Quantifying the long-term changes of terrestrial water storage and their driving factors

Objective: To unravel the driving forces behind TWS trends from 1948 to 2012 using ELM v1.

Approach: Employ factorial simulations with the ELM v1 model to parse out the contributions of climate change, land use, and CO_2 levels to TWS trends.

Results/Impacts: The study successfully linked climate change to the predominant influence TWS trends from 1948 to 2012. It demonstrated that TWS generally increased, with a noticeable slowdown or reversal in the later half of the period. The effects of land use change and elevated CO2 were significant but secondary, with land conversion to agriculture showing a positiv impact on TWS. Nitrogen and aerosol contributions were less pronounced. This research provides a nuanced understanding of TWS dynamics essential for future water resource management and policy-making..

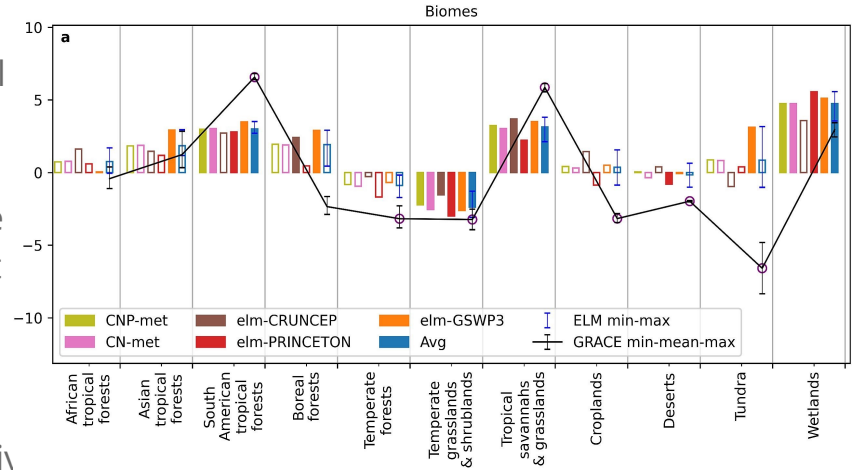

Figure: Comparison of ELM-simulated and GRACE observed trends in biome-level annual average TWS over 2003–2012.

Shi, X., Wang, Y., Mao, J., Thornton, P.E., Daniel, R.M., Hoffman, F.M. and Hao, Y., 2024. Quantifying the long-term changes of terrestrial water storage and their driving factors. ***Journal of Hydrology***, p.131096.