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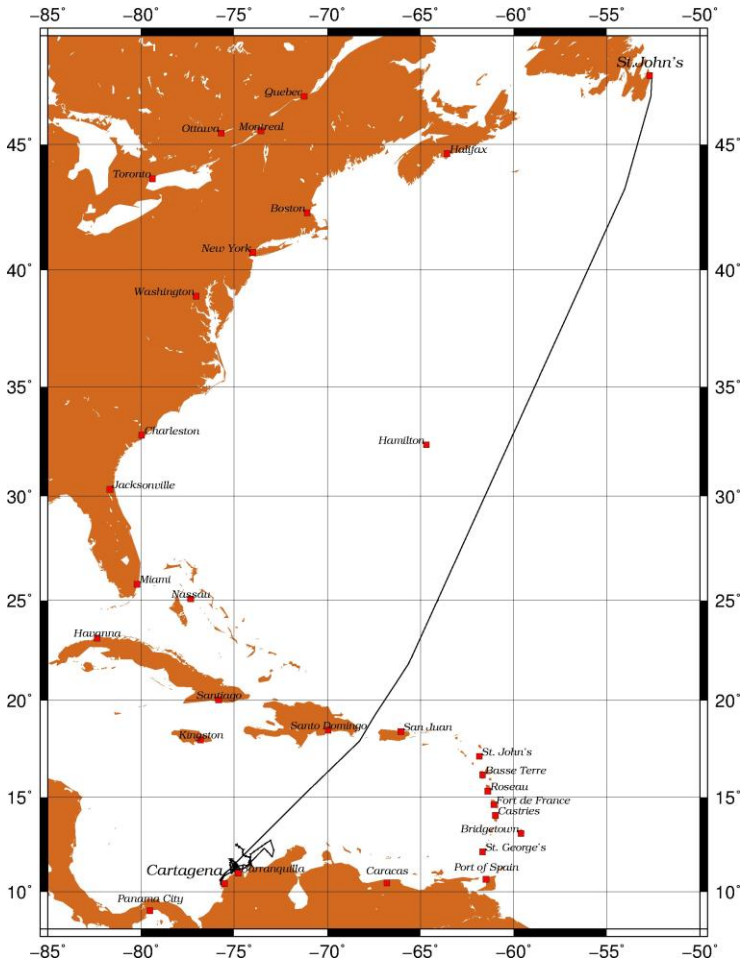
Short Cruise Report
Maria S. Merian MSM112 “RioM ROFI”

St. John’s, Canada – Cartagena, Colombia
07/10/2022 – 14/11/2022
Chief Scientist: Prof. Dr. Christian Winter
Captain: Björn Maaß



Objectives

The Rio Magdalena is the main freshwater tributary to the Caribbean Sea. At the mouth its discharge interacts with tidal and wind-driven currents, mesoscale eddies, the Panamá-Colombia Current and possibly the La Guajira upwelling system in NE Colombia, forming a unique region of land-sea interactions with complex transport patterns of water, sediments, nutrients and pollutants along the Caribbean coast, shelf and the open ocean.

The outer estuary of the Magdalena River is prototypical of a tropical ROFI (Region Of Freshwater Influence) system. Understanding the processes of fluviatile and marine interactions is important, as tropical ROFIs are particularly vulnerable systems that may react strongly to climate change in the future.

The joint expedition MSM112 “RioM ROFI” of Colombian and German research groups with the research vessel MARIA S. MERIAN investigated geophysical, sedimentological and biochemical land-sea interaction processes. We carried out hydro-acoustic measurements, direct sampling (water, surface sediments, plankton, and box and gravity cores), and by the deployment of an autonomous seafloor observatory (lander) and a towed observation platform (catamaran).

Research objectives were to understand the dynamics and extent of the freshwater and suspended sediment river plume; to analyse transport pathways of suspended sediments and bed sediments; and to map the morphology and subbottom of three canyon systems offshore the Colombian coastline.

The following objectives were met:

1. The sedimentology and morphology of three submarine canyon system offshore the Colombian Caribean coast were investigated by Multibeam Echosounder, Parasound subbottom profiler, and sediment sampling (gravity cores and box cores)

2. The hydrodynamics and suspended sediment transport processes in the ROFI (Region of Freshwater Influence) of the Rio Magdalena were measured by an autonomous lander, CTD stations, water samples, and hydroacoustic measurements with hull mounted, and a towed catamaran.

3. The connectivity of the upwelling system of La Guajra and the Rio Magdalena estuary was investigated based on water samples, CTD stations, and sediment cores.

Narrative

The joint expedition MSM112 “RioM ROFI” with the German research vessel MARIA S. MERIAN investigated geophysical, sedimentological and biochemical land-sea interaction processes in the coastal and offshore waters of the Colombian Caribbean.

The cruise started in St. John's (Canada) on October 6th, 2022 where the containers with the scientific gear were loaded. The German team of scientists from CAU Kiel and IOW Warnemuende boarded and we set off in the evening. With a maximum speed of 10 knots through the water, due to the energy saving measures in place, we sailed south for 12 days, through the Sargasso Sea, observing the fascinating loops of the Gulf Stream, which could be observed in the flow data of the hull mounted Acoustic Doppler Current Profiler (ADCP). After the passage between the Dominican Republic and Puerto Rico, we sailed through the Caribbean Sea, heading straight for Colombia.

We moored at the port of Cartagena for one day (19.10.). The Colombian scientists of the participating institutions Universidad del Norte (Barranquilla), Universidad Nacional de Colombia (Medellín), Universidad de Antioquia (Turbo) and Centro de Innovación y Tecnología de Ecopetrol S.A. boarded. Also an observer for marine mammals and an inspector of the competent authority DIMAR joined the cruise. After a diplomatic reception on the quay and a VIP visit to the ship the actual research expedition started.

After a short transit, we reached the first study area offshore the Rio Magdalena already on the next morning (20.10.): Here, submarine canyons, large slumps, and channel-levee systems are located in close proximity to the river mouth. We first used the multibeam echo sounder and parametric echo sounder to survey the morphology and shallow subsurface of two channels. The gradients are impressive: It is only 38 nautical miles from the shallow shelf to water depths of almost 2.900m. In some places the channels have eroded 400m into the adjacent rocks. With the parametric echo sounder the structure of the subbottom was revealed. Profiles across the axis of the canyons then were analysed to define suitable positions for sampling with box and gravity corers. We recovered several large box cores and gravity cores. The boxes were immediately processed and a large amount of subsamples were collected for specific further processing in the corresponding laboratories.

