

Short Cruise Report
RV METEOR cruise M57/1

Dates: January 20 to February 08, 2003
Port calls: Cape Town (South Africa) – Walvis Bay (Namibia)

Chief scientist: Dr. Ralph Schneider

Participating Institutions: RCOM, Research Center “Ocean Margins”
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Summary of the cruise

METEOR 57/1 was the first leg out of three of METEOR expedition M57. The aim of this leg was to retrieve water samples, surface sediments and about 12 m long sediment cores along transects on the shelf and perpendicular to the upper continental margin between 29° and 35°S off western South Africa beneath the Benguela Current system. The major scientific objective was the detailed reconstruction of the Late Quaternary climate history of the southern Benguela current system and the influence of the Agulhas warm water entrainment into the South Atlantic. Furthermore, the marine sediments should provide geochemical parameters for the reconstruction of climatic changes on the African continent, which then can be compared with continental climate records and the evolution of human settlements along the west coast. In this context, in particular latitudinal movements of the westerly wind belt and the winter rainfall region over the western South Africa are of great interest. In addition to these surface processes, Late Quaternary variations in intermediate and deep water masses, e.g. SACW, AAIW, and NADW will be investigated, remote from the strong upwelling system off Namibia. Another major goal of this leg M57/1 was the expansion and continuation of previous studies in the South Atlantic which try to assemble a basin-wide knowledge about the diversity and geographical distribution of different microfossil species or groups and the validation of their relationship to certain oceanic conditions in the entire Atlantic.

After two days of uploading and storage of scientific and technical equipment, RV METEOR left Cape Town at January 20, with 29 scientists from Germany, Spain and South Africa onboard. The cruise began with sediment-acoustic and sea-floor mapping surveys using the PARASOUND and HYDROSWEEP systems installed on the ship. These surveys were needed to identify locations southwest of Cape Town and at the lower end of the Cape Canyon suitable for sampling of sediment cores in combination with plankton and water column sampling. This three day program was followed by further surveys towards the north where sampling transects were performed across the continental slope between 700 and 3200

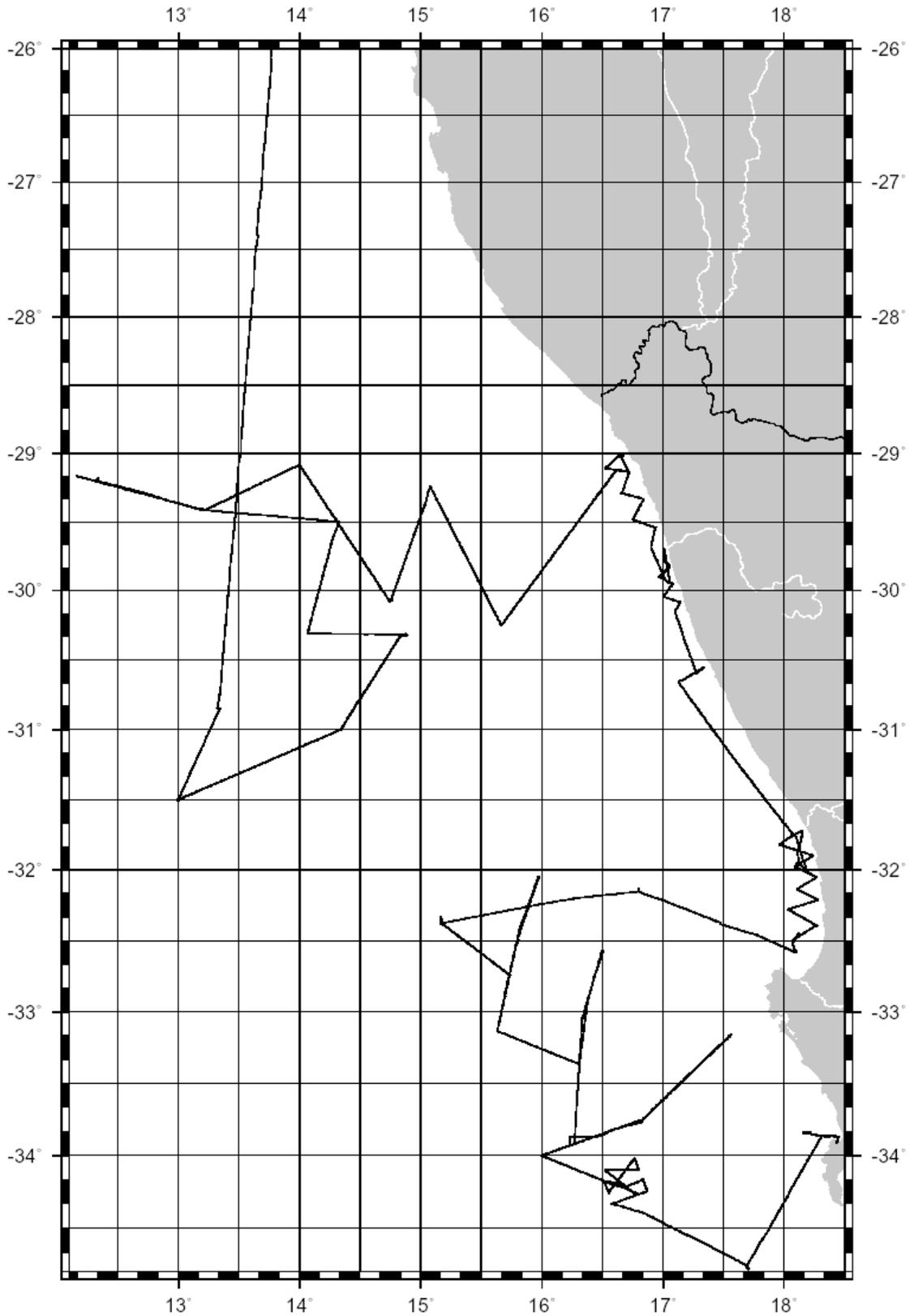
m of water depth. Water properties like temperature and salinity were continuously measured with shipboard systems and with XBT and CTD casts along these transects.

