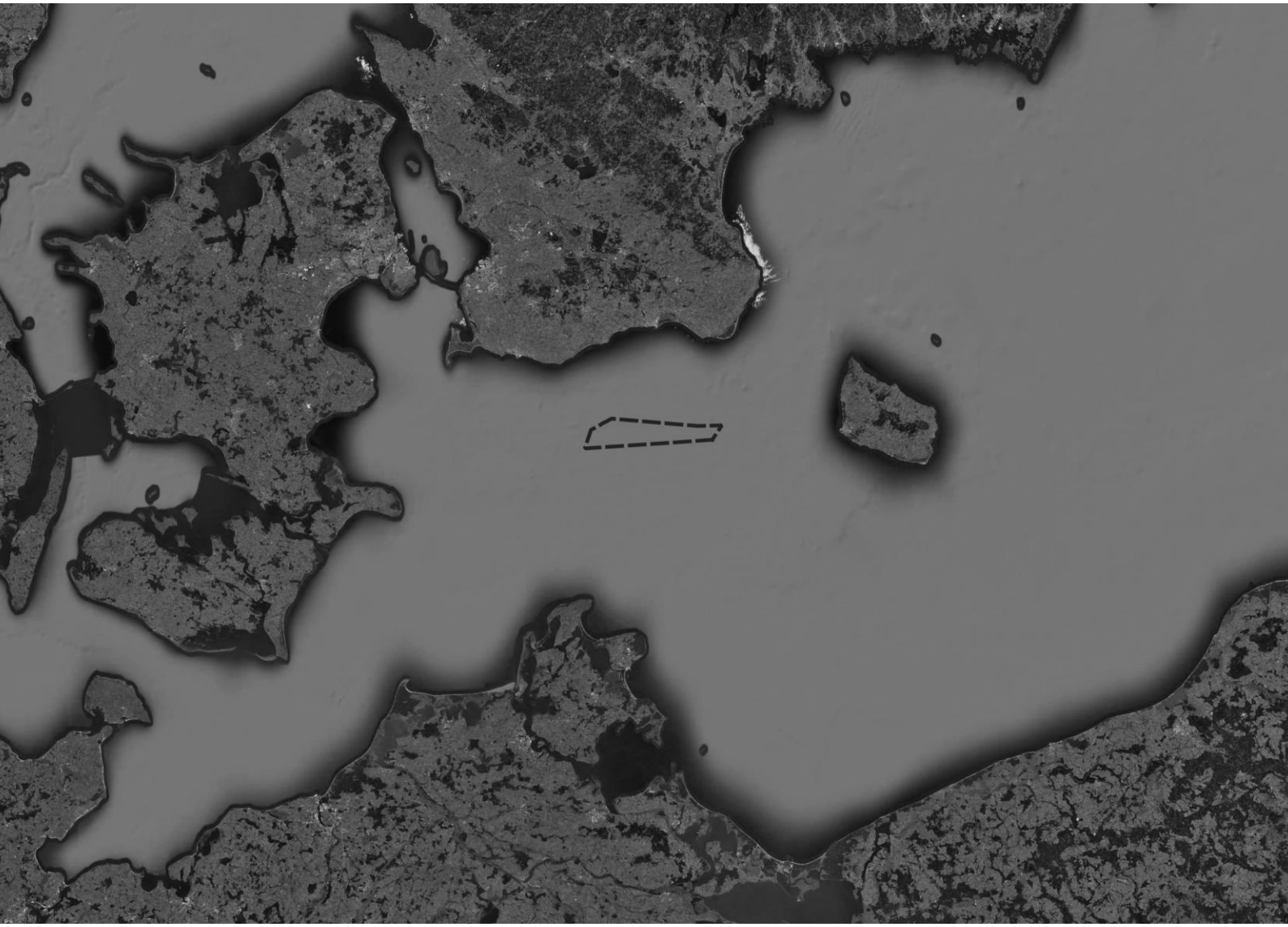

Triton OWF

Sediment Dispersal, seabed preparation

OX2 AB

Date: 11 Nov. 2021

Contents

Appendix

1 Introduction

OX2 has provided NIRAS with a sediment dispersal study concerting the potential impact due to the establishment of the Triton Wind Farm located in the Baltic Sea located at around 45 m of water 28 km south of Ystad (Sweden), 35 km west of Ronne (danish island Bornholm), 45 km north of Rygen (Germany) and 58 km east of Mon (danish island).

The dispersal of sediment due to either dredging, drilling or jetting has with a numerical model been simulated in time and space for three types of wind turbine substructures and 2 layouts, i.e. 15 MW and 25 MW. Infield cables, ring cables export cables, OSS and Platform jackets have for each layout been constant. Moreover, for the drilled cases, monopiles and jackets, the release of sediment 2m above the seabed and 2 m below the surface have been simulated. The various cases and layouts are listed in Table 1.1

Table 1.1: Layouts and Cases with respective Infield cables, ring cables export cables, OSS and Platform jackets

Layout	Substructure	No	Dimension	Embedded depth	Comment	Drilling/d redged	Spill	Spill Gross per unit	Spill source location	No cases
			[m]	[m]				[m3/unit]	-	#
15 MW	MP	129	Ø10 m	50		15%	100%	3927	bottom or surface	2
	Jacket	129	Ø4.5 m	35	4 pin piles	15%	100%	2227	bottom or surface	2
	Gravity	129	Ø35 m	3		100%	5%	144	surface	1
	MP (25MW)	129	Ø14m	55		15%	100%	6220	bottom or surface	2
	OSS, jacket	3x4	Ø4.5 m	40	4 pin piles	100%	100%	2227	bottom	-
	Platforms, jacket	3x4	Ø4.5 m	40	4 pin piles	100%	100%	2227	bottom	-
	Export cables	7		1	1x0.5 m trench	100%	100%	-	bottom	-
	Infield cables	26		1	1x0.5 m trench	100%	100%	-	bottom	-
	Ring cables	4		1	1x0.5 m trench	100%	100%	-	bottom	-
25 MW	MP	68	Ø12m	55		15%	100%	6220	bottom or surface	2
	Jacket	68	Ø4.5 m	55	4 pin piles	15%	100%	3499	bottom or surface	2
	Gravity	68	Ø45 m	3		100%	5%	239	surface	1
	OSS, jacket	2x4	Ø4.5 m	40	4 pin piles	100%	100%	2227	bottom	-
	Platforms, jacket	3x4	Ø4.5 m	40	4 pin piles	100%	100%	2227	bottom	-
	Export cables	4		1	1x0.5 m trench	100%	100%	-	bottom	-
	Infield cables	20		1	1x0.5 m trench	100%	100%	-	bottom	-
	Ring cables	5		1	1x0.5 m trench	100%	100%	-	bottom	-

2 Abbreviations

GBS	Gravity Based Structure
Hectare	10,000 m^2
MP	Monopile
MW	MegaWatt
OSS	Offshore substation
OWF	Offshore Wind Farm

3 Summary

The location of the Triton Offshore Wind Farm in an area with a flat seabed at around 45 m of water combined with a current there for more than 90% the time is less than 10 cm/s results in minimum dispersal of the sediment and the general impression across the various scenarios is that the majority of the sediment is kept inside the footprint of the wind farm and only a few per cent is transported further away.

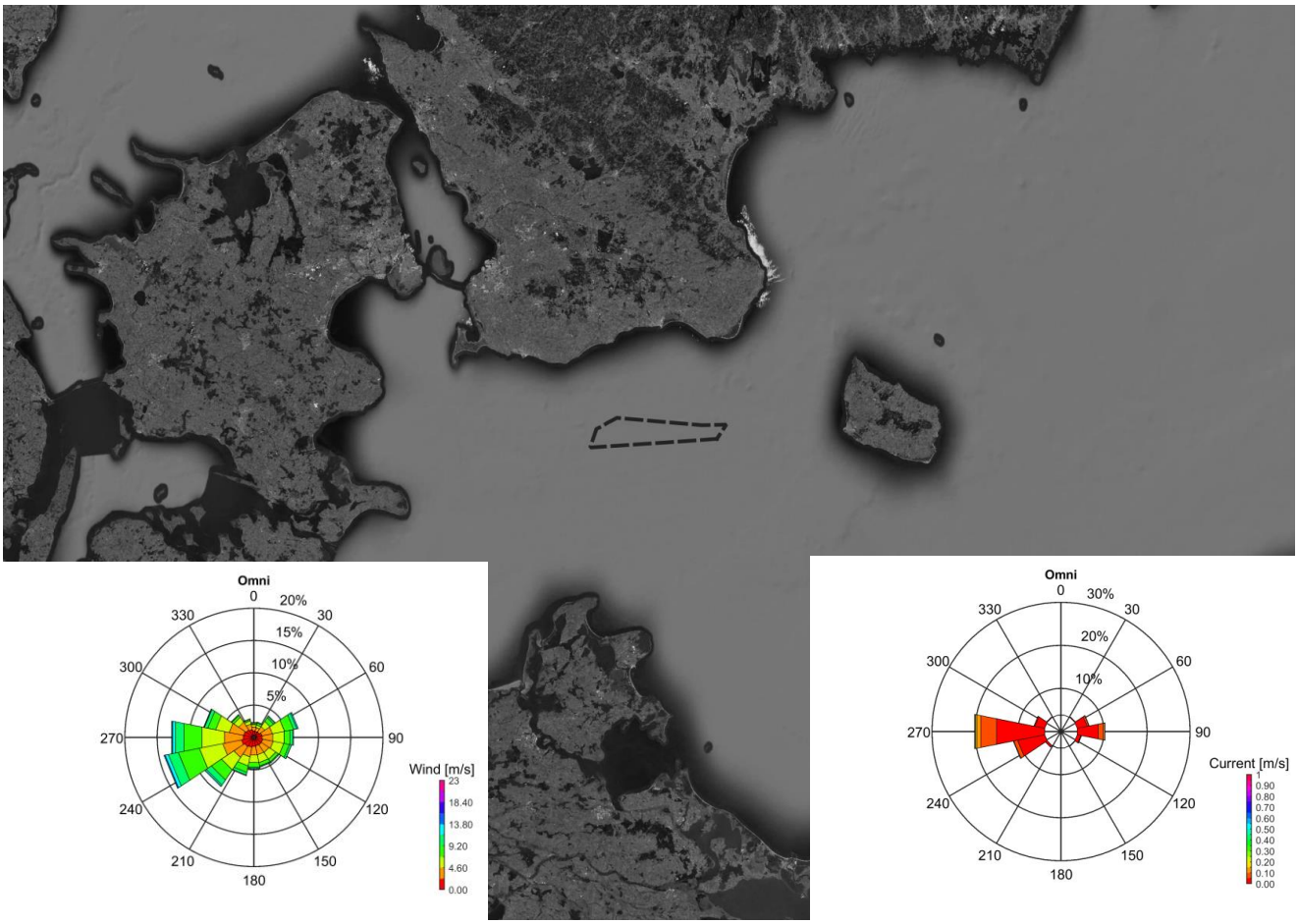

Figure 3.1: Location of the Triton Offshore Wind Farm with the wind (left) and current (right) rose for the centre of the wind farm.

The simulated cases are together with the NET spill listed in Table 3.1 and at the bottom of the table the percentage of spilled sediment accordantly to the 15MW worst-case. For this worst-case scenario, the NET spill is estimated to be 247,613 m^3 or 458,084 tonnes.

Table 3.1: List of cases to be investigated. The NET spill is the amount of worked material with a grain size less than 0.25 mm i.e. fines available for sediment dispersal.

Case	**-**	**15 MW**	**15 MW worst case**	**25 MW**	**15 MW**	**25 MW**	**15 MW**	**25 MW**
Substructure	-	MP	MP	MP	GBS	GBS	Jacket 3 legs	Jacket 3 legs
Capacity, total	MW	1935	3225	1700	1935	1700	1935	1700
Capacity	**MW/Unit**	**15**	**25**	**25**	**15**	**25**	**15**	**25**
Nos	#	129	129	68	129	68	129	68
Bottom diameter, base (< 45m)	m	10	14	14	35	45	4.5	4.5
Drilling/dredging depth	m	50	50	55	3	3	35	55
Spill percentage	%	100%	100%	100%	5%	5%	100%	100%
Vol. to be removed	m^3/pos.	3927	7697	8467	2886	4771	1670	2624
% Drilled/dredged	#	15%	15%	15%	100%	100%	15%	15%
Total no. to be drilled/dredged	#	19	19	10	129	68	19	10
Total drilled vol. foundation	m^3	75987	148935	86359	372338	324448	32314	26767
Spill, gross foundation	m^3	75987	148935	86359	18617	16222	32314	26767
Spill, NET foundation	m^3	52279	102467	59415	12808	11161	22232	18416
Length infield cable	m	233756	233756	194995	233756	194995	233756	194995
Spill	%	100	100	100	100	100	100	100
Spill, gross infield cable	m^3	175317	175317	146246	175317	146246	175317	146246
Spill, NET infield cable	m^3	120618	120618	100617	120618	100617	120618	100617
No. OSS Jackets (4 per pos)	#	12	12	8	12	8	12	8
No. Platform Jackets (4 per pos)	#	12	12	12	12	12	12	12
OSS/Platform - pin piles	#	4	4	4	4	4	4	4
Bottom diameter, base	m	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Drilling depth	m	65	65	65	65	65	65	65
Spill percentage	%	100%	100%	100%	100%	100%	100%	100%
Vol. to be removed	m^3/pos.	4135	4135	4135	4135	4135	4135	4135
% Drilled	#	15%	15%	15%	15%	15%	15%	15%
Spill, gross OSS	m^3	14886	14886	12405	14886	12405	14886	12405
Spill, NET OSS	m^3	10242	10242	8535	10242	8535	10242	8535
Length export cable	m	41528	41528	31807	41528	31807	41528	31807
Spill	%	100	100	100	100	100	100	100
Spill, gross export cable	m^3	20764	20764	15903	20764	15903	20764	15903
Spill, NET export cable	m^3	14286	14286	10942	14286	10942	14286	10942
Spill, gross	m^3	286955	359902	260914	229584	190777	243281	201322
Spill, NET	m^3	197425	247613	179509	157954	131255	167377	138509
Percentage vs. worst case	**%**	**80%**	**100%**	**72%**	**64%**	**53%**	**68%**	**56%**

Table 3.2 and Table 3.3 summarize the total area affected with concentration levels of 10, 25, 50 and 100 mg/l and selected sedimentation thickness. The difference between releasing the sediment at 2 m above the seabed compared to 2 m below the surface is that the former will result in smaller sediment plumes for the cost of larger areas with higher sedimentation.

For the worst-case, the 15MW layout with the monopile dimension for the 25 MW wind turbine substructure i.e. "15MW worst-case" the sediment plume with concentrations above 10 mg/l will at the lower 10 m of the water column extent to 892 hectares when released 2 m above the seabed versus 977 hectares when released 2 m below the surface. For the upper 10 m of the water column, the same numbers are 231 hectares versus 4813 hectares. The

sedimentation on the other hand is 7281 hectares vs. 8459 hectares covers with a minimum of 1 mm of sediment which when looking at sedimentation of 50 mm is 33 hectares versus 1 hectare.

Table 3.2: Total area in hectares affected by concentration levels above 10, 25, 50 and 100 mg/l for 6 and 24 hours. "bottom" = sediment released 2 m above the seabed, "surface" = sediment released 2 m below the surface, "lower 10 m" average of the lowest 10 m of the water column, "upper 10 m" average of the highest 10 m of the water column.

Case	Substructure source	Average concentration	Concentration, 6 hours				Concentration, 24 hours			
			10 [mg/l]	25 [mg/l]	50 [mg/l]	100 [mg/l]	10 [mg/l]	25 [mg/l]	50 [mg/l]	100 [mg/l]
15MW worst-case	bottom	lower 10m	892	370	84	0	348	181	40	0
		upper 10m	231	46	4	0	34	3	0	0
15MW worst-case	surface	lower 10m	977	252	53	2	256	66	8	0
		upper 10m	4813	1232	453	115	1909	560	216	42
15MW MP	bottom	lower 10m	759	353	73	1	262	135	21	0
		upper 10m	148	34	5	1	16	1	0	0
15MW MP	surface	lower 10m	874	188	36	5	154	38	3	0
		upper 10m	3356	991	425	117	1083	379	146	16
15MW GBS	surface	lower 10m	417	100	21	3	77	35	11	0
		upper 10m	814	53	1	0	0	0	0	0
15MW Jacket	bottom	lower 10m	620	251	0	0	131	52	0	0
		upper 10m	89	11	0	0	0	0	0	0
15MW Jacket	surface	lower 10m	509	113	4	0	67	21	0	0
		upper 10m	1704	500	171	12	321	106	16	1
25MW MP	bottom	lower 10m	456	206	49	0	202	117	17	0
		upper 10m	86	22	19	0	26	13	12	0
25MW MP	surface	lower 10m	602	137	29	0	159	34	13	0
		upper 10m	2507	705	265	74	1096	319	128	23
25MW GBS	surface	lower 10m	364	74	8	0	38	16	1	0
		upper 10m	721	55	3	0	22	0	0	0
25MW Jacket	bottom	lower 10m	340	150	24	0	100	52	1	0
		upper 10m	52	14	8	0	8	5	0	0
25MW Jacket	surface	lower 10m	333	83	22	0	59	21	4	0
		upper 10m	1230	344	125	22	404	118	34	0

Table 3.3: Total area in hectares affected by various sedimentation levels per case. "bottom" = sediment released 2 m above the seabed, "surface" = sediment released 2 m below the surface.

Case	Substructure source	Sedimentation											
		1	2	5	10	15	20	25	30	35	40	50	100
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
15MW worst-case	bottom	7281	2422	622	365	244	179	133	98	76	58	33	3
	surface	8459	3140	638	258	119	56	26	12	6	4	1	0
15MW MP	bottom	7088	2299	495	248	143	90	52	29	16	10	3	0
	surface	7862	2647	425	114	40	18	8	3	1	0	0	0
15MW GBS	surface	6897	1891	169	71	40	27	19	14	11	9	8	3
15MW Jacket	bottom	6791	2022	327	102	35	16	8	3	1	0	0	0
	surface	7022	2064	189	53	24	12	6	2	1	0	0	0
25MW MP	bottom	6081	2671	410	217	152	111	82	63	45	35	19	1
	surface	6733	3079	451	167	65	26	11	7	3	2	0	0
25MW GBS	surface	5960	1891	135	42	21	12	6	3	1	1	0	0
25MW Jacket	bottom	5850	2485	292	100	50	23	11	4	2	1	0	0
	surface	6069	2594	225	43	22	12	6	3	1	1	0	0

4 Methodology

For some of the potential types of foundations, the construction phase will require drilling to ensure the installation per the design requirements or due to environmental issues.
Drilling may cause some spill of sediment. Likewise, the installation of the inter-array cables may require jetting of the seabed.

The approach is to calculate the sediment spill based on a verified numerical model which includes a hydrodynamic model and spreading of sediment. The behaviour of the sediment is based on values found in the literature, in this case (DHI/IOW Consortium, 2013).

The hydrodynamics is simulated with the use of MIKE 21 HD (DHI, n.d.) and the spreading of the sediment with MIKE 21 PT (DHI, n.d.) which with input from the hydrodynamic model, sediment grain sizes, settling velocities etc. can simulate the movement of the sediment in time and space (horizontal and vertical).

Sediment spill from the placement of scour protection, rock berms for protection of insufficient buried cables and edge scouring is assumed to be insignificant and is not included in the present study.

The study includes the following tasks:

1) Setup of a hydrodynamic model to get the current and tide pattern;
2) Verify the model against measured data e.g. tide and current;
3) Find a period representative for the planned installation period i.e. an average period regarding current i.e. transport of sediment;
4) Analyse the sediment data and define the average grain distribution;
5) Define the number of grain fractions to be simulated;
6) Identify the settling velocities for the grain fractions;
7) Determine the sediment spill in time and space due to the installation activities;
8) Analyse the outcome of the modelling for the duration with concentrations above various values, e.g. 10 mg/l (0.01 kg/m^3) in the water column and the sedimentation in millimetres.

The selection of MIKE 21 PT for the description of the sediment dispersal is due to the nature of the plumes created by dredging, drilling, ploughing and jetting which are initially narrow and occur in various depths of the water column. For the near field this is quite difficult to describe in a traditional calculation mesh and at the same time maintaining a reasonable calculation time.

MIKE 21 PT is a so-called Lagrangian model which over time considers both the position and properties of the particles e.g. keeping track of the particle position in both x,y- and z- according to the mean current field. This is opposite to an Eulerian model which does it cell wise where e.g. the concentration will be an average of the volume over each cell, making this type of model extremely sensitive to the model resolution both horizontally and vertically. The PT model is on the other side sensitive to the amount of material related to the released particles resulting in a large number of particles to reach an acceptable resolution.

5 Data

The data and assumptions behind the present study are listed in the following subchapters with a short description.

5.1 Project area

The Triton OWF is located at around 45 m of water 28 km south of Ystad, 35 km west of Ronne, 45 km north of Rygen and 58 km east of Mon, Figure 5.1.

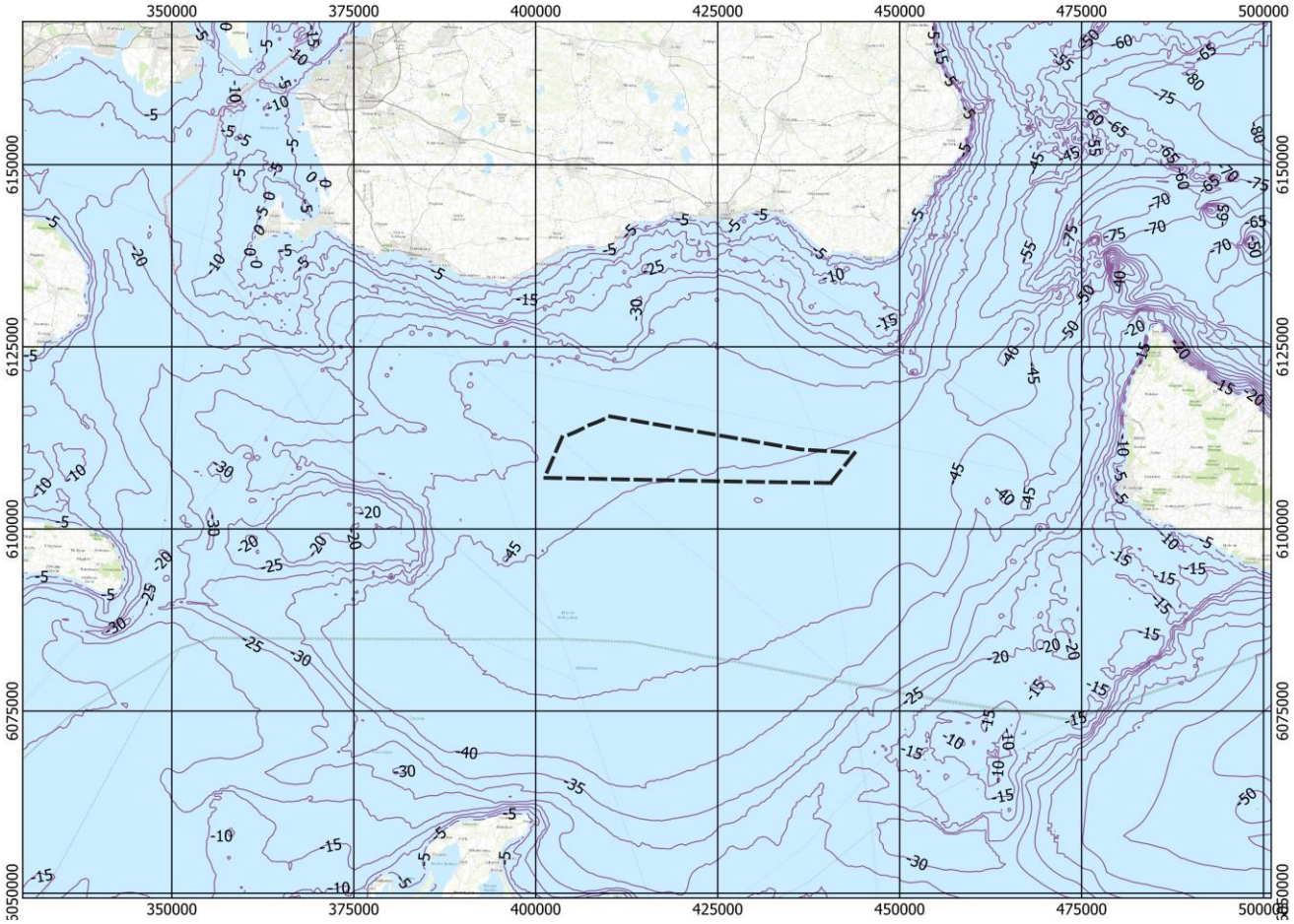

Figure 5.1: Triton OWF, location marked with 5 m contour curves (Baltic Sea Hydrographic Commission, 2020).

5.2 Spill sources

Sediment spill from the installation activities are for this project mainly related to the installation of:

- the monopiles or pin piles for the case that they have to be drilled due to boulders or hard soil; and
- the cables when burying them in the seabed.

The spill from these two activities is further explained in the following.

5.2.1 Drilling

The project predicts that up to 15% of the monopiles are likely to be drilled. Moreover, the 4 pin piles for each of the offshore substation and platform structures are assumed to be drilled.

The drilling speed for both the monopiles and pin piles is taken as 30 m^3/hour plus 0.5 days per foundation for the movement of equipment. The actual drilling methodology is at present unknown. To investigate the worst cases in terms of sediment spill, results are presented for the case where the sediment is pumped out 2 meters above the seabed as well as when it is released 2 meters below the surface and as such brought into suspension (in close vicinity of the foundations) whereof the fines (sediment with a mean diameter of less than 0.25 mm) will be available for dispersal.

5.2.2 Dredging

Seabed preparation before the installation of the gravity foundations is assumed to be carried out with a backhoe dredger with a capacity of 150 m^3/hour, a spill of 5% (Gray, 2006) and half a day to move between the foundations. Intense monitoring under the construction of the Oresund link bridge has documented that sediment spillage due to dredging is less than 5% which was the limitation required by the Swedish and Danish Governments.

The deposition of the material is not included in this study but is expected to be placed next to the foundation or at a dedicated spoil ground.

5.2.3 Jetting

The actual cable installation covers:

- Pre-lay grapnel run e.g. cleaning of the cable corridor – spill assumed to be insignificant
- Jetting of 1.5 m x 0.5 m for infield- and export cables with a 100% spill of the fines e.g. sediments with a mean diameter of less than 0.25 mm, assuming that only these sediments will be flushed out of the trench;

5.3 Wind farm layouts

Layouts showing the 15MW and 25MW locations of substructures, OSS, platform, infield cables, ring cables and export cables are presented in Figure 5.2 and Figure 5.3.

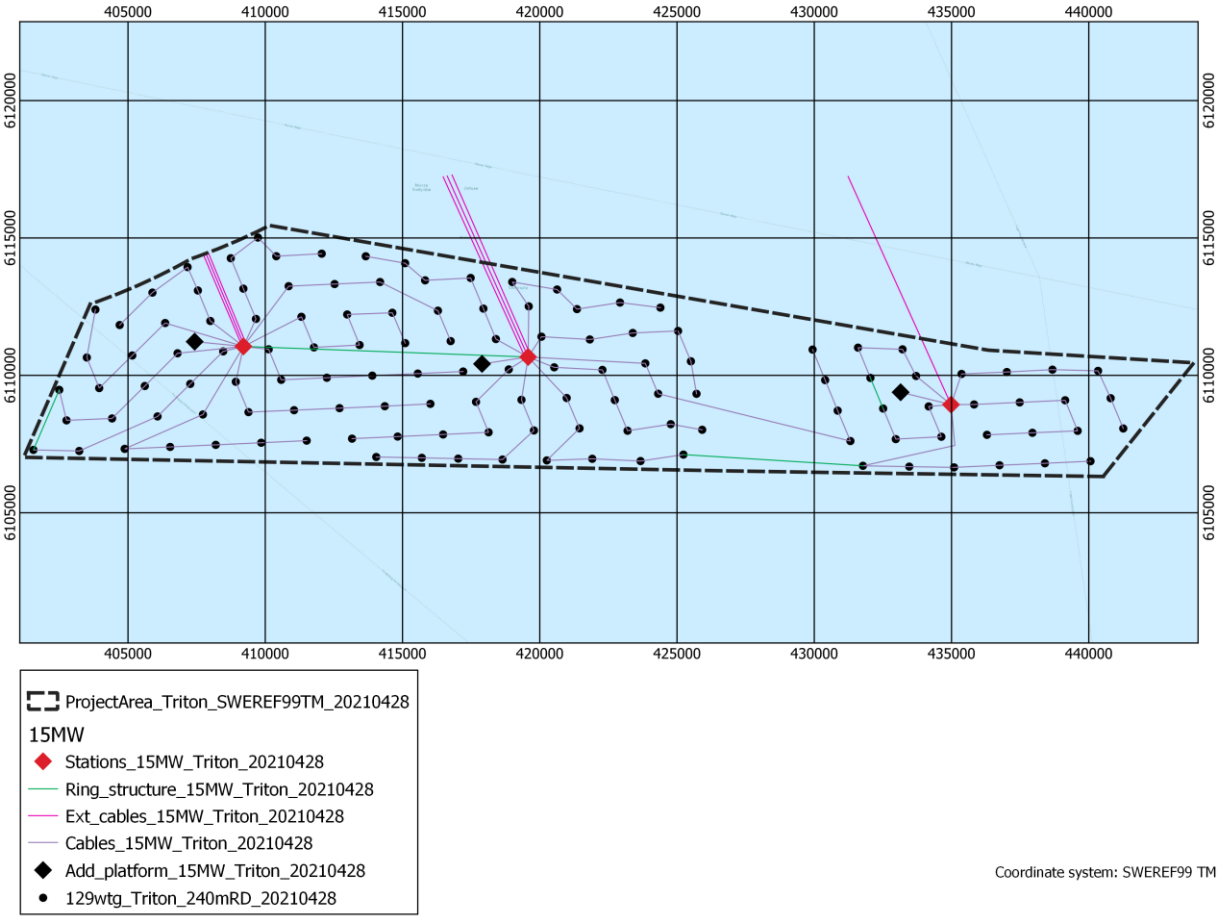

Figure 5.2: 15MW layout incl. infield cables, ring cables and a part of the export cables

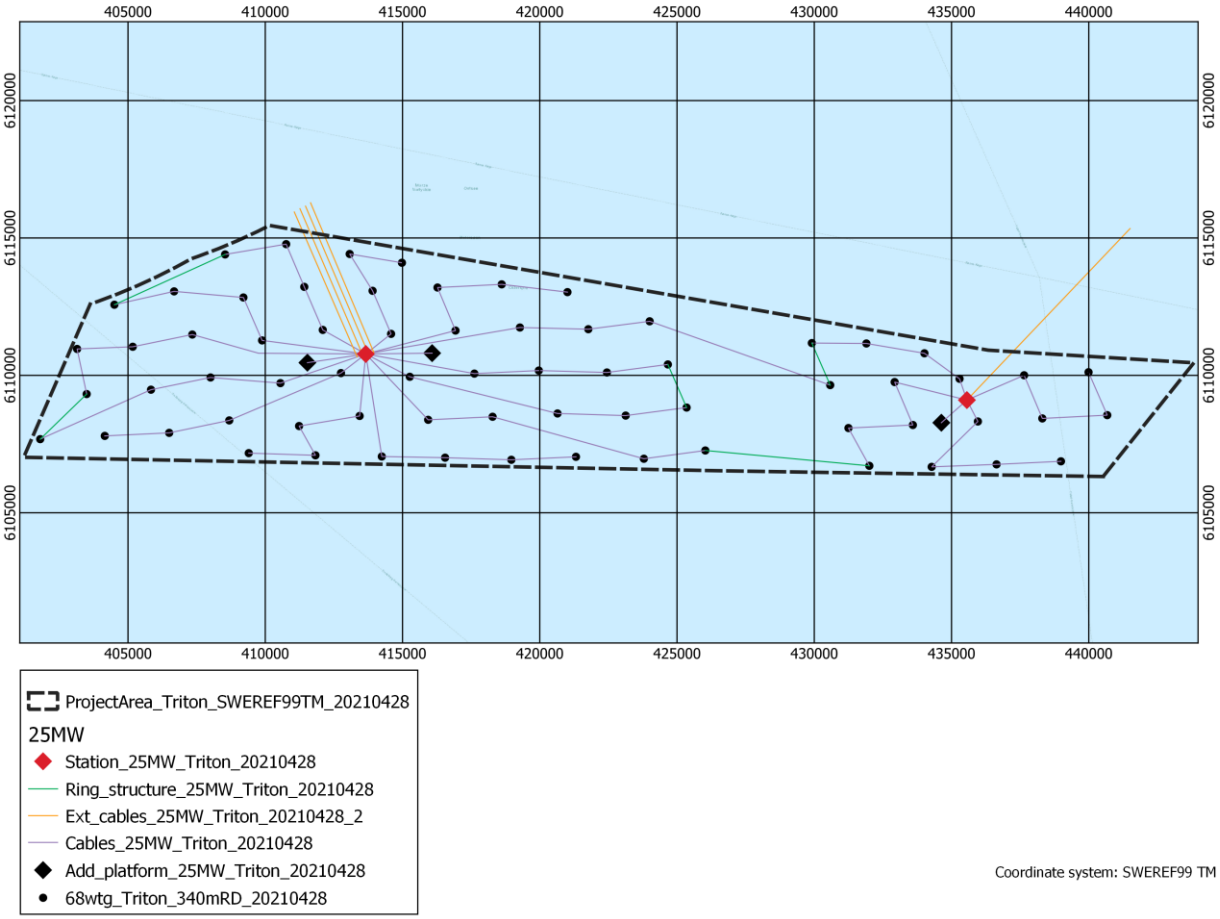

Figure 5.3: 25MW layout incl. infield cables, ring cables and a part of the export cables

5.4 Cases and estimated installation spills

In total 12 cases have been simulated. For the monopile and jacket for 2 situations; one with the drilled sediment released 2 m below the sea surface and a second 2 m above the seabed. For the GBS foundations simulations with sediment released at 2 m below the surface are presented.

The various cases are listed in Table 5.1 including the assumptions about the number of substructures, dimensions, spill percentage, etc. summarized as estimated gross and net spill. For comparison is the spill is given in percentage according to the worst-case scenario i.e. 15 MW worst-case based on the 15 MW wind farm layout and the 25 MW monopiles. The estimated NET spill for this case is 247,613 m^3.

Table 5.1: List of cases to be investigated. The NET spill is the amount of worked material with a grain size less than 0.25 mm i.e. fines available for sediment dispersal.

Case	**-**	**15 MW**	**15 MW worst case**	**25 MW**	**15 MW**	**25 MW**	**15 MW**	**25 MW**
Substructure	-	MP	MP	MP	GBS	GBS	Jacket 3 legs	Jacket 3 legs
Capacity, total	MW	1935	3225	1700	1935	1700	1935	1700
Capacity	**MW/Unit**	**15**	**25**	**25**	**15**	**25**	**15**	**25**
Nos	#	129	129	68	129	68	129	68
Bottom diameter, base (< 45m)	m	10	14	14	35	45	4.5	4.5
Drilling/dredging depth	m	50	50	55	3	3	35	55
Spill percentage	%	100%	100%	100%	5%	5%	100%	100%
Vol. to be removed	m^3/pos.	3927	7697	8467	2886	4771	1670	2624
% Drilled/dredged	#	15%	15%	15%	100%	100%	15%	15%
Total no. to be drilled/dredged	#	19	19	10	129	68	19	10
Total drilled vol. foundation	m^3	75987	148935	86359	372338	324448	32314	26767
Spill, gross foundation	m^3	75987	148935	86359	18617	16222	32314	26767
Spill, NET foundation	m^3	52279	102467	59415	12808	11161	22232	18416
Length infield cable	m	233756	233756	194995	233756	194995	233756	194995
Spill	%	100	100	100	100	100	100	100
Spill, gross infield cable	m^3	175317	175317	146246	175317	146246	175317	146246
Spill, NET infield cable	m^3	120618	120618	100617	120618	100617	120618	100617
No. OSS Jackets (4 per pos)	#	12	12	8	12	8	12	8
No. Platform Jackets (4 per pos)	#	12	12	12	12	12	12	12
OSS/Platform - pin piles	#	4	4	4	4	4	4	4
Bottom diameter, base	m	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Drilling depth	m	65	65	65	65	65	65	65
Spill percentage	%	100%	100%	100%	100%	100%	100%	100%
Vol. to be removed	m^3/pos.	4135	4135	4135	4135	4135	4135	4135
% Drilled	#	15%	15%	15%	15%	15%	15%	15%
Spill, gross OSS	m^3	14886	14886	12405	14886	12405	14886	12405
Spill, NET OSS	m^3	10242	10242	8535	10242	8535	10242	8535
Length export cable	m	41528	41528	31807	41528	31807	41528	31807
Spill	%	100	100	100	100	100	100	100
Spill, gross export cable	m^3	20764	20764	15903	20764	15903	20764	15903
Spill, NET export cable	m^3	14286	14286	10942	14286	10942	14286	10942
Spill, gross	m^3	286955	359902	260914	229584	190777	243281	201322
Spill, NET	m^3	197425	247613	179509	157954	131255	167377	138509
Percentage vs. worst case	**%**	**80%**	**100%**	**72%**	**64%**	**53%**	**68%**	**56%**

5.5 Installation programme

In the following the different activities to be carried out in the construction phase for the installation of the wind farm are listed.

The installation of the foundations and cables are expected to take place in the summertime between April 1st and December 1st. For simplification and due to the early stage of the project, where information about the weather criteria for the installation activities is unknown, delays due to weather have not been included.

For all wind farm layouts, a conceptual installation program with a single installation setup has been defined to mimic the sediment spill over time. All starting April 1st and having an end date depending on the number of units and

installation capacity. The 25 MW MP scenario has the longest installation period and the estimated end date exclusive weather is January 6th, Table 5.2.

Table 5.2: Installation program, 25 MW MP worst-case

Activity	Amount	Unit	Capacity	Unit	Days	Start	End
1 OSS + Platform	24	#	7.00	days/(FOU+topside)	168	2030-04-01	2030-09-16
1 OSS + Platform drilling	99243	m3	30	m3/hour + 0.5 day/FOU	150	2030-04-01	2030-08-28
1 MP installation	129	#	1.50	days/FOU + 0.5 day/FOU	258	2030-04-01	2030-12-15
1 MP drilling	148935	m3	30	m3/hour + 0.5 day/FOU	271	2030-04-01	2030-12-29
1 Infield cable, laying + pull in	233756	m	300	m/hour + 0.5 day/pull in	97	2030-09-27	2031-01-02
1 Infield cable, burial	233756	m	150	m/hour	65	2030-11-02	2031-01-06
Export Cable	210000	m	150	m/hour	58	2030-06-24	2030-08-21

5.6 Driving forces hydrodynamic model

5.6.1 Bathymetry data

Water depths in the model comes from various sources:

1) EMODnet bathymetry data (EMODnet, 2020);
2) Sea charts, Danish waters (Matrikelstyrelsen, 2012);
3) AIS data – inner Danish waters (Miljøministeriet, n.d.).
4) BSHC data – Baltic Sea (Baltic Sea Hydrographic Commission, 2020)

5.6.2 Wind and air pressure

Atmospheric data in the form of wind speed in x and y-directions and air pressure has been extracted from ECMWF (ECMWF, 2019). Data has a horizontal resolution of 0.5 degrees and 1 hour temporal.

5.6.3 Water level

At the model boundary towards the Atlantic Ocean, the tidal elevation is given as the astronomical tide along the boundary lines.

For verification of the hydrodynamic model, simulated and observed water levels are compared for Ystad, Gedser, Ronne, Kalmar and Visby (SMHI, Ladda ner oceanografiska observationer, 2019), cf. Section 6.2.

5.6.4 Discharge

Run-off from the most dominant catchment areas based on average values is included in the model. The data is downloaded from various homepages e.g. for Sweden Vattenweb (SMHI, vattenwebb, 2019). The sources considered in the model are illustrated in Figure 5.4.

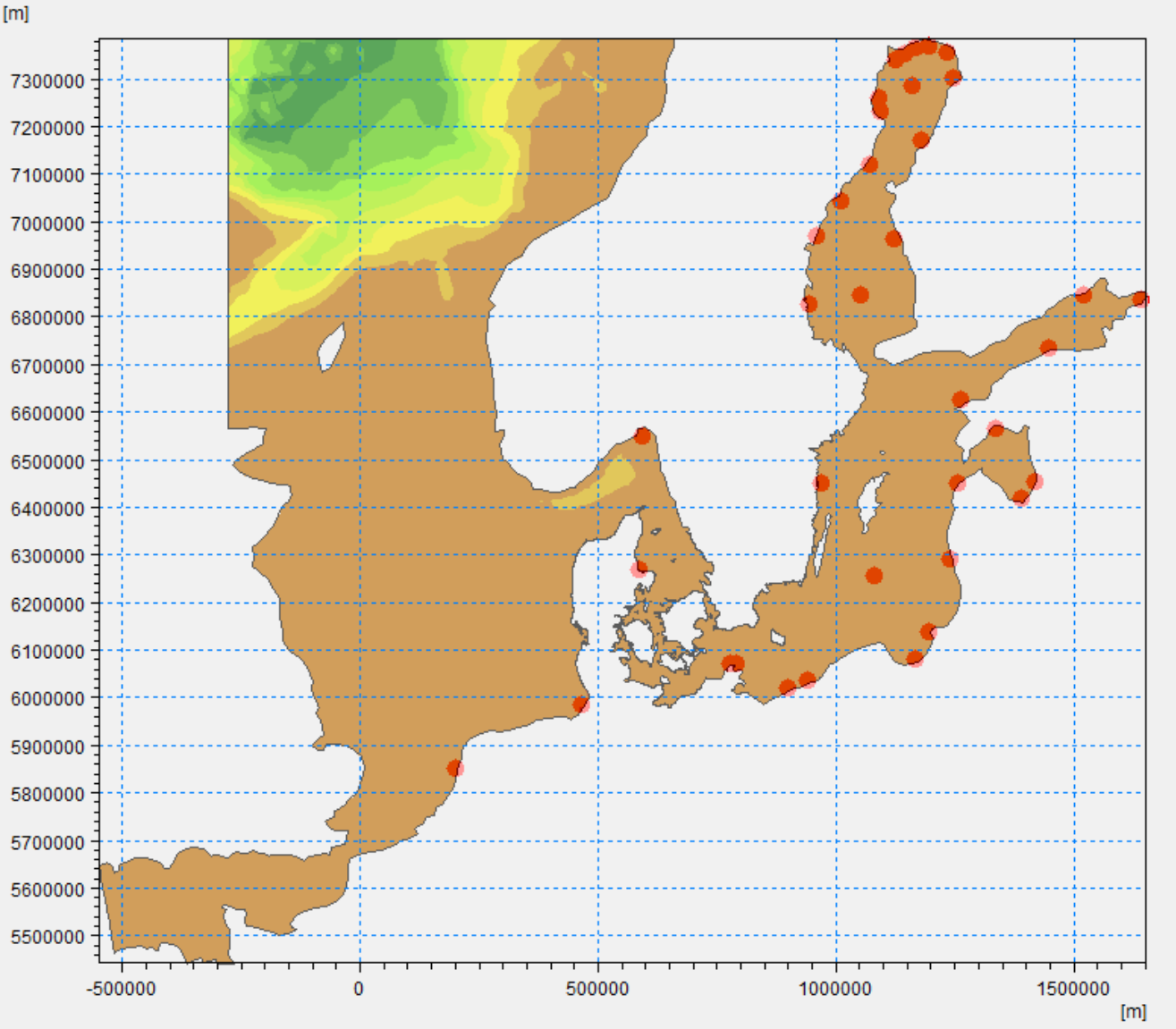

Figure 5.4: Most significant rivers (red dots) included in the MIKE21 models.

5.7 Sediment data

The topsoil at the site is based on the surficial geology from (SGU, 2020), Figure 5.5, and for an estimate of the grain distribution similar sediment found in (DHI/IOW Consortium, 2013) has been used, i.e. "Mud" interpreted as soft sediment with a high content of clay and silt, Figure 5.6.

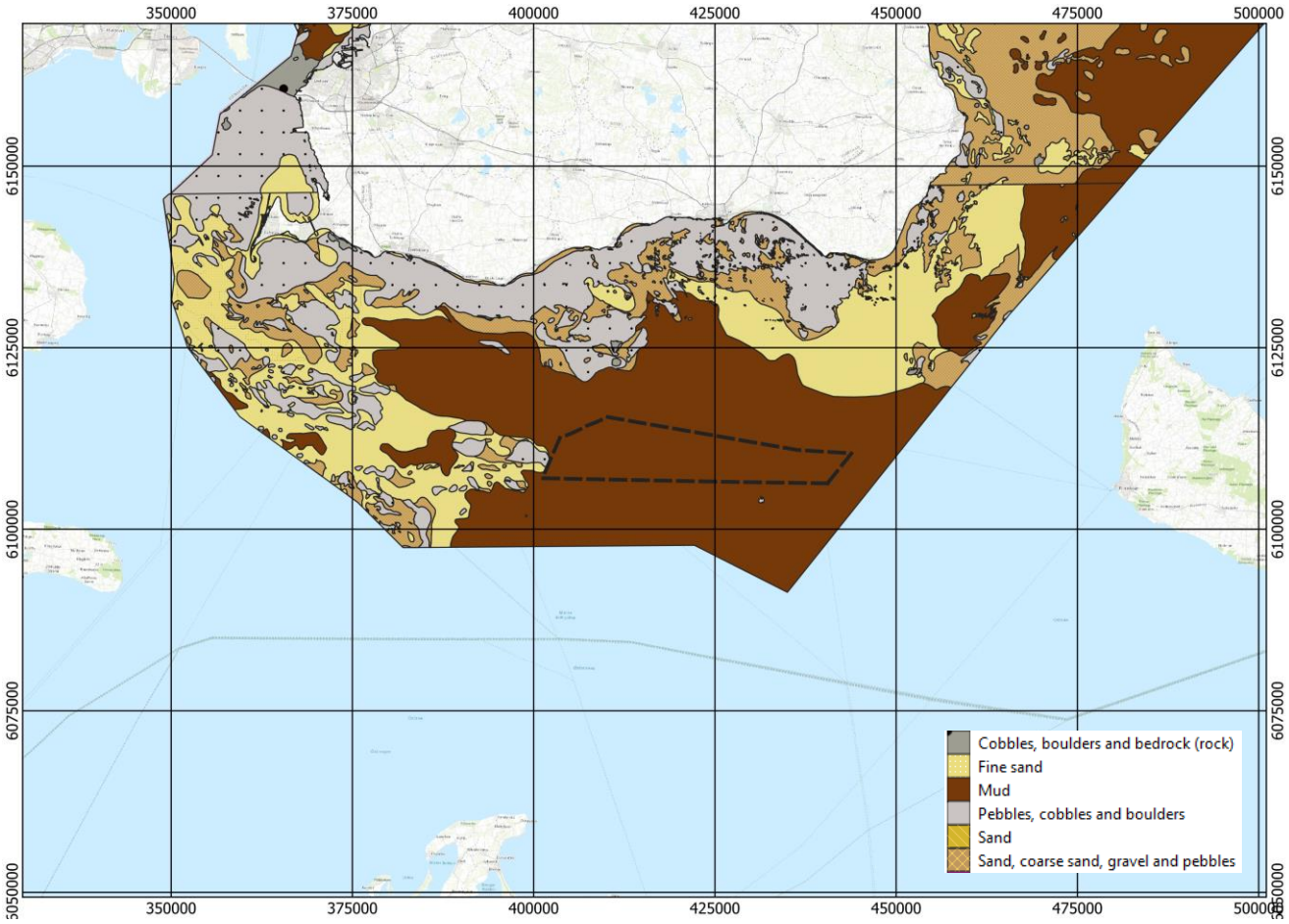

Figure 5.5: The background maps show the surficial geology. Triton OWF is marked with a dashed line.

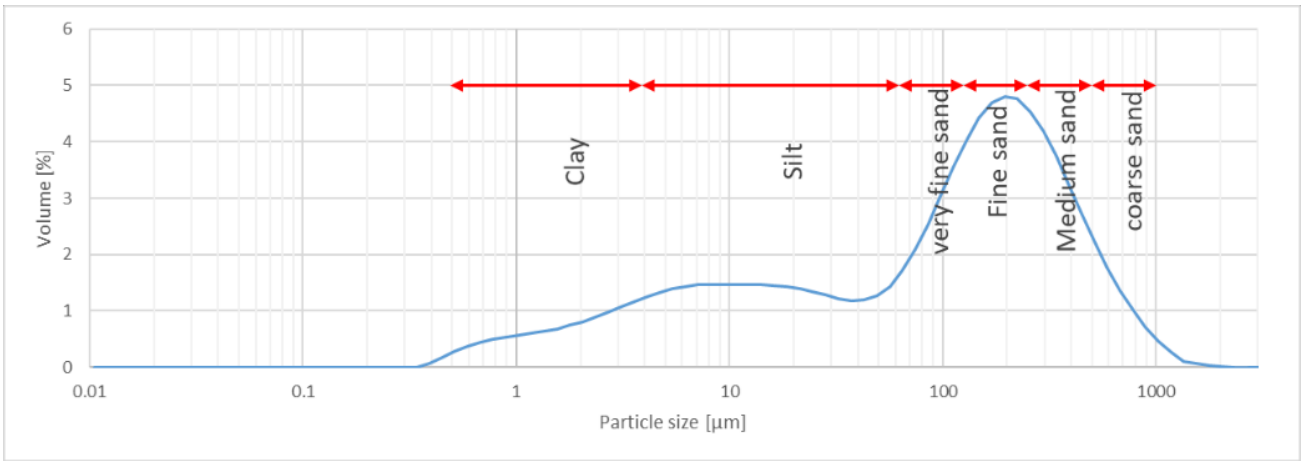

Figure 5.6: Grain distribution used for the modelling of sediment spill, sample RC17 (DHI/IOW Consortium, 2013)

For sand with a settling velocity of 15 mm/s, it will take 33 minutes for the sediment to settle at 30 m water depth. For 2 m above the seabed, it will take just above 2 minutes. Thus material coarser than the specified sand, Table 5.3, will settle very close to where the drilling or jetting activity occurs.

As described in (DHI/IOW Consortium, 2013) the critical shear stress for resuspension in Oresund is found to be 0.3 N/m^2 and has been applied for this modelling. Moreover, the selected drift profile in the model was set to "bed shear profile and surface wind acceleration". Resuspension in the model has only been considered for sediment finer than sand, as coarser material will settle in close vicinity of where it was suspended.

The assumed density is 1850 kg/m^3.

Table 5.3: Sediment characteristics and ranges used for the modelling

Fraktion	sand	very fine sand/coarse silt	medium silt	fine silt	very fine silt/Clay
Mean	0.1470	0.0650	0.0280	0.0100	0.0070
From	0.1060	0.0465	0.0190	0.0085	0.0000
To	0.2000	0.1060	0.0465	0.0190	0.0085
Distribution [%]	21.5	12.1	7.6	8.8	18.9
Settling velocity [mm/s]	15	2.92	0.56	0.07	0.03

6 Hydrodynamic model setup and verification

6.1 Bathymetry

The calculation mesh is divided into several mesh sizes depending on the area of interest, Figure 6.1.

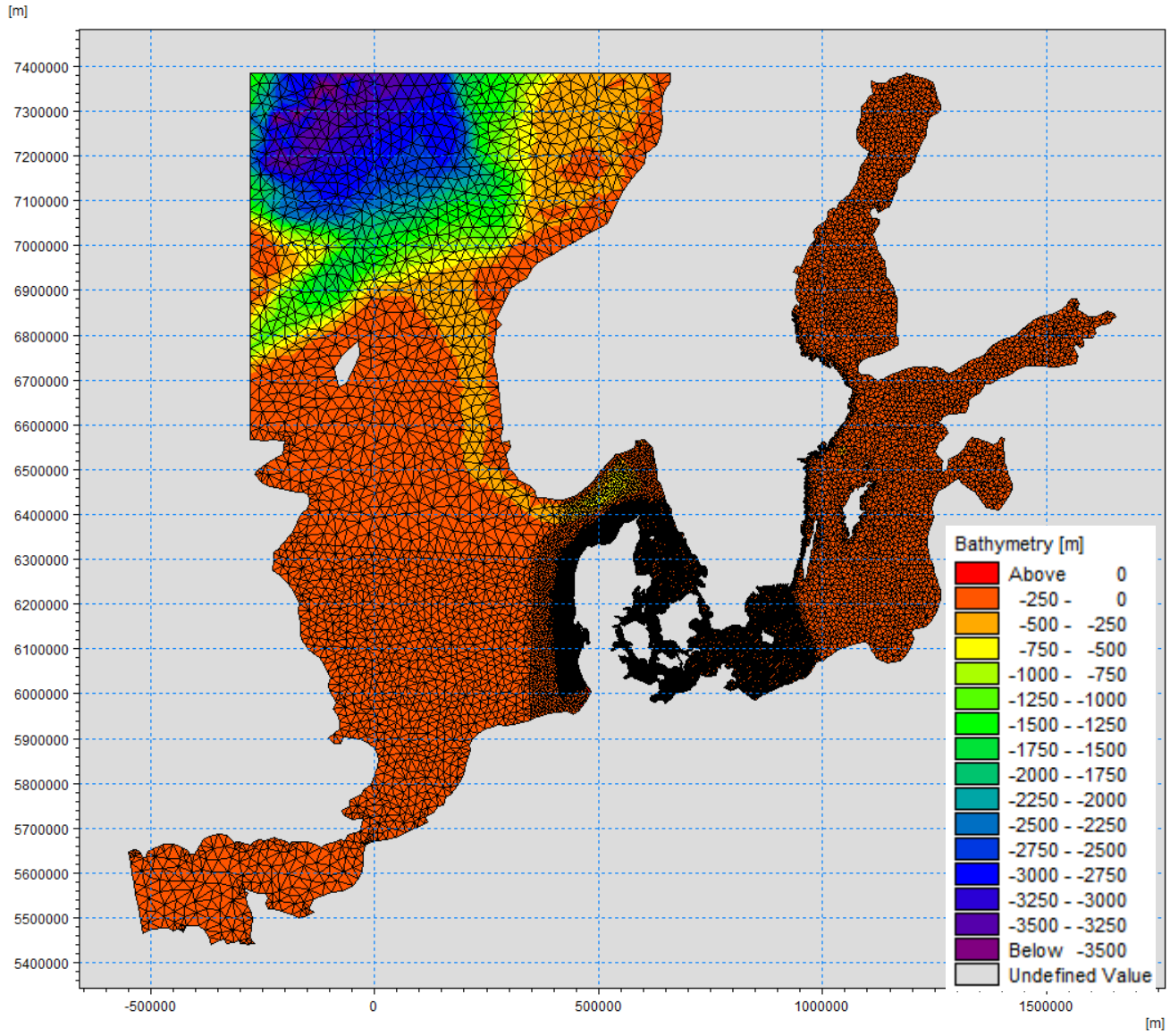

Figure 6.1: Mesh adoption for the MIKE21 Model

A closeup of the area around the Triton OWF is shown in Figure 6.2, where the finest mesh size extends from the wind farms to the Swedish coastline.

A sensitivity study has been made to investigate how far from the wind farm significant amounts of sediments are transported. The conclusion led to the mesh size and extend as shown in Figure 6.2.

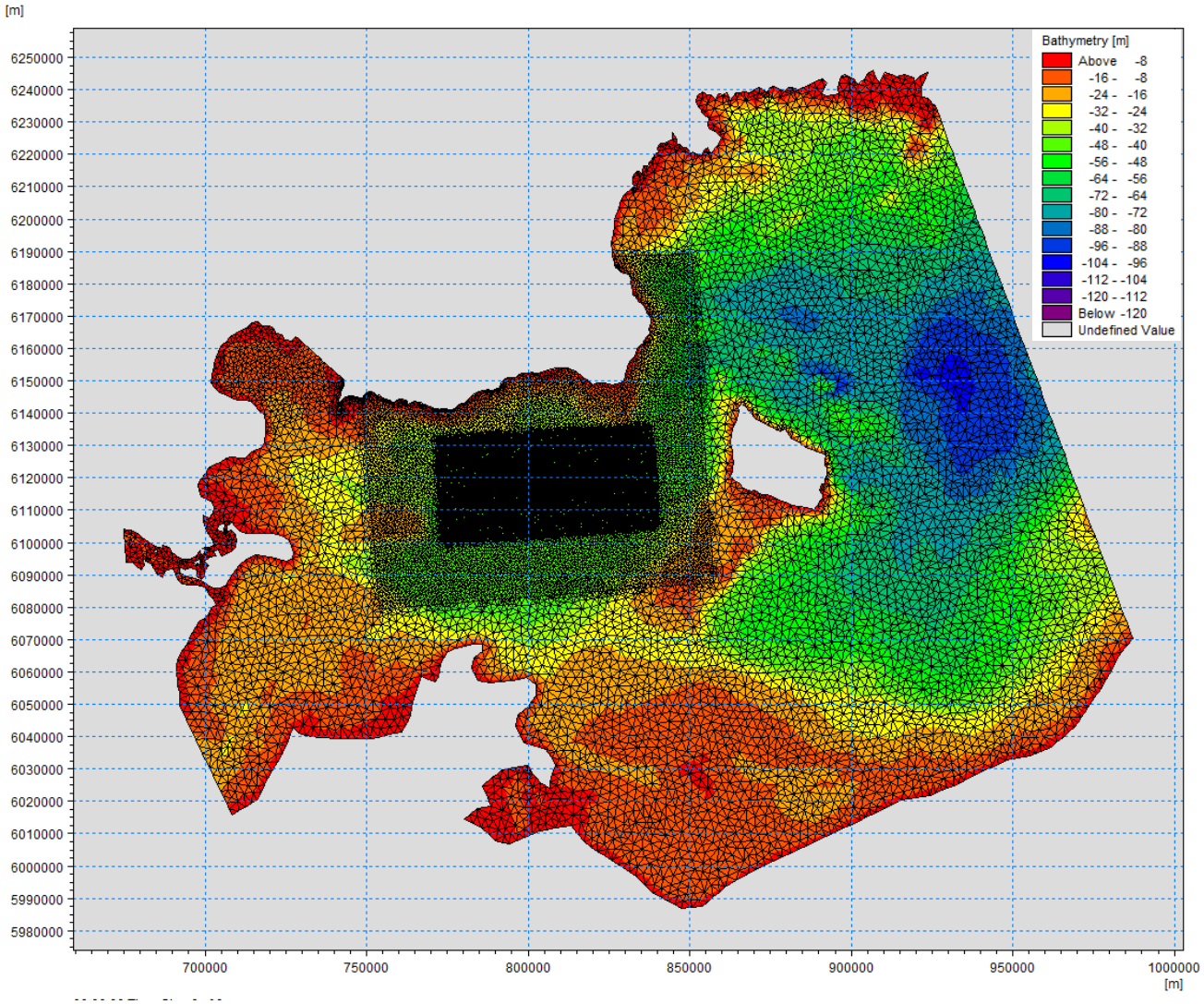

Figure 6.2: Local model mesh, wind farm site.

6.2 Verification

As the model boundary is located where the North Sea meets the Atlantic Ocean, the simulated mean sea water level reference is the Atlantic Ocean without salinity corrections.

Observed and simulated water levels in Ystad, Kalmar, Visby, Ronne and Gedser have been used as a reference for the comparison of observed and modelled water levels. The 5 locations of evaluation are shown in Figure 6.3.

Figure 6.3: Locations of evaluation regarding water levels. Locations are Gedser, Ystad, Ronne, Kalmar and Visby.

The time series comparison between observed and simulated water levels at the five locations is shown in Figure 6.4, Figure 6.5 and Figure 6.6 and qualitatively in Table 6.1.

In general, a reasonably good agreement between the observed and simulated water level is seen with a correlation coefficient higher than 0.92, where 1 is 100 % agreement.

Moreover, the exact location of the gauges in Gedser, Ystad, Ronne, Kalmar and Visby, is unknown, thus local effects are not included in the simulated water levels.

When comparing the water level in Figure 6.4, Figure 6.5 and Figure 6.6 is it important to have in mind that the simulated water level is according to the mean water level in the Atlantic Ocean which is different from the Swedish mean level RH 2000.

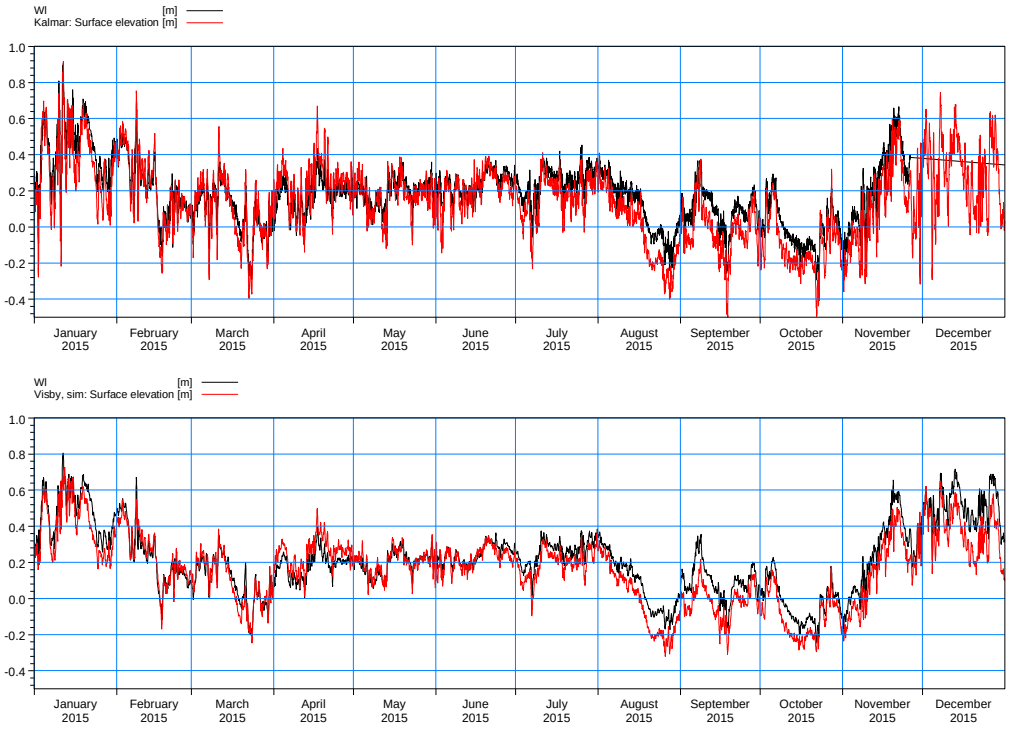

Figure 6.4: Top: Kalmar, bottom: Visby – Comparison of observed (black) and simulated (red) water level.

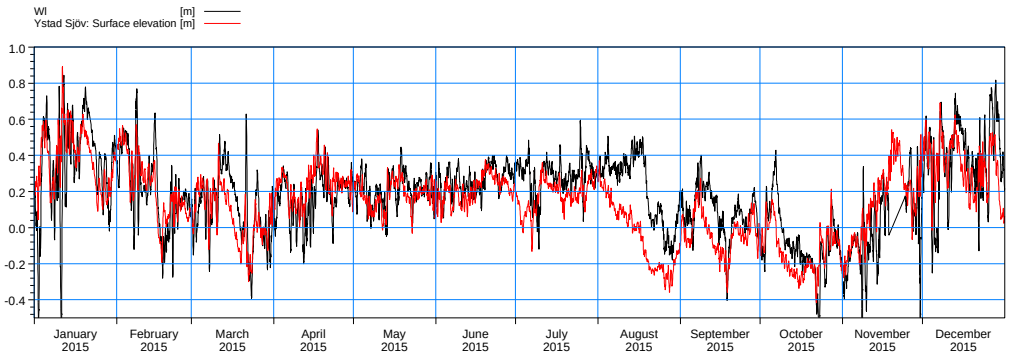

Figure 6.5: Ystad – Comparison of observed (black) and simulated (red) water level.

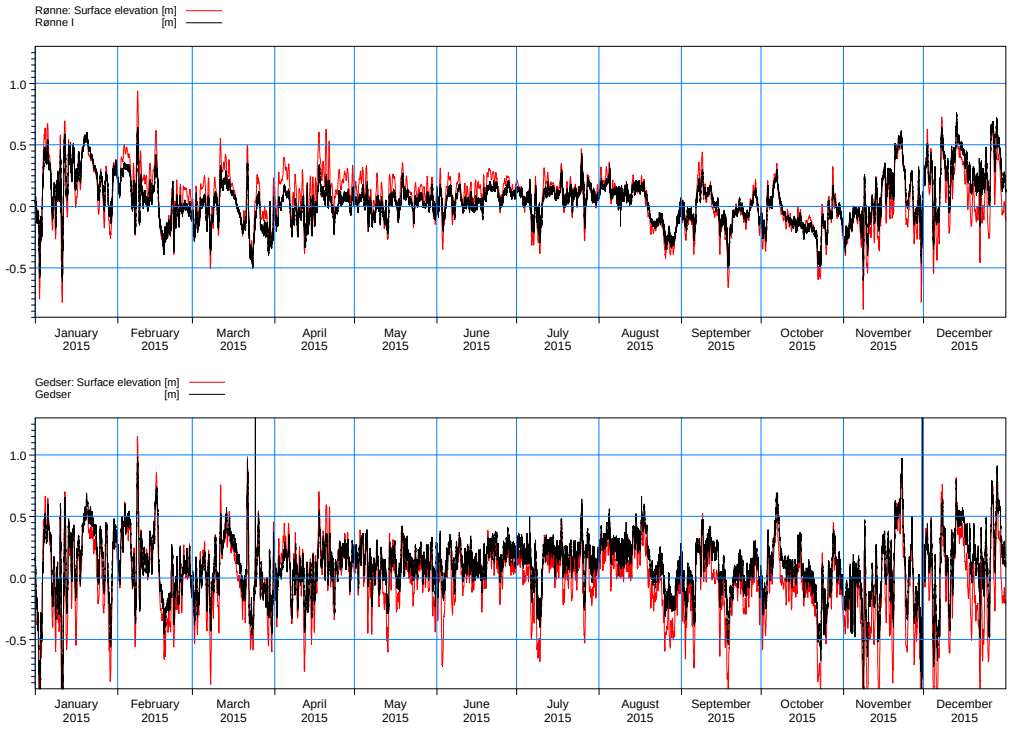

Figure 6.6: Top: Ronne, bottom: Gedser – Comparison of observed (black) and simulated (red) water level.

Table 6.1: Quality Index, observed versus simulated water level in Ystad, Kalmar and Visby

Quality index, description	Abbreviation	Unit	Ystad	Kalmar	Visby
Mean difference	BIAS	[m]	0.07	0.06	0.01
Absolute mean difference	AME	[m]	0.12	0.09	0.07
Root mean square	RMSE	[m]	0.15	0.12	0.08
Correlation coefficient	CC	[-]	0.92	0.94	0.96

This verifies the validity of the numerical model for the year 2015. For the selection of which year to be used in the numerical model, please refer see the following section.

6.3 Selection of simulation period

The simulation period for the installation activities across the whole wind farm is selected to cover the calmest period of the year based on the assumption that when the current or movement of the sediment is at the lowest the concentration and also the sedimentation will be at the highest.

The general current pattern is dominated by a westerly current, probably driven by the dominating westerly wind, Figure 6.7.

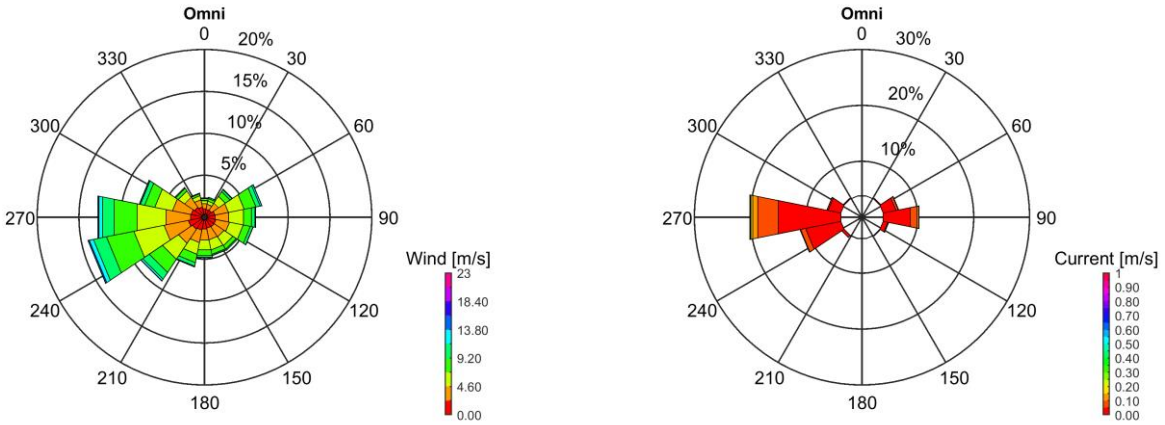

Figure 6.7: Wind (left) and current (right) rose for the year 2008 to 2018 at the centre of the wind farm.

The current speed is for more than 90% of the time, less than 10 cm/s and only for around 0.6% above 20 cm/s. The simulated water level and current are shown in Figure 6.8. The few situations with currents above 20 cm/s all seem to happen in the winter period.

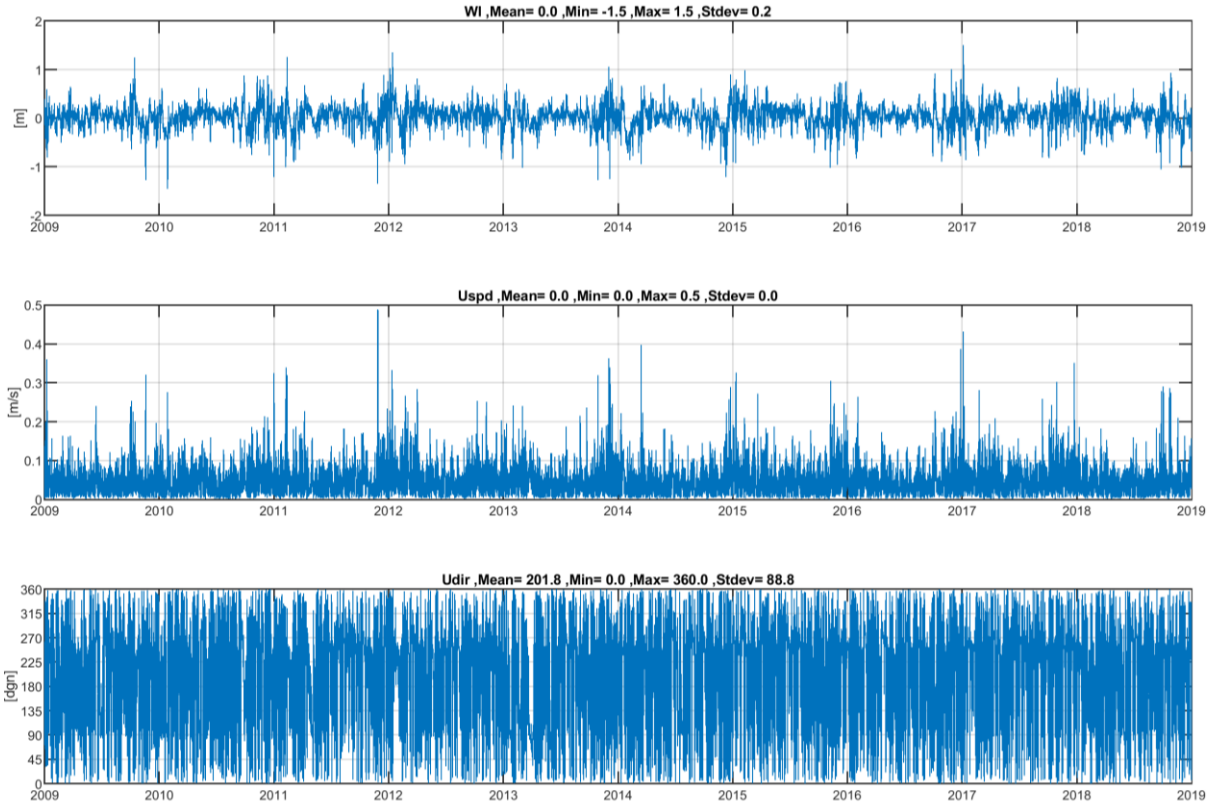

Figure 6.8: Water level, current speed and current direction at the centre of the wind farm from 2008 to 2018.

From the estimated installation programme in chapter 5.5, the installation period is when started April 1st expected to end in the beginning of January for the 25 MW MP scenario. And earlier for the other scenarios.

The year with the wind/current conditions closet the average is found to be 2010, cf. Appendix 1, Appendix 2 and Appendix 3.

7 Sediment dispersal

7.1 Guidance

The sediment modelling simulates the dispersal of the sediment in time and space from the installation activities starting April 1st to March 1st which is 6 weeks longer than the case with the longest installation period. This is to ensure that the sediment has sufficient time to disperse, settle or coming into resuspension to a level where the concentration is insignificant.

Data are per 10 minutes saved as concentrations in mg/l and sedimentation in g/m^2. To make these data meaningful they have to be processed as follow

- Durations of which certain concentration levels are exceeded are presented for
    - The upper 10 m of the water column
    - The lowest 10 m of the water column
    - As depth-averaged through the entire water column.

  The durations are presented for concentrations exceeding 10, 25, 100, 500 and 1000 mg/l. The duration is the sum of time where the concentration exceeded the mentioned concentration levels during the simulation period.
- Maximum sedimentation is the maximum modelled sedimentation in g/m^2 divided by the density (which is assumed to 1850 kg/m^3) presented in mm in the following interval:

    - 1-2 mm sedimentation
    - 2-5 mm sedimentation
    - 5-10 mm sedimentation
    - 10-10 mm sedimentation
    - 20-50 mm sedimentation
    - 50-100 mm sedimentation

Durations and maximum sedimentations are presented in plots for selected intervals.

Moreover to make the comparison easier durations and maximum sedimentations are also presented for selected areas, Figure 7.1, in hectare and a percentage of the relevant area listed in a table. For a final indication of the affected area, the sedimentation for the last time step in the simulation is presented in the percentage of the total sediment spill for squares of 10 km^2, Figure 7.2.

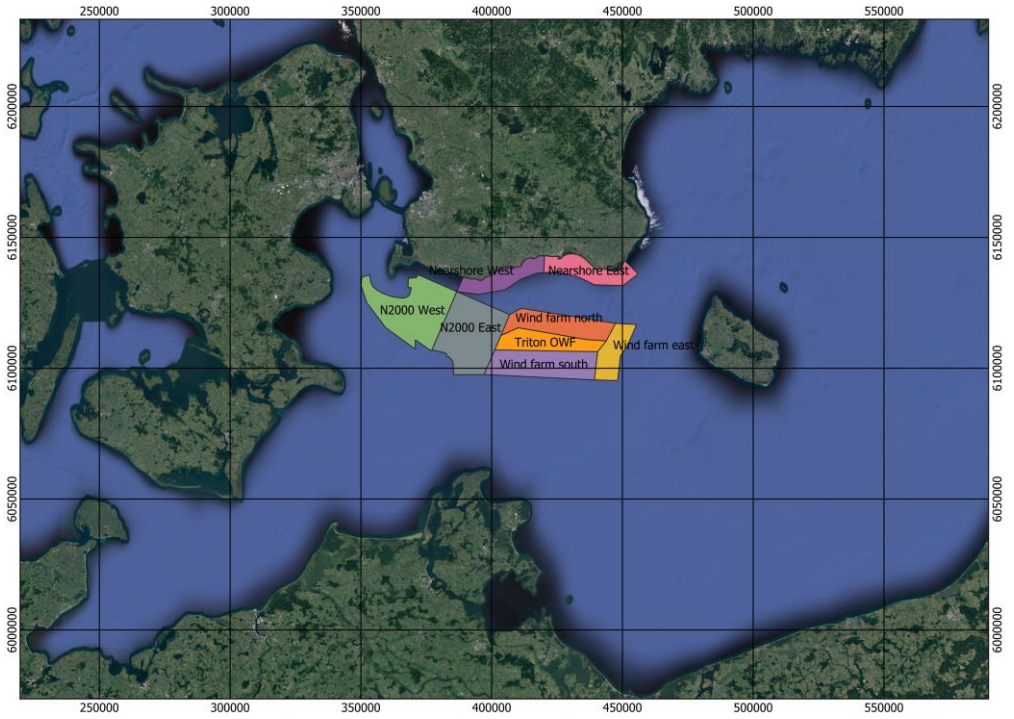

Figure 7.1: Areas for concentration durations, maximum sedimentation and masse balance. Coordinate system: SWEREF99 TM

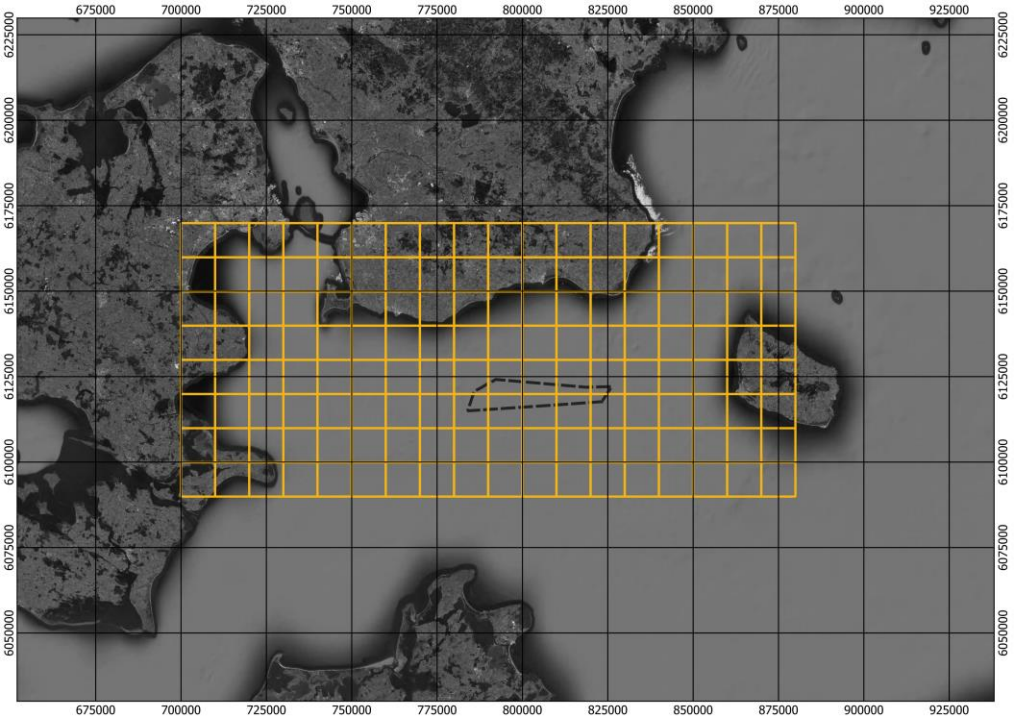

Figure 7.2: Areas end sedimentation in percentages of the total sediment spill. Coordinate system: WGS84 UTM32N

7.1.1 Maximum Sedimentation

For each time step in the modelling, the sedimentation i.e. deposition and/or erosion is simulated as an average for each grid in the model as kg per square meter. To get the sedimentation in mm it assumed that the consolidation takes place over a short time thus the thickness of the sediment can be found by dividing the sedimented mass with the density.

7.1.2 Duration

The duration with a concentration above a certain level i.e. the cumulative time where the concentration has been above the selected level for the whole simulation time. This is in contrast to the instantaneous concentration.

7.1.3 Temporal & Surface versus bottom

Each installation scenario is simulated for the period April 1st to March 1st i.e. 11 months to illustrate the sediment concentration and sedimentation levels in time and space.

For illustration, the sediment dispersal and sedimentation are presented for a single position taken from the worst-case scenario with drilled sediment released 2 m below the surface and 2 m above the seabed. Referred to as "surface" and "bottom", respectively.

7.1.4 Depth averages

The sediment concentrations are given for an average over the total depth and for an average for the upper 10 m and the lower 10 m of the water column.

7.2 15 MW layout worst-cases

The outcome from the modelling is presented as concentration durations and sedimentation for a single position and the whole wind farm. In addition, the dispersal of the sediment for the single position is also presented per 4 hours.

This is for both the case with the drilled sediment release 2 m below the surface and for the one with the drilled sediment released 2 m above the seabed.

7.2.1 Concentration

7.2.1.1 Temporal, single position

The temporal dispersal of the spilled sediment for the scenario with the sediment released 2 m above the bottom and 2 m below the surface is per 4 hours illustrated in:

- Bottom, 2 m above: Average for the lower 10 m in Appendix 4 and the upper 10 m in Appendix 5.
- Surface, 2 m below: Average for the lower 10 m in Appendix 7 and the upper 10 m in Appendix 8.

The simulated drilling operation starts 2010-04-01 0:00 and ends 2010-04-11 16:43. For a water depth of 45 m, the considered fractions of sediment will in principle settle as follows:

- Sand in around 50 minutes;
- Very fine sand/coarse silt in 4 hours;
- Medium silt in 22 hours;
- Fine silt in 178 hours (7.5 days);
- Very fine silt/clay in 416 hours (17 days).

But as illustrated in the appendixes the fines will, over the settling time, be transported several kilometres in various directions given by the current diluting the sediment cloud to a level below 1 mg/l.

There is a clear trend when the sediment is released close to the seabed, the concentration level is significantly higher and the extend of the plume is correspondingly smaller.

7.2.1.2 Duration, single position

A more convenient way to evaluate the concentration is, to sum up, the time at a given position for a predefined concentration level to picture the time for which the selected concentration has been exceeded.

This has in Figure 7.3 and Figure 7.4 been done for the three sections of the water column previously defined (10 m upper water column, 10 m above the seabed and depth average over the entire water column).

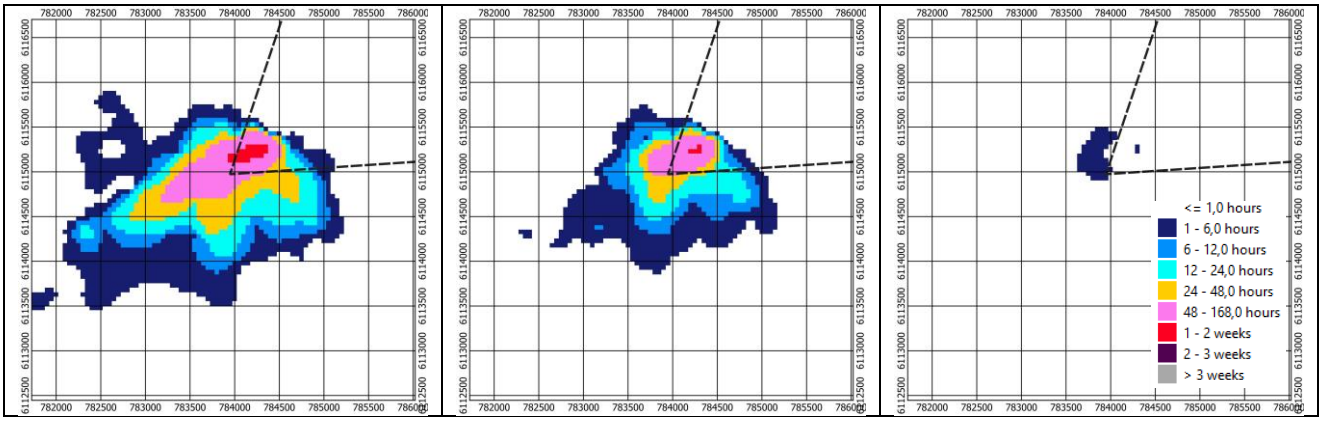

Figure 7.3: "Surface", duration 10 mg/l; left: upper 10 m, mid: depth average, right lower 10 m

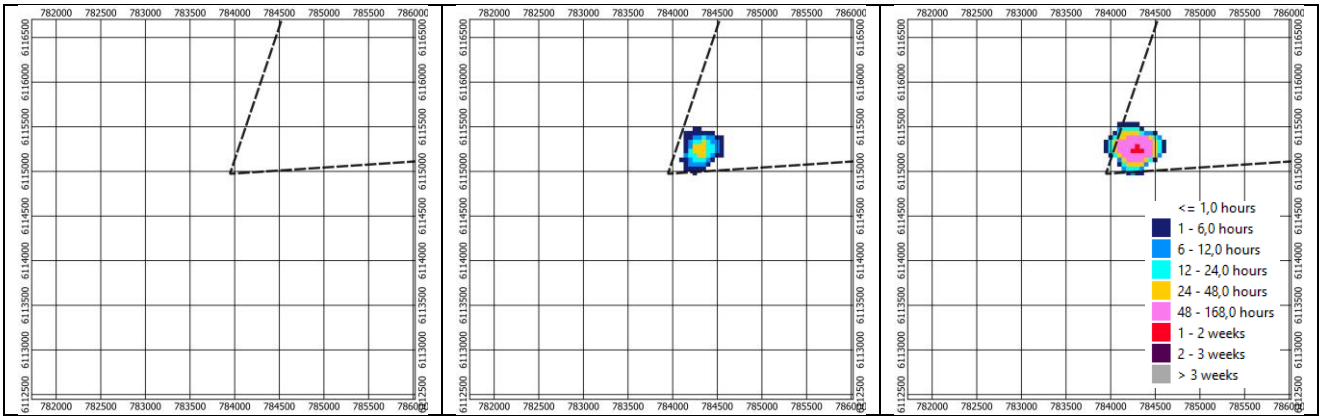

Figure 7.4: "Bottom", duration 10 mg/l; left: upper 10 m, mid: depth average, right lower 10 m

When the sediment is released 2 m below the surface the distance to the bottom makes room for the sediment to be transported along and to have the sediment suspended for longer solely because of the time it takes the sediment to settle at the seabed.

This is evident when the areas affected are considered, Table 7.1. For the lower 10 m of the water column when the sediment is released 2 m above the seabed concentration levels above 10 mg/l will affect an area of 28.25 hectares for 0.5 hours which with the source 2 m below the surface increases to 32.5 hectares (and also 0.5 hours).

Correspondingly, the 10 mg/l will have a longer duration for the former (release 2 m below the surface); 7 days versus 3 hours.

In the upper 10 m of the water column, the opposite is the case. With the sediment released 2 m above the seabed, no sediment is observed in this part of the water column. For the sediment spill released 2 m below the surface, the sediment plume will cover a much larger area and also reach higher concentration levels. A concentration of 10 mg/l will for 0.5 hours covers up to 628 hectares and 100 mg/l for 12 hours in the top 10 m of the water column.

Table 7.1: Single Position, Total areas in hectares affected by selected average concentration levels for the lowest 10 m, depth average and the highest 10 of the water column.

Sediment source 2 m above the seabed

Depth range	Concen-tration	Unit	Duration 0.5 [hour]	1 [hour]	3 [hour]	6 [hour]	12 [hour]	1 [day]	2 [day]	7 [day]
10 above seabed	10	[mg/l]	28.25	28	26.25	22.75	20.25	15.25	10	1
	25	[mg/l]	21.75	21	19.25	16	14	10	5.5	0
	50	[mg/l]	0	0	0	0	0	0	0	0
	100	[mg/l]	0	0	0	0	0	0	0	0
Depth average	10	[mg/l]	20.25	18.5	14.25	10.5	6	2.25	0	0
	25	[mg/l]	0	0	0	0	0	0	0	0
	50	[mg/l]	0	0	0	0	0	0	0	0
	100	[mg/l]	0	0	0	0	0	0	0	0
10 m below surface	10	[mg/l]	0	0	0	0	0	0	0	0
	25	[mg/l]	0	0	0	0	0	0	0	0
	50	[mg/l]	0	0	0	0	0	0	0	0
	100	[mg/l]	0	0	0	0	0	0	0	0

Sediment source 2 m below the surface

Depth range	Concen-tration	Unit	Duration 0.5 [hour]	1 [hour]	3 [hour]	6 [hour]	12 [hour]	1 [day]	2 [day]	7 [day]
10 above seabed	10	[mg/l]	32.5	17.75	1.25	0	0	0	0	0
	25	[mg/l]	0	0	0	0	0	0	0	0
	50	[mg/l]	0	0	0	0	0	0	0	0
	100	[mg/l]	0	0	0	0	0	0	0	0
Depth average	10	[mg/l]	327.25	275.25	190	141.75	89.75	45.75	25.25	1
	25	[mg/l]	66	53.5	34.5	15.5	8.25	3.5	0.5	0
	50	[mg/l]	1.75	0	0	0	0	0	0	0
	100	[mg/l]	0	0	0	0	0	0	0	0
10 m below surface	10	[mg/l]	628	528	348	277.75	205.75	122.25	58.5	6.25
	25	[mg/l]	185.25	158.25	102.25	71	47.5	34.25	24	2.5
	50	[mg/l]	60.5	49.75	32.5	18.25	13	8.25	3	0
	100	[mg/l]	17.5	15	9	4	1	0	0	0

7.2.1.3 Duration, whole wind farm

Duration plots for the scenario with the sediment source released 2 m above the seabed (Bottom) and 2 m below the surface (Surface) are presented in

- Bottom, depth average concentrations 10, 25, 50, 100 and 1000 mg/l in Appendix 10, Appendix 11, Appendix 12, Appendix 13 and Appendix 14;
- Bottom, highest 10 m average concentrations 10, 100 and 1000 mg/l in Appendix 15, Appendix 16 and Appendix 17
- Bottom, lowest 10 m average concentrations 10, 100 and 1000 mg/l in Appendix 18, Appendix 19 and Appendix 20
- Surface, depth average concentrations 10, 25, 50, 100 and 10 mg/l in Appendix 22, Appendix 23, Appendix 24, Appendix 25 and Appendix 26
- Surface, highest 10 m average concentrations 10, 100 and 1000 mg/l in Appendix 27, Appendix 28 and Appendix 29

- Surface, lowest 10 m average concentrations 10, 100 and 1000 mg/l in Appendix 30, Appendix 31 and Appendix 32

Table 7.2 shows the duration of exceedance for 10, 25, 50 and 100 mg/l for the three subdivisions of the water column when sediment is released 2 m above the seabed (top) and 2 m below the surface (bottom). This is shown for all areas in the model, i.e. inside and outside the Triton OWF.

The areas of which concentration levels exceed 10 mg/l when sediment is released 2 m above the seabed reaches almost 892 hectares and lasts for 6 hours (when looking at the bottom 10 meters of the water column) which for when sediment is released 2 m below the surface is almost 977 hectares.

A comparison is best made over the entire water column, as this represents all sediment being spilled. It is therefore seen how much more the sediment is dispersed when released just below the surface, compared to just above the seabed. This is shown e.g. for areas exceeding 10 mg/l when depth averaging the concentration, as the Bottom case causes 416.3 hectares and the Surface case causes 2755.5 hectares. The duration of the concentration levels above 10 mg/l are for both cases limited to 168 hours (i.e. 7 days).

Table 7.2: 15MW worst-case, Total areas in hectares affected by selected average concentration levels for the lowest 10 m, depth average and the highest 10 of the water column. Top: drilled material release 2 m above the seabed, Bottom: drilled material released 2 m below the surface.

Sediment source 2 m above the seabed

Depth range	Concen-tration	Unit	Duration							
			6	12	24	48	168	14	21	28
			[hour]	[hour]	[hour]	[hour]	[hour]	[day]	[day]	[day]
10 above seabed	10	[mg/l]	891.5	530.8	348.3	211.8	22.5	0.0	0.0	0.0
	25	[mg/l]	369.8	264.0	180.5	97.3	7.3	0.0	0.0	0.0
	50	[mg/l]	84.3	58.8	40.0	20.5	0.5	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	416.3	208.8	102.8	49.8	2.8	0.0	0.0	0.0
	25	[mg/l]	66.5	32.3	22.5	14.3	1.5	0.0	0.0	0.0
	50	[mg/l]	20.5	9.8	5.5	1.8	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	230.5	92.5	34.0	14.3	0.0	0.0	0.0	0.0
	25	[mg/l]	46.0	11.8	3.3	0.0	0.0	0.0	0.0	0.0
	50	[mg/l]	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sediment source 2 m below the surface

Depth range	Concen-tration	Unit	Duration							
			6	12	24	48	168	14	21	28
			[hour]	[hour]	[hour]	[hour]	[hour]	[day]	[day]	[day]
10 above seabed	10	[mg/l]	976.8	496.8	256.3	102.5	3.0	0.0	0.0	0.0
	25	[mg/l]	251.8	137.3	65.5	24.0	0.0	0.0	0.0	0.0
	50	[mg/l]	52.8	21.3	8.0	1.5	0.0	0.0	0.0	0.0
	100	[mg/l]	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	2755.5	1617.5	899.0	462.5	32.3	0.0	0.0	0.0
	25	[mg/l]	548.8	327.0	167.0	74.3	1.8	0.0	0.0	0.0
	50	[mg/l]	106.0	61.5	33.0	16.8	0.5	0.0	0.0	0.0
	100	[mg/l]	23.0	12.5	6.5	1.8	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	4813.3	3325.8	1909.0	909.0	93.8	0.0	0.0	0.0
	25	[mg/l]	1231.8	840.5	560.0	329.0	29.5	0.0	0.0	0.0
	50	[mg/l]	452.5	328.0	216.0	105.3	3.5	0.0	0.0	0.0
	100	[mg/l]	114.8	76.3	42.0	14.8	0.0	0.0	0.0	0.0

Areas for concentration levels inside the Triton OWF are listed in Table 7.3 and when compared to the total areas in Table 7.2 it becomes clear that the majority of the regions affected by the various concentration levels are located inside the wind farm area. E.g. for the depth averaged results in the Surface case where the area exceeding 10 mg/l is 2755.5 hectares when looking across the entire model domain versus 2542.3 hectares when looking only inside the wind farm. I.e. 233,2 hectares are found outside the Triton OWF.

Table 7.3: 15MW worst-case, Wind Farm area in hectares affected by selected average concentration levels for the lowest 10 m, depth average and the highest 10 of the water column. Top: drilled material release 2 m above the seabed, Bottom: drilled material released 2 m below the surface.

Sediment source 2 m above the seabed

Depth range	Concen-tration	Unit	Duration							
			6	12	24	48	168	14	21	28
			[hour]	[hour]	[hour]	[hour]	[hour]	[day]	[day]	[day]
10 above seabed	10	[mg/l]	861.8	520.5	345.0	211.0	22.5	0.0	0.0	0.0
	25	[mg/l]	363.3	263.0	180.5	97.3	7.3	0.0	0.0	0.0
	50	[mg/l]	82.5	58.8	40.0	20.5	0.5	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	396.3	204.0	102.5	49.8	2.8	0.0	0.0	0.0
	25	[mg/l]	62.0	32.0	22.5	14.3	1.5	0.0	0.0	0.0
	50	[mg/l]	18.8	9.8	5.5	1.8	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	211.3	87.8	33.8	14.3	0.0	0.0	0.0	0.0
	25	[mg/l]	41.5	11.5	3.3	0.0	0.0	0.0	0.0	0.0
	50	[mg/l]	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sediment source 2 m below the surface

Depth range	Concen-tration	Unit	Duration							
			6	12	24	48	168	14	21	28
			[hour]	[hour]	[hour]	[hour]	[hour]	[day]	[day]	[day]
10 above seabed	10	[mg/l]	933.5	478.8	249.0	99.8	3.0	0.0	0.0	0.0
	25	[mg/l]	240.3	132.3	64.8	24.0	0.0	0.0	0.0	0.0
	50	[mg/l]	50.0	21.0	8.0	1.5	0.0	0.0	0.0	0.0
	100	[mg/l]	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	2542.3	1504.5	856.3	447.5	32.3	0.0	0.0	0.0
	25	[mg/l]	534.3	321.3	166.3	74.3	1.8	0.0	0.0	0.0
	50	[mg/l]	103.3	61.3	33.0	16.8	0.5	0.0	0.0	0.0
	100	[mg/l]	22.5	12.5	6.5	1.8	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	4347.3	3042.5	1756.0	854.5	92.5	0.0	0.0	0.0
	25	[mg/l]	1163.8	805.3	541.8	320.8	29.5	0.0	0.0	0.0
	50	[mg/l]	447.0	327.8	216.0	105.3	3.5	0.0	0.0	0.0
	100	[mg/l]	114.3	76.3	42.0	14.8	0.0	0.0	0.0	0.0

The difference between Table 7.2 and Table 7.3 reveals that most of the sediment is kept inside the Triton OWF, as the hectares for exceeding 10 mg/l in e.g. the depth average case is reduced to 2542.3 from 2755.5 for 6 hours duration.

7.2.2 Sedimentation

7.2.2.1 Temporal, single position

The temporal dispersal of the spilled sediment for the scenario with the sediment released 2 m above the bottom and 2 m below the surface is per 4 hours illustrated in:

- Bottom, 2 m above the seabed: sedimentation in mm Appendix 6 and
- Surface, 2 m below the surface: sedimentation in mm Appendix 9.

The simulated drilling operation starts 2010-04-01 0:00 and ends 2010-04-11 16:43. For the Bottom scenario, the majority of the sediment settles within a distance of 500m in a southwestern direction. As mentioned for the concentration, the sediment will when released 2 m below the surface have to opportunity to travel a longer distance before it settles which when it comes to sedimentation reduces the maximum sedimentation but increasing the affected area.

7.2.2.2 Maximum sedimentation, single position

Table 7.4 shows the maximum sedimentation for the single position with the sediment released 2 m above the seabed and 2 m below the surface. The larger dispersal for the surface scenario increases the affected area with the sedimentation of 1 mm from 35 to 66 hectares but has maximum sedimentation of 15 mm compared to 50 mm for the release 2 m above the seabed.

Table 7.4: Single Position, Maximum sedimentation for the scenario with the sediment source 2 m above the seabed (top) and 2 m below the surface. Affected areas in hectares (bottom).

Source location	Sedimentation										
	1	2	5	10	15	20	25	30	35	40	50
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Bottom	35.00	27.00	17.50	11.75	8.50	6.75	5.00	3.50	3.50	2.25	1.25
Surface	66.00	31.00	14.00	5.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00

7.2.2.3 Maximum sedimentation, whole wind farm

Plots showing the maximum sedimentation for the scenario with the sediment source 2 m above the seabed (Bottom) and 2 m below the surface (Surface) are presented in:

- Bottom: Appendix 21 and
- Surface: Appendix 33.

In general sedimentation larger than 1 mm up to 1500 m from the drilled monopile for the Surface and around 600 m for the Bottom scenario. For the infield cables, the extent for the 1 mm sedimentation is up to +/300 m. The largest consecutive area with the sedimentation of 5 mm is observed in the vicinity of the 3 OSS where the cumulative sedimentation due to the drilling of the jackets and the jetting of the infield and export cable together reach a radius of 1000 m.

The largest sedimentations are observed next to the drilled monopiles where the sedimentation rate comes above 100 mm.
Table 7.5 shows the deposition levels for the regions shown in Figure 7.1 and the following is noted

- The majority of the spilled sediment deposit inside the wind farm area.
- The north part of the windfarm is mostly affected by the sedimentation in terms of area whereas the largest depositions of sediment is in the southern part of the wind farm (aside from the wind farm itself).
- The spilled sediments have for the present work no effect on the beach area north of the wind farm.
- Only a small part of the Natura 2000 area east of the wind farm is affected.
- The thickness of the deposited sediment is significantly larger when the spilled sediment is released 2 m above the seabed.
- The extent with a deposit of 1 mm is much larger when the spilled sediment is released 2 m below the surface.
- For both scenarios, the maximum sedimentation outside the wind farm area is around 15 mm.

Table 7.5: 15MW worst-case, Maximum sedimentation for the scenario with the sediment source 2 m above the seabed and 2 m below the surface. Affected areas in hectares for the zones in Figure 7.1.

Sediment source 2 m above the seabed

		Sedimentation											
		1	2	5	10	15	20	25	30	35	40	50	100
Area	Unit	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Wind Farm	[ha]	7281	2422	622	365	244	179	133	98	76	58	33	3
windfarm East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
windfarm North	[ha]	372	120	0	0	0	0	0	0	0	0	0	0
windfarm South	[ha]	74	40	16	5	1	0	0	0	0	0	0	0
N2000 East	[ha]	15	6	1	0	0	0	0	0	0	0	0	0
N2000 West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
Total	[ha]	7730	2580	634	367	244	179	133	98	76	58	33	3

Sediment source 2 m below the surface

		Sedimentation											
		1	2	5	10	15	20	25	30	35	40	50	100
Area	Unit	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Wind Farm	[ha]	8459	3140	638	258	119	56	26	12	6	4	1	0
windfarm East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
windfarm North	[ha]	378	124	0	0	0	0	0	0	0	0	0	0
windfarm South	[ha]	145	51	15	6	1	0	0	0	0	0	0	0
N2000 East	[ha]	42	12	3	0	0	0	0	0	0	0	0	0
N2000 West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
Total	[ha]	9006	3318	652	261	120	56	26	12	6	4	1	0

The Bottom case causes the most sedimentation, i.e. deposition of sediments in the vertical direction as it exceeds 100 mm whereas the Surface case causes approximately 50 mm of sedimentation. The Surface case on the other hand cause the largest dispersion of sediment as sedimentation of a minimum of 1 mm is found across 8459 hectares, which in the Bottom case is 7281 hectares.

7.2.2.4 Final sedimentation, whole wind farm

A more overall way to illustrate the dispersal of the sediment is done in Figure 7.5 where the distribution approximately 30 days after end of work is shown in percentage of the total amount of sedimentation in squares of 100 km^2. The distribution at this level for the 2 scenarios are very alike as the majority of the sediment has settled with a distance of 5 km from the wind farm. Only the square southwest of the wind farm shows a very small amount of material settles outside the OWF; 0.1%.

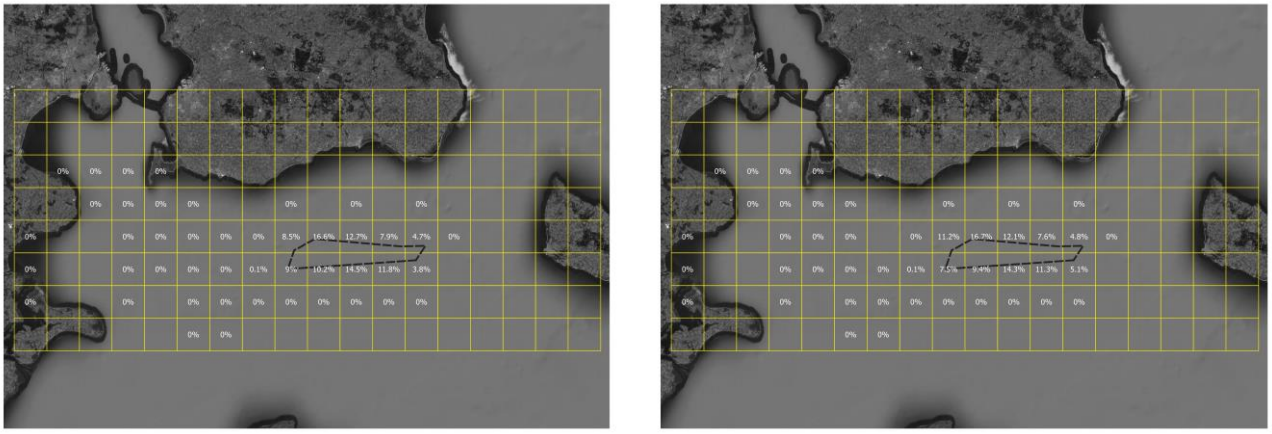

Figure 7.5: Left: "Surface", right: "Bottom", 15 MW MP worst case– distribution in the percentage of deposited sediment

7.3 15 MW layout MP cases

The outcome from the modelling is in this chapter presented as concentration durations and sedimentation for the whole wind farm. This is presented for cases with sediment released at 2 m below the surface and 2 m above the seabed and is referred to as Surface and Bottom.

7.3.1 Concentration

7.3.1.1 Duration, whole wind farm

Duration plots for the scenario with the sediment source released 2 m above the seabed (Bottom) and 2 m below the surface (Surface) are presented in

- Bottom, depth average concentrations 10, 100 and 1000 mg/l in Appendix 34, Appendix 35 and Appendix 36;
- Bottom, highest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 37, Appendix 38 and Appendix 39
- Bottom, lowest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 40, Appendix 41 and Appendix 42
- Surface, depth average concentrations 10, 100 and 10 mg/l in Appendix 44, Appendix 45 and Appendix 46
- Surface, highest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 47, Appendix 48 and Appendix 49
- Surface, lowest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 50, Appendix 51 and Appendix 52.

Table 7.6 shows the duration of exceedance for 10, 25, 50 and 100 mg/l for the three subdivisions of the water column when sediment is released 2 m above the seabed (top table) and 2 m below the surface (bottom table). This is shown for all areas in the model, i.e. inside and outside the Triton OWF.

The areas of which concentration levels exceed 10 mg/l when sediment is released 2 m above the seabed reaches 759 hectares and lasts for 6 hours (when looking at the bottom 10 meters of the water column) which for when sediment is released 2 m below the surface is almost 874 hectares.

As an overall comparison with the Bottom case, the Surface case causes much larger areas with concentrations exceeding both 10, 25, 50 and 100 mg/l when looking at depth average cases. E.g., the area with concentration levels above 10 mg/l increases from 352.8 hectares to 1945.8 hectares, or 552 %, when releasing sediment near the surface compared to the seabed. The total duration exceeding 10 mg/l is in both cases limited to approximately 48 hours.

Table 7.6: 15MW MP, Total areas in hectares affected by selected average concentration levels for the lowest 10 m, depth average and the highest 10 of the water column. Top: drilled material release 2 m above the seabed, Bottom: drilled material released 2 m below the surface.

Sediment source 2 m above the seabed

Depth range	Concentration	Unit	Duration 6 [hour]	12 [hour]	24 [hour]	48 [hour]	168 [hour]	14 [day]	21 [day]	28 [day]
10 above seabed	10	[mg/l]	759.3	434.3	262.0	119.3	0.0	0.0	0.0	0.0
	25	[mg/l]	352.8	235.8	134.8	52.8	0.0	0.0	0.0	0.0
	50	[mg/l]	72.5	40.3	21.0	7.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	352.8	168.0	65.3	21.8	0.0	0.0	0.0	0.0
	25	[mg/l]	59.5	28.0	15.5	7.0	0.0	0.0	0.0	0.0
	50	[mg/l]	14.5	6.5	2.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	148.3	56.3	15.5	4.0	0.0	0.0	0.0	0.0
	25	[mg/l]	34.0	8.0	0.8	0.0	0.0	0.0	0.0	0.0
	50	[mg/l]	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sediment source 2 m below the surface

Depth range	Concentration	Unit	Duration 6 [hour]	12 [hour]	24 [hour]	48 [hour]	168 [hour]	14 [day]	21 [day]	28 [day]
10 above seabed	10	[mg/l]	874.0	385.5	153.8	43.5	0.0	0.0	0.0	0.0
	25	[mg/l]	187.8	91.8	37.8	9.3	0.0	0.0	0.0	0.0
	50	[mg/l]	36.3	11.8	3.3	0.5	0.0	0.0	0.0	0.0
	100	[mg/l]	5.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	1945.8	1159.0	582.8	235.0	0.0	0.0	0.0	0.0
	25	[mg/l]	472.0	268.8	104.3	24.5	0.0	0.0	0.0	0.0
	50	[mg/l]	96.3	43.8	19.3	6.3	0.0	0.0	0.0	0.0
	100	[mg/l]	14.0	7.5	1.8	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	3355.8	2062.5	1083.3	432.3	0.0	0.0	0.0	0.0
	25	[mg/l]	991.3	638.3	379.3	175.3	0.0	0.0	0.0	0.0
	50	[mg/l]	424.5	280.8	146.3	44.3	0.0	0.0	0.0	0.0
	100	[mg/l]	116.5	59.5	16.3	4.0	0.0	0.0	0.0	0.0

The same results are shown only for the Triton OWF area in Table 7.7.

The difference between areas exceeding 10 mg/l for the total area and wind farm area in the Surface case concerning depth average results are 115 hectares, cf. Table 7.6 and Table 7.7.

Table 7.7: 15MW MP, Wind Farm area in hectares affected by selected average concentration levels for the lowest 10 m, depth average and the highest 10 of the water column. Top: drilled material release 2 m above the seabed, Bottom: drilled material released 2 m below the surface.

Sediment source 2 m above the seabed

Depth range	Concentration	Unit	Duration 6 [hour]	12 [hour]	24 [hour]	48 [hour]	168 [hour]	14 [day]	21 [day]	28 [day]
10 above seabed	10	[mg/l]	739.5	428.8	261.3	119.3	0.0	0.0	0.0	0.0
	25	[mg/l]	349.0	235.3	134.8	52.8	0.0	0.0	0.0	0.0
	50	[mg/l]	72.0	40.3	21.0	7.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	341.5	165.5	65.3	21.8	0.0	0.0	0.0	0.0
	25	[mg/l]	57.8	28.0	15.5	7.0	0.0	0.0	0.0	0.0
	50	[mg/l]	14.0	6.5	2.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	137.5	53.8	15.5	4.0	0.0	0.0	0.0	0.0
	25	[mg/l]	32.3	8.0	0.8	0.0	0.0	0.0	0.0	0.0
	50	[mg/l]	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sediment source 2 m below the surface

Depth range	Concen-tration	Unit	Duration							
			6	12	24	48	168	14	21	28
			[hour]	[hour]	[hour]	[hour]	[hour]	[day]	[day]	[day]
10 above seabed	10	[mg/l]	828.8	363.5	148.0	42.8	0.0	0.0	0.0	0.0
	25	[mg/l]	175.3	86.5	37.3	9.3	0.0	0.0	0.0	0.0
	50	[mg/l]	31.8	11.3	3.3	0.5	0.0	0.0	0.0	0.0
	100	[mg/l]	5.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	1830.8	1101.0	557.5	227.8	0.0	0.0	0.0	0.0
	25	[mg/l]	440.5	254.3	102.5	24.5	0.0	0.0	0.0	0.0
	50	[mg/l]	91.8	43.3	19.3	6.3	0.0	0.0	0.0	0.0
	100	[mg/l]	14.0	7.5	1.8	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	3083.3	1948.0	1037.8	418.3	0.0	0.0	0.0	0.0
	25	[mg/l]	935.3	607.8	365.8	170.8	0.0	0.0	0.0	0.0
	50	[mg/l]	404.0	272.0	146.0	44.3	0.0	0.0	0.0	0.0
	100	[mg/l]	116.5	59.5	16.3	4.0	0.0	0.0	0.0	0.0

The difference between Table 7.6 and Table 7.7 reveals that most of the sediment is kept inside the Triton OWF, as the hectares for exceeding 10 mg/l in e..g the depth average case is reduced to 1830.3 from 1945.8 for 6 hours duration in the Bottom case.

7.3.2 Sedimentation

7.3.2.1 Maximum sedimentation, whole wind farm

Plots showing the maximum sedimentation for the scenario with the sediment source 2 m above the seabed and 2 m below the surface are presented in

- Bottom: Appendix 43 and
- Surface: Appendix 53.

In general sedimentation larger than 1 mm is found up to 1400 m from the drilled monopile for the Surface and around 600 m for the Bottom cases. For the infield cables, the extent for the 1 mm sedimentation is up to +/300 m. The largest consecutive area with the sedimentation of 5 mm is (aside from a single MP foundation) observed in the vicinity of the 3 OSS where the cumulative sedimentation due to the drilling of the jackets and the jetting of the infield and export cable together reach a radius of 1100 m.

The largest sedimentations are observed next to the drilled monopiles where the sedimentation rate reaches 50-100 near the MP foundations.

Table 7.8 shows the deposition levels for the regions shown in Figure 7.1 and the following is noted

- The majority of the spilled sediment deposit inside the wind farm area.
- The north part of the wind farm is mostly affected by the sedimentation in terms of area whereas the largest depositions of sediment are the southern part of the wind farm (aside from the wind farm itself).
- The spilled sediments have for the present work no effect on the beach area north of the wind farm.
- The thickness of the deposited sediment is significantly larger when the spilled sediment is released 2 m above the seabed.
- The area experiencing depositions of sediments are significantly larger when the sediment is released 2 m below the surface.

• The maximum sedimentation is 35 mm and 50 mm for the Surface and Bottom case respectively.

Table 7.8: 15MW MP, Maximum sedimentation for the scenario with the sediment source 2 m above the seabed and 2 m below the surface. Affected areas in hectares for the zones in Figure 7.1.

Sediment source 2 m above the seabed

		Sedimentation											
		1	2	5	10	15	20	25	30	35	40	50	100
Area	Unit	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Wind Farm	[ha]	7088	2299	495	248	143	90	52	29	16	10	3	0
windfarm East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
windfarm North	[ha]	371	120	0	0	0	0	0	0	0	0	0	0
windfarm South	[ha]	45	23	5	0	0	0	0	0	0	0	0	0
N2000 East	[ha]	10	1	0	0	0	0	0	0	0	0	0	0
N2000 West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
Total	[ha]	7506	2438	498	248	143	90	52	29	16	10	3	0

Sediment source 2 m below the surface

		Sedimentation											
		1	2	5	10	15	20	25	30	35	40	50	100
Area	Unit	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Wind Farm	[ha]	7862	2647	425	114	40	18	8	3	1	0	0	0
windfarm East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
windfarm North	[ha]	373	124	0	0	0	0	0	0	0	0	0	0
windfarm South	[ha]	83	26	6	1	0	0	0	0	0	0	0	0
N2000 East	[ha]	22	7	0	0	0	0	0	0	0	0	0	0
N2000 West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
Total	[ha]	8327	2798	429	115	40	18	8	3	1	0	0	0

7.3.2.2 Final sedimentation, whole wind farm

The distribution of sedimentation 30 days after end of work, also called final sedimentation, is in both the Surface and Bottom case restricted to the Triton OWF or very close to the border as seen in Figure 7.6 where 0 % is located in a mesh-grid outside the wind farm showing that the sedimentation extends along the borders or shape of the wind farm. In addition, the direction of spreading follows the dominating current directions in this part of the Baltic Sea.

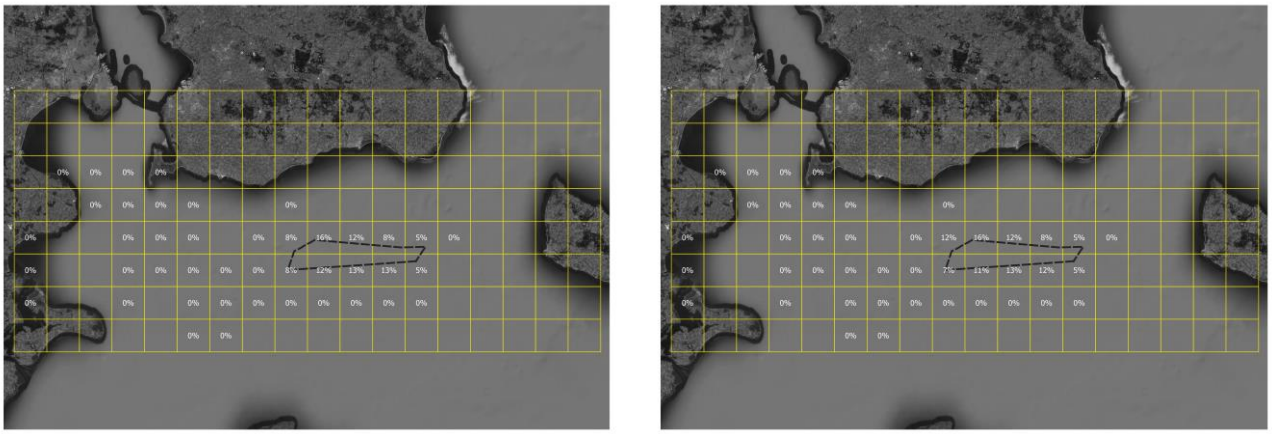

Figure 7.6: Left: "Surface", right: "Bottom", 15 MW MP – distribution in the percentage of deposited sediment

7.4 15 MW layout GBS cases

The outcome from the modelling is in this chapter presented as concentration durations and sedimentation for the whole wind farm. This is presented for cases with sediment released at 2 m below the surface, and is referred to as Surface.

7.4.1 Concentration

7.4.1.1 Duration, whole wind farm

Duration plots for the scenario with the sediment source released 2 m below the surface are presented in

- Surface, depth average concentrations 10, 100 and 1000 mg/l in Appendix 54, Appendix 55 and Appendix 56
- Surface, highest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 57, Appendix 58 and Appendix 59
- Surface, lowest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 60, Appendix 61 and Appendix 62
-

Table 7.9 shows the duration of exceedance for 10, 25, 50 and 100 mg/l for the three subdivisions of the water column when sediment is released 2 m below the surface. This is shown for all areas in the model, i.e. inside and outside the Triton OWF.

The areas of which concentration levels exceed 10 mg/l when sediment is released 2 m below the surface reaches almost 417 hectares and lasts for 6 hours (when looking at the bottom 10 meters of the water column).

Being that the sediment is released just below the surface, the largest area with concentration levels exceeding 10 mg/l is inside the top 10 meter, whereas the concentration levels increase in the bottom 10 meters due to the jetting of infield cables. This sediment is further diluted over the entire water column, meaning the area with increased concentration levels are smaller across the entire water column compared to the top and bottom 10 meters.

Table 7.9: 15MW GBS, Total areas in hectares affected by selected average concentration levels for the lowest 10 m, depth average and the highest 10 of the water column.

Sediment source 2 m above the seabed

Depth range	Concen-tration	Unit	Duration							
			6 [hour]	12 [hour]	24 [hour]	48 [hour]	168 [hour]	14 [day]	21 [day]	28 [day]
10 above seabed	10	[mg/l]	416.8	155.3	77.3	35.3	2.8	0.0	0.0	0.0
	25	[mg/l]	100.0	59.5	34.5	15.5	1.3	0.0	0.0	0.0
	50	[mg/l]	20.5	15.0	10.5	6.0	0.0	0.0	0.0	0.0
	100	[mg/l]	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	273.0	75.5	19.8	9.0	0.5	0.0	0.0	0.0
	25	[mg/l]	15.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0
	50	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	814.0	165.3	0.3	0.0	0.0	0.0	0.0	0.0
	25	[mg/l]	52.8	4.5	0.0	0.0	0.0	0.0	0.0	0.0
	50	[mg/l]	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

The same results are shown only for the Triton OWF area in Table 7.10.