In the meantime the longed-for extension of the research permits had arrived - now allowing some flexibility and optimization of the positioning of cores and samples. This also applied for the autonomous lander, a measurement system that was deployed to the seafloor for almost two weeks to measure data on waves and current velocities, in-situ grain sizes and turbidity of the water column. The lander observations contribute to the second thematic field of the cruise: The characterization of the hydro- and transport dynamics in the region of freshwater influence. We investigated the structure of the freshwater and sediment plume, which extends from the river mouth many kilometers out into the Caribbean Sea, using a variety of methods: In addition to the lander, the onboard installed velocity meters (ADCP), the CTD probe, a towed catamaran with a measurement chain of sensors and a microstructure probe that was continuously winched up and down from the stern of the ship. For these observations, various transects had been defined on the basis of satellite images.

After these a third canyon system was explored: The La Aguja Canyon, which cuts deep into the seafloor just in front of the impressive mountain range of the Sierra Nevada de

Santa Marta. A place of (the world's most) extreme topographic gradients: From the peaks (5.775m) to the coast, it is only about 50km, from there to the 3.800m deep Colombian Basin again only 80km. The canyon is of tectonic origin, but today characterized by submarine erosion, slides and sedimentary deposition and determines the transport pathways of sediments from the shelf to the continental rise. The 115km long meandering channel is morphologically similar to those previously studied offshore the Rio Magdalena - but without their fluvial influence.

We performed a new, very detailed mapping of the seafloor by surveying with the multibeam echosounder and gained a good insight into the shallow subsurface by imaging with the parametric echosounder. The high resolution bathymetry details the steep slopes, slumps, meanders, and corresponding sedimentary deposits that we tracked in a series of stations with large box cores and 10m gravity cores from the coast to the continental shelf.

The last week of the expedition MSM112 started in the waters off La Guajira, where a transect of CTD stations was defined from water depths of 2600m towards the shallow coastal waters. Also, here additional gravity cores and box cores were taken. As in the weeks before, the weather and wave conditions were perfect for the research work and we returned to the first study area even a little earlier than planned.

At the mouth of the Rio Magdalena the sea floor observatory was recovered. The lander had been measuring for about two weeks at a depth of 30m and had recorded current profiles with several ADCPs and also other water column properties. Based on the observations of the first week and more recent satellite imagery, we could optimize our measurement program of the last days accordingly. We again combined profile measurements in the plume with the shipboard installed ADCPs and by using the towed catamaran with various CTD and current sensors. At selected stations along and across the sediment plume, we collected water samples and determined the structure and nature of the sediment plume with microstructure probes, CTD, and LISST (in-situ particle sizer).

The MSM112 research program ended with the last CTD station on the afternoon of Nov. 13, 2022, in the Rio Magdalena river mouth. We arrived in Cartagena in the morning of Nov 14, with great data series, promising samples and the best memories in our luggage.

Acknowledgements

We thank Captain Maaß and the entire crew of RV MARIA S. MERIAN for their excellent support and great spirit during the cruise. The professional working environment and supportive atmosphere on the MERIAN are greatly appreciated. Thank you very much to all institutions and people involved in making this expedition possible: The German Research Foundation, the reviewers and the Review Panel German Research Vessels, the ship management, the Research Fleet Coordination Centre, and all participating students, scientists and technicians on board and ashore.

Cruise participants

1.	Christian Winter	Chief Scientist	CAU
2.	Marius Becker	Physical Oceanography	CAU
3.	Gabriel Herbst	Technician lander	CAU
4.	Yamirka Rojas-Agramonte	Geology, heavy minerals	CAU
5.	Peter Holtermann	Physical Oceanography	IOW
6..	Robert Mars	Technician Oceanography	IOW
7.	Giuliana Diaz	Marine Geology, Box Cores	CAU
8.	Gitta Ann v. Rönn	Marine Geology, Gravity Cores	CAU
9.	Lena Jebasinski	Marine Geology, Geochemistry	CAU
10.	Kathrin Groß,	Student	CAU
11.	Rachel Barrett	Marine Geology, Hydroacoustics	CAU
12.	Oscar Alvarez	Physical Oceanography	Uni Norte
13.	Milena Benavides Serrato	Marine Biology	UNAL
14..	Yuley Cardona	Physical Oceanography	UNAL
15.	Alejandro Bustamante	Sedimentology	UNAL
16.	José M. Riascos	Marine Biology	U Ant
17.	Estefany Villanueva	Marine Geology	Uni Norte
18..	Jhon Carlos Salon Barros	Marine Biology	Uni Norte
19.	Franklin Arévalo	Physical Oceanography	Uni Norte
20.	Adriana Gracia	Marine Mammal Observer	U Ant
21.	Julian Naranjo Vesga	Marine Geology	Ecopetrol
22.	Alberto Guardo	Inspector DIMAR	DIMAR

Institutions

CAU: Christian-Albrechts-Universität zu Kiel, Institute of Geosciences, Otto-Hahn Platz 1, 24118 Kiel, Germany

IOW: Leibniz-Institut für Ostseeforschung Warnemünde, Physical Oceanography, Seestraße 15, 18119 Rostock, Germany

Uni Norte: Universidad del Norte, Department of Physics and Geosciences, Km. 5 vía Puerto Colombia, Barranquilla, Colombia

UNAL: Universidad Nacional de Colombia, Medellín, Facultad de Minas, Departamento de Geociencias y Medio Ambiente, Cra 80 No. 65-223 M2-301, Medellin, Colombia

U Ant: Universidad de Antioquia, Sede Ciencias del Mar, Carrera 28 # 107 - 49 Barrio La Lucila, Turbo, Colombia

Ecopetrol: Instituto Colombiano del Petróleo, ICP-Ecopetrol S.A, Centro de Innovación y Tecnologia de Exploración, km. 7 vía Piedecuesta, Santander, Colombia

