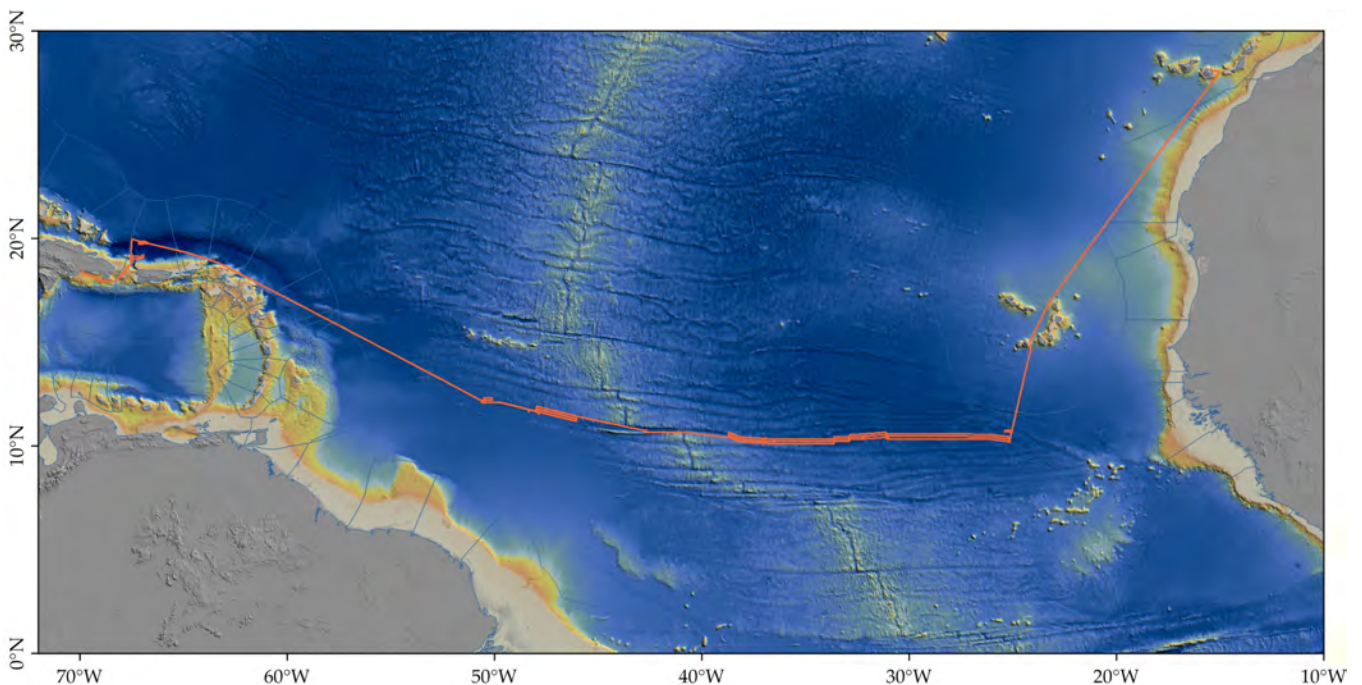


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## Short Cruise Report R.V. "Sonne" Cruise SO-237

Las Palmas - Santo Domingo  
14.12.2014 - 26.01.2015  
Chief Scientist: Colin Devey  
Captain: Oliver Meyer



## **Objectives**

The abyssal seafloor makes up > 60% of our planet's surface, it is nevertheless largely unexplored. We know very little about how the processes which created it have varied through time, about life on the deep seafloor or about how the hydrosphere, biosphere and lithosphere interact over this vast area. In the Atlantic, transform faults and fracture zones characterize most of the seafloor bathymetry and the volcanic and tectonic process which create and modify the crust can be deduced from their bathymetric signature. During the cruise SO-237 we surveyed and sampled the entire length of one of the major offsets of the Mid-Atlantic Ridge, the Vema Fracture Zone, looking at a history of plate creation and modification over 120Ma. Variations in benthic communities along this transect will be investigated using samples recovered from corers and towed gear as well as detailed photographic mapping of the benthic megafauna using AUV. The results will be used to test the hypothesis that the Mid-Atlantic Ridge serves as a barrier limiting benthic species distribution in the abyssal basins on both sides of the ridge. The Puerto Rico Trench is much deeper than the surrounding abyssal West Atlantic and so we also took samples there to determine whether the biodiversity of its hadal meio-, macro-, and megabenthic fauna differs from that of the abyssal Atlantic due to isolation of the trench. The cruise yielded important information for the Transregio proposal "Maturing oceanic plates: Earth's hidden reactors" and has provided the first high-resolution bathymetric survey along an entire fracture zone trace and one of the world's best surveyed seafloor features.

