

Title: Assessing global lake water storage dynamics since the 1990s

Abstract

Lakes are essential components of the global hydrological cycle. They function as sentinels of climate change, and provide indispensable water supply, energy generation, aquatic ecosystems for meeting agricultural, industrial, and domestic needs. Despite the importance of lakes to natural systems and human societies, their water storage dynamics are poorly understood on a global scale. This is further exacerbated by the declining gauging measurements across the world. The resulting knowledge gap prevents a fundamental understanding of the surface water availability, and thus impedes effective water resource management. Regional evidence has suggested that water-abundant regions show increasing trends in surface water areas whereas water-limited regions exhibit decreasing trends. However, whether this divergence also holds true for the storage of open water bodies across the global land surface remains unknown. In this presentation, a new investigation on understanding recent global lake volume dynamics will be introduced. First, multi-mission satellite data (i.e., Landsat and a constellation of satellite radar altimetry) are leveraged to generate near monthly lake volume changes in about 1,000 major lakes from 1990s to the present. Then, the global lake volume time series dataset is used to test whether the recent trends in global open-surface water storage exhibit a divergence between arid and humid regions. Finally, the linkages between lake volume changes and climate variability/change are explored and the dominant drivers for some regional hotspots with evident lake volume trends are identified. These results will advance the understanding of surface water storage dynamics and the implications for the water cycle.