DIMAR: Dirección General Marítima Colombiana (Dimar), Carrera 54 N°. 26-50 CAN, Bogotá, Colombia

Station list

EM122: Deep-Sea Multibeam Echosounder, EM712: Shallow-water Multibeam Echosounder, ADCP: Acoustic Doppler Current Profiler, EK80 Fish Finder Echosounder

Activity	Date / Time	Device	Position	Position	Depth	Comment
No.	[UTC]		Lat	Lon	[m]	
MSM112_1-1	20.10.2022 15:02	EM712	11° 07,593' N	074° 51,972' W	32	profile start
MSM112_1-1	20.10.2022 16:17	EM712	11° 08,256' N	074° 51,147' W	79	profile end
MSM112_2-1	20.10.2022 19:29	ADCP	11° 06,979' N	074° 52,978' W	187	profile start
MSM112_2-2	20.10.2022 19:29	EM122	11° 06,983' N	074° 52,990' W	185	profile start
MSM112_2-3	20.10.2022 19:29	Parasound	11° 06,984' N	074° 52,994' W	185	profile start
MSM112_2-4	20.10.2022 19:29	ADCP	11° 06,984' N	074° 52,994' W	185	profile start
MSM112_2-3	21.10.2022 15:38	Parasound	11° 35,297' N	074° 57,133' W	2568	profile end
MSM112_2-4	21.10.2022 15:38	ADCP	11° 35,297' N	074° 57,133' W	2568	profile end
MSM112_2-2	21.10.2022 15:38	EM122	11° 35,316' N	074° 57,118' W	2569	profile end
MSM112_2-1	21.10.2022 15:38	ADCP	11° 35,334' N	074° 57,103' W	2568	profile end
MSM112_3-1	21.10.2022 17:10	Box Corer	11° 33,469' N	074° 58,635' W	2548	
MSM112_3-3	21.10.2022 19:29	CTD	11° 33,464' N	074° 58,483' W	2559	
MSM112_3-4	21.10.2022 21:05	Gravity Corer	11° 33,469' N	074° 58,631' W	2546	
MSM112_4-1	21.10.2022 23:14	Box Corer	11° 29,376' N	075° 01,815' W	2457	
MSM112_5-1	22.10.2022 01:44	Box Corer	11° 25,102' N	075° 05,652' W	2144	
MSM112_5-2	22.10.2022 03:42	CTD	11° 24,936' N	075° 05,773' W	2138	
MSM112_6-1	22.10.2022 05:41	Box Corer	11° 22,686' N	075° 01,214' W	1483	
MSM112_7-1	22.10.2022 08:25	Box Corer	11° 19,732' N	074° 57,496' W	1356	
MSM112_7-2	22.10.2022 10:08	CTD	11° 19,969' N	074° 56,929' W	1348	
MSM112_7-3	22.10.2022 11:15	Box Corer	11° 19,969' N	074° 56,929' W	1348	
MSM112_7-4	22.10.2022 12:45	Gravity Corer	11° 19,972' N	074° 56,940' W	1347	
MSM112_7-5	22.10.2022 14:13	Box Corer	11° 19,732' N	074° 57,497' W	1354	
MSM112_8-1	22.10.2022 15:48	Box Corer	11° 15,626' N	074° 55,315' W	904	
MSM112_9-1	22.10.2022 17:29	Box Corer	11° 10,626' N	074° 55,214' W	462	
MSM112_9-2	22.10.2022 18:17	CTD	11° 10,778' N	074° 55,080' W	530	
MSM112_9-3	22.10.2022 19:14	Gravity Corer	11° 10,622' N	074° 55,221' W	463	
MSM112_10-1	22.10.2022 20:49	EM122	11° 03,214' N	074° 58,964' W	104	profile start
MSM112_10-2	22.10.2022 20:49	ADCP	11° 03,214' N	074° 58,964' W	104	profile start
MSM112_10-3	22.10.2022 20:49	Parasound	11° 03,214' N	074° 58,964' W	104	profile start
MSM112_10-4	22.10.2022 20:49	ADCP	11° 03,214' N	074° 58,964' W	104	profile start
MSM112_10-3	23.10.2022 05:52	Parasound	11° 17,717' N	074° 47,926' W	599	profile end
MSM112_10-2	23.10.2022 05:53	ADCP	11° 17,693' N	074° 47,888' W	603	profile end
MSM112_10-4	23.10.2022 05:53	ADCP	11° 17,693' N	074° 47,888' W	603	profile end
MSM112_10-1	23.10.2022 05:53	EM122	11° 17,687' N	074° 47,877' W	607	profile end
MSM112_11-1	23.10.2022 06:01	EM122	11° 18,200' N	074° 47,076' W	646	profile start
MSM112_11-2	23.10.2022 06:01	Parasound	11° 18,222' N	074° 47,054' W	651	profile start
MSM112_11-3	23.10.2022 06:02	ADCP	11° 18,239' N	074° 47,042' W	654	profile start
MSM112_11-1	23.10.2022 10:14	EM122	11° 16,173' N	075° 02,201' W	1404	profile end
MSM112_11-2	23.10.2022 10:14	Parasound	11° 16,173' N	075° 02,201' W	1404	profile end
MSM112_11-3	23.10.2022 10:14	ADCP	11° 16,173' N	075° 02,201' W	1404	profile end

