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Short Cruise Report
Maria S. Merian MSM79

Edinburgh - Las Palmas - Mindelo
30.10.2018 - 09.11.2018 - 03.12.2018
Chief Scientist: Karin Zonneveld
Captain: Ralf Schmidt

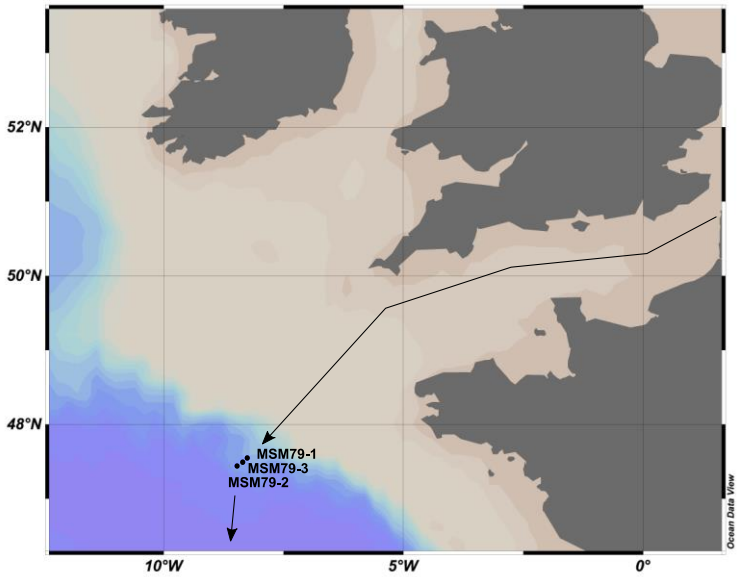

Figure 1a. Map depicting cruise track and station positions Leg 1.
EUROTHAW: Edinburgh – Las Palmas