The difference between areas exceeding 10 mg/l for the total area and windfarm area concerning depth average results are 15 hectares, cf. Table 7.9 andTable 7.10.

Table 7.10: 15MW GBS, Wind Farm area in hectares affected by selected average concentration levels for the lowest 10 m, depth average and the highest 10 of the water column.

Sediment source 2 m above the seabed

Depth range	Concen-tration	Unit	Duration							
			6 [hour]	12 [hour]	24 [hour]	48 [hour]	168 [hour]	14 [day]	21 [day]	28 [day]
10 above seabed	10	[mg/l]	392.0	143.0	71.8	33.5	2.8	0.0	0.0	0.0
	25	[mg/l]	97.5	58.3	34.3	15.5	1.3	0.0	0.0	0.0
	50	[mg/l]	20.5	15.0	10.5	6.0	0.0	0.0	0.0	0.0
	100	[mg/l]	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	257.8	70.0	19.8	9.0	0.5	0.0	0.0	0.0
	25	[mg/l]	15.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0
	50	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	804.5	163.0	0.3	0.0	0.0	0.0	0.0	0.0
	25	[mg/l]	52.8	4.5	0.0	0.0	0.0	0.0	0.0	0.0
	50	[mg/l]	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

The difference between Table 7.9 and Table 7.10 reveals that most of the sediment is kept inside the Triton OWF, as the hectares for exceeding 10 mg/l in e..g the depth average case is reduced to 257.8 from 273 for 6 hours duration.

7.4.2 Sedimentation

7.4.2.1 Maximum sedimentation, whole wind farm

Plots showing the maximum sedimentation for the scenario with the sediment source 2 m below the surface (Surface) are presented in

- Surface: Appendix 63

In general sedimentation larger than 1 mm is found up to 750 m from the dredged GBS. For the infield cables, the extent for the 1 mm sedimentation is up to +/275 m. The largest consecutive area with the sedimentation of 5 mm is observed in the vicinity of the 3 OSS where the cumulative sedimentation due to the drilling of the jackets and the jetting of the infield and export cable together reach a radius of almost 1200 m.

The largest sedimentations are observed next to a dredged foundation in the southwestern corner of Triton OWF as it exceeds 100 mm.

Table 7.8 shows the deposition levels for the regions shown in Figure 7.1 and the following is noted

- The majority of the spilled sediment deposit inside the wind farm area.
- The north part of the wind farm is mostly affected by the sedimentation in terms of area whereas the largest depositions of sediment are in the southern part of the wind farm (aside from the wind farm itself).
- Some sedimentation occurs in the Natura 2000 East area reaching approximately 10 mm sedimentation.
- The spilled sediments have for the present work no effect on the beach area north of the wind farm.

• The maximum sedimentation is slightly above 100 mm.

Table 7.11: 15MW GBS, Maximum sedimentation for the scenario with the sediment source 2 m above the seabed and 2 m below the surface. Affected areas in hectares for the zones in Figure 7.1.

Sediment source 2 m below the surface

Area	Unit	Sedimentation											
		1	2	5	10	15	20	25	30	35	40	50	100
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Wind Farm	[ha]	6897	1891	169	71	40	27	19	14	11	9	8	3
windfarm East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
windfarm North	[ha]	369	120	0	0	0	0	0	0	0	0	0	0
windfarm South	[ha]	7	2	1	0	0	0	0	0	0	0	0	0
N2000 East	[ha]	23	11	4	1	0	0	0	0	0	0	0	0
N2000 West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
Total	[ha]	7294	2024	173	72	40	27	19	14	11	9	8	3

7.4.2.2 Final sedimentation, whole wind farm

The distribution of sedimentation 30 days after the end of work is in both this case predominantly restricted to the Triton OWF or very close to the border as seen in Figure 7.7 where 0.1 % is located in a mesh-grid outside the wind farm showing that the sedimentation extends along the borders or shape of it. In addition, the direction of spreading follows the dominating current directions in this part of the Baltic Sea.

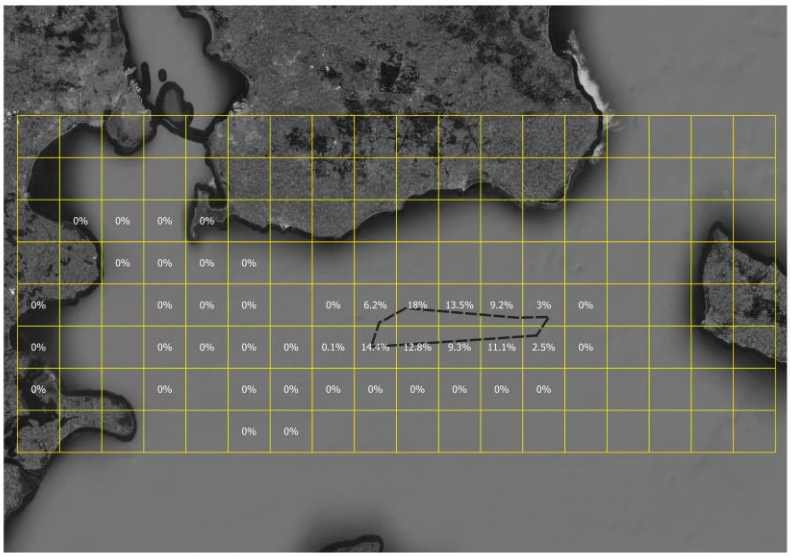

Figure 7.7: "Surface - 15 MW GBS distribution in the percentage of deposited sediment

7.5 15 MW layout Jacket cases

The outcome from the modelling is in this chapter presented as concentration durations and sedimentation for the whole wind farm. This is presented for cases with sediment released at 2 m below the surface and 2 m above the seabed, and is referred to as Surface and Bottom.

7.5.1 Concentration

7.5.1.1 Duration, whole wind farm

Duration plots for the scenario with the sediment source released 2 m above the seabed (Bottom) and 2 m below the surface (Surface) are presented in

- Bottom, depth average concentrations 10, 100 and 1000 mg/l in Appendix 64, Appendix 65 and Appendix 66
- Bottom, highest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 67, Appendix 68 and Appendix 69
- Bottom, lowest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 70, Appendix 71 and Appendix 72
- Surface, depth average concentrations 10, 100 and 10 mg/l in Appendix 74, Appendix 75 and Appendix 76
- Surface, highest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 77, Appendix 78 and Appendix 79
- Surface, lowest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 80, Appendix 81 and Appendix 82

Table 7.12 shows the duration of exceedance for 10, 25, 50 and 100 mg/l for the three subdivisions of the water column when sediment is released 2 m above the seabed (top table) and 2 m below the surface (bottom table). This is shown for all areas in the model, i.e. inside and outside the Triton OWF.

The areas of which concentration levels exceed 10 mg/l when sediment is released 2 m above the seabed reaches 620 hectares and lasts for 6 hours (when looking at the bottom 10 meters of the water column) which for when sediment is released 2 m below the surface is almost 509 hectares.

As an overall comparison with the Bottom case, the Surface case causes much larger areas with concentrations exceeding both 10, 25, 50 and 100 mg/l when looking at depth average cases, up to 485 % of the area with concentration levels exceeding 10 mg/l for 6 hours. The total duration exceeding 10 mg/l is in both cases limited to approximately 48 hours.

Table 7.12: 15MW Jacket, Total areas in hectares affected by selected average concentration levels for the lowest 10 m, depth average and the highest 10 of the water column. Top: drilled material release 2 m above the seabed, Bottom: drilled material released 2 m below the surface.

Sediment source 2 m above the seabed

Depth range	Concen-tration	Unit	Duration 6 [hour]	12 [hour]	24 [hour]	48 [hour]	168 [hour]	14 [day]	21 [day]	28 [day]
10 above seabed	10	[mg/l]	619.8	296.3	131.0	25.5	0.0	0.0	0.0	0.0
	25	[mg/l]	251.0	137.5	51.8	8.3	0.0	0.0	0.0	0.0
	50	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	187.8	61.3	17.3	1.8	0.0	0.0	0.0	0.0
	25	[mg/l]	30.5	11.0	3.8	0.3	0.0	0.0	0.0	0.0
	50	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	88.5	14.8	0.0	0.0	0.0	0.0	0.0	0.0
	25	[mg/l]	10.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	50	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sediment source 2 m below the surface

Depth range	Concentration	Unit	Duration 6 [hour]	12 [hour]	24 [hour]	48 [hour]	168 [hour]	14 [day]	21 [day]	28 [day]
10 above seabed	10	[mg/l]	509.3	198.5	67.0	19.0	0.0	0.0	0.0	0.0
	25	[mg/l]	113.0	47.5	21.3	6.3	0.0	0.0	0.0	0.0
	50	[mg/l]	4.3	0.8	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	910.3	432.0	143.8	7.3	0.0	0.0	0.0	0.0
	25	[mg/l]	140.3	41.8	9.3	0.5	0.0	0.0	0.0	0.0
	50	[mg/l]	17.5	6.0	0.3	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	1704.0	861.3	320.8	30.0	0.0	0.0	0.0	0.0
	25	[mg/l]	500.3	285.8	105.8	5.0	0.0	0.0	0.0	0.0
	50	[mg/l]	171.0	70.8	16.3	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	12.0	4.0	1.0	0.0	0.0	0.0	0.0	0.0

The same results are shown only for the Triton OWF area in Table 7.13.

The difference between areas exceeding 10 mg/l for the Surface case concerning depth average results are in this case 69 hectares, cf. Table 7.12 and Table 7.13.

Table 7.13: 15MW Jacket, Wind Farm area in hectares affected by selected average concentration levels for the lowest 10 m, depth average and the highest 10 of the water column. Top: drilled material release 2 m above the seabed, Bottom: drilled material released 2 m below the surface.

Sediment source 2 m above the seabed

Depth range	Concentration	Unit	Duration 6 [hour]	12 [hour]	24 [hour]	48 [hour]	168 [hour]	14 [day]	21 [day]	28 [day]
10 above seabed	10	[mg/l]	613.0	296.3	131.0	25.5	0.0	0.0	0.0	0.0
	25	[mg/l]	250.0	137.5	51.8	8.3	0.0	0.0	0.0	0.0
	50	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	185.8	61.3	17.3	1.8	0.0	0.0	0.0	0.0
	25	[mg/l]	30.3	11.0	3.8	0.3	0.0	0.0	0.0	0.0
	50	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	86.5	14.8	0.0	0.0	0.0	0.0	0.0	0.0
	25	[mg/l]	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	50	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sediment source 2 m below the surface

Depth range	Concentration	Unit	Duration 6 [hour]	12 [hour]	24 [hour]	48 [hour]	168 [hour]	14 [day]	21 [day]	28 [day]
10 above seabed	10	[mg/l]	496.0	194.0	65.5	18.8	0.0	0.0	0.0	0.0
	25	[mg/l]	107.0	45.5	21.0	6.3	0.0	0.0	0.0	0.0
	50	[mg/l]	4.3	0.8	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	841.8	407.0	139.8	7.0	0.0	0.0	0.0	0.0
	25	[mg/l]	128.3	39.8	9.0	0.5	0.0	0.0	0.0	0.0
	50	[mg/l]	17.5	6.0	0.3	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	1572.3	803.3	310.0	29.8	0.0	0.0	0.0	0.0
	25	[mg/l]	461.3	270.5	104.3	5.0	0.0	0.0	0.0	0.0
	50	[mg/l]	165.3	70.3	16.3	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	12.0	4.0	1.0	0.0	0.0	0.0	0.0	0.0

The difference between Table 7.12 and Table 7.13 reveals that most of the sediment is kept inside the Triton OWF, as the hectares for exceeding 10 mg/l in e..g the depth average case is reduced to 841.8 from 910.3 for 6 hours duration in the Bottom case.

7.5.2 Sedimentation

7.5.2.1 Maximum sedimentation, whole wind farm

Plots showing the maximum sedimentation for the scenario with the sediment source 2 m above the seabed (Bottom) and 2 m below the surface (Surface) are presented in

- Bottom: Appendix 73 and
- Surface: Appendix 83.

In general sedimentation larger than 1 mm is found up to 850 m from the drilled monopile for the Surface and around 700 m for the Bottom scenario. For the infield cables, the extent for the 1 mm sedimentation is up to +/275 m. The largest consecutive area with the sedimentation of 5 mm is (aside from a single jacket foundation) observed in the vicinity of the 3 OSS where the cumulative sedimentation due to the drilling of the jackets and the jetting of the infield and export cable together reach a radius of 1100 m.

The largest sedimentations are observed next to a dredged foundation in the eastern part of Triton OWF as it reaches approximately 35 mm.

Table 7.14 shows the deposition levels for the regions shown in Figure 7.1 and the following is noted

- The majority of the spilled sediment deposit inside the wind farm area.
- The north part of the wind farm is mostly affected by the sedimentation in terms of area whereas the largest depositions of sediment are in the southern part of the wind farm (aside from the wind farm itself).
- The spilled sediments have for the present work no effect on the beach area north of the wind farm.
- Only a small part of the Natura 2000 East area is affected.
- The thickness of the deposited sediment is very similar when the spilled sediment is released 2 m above the seabed.
- The extent with a deposit of 1 mm is larger when the spilled sediment is released 2 m below the surface, although not significantly.
- For both scenarios, the maximum sedimentation outside the wind farm area is around 2-5 mm.

Table 7.14: 15MW Jacket, Maximum sedimentation for the scenario with the sediment source 2 m above the seabed and 2 m below the surface. Affected areas in hectares for the zones in Figure 7.1.

Sediment source 2 m above the seabed

Area	Unit	Sedimentation											
		1	2	5	10	15	20	25	30	35	40	50	100
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Wind Farm	[ha]	6791	2022	327	102	35	16	8	3	1	0	0	0
windfarm East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
windfarm North	[ha]	370	120	0	0	0	0	0	0	0	0	0	0
windfarm South	[ha]	21	6	0	0	0	0	0	0	0	0	0	0
N2000 East	[ha]	3	0	0	0	0	0	0	0	0	0	0	0
N2000 West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
Total	[ha]	7178	2145	327	102	35	16	8	3	1	0	0	0

Sediment source 2 m below the surface

Area	Unit	Sedimentation											
		1	2	5	10	15	20	25	30	35	40	50	100
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Wind Farm	[ha]	7022	2064	189	53	24	12	6	2	1	0	0	0
windfarm East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
windfarm North	[ha]	374	119	0	0	0	0	0	0	0	0	0	0
windfarm South	[ha]	25	9	2	0	0	0	0	0	0	0	0	0
N2000 East	[ha]	7	1	0	0	0	0	0	0	0	0	0	0
N2000 West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
Total	[ha]	7420	2189	190	53	24	12	6	2	1	0	0	0

7.5.2.2 Final sedimentation, whole wind farm

The distribution of sedimentation 30 days after end of work is in the Bottom case restricted to the Triton OWF or very close to the border as seen in Figure 7.8 where 0.1 % is located in a mesh-grid outside the wind farm showing that the sedimentation extends along the borders or shape of it. In addition, the direction of spreading follows the dominating current directions in this part of the Baltic Sea.

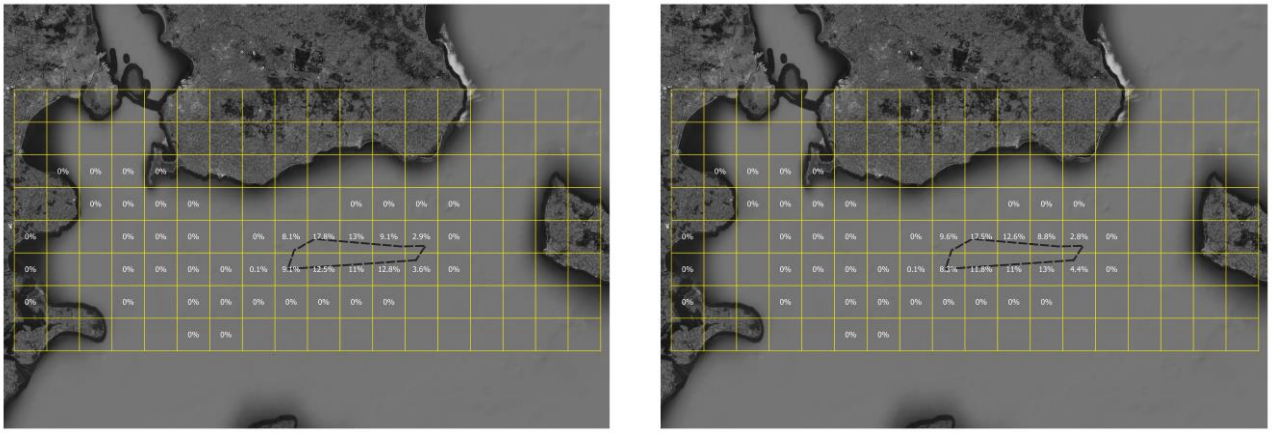

Figure 7.8: Left: "Surface", right: "Bottom", 15 MW Jacket – distribution in the percentage of deposited sediment

7.6 25 MW MP layout cases

7.6.1 Concentration

7.6.1.1 Duration, whole wind farm

Duration plots for the scenario with the sediment source released 2 m above the seabed (Bottom) and 2 m below the surface (Surface) are presented in:

- Bottom, depth average concentrations 10, 100 and 1000 mg/l inAppendix 84, Appendix 85 and Appendix 86;
- Bottom, highest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 87, Appendix 88 and Appendix 89
- Bottom, lowest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 90, Appendix 91 and Appendix 92
- Surface, depth average concentrations 10, 100 and 10 mg/l in Appendix 94, Appendix 95 and Appendix 96
- Surface, highest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 97, Appendix 98 and Appendix 99
- Surface, lowest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 100, Appendix 101 and Appendix 102

Table 7.15 shows the duration of exceedance for 10, 25, 50 and 100 mg/l for the three subdivisions of the water column when sediment is released 2 m above the seabed (top table) and 2 m below the surface (bottom table). This is shown for all areas in the model, i.e. inside and outside the Triton OWF.

The areas of which concentration levels exceed 10 mg/l when sediment is released 2 m above the seabed reaches 456 hectares and lasts for 6 hours (when looking at the bottom 10 meters of the water column) which for when sediment is released 2 m below the surface is almost 86 hectares.

As an overall comparison with the Bottom case, the Surface case causes much larger areas with concentrations exceeding both 10, 25, 50 and 100 mg/l when looking at depth average cases, up to 685 % of the area with concentration levels exceeding 10 mg/l for 6 hours. The total duration exceeding 10 mg/l is in both cases limited to approximately 168 hours or 1 week.

Table 7.15: 25MW MP, Total areas in hectares affected by selected average concentration levels for the lowest 10 m, depth average and the highest 10 of the water column. Top: drilled material release 2 m above the seabed, Bottom: drilled material released 2 m below the surface.

Sediment source 2 m above the seabed

Depth range	Concen-tration	Unit	Duration							
			6	12	24	48	168	14	21	28
			[hour]	[hour]	[hour]	[hour]	[hour]	[day]	[day]	[day]
10 above seabed	10	[mg/l]	455.8	290.5	202.0	123.8	13.5	0.0	0.0	0.0
	25	[mg/l]	205.5	159.5	116.8	65.8	5.3	0.0	0.0	0.0
	50	[mg/l]	49.3	30.3	16.8	8.0	1.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	214.8	131.0	81.0	43.5	3.0	0.0	0.0	0.0
	25	[mg/l]	22.0	16.3	12.3	8.0	1.0	0.0	0.0	0.0
	50	[mg/l]	19.3	15.8	11.8	7.8	1.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	85.5	40.8	25.5	16.3	1.8	0.0	0.0	0.0
	25	[mg/l]	22.0	16.8	12.5	8.0	1.0	0.0	0.0	0.0
	50	[mg/l]	19.0	15.8	11.8	7.8	1.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sediment source 2 m below the surface

Depth range	Concen-tration	Unit	Duration							
			6	12	24	48	168	14	21	28
			[hour]	[hour]	[hour]	[hour]	[hour]	[day]	[day]	[day]
10 above seabed	10	[mg/l]	602.0	318.5	158.5	55.0	1.0	0.0	0.0	0.0
	25	[mg/l]	137.3	74.8	34.3	12.3	1.0	0.0	0.0	0.0
	50	[mg/l]	28.8	18.8	12.5	7.8	1.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	1472.8	958.3	546.8	284.0	18.8	0.0	0.0	0.0
	25	[mg/l]	345.8	221.5	119.3	49.0	1.0	0.0	0.0	0.0
	50	[mg/l]	75.5	37.3	15.8	7.8	1.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	2506.8	1755.3	1096.0	595.3	75.3	0.0	0.0	0.0
	25	[mg/l]	704.5	472.3	319.3	198.3	21.8	0.0	0.0	0.0
	50	[mg/l]	265.3	189.5	128.0	68.5	4.3	0.0	0.0	0.0
	100	[mg/l]	73.5	45.8	22.5	4.8	0.0	0.0	0.0	0.0

The same results are shown only for the Triton OWF area in Table 7.16.

The difference between areas exceeding 10 mg/l for the Surface case concerning depth average results are in this case around 1000 hectares, cf. Table 7.15 and Table 7.16.

Table 7.16: 25MW MP, Wind Farm area in hectares affected by selected average concentration levels for the lowest 10 m, depth average and the highest 10 of the water column. Top: drilled material release 2 m above the seabed, Bottom: drilled material released 2 m below the surface.

Sediment source 2 m above the seabed

Depth range	Concen-tration	Unit	Duration							
			6	12	24	48	168	14	21	28
			[hour]	[hour]	[hour]	[hour]	[hour]	[day]	[day]	[day]
10 above seabed	10	[mg/l]	428.3	280.3	200.0	123.8	13.5	0.0	0.0	0.0
	25	[mg/l]	200.3	158.3	116.8	65.8	5.3	0.0	0.0	0.0
	50	[mg/l]	48.8	30.3	16.8	8.0	1.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	195.3	122.3	79.3	43.5	3.0	0.0	0.0	0.0
	25	[mg/l]	18.8	16.0	12.3	8.0	1.0	0.0	0.0	0.0
	50	[mg/l]	18.8	15.8	11.8	7.8	1.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below	10	[mg/l]	67.3	32.3	23.8	16.3	1.8	0.0	0.0	0.0
	25	[mg/l]	18.8	16.5	12.5	8.0	1.0	0.0	0.0	0.0
	50	[mg/l]	18.5	15.8	11.8	7.8	1.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sediment source 2 m below the surface

Depth range	Concen-tration	Unit	Duration							
			6	12	24	48	168	14	21	28
			[hour]	[hour]	[hour]	[hour]	[hour]	[day]	[day]	[day]
10 above seabed	10	[mg/l]	570.0	302.3	152.3	54.5	1.0	0.0	0.0	0.0
	25	[mg/l]	131.5	73.0	34.3	12.3	1.0	0.0	0.0	0.0
	50	[mg/l]	27.0	18.8	12.5	7.8	1.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	1291.3	870.3	515.3	278.5	18.8	0.0	0.0	0.0
	25	[mg/l]	338.3	219.8	119.3	49.0	1.0	0.0	0.0	0.0
	50	[mg/l]	73.8	37.3	15.8	7.8	1.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below	10	[mg/l]	2085.5	1508.8	985.8	562.3	75.3	0.0	0.0	0.0
	25	[mg/l]	644.3	450.5	313.3	197.3	21.8	0.0	0.0	0.0
	50	[mg/l]	259.8	188.3	128.0	68.5	4.3	0.0	0.0	0.0
	100	[mg/l]	73.5	45.8	22.5	4.8	0.0	0.0	0.0	0.0

The difference between Table 7.12 and Table 7.13 reveals that most of the sediment is kept inside the Triton OWF, as the hectares for exceeding 10 mg/l in e..g the depth average case is reduced to 195.3 from 214.8 for 6 hours duration in the Bottom case.

7.6.2 Sedimentation

7.6.2.1 Maximum sedimentation, whole wind farm

Plots showing the maximum sedimentation for the scenario with the sediment source 2 m above the seabed (Bottom) and 2 m below the surface (Surface) are presented in

- Bottom: Appendix 93 and
- Surface: Appendix 103.

In general sedimentation larger than 1 mm is found up to 350 m from the drilled monopile for the Bottom case and 900 m for the Surface case. For the infield cables, the extent for the 1 mm sedimentation is up to +/250 m. The largest consecutive area with the sedimentation of 5 mm is (aside from a single MP foundation) observed in the vicinity of the 3 OSS where the cumulative sedimentation due to the drilling of the jackets and the jetting of the infield and export cable together reach a radius of 2000 m.

The largest sedimentations are observed next to the drilled monopiles where the sedimentation rate reaches 50-100 mm whereas the OSS reaches 20-50 mm at most.

Table 7.17: 25MW MP, Maximum sedimentation for the scenario with the sediment source 2 m above the seabed and 2 m below the surface. Affected areas in hectares for the zones in Figure 7.1.

Sediment source 2 m above the seabed

		Sedimentation											
		1	2	5	10	15	20	25	30	35	40	50	100
Area	Unit	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Wind Farm	[ha]	6081	2671	410	217	152	111	82	63	45	35	19	1
windfarm East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
windfarm North	[ha]	208	79	2	0	0	0	0	0	0	0	0	0
windfarm South	[ha]	30	11	0	0	0	0	0	0	0	0	0	0
N2000 East	[ha]	6	3	1	0	0	0	0	0	0	0	0	0
N2000 West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
Total	[ha]	6318	2762	413	217	152	111	82	63	45	35	19	1

Sediment source 2 m below the surface

Area	Unit	Sedimentation											
		1	2	5	10	15	20	25	30	35	40	50	100
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Wind Farm	[ha]	6733	3079	451	167	65	26	11	7	3	2	0	0
windfarm East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
windfarm North	[ha]	210	79	2	0	0	0	0	0	0	0	0	0
windfarm South	[ha]	41	16	1	0	0	0	0	0	0	0	0	0
N2000 East	[ha]	32	9	0	0	0	0	0	0	0	0	0	0
N2000 West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
Total	[ha]	7008	3181	454	167	65	26	11	7	3	2	0	0

7.6.2.2 Final sedimentation, whole wind farm

The sedimentation in the percentage of the total sedimentation is for the 2 cases shown in Figure 7.9. Despite that, the sediment travels a significantly larger distance when released at the surface the end sedimentation when looked at in squares of 10 by 10 km is nearly the same.

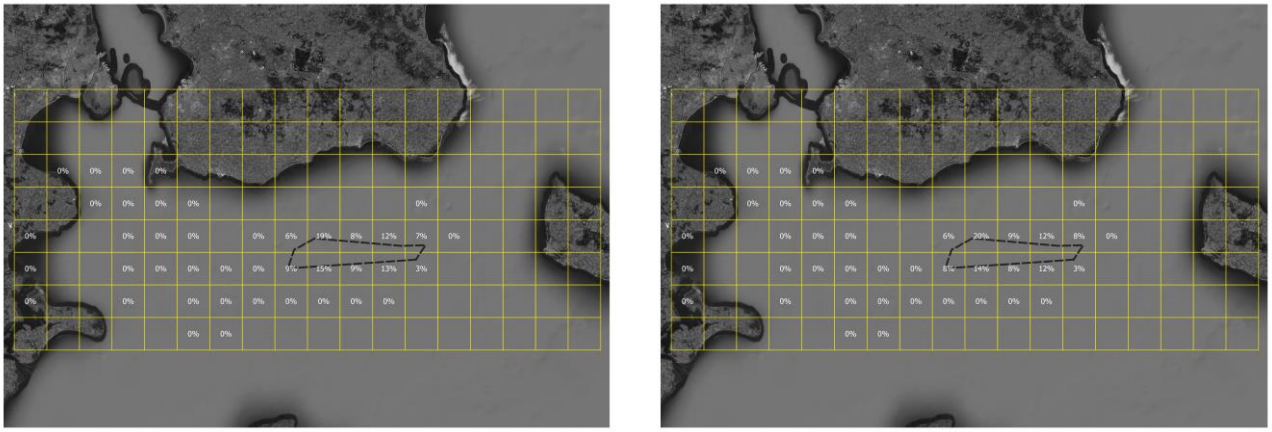

Figure 7.9: Left: "Surface", right: "Bottom", 25 MW MP – distribution in the percentage of deposited sediment

7.7 25 MW GBS layout cases

7.7.1 Concentration

7.7.1.1 Duration, whole wind farm

Duration plots for the scenario with the sediment source released 2 m above the seabed (Bottom) are presented in

- Bottom, depth average concentrations 10, 100 and 1000 mg/l in Appendix 104, Appendix 105 and Appendix 106
- Bottom, highest 10 m average concentrations 10, 100 and 1000 mg/l in Appendix 107, Appendix 108 and Appendix 109
- Bottom, lowest 10 m average concentrations 10, 100 and 1000 mg/l in Appendix 110, Appendix 111 and Appendix 112

Table 7.18 shows the duration of exceedance for 10, 25, 50 and 100 mg/l for the three subdivisions of the water column when sediment is released 2 m below the surface for the total area affected.

The areas in which concentration levels exceed 10 mg/l for 6 hours reaches 721 hectares in the upper 10 m and 364 hectares in the lower 10 m of the water column.

Table 7.18: 25MW GBS, Total areas in hectares affected by selected average concentration levels for the lowest 10 m, depth average and the highest 10 of the water column. Top: drilled material release 2 m above the seabed, Bottom: drilled material released 2 m below the surface.

Sediment source 2 m below the surface

Depth range	Concen-tration	Unit	Duration							
			6	12	24	48	168	14	21	28
			[hour]	[hour]	[hour]	[hour]	[hour]	[day]	[day]	[day]
10 above seabed	10	[mg/l]	364.0	96.5	37.5	11.3	0.0	0.0	0.0	0.0
	25	[mg/l]	73.8	31.8	16.3	4.8	0.0	0.0	0.0	0.0
	50	[mg/l]	8.0	3.5	0.5	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	218.8	45.5	5.5	0.3	0.0	0.0	0.0	0.0
	25	[mg/l]	10.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0
	50	[mg/l]	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	721.0	269.5	21.5	0.0	0.0	0.0	0.0	0.0
	25	[mg/l]	55.3	10.5	0.0	0.0	0.0	0.0	0.0	0.0
	50	[mg/l]	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

The same results are shown only for the Triton OWF area in Table 7.19. By comparison, it is clear that areas affected by concentration levels above 10 mg / l with a duration of more than 12 hours are within the wind farm area.

Table 7.19: 25MW GBS, Wind Farm area in hectares affected by selected average concentration levels for the lowest 10 m, depth average and the highest 10 of the water column. Top: drilled material release 2 m above the seabed, Bottom: drilled material released 2 m below the surface.

Sediment source 2 m below the surface

Depth range	Concen-tration	Unit	Duration							
			6 [hour]	12 [hour]	24 [hour]	48 [hour]	168 [hour]	14 [day]	21 [day]	28 [day]
10 above seabed	10	[mg/l]	356.8	96.5	37.5	11.3	0.0	0.0	0.0	0.0
	25	[mg/l]	73.8	31.8	16.3	4.8	0.0	0.0	0.0	0.0
	50	[mg/l]	8.0	3.5	0.5	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	217.5	45.5	5.5	0.3	0.0	0.0	0.0	0.0
	25	[mg/l]	10.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0
	50	[mg/l]	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below	10	[mg/l]	718.5	269.5	21.5	0.0	0.0	0.0	0.0	0.0
	25	[mg/l]	55.3	10.5	0.0	0.0	0.0	0.0	0.0	0.0
	50	[mg/l]	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

7.7.2 Sedimentation

7.7.2.1 Maximum sedimentation, whole wind farm

Plot showing the maximum sedimentation for the scenario with the sediment source 2 m above the seabed (Bottom) is presented in

- Bottom: Appendix 113

In general sedimentation, less than 5 mm is found up to 250 m from the dredged position. For the infield cables, the extent for the 1 mm sedimentation is up to +/250 m. The largest consecutive area with the sedimentation of 5 mm is observed in the vicinity of the 3 OSS where the cumulative sedimentation due to the drilling of the jackets and the jetting of the infield and export cable together reach a radius of 1100 m.

Table 7.20: 25MW GBS, Maximum sedimentation for the scenario with the sediment source 2 m above the seabed and 2 m below the surface. Affected areas in hectares for the zones in Figure 7.1.

Sediment source 2 m below the surface

Area	Unit	Sedimentation											
		1 [mm]	2 [mm]	5 [mm]	10 [mm]	15 [mm]	20 [mm]	25 [mm]	30 [mm]	35 [mm]	40 [mm]	50 [mm]	100 [mm]
Wind Farm	[ha]	5960	1891	135	42	21	12	6	3	1	1	0	0
windfarm East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
windfarm North	[ha]	208	79	2	0	0	0	0	0	0	0	0	0
windfarm South	[ha]	8	0	0	0	0	0	0	0	0	0	0	0
N2000 East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
N2000 West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
Total	[ha]	6171	1970	137	42	21	12	6	3	1	1	0	0

7.7.2.2 Final sedimentation, whole wind farm

The distribution of sedimentation 30 days after the end of work is illustrated in Figure 7.10 as mention previous the majority of the sediment has settled inside the wind farm area and 99% within a distance of 10 km.

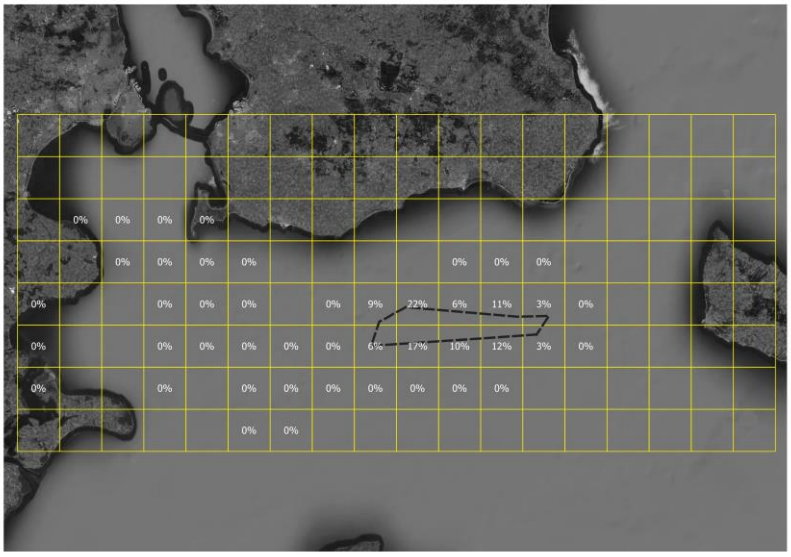

Figure 7.10: "Surface - 25 MW GBS distribution in the percentage of deposited sediment

7.8 25 MW Jacket layout cases

7.8.1 Concentration

7.8.1.1 Duration, whole wind farm

Duration plots for the scenario with the sediment source released 2 m above the seabed (Bottom) and 2 m below the surface (Surface) are presented in:

- Bottom, depth average concentrations 10, 100 and 1000 mg/l inAppendix 114, Appendix 115 and Appendix 116;
- Bottom, highest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 117, Appendix 118 and Appendix 119
- Bottom, lowest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 120, Appendix 121 andAppendix 122
- Surface, depth average concentrations 10, 100 and 10 mg/l in Appendix 124, Appendix 125 and Appendix 126
- Surface, highest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 127, Appendix 128 and Appendix 129
- Surface, lowest 10 m concentrations 10, 100 and 1000 mg/l in Appendix 130, Appendix 131 and Appendix 132

Table 7.15 shows the duration of exceedance for 10, 25, 50 and 100 mg/l for the three subdivisions of the water column when sediment is released 2 m above the seabed (top table) and 2 m below the surface (bottom table). This is shown for all areas in the model, i.e. inside and outside the Triton OWF.

The areas of which concentration levels exceed 10 mg/l when sediment is released 2 m above the seabed reaches 340 hectares and lasts for 6 hours (when looking at the bottom 10 meters of the water column) which for when sediment is released 2 m below the surface is almost 333 hectares.

As an overall comparison with the Bottom case, the Surface case causes much larger areas with concentrations exceeding both 10, 25, 50 and 100 mg/l when looking at depth average cases, up to 539 % of the area with concentration levels exceeding 10 mg/l for 6 hours. The total duration exceeding 10 mg/l is in both cases limited to approximately 48 hours.

Table 7.21: 25MW Jacket, Total areas in hectares affected by selected average concentration levels for the lowest 10 m, depth average and the highest 10 of the water column. Top: drilled material release 2 m above the seabed, Bottom: drilled material released 2 m below the surface.

Sediment source 2 m above the seabed

Depth range	Concen-tration	Unit	Duration							
			6	12	24	48	168	14	21	28
			[hour]	[hour]	[hour]	[hour]	[hour]	[day]	[day]	[day]
10 above seabed	10	[mg/l]	340.3	188.5	100.0	31.5	0.0	0.0	0.0	0.0
	25	[mg/l]	149.5	100.5	51.5	11.5	0.0	0.0	0.0	0.0
	50	[mg/l]	24.3	10.3	1.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	122.8	61.0	21.0	3.5	0.0	0.0	0.0	0.0
	25	[mg/l]	14.3	9.8	5.0	1.0	0.0	0.0	0.0	0.0
	50	[mg/l]	7.8	3.3	0.3	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	51.5	23.0	8.0	1.5	0.0	0.0	0.0	0.0
	25	[mg/l]	13.5	9.8	5.0	1.0	0.0	0.0	0.0	0.0
	50	[mg/l]	7.8	3.3	0.3	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sediment source 2 m below the surface

Depth range	Concen-tration	Unit	Duration 6 [hour]	12 [hour]	24 [hour]	48 [hour]	168 [hour]	14 [day]	21 [day]	28 [day]
10 above seabed	10	[mg/l]	332.8	143.5	59.0	12.8	0.0	0.0	0.0	0.0
	25	[mg/l]	83.0	47.0	21.3	5.0	0.0	0.0	0.0	0.0
	50	[mg/l]	22.3	11.8	3.8	0.8	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	662.3	402.0	191.0	38.5	0.0	0.0	0.0	0.0
	25	[mg/l]	119.8	50.3	13.3	1.3	0.0	0.0	0.0	0.0
	50	[mg/l]	18.0	8.8	3.5	0.8	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	1230.0	746.3	404.3	131.8	0.0	0.0	0.0	0.0
	25	[mg/l]	343.5	227.5	117.8	34.3	0.0	0.0	0.0	0.0
	50	[mg/l]	125.0	78.0	34.3	4.5	0.0	0.0	0.0	0.0
	100	[mg/l]	21.8	5.0	0.3	0.0	0.0	0.0	0.0	0.0

The same results are shown only for the Triton OWF area in Table 7.16.

The difference between areas exceeding 10 mg/l for the Surface case concerning depth average results are in this case 31 hectares, cf. Table 7.15 and Table 7.16.

Table 7.22: 25MW Jacket, Wind Farm area in hectares affected by selected average concentration levels for the lowest 10 m, depth average and the highest 10 of the water column. Top: drilled material release 2 m above the seabed, Bottom: drilled material released 2 m below the surface.

Sediment source 2 m above the seabed

Depth range	Concen-tration	Unit	Duration 6 [hour]	12 [hour]	24 [hour]	48 [hour]	168 [hour]	14 [day]	21 [day]	28 [day]
10 above seabed	10	[mg/l]	332.8	188.5	100.0	31.5	0.0	0.0	0.0	0.0
	25	[mg/l]	148.8	100.5	51.5	11.5	0.0	0.0	0.0	0.0
	50	[mg/l]	24.3	10.3	1.0	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	121.0	61.0	21.0	3.5	0.0	0.0	0.0	0.0
	25	[mg/l]	14.3	9.8	5.0	1.0	0.0	0.0	0.0	0.0
	50	[mg/l]	7.8	3.3	0.3	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	49.8	23.0	8.0	1.5	0.0	0.0	0.0	0.0
	25	[mg/l]	13.5	9.8	5.0	1.0	0.0	0.0	0.0	0.0
	50	[mg/l]	7.8	3.3	0.3	0.0	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sediment source 2 m below the surface

Depth range	Concen-tration	Unit	Duration 6 [hour]	12 [hour]	24 [hour]	48 [hour]	168 [hour]	14 [day]	21 [day]	28 [day]
10 above seabed	10	[mg/l]	325.8	143.5	59.0	12.8	0.0	0.0	0.0	0.0
	25	[mg/l]	83.0	47.0	21.3	5.0	0.0	0.0	0.0	0.0
	50	[mg/l]	22.3	11.8	3.8	0.8	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Depth average	10	[mg/l]	631.5	387.8	190.0	38.5	0.0	0.0	0.0	0.0
	25	[mg/l]	119.8	50.3	13.3	1.3	0.0	0.0	0.0	0.0
	50	[mg/l]	18.0	8.8	3.5	0.8	0.0	0.0	0.0	0.0
	100	[mg/l]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 m below surface	10	[mg/l]	1088.8	694.0	379.3	123.8	0.0	0.0	0.0	0.0
	25	[mg/l]	334.8	224.5	117.5	34.3	0.0	0.0	0.0	0.0
	50	[mg/l]	124.5	78.0	34.3	4.5	0.0	0.0	0.0	0.0
	100	[mg/l]	21.8	5.0	0.3	0.0	0.0	0.0	0.0	0.0

The difference between Table 7.21 and Table 7.16 reveals that most of the sediment is kept inside the Triton OWF, as the hectares for exceeding 10 mg/l in e..g the depth average case is reduced to 121 from 123 for 6 hours duration in the Bottom case, and the two cases are thereby very similar.

7.8.2 Sedimentation

7.8.2.1 Maximum sedimentation, whole wind farm

Plots showing the maximum sedimentation for the scenario with the sediment source 2 m above the seabed (Bottom) and 2 m below the surface (Surface) are presented in:

- Bottom: Appendix 123 and
- Surface: Appendix 133.

In general sedimentation larger than 1 mm is found up to 800 m from the drilled jackets for the Surface and around 700 m for the Bottom scenario. For the infield cables, the extent for the 1 mm sedimentation is up to +/250 m. The largest consecutive area with the sedimentation of 5 mm is (aside from a single jacket foundation) observed in the vicinity of the 2 OSS where the cumulative sedimentation due to the drilling of the jackets and the jetting of the infield and export cable together reach a radius of 1350 m.

The largest sedimentations are observed next to a dredged foundation in the southwest of the eastern OSS as it reaches approximately 55 mm.

Table 7.14 shows the deposition levels for the regions shown in Figure 7.1 and the following is noted

- The majority of the spilled sediment deposit inside the wind farm area.
- The north part of the wind farm is mostly affected by the sedimentation in terms of both areas and the largest depositions of sediment (aside from the wind farm itself).
- The spilled sediments have for the present work no effect on the beach area north of the wind farm.
- Only a small part of the Natura 2000 East area is affected.
- The thickness of the deposited sediment is very similar when the spilled sediment is released 2 m above the seabed.
- The extent with a deposit of 1 mm is similar when the spilled sediment is released 2 m below the surface.
- For both scenarios, the maximum sedimentation outside the wind farm area is around 2-5 mm.

Table 7.23: 25MW Jacket, Maximum sedimentation for the scenario with the sediment source 2 m above the seabed and 2 m below the surface. Affected areas in hectares for the zones in Figure 7.1.

Sediment source 2 m above the seabed

Area	Unit	Sedimentation											
		1	2	5	10	15	20	25	30	35	40	50	100
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Wind Farm	[ha]	5850	2485	292	100	50	23	11	4	2	1	0	0
windfarm East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
windfarm North	[ha]	208	79	2	0	0	0	0	0	0	0	0	0
windfarm South	[ha]	2	0	0	0	0	0	0	0	0	0	0	0
N2000 East	[ha]	3	1	0	0	0	0	0	0	0	0	0	0
N2000 West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
Total	[ha]	6061	2565	293	100	50	23	11	4	2	1	0	0

Sediment source 2 m below the surface

Area	Unit	Sedimentation											
		1	2	5	10	15	20	25	30	35	40	50	100
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Wind Farm	[ha]	6069	2594	225	43	22	12	6	3	1	1	0	0
windfarm East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
windfarm North	[ha]	208	79	2	0	0	0	0	0	0	0	0	0
windfarm South	[ha]	2	0	0	0	0	0	0	0	0	0	0	0
N2000 East	[ha]	5	1	0	0	0	0	0	0	0	0	0	0
N2000 West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore East	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore West	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
NearShore	[ha]	0	0	0	0	0	0	0	0	0	0	0	0
Total	[ha]	6281	2674	226	43	22	12	6	3	1	1	0	0

7.8.2.2 Final sedimentation, whole wind farm

The distribution of sedimentation 30 days after the end of work is in the Bottom case restricted to the Triton OWF or very close to the border as seen in Figure 7.11Figure 7.8 where 0.1 % is located in a mesh-grid outside the wind farm showing that the sedimentation extends along the borders or shape of it. In addition, the direction of spreading follows the dominating current directions in this part of the Baltic Sea.

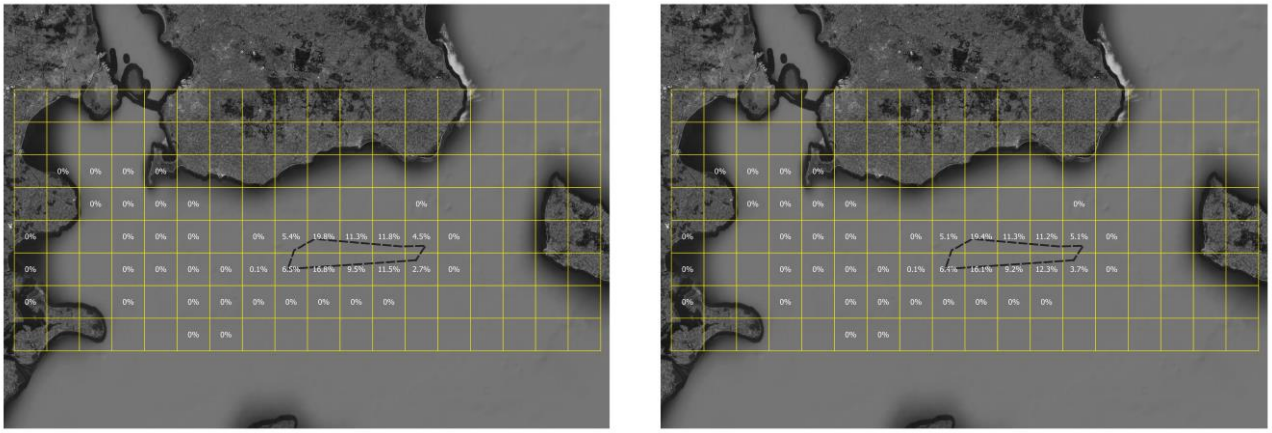

Figure 7.11: Left: "Surface", right: "Bottom", 25 MW Jacket – distribution in the percentage of deposited sediment

8 References

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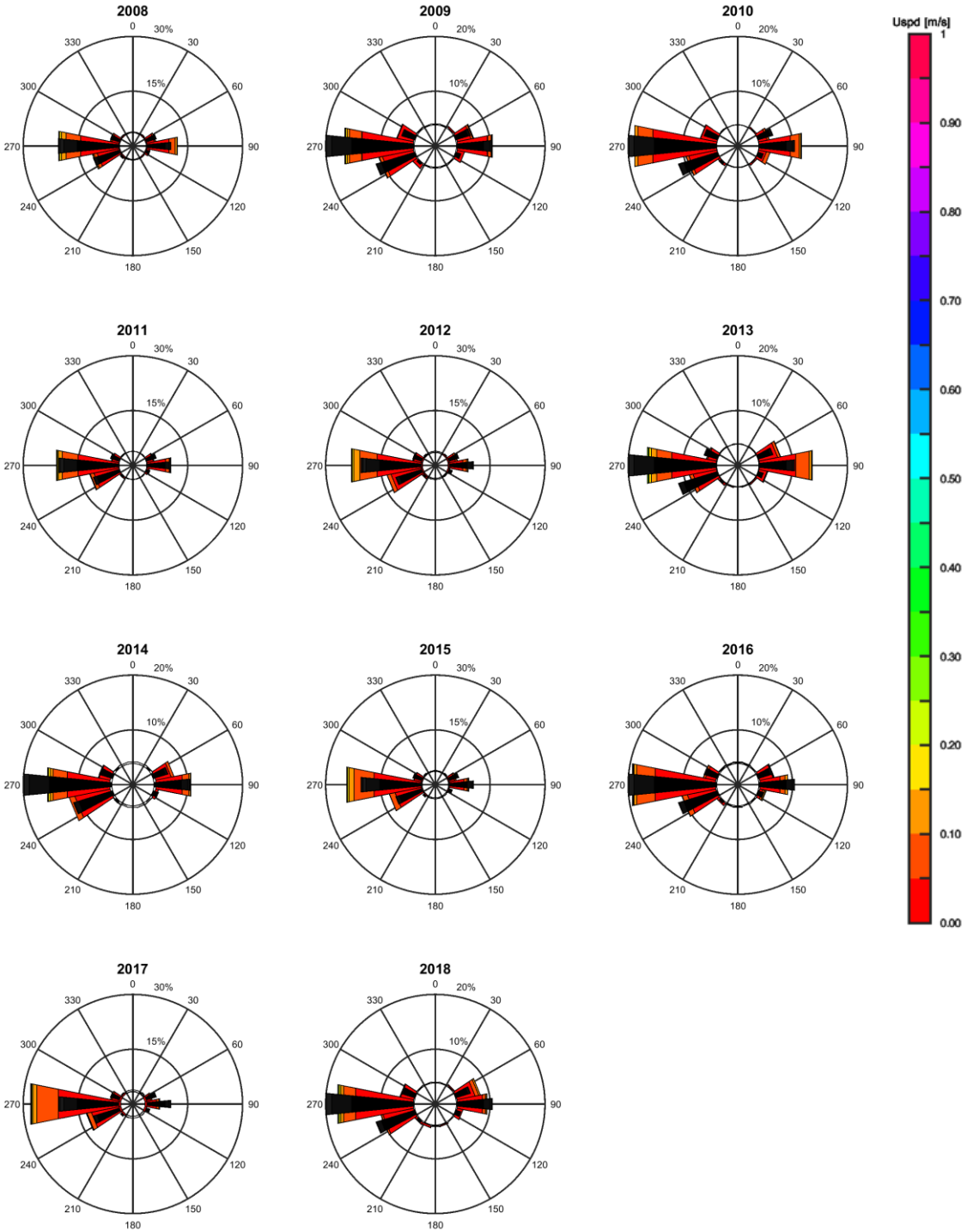
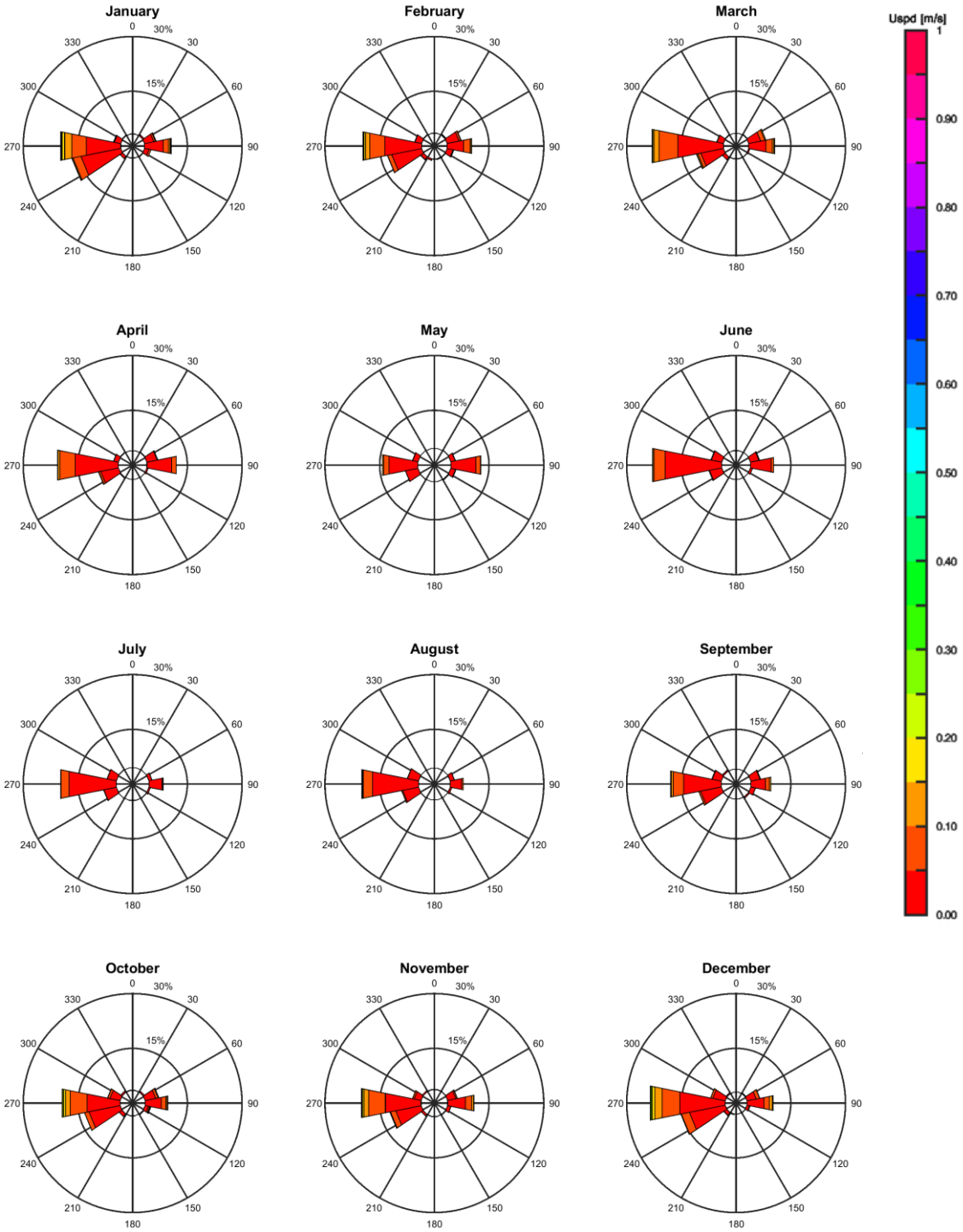
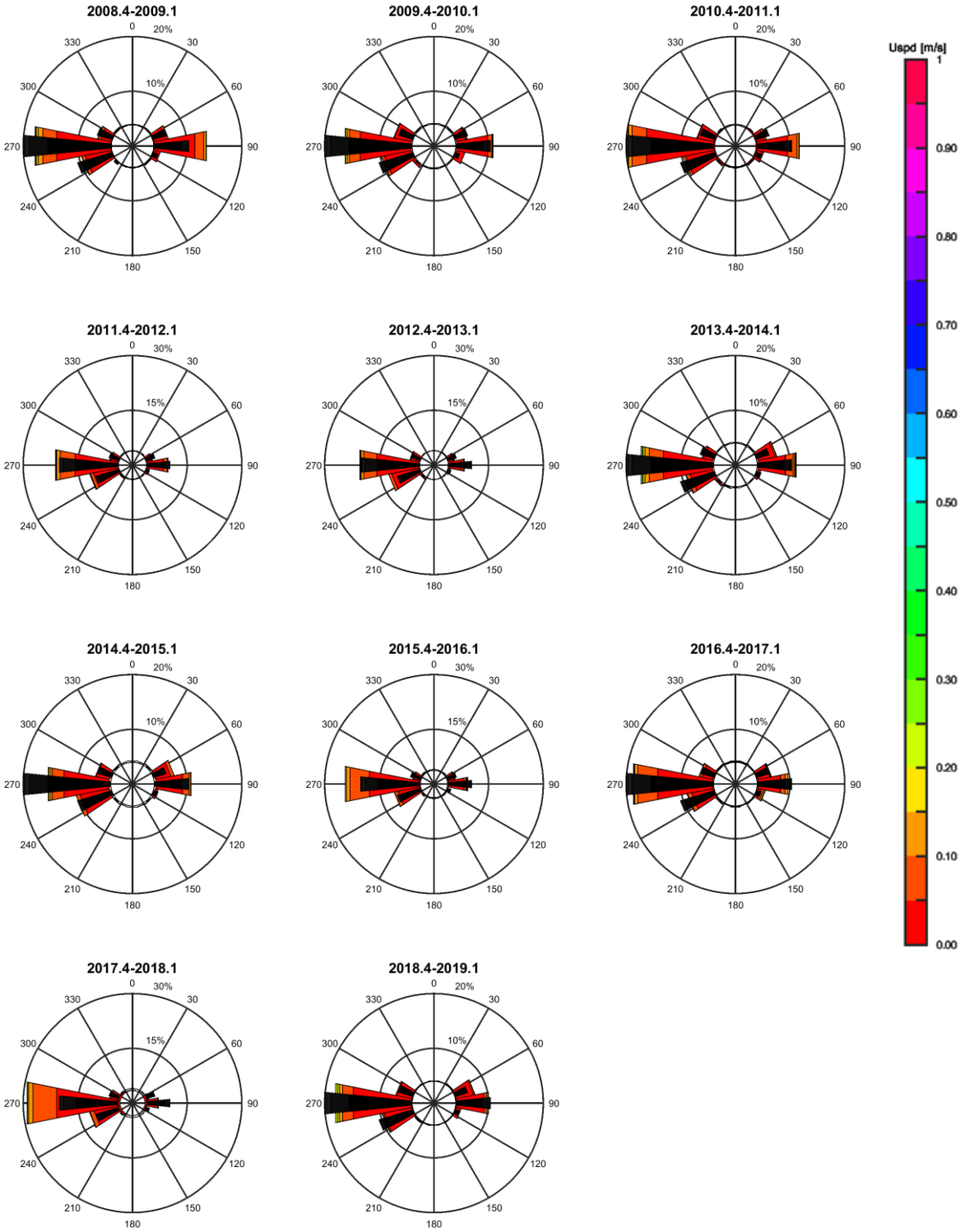
Appendix 1: Current roses yearly variations 2008 to 2018



Appendix 2: Current roses monthly average year 2008 to 2018



Appendix 3: Current roses April to December from 2008 to 2018

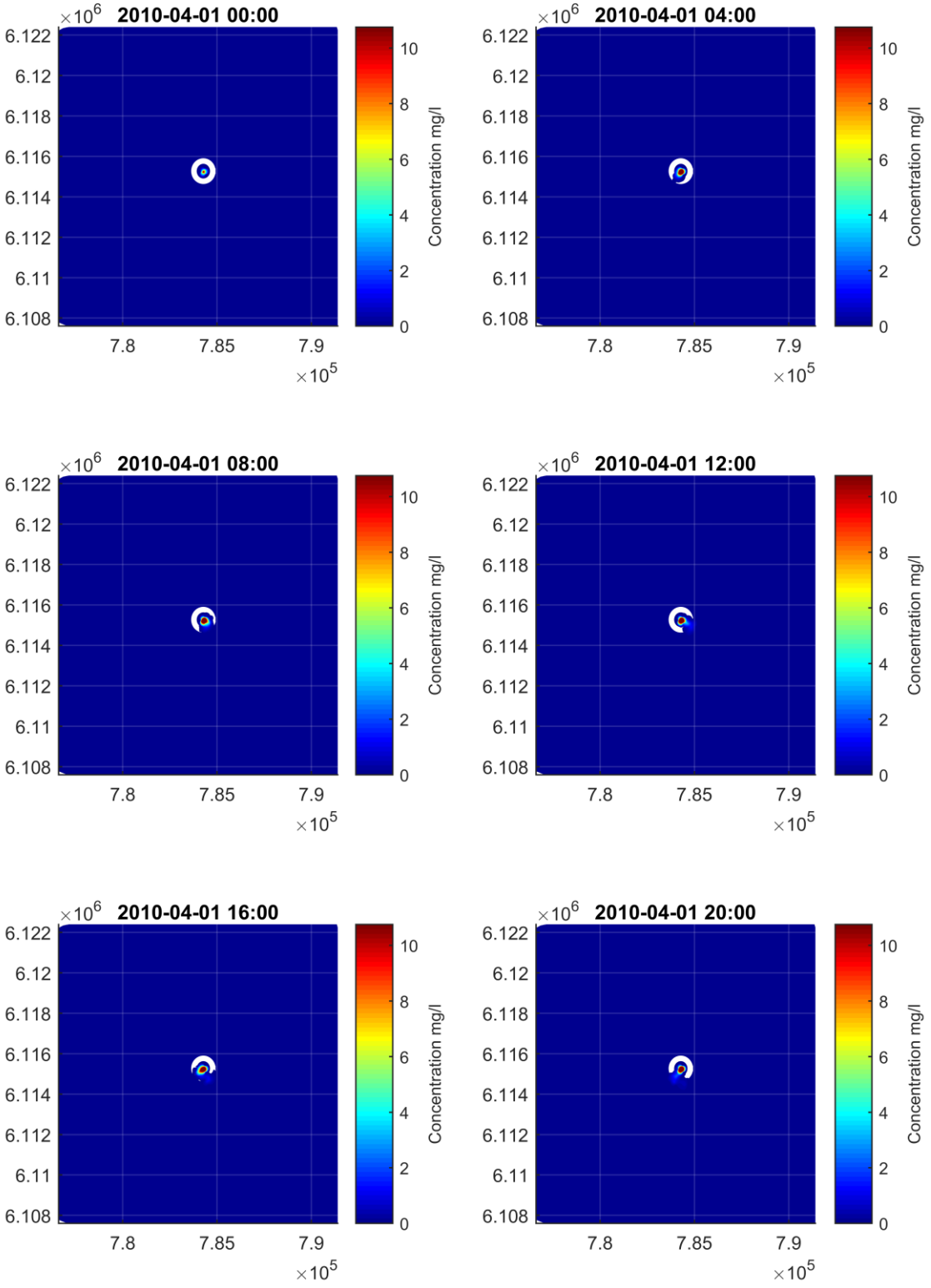


Appendix 4: 15MW MP worst-case, Bottom single position – concentration lower 10 m

Instantaneous concentration levels due to sediment spill for the drilling period

The white circle has a radius of 500 m

Start drilling: 2010-04-01 0:00
End drilling: 2010-04-11 16:43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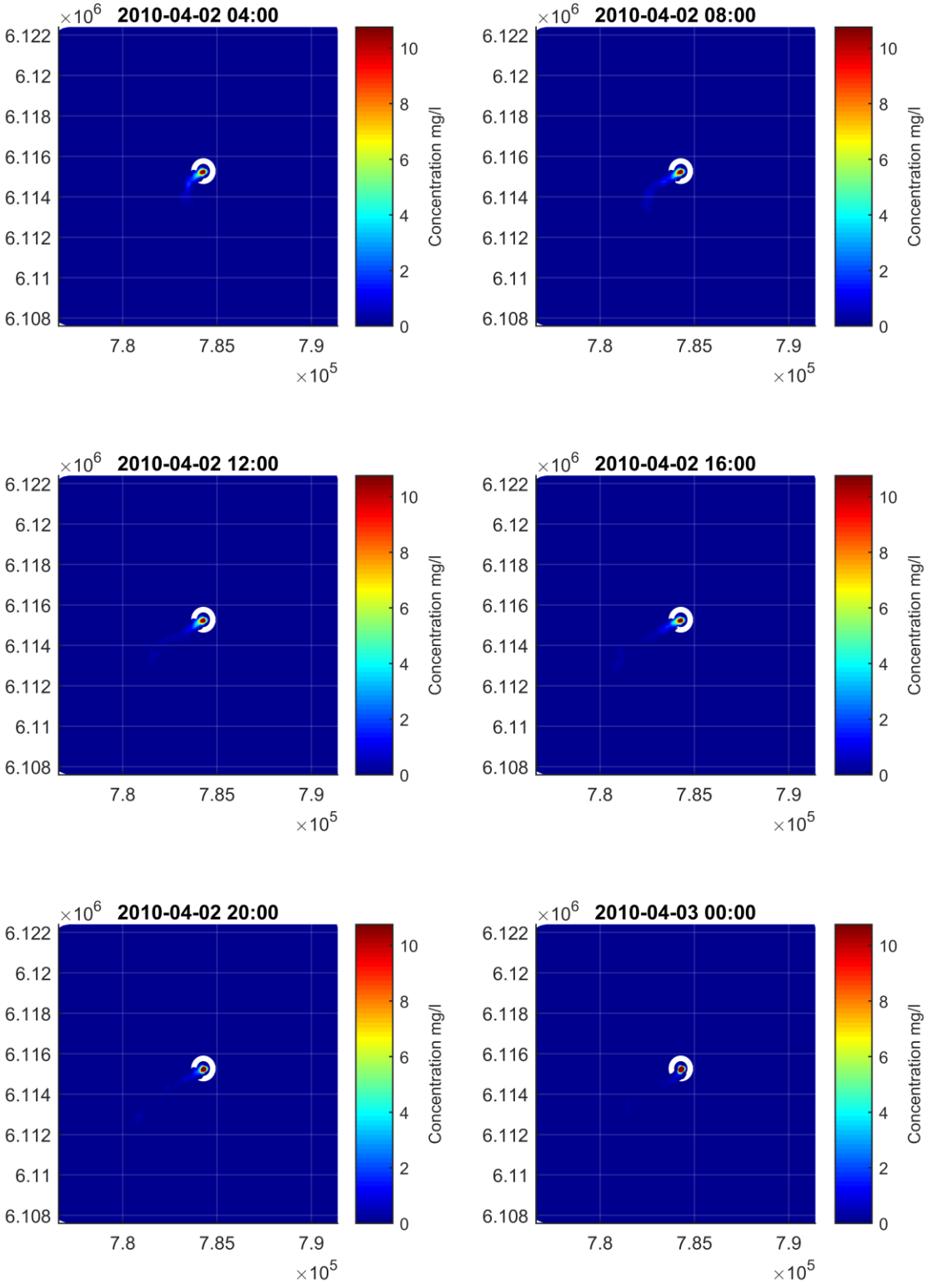
2010-04-01 20:00
×10^6
6.122
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Concentration mg/l
0
2
4
6
8
10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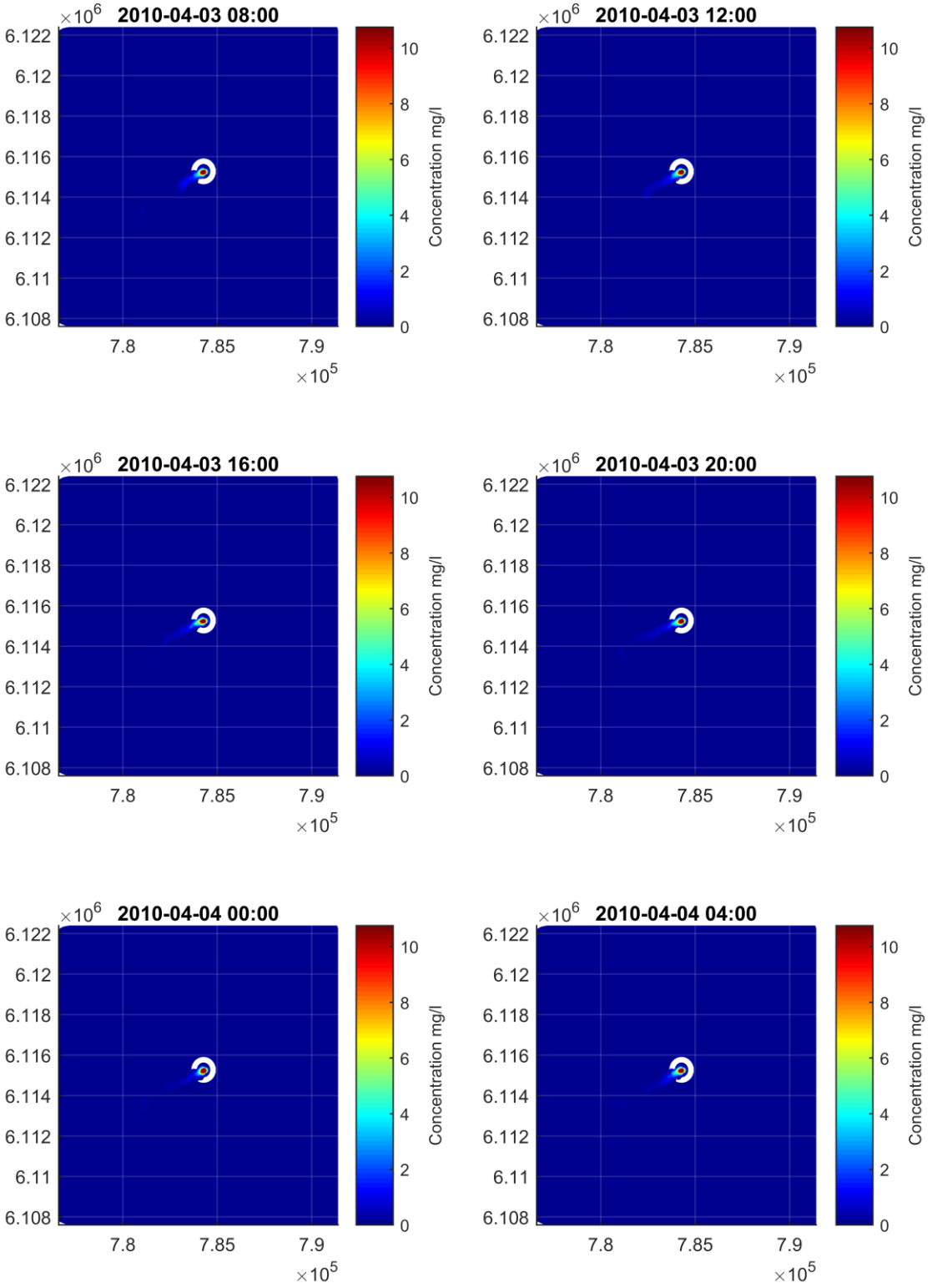
2010-04-03 00:00
×10^6
6.122
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Concentration mg/l
0
2
4
6
8
10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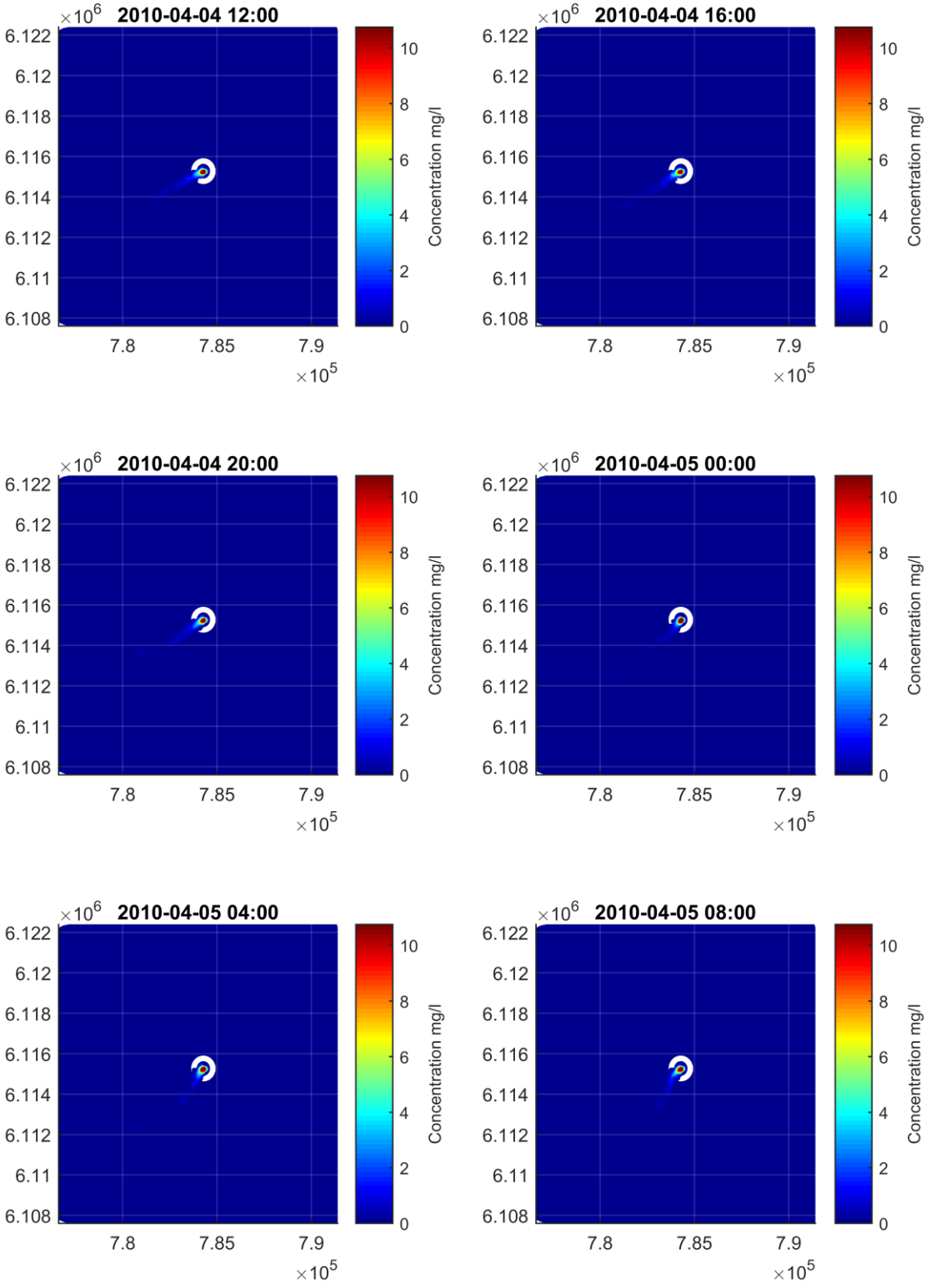
×10^6
6.122
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Concentration mg/l
0
2
4
6
8
10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6.118
6.116
6.114
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6.108
7.8
7.85
7.9
×10^5
Concentration mg/l
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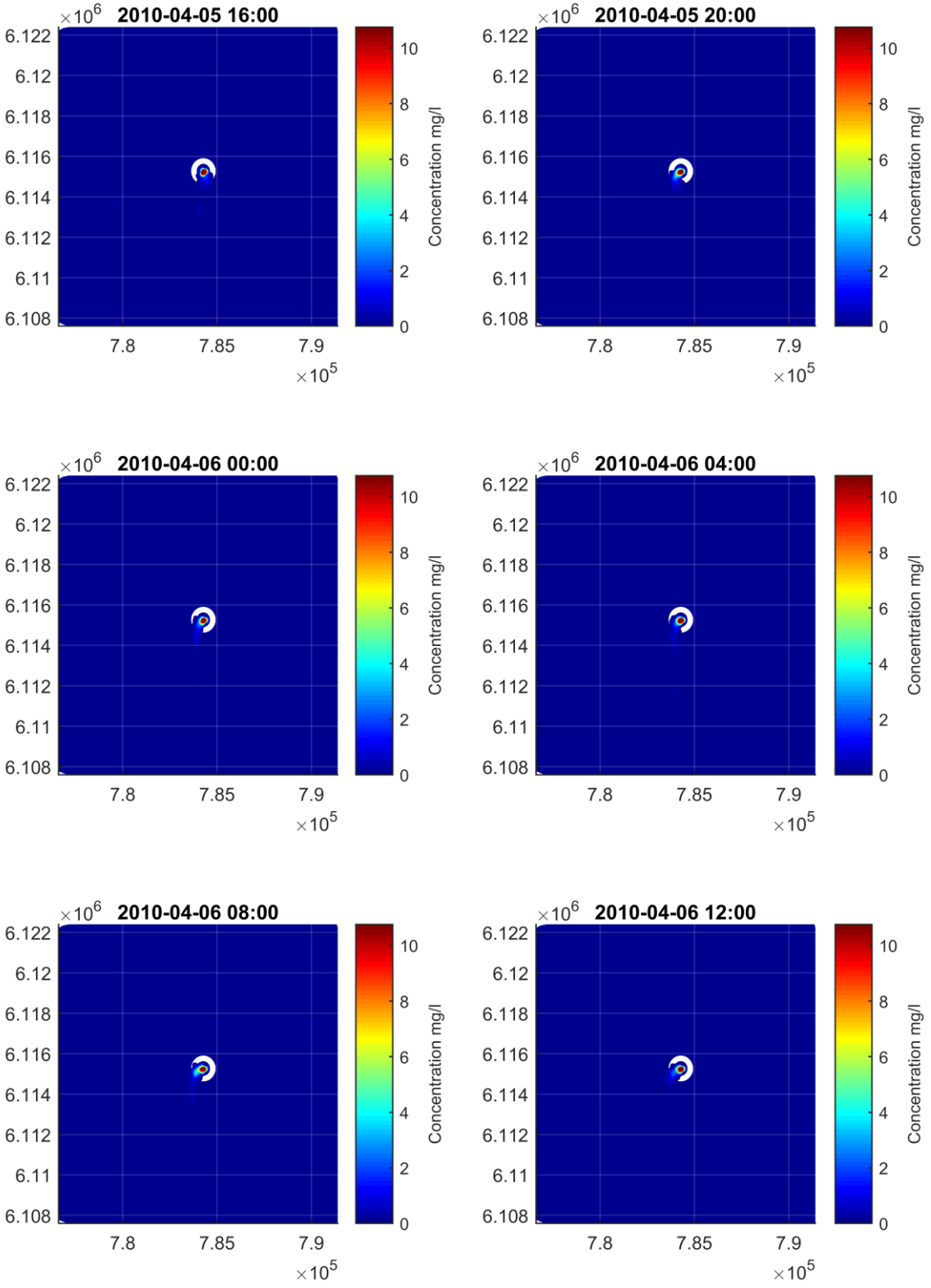
2
4
6
8
10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7.8
7.85
7.9
×10^5
Concentration mg/l
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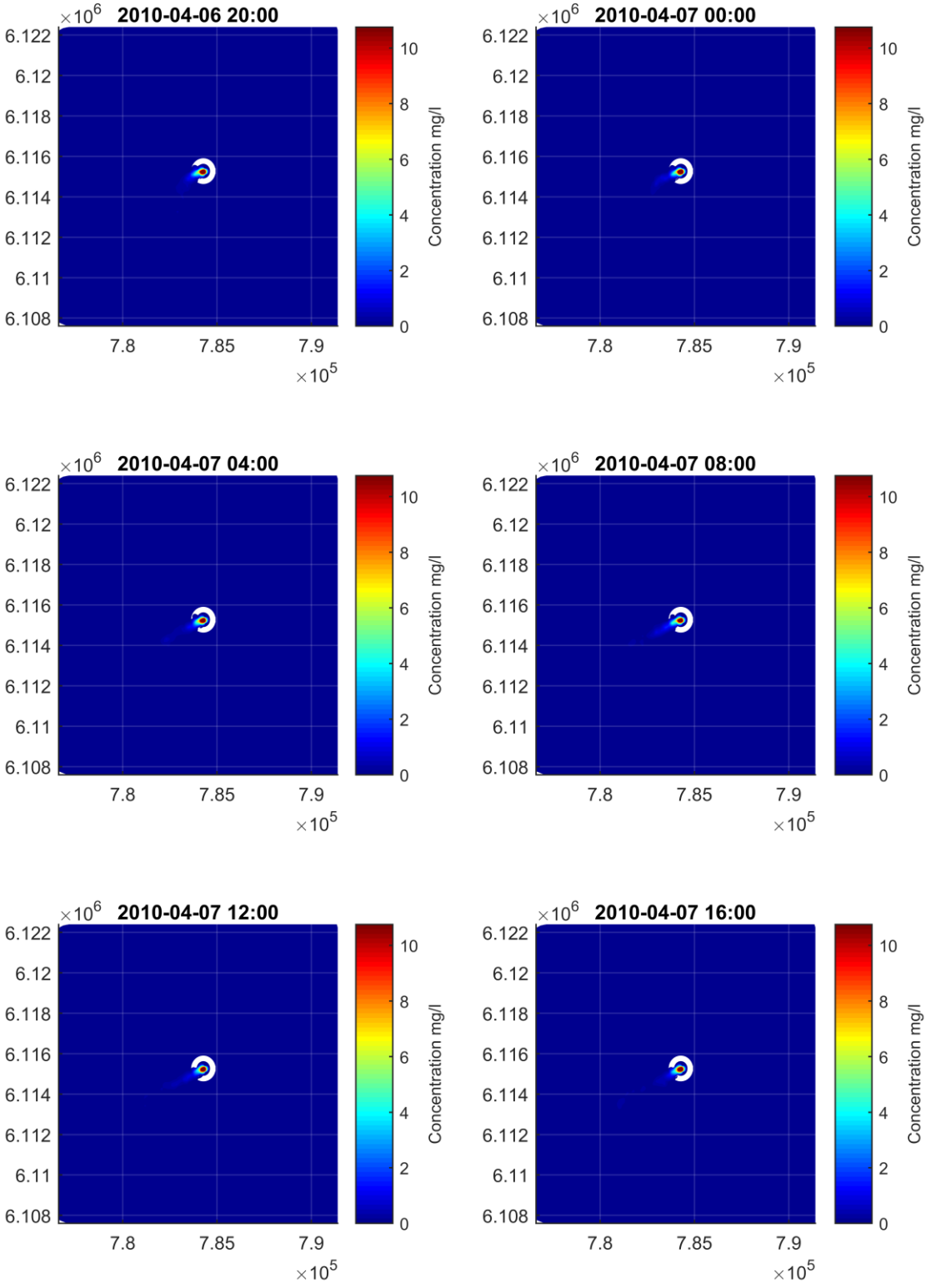
8
6
4
2
0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7.9
×10^5
Concentration mg/l
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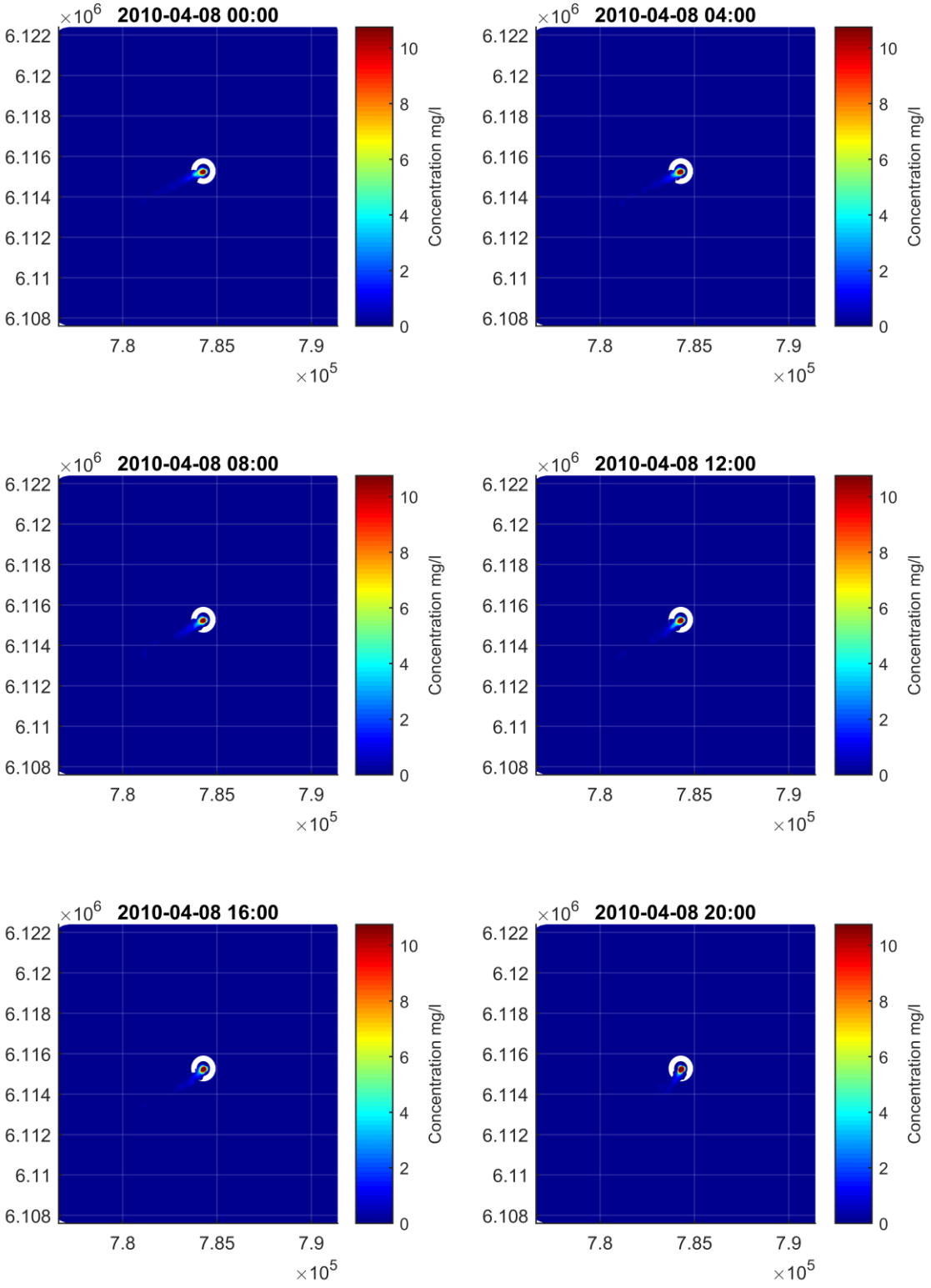
2
4
6
8
10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6.114
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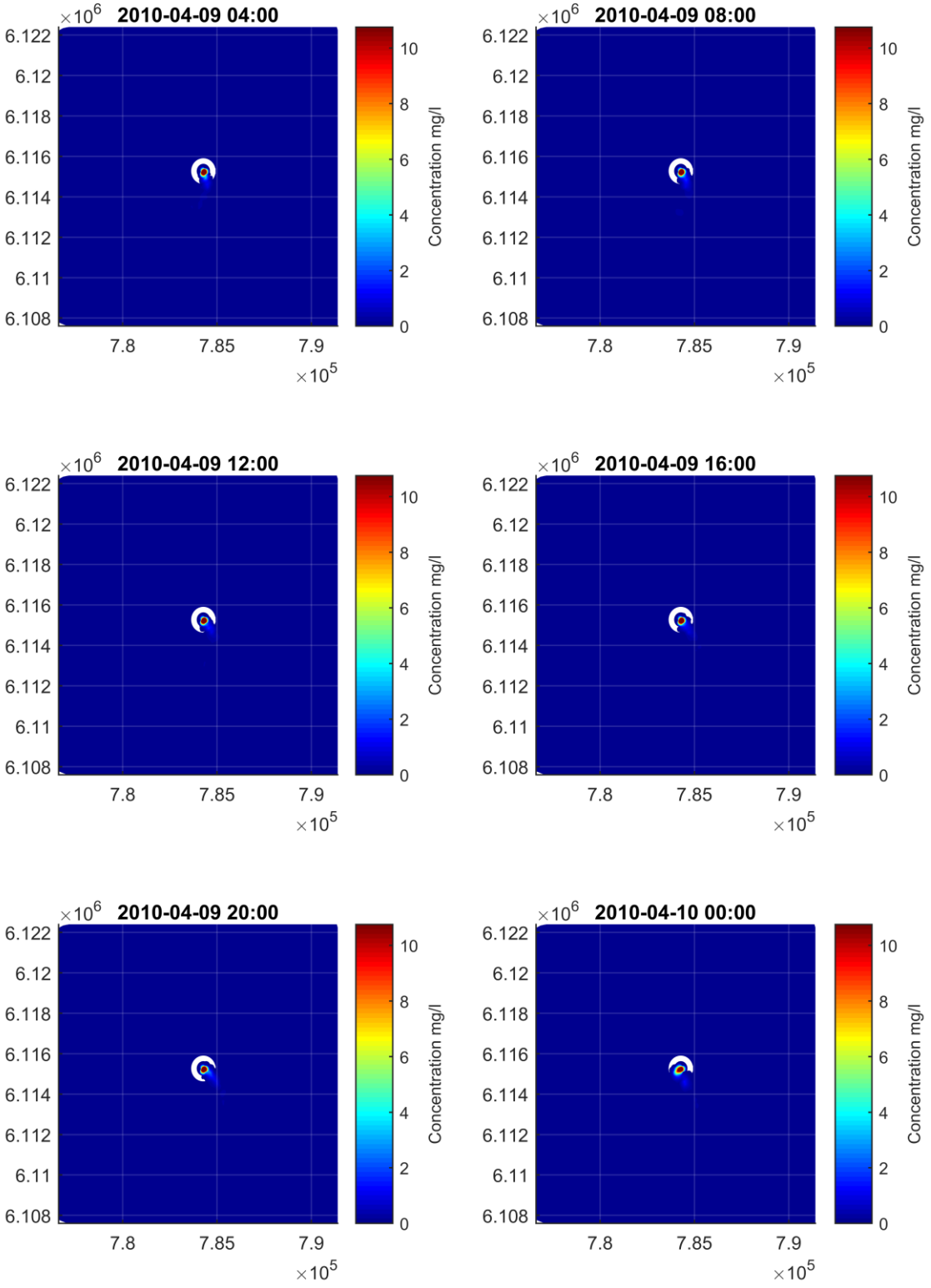
7.9
×10^5
Concentration mg/l
0
2
4
6
8
10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6.116
6.114
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7.8
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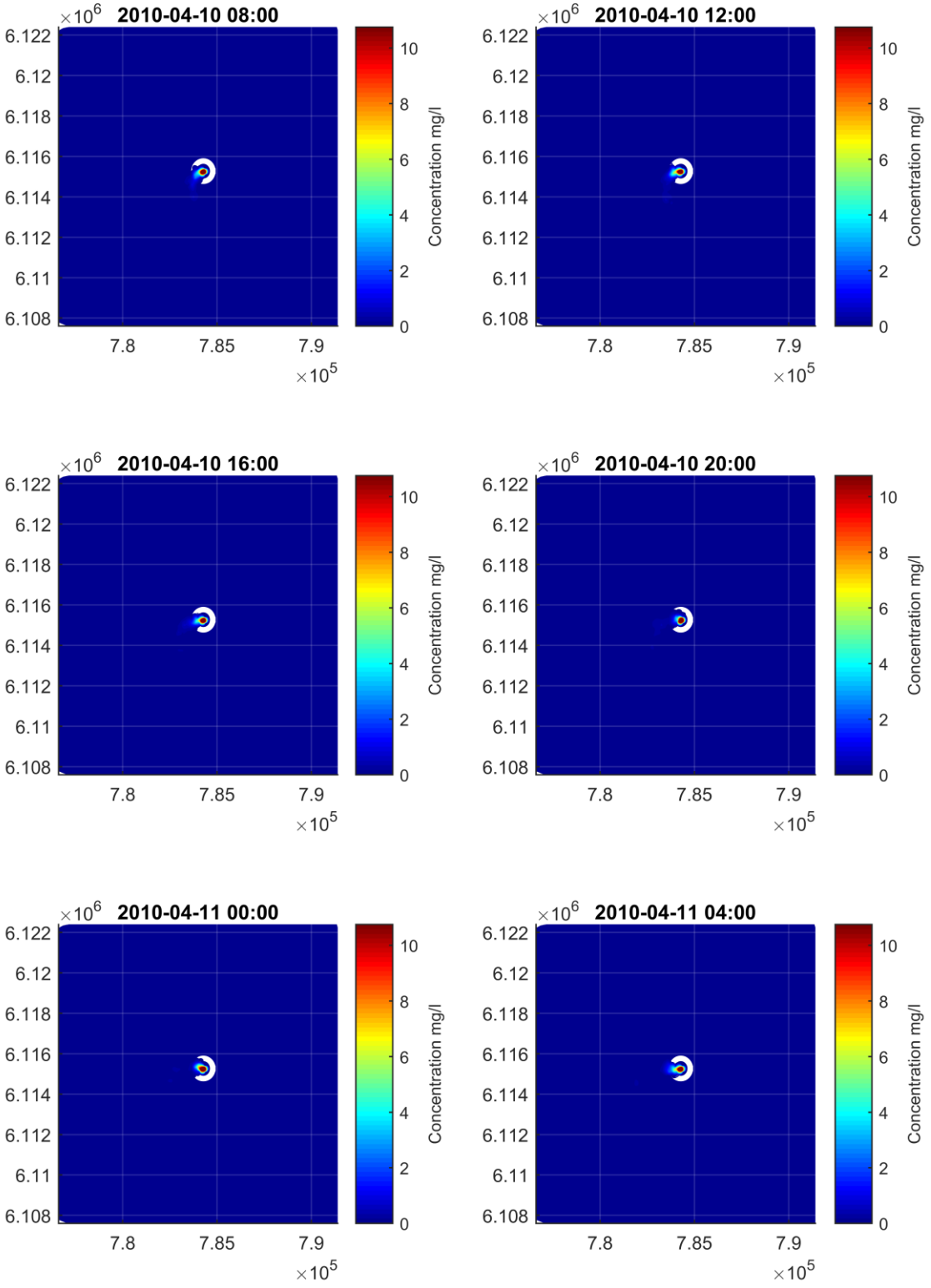
×10^5
Concentration mg/l
0
2
4
6
8
10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Concentration mg/l
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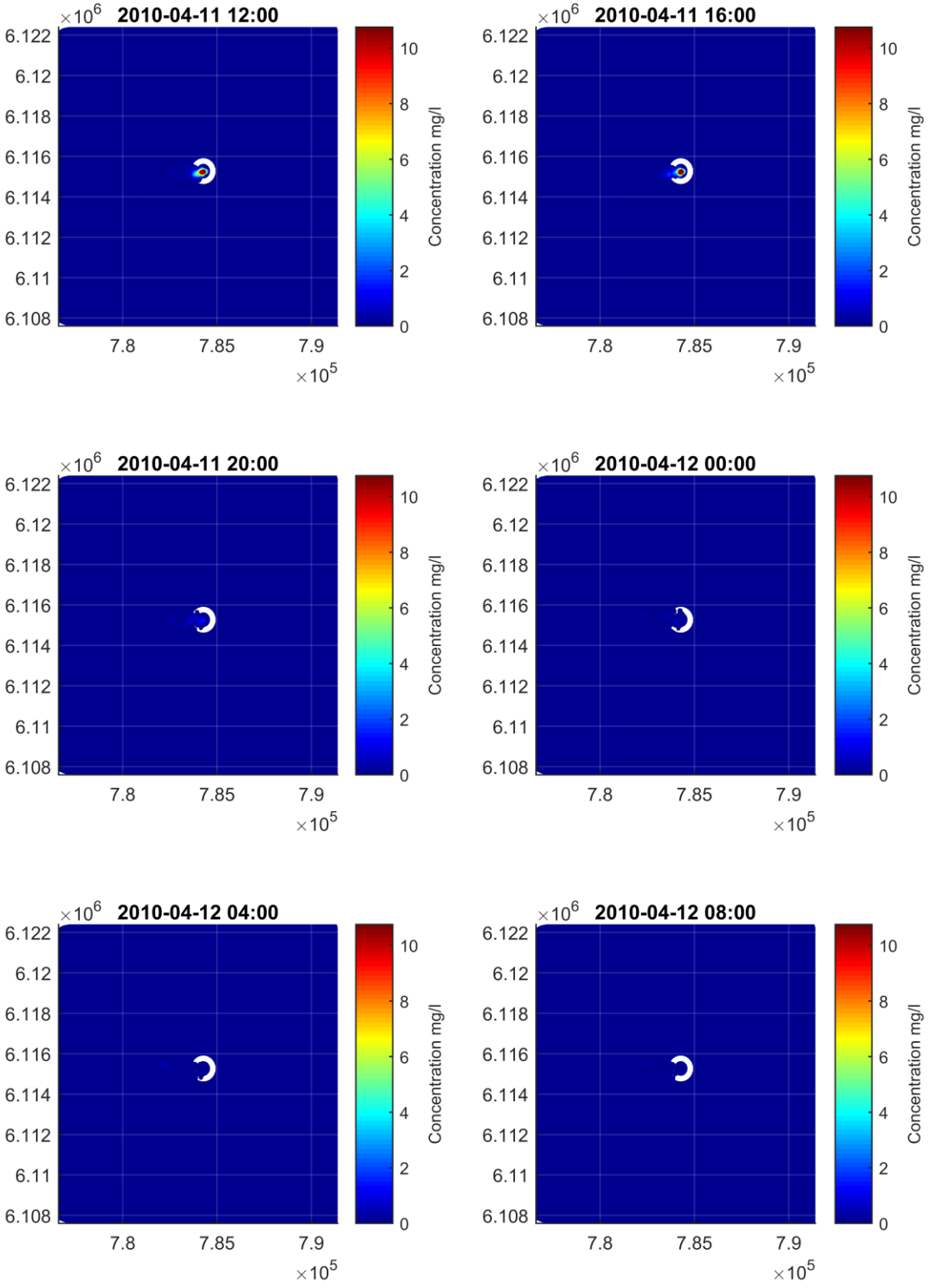
2
4
6
8
10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6.118
6.116
6.114
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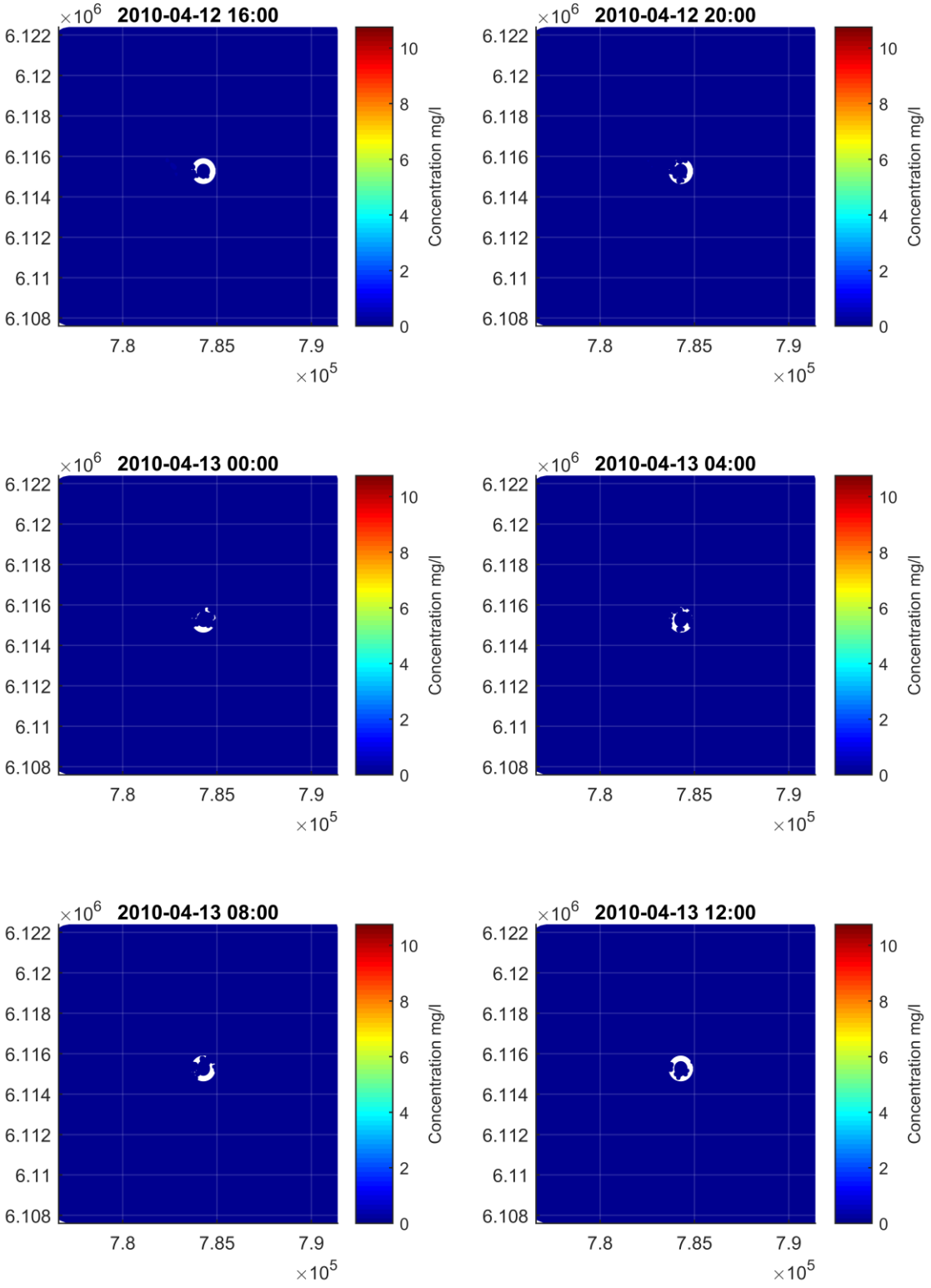
7.9
×10^5
Concentration mg/l
0
2
4
6
8
10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6.116
6.114
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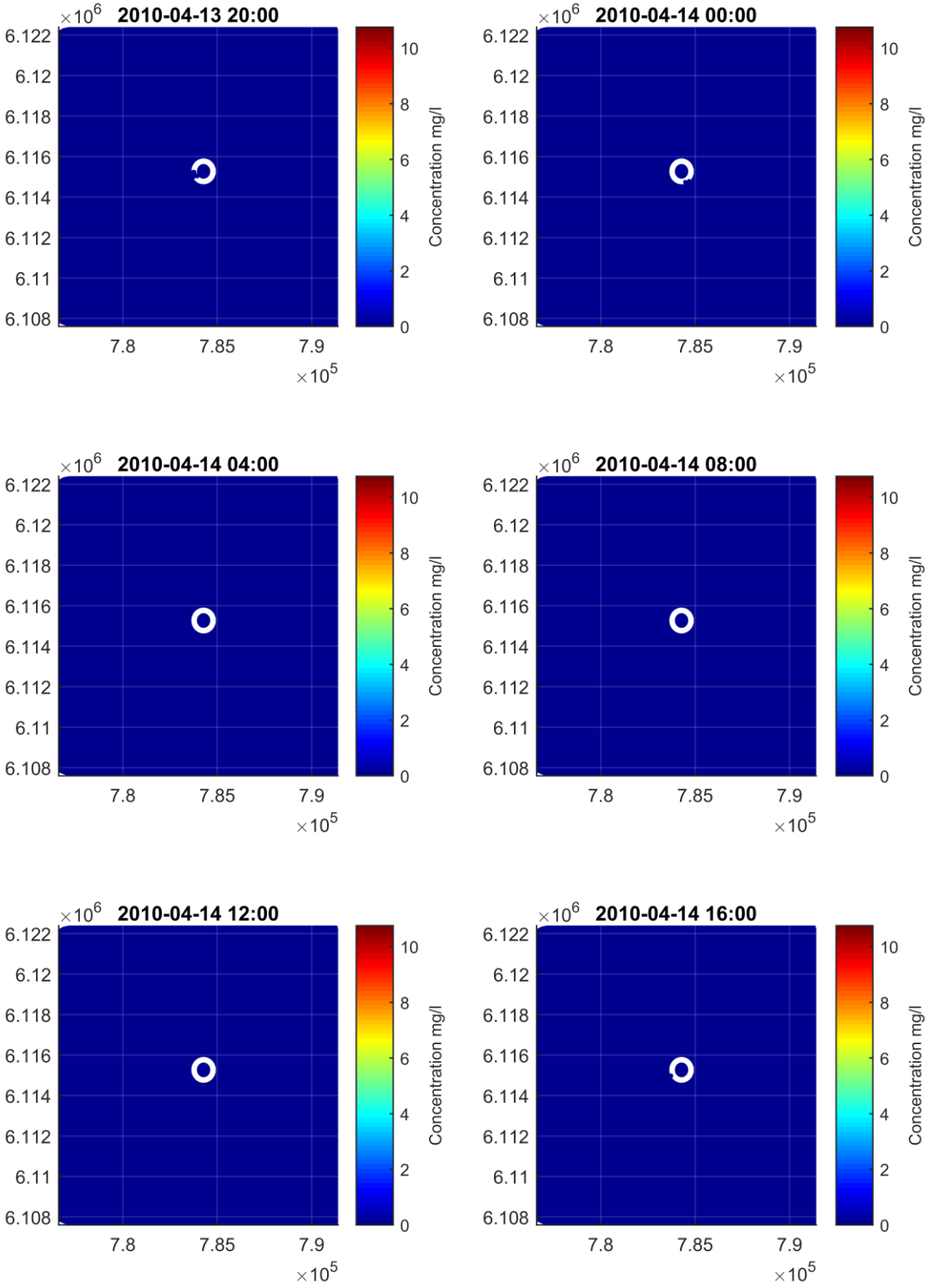
7.9
×10^5
Concentration mg/l
10
8
6
4
2
0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6.118
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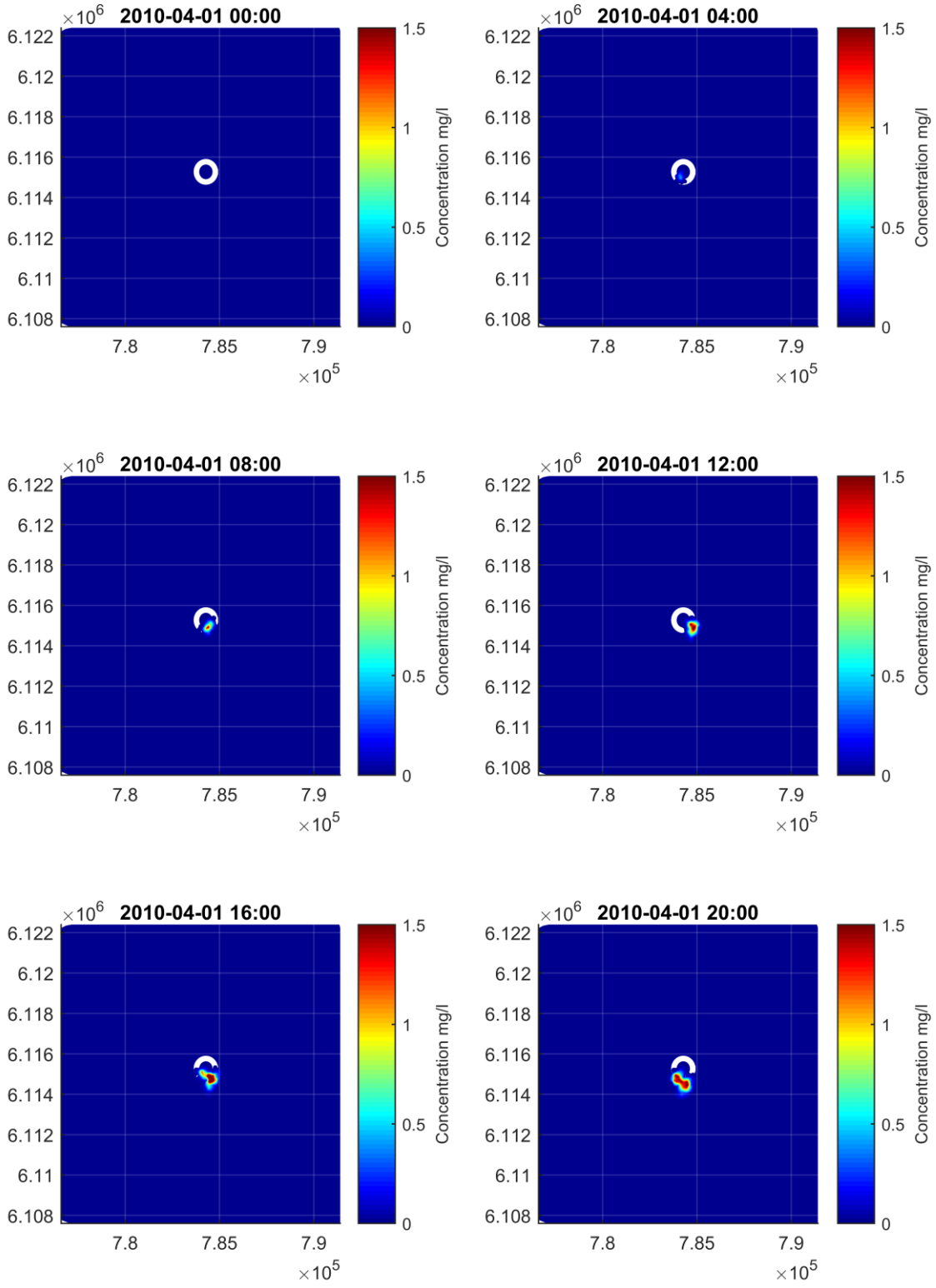
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Concentration mg/l
0
2
4
6
8
10

Appendix 5: 15MW MP worst-case, Bottom single position – concentration upper 10 m

