



## 1. Weekly Report (12.09. – 15.09.2024)

The SONNE expedition SO307 is a joint project of the GEOMAR Helmholtz Center for Ocean Research Kiel and the Museum für Naturkunde Berlin. Scientific work is to be carried out for the main geological project (MADAGASCAR) and for a sub-project of the biological oceanography (INDICOM). Additionally, a biological sub-project is carried out by the Museum für Naturkunde (MADAGASCAR-BIO). The working area is the Madagascar Ridge, a submarine plateau that extends south of Madagascar towards the Southwest Indian Ridge, spreading center (Fig. 1).

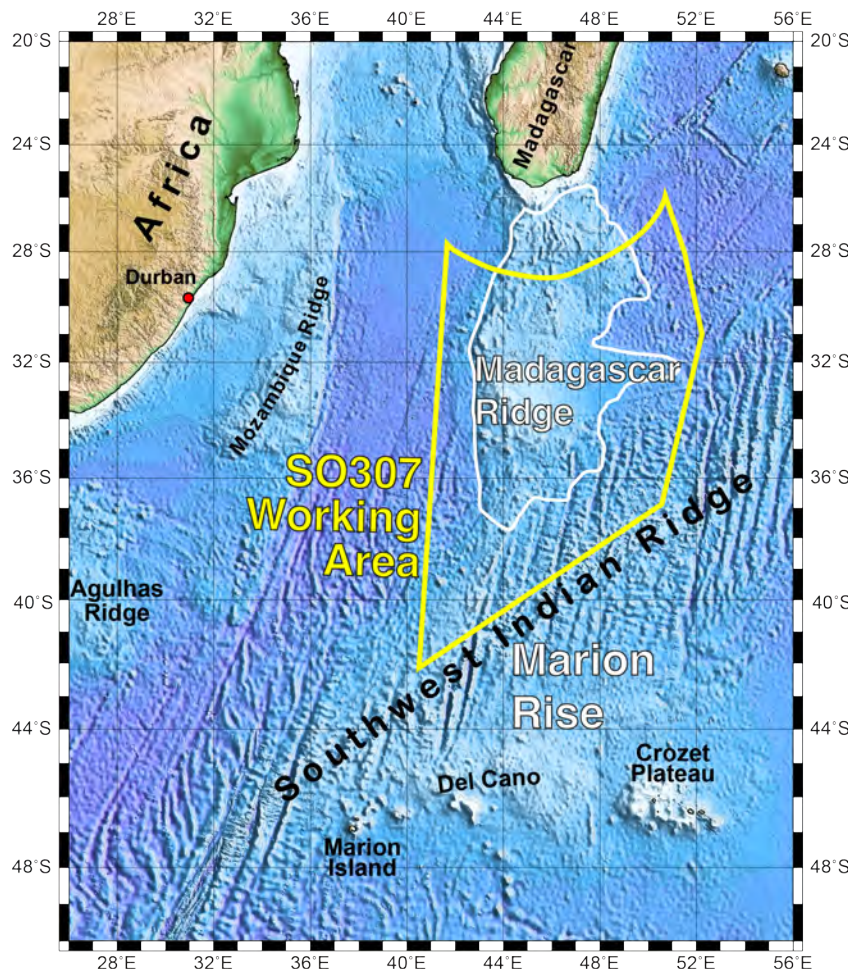


Fig.1: Overview map of the Southwest Indian Ocean with the location of the Madagascar Ridge (GEBCO\_2014 Grid, version 20150318, <http://www.gebco.net>).

The geological investigations aim to understand the age and formation of the Madagascar Ridge. The theories currently being discussed include: 1) origin by exceptionally strong, widespread volcanism, 2) by the uplift of regionally occurring, unusually light material from the Earth's mantle, or 3) that it is formed at least

partially by continental crust (as a relic after the southern continent of Gondwana broke up and rifted apart). The answers to these questions will also contribute to the understanding of the origin of other, as yet unexplored plateaus in the world's oceans. We are planning to carry out extensive multibeam and sediment echosounder mapping as well as rock sampling using a chain bag dredge.

In addition to the geological research, the biology of the Madagascar Ridge is also being studied. The team from the Museum für Naturkunde Berlin is researching the diversity of species on and in the seabed. Their main aim is to identify previously unknown species and investigate their distribution. To this end, sediment samples will be taken with a multi-corer and a TV grab. Any biological growth on the surface of the recovered rock samples will also be collected. These investigations contribute to the long-term monitoring of deep-sea biodiversity and provide important insights into how oceanic highs, such as the Madagascar Ridge, influence the distribution of species.

Another goal of the expedition is to better understand the cycle of organic material in the deep ocean. A team from GEOMAR's Biological Oceanography research group is investigating gel particles found in ocean water, which are rich in carbohydrates and proteins and could play an important role in the microbial decomposition of carbon. Therefore, water samples are taken from different depths of the ocean using a CTD (Conductivity, Temperature, Depth) probe connected to a Rosette Water Sampler in order to determine oceanographic, biogeochemical and biological parameters such as bacterial activity. This research is crucial for understanding carbon fluxes in the ocean and can contribute to improving climate models.



*Fig.2: R/V SONNE leaving port in Durban (Photo: J. Geldmacher).*

The SONNE left the port of Durban (South Africa) on September 12th and set off in choppy seas on its multi-day transit towards the working area. After leaving South Africa's Exclusive Economic Zone (EEZ) in the late evening of September 13, the ship's echo sounders were switched on. The bathymetric data recorded during the transit to the working area will be made available worldwide via international databases. The first CTD station was reached early Sunday morning, September 15. Several deployments yielded data and water samples from 10 to 4,500 m depth. In the afternoon, the first multi-corer deployment by the biologists successfully retrieved sediment sample from 4,600 m depth.

Since boarding the ship in Durban, we are enjoying the hospitality and excellent support of the entire crew.

Best wishes to all those who stayed at home,

Jörg Geldmacher  
(GEOMAR Helmholtz-Centre for Ocean Research Kiel)