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**Short Cruise Report**  
**RV METEOR M161**  
**EUREC<sup>4</sup>A**

**Bridgetown, Barbados – Ponta Delgada (Azores), Portugal**  
**17.01.2020 – 03.03.2020**

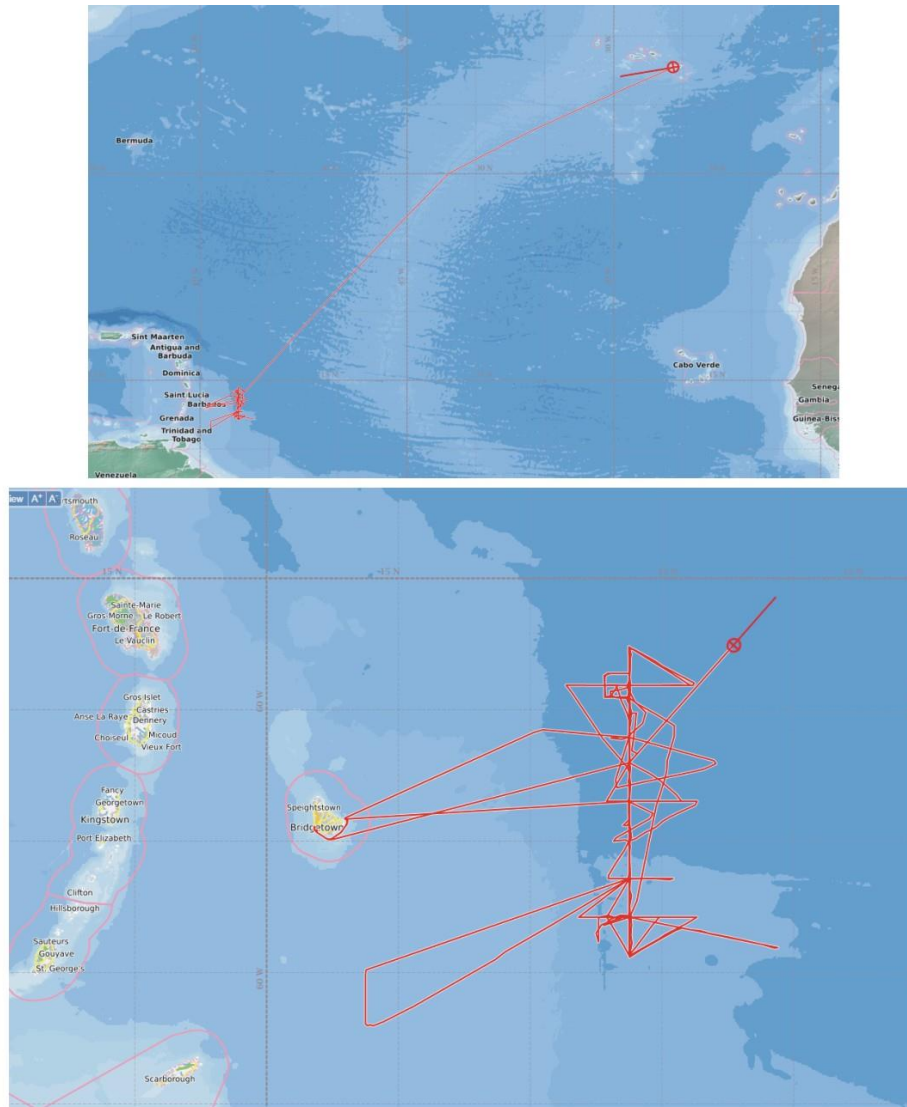
**Chief Scientists:**

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**Dr. Stefan Kinne (Max Planck Institute for Meteorology)**

**Captain: Rainer Hammacher**





# FS METEOR

M161

Bridgetown - Ponta Delgada  
17.01.2020 - 03.03.2020



**Figure 1: Track chart of R/V METEOR, cruise M161 (top) with zoom-in of core working area off Barbados (bottom).**

## Objectives

The M161 cruise on R/V METEOR was part of the multi-ship and multi-airplane campaign EUREC<sup>4</sup>A. The aim of the EUREC<sup>4</sup>A campaign was to better understand the life cycle of clouds and their role in the Earth's climate system to eventually improve climate predictions.

Work on R/V METEOR focused on the observation of lower-altitude clouds and convection as well as air-sea interactions in the trade wind region in the tropical western North Atlantic off Barbados. This region is characterized by low-altitude clouds that are not well presented in climate models yet, but may have a significant impact. To achieve statistically relevant observations, the core working area of the R/V METEOR cruise M161 was placed upwind of the Barbados Cloud Observatory (BCO) on a North-South transect of about 140 NM. This transect had two intersections with the flight pattern of the German HALO research aircraft, which was also participating in the campaign. The positioning of the different research platforms (e.g. BCO, HALO and R/V METEOR) aimed to strengthen the overall comparability and coverage of measurements.

The atmospheric properties were observed remotely and by in situ sampling. To complement the atmospheric observations, air-sea interactions and oceanographic properties were characterized by sampling both the boundary layers and the upper ocean waters, mostly down to 800 m with some exceptions of deeper sampling.

