



SO-234 Leg 1 SPACES

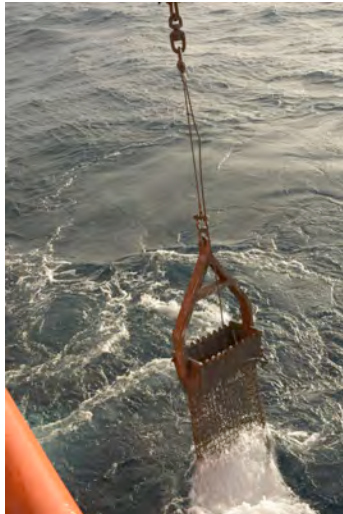
Weekly Report No. 1
(22.06. – 29.06.2014)



R/V SONNE
30°19'S / 14°37'E

Leg 1 of the R/V SONNE expedition SO-234 commenced from the port of Walvis Bay in Namibia. The full utilization of the port and heavy sand storms meant that the Leg 1 scientists had to embark one day earlier than originally planned and that R/V SONNE left the port at noon on June 22nd - also one day earlier than scheduled. From Walvis Bay we sailed westward approximately 320 nautical miles in marvelous sunny and calm conditions. In the afternoon of June 23rd SONNE arrived at our working area at the southeastern margin of the Walvis Ridge, a huge submarine ridge which extends ~1,500 km southwest from the Namibian coast.

SO-234/1 is a training and capacity building cruise for students from southern Africa and Germany in the framework of the BMBF-funded SPACES program (Science for the Assessment of Complex Earth System Processes), a cooperative research project initiated by the relevant ministries in Namibia, South Africa, Angola and Germany. Therefore, nine students from Namibia, South Africa, and Germany joined this cruise in addition to 12 scientists from Germany, Great Britain, Australia, and Saudi Arabia. Scientifically SO-234/1 continues the studies of the temporal and geochemical evolution of the Walvis Ridge conducted on the precursor SO-233 expedition (www.geomar.de/forschen/expeditionen; www.oceanblogs.org/walvis2) and is broadened by biological studies of deep sea fish. The biological work is being carried out by the University of Tübingen and aims to get a better understanding of the adaptations of visual systems in mesopelagic animals to bioluminescence.



The dredge comes back on board after a haul (photo: Roland Knauer).

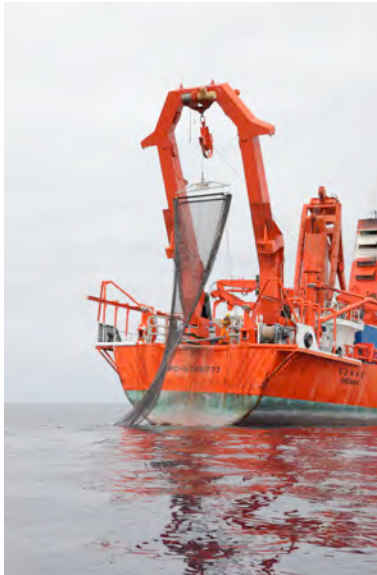


Scientists explain to students the type and composition of a lava sample (photo: Roland Knauer).

The working area of SO234/1 comprises several seamounts, such as the Ewing Seamount which rises more than 4,000 m above the abyssal plain, and a section of the southeastern margin of the Walvis Ridge that is very important for the geological studies. Sampling of this section, however, failed on SO-233 due to bad weather conditions but could now be successfully completed due to the fine, calm weather holding until Thursday morning. As on the previous cruise, rock sampling has been conducted using chain bag dredges. All SO-234/1 dredge hauls recovered *in situ* rocks from up to 3,500 m water depth. Many dredges, however, yielded carbonates. The morphology of the sampled features clearly indicates, that they once formed a volcanic archipelago which has been eroded to sea level by the waves after the volcanoes became extinct. As the crust beneath the archipelago cools, it subsides and the volcanoes sink beneath sea level. The dredged carbonates most likely represent relics of coral reefs which once grew on the former wave cut top of volcanoes in an early stage of subsidence. Luckily some dredge hauls also returned lava fragments and

volcaniclastic rocks suitable for volcanological, geochemical, and geochronological analyses. Among others, we dredged fairly fresh, feldspar-phyric lava at the to this day un-sampled section of the southeastern margin of the Walvis Ridge, so that this sampling gap is now filled.

The group of biologists had the opportunity to conduct ten trawls at depths between 400 and 1,000 m. They used a rectangular midwater Tucker Trawl with an opening of 16 square meters that could be closed during descent and retrieval of the net with a control signal from on-board ship. Opening times ranged between 2 and 4 hours.



The net is deployed in closed condition. (photo: Ulrich Mattheus).



A lanternfish (Myctophidae) shows features typical of most mesopelagic fish: Dark colouring, and/or silvery reflectors; big eyes and numerous photophores for producing bioluminescence (photo: Ulrich Mattheus).

All trawls were successful and brought numerous animals from the junction of the meso- and bathypelagic habitats including, apart from fishes, several cephalopods, crustaceans, deep-sea jellyfish, ctenophors and many salp colonies. Students could study the general appearance of the animals from this region: The great majority were either transparent; most of the crustaceans looked red to the human observer - however, in the short-wavelength light of the deep-sea this makes them blackish and thus invisible; fish were either transparent, or dark brown and/or silvery/reflectant. As for the species of fish caught, there were the "inevitable" and dominant cyclothone species (making up for the most numerous vertebrate on earth), but also there were many lanternfish species, hatchetfish, a number of anglerfish, pelican eels, viperfish and some more rare species such as a pearleye.

For subsequent studies of the adaptative mechanisms of visual systems to perceive bioluminescence, eyes and brains were dissected and fixed so they could be further examined in the respective home labs. In addition muscle and liver tissue was collected for molecular and genetic studies on the phylogeny of mirror eyes.

As a result of the long transit to Durban, a TV-grab station on Friday noon was the final deployment of this cruise. The TV-grab is essentially a huge set of steel shovels which has a camera attached so that it is possible to see in the ship's lab the seafloor and what is sampled. This camera delivered spectacular views from the eastern flank of the Ewing seamount which showed, among other things, steep rock ledges closely overgrown with deep sea corals and other benthic fauna. Unfortunately, this "landscape" was too rough for sampling with the TV-grab, so that an attempt to sample rocks yielded just a small amount of carbonate mud. After the TV-grab was safely fixed on deck, R/V SONNE headed on the eight days transit around southern Africa to Durban.

Due to the fair weather conditions and the excellent support from the master and the crew, we were able to complete 18 sampling stations within only four days. Most of these stations were successful and yielded rocks or marine organism, respectively, suitable for further studies. On Saturday evening, we celebrated the success of this short cruise with a hump party in the geo-lab. All participants are doing well and send greetings to everyone at home.

For all cruise participants
Reinhard Werner