## **Cruise Narrative**

The brand new research vessel "Sonne" left Las Palmas for her maiden scientific voyage on 14th December 2014 for a 4-day transit to the working area south of the Cape Verde islands. On Thursday 18.12.14 we left the Cape Verde EEZ and the first scientific data were collected with the ship's multibeam echo-sounder. The seafloor sampling began on Friday 19.12.14 with successful deployments of the sediment gravity core, the multi-corer and the epibenthos sled. In parallel the deep-diving autonomous underwater vehicle ABYSS was deployed to map the seafloor in high resolution. Following a successful dredge haul in the night from Saturday 20.12.14 to 21.12.14, Sonne then began the first long mapping transect with over 4 days of multibeam measurements, providing the first-ever seafloor maps of the crust between 25° and 31°W along the Vema Fracture Zone. In the afternoon of 25.12.14 the AUV was again deployed, followed by the usual sequence of 3 Multi-corers, a gravity core, two epibenthos-sled deployments and a dredge. The return of the AUV on 27.12. with evidence of an Eh-anomaly 80m above the seafloor led us to carry out one extra gravity core at the position. There then followed the second large mapping block, covering the region 31° - 37°W. On 01.01.15 at 15:00 the first station work at 37°W began with biological sampling as the wind was too strong (Beaufort 7) to deploy the AUV. Following three successful MUC deployments the weather had improved to such an extent that we were able to deploy the AUV for its first photographic mission - this returned 9000 pictures after a 16 hour dive, showing large clumps of sunken Sargassum algae on the seafloor at 5300m.

The following epibenthos sleds also contained large amounts of sargassum debris. There then followed a long mapping transit towards the active transform fault region, which we arrived at in the early morning of 06.01.15. During this mapping transit we deployed two APEX floats at 38 and 42°W. Upon arrival in the transform region, preparations began for extensive AUV diving with the deployment of two LBL transponders. During the calibration phase for these transponders the weather worsened significantly and the first AUV deployment in the region where Cannat et al. (1991) found evidence of seafloor clam beds had to be delayed. We completed 6 MUC deployments (3 empty, probably as a result of the poor weather conditions), two EBS, two gravity corers (one empty) and a CTD tow-yo whilst waiting for an improvement in the weather. When this had not materialized by 08.01.15 we continued the mapping transit westward, releasing two more YPEX floats at 45° and 48°W.

The first station on the west of the spreading axis was reached on 11.01.15. The AUV was deployed to map an area of seafloor for the filming of a subsequent EBS deployment. During the AUV dive the EBS was deployed for its first haul. This deployment led to the sled becoming stuck on the bottom, after several hours manoeuvring the sled was freed and came to the surface full of round Mn-nodules. A second deployment returned benthic fauna and Mn-crusts. Due to difficulties with the first EBS haul the AUV photo-mapping did not see the EBS trace but did return with 8500 pictures of the seafloor. Three MUC deployments were successful, as was a gravity corer. The dredge had no bites and returned empty. Late on 12.01.15 we continued the mapping westward and arrived at the second station west of the spreading axis on 13.01.15 in the early evening. Due to shortage of time (caused by the sampling problems during bad weather at the spreading axis) it was decided to only perform EBS and MUC sediment sampling and to try to make a photo-survey of the EBS track using the AUV. This was all successfully achieved and on 15.01.15 we began the 82 hour transit to the Puerto Rico trough at full speed. Details of all sampling areas along the Vema Fracture Zone are shown in Figures 1 & 2.

