Norbert Frank
Institut für Umweltphysik
Universität Heidelberg
Im Neuenheimer Feld 229
69120 Heidelberg

Tel.: 06221 546332
Fax: 06221 546405
email: Norbert.Frank@iup.uni-heidelberg.de

Short Cruise Report

M151

Atlantic Thermocline Ocean and Ecosystems Dynamic during Natural Climate Change

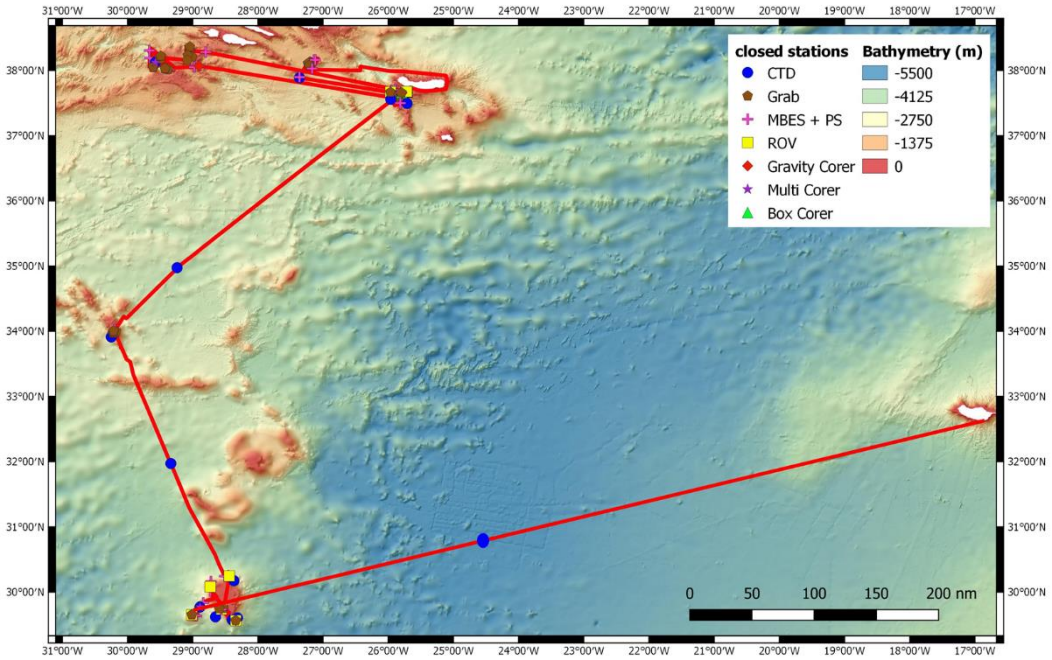
Ponta Delgada (Portugal) - Funchal (Portugal)

October 6 - 31, 2018

Chief Scientist: Norbert Frank

Co-Chief Scientists: Dierk Hebbeln, André Freiwald

Captain: Rainer Hammacher



Rational / Objectives

How does the line of zero-Ekman pumping (LZE) evolve in the northeast Atlantic since the last glacial? What is the impact of climate changes on cold-water coral (CWC) populations on seamounts? Do seamount sediments and weathering influence the trace isotope composition of seawater? These questions were in the focus of the M151 - ATHENA cruise conducted along the slopes of the Azores Islands, of Atlantis Seamount and of Great Meteor Seamount (including the western Little Meteor Seamount).

The subtropical northeast Atlantic thermocline water and cold-water coral ecosystem dynamics is today influenced by the eastward propagating eddy driven recirculation at depth as part of the subtropical Atlantic gyre, i.e. the Azores current. Moreover, mid-depth water masses such as Mediterranean Outflow Water (MOW) and Antarctic Intermediate Water (AAIW) are influencing the stratification of the water column and its isopycnal flow, comprising diurnal tidal forcing, seasonal wind driven forcing and multi-decadal variability. Hence, archives are needed to capture such processes and time scales determining the position of the LZE.

Cold-water corals (CWC) are well known in these areas, but have likely been more abundant during the last glacial compared to today reflecting environmental changes related to the southward shift of sub-polar thermocline waters, i.e. the LZE. To advance our understanding of the climate driven variability of the LZE, and thus the Azores frontal system and its impact on coral ecosystems we have explored potential CWC grounds spanning a longitudinal range of 38.5°N to 29.5°N. To derive from the studied corals information on past seawater properties, past coral abundances and the cycle of trace elements and isotopes in the ocean, the cruise objective is to collect modern and fossil corals, as well as seawater and sediments. Post-cruise the geochemical composition of the recovered coral skeletons, sediments and seawater will be investigated. This can provide measures of time, ambient seawater temperature, water mass provenance, state of ventilation, and even nutrient abundance.

To collect corals, sediment, pore-water and seawater numerous seafloor technologies were applied including a remotely operated vehicle (ROV), box-, gravity-, and multi-corers, and grab sampling as well as CTD-casts and geo-physical seafloor observations (swath bathymetry and parasound). Once the modern hydrography, seawater geochemistry, and ecosystem zonation and health has been assessed, fossil corals will be dated and ambient conditions retrieved to provide quantitative measures of water mass changes and its impact on cold-water coral ecosystems in the past. In each of the vast studied areas our work plan consisted of 5 subsequent steps: (1) First we applied swath bathymetry mapping of the seafloor topography, parasound sounding to describe the sediment cover, and hydro-acoustic current speed measurements to identify possible areas of coral habitats (see

Fig.1). This was followed by (2) a CTD – cast to identify and sample the respective water masses of the region (see Fig. 2). In cases when active coral thickets were found during the later ROV dive or grab sampling we conducted further 6 – 12 hours Yoyo CTD casts to gain insight in the tidal cycle along the partly rough topography. If the weather was permitting (3) the ROV-Squid was deployed along a carefully selected upslope and current facing track of typically 0.5 to 1 nautical miles, which allowed us to identify the composition and distribution of benthic communities in relation to seabed geological features and to document the presence, taxonomic composition and the bathymetric occurrence of living and fossil cold-water corals (Fig. 3). Moreover, the physical water mass properties were measured and if possible water was sampled next to a collected living cold-water coral. Based on the seafloor imaging and preliminary sampling by the ROV further sites were chosen (4) for subsequent grab sampling (Fig. 4). Upon identification of sediment patches, we also deployed box-, gravity-, or multi-corer to recover further coral- and sediment samples (Fig. 5). Hence, this strategy was repeated at all sites studied. The subsequent picture stretch (Fig. 1 – 6) provides a first glance on the applied methods and resulting onboard observations. We have found numerous coral patches spanning from fossil *Lophelia pertusa* and *Madrepora oculata* accumulations to living reef-like environments of *Eguchipsammia c.f. cornucopia* corals and a unique juvenile *Madrepora oculata* reef-like structure. Diverse coral gardens dominated by octocorals *Callogorgia verticillata*, *Acanthogorgia* sp. and *Dentomuricea* c.f. *meteor* were also observed.
Numerous other species of hard part forming corals have been recovered such as *Solenosmilia variabilis*, *Caryophyllia* spp. and *Desmophyllum dianthus* solitary corals. In addition to the quantitative collection of cold-water corals on many of the studied sites, we have collected hundreds of seawater samples for various types of tracer studies including the radiogenic isotopes of neodymium, radiocarbon, uranium and lithium isotopes, but also for trace elements. Given the overall lack of sediment availability in oligotrophic waters, sediment recovery was rather sparse and successful solely in topographic depressions of the Açor Bank south of Pico Island, were we found carbonate ooze with a large number of pteropods. Given the numerous recovered living corals we will certainly be able to further advance the calibration of proxies and tracers. Solely the study of sediment Nd fluxes based on the pore fluids of multi-corer samples cannot be achieved due to the lack of samples. A side of the main research subjects, ecosystem videos will be used for spatial planning of marine protected areas by our partners from IMAR / University of the Azores and samples have been taken from corals and bulk sediment to conduct a preliminary study coral and environmental DNA by our partner IFREMER (Fig. 6). We also documented and collected benthic organisms covering at least the ecological dominant key species for taxonomic purposes and for their ecological role in the seamount systems. Especially with the ROV, we were able to conduct our dives in the volcanic hard substrate areas with their rugged topography. Getting biological information from these otherwise impossible to be sampled sites with conventional gears opens a hitherto poorly known insight to the bathyal communities. These samples and video data will be exploited by the team Senckenberg am Meer and IMAR.