Instantaneous concentration levels due to sediment spill for the drilling period

The white circle has a radius of 500 m

Start drilling: 2010-04-01 0:00
End drilling: 2010-04-11 16:43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2010-04-01 20:00
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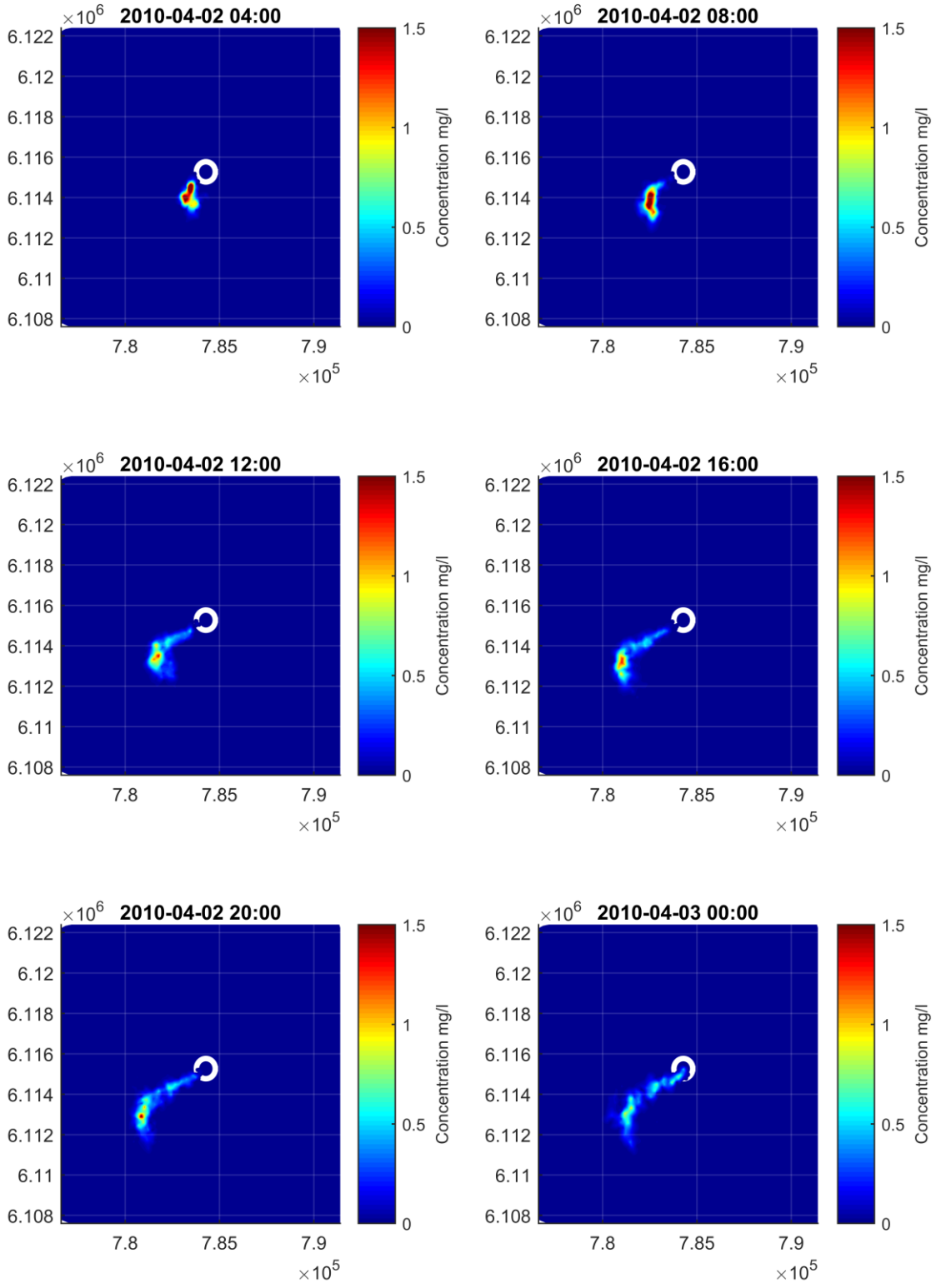
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
1.5
1
0.5
0
Concentration mg/l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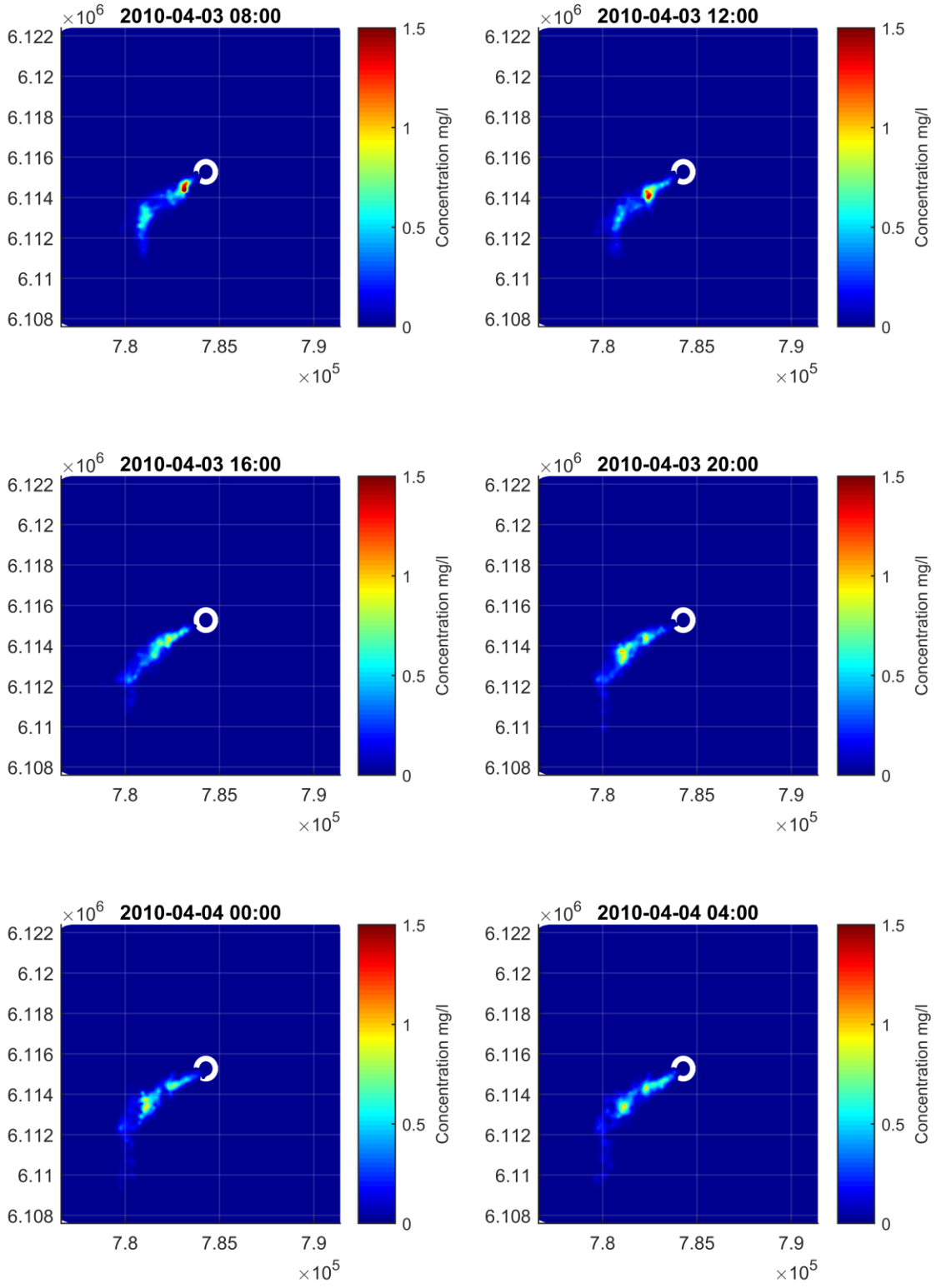
2010-04-03 00:00
×10^6
6.122
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
1.5
1
0.5
0
Concentration mg/l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2010-04-04 04:00
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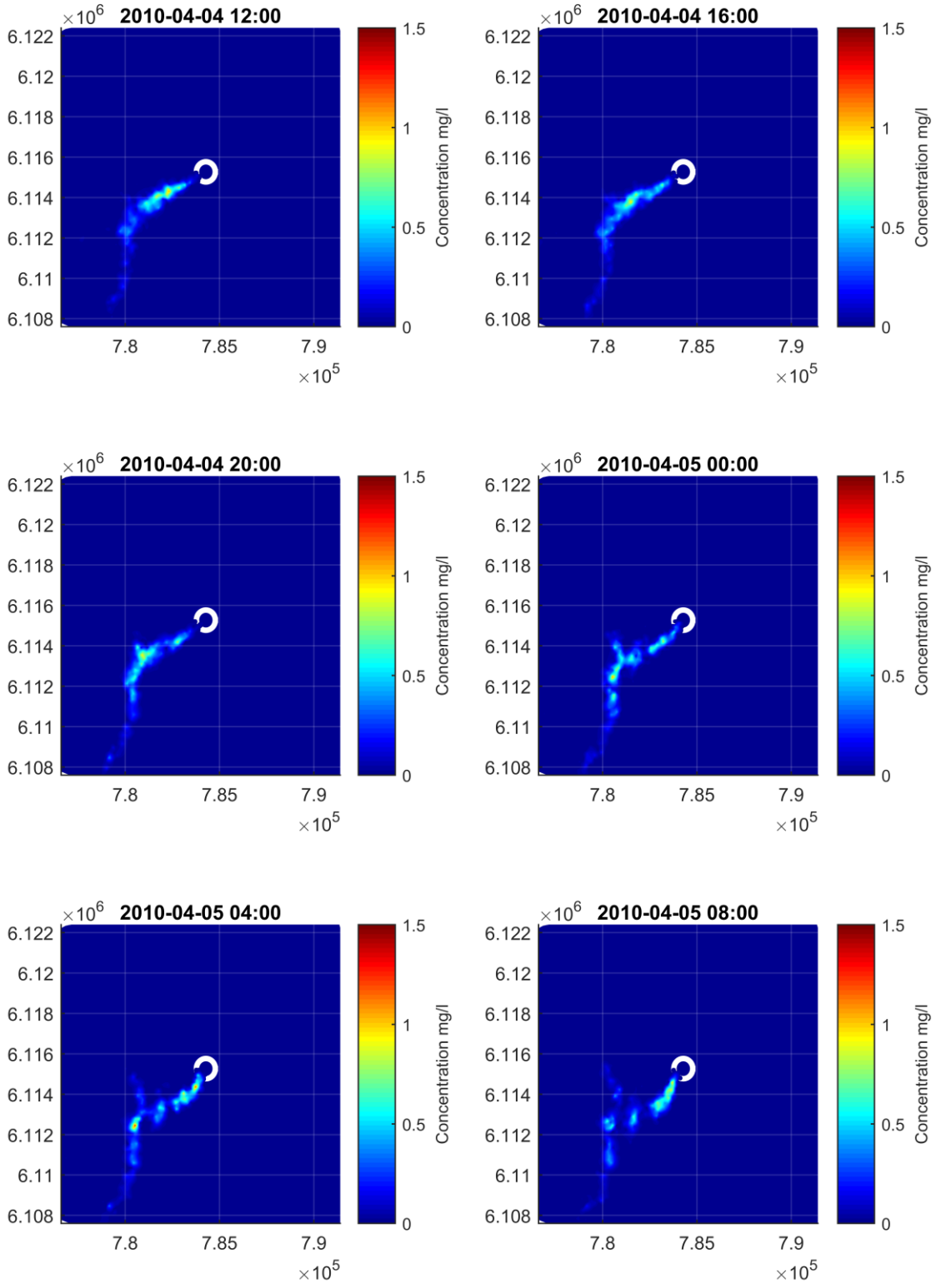
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
1.5
1
0.5
0
Concentration mg/l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2010-04-05 08:00
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6.12
6.118
6.116
6.114
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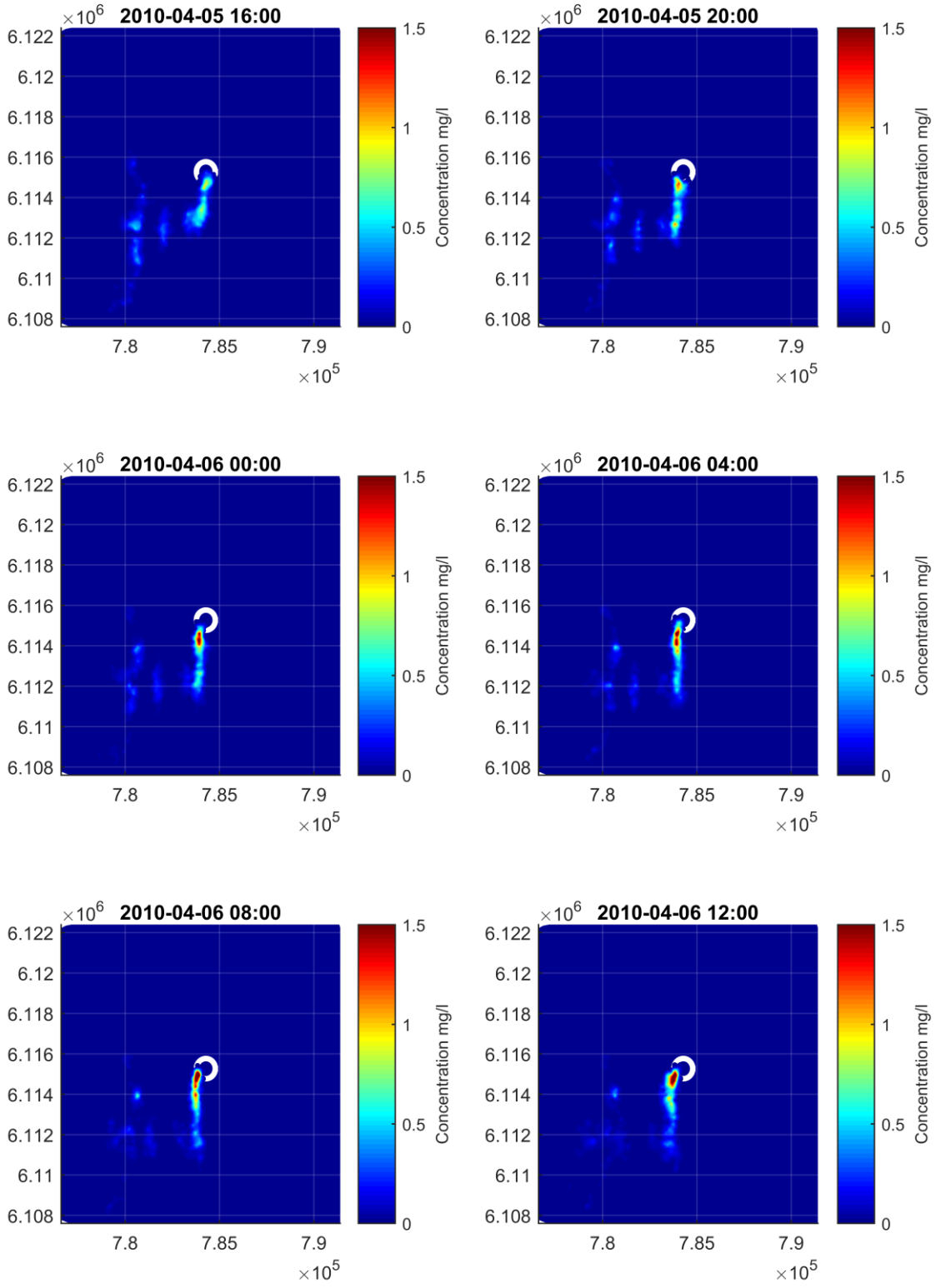
6.11
6.108
7.8
7.85
7.9
×10^5
1.5
1
0.5
0
Concentration mg/l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6.118
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6.114
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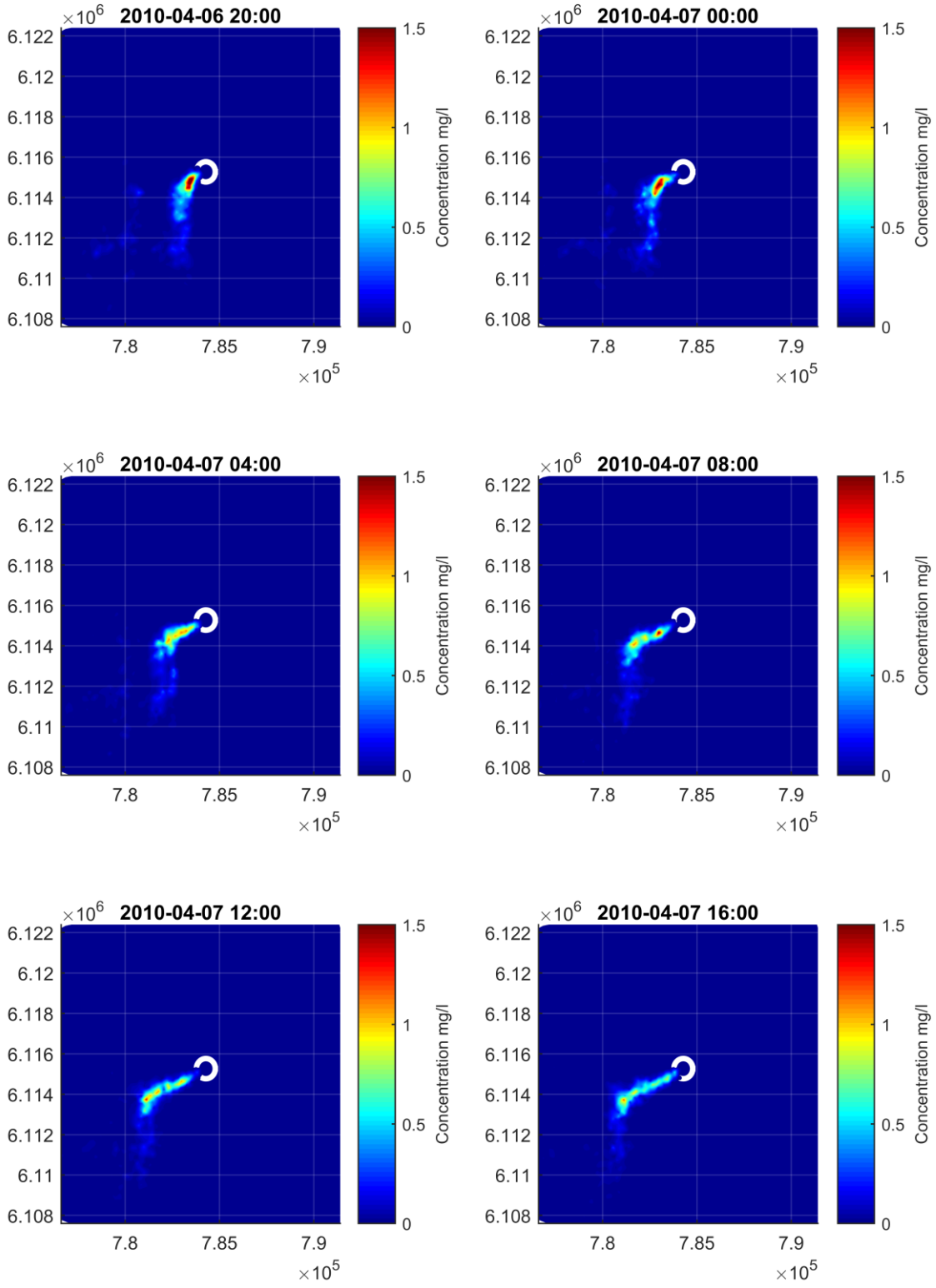
Concentration mg/l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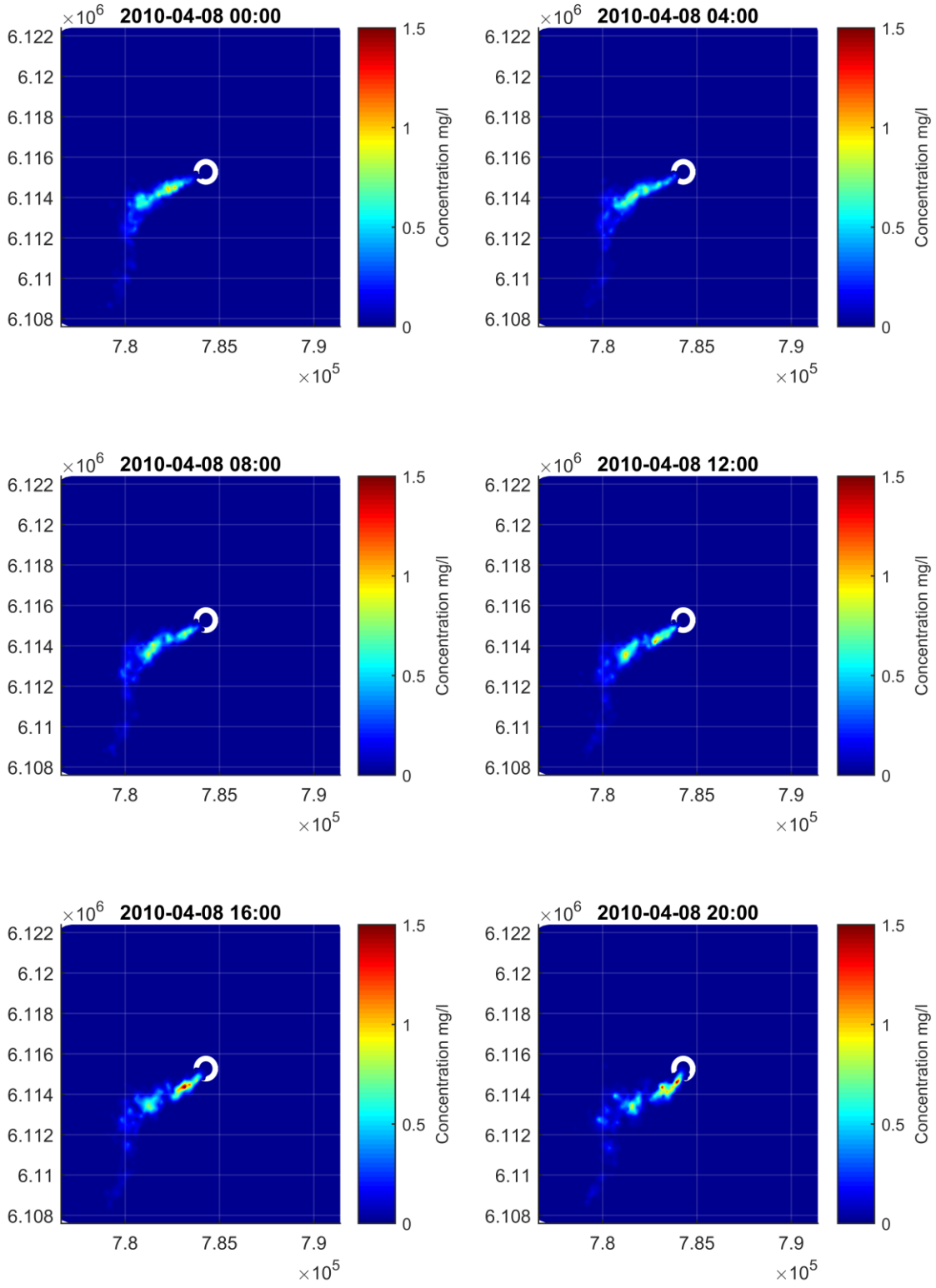
Concentration mg/l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6.118
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7.8
7.85
7.9
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1.5
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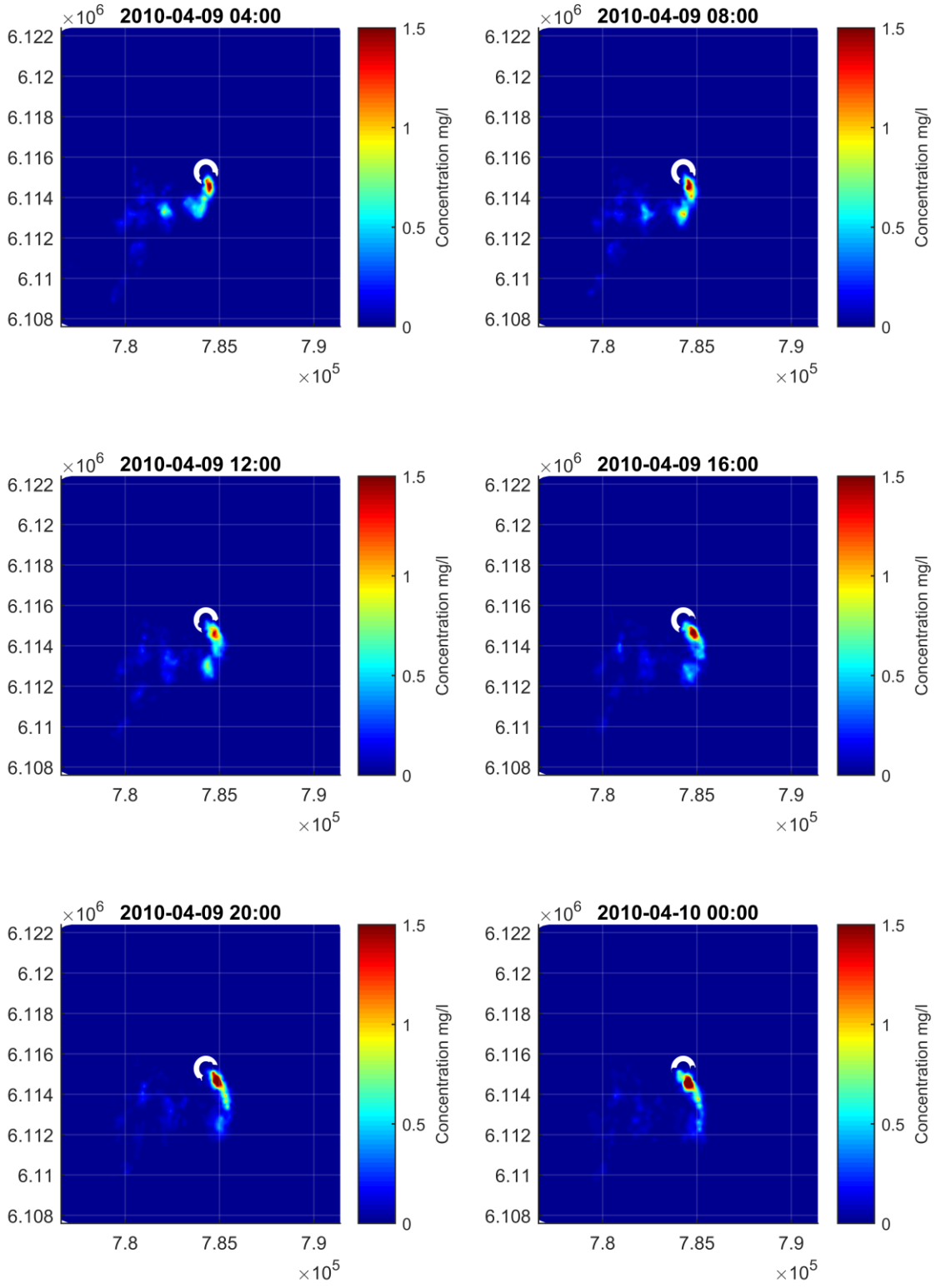
Concentration mg/l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7.8
7.85
7.9
×10^5
1.5
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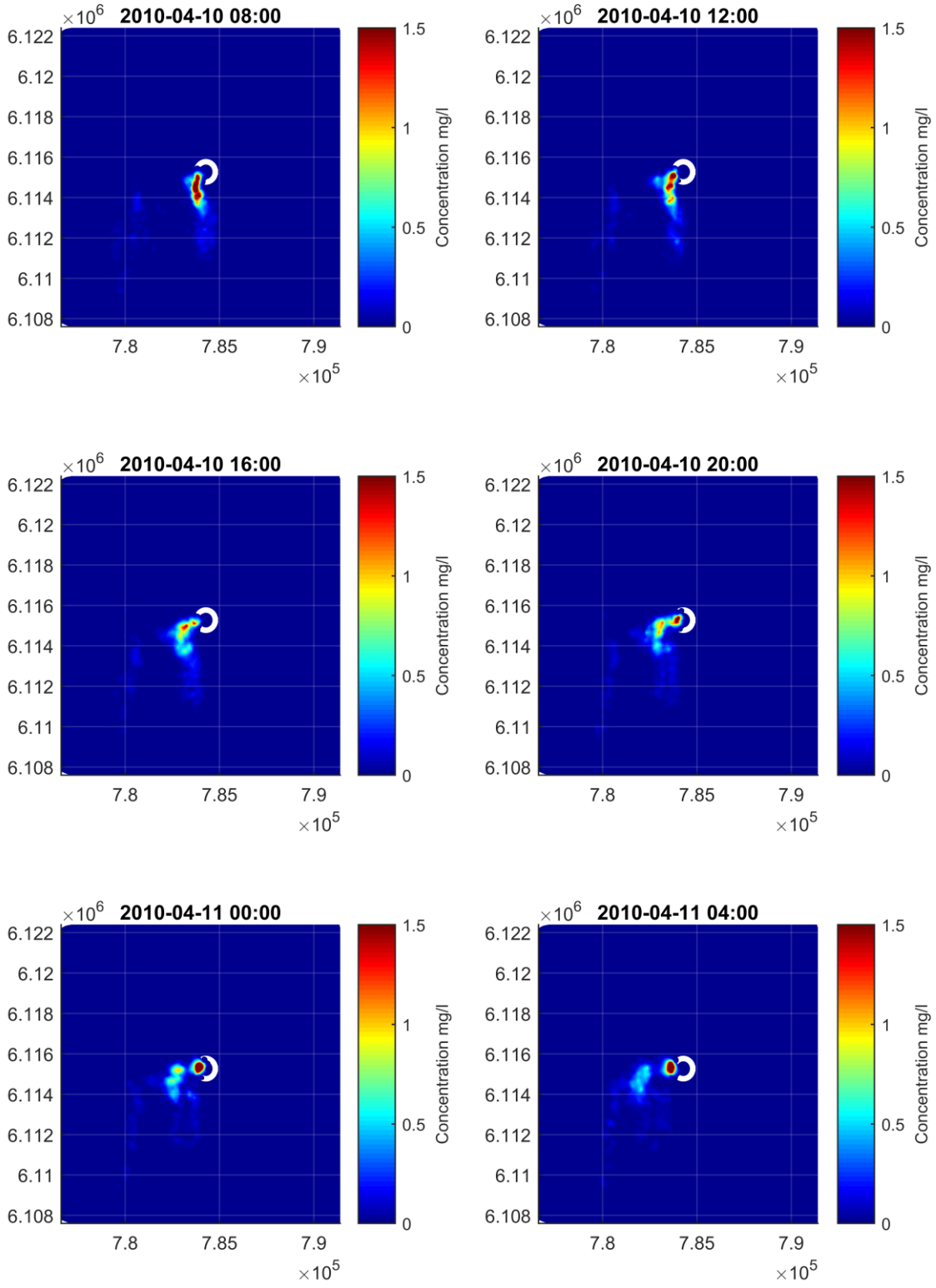
Concentration mg/l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6.116
6.114
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7.8
7.85
7.9
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1.5
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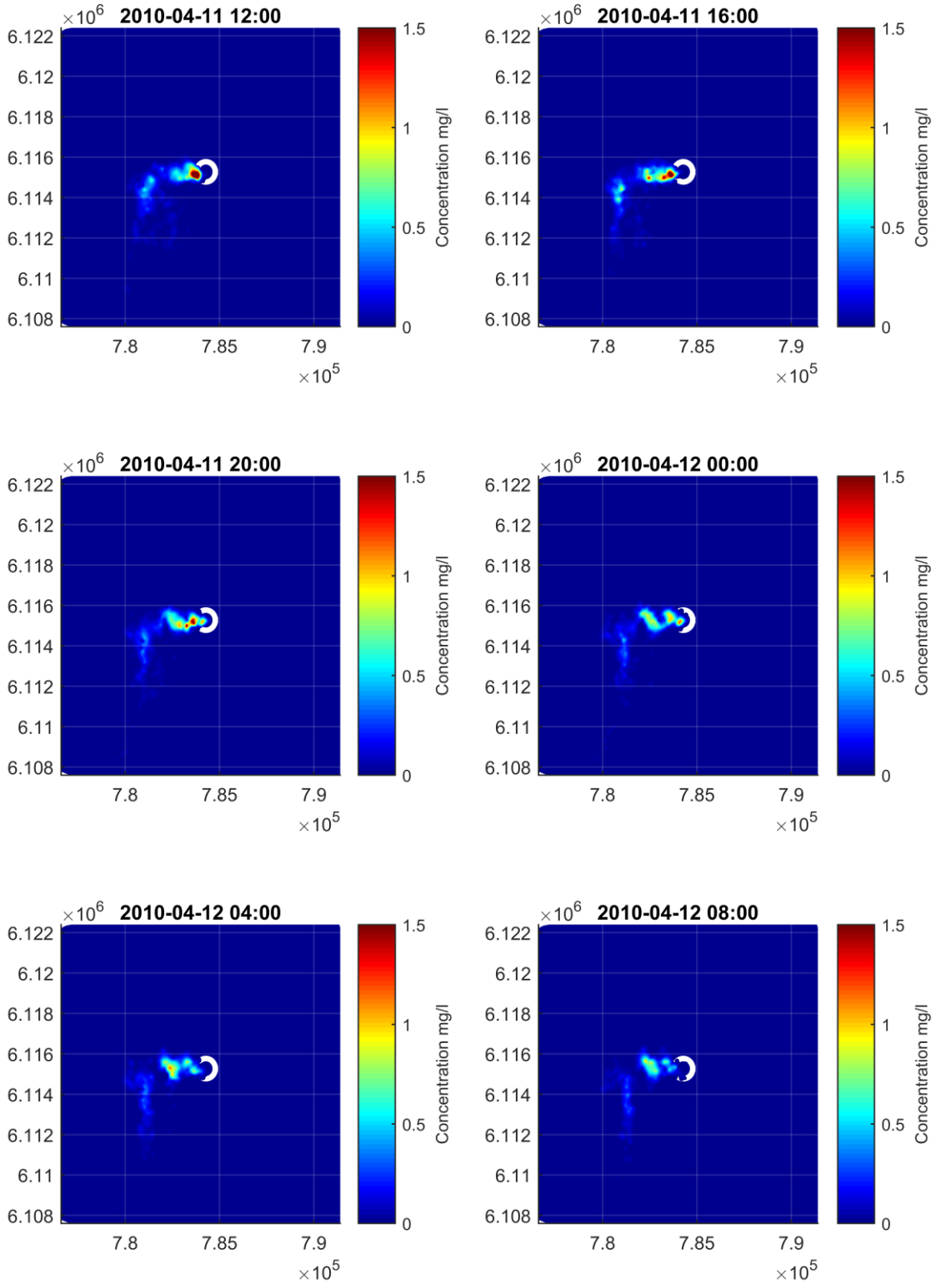
Concentration mg/l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6.12
6.118
6.116
6.114
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6.108
7.8
7.85
7.9
×10^5
1.5
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0.5
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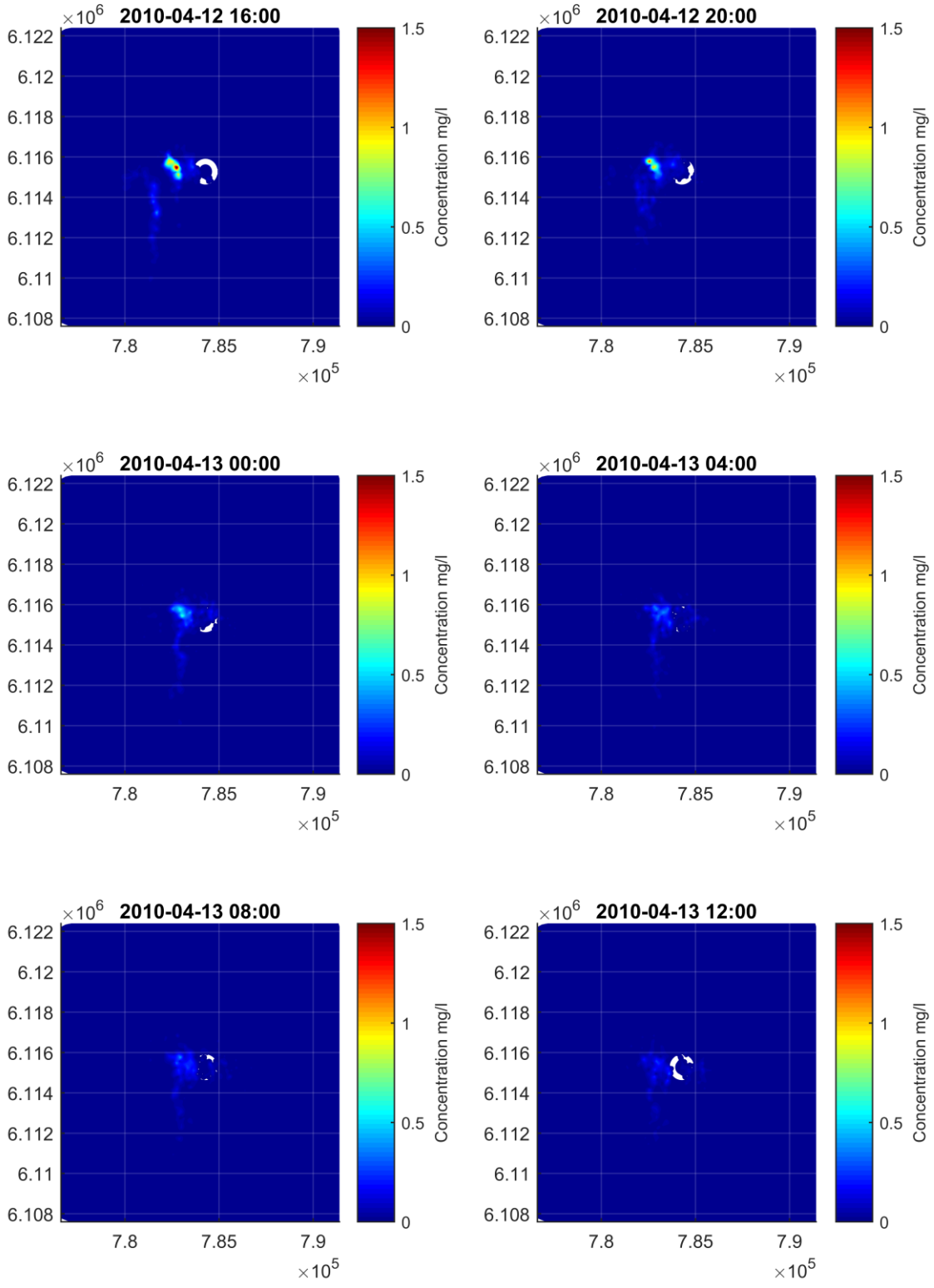
Concentration mg/l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2010-04-13 12:00
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6.118
6.116
6.114
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7.8
7.85
7.9
×10^5
1.5
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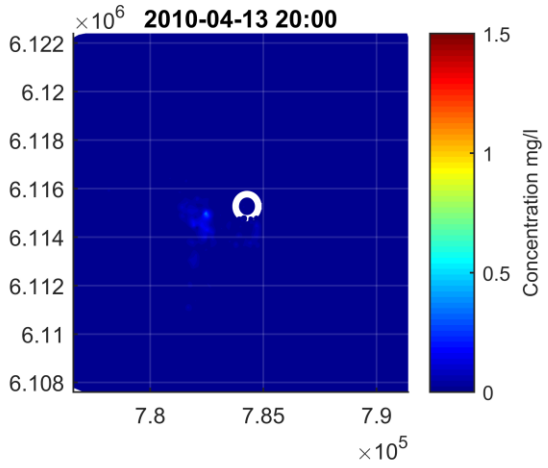
0.5
0
Concentration mg/l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6.114
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6.108
7.8
7.85
7.9
×10^5
1.5
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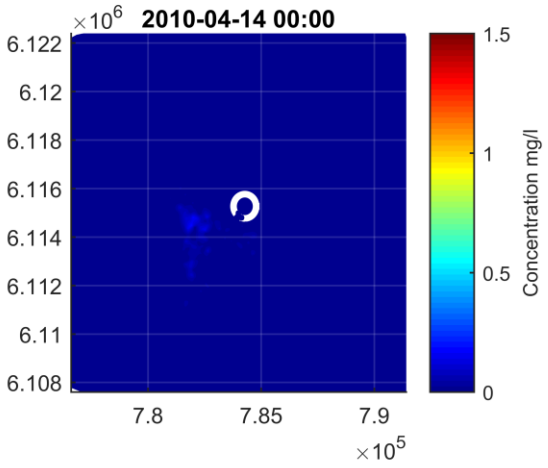
0.5
0
Concentration mg/l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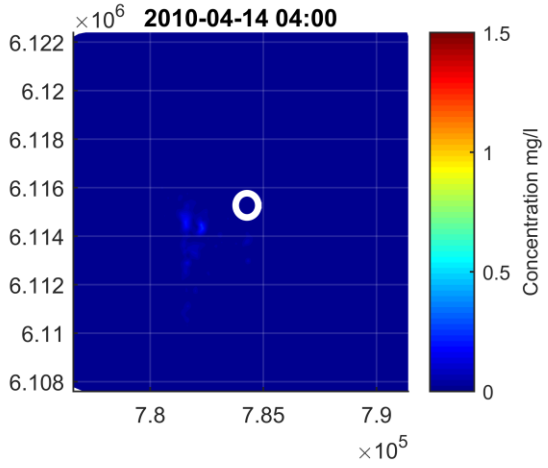
6.108
7.8
7.85
7.9
×10^5
1.5
1
0.5
0
Concentration mg/l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6.118
6.116
6.114
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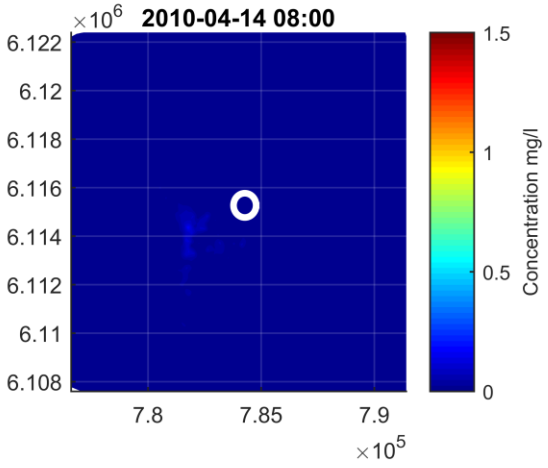
6.108
7.8
7.85
7.9
×10^5
1.5
1
0.5
0
Concentration mg/l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2010-04-14 08:00
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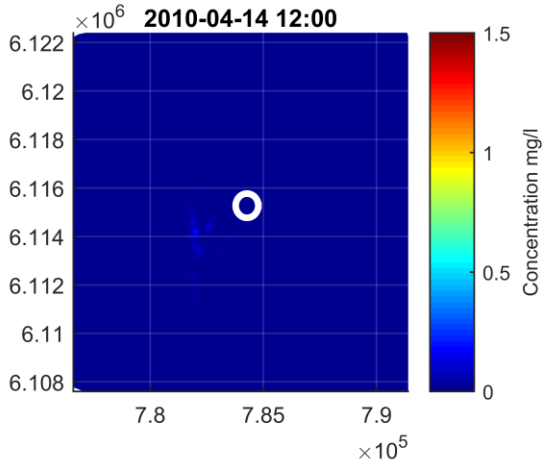
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
1.5
1
0.5
0
Concentration mg/l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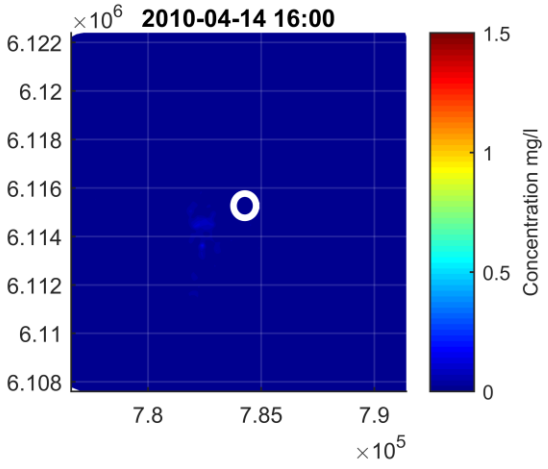
6.108
7.8
7.85
7.9
×10^5
1.5
1
0.5
0
Concentration mg/l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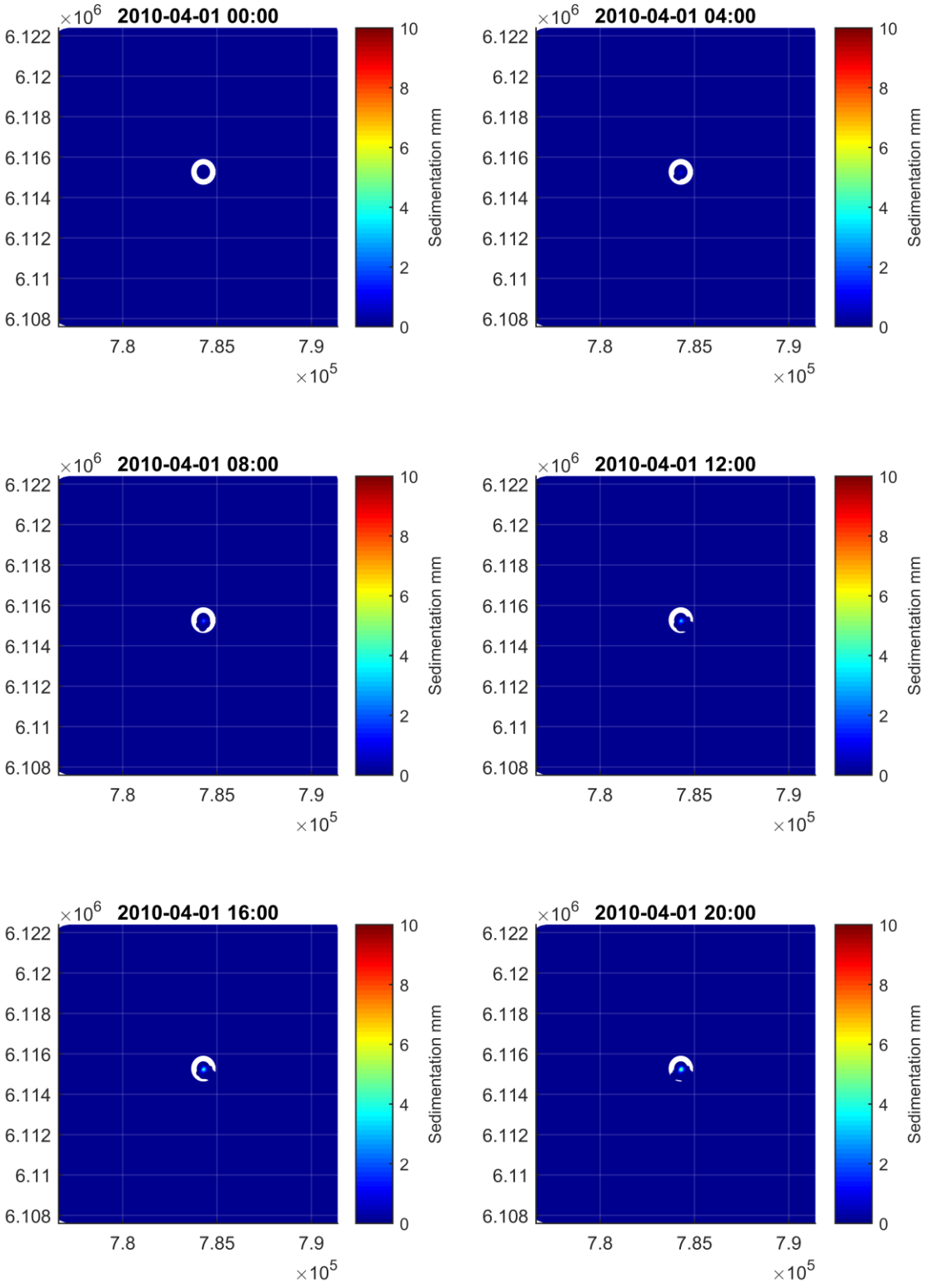
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
1.5
1
0.5
0
Concentration mg/l

Appendix 6: 15MW MP worst-case, Bottom single position – sedimentation

15MW MP worst-case, Bottom single position – sedimentation
Instantaneous sedimentation levels due to sediment spill for the drilling period

The white circle has a radius of 500 m

Start drilling: 2010-04-01 0:00
End drilling: 2010-04-11 16:43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2010-04-01 12:00
2010-04-01 16:00
2010-04-01 20:00
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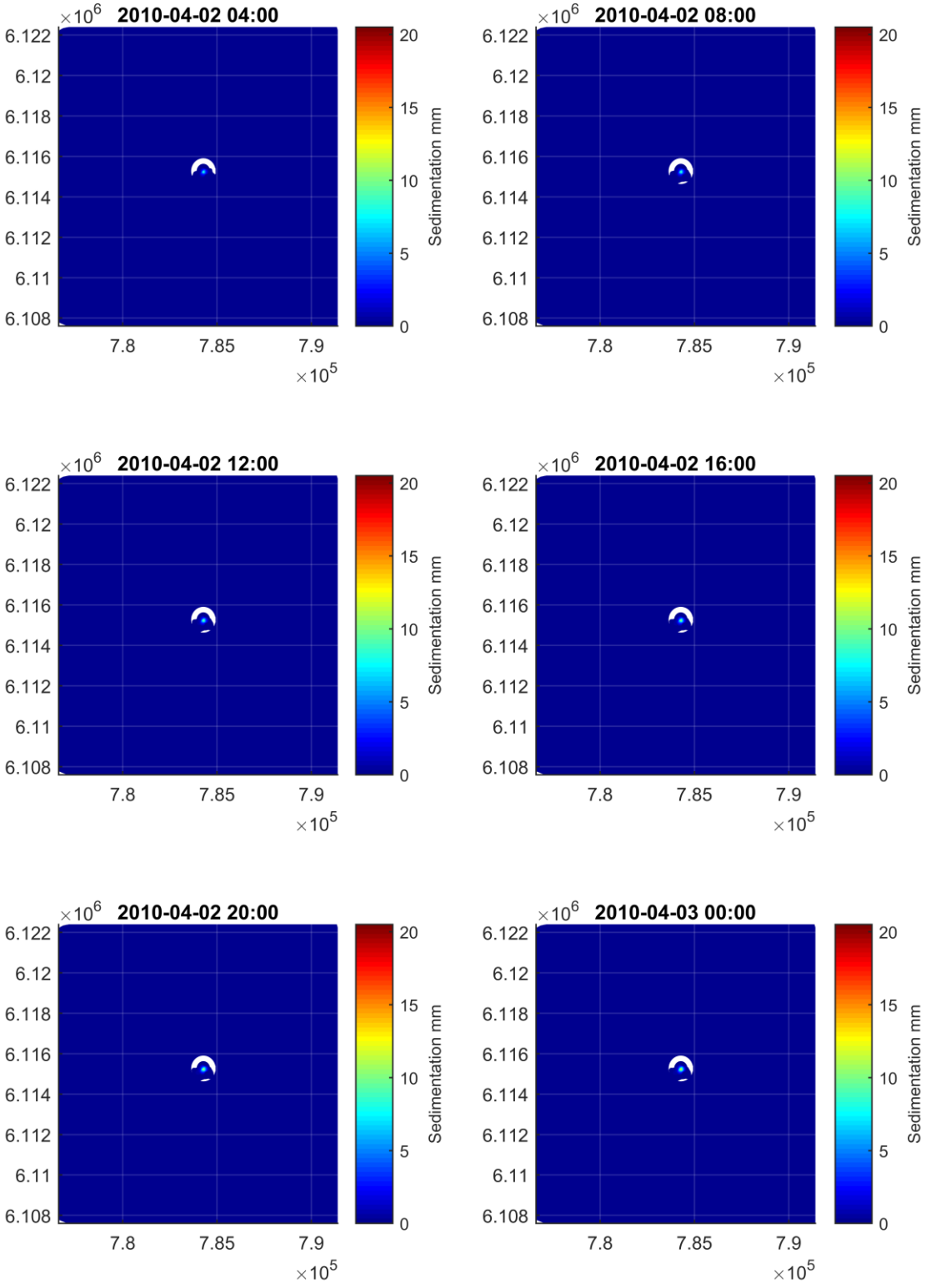
6.122
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Sedimentation mm
0
2
4
6
8
10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2010-04-03 00:00
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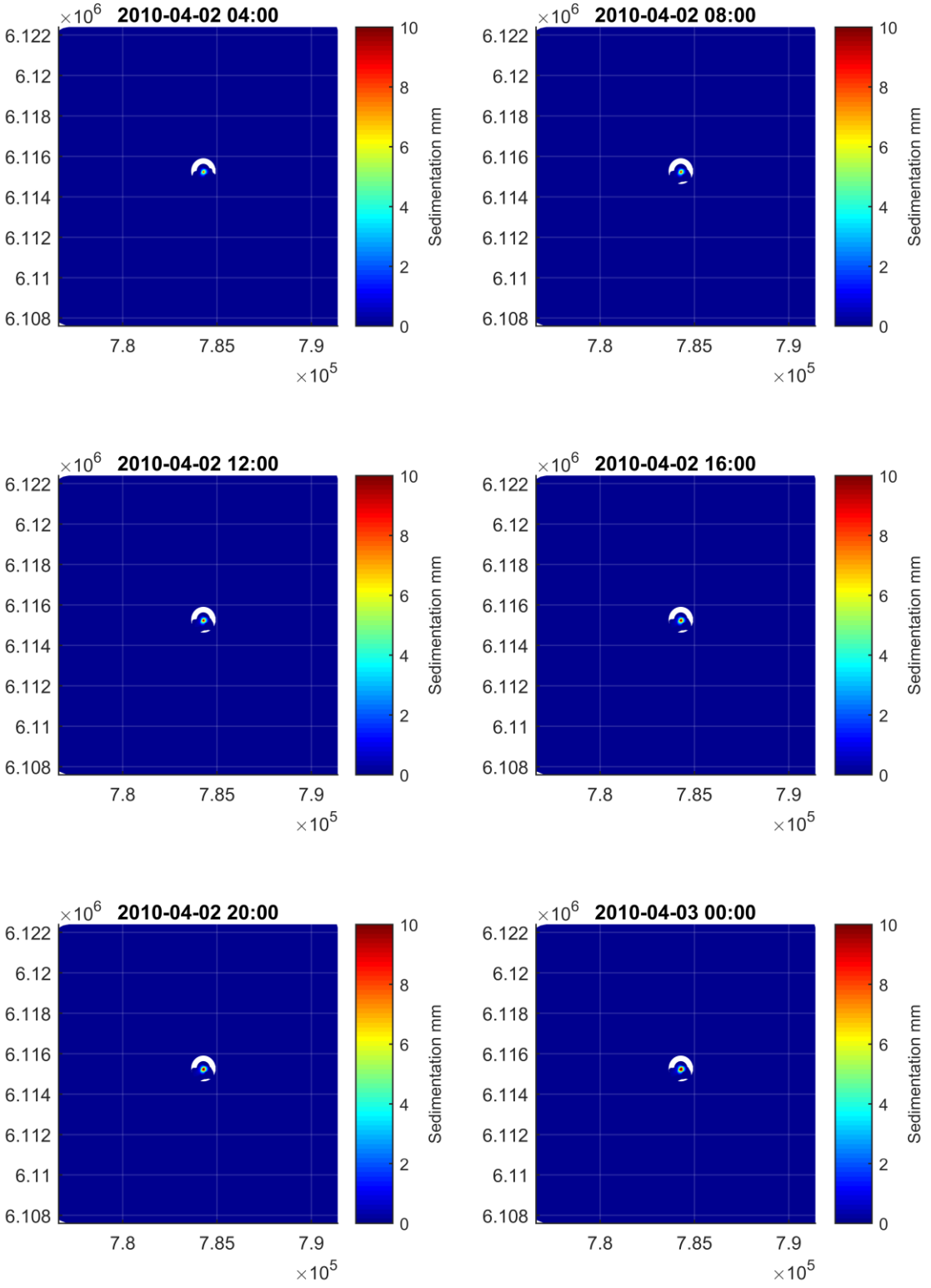
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Sedimentation mm
20
15
10
5
0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×10^6
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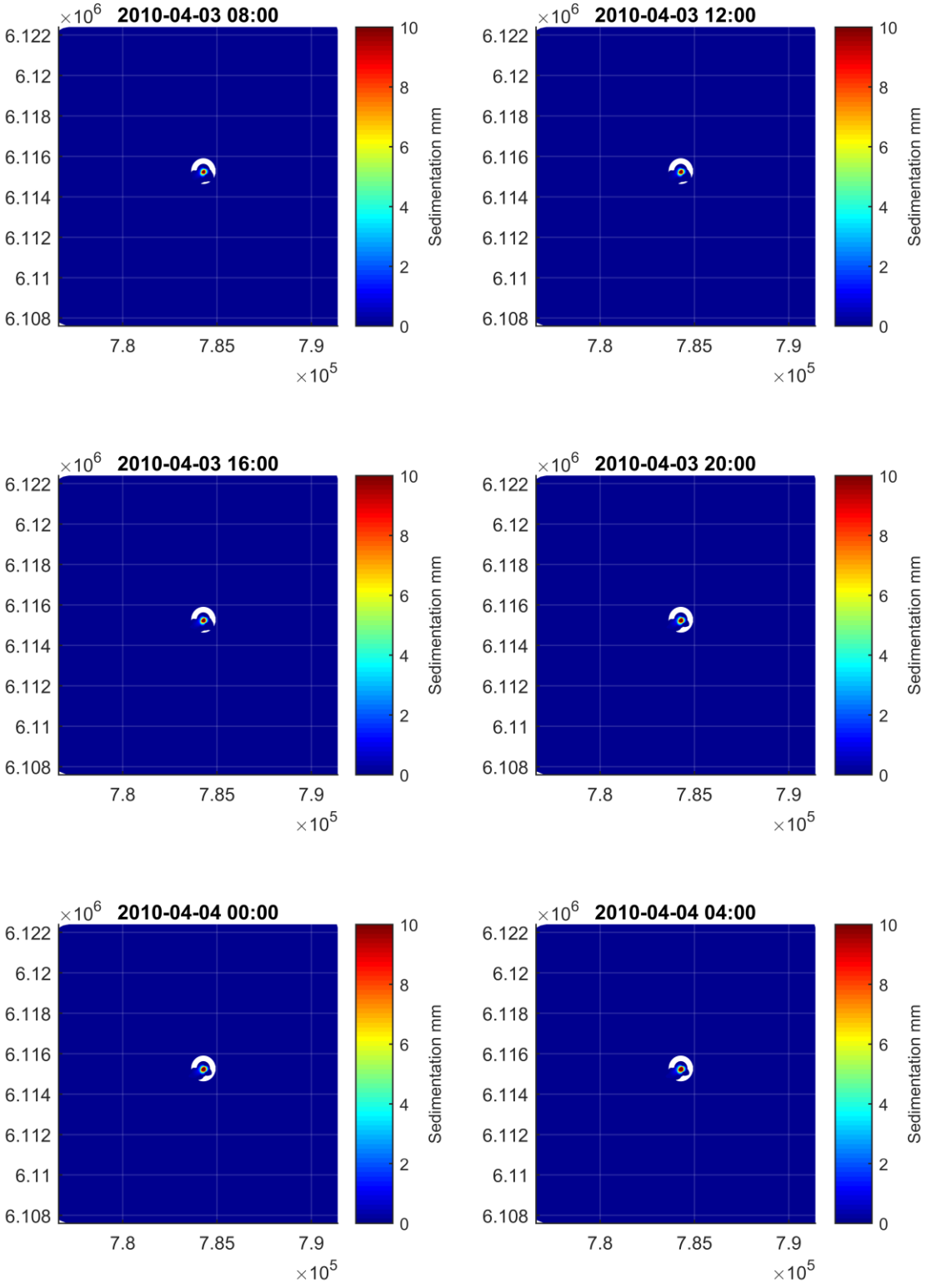
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Sedimentation mm
0
2
4
6
8
10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2010-04-03 16:00
2010-04-03 20:00
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2010-04-04 04:00
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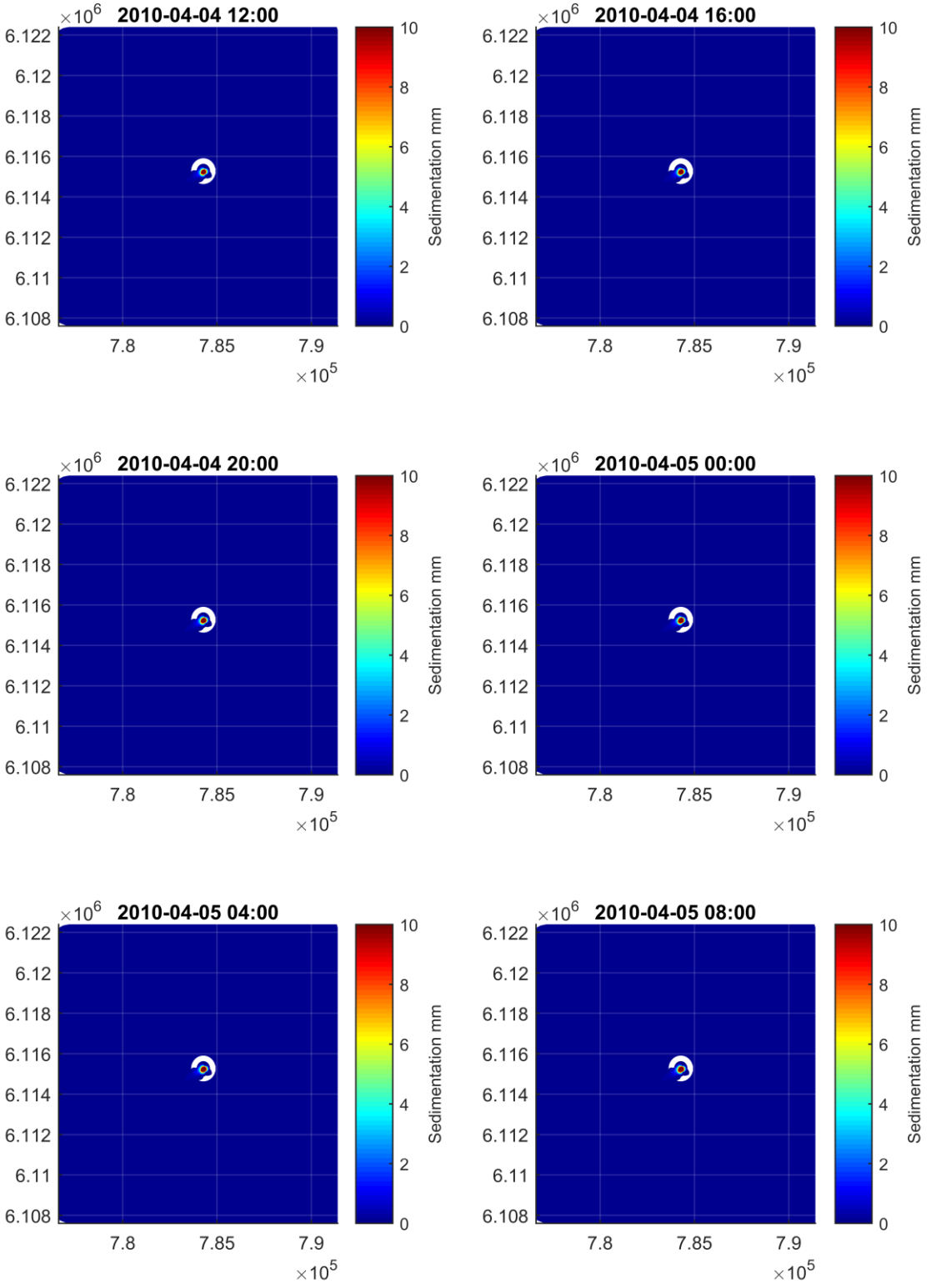
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Sedimentation mm
0
2
4
6
8
10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2010-04-05 08:00
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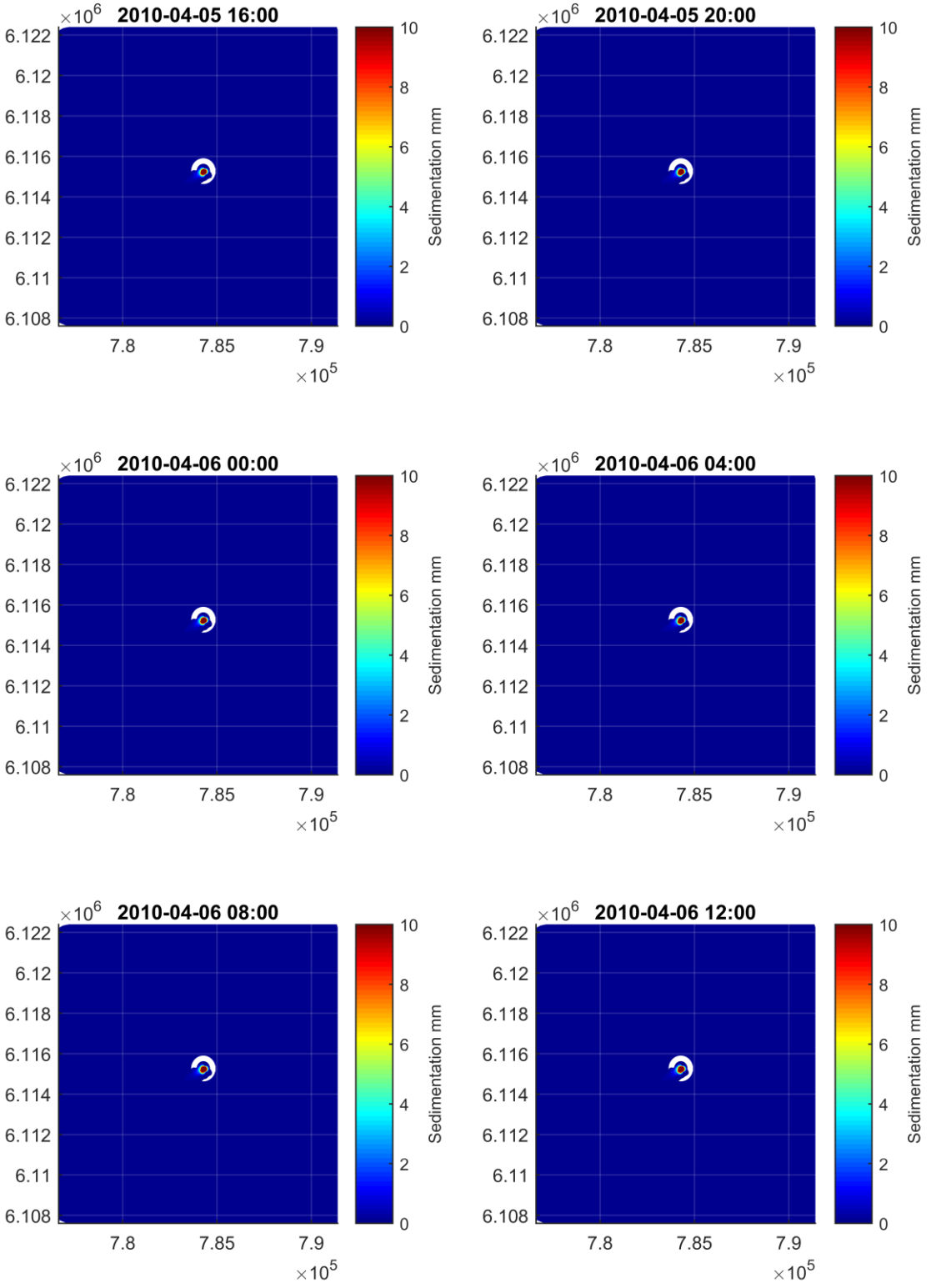
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Sedimentation mm
0
2
4
6
8
10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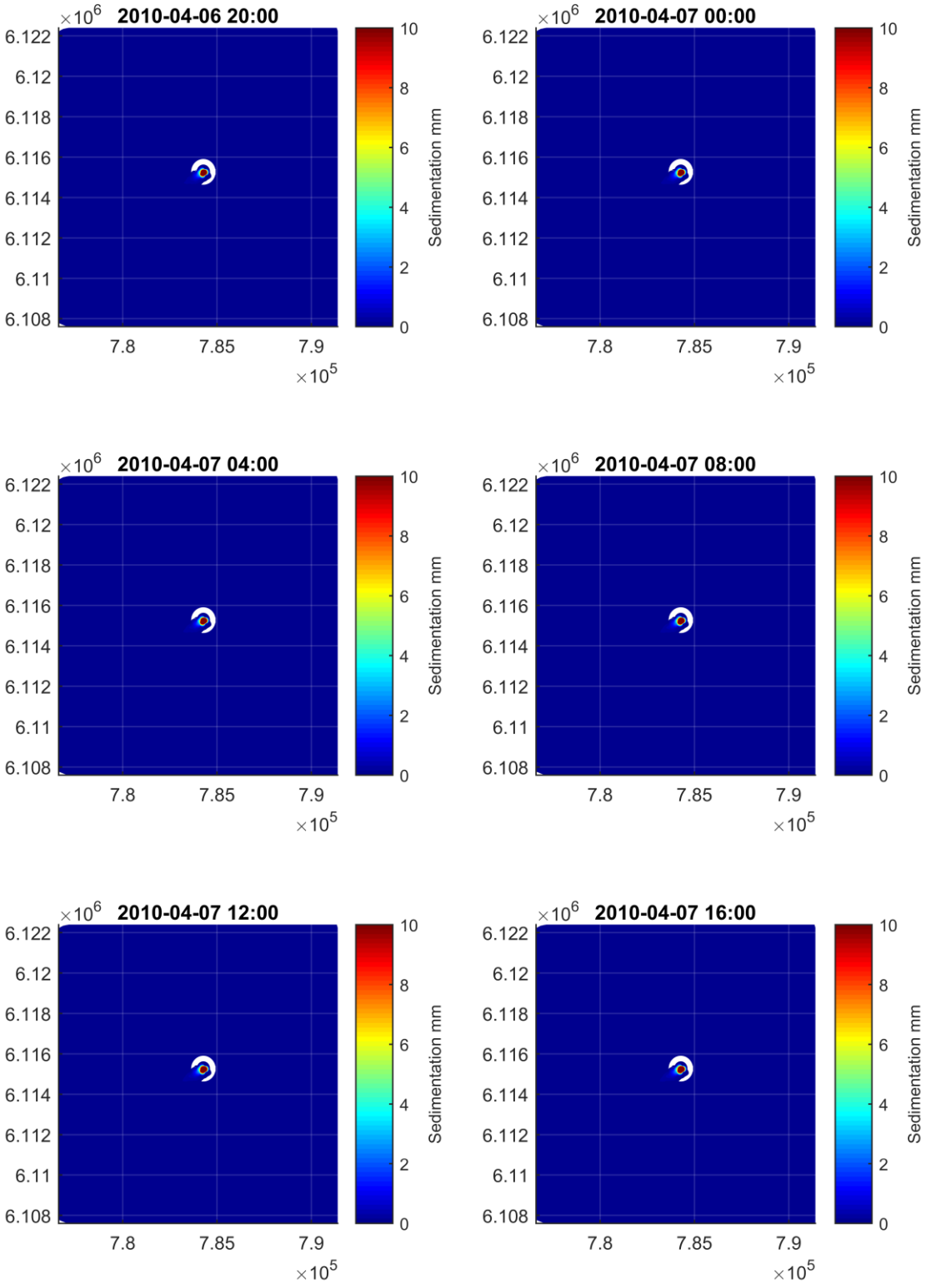
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Sedimentation mm
0
2
4
6
8
10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6.12
6.118
6.116
6.114
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6.11
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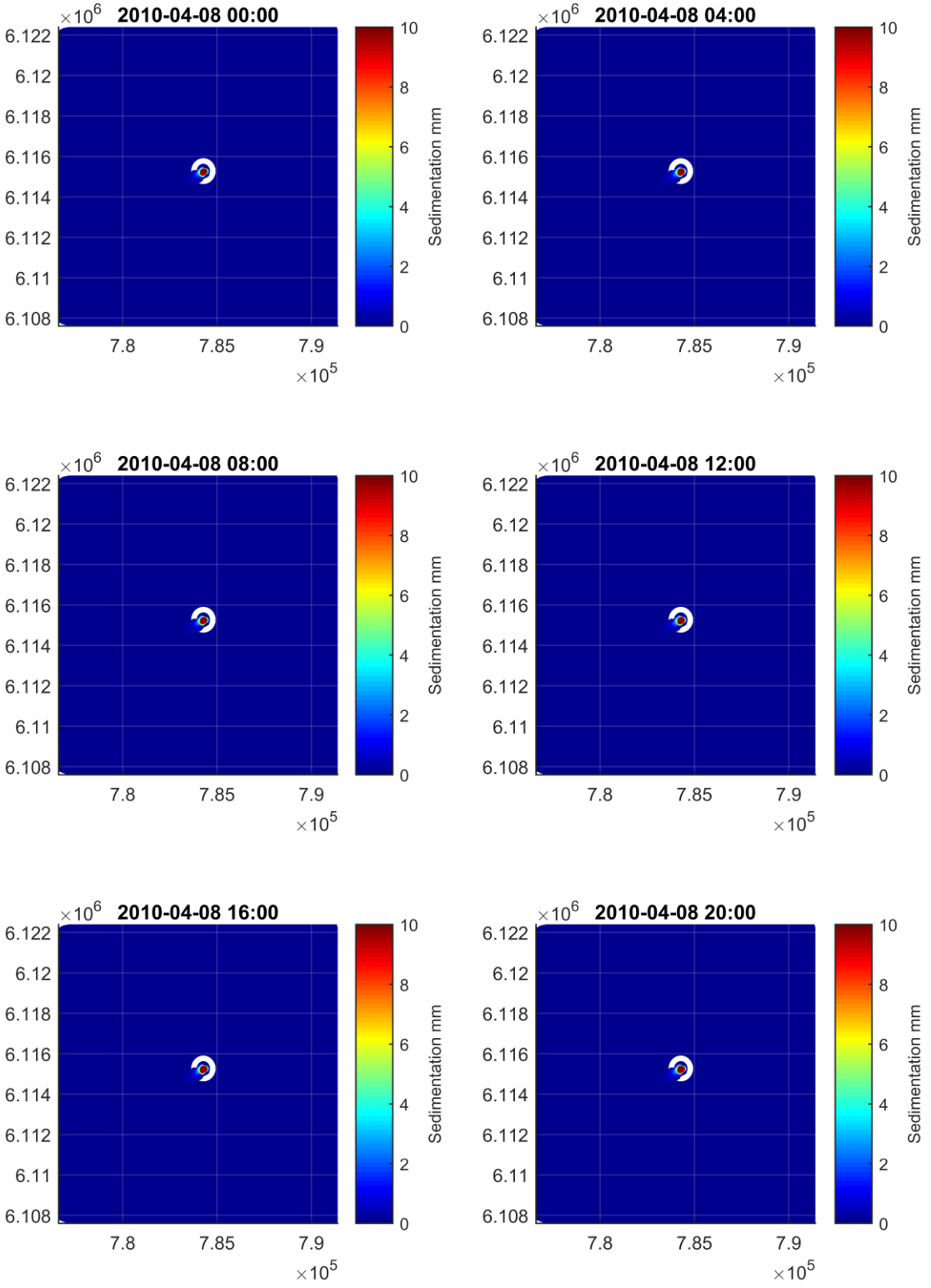
7.8
7.85
7.9
×10^5
Sedimentation mm
0
2
4
6
8
10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2010-04-08 20:00
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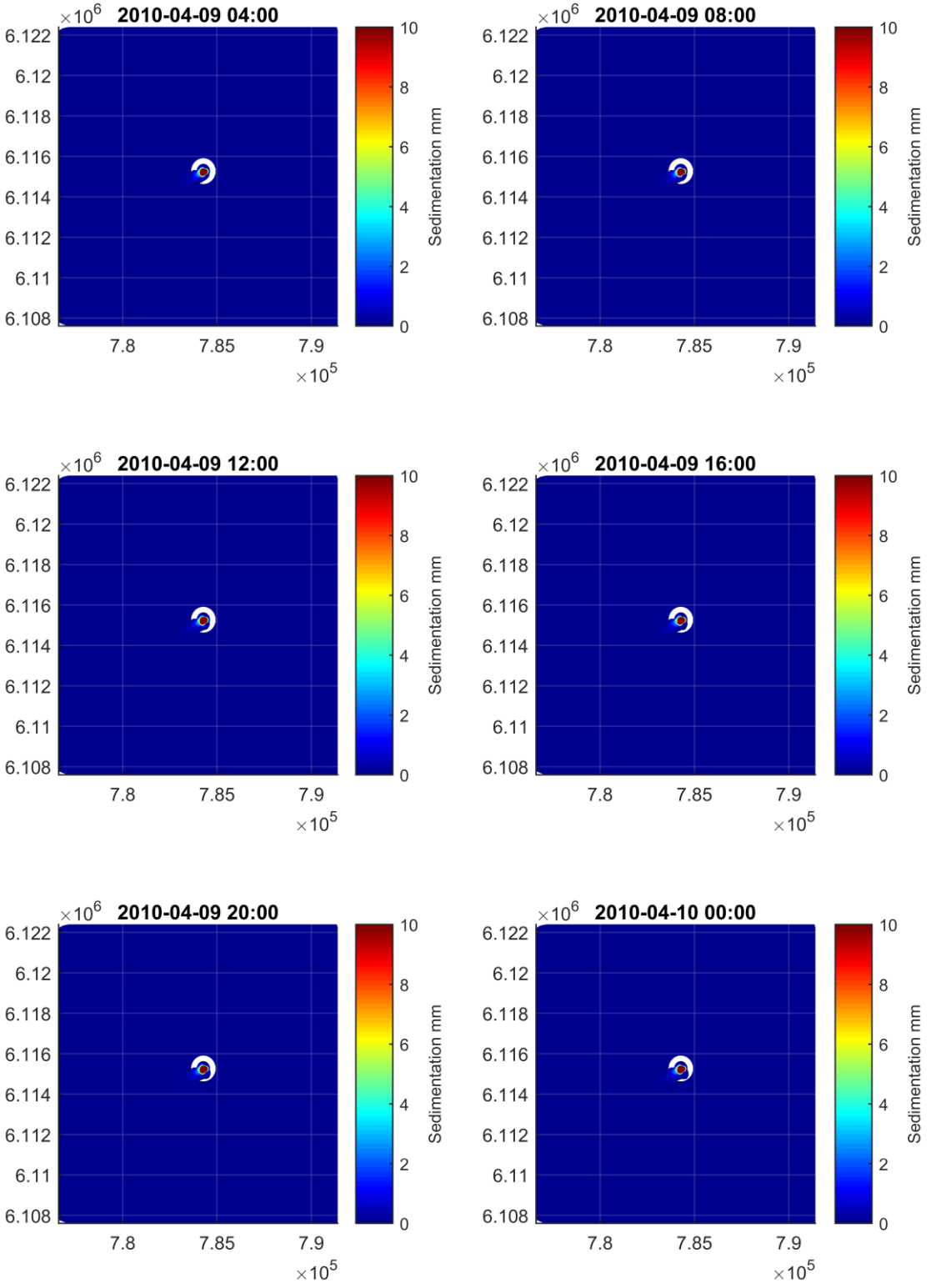
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Sedimentation mm
0
2
4
6
8
10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2010-04-09 12:00
2010-04-09 16:00
2010-04-09 20:00
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×10^6
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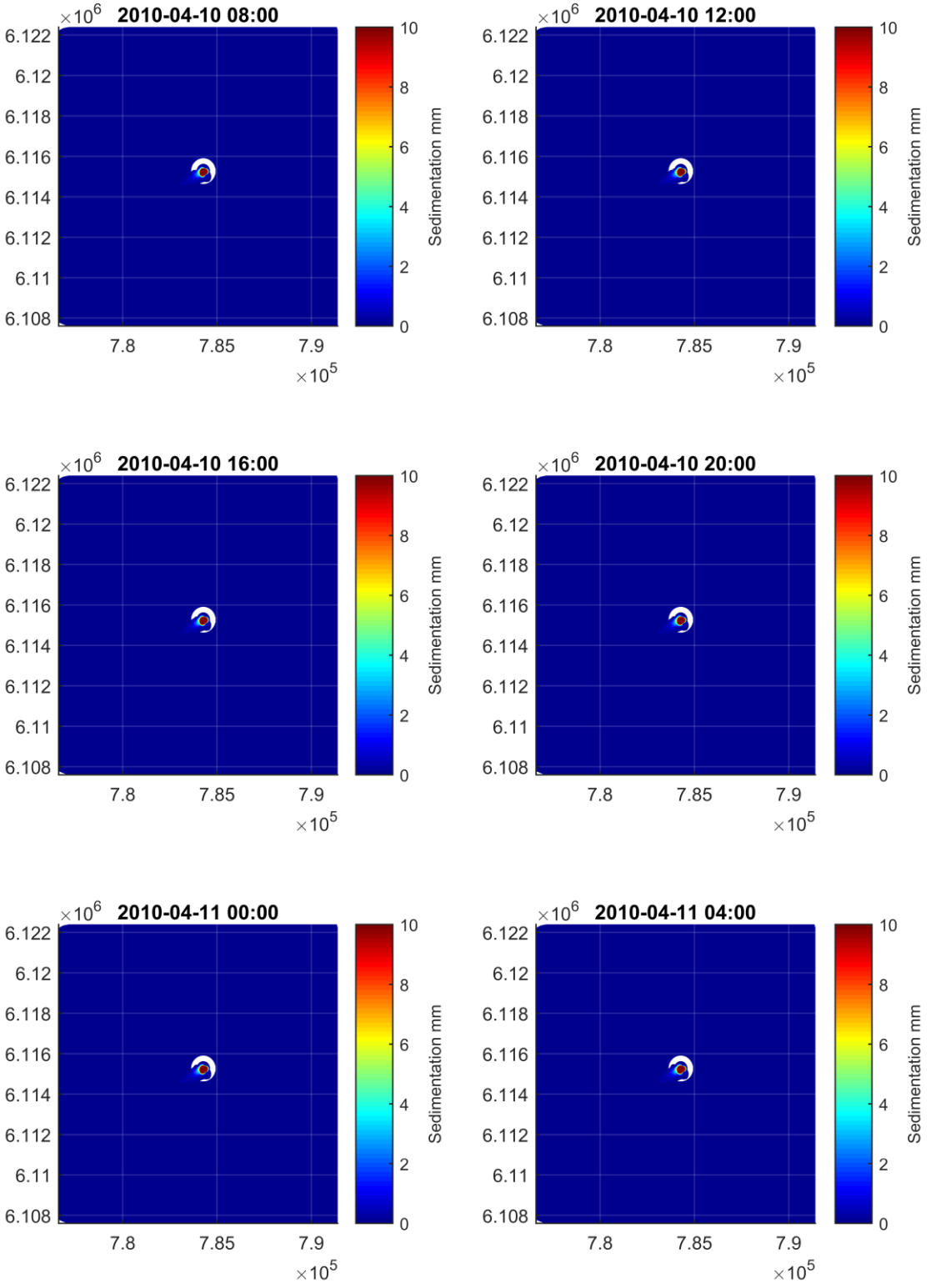
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Sedimentation mm
0
2
4
6
8
10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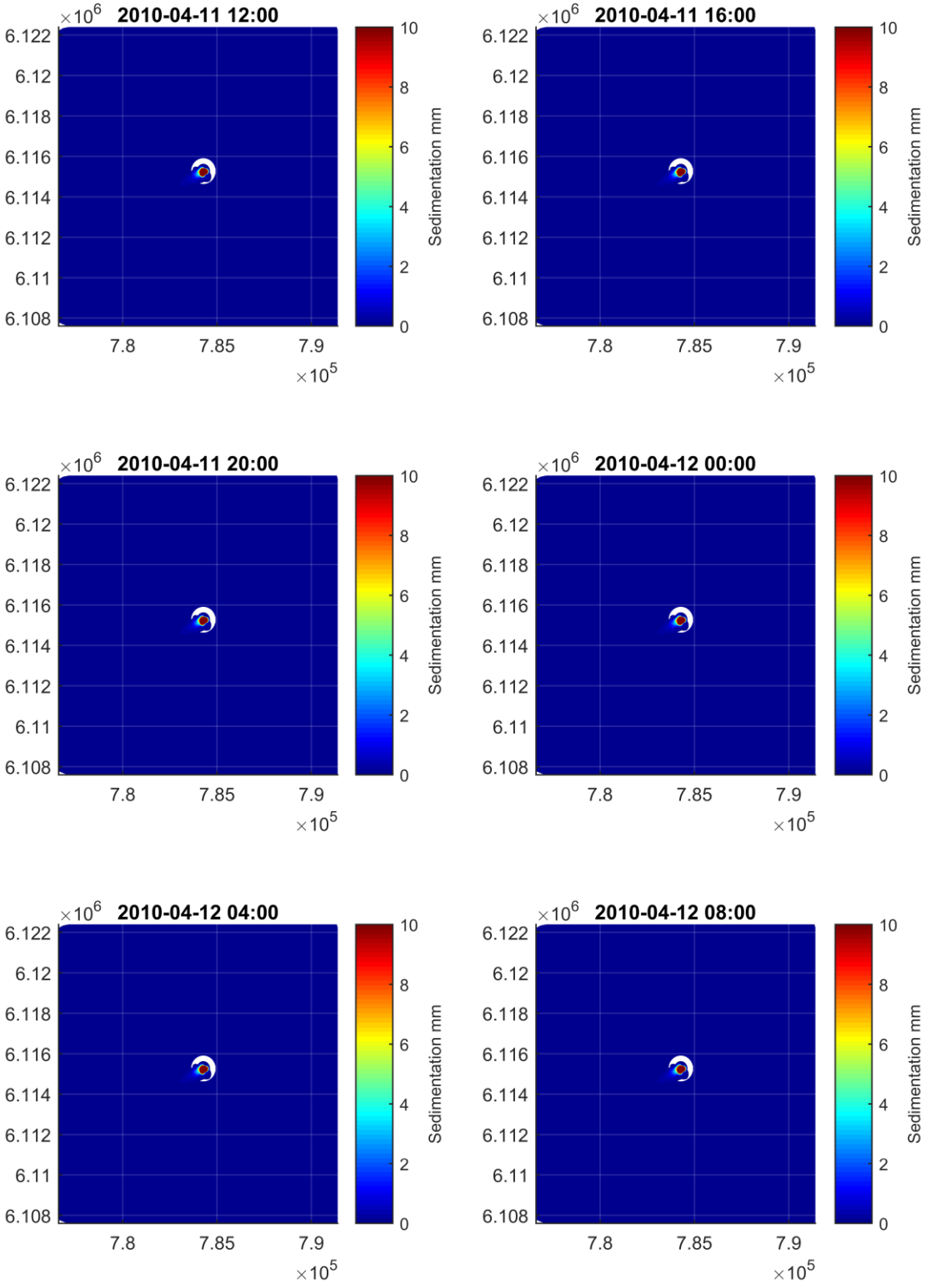
2010-04-10 16:00
2010-04-10 20:00
2010-04-11 00:00
2010-04-11 04:00
×10^6
6.122
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Sedimentation mm
0
2
4
6
8
10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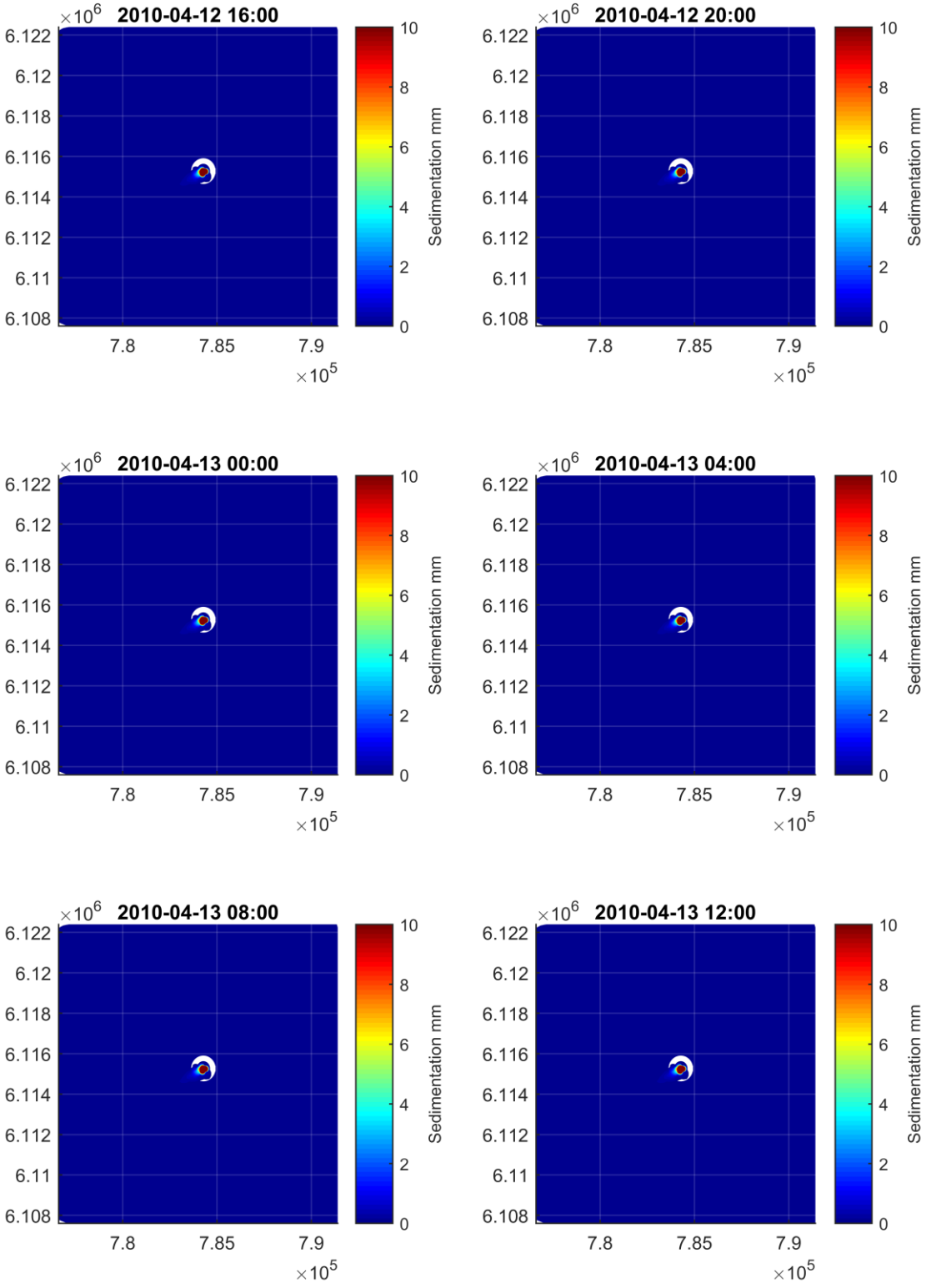
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Sedimentation mm
0
2
4
6
8
10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6.118
6.116
6.114
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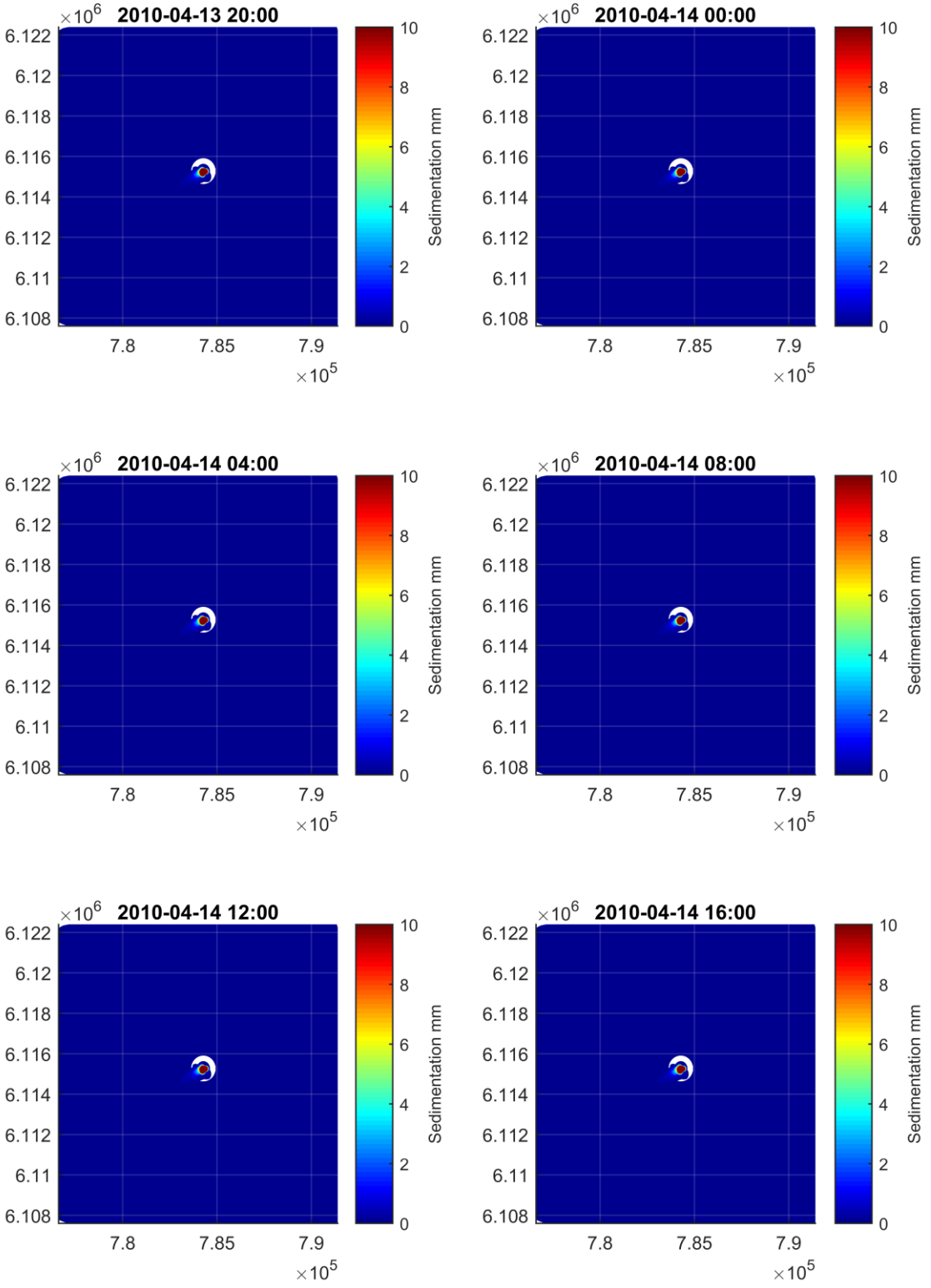
6.11
6.108
7.8
7.85
7.9
×10^5
Sedimentation mm
0
2
4
6
8
10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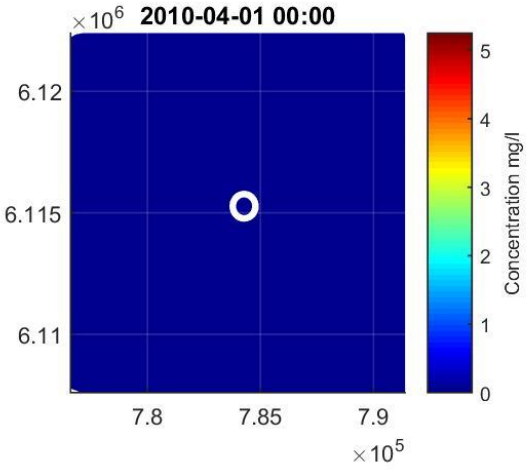
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Sedimentation mm
0
2
4
6
8
10

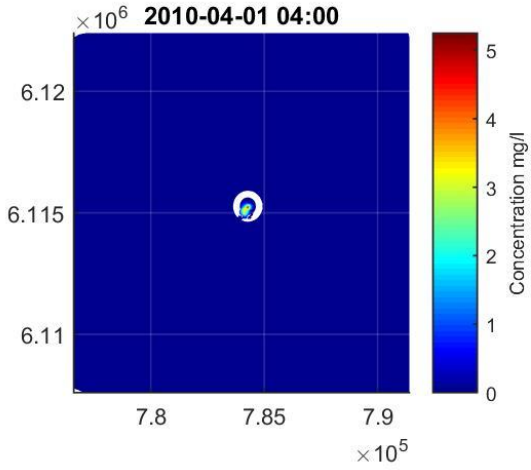
Appendix 7: 15MW MP worst-case, Surface single position – concentration lower 10 m

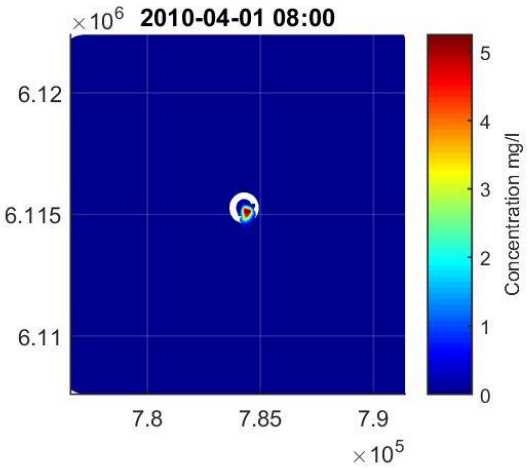
Instantaneous concentration levels due to sediment spill for the drilling period

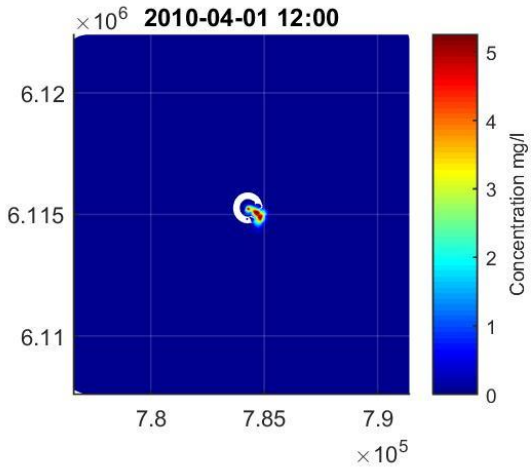
The white circle has a radius of 500 m

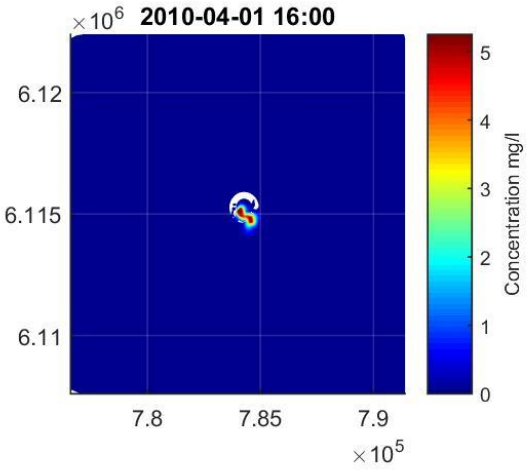
Start drilling: 2010-04-01 0:00
End drilling: 2010-04-11 16:43


×10^6 2010-04-01 00:00
6.12
6.115
6.11
7.8
7.85
7.9
×10^5
Concentration mg/l
0
1
2
3
4
5


×10^6 2010-04-01 04:00
6.12
6.115
6.11
7.8
7.85
7.9
×10^5
Concentration mg/l
0
1
2
3
4
5


×10^6 2010-04-01 08:00
6.12
6.115
6.11
7.8
7.85
7.9
×10^5
Concentration mg/l
0
1
2
3
4
5


×10^6 2010-04-01 12:00
6.12
6.115
6.11
7.8
7.85
7.9
×10^5
Concentration mg/l
0
1
2
3
4
5


×10^6 2010-04-01 16:00
6.12
6.115
6.11
7.8
7.85
7.9
×10^5
Concentration mg/l
0
1
2
3
4
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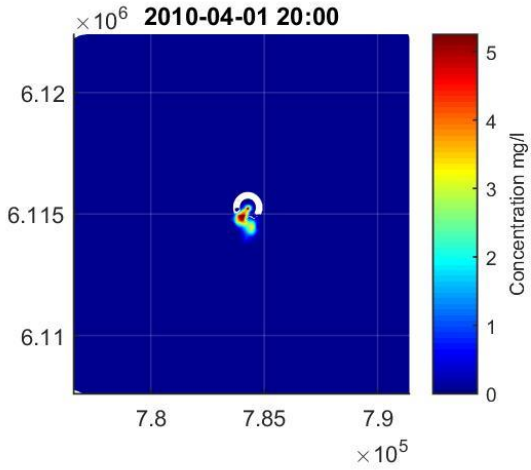
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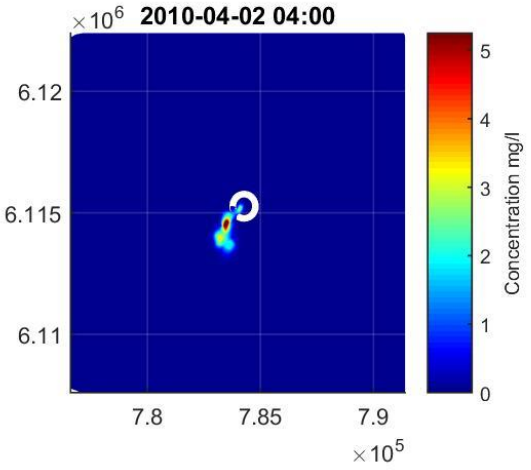
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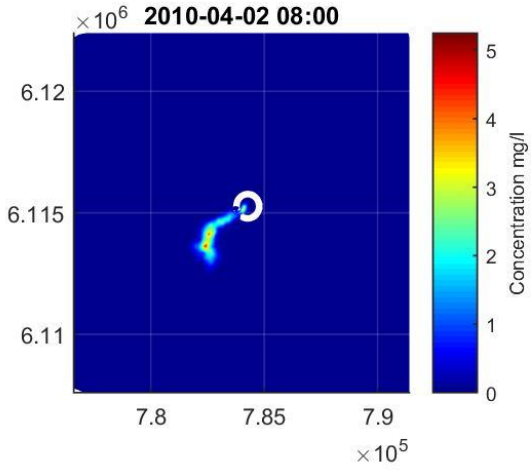
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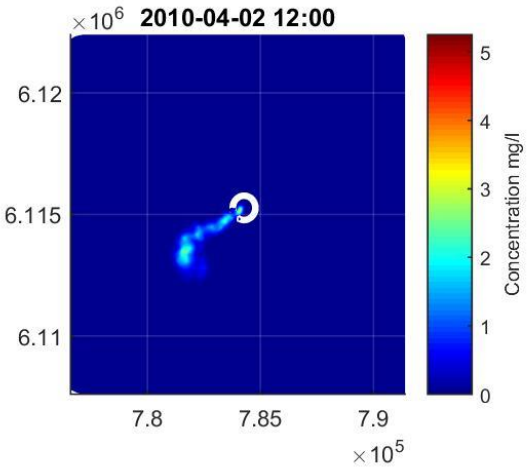
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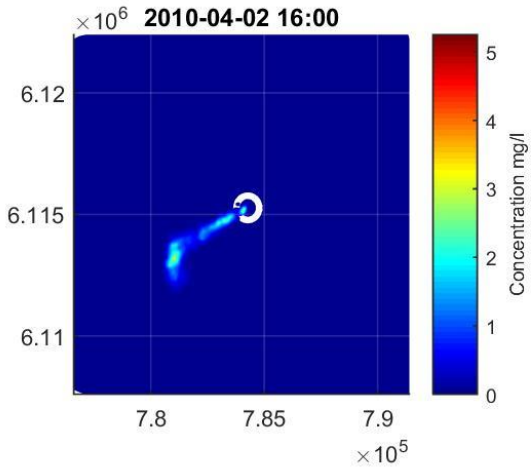
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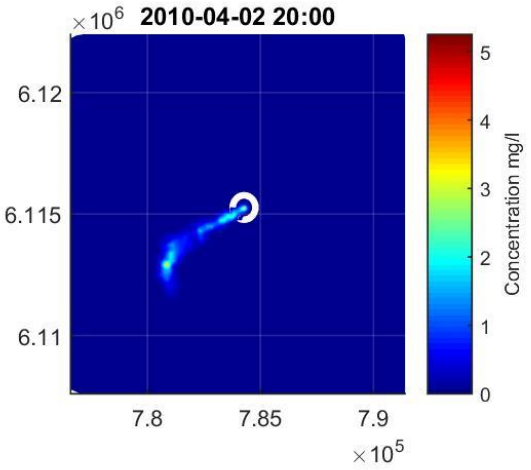
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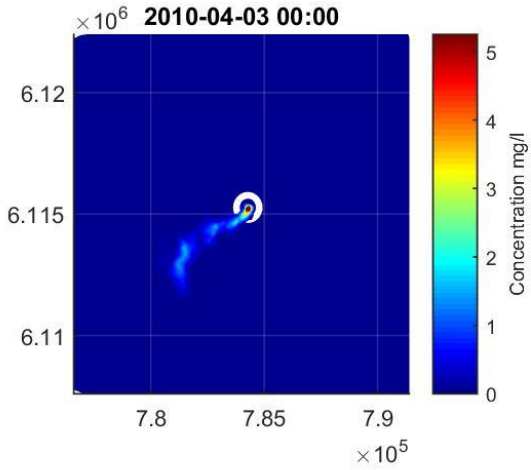
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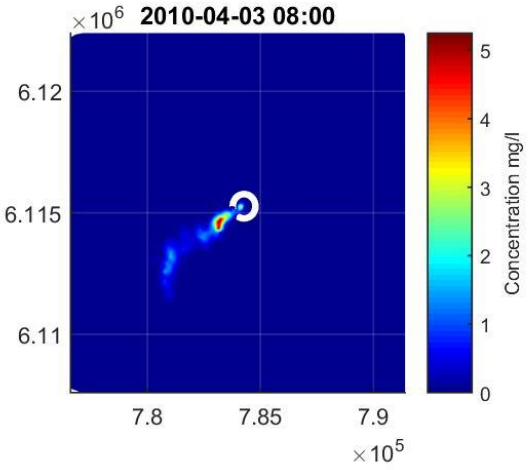
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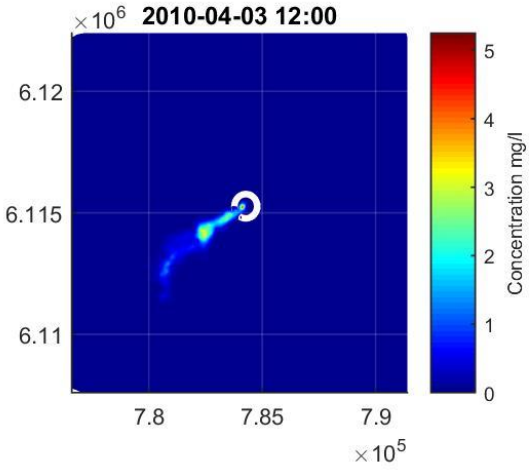
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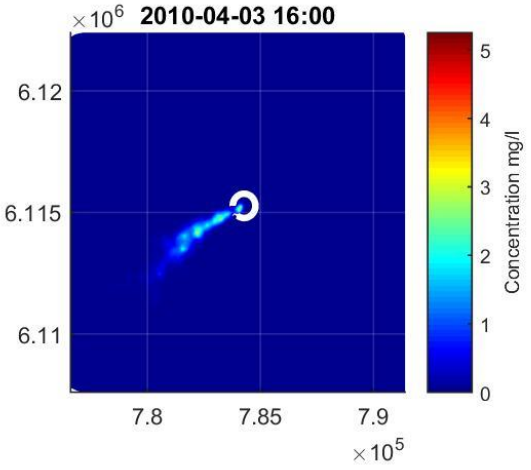
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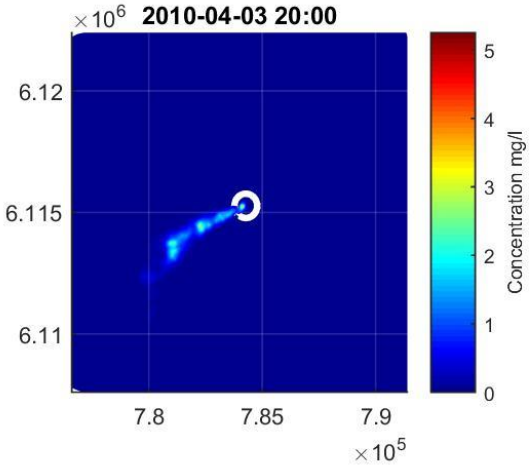
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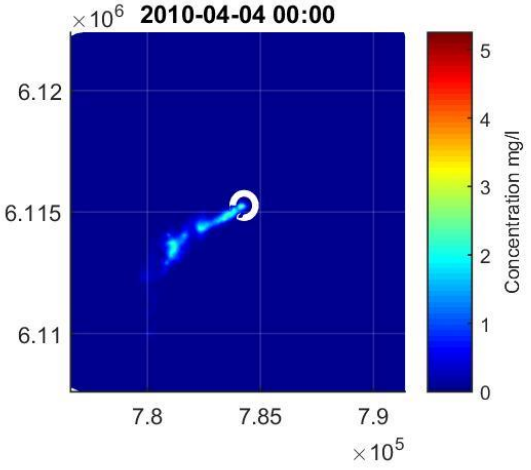
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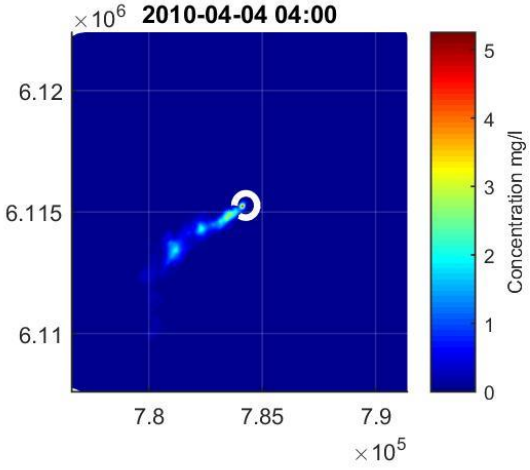
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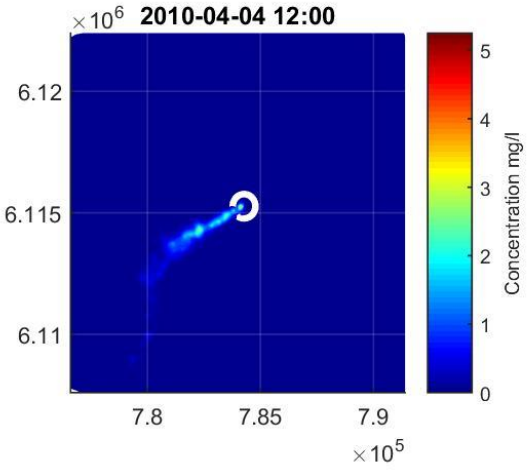
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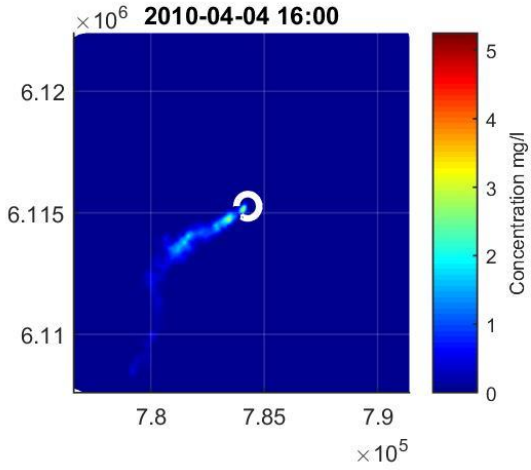
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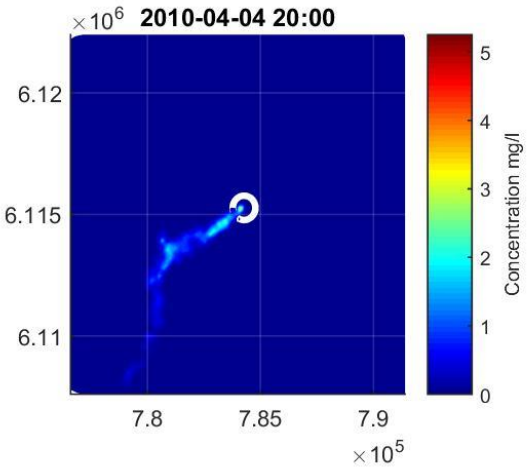
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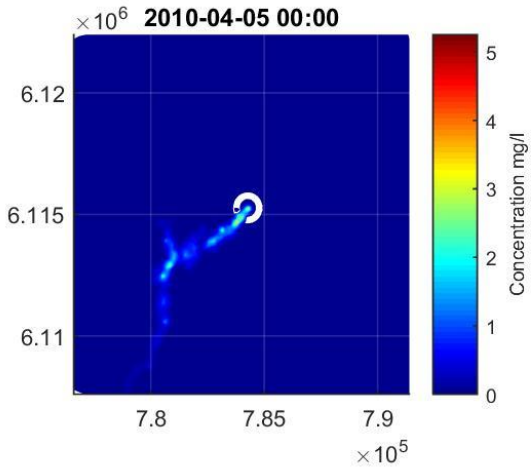
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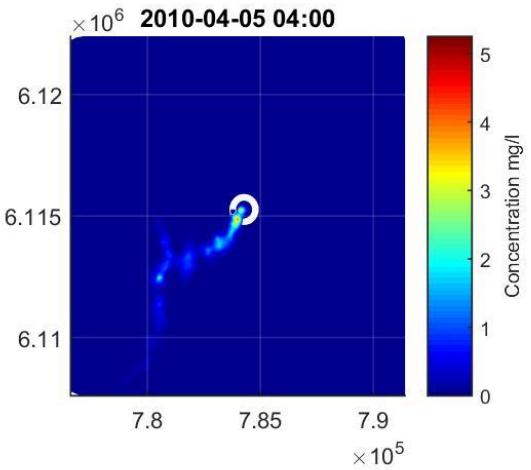
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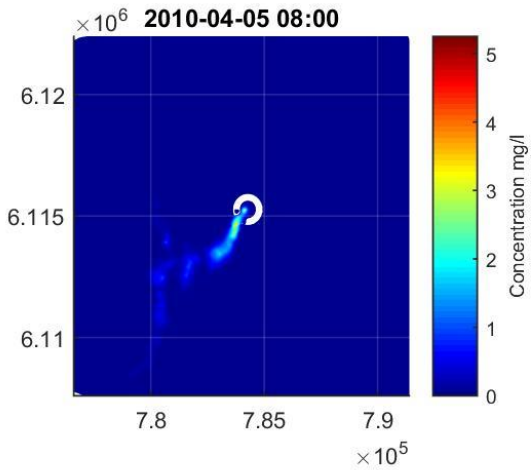
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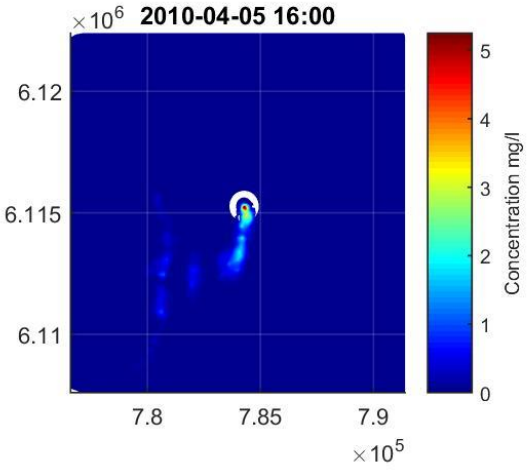
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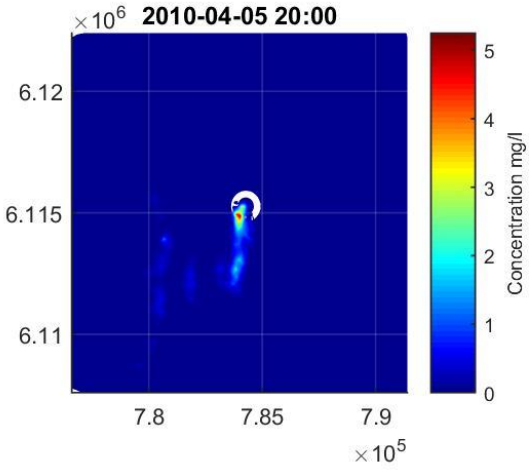
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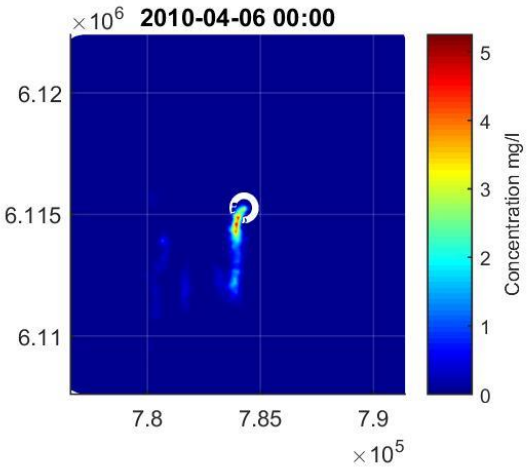
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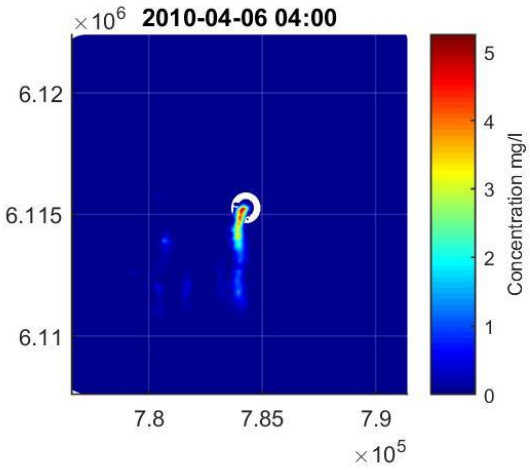
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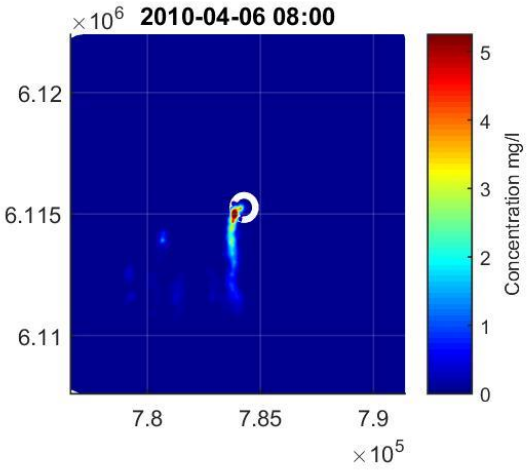
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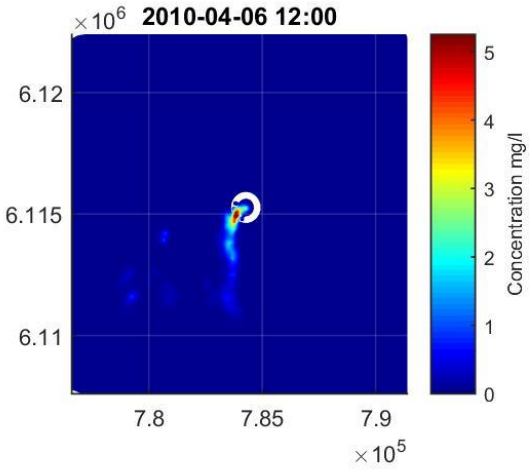
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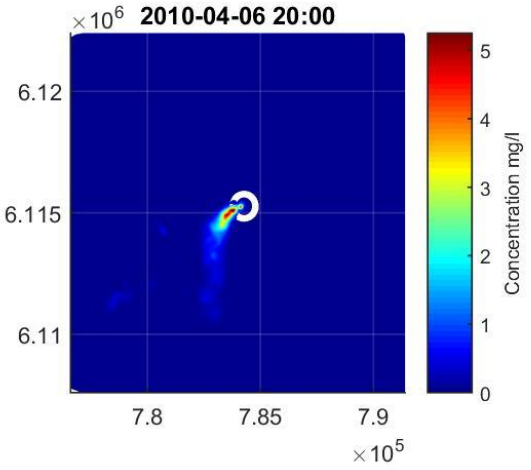
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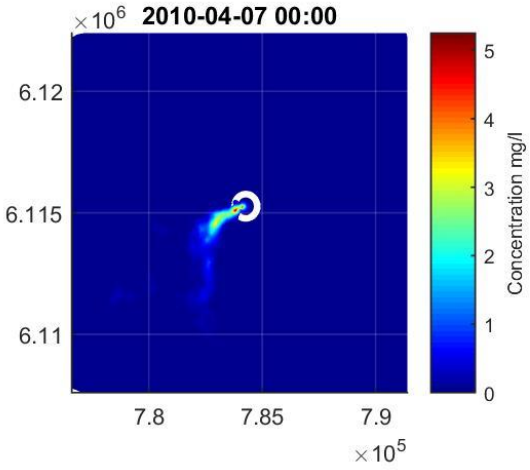
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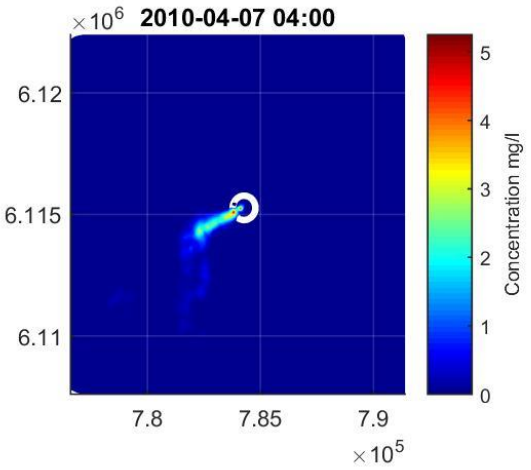
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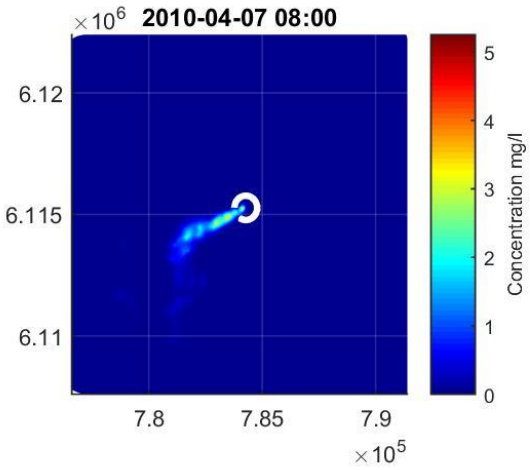
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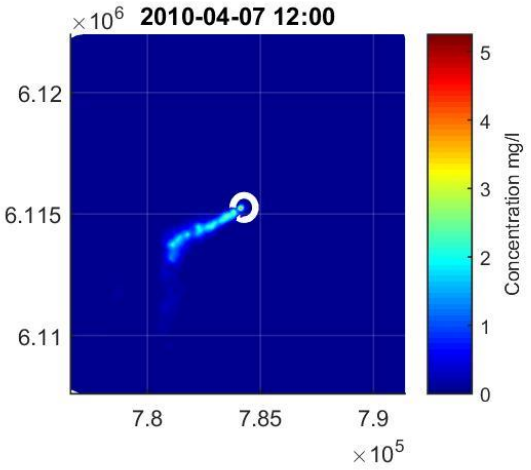
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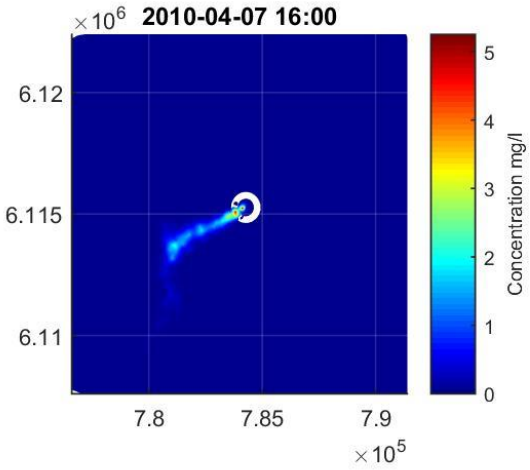
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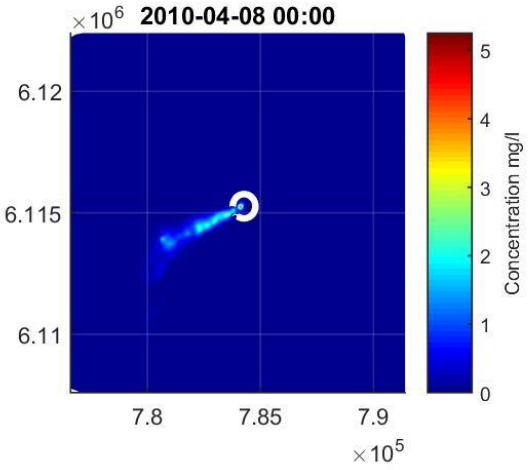
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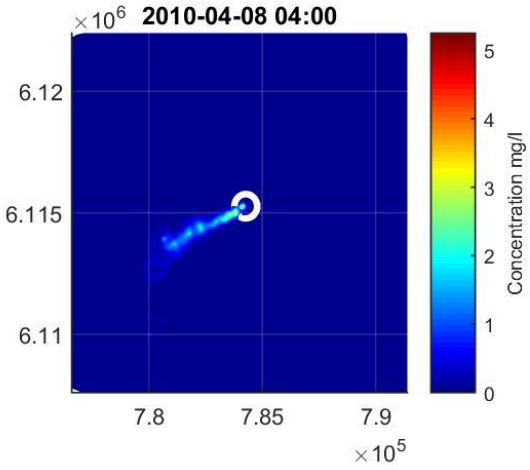
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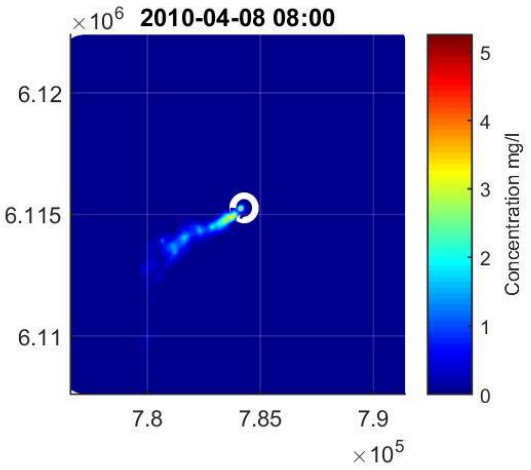
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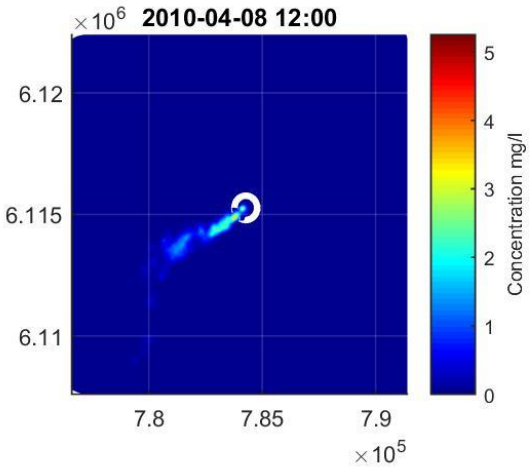
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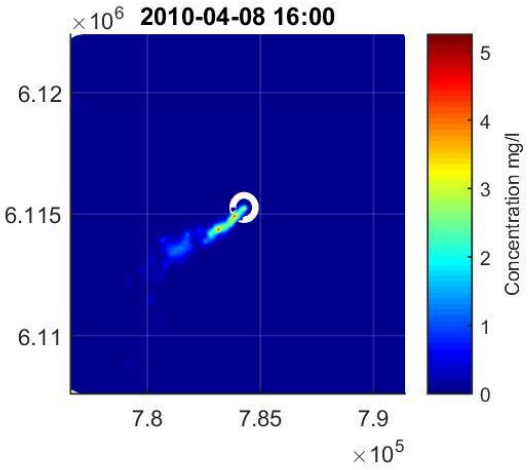
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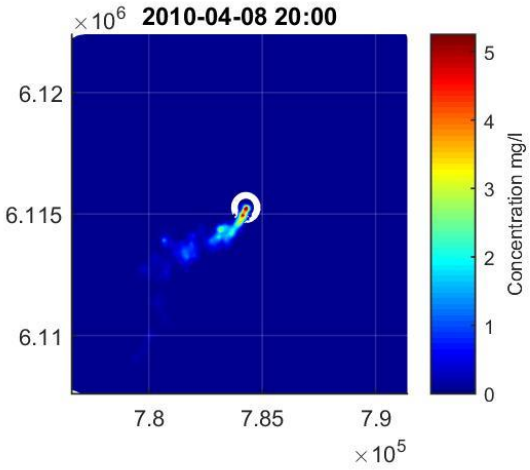
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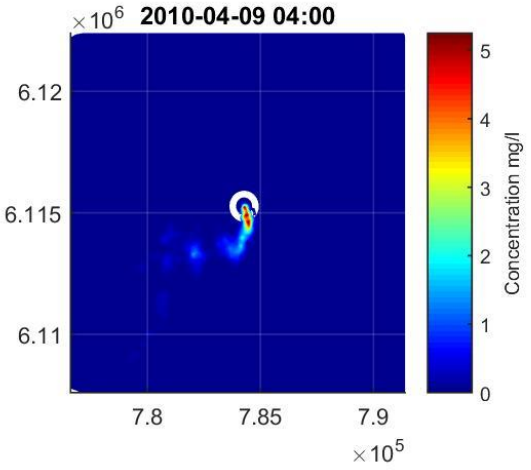
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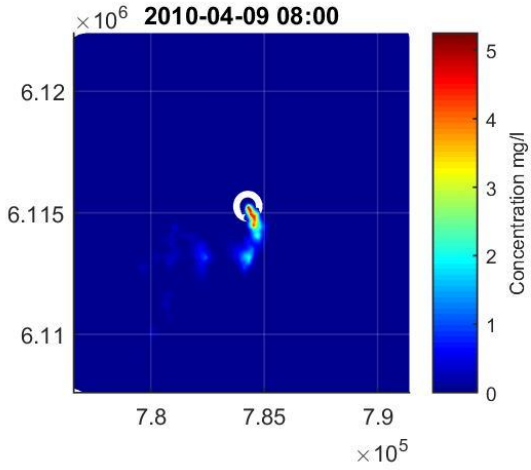
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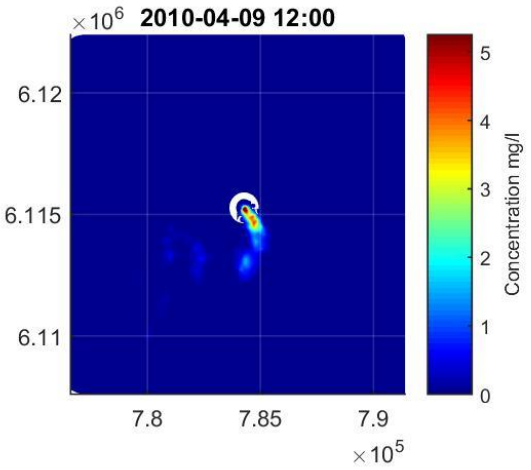
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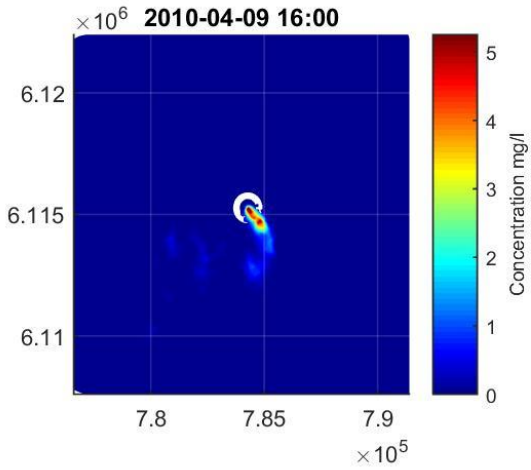
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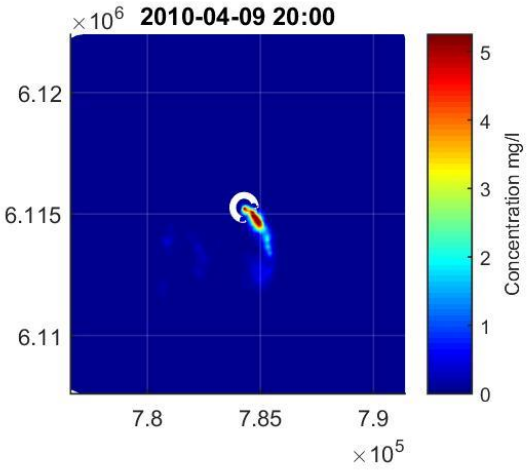
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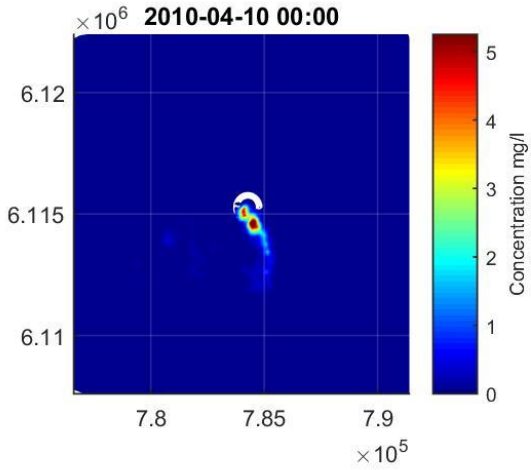
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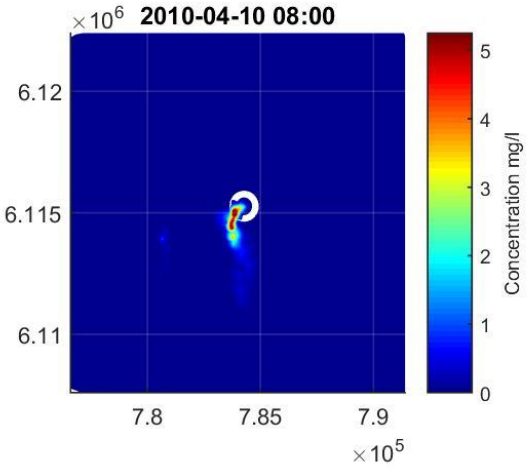
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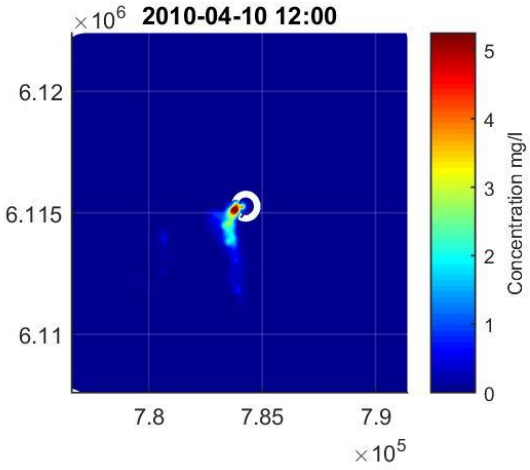
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Concentration mg/l
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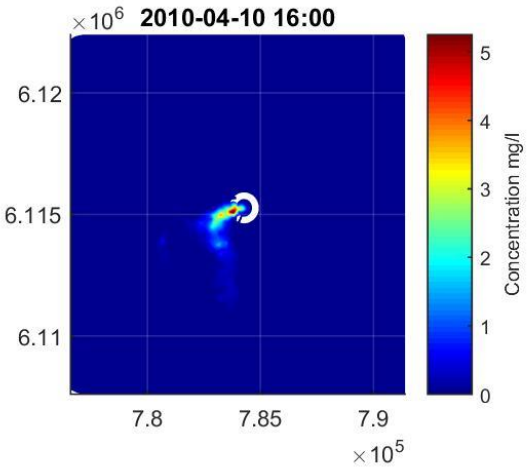
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Concentration mg/l
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4
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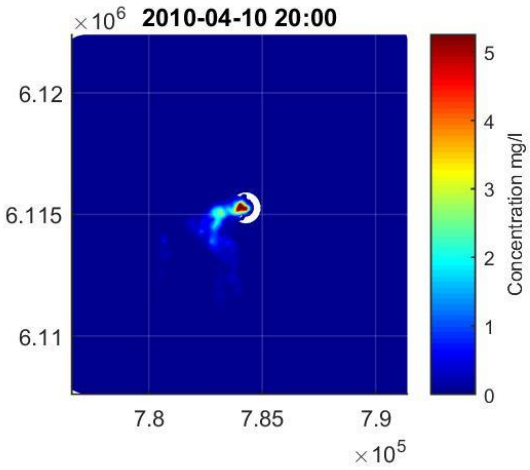
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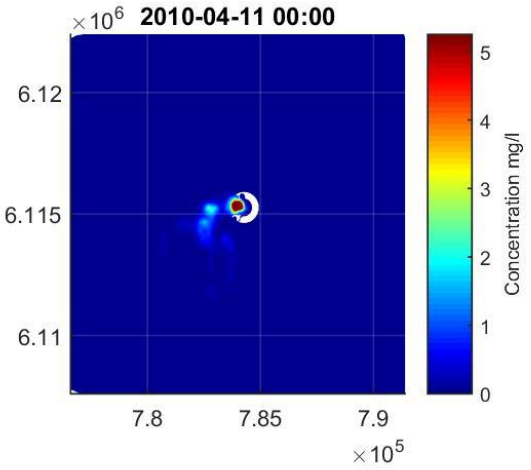
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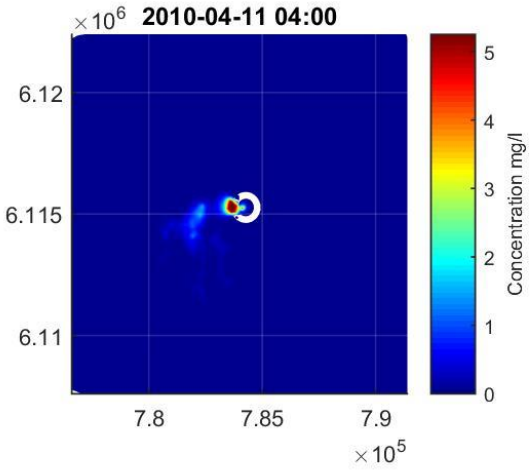
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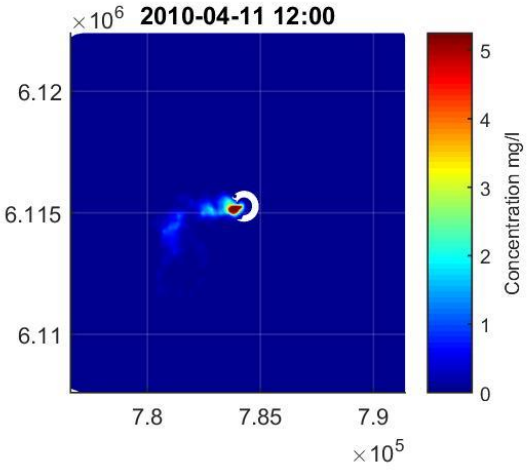
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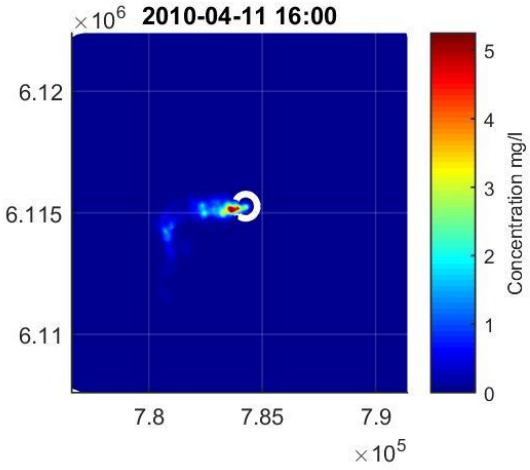
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Concentration mg/l
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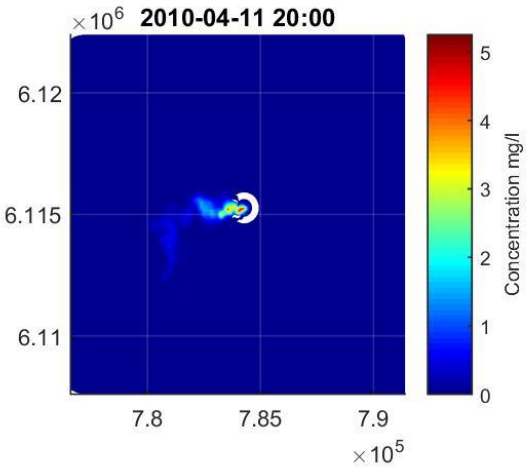
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Concentration mg/l
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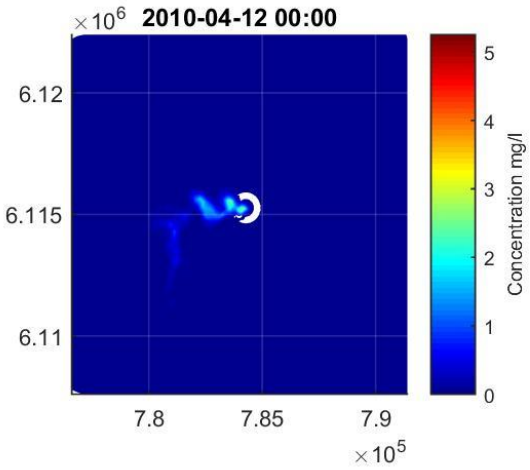
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Concentration mg/l
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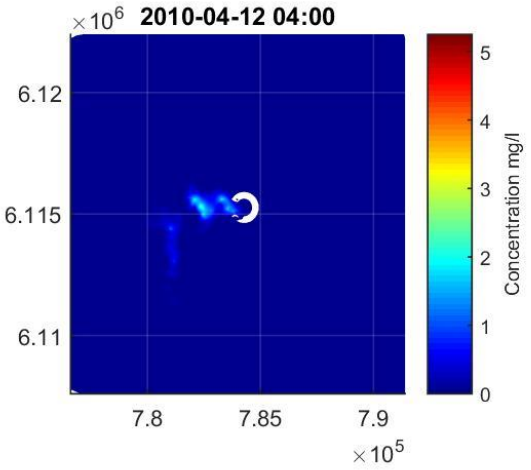
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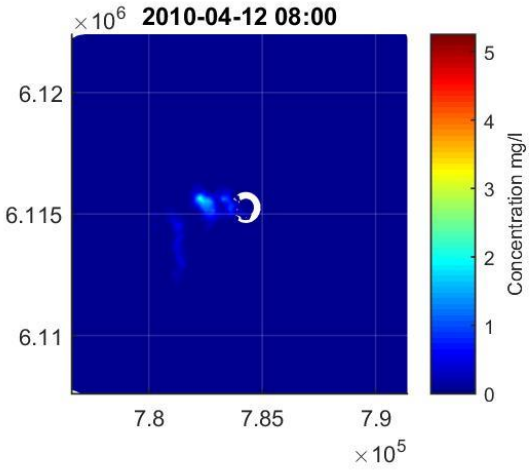
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Concentration mg/l
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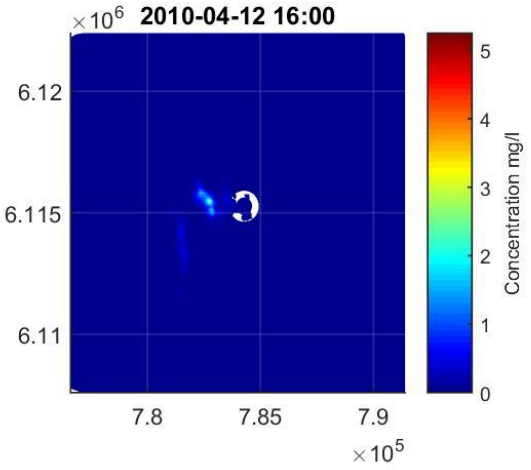
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×10^5
Concentration mg/l
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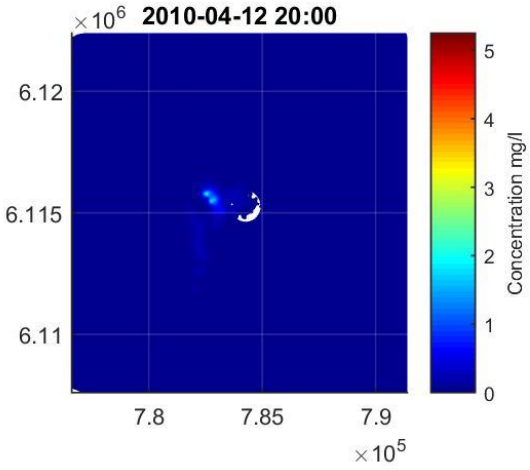
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×10^5
Concentration mg/l
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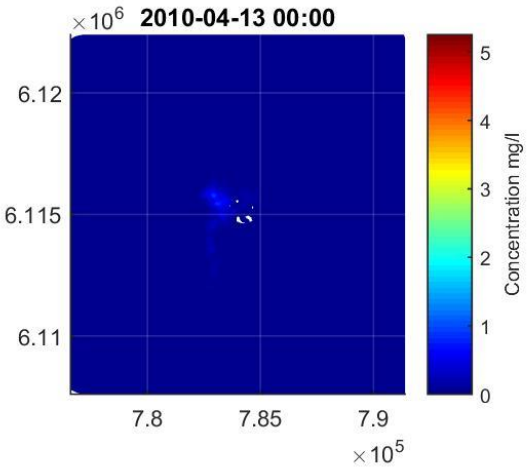
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Concentration mg/l
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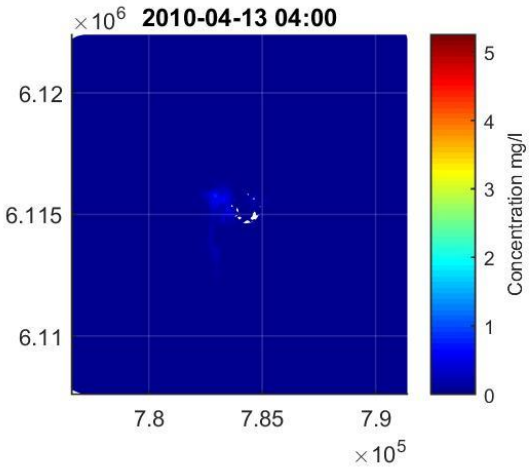
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Concentration mg/l
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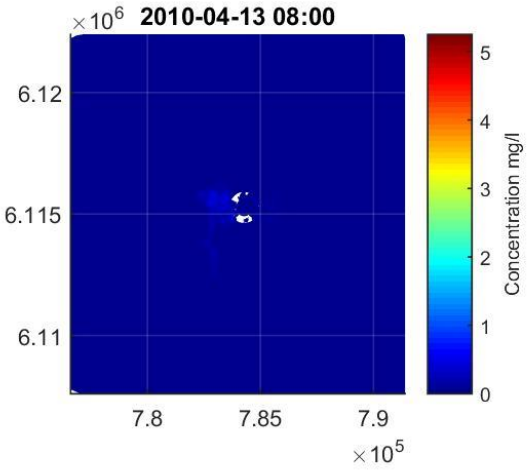
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Concentration mg/l
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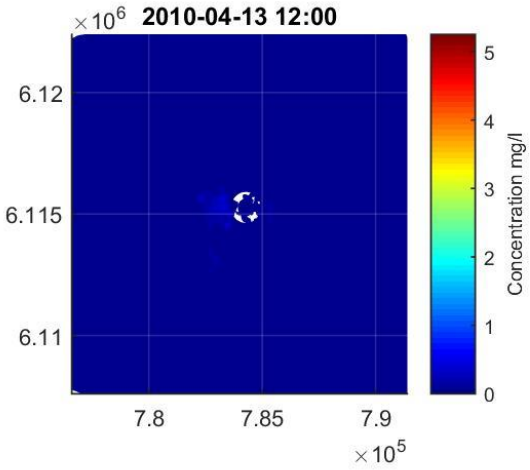
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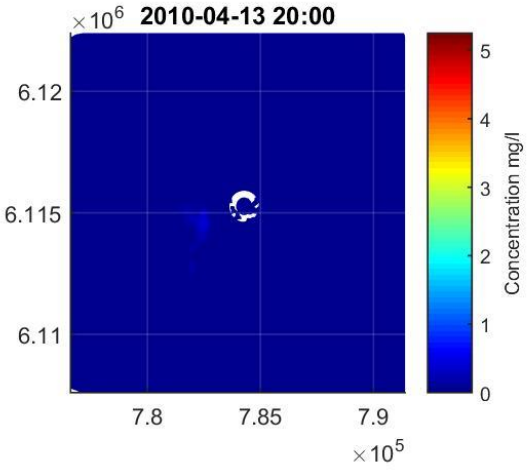
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×10^5
Concentration mg/l
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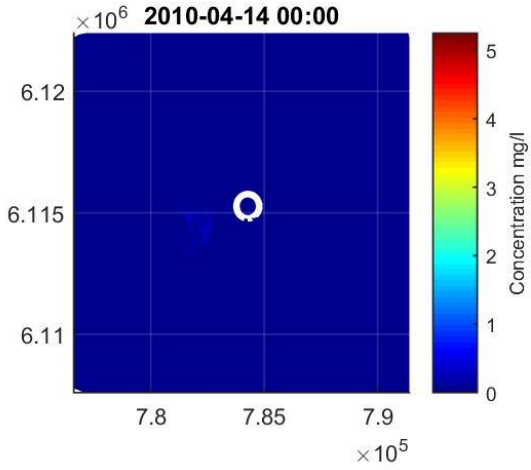
4
5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7.85
7.9
×10^5
Concentration mg/l
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2
3
4
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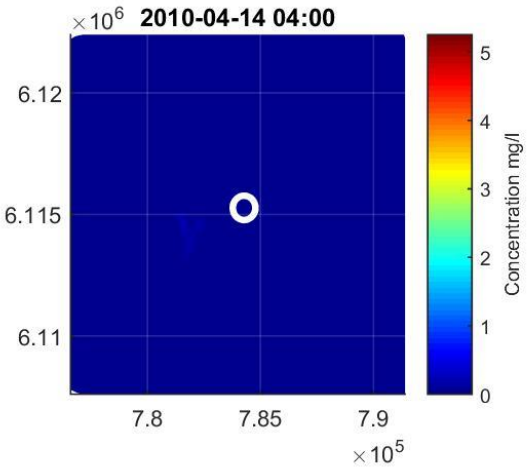
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6.11
7.8
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7.9
×10^5
Concentration mg/l
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2
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4
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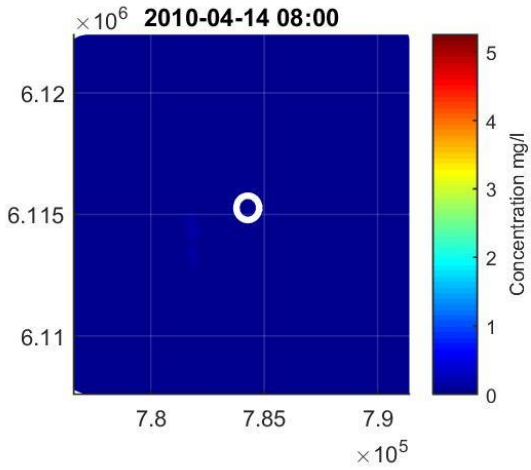
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7.9
×10^5
Concentration mg/l
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4
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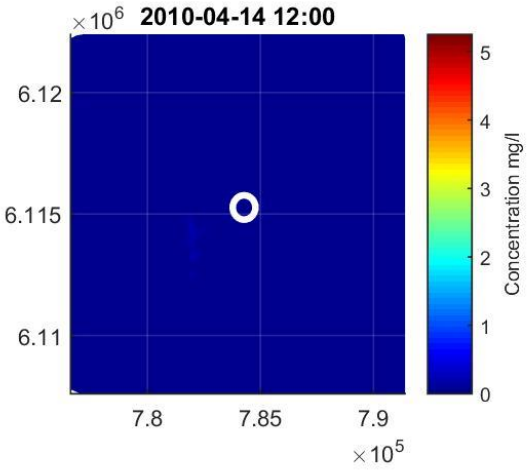
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Concentration mg/l
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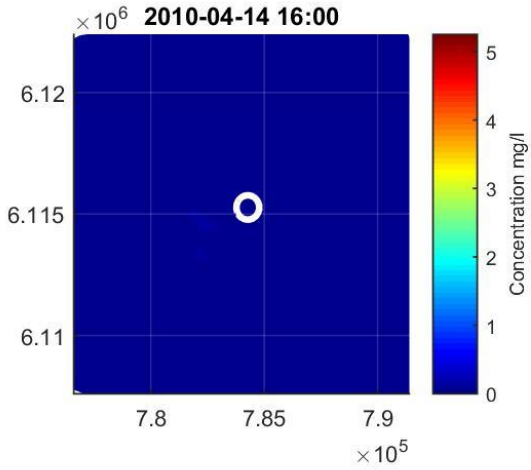
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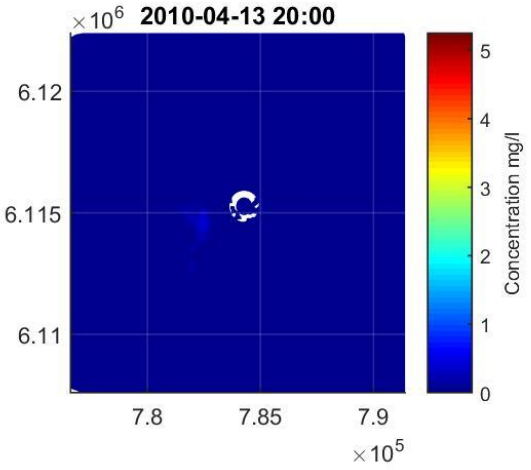
6.115
6.11
7.8
7.85
7.9
×10^5
Concentration mg/l
0
1
2
3
4
5