After one week of sediment and water column sampling on the continental slope the work was continued on the Southwest African shelf in water depths between water depths of 60 and 140 m. The scientific program during this second week was focused on the detailed acoustic survey and geological sampling of the Holocene mud belt deposited on the inner shelf between Sankt Helena's Bay and the southern rim of the Orange delta at 29°S. The main purpose was to retrieve sediment cores containing the Holocene mud which increases in its thickness from a few meters in Sankt Helena's Bay to about 30 m close to the mouth of the Orange river. Again the sediment coring was accompanied by extensive water column sampling with water bottle samplers, with plankton net hauls, and with XBT and CTD casts in order to investigate the hydrographic conditions and plankton stocks in the coastal upwelling system of the southern Benguela Current.

During the last week of leg M57-1 the sampling program was shifted back to the continental slope where several, about 100 miles long, acoustic surveys lead us to sample locations between water depths of 600 and 3800 m. It turned out that the continental slope between 31° and 29°S is covered by a lot more slumps and debris flows than were detected before along the southern transects sampled in the first week of the cruise. This made it more difficult to identify coring locations along the upper slope that contain continuous Quaternary sediment sequences west of the shelf near the Orange delta. Nonetheless the cores and water samples collected during this last week of the cruise satisfactorily completed the anticipated scientific program of leg M57-1. All station and survey work was terminated at 29°S on the way northward to Walvis Bay where RV METEOR arrived at February 08, 2003, the end of this first leg of M57.

In total about 2000 nm of hydroacoustic surveys with the shipboard PARASOUND, HYDROSWEEP and ADCP systems were achieved during M57-1. 32 coring stations were sampled for Holocene and late Pleistocene coastal and pelagic sediments. The lengths of sediment cores retrieved commonly range between 4 and 9 m and contain sediments between 6,000 and 600,000 years in age. Continuous profiling with the shipboard thermo-salinograph was combined with 52 XBT stations along the survey transects, while the water column sampling with water bottle sampler, CTD casts, and plankton net hauls was carried out at 17 stations. While the XBT casts measured the upper 700 m of the water column, water bottle samplers and CTD casts were obtained down to 1000 m water depth, at some stations even down to 3000 m. Plankton net hauls were generally taken down to 800 m, except for the stations on the shelf where the maximum water depth for water column sampling was about 100 m. Plankton sampling from surface waters with shipboard pump systems was performed at 58 stations in total. A detailed listing and documentation of the scientific program achieved during M57-1 can be found in the regular reports of the "Leitstelle METEOR" (www.ifm.uni-hamburg.de) which should be available in summer 2003.

Dr. Ralph Schneider (chief scientist)



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Map of M57-1 cruise track