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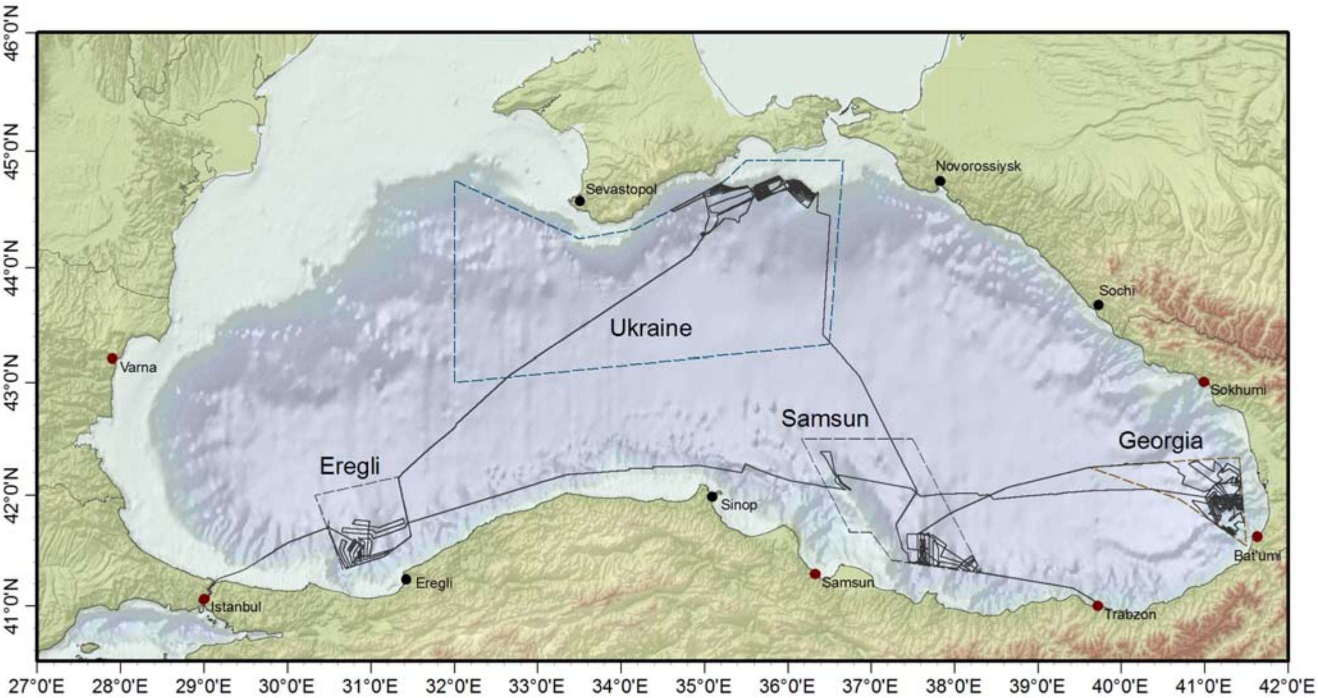
Short Cruise Report
METEOR cruise M84/2

Istanbul – Trabzon – Istanbul
26 February – 2 April 2011
Chief Scientist: Gerhard Bohrmann
Captain: Michael Schneider



Track lines of R/V METEOR during cruise M84/2. Stippled lines indicate the areas of research permission in Ukraine, Georgia and Turkey.

Objectives:
Recent drilling campaigns and quantification approaches of natural methane hydrate in marine sediments showed that we generally have to count with an inhomogeneous distribution of gas hydrates. This is relevant for both, the question of quantitative estimation of global methane hydrate concentration, and for the dynamics of formation and decomposition of methane hydrates, and processes in this connection (seepage, cementation of marine sediments, etc.). While the lowermost depth level of gas hydrate deposits is indicated by the presence of a BSR (Bottom Simulating Seismic Reflector), the uppermost depth level is hardly known although this would be of high relevance for the

