FS SONNE

Expedition SO307: MADAGASCAR, MADAGASCAR-BIO & INDICOM

12.09. – 28.10.2024, Durban – Durban

4. Weekly Report (30.09. – 06.10.2024)

We reached the southern part of the working area at the beginning of this week. This is the region between the Madagascar Ridge (in the north) and the spreading center of the Southwest Indian Ridge (in the south). Here, our working area is dissected by several tectonic offset faults, so-called fracture zones (FZ), which are clearly visible on every map of the sea floor. Along these zones, the spreading center axis is offset horizontally, so that the FZ always run transverse to the spreading ridge. As a result, ocean crusts of different ages lie side by side at the FZ. As the younger part of the lithosphere has generally not subsided (to greater seafloor depth) as far as the older part, the course of the FZ can be recognized by high ridges often with steep slopes, which are separated from each other by narrow, deep basins (marking the actual course of the fault). The strong relief and young age of the seabed should provide good conditions for hard rock exposure and therefore sampling with the chain bag dredge.

Our working area here is bordered by the Discovery FZ in the west (at approx. 43°E) and the Indomed FZ in the east (at approx. 46°E). While the sample yield from the northern and central part of the Discovery-Indomed segment was already very satisfactory, we were initially unable to obtain any rocks from the southern part (i.e. near the spreading center) despite our best efforts (seven empty dredge hauls in a row). Only after moving to the western edge, to the Discovery FZ, was it finally possible to obtain plenty and suitable volcanic rocks from the southern part of the Discovery-Indomed segment. It is noteworthy that no mantle rocks (peridotites) have yet been encountered here, as on the Madagascar Ridge itself.

The multicorer (MUC) used by the biologists for sediment sampling also yielded virtually nothing in this southern working area. This was probably due to the heavy swell, which made coring on the seabed difficult. However, in the northern working area (Madagascar Ridge), the MUC served the biologists well. When placed on the seabed, its twelve Plexiglas tubes, 50 cm long and 10 cm in diameter, pierce the sediment surface almost non-destructively. Side flaps then close the bottom of each tube so that the excavated sediment can no longer fall out (Fig. 1a). This also brings ocean bottom water from directly above the sediment surface up on deck (Fig. 1b). The sediments are then recovered and immediately fixed with formaldehyde so that any small animals living in the sea floor, the so-called meiofauna with sizes between 0.3 and 1 mm, are preserved until they are extracted from the sediment in the laboratories of the Museum für Naturkunde in Berlin. Despite their small size, the meiofauna is important because it forms the food base for many larger organisms. It

is expected that a large variety of this fauna will be found, but this will only become clearer after extraction and sorting in Berlin. Our biologists on board SO307 have particular high hopes for the worm-shaped “mud dragons” (Kinorhyncha) (Fig. 1c), which occur worldwide but are still largely unexplored, especially in the deep sea.

Fig.1a: A successful MUC filled with deep-sea sediment comes back on board. Science (left) and ship's crew (right) work hand in hand. Photo: J.G.

Abb.1b: The pipes with the excavated sediments are carefully recovered. The top 30 cm are still filled with the original ocean bottom water from a depth of several thousand meters. Photo: J.G.

Abb. 1c: Microscope photo of the “mud dragon” Campyloderes cf. vanhoeffeni. The head area (top) with its numerous spine-like appendages is almost completely retracted here. Foto: B. Neuhaus

In the meantime, we have advanced to over 40° south this week and the increasing proximity to Antarctica is making itself felt with cooler temperatures (air 8-13°C, water 11-13°C). On the other hand, numerous albatrosses always accompany the ship and whale sightings are frequent. Unfortunately, the weather conditions in these latitudes are quite variable with many small-scale storm lows passing through. Towards the end of the week, we therefore had to occasionally include short mapping sections before the dredging work could be resumed in better conditions.

Best wishes to all those who stayed at home

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Blog posts on this expedition can be found at: https://www.oceanblogs.org/so307/