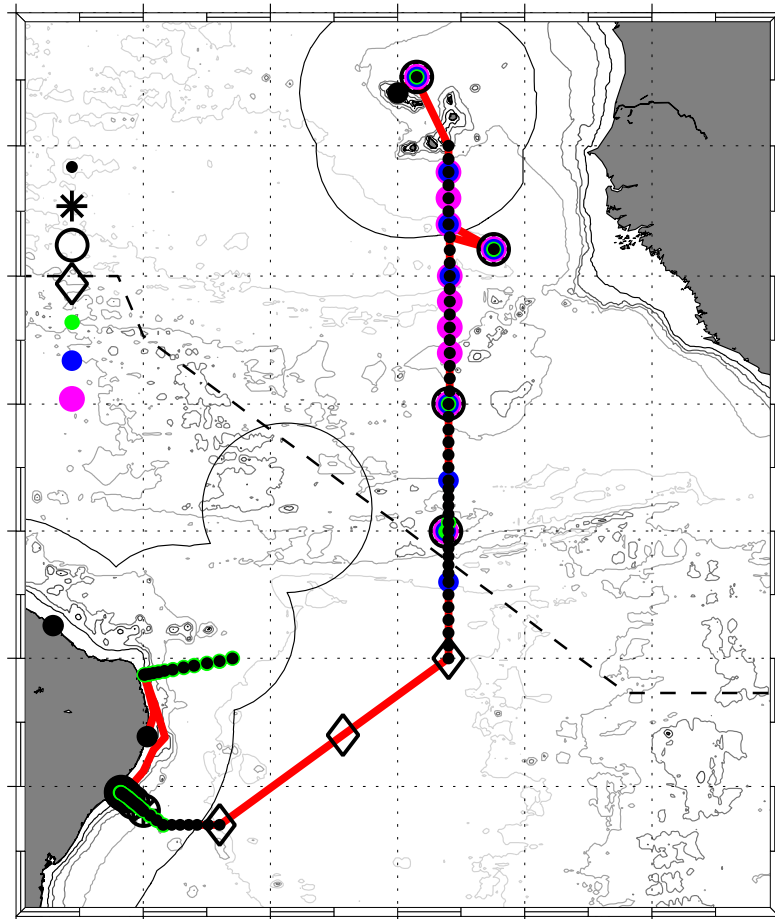


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Short Cruise Report
R/V METEOR M119 Mindelo – Recife
8th September – 12th October 2015
Chief Scientist: Prof. Dr. Peter Brandt
Captain: Michael Schneider

Meteor 119, Mindelo – Recife, Sep. 8 – Oct. 12, 2015



Bathymetric map with ship track of R/V METEOR cruise M119 including locations of CTD stations, mooring recoveries and deployments, microstructure measurements, multinet stations and towed camera stations. Black solid lines mark territorial waters of Brazil and Cape Verde, dashed black line marks SAR area of Brazil.

Objectives

R/V METEOR cruise M119 was a joint effort of the Kiel Collaborative Research Centre SFB 754 ("Climate - Biogeochemistry Interactions in the Tropical Ocean") involving the BMBF joint project RACE and the German-French-African Cooperative Project AWA. The main goal within the framework of the SFB 754 was the quantification of oxygen supply to the oxygen minimum zone (OMZ) of the Eastern Tropical North Atlantic (ETNA). Ventilation processes to be investigated include lateral and vertical mixing and oxygen advection (SFB SP A3 and A4). Other foci of this cruise were the role of zooplankton and particles for oxygen consumption and biogeochemical cycles (SFB SP B8), camera observations of epi- and mesopelagic communities of macrozooplankton and micronekton (project of the Cluster of Excellence "Future Ocean"), and incubation experiments and water sampling for estimating N_2 fixation. All planned hydrographic and current data were acquired as planned (with some reduction of the number of CTD station along $23^\circ W$), including the successful recovery of all moorings. At the equator, the cruise additionally focussed on the equatorial current system, its interannual to decadal variability and its role in the zonal transport of heat, freshwater, and oxygen (BMBF RACE, SFB 754). The long-term mooring at the equator, at $23^\circ W$ was successfully recovered and redeployed. At the western boundary of the South Atlantic off Brazil, a special focus was placed on the transport variability of the North Brazil Undercurrent (NBUC) and the Deep Western Boundary Current (DWBC) – as part of the meridional overturning circulation (AMOC) – on timescales from intraseasonal to decadal (BMBF RACE). The mooring array at $11^\circ S$ at the shelf and continental slope off the Brazilian coast was successfully recovered and redeployed. The boundary current system was surveyed with two high-resolution hydrographic sections (CTD/LADCP, shipboard ADCP, microstructure) at $5^\circ S$ and $11^\circ S$ off Brazil.

