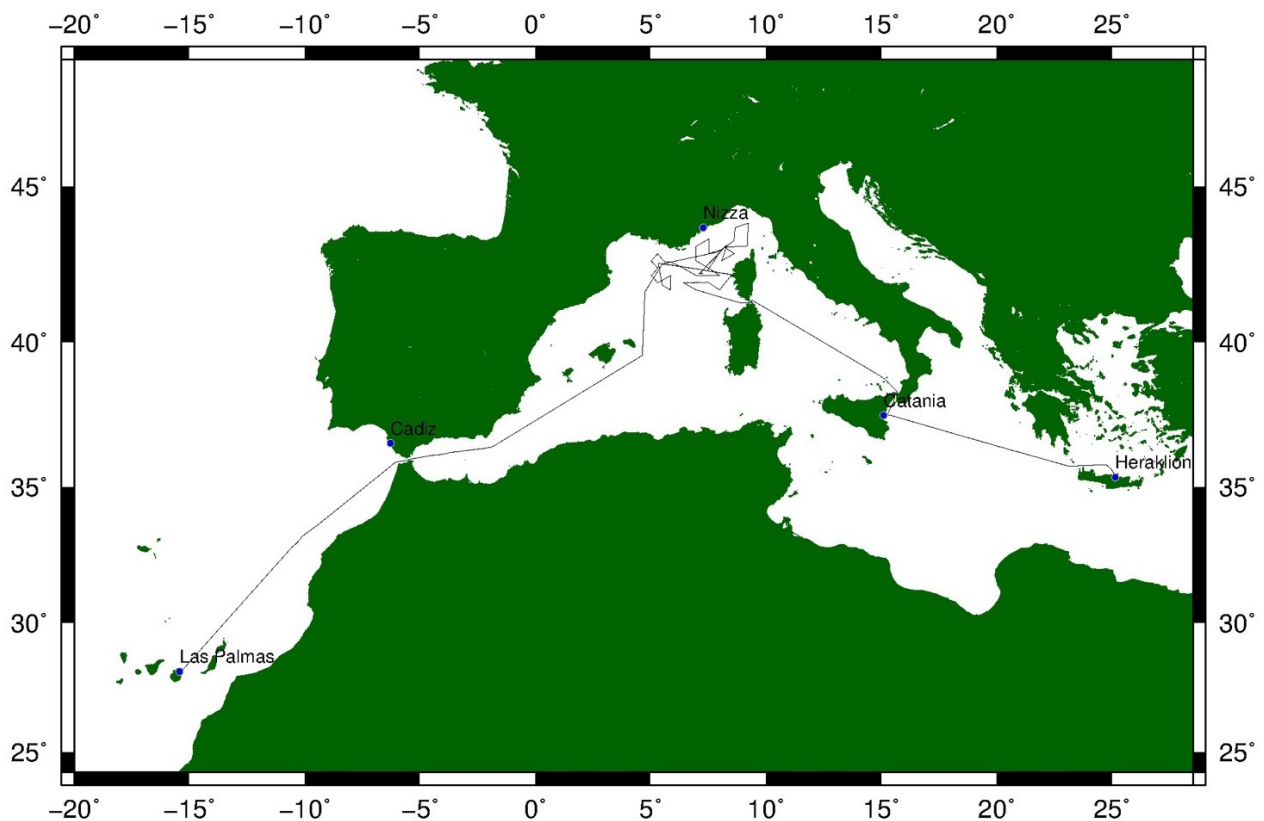


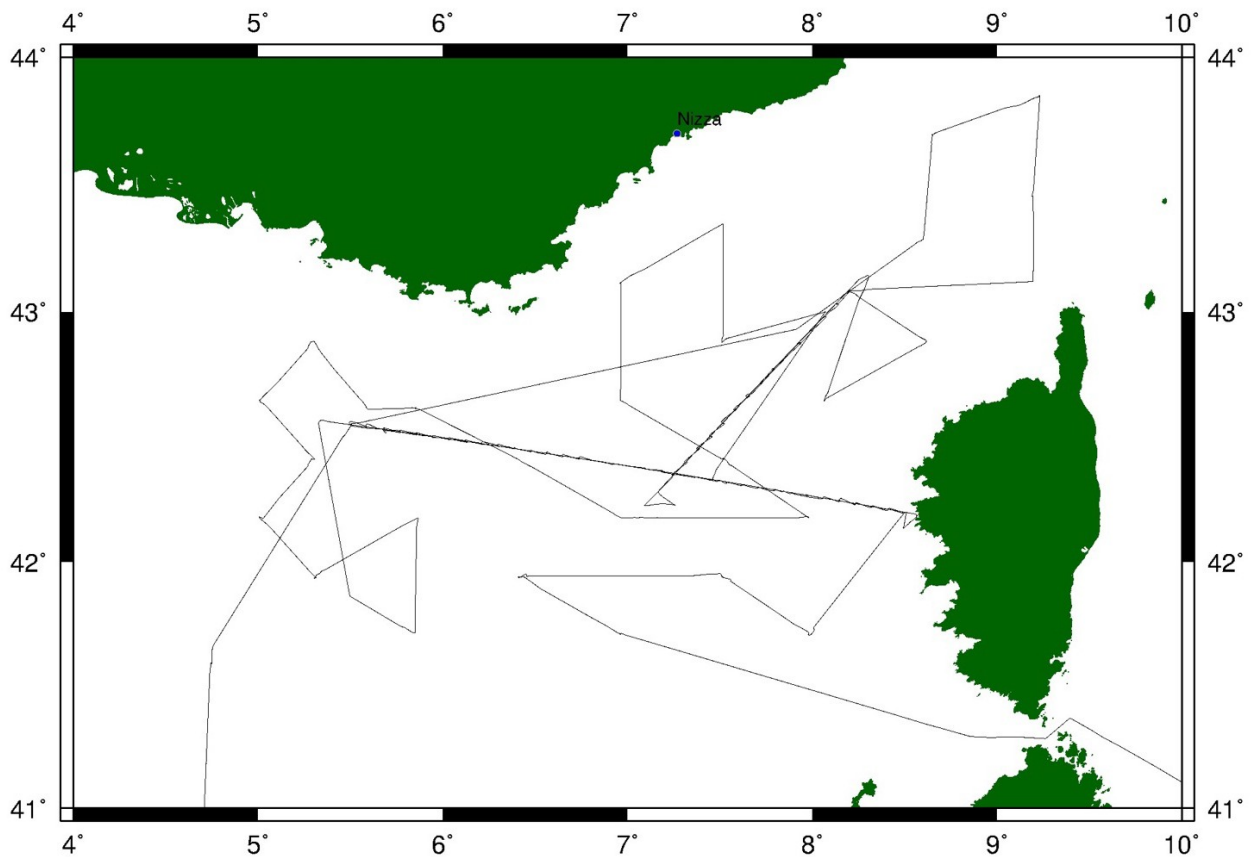
Heidrun Kopp
GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel
Wischhofstr. 1-3
24148 Kiel

Tel: +49-431-600-2334
Fax: +49-431-600-2922
Email: hkopp@geomar.de

Short Cruise Report
RV Maria S. Merian Cruise MSM71

Las Palmas de Gran Canaria - Heraklion
07. February 2018 – 27. February 2018
Chief Scientist: Heidrun Kopp
Captain: Ralf Schmidt





Objectives

The aim of cruise MSM-71 LOBSTER (**L**igurian **O**cean **B**ottom **S**eismology and **T**ectonics **R**esearch) is twofold: 1) to conduct a detailed amphibious seismic refraction survey of the Ligurian basin transition from the oceanic to the continental domain, and 2) to recover a network of French/German ocean bottom seismometers (OBS) in the framework of AlpArray and the German SPP 2017 'Mountain Building Processes in 4D' (<http://www.spp-mountainbuilding.de/>) (Fig. 1). Alp Array is a European initiative with the aim to deploy several hundred closely spaced broadband seismometers that cover the entire Alpine orogen to provide state-of-the-art imaging of subsurface structures. The offshore component of AlpArray involves the deployment of 29 broadband stations from France/Germany in the Ligurian Sea. This deployment took place in June 2017 using the French RV *PourquoiPas?* as platform. In order to share ship-related costs between the two nations, recovery was conducted using RV *Maria S. Merian* during cruise MSM71. OBS recordings of teleseismic events are essential to define subsurface structures at the transition from the Western Alps to the Apennines and improve our understanding of the 3D-geometry of the system and its kinematics. In addition, the two active wide-angle transects of 270 km (147 nm) and 136 km (73 nm) aim to unravel the upper structure of the Ligurian Basin at crustal scale resolution.