Appendix 8: 15MW MP worst-case, Surface single position – concentration upper 10 m

Instantaneous concentration levels due to sediment spill for the drilling period

The white circle has a radius of 500 m

Start drilling: 2010-04-01 0:00
End drilling: 2010-04-11 16:43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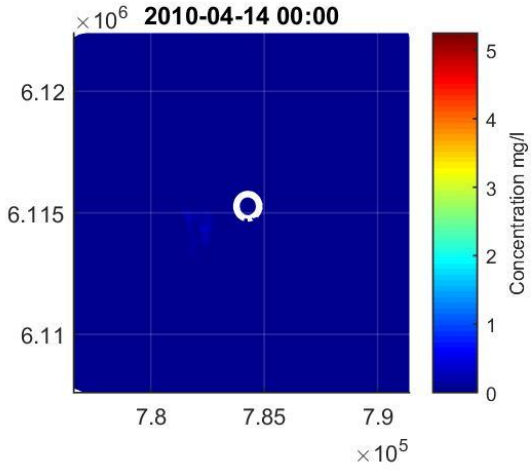
6.115
6.11
7.8
7.85
7.9
×10^5
Concentration mg/l
0
1
2
3
4
5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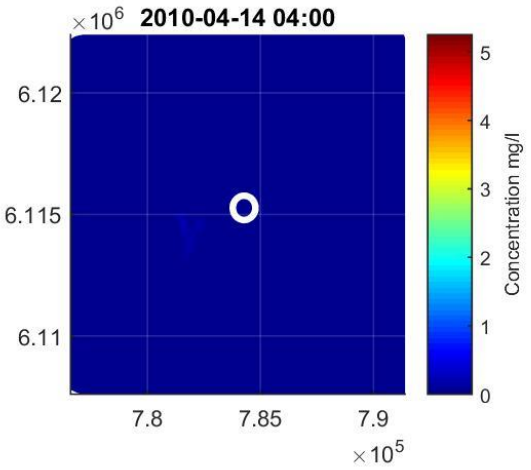
6.115
6.11
7.8
7.85
7.9
×10^5
Concentration mg/l
0
1
2
3
4
5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6.115
6.11
7.8
7.85
7.9
×10^5
Concentration mg/l
0
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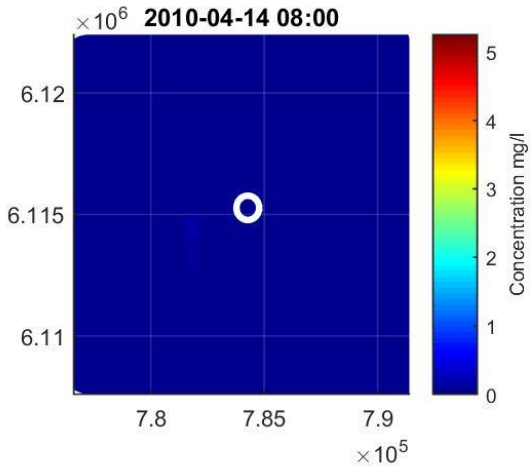
2
3
4
5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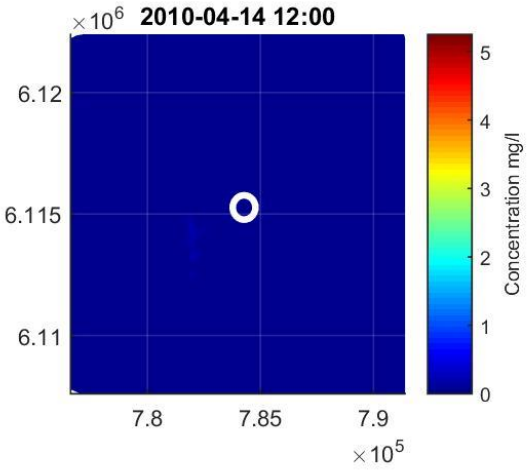
6.115
6.11
7.8
7.85
7.9
×10^5
Concentration mg/l
0
1
2
3
4
5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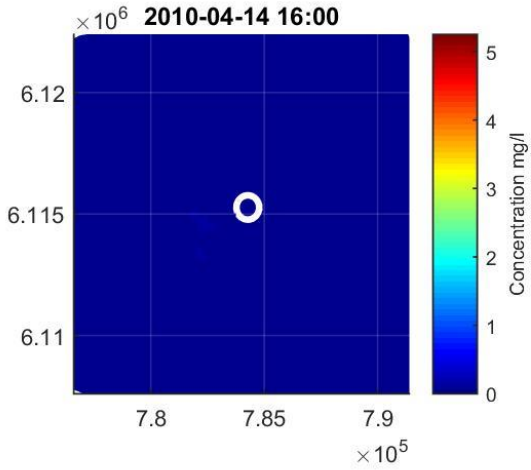
6.115
6.11
7.8
7.85
7.9
×10^5
Concentration mg/l
0
1
2
3
4
5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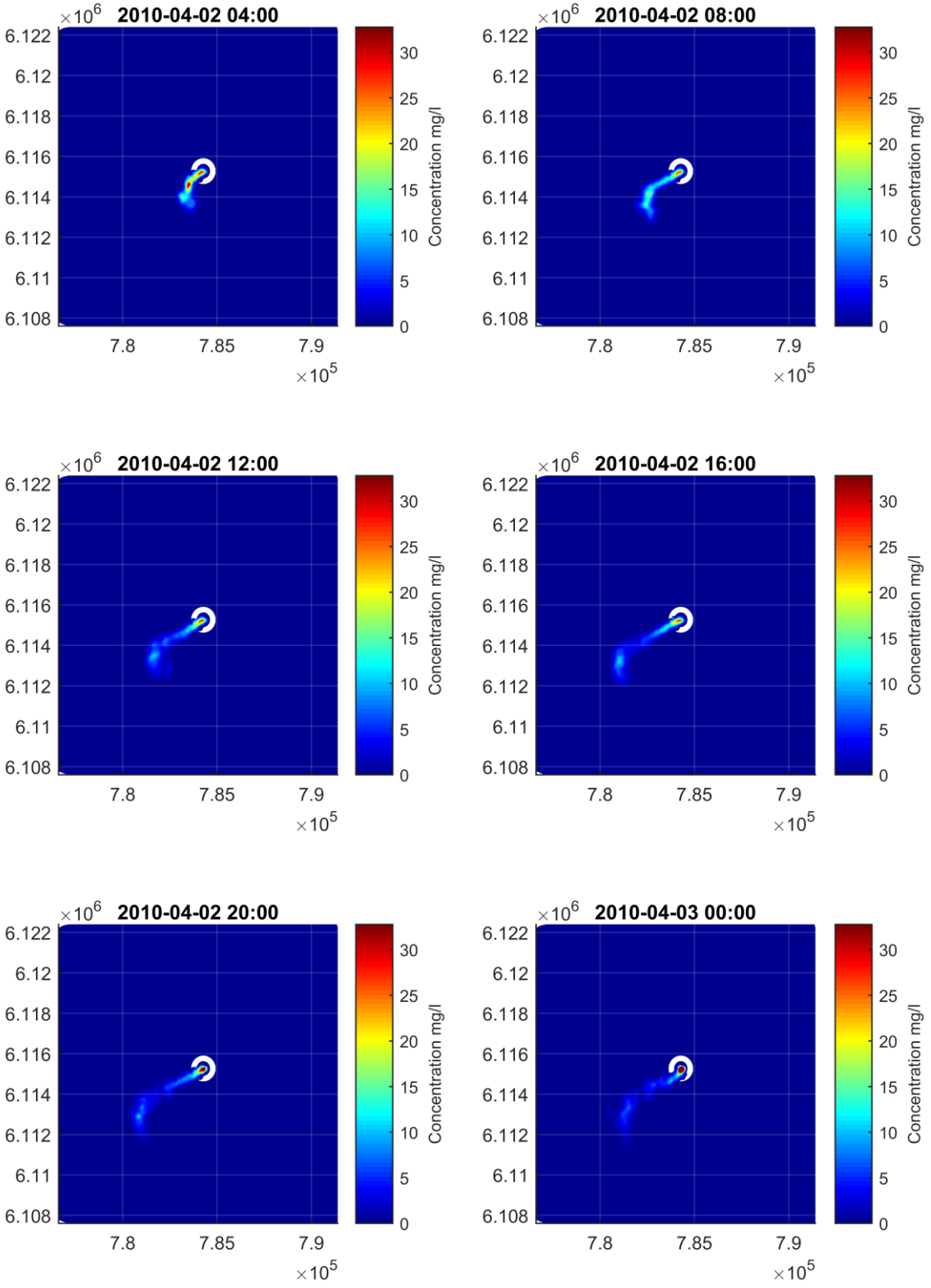
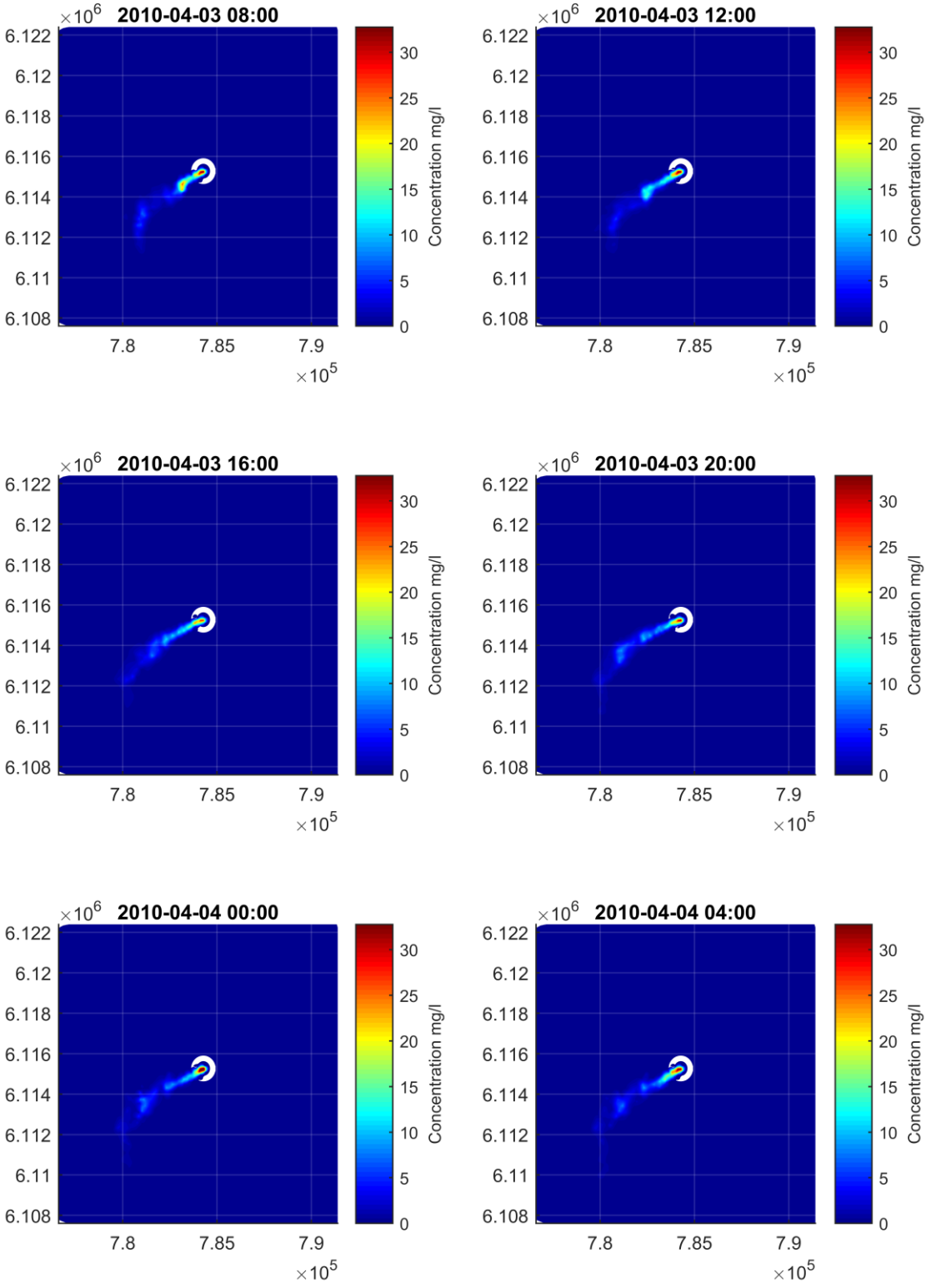
6.115
6.11
7.8
7.85
7.9
×10^5
Concentration mg/l
0
1
2
3
4
5


2010-04-02 04:00
2010-04-02 08:00
2010-04-02 12:00
2010-04-02 16:00
2010-04-02 20:00
2010-04-03 00:00
×10^6
6.122
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Concentration mg/l
30
25
20
15
10
5
0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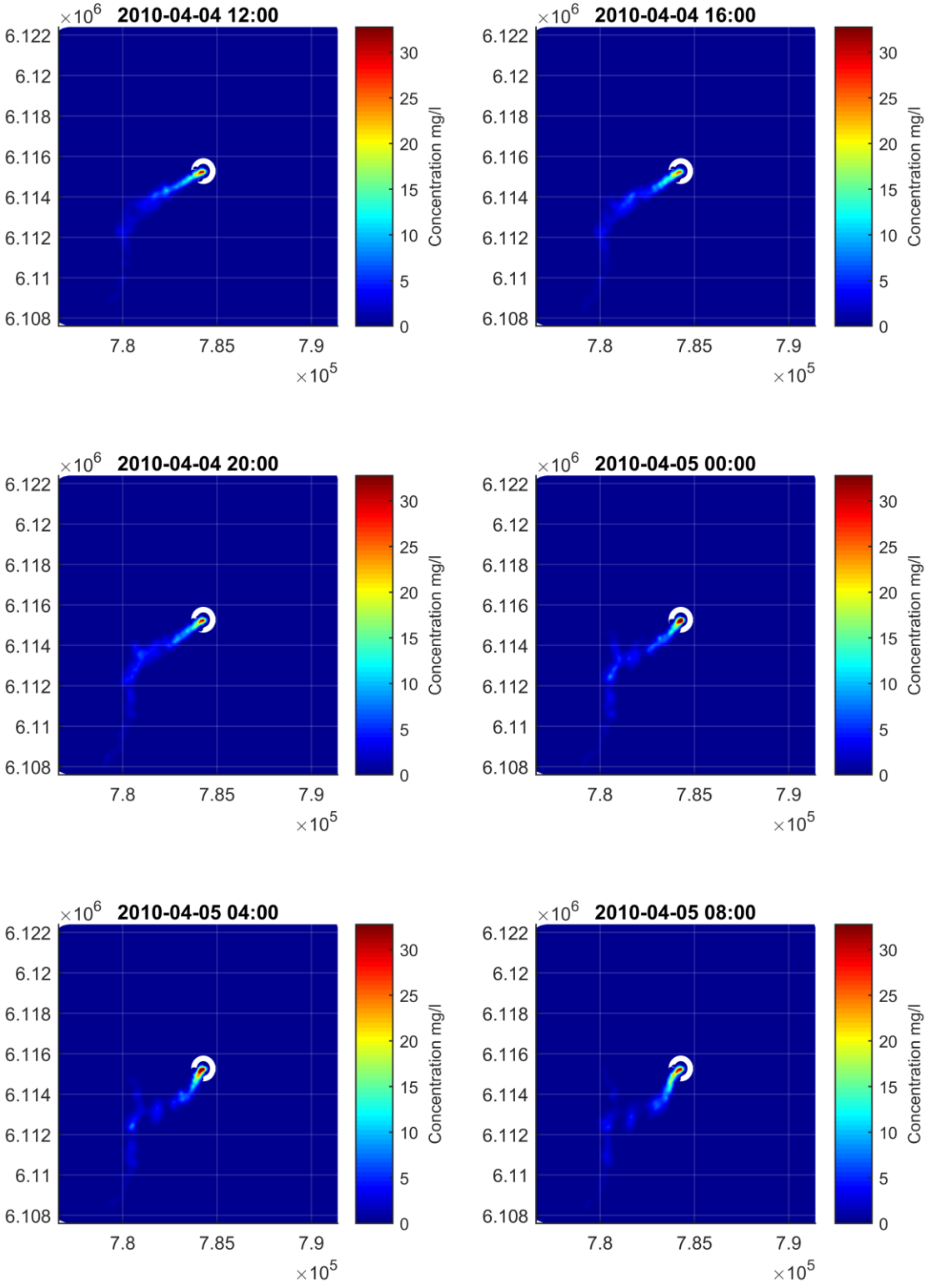
2010-04-03 12:00
2010-04-03 16:00
2010-04-03 20:00
2010-04-04 00:00
2010-04-04 04:00
×10^6
6.122
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Concentration mg/l
30
25
20
15
10
5
0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2010-04-04 16:00
2010-04-04 20:00
2010-04-05 00:00
2010-04-05 04:00
2010-04-05 08:00
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6.118
6.116
6.114
6.112
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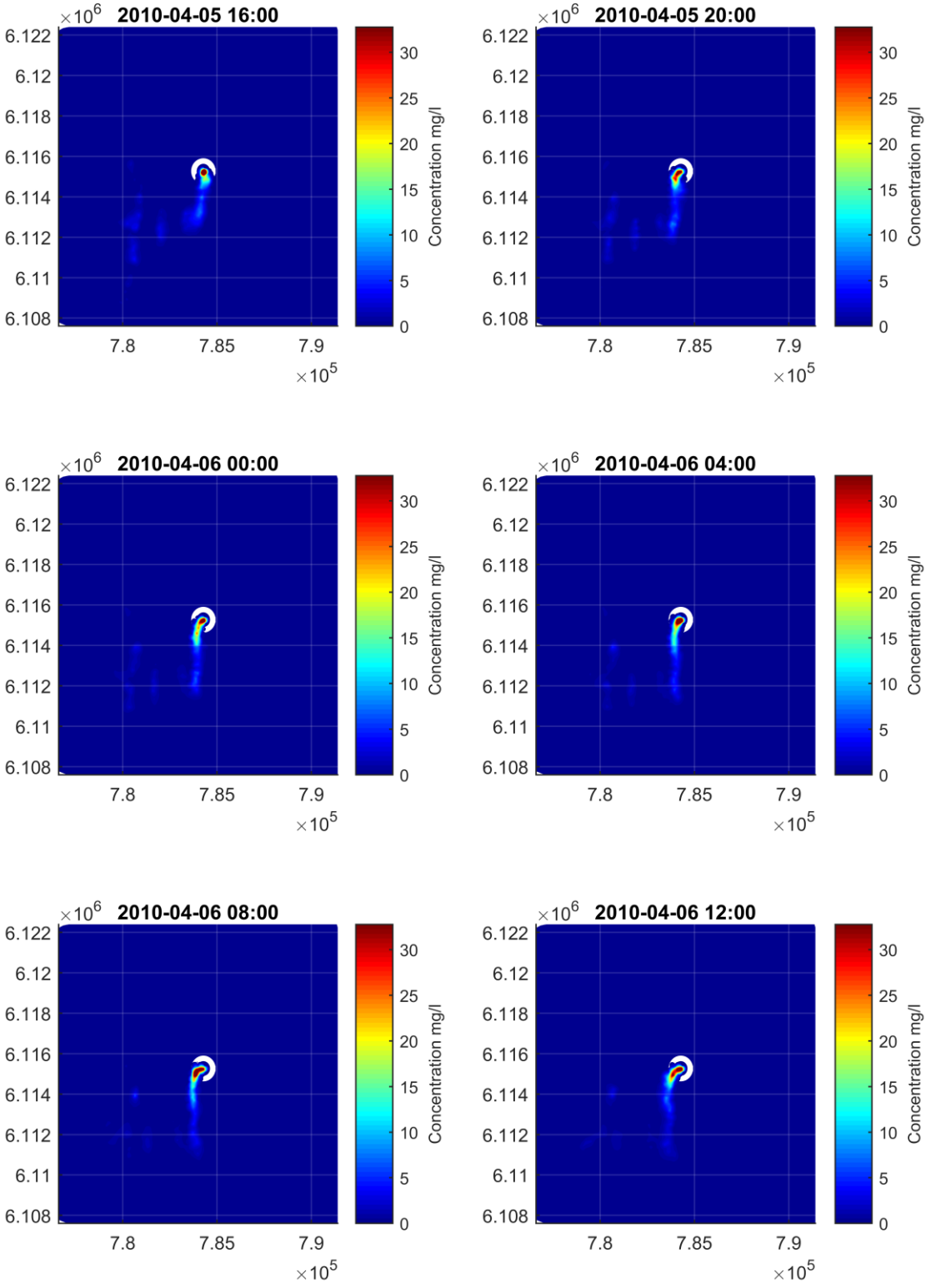
6.108
7.8
7.85
7.9
×10^5
Concentration mg/l
30
25
20
15
10
5
0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2010-04-06 00:00
2010-04-06 04:00
2010-04-06 08:00
2010-04-06 12:00
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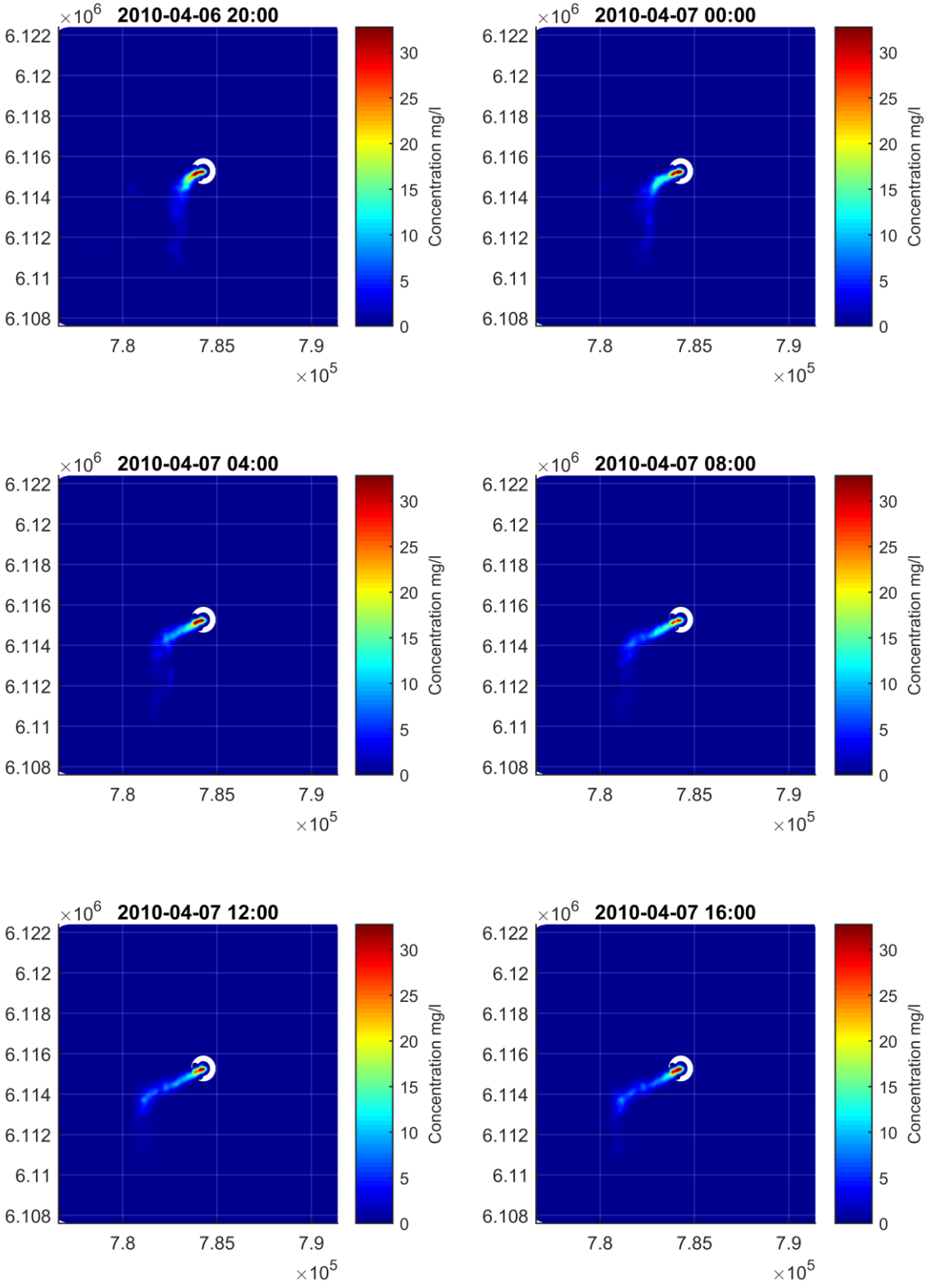
6.122
6.12
6.118
6.116
6.114
6.112
6.11
6.108
7.8
7.85
7.9
×10^5
Concentration mg/l
30
25
20
15
10
5
0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2010-04-07 04:00
2010-04-07 08:00
2010-04-07 12:00
2010-04-07 16:00
×10^6
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6.118
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6.114
6.112
6.11
6.108
7.8
7.85
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×10^5
Concentration mg/l
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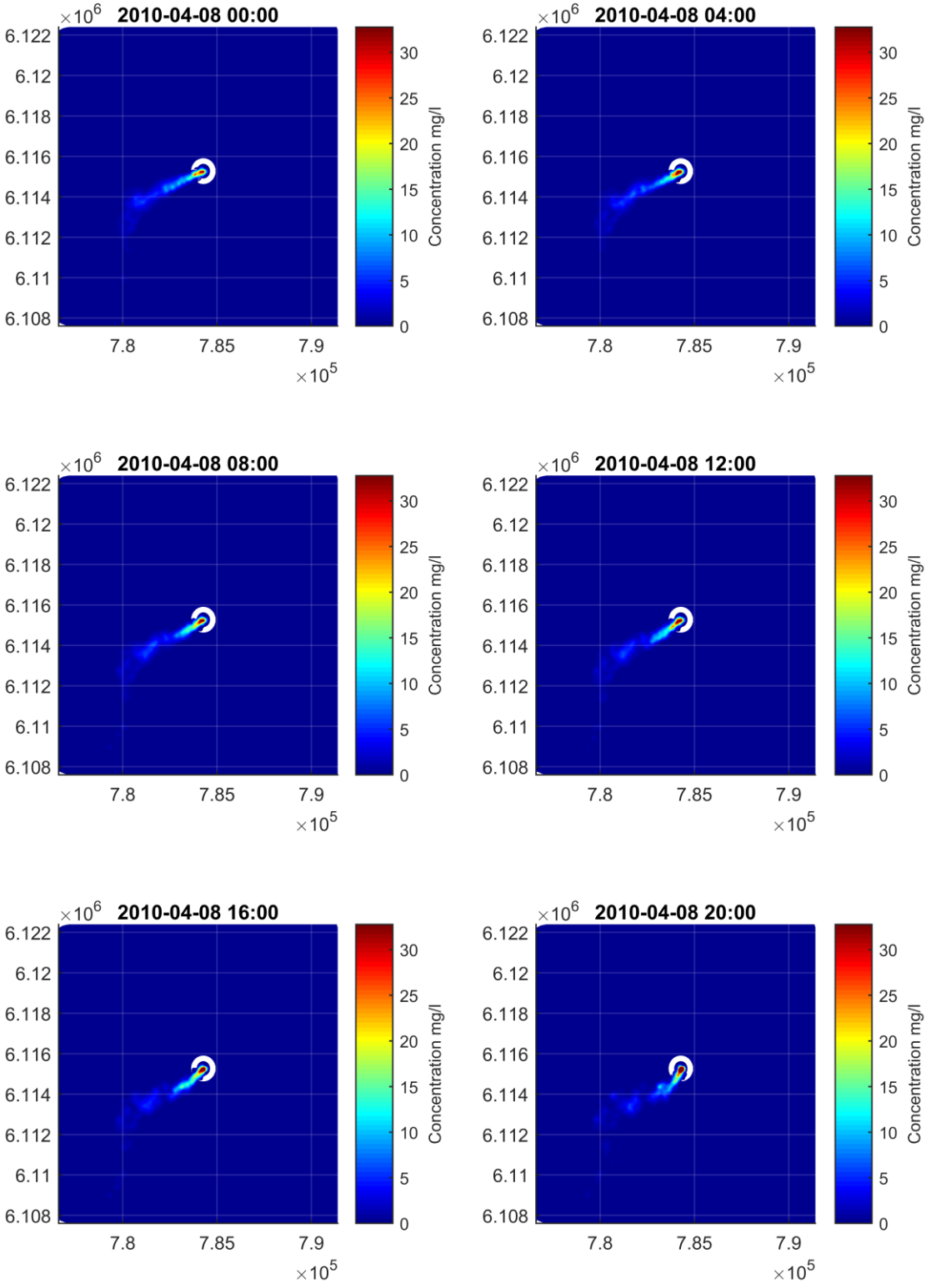
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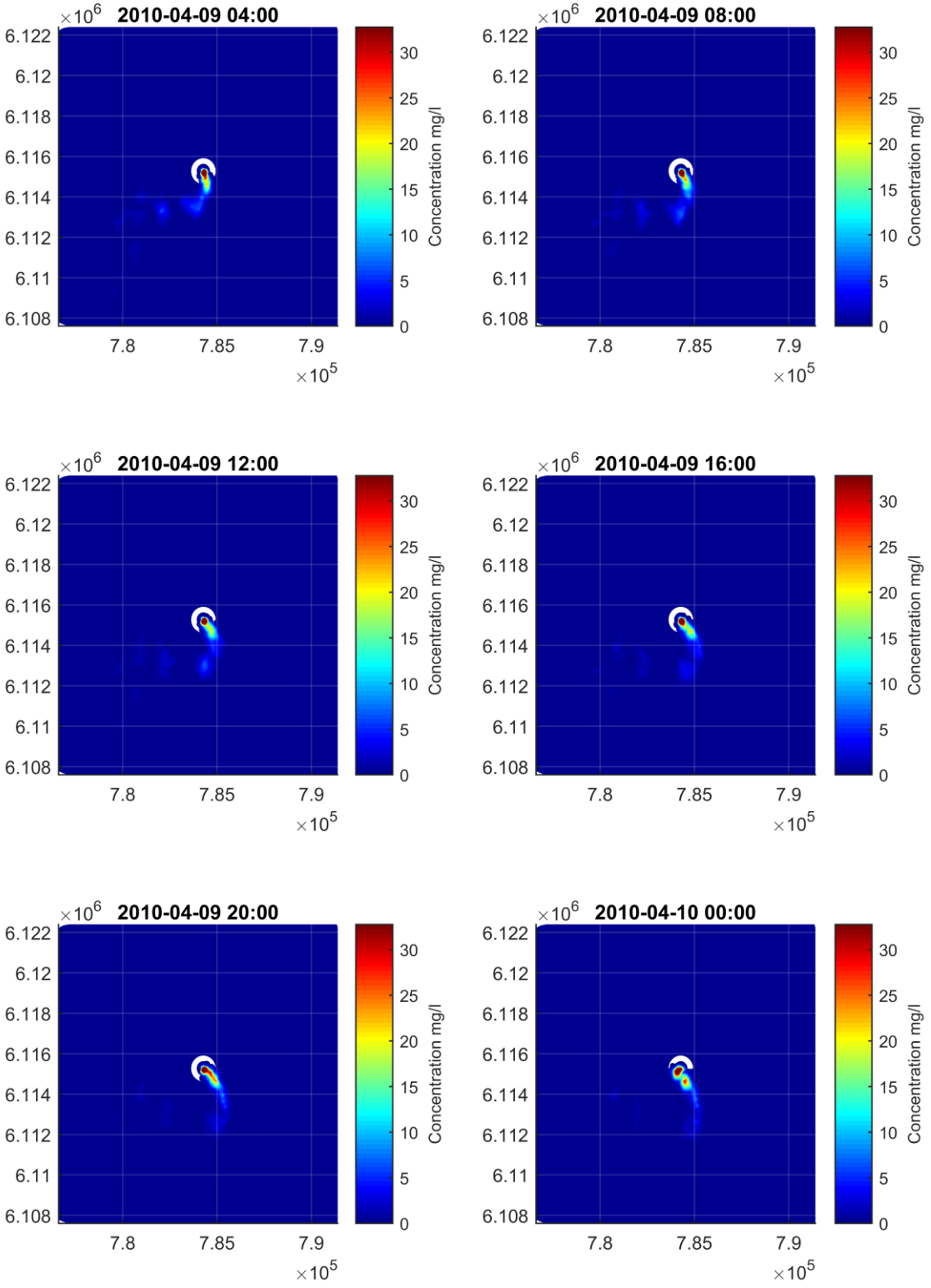
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Concentration mg/l
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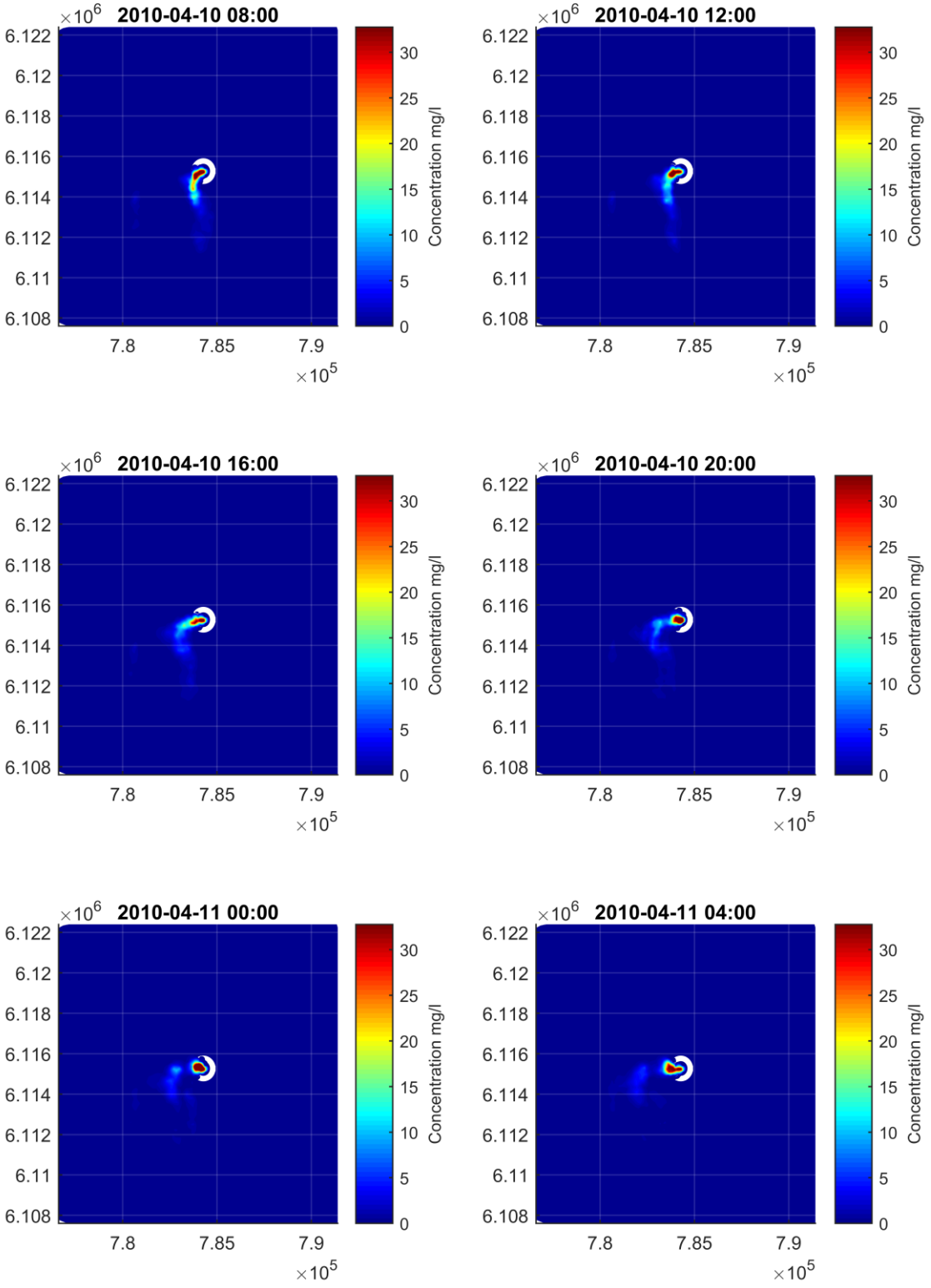
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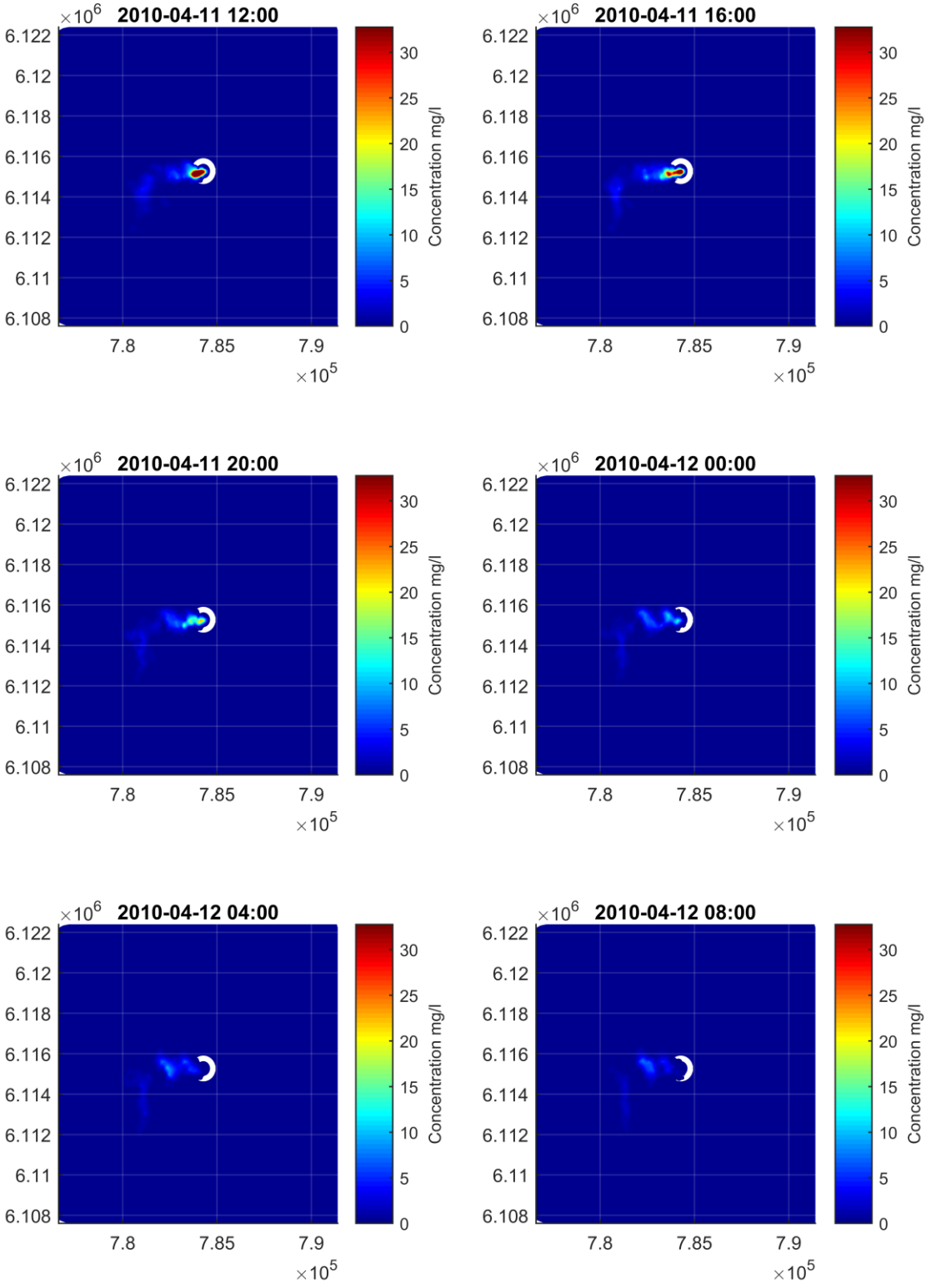
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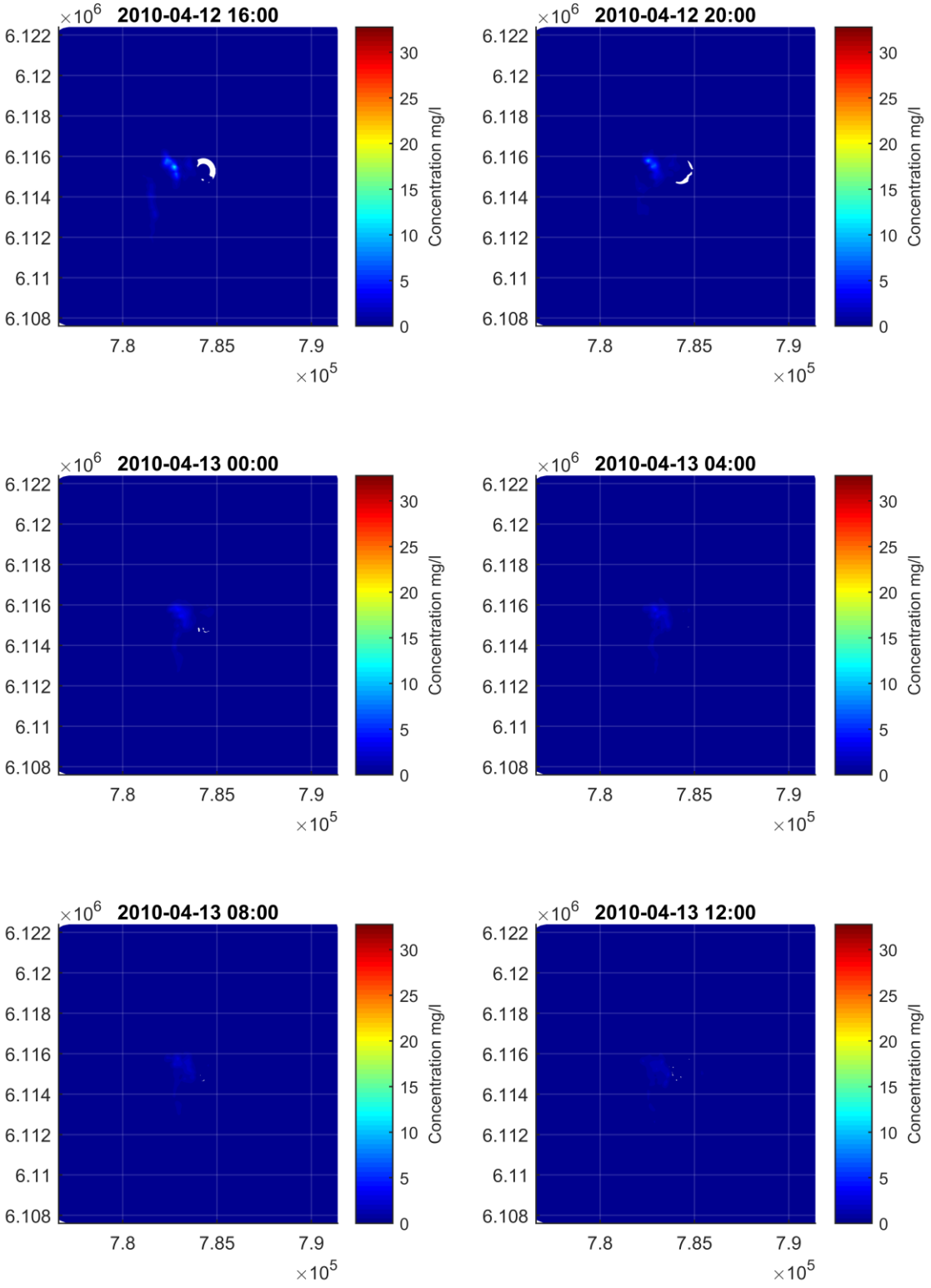
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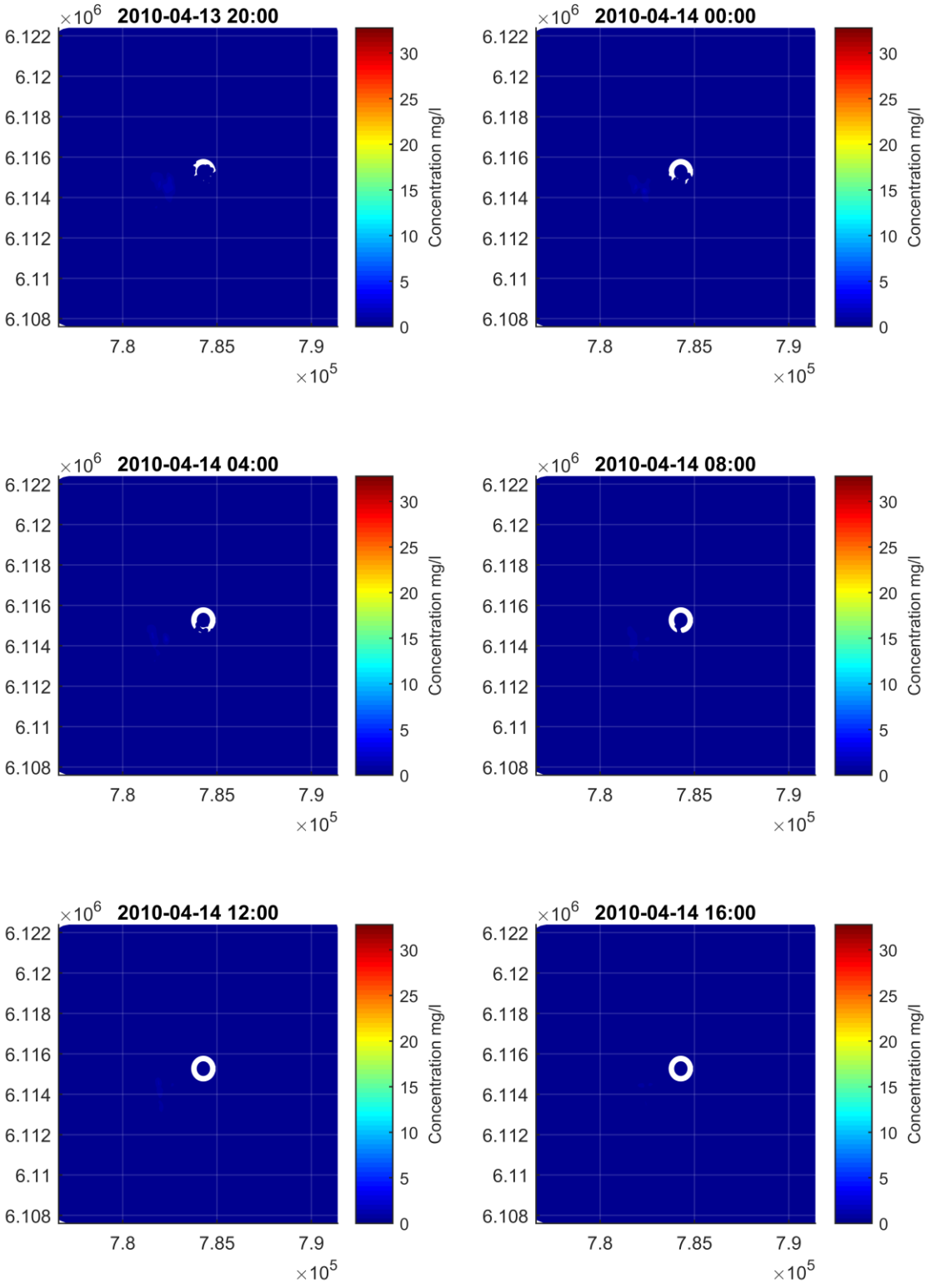
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×10^5
Concentration mg/l
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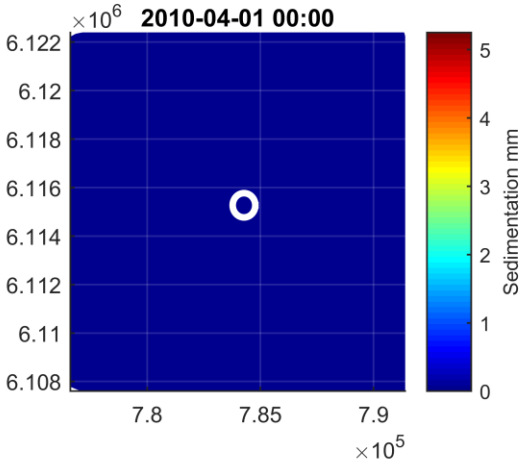
Appendix 9: 15MW MP worst-case, Surface single position – sedimentation

15MW MP worst-case, Bottom single position – sedimentation
Instantaneous sedimentation levels due to sediment spill for the drilling period

The white circle has a radius of 500 m

Start drilling: 2010-04-01 0:00
End drilling: 2010-04-11 16:43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Sedimentation mm
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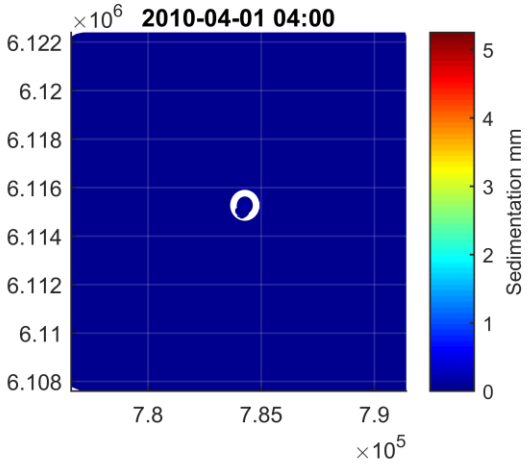
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×10^5
Sedimentation mm
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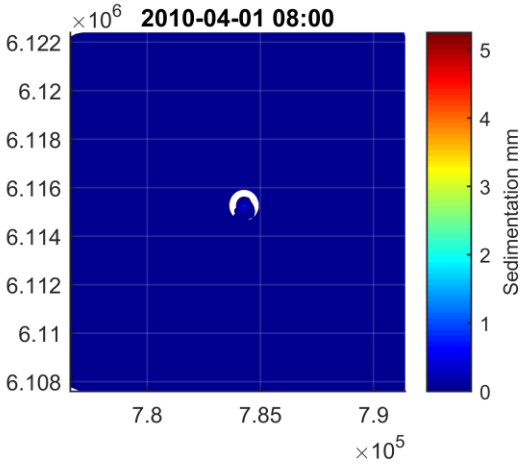
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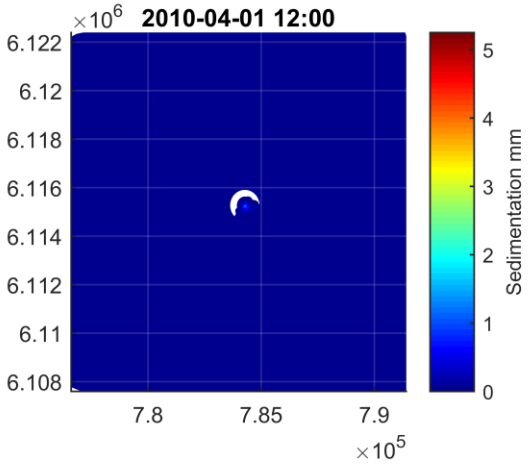
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×10^5
Sedimentation mm
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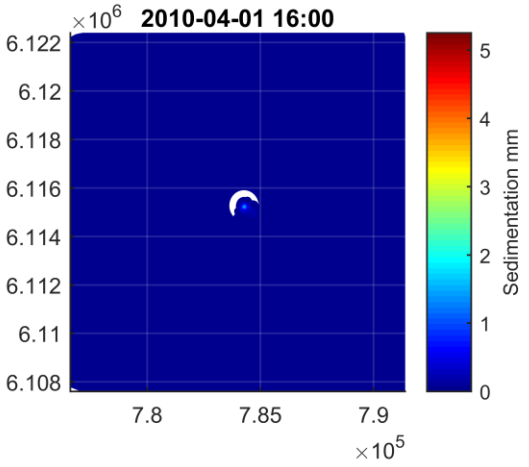
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×10^5
Sedimentation mm
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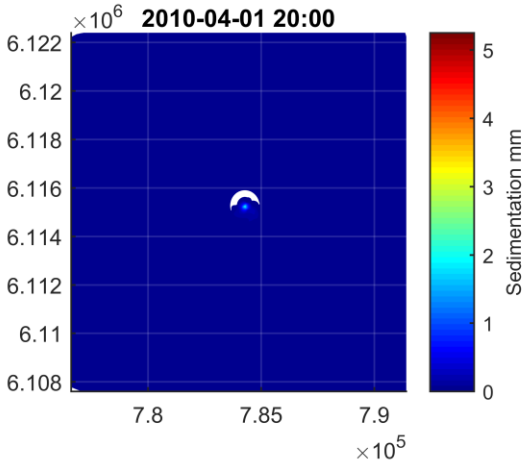
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Sedimentation mm
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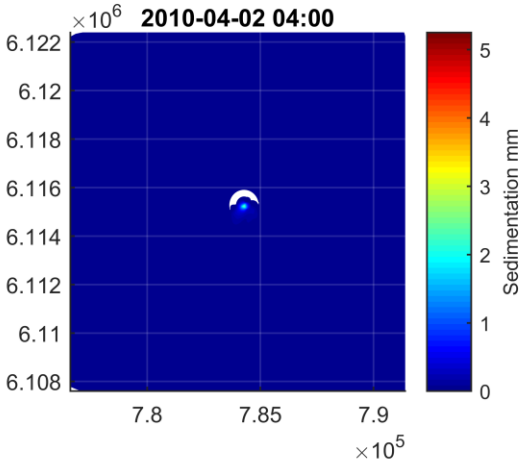
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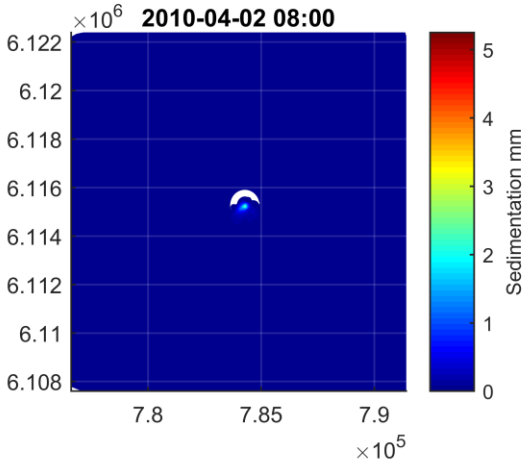
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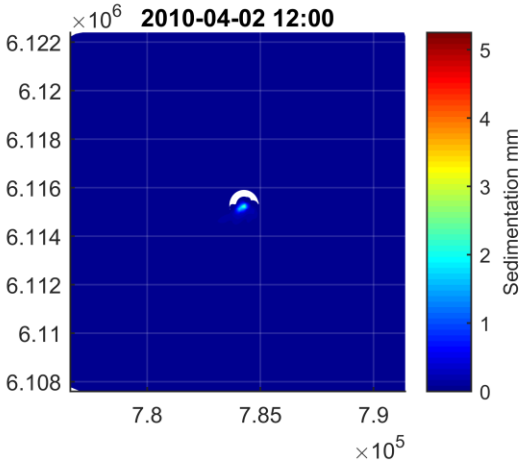
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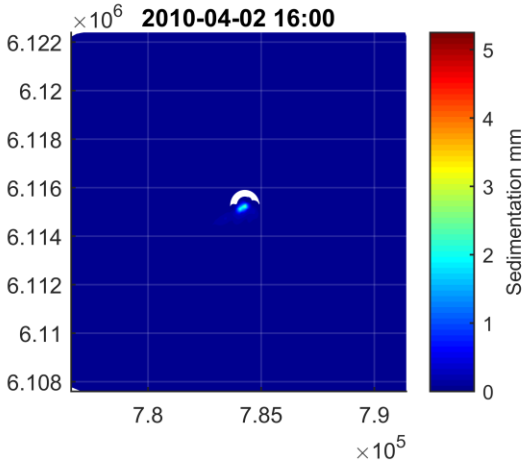
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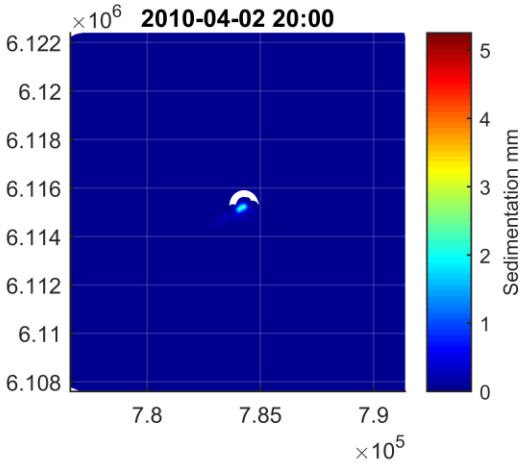
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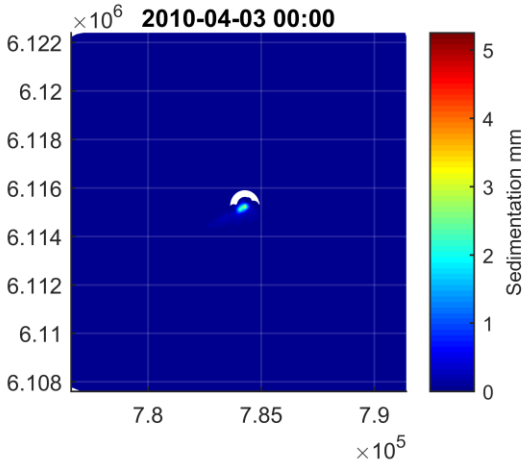
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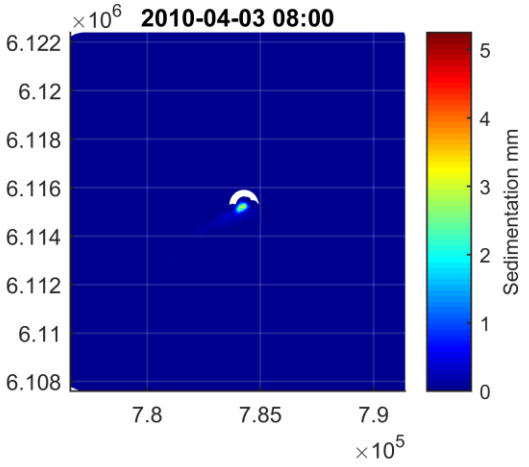
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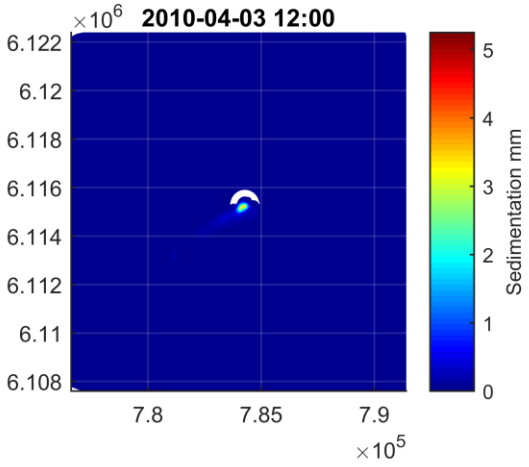
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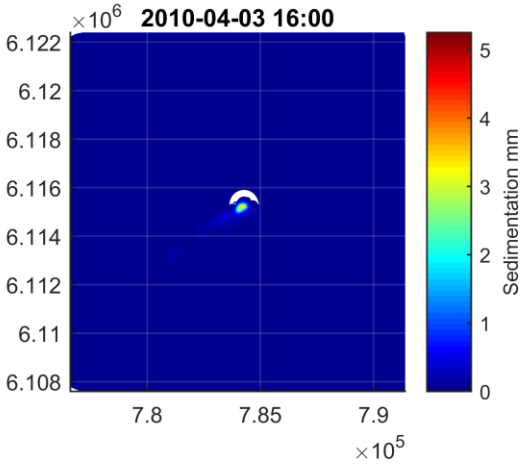
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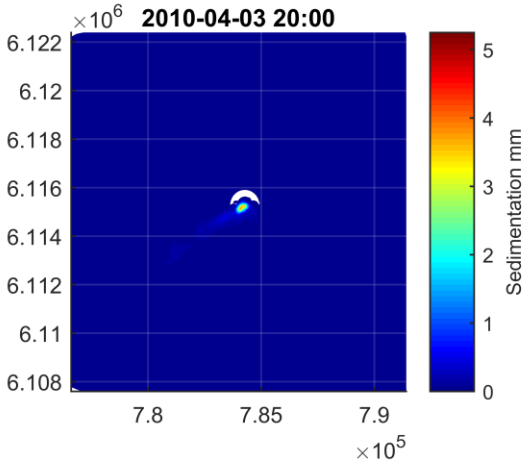
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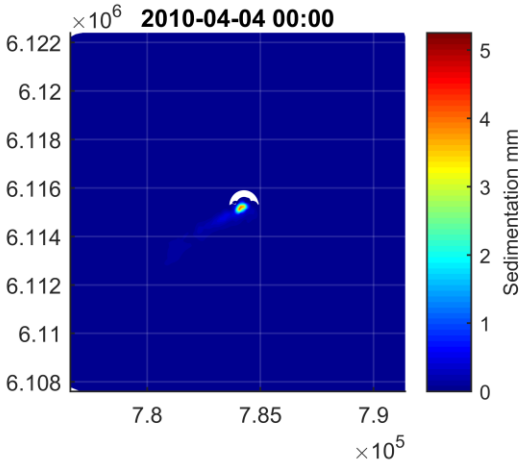
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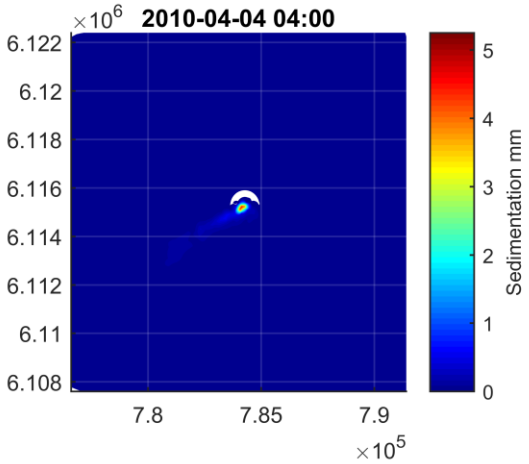
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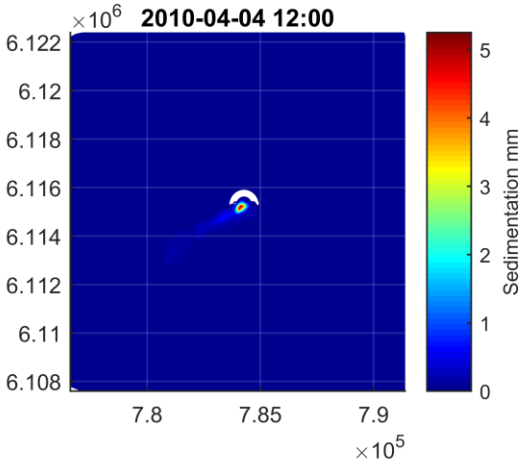
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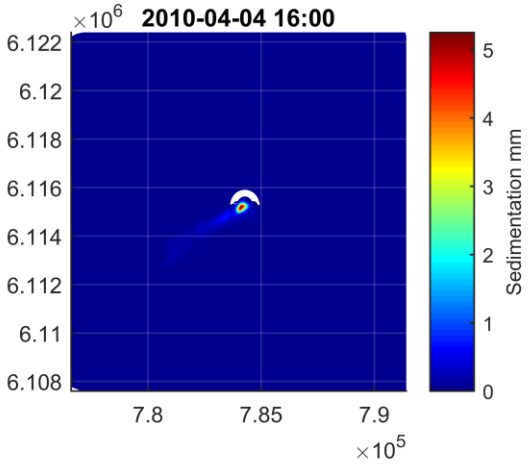
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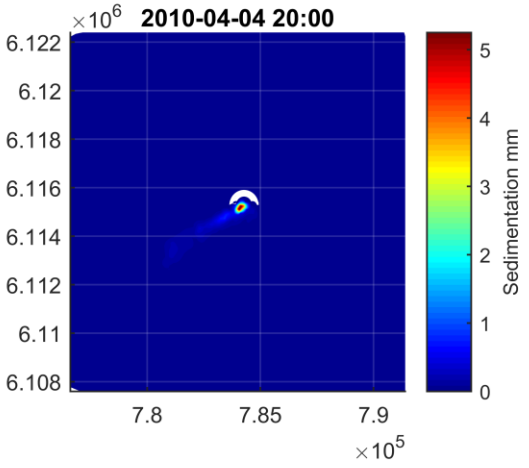
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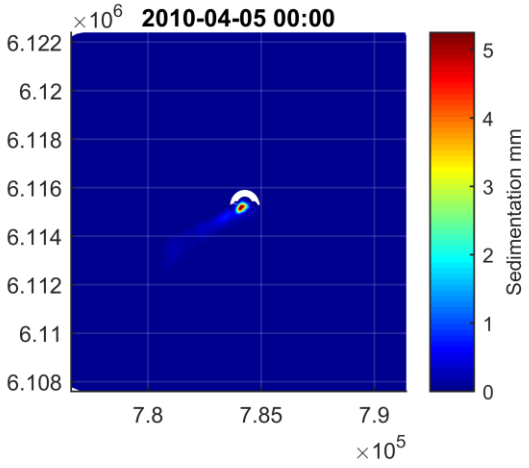
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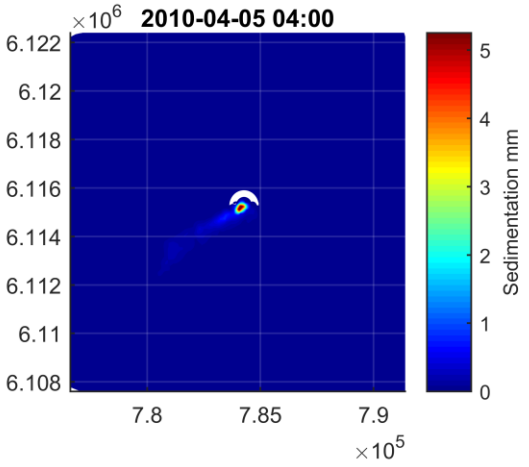
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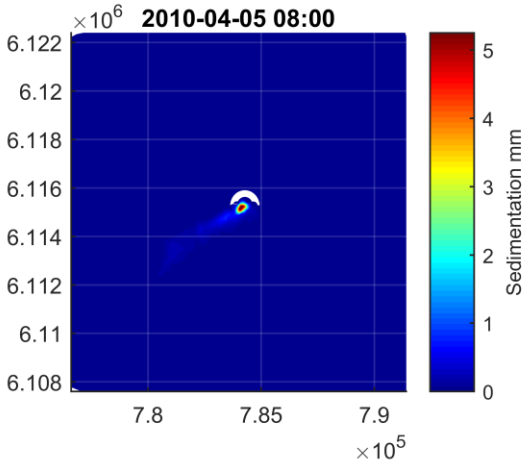
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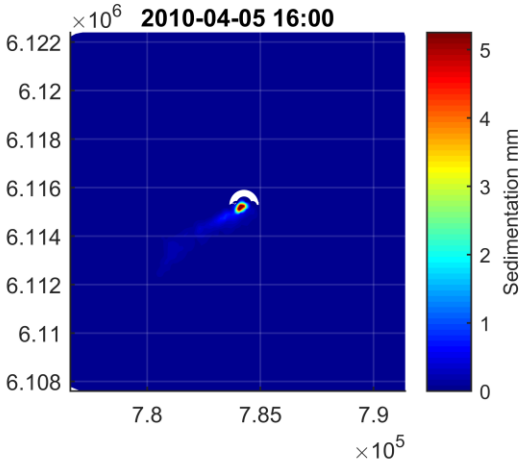
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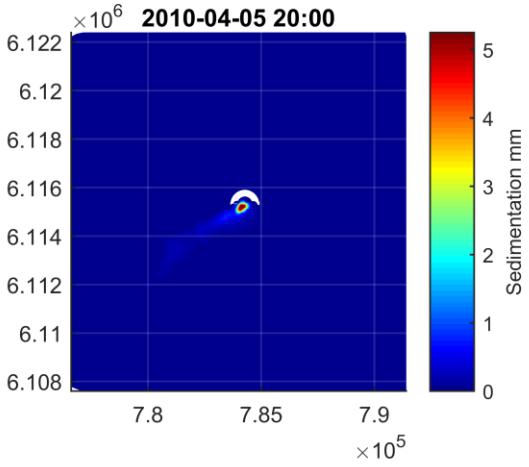
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Sedimentation mm
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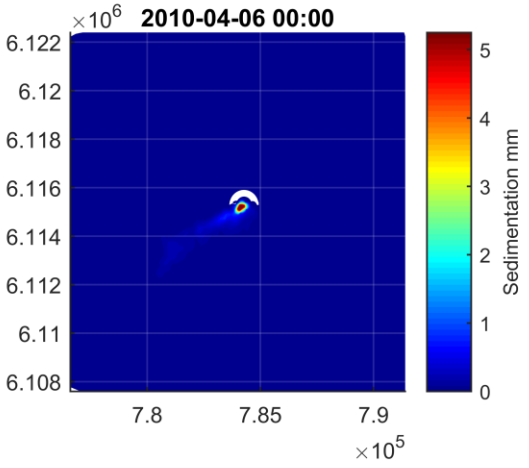
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Sedimentation mm
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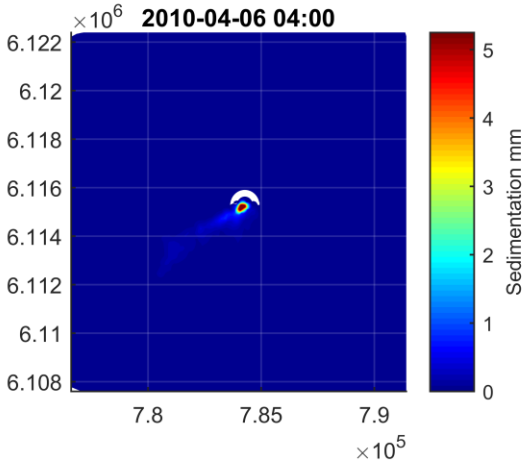
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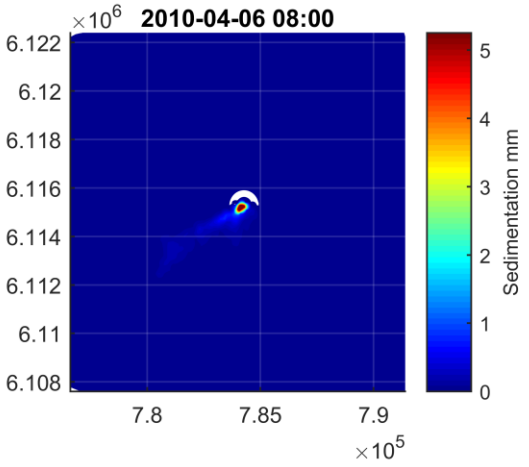
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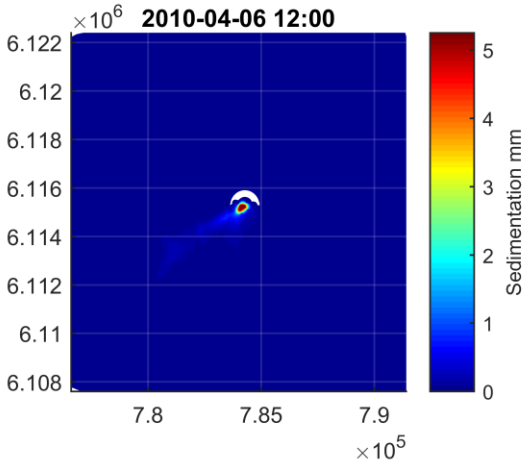
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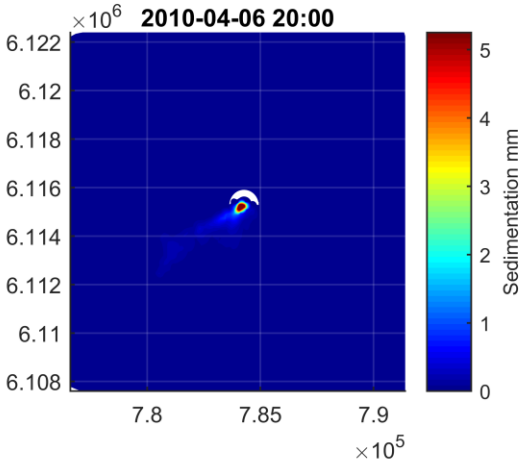
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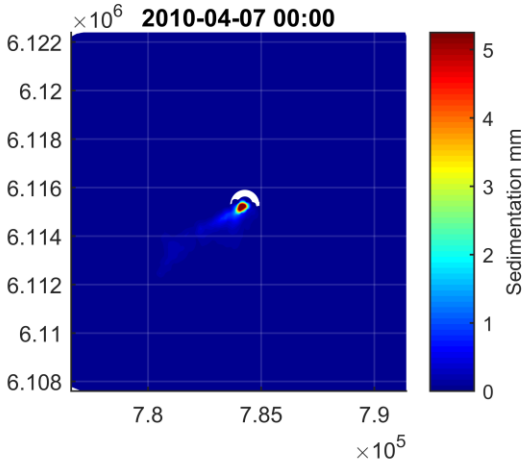
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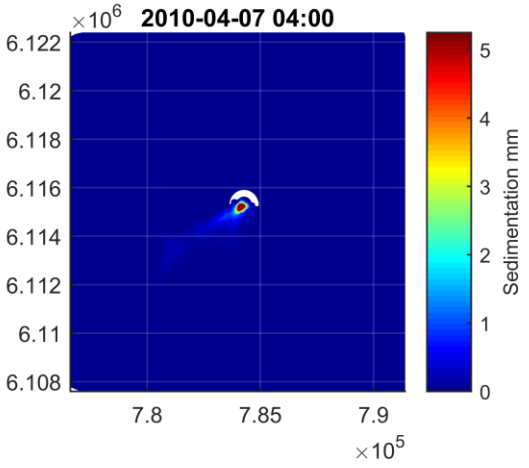
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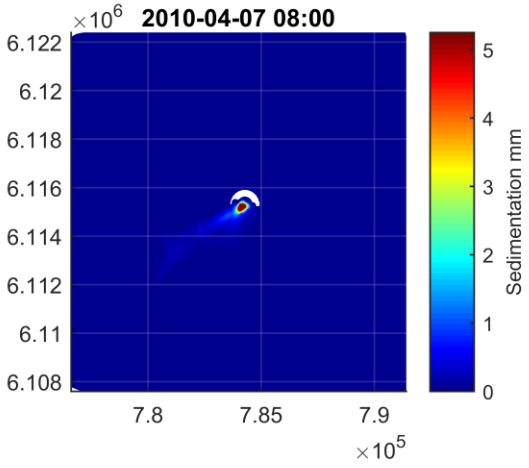
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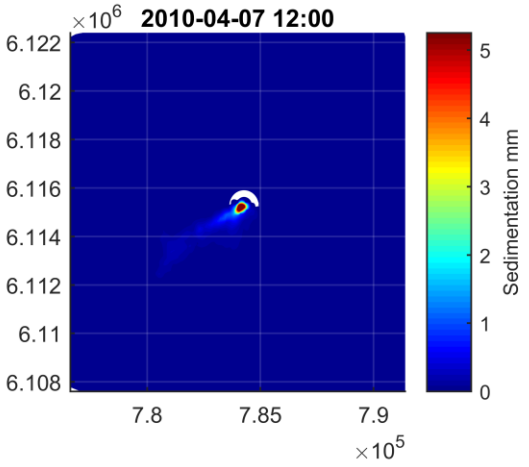
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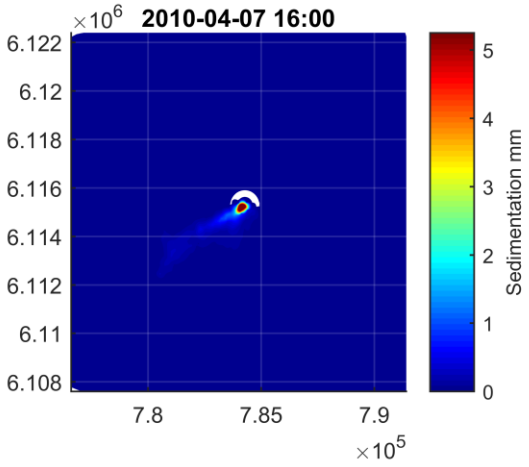
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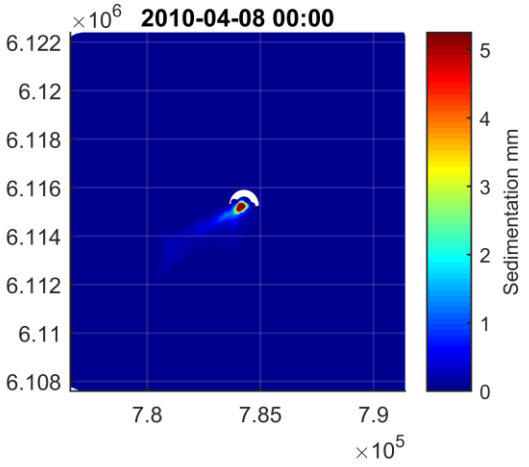
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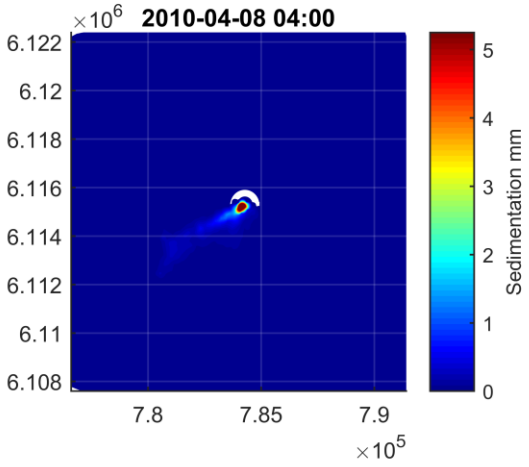
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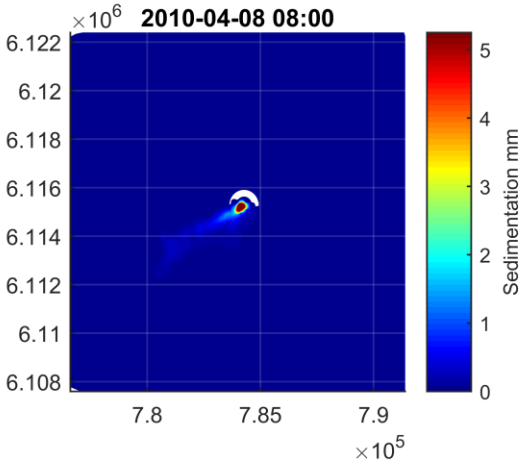
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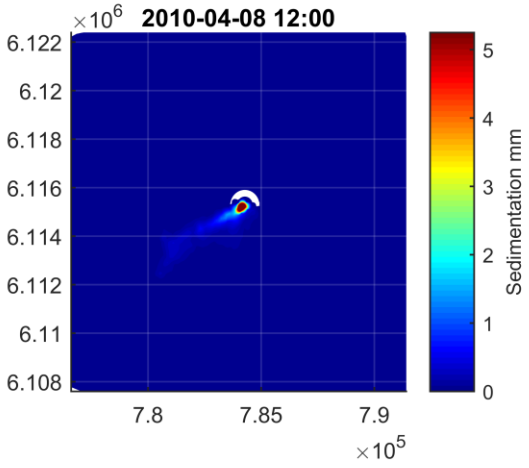
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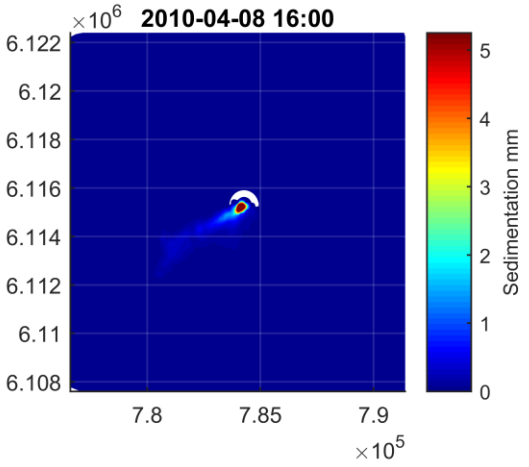
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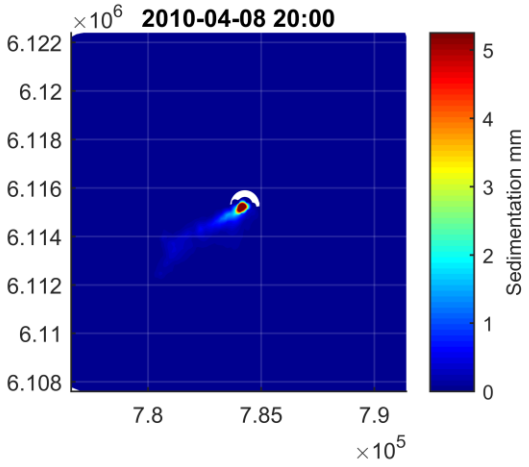
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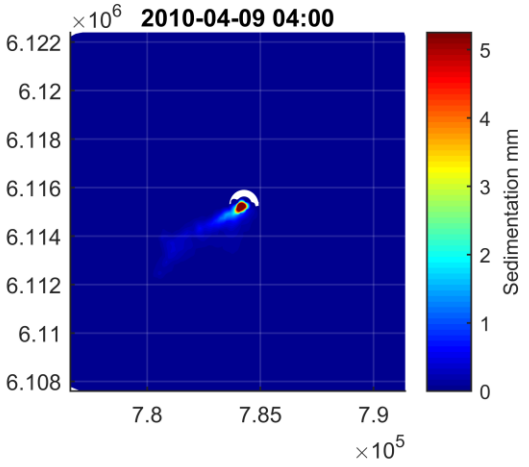
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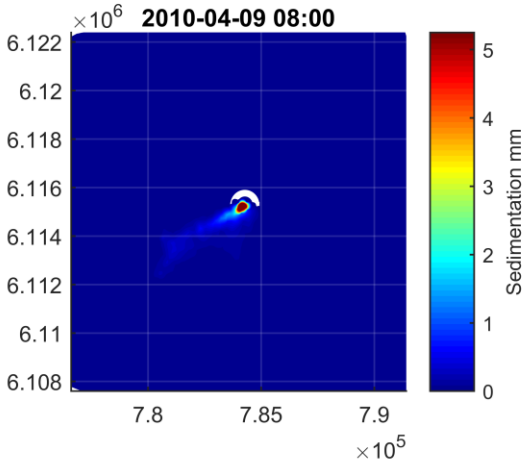
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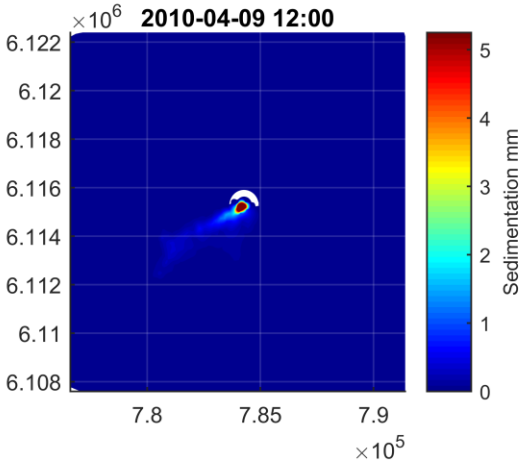
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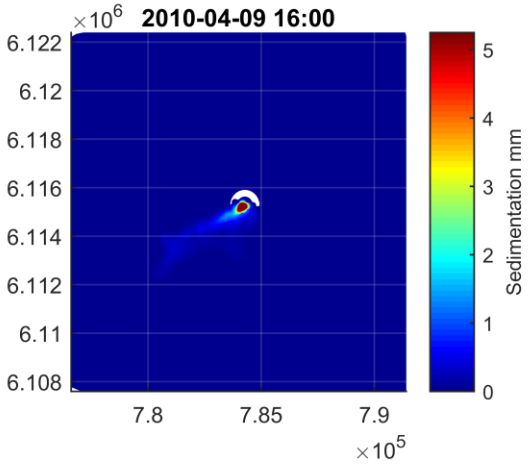
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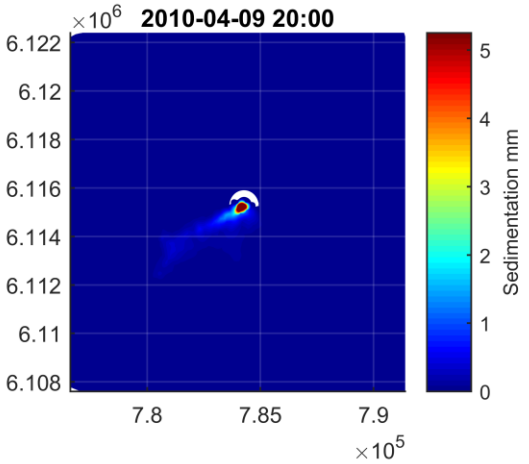
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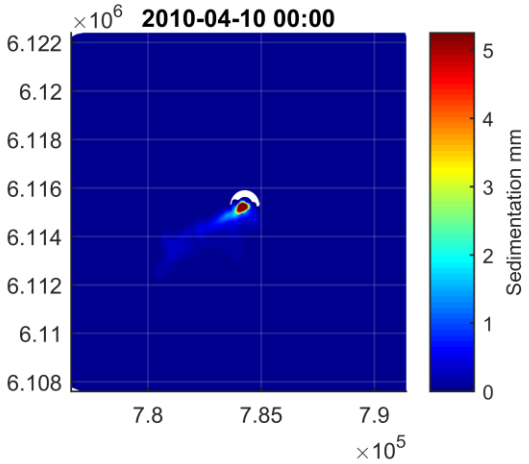
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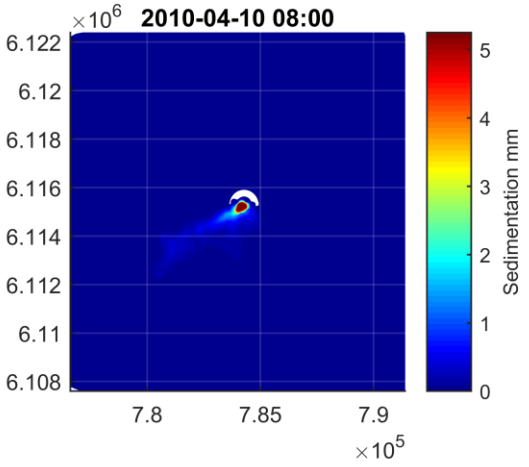
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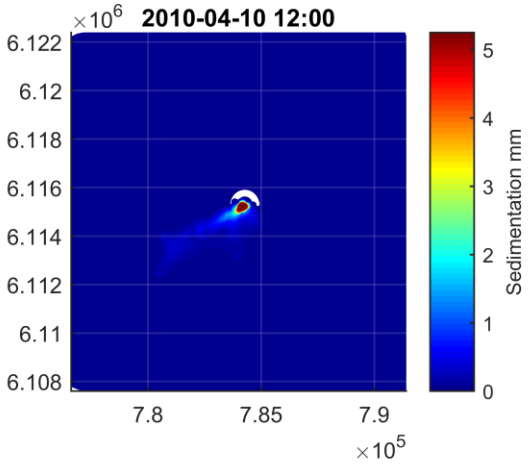
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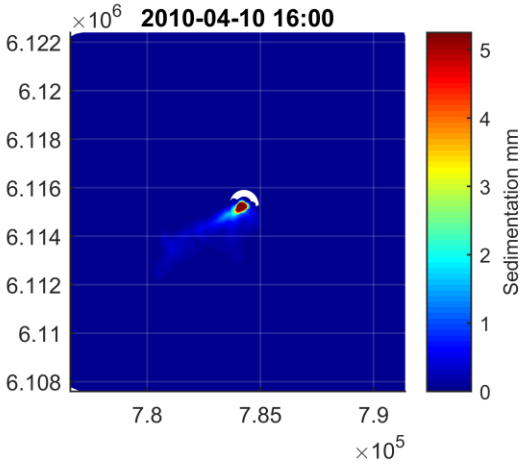
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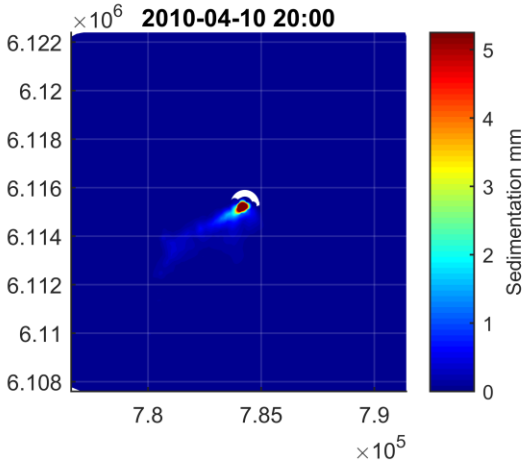
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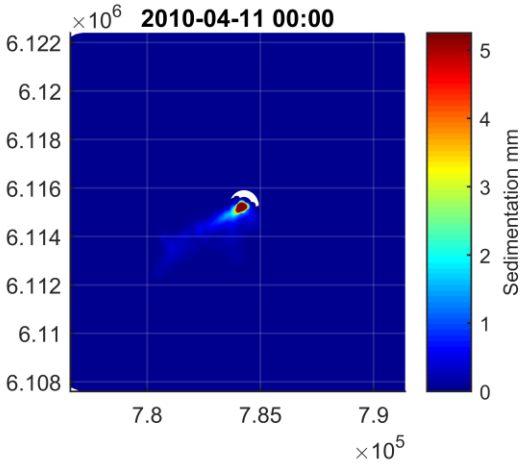
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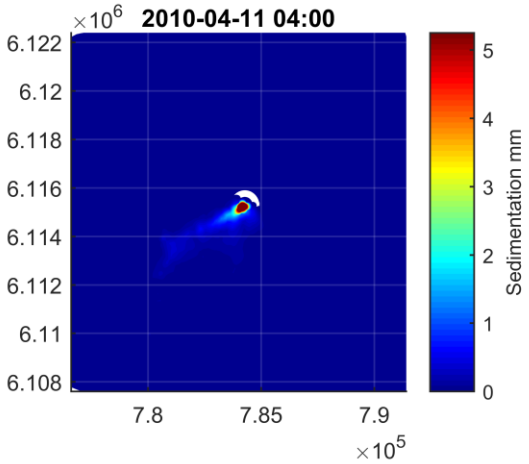
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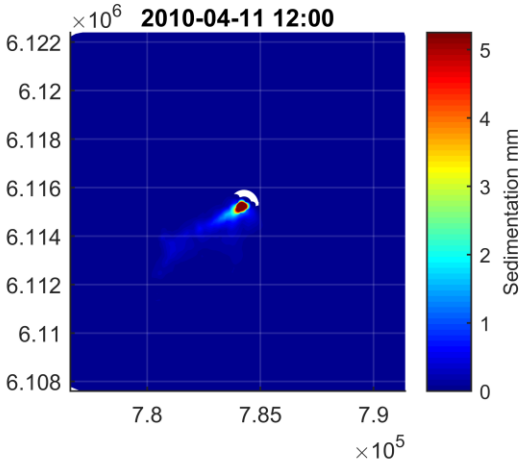
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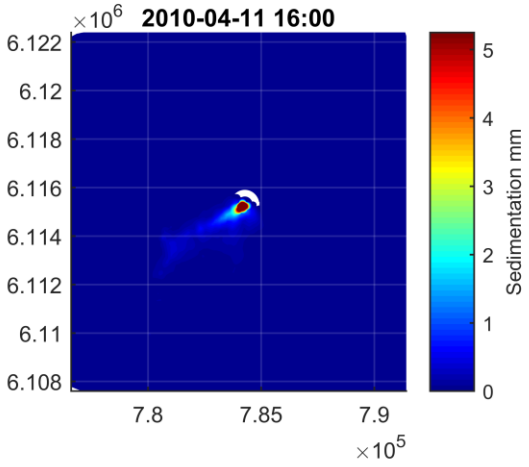
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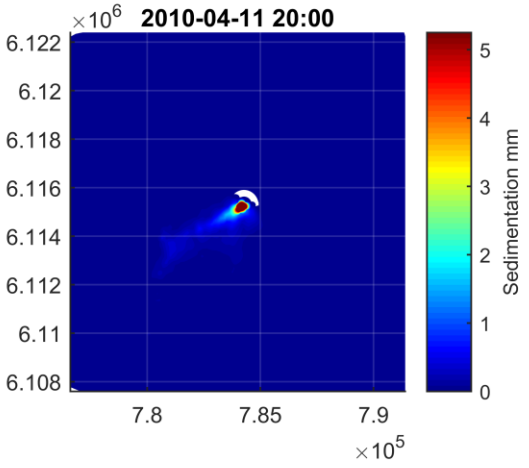
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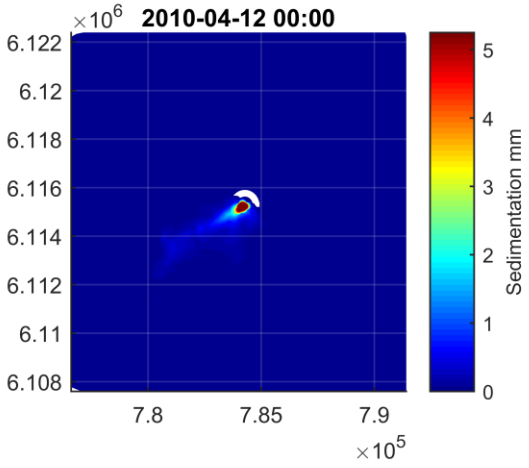
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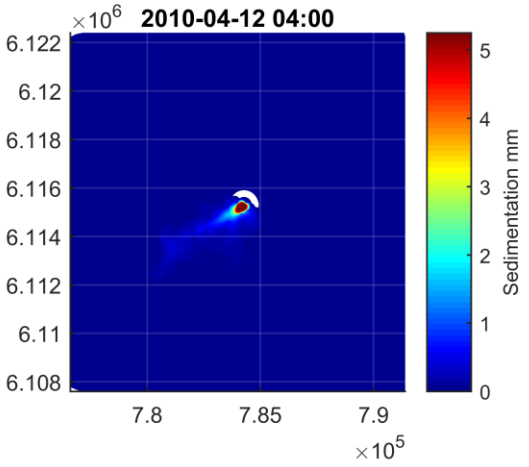
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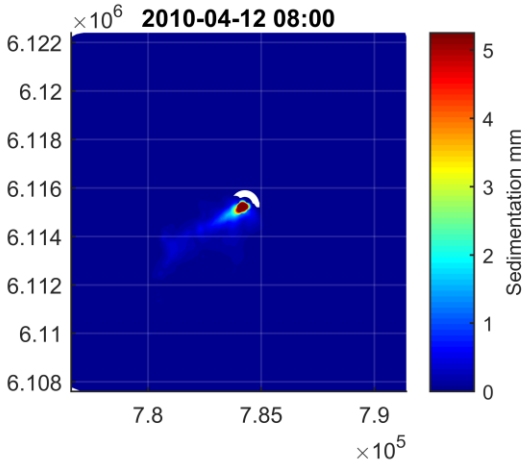
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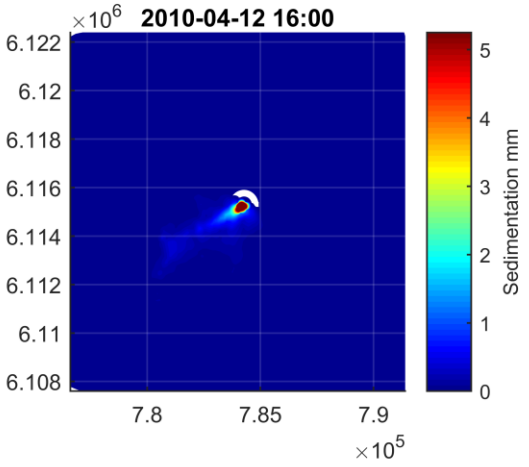
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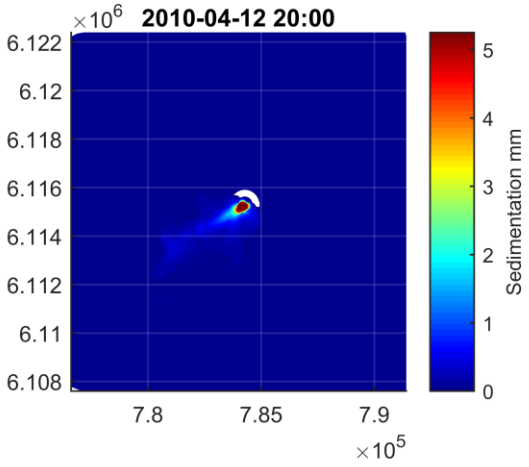
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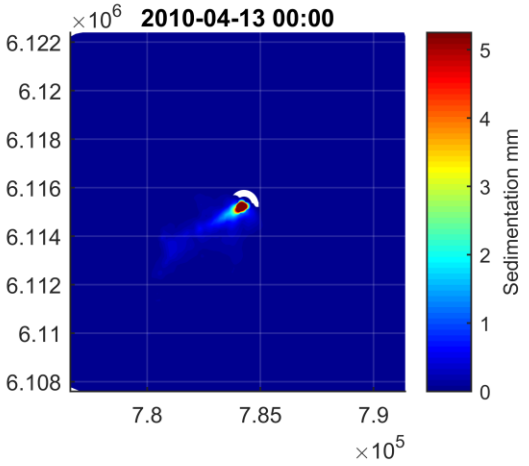
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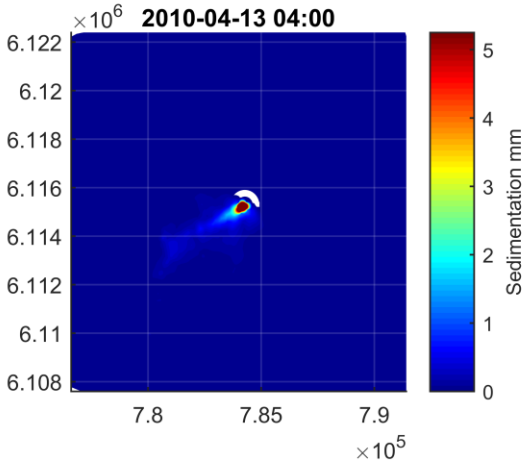
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6.114
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×10^5
Sedimentation mm
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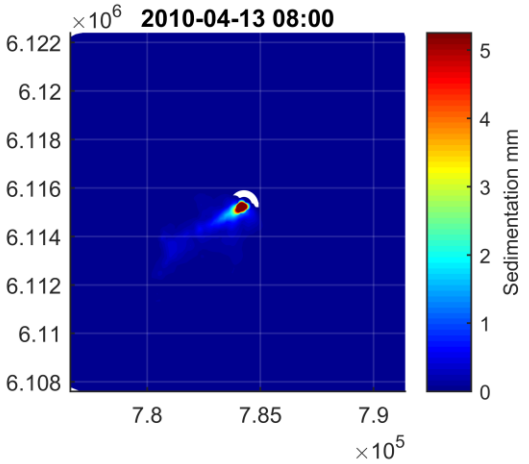
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Sedimentation mm
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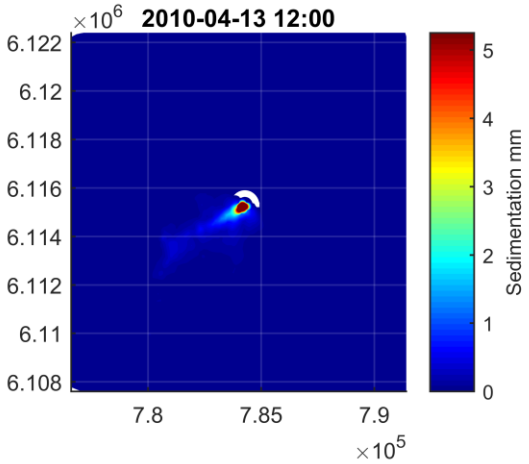
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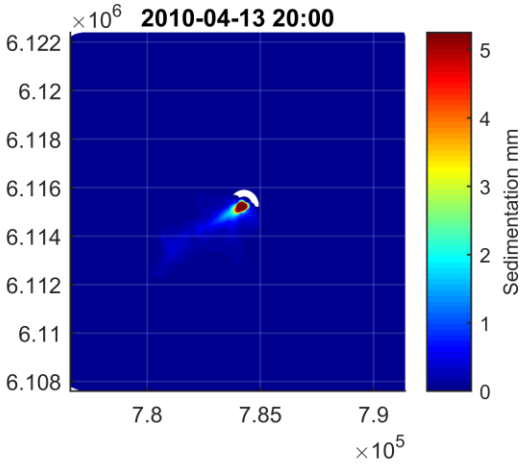
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Sedimentation mm
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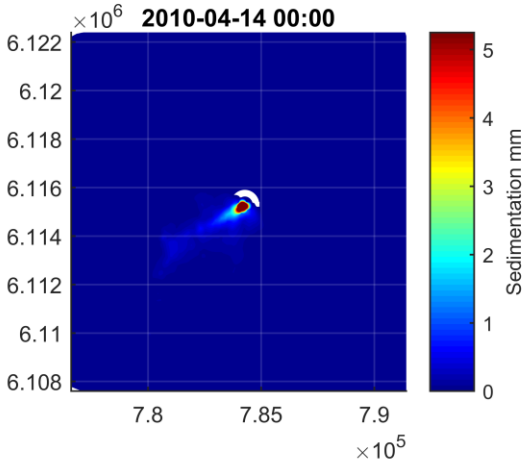
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×10^5
Sedimentation mm
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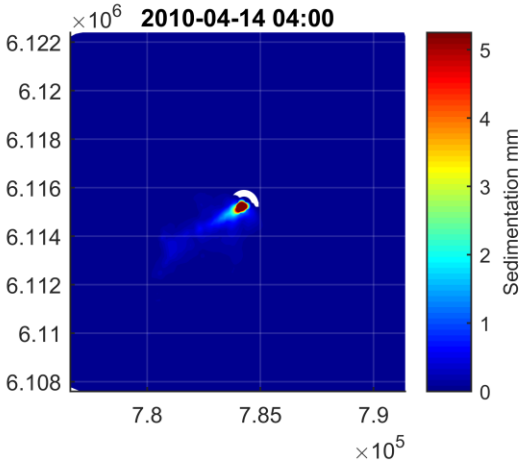
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×10^5
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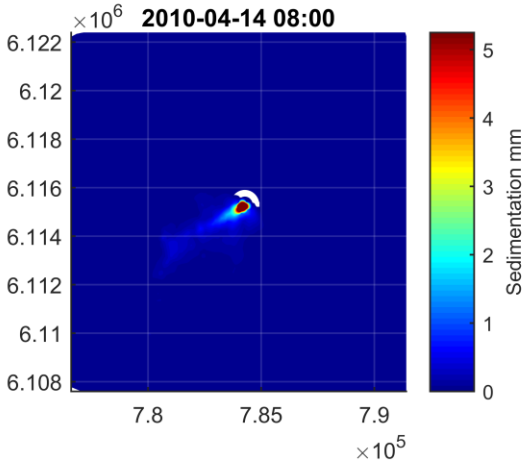
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×10^5
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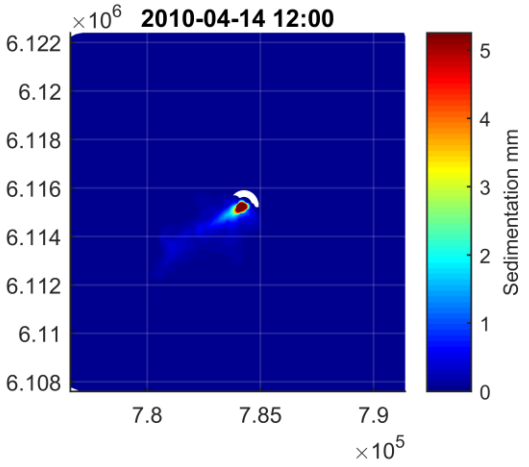
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Sedimentation mm
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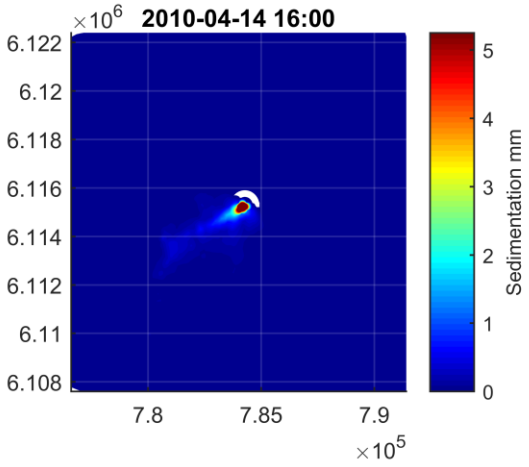
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6.114
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6.108
7.8
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×10^5
Sedimentation mm
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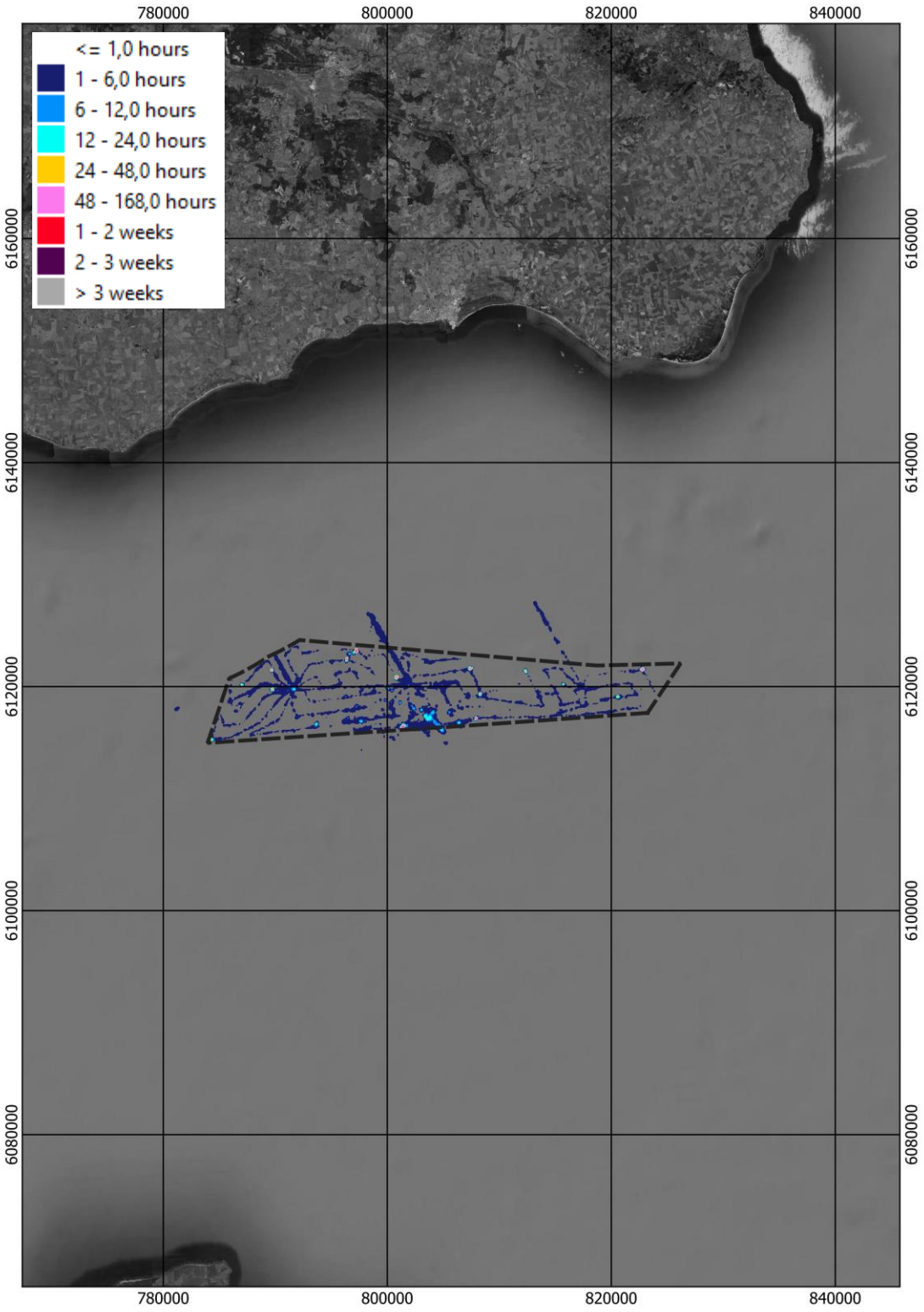
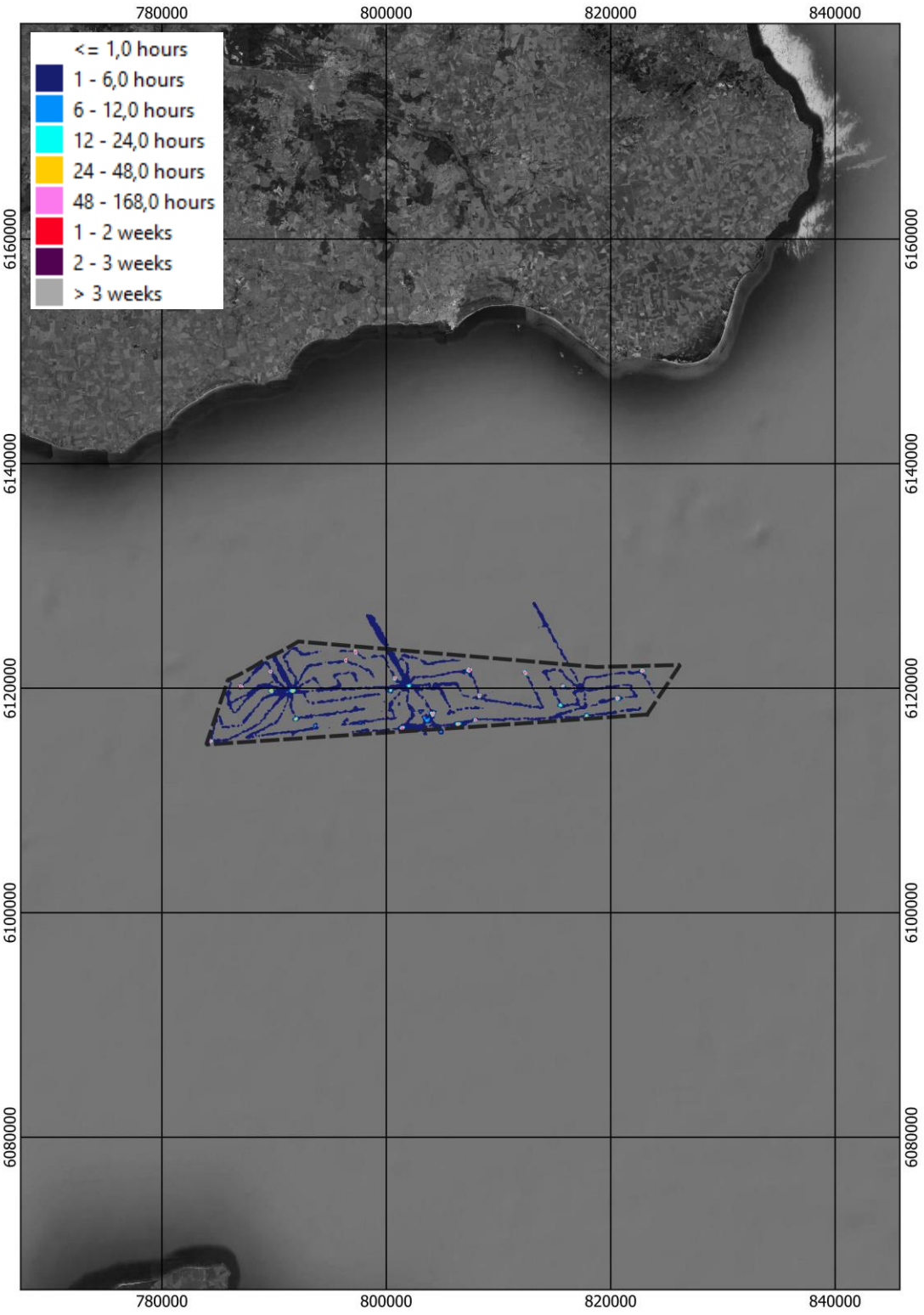
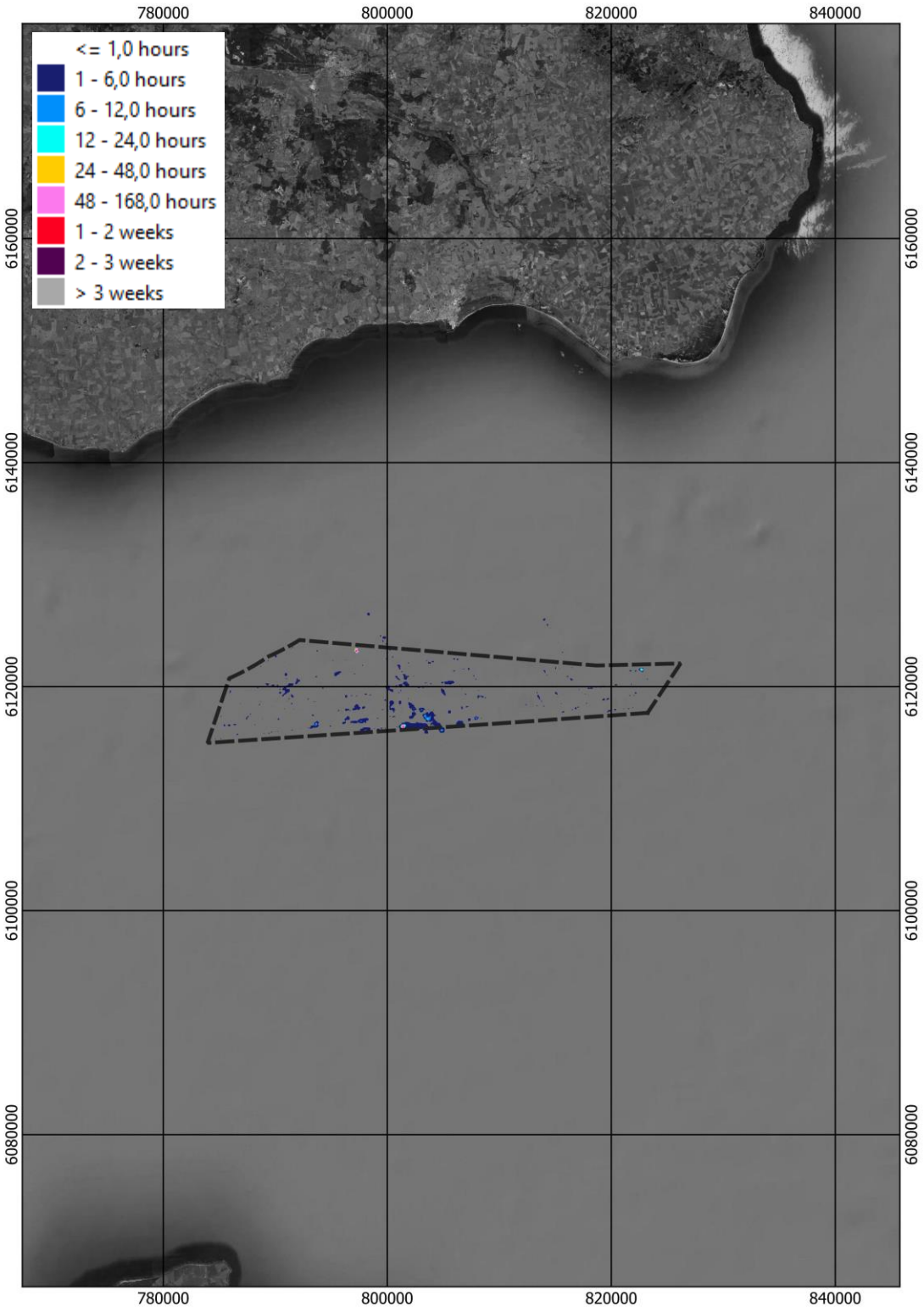
Appendix 10: 15MW MP worst-case, Bottom – Duration 10 mg/l, depth average