Narrative

R/V METEOR departed from Mindelo on September 8, 2015 at 9:00 and headed north between the Cape Verdean islands of São Vicente and Santo Antão. The recovery of the CVOO (Cape Verde Ocean Observatory) mooring north of São Vicente was the first activity of the cruise. It was followed by stations with the CTD-rosette system, by zooplankton multinet stations, microstructure stations, and towed camera stations. An underwater video profiler (UVP) were alternately attached to the CTD-rosette and the towed camera system. Additional instrumentation at the CTD-rosette included a lowered ADCP system (up- and downward looking 300 kHz ADCPs) and a fluorometer. Collected water samples were used for measuring oxygen, nutrients, chlorophyll-*a* (Chl-*a*) and salinity as well as for incubation experiments for estimating Carbon and Nitrogen fixation rates. Some of the CTD/O₂ 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 morning of September 10, when the CVOO mooring was successfully redeployed. In between the two mentioned mooring operation we deployed another mooring in the morning of September 9. This mooring consists of a newly developed under water winch with profiler allowing physical and biogeochemical measurements with a complex sensor package between the parking depth of the winch at about 140m depth and the sea

surface, where satellite communication allows real-time data transfer. Due to a malfunctioning of the which, the winch system had to be recovered on September 10 after the CVOO mooring deployment. The rest of the winch mooring including an upward looking ADCP at 160 m is still in place to be regularly recovered during our next cruise into the tropical Atlantic.

The measurements along 23°W, including 51 CTD-O₂/LADCP/UVP stations between 15°N and 5°00'S, were a main focus of our cruise. Other measurements included rates of carbon and nitrogen fixation, nutrient concentration, and chlorophyll concentration. In addition spectro-radiometer measurements typically performed around noon to infer the underwater light in the upper 100 m. Several underway systems were used for continuous along track measurements throughout the cruise: i) two shipboard ADCPs with a frequency of 38 kHz and 75 kHz measuring horizontal velocities in the upper 600 and 1000 m, respectively, ii) the thermosalinograph measuring near-surface temperature and salinity and iii) oxygen and total gas tension measurements in a throughflow box. The work along the 23°W section started on September 11 and ended on September 26. The spatial resolution of CTD station work was 30' in latitude north of 2°N and south of 2°S and 20' in latitude between 2°N and 2°S. Stations north of 5°N were performed down to 1300 m and from 5°N to 5°S full-depth profiles were taken. Zooplankton multinet and towed camera stations were performed within the latitudinal range of the OMZ of the tropical North Atlantic every 2° and 1° in latitude, respectively, with some additional stations near the equator.

On September 13 and 14, 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. At this location, the OSTRE (Oxygen Supply Tracer Release Experiment) was carried out in November 2012, and the tracer distribution was surveyed last time during M116. During the night from September 12 to 13, while approaching the mooring position, a malfunctioning of a fire sea water pump resulted in a flooding of the control box of the central hydraulic system of the ship. The severe damage at the hydraulic system of the ship did not allow for any scientific measurements except microstructure measurements, which used its own winch system. Thus microstructure measurements were carried out for about one day, which will allow a better comparison of the diapycnal diffusivities derived from the tracer release experiment and the microstructure measurements. After the provisional repair of the hydraulic system of the ship, the mooring that 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, was successfully recovered on September 13. Unfortunately the LRADCP developed a water leakage just after the deployment 1.5 years ago and no relevant data could be acquired with this instrument. Other moored instrumentation worked as planned. As the hydraulic system of the ship could not be completely repaired with the material and replacement parts on board, it became evident that the cruise time of M119 had to be reduced by one day to allow a proper repair of the hydraulic system during the port stay in Recife at the end of the cruise. With this information, we decided to reduce the number of CTD stations by reducing the resolution near the equator compared to previous cruises and to finish the 23°W section already at 5°S.

On the afternoon of September 18, we arrived at the next mooring at 23°W, 5°N. Similar to the mooring at 11°N, the moorings was equipped with a series of oxygen, temperature and salinity sensors as well as LRADCPs. The mooring was recovered successfully, yielding almost complete datasets. After performing CTD, multinet, towed camera and microstructure stations during the night, the mooring was redeployed in the morning of September 19 to continue observations of long-term variability at the southern rim of the OMZ.