Narrative

Our Cruise was heavily impacted by the weather conditions, which at the end had reduced the planned 18.5 days of exploring work to solely 8 days near the seamounts south of the Azores, i.e. Atlantis-, and Great Meteor. In total we lost however only 1.5 work days when hiding from the storm east of São Miguel and another 0.5 days when recovering spare parts for the ROV in Ponta Delgada on the 17th October 2018. This is due to the fact that we had planned on escape areas since October was a month later than the requested optimal period for the cruise and hence the risk of rough seas was comparably high. Those areas included an area southwest of São Miguel (Mar da Prata) planned for the ROV Test on the 06-07 October, the Albatroz Seamount centered between the Islands of São Miguel and Pico and the Açor and Princesa Alice Bank southwest of Pico. In fact, our cruise was composed of a 1 day short cruise to test the ROV Squid for which a delegation of the German Science Foundation (DFG) visited the RV Meteor. Due to the rough weather, the ROV test dive to the slopes of Mar da Prata was cancelled and replaced by a grab sampling program that successfully identified an *Eguchipsammia c.f. cornucopia* (E.c.) reef like structure at the José Gaspar volcano. On the 07. October we returned to Ponta Delgada and boarded the rest of the scientific team to start on the 08.October with the M151 – ATHENA cruise to the south of the Azores seamounts. However, since the hurricane Leslie was to the southwest of us with a predicted trajectory towards the planned seamounts and northeastern low pressure systems producing high

waves to the eastern escape seamounts, we remained near the Azores to conduct further work until the conditions became better. This off program started on the 08. October and finally lasted until the 20th October when the weather was ultimately clear enough to head south, leaving us with 8 work days for the initially planned scientific program. During the first 10 days we studied several of the escape areas in great detail with first exploration of Mar da Prata (37°39,9'N; 25°57,9'W) on the 08 to 10 October. Here we recovered a large variety of fossil corals in depth ranges from 1200 to 340 m, carefully mapped the area and took seawater samples till 1600 m depth at the end of a first Yoyo CTD of 6 hours. At the 10th October we investigated the Albatroz Seamount (38°07'N; 27°10,9'W). Here we mapped the major volcano and obtained from its northern flank fossil remains of the cold-water coral *Lophelia pertusa* (Lp). However, overall the recovery of grab sampling was small. On the 11th October we were hiding east of Sao Miguel to wait for the weather to clear up. On the 12th October we returned to Ponta Delgada to recover a spare part of the ROV and took further samples on the peak of José Gaspar volcano confirming the presence of living *E. cornucopia*. In the evening we steamed towards Açor Bank since the weather prediction showed lowest wave height just south of Pico Island. Here we conducted mapping, identified a fishbowl like depression with significant sediment deposits and deployed numerous grab samplers as well as two gravity cores and a multi-corer for pore water studies of Neodymium isotopes and trace elements. Additionally, a CTD cast helped to identify the regional water masses from which samples were taken. We stayed in this region until the evening of the 15th October when we steamed back to Sao Miguel Island to again recover another spare part of the ROV. On the transit some interesting sedimentary features had been found which we investigated using gravity corer and grab sampler retrieving only sand. Even though storm Leslie had passed the key work area by now we decided to remain in the region of the José Gaspar volcano to complete the scientific work. Between the 16th to 19th October we completed two further Yoyo CTD's tracing the tidal currents, we discovered a unique patch of fossil *L. pertusa* and we conducted two ROV dives to monitor and sample the previously discovered *E. cornucopia* reef of José Gaspar. Boxes filled with samples and with hours of video material and excellent maps we finally steamed south towards Atlantis seamount on the 20th October. On the transit we sampled water of the entire water column down to 3600 m and we collected another multi-corer for pore water geochemistry and environmental genetics. On the 21th October we reached Atlantis seamount and followed the work plan with mapping, water characterization followed by grab sampling since wave height did still not permit to deploy the ROV. By 23:00 this day it became clear that the undercurrents were too strong to place the grab sampler properly on the seafloor, hence we could not recover a reasonable amount of corals even though almost each grab contained small fossil coral samples. Thus, we steamed to the most southern site, the Great Meteor seamount (GMS), taking an additional CTD along the way. From the 22th October to 27 th October at midnight we investigated the southeastern, northwestern and western slopes of GMS. Detailed maps were complemented by ADCP current meter measurements and water mass sampling prior to the ROV dives, which revealed frequent fossil coral occurrences. Nevertheless until the 27th October we were unable to detect large coral accumulations or active reef like environments needed for the scientific purpose of our project. Overall we collected numerous fossil corals and observed a greatly depth structured fauna. A major obstacle was the high bottom water currents which made the ROV dives challenging requiring a very detailed planning. On the night to the 28th October we decided to explore the Little Meteor seamount east of GMS. Here we discovered a unique volcanic environment with far more fish and benthic life. By the end of the dive we obtained a glance of a unique *Madrepora oculata* coral reef-like structure that we subsequently sampled using the grab sampler. At midnight we decided to head towards Funchal since again weather constrains became severe significantly slowing down the transit.

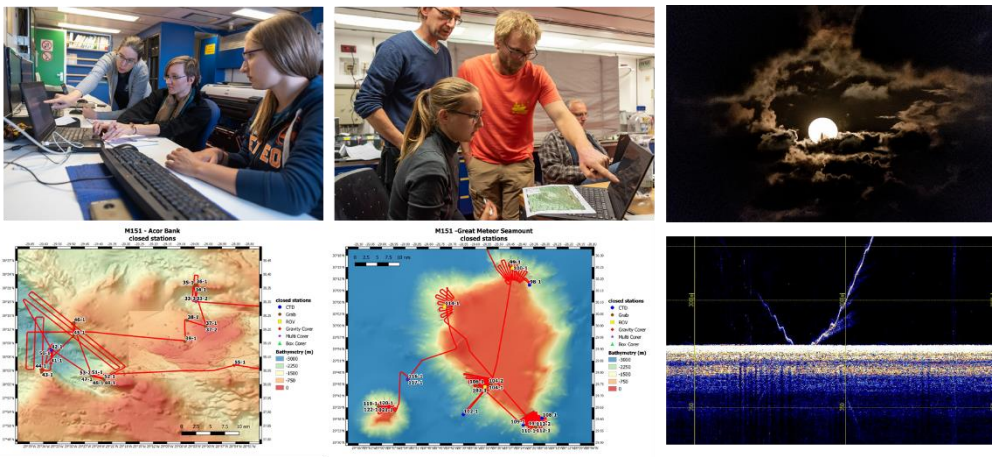


Figure 1: The above images summaries the mapping effort, which was conducted mostly overnight and through which a large number of seafloor details were revealed. The Parasound profile to the bottom right has captured the Multi-Corer. Not shown Acoustic Doppler Current Profiles (ADCP).

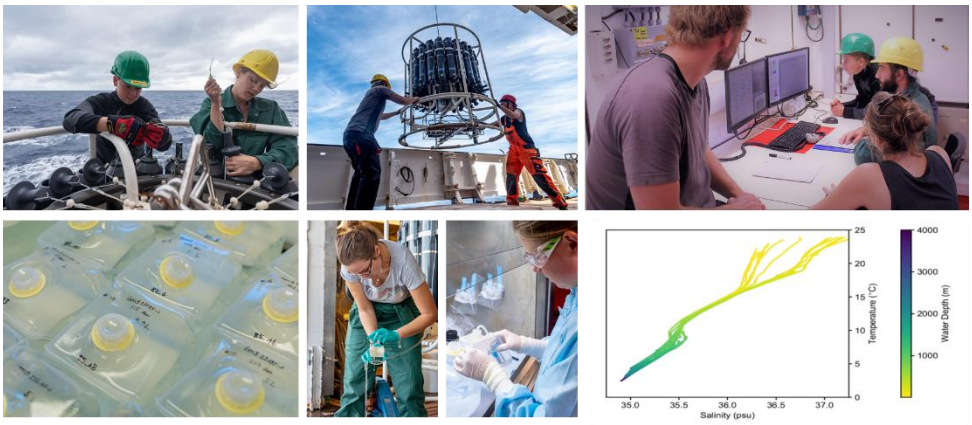


Figure 2: CTD casts performed during M151 ATHENA. Water samples and physical property measurements have also been collected during the ROV dives (not shown here). Samples have been filtered if needed and have been treated on board according to the respective international protocols (such as GEOTRACES).

