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## Short Cruise Report RV METEOR M141/1

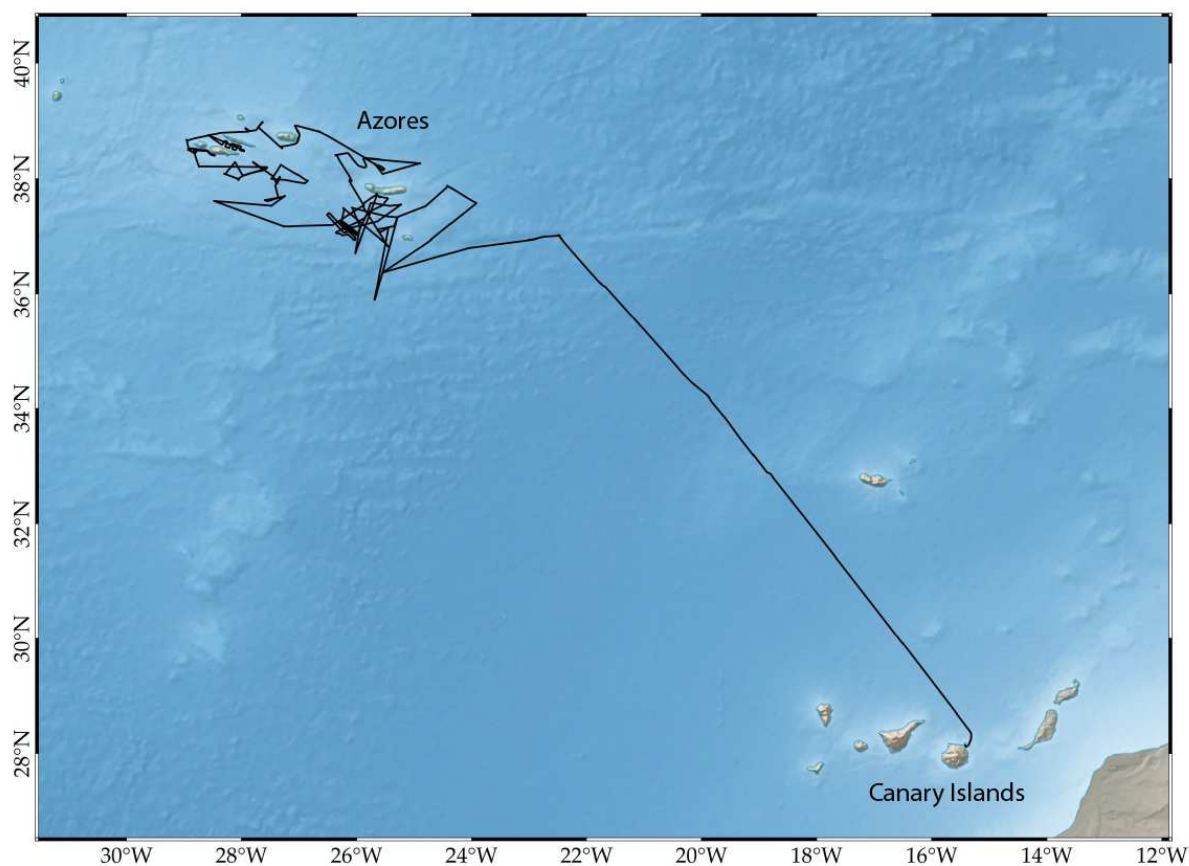
Las Palmas de Gran Canaria (Spain) – Ponta Delgada (Azores, Portugal)

08 September - 03 October 2017

Project: “Azores Tephra”

Chief Scientist: Thor H. Hansteen

Captain: Detlef Korte



Cruise track of M141/1

## Objectives

Volcanic eruptions, earthquakes, landslides and tsunamis are comparatively frequent at the Azores, and have the potential to cause severe loss of life, damage to infrastructure and societal disruption across the North Atlantic. Thus the RV Meteor cruise M141/1 was designed to identify the age, source, recurrence intervals and eruptive style of large explosive volcanic eruptions on the Azores islands during the last several hundred thousand years, and to investigate possible links to tsunamigenic sector collapses.

We performed regional sampling of marine sediment cores to provide extended records of widespread volcanoclastic deposits that are to be correlated by post-cruise geochemical correlations and biostratigraphic and radiometric dating. The aim is to identify the age, source, frequency and magnitude of large explosive volcanic eruptions of the last several hundred thousand years. We further used reflection seismics at selected locations complemented by bathymetric mapping to get a handle on landslide chronology and trigger mechanisms. The combined use of hydroacoustic multibeam mapping and the sediment echosounder "Parasound" was essential for selecting optimal coring locations. We also performed pore water sampling and analyses, aimed at detecting hydrothermal venting sites at the Terceira Rift, and to investigate the effects of ash alteration on the pore water chemistry. Multicorer sampling of surface sediments was done in order to investigate the regional meiobenthos fauna distribution, and to obtain volcanic ashes from the most recent eruptions. Overarching research questions are:

- What were the magnitudes of Pleistocene through Holocene eruptions, and how did they vary with time?
- Were Pleistocene eruption frequencies similar to partly known Holocene records or are there systematic variations in recurrence through time?
- If so, can the various periods be correlated with (a) stages of island maturation, (b) volcano-tectonic setting in the deformation system of the Azores, or (c) external forcing related to e.g. climate changes, sea level variations, and erosion rates?
- Can phases of explosive volcanism retrieved from the cores be correlated with major eruptions recognized/dated on land? Alternatively, the new offshore tephra deposits should significantly complement the available land-based record.
- Can we identify and date large mass wasting events in gravity cores collected peripheral to collapse structures, and can we observe temporal changes in volcanic/magmatic activity across such markers?
- Do mafic Plinian eruptions occur in the Azores? Are these and other highly explosive eruptions limited to mature islands?