MSM112_12-1	23.10.2022 12:59	EM122	10° 58,053' N	075° 07,079' W	45	profile start
MSM112_12-2	23.10.2022 12:59	Parasound	10° 58,053' N	075° 07,077' W	47	profile start
MSM112_12-3	23.10.2022 12:59	ADCP	10° 58,053' N	075° 07,077' W	47	profile start
MSM112_12-4	23.10.2022 12:59	ADCP	10° 58,053' N	075° 07,079' W	45	profile start
MSM112_12-1	24.10.2022 11:20	EM122	11° 44,466' N	075° 14,001' W	3181	profile end
MSM112_12-2	24.10.2022 11:20	Parasound	11° 44,466' N	075° 14,001' W	3181	profile end
MSM112_12-3	24.10.2022 11:20	ADCP	11° 44,466' N	075° 14,001' W	3181	profile end
MSM112_12-4	24.10.2022 11:20	ADCP	11° 44,466' N	075° 13,999' W	3181	profile end
MSM112_13-1	24.10.2022 15:00	CTD	11° 28,084' N	074° 51,096' W	1755	
MSM112_14-2	24.10.2022 19:07	ADCP	11° 28,098' N	074° 51,082' W	0	profile start
MSM112_14-3	24.10.2022 19:18	EK80	11° 27,857' N	074° 51,086' W	1740	profile start
MSM112_14-2	25.10.2022 13:24	ADCP	11° 08,165' N	074° 51,150' W	70	profile end
MSM112_14-3	25.10.2022 13:24	EK80	11° 08,168' N	074° 51,149' W	69	profile end
MSM112_15-1	25.10.2022 14:06	CTD	11° 08,412' N	074° 51,115' W	92	
MSM112_16-1	25.10.2022 16:03	CTD	11° 10,661' N	074° 51,061' W	282	
MSM112_17-1	25.10.2022 18:01	CTD	11° 12,781' N	074° 51,074' W	412	
MSM112_18-1	25.10.2022 19:35	CTD	11° 15,396' N	074° 51,073' W	534	
MSM112_19-1	25.10.2022 21:22	CTD	11° 18,171' N	074° 51,093' W	748	
MSM112_20-1	25.10.2022 23:25	CTD	11° 21,459' N	074° 50,911' W	1135	
MSM112_21-1	26.10.2022 01:24	CTD	11° 24,698' N	074° 51,053' W	1230	
MSM112_22-1	26.10.2022 03:42	CTD	11° 27,955' N	074° 51,092' W	1750	
MSM112_23-1	26.10.2022 07:17	CTD	11° 12,694' N	075° 02,108' W	1063	
MSM112_24-1	26.10.2022 09:11	CTD	11° 12,803' N	074° 56,387' W	599	
MSM112_25-1	26.10.2022 11:24	CTD	11° 12,693' N	074° 45,717' W	370	
MSM112_26-1	26.10.2022 12:53	CTD	11° 12,735' N	074° 40,180' W	377	
MSM112_27-2	26.10.2022 15:05	ADCP	11° 12,739' N	074° 40,258' W	371	profile start
MSM112_27-3	26.10.2022 15:05	EK80	11° 12,741' N	074° 40,281' W	362	profile start
MSM112_27-2	27.10.2022 00:51	ADCP	11° 12,706' N	075° 02,197' W	1068	profile end
MSM112_27-3	27.10.2022 00:51	EK80	11° 12,706' N	075° 02,197' W	1068	profile end
MSM112_28-2	27.10.2022 04:20	ADCP	11° 08,957' N	074° 50,891' W	161	profile start
MSM112_28-3	27.10.2022 04:20	EK80	11° 08,981' N	074° 50,894' W	161	profile start
MSM112_28-2	27.10.2022 09:39	ADCP	11° 28,109' N	074° 51,062' W	1759	profile end
MSM112_28-3	27.10.2022 09:39	EK80	11° 28,109' N	074° 51,062' W	1759	profile end
MSM112_31-1	28.10.2022 14:06	Box Corer	11° 44,677' N	075° 10,905' W	3163	
MSM112_31-2	28.10.2022 16:58	Gravity Corer	11° 44,677' N	075° 10,864' W	3163	
MSM112_32-1	28.10.2022 18:38	Parasound	11° 39,124' N	075° 08,061' W	2941	profile start
MSM112_32-2	28.10.2022 18:38	EM122	11° 39,124' N	075° 08,069' W	2941	profile start
MSM112_32-1	28.10.2022 19:05	Parasound	11° 39,056' N	075° 11,226' W	2879	profile end
MSM112_32-2	28.10.2022 19:05	EM122	11° 39,056' N	075° 11,228' W	2879	profile end
MSM112_32-3	28.10.2022 20:27	Box Corer	11° 39,091' N	075° 10,095' W	2844	
MSM112_32-4	28.10.2022 22:58	Box Corer	11° 39,084' N	075° 10,080' W	2833	
MSM112_33-1	29.10.2022 02:44	Box Corer	11° 24,941' N	075° 13,106' W	2157	
MSM112_33-2	29.10.2022 04:32	Gravity Corer	11° 24,935' N	075° 13,105' W	2157	
MSM112_34-1	29.10.2022 07:27	Box Corer	11° 08,706' N	075° 09,962' W	687	
MSM112_35-1	29.10.2022 09:16	Box Corer	10° 57,918' N	075° 08,274' W	48	
MSM112_36-1	29.10.2022 12:51	EM712	11° 08,220' N	074° 51,101' W	85	profile start
MSM112_36-2	29.10.2022 12:51	EM122	11° 08,220' N	074° 51,101' W	85	profile start
MSM112_36-1	29.10.2022 13:42	EM712	11° 07,861' N	074° 51,589' W	28	profile end

