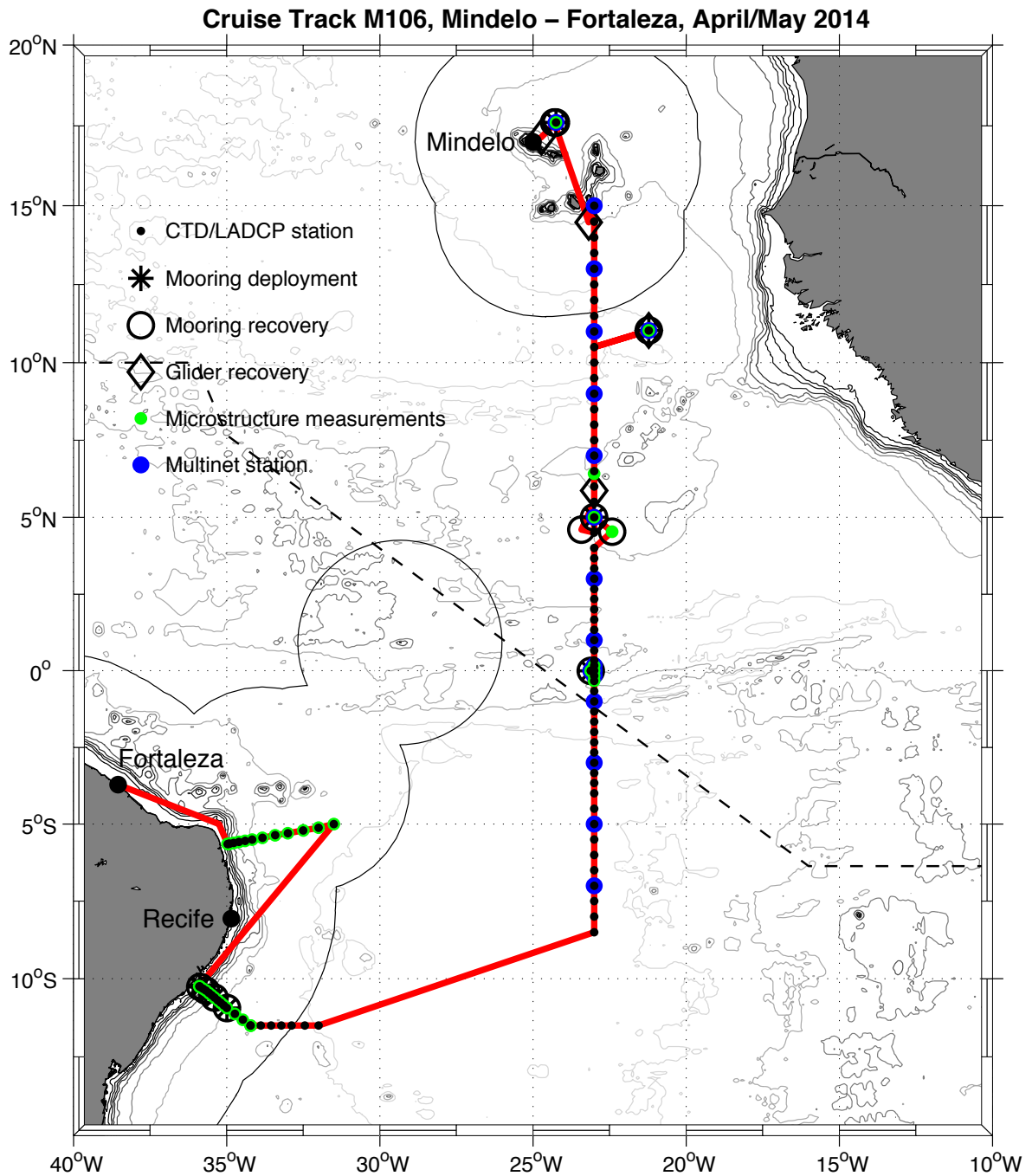


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**Short Cruise Report**  
**R/V METEOR M106 Mindelo – Fortaleza**  
**19<sup>th</sup> April – 26<sup>th</sup> May 2014**  
**Chief Scientist: Prof. Dr. Peter Brandt**  
**Captain: Michael Schneider**



*Bathymetric map with ship track of R/V METEOR cruise M106 including locations of CTD/LADCP stations, microstructure measurements, multinet stations, mooring recoveries and deployments, and Glider recoveries. Black solid lines mark territorial waters of Brazil and Cape Verde, dashed black line marks SAR area of Brazil.*

## **Objectives**

Cruise M106 is a joint effort of the Kiel Collaborative Research Centre SFB 754 ("Climate - Biogeochemistry Interactions in the Tropical Ocean"), of the BMBF joint project RACE and of the German-French Cooperative Project AWA. Within the framework of the SFB 754, ventilation processes of the oxygen minimum zone (OMZ), including lateral and vertical mixing and oxygen advection (SP A3 and A4) as well as the role of zooplankton and

particles for oxygen consumption and biogeochemical cycles (SP B8) were investigated. At the equator, the cruise focussed on the equatorial current system, its interannual variability and its role in the zonal transport of heat, freshwater, and oxygen (BMBF RACE, SFB 754).

Within the framework of RACE the aim of this cruise was to investigate the variability of the western boundary current system offshore of South America. A special focus was laid on the study of the North Brazil Undercurrent (NBUC), which is part of the Atlantic meridional overturning circulation (AMOC). Previous measurements of this system were done in 2000 to 2004 and in 2013 and therefore the measurements aimed to resolve intraseasonal to decadal transport variability.

The main tasks during M106 were the recovery and redeployment of several sub-surface moorings (part of them are long-term efforts addressing up to decadal variations in the tropical Atlantic), a glider swarm experiment north, east, and south of the Cape Verde archipelago and station work with a CTD/Lowered ADCP/Underwater Vision Profiler (UVP), a microstructure probe and a zooplankton multinet. Water samples from the CTD rosette were taken for chemical and biological measurements and for nitrogen fixation experiments. In addition, underway measurements of upper ocean currents with two shipboard ADCPs, hydrographic measurements of temperature, salinity, CO<sub>2</sub>, O<sub>2</sub>, N<sub>2</sub>O, and meteorological measurements were performed.