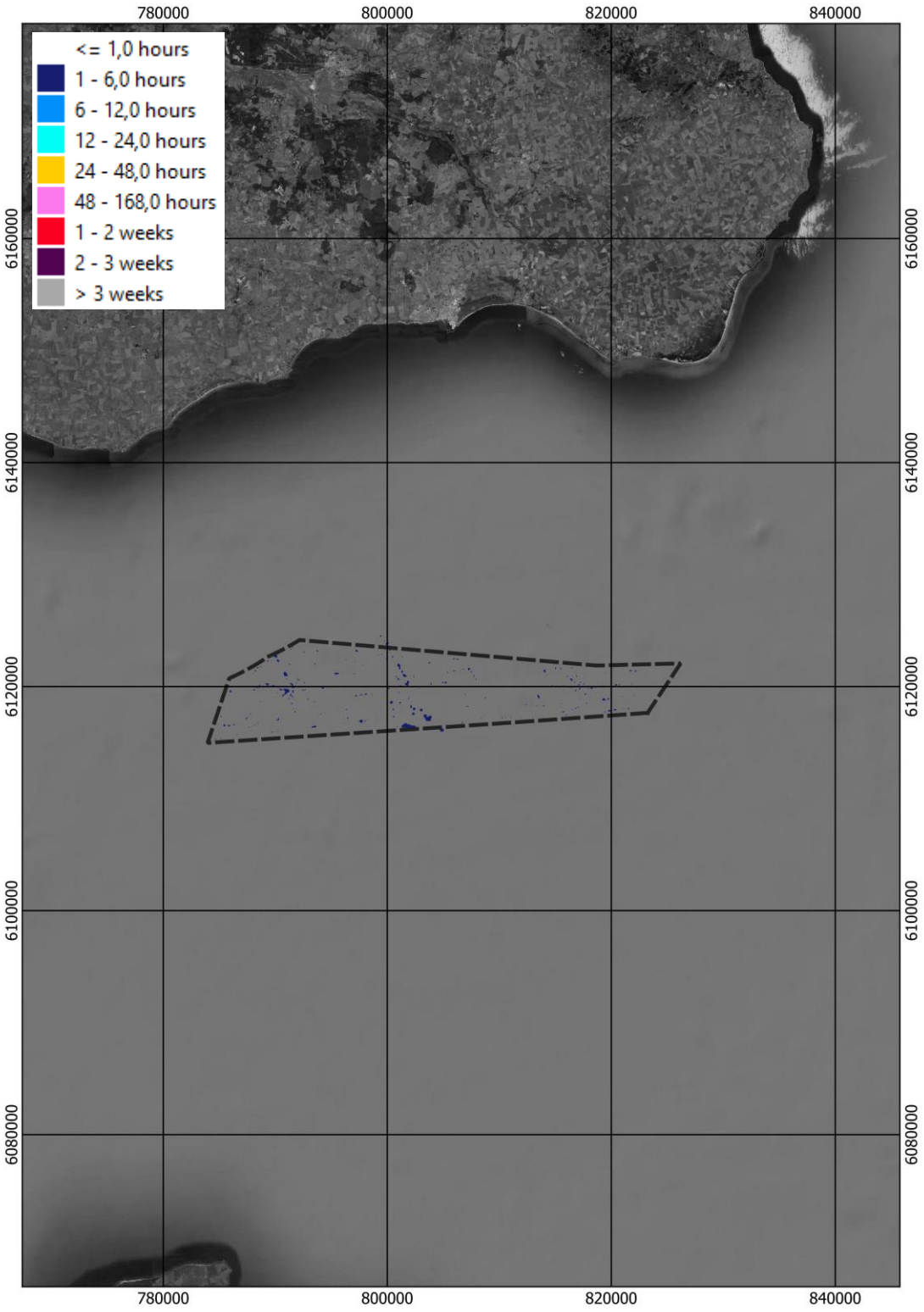
Appendix 11: 15MW MP worst-case, Bottom – Duration 25 mg/l, depth average



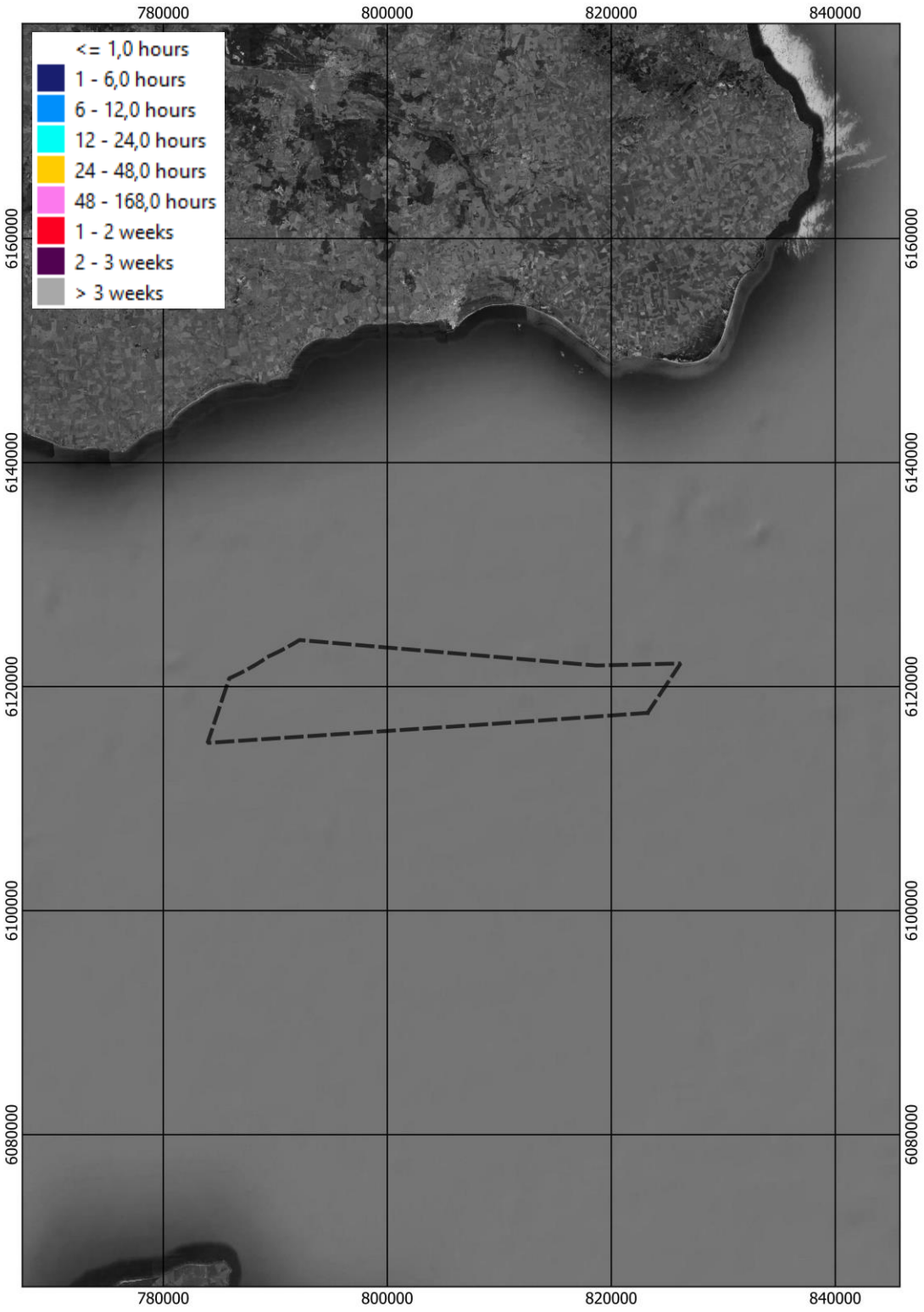
Appendix 12: 15MW MP worst-case, Bottom – Duration 50 mg/l, depth average



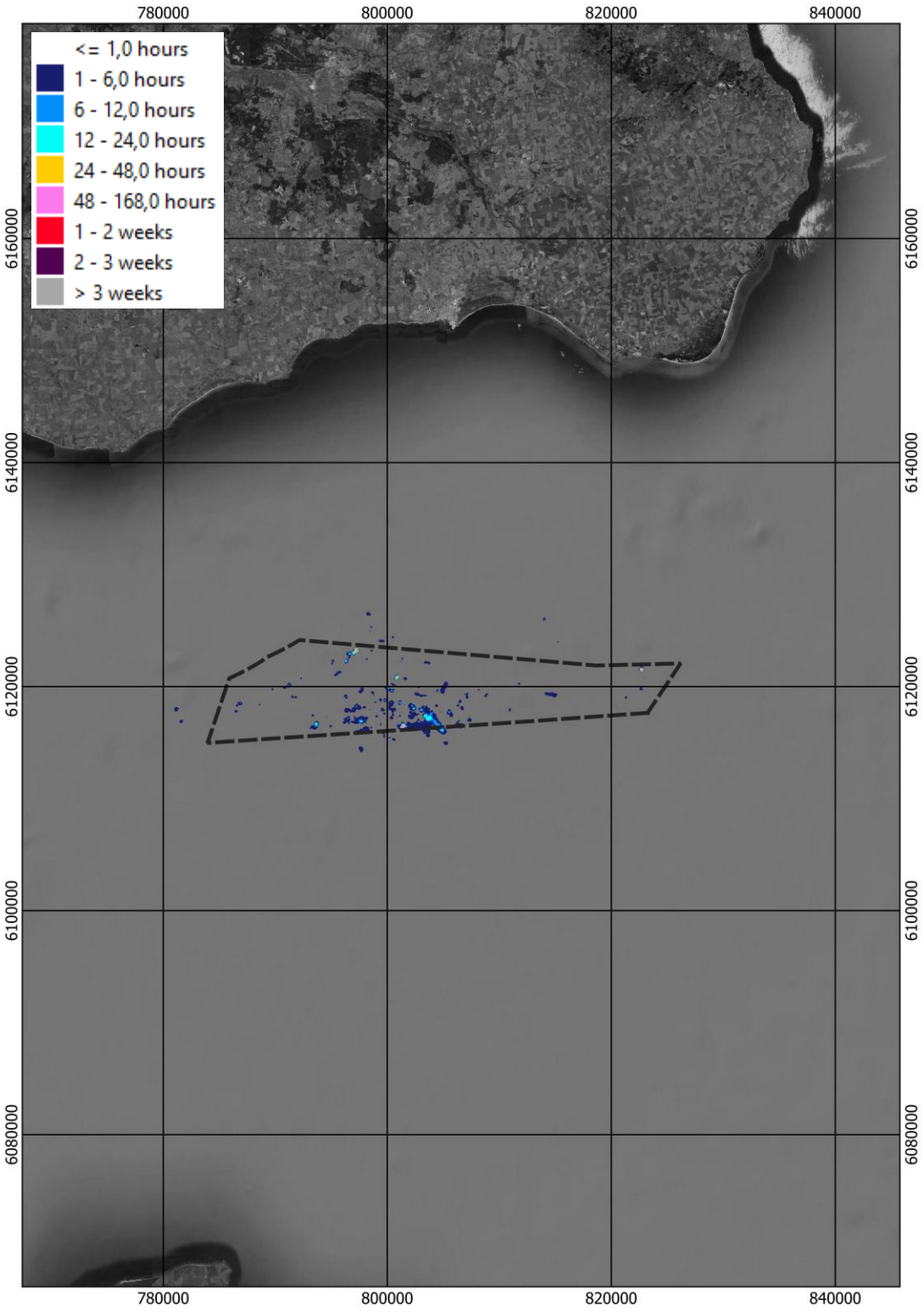
Appendix 13: 15MW MP worst-case, Bottom – Duration 100 mg/l, depth average



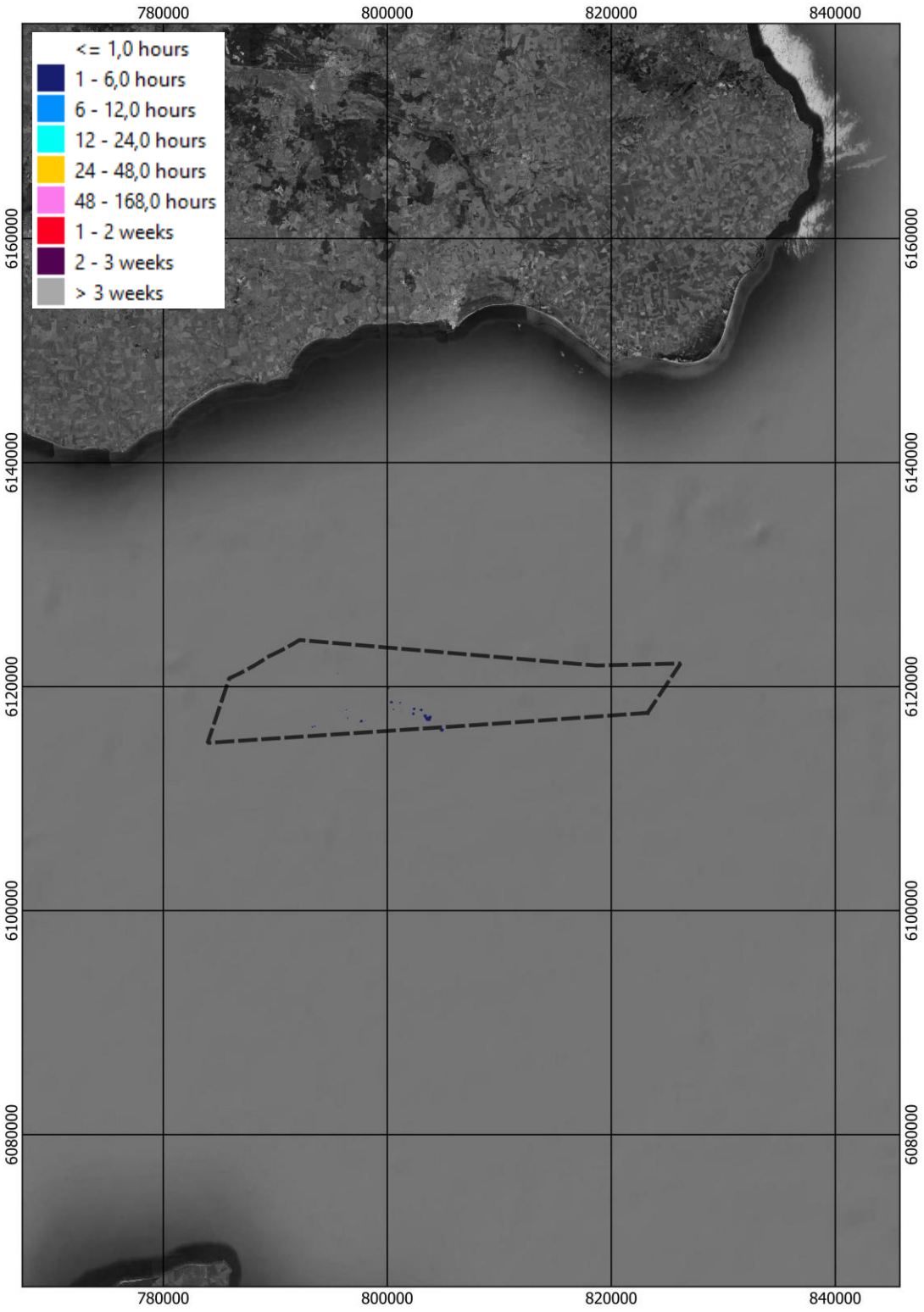
Appendix 14: 15MW MP worst-case, Bottom – Duration 1000 mg/l, depth average



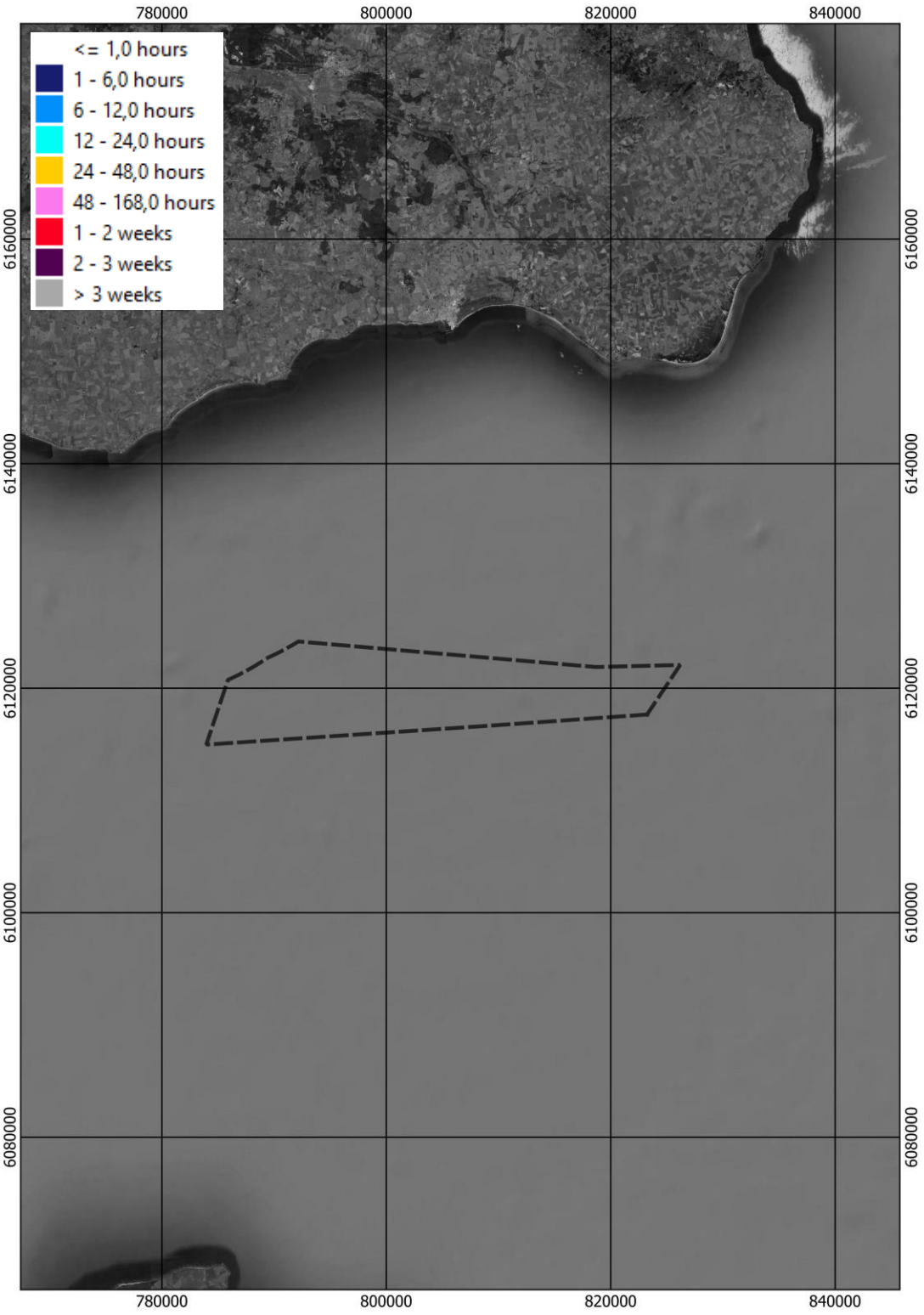
Appendix 15: 15MW MP worst-case, Bottom – Duration 10 mg/l, upper 10 m



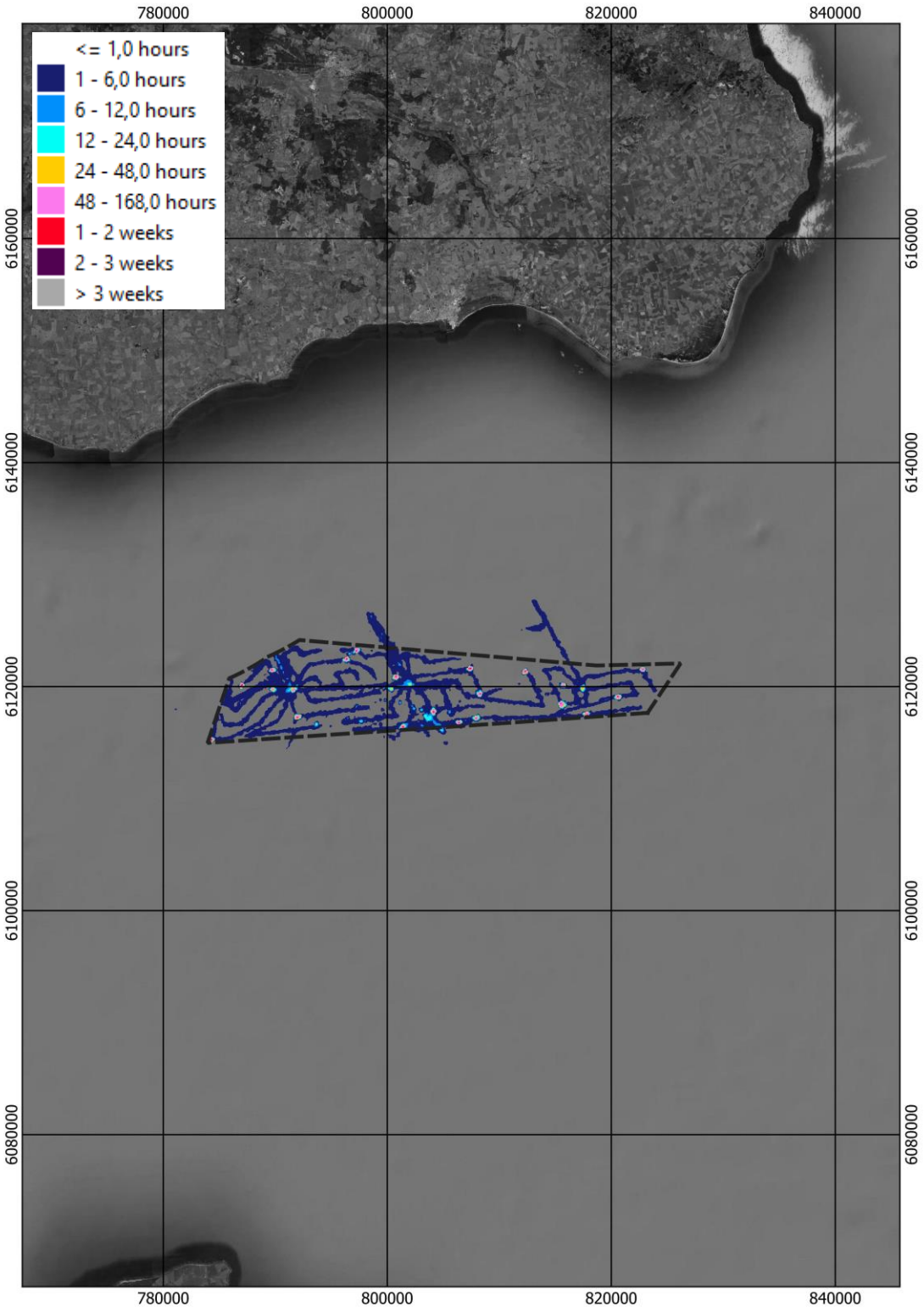
Appendix 16: 15MW MP worst-case, Bottom – Duration 100 mg/l, upper 10 m



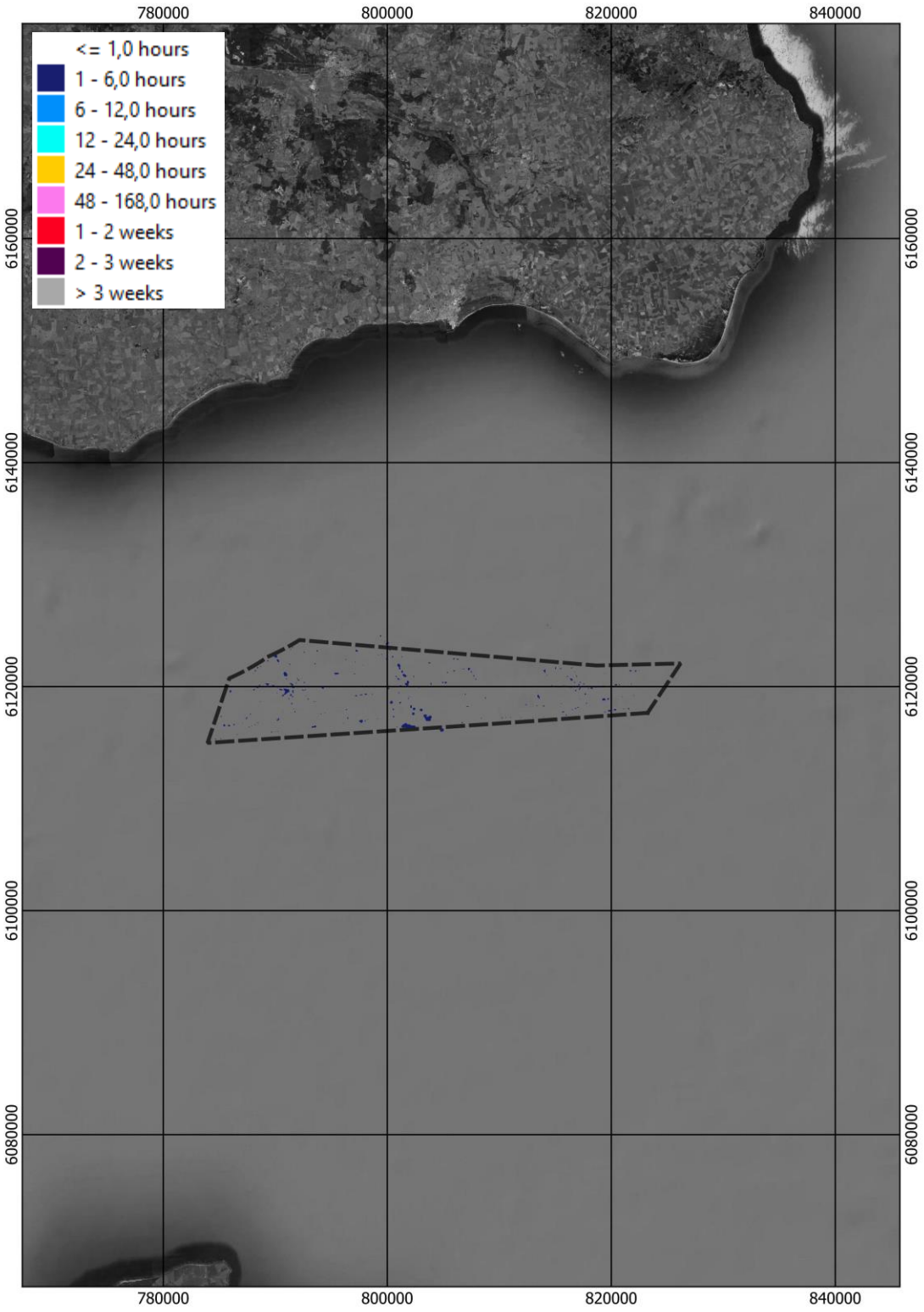
Appendix 17: 15MW MP worst-case, Bottom – Duration 1000 mg/l, upper 10 m



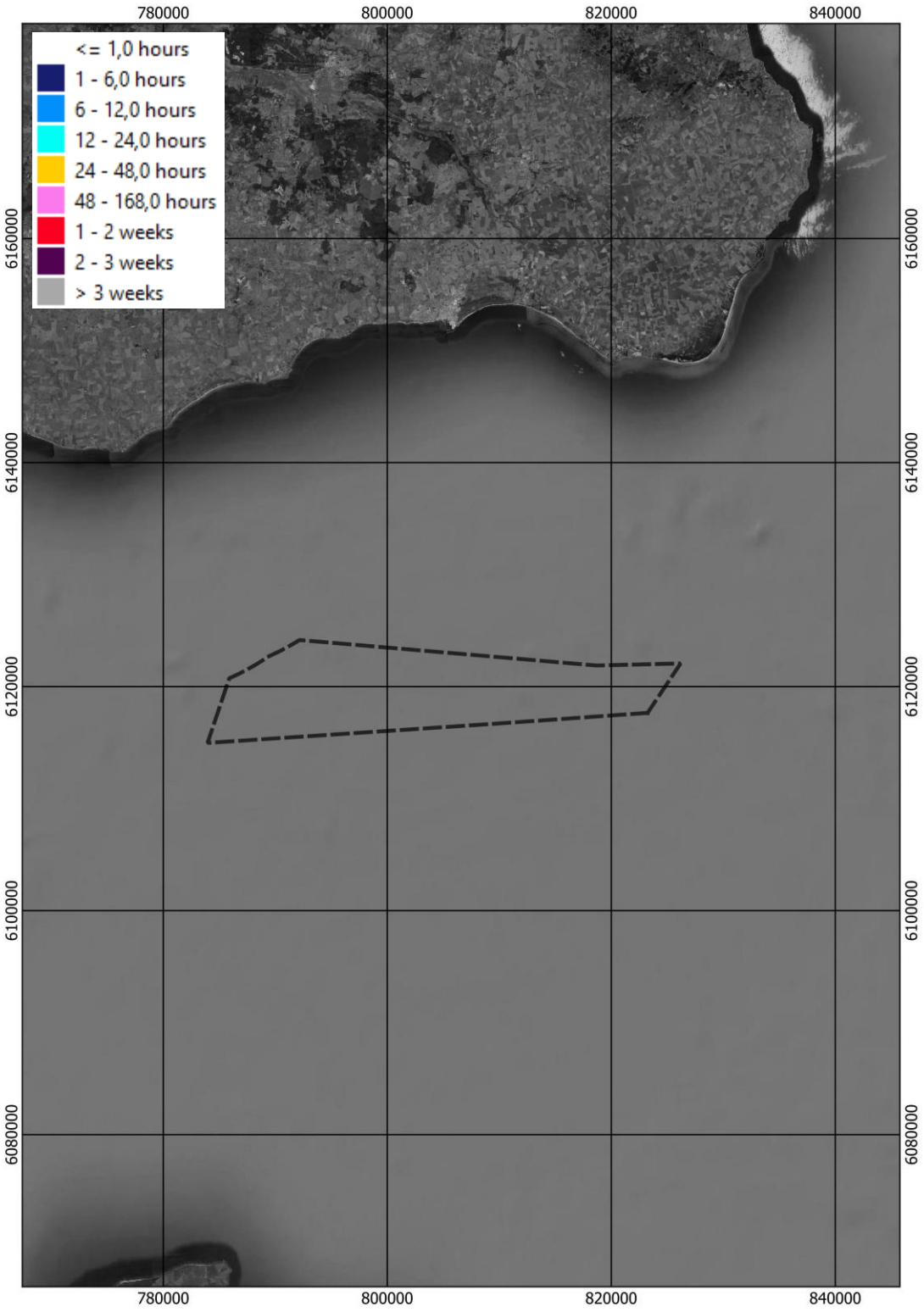
Appendix 18: 15MW MP worst-case, Bottom – Duration 10 mg/l, lower 10 m



Appendix 19: 15MW MP worst-case, Bottom – Duration 100 mg/l, lower 10 m

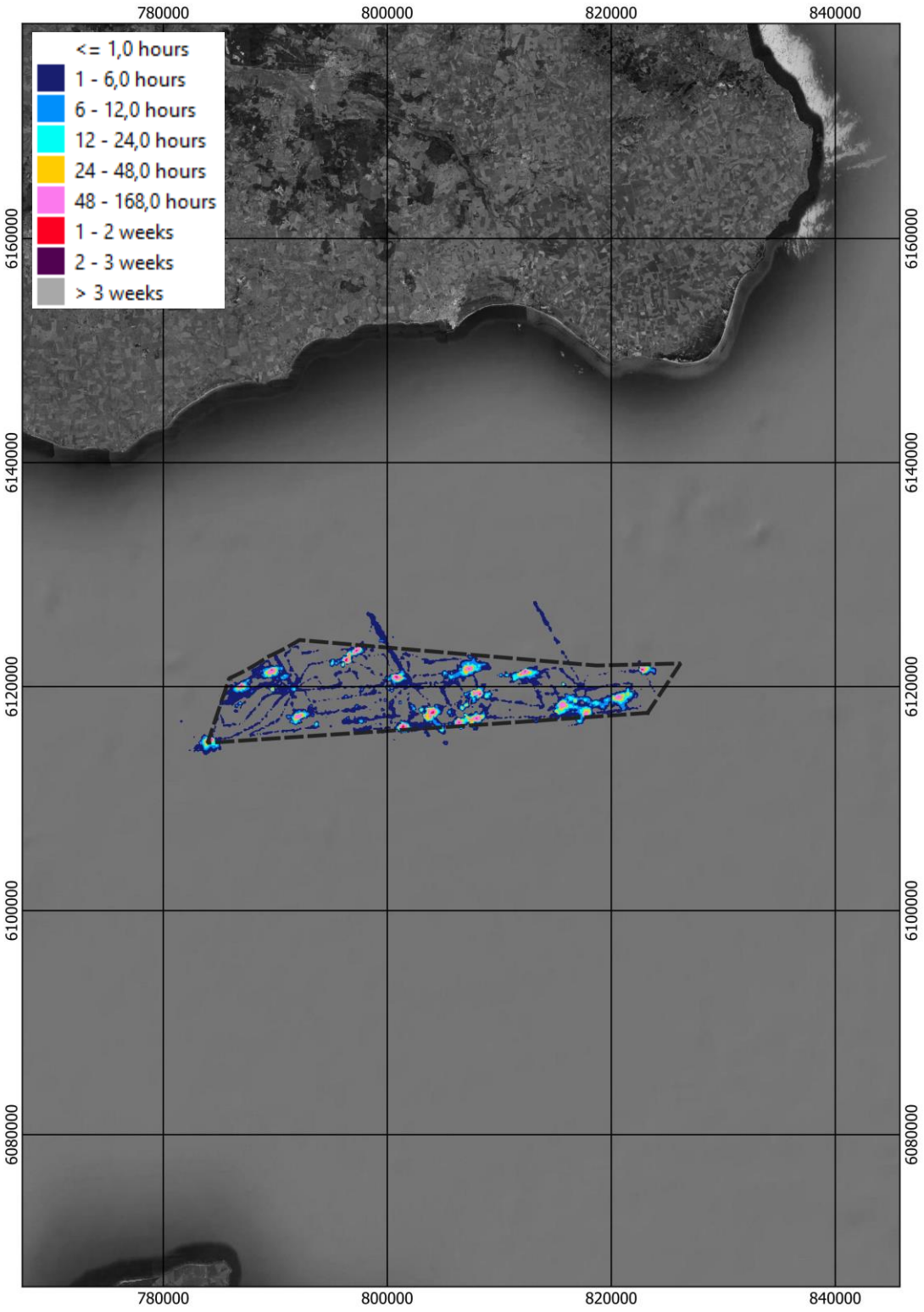


Appendix 20: 15MW MP worst-case, Bottom – Duration 1000 mg/l, lower 10 m

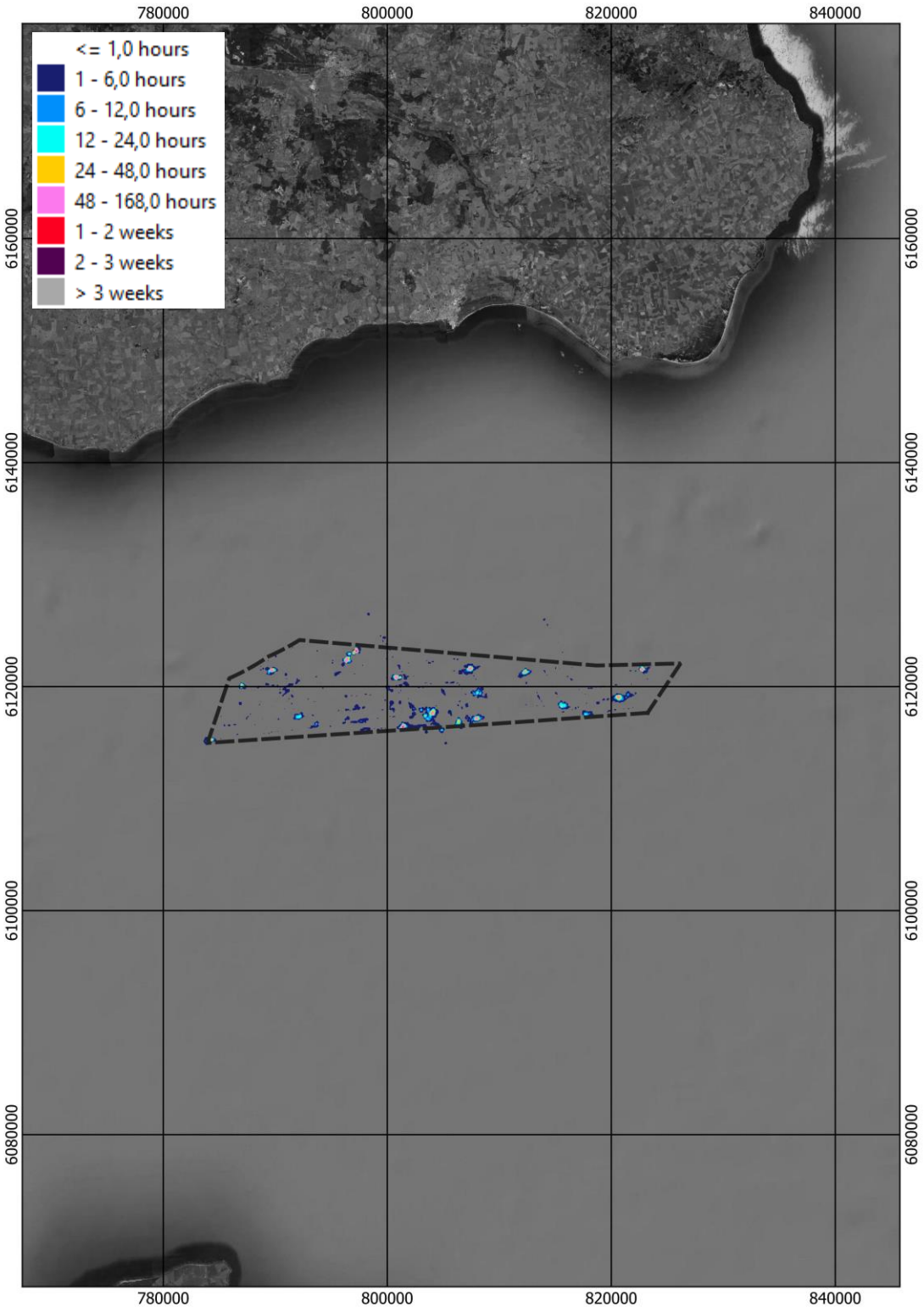


Appendix 21: 15MW MP worst-case, Bottom – Maximum sedimentation in mm

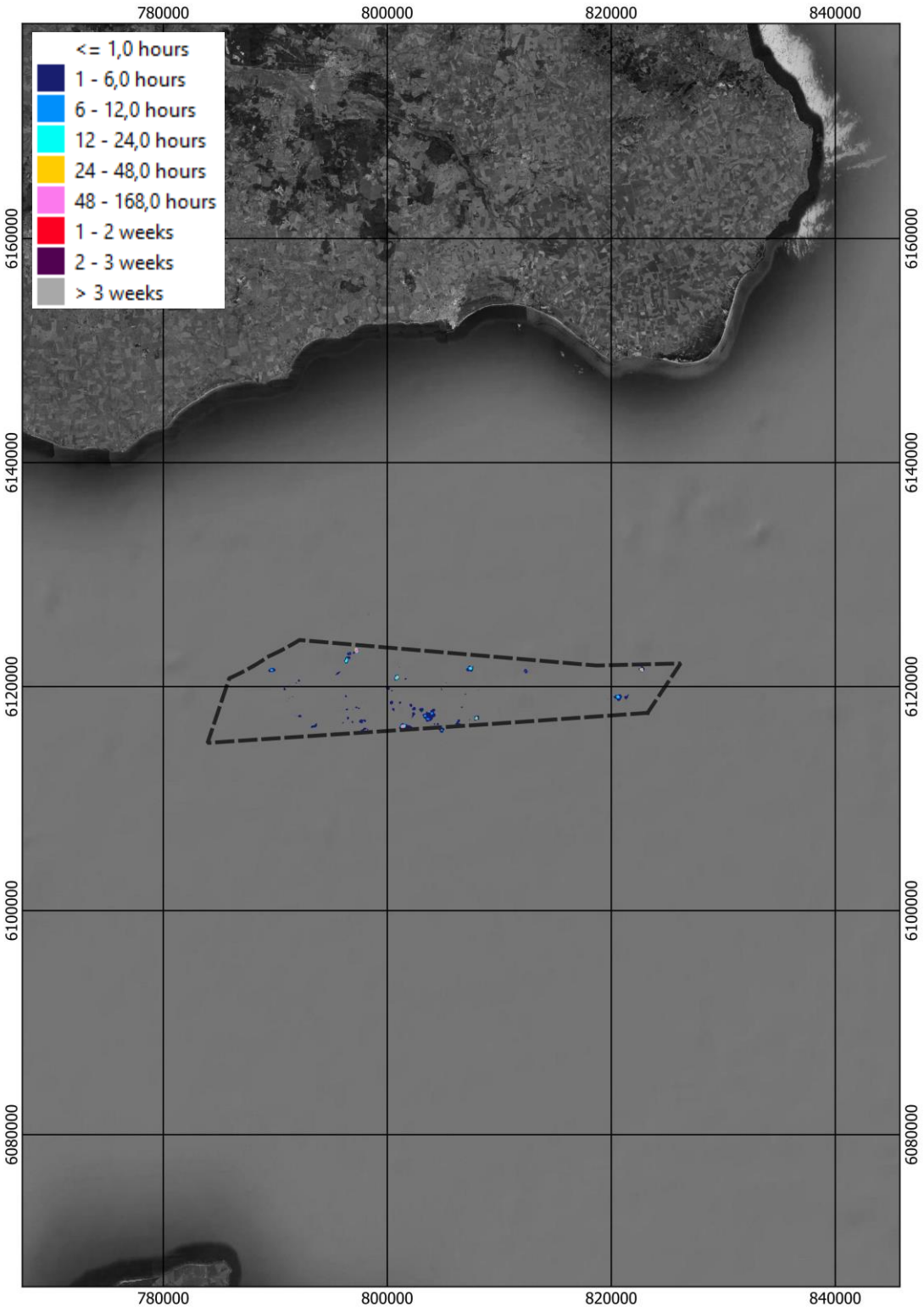
Appendix 22: 15MW MP worst-case, Surface – Duration 10 mg/l, depth average



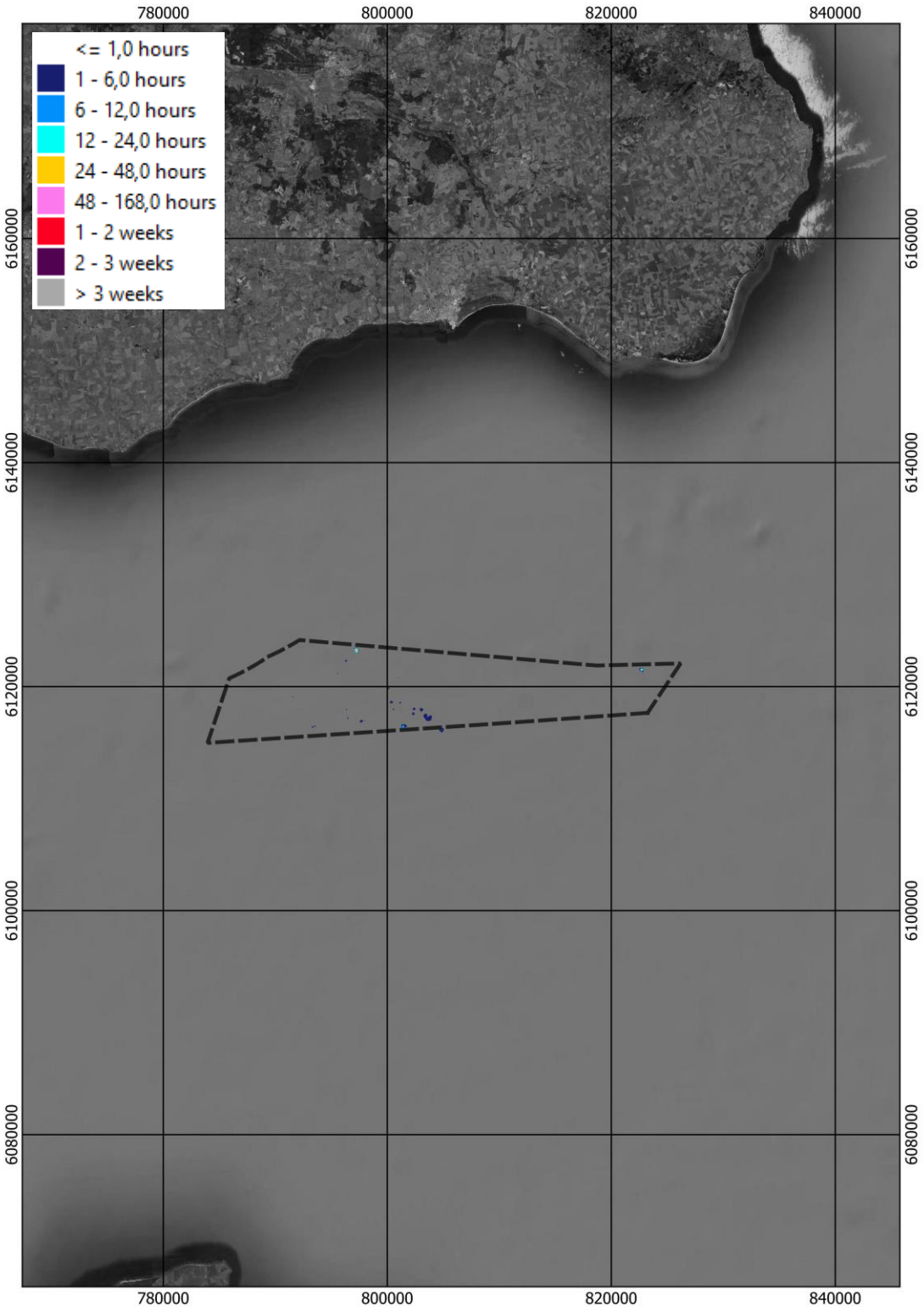
Appendix 23: 15MW MP worst-case, Surface – Duration 25 mg/l, depth average



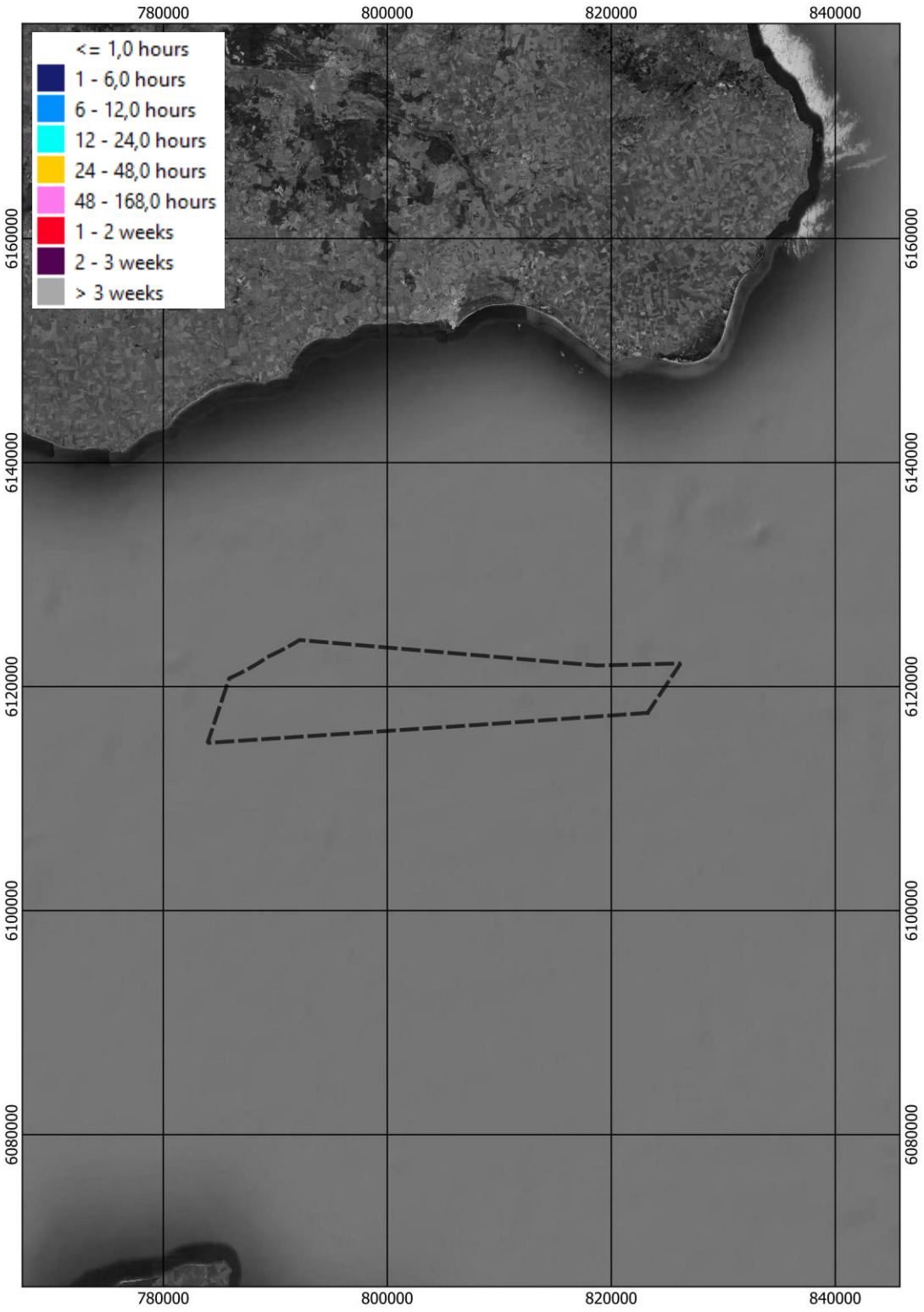
Appendix 24: 15MW MP worst-case, Surface – Duration 50 mg/l, depth average



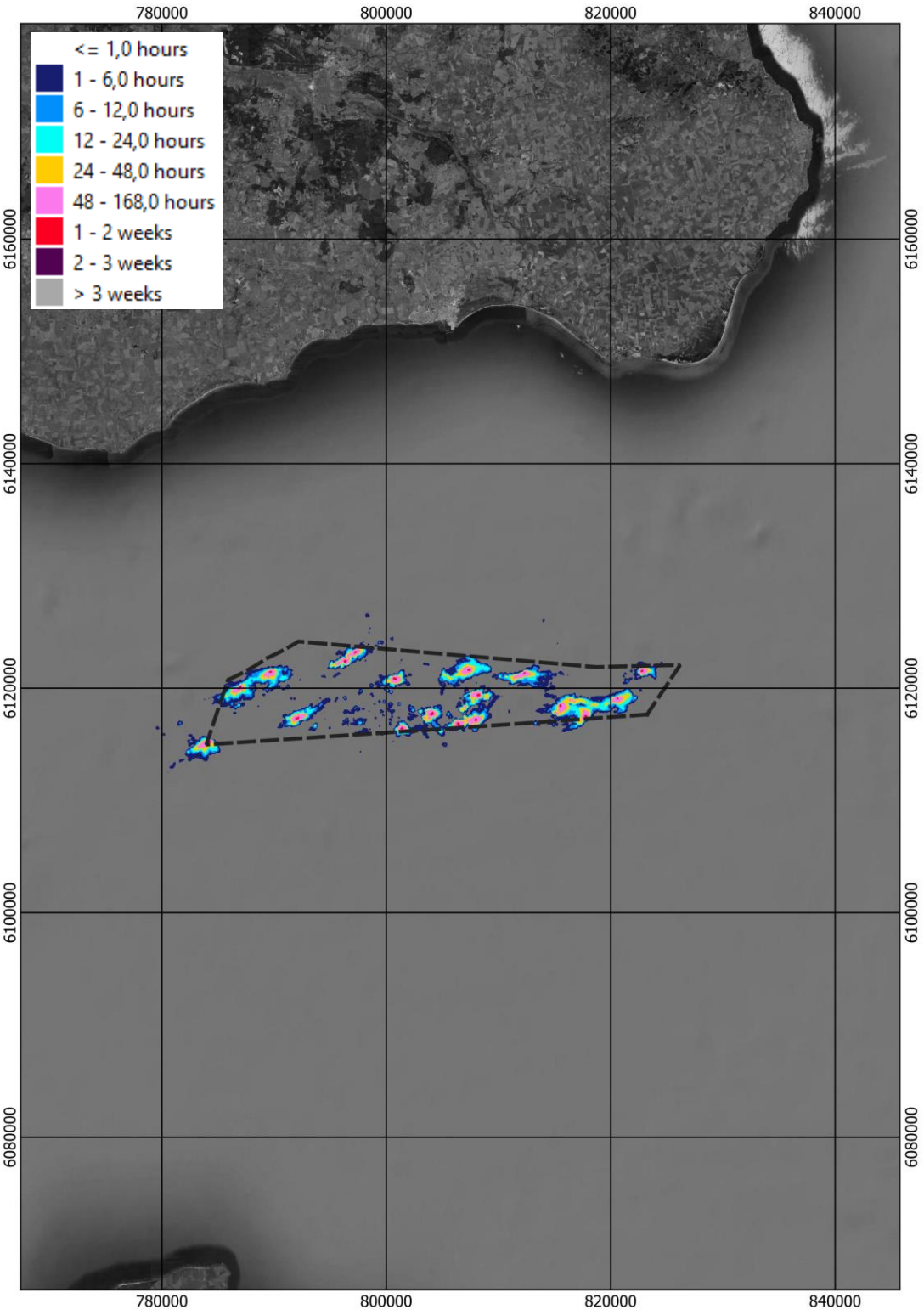
Appendix 25: 15MW MP worst-case, Surface – Duration 100 mg/l, depth average



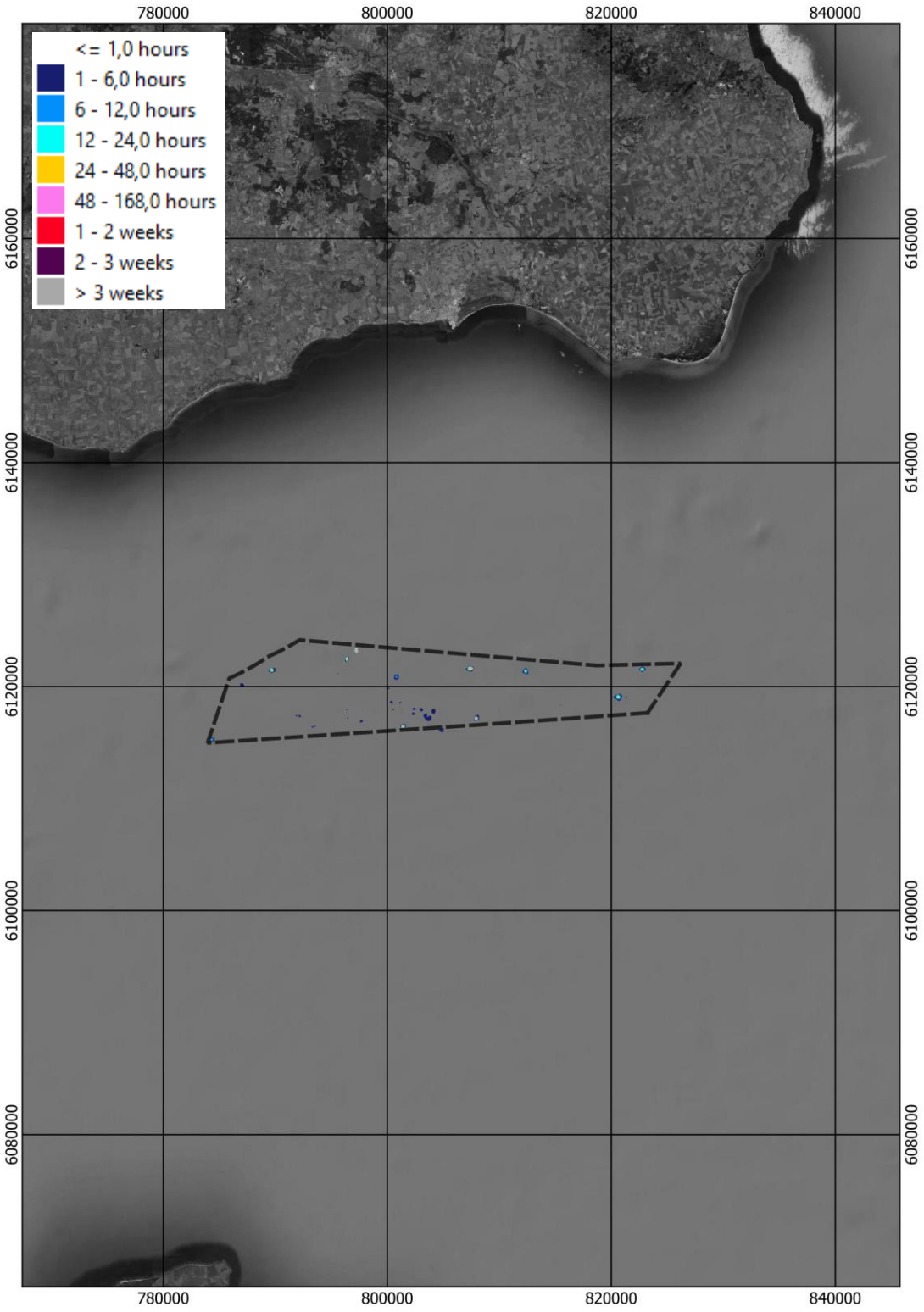
Appendix 26: 15MW MP worst-case, Surface – Duration 1000 mg/l, depth average



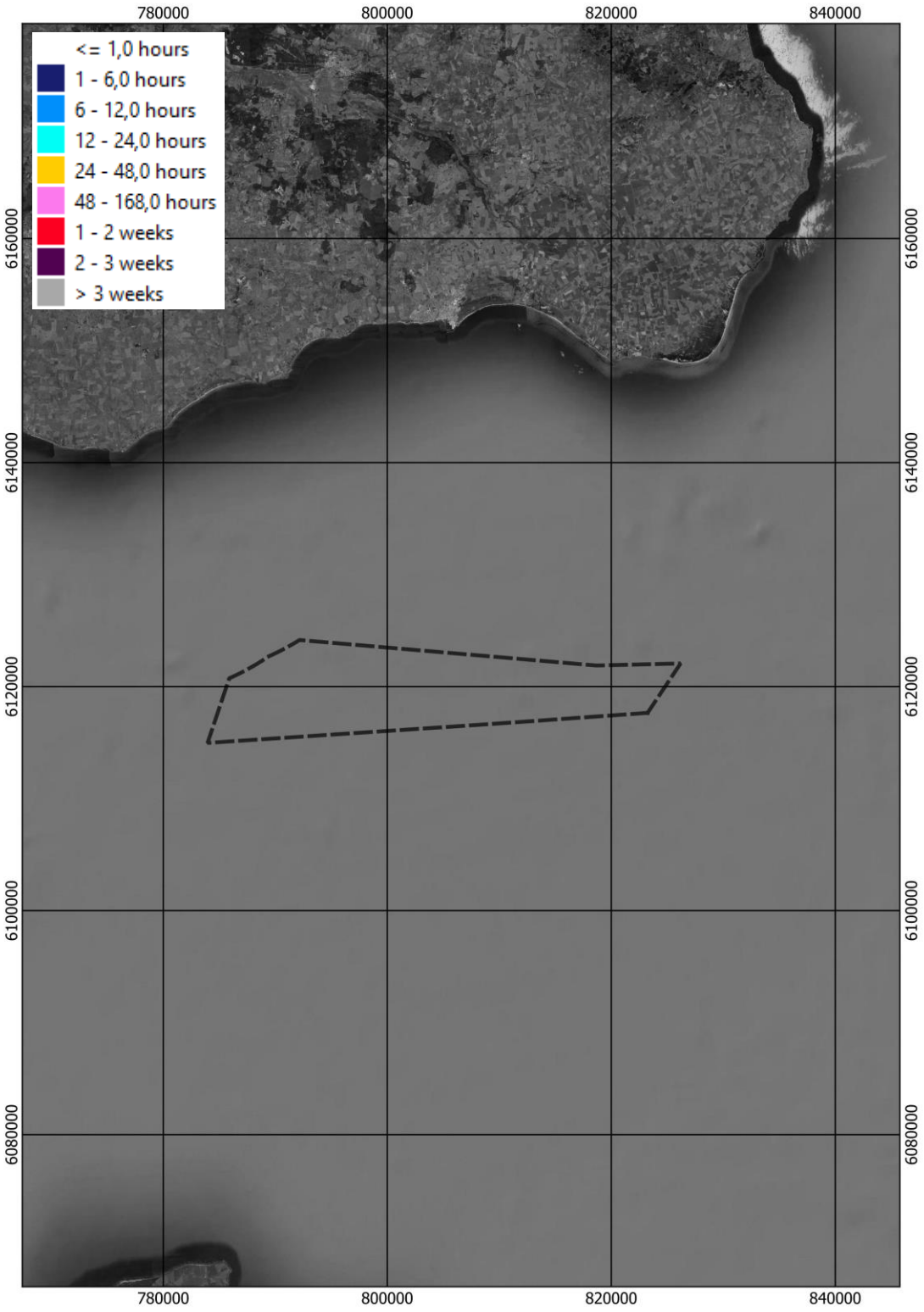
Appendix 27: 15MW MP worst-case, Surface – Duration 10 mg/l, upper 10 m



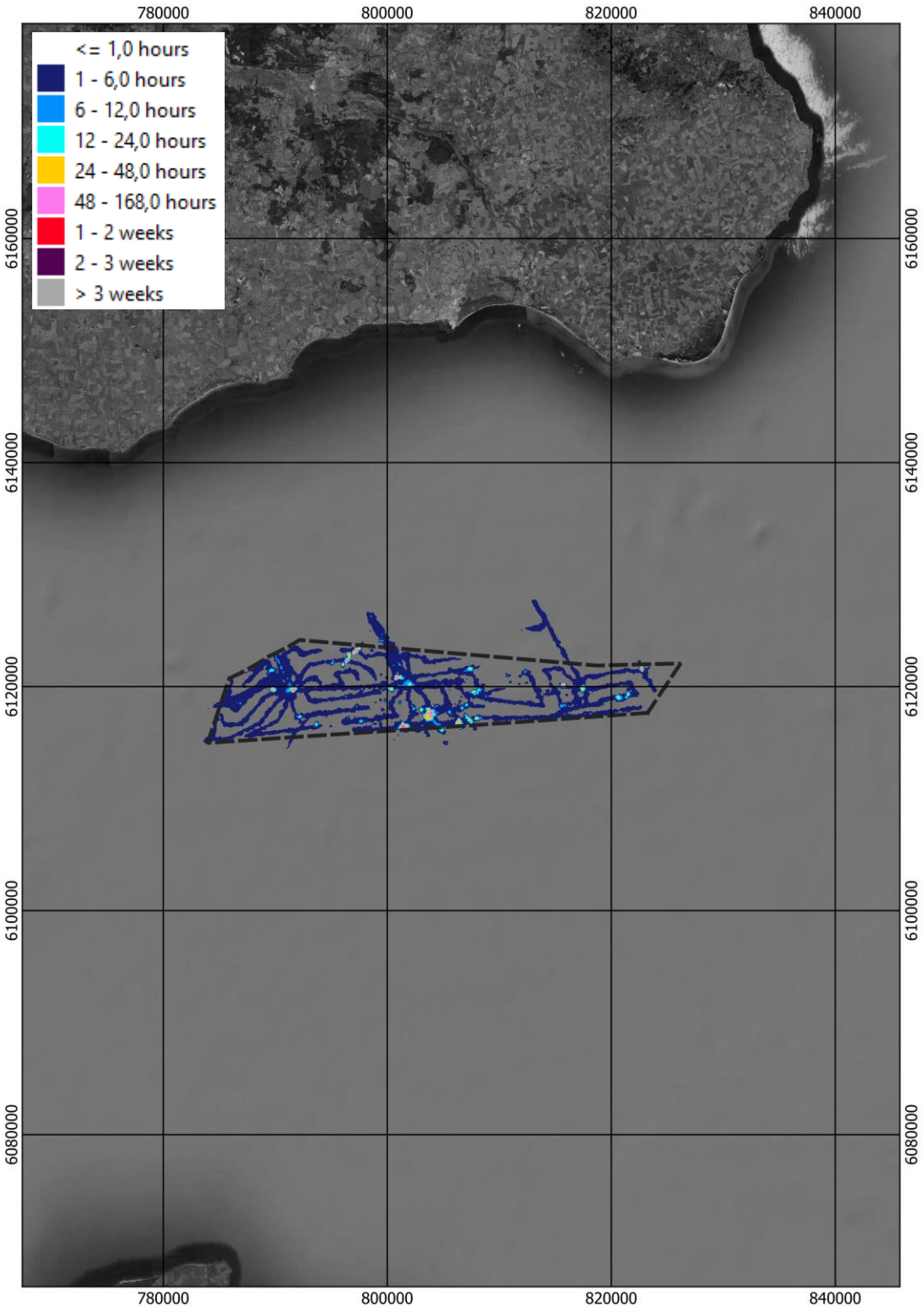
Appendix 28: 15MW MP worst-case, Surface – Duration 100 mg/l, upper 10 m



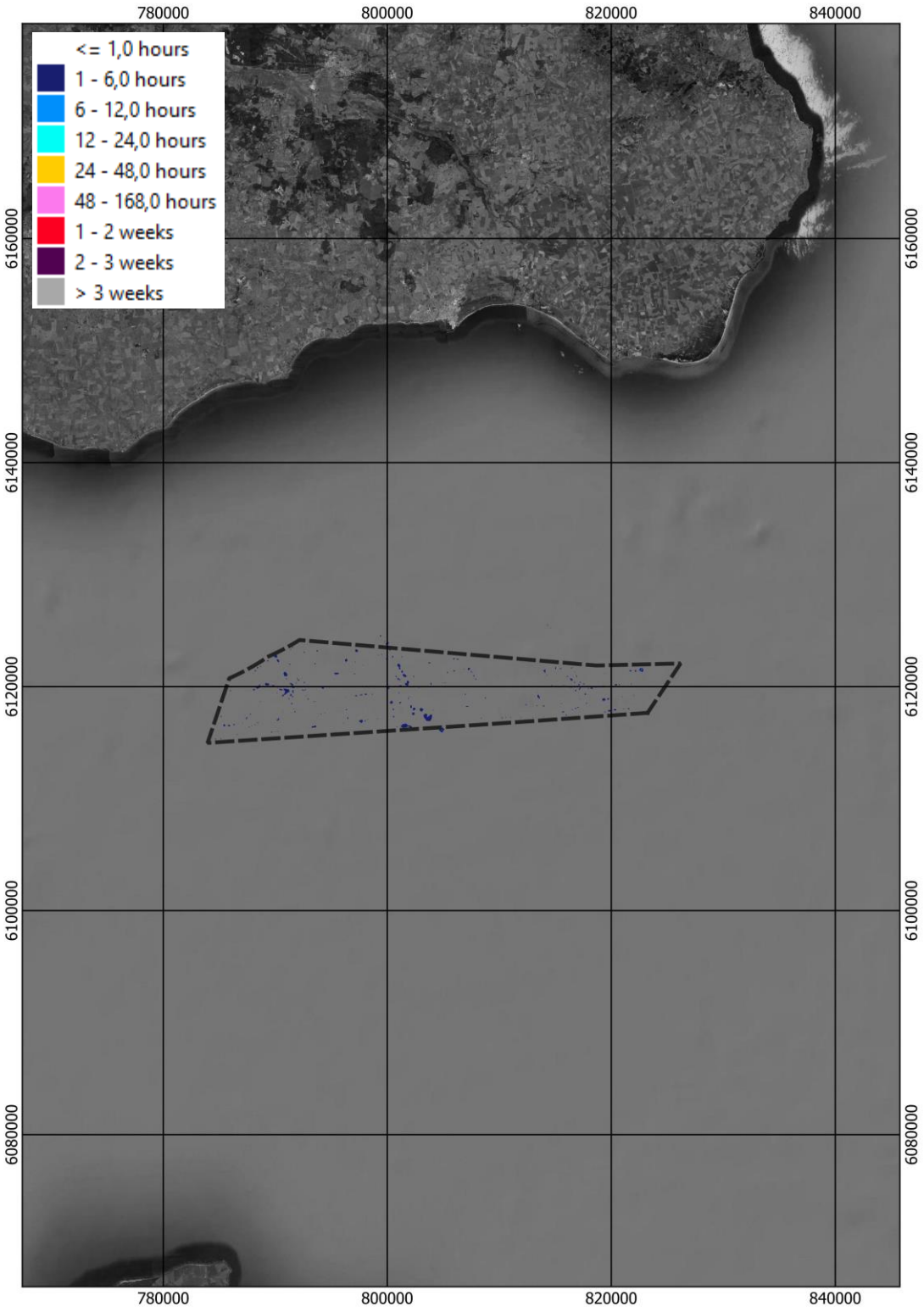
Appendix 29: 15MW MP worst-case, Surface – Duration 1000 mg/l, upper 10 m



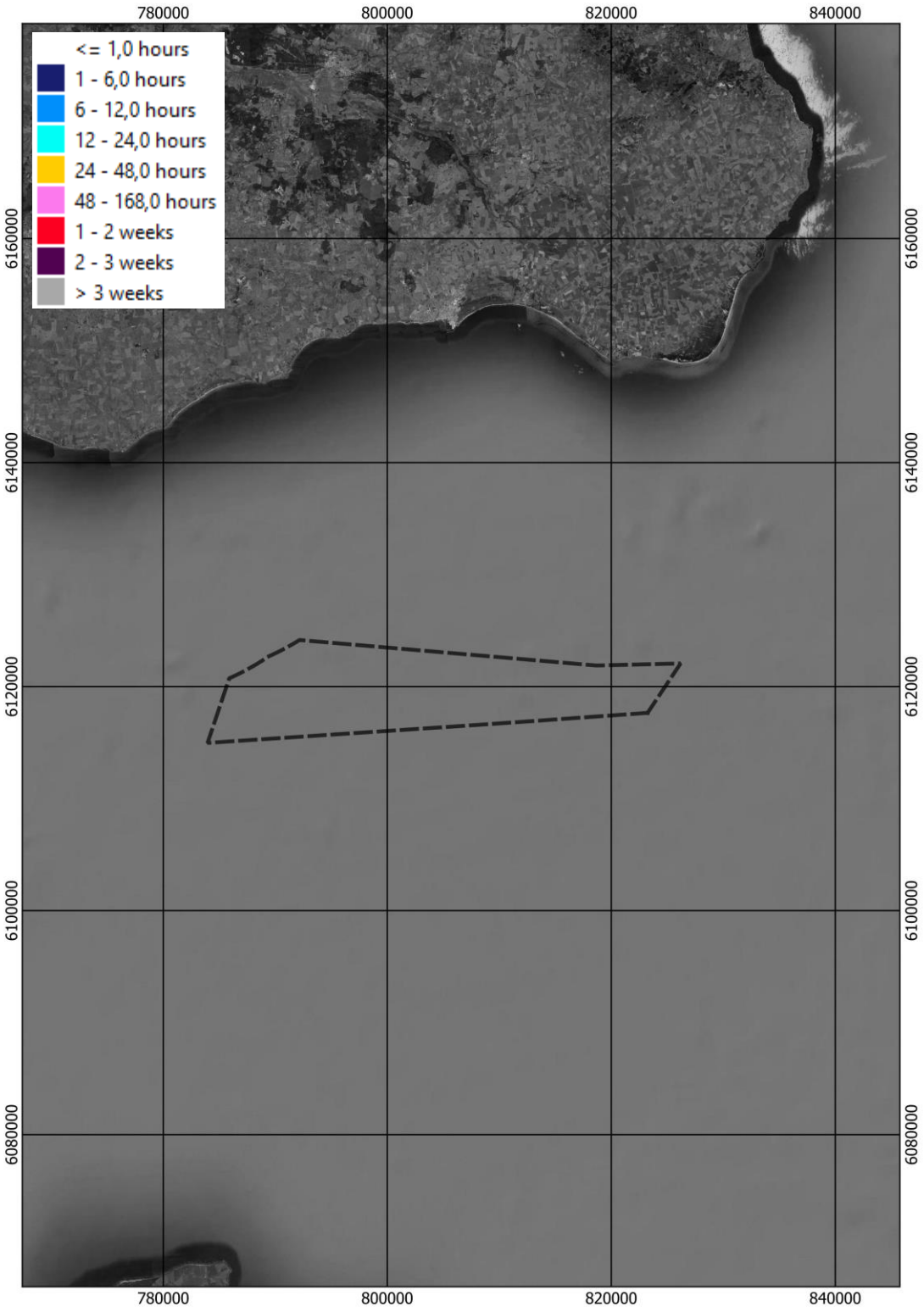
Appendix 30: 15MW MP worst-case, Surface – Duration 10 mg/l, lower 10 m



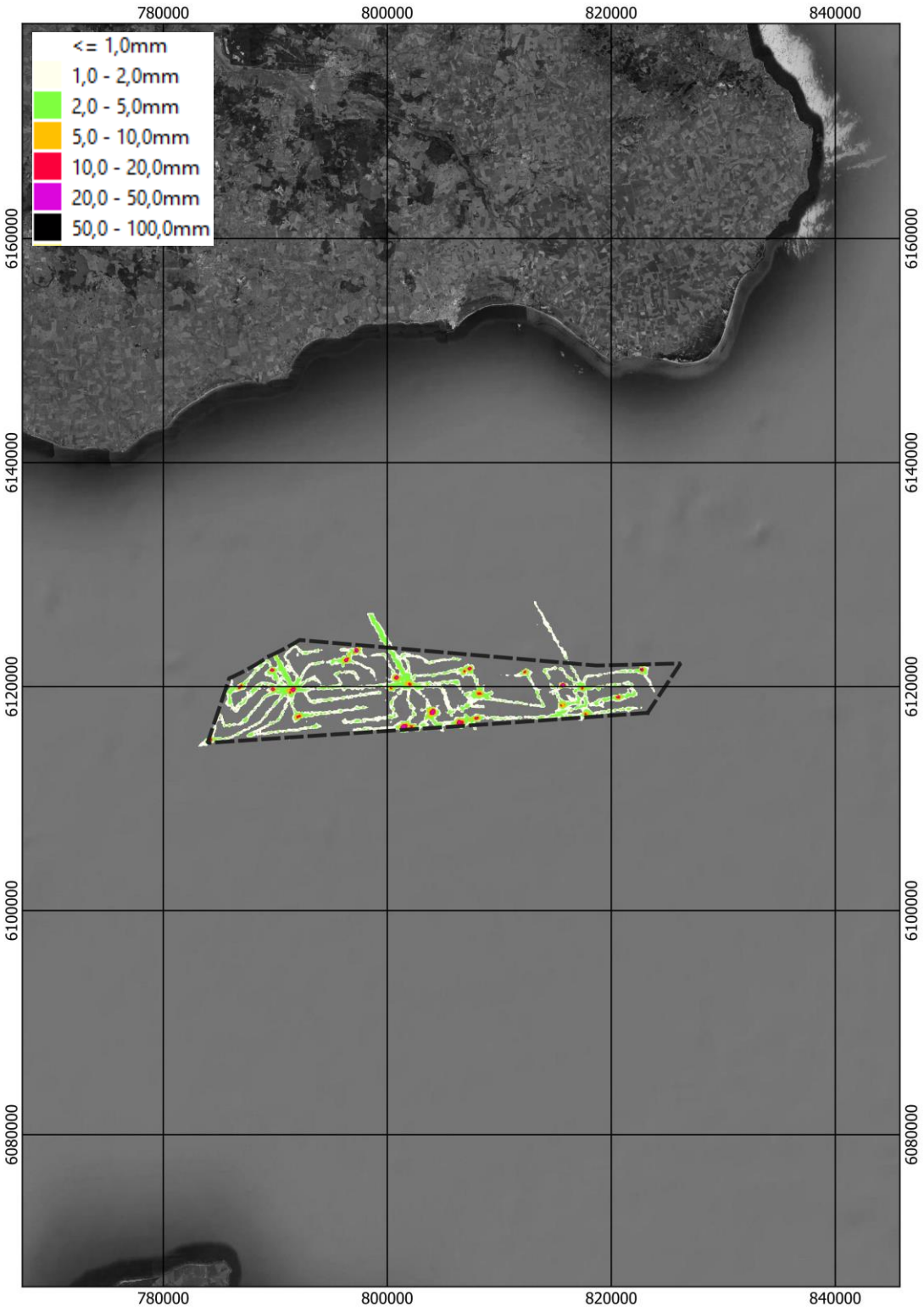
Appendix 31: 15MW MP worst-case, Surface – Duration 100 mg/l, lower 10 m



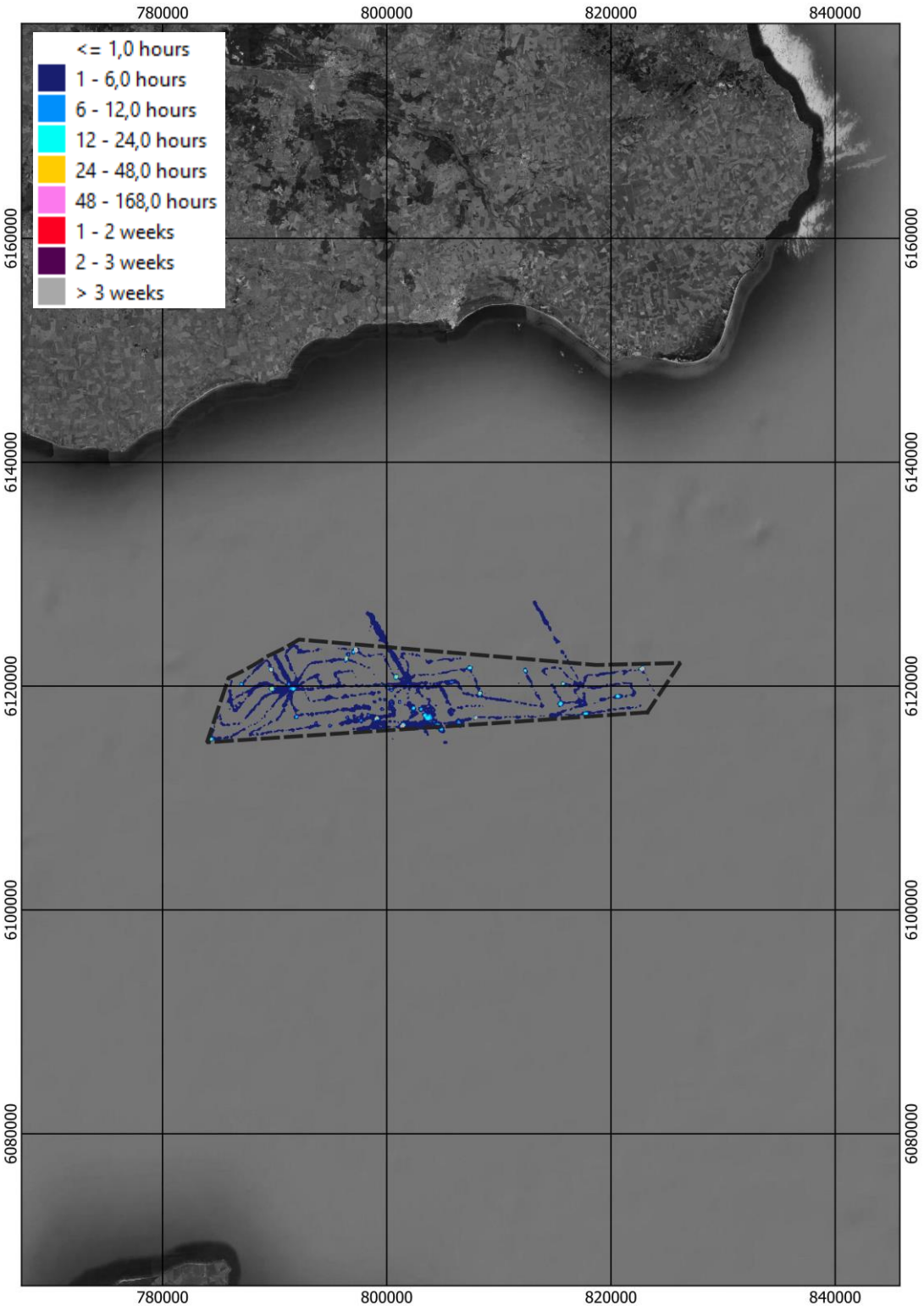
Appendix 32: 15MW MP worst-case, Surface – Duration 1000 mg/l, lower 10 m



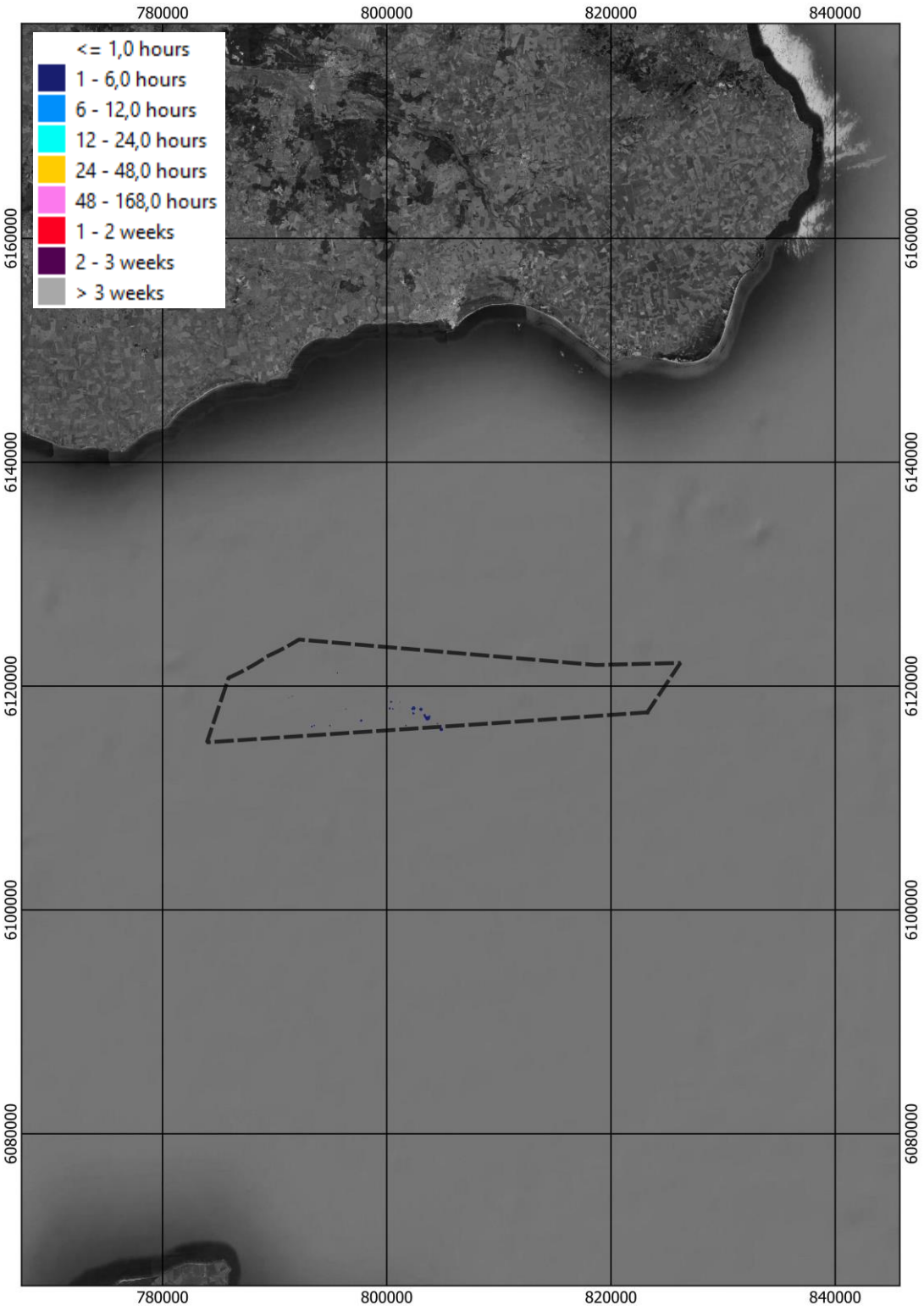
Appendix 33: 15MW MP worst-case, Surface – Maximum sedimentation in mm



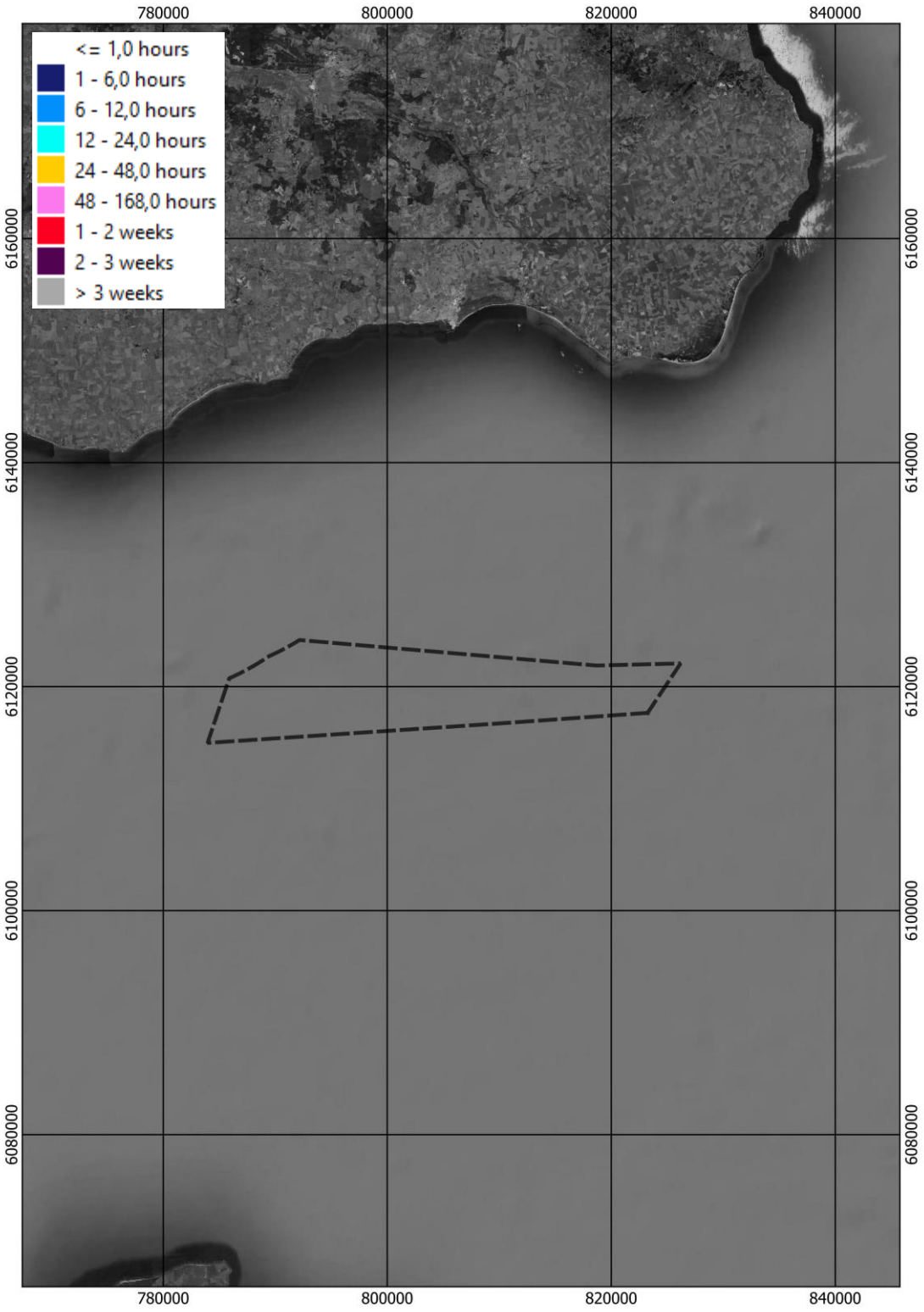
Appendix 34: 15MW MP, Bottom – Duration 10 mg/l, depth average



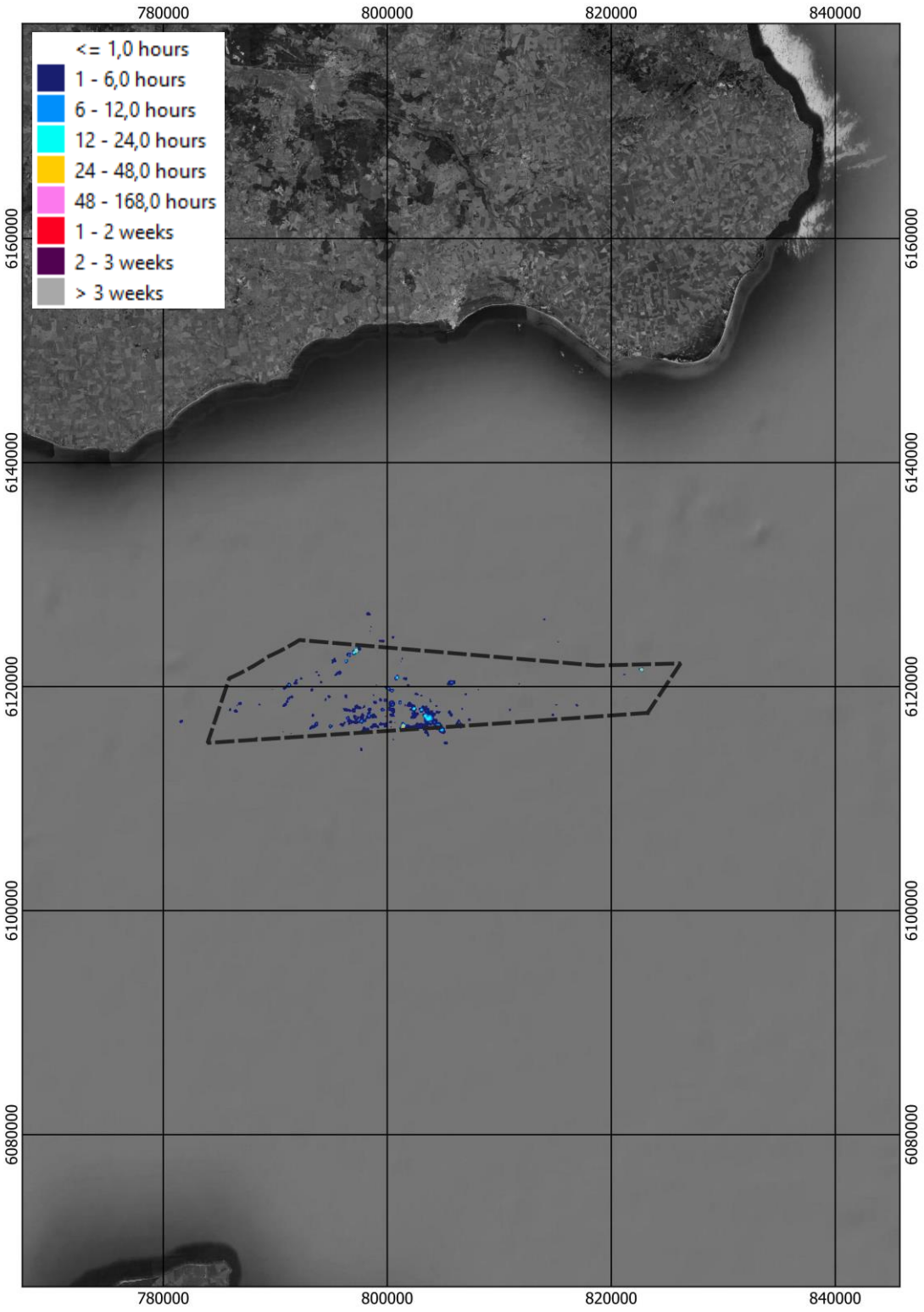
Appendix 35: 15MW MP, Bottom – Duration 100 mg/l, depth average



