SONNE 303
BIOGIN – IIOE2

La Réunion – Colombo, 23.01. – 19.02.2024

5. Weekly Report

05.02.-11.02.2024

The equatorial Indian Ocean

On our first profile section, we reached the equator on February 5 and our northernmost station at 2°N on February 6. Both stations were focus stations at which we carried out detailed sampling of the water column (Photo 1) in addition to using multicorers, gravity corers, plankton nets and drifters. At all water stations we take samples for nutrients and their natural nitrogen isotopes, alkalinity, dissolved inorganic carbon and suspended matter concentrations. In most samples, we also measure the concentrations of greenhouse gases such as carbon dioxide, nitrous oxide and methane in order to determine the release of these gases from the ocean.

At focus stations, we also take large quantities of water in order to examine the dissolved organic fraction more closely. After 30 liters of water have been filtered through a filter with a pore size of 0.7 µm, the filtrate is then further separated using special membranes. As a result, dissolved organic material is divided into three different size classes and then analyzed in the home laboratory. Colloids such as humic substances are found in the largest fraction. The middle fraction contains large molecules such as vitamins or proteins and the smallest fraction contains individual molecules such as glucose or single amino acids. The composition and degradability of the different size classes will be investigated as a function of water depth and oxygen content. An important question here is the provenance of this material and the residence time in the ocean before it is finally respired again to carbon dioxide.

Large quantities of water are also required to determine the rates of nitrification, the release of nitrous oxide and the fixation of nitrogen by microorganisms. Nitrogen fixation is determined in so-called incubation tests on deck (Photo 2). Large bottles are used to measure how much gaseous nitrogen is incorporated into organic matter over a certain period of time. For this purpose, the conditions in the upper water layers are simulated by constantly flowing seawater through the containers in which the sample bottles are placed in order to keep the temperature constant and using bluish foil to simulate the light conditions in the sea (Photo 2).

On Saturday morning we reached our northernmost station at 3°N southwest of Sri Lanka. This is again a focus station where we collected a total of 1200 liters of water from depths between 3200 m and the surface and deployed three plankton nets. The second station in this second working area was a sediment station on a seamount where the water depth was only 3300 meters. We are currently at the next focus station at 2°N, where we are starting our second profile section at 80°E, on which we will gradually work our way southwards.