Further questions to be addressed within the framework of interdisciplinary cooperation are:

- What role do the active regional tectonics play for hydrothermal venting at the Azores?
- What is the effect of volcanic ash alteration on pore water chemistry?

Additionally, sun photometer measurements and cloud imaging photos were obtained throughout the cruise.

The cruise was designed in close coordination with the cruises M113 (Hübscher et al., 2015) and the complementary cruise M128 (Beier et al., 2017). The access to bathymetric, seismic and "Parasound" data from the above cruises was essential for the detailed cruise planning of M141.

## Narrative

The final preparations for cruise M141/1 were carried out onboard the RV METEOR in the harbor of Las Palmas (Gran Canaria, Spain). Three scientists boarded the ship in the morning of September 7<sup>th</sup> to unpack the three containers and prepare the coring equipment. A visit and ship's tour were held on the same day for Michael Kemmerling, head of the „Gran Acuario de Canarias“. The remaining scientists boarded the ship late in the evening, and started preparations in the laboratories during the next day.

The RV METEOR disembarked from Gran Canaria in the forenoon of September 8<sup>th</sup> and began her transit to the first working area east of the Azores Plateau at the western end of the Gloria fault. The scientists used the transit time to finish lab preparations and for the set-up of equipment. Scientific work began during the transit on September 10<sup>th</sup> with the deployment of an Expendable Bathythermograph (XBT) for calibration of the EM122 multibeam echo sounder. Geological sampling began on September 11<sup>th</sup> with the recovery of a gravity core (GC) followed by two multicorer (MuC) hauls about 70 nm east of the Azores Plateau. Following a transit with hydroacoustic mapping, gravity core sampling was done at the eastern end of the Azores Plateau on September 12<sup>th</sup>. From here on, both EM122 multibeam data and “Parasound” recordings were routinely performed during transit between the sampling stations.

Investigations during the first week were focused on the areas south and southeast of the volcanically very active island São Miguel, including the tectonic Povoação Basin SE of the island. The first sparker seismic reflection profiles during the cruise were successfully obtained on September 13<sup>th</sup> across distal parts of landslide deposits about 60 nm south of São Miguel and SE of the Monaco Bank. On the same day, the free-fall gravity corer (GCS; gravity corer with scissor release; see Methods section), which involves acceleration of the coring device immediately prior to ground impact, was successfully deployed. This sampling device was preferentially used during the rest of the cruise, due to its superior penetration of ash and tephra layers of up to 70 cm thickness in many locations. Between September 14<sup>th</sup> and 17<sup>th</sup>, GCS cores were recovered during the day, and MuC sampling and transits were done at night, all in areas at distances up to 130 nm south to southeast of the presumed volcanic source São Miguel. Following a health problem of a crew member, the ship went to the roadstead at Ponta Delgada in the night between September 17<sup>th</sup> and 18<sup>th</sup>. The time lost during this deviation was largely made up for by changing the order of stations.

The second week commenced with repeated gravity corer deployments across the South-Central regions of the Azores Plateau, using 10 to 15 m steel tube lengths and the scissor release system. Sediment cores were taken both from undisturbed basin sequences and above sediment-covered fault scarps, the latter in order to trace possible hydrothermal influence on the pore water chemistry. Coring was highly successful, with a core recovery up to about 12m. This exceeds the length of any previous marine cores at the Azores. All cores contain conspicuous volcanic ash and lapilli layers, some with a thickness of several tens of cm. Ash and lapilli deposits distal to the presumed sources on São Miguel were sampled by GCS south of the Azores plateau, partly in the topographic depressions tracing the East Azores Fault Zone. Multicorer deployments performed at several stations were successful throughout the second week. Gaps in the existing high-

resolution hydroacoustic maps were filled in the course of four nighttime deployments during the second week. On September 22<sup>nd</sup>, two sparker seismic profiles were recorded SE of Pico island, across a presumed landslide runout tip. The operation had to be interrupted due to increasing swell and wind. Following GCS and MuC deployments off Pico, Fayal and São Jorge islands, six very successful seismic profiles were recorded across major flank collapse deposits between NE Pico and São Jorge islands on September 24<sup>th</sup>.

