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Short Cruise Report
Meteor M127

Bridgetown (Barbados) – Ponta Delgada (Portugal)
May 25 – June 28, 2016
Chief Scientist: Dr. Sven Petersen
Captain: Rainer Hammacher

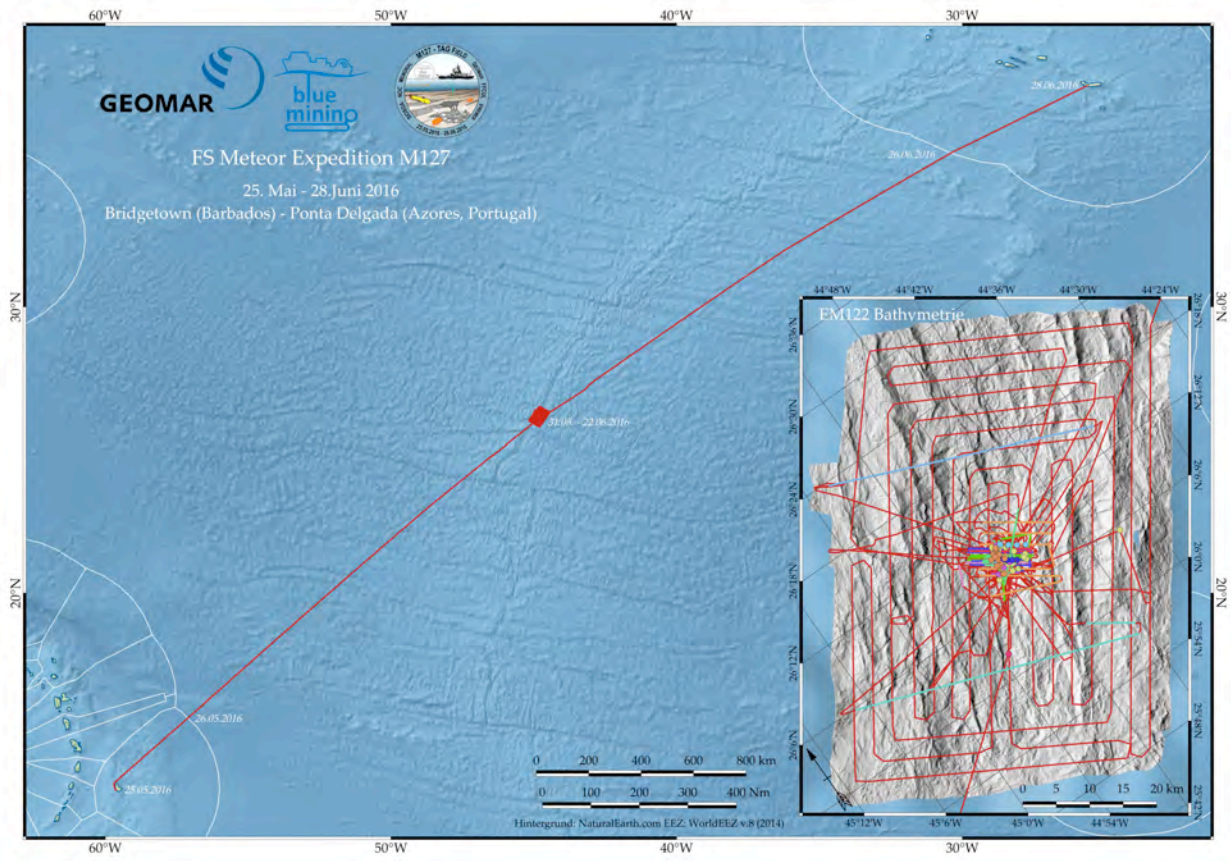

Fig. 1: Map of the cruise track from Bridgetown (Barbados) to Ponta Delgada (Azores, Portugal). Insert shows cruis track in the working area with ship-based bathymetry (red lines) and seismic profiles (other colors). Other stations such as gravity coring or the deployments of Ocean-bottom-seismometers were performed within 10 km of the active TAG hydrothermal field located at 26°08'N/44°48'W.

Objectives

Cruise M127 is an integral part of the EU-FP7 project "Blue Mining: Breakthrough Solutions for the Sustainable Deep Sea Mining Value Chain" and is addressing research questions regarding the nature and resource potential of marine minerals, especially seafloor massive sulfides (SMS) along mid-ocean ridges. These deposits are often seen as a possible future contribution to a secure metal supply for global human needs. Resource estimates, however, are lacking several of the fundamental answers that need to be addressed. There are currently several orders of magnitude between resources estimates based on observations at the seafloor and those based on calculated metal fluxes. In order to provide realistic resource estimates, we need to understand how much of the metal that is released by high-temperature fluid convection over a given length of a ridge axis and over a specific geological time frame is actually deposited as massive sulfides. Additionally, exploration is currently only targeting active deposits. It is assumed that 10 times more inactive massive sulfides are occurring within the neovolcanic zone, but until recently the technology to identify those deposits was lacking thereby underestimating the global resource potential. Within the framework of the Blue Mining project some of these technical limitations are addressed and this provides us with the tools to address, for the first time, the full metal potential and fluxes of a slow-spreading mid-ocean ridge.

