

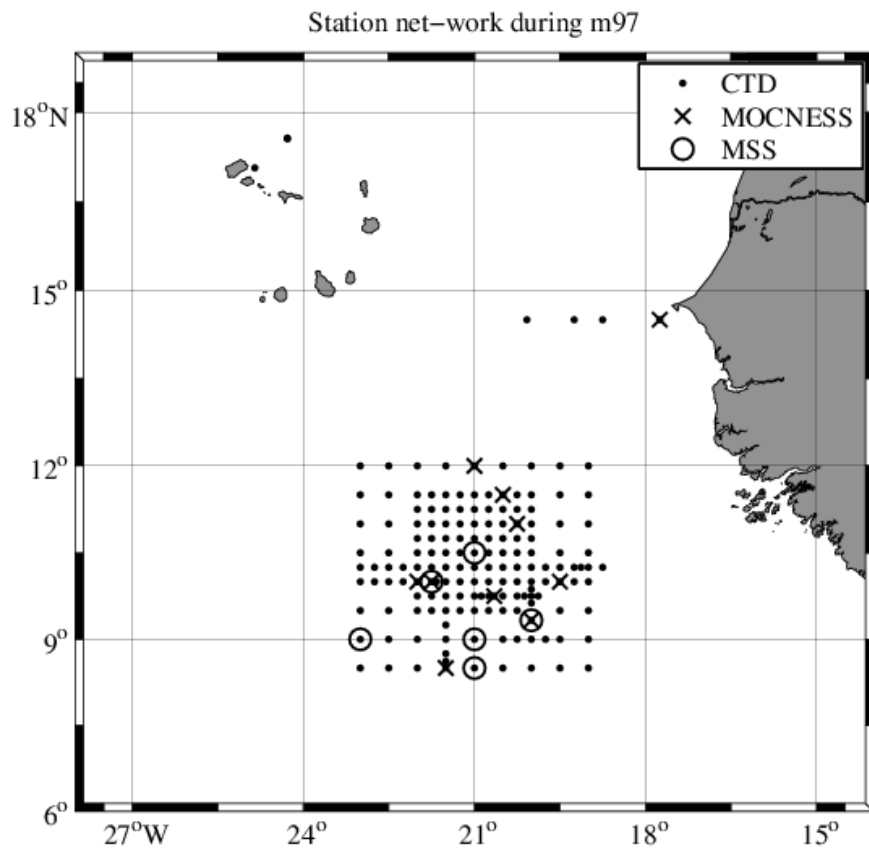
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Short Cruise Report METEOR - M97

Mindelo - Fortaleza
26.05.2013 – 29.06.2013

Chief Scientist: Dr. Toste Tanhua

Captain: Mr. Michael Schneider



Objectives

The cruise M97 to the Tropical Eastern North Atlantic was a contribution to the DFG Sonderforschungsbereich (SFB) 754, Climate - Biogeochemistry Interactions in the Tropical Ocean. The main goals of this cruise were to:

- 1) Quantify and better understand the supply of oxygen to the oxygen minimum zone (OMZ) of the Tropical Atlantic with a particular focus on the role of sub-mesoscale processes for lateral and vertical oxygen fluxes and thus a critical aspect of the ventilation of this region.
- 2) Provide the oxygen distribution of Tropical Eastern North Atlantic OMZ with high temporal and spatial resolution and to identify sub-tropical-tropical circulation pathways that provide oxygen to the eastern tropical oxygen minimum zones; to observe temporal variability in the supply of oxygen to the OMZ, and in the inventory of oxygen in the OMZ.
- 3) Study the zooplankton-mediated carbon, oxygen and nitrogen flux and heterotrophic responses to low oxygen. Abundance, biomass and diversity of the zooplankton community will be studied in relation to water mass characteristics.

During the M97 cruise the main objective was to map out an artificial tracer (CF_3SF_5) that was injected in the area ($\sim 11^\circ\text{N}$, 21°W) in December of 2012 (cruise MSM22). The objectives were particularly aimed at mapping the horizontal dispersion of the tracer. Therefore the cruise covered a grid of stations within “control volume” see Figure 1. By measuring the decay of tracer within the control volume over time, estimates of isopycnal mixing can be obtained. In all we conducted tracer measurements on 171 CTD station, and found the tracer at 113 of those stations. The horizontal and vertical distribution of the tracer was well mapped out during the cruise. Complementary measurements with a microstructure sonde were carried out to about 800 meters depth, i.e. deeper than we normally have done in the past in this region.

During the cruise we carried out 14 MOCNESS and 18 MultiNet casts in order to study the vertical flux of biogeochemical parameters by zooplankton and nekton. Experiments were carried out in the climate controlled lab to determine fluxes. For positions where net sampling were conducted we also sampled for a range of biogeochemical variables in the water column. In addition, a total of 13 incubation experiments for quantification of nitrogen fixation were carried out during the cruise.

Narrative

The science party arrives to the METEOR in the morning of May 25; some of the scientists have already been busy during the previous two days with unloading containers and setting up some sensitive experiments. In the afternoon, a team of 4 persons from ZDF also arrives. The METEOR leaves the dock in Mindelo at 19:00. A test CTD is performed at the 2000 meter depth contour shortly after leaving port. METEOR arrives to the Cape Verde Ocean Observatory (CVOO) in the late night and a multinet (in the dark) is performed, followed by a deep CTD station where a large range of parameters were sampled. In the early work to deploy a new mooring begin at 08:00. At noon the mooring is deployed – this time with the weight first due to a sensitive piece of equipment in the top part of the mooring. After a couple of hour communication tests with the mooring, METEOR moves back to the CVOO station for a day-time multinet. The next action was replacement of the swivel on the “old” mooring about 3 nm northeast of the CVOO station. The surface element with data communication now seems to work. The day at the CVOO station ends with a few additional hours of communication tests with the “new” which also seems to work as it should. As the last action of the METEOR we conduct an additional test-CTD and MSS profiling at the CVOO site. METEOR docks again in Mindelo at 07:00 for exchange of scientific personnel and unloading of a few scientific items.