Figure 3: Example Images of the ROV deployment to observe, characterize and to sample living coral habitats and fossil coral thickets. We have made numerous discoveries such as an *Eguchipsammia c.f. cornucopia* reef-like thicket on the José Gaspar Volcano and a flourishing juvenile *Madrepora oculata* ecosystem at the Little Meteor Seamount.

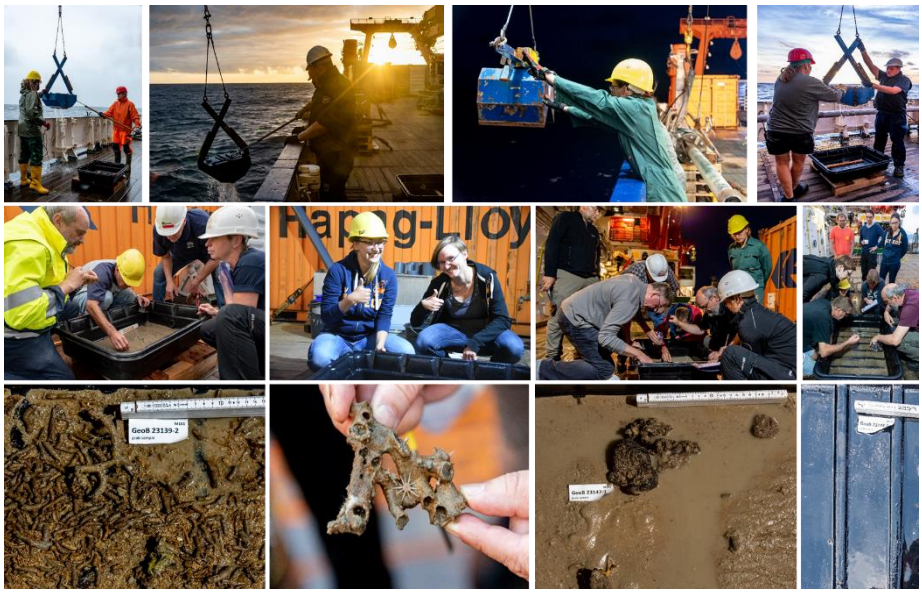


Figure 4: Certainly the most used equipment given the weather constraints was the grab sampler. About 81 times deployed, the grab sampler often just contained a bit of sand and foraminifera, but sometimes it was loaded with fossil and living corals and other fauna.

Figure 5: As expected for the oligothropic waters of the subtropical east Atlantic sediment patches were a quite rare feature. Consequently Box Corer, Gravity Corer, and Multi-Corer could not be deployed systematically.

Figure 6: Other activities on board include the study of the environmental DNA using a portable DNA Sequencer, the microscopic study and identification of species including documentation. Also the German weather station has been of great importance to inform on the trajectories of storms and swell. In-situ water sampling for the calibration of the ship thermos-salinometer was conducted and of course we had convective clouds, spills of water, unique view's of Pico Island and deep fun.

Acknowledgements

We greatly acknowledge the outstanding work of captain Rainer Hammacher and his crew of RV Meteor. We are grateful to the diplomatic representatives of Portugal who granted the possibility to sample the seafloor and seawater in their national waters. We are thankful to Andrea Schröder-Ritzrau who was a cornerstone of the cruise preparation and operations. We acknowledge Klaus Bohn from LPL Hamburg and Götz Ruhland from MARUM, as well as Claudia Müller and the team at the Leitstelle Hamburg for their help and advice regarding logistics and cruise organization. We also acknowledge Ira Weigert and her colleagues from Contiways and the Agents in Ponta Delgada and Funchal who helped with travel, customs and logistics and advice. Last but not least we acknowledge the DFG for funding of this cruise and the visit during the short ROV test.

Participants

Name	Institute	Discipline
Frank, Norbert, Prof. Dr.	IUP Heidelberg	Chief Scientist
Blaser, Patrick, Dr.	GEOW Heidelberg	Water Chemistry
Carreiro-Silva, Marina, Dr.	IMAR Horta, Acores	Geobiology
Diekamp, Volker	MARUM Bremen	Photography
Eichstädter, René	IUP Heidelberg	Geobiology
Freiwald, André, Prof. Dr.	SAM Wilhelmshaven	Co-Chief Scientist
Gaide, Stefanie	MARUM Bremen	Hydroacustics Mapping
Günther, Babett, Dr.	IFREMER	Genetics
Hebbeln, Dierk, Prof. Dr.	MARUM Bremen	Co-Chief Scientist
Hemsing, Freya, Dr.	IUP Heidelberg	Water Chemistry
Hoffman, Leon	SAM Wilhelmshaven	Geobiology
Krengel, Thomas	IUP Heidelberg	Marine Geology
Lausecker, Marleen	IUP Heidelberg	Water Chemistry
Leymann, Tom	MARUM Bremen	ROV
Link, Jasmin	IUP Heidelberg	Hydroacustics Mapping
Linnemann, Ulf, Prof. Dr.	SnG Dresden	Petrology
Matos, Lélia, Dr.	IPMAR	Observer
Nowald, Nicolas, Dr.	MARUM Bremen	ROV
Raddatz, Jacek, Dr.	IfG Frankfurt	Marine Geology
Schade, Tobias	MARUM Bremen	Marine Geology
Schröder, Marcel	MARUM Bremen	ROV
Schröder-Ritzrau, Andrea, Dr.	IUP Heidelberg	Marine Geology
Seiter, Christian	MARUM Bremen	ROV
Speicher, Ronja	IUP Heidelberg	Water Chemistry
Stelzner, Martin	DWD	Meteorology
Tamborrino, Leonardo	MARUM Bremen	Marine Geology
Wefing, Anne-Marie	ETH	Water Chemistry
Wenzel, Julia	DWD	Meteorology
Wefing, Anne-Marie	ETH	Water Chemistry
Wienberg, Claudia	MARUM Bremen	Marine Geology

Participating Institutes

IUP
Institut für Umweltphysik
Universität Heidelberg
Im Neuenheimer Feld 229
69120 Heidelberg

MARUM
Zentrum für Marine Umweltwissenschaften
Universität Bremen
Leobener Str. 8
28359 Bremen

SAM
Senckenberg am Meer
Südstrand 40

26382 Wilhelmshaven

SnS
Senckenberg Naturhistorische Sammlungen
Königsbrücker Landstraße 159
01109 Dresden

ETH
Laboratory of Ion Beam Physics,
Eidgenössisch Technische Hochschule
Rämistrasse 101
8092 Zürich
Schweiz

IPMAR
Instituto Portugues do Mar e da Atmosfera
Rua C do Aeroporto
1749-077 Lisboa
Portugal

IMAR
Departamento de Oceanografia e Pescas
Universidade dos Açores
PT-9901 862 Horta
Portugal

IFREMER
Laboratoire Halieutique Mediterranee (PDG-RBE-MARBEC-LHM)
Station de Sète
Avenue Jean Monnet
CS 30171 - 34203 Sète Cedex
France

DWD
Deutscher Wetterdienst
Seewetteramt
Bernhard-Nocht-Straße 76
20359 Hamburg

IfG
Goethe-Universität Frankfurt
Institut für Geowissenschaften
Altenhöferallee 1
60438 Frankfurt am Main