## Narrative

The M161 cruise had a resourceful focus on probing the atmosphere and ocean-atmosphere fluxes as part of the EUREC<sup>4</sup>A campaign. Many of the instruments required specialized personnel and additional time beyond the regular port time for installation and testing. We therefore carried out an 'installation cruise' from 13 January 2020 until 17 January 2020. Before leaving port on 13 January 2020, a group of scientists from the Caribbean Institute for Meteorology and Hydrology (CIMH) visited the R/V METEOR. Once departed, most time of the installation cruise was spent setting up and testing equipment just outside Bridgetown, Barbados and in waters east of the Barbados Cloud Observatory (BCO), a cloud monitoring station managed by the Max Planck Institute for Meteorology in Hamburg, Germany. While the majority of M161 scientists were already on board during the installation cruise, we also enjoyed the company of an observer from Trinidad and Tobago as well as a German film team. Upon return of R/V METEOR into the port of Bridgetown, Barbados on 17 January 2020, some remaining equipment was brought onto the ship while the technical support staff disembarked and the remaining M161 participants boarded the vessel. R/V METEOR set sail again in the evening of 17 January 2020 with 30 scientists on board, including one person from the German Meteorological Service (DWD) and two observers from Barbados.

Only a few hours after leaving port, we stopped east of the BCO site to allow the calibration of the many instruments on board as well as comparative measurements between the BCO site and R/V METEOR. Our activities off the BCO site were joined by the German R/V MARIA S. MERIAN, and we later jointly departed in wind-direction to our core working area about 130 NM east of Barbados along a North-South transect at 57°14.7'W and between 12°N and 14°30'N. This joint transition to the core working area of R/V METEOR allowed both research vessels to carry out comparisons of their instruments and parallel measurements while steaming into the winds and clouds.

In the following weeks, the scientific party primarily surveyed its core working area by steaming north-south on the transect line with intermittent excursions in east or west directions to allow, e.g., the launch of the Cloud Kite due to wind restrictions and carry out specific oceanographic observations. Most of our atmospheric and some oceanographic measurements, however, were run continuously during the entire cruise.

Towards the end of our first week, participants from the University of East Anglia released two gliders in the northern section of our core working area. The two gliders were later joined by a third glider which was delivered by an Autonaut that started its journey on Barbados. On 24 January 2020, the Cloud Kite from the Max Planck Institute for Dynamics and Self-Organization was launched for the first time but was unfortunately lost in the morning of 08 February 2020 during intense rainfall with heavy wind gusts. The cloud kite was replaced with a smaller cloud kite, and in the course of the cruise a total of about 90 flight hours were recorded. An aircraft-coordinated curtain sampling experiment on 26 January 2020 provided an opportunity for the atmospheric scientists on board R/V METEOR to match their ship-borne measurements with air-borne measurements on the research aircraft HALO. This excursion on a south-eastern leg led us out of our core working area and outside of the exclusive economic zone (EEZ) of Barbados at which point we deployed one of five ARGO floats.

Almost mid-cruise, R/V METEOR set out for a ‘rescue mission’: one of the gliders in the wider research area experienced leakage and needed to be taken on board. As the R/V MARIA S. MERIAN, who originally was planned to pick up the glider at the end of the EUREC<sup>4</sup>A campaign, was too far away from the glider location, R/V METEOR headed south-west and recovered the glider on 03 February 2020. By now, the scientific work on board had settled in from all the excitement in the first two to three weeks and continuous as well as discrete atmospheric and oceanographic observations became routine. Until the 18 February 2020, our work program allowed us to accomplish about 230 CTD casts of which 26 were also used for microbiological and biogeochemical water sampling. Besides the active and passive remote sensing of the atmosphere, about 200 radiosondes were launched and almost 100 quadcopter flights were completed during this period. To ensure safe operation, the three gliders were also recovered at times of calmer weather.

On 19 February 2020, just before the R/V MARIA S. MERIAN headed back to Bridgetown to finish her cruise, a second simultaneous measurement campaign with both ships was carried out east of the BCO site. The rescued glider was then transferred from R/V METEOR to R/V MARIA S. MERIAN while lying in island-protected waters off Bridgetown due to increasing weather and sea conditions in the region. At this time, we received frozen seawater samples from the R/V MARIA S. MERIAN to be shipped together with our frozen seawater samples later from Ponta Delgada, Azores.

As we set sail to reach the Azores in early March, we visited our core working area once more for a last sampling effort in this region. On the subsequent transit of the R/V METEOR to Ponta Delgada, the remaining four of five ARGO floats were deployed, (only) two radiosondes per day were launched, about 25 CTD casts were realized (some were also used for water sampling) and several quadcopter flights were added on days with lower wind speeds. We reached the port of Ponta Delgada, Azores in the evening of 02 March 2020, where containers and equipment were offloaded the next day for shipments back home. On 04 March 2020, the entire scientific party disembarked R/V METEOR to head back to their home laboratories.

## Acknowledgements

The scientific staff of R/V METEOR cruise M161 is incredibly grateful for the friendly and enjoyable atmosphere on board R/V METEOR, and we thank Captain Rainer Hammacher and his entire crew for the assistance, professionalism and close collaboration.