estimation of the total volume. The seafloor drilling device MeBo developed at the MARUM in Bremen, was planned to use for drilling hydrates in the Black Sea. We have been interested in understanding the methane flux and the gas hydrate distribution for the global carbon cycle. The anoxic Black Sea is highly suitably for those investigations because it is a marginal sea with the highest dissolved methane concentrations which are fed by several hundreds to thousands of methane seeps. With the drilling device MeBo and the autoclaves deployed on different positions of the drill string (similar to the ODP pressure core sampler) we will be able to sample the upper 50 metres in order to quantify the gas hydrate distribution. In detail we will address the following questions: How much gas hydrate can be detected near the surface in and outside the seep areas, and how much gas hydrate appears in deeper areas? Which textures, which fabrics and which gas hydrate structures (sI, sII, sH) can be found from gas hydrates, which relations in the depth distribution occur?
Are there any rock veins or cemented tracks, or is the gas hydrate dispersed or enriched in layers? In which depth generally upper level of gas hydrate deposits are to be found, which mainly should be governed by dissolution processes? Can the pore water gradients give answers regarding the establishment or the dynamics of this upper level? Can we prove a fast gas rise with a formation of gas hydrate and salt concentration in the seep areas? Which fluid flows occur? Transport of a free gas versus dissolved gas in the fluid? Which hydrocarbons are to be found in gas hydrates? How is the interaction with the gas hydrate phase? What are the differences between seep and non-seep locations?

Cruise narrative:
On Saturday 26 February, 2011 R/V METEOR left at 1 p.m. local time her place situated on Ahirkapi roads, south from the Golden Horn of Istanbul and reached the Black Sea after crossing the Bosphorus. During the night we also reached the first working area at Eregli, and we started to record the data from the multi-beam EM122 and the Parasound sytems. Due to scientific information from former cruises we could find acoustic anomalies in the water column very fast with the Parasound, which showed us strong emissions of free gas into the water column. During the second week of our cruise first of all we investigated methane emissions in the western working area of the Turkish sector. If free methane escapes from the seafloor deeper than 750m water depth the emission of gas is always associated with methane hydrate occurrence in the sediments.
The 750m water depth at 9°C marks the upper stability boundary for methane hydrate of structure I within the Black Sea. Earlier samplings could prove methane hydrates down in the sediment to about 3-4m below seafloor, and with the portable drilling system MeBo we can penetrate the sediments even deeper, to understand also there the methane hydrate spreading. The acoustic systems of R/V METEOR, the multibeam echosounders EM122 and EM710 and the Parasound system were the most important tools we applied during our search for methane hydrate occurrences. Drilling with MeBo at Eregli Seep showed only a drilling result of a few meters, at least it sampled young sediments of the classic Black Sea sequence which we could not have sampled with the gravity corer in this area with considerably higher sedimentation rates. Further drillings in this area we saved for our way back to Istanbul

The further course of the expedition followed the Turkish Black Sea coast to the East into the next working area near the city of Samsun. The side trip was only short, and our course led us to the Georgian continental margin – our main work area. The third working week was entirely dedicated to the investigation of gas hydrates off Georgia, and we wanted to investigate in the depth the earlier well pre-investigated seepage areas of Batumi seep and the Pochori Mound by MeBo drillings. Yet on Saturday evening we started the drilling at Pechori Mound. The Pechori Mound is an active, relatively high in sea floor morphology seep structure overtopping the seafloor by several tens of meters. We could core a sediment sequence of about 20m providing in the majority massive gas hydrates. Above all the thickness of the gas hydrate layers were surprisingly high. During the following nights we mainly performed profiles with the ship’s own acoustic systems where we measured repeatedly the already known gas seeps in order to understand the time variability of the gas emissions. Monday night we investigated a so far unknown area at Kulevi Ridge, and also there we detected massive gas flares in the water column whose emissions almost reached the water surface. At this occasion we learned to combine the single beams of the echo sounder EM122, which often show due to the narrow overlapping of the water column, and to compose them in a 3-D-illustration to a very realistic image of the single gas plumes in the water column. Much to our surprise we now could see that the upper ends of the gas plumes are clearly influenced by the flow conditions in the water. This might explain why in the 2-D-profiles view normally the gas plumes are cut to the upper end. It is an important conclusion that this is not true, but that the gas definitely migrates towards the water surface.