Stationlist

					Bottom contact / Start of survey / End Survey						
EXPEDITION	GEOB_NR	SHIPSITE	AREA	GEAR	DATE	TIME	LATITUDE	LONGITUDE	DEPTH	RECOVERY	REMARKS
M151	GeoB23101-1	M151/1-1	Sao Miguel Slope	MBES/PS	06.10.18	06:31	37°40.490´N	25°43.020´W	320		EM122/EM710 plus ADCP
					06.10.18	09:21	37°36.915´N	25°47.720´W	662		mapping speed: 5 kn; mapping with EM710 interrupted
M151	GeoB23102-1	M151/2-1	Sao Miguel Slope	CTD+RO	06.10.18	10:30	37°37.764´N	25°44.855´W	707		SLmax=691m
M151	GeoB23103-1	M151/3-1	José Gaspar seamount	GS	06.10.18	12:11	37°40.225´N	25°42.909´W	505	bulk	few volcano-clastic fine sand
M151	GeoB23104-1	M151/4-1	José Gaspar seamount	GS	06.10.18	12:56	37°40.410´N	25°42.957´W	380	bulk	few medium sand, few bioclasts incl. few coral fragments
M151	GeoB23105-1	M151/5-1	José Gaspar seamount	GS	06.10.18	13:22	37°40.467´N	25°42.992´W	337	bulk	few coral rubble (*Eguchipsammia*)
M151	GeoB23105-2	M151/5-2	José Gaspar seamount	GS	06.10.18	14:00	37°40.473´N	25°42.997´W	329	bulk	*Eguchipsammia* rubble
M151	GeoB23106-1	M151/6-1	José Gaspar seamount	GS	06.10.18	14:37	37°40.522´N	25°42.996´W	314	bulk	abundant *Eguchipsammia* rubble and live *Eguchipsammia*
M151	GeoB23107-1	M151/7-1	Sao Miguel Slope	MBES/PS	06.10.18	15:50	37°41.513´N	25°53.117´W	613		EM122/EM710 plus ADCP, mapping speed: 5 kn
					07.10.18	07:00	37°40.365´N	25°43.972´W	629		ADCP stopped at 17:00
M151	GeoB23108-1	M151/8-1	José Gaspar seamount	ROV	08.10.18	09:21	37°40.233´N	25°43.797´W	634		dive#30; deployment had to be interrupted
					08.10.18	10:15	37°40.233´N	25°43.797´W	634		due to technical problems with the ROV
M151	GeoB23109-1	M151/9-1	Mar da Prata NW	GS	08.10.18	11:54	37°40.112´N	25°55.562´W	834	bulk	coral rubble with shells
M151	GeoB23110-1	M151/10-1	Mar da Prata NW	GS	08.10.18	12:43	37°40.278´N	25°55.496´W	714	bulk	coral rubble with other shells
M151	GeoB23111-1	M151/11-1	Mar da Prata NW	GS	08.10.18	13:23	37°40.389´N	25°55.476´W	595	bulk	bioclastic sand with few corals and shells
M151	GeoB23112-1	M151/12-1	Mar da Prata NW	GS	08.10.18	14:12	37°39.640´N	25°55.080´W	599	bulk	bioclastic sand with few corals and shells
M151	GeoB23113-1	M151/13-1	Mar da Prata NW	GS	08.10.18	15:24	37°39.914´N	25°57.755´W	944	bulk	few coral rubble with other shells
M151	GeoB23114-1	M151/14-1	Mar da Prata NW	GS	08.10.18	16:58	37°40.149´N	25°54.350´W	406	bulk	volcanoclastic sand
M151	GeoB23115-1	M151/15-1	Mar da Prata NW	MBES/PS	08.10.18	17:37	37°41.959´N	25°53.820´W	674		EM122/EM710, mapping speed: 5 kn
					09.10.18	00:39	37°36.422´N	25°56.455´W	1145		
M151	GeoB23116-1	M151/16-1	deep site SW of Mar da Prata	CTD+RO	09.10.18	01:43	37°33.441´N	25°57.648´W	1903		SLmax=1831m; Yoyo CTD for 6 hours (until 07:05)
					09.10.18	07:05	37°33.441´N	25°57.648´W	1903		
M151	GeoB23117-1	M151/17-1	Mar da Prata NW	MBES/PS	09.10.18	08:04	37°41.938´N	25°57.157´W	1108		EM122/EM710 plus ADCP
					09.10.18	09:24	37°40.527´N	25°57.803´W	1224		
M151	GeoB23118-1	M151/18-1	Mar da Prata NW	ROV	09.10.18	12:39	37°40.249´N	25°57.906´W	1237		dive#31; dive had to be aborted due to
					09.10.18	13:03	37°40.218´N	25°57.854´W	1227		a complete system failout; dead vehicle recovery
M151	GeoB23119-1	M151/19-1	Mar da Prata NW	GS	09.10.18	15:15	37°39.957´N	25°57.797´W	925	bulk	coral-barnacle rubble
M151	GeoB23120-1	M151/20-1	Mar da Prata NW	GS	09.10.18	16:08	37°39.922´N	25°57.876´W	949	bulk	few but large *Solenosmilia* rubble
M151	GeoB23121-1	M151/21-1	Mar da Prata NW	GS	09.10.18	17:10	37°39.930´N	25°57.968´W	961	bulk	*Solenosmilia* rubble
M151	GeoB23122-1	M151/22-1	Albatroz seamount	CTD+RO	10.10.18	01:55	37°53.283'N	27°21.675'W	1649		SLmax=1600m
M151	GeoB23123-1	M151/23-1	Albatroz seamount	MBES/PS	10.10.18	02:53	37°53.889'N	27°21.656'W	1398		EM122/EM710 plus ADCP, mapping speed: 8 kn
					10.10.18	10:31	38°9.823'N	27°8.123'W	1509		
M151	GeoB23124-1	M151/24-1	Albatroz seamount	GS	10.10.18	11:31	38°07.990'N	27°11.910'W	1007	bulk	coral rubble
M151	GeoB23125-1	M151/25-1	Albatroz seamount	GS	10.10.18	12:43	38°06.929'N	27°10.898'W	769	./.	empty
M151	GeoB23125-2	M151/25-2	Albatroz seamount	GS	10.10.18	13:25	38°06.932'N	27°10.893'W	770	bulk	foraminifera sand
M151	GeoB23126-1	M151/26-1	Albatroz seamount	GS	10.10.18	14:20	38°06.660'N	27°10.195'W	712	bulk	rock colonised with octocorals and sponges
M151	GeoB23127-1	M151/27-1	Albatroz seamount	GS	10.10.18	15:31	38°06.554'N	27°13.805'W	1144	bulk	very few fragments
M151	GeoB23128-1	M151/28-1	Albatroz seamount	GS	10.10.18	16:59	38°04.542'N	27°12.578'W	1125	bulk	silty fine sand
M151	GeoB23129-1	M151/29-1	Albatroz seamount	MBES/PS	10.10.18	18:13	38°09.727'N	27°07.184'W	1125		EM122/EM710 plus ADCP, mapping speed: 8 kn
					10.10.18	22:00	38°01.769'N	27°10.101'W	1900		continuation of GeoB23123-1