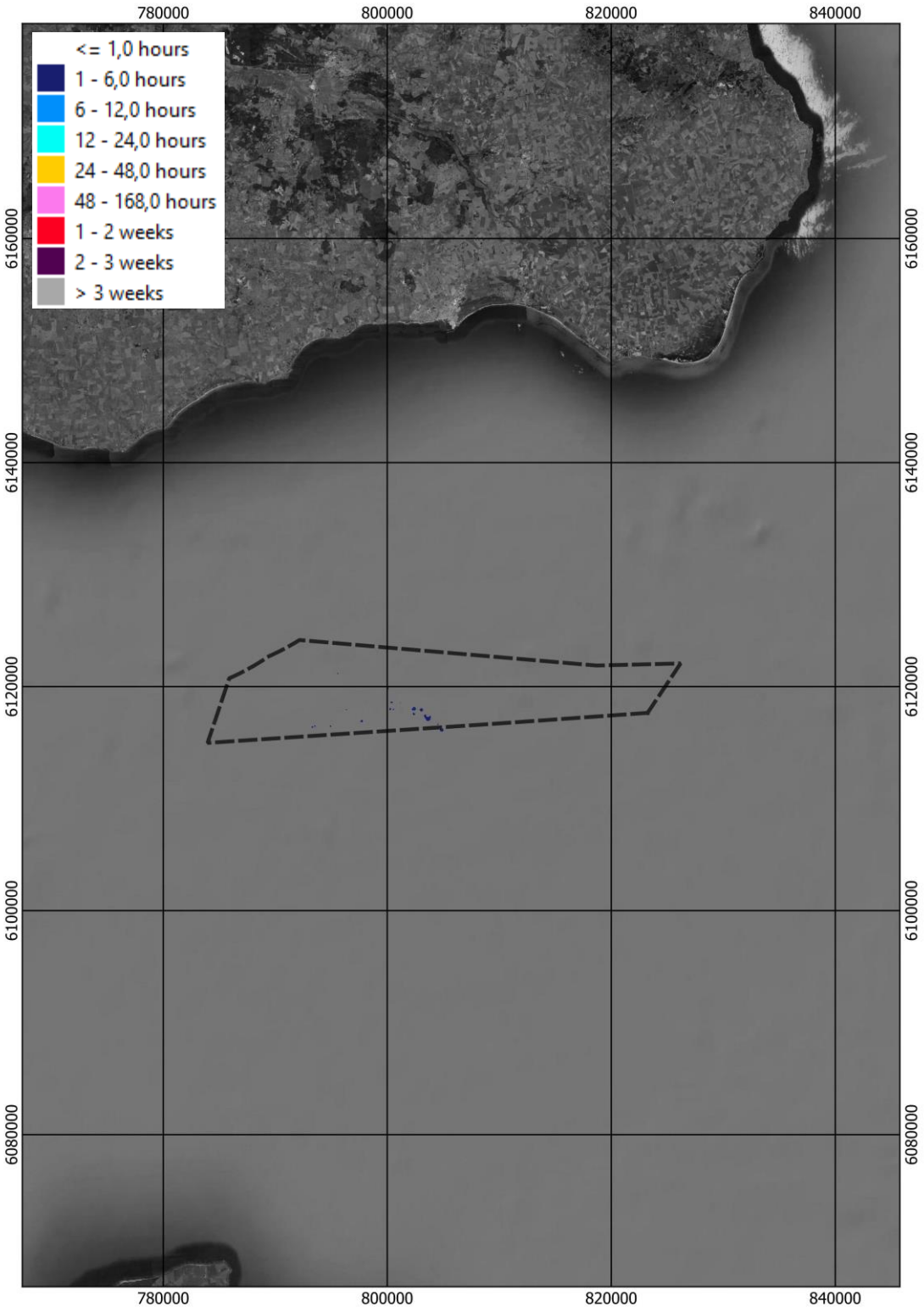
Appendix 36: 15MW MP, Bottom – Duration 1000 mg/l, depth average



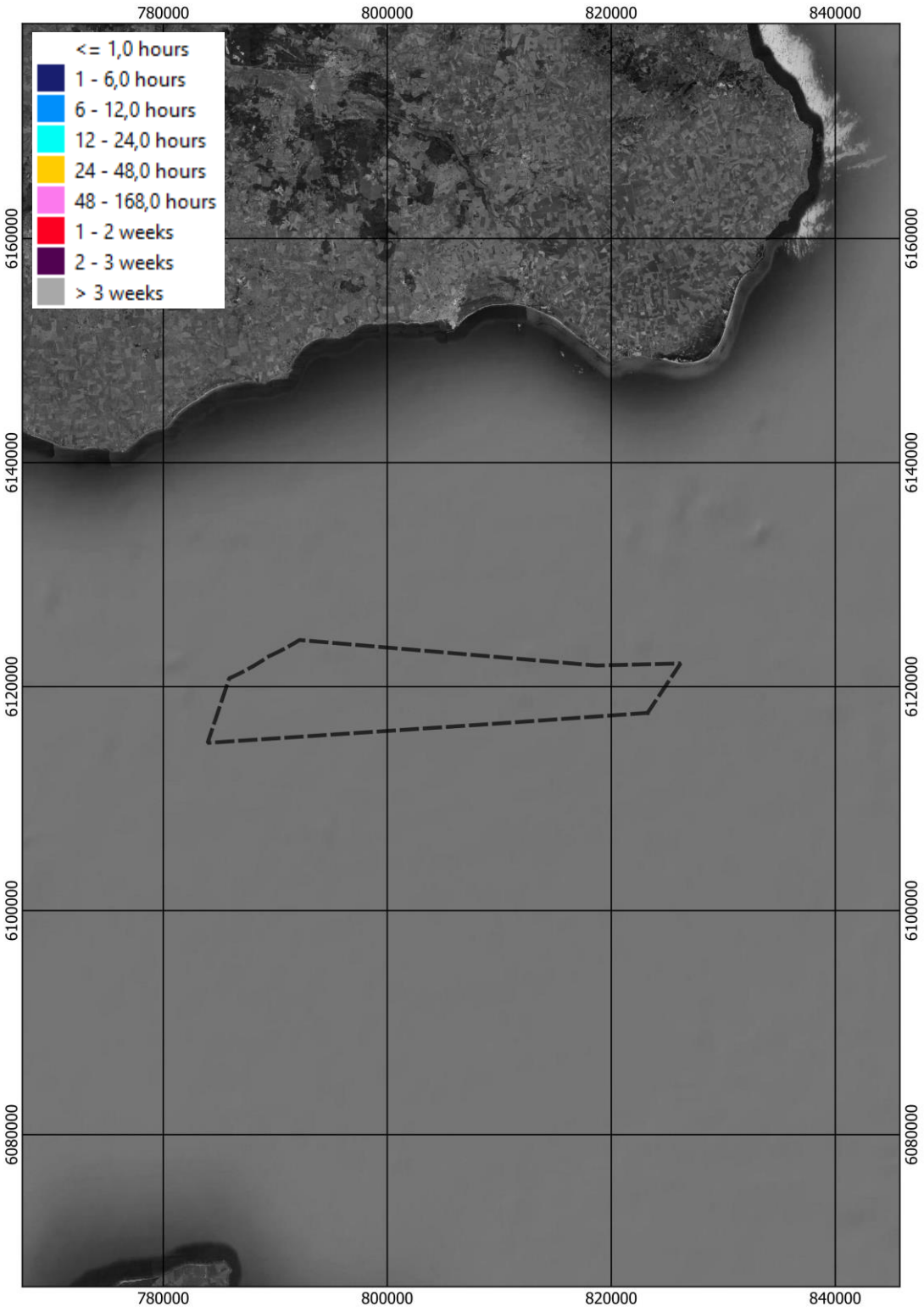
Appendix 37: 15MW MP, Bottom – Duration 10 mg/l, upper 10 m



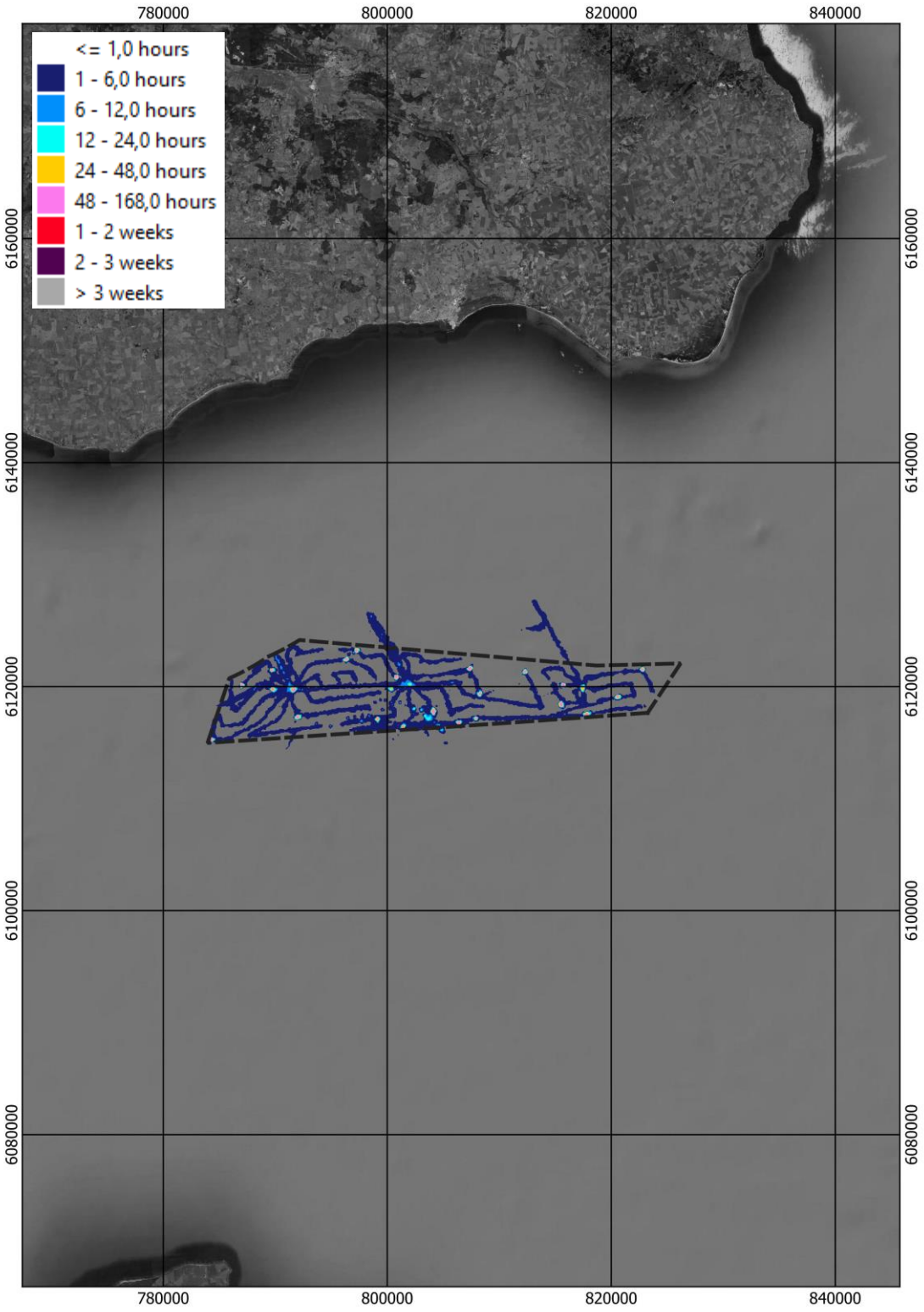
Appendix 38: 15MW MP, Bottom – Duration 100 mg/l, upper 10 m



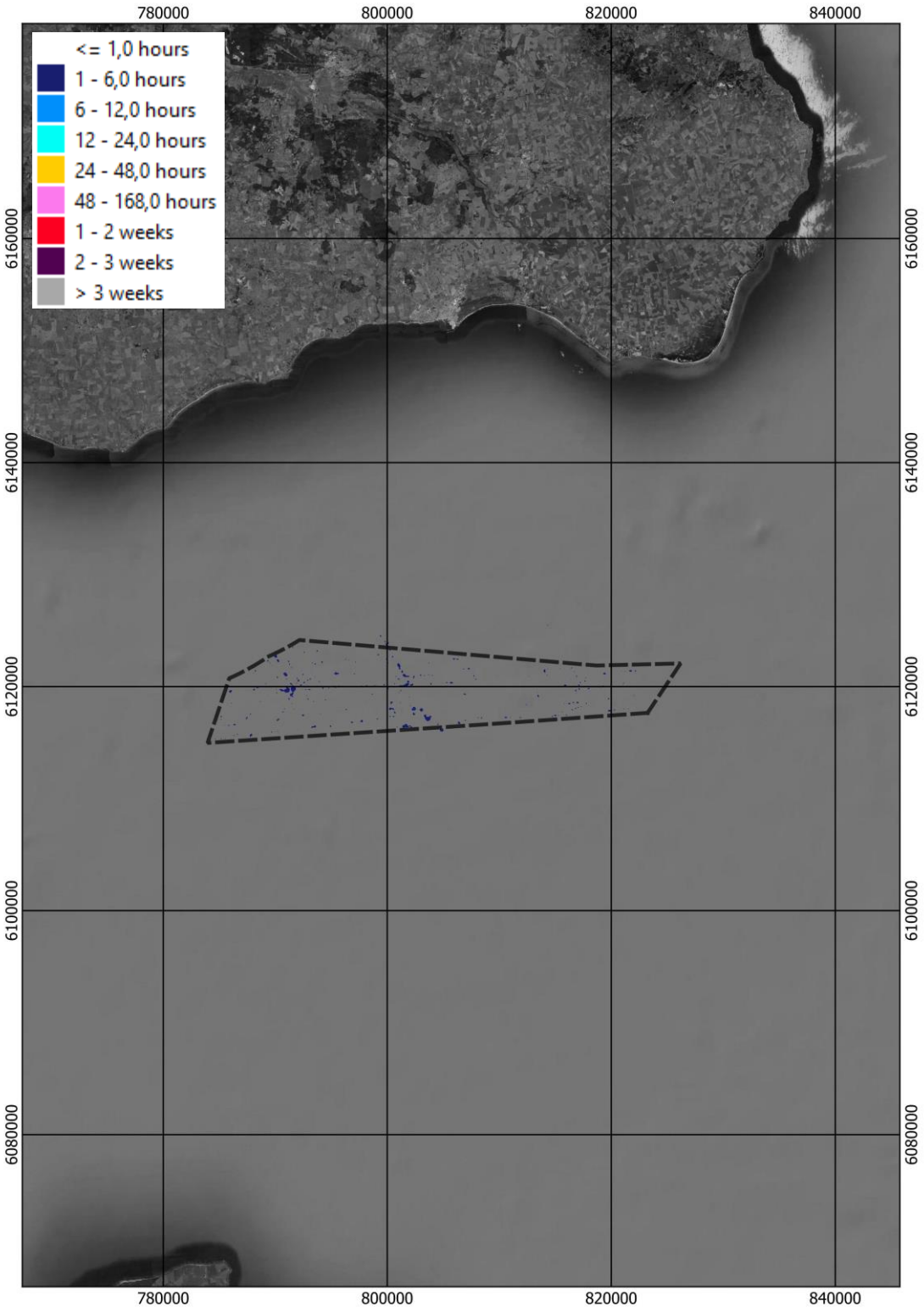
Appendix 39: 15MW MP, Bottom – Duration 1000 mg/l, upper 10 m



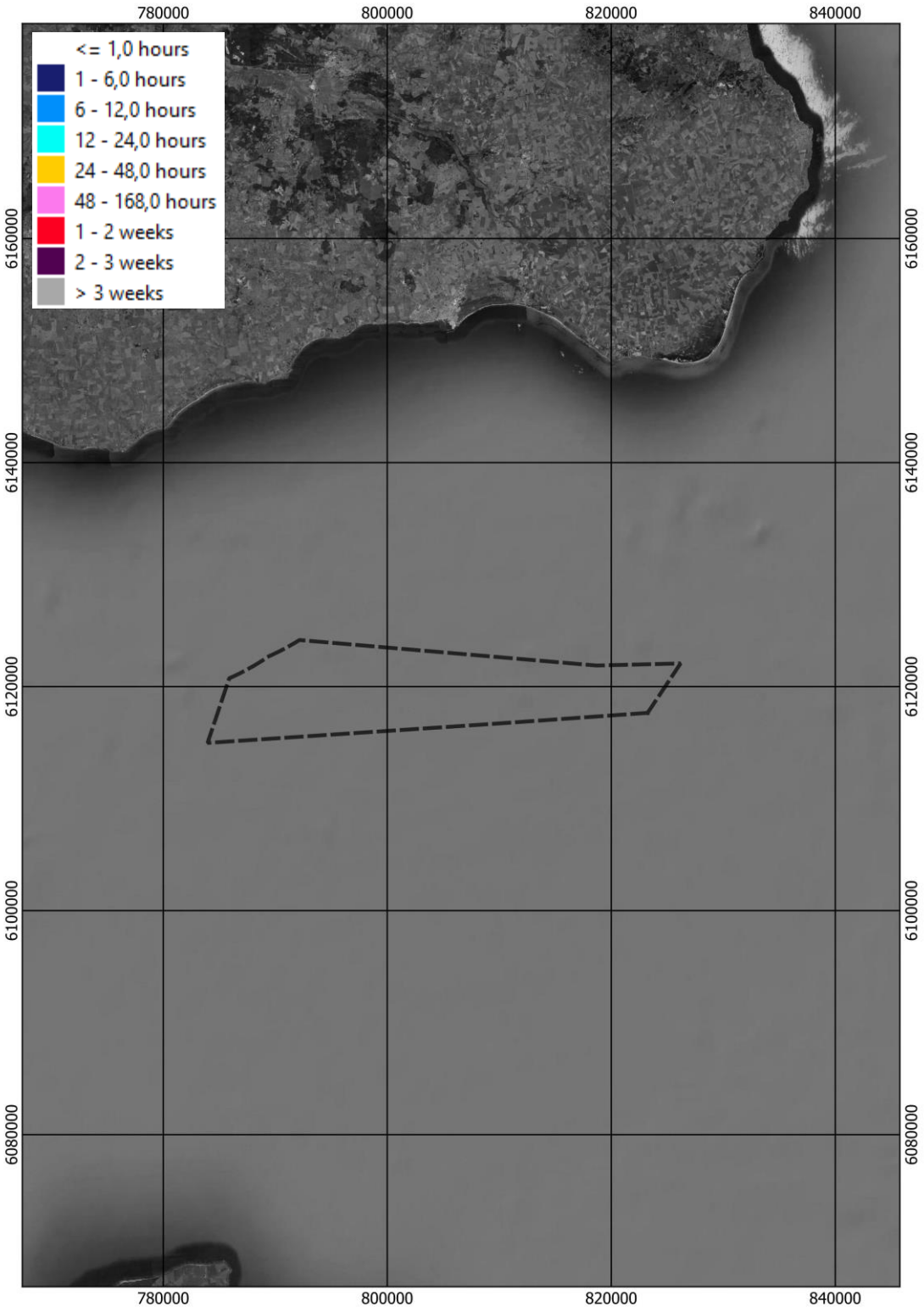
Appendix 40: 15MW MP, Bottom – Duration 10 mg/l, lower 10 m



Appendix 41: 15MW MP, Bottom – Duration 100 mg/l, lower 10 m

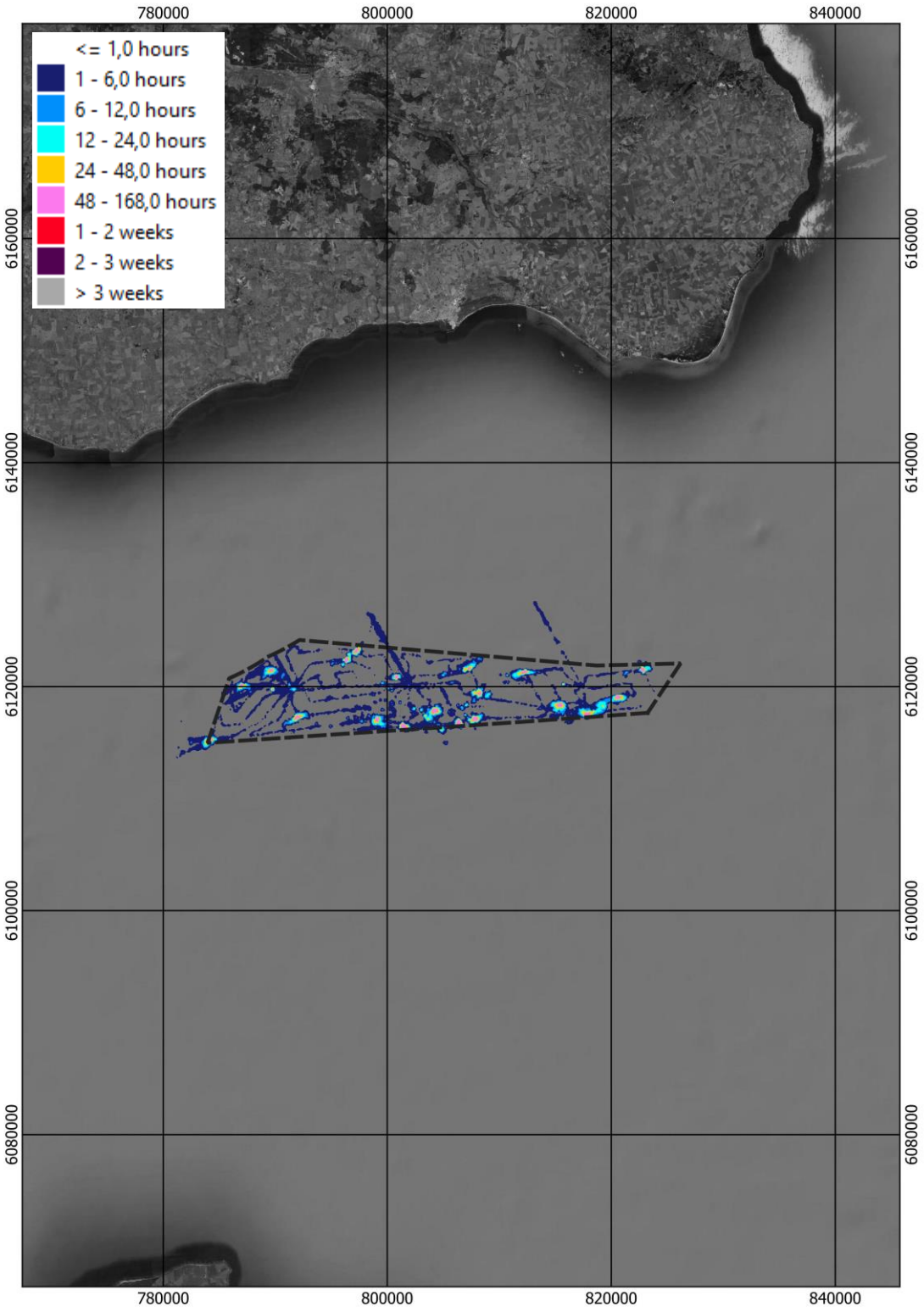


Appendix 42: 15MW MP, Bottom – Duration 1000 mg/l, lower 10 m

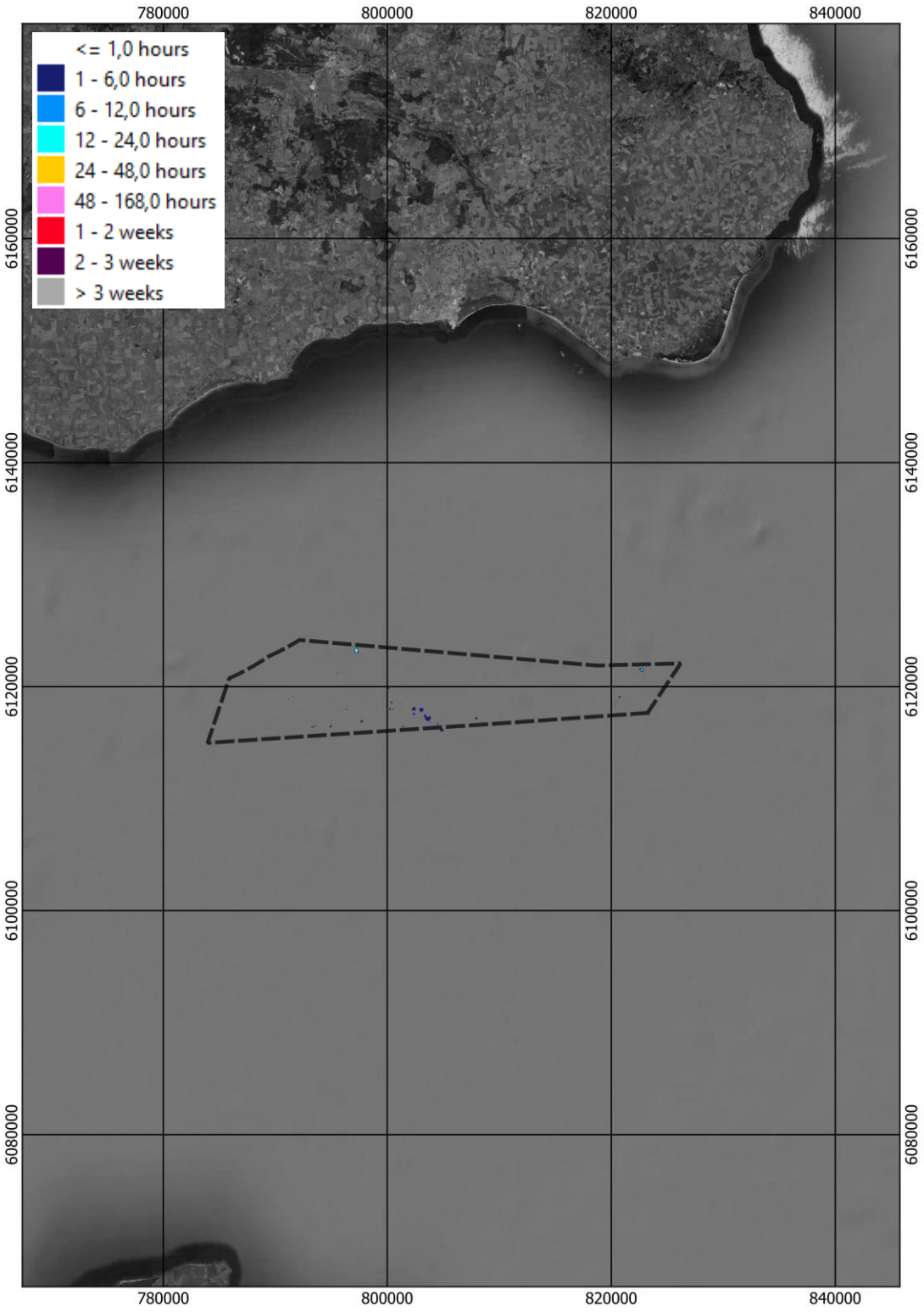


Appendix 43: 15MW MP, Bottom – Maximum sedimentation in mm

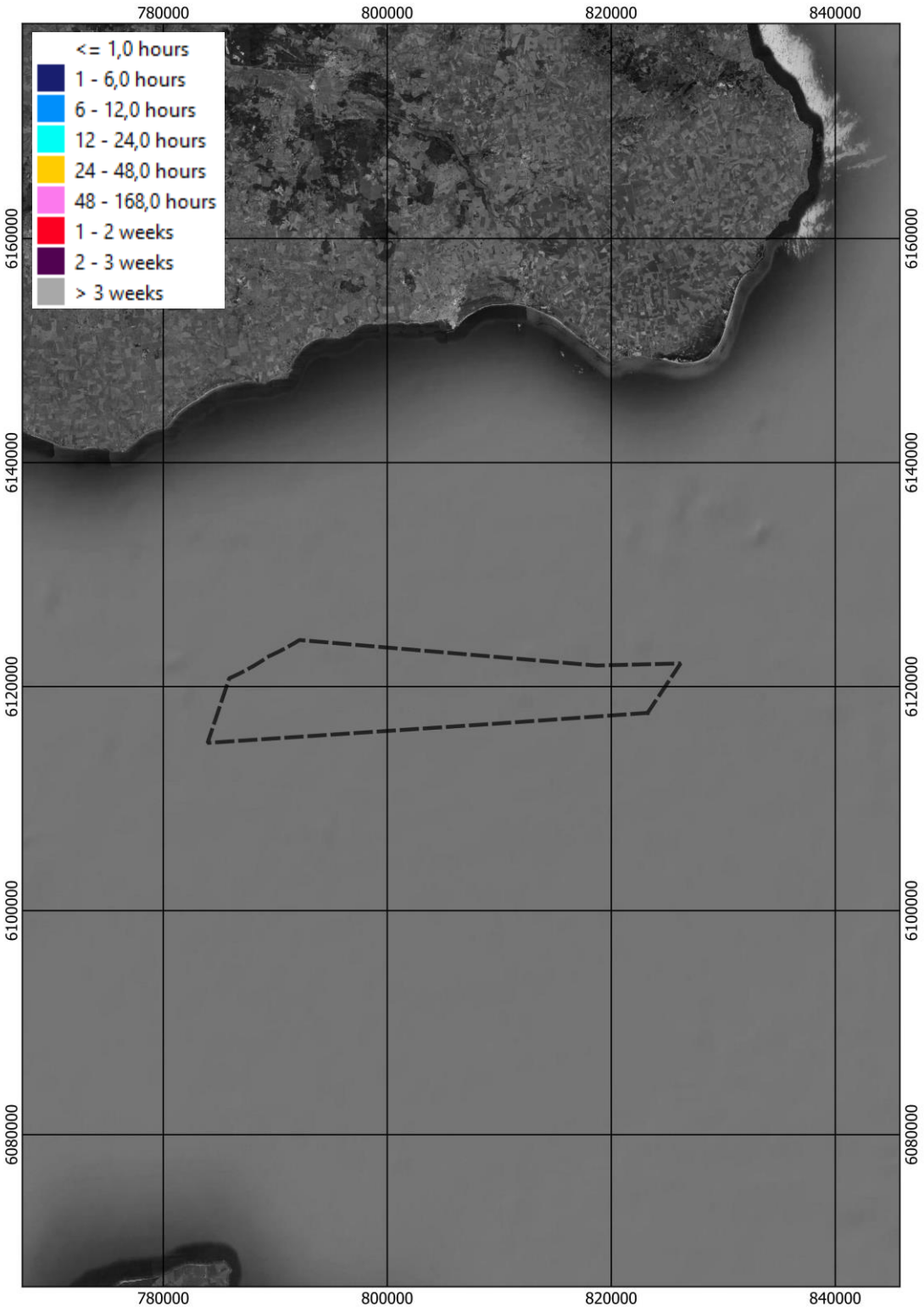
Appendix 44: 15MW MP, Surface – Duration 10 mg/l, depth average



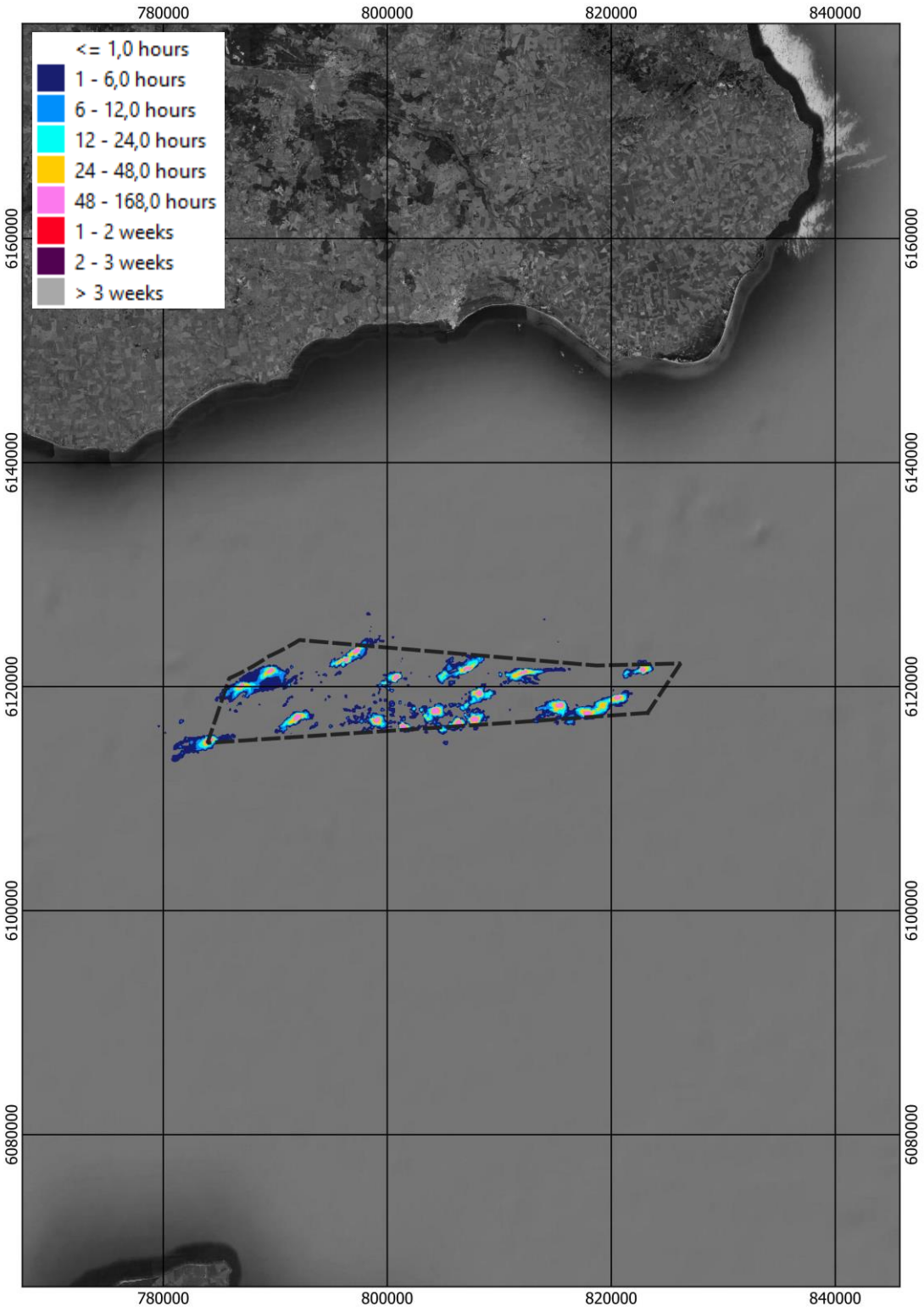
Appendix 45: 15MW MP, Surface – Duration 100 mg/l, depth average



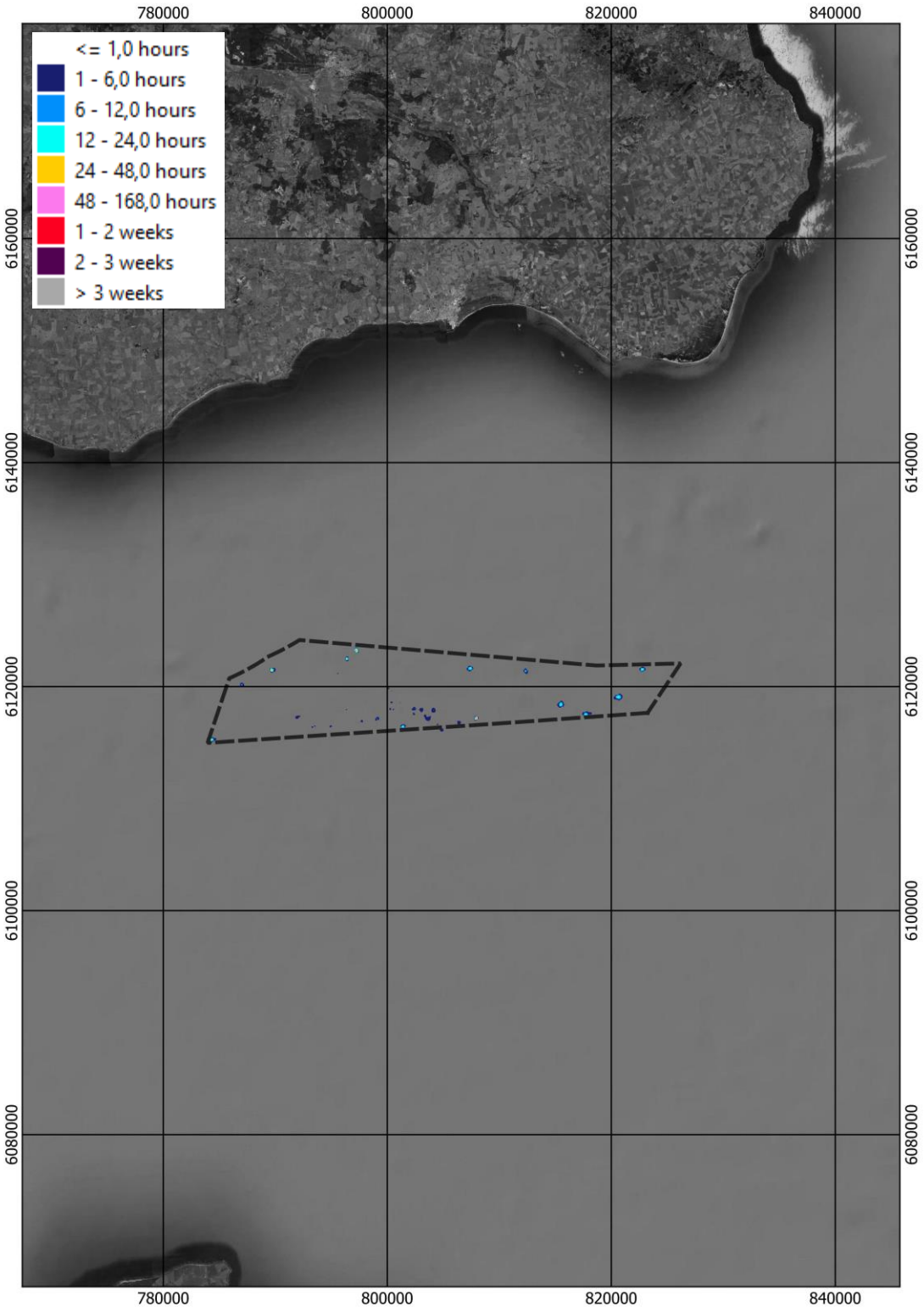
Appendix 46: 15MW MP, Surface – Duration 1000 mg/l, depth average



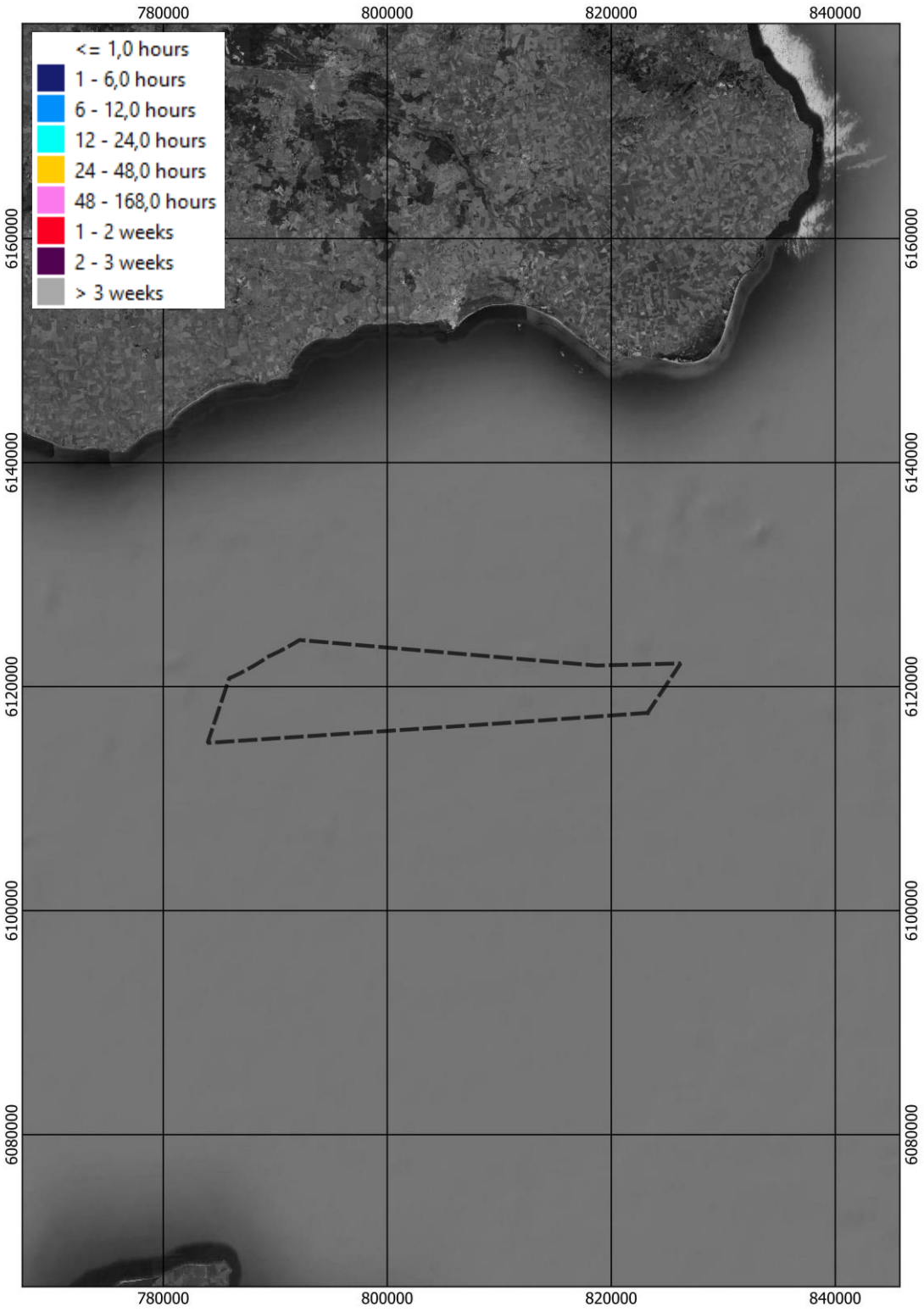
Appendix 47: 15MW MP, Surface – Duration 10 mg/l, upper 10 m



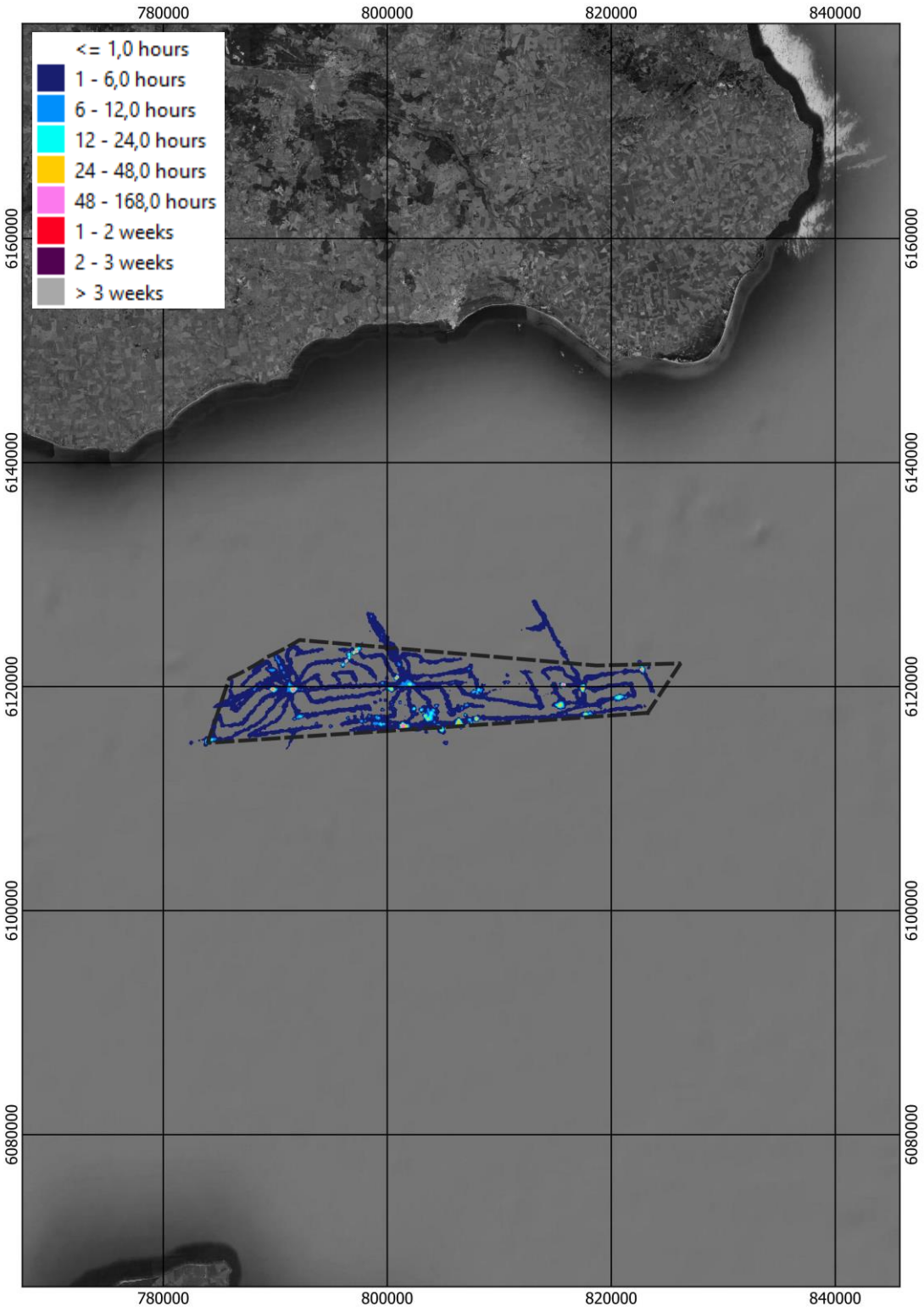
Appendix 48: 15MW MP, Surface – Duration 100 mg/l, upper 10 m



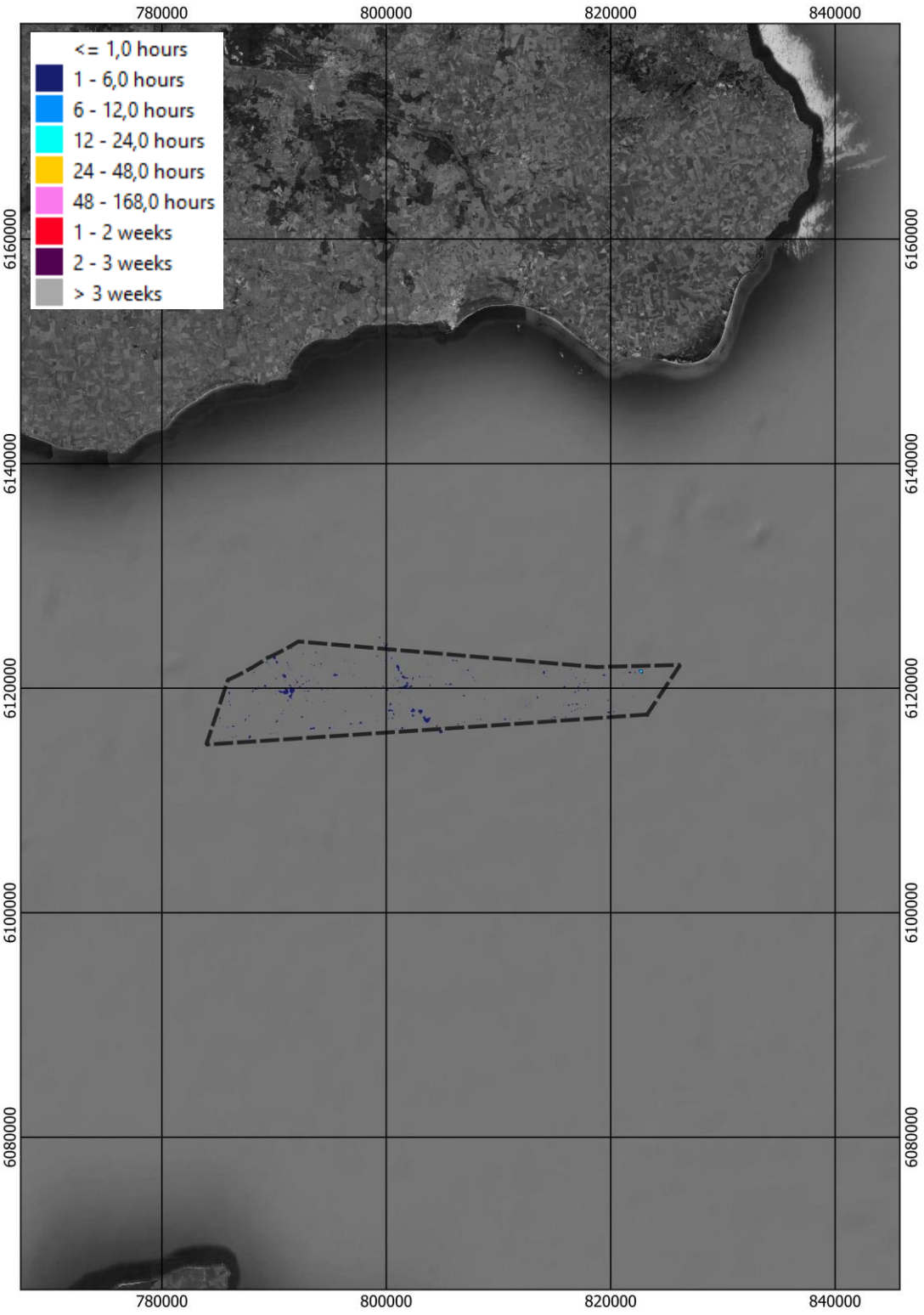
Appendix 49: 15MW MP, Surface – Duration 1000 mg/l, upper 10 m



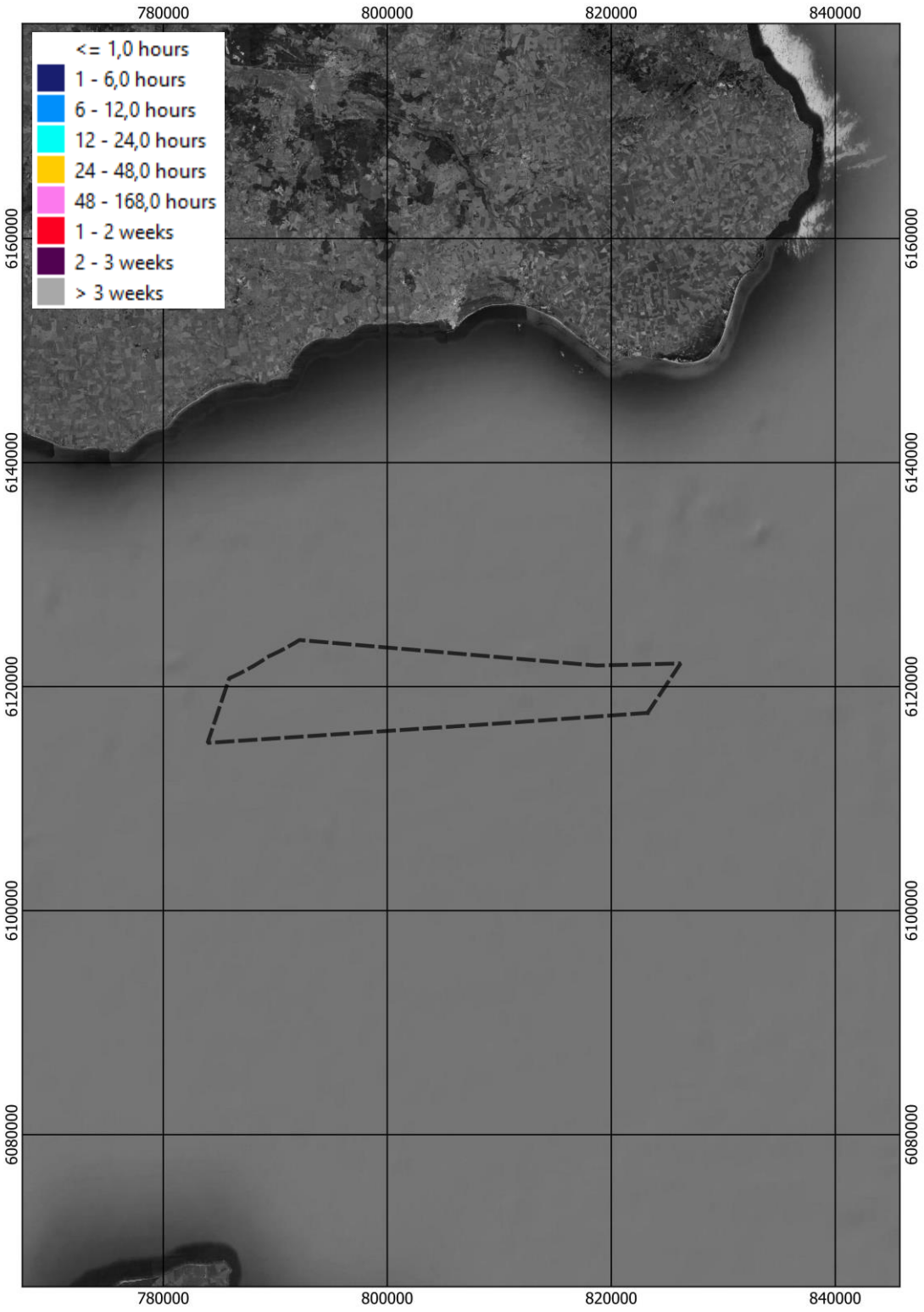
Appendix 50: 15MW MP, Surface – Duration 10 mg/l, lower 10 m



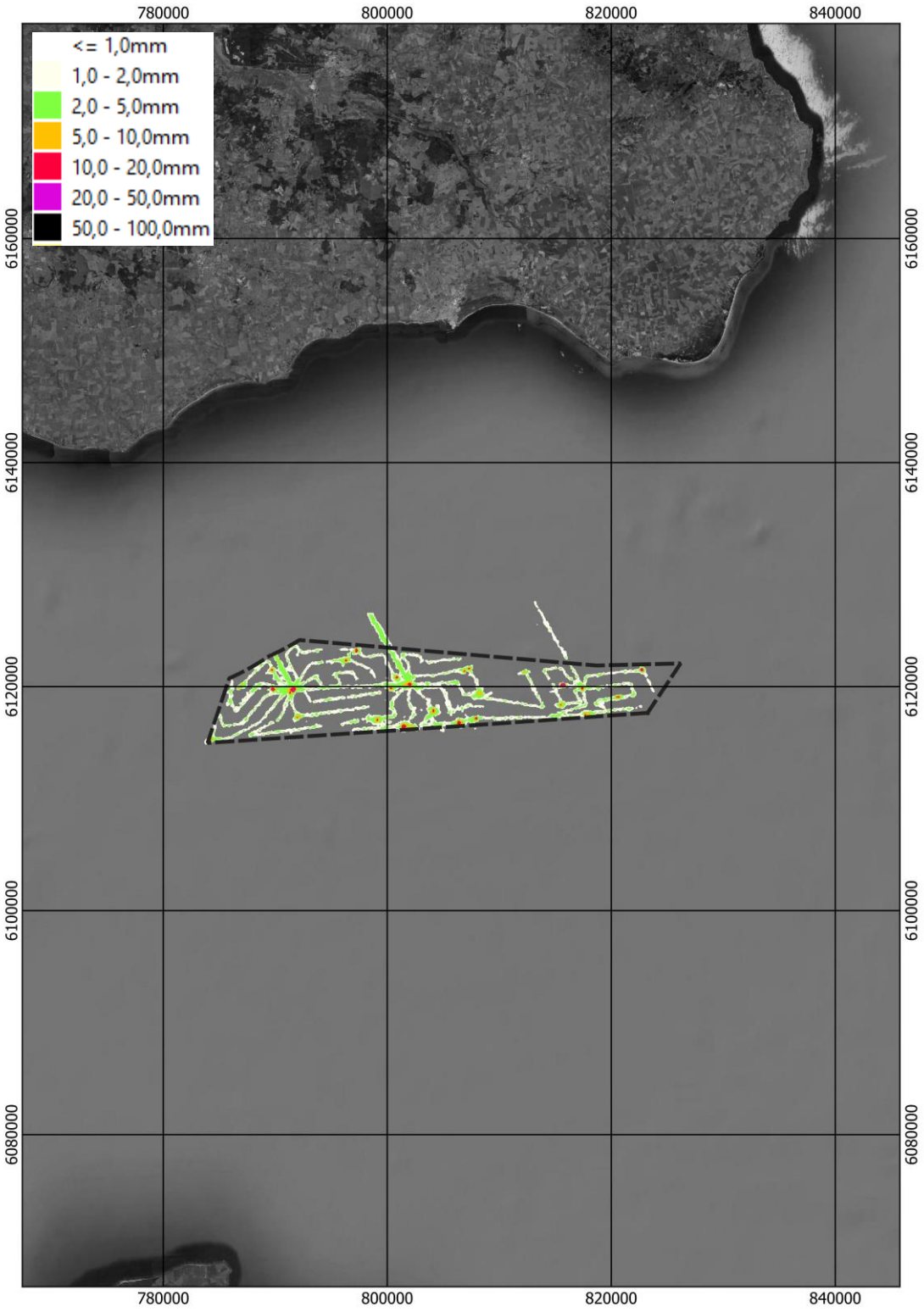
Appendix 51: 15MW MP, Surface – Duration 100 mg/l, lower 10 m



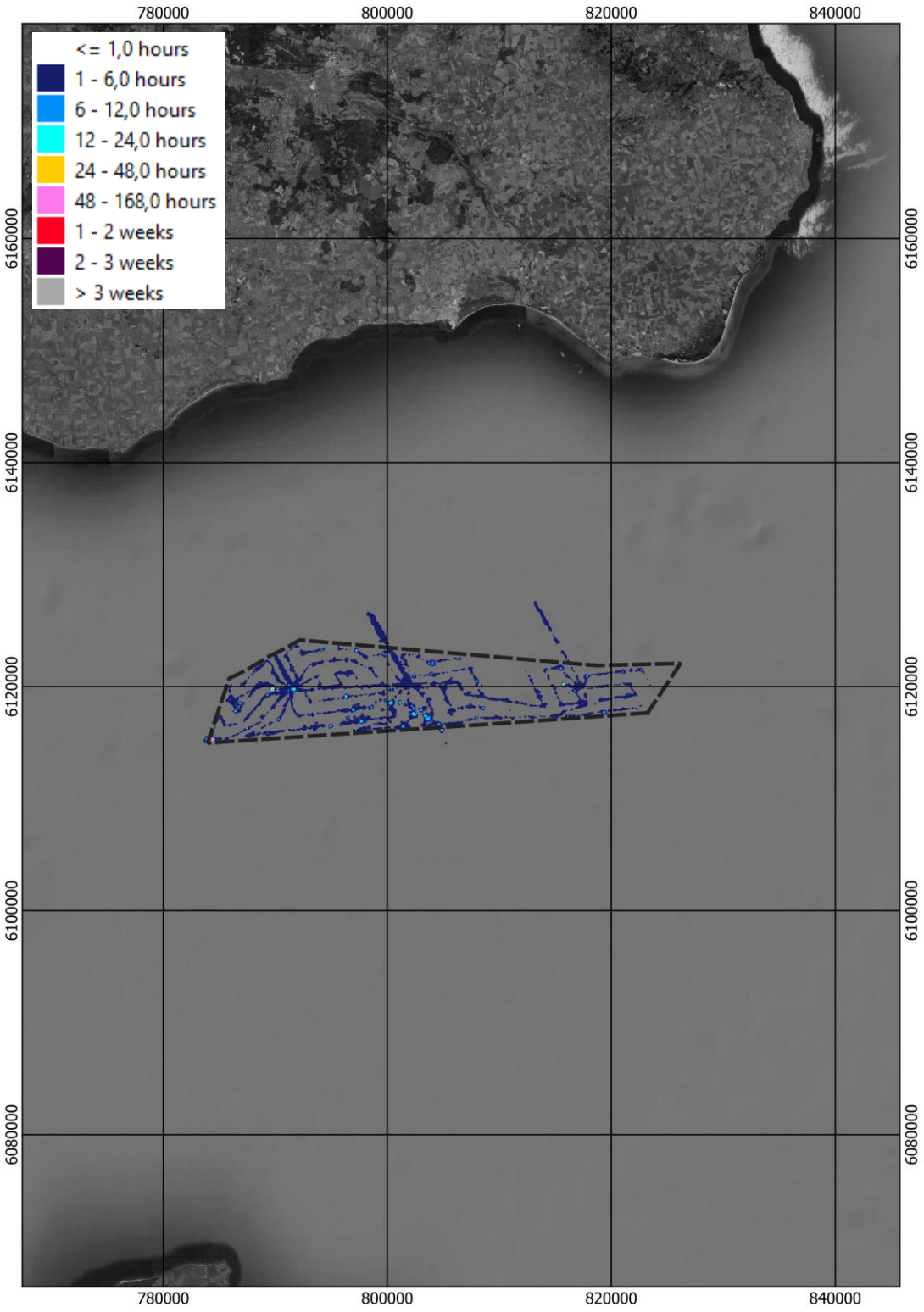
Appendix 52: 15MW MP, Surface – Duration 1000 mg/l, lower 10 m



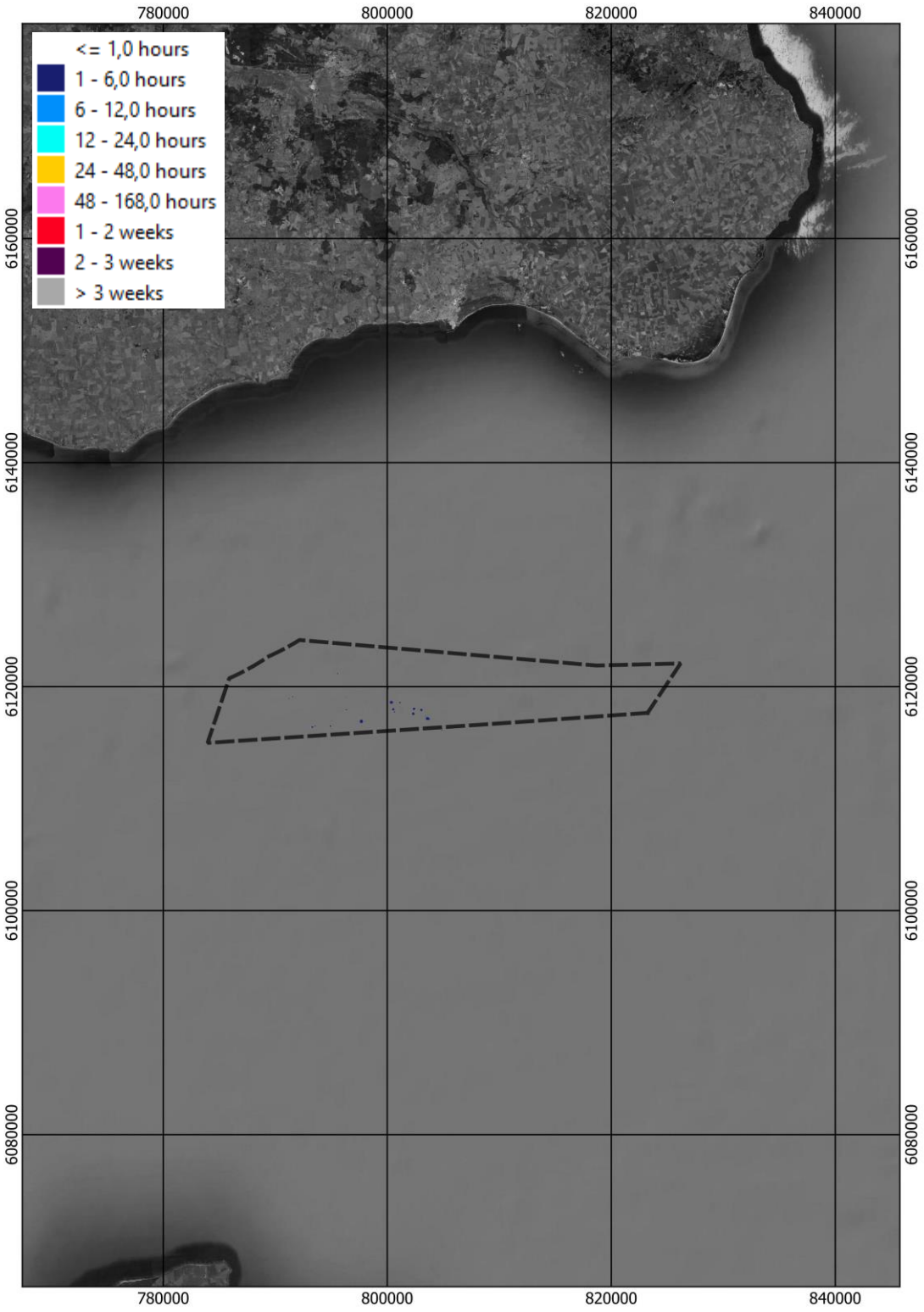
Appendix 53: 15MW MP, Surface – Maximum sedimentation in mm



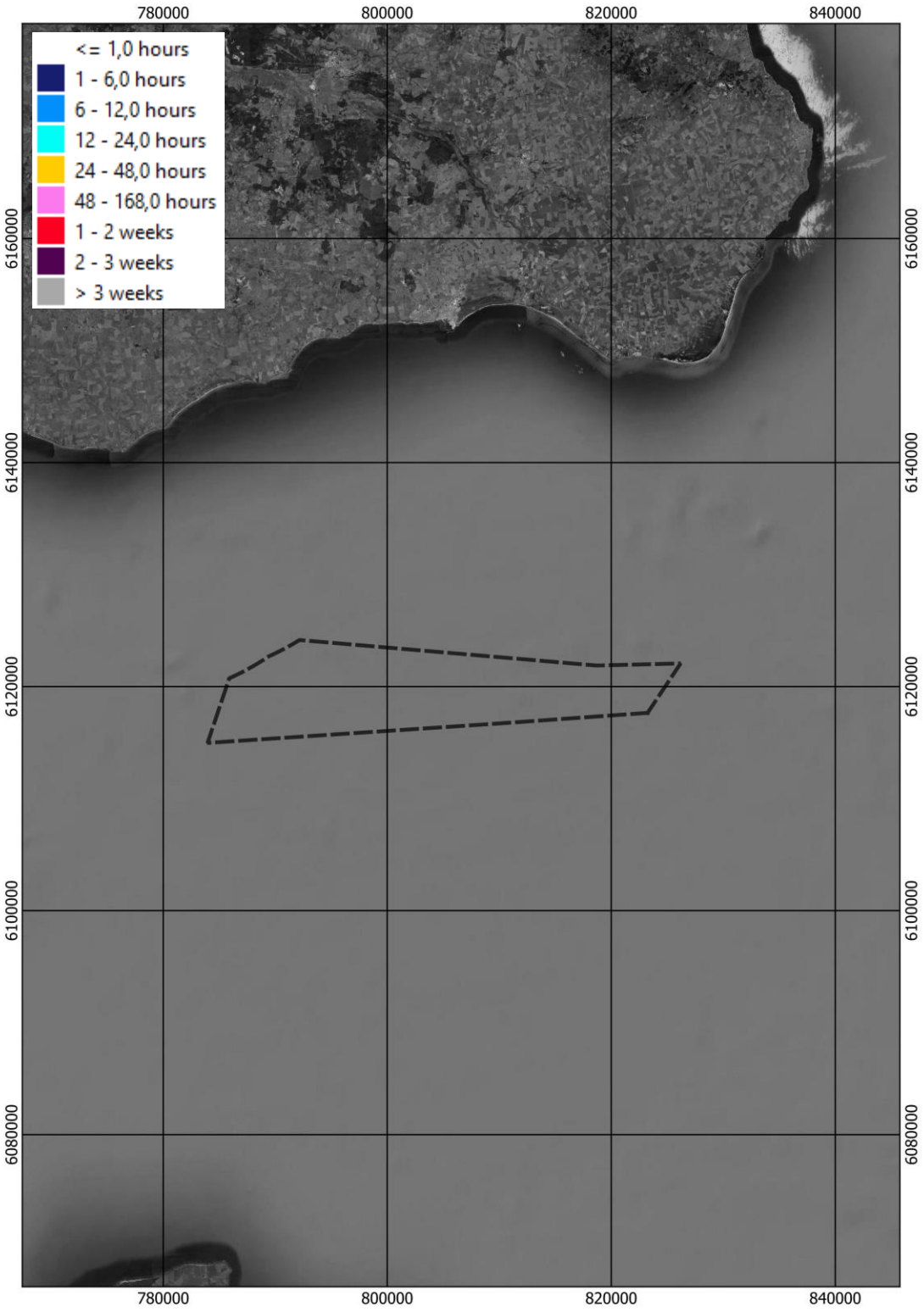
Appendix 54: 15MW GBS, Duration 10 mg/l, depth average



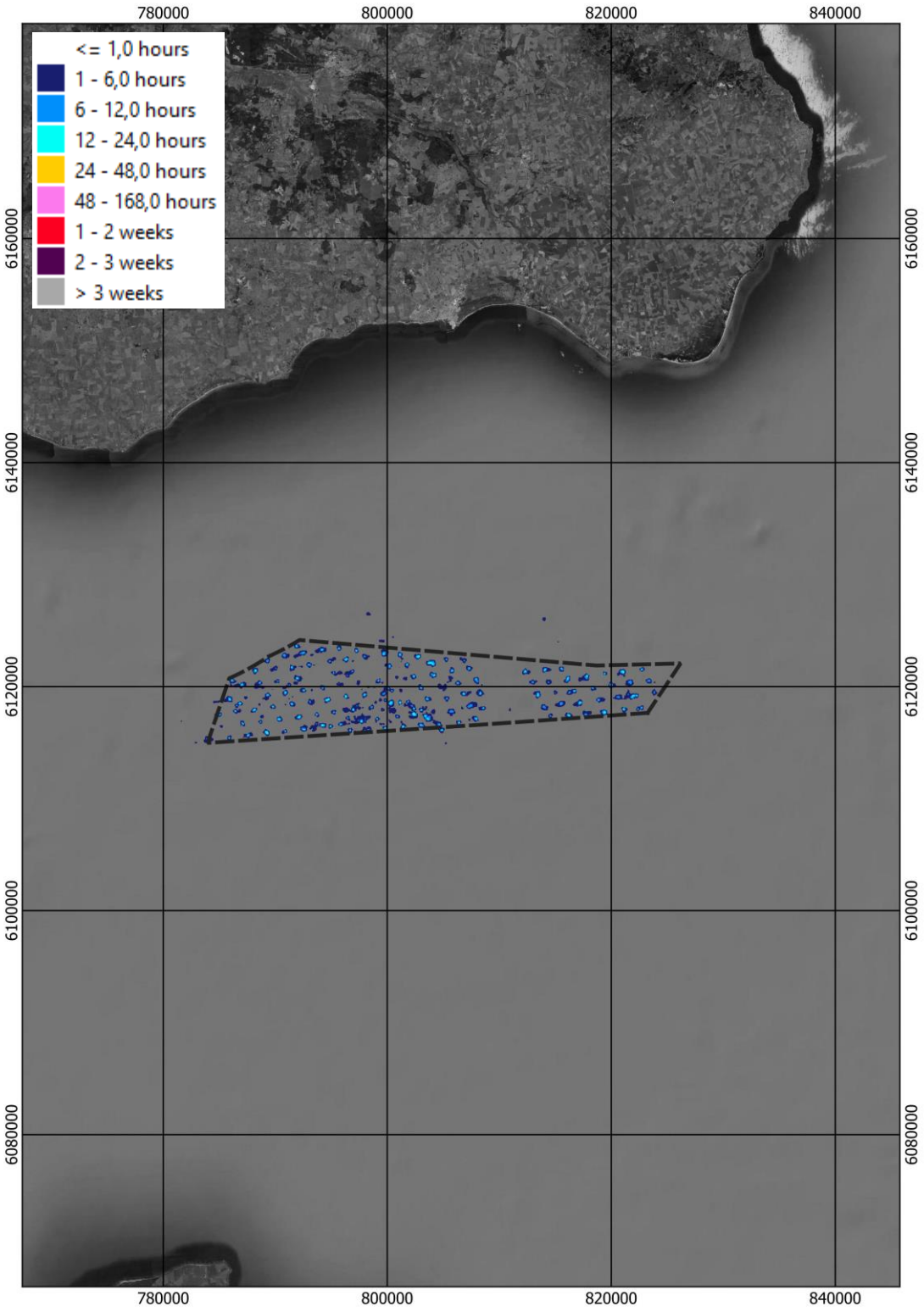
Appendix 55: 15MW GBS, Duration 100 mg/l, depth average



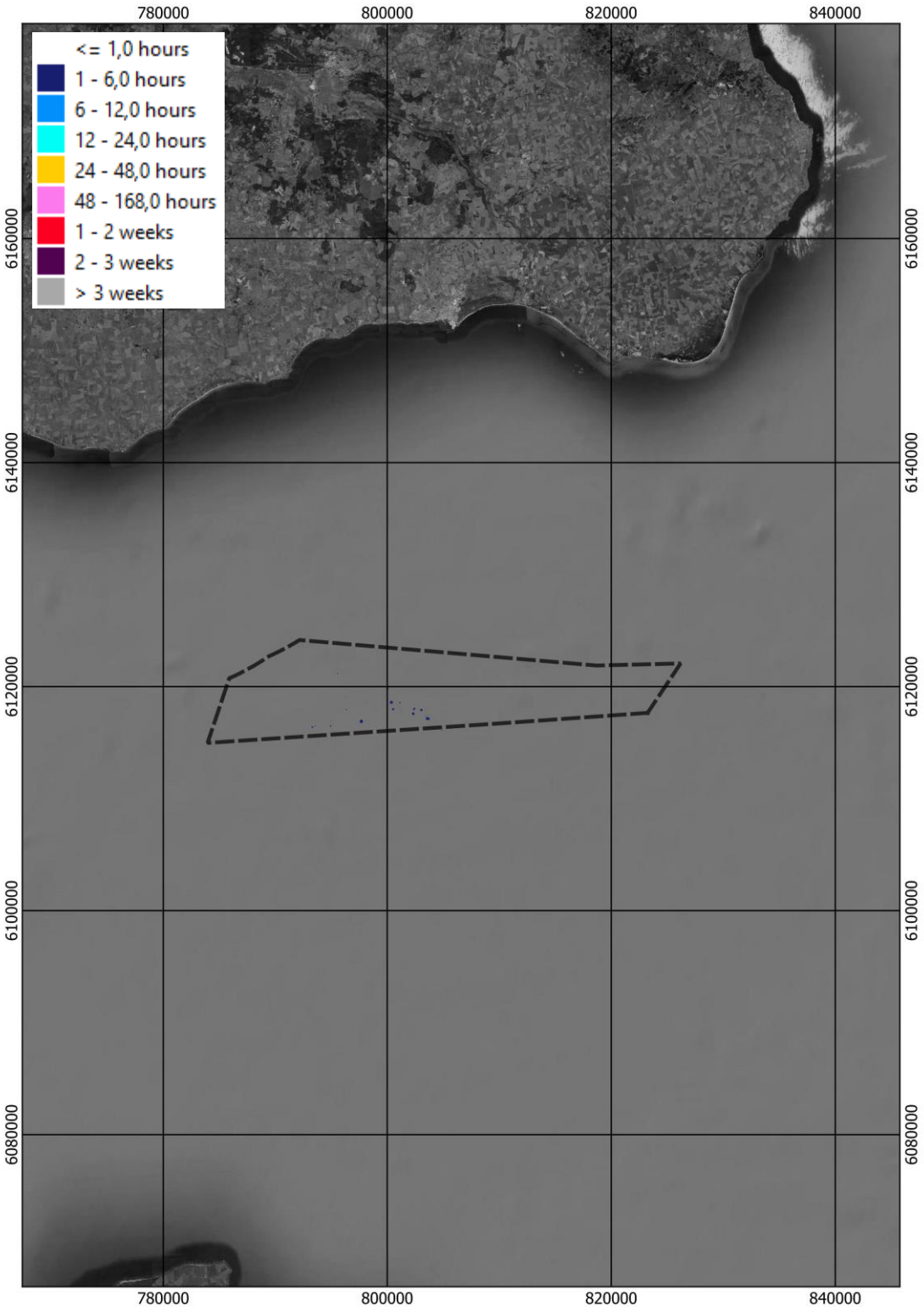
Appendix 56: 15MW GBS, Duration 1000 mg/l, depth average



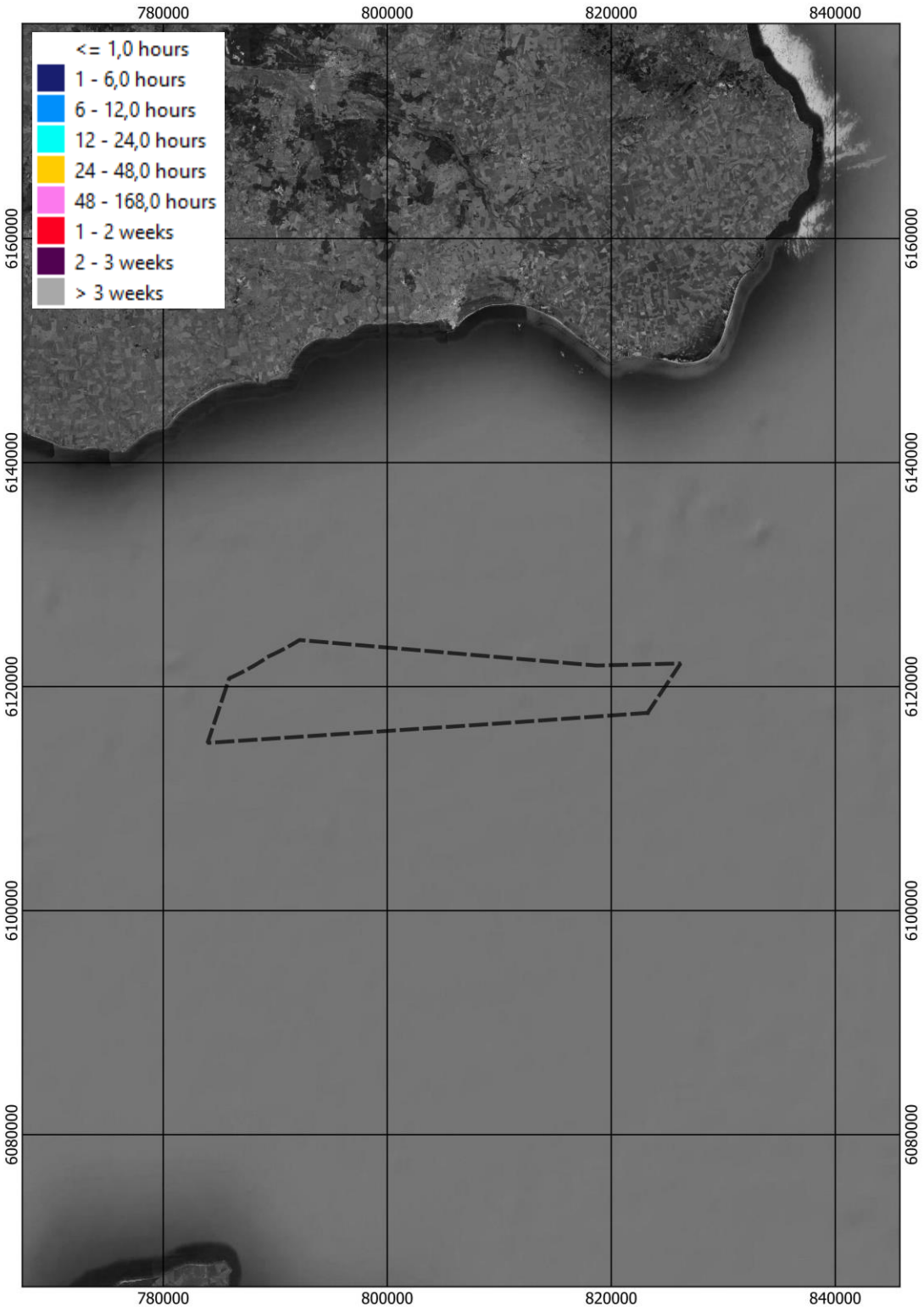
Appendix 57: 15MW GBS, Duration 10 mg/l, upper 10 m



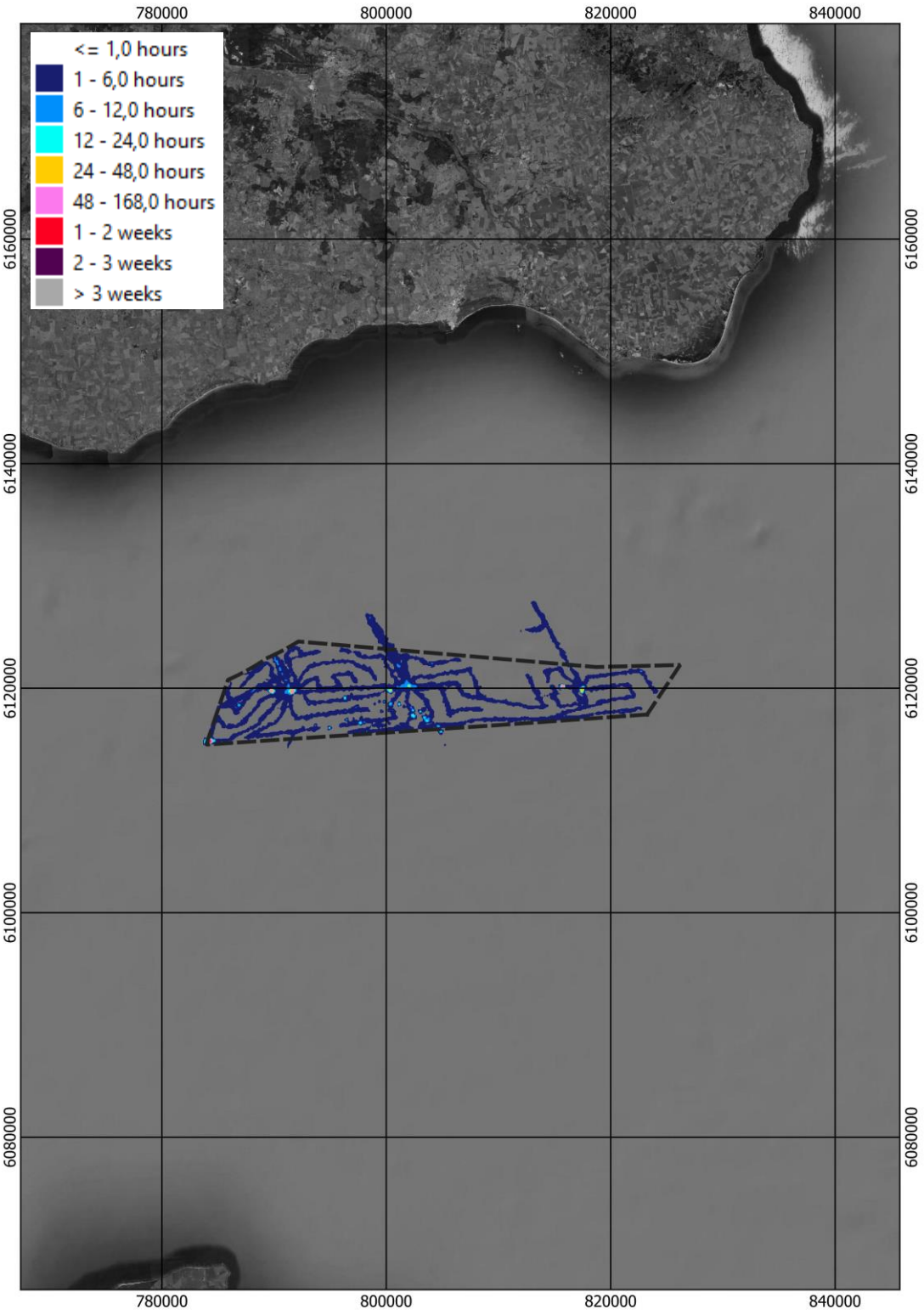
Appendix 58: 15MW GBS, Duration 100 mg/l, upper 10 m



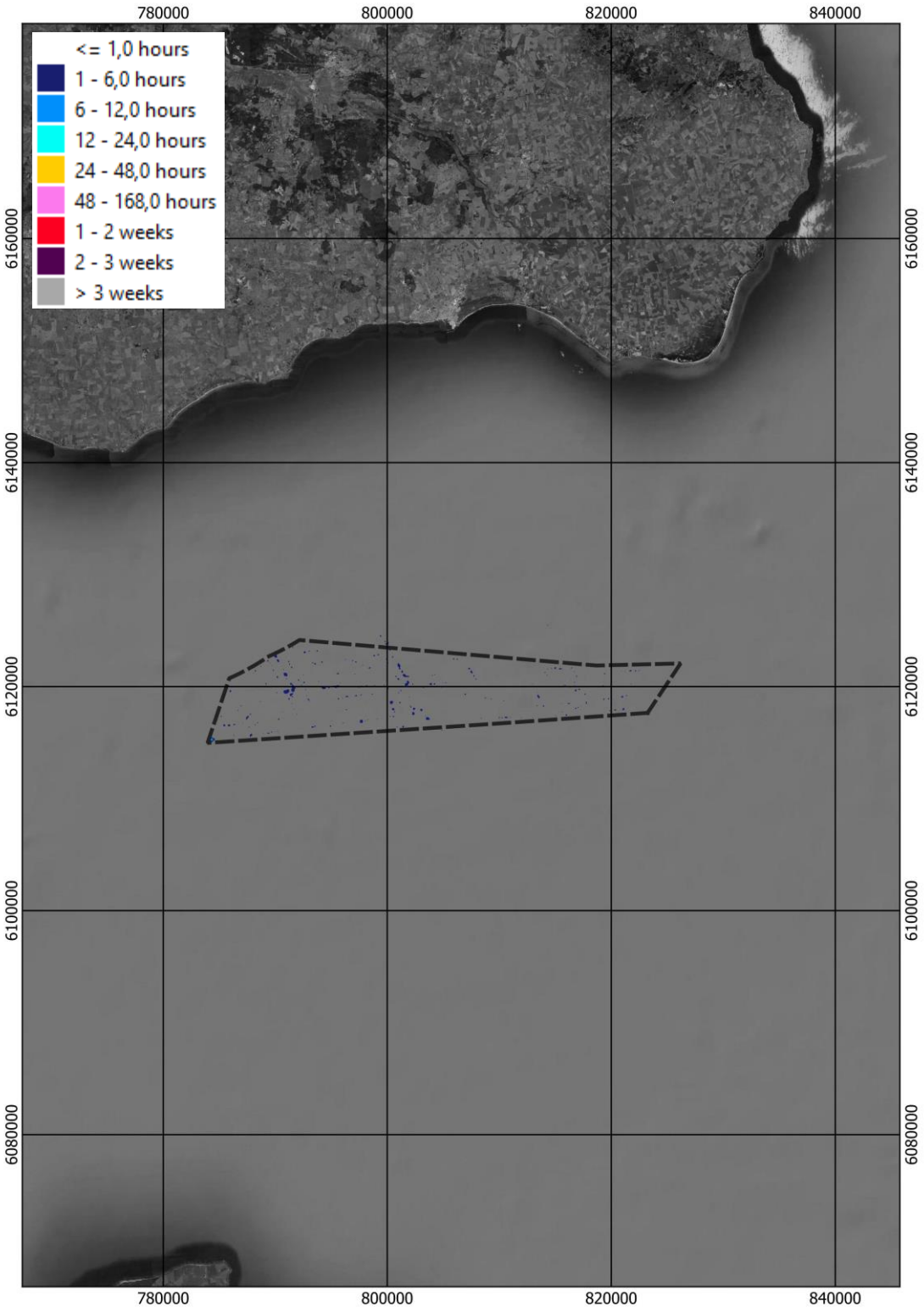
Appendix 59: 15MW GBS, Duration 1000 mg/l, upper 10 m



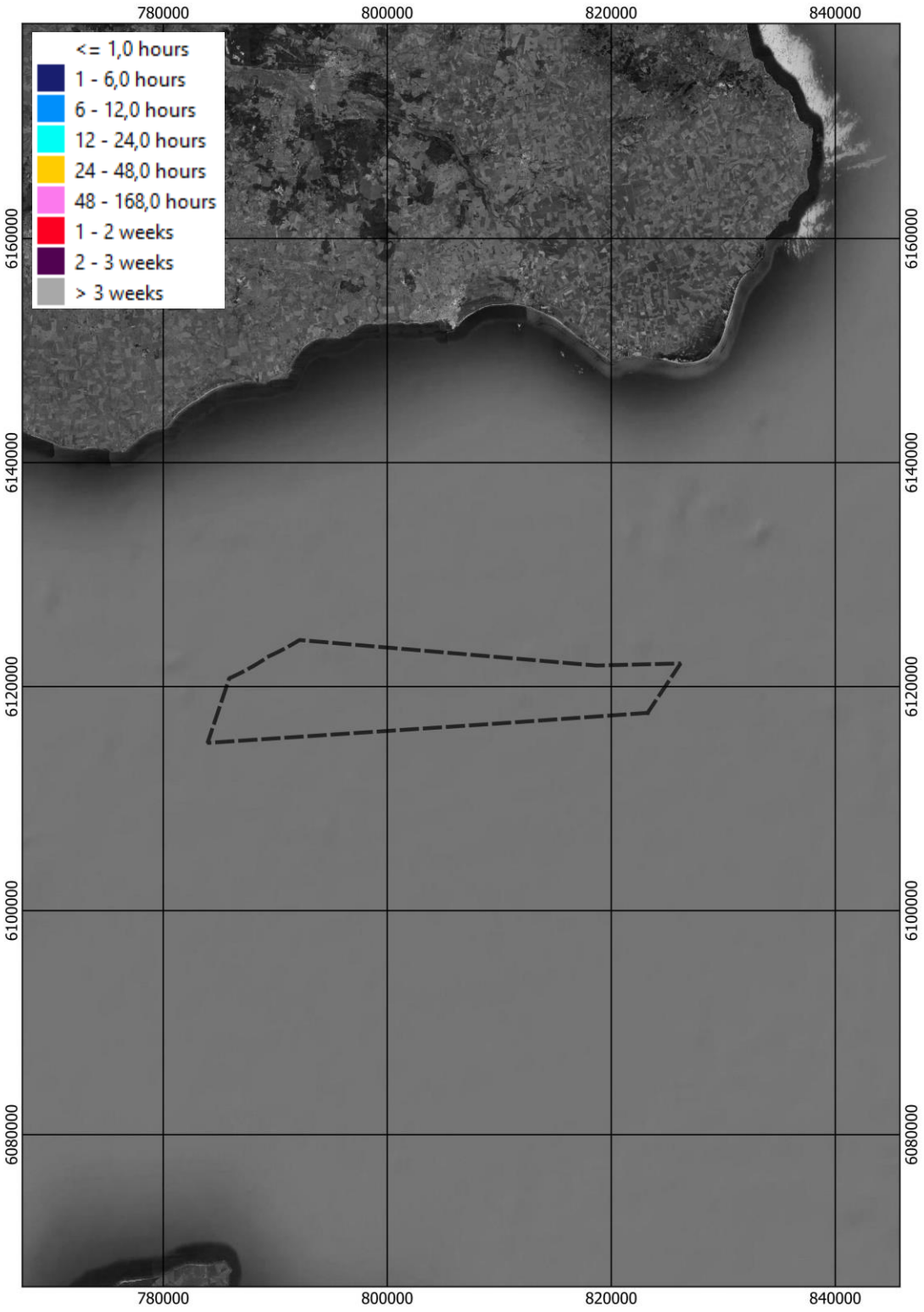
Appendix 60: 15MW GBS, Duration 10 mg/l, lower 10 m



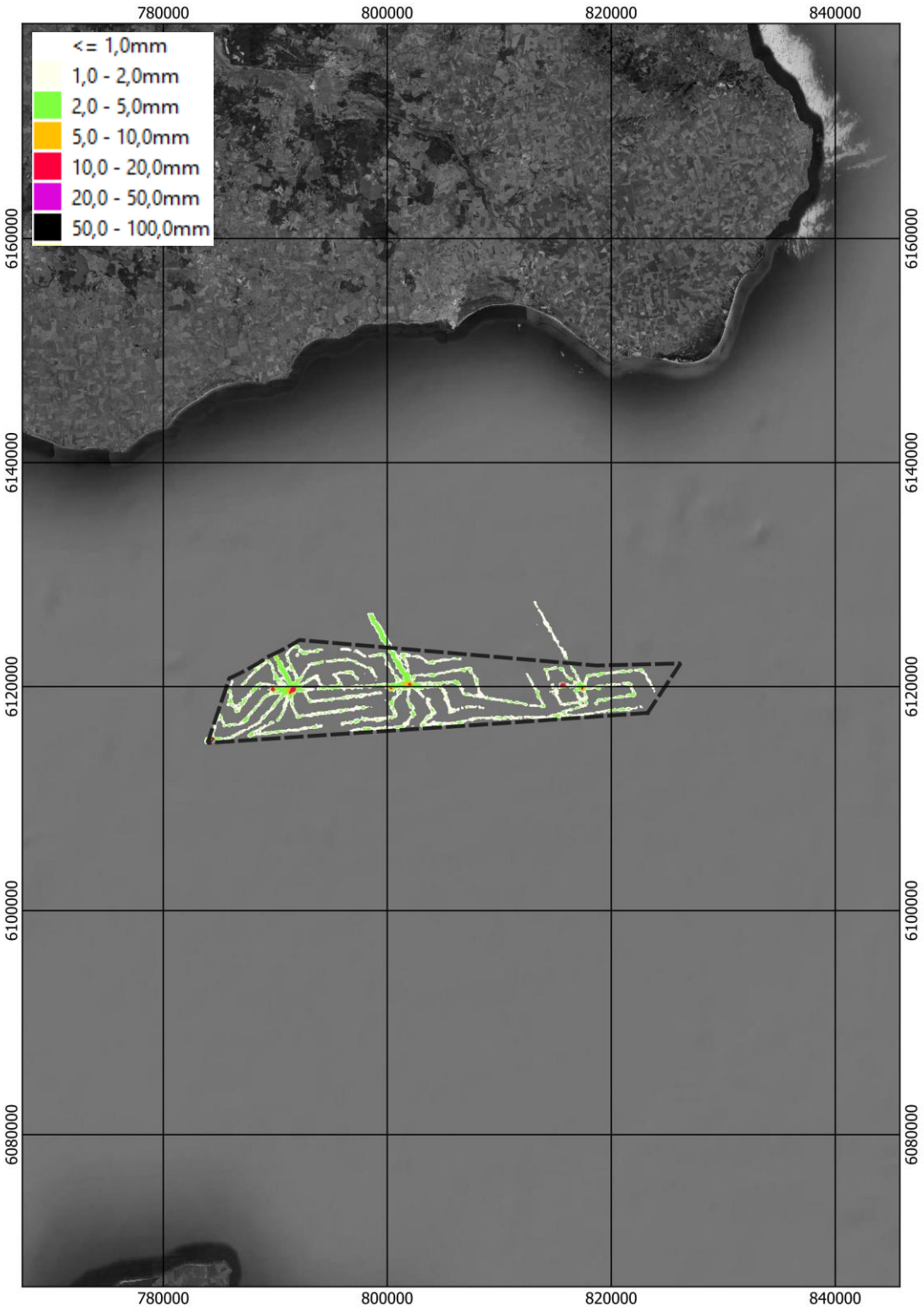
Appendix 61: 15MW GBS, Duration 100 mg/l, lower 10 m



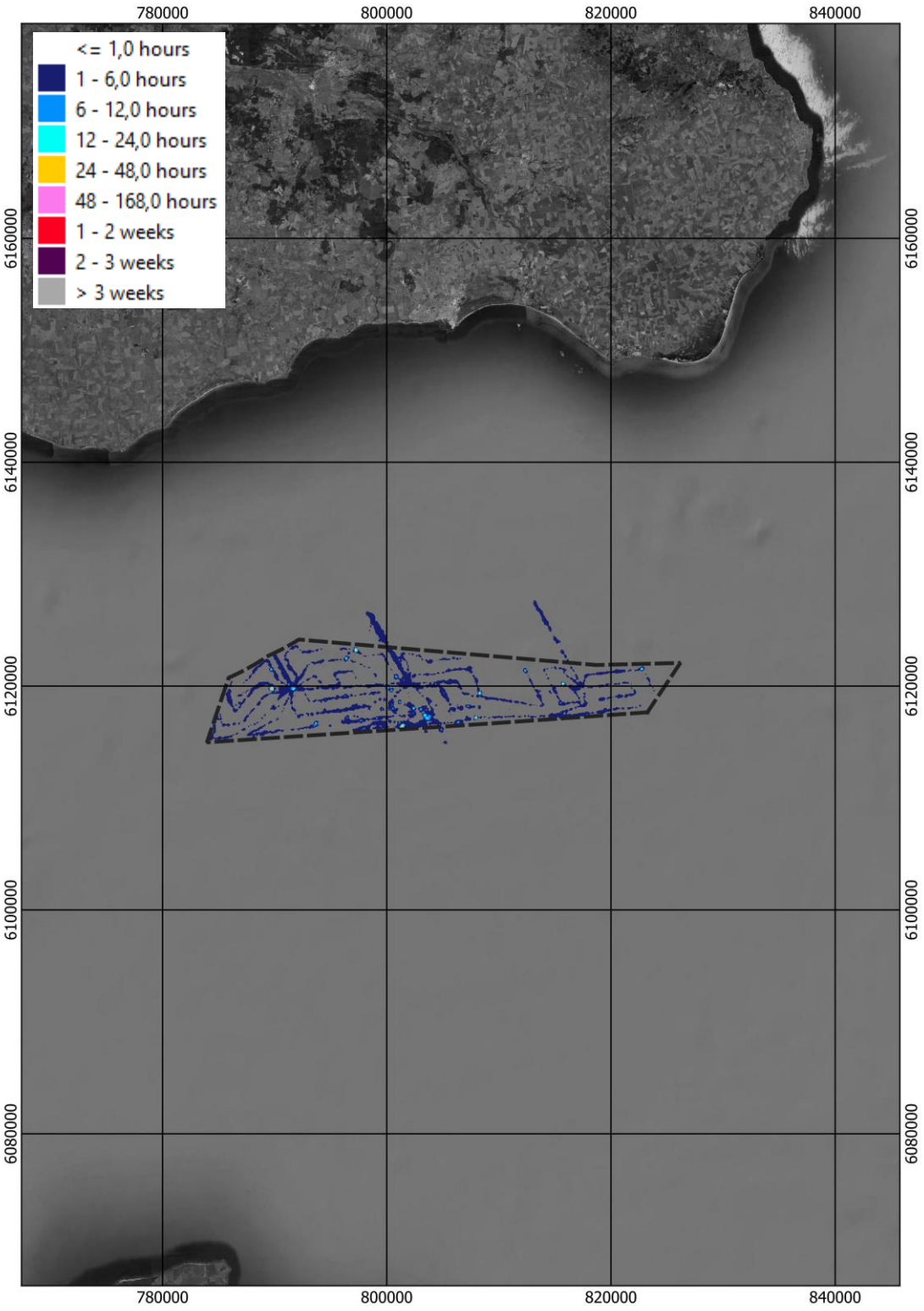
Appendix 62: 15MW GBS, Duration 1000 mg/l, lower 10 m



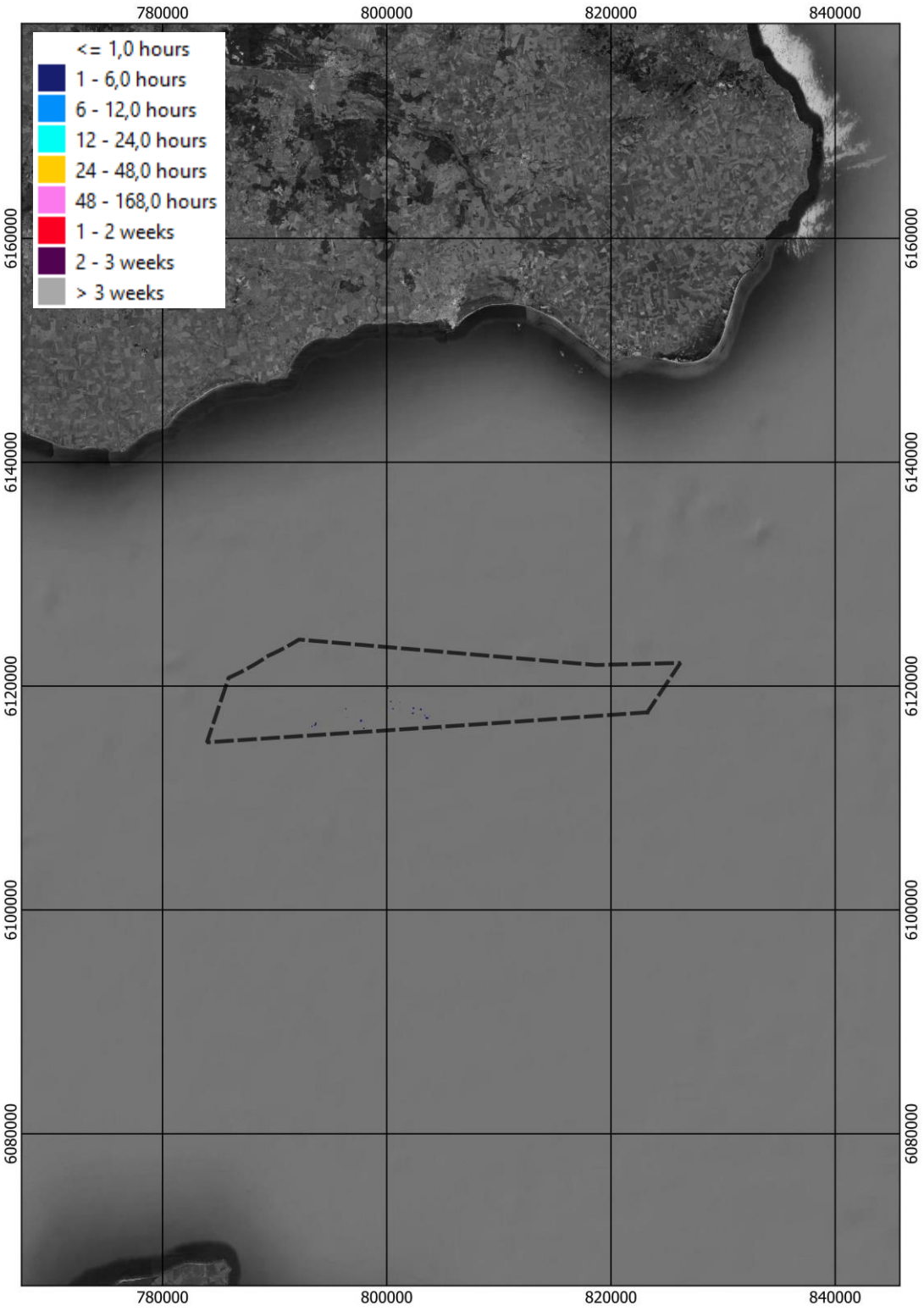
Appendix 63: 15MW GBS, Maximum sedimentation in mm



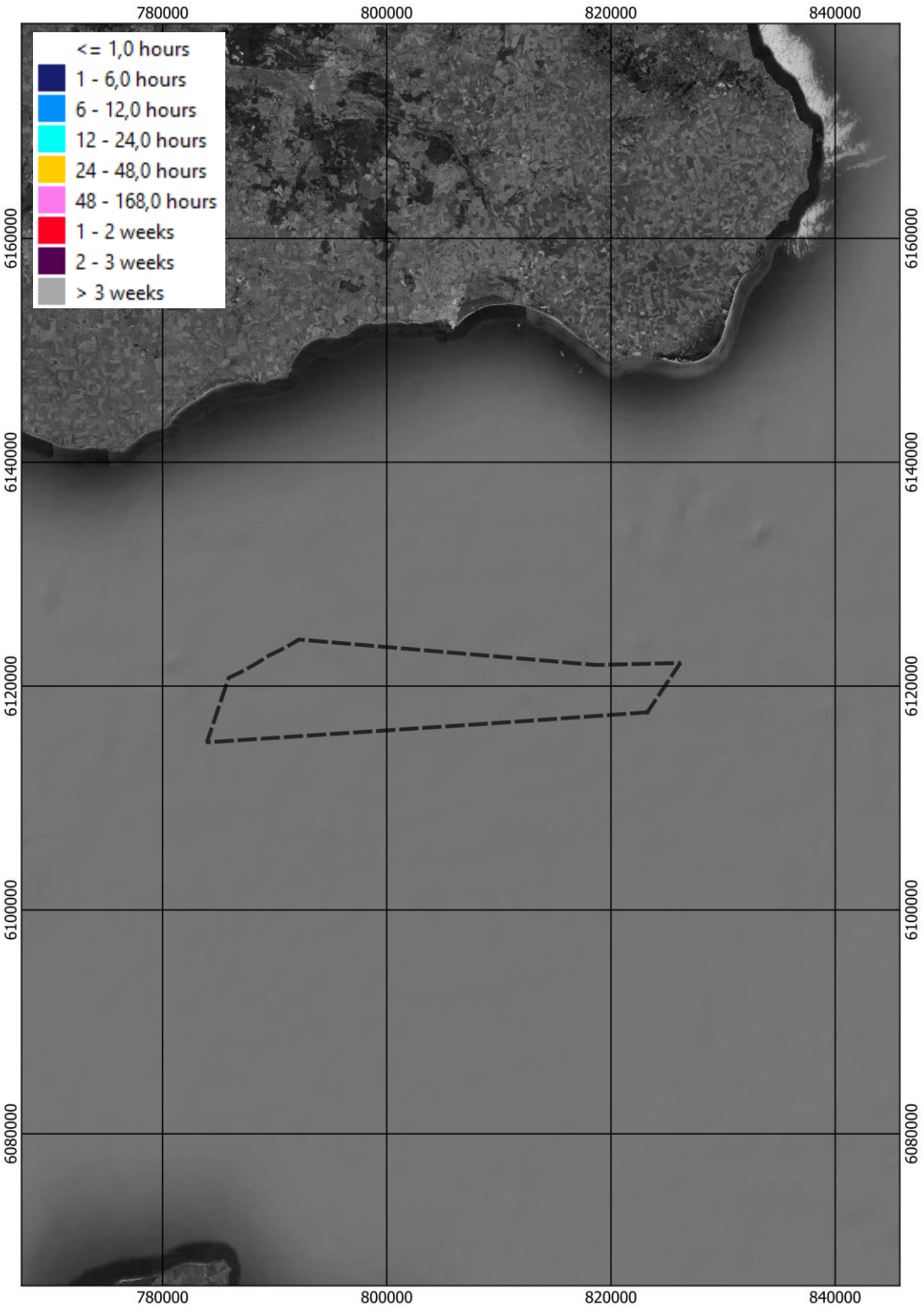
Appendix 64: 15MW Jacket, Bottom – Duration 10 mg/l, depth average



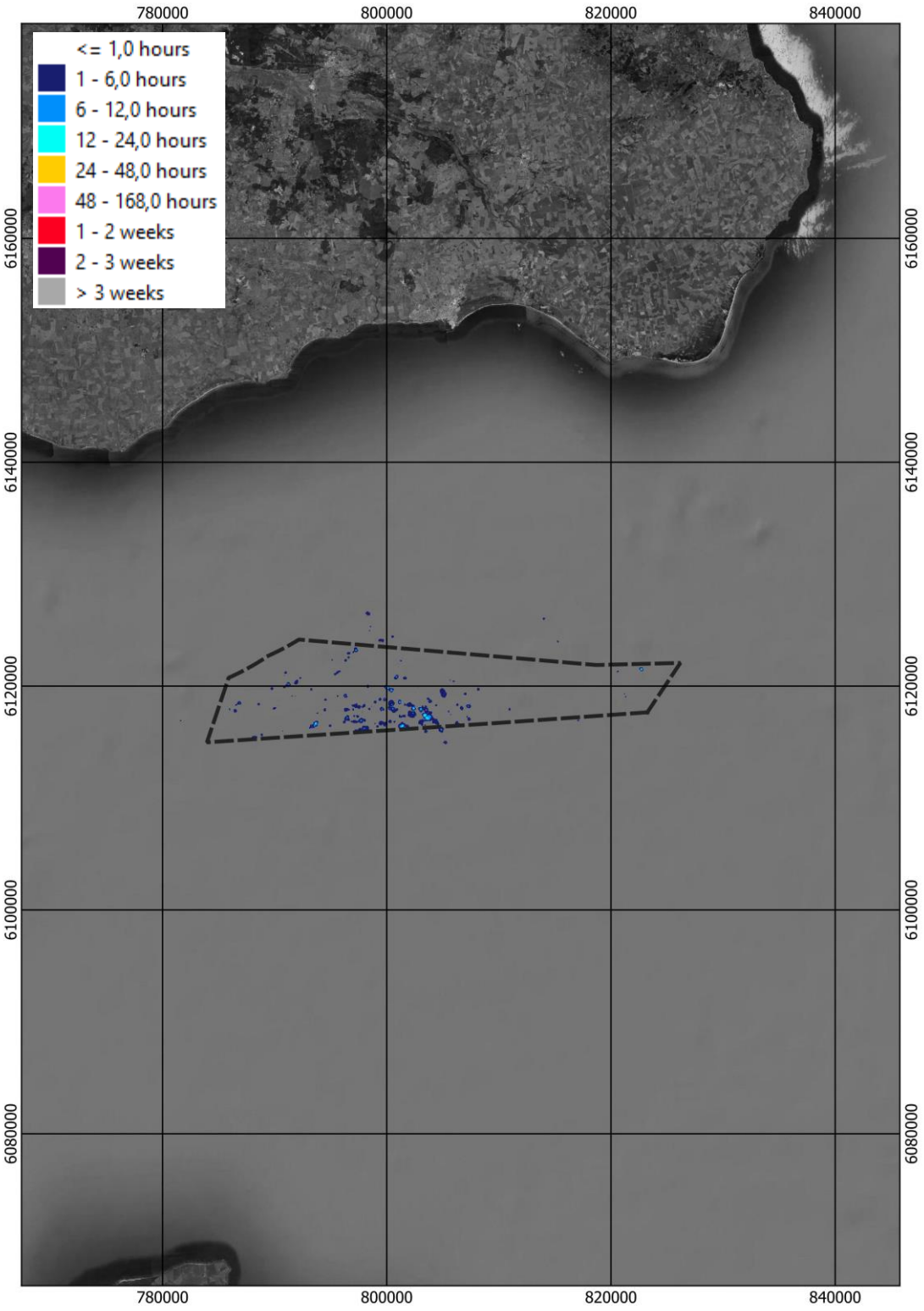
Appendix 65: 15MW Jacket, Bottom – Duration 100 mg/l, depth average



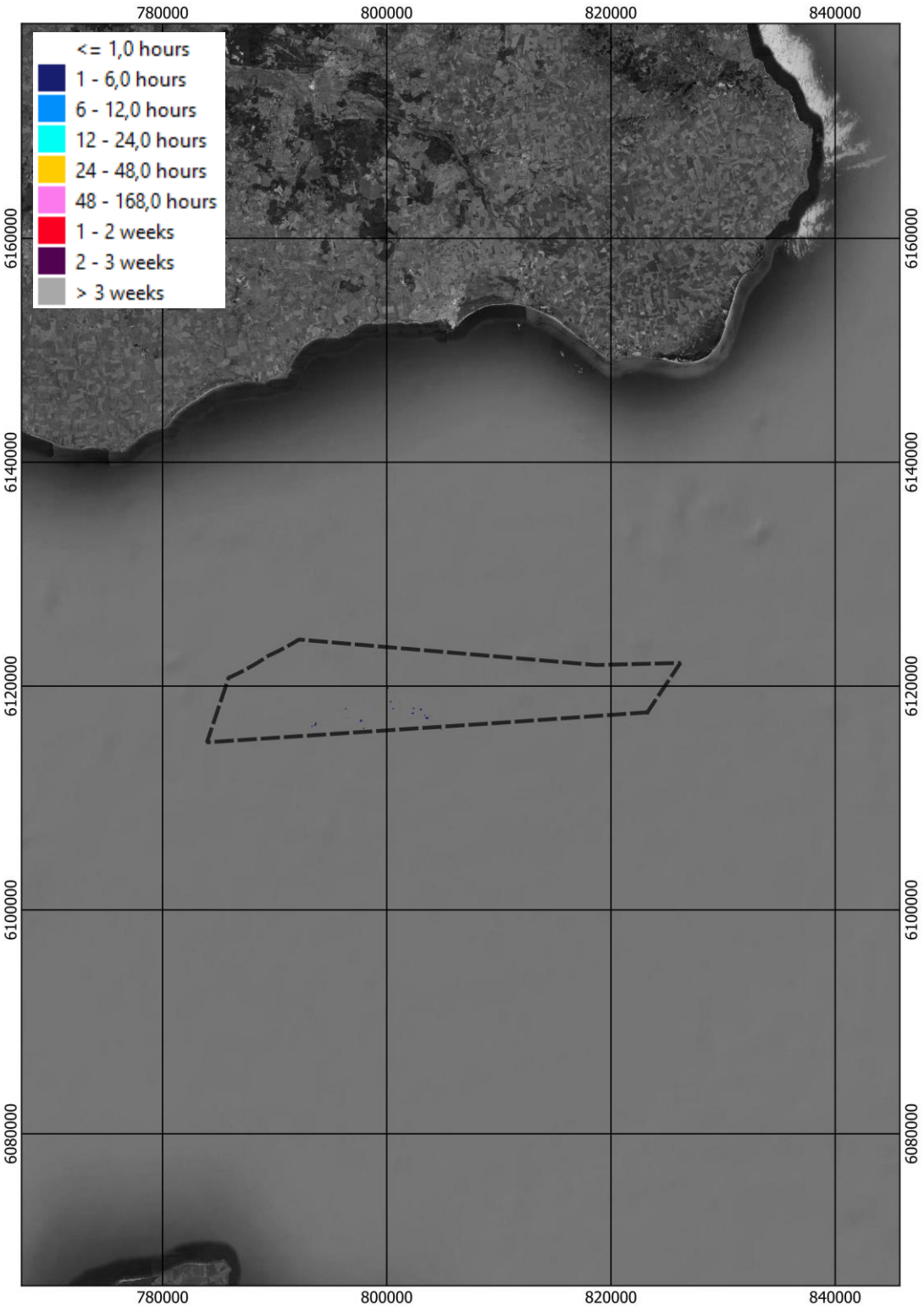
Appendix 66: 15MW Jacket, Bottom – Duration 1000 mg/l, depth average



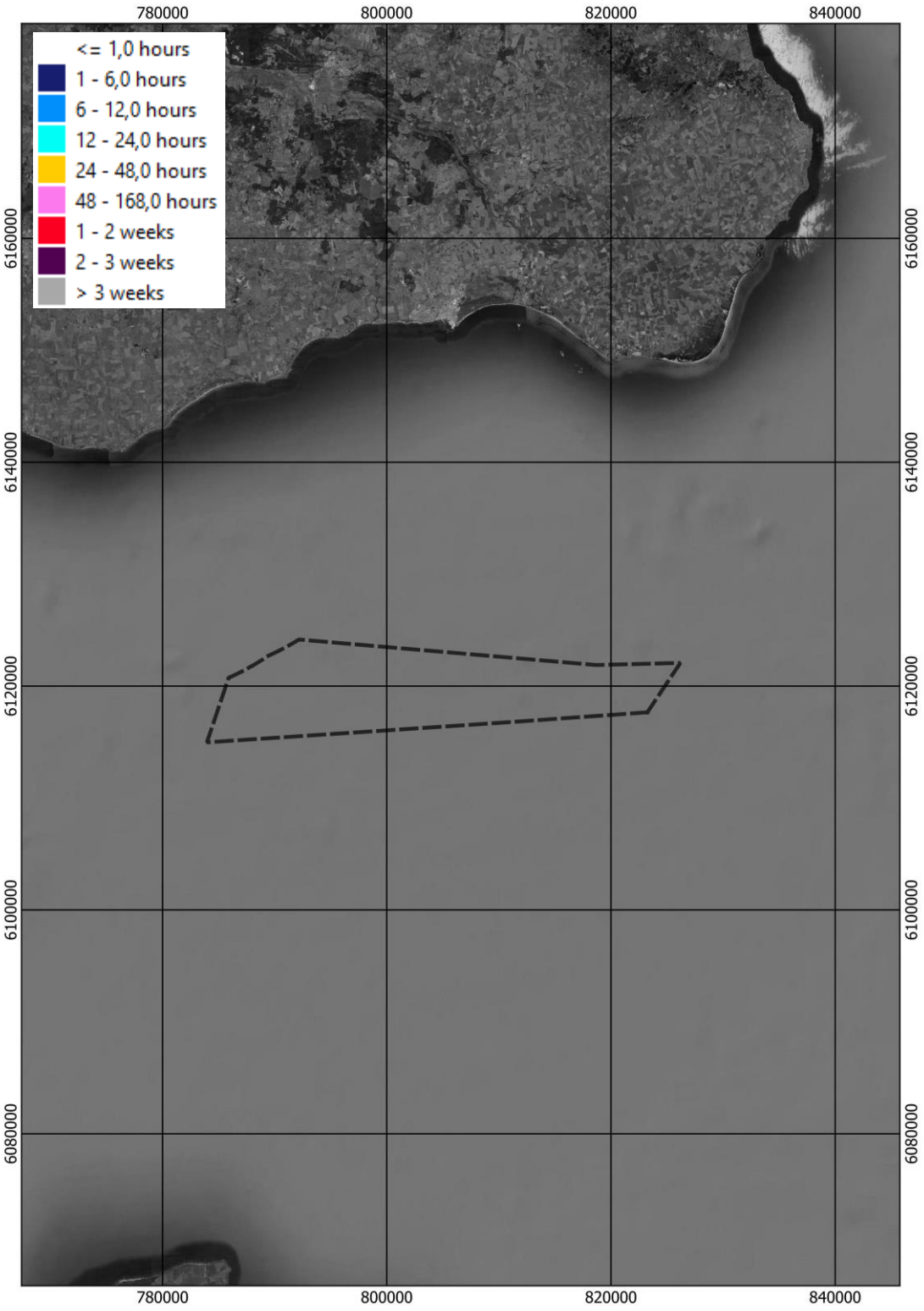
Appendix 67: 15MW Jacket, Bottom – Duration 10 mg/l, upper 10 m



