

EGU24-14682, updated on 16 Sep 2024  
<https://doi.org/10.5194/egusphere-egu24-14682>  
EGU General Assembly 2024  
© Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



## Human activity has decoupled surface water storage from precipitation in global drylands

**Gang Zhao**<sup>1,2</sup>, Huilin Gao<sup>3</sup>, Yao Li<sup>4</sup>, Qihong Tang<sup>2</sup>, Iestyn Woolway<sup>5</sup>, Julian Merder<sup>1</sup>, Lorenzo Rosa<sup>1</sup>, and Anna Michalak<sup>1</sup>

<sup>1</sup>Department of Global Ecology, Carnegie Institution for Science, Stanford, USA

<sup>2</sup>Institute of Geographic Sciences and Natural Resources Research, CAS, Beijing, China

<sup>3</sup>Zachry Department of Civil and Environmental Engineering, Texas A&M University, College Station, USA

<sup>4</sup>School of Geographical Sciences, Southwest University, Chongqing, China

<sup>5</sup>School of Ocean Sciences, Bangor University, Anglesey, UK

The availability of surface water in global drylands is essential for local populations and ecosystems. However, the long-term changes in surface water storage and their underlying causes, particularly from anthropogenic activities, remain largely unknown. Here we utilized optical and altimetric remote sensing data to create monthly time series of storage changes between 1985 and 2020 for 105,400 lakes and reservoirs in global drylands. Our analysis reveals that surface water storage in global drylands has been increasing at a rate of 2.20 km<sup>3</sup> per year, primarily due to the addition of new reservoirs. For lakes and older reservoirs constructed before 1983, their long-term storage changes are mainly attributed to anthropogenic activities, including human-induced warming and water management, rather than changes in precipitation. These observation-based findings highlight that anthropogenic activities have decoupled surface water storage from precipitation in global drylands, with significant implications for the sustainability of local society and ecosystems.