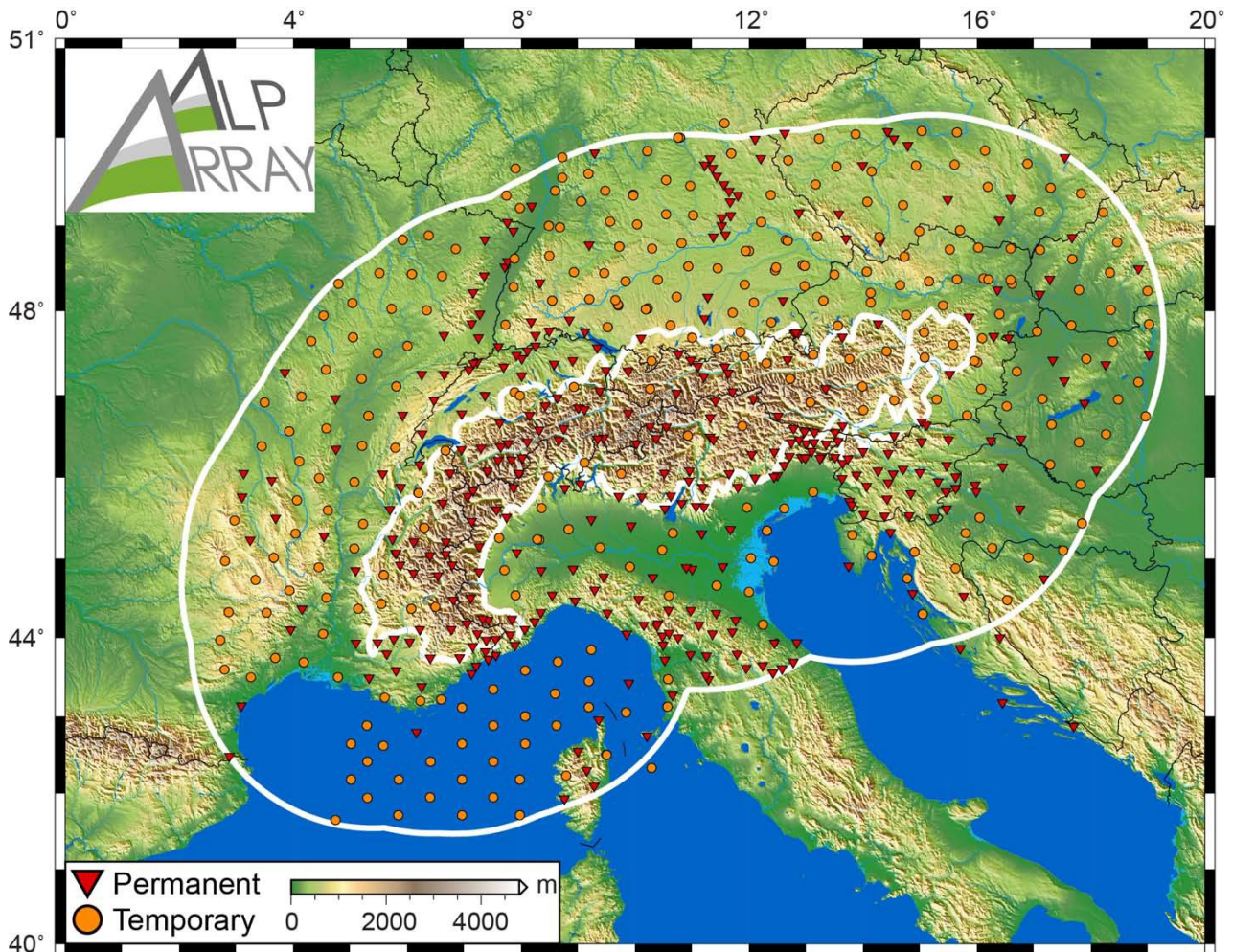


Figure 1: Map of the station distribution achieved in the framework of AlpArray (as of February 2018).

From: <http://www.alparray.ethz.ch/en/home/>.

Narrative

Cruise MSM 71 commenced in Las Palmas de Gran Canaria, Spain, on Feb 7, 2018, where 21 scientists from France, Germany, the Netherlands and China embarked on RV Maria s Merian. The vessel left port at 16:30h local time with some hours delay after a last provisions container was loaded to start on the transit north towards the Strait of Gibraltar. The previous days in port as well as the transit were used to prepare our equipment, in particular to set up the air guns, the streamer and the short period ocean bottom hydrophones and ocean bottom seismometers. After five days of transit we arrived at the first OBS site on Feb 12, 2018 at 09:00h to release the first station of the broadband OBS AlpArray network (OBS A412A), which is positioned at the southwestern extremity of the working area at 41°38,85'N/04°44,69'E (Fig. 4.1). The instrument had been continuously recording since June 2017. We continued on a short transit north to the NW starting point of the 147 nm long refraction line P01 at 42°33,00'N/05°30,00'E. During this time, weather conditions deteriorated and we could only deploy two short-period stations before wind conditions of up to 11 Bft forced us to wait for calmer conditions. An XSV probe was launched at 42°32,44'N/05°35,33'E, reaching a depth of 1956 m. We re-commenced OBS deployment after a two hour break, when conditions had calmed to around 8 Bft. The deployment of a total of 35 short period stations at 4 nm spacing was completed at 13:45h on Feb 13 at 42°12,00'N/08°30,00'E. Simultaneously, colleagues from IDPA-CNR of Milan installed three land seismometers on the western portion of the island of Corsica to record our air gun shots. Marine mammal mitigation procedures were initiated prior to shooting. Shooting of

profile P01 commenced at 15:15h with two G-gun arrays of 84 l total towed on the starboard and portside of RV Maria s Merian. A 280 m long geo-eel streamer was deployed along the profile and recovered after we passed the last seafloor station. The vessel then turned on to a 45 nm long southward profile to shoot into the AlpArray broadband seismometer network. The turn was used for maintenance of both air gun arrays. Shooting was terminated on Feb 15 at 09:00h at 41°54,16'N/05°29,24'E.

This was followed by the recovery of five broadband OBS from the AlpArray network located in the southwestern part of the study area (A421A, A414A, A413A, A404A, A405A; all recovered between 10:45h and 22:20h on Feb 15, 2018). Recovery was continued the next day (A401A, A402A, A406A, A415, A423A, A430, A424A). During recovery, it was noticed that the radio beacon and flash light as well as the flag on the DEPAS and GEOMAR stations did not protrude from the water as the instrument ascended horizontally and due to insufficient weight did not turn into the vertical. Consequently, the radio beacon and flash light could not function and did not send any signals. We thus had to rely on a visual location of the instruments, at night aided by the ice flood lights of RV Maria s Merian. As the weather conditions were optimal and the sea very still during recovery, we could also locate the instruments on the ship's ice radar. Despite our efforts, one station could not be recovered (A406A) as it could not be located on the surface.

