

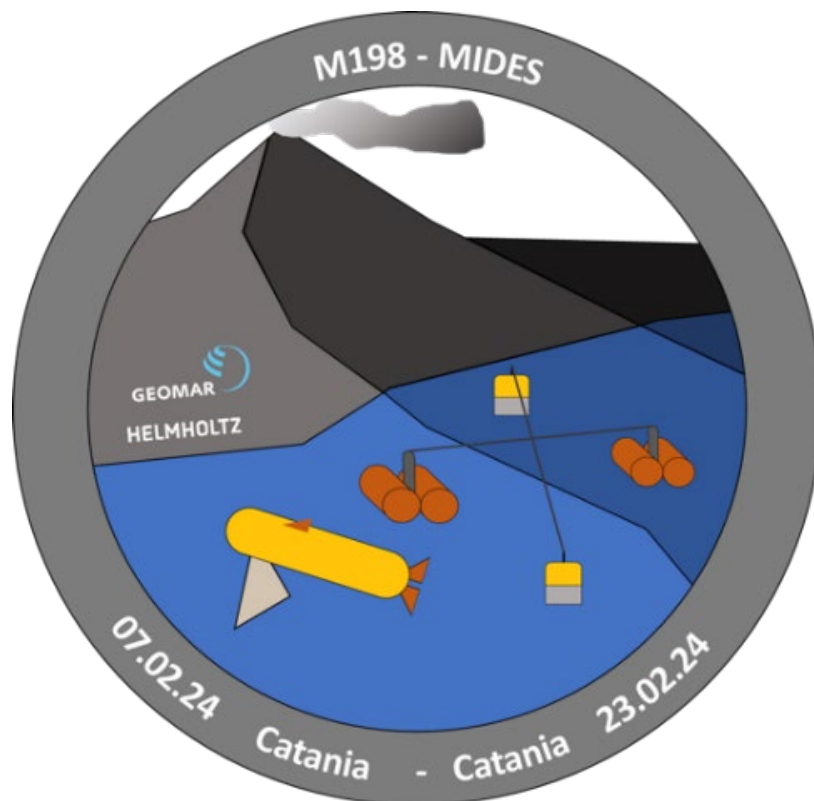
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Short Cruise Report RV METEOR M198