MSM112_36-2	29.10.2022 13:42	EM122	11° 07,861' N	074° 51,589' W	28	profile end
MSM112_37-1	29.10.2022 14:48	van Veen Grab	11° 07,915' N	074° 51,526' W	30	
MSM112_37-1	29.10.2022 14:52	van Veen Grab	11° 07,915' N	074° 51,525' W	29	
MSM112_37-1	29.10.2022 14:58	van Veen Grab	11° 07,915' N	074° 51,525' W	29	
MSM112_38-1	29.10.2022 15:21	Parasound	11° 07,915' N	074° 51,525' W	30	profile start
MSM112_38-1	29.10.2022 15:49	Parasound	11° 08,085' N	074° 51,363' W	56	profile end
MSM112_39-1	29.10.2022 16:48	Gravity Corer	11° 07,838' N	074° 51,644' W	28	
MSM112_39-2	29.10.2022 17:27	CTD	11° 07,838' N	074° 51,644' W	28	
MSM112_39-3	29.10.2022 18:19	Lander	11° 07,838' N	074° 51,644' W	27	deployed
MSM112_39-4	29.10.2022 18:27	EM712	11° 07,838' N	074° 51,644' W	28	profile start
MSM112_39-5	29.10.2022 18:27	EM122	11° 07,838' N	074° 51,644' W	28	profile start
MSM112_39-4	29.10.2022 18:32	EM712	11° 07,868' N	074° 51,649' W	32	profile end
MSM112_39-5	29.10.2022 18:32	EM122	11° 07,869' N	074° 51,649' W	32	profile end
MSM112_41-1	30.10.2022 16:17	Parasound	11° 11,389' N	075° 03,369' W	963	profile start
MSM112_41-2	30.10.2022 16:17	EM122	11° 11,389' N	075° 03,369' W	963	profile start
MSM112_41-1	30.10.2022 16:38	Parasound	11° 10,990' N	075° 05,697' W	912	profile end
MSM112_41-2	30.10.2022 16:38	EM122	11° 10,988' N	075° 05,704' W	911	profile end
MSM112_41-3	30.10.2022 17:45	Box Corer	11° 10,915' N	075° 04,968' W	943	
MSM112_42-1	30.10.2022 19:12	Box Corer	11° 07,831' N	075° 03,109' W	604	
MSM112_42-2	30.10.2022 19:51	Box Corer	11° 07,833' N	075° 02,775' W	538	
MSM112_42-3	30.10.2022 20:39	Box Corer	11° 07,833' N	075° 02,775' W	536	
MSM112_42-4	30.10.2022 21:20	Gravity Corer	11° 07,831' N	075° 02,774' W	536	
MSM112_44-1	31.10.2022 16:34	EM122	11° 10,692' N	074° 50,581' W	296	profile start
MSM112_44-1	31.10.2022 16:34	EM122	11° 10,693' N	074° 50,578' W	296	rec start
MSM112_44-2	31.10.2022 16:34	Parasound	11° 10,705' N	074° 50,500' W	304	profile start
MSM112_44-2	31.10.2022 16:34	Parasound	11° 10,706' N	074° 50,495' W	305	rec start
MSM112_44-1	31.10.2022 16:36	EM122	11° 10,723' N	074° 50,237' W	299	rec end
MSM112_44-2	31.10.2022 16:36	Parasound	11° 10,723' N	074° 50,237' W	299	rec end
MSM112_44-1	31.10.2022 16:55	EM122	11° 11,173' N	074° 46,574' W	311	rec start
MSM112_44-2	31.10.2022 16:55	Parasound	11° 11,173' N	074° 46,574' W	311	rec start
MSM112_44-1	31.10.2022 16:57	EM122	11° 11,336' N	074° 46,235' W	325	rec end
MSM112_44-2	31.10.2022 16:57	Parasound	11° 11,336' N	074° 46,235' W	325	rec end
MSM112_44-2	31.10.2022 18:07	Parasound	11° 11,539' N	074° 33,967' W	468	rec start
MSM112_44-1	31.10.2022 18:07	EM122	11° 11,539' N	074° 33,964' W	468	rec start
MSM112_44-1	31.10.2022 18:12	EM122	11° 11,411' N	074° 33,161' W	492	rec end
MSM112_44-2	31.10.2022 18:12	Parasound	11° 11,405' N	074° 33,124' W	486	rec end
MSM112_44-1	31.10.2022 19:34	EM122	11° 24,075' N	074° 31,169' W	1037	rec start
MSM112_44-2	31.10.2022 19:35	Parasound	11° 24,097' N	074° 31,167' W	1039	rec start
MSM112_44-1	31.10.2022 19:41	EM122	11° 24,998' N	074° 31,073' W	1053	rec end
MSM112_44-2	31.10.2022 19:41	Parasound	11° 24,998' N	074° 31,073' W	1053	rec end
MSM112_44-1	31.10.2022 20:59	EM122	11° 23,169' N	074° 17,985' W	672	rec start
MSM112_44-2	31.10.2022 20:59	Parasound	11° 23,158' N	074° 17,948' W	671	rec start
MSM112_44-2	31.10.2022 21:05	Parasound	11° 22,932' N	074° 17,100' W	625	rec end
MSM112_44-1	31.10.2022 21:05	EM122	11° 22,920' N	074° 17,057' W	621	rec end
MSM112_44-1	31.10.2022 21:06	EM122	11° 22,871' N	074° 16,847' W	605	profile end
MSM112_44-2	31.10.2022 21:06	Parasound	11° 22,869' N	074° 16,823' W	602	profile end
MSM112_45-1	31.10.2022 22:45	EM122	11° 22,272' N	074° 02,052' W	621	profile start
MSM112_45-2	31.10.2022 22:45	Parasound	11° 22,272' N	074° 02,052' W	621	profile start

