

Matrix approach to land carbon cycle modeling

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Land ecosystems offer an effective nature-based solution to climate change mitigation by absorbing approximately 30% of anthropogenically emitted carbon. This estimated absorption is primarily based on constraints from atmospheric and oceanic measurements while quantification from direct studies of the land carbon cycle themselves displays great uncertainty. The latter hinders prediction of the future fate of the land carbon sink. This talk will present a matrix approach, which will be shown to unify land carbon cycle models, help diagnose model performance with new analytics, accelerate computational efficiency for spin-up, enable data assimilation with complex models, and guide carbon cycle research with a new theoretical framework. The unified framework can be used to evaluate relative importance of various processes, identify sources of uncertainty in model predictions, and improve accuracy of quantification of land carbon sequestration.