

# Cruise HE 333 with RV Heincke

Bremerhaven – Svalbard – Bremerhaven

August 7<sup>th</sup> to 30<sup>th</sup>, 2010

RIS ID 3690



Name and address of scientist in charge: **Prof. Dr. Michael Schlüter**

[Michael.schlueter@awi.de](mailto:Michael.schlueter@awi.de)

**Alfred Wegner Institute for Polar and Marine Research  
Am Handelshafen 12  
D-27570 Bremerhaven, Germany**

## Overview

Investigations of the methane cycle in surface and bottom waters of the Storfjord as well as around gas flares west of Prins Karls Foreland (Svalbard) were major objectives of this research cruise.

For these biogeochemical objectives water and surface sediment samples were gathered by Rosette Water Sampler, CTD, Multi Corer as well as a Benthic Chamber System. Furthermore, we applied novel Underwater Membrane Inlet Mass Spectrometry (UM-MIMS) for measurements of gas concentration in the water column.

The cruise started at 7.8.2010 in Bremerhaven and we arrived at the first sampling site in Storfjord at 14.8.2010. We left Storfjord at the 18.8.2010 to Longyearbyen for exchange of personnel and left at the 19.8.2010 to Prins Karls Foreland. West of Prins Karls Foreland gas flares were investigated. We left Svalbard at 19.08.2010 towards Bremerhaven.

## Sampling Sites

The sites in the Storfjord as well as west of Prins Karls Foreland, where water and sediments samples were gathered are shown in figure 1 and 2. The station list is provided in the appendix.

In the Storfjord the investigation of the methane cycle in the water column was the prime objective. This investigation, done in cooperation with the MPI Bremen, are based on former result of cruises by RV Heincke as well as RV Polarstern (Damm et al., 2005, 2007, 2008; see appendix).

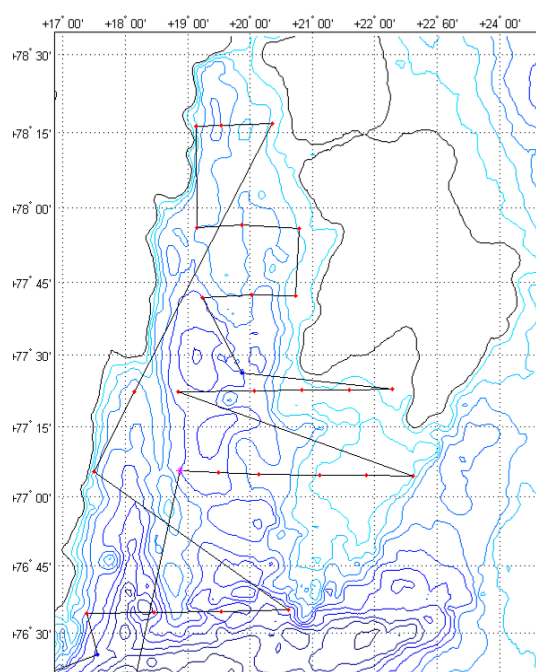


Fig. 1: Sampling sites in the Storfjord.

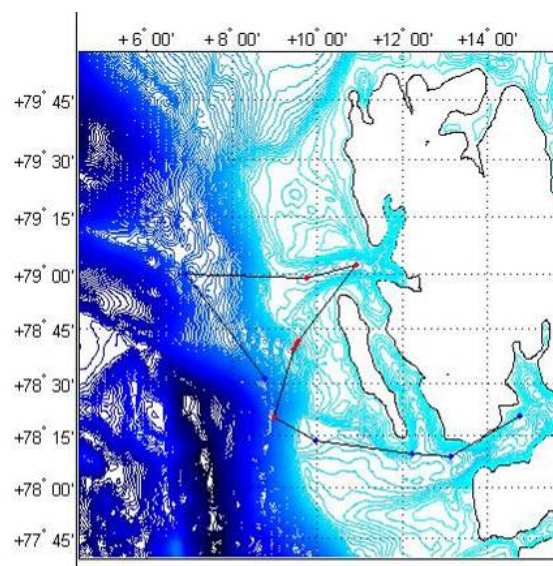


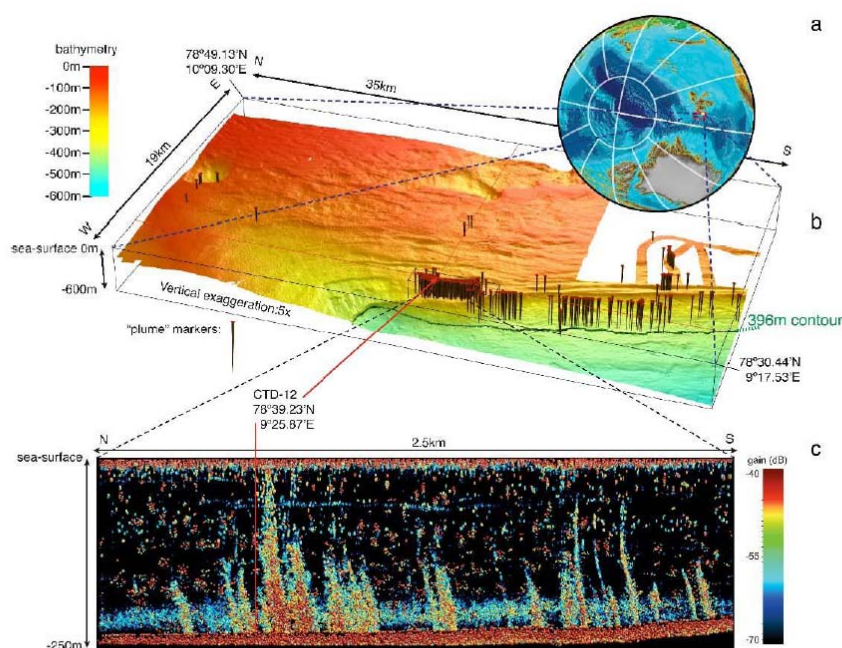
Fig. 2: Sampling sites W off Prins Karls Foreland.

West of Prince Karls Foreland gas flares were investigated. These gas flares were observed and studied (by geophysical techniques) by Mienert et al. (1998), Vanneste et al. (2005) as well as Westbrook et al. (2009)<sup>1</sup>. The region where gas flares were observed is shown in figure 3.

