Background: Accurate evapotranspiration (ET) data are essential for management of water resources, as well as assessing changes in wildfire risk and water and carbon cycling. ET is the total flux of water vapor from soil (evaporation) and vegetation (transpiration) to the atmosphere. Remotely sensed ET data offer strong potential to support data-driven approaches for sustainable water management. However, practitioners require robust and rigorous accuracy assessments of such data. To meet this demand, the OpenET system development was led by ARC with public and private sector partners and leveraged an ensemble of six remote sensing models. OpenET provides access to field-scale (30 m) ET data for the 23 western United States for any user with an internet connection.

Main findings: In order to quantify the accuracy of OpenET, this study compares the platform's outputs against observations from 152 in situ stations, primarily eddy covariance flux towers, deployed across the contiguous United States (Figure). All models performed well, and the OpenET ensemble mean, with outlier removal, typically outperformed any individual model in terms of error statistics. It also met user accuracy requirements for agricultural crops at all timescales. This finding highlights the substantial progress achieved in developing fully automated satellite-based remote sensing of ET (RSET) modelling approaches that can be employed to map ET over large areas at field-scale resolution.

Impact: This study adds confidence to water resource managers, farmers, ranchers, scientists and other potential users of OpenET due to the high rigor and transparency of methods that were employed. The study also identifies key pathways to continue to advance the accuracy of RSET approaches.
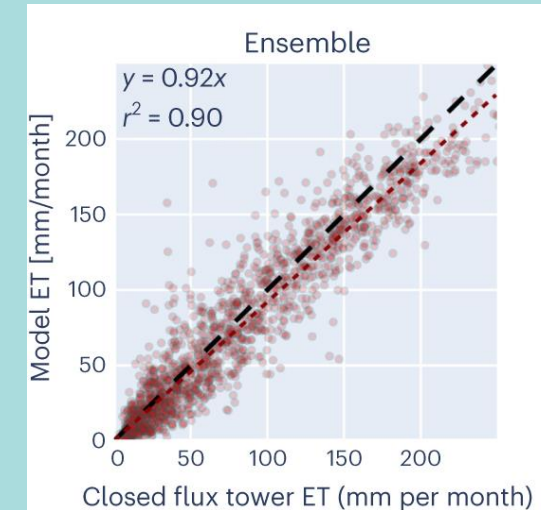

Figure (left): Monthly comparison of OpenET model mean ensemble ET versus closed flux tower ET from all cropland stations for all months of record.
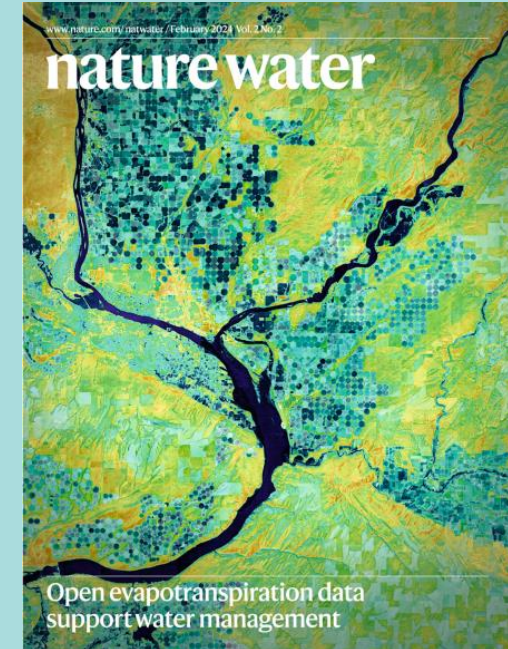

Image (right): OpenET on cover of *Nature Water*, February 2024.

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