Geophysical Research Abstracts
Vol. 14, EGU2012-7235-2, 2012
EGU General Assembly 2012

A precise gravimetric geoid model for the Gulf of Corinth (KTH-COR12)

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Greece is a very active region where three major tectonic plates, the Eurasia, Africa, and Arabia plates meet. The motions of those major plates drive smaller plates, like the Aegean Sea plate, whose shape and motion determine the locations and focal mechanisms of most earthquakes in the region. The northern edge of the Aegean Sea plate is the Eurasian plate which is a divergent boundary responsible for the formation of the Gulf of Corinth. As a result our area of interest is the most rapidly extending rift system in Greece connected with the highest seismic activities in the Euro-Mediterranean region, an estimate of 1 to 1.5 cm/year of north–south extension, frequent seismic swarms, and destructive historical earthquakes. The key to a better monitoring of the regional earth crustal movements is the use of accurate orthometric heights stemming from GPS geometric heights and a precise geoid model.

A precise gravimetric geoid model of the Gulf of Corinth has been computed using the least squares modification of Stokes formula developed at KTH (KTH method). In this method, a stochastic approach applies additional information about the potential coefficients and the gravity anomaly errors in combination with the least squares modification of Stokes kernel to minimize the expected global mean square error (MSE). For this purpose, a dataset of local terrestrial gravity anomalies was combined with a global geopotential model, namely the ITG-Grace2010s satellite-only gravity field model. Areas with no terrestrial gravity information (i.e. sea regions) were filled with EGM08 gravity anomaly values. The SRTM90 digital elevation data from Shuttle Radar Topographic Mission (SRTM) of NASA, with a 90m resolution was chosen for the, essential for the computations, DEM. Additionally, GPS/Levelling, mean sea surface (MSS) and mean dynamic topography (MDT) datasets were used for externally evaluating the geoid model.

In this poster the methodology behind the construction of the KTH-COR12 regional geoid model is presented and its external evaluation is analyzed. The contribution of the geoid model to the local geodynamic and engineering applications is also briefly investigated.