On Thursday March 3 we started the MeBo drillings at Batumi Seep, our most important seep area. During a 20-hours deployment we could proceed only very slowly as the soft sediments of the Black Sea lead to a heavy sinking of MeBo, and therefore the motors of the drill rig constantly had to be cooled before continuing the drilling. Up to a drill depth of 10m we could drill plenty of gas hydrates which are very valuable for our scientific examination in Bremen. Unfortunately, due to damage at the drill rig we had to cease our drilling activities for this cruise.
At the beginning the forth week of the cruise was related to an intensive sampling program at the different seep locations in Georgia. On this occasion for the first time during this cruise the dynamic autoclave piston corer (DAPC) could be deployed for sampling the upper 250cm of the sediments. Besides the sediments also gases and gas hydrates were sampled under in-situ pressure of the seafloor in the pressure-tight autoclave. While during the normal sampling using the gravity corer the gas fractions get lost in high quantity and the gas hydrates decompose because of the pressure reduction during heaving, the gases and gas hydrates in the autoclave survive and allow a quantitative determination.

These new seeps we had discovered by their oil slicks shown in satellite imaging. The hydro-acoustic measurements of these oil seeps showed that they are connected to gas emissions, and the sampling proved that near the seafloor gas hydrates can be encountered. After this intensive deployment of our devices we left the working area in Georgia on Tuesday and arrived at the Samsun working area in Turkey after a 7-hour transit. Also here several areas with a higher backscatter signal on the seafloor in 1,200-1,400m water depth were know from former expeditions, and we had the suspicion that also these were gas emissions on the seafloor. Here again we used the EM122 and tried to compare the backscatter pattern measured with the deep-towed Sidescan Sonar with the backscatter images of the EM122 mapping. We were surprised to find identical figures of structures in the areas of the overlapping measurements, which made us map the entire ridge during the first night. We found that we could trace 22 areas with higher backscatter signals along the approx. 25km ridge, half of the patches showing active gas emissions to the water column.
A sampling program with the gravity corer on five of these patches with higher backscatter proved that everywhere gas hydrate was abundant so that we could clearly document the rise of gas from the underground. The gas emissions seem to follow a tectonic line. As the ridge up to now was unnamed, and we intend to publish our investigations, we named this ridge in accordance with our Turkish colleagues on board “Ordu Ridge”. The ridge can be morphologically clearly separated and is situated in a South/North prolongation of the provincial town Ordu, so that we think to have found a suitable name for our subject matter of investigation.

On Thursday, March 17 R/V METEOR entered the port of Trabzon in order to embark part of the scientific crew and also the expedition equipment on Thursday and Friday. On Saturday we moved back to the Samsun working area where we will accomplish our final investigations. During week 5 of our cruise we completed the work in the Turkish working area Samsun. The transit to Ukraine working area was very exhausting as under strong wind around 8 Beaufort the METEOR could proceed only very slowly. In Ukraine our first destination was a strong gas emission site in a water depth of 900m which is well-known by the name Kerch Flare. This time at once the sampling of a sediment core rich in gas hydrate succeeded as we could locate the emissions more exactly. An extensive sampling program was executed until Thursday evening. The night as well as the entire Friday we used for mapping on the continental slopes of Kerch deep sea fan, development of the mountains as well as the Crimean Peninsula. These showed how dependant on the landward side the continental ridge shows completely different morphologies.

On Sunday we had already visited the two mud volcanoes Dvurechenskii MV and Helgoland MV and had recorded gas activity by acoustic analyses as well as we had sampled sediments of the mud volcanoes. With this we wanted to continue next day. But meanwhile our little post-processing group on board had completely processed the multibeam echo sounder data measured so far along the Ukrainian continental slope, and we looked amazed at the brilliant maps. Though there were unfortunately several blanks in the data due to the lack of time which we would rather have liked to fill in by reproduced measurements.

Furthermore we found a couple of gaps in the backscatter intensity maps which we liked to fill by further measurements. We therefore quickly decided to plan a further measuring day in the area of Kerch Fan in order to substantiate the pressing questions with further data. So far we had left behind an area in the North on the Ukrainian Shelf, which had been restricted for us because of military exercises for several days from 7:30 a.m. until 11:30 p.m. We had hoped now to have another chance to measure those parts of the shelf by this new measurement. But on Monday morning the vessel received another message which restrained us from doing so. We had to give way once again. But in the end we could fill in the gaps during the measurements on the upper continental slope, and so we could achieve a complete detailed image from this highly interesting slope morphology giving us an important insight into the geological processes. We were astonished about the highly detailed structures which are characterized by the down-slope transport. The overlaying areas with high backscatter intensity turned out as areas with stronger gas emissions which strengthens our work hypothesis of quantifying these emissions.

