296
	8 – 12 m	77	0	77	38	39
	> 12 m	8	0	8	3	5
3	Unknown	29	28	1	5	24
	0 – 8 m	598	411	185	324	272
	8 – 12 m	47	0	47	22	25
	> 12 m	0	0	0	0	0
4	Unknown	12	12	0	6	6
	0 – 8 m	164	127	36	120	44
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0

Week 14 (30/03/2009 – 05/04/2009)						
Area	***Draught***	***Total***	***Inland navigation***	***Seagoing***	***Arrival***	***Departure***
1	Unknown	79	73	5	15	64
	0 – 8 m	810	436	370	382	424
	8 – 12 m	210	0	210	61	149
	> 12 m	20	0	20	6	14
2	Unknown	64	57	6	13	51
	0 – 8 m	616	371	241	321	292
	8 – 12 m	69	0	69	34	35
	> 12 m	7	0	7	3	4
3	Unknown	63	56	6	13	49
	0 – 8 m	579	352	223	298	278
	8 – 12 m	41	0	41	18	23
	> 12 m	1	0	1	1	0
4	Unknown	14	12	2	6	8
	0 – 8 m	156	106	47	101	55
	8 – 12 m	0	0	0	0	0
	> 12 m	0	0	0	0	0