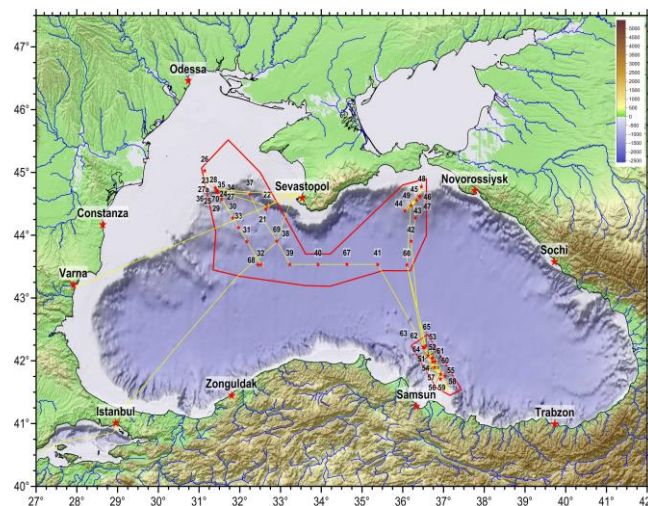
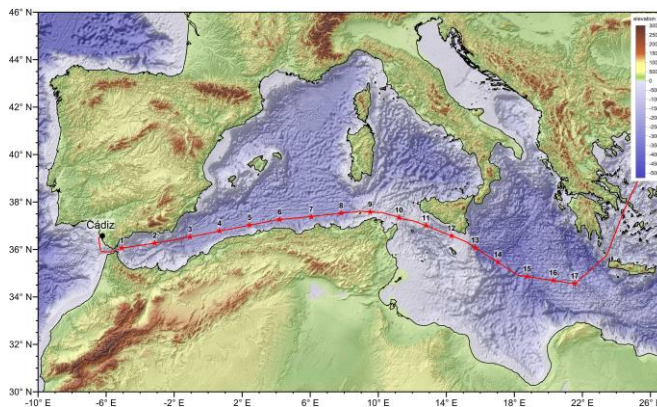


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## Short Cruise Report RV M.S.Merian MSM33

**Cadiz, Spain – Sevastopol, Ukraine**  
**Sevastopol, Ukraine - Varna, Bulgaria**  
**02.11.2013 - 10.11.2013**  
**04.12.2013 - 06.12.2013**  
**Chief Scientist: Prof. Dr. Helge Arz**  
**Captains: Ralf Schmidt, Björn Maaß**



## Objectives

The overarching goal of the proposed cruise is to investigate the biology and biogeochemistry of the central Black Sea with special consideration of the processes at the pelagic redoxcline. By identifying microbiological agents and assessing rates of the coupled cycles of carbon, nitrogen, phosphorus, sulfur, manganese and iron at the redox boundary the functional response of this specific environment upon the change of external conditions will be visible. As element speciation and the elemental input/output relation in marginal seas with anoxic water bodies are different from oxic environments, this study fosters the understanding of land/ocean interaction in terms of element transfer.

As a major and immediate forcing factor for redoxcline turnover the particle export from the mixed layer will be studied as a function of abundance and activity of pelagic populations. Furthermore it is important to understand the changes in the quantity and quality of particle flux from aerated water through redoxcline and anoxic conditions to the sediment with the emphasis on the carbon cycle and to establish a time series station in the central part of the western gyre in the Black Sea. In this context it will be also important to investigate the importance of the "Mn-Fe-P shuttle" for the phosphorus cycle and primary productivity as well as to characterize the authigenic particles geochemically with a special focus on trace metal enrichments to clarify the trapping function of anoxic basins. Particle fluxes will be additionally determined by using  $^{234}\text{Th}$  as a naturally occurring radiotracer for the euphotic zone and analysis of sediment trap material below the particle remineralisation zone and the redoxcline. This part of the programme will be completed by geological studies that aim to reconstruct historic changes in redoxcline functioning by means of multiple proxy approaches on the background of general and long term climatic developments in the area.

Another aim of this cruise is to determine the role of in time and space intermediate turbulent mixing events in the depth of the redoxcline and the significance of these events on diapycnal mixing rates and biological activities at the redoxcline. The strength, location and amount of the mixing events are studied by choosing two typical environments: A station in the center of the Black Sea with water depths of more than thousand meters and a transect at the boundary chosen such that it crosses the depth interval where the redoxcline hits the boundary. The transect study is supported by a nearby ADCP mooring recording the vertical velocity field, giving the opportunity to relate the local velocity field to the measured mixing events. The choice of these two locations allows assessing the amount of mixing in the interior compared to basin boundary processes. In a second step the identified mixing zones can then subsequently sampled for biological activity.

