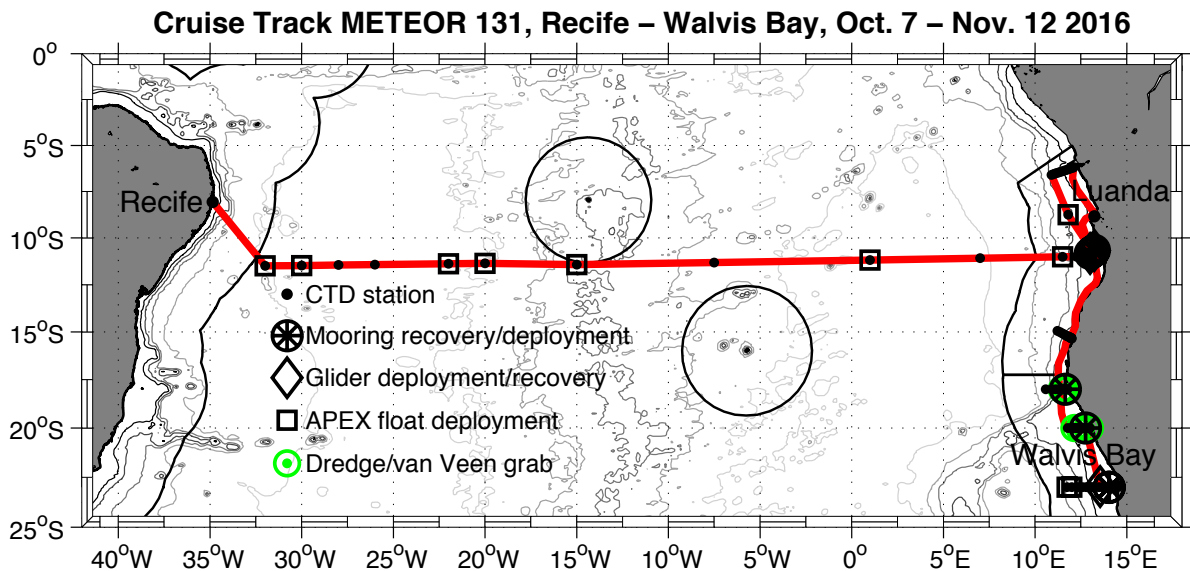


Prof. Dr. Peter Brandt  
GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel  
Dienstgebäude Westufer  
Düsternbrooker Weg 20, Raum B14  
D-24105 Kiel  
Germany

Tel.: +49 (0)431 600 4105  
Fax: +49 (0)431 600 4102  
E-Mail: pbrandt@geomar.de

**Short Cruise Report**  
**R/V METEOR M131 Recife – Walvis Bay**  
**7<sup>th</sup> October – 12<sup>th</sup> November 2016**  
**Chief Scientist: Prof. Dr. Peter Brandt**  
**Captain: Rainer Hammacher**



*Bathymetric map with ship track of R/V METEOR cruise M131, including locations of CTD stations, mooring recoveries and deployments, glider and Argo float deployments and dredge/ van Veen grab stations. Black solid lines mark exclusive economic zones of Brazil, Ascension, Saint Helena, Angola and Namibia.*

## **Objectives**

During R/V METEOR cruise M131 a physical oceanography research program with a biogeochemical component was carried out in the eastern boundary upwelling region off Angola and Namibia. The program is an integral component of the EU collaborative project PREFACE (“Enhancing prediction of tropical Atlantic climate and its impacts”) and the BMBF collaborative project SACUS (“Southwest African Coastal Upwelling System and Benguela Niños”). The major aim of the cruise was (1) to determine the variability of eastern boundary current transport, water masses variability and wave propagation along the coastal wave guide; (2) to quantify the physical processes controlling the mixed-layer heat and freshwater budgets in the eastern boundary region, including the loss of heat due to turbulent

mixing; and (3) to investigate the upper-ocean water mass variability associated with the variability of the meridional overturning circulation along a transatlantic transect at about 11°S. Altogether, five moorings with instrumentation observing the variability of currents, hydrography and oxygen along the continental margin of Angola and Namibia were successfully recovered (while two additional moorings could not be recovered) and six moorings were deployed (two short-term moorings were deployed and recovered). Seven high-resolution hydrographic and microstructure sections that included oxygen, nutrient, turbidity and particle measurements across selected international repeat-lines in the eastern boundary current system were successfully completed, advancing the understanding of seasonal and interannual variability of hydrography, mixed-layer properties and diapycnal heat flux. At two of these sections, autonomous measurement platforms (gliders) with microstructure probes and/or nutrient sensors were deployed sampling the sections at very high resolution for a period of up to six days. A high-resolution transatlantic hydrographic section was successfully completed using an underway sampling system. The observational program was complemented by sampling the sediment, measurements of the size distribution of aerosols and echosounder measurements of zooplankton.

## **Narrative**

R/V METEOR departed from Recife on October 7, 2016 at 9:30 and headed southeast toward the starting point of our transatlantic measurements at 11°30'S, 32°W outside the exclusive economic zone (EEZ) of Brazil. Port stops in Recife are often used by our groups, together with our scientific partners from the Universidade Federal de Pernambuco in Recife, to hold joint scientific colloquiums aimed at enhancing the scientific and technical exchange between students, scientists and technicians. This year, on October 5, we had already the fifth seminar of the Bilateral Cooperation DOCEAN (Departamento de Oceanografia) – GEOMAR. This time the German Consul General Maria Könning-De Siqueira Regueira participated. She welcomed the scientists and stressed the importance of the visit of the German RV METEOR in Recife. She stated that „science is a fundamental pillar of the cooperation between Brazil and Germany“.

The measurements along the ~11°S section across the basin encompasses measurements with the Underway CTD (UCTD) system, shipboard ADCP measurements using the 75kHz and the 38kHz Ocean Surveyors aboard Meteor, and additional CTD stations for calibration of the UCTD probes. The CTD system includes an upward and downward looking lowered ADCP (LADCP) and an Underwater Vision Profiler (UVP). During the transit seven Argo floats provided by the BSH (Bundesamt für Seeschifffahrt und Hydrographie, Federal Maritime and Hydrographic Agency) were deployed within the German Argo program. The UCTD worked very well and we were able to acquire hydrographic data in the upper 400 m with 1 hour resolution across the entire basin. On October 20, the ~11°S section was completed when we reached our eastern boundary mooring array consisting of three moorings that were installed during Meteor cruise M120. Early in the morning of October 21, we started the mooring service with the successful recovery of a mooring equipped with an 75kHz Longranger ADCP. At the same location we deployed a glider with a SUNA nutrient sensor on its mission along a cross-shelf section at about 11°S. Still before lunch, we arrived at the second mooring

position equipped with 4 MicroCATs and 4 oxygen loggers. We received a signal from the release, but later on, using triangulation, located the release about 2 km from the deployment position. Upon sending the release command, the release remained at the bottom, suggesting that the mooring wire was broken above the release, very likely due to strong fishing activities in the region. As this was already the second mooring loss, we decide not to redeploy this mooring at the shelf break. The third mooring was a bottom shield equipped with a 75kHz Longranger ADCP. However, we were not able to receive an answer from the release installed in the bottom shield and we decided not to send a release command as we wanted to use the rest of the daylight for the deployment of two additional gliders. Both gliders were equipped with MicroRider probes to measure turbulent mixing. One glider was sent on mission along the same cross-shelf section, the other glider was put in a mooring mode profiling repeatedly between positions at about 200m water depths. All three gliders were planned to be recovered 6 days later, after our return from our measurements at about 6°S. In between the mooring locations and toward the shallowest station on the shelf, we used another Underway CTD system, called RapidCast that was delivered by Oceanscience, San Diego, USA for testing. With the RapidCast system we acquired hydrographic profiles down to 125m in a fast repeat mode with a temporal resolution of about 5 min (up to 2 min in shallower water on the shelf). During the night, the first measurements using the ScanFish system were performed from the shallow station on the shelf across the shelf break. The ScanFish worked very well and delivered temperature, salinity, oxygen, chlorophyll and turbidity data from the upper 100 m of the ocean showing strong variability associated with internal waves.

