	**SO233** **Walvis II** **Weekly Report No. 4** **(2.06.2014 - 9.06.2014)**	 **R/V SONNE** 25°52´ S / 06°37´ E

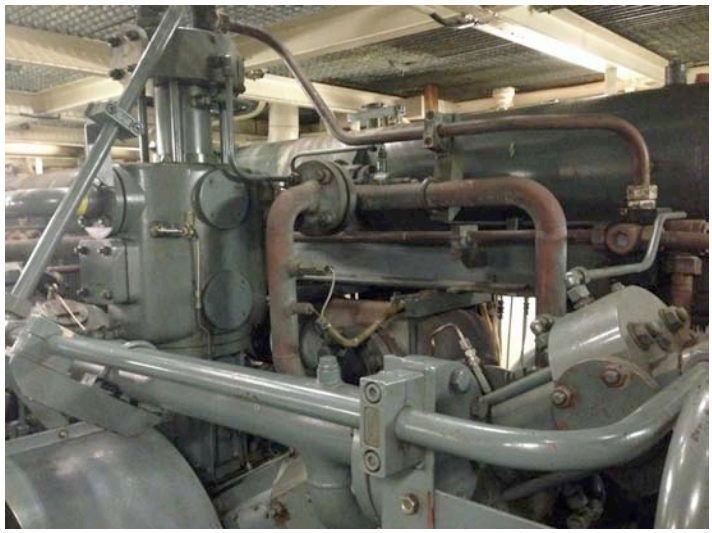
This week we collected volcanic rocks, sediments and marine fauna from the central part of the Walvis Ridge. The highlight of the week for many was reaching the halfway point of the cruise, which was good news for some but bad news for others. The geologists on board work 12-hour shifts (7:45 to 19:45 and 19:45 to 7:45). The former day shift is now working at night and the former night shift has switched to day, so that they can also enjoy the occasional sunshine.

Seafloor mapping revealed exciting new insights into tectonic processes resulting from the interaction of the Tristan-Gough hotspot (mantle plume) with the Mid-Atlantic Ridge. The central part of the Walvis Ridge consists of a large plateau-like structure located at ~1 km depth with dimensions of ~200 km in the N-S direction and ~100 km in the E-W direction. We believe that the plateau was formed through erosion of a large volcanic island to sea level as it subsided below sea level. Cutting the southern portion of the plateau is an impressive NE-SW trending graben extending for more than 250 km and up to 20 km wide. The steep walls on both sides of the graben are up to 1 km high. Grabens are formed as a result of extensional tectonics, in which blocks between two faults drop down when the rocks are stretched apart. The morphology of the graben indicates that it must have formed after the erosion to sea level took place and the former volcanic island subsided beneath sea level. Around the rims of the platform we were only able to recover reef carbonates via dredging, but by dredging the steep scarps of the graben, we were able to recover exposed volcanic basement. The NE-SW orientation of the graben parallels the northwestern edge of the Walvis Ridge, where a part of the Rio Grande Rise (a huge submarine plateau on the South American Plate off-shore Brazil) was once connected to the Walvis Ridge. Therefore the extensional graben structure is clearly related to seafloor spreading at the Mid-Atlantic Ridge, where the African and South American Plates drift apart and new seafloor forms. As a result of the Tristan-Gough plume being located beneath the Mid-Atlantic Ridge, the Tristan-Gough hotspot track was split in half to form the Walvis Ridge and Rio Grande Rise. Therefore the two parts of the hotspot track are now located not only on different tectonic plates but also on different sides of the Atlantic Ocean. Another exciting discovery was a huge embayment up to 30 km across on the southeast corner of the Walvis plateau, which must have been formed by a massive submarine landslide. On the northwest side of the Walvis Ridge, we found a number of very sharp, elongated ridge-like seamounts that clearly represented volcanism along fracture zones, representing the trace of former transform faults that offset segments of the Mid-Atlantic Ridge.

As usual we recovered rock-dwelling organisms from the dredged rocks and sediments in the dredges. We also deployed the TV grab again this week. For the first two hours we drifted above the sea floor above monotonous sediments, with the occasional sponge, deep-water coral, sea anemone, sea urchin, brittle star or stalked crinoid. Suddenly the view became rather spectacular, as a steep wall on the flank of the guyot loomed out of the darkness. The wall, located at 1.5 km water depth, was covered with corals. At its base, we the TV grab scooped up sediments with a few rocks. When the TV grab shovels were emptied on the deck, we realized that we had recovered the remains of a highly diverse cold-water coral reef containing about 10 different species of corals. The huge variety of shelly organisms associated with them, consisted of snails, bivalves and brachiopods and was dominated by many specimens of the large file clam *Acesta angolensis*. Unfortunately, all organisms were dead and it is unclear whether they represent the recent debris fallen off the steep slope just above the shell bed or whether they are much older - something that needs to be clarified in the laboratory at home.

All on board are doing well and send their best greetings.

Kaj Hoernle (chief scientist SO233) and the cruise participants



The scientists received a tour of the engine central command station (left) and engine room in the bowels of the Sonne.

A wrench for every job.

Sawing rocks is a messy job.

Sorting through a load of sediments, shell fragments and rocks recovered by the TV-Grab.

The result of careful washing and sorting. After drying the samples will be described and carefully packed for the journey to Germany, where they await detailed study.

Fotos: Kaj Hoernle