The last mooring along the 23°W section was recovered at the equator on September 22. This mooring is installed in cooperation with the international PIRATA program. As part of the PIRATA program, upper ocean currents including the Equatorial Undercurrent are measured using an upward looking 150 kHz ADCP installed at a depth of about 210 m. Directly below is a downward looking LRADCP and between about 750 and 1000 m there are several single-point current meters. Between 1000 m and 3500 m a moored profiler travels up and down the mooring wire every 6 days while measuring velocity, temperature and salinity. All instruments worked well, particularly delivering full-depth velocity measurements for a period of about 1.5 years. This mooring is a long-term effort beginning in 2002 aimed at identifying equatorial current variability on intraseasonal, seasonal, interannual and decadal time scales.

After completion of measurements along 23°W on September 26, R/V METEOR headed southwest towards the western boundary off Brazil. During the transit three Argo floats provided by the BSH (Bundesamt für Seeschifffahrt und Hydrographie) were deployed within the German Argo program. At a test CTD station along the transit aimed for testing the CTD system, we noticed a failure of one flash lamp of the UVP. The UVP could not be repaired and a new electronic board was requested to be installed during the port call in Recife hopefully allowing a use of the UVP during the next cruise, M120. CTD station and mooring work along 11°S commenced on September 28. Along this section, 4 current meter moorings were recovered and redeployed, one PIES (inverted echo sounder with pressure sensor) was recovered (deployed in July 2013 during M98) and data from two PIES (deployed in May 2014 during M106) were acoustically transferred to the ship via a separate acoustic modems attached to the PIES. One bottom pressure sensor that was also deployed in July 2013 during M98 could not be recovered. It was not possible to establish an acoustic connection to the single release and we have to conclude that the system is either not in place anymore or is not able to respond to the release command. With the deployment of the fourth mooring off Brazil on October 4, the mooring work during M106 ended very successfully: all moorings (except the single bottom pressure sensor) 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 stations and 16 microstructure stations with acquisition of typically 3 profiles per station and one 12-h 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 along about 11°S was finished on October 6 and R/V METEOR thereafter headed north towards the westernmost station of the 5°S section.

Along the last section of the cruise along about 5°S, a total of 14 surface-to-bottom CTD stations and 9 microstructure stations with acquisition of typically 4 profiles per station were

carried out. The section was finished on October 10. After finishing the last CTD cast at the easternmost station of the 5°S section, R/V METEOR turned westward to repeat the ADCP measurements along the 5°S section.

The ship arrived at the port of Recife, Brazil on October 12, 2015 at 8:00, one day before the originally planned arrival time.

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 M119

1	Brandt, Peter, Prof. Dr.	Chief Scientist	GEOMAR
2	Fernández Carrera, Ana, Dr.	N/C Fixation	GATECH
3	Fried, Nora	2 CTD watch, salinometer, optodes, moored ADCPs	GEOMAR
4	Hahn, Johannes, Dr.	optodes, MicroCATs, 1 CTD watch	GEOMAR
5	Hahn, Tobias	O ₂ , underway O ₂ and total gas pressure, 1 CTD watch	GEOMAR
6	Hench, Kosmas	UVP, water biogeochemistry	GEOMAR
7	Hoving, Hendrik Jan Ties, Dr.	Towed camera	GEOMAR
8	Hummels, Rebecca, Dr.	Moored ADCPs, current meter, 2 CTD watch (MSS)	GEOMAR
9	Kisjeloff, Boris	1 CTD watch, optodes, MicroCATs	GEOMAR
10	Köhn, Eike	2 CTD watch (MSS), MicroCATs	GEOMAR
11	Krahmann, Gerd, Dr.	CTD, 1 CTD watch, LADCP	GEOMAR
12	Martens, Wiebke	1 CTD watch, CTD technique, MicroCATs	GEOMAR
13	Niehus, Gerd	Moorings, releaser	GEOMAR
14	Papenburg, Uwe	Moorings, current meters, ADCPs	GEOMAR
15	Rentsch, Harald	Meteorology	DWD
16	Rohleder, Christian	Meteorology	DWD
17	Rudminat, Francie	N ₂ fixation, meta-omics	GEOMAR
18	Schütte, Florian	2 CTD watch (MSS), shipboard ADCP	GEOMAR
19	Subramaniam, Ajit, Dr.	Bio-optics, phytoplankton	LDEO
20	Tuchen, Franz Philip	2 CTD watch (MSS), moored profiler	GEOMAR
21	Turner, Katherine	Salinometer, 2 CTD watch	GEOMAR
22	Tyaquiçã, Pedro	1 CTD watch, Moorings	UFPE
23	Vandromme, Pierre, Dr.	UVP, multinet	GEOMAR
24	Pimentel Machado Neto, Almir	Observer	Brazil

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Tab. 1.1: Station list of R/V METEOR cruise M119.