Slow-spreading mid-ocean ridges, such as the Mid-Atlantic Ridge are known to host accumulations of large submarine massive sulfide (SMS) deposits. The TAG Hydrothermal field at 26°N on the Mid-Atlantic Ridge, for instance, is characterized by a large active black smoker complex and by several similar-sized inactive (eSMS) sites, despite the fact that only small areas of this ridge segment were ever been investigated in detail. This area was therefore choosen as the working area for this project. In the time between submitting the Blue Mining proposal to the EU in 2013 and our cruise in 2016, the French Institute IFREMER, has obtained an exploration license for seafloor massive sulfides from the International Seabed Authority.

During our cruise the detailed high-resolution AUV-based mapping on a segment scale combined with 2D seismic observations and the investigation of surface sediments will help to answer the following scientific questions:

1) What is the accumulation rate of sulfide formation at a slow-spreading ridge and how does it change over time?
2) What are the regional and local spatial controls of these large hydrothermal fields?
3) What is the proportion between active and inactive deposits at a slow-spreading ridge?
4) How far out (back in time) can we trace hydrothermal activity using geophysical and geochemical instrumentation (AUV-based surveys plus sediment geochemistry)?

Specific technology topics of interest within "Blue Mining" that were adressed during cruise M127 are:

1) Test of AUV-based self-potential sensor package for use in exploration of inactive sulphide occurrences (eSMS).
2) Produce regional, high-resolution topographic maps to aid a geochemical study of surface sediments (cover rocks) to identify concealed sulfide mineralization.
3) Provide high-resolution geophysical sections across type examples of eSMS.
4) Provide high-resolution photomosaics of SMS to aid recognition of areas of potential marine mining impact (in cooperation with the EU-FP7-project "MIDAS").

Narrative

Preparations during the port call in Bridgetown resulted in the presence of several member of the scientific crew well before the official boarding. Leaving the 5 containers of the ROV Quest on board for M128 provided additional constraints on the logistics since 5 containers with material for our cruise came from Kiel and were met by 2 containers with seismic gear that came from RV Sonne via New Zealand. Preparations in Barbados were interupted on May 23rd by an offical banquett on the vessel organized by the German consulate and the ships crew. Several guests from the island were introduced to the ship and the scientific instruments were presented. The science party was complete on the evening of Wednesday May 25th when RV Meteor left port at 21:00 LT for its 5-day transit to the working area. Shortly after leaving the Exclusive Economic Zone of Barbados on 20:00 LT on May 26th the 75 kHz ADCP and the Kongsberg EM122 multibeam echosounding system started to collect transit data of seafloor topography and ocean current information. This data will be made publically available shortly after the cruise.

In the afternoon of May 29th the transit was interrupted shortly in order to deploy the first of three ARGO floats (part of a global network of surface buoys collecting seasurface data and transmitting it via satellite) and for testing of some of our instruments. Station work in the working area (TAG segment at 26°N, MAR) started just before midnight on May 30th and included seismic shooting with a surface streamer along a number of profile lines as well as the deployment of Ocean Bottom Electro-Magnetic stations (OBEM) and Ocean Bottom Seismometers (OBS). The OBEM instruments will be recording variations in the electromagnetic field in passive mode for the duration of this cruise. They will not be recovered at the end of this cruise, however, since they will be used for passive and active controlled-source EM works during the following RV James Cook cruise in July/August 2016. Another important part of cruise M127 was mapping the topography of the seafloor in various resolutions. This included ship-based multibeam mapping over the entire length of the 26°N ridge segment as well as high-resolution mapping using an autonomous underwater vehicle (AUV) flying close (40-100 m altitude) to the seafloor. The ship-based multibeam mapped along 710 nautical miles of profile lines covering approximately 7,000 km^2 in the working area. Another 1,800 nautical miles of lines were mapped on the transit from Barbados to the working area and from there to the Azores.

The AUV was used on 15 missions, usually with survey time close to the seafloor of between 10 and 12 hours. The majority of the dives was used to map the topography of the main working area at 2m resolution. These dives were flown at altitudes between 60 and 90 m above the seafloor. Two dives mapped inactive sulfide occurrences at lower altitudes and with a resolution of only 50 cm in order to better understand the local geologicalcontrols on past venting and also preparation for a drilling cruise with RV James Cook this summer.

A modular towed instrument platform (HYBIS) was used to deploy 10 of the Ocean Bottom Seismometers (OBS) to the seafloor with high precision. Since this platform has built-in cameras and can be equipped with a sampling module we used this instrument later in the cruise to further

visually inspect the seafloor and select locations for sampling. HYBIS has been used 7 times for this geological inspection of the seafloor and recovered one sample on each of these dives.