Organic contaminants, especially the Persistent Organic Pollutants (POPs) are ubiquitous distributed in the environment through the riverine input, dissolved in seawater, scavenged to suspended particles (SPM)/sinking particles and ultimately accumulated in surface sediments. The presence in marine ecosystems has important aspects, several POP compounds like PCBs and DDTs accumulate in marine food webs and some compounds have toxic effects in marine organisms. During the expedition the POP sampling programme is intended to study the distribution of POPs in all water types (surface and deep waters, salinity range, regional differences, river input) of the Mediterranean and Northern Black Sea.

A major goal of this cruise is also to collect short and long sediment cores from the northern and southeastern Black Sea in order to obtain continuous paleoenvironmental records of adequate resolution and length. Pore water analyses will provide information about the modification of primary geochemical signals. We expect that these new sedimentary records will provide important information on Holocene and earlier changes in continental climate and surface ocean conditions and will allow establishing relationships to regional oceanographic changes as well as to the large-scale climate variability.

## Narrative

In the morning of the 2nd November RV M.S. Merian departed from Cadiz, Spain for a 8 days long transit across the Mediterranean Sea to arrive the main working area in the Black Sea. With 14 IOW scientists on board the transit work started after the passage of the Gibraltar Strait. Main task during the transit was to continuously sample water from the ships clean seawater supply for volatile organic compounds, organic pollutants, nutrient, and stable isotope (O,C,H) analyses. Furthermore, the transit was used to setup instruments to be ready for deployment in the Black Sea. On the 9th November we passed the Bosphorus Strait arriving Sevastopol in time to exchange/complete the scientific crew with colleagues from Germany (IOW), Ukraine (IBSS, MHI), and Turkey (ITU/EMCOL).

Shortly after leaving Sevastopol M.S. Merian approached the first working area west of Crimea. Here we recovered a first sound velocity profile for the acoustic systems and identified a first sediment sampling station in the center of the main submarine Dnjepr canyon. In the northernmost part of this working area we deployed a ADCP mooring station at water depths of about 170 m close to the shelf edge in order to record for the next 8 days temporal changes of the redoxcline structure fringing the upper slope. On several stations from the shelf down to the central western Black Sea Basin an extensive water column sampling program with deployments of CTD/Rosette, Pump-CTD, InSitu-Pumps, Multi-Net, and multicorer (for surface sediments) was conducted. More than four days were spent on our first "main station" in the central western Black Sea, with more than 30 deployments mainly concentrating on the water column. High resolution Pump-CTD profiles were combined with standard CTD-casts for retrieving samples for chemical, geochemical, and microbiological analyses. The Multi-Net was used for collecting zooplankton at specific depth intervals within the redoxcline. The work on the main station was closed on Sunday 17 Nov with the successful deployment of a sediment trap mooring that will stay there for the next approximately 1.5 years. For the next two days we moved upslope again to complete several shallow water stations and recover the ADCP mooring. Further sediment sampling in the Dnjepr canyon revealed unconsolidated opal-rich sediments which are untypical for the Black Sea and may result from high lateral input originating from nutrient rich shallow water areas proximal to rivers.

On the 19 Nov we left the western working area and continued with deep water stations along a west-east oriented profile deploying on each station the CTD/Rosette and occasionally adding the Multi-Net, P-CTD, and multicorer casts to the station program. The next days we spent on stations along a upslope transect towards the Kerch Strait east of the Crimean peninsula, where we basically performed a comparable program as in the western working area with mainly the CTD/Rosette, Pump-CTD, Multi-Net, and Multicorer. In addition, we used nighttime for sediment acoustic profiling on the upper slope area in order to identify three suitable sites for geological multicorer and gravity corer sampling. However, stiff glacial clays prohibited deeper sediment penetration on these stations and average core recovery was about 6 meters.

Exceptionally good weather conditions supported detailed water column studies also on the second "main station" in the eastern central Black Sea. Of particular interest were high-resolution Pump-CTD casts on this stations recording the chemical and physical redoxcline structure at a great detail. Later, these results will be combined with microbiological results from the station. On Monday 25 Nov RV M.S. Merian headed towards the southeastern working area in the Turkish part of the Black Sea. Target was the Archangelsky Ridge, where we planned an extensive geological sampling program. For three days sediment acoustic mapping of the ridge structure was performed during night time interrupted by geological sampling stations during day time. On 15 stations distributed along the crest region of the ridge we recovered more than 110 m of sediment cores potentially revealing the Black Sea history of the last about 150 kyrs.