Station No. M119 Ship/Science		Latitude	Longitude	Time	Work
683-1	KPO_1128	17°36.354'N	24°14.976'W	08.09. 15:00-20:30	Mooring recovery
684-1	CTD_1	17°37'N	24°20'W	08.09. 21:10-00:10	CTD station (3598m/bottom)
685-1	MN_1	17°37'N	24°22'W	09.09. 00:30-2:20	Multinet
686-1	CTD_2	17°37'N	24°21'W	09.09. 04:00-05:00	CTD station (1000m)
687-1	MSS_1	17°37'N	24°21'W	09.09. 05:40-06:20	Microstructure
688-1	MN_2	17°36'N	24°19'W	09.09. 06:40-07:40	Multinet
689-1	KPO_1156	17°36.27'N	24°18.82'W	09.09. 08:50-13:50	Mooring deployment
690-1	SR_1	17°36'N	24°18'W	09.09. 14:20-14:40	Spectroradiometer
691-1	MN_3	17°36'N	24°18'W	09.09. 14:50-16:00	Multinet
692-1	CTD_3	17°36'N	24°18'W	09.09. 16:20-18:40	CTD station (3598m/bottom)
693-1	KPO_1156	17°36.27'N	24°18.82'W	09.09. 19:00-19:40	Mooring acoustic communication
694-1	TC_1	17°36'N	24°18'W	09.09. 22:00-23:20	Towed Camera
695-1	KPO_1143	17°36.40'N	24°14.98' W	10.09. 07:00-13:40	Mooring deployment
696-1	KPO_1156	17°36.27'N	24°18.82'W	10.09. 14:20-15:30	Mooring winch recovery
697-1	CTD_4	15°00'N	23°00'W	11.09. 06:00-06:50	CTD station (1000m)
698-1	CTD_5	14°30'N	23°00'W	11.09. 09:40-10:40	CTD station (1300m)
699-1	SR_2	14°30'N	23°00'W	11.09. 10:50-11:00	Spectroradiometer
700-1	CTD_6	14°00'N	23°00'W	11.09. 13:50-14:50	CTD station (1300m)
701-1	MN_4	14°00'N	23°00'W	11.09. 15:00-16:10	Multinet
702-1	TC_2	14°00'N	23°00'W	11.09. 16:40-18:50	Towed Camera
703-1	CTD_7	13°30'N	23°00'W	11.09. 21:50-22:50	CTD station (1300m)
704-1	CTD_8	13°00'N	23°00'W	12.09. 02:00-02:50	CTD station (1300m)
705-1	TC_3	13°00'N	23°00'W	12.09. 03:50-06:30	Towed Camera
706-1	CTD_9	12°30'N	23°00'W	12.09. 09:40-11:00	CTD station (1300m) Calibration auf Optodes/MCs
707-1	SR_3	12°00'N	23°00'W	12.09. 14:10-	Spectroradiometer

				14:30	
708-1	CTD_10	12°00'N	23°00'W	12.09. 14:50-15:50	CTD station (1300m)
709-1	MN_5	12°00'N	23°00'W	12.09. 16:00-17:10	Multinet
710-1	TC_4	12°00'N	23°00'W	12.09. 17:30-19:10	Towed Camera
711-1	MSS_2	11°02'N	21°15'W	13.09. 08:40-14.09. 04:50	Microstructure
712-1	KPO_1127	11°02.216'N	21°13.290'W	14.09. 06:40-10:30	Mooring recovery
713-1	SR_4	11°02'N	21°13'W	14.09. 10:50-11:00	Spectroradiometer
714-1	CTD_11	11°02'N	21°13'W	14.09. 11:10-11:40	CTD station (200m)
715-1	MN_6	11°02'N	21°13'W	14.09. 11:50-12:40	Multinet
716-1	TC_5	11°02'N	21°13'W	14.09. 12:50-14:20	Towed Camera
717-1	KPO_1142	11°02.216'N	21°13.290'W	14.09. 15:30-19:50	Mooring deployment
718-1	CTD_12	11°02'N	21°15'W	14.09. 20:20-21:40	CTD station (1300m)
719-1	MN_7	11°02'N	21°15'W	14.09. 21:50-22:50	Multinet
720-1	TC_6	11°02'N	21°15'W	14.09. 23:00-01:30	Towed Camera
721-1	SR_5	11°30'N	22°57'W	15.09. 11:20-11:40	Spectroradiometer
722-1	CTD_13	11°30'N	22°57'W	15.09. 11:40-13:00	CTD station (1300m)
723-1	CTD_14	11°00'N	22°57'W	15.09. 17:20-18:40	CTD station (1300m)
724-1	CTD_15	10°30'N	22°57'W	15.09. 21:50-23:20	CTD station (1300m)
725-1	CTD_16	10°00'N	22°57'W	16.09. 02:30-3:20	CTD station (1300m)
726-1	MN_8	10°00'N	22°57'W	16.09. 03:40-4:30	Multinet
727-1	TC_7	10°00'N	22°57'W	16.09. 04:50-7:10	Towed Camera
728-1	SR_6	09°30'N	22°57'W	16.09. 10:20-10:30	Spectroradiometer
729-1	CTD_17	09°30'N	22°57'W	16.09. 10:30-12:00	CTD station (1300m)
730-1	SR_7	09°00'N	22°57'W	16.09. 15:30-15:40	Spectroradiometer
731-1	CTD_18	09°00'N	22°57'W	16.09. 15:50-16:50	CTD station (1300m)
732-1	TC_8	09°00'N	22°57'W	16.09. 17:20-19:40	Towed Camera
733-1	CTD_19	08°30'N	22°57'W	16.09. 22:40-23:40	CTD station (1300m)
734-1	CTD_20	08°00'N	22°57'W	17.09. 03:00-	CTD station (1300m)