<sup>1</sup> Mienert, J., Posewang, J., & Baumann, M. (1998). Gas hydrates along the north-eastern Atlantic Margin: possible hydrate bound margin instabilities and possible release of methane, in Henriet, J.-P., & Mienert, J. (eds.), *Gas Hydrates: Relevance to World Margin Stability and Climatic Change*, Geological Society Special Publication 137, 275-291.

Vanneste, M., Guidard, S., Mienert, J. (2005) Bottom-simulating reflections and geothermal gradients across the western Svalbard margin, *Terra Nova* 1: 510–516.

Westbrook G. K., et al. (2009) Escape of methane gas from the seabed along the West Spitsbergen continental margin. *Geophys. Res. Lett* 36:L15608.



**Fig. 1:** Seepage offshore W-Spitsbergen evidenced by numerous flares (c) seems to be confined to a narrow bathymetric interval (b) coinciding with the upper limit of the gas hydrate stability zone (GHSZ) in the area (from Westbrook et al., 2009).

Figure 3: Region west of Prins Karls Foreland where gas flares were observed for water depths of about 250 m (Westbrook et al., 2009).

## Sampling and analysis

At the sampling sites we used a CTD/Rosette Sampler for investigations of methane, dimethyl sulfide (DMS), O<sub>2</sub>, nutrients as well as naturally occurring radio nuclides including radon and radium. Methane and DMS were analysed by gas chromatography, and oxygen by Winkler titration and O<sub>2</sub>-optodes. Nutrients were analysed by Flow Injection analysis. For analysis of Radon and Radium Lucas cells and the RaDeCC systems were applied. These analysed were run on board the ship.

In the Stor fjord, samples for quantification of microbiological turnover rates of methane were collected (MPI-Bremen). The addition of tracers and the incubation started immediately after samples were retrieved.

In addition to water sampling and subsequent gas analysis a novel Underwater Membrane Inlet Mass Spectrometry (UM-MIMS) was applied (Schlüter and Gentz, 2008). This system allows the in situ analysis of gases with an AMU of 1 to 200 including methane, nitrogen, argon, as well as carbon dioxide (fig. 4).

For the detection of gas flares the EK60 (Simrad) hydro-acoustic system was applied. An example for the gas flares observed off Prins Karls Foreland is given by figure 5.

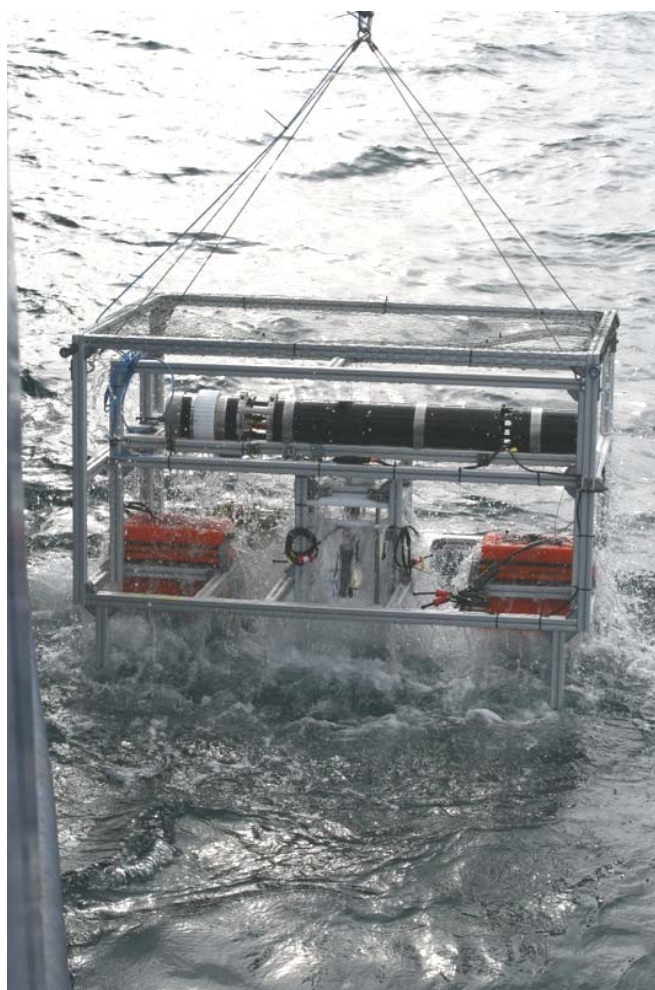
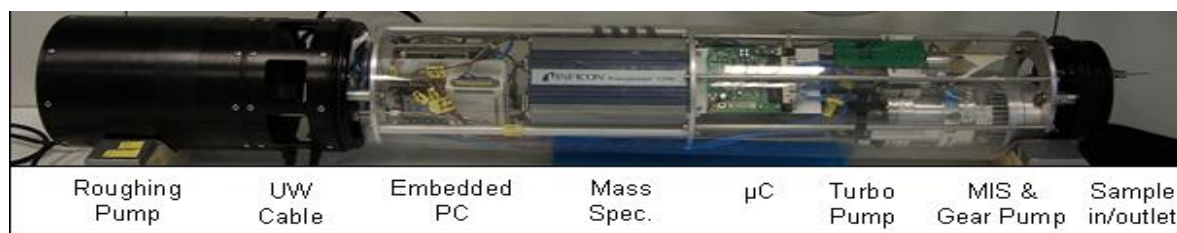


Figure 4: Components of the Underwater Membrane Inlet Mass Spectrometer (UW-MIMS) for analysis of gases in the water column (top). Deployment of the UW-MIMS (equipped with a underwater cryo-trap) and the benthic chamber system (bottom).

