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# Short Cruise Report

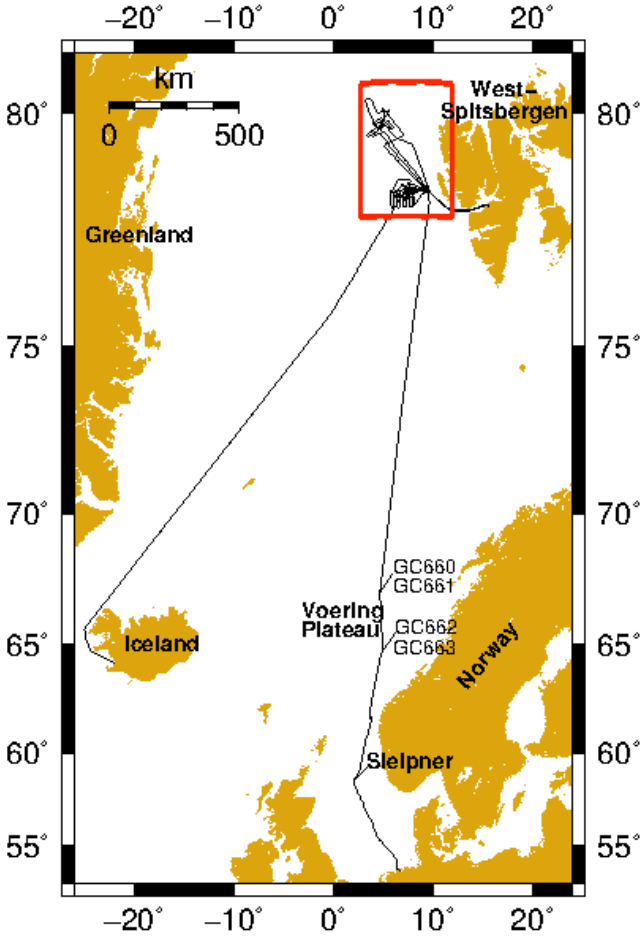
# Maria S. Merian MSM21/4

## Reykjavik/Iceland – Emden/Germany

## 12 August 2012 – 11 September 2012

## Chief Scientist: Christian Berndt

## Captain: Klaus Bergmann



**Objectives**

The goal of the cruise was to quantify the methane flux emitted through the seabed and to find out if the observed venting is indeed the result of bottom water warming-induced gas hydrate dissociation and that it is not due to other geological processes. The main objectives of the cruise were:

- Recovery and reinstallation of the MASOX observatory. The observatory was deployed during an RV Jan Mayen cruise in summer 2010 and was than recovered, maintained, and re-deployed during a NOCS cruise in summer 2011. During our cruise we had to recover this observatory in Svalbard and take it south to the Sleipner field for the ECO2 project. The measurements from the Svalbard deployment show the variability of seepage on a seasonal scale and provide insight into the dynamics of the seep system.

- Acoustic imaging of fluid migration pathways and seep sites. We collected 2D-high resolution reflection seismic data to image fluid migration pathways. These data will allow distinguishing between fluid migration along faults and the creation of pathways by hydraulic fracturing. The EA600 multi-frequency echosounder and the PARASOUND system were used for flare imaging in order to identify active seeps and variations in their activity.

- Surveys of benthic and pelagic methanotrophic activity. Sampling with JAGO push cores facilitated a selective sampling of surface sediments (max 20 cm) in the vicinity of gas vents to study microbial methanotrophic activity and sediment porewater chemistry. If seepage activity were established as a consequence of gas-hydrate dissociation only recently we expect to find relatively low activity and abundance of the methanotrophic community in the sediment. In addition to surface sampling, we have deployed gravity corers to study deeper parts of the sediment with respect to microbiology and geochemistry along transect laid across venting sites. Deeper cores will provide information about past or weaker seepage activities. The fate of methane after passing the benthic biological filter was investigated with CTD/Rosette casts across venting sites to study the activity of methanotrophic bacteria in the water column and their coupling to hydrographic characteristics.

- U/Th and $^{14}C$ dating of sediments from the vent sites. Dating of carbonaceous sediments from venting sites will reveal their nature and age of genesis.

- Analysis of slope stability. Further investigation were focused on the state of slope concerning (in)stability. In particular, we have tried to investigate the presence of precursory phenomena for slope failures that might be caused by hydrate dissociation such as elongated cracks running along the slope within the anticipated bathymetric range. This included acoustic and seismic surveying and geological sampling by gravity coring.

- Surveys of methane concentrations and distribution in the water column. CTD rosettes were deployed along vertical and horizontal transects in the area of gas venting. Gas flares identified by acoustic techniques were used to guide the sampling. The distribution of methane concentrations around the gas vents provides information about changes of the gas injection into the water column in comparison with earlier data.

**Narrative**

On 12.8.12 we left Reykjavik heading north towards Svalbard. We made good progress except for some hours on Tuesday afternoon when we had to slow down in fog in order to avoid sea ice. We reached the survey area on Friday morning, 17.8.2012. At the first station in 1400 m water depth we calibrated the heat flow probe and ran a CTD dip to obtain a water column sound velocity profile. At the observatory site we collected a second CTD using 24 water sampling bottles. At 14:00 we carried out trial deployment of the manned submersible JAGO that was successfully completed after 30 minutes. At 18:30 we deployed the seismic system and started to acquire three seismic profiles towards Vestnesa, down its southern slope and back to the study area. On 18.8.2012 JAGO dove along a recovery cable and managed to hook the recovery cable to the observatory and everything was hoisted up to the surface Before leaving the bottom JAGO took two rock samples and filled a Niskin bottle. Everything was on deck at 17:00. Afterwards we surveyed the observatory position once more with PARASOUND and EA600 echosounder to ensure that there were significant gas flares. Then we started a CTD and heat flow probe transect and continued seismic surveying of the Knipovich Ridge / Vestnesa transition. During the night on Monday 20.8.2012 the wind picked up reaching 7 Bft with occasional gust of force 9. We moved north to extend the BSR map. Unfortunately, during recovery of the streamer after a 5 nm-long profile the streamer got entangled in the starboard propeller. Therefore, we steamed back to Longyear. On Wednesday we arrived in Longyear at 13:00 local time and drop anchor at 14:00. A diver managed to clear the remains from the starboard pod. This took only 10 minutes. We left Longyear at 17:00 ship time (UTC) and sailed back to a flare site that we had discovered during the multibeam and PARASOUND transect 60 m west of the MASOX observatory position where we collected a gravity core at the most pronounced flare. The core smelled strongly of $H_2S$ and showed few drop stones. On Thursday 23.8.2912 we steamed 5 miles north to a site that was occupied for a 24 hour CTD in the previous year and where previous HyBis dives by the British colleagues found strong evidence for seepage. Here we acquired a PARASOUND profile confirming that active flares existed within the 380 and 390 m depth interval. Upon this we collected a heat flow transect along this profile that had to be terminated at 07:00 when the temperature sensor string was worn off. We sailed back to the southern flare site at the MASOX observatory position and at 08:00 we deployed JAGO in light easterly winds. JAGO operation was smooth and at 11:00 the JAGO team was able to find a flare site approximately 50 m WNW of the MASOX observatory position. The peepers (pore water samplers) and a 40 cm long heat flow probe were deployed and the site marked. Strong zonation of free gas bubbles, beggiatoa mats and pogonophera tube worm fields indicated a highly active seep site. The aim of a second dive at the same site was the deployment of large push cores. From Friday morning onwards we collected water samples at five stations around the main flare site in order to investigate the lateral diffusion of methane away from the gas bubble flares. On 25.8. JAGO was deployed for a sixth time and almost immediately discovered a bacteria mat at an active gas flare. Five push corers and a Niskin bottle were taken. The entire area is more rocky than the Masox observatory site. After another dive to a nearby vent we steamed north to survey a previously discovered landslide and collect three gravity cores on 27.8.2012 to obtain minimum ages for the slide event. We also shot a seismic profile from ODP Site 912 down the slide headwall to the location of the second gravity core. Back at Prins Karls Forland