French military operations made it necessary to schedule the recovery of stations A416A, A408A, A409A and A417A for Feb 17, as the maritime area where these stations are installed was to be closed to ship traffic afterwards. We thus continued recovery operations in this area. However, station A408A did not respond to the release or range signal and could not be recovered. We next headed towards OBS A418A, which was safely recovered before heading south to start recovery along the refraction profile at 21:30h, Feb 17. Due to scheduling issues we recovered stations along the western part of the profile first, starting with OBS 113 towards OBH 135. OBH 134 responded to our release signal, but due to technical failure could not turn the hook to release the anchor. Recovery along profile P01 was terminated at 17:00h on Feb 18, before we had to leave the area by Feb 19, 07:00h due to military operations. As we could also not access the broadband stations located to the south of profile P01 due to closure of the maritime region, we subsequently headed north and on Feb 19 at 05:00h arrived at station OBS A419A, which was safely recovered.

Subsequent stations A411A, A434A and A420A were all located in Italian waters and safely recovered before we headed for station A427A, which was situated in French territory. All stations were safely recovered during daylight hours of Feb 19, 2018. We then continued to deploy a total of 15 sea floor stations (12 OBS and 3 OBH) along the second refraction profile P02, which starts at 43°05.07'N / 08°11.82'E and trends in a NE-SW direction covering the central part of the Ligurian Basin to the crossing point with profile P01 at 42°21.00'N / 07°15.00'E. Mammal and turtle mitigation procedures preceded the deployment of the air gun arrays and the streamer, before shooting commenced at 07:30h on Feb 20, 2018 and lasted until 01:45h on Feb 21, 2018. Prior to recovery of the stations on profile P02 we collected station A425A and A426A located east of profile P02 during the morning of Feb 21, 2018. A second XSV probe was launched at 42°52.80'N/08°37,29'E. Instrument recovery on P02 was finished at 01:15h on Feb 22, 2018 and we continued with the recovery of the remaining stations on the eastern portion of P01 (OBS112-OBS101), which was achieved by 12h on Feb 22, 2018. The final four stations of the AlpArray network (A429A, A422A, A428A, A313A) were recovered on Feb 22 starting at 16:00h until Feb 23 at 07:15h.

On Feb 23, 2018 at 14:30h RV Maria s Merian commenced the passage through the Strait of Bonifacio to begin our transit towards the port of Heraklion/Crete. During transit, we passed the Strait of Messina on Feb. 24, 2018 and stopped at a seafloor geodesy array (GeoSEA) offshore Catania, Sicily, located at 37°32,39'N/15°15,53'E to test the newly installed SONARDYNE Ranger system on RV Maria s Merian, as the GeoSEA array uses SONARDYNE acoustic transponders for telemetry measurements on the flank of Mt Etna.

During the short stop of RV Maria s Merian we could verify that all stations are up and running, before we commenced our final transit to Heraklion at 05:00h on Feb. 25, 2018.

RV Maria s Merian safely reached the pilot station at Heraklion harbor on Feb 27 at 08:00h and berthed at 08:30h, terminating cruise MSM 71 (Fig. 4.2). Weather conditions were very variable during the cruise, with stormy phases (11 Bft) and intermittent calm seas.

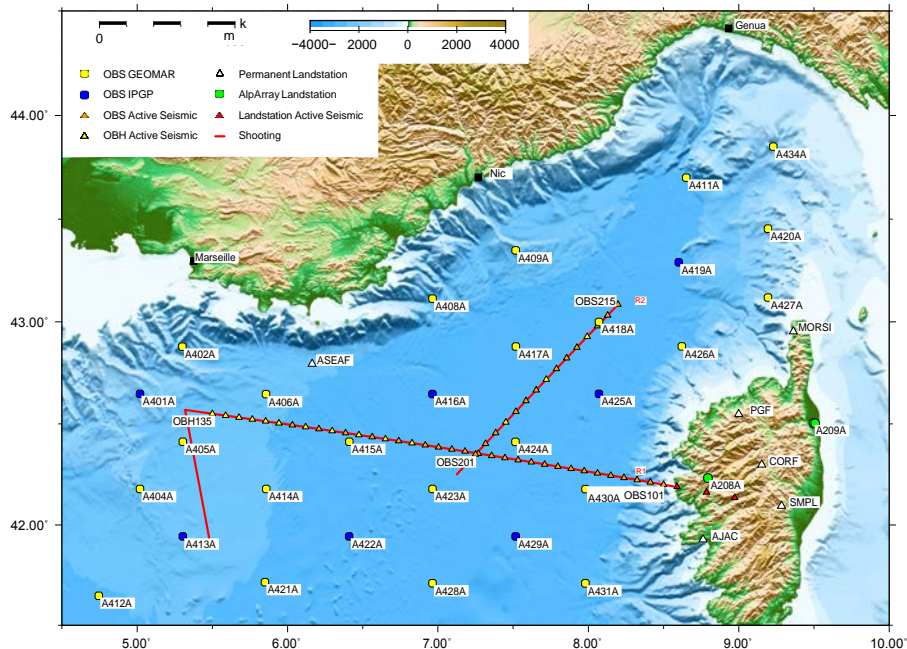


Figure 2: Station and profile distribution in the Ligurian Sea. Two refraction/reflection profiles were acquired with 35 and 15 stations, respectively. In addition, shooting along profile P01 was extended to the SE in order for the long-term AlpArray OBS to record the shots.

Acknowledgements

We like to thank Captain Ralf Schmidt, his officers and the crew of R/V Maria S. Merian for their support of our measurement programme and for creating a very friendly atmosphere on board. Their professional assistance at sea is kindly acknowledged.

The ship time of R/V Maria S. Merian was provided by the Deutsche Forschungsgemeinschaft DFG. We gratefully acknowledge the support.

Teilnehmerliste

Name		Institution
1. Prof. Dr. Heidrun Kopp	Chief Scientist	GEOMAR
2. Dr. Dietrich Lange	Co-Chief Scientist	GEOMAR
3. Prof. Dr. Anne Paul	Geology	Univ. Grenoble
4. Dr. Anke Dannowski	OBS	GEOMAR
5. Dr. Martin Thorwart	Seismology	CAU
6. Florian Petersen	OBS	GEOMAR
7. Felix Wolf	Seismics	GEOMAR
8. Yueyang Xia	Seismics	GEOMAR
9. Kevin Marquardt	Seismics	CAU
10. Andreas Brotzer	Seismics	KIT
11. Carsten Lehmann	Seismics	GEOMAR
12. Morlin Neckel	Seismics	CAU
13. Leonie Papanagnou	Seismics	CAU
14. Bettina Schramm	Seismology	GEOMAR
15. Coralie Aubert	Seismology	Univ.Grenoble
16. Simon Besancon	Technician	IPGP
17. Dr. Martha Deen	Seismology	IPGP
18. Dr. Anouk Beniest	Seismology	UPMC
19. Klaus-Peter Steffen	Technician	GEOMAR
20. Florian Beek	Technician	GEOMAR
21. Patrick Schröder	Technician	GEOMAR

CAU

Christian-Albrechts Universität zu Kiel
Christian-Albrechts-Platz 4
24118 Kiel, Germany

GEOMAR

Helmholtz-Zentrum für
Ozeanforschung Kiel
Wischhofstr. 1-3
24148 Kiel, Germany

IPGP

Laboratoire de Géosciences Marines
Institut de Physique du Globe de Paris
4 Place Jussieu
75252 Paris Cedex 5