MSM112_45-1	02.11.2022 13:12	EM122	12° 30,555' N	074° 55,048' W	3826	profile end
MSM112_45-2	02.11.2022 13:12	Parasound	12° 30,555' N	074° 55,048' W	3826	profile end
MSM112_46-1	02.11.2022 17:28	Box Corer	12° 29,161' N	074° 51,993' W	3838	
MSM112_46-2	02.11.2022 20:02	Gravity Corer	12° 29,166' N	074° 51,937' W	3838	
MSM112_46-3	03.11.2022 13:52	Gravity Corer	12° 29,166' N	074° 51,947' W	3837	
MSM112_47-1	03.11.2022 17:29	Box Corer	12° 23,209' N	074° 43,264' W	3831	
MSM112_48-1	03.11.2022 21:54	Box Corer	12° 14,054' N	074° 31,075' W	3766	
MSM112_48-2	04.11.2022 01:01	Box Corer	12° 14,048' N	074° 31,086' W	3768	
MSM112_49-1	04.11.2022 04:53	Box Corer	12° 05,274' N	074° 32,831' W	3637	
MSM112_50-1	04.11.2022 10:43	Box Corer	11° 57,312' N	074° 30,819' W	3387	
MSM112_50-2	04.11.2022 13:07	Gravity Corer	11° 56,947' N	074° 31,404' W	3369	
MSM112_51-1	04.11.2022 16:03	Box Corer	11° 51,920' N	074° 21,847' W	2702	
MSM112_52-1	04.11.2022 19:23	Box Corer	11° 48,926' N	074° 07,822' W	2019	
MSM112_52-2	04.11.2022 21:15	Box Corer	11° 48,926' N	074° 07,822' W	2018	
MSM112_52-3	04.11.2022 23:04	Box Corer	11° 48,847' N	074° 08,129' W	2020	
MSM112_52-4	05.11.2022 00:40	Box Corer	11° 48,846' N	074° 08,128' W	2011	
MSM112_53-1	05.11.2022 03:44	Box Corer	11° 37,508' N	074° 10,100' W	1594	
MSM112_54-1	05.11.2022 09:56	Box Corer	11° 27,997' N	074° 07,983' W	1187	
MSM112_54-2	05.11.2022 11:16	Gravity Corer	11° 28,178' N	074° 07,524' W	1078	
MSM112_54-3	05.11.2022 12:48	Gravity Corer	11° 28,175' N	074° 07,525' W	1078	
MSM112_55-1	05.11.2022 14:30	Box Corer	11° 23,164' N	074° 03,742' W	915	
MSM112_56-1	05.11.2022 18:24	Box Corer	11° 48,833' N	074° 08,125' W	1999	
MSM112_57-1	05.11.2022 20:22	Parasound	11° 58,859' N	074° 06,138' W	1953	profile start
MSM112_57-2	05.11.2022 20:22	EM122	11° 58,886' N	074° 06,163' W	1959	profile start
MSM112_57-3	05.11.2022 20:22	ADCP	11° 58,910' N	074° 06,188' W	1958	profile start
MSM112_57-4	05.11.2022 20:22	ADCP	11° 58,927' N	074° 06,205' W	1959	profile start
MSM112_57-1	05.11.2022 21:48	Parasound	11° 59,686' N	074° 06,844' W	2014	profile end
MSM112_57-2	05.11.2022 21:48	EM122	11° 59,686' N	074° 06,844' W	2014	profile end
MSM112_57-3	05.11.2022 21:48	ADCP	11° 59,686' N	074° 06,844' W	2014	profile end
MSM112_57-4	05.11.2022 21:48	ADCP	11° 59,686' N	074° 06,844' W	2014	profile end
MSM112_57-5	05.11.2022 22:34	CTD	11° 59,688' N	074° 06,845' W	2014	
MSM112_57-6	06.11.2022 00:12	Box Corer	11° 59,647' N	074° 06,890' W	2015	
MSM112_58-1	06.11.2022 02:22	Parasound	12° 06,810' N	073° 56,112' W	1787	profile start
MSM112_58-2	06.11.2022 02:22	EM122	12° 06,836' N	073° 56,078' W	1787	profile start
MSM112_58-3	06.11.2022 02:22	ADCP	12° 06,858' N	073° 56,047' W	1783	profile start
MSM112_58-4	06.11.2022 02:23	ADCP	12° 06,899' N	073° 55,990' W	1775	profile start
MSM112_58-4	06.11.2022 03:38	ADCP	12° 07,992' N	073° 54,940' W	1687	profile end
MSM112_58-3	06.11.2022 03:38	ADCP	12° 07,989' N	073° 54,943' W	1685	profile end
MSM112_58-2	06.11.2022 03:38	EM122	12° 07,986' N	073° 54,947' W	1686	profile end
MSM112_58-1	06.11.2022 03:38	Parasound	12° 07,983' N	073° 54,951' W	1687	profile end
MSM112_58-5	06.11.2022 04:26	CTD	12° 07,876' N	073° 55,096' W	1687	
MSM112_58-6	06.11.2022 06:08	Box Corer	12° 07,869' N	073° 55,096' W	1685	
MSM112_59-1	06.11.2022 08:59	Parasound	12° 15,150' N	073° 44,669' W	2433	profile start
MSM112_59-2	06.11.2022 08:59	EM122	12° 15,175' N	073° 44,636' W	2436	profile start
MSM112_59-3	06.11.2022 08:59	ADCP	12° 15,194' N	073° 44,610' W	2438	profile start
MSM112_59-4	06.11.2022 09:00	ADCP	12° 15,207' N	073° 44,593' W	2440	profile start
MSM112_59-1	06.11.2022 10:05	Parasound	12° 15,883' N	073° 43,601' W	2507	profile end
MSM112_59-2	06.11.2022 10:05	EM122	12° 15,883' N	073° 43,601' W	2507	profile end