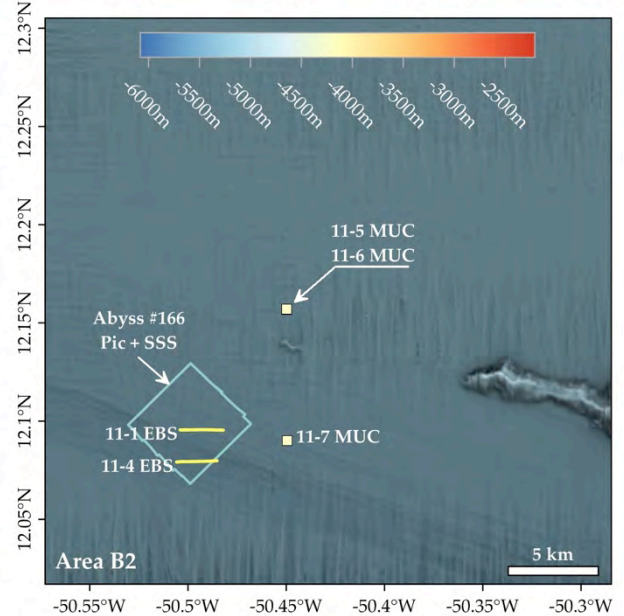
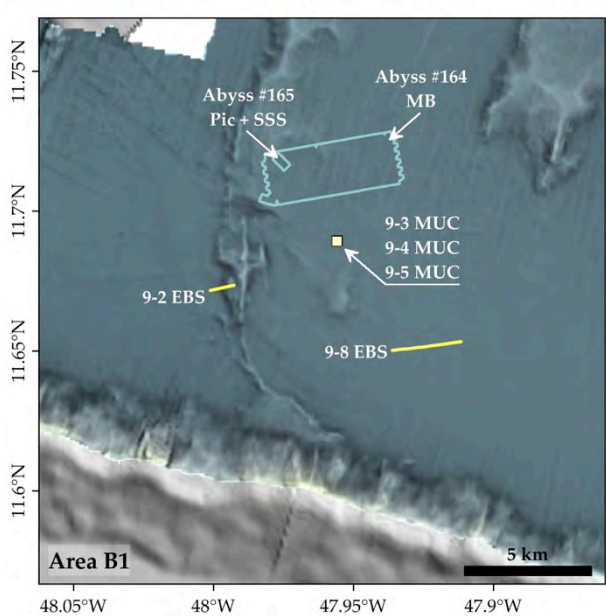
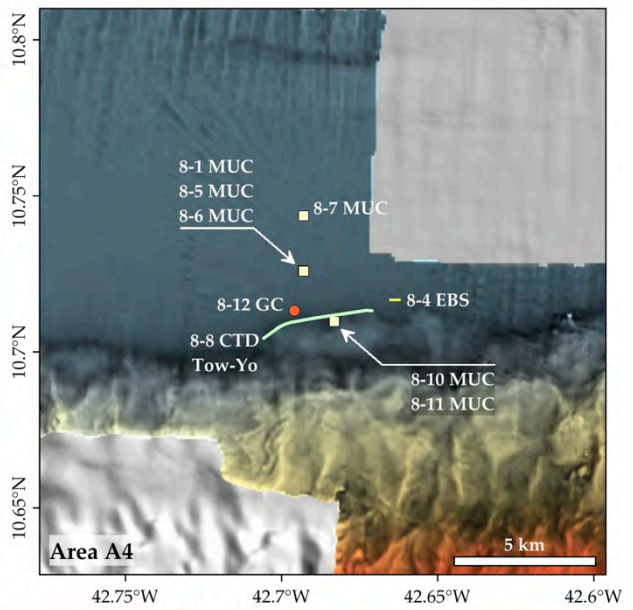
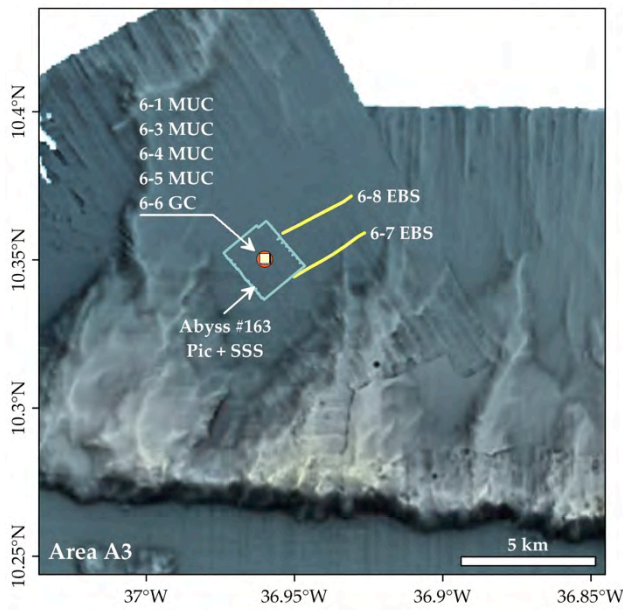
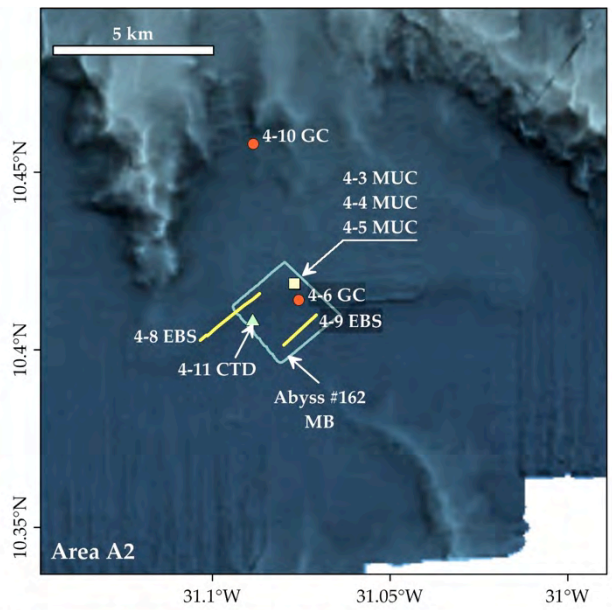
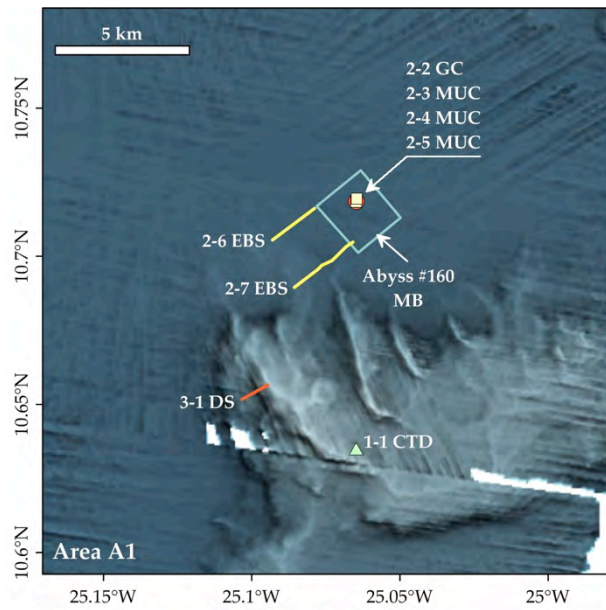


Figure 1: Maps of the areas of biological sampling and AUV deployment.