Separated only by a gravity core and a MuC station, the seismic profiles from the previous day were extended by another six profiles on September 25<sup>th</sup>, marking the beginning of the third week. During the third week, extensive gravity coring was performed along and parallel to the Terceira rift axis, which represents the diffuse plate boundary between the Eurasian and African plates. Several successful GCS and MuC deployments were done in the East Graciosa Basin between the islands Graciosa and Terceira, and off Terceira. Starting on September 28<sup>th</sup>, GCS coring and MuC work was performed around São Miguel, commencing on the Northern submarine slope of the island, followed by sampling in the South Hirondele Basin WNW of the island. During September 29<sup>th</sup> and 30<sup>th</sup>, GCS coring was done on the S flank of São Miguel and in the adjacent Monaco Graben until October 1<sup>st</sup>. Multibeam mapping and MuC deployments followed on October 1<sup>st</sup> and 2<sup>nd</sup>.

The RV METEOR called at the port of Ponta Delgada on the morning of October 3<sup>rd</sup>, having successfully completed cruise M141/1.

### **Acknowledgements**

We thank Captain Detlef Korte, the officers and the entire crew of RV METEOR for their excellent support. They created a very professional working environment and contributed a lot to the success of this cruise. Furthermore we acknowledge the professional patronage of the German Ministry of Foreign Affairs and the Leitstelle (control station) METEOR/MERIAN. We appreciate the support of the government of Portugal for providing permission to work in their territorial waters. The METEOR expedition 141/1 was funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Council) and the Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie (BMBF, Federal Ministry of Education, Research and Technology).

## Participants

|    | <b>Name</b>          | <b>Function</b>                 | <b>Institution</b> |
|----|----------------------|---------------------------------|--------------------|
| 1  | Hansteen, Thor H.    | Chief Scientist, Volcanology    | GEOMAR             |
| 2  | Freundt, Armin       | Co-Chief Scientist, Volcanology | GEOMAR             |
| 3  | Kutterolf, Steffen   | Tephrostratigraphy              | GEOMAR             |
| 4  | Strehlow, Karen      | Volcanology                     | GEOMAR             |
| 5  | Nasras, Symeon       | Bathymetry, Parasound           | Univ. Athens       |
| 6  | Schindbeck, Julie    | Volcanology                     | GEOMAR             |
| 7  | Samrock, Lisa        | Volcanology, Geology            | GEOMAR             |
| 8  | Krohne, Kevin        | Stud. Assist. Volcanology       | Univ. Kiel         |
| 9  | Schott, Thorsten     | Core Technician                 | GEOMAR             |
| 10 | Sievers, Carina      | Volcanology                     | Univ. Hamburg      |
| 11 | Schmidt, Christopher | Porewater geochemistry          | GEOMAR             |
| 12 | Horstmann, Edith     | Porewater geochemistry          | EAWAG              |
| 13 | Rathjen, Frauke      | Documentation                   | GEOMAR             |
| 14 | Meier, Karl J. F.    | Porewater geochemistry          | GEOMAR             |
| 15 | Lux, Thorsten        | Stud. Assist. Volcanology       | GEOMAR             |
| 16 | Lebas, Elodie        | Volcanology/ Geophysics         | Univ. Kiel         |
| 17 | Albers, Lena         | Meiobenthic Arthropoda          | DZMB               |
| 18 | Pointner, Karin      | Meiobenthic Arthropoda          | DZMB               |
| 19 | Hellmuth, Friedrich  | Stud. Assist. Volcanology       | Univ. Freiberg     |
| 20 | Gummert, Linus       | Stud. Assist. Geophysics        | Univ. Kiel         |
| 21 | Fockenberger, Kai    | Volcanology                     | GEOMAR             |
| 22 | Holzmüller, Julia    | Stud. Assist. Volcanology       | LMU München        |
| 23 | Stern, Sönke         | Stud. Assist. Volcanology       | LMU München        |
| 24 | Grob, Henrik         | Sparker Seismics                | Univ. Hamburg      |
| 25 | Frahm, Laura         | Bathymetry, Parasound           | Univ. Hamburg      |
| 26 | Mieslinger, Theresa  | Aerosol Chemistry               | MPIM Hamburg       |
| 27 | Stelzner, Martin     | Meteorology Station             | DWD                |

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|                       |   |
|-----------------------|---|
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## Station list