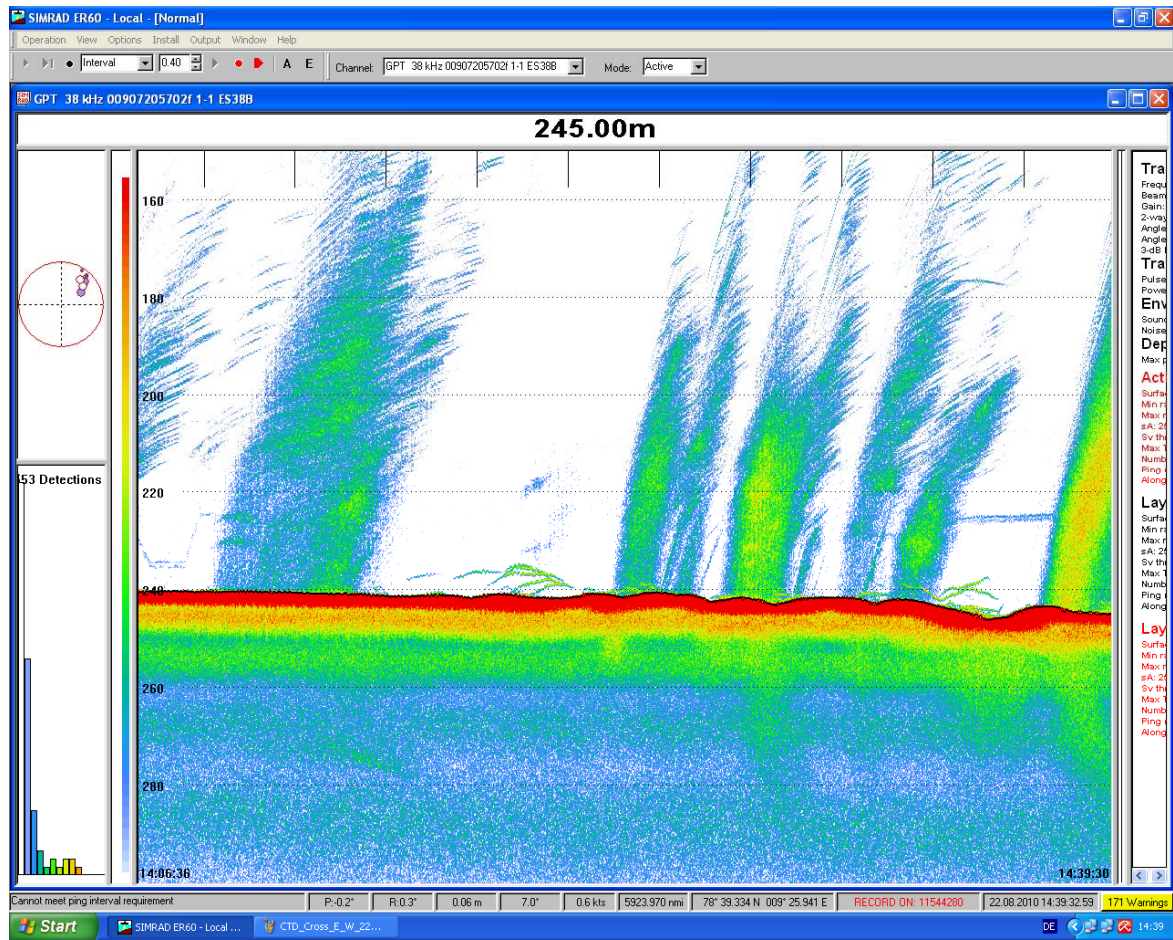


Figure 5: Example for gas flares observed west of Prince Karls Foreland by the EK60 (Simrad).

## Preliminary results

In the Storford enhanced gas concentration were observed again at sites previously investigated by Damm et al (2008). This underlines the importance of the these region for the release of methane from the seafloor as well as of the in situ production of methane in surface waters. Results of the analysis of carbon isotopes of methane and especially of microbial turnover rates will provide more detailed information about the methane formation and fate.

West of Prins Karls Foreland the spatial distribution of gas flares and its relation to the seafloor morphology was investigated. Gas concentrations in the water column around gas flares were surveyed with a high spatial analysis by UW-MIMS as well as water sampling and subsequent analysis by gas chromatography. A complex concentration field was observed. Based on the detailed analysis of the data derived by UWMS a spatial budget of the amount of methane in the water column will be derived.

## Appendix

Literature with respect to results derived by cruise participants during former cruises with RV Heincke and RV Polarstern to Svalbard

Damm, E., Mackensen, A., Budeus, G., Faber, E. Hanfland, 2005. Pathways of methane in seawater: Plume spreading in an Arctic shelf environment (SW-Spitsbergen). *Continental Shelf Research* 25, 1453–1472.

Damm, E., Schauer, U., Rudels, B., Haas, C.(2007).Excess of bottom-released methane in an Arctic shelf sea polynya in winter, *Continental Shelf Research*, 27(12), 1692-1701.

Damm, E., Kiene, R.P., Schwarz, J.N., Falck, E., Dieckmann, G. 2008.Methane cycling in Arctic shelf water and its relationship with phytoplankton bloom and DMSP, *Marine Chemistry*, 109(1-2), 45-59.

Schlüter, M., Gentz, T., 2008. Application of Membrane Inlet Mass Spectrometry for online and in situ analysis of methane in aquatic environments, *Journal of the American Society for Mass Spectrometry*, 19(10), 1395-1402.

### List of participants

<b>Name</b>	<b>Institute</b>
Schlüter, M., Prof. Dr., Chief Scientist	AWI
Rutgers van der Loeff, M., Dr.	AWI
Damm, E., Dr.	AWI
Mau, S., Dr.	MPI Bremen
Wollenburg, J., Dr.	AWI
Gentz, T., PhD	AWI
Blees, J., PhD	MPI Bremen
Baumann, L., TA	AWI
Wischnewski, L.	AWI
Holler, M.	Univ. Bremen
Hofmann, J.	Univ. Bremen
Scholz, D.	Applied Univ. Bremerhaven