				03:50	
735-1	TC_9	08°00'N	22°57'W	17.09. 04:30-07:30	Towed Camera
736-1	CTD_21	07°30'N	22°57'W	17.09. 10:30-11:50	CTD station (1300m)
737-1	CTD_22	07°00'N	22°57'W	17.09. 15:00-16:00	CTD station (1300m)
738-1	TC_10	07°00'N	22°57'W	17.09. 16:40-18:30	Towed Camera
739-1	CTD_23	06°30'N	22°57'W	17.09. 21:20-22:20	CTD station (1300m)
740-1	CTD_24	06°00'N	22°57'W	18.09. 01:20-2:10	CTD station (1300m)
741-1	CTD_25	05°30'N	22°57'W	18.09. 05:20-6:20	CTD station (1300m)
742-1	TC_11	05°00'N	22°57'W	18.09. 09:20-11:40	Towed Camera
743-1	MN_9	05°00'N	22°57'W	18.09. 11:50-12:40	Multinet
744-1	SR_8	05°00'N	22°57'W	18.09. 12:50-14:00	Spectroradiometer
745-1	CTD_26	05°00'N	22°57'W	18.09. 13:00-14:10	CTD station (1300m)
746-1	KPO_1126	05°01.0'N	23°00.0'W	18.09. 14:40-17:30	Mooring recovery
747-1	CTD_27	05°00'N	23°00'W	18.09. 18:10-20:40	CTD station (4199m/bottom)
748-1	TC_12	05°00'N	23°00'W	18.09. 21:00-23:30	Towed Camera
749-1	MN_10	05°00'N	23°00'W	18.09. 23:40-00:30	Multinet
750-1	CTD_28	05°00'N	23°00'W	19.09. 00:50-02:10	CTD station (1300m) Calibration of optodes
751-1	MSS_3	05°00'N	23°00'W	19.09. 03:20-06:10	Microstructure
752-1	KPO_1141	05°01.0'N	23°00'W	19.09. 06:30-12.50	Mooring deployment
753-1	CTD_29	04°30'N	23°00'W	19.09. 16:20-18:50	CTD station (4140m/bottom)
754-1	CTD_30	04°00'N	23°00'W	19.09. 21:30-00:10	CTD station (4212m/bottom)
755-1	CTD_31	03°30'N	23°00'W	20.09. 02:50-5:30	CTD station (4380m/bottom)
756-1	CTD_32	03°00'N	23°00'W	20.09. 08:10-11:10	CTD station (4641m/bottom)
757-1	SR_9	02°30'N	23°00'W	20.09. 14:00-14:10	Spectroradiometer
758-1	CTD_33	02°30'N	23°00'W	20.09. 14:20-17:10	CTD station (4540m/bottom)
759-1	CTD_34	02°00'N	23°00'W	20.09. 19:50-22:30	CTD station (4328m/bottom)
760-1	MN_11	02°00'N	23°00'W	20.09. 22:40-23:30	Multinet
761-1	CTD_35	01°40'N	23°00'W	21.09. 01:20-	CTD station (4119m/bottom)

