

Diving by the Submersible NAUTILE at the Rodriguez Segment at the central Indian Ridge

Jerome Dyment[1], # Mitsuko Kitazawa[2], Christophe Hemond[3], Miho Asada[4], Kensaku Tamaki[5]

[1] CNRS UMR 6538,IUEM,UBO, [2] Earth & Planetary Sci., Univ. of Tokyo

ORI, [3] Univ. Brest, [4] O.R.I.,University of Tokyo, [5] ORI,Univ of Tokyo

Among the World ocean ridge system, the Indian Ocean spreading centres are poorly studied by direct observations. In May-June 2000, the French manned submersible NAUTILE dived for the first time in the Indian Ocean at 19 deg. S during the GIMNAUT (Geochronology, ridge-hotspot Interaction, Magnetic with NAUTile) cruise onboard the R/V L Atalante. It was the second time that this type of equipment were used in this ocean. The study area was focused on the Central Indian Ridge (CIR) near the Rodriguez ridge at 19 deg. S.

Among the World ocean ridge system, the Indian Ocean spreading centres are poorly studied by direct observations. In May-June 2000, the French manned submersible NAUTILE dived for the first time in the Indian Ocean at 19 deg. S during the GIMNAUT (Geochronology, ridge-hotspot Interaction, Magnetic with NAUTile) cruise onboard the R/V L Atalante. It was the second time that this type of equipment were used in this ocean. The study area was focused on the Central Indian Ridge (CIR) near the Rodriguez ridge at 19 deg. S.

GIMNAUT cruise is principally addressed to the problem of accurate dating methods for recent tectonic process at mid-ocean ridges. A special attention is carried on the combination of the use of existing geochemical absolute dating methods for the recent Mid-Ocean Ridge Basalts (MORB) and the observation of a dated and continuous sequence of the recent geomagnetic intensity variations. At Rodriguez ridge, rocks are enriched in trace elements that are required for optimal results in geochemical dating methods and the topography is relatively flat so that its effect on the magnetic data will be limited. These two reasons made the Rodriguez ridge being a good target for the GIMNAUT cruise. Moreover, it provides the chance to study a slow to intermediate spreading centre overlying a hotspot.

During this cruise, two transects of the CIR were done. They reach the Brunhes-Matsuyama magnetic boundaries (about 800 kyr) of the both flanks. They pass through the ridge axis at latitudes 19 deg. 11 S (northern profile) and at 19 deg. 29 S (southern profile). Direct geological observations have been done during 20 dives of the Nautile. About 150 samples have been collected. During 17 dives, the vector magnetic field have measured successfully with the Deep-Sea Three Components Magnetometer (DSTCM) of the Ocean Research Institute (Japan). The DSTCM data will be processed at the ORI. The variation of the magnetized oceanic crust will be obtained. Gravity has been measured at 29 stations on the seafloor. During nights, surface geophysical measurements, deep-tow magnetic profile and dredge haul completed direct observations.

Few preliminary results can be noticed. All the observed and sampled rocks were basalts, with a majority of pillow lava and a large numbers of dykes. It is in accord with the supposed hot magmatic character of the CIR at 19S. The rapid deposition of pelagic sediments shows that the tectonic activity is focused on the inner valley. Despite reported signs of possible hydrothermal plumes in water column, no

Active hydrothermal vent has been observed, although evidence of pervasive hydrothermal circulation is widespread.