## Station List HE333

Station	Date	Lat	Long	Depth [m]	Gear
HE333/001-1	14.08.2010	77° 5,62' N	18° 52,72' E	126.4	CTD - Seabird
HE333/001-1	14.08.2010	77° 5,62' N	18° 52,73' E	127.1	CTD - Seabird
HE333/001-1	14.08.2010	77° 5,61' N	18° 52,72' E	126.4	CTD - Seabird
HE333/001-2	14.08.2010	77° 5,62' N	18° 52,74' E	126.4	CTD/rosette water sampler
HE333/001-2	14.08.2010	77° 5,64' N	18° 52,80' E	125.6	CTD/rosette water sampler
HE333/001-2	14.08.2010	77° 5,63' N	18° 52,77' E	125.7	CTD/rosette water sampler
HE333/001-3	14.08.2010	77° 5,66' N	18° 52,75' E	124.8	CTD - Seabird
HE333/001-3	14.08.2010	77° 5,66' N	18° 52,66' E	124.9	CTD - Seabird
HE333/001-3	14.08.2010	77° 5,66' N	18° 52,65' E	124.9	CTD - Seabird
HE333/002-1	14.08.2010	77° 5,22' N	19° 29,72' E	140.2	CTD - Seabird
HE333/002-1	14.08.2010	77° 5,23' N	19° 29,59' E	140.2	CTD - Seabird
HE333/002-1	14.08.2010	77° 5,25' N	19° 29,35' E	140.2	CTD - Seabird
HE333/002-2	14.08.2010	77° 5,22' N	19° 29,54' E	140.2	CTD - Seabird
HE333/002-2	14.08.2010	77° 5,23' N	19° 29,43' E	140.3	CTD - Seabird
HE333/002-2	14.08.2010	77° 5,23' N	19° 29,43' E	139.8	CTD - Seabird
HE333/002-3	14.08.2010	77° 5,23' N	19° 29,44' E	140.5	CTD/rosette water sampler
HE333/002-3	14.08.2010	77° 5,24' N	19° 29,41' E	140.3	CTD/rosette water sampler
HE333/002-3	14.08.2010	77° 5,28' N	19° 29,31' E	140.2	CTD/rosette water sampler
HE333/003-1	14.08.2010	77° 4,83' N	20° 8,35' E	95	CTD/rosette water sampler
HE333/003-1	14.08.2010	77° 4,82' N	20° 8,28' E	93	CTD/rosette water sampler
HE333/003-1	14.08.2010	77° 4,82' N	20° 8,23' E	92.2	CTD/rosette water sampler
HE333/003-2	14.08.2010	77° 4,81' N	20° 8,20' E	90.8	CTD - Seabird
HE333/003-2	14.08.2010	77° 4,80' N	20° 8,15' E	88.9	CTD - Seabird
HE333/003-2	14.08.2010	77° 4,78' N	20° 8,11' E	86.4	CTD - Seabird
HE333/004-1	14.08.2010	77° 4,70' N	21° 7,34' E	17.1	CTD - Seabird
HE333/004-1	14.08.2010	77° 4,70' N	21° 7,31' E	17.4	CTD - Seabird
HE333/004-1	14.08.2010	77° 4,69' N	21° 7,24' E	16.6	CTD - Seabird
HE333/005-1	14.08.2010	77° 4,69' N	21° 7,24' E	16.8	CTD - Seabird
HE333/005-1	14.08.2010	77° 4,54' N	21° 52,21' E	12.1	CTD - Seabird
HE333/005-1	14.08.2010	77° 4,54' N	21° 52,15' E	11.9	CTD - Seabird
HE333/005-2	14.08.2010	77° 4,53' N	21° 52,14' E	12.5	CTD/rosette water sampler
HE333/005-2	14.08.2010	77° 4,53' N	21° 52,14' E	12.5	CTD/rosette water sampler
HE333/005-2	14.08.2010	77° 4,53' N	21° 52,15' E	12.5	CTD/rosette water sampler
HE333/006-1	14.08.2010	77° 22,83' N	21° 0,71' E	28.1	Multi corer
HE333/006-1	14.08.2010	77° 22,82' N	21° 0,79' E	28.4	Multi corer

HE333/007-1	14.08.2010	77° 22,61' N	20° 4,16' E	114.9	Multi grab
HE333/007-1	14.08.2010	77° 22,62' N	20° 4,22' E	114.8	Multi grab
HE333/008-1	15.08.2010	77° 22,80' N	21° 35,34' E	16.5	CTD - Seabird
HE333/008-1	15.08.2010	77° 22,87' N	21° 35,44' E	16.1	CTD - Seabird
HE333/008-1	15.08.2010	77° 22,89' N	21° 35,49' E	16.1	CTD - Seabird
HE333/008-2	15.08.2010	77° 22,92' N	21° 35,53' E	16.2	CTD/rosette water sampler
HE333/008-2	15.08.2010	77° 22,94' N	21° 35,59' E	16.3	CTD/rosette water sampler
HE333/008-2	15.08.2010	77° 22,96' N	21° 35,68' E	16	CTD/rosette water sampler
HE333/009-1	15.08.2010	77° 22,72' N	20° 49,67' E	29.7	CTD - Seabird
HE333/009-1	15.08.2010	77° 22,75' N	20° 49,89' E	29	CTD - Seabird
HE333/009-1	15.08.2010	77° 22,76' N	20° 50,01' E	28.6	CTD - Seabird
HE333/010-1	15.08.2010	77° 22,67' N	20° 3,81' E	115.6	CTD - Seabird
HE333/010-1	15.08.2010	77° 22,68' N	20° 3,97' E	115.2	CTD - Seabird
HE333/010-1	15.08.2010	77° 22,65' N	20° 4,36' E	114.8	CTD - Seabird
HE333/010-2	15.08.2010	77° 22,65' N	20° 4,45' E	114.7	CTD/rosette water sampler
HE333/010-2	15.08.2010	77° 22,64' N	20° 4,57' E	114.9	CTD/rosette water sampler
HE333/010-2	15.08.2010	77° 22,64' N	20° 4,73' E	114.7	CTD/rosette water sampler
HE333/010-3	15.08.2010	77° 22,65' N	20° 4,92' E	114.6	Multi corer
HE333/010-3	15.08.2010	77° 22,65' N	20° 5,10' E	114.4	Multi corer
HE333/011-1	15.08.2010	77° 22,36' N	18° 50,68' E	140.8	CTD - Seabird
HE333/011-1	15.08.2010	77° 22,33' N	18° 50,98' E	140.8	CTD - Seabird
HE333/011-1	15.08.2010	77° 22,29' N	18° 51,34' E	141	CTD - Seabird
HE333/011-2	15.08.2010	77° 22,26' N	18° 51,39' E	141.3	CTD/rosette water sampler
HE333/011-2	15.08.2010	77° 22,25' N	18° 51,41' E	141	CTD/rosette water sampler
HE333/011-2	15.08.2010	77° 22,19' N	18° 51,79' E	141.5	CTD/rosette water sampler
HE333/011-3	15.08.2010	77° 22,11' N	18° 51,90' E	141	Multi corer
HE333/011-3	15.08.2010	77° 22,00' N	18° 51,80' E	140.4	Multi corer
HE333/012-1	15.08.2010	77° 41,92' N	19° 14,37' E	130.5	CTD - Seabird
HE333/012-1	15.08.2010	77° 41,93' N	19° 14,49' E	129.3	CTD - Seabird
HE333/012-1	15.08.2010	77° 41,94' N	19° 14,34' E	130.2	CTD - Seabird
HE333/012-2	15.08.2010	77° 42,00' N	19° 14,13' E	130.9	CTD - Seabird
HE333/012-2	15.08.2010	77° 42,02' N	19° 14,12' E	130.3	CTD - Seabird
HE333/012-2	15.08.2010	77° 42,08' N	19° 14,13' E	129	CTD - Seabird
HE333/012-3	15.08.2010	77° 42,11' N	19° 14,13' E	128.4	CTD/rosette water sampler
HE333/012-3	15.08.2010	77° 42,14' N	19° 14,11' E	128.1	CTD/rosette water sampler
HE333/012-3	15.08.2010	77° 42,17' N	19° 14,11' E	127.9	CTD/rosette water sampler
HE333/012-4	15.08.2010	77° 42,20' N	19° 14,13' E	127	CTD/rosette water sampler
HE333/012-4	15.08.2010	77° 42,20' N	19° 14,15' E	126.9	CTD/rosette water sampler
HE333/012-4	15.08.2010	77° 42,21' N	19° 14,16' E	126.8	CTD/rosette water sampler
HE333/013-1	15.08.2010	77° 42,03' N	20° 38,61' E	31.1	Multi corer