## **Narrative**

R/V METEOR departed from Mindelo on April 19, 2014 at 9:00 and headed north between the Cape Verdean islands of São Vicente and Santo Antão. The recovery of a glider that was part of a glider swarm experiment north, east, and south of the Cape Verde archipelago was the first activity of the cruise. All gliders to be recovered during M106 were deployed during the previous cruise M105 with chief scientist Martin Visbeck. The successful recovery of the CVOO (Cape Verde Ocean Observatory) mooring north of São Vicente was followed by several CTD-O<sub>2</sub>/Lowered ADCP/UVP stations which were used for water sampling of oxygen, dissolved inorganic carbon and total alkalinity (DIC/TA), nutrients, chlorophyll-*a* (Chl-*a*) and salinity. Furthermore zooplankton multinet stations during day and night, and microstructure measurements were conducted. Some of the CTD/O<sub>2</sub> stations were also used to calibrate different moored instruments, including MicroCATs, optodes and Mini-TD (temperature, depth) loggers. These instruments were either just recovered or to be deployed in the afternoon of April 20, when the CVOO mooring was successfully redeployed.

On April 21 at 15:50, the second glider was recovered south of the Cape Verdean island of Maio. This glider - together with another French glider was part of the German-French Cooperative Project AWA - observed hydrographic properties in the eastern boundary upwelling region along the zonal 14°30'N section between Senegal and Cape Verde.

The measurements along 23°W, including 75 CTD-O<sub>2</sub>/LADCP/UVP stations between 15°N and 8°30'S, were a main focus of our cruise. The work along this section started on April 15 and ended on May 10. The spatial resolution of CTD station work was 30' in latitude north of 4°N and south of 4°S, 20' in latitude between 4°N and 4°S with some additional CTD-O<sub>2</sub>/LADCP/UVP stations near the equator. Most of the stations were performed down to the bottom; few were used for additional water sampling for nitrogen fixation experiments or

for moored instrument calibration. Additional zooplankton multinet stations were performed every 2° in latitude, with some higher resolution near the equator.

On April 24 and 25, we departed from the 23°W section to recover and redeploy the SFB754 mooring at 21°13'W, 11°02'N which corresponds approximately to the centre of the OMZ. The mooring was equipped with a series of oxygen, temperature and salinity sensors as well as a 75 kHz Longranger (LR) ADCP for velocity measurements in the upper 800 m. At this location we also recovered the third glider that measured spatial variability of hydrographic properties around the mooring to be combined in the future analysis with the temporal variability observed with the moored instruments. At this location, the OSTRE (Oxygen Supply Tracer Release Experiment) was carried out in November 2012, and the tracer distribution was surveyed during M105. Another glider was later recovered near 23°W, 6°N. This glider, additionally equipped with a microstructure probe, first conducted profiling operations around the mooring position 21°13'W, 11°02'N. Thereafter, a southward transect across the abyssal plain region and a region with a number of seamounts was conducted to measure regional differences in the diapycnal mixing.

On April 28, we arrived at the mooring array at 4.5-5°N composed of three moorings in a triangular configuration. The moorings were equipped with a series of oxygen, temperature and salinity sensors as well as LR ADCPs. All three moorings were recovered successfully in three successive days, yielding almost complete datasets. Only one mooring, at 23°W, 5°N, was redeployed to continue observations of long-term variability at the southern rim of the OMZ.

On May 3, the equatorial mooring was recovered and redeployed the next day. This mooring, deployed in cooperation with the international PIRATA program, is aimed at observing the equatorial current system. This includes the eastward flowing Equatorial Undercurrent in the upper 200m with a core depth of about 80m, and the westward flowing Equatorial Intermediate Current below the EUC and the Equatorial Deep Jets (EDJ). The recovered mooring was equipped with two ADCPs for the near surface and intermediate flow above 800m, with few single-point current meters, oxygen, temperature and salinity sensors, and with a moored profiler (for velocity, oxygen, temperature and salinity measurements) climbing the mooring wire up and down every four days between 3500 and 1000m water depth. All instruments worked well. Even the moored profiler, which experienced some failures during previous mooring periods, worked throughout the entire mooring period, with some degradation in the profiling range toward the end of the mooring period. At the equator, few CTD-O<sub>2</sub>/LADCP/UVP stations were repeated to confirm the large marine snowfall of particles right at the equator as observed with the UVP. In comparison to similar measurements during MSM22 in November 2012, we again observed a curtain of small particles (0.06 – 0.25 mm ESD) from 2°N to 2°S that extended from the sea surface to the seafloor at 3000 to 5000 m depth. The abundance of larger particles (0.25 – 1.50 mm ESD), however, was different in May 2014 compared to November 2012. A marine snowfall of large particles was mainly observed directly after the upwelling season in November 2012, but was not present in May 2014 (before the equatorial upwelling season).

After completion of measurements along 23°W on May 10, R/V METEOR headed southwest towards the western boundary off Brazil. After the transit to the next working area,

the CTD-O<sub>2</sub>/LADCP/UVP station and mooring work along 11°S commenced on May 12, 2014. Along this section, 4 current meter moorings were recovered and redeployed, and two PIES (inverted echo sounder with pressure sensor) with separate acoustic modems for data transmission were deployed. With the deployment of the fourth mooring off Brazil on May 17, the mooring work during M106 ended very successfully: all moorings were recovered, and mooring deployments went very smoothly without problems. In between and following the mooring work, a total of 22 surface-to-bottom CTD-O<sub>2</sub>/LADCP/UVP stations and 16 microstructure stations with acquisition of typically 3 profiles per station were carried out. Some CTD stations were again used for moored instrument calibration. Water samples were taken for calibration of salinity and oxygen sensors of the CTD system as well as for incubation experiments for nitrogen fixation studies. The CTD section was finished on May 19, 2014 and R/V METEOR thereafter headed northeast towards the easternmost station of the 5°S section.

Along the last section of the cruise along about 5°S, a total of 17 surface-to-bottom CTD-O<sub>2</sub>/LADCP/UVP stations and 13 microstructure stations with acquisition of typically 3 profiles per station were carried out. The section was finished on May 24.

The ship arrived at the port of Fortaleza, Brazil on May 26, 2014 at 8:00.

## **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 came from the German Science Foundation (DFG) as part of the SFB754 (Climate Biogeochemistry Interactions in the Tropical Ocean) and the German Federal Ministry of Education and Research (BMBF) as part of the Joint Project RACE (03F0443B) and AWA (01DG12073E).