After successfully completing our geological tasks in the SE Black Sea on Friday the 29 Nov we returned to the eastern main station to continue water column work there. In the night from Sunday to Monday this work was completed as well and we commenced our way back to Sevastopol. Despite impaired weather conditions, we deployed for the last time of this cruise on a station close to the initial ADCP mooring position in the shallow water area west of Sevastopol the Pump-CTD system to continuously record vertical profiles across the redoxcline for more than 12 hours. Finally, on the 3 Dec. we finished this last station to arrive Sevastopol next morning in time. After debarking of our Ukrainian colleagues M.S. Merian headed towards Varna, Bulgaria, which was the final harbor and the end of the altogether very successful cruise MSM33.

## **Acknowledgements**

A major part of the scientific program of the cruise is embedded in the bilateral German Ukrainian Project on the " Biological/biogeochemical processes and element fluxes at the Black Sea pelagic redoxcline, sedimentation processes and the Late Holocene development of the system" partly funded by the IB-BMBF. We are grateful to the "DFG - Senatskommission für Ozeanographie" and the "Leitstelle Deutsche Forschungsschiffe" for making this cruise happen. We also acknowledge the permissions of the involved Mediterranean countries to fulfil our work during the transit, but special gratitude goes to Ukraine and Turkey which allowed to conduct research in their Black Sea territorial waters. Finally, we thank Captain's Ralf Schmidt and Björn Maaß and the ship's crew for the overall success of the cruise MSM33.

## Participant list

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## Station list

Station No.		Alias	Gear	Date	Time	Latitude	Longitude	Water depth	Remarks / core recovery /
M.S.MERIAN	MSM33				[UTC]	[°N]	[°E]	[m bsl]	[cm]
MSM33/684-1	1		SWS	02.11.2013	16:00	36° 3,213	5° 4,301		
MSM33/685-1	2		SWS		22:00	36° 16,062	3° 8,109		----
MSM33/686-1	3		SWS	03.11.2013	5:00	36° 31,691	1° 3,906		----
MSM33/687-1	4		SWS		11:00	36° 46,409	0° 40,268		----
MSM33/688-1	5		SWS		17:05	37° 1,283	2° 25,914		----
MSM33/689-1	6		SWS		23:00	37° 15,316	4° 12,211		----
MSM33/690-1	7		SWS	04.11.2013	5:05	37° 22,516	6° 3,357		----
MSM33/691-1	8		SWS		11:00	37° 31,456	7° 49,173		----
MSM33/692-1	9		SWS		17:00	37° 34,933	9° 30,988		----
MSM33/693-1	10		SWS		23:00	37° 19,985	11° 13,098		----
MSM33/694-1	11		SWS	05.11.2013	5:00	37° 0,072	12° 48,373		----
MSM33/695-1	12		SWS		11:00	36° 34,481	14° 17,980		----
MSM33/696-1	13		SWS		17:00	36° 3,934	15° 41,894		----
MSM33/697-1	14		SWS		23:00	35° 27,686	17° 1,729		----
MSM33/698-1	15		SWS	06.11.2013	9:12	34° 51,551	18° 45,103		----
MSM33/699-1	16		SWS		15:00	34° 41,588	20° 16,854		----
MSM33/700-1	17		SWS		19:53	34° 33,444	21° 32,838		----
MSM33/701-1	18		SWS	09.11.2013	22:00	43° 21,670	31° 58,108		----
MSM33/701-1	19		SWS	10.11.2013	3:40	44° 24,119	33° 10,355		----
MSM33/702-1	21-1	-	CTD/RO		21:21	44° 25,208	32° 38,406	1646,1	----
MSM33/703-1			MB-PS						
MSM33/704-1	22-1	G3	MUC	11.11.2013	00:51	44° 27,771	32° 40,327	1680,6	39 cm
MSM33/705-1	22-2	G3	GC		02:26	44° 27,770	32° 40,325	1665,4	190 cm
MSM33/706-1	23-1	P1-3	CTD/RO		07:55	44° 42,756	31° 26,349	99,2	----
MSM33/707-1	24-1	P1-3	CTD/RO		09:15	44° 41,101	31° 27,993	265	----
MSM33/708-1			MB-PS						
MSM33/709-1	25-1	ADCP mooring	CTD/RO		11:21	44° 41,786	31° 26,758	157,3	----
MSM33/710-1	25-2	ADCP mooring	MOR		12:41	44° 41,739	31° 26,850	170,1	----
MSM33/711-1			SWS		13:30	44° 42,715	31° 26,366		----
MSM33/712-1			MB-PS						
MSM33/713-1	26-1	P1-1	CTD/RO		17:41	45° 1,806	31° 8,415	55,5	----
MSM33/714-1	26-2	P1-1	MUC		18:01	45° 1,807	31° 8,414	55,5	25 cm
MSM33/715-1			SWS		20:15	44° 42,457	31° 26,696		----
MSM33/716-1	27-1	P1-3	CTD/RO		20:57	44° 41,100	31° 28,001	244,4	----