on 28.8.2012 we deployed JAGO to investigate the seep sites south of the MASOX observatory position. Here, there was less activity but it was possible to identify some gas flares and obtain push core samples from a local depression that appeared to be a trawl mark. Afterwards we carried out a CTD transect from the Hybis Site down to the lower part of the slope in order to determine the variability of the Spitsbergen current. On Wednesday we were finished with the CTD work and we measured a seismic oceanography profile on the way back to the next JAGO dive site in 285 m water depth. Here, the sea floor was very rocky with large carbonate crusts. At their edges gas flares were discovered. After JAGO was retrieved we sailed back to the northern termination of the Knipovich Ridge where we collected a heat flow transect. During the night to Friday we repeated the heat flow and water sampling transect across the MASOX observatory site. Afterwards the wind picked up and we could only do multibeam profiling of the northern termination of the Knipovich Ridge. On Saturday 1.9.2012 weather had improved (force 6 with gusts 7) and we decided to deploy the seismic system to survey the transition of the Knipovich Ridge into the Molløy Transform Margin. The aim was to determine if heat from the ridge is causing additional production of gas and is the ultimate reason for the Svalbard gas hydrate province. At lunchtime of 2.9. 2012 we retrieved the seismic system and steamed back to MASOX observatory site where we launched JAGO for a last time to recover the peepers and the temperature probe On 3.9.2012 we deployed the seismic equipment again to collect further seismic lines across the Knipovich Ridge termination. We discovered a previously unknown area of bottom simulating reflectors, i.e. gas hydrate indications, on the oceanic crust and imaged a large pipe structure in the northern part of the Hydratech area which was discovered in 2008. After retrieving the seismic system at 17:30 we collected two gravity core samples from the pipe structure and a fault outcrop where the heat flow probe had shown increased fluid migration earlier. Both cores did not show obvious signs of methane advection. But pore water samples were taken for later analysis. At midnight of 4.9.212 we started a last water column sampling programme at three seep sites and at a reference station south of the gas flare area. A final attempt to collect a gravity core from the MASOX observatory site turned out a spectacular success. We retrieved a 3 m-long core with very high sulfide concentration and soupy sediments at the top which will allow an assessment of methane advection rates and their variability. At 08:00 we started the transit towards the Vøring Plateau off mid-Norway. There we collected four gravity cores. On 8.9.2012 we arrived at the observatory deployment site northwest of Sleipner and took up contact with RRS James Cook. We deployed the observatory at 09:30. On 10.9.2012 we docked in Emden.

**Acknowledgements**

We would like to thank captain Klaus Bergmann, his officers and crew of RV Maria S. Merian for their professional support of our science programme and for very pleasant company on board. We also like to thank our technical engineer Gero Wetzel for his dedication to making things work. Special thanks go to Jürgen Mienert at the University of Tromsø for borrowing us spare parts for the damaged streamer system. The ship time of RV Merian was provided by the Deutsche Forschungsgemeinschaft within the core program METEOR/MERIAN. Financial support for the different projects carried out during the cruise was provided through the Excellence Cluster Future Ocean and funding through the institutions involved. We gratefully appreciate all this support.

## Participants and Affiliations

### Participants

| | | | |
|---|---|---|---|
| 1. | Prof. Christian Berndt | Chief scientist | GEOMAR |
| 2. | Prof. Sebastian Krastel | Leader Seismics | GEOMAR |
| 3. | Ines Dumke | Seismics | GEOMAR |
| 4. | Felix Gross | Seismics | GEOMAR |
| 5. | Kathrin Lieser | Seismics | GEOMAR |
| 6. | Karolin Dünnbier | Seismics | GEOMAR |
| 7. | Gero Wetzel | Seismic Engineer | GEOMAR |
| 8. | Prof. Tina Treude | Leader biogeochemistry | GEOMAR |
| 9. | Dr. Helge Niemann | Leader water biochemistry | UBasel |
| 10. | Lea Steinle | Water biochemistry | UBasel |
| 11. | Dr. Stefan Krause | Sediment geochemistry | GEOMAR |
| 12. | Kerstin Kretschmer | Sediment geochemistry | GEOMAR |
| 13. | Victoria Bertics | Sediment geochemistry | GEOMAR |
| 14. | Carolyn Graves | Sediment geochemistry | NOCS |
| 15. | Veit Hühnerbach | Observatory | NOCS |
| 16. | Dr. Peter Franek | Observatory | UTromsø |
| 17. | Dr. Tom Feseker | Heat flow | MARUM |
| 18. | Karen Hissmann | JAGO | GEOMAR |
| 19. | Jürgen Schauer | JAGO | GEOMAR |
| 20. | Martin Fenske | JAGO | GEOMAR |

### Affiliations

| | |
|---|---|
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| NOCS | National Oceanography Centre, University of Southampton<br>European Way, Southampton, SO14 3ZH, U.K. |
| UBasel | Department of Environmental Sciences, University of Basel, Switzerland |
| UTromsø | Institute of Geology, University of Tromsø, Dramsveien 201, 9037 Tromsø, Norway |
| MARUM | Center for Marine Environmental Sciences (MARUM), University of Bremen, Klagenfurter Straße, 28359 Bremen, Germany |