## Participants M106

| Name                           | Position/Discipline                                  | Institute      |
|--------------------------------|--|----------------|
| 1. Brandt, Peter               | Chief scientist                                      | GEOMAR         |
| 2. Ansorge, Cedrick            | Microtops, aerosol                                   | MPIM           |
| 3. Faustmann, Jannik           | UVP, Microbial respiration                           | GEOMAR         |
| 4. Felipe, Rodrigo             | Observer   |                |
| 5. Fischer, Tim                | CTD, CTD watch, microstructure                       | GEOMAR         |
| 6. Grundle, Damian             | N <sub>2</sub> O                                     | GEOMAR         |
| 7. Hahn, Johannes              | CTD watch, optodes, MicroCATs                        | GEOMAR         |
| 8. Hauschildt, Jaard           | Underway CO <sub>2</sub> /O <sub>2</sub> , CTD watch | GEOMAR         |
| 9. Hummels, Rebecca            | LADCP, CTD, CTD watch                                | GEOMAR         |
| 10. Kiko, Rainer               | UVP, Multinet, CTD sampling                          | GEOMAR         |
| 11. Kiseloff, Boris            | CTD watch, optodes, MicroCATs                        | GEOMAR         |
| 12. Kopte, Robert              | CTD watch, shipboard ADCP, moored ADCPs              | GEOMAR         |
| 13. Kühnle, Svenja             | UVP  | GEOMAR         |
| 14. Martens, Wiebke            | CTD watch, CTD technology                            | GEOMAR         |
| 15. Müller, Mario              | Glider, moored ADCPs, MMP                            | GEOMAR         |
| 16. Niehus, Gerd               | Moorings, CTD, releaser                              | GEOMAR         |
| 17. Pankin, Ulrike             | O <sub>2</sub> , UVP                                 | GEOMAR         |
| 18. Papenburg, Uwe             | Moorings, current meters, ADCPs                      | GEOMAR         |
| 19. Rath, Willi                | CTD, CTD watch, glider                               | GEOMAR         |
| 20. Schweizer, Ellen           | O <sub>2</sub> , CTD watch, optodes                  | GEOMAR         |
| 21. Singh, Arvind              | N <sub>2</sub> fixation                              | GEOMAR         |
| 22. Stelzner, Martin           | Meteorology  | DWD<br>Hamburg |
| 23. Stolle, Clara              | CTD watch, thermosalinograph                         | GEOMAR         |
| 24. Tchamabi, Christine Carine | CTD watch  | UFPE           |
| 25. Tuchen, Franz Philip       | CTD watch, moored profiler                           | GEOMAR         |
| 26. Vandromme, Pieter          | UVP  | GEOMAR         |
| 27. Vogel, Bendix              | Salinometer, CTD watch, current meters               | GEOMAR         |

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**DWD** Deutscher Wetterdienst, Seeschiffahrtsberatung, Bernhard-Nocht-Straße 76, 20359 Hamburg, Germany

**MPIM** Max Planck Institute for Meteorology, Bundesstrasse 53, 20146 Hamburg, Germany

**UFPE** Lab. Oceanografia Física Estuarina e Costeira – LOFEC, Depart. Oceanografia da Universidade Federal de Pernambuco – UFPE, Av. Arquitetura, s/n, 50740-550 - Cidade Universitária Recife-PE, Brasil

**Tab. 1.1:** Station list of R/V METEOR cruise M106.

| Station No. M106<br>Ship/Science |          | Latitude    | Longitude   | Time               | Work                                     |
|----------------------------------|----------|-------------|-------------|--------------------|--|
| 321-1                            | Ifm13    | 17°08.8'N   | 24°43.5'W   | 19.04. 12:20-12:40 | <b>Glider recovery</b>                   |
| 322-1                            | KPO_1094 | 17°36.40'N  | 24°14.98' W | 19.04. 17:00-20:40 | <b>Mooring recovery</b>                  |
| 322-2                            | CTD_1    | 17°36'N     | 24°15'W     | 19.04. 21:40-0:40  | <b>CTD/LADCP station (3598m/bottom),</b> |
| 322-3                            | CTD_2    | 17°36'N     | 24°15'W     | 20.04. 1:50-3:00   | <b>CTD/LADCP station (1000m)</b>         |
| 322-4                            | MN_1     | 17°36'N     | 24°15'W     | 20.04. 3:20-4:10   | <b>Multinet</b>                          |
| 322-5                            | CTD_3    | 17°36'N     | 24°15'W     | 20.04. 4:40-7:30   | <b>CTD/LADCP station (3597m/bottom)</b>  |
| 323-1                            | KPO_1136 | 17°36.27'N  | 24°18.82'W  | 20.04. 8:10-10:50  | <b>Mooring recovery</b>                  |
| 324-1                            | MN_2     | 17°36'N     | 24°15'W     | 20.04. 11:50-12:40 | <b>Multinet</b>                          |
| 324-2                            | KPO_1128 | 17°36.354'N | 24°14.976'W | 20.04. 15:10-19:40 | <b>Mooring deployment</b>                |
| 324-3                            | MSS_1    | 17°36'N     | 24°15'W     | 20.04. 20:10-21:40 | <b>Microstructure</b>                    |
| 325-1                            | Ifm02    | 14°30'N     | 23°10'W     | 21.04. 15:50-16:30 | <b>Glider recovery</b>                   |
| 326-1                            | CTD_4    | 15°00'N     | 23°00'W     | 21.04. 20:30-20:50 | <b>CTD/LADCP station (120m)</b>          |
| 326-2                            | MN_3     | 15°00'N     | 23°00'W     | 21.04. 21:00-22:00 | <b>Multinet</b>                          |
| 326-3                            | CTD_5    | 15°00'N     | 23°00'W     | 21.04. 22:20-0:40  | <b>CTD/LADCP station (2737m/bottom)</b>  |
| 327-1                            | CTD_6    | 14°30'N     | 23°00'W     | 22.04. 3:50-4:40   | <b>CTD/LADCP station (1300m)</b>         |
| 328-1                            | CTD_7    | 14°00'N     | 23°00'W     | 22.04. 7:40-10:10  | <b>CTD/LADCP station (4317m/bottom)</b>  |
| 329-1                            | CTD_8    | 13°30'N     | 23°00'W     | 22.04. 14:00-16:00 | <b>CTD/LADCP station (1300m)</b>         |
| 330-1                            | CTD_9    | 13°00'N     | 23°00'W     | 22.04. 18:00-20:50 | <b>CTD/LADCP station (4731m/bottom)</b>  |
| 328-1                            | CTD_7    | 14°00'N     | 23°00'W     | 22.04. 7:40-10:10  | <b>CTD/LADCP station (4312m/bottom)</b>  |
| 329-1                            | CTD_8    | 13°30'N     | 23°00'W     | 22.04. 14:00-16:00 | <b>CTD station (1300m)</b>               |
| 330-1                            | CTD_9    | 13°00'N     | 23°00'W     | 22.04. 18:00-20:50 | <b>CTD station (4731m/bottom)</b>        |
| 330-2                            | MN_4     | 13°00'N     | 23°00'W     | 22.04. 21:10-22:00 | <b>Multinet</b>                          |
| 331-1                            | CTD_10   | 12°30'N     | 23°00'W     | 23.04. 1:00-1:50   | <b>CTD station (1300m)</b>               |
| 332-1                            | CTD_11   | 12°00'N     | 23°00'W     | 23.04. 4:50-7:40   | <b>CTD station (5037m/bottom)</b>        |
| 333-1                            | CTD_12   | 11°30'N     | 23°00'W     | 23.04. 10:30-12:00 | <b>CTD station (1300m)</b>               |