On our way back to the West to the two mud volcanoes we crossed numerous mud volcanoes among which the Tbilisi MV, the Odessa MV, Vodianitskii MV as well as the NIOZ mud volcano clearly showed activities in the form of flares. Also the Dvurechenskii mud volcano now showed a definite gas flare in its centre. The mud volcanoes of the Sorokin Trough in general are related to the zone of diapirs formed by the Maikop Formation in the underground. In the cap area of the mud diapirs, due to the higher gas pressure, often appears break-through of relatively liquid and gas bearing mud channelling upwards along discontinuities and developing cone-like structures on arrival at the seafloor which we consider the virtual mud volcanoes. The Sogokin Trough itself is characterized by crust al compression supporting the diapir-like uplifting of the mud formation and which had been shaped in the course of the Caucasus mountain's development.

Back to the two mud volcanoes, the Dvurechenskii and the Helgoland MV, both turned out active whereas two days ago the Dvurechenskii seemed to be in a calm phase. A precise analysis of echo sounder data taken two days ago thus showed that the Dvurechenskii MV had already been active, however, we could not see this in the proximate profile below the vessel. An 18-hours long sampling program followed up mainly at Helgoland mud volcano, and we could take highly interesting sediment cores. One gravity core was very near to the conduit of the mud volcano where we measured temperatures of about 20°C and we could directly sample fluids rising from very deep. The extremely high ammonium concentrations of the pore waters give a hint on special diagenesis conditions occurring in greater depth. Ten meters beneath we could sample gas hydrates with a gravity corer, i. e. there the temperature is already lower than 16°C. A bit deeper in the area of the edge of the inner volcano structure we had already 9°C corresponding to the normal bottom water temperature in the deep Black Sea. After further measurements at Ukraine and in Turkey we finished our station and profile work of this cruise on Friday, 1 April at 10:37 a.m.

The cruise finished on Saturday April 2, when RV METEOR finished the passage through the Bosphorus and reached the berth of Haydarpasa (berth 13) at 19:12. This was around one day later than planned, because of the intensive fog in the channel which strictly limited the passage and as many other ships RV METEOR was forced to wait at the entrance of the channel.

Acknowledgements
We thank the captain, Michael Schneider and also his crew for the outstanding support of our scientific work on board the research vessel. At the same time we thank both teams of MeBo and AUV, without their achievements we would not have reached our scientific goals. The ship time of RV METEOR was provided by the Deutsche Forschungsgemeinschaft within the core program METEOR/MERIAN.

