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Stability of Aswan area, Egypt detected from geophysical and geodetic data

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Aswan area is one of the important areas in Egypt and because it encompasses the vital engineering structure of the High dam, so it has been selected for the present study. The Aswan High Dam is considered as a unique structure among all the large irrigation and electric power project in the world. This paper deals with using micro-gravity, precise leveling and GPS data for geophysical and geodetically studies. For carrying out the detailed gravity survey in the area were established for studying the subsurface structures. To study the recent vertical movements, a profile of 10 km length joins the High and old Aswan dams were established along the road connecting the two dams. This profile consists of 35 GPS/leveling stations extending along the two sides of the road and on the High Dam body. Precise leveling was carried out with GPS and repeated micro-gravity survey in the same time. GPS network consisting of nine stations was established for studying the recent horizontal crustal movements. Many campaigns from December 2001 to January 2012 were performed for collecting the gravity, leveling and GPS data. The main aim of this work is to study the structural features and the behavior of the area as depicted from gravity, leveling and GPS measurements. The present work focuses on the analysis of the gravity, leveling and GPS data. The gravity results of the present study investigate and analyze the subsurface geologic structures and reveal to there be minor structures; features and anomalies are taking W-E and N-S directions. The geodetic results indicated lower rates of the vertical and horizontal displacements and strain values. This may be related to the stability of the area.

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Resolution of lateral in homogeneities using the common refracting element method

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Every reliable interpretation method of shallow refraction seismic travel time data (also known as first arrivals or head waves) has to include criteria for distinguishing between vertical and horizontal variations of velocities. The Common Refractor Element (CRE) method presents a simple approach to interpret shallow refraction seismic data, especially in cases of piecewise lateral changes along the refracting interfaces. In this method, a common linear travel time element, (or part of it), which corresponds to a linear common refractor element is used for inversion of these first arrivals. Linear travel time elements are defined as linear parts of the travel time curve with equal slopes and consequently equal apparent velocities. Travel time parameters such as the layer reciprocal time, the apparent refractor velocity and the intercept time values are used to distinguish between vertical and horizontal variations. Layer reciprocal time means that the forward and reversed travel time refracted from one layer must be equal at the two ends of the travel time curve. Lateral changes in dip and/or velocity along the refracting interface create a travel time curve of different linear segments and the extrapolation of corresponding travel time elements for reversing profiles are not equal at both ends of the travel time curve, except for the last two refractor elements that represent the last two elements from each side of the refractor. Apparent refractor velocity can be used in several ways as another parameter for lateral variation or structure identification. In-line reversed profiling technique is essential for the required data.

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