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Estimation of water storage change of Lake Nasser using GRACE gravity data

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Lake Nasser, which impounds by the High Dam, is the main water reservoir for the whole Egyptian territory. Water storage at the lake plays an essential role in water demands and affects almost the whole country. Thus, observation based information about water income, the spatial distribution and temporal variation of water storage is of great importance. We used data from the Gravity Recovery and Climate Experiment (GRACE) satellite mission to determine the spatiotemporal variation of water stored on the Lake or beneath the crust surrounding it. Integrated gravity signals from Grace have been separated into its individual components related to mass redistribution in and around the Lake. Temporal gravity variation from GRACE correlated quiet well with the hydrological cycle of the Lake. Spectral analysis has been used to differentiate between water storage in the Lake and the spatial distribution of underground water variation. On the other hand, GRACE data enable the complete scope of the whole Nile basin and its relation to the water storage of the Lake. In this manner, filtering of the spherical harmonics from GRACE plays an important role and has been tested in the current research. Finally, global data from GRACE to the whole Nile basin together with global hydrological models give important information of the seasonal water income to the Lake and puts an important step toward for the construction of a hydrological model to predict water income to the Lake.