HE333/013-1	15.08.2010	77° 42,04' N	20° 38,54' E	31.3	Multi corer
HE333/013-2	15.08.2010	77° 42,17' N	20° 39,20' E	28.1	CTD/rosette water sampler
HE333/013-2	15.08.2010	77° 42,16' N	20° 39,20' E	28.3	CTD/rosette water sampler
HE333/013-2	15.08.2010	77° 42,16' N	20° 39,09' E	29.5	CTD/rosette water sampler
HE333/014-1	16.08.2010	77° 59,98' N	19° 2,48' E	92.6	CTD - Seabird
HE333/014-1	16.08.2010	77° 59,95' N	19° 2,23' E	91.2	CTD - Seabird
HE333/014-1	16.08.2010	77° 59,95' N	19° 1,88' E	90.7	CTD - Seabird
HE333/015-1	16.08.2010	77° 41,36' N	19° 0,84' E	139.7	CTD - Seabird
HE333/015-1	16.08.2010	77° 41,36' N	19° 0,61' E	140.8	CTD - Seabird
HE333/015-1	16.08.2010	77° 41,34' N	19° 0,37' E	141.4	CTD - Seabird
HE333/015-2	16.08.2010	77° 41,35' N	19° 0,34' E	140.7	CTD/rosette water sampler
HE333/015-2	16.08.2010	77° 41,34' N	19° 0,27' E	140.9	CTD/rosette water sampler
HE333/015-2	16.08.2010	77° 41,33' N	19° 0,51' E	140.6	CTD/rosette water sampler
HE333/015-3	16.08.2010	77° 41,45' N	19° 0,16' E	139.5	CTD - Seabird
HE333/015-3	16.08.2010	77° 41,47' N	19° 0,08' E	138.8	CTD - Seabird
HE333/015-3	16.08.2010	77° 41,47' N	18° 59,92' E	138.8	CTD - Seabird
HE333/015-4	16.08.2010	77° 41,48' N	18° 59,96' E	139.1	Multi corer
HE333/015-4	16.08.2010	77° 41,49' N	18° 59,67' E	138.6	Multi corer
HE333/015-4	16.08.2010	77° 41,48' N	18° 59,59' E	139.3	Multi corer
HE333/016-1	16.08.2010	77° 56,00' N	19° 8,89' E	70.7	CTD - Seabird
HE333/016-1	16.08.2010	77° 56,03' N	19° 8,69' E	71.9	CTD - Seabird
HE333/016-1	16.08.2010	77° 56,03' N	19° 8,66' E	72.5	CTD - Seabird
HE333/017-1	16.08.2010	78° 16,20' N	19° 20,13' E	95.1	CTD - Seabird
HE333/017-1	16.08.2010	78° 16,20' N	19° 20,10' E	94.9	CTD - Seabird
HE333/017-1	16.08.2010	78° 16,20' N	19° 19,93' E	95.4	CTD - Seabird
HE333/018-1	16.08.2010	78° 15,26' N	19° 30,71' E	105.8	CTD - Seabird
HE333/018-1	16.08.2010	78° 15,28' N	19° 30,57' E	105.5	CTD - Seabird
HE333/018-1	16.08.2010	78° 15,28' N	19° 30,36' E	105.9	CTD - Seabird
HE333/018-2	16.08.2010	78° 15,28' N	19° 30,20' E	106.1	CTD/rosette water sampler
HE333/018-2	16.08.2010	78° 15,27' N	19° 30,06' E	105.5	CTD/rosette water sampler
HE333/018-2	16.08.2010	78° 15,26' N	19° 29,94' E	106.4	CTD/rosette water sampler
HE333/018-3	16.08.2010	78° 15,26' N	19° 29,80' E	107.4	Bottom water sampler
HE333/018-3	16.08.2010	78° 15,25' N	19° 29,70' E	108.6	Bottom water sampler
HE333/018-3	16.08.2010	78° 15,26' N	19° 29,60' E	108.3	Bottom water sampler
HE333/018-3	16.08.2010	78° 15,28' N	19° 29,39' E	113.4	Bottom water sampler
HE333/018-4	16.08.2010	78° 15,30' N	19° 29,23' E	113.8	CTD - Seabird
HE333/018-4	16.08.2010	78° 15,27' N	19° 29,11' E	113.8	CTD - Seabird
HE333/018-4	16.08.2010	78° 15,29' N	19° 29,11' E	114.2	CTD - Seabird
HE333/018-5	16.08.2010	78° 15,31' N	19° 29,06' E	114.5	CTD - Seabird
HE333/018-5	16.08.2010	78° 15,31' N	19° 28,91' E	113.8	CTD - Seabird
HE333/018-5	16.08.2010	78° 15,33' N	19° 28,83' E	113.1	CTD - Seabird