## Participants

Name	Discipline	institute
Wiebke Mohr	Microbiology / Co-Chief Scientist	MPI-MM
Stefan Kinne	Atmosphere / Co- Chief Scientist	MPI-M
Heike Kalesse	Atmosphere / Scientist	LIM
Johannes Röttenbacher	Atmosphere / Scientist	LIM
Ludwig Worbes	Atmosphere / Scientist	MPI-M
Imke Schirmacher	Atmosphere / Scientist	UHH
Oliver Schlenczek	Atmosphere / Scientist	MPI-DS
Antonio Ibanez Landeta	Atmosphere / Scientist	MPI-DS
Marcel Meyer	Atmosphere / Scientist	MPI-DS
Marcel Schröder	Atmosphere / Scientist	MPI-DS
Alma Anna Ubele	Atmosphere / Scientist	MPI-C
Sebastian Los	Atmosphere / Scientist	UNM
Abiel Kidane	Microbiology / Scientist	MPI-MM
Jan von Arx	Microbiology / Scientist	MPI-MM
Callum Rollo	Oceanography / Scientist	UEA
Elizabeth Siddle	Oceanography / Scientist	UEA
Yanmichel Morfa Avalos	Atmosphere / Scientist	MPI-M
Katharina Baier	Atmosphere / Scientist	MPI-M
Almuth Neuberger	Atmosphere / Scientist	MPI-M
Darek Baranowski	Oceanography / Scientist	U Warsaw
Michal Chilinski	Atmosphere / Scientist	U Warsaw
Jakub Nowak	Atmosphere / Scientist	U Warsaw
Robert Grosz	Atmosphere / Scientist	U Warsaw
Wojciech Szkolka	Atmosphere / Scientist	U Warsaw
Przemek Makuch	Oceanography / Scientist	IOPAN
Geiske de Groot	Atmosphere / Scientist	TU Delft
Kevin Helfer	Atmosphere / Scientist	TU Delft
Sanola Sandiford	Observer	CMIH
John Gollop	Observer	BBCG
Andreas Raeke	Meteorologist	DWD

## Participating institutes

MPI-M	Max-Planck Institute for Meteorology, Hamburg
MPI-MM	Max-Planck Institute for Marine Microbiology, Bremen
MPI-DS	Max-Planck Institute for Dynamics and Self-Organization, Göttingen
MPI-C	Max-Planck Institute for Chemistry, Mainz
UHH	University of Hamburg, Dep of Meteorology, Hamburg
LIM	University of Leipzig, Institute for Meteorology, Leipzig
UNM	University of New Mexico, Albuquerque, U.S.A.
UEA	University of East Anglia, Norwich, U.K.
TU Delft	Delft University of Technology, Delft, Netherlands
U Warsaw	University of Warsaw, Warsaw, Poland
IOPAN	Institute of Oceanology of the Polish Academy of Sciences, Sopot, Poland
CIMH	Caribbean Institute for Meteorology and Hydrology, Bridgetown, Barbados
BBCG	Barbados Coastguard, Barbados
DWD	Deutscher Wetterdienst, Geschäftsfeld Seeschifffahrt, Seewetteramt, Hamburg

## Station list

Station	Date / Time UTC	Device	Latitude (°N)	Longitude (°W)	Depth (m)	Rope Length (m)
M161_1-1	18.01.2020 20:40	CTD	13° 40.248'	058° 18.482'	3318	10
M161_2-1	19.01.2020 08:03	CTD	13° 47.103'	057° 15.136'	4842	500
M161_3-1	19.01.2020 11:40	CTD	13° 47.104'	057° 15.136'	4846	200
M161_4-1	20.01.2020 14:53	CTD	14° 03.167'	057° 15.286'	4974	500
M161_5-1	20.01.2020 18:17	CTD	14° 27.034'	057° 14.881'	5472	800
M161_6-1	20.01.2020 20:52	CTD	14° 10.657'	057° 15.193'	5152	800
M161_7-1	21.01.2020 00:05	CTD	13° 47.071'	057° 15.070'	4838	800
M161_8-1	21.01.2020 03:05	CTD	13° 27.178'	057° 14.989'	4929	800
M161_9-1	21.01.2020 06:08	CTD	13° 07.095'	057° 15.032'	4915	800
M161_10-1	21.01.2020 08:43	CTD	13° 06.819'	057° 17.054'	4885	200
M161_11-1	21.01.2020 12:25	CTD	13° 31.510'	057° 15.216'	4940	801
M161_12-1	21.01.2020 14:54	CTD	13° 42.826'	057° 23.551'	4875	800
M161_13-1	21.01.2020 18:51	CTD	14° 10.993'	057° 43.353'	5289	783
M161_14-1	21.01.2020 21:47	CTD	14° 10.924'	057° 25.000'	5170	800
M161_15-1	22.01.2020 00:54	CTD	14° 10.901'	057° 06.343'	5133	800
M161_16-1	22.01.2020 04:01	CTD	14° 10.908'	056° 46.816'	5181	800

