Wochenbericht M75-1b, la Reunion – Dar es Salaam

20 January 2008

The present M75-1b cruise of FS Meteor is a special one in that it is a so-called barter cruise. Barter cruises are carried out in the framework of the Ocean Facility Exchange Group (OFEG) in which a number of European countries exchange ship time (and other large and expensive ocean instrumentation). Germany, England, France, Norway, Spain and the Netherlands participate in this consortium. Efficiency in the expensive use of ship time is increased a.o. by combining research programs from different countries on one vessel. Another possibility is that a research program from one country is performed on a research vessel from another country. By this, especially long and expensive transit times of the vessels towards research areas can be avoided. The present cruise is an example of the latter: a Dutch research program in the Indian Ocean is carried out by the German RV Meteor that was planned to be in this area to carry out a number of German research programs. Similarly, the Dutch RV Pelagia will carry out a German research program in the Gulf of Cadiz in early 2008.

The M75-1b cruise forms part of the Dutch Long-term Ocean Climate Observations (LOCO) program. The scientific goal of the LOCO- programme in the Indian Ocean is to determine the variability in the currents and fluxes through the Mozambique Channel. This flow forms an important part of the inflow into the Agulhas Current which transports enormous amounts of heat from the tropical towards the polar regions in the Indian Ocean. Moreover, inter-basin leakage between the Indian and Atlantic ocean is largely controlled by the strength of the Agulhas Current. There are strong suggestions that the strength of the flow through the Mozambique Channel at the upstream edge of the Agulhas Current ultimately influence this inter-ocean exchange. Moreover, observations during a pilot experiment in 2000-2002 have shown that there is a relatively strong northward flowing current at great depths along the continental slope of Mozambique. This current consists of North Atlantic Deep Water (NADW). Thus, both the near surface and the near bottom currents form part of the global overturning circulation. Quantification of the (variability in) this overturning circulation is one of the most important goals of this research programme.

As a part of this program long-term oceanographic moorings with current meters, temperature and salinity sensors and sediment traps have been deployed in the narrowest passage of the Mozambique Channel, along a section between Madagascar and Mozambique, in late 2003. These moorings are recovered, serviced and redeployed every 1-2 years, depending on the availability of shiptime. Servicing of the moorings is combined with a hydrographic survey along the mooring array to increase the spatial resolution of the measurements and to obtain information on additional hydrographic and geochemical parameters to determine the variation of the water mass and sediment characteristics of the flow.

FS Meteor in the harbor of la Reunion

Outside the harbor in la Reunion

The cruise started on Saturday 19 January on the French island la Reunion, to the west of Madagascar. The transit to the working area is along the northern site of Madagascar and takes about 4 days. During these transit days everybody is busy with preparations for the work that has to be done along the mooring section. Meetings are organized for discussions between scientists and crew members to harmonize the ships facilities (and habits) with those from the Dutch science team. Thus far, everything seems to work out smoothly.

The weather is very nice: tropical temperatures above 27 degrees (both air and sea) and an easterly breeze of some 3-4 Bft. Also the sea is very calm. Detailed weather predictions are made daily by 2 scientist from the ´Deutsche Wetter Dienst´ that participate on this cruise. These

helped to decide to take the northern route (and not the southern) to the Mozambique Channel since the weather and sea state (swell) was predicted to be much better along that route. Compared to normal practice there is one additional meteorological scientist because of the relatively high chance of cyclones in this area in this part of the year. Happily, thus far no cyclones have been predicted!

Best regards,

Herman Ridderinkhof

Fahrtleiter FS Meteor M75-1b

Wochenbericht M75-1b, la Reunion – Dar es Salaam

27 January 2008

Transit to the narrowest part of the Mozambique Channel, where our mooring array is placed over the entire cross-section, continued until Wednesday late afternoon when we arrived on the Madagsascar site of the section. After 22 months of observations the first mooring came smoothly to the surface after releasing. During transit much attention had been paid to the way of operating, since both the design and the wires used differ between the German and Dutch habits. Moreover, our moorings are taken out from the stern of the vessel and not from the side as is the habit on the Meteor. A film from mooring operations during previous cruises was shown and used to discuss the way of operating with the Meteor. These preparations clearly paid of during the actual operations. Everything went very smoothly, not only with this first mooring but also with the seven others that were taken out on Thursday and Friday during daylight. We have never taken out so many moorings in such a short time period. A major reason was that all acoustic releases reacted immediately upon receiving the 'release' command. The results are extremely good, all 9 ADCP's functioned 100 %, 19 out of 20 temperature-salinity sensors worked well and only 3 out of 17 current meters did not function during the entire period. Also both sediment traps had functioned excellently. All in all we have an extremely good dataset for the last 22 months. A first inspection of the data shows that the current field is dominated by southward migrating eddies. However, compared to previous years, there seems to be a strong seasonal signal in that during the southern hemisphere winter period these eddies are much stronger than during the summer period.