Catania (Italy) – Catania (Italy)
09.02.2024 – 22.02.2024

Chief Scientist: Prof. Dr. Morelia Urlaub
Captain: Rainer Hammacher



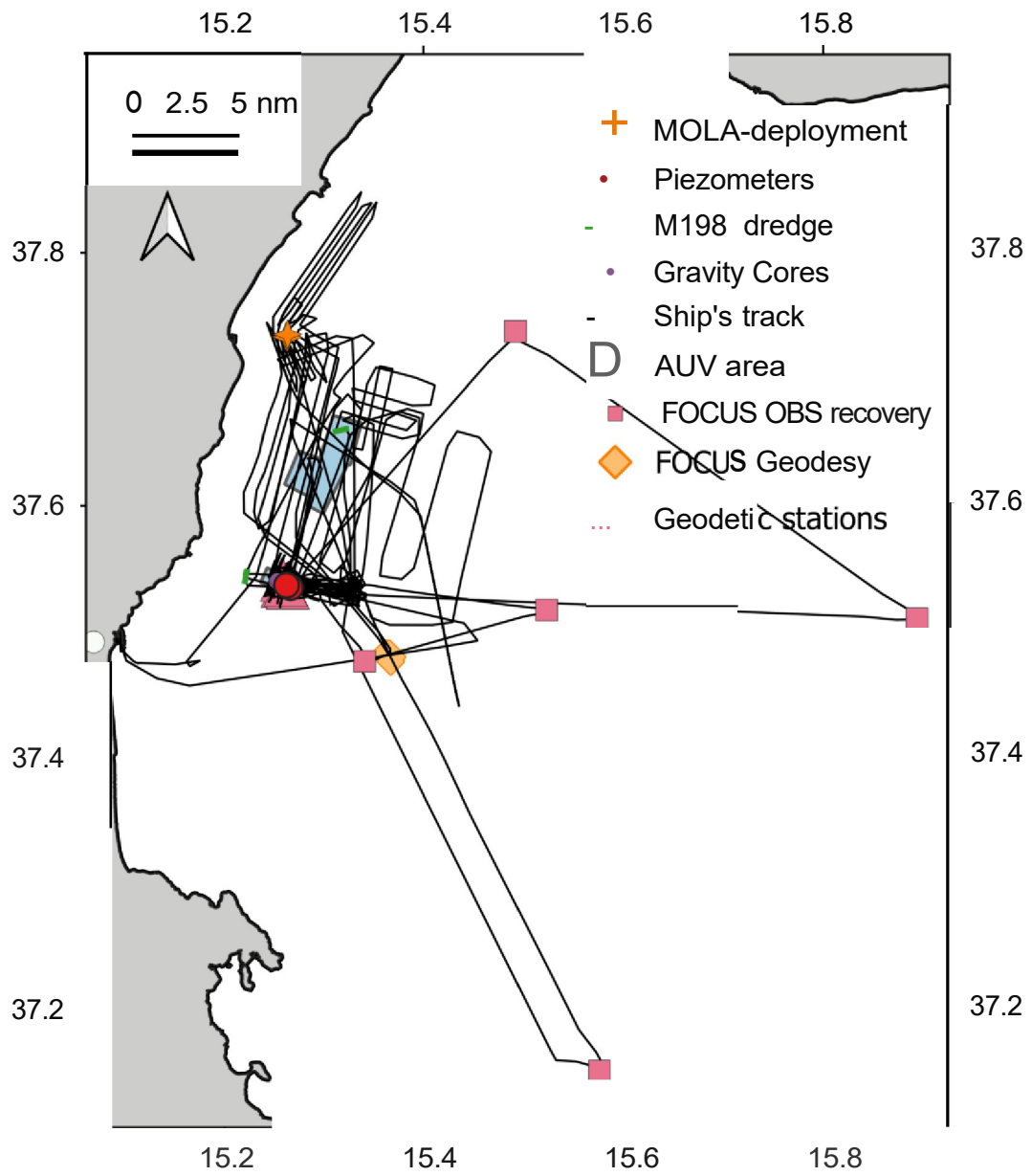


Fig. 1: Cruise track of RV METEOR cruise M198.

Objectives

Mount Etna is Europe's largest active volcano. Its southeastern flank is moving anomalously with respect to the rest of the volcanic edifice. This instability reaches several kilometers into the Ionian Sea. The area affected by the instability is the study area of this research cruise. During the research cruise M198 we aimed to (1) service the current seafloor deformation monitoring system and add long-term in-situ pore pressure and temperature measurements, (2) collect high-resolution bathymetric data with a multibeam echosounder mounted to an Autonomous Underwater Vehicle (AUV), (3) test a new generation of low-cost and easy-to-handle smart instruments (MOLA) for seafloor volcano monitoring, and (4) collect rocks with a chainbag dredge.

Narrative

RV Meteor left the port of Catania on the 9th of February at 10am local time. The scientific work began with the attempt to recover five seafloor instruments about 5 nm off Acitrezza. Unfortunately, this was not successful and all instruments remained on the seafloor. Data upload via an acoustic modem was successful. A CTD profile was conducted. During the night the vessel remained in the area for a sediment echosounder (PARASOUND) survey. In the morning of the 11th February the first attempt to recover one instrument from the seafloor was made by putting out a cable equipped with several hooks on the seafloor radially around the position of the instrument. The attempt was not successful. In the evening after a short transit to the east, two transponders were deployed and their absolute positions determined. The transponders serve as a navigation fix for the Autonomous Underwater Vehicle (AUV). During the night the USBL system's external antenna was calibrated. In the early morning of the following day pressure and communication tests were performed with the newly developed "Modular Ocean Lander Architecture" (MOLA) instruments. They were lowered in a cage to 400m water depth. After the tests a second unsuccessful recovery attempt was done. In the afternoon the AUV was deployed for its first nightly dive. While the AUV was mapping the seafloor autonomously, two gravity cores were recovered. Further tests with the MOLA instruments were performed and two Ocean Bottom Seismometers (OBS) were recovered. In the morning of the 12th February we recovered the AUV and conducted another attempt to recover a seafloor instrument, which again turned out not successful. Two "dry" tests with the piezometer, a 6.5m long lance, were conducted and another gravity core was taken. The AUV was deployed in the late evening for another night dive and a third OBS was recovered. The AUV was recovered in the morning and the first of two piezometers was installed after lunchtime. Two gravity cores were taken. The AUV was put to water but immediately retrieved because of small water intrusions. Further MOLA tests were conducted with a cage, followed by a bathymetric survey during the night. Wednesday, 14th of February started with another recovery attempt, followed by AUV deployment and another gravity core. MOLA tests were done in the evening and a bathymetric survey lasted until the morning of the next day. In perfect weather conditions the AUV was recovered followed by yet another attempt to recover the instruments. In the evening the AUV was deployed and MOLA tests performed. The night was spent collecting sediment echosounder profiles. After recovery of the AUV, one of the seafloor instruments was finally released and floated to the sea surface. It was then recovered with the vessel's rigid inflatable boat. In the afternoon the first chainbag dredge was deployed and yielded a