MSM33/717-1	27-2	P1-3	P-CTD		23:32	44° 41,099	31° 28,001	243,4	----
MSM33/718-1	27-3	P1-3	CTD/RO	12.11.2013	00:42	44° 41,100	31° 28,001	240	----
MSM33/719-1	27-4	P1-3	MUC		01:21	44° 41,100	31° 28,001	237	without intact surface -> discarded
MSM33/719-2	27-5	P1-3	MUC		02:01	44° 41,100	31° 28,001	234	25 cm
MSM33/720-1	27a-1		P-CTD		04:00	44° 41,82	31° 27,39	153	----
MSM33/721-1	28-1	P1-2	MUC		06:08	44° 45,394	31° 23,829	71,2	28 cm
MSM33/722-1	28-2	P1-2	CTD/RO		06:58	44° 44,986	31° 24,248	72,5	----
MSM33/724-1	29-1	P1-4	CTD/RO		09:52	44° 36,108	31° 32,042	759	----
MSM33/725-1	29-2	P1-4	MN		10:56	44° 35,71	31° 32,44	785,3	----
MSM33/726-1	29-3	P1-4	BONGO		12:46	44° 34,07	31° 34,02	865,9	----
MSM33/727-1	29-4	P1-4	WP2		13:37	44° 33,551	31° 34,521	902	----
MSM33/727-1	29-5	P1-4	WP2		14:06	44° 33,551	31° 34,521	898,5	----
MSM33/728-1	29-6	P1-4	CTD/RO		15:13	44° 34,728	31° 33,261	898,5	----
MSM33/729-1	29-7	P1-4	P-CTD		17:11	44° 34,727	31° 33,261	827,5	----
MSM33/730-1	29-8	P1-4	ISP		19:00	44° 34,728	31° 33,259	826,7	----
MSM33/731-1	29-9	P1-4	CTD/RO	13.11.2013	01:56	44° 34,729	31° 33,258	824,5	----
MSM33/732-1	29-10	P1-4	MUC		03:58	44° 34,729	31° 33,259	825,2	46 cm
MSM33/733-1	29-11	P1-4	MUC		05:13	44° 34,731	31° 33,260	831,5	47 cm
MSM33/734-1			SWS		6:10	44° 34,731	31° 33,260	831,5	----
MSM33/735-1	30-1	P1-5	CTD/RO		8:50	44° 16,753	31° 49,758	1288,87	----
MSM33/736-1	30-2	P1-5	P-CTD		10:52	44° 16,752	31° 49,758	1287	----
MSM33/737-1	30-3	P1-5	CTD/RO		12:02	44° 16,753	31° 49,757	1288,1	----
MSM33/738-1	30-4	P1-5	MUC		14:28	44° 16,751	31° 49,759	1286	45 cm
MSM33/740-1	31-1	P1-6	CTD/RO		19:08	43° 54,253	32° 10,408	1679,59	----
MSM33/741-1	31-2	P1-6	P-CTD		20:25	43° 54,252	32° 10,407	1660,11	----
MSM33/742-1	31-3	P1-6	CTD/RO		22:18	43° 54,252	32° 10,407	1676,69	----
MSM33/743-1	31-4	P1-6	MUC	14.11.2013	00:51	43° 54,252	32° 10,407	1660	41 cm
MSM33/745-1	32-1	M1	CTD/RO		07:49	43° 31,922	32°30,907	2069,2	----
MSM33/746-2	32-2	M1	CTD/RO		10:53	43° 31,922	32°30,909	2069,6	----
MSM33/747-1	32-3	M1	P-CTD		12:47	43° 31,922	32°30,908	2069,6	----
MSM33/748-1	32-4	M1	GWS		13:29	43°31,921	32°30,909	2070,9	----
MSM33/749-1	32-5	M1	P-CTD		16:44	43°31,922	32°30,908	2067,4	----
MSM33/750-1	32-6	M1	CTD/RO		17:56	43°31,922	32°30,908	2069,2	----
MSM33/751-1	32-7	M1	CTD/RO		21:28	43°31,923	32°30,906	2069,4	----
MSM33/752-1	32-8	M1	CTD/RO		23:14	43°31,924	32°30,903	2067,4	----
MSM33/753-1	32-9	M1	CTD/RO	15.11.2013	01:24	43°31,923	32°30,906	2070,0	----
MSM33/754-1	32-10	M1	CTD/RO		02:46	43°31,924	32°30,906	2068,4	----
MSM33/755-1	32-11	M1	P-CTD		03:54	43°31,924	32°30,907	2066,9	----



