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Evaluation of the Recent Local and Global Geoid Models in Iran based on the GPS/levelling and Vertical Gravity Components

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In order to improve the local geoid models, the selection of the best Global Geopotential Model (GGM) model for the region is essential, to be used in a combined solution from GGM and local gravimetric data. Also, a number of regional gravimetric geoid models have recently been determined for the Iran area, and a common problem is to select the best model, e.g. for engineering applications. We discuss these problems by taking advantage of 460 GPS/levelling points and 10 Laplace points as an external tool for validation of different global and local geoid models in the absolute and relative senses. By using relative comparisons of the height differences between precise levelling and GPS/geoid models we avoid possible unknown systematic effects between the different types of observables. Several high resolution GGMs published recently based on the recent satellite gravimetry data. The most important models are EGM2008 and EIGEN-6C models. The study shows that the EGM2008 mode fits the GPS/levelling data in Iran with the best absolute and relative accuracy among the GGMs. Among the local geoid models, the newly gravimetric Quasi-geoid model IRQ09 agrees considerably better with GPS/levelling than any of the other recent local geoid models. Its rms fit with GPS/levelling is 19 cm. Hence, we strongly recommend the use of this new model in any surveying engineering or GPS/levelling projects in the area.