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Presenter

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Title

Optimization of modeled land-atmosphere exchanges of water and energy by Bayesian parameter calibration

The single largest uncertainty in climate model energy balance is the surface latent heating over tropical land. Resolving this issue will require better exploiting information which lies at the interface between observations and advanced modeling tools, both of which are imperfect. Further, a complex sequence of exchanges control water and energy transport within ecosystems. There are remarkably few observations which can constrain these fluxes, placing strict requirements on developing statistical methods to maximize the use of limited information to best improve models. I discuss an approach to calibrating select model parameters to observational data in a Bayesian estimation framework, requiring Markov Chain Monte Carlo sampling of the posterior distribution. Our Bayesian calibration approach is illustrated on a simple land surface model and is shown to constrain uncertain parameters as well as inform relevant values for operational use. Additionally, previous work has demonstrated the power of incorporating stable water isotopes into land surface models for further constraining ecosystem processes[1]. We discuss the application of the estimation scheme to a state-of-the-art land surface model which is a component of a global climate system model and specific challenges which arise in calibration models with a large number of parameters.

References

[1] Wong, T. E., M. Berkelhammer, and D. C. Noone. "A model-based evaluation of the efficacy of evapotranspiration partitioning from stable water isotopes." *in prep.*