

Application of a *priori* primary production model to estimate evapotranspiration

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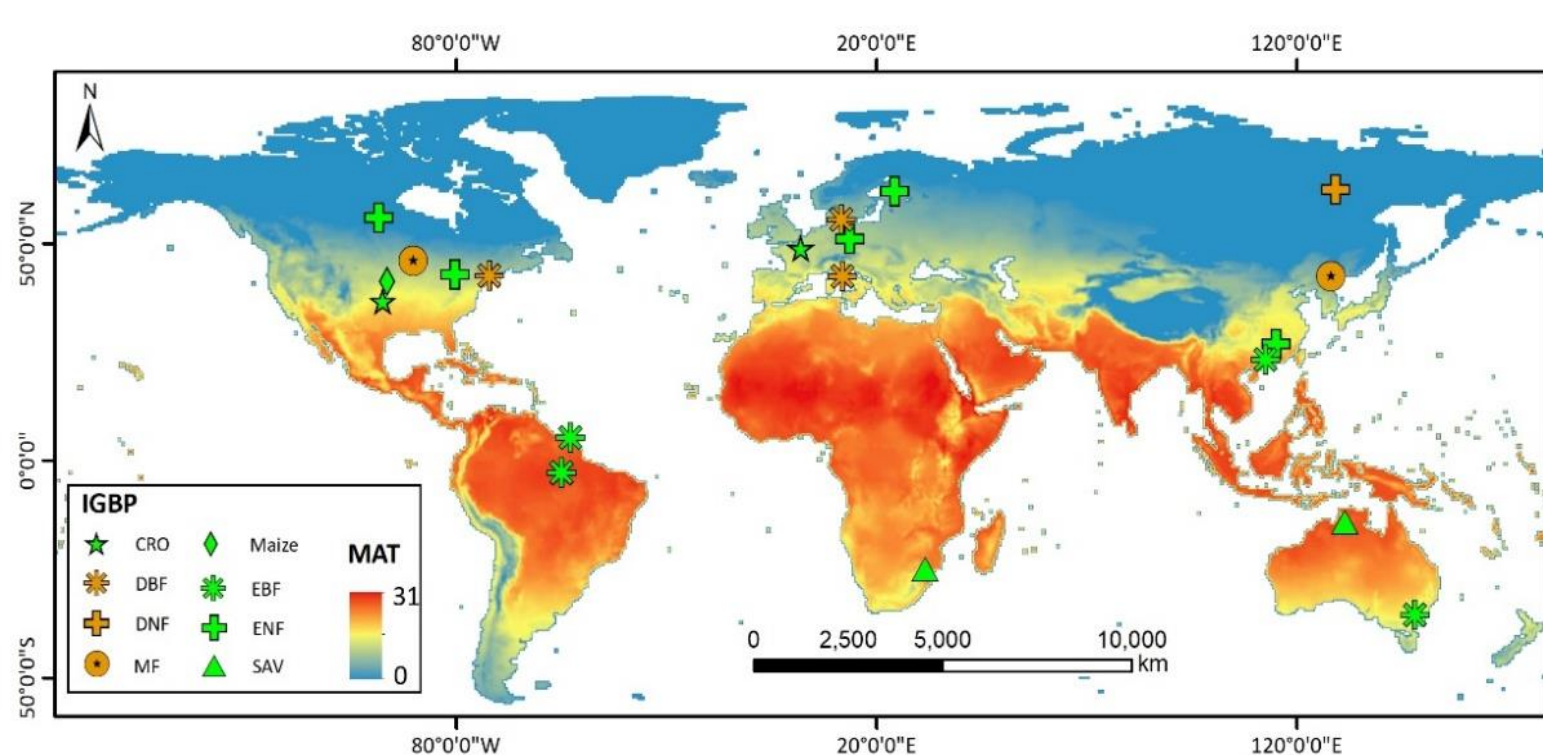


