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## Short Cruise Report

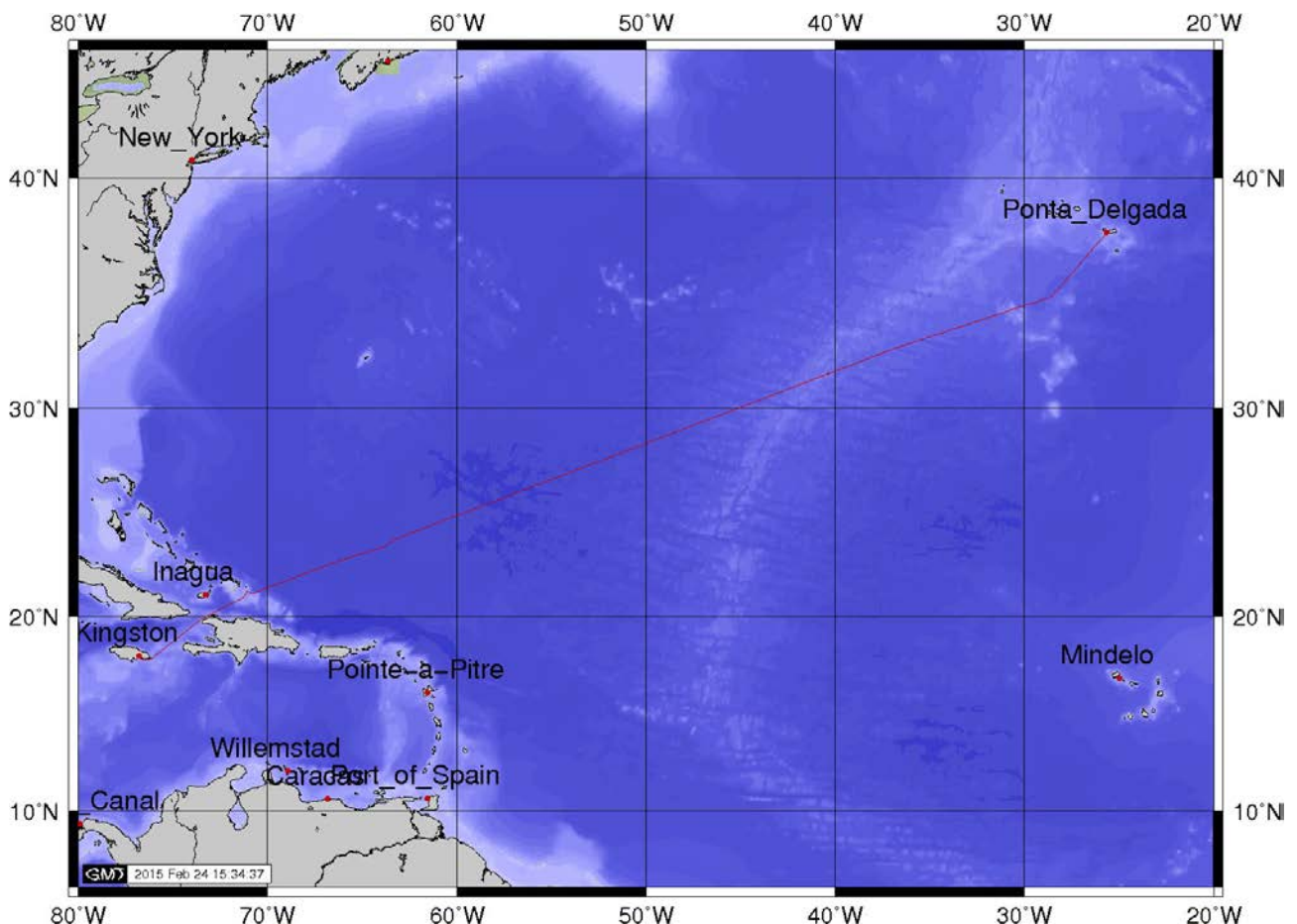
### METEOR M113/2

**Chief Scientist: Michael Siccha**

**Master: Michael Schneider**

### Objectives

Planktic foraminifera are amongst the most widely employed biological proxies for the reconstructions of the paleoenvironmental conditions of the world oceans. Nonetheless is our knowledge about their ecology and parameters controlling their distribution in the recent oceans incomplete. Sampling efforts with a consistent taxonomy and a comprehensive and accurate recording of the environmental conditions of the habitat of the sampled assemblages are required to improve our understanding of planktic foraminifera



ecology. This knowledge can then be transferred on the interpretation of fossil assemblages and ameliorate paleoenvironmental reconstructions. The track of FS METEOR for this transit cruise poses an excellent opportunity to sample the sparsely investigated regions of the oligotrophic central gyre of the North Atlantic.