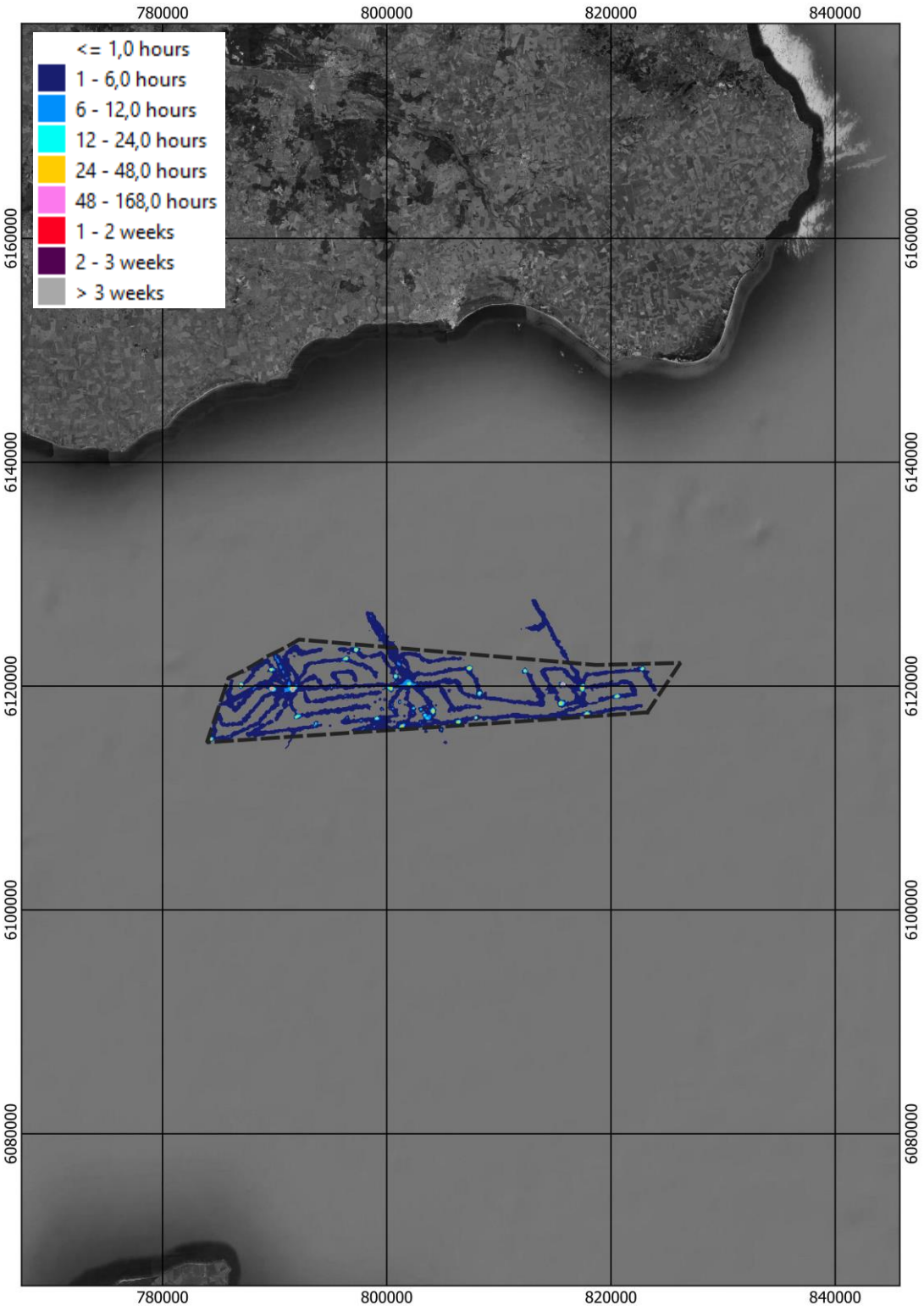
Appendix 68: 15MW Jacket, Bottom – Duration 100 mg/l, upper 10 m



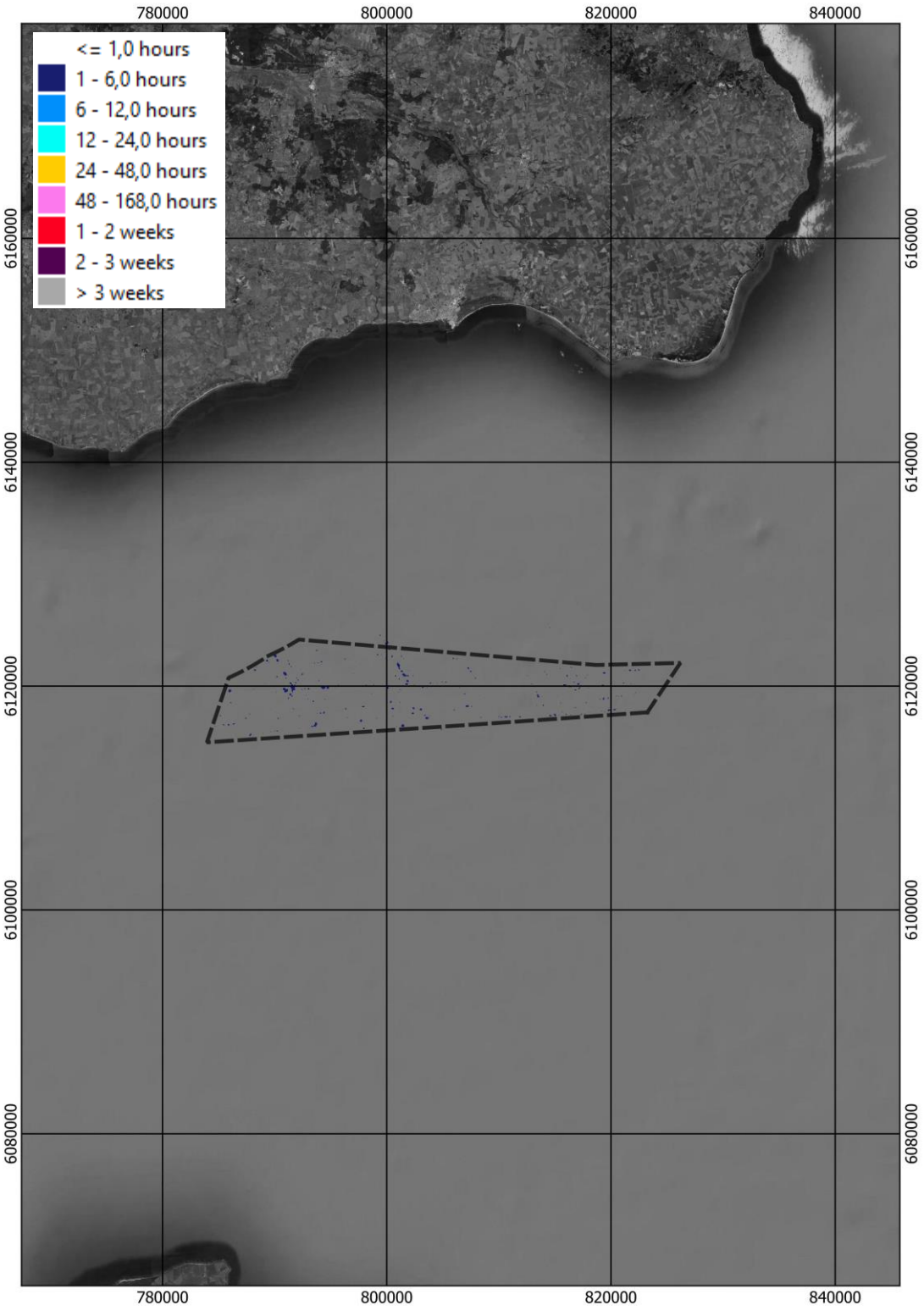
Appendix 69: 15MW Jacket, Bottom – Duration 1000 mg/l, upper 10 m



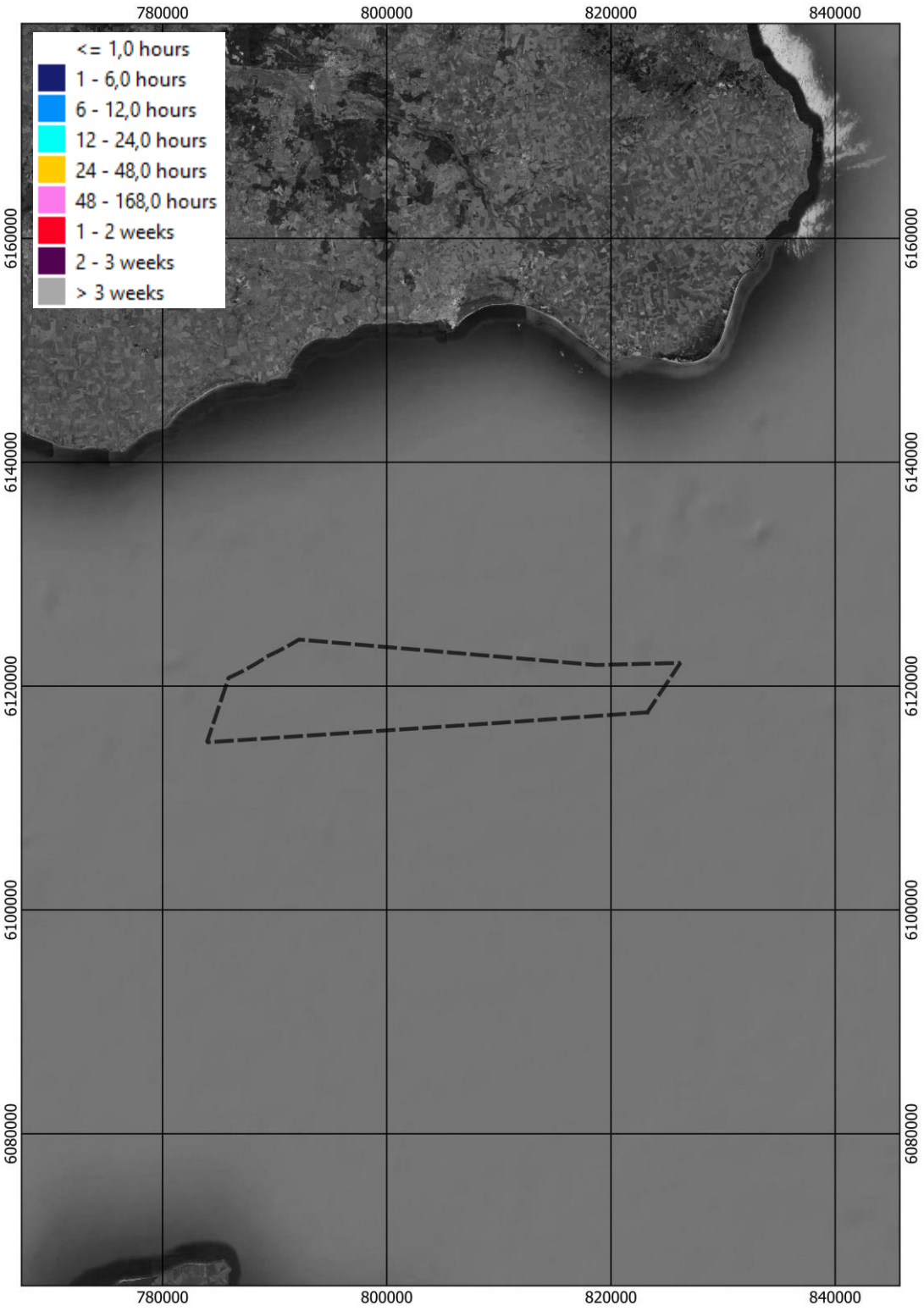
Appendix 70: 15MW Jacket, Bottom – Duration 10 mg/l, lower 10 m



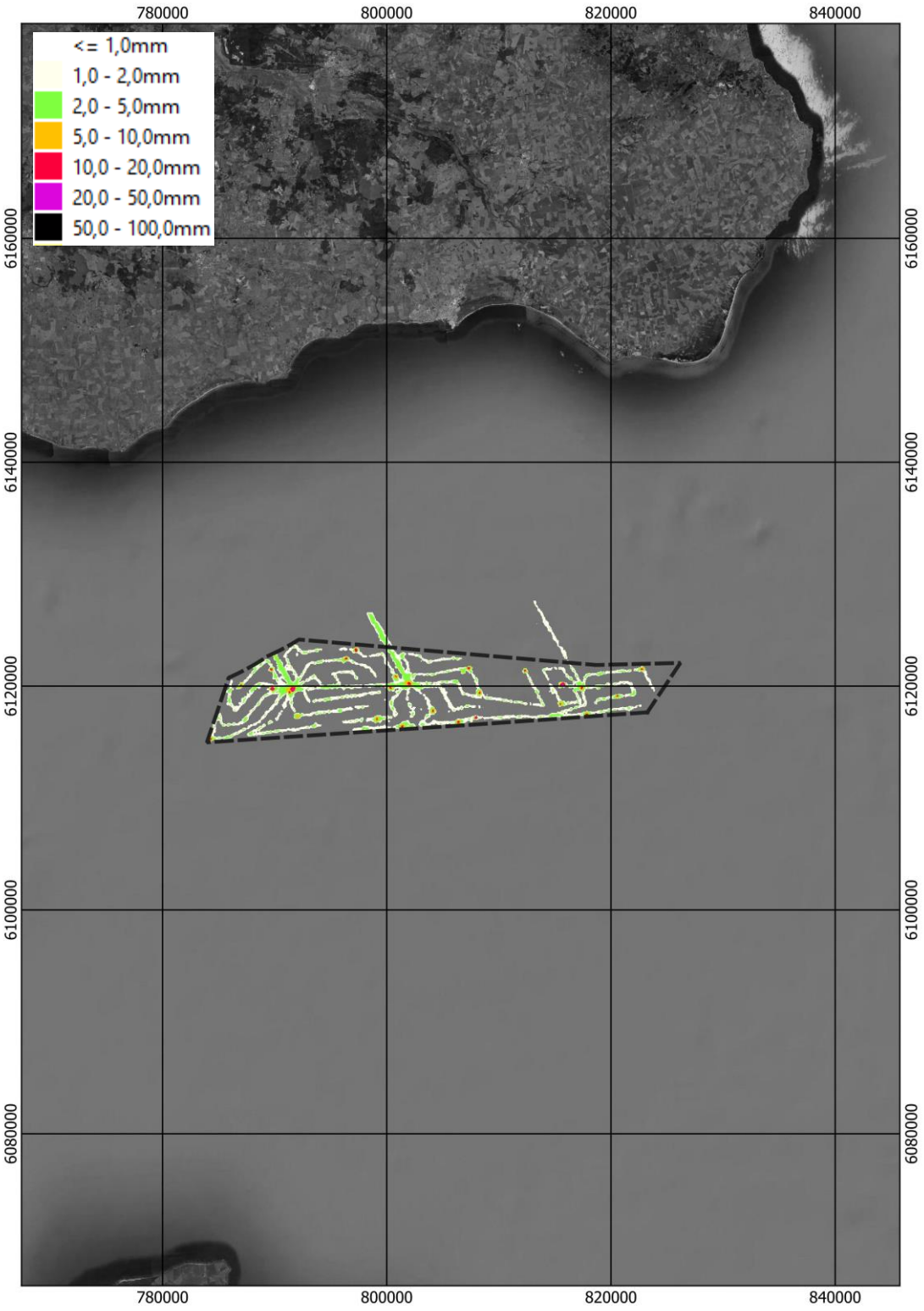
Appendix 71: 15MW Jacket, Bottom – Duration 100 mg/l, lower 10 m



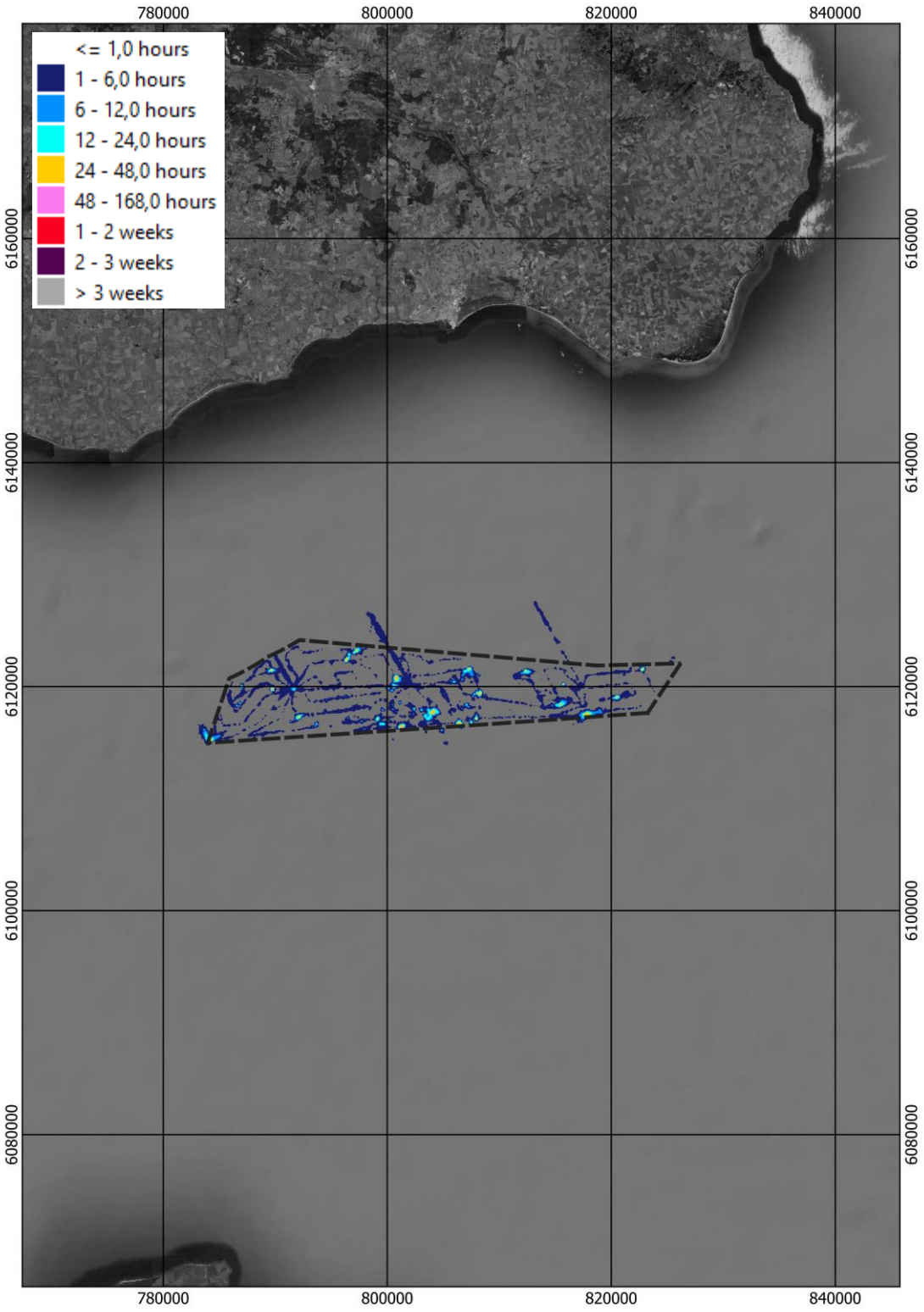
Appendix 72: 15MW Jacket, Bottom – Duration 1000 mg/l, lower 10 m



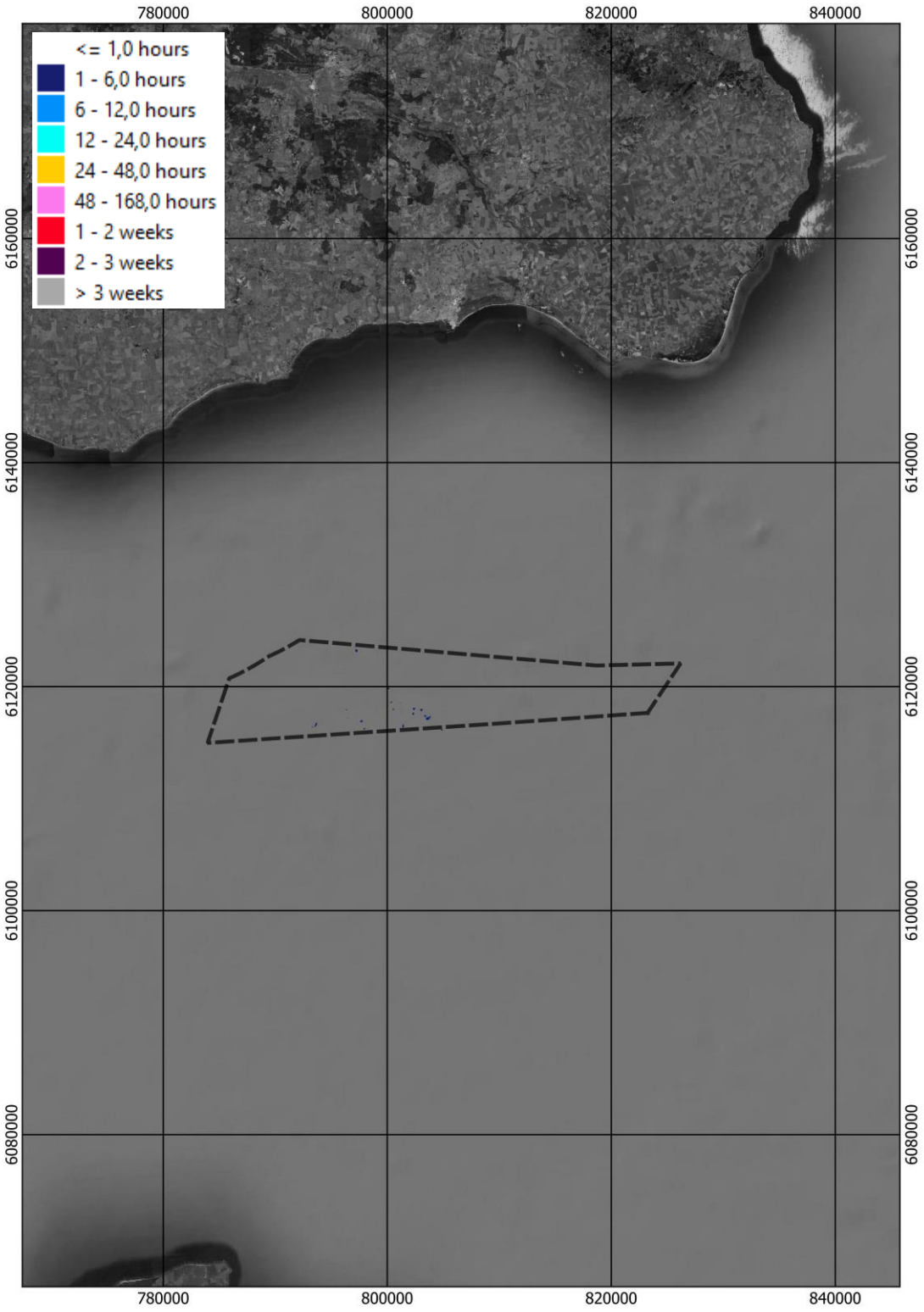
Appendix 73: 15MW Jacket, Bottom – Maximum sedimentation in mm



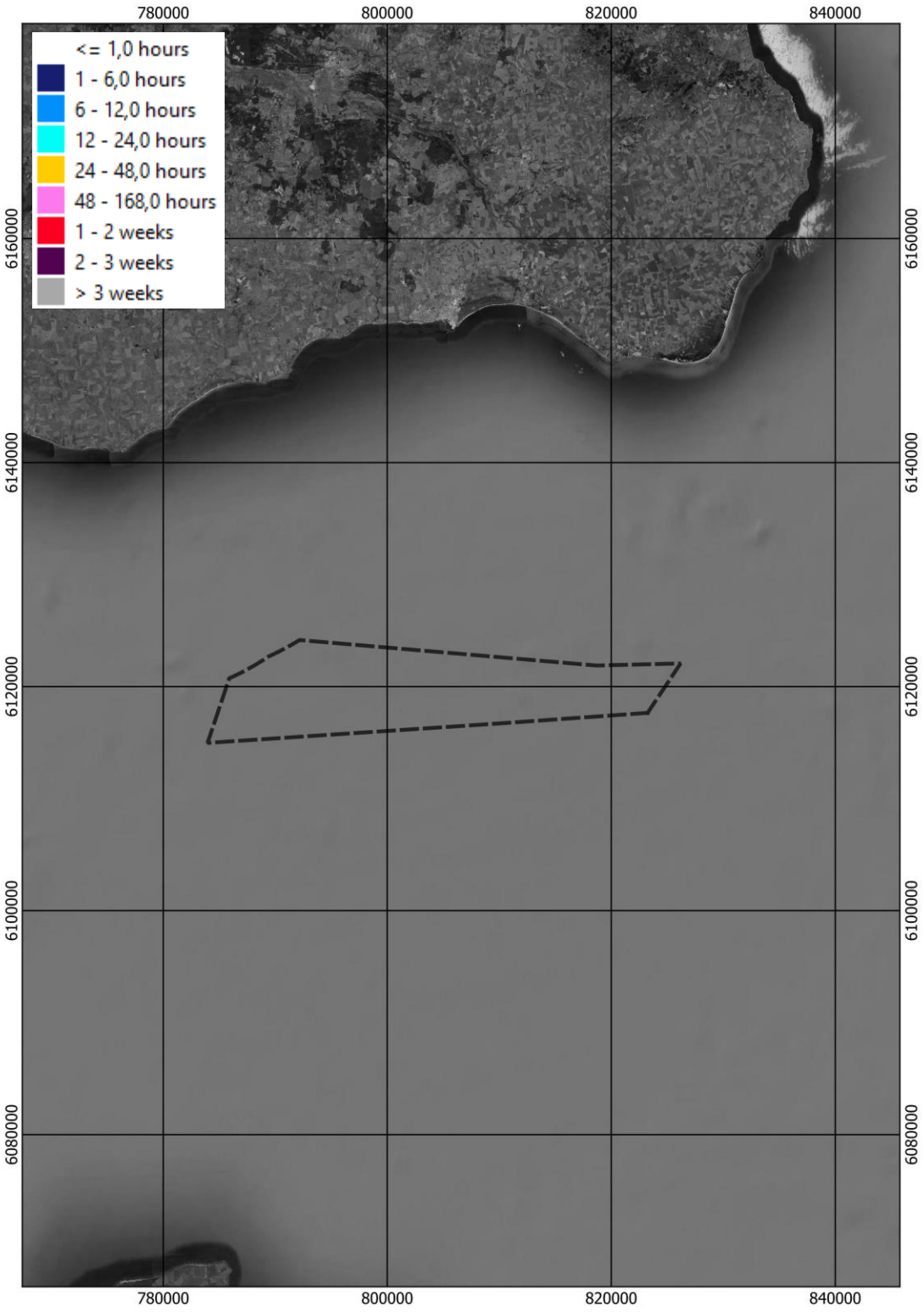
Appendix 74: 15MW Jacket, Surface – Duration 10 mg/l, depth average



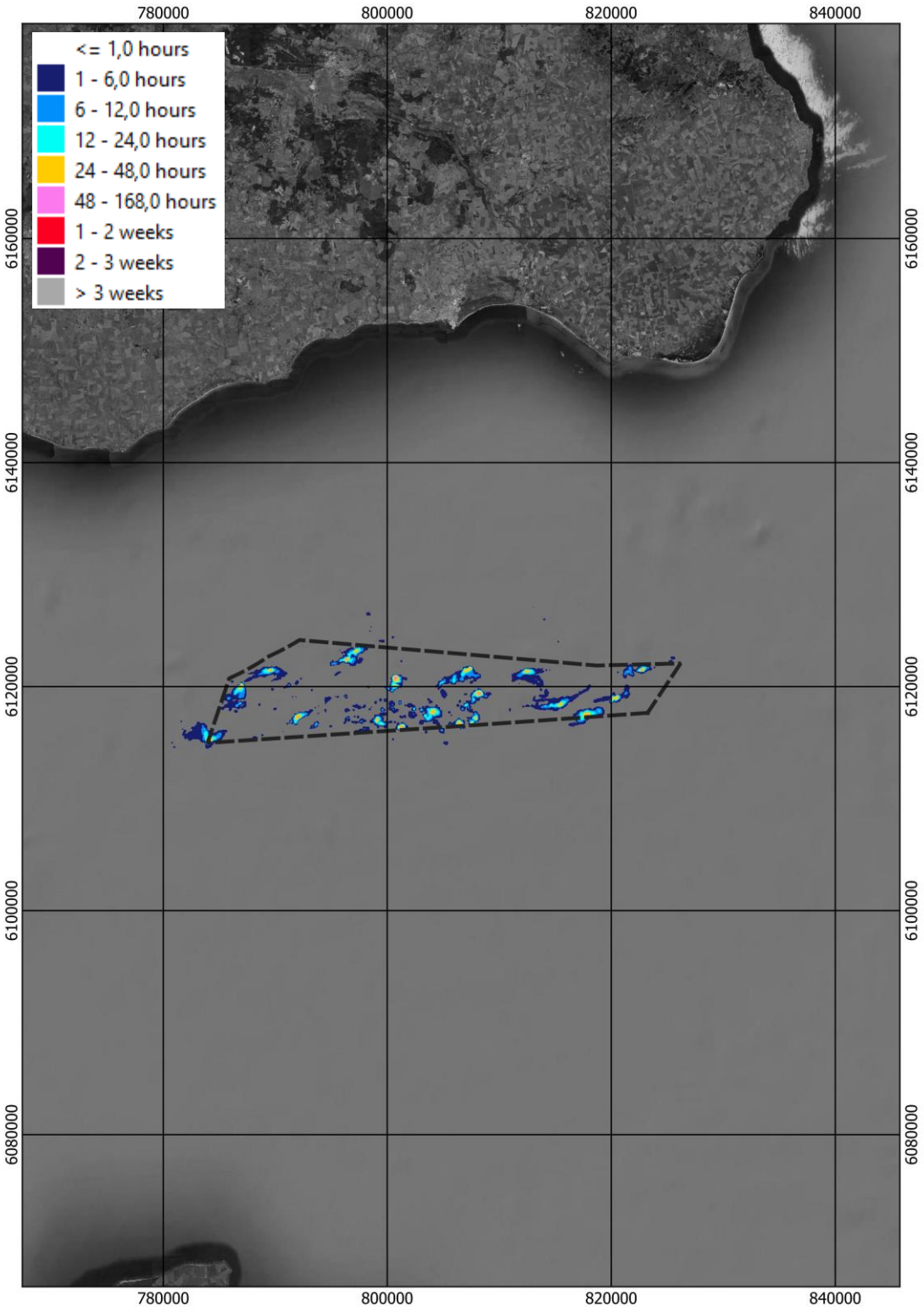
Appendix 75: 15MW Jacket, Surface – Duration 100 mg/l, depth average



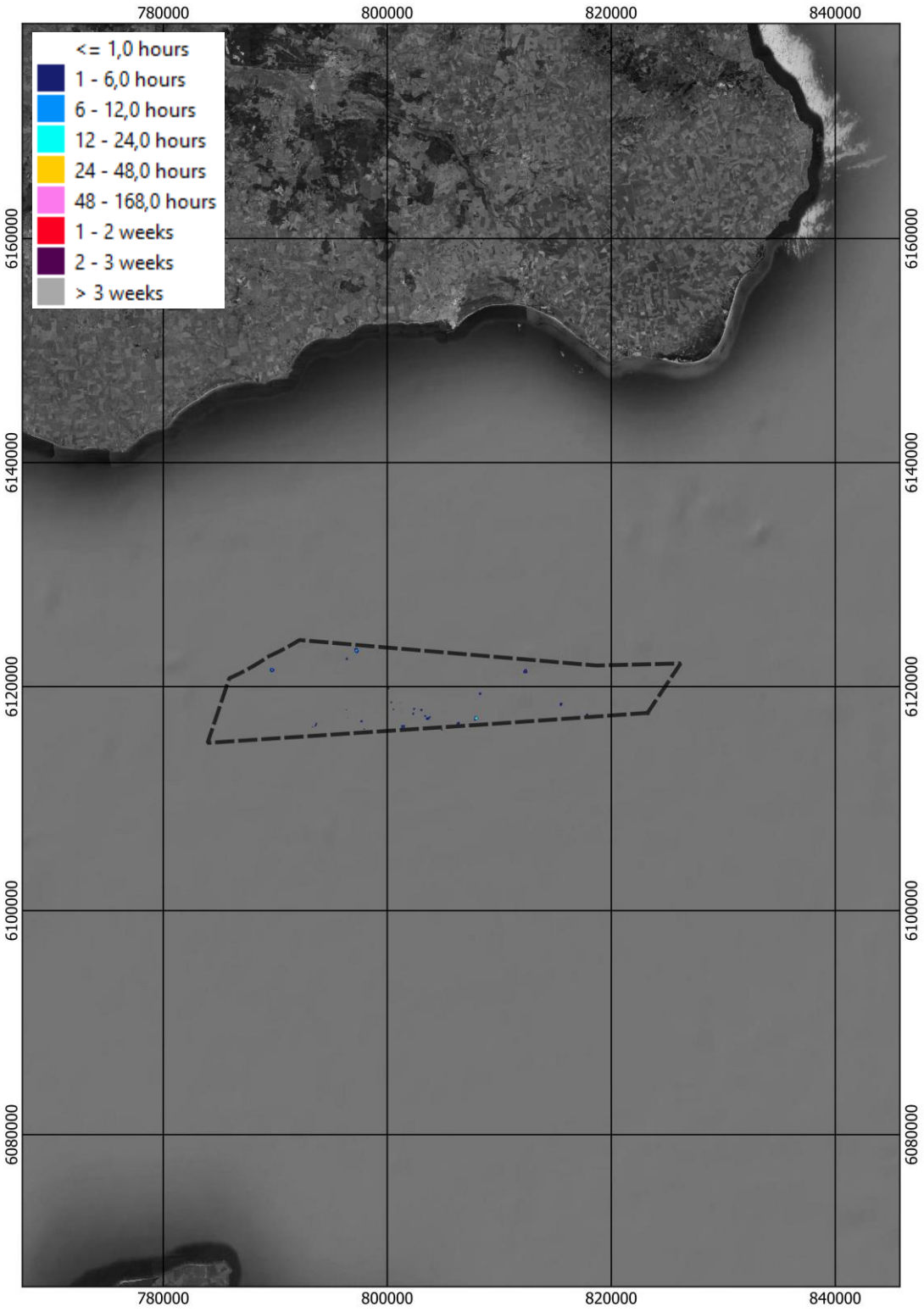
Appendix 76: 15MW Jacket, Surface – Duration 1000 mg/l, depth average



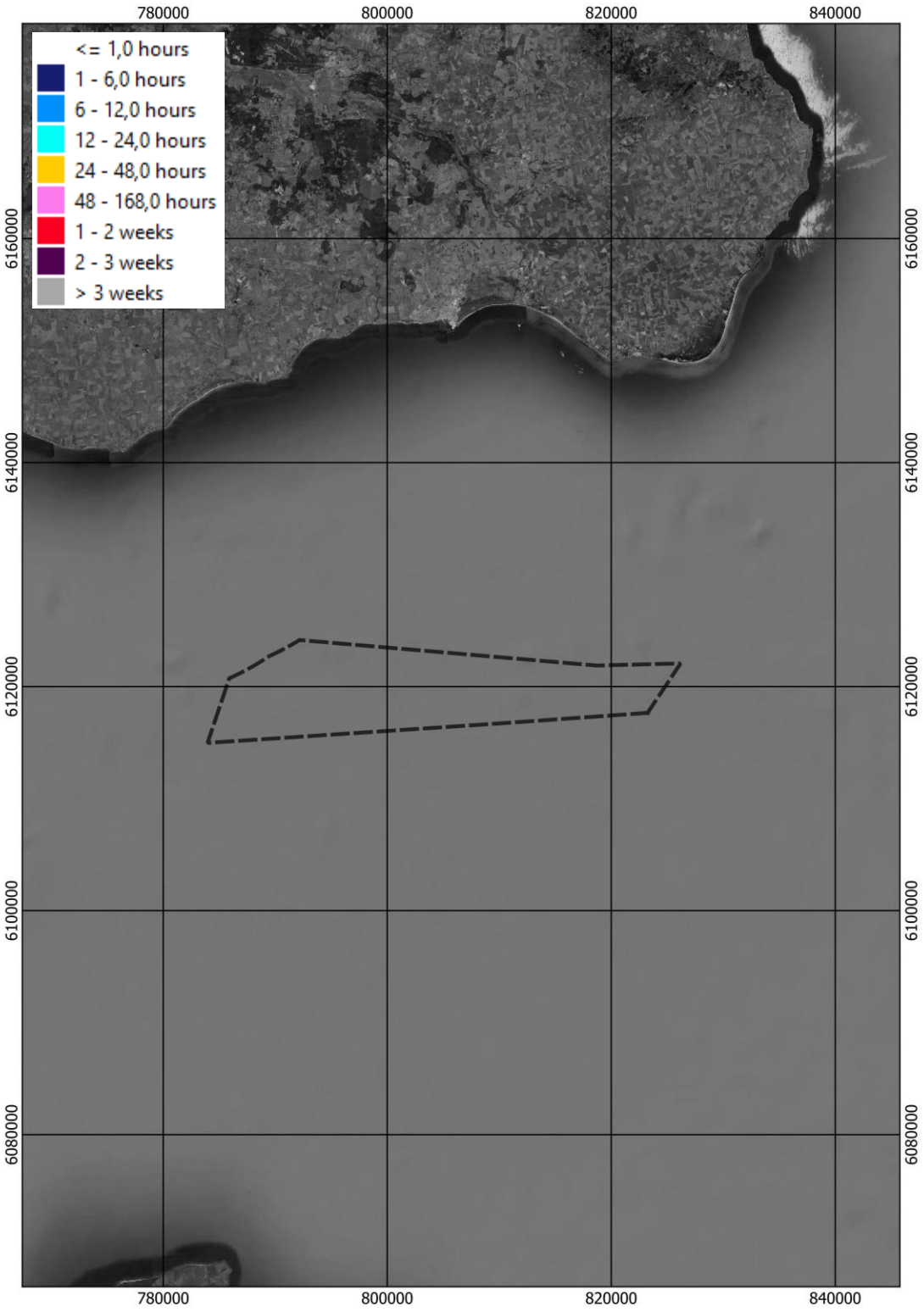
Appendix 77: 15MW Jacket, Surface – Duration 10 mg/l, upper 10 m



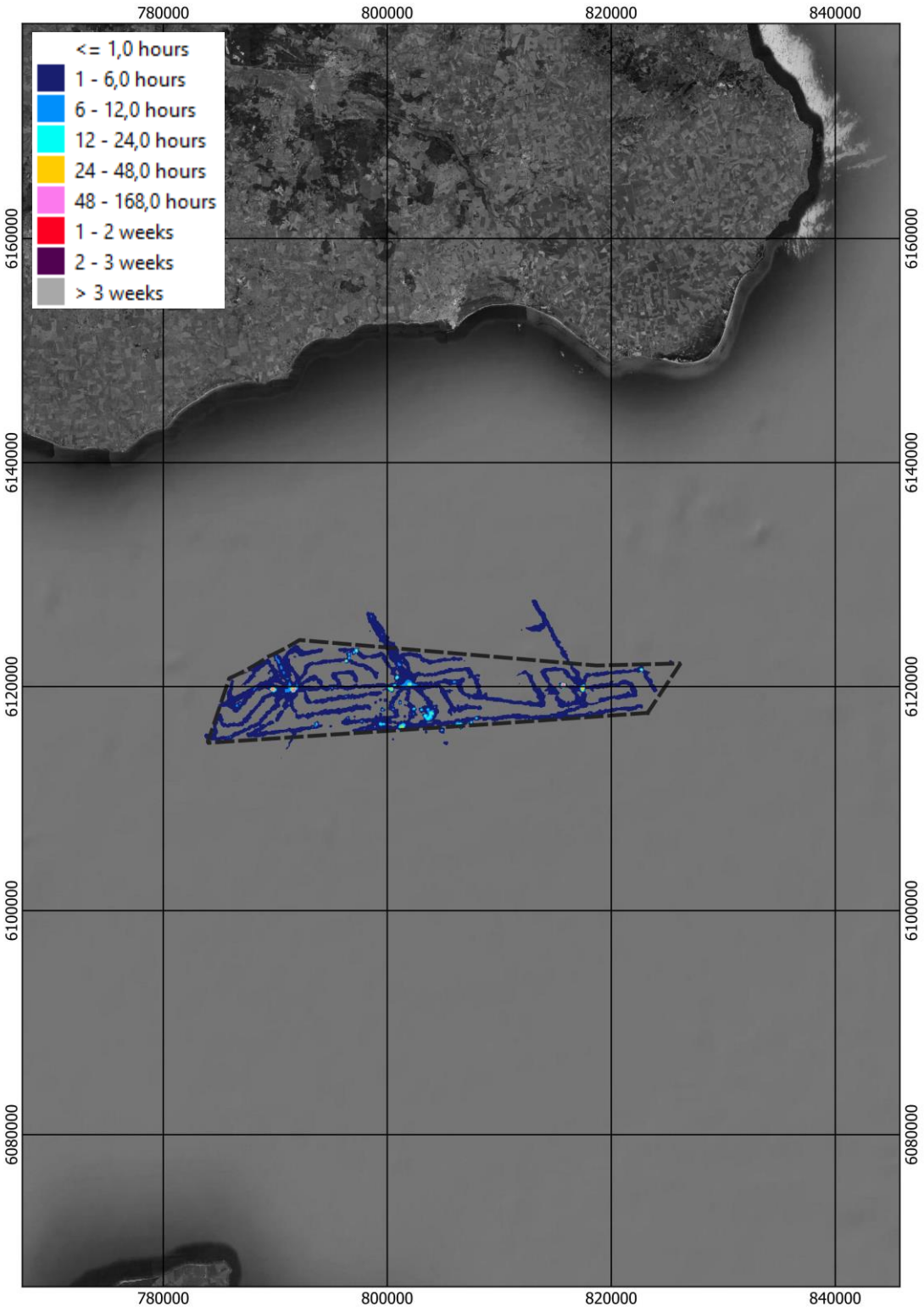
Appendix 78: 15MW Jacket, Surface – Duration 100 mg/l, upper 10 m



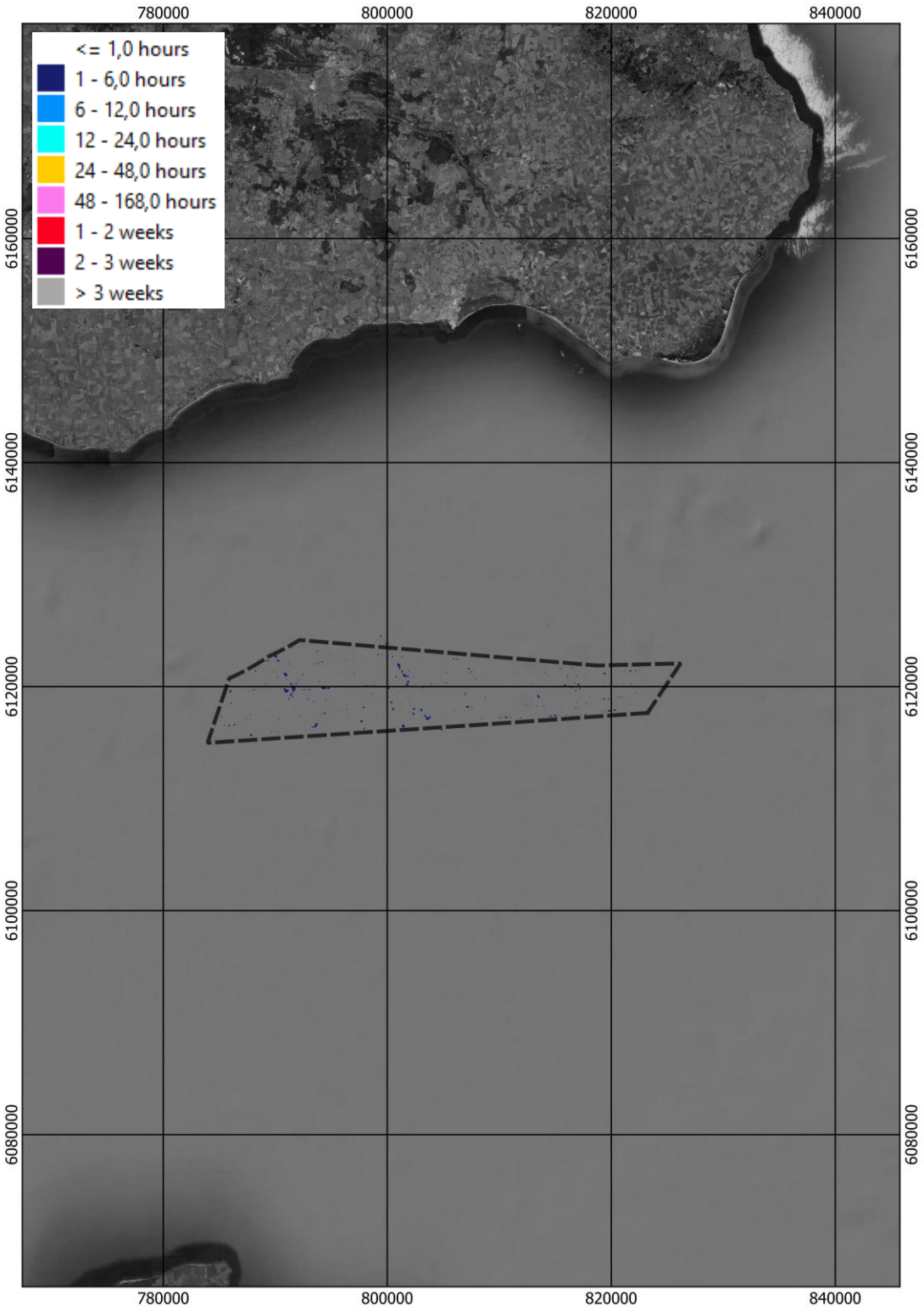
Appendix 79: 15MW Jacket, Surface – Duration 1000 mg/l, upper 10 m



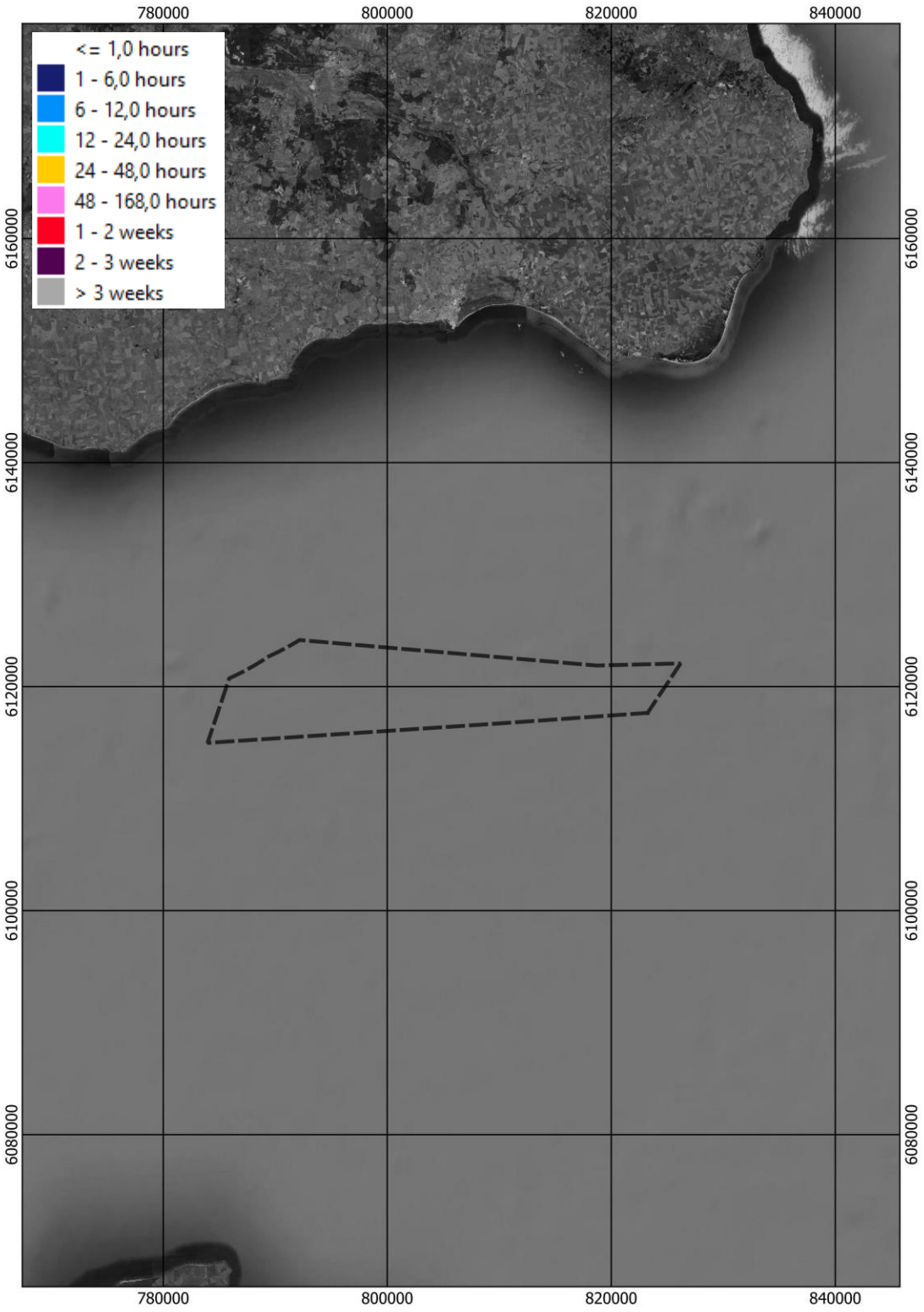
Appendix 80: 15MW Jacket, Surface – Duration 10 mg/l, lower 10 m



Appendix 81: 15MW Jacket, Surface – Duration 100 mg/l, lower 10 m

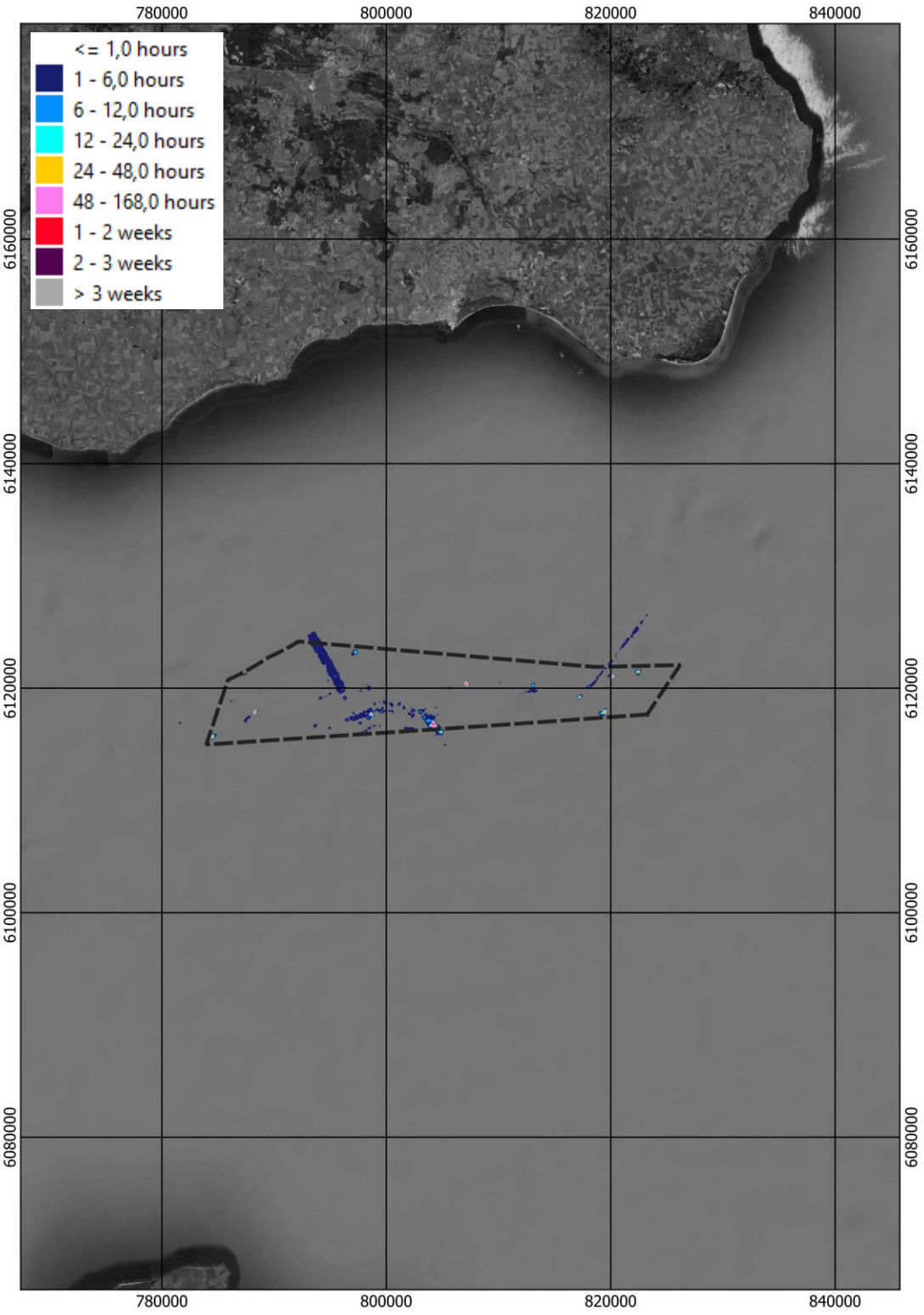


Appendix 82: 15MW Jacket, Surface – Duration 1000 mg/l, lower 10 m

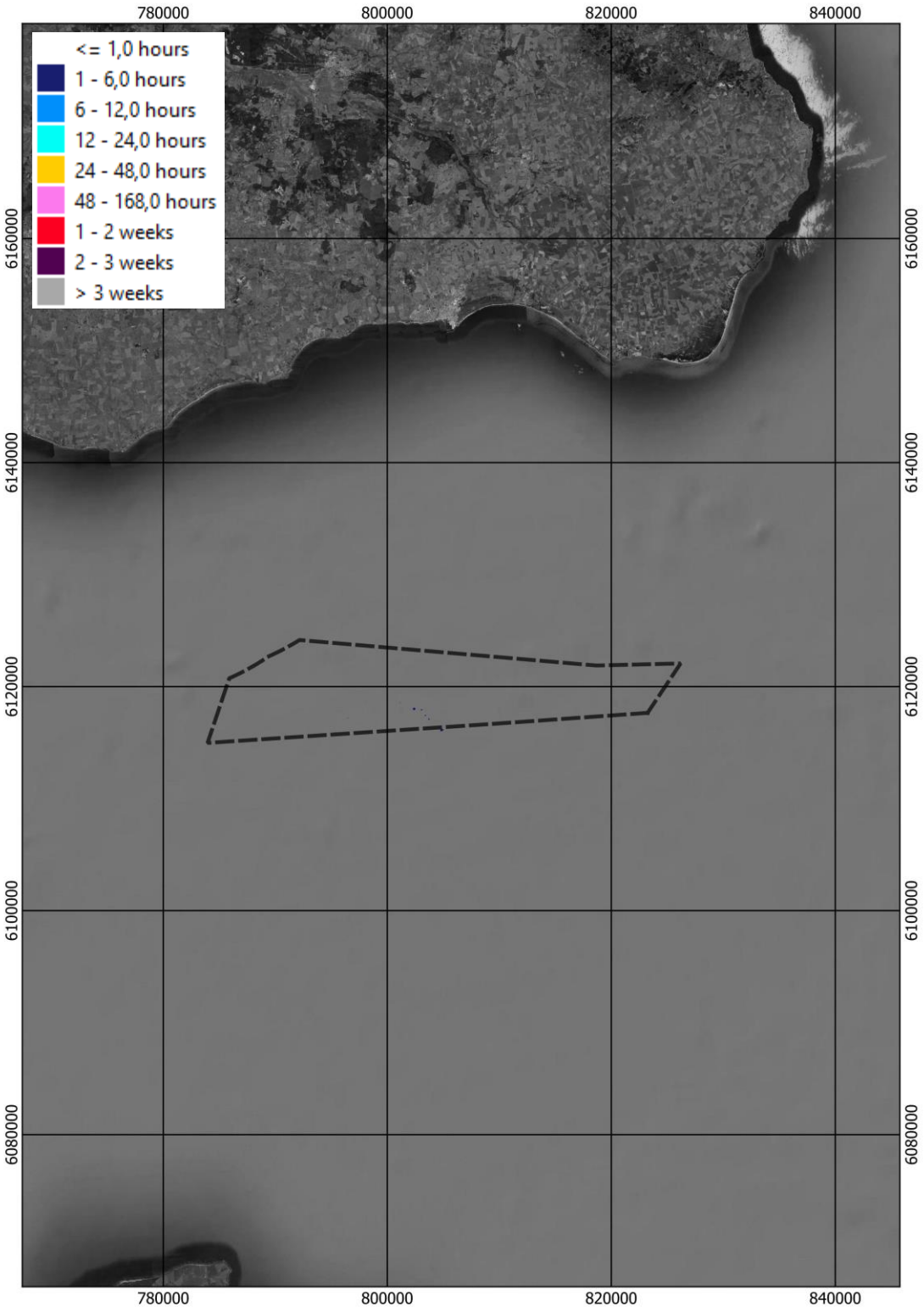


Appendix 83: 15MW Jacket, Surface – Maximum sedimentation in mm

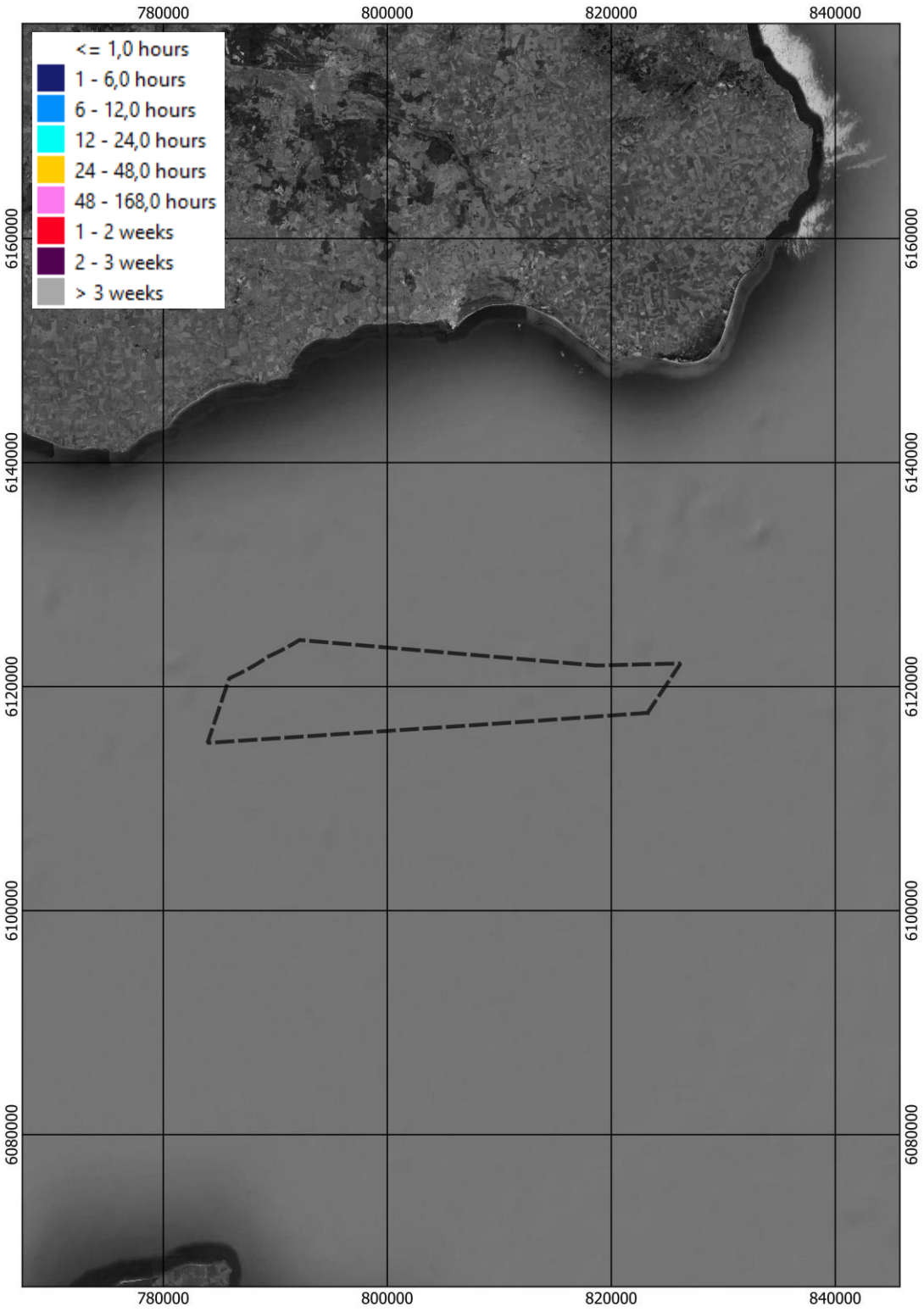
Appendix 84: 25MW MP, Bottom – Duration 10 mg/l, depth average



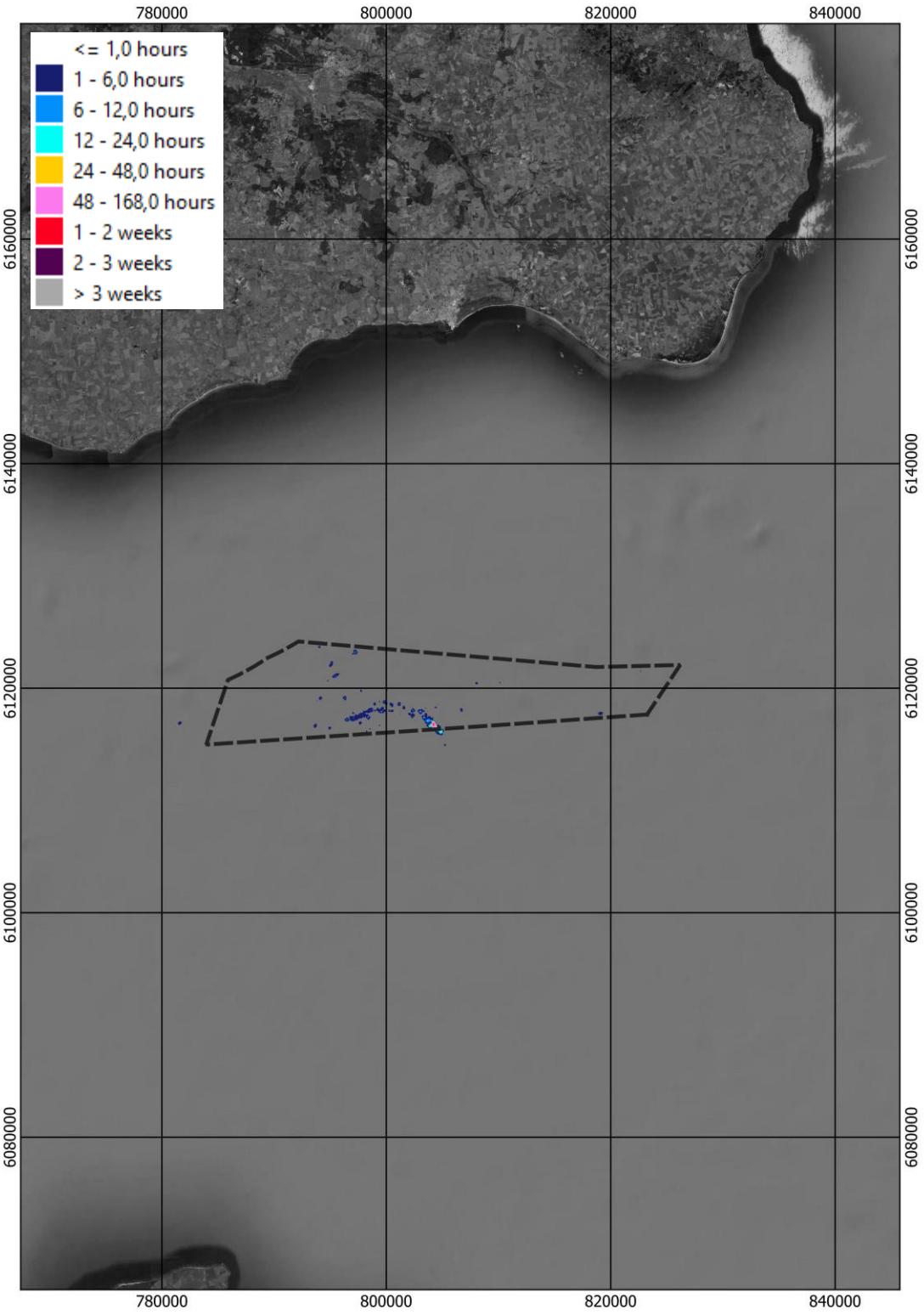
Appendix 85: 25MW MP, Bottom – Duration 100 mg/l, depth average



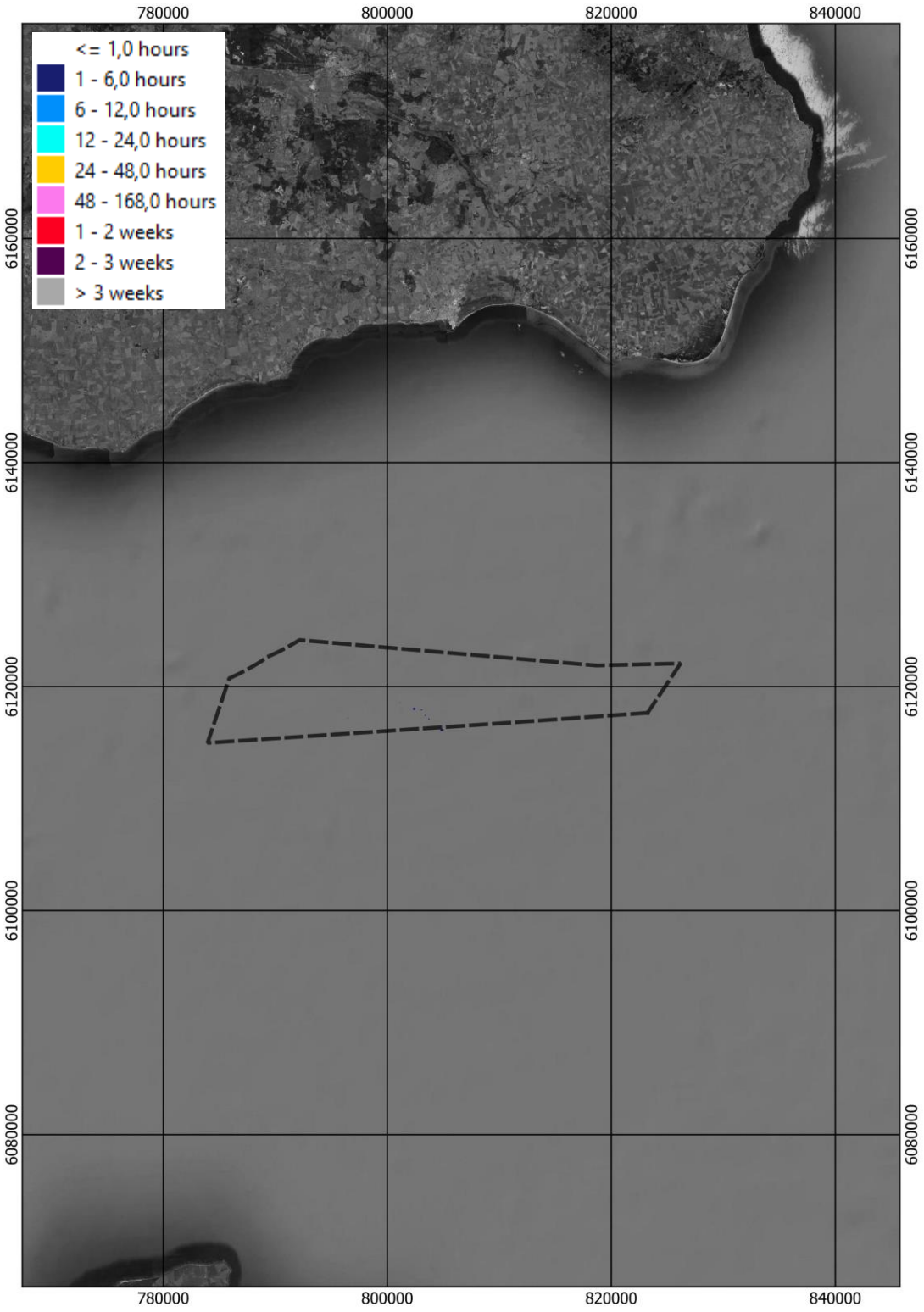
Appendix 86: 25MW MP, Bottom – Duration 1000 mg/l, depth average



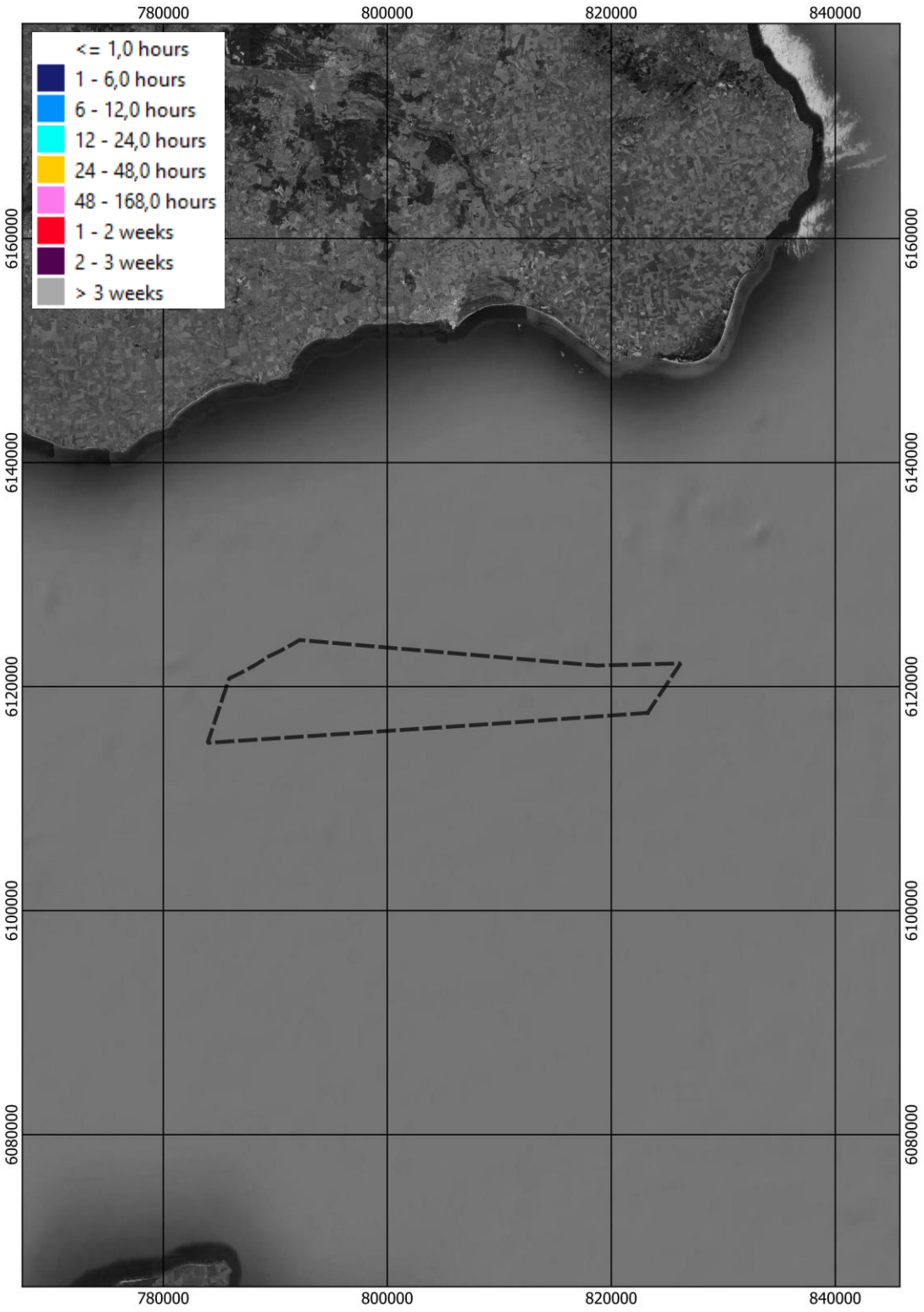
Appendix 87: 25MW MP, Bottom – Duration 10 mg/l, upper 10 m



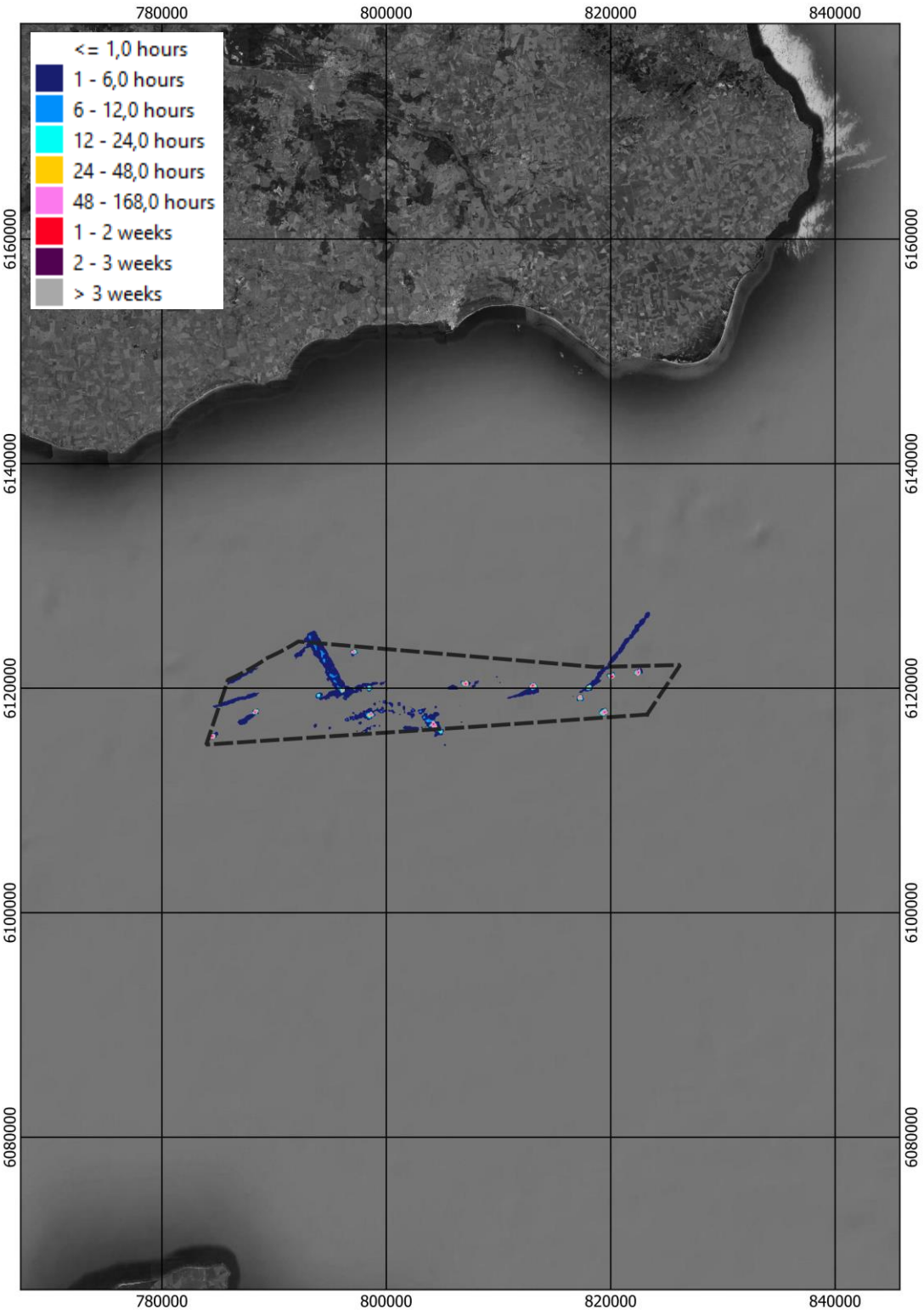
Appendix 88: 25MW MP, Bottom – Duration 100 mg/l, upper 10 m



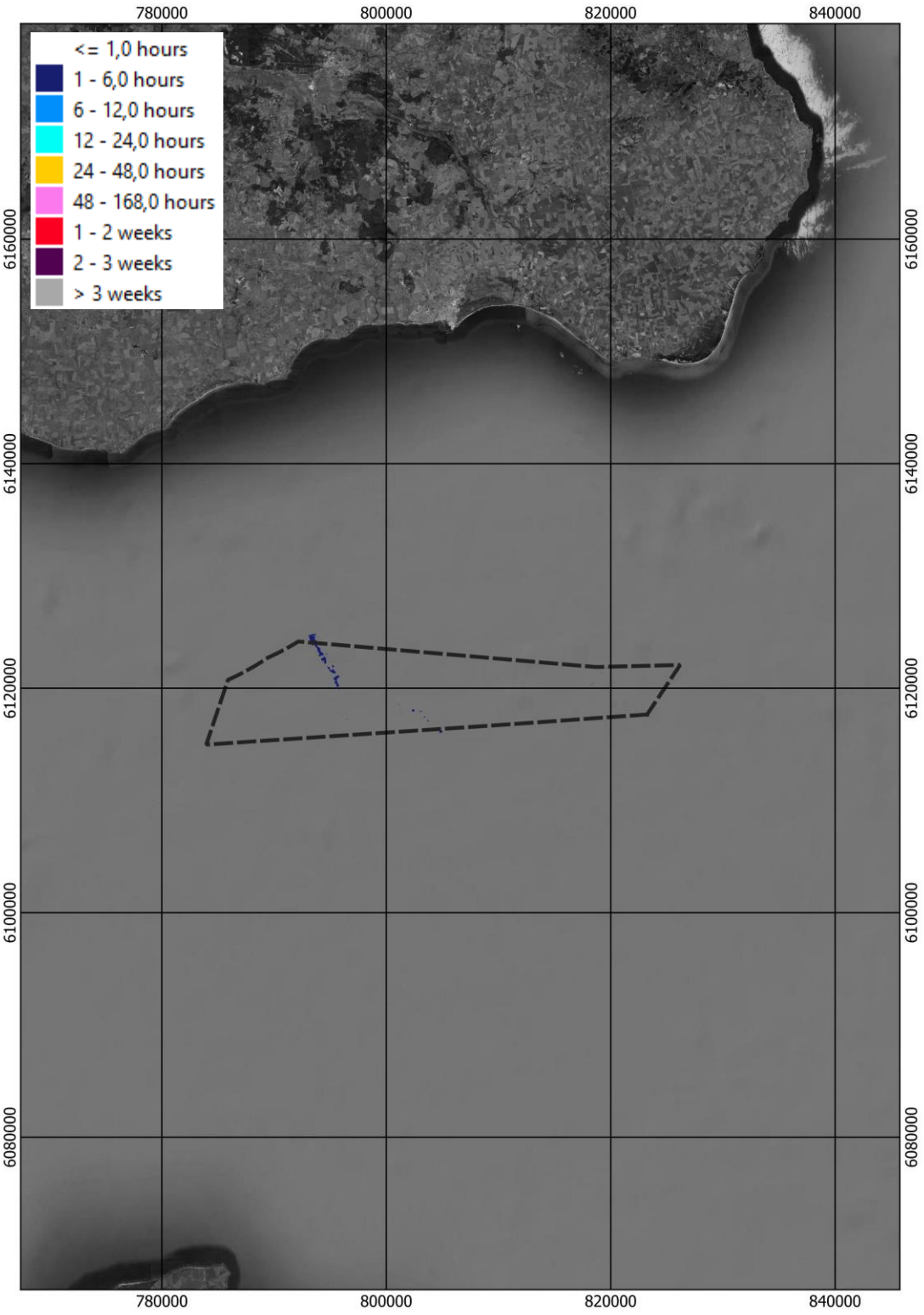
Appendix 89: 25MW MP, Bottom – Duration 1000 mg/l, upper 10 m



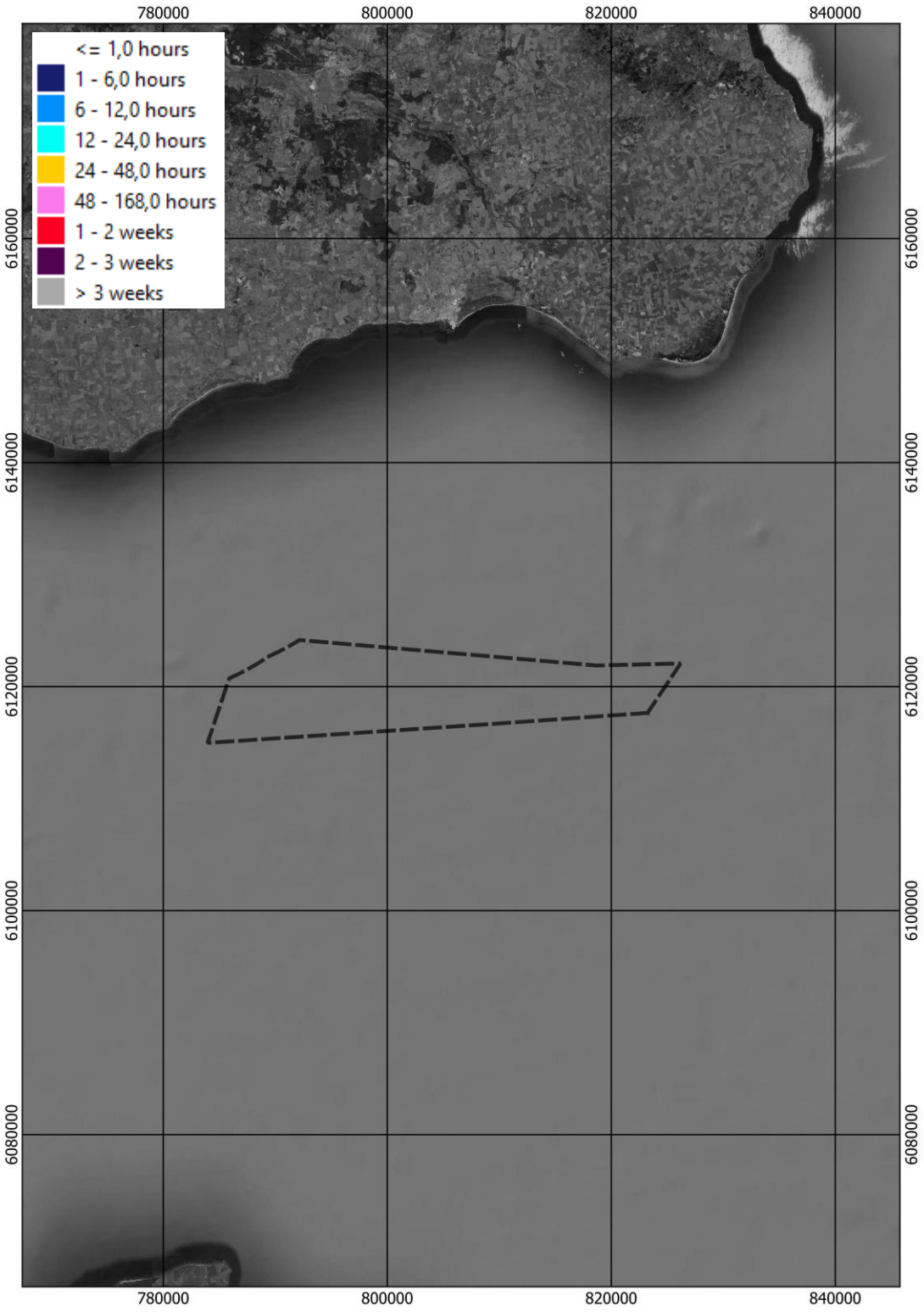
Appendix 90: 25MW MP, Bottom – Duration 1000 mg/l, lower 10 m



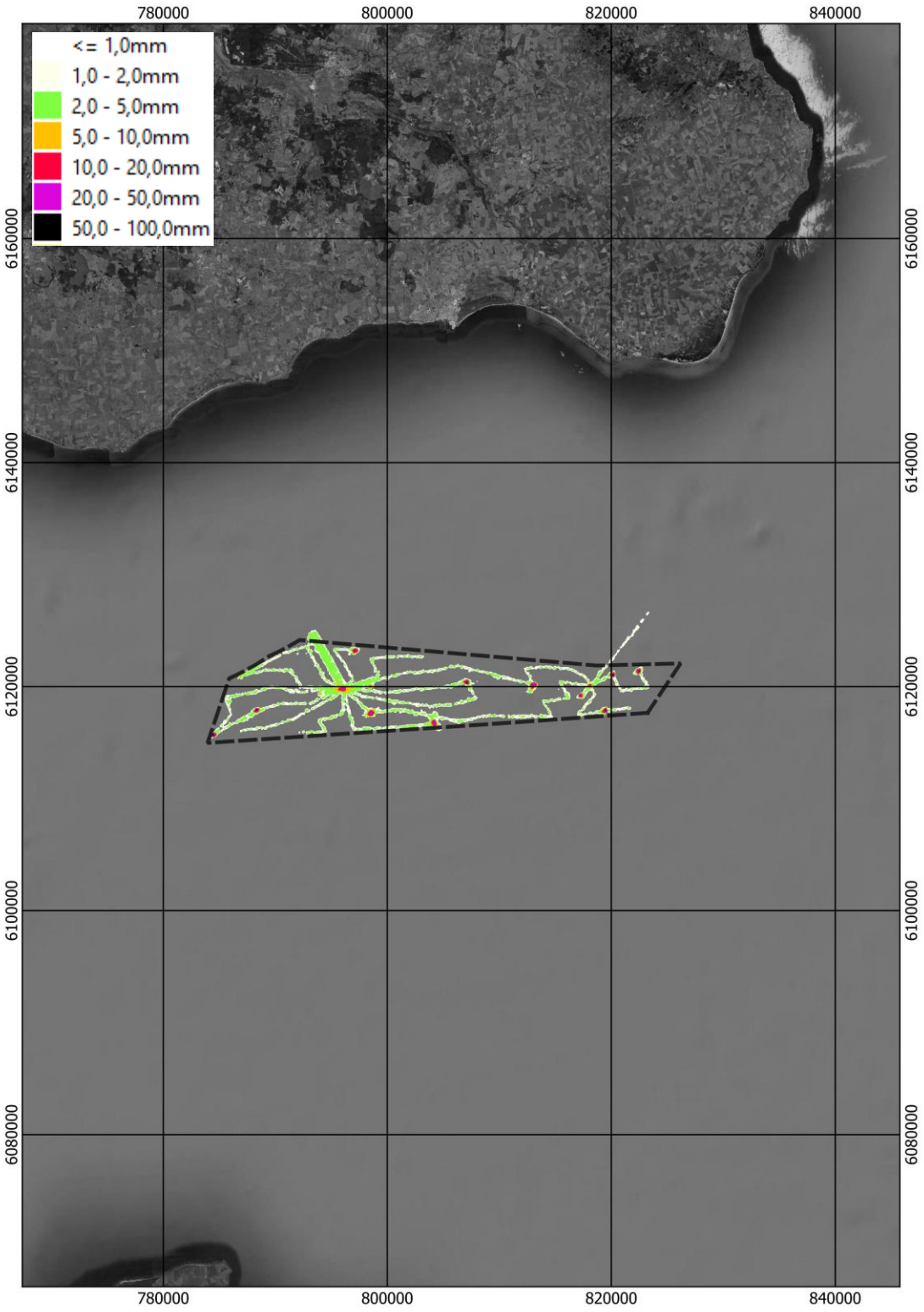
Appendix 91: 25MW MP, Bottom – Duration 100 mg/l, lower 10 m



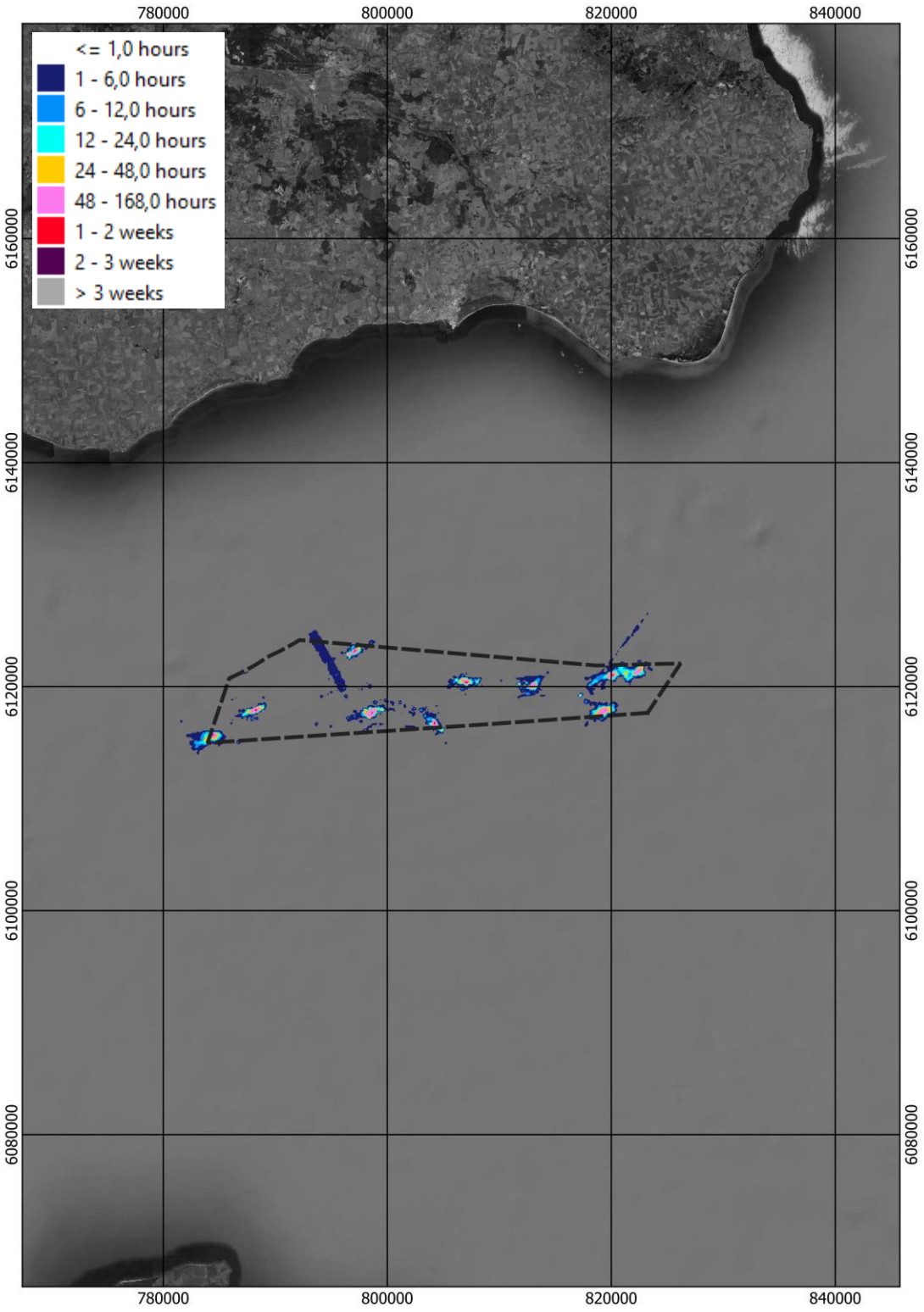
Appendix 92: 25MW MP, Bottom – Duration 1000 mg/l, lower 10 m



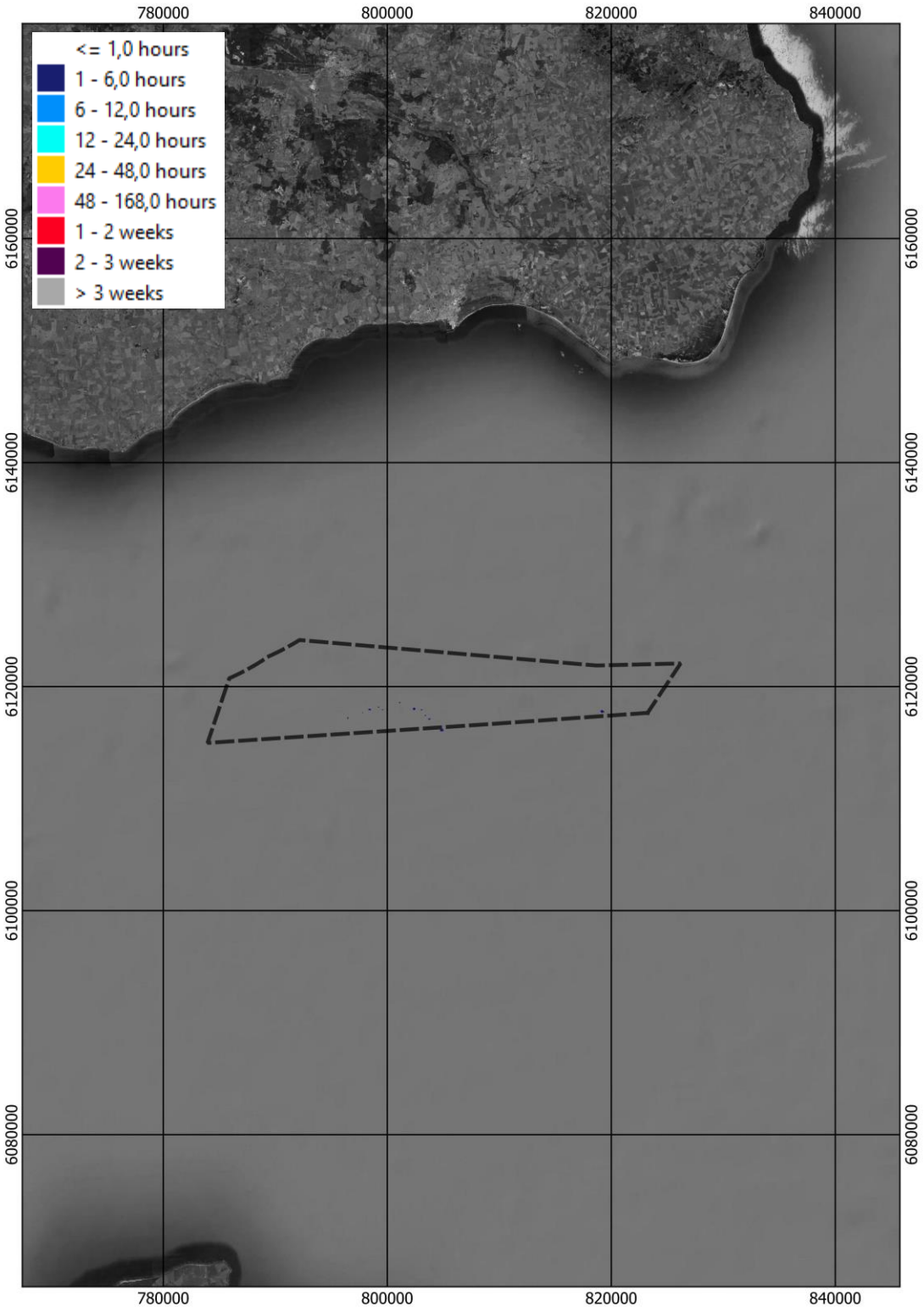
Appendix 93: 25MW MP, Bottom – Maximum sedimentation in mm



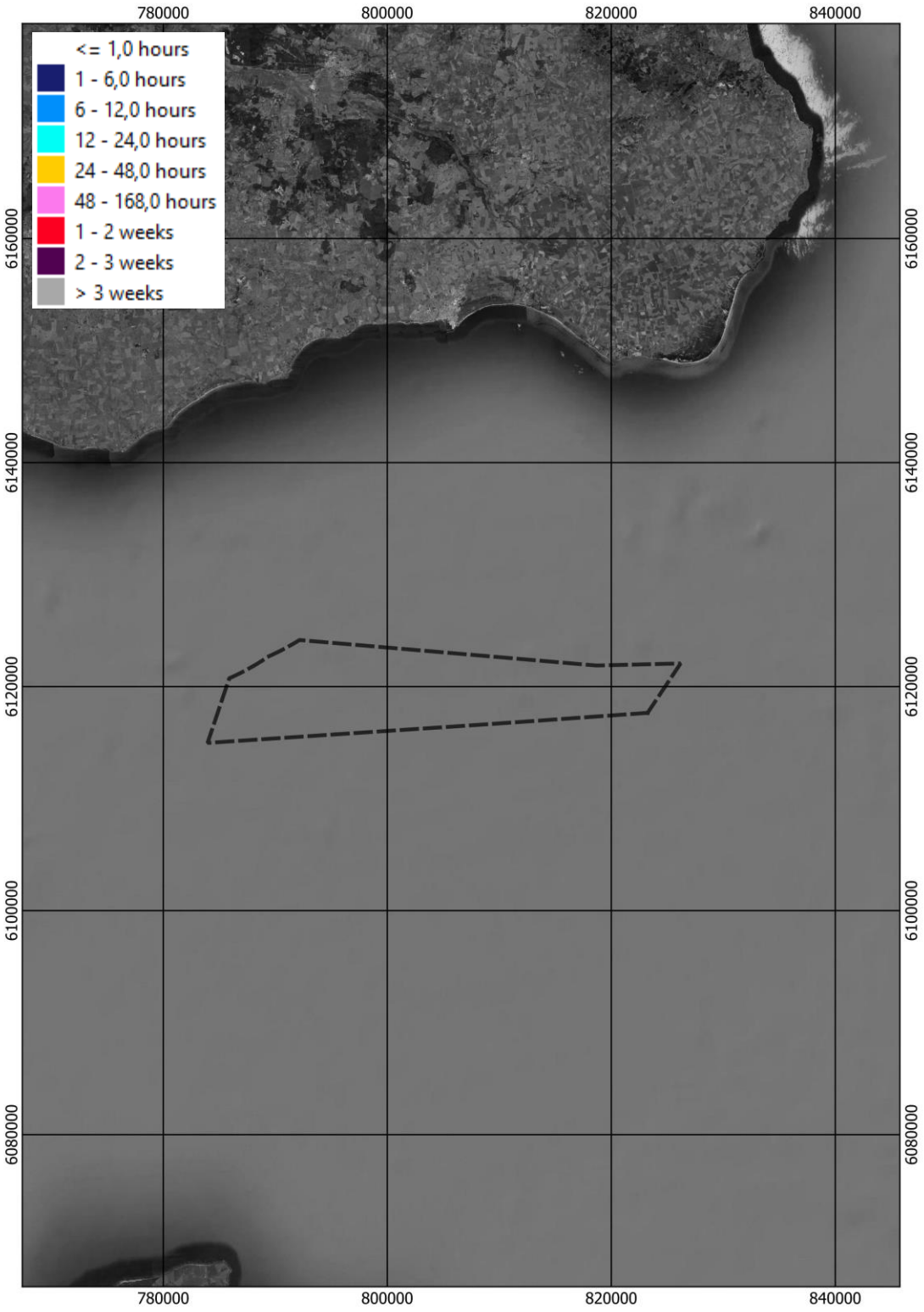
Appendix 94: 25MW MP, Surface – Duration 10 mg/l, depth average



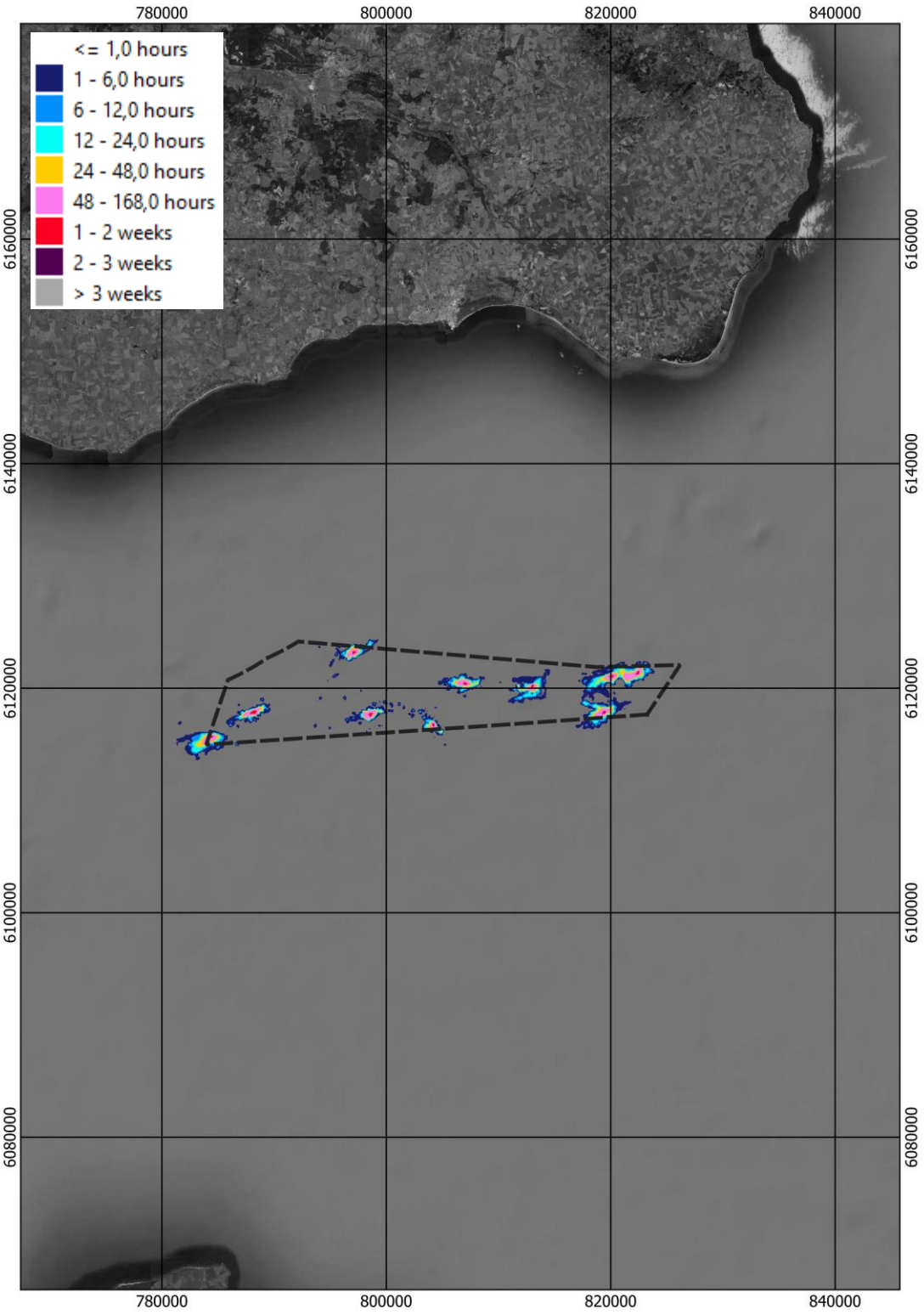
Appendix 95: 25MW MP, Surface – Duration 100 mg/l, depth average



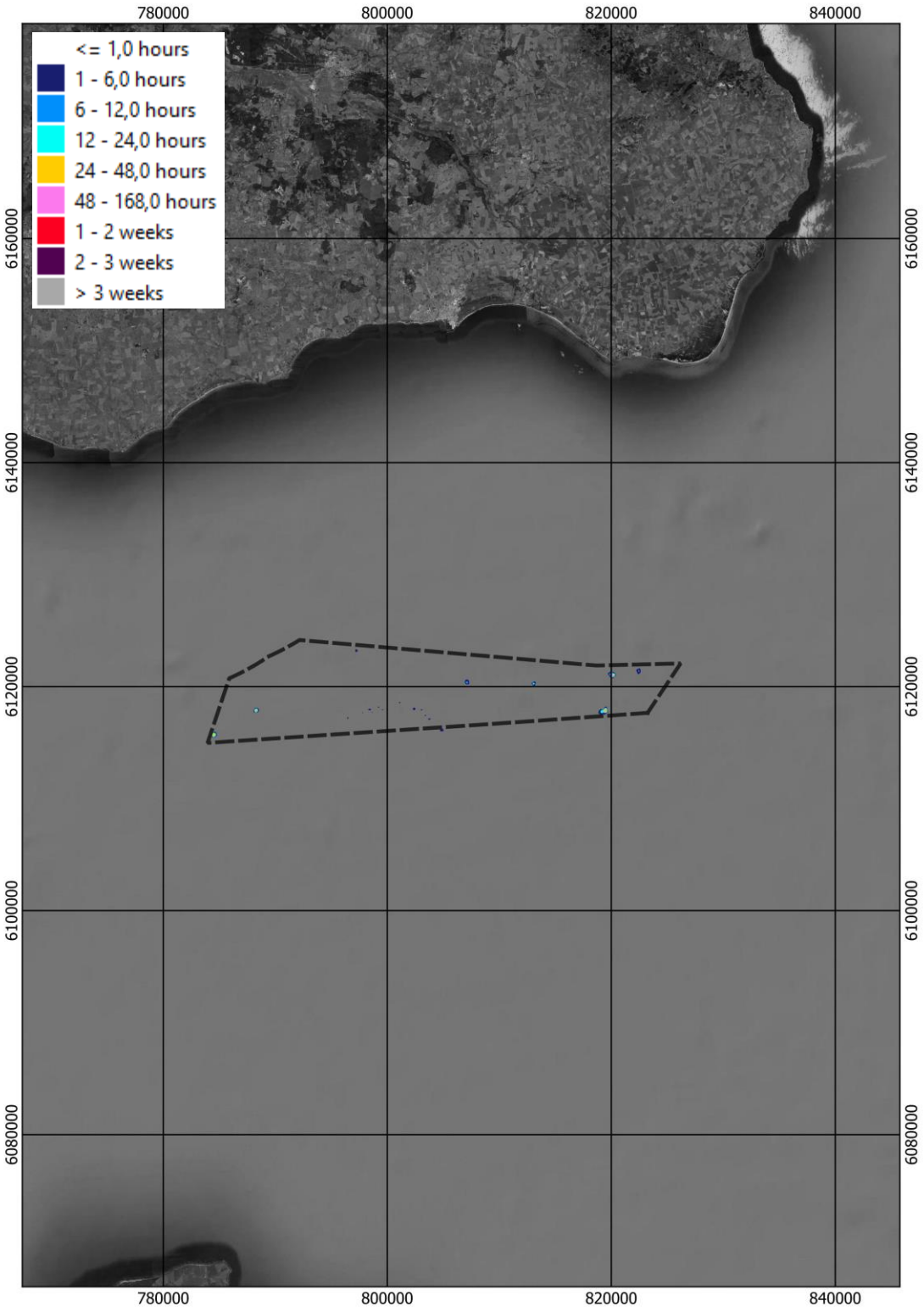
Appendix 96: 25MW MP, Surface – Duration 1000 mg/l, depth average



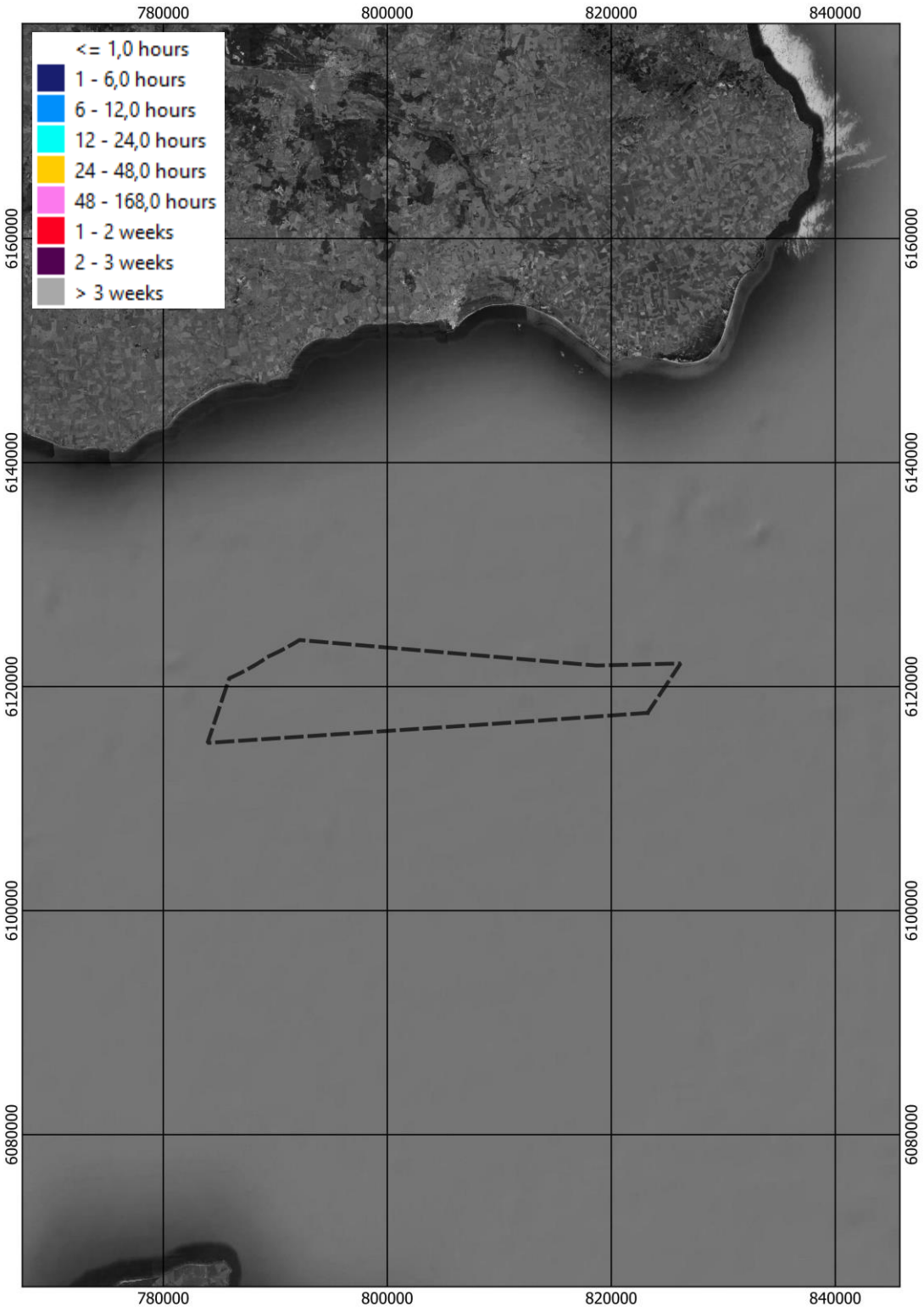
Appendix 97: 25MW MP, Surface – Duration 10 mg/l, upper 10 m



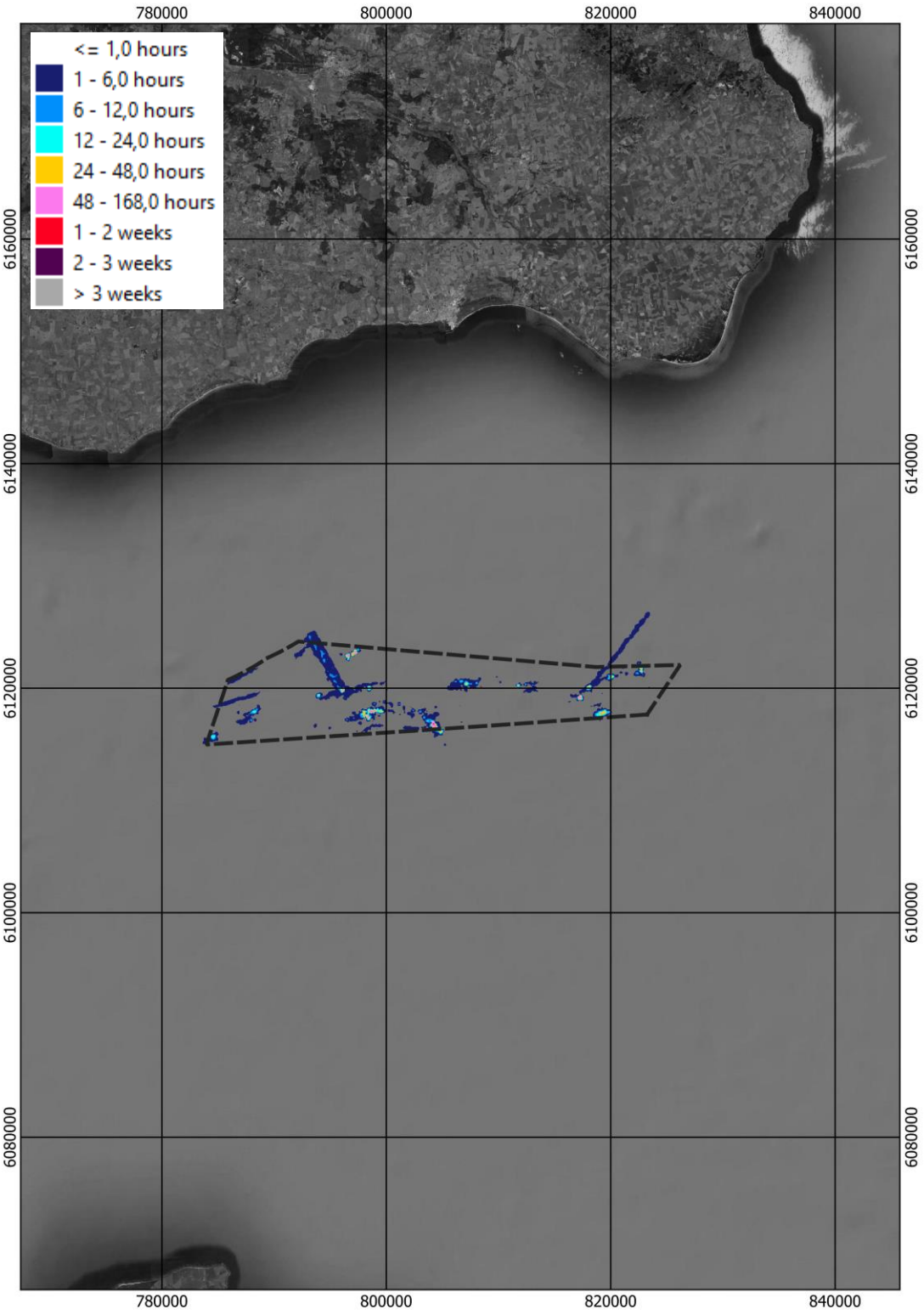
Appendix 98: 25MW MP, Surface – Duration 100 mg/l, upper 10 m



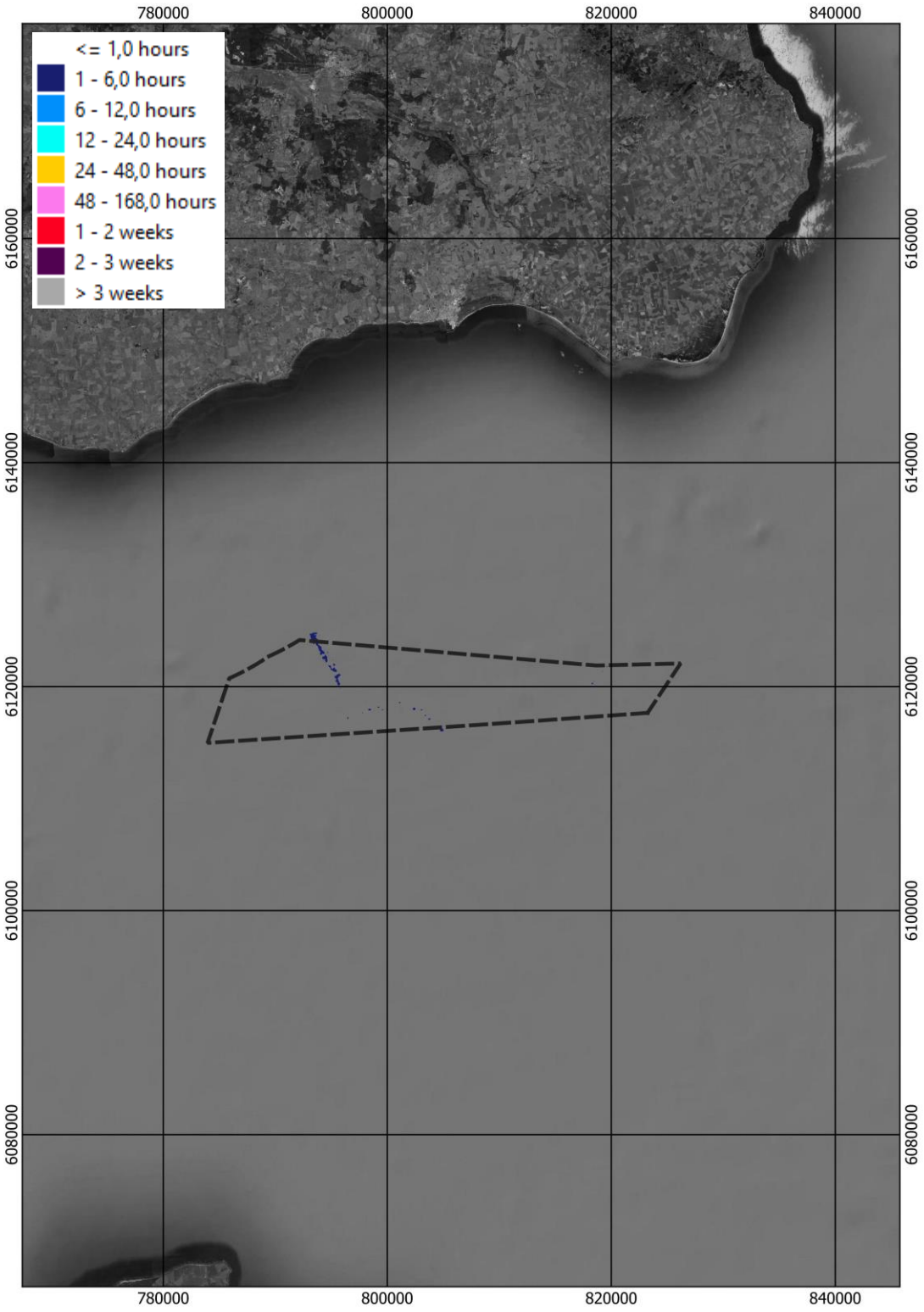
Appendix 99: 25MW MP, Surface – Duration 1000 mg/l, upper 10 m