After finishing the measurements at 11°S, Meteor headed north towards our northernmost study area located in the vicinity of the Congo river mouth at about 6°S. During the transit, measurements with the RapidCast system were performed and another Argo float was deployed. The bearing of the UCTD winch drum failed and could not be repaired on board. Later we switched to our second UCTD system provided by the University of Hamburg. The 6°S section was surveyed within 25 hours on October 23 and 24. The measurements comprise 13 CTD-O<sub>2</sub>/LADCP/UVP and 13 shipboard microstructure stations. On October 25, at 8:00 we arrived in Luanda for a port stop which was organized during the days prior with great help of the German embassy in Luanda and our partner institute INIP (Instituto Nacional de Investigação Pesqueira Republica de Angola). A reception aboard RV Meteor was very well received in Luanda, including the visit of two ministers, the Minister of Fisheries and the Minister of Science. The interest by the media was very large with several interviews for television and newspapers. Overall, the reception can be regarded as a great success, strengthening the good relations between Angola and Germany in the field of ocean research. On October 26, we left the port of Luanda and headed south to the 11°S section to continue the measurements started 6 day before. The first glider was recovered on October 27, at 1:50 without problems. Reaching the position of the bottom shield that was so far not recovered, we tried to acoustically release it. However, we obtained no return signal and the shield did not come to the surface. The shield must be regarded as lost. We still decided to deploy a new shield nearby. However, this time we used an additional bottom line that could be dredged in case the release does not work with the shield still in place. After recovery of the second

glider, the subsurface mooring with a Longranger ADCP was deployed at same position where we had recovered a similar mooring 6 days before. After the end of the mooring work along 11°S, we started the hydrographic section with 14 CTD-O<sub>2</sub>/LADCP/UVP and 14 shipboard microstructure stations. The last glider was successfully recovered almost at the end of the section ending the glider swarm measurements at 11°S.

From 11°S to 15°S, we closely followed the 500m depth contour to produce an along shelf hydrographic section using the two UCTD systems aboard that will stretch from about 10°S to 20°S across the Angola Benguela Frontal Zone (ABFZ). On October 30, we reached the 15°S section and, within about 34 hours, took 15 CTD-O<sub>2</sub>/LADCP/UVP and 15 shipboard microstructure stations. After completing the 15°S section, we returned to the 500m depth contour and continued the along-shelf section with UCTD measurements and microstructure stations every 15 minutes in latitude.

On November 2<sup>nd</sup>, a bottom shield with an ADCP and MicroCAT was successfully recovered at the 18°S section. Subsequently, a new shield was deployed at the same location. Along the 18°S section, 11 CTD-O<sub>2</sub>/LADCP/UVP and 11 shipboard microstructure stations were taken. At this section also the first samples with the van Veen grab were taken. Unfortunately the dredge for bottom sediment sampling was lost during first use because of a broken wire. The use of the second dredge aboard METEOR was postponed to the 20°S section. After completing the 18°S section, measurements with the UCTD and RapidCast system were conducted approximately along the 500m depth contour.

On November 4<sup>th</sup>, the work at the 20°S section started with the successful recovery of a similar bottom shield as was deployed at 18°S. It was followed by the deployment of a short-term mooring. The measurement program along 20°S consist again of CTD and microstructure stations as well as sediment sampling with the van Veen grab and the dredge. Due to strong swell and wind waves, few of the stations planned in deeper waters farther offshore were omitted. Use of the ScanFish on November 5<sup>th</sup> had to be stopped because of the failure of few sensors. On November 6, an almost full day of measurements with the shipboard microstructure probe was obtained to observe the short-term variability of mixing activity on the shelf. Finally, on November 7, the short-term mooring was recovered and the new bottom shield deployed. After a short test with the ScanFish, Meteor headed to the last section at 23°S off Walvis Bay.

On November 8, a glider with a MicroRider system was deployed. This glider will be recovered at the beginning of the next METEOR cruise from Walvis Bay to Cape Town. Following the glider deployment, two moorings, one with a sediment trap, were recovered successfully. The sediment trap sampled sinking particles at about monthly resolution. At the mooring position another short-term mooring was deployed to be recovered before heading to the port of Walvis Bay. Along the 23°S section, 18 CTD-O<sub>2</sub>/LADCP/UVP and 14 shipboard microstructure stations were taken. On the way back across the shelf break toward the coast, the ScanFish was used, starting in the evening of November 10. This section ended on the shelf close to the mooring locations. Here the short-term mooring was recovered and the other two moorings were deployed for the next mooring period finishing the scientific program of METEOR cruise M131.

The ship arrived at the port of Walvis Bay, Namibia on November 12, 2016 at 6:00.

## **Acknowledgements**

We greatly appreciate the cooperative working atmosphere as well as the professionalism and seamanship of crew, officers and Captain of R/V METEOR who made this work a success. The ship time of METEOR was provided by the German Science Foundation (DFG) within the core program METEOR/MERIAN. Financial support was provided by the German Federal Ministry of Education and Research as part of the SACUS project (03G0837A), and by the European Union 7th Framework Programme (FP7 417 2007–2013) under grant agreement 603521 PREFACE project.

## Participants M131

|    |                                       |                                  |           |
|----|---------------------------------------|----------------------------------|-----------|
| 1  | Brandt, Peter, Prof. Dr.              | Chief Scientist                  | GEOMAR    |
| 2  | Begler, Christian                     | Glider, moorings, UCTD           | GEOMAR    |
| 3  | Beier, Sebastian                      | Moorings, MSS, technique         | IOW       |
| 4  | Canganjo, Enoque                      | CTD watch, ADCP                  | INIP      |
| 5  | Coelho, Paulo                         | CTD watch, ADCP                  | INIP      |
| 6  | dos Santos Canjongo Saquenha, Eridson | CTD watch, ADCP                  | INIP      |
| 7  | Hamm, Thea                            | Oxygen, Winkler                  | GEOMAR    |
| 8  | Herrford, Josefine                    | CTD, salinometer                 | GEOMAR    |
| 9  | Imbol Koungue, Rodrigue Anicet        | CTD watch, moorings              | UCT       |
| 10 | Kamwi, Blessing                       | CTD watch, ADCP processing       | NatMIRC   |
| 11 | Köhn, Eike                            | CTD watch, Suna, LADCP           | GEOMAR    |
| 12 | Kopte, Robert                         | CTD, ADCP, MicroRider            | GEOMAR    |
| 13 | Metcalf, Megan                        | CTD watch, salinometer           | GEOMAR    |
| 14 | Mohrholz, Volker                      | Moorings, MSS                    | IOW       |
| 15 | Müller, Mario                         | Moorings, computer, UCTD, glider | GEOMAR    |
| 16 | Nielsen, Martina                      | Logistics, moorings, CTD watch   | GEOMAR    |
| 17 | Ostrowski, Marek                      | Echolot                          | IMR       |
| 18 | Pohl, Frank                           | Benthos, MSS, moorings           | IOW       |
| 19 | Raeke, Andreas                        | Meteorology                      | DWD       |
| 20 | Schmidt, Martin                       | CTD watch, MSS                   | IOW       |
| 21 | Schuffenhauer, Ingo                   | CTD watch, MSS, moorings         | IOW       |
| 22 | Thomsen, Sören                        | UCTD, thermosal, glider          | GEOMAR    |
| 23 | Vogel, Raphaela                       | Aerosol, Oxygen                  | MPIM      |
| 24 | von Neuhoff, Stephanie                | Media                            | Freelance |
| 25 | Vorrath, Elena                        | Moorings, nutrients, CTD watch   | UHH       |
| 26 | Wiese, Hannah                         | 2 CTD watch, CTD, thermosal      | GEOMAR    |