| Station         | Date     | Time UTC | PositionLat  | PositionLon   | Depth [m] | Gear     | Comment             |
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| ME 141-1/1135-1 | 10.09.17 | 14:30    | 34° 44.58' N | 020° 26.72' W | 5190.1    | XBT      |                     |
| ME 141-1/1136-1 | 11.09.17 | 09:27    | 37° 00.29' N | 022° 27.61' W | 4820.1    | GC       |                     |
| ME 141-1/1136-2 | 11.09.17 | 12:32    | 37° 00.29' N | 022° 27.62' W | 4819.3    | MUC      |                     |
| ME 141-1/1136-3 | 11.09.17 | 15:48    | 37° 00.29' N | 022° 27.62' W | 4822.1    | MUC      |                     |
| ME 141-1/1137-1 | 11.09.17 | 18:40    | 37° 00.29' N | 022° 27.62' W | 4824.2    | MB-PS    |                     |
| ME 141-1/1138-1 | 12.09.17 | 06:12    | 36° 47.73' N | 024° 03.63' W | 4292.8    | GC       |                     |
| ME 141-1/1139-1 | 12.09.17 | 08:32    | 36° 47.79' N | 024° 03.64' W | 4295.6    | MB-PS    |                     |
| ME 141-1/1140-1 | 12.09.17 | 16:24    | 36° 22.34' N | 025° 32.84' W | 3999.9    | GC       |                     |
| ME 141-1/1140-2 | 12.09.17 | 18:54    | 36° 22.25' N | 025° 32.78' W | 4001.5    | MUC      |                     |
| ME 141-1/1141-1 | 12.09.17 | 22:30    | 36° 22.27' N | 025° 32.75' W | 4654.2    | MB-PS    |                     |
| ME 141-1/1142-1 | 13.09.17 | 08:00    | 37° 13.32' N | 025° 18.94' W | 2171.3    | SEISREFL | marine mammal watch |
| ME 141-1/1141-1 | 13.09.17 | 09:00    | 37° 20.41' N | 025° 16.86' W | 2062.6    | MB-PS    |                     |
| ME 141-1/1142-1 | 13.09.17 | 09:07    | 37° 19.98' N | 025° 17.13' W | 2071.5    | SEISREFL |                     |
| ME 141-1/1143-1 | 13.09.17 | 16:30    | 37° 04.41' N | 025° 35.10' W | 2257.5    | MB-PS    |                     |
| ME 141-1/1144-1 | 13.09.17 | 18:06    | 37° 09.14' N | 025° 26.30' W | 2278.5    | GCS      |                     |
| ME 141-1/1145-1 | 13.09.17 | 20:24    | 37° 08.70' N | 025° 26.60' W | 2291.6    | MB-PS    |                     |
| ME 141-1/1146-1 | 14.09.17 | 05:18    | 35° 53.99' N | 025° 41.18' W | 3942.5    | MUC      |                     |
| ME 141-1/1146-2 | 14.09.17 | 08:23    | 35° 53.98' N | 025° 41.17' W | 3943      | MUC      |                     |
| ME 141-1/1146-3 | 14.09.17 | 11:22    | 35° 53.98' N | 025° 41.17' W | 4014.1    | GCS      |                     |
| ME 141-1/1147-1 | 14.09.17 | 14:33    | 35° 53.98' N | 025° 41.16' W | 3941.8    | MB-PS    |                     |
| ME 141-1/1148-1 | 14.09.17 | 17:41    | 36° 22.26' N | 025° 32.75' W | 3998.5    | GCS      |                     |
| ME 141-1/1148-2 | 14.09.17 | 20:34    | 36° 22.24' N | 025° 32.76' W | 4000.1    | MUC      |                     |
| ME 141-1/1149-1 | 14.09.17 | 23:19    | 36° 22.25' N | 025° 32.76' W | 4000.8    | MB-PS    |                     |
| ME 141-1/1150-1 | 15.09.17 | 06:00    | 36° 53.57' N | 024° 45.75' W | 2573.2    | GCS      |                     |
| ME 141-1/1151-1 | 15.09.17 | 08:21    | 36° 53.78' N | 024° 45.62' W | 2560.8    | MB-PS    |                     |
| ME 141-1/1152-1 | 15.09.17 | 14:23    | 37° 34.23' N | 023° 55.24' W | 2900.2    | GCS      |                     |
| ME 141-1/1153-1 | 15.09.17 | 17:00    | 37° 34.41' N | 023° 54.91' W | 2908.2    | MB-PS    |                     |
| ME 141-1/1154-1 | 15.09.17 | 20:27    | 37° 52.71' N | 024° 25.12' W | 2883.8    | GCS      |                     |
| ME 141-1/1154-2 | 15.09.17 | 22:51    | 37° 52.71' N | 024° 25.12' W | 2883.8    | MUC      |                     |
| ME 141-1/1154-3 | 16.09.17 | 01:01    | 37° 52.71' N | 024° 25.12' W | 2885.9    | MUC      |                     |
| ME 141-1/1155-1 | 16.09.17 | 03:27    | 37° 51.93' N | 024° 24.47' W | 2905.5    | MB-PS    |                     |
| ME 141-1/1156-1 | 16.09.17 | 06:22    | 37° 31.48' N | 024° 47.50' W | 2919.3    | GCS      |                     |
| ME 141-1/1157-1 | 16.09.17 | 08:54    | 37° 31.37' N | 024° 47.59' W | 2922.9    | MB-PS    |                     |
| ME 141-1/1158-1 | 16.09.17 | 11:54    | 37° 20.05' N | 025° 16.66' W | 2066.4    | GCS      |                     |
| ME 141-1/1159-1 | 16.09.17 | 14:10    | 37° 19.49' N | 025° 16.86' W | 2082.4    | MB-PS    |                     |
| ME 141-1/1160-1 | 16.09.17 | 15:20    | 37° 20.42' N | 025° 27.57' W | 2101.6    | GCS      |                     |
| ME 141-1/1160-2 | 16.09.17 | 17:32    | 37° 20.45' N | 025° 27.56' W | 2101      | MUC      |                     |
| ME 141-1/1160-3 | 16.09.17 | 19:15    | 37° 20.41' N | 025° 27.58' W | 2102.7    | MUC      |                     |
| ME 141-1/1161-1 | 16.09.17 | 20:49    | 37° 20.52' N | 025° 27.91' W | 2095.4    | MB-PS    |                     |
| ME 141-1/1162-1 | 17.09.17 | 01:30    | 37° 29.52' N | 026° 04.88' W | 2346.4    | MUC      |                     |
| ME 141-1/1162-2 | 17.09.17 | 03:20    | 37° 29.61' N | 026° 04.80' W | 2345.1    | MUC      |                     |
| ME 141-1/1162-3 | 17.09.17 | 06:02    | 37° 29.60' N | 026° 04.80' W | 2345.6    | GCS      |                     |
| ME 141-1/1163-1 | 17.09.17 | 08:10    | 37° 29.60' N | 026° 04.80' W | 2346.7    | MB-PS    |                     |
| ME 141-1/1164-1 | 17.09.17 | 11:31    | 37° 10.10' N | 025° 56.36' W | 2551.1    | GCS      |                     |

