

GEOPHYSICAL STUDIES OF THE INTRAPLATE DEFORMATION ZONE, CENTRAL INDIAN OCEAN

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Mosaic of the deformed crustal blocks and their structure in the central Indian Ocean are studied from the seismic reflection and refraction, gravity (ship-borne and satellite) and bathymetric data. Bathymetry and gravity data have revealed NE-SW trending deformed blocks. Positive gravity closures, 15 to 65 mGal amplitude correlated with seismic reflection data have enabled identification of 23 deformed blocks and northward volcanic trace as buried hills parallel to 82°30'E. Reflection records have revealed deformed blocks of 50 to 330 km long and 0.3 to 2.0 km relief in the form of anticlinal basement rises, zones of high angle faults, low amplitude broad basement rises associated with high-angle faults and reactivated pre-existing structures. Seismic sequence stratigraphy studies on correlation with results of ODP Leg 116 sites have revealed 2 to 3 km thick pelagic and turbidite sediments carpeting the oceanic basement. They consist of 5 sequences, H1 to H5 separated by Oligocene stratigraphic boundary and upper Miocene, lower Pliocene and upper Pleistocene structural unconformities. Refraction and satellite gravity data model studies have revealed crustal structure and northward increase, from 7 to 9 km in thickness of crust. Down flexuring of the lithosphere was initiated due to excess volcanic load of the Afanasy Nikitin seamount since the late Cretaceous. Further, deformation resulting in the deformed or upthrust crustal blocks in the mid-plate position is effected by the temporal and spatial changes in the in-plane accumulative stresses between the plate ends and mid-plate positions since the Eocene time.