The final instrument being used was a short (3m) gravity corer for sediment sampling. In the course of the cruise 35 stations were attampted of which 22 stations scuccessfully retrieved sediment. Rock fragments were recovered in 9 stations indicating the volcanic nature of those sampling stations. At the end of the cruise all Ocean Bottom Seismometers (OBS) were recovered. Only the six OBEM were intentionally left behind.

Station work in the working area ended on 20:30 LT on June 23rd. when the 5 day transit to Ponta Delgada was started. The transit was interrupted on June 25th and June 26th for the deployment of two ARGOS floats. During the transit ship-based multibeam mapping and collection of 75-kHz ADCP measurements continued. The data collection stopped just before entering the Portugese EEZ at 20:00 LT on June 26th. The cruise ended 09:00 LT of June 28th with docking in Ponta Delgada.

Acknowledgements

We gratefully acknowledge the expertise and help of captian Rainer Hammacher, his officers and crew of the RV Meteor. The work was supported by grants from the EU-FP7-Project “Blue Mining grant No. 604500. Additional support by GEOMAR Helmholtz Centre for Ocean Research is greatfully acknowledged.

Participants

Name	Discipline	Institution
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Dr. Alba Gil	OBS	NOC
Dr. Nico Augustin	AUV bathymetry	GEOMAR
Dr. Isobel Yeo	AUV bathymetry, sidescan	GEOMAR
Dr. Florent Szitkar	self-potential, magnetics	GEOMAR
Prof. John Jamieson	Mineral resources	Memorial
Prof. Fernando Barriga	Mineral resources	FFCUL
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Dr. Honglin Li	Mineral resources	SIOSOA
Dr. Anna Lichtschlag	GC porewater chemistry	NOC
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Meike Klischies	Structural geology	GEOMAR
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Florian Besson	Geology	IFREMER
Holger Jens	Meteorology	DWD
Andreas Raeke	Meteorology	DWD
Laura Raeke	Meteorology	MPI

GEOMAR	Helmholtz-Centre for Ocean Research, Kiel (Germany)
NOC	National Oceanography Centre, Southampton (UK)
SIOSOA	State Oceanic Administration – Second Institute of Oceanography, Hangzhou
IFREMER	Centre Ifremer Bretagne, Plouzane (France)
FFCUL	Faculdade de Farmácia da Universidade de Lisboa, Lisbon (Portugal)
MPI	Max-Planck Institut für Meteorology, Hamburg (Germany)
Memorial	Memorial University of Newfoundland, St. Johns (Canada)
DWD	Deutscher Wetterdienst, Seeschiffahrtsberatung, Hamburg (Germany)

