

## **Computation of Geoid and its interpretation in Saurashtra, western India using Gravity data**

### **Abstract:**

The geoidal anomaly is related with the density structure within the Earth. The long wavelength features are associated with deep mass anomalies (core/mantle), while the very short ones correspond to uncompensated topography and lithospheric flexure. In the middle term wavelengths the geoid depends upon the mass anomalies within the lithosphere and is proportional to the first moment of the density anomaly. This can also provide useful tectonic information about lithospheric structure.

By applying Least square collocation technique geoid undulation has been determined by combining geopotential model, Free-air gravity anomalies and height data in Saurashtra, Western India. A detail terrain model (DTM) has been used for removing the residual terrain effect and terrain effect. A positive geoidal undulation of 1-2 m has been observed after removing a regional trend from the gravimetric geoid over Saurashtra Plateau. It has been found that the layered structure of the crust plays an important role in the existence of the geoidal high in Saurashtra region. The layered structure of the lithosphere i.e. Moho is characterized by a thick, high-density crust and as associated geoidal anomalies. The upper mantle also plays an important role in the isostatic equilibrium of the whole lithosphere. Therefore, the effects of crustal structure have also been studied by applying Airy and Pratt-type isostatic models and compared with observed gravimetric geoidal anomalies. The modeling of regional Bouguer gravity also indicates the gravity low is caused by two sources: the crustal root is anomalously dense or upper mantle is anomalously light.

keywords: Gravimetric geoid, isostasy, modeling