wealth of volcanic rocks. Further MOLA tests were then done and two of the instruments still remaining on the seafloor were ranged in order to determine their exact positions. On the 17th February during daylight further recovery attempts were done. In the evening, the AUV was deployed and a bathymetric survey was conducted. In the morning of the 18th February a third instrument was ranged, followed by recovery attempts, AUV deployment and two chainbag dredge profiles. The night was spent with bathymetric mapping. In the morning of the following day the AUV was recovered and three of the MOLA instruments were deployed in 150 m water depth. All communication tests were positive and all three instruments released and could be recovered with the rigid inflatable boat. In the afternoon the second piezometer was deployed and a last gravity core was taken. The last seafloor instrument was ranged and the AUV started another dive. Two more OBS were recovered during the night and the following Tuesday, 20th February 2024, was spent for a final attempt to recover the instruments at the seafloor. In the afternoon, we recovered the AUV and one of the transponders used for positioning of the AUV. The last day of the cruise was used to download seafloor geodetic data from a network of our French colleagues. We also recovered the second transponder and performed final communication tests with the MOLA instruments. Finally, a bathymetric survey was conducted before the scientific activities were stopped in the early morning of the 22nd of February.

Acknowledgements

We are grateful to the Government of Italy for granting permission to work in Italy's Exclusive Economic Zone. Cruise M198 was realized thanks to funding from the Helmholtz Association (VH-NG-1617).

Teilnehmerliste

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GEOMAR: GEOMAR Helmholtz Centre for Ocean Research Kiel (Germany)

INGV-OE: Istituto Nazionale di Geofisica e Vulcanologia – Osservatorio Etneo, Catania (Italy)

IFREMER: Institut français de recherche pour l'exploitation de la mer

IUEM: L'Institut Universitaire Européen de la Mer, Brest (France)

TUHH: Technical University Hamburg-Harburg (Germany)

DWD: Deutscher Wetterdienst

Stationsliste

Station list of cruise M198. GDS = seafloor geodetic station; CTD = Conductivity, Temperature, Depth; GC = gravity corer; AUV_ABYSS = Autonomous Underwater Vehicle ABYSS; OBS = MOLA lander; Piezo = piezometer; DRG = chainbag dredge