METEOR steam towards the last station that was carried out along $14^{\circ}30'$ during the M96 cruise. However, our permission to carry out science in Senegal was revoked and we changed course towards the area where we expect to find the tracer, i.e. a box with the sides 12°N , 19°W , 8°N , 23°W . We start the search for the tracer by a section along 12°N , and already on the second station (at 21°W) we find the tracer at the roughly the density where we injected it. This is really good news for the tracer group! At 21°W we also carried out the first MOCNESS cast together with a MultiNet cast and sampling for initiation of the first N_2 fixation incubations. We keep doing CTD stations every 4 hours, roughly. We find the tracer at most, but not all, stations. Particularly high concentrations are found in the western edge of our sample box. We carried out a multiple multinet/MOCNESS sampling in the dark and in the light. Sampling for N_2 fixation takes place every second morning before the sun is up. On the NE corner of the release position we carried out a deep CTD to the bottom and found low concentration of the tracer on the two deepest depths.

We deployed a glider at $10^{\circ}30'\text{N}$, $19^{\circ}30'\text{W}$ on June 5 that should do sections along the coast of Senegal and Mauretania for the AWA project. In the morning of June 7th we steam back to a position in the vicinity of where the glider was deployed; it was too heavily ballasted and could not reach the surface in the low salinity warm water (i.e. low density). The glider had dropped its “emergency weight” and was drifting on the surface. Glider recovered after breakfast. We are then steaming towards Dakar in order to pick an observer from Senegal.

We arrive to Dakar in the morning of June 8th and wait on the roads for our observer to arrive. We can soon leave Dakar and start with the science again. The underway instruments (TSG, ADCP, pCO_2) are turned on at the 12nm border, and we make the first underway CTD cast. Since none of those on-board have any experience with this instrument, it is somewhat nervous, particularly since it is only 260 meters depth so that we have to be careful not to set the sonde in the sand. We then conduct a

MOCNESS cast starting at the 1000 m isobaths. The cast reveals similar species composition as over the Namibian shelf, but different compared to above the OMZ. Genetic analysis will show if it is really the same species, or just the same morphology. We continue with uCTD and deep CTD casts in order and by evening on the 9th we have completed the 14°30' section that was started during M96, but could not be completed due to logistical reasons.

We resume work in the tracer box in the late morning of the 10th, this time doing the stations in EEZ of Senegal that we could not do before. On June 12 we conduct one more night/day station, i.e. we conduct multiple multinet and MOCNESS sampling on the same position; once during daylight hours, and one during night-time. In the afternoon of the 13th we deploy the glider again. This time it is ballasted somewhat lighter. The position is 10°00'N, 20°00'W and it all seems to work fine this time around. During the night of the 14th we extend a section along 10°15' towards the east to find the end of the tracer patch along this latitude. A new scheme developed that allowed for fast decision from the tracer lab once the results of the first tracer measurements were known; if more than 100 fM tracer found – stop for one extra station in between. Along the 9°45'N section we do find a few stations that qualified, so that we stopped and made extra stations. On one station with particularly high concentrations we even made a complete survey 7.5 nm from the original station in all four directions.

In the evening of the 17th we made another rendezvous with the glider; it still had a rubber cap on the oxygen sensor. Tracer stations and one MOCNESS migration study in the evening of the 19th. The Meteor is during this time moving in the ITCZ with weak winds and an occasional squall in the afternoon. During this time we do a few microstructure stations as well, multiple technical issues have prevented a lot of this work before, by doing casts to deeper than 800 m we are on the limit of the equipment. METEOR is now south of the ITCZ and had to steam against the southeast trade wind, and current, to reach the southeastern most position at 8°N 19°W. We finalized the 8°00'N section with some extra stations along 21°30'W. Last CTD is conducted in the morning of the 23rd, CTD#184. On this position we also conduct a MOCNESS/MultiNet day/night station, with MSS. The METEOR is now steaming time towards Fortaleza in Brazil. Already on the 24th we turn off the underway measurements as we are entering Brazilian EEZ where we do not have permission to conduct scientific work. We have enough time to pack instruments and equipment in the containers during the transit. In the evening of the 29th, the METEOR arrives to the port of Fortaleza.

Acknowledgements

We like to thank captain Michael Schneider, his officers and crew of RV METEOR for their support of our measurement program and for creating a very friendly and professional work atmosphere on board. The ship time of METEOR was provided by the German Science Foundation (DFG) within the core program METEOR/MERIAN. The support for the cruise was provided by the Senatskommission für Ozeanographie der DFG through the SFB 754.