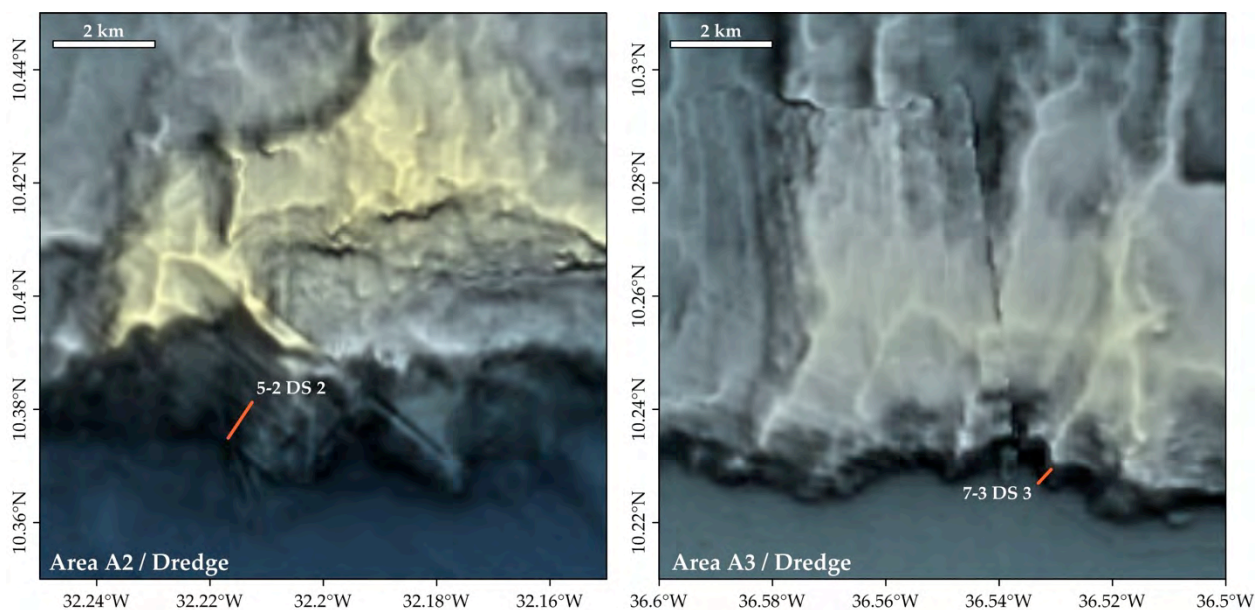


Figure 2: Maps of the dredge stations conducted away from the biological sampling spots.

This transit occurred with no major incidents, we arrived on station for the first MUC deployment in 8350m water depth at 20:00 on 18.01.15. At 8290m wire length (60m above bottom) problems with a pulley in the wire system (bolts in the axle had worked loose and broken) meant the station had to be abandoned and the MUC returned to deck at 0,3 m/s (7,5 hours!). The problem was solved within 3 hours by the engineers and the MUC was attempted once more. After 6 hours waiting, it returned empty. Another attempt was similarly fruitless but did return evidence for a very soft and sticky bottom sediment, which we were then able to sample with a subsequent MUC lowered extremely slowly into the sediment. We were able to recover 3 full MUCs then at this station and also deployed the EBS twice at depths of around 8350m, on the first deployment using the full working length of cable available on the ship (11.000m). During this deployment it became clear that the friction winch was at the limit of its lifting capacity and that it began to stall at around 100kN. For this reason, in consultation with the Captain and Chief Engineer, it was decided not to risk dredging at these depths as almost no tension at the seafloor would be available. The second deep station in the Puerto Rico Trough was completed on the evening of 23.01.15 and the ship moved to shallower water (ca. 5000m) for MUC and EBS deployments. These were completed at 15:00 on 25.01.15 at which time the ship began an 17-hour transit to Santo Domingo. The ship tied up in Santo Domingo on 26.01.15 at 08:00.

### Acknowledgements

We thank Capt. Meyer and his crew for the excellent support during the SO-237 cruise - it was as always a real pleasure to work with them. The cruise was financed through BMBF grant 03G0237A to A. Brandt (travel, transport, consumables) and through internal funds of Geomar (AUV-costs). The help of the German Embassies in Washington (Frau Weiss) and Santo Domingo

(Frau Weber) with acquiring permission to work in the Puerto Rico Trench is gratefully acknowledged.