Introduction

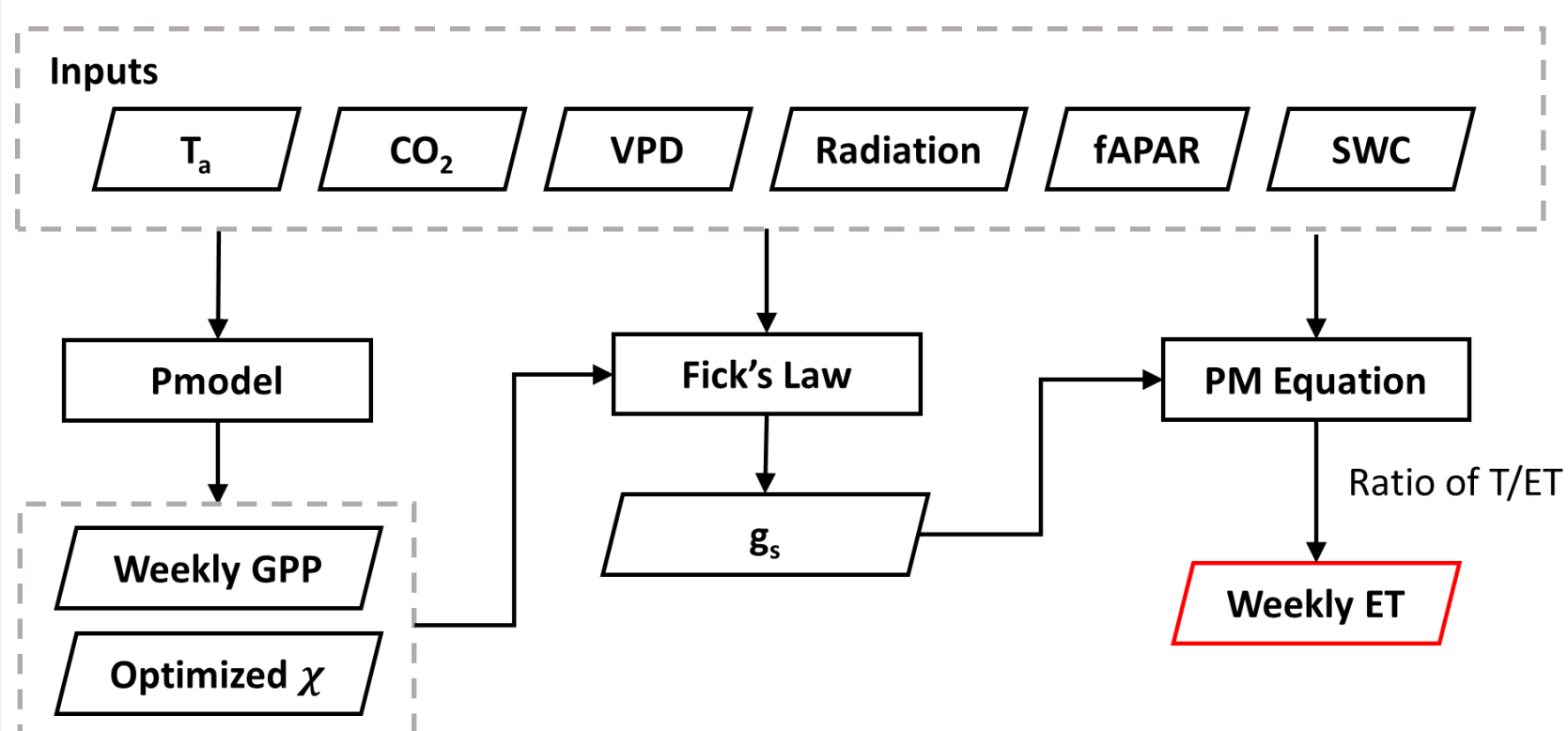
Accurate estimation of terrestrial evapotranspiration (ET) is a basic demand in studies concerning water cycle and the energy exchange. Estimating ET with the help of remote sensing (RS) observation has been proven to be effective globally. However, there still remains a simplification that generalizing site-calibrated parameter into all similar regions, and future scenario. Wang et al. (2017) proposed a theoretical-based primary production model (Pmodel) with the help of first-principles theory. So in this research, we employ this *priori* production model and Penman-Monteith Equation to estimate surface ET.

Data and sites

Totally 20 sites with over 200 years of observations from FLUXNET2015 are chosen including 7 types of C3 plants and maize (C4).