Cruise participants science:

Tanhua, Toste. Dr.	Fahrtleiter / <i>Chief Scientist</i>	GEOMAR
Stramma, Lothar, Dr	Co-Chief Scientist, Sali	GEOMAR
Schütte, Florian	CTD processing	GEOMAR
Fischer, Tim, Dr.	Microstructure/CTD	GEOMAR
Link, Rudolf (tech)	CTD/Technical	GEOMAR
Liang, Xi	CTD/SADCP	GEOMAR
Vieira, Nuno (tech)	CTD	INDP
Maas, Josefine (student)	CTD	GEOMAR
Lohmann, Martina	O ₂	GEOMAR
Bogner, Boie (tech)	Tracer	GEOMAR
Köllner, Manuela	Tracer	GEOMAR
Huang, Peng	Tracer	GEOMAR
Theisen, Stefan, Dr.	Tracer	FWS
Ito, Maysa (student)	Tracer	GEOMAR
Rudminat, Francie (student)	Tracer	GEOMAR
Böhnert, Hauke (student)	Tracer	GEOMAR
Kiko, Rainer, Dr.	zooplankton	GEOMAR
Hauss, Helena, Dr.	zooplankton	GEOMAR
Buchholz, Friedrich, Prof. Dr.	zooplankton	AWI
Piatkowski, Uwe, Dr.	zooplankton	GEOMAR
Valdares Costa, Marcia	zooplankton	INDP
Ossenbrügger, Holger	zooplankton	GEOMAR
Stange, Paul (student)	Nitrogen Fixation	GEOMAR
Singh, Arvind, Dr.	Nitrogen fixation	GEOMAR
Redler, Rene, Dr.	MICROTOPS	MPI-HH
Diallo, Amadou	Observer	Senegal
Robert Brünjes (student)	pCO ₂	GEOMAR
Stelzner, Martin	Bordwetterwarte	DWD

ADDITIONAL FOR 25-27/5/2013

Steinhoff, Tobias, Dr.	mooring, pCO ₂	GEOMAR
Fiedler, Björn, Dr.	mooring	GEOMAR
Pinck, Andreas	mooring; tracer	GEOMAR
Niehus, Gerd	mooring	GEOMAR
Zenk, Cordula	mooring	GEOMAR
Torres Vega, Maria	mooring	Develogic
Herles Wolfgang	filming	ZDF
Rebholz, Thomas	filming	ZDF
Gebhardt, Anne	filming	ZDF
Hügler, Matthias	filming	ZDF

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DWD	Deutscher Wetterdienst Hamburg, Germany

Stationsliste

Stat.	CTD	Date	Time	Latitude	Longitude	max. p [db]	Comment/measurements
ME970/1087-1	001	25.05.13	22:02	17° 04.17' N	24° 51.16' W		CTD test station
ME970/1088-1		26.05.13	04:16	17° 33.99' N	24° 17.09' W		MSN
ME970/1089-1	002	26.05.13	05:16	17° 34.00' N	24° 17.00' W		CVOO deep cast
ME970/1090-1		26.05.13	08:00	17° 33.92' N	24° 17.06' W		Mooring deployment begins
ME970/1091-1		26.05.13	15:55	17° 33.95' N	24° 16.99' W		MSN
ME970/1092-1		26.05.13	17:36	17° 36.25' N	24° 15.34' W		MOR information
ME970/1093-1		26.05.13	19:16	17° 36.07' N	24° 18.98' W		Hydrophone into water
ME970/1094-1	003	27.05.13	00:00	17° 33.90' N	24° 17.02' W		Test of sampler
ME970/1095-1		27.05.13	00:46	17° 33.98' N	24° 16.98' W		MSS (did not work)
ME970/1096-1	004	29.05.13	03:27	11° 59.98' N	20° 29.97' W		Tracer 1200 m cast
ME970/1097-1	005	29.05.13	07:10	11° 59.98' N	21° 00.00' W		N ₂ fix 100 m cast
ME970/1098-1		29.05.13	07:42	11° 59.98' N	21° 00.00' W		MSN
ME970/1099-1	006	29.05.13	08:40	11° 60.00' N	21° 00.00' W		Bio 1200 m cast
ME970/1100-1		29.05.13	09:47	11° 59.99' N	21° 00.21' W		Mocness
ME970/1101-1	007	29.05.13	15:11	12° 00.00' N	21° 29.99' W		Tracer 1200 m cast