HE333/018-6	16.08.2010	78° 15,30' N	19° 28,80' E	112.3	Bottom water sampler
HE333/018-6	16.08.2010	78° 15,29' N	19° 28,69' E	111.8	Bottom water sampler
HE333/018-6	16.08.2010	78° 15,29' N	19° 28,66' E	111.7	Bottom water sampler
HE333/018-6	16.08.2010	78° 15,30' N	19° 28,68' E	112	Bottom water sampler
HE333/018-7	16.08.2010	78° 15,28' N	19° 29,87' E	106.7	Multi corer
HE333/018-7	16.08.2010	78° 15,28' N	19° 29,86' E	106.6	Multi corer
HE333/019-1	16.08.2010	78° 15,41' N	20° 20,16' E	42.6	CTD - Seabird
HE333/019-1	16.08.2010	78° 15,38' N	20° 19,98' E	42.6	CTD - Seabird
HE333/019-1	16.08.2010	78° 15,35' N	20° 19,84' E	42.8	CTD - Seabird
HE333/019-2	16.08.2010	78° 15,33' N	20° 19,75' E	43	CTD/rosette water sampler
HE333/019-2	16.08.2010	78° 15,32' N	20° 19,69' E	43.1	CTD/rosette water sampler
HE333/019-2	16.08.2010	78° 15,32' N	20° 19,68' E	43	CTD/rosette water sampler
HE333/020-1	17.08.2010	77° 42,04' N	20° 38,66' E	31.2	Bottom lander, chamber
HE333/021-1	17.08.2010	77° 55,77' N	20° 47,36' E	29.1	CTD - Seabird
HE333/021-1	17.08.2010	77° 55,77' N	20° 47,31' E	29.1	CTD - Seabird
HE333/021-1	17.08.2010	77° 55,77' N	20° 47,12' E	32.5	CTD - Seabird
HE333/021-2	17.08.2010	77° 55,79' N	20° 47,02' E	33.9	CTD/rosette water sampler
HE333/021-2	17.08.2010	77° 55,79' N	20° 47,00' E	34.2	CTD/rosette water sampler
HE333/021-2	17.08.2010	77° 55,81' N	20° 46,84' E	33.9	CTD/rosette water sampler
HE333/022-1	17.08.2010	77° 42,03' N	20° 38,62' E	31.3	in situ Massen-Spektrometer
HE333/023-1	17.08.2010	77° 41,98' N	20° 37,72' E	32.6	Multi corer
HE333/023-1	17.08.2010	77° 41,96' N	20° 37,71' E	33.7	Multi corer
HE333/024-1	17.08.2010	77° 22,65' N	20° 4,53' E	114.8	CTD - Seabird
HE333/024-1	17.08.2010	77° 22,74' N	20° 4,30' E	115.1	CTD - Seabird
HE333/024-1	17.08.2010	77° 22,79' N	20° 4,27' E	115.2	CTD - Seabird
HE333/024-2	17.08.2010	77° 22,87' N	20° 4,28' E	115.3	CTD/rosette water sampler
HE333/024-2	17.08.2010	77° 22,89' N	20° 4,29' E	115.6	CTD/rosette water sampler
HE333/024-2	17.08.2010	77° 22,97' N	20° 4,06' E	116.1	CTD/rosette water sampler
HE333/025-1	17.08.2010	77° 42,34' N	20° 1,33' E	38.2	CTD - Seabird
HE333/025-1	17.08.2010	77° 42,35' N	20° 1,35' E	39	CTD - Seabird
HE333/025-1	17.08.2010	77° 42,35' N	20° 1,28' E	37.1	CTD - Seabird
HE333/026-1	17.08.2010	77° 56,56' N	19° 51,95' E	72.8	CTD - Seabird
HE333/026-1	17.08.2010	77° 56,58' N	19° 51,78' E	72.2	CTD - Seabird
HE333/026-1	17.08.2010	77° 56,61' N	19° 51,62' E	73.5	CTD - Seabird
HE333/027-1	18.08.2010	77° 5,28' N	17° 29,95' E	73.1	CTD - Seabird
HE333/027-1	18.08.2010	77° 5,23' N	17° 29,97' E	74.6	CTD - Seabird
HE333/027-1	18.08.2010	77° 5,20' N	17° 29,93' E	74.8	CTD - Seabird

HE333/028-1	18.08.2010	76° 34,90' N	19° 3,07' E	142.8	CTD - Seabird
HE333/028-1	18.08.2010	76° 34,90' N	19° 2,95' E	141.8	CTD - Seabird
HE333/028-1	18.08.2010	76° 34,90' N	19° 2,88' E	141.7	CTD - Seabird
HE333/028-2	18.08.2010	76° 34,95' N	19° 2,42' E	141.1	CTD - Seabird
HE333/028-2	18.08.2010	76° 34,95' N	19° 2,39' E	140.9	CTD - Seabird
HE333/028-2	18.08.2010	76° 34,94' N	19° 2,17' E	141.1	CTD - Seabird
HE333/028-3	18.08.2010	76° 34,94' N	19° 2,15' E	141.3	CTD/rosette water sampler
HE333/028-3	18.08.2010	76° 34,96' N	19° 2,12' E	140.9	CTD/rosette water sampler
HE333/028-3	18.08.2010	76° 34,97' N	19° 1,97' E	140.7	CTD/rosette water sampler
HE333/029-1	19.08.2010	78° 23,26' N	16° 25,75' E	35.2	in situ Massen-Spektrometer
HE333/029-1	19.08.2010	78° 23,25' N	16° 25,89' E	32.8	in situ Massen-Spektrometer
HE333/030-1	20.08.2010	78° 20,03' N	8° 59,49' E	1228.4	CTD - Seabird
HE333/030-1	20.08.2010	78° 20,40' N	8° 59,48' E	1237.3	CTD - Seabird
HE333/030-1	20.08.2010	78° 20,61' N	8° 59,08' E	1253	CTD - Seabird
HE333/030-2	20.08.2010	78° 20,49' N	8° 59,93' E	1228.4	CTD - Seabird
HE333/030-2	20.08.2010	78° 20,87' N	8° 59,48' E	1243.8	CTD - Seabird
HE333/030-2	20.08.2010	78° 21,09' N	8° 58,72' E	1262.8	CTD - Seabird
HE333/030-3	20.08.2010	78° 19,99' N	8° 59,82' E	1219.8	Multi corer
HE333/030-3	20.08.2010	78° 20,07' N	8° 59,78' E	1222.3	Multi corer
HE333/030-3	20.08.2010	78° 20,10' N	8° 59,68' E	1225.6	Multi corer
HE333/030-4	20.08.2010	78° 20,11' N	8° 59,38' E	1232.9	Multi corer
HE333/030-4	20.08.2010	78° 20,12' N	8° 59,34' E	1234.3	Multi corer
HE333/030-4	20.08.2010	78° 20,22' N	8° 59,72' E	1227	Multi corer
HE333/030-5	20.08.2010	78° 20,07' N	8° 59,21' E	1235.4	Multi corer
HE333/030-5	20.08.2010	78° 20,15' N	8° 59,34' E	1234.7	Multi corer
HE333/030-5	20.08.2010	78° 20,18' N	8° 59,62' E	1227.8	Multi corer
HE333/031-1	20.08.2010	78° 40,02' N	9° 30,12' E	234.8	Vertikal Gas plumes
HE333/031-1	21.08.2010	78° 39,16' N	9° 25,84' E	242.6	Vertikal Gas plumes
HE333/032-1	21.08.2010	78° 39,17' N	9° 25,89' E	242.6	CTD/rosette water sampler
HE333/032-1	21.08.2010	78° 39,09' N	9° 25,68' E	241.7	CTD/rosette water sampler
HE333/032-1	21.08.2010	78° 38,73' N	9° 25,61' E	243.1	CTD/rosette water sampler
HE333/033-1	21.08.2010	78° 39,15' N	9° 25,87' E	241.9	CTD/rosette water sampler
HE333/033-1	21.08.2010	78° 39,18' N	9° 25,83' E	241.8	CTD/rosette water sampler
HE333/033-1	21.08.2010	78° 39,19' N	9° 25,77' E	241.1	CTD/rosette water sampler
HE333/034-1	21.08.2010	78° 39,11' N	9° 26,00' E	240.8	CTD - Seabird
HE333/034-1	21.08.2010	78° 39,15' N	9° 25,91' E	241.6	CTD - Seabird
HE333/034-1	21.08.2010	78° 39,17' N	9° 25,94' E	241.7	CTD - Seabird
HE333/035-1	21.08.2010	78° 39,10' N	9° 25,95' E	240.9	CTD - Seabird