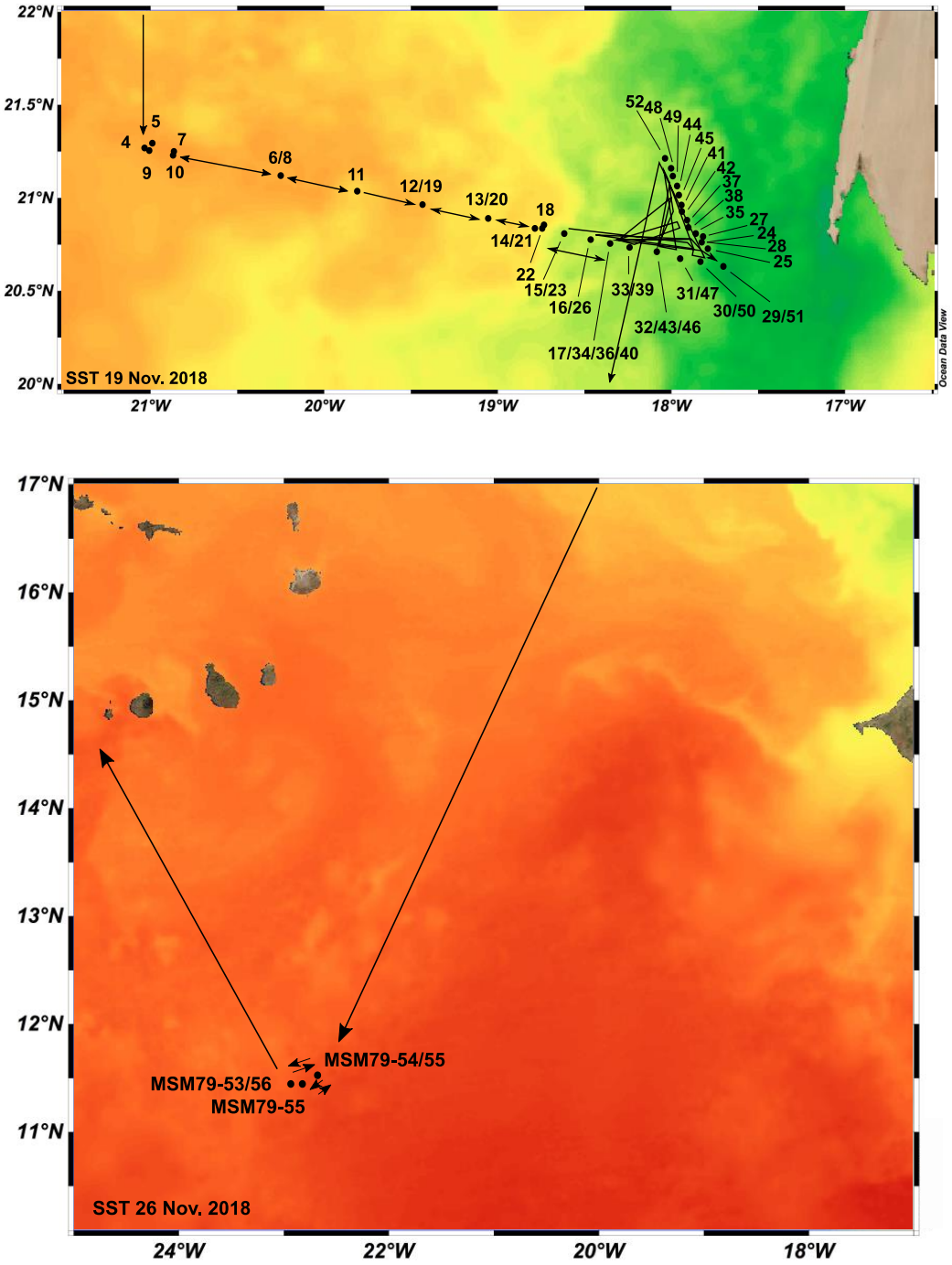

Figure 1b. Map depicting satellite derived sea surface temperature at 19.11.18 and 26.11.18, cruise track and station positions Leg 2. MACPEI: Las Palmas – Mindelo.
Upper graph research area 1 off Cape Blanc, lower graph research area 2 off Cap Verden Islands.
(Figures established with the courtesy of the NASA and downloaded from the NOAA website “state of the Ocean”)

Objectives

The scientific activities of cruise MSM-79 focus on “organic carbon" and processes that steer its turnover. Despite that it is well known that carbon dioxide is an important greenhouse gas affecting our climate and that the ocean plays an important role in the global carbon cycle, many key processes regarding the entry, production, transport, deposition and degradation of organic carbon to and at the ocean floor as well as the carbon re-emission to the atmosphere, are not well understood.

During the First Leg “EUROTHAW” the focus lay on so called “old carbon” that becomes released by the thawing of permafrost soils. This process is currently taking place in large parts of Siberia and northern North America as a result of today's global warming. The impact of this release on marine ecosystems and the processes leading to the degradation and/or deposition of this carbon as well as the effects of this release on the global climate are largely unknown. The objective of the EUROTHAW program is to obtain high-resolution sediment archives that record the melting of European permafrost at the end of the last ice age approximately 20,000 years before present.

The second Leg “MACPEI” was aimed at obtaining a comprehensive insight into key aspects of the ocean carbon pump during active upwelling, notably mechanisms and processes that shape the vertical organic-matter particle flux, the turnover, transport, degradation and alteration of OM during the settling process and the effect of these processes on selected OM based palaeoceanographic lipid biomarker proxies.
For this, a comprehensive approach is followed by studying the production, settling, degradation and alteration of organic matter in relationship to environmental and oceanographic properties, notably mineral dust input, upwelling intensity and redox conditions. An “ecosystem” approach is followed where major representatives of the ecosystem (phytoplankton, zooplankton and microbial community) have been followed from their production and activity in the water column towards embedding in the sediments.

The following aims have been addressed:

a. Determination of the succession of export production formed by selected phytoplankton groups (coccolithophores and cyst forming dinoflagellates), microbial and zooplankton communities in relationship to upwelling succession and dust fertilization of the ocean.
b. Quantification of the processes shaping the vertical flux at the base of the euphotic zone, in the twilight zone (100 to 1000 m), and in the deep ocean.
c. Determination of the rate of vertical and lateral transport of different groups of phytoplankton, microbes and zooplankton in relation to the location and presence of active upwelling cells, eddies/filaments and nepheloid layers in the upper and deeper water column.
d. Determination of carbon assimilation and lipid biosynthetic rates of heterotrophic and autotrophic archaea and bacteria at different redox and nutrient conditions in the water column and the corresponding surface sediment.
e. Examination of the environmental impacts on and export mechanisms of archaeal lipids that form the basis for temperature proxies frequently used in paleoceanographic studies, such as TEX_{86}.
f. Determination of the lipid and carbon isotopic inventory in, and alteration of the macromolecular and isotopic characteristics of particulate organic matter in relation to oxygen concentrations in the water column and at the sediment-water interface and its effects on palaeoceanographic proxies.

