

# **Report on CCSM Land Model Working Group Meeting**

## **Sixth Annual CCSM Workshop, The Village at Breckenridge**

**Co-Chairs: Gordon Bonan and Paul Houser**

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The Land Model Working Group Meeting consisted of several 30 minute presentations followed by a general group discussion. Keith Oleson presented results of the community Land Model coupled to CCM3. This allowed for evaluation of the new land model biogeophysics in a known host atmospheric model. The Community Land Model

Biogeophysics differs from the Common Land Model proposed by Dickinson, Zeng, et al. in several key respects. However, the model preserves most of the improvements seen in the Common Land Model, especially with respect to surface air temperature, snow, and runoff.

Sam Levis presented results related to the development of a dynamic global vegetation model for use with the Community Land Model. This model allows for the changing composition and structure of vegetation over time. Initial results were very promising, with the model adequately capturing the biogeography of vegetation, carbon fluxes, and carbon pools. This provides a basis for further development of the terrestrial carbon cycle for CCSM.

Peter Thornton presented issues related to the implementation of terrestrial carbon and nitrogen cycles and disturbance in CCSM. Development of the terrestrial carbon cycle and its link to nitrogen and disturbance were identified by the Land Working Group, the Biogeochemistry Working Group, and the SSC as high priorities for the land model.

Zong-Liang Yang presented results on proposed improvements to the soil hydrology used in the Community Land Model. These improvements were related to the freezing point of soil water and the vertical profile of hydraulic conductivity. These changes improved the simulation of runoff in an arctic watershed. These changes were not adopted for the present Community Land Model because there was not an opportunity to evaluate them globally. However, it is likely they will be adopted in future versions of the model.

Robert Dickinson presented draft guidelines for including a sub grid scale representation of land cover in the Community Land Model. These results look promising. One difficulty will be in keeping a consistent treatment of sub-grid scale heterogeneity between the fixed land cover and dynamic land cover versions of the model.

Two issues arose during the group discussion:

(1) Code ownership and availability -- Some members of the working group advocated an open source code policy whereby any interested developer could obtain the model and modify it as seen fit. Others advocated a limited distribution to only active collaborators. The working group has a policy similar to the