MSM33/756-1	32-12	M1	CTD/RO		07:30	43°31,924	32°30,907	2068,7	----
MSM33/757-1	32-13	M1	GWS		10:16	43°31,922	32°30,910	2068,1	----
MSM33/758-1	32-14	M1	P-CTD		12:24	43°31,922	32°30,906	2070,0	----
MSM33/759-1	32-15	M1	MN		13:30	43° 32,17	32° 31,75	2075	----
MSM33/759-1	32-15	M1	SWS		13:30	43° 32,17	32° 31,75	2075	----
MSM33/760-1	32-16	M1	BONGO		14:26	43° 32,87	32° 34,10	2104,9	----
MSM33/761-1	32-17	M1	MN		15:11	43° 33,47	32° 35,13	2084,6	----
MSM33/762-1	32-18	M1	GWS		16:54	43°31,924	32°30,905	2067,9	----
MSM33/763-1	32-19	M1	CTD/RO		18:26	43°31,924	32°30,905	2067,9	----
MSM33/764-1	32-20	M1	CTD/RO		20:10	43°31,925	32°30,904	2066,6	Cancelled
MSM33/765-1	32-21	M1	CTD/RO		20:27	43°31,925	32°30,904	2066,6	----
MSM33/766-1	32-22	M1	CTD/RO		21:35	43°31,925	32°30,904	2066,0	----
MSM33/767-1	32-23	M1	MUC		23:01	43°31,820	32°28,073	2030,0	43 cm
MSM33/768-1	32-24	M1	MUC	16.11.2013	00:53	43°31,824	32°28,088	2030,0	43 cm
MSM33/769-1	32-25	M1	GWS		06:53	43°31,929	32°30,913	2069,7	----
MSM33/770-1	32-26	M1	P-CTD		08:03	43°31,928	32°30,910	2067,2	----
MSM33/771-1	32-27	M1	ISP		09:07	43°31,923	32°30,909	2072,8	----
MSM33/772-1	32-28	M1	P-CTD		17:06	43°31,923	32°30,908	2071,5	----
MSM33/773-1	32-29	M1	P-CTD		22:16	43°31,922	32°30,908	2067,0	----
MSM33/774-1	32-30	M1	MN		22:57	43° 32,30	32° 30,55	2080,0	----
MSM33/775-1	32-31	M1	MN		23:52	43° 33,69	32° 29,23	2051,6	----
MSM33/776-1	32-32	M1	ISP	17.11.2013	01:40	43°31,927	32°30,913	2067,4	----
MSM33/777-1	32-33	M1	SWS		08:43	43°31,925	32°30,914	2069,4	----
MSM33/778-1	32-34	M1	MOR		12:49	43°31,835	32°30,159	2068,0	----
MSM33/779-1	32-35	M1	CTD/RO		13:37	43°31,807	32°30,261	2310,6	----
MSM33/780-1	32-36	M1	CTD/RO		15:58	43°31,805	32°30,261	2068,3	----
MSM33/781-1	33-1		GC		20:35	44°7,53	31°58,24	1468	924 cm
MSM33/782-1	34-1		P-CTD	18.11.2013	01:15	44° 41,099	31° 28,100	506,3	----
MSM33/783-1	35-1		P-CTD		03:04	44° 41,819	31° 27,399	152,9	----
MSM33/784-1	35-2		P-CTD		08:35	44° 41,822	31° 27,397	152,5	----
MSM33/785-1	35-3		P-CTD		10:26	44° 41,821	31° 27,397	152,5	----
MSM33/786-1	36-1	ADCP mooring	MOR		11:54	44° 41,665	31° 26,729	170,8	----
MSM33/787-1	37-1	G2	CTD/RO		15:47	44° 39,151	32° 14,894	1137,8	----
MSM33/788-1	37-2	G2	MUC		17:03	44° 39,151	32° 14,893	1120,6	50 cm
MSM33/789-1	37-3	G2	MUC		18:20	44° 39,104	32° 14,661	1176,4	4 weights less; overshoot
MSM33/790-1	37-4	G2	MUC		19:39	44° 39,098	32° 14,662	1171	4 weights less; overshoot
MSM33/791-1	38-1	P2-4	CTD/RO	19.11.2013	03:05	43° 54,606	32° 54,514	1924,9	Cancelled due to winch malfunction
MSM33/792-1	39-1	P3-1	CTD/RO		07:36	43° 32,149	33° 13,679	2160,5	----