ME970/1102-1	008	29.05.13	18:48	11° 59.96' N	22° 00.04' W		Tracer 1200 m cast
ME970/1103-1	009	29.05.13	22:59	11° 59.95' N	22° 30.06' W		Tracer 1200 m cast
ME970/1104-1		30.05.13	02:47	11° 60.00' N	23° 00.00' W		MSN
ME970/1105-1		30.05.13	03:47	11° 60.00' N	23° 00.00' W		Bio CTD Sensor problem
ME970/1106-1	010	30.05.13	04:17	11° 60.00' N	23° 00.00' W		Bio 1200 m cast
ME970/1107-1	011	30.05.13	07:58	11° 29.97' N	23° 00.04' W		Tracer 1200 m cast
ME970/1108-1	012	30.05.13	11:40	10° 59.88' N	23° 00.08' W		Tracer 1200 m cast
ME970/1109-1		30.05.13	12:06	10° 59.91' N	23° 00.18' W		Secchi disc
ME970/1110-1		30.05.13	12:39	10° 59.92' N	23° 00.16' W		Secchi disc
ME970/1111-1	013	30.05.13	15:35	10° 29.99' N	23° 00.03' W		Tracer 1200 m cast
ME970/1112-1	014	30.05.13	19:16	10° 30.00' N	22° 30.00' W		Tracer 1200 m cast
ME970/1113-1	015	30.05.13	23:11	11° 00.06' N	22° 30.08' W		Tracer 1200 m cast
ME970/1114-1	016	31.05.13	03:00	11° 30.03' N	22° 30.02' W		N ₂ fix 100 m cast
ME970/1115-1		31.05.13	03:23	11° 30.03' N	22° 30.02' W		W2 net Calcofi
ME970/1116-1	017	31.05.13	04:06	11° 30.05' N	22° 30.09' W		Bio 1200 m cast
ME970/1117-1	018	31.05.13	07:46	11° 30.00' N	21° 60.00' W		Tracer 1200 m cast
ME970/1118-1	019	31.05.13	10:06	11° 30.10' N	21° 44.98' W		Tracer 700 m cast
ME970/1119-1	020	31.05.13	12:16	11° 29.96' N	21° 29.95' W		Tracer 1200 m cast
ME970/1120-1	021	31.05.13	14:37	11° 30.05' N	21° 14.97' W		Tracer 700 m cast
ME970/1121-1	022	31.05.13	16:38	11° 30.01' N	20° 59.93' W		Tracer 1200 m cast
ME970/1122-1	023	31.05.13	18:56	11° 30.02' N	20° 44.98' W		Tracer 700 m cast
ME970/1123-1	024	31.05.13	21:02	11° 29.98' N	20° 30.00' W		Bio 1200 m cast
ME970/1124-1		31.05.13	22:10	11° 29.91' N	20° 29.92' W		Mocness
ME970/1125-1	025	01.06.13	01:56	11° 30.07' N	20° 15.01' W		Tracer 700 m cast
ME970/1126-1	026	01.06.13	04:04	11° 29.97' N	20° 00.01' W		Tracer 1200 m cast
ME970/1127-1	027	01.06.13	06:28	11° 14.97' N	19° 59.98' W		Tracer 1200 m cast
ME970/1128-1	028	01.06.13	08:52	11° 14.95' N	20° 14.99' W		Tracer 700 m cast
ME970/1129-1	029	01.06.13	11:02	11° 14.97' N	20° 30.00' W		Tracer 1200 m cast
ME970/1130-1	030	01.06.13	13:20	11° 14.97' N	20° 44.99' W		Tracer 700 m cast
ME970/1131-1	031	01.06.13	15:25	11° 14.97' N	20° 59.98' W		Tracer 1200 m cast
ME970/1132-1	032	01.06.13	17:51	11° 14.99' N	21° 15.02' W		Tracer 700 m cast
ME970/1133-1	033	01.06.13	20:02	11° 15.01' N	21° 30.03' W		Tracer 1200 m cast
ME970/1134-1	034	01.06.13	22:15	11° 15.06' N	21° 45.10' W		Tracer 700 m cast
ME970/1135-1	035	02.06.13	00:22	11° 15.03' N	21° 59.98' W		Tracer 1200 m cast
ME970/1136-1	036	02.06.13	02:56	11° 00.03' N	22° 00.04' W		Tracer 1200 m cast