				04:00	
762-1	CTD_36	01°20'N	23°00'W	21.09. 05:50-08:50	CTD station (4717m/bottom)
763-1	SR_10	01°00'N	23°00'W	21.09. 10:50-11:10	Spectroradiometer
764-1	CTD_37	01°00'N	23°00'W	21.09. 11:20-14:10	CTD station (3220m/bottom)
765-1	CTD_38	00°40'N	23°00'W	21.09. 16:00-18:30	CTD station (3898m/bottom)
766-1	CTD_39	00°20'N	23°00'W	21.09. 20:20-22:50	CTD station (3913m/bottom)
767-1	MSS_4	00°20'N	23°00'W	21.09. 23:30-04:50	Microstructure
768-1	KPO_1125	00°00.20'N	23°06.80'W	22.09. 6:30-11:10	Mooring recovery
769-1	SR_11	00°00'N	23°06'W	22.09. 11:20-11:30	Spectroradiometer
770-1	CTD_40	00°00'N	23°06'W	22.09. 11:40-12:50	CTD station (800m) Calibration of Optodes
771-1	MN_12	00°00'N	23°06'W	22.09. 13:00-13:50	Multinet
772-1	TC_13	00°00'N	23°06'W	22.09. 14:10-16:30	Towed Camera
773-1	MSS_5	00°00'N	23°06'W	22.09. 16:40-19:30	Microstructure
774-1	CTD_41	00°00'N	23°06'W	22.09. 20:00-22:30	CTD station (3952m/bottom)
775-1	MN_13	00°00'N	23°06'W	22.09. 22:40-00:30	Multinet
776-1	TC_14	00°00'N	23°06'W	23.09. 00:50-02:50	Towed Camera
777-1	MSS_6	00°00'N	23°06'W	23.09. 03:10-05:40	Microstructure
778-1	KPO_1141	00°00.20'N	23°06.80'W	23.09. 08:00-11:40	Mooring deployment
779-1	MN_14	00°00'N	23°06'W	23.09. 12:10-13:10	Multinet
780-1	CTD_42	00°20'S	23°00'W	23.09. 16:50-19:40	CTD station (4610m/bottom)
781-1	CTD_43	00°40'S	23°00'W	23.09. 21:50-00:10	CTD station (3560m/bottom)
782-1	CTD_44	01°00'S	23°00'W	24.09. 02:00-04:50	CTD station (4120m/bottom)
783-1	CTD_45	01°20'S	23°00'W	24.09. 06:50-10:00	CTD station (4850m/bottom)
784-1	CTD_46	01°40'S	23°00'W	24.09. 12:10-15:20	CTD station (4920m/bottom)
785-1	CTD_47	02°00'S	23°00'W	24.09. 17:30-18:10	CTD station (200m)
786-1	MN_15	02°00'S	23°00'W	24.09. 18:20-19:20	Multinet
787-1	CTD_48	02°00'S	23°00'W	24.09. 19:30-22:30	CTD station (5230m/bottom)
788-1	CTD_49	02°30'S	23°00'W	25.09. 01:40-	CTD station (5780m/bottom)

				5:30	
789-1	CTD_50	03°00'S	23°00'W	25.09. 08:10-12:10	CTD station (5520m/bottom)
790-1	SR_12	03°30'N	23°00'W	25.09. 15:00-15:10	Spectroradiometer
791-1	CTD_51	03°30'S	23°00'W	25.09. 15:20-19:00	CTD station (5490m/bottom)
792-1	CTD_52	04°00'S	23°00'W	25.09. 21:50-01:40	CTD station (5820m/bottom)
793-1	CTD_53	04°30'S	23°00'W	26.09. 04:40-08:10	CTD station (5160m/bottom)
794-1	SR_13	05°00'N	23°00'W	26.09. 11:20-11:30	Spectroradiometer
795-1	CTD_54	05°00'S	23°00'W	26.09. 11:40-15:10	CTD station (5190m/bottom)
796-1	ARGO_1	05°00'S	23°00'W	26.09. 15:20	Argo Float Deployment
797-1	CTD_55	08°00'S	27°09'W	27.09. 15:30-16:00	CTD station (500m)
798-1	ARGO_2	08°00'S	27°09'W	27.09. 16:10	Argo Float Deployment
799-1	CTD_56	11°30'S	32°00'W	28.09. 18:40-21:50	CTD station (5030m/bottom)
800-1	ARGO_3	11°30'S	32°00'W	28.09. 22:00	Argo Float Deployment
801-1	CTD_57	11°30'S	32°27'W	29.09. 00:30-03:20	CTD station (4760m/bottom)
802-1	CTD_58	11°30'S	32°53'W	29.09. 05:40-07:40	CTD station (3490m/bottom)
803-1	CTD_59	11°30'S	33°13'W	29.09. 09:30-12:00	CTD station (4280m/bottom)
804-1	CTD_60	11°30'S	33°33'W	29.09. 14:00-17:30	CTD station (4963m/bottom)
805-1	CTD_61	11°30'S	33°53'W	29.09. 19:20-22:10	CTD station (4617m/bottom)
806-1		11°30'S	34°13'W	30.09. 00:00	Start ADCP section
807-1	KPO_1130	10°22.8'S	35°40.8'W	30.09. 08:00-11:50	Mooring recovery
808-1	KPO_1129	10°16.0'S	35°51.7'W	30.09. 13:10-14:50	Mooring recovery
806-1		10°14.2'S	35°54.2'W	30.09. 15:20	End ADCP section (70m)
809-1	KPO_1108	10°13.7'S	35°52.5'W	30.09. 15:40-17:00	Bottom Pressure Sensor recovery
810-1	KPO_1134	10°13.58'S	35°52.42'W	30.09. 18:10-21:00	PIES communication
811-1		10°14.2'S	35°54.2'W	30.09. 21:30	Start ADCP section (70m/bottom)
812-1	CTD_62	10°14.6'S	35°53.6'W	30.09. 21:50-22:00	CTD station (220 m/bottom)
813-1	MSS_7	10°14.6'S	35°53.6'W	30.09. 22:20-23:20	Microstructure
814-1	CTD_63	10°15.3'S	35°52.6'W	30.09. 23:40-00:00	CTD station (520 m/bottom)
815-1	MSS_8	10°15.3'S	35°52.6'W	01.10. 00:10-01:50	Microstructure
816-1	CTD_64	10°16.0'S	35°51.7'W	01.10. 02:30-03:00	CTD station (900 m/bottom)
817-1	MSS_9	10°16.0'S	35°51.7'W	01.10. 03:10-	Microstructure