Cruise participants

Name	Working group	Affiliation	Participation
Emine Akasu	Observer	MTA, Ankara	Leg 2b
André Bahr	Sedimentology	IFG, Frankfurt	Leg 2a & b
Markus Bergenthal	MeBo	MARUM, Bremen	Leg 2a
Gerhard Bohrmann	Chief Scientist	GeoB, Bremen	Leg 2a & b
Klaus Dehning	DAPC, Corers	MARUM, Bremen	Leg 2b
Volker Diekamp	Sediments	MARUM, Bremen	Leg 2a & b
Bettina Domeyer	Pore water	IFM-GEOMAR, Kiel	Leg 2a
Christian d. Santos Ferreira	Mapping	MARUM, Bremen	Leg 2b
Ralf Düßmann	MeBo	MARUM, Bremen	Leg 2a
Tim Freudenthal	MeBo	MARUM, Bremen	Leg 2a
Matthias Haeckel	Pore Water	IFM-GEOMAR, Kiel	Leg 2a & b
Kenji Hatsukano	Sedimentologie	IFG, Frankfurt	Leg 2b
Oliver Herschelmann	MeBo	MARUM, Bremen	Leg 2a
Hans-Jürgen Hohnberg	Autoclave tools	GeoB, Bremen	Leg 2a & b
Daniel Hüttich	DAPC	MARUM, Bremen	Leg 2b
Kai Kaszemeik	MeBo	MARUM, Bremen	Leg 2a
Thorsten Klein	MeBo	MARUM, Bremen	Leg 2a
George Komakhidze	Observer	BSMC, Batumi	Leg 2a
Eberhard Kopiske	AUV	MARUM, Bremen	Leg 2a
Jan-Hendrik Körber	PARASOUND	MARUM, Bremen	Leg 2a
Ulrike Lomnitz	Pore water	IFM-GEOMAR, Kiel	Leg 2b
Tatiana Malakhova	Observer	IBSS, Sevastopol	Leg 2b
Gerrit Meinecke	AUV	MARUM, Bremen	Leg 2a
Doris Meyerdierks	Media	IFM-GEOMAR	Leg 2b
Dimitry Nadezhkin	Sedimentology	MSU, Moscow	Leg 2b
Stefanie Oelfke	Multibeam	GeoB, Bremen	Leg 2b
Asli Özmaral	Parasound	ITU, Istanbul	Leg 2a
Thomas Pape	Gas Analyses	GeoB, Bremen	Leg 2a & b
Elena Piňero	Pore water	IFM-GEOMAR,Kiel	Leg 2a
Vlad Rădulescu	Multibeam	MAREXIN, Bucharest	Leg 2a
Andreas Raeke	Meterology	DWD, Hamburg	Leg 2a & b
Anja Reitz	Pore water	IFM-GEOMAR	Leg 2b
Jens Renken	AUV	MARUM, Bremen	Leg 2a
Michael Reuter	MeBo	MARUM, Bremen	Leg 2a
Miriam Römer	Flare mapping	GeoB, Bremen	Leg 2a & b
Uwe Rosiak	MeBo	MARUM, Bremen	Leg 2a
Heiko Sahling	Mapping/Interpretation	GeoB, Bremen	Leg 2a
Marten Schmager	Multibeam	GeoB, Bremen	Leg 2b
Adrian Stachowski	MeBo	MARUM, Bremen	Leg 2a & b
Michal Tomczyk	Parasound	MARUM, Bremen	Leg 2b
David Wangner	Gas analyses	GeoB, Bremen	Leg 2b
Jiangong Wei	Sedimentology	GeoB, Bremen	Leg 2a & b
Paul Wintersteller	Maps	MARUM, Bremen	Leg 2a & b
Tingting Wu	Parasound	GeoB, Bremen	Leg 2b

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MSU	Geology and geochemistry of fuel minerals, Geological faculty Moscow State University, Leninskie Gory, 119992 Moscow, Russia
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HWK	Hanse-Wissenschaftskolleg, Lehmkuhlenbusch 4, 27753 Delmenhorst, Germany

