In-situ validation and statistical comparison of two remotely-sensed evapotranspiration models implemented at European cropland sites: Two Source Energy Balance and Surface Temperature Initiated Closure

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MAIN BODY OF TEXT

Upcoming thermal satellite missions TRISHNA (ISRO/CNES) and LSTM (ESA) will facilitate the delivery of field-scale evapotranspiration (ET) with global coverage at two- and three-day temporal frequency. ET at this spatiotemporal resolution can be used to monitor crop stress, inform irrigation practices, and track irrigation water use to support water resource management in regions affected by drought. ET products must be timely and reliable to maximize uptake and effective use by stakeholders. Given the existence of a wide variety of ET models with different assumptions, selecting the most generalizable model for operational use is challenging.

This poster will present first results of an analysis of the generalizability of two ET models forced by remote sensing data, with a focus on agricultural use cases. The models are Two Source Energy Balance Priestly-Taylor (TSEB-PT) implemented through pyTSEB [1] and Surface Temperature Initiated Closure (STIC) in its STIC-JPL formulation [2]. Generalizability will be assessed by in-situ validation of both models forced with the same data, including Landsat land surface temperature and MODIS leaf area index. The validation dataset will be eddy-covariance flux tower ET from Integrated Carbon Observing System (ICOS) and Associated European cropland sites. In addition, the analysis will include a statistical comparison of the relative behavior of pyTSEB and STIC-JPL applied over different crop types and climates. These results will further the understanding of systematic differences in pyTSEB and STIC-JPL behavior, contributing to an assessment of their strengths and limitations with respect to operational use.

1. Nieto, H., Guzinski, R., & Kustas, W. P. (2018). pyTSEB: A python Two Source Energy Balance model for estimation of evapotranspiration with remote sensing data (Version 2.2) [Computer software]. https://doi.org/10.5281/zenodo.594732
2. Halverson, G., Mallick, K., Hu, T., Pascolini-Campbell, M., Villanueva-Weeks, C. (2026). Surface Temperature Initiated Closure (STIC) Evapotranspiration Model Python Implementation (Version 1.3)[Computer software]. JPL-Evapotranspiration-Algorithms/STIC-JPL: Surface Temperature Initiated Closure (STIC) Evapotranspiration Model Python Implementation