Device Operation	Date and Time [UTC]	Gear	Latitude	Longitude	Comment
M198_1-1	09.02.2024 12:13	GDS	37° 32.333' N	015° 15.749' E	in the water
M198_1-1	09.02.2024 13:51	GDS	37° 32.334' N	015° 15.747' E	on deck
M198_1-2	09.02.2024 13:58	GDS	37° 32.337' N	015° 15.747' E	released
M198_1-2	16.02.2024 11:14	GDS	37° 32.057' N	015° 15.414' E	on deck
M198_1-3	09.02.2024 14:37	GDS	37° 32.232' N	015° 15.621' E	released
M198_1-3	21.02.2024 15:17	GDS	37° 35.719' N	015° 17.896' E	information
M198_1-4	09.02.2024 15:28	GDS	37° 32.204' N	015° 15.700' E	released
M198_1-4	10.02.2024 07:12	GDS	37° 32.338' N	015° 15.812' E	in the water
M198_1-4	10.02.2024 08:12	GDS	37° 31.948' N	015° 15.690' E	on deck
M198_1-4	11.02.2024 06:28	GDS	37° 32.143' N	015° 16.254' E	in the water
M198_1-4	11.02.2024 06:49	GDS	37° 32.130' N	015° 16.205' E	on deck
M198_1-4	11.02.2024 18:12	GDS	37° 32.066' N	015° 15.994' E	in the water
M198_1-4	11.02.2024 18:31	GDS	37° 32.068' N	015° 15.990' E	on deck
M198_1-4	21.02.2024 15:18	GDS	37° 35.752' N	015° 17.878' E	information
M198_1-5	09.02.2024 17:00	CTD	37° 32.220' N	015° 15.620' E	in the water
M198_1-5	09.02.2024 17:25	CTD	37° 32.219' N	015° 15.620' E	max depth/on ground
M198_1-5	09.02.2024 17:47	CTD	37° 32.219' N	015° 15.621' E	on deck
M198_2-1	10.02.2024 06:42	GDS	37° 32.328' N	015° 15.835' E	in the water
M198_2-1	10.02.2024 07:00	GDS	37° 32.329' N	015° 15.834' E	on deck
M198_3-1	10.02.2024 15:49	GC	37° 32.104' N	015° 15.949' E	in the water
M198_3-1	10.02.2024 16:23	GC	37° 32.097' N	015° 15.942' E	max depth/on ground
M198_3-1	10.02.2024 17:05	GC	37° 32.097' N	015° 15.937' E	on deck
M198_4-1	10.02.2024 18:27	AUV_ABYSS	37° 32.127' N	015° 19.413' E	in the water
M198_4-1	10.02.2024 19:01	AUV_ABYSS	37° 32.557' N	015° 19.855' E	in the water
M198_4-1	20.02.2024 17:08	AUV_ABYSS	37° 32.054' N	015° 19.301' E	information
M198_4-1	20.02.2024 19:54	AUV_ABYSS	37° 31.284' N	015° 18.323' E	on deck
M198_4-1	21.02.2024 13:34	AUV_ABYSS	37° 31.281' N	015° 19.770' E	information
M198_4-1	21.02.2024 14:16	AUV_ABYSS	37° 32.295' N	015° 19.691' E	on deck
M198_5-1	11.02.2024 03:11	CTD	37° 32.402' N	015° 15.510' E	in the water
M198_5-1	11.02.2024 04:30	CTD	37° 32.401' N	015° 15.510' E	on deck
M198_5-1	11.02.2024 04:33	CTD	37° 32.401' N	015° 15.510' E	in the water
M198_5-1	11.02.2024 06:01	CTD	37° 32.402' N	015° 15.502' E	on deck
M198_6-1	11.02.2024 14:39	AUV_ABYSS	37° 31.758' N	015° 20.029' E	in the water
M198_6-1	11.02.2024 14:54	AUV_ABYSS	37° 31.743' N	015° 19.983' E	information
M198_6-1	12.02.2024 06:52	AUV_ABYSS	37° 32.233' N	015° 19.928' E	information
M198_6-1	12.02.2024 07:06	AUV_ABYSS	37° 32.229' N	015° 19.985' E	on deck
M198_7-1	11.02.2024 16:48	GC	37° 32.076' N	015° 16.062' E	in the water
M198_7-1	11.02.2024 17:37	GC	37° 32.063' N	015° 15.993' E	max depth/on ground
M198_7-1	11.02.2024 18:06	GC	37° 32.065' N	015° 15.993' E	on deck
M198_8-1	11.02.2024 18:55	GC	37° 32.211' N	015° 15.710' E	in the water

