CGD SEMINAR

NCAR

DATE: Tuesday 12 February, 2019

TIME: 11 am – 12 pm

LOCATION: NCAR, 1850 Table Mesa Drive
Mesa Lab, Main Seminar Room

TITLE: Separating the impact of individual land surface properties on both the coupled and un-coupled land-atmosphere system

SPEAKER: Marysa Laguë, University of Washington

ABSTRACT:

While the land surface is highly dependent on the atmosphere above it, the reverse is also true - changes in the land surface, such as changes in vegetation, can drive substantial responses in the atmosphere on local, regional, and global scales. However, changes in vegetation encompass many simultaneous changes to various surface properties of the land, such as albedo, evaporative resistance, and aerodynamic roughness. Each of these surface properties has a different impact on the partitioning of energy within the terrestrial surface energy budget. These changes in surface energy fluxes can impact the atmosphere on local scales through changes in temperature or cloud cover, and global scales through changes in large scale atmospheric circulation – changes which can then feedback on the land surface. Because vegetation changes modify many surface properties simultaneously, it is often unclear why the coupled land-atmosphere system responds to a given change in vegetation the way it does. In order to isolate the effects of individual surface properties on terrestrial climate, we have developed an idealized land surface model (SLIM) which can be coupled to CESM in place of CLM. Using this idealized land model, we test the sensitivity of the atmosphere to global changes in three individual land surface properties: albedo, evaporative resistance, and surface roughness. We show that each surface property drives a spatially distinct pattern of atmospheric response. In addition to isolating the effect of these three land surface properties on the coupled land-atmosphere system, we also quantify how much of the total response comes directly from the land surface (using offline land model simulations), and how much of the total response comes from atmospheric feedbacks to the land surface change. We show that atmospheric feedbacks play a critical role in defining the temperature response to changes in albedo and evaporative resistance, particularly in the extra-tropics, with atmospheric feedbacks accounting for over 50% of the surface temperature response to changing albedo in over 80% of land areas.

Live webcast: http://ucarconnect.ucar.edu/live

For more information, contact Tracy Baker, tbaker@ucar.edu, 303.497.1366