**DWD** Deutscher Wetterdienst, Seeschiffahrtsberatung, Bernhard-Nocht-Straße 76, 20359 Hamburg, Germany, <http://www.dwd.de>

**GEOMAR** Helmholtz-Zentrum für Ozeanforschung Kiel, Düsternbrooker Weg 20, 24105 Kiel, Germany, <http://www.geomar.de/>

**IMR** Institute of Marine Research, Department Oceanography, Nordnesgaten 50, 5817 Bergen, Norway, <http://www.imr.no/en>

**INIP** Instituto Nacional de Investigacao Pesqueira, Rua Mortala Mohamed, Ilha do Cabo, PO Box 260, Luanda, Angola, <http://preface.b.uib.no/about/project-partners/inip/>

**IOW** Leibniz-Institut für Ostseeforschung, Warnemünde Seestraße 15, 18119 Rostock, Germany, <http://www.io-warnemuende.de/>

**MFMR** Ministry of Fisheries and Marine Resources, National Marine Information and Research Center (NatMIRC) Oceanography and

Chemistry Department, Strand Street, Box 912, Swakopmund,  
Namibia, <http://www.mfmr.gov.na/>

**MPIM**

Max-Planck-Institut für Meteorologie, Bundesstrasse 53, 20146  
Hamburg, Germany, <http://www.mpimet.mpg.de/mpimet-startseite/>

**UCT**

University of Cape Town, Department of Oceanography, RW James  
Building, University Avenue, Rondebosch, 7701, South Africa,  
<http://www.ma-re.uct.ac.za>

**UHH**

Universität Hamburg, Zentrum für Erdsystemforschung und  
Nachhaltigkeit, Institut für Geologie, Abteilung Biogeochemie,  
Bundesstraße 55, 20146 Hamburg

**Tab. 1.1:** Station list of R/V METEOR cruise M131.

| Station No. M119<br>Ship/Science |         | Latitude   | Longitude  | Time               | Work                                 |
|----------------------------------|---------|------------|------------|--------------------|--------------------------------------|
| 1162                             | CTD_1   | 11°30'S    | 32°00'W    | 08.10. 11:26-12:43 | CTD station (2000m)                  |
| 1163                             | Argo_1  | 11°30'S    | 32°00'W    | 08.10. 12:55       | FLOAT deployment (WMO #3901842)      |
| 1164                             | UCTD    | 11°30'S    | 32°00'W    | 08.10. 13:02       | Underway-CTD (every 1h)              |
| 1165                             | CTD_2   | 11°29'S    | 30°00'W    | 09.10. 02:20-05:27 | CTD station (bottom)                 |
| 1166                             | Argo_2  | 11°29'S    | 30°00'W    | 09.10. 05:39       | FLOAT deployment (WMO #3901843)      |
| 1167                             | UCTD    | 11°29'S    | 30°00'W    | 09.10. 06:00       | Underway-CTD (every 1h)              |
| 1168                             | CTD_3   | 11°27'S    | 28°00'W    | 09.10. 17:53-21:33 | CTD station (bottom)                 |
| 1169                             | UCTD    | 11°27'S    | 28°00'W    | 09.10. 21:49       | Underway-CTD (every 1h)              |
| 1170                             | CTD_4   | 11°26'S    | 26°00'W    | 10.10. 11:11-14:54 | CTD station (bottom)                 |
| 1171                             | UCTD    | 11°26'S    | 26°00'W    | 10.10. 15:12       | Underway-CTD (every 1h)              |
| 1172                             | CTD_5   | 11°23'S    | 22°00'W    | 11.10. 15:54-17:09 | CTD station (2000m)                  |
| 1173                             | Argo_3  | 11°23'S    | 22°00'W    | 11.10. 17:26       | FLOAT deployment (WMO #3901867)      |
| 1174                             | UCTD    | 11°23'S    | 22°00'W    | 11.10. 18:00       | Underway-CTD (every 1h)              |
| 1175                             | CTD_6   | 11°22'S    | 20°00'W    | 12.10. 05:36-06:51 | CTD station (2000m)                  |
| 1176                             | Argo_4  | 11°22'S    | 20°00'W    | 12.10. 07:01       | FLOAT deployment (WMO #3901868)      |
| 1177                             | UCTD    | 11°22'S    | 20°00'W    | 12.10. 07:17       | Underway-CTD (every 1h)              |
| 1178                             | CTD_7   | 11°26'S    | 15°00'W    | 13.10. 15:35-16:50 | CTD station (2000m)                  |
| 1179                             | Argo_5  | 11°26'S    | 15°00'W    | 13.10. 17:13       | FLOAT deployment (WMO #3901844)      |
| 1180                             | UCTD    | 11°26'S    | 15°00'W    | 13.10. 17:22       | Underway-CTD (every 1h)              |
| 1181                             | CTD_8   | 11°19'S    | 07°30'W    | 15.10. 19:24-19:52 | CTD station (500m)                   |
| 1182/3                           | UCTD    | 11°19'S    | 07°30'W    | 15.10. 20:08       | Underway-CTD and Rapid Cast          |
| 1184                             | CTD_9   | 11°11'S    | 01°00'E    | 17.10. 21:40-22:59 | CTD station (2000m)                  |
| 1185                             | Argo_6  | 11°11'S    | 01°00'E    | 18.10. 23:05       | FLOAT deployment (WMO #3901866)      |
| 1186/7                           | UCTD    | 11°11'S    | 01°00'E    | 18.10. 23:14       | Underway-CTD and Rapid Cast          |
| 1188                             | CTD_10  | 11°05'S    | 07°00'E    | 19.10. 10:00-10:45 | CTD station (700m)                   |
| 1189                             | UCTD    | 11°05'S    | 07°00'E    | 19.10. 11:02       | Underway-CTD and Rapid Cast          |
| 1190                             | CTD_11  | 11°01'S    | 11°30'E    | 20.10. 12:15-14:41 | CTD station (~3500m/bottom)          |
| 1191                             | Argo_7  | 11°01'S    | 11°30'E    | 20.10. 14:53       | FLOAT deployment (WMO #3901846)      |
| 1192                             | UCTD    | 11°01'S    | 11°30'E    | 20.10. 15:07       | Underway-CTD (every 1h)              |
| 1193                             | CTD_12  | 11°00'S    | 12°15'E    | 20.10. 19:06-20:24 | CTD station (~1590m/bottom)          |
| 1194                             | UCTD    | 11°00'S    | 12°15'E    | 20.10. 20:37       | Underway-CTD and Rapid Cast          |
| 1195                             | KPO1153 | 10°50.00'S | 13°00.01'E | 21.10. 05:50-07:25 | Mooring recovery                     |
| 1196                             | Ifm13   | 10°50.06'S | 13°00.1'E  | 21.10. 08:37-09:33 | Glider deployment                    |
| 1197                             | UCTD    | 10°50.06'S | 13°00.1'E  | 21.10. 09:45       | Rapid Cast                           |
| 1198                             | KPO1151 | 10°42.13'S | 13°11.83'E | 21.10. 14:00       | Mooring (releases at bottom located, |



