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Geoid modeling for Iran using the gravity data from recently established gravity networks and readjusted old gravity data

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Determination of a precise geoid is highly demanded in Iran especially for GPS users to be able to convert ellipsoidal height to orthometric height which is the standard height system in Iran. Previous attempts to produce a geoid model for Iran were not able to satisfy the need for a precise geoid. Lack of enough gravity data (poor coverage), poor knowledge about the quality of gravity data and gross errors observed in the data set and most probably used in the previous models, are the main reasons. The old gravity data from the region of Iran which are maintained by BGI are not dense and accurate either. Attempts to collect precise gravity data in Iran have been done by different groups in different ways during a long period of time (3 decades). Lack of absolute gravity and precise first order gravity networks during the measurements, resulted in a data set with many unrevealed outliers and the accuracy difficult to be estimated. During the last few years, the absolute gravity network of Iran was established and soon after, the project of establishment of the first order gravity network was begun. The 1st order gravity network consists of 700 stations and majority of the stations have been measured for gravity, Levelling and GPS. Densification of the gravity networks is then started by establishing the 2nd order gravity networks. Establishment of the 2nd order network was begun in 2008 and it is an ongoing project now.
Determination of a new geoid model for Iran using the new set of gravity data and the enhanced (readjusted) old gravity data is represented here. Recently released geopotential models from GRACE mission are implemented in a remove-restore sense. The determined geoid is then compared with the existing models and also evaluated with GPS-leveling data. A combined gravimetric/GPS-leveling geoid is computed at the end and cross-validated with the GPS-leveling data.