Another focus of our work is the establishment of the environmental sequencing approach for the determination of the species composition of planktic foraminifera assemblages. To this end replicate samples analysed via environmental sequencing and the traditional approach are required for validation. Patchiness in the distribution of planktic (and other) organisms is a well documented phenomenon in the biological sciences. In the field of paleoceanography however this issue is mostly ignored due to the time and cost constraints of sampling. On this cruise we want to conduct a test sampling scheme for the quantification of the patchiness in the spatial distribution of planktic foraminifera in the water column. In contrast to two-dimensional terrestrial studies this task poses more of a challenge in the three-dimensional environment of the ocean.

Another aim of the cruise was to obtain water samples for analysis of Endosulfan and other halogenated chemicals. Endosulfan is globally used neurotoxic pesticide, introduced as replacement for DDT, that was just recently prohibited in most countries (e.g. not in India). Data from the transect through the Atlantic will be used for model validation.

In summary the scientific objectives of the cruise are:

- Sampling of the planktic foraminifera assemblages along the cruise track together with accurately co-registered environmental data of the water column
- Obtain replicate filter samples of the sampled planktic foraminifera assemblages for environmental sequencing
- Conduct a test-sampling scheme for the patchiness of spatial distribution of planktic foraminifera
- Obtain water samples along the cruise track for the analysis the recently prohibited neurotoxic pesticide Endosulfan

## **Cruise Narrative**

The scientific crew of transit cruise M113/2 boarded the METEOR anchored in the Port of Ponta Delgada in the Azores on the morning of Friday, 23<sup>th</sup> of January. Friday and Saturday were used to set up our equipment, which had arrived via air freight. After leaving the EEZ of the Azores we began our station work on the 25<sup>th</sup> of January at 8 am with our standard sampling scheme of a CTD cast down to 1000 m followed by three multiple-closing-net casts down to 700, 100 and 500 m. The available station time and relatively low abundance of plankton in the net hauls allowed us to extend our working programme to two stations per day at 8 am and 2 pm. Deployment depth of the CTD cast was reduced to 800 m during the second daily station. We conducted two-station-sampling-pattern on the 26<sup>th</sup> and 27<sup>th</sup> of January. On the 26<sup>th</sup> we also ran an additional test station with a single multiple-closing-net cast down to 250 m with 65 µm mesh width.

This cast was not successful as even with reduced heaving speed, one net ruptured along the seam and two more broke loose from their buckets at the cod end. The two collecting nets were those from the two lowermost sampling intervals and the collected material did not show a significantly different composition from the material collected with 100 µm mesh width. We conducted our spatial autocorrelation sampling scheme on the 28<sup>th</sup> of January, where sampled the water column at nine defined positions in short distances with a total of 18 multiple-closing-net and two CTD casts. We work began at 8 am in the morning and was concluded at 7 pm. We incorporated the current direction and strength into the sampling scheme with the help of the bridge instruments and crew. The final relative distances of the stations to each other will be determined with the data from the ships Acoustic-Doppler-Current-Profiler (ADCP). Thanks to the efforts of the WTD, we were later during the cruise able to interface our computers with the ships navigational data system, and will thus for future sampling attempts be able to employ the available online data in more sophisticated way.

From the 29<sup>th</sup> of January to the 1<sup>st</sup> of February we continued our two-station-sampling-pattern. The continual observation of a well-defined deep chlorophyll maximum in the CTD data, prompted an extension of our sampling pattern by a fourth net at each of the two daily stations for the days from the 2<sup>nd</sup> to the 4<sup>th</sup> of February.