|      |         |            |            |                    |   |
|------|---------|------------|------------|--------------------|---|
|      |         |            |            |                    | mooring not recovered)  |
| 1199 | KPO1152 | 10°42.57'S | 13°11.13'E | 21.10. 14:42-16:00 | <b>Mooring</b> (no response from releases, not released so far)                       |
| 1200 | Ifm03   | 10°42.13'S | 13°11.83'E | 21.10. 16:48-17:32 | <b>Glider</b> deployment  |
| 1201 | Ifm09   | 10°42.13'S | 13°11.83'E | 21.10. 17:51-18:23 | <b>Glider</b> deployment  |
| 1199 | KPO1152 | 10°42.57'S | 13°11.13'E | 21.10. 20:50-21:15 | <b>Mooring</b> (no response from releases, not released so far)                       |
| 1202 | UCTD    | 10°42'S    | 13°11'E    | 21.10. 21:47       | <b>Rapid Cast</b>   |
| 1203 | SCF_1   | 10°28.3'S  | 13°26.6'E  | 21.10. 00:10-04:21 | <b>ScanFish</b> (Start at 40m depth at 6kn speed) and <b>echosounder measurements</b> |
| 1204 | UCTD    | 10°42'S    | 13°07'E    | 22.10. 04:32       | <b>Underway-CTD and Rapid Cast</b>  |
| 1205 | CTD_13  | 08°45'S    | 11°48'E    | 22.10. 18:26-19:53 | <b>CTD</b> station (2000m)  |
| 1206 | Argo_8  | 08°45'S    | 11°48'E    | 22.10. 20:02       | <b>FLOAT</b> deployment (WMO #3901847)  |
| 1207 | UCTD    | 08°45'S    | 11°48'E    | 22.10. 20:11       | <b>Underway-CTD and Rapid Cast</b>  |
| 1208 | CTD_14  | 06°36'S    | 10°54'E    | 23.10. 08:46-10:01 | <b>CTD</b> station (1613m/bottom)   |
| 1209 | MSS_1   | 06°36'S    | 10°54'E    | 23.10. 10:04-11:12 | <b>MSS</b> station  |
| 1210 | CTD_15  | 06°34'S    | 11°00'E    | 23.10. 12:07-13:04 | <b>CTD</b> station (1444m/bottom)   |
| 1211 | MSS_2   | 06°34'S    | 11°00'E    | 23.10. 13:19-14:25 | <b>MSS</b> station  |
| 1212 | CTD_16  | 06°32'S    | 11°06'E    | 23.10. 15:03-15:50 | <b>CTD</b> station (1170m/bottom)   |
| 1213 | MSS_3   | 06°32'S    | 11°06'E    | 23.10. 16:00-16:46 | <b>MSS</b> station  |
| 1214 | CTD_17  | 06°30'S    | 11°12'E    | 23.10. 17:23-18:12 | <b>CTD</b> station (976m/bottom)  |
| 1215 | MSS_4   | 06°30'S    | 11°12'E    | 23.10. 18:15-18:59 | <b>MSS</b> station  |
| 1216 | CTD_18  | 06°28'S    | 11°18'E    | 23.10. 19:36-20:15 | <b>CTD</b> station (705m/bottom)  |
| 1217 | MSS_5   | 06°28'S    | 11°18'E    | 23.10. 20:18-21:08 | <b>MSS</b> station  |
| 1218 | CTD_19  | 06°27'S    | 11°22'E    | 23.10. 21:44-22:13 | <b>CTD</b> station (532m/bottom)  |
| 1219 | MSS_6   | 06°27'S    | 11°22'E    | 23.10. 22:15-23:07 | <b>MSS</b> station  |
| 1220 | CTD_20  | 06°24'S    | 11°30'E    | 24.10. 00:00-00:28 | <b>CTD</b> station (334m/bottom)  |
| 1221 | MSS_7   | 06°24'S    | 11°30'E    | 24.10. 00:31-01:36 | <b>MSS</b> station  |
| 1222 | CTD_21  | 06°22'S    | 11°36'E    | 24.10. 02:05-02:20 | <b>CTD</b> station (190m/bottom)  |
| 1223 | MSS_8   | 06°22'S    | 11°36'E    | 24.10. 02:26-02:58 | <b>MSS</b> station  |
| 1224 | CTD_22  | 06°20'S    | 11°42'E    | 24.10. 03:32-03:44 | <b>CTD</b> station (115m/bottom)  |
| 1225 | MSS_9   | 06°20'S    | 11°42'E    | 24.10. 03:50-04:14 | <b>MSS</b> station  |
| 1226 | CTD_23  | 06°18'S    | 11°48'E    | 24.10. 04:56-      | <b>CTD</b> station (102m/bottom)  |

|      |         |            |            |                    |  |
|------|---------|------------|------------|--------------------|--|
|      |         |            |            | 05:10              |  |
| 1227 | MSS_10  | 06°18'S    | 11°48'E    | 24.10. 05:16-05:34 | <b>MSS station</b>   |
| 1228 | CTD_24  | 06°16'S    | 11°54'E    | 24.10. 06:14-06:25 | <b>CTD station (80m/bottom)</b>  |
| 1229 | MSS_11  | 06°16'S    | 11°54'E    | 24.10. 06:27-06:54 | <b>MSS station</b>   |
| 1230 | CTD_25  | 06°14'S    | 12°00'E    | 24.10. 07:37-07:45 | <b>CTD station (60m/bottom)</b>  |
| 1231 | MSS_12  | 06°14'S    | 12°00'E    | 24.10. 07:51-08:20 | <b>MSS station</b>   |
| 1232 | CTD_26  | 06°12'S    | 12°06'E    | 24.10. 09:02-09:13 | <b>CTD station (41m/bottom)</b>  |
| 1233 | MSS_13  | 06°12'S    | 12°06'E    | 24.10. 09:17-09:42 | <b>MSS station</b>   |
|      |         | 08°44.54'S | 13°17.13'E | 25.10. 08:00       | <b>Luanda Reception</b>  |
|      |         | 08°44.54'S | 13°17.13'E | 26.10. 11:00       | <b>Departure Luanda</b>  |
| 1234 | UCTD    | 08°56'S    | 12°49'E    | 26.10. 14:38       | <b>Underway-CTD and Rapid Cast</b>                                     |
| 1235 | Ifm03   | 10°46.4'S  | 13°03.3'E  | 27.10. 01:50       | <b>Glider recovery</b>   |
| 1236 | KPO1152 | 10°42.57'S | 13°11.13'E | 27.10. 05:40-7:30  | <b>Mooring</b> (could not be recovered, no signal from release)        |
| 1237 | CTD_27  | 10°42.75'S | 12°11.38'E | 27.10. 08:24-8:52  | <b>CTD station (500m/bottom)</b>                                       |
| 1238 | KPO1174 | 10°42.74'S | 13°11.34'E | 27.10. 09:26-11:53 | <b>Mooring deployment</b>  |
| 1239 | Ifm13   | 10°47.5'S  | 13°04.7'E  | 27.10. 13:20       | <b>Glider recovery</b>   |
| 1240 | KPO1175 | 10°50.00'S | 13°00.00'E | 27.10. 15:19-16:22 | <b>Mooring deployment</b>  |
| 1241 | UCTD    | 10°57'S    | 12°49'E    | 27.10. 17:48       | <b>Underway-CTD</b>  |
| 1242 | CTD_28  | 11°00'S    | 12°45'E    | 27.10. 18:24-19:25 | <b>CTD station (1427m/bottom)</b>                                      |
| 1243 | MSS_14  | 11°00'S    | 12°45'E    | 27.10. 19:28-20:16 | <b>MSS station</b>   |
| 1244 | CTD_29  | 10°56.7'S  | 12°50'E    | 27.10. 20:59-21:59 | <b>CTD station (1366m/bottom)</b>                                      |
| 1245 | MSS_15  | 10°56.7'S  | 12°50'E    | 27.10. 22:02-22:53 | <b>MSS station</b>   |
| 1246 | CTD_30  | 10°53.3'S  | 12°55'E    | 27.10. 23:28-00:23 | <b>CTD station (1268m/bottom)</b>                                      |
| 1247 | MSS_16  | 10°53.3'S  | 12°55'E    | 28.10. 00:28-01:10 | <b>MSS station</b>   |
| 1248 | CTD_31  | 10°50.6'S  | 13°00.4'E  | 28.10. 01:22-02:43 | <b>CTD station (1210m/bottom)</b><br>Keep distance to mooring position |
| 1249 | MSS_17  | 10°50.6'S  | 13°00.4'E  | 28.10. 02:51-03:30 | <b>MSS station</b>   |
| 1250 | CTD_32  | 10°48'S    | 13°03'E    | 28.10. 03:55-04:45 | <b>CTD station (1136m/bottom)</b>                                      |
| 1251 | MSS_18  | 10°48'S    | 13°03'E    | 28.10. 04:51-05:30 | <b>MSS station</b>   |
| 1252 | CTD_33  | 10°46'S    | 13°06'E    | 28.10. 05:59-06:37 | <b>CTD station (935m/bottom)</b>                                       |
| 1253 | MSS_19  | 10°46'S    | 13°06'E    | 28.10. 06:44-07:26 | <b>MSS station</b>   |
| 1254 | CTD_34  | 10°44'S    | 13°09'E    | 28.10. 07:52-      | <b>CTD station (689m/bottom)</b>                                       |