Station list

Date 2011	St. No.	Instrument	Time (UTC) Begin	End	Latitude N	Longitude E	Water depth (m)
26.02.	135	SVP-1	22:58	00:04	41°42.493	30°28.745	1837
27.02.	136	MB/PS-1	00:58	13:30	41°42.666	30°29.219	1818
27.02.	137	GC-1	14:36	15:42	41°28.536	30°51.649	1026
27.02.	138	GC-2	16:14	17:15	41°28.470	30°51.633	1022
27.02.	139	MB/PS-2	17:40	04:27	41°26.638	30°53.472	1186
28.02.	140	SVP-2	05:27	05:41	41°28.197	30°51.790	1010
28.02.	141	MB/PS-3	06:05	07:39	41°28.268	30°51.812	1010
28.02.	142	MeBo-63	08:28	22:17	41°27.365	30°51.142	975
28.02.	143	MB/PS-4	22:37	05:20	41°27.366	30°51.173	972
01.03.	144	AUV-39	05:30	12:50	41°27.598	30°52.382	982
01.03.	145	LDP-1	9:40	10:43	41°28.075	30°52.392	996
01.03.	146	AUV-40	11:37	12:50	41°27.813	30°52.479	993
01.03.	147	MB/PS-5	13:05	18:37	41°27.910	30°52.793	989
02.03.	148	SVP-3	14:52	15:22	42°04.434	36°28.051	1079
02.03.	149	MB/PS-6	15:30	16:46	42°04.498	36°28.152	1081
02.03.	150	GC-3	17:00	17:28	42°03.000	36°14.192	388
02.03.	151	MB/PS-7	17:36	07:55	42°02.978	36°41.278	404
03.03.	152	SVP-4	18:58	20:12	42°03.211	40°22.153	1804
03.03.	153	MB/PS-8	20:36	03:28	42°03.176	40°22.379	1807
04.03.	154	GC-4	04:16	05:02	41°57.144	41°16.851	879
04.03.	155	LDP-2	05:23	07:45	41°57.145	41°16.851	878
04.03.	156	MeBo-64	06:41	10:23	41°57.174	41°16.850	878
04.03.	157	MIC-1	10:40	10:24	41°57.155	41°16.874	878
04.03.	158	MB/PS-9	11:25	14:00	41°57.178	41°16.868	881
04.03.	159	MeBo-65	14:46	08:01	41°57.171	41°16.853	878
05.03.	160	AUV-41	08:57	10:15	41°57.587	41°17.920	854
05.03.	161	MB/PS-10	10:29	12:58	41°57.759	41°17.698	842
05.03.	162	AUV-42	13:16	13:21	41°57.570	41°17.910	859
05.03.	163	MB/PS-11	14:34	04:08	41°56.038	41°21.801	1071
06.03.	164	GC-5	04:48	05:44	41°58.780	41°07.591	936
06.03.	165	MeBo-66	06:50	13:18	41°58.963	41°07.595	1025
06.03.	166	MB/PS-12	13:36	17:48	41°58.939	41°07.589	1024
06.03.	167	SVP-5	18:07	18:24	41°59.000	41°07.532	1031
06.03.	168	MeBo-67	18:33	08:34	41°58.985	41°07.590	1027
07.03.	169	LDP-3	08:59	09:54	41°58.981	41°07.541	1026
07.03.	170	MB/PS-13	09:53	15:20	41°58.981	41°07.541	1026
07.03.	171	SVP-6	15:22	15:42	42°07.000	41°23.46	713
07.03.	172	MB/PS-14	15:48	02:48	42°07.029	41°23.398	721
08.03.	173	AUV-43	04:06	05:29	41°57.361	41°18.018	838
08.03.	174	MB/PS-15	06:20	08:23	41°55.892	41°16.75	951
08.03.	175	AUV-44	08:42	09:22	41°57.570	41°17.831	863
08.03.	176	MB/PS-16	09:45	11:25	41°58.561	41°16.122	991
08.03.	177	AUV-45	11:35	12:49	41°57.597	41°17.881	860
08.03.	178	MB/PS-17	12:55	03:44	41°57.680	41°17.809	862
09.03.	179	GC-6	04:00	04:46	41°52.278	41°17.273	880
09.03.	180	LDP-4	05:02	05:54	41°52.278	41°17.273	878
09.03.	181	MB/PS-18	06:06	07:08	41°52.440	41°17.500	880