## Stationsliste

## Appendix 1: PARASOUND and multibeam profiles

| survey | instruments | start survey | | | | end survey | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | date | time | latitude | longitude | date | time | latitude | longitude |
| S01 | MB | 17/08/2012 | 08:09 | 78° 36.93' N | 7° 26.60' E | 17/08/2012 | 10:40 | 78° 33.33' N | 9° 28.60' E |
| P100 | MB+SB+Para+Seismic | 17/08/2012 | 20:16 | 78° 32.68' N | 9° 40.92' E | 18/08/2012 | 01:55 | 78° 42.39' N | 7° 30.51' E |
| P101 | MB+SB+Para+Seismic | 18/08/2012 | 01:55 | 78° 42.39' N | 7° 30.51' E | 18/08/2012 | 04:30 | 78° 30.78' N | 7° 02.55' E |
| P102 | MB+SB+Para+Seismic | 18/08/2012 | 04:30 | 78° 30.78' N | 7° 02.55' E | 18/08/2012 | 08:15 | 78° 35.64' N | 8° 28.64' E |
| S02 | MB+SB+Para | 18/08/2012 | 08:15 | 78° 35.64' N | 8° 28.64' E | 18/08/2012 | 11:20 | 78° 33.30 ' N | 9° 28.58' E |
| S03 | MB+SB+Para | 18/08/2012 | 16:30 | 78° 33.30' N | 9° 28.62' E | 18/08/2012 | 18:50 | 78° 33.15' N | 9° 25.42' E |
| S04 | MB+SB+Para | 19/08/2012 | 09:49 | 78° 33.42' N | 9° 31.53' E | 19/08/2012 | 14:00 | 78° 33.58' N | 9° 33.85' E |
| P200 | MB+SB+Para+Seismic | 19/08/2012 | 17:25 | 78° 38.96' N | 9° 19.35' E | 19/08/2012 | 17:54 | 78° 37.63' N | 9° 10.43' E |
| P201 | MB+SB+Para+Seismic | 19/08/2012 | 17:54 | 78° 37.63' N | 9° 10.43' E | 19/08/2012 | 20:00 | 78° 35.07' N | 8° 19.38' E |
| P202 | MB+SB+Para+Seismic | 19/08/2012 | 20:00 | 78° 35.07' N | 8° 19.38' E | 19/08/2012 | 20:21 | 78° 35.89' N | 8° 11.95' E |
| P203 | MB+SB+Para+Seismic | 19/08/2012 | 20:21 | 78° 35.89' N | 8° 11.95' E | 19/08/2012 | 22:51 | 78° 32.49' N | 7° 11.85' E |
| P204 | MB+SB+Para+Seismic | 19/08/2012 | 22:51 | 78° 32.49' N | 7° 11.85' E | 19/08/2012 | 23:10 | 78° 33.68' N | 7° 08.64' E |
| P205 | MB+SB+Para+Seismic | 19/08/2012 | 23:10 | 78° 33.68' N | 7° 08.64' E | 20/08/2012 | 01:53 | 78° 36.85' N | 8° 10.05' E |
| P206 | MB+SB+Para+Seismic | 20/08/2012 | 01:53 | 78° 36.85' N | 8° 10.05' E | 20/08/2012 | 02:47 | 78° 33.56' N | 8° 17.82' E |
| P207 | MB+SB+Para+Seismic | 20/08/2012 | 02:47 | 78° 33.56' N | 8° 17.82' E | 20/08/2012 | 05:56 | 78° 29.72' N | 7° 15.54' E |
| P208 | MB+SB+Para+Seismic | 20/08/2012 | 06:16 | 78° 28.47' N | 7° 14.06' E | 20/08/2012 | 09:23 | 78° 31.61' N | 8° 20.46' E |
| S05 | MB+SB+Para | 20/08/2012 | 09:23 | 78° 31.61' N | 8° 20.46' E | 20/08/2012 | 11:50 | 78° 33.29' N | 9° 28.54' E |
| S06 | MB+SB+Para | 20/08/2012 | 12:20 | 78° 33.30' N | 9° 28.51' E | 20/08/2012 | 19:50 | 79° 26.70' N | 5° 26.79' E |
| P300 | MB+SB+Para+Seismic | 20/08/2012 | 23:55 | 79° 37.90' N | 6° 58.32' E | 21/08/2012 | 02:13 | 79° 46.77' N | 6° 21.77' E |
| S07 | MB+SB+Para | 21/08/2012 | 02:13 | 79° 46.77' N | 6° 21.77' E | 22/08/2012 | 08:13 | 78° 09.04' N | 13° 43.11' E |
| S08 | MB+SB+Para | 22/08/2012 | 22:10 | 78° 27.95' N | 9° 58.79' E | 22/08/2012 | 22:50 | 78° 33.90' N | 9° 27.17' E |
| S09 | MB+SB+Para | 23/08/2012 | 15:02 | 78° 33.25' N | 9° 25.49' E | 23/08/2012 | 17:51 | 78° 33.60' N | 9° 30.77' E |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| S10 | MB+SB+Para | 24/08/2012 | 13:53 | 78° 33.64' N | 9° 31.86' E | 24/08/2012 | 16:46 | 78° 33.47' N | 9° 24.98' E |
| S11 | MB+SB+Para | 25/08/2012 | 06:14 | 78° 36.22' N | 9° 23.90' E | 25/08/2012 | 07:47 | 78° 36.71' N | 9° 25.67' E |
| S12 | MB+SB+Para | 25/08/2012 | 14:34 | 78° 36.66' N | 9° 29.53' E | 25/08/2012 | 16:33 | 78° 36.52' N | 9° 22.93' E |
| S13 | MB+SB+Para | 25/08/2012 | 21:14 | 78° 36.76' N | 9° 25.16' E | 25/08/2012 | 23:48 | 79° 0.38' N | 8° 48.50' E |
| S14 | MB+SB+Para | 26/08/2012 | 00:11 | 79° 4.62' N | 8° 40.80' E | 26/08/2012 | 07:10 | 79° 47.18' N | 5° 13.96' E |