|      |         |             |             |                    |  |
|------|---------|-------------|-------------|--------------------|--|
|      |         |             |             | 08:23              |  |
| 1255 | MSS_20  | 10°44'S     | 13°09'E     | 28.10. 08:25-09:06 | <b>MSS</b> station   |
| 1256 | CTD_35  | 10°42'S     | 13°12'E     | 28.10. 09:36-10:13 | <b>CTD</b> station (426m/bottom)                                     |
| 1257 | MSS_21  | 10°42'S     | 13°12'E     | 28.10. 10:16-10:59 | <b>MSS</b> station   |
| 1258 | CTD_36  | 10°40'S     | 13°15'E     | 28.10. 11:29-11:47 | <b>CTD</b> station (219m/bottom)                                     |
| 1259 | Ifm09   | 10°40.68'S  | 13°15.95'E  | 28.10. 12:19       | <b>Glider</b> recovery   |
| 1260 | MSS_22  | 10°40'S     | 13°15'E     | 28.10. 12:57-13:37 | <b>MSS</b> station   |
| 1261 | CTD_37  | 10°38'S     | 13°18'E     | 28.10. 14:05-14:18 | <b>CTD</b> station (122m/bottom)                                     |
| 1262 | MSS_23  | 10°38'S     | 13°18'E     | 28.10. 14:28-15:03 | <b>MSS</b> station   |
| 1263 | CTD_38  | 10°36'S     | 13°21'E     | 28.10. 15:31-15:44 | <b>CTD</b> station (106m/bottom)                                     |
| 1264 | MSS_24  | 10°36'S     | 13°21'E     | 28.10. 15:51-16:34 | <b>MSS</b> station   |
| 1265 | CTD_39  | 10°34'S     | 13°24'E     | 28.10. 16:55-17:09 | <b>CTD</b> station (85m/bottom)                                      |
| 1266 | MSS_25  | 10°34'S     | 13°24'E     | 28.10. 17:16-17:51 | <b>MSS</b> station   |
| 1267 | CTD_40  | 10°32'S     | 13°27'E     | 28.10. 18:12-18:23 | <b>CTD</b> station (59m/bottom)                                      |
| 1268 | MSS_26  | 10°32'S     | 13°27'E     | 28.10. 18:30-18:54 | <b>MSS</b> station   |
| 1269 | CTD_41  | 10°30'S     | 13°30'E     | 28.10. 19:20-19:30 | <b>CTD</b> station (43m/bottom)                                      |
| 1270 | MSS_27  | 10°30'S     | 13°30'E     | 28.10. 19:36-20:01 | <b>MSS</b> station   |
| 1271 | UCTD    | 10°30'S     | 13°30'E     | 28.10. 20:23       | <b>RapidCast</b>   |
| 1272 | KPO1154 | 10°40.443'S | 13°14.439'E | 28.10. 22:19-22:41 | <b>PIES</b> communication (not successful)                           |
| 1273 | KPO1155 | 10°42.682'S | 13°11.085'E | 28.10. 23:22-23:36 | <b>PIES</b> communication (not successful)                           |
| 1274 | UCTD    | 10°42.682'S | 13°11.085'E | 28.10. 23:49       | <b>Underway-CTD and Rapid Cast</b><br>(along the 500m depth contour) |
| 1275 | CTD_42  | 14°57'S     | 11°13'E     | 30.10. 10:22-12:53 | <b>CTD</b> station (2894m/bottom)                                    |
| 1276 | MSS_28  | 14°57'S     | 11°13'E     | 30.10. 12:57-13:42 | <b>MSS</b> station   |
| 1277 | CTD_43  | 15°01'S     | 11°21'E     | 30.10. 14:40-16:28 | <b>CTD</b> station (2699m/bottom)                                    |
| 1278 | MSS_29  | 15°01'S     | 11°21'E     | 30.10. 16:32-17:15 | <b>MSS</b> station   |
| 1279 | CTD_44  | 15°05'S     | 11°29'E     | 30.10. 18:16-19:18 | <b>CTD</b> station (~2000m/bottom)                                   |
| 1280 | MSS_30  | 15°05'S     | 11°29'E     | 30.10. 19:20-20:04 | <b>MSS</b> station   |
| 1281 | CTD_45  | 15°08'S     | 11°35'E     | 30.10. 20:56-22:14 | <b>CTD</b> station (2050m/bottom)                                    |
| 1282 | MSS_31  | 15°08'S     | 11°35'E     | 30.10. 22:18-      | <b>MSS</b> station   |