| Station         | Date     | Time UTC | PositionLat  | PositionLon   | Depth [m] | Gear     | Comment             |
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| ME 141-1/1166-1 | 17.09.17 | 15:39    | 36° 51.23' N | 025° 59.88' W | 3540      | XBT      |                     |
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| ME 141-1/1167-1 | 17.09.17 | 16:48    | 36° 42.47' N | 026° 01.42' W | 3599.3    | GCS      |                     |
| ME 141-1/1168-1 | 18.09.17 | 09:07    | 37° 11.56' N | 026° 24.88' W | 2608.2    | GCS      |                     |
| ME 141-1/1169-1 | 18.09.17 | 11:20    | 37° 11.51' N | 026° 24.96' W | 2610.9    | MB-PS    |                     |
| ME 141-1/1170-1 | 18.09.17 | 15:50    | 37° 10.03' N | 027° 15.04' W | 2665.8    | GCS      |                     |
| ME 141-1/1170-2 | 18.09.17 | 18:24    | 37° 10.04' N | 027° 15.05' W | 2664.3    | MUC      |                     |
| ME 141-1/1170-3 | 18.09.17 | 20:20    | 37° 10.04' N | 027° 15.04' W | 2665.7    | MUC      |                     |
| ME 141-1/1171-1 | 18.09.17 | 22:39    | 37° 10.00' N | 027° 15.20' W | 2664.6    | MB-PS    |                     |
| ME 141-1/1172-1 | 19.09.17 | 06:05    | 37° 36.74' N | 028° 28.87' W | 2080.5    | GCS      |                     |
| ME 141-1/1173-1 | 19.09.17 | 08:10    | 37° 36.67' N | 028° 28.81' W | 2088.7    | MB-PS    |                     |
| ME 141-1/1174-1 | 19.09.17 | 12:54    | 37° 31.67' N | 027° 28.63' W | 2289.3    | GCS      |                     |
| ME 141-1/1175-1 | 19.09.17 | 15:20    | 37° 31.77' N | 027° 28.65' W | 2293      | MB-PS    |                     |
| ME 141-1/1176-1 | 19.09.17 | 17:31    | 37° 41.99' N | 027° 14.28' W | 2270.1    | GCS      |                     |
| ME 141-1/1177-1 | 19.09.17 | 20:00    | 37° 41.98' N | 027° 14.26' W | 2267      | MB-PS    |                     |
| ME 141-1/1178-1 | 19.09.17 | 21:57    | 37° 37.00' N | 027° 32.48' W | 2174.9    | MUC      |                     |
| ME 141-1/1178-2 | 19.09.17 | 23:47    | 37° 36.99' N | 027° 32.48' W | 2173.7    | MUC      |                     |
| ME 141-1/1179-1 | 20.09.17 | 01:35    | 37° 36.98' N | 027° 32.47' W | 2175.3    | MB-PS    |                     |
| ME 141-1/1180-1 | 20.09.17 | 06:14    | 37° 36.99' N | 027° 32.48' W | 2174.8    | GC       |                     |
| ME 141-1/1181-1 | 20.09.17 | 08:20    | 37° 37.46' N | 027° 30.72' W | 2213.2    | MB-PS    |                     |
| ME 141-1/1182-1 | 20.09.17 | 08:24    | 37° 37.46' N | 027° 30.72' W | 2214      | GC       |                     |
| ME 141-1/1183-1 | 20.09.17 | 09:55    | 37° 37.46' N | 027° 30.72' W | 2214.9    | MB-PS    |                     |
| ME 141-1/1184-1 | 20.09.17 | 10:18    | 37° 37.42' N | 027° 29.62' W | 2228.5    | GC       |                     |
| ME 141-1/1185-1 | 20.09.17 | 12:02    | 37° 37.42' N | 027° 29.63' W | 2229.9    | MB-PS    |                     |
| ME 141-1/1186-1 | 20.09.17 | 13:27    | 37° 36.97' N | 027° 32.52' W | 2174.6    | GC       |                     |
| ME 141-1/1187-1 | 20.09.17 | 15:00    | 37° 36.98' N | 027° 32.56' W | 2175.4    | MB-PS    |                     |
| ME 141-1/1188-1 | 20.09.17 | 17:19    | 37° 40.04' N | 027° 21.48' W | 2312.8    | GC       |                     |
| ME 141-1/1189-1 | 20.09.17 | 18:55    | 37° 40.06' N | 027° 21.36' W | 2312.7    | MB-PS    |                     |
| ME 141-1/1190-1 | 20.09.17 | 20:15    | 37° 52.85' N | 027° 24.60' W | 1507.6    | MB-PS    |                     |
| ME 141-1/1191-1 | 21.09.17 | 03:30    | 37° 58.83' N | 027° 15.13' W | 1637.6    | MB-PS    |                     |
| ME 141-1/1192-1 | 21.09.17 | 06:00    | 37° 55.06' N | 026° 54.35' W | 2253.2    | GC       |                     |
| ME 141-1/1193-1 | 21.09.17 | 07:36    | 37° 55.07' N | 026° 54.33' W | 2252.2    | MB-PS    |                     |
| ME 141-1/1194-1 | 21.09.17 | 09:37    | 37° 57.66' N | 026° 51.29' W | 2154.6    | GC       |                     |
| ME 141-1/1195-1 | 21.09.17 | 11:25    | 37° 57.65' N | 026° 51.91' W | 2175.8    | MB-PS    |                     |
| ME 141-1/1196-1 | 21.09.17 | 14:20    | 38° 14.53' N | 027° 18.64' W | 1666.5    | GC       |                     |
| ME 141-1/1196-2 | 21.09.17 | 15:48    | 38° 14.51' N | 027° 18.66' W | 1666.5    | MUC      |                     |
| ME 141-1/1196-3 | 21.09.17 | 17:16    | 38° 14.51' N | 027° 18.67' W | 1666.3    | MUC      |                     |
| ME 141-1/1197-1 | 21.09.17 | 18:36    | 38° 14.50' N | 027° 18.73' W | 1666.5    | MB-PS    |                     |
| ME 141-1/1198-1 | 22.09.17 | 06:00    | 38° 03.30' N | 027° 58.87' W | 1822.8    | GC       |                     |
| ME 141-1/1199-1 | 22.09.17 | 07:28    | 38° 04.08' N | 027° 59.31' W | 1825.1    | MB-PS    |                     |
| ME 141-1/1200-1 | 22.09.17 | 09:20    | 38° 17.54' N | 028° 06.71' W | 1675.4    | GC       |                     |
| ME 141-1/1201-1 | 22.09.17 | 11:00    | 38° 17.49' N | 028° 06.76' W | 1676.5    | MB-PS    |                     |
| ME 141-1/1202-1 | 22.09.17 | 11:31    | 38° 14.08' N | 028° 09.53' W | 1788.3    | SEISREFL | marine mammal watch |
| ME 141-1/1201-1 | 22.09.17 | 12:41    | 38° 04.95' N | 028° 16.88' W | 1825.6    | MB-PS    |                     |
| ME 141-1/1202-1 | 22.09.17 | 13:03    | 38° 05.57' N | 028° 18.54' W | 1821.7    | SEISREFL |                     |
| ME 141-1/1203-1 | 22.09.17 | 21:18    | 38° 07.07' N | 027° 45.89' W | 1767.9    | MB-PS    |                     |