| S15 | MB+SB+Para | 26/08/2012 | 08:29 | 79° 47.47' N | 5° 12.69' E | 26/08/2012 | 11:18 | 79° 34.67' N | 3° 34.53' E |
| S16 | MB+SB+Para | 26/08/2012 | 13:03 | 79° 34.55' N | 3° 33.05' E | 26/08/2012 | 23:44 | 79° 49.86' N | 5° 14.98' E |
| S17 | MB+SB+Para | 27/08/2012 | 00:50 | 79° 49.89' N | 5° 15.24' E | 27/08/2012 | 02:06 | 79° 43.79' N | 4° 30.64' E |
| S18 | MB+SB+Para | 27/08/2012 | 04:46 | 79° 44.24' N | 4° 33.38' E | 27/08/2012 | 05:12 | 79° 46.88' N | 4° 11.51' E |
| S19 | MB+SB+Para | 27/08/2012 | 06:35 | 79° 47.02' N | 4° 10.92' E | 27/08/2012 | 13:12 | 80° 1.32' N | 5° 16.01' E |
| P400 | MB+SB+Para+Seismic | 27/08/2012 | 14:16 | 80° 1.85' N | 5° 35.17' E | 27/08/2012 | 18:51 | 79° 42.42' N | 4° 27.89' E |
| P500 | MB+SB+Para+Seismic | 27/08/2012 | 20:00 | 79° 44.23' N | 4° 32.76' E | 27/08/2012 | 22:16 | 79° 34.93' N | 4° 1.84' E |
| S20 | MB+SB+Para | 27/08/2012 | 23:38 | 79° 38.14' N | 4° 41.99' E | 28/08/2012 | 06:44 | 78° 34.92' N | 9° 12.90' E |
| S21 | MB+SB+Para | 28/08/2012 | 07:10 | 78° 33.12' N | 9° 30.14' E | 28/08/2012 | 07:44 | 78° 33.10' N | 9° 28.99' E |
| S22 | MB+SB+Para | 28/08/2012 | 14:24 | 78° 33.00' N | 9° 31.48' E | 28/08/2012 | 18:12 | 78° 32.76' N | 9° 29.54' E |
| P600 | MB+SB+Para+Seismic | 29/08/2012 | 08:39 | 78° 25.31' N | 7° 4.96' E | 29/08/2012 | 15:08 | 78° 37.39' N | 9° 35.12' E |
| S23 | MB+SB+Para | 30/08/2012 | 18:47 | 78° 33.13' N | 9° 25.14' E | 30/08/2012 | 19:02 | 78° 33.42' N | 9° 31.16' E |
| S24 | MB+SB+Para | 31/08/2012 | 15:50 | 78° 36.40' N | 9° 20.38' E | 1/09/2012 | 16:37 | 78° 32.77' N | 5° 44.92' E |
| P700 | MB+Para+Seismic | 1/09/2012 | 19:06 | 78° 26.84' N | 6° 21.85' E | 1/09/2012 | 21:55 | 78° 37.18' N | 7° 9.08' E |
| P701 | MB+Para+Seismic | 1/09/2012 | 21:55 | 78° 37.18' N | 7° 9.08' E | 1/09/2012 | 23:07 | 78° 36.45' N | 7° 38.32' E |
| P702 | MB+Para+Seismic | 1/09/2012 | 23:07 | 78° 36.45' N | 7° 38.32' E | 2/09/2012 | 01:31 | 78° 24.89' N | 7° 44.25' E |
| P703 | MB+Para+Seismic | 2/09/2012 | 01:31 | 78° 24.89' N | 7° 44.25' E | 2/09/2012 | 01:55 | 78° 24.67' N | 7° 35.49' E |
| P704 | MB+Para+Seismic | 2/09/2012 | 03:54 | 78° 24.69' N | 7° 35.47' E | 2/09/2012 | 06:55 | 78° 26.92' N | 6° 21.39' E |
| P705 | MB+Para+Seismic | 2/09/2012 | 06:55 | 78° 26.92' N | 6° 21.39' E | 2/09/2012 | 08:09 | 78° 24.08' N | 6° 42.50' E |
| P706 | MB+Para+Seismic | 2/09/2012 | 08:09 | 78° 24.08' N | 6° 42.50' E | 2/09/2012 | 11:25 | 78° 37.41' N | 7° 25.49' E |
| P800 | MB+Para+Seismic | 3/09/2012 | 02:26 | 78° 21.79' N | 7° 08.25' E | 3/09/2012 | 07:26 | 78° 45.13'N | 7° 47.05' E |
| P801 | MB+Para+Seismic | 3/09/2012 | 07:36 | 78° 45.60' N | 7° 43.80' E | 3/09/2012 | 10:15 | 78° 46.94' N | 6° 37.06' E |
| P802 | MB+Para+Seismic | 3/09/2012 | 10:23 | 78° 46.61' N | 6° 34.59' E | 3/09/2012 | 13:05 | 78° 34.67' N | 6° 02.80' E |
| P803 | MB+Para+Seismic | 3/09/2012 | 13:13 | 78° 34.25' N | 6° 03.71' E | 3/09/2012 | 14:14 | 78° 32.15' N | 6° 26.91' E |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| P804 | MB+Para+Seismic | 3/09/2012 | 14:20 | 78° 32.40' N | 6° 29.37' E | 3/09/2012 | 16:31 | 78° 41.91' N | 6° 54.78' E |
| P805 | MB+Para+Seismic | 3/09/2012 | 16:39 | 78° 41.82' N | 6° 57.39' E | 3/09/2012 | 17:06 | 78° 39.64' N | 6° 57.66' E |
| S25 | MB+Para | 4/09/2012 | 07:08 | 78° 18.82' N | 9° 41.59' E | 6/09/2012 | 17:06 | 67° 8.03' N | 4° 40.93' E |
| S26 | MB+Para | 6/09/2012 | 17:06 | 67° 8.03' N | 4° 40.93' E | 6/09/2012 | 17:44 | 67° 6.72' N | 4° 41.56' E |
| S27 | MB+Para | 6/09/2012 | 20:57 | 67° 6.64' N | 4° 41.64' E | 7/09/2012 | 11:15 | 64° 42.31' N | 4° 58.38' E |
| S28 | MB+Para | 9/09/2012 | 5:14:00 | 58° 36.11' N | 2° 6.90' E | 9/09/2012 | 5:35:59 | 58° 35.95' N | 2° 5.36' E |