HE333/035-1	21.08.2010	78° 39,11' N	9° 25,92' E	241.2	CTD - Seabird
HE333/035-1	21.08.2010	78° 39,14' N	9° 25,90' E	241.9	CTD - Seabird
HE333/036-1	21.08.2010	78° 39,17' N	9° 25,91' E	242.5	Bottom water sampler
HE333/036-1	21.08.2010	78° 39,17' N	9° 26,00' E	241	Bottom water sampler
HE333/036-1	21.08.2010	78° 39,18' N	9° 25,67' E	241.4	Bottom water sampler
HE333/037-1	21.08.2010	78° 39,15' N	9° 25,92' E	241.7	Bottom water sampler
HE333/037-1	21.08.2010	78° 39,16' N	9° 25,94' E	241.4	Bottom water sampler
HE333/037-1	21.08.2010	78° 39,18' N	9° 25,77' E	241.7	Bottom water sampler
HE333/038-1	21.08.2010	78° 39,16' N	9° 25,94' E	241.6	Multi corer
HE333/038-1	21.08.2010	78° 39,18' N	9° 25,69' E	241.3	Multi corer
HE333/038-1	21.08.2010	78° 39,14' N	9° 25,67' E	242	Multi corer
HE333/039-1	21.08.2010	78° 39,05' N	9° 25,86' E	243.1	in situ Massen-Spektrometer
HE333/039-1	21.08.2010	78° 39,10' N	9° 25,77' E	242.9	in situ Massen-Spektrometer
HE333/039-1	21.08.2010	78° 39,51' N	9° 25,61' E	246.4	in situ Massen-Spektrometer
HE333/040-1	21.08.2010	78° 39,04' N	9° 26,00' E	240.6	in situ Massen-Spektrometer
HE333/040-1	21.08.2010	78° 39,14' N	9° 25,90' E	242.1	in situ Massen-Spektrometer
HE333/040-1	21.08.2010	78° 39,55' N	9° 22,81' E	364.3	in situ Massen-Spektrometer
HE333/041-1	21.08.2010	78° 39,10' N	9° 25,92' E	240.3	CTD/rosette water sampler
HE333/041-1	21.08.2010	78° 39,20' N	9° 25,62' E	241.8	CTD/rosette water sampler
HE333/041-1	21.08.2010	78° 39,22' N	9° 25,58' E	241.1	CTD/rosette water sampler
HE333/042-1	21.08.2010	78° 39,39' N	9° 25,75' E	244.7	CTD - Seabird
HE333/042-1	21.08.2010	78° 39,24' N	9° 25,92' E	242.5	CTD - Seabird
HE333/042-1	21.08.2010	78° 38,70' N	9° 25,41' E	244.2	CTD - Seabird
HE333/043-1	21.08.2010	78° 39,17' N	9° 28,44' E	236.1	CTD - Seabird
HE333/043-1	21.08.2010	78° 39,20' N	9° 27,93' E	242.4	CTD - Seabird
HE333/043-1	21.08.2010	78° 39,21' N	9° 21,01' E	405.4	CTD - Seabird
HE333/045-1	22.08.2010	78° 37,58' N	8° 6,82' E	1024.6	Multi corer
HE333/045-1	22.08.2010	78° 37,66' N	8° 6,67' E	1022.7	Multi corer
HE333/046-1	22.08.2010	78° 39,53' N	9° 25,89' E	246.7	CTD - Seabird
HE333/046-1	22.08.2010	78° 39,49' N	9° 25,92' E	247.3	CTD - Seabird
HE333/046-1	22.08.2010	78° 39,31' N	9° 25,50' E	242.9	CTD - Seabird
HE333/047-1	22.08.2010	78° 38,71' N	9° 25,83' E	239.2	CTD - Seabird
HE333/047-1	22.08.2010	78° 38,76' N	9° 25,90' E	240.9	CTD - Seabird
HE333/047-1	22.08.2010	78° 39,46' N	9° 26,19' E	248	CTD - Seabird