					Bottom contact / Start of survey / End Survey						
EXPEDITION	GEOB_NR	SHIPSITE	AREA	GEAR	DATE	TIME	LATITUDE	LONGITUDE	DEPTH	RECOVERY	REMARKS
M151	GeoB23130-1	M151/30-1	José Gaspar seamount	GS	12.10.18	16:22	37°40.512´N	25°42.999´W	309	bulk	coral rubble and live *Eguchipsammia*
M151	GeoB23131-1	M151/31-1	José Gaspar seamount	GS	12.10.18	16:54	37°40.545´N	25°43.076´W	293	bulk	coral rubble and live *Eguchipsammia*
M151	GeoB23132-1	M151/32-1	Acor Bank - fishbowl trough	MBES/PS	13.10.18	10:43	38°16.957'N	28°48.039'W	1008		EM122/EM710 and Parasound; mapping speed: 8kn
					13.10.18	14:00	38°18.072'N	29°02.591'W	1465		
M151	GeoB23133-1	M151/33-1	Acor Bank - fishbowl trough	CTD+RO	13.10.18	14:36	38°18.055'N	29°02.626'W	1465		SLmax=1465m
M151	GeoB23133-2	M151/33-2	Acor Bank - fishbowl trough	GC6	13.10.18	15:59	38°18.059'N	29°02.628'W	1465	527 cm	rope speed: 1.2 m/s; opened on-board
M151	GeoB23133-3	M151/33-3	Acor Bank - fishbowl trough	MUC	13.10.18	17:15	38°18.058'N	29°02.629'W	1465	6-12 cm	
M151	GeoB23134-1	M151/34-1	Acor Bank North	GS	13.10.18	18:42	38°21.399'N	29°02.905'W	512	bulk	very few sand
M151	GeoB23135-1	M151/35-1	Acor Bank North	GS	13.10.18	19:28	38°21.524'N	29°03.032'W	648	bulk	sand with abundant polychaet tubes
M151	GeoB23136-1	M151/36-1	Acor Bank North	GS	13.10.18	20:19	38°21.758'N	29°02.654'W	439	bulk	very few sand
M151	GeoB23137-1	M151/37-1	Acor Bank Central	GS	13.10.18	21:48	38°12.655'N	29°00.563'W	173	./.	empty
M151	GeoB23137-2	M151/37-2	Acor Bank Central	GS	13.10.18	22:02	38°12.566'N	29°00.566'W	173	bulk	very few sand
M151	GeoB23138-1	M151/38-1	Acor Bank Central	GS	13.10.18	22:59	38°13.983'N	29°04.555'W	395	bulk	sand
M151	GeoB23139-1	M151/39-1	Acor Bank Central	GS	13.10.18	23:53	38°09.344'N	29°05.042'W	339	./.	not closed
M151	GeoB23139-2	M151/39-2	Acor Bank Central	GS	14.10.18	00:10	38°09.344'N	29°05.042'W	339	bulk	*Eguchipsammia* rubble
M151	GeoB23140-1	M151/40-1	Acor Bank - deep trough	MBES/PS	14.10.18	03:07	38°11.272'N	29°09.493'W	2667		EM122/EM710 and Parasound; mapping speed: 6kn
					14.10.18	8:20	38°08.459'N	29°34.290'W	2671		
M151	GeoB23141-1	M151/41-1	Acor Bank - deep trough	GC6	14.10.18	09:37	38°04.538'N	29°04.391'W	2612	471 cm	rope speed: 1.2 m/s; opened on-board
M151	GeoB23142-1	M151/42-1	Acor Bank - deep trough	CTD+RO	14.10.18	11:59	38°07.548'	29°34.310'W	2667		SLmax=2645m
M151	GeoB23143-1	M151/43-1	Acor Bank South	GS	14.10.18	14:41	38°02.684'N	29°36.428'W	1063	./.	empty
M151	GeoB23144-1	M151/44-1	Acor Bank South	GS	14.10.18	15:55	38°03.292'N	29°36.520'W	1283	bulk	basaltic roundish rock
M151	GeoB23145-1	M151/45-1	Acor Bank South	GS	14.10.18	17:56	38°10.620'N	29°29.417'W	1333	bulk	rope length: 1374 m; sampl. Pos. steep flank; biocl. sand, one *Desmophyll*
M151	GeoB23146-1	M151/46-1	Acor Bank South	GS	14.10.18	19:39	38°13.406'N	29°29.369'W	979	bulk	well-sorted carbonatic fine sand
M151	GeoB23147-1	M151/47-1	Acor Bank South	GS	14.10.18	21:49	38°01.872'N	29°25.558'W	830	bulk	*Lophelia-Madrepora* rubble
M151	GeoB23148-1	M151/48-1	Acor Bank South	GS	14.10.18	22:49	38°01.043'N	29°22.732'W	542	./.	empty
M151	GeoB23149-1	M151/49-1	Acor Bank	MBES/PS	14.10.18	23:22	38°18.362'N	29°22.469'W	715		EM122/EM710 and Parasound; mapping speed: 8kn
					15.10.18	08:31	38°18.362'N	29°39.761'W	2539		
M151	GeoB23150-1	M151/50-1	Acor Bank South	MUC	15.10.18	10:37	38°07.533'N	29°25.513'W	2672	8 cm	
M151	GeoB23151-1	M151/51-1	Acor Bank South	GS	15.10.18	12:46	38°01.932'N	29°25.511'W	814	./.	empty
M151	GeoB23152-1	M151/52-1	Acor Bank South	GS	15.10.18	13:56	38°01.204'N	29°22.833'W	494	bulk	live hydrozoan with basal part
M151	GeoB23153-1	M151/53-1	Acor Bank South	GS	15.10.18	15:08	38°01.875'N	29°25.565'W	832	bulk	*Lophelia-Madrepora* rubble
M151	GeoB23153-2	M151/53-2	Acor Bank South	GS	15.10.18	15:52	38°01.878'N	29°25.562'W	831	bulk	*Lophelia-Madrepora* rubble
M151	GeoB23153-3	M151/53-3	Acor Bank South	GS	15.10.18	16:50	38°01.875'N	29°25.562'W	830	bulk	almost empty, one solitary coral
M151	GeoB23154-1	M151/54-1	Acor Bank	MBES/PS	15.10.18	19:05	38°03.072'N	28°58.593'W	959		EM122/EM710 and Parasound; mapping speed: 5kn
					15.10.18	19:53	38°04.330'N	28°53.710'W	972		
M151	GeoB23155-1	M151/55-1	Acor Bank North	GC6	15.10.18	20:30	38°04.159'N	28°54.319'W	965	./.	empty, probably due to sandy sediment
M151	GeoB23156-1	M151/56-1	Mar da Prata SW	GS	16.10.18	09:34	37°34.746'N	25°54.848'	925	bulk	volcanoclastic sand
M151	GeoB23157-1	M151/57-1	Mar da Prata SW	GS	16.10.18	10:30	37°35.007'N	25°54.568'W	706	bulk	very few material (2 sponges, 1 barnacle plate)
M151	GeoB23158-1	M151/58-1	Mar da Prata SW	GS	16.10.18	11:24	37°35.135'N	25°54.153'W	514	bulk	very few material
M151	GeoB23159-1	M151/59-1	Mar da Prata SW	GS	16.10.18	12:59	37°33.992'N	25°52.820'W	410	bulk	large volcanoclasts, solitary corals

