Geophysical Research Abstracts
Vol. 12, EGU2010-9394-1, 2010
EGU General Assembly 2010

The role of new terrestrial gravity/GPS/levelling data, GRACE geopotential model and SRTM elevations on the earth gravity field modelling and its changes in Iran

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In order to model the earth gravity field and its temporal variations, different gravity data with terrestrial, airborne and satellite gathered kinds are necessary. It is possible to recover by them the short, medium and long wavelengths of the gravity field respectively. Terrestrial gravity data, especially for the regions with highly variations, are useful for different purposes, i.e. to estimate the actual gravity range in the country, to extend the gravity calibration line, to study the isostasy status (Aboghasem et al., EGU10), to modify the numerical density models, to ameliorate the local geoid models, to prepare a background for geodynamical researches, and so on.
The Multi-purpose Physical Geodesy and Geodynamics Network of Iran has recently established over Iran with 700 stations of 30' by 30' distribution (MPGGNI05, Hatam et al., EGU08). About 2000 precise relative gravity measurements gathered between the neighbour stations are prepared the possibility to compute the accurate, confident and homogeneous gravity values for the mentioned network. The MPGGNI is connected to the new 24-stations established national absolute gravity base network of Iran (NGBI09, Hatam et al., EGU09) to unify the reference system and to strengthen the accuracy and confident over the country. All 6 used relative gravimeters were regularly calibrated by the recently established tele cabin/ land national gravity calibration line (TC/L NGCLI, Hatam et al., EGU07). In addition, precise levelling measurements have tied the MPGGNI stations and have connected the new network to the existed national precise levelling network of Iran. Also, precise GPS measurements have been done at each station of MPGGNI with 24 hours duration. The MPGGNI can be understood typically as a precise gravity and GPS/Levelling network, and by repeating it, it is possible to model the changes of different components of the gravity field. In order to improve the precision of old gravity data, each station of MPGGNI was tied to the existed levelling bench marks by relative gravity measurements. The already existed gravity data in Iran are about 22,000 points which half of them are at precise levelling stations.
In order to choose an optimum geopotential model for Iran, to compute the long wavelengths part of the gravity field, a study has been followed based on different satellite only and combined global models, e.g., EIGEN-GRACE02S and EGM08, up to maximum degree and order of 360/360. The SRTM and GTOPO30 elevation data have used for the evaluation of topographical effects for near and far zones respectively. A new built density model with lateral variations, based on 1:250,000 geological maps (Cheraghi, EGU07), has used together with the mentined elevation models to ameliorate the results. The GRAVSOFT and SHGEO softwares are used for the computation of earth gravity field over Iran, typically the gravimetric geoid. A comparison was made between the gravimetric geoid and GPS/levelling points. An adjustment was finally made between the two mentioned kind models. To improve the gravity field model locally in the highest mountain of Iran, (Damavand 5610 m, Hatam et al., EGU09), the data of a profile containing gravity, gps, and trigonometric levelling from down to the summit have used.
Several absolute gravity stations were measured repeatedly each year since 2000. A study is made to understand the possible correlations between the gravity changes, underground water level changes, repeated precise levelling measurements, permanent GPS stations and geoidal suface varations.