|      |        |           |           |                    |   |
|------|--------|-----------|-----------|--------------------|---|
|      |        |           |           | 23:01              |   |
| 1283 | CTD_46 | 15°11'S   | 11°41'E   | 30.10. 23:54-00:55 | <b>CTD</b> station (1584m/bottom)                   |
| 1284 | MSS_32 | 15°11'S   | 11°41'E   | 31.10. 01:02-01:41 | <b>MSS</b> station                                  |
| 1285 | CTD_47 | 15°13'S   | 11°45'E   | 31.10. 02:23-03:18 | <b>CTD</b> station (1338m/bottom)                   |
| 1286 | MSS_33 | 15°13'S   | 11°45'E   | 31.10. 03:25-04:12 | <b>MSS</b> station                                  |
| 1287 | CTD_48 | 15°15'S   | 11°49'E   | 31.10. 04:42-05:26 | <b>CTD</b> station (954m/bottom)                    |
| 1288 | MSS_34 | 15°15'S   | 11°49'E   | 31.10. 05:29-06:16 | <b>MSS</b> station                                  |
| 1289 | CTD_49 | 15°16'S   | 11°51'E   | 31.10. 06:39-07:28 | <b>CTD</b> station (749m/bottom)                    |
| 1290 | MSS_35 | 15°16'S   | 11°51'E   | 31.10. 07:30-08:12 | <b>MSS</b> station                                  |
| 1291 | CTD_50 | 15°17'S   | 11°53'E   | 31.10. 08:42-09:19 | <b>CTD</b> station (555m/bottom)                    |
| 1292 | MSS_36 | 15°17'S   | 11°53'E   | 31.10. 09:21-10:07 | <b>MSS</b> station                                  |
| 1293 | CTD_51 | 15°18'S   | 11°55'E   | 31.10. 10:47-11:19 | <b>CTD</b> station (676m/bottom)                    |
| 1294 | MSS_37 | 15°18'S   | 11°55'E   | 31.10. 11:21-12:05 | <b>MSS</b> station                                  |
| 1295 | CTD_52 | 15°18.5'S | 11°56'E   | 31.10. 12:28-13:00 | <b>CTD</b> station (639m/bottom)                    |
| 1296 | MSS_38 | 15°18.5'S | 11°56'E   | 31.10. 13:03-13:46 | <b>MSS</b> station                                  |
| 1297 | CTD_53 | 15°19'S   | 11°57'E   | 31.10. 14:11-14:35 | <b>CTD</b> station (435m/bottom)                    |
| 1298 | MSS_39 | 15°19'S   | 11°57'E   | 31.10. 14:37-15:19 | <b>MSS</b> station                                  |
| 1299 | CTD_54 | 15°19.5'S | 11°58'E   | 31.10. 15:40-15:56 | <b>CTD</b> station (227m/bottom)                    |
| 1300 | MSS_40 | 15°19.5'S | 11°58'E   | 31.10. 16:00-16:34 | <b>MSS</b> station                                  |
| 1301 | CTD_55 | 15°20'S   | 11°59'E   | 31.10. 16:53-17:09 | <b>CTD</b> station (97m/bottom)                     |
| 1302 | CTD_56 | 15°21'S   | 12°01'E   | 31.10. 17:35-17:45 | <b>CTD</b> station (43m/bottom)                     |
| 1303 | MSS_41 | 15°21'S   | 12°00.5'E | 31.10. 18:00-18:45 | <b>MSS</b> station                                  |
| 1304 | MSS_42 | 15°20'S   | 11°59'E   | 31.10. 18:57-19:36 | <b>MSS</b> station                                  |
| 1305 | MSS_43 | 15°19.5'S | 11°58'E   | 31.10. 19:45-20:34 | <b>MSS</b> station                                  |
| 1306 | UCTD   | 15°18.5'S | 11°56'E   | 31.10. 20:53       | <b>Rapid Cast</b><br>(along the 500m depth contour) |
| 1307 | MSS_44 | 15°30'S   | 11°45'E   | 31.10. 22:38-23:16 | <b>MSS</b> station                                  |
| 1308 | UCTD   | 15°31'S   | 11°44'E   | 31.10. 23:19       | <b>Rapid Cast</b>                                   |
| 1309 | MSS_45 | 15°45'S   | 11°38'E   | 01.11. 01:01-01:50 | <b>MSS</b> station                                  |

|      |        |         |         |                    |                                  |
|------|--------|---------|---------|--------------------|----------------------------------|
| 1310 | UCTD   | 15°45'S | 11°38'E | 01.11. 01:58       | <b>Rapid Cast</b>                |
| 1311 | MSS_46 | 15°52'S | 11°37'E | 01.11. 02:45-03:28 | <b>MSS station</b>               |
| 1312 | UCTD   | 16°53'S | 11°37'E | 01.11. 03:31       | <b>Rapid Cast</b>                |
| 1313 | MSS_47 | 16°00'S | 11°34'E | 01.11. 04:23-05:03 | <b>MSS station</b>               |
| 1314 | UCTD   | 16°01'S | 11°33'E | 01.11. 05:05       | <b>Rapid Cast</b>                |
| 1315 | MSS_48 | 16°15'S | 11°27'E | 01.11. 06:36-07:19 | <b>MSS station</b>               |
| 1316 | UCTD   | 16°16'S | 11°27'E | 01.11. 07:20       | <b>Rapid Cast</b>                |
| 1317 | MSS_49 | 16°30'S | 11°21'E | 01.11. 08:53-09:35 | <b>MSS station</b>               |
| 1318 | UCTD   | 16°31'S | 11°21'E | 01.11. 09:37       | <b>Rapid Cast</b>                |
| 1319 | MSS_50 | 16°45'S | 11°17'E | 01.11. 11:10-11:52 | <b>MSS station</b>               |
| 1320 | UCTD   | 16°46'S | 11°16'E | 01.11. 11:54       | <b>Rapid Cast</b>                |
| 1321 | MSS_51 | 17°00'S | 11°16'E | 01.11. 13:30-14:13 | <b>MSS station</b>               |
| 1322 | UCTD   | 17°01'S | 11°16'E | 01.11. 14:16       | <b>Rapid Cast</b>                |
| 1323 | MSS_52 | 17°15'S | 11°16'E | 01.11. 15:54-16:32 | <b>MSS station</b>               |
| 1324 | UCTD   | 17°15'S | 11°16'E | 01.11. 16:40       | <b>Rapid Cast</b>                |
| 1325 | MSS_53 | 17°30'S | 11°18'E | 01.11. 18:32-19:20 | <b>MSS station</b>               |
| 1326 | UCTD   | 17°30'S | 11°18'E | 01.11. 19:20       | <b>Rapid Cast</b>                |
| 1327 | MSS_54 | 17°45'S | 11°19'E | 01.11. 21:07-21:54 | <b>MSS station</b>               |
| 1328 | UCTD   | 17°45'S | 11°19'E | 01.11. 21:59       | <b>Rapid Cast</b>                |
| 1329 | CTD_57 | 18°00'S | 11°22'E | 01.11. 23:51-00:19 | <b>CTD station (539m/bottom)</b> |
| 1330 | MSS_55 | 18°00'S | 11°22'E | 02.11. 00:24-01:12 | <b>MSS station</b>               |
| 1331 | CTD_58 | 18°00'S | 11°27'E | 02.11. 02:02-02:22 | <b>CTD station (274m/bottom)</b> |
| 1332 | MSS_56 | 18°00'S | 11°27'E | 02.11. 02:27-03:08 | <b>MSS station</b>               |
| 1333 | CTD_59 | 18°00'S | 11°31'E | 02.11. 03:46-04:06 | <b>CTD station (230m/bottom)</b> |
| 1334 | MSS_57 | 18°00'S | 11°31'E | 02.11. 04:09-04:44 | <b>MSS station</b>               |
| 1335 | CTD_60 | 18°00'S | 11°35'E | 02.11. 05:17-05:36 | <b>CTD station (182m/bottom)</b> |
| 1336 | MSS_58 | 18°00'S | 11°35'E | 02.11. 05:41-06:19 | <b>MSS station</b>               |
| 1337 | CTD_61 | 18°00'S | 11°38'E | 02.11. 06:41-06:57 | <b>CTD station (127m/bottom)</b> |
| 1338 | MSS_59 | 18°00'S | 11°38'E | 02.11. 06:59-07:42 | <b>MSS station</b>               |
| 1339 | LTKC   | 18°00'S | 11°39'E | 02.11. 08:01-08:43 | <b>Mooring recovery</b>          |
| 1340 | LTKC   | 18°00'S | 11°39'E | 02.11. 09:39-10:01 | <b>Mooring deployment</b>        |
| 1341 | CTD_62 | 18°00'S | 11°43'E | 02.11. 10:43-10:54 | <b>CTD station (89m/bottom)</b>  |