Narrative

Leg 1. EUROTHAW (Edinburgh – Las Palmas)

Research vessel MARIA S. MERIAN left the harbour of Edinburgh on Monday, October 29th 2018 shortly after 6 pm and immediately after the embarking of the last two members of the scientific crew. On board were 6 scientists from MARUM (University of Bremen), the Alfred Wegener Institute (Bremerhaven) and Université Lille/CNRS (France). Until around noon of October 30th, technical tests were performed in the vicinity of Edinburgh, and two technicians left the vessel by boat at 1 pm. Following this last crew change, MARIA S. MERIAN headed off towards the working area of leg MSM 79/1 (Eurothaw) on the Celtic margin near the mouth of the English Channel. The working area was reached at 11:30 on November 2nd, and hydroacoustic surveying started immediately. After selection of two promising sites for gravity corer and multicorer deployment, the first two geological stations were occupied during the afternoon and evening of November 2nd, with successful completion of station work at 1:30 am on November 3rd, when the transit to Las Palmas was started. Weather conditions during station work were favourable, but soon on the transit, rather strong winds and big swell conditions were encountered. The port of Las Palmas was reached in the evening of November 7th.

Leg 2. MACPEI (Las Palmas - Mindelo)

The stay in port between November 7th and 10th in Las Palmas was used to exchange part of the scientific crew. Two members of the EUROTHAW program; Prof. Mollenhauer (AWI-Bremerhaven) and Dr. Servais (CNRS/Univ. Lille) left the ship and 17 scientific team members from the MARUM (Bremen, Germany), AWI (Bremerhaven, Germany), The Royal NIOZ (Texel the Netherlands) and University of Westminster (London, UK) arrived.

In the morning of November 10th, the Maria S. Merian left the port of Las Palmas to head south to the upwelling region off Cape Blanc (NW Africa). There she arrived in the late night/early morning of November 12th were station work was started by characterizing of the water column using the ships-own CTD. The early morning light revealed that the weather and sea conditions were suitable to recover the dust buoy “Carmen”. At 4 o’clock in the afternoon, Carmen was safely sealed on deck to be cleaned and serviced. Station work continued with characterizing of the water column on the most offshore station of a transect between the position of buoy “Carmen” where only sporadically the most distal parts of upwelling filaments pass in the upper waters and regions of active upwelling occurring at the continental shelf rim.

The next day activities in the region were continued by recovering the Mooring CB that contained thee sediment traps that had collected particles at 3700 m, 1500 m and 1400 m water depth. These traps are part of the long-term monitoring program of the MARUM that had its origin in 1988. All traps and dust collectors as well as the, CTD systems attached to the buoy had functioned perfectly during the sampling period of one year.

After the safe recovering of the mooring station work continued by sampling particles from the bottom nepheloid layer as well as from surface sediments at the most distal transect station by in-situ pumps and multi coring.

Taking advantage of the good weather, in the early morning of November 14th, station work started by deployment of the now serviced and cleaned durst buoy and the CB mooring. In the early afternoon, the durst buoy was released for another year of sampling followed by the mooring about 4 hours later.

In the following week station work concentrated on the characterization of the water column as well as the collection of water, particulate organic matter from the photic zone,

from intermediate and bottom nepheloid layers as well as collecting of surface sediments with the CTD/rosette, in-situ pump systems and multicorer. From 15 to 16 November the position and extension of the oxygen minimum zone as well as the intermediate and bottom water nepheloid layers where determined at the 9 most distal transect stations. At November 16th, the transect work was shortly interrupted by the recovery of the second MARUM monitoring program mooring CBi, that contained two sediment traps that had collected water at 2164 m and 1264 m water depth. The traps of this mooring had functioned without any problems providing a maximum of collected samples.
Between the 16th and 19th of November each of the previous characterized transect stations was revisited to collect water and particles from the water column at different oxygen concentrations and from selected nepheloid layers using CTD/Rosette and In-situ pumps. Furthermore, on every station surface sediments were collected by multi coring. At November18th this transect work was shortly interrupted by the release of the CBi mooring.