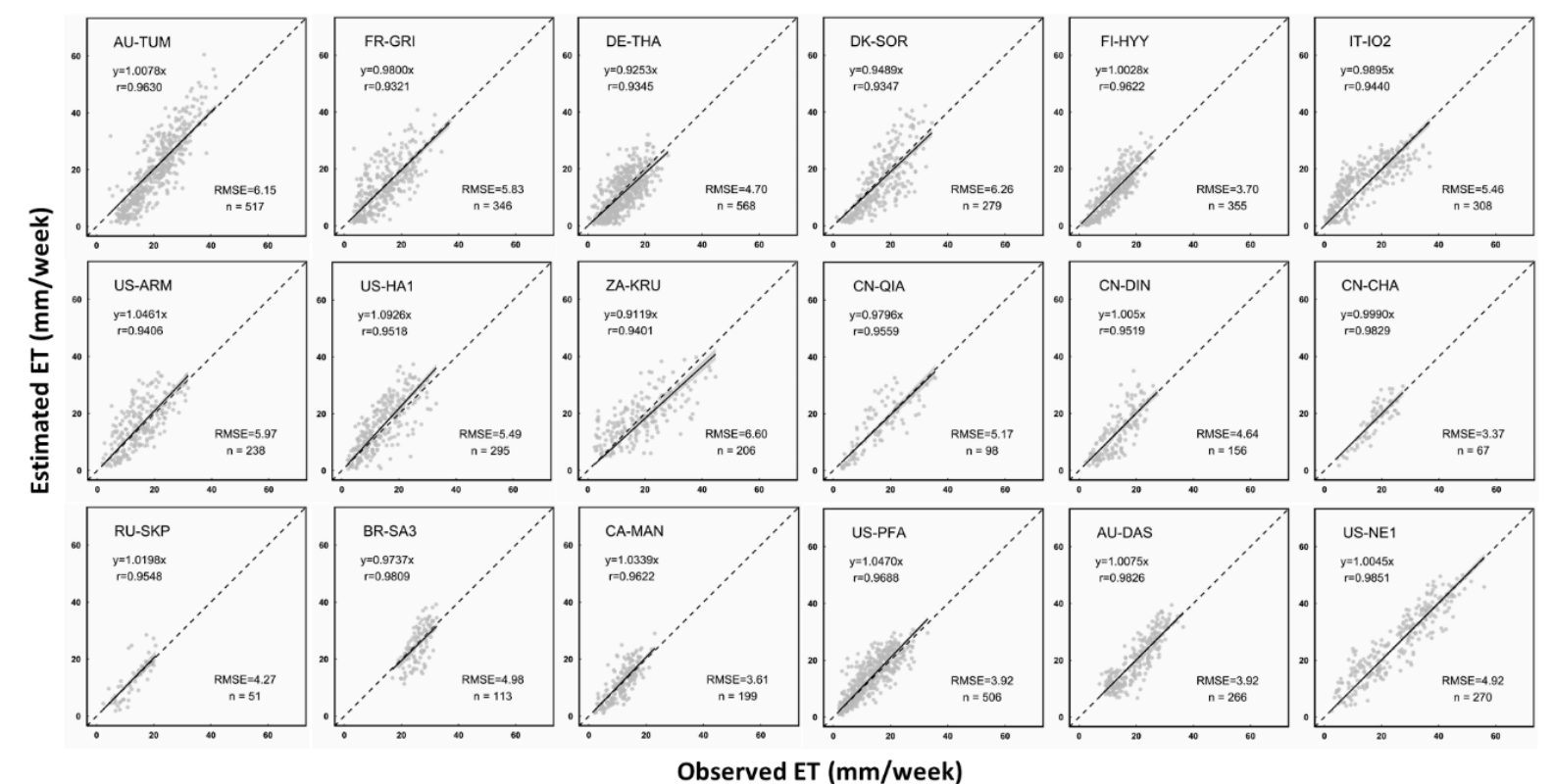


Method

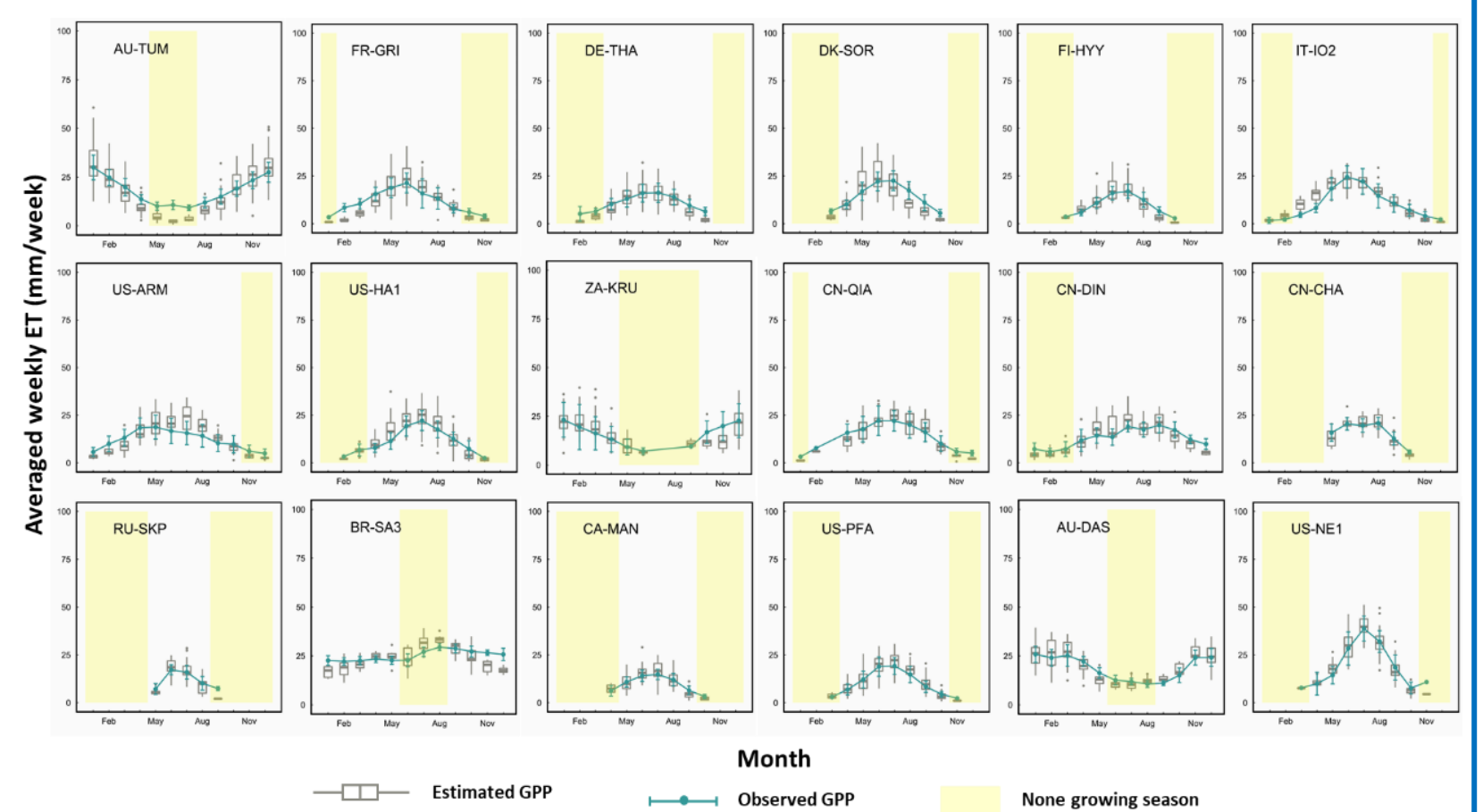


- Canopy conductance is simulated based on the theoretical model (Fick's Law).
- ET is estimated using Penman-Monteith equation.
- Soil evaporation is simplified to obey a constant ratio.

Results



Comparison between estimated ET against observed ET



Temporal trend of estimated ET and observed ET.

Conclusion

- Our model performs a satisfied accuracy without model calibration for different land cover types.
- The model could be extended into future scenarios since plant response towards climate change is described.
- Soil evaporation requires further consideration.

Reference

- Wang H, Prentice I C, Keenan T F, et al. Towards a universal model for carbon dioxide uptake by plants[J]. Nature Plants, 2017, 3(9): 734-741.

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