## Cruise Participants

| Name                        | Discipline                       | Institution |
|-----------------------------|----------------------------------|-------------|
| Devey, Colin, Prof. Dr.     | Marine Geology / Chief Scientist | GEOMAR      |
| Arndt, Hartmut, Prof. Dr.   | Marine Microbiology              | U. Köln     |
| Augustin, Nico, Dr.         | Marine Geology/Bathymetry        | GEOMAR      |
| Bober, Simon                | Macrofauna                       | U. HH       |
| Borges, Valeska             | Meiofauna                        | U. HH       |
| Brandt, Angelika, Prof. Dr. | Meiofauna                        | U. HH       |
| Brenke, Nils, Dr.           | EBS Technics                     | U. HH       |
| Brix-Elsig, Saskia, Dr.     | Macrofauna/Isopoda               | DZMB, HH    |
| Elsner, Nikolaus            | Macrofauna/Isopoda               | U. HH       |
| Frutos, Inmaculada, Dr.     | Macrofauna/Isopoda               | U. HH       |
| Guggolz, Theresa            | Macrofauna/Polychaeta            | U. HH       |
| Heitland, Nele              | Macrofauna/Isopoda               | U. HH       |
| Jeuck, Alexandra            | Protists/Nanoflagellates         | U. Köln     |
| Klischies, Meike            | Marine Geology/Bathymetry        | GEOMAR      |
| Köhler, Janna               | Oceanography                     | U. HB       |
| Lejzerovicz, Franck         | Protists/Foraminifera            | U. Geneva   |
| Lins, Lidia                 | Nematodes                        | U. Ghent    |
| Linse, Katrin               | Macrofauna/Mollusca              | BAS         |
| Malytina, Marina            | Macrofauna/Isopoda               | IBM         |
| Metz, Dirk                  | Marine Geology/Bathymetry        | Oxon        |
| Minzlaff, Ulrike            | Macrofauna/Biochemistry          | U. HH       |
| Prauß, Dennis               | Microbiology                     | U. Köln     |
| Palgan, Dominik             | Marine Geology/Petrology         | GEOMAR      |
| Riehl, Torben               | Macrofauna/Isopoda               | U. HH       |
| Rothenbeck, Marcel          | AUV-Leitung                      | GEOMAR      |
| Schmidt, Christina          | Meiofauna                        | DZMB, WHV   |
| Schmidt, Christopher        | Marine Geology/Pore waters       | GEOMAR      |
| Schoenle, Alexandra         | Protists/Nanoflagellates         | U. Köln     |
| Schultze, Gudrun            | Biology Team                     | PTJ         |
| Schwabe, Enrico             | Macrofauna/Mollusca              | ZSM Munich  |
| Springer, Tanya             | Biology/Data management          | U. HH       |
| Steinführer, Anja           | AUV-Navigation                   | GEOMAR      |
| Triebe, Lars                | AUV-Technik                      | GEOMAR      |
| Voltski, Ivan               | Protists/Foraminifera            | U. Geneva   |
| Walter, Thomas              | Öffentlichkeitsarbeit            | U. HH.      |
| Wenzlaff, Emanuel           | AUV-Technik                      | GEOMAR      |
| Yeo, Isobel                 | Marine Geology/Bathymetry        | GEOMAR      |
| Zinnkann, Ann-Christine     | Macrofauna/Biochemistry          | U. HH       |
| Zoeller, Khalhela           | Marine Geology/Petrology         | U. Ottawa   |