|         |          |             |             |                    |   |
|---------|----------|-------------|-------------|--------------------|---|
| 334-1   | MN_5     | 11°00'N     | 23°00'W     | 23.04. 16:10-17:10 | <b>Multinet</b>                             |
| 334-2   | CTD_13   | 11°00'N     | 23°00'W     | 23.04. 17:30-21:10 | <b>CTD station (5144m/bottom)</b>           |
| 334-3   | MN_6     | 11°00'N     | 23°00'W     | 23.04. 21:10-22:20 | <b>Multinet</b>                             |
| 335-1   | CTD_14   | 10°30'N     | 23°00'W     | 24.04. 1:20-2:10   | <b>CTD station (1300m)</b>                  |
| 336-1   | Ifm12    | 11°01.8'N   | 21°13.5'W   | 24.04. 13:30-13:40 | <b>Glider recovery</b>                      |
| 337-1   | KPO_1091 | 11°02.216'N | 21°13.290'W | 24.04. 13:50-17:40 | <b>Mooring recovery</b>                     |
| 337-2   | CTD_15   | 11°00'N     | 21°13'W     | 24.04. 18:20-21:30 | <b>CTD/LADCP station (5068m/bottom)</b>     |
| 337-3   | MN_7     | 11°00'N     | 21°13'W     | 24.04. 21:40-22:40 | <b>Multinet</b>                             |
| 337-4   | CTD_16   | 11°00'N     | 21°13'W     | 24.04. 23:00-0:20  | <b>CTD/LADCP station (1300m)</b>            |
| 337-5/6 | MSS_2    | 11°00'N     | 21°13'W     | 25.04. 0:30-6:30   | <b>Microstructure</b>                       |
| 337-7   | KPO_1127 | 11°02.216'N | 21°13.290'W | 25.04. 8:50-13:10  | <b>Mooring deployment</b>                   |
| 337-8/9 | CTD_17   | 11°00'N     | 21°13'W     | 25.04. 14:20-15:40 | <b>CTD station (1300m)</b>                  |
| 337-10  | MN_9     | 11°00'N     | 21°13'W     | 25.04. 15:00-16:50 | <b>Multinet</b>                             |
|         |          | 10°30'N     | 23°00'W     | 26.04. 02:30       |   |
| 338-1   | CTD_18   | 10°00'N     | 23°00'W     | 26.04. 5:30-8:20   | <b>CTD/LADCP station (5029m/bottom)</b>     |
| 339-1   | CTD_19   | 9°30'N      | 23°00'W     | 26.04. 11:20-12:10 | <b>CTD/LADCP station (1300m)</b>            |
| 340-1   | MN_10    | 9°00'N      | 23°00'W     | 26.04. 15:00-15:50 | <b>Multinet</b>                             |
| 340-2   | CTD_20   | 9°00'N      | 23°00'W     | 26.04. 16:00-19:20 | <b>CTD/LADCP station (4890m/bottom)</b>     |
| 341-1   | CTD_21   | 8°30'N      | 23°00'W     | 26.04. 22:20-23:20 | <b>CTD/LADCP station (1300m)</b>            |
| 342-1   | CTD_22   | 8°00'N      | 23°00'W     | 27.04. 2:20-5:00   | <b>CTD/LADCP station (4408m/bottom)</b>     |
| 343-1   | CTD_23   | 7°30'N      | 23°00'W     | 27.04. 8:00-9:00   | <b>CTD/LADCP/PAR station (1300m)</b>        |
| 344-1   | CTD_24   | 6°58'N      | 22°58.7'W   | 27.04. 12:10-13:10 | <b>CTD/LADCP/PAR station (1312m/bottom)</b> |
| 344-2   | MN_11    | 6°58'N      | 22°58.7'W   | 27.04. 13:20-14:10 | <b>Multinet</b>                             |
| 345-1   | CTD_25   | 6°34'N      | 22°55.5'W   | 27.04. 16:30-18:40 | <b>CTD/LADCP station (3351m/bottom)</b>     |
| 346-1   | MSS_3    | 6°25'N      | 22°54.5'W   | 27.04. 20:10-23:30 | <b>Microstructure (over sea mount)</b>      |
| 347-1   | CTD_26   | 6°00'N      | 23°00'W     | 28.04. 1:50-2:10   | <b>CTD/LADCP station (100m)</b>             |
| 347-2   | CTD_27   | 6°00'N      | 23°00'W     | 28.04. 2:30-5:00   | <b>CTD/LADCP station (4089m/bottom)</b>     |
| 348-1   | Ifm03    | 5°52'N      | 23°00'W     | 28.04. 6:30-       | <b>Glider recovery</b>                      |