ISTerre

Institut des Sciences de la Terre
Université Grenoble Alpes
CS 40700
38058 GRENOBLE Cedex 9, France

KIT

Karlsruher Institut für Technologie
Geophysikalisches Institut (GPI)
Hertzstrasse 16
76187 Karlsruhe, Germany

UPMC

Université Pierre et Marie Curie
Institut des Sciences de la Terre
(ISTeP) 4 Place Jussieu
75252 Paris – CEDEX 5, France

	INST.	LAT (N)	LON (E)	DEPLOY.	RECOV.	RECOV.	DEPTH	RELEASER CODE	ENABLE CODE	TIME RELEASE	ANT.	FREQ	RECORDER	REC.	CYLIND.	SKEW	SENSORS	Hydrophone	
		D:M	D:M	DATE	DATE	TIME				UTC		MHz	NO.	NO.	NO.	(ms)			
DEPAS	1	A402A	42° 52.76	5° 18.03	20.06.17	16.02.18	02:29:00	1632	644421	656454	01.10.2018 09:00	C	160,725	6D6	61607097	87		Trillium 000155	984007
	2	A404A	42° 10.695	5° 01.156	20.06.17	15.02.18	18:29:00	2013	534037	516253	01.10.2018 10:30	C	160,725	6D6	61607095	80		Trillium 000141	984003
	3	A405A	42° 24.694	5° 18.219	16.06.17	15.02.18	21:34:00	2192	231104	213614	01.10.2018 13:00	C	160,725	6D6	61607086	Trim		Trillium 000151	700049
	4	A406A	42° 38.8	5° 51.4	22.06.17	-	-	2399	534224	516742	01.10.2018 08:30	B	159,480	6D6	61607098	78		Trillium 1608-218	583004
	5	A408A	43° 6.805	6° 57.820	18.06.17	-	-	2249	650727	670435	01.10.2018 19:00	C	160,725	6D6	61607096	Teiran		Trillium 000142	312180
	6	A409A	43° 20.891	7° 31.003	18.06.17	17.02.18	09:40:00	1981	650761	670544	01.10.2018 12:30	D	160,785	6D6	61607093	Till		Trillium 000139	700043
	7	A411A	43° 42.023	8° 39.070	19.06.17	19.02.18	08:01:00	2550	534123	516517	01.10.2018 16:30	A	159,585	MTS	050818	69		Güralp T4N61	-
	8	A412A	41° 38.855	4° 44.690	16.06.17	12.02.18	08:42:00	2519	231203	214047	01.10.2018 13:30	B	159,480	6D6	61607085	0912-139		Trillium 000152	700065
	9	A414A	42° 10.696	5° 51.499	15.06.17	15.02.18	12:46:00	2463	334750	336502	01.10.2018 14:30	D	160,785	6D6	61607088			Trillium 000122	700054
	10	A415A	42° 24.714	6° 24.656	15.06.17	16.02.18	12:37:00	2595	334735	336450	01.10.2018 15:00	C	160,725	6D6	61607087	Trubert		Trillium 000146	700047
	11	A417A	42° 52.777	7° 31.069	17.06.17	17.02.18	12:24:00	2677	445036	462304	01.10.2018 18:30	D	160,785	6D6	61607092	Tedrich		Trillium 000158	700053
	12	A418A	42° 59.995	8° 04.254	19.06.17	17.02.18	15:05:00	2632	533770	516131	01.10.2018 17:30	B	159,480	6D6	61607099	79		Trillium 000156	984004
	13	A420A	43° 27.224	9° 11.729	24.06.17	19.02.19	13:42:00	1354	534165	516633	01.10.2018 11:30	A	159,585	6D6	61607100	40		Trillium 000157	31201902
	14	A421A	41° 42.918	5° 50.998	17.06.17	15.02.18	09:59:00	2525	445717	464353	01.10.2018 14:00	B	159,480	6D6	63667089	Tarik		Trillium 000154	700042
	15	A423A	42° 10.704	6° 57.843	18.06.17	16.02.18	15:38:00	2706	430462	412606	01.10.2018 19:30	D	160,785	6D6	61607094	0912-137		Trillium 000144	700050
	16	A424A	42° 24.669	7° 30.920	18.06.17	16.02.18	22:34:00	2746	533736	516006	01.10.2018 08:00	D	160,785	MTS	050814	25		Güralp T4N26	-
	17	A426A	42° 52.805	8° 37.289	19.06.17	21.02.18	07:57:00	2564	533664	515660	01.10.2018 09:30	A	159,585	MTS	050808	6		Güralp T4N25	-
	18	A427A	43° 07.139	9° 11.680	19.06.17	19.02.18	15:53:00	1357	534071	516364	01.10.2018 10:00	C	160,725	MTS	050812	39		Güralp T4R07	-
	19	A428A	41° 42.614	6° 57.833	17.06.17	23.02.18	05:36:00	2734	446460	466147	01.10.2018 12:00	D	160,785	6D6	61607090	0912-138		Trillium 000143	700048
	20	A430A	42° 10.674	7° 58.855	17.06.17	16.02.18	19:51:00	2752	231056	213462	01.10.2018 20:00	D	160,785	6D6	61607091	Tohbert		Trillium 000138	700045
	21	A431A	41° 42.58	7° 58.831	17.06.17	22.02.18	14:16:00	2666	334773	336544	01.10.2018 15:30	C	160,725	MCS	060740	Tabby		Güralp 1205-005	700044
	22	A434A	43° 51.019	9° 13.792	24.06.17	19.02.18	11:14:00	1133	451241	471533	01.10.2018 17:00	D	160,785	6D6	61607067	34		Trillium 000153	984002
IPGP	1	A401A	42° 38.828	5° 01.145	21.06.17	16.02.18	00:01:00	1613.5				C	160,725	SIO				Trillium 240	
	2	A413A	41° 56.583	5° 18.213	22.06.17	15.02.18	15:41:00	2278				C	160,725	SIO				Trillium 240	
	3	A416A	42° 38.805	6° 57.807	25.06.17	17.02.18	01:54:00	2757				C	160,725	SIO				Trillium 240	
	4	A419A	43° 17.426	8° 36.053	23.06.17	19.02.18	04:08:00	2588				C	160,725	SIO				Trillium 240	
	5	A422A	41° 56.602	6° 24.607	22.06.17	23.02.18	00:15:00	2542.8				C	160,725	SIO				Trillium 240	
	6	A425A	42° 38.828	8° 4.218	23.06.17	21.01.18	03:40:00	2713				C	160,725	SIO				Trillium 240	
	7	A429A	41° 56.608	7° 31.004	23.06.17	22.02.18	17:09:00	2773				C	160,725	SIO				Trillium 240	