Stat.	CTD	Date	Time	Latitude	Longitude	max. p [db]	Comment/measurements
ME970/1137-1	037	02.06.13	05:26	11° 00.01' N	21° 44.99' W		N ₂ fix 100 m cast
ME970/1138-1		02.06.13	05:50	11° 00.01' N	21° 44.99' W		W2 net Calcofi
ME970/1139-1	038	02.06.13	06:32	11° 00.01' N	21° 44.99' W		Bio 1200 m cast
ME970/1140-1	039	02.06.13	08:58	10° 59.99' N	21° 30.02' W		Tracer 1200 m cast
ME970/1141-1	040	02.06.13	11:23	11° 00.08' N	21° 15.08' W		Tracer 700 m cast
ME970/1142-1	041	02.06.13	13:28	11° 00.05' N	20° 59.97' W		Tracer 1200 m cast
ME970/1143-1	042	02.06.13	15:48	11° 00.05' N	20° 44.96' W		Tracer 700 m cast
ME970/1144-1	043	02.06.13	17:52	10° 59.96' N	20° 29.99' W		Tracer 1200 m cast
ME970/1145-1	044	02.06.13	20:08	11° 00.00' N	20° 15.02' W		Bio 1200 m cast
ME970/1146-1		02.06.13	21:14	11° 00.00' N	20° 15.02' W		MSN
ME970/1147-1		02.06.13	22:16	11° 00.20' N	20° 15.05' W		Mocness
ME970/1148-1	045	03.06.13	02:16	11° 00.01' N	19° 60.00' W		Tracer 1200 m cast
ME970/1149-1	046	03.06.13	04:40	10° 44.99' N	19° 59.98' W		Tracer 1200 m cast
ME970/1150-1	047	03.06.13	07:04	10° 44.96' N	20° 15.00' W		Tracer 700 m cast
ME970/1151-1	048	03.06.13	09:24	10° 59.93' N	20° 14.98' W		Bio 1200 m cast
ME970/1152-1		03.06.13	10:28	10° 59.93' N	20° 14.98' W		MSN
ME970/1153-1		03.06.13	11:24	11° 00.04' N	20° 14.99' W		Mocness
ME970/1154-1	049	03.06.13	16:07	10° 44.98' N	20° 30.00' W		Tracer 1200 m cast
ME970/1155-1	050	03.06.13	18:28	10° 44.98' N	20° 45.00' W		5043 m deep cast, release pos.
ME970/1156-1	051	03.06.13	22:59	10° 44.97' N	21° 00.03' W		Tracer 1200 m cast
ME970/1157-1	052	04.06.13	01:18	10° 45.02' N	21° 15.04' W		Tracer 700 m cast
ME970/1158-1	053	04.06.13	03:16	10° 45.01' N	21° 30.00' W		Tracer 1200 m cast
ME970/1159-1	054	04.06.13	05:32	10° 44.98' N	21° 45.05' W		N ₂ fix 100 m cast
ME970/1160-1		04.06.13	05:52	10° 45.01' N	21° 45.02' W		W2 net Calcofi
ME970/1161-1	055	04.06.13	06:29	10° 45.01' N	21° 45.02' W		Bio 1200 m cast
ME970/1162-1	056	04.06.13	08:48	10° 45.00' N	22° 00.04' W		Tracer 1200 m cast
ME970/1163-1	057	04.06.13	11:20	10° 29.97' N	22° 00.05' W		Tracer 1200 m cast
ME970/1164-1	058	04.06.13	14:01	10° 29.99' N	21° 45.05' W		Tracer 700 m cast
ME970/1165-1	059	04.06.13	16:10	10° 30.03' N	21° 29.99' W		Tracer 1200 m cast
ME970/1166-1	060	04.06.13	18:34	10° 30.00' N	21° 15.05' W		Tracer 700 m cast
ME970/1167-1	061	04.06.13	20:44	10° 30.02' N	21° 00.01' W		5162 m deep cast
ME970/1168-1		05.06.13	00:01	10° 30.05' N	21° 00.06' W		MSS
ME970/1169-1	062	05.06.13	03:20	10° 30.04' N	20° 45.01' W		Tracer 700 m cast
ME970/1170-1	063	05.06.13	05:26	10° 30.03' N	20° 30.01' W		Tracer 1200 m cast
ME970/1171-1	064	05.06.13	07:42	10° 30.00' N	20° 15.00' W		Tracer 700 m cast
ME970/1172-1	065	05.06.13	09:00	10° 30.00' N	20° 00.35' W		Tracer 1200 m cast
ME970/1173-1	066	05.06.13	13:28	10° 30.01' N	19° 29.98' W		Tracer 1200 m cast
ME970/1174-1		05.06.13	14:22	10° 30.01' N	19° 29.97' W		Glider deployment
ME970/1175-1		05.06.13	17:45	10° 08.54' N	19° 30.18' W		Mocness
ME970/1176-1	067	05.06.13	22:17	09° 59.95' N	19° 29.99' W		Bio 1200 m cast
ME970/1177-1	068	06.06.13	01:50	09° 29.99' N	19° 29.98' W		Tracer 1200 m cast
ME970/1178-1	069	06.06.13	05:22	08° 59.98' N	19° 29.95' W		N ₂ fix 49 m cast
ME970/1179-1		06.06.13	05:24	08° 59.99' N	19° 29.95' W		Hand net
ME970/1180-1	070	06.06.13	06:00	08° 60.00' N	19° 30.00' W		Tracer 1200 m cast
ME970/1181-1	071	06.06.13	09:35	08° 29.92' N	19° 29.97' W		Tracer 1200 m cast
ME970/1182-1	072	06.06.13	13:10	08° 29.97' N	18° 59.98' W		Tracer 1200 m cast
ME970/1183-1	073	06.06.13	17:06	08° 59.97' N	18° 59.95' W		Tracer 1200 m cast
ME970/1184-1	074	06.06.13	21:00	09° 30.02' N	19° 00.01' W		Tracer 1200 m cast
ME970/1185-1	075	07.06.13	00:46	09° 59.97' N	18° 59.99' W		Tracer 1200 m cast
ME970/1186-1	076	07.06.13	04:31	10° 29.98' N	19° 00.02' W		Tracer 1200 m cast
ME970/1187-1		07.06.13	08:40	10° 23.50' N	19° 36.52' W		Glider recovery
ME970/1188-1		08.06.13	14:44	14° 29.95' N	17° 35.96' W		uCTD
ME970/1189-1		08.06.13	15:03	14° 29.96' N	17° 38.86' W		uCTD