MSM33/793-1	40-1	P3-2	P-CTD		12:35	43° 32,153	33° 55,359	2179,8	----
MSM33/794-1	40-2	P3-2	MN		13:17	43° 32,04	33° 55,78	2180,8	----
MSM33/795-1	40-3	P3-2	MUC		14:56	43° 31,887	33° 57,37	2182,3	15 cm
MSM33/796-1	40-4	P3-2	CTD/RO		17:46	43° 32,151	33° 55,36	2181,5	----
MSM33/797-1	41-1	P3-4	P-CTD	20.11.2013	03:48	43° 32,152	35° 23,082	2189,4	----
MSM33/798-1	41-2	P3-4	CTD/RO		05:17	43° 32,153	35° 23,082	2191,8	----
MSM33/799-1			MB+PS						
MSM33/800-1	41a		SWS		21:13	43° 23,787	36° 16,607		----
MSM33/801-1	42-1	P5-6	CTD/RO	21.11.2013	00:47	43° 54,351	36° 12,347	2124,6	----
MSM33/802-1	42-2	P5-6	CTD/RO		03:02	43° 54,353	36° 12,347	2083,7	----
MSM33/803-1	42-3	P5-6	MUC		05:34	43° 54,353	36° 12,347	2082,9	42 cm
MSM33/805-1	43-1	P5-5	CTD/RO		09:33	44° 16,759	36° 18,956	1514,8	----
MSM33/806-1	43-2	P5-5	P-CTD		11:15	44° 16,758	36° 18,956	1516,5	----
MSM33/806-1	43-2a	P5-5	SWS		11:25	44° 16,758	36° 18,956	1516,5	----
MSM33/807-1	43-3	P5-5	P-CTD		14:51	44° 16,758	36° 18,956	1516,1	----
MSM33/808-1	43-4	P5-5	P-CTD AFIS		16:55	44° 16,759	36° 18,956	1509,2	----
MSM33/809-1	43-5	P5-5	CTD/RO		17:48	44° 16,758	36° 18,956	1514,9	----
MSM33/810-1	43-6	P5-5	MUC		19:39	44° 16,759	36° 18,956	1516,3	47 cm
MSM33/811-1	43a		SWS		20:45	44° 16,759	36° 18,956		----
MSM33/811-2			MB+PS						
MSM33/812-1	44-1		MUC	22.11.2013	06:02	44° 23,429	36° 3,279	1272,5	41 cm
MSM33/813-1	44-2		GC		07:04	44° 23,432	36° 3,283	1275,3	599 cm
MSM33/814-1	45-1	P5-4	P-CTD		10:29	44° 33,666	36° 20,302	347,8	----
MSM33/815-1	45-2	P5-4	MN		11:25	44° 33,95	36° 20,76	340,4	----
MSM33/815-1	45-3a	P5-4	SWS		11:25	44° 33,95	36° 20,76	340,4	----
MSM33/815-2	45-3	P5-4	MN		12:26	44° 34,53	36° 21,64	335,4	----
MSM33/815-3	45-4	P5-4	MN		13:35	44° 35,49	36° 23,27	321,0	----
MSM33/816-1	45-5	P5-4	CTD/RO		15:04	44° 36,239	36° 24,538	266,3	----
MSM33/817-1	45-6	P5-4	CTD/RO		16:20	44° 36,240	36° 24,539	266,0	----
MSM33/818-1	45-7	P5-4	P-CTD		18:19	44° 36,240	36° 24,539	266,5	----
MSM33/818-1	45-8	P5-4	P-CTD		18:52	44° 36,240	36° 24,539	266,3	----
MSM33/819-1	45-9	P5-4	ISP		19:40	44° 36,240	36° 24,539	266,5	----
MSM33/820-1	45-10	P5-4	MUC	23.11.2013	02:36	44° 36,240	36° 24,538	266,1	overpenetration
MSM33/821-1	45-11	P5-4	MUC		03:11	44° 36,240	36° 24,539	282,7	4 weights less; 45 cm
MSM33/822-1	45-12	P5-4	MUC		03:46	44° 36,240	36° 24,539	266,9	45 cm
MSM33/823-1	46-1	P5-3	CTD/RO		05:10	44° 37,701	36° 24,916	150,0	----
MSM33/824-1	46-2	P5-3	CTD/RO		06:29	44° 37,701	36° 24,916	150,0	----
MSM33/825-1	46-3	P5-3	P-CTD		08:17	44° 37,701	36° 24,916	150,0	----