M161_17-1	22.01.2020 07:53	CTD	14° 28.478'	057° 14.851'	5504	800
M161_18-1	22.01.2020 10:40	CTD	14° 10.926'	057° 14.703'	5170	1000
M161_19-1	22.01.2020 14:23	CTD	14° 10.922'	057° 14.703'	5207	800
M161_20-1	22.01.2020 16:27	CTD	14° 10.922'	057° 14.703'	5176	801
M161_21-1	22.01.2020 18:22	CTD	14° 10.923'	057° 14.704'	5172	800
M161_22-1	22.01.2020 20:17	CTD	14° 10.923'	057° 14.703'	5174	800
M161_23-1	22.01.2020 22:25	CTD	14° 10.920'	057° 14.704'	5170	1000
M161_24-1	23.01.2020 00:20	CTD	14° 10.919'	057° 14.703'	5178	800
M161_25-1	23.01.2020 02:16	CTD	14° 10.920'	057° 14.704'	5170	800
M161_26-1	23.01.2020 04:20	CTD	14° 10.921'	057° 14.704'	5173	800
M161_27-1	23.01.2020 06:19	CTD	14° 10.921'	057° 14.704'	5178	800
M161_28-1	23.01.2020 08:18	CTD	14° 10.919'	057° 14.704'	5172	800
M161_29-1	23.01.2020 10:22	CTD	14° 10.922'	057° 20.283'	5172	1000
M161_30-1	23.01.2020 14:19	Glider deployment	14° 10.922'	057° 20.285'	5172	0
M161_31-1	23.01.2020 14:56	Glider deployment	14° 10.920'	057° 20.287'	5171	0
M161_32-1	23.01.2020 15:24	CTD	14° 10.921'	057° 20.284'	5170	500
M161_33-1	23.01.2020 17:47	CTD	14° 05.526'	057° 25.849'	5100	500
M161_34-1	23.01.2020 19:51	CTD	14° 16.355'	057° 25.906'	5249	500
M161_35-1	23.01.2020 22:31	CTD	14° 16.341'	057° 14.749'	5322	500
M161_36-1	24.01.2020 00:58	CTD	14° 05.516'	057° 14.719'	5015	500
M161_37-1	24.01.2020 03:33	CTD	13° 53.350'	057° 14.707'	4870	800
M161_38-1	24.01.2020 05:57	CTD	13° 44.772'	057° 14.753'	4825	799
M161_39-1	24.01.2020 08:13	CTD	13° 44.772'	057° 14.753'	4827	250
M161_40-1	24.01.2020 12:20	CTD	13° 58.185'	057° 14.703'	4829	800
M161_42-1	24.01.2020 16:52	CTD	13° 58.201'	057° 11.571'	4816	760
M161_43-1	24.01.2020 19:11	CTD	13° 50.171'	057° 12.436'	4839	800
M161_44-1	25.01.2020 00:03	CTD	13° 35.700'	057° 14.711'	4831	800
M161_45-1	25.01.2020 03:27	CTD	13° 17.978'	057° 14.724'	4952	801
M161_46-1	25.01.2020 06:32	CTD	12° 59.957'	057° 14.705'	4737	800
M161_47-1	25.01.2020 09:29	CTD	12° 42.761'	057° 14.724'	4462	800
M161_48-1	25.01.2020 12:45	CTD	12° 25.063'	057° 14.747'	4494	800

M161_49-1	25.01.2020 15:42	CTD	12° 07.527'	057° 14.696'	4471	800
M161_50-1	25.01.2020 19:18	CTD	12° 25.086'	057° 01.038'	4458	800
M161_51-1	25.01.2020 20:54	CTD	12° 25.117'	057° 10.122'	4486	800
M161_52-1	25.01.2020 22:41	CTD	12° 25.120'	057° 19.342'	4495	800
M161_53-1	26.01.2020 00:28	CTD	12° 25.122'	057° 28.541'	4468	800
M161_54-1	26.01.2020 02:29	CTD	12° 25.109'	057° 37.781'	3566	800
M161_55-1	26.01.2020 07:15	CTD	12° 42.813'	057° 14.684'	4458	800
M161_56-1	26.01.2020 10:04	CTD	12° 25.126'	057° 14.702'	4493	800
M161_57-1	26.01.2020 19:32	CTD	12° 11.220'	056° 07.059'	4495	2000
M161_58-1	26.01.2020 20:17	ARGO float deployment	12° 11.204'	056° 07.009'	4481	0
M161_59-1	26.01.2020 22:40	CTD	12° 15.860'	056° 28.705'	4437	800
M161_60-1	27.01.2020 01:23	CTD	12° 20.471'	056° 51.065'	4446	801
M161_61-1	27.01.2020 05:06	CTD	12° 07.501'	057° 14.735'	4471	800
M161_62-1	27.01.2020 07:13	CTD	12° 07.502'	057° 14.736'	4471	250
M161_63-1	27.01.2020 10:07	CTD	12° 25.123'	057° 14.705'	4495	800
M161_64-1	27.01.2020 13:20	CTD	12° 42.750'	057° 14.737'	4459	801
M161_65-1	27.01.2020 16:26	CTD	13° 00.024'	057° 14.717'	4738	800
M161_66-1	27.01.2020 22:45	CTD	13° 18.024'	057° 14.734'	4954	800
M161_67-1	28.01.2020 01:47	CTD	13° 35.638'	057° 14.716'	4828	801
M161_68-1	28.01.2020 04:49	CTD	13° 53.337'	057° 14.694'	4863	800
M161_69-1	28.01.2020 07:48	CTD	14° 10.917'	057° 14.723'	5170	800
M161_70-1	28.01.2020 10:50	CTD	14° 28.549'	057° 14.728'	5509	800
M161_71-1	28.01.2020 14:04	CTD	14° 10.926'	057° 14.731'	5175	801
M161_72-1	28.01.2020 18:58	CTD	13° 47.638'	057° 14.738'	4844	800
M161_73-1	28.01.2020 21:53	CTD	13° 31.228'	057° 14.744'	4939	800
M161_74-1	29.01.2020 00:49	CTD	13° 18.004'	057° 14.728'	4953	800
M161_75-1	29.01.2020 03:32	CTD	13° 00.066'	057° 14.721'	4741	801
M161_76-1	29.01.2020 05:21	CTD	12° 52.849'	057° 14.697'	4506	800
M161_77-1	29.01.2020 07:17	CTD	12° 52.850'	057° 14.696'	4506	250
M161_78-1	29.01.2020 09:23	CTD	12° 42.784'	057° 14.737'	4459	800
M161_79-1	29.01.2020 12:50	CTD	12° 25.206'	057° 14.742'	4494	800