|       |          |          |           |                    |   |
|-------|----------|----------|-----------|--------------------|---|
|       |          |          |           | 6:40               |   |
| 349-1 | CTD_28   | 5°30'N   | 23°00'W   | 28.04. 8:50-9:50   | <b>CTD/LADCP/PAR station (1300m)</b>    |
| 350-1 | KPO_1093 | 4°36.0'N | 23°25.0'W | 28.04. 15:30-17:50 | <b>Mooring recovery</b>                 |
| 351-1 | CTD_29   | 4°30'N   | 23°00'W   | 29.04. 20:30-23:20 | <b>CTD/LADCP station (4118m/bottom)</b> |
| 352-1 | MSS_4    | 4°59'N   | 22°59'W   | 29.04. 2:30-5:30   | <b>Microstructure</b>                   |
| 352-2 | CTD_30   | 4°59'N   | 23°00'W   | 29.04. 6:00-7:30   | <b>CTD/LADCP station (1300m)</b>        |
| 352-3 | KPO_1090 | 5°01.0'N | 23°00.0'W | 29.04. 7:50-11:20  | <b>Mooring recovery</b>                 |
| 352-4 | CTD_31   | 5°01'N   | 23°00'W   | 29.04. 11:50-12:40 | <b>CTD/LADCP/PAR station (1300m)</b>    |
| 352-5 | MN_12    | 5°01'N   | 23°00'W   | 29.04. 12:50-13:40 | <b>Multinet</b>                         |
| 352-6 | KPO_1126 | 5°01.0'N | 23°00.0'W | 29.04. 15:10-19:10 | <b>Mooring deployment</b>               |
| 352-7 | CTD_32   | 5°02'N   | 22°59'W   | 29.04. 19:30-21:00 | <b>CTD/LADCP station (1300m)</b>        |
| 352-8 | CTD_33   | 4°59'N   | 23°00'W   | 29.04. 22:00-0:50  | <b>CTD/LADCP station (4199m/bottom)</b> |
| 352-9 | MN_13    | 4°59'N   | 23°00'W   | 30.04. 1:00-1:40   | <b>Multinet</b>                         |
| 353-1 | MSS_5    | 4°30.0'N | 22°25.0'W | 30.04. 6:10-7:40   | <b>Microstructure</b>                   |
| 353-2 | KPO_1092 | 4°32.0'N | 22°25.0'W | 30.04. 7:50-9:50   | <b>Mooring recovery</b>                 |
| 354-1 | CTD_34   | 4°00'N   | 23°00'W   | 30.04. 15:20-18:00 | <b>CTD/LADCP station (4212m/bottom)</b> |
| 355-1 | CTD_35   | 3°40'N   | 23°00'W   | 30.04. 21:10-23:40 | <b>CTD/LADCP station (4436m/bottom)</b> |
| 356-1 | CTD_36   | 3°20'N   | 23°00'W   | 01.05. 1:40-4:20   | <b>CTD/LADCP station (4153m/bottom)</b> |
| 357-1 | CTD_37   | 3°00'N   | 23°00'W   | 01.05. 6:40-10:00  | <b>CTD/LADCP station (4641m/bottom)</b> |
| 357-2 | MN_14    | 3°00'N   | 23°00'W   | 01.05. 10:10-11:00 | <b>Multinet</b>                         |
| 357-3 | CTD_38   | 3°00'N   | 23°00'W   | 01.05. 11:30-11:50 | <b>CTD/PAR station (200m)</b>           |
| 358-1 | CTD_39   | 2°40'N   | 23°00'W   | 01.05. 14:10-16:50 | <b>CTD/LADCP station (4699m/bottom)</b> |
| 359-1 | CTD_40   | 2°20'N   | 23°00'W   | 01.05. 19:10-21:40 | <b>CTD/LADCP station (4277m/bottom)</b> |
| 360-1 | CTD_41   | 2°00'N   | 23°00'W   | 01.05. 23:50-0:10  | <b>CTD/LADCP station (200m)</b>         |
| 360-2 | CTD_42   | 2°00'N   | 23°00'W   | 02.05. 0:40-3:20   | <b>CTD/LADCP station (4328m/bottom)</b> |
| 361-1 | CTD_43   | 1°40'N   | 23°00'W   | 02.05. 5:40-8:00   | <b>CTD/LADCP station (4119m/bottom)</b> |
| 362-1 | CTD_44   | 1°20'N   | 23°00'W   | 02.05. 10:30-13:20 | <b>CTD/LADCP station (4717m/bottom)</b> |
| 363-1 | MN_15    | 1°00'N   | 23°00'W   | 02.05. 15:50-      | <b>Multinet</b>                         |

|       |          |           |            |                    |   |
|-------|----------|-----------|------------|--------------------|---|
|       |          |           |            | 17:00              |   |
| 363-2 | CTD_45   | 1°00'N    | 23°00'W    | 02.05. 17:10-19:10 | <b>CTD/LADCP station (3220m/bottom)</b> |
| 364-1 | CTD_46   | 0°40'N    | 23°00'W    | 02.05. 21:30-23:50 | <b>CTD/LADCP station (3898m/bottom)</b> |
| 365-1 | CTD_47   | 0°20'N    | 23°00'W    | 03.05. 2:10-4:30   | <b>CTD/LADCP station (3913m/bottom)</b> |
| 366-1 | MSS_6    | 0°00'N    | 23°06'W    | 03.05. 6:40-7:40   | <b>Microstructure</b>                   |
| 366-2 | KPO_1089 | 0°00.20'N | 23°06.80'W | 03.05. 7:50-11:40  | <b>Mooring recovery</b>                 |
| 366-3 | MN_16    | 0°00'N    | 23°01'W    | 03.05. 12:50-13:40 | <b>Multinet</b>                         |
| 366-4 | CTD_48   | 0°00'N    | 23°01'W    | 03.05. 13:50-15:10 | <b>CTD/LADCP/PAR station (1300m)</b>    |
| 367-1 | MN_17    | 0°10'N    | 23°00'W    | 03.05. 16:40-17:40 | <b>Multinet</b>                         |
| 367-2 | CTD_49   | 0°10'N    | 23°00'W    | 03.05. 17:40-18:40 | <b>CTD/LADCP/PAR station (1300m)</b>    |
| 367-3 | MSS_7    | 0°10'N    | 23°00'W    | 03.05. 18:50-19:40 | <b>Microstructure</b>                   |
| 368-1 | CTD_50   | 0°10'S    | 23°00'W    | 03.05. 22:00-23:20 | <b>CTD/LADCP station (1300m)</b>        |
| 368-2 | MN_18    | 0°10'S    | 23°00'W    | 03.05. 23:30-0:30  | <b>Multinet</b>                         |
| 368-3 | MSS_8    | 0°10'S    | 23°00'W    | 04.05. 0:40-2:30   | <b>Microstructure</b>                   |
| 369-1 | MN_19    | 0°00'N    | 23°01'W    | 04.05. 3:40-4:40   | <b>Multinet</b>                         |
| 369-2 | CTD_51   | 0°00'N    | 23°01'W    | 04.05. 4:40-7:00   | <b>CTD/LADCP station (3952m/bottom)</b> |
| 370-1 | KPO_1125 | 0°00.20'N | 23°06.80'W | 04.05. 9:00-12:30  | <b>Mooring deployment</b>               |
| 371-1 | CTD_52   | 0°00'N    | 23°01'W    | 04.05. 13:10-13:40 | <b>CTD/LADCP/PAR station (600m)</b>     |
| 371-2 | MSS_9    | 0°00.3'N  | 22°59.6'W  | 04.05. 15:10-16:00 | <b>Microstructure</b>                   |
| 371-3 | CTD_53   | 0°00'N    | 23°01'W    | 04.05. 16:40-18:50 | <b>CTD/LADCP station (3951m/bottom)</b> |
| 372-1 | CTD_54   | 0°20'S    | 23°00'W    | 04.05. 21:10-21:30 | <b>CTD/LADCP station (50m)</b>          |
| 372-1 | CTD_55   | 0°20'S    | 23°00'W    | 04.05. 21:30-0:30  | <b>CTD/LADCP station (4614m/bottom)</b> |
| 372-2 | MSS_10   | 0°20'S    | 22°59.6'W  | 05.05. 0:40-2:10   | <b>Microstructure</b>                   |
| 372-3 | CTD_56   | 0°20'S    | 23°00'W    | 05.05. 2:30-5:10   | <b>CTD/LADCP station (4613m/bottom)</b> |
| 373-1 | CTD_57   | 0°40'S    | 23°00'W    | 05.05. 7:20-9:30   | <b>CTD/LADCP station (3562m/bottom)</b> |
| 374-1 | CTD_58   | 1°00'S    | 23°00'W    | 05.05. 12:00-14:20 | <b>CTD/LADCP station (4120m/bottom)</b> |
| 374-2 | MN_20    | 1°00'S    | 23°00'W    | 05.05. 14:30-15:20 | <b>Multinet</b>                         |
| 375-1 | CTD_59   | 1°20'S    | 23°00'W    | 05.05. 17:40-      | <b>CTD/LADCP station (4847m/bottom)</b> |