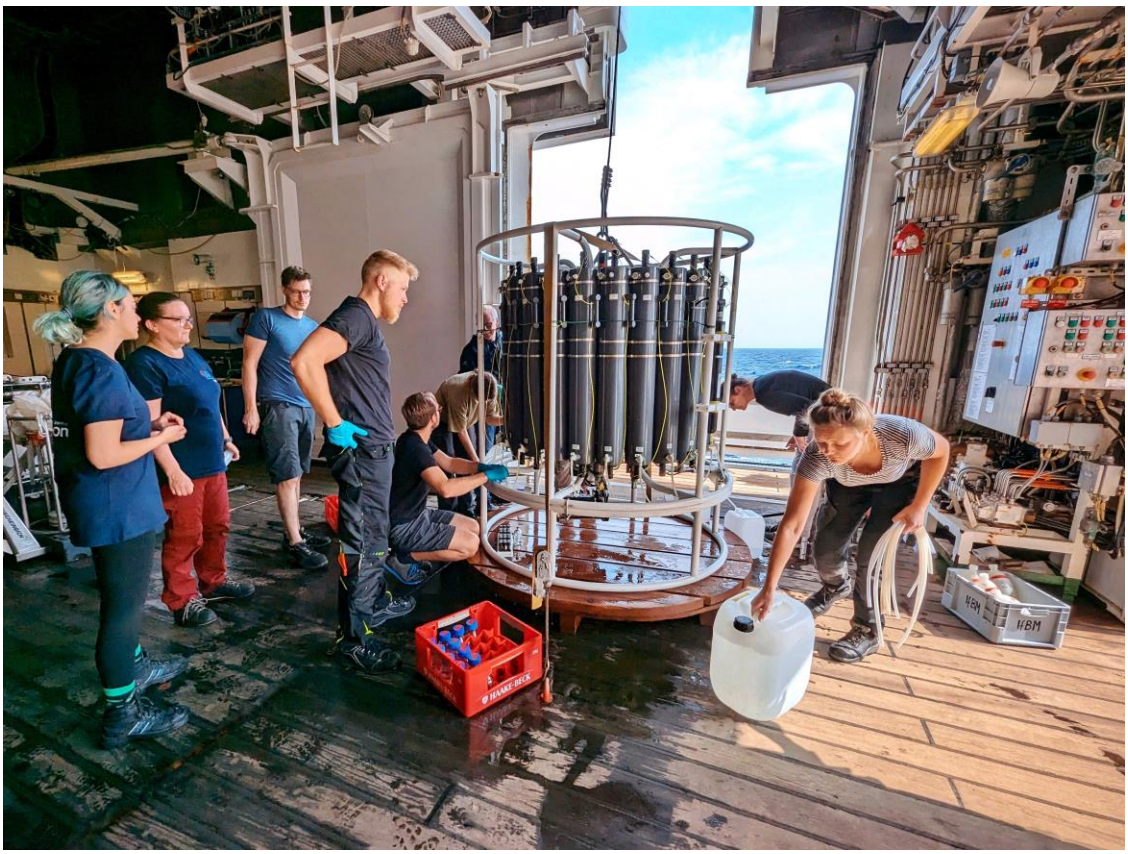

Photo 1: Sampling at the water station. A fixed sequence is followed so that gas samples can always be taken first. © Yves Sorge

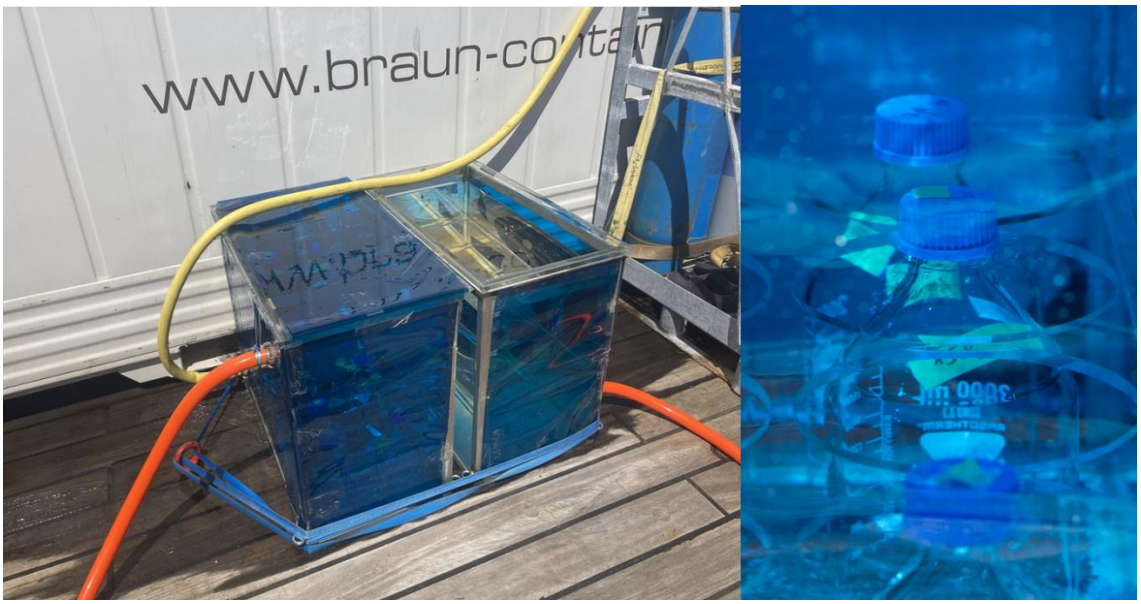

Photo 2: Incubations on deck to determine nitrogen fixation. © Tina Sanders

The work on the second profile is also running very smoothly and the atmosphere on board remains very good.

Best regards from on board to all those who stayed at home

Birgit Gaye
Chief Scientist