Disentangling climatic and anthropogenic controls on terrestrial ET trends

Objective:

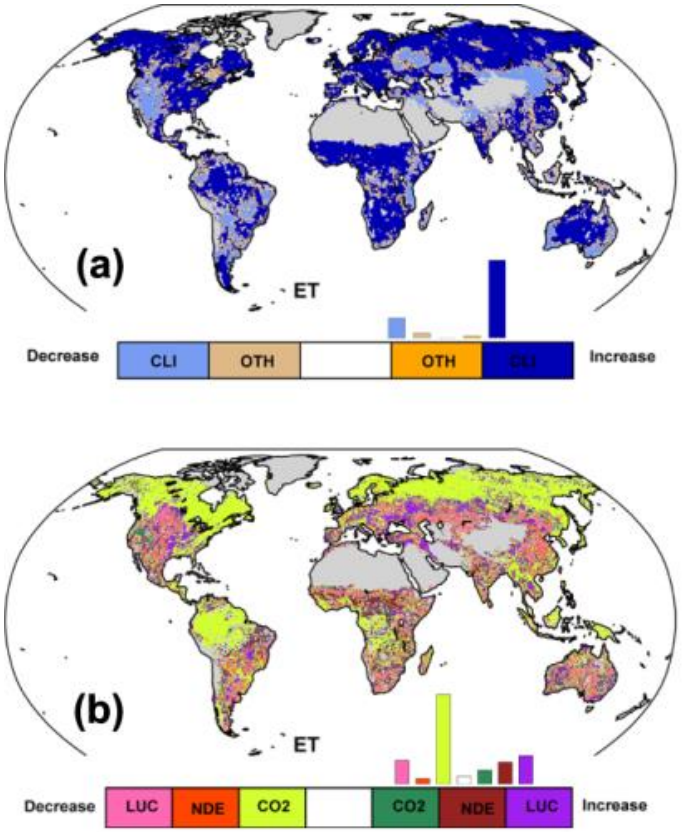
Examine natural and anthropogenic controls on terrestrial evapotranspiration (ET) changes from 1982 to 2010.

Approach:

- We created a diagnostic tool combining ET information from 11 long-term datasets. All input datasets were based on extensive in situ observations, satellite retrievals, or both.
- We used this diagnostic tool to evaluate single-factor and multi-factor simulations from the Multi-Scale Synthesis and Terrestrial Model Intercomparison Project (MsTMIP).

Results/Impacts:

- Changing climate was assessed to be the dominant control on spatiotemporal variations in ET.
- Rising atmospheric CO_2 concentration was the second most important factor influencing ET, with higher CO_2 driving a decreasing trend in ET.
- Nitrogen deposition slightly amplified global ET via enhanced plant growth. Land-use-induced ET responses were minor globally but pronounced locally.
- Multi-stream datasets and multi-modeling frameworks help to quantify the strengthening anthropogenic fingerprint on the global hydrologic cycle.



Spatial distribution of the dominant drivers for the ET. (a) Dominant drivers for the natural and human-induced ET, and (b) dominant drivers for the human-induced ET. CLI: the impact from historical climate only, OTH: all anthropogenic impacts, CO_2: the historical CO_2 impact only, NDE: the historical nitrogen deposition impact only, LUC: the historical land use/land cover change impact only.

Mao, Jiafu, et al. (2015), Disentangling climatic and anthropogenic controls on global terrestrial evapotranspiration trends, *Environ. Res. Lett.*, 10(9):094008, doi:10.1088/1748-9326/10/9/094008.