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Short Cruise Report

Meteor M118

Rostock – Sal (Cape Verde)

20.08.15 – 04.09.15

Chief Scientist: Thorsten Stoeck

Captain: Michael Schneider



Objectives

Latitudinal diversity gradients in marine protistan plankton (ProLDG)

“The nearer we approach the tropics, the greater the increase in the variety of structure, grace of form, and mixture of colors, as also in perpetual youth and vigor of organic life”. (Alexander von Humboldt, 1807).

Explaining Latitudinal Diversity Gradients (LDG) is one of the biggest challenges and a key question in ecology. Understanding of spatial diversity structures is highly relevant for applied issues of major concern to humankind, including the control of diseases and their vectors, the effects of global climate change on biodiversity (loss) and ecosystem function(ing) and services, and the spread of invasive species. LDGs are well known and described for macroorganisms since more than two centuries. Due to the scarcity of adequate geographic microbial community surveys and the approaches to analyse such patterns, investigations of LDGs in protistan plankton, an essential component for marine ecosystem function(ing) are still in its infancies. The handful of available studies, all of which are based on meta-data collections from the literature, paint different pictures regarding the presence, absence and strength of LDGs in protistan plankton. Therefore, inferences of hypotheses on mechanisms shaping such patterns are nearly impossible. *The transit cruise of RV Meteor from Rostock to Cape Verde was a unique opportunity to collect a hitherto unprecedented solid (molecular genotype) dataset to infer possible LDGs and predictors of marine protistan plankton diversity.*

The main objective of this project is to reveal whether microbial plankton diversity and distribution is governed by similar rules as macroorganisms.

Narrative

We left Rostock harbour on September 20th at 9 am local time. While passing the Baltic Sea, the “Nord-Ostsee-Kanal”, the North Sea and the English Channel, we got our gear and equipment ready for sampling and sample processing. This was supported by the vessel’s WTD (Wissenschaftlich Technischer Dienst), which made all preparations very smoothly. In a meeting with the captain and part of the crew we discussed and planned the cruise and sampling procedures in detail.

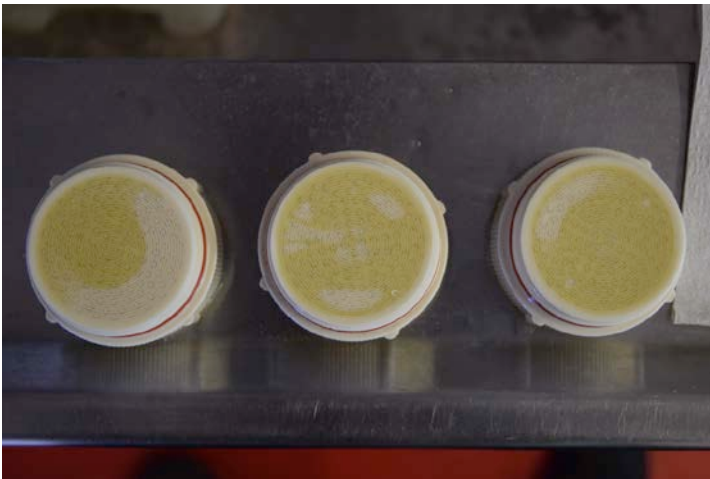
On August 23rd at 3.25 am we reached our first sampling site in the Western English Channel (UK territory). In the first CTD cast, communication with the CTD deck unit failed. Thanks to the support of the WTD, this problem could be solved quickly, and the CTD was ready to operate for the first cast. Probes connected to the CTD were: temperature, salinity, conductivity, oxygen, PAR and fluorescence. With the fluorescence probe, we identified the deep chlorophyll maximum (DCM). It was decided to sample the DCM at all stations to have comparative samples (samples collected in the same “habitat type” are more adequate for a comparison than samples collected at the same depth; the choice of the DCM was based on a very constructive and helpful reviewer comment on my original proposal). The DCM was clearly visible based on fluorescence peaks at every station. Sample depth for DCM varied notable between stations, ranging from ca. 40 m to ca. 140 m. CTD sampling at all sites went very smoothly and from the Niskin bottles we collected water for hydrochemical analyses, virus counts, protistan plankton counts, metazooplankton counts, bacterial counts, nutrient measurements, quantification of organic matter and DNA filters for protists, fungi and bacteria. Furthermore, samples for the quantification of DMSO (dimethylsulfoxide), an organo sulphur compound, were collected for a colleague (Daniel Vaultot) at the Station Biologique Roscoff (CNRS).

