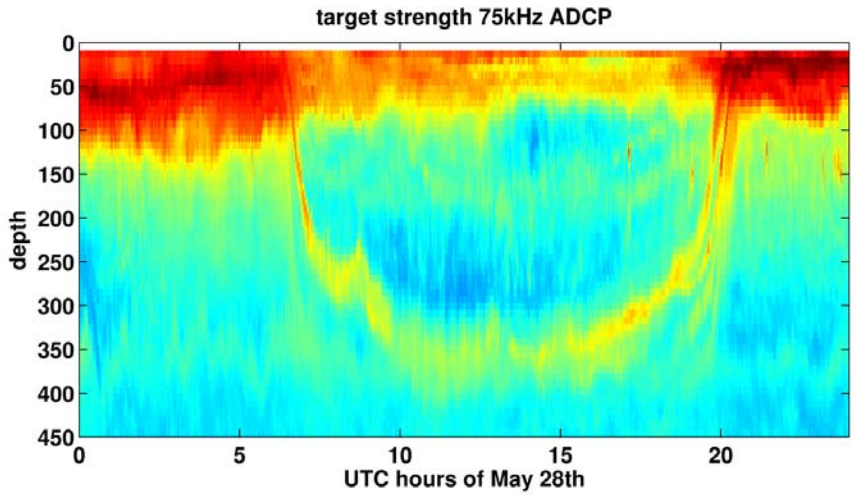
Meteor cruise 97:
Oxygen Supply Tracer Release Experiment
SFB754

3rd Weekly report for the Meteor cruise M97, 10 - 16 June

Mindelo (Cape Verde) – Fortalzea (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.

There is a group of biologists on board that works on zooplankton, and the effect of zooplankton on the oxygen minimum zone. Most of the zooplankton migrates between surface water – where they spend the night feeding, and deeper water during day-time – where they can avoid predation in the dark water. The deeper water (a few hundred meters depth) in this area has low oxygen concentration which makes it more difficult for fast swimming predators to catch the zooplankton. These animals are small, but there are a lot of them. The question is what does their daily migration do to the flux of oxygen, carbon and nutrients to the oxygen minimum zone?