OBS-Deployment

MSM71 - LOBSTER - Februar 2018

Profile R1

Station	Latitude	Longitude	Depth	Ch.	Freq./MHz	Release	Enable	Disable	Deployment date/time	Release date/time	Recorder	Hydrophone	Geophone
OBH135	42.54928	N 5.50022	E 2257	C	160.725	431606	415711	415732	12.02.2018 16:19:00	23.02.2018 11:00	Geolog-014	HTI-43	
OBH134	42.54078	N 5.58887	E 2285	C	160.725	647077	664247	664264	12.02.2018 17:06:00	23.02.2018 11:20	Geolog-019	HTI-28	
OBH133	42.53160	N 5.67735	E 2366	B	159.480	450253	467130	467155	12.02.2018 19:03:00	23.02.2018 11:40	Geolog-001	OAS-46	
OBH132	42.52178	N 5.76640	E 2404	no antenna		427524	410310	410333	12.02.2018 19:55:00	23.02.2018 12:00	Geolog-003	HTI-37	
OBH131	42.51232	N 5.85482	E 2467	A	154.585	447756	466147	466164	12.02.2018 20:41:00	23.02.2018 12:20	Geolog-009	HTI-302	
OBH130	42.50517	N 5.94357	E 2492	D	160.785	133525	117432	117457	12.02.2018 21:23:00	23.02.2018 12:40	Geolog-002	HTI-81	
OBS129	42.49385	N 6.03187	E 2523	A	154.585	134071	120527	120542	12.02.2018 22:05:00	23.02.2018 13:00	Geolog-022	HTI-11	
OBH128	42.48410	N 6.12065	E 2531	D	160.785	646574	663316	663335	12.02.2018 22:44:00	23.02.2018 13:20	Geolog-004	HTI-113	
OBS127	42.47464	N 6.20923	E 2553	B	159.480	433477	417644	417667	12.02.2018 23:17:00	23.02.2018 13:40	Geolog-013	OAS-26	1001-113
OBH126	42.46477	N 6.29753	E 2560	A	154.585	451146	471277	471306	12.02.2018 23:57:00	23.02.2018 14:00	Geolog-021	HTI-32	
OBS125	42.45512	N 6.38588	E 2587	D	160.785	450215	467007	467024	13.02.2018 0:30:00	23.02.2018 14:20	Geolog-017	OAS-44	Owen-0509-072
OBH124	42.44513	N 6.47473	E 2594	B	159.480	433622	420225	420263	13.02.2018 1:00:00	23.02.2018 14:40	Geolog-016	HTI-102	
OBS123	42.43587	N 6.56285	E 2622	D	160.785	647031	664125	664140	13.02.2018 1:31:00	23.02.2018 15:00	Geolog-012	OAS-27	Owen-0205-026
OBH122	42.42537	N 6.65112	E 2631	C	160.725	430135	411537	411552	13.02.2018 2:06:00	23.02.2018 15:20	Geolog-008	HTI-119	
OBS121	42.41525	N 6.73960	E 2915	D	160.785	451207	471707	471427	13.02.2018 2:39:00	23.02.2018 15:40	Geolog-010	OAS-11	0309-046
OBH120	42.40502	N 6.82765	E 2660	C	160.725	427623	410540	410563	13.02.2018 3:17:00	23.02.2018 16:00	Geolog-020	HTI-26	
OBS119	42.39520	N 6.91582	E 2668	D	160.785	435610	440126	440143	13.02.2018 3:48:00	23.02.2018 16:40	Geolog-011	HTI-58	Owen-0708-101
OBS118	42.38452	N 7.00412	E 2675	B	159.480	133770	120263	120312	13.02.2018 4:20:00	23.02.2018 17:00	Geolog-005	HTI-90	Owen-0807-102
OBS117	42.37448	N 7.09180	E 2708	D	160.785	647125	664370	664417	13.02.2018 4:54:00	23.02.2018 17:20	Geolog-015	HTI-73	Owen-0708-099
OBS116	42.36363	N 7.18095	E 2709	B	159.480	433166	416704	416727	13.02.2018 5:27:00	23.02.2018 17:40	Geolog-018	HTI-984005	Owen-1205-126
OBS115	42.35328	N 7.26853	E 2724	A	154.585	447503	465324	465341	13.02.2018 5:58:00	23.02.2018 18:00	6D6-61607128	HTI-39	Owen-0403-057
OBS114	42.34265	N 7.35702	E 2967	A	154.585	444674	461737	461752	13.02.2018 6:25:00	23.02.2018 18:20	?6D6-61067127	HTI-27	Owen-1001-119
OBS113	42.33203	N 7.44492	E 2973	D	160.785	427737	411005	411026	13.02.2018 6:54:00	23.02.2018 18:40	6D6-61607124	HTI-984006	Owen-0807-097
OBS112	42.32135	N 7.53290	E 2737	D	160.785	250177	237153	237170	13.02.2018 7:23:00	23.02.2018 19:00	6D6-61607126	HTI-33	Owen-1205-131
OBS111	42.31027	N 7.62143	E 2740	D	160.785	433227	417037	417052	13.02.2018 7:53:00	23.02.2018 19:20	6D6-61607123	HTI-47	Owen-0509-076
OBS110	42.30010	N 7.70892	E 2978	B	159.480	430424	412470	412501	13.02.2018 8:25:00	23.02.2018 19:40	6D6-61607122	HTI-84	Owen-0510-078
OBS109	42.28903	N 7.79737	E 2740	B	159.480	427260	407463	407512	13.02.2018 8:56:00	23.02.2018 20:00	6D6-61607125	HTI-68	Owen-1609-128
OBS108	42.27825	N 7.88498	E 2732	A	154.585	145331	160061	160110	13.02.2018 9:24:00	23.02.2018 20:20	6D6-61607118	HTI-53	Owen-0205-031
OBS107	42.26758	N 7.97237	E 2732	A	154.585	427430	410051	410072	13.02.2018 9:52:00	23.02.2018 20:40	6D6-61607117	HTI-984009	Owen-0403-054
OBS106	42.25620	N 8.06038	E 2726	D	160.785	442205	440755	440776	13.02.2018 10:23:00	23.02.2018 21:00	6D6-61607119	HTI-50	Owen-0307-210
OBS105	42.24513	N 8.14852	E 2714	B	159.480	433375	417411	417432	13.02.2018 10:51:00	23.02.2018 21:20	6D6-61607120	HTI-40	Owen-0701-086
OBS104	42.23415	N 8.23650	E 2654	C	160.725	450445	467632	467657	13.02.2018 11:21:00	23.02.2018 21:40	6D6-61607116	HTI-46	Owen-1205-132
OBS103	42.22280	N 8.32440	E 2500	no antenna		143272	141117	141134	13.02.2018 11:49:00	23.02.2018 22:00	6D6-61607115	HTI-111	Owen-1205-125
OBS102	42.21162	N 8.41232	E 1954	C	160.725	450742	470567	470605	13.02.2018 12:17:00	23.02.2018 22:20	6D6-61607114	HTI-67	Owen-1205-129
OBS101	42.20010	N 8.50030	E 609	no antenna		646532	663160	663202	13.02.2018 12:48:00	23.02.2018 22:40	6D6-61607113	HTI-48	Owen-1609-131