Stat.	CTD	Date	Time	Latitude	Longitude	max. p [db]	Comment/measurements
ME970/1190-1		08.06.13	15:29	14° 29.98' N	17° 41.68' W		Mocness
ME970/1191-1		08.06.13	18:05	14° 29.92' N	17° 44.96' W		MSN
ME970/1192-1	077	08.06.13	19:30	14° 29.99' N	17° 45.00' W		1649 m deep cast
ME970/1193-1		08.06.13	21:36	14° 30.00' N	17° 52.67' W		uCTD
ME970/1194-1		08.06.13	22:16	14° 30.00' N	17° 58.53' W		uCTD
ME970/1195-1		08.06.13	22:44	14° 30.00' N	18° 02.50' W		uCTD
ME970/1196-1		08.06.13	23:23	14° 30.00' N	18° 08.18' W		uCTD
ME970/1197-1	078	09.06.13	00:23	14° 30.00' N	18° 14.87' W		2599 m deep cast
ME970/1198-1		09.06.13	02:20	14° 30.00' N	18° 16.95' W		uCTD
ME970/1199-1		09.06.13	02:49	14° 29.92' N	18° 21.42' W		uCTD
ME970/1200-1		09.06.13	03:19	14° 30.00' N	18° 25.98' W		uCTD
ME970/1201-1		09.06.13	03:50	14° 30.00' N	18° 30.63' W		uCTD
ME970/1202-1		09.06.13	04:23	14° 30.00' N	18° 35.64' W		uCTD
ME970/1203-1		09.06.13	04:50	14° 30.00' N	18° 39.72' W		uCTD
ME970/1204-1	079	09.06.13	05:32	14° 30.06' N	18° 44.95' W		3216 m deep cast
ME970/1205-1		09.06.13	07:52	14° 30.00' N	18° 47.20' W		uCTD
ME970/1206-1		09.06.13	08:25	14° 30.00' N	18° 52.33' W		uCTD
ME970/1207-1		09.06.13	09:04	14° 30.00' N	18° 58.33' W		uCTD
ME970/1208-1		09.06.13	09:34	14° 30.00' N	19° 02.84' W		uCTD
ME970/1209-1		09.06.13	10:04	14° 30.00' N	19° 07.33' W		uCTD
ME970/1210-1	080	09.06.13	11:02	14° 30.00' N	19° 14.99' W		N ₂ fix 100 m cast
ME970/1211-1		09.06.13	11:26	14° 30.00' N	19° 15.00' W		MSN
ME970/1212-1	081	09.06.13	12:02	14° 30.00' N	19° 15.00' W		3613 m deep cast
ME970/1213-1		09.06.13	13:33	14° 30.00' N	19° 15.00' W		Plankton net
ME970/1214-1		09.06.13	14:26	14° 30.13' N	19° 16.48' W		uCTD
ME970/1215-1		09.06.13	14:58	14° 30.00' N	19° 21.47' W		uCTD
ME970/1216-1		09.06.13	15:27	14° 30.00' N	19° 26.08' W		uCTD
ME970/1217-1		09.06.13	16:16	14° 30.00' N	19° 33.87' W		uCTD
ME970/1218-1		09.06.13	16:57	14° 30.00' N	19° 40.38' W		uCTD
ME970/1219-1	082	09.06.13	19:14	14° 29.98' N	20° 05.00' W		4038 m deep cast
ME970/1220-1	083	10.06.13	10:20	11° 59.96' N	19° 59.97' W		Tracer 1200 m cast
ME970/1221-1	084	10.06.13	13:55	12° 00.01' N	19° 29.99' W		Tracer 1200 m cast
ME970/1222-1		10.06.13	17:30	11° 59.99' N	18° 59.97' W		MSN
ME970/1223-1	085	10.06.13	18:28	11° 59.99' N	18° 59.97' W		Bio 1200 m cast
ME970/1224-1	086	10.06.13	22:05	11° 29.94' N	18° 59.98' W		Tracer 1200 m cast
ME970/1225-1	087	11.06.13	01:48	11° 30.00' N	19° 30.01' W		Tracer 1200 m cast
ME970/1226-1	088	11.06.13	06:40	10° 59.99' N	18° 59.98' W		N ₂ fix 100 m cast
ME970/1227-1		11.06.13	06:46	10° 59.99' N	18° 59.98' W		Hand net
ME970/1228-1		11.06.13	07:02	10° 59.99' N	18° 59.98' W		MSN
ME970/1229-1	089	11.06.13	07:32	10° 59.99' N	18° 59.98' W		Bio 1200 m cast
ME970/1230-1	090	11.06.13	11:07	11° 00.07' N	19° 29.97' W		Tracer 1200 m cast
ME970/1231-1		11.06.13	11:22	11° 00.08' N	19° 29.98' W		Hand net
ME970/1232-1		11.06.13	11:32	11° 00.08' N	19° 29.98' W		Hand net
ME970/1233-1	091	11.06.13	16:47	10° 15.00' N	19° 59.97' W		Tracer 1200 m cast
ME970/1234-1	092	11.06.13	19:10	10° 15.02' N	20° 15.01' W		Tracer 700 m cast
ME970/1235-1	093	11.06.13	21:18	10° 14.99' N	20° 29.98' W		Tracer 1200 m cast
ME970/1236-1	094	11.06.13	23:36	10° 15.06' N	20° 44.96' W		Tracer 700 m cast
ME970/1237-1		11.06.13	23:39	10° 15.07' N	20° 44.97' W		Hand net
ME970/1238-1		11.06.13	23:55	10° 15.07' N	20° 44.97' W		Hand net
ME970/1239-1	095	12.06.13	01:43	10° 15.01' N	20° 59.99' W		Tracer 1200 m cast
ME970/1240-1	096	12.06.13	04:02	10° 15.01' N	21° 14.99' W		Tracer 700 m cast
ME970/1241-1	097	12.06.13	06:06	10° 15.01' N	21° 30.03' W		Tracer 1200 m cast
ME970/1242-1	098	12.06.13	08:28	10° 14.97' N	21° 45.00' W		Tracer 700 m cast