					Bottom contact / Start of survey / End Survey						
EXPEDITION	GEOB_NR	SHIPSITE	AREA	GEAR	DATE	TIME	LATITUDE	LONGITUDE	DEPTH	RECOVERY	REMARKS
M151	GeoB23159-2	M151/59-2	Mar da Prata SW	GS	16.10.18	13:21	37°33.991'N	25°52.821'W	410	bulk	very few material
M151	GeoB23160-1	M151/60-1	Mar da Prata SW	GS	16.10.18	14:08	37°36.049'N	25°52.420'W	190	bulk	sand
M151	GeoB23161-1	M151/61-1	José Gaspar seamount	BC	16.10.18	15:38	37°40.526'N	25°42.995'W	311	20 cm	same position as 23106-1; live and fossil *Eguchipsammia*
M151	GeoB23162-1	M151/62-1	Mar da Prata "dunes"	BC	16.10.18	17:07	37°38.644'N	25°46.860'W	610	13 cm	sand
M151	GeoB23163-1	M151/63-1	Mar da Prata "dunes"	BC	16.10.18	18:01	37°38.546'N	25°47.087'W	613	12 cm	sand
M151	GeoB23164-1	M151/64-1	Mar da Prata "off-dunes"	GC6	16.10.18	19:29	37°38.019'N	25°48.411'W	610	./.	empty
M151	GeoB23165-1	M151/65-1	José Gaspar seamount	GC3	16.10.18	20:38	37°40.525'N	25°43.008'W	302	30 cm	same position as 23106-1/23161-1; *Eguchipsammia* rubble
M151	GeoB23166-1	M151/66-1	deep site SW of Mar da Prata	CTD+RO	16.10.18	22:03	37°33.448'N	25°57.653'W	1906		Yoyo CTD for 12 hours; same position as 23116-1
					17.10.18	11:02	37°33.448'N	25°57.653'W	1906		
M151	GeoB23167-1	M151/67-1	Mar da Prata	MBES/PS	17.10.18	14:13	37°38.793'N	25°47.355'W	605		EM122/EM710 and Parasound; mapping speed: 7kn
					17.10.18	14:41	37°38.875'N	25°47.296'W	634		
M151	GeoB23168-1	M151/68-1	Mar da Prata NW	GS	17.10.18	15:58	37°39.935'N	25°57.983'W	952	bulk	few coral rubble (*Solenosmilia,Madrepora*); same position as 23121-1
M151	GeoB23168-2	M151/68-2	Mar da Prata NW	GS	17.10.18	16:39	37°39.935'N	25°57.982'W	952	bulk	coral rubble (mainly *Solenosmilia,Lophelia*); same position as 23121-1
M151	GeoB23169-1	M151/69-1	Mar da Prata "little brother"	GS	17.10.18	18:31	37°39.532'N	25°47.310'W	595	bulk	*Lophelia* rubble
M151	GeoB23169-2	M151/69-2	Mar da Prata "little brother"	GS	17.10.18	19:00	37°39.532'N	25°47.313'W	598	bulk	*Lophelia-Madrepora* rubble
M151	GeoB23170-1	M151/70-1	Mar da Prata "off-dunes"	GS	17.10.18	19:59	37°37.671'N	25°47.731'W	637	bulk	sand
M151	GeoB23171-1	M151/71-1	José Gaspar seamount	CTD	17.10.18	21:11	37°39.455'N	25°42.587'W	670		Yoyo CTD for 12 hours; first attempt had to be
M151	GeoB23171-1	M151/71-1	José Gaspar seamount	CTD	17.10.18	23:15	37°29.607'N	25°42.657'W	785		aborted as the CTD got entangled in a longline
					18.10.18	07:12	37°29.606'N	25°42.655'W	786		continuation of Yoyo CTD at another position
M151	GeoB23172-1	M151/72-1	José Gaspar seamount	ROV	18.10.18	09:48	37°40.204'N	25°42.805'W	544		dive#32; dive aborted due to leak in thruster
					18.10.18	14:42	37°40.495'N	25°42.861'W	385		
M151	GeoB23172-2	M151/72-1	José Gaspar seamount	ROV	18.10.18	10:24	37°40.238'N	25°42.804'W	533		sample#1: *Lophelia* rubble
M151	GeoB23172-3	M151/72-1	José Gaspar seamount	ROV	18.10.18	11:40	37°40.291'N	25°42.807'W	503		sample#2: sponge
M151	GeoB23172-4	M151/72-1	José Gaspar seamount	ROV	18.10.18	12:31	37°40.347'N	25°42.805'W	469		sample#3: *Lophelia* rubble
M151	GeoB23172-5	M151/72-1	José Gaspar seamount	ROV	18.10.18	14:17	37°40.492'N	25°42.806'W	406		sample#4: net sample with sand and abundant crustacean shells
M151	GeoB23173-1	M151/73-1	Mar da Prata "little brother"	GS	18.10.18	16:18	37°39.534'N	25°47.265'W	600	bulk	*Lophelia* rubble
M151	GeoB23174-1	M151/74-1	Mar da Prata "little brother"	GS	18.10.18	16:54	37°39.534'N	25°47.286'W	600	bulk	sand very few coral rubble
M151	GeoB23175-1	M151/75-1	Mar da Prata "little brother"	GS	18.10.18	17:30	37°39.524'N	25°47.300'W	603	bulk	sand very few coral rubble
M151	GeoB23176-1	M151/76-1	Mar da Prata "little brother"	GS	18.10.18	18:06	37°39.511'N	25°47.308'W	604	bulk	*Lophelia* rubble
M151	GeoB23177-1	M151/77-1	Mar da Prata "little brother"	GS	18.10.18	18:46	37°39.578'N	25°47.298'W	605	bulk	sand
M151	GeoB23178-1	M151/78-1	Mar da Prata "little brother"	GS	18.10.18	19:30	37°39.542'N	25°47.332'W	603	./.	empty
M151	GeoB23179-1	M151/79-1	Mar da Prata	MBES/PS	18.10.18	20:00	37°39.354'N	25°48.094'W	609		EM122/EM710 and Parasound; mapping speed: 8-9kn
					19.10.18	07:00	37°29.940'N	25°48.848'W	536		
M151	GeoB23180-1	M151/80-1	José Gaspar seamount	ROV	19.10.18	08:16	37°40.455'N	25°42.082'W	340		dive#33; deployment aborted
					19.10.18	08:21	37°40.454'N	25°42.081'W	341		
M151	GeoB23181-1	M151/81-1	Mar da Prata "little brother"	BC	19.10.18	11:10	37°39.524'N	25°47.317'W	599	10-14 cm	*Lophelia* rubble
M151	GeoB23182-1	M151/82-1	Jose Gaspar seamount	ROV	19.10.18	13:30	37°40.444'N	25°42.964'W	349		dive#33; continuation of 23172-1
					19.10.18	16:08	37°40.481'N	25°43.162'W	339		
M151	GeoB23182-2	M151/82-1	Jose Gaspar seamount	ROV	19.10.18	13:54	37°40.480'N	25°43.017'W	314		sample#1: water sample (T: 14.02°C, O2: 4.79 ml/l, S: 35.82)
M151	GeoB23182-3	M151/82-1	Jose Gaspar seamount	ROV	19.10.18	13:58	37°40.479'N	25°43.017'W	314		sample#2: pushcorer -> empty