				04:30	
818-1	CTD_65	10°19.5'S	35°46.1'W	01.10. 05:30-06:40	CTD station (1760 m/bottom)
819-1	MSS_10	10°19.5'S	35°46.1'W	01.10. 07:00-08:00	Microstructure
820-1	KPO_1144	10°16.0'S	35°51.7'W	01.10. 09:30-10:30	Mooring deployment
821-1	KPO_1109	10°14.15'S	35°51.9'W	01.10. 11:50-12:50	PIES recovery
822-1	KPO_1135	10°13.972'S	35°51.744'W	01.10. 13:20-14:40	PIES communication
823-1	KPO_1134	10°13.58'S	35°52.42'W	01.10. 14:50-16:40	PIES communication
824-1	KPO_1108	10°13.7'S	35°52.5'W	01.10. 16:50-17:00	Bottom Pressure Sensor recovery
825-1	CTD_66	10°22.8'S	35°40.8'W	01.10. 18:30-20:20	CTD station (2320 m/bottom)
826-1	MSS_11	10°22.8'S	35°40.8'W	01.10. 20:40-22:10	Microstructure
827-1	CTD_67	10°27.4'S	35°34.9'W	01.10. 23:00-00:50	CTD station (2880 m/bottom)
828-1	MSS_12	10°27.4'S	35°34.9'W	02.10. 01:00-02:30	Microstructure
829-1	CTD_68	10°32.0'S	35°29.3'W	02.10. 04:30-06:30	CTD station (3210 m/bottom)
830-1	KPO_1145	10°22.8'S	35°40.8'W	02.10. 08:50-11:10	Mooring deployment
831-1	MSS_13	10°32.0'S	35°29.3'W	02.10. 12:50-14:20	Microstructure
832-1	KPO_1131	10°36.5'S	35°23.6'W	02.10. 15:10-17:40	Mooring recovery
833-1	CTD_69	10°36.5'S	35°23.6'W	02.10. 18:20-20:30	CTD station (3520 m/bottom)
834-1	MSS_14	10°36.5'S	35°23.6'W	02.10. 20:50-23:00	Microstructure
835-1	CTD_70	10°41.4'S	35°17.6'W	03.10. 00:00-02:10	CTD station (3673m/bottom)
836-1	MSS_15	10°41.4'S	35°17.6'W	03.10. 02:20-04:00	Microstructure
837-1	CTD_71	10°46.4'S	35°11.6'W	03.10. 05:00-07:20	CTD station (3868m/bottom)
838-1	KPO_1146	10°36.5'S	35°23.6'W	03.10. 09:40-12:50	Mooring deployment
839-1	MSS_16	10°46.4'S	35°11.6'W	03.10. 14:40-16:30	Microstructure
840-1	CTD_72	10°51.4'S	35°05.6'W	03.10. 17:20-20:00	CTD station (3960m/bottom)
841-1	MSS_17	10°51.4'S	35°05.6'W	03.10. 20:20-21:50	Microstructure
842-1	CTD_73	10°56.4'S	34°59.6'W	03.10. 22:40-01:10	CTD station (4096m/bottom)
843-1	MSS_18	10°56.4'S	34°59.6'W	04.10. 01:20-03:10	Microstructure
844-1	KPO_1132	10°56.4'S	34°59.6'W	04.10. 07:10-	Mooring recovery

