Third weekly report of *RVPoseidon* Expedition POS 533 - AIMAC

Atmosphere-Ocean-Islands-Biogeochemical Interactions in the Macaronesian Archipelagos of the Cape Verdes, the Canaries and Madeira (11.03.-170.03.2019)

Mindelo (Cabo Verde) - Las Palmas (Gran Canary) - Funchal (Madeira) - Las Palmas

At midnight on March 11, we reached our first station about 70 km off the Canary Islands, after five days of a very rough transit with continuous sensor recordings of temperature, salinity, chlorophyll, oxygen, pH, meteorological parameters, carbon dioxide and methane and three hourly sampling of atmosphere and ocean. Due to time constraints, we had to drop the planned station transect off the islands in 150 km distance. At the station Transect C9_600 (Fig. 1) there was still strong wind, waves and current. Everyone was sure that the routine use of the microstructure probe (VMP), as often done, was possible without any problems. After 80m free fall of the probe and correct ship drift, however, the line of the VMP caught suddenly and unexpectedly in the propeller (we suspect a strong undercurrent) and all liberation attempts were not successful. Thus, the knives fitted especially for such incidents on the screw did their work, freed the ship and the probe of our Madeira colleagues disappeared in the depths. This sad loss now prevents us from measuring the turbulent vertical velocities of the upper water column, but luckily our Portuguese colleagues have now recovered from the shock. Part of the missing data we can replace with measurements from the ADCP that scans the flow velocities in the upper 120 meters of the ocean. All other devices continue to work properly. Over the next three days, the route passed the spectacular sceneries of the islands of El Hierro, Gomera, Tenerife and Gran Canary and we performed deep water sampling casts every 2 to 4 hours and the 3 hourly underway sampling continued in parallel.

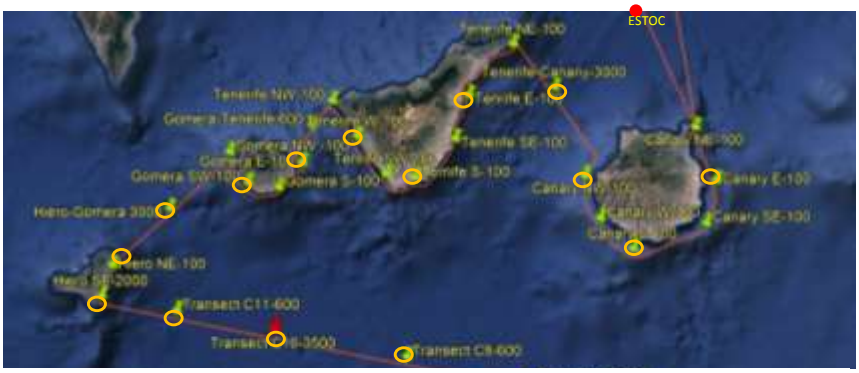

Fig. 1: Route und station plan for the Canary islands.



Fig. 2: a) Sampling of iron off Tenerife b) Air sampling off Gran Canary, c) Entry into Las Palmas.

In the vicinity of the large islands (2 to 3 km away from Tenerife and Gran Canaria) we found, as expected, high concentrations of halogenated hydrocarbons in some places. The upper water column was well mixed between 120 and 200m due to the prevailing winter conditions. This made the concentration signals originating from the islands - presumably by dilution- lower than we had expected. The lack of sleep during the three days of intensive station and underway work was well tolerated, and when we arrived at Las Palmas on the afternoon of March 14 as planned, everyone had enough energy to go ashore. Since we did not leave until the next morning, Melchor and Magdalena took the opportunity to show us their Las Palmas in the evening, which we really liked. Thank you again a lot for that. There we were together with the disembarking Melina, Corinne and Jesus for the last time and the newcomers Franziska, Catia and Ricardo. Unfortunately, Antonio from Mindelo could not arrive in Las Palmas, as a sandstorm (Fig. 3) lead to the cancellation of all

flights to Cape Verde and there was no substitute, which would have allowed him to reach the ship in time for departure. So Claudio from Funchal stayed, against the original planning on board, which was very positive for the training of his new colleagues and the continuity of operations on board. In good weather we left Las Palmas, sampled the Spanish ESTOC time series in the evening and set up a stopover at the Selvagens. This small archipelago of the Portuguese was crossed at the same time by a great cruise ship, which underlines the attractiveness of this protected area and we managed to sample the clean sea air before we were overtaken by the giant. Then we continued through the nutrient-poor regions of the subtropical north-east Atlantic to the first transect station before Madeira, which we reached today at one o'clock midday. Until the time we arrive in Funchal on March 19 and our Portuguese colleagues and their samples will be released from the boat, nineteen stations at different local distances are planned in the lee of the island, which will take place every two to three hours. In Funchal we finish our sampling, will measure the last trace gas samples on March 20 on the way back to Las Palmas and on March 21, dismantle all equipment and stow it in our boxes, which will then arrive in Kiel with the Poseidon in early April.

Fig. 3.: Sandstorm off Mauritania on March 12th (www. windy.com).

After the end of the stations of POS 533, we collected hundreds of air samples in numerous boxes, thousands of water samples in bulging refrigerators and freezers, as well as thousands of data, waiting for their evaluation. For the moment, the data indicate that the winter deep mixing of the oceanic surface layer in March results in a strong dilution of all contained compounds, and therefore lower concentrations of the volatile halogenated hydrocarbons, especially of bromoform, were found, than we had expected for the summer months. Especially on the eastern side of the islands, the wind-facing side, the mixing was particularly deep. However, mixing and deep-water upwelling off the African coast also led to local phytoplankton blooms, as shown by the distribution of freshly produced isoprene (Figure 4). The phytoplankton also produces sulfur-containing and halogenated trace gases, which concentrations, however, can only be determined in Kiel, as well as the content of dissolved and particulate organic carbon, as well as fluorescent and colored dissolved organic matter in the water. The phytoplankton composition will be investigated in Funchal, the presence of other microorganisms in Odense, the concentrations of non-volatile disinfection by-products in Marseille, the carbon cycle in Las Palmas and atmospheric trace gases in Miami. We look forward to the data and the cruise meeting that we planned for early November in Funchal, where I hope most of the samples will be measured and data evaluated.

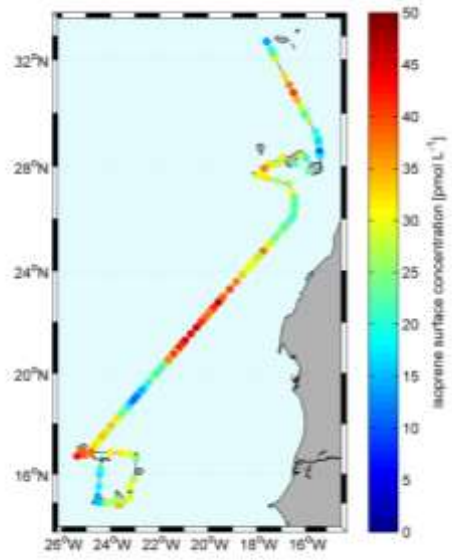

Fig. 4: Isoprene in surface water of the subtropical North-East Atlantic (Data from Dennis Booge).

Greetings from the Poseidon, on which all are well, sends the AIMAC- team.

Yours Birgit Quack

Madeira, 17.03.2019