					Bottom contact / Start of survey / End Survey						
EXPEDITION	GEOB_NR	SHIPSITE	AREA	GEAR	DATE	TIME	LATITUDE	LONGITUDE	DEPTH	RECOVERY	REMARKS
M151	GeoB23182-4	M151/82-1	Jose Gaspar seamount	ROV	19.10.18	14:23	37°40.509'N	25°43.048'W	293		sample#3: net sample with fossil/live *Eguchipsammia* , gorgonians
M151	GeoB23182-5	M151/82-1	Jose Gaspar seamount	ROV	19.10.18	14:50	37°40.519'N	25°43.048'W	292		sample#4: echinoid
M151	GeoB23183-1	M151/83-1	Mar da Prata "little brother"	GC3	19.10.18	17:44	37°39.537'N	25°47.307'W	599	./.	empty, but abundant coral rubble in the core catcher
M151	GeoB23184-1	M151/84-1	Mar da Prata "little sister"	GS	19.10.18	18:29	37°39.492'N	25°47.704'W	600	bulk	*Lophelia* rubble
M151	GeoB23185-1	M151/85-1	Atlantis Basin	CTD+RO	20.10.18	15:00	34°58.485'N	29°14.378'W	3649		
M151	GeoB23185-2	M151/85-2	Atlantis Basin	MUC	20.10.18	18:33	34°58.489'N	29°14.378'W	3649	1-5 cm	
M151	GeoB23401-1	M151/86-1	Atlantis seamount south	MBES/PS	21.10.18	02:13	34°01.372'N	30°11.669'W	387		EM122/EM710 and Parasound; mapping speed: 8-9kn
					21.10.18	10:29	33°55.391'N	30°13.136'W	1803		
M151	GeoB23402-1	M151/87-1	Atlantis seamount south	CTD+RO	21.10.18	10:47	33°54.736'N	30°14.945'W	2254		SLmax=2257m
M151	GeoB23403-1	M151/88-1	Atlantis seamount south	GS	21.10.18	14:11	33°58.369'N	30°13.324'W	862	bulk	rope length: 944m(!); very few material, small *Solenosmilia* fragments
M151	GeoB23404-1	M151/89-1	Atlantis seamount south	GS	21.10.18	15:30	33°58.242'N	30°12.381'W	677	bulk	rope length: 777m(!); carbonatic sand with some *Solenosmilia* fragments
M151	GeoB23405-1	M151/90-1	Atlantis seamount south	GS	21.10.18	16:29	33°58.918'N	30°12.030'W	621	bulk	rope length: 662m; very few material, two *Madrepora* (?) branches
M151	GeoB23406-1	M151/91-1	Atlantis seamount south	GS	21.10.18	17:33	33°59.448'N	30°11.891'W	467	bulk	rope length: 495m; large sponges
M151	GeoB23407-1	M151/92-1	Atlantis seamount south	GS	21.10.18	18:51	33°58.788'N	30°11.711'W	705	./.	empty
M151	GeoB23408-1	M151/93-1	Atlantis seamount south	GS	21.10.18	20:08	33°59.787'N	30°10.604'W	617	bulk	bioclastic sand
M151	GeoB23409-1	M151/94-1	Atlantis seamount south	GS	21.10.18	21:09	33°59.510'N	30°12.810'W	550	bulk	almost empty, one shrimp
M151	GeoB23410-1	M151/95-1	Atlantis seamount south	GS	21.10.18	21:53	34°00.271'N	30°12.826'W	424	bulk	almost empty, one live juvenile *Leptosammia formosa*
M151	GeoB23411-1	M151/96-1	Transit Great Meteor Bank	CTD+RO	22.10.18	11:07	31°58.363'N	29°20.119'W	3985		SLmax=4024m
M151	GeoB23412-1	M151/97-1	Great Meteor Bank North	MBES/PS	22.10.18	22:45	30°14.672'N	28°30.584'W	2205		EM122/EM710 and Parasound; mapping speed: 8kn
					23.10.18	07:30	30°11.765'N	28°23.732'W	745		
M151	GeoB23413-1	M151/98-1	Great Meteor Bank North	CTD+RO	23.10.18	08:46	30°10.456'N	28°22.037'W	1681		SLmax=1681m
M151	GeoB23414-1	M151/99-1	Great Meteor Bank North	GS	23.10.18	11:12	30°15.489'N	28°27.250'W	1032	./.	empty
M151	GeoB23415-1	M151/100-1	Great Meteor Bank North	ROV	23.10.18	13:58	30°14.747'N	28°26.291'W	987		dive#34
					23.10.18	19:10	30°14.198'N	28°26.442'W	751		
M151	GeoB23415-2	M151/100-1	Great Meteor Bank North	ROV	23.10.18	14:15	30°14.743'N	28°26.289'W	985		sample#1: *Madrepora* rubble
M151	GeoB23415-3	M151/100-1	Great Meteor Bank North	ROV	23.10.18	14:55	30°14.688'N	28°26.309'W	975		sample#2: 2x *Acanella arbuscula* (isidid octocoral)
M151	GeoB23415-4	M151/100-1	Great Meteor Bank North	ROV	23.10.18	15:01	30°14.681'N	28°26.312'W	972		sample#3: *Madrepora* rubble
M151	GeoB23415-5	M151/100-1	Great Meteor Bank North	ROV	23.10.18	16:32	30°14.460'N	28°26.353'W	894		sample#4: *Madrepora* rubble, *Swiftia* sp. (red octocoral)
M151	GeoB23415-6	M151/100-1	Great Meteor Bank North	ROV	23.10.18	17:27	30°14.353'N	28°26.352'W	822		sample#5: water sample (T: 9.91°C, O2: 3.73 ml/l, S: 35.48)
M151	GeoB23415-7	M151/100-1	Great Meteor Bank North	ROV	23.10.18	19:09	30°14.206'N	28°26.442'W	751		sample#6: *Madrepora* rubble
M151	GeoB23416-1	M151/101-1	Great Meteor Bank SW	MBES/PS	24.10.18	00:32	29°46.546'N	28°32.469'W	323		EM122/EM710 and Parasound; mapping speed: 8-9kn
					24.10.18	07:01	29°44.598'N	28°32.169'W	340		
M151	GeoB23417-1	M151/102-1	Great Meteor Bank SW	CTD+RO	24.10.18	08:58	29°37.206'N	28°39.006'W	2934		SLmax=2624m
M151	GeoB23418-1	M151/103-1	Great Meteor Bank SW	ROV	24.10.18	13:24	29°44.100'N	28°33.457'W	749		dive#35
					24.10.18	17:13	29°44.542'N	28°33.291'W	497		
M151	GeoB23418-2	M151/103-1	Great Meteor Bank SW	ROV	24.10.18	13:41	29°44.334'N	28°33.451'W	731		sample#1: rock
M151	GeoB23418-3	M151/103-1	Great Meteor Bank SW	ROV	24.10.18	15:16	29°44.112'N	28°33.417'W	554		sample#2: white octocoral
M151	GeoB23418-4	M151/103-1	Great Meteor Bank SW	ROV	24.10.18	15:35	29°44.431'N	28°33.395'W	545		sample#3: rock
M151	GeoB23418-5	M151/103-1	Great Meteor Bank SW	ROV	24.10.18	15:54	29°44.454'N	28°33.377'W	535		sample#4: sponge
M151	GeoB23418-6	M151/103-1	Great Meteor Bank SW	ROV	24.10.18	16:33	29°44.491'N	28°33.357'W	518		sample#5: sponge
M151	GeoB23418-7	M151/103-1	Great Meteor Bank SW	ROV	24.10.18	16:47	29°44.498'N	28°33.329'W	514		sample#6: sponge

