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Gravity and height measurements along the profile of Damavand mountain in Iran

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In order to model the earth gravity field, 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, to modify the numerical density models, to ameliorate the local geoid models, to prepare a background for geodynamical researches, and so on.
Damavand, placed in central Alborz, is the highest mountain in Iran with the maximum elevation of 5610 meters. The region is considerable for its geodynamical activities with different active faults. Damavand had also some volcanic activities before. Sulphuric gases exit out now from different holes around the Damavand summit.
A profile of 5 stations was established from down (1700 m) to the top of Damavand (5610 m). The height difference between each two neighbor stations is about 1000 meters. All the gravity differences between each 2 neighbor stations were measured by one CG-5 relative gravimeter in go and return manner to eliminate the instrumental drift error. The profile was connected to an absolute gravity station to ameliorate the qualities of the gravity results. The mentioned absolute gravity station is belong to the (Tele Cabin/ Land) National Gravity Calibration Line of Iran (TC/L NGCLI05) with a total gravity range of 1220 mGals. The modified total gravity range by this connection is 1650 mGals. All the stations of Damavand gravity profile were measured by a bi-frequency GPS receiver for a duration of 12 hours to obtain their precise geodetical heights with an accuracy of 1-3 cm (except one station at the summit, because of atmospheric limitations, only 1 hour GPS measurements obtained). The explained GPS campaign data were processed together with the simultaneous measurements of one permanent GPS station which placed 20 km far from Damavand mountain. Each 2 neighbor stations of Damavand gravity profile was trigonometrically levelled by a precise total station system, TC1800. The Damavand profile was also connected to the 1-st order national precise leveling network of Iran. An estimation of geoidal undulations was done along the profile by using the all three mentioned kinds of data.