Station list M127

Station	Gear Abbrev.	Date	Time	PositionLat	PositionLon	Depth [m]	Date	Time	PositionLat	PositionLon	Depth [m]
ME127/557	XBT	29.05.16	15:45	22°57.30'N	048°45.16'W	4283	29.05.16	15:52	22°57.75'N	048°44.63'W	4108
ME127/558	HYBIS (test)	29.05.16	15:47	22°57.43'N	048°45.01'W	4269	29.05.16	18:16	22°58.42'N	048°43.38'W	-
ME127/559	AUV (test)	29.05.16	17:34	22°58.43'N	048°43.49'W	4348	29.05.16	18:58	22°58.35'N	048°43.55'W	-
ME127/560	REL	29.05.16	19:07	22°58.35'N	048°43.65'W	4342	29.05.16	21:21	22°58.23'N	048°43.74'W	-
ME127/561	ARGOS	29.05.16	21:28	22°58.30'N	048°43.81'W	4342	-	-	-	-	-
ME127/562	HYBIS (test)	30.05.16	13:34	24°44.20'N	046°32.81'W	3740	30.05.16	14:05	24°44.20'N	046°32.81'W	3738
ME127/563	REL	30.05.16	14:15	24°44.20'N	046°32.81'W	3739	30.05.16	15:12	24°44.20'N	046°32.81'W	-
ME127/564	XBT	31.05.16	01:57	26°01.60'N	044°53.93'W	4516	31.05.16	02:05	26°02.12'N	044°53.28'W	4573
ME127/565	MB-PS	31.05.16	02:15	26°02.91'N	044°52.73'W	4488	31.05.16	09:20	26°10.85'N	044°51.43'W	3719
ME127/566	AUV transp.	31.05.16	10:04	26°08.36'N	044°49.08'W	-	31.05.16	13:19	26°07.75'N	044°49.09'W	-
ME127/567	OBEM	31.05.16	16:25	26°09.58'N	044°49.29'W	3588	31.05.16	20:01	26°09.590'N	044°49.290'W	3586
ME127/568	AUV	31.05.16	20:33	26°07.87'N	044°48.26'W	-	01.06.16	11:50	26°09.22'N	044°49.59'W	-
ME127/569	MB-PS	31.05.16	22:13	26°08.00'N	044°50.21'W	3773	01.06.16	07:18	26°04.30'N	044°46.96'W	2881
ME127/570	OBEM	01.06.16	08:03	26°09.52'N	044°49.22'W	3593	01.06.16	11:04	26°09.512'N	044°49.171'W	3578
ME127/571	OBEM	01.06.16	12:19	26°09.29'N	044°48.87'W	3537	01.06.16	15:31	26°09.30'N	044°48.91'W	3562
ME127/572	AUV	01.06.16	18:03	26°07.83'N	044°48.62'W	3617	02.06.16	10:34	26°10.47'N	044°49.65'W	3669
ME127/573	OBEM	01.06.16	18:49	26°09.33'N	044°48.99'W	3539	01.06.16	21:45	26°09.305'N	044°48.875'W	3560
ME127/574	OBEM	01.06.16	22:11	26°09.09'N	044°48.56'W	3517	02.06.16	01:16	26°09.076'N	044°48.562'W	3510
ME127/575	OBEM	02.06.16	01:34	26°08.80'N	044°48.19'W	3398	02.06.16	04:25	26°08.808'N	044°48.185'W	3397
ME127/576	GC	02.06.16	04:57	26°10.422'N	044°48.318'W	3434	02.06.16	07:06	-	-	-
ME127/577	MB-PS	02.06.16	08:00	26°04.10'N	044°47.08'W	2942	02.06.16	09:23	26°11.15'N	044°42.24'W	3265
ME127/578	OBS	02.06.16	11:01	26°08.260'N	044°49.573'W	3680	-	-	-	-	-
ME127/579	OBS	02.06.16	11:11	26°08.217'N	044°49.507'W	3644	-	-	-	-	-
ME127/580	2D-MCS	02.06.16	11:56	26°07.71'N	044°48.56'W	3610	02.06.16	18:18	26°08.25'N	044°50.10'W	3631
ME127/581	OBS (2 on deck)	02.06.16	18:21	26°09.01'N	044°50.31'W	-	02.06.16	20:50	26°09.15'N	044°50.52'W	-
ME127/582	AUV	02.06.16	21:25	26°07.91'N	044°48.80'W	-	03.06.16	13:25	26°09.48'N	044°49.30'W	-
ME127/583	GC	02.06.16	22:14	26°09.659'N	044°48.818'W	3510	03.06.16	00:27	-	-	-
ME127/584	GC	03.06.16	00:51	26°08.772'N	044°49.140'W	3605	03.06.16	03:03	-	-	-
ME127/585	MB-PS	03.06.16	03:57	26°11.20'N	044°42.28'W	3263	03.06.16	07:50	26°58.66'N	044°48.79'W	3290
ME127/586	HYBIS/OBS	03.06.16	09:20	26°09.79'N	044°49.56'W	-	03.06.16	14:32	26°09.576'N	044°49.289'W	3593
ME127/587	HYBIS/OBS	03.06.16	16:13	26°09.56'N	044°49.23'W	-	03.06.16	21:10	26°09.523'N	044°49.231'W	3548
ME127/588	HYBIS/OBS	03.06.16	21:48	26°09.54'N	044°49.21'W	3566	04.06.16	01:22	26°09.514'N	044°49.210'W	3570
ME127/589	GC	04.06.16	01:59	26°08.779'N	044°49.134'W	3600	04.06.16	04:36	-	-	-
ME127/590	GC	04.06.16	05:03	26°08.228'N	044°49.383'W	3628	04.06.16	07:19	-	-	-
ME127/591	OBS	04.06.16	07:56	26°10.208'N	044°49.273'W	3458	-	-	-	-	-
ME127/592	OBS	04.06.16	08:17	26°09.958'N	044°49.029'W	3476	-	-	-	-	-
ME127/593	OBS	04.06.16	08:35	26°09.877'N	044°48.874'W	3441	-	-	-	-	-
ME127/594	OBS	04.06.16	08:57	26°09.315'N	044°48.667'W	3518	-	-	-	-	-
ME127/595	OBS	04.06.16	09:29	26°09.109’N	044°49.222’W	3591	-	-	-	-	-