With the exception of few stations in the Bay of Biscay, we were lucky enough to obtain samples from all stations. In the Bay of Biscay, very strong winds and high waves action did not enable sampling of three stations.

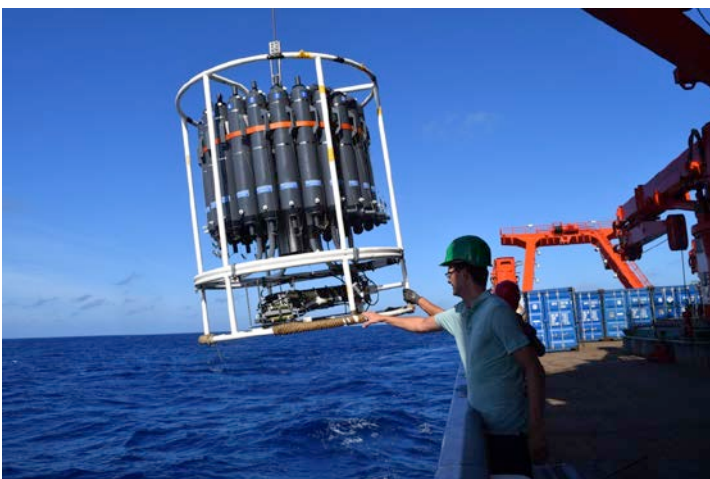
One “non-scientific” highlight included the approach of Madeira, where we stopped only shortly (30 minutes) to take two technicians on board to test newly installed winches. Electronic systems. Because we were well on schedule, it would have been nice to make a few hours stop at this island. Unfortunately, this request was turned down by the managing-owner Briese Research. The work of the two technicians did neither interfere with our own sampling nor did it disturb the schedule in any way.

With the exception of two incidences, the whole cruise went very smoothly and comfortably. One of these incidences regards our peristaltic pump, which we brought on

board for the filtration of plankton on filters for DNA extraction. An electric connector on our pump broke and it was only due to the help of WTD that we could continue working with this pump and DNA filtration. This is just one example I want to mention representative of the support we obtained from the Meteor crew. Likewise, the ship's command was extremely supportive. Representative for this support I here describe the second incidence that we encountered, which was solved in best practice by the ship's command. During the cruise we have learned from our sample transportation company (World Courier) that there is against previous assumptions and against the quote we obtained from World Courier no possibility to obtain and transport dry ice on the Cap Verde islands. The only option was to fly dry ice immediately from Lisbon (Portugal) to Sal, an island that was offside the original cruise track (originally, Mindelo on the island Sao Vicente was planned). Despite a high organizational and administrative effort, the captain made it possible on very short notice to deliver the scientific team and the samples to the harbour of Sal (Palmeira), where a courier with dry ice expected us. The valuable samples as well as we ourselves made it back home from Sal safe and sound.



Filtered water samples from the DCM.



Operating the CTD



Wrapping up the samples for transport back to Germany

Acknowledgements

In sum we look back at an extraordinarily successful, comfortable and exciting cruise M118. This is due to the whole team on board Meteor during M118: Above all, thanks to the ship's command for guiding us safely through the wildest Atlantic waters and for always making the right judgements of and calls at all situations during this cruise. Our thanks also goes to the WTD, who always made our electronic equipment work under the most difficult circumstances and at all times, day or night. Thanks to the Steward and the "kitchen team" for taking so good care of us. Thanks to the deck team for their continuous support. Thanks to the Doc for keeping us fit and able to do our jobs on board and thanks to the Sysman to take such good care of our data. Thanks to the "Weathermen" to provide us with the prospects, which helped planning stations and sampling. To the machine team, thanks a lot for the interesting insides into Meteor's belly and to keep the ship always going. Without this whole team, the cruise would not have been the same! Thanks also to the DFG-Senatskommission Ozean, which enabled this project and also to the Leitstelle Deutsche Forschungsschiffe in Hamburg for their excellent support in preparation of this cruise!