MSM112_59-3	06.11.2022 10:05	ADCP	12° 15,883' N	073° 43,601' W	2507	profile end
MSM112_59-4	06.11.2022 10:05	ADCP	12° 15,883' N	073° 43,601' W	2507	profile end
MSM112_59-5	06.11.2022 11:04	CTD	12° 15,845' N	073° 43,651' W	2501	
MSM112_59-6	06.11.2022 12:57	Box Corer	12° 15,845' N	073° 43,651' W	2501	
MSM112_60-1	06.11.2022 15:32	Parasound	12° 24,428' N	073° 31,511' W	2575	profile start
MSM112_60-2	06.11.2022 15:32	EM122	12° 24,450' N	073° 31,478' W	2574	profile start
MSM112_60-3	06.11.2022 15:32	ADCP	12° 24,467' N	073° 31,454' W	2573	profile start
MSM112_60-4	06.11.2022 15:32	ADCP	12° 24,480' N	073° 31,434' W	2570	profile start
MSM112_60-4	06.11.2022 16:44	ADCP	12° 25,083' N	073° 30,586' W	2568	profile end
MSM112_60-3	06.11.2022 16:44	ADCP	12° 25,083' N	073° 30,586' W	2569	profile end
MSM112_60-2	06.11.2022 16:44	EM122	12° 25,083' N	073° 30,586' W	2569	profile end
MSM112_60-1	06.11.2022 16:44	Parasound	12° 25,083' N	073° 30,586' W	2568	profile end
MSM112_60-5	06.11.2022 17:41	CTD	12° 25,081' N	073° 30,585' W	2569	
MSM112_60-6	06.11.2022 19:38	Box Corer	12° 25,088' N	073° 30,579' W	2569	
MSM112_61-1	06.11.2022 21:53	Parasound	12° 31,581' N	073° 20,813' W	2670	profile start
MSM112_61-2	06.11.2022 21:53	EM122	12° 31,581' N	073° 20,813' W	2670	profile start
MSM112_61-3	06.11.2022 21:53	ADCP	12° 31,581' N	073° 20,813' W	2670	profile start
MSM112_61-4	06.11.2022 21:53	ADCP	12° 31,581' N	073° 20,813' W	2670	profile start
MSM112_61-1	06.11.2022 23:00	Parasound	12° 32,336' N	073° 19,679' W	2665	profile end
MSM112_61-2	06.11.2022 23:00	EM122	12° 32,336' N	073° 19,679' W	2665	profile end
MSM112_61-3	06.11.2022 23:00	ADCP	12° 32,336' N	073° 19,679' W	2665	profile end
MSM112_61-4	06.11.2022 23:00	ADCP	12° 32,336' N	073° 19,679' W	2665	profile end
MSM112_61-5	07.11.2022 00:03	CTD	12° 32,272' N	073° 19,810' W	2667	
MSM112_61-6	07.11.2022 02:05	Box Corer	12° 32,272' N	073° 19,809' W	2666	
MSM112_61-7	07.11.2022 03:46	Gravity Corer	12° 32,272' N	073° 19,810' W	2667	
MSM112_62-1	07.11.2022 09:00	Parasound	12° 42,884' N	073° 03,885' W	2721	profile start
MSM112_62-2	07.11.2022 09:00	EM122	12° 42,884' N	073° 03,885' W	2721	profile start
MSM112_62-3	07.11.2022 09:00	ADCP	12° 42,884' N	073° 03,885' W	2721	profile start
MSM112_62-4	07.11.2022 09:00	ADCP	12° 42,884' N	073° 03,885' W	2721	profile start
MSM112_62-1	07.11.2022 10:14	Parasound	12° 43,874' N	073° 02,960' W	2720	profile end
MSM112_62-2	07.11.2022 10:14	EM122	12° 43,874' N	073° 02,960' W	2720	profile end
MSM112_62-3	07.11.2022 10:14	ADCP	12° 43,874' N	073° 02,960' W	2720	profile end
MSM112_62-4	07.11.2022 10:14	ADCP	12° 43,874' N	073° 02,960' W	2720	profile end
MSM112_62-5	07.11.2022 11:18	CTD	12° 43,811' N	073° 02,999' W	2723	
MSM112_62-6	07.11.2022 13:22	Box Corer	12° 43,834' N	073° 03,006' W	2722	
MSM112_63-1	07.11.2022 17:49	Parasound	12° 13,629' N	072° 52,618' W	472	profile start
MSM112_63-2	07.11.2022 17:49	EM122	12° 13,607' N	072° 52,616' W	472	profile start
MSM112_63-3	07.11.2022 17:49	ADCP	12° 13,578' N	072° 52,612' W	471	profile start
MSM112_63-4	07.11.2022 17:49	ADCP	12° 13,555' N	072° 52,610' W	470	profile start
MSM112_63-1	07.11.2022 18:45	Parasound	12° 12,212' N	072° 53,761' W	451	profile end
MSM112_63-2	07.11.2022 18:45	EM122	12° 12,210' N	072° 53,771' W	454	profile end
MSM112_63-3	07.11.2022 18:45	ADCP	12° 12,206' N	072° 53,797' W	453	profile end
MSM112_63-4	07.11.2022 18:45	ADCP	12° 12,204' N	072° 53,811' W	453	profile end
MSM112_63-5	07.11.2022 19:31	Box Corer	12° 11,222' N	072° 52,202' W	388	
MSM112_63-6	07.11.2022 20:10	Gravity Corer	12° 11,229' N	072° 52,203' W	392	
MSM112_64-1	07.11.2022 22:35	EM122	11° 52,456' N	072° 57,290' W	404	profile start
MSM112_64-2	07.11.2022 22:35	Parasound	11° 52,456' N	072° 57,290' W	404	profile start
MSM112_64-3	07.11.2022 22:35	ADCP	11° 52,456' N	072° 57,290' W	404	profile start

