



Major Fault Patterns in Zanjan State of Iran Based of GECO Global Geoid Model

Sayyed Amir Hossein Beheshty (1), Mohammad Abrari Vajari (2), and SeyedehSusan Raoufikelachayeh (3)

(1) Islamic Azad University of Zanjan, Department of Civil Engineering, Zanjan, Iran, (2) University of Zanjan, Department of Civil Engineering, Zanjan, Iran, (3) Islamic Azad University of Zanjan, Zanjan, Iran

A new Earth Gravitational Model (GECO) to degree 2190 has been developed incorporates EGM2008 and the latest GOCE based satellite solutions. Satellite gradiometry data are more sensitive information of the long- and medium- wavelengths of the gravity field than the conventional satellite tracking data. Hence, by utilizing this new technique, more accurate, reliable and higher degrees/orders of the spherical harmonic expansion of the gravity field can be achieved. Gravity gradients can also be useful in geophysical interpretation and prospecting. We have presented the concept of gravity gradients with some simple interpretations. A MATLAB based computer programs were developed and utilized for determining the gravity and gradient components of the gravity field using the GGMs, followed by a case study in Zanjan State of Iran. Our numerical studies show strong (more than 72%) correlations between gravity anomalies and the diagonal elements of the gradient tensor. Also, strong correlations were revealed between the components of the deflection of vertical and the off-diagonal elements as well as between the horizontal gradient and magnitude of the deflection of vertical. We clearly distinguished two big faults in North and South of Zanjan city based on the current information. Also, several minor faults were detected in the study area. Therefore, the same geophysical interpretation can be stated for gravity gradient components too. Our mathematical derivations support some of these correlations.