M161_80-1	29.01.2020 16:13	CTD	12° 07.498'	057° 14.708'	4471	800
M161_81-1	29.01.2020 19:13	CTD	12° 25.141'	057° 14.741'	4494	800
M161_82-1	29.01.2020 22:37	CTD	12° 42.751'	057° 14.740'	4458	800
M161_83-1	30.01.2020 01:37	CTD	13° 00.044'	057° 14.709'	4738	800
M161_84-1	30.01.2020 04:44	CTD	13° 18.111'	057° 14.767'	4951	800
M161_85-1	30.01.2020 07:48	CTD	13° 35.621'	057° 14.727'	4834	800
M161_86-1	30.01.2020 11:01	CTD	13° 17.995'	057° 25.044'	4924	800
M161_87-1	30.01.2020 20:11	CTD	13° 17.990'	056° 50.842'	4941	800
M161_88-1	30.01.2020 22:24	CTD	13° 17.997'	057° 02.942'	4950	800
M161_89-1	31.01.2020 01:13	CTD	13° 17.998'	057° 25.017'	4924	800
M161_90-1	31.01.2020 07:16	CTD	13° 18.003'	056° 50.905'	4943	800
M161_91-1	31.01.2020 09:42	CTD	13° 26.891'	056° 59.538'	4869	800
M161_92-1	31.01.2020 12:44	CTD	13° 35.642'	057° 14.753'	4833	800
M161_93-1	31.01.2020 15:42	CTD	13° 53.347'	057° 14.705'	4869	800
M161_94-1	31.01.2020 18:49	CTD	14° 10.915'	057° 14.696'	5179	800
M161_95-1	31.01.2020 22:04	CTD	14° 28.565'	057° 14.733'	5506	800
M161_96-1	01.02.2020 00:34	CTD	14° 16.333'	057° 14.728'	5322	800
M161_97-1	01.02.2020 02:40	CTD	14° 16.320'	057° 25.891'	5251	800
M161_98-1	01.02.2020 04:53	CTD	14° 05.516'	057° 25.900'	5100	800
M161_99-1	01.02.2020 06:56	CTD	14° 05.515'	057° 25.899'	5101	250
M161_100-1	01.02.2020 09:26	CTD	14° 05.529'	057° 14.775'	5015	800
M161_101-1	01.02.2020 11:53	CTD	13° 53.351'	057° 14.734'	4863	800
M161_102-1	01.02.2020 15:10	CTD	13° 35.643'	057° 14.732'	4827	800
M161_103-1	01.02.2020 18:19	CTD	13° 18.054'	057° 14.780'	4953	800
M161_104-1	01.02.2020 21:52	CTD	13° 00.041'	057° 14.785'	4740	800
M161_105-1	02.02.2020 00:39	CTD	12° 42.752'	057° 25.016'	4511	802
M161_106-1	02.02.2020 06:38	CTD	12° 42.751'	056° 54.855'	4454	800
M161_107-1	02.02.2020 08:40	CTD	12° 42.756'	057° 04.062'	4500	800
M161_108-1	02.02.2020 10:42	CTD	12° 42.748'	057° 14.742'	4460	800
M161_109-1	02.02.2020 13:58	CTD	12° 25.133'	057° 14.706'	4494	800
M161_110-1	02.02.2020 17:08	CTD	12° 07.515'	057° 14.738'	4473	800