|       |        |         |         |                    |   |
|-------|--------|---------|---------|--------------------|---|
|       |        |         |         | 20:30              |   |
| 376-1 | CTD_60 | 1°40'S  | 23°00'W | 05.05. 22:50-1:40  | CTD/LADCP station (4923m/bottom)            |
| 377-1 | CTD_61 | 2°00'S  | 23°00'W | 06.05. 4:00-7:20   | CTD/LADCP station (5216m/bottom)            |
| 378-1 | CTD_62 | 2°20'S  | 23°00'W | 06.05. 9:50-13:10  | CTD/LADCP station (5124m/bottom)            |
| 379-1 | CTD_63 | 2°40'S  | 23°00'W | 06.05. 15:30-19:00 | CTD/LADCP station (5630m/bottom)            |
| 380-1 | CTD_64 | 3°00'S  | 23°00'W | 06.05. 21:30-21:50 | CTD/LADCP station (120m)                    |
| 380-2 | MN_21  | 3°00'S  | 23°00'W | 06.05. 22:00-22:50 | Multinet                                    |
| 380-3 | CTD_65 | 3°00'S  | 23°00'W | 06.05. 23:40-3:30  | CTD/LADCP station (5469m/bottom)            |
| 381-1 | CTD_66 | 3°20'S  | 23°00'W | 07.05. 6:00-9:20   | CTD/LADCP station (5179m/bottom)            |
| 382-1 | CTD_67 | 3°40'S  | 23°00'W | 07.05. 11:50-15:20 | CTD/LADCP station (5332m/bottom)            |
| 383-1 | CTD_68 | 4°00'S  | 23°00'W | 08.05. 0:00-4:10   | CTD/LADCP station (5822m/bottom)            |
| 384-1 | CTD_69 | 4°30'S  | 23°00'W | 08.05. 7:30-11:10  | CTD/LADCP station (5162m/bottom)            |
| 385-1 | CTD_70 | 5°00'S  | 23°00'W | 08.05. 14:40-17:50 | CTD/LADCP station (5188m/bottom)            |
| 385-2 | MN_22  | 5°00'S  | 23°00'W | 08.05. 18:00-18:50 | Multinet                                    |
| 386-1 | CTD_71 | 5°30'S  | 23°00'W | 08.05. 22:20-23:20 | CTD/LADCP station (1300m)                   |
| 387-1 | CTD_72 | 6°00'S  | 23°00'W | 09.05. 2:40-5:50   | CTD/LADCP station (5212m/bottom)            |
| 388-1 | CTD_73 | 6°30'S  | 23°00'W | 09.05. 9:10-10:00  | CTD/LADCP/PAR station (1300m)               |
| 389-1 | CTD_74 | 7°00'S  | 23°00'W | 09.05. 13:20-13:40 | CTD/LADCP station (120m/bottom)             |
| 389-2 | MN_23  | 7°00'S  | 23°00'W | 09.05. 13:40-14:30 | Multinet                                    |
| 389-3 | CTD_75 | 7°00'S  | 23°00'W | 09.05. 14:40-17:50 | CTD/LADCP station (5236m/bottom)            |
| 390-1 | CTD_76 | 7°30'S  | 23°00'W | 09.05. 21:10-22:00 | CTD/LADCP station (1300m)                   |
| 391-1 | CTD_77 | 8°00'S  | 23°00'W | 10.05. 1:20-5:10   | CTD/LADCP station (5575m/bottom)            |
| 392-1 | CTD_78 | 8°30'S  | 23°00'W | 10.05. 8:20-9:50   | CTD/LADCP station (1300m)                   |
| 393-1 |        | 11°30'S | 32°00'W | 12.05. 14:30-15:40 | Pressure test of PIES modems, releaser test |
| 393-2 | CTD_79 | 11°30'S | 32°00'W | 12.05. 15:50-19:00 | CTD/LADCP station (5027m/bottom)            |
| 394-1 | CTD_80 | 11°30'S | 32°27'W | 12.05. 22:00-1:00  | CTD/LADCP station (4759m/bottom)            |
| 395-1 | CTD_81 | 11°30'S | 32°53'W | 13.05. 3:40-5:50   | CTD/LADCP station (3491m/bottom)            |
| 396-1 | CTD_82 | 11°30'S | 33°13'W | 13.05. 8:00-       | CTD/LADCP station (4283m/bottom)            |

