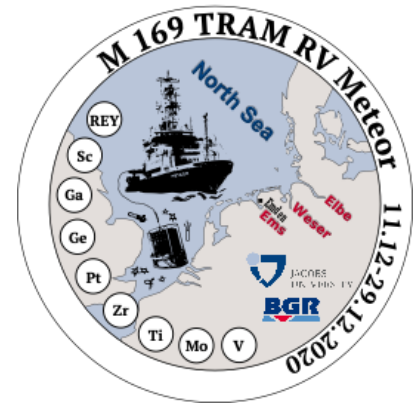




FS Meteor
Expedition M169
(GPF 20-3_091)
11.12.2020 (Emden)
– 29.12.2020 Emden



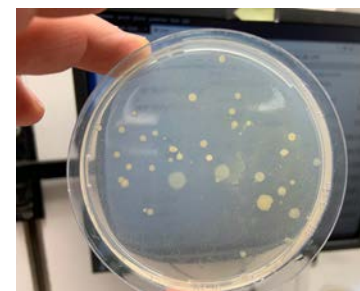
M169, 2. Weekly Report 14.12.-20.12.2020

The work started in the 2nd week on 14.12. with a return to the Ems to sample the planned 12-hour tidal cycle at a fixed location several times at high water, low water and in between. Preferably, this should happen at a location where the salinities - and thus the respective influences of river water and sea water - change as much as possible within the tidal changes. The geochemical and microbiological effects expected during salinity changes are generally stronger in the lower salinity range than in the higher salinity range. However, due to the limited navigability of the Ems River, it was not possible to sample the tidal cycle further upstream. Instead, with the help of the river pilot, we chose a location where the RV Meteor could be anchored for 12 hours without interfering with other vessels, where we covered a salinity range of about 22-25 PSU.

Subsequently, on Dec. 15, we began the profile along the western boundary of the German EEZ into the northwesternmost tip of the Dogger Bank. Continuous recording of salinity by the ship's thermosalinograph indicated a measurable influence of the Rhine water flowing in from the west along the stretch between about 54°N and 55°N. On average, we took water samples every 15-20 nautical miles with the CTD rosette to obtain material for microbiology and solid particle filtration, and with the trace metal clean GoFlo bottles on Kevlar rope for trace element analysis. The profile was continued on Dec. 17 along the northern EEZ boundary toward Sylt, where we already clearly entered the Elbe River influence area. In a zigzag line we continued the profiles and sampling on 18. and 19.12. to the southeast in order to achieve the best possible resolution of the influence of the Elbe as well as the Schleswig-Holstein coastal zone. However, the restrictions on ship traffic and the shallow water depth did not allow very close to shore sampling.

While geochemical analysis results can only be generated in the home laboratory, initial microbiological findings are already available on board. As part of the investigations of bacterial zinc resistance, over 60 stations have been sampled so far by filtration of 10 L of water and plating out (cultivation-dependent method) on 1 mM ZnSO₄-containing marine nutrient agar plates.

The measurable results so far showed the following preliminary tendencies: Bacterial zinc resistance seems to occur more in sea-water than in river water (tidal cycle of the Ems River), is more particle-associated and occurs mainly in the near-surface water of the tested stations (6-15 m). The bacterial isolates (the figure shows a representative sample from 11 m water depth, photo by Matthias Ullrich) are secured and later genetically and biochemically analyzed in the laboratory.



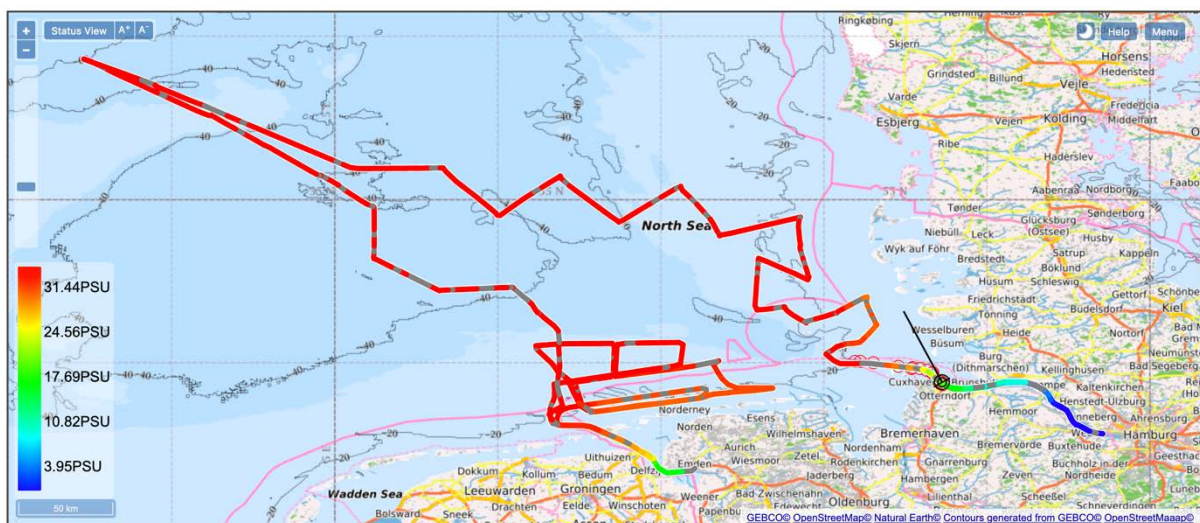
We were eagerly awaiting the Elbe river cruise that started early in the morning on December 19. The pilot guided us upstream to Wedel, shortly before Hamburg, where we sampled the influence of Hamburg on the Elbe water in bright sunshine and blue skies. We had already noticed in the Ems that the high particle concentrations in the rivers are unfavorable when sampling with our sensitive GoFlo bottles. Therefore, before sampling the Elbe, we developed a concept together with the deck crew and the bridge in which we could attach a several meter long acid-cleaned laboratory hose to the Kevlar rope and lower it into the water with the help of a plastic-sheathed weight using the crane or winch

next to the ship. With the help of the pump that we had brought along for ultrafiltration, the river water samples can thus be pumped directly into large sample containers and the GoFlo bottles can be spared.

Further stations followed on the way downstream to the roadstead at Freiburg (Elbe), where we investigated the 12-hour tidal cycle equivalent to the Ems, but with higher river water content at salinities between 3 and 7 PSU. Since this morning (20.12.), after the change from river pilot to coastal pilot at Brunsbüttel, we continue sampling the salinity tidal gradient towards Cuxhaven and Neuwerk and will have finished this around 8 pm. Due to the shallow water depths and relatively short distances, we will then have already run 131 CTD, GoFlo and pump stations and mapped the entire distance between the stations with ADCP and thermosalinographs before we will devote the next week to the region around Helgoland, the inner area of the German EEZ and the Weser.



RV Meteor photographed by a visitor at the Elbe riverside of Wedel close to Hamburg, when river endmember samples were taken. Photo by Regina Renken



Sampled area of cruise M169 with salinity profiles through Dec. 20, 2020; DSHIP data from the ship's own thermosalinograph, imaged with Mapviewer (DSHIP).

After in between some scientists had to struggle a bit with seasickness during short phases with up to 8 Beaufort wind force in the Dogger Bank region, the voyage has so far been in relatively calm weather most of the time. The Christmas tree in the mess hall has been decorated by now and we are looking forward to a special Christmas in this unusual year. Everyone is in good spirits and sends greetings from aboard!

Andrea Koschinsky (Chief scientist M169, Jacobs University Bremen) and the team of M169