OBS-Deployment

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Profile R2

Station	Latitude	Longitude	Depth	Ch.	Freq./MHz	Release	Enable	Disable	Deployment date/time	Release date/time	Recorder	Hydrophone	Geophone
OBS201	42.35038 N	7.25015 E	2720	D	160.785	427737	411005	411026	20.02.2018 3:07:00	23.02.18 18:40	Geolog-014	HTI-43	Owen-0807-097
OBS202	42.40247 N	7.31748 E	2721	A	154.585	444674	461737	461752	20.02.2018 2:36:00	23.02.18 18:20	Geolog-004	???-102	Owen-1001-119
OBS203	42.45548 N	7.38443 E	2960	A	154.585	447503	465324	465341	20.02.2018 2:03:00	23.02.18 18:00	Geolog-003	HTI-37	Owen-0403-057
OBH204	42.50810 N	7.45120 E	2725	B	159.480	450253	467130	467155	20.02.2018 1:34:00	23.02.18 11:40	Geolog-002	HTI-81	
OBS205	42.56087 N	7.51852 E	2722	B	159.480	433166	416704	416727	20.02.2018 1:04:00	23.02.18 17:40	Geolog-018	HTI-984005	Owen-1205-126
OBS206	42.61358 N	7.58588 E	2715	D	160.785	647125	664370	664417	20.02.2018 0:32:00	23.02.18 17:20	Geolog-015	HTI-73	Owen-0708-099
OBS207	42.66598 N	7.65343 E	2707	B	159.480	133770	120263	120312	20.02.2018 0:01:00	23.02.18 17:00	Geolog-005	HTI-90	Owen-0807-102
OBH208	42.71828 N	7.72128 E	2700	C	160.725	447756	466147	466164	19.02.2018 23:30:00	23.02.18 12:20	Geolog-009	HTI-302	
OBS209	42.77118 N	7.78852 E	2693	A	154.585	134071	120527	120542	19.02.2018 22:56:00	23.02.18 13:00	Geolog-022	HTI-11	Owen-1001-117
OBS210	42.82350 N	7.85648 E	2683	D	160.785	435610	440126	440143	19.02.2018 22:26:00	23.02.18 16:40	Geolog-011	HTI-58	Owen-0708-101
OBS211	42.87587 N	7.92435 E	2670	D	160.785	451207	471404	471427	19.02.2018 21:55:00	23.02.18 15:40	Geolog-010	OAS-11	Owen-0309-046
OBH212	42.92810 N	7.99233 E	2647	D	160.785	133525	117432	117457	19.02.2018 21:21:00	23.02.18 12:40	Geolog-001	OAS-46	
OBS213	42.98022 N	8.06098 E	2627	D	160.785	647031	664125	664140	19.02.2018 20:50:00	23.02.18 15:00	Geolog-012	OAS-27	Owen-0209-026
OBS214	43.03245 N	8.12583 E	2606	D	160.785	450215	467007	467024	19.02.2018 20:19:00	23.02.18 14:20	Geolog-017	OAS-44	Owen-0509-072
OBS215	43.08417 N	8.19672 E	2586	B	159.480	433477	417644	417667	19.02.2018 19:45:00	23.02.18 13:40	Geolog-013	OAS-26	Owen-1001-113



Activity	Date / Time	Device	Action	Position	Position	Depth	Speed	Course	Wind	Wind	Winch	Comment	XSV	SEISOBR	SEISSRC	SEITR	P70	GDS	EM122	Gespult Draht	Gespult Draht	Gespult Draht	Gespult Draht
No.	No.	[UTC]		Lat	Lon	[m]	kn	kn	[°]	Veloc	m/s	m								Winde: EL1	Winde: EL2	Winde: SEW	Winde: ARW
MSM71_51-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 24,609' N	007° 31,114' E	0	0,5	295,1	190	4,3				1									
MSM71_52-1	#####	Seismic Ocean Bottom Receiver	released	42° 37,853' N	007° 00,146' E	0	0,4	248,3	59	6,9		A416A											
MSM71_52-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 38,672' N	006° 58,088' E	0	0	220,3	55	8,4													
MSM71_52-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 38,865' N	006° 57,706' E	0	0	203,1	59	9,2				1									
MSM71_53-1	#####	Seismic Ocean Bottom Receiver	released	43° 04,615' N	006° 57,863' E	0	0,1	236,9	76	15,2		A408A (keine Antwort)											
MSM71_53-1	#####	Seismic Ocean Bottom Receiver	information	43° 06,708' N	006° 57,403' E	0	0	150,2	96	13,2		Abbruch der Suche, keine											
MSM71_54-1	#####	Seismic Ocean Bottom Receiver	released	43° 19,807' N	007° 28,521' E	0	0,2	163,7	69	10,8		A409A											
MSM71_54-1	#####	Seismic Ocean Bottom Receiver	at surface	43° 20,741' N	007° 30,757' E	0	0	219,3	69	11,3													
MSM71_54-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	43° 20,804' N	007° 31,040' E	0	0,9	180,7	54	11,8				1									
MSM71_55-1	#####	Seismic Ocean Bottom Receiver	released	42° 54,703' N	007° 31,052' E	0	0,4	260,6	82	6,3		A417A											
MSM71_55-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 52,741' N	007° 30,726' E	0	0,1	338,6	190	4,2													
MSM71_55-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 52,966' N	007° 31,165' E	0	0,6	323,9	199	5,6				1									
MSM71_56-1	#####	Seismic Ocean Bottom Receiver	released	42° 59,471' N	008° 01,662' E	0	0,1	158,9	221	11,9		A418A											
MSM71_56-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 59,817' N	008° 04,097' E	0	0	310,4	215	13,1													
MSM71_56-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 59,979' N	008° 04,169' E	0	1,2	68,9	221	12,5				1									
MSM71_25-1	#####	Seismic Ocean Bottom Receiver	released	42° 22,046' N	007° 28,659' E	0	0,4	143,5	272	11,9													
MSM71_25-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 19,887' N	007° 27,087' E	0	0	2,1	266	10,4													
MSM71_25-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 19,608' N	007° 26,970' E	0	0,5	28,4	269	15,3				1									
MSM71_24-1	#####	Seismic Ocean Bottom Receiver	released	42° 19,607' N	007° 26,968' E	0	0,1	157,3	272	13,1													
MSM71_24-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 20,477' N	007° 21,839' E	0	0	355	283	20,6													
MSM71_24-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 20,323' N	007° 21,759' E	0	1,4	104,8	287	20,9				1									
MSM71_23-1	#####	Seismic Ocean Bottom Receiver	released	42° 20,301' N	007° 21,883' E	0	0,2	285,7	288	19													
MSM71_23-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 20,958' N	007° 16,559' E	0	1,2	265,9	291	24,4													
MSM71_23-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 20,975' N	007° 16,338' E	0	1,4	117,8	294	28,3				1									
MSM71_22-1	#####	Seismic Ocean Bottom Receiver	released	42° 20,956' N	007° 16,387' E	0	0,5	118,5	290	26,4													