M198_8-1	11.02.2024 19:28	GC	37° 32.219' N	015° 15.667' E	max depth/on ground
M198_8-1	11.02.2024 20:07	GC	37° 32.223' N	015° 15.658' E	on deck
M198_9-1	11.02.2024 20:53	OBS	37° 32.224' N	015° 16.680' E	in the water
M198_9-1	11.02.2024 22:03	OBS	37° 32.235' N	015° 17.260' E	on deck
M198_9-1	11.02.2024 22:06	OBS	37° 32.239' N	015° 17.287' E	in the water
M198_9-1	12.02.2024 00:05	OBS	37° 32.261' N	015° 17.513' E	on deck
M198_10-1	12.02.2024 01:11	OBS	37° 28.353' N	015° 20.527' E	information
M198_10-1	12.02.2024 01:32	OBS	37° 28.354' N	015° 20.528' E	information
M198_10-1	12.02.2024 01:46	OBS	37° 28.412' N	015° 20.415' E	on deck
M198_11-1	12.02.2024 03:11	OBS	37° 30.750' N	015° 31.542' E	in the water
M198_11-1	12.02.2024 03:17	OBS	37° 30.741' N	015° 31.471' E	on deck
M198_11-1	12.02.2024 03:17	OBS	37° 30.741' N	015° 31.471' E	information
M198_11-1	12.02.2024 04:06	OBS	37° 31.030' N	015° 31.561' E	on deck
M198_12-1	12.02.2024 14:28	Piezo	37° 32.110' N	015° 15.943' E	in the water
M198_12-1	12.02.2024 14:31	Piezo	37° 32.110' N	015° 15.943' E	in the water
M198_12-1	12.02.2024 15:05	Piezo	37° 32.128' N	015° 15.967' E	max depth/on ground
M198_12-1	12.02.2024 15:29	Piezo	37° 32.136' N	015° 15.942' E	on deck
M198_13-1	12.02.2024 15:48	Piezo	37° 32.217' N	015° 15.707' E	in the water
M198_13-1	12.02.2024 16:18	Piezo	37° 32.236' N	015° 15.732' E	max depth/on ground
M198_13-1	12.02.2024 16:47	Piezo	37° 32.236' N	015° 15.731' E	on deck
M198_14-1	12.02.2024 17:28	GC	37° 32.236' N	015° 15.732' E	in the water
M198_14-1	12.02.2024 17:53	GC	37° 32.237' N	015° 15.731' E	max depth/on ground
M198_14-1	12.02.2024 18:20	GC	37° 32.236' N	015° 15.731' E	on deck
M198_15-1	12.02.2024 19:45	AUV_ABYSS	37° 31.472' N	015° 19.981' E	in the water
M198_15-1	13.02.2024 08:59	AUV_ABYSS	37° 32.018' N	015° 20.182' E	on deck
M198_16-1	13.02.2024 00:10	OBS	37° 08.944' N	015° 34.455' E	information
M198_16-1	13.02.2024 00:38	OBS	37° 08.947' N	015° 34.456' E	information
M198_16-1	13.02.2024 00:57	OBS	37° 09.041' N	015° 34.238' E	on deck
M198_17-1	13.02.2024 10:44	Piezo	37° 32.105' N	015° 15.953' E	in the water
M198_17-1	13.02.2024 12:02	Piezo	37° 32.131' N	015° 15.926' E	max depth/on ground
M198_17-1	13.02.2024 12:02	Piezo	37° 32.131' N	015° 15.926' E	in the water
M198_17-1	13.02.2024 12:05	Piezo	37° 32.131' N	015° 15.926' E	information
M198_17-1	13.02.2024 12:31	Piezo	37° 32.131' N	015° 15.926' E	on deck
M198_18-1	13.02.2024 13:08	GC	37° 32.401' N	015° 15.084' E	in the water
M198_18-1	13.02.2024 13:34	GC	37° 32.426' N	015° 15.087' E	max depth/on ground
M198_18-1	13.02.2024 13:59	GC	37° 32.426' N	015° 15.088' E	on deck
M198_19-1	13.02.2024 14:38	GC	37° 32.341' N	015° 15.383' E	in the water
M198_19-1	13.02.2024 15:06	GC	37° 32.346' N	015° 15.392' E	max depth/on ground
M198_19-1	13.02.2024 15:31	GC	37° 32.347' N	015° 15.391' E	on deck
M198_20-1	13.02.2024 17:17	OBS	37° 31.381' N	015° 19.977' E	in the water
M198_20-1	13.02.2024 19:02	OBS	37° 31.381' N	015° 19.977' E	on deck
M198_20-1	13.02.2024 19:04	OBS	37° 31.381' N	015° 19.977' E	in the water
M198_20-1	13.02.2024 20:52	OBS	37° 31.382' N	015° 19.973' E	on deck
M198_21-1	14.02.2024 13:47	AUV_ABYSS	37° 31.852' N	015° 20.066' E	in the water
M198_21-1	15.02.2024 07:40	AUV_ABYSS	37° 32.208' N	015° 19.962' E	on deck
M198_22-1	14.02.2024 15:15	GC	37° 32.444' N	015° 15.130' E	in the water
M198_22-1	14.02.2024 16:32	GC	37° 32.486' N	015° 15.156' E	max depth/on ground
M198_22-1	14.02.2024 16:56	GC	37° 32.487' N	015° 15.156' E	on deck
M198_22-2	14.02.2024 17:38	OBS	37° 32.486' N	015° 15.157' E	in the water
M198_22-2	14.02.2024 17:56	OBS	37° 32.486' N	015° 15.158' E	max depth/on ground