Station	Gear Abbrev.	Date	Time	PositionLat	PositionLon	Depth [m]	Date	Time	PositionLat	PositionLon	Depth [m]
ME127/596	HYBIS/OBS	04.06.16	11:07	26°09.51’N	044°49.27’W	3575	04.06.16	14:33	26°09.492'N	044°49.248'W	3551
ME127/597	HYBIS/OBS	04.06.16	15:40	26°09.59’N	044°49.22’W	3594	04.06.16	19:31	26°09.543'N	044°49.235'W	3597
ME127/598	OBS	04.06.16	19:55	26°09.593’N	044°49.212’W	3542	-	-	-	-	-
ME127/599	AUV (calibr)	04.06.16	21:41	26°07.95’N	044°48.49’W	3586	04.06.16	23:21	26°08.10’N	044°48.97’W	3671
	AUV (mission)	04.06.16	23:54	26°08.09’N	044°48.69’W	3635	05.06.16	13:42	26°09.43’N	044°48.99’W	3524
ME127/600	GC	05.06.16	00:33	26°09.184'N	044°49.042'W	3559	05.06.16	02:48	-	-	-
ME127/601	GC	05.06.16	03:15	26°08.422'N	044°49.401'W	3664	05.06.16	05:31	-	-	-
ME127/602	OBS	05.06.16	06:12	26°09.062'N	044°49.421'W	3571	-	-	-	-	-
ME127/603	OBS	05.06.16	06:34	26°09.158’N	044°49.577'W	3604	-	-	-	-	-
ME127/604	OBH	05.06.16	07:01	26°09.369’N	044°49.417’W	3608	-	-	-	-	-
ME127/605	OBS	05.06.16	07:43	26°09.895’N	044°49.709’W	3640	-	-	-	-	-
ME127/606	OBS	05.06.16	08:12	26°09.895’N	044°49.289’W	3520	-	-	-	-	-
ME127/607	OBH	05.06.16	08:39	26°10.189’N	044°48.946’W	3451	-	-	-	-	-
ME127/608	HYBIS/OBS	05.06.16	09:21	26°09.35’N	044°48.96’W	3568	05.06.16	13:17	26°09.325'N	044°48.961'W	3514
ME127/609	HYBIS/OBS	05.06.16	14:40	26°09.32’N	044°48.92’W	3566	05.06.16	19:14	26°09.368'N	044°48.966'W	3507
ME127/610	AUV	05.06.16	20:00	26°07.89’N	044°48.69’W	-	06.06.16	11:12	26°09.46'N	044°49.34'W	3609
ME127/611	HYBIS/OBS	05.06.16	20:43	26°09.32’N	044°48.95’W	-	06.06.16	00:23	26°09.304'N	044°48.943'W	3533
ME127/612	OBH	06.06.16	00:49	26°10.364’N	044°48.898’W	3437	-	-	-	-	-
ME127/613	OBH	06.06.16	01:02	26°10.438’N	044°48.815’W	3418	-	-	-	-	-
ME127/614	OBH	06.06.16	01:11	26°10.547’N	044°48.794’W	3425	-	-	-	-	-
ME127/615	GC	06.06.16	01:39	26°07.863'N	044°48.180'W	3555	06.06.16	03:47	-	-	-
ME127/616	GC	06.06.16	05:00	26°09.391'N	044°48.464'W	3500	06.06.16	07:08	-	-	-
ME127/617	GC	06.06.16	07:37	26°09.253'N	044°48.519'W	3462	06.06.16	09:46	-	-	-
ME127/618	HYBIS/OBS	06.06.16	12:10	26°09.30’N	044°48.99’W	3543	06.06.16	15:56	26°09.278'N	044°48.992'W	3560
ME127/619	HYBIS/OBS	06.06.16	16:38	26°09.37’N	044°49.02’W	-	06.06.16	19:56	26°09.347'N	044°49.011'W	3507
ME127/620	AUV	06.06.16	20:35	26°08.00’N	044°48.52’W	-	07.06.16	10:09	26°10.51’N	044°49.79’W	3647
ME127/621	MB-PS	06.06.16	22:36	26°04.67’N	044°55.75’W	3406	07.06.16	09:11	26°13.89’N	044°53.27’W	3208
ME127/622	2D-MCS	07.06.16	11:54	26°08.56’N	044°49.72’W	-	08.06.16	00:11	26°07.82’N	044°49.77’W	3698
	2D-MCS	08.06.16	01:07	26°07.97’N	044°49.65’W	3671	08.06.16	13:58	26°11.29’N	044°51.27’W	3635
	2D-MCS	08.06.16	15:00	26°10.89’N	044°51.54’W	3724	08.06.16	22:41	26°07.52’N	044°46.75’W	2763
ME127/623	AUV	08.06.16	23:06	26°07.83’N	044°48.66’W	3661	09.06.16	14:30	26°07.90’N	044°48.41’W	3571
ME127/624	2D-MCS	08.06.16	23:59	26°07.52’N	044°47.15’W	2847	09.06.16	12:59	26°11.77’N	044°50.82’W	3687
ME127/625	2D-MCS	09.06.16	15:05	26°07.97’N	044°49.15’W	3691	10.06.16	01:54	26°11.68’N	044°50.86’W	3738
ME127/626	GC	10.06.16	02:42	26°10.401'N	044°48.747'W	3407	10.06.16	04:46	-	-	-
ME127/627	GC	10.06.16	05:25	26°09.139'N	044°48.860'W	3519	10.06.16	07:37	-	-	-
ME127/628	GC	10.06.16	08:12	26°09.639'N	044°49.270'W	3558	10.06.16	10:24	-	-	-
ME127/629	OBH (rec)	10.06.16	09:55	26°09.64’N	044°49.27’W	-	-	not	released	-	-
ME127/630	OBH (rec)	10.06.16	11:59	26°09.70’N	044°49.54’W	-	10.06.16	13:46	26°11.13’N	044°49.02’W	-
ME127/631	OBH (rec)	10.06.16	12:00	26°09.71’N	044°49.55’W	-	10.06.16	13:56	26°11.07’N	044°48.91’W	-
ME127/632	OBH (rec)	10.06.16	12:01	26°09.72’N	044°49.55’W	-	10.06.16	13:37	26°11.15’N	044°48.91’W	-
ME127/633	OBH (rec)	10.06.16	12:02	26°09.73’N	044°49.56’W	-	10.06.16	14:09	26°11.02’N	044°49.08’W	-
ME127/634	MB-PS	10.06.16	17:42	26°58.71’N	044°48.75’W	3216	10.06.16	21:28	26°10.35’N	044°38.35’W	2761