09.03.	182	GC-7	08:05	09:10	41°57.580	41°17.411	838
09.03.	183	AUV-46	09:19	11:11	41°57.880	41°17.411	837
09.03.	184	MIC-2	11:42	12:46	41°57.489	41°17.462	840
09.03.	185	MeBo-68	14:30	11:08	41°57.590	41°17.350	838
10.03.	186	AUV-47	11:53	13:04	41°57.541	41°17.112	837
10.03.	187	MIC-3	14:10	14:56	41°57.520	41°17.500	840
10.03.	188	MIC-4	15:10	16:00	41°57.520	41°17.500	840
10.03.	189	MB/PS-19	16:06	06:00	41°57.294	41°17.771	841
11.03.	190	MIC-5	06:10	06:53	41°57.462	41°17.182	848
11.03.	191	GC-8	07:06	07:55	41°57.466	41°17.182	840
11.03.	192	MIC-6	08:25	09:04	41°57.550	41°17.230	840
11.03.	193	GC-9	09:43	10:22	41°57.907	41°18.270	875
11.03.	194	GC-10	10:46	11:20	41°57.879	41°18.346	868
11.03.	195	GC-11	11:34	12:08	41°57.879	41°18.346	868
11.03.	196	SVP-6	12:20	12:29	41°57.880	41°18.330	868
11.03.	197	MB/PS-20	12:33	08:47	41°57.880	41°18.330	868
12.03.	198	MIC-7	09:02	09:45	41°57.565	41°17.089	840
12.03.	199	GC-12	10:02	10:45	41°57.570	41°17.102	842
12.03.	200	AUV-48	11:40	12:30	41°57.498	41°18.052	843
12.03.	201	GC-13	14:50	15:36	41°57.876	41°18.329	876
12.03.	202	GC-14	16:00	16:48	41°58.049	41°18.451	907
12.03.	203	GC-15	17:26	18:17	41°57.605	41°17.260	842
12.03.	204	MB/PS-21	18:24	03:42	41°57.600	41°17.210	839
13.03.	205	MIC-8	04:02	04:50	41°57.608	41°17.264	840
13.03.	206	DAPC-1	05:36	06:27	41°57.871	41°18.312	870
13.03.	207	GC-16	07:12	08:07	41°57.632	41°17.079	842
13.03.	208	MIC-9	08:14	09:00	41°57.632	41°17.075	842
13.03.	209	GC-17	09:25	10:15	41°57.538	4.117.433	839
13.03.	210	MIC-10	10:45	11:34	41°57.469	41°17.270	847
13.03.	211	GC-18	12:28	13:27	41°58.985	41°07.588	1015
13.03.	212	GC-19	13:55	14:58	41°58.800	41°07.872	1085
13.03.	213	GC-20	15:38	16:38	41°58.893	41°07.607	1010
13.03.	214	GC-21	16:56	17:52	41°58.938	41°07.518	1025
13.03.	215	MB/PS-22	18:14	06:45	41°58.470	41°05.900	1224
14.03.	216	GC-22	07:07	07:53	42°07.104	41°22.753	712
14.03.	217	GC-23	09:03	09:55	42°05.753	41°08.449	1121
14.03.	218	GC-24	11:07	12:00	41°57.580	41°17.392	839
14.03.	219	MIC-11	12:05	12:54	41°57.583	41°17.398	839
14.03.	220	GC-25	13:58	15:12	41°58.082	41°06.154	1123
14.03.	221	DAPC-2	16:20	17:00	41°57.874	41°18.331	868
14.03.	222	MB/PS-23	17:30	04:26	41°57.897	41°18.191	870
15.03.	223	SVP-7	11:23	11:38	41°50.402	37°57.184	2039
15.03.	224	MB/PS-24	12:05	14:26	41°50.403	37°57.184	2040
15.03.	225	SVP-8	14:28	14:48	41°38.718	37°33.058	1666
15.03.	226	MB/PS-25	14:50	05:40	41°38.718	37°33.058	1655
16.03.	227	GC-26	6:16	6:08	41°24.221	37°35.270	1254
16.03.	229	DAPC-3	8:19	9:53	41°32.661	37°37.449	1534
16.03.	228	GC-27	9:47	11:04	41°32.670	37°37.460	1535
16.03.	230	MB/PS-26	11:07	22:27	41°32.659	37°37.458	1535
19.03.	231	SVP-9	12:50	13:10	41°18.169	38°19.867	1854
19.03.	232	MB/PS-27	13:26	06:18	41°18.180	38°19.760	1854
20.03.	233	MIC-12	06:36	07:48	41°32.670	37°37.460	1537

