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Editorial

A Note On Gravitational Field

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EDITORIAL NOTE

Gravity Recovery and Ocean Circulation Explorer (GOCE) is one of the gravity data that can be used for the determination of gravity field parameters such as the deflection of the vertical component, geoid height etc. GOCE mission was aimed at measurement of gravity field anomalies with accuracy of 10-2ms-2 and to determine the geoid with an accuracy of 1-2cm.The use of this GOCE data in an area, just like any other global geo-potential model (GGM) will depend on its fit to the terrestrial observed values. The main thrust of this paper is to validate GOCE data over terrestrial observed gravity anomalies for one hundred and fifteen points where bouguer gravity anomaly has been computed over Enugu State in Nigeria. The computed gravity anomaly obtained using the GOCE data was compared to the one obtained terrestrially for the entire points. The maximum and minimum difference was 0.064768m/gal and 29.62059m/gal. The root mean square error is 13.79396, 14.42247 and 13.09670 for the different epochs R3, R4, R5 respectively. It was found that GOCE derived gravity values cannot be used in Nigeria to represent point values because it has a long wavelength of measurement. It may however be considered for a reference for geoid computation where it takes care of the long wavelength as part of the gravity field.

The earth gravity field and its time variation are essential in the study of fundamental earth processes such as mantle convection, plate tectonic, fluid mass transport both on the surface and in the core The gravity field of the earth is critical in such areas as positioning and navigation, metrology, geophysics, geodynamics, oceanography, cryospheric sciences and other disciplines related to the earth's climate and environment. The accurate determination of the gravity field and its temporal variations is one of the three fundamental pillars of modern geodesy Terrestrial gravity observation is a very tedious process but precise in meeting the geodynamic and geopotential need of the local area. However, Satellite method such as Gravity Recovery and Climate Experiment (GRACE), Challenging Mini-Satellite Payload (CHAMP), and Gravity Recovery and Ocean Circulation Explorer (GOCE) has come to the rescue by providing global data of long-wavelength with varying accuracies at different parts of the globe. The usefulness of any satellite global gravity model in any region depends on its fitness in the region as well as the required accuracy. Hence, there is need to investigate the fitness of the global satellite gravity mission within the local gravity field. This research therefore seeks to determine the fitness of GOCE data acquired over an area by comparing it with directly observed data. In order words comparing the gravity anomalies obtained based on bouguer reduction method by the GOCE satellite and the gravity anomalies obtained by terrestrial observation using the time-wise approach. It is based on the following objectives; acquiring terrestrial gravity anomaly observation from the Nigeria Geological Surveys at selected points in Enugu State (115 station-validation point); extracting an up-to-date GOCE satellite gravity anomaly data for the same points; fitting the reference system used in deriving the two sets of gravity anomalies as well as pre-process the terrestrial gravity anomalies as checks against errors; computing the difference between the two sets of gravity anomalies at the validation points and determining the fitness of the GOCE and terrestrial gravity data over Enugu State. Asserts that gravity anomaly fields must be derived from the observed gravity field for oil and gas exploration, mineral ore exploitations and allied geological activities

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