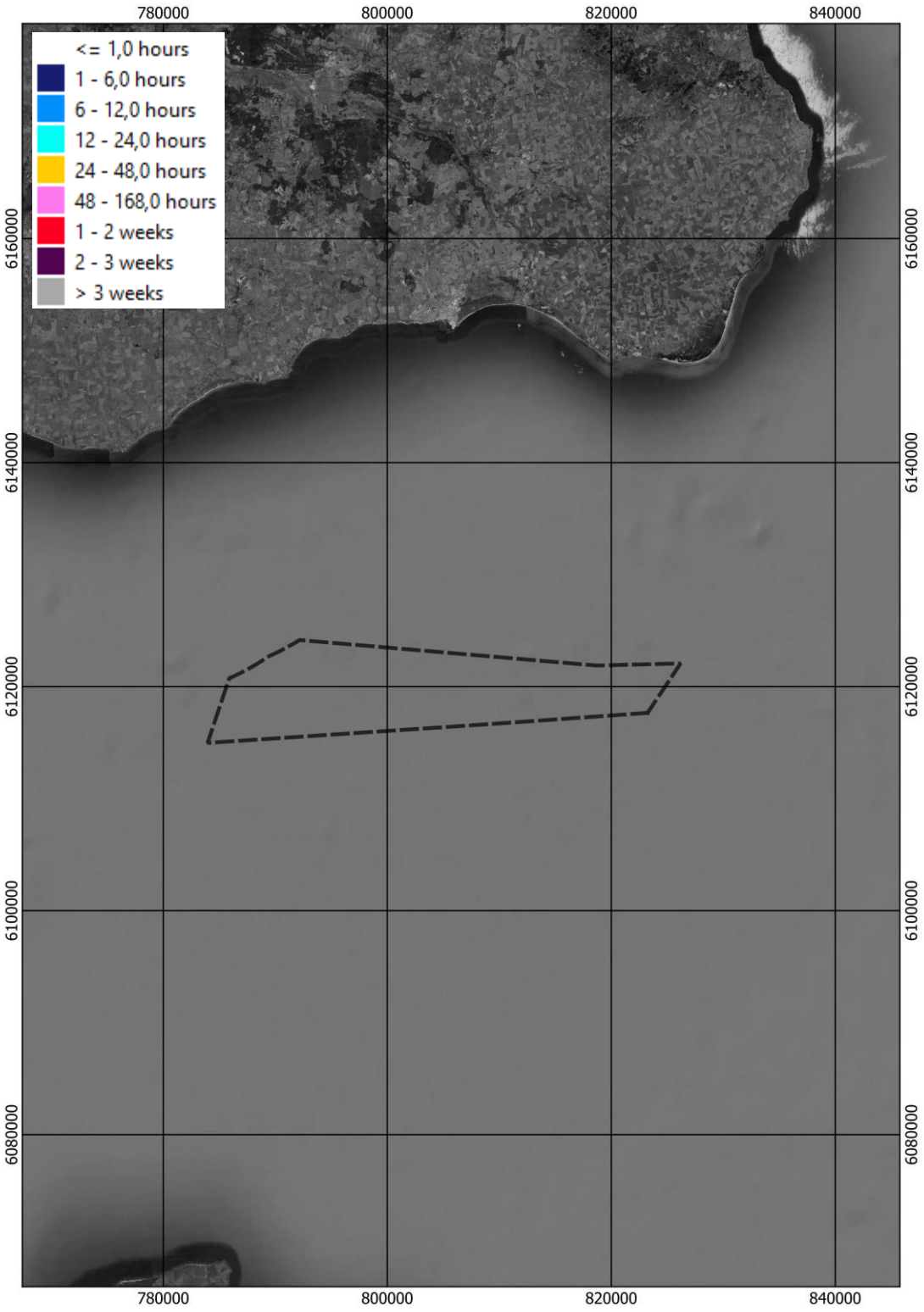
Appendix 100: 25MW MP, Surface – Duration 10 mg/l, lower 10 m



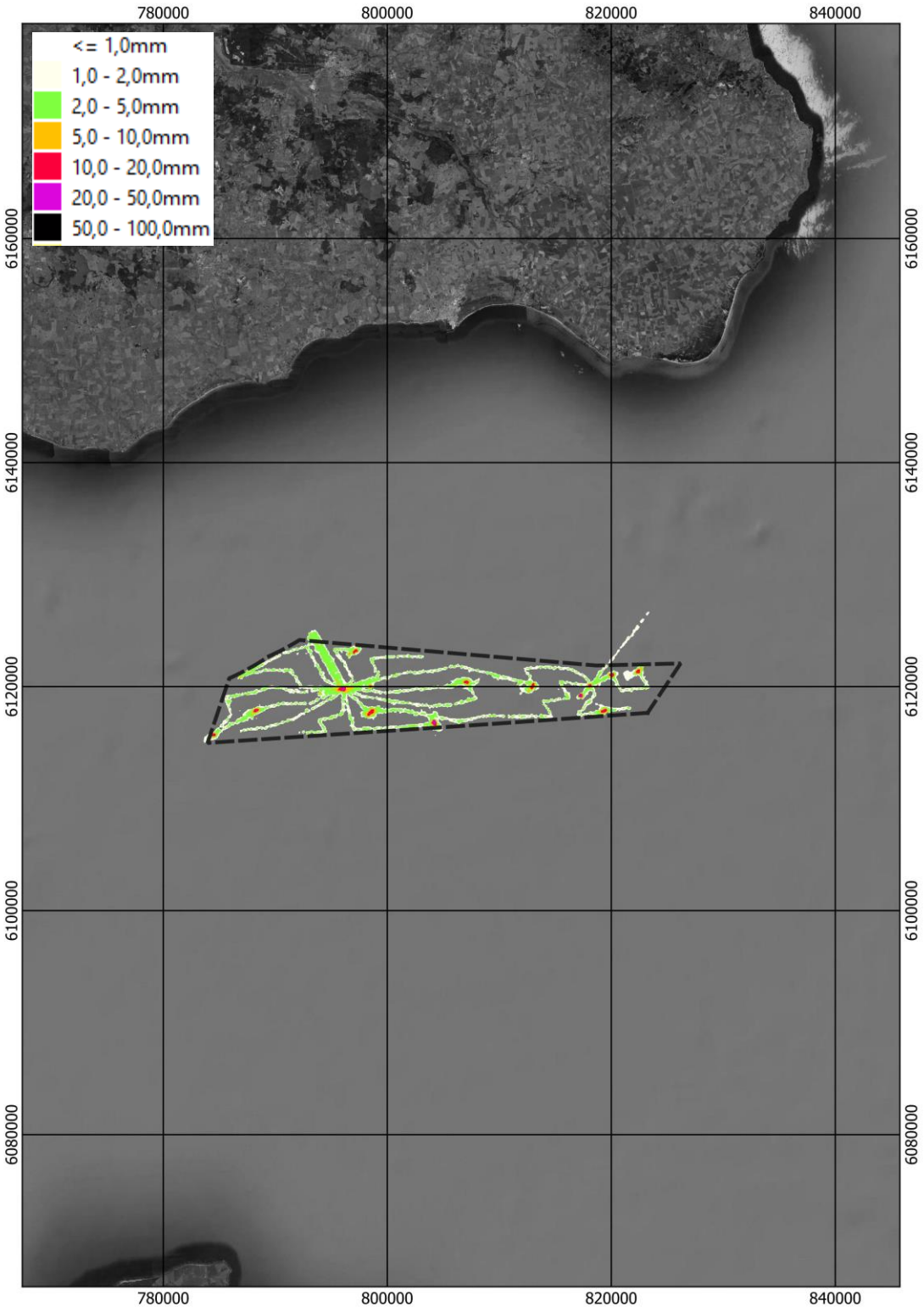
Appendix 101: 25MW MP, Surface – Duration 100 mg/l, lower 10 m



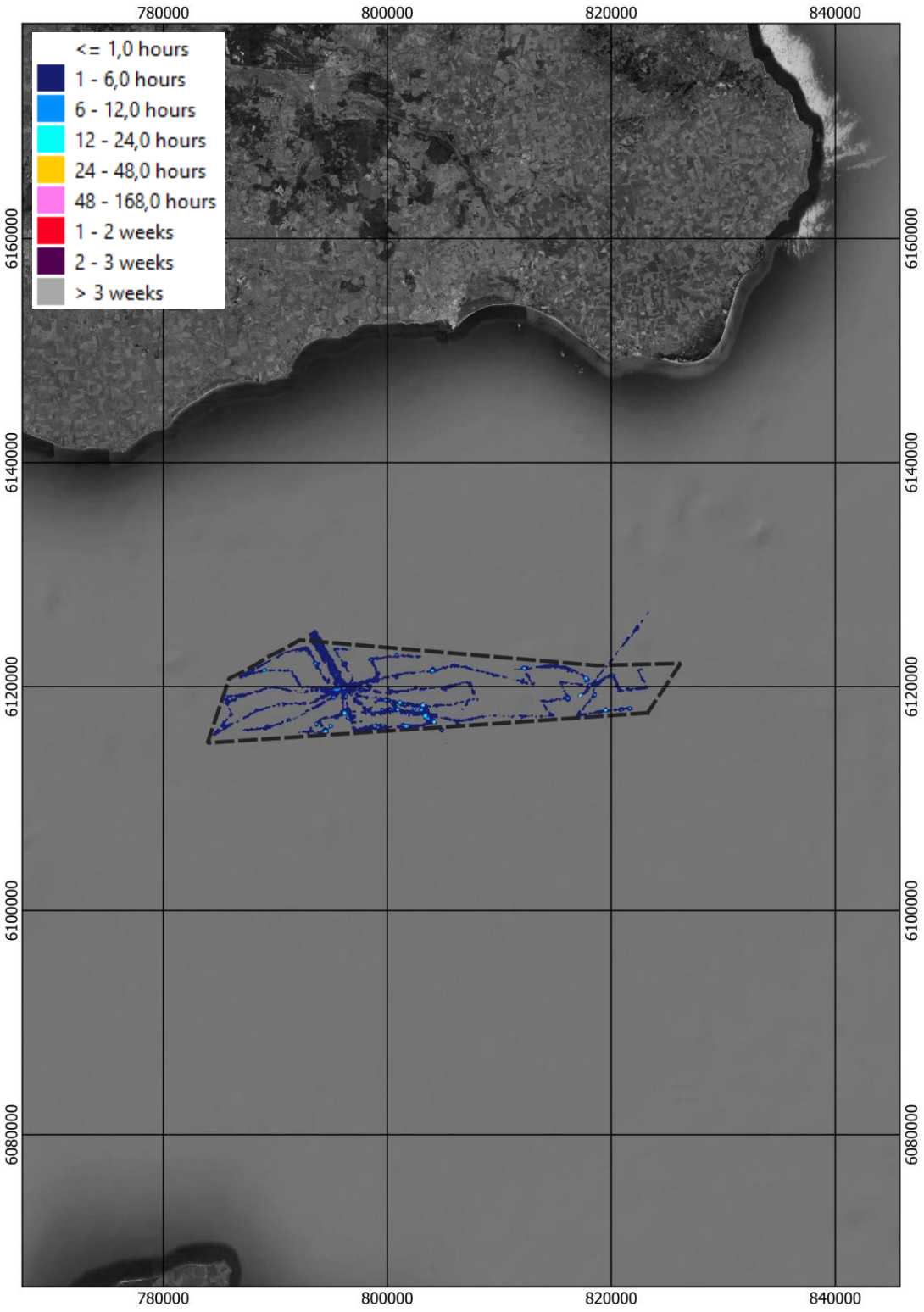
Appendix 102: 25MW MP, Surface – Duration 1000 mg/l, lower 10 m



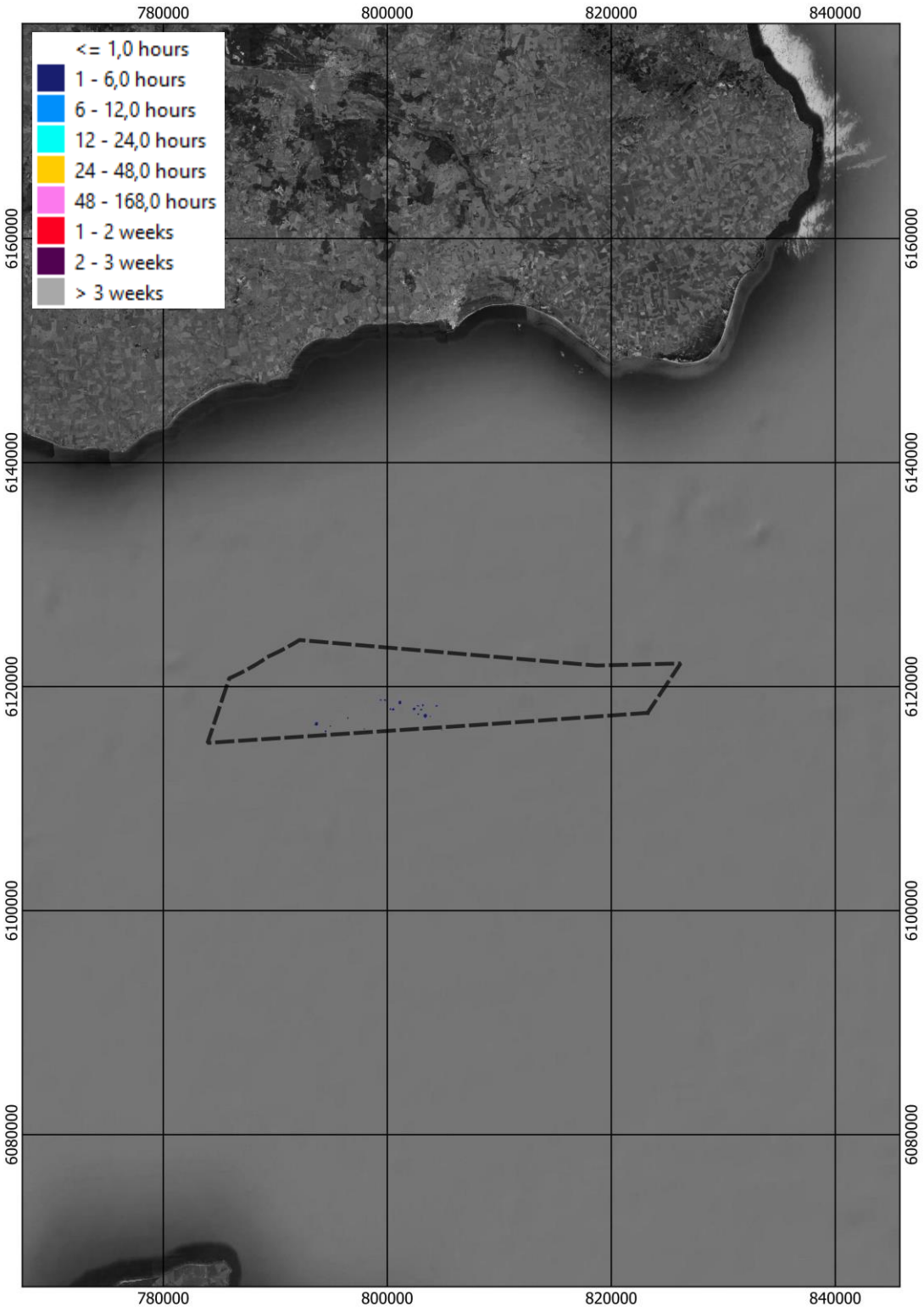
Appendix 103: 25MW MP, Surface – Maximum sedimentation in mm



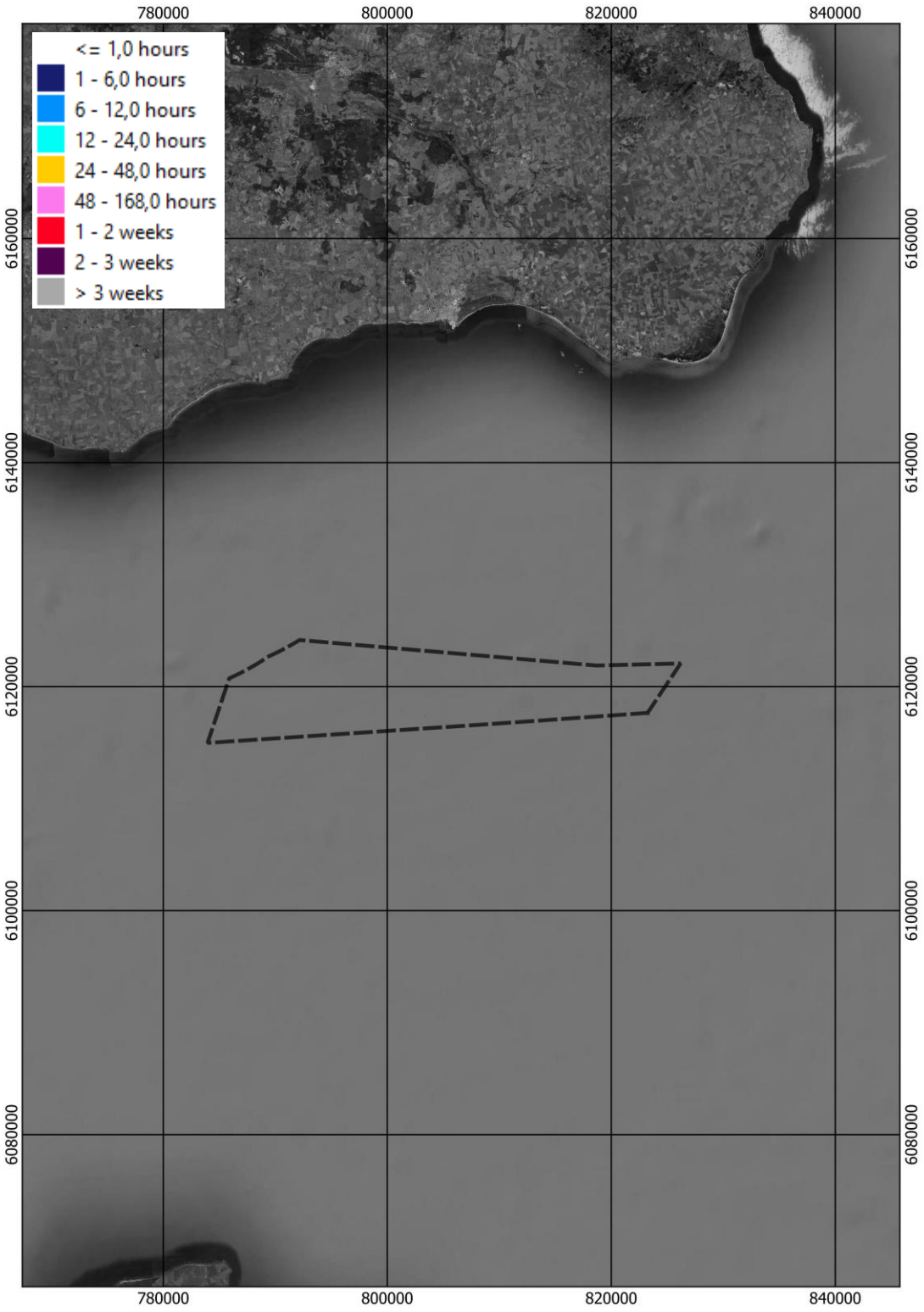
Appendix 104: 25MW GBS, Duration 10 mg/l, depth average



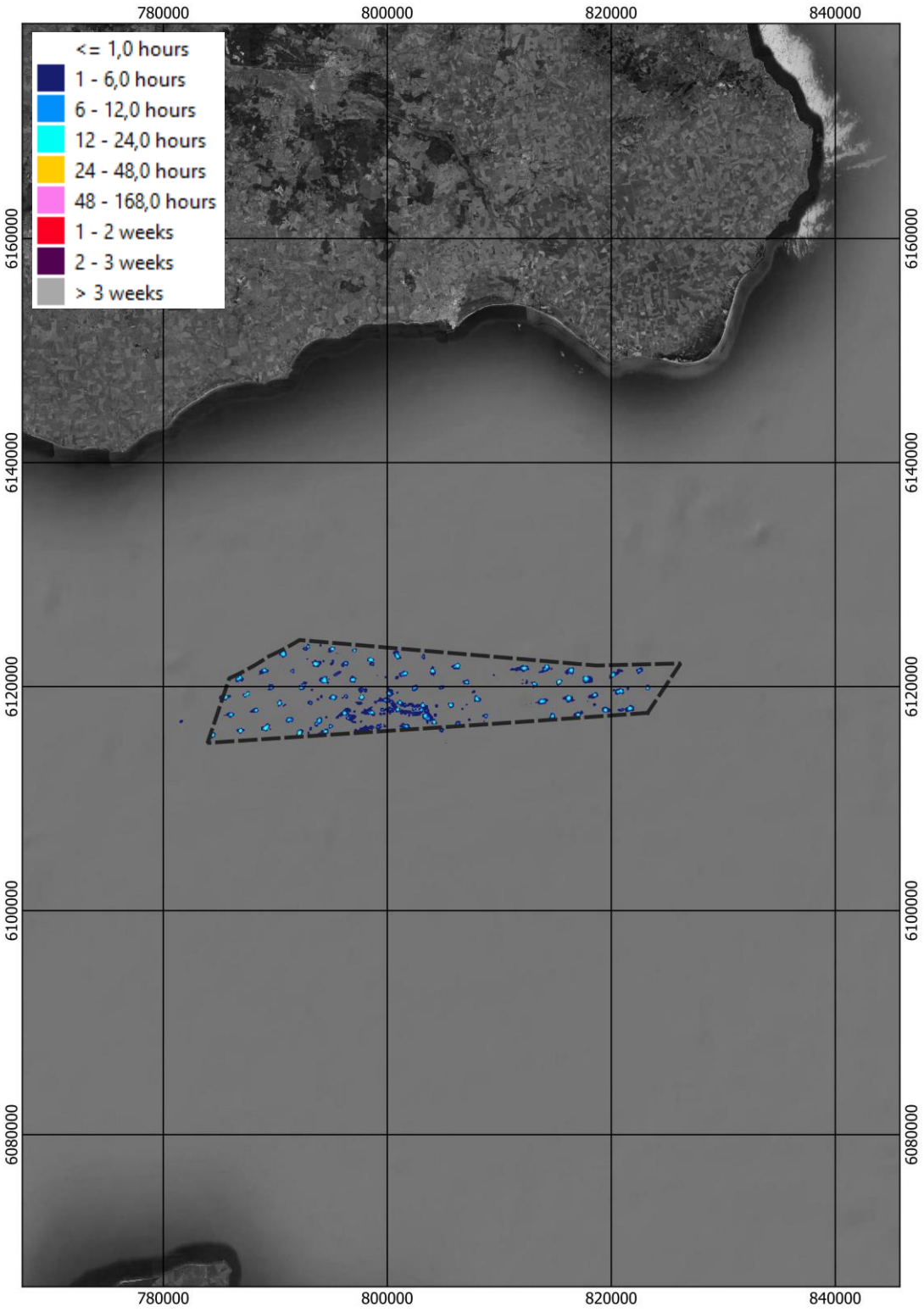
Appendix 105: 25MW GBS, Duration 100 mg/l, depth average



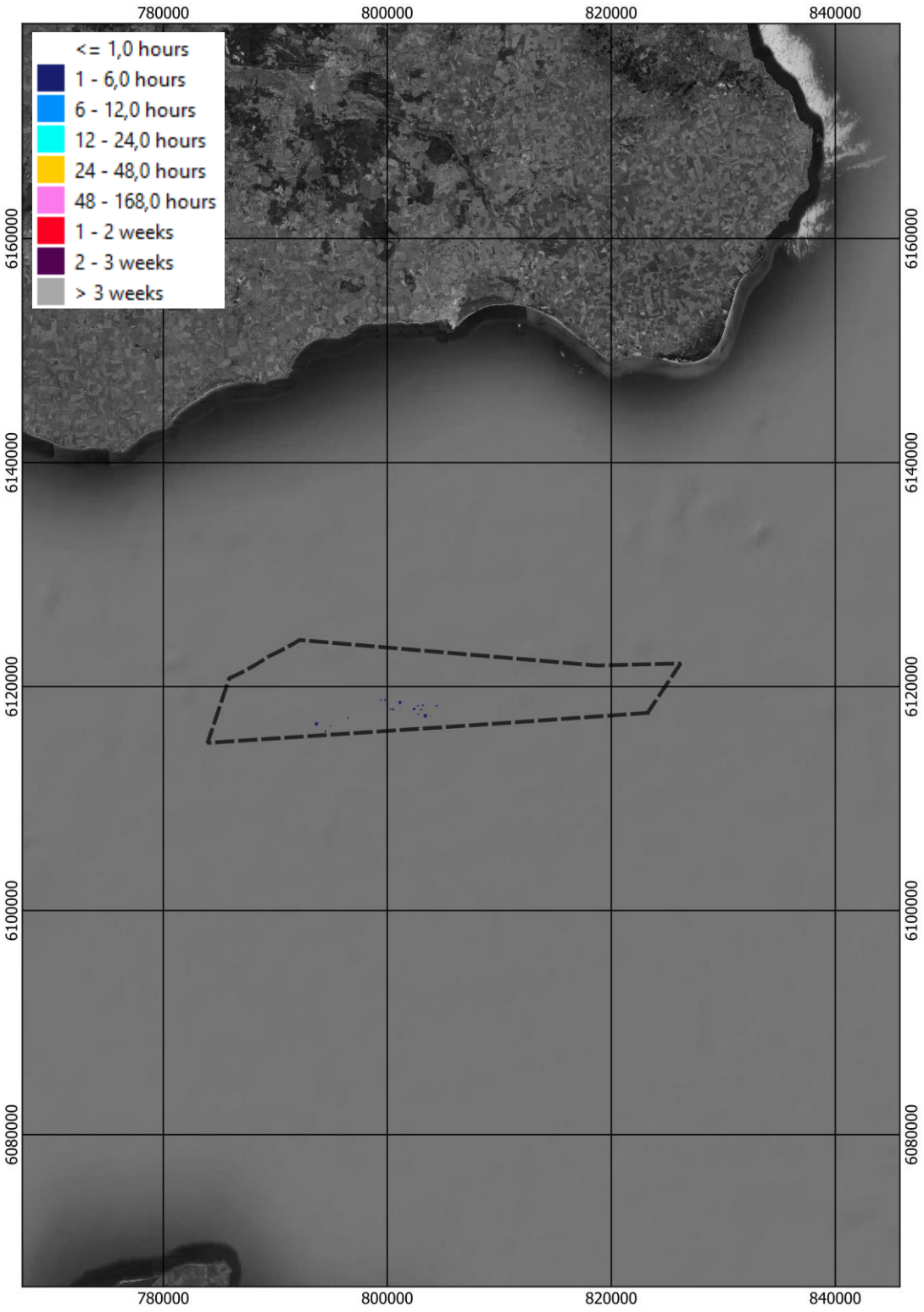
Appendix 106: 25MW GBS, Duration 1000 mg/l, depth average



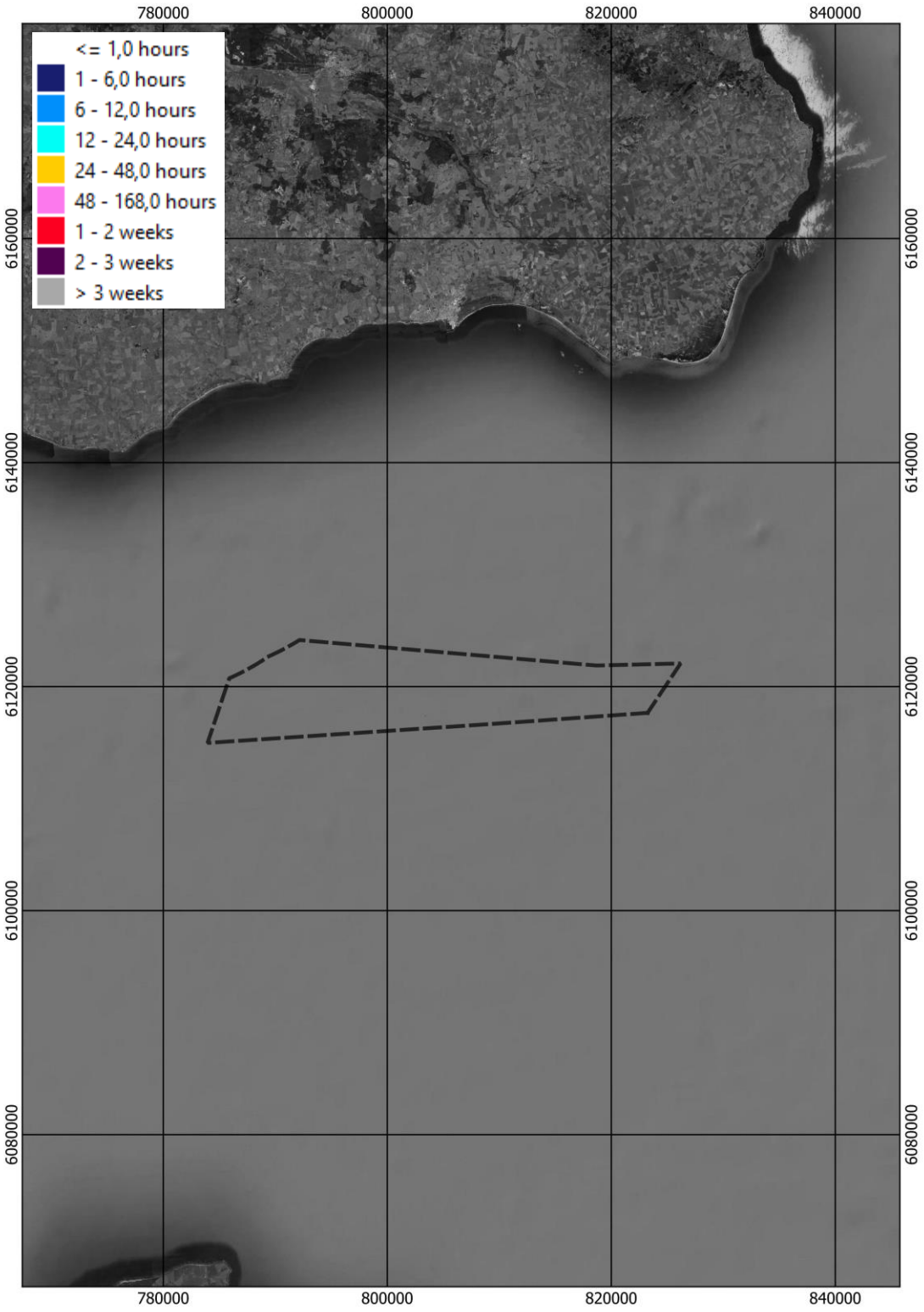
Appendix 107: 25MW GBS, Duration 10 mg/l, upper 10 m



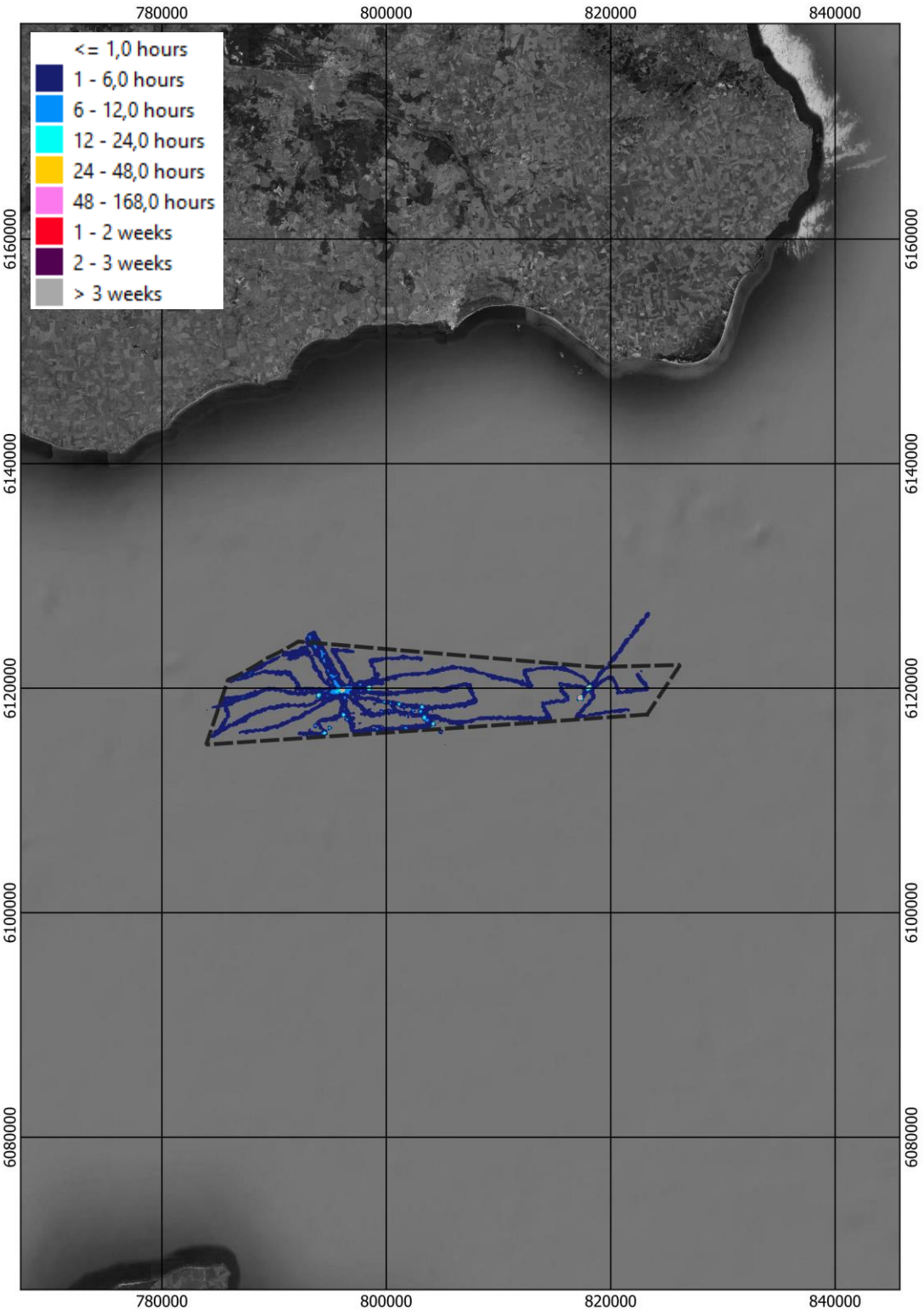
Appendix 108: 25MW GBS, Duration 100 mg/l, upper 10 m



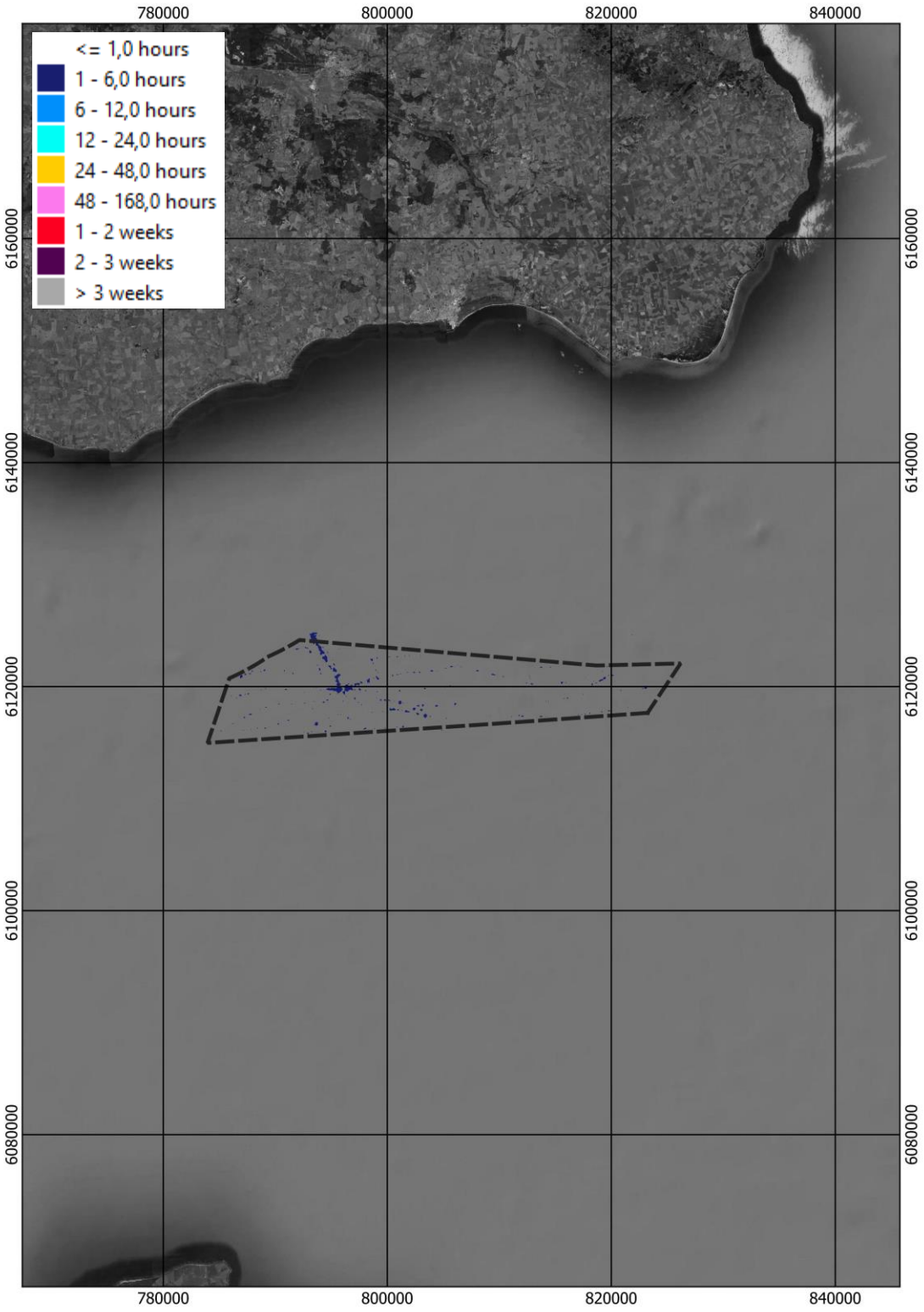
Appendix 109: 25MW GBS, Duration 1000 mg/l, upper 10 m



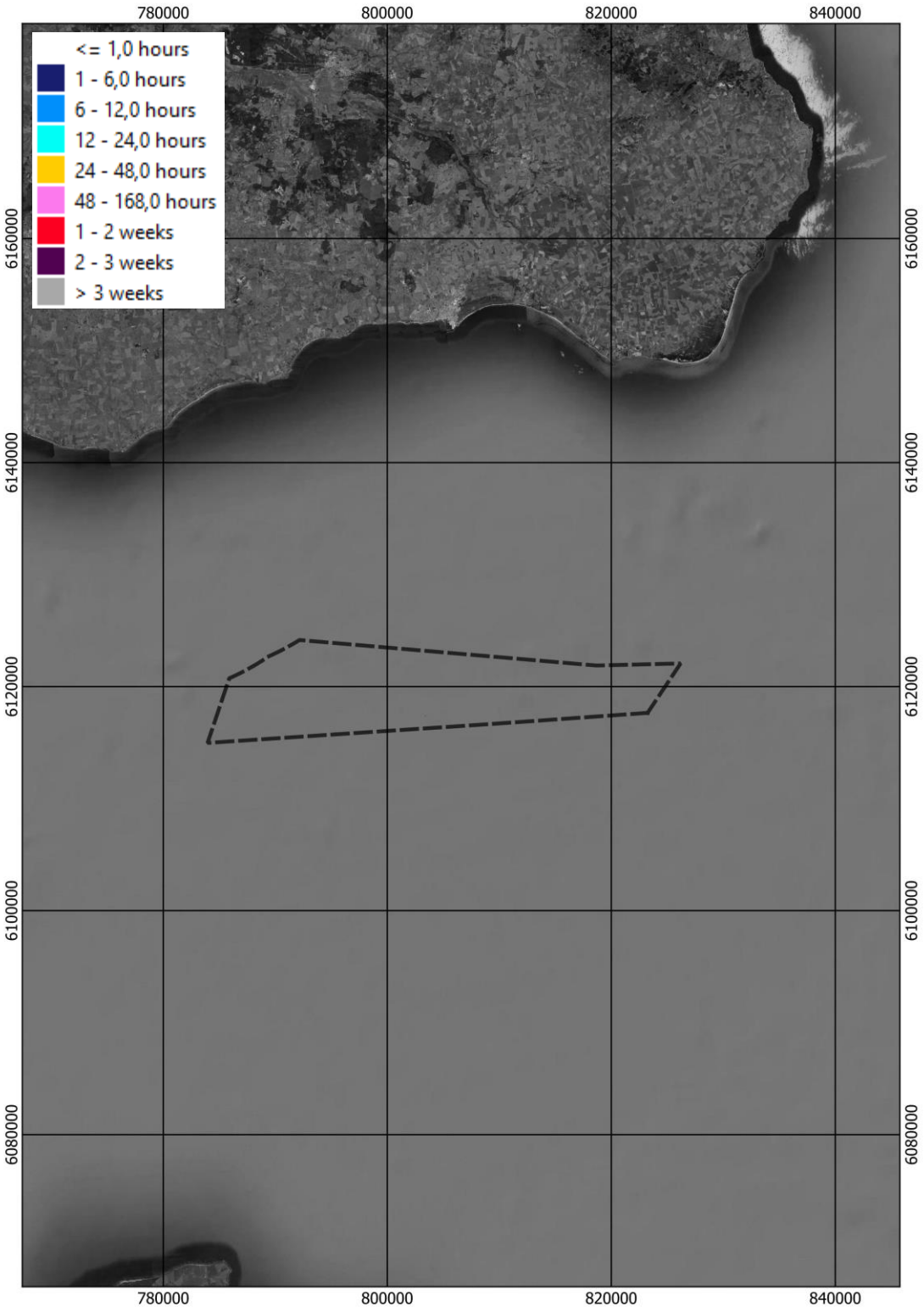
Appendix 110: 25MW GBS, Duration 10 mg/l, lower 10 m



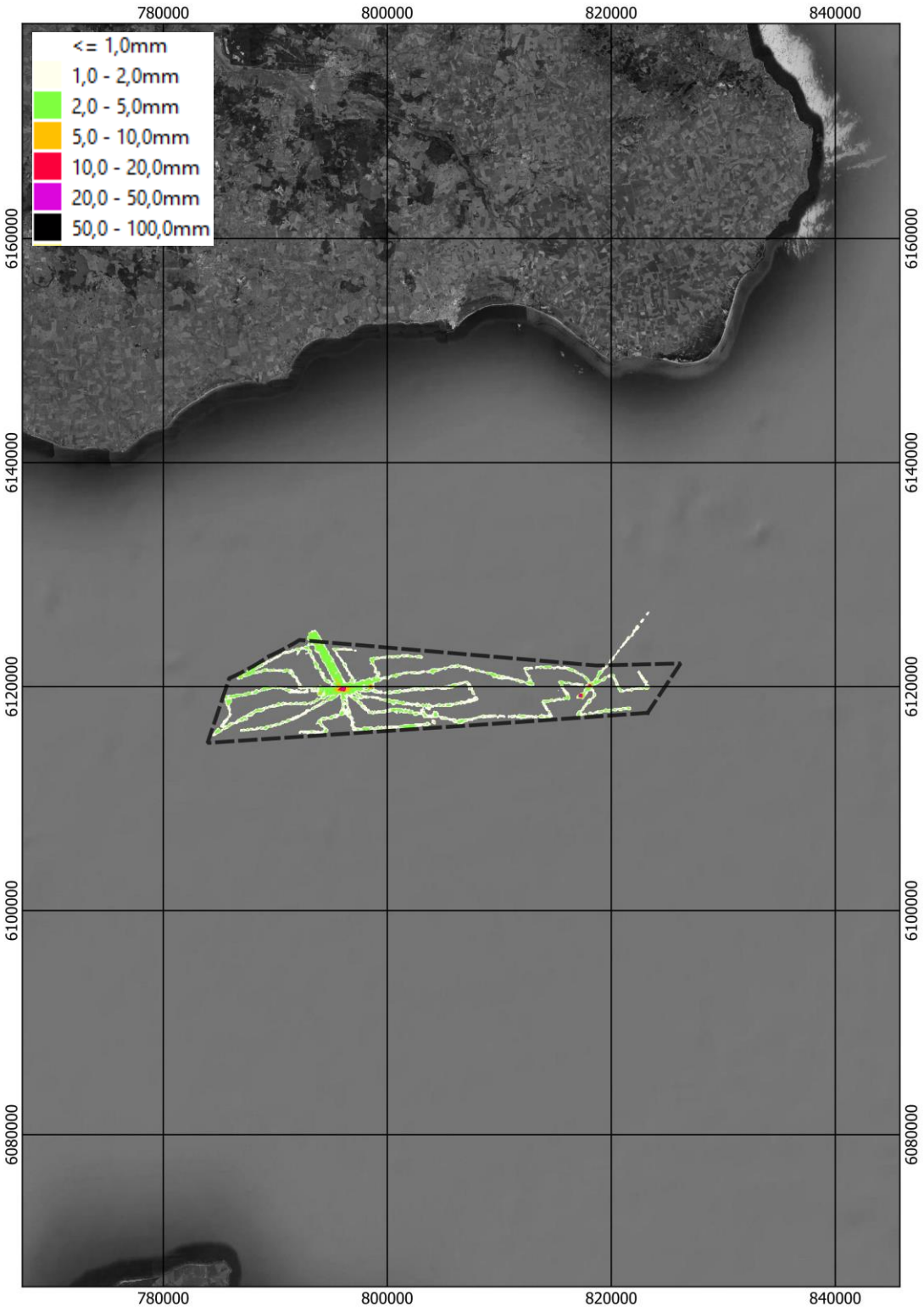
Appendix 111: 25MW GBS, Duration 100 mg/l, lower 10 m



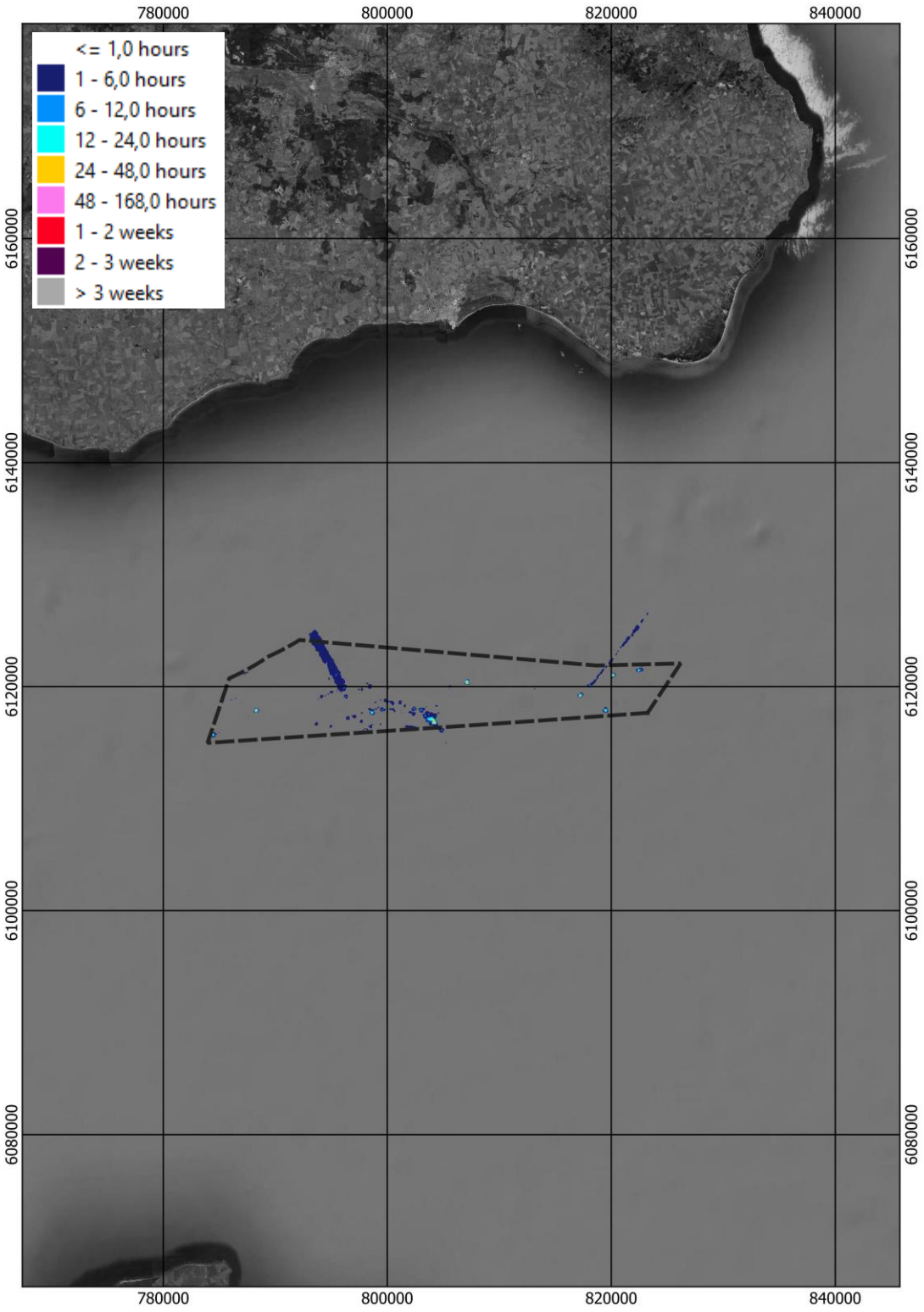
Appendix 112: 25MW GBS, Duration 1000 mg/l, lower 10 m



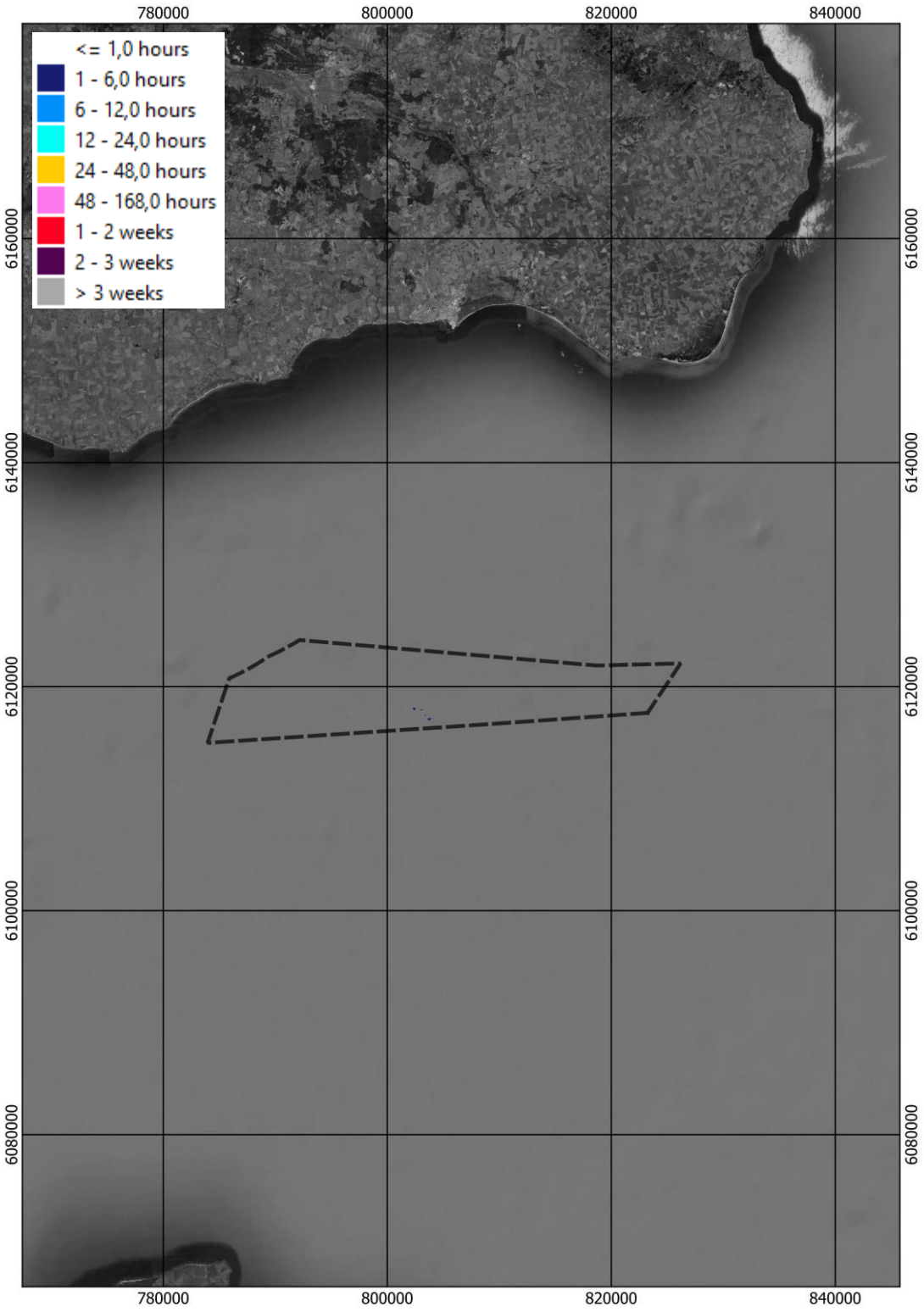
Appendix 113: 25MW GBS, Maximum sedimentation in mm



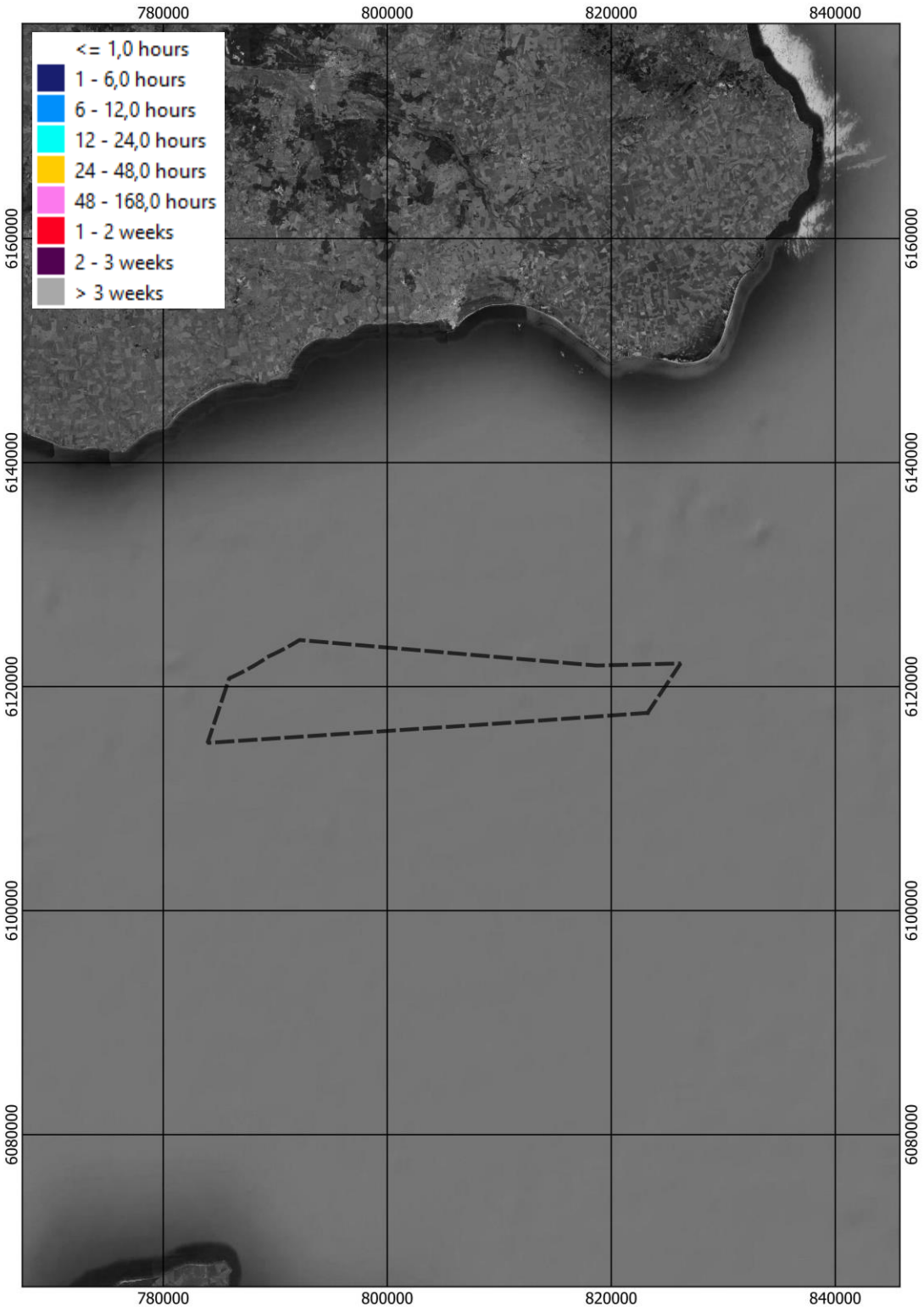
Appendix 114: 25MW Jacket, Bottom – Duration 10 mg/l, depth average



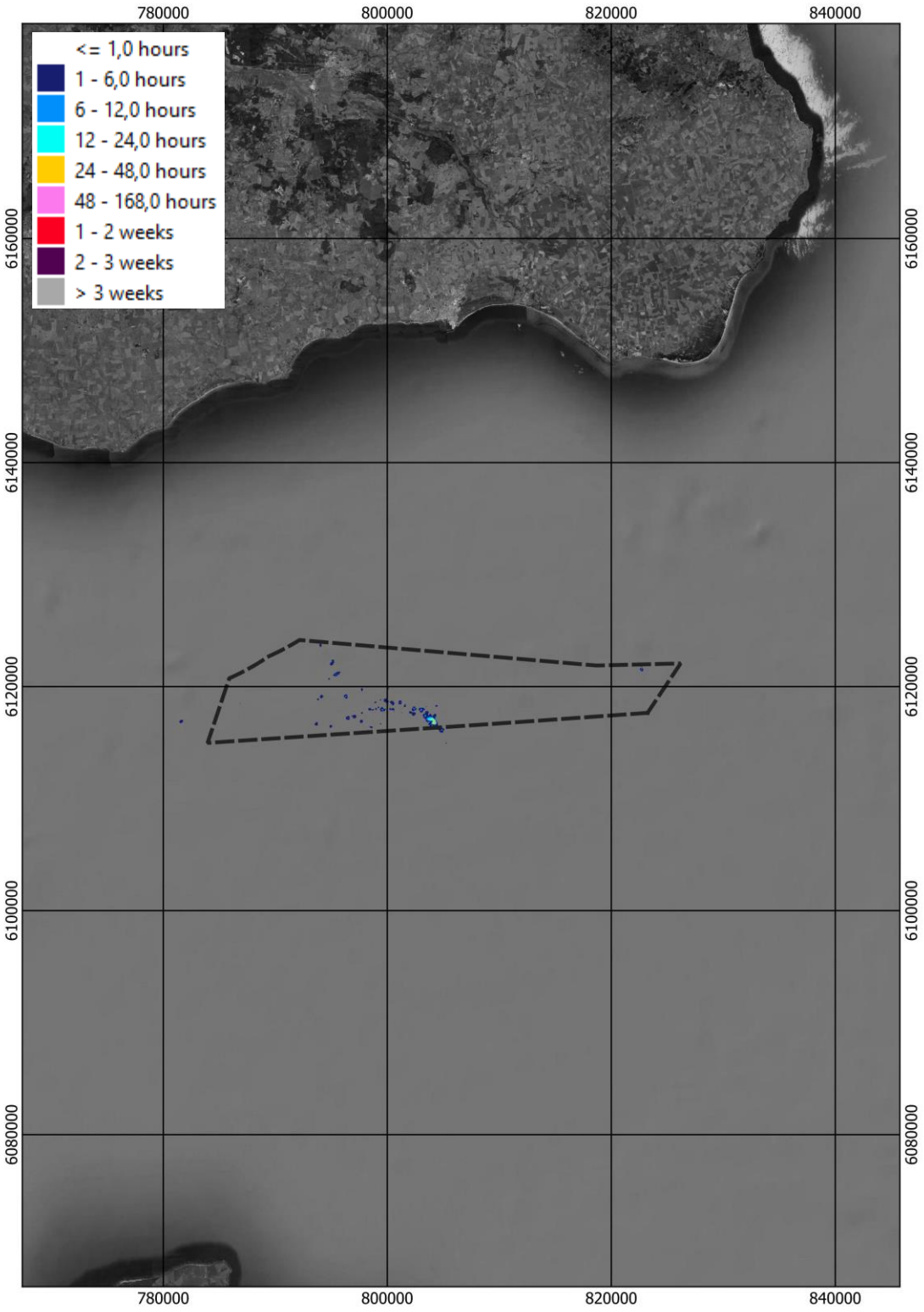
Appendix 115: 25MW Jacket, Bottom – Duration 100 mg/l, depth average



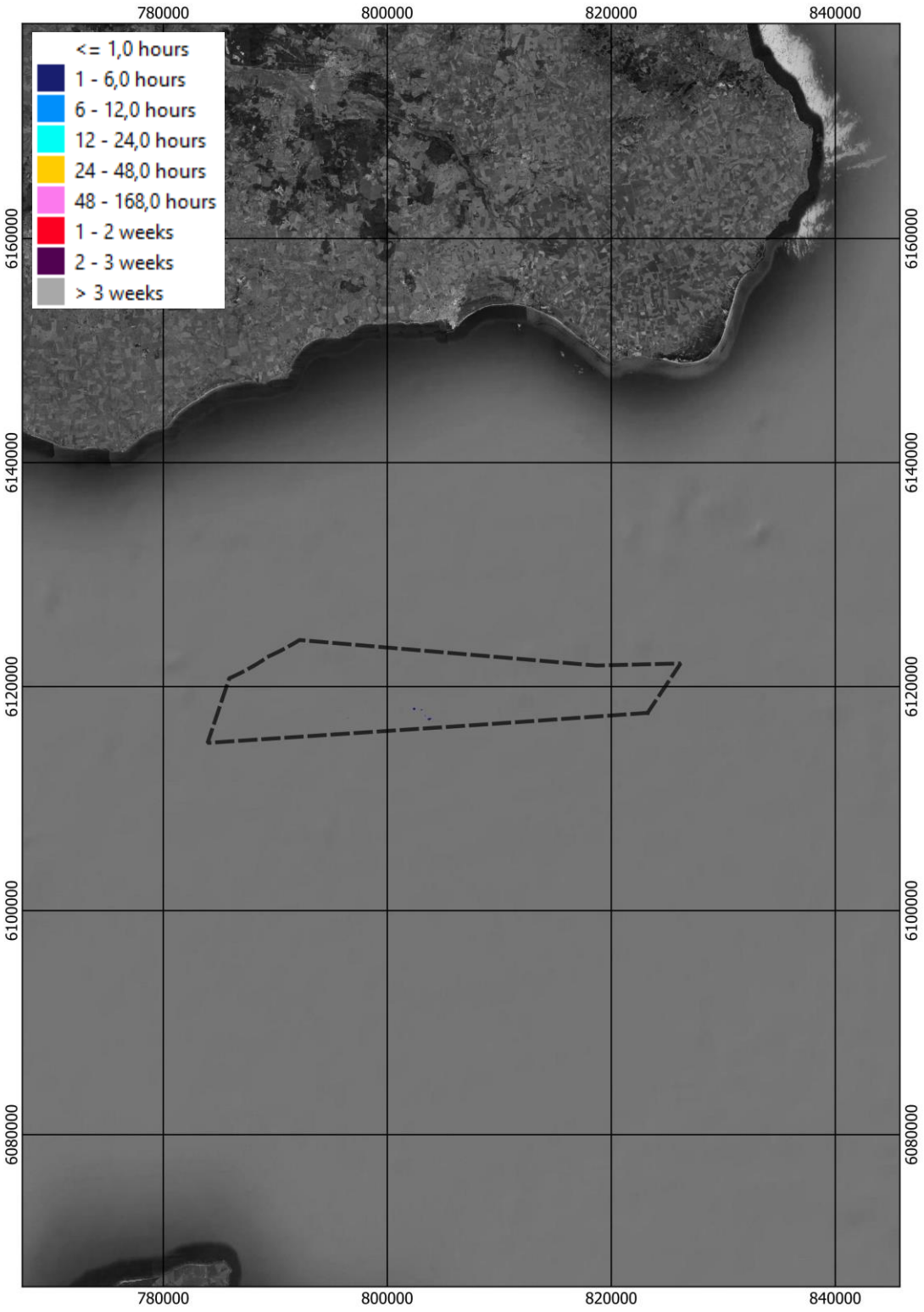
Appendix 116: 25MW Jacket, Bottom – Duration 1000 mg/l, depth average



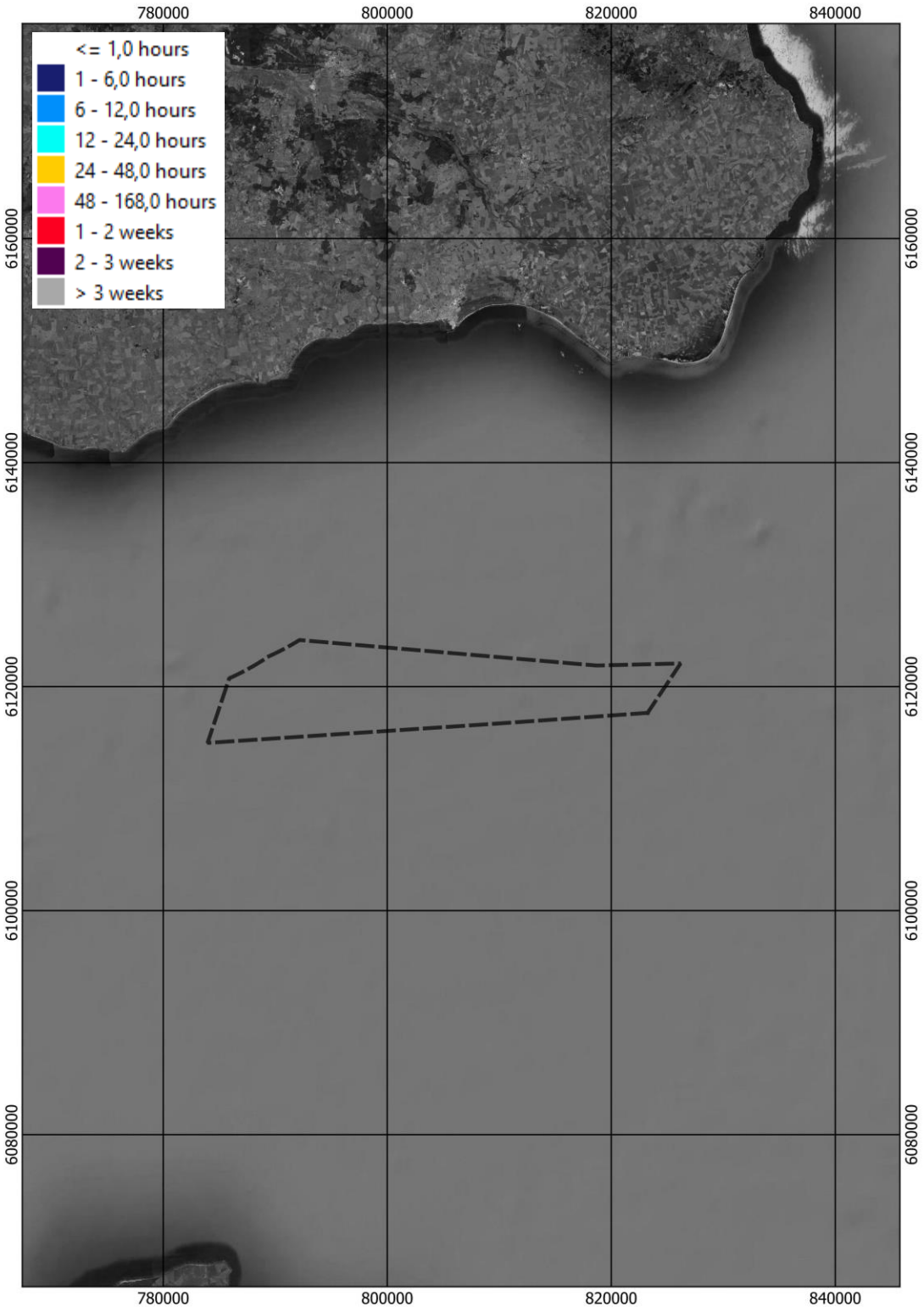
Appendix 117: 25MW Jacket, Bottom – Duration 10 mg/l, upper 10 m



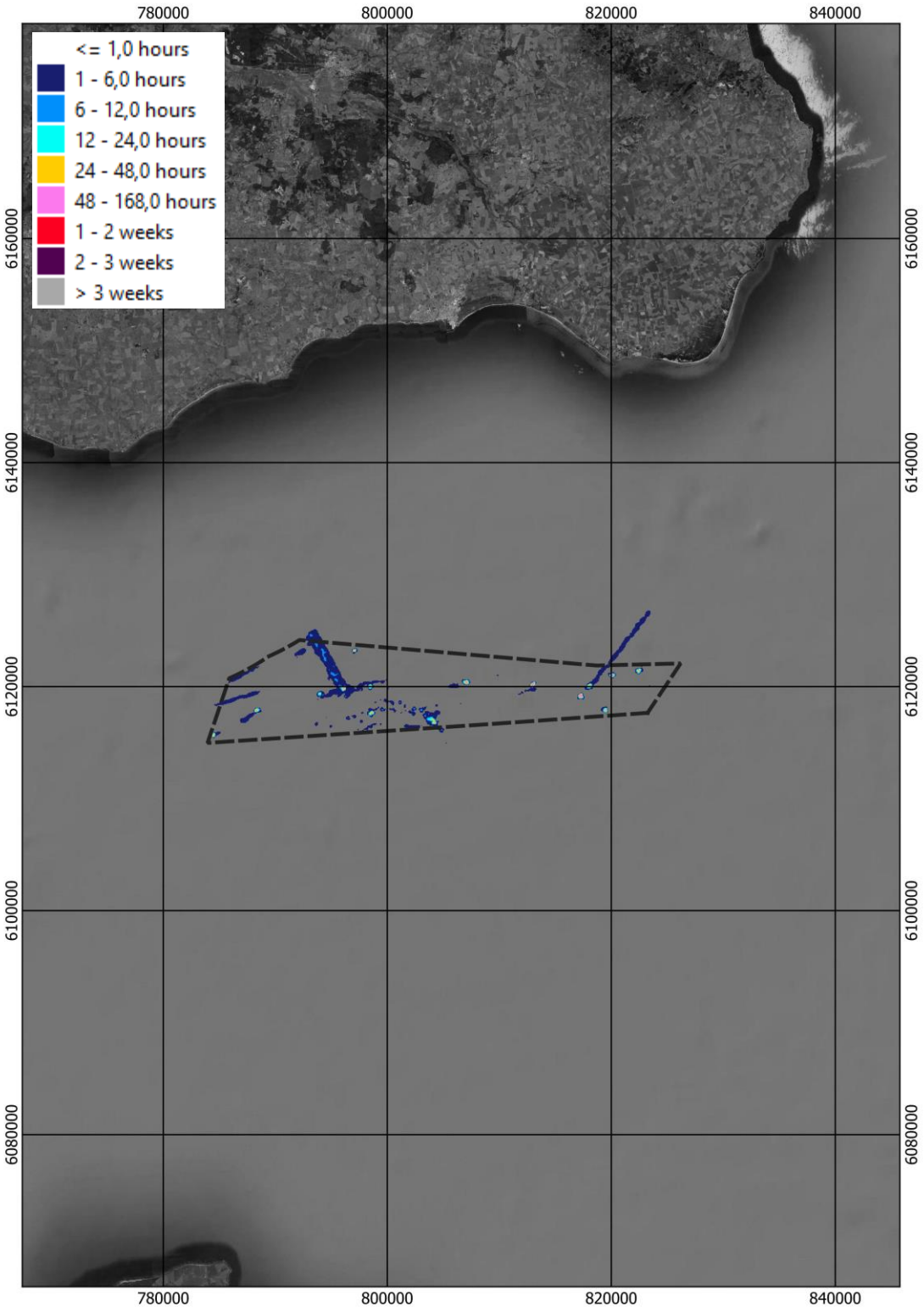
Appendix 118: 25MW Jacket, Bottom – Duration 100 mg/l, upper 10 m



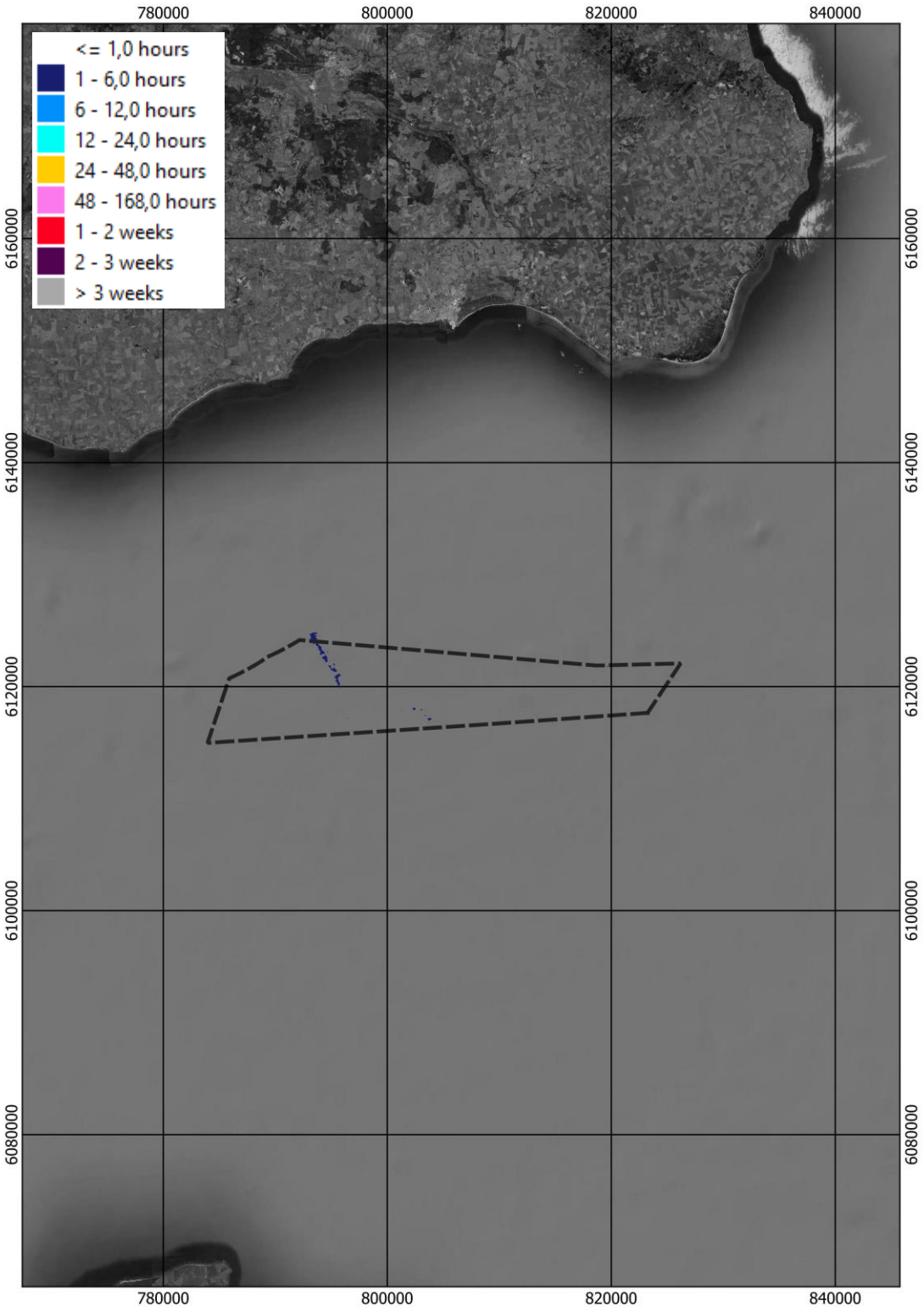
Appendix 119: 25MW Jacket, Bottom – Duration 1000 mg/l, upper 10 m



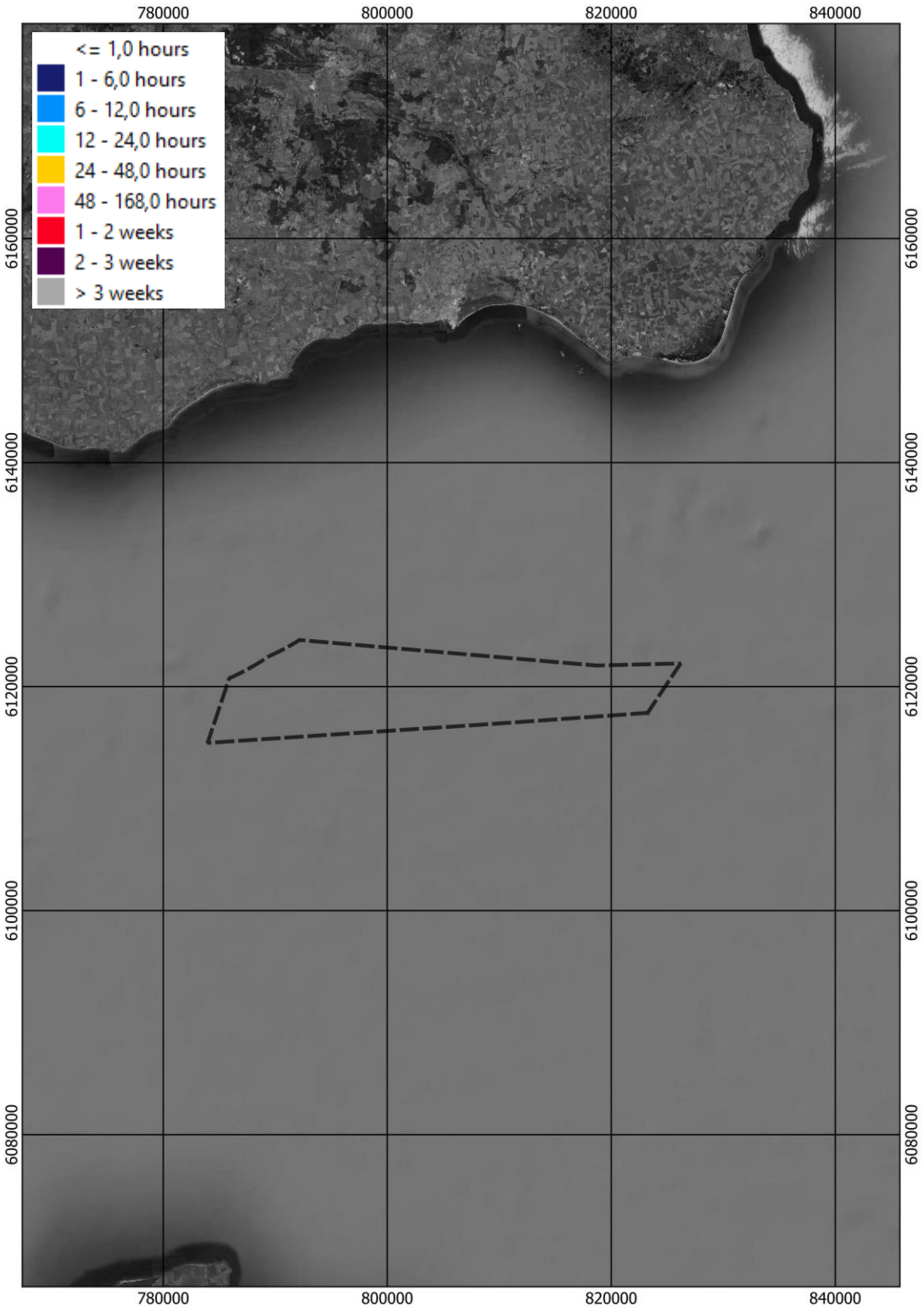
Appendix 120: 25MW Jacket, Bottom – Duration 10 mg/l, lower 10 m



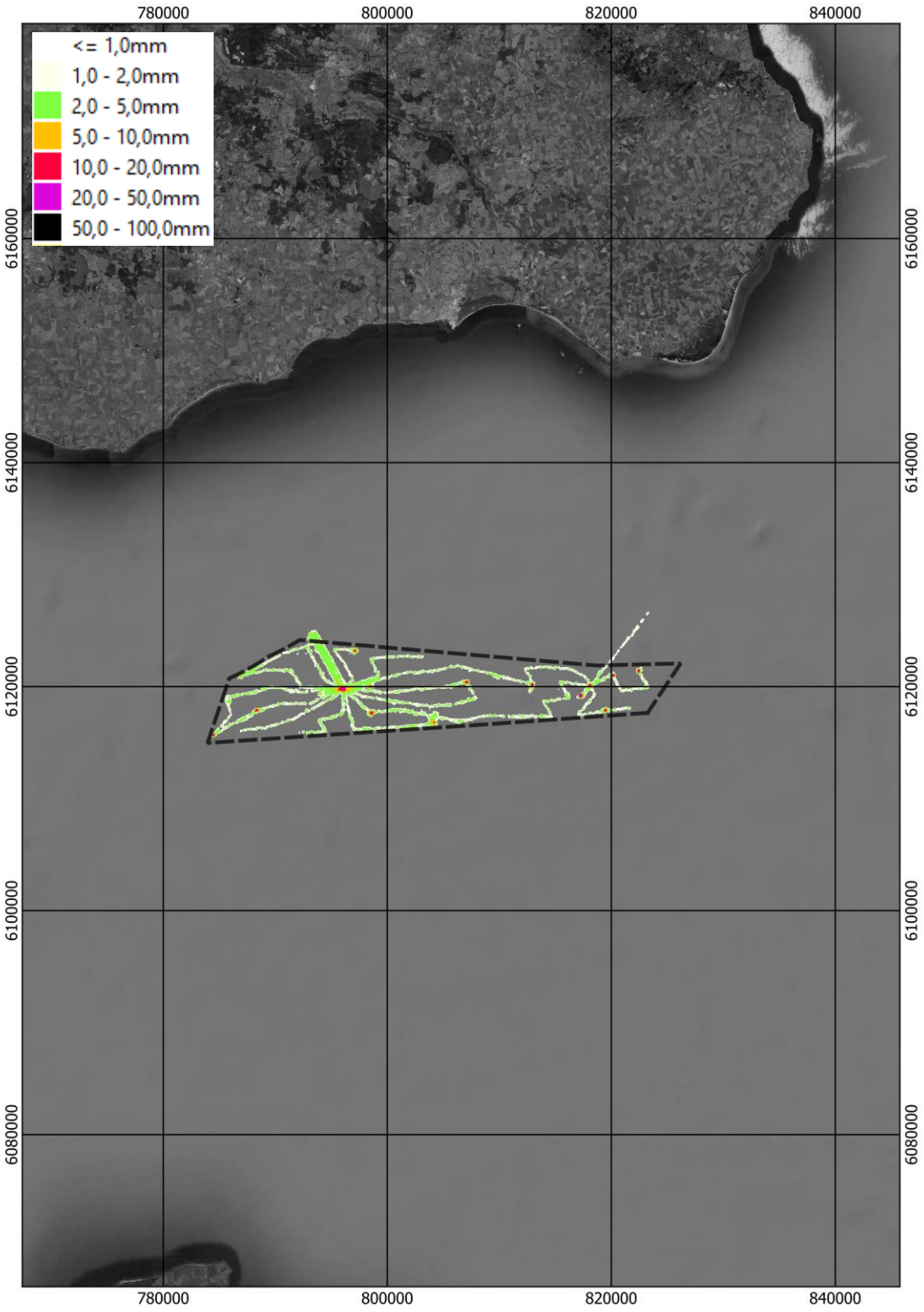
Appendix 121: 25MW Jacket, Bottom – Duration 100 mg/l, lower 10 m



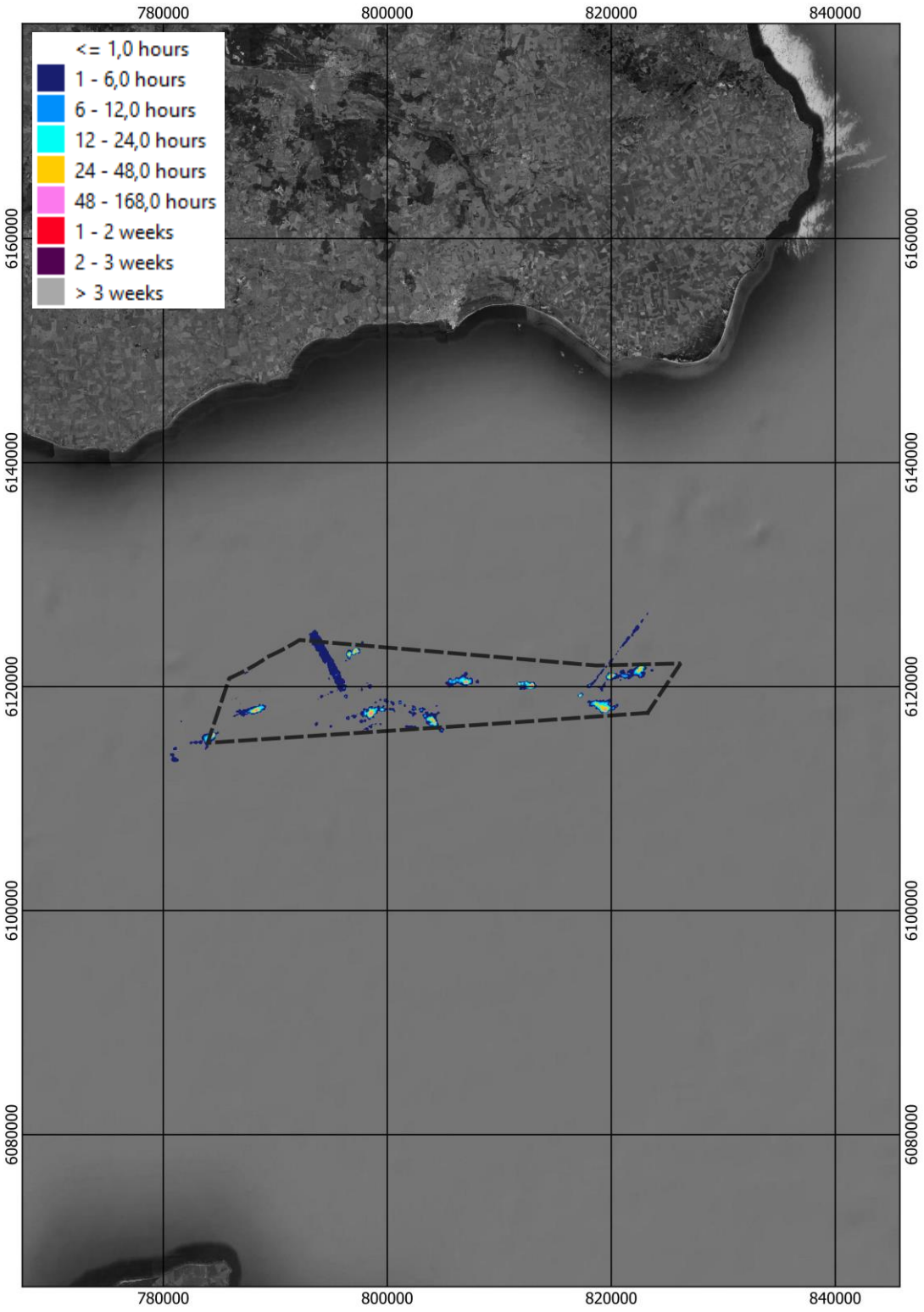
Appendix 122: 25MW Jacket, Bottom – Duration 1000 mg/l, lower 10 m



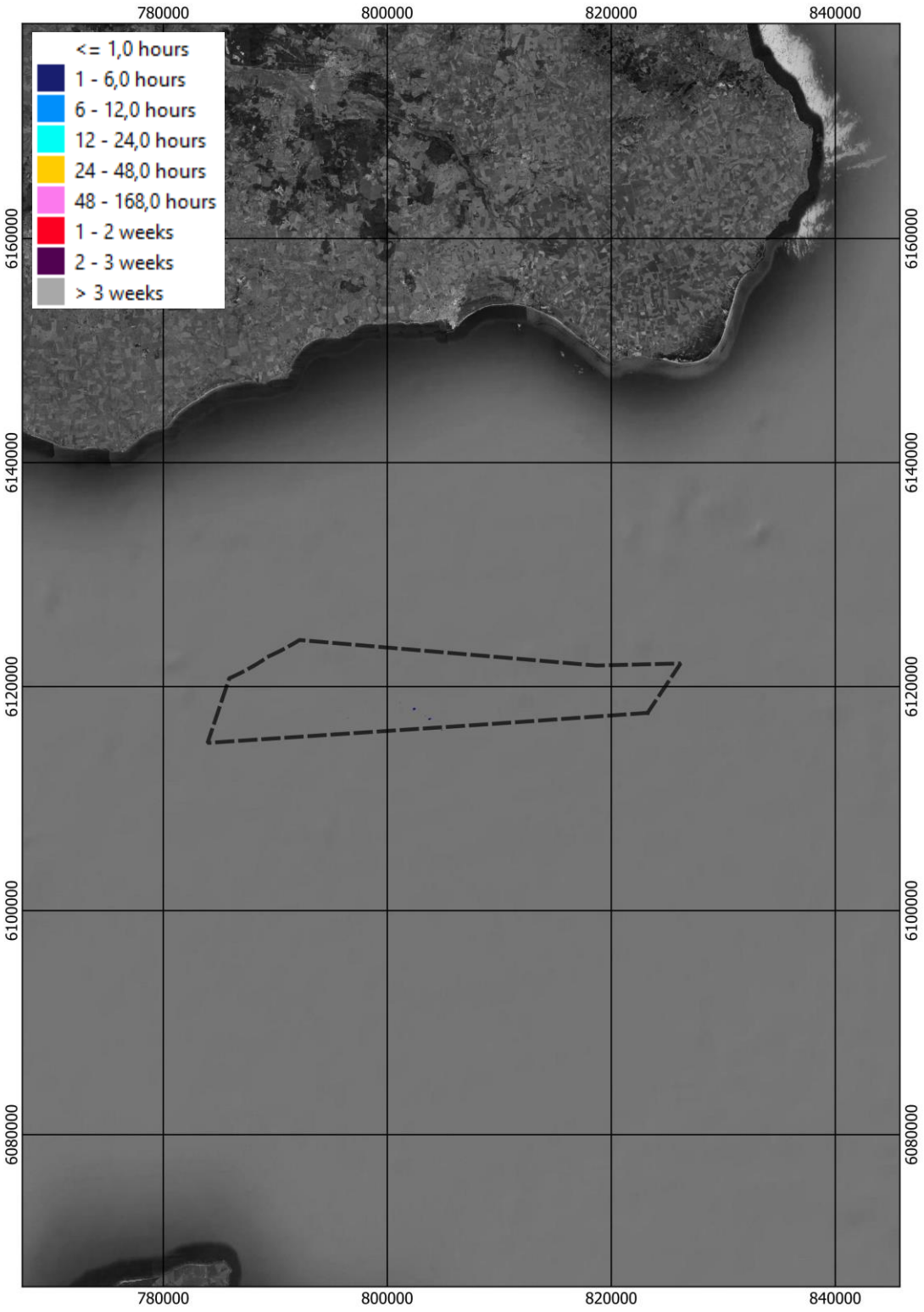
Appendix 123: 25MW Jacket, Bottom - Maximum sedimentation in mm



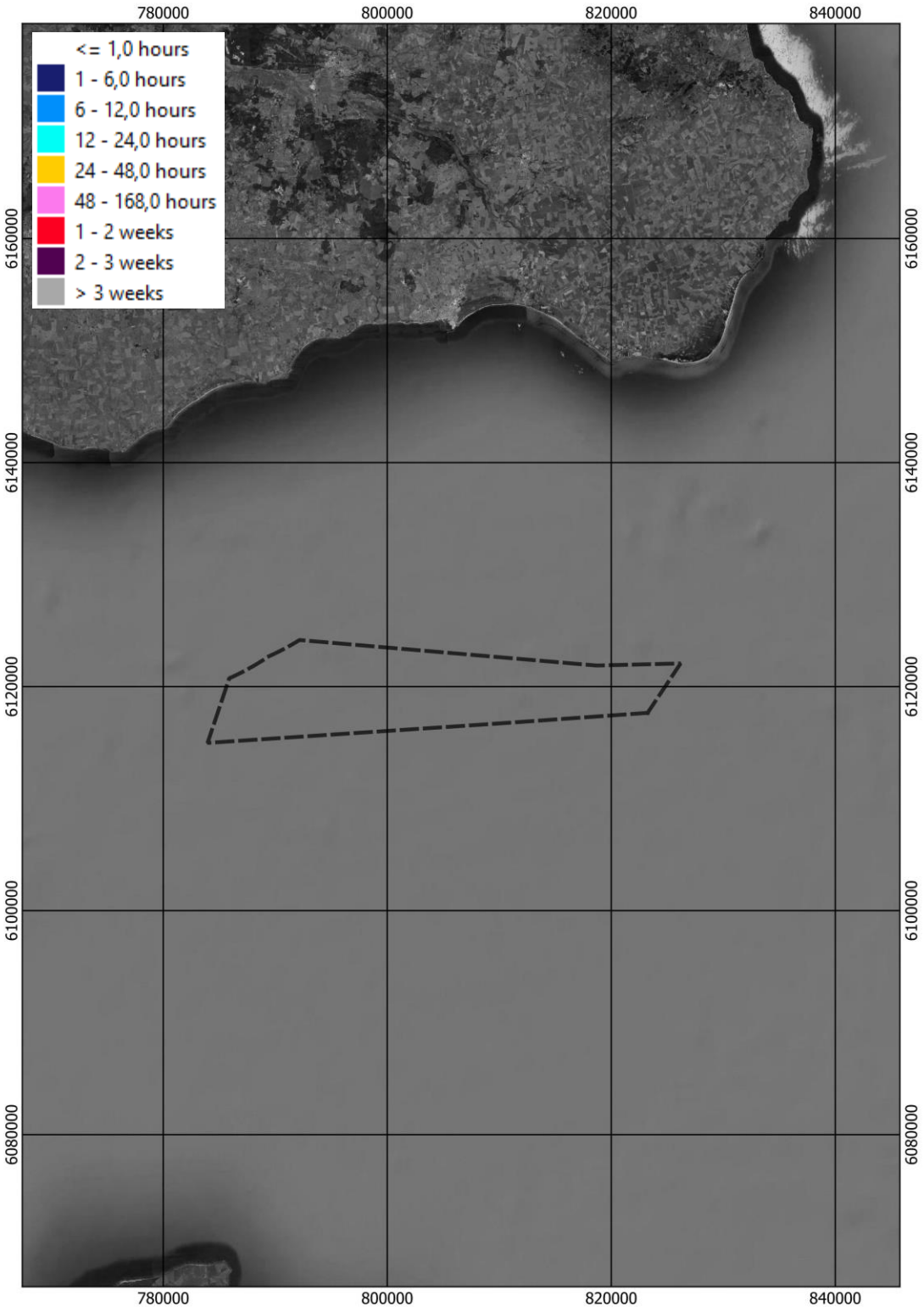
Appendix 124: 25MW Jacket, Surface – Duration 10 mg/l, depth average



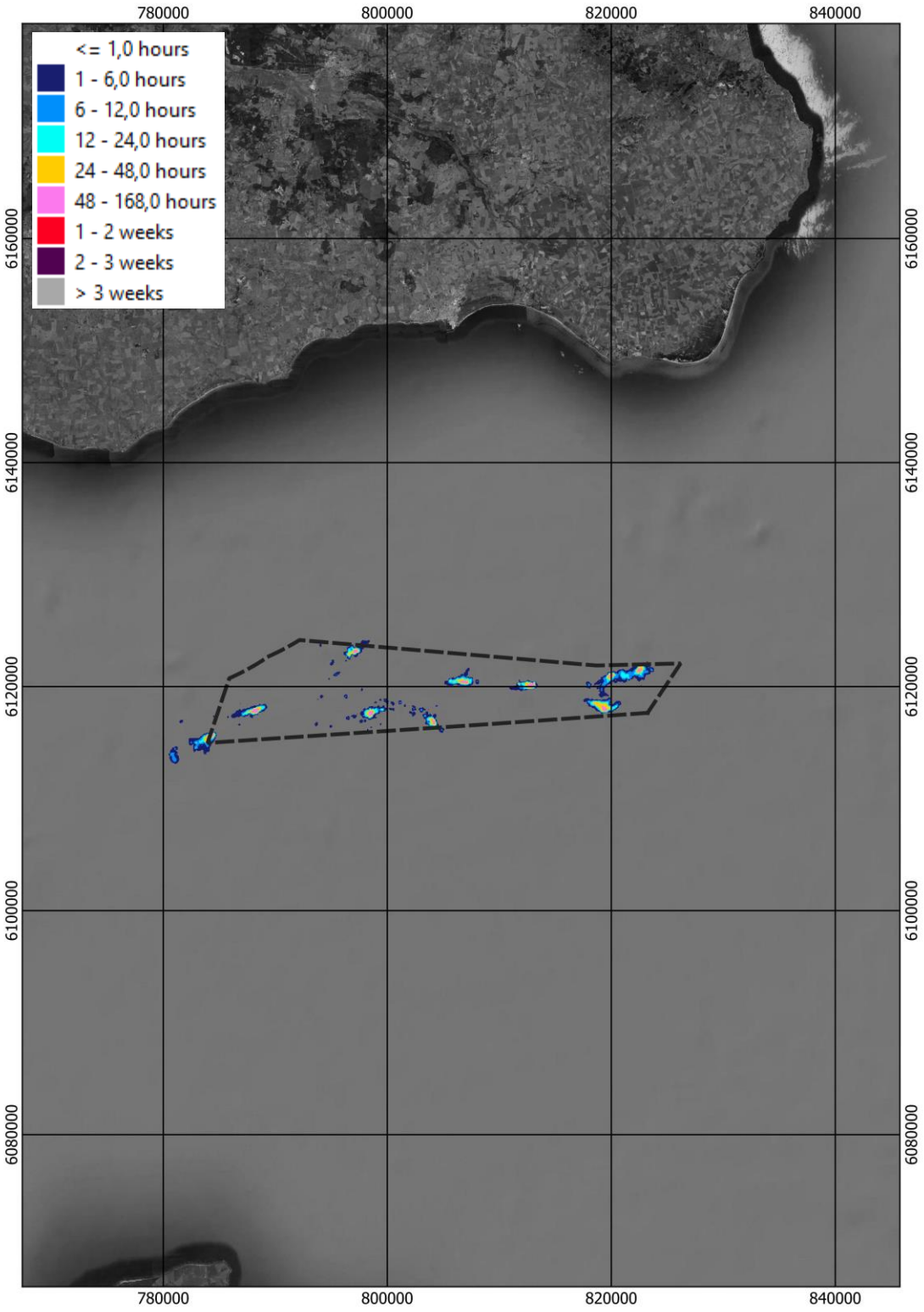
Appendix 125: 25MW Jacket, Surface – Duration 100 mg/l, depth average



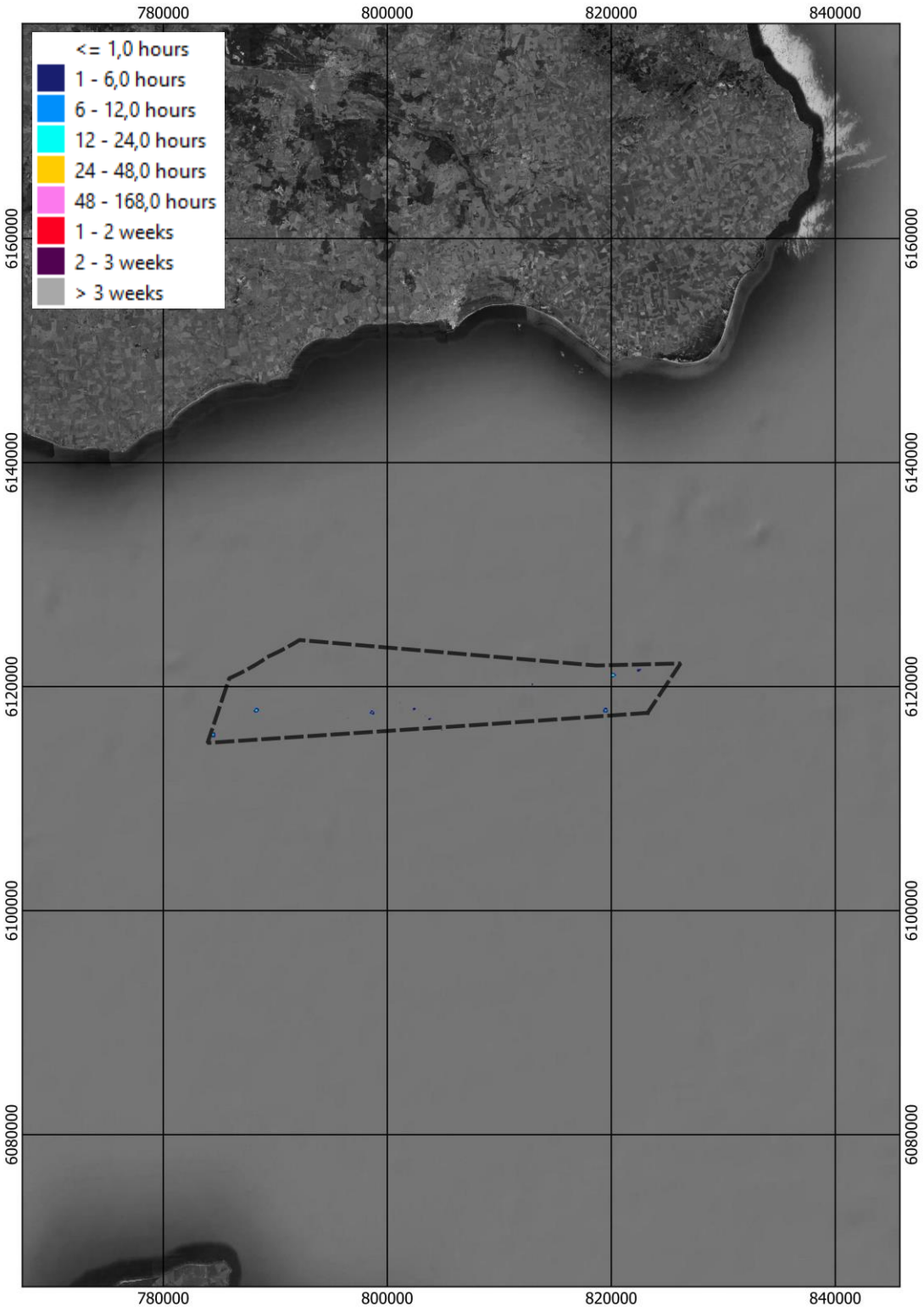
Appendix 126: 25MW Jacket, Surface – Duration 1000 mg/l, depth average



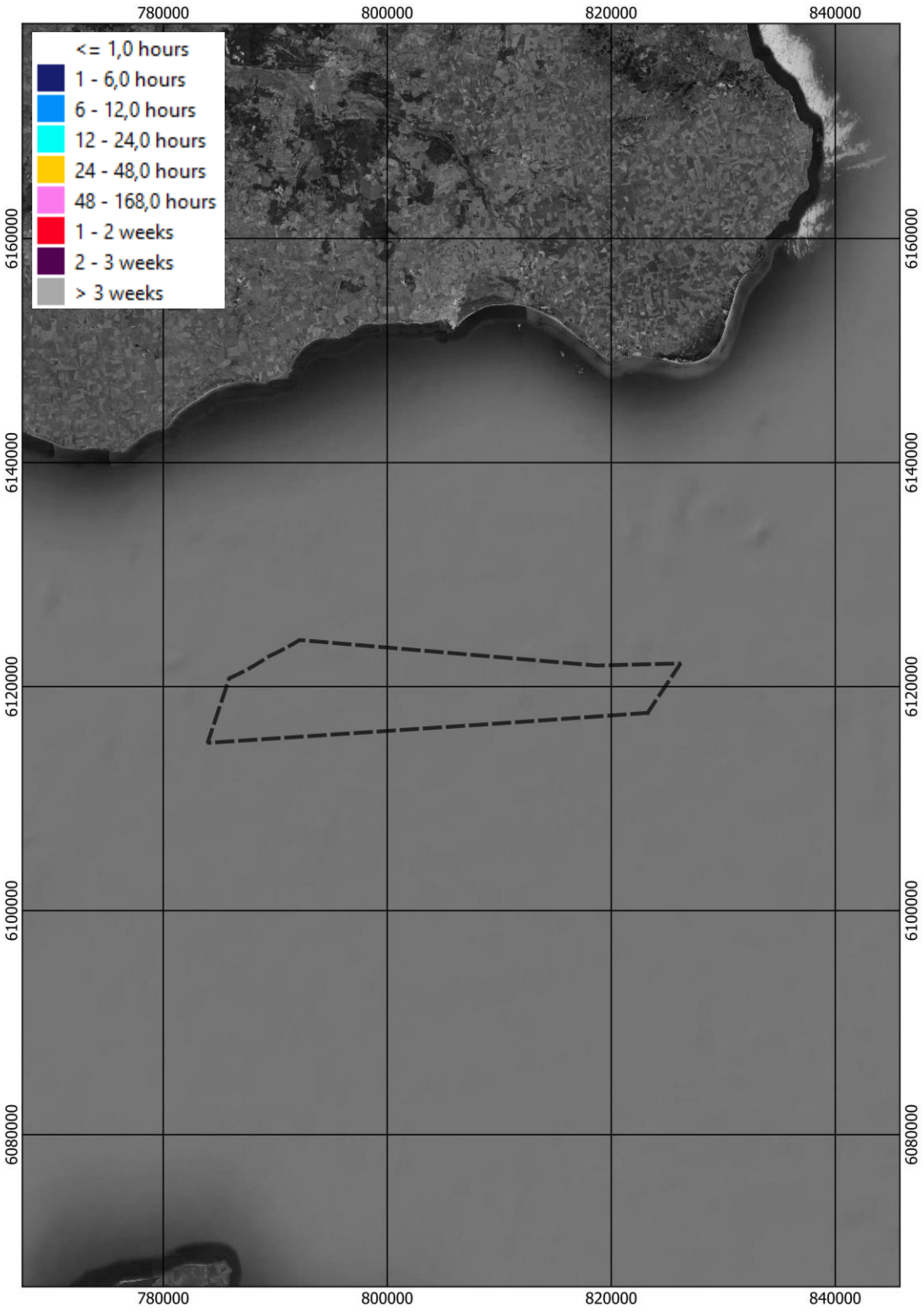
Appendix 127: 25MW Jacket, Surface – Duration 10 mg/l, upper 10 m



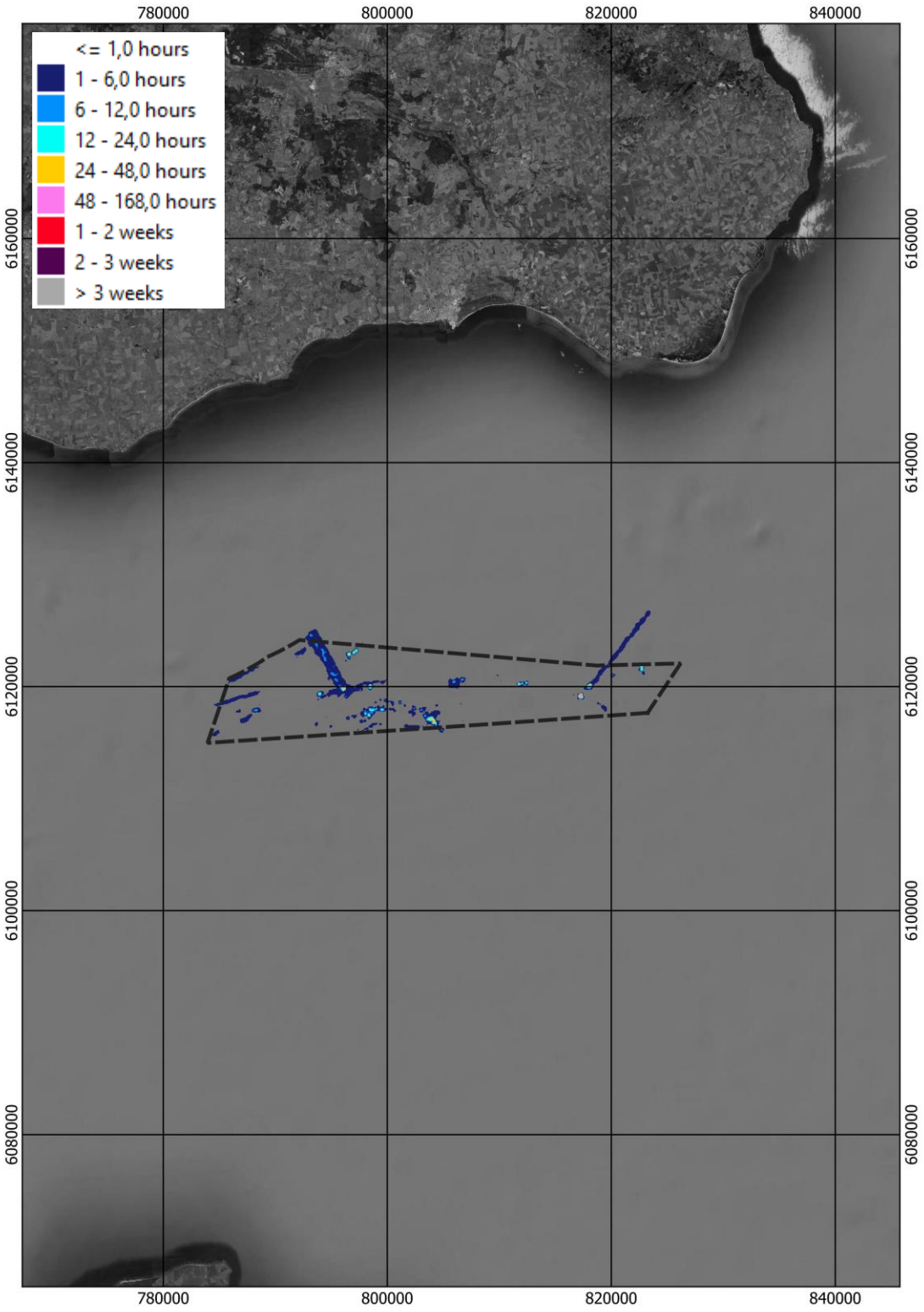
Appendix 128: 25MW Jacket, Surface – Duration 100 mg/l, upper 10 m



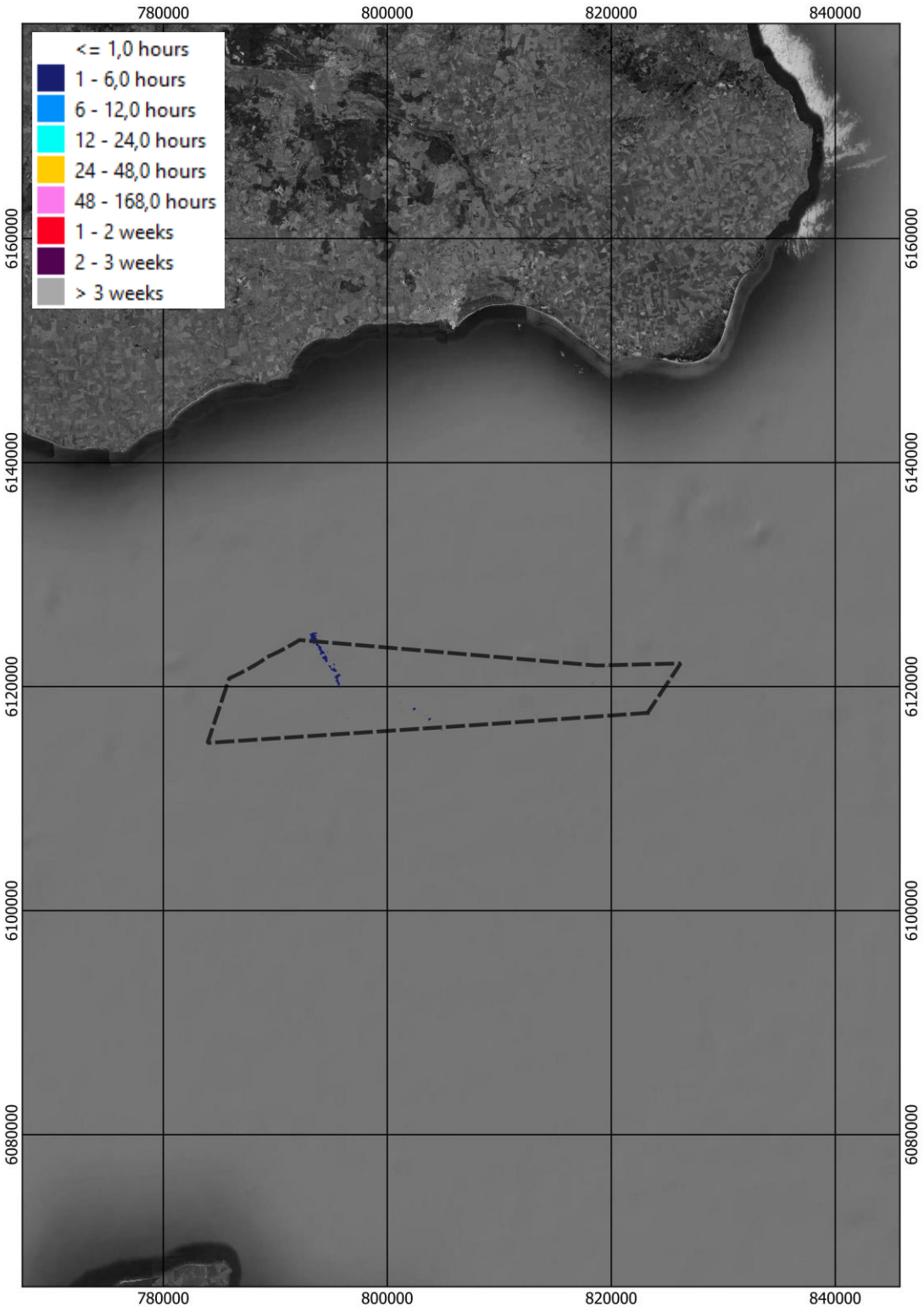
Appendix 129: 25MW Jacket, Surface – Duration 1000 mg/l, upper 10 m



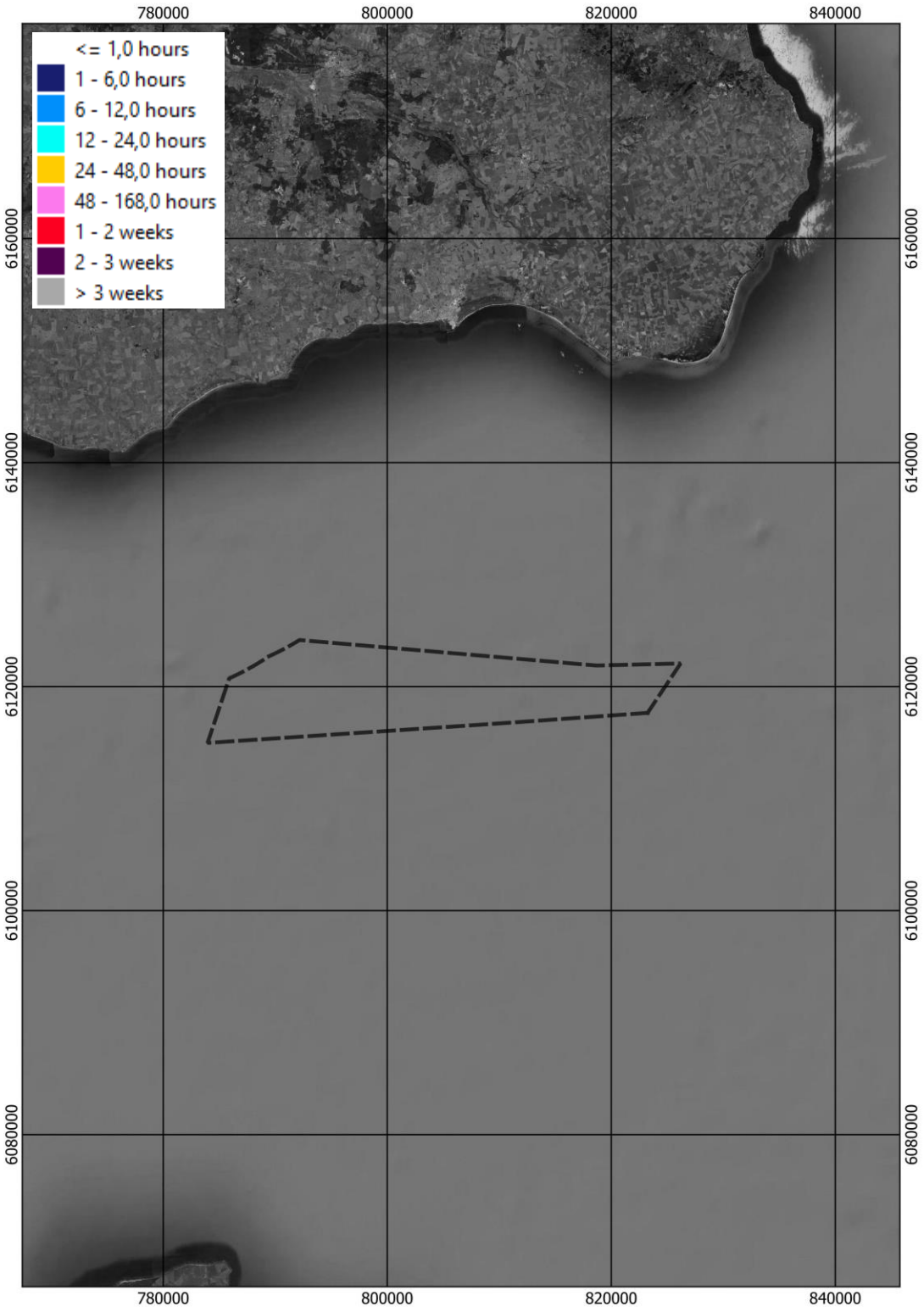
Appendix 130: 25MW Jacket, Surface – Duration 10 mg/l, lower 10 m



Appendix 131: 25MW Jacket, Surface – Duration 100 mg/l, lower 10 m



Appendix 132: 25MW Jacket, Surface – Duration 1000 mg/l, lower 10 m



Appendix 133: 25MW Jacket, Surface - Maximum sedimentation in mm