NCAR | CLIMATE & GLOBAL DYNAMICS

CGD Seminar Series

Improving Carbon Cycling using Land Data Assimilation: Progress and Challenges

Brett Raczka

UCAR

Date: Tuesday, 2 November 2021

Time: 11am – 12pm

For Zoom information, please contact Tracy Baker tbaker@ucar.edu

For live stream information, visit the CGD Seminar Webpage

ABSTRACT

Land surface models continue to advance in the representation of water, energy, carbon and nitrogen cycling. Despite these advances model performance can be limited because of errors in initial conditions, boundary conditions, model structure, and parametric errors. Data assimilation (DA) techniques combined with an expanding earth system network of observations present an opportunity to reduce these errors and improve simulations. This seminar reviews fundamental concepts of an EnKF DA system as part of the Data Assimilation Research Testbed (DART) and describes how it can be used to improve the representation of land surface processes. I focus on the Western US, a region that is important to monitor given its vulnerability to disturbance and shifts in carbon uptake. I show that when the Community Land Model (CLM5.0) is coupled with DART to include observations of biomass and leaf area, the simulated carbon uptake is significantly reduced compared to the prior estimate. I discuss a strategy to incorporate complementary observations (snow, solar-induced fluorescence, soil moisture) to further improve understanding of carbon cycling, describing the challenges of coupling DA systems with complex models. Furthermore, I discuss approaches to account for systemic biases between models and observations, and approaches to model development that can benefit both the earth system and DA modeling communities.