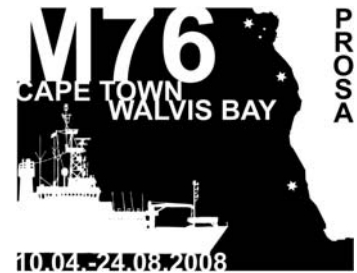


4. Wochenbericht Meteor Reise M76/1b

Kapstadt (Südafrika) – Walvis Bay (Namibia)

28.-04.05.2008



The week began as *Meteor* arrived at the continental rise site GeoB12808 (26°22'S , 11°53'E, 3794 meter water depth) in the mid morning hours of Monday April 28th. Here, we expected to obtain organic-poor, carbonate-rich sediments from beyond the continental margin depocenter. After some initial difficulties with the gravity coring – the coring device was simply too short and too heavy and thus “shot through” the creamy deep lying sediments – we were able to retrieve an excellent 5.6 meter long core. A matching Multicorer set of surface samples completed the coring operation at GeoB12808.

As expected, surface sediments consisted of a high carbonate fraction (foraminiferal/nannofossil ooze) with manganese oxides providing a darker brown coloration in the surface 10 cm. Sediment color alternates between dark (generally olive gray) and light (generally light grey) intervals throughout the core and exhibits clear indications of massive bioturbation throughout. The darker layers are expectedly comprised of higher organic, low carbonate-content sediments. Sediment pore water geochemistry indicates further ongoing microbial activity in the deeper, dark layers of sediment. Hydrogen sulfide, the product of microbial sulfate reduction, was detected at depths below 2 meters. The diffusion of hydrogen sulfide and subsequent precipitation of iron sulfides also leads to the prominent formation of the not only scientifically fascinating but aesthetically pleasing “Liesegang Rings” in the upper carbonate bearing sections of the cores (See figure 1).

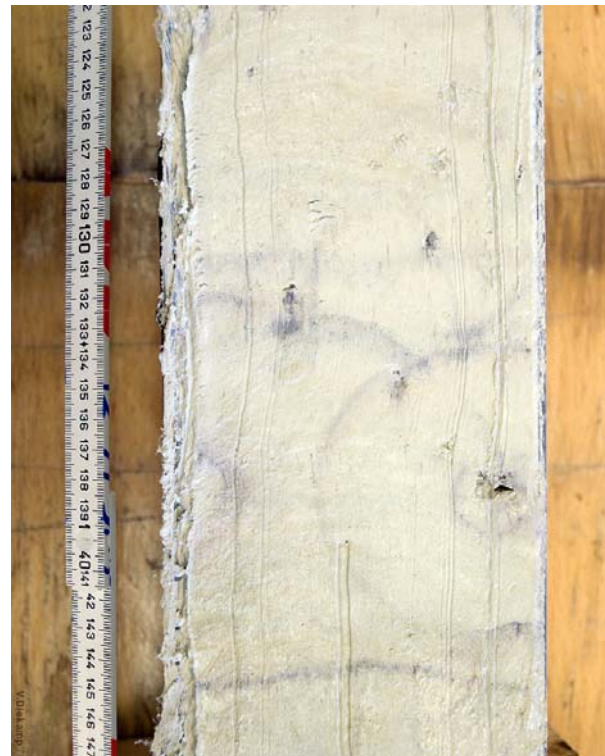


Figure 1. Dark purple „Liesegang Rings“ in depths of 3,1 to 3,6 meters below surface at SiteGeoB12808 (Photo: V. Diekamp, MARUM).

Although, the microbial activities are certainly an order of magnitude lower than comparable depths from the center of the high organic carbon content depocenter, these first indices of microbial activity in the sub-surface sediments at 4000 meter water depth clearly demonstrate the magnitude of this deep sub-seafloor microbial habitat. At the second scientific site meeting held onboard on Friday afternoon, scientists were pleased with the consistency between results from pore water geochemistry, lithology and microbial cell counts, the latter using the newer and perhaps more accurate Sybr Green stain (see 2. *Wochenbericht*). These preliminary data

demonstrate the importance of paleoceanographic events on the ongoing sub-seafloor microbial processes, and, moreover, the importance of the Benguela Upwelling system as an organic carbon depocenter of significance in the ocean carbon cycle.

With the completion of work at Station GeoB12808 on Monday night and with a short reoccupation of Station 12803 to obtain surface sediments, we had nearly completed our planned non-MeBo coring program. While we were waiting on the wind and wave conditions to improve for deployment of MeBo, we used Tuesday and the days following to complete the PARASOUND survey in the area north of 25°30'S to 24°00'S.

Diminishing swell and wind conditions finally allowed us to deploy the MeBo on late morning on May 2. Unfortunately problems with electrical insulation on the cable and with the MeBo winch meant that we had to bring MeBo back on deck. Thus, on Saturday we decided to use the break in MeBo operations to sample further sites in the mudbelt on the continental shelf.

Two additional sites north of the former Site GeoB12806 were sampled with Multicorer and gravity corer (GeoB12809, 24°17.1'S, 14°16.1'E, water depth 120 m; and GeoB12810, 24°03.2'S, 14°15.7'E, water depth 112 m). The 14.5° C water on the shelf was noticeably filled with a enormous abundance of large flocculent particles (estimates of hundreds per liter, cm in diameter). We recovered surface sediments, which were highly enriched in sulphur bacteria including thick mats of very large *Beggiatoa* and abundant *Thiomargarita* filaments. Snails and worms were observed on and in the surface sediments, consistent with the presence of a well oxygenated water column as measured by Winkler titration. Gravity cores successfully returned with cores (>3 m length) that penetrated to a known shelly layer, whose probable origin was from the sea-level low stand during the last glacial epoch.

On this first Sunday morning in May the weather remains friendly, and promises to remain so. We expect to test and deploy MeBo early this afternoon. Pleased with our last round of sediment samples, and optimistic with the expectation of obtaining more interesting samples, we look forward to the last full week of operations on **Meteor** Expedition 76-1. On behalf of the scientific party and ship's crew, our very best regards,

Timothy G. Ferdelman