MSM33/826-1	46-4	P5-3	P-CTD		11:32	44° 37,701	36° 24,915	150,2	----
MSM33/827-1	46-5	P5-3	P-CTD AFIS		13:19	44° 37,701	36° 24,915	150,0	----
MSM33/828-1	46-6	P5-3	MUC		13:55	44° 37,701	36° 24,915	150,0	22 cm
MSM33/829-1	46-7	P5-3	MUC		14:19	44° 37,701	36° 24,915	150,0	MUC not released
MSM33/829-1	46-8	P5-3	MUC		14:39	44° 37,701	36° 24,915	150,2	31 cm
MSM33/830-1	47-1		MUC		15:22	44° 36,597	36° 24,645	213,6	46 cm
MSM33/831-1	47-2		GC		16:01	44° 36,596	36° 24,665	213,9	611 cm
MSM33/832-1	48-1	P5-2	CTD/RO		17:33	44° 46,564	36° 27,421	55,0	----
MSM33/833-1	48-2	P5-2	CTD/RO		18:32	44° 46,568	36° 27,422	54,8	----
MSM33/834-1	48-3	P5-2	MUC		18:45	44° 46,564	36° 27,421	54,8	26 cm
MSM33/835-1	49-1		MUC		21:11	44° 28,386	36° 11,957	844,6	46 cm
MSM33/836-1	49-2		GC		22:02	44° 28,365	36° 11,921	841,0	601 cm
MSM33/837-1	50-1	P3-5	CTD	24.11.2013	06:00	43° 31,805	36° 5,998	2172,9	----
MSM33/838-1	50-2	P3-5	GWS		07:31	43° 31,805	36° 5,997	2173,2	----
MSM33/839-1	50-3	P3-5	P-CTD		09:47	43° 31,805	36° 5,997	2173,9	----
MSM33/840-1	50-4	P3-5	MN		10:25	43° 31,780	36° 5,740	2178,3	----
MSM33/841-1	50-5	P3-5	P-CTD		13:57	43° 31,799	36° 6,001	2173,5	----
MSM33/841-1	50-5a	P3-5	SWS		13:57	43° 31,799	36° 6,001	2173,5	----
MSM33/842-1	50-6	P3-5	P-CTD		18:17	43° 31,798	36° 5,999	2173,5	----
MSM33/843-1	50-7	P3-5	GWS		18:55	43° 31,803	36° 5,998	2173,5	----
MSM33/844-1	50-8	P3-5	P-CTD		20:45	43° 31,803	36° 5,998	2172,9	----
MSM33/845-1	50-9	P3-5	ISP		21:48	43° 31,803	36° 5,998	2172,9	----
MSM33/846-1			MB+PS	25.11.2013					
MSM33/847-1	51-1		MUC	26.11.2013	05:25	42° 2,394	36° 43,078	429,1	41 cm
MSM33/848-1	51-2		GC		05:53	42° 2,386	36° 43,079	433,1	796 cm
MSM33/849-1	51-3		PC		08:34	42° 2,380	36° 43,076	428,4	1027 cm
MSM33/850-1	52-1		GC		11:32	42° 5,077	36° 37,191	467,4	682 cm
MSM33/851-1	53-1		GC		12:48	42° 5,011	36° 37,366	443,4	797 cm
MSM33/852-1	54-1		MUC		14:45	41° 58,99	36° 43,85	382,2	40 cm
MSM33/853-1			MB+PS						
MSM33/854-1	54-2		GC	27.11.2013	05:03	41° 58,986	36° 43,843	378,2	822 cm
MSM33/855-1	54-3		PC		08:04	41° 58,985	36° 43,845	382,2	953 cm
MSM33/856-1	55-1		PC		11:20	41° 54,008	36° 46,975	362,4	948 cm
MSM33/857-1	55-2		MUC		12:12	41° 54,017	36° 46,970	361,5	41 cm
MSM33/858-1	55-3		GC		13:32	41° 54,016	36° 46,968	362,6	759 cm
MSM33/859-1	56-1		GC		15:18	41° 47,330	36° 55,805	373,9	736 cm
MSM33/860-1	57-1		GC		16:43	41° 47,377	36° 55,947	374,0	778 cm
MSM33/861-1	58-1		CTD/RO		18:56	41° 45,600	37° 2,023	555,6	----