M161_111-1	02.02.2020 20:06	CTD	12° 25.136'	057° 14.750'	4494	800
M161_112-1	02.02.2020 23:15	CTD	12° 42.765'	057° 14.712'	4464	800
M161_113-1	03.02.2020 13:03	Glider recovery (MSM)	11° 35.228'	059° 14.875'	1676	0
M161_114-1	03.02.2020 16:22	CTD	12° 01.074'	059° 14.570'	1943	1000
M161_115-1	04.02.2020 05:28	CTD	12° 35.274'	057° 36.416'	3848	800
M161_116-1	04.02.2020 07:31	CTD	12° 35.274'	057° 36.416'	3846	250
M161_117-1	04.02.2020 11:36	CTD	12° 42.756'	057° 14.741'	4459	800
M161_118-1	04.02.2020 18:52	CTD	13° 00.035'	057° 14.752'	4742	800
M161_119-1	04.02.2020 22:07	CTD	13° 18.021'	057° 14.751'	4952	779
M161_120-1	05.02.2020 01:15	CTD	13° 35.644'	057° 14.723'	4829	800
M161_121-1	05.02.2020 04:28	CTD	13° 53.306'	057° 14.698'	4862	800
M161_122-1	05.02.2020 07:40	CTD	14° 10.908'	057° 14.726'	5171	800
M161_123-1	05.02.2020 10:48	CTD	14° 28.553'	057° 14.751'	5509	800
M161_124-1	05.02.2020 14:06	CTD	14° 10.898'	057° 14.731'	5170	800
M161_125-1	05.02.2020 17:08	Glider recovery	14° 07.769'	057° 23.673'	5124	0
M161_126-1	05.02.2020 19:54	CTD	14° 04.928'	057° 14.744'	5005	800
M161_127-1	05.02.2020 22:47	CTD	14° 04.927'	057° 14.745'	5003	809
M161_128-1	06.02.2020 00:50	CTD	14° 04.928'	057° 14.744'	5005	800
M161_129-1	06.02.2020 02:48	CTD	14° 04.929'	057° 14.744'	5002	800
M161_130-1	06.02.2020 04:54	CTD	14° 04.929'	057° 14.744'	5004	801
M161_131-1	06.02.2020 06:53	CTD	14° 04.926'	057° 14.745'	5004	800
M161_132-1	06.02.2020 08:52	CTD	14° 04.927'	057° 14.745'	5005	800
M161_133-1	06.02.2020 10:59	CTD	14° 04.928'	057° 14.745'	5004	800
M161_134-1	06.02.2020 12:51	CTD	14° 04.929'	057° 14.743'	5004	800
M161_135-1	06.02.2020 14:53	CTD	14° 04.927'	057° 14.743'	5004	800
M161_136-1	06.02.2020 16:48	CTD	14° 04.933'	057° 14.745'	5006	800
M161_137-1	06.02.2020 18:34	CTD	14° 04.931'	057° 14.745'	5004	800
M161_138-1	06.02.2020 22:56	CTD	13° 35.666'	057° 14.798'	4827	800
M161_139-1	07.02.2020 02:18	CTD	13° 18.009'	057° 14.725'	4952	800
M161_140-1	07.02.2020 05:24	CTD	12° 58.030'	057° 14.761'	4659	800

M161_141-1	07.02.2020 07:35	CTD	12° 58.033'	057° 14.759'	4660	250
M161_142-1	07.02.2020 12:07	CTD	12° 26.154'	057° 14.789'	4494	1736
M161_142-2	07.02.2020 14:31	CTD	12° 26.152'	057° 14.788'	4493	4485
M161_143-1	07.02.2020 20:24	CTD	12° 07.524'	057° 14.801'	4473	800
M161_144-1	07.02.2020 23:42	CTD	12° 25.122'	057° 14.701'	4493	800
M161_145-1	08.02.2020 02:47	CTD	12° 25.123'	057° 14.701'	4492	800
M161_146-1	08.02.2020 05:14	CTD	12° 25.123'	057° 14.701'	4494	800
M161_147-1	08.02.2020 07:08	CTD	12° 25.123'	057° 14.701'	4493	799
M161_148-1	08.02.2020 09:00	CTD	12° 25.124'	057° 14.699'	4493	799
M161_149-1	08.02.2020 20:46	CTD	12° 25.129'	057° 14.701'	4492	800
M161_150-1	08.02.2020 22:45	CTD	12° 25.127'	057° 14.702'	4494	800
M161_151-1	09.02.2020 00:49	CTD	12° 25.127'	057° 14.703'	4492	800
M161_152-1	09.02.2020 02:49	CTD	12° 25.125'	057° 14.702'	4492	800
M161_153-1	09.02.2020 04:54	CTD	12° 25.129'	057° 14.701'	4493	800
M161_154-1	09.02.2020 06:48	CTD	12° 25.126'	057° 14.702'	4495	800
M161_155-1	09.02.2020 08:46	CTD	12° 25.130'	057° 14.702'	4494	800
M161_156-1	09.02.2020 10:46	CTD	12° 25.128'	057° 14.702'	4494	799
M161_157-1	09.02.2020 12:49	CTD	12° 25.128'	057° 14.702'	4492	800
M161_158-1	09.02.2020 14:47	CTD	12° 25.127'	057° 14.701'	4492	800
M161_159-1	09.02.2020 16:53	CTD	12° 25.128'	057° 14.701'	4493	800
M161_160-1	09.02.2020 18:45	CTD	12° 25.131'	057° 14.701'	4494	799
M161_161-1	09.02.2020 20:46	CTD	12° 25.129'	057° 14.702'	4494	800
M161_162-1	09.02.2020 23:28	CTD	12° 42.733'	057° 14.741'	4459	800
M161_163-1	10.02.2020 02:34	CTD	13° 00.031'	057° 14.702'	4739	800
M161_164-1	10.02.2020 05:20	CTD	13° 17.997'	057° 14.723'	4951	800
M161_165-1	10.02.2020 07:22	CTD	13° 17.997'	057° 14.724'	4950	250
M161_166-1	10.02.2020 10:57	CTD	13° 35.641'	057° 14.708'	4828	800
M161_167-1	10.02.2020 13:44	CTD	13° 53.330'	057° 14.722'	4862	800
M161_168-1	10.02.2020 16:27	CTD	14° 10.920'	057° 14.726'	5171	800
M161_169-1	10.02.2020 18:49	CTD	14° 10.922'	057° 14.725'	5173	800
M161_170-1	10.02.2020 20:51	CTD	14° 10.922'	057° 14.724'	5172	800