|       |          |             |             |                    |   |
|-------|----------|-------------|-------------|--------------------|---|
|       |          |             |             | 10:30              |   |
| 397-1 | CTD_83   | 11°30'S     | 33°33'W     | 13.05. 11:40-14:40 | <b>CTD/LADCP station (4963m/bottom)</b> |
| 398-1 | CTD_84   | 11°30'S     | 33°53'W     | 13.05. 16:40-19:10 | <b>CTD/LADCP station (4617m/bottom)</b> |
|       |          | 11°30'S     | 34°13'W     |                    | <b>Start ADCP section</b>               |
| 399-1 | KPO_1096 | 10°22.8'S   | 35°40.8'W   | 14.05. 7:50-9:40   | <b>Mooring recovery</b>                 |
| 400-1 | KPO_1095 | 10°16.0'S   | 35°51.7'W   | 14.05. 11:20-12:30 | <b>Mooring recovery</b>                 |
|       |          | 10°14.2'S   | 35°54.2'W   |                    | <b>End ADCP section (70m)</b>           |
|       |          | 10°13.677'S | 35°52.500'W |                    | <b>Depth measurement: 297m</b>          |
| 401-1 | KPO_1134 | 10°13.58'S  | 35°52.42'W  | 14.05. 13:30       | <b>Deployment of PIES (303m)</b>        |
|       |          | 10°14.149'S | 35°51.905'W |                    | <b>Depth measurement: 484m</b>          |
| 402-1 | KPO_1135 | 10°13.972'S | 35°51.744'W | 14.05. 13:50       | <b>Deployment of PIES (495m)</b>        |
|       |          | 10°14.2'S   | 35°54.2'W   |                    | <b>Start ADCP section (70m)</b>         |
| 403-1 | CTD_85   | 10°14.6'S   | 35°53.6'W   | 14.05. 14:30-14:50 | <b>CTD/LADCP station (219m/bottom)</b>  |
| 403-2 | MSS_11   | 10°14.6'S   | 35°53.6'W   | 14.05. 15:00-15:50 | <b>Microstructure</b>                   |
| 404-1 | CTD_86   | 10°15.3'S   | 35°52.6'W   | 14.05. 16:10-16:40 | <b>CTD/LADCP station (510m/bottom)</b>  |
| 404-2 | MSS_12   | 10°15.3'S   | 35°52.6'W   | 14.05. 16:50-18:30 | <b>Microstructure</b>                   |
| 405-1 | CTD_87   | 10°16.0'S   | 35°51.7'W   | 14.05. 18:50-19:30 | <b>CTD/LADCP station (899m/bottom)</b>  |
| 405-2 | MSS_13   | 10°16.0'S   | 35°51.7'W   | 14.05. 19:40-21:10 | <b>Microstructure</b>                   |
| 406-1 | CTD_88   | 10°19.5'S   | 35°46.1'W   | 14.05. 22:20-23:40 | <b>CTD/LADCP station (1757m/bottom)</b> |
| 406-2 | MSS_14   | 10°19.5'S   | 35°46.1'W   | 14.05. 23:50-1:20  | <b>Microstructure</b>                   |
| 407-1 | CTD_89   | 10°22.8'S   | 35°40.8'W   | 15.05. 2:10-3:40   | <b>CTD/LADCP station (2308m/bottom)</b> |
| 407-2 | MSS_15   | 10°22.8'S   | 35°40.8'W   | 15.05. 3:40-6:20   | <b>Microstructure</b>                   |
| 408-1 | KPO_1130 | 10°22.8'S   | 35°40.8'W   | 15.05. 8:00-10:20  | <b>Mooring deployment</b>               |
| 409-1 | KPO_1129 | 10°16.0'S   | 35°51.7'W   | 15.05. 12:30-13:10 | <b>Mooring deployment</b>               |
| 410-1 | CTD_90   | 10°27.4'S   | 35°34.9'W   | 15.05. 15:30-17:20 | <b>CTD/LADCP station (2865m/bottom)</b> |
| 410-2 | MSS_16   | 10°27.4'S   | 35°34.9'W   | 15.05. 17:30-19:10 | <b>Microstructure</b>                   |
| 411-1 | CTD_91   | 10°32.0'S   | 35°29.3'W   | 15.05. 20:10-21:00 | <b>CTD/LADCP station (3205m/bottom)</b> |
| 411-2 | MSS_17   | 10°32.0'S   | 35°29.3'W   | 15.05. 21:10-21:40 | <b>Microstructure</b>                   |
| 411-3 | CTD_92   | 10°32.0'S   | 35°29.3'W   | 15.05. 20:10-21:00 | <b>CTD/LADCP station (3205m/bottom)</b> |
| 411-4 | MSS_18   | 10°32.0'S   | 35°29.3'W   | 15.05. 21:10-21:40 | <b>Microstructure</b>                   |
| 412-1 | CTD_93   | 10°36.5'S   | 35°23.6'W   | 16.05. 2:50-5:00   | <b>CTD/LADCP station (3512m/bottom)</b> |