MSM112_64-4	07.11.2022 22:35	ADCP	11° 52,456' N	072° 57,290' W	404	profile start
MSM112_64-1	07.11.2022 23:44	EM122	11° 51,843' N	072° 58,257' W	656	rec end
MSM112_64-2	07.11.2022 23:44	Parasound	11° 51,843' N	072° 58,257' W	656	rec end
MSM112_64-3	07.11.2022 23:44	ADCP	11° 51,843' N	072° 58,257' W	656	profile end
MSM112_64-4	07.11.2022 23:44	ADCP	11° 51,843' N	072° 58,257' W	656	profile end
MSM112_64-5	08.11.2022 00:11	CTD	11° 51,836' N	072° 58,272' W	661	
MSM112_64-6	08.11.2022 01:21	Box Corer	11° 51,431' N	072° 57,980' W	808	
MSM112_65-1	08.11.2022 04:07	CTD	12° 00,999' N	073° 06,716' W	1856	
MSM112_66-1	08.11.2022 09:57	Parasound	12° 08,566' N	073° 14,351' W	2483	profile start
MSM112_66-2	08.11.2022 09:57	EM122	12° 08,566' N	073° 14,351' W	2483	profile start
MSM112_66-3	08.11.2022 09:57	ADCP	12° 08,566' N	073° 14,351' W	2483	profile start
MSM112_66-4	08.11.2022 09:57	ADCP	12° 08,566' N	073° 14,351' W	2483	profile start
MSM112_66-1	08.11.2022 11:14	Parasound	12° 09,724' N	073° 15,007' W	2440	profile end
MSM112_66-2	08.11.2022 11:14	EM122	12° 09,724' N	073° 15,007' W	2440	profile end
MSM112_66-3	08.11.2022 11:14	ADCP	12° 09,724' N	073° 15,007' W	2440	profile end
MSM112_66-4	08.11.2022 11:14	ADCP	12° 09,724' N	073° 15,007' W	2440	profile end
MSM112_66-5	08.11.2022 12:11	CTD	12° 09,680' N	073° 15,001' W	2437	
MSM112_66-6	08.11.2022 14:07	Box Corer	12° 09,655' N	073° 15,015' W	2435	
MSM112_67-1	08.11.2022 17:46	CTD	12° 17,872' N	073° 23,102' W	2674	
MSM112_68-1	09.11.2022 03:34	Box Corer	11° 23,058' N	074° 17,615' W	655	
MSM112_68-2	09.11.2022 04:11	Gravity Corer	11° 23,058' N	074° 17,615' W	656	
MSM112_69-1	09.11.2022 10:04	Parasound	11° 11,569' N	074° 32,743' W	495	profile start
MSM112_69-2	09.11.2022 10:04	EM122	11° 11,569' N	074° 32,743' W	495	profile start
MSM112_69-3	09.11.2022 10:04	ADCP	11° 11,569' N	074° 32,743' W	495	profile start
MSM112_69-4	09.11.2022 10:04	ADCP	11° 11,569' N	074° 32,743' W	495	profile start
MSM112_69-1	09.11.2022 11:00	Parasound	11° 11,497' N	074° 33,599' W	480	profile end
MSM112_69-2	09.11.2022 11:00	EM122	11° 11,497' N	074° 33,599' W	480	profile end
MSM112_69-3	09.11.2022 11:00	ADCP	11° 11,497' N	074° 33,599' W	480	profile end
MSM112_69-4	09.11.2022 11:00	ADCP	11° 11,497' N	074° 33,599' W	480	profile end
MSM112_69-5	09.11.2022 11:17	Box Corer	11° 11,481' N	074° 33,605' W	469	
MSM112_69-6	09.11.2022 12:08	Gravity Corer	11° 11,483' N	074° 33,604' W	476	
MSM112_70-1	09.11.2022 13:42	Parasound	11° 23,949' N	074° 31,928' W	1035	profile start
MSM112_70-2	09.11.2022 13:43	EM122	11° 23,984' N	074° 31,924' W	1034	profile start
MSM112_70-3	09.11.2022 13:43	ADCP	11° 24,019' N	074° 31,921' W	1036	profile start
MSM112_70-4	09.11.2022 13:43	ADCP	11° 24,046' N	074° 31,917' W	1036	profile start
MSM112_70-1	09.11.2022 14:48	Parasound	11° 24,826' N	074° 30,341' W	1057	profile end
MSM112_70-2	09.11.2022 14:48	EM122	11° 24,816' N	074° 30,331' W	1054	profile end
MSM112_70-3	09.11.2022 14:48	ADCP	11° 24,807' N	074° 30,322' W	1052	profile end
MSM112_70-4	09.11.2022 14:48	ADCP	11° 24,799' N	074° 30,315' W	1054	profile end
MSM112_70-5	09.11.2022 15:16	Box Corer	11° 24,600' N	074° 30,273' W	1049	
MSM112_70-6	09.11.2022 16:18	Gravity Corer	11° 24,600' N	074° 30,273' W	1049	
MSM112_70-7	09.11.2022 17:31	Gravity Corer	11° 24,597' N	074° 30,276' W	1049	
MSM112_71-1	09.11.2022 21:18	Parasound	11° 18,903' N	075° 01,965' W	1502	profile start
MSM112_71-2	09.11.2022 21:18	EM122	11° 18,905' N	075° 01,965' W	1502	profile start
MSM112_71-3	09.11.2022 21:18	ADCP	11° 18,905' N	075° 01,965' W	1502	profile start
MSM112_71-4	09.11.2022 21:18	ADCP	11° 18,905' N	075° 01,965' W	1502	profile start
MSM112_71-1	09.11.2022 21:54	Parasound	11° 19,742' N	075° 00,905' W	1480	profile end
MSM112_71-2	09.11.2022 21:54	EM122	11° 19,742' N	075° 00,905' W	1480	profile end

MSM112_71-3	09.11.2022 21:54	ADCP	11° 19,742' N	075° 00,905' W	1480	profile end
MSM112_71-4	09.11.2022 21:54	ADCP	11° 19,742' N	075° 00,905' W	1480	profile end
MSM112_71-5	09.11.2022 22:30	Box Corer	11° 19,685' N	075° 01,015' W	1489	
MSM112_39-6	11.11.2022 14:26	CTD	11° 07,850' N	074° 51,623' W	28	
MSM112_39-3	11.11.2022 14:33	Lander	11° 07,856' N	074° 51,625' W	28	on deck
MSM112_74-2	11.11.2022 21:03	CTD	11° 12,778' N	074° 40,170' W	375	
MSM112_74-5	11.11.2022 22:55	CTD	11° 12,704' N	074° 43,221' W	351	
MSM112_75-2	12.11.2022 13:39	CTD	11° 28,348' N	074° 51,219' W	1758	
MSM112_75-5	12.11.2022 15:24	CTD	11° 24,670' N	074° 51,073' W	1222	
MSM112_75-8	12.11.2022 16:52	CTD	11° 21,491' N	074° 51,109' W	1178	
MSM112_75-11	12.11.2022 18:35	CTD	11° 18,195' N	074° 51,145' W	752	
MSM112_75-14	12.11.2022 20:04	CTD	11° 15,406' N	074° 51,125' W	537	
MSM112_75-17	12.11.2022 21:28	CTD	11° 12,736' N	074° 51,150' W	408	
MSM112_75-20	12.11.2022 22:35	CTD	11° 10,584' N	074° 51,129' W	267	
MSM112_75-23	12.11.2022 23:52	CTD	11° 08,254' N	074° 51,129' W	78	
MSM112_77-1	13.11.2022 13:37	CTD	11° 08,345' N	075° 02,176' W	740	
MSM112_77-4	13.11.2022 14:42	CTD	11° 08,319' N	074° 59,608' W	357	
MSM112_77-7	13.11.2022 15:43	CTD	11° 08,292' N	074° 56,447' W	239	
MSM112_77-10	13.11.2022 16:41	CTD	11° 08,316' N	074° 53,749' W	186	
MSM112_77-13	13.11.2022 17:41	CTD	11° 08,364' N	074° 51,090' W	94	
MSM112_77-16	13.11.2022 18:40	CTD	11° 08,253' N	074° 48,740' W	133	
MSM112_77-19	13.11.2022 19:37	CTD	11° 08,242' N	074° 45,868' W	128	
MSM112_77-21	13.11.2022 20:12	CTD	11° 08,207' N	074° 43,033' W	46	
MSM112_77-23	13.11.2022 20:50	CTD	11° 08,215' N	074° 39,997' W	68	