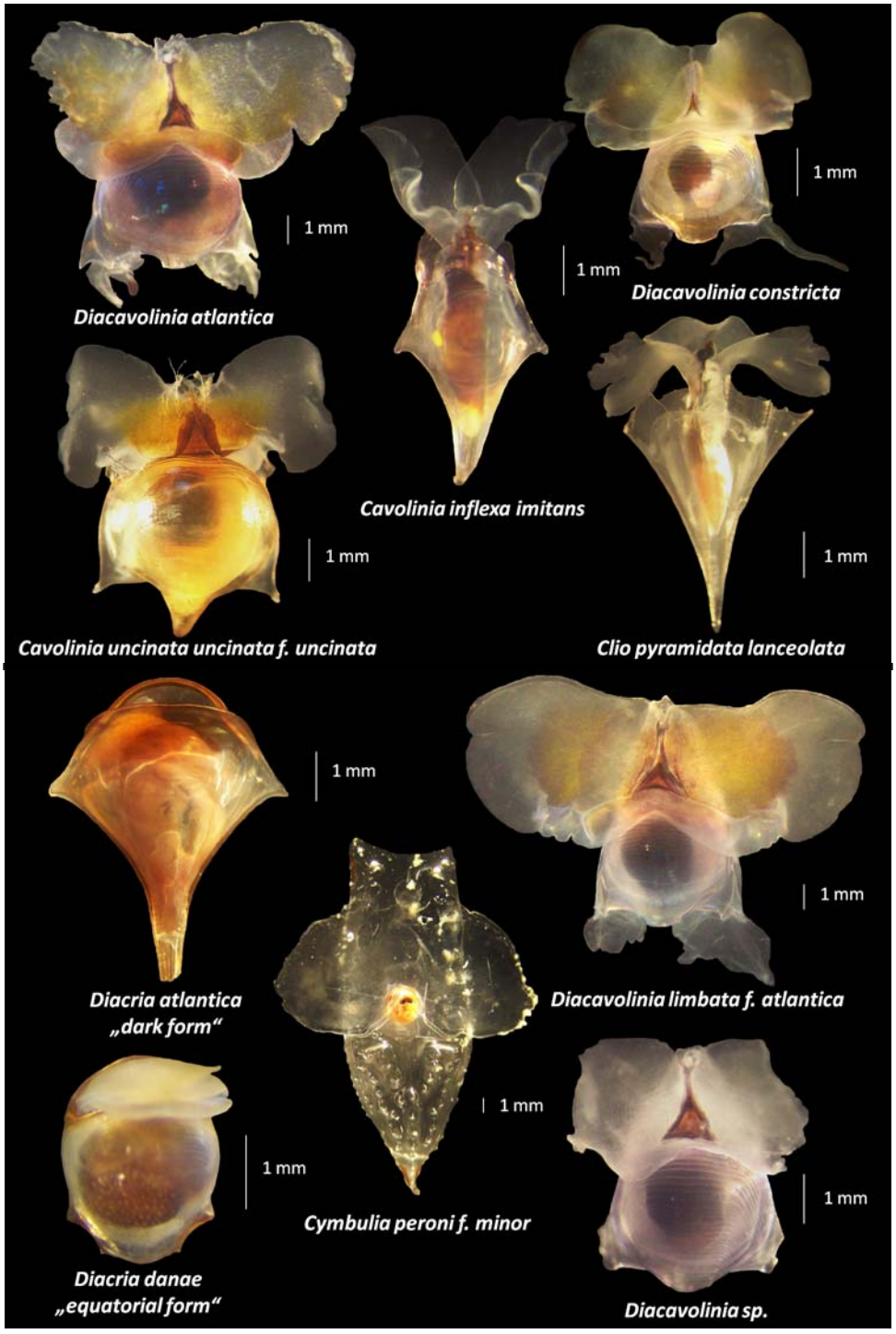
This figure is showing the target strength of the ADCP (Acoustic Doppler Current Profiles, an instrument to measure the direction and speed of currents in the interior ocean) signal over a 24 hour period. The movement of animals can easily be seen as red/yellow bands going down to depths during day-time.

We have a few tools at hand to better understand the migration of these animals and how they influence their surroundings. There are plankton nets to catch the animals; the so called MOCNESS net is designed to catch slightly larger, but still small, animals by having larger mesh-size (2 mm) and by towing the net at 2 knots while catching the animals. Only fast-swimmers can avoid being caught in the MOCNESS net. For slightly smaller animals we use the so called MultiNet, with smaller mesh-size (0.2 mm). Both of these devices have several nets that can be opened at different depths and times, so that information on where and when the animals are at a certain depth can be obtained.

The MOCNESS net is being deployed from the stern of the METEOR. Photo T. Tanhua.

So far we have conducted targeted sampling with the nets during both the morning and evening migration period. We have also conducted a number of stations where we catch animals the same position during both day and night. Once the animals are on deck, our biologists start to investigate them, and do experiments on them in the temperature controlled lab in order to determine fluxes of carbon and nutrients etc. The results are very interesting and we are learning more about the influence of zooplankton in the tropical Atlantic and how they respond to acidification, for instance.

The zooplankton animals are studied under the microscope for a more precise identification and for estimation of abundance and diversity. There are groups of special interest such as pelagic snails, shrimps, cephalopods and early life fish which are studied in more detail and of which samples are taken for phylogenetic investigations and for genetic barcoding.



Photos of some pelagic snails that we have caught during the cruise. Photo H. Ossenbrügger.

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

Toste Tanhua Meteor, Sunday June 16, 2013