In the fourth week of MSM79, research activities were carried out in the region of active upwelling near the cape Blanc coastal region. In the morning of November19th a drifting trap was released at the rim of an active upwelling cell. The position of this upwelling cell was determined by satellite imaging of surface water temperatures. Unfortunately, it was not possible to release the drifting trap in the middle of the active upwelling cell as at this position a fleet of small fishery vessels were active. To minimize the risk that the drifting trap would be lost or damaged by one of their fishing nets, the trap was released some miles more offshore. This was performed after the water column properties were characterized by CTD to ensure the presence of active upwelling. This drifting trap was released for a time period of about 23 hours. After 23 hours, it was replaced by a second drifting trap that again was released for a period of about 23 hours. This deployment and recovery of drifting traps was executed every day between November 19th and 26th.
During the afternoon and nights station work continued at the 7 most onshore stations of the upwelling - open ocean transect. Here the same strategy as previously was followed. First ocean characteristics were determined by CTD profiling. Additionally, stations were revisited and water layers characterized by different oxygen concentrations, selected nepheloid layers and surface water sediments were collected with rosette, in-situ pumps and multi-coring respectively. In the early morning of November26th our activities were terminated by the recovery of the 7th drifting trap and a last characterization of the upper water column. Hereafter, a transit was started to the last part of the research cruise, located south-west of the Cape Verde Islands.

In the early hours of November 29th, the location of the anchor point of a second dust buoy “Laura” was reached. The precise location of this buoy could easily be determined already from 6 nautical-miles distance due to her well-functioning flash light. By early daylight the recovery of this buoy was started. The safe recovery of this buoy could be finished in the early afternoon. Directly afterwards a short transect was started to the position of a nearby mooring site M1 that contained three sediment traps. This mooring was successfully released and its recovery could be finished in the early evening. During the night from November 29th and November 30th water column water and suspended matter was collected by CTD/rosette and in-situ pumps that the mooring M1 location. In the morning of November 30tha so called “test-mooring” of the Royal Netherlands Institute of Sea Research was recovered, inspected, serviced and deployed again. At this mooring different line and connection systems are being tested in natural environments. In the afternoon, the now cleaned and serviced mooring M1 was deployed again.
On the last station day at December 1th the now cleaned and serviced dust buoy “Laura” was re-deployed. The successful deployment could be finished in the early afternoon after which the transit to Mindelo was started.

Acknowledgements

The scientific crew of cruise MSM79 thanks Captain Schmidt and his crew for their great flexibility, their excellent technical assistance, health service and by creating a very pleasant working atmosphere that substantially contributed to the success of this cruise. We greatly appreciate the support by the Leitstelle Deutsche Forschungsschiffe (LDF) at the University of Hamburg. We especially acknowledge the support of Captain N. Jakobi of the LDF, which greatly attributed to the success of this cruise. The notification of his sudden death was received with great shock and deep grieve. The expedition was funded by the Deutsche Forschungsgemeinschaft.

Participants

Leg 1. EUROTHAW

Name	Discipline	Institution	Nationality
Prof. Dr. Karin Zonneveld	Marine Palynology	MARUM	Dutch
Dr. Hendrik Grotheer	Organic Geochemistry	AWI	German
Marcus Klann	Marine Geology/Logistics	MARUM	German
Prof. Dr. Gesine Mollenhauer	Organic Geochemistry	AWI	German
Dr. Thomas Servais	Observer, Palynology	CNRS/Univ.Lille (F)	Belgian
Dr. Gerard Versteegh	Palynology/org. geochem.	MARUM	Dutch

Leg 2. MACPEI

Name	Discipline	Institution	Nationality
Prof. Dr. Karin Zonneveld	Marine Palynology	MARUM	Dutch
Dr. Karl-Heinz Baumann	Micropaleontology	MARUM	German
Barry Boersen	Sedimentology/Technic	NIOZ	Dutch
Janina Bösche	Marine Palynology	MARUM	German
Charlotte Decker	Organic Geochemistry	MARUM	German
Jan-Dirk De Visser	Sedimentology/Technic	NIOZ	Dutch
Dr. Barbara Donner	Micropaleontology	MARUM	German
Dr. Marcus Elvert	Organic Geochemistry	MARUM	German
Dr. Hendrik Grotheer	Organic Geochemistry	AWI	German
Laura Kattein	Organic Geochemistry	MARUM	German
Marcus Klann	Marine Geology/Logistics	MARUM	German
Bob Koster	Sedimentology/Technic	NIOZ	Dutch
Dr. Martin Könnecke	Organic Geochemistry	MARUM	German
Frederik Lange	Organic Geochemistry	MARUM	German
Prof. Jane Lewis	Plankton Biology	Univ. Westminster	British
Birgit Lübben	Mar. Palynology/Technic	MARUM	German
Sandra Petrov (PhD)	Organic Geochemistry	MARUM	German
Dr. Götz Rühland	Marine Geology/Logistics	MARUM	German
Dr. Jan-Beerend Stuut	Sedimentology	NIOZ	Dutch
Dr. Gerard Versteegh	Organic Geochemistry	MARUM	Dutch