## Appendix 2: Seismic profiles

| profile | start | | | | end | | | |
|---|---|---|---|---|---|---|---|---|
| | date | time | latitude | longitude | date | time | latitude | longitude |
| **Survey P100 - station no. 548** | | | | | | | | |
| P100 | 17/08/2012 | 20:16 | 78° 32.68' N | 9° 40.92' E | 18/08/2012 | 01:55 | 78° 42.39' N | 7° 30.51' E |
| P101 | 18/08/2012 | 01:55 | 78° 42.39' N | 7° 30.51' E | 18/08/2012 | 04:30 | 78° 30.78' N | 7° 2.55' E |
| P102 | 18/08/2012 | 04:30 | 78° 30.78' N | 7° 2.55' E | 18/08/2012 | 08:15 | 78° 35.64' N | 8° 28.64' E |
| **Survey P200 - station no. 562** | | | | | | | | |
| P200 | 19/08/2012 | 17:25 | 78° 38.96' N | 9° 19.35' N | 19/08/2012 | 17:54 | 78° 37.63' N | 9° 10.43' E |
| P201 | 19/08/2012 | 17:54 | 78° 37.63' N | 9° 10.43' E | 19/08/2012 | 20:00 | 78° 35.07' N | 8° 19.38' E |
| P202 | 19/08/2012 | 20:00 | 78° 35.07' N | 8° 19.38' E | 19/08/2012 | 20:21 | 78° 35.89' N | 8° 11.95' E |
| P203 | 19/08/2012 | 20:21 | 78° 35.89' N | 8° 11.95' E | 19/08/2012 | 22:51 | 78° 32.49' N | 7° 11.85' E |
| P204 | 19/08/2012 | 22:51 | 78° 32.49' N | 7° 11.85' E | 19/08/2012 | 23:10 | 78° 33.68' N | 7° 08.64' E |
| P205 | 19/08/2012 | 23:10 | 78° 33.68' N | 7° 08.64' E | 20/08/2012 | 01:53 | 78° 36.85' N | 8° 10.05' E |
| P206 | 20/08/2012 | 01:53 | 78° 36.85' N | 8° 10.05' E | 20/08/2012 | 02:47 | 78° 33.56' N | 8° 17.82' E |
| P207 | 20/08/2012 | 02:47 | 78° 33.56' N | 8° 17.82' E | 20/08/2012 | 05:56 | 78° 29.72' N | 7° 15.54' E |
| P208 | 20/08/2012 | 06:16 | 78° 28.47' N | 7° 14.06' E | 20/08/2012 | 09:23 | 78° 31.61' N | 8° 20.46' E |
| **Survey P300 - station no. 565** | | | | | | | | |
| P300 | 20/08/2012 | 23:55 | 79° 37.90' N | 6° 58.32' E | 21/08/2012 | 02:13 | 79° 46.77' N | 6° 21.77' E |
| **Survey P400/P500 - station no. 608** | | | | | | | | |
| P400 | 27/08/2012 | 14:16 | 80° 01.85' N | 5° 35.17' E | 27/08/2012 | 18:51 | 79° 42.42' N | 4° 27.89' E |
| P500 | 27/08/2012 | 20:00 | 79° 44.23' N | 4° 32.76' E | 27/08/2012 | 22:16 | 79° 34.93' N | 4° 01.84' E |
| **Survey P600 - station no. 619** | | | | | | | | |
| P600 | 29/08/2012 | 08:39 | 78° 25.31' N | 7° 04.96' E | 29/08/2012 | 15:08 | 78° 37.39' N | 9° 35.12' E |

| Survey P700 - station no. 646 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| P700 | 1/09/2012 | 18:33 | 78° 25.22' N | 6° 11.20' E | 1/09/2012 | 21:55 | 78° 37.18' N | 7° 09.08' E |
| P701 | 1/09/2012 | 22:01 | 78° 37.30' N | 7° 11.57' E | 1/09/2012 | 23:06 | 78° 36.45' N | 7° 38.32' E |
| P702 | 1/09/2012 | 23:11 | 78° 36.25' N | 7° 39.59' E | 2/09/2012 | 01:33 | 78° 24.74' N | 7° 44.25' E |
| P703 | 2/09/2012 | 01:38 | 78° 24.49' N | 7° 41.81' E | 2/09/2012 | 01:50 | 78° 24.65' N | 7° 36.85' E |
| P704 | 2/09/2012 | 03:54 | 78° 24.69' N | 7° 35.47' E | 2/09/2012 | 06:54 | 78° 26.92' N | 6° 21.37' E |
| P705 | 2/09/2012 | 07:05 | 78° 26.45' N | 6° 20.23' E | 2/09/2012 | 08:10 | 78° 24.03' N | 6° 43.02' E |
| P706 | 2/09/2012 | 08:15 | 78° 24.14' N | 6° 44.99' E | 2/09/2012 | 11:25 | 78° 37.41' N | 7° 25.49' E |
| **Survey P800 - station no. 651** | | | | | | | | |
| P800 | 3/09/2012 | 02:26 | 78° 21.79' N | 7° 08.25' E | 3/09/2012 | 07:26 | 78° 45.13'N | 7° 47.05' E |
| P801 | 3/09/2012 | 07:36 | 78° 45.60' N | 7° 43.80' E | 3/09/2012 | 10:15 | 78° 46.94' N | 6° 37.06' E |
| P802 | 3/09/2012 | 10:23 | 78° 46.61' N | 6° 34.59' E | 3/09/2012 | 13:05 | 78° 34.67' N | 6° 02.80' E |
| P803 | 3/09/2012 | 13:13 | 78° 34.25' N | 6° 03.71' E | 3/09/2012 | 14:14 | 78° 32.15' N | 6° 26.91' E |
| P804 | 3/09/2012 | 14:20 | 78° 32.40' N | 6° 29.37' E | 3/09/2012 | 16:31 | 78° 41.91' N | 6° 54.78' E |
| P805 | 3/09/2012 | 16:39 | 78° 41.82' N | 6° 57.39' E | 3/09/2012 | 17:06 | 78° 39.64' N | 6° 57.66' E |

## Appendix 3: JAGO dives

| dive # | station no. | site | touch down | | lift off | | depth | date | sub-merged | surfaced | activities |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | latitude | longitude | latitude | longitude | | | | | |
| 1183 (1) | 549 | MASOX site | 78° 33.31' N | 9° 28.59' E | 78° 33.30' N | 9° 28.61' E | 392 | 18/08/2012 | 12:00 | 14:45 | MASOX observatory recovery |
| 1184 (2) | 577 | MASOX site | 78° 33.33' N | 9° 28.41' E | 78° 33.34' N | 9° 28.41' E | 392 | 23/08/2012 | 09:10 | 13:57 | peeper/T sensor deployment, gas |
| 1185 (3) | 579 | MASOX site | 78° 33.35' N | 9° 28.40' E | 78° 33.35' N | 9° 28.42' E | 394 | 23/08/2012 | 19:18 | 21:40 | push cores, gas, water |
| 1186 (4) | 585 | MASOX site | 78° 33.34' N | 9° 28.40' E | 78° 33.35' N | 9° 28.35' E | 394 | 24/08/2012 | 09:12 | 12:48 | push cores, gas, water |
| 1187 (5) | 587 | MASOX site | 78° 33.34' N | 9° 28.44' E | 78° 33.34' N | 9° 28.41' E | 394 | 24/08/2012 | 17:29 | 19:54 | push cores, gas, water |
| 1188 (6) | 597 | HyBIS site | 78° 36.68' N | 9° 25.49' E | 78° 36.69' N | 9° 25.49' E | 386 | 25/08/2012 | 08:39 | 13:00 | push cores, gas, water, carbonate |
| 1189 (7) | 599 | HyBIS site | 78° 36.68' N | 9° 25.36' E | 78° 36.66' N | 9° 25.52' E | 386 | 25/08/2012 | 17:24 | 21:06 | push cores, gas, water, carbonate |
| 1190 (8) | 611 | SE peeper site | 78° 33.18' N | 9° 29.39' E | 78° 33.18' N | 9° 29.44' E | 395 | 28/08/2012 | 09:40 | 13:05 | push cores, gas, water, biosamples |
| 1191 (9) | 620 | shallow seeps | 78° 39.33' N | 9° 26.11' E | 78° 39.30' N | 9° 26.07' E | 245 | 29/08/2012 | 16:31 | 20:28 | gas, water, carbonate, biosamples |
| 1192 (10) | 647 | MASOX site | 78° 33.36' N | 9° 28.45' E | 78° 33.34' N | 9° 28.41' E | 394 | 2/09/2012 | 15:00 | 17:41 | peeper/T sensor recovery, gas, water |