HE333/048-1	22.08.2010	78° 39,17' N	9° 28,66' E	234.2	CTD - Seabird
HE333/048-1	22.08.2010	78° 39,16' N	9° 28,12' E	240.8	CTD - Seabird
HE333/048-1	22.08.2010	78° 39,18' N	9° 24,58' E	255.6	CTD - Seabird
HE333/049-1	22.08.2010	78° 38,81' N	9° 25,91' E	240.4	CTD - Seabird
HE333/049-1	22.08.2010	78° 39,11' N	9° 25,87' E	241.4	CTD - Seabird
HE333/049-1	22.08.2010	78° 39,53' N	9° 25,95' E	248	CTD - Seabird
HE333/050-1	22.08.2010	78° 39,21' N	9° 28,26' E	239.6	CTD - Seabird
HE333/050-1	22.08.2010	78° 39,17' N	9° 27,93' E	240.1	CTD - Seabird
HE333/050-1	22.08.2010	78° 39,14' N	9° 25,19' E	244.5	CTD - Seabird
HE333/051-1	22.08.2010	78° 39,35' N	9° 26,05' E	244.6	CTD - Seabird
HE333/051-1	22.08.2010	78° 39,36' N	9° 25,99' E	244.9	CTD - Seabird
HE333/051-1	22.08.2010	78° 39,37' N	9° 26,02' E	244.9	CTD - Seabird
HE333/052-1	22.08.2010	78° 38,63' N	9° 25,88' E	238.2	CTD - Seabird
HE333/052-1	22.08.2010	78° 38,68' N	9° 25,93' E	238	CTD - Seabird
HE333/052-1	22.08.2010	78° 39,74' N	9° 26,21' E	260.6	CTD - Seabird
HE333/053-1	22.08.2010	78° 39,19' N	9° 28,62' E	235.9	CTD - Seabird
HE333/053-1	22.08.2010	78° 39,16' N	9° 28,02' E	240.5	CTD - Seabird
HE333/053-1	22.08.2010	78° 39,14' N	9° 24,93' E	247.2	CTD - Seabird
HE333/054-1	23.08.2010	78° 38,66' N	9° 25,88' E	237.4	CTD - Seabird
HE333/054-1	23.08.2010	78° 38,71' N	9° 25,77' E	238.9	CTD - Seabird
HE333/054-1	23.08.2010	78° 38,77' N	9° 25,49' E	242.7	CTD - Seabird
HE333/055-1	23.08.2010	78° 38,76' N	9° 24,70' E	255.5	CTD - Seabird
HE333/055-1	23.08.2010	78° 38,79' N	9° 24,54' E	262.2	CTD - Seabird
HE333/055-1	23.08.2010	78° 38,86' N	9° 24,48' E	266.9	CTD - Seabird
HE333/056-1	23.08.2010	78° 39,15' N	9° 24,53' E	255.7	CTD - Seabird
HE333/056-1	23.08.2010	78° 39,17' N	9° 24,49' E	259.5	CTD - Seabird
HE333/056-1	23.08.2010	78° 39,21' N	9° 24,57' E	253.7	CTD - Seabird
HE333/057-1	23.08.2010	78° 39,55' N	9° 24,60' E	265.6	CTD - Seabird
HE333/057-1	23.08.2010	78° 39,59' N	9° 24,57' E	267.9	CTD - Seabird
HE333/057-1	23.08.2010	78° 39,65' N	9° 24,39' E	276	CTD - Seabird
HE333/058-1	23.08.2010	78° 39,53' N	9° 25,93' E	246.4	CTD - Seabird
HE333/058-1	23.08.2010	78° 39,56' N	9° 25,95' E	247.3	CTD - Seabird
HE333/058-1	23.08.2010	78° 39,61' N	9° 25,99' E	250.9	CTD - Seabird
HE333/059-1	23.08.2010	78° 39,55' N	9° 28,04' E	247.4	CTD - Seabird
HE333/059-1	23.08.2010	78° 39,55' N	9° 28,04' E	247.4	CTD - Seabird

HE333/059-1	23.08.2010	78° 39,58' N	9° 27,95' E	248	CTD - Seabird
HE333/060-1	23.08.2010	78° 39,16' N	9° 28,07' E	239.8	CTD - Seabird
HE333/060-1	23.08.2010	78° 39,15' N	9° 28,01' E	240.2	CTD - Seabird
HE333/060-1	23.08.2010	78° 39,17' N	9° 28,04' E	240.3	CTD - Seabird
HE333/060-2	23.08.2010	78° 39,16' N	9° 28,01' E	240	CTD/rosette water sampler
HE333/060-2	23.08.2010	78° 39,17' N	9° 27,99' E	240.2	CTD/rosette water sampler
HE333/060-2	23.08.2010	78° 39,18' N	9° 27,98' E	241.2	CTD/rosette water sampler
HE333/060-3	23.08.2010	78° 39,16' N	9° 28,01' E	240.1	CTD/rosette water sampler
HE333/060-3	23.08.2010	78° 39,16' N	9° 27,98' E	240.4	CTD/rosette water sampler
HE333/060-3	23.08.2010	78° 39,16' N	9° 27,90' E	240.6	CTD/rosette water sampler
HE333/061-1	23.08.2010	78° 38,58' N	9° 27,63' E	231.8	Vertikal Gas plumes
HE333/061-1	23.08.2010	78° 37,92' N	9° 26,02' E	271.1	Vertikal Gas plumes
HE333/062-1	23.08.2010	78° 38,73' N	9° 28,16' E	230.6	CTD - Seabird
HE333/062-1	23.08.2010	78° 38,76' N	9° 27,96' E	230.8	CTD - Seabird
HE333/062-1	23.08.2010	78° 38,78' N	9° 27,94' E	230.9	CTD - Seabird
HE333/063-1	23.08.2010	78° 39,34' N	9° 27,18' E	246.1	CTD - Seabird
HE333/063-1	23.08.2010	78° 39,36' N	9° 27,04' E	246.2	CTD - Seabird
HE333/063-1	23.08.2010	78° 39,35' N	9° 26,90' E	246	CTD - Seabird
HE333/064-1	23.08.2010	78° 39,34' N	9° 25,14' E	247.4	CTD - Seabird
HE333/064-1	23.08.2010	78° 39,35' N	9° 25,10' E	246.5	CTD - Seabird
HE333/064-1	23.08.2010	78° 39,35' N	9° 25,02' E	247.1	CTD - Seabird
HE333/065-1	23.08.2010	78° 39,43' N	9° 20,23' E	424.4	CTD - Seabird
HE333/065-1	23.08.2010	78° 39,47' N	9° 19,72' E	433.5	CTD - Seabird
HE333/065-1	23.08.2010	78° 39,65' N	9° 19,35' E	443.4	CTD - Seabird
HE333/066-1	23.08.2010	78° 39,36' N	9° 26,04' E	245.4	Bottom water sampler
HE333/066-1	23.08.2010	78° 39,37' N	9° 26,00' E	245.3	Bottom water sampler
HE333/066-1	23.08.2010	78° 39,38' N	9° 25,93' E	244.9	Bottom water sampler
HE333/067-1	23.08.2010	79° 2,12' N	10° 49,93' E	318	Multi corer
HE333/067-1	23.08.2010	79° 2,15' N	10° 49,70' E	318.8	Multi corer
HE333/068-1	23.08.2010	78° 58,69' N	9° 45,83' E	229.3	Multi corer
HE333/068-1	23.08.2010	78° 58,74' N	9° 45,90' E	227.4	Multi corer