M198_22-2	14.02.2024 20:36	OBS	37° 32.486' N	015° 15.157' E	on deck
M198_23-1	15.02.2024 16:59	AUV_ABYSS	37° 31.425' N	015° 20.023' E	in the water
M198_23-1	16.02.2024 05:53	AUV_ABYSS	37° 32.278' N	015° 19.732' E	on deck
M198_24-1	15.02.2024 18:23	OBS	37° 31.558' N	015° 16.100' E	in the water
M198_24-1	15.02.2024 21:37	OBS	37° 31.558' N	015° 16.101' E	max depth/on ground
M198_24-1	15.02.2024 22:11	OBS	37° 31.560' N	015° 16.099' E	on deck
M198_25-1	16.02.2024 12:07	DRG	37° 32.410' N	015° 13.245' E	in the water
M198_25-1	16.02.2024 12:24	DRG	37° 32.412' N	015° 13.248' E	max depth/on ground
M198_25-1	16.02.2024 12:49	DRG	37° 32.748' N	015° 13.339' E	hoisting
M198_25-1	16.02.2024 13:36	DRG	37° 32.754' N	015° 13.342' E	information
M198_25-1	16.02.2024 13:51	DRG	37° 32.648' N	015° 13.314' E	on deck
M198_26-1	16.02.2024 15:00	DRG	37° 32.649' N	015° 13.309' E	in the water
M198_26-1	16.02.2024 15:16	DRG	37° 32.652' N	015° 13.311' E	max depth/on ground
M198_26-1	16.02.2024 15:28	DRG	37° 32.837' N	015° 13.358' E	max depth/on ground
M198_26-1	16.02.2024 15:30	DRG	37° 32.843' N	015° 13.360' E	hoisting
M198_26-1	16.02.2024 15:56	DRG	37° 32.843' N	015° 13.361' E	information
M198_26-1	16.02.2024 16:25	DRG	37° 32.777' N	015° 13.444' E	on deck
M198_27-1	16.02.2024 17:39	OBS	37° 32.480' N	015° 15.464' E	in the water
M198_27-1	16.02.2024 20:36	OBS	37° 32.560' N	015° 15.408' E	on deck
M198_27-1	16.02.2024 20:42	OBS	37° 32.552' N	015° 15.414' E	in the water
M198_27-1	16.02.2024 21:55	OBS	37° 32.510' N	015° 15.444' E	max depth/on ground
M198_27-1	16.02.2024 22:34	OBS	37° 32.495' N	015° 15.454' E	on deck
M198_28-1	17.02.2024 15:33	AUV_ABYSS	37° 32.036' N	015° 19.882' E	in the water
M198_28-1	18.02.2024 07:50	AUV_ABYSS	37° 38.154' N	015° 17.592' E	on deck
M198_29-1	17.02.2024 17:15	DRG	37° 39.620' N	015° 19.237' E	in the water
M198_29-1	17.02.2024 17:37	DRG	37° 39.611' N	015° 19.260' E	max depth/on ground
M198_29-1	17.02.2024 17:56	DRG	37° 39.569' N	015° 18.930' E	max depth/on ground
M198_29-1	17.02.2024 17:57	DRG	37° 39.569' N	015° 18.928' E	hoisting
M198_29-1	17.02.2024 18:31	DRG	37° 39.568' N	015° 18.926' E	information
M198_29-1	17.02.2024 18:51	DRG	37° 39.571' N	015° 18.995' E	on deck
M198_30-1	17.02.2024 19:20	DRG	37° 39.575' N	015° 19.001' E	in the water
M198_30-1	17.02.2024 20:04	DRG	37° 39.518' N	015° 18.671' E	max depth/on ground
M198_30-1	17.02.2024 20:54	DRG	37° 39.515' N	015° 18.667' E	information
M198_30-1	17.02.2024 21:20	DRG	37° 39.536' N	015° 18.650' E	on deck
M198_31-1	18.02.2024 17:25	AUV_ABYSS	37° 31.712' N	015° 20.044' E	in the water
M198_31-1	19.02.2024 03:45	AUV_ABYSS	37° 31.920' N	015° 19.836' E	on deck
M198_32-1	18.02.2024 18:55	DRG	37° 32.781' N	015° 13.312' E	in the water
M198_32-1	18.02.2024 19:27	DRG	37° 32.958' N	015° 13.364' E	max depth/on ground
M198_32-1	18.02.2024 19:28	DRG	37° 32.958' N	015° 13.364' E	information
M198_32-1	18.02.2024 19:51	DRG	37° 32.957' N	015° 13.363' E	information
M198_32-1	18.02.2024 20:05	DRG	37° 32.941' N	015° 13.401' E	on deck
M198_33-1	18.02.2024 21:37	DRG	37° 41.104' N	015° 18.908' E	in the water
M198_33-1	18.02.2024 21:57	DRG	37° 41.107' N	015° 18.918' E	max depth/on ground
M198_33-1	18.02.2024 22:24	DRG	37° 41.286' N	015° 18.627' E	hoisting
M198_33-1	18.02.2024 23:00	DRG	37° 41.290' N	015° 18.625' E	information
M198_33-1	18.02.2024 23:19	DRG	37° 41.300' N	015° 18.596' E	on deck
M198_34-1	19.02.2024 05:42	OBS	37° 44.007' N	015° 15.717' E	in the water
M198_34-1	19.02.2024 09:29	OBS	37° 44.144' N	015° 15.732' E	on deck
M198_34-2	19.02.2024 06:02	OBS	37° 43.965' N	015° 15.802' E	in the water
M198_34-2	19.02.2024 09:30	OBS	37° 44.144' N	015° 15.731' E	on deck