|      |        |             |            |                    |  |
|------|--------|-------------|------------|--------------------|--|
| 1342 | VGRAB  | 18°00'S     | 11°43'E    | 02.11. 11:08-11:50 | <b>Van Veen Grab</b>   |
| 1343 | MSS_60 | 18°00'S     | 11°43'E    | 02.11. 12:03-12:34 | MSS station  |
| 1344 | VGRAB  | 18°01'S     | 11°43'E    | 02.11. 12:43-12:50 | <b>Van Veen Grab</b>   |
| 1345 | DRG    | 18°00'S     | 11°43'E    | 02.11. 13:16-14:18 | <b>Dredge</b> (lost, broken wire)                                    |
| 1346 | CTD_63 | 18°00'S     | 11°46'E    | 02.11. 15:05-15:14 | CTD station (51m/bottom)   |
| 1347 | VGRAB  | 18°00'S     | 11°46'E    | 02.11. 15:33-15:59 | <b>Van Veen Grab</b>   |
| 1348 | MSS_61 | 18°00'S     | 11°46'E    | 02.11. 16:03-16:37 | MSS station  |
| 1349 | VVG    | 18°00'S     | 11°35'E    | 02.11. 17:50-18:46 | <b>Van Veen Grab</b>   |
| 1350 | VVG    | 18°00'S     | 11°27'E    | 02.11. 19:43-20:55 | <b>Van Veen Grab</b>   |
| 1351 | CTD_64 | 18°00'S     | 10°35'E    | 03.11. 01:42-04:01 | CTD station (3486m/bottom)   |
| 1352 | MSS_62 | 18°00'S     | 10°35'E    | 03.11. 04:04-04:47 | MSS station  |
| 1353 | CTD_65 | 18°00'S     | 10°55'E    | 03.11. 06:45-08:58 | CTD station (2807m/bottom)   |
| 1354 | MSS_63 | 18°00'S     | 10°55'E    | 03.11. 09:01-09:49 | MSS station  |
| 1355 | UCTD   | 18°01'S     | 10°56'E    | 03.11. 10:04       | <b>Rapid Cast</b>  |
| 1356 | CTD_66 | 18°00'S     | 11°07'E    | 03.11. 11:20-12:38 | CTD station (~1970m/bottom)  |
| 1357 | MSS_64 | 18°00'S     | 11°07'E    | 03.11. 12:42-13:25 | MSS station  |
| 1358 | CTD_67 | 18°00'S     | 11°17'E    | 03.11. 14:37-15:22 | CTD station (~800m/bottom)   |
| 1359 | MSS_65 | 18°00'S     | 11°17'E    | 03.11. 15:24-16:12 | MSS station  |
| 1360 | UCTD   | 18°00'S     | 11°22'E    | 03.11. 16:58       | <b>Underway-CTD and Rapid Cast</b><br>(along the 500m depth contour) |
| 1361 | UCTD   | 20°00'S     | 11°40'E    | 04.11. 05:00       | <b>Rapid Cast</b><br>(only Rapid Cast along 20°S)                    |
| 1362 | LTTB   | 19°59.97'S  | 12°44.98'E | 04.11. 11:30-12:31 | <b>Mooring</b> recovery  |
| 1363 | HRTB   | 19°59.97' S | 12°44.98'E | 04.11. 12:55-13:34 | <b>Mooring</b> deployment  |
| 1364 | CTD_68 | 20°00'S     | 12°58.3'E  | 04.11. 15:21-15:30 | CTD station (41m/bottom)   |
| 1365 | VGRAB  | 20°00'S     | 12°58.3'E  | 04.11. 15:37-16:00 | <b>Van Veen Grab</b>   |
| 1366 | DRG    | 20°00'S     | 12°58.3'E  | 04.11. 16:16-17:08 | <b>Dredge</b>  |
| 1367 | MSS_66 | 20°00'S     | 12°58.3'E  | 04.11. 17:20-17:53 | MSS station  |
| 1368 | CTD_69 | 20°00'S     | 12°57.1'E  | 04.11. 18:13-18:22 | CTD station (54m/bottom)   |
| 1369 | MSS_67 | 20°00'S     | 12°57.1'E  | 04.11. 18:29-      | MSS station  |

|      |        |         |           |                    |                                  |
|------|--------|---------|-----------|--------------------|----------------------------------|
|      |        |         |           | 18:58              |                                  |
| 1370 | CTD_70 | 20°00'S | 12°51'E   | 04.11. 19:41-19:54 | <b>CTD station (99m/bottom)</b>  |
| 1371 | VGRAB  | 20°00'S | 12°51'E   | 04.11. 19:59-20:39 | <b>Van Veen Grab</b>             |
| 1372 | MSS_68 | 20°00'S | 12°51'E   | 04.11. 20:44-21:26 | <b>MSS station</b>               |
| 1373 | CTD_71 | 20°00'S | 12°45'E   | 04.11. 22:11-22:24 | <b>CTD station (119m/bottom)</b> |
| 1374 | MSS_69 | 20°00'S | 12°45'E   | 04.11. 22:25-23:09 | <b>MSS station</b>               |
| 1375 | CTD_72 | 20°00'S | 12°41'E   | 04.11. 23:43-23:57 | <b>CTD station (124m/bottom)</b> |
| 1376 | MSS_70 | 20°00'S | 12°41'E   | 05.11. 00:11-00:47 | <b>MSS station</b>               |
| 1377 | CTD_73 | 20°00'S | 12°35.5'E | 05.11. 01:36-01:52 | <b>CTD station (134m/bottom)</b> |
| 1378 | MSS_71 | 20°00'S | 12°35.5'E | 05.11. 01:55-02:36 | <b>MSS station</b>               |
| 1379 | CTD_74 | 20°00'S | 12°30'E   | 05.11. 03:23-03:40 | <b>CTD station (151m/bottom)</b> |
| 1380 | MSS_72 | 20°00'S | 12°30'E   | 05.11. 03:43-04:39 | <b>MSS station</b>               |
| 1381 | CTD_75 | 20°00'S | 12°25'E   | 05.11. 05:16-05:33 | <b>CTD station (196m/bottom)</b> |
| 1382 | VGRAB  | 20°00'S | 12°25'E   | 05.11. 05:43-06:38 | <b>Van Veen Grab</b>             |
| 1383 | MSS_73 | 20°00'S | 12°25'E   | 05.11. 06:41-07:36 | <b>MSS station</b>               |
| 1384 | CTD_76 | 20°00'S | 12°20'E   | 05.11. 08:12-08:28 | <b>CTD station (213m/bottom)</b> |
| 1385 | MSS_74 | 20°00'S | 12°20'E   | 05.11. 08:29-09:11 | <b>MSS station</b>               |
| 1386 | CTD_77 | 20°00'S | 12°15'E   | 05.11. 09:48-10:03 | <b>CTD station (246m/bottom)</b> |
| 1387 | MSS_75 | 20°00'S | 12°15'E   | 05.11. 10:05-10:53 | <b>MSS station</b>               |
| 1388 | CTD_78 | 20°00'S | 12°09'E   | 05.11. 11:32-11:51 | <b>CTD station (280m/bottom)</b> |
| 1389 | VGRAB  | 20°00'S | 12°09'E   | 05.11. 11:57-13:09 | <b>Van Veen Grab</b>             |
| 1390 | MSS_76 | 20°00'S | 12°09'E   | 05.11. 13:15-14:02 | <b>MSS station</b>               |
| 1391 | CTD_79 | 20°00'S | 12°04'E   | 05.11. 14:44-15:04 | <b>CTD station (310m/bottom)</b> |
| 1392 | MSS_77 | 20°00'S | 12°04'E   | 05.11. 15:07-15:49 | <b>MSS station</b>               |
| 1393 | CTD_80 | 20°00'S | 11°58.4'E | 05.11. 16:34-17:01 | <b>CTD station (345m/bottom)</b> |
| 1394 | MSS_78 | 20°00'S | 11°58.4'E | 05.11. 17:08-18:04 | <b>MSS station</b>               |
| 1395 | CTD_81 | 20°00'S | 11°46.8'E | 05.11. 19:26-19:56 | <b>CTD station (450m/bottom)</b> |
| 1396 | MSS_79 | 20°00'S | 11°46.8'E | 05.11. 19:59-      | <b>MSS station</b>               |