## Appendix 4: CTD stations

| Station no. | latitude | longitude | depth | rope length | deployment | | recovery | |
|---|---|---|---|---|---|---|---|---|
| | | | | | date | time | date | time |
| 544-2 | 78° 37.00' N | 7° 24.00' E | 1434.8 | 1300 | 17/08/2012 | 05:56 | 17/08/2012 | 06:45 |
| 546-1 | 78° 33.33' N | 9° 28.62' E | 392.1 | 360 | 17/08/2012 | 10:59 | 17/08/2012 | 11:25 |
| 546-2 | 78° 33.31' N | 9° 28.64' E | 392.0 | 100 | 17/08/2012 | 12:22 | 17/08/2012 | 14:22 |
| 550-1 | 78° 33.15' N | 9° 25.41' E | 427.9 | 423 | 18/08/2012 | 18:51 | 18/08/2012 | 19:16 |
| 551-1 | 78° 33.24' N | 9° 26.75' E | 404.6 | ? | 18/08/2012 | 21:05 | 18/08/2012 | 21:29 |
| 552-1 | 78° 33.26' N | 9° 27.32' E | 404.2 | 403 | 18/08/2012 | 22:41 | 18/08/2012 | 23:03 |
| 553-1 | 78° 33.29' N | 9° 27.94' E | 396.5 | 396 | 18/08/2012 | 23:56 | 19/08/2012 | 00:08 |
| 554-1 | 78° 33.30' N | 9° 28.53' E | 389.4 | 387 | 19/08/2012 | 01:21 | 19/08/2012 | 01:35 |
| 555-1 | 78° 33.32' N | 9° 28.69' E | 394.4 | 389 | 19/08/2012 | 02:27 | 19/08/2012 | 02:46 |
| 556-1 | 78° 33.33' N | 9° 29.23' E | 389.2 | 386 | 19/08/2012 | 03:44 | 19/08/2012 | 04:03 |
| 557-1 | 78° 33.35' N | 9° 29.83' E | 384.0 | 381 | 19/08/2012 | 05:01 | 19/08/2012 | 05:20 |
| 558-1 | 78° 33.38' N | 9° 30.54' E | 377.0 | 375 | 19/08/2012 | 06:14 | 19/08/2012 | 06:32 |
| 559-1 | 78° 33.40' N | 9° 31.40' E | 358.1 | 355 | 19/08/2012 | 07:24 | 19/08/2012 | 07:44 |
| 580 | 78° 33.34' N | 9° 28.39' E | 389.6 | 387 | 23/08/2012 | 22:38 | 23/08/2012 | 22:59 |
| 581 | 78° 33.31' N | 9° 28.49' E | 386.1 | 384 | 24/08/2012 | 00:52 | 24/08/2012 | 01:11 |
| 582 | 78° 33.33' N | 9° 28.19' E | 390.0 | 387 | 24/08/2012 | 02:25 | 24/08/2012 | 02:44 |
| 583 | 78° 33.39' N | 9° 28.27' E | 391.5 | 388 | 24/08/2012 | 03:51 | 24/08/2012 | 04:10 |
| 584 | 78° 33.37' N | 9° 28.60' E | 388.3 | 386 | 24/08/2012 | 05:15 | 24/08/2012 | 05:31 |
| 601 | 79° 34.39' N | 3° 32.37' E | 3256.7 | 1750 | 26/08/2012 | 11:32 | 26/08/2012 | 12:47 |
| 605-2 | 79° 44.14' N | 4° 33.25' E | 2708.4 | 1500 | 27/08/2012 | 03:41 | 27/08/2012 | 04:42 |
| 613 | 78° 33.31' N | 9° 28.55' E | 388.5 | 383 | 28/08/2012 | 19:04 | 28/08/2012 | 19:23 |
| 614 | 78° 36.63' N | 9° 25.67' E | 375.5 | 372 | 28/08/2012 | 21:02 | 28/08/2012 | 21:20 |
| 615 | 78° 34.73' N | 9° 2.04' E | 599.2 | 599 | 28/08/2012 | 22:10 | 28/08/2012 | 22:52 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 616-2 | 78° 32.65' N | 8° 32.42' E | 1054.5 | 1054 | 29/08/2012 | 01:56 | 29/08/2012 | 02:47 |
| 617 | 78° 30.05' N | 8° 1.42' E | 1709.9 | 1690 | 29/08/2012 | 03:47 | 29/08/2012 | 04:54 |
| 618 | 78° 26.19' N | 7° 14.48' E | 3128.8 | 2500 | 29/08/2012 | 06:00 | 29/08/2012 | 07:35 |
| 621 | 78° 39.34' N | 9° 26.05' E | ? | 57 | 29/08/2012 | 20:55 | 29/08/2012 | 21:02 |
| 633-1 | 78° 33.16' N | 9° 25.39' E | 853.6 | 422 | 30/08/2012 | 19:32 | 30/08/2012 | 20:04 |
| 634-1 | 78° 33.24' N | 9° 26.78' E | ? | 404 | 30/08/2012 | 21:17 | 30/08/2012 | 21:36 |
| 635-1 | 78° 33.26' N | 9° 27.34' E | ? | 400 | 30/08/2012 | 22:39 | 30/08/2012 | 22:57 |
| 636-1 | 78° 33.29' N | 9° 27.97' E | ? | 393 | 30/08/2012 | 23:51 | 31/08/2012 | 00:12 |
| 637-1 | 78° 33.31' N | 9° 28.53' E | 387.5 | 401 | 31/08/2012 | 01:05 | 31/08/2012 | 01:23 |
| 638-1 | 78° 33.32' N | 9° 28.73' E | 390.0 | 389 | 31/08/2012 | 02:35 | 31/08/2012 | 02:55 |
| 639-1 | 78° 33.34' N | 9° 29.22' E | 389.4 | 383 | 31/08/2012 | 03:53 | 31/08/2012 | 04:12 |
| 640-1 | 78° 33.36' N | 9° 29.80' E | 381.5 | 378 | 31/08/2012 | 05:00 | 31/08/2012 | 05:20 |
| 641-1 | 78° 33.38' N | 9° 30.50' E | 374.6 | 370 | 31/08/2012 | 06:17 | 31/08/2012 | 06:37 |
| 642-1 | 78° 33.41' N | 9° 31.36' E | 358.0 | 352 | 31/08/2012 | 07:51 | 31/08/2012 | 08:15 |
| 648-1 | 78° 33.34' N | 9° 28.41' E | 387.1 | 388 | 2/09/2012 | 18:40 | 2/09/2012 | 19:02 |
| 649 | 78° 36.68' N | 9° 25.54' E | ? | 375 | 2/09/2012 | 21:28 | 2/09/2012 | 21:48 |
| 650 | 78° 39.31' N | 9° 26.07' E | ? | 239 | 2/09/2012 | 22:24 | 2/09/2012 | 22:38 |
| 653-2 | 78° 33.31' N | 7° 51.95' E | 1486.9 | 1400 | 3/09/2012 | 21:44 | 3/09/2012 | 22:38 |
| 654 | 78° 33.34' N | 9° 28.39' E | 390.5 | 387 | 4/09/2012 | 00:46 | 4/09/2012 | 01:05 |
| 655 | 78° 36.67' N | 9° 25.48' E | 380.3 | 376 | 4/09/2012 | 02:02 | 4/09/2012 | 02:18 |
| 656 | 78° 39.30' N | 9° 26.01' E | 244.1 | 236 | 4/09/2012 | 03:05 | 4/09/2012 | 03:18 |
| 658 | 78° 18.82' N | 9° 41.65' E | 306.9 | 303 | 4/09/2012 | 06:52 | 4/09/2012 | 07:08 |

