

Abstract

Changes in Net Global Surface Water Area Since 1985 †

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Abstract: Spatial and temporal characteristics of surface water resources (e.g., extension, connectivity, seasonality) are key elements in water allocation, climate and hydrological regulation, ecosystem functioning, and the food-energy-water nexus. Changes in surface water area due to losses/gains to land could strongly affect these processes on different scales. Previous findings on changes in the Earth's surface water area are contradictory. Based on water–land year classification datasets, we estimated global surface water area changes between 1985–2000 and 2001–2015. We found a net global gain in surface water of 100,454 km², attributable to a large net gain in seasonal water (83,329 km²) and a small net gain in permanent water (17,125 km²). In general, net changes were highly heterogeneous in space, with local exceptions of clear drying and wetting trends, e.g., the Aral Sea and Quill Lakes, respectively. These findings raise multiple questions as to why seasonal water gains dominate and how different intertwined drivers (e.g., hydroclimate and human-induced water–land use changes) shape the distribution of the Earth's surface water. Understanding these long-term changes is essential to predicting water-related pressures and prioritizing management decisions.

Keywords: surface water changes; seasonal water; permanent water; Google Earth Engine



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