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Biogenic Sedimentation of the Persian Gulf

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The remains of skeletal hard parts in marine sediments are of particular interest to the geologist. If he is able to relate these remains in recent sediments to the environment of deposition (water movement, water chemistry, water depth, distance from land, distance from the open ocean, bottom type, etc.) he is then able to deduce the environment of deposition of ancient sediments.

With this goal in mind a team of geologists from the Geological-Paleontological Institute of Kiel University took part in the International Indian Ocean Expedition and visited the NE part of the Persian Gulf from March 3 to April 24, 1965 (DIETRICH et al., 1966). Detailed descriptions of the results thus far completed are to be found in the “Meteor-Forschungsergebnisse” (see references).

I. Environmental Framework

Morphology (SEIBOLD and VOLLBRECHT, 1969): The Persian Gulf (Fig.1) is divided by the central and eastern swells into the Western Basin (depths to 73 m), the Central Basin (depths to 105 m), and the Hormuz Region (depth south of Tunb 192 m, within the Masandam Channel 302 m). The mean depth of the Gulf is 35 m. The Biaban Shelf with its slope break at 110 – 120 m forms the transition to the continental slope.

Hydrology (HARTMANN et al., 1971; SEIBOLD, 1970): The Persian Gulf lies within

Fig. 1. Bathymetric and index map of the Persian Gulf. (After SEIBOLD and VOLLBRECHT, 1969)
an arid climate region. The high loss of water through evaporation (annual mean 144 cm) is not compensated for by precipitation and river inflow. As a result, surface water from the Indian Ocean enters the Gulf along the Iranian coast. During the summer, surface waters reach temperatures of up to 36° C in the Central Gulf. Even higher readings have been recorded in near-shore areas. Temperatures in winter, however, may fall below 20° C (Fig. 2). Salinity increases at the surface from approx. 36.6‰ near the entrance to about 40.6‰ in the NE-Gulf (Fig. 3). There, due to cooling and evaporation, the highly saline water sinks to the bottom raising the salinity and lowering the temperature of the bottom water in comparison with the surface. Water flowing out of the Persian Gulf follows the deeps near the Arabian coast (Fig. 2 and 3). The predominantly northwesterly Shemal winds, often of prolonged duration, tend to homogenize the surface waters to a depth of about 30 m. Because of the previously mentioned circulation pattern, the waters of the Persian Gulf contain oxygen all the way down to the bottom. The content of nutrients, however, is low with the exception of mixing zones that extend from the shelf margin to the Hormus Region. (Hatched in Figs. 2 and 3).