## Appendix 5: Heatflow stations

| Station no. | latitude | longitude | depth | deployment | | recovery | |
|---|---|---|---|---|---|---|---|
| | | | | date | time | date | time |
| 544-1 | 78° 37.00' N | 7° 24.00' E | 1439.5 | 17/08/2012 | 04:37 | 17/08/2012 | 05:45 |
| 550-2 | 78° 33.15' N | 9° 25.42' E | 425.5 | 18/08/2012 | 19:31 | 18/08/2012 | 20:30 |
| 551-2 | 78° 33.23' N | 9° 26.75' E | 403.9 | 18/08/2012 | 21:43 | 18/08/2012 | 22:23 |
| 552-2 | 78° 33.26' N | 9° 27.32' E | 404.5 | 18/08/2012 | 23:08 | 18/08/2012 | 23:39 |
| 553-2 | 78° 33.28' N | 9° 27.99' E | 399.2 | 19/08/2012 | 00:25 | 19/08/2012 | 00:32 |
| 554-2 | 78° 33.30' N | 9° 28.55' E | 389.8 | 19/08/2012 | 01:39 | 19/08/2012 | 02:07 |
| 555-2 | 78° 33.31' N | 9° 28.73' E | 392.9 | 19/08/2012 | 02:52 | 19/08/2012 | 03:22 |
| 556-2 | 78° 33.33' N | 9° 29.26' E | 388.6 | 19/08/2012 | 04:05 | 19/08/2012 | 04:38 |
| 557-2 | 78° 33.35' N | 9° 29.83' E | 386.9 | 19/08/2012 | 05:26 | 19/08/2012 | 05:56 |
| 558-2 | 78° 33.38' N | 9° 30.53' E | 376.0 | 19/08/2012 | 06:36 | 19/08/2012 | 07:06 |
| 559-2 | 78° 33.40' N | 9° 31.39' E | 358.2 | 19/08/2012 | 07:49 | 19/08/2012 | 08:25 |
| 564 | 79° 26.94' N | 5° 25.68' E | 2357.6 | 20/08/2012 | 19:53 | 20/08/2012 | 20:48 |
| 568 | 78° 36.61' N | 9° 17.94' E | 451.1 | 23/08/2012 | 01:14 | 23/08/2012 | 01:41 |
| 569 | 78° 36.62' N | 9° 19.21' E | 437.7 | 23/08/2012 | 02:02 | 23/08/2012 | 02:23 |
| 570 | 78° 36.64' N | 9° 20.91' E | 427.7 | 23/08/2012 | 02:49 | 23/08/2012 | 03:13 |
| 571 | 78° 36.66' N | 9° 22.16' E | 417.0 | 23/08/2012 | 03:34 | 23/08/2012 | 04:00 |
| 572 | 78° 36.67' N | 9° 22.93' E | 406.5 | 23/08/2012 | 04:23 | 23/08/2012 | 04:44 |
| 573 | 78° 36.67' N | 9° 23.51' E | 394.5 | 23/08/2012 | 04:48 | 23/08/2012 | 05:16 |
| 574 | 78° 36.68' N | 9° 24.30' E | 389.0 | 23/08/2012 | 05:25 | 23/08/2012 | 05:51 |
| 575 | 78° 36.69' N | 9° 25.03' E | 384.7 | 23/08/2012 | 06:00 | 23/08/2012 | 06:27 |
| 576 | 78° 36.70' N | 9° 25.51' E | 377.7 | 23/08/2012 | 06:33 | 23/08/2012 | 07:02 |
| 588 | 78° 26.85' N | 8° 44.22' E | 1311.5 | 24/08/2012 | 21:56 | 24/08/2012 | 22:45 |
| 589 | 78° 32.79' N | 9° 16.54' E | 3813.9 | 24/08/2012 | 23:44 | 25/08/2012 | 00:18 |
| 590 | 78° 33.03' N | 9° 22.08' E | 461.1 | 25/08/2012 | 00:48 | 25/08/2012 | 01:23 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 591 | 78° 33.27' N | 9° 27.71' E | 411.5 | 25/08/2012 | 01:51 | 25/08/2012 | 02:20 |
| 592 | 78° 33.29' N | 9° 28.28' E | 400.9 | 25/08/2012 | 02:35 | 25/08/2012 | 02:57 |
| 593 | 78° 33.32' N | 9° 28.99' E | 403.6 | 25/08/2012 | 03:14 | 25/08/2012 | 03:37 |
| 594 | 78° 33.35' N | 9° 29.55' E | 395.0 | 25/08/2012 | 03:46 | 25/08/2012 | 04:09 |
| 595 | 78° 33.37' N | 9° 30.14' E | 390.2 | 25/08/2012 | 04:19 | 25/08/2012 | 04:57 |
| 622 | 78° 30.60' N | 7° 7.08' E | 2941.9 | 29/08/2012 | 23:50 | 30/08/2012 | 01:42 |
| 623 | 78° 31.15' N | 7° 16.23' E | 2335.7 | 30/08/2012 | 02:23 | 30/08/2012 | 03:53 |
| 624 | 78° 31.50' N | 7° 21.90' E | 2050.9 | 30/08/2012 | 04:24 | 30/08/2012 | 05:53 |
| 625 | 78° 33.27' N | 7° 50.55' E | 1508.6 | 30/08/2012 | 06:39 | 30/08/2012 | 07:54 |
| 633-2 | 78° 33.16' N | 9° 25.39' E | ? | 30/08/2012 | 20:27 | 30/08/2012 | 20:56 |
| 634-2 | 78° 33.24' N | 9° 26.78' E | ? | 30/08/2012 | 21:40 | 30/08/2012 | 22:12 |
| 635-2 | 78° 33.26' N | 9° 27.34' E | ? | 30/08/2012 | 23:02 | 30/08/2012 | 23:32 |
| 636-2 | 78° 33.29' N | 9° 27.97' E | 394.2 | 31/08/2012 | 00:18 | 31/08/2012 | 00:55 |
| 637-2 | 78° 33.31' N | 9° 28.53' E | 390.0 | 31/08/2012 | 01:29 | 31/08/2012 | 01:59 |
| 638-2 | 78° 33.32' N | 9° 28.73' E | 391.5 | 31/08/2012 | 03:02 | 31/08/2012 | 03:35 |
| 639-2 | 78° 33.34' N | 9° 29.23' E | 387.4 | 31/08/2012 | 04:16 | 31/08/2012 | 04:49 |
| 640-2 | 78° 33.36' N | 9° 29.80' E | 381.2 | 31/08/2012 | 05:26 | 31/08/2012 | 05:57 |
| 641-2 | 78° 33.38' N | 9° 30.50' E | 374.7 | 31/08/2012 | 06:41 | 31/08/2012 | 07:14 |
| 642-2 | 78° 33.41' N | 9° 31.36' E | 358.1 | 31/08/2012 | 08:21 | 31/08/2012 | 08:58 |