Station	Gear Abbrev.	Date	Time	PositionLat	PositionLon	Depth [m]	Date	Time	PositionLat	PositionLon	Depth [m]
ME127/635	AUV	10.06.16	22:43	26°07.88’N	044°48.70’W	3639	11.06.16	15:02	26°08.56’N	044°48.36’W	3424
ME127/636	GC	11.06.16	00:07	26°09.088'N	044°49.540'W	3604	11.06.16	02:17	-	-	-
ME127/637	GC	11.06.16	02:50	26°07.986'N	044°48.726'W	3639	11.06.16	04:59	-	-	-
ME127/638	GC	11.06.16	05:30	26°08.015'N	044°50.158'W	3753	11.06.16	07:45	-	-	-
ME127/639	OBH	11.06.16	08:35	26°10.570’N	044°48.285’W	3442	-	-	-	-	-
ME127/640	OBH	11.06.16	09:01	26°10.122’N	044°47.680’W	3229	-	-	-	-	-
ME127/641	OBH	11.06.16	09:33	26°09.678’N	044°47.088’W	3102	-	-	-	-	-
ME127/642	OBH	11.06.16	10:06	26°09.252’N	044°46.419’W	2824	-	-	-	-	-
ME127/643	MB-PS	11.06.16	16:08	26°13.87’N	044°53.35’W	3201	12.06.16	14:18	26°16.29’N	044°33.87’W	3557
ME127/644	GC	12.06.16	15:54	26°09.006'N	044°48.695'W	3515	12.06.16	18:06	-	-	-
ME127/645	GC	12.06.16	18:37	26°08.713'N	044°48.725'W	3562	12.06.16	20:48	-	-	-
ME127/646	2D-MCS	12.06.16	22:57	26°12.99’N	044°48.26’W	3733	13.06.16	16:05	26°06.86’N	044°52.01’W	4023
ME127/647	GC	13.06.16	18:35	26°09.146’N	044°48.858’W	3520	13.06.16	20:51	-	-	-
ME127/648	AUV	13.06.16	22:11	26°08.05’N	044°48.58’W	3608	15.06.16	16:02	26°18.89’N	045°01.11’W	-
ME127/649	GC	13.06.16	22:39	26°08.534'N	044°48.245'W	3423	14.06.16	00:41	-	-	-
ME127/650	MB-PS	14.06.16	01:08	26°06.80’N	044°45.72’W	2321	14.06.16	08:00	26°21.69’N	044°33.70’W	2912
ME127/651	HYBIS	14.06.16	10:14	26°09.08’N	044°48.66’W	3500	14.06.16	13:46	26°09.091’N	044°48.580’W	3534
ME127/652	HYBIS	14.06.16	18:25	26°08.83’N	044°48.61’N	-	14.06.16	21:36	26°08.805’N	044°48.483’N	3439
ME127/653	2D-MCS	14.06.16	21:49	26°08.47’N	044°49.74’W	3652	15.06.16	17:37	26°12.27’N	044°45.07’W	3697
ME127/654	OBS (rec)	15.06.16	17:08	26°13.38’N	044°54.09’W	-	15.06.16	18:24	26°09.84’N	044°49.48’W	-
ME127/655	OBS (rec)	15.06.16	17:52	26°09.98’N	044°49.73’W	-	15.06.16	18:55	26°09.48’N	044°49.03’W	-
ME127/656	OBS (rec)	15.06.16	18:27	26°09.80’N	044°49.45’W	-	15.06.16	19:41	26°10.49’N	044°49.55’W	-
ME127/657	OBS (rec)	15.06.16	18:56	26°09.48’N	044°49.02’W	-	15.06.16	20:00	26°10.14’N	044°49.09’W	-
ME127/658	OBS (rec)	15.06.16	19:22	26°10.12’N	044°49.30’W	-	15.06.16	20:28	26°10.02’N	044°48.93’W	-
ME127/659	OBS (rec)	15.06.16	19:57	26°10.15’N	044°49.17’W	-	15.06.16	20:48	26°10.15’N	044°49.41’W	-
ME127/660	OBS (rec)	15.06.16	20:25	26°10.09’N	044°48.98’W	-	15.06.16	21:26	26°09.27’N	044°49.23’W	-
ME127/661	OBS (rec)	15.06.16	20:51	26°10.12’N	044°49.39’W	-	15.06.16	21:58	26°09.22’N	044°49.37’W	-
ME127/662	OBS (rec)	15.06.16	21:18	26°09.30’N	044°49.45’W	-	15.06.16	22:25	26°09.27’N	044°49.55’W	-
ME127/663	OBS (rec)	15.06.16	21:45	26°09.38’N	044°49.58’W	-	15.06.16	23:04	26°09.60’N	044°49.24’W	-
ME127/664	OBS (rec)	15.06.16	22:10	26°09.52’N	044°49.69’W	-	15.06.16	23:29	26°10.06’N	044°49.74’W	-
ME127/665	AUV	16.06.16	00:12	26°08.10’N	044°48.68’W	-	16.06.16	13:55	26°07.90’N	044°48.30’W	-
ME127/666	GC	16.06.16	00:58	26°08.593'N	044°46.920'W	3000	16.06.16	02:52	-	-	-
ME127/667	GC	16.06.16	03:13	26°08.161'N	044°47.095'W	2992	16.06.16	05:09	-	-	-
ME127/668	OBS (rec)	16.06.16	04:43	26°08.16’N	044°47.10’W	-	16.06.16	05:48	26°09.63’N	044°49.34’W	-
ME127/669	OBS (rec)	16.06.16	05:26	26°08.60’N	044°47.68’W	-	16.06.16	06:54	26°09.75’N	044°49.45’W	-
ME127/670	OBS (rec)	16.06.16	06:11	26°09.59’N	044°49.49’W	-	16.06.16	07:58	26°09.61’N	044°49.33’W	-
ME127/671	OBS (rec)	16.06.16	06:54	26°09.75’N	044°49.45’W	-	16.06.16	08:48	26°09.75’N	044°49.04’W	-
ME127/672	OBS (rec)	16.06.16	08:00	26°09.63’N	044°49.35’W	-	16.06.16	09:14	26°09.40’N	044°49.01’W	-
ME127/673	OBH (rec)	16.06.16	08:43	26°09.67’N	044°49.63’W	-	16.06.16	10:00	26°10.71’N	044°48.35’W	-
ME127/674	OBH (rec)	16.06.16	09:17	26°09.35’N	044°49.06’W	-	16.06.16	10:26	26°10.21’N	044°47.75’W	-
ME127/675	OBH (rec)	16.06.16	09:56	26°10.81’N	044°48.37’W	-	-	not released		-	-
ME127/676	OBH (rec)	16.06.16	10:14	26°10.42’N	044°48.04’W	-	16.06.16	11:43	26°09.32’N	044°46.69’W	-