				09:50	
845-1	KPO_1147	10°56.4'S	34°59.6'W	04.10. 12:00-15:30	Mooring deployment
846-1	CTD_74	11°07.6'S	34°43.9'W	04.10. 17:30-20:10	CTD station (4244m/bottom)
847-1	MSS_19	11°07.6'S	34°43.9'W	04.10. 20:30-22:10	Microstructure
848-1	CTD_75	11°18.8'S	34°28.2'W	05.10. 00:00-02:50	CTD station (4634m/bottom)
849-1	MSS_20	11°18.8'S	34°28.2'W	05.10. 02:50-04:10	Microstructure
850-1	CTD_76	11°30.0'S	34°13.0'W	05.10. 06:10-08:50	CTD station (4569m/bottom)
851-1	MSS_21	11°30.0'S	34°13.0'W	05.10. 09:10-11:10	Microstructure
		11°30'S	34°13'W	05.10. 11:10	End ADCP section
852-1	CTD_77	11°30'S	33°53'W	05.10. 13:10-15:50	CTD station (4617m/bottom)
853-1		11°30'S	34°13'W	05.10. 17:30	Start ADCP section
		10°14.2'S	35°54.2'W	06.10. 04:40	End ADCP section (70m)
854-1	MSS_22	10°14.6'S	35°53.6'W	06.10. 04:50-16:20	Microstructure along section
		5°39.0'S	34°57.6'W	07.10. 18:30	Start ADCP section
855-1	CTD_78	5°39.0'S	34°57.6'W	07.10. 18:40-19:00	CTD station (280m/bottom)
856-1	MSS_23	5°39.0'S	34°57.6'W	07.10. 19:10-20:40	Microstructure
857-1	CTD_79	5°38.3'S	34°56.0'W	07.10. 21:00-21:30	CTD station (740m/bottom)
858-1	MSS_24	5°38.3'S	34°56.0'W	07.10. 21:40-23:40	Microstructure
859-1	CTD_80	5°38.0'S	34°54.0'W	08.10. 00:00-01:00	CTD station (1654m/bottom)
860-1	MSS_25	5°38.0'S	34°54.0'W	08.10. 01:30-03:40	Microstructure
861-1	CTD_81	5°36.6'S	34°46.0'W	08.10. 04:30-06:10	CTD station (2837m/bottom)
862-1	MSS_26	5°36.6'S	34°46.0'W	08.10. 06:50-08:40	Microstructure
863-1	CTD_82	5°34.8'S	34°36.0'W	08.10. 09:50-12:00	CTD station (3405m/bottom)
864-1	MSS_27	5°34.8'S	34°36.0'W	08.10. 12:40-14:40	Microstructure
865-1	CTD_83	5°32.7'S	34°24.0'W	08.10. 15:50-19:00	CTD station (3761m/bottom)
866-1	MSS_28	5°32.7'S	34°24.0'W	08.10. 19:10-21:20	Microstructure
867-1	CTD_84	5°30.2'S	34°10.0'W	08.10. 23:00-01:30	CTD station (4110m/bottom)
868-1	MSS_29	5°30.2'S	34°10.0'W	09.10. 01:40-03:10	Microstructure
869-1	CTD_85	5°26.6'S	33°50.0'W	09.10. 05:10-07:50	CTD station (4316m/bottom)
870-1	MSS_30	5°26.6'S	33°50.0'W	09.10. 08:00-	Microstructure

				09:40	
871-1	CTD_86	5°21.7'S	33°25.0'W	09.10. 12:20-15:10	CTD station (4474m/bottom)
872-1	MSS_31	5°21.7'S	33°25.0'W	09.10. 15:30-17:20	Microstructure
873-1	CTD_87	5°17.7'S	33°00.0'W	09.10. 20:00-22:30	CTD station (4555m/bottom)
874-1	CTD_88	5°17.7'S	33°00.0'W	09.10. 23:00-01:50	CTD station (4555m/bottom)
875-1	CTD_89	5°12.3'S	32°30.0'W	10.10. 05:00-08:00	CTD station (4589m/bottom)
876-1	CTD_90	5°07.0'S	32°00.0'W	10.10. 11:10-14:00	CTD station (4602m/bottom)
877-1	CTD_91	5°00.0'S	31°30.0'W	10.10. 17:00-20:30	CTD station (4692m/bottom)
		5°00.0'S	31°30.0'W	11.10. 21:00	End/Start ADCP section
		5°39.0'S	34°57.8'W	11.10. 15:30	End ADCP section