AWI: Alfred-Wegener-Institute, Heimholz-Zentrum für Polar- und Meeresforschung
MARUM: Research Faculty university of Bremen, Center for Marine environmental Sciences
NIOZ: Royal Netherlands Institute of Sea Research
CNRS Univ. Lille
Univ. Westminster

Stationslist

Station Ship No.	Station GeoB No.	Device	Date	Time [UTC] seafloor / maximum wire length	Latitude [N]	Longitude [W]	Water depth [m]	Samples / Core recovery
MSM79_1_1	GeoB 23301-1	Parasound	02.11.18	11:36	47°29,663'	8°20,817'	2060	start
MSM79_1_1	GeoB 23301-1	Parasound	02.11.18	12:54	47°24,854'	8°33,187'	2201	end
MSM79_2_1	GeoB 23302-1	MUC	02.11.18	14:14	47°26,606'	8°28,673'	2180	15 cm
MSM79_2_2	GeoB 23302-2	SL	02.11.18	15:09	47°26,606'	8°28,673'	2167	700 cm
MSM79_2_3	GeoB 23302-3	SL	02.11.18	17:33	47°26,606'	8°28,673'	2184	711 cm
MSM79_3_1	GeoB 23303-1	MUC	02.11.18	20:19	47°32.58'	8°15.776'	2121	15 cm
MSM79_3_2	GeoB 23303-2	SL	02.11.18	21:46	47°32.59'	8°15.776'	2136	704 cm
MSM79_3_3	GeoB 23303-3	SL	02.11.18	23:41	47°32.591'	8°15.774'	2132	704 cm
MSM79_4_1	GeoB 23304-1	CTD	12.11.18	04:01	21°16,323'	21°02.001'	4288	Carmen
MSM79_5_1	GeoB 23305-1	Carmen/buoy	12.11.18	15:55	21°,17.704'	20°59.425'	4234	Carmen
MSM79_6_1	GeoB 23306-1	CTD	12.11.18	19:19	21°07,442'	20°,14.955'	3964	
MSM79_6_2	GeoB 23306-2	CTD	12.11.18	20:44	21°07,441'	20°14.952'	3967	
MSM79_6_3	GeoB 23306-3	ISP	13.11.18	02:47	21°07.442'	20°14.955'	3964	
MSM79_7_1	GeoB 23307-1	Mooring CB	13.11.18	08:04	21°14,919'	20°51,703	4170	CB
MSM79_7_2	GeoB 23307-2	MUC	13.11.18	12:33	21°16,767'	20°50,099'	4183	30 cm
MSM79_8_1	GeoB 23308-1	ISP	13.11.18	18:04	21°07,435'	20°14,944'	3962	
MSM79_8_2	GeoB 23308-2	MUC	13.11.18	21:13	21°07,435'	20°14,943'	3961	21 cm
MSM79_9_1	GeoB 23309-1	Carmen/buoy	14.11.18	12:48	21°15,673	21°00,443'	4231	Carmen
MSM79_10_1	GeoB 23310-1	Mooring CB	14.11.18	15:52	21°14,005'	20°52,136'	4162	CB
MSM79_11_1	GeoB 23311-1	CTD	14.11.18	23:41	21°02,274'	19°48,310'	3723	
MSM79_11_2	GeoB 23311-2	CTD	15.11.18	01:39	21°02,274'	19°48,311'	3723	
MSM79_11_3	GeoB 23311-3	CTD	15.11.18	02:53	21°02,273'	19°48,310'	3721	
MSM79_11_4	GeoB 23311-4	CTD	15.11.18	04:15	21°02,274'	19°48.310'	3724	
MSM79_11_5	GeoB 23311-5	CTD	15.11.18	05:04	21°02,273'	19°48,310'	3725	
MSM79_11_6	GeoB 23311-6	ISP	15.11.18	06:48	21°02,273'	19°48,310'	3724	
MSM79_11_7	GeoB 23311-7	MUC	15.11.18	11:00	21°02,273'	19°48,311'	3723	20 cm