Stat.	CTD	Date	Time	Latitude	Longitude	max. p [db]	Comment/measurements
ME970/1243-1	099	12.06.13	10:30	10° 15.01' N	22° 00.02' W		Tracer 1200 m cast
ME970/1244-1	100	12.06.13	12:56	09° 59.99' N	22° 00.02' W		Tracer 1200 m cast
ME970/1245-1		12.06.13	14:49	09° 60.00' N	21° 51.09' W		Mocness
ME970/1246-1		12.06.13	17:44	10° 00.01' N	21° 44.99' W		MSN
ME970/1247-1	101	12.06.13	18:40	10° 00.01' N	21° 44.99' W		Bio 1200 m cast
ME970/1248-1		12.06.13	19:52	09° 59.95' N	21° 44.98' W		MSS
ME970/1249-1		12.06.13	22:09	09° 59.53' N	21° 44.67' W		MSN
ME970/1250-1		12.06.13	23:07	09° 59.78' N	21° 44.62' W		Mocness
ME970/1251-1	102	13.06.13	01:50	09° 59.85' N	21° 39.81' W		N ₂ fix 100 m cast
ME970/1252-1	103	13.06.13	03:13	09° 59.99' N	21° 30.01' W		Tracer 1200 m cast
ME970/1253-1	104	13.06.13	05:36	09° 59.98' N	21° 15.01' W		Tracer 700 m cast
ME970/1254-1	105	13.06.13	07:38	09° 59.96' N	21° 00.01' W		Bio 1200 m cast
ME970/1255-1	106	13.06.13	09:56	10° 00.06' N	20° 44.99' W		Tracer 700 m cast
ME970/1256-1	107	13.06.13	12:04	10° 00.02' N	20° 30.03' W		Tracer 1200 m cast
ME970/1257-1	108	13.06.13	14:26	09° 59.98' N	20° 15.00' W		Tracer 700 m cast
ME970/1258-1	109	13.06.13	16:28	10° 00.00' N	19° 59.99' W		Tracer 1200 m cast
ME970/1259-1		13.06.13	17:22	10° 00.00' N	19° 59.99' W		Glider deployment
ME970/1260-1	110	13.06.13	20:32	10° 14.98' N	19° 45.02' W		Tracer 700 m cast
ME970/1261-1	111	13.06.13	22:41	10° 15.03' N	19° 29.99' W		Tracer 700 m cast
ME970/1262-1	112	14.06.13	00:49	10° 14.97' N	19° 15.01' W		Tracer 700 m cast
ME970/1263-1	113	14.06.13	02:24	10° 15.06' N	19° 07.52' W		Tracer 700 m cast
ME970/1264-1	114	14.06.13	03:50	10° 15.04' N	19° 00.02' W		Tracer 700 m cast
ME970/1265-1	115	14.06.13	05:52	10° 15.00' N	18° 45.01' W		Tracer 700 m cast
ME970/1266-1	116	14.06.13	09:49	10° 00.03' N	19° 15.04' W		Tracer 700 m cast
ME970/1267-1	117	14.06.13	13:02	10° 00.00' N	19° 44.99' W		Tracer 700 m cast
ME970/1268-1		14.06.13	13:12	10° 00.00' N	19° 44.98' W		Plankton net
ME970/1269-1	118	14.06.13	15:35	09° 45.01' N	19° 60.00' W		Tracer 1200 m cast
ME970/1270-1	119	14.06.13	17:24	09° 44.98' N	20° 07.06' W		Tracer 700 m cast
ME970/1271-1		14.06.13	17:26	09° 44.98' N	20° 07.06' W		Hand net
ME970/1272-1	120	14.06.13	19:04	09° 52.48' N	20° 00.01' W		Tracer 700 m cast
ME970/1273-1	121	14.06.13	20:48	09° 44.99' N	19° 52.52' W		Tracer 700 m cast
ME970/1274-1	122	14.06.13	22:37	09° 37.52' N	20° 00.07' W		Tracer 700 m cast
ME970/1275-1	123	15.06.13	00:50	09° 44.99' N	20° 15.05' W		Tracer 700 m cast
ME970/1276-1	124	15.06.13	02:50	09° 45.01' N	20° 30.00' W		Tracer 1200 m cast
ME970/1277-1	125	15.06.13	04:34	09° 44.98' N	20° 39.04' W		N ₂ fix 100 m cast
ME970/1278-1		15.06.13	05:00	09° 44.96' N	20° 39.25' W		Mocness
ME970/1279-1	126	15.06.13	07:58	09° 44.98' N	20° 44.92' W		Bio 1200 m cast
ME970/1280-1		15.06.13	08:53	09° 44.98' N	20° 45.00' W		MSN
ME970/1281-1	127	15.06.13	10:35	09° 45.01' N	20° 52.52' W		Tracer 700 m cast
ME970/1282-1	128	15.06.13	12:01	09° 45.02' N	21° 00.01' W		Tracer 1200 m cast
ME970/1283-1	129	15.06.13	14:25	09° 45.04' N	21° 14.99' W		Tracer 700 m cast
ME970/1284-1	130	15.06.13	16:29	09° 45.03' N	21° 30.02' W		Tracer 1200 m cast
ME970/1285-1	131	15.06.13	18:56	09° 45.05' N	21° 44.97' W		Tracer 700 m cast
ME970/1286-1	132	15.06.13	20:59	09° 45.00' N	21° 59.98' W		Tracer 1200 m cast
ME970/1287-1		15.06.13	21:01	09° 45.00' N	21° 59.98' W		Hand net
ME970/1288-1		15.06.13	21:26	09° 45.00' N	21° 59.98' W		Hand net
ME970/1289-1	133	15.06.13	23:52	10° 00.04' N	22° 15.03' W		Tracer 700 m cast
ME970/1290-1	134	16.06.13	02:02	10° 14.98' N	22° 15.00' W		Tracer 700 m cast
ME970/1291-1	135	16.06.13	04:03	10° 15.05' N	22° 30.00' W		Tracer 700 m cast
ME970/1292-1	136	16.06.13	06:06	10° 14.99' N	22° 44.99' W		Tracer 700 m cast
ME970/1293-1	137	16.06.13	08:12	10° 15.00' N	22° 60.00' W		Tracer 700 m cast
ME970/1294-1	138	16.06.13	10:36	09° 59.96' N	23° 00.05' W		Tracer 1200 m cast
ME970/1295-1	139	16.06.13	13:02	09° 60.00' N	22° 45.01' W		Tracer 700 m cast

