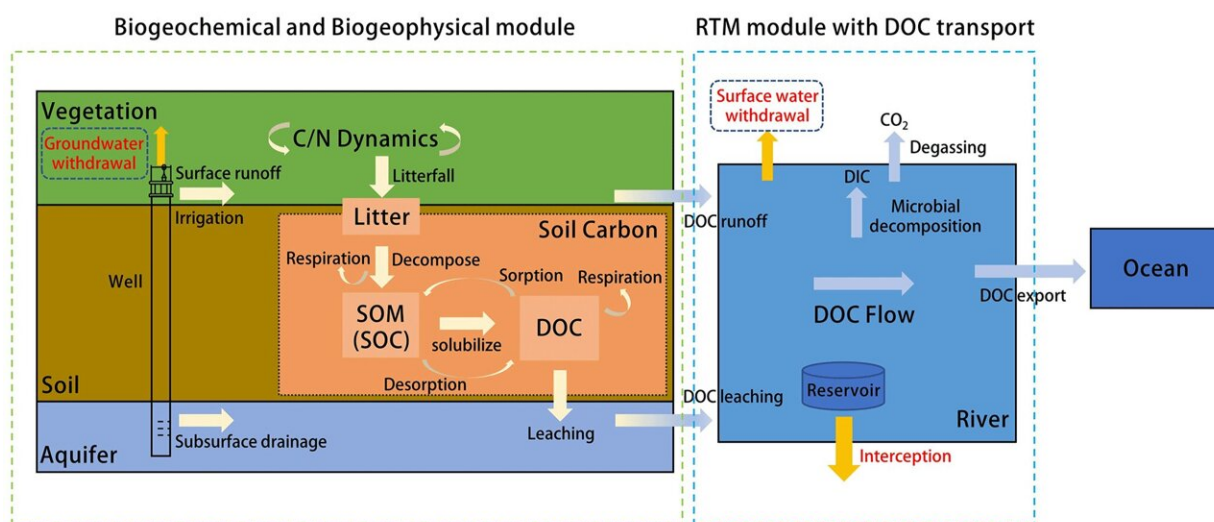


Revealing the role of anthropogenic water regulation in shaping riverine dissolved organic carbon fluxes

September 20 2023, by Li Yuan



Schematic diagram of the land surface model with riverine dissolved organic carbon (DOC) transport and anthropogenic water regulation (C: carbon; N: nitrogen; SOM: soil organic matter; SOC: soil organic carbon; DIC: dissolved inorganic carbon). Credit: *Earth System Dynamics* (2023). DOI: 10.5194/esd-14-897-2023

Riverine dissolved organic carbon (DOC) plays a crucial role in supporting microbial ecosystems in rivers and oceans while also contributing to greenhouse gas emissions from freshwater systems.

In recent years, human-driven water regulation activities have significantly disrupted natural processes within [river basins](#), leading to alterations in hydrological and hydraulic dynamics and affecting material circulation and transport.

A collaborative research team led by the Institute of Atmospheric Physics (IAP) of the Chinese Academy of Sciences has developed innovative models that account for both soil and riverine DOC dynamics, as well as the influence of anthropogenic water regulation activities. These models have been integrated into the land surface model CLM5.0.

The study was published in *Earth System Dynamics* on Sept. 4.

"We conducted three sets of numerical simulations from 1981 to 2013 on a global scale using our developed model to investigate the effects of anthropogenic water regulation on riverine DOC transport," said Ph.D. candidate You Yanbin from IAP.

The researchers found that in the majority of cases, the transport of DOC in rivers was predominantly reduced by surface water regulation. Prof. Xie Zhenghui, co-corresponding author noted, "The total impact of anthropogenic water regulation reduced global annual riverine DOC exports to the ocean by approximately $13.36 \pm 2.45 \text{ Tg C yr}^{-1}$, and this effect increased from 4.83% to 6.20% during 1981–2013."

In addition, the greatest impact of anthropogenic water regulation activities was concentrated in the region from 23.5°N to 66°N because this zone contains the highest intensity of human water use activities.

"Our innovative scheme for simulating DOC exports from terrestrial to aquatic systems is pivotal in accurately estimating global carbon budgets," said Prof. Jia Binghao, co-corresponding author of the study.

More information: Yanbin You et al, Impacts of anthropogenic water regulation on global riverine dissolved organic carbon transport, *Earth System Dynamics* (2023). [DOI: 10.5194/esd-14-897-2023](https://doi.org/10.5194/esd-14-897-2023)

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