MSM79_12_1	GeoB 23312-1	CTD	15.11.18	15:43	20°58,022'	19°25,923'	3487	
MSM79_13_1	GeoB 23313-1	CTD	15.11.18	19:09	20°53,638'	19°03,108'	3220	
MSM79_13_2	GeoB 23313-2	CTD	15.11.18	21:24	20°53,638'	19°03,108'	3220	
MSM79_14_1	GeoB 23314-1	CTD	15.11.18	23:54	20°50,449'	18°46,897'	2784	
MSM79_15_1	GeoB 23315-1	CTD	16.11.18	02:33	20°48,612'	18°36,825'	2391	
MSM79_16_1	GeoB 23316-1	CTD	16.11.18	04:58	20°46,824'	18°27,848'	1904	
MSM79_17_1	GeoB 23317-1	CTD	16.11.18	07:11	20°45,445'	18°20,377'	1716	
MSM79_18_1	GeoB 23318-1	CBi	16.11.18	11:35	20°51,363'	18°43,945'	2700	
MSM79_19_1	GeoB 23319-1	CTD	16.11.18	16:19	20°58,026'	19°25,935'	3482	
MSM79_19_2	GeoB 23319-2	ISP	16.11.18	18:48	20°58,026'	19°25,935'	3482	
MSM79_19_3	GeoB 23319-3	MUC	16.11.18	23:20	20°58,026'	19°25,933'	3481	17 cm
MSM79_19_4	GeoB 23319-4	MP	16.11.18	16:19	20°58,026'	19°25,935'	5	
MSM79_20_1	GeoB 23320-1	CTD	17.11.18	02:53	20°53,637'	19°03,086'	3215	
MSM79_20_2	GeoB 23320-2	ISP	17.11.18	06:25	20°53,640'	19°03,089'	3219	
MSM79_20_3	GeoB 23320-3	ISP	17.11.18	10:42	20°53,641'	19°03,086'	3214	
MSM79_20_3	GeoB 23320-4	CTD	17.11.18	14:53	20°53,641'	19°03,085'	3213	
MSM79_20_5	GeoB 23320-5	CTD	17.11.18	16:00	20°53,641'	19°03,085'	3216	
MSM79_20_6	GeoB 23320-6	CTD	17.11.18	17:24	20°53,641'	19°03,085'	3216	
MSM79_20_7	GeoB 23320-7	CTD	17.11.18	18:08	20°53,641'	19°03,085'	3214	
MSM79_20_8	GeoB 23320-8	ISP	17.11.18	19:17	20°53,641'	19°03,085'	3216	
MSM79_20_9	GeoB 23320-9	MUC	17.11.18	23:38	20°53,641'	19°03,085'	3215	30 cm
MSM79_21_1	GeoB 23321-1	CTD	18.11.18	03:21	20°50,442'	18°46,884'	2781	
MSM79_21_2	GeoB 23321-2	ISP	18.11.18	05:48	20°50,443'	18°46,884'	2782	
MSM79_21_3	GeoB 23321-3	ISP	18.11.18	10:21	20°50,443'	18°46,884'	2785	
MSM79_21_4	GeoB 23321-4	MUC	18.11.18	13:40	20°50,443'	18°46,884'	2782	29 cm
MSM79_22_1	GeoB 23322-1	CBi	18.11.18	16:32	20°50,172'	18°44,162'	2691	Cbi
MSM79_23_1	GeoB 23323-1	CTD	11.01.00	18:33	20°48,606'	18°36,832'	2396	
MSM79_23_2	GeoB 23323-2	ISP	18.11.18	20:20	20°48,607'	18°36,833'	2391	
MSM79_23_3	GeoB 23323-3	MUC	19.11.18	00:17	20°48,606'	18°36,833'	2396	26 cm
MSM79_24_1	GeoB 23324-1	CTD	19.11.18	09:30	20°46,095'	17°49,419'	802	
MSM79_25_1	GeoB 23325-1	CTD	19.11.18	10:43	20°46,765'	17°47,242'	608	
MSM79_25_2	GeoB 23325-2	DT	19.11.18	11:07	20°43,742'	17°47,285'	606	DT-1

