Anthropogenic Land Cover Change Experiments in the CCSM

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Part 1. Model basics and procedures

The Community Climate System Model (CCSM) is comprised of four sub models to simulate the atmosphere (Community Atmosphere Model - CAM), the ocean (Parallel Ocean Program - POP), sea ice surface (Community Sea Ice Model – CSIM), and the terrestrial surface (Community Land Model – CLM). Anthropogenic forcings of climate change can be divided into those affecting atmospheric composition (e.g., greenhouse gases and aerosols), simulated in the CAM, and those that affect land cover, simulated in the CLM. Anthropogenic land cover change alters energy, water, and carbon exchanges between land and atmosphere and in doing so alters climate. The first part of this session will focus on how these processes are simulated in the CLM, and how similar land cover changes in different environments can result in different climate changes.

Part 2. Simulation scenarios and statistical considerations

To simulate human land cover change in the CLM, datasets are developed to show how natural vegetation is replaced by croplands and grazing lands. Simulations can be categorized as equilibrium simulations where the model reaches equilibrium conditions with a fixed land cover type. Alternatively, transient simulations simulate climate through time with changing land surface conditions. Transient simulation could also include atmospheric forcing where, for example, greenhouse gas concentration change over time along with land cover change. We will illustrate typical outcomes from such simulations using the older Parallel Climate Model. We will also discuss problems that arise when determining statistical confidence from these high temporal and spatially correlated climate variables.
References

CLM Literature (Model description etc.)


PCM Literature (land cover change)


SRES and Land cover change literature

If anyone is burning to know there is a paper in press as well


see http://www.sage.wisc.edu/pages/landuse.html <http://www.sage.wisc.edu>


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