Stat.	CTD	Date	Time	Latitude	Longitude	max. p [db]	Comment/measurements
ME970/1296-1	140	16.06.13	15:07	10° 00.03' N	22° 30.03' W		Tracer 1200 m cast
ME970/1297-1	141	16.06.13	19:44	09° 30.00' N	22° 60.00' W		Tracer 1200 m cast
ME970/1298-1	142	16.06.13	23:26	09° 30.00' N	22° 29.98' W		Tracer 1200 m cast
ME970/1299-1	143	17.06.13	02:57	09° 30.04' N	22° 00.01' W		Tracer 1200 m cast
ME970/1300-1	144	17.06.13	05:18	09° 30.00' N	21° 45.00' W		N ₂ fix 100 m cast
ME970/1301-1		17.06.13	05:36	09° 30.00' N	21° 45.00' W		Calcofi
ME970/1302-1	145	17.06.13	06:02	09° 30.00' N	21° 45.00' W		Bio 1200 m cast
ME970/1303-1	146	17.06.13	08:22	09° 29.99' N	21° 30.01' W		Tracer 1200 m cast
ME970/1304-1	147	17.06.13	10:49	09° 29.99' N	21° 15.04' W		Tracer 700 m cast
ME970/1305-1	148	17.06.13	13:05	09° 30.00' N	21° 00.12' W		Tracer 1200 m cast
ME970/1306-1	149	17.06.13	15:35	09° 30.01' N	20° 45.02' W		Tracer 700 m cast
ME970/1307-1		17.06.13	18:53	09° 32.81' N	20° 16.75' W		Glider service
ME970/1308-1	150	17.06.13	20:02	09° 30.00' N	20° 15.01' W		Tracer 700 m cast
ME970/1309-1	151	17.06.13	22:14	09° 30.01' N	20° 30.05' W		Tracer 1200 m cast
ME970/1310-1		18.06.13	01:28	09° 21.99' N	20° 05.97' W		Mocness
ME970/1311-1		18.06.13	04:19	09° 20.07' N	19° 59.97' W		MSN
ME970/1312-1	152	18.06.13	05:18	09° 20.07' N	19° 59.97' W		Bio 1200 m cast
ME970/1313-1		18.06.13	06:32	09° 20.07' N	19° 59.94' W		MSS
ME970/1314-1		18.06.13	08:18	09° 19.79' N	19° 59.97' W		MSN
ME970/1315-1		18.06.13	09:16	09° 19.73' N	19° 59.93' W		Mocness
ME970/1316-1	153	18.06.13	13:51	09° 00.06' N	19° 44.97' W		Tracer 700 m cast
ME970/1317-1	154	18.06.13	15:55	09° 00.11' N	19° 59.96' W		Tracer 1200 m cast
ME970/1318-1	155	18.06.13	18:16	09° 00.00' N	20° 14.99' W		Tracer 700 m cast
ME970/1319-1	156	18.06.13	20:26	09° 00.02' N	20° 29.99' W		Tracer 1200 m cast
ME970/1320-1	157	19.06.13	00:08	09° 00.03' N	21° 00.00' W		Tracer 2000 m cast
ME970/1321-1		19.06.13	01:35	09° 00.09' N	21° 00.02' W		MSS
ME970/1322-1	158	19.06.13	07:06	09° 14.99' N	21° 29.99' W		N ₂ fix 100 m cast
ME970/1323-1		19.06.13	07:26	09° 15.00' N	21° 29.98' W		MSN
ME970/1324-1	159	19.06.13	08:22	09° 15.00' N	21° 30.00' W		Bio 700 m cast
ME970/1325-1	160	19.06.13	10:34	09° 00.01' N	21° 30.03' W		Tracer 1200 m cast
ME970/1326-1	161	19.06.13	14:06	09° 00.01' N	21° 59.98' W		Tracer 1200 m cast
ME970/1327-1		19.06.13	14:17	09° 00.01' N	21° 59.98' W		Plankton net
ME970/1328-1	162	19.06.13	17:46	09° 00.02' N	22° 29.96' W		Tracer 1200 m cast
ME970/1329-1	163	19.06.13	21:23	08° 60.00' N	22° 59.94' W		Tracer 1200 m cast
ME970/1330-1		19.06.13	22:29	08° 59.88' N	22° 59.93' W		MSS
ME970/1331-1	164	20.06.13	03:36	08° 29.99' N	22° 59.98' W		Tracer 1200 m cast
ME970/1332-1	165	20.06.13	07:02	08° 29.99' N	22° 30.00' W		Tracer 1200 m cast
ME970/1333-1	166	20.06.13	10:34	08° 30.00' N	21° 59.97' W		Tracer 1200 m cast
ME970/1334-1	167	20.06.13	14:37	08° 44.97' N	21° 30.04' W		Tracer 700 m cast
ME970/1335-1		20.06.13	14:43	08° 45.00' N	21° 30.02' W		Plankton net
ME970/1336-1	168	20.06.13	16:08	08° 37.50' N	21° 30.03' W		Tracer 700 m cast
ME970/1337-1	169	20.06.13	17:38	08° 29.97' N	21° 30.06' W		Bio 1200 m cast
ME970/1338-1		20.06.13	18:40	08° 30.00' N	21° 29.95' W		Mocness
ME970/1339-1	170	20.06.13	23:37	08° 30.02' N	21° 00.09' W		Tracer 1200 m cast
ME970/1340-1		21.06.13	00:47	08° 30.02' N	21° 00.07' W		MSS
ME970/1341-1	171	21.06.13	06:06	08° 30.01' N	20° 30.03' W		Tracer 1200 m cast
ME970/1342-1	172	21.06.13	09:57	08° 30.02' N	20° 00.02' W		Tracer 1200 m cast
ME970/1343-1	173	21.06.13	17:34	08° 00.02' N	19° 00.03' W		Tracer 1200 m cast
ME970/1344-1		21.06.13	17:38	08° 00.02' N	19° 00.03' W		Hand net
ME970/1345-1	174	21.06.13	21:16	08° 00.04' N	19° 29.99' W		Tracer 1200 m cast
ME970/1346-1	175	22.06.13	00:50	08° 00.02' N	20° 00.03' W		Tracer 1200 m cast
ME970/1347-1	176	22.06.13	04:18	08° 00.02' N	20° 29.99' W		Tracer 1200 m cast
ME970/1348-1	177	22.06.13	07:52	08° 00.01' N	21° 00.02' W		N ₂ fix 100 m cast