M161_171-1	10.02.2020 22:45	CTD	14° 10.924'	057° 14.726'	5177	800
M161_172-1	11.02.2020 00:48	CTD	14° 10.922'	057° 14.725'	5172	800
M161_173-1	11.02.2020 02:49	CTD	14° 10.921'	057° 14.725'	5170	800
M161_174-1	11.02.2020 04:49	CTD	14° 10.919'	057° 14.725'	5181	800
M161_175-1	11.02.2020 06:45	CTD	14° 10.923'	057° 14.725'	5172	800
M161_176-1	11.02.2020 08:50	CTD	14° 10.921'	057° 14.725'	5171	799
M161_177-1	11.02.2020 10:43	CTD	14° 10.923'	057° 14.703'	5173	800
M161_178-1	11.02.2020 13:55	CTD	14° 10.927'	057° 14.702'	5173	800
M161_179-1	11.02.2020 16:44	CTD	14° 10.927'	057° 14.701'	5172	800
M161_180-1	11.02.2020 18:38	CTD	14° 10.928'	057° 14.704'	5172	800
M161_181-1	12.02.2020 12:52	CTD	12° 25.128'	057° 14.702'	4495	800
M161_182-1	12.02.2020 16:15	CTD	12° 25.149'	056° 59.369'	4452	800
M161_183-1	12.02.2020 18:54	CTD	12° 25.126'	056° 44.011'	4437	800
M161_184-1	12.02.2020 21:39	CTD	12° 16.508'	056° 59.414'	4462	800
M161_185-1	13.02.2020 00:53	CTD	12° 07.521'	057° 14.706'	4471	800
M161_186-1	13.02.2020 04:47	CTD	12° 25.132'	057° 24.915'	4492	800
M161_187-1	13.02.2020 06:55	CTD	12° 25.132'	057° 24.915'	4493	250
M161_188-1	13.02.2020 10:06	CTD	12° 42.725'	057° 14.755'	4462	800
M161_189-1	13.02.2020 12:55	CTD	13° 00.040'	057° 14.755'	4742	800
M161_190-1	13.02.2020 15:53	CTD	13° 18.003'	057° 14.701'	4954	800
M161_191-1	13.02.2020 18:38	CTD	13° 35.638'	057° 14.714'	4829	799
M161_192-1	13.02.2020 21:33	CTD	13° 53.294'	057° 14.756'	4863	800
M161_193-1	14.02.2020 00:43	CTD	14° 10.923'	057° 14.711'	5172	801
M161_194-1	14.02.2020 03:47	CTD	14° 28.559'	057° 14.712'	5495	800
M161_195-1	14.02.2020 06:42	CTD	14° 10.917'	057° 14.746'	5172	800
M161_196-1	14.02.2020 09:42	CTD	13° 53.314'	057° 14.775'	4861	800
M161_197-1	14.02.2020 12:50	CTD	13° 35.656'	057° 14.712'	4834	800
M161_198-1	14.02.2020 15:50	CTD	13° 17.989'	057° 14.711'	4951	800
M161_199-1	14.02.2020 18:16	CTD	13° 17.996'	057° 24.938'	4921	800
M161_200-1	14.02.2020 20:31	CTD	13° 18.017'	057° 14.800'	4951	800
M161_201-1	14.02.2020 23:23	CTD	13° 17.996'	056° 59.418'	4948	800

M161_202-1	15.02.2020 02:02	CTD	13° 18.006'	056° 43.811'	4936	800
M161_203-1	15.02.2020 04:50	CTD	13° 08.989'	056° 59.396'	4930	800
M161_204-1	15.02.2020 07:47	CTD	13° 00.048'	057° 14.734'	4744	800
M161_205-1	15.02.2020 10:51	CTD	12° 42.711'	057° 14.713'	4455	828
M161_206-1	15.02.2020 14:03	CTD	12° 25.131'	057° 14.717'	4494	800
M161_207-1	15.02.2020 16:55	CTD	12° 07.509'	057° 14.734'	4470	800
M161_208-1	15.02.2020 19:27	CTD	12° 25.122'	057° 14.734'	4493	800
M161_209-1	15.02.2020 22:36	CTD	12° 42.751'	057° 14.744'	4452	800
M161_210-1	16.02.2020 01:50	CTD	13° 00.046'	057° 14.702'	4742	800
M161_211-1	16.02.2020 04:51	CTD	13° 22.860'	057° 14.719'	4955	799
M161_212-1	16.02.2020 06:54	CTD	13° 22.861'	057° 14.719'	4955	250
M161_213-1	16.02.2020 08:57	CTD	13° 35.643'	057° 14.717'	4827	799
M161_214-1	16.02.2020 11:25	CTD	13° 53.332'	057° 14.720'	4863	800
M161_215-1	16.02.2020 14:21	Glider recovery	14° 11.015'	057° 20.522'	5170	0
M161_216-1	16.02.2020 14:40	Glider recovery	14° 10.984'	057° 20.481'	5168	0
M161_217-1	16.02.2020 15:21	CTD	14° 10.975'	057° 20.610'	5168	1000
M161_218-1	16.02.2020 17:21	CTD	14° 10.916'	057° 25.237'	5174	800
M161_219-1	16.02.2020 19:48	CTD	14° 10.927'	057° 14.761'	5168	800
M161_220-1	16.02.2020 22:27	CTD	14° 10.942'	057° 04.015'	5101	800
M161_221-1	17.02.2020 00:48	CTD	14° 10.922'	056° 54.016'	5128	800
M161_222-1	17.02.2020 03:24	CTD	14° 10.938'	056° 44.063'	5163	800
M161_223-1	17.02.2020 06:22	CTD	14° 19.747'	056° 59.846'	5373	800
M161_224-1	17.02.2020 09:13	CTD	14° 28.580'	057° 14.778'	5508	800
M161_225-1	17.02.2020 12:12	CTD	14° 10.925'	057° 14.725'	5173	800
M161_226-1	17.02.2020 15:37	CTD	13° 53.317'	057° 14.702'	4872	800
M161_227-1	17.02.2020 18:16	CTD	13° 35.643'	057° 14.733'	4827	800
M161_228-1	17.02.2020 20:55	CTD	13° 17.993'	057° 14.736'	4953	800
M161_229-1	17.02.2020 23:46	CTD	13° 00.031'	057° 14.723'	4736	800
M161_230-1	18.02.2020 02:24	CTD	12° 42.751'	057° 14.712'	4459	800
M161_231-1	18.02.2020 05:21	CTD	12° 25.154'	057° 14.747'	4493	800
M161_232-1	18.02.2020 08:09	CTD	12° 07.511'	057° 14.731'	4472	800