MSM71_22-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 21,636' N	007° 11,221' E	0	0	184,3	296	28,8													
MSM71_22-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 21,931' N	007° 11,386' E	0	1,1	32,2	288	27,8				1									
MSM71_21-1	#####	Seismic Ocean Bottom Receiver	released	42° 21,948' N	007° 11,394' E	0	0,6	31,4	292	29,3		Keine Antwort											
MSM71_21-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 22,337' N	007° 05,695' E	0	0	293	283	29,5													
MSM71_21-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 22,582' N	007° 05,721' E	0	0,7	30,9	274	29,5				1									
MSM71_20-1	#####	Seismic Ocean Bottom Receiver	released	42° 22,588' N	007° 05,737' E	0	0,1	214	276	26		Keine Antwort											
MSM71_20-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 23,031' N	007° 00,660' E	0	0,6	322,8	284	32,7													
MSM71_20-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 23,066' N	007° 00,496' E	0	1,8	77,9	284	34,3				1									
MSM71_19-1	#####	Seismic Ocean Bottom Receiver	released	42° 23,085' N	007° 00,562' E	0	0	66,9	289	30		Keine Antwort											
MSM71_19-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 23,624' N	006° 55,366' E	0	0,1	313,1	295	34,6													
MSM71_19-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 23,463' N	006° 55,081' E	0	1,3	210,3	293	33,7				1									
MSM71_18-1	#####	Seismic Ocean Bottom Receiver	released	42° 23,442' N	006° 55,064' E	0	0,5	14,8	297	34,1		Keine Antwort											
MSM71_18-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 24,287' N	006° 50,020' E	0	0,4	47,4	299	37,9													
MSM71_18-1	#####	Seismic Ocean Bottom Receiver	OBH on deck	42° 24,256' N	006° 49,919' E	0	1,8	104,8	296	36,7				1									
MSM71_17-1	#####	Seismic Ocean Bottom Receiver	released	42° 24,319' N	006° 50,070' E	0	0,1	290,5	300	35,9													
MSM71_17-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 24,827' N	006° 45,187' E	0	8	280	302	34,5													
MSM71_17-1	#####	Seismic Ocean Bottom Receiver	information	42° 24,939' N	006° 44,613' E	0	1,2	62,2	301	37,2													
MSM71_16-1	#####	Seismic Ocean Bottom Receiver	released	42° 24,952' N	006° 44,633' E	0	0,3	36,8	301	30,8													
MSM71_16-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 25,392' N	006° 40,226' E	0	8,8	280,6	309	33,8													
MSM71_16-1	#####	Seismic Ocean Bottom Receiver	OBH on deck	42° 25,472' N	006° 39,270' E	0	0,7	58,1	306	34,5				1									
MSM71_15-1	#####	Seismic Ocean Bottom Receiver	released	42° 25,472' N	006° 39,297' E	0	0	301,5	304	35,2													
MSM71_15-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 26,034' N	006° 34,545' E	0	8,6	279,5	313	34,4													
MSM71_15-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 26,172' N	006° 33,957' E	0	0,2	74,6	302	33,2				1									
MSM71_14-1	#####	Seismic Ocean Bottom Receiver	released	42° 26,181' N	006° 33,976' E	0	0,3	334	306	34,1													
MSM71_14-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 26,569' N	006° 29,813' E	0	8,7	279	312	31,2													
MSM71_14-1	#####	Seismic Ocean Bottom Receiver	OBH on deck	42° 26,580' N	006° 28,610' E	0	0,4	215,6	309	29,2				1									
MSM71_13-1	#####	Seismic Ocean Bottom Receiver	released	42° 26,575' N	006° 28,613' E	0	0,3	115	307	30,4													
MSM71_13-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 27,200' N	006° 23,293' E	0	0,7	282,3	306	28,7													
MSM71_13-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 27,313' N	006° 23,388' E	0	1,4	125,3	319	28,2				1									
MSM71_12-1	#####	Seismic Ocean Bottom Receiver	released	42° 27,245' N	006° 23,396' E	0	1,6	138,2	316	30,5													
MSM71_12-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 27,781' N	006° 18,511' E	0	6	265,7	315	29,3													
MSM71_12-1	#####	Seismic Ocean Bottom Receiver	OBH on deck	42° 27,913' N	006° 17,918' E	0	0,4	234,9	320	28,3				1									
MSM71_11-1	#####	Seismic Ocean Bottom Receiver	released	42° 27,914' N	006° 17,918' E	0	0,5	89,3	314	29,7													
MSM71_11-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 28,338' N	006° 12,976' E	0	4	264,4	315	30,5													
MSM71_11-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 28,457' N	006° 12,649' E	0	0,7	169,8	318	31,8				1									
MSM71_10-1	#####	Seismic Ocean Bottom Receiver	released	42° 28,347' N	006° 12,735' E	0	0,2	300,9	320	26,4													
MSM71_10-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 28,884' N	006° 07,657' E	0	4,3	273,5	319	33,4													
MSM71_10-1	#####	Seismic Ocean Bottom Receiver	OBH on deck	42° 28,943' N	006° 07,258' E	0	0,9	104,4	322	28,3				1									
MSM71_9-1	#####	Seismic Ocean Bottom Receiver	released	42° 28,902' N	006° 07,310' E	0	0,7	340,8	318	29,4													
MSM71_9-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 29,480' N	006° 02,361' E	0	6,1	275,7	318	32,6													
MSM71_9-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 29,561' N	006° 01,931' E	0	0,8	103,4	307	33,6				1									
MSM71_8-1	#####	Seismic Ocean Bottom Receiver	released	42° 29,550' N	006° 01,927' E	0	0,1	183,1	315	29,4													
MSM71_8-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 29,960' N	005° 57,880' E	0	9,9	278,3	324	31,5													
MSM71_8-1	#####	Seismic Ocean Bottom Receiver	OBH on deck	42° 30,027' N	005° 56,616' E	0	1	79,2	320	31,3				1									
MSM71_7-1	#####	Seismic Ocean Bottom Receiver	released	42° 30,016' N	005° 56,668' E	0	0,4	241,2	317	26,9													
MSM71_7-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 30,604' N																			