|      |        |             |            |                    |                                       |
|------|--------|-------------|------------|--------------------|---------------------------------------|
|      |        |             |            | 20:37              |                                       |
| 1397 | SCF    | 20°02'S     | 11°46'E    | 05.11. 20:59-22:00 | <b>ScanFish</b> (sensor failure)      |
| 1398 | MSS_80 | 20°00'S     | 12°45'E    | 06.11. 08:18-05:39 | <b>MSS</b> station                    |
| 1399 | HRTB   | 19°59.97' S | 12°44.98'E | 07.11. 06:00-06:45 | <b>Mooring</b> recovery               |
| 1400 | LTTB   | 19°59.97'S  | 12°44.98'E | 07.11. 07:10-07:37 | <b>Mooring</b> deployment             |
| 1401 | SCF    | 20°01'S     | 12°45'E    | 07.11. 08:56-10:30 | <b>ScanFish</b> (test)                |
| 1402 | Ifm09  | 22°58'S     | 13°33'E    | 08.11. 07:25-08:00 | <b>Glider</b> deployment              |
| 1403 | LTMB   | 22°59.90'S  | 14°02.90'E | 08.11. 11:20-12:16 | <b>Mooring</b> recovery               |
| 1404 | WBST   | 23°01.00'S  | 14°02.20'E | 08.11. 12:38-13:25 | <b>Mooring</b> sediment trap recovery |
| 1405 | HRMB   | 22° 59.98'S | 14°02.27'E | 08.11. 14:03-14:30 | <b>Mooring</b> deployment             |
| 1406 | CTD_82 | 23°00'S     | 14°22'E    | 08.11. 16:50-17:00 | <b>CTD</b> station (40m/bottom)       |
| 1407 | MSS_81 | 23°00'S     | 14°22'E    | 08.11. 17:03-17:33 | <b>MSS</b> station                    |
| 1408 | CTD_83 | 23°00'S     | 14°19'E    | 08.11. 18:00-18:11 | <b>CTD</b> station (71m/bottom)       |
| 1409 | MSS_82 | 23°00'S     | 14°19'E    | 08.11. 18:12-18:52 | <b>MSS</b> station                    |
| 1410 | CTD_84 | 23°00'S     | 14°13'E    | 08.11. 19:35-19:47 | <b>CTD</b> station (108m/bottom)      |
| 1411 | MSS_83 | 23°00'S     | 14°13'E    | 08.11. 19:51-20:30 | <b>MSS</b> station                    |
| 1412 | CTD_85 | 23°00'S     | 14°08'E    | 08.11. 21:13-21:27 | <b>CTD</b> station (135m/bottom)      |
| 1413 | MSS_84 | 23°00'S     | 14°08'E    | 08.11. 21:29-22:16 | <b>MSS</b> station                    |
| 1414 | CTD_86 | 23°00'S     | 14°03'E    | 08.11. 22:57-23:11 | <b>CTD</b> station (134m/bottom)      |
| 1415 | MSS_85 | 23°00'S     | 14°03'E    | 08.11. 23:13-23:45 | <b>MSS</b> station                    |
| 1416 | CTD_87 | 23°00'S     | 13°57.5'E  | 09.11. 01:44-01:52 | <b>CTD</b> station (141m/bottom)      |
| 1417 | MSS_86 | 23°00'S     | 13°57.5'E  | 09.11. 02:07-02:57 | <b>MSS</b> station                    |
| 1418 | CTD_88 | 23°00'S     | 13°52'E    | 09.11. 03:56-04:12 | <b>CTD</b> station (143m/bottom)      |
| 1419 | MSS_87 | 23°00'S     | 13°52'E    | 09.11. 04:17-05:00 | <b>MSS</b> station                    |
| 1420 | CTD_89 | 23°00'S     | 13°41'E    | 09.11. 06:09-06:28 | <b>CTD</b> station (150m/bottom)      |
| 1421 | MSS_88 | 23°00'S     | 13°41'E    | 09.11. 06:32-07:14 | <b>MSS</b> station                    |
| 1422 | CTD_90 | 23°00'S     | 13°30'E    | 09.11. 08:27-08:42 | <b>CTD</b> station (235m/bottom)      |
| 1423 | MSS_89 | 23°00'S     | 13°30'E    | 09.11. 08:45-      | <b>MSS</b> station                    |



|      |         |              |               |                    |  |
|------|---------|--------------|---------------|--------------------|--|
|      |         |              |               | 09:36              |  |
| 1424 | Ifm09   | 22°57.76'S   | 13°18.82'E    | 09.11. 11:05       | <b>Glider</b> (visit to check MSS sensors) |
| 1425 | CTD_91  | 23°00'S      | 13°19'E       | 09.11. 11:48-12:11 | <b>CTD</b> station (357m/bottom)           |
| 1426 | MSS_90  | 23°00'S      | 13°19'E       | 09.11. 12:18-13:06 | <b>MSS</b> station                         |
| 1427 | CTD_92  | 23°00'S      | 13°09'E       | 09.11. 14:12-14:34 | <b>CTD</b> station (315m/bottom)           |
| 1428 | MSS_91  | 23°00'S      | 13°09'E       | 09.11. 14:40-15:25 | <b>MSS</b> station                         |
| 1429 | CTD_93  | 23°00'S      | 13°03'E       | 09.11. 16:15-16:37 | <b>CTD</b> station (407m/bottom)           |
| 1430 | MSS_92  | 23°00'S      | 13°03'E       | 09.11. 16:39-17:32 | <b>MSS</b> station                         |
| 1431 | CTD_94  | 23°00'S      | 12°57'E       | 09.11. 18:20-18:51 | <b>CTD</b> station (589m/bottom)           |
| 1432 | MSS_93  | 23°00'S      | 12°57'E       | 09.11. 18:56-19:36 | <b>MSS</b> station                         |
| 1433 | UCTD    | 23°00'S      | 12°49.5'E     | 09.11. 20:20       | <b>Underway-CTD</b>                        |
| 1434 | CTD_95  | 23°00'S      | 12°47'E       | 09.11. 20:43-21:37 | <b>CTD</b> station (936m/bottom)           |
| 1435 | MSS_94  | 23°00'S      | 12°47'E       | 09.11. 21:39-22:26 | <b>MSS</b> station                         |
| 1436 | UCTD    | 23°00'S      | 12°39'E       | 09.11. 23:19       | <b>Underway-CTD</b>                        |
| 1437 | CTD_96  | 23°00'S      | 12°35'E       | 09.11. 23:48-00:53 | <b>CTD</b> station (1423m/bottom)          |
| 1438 | MSS_95  | 23°00'S      | 12°35'E       | 09.11. 00:55-01:01 | <b>MSS</b> station<br>(cable broken)       |
| 1439 | CTD_97  | 23°00'S      | 12°20'E       | 10.11. 02:41-04:28 | <b>CTD</b> station (2062m/bottom)          |
| 1440 | CTD_98  | 23°00'S      | 12°00'E       | 10.11. 06:31-08:37 | <b>CTD</b> station (2703m/bottom)          |
| 1441 | Argo_9  | 23°00'S      | 12°00'E       | 10.11. 08:46       | <b>FLOAT</b> deployment (WMO #3901869)     |
| 1442 | CTD_99  | 23°00'S      | 11°45'E       | 10.11. 10:21-12:41 | <b>CTD</b> station (3260m/bottom)          |
| 1443 | Argo_10 | 23°00'S      | 11°45'E       | 10.11. 12:47       | <b>FLOAT</b> deployment (WMO #3901870)     |
| 1444 | SCF     | 23°00'S      | 12°47'E       | 10.11. 19:02-09:43 | <b>ScanFish</b> (section along 23°W)       |
| 1445 | HRMB    | 22° 59.98' S | 014° 02.27' E | 11.11. 11:32-12:19 | <b>Mooring</b> recovery                    |
| 1446 | WBST    | 23° 01.00' S | 014° 02.20' E | 11.11. 12:30-12:47 | <b>Mooring</b> sediment trap deployment    |
| 1447 | LTMB    | 22° 59.81' S | 014° 02.36' E | 11.11. 13:12-13:30 | <b>Mooring</b> deployment                  |