MSM79_26_1	GeoB 23326-1	CTD	19.11.18	16:15	20°46,831'	18°27,651'	1903	
MSM79_26_2	GeoB 23326-2	ISP	19.11.18	17:52	20°46,832'	18°27,654'	1906	
MSM79_26_3	GeoB 23326-3	ISP	19.11.18	22:23	20°46,832'	18°27,654'	1906	
MSM79_26_4	GeoB 23326-4	ISP	20.11.18	01:43	20°46,833'	18°27,654'	1905	
MSM79_26_4	GeoB 23326-5	ISP	20.11.18	04:05	20°46,831'	18°27,654'	1906	
MSM79_26_6	GeoB 23326-6	CTD	20.11.18	05:07	20°46,832'	18°27,652'	1907	
MSM79_26_6	GeoB 23326-6	CTD	20.11.18	05:32	20°46,833'	18°27,653'	1907	
MSM79_26_6	GeoB 23326-6	CTD	20.11.18	06:37	20°46,832'	18°27,653'	1906	
MSM79_26_6	GeoB 23326-6	CTD	20.11.18	07:49	20°46,832'	18°27,653'	1907	
MSM79_26_6	GeoB 23326-6	CTD	20.11.18	08:33	20°46,832'	18°27,655'	1907	
MSM79_26_7	GeoB 23326-7	MUC	20.11.18	09:13	20°46,832'	18°27,654'	1908	25 cm
MSM79_27_1	GeoB 23327-1	DT	20.11.18	14:46	20°47,314'	17°48,773'	868	DT-1
MSM79_27_2	GeoB 23327-2	CTD	20.11.18	15:03	20°47,311'	17°48,789'	871	
MSM79_27_3	GeoB 23327-3	DT	20.11.18	14:46	20°47,302'	17°48,796'	870	DT-2
MSM79_28_1	GeoB 23328-1	CTD	20.11.18	16:43	20°45,446'	17°48,425'	736	
MSM79_29_1	GeoB 23329-1	CTD	20.11.18	18:19	20°38,108'	17°42,066'	276	
MSM79_30_1	GeoB 23330-1	CTD	20.11.18	19:46	20°39,545'	17°49,575'	500	
MSM79_31_1	GeoB 23331-1	CTD	20.11.18	21:11	20°40,921'	17°56,480'	785	
MSM79_32_1	GeoB 23332-1	CTD	20.11.18	23:03	20°42,463'	18°04,675'	1150	
MSM79_33_1	GeoB 23333-1	CTD	21.11.18	01:13	20°44,220'	18°14,046'	1575	
MSM79_34_1	GeoB 23334-1	CTD	21.11.18	03:13	20°45,235'	18°20,407'	1702	
MSM79_35_1	GeoB 23335-1	DT	21.11.18	08:22	20°48,464'	17°51,411'	1002	DT-2
MSM79_35_2	GeoB 23335-2	CTD	21.11.18	08:53	20°48,601'	17°51,469'	1013	
MSM79_35_3	GeoB 23335-3	CTD	21.11.18	09:58	20°48,831'	17°51,522'	1029	
MSM79_35_4	GeoB 23335-4	DT	21.11.18	10:27	20°48,943'	17°51,564'	1035	DT-3
MSM79_36_1	GeoB 23336-1	CTD	21.11.18	14:34	20°45,464'	18°20,397'	1718	
MSM79_36_2	GeoB 23336-2	ISP	21.11.18	16:04	20°45,464'	18°20,397'	1716	
MSM79_36_3	GeoB 23336-3	ISP	21.11.18	19:22	20°45,464'	18°20,397'	1719	
MSM79_37_1	GeoB 23337-1	DT	22.11.18	08:21	20°52,884'	17°54,372'	1433	DT-3
MSM79_37_2	GeoB 23337-2	CTD	22.11.18	08:37	20°52,915'	17°54,389'	1436	
MSM79_37_3	GeoB 23337-3	DT	22.11.18	09:29	20°53,022'	17°54,541'	1426	DT-4
MSM79_38_1	GeoB 23338-1	CTD	22.11.18	10:40	20°50,615'	17°54,004'	1237	