M161_233-1	18.02.2020 10:58	CTD	12° 25.139'	057° 14.754'	4493	800
M161_234-1	18.02.2020 14:02	CTD	12° 42.752'	057° 14.711'	4458	800
M161_235-1	18.02.2020 17:15	CTD	13° 00.071'	057° 14.706'	4741	800
M161_236-1	18.02.2020 21:02	CTD	13° 18.011'	057° 14.733'	4952	800
M161_237-1	20.02.2020 15:33	CTD	13° 35.642'	057° 14.703'	4842	800
M161_238-1	20.02.2020 17:00	CTD	13° 35.643'	057° 14.701'	4829	250
M161_239-1	21.02.2020 12:57	CTD	15° 48.690'	055° 16.314'	5503	2000
M161_240-1	21.02.2020 13:53	ARGO float deployment	15° 48.711'	055° 16.184'	5505	0
M161_241-1	21.02.2020 20:24	CTD	16° 32.659'	054° 36.986'	5325	500
M161_242-1	23.02.2020 14:18	CTD	21° 31.580'	050° 04.858'	5383	500
M161_243-1	23.02.2020 17:13	CTD	21° 48.319'	049° 49.763'	4548	500
M161_244-1	23.02.2020 20:06	CTD	22° 04.853'	049° 34.125'	5080	500
M161_245-1	24.02.2020 15:40	CTD	24° 30.443'	047° 17.849'	4253	1000
M161_246-1	25.02.2020 13:30	CTD	27° 06.681'	044° 48.634'	3301	1000
M161_247-1	25.02.2020 17:11	CTD	27° 26.053'	044° 29.989'	2910	500
M161_248-1	25.02.2020 20:08	CTD	27° 43.338'	044° 13.007'	2880	500
M161_249-1	26.02.2020 11:49	CTD	29° 36.715'	042° 22.117'	2760	500
M161_250-1	26.02.2020 15:49	CTD	30° 00.102'	041° 58.921'	3989	2000
M161_251-1	26.02.2020 16:38	ARGO float deployment	30° 00.226'	041° 58.678'	4002	0
M161_252-1	26.02.2020 19:08	CTD	30° 11.727'	041° 37.008'	2493	500
M161_253-1	27.02.2020 10:19	CTD	31° 30.439'	039° 07.224'	3562	600
M161_254-1	27.02.2020 13:38	CTD	31° 40.232'	038° 48.882'	3515	2000
M161_255-1	27.02.2020 14:26	ARGO float deployment	31° 40.230'	038° 48.714'	3516	0
M161_256-1	27.02.2020 18:10	CTD	31° 56.606'	038° 13.446'	2950	500
M161_257-1	28.02.2020 08:09	CTD	33° 05.437'	036° 01.127'	2762	2000
M161_258-1	28.02.2020 08:52	ARGO float deployment	33° 05.590'	036° 01.173'	2763	0
M161_259-1	28.02.2020 15:11	CTD	33° 35.206'	034° 55.261'	3286	500
M161_260-1	28.02.2020 20:52	CTD	34° 00.005'	034° 00.018'	2971	999
M161_261-1	29.02.2020 07:46	CTD	34° 48.300'	032° 13.776'	2762	1000
M161_262-1	29.02.2020 12:16	CTD	35° 07.898'	031° 30.843'	3167	500
M161_263-1	29.02.2020 15:08	CTD	35° 18.497'	031° 06.799'	3225	500

M161_264-1	29.02.2020 19:16	CTD	35° 32.273'	030° 36.845'	3196	1000
M161_265-1	01.03.2020 08:24	CTD	36° 15.468'	028° 59.296'	3363	1000
M161_266-1	01.03.2020 17:27	CTD	36° 58.684'	027° 21.005'	2108	1000