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Abstract

Surface water bodies (lakes, reservoirs and rivers) are key components of the water cycle and are important water sources. Water level and storage vary greatly under the impacts of climate change and human activities. A national-scale surface water monitoring dataset for China is not available. The spatio-temporal pattern of surface water dynamics is poorly known due to insufficient in situ monitoring capabilities and restricted access to monitoring data. In comparison with other satellites, the 369 day repeat orbit enables Cryosat-2 to monitor smaller water bodies than other satellites and the SIRAL sensor has higher precise than conventional altimeters.

We investigated water level variations for large lakes, reservoirs and rivers during the period of 2010 - 2015 using Cryosat-2 altimetry data. Water storage changes for 759 water bodies were estimated, and the contribution of surface water storage (SWS) changes to terrestrial water storage (TWS) was evaluated in combination with results from the Gravity Recovery and Climate Experiment (GRACE). Moreover, water level dynamics in the Yangtze and Yellow Rivers were mapped.

Results show that 1) surface water levels change significantly at regional scale, i.e. declining in Junggar Basin, Huai River Basin and Hubei Province while rising in North Tibetan Plateau and Songnen Plain; 2) SWS change affects TWS variation greatly, especially in Tibetan Plateau ; 3) TWS in Songhua River basin has been fluctuating strongly over the past decade and the North China Plain maintained a consistently decreasing trend in TWS (- 20 mm/yr); 4) Change observed in Songnen Plain is also seen from SongLiao Water Resources Bulletin.