MSM79_39_1	GeoB 23339-1	CTD	22.11.18	14:04	20°44,241'	18°14,059'	1575	
MSM79_39_2	GeoB 23339-2	ISP	22.11.18	15:37	20°44,242'	18°14,059'	1577	
MSM79_39_3	GeoB 23339-3	MUC	22.11.18	19:07	20°44,242'	18°14,061'	1577	19 cm
MSM79_40_1	GeoB 23340-1	MUC	22.11.18	21:03	20°45,4522'	18°20,390'	1717	29 cm
MSM79_41_1	GeoB 23341-1	DT	23.11.18	08:19	20°58,087'	17°56,357'	1680	DT-4
MSM79_41_2	GeoB 23341-2	CTD	23.11.18	08:37	20°58,131'	17°56,374'	1684	
MSM79_41_3	GeoB 23341-3	DT	23.11.18	09:29	20°58,204'	17°56,401'	1692	DT-5
MSM79_42_1	GeoB 23342-1	CTD	23.11.18	12:18	20°55,849'	17°56,102'	1592	
MSM79_43_1	GeoB 23343-1	CTD	23.11.18	15:09	20°42,474'	18°04,716'	1150	
MSM79_43_2	GeoB 23343-2	ISP	23.11.18	16:18	20°42,474'	18°04,716'	1150	
MSM79_43_3	GeoB 23343-3	ISP	23.11.18	19:25	20°42,474'	18°04,716'	1150	
MSM79_44_1	GeoB 23344-1	DT	24.11.18	08:18	21°04,417'	17°57,958'	1765	DT-5
MSM79_44_2	GeoB 23344-2	CTD	24.11.18	08:36	21°04,490'	17°57,950'	1753	
MSM79_44_3	GeoB 23344-3	DT	24.11.18	08:59	21°04,647'	17°57,953	1753	DT-6
MSM79_45_1	GeoB 23345-1	CTD	24.11.18	10:59	21°00,695'	17°57,033'	1794	
MSM79_46_1	GeoB 23346-1	MUC	24.11.18	10:59	20°42,450'	18°04,727'	1794	14 cm
MSM79_47_1	GeoB 23347-1	CTD	24.11.18	16:37	20°40,848'	17°56,490'	780	
MSM79_47_2	GeoB 23347-2	ISP	24.11.18	17:36	20°40,841'	17°56,442'	779	
MSM79_47_3	GeoB 23347-3	ISP	24.11.18	20:37	20°40,843'	17°56,441'	776	
MSM79_47_4	GeoB 23347-4	MUC	24.11.18	22:49	20°40,841'	17°56,440'	779	13 cm
MSM79_48_1	GeoB 23348-1	DT	25.11.18	08:15	21°09,655'	18°00,004'	1609	DT-6
MSM79_48_2	GeoB 23348-2	CTD	25.11.18	08:31	21°09.714'	18°00,008'	1610	
MSM79_48_3	GeoB 23348-3	DT	25.11.18	08:56	21°09,802'	18°00,017'	1611	DT-7
MSM79_49_1	GeoB 23349-1	CTD	25.11.18	10:42	21°07,346'	17°95,252'	1684	
MSM79_50_1	GeoB 23350-1	CTD	25.11.18	14:56	20°39,520'	17°49,609'	497	
MSM79_50_2	GeoB 23350-2	ISP	25.11.18	15:41	20°39,519'	17°49,609'	498	
MSM79_51_1	GeoB 23351-1	CTD	25.11.18	19:55	20°38,090'	17°42,075'	277	
MSM79_51_2	GeoB 23351-2	ISP	25.11.18	20:20	20°38,091'	17°42,075'	277	
MSM79_52_1	GeoB 23352-1	DT	26.11.18	07:41	21°12,836'	18°01,882'	1523	DT-7
MSM79_52_2	GeoB 23352-2	CTD	26.11.18	07:55	21°12,838'	18°01,884'	1526	DT-7
MSM79-53-1	GeoB 23353-1	Buoy	29.11.18	12:44	11°26,481'	22°55,686'	5121	Laura

MSM79-54-1	GeoB 23354-1	Mooring	29.11.18	17:34	11°30,671'	22°40,612'	5063	M1
MSM79-54-2	GeoB 23354-2	CTD	29.11.18	18:21	11°30,675'	22°40,610'	5063	
MSM79-54-3	GeoB 23354-3	ISP	29:11.18	19:20	11°30,609	22°40,609'	5065	
MSM79-54-4	GeoB 23354-4	ISP	29:11.18	23:17	11°30,678	22°40,612'	5067	
MSM79-55-1	GeoB 23355-1	Mooring	30.11.18	10:11	11°27,253'	22°49,767'	5349	test mooring
MSM79-55-2	GeoB 23355-2	Mooring	30.11.18	11:47	11°26,849'	22°49,776'	5098	test mooring
MSM79-56-1	GeoB 23356-1	Mooring	30.11	15:03	11°29,659'	22°42,075'	5072	M1
MSM79-56-2	GeoB 23356-2	CTD	30.11	17:02	11°29,284'	22°42,874'	5072	
MSM79-57-1	GeoB 23357-1	Buoy	01.12.18	13:12	11°21,233'	22°58,564'	5120	Laura

CTD = CTD/Rosette
DT = Drifting Trap
ISP = In-Situ Pump
MUC = Multicore
SL = Gravity Core