|       |          |           |           |                    |   |
|-------|----------|-----------|-----------|--------------------|---|
| 412-2 | MSS_19   | 10°36.5'S | 35°23.6'W | 16.05. 5:20-7:00   | <b>Microstructure</b>                   |
| 412-3 | KPO_1097 | 10°36.5'S | 35°23.6'W | 16.05. 7:20-10:20  | <b>Mooring</b> recovery                 |
| 412-4 | KPO_1131 | 10°36.5'S | 35°23.6'W | 16.05. 13:40-16:40 | <b>Mooring</b> deployment               |
| 413-1 | CTD_94   | 10°41.4'S | 35°17.6'W | 16.05. 17:50-20:00 | <b>CTD/LADCP</b> station (3673m/bottom) |
| 413-2 | MSS_20   | 10°41.4'S | 35°17.6'W | 16.05. 20:10-21:10 | <b>Microstructure</b>                   |
| 414-1 | CTD_95   | 10°46.4'S | 35°11.6'W | 16.05. 22:10-0:30  | <b>CTD/LADCP</b> station (3868m/bottom) |
| 414-2 | MSS_21   | 10°46.4'S | 35°11.6'W | 17.05. 0:40-1:40   | <b>Microstructure</b>                   |
| 415-1 | CTD_96   | 10°51.4'S | 35°05.6'W | 17.05. 2:40-5:00   | <b>CTD/LADCP</b> station (3960m/bottom) |
| 415-2 | MSS_22   | 10°51.4'S | 35°05.6'W | 17.05. 5:10-6:30   | <b>Microstructure</b>                   |
| 416-1 | KPO_1098 | 10°56.4'S | 34°59.6'W | 17.05. 7:20-9:50   | <b>Mooring</b> recovery                 |
| 416-2 | CTD_97   | 10°56.4'S | 34°59.6'W | 17.05. 10:30-13:00 | <b>CTD/LADCP</b> station (4096m/bottom) |
| 416-3 | KPO_1132 | 10°56.4'S | 34°59.6'W | 17.05. 14:10-17:50 | <b>Mooring</b> deployment               |
| 416-4 | MSS_23   | 10°56.4'S | 34°59.6'W | 17.05. 18:00-19:40 | <b>Microstructure</b>                   |
| 417-1 | CTD_98   | 11°07.6'S | 34°43.9'W | 17.05. 21:50-0:30  | <b>CTD/LADCP</b> station (4244m/bottom) |
| 417-2 | MSS_24   | 11°07.6'S | 34°43.9'W | 18.05. 0:30-2:10   | <b>Microstructure</b>                   |
| 418-1 | CTD_99   | 11°18.8'S | 34°28.2'W | 18.05. 3:20-6:10   | <b>CTD/LADCP</b> station (4634m/bottom) |
| 418-2 | MSS_25   | 11°18.8'S | 34°28.2'W | 18.05. 6:20-8:00   | <b>Microstructure</b>                   |
| 419-1 | CTD_100  | 11°30.0'S | 34°13.0'W | 18.05. 10:10-13:10 | <b>CTD/LADCP</b> station (4569m/bottom) |
| 419-2 | MSS_26   | 11°30.0'S | 34°13.0'W | 18.05. 13:20-14:40 | <b>Microstructure</b>                   |
|       |          | 11°30'S   | 34°13'W   |                    | <b>Start ADCP section</b>               |
| 420-1 | CTD_101  | 10°36.5'S | 35°23.6'W | 18.05. 23:00-1:20  | <b>CTD/LADCP</b> station (3525m/bottom) |
| 421-1 | CTD_102  | 10°32.0'S | 35°29.3'W | 19.05. 2:20-4:30   | <b>CTD/LADCP</b> station (3204m/bottom) |
|       |          | 10°14.2'S | 35°54.2'W |                    | <b>End ADCP section (70m)</b>           |
| 422-1 | CTD_103  | 5°00'S    | 31°30'W   | 20.05. 23:10-2:10  | <b>CTD/LADCP</b> station (4692m/bottom) |
| 422-2 | MSS_27   | 5°00'S    | 31°30'W   | 21.05. 2:20-4:00   | <b>Microstructure</b>                   |
| 423-1 | CTD_104  | 5°07.0'S  | 32°00.0'W | 21.05. 7:00-9:40   | <b>CTD/LADCP</b> station (4602m/bottom) |
| 423-2 | MSS_28   | 5°07.0'S  | 32°00.0'W | 21.05. 9:50-11:20  | <b>Microstructure</b>                   |
| 424-1 | CTD_105  | 5°12.3'S  | 32°30.0'W | 21.05. 14:20-14:40 | <b>CTD/LADCP</b> station (120 m)        |

|       |         |          |           |                    |   |
|-------|---------|----------|-----------|--------------------|---|
| 424-2 | CTD_106 | 5°12.3'S | 32°30.0'W | 21.05. 15:00-17:40 | <b>CTD/LADCP station (4589m/bottom)</b> |
| 424-3 | MSS_29  | 5°12.3'S | 32°30.0'W | 21.05. 17:50-18:10 | <b>Microstructure</b>                   |
| 425-1 | CTD_107 | 5°17.7'S | 33°00.0'W | 21.05. 21:20-0:00  | <b>CTD/LADCP station (4555m/bottom)</b> |
| 425-2 | MSS_30  | 5°17.7'S | 33°00.0'W | 22.05. 0:10-1:20   | <b>Microstructure</b>                   |
| 426-1 | CTD_108 | 5°21.7'S | 33°25.0'W | 22.05. 4:10-6:40   | <b>CTD/LADCP station (4474m/bottom)</b> |
| 426-2 | MSS_31  | 5°21.7'S | 33°25.0'W | 22.05. 6:50-8:20   | <b>Microstructure</b>                   |
| 427-1 | CTD_109 | 5°26.6'S | 33°50.0'W | 22.05. 10:50-13:20 | <b>CTD/LADCP station (4316m/bottom)</b> |
| 427-2 | MSS_32  | 5°26.6'S | 33°50.0'W | 22.05. 13:20-15:10 | <b>Microstructure</b>                   |
| 428-1 | CTD_110 | 5°30.2'S | 34°10.0'W | 22.05. 17:30-17:50 | <b>CTD/LADCP station (120m)</b>         |
| 428-2 | CTD_111 | 5°30.2'S | 34°10.0'W | 22.05. 18:20-20:50 | <b>CTD/LADCP station (4110m/bottom)</b> |
| 428-3 | MSS_33  | 5°30.2'S | 34°10.0'W | 22.05. 21:00-22:30 | <b>Microstructure</b>                   |
| 429-1 | CTD_112 | 5°32.7'S | 34°24.0'W | 23.05. 00:00-3:00  | <b>CTD/LADCP station (3761m/bottom)</b> |
| 429-2 | MSS_34  | 5°32.7'S | 34°24.0'W | 23.05. 3:00-4:40   | <b>Microstructure</b>                   |
| 430-1 | CTD_113 | 5°34.8'S | 34°36.0'W | 23.05. 6:00-8:00   | <b>CTD/LADCP station (3405m/bottom)</b> |
| 430-2 | MSS_35  | 5°34.8'S | 34°36.0'W | 23.05. 8:10-9:40   | <b>Microstructure</b>                   |
| 431-1 | CTD_114 | 5°36.6'S | 34°46.0'W | 23.05. 10:50-12:30 | <b>CTD/LADCP station (2837m/bottom)</b> |
| 431-2 | MSS_36  | 5°36.6'S | 34°46.0'W | 23.05. 12:40-14:00 | <b>Microstructure</b>                   |
| 432-1 | CTD_115 | 5°38.0'S | 34°54.0'W | 23.05. 15:00-16:00 | <b>CTD/LADCP station (1654m/bottom)</b> |
| 432-2 | MSS_37  | 5°38.0'S | 34°54.0'W | 23.05. 16:00-17:50 | <b>Microstructure</b>                   |
| 432-3 | CTD_116 | 5°38.0'S | 34°54.0'W | 23.05. 18:30-19:00 | <b>CTD/LADCP station (600m)</b>         |
| 433-1 | CTD_117 | 5°38.3'S | 34°56.0'W | 23.05. 20:00-20:30 | <b>CTD/LADCP station (740m/bottom)</b>  |
| 433-2 | MSS_38  | 5°38.3'S | 34°56.0'W | 23.05. 20:40-21:30 | <b>Microstructure</b>                   |
| 434-1 | CTD_118 | 5°39.0'S | 34°57.6'W | 23.05. 22:10-22:30 | <b>CTD/LADCP station (280m/bottom)</b>  |
| 434-2 | MSS_39  | 5°39.0'S | 34°57.6'W | 23.05. 23:40-0:20  | <b>Microstructure</b>                   |