GEOMAR: Helmholtz Centre for Ocean Research, Kiel, Germany

U. HH: Universität Hamburg, Centrum für Naturkunde,  
Zoologisches Museum Hamburg.

U. HB: Institute of Environmental Physics, University of Bremen,  
Germany

BAS: British Antarctic Survey, Cambridge, UK

U. Ottawa: University of Ottawa, Canada

Oxon: Department of Earth Sciences, University of Oxford, UK

PTJ: Projektträger Jülich, Warnemünde, Germany

ZSM Munich: Zoologische Staatssammlung München, Munich, Germany

U. Köln: Institute of Zoology, University of Cologne, Germany

U. Geneva: Department of Genetics and Evolution, University of  
Geneva, Switzerland

DZMB WHV: Deutsches Zentrum für Meeresbiologie, Wilhelmshaven

DZMB HH: Deutsches Zentrum für Meeresbiologie, Hamburg

U. Ghent: Marine Biology Department, University of Ghent, Belgium

IMB: A.V. Zhirmunsky Institute of Marine Biology FEB RAS,  
Vladivostok, Russia



## Station List

| Stat. No. | Date     | Time UTC | Latitude                    | Longitude     | Depth [m] | Wire Length [m] | Device       | Action                  |
|-----------|----------|----------|-----------------------------|---------------|-----------|-----------------|--------------|-------------------------|
|           |          |          | <i>* Posidonia position</i> |               |           |                 |              |                         |
| 1-1       | 18.12.14 | 19:56    | 10°38.06' N                 | 25°03.88' W   | 4790      | 4750            | CTD + MAPR   | Soundvelocity profile   |
| 2-1       | 19.12.14 | 8:49     | 10°43.25' N                 | 25°03.88' W   | 5461      | -               | AUV          | Launch Dive 160         |
| 2-2       | 19.12.14 | 11:15    | 10°43.11' N                 | 25°03.88' W   | 5507      | 5535            | GC + MAPR    | On/Off bottom           |
|           | 19.12.14 | 11:32    | 10°43.118' N                | 25°03.893' W  | -         | -               | Algae        | Sampling at sea surface |
| 2-3       | 19.12.14 | 15:08    | 10°43.112' N                | 25°03.886' W  | 5498      | 5561            | MUC + MAPR   | On/Off bottom           |
| 2-4       | 19.12.14 | 19:43    | 10°43.108' N                | 25°03.888' W  | 5517      | 5559            | MUC          | On/Off bottom           |
| 2-5       | 20.12.14 | 4:34     | 10°43.17' N                 | 25°03.88' W   | 5518      | 5553            | MUC          | On/Off bottom           |
| 2-6       | 20.12.14 | 11:09    | *10°42.330' N               | *25°05.580' W | 5520      | 8204            | EBS          | On bottom               |
| 2-6       | 20.12.14 | 12:18    | *10°42.969' N               | *25°04.728' W | 5520      | 6568            | EBS          | Off bottom              |
| 2-7       | 20.12.14 | 19:50    | *10°41.370' N               | *25°05.137' W | 5514      | 8200            | EBS          | On bottom               |
| 2-7       | 20.12.14 | 21:20    | *10°42.287' N               | *25°03.952' W | 5510      | 5725            | EBS          | Off bottom              |
| 3-1       | 21.12.14 | 3:30     | 10°39.00' N                 | 25°05.60' W   | 5144      | 5195            | DS           | On bottom               |
| 3-1       | 21.12.14 | 5:25     | 10°39.60' N                 | 25°05.30' W   | 4879      | 4871            | DS           | Off bottom              |
| 4-1       | 25.12.14 | 21:38    | 10°27.70' N                 | 31°01.60' W   | 5672      | -               | AUV          | Launch Dive 161         |
| 4-2       | 25.12.14 | 21:52    | 10°27.82' N                 | 31°01.64' W   | 5637      | 200             | Plankton-Net | On depth                |
| 4-3       | 26.12.14 | 3:06     | 10°25.11' N                 | 31°04.61' W   | 5771      | 5809            | MUC          | On/Off bottom           |
| 4-4       | 26.12.14 | 7:24     | 10°25.12' N                 | 31°04.62' W   | 5759      | 5813            | MUC + MAPR   | On/Off bottom           |
| 4-5       | 26.12.14 | 11:39    | 10°25.12' N                 | 31°04.62' W   | 5767      | 5814            | MUC          | On/Off bottom           |
|           | 26.12.14 | 12:16    | 10°25.114' N                | 31°4.617' W   | -         | -               | Algae        | Sampling at sea surface |
| 4-6       | 26.12.14 | 17:31    | 10°24.84' N                 | 31°04.54' W   | 5805      | 5857            | GC           | On/Off bottom           |
| 4-7       | 26.12.14 | 20:34    | 10°24.76' N                 | 31°04.53' W   | 5808      | -               | AUV          | Launch Dive 162         |
| 4-8       | 27.12.14 | 1:24     | *10°24.161' N               | *31°06.205' W | 5735      | 8200            | EBS          | On bottom               |
| 4-8       | 27.12.14 | 2:46     | *10°24.950' N               | *31°05.204' W | 5725      | 6080            | EBS          | Off bottom              |
| 4-9       | 27.12.14 | 8:33     | *10°24.082' N               | *31°04.795' W | 5735      | 8200            | EBS          | On bottom               |
| 4-9       | 27.12.14 | 10:52    | *10°24.589' N               | *31°04.247' W | 5733      | 6050            | EBS          | Off bottom              |
|           | 28.12.14 | 16:58    | 10°24.481' N                | 31°5.318' W   | -         | -               | Algae        | Sampling at sea surface |
| 4-10      | 28.12.14 | 17:52    | 10°27.48' N                 | 31°05.31' W   | 5814      | 5857            | GC + MAPR    | On/Off bottom           |
| 4-11      | 28.12.14 | 20:11    | 10°24.48' N                 | 31°05.32' W   | 5820      | 300             | CTD          | Casting Depth of 300 m  |
| 5-1       | 29.12.14 | 6:15     | 10°22.515' N                | 32°12.987' N  | 5455      | 5584,3          | DS           | On bottom               |
| 5-1       | 29.12.14 | 9:30     | 10°22.874' N                | 32°12.755' N  | 5004      | 4967            | DS           | Off bottom              |
| 6-1       | 01.01.15 | 19:25    | 10°21.01' N                 | 36°57.58' W   | 5138      | 5178            | MUC          | On/Off bottom           |
| 6-2       | 01.01.15 | 21:20    | 10°20.998' N                | 36°57.616' W  | 5136      | -               | AUV          | Launch Dive 163         |
| 6-3       | 01.01.15 | 23:37    | 10°21.03' N                 | 36°57.59' W   | 5138      | 5180            | MUC + MAPR   | On/Off bottom           |
| 6-4       | 02.01.15 | 3:30     | 10°21.03' N                 | 36°57.61' W   | 5134      | 5182            | MUC + MAPR   | On/Off bottom           |
| 6-5       | 02.01.15 | 7:09     | 10°21.03' N                 | 36°57.61' W   | 5137      | 5178            | MUC + MAPR   | On/Off bottom           |
| 6-6       | 02.01.15 | 10:48    | 10°21.02' N                 | 36°57.60' W   | 5135      | 5177            | GC + MAPR    | On/Off bottom           |
| 6-7       | 02.01.15 | 17:49    | *10°20.659' N               | *36°57.010' W | 5085      | 7500            | EBS          | On bottom               |
| 6-7       | 02.01.15 | 19:15    | *10°21.547' N               | *36°55.585' W | 5079      | 5600            | EBS          | Off bottom              |
| 6-8       | 02.01.15 | 2:12     | *10°21.542' N               | *36°57.236' W | 5119      | 7100            | EBS          | On bottom               |