MSM33/862-1			MB+PS						
MSM33/862-1	58a		SWS		19:49	41° 45,830	37° 2,405		----
MSM33/863-1	59-1		MUC	28.11.2013	06:11	41° 42,858	36° 55,421	311,6	43 cm
MSM33/864-1	60-1		GC		08:36	41° 59,623	36° 47,528	498,8	739 cm
MSM33/865-1	61-1		GC		10:14	42° 2,850	36° 44,016	479,3	746 cm
MSM33/866-1			MB+PS						
MSM33/867-1	62-1		GC		15:05	42° 13,146	36° 30,107	767,3	747 cm
MSM33/868-1	63-1		GC		16:22	42° 13,274	36° 30,000	785,5	704 cm
MSM33/869-1	64-1		GC		17:36	42° 12,456	36° 31,520	660,5	721 cm
MSM33/870-1	65-1		P-CTD		19:57	42° 14,574	36° 34,312	1382,3	----
MSM33/871-1	65-2		P-CTD	29.11.2013	00:57	42° 14,573	36° 34,312	1386,6	----
MSM33/872-1	65-3		CTD/RO		04:08	42° 14,600	36° 34,334	1375,5	----
MSM33/873-1	66-1	P3-5	CTD/RO		13:05	43° 31,802	36° 5,996	2171,7	----
MSM33/874-1	66-2	P3-5	CTD/RO		16:10	43° 31,798	36° 5,997	2170,6	----
MSM33/875-1	66-3	P3-5	CTD/RO		18:32	43° 31,796	36° 6,000	2173,8	----
MSM33/876-1	66-4	P3-5	CTD/RO		21:43	43° 31,796	36° 6,000	2173,5	----
MSM33/877-1	66-5	P3-5	ISP		22:59	43° 31,800	36° 5,995	2172,8	----
MSM33/878-1	66-6	P3-5	CTD/RO	30.11.2013	07:28	43° 31,801	36° 5,995	2177,2	----
MSM33/879-1	66-7	P3-5	P-CTD		09:02	43° 31,799	36° 5,999	2173,1	cancelled
MSM33/879-1	66-8	P3-5	P-CTD		09:47	43° 31,799	36° 5,998	2180,5	----
MSM33/880-1	66-9	P3-5	MN		10:51	43° 32,060	36° 5,750	2173,3	----
MSM33/881-1	66-10	P3-5	MN		12:00	43° 32,910	36° 5,050	2175,2	----
MSM33/882-1	66-11	P3-5	CTD/RO		14:19	43° 31,803	36° 5,997	2176,1	----
MSM33/883-1	66-12	P3-5	P-CTD		16:04	43° 31,803	36° 5,997	2176,1	----
MSM33/884-1	66-13	P3-5	MN		21:21	43° 31,810	36° 5,870	2182,0	----
MSM33/885-1	66-14	P3-5	MN		22:24	43° 31,840	36° 4,080	2173,9	----
MSM33/886-1	66-15	P3-5	MUC	01.12.2013	00:35	43° 31,989	36° 5,977	2174,4	38 cm
MSM33/887-1	67-1	P3-3	CTD/RO		07:47	43° 31,371	34° 37,645	2206,4	----
MSM33/888-1	68-1	M1	P-CTD		17:58	43° 32,003	32° 26,997	2012,5	----
MSM33/889-1	68-2	M1	P-CTD		21:03	43° 32,004	32° 26,997	2018,7	----
MSM33/890-1	68-3	M1	CTD/RO	02.12.2013	02:52	43° 32,003	32° 26,996	2019,6	----
MSM33/891-1	69-1	P2-4	CTD/RO		11:01	43° 54,611	32° 54,505	1933,6	----
MSM33/892-1	70-1		P-CTD	03.12.2013	04:43	44° 41,665	31° 26,719	358,2	----

CTD/RO  
P-CTD  
ISP  
MN  
SWS  
GWS  
BONGO  
WP2

Conductivity-temperature-depth-profiler with 24 10l-Nisquin bottles  
Pump-CTD  
InSitu-Pump  
Multi-Net  
Surface Water Sample  
Giant water sampler  
Bongo net  
WP2 Net

MUC  
GC  
PC  
MB+PS  
MOR

Multi corer  
Gravity corer  
Piston corer  
Multibeam + Parasound  
Mooring