| Station         | Date     | Time UTC | PositionLat  | PositionLon   | Depth [m] | Gear     | Comment             |
|-----------------|----------|----------|--------------|---------------|-----------|----------|---------------------|
| ME 141-1/1204-1 | 23.09.17 | 06:02    | 38° 12.92' N | 028° 44.31' W | 1359      | GC       |                     |
| ME 141-1/1205-1 | 23.09.17 | 07:32    | 38° 13.20' N | 028° 44.65' W | 1367.4    | MB-PS    |                     |
| ME 141-1/1206-1 | 23.09.17 | 09:24    | 38° 27.68' N | 028° 49.74' W | 1020.2    | GC       |                     |
| ME 141-1/1206-2 | 23.09.17 | 10:36    | 38° 27.67' N | 028° 49.74' W | 1018.8    | MUC      |                     |
| ME 141-1/1206-3 | 23.09.17 | 11:30    | 38° 27.68' N | 028° 49.74' W | 1019.3    | MUC      |                     |
| ME 141-1/1207-1 | 23.09.17 | 12:30    | 38° 27.79' N | 028° 49.80' W | 1024.6    | MB-PS    |                     |
| ME 141-1/1208-1 | 24.09.17 | 01:42    | 38° 39.98' N | 028° 57.42' W | 1656.5    | MUC      |                     |
| ME 141-1/1208-2 | 24.09.17 | 06:24    | 38° 38.92' N | 028° 57.14' W | 1638.8    | GC       |                     |
| ME 141-1/1209-1 | 24.09.17 | 08:12    | 38° 39.31' N | 028° 57.10' W | 1818.4    | MB-PS    |                     |
| ME 141-1/1210-1 | 24.09.17 | 10:14    | 38° 44.79' N | 028° 35.13' W | 1225.9    | GC       |                     |
| ME 141-1/1211-1 | 24.09.17 | 11:21    | 38° 44.89' N | 028° 34.79' W | 1228.5    | MB-PS    |                     |
| ME 141-1/1212-1 | 24.09.17 | 15:25    | 38° 29.90' N | 027° 59.32' W | 1292.6    | GC       |                     |
| ME 141-1/1213-1 | 24.09.17 | 15:57    | 38° 29.89' N | 027° 59.32' W | 1292.6    | SEISREFL | marine mammal watch |
| ME 141-1/1212-1 | 24.09.17 | 16:23    | 38° 29.89' N | 027° 59.32' W | 1292.7    | GC       |                     |
| ME 141-1/1213-1 | 24.09.17 | 17:08    | 38° 28.10' N | 027° 57.40' W | 1282.1    | SEISREFL |                     |
| ME 141-1/1214-1 | 25.09.17 | 00:33    | 38° 35.22' N | 028° 10.12' W | 1266.6    | MB-PS    |                     |
| ME 141-1/1215-1 | 25.09.17 | 01:18    | 38° 34.68' N | 028° 12.53' W | 1259.5    | MUC      |                     |
| ME 141-1/1215-2 | 25.09.17 | 02:31    | 38° 34.68' N | 028° 12.53' W | 1260.2    | MUC      |                     |
| ME 141-1/1215-3 | 25.09.17 | 06:02    | 38° 34.68' N | 028° 12.53' W | 1260.2    | GC       |                     |
| ME 141-1/1216-1 | 25.09.17 | 07:06    | 38° 34.68' N | 028° 12.53' W | 1259.9    | MB-PS    |                     |
| ME 141-1/1217-1 | 25.09.17 | 07:06    | 38° 34.68' N | 028° 12.53' W | 1259.9    | SEISREFL | marine mammal watch |
| ME 141-1/1216-1 | 25.09.17 | 07:45    | 38° 34.15' N | 028° 05.00' W | 1257.2    | MB-PS    |                     |
| ME 141-1/1217-1 | 25.09.17 | 08:06    | 38° 34.68' N | 028° 05.39' W | 1254.2    | SEISREFL |                     |
