



Meteor cruise 97: **Oxygen Supply Tracer Release Experiment** **SFB754**

5th Weekly report for the Meteor cruise M97, 24-28 June

Mindelo (Cape Verde) – Fortaleza (Brazil), May 25 – June 28, 2013

This Meteor cruise is one component of the collaborative research project SFB754; Climate – Biogeochemistry interactions in the tropical ocean, funded by the German Science Foundation (DFG). This project is particularly interested in the areas of low oxygen concentrations that are found in the eastern part of the tropical oceans. Relevant for this project are, for instance: How does subsurface dissolved oxygen in the tropical ocean respond to variability in ocean circulation and ventilation? What is the role of zooplankton in the biogeochemical cycles, and, in particular, how important is the diurnal migration of zooplankton for transport of organic matter? With cruise M97 we attempt to provide more data to be able to answer these and other questions relevant for the dynamics of the Oxygen Minimum Zone in the Tropical North Atlantic.

The station work ended last Sunday where we had to leave our working area, the Oxygen Minimum Zone of the Tropical Eastern North Atlantic, and start our transit to Fortaleza in Brazil. This was not quite the end of the science though since there are a few underway systems that are collecting data as the ship is moving. These systems were active for another day, until we entered the economic exclusive zone of Brazil, where we had to turn off the instruments. The Economic Exclusive Zone of a country normally stretches 200 nautical miles off the coast, or from any island. In this case there is a very small island in the middle of the Atlantic that belongs to Brazil that have a 200 mile zone around it that were in the way of our track towards Brazil.

One of the underway systems that we are using during this cruise is an instrument that measures the partial pressure of carbon dioxide (CO_2) in the surface waters. Carbon dioxide is a gas that is affected by biological activities so that photo-synthesizers use carbon dioxide and water to produce organic matter, this process would reduce the concentration of CO_2 in the water and lead to a flux of CO_2 from the atmosphere to the ocean. On our cruise we found that the CO_2 concentration was almost always higher in the water than in the air, so that CO_2 was leaving the ocean going into the atmosphere. The reason for this is probably that there is upwelling in the region, so that water from below is coming to the surface; deep waters do always have higher CO_2 concentration than the atmosphere.

During our cruise we made 275 stations, of which 184 were CTD casts. In total we measured almost 200 vertical kilometers of the tropical ocean with the CTD probe. From these CTD casts we brought more than 42 m³ of water to deck for analysis. We also conducted 14 MOCNESS stations, almost 20 MultiNet stations and 8 microstructure stations. The particularly interesting part of the microstructure measurements was that we were able to reach depths more than 800 meters. This is deeper than what we previously have been able to do in this area, and is of particular interest to this experiment for determination of dissipation in the lower part of the oxygen minimum zone.

This was a successful cruise and we did manage to achieve all the goals that we had for this expedition. We would particularly like to thank the captain and the crew for the excellent support during the cruise.

In the name of all the participants, best regards from the Meteor,

Toste Tanhua

Meteor, Friday June 28, 2013