|      |          |       |               |               |      |      |              |                         |
|------|----------|-------|---------------|---------------|------|------|--------------|-------------------------|
| 6-8  | 02.01.15 | 3:20  | *10°22.293' N | *36°55.852' W | 5127 | 5400 | EBS          | Off bottom              |
| 7-1  | 03.01.15 | 13:17 | 10°13.62' N   | 36°31.96' W   | 5063 | 5102 | DS           | On bottom               |
|      | 03.01.15 | 14:54 | 10°14.161' N  | 36°31.615' W  | -    | -    | Algae        | Sampling at sea surface |
| 7-1  | 03.01.15 | 15:50 | 10°13.763' N  | 36°31.81' W   | 4760 | 4490 | DS           | Off bottom              |
| 8-1  | 06.01.15 | 05:04 | 10° 43.60' N  | 42° 40.99' W  | 5184 | -    | AUV          | Transponder 1 to water  |
| 8-1  | 06.01.15 | 05:54 | 10° 43.58' N  | 42° 41.92' W  | 5183 | -    | AUV          | Transponder 2 to water  |
| 8-2  | 06.01.15 | 8:08  | 10°43.56' N   | 42°41.59' W   | 5183 | 5239 | MUC          | On/Off bottom           |
| 8-3  | 06.01.15 | 11:38 | 10°43.56' N   | 42°41.59' W   | 5182 | 200  | Plankton-Net | At depth                |
| 8-4  | 06.01.15 | 19:01 | 10°43.00' N   | 42°39.91' W   | 5176 | 7500 | EBS          | On bottom               |
| 8-4  | 06.01.15 | 20:18 | 10°43.00' N   | 42°39.73' W   | 5178 | 5450 | EBS          | Off bottom              |
| 8-5  | 06.01.15 | 0:50  | 10°43.55' N   | 42°41.59' W   | 5183 | 5243 | MUC + MAPR   |                         |
| 8-6  | 07.01.15 | 4:37  | 10°43.54' N   | 42°41.58' W   | 5180 | 5200 | MUC          |                         |
| 8-7  | 07.01.15 | 8:40  | 10°44.62' N   | 42°41.58' W   | 5185 | 5226 | MUC          |                         |
| 8-8  | 07.01.15 | 14:35 | *10°42.263' N | *42°42.343' W | 5110 | 5100 | CTD + MAPR   | Tow-Yo-Start            |
| 8-8  | 07.01.15 | 20:22 | *10°42.792' N | *42°40.264' W | 5170 | 5160 | CTD + MAPR   | Tow-Yo-End              |
| 8-9  | 08.01.15 | 0:35  | 10°43.67' N   | 42°41.75' W   | 5141 | 5206 | GC + MAPR    | On/Off bottom           |
| 8-10 | 08.01.15 | 7:10  | 10°42.58' N   | 42°40.99' W   | 5117 | 5167 | MUC          | On/Off bottom           |
| 8-11 | 08.01.15 | 10:49 | 10°42.59' N   | 42°40.99' W   | 5122 | 5162 | MUC          | On/Off bottom           |
| 8-12 | 08.01.15 | 15:13 | 10°42.79' N   | 42°41.76' W   | 5176 | 5213 | GC + MAPR    | On/Off bottom           |
|      | 08.01.15 | 19:10 | 10°42.645' N  | 42°41.893' W  | -    | -    | Algae        | Sampling at sea surface |
| 9-1  | 11.01.15 | 6:23  | 11°42.58' N   | 47°59.07' W   | 4974 | -    | AUV          | Launch Dive 164         |
| 9-2  | 11.01.15 | 10:38 | *11°40.299' N | *48°00.071' W | 4995 | 7100 | EBS          | On bottom               |
| 9-2  | 11.01.15 | 14:45 | *11°40.410' N | *47°59.565' W | 4986 | 4870 | EBS          | Off bottom              |
| 9-3  | 11.01.15 | 19:34 | 11°41.37' N   | 47°57.36' W   | 4996 | 5051 | MUC + MAPR   | On/Off bottom           |
| 9-4  | 11.01.15 | 0:31  | 11°41.36' N   | 47°57.34' W   | 5000 | 5050 | MUC + MAPR   | On/Off bottom           |
|      | 12.01.15 | 00:51 | 11°41.357' N  | 47°57.334' W  | -    | -    | Algae        | Sampling at sea surface |
| 9-5  | 12.01.15 | 4:23  | 11°41.35' N   | 47°57.36' W   | 4997 | 5017 | MUC          | On/Off bottom           |
| 9-6  | 12.01.15 | 7:14  | 11°42.58' N   | 47°59.07' W   | 4977 | -    | AUV          | Launch Dive 165         |
| 9-7  | 12.01.15 | 11:17 | 11°32.00' N   | 47°51.64' W   | 4941 | 4955 | GC + MAPR    | On/Off bottom           |
| 9-8  | 12.01.15 | 17:33 | *11°39.014' N | *47°56.168' W | 5004 | 5460 | EBS          | On bottom               |
| 9-8  | 12.01.15 | 19:29 | *11°39.201' N | *47°54.697' W | 5001 | 5260 | EBS          | Off bottom              |
| 10-1 | 13.01.15 | 3:49  | 11°39.96' N   | 48°20.89' W   | 4236 | 4307 | DS           | On bottom               |
| 10-1 | 13.01.15 | 6:10  | 11°40.44' N   | 48°19.56' W   | 3625 | 3625 | DS           | Off bottom              |
| 11-1 | 14.01.15 | 00:00 | *12°05.732' N | *50°30.239' W | 5093 | 5721 | EBS          | On bottom               |
| 11-1 | 14.01.15 | 10:34 | *12°05.727' N | *50°28.922' W | 5088 | 5400 | EBS          | Off bottom              |
| 11-2 | 14.01.15 | 11:47 | 12°05.80' N   | 50°27.96' W   | -    | -    | Plankton-Net | In Water                |
| 11-2 | 14.01.15 | 12:23 | 12°05.92' N   | 50°28.01' W   | -    | -    | Plankton-Net | On deck                 |
| 11-3 | 14.01.15 | 13:57 | 12°05.99' N   | 50°28.4' W    | 5093 | -    | AUV          | Launch Dive 166         |
| 11-4 | 14.01.15 | 17:27 | *12°04.753' N | *50°30.348' W | 5130 | 5770 | EBS          | On bottom               |
| 11-4 | 14.01.15 | 19:03 | *12°04.791' N | *50°29.114' W | 5108 | 5460 | EBS          | Off bottom              |
| 11-5 | 14.01.15 | 23:19 | 12°05.40' N   | 50°26.98' W   | 5091 | 5145 | MUC          | On/Off bottom           |
| 11-6 | 15.01.15 | 3:03  | 12°05.42' N   | 50°26.98' W   | 5090 | 5115 | MUC          | On/Off bottom           |
| 11-7 | 15.01.15 | 6:38  | 12°05.40' N   | 50°26.97' W   | 5090 | 5142 | MUC          | On/Off bottom           |
|      | 19.01.15 | 00:54 | 19°43.400' N  | 67°8.010' W   | -    | -    | Algae        | Sampling at sea surface |
| 12-1 | 19.01.15 | 17:15 | 19°46.01' N   | 66°49.99' W   | 8346 | 8414 | MUC + MAPR   | On/Off bottom           |