| ME 141-1/1218-1 | 25.09.17 | 15:43    | 38° 35.71' N | 028° 21.47' W | 1097.1    | MB-PS    |                     |
| ME 141-1/1219-1 | 25.09.17 | 17:56    | 38° 44.79' N | 028° 34.87' W | 1229.8    | GC       |                     |
| ME 141-1/1219-2 | 25.09.17 | 19:12    | 38° 44.80' N | 028° 34.96' W | 1228.1    | GC       |                     |
| ME 141-1/1220-1 | 25.09.17 | 20:30    | 38° 45.02' N | 028° 34.77' W | 1229.2    | MB-PS    |                     |
| ME 141-1/1221-1 | 25.09.17 | 23:18    | 38° 48.63' N | 027° 57.00' W | 750.8     | MB-PS    |                     |
| ME 141-1/1222-1 | 26.09.17 | 02:20    | 38° 50.33' N | 027° 44.71' W | 2334.4    | MB-PS    |                     |
| ME 141-1/1223-1 | 26.09.17 | 06:00    | 38° 55.91' N | 027° 40.56' W | 2480.2    | GC       |                     |
| ME 141-1/1224-1 | 26.09.17 | 08:11    | 38° 56.27' N | 027° 40.30' W | 2482.1    | GC       |                     |
| ME 141-1/1225-1 | 26.09.17 | 10:24    | 38° 54.47' N | 027° 41.61' W | 2479.8    | GC       |                     |
| ME 141-1/1225-2 | 26.09.17 | 12:23    | 38° 54.46' N | 027° 41.61' W | 2480      | GCS      |                     |
| ME 141-1/1226-1 | 26.09.17 | 15:13    | 38° 53.38' N | 027° 42.40' W | 2481.8    | GCS      |                     |
| ME 141-1/1226-2 | 26.09.17 | 17:44    | 38° 53.36' N | 027° 42.39' W | 2484.4    | MUC      |                     |
| ME 141-1/1226-3 | 26.09.17 | 19:30    | 38° 53.36' N | 027° 42.39' W | 2484.1    | MUC      |                     |
| ME 141-1/1227-1 | 26.09.17 | 21:24    | 38° 53.41' N | 027° 42.35' W | 2433.3    | MB-PS    |                     |
| ME 141-1/1228-1 | 27.09.17 | 01:28    | 38° 32.95' N | 027° 19.56' W | 1269.1    | MUC      |                     |
| ME 141-1/1228-2 | 27.09.17 | 02:40    | 38° 32.97' N | 027° 19.55' W | 1269.5    | MUC      |                     |
| ME 141-1/1229-1 | 27.09.17 | 05:58    | 38° 33.03' N | 027° 19.43' W | 1263.7    | MB-PS    |                     |
| ME 141-1/1230-1 | 27.09.17 | 10:22    | 38° 54.94' N | 027° 04.09' W | 1548.8    | GCS      |                     |
| ME 141-1/1231-1 | 27.09.17 | 12:09    | 38° 55.22' N | 027° 03.68' W | 1548.4    | MB-PS    |                     |
| ME 141-1/1232-1 | 27.09.17 | 14:40    | 38° 48.86' N | 026° 39.69' W | 1517.5    | GCS      |                     |
| ME 141-1/1233-1 | 27.09.17 | 16:30    | 38° 49.06' N | 026° 39.83' W | 1519.4    | MB-PS    |                     |
| ME 141-1/1234-1 | 27.09.17 | 22:56    | 38° 15.29' N | 025° 40.96' W | 2477.7    | MUC      |                     |
| ME 141-1/1234-2 | 28.09.17 | 00:44    | 38° 15.30' N | 025° 40.95' W | 2477.8    | MUC      |                     |
| ME 141-1/1235-1 | 28.09.17 | 02:41    | 38° 15.40' N | 025° 41.06' W | 2478.9    | MB-PS    |                     |



