FS Meteor Cruise M147

Las Palmas, Canary Islands – Belém, Brazil

Weekly Report 07.05.2018-13.05.2018

On the 7th May we continued the investigations of the groundwater discharges from the mangrove belt southeast of the river mouth of the Rio Pará; during the salinity and CO2 measurements in the transects parallel to the coastline the salinity was significantly reduced all the time compared to ambient seawater with 35 PSU; we measured between 29 in the eastern part and 15 PSU in the western part of the sections, however, in the west a possible influence of the Rio Pará plume cannot be excluded.

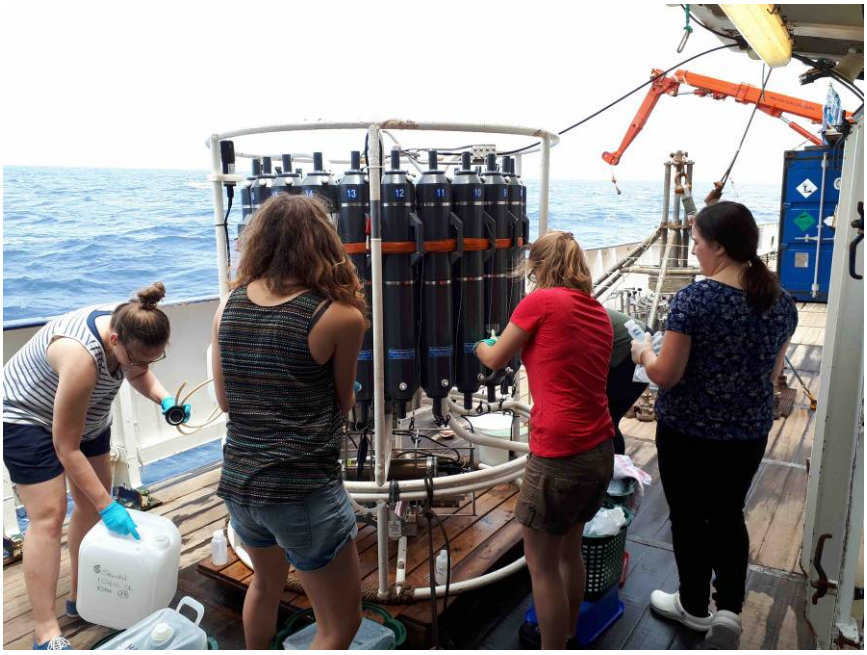
On the way from there to the North we continued to monitor the salinity course and sampled the surface water with the towed fish. After one day we reached the seawater endmember at the NE end of the salinity section towards the Canal do Sul, the southern outflow channel of the Amazon River. After sampling with the standard and trace-metal clean CTD rosette, the surface pump and the multicorer, we followed the gradient in the direction of the river. However, due to the constraints of the tides, which further complicate the conditions in this very dynamic and complex estuarine system, we had to interrupt the sampling of the further salinity points in order to be able to still cross the shallow extended sandbank at high tide, which at low tide is partly shallower than 10 m. The Canal do Sul itself could not be navigated because of the moving shallows and sandbanks, which, however, was not a problem for us as we found the river endmember at 0.03 PSU salinity directly behind the sandbank. We took two samples at different locations and deployed the multicorer, and then waited for the returning high tide, which flushed the river water–seawater mixtures of 1, 2, and 4 PSU salinity into our sampling bottles. We were able to cross the sandbank again in the direction of the Atlantic in the early evening, however, because of a medical emergency we had to head for Belém immediately.

The intense greenish color of the water off the mangrove belt southeast of the large rivers and at the margin of the Amazon freshwater plume indicate the high biological productivity of these water masses.

After we had returned to the working area, we resumed the investigations along the salinity section of the southern outflow of the Amazon, which we had left two days before. On the way we made a stopover with water and sediment sampling at 48°W between the outflow zones of the Rio Pará and the Amazon, on the 20 m depth contour line, which we would follow later on with the surface current towards the Northwest. We covered the salinity points 21, 16, 12, 9 and 6 PSU on our southern Amazon section with CTD-rosette and pump sampling. The recovery of sediment, however, proved to be difficult. In the area of 40-50 m water depth, the sediment was very course-grained and difficult to penetrate, and pore water could not be extracted. Closer to the river mouth, the surface sediment was very liquid and not well structured, as it is apparently continuously re-suspended and mixed by the tidal forces. This hampered a detailed sampling significantly.

On the evening of the 11th May we returned to the 20 m depth contour line off the Amazon mouth and steamed along the ca. 400 nautical mile-long southeast-northwest profile in a northwestern direction to follow the spreading and temporal changes of the Amazon plume. Intense fishing activities with a large number of nets on long lines along our sampling route demanded very great attention on the bridge and required some small adaptations of the sampling points. At 13 stations altogether, surface water samples were taken; and the multicorer was deployed at four stations. With increasing distance from the river mouth the sampling of the sediment was again easier than within the outflow zone. At the border to the EEZ of French Guiana we increased our distance from the coast to at least 50 nm, according to the research permission, and moved further east. Here, the plume which so far was mostly focused along a rather small stretch off the coast, starts to

extend into the Atlantic. At water depths of around 80 m the trace-metal clean rosette was deployed again.



The ship-owned CTD-rosette delivers the water samples for many groups for the determination of nutrients, dissolved oxygen, DOM and other components which later will be analysed in the home labs. Samples for trace metals, however, are exclusively sampled by the towed fish and the trace-metal clean rosette..

The lab work continues to be very intense and runs successfully, and the atmosphere is still very good and cooperative. After two intense weeks of work we have already gained an enormous amount of samples and data and we are convinced that at the end of the next week, which will also be the end of the cruise, all sample bottles will be filled and all filters will be used up.

With best wishes from the science and ship's teams of RV Meteor

Andrea Koschinsky

RV Meteor, 13 May, 2018