Station	Gear Abbrev.	Date	Time	PositionLat	PositionLon	Depth [m]	Date	Time	PositionLat	PositionLon	Depth [m]
ME127/677	HYBIS	16.06.16	14:32	26°10.30’N	044°48.82’W	-	16.06.16	18:32	26°10.344’N	044°48.844’W	3418
ME127/678	OBH (rec)	16.06.16	19:01	26°09.68’N	044°49.36’W	-	-	-	-	-	-
ME127/679	OBH (rec)	16.06.16	19:42	26°09.96’N	044°47.28’W	-	-	-	-	-	-
ME127/680	MB-PS	16.06.16	21:57	26°10.54’N	044°49.97’W	3670	17.06.16	02:29	26°08.47’N	044°47.99’W	3404
ME127/681	GC	17.06.16	02:58	26°10.444'N	044°49.076'W	3510	17.06.16	05:05	-	-	-
ME127/682	GC	17.06.16	05:23	26°10.243'N	044°48.706'W	3445	17.06.16	07:25	-	-	-
ME127/683	GC	17.06.16	07:55	26°08.341'N	044°49.933'W	3700	17.06.16	10:08	-	-	-
ME127/684	HYBIS	17.06.16	10:42	26°08.75’N	044°49.30’W	3599	17.06.16	15:32	26°08.711’N	044°49.190’W	3590
ME127/685	HYBIS	17.06.16	16:16	26°09.38’N	044°48.76’W	-	17.06.16	19:51	26°09.373’N	044°48.825’W	3539
ME127/686	AUV	17.06.16	21:26	26°08.02’N	044°48.81’W	-	18.06.16	13:09	26°09.57’N	044°47.56’W	-
ME127/687	MB-PS	17.06.16	22:22	26°02.88’N	044°54.76’W	4157	18.06.16	10:36	26°02.25’N	044°53.15’W	4603
ME127/688	HYBIS	18.06.16	13:41	26°08.32’N	044°50.05’W	-	18.06.16	19:20	26°08.465’N	044°49.929’W	3632
ME127/689	AUV	18.06.16	20:10	26°08.00’N	044°48.81’W	3636	19.06.16	09:40	26°10.04’N	044°46.99’W	3121
ME127/690	GC	18.06.16	20:46	26°10.774'N	044°49.041'W	3644	18.06.16	22:57	-	-	-
ME127/691	GC	18.06.16	23:27	26°08.417'N	044°47.184'W	3067	19.06.16	01:23	-	-	-
ME127/692	GC	19.06.16	01:47	26°08.559'N	044°48.397'W	3422	19.06.16	03:48	-	-	-
ME127/693	GC	19.06.16	04:18	26°08.466'N	044°49.917'W	3654	19.06.16	06:31	-	-	-
ME127/694	HYBIS	19.06.16	10:45	26°10.52’N	044°48.69’W	3434	19.06.16	15:50	26°10.683’N	044°48.630’W	3436
ME127/695	OBEM	19.06.16	17:34	26°08.570’N	044°47.840’W	3348	19.06.16	20:38			
ME127/696	AUV	19.06.16	21:12	26°07.99’N	044°48.83’W	3631	20.06.16	12:01	26°09.26’N	044°48.62’W	3512
ME127/697	2D-MCS	19.06.16	23:40	26°06.22’N	045°08.53’W	3141	20.06.16	10:45	26°01.11’N	044°47.24’W	3173
ME127/698	2D-MCS	20.06.16	13:50	26°23.22’N	044°56.88’W	3009	21.06.16	00:56	26°14.32’N	044°35.21’W	2967
ME127/699	AUV	21.06.16	03:16	26°07.95’N	044°49.03’W	-	21.06.16	17:58	26°05.92’N	044°47.89’W	2693
ME127/700	GC	21.06.16	05:00	26°10.053'N	044°48.027'W	3345	21.06.16	07:02	-	-	-
ME127/701	GC	21.06.16	07:24	26°09.367'N	044°47.611'W	3248	21.06.16	09:28	-	-	-
ME127/702	GC	21.06.16	10:02	26°09.436'N	044°49.063'W	3560	21.06.16	12:13	-	-	-
ME127/703	GC	21.06.16	12:41	26°08.984'N	044°48.576'W	3460	21.06.16	14:49	-	-	-