| Station         | Date     | Time UTC | PositionLat  | PositionLon   | Depth [m] | Gear  | Comment |
|-----------------|----------|----------|--------------|---------------|-----------|-------|---------|
| ME 141-1/1236-1 | 28.09.17 | 06:02    | 38° 15.30' N | 025° 40.93' W | 2477.7    | GCS   |         |
| ME 141-1/1237-1 | 28.09.17 | 08:28    | 38° 14.99' N | 025° 40.80' W | 2474.4    | MB-PS |         |
| ME 141-1/1238-1 | 28.09.17 | 10:14    | 38° 04.82' N | 025° 32.55' W | 2010.9    | GCS   |         |
| ME 141-1/1239-1 | 28.09.17 | 12:12    | 38° 05.07' N | 025° 32.64' W | 2019.7    | MB-PS |         |
| ME 141-1/1240-1 | 28.09.17 | 16:01    | 38° 16.05' N | 024° 53.22' W | 3262.7    | GCS   |         |
| ME 141-1/1241-1 | 28.09.17 | 18:50    | 38° 16.07' N | 024° 53.25' W | 3261.2    | MB-PS |         |
| ME 141-1/1242-1 | 29.09.17 | 06:14    | 38° 24.26' N | 026° 21.14' W | 1655.2    | GCS   |         |
| ME 141-1/1243-1 | 29.09.17 | 09:34    | 38° 24.34' N | 026° 20.99' W | 1657      | MB-PS |         |
| ME 141-1/1244-1 | 29.09.17 | 13:04    | 37° 58.48' N | 026° 05.07' W | 3213.4    | GCS   |         |
| ME 141-1/1245-1 | 29.09.17 | 16:18    | 37° 58.09' N | 026° 05.43' W | 3211.7    | GC    |         |
| ME 141-1/1246-1 | 29.09.17 | 18:12    | 37° 58.10' N | 026° 05.43' W | 3212.7    | MB-PS |         |
| ME 141-1/1247-1 | 30.09.17 | 06:06    | 36° 52.00' N | 025° 28.74' W | 2374.3    | GCS   |         |
| ME 141-1/1248-1 | 30.09.17 | 08:20    | 36° 52.02' N | 025° 28.73' W | 2374      | MB-PS |         |
| ME 141-1/1249-1 | 30.09.17 | 14:15    | 37° 27.60' N | 026° 12.09' W | 2363.4    | GCS   |         |
| ME 141-1/1250-1 | 30.09.17 | 16:39    | 37° 27.68' N | 026° 12.15' W | 2362.2    | MB-PS |         |
| ME 141-1/1251-1 | 01.10.17 | 08:25    | 37° 32.80' N | 025° 13.73' W | 1660.2    | GCS   |         |
| ME 141-1/1252-1 | 01.10.17 | 10:39    | 37° 32.83' N | 025° 14.26' W | 1652.9    | MB-PS |         |
| ME 141-1/1253-1 | 01.10.17 | 12:02    | 37° 31.59' N | 025° 25.59' W | 1317.9    | GC    |         |
| ME 141-1/1254-1 | 01.10.17 | 13:11    | 37° 31.58' N | 025° 25.59' W | 1318.5    | MB-PS |         |
| ME 141-1/1255-1 | 01.10.17 | 15:13    | 37° 34.29' N | 025° 45.45' W | 742.1     | GC    |         |
| ME 141-1/1255-2 | 01.10.17 | 16:14    | 37° 34.29' N | 025° 45.45' W | 742.4     | MUC   |         |
| ME 141-1/1255-3 | 01.10.17 | 17:22    | 37° 34.29' N | 025° 45.45' W | 741.7     | MUC   |         |
| ME 141-1/1256-1 | 01.10.17 | 18:08    | 37° 34.08' N | 025° 45.64' W | 718.9     | MB-PS |         |
| ME 141-1/1256-1 | 02.10.17 | 03:16    | 37° 24.12' N | 026° 28.73' W | 1050.9    | MB-PS |         |