The top of current meter mooring is taken out. Inside the float an ADCP (Acoustic Doppler Current Profiler) is installed

A sediment trap is placed on deck. Below the trap filled cups are visible.

During nighttime samples from the seafloor were taken with a multicorer and the CTD-frame with bottles was used to obtain additional information on parameters from the water column. Thus far, only a few CTD and Multicore stations were taken since the focus was completely on the mooring operations. This was done because the meteorologist on board predicted the development of a tropical storm in the northern part of Mozambique Channel by the end of the week. If so, the Meteor had to finish the operations along the section. Knowing this, we concentrated on the first priority of our work: recovery of the moorings, servicing the instruments and redeployment. On Friday it became clear that the predictions from the meteorologist, Christian, were perfect: we had to move out of the region during the course of Saturday. Knowing this, and not knowing how long our ‘period of sheltering’ would take, we decided to start redeployment of the moorings on Saturday morning. Two could be finished before we went in a southwest direction at 2 pm. Now, on Sunday evening, we are some 200 miles away from the mooring section waiting for the passage of the tropical storm FAME (that is the name she officially got on Saturday). The track of the storm seems to follow the predictions. This means that FAME moves along the Madagascar site of the channel, a few hundred km’s away from us. The weather conditions near the Meteor are fine, cloudy: some rain, and wind about 4-5 Bft.

Dark clouds behind the Meteor showing the presence of FAME just before the Meteor sailed southwards.

On Monday early in the morning the Meteor will start sailing back to the research area. We hope to be able to start our work on Tuesday, early in the morning. If you want to be informed daily on this cruise, you can have a look at the cruise diary that is presented on the NIOZ website (www.nioz.nl\M75_1b).

Best regards,

Herman Ridderinkhof

Fahrtleiter FS Meteor M75-1b

Wochenbericht M75-1b, la Reunion – Dar es Salaam

3 February 2008

The tropical cyclone FAME followed a course according to the predictions, so the Meteor could sail back to the narrowest section of the Mozambique Channel early Monday morning to arrive on the section late Monday evening. There operations continued following a regular scheme: redeployment of moorings during daylight, CTD profiling, taking water samples and taking samples from the seafloor during night hours. Despite the loss of more than 2 days due to the passage of FAME, all planned observations could be carried out. This success could only be achieved because all operations went very smoothly: all moorings came to the surface immediately after releasing and there were no technical problems onboard the Meteor that caused any delay.

Early Friday morning the scientific activities were finished and the Meteor set course to Dar es Salaam. The success of the cruise was celebrated with a BBQ on the deck. The food was delicious again, including ‘bratwursten’ ofcourse.

Last days were used to load the containers which will be transported back to Texel

Saturday and Sunday were used for packing all gear into the three containers that will be shipped back to Texel, further analyses of the data and writing reports on this cruise. On Sunday afternoon a number of us presented first results of the project. From the mooring data it was shown that eddy like motions dominate the current field, similar to what we have seen during

previous cruises. However, the data also suggested that the total water transport through the Mozambique Channel has increased enormously in the last 1.5 years. In this period the southward transport is more than double the transport during the previous 2-3 years. As yet, the reason for this is unclear. Anyhow, it clearly shows the importance of long term observations to obtain a complete picture. The detailed acoustic observations of the sea floor that penetrate a few hundred meters deep clearly showed that near the centre of the channel an area is present with a very regular sedimentation over very long time periods. This gives the geologists the possibility to study past climate fluctuations if long cores are taken at that position in the future.

Scientist on board of the Meteor

On Sunday afternoon a traditional picture of the scientific team on board the Meteor was taken. All members of the team look happy. This is not surprising, both scientifically and socially this was an excellent cruise. On behalf of the scientists I like to thank captain Niels Jakobi and his crew for the excellent facilities that they offered us during the past two weeks.

Beste Gruße von den Fahrtleiter,

Herman Ridderinkhof

Fahrtleiter FS Meteor M75-1b