ME127/704	OBH (rec)	21.06.16	16:00	-	-	-	21.06.16	20:46	26°09.68’N	044°47.15’W	-
ME127/705	OBH (rec)	21.06.16	16:01	-	-	-	21.06.16	21:39	26°09.49’N	044°49.59’W	-
ME127/706	AUV	21.06.16	22:02	26°07.93’N	044°48.89’W	-	22.06.16	13:31	26°07.80’N	044°50.91’W	3973
ME127/707	MB-PS	21.06.16	23:39	26°18.59’N	044°58.98’W	2682	22.06.16	11:01	25°59.41’N	044°39.74’W	2652
ME127/708	AUV-T	22.06.16	12:45	26°07.73’N	044°49.51’W	3703	22.06.16	14:04	26°08.58’N	044°49.12’W	3573
ME127/709	AUV-T	22.06.16	12:46	26°07.73’N	044°49.51’W	3701	22.06.16	14:19	26°08.21’N	044°49.25’W	3656
ME127/710	GC	22.06.16	15:38	26°05.485'N	044°38.763'W	2130	22.06.16	16:59	-	-	-
ME127/711	GC	22.06.16	17:04	26°05.485'N	044°38.770'W	2130	22.06.16	18:29	-	-	-
ME127/712	MB-PS	22.06.16	19:28	25°58.47’N	044°40.51’W	2753	22.06.16	22:31	26°18.95’N	044°26.01’W	3434
ME127/713	ARGOS	25.06.16	09:07	31°56.75’N	036°16.86’W	3463	-	-	-	-	-
ME127/714	ARGOS	26.06.16	20:57	35°20.16’N	030°29.60’W	3127	-	-	-	-	-

Locations for OBEM and HyBis are originally locations obtained using *Posidonia* USBL data; all OBS (also those deployed by HyBis) and OBH locations are further recalculated using results from seismic shooting.

ARGOS:	ships position for launch of floats
AUV:	ships position and time for launch and recovery
AUV-T:	ships position and time from release signal to transponder recovery on deck
GC:	time from launch to recovery of the instrument; location at bottom contact obtained by Posidonia; depth = cable out at contact
HYBIS/OBS:	ships position and time for launch; time of recovery; instrument deployment location is recalculated seafloor position
HYBIS:	ships position and time for launch; time of recovery; location at sampling point obtained by Posidonia
MB-PS:	ships position and time for begin / end of ships multibeam echosounding surveys
2D-MCS:	ships position and time for launch and recovery of seismic gear
OBS/H:	ships time for launch; bottom location is recalculated seafloor position / -
OBEM:	ships position and time for launch; time of recovery of cable; bottom location at end is recalculated seafloor position
OBS/H (rec):	ships position and time from release signal to instrument recovery on deck
REL:	ships position and time for launch and recovery; REL = function test of releasers in metal crate lowered to 1000m or 2000m
XBT:	ships position and time for launch / ships position and time for cutting the copper wire (reached max depth of 2000m)