20.03.	234	DAPC-4	07:51	09:34	41°32.670	37°37.440	1536
20.03.	235	GC-28	9:37	11:02	41°32.443	37°36.888	1522
20.03.	236	LDP-5	11:19	12:40	41°32.440	37°36.890	1521
20.03.	237	GC-29	12;53	13:55	41°31.843	37°36.496	1509
20.03.	238	GC-30	14:56	16:03	41°31.160	37°37.338	1493
20,03	239	MB/PS-28	16:10	06:54	41°31.160	37°37.340	1494
21.03.	240	MIC-13	07:45	08:52	41°32.416	37°36.867	1518
21.03.	241	DAPC-5	09:13	10:51	41°32.670	37°37.460	1536
21.03.	242	MIC-14	11:15	12:16	41°31.164	37°37.352	1499
21.03.	243	GC-31	12:24	13:31	41°31.138	37°37.347	1505
21.03.	244	GC-32	14:54	16:18	41°22.850	37°48.160	1526
22.03.	245	SVP-10	16:40	17:06	41°22.850	37°48.170	1528
22.03.	246	MB/PS-29	17:39	07:22	41°22.050	37°45.440	1683
22.03.	247	MB/PS-30	19:08	11:25	43°24.950	36°25.230	2160
23.03.	248	GC-33	11:34	12:35	44°37.420	35°42.359	906
23.03.	249	GC-34	12:52	13:49	44°37.386	35°42.164	878
23.03.	250	DAPC-6	?	?	44°37.386	35°42.164	878
23.03.	251	MIC-15	15:26	16:16	44°37.386	35°42.164	878
23.03.	252	SVP-11	16:20	16:44	44°37.380	35°42.160	880
23.03.	253	MB/PS-31	17:08	10:16	44°36.840	35°42.090	929
24.03.	254	GC-35	10:35	11:18	44°37.419	35°42.359	894
24.03.	255	LDP-6	11:25	12:10	44°37.419	35°42.357	895
24.03.	256	GC-36	12:30	13:28	44°37.230	35°42.282	889
24.03.	257	DAPC-7	13:39	14:34	44°37.230	35°42.282	889
24.03.	258	MIC-16	14:54	15:02	44°37.243	35°42.286	888
24.03.	259	MB/PS-32	16:05	11:11	44°37.010	35°42.590	910
25.03.	260	GC-37		12:15	44°37.182	35°42.279	887
25.03.	261	GC-38	12:41	13:11	44°37.171	35°41.763	896
25.03.	262	GC-39		14:44	44°37.166	35°42.261	890
25.03.	263	DAPC-8	15:24	16:22	44°37.180	35°42.270	885
25.03.	264	MIC-17	16:52	17:55	44°37.105	35°41.759	896
25.03.	265	MB/PS-33	18:00	11:06	44°37.180	35°41.820	891
26.03.	266	SVP-12	11:10	11:33	44°36.100	34°53.200	1522
26.03.	267	MB/PS-34	11:53	05:13	44°35.770	34°52.280	1543
27.03.	268	GC-40	05:46	07:41	44°17.322	35°0.065	2082
27.03.	269	MIC-18	07:47	09:18	44°17.329	35°0.081	2080
27.03.	270	GC-41	09:38	11:56	44°17.311	35°0.037	2088
27.03.	271	DAPC-9	12:29	14:18	44°16.970	34°58.670	2054
27.03.	272	GC-42	14:25	18:16	44°17.041	34°58.891	2051
27.03.	273	MB/PS-35	18:31	02:40	44°17.054	34°58.898	2060
29.03.	274	LDP-7	03:10	04:48	44°16.950	34°58.670	2054
29.03.	275	MIC-19	05:10	07:00	44°17.311	35°0.037	2088
29.03.	276	GC-43	07:09	08:54	44°17.311	35°0.037	2088
29.03.	277	MIC-20	08:58	10:28	44°17.311	35°0.037	2088
29.03.	278	DAPC-10	10:38	12:14	44°17.300	35°0.040	2080
29.03.	279	GC-44	12:33	15:24	44°17.304	35°0.042	2079
29.03.	280	GC-45	16:02	17:50	44°17.295	35°0.044	2079
29.03.	281	GC-46	18:20	20:00	44°18.166	34°59.162	2054
29.03.	282	MIC-21	20:04	21:34	44°18.166	34°59.162	2054
29.03.	283	LDP-8	21:58	23:30	44°18.166	34°59.162	2054
29.03.	284	MB/PS-36	23:43	13:00	44°17.220	34°58.590	2074
30.03.	285	SVP-13	22:52	23:10	42°9.560	31°19.500	2147
30.03.	286	MB/PS-37	23:28	07:37	42°9.580	31°19.600	2148

Instrument deployments:

MeBo drill sites :	4
Autoclave corer (LDP) :	8
Autoclave pisron corer (DAPC) :	10
Mini corer (MIC):	21
Gravity corer (GC):	46
AUV deployments:	9
Sound velocity profiles (SVP):	13
Multi beam and Parasound recordings:	17 days 23 hours 33 minutes