Participants

1. Thorsten Stoeck	Fahrtleiter / <i>Chief Scientist</i>	TU Kaiserslautern
2. Sabine Filker	Senior Scientist, CTD, sampling sample processing	TU KL
3. Hans-Werner Breiner	Technician, CTD, sampling sample processing	TU KL
4. Steffen Kühner	Scientist, CTD, sampling sample processing	TU KL

Stationslist

Station	Date	Time UTC	PositionLat	PositionLon
ME 118/638-1	8/23/15	3:25	49° 18,99' N	005° 12,01' W
ME 118/639-1	8/23/15	8:30	48° 42,01' N	005° 52,38' W
ME 118/640-1	8/23/15	13:00	48° 05,41' N	006° 25,91' W
ME 118/641-1	8/23/15	17:10	47° 26,64' N	006° 59,20' W
ME 118/642-1	8/24/15	12:21	44° 31,59' N	009° 24,23' W
ME 118/643-1	8/24/15	18:53	43° 34,60' N	010° 09,76' W
ME 118/644-1	8/25/15	0:38	42° 54,46' N	010° 41,62' W
ME 118/645-1	8/25/15	5:21	42° 15,14' N	011° 12,36' W
ME 118/646-1	8/25/15	9:21	41° 36,96' N	011° 41,57' W
ME 118/647-1	8/25/15	13:52	40° 56,90' N	012° 12,27' W
ME 118/648-1	8/25/15	18:16	40° 18,39' N	012° 40,94' W
ME 118/649-1	8/25/15	22:41	39° 37,05' N	013° 07,83' W
ME 118/650-1	8/26/15	2:59	38° 57,31' N	013° 33,78' W
ME 118/651-1	8/26/15	7:18	38° 17,24' N	013° 59,16' W
ME 118/652-1	8/26/15	11:42	37° 36,94' N	014° 25,02' W
ME 118/653-1	8/26/15	16:05	36° 56,40' N	014° 50,67' W
ME 118/654-1	8/26/15	20:17	36° 16,03' N	015° 15,66' W
ME 118/655-1	8/27/15	0:27	35° 35,12' N	015° 41,15' W
ME 118/656-1	8/27/15	4:51	34° 54,79' N	016° 05,88' W
ME 118/657-1	8/27/15	9:07	34° 14,81' N	016° 30,86' W
ME 118/658-1	8/27/15	13:31	33° 34,14' N	016° 56,41' W
ME 118/659-1	8/27/15	17:50	32° 53,98' N	017° 20,41' W
ME 118/660-1	8/28/15	2:39	32° 11,97' N	017° 39,61' W
ME 118/661-1	8/28/15	6:54	31° 30,36' N	017° 59,50' W
ME 118/662-1	8/28/15	11:29	30° 47,68' N	018° 19,71' W
ME 118/663-1	8/28/15	15:55	30° 04,62' N	018° 39,34' W
ME 118/664-1	8/28/15	20:05	29° 24,05' N	018° 58,16' W
ME 118/665-1	8/29/15	0:20	28° 42,58' N	019° 17,70' W
ME 118/666-1	8/29/15	4:27	28° 00,26' N	019° 36,51' W
ME 118/667-1	8/29/15	8:45	27° 18,02' N	019° 56,14' W
ME 118/668-1	8/29/15	12:58	26° 37,46' N	020° 14,17' W
ME 118/669-1	8/29/15	20:14	25° 54,46' N	020° 33,67' W
ME 118/670-1	8/30/15	0:46	25° 12,84' N	020° 52,04' W
ME 118/671-1	8/30/15	4:56	24° 30,59' N	021° 10,72' W
ME 118/672-1	8/30/15	9:19	23° 48,87' N	021° 29,24' W
ME 118/673-1	8/30/15	13:41	23° 08,59' N	021° 47,33' W
ME 118/674-1	8/30/15	19:21	22° 29,19' N	022° 04,20' W
ME 118/675-1	8/31/15	1:27	21° 46,14' N	022° 23,17' W
ME 118/676-1	8/31/15	7:05	21° 06,09' N	022° 40,65' W
ME 118/677-1	8/31/15	22:41	20° 22,87' N	022° 59,32' W
ME 118/678-1	9/1/15	12:22	19° 43,15' N	023° 16,44' W
ME 118/679-1	9/1/15	17:22	19° 00,04' N	023° 35,14' W
ME 118/680-1	9/1/15	23:15	18° 17,80' N	023° 52,55' W
ME 118/681-1	9/2/15	9:52	17° 38,50' N	024° 09,50' W
ME 118/682-1	9/3/15	9:10	16° 56,71' N	024° 27,39' W