With this additional net cast we specifically targeted and bracketed the deep chlorophyll maximum in order to examine any potential planktic foraminifera habitat preferences in detail. The depth intervals of this additional were based on the fluorometric data from the preceding CTD cast. Saturday the 31<sup>st</sup> of January to Monday the 2<sup>nd</sup> February were the only bumpy days of the whole cruise, where wave heights reached 4 meters. Apart from these days the whole cruise passed under for the season and region unusually calm weather conditions. Sampling of the last station was conducted in the afternoon of the 5<sup>th</sup> of February before entering the EEZ of the Dominican Republic. The remaining time until reaching Kingston was used for demobilization of the equipment and data consolidation. On the morning of Monday the 9<sup>th</sup> of February the METEOR berthed in the port of Kingston in Jamaica, terminating cruise M113/2.

## Acknowledgements

We would like thank the Control Station German Research Vessels in Hamburg for their support in organizing this cruise in the short time available. The cruise was coordinated and carried out by MARUM Center for Marine Environmental Sciences at the University of Bremen. It was financed by the Deutsche Forschungsgemeinschaft [DFG]. We would like to extend our particular gratitude to the master of the vessel Michael Schneider and his whole crew for their continued support and pleasant atmosphere aboard RV METEOR.

## Participants

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Margret Bayer	Technician	Univ. Tübingen
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## Station list

Ship Station Name	GeoB Station name	Date [UTC]	Latitude [deg]	Longitude [deg]	Depth [m]	CTD profile [m]	Fluorospectrometer intervals	Deep multinet [0-700 m]	Shallow multinet [0-100 m]	Filter multinet [0-500 m]	Mixed Layer multinet [0~250 m]
M113/2-33	GeoB19601	2015/01/25	34,659	-29,682	3554,3	1000	24	1	1	1	-
M113/2-34	GeoB19602	2015/01/26	33,592	-33,690	3112,9	1000	24	1	1	1	-
M113/2-35	GeoB19603	2015/01/26	33,472	-34,113	3055,9	-	-	-	-	-	1
M113/2-36	GeoB19604	2015/01/26	33,421	-34,256	3150,6	800	24	1	1	1	-
M113/2-37	GeoB19605	2015/01/27	32,671	-37,012	3341,8	1000	24	1	1	1	-
M113/2-38	GeoB19606	2015/01/27	32,476	-37,582	3092,5	800	24	1	1	1	-
M113/2-39	GeoB19607	2015/01/28	31,578	-40,367	2874,4	400	48	-	-	-	18
M113/2-40	GeoB19608	2015/01/29	30,840	-42,596	3134,5	1000	24	1	1	1	-
M113/2-41	GeoB19609	2015/01/29	30,659	-43,155	3505,8	800	24	1	1	1	-
M113/2-42	GeoB19610	2015/01/30	29,691	-46,079	4191,6	1000	24	1	1	1	-
M113/2-43	GeoB19611	2015/01/30	29,595	-46,363	4195,2	800	24	1	1	1	-
M113/2-44	GeoB19612	2015/01/31	28,583	-49,364	4411,1	1000	24	1	1	1	-
M113/2-45	GeoB19613	2015/01/31	28,394	-49,934	4729,3	800	24	1	1	1	-
M113/2-46	GeoB19614	2015/02/01	27,472	-52,664	5554,5	1000	24	1	1	1	-
M113/2-47	GeoB19615	2015/02/01	27,280	-53,216	5762,6	800	24	1	1	1	-
M113/2-48	GeoB19616	2015/02/02	26,377	-55,874	5956,8	1000	24	1	1	1	1
M113/2-49	GeoB19617	2015/02/02	26,209	-56,373	6446,1	800	24	1	1	1	1
M113/2-50	GeoB19618	2015/02/03	25,277	-59,064	5560,2	1000	24	1	1	1	1
M113/2-51	GeoB19619	2015/02/03	25,100	-59,591	6011,0	800	24	1	1	1	1
M113/2-52	GeoB19620	2015/02/04	24,063	-62,544	5890,3	1000	24	1	1	1	1
M113/2-53	GeoB19621	2015/02/04	23,853	-63,108	5851,6	800	23	1	1	1	1
M113/2-54	GeoB19622	2015/02/05	23,167	-64,753	5830,3	1000	24	1	1	1	-