

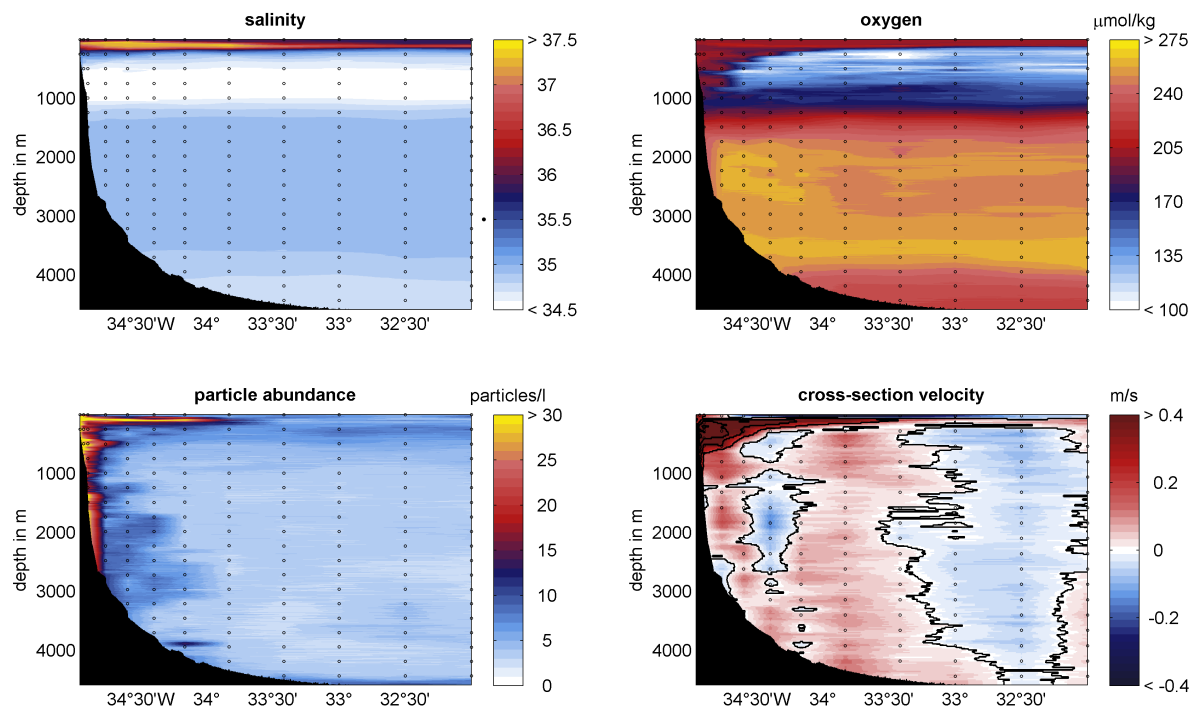
## 2. Weekly Report M98, Fortaleza-Walvis Bay

1.7.-28.7.2013

The second week of the METEOR cruise M98 was dominated by the measurement of the western boundary current off Brazil. The western boundary current is the main route for the exchange of water masses between the northern and the southern hemisphere. Warm water is transported northward in the boundary current and ultimately supplies, along different routes, the Florida Current and the North Atlantic Current; cold water from the subpolar North Atlantic is transported to the south. Preliminary results from the first data from CTD/O<sub>2</sub> - system (for the determination of water mass properties such as temperature, salinity, oxygen, and number of particles) and the LADCP - system (acoustic current meter on the CTD rosette) have already been evaluated. Figure 1 is the prize-winning figure from a little competition between our students on board to illustrate the observational results along 5°S. Remarkable in the preliminary data is the weak deep western boundary current. In contrast to most previous cruises, southward flow in the area typically covered by the boundary current could only be seen in one deep flow profile. Salinity and oxygen values show the typical distribution of water masses in the region. Also interesting is the distribution of particles in the water. Strong peaks were found only near the surface and directly near the floor at the shelf. The maxima in the North Brazil Current may be one explanation for similar maxima in the ocean interior, which were found during our last research cruise with RV Maria S. Merian along 23°W. The North Brazil Current retroflects north of the equator away from the shelf and subsequently feeds several eastward currents that could transport these particles into the ocean interior.

### *Mooring operation along 11 ° S*

Along 11°S, 4 moorings outfitted with different sensors, a PIES (acoustic inverted echo sounder with pressure sensor), and a bottom pressure sensor have been deployed. The deployed mooring array will be used to repeat measurements taken in the years 2000 to 2004 and will give us information about possible variations in the western boundary current circulation on decadal time scales. The mooring work at 11°S were completed without any complications due to good technical preparation, professional collaboration between crew and science team, and team-work oriented science. The different sensors will record data until May 2014, when the moorings will be recovered during our next cruise into the area. Then we will learn for example if the extremely weak deep western boundary current was a short-term event at the time of our LADCP measurements or whether there is actually changing circulation compared to the measurements from 2000-2004.



**Figure 1:** Salinity (top left), oxygen (top right), particles per liter (bottom left) and flow parallel to the coast (bottom right, contour lines every 20 cm/s) from our CTD/LADCP measurements. Dotted lines indicate the positions of the CTD/LADCP stations at (illustration: Siren Rühls).

### *Underway measurements using the Underway-CTD*

We are currently on the transit from Brazil to Angola. This long leg will be used to perform various measurements underway. In the next report we will discuss in more detail the underway flux measurements of various gases and the exchange of gases between the ocean and atmosphere. Here are a few words about the Underway-CTD, which is thrown at full speed on a line into the water, descends to approximately 350m depth and is then brought up by the line again. We have two systems on board. Both systems have been used during preceding cruises, but were no longer functioning due to various problems. Based on the information available to us, we were able to bring some spare parts (a late box of spare parts could be taken on board in Recife) and actually fix both systems again. Thanks to all at this point, and especially Mario Müller, who helped to set up the new bearing, eliminate corrosion at various places, and to solder new parts of the electronics. The ship operations are particularly impressive with their ability to repair of such equipment - a big thank you to the senior engineer Volker Hartig and his team from the engine. Currently, the Underway-CTD measurements run with hourly profiles around the clock. With these data we can later determine freshwater and heat content along the route, which are important parameters for the tropical climate.

METEOR is fighting against wind, waves and swell so it is, unfortunately, only reaching speeds well below its average. We have lost important time along the route from South America to Africa that will impact the observation program offshore Angola. The weather forecast promises some improvement and so we are confident that the planned research can be successfully completed. Our half-trip festival took place in any case - even in wind and rain - and scientists and crew can look back on a successful first half of M98.

Greetings from the tropics,  
Peter Brandt and the participants of M98