Using the Community Earth System Model to Understand Land Management under Future Climate and Socioeconomic Scenarios

Historical land management has transformed the Earth’s surface through deforestation, wood harvesting, agricultural expansion, urbanization and hydrological engineering. As humanity continues to transform the world through altering the land surface and the atmospheric concentrations of carbon dioxide and other greenhouse gases, there is a growing need to quantify the impacts that land management has on the climate system, and how changes in the climate system impact natural and human managed landscapes. Historical deforestation and agricultural expansion have resulted in large losses of terrestrial stores of carbon from the world’s forests accounting for around 150 PgC, or a third of human carbon emission since 1850. Agricultural production also has increased dramatically over the historical period through expansion and intensified management, with current global crop yields around twice those of the 1960s. Sustainably managing the competing demands on terrestrial systems to provide food, fiber, wood products, carbon storage, and fresh water, while maintaining the health of natural ecosystems is the challenge of our and future generations. As Earth System Models have evolved from climate models, ever more complex and rich representations of land surface processes and human activities are now being included in them. This framework allows the assessment of each of these components under historical and future climate and socioeconomic conditions. This presentation details the use of the CESM within the last Intergovernmental Panel on Climate Change Assessment Report (IPCC AR5) along with more recent developments and experiments investigating the potential impacts or uses of land cover and agricultural production over the coming century.

Seminars are live webcast: http://www.fin.ucar.edu/it/mms/ml-live-chat1.htm

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