CryoSat-2 radar altimetry for monitoring freshwater resources of China - DTU Orbit (24/08/2019)

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Surface water bodies (lakes, reservoirs, and rivers) are key components of the water cycle and are important water resources. Water level and storage vary greatly under the impacts of climate change and human activities. Due to sparse in-situ monitoring networks, a comprehensive national-scale monitoring dataset of surface water bodies in China is not available. Over the last two decades, satellite altimetry has been used successfully for inland water monitoring. Here, we use CryoSat-2 radar altimetry to monitor water level variations of large lakes, reservoirs and rivers across China and demonstrate its potential to complement available in-situ monitoring datasets for the country.

In this study, over 1000 lakes and reservoirs, and 6 large rivers are investigated. The results show that surface water varied greatly over the past 6 years, e.g. in the Tibetan Plateau, the Junggar Basin, the Northeast China Plain, and the central Yangtze River basin. Estimated changes in volume indicate that surface water variation contributes significantly to terrestrial storage variation, especially in the Qaidam Basin and the Tibetan Plateau. CryoSat-2 is capable of measuring regional-scale river level at high spatial resolution and competitive accuracy as demonstrated by comparison with available in-situ gauging data. The results are encouraging with RMSE values ranging from 0.24 to 0.35 m for the Heilongjiang-Amur River, 0.22 to 0.6 m for the Yellow River and 0.22 to 0.5 m for the Songhua River. Comparatively, accuracy is much lower over the Yangtze and Pearl Rivers (RMSE ~ 2.6 m and ~ 3.3 m), probably due to intensive inland waterway navigation. CryoSat-2 shows great potential for monitoring surface water at national scale in China.

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