



The effect of local hydrogeological characteristics on gravity measurement

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Temporal gravity data contains abundant information of mass migration inner of the Earth, and surface gravity observations are influenced by local hydrogeological characteristics largely. Supplementing with absolute and relative gravity measurements, superconducting gravimeter observation is an important method to investigate the local hydrogeological characteristics. Two superconducting gravimeters in WGNFS (Wuhan Geodetic National Field Scientific Observation and Research Station) recorded significant gravity variation trend from 2013 to 2015 which have highly correlated with the groundwater observation data obtained at WGET (Wuhan Gravitation and Earth Tide National Field Scientific Observation and Research Station). However, the superconducting gravimeter observation data in WGET is almost immune to the groundwater observation data. For investigating and understanding this phenomenon, firstly, we collect geophysics and geodesy information including gravity, hydrological, geological and topographical data; Secondly, based on above data, we derive the geological structure and establish the local hydrological model to obtain the hydrogeological parameters; Then we simulate the local hydrological model to obtain the local hydrogeological distribution characteristics and the influence of it on surface gravity measurements; Finally, we compare the measured gravity data with simulation results to obtain the optimal hydrological gravity model and a calculation software of local hydrological gravity correction model. This study is the foundation of monitoring the groundwater migration by the surface gravity observations, which provides the reference model for the earthquake event, the crustal movement and other geophysical phenomenon. Meanwhile, it has important significance for further analysis and application of surface gravity observations.

Keywords: gravity measurement; hydrogeological characteristics; gravity- hydrological model; simulation