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Evaluation of the New Earth Gravitational Model (EGM2008) in Iran

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A variety of global geopotential models, which express the Earth's gravity field and thus geoid heights in terms of spherical harmonic basis functions, have been computed by various groups. Earth Gravitational Model (EGM2008) is the most up to date and high resolution model up to degree 2160 which has been developed and published by National Geospatial-Intelligence Agency. EGM2008 incorporates improved 5x5 minutes gravity anomalies and has benefited from the latest GRACE based satellite solutions. The main goal of this research is the find answers to the question that is EGM2008 is the best GGM model for Iran? The standard deviation of the differences between free-air gravity anomalies from EGM2008 and BGI free-air gravity anomalies datasets is 17.6 mGal, compared to, e.g., 60.1 mGal for EGM96. Also, we discuss these problems by taking advantage of 475 GPS/levelling points as an external tool for validation of recent global and local geoid models in the absolute senses. The study shows that the EGM2008 agrees considerably better with GPS/levelling than any of the other recent/well-known global geoid models in Iran. Its RMS after 4- parameter fitting with GPS/levelling is 42 cm. The results of fitting for EGM96, EIGEN-5C and official local geoid model for Iran (IfAG/NCC) are significantly less and about 66, 69 and 80cm, respectively. Hence, we strongly recommend the use of EGM2008 in any surveying engineering, GPS/levelling and future local geoid models in the area.