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Satellite-based evapotranspiration (ET) products such as OpenET and GLEAM are widely used for drought monitoring and ecosystem-climate studies. However, their ability to accurately capture interannual variability (IAV), a key requirement for such applications, remains under-evaluated. Here, we assessed IAV in OpenET and GLEAM using an independent water balance approach that combined precipitation, discharge, and GRACE/FO total water storage anomalies across nine river basins in the western United States. Even after accounting for observational uncertainty through a Monte Carlo approach, both products systematically underestimate IAV relative to water balance-based ET, by more than 60% on average. This result is further supported by long-term tower measurements from AmeriFlux. We also demonstrated that ET sensitivity to climate and vegetation drivers in OpenET and GLEAM differ substantially from water balance-based estimates. These findings reveal important limitations in satellite-based ET products and highlight the need for improved IAV representation to support ecosystem and climate applications.

Presentation file

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