|       |          |       |               |               |      |      |              |               |
|-------|----------|-------|---------------|---------------|------|------|--------------|---------------|
| 12-2  | 19.01.15 | 23:36 | 19°46.02' N   | 66°49.00' W   | 8337 | 8428 | MUC          | On/Off bottom |
| 12-3  | 20.01.15 | 6:13  | 19°46.01' N   | 66°50.00' W   | 8336 | 8404 | MUC          | On/Off bottom |
| 12-4  | 20.01.15 | 12:14 | 19°50.20' N   | 66°50.30' W   | 8323 | 8404 | GC           | On/Off bottom |
| 12-5  | 20.01.15 | 20:40 | 19°49.50' N   | 66°50.97' W   | 8339 | 8964 | EBS          | On bottom     |
| 12-5  | 20.01.15 | 22:54 | 19°46.85' N   | 66°49.99' W   | 8338 | 8845 | EBS          | Off bottom    |
| 12-6  | 21.01.15 | 07:19 | 19°48.49' N   | 66°45.44' W   | 8340 | 9470 | EBS          | On bottom     |
| 12-6  | 21.01.15 | 08:19 | 19°48.60' N   | 66°45.12' W   | 8336 | 9208 | EBS          | Off bottom    |
| 12-7  | 21.01.15 | 15:58 | 19° 46.00' N  | 66° 49.99' W  | 8338 | 8407 | MUC          | On/Off bottom |
| 12-8  | 21.01.15 | 21:49 | 19° 46.00' N  | 66° 49.99' W  | 8340 | 8421 | MUC          | On/Off bottom |
| 12-9  | 22.01.15 | 00:56 | 19° 46.01' N  | 66° 49.99' W  | 8338 | 200  | Plancton-Net | At depth      |
| 12-10 | 22.01.15 | 05:02 | 19° 48.81' N  | 66° 58.39' W  | 8317 | 8403 | GC           | On/Off bottom |
| 13-1  | 22.01.15 | 11:57 | 19°43.809' N  | 67°09.284' W  | 8352 | 8430 | MUC          | On/Off bottom |
| 13-2  | 22.01.15 | 17:56 | 19°43.812' N  | 67°09.284' W  | 8350 | 8430 | MUC          | On/Off bottom |
| 13-3  | 22.01.15 | 23:26 | 19°43.817' N  | 67°09.285' W  | 8350 | 8428 | MUC          | On/Off bottom |
| 13-4  | 23.01.15 | 06:47 | 19°46.73' N   | 67°06.21' W   | 8329 | 9261 | EBS          | On bottom     |
| 13-4  | 23.01.15 | 08:07 | 19°47.13' N   | 67°05.79' W   | 8316 | 9050 | EBS          | Off bottom    |
| 13-5  | 23.01.15 | 15:49 | 19°49.85' N   | 67°02.91' W   | 8082 | 9157 | EBS          | On bottom     |
| 13-5  | 23.01.15 | 16:52 | 19°50.14' N   | 67°02.60' W   | 8043 | 8853 | EBS          | Off bottom    |
| 13-6  | 23.01.15 | 23:45 | 19°48.63' N   | 66°58.43' W   | 8322 | 8399 | GC           | On/Off bottom |
| 14-1  | 24.01.15 | 18:42 | *19°00.760' N | *67°10.219' W | 4552 | 5111 | EBS          | On bottom     |
| 14-1  | 24.01.15 | 19:55 | *19°01.373' N | *67°09.776' W | 4552 | 5156 | EBS          | Off bottom    |
| 14-2  | 25.01.15 | 0:34  | *19°03.044' N | *67°08.650' W | 4930 | 5490 | EBS          | On bottom     |
| 14-2  | 25.01.15 | 1:57  | *19°03.877' N | *67°08.100' W | 4925 | 5181 | EBS          | Off bottom    |
| 14-3  | 25.01.15 | 6:11  | 19°04.68' N   | 67°07.77' W   | 4925 | 4996 | MUC          | On/Off bottom |
| 14-4  | 25.01.15 | 9:38  | 19°04.66' N   | 67°07.75' W   | 4925 | 4969 | MUC          | On/Off bottom |
| 14-5  | 25.01.15 | 13:00 | 19°04.66' N   | 67°07.76' W   | 4925 | 4992 | MUC          | On/Off bottom |

EBS - Epibenthos-Sled

MUC - Multicorer

GC - Gravity Corer (5m)

MAPR - Miniature Autonomous Plume Recorders

AUV - Autonomous Underwater Vehicle (ABYSS, Geomar)

DS - Chain bag dredge