

CEAE Seminar

Title:

From the Amazon to the Missouri River Basin: exploring links between vegetation, climate, and extreme events

Abstract:

The land surface plays an integral role in the Earth system. This talk will describe modeling efforts in previous and ongoing studies aimed at assessing the role of land-use change on land-atmosphere interaction. The first part of the talk will focus on the Amazon region, where the land surface and atmosphere play a significant role in both the local and global climates. Large-scale land-use change in the Amazon region has been shown to have a profound impact on the local climate and has the potential to impact the global climate system. Through the use of fully coupled land-atmosphere-ocean simulations, the responses and sensitivities to replacing Amazon vegetation with a heterogeneous crop cover were assessed both locally and globally. Consistent with previous modeling studies we found local increases in surface temperature and decreases in precipitation. After deforestation, it was determined that stronger regions of land-atmospheric coupling emerge in regions that were previously densely forested, while areas that receive irrigation become less coupled with the atmosphere. This study highlighted large-scale changes to the zonal and meridional circulation that are found to have impacts in remote regions throughout the tropics. The second part of the talk will describe two new modeling efforts. The first seeks to identify the key controls on alpine vegetation growth in the Green Lakes Valley (part of Niwot Ridge Long Term Ecological Research, LTER) through a 20-m implementation of the Distributed Hydrology Soil Vegetation Model (DHSVM). The second study seeks to explain why 9 out of the 10 most extreme streamflow years on the Missouri River Basin since 1898 have occurred since 1975, making use of a range of observational sources and the Variable Infiltration Capacity (VIC) model. These two ongoing projects are still in preliminary stages, hence their presentation will focus on hypotheses, data challenges and initial findings.