M198_34-3	19.02.2024 06:23	OBS	37° 44.111' N	015° 15.812' E	in the water
M198_34-3	19.02.2024 09:30	OBS	37° 44.144' N	015° 15.731' E	on deck
M198_35-1	19.02.2024 12:25	Piezo	37° 32.200' N	015° 15.687' E	in the water
M198_35-1	19.02.2024 13:34	Piezo	37° 32.203' N	015° 15.684' E	max depth/on ground
M198_35-1	19.02.2024 13:34	Piezo	37° 32.203' N	015° 15.684' E	in the water
M198_35-1	19.02.2024 13:42	Piezo	37° 32.203' N	015° 15.687' E	information
M198_35-1	19.02.2024 14:13	Piezo	37° 32.182' N	015° 15.647' E	on deck
M198_36-1	19.02.2024 14:42	GC	37° 32.094' N	015° 15.965' E	in the water
M198_36-1	19.02.2024 15:14	GC	37° 32.101' N	015° 15.992' E	max depth/on ground
M198_36-1	19.02.2024 15:41	GC	37° 32.097' N	015° 16.014' E	on deck
M198_37-1	19.02.2024 18:46	AUV_ABYSS	37° 31.748' N	015° 19.965' E	in the water
M198_37-1	20.02.2024 16:41	AUV_ABYSS	37° 32.029' N	015° 19.770' E	on deck
M198_38-1	19.02.2024 22:24	OBS	37° 30.469' N	015° 53.399' E	in the water
M198_38-1	19.02.2024 23:05	OBS	37° 30.506' N	015° 53.393' E	information
M198_38-1	19.02.2024 23:19	OBS	37° 30.579' N	015° 53.400' E	on deck
M198_39-1	20.02.2024 02:26	OBS	37° 44.084' N	015° 29.120' E	information
M198_39-1	20.02.2024 02:48	OBS	37° 44.074' N	015° 29.101' E	information
M198_39-1	20.02.2024 03:01	OBS	37° 44.085' N	015° 29.244' E	on deck
M198_40-1	21.02.2024 15:52	OBS	37° 40.101' N	015° 15.961' E	in the water
M198_40-1	21.02.2024 17:33	OBS	37° 40.103' N	015° 15.962' E	max depth/on ground
M198_40-1	21.02.2024 18:28	OBS	37° 40.103' N	015° 15.962' E	on deck