Activity	Date / Time	Device	Action	Position	Position	Depth	Speed	Course	Wind Dirct	Wind Veloc	Winch	Comment	XSV	SEISOBR	SEISSRC	SEITR	P70	GDS	EM122	Gespult Draht	Gespult Draht	Gespult Draht	Gespult Draht	
No.	No.	[UTC]		Lon	Lat	[m]	kn	kn	[°]	m/s		m								Winde: EL1	Winde: EL2	Winde: SEW	Winde: ARW	
MSM71 60-1	#####	Seismic Ocean Bottom Receiver	released	43° 27,334' N	009° 11,331' E	0	0,1	359	12	12,5		A420A												
MSM71 60-1	#####	Seismic Ocean Bottom Receiver	at surface	43° 27,331' N	009° 11,389' E	0	0,2	102	13	9,9														
MSM71 60-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	43° 27,294' N	009° 11,696' E	0	0,6	76,7	358	13				1										
MSM71 61-1	#####	Seismic Ocean Bottom Receiver	released	43° 07,340' N	009° 11,626' E	0	0,5	245,7	31	7,3		A427A												
MSM71 61-1	#####	Seismic Ocean Bottom Receiver	at surface	43° 07,344' N	009° 11,605' E	0	0,1	19,6	20	6,4														
MSM71 61-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	43° 07,248' N	009° 11,572' E	0	0,5	233,1	30	6,9				1										
MSM71 62-1	#####	Seismic Ocean Bottom Receiver	OBS deployed	43° 05,050' N	008° 11,803' E	2586	0,2	313,6	47	14,2		OBS 215												
MSM71 63-1	#####	Seismic Ocean Bottom Receiver	OBS deployed	43° 01,947' N	008° 07,753' E	2606,5	0	55,5	46	13,5		OBS 214												
MSM71 64-1	#####	Seismic Ocean Bottom Receiver	OBS deployed	42° 58,813' N	008° 03,659' E	2627,2	0	207,1	51	11,3		OBS 213												
MSM71 65-1	#####	Seismic Ocean Bottom Receiver	OBS deployed	42° 55,686' N	007° 59,540' E	2648,6	0	146,3	48	12,8		OBS 212												
MSM71 66-1	#####	Seismic Ocean Bottom Receiver	OBS deployed	42° 52,552' N	007° 55,461' E	2679,7	0,1	289,8	91	5,8		OBS 211												
MSM71 67-1	#####	Seismic Ocean Bottom Receiver	OBS deployed	42° 49,410' N	007° 51,390' E	2683,3	0,1	24,7	33	6,7		OBS 210												
MSM71 68-1	#####	Seismic Ocean Bottom Receiver	OBS deployed	42° 46,278' N	007° 47,322' E	2690,8	0,2	245,8	146	3,6		OBS 209												
MSM71 69-1	#####	Seismic Ocean Bottom Receiver	OBS deployed	42° 43,097' N	007° 43,277' E	2701,3	0,2	108	58	2,5		OBS 208												
MSM71 70-1	#####	Seismic Ocean Bottom Receiver	OBS deployed	42° 39,958' N	007° 39,206' E	2706,7	0,2	201,4	81	4,7		OBS 207												
MSM71 71-1	#####	Seismic Ocean Bottom Receiver	OBS deployed	42° 36,815' N	007° 35,151' E	2711,2	0,2	252,2	87	4,5		OBS 206												
MSM71 72-1	#####	Seismic Ocean Bottom Receiver	OBS deployed	42° 33,651' N	007° 31,111' E	2716,8	0,2	201,6	358	8,7		OBS 205												
MSM71 73-1	#####	Seismic Ocean Bottom Receiver	OBS deployed	42° 30,485' N	007° 27,072' E	2725	0,4	221,2	51	9,9		OBS 204												
MSM71 74-1	#####	Seismic Ocean Bottom Receiver	OBS deployed	42° 27,328' N	007° 23,066' E	2990,1	0,2	180,8	334	2,1		OBS 203												
MSM71 75-1	#####	Seismic Ocean Bottom Receiver	OBS deployed	42° 24,148' N	007° 19,049' E	2720,5	0,1	193,9	199	4,2		OBS 202												
MSM71 76-1	#####	Seismic Ocean Bottom Receiver	OBS deployed	42° 21,023' N	007° 15,009' E	2722,7	0,2	183,4	224	6,2		OBS 201												
MSM71 77-1	#####	Seismic Source	Airgun in water	42° 13,979' N	007° 14,825' E	0	2	306,4	9	7,5		Bb-Seite40m												
MSM71 77-1	#####	Seismic Source	Airgun in water	42° 14,218' N	007° 14,364' E	0	2	307	31	8,9		Stb-Seite40m												
MSM71 77-2	#####	Seismic Towed Receiver	MCS in water	42° 15,232' N	007° 12,402' E	0	4	305,3	16	11,2		280m												
MSM71 77-4	#####	Deep-sea Multibeam Echosound	profile start	42° 17,490' N	007° 10,472' E	2715	4	46,5	35	11,4		rwk=044°, v=4,0 kn												
MSM71 77-1	#####	Seismic Source	profile start	42° 17,492' N	007° 10,475' E	2715	4,1	47,3	35	11,4														
MSM71 77-3	#####	Parasound	profile start	42° 17,506' N	007° 10,494' E	2876	4	44	40	11,5		rwk=044°, v=4,0 kn			1					1				
MSM71 77-4	#####	Deep-sea Multibeam Echosound	profile end	43° 07,390' N	008° 14,820' E	2576,2	4,3	39,8	36	23,5							1							
MSM71 77-3	#####	Parasound	profile end	43° 07,398' N	008° 14,828' E	2578	4,3	41,5	36	24,1														
MSM71 77-2	#####	Seismic Towed Receiver	MCS on deck	43° 07,954' N	008° 16,016' E	2575,5	3,6	63,6	24	24,3														
MSM71 77-1	#####	Seismic Source	Airgun on deck	43° 08,169' N	008° 16,688' E	2815,1	2,2	71,6	24	22,8		Bb-Array												
MSM71 77-1	#####	Seismic Source	Airgun on deck	43° 08,354' N	008° 17,324' E	2583,1	2,4	64	24	22,8		Stb-Array												
MSM71 78-1	#####	Seismic Ocean Bottom Receiver	released	42° 40,745' N	008° 05,134' E	2618,5	0,9	204,7	44	28,4		A425A												
MSM71 78-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 38,663' N	008° 03,958' E	2622,2	1,4	16,3	38	27,7														
MSM71 78-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 38,665' N	008° 03,959' E	2621,8	1,3	16,6	38	27,7				1										
MSM71 79-1	#####	Seismic Ocean Bottom Receiver	released	42° 51,743' N	008° 34,785' E	2472	1	201,3	44	21,2		A426A												
MSM71 80-1	#####	Expandedable Sound Velocimet	in the water	42° 52,660' N	008° 36,940' E	0	0	322,4	53	22,1			1											
MSM71 80-1	#####	Expandedable Sound Velocimet	station end	42° 52,672' N	008° 36,927' E	0	0,1	338,5	71	22,7														
MSM71 79-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 52,697' N	008° 36,902' E	0	0,2	12,4	70	18														
MSM71 79-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 52,999' N	008° 37,094' E	0	1,1	29	53	13,2				1										
MSM71 62-1	#####	Seismic Ocean Bottom Receiver	released	43° 04,111' N	008° 14,197' E	0	0,9	246,5	43	23,7														
MSM71 62-1	#####	Seismic Ocean Bottom Receiver	at surface	43° 04,855' N	008° 11,650' E	0	0,2	43,2	29	31,4														
MSM71 62-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	43° 05,045' N	008° 11,776' E	0	1,3	140,4	17	34,4				1										
MSM71 63-1	#####	Seismic Ocean Bottom Receiver	released	43° 05,004' N	008° 11,776' E	0	0,3	230,9	33	34														
MSM71 63-1	#####	Seismic Ocean Bottom Receiver	at surface	43° 01,778' N	008° 07,636' E	0	1,1	271,1	36	35,2														
MSM71 63-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	43° 01,938' N	008° 07,911' E	0	1,1	140,2	22	31,9				1										
MSM71 64-1	#####	Seismic Ocean Bottom Receiver	released	43° 01,880' N	008° 07,981' E	0	0,3	126,4	27	32,6														
MSM71 64-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 58,643' N	008° 03,434' E	0	1,3	346,1	25	35														
MSM71 64-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 58,851' N	008° 03,998' E	0	0,9	136,8	26	31,6				1										
MSM71 65-1	#####	Seismic Ocean Bottom Receiver	released	42° 58,833' N	008° 03,997' E	0	0,1	305,6	36	34														
MSM71 65-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 55,477' N	007° 59,900' E	0	11,1	238,3	36	32,5														
MSM71 65-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 55,795' N	007° 59,705' E	0	0,8	168	35	33,5				1										
MSM71 66-1	#####	Seismic Ocean Bottom Receiver	released	42° 55,773' N	007° 59,742' E	0	0,2	157,6	30	33,2														
MSM71 66-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 52,470' N	007° 55,592' E	0	4,2	321,6	32	33,6														
MSM71 66-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 52,637' N	007° 55,753' E	0	0,8	95	41	31,7				1										
MSM71 67-1	#####	Seismic Ocean Bottom Receiver	released	42° 52,627' N	007° 55,752' E	0	0,5	131,9	32	30,9														
MSM71 67-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 50,789' N	007° 53,822' E	0	12,8	227,3	27	31,1														
MSM71 67-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 49,401' N	007° 51,365' E	0	0,4	269,8	34	31,7				1										
MSM71 68-1	#####	Seismic Ocean Bottom Receiver	released	42° 49,367' N	007° 51,353' E	0	0,9	131,9	31	33,8														
MSM71 68-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 46,035' N	007° 47,122' E	0	0,5	34,8	35	30,7														
MSM71 68-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 46,363' N	007° 46,955' E	0	0,6	153,9	34	31,8				1										
MSM71 69-1	#####	Seismic Ocean Bottom Receiver	released	42° 46,361' N	007° 46,961' E	0	0,3	357	34	30,5														
MSM71 69-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 43,269' N	007° 43,977' E	0	12,7	220,9	33	30														
MSM71 69-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 43,056' N	007° 43,134' E	0	0,9	168,6	42	30,1				1										
MSM71 70-1	#####	Seismic Ocean Bottom Receiver	released	42° 43,018' N	007° 43,174' E	0	0,6	138,4	45	29,1														
MSM71 70-1	#####	Seismic Ocean Bottom Receiver	at surface	42° 39,722' N	007° 38,601' E	0	10,8	139,5	53	31,3														
MSM71 70-1	#####	Seismic Ocean Bottom Receiver	OBS on deck	42° 39,968' N	007° 39,030' E	0	1,2	202,7	49	29,5				1										

