First Results of Evaluating and Adjusting the Multi-Purpose Physical Geodesy Network (1st order gravity network) of Iran

H. Cheraghi, A. Soltanpour, N. Azizian, and Y. Hatam

National Cartographic Center (NCC), PO Box 13185-1684, Azadi Sq., Meraj Ave, Tehran, Iran.(hamideh_ch@yahoo.com, + 98 21 66071098)

Iranian first order gravity network (multi-purpose physical geodesy and geodynamic network of Iran) was established by National Cartographic Center of Iran (NCC) between 2004 and 2007. The first order net stations consist of about 700 stations which are situated at about 45-55 Km distance. The main objectives of the network are establishing the first order gravity network with precise gravity values, densification of the existed Gravity Base Network (zero-order) of Iran, estimating the precise orthometric heights, and computing a precise geoid. 1745 relative gravity measurements between each 2 neighbor 55 km stations and 92 relative gravity measurements between the zero and first order network (connecting the first order net to the stations of Gravity Base Network of Iran) were made. Each relative gravity measurement is measured at one day and it contains three sets of 0.5 hour observations (go and return). The gravimetric measurements of the network were made using Scintrex CG5 and CG3 Gravimeters. Gravity measurements may contain gross, random and systematic errors. Systematic errors are primarily due to gravimeter drift and unmodeled calibration factors of instrument reading. The gravity measurements were corrected by the time dependent drift error and scale factor using the new Tele Cabin /Land National Gravity Calibration Line for Iran. In some cases, outliers (gross errors) are hidden in the data, and failure to detect them will result in a false determination of gravity values. The set of data containing about 1837 values of and 23 values of absolute gravity (zero-order) was adjusted using the weighted constraint least squares method. The weighted constraint model introduces a priori gravity values at given stations as constraints. Outliers has been detected using -test method. Results after adjustment show that the mean and maximum standard deviations of the stations are 3 and 24 respectively.