## Appendix 6: Gravity core stations

| Station no. | latitude | longitude | depth | deployment | | recovery | | length [cm] |
|---|---|---|---|---|---|---|---|---|
| | | | | date | time | date | time | |
| 561-1 | 78° 33.28' N | 9° 28.00' E | 396.1 | 19.8.12 | 14:33 | 19.8.12 | 14:54 | / |
| 561-2 | 78° 33.28' N | 9° 28.00' E | 396.5 | 19.8.12 | 15:18 | 19.8.12 | 15:37 | 120 |
| 563 | 78° 33.29' N | 9° 28.54' E | 389.4 | 20.8.12 | 11:51 | 20.8.12 | 12:11 | 100 |
| 567 | 78° 33.32' N | 9° 28.41' E | 389.8 | 21.8.12 | 23:27 | 21.8.12 | 23:47 | 130 |
| 603 | 79° 49.87' N | 5° 14.98' E | 1355.4 | 26.8.12 | 23:50 | 27.8.12 | 0:32 | 330 |
| 605-1 | 79° 44.14' N | 4° 33.25' E | 2706.1 | 27.8.12 | 2:24 | 27.8.12 | 3:35 | 350 |
| 606 | 79° 47.02' N | 4° 10.92' E | 2622.7 | 27.8.12 | 5:24 | 27.8.12 | 6:33 | 380 |
| 626-1 | 78° 33.54' N | 9° 27.86' E | 392.6 | 30.8.12 | 11:01 | 30.8.12 | 11:19 | / |
| 626-2 | 78° 33.54' N | 9° 27.86' E | 391.9 | 30.8.12 | 12:55 | 30.8.12 | 13:38 | / |
| 627 | 78° 33.52' N | 9° 27.89' E | 393.3 | 30.8.12 | 14:02 | 30.8.12 | 14:18 | / |
| 628 | 78° 33.48' N | 9° 28.13' E | 391.2 | 30.8.12 | 14:45 | 30.8.12 | 15:02 | / |
| 629 | 78° 33.45' N | 9° 27.97' E | 393.0 | 30.8.12 | 15:35 | 30.8.12 | 15:53 | 130 |
| 630 | 78° 33.41' N | 9° 28.20' E | 392.0 | 30.8.12 | 16:23 | 30.8.12 | 16:43 | / |
| 631 | 78° 33.42' N | 9° 27.11' E | 401.2 | 30.8.12 | 17:30 | 30.8.12 | 17:49 | / |
| 643 | 78° 37.03' N | 9° 19.02' E | 437.2 | 31.8.12 | 10:11 | 31.8.12 | 10:44 | / |
| 644-1 | 78° 37.01' N | 9° 19.06' E | 436.2 | 31.8.12 | 11:08 | 31.8.12 | 11:56 | / |
| 644-2 | 78° 37.01' N | 9° 19.08' E | 435.5 | 31.8.12 | 13:29 | 31.8.12 | 14:12 | / |
| 648-2 | 78° 33.34' N | 9° 28.46' E | 386.9 | 2.9.12 | 19:11 | 2.9.12 | 19:48 | / |
| 648-3 | 78° 33.34' N | 9° 28.47' E | 385.0 | 2.9.12 | 20:08 | 2.9.12 | 20:42 | / |
| 652 | 78° 40.84' N | 6° 57.50' E | 1450.6 | 3.9.12 | 18:06 | 3.9.12 | 18:48 | / |
| 653-1 | 78° 33.31' N | 7° 51.95' E | 1490.0 | 3.9.12 | 20:30 | 3.9.12 | 21:25 | / |
| 657 | 78° 33.34' N | 9° 28.38' E | 388.4 | 4.9.12 | 04:33 | 4.9.12 | 05:00 | 210 |
| 660 | 67° 6.68' N | 4° 41.74' E | 1348.0 | 6.9.12 | 18:24 | 6.9.12 | 19:19 | 506 |
| 661 | 67° 6.64' N | 4° 41.64' E | 1344.0 | 6.9.12 | 19:59 | 6.9.12 | 20:57 | 380 |
| 662 | 64° 42.31' N | 4° 58.38' E | 798.4 | 7.9.12 | 11:15 | 7.9.12 | 11:49 | ? |
| 663 | 64° 35.12' N | 4° 45.76' E | 1143.9 | 7.9.12 | 13:36 | 7.9.12 | 14:13 | ? |

## Appendix 7: Observatory positions

| station no. | site | Position | | depth | date | comment |
|---|---|---|---|---|---|---|
| | | latitude | longitude | | | |
| 549 | MASOX site | 78° 33.31' N | 9° 28.59' E | 392 | 18/08/2012 | MASOX observatory recovery |
| 665 | Sleipner | 58° 35.760' N | 2° 5.341' E | 85 | 09/09/2012 | MASOX observatory deployment |