					Bottom contact / Start of survey / End Survey						
EXPEDITION	GEOB_NR	SHIPSITE	AREA	GEAR	DATE	TIME	LATITUDE	LONGITUDE	DEPTH	RECOVERY	REMARKS
M151	GeoB23418-8	M151/103-1	Great Meteor Bank SW	ROV	24.10.18	17:08	29°44.543'N	28°33.285'W	495		sample#7: water sample
M151	GeoB23419-1	M151/104-1	Great Meteor Bank SW	GS	24.10.18	18:38	29°45.008'N	28°31.984'W	320	bulk	carbonatic sand, few small fragments of solitary corals
M151	GeoB23419-2	M151/104-2	Great Meteor Bank SW	GS	24.10.18	19:01	29°45.008'N	28°31.985'W	319	bulk	carbonatic sand
M151	GeoB23420-1	M151/105-1	Great Meteor Bank SW	MBES/PS	24.10.18	19:45	29°43.941'N	28°33.689'W	1189		survey to search for sampling positions
					24.10.18	20:11	29°44.854'N	28°35.885'W	974		
M151	GeoB23421-1	M151/106-1	Great Meteor Bank SW	GS	24.10.18	20:52	29°44.767'N	28°35.587'W	937	./.	empty
M151	GeoB23422-1	M151/107-1	Great Meteor Bank South	MBES/PS	24.10.18	22:35	29°35.892'N	28°24.335'W	1525		EM122/EM710 and Parasound; mapping speed: 8kn
					25.10.18	06:53	29°36.299'N	28°18.763'W	1588		
M151	GeoB23423-1	M151/108-1	Great Meteor Bank South	CTD+RO	25.10.18	07:50	29°36.295'N	28°18.764'W	1585		SLmax=1579m
M151	GeoB23424-1	M151/109-1	Great Meteor Bank South	CTD+RO	25.10.18	09:43	29°34.478'N	28°23.650'W	1836		SLmax=1851m
M151	GeoB23425-1	M151/110-1	Great Meteor Bank South	ROV	25.10.18	12:46	29°33.842'N	28°20.328'W	964		dive#36
					25.10.18	18:05	29°34.329'N	28°20.410'W	964		
M151	GeoB23425-2	M151/110-1	Great Meteor Bank South	ROV	25.10.18	13:09	29°33.893'N	28°20.334'W	948		sample#1: *M. oculata* with live *D. dianthus* , sponge (#1-3: one site)
M151	GeoB23425-3	M151/110-1	Great Meteor Bank South	ROV	25.10.18	13:16	29°33.893'N	28°20.334'W	948		sample#2: *Acanella arbuscula* (isidid octocoral), *M. oculata* and others
M151	GeoB23425-4	M151/110-1	Great Meteor Bank South	ROV	25.10.18	13:28	29°33.893'N	28°20.334'W	948		sample#3: water sample (T: 13.69°C, O2: 4.23 ml/l, S: 35.84)
M151	GeoB23425-5	M151/110-1	Great Meteor Bank South	ROV	25.10.18	13:40	29°33.910'N	28°20.328'W	945		sample#4: large sponge
M151	GeoB23425-6	M151/110-1	Great Meteor Bank South	ROV	25.10.18	14:00	29°33.915'N	28°20.336'W	945		sample#5: 2 living colonies of *Madrepora oculata* with *Eunice*
M151	GeoB23425-7	M151/110-1	Great Meteor Bank South	ROV	25.10.18	14:28	29°33.923'N	28°20.352'W	944		sample#6: netsample coral rubble an one rock
M151	GeoB23425-8	M151/110-1	Great Meteor Bank South	ROV	25.10.18	15:31	29°33.999'N	28°20.384'W	903		sample#7: living colony of *Madrepora oculata* with *Eunice*
M151	GeoB23425-9	M151/110-1	Great Meteor Bank South	ROV	25.10.18	15:42	29°33.999'N	28°20.384'W	903		sample#8: dead coral framework
M151	GeoB23425-10	M151/110-1	Great Meteor Bank South	ROV	25.10.18	16:36	29°34.070'N	28°20.408'W	855		sample#9: netsample with coral rubble
M151	GeoB23426-1	M151/111-1	Great Meteor Bank South	GC3	25.10.18	19:29	29°34.069'N	28°20.414'W	861	./.	just few shells in CC
M151	GeoB23426-2	M151/111-2	Great Meteor Bank South	GS	25.10.18	20:10	29°34.069'N	28°20.414'W	856	bulk	very few material, one fossil *Madrepora*
M151	GeoB23427-1	M151/112-1	Great Meteor Bank South	GC3	25.10.18	21:00	29°33.955'N	28°20.382'W	934	./.	just few shells in CC
M151	GeoB23428-1	M151/113-1	Great Meteor Bank	MBES/PS	26.10.18	04:03	30°01.092'N	28°43.768'W	1605		EM122/EM710 and Parasound; mapping speed: 8kn
					26.10.18	09:55	30°09.750'N	28°43.155'W	1686		
M151	GeoB23429-1	M151/114-1	Great Meteor Bank NW	ROV	26.10.18	12:04	30°04.930'N	28°43.786'W	1032		dive#37
					26.10.18	17:15	30°05.181'N	28°43.472'W	904		
M151	GeoB23429-2	M151/114-1	Great Meteor Bank NW	ROV	26.10.18	12:12	30°04.929'N	28°43.786'W	1032		sample#1: netsample with pebbels, echinoid spines
M151	GeoB23429-3	M151/114-1	Great Meteor Bank NW	ROV	26.10.18	13:04	30°05.033'N	28°43.755'W	971		sample#2: basaltic rock with sponge
M151	GeoB23429-4	M151/114-1	Great Meteor Bank NW	ROV	26.10.18	14:39	30°05.191'N	28°43.617'W	895		sample#3: *A. arbuscula* (isidid octocoral), living *M. oculata* and sol.corals
M151	GeoB23429-5	M151/114-1	Great Meteor Bank NW	ROV	26.10.18	15:00	30°05.191'N	28°43.617'W	895		sample#4: water sample (T: 8.93°C, O2: 3.78 ml/l, S: 35.41)
M151	GeoB23429-6	M151/114-1	Great Meteor Bank NW	ROV	26.10.18	15:06	30°05.191'N	28°43.617'W	895		sample#5: dead coral fragments*(M. ocu.* and *L. pert.)* (same as #3 & 4)
M151	GeoB23429-7	M151/114-1	Great Meteor Bank NW	ROV	26.10.18	15:32	30°05.179'N	28°43.572'W	902		sample#6: 3x crust
M151	GeoB23429-8	M151/114-1	Great Meteor Bank NW	ROV	26.10.18	15:57	30°05.173'N	28°43.552'W	906		sample#7: netsample with living *M. oculata* , solitary corals, sponge
M151	GeoB23429-9	M151/114-1	Great Meteor Bank NW	ROV	26.10.18	16:25	30°05.173'N	28°43.552'W	906		sample#8: netsample with coral rubble, a piece of crust (same site as #7)
M151	GeoB23429-10	M151/114-1	Great Meteor Bank NW	ROV	26.10.18	17:13	30°05.181'N	28°43.471'W	904		sample#9: stone with anemone and barnacles
M151	GeoB23430-1	M151/115-1	Transit Great to Little Meteor	MBES/PS	26.10.18	23:59	29°50.307'N	28°50.249'W	3073		EM122/EM710 and Parasound; mapping speed: 8kn
					26.10.18	20:59	29°46.140'N	28°53.333'W	3252		
M151	GeoB23431-1	M151/116-1	Transit Great to Little Meteor	CTD+RO	26.10.18	22:19	29°46.258'N	28°53.258'W	3252		SLmax=3282
M151	GeoB23432-1	M151/117-1	Transit Great to Little Meteor	MUC	26.10.18	23:59	29°46.258'N	28°53.258'W	3256	0-5 cm	same site as CTD GeoB23431-1
M151	GeoB23433-1	M151/118-1	Little Meteor Bank North	MBES/PS	27.10.18	02:41	29°38.151'N	28°56.358'W	1248		EM122/EM710 and Parasound; mapping speed: 8kn
					27.10.18	07:03	29°38.428'N	28°58.450'W	288		

					Bottom contact / Start of survey / End Survey						
EXPEDITION	GEOB_NR	SHIPSITE	AREA	GEAR	DATE	TIME	LATITUDE	LONGITUDE	DEPTH	RECOVERY	REMARKS
M151	GeoB23434-1	M151/119-1	Little Meteor Bank North	ROV	27.10.18	09:15	29°39.194'N	29°00.949'W	916		dive#38
					27.10.18	12:37	29°39.286'N	29°00.774'W	757		
M151	GeoB23434-2	M151/119-1	Little Meteor Bank North	ROV	27.10.18	09:22	29°39.194'N	29°00.949'W	916		sample#1: basaltic rock with sponge
M151	GeoB23434-3	M151/119-1	Little Meteor Bank North	ROV	27.10.18	09:42	29°39.206'N	29°00.924'W	893		sample#2: live gorgonian and *Madrepora oculata*
M151	GeoB23434-4	M151/119-1	Little Meteor Bank North	ROV	27.10.18	10:07	29°39.215'N	29°00.910'W	876		sample#3: *Lophelia* framework
M151	GeoB23434-5	M151/119-1	Little Meteor Bank North	ROV	27.10.18	10:27	29°39.223'N	29°00.895'W	865		sample#4: netsample with coral rubble, live *Calliostoma* sp.
M151	GeoB23434-6	M151/119-1	Little Meteor Bank North	ROV	27.10.18	12:36	29°39.289'N	29°00.774'W	757		sample#5: water sample
M151	GeoB23434-7	M151/119-1	Little Meteor Bank North	ROV	27.10.18	12:37	29°39.289'N	29°00.774'W	757		sample#6: live *Madrepora oculata* , *Aphrocallistes* sp.
M151	GeoB23435-1	M151/120-1	Little Meteor Bank North	GS	27.10.18	13:48	29°39.301'N	29°00.765'W	746	bulk	fossil Madrepora-Eunice "pioneer" example (!)
M151	GeoB23436-1	M151/121-1	Little Meteor Bank North	GS	27.10.18	14:35	29°39.235'N	29°00.881'W	852	bulk	small-sized Fe-Mn coated *Madrepora* rubble, crusts
M151	GeoB23437-1	M151/122-1	Little Meteor Bank North	GS	27.10.18	15:21	29°39.262'N	29°00.827'W	811	bulk	*Madrepora* rubble
M151	GeoB23438-1	M151/123-1	Little Meteor Bank North	GS	27.10.18	16:15	29°39.301'N	29°00.210'W	464	bulk	bioclastic sand
M151	GeoB23439-1	M151/124-1	Little Meteor Bank North	GS	27.10.18	17:10	29°38.796'N	29°59.103'W	283	bulk	bioclastic sand
M151	GeoB23440-1	M151/125-1	Little Meteor Bank North	GS	27.10.18	17:45	29°38.703'N	28°58.501'W	284	bulk	bioclastic sand
M151	GeoB23441-1	M151/126-1	Little Meteor Bank North	GS	27.10.18	18:30	29°38.004'N	28°58.002'W	282	bulk	bioclastic sand
M151	GeoB23442-1	M151/127-1	Little Meteor Bank North	GS	27.10.18	19:18	29°37.998'N	28°59.005'W	274	bulk	bioclastic sand
M151	GeoB23443-1	M151/128-1	Little Meteor Bank North	GS	27.10.18	20:26	29°39.794'N	29°01.379'W	1161	./.	empty
M151	GeoB23444-1	M151/129-1	Little Meteor Bank	CTD+RO	27.10.18	21:53	29°39.496'N	29°39.469'W	1586		SLmax=1612m
M151	GeoB23445-1	M151/130-1	Transit Funchal	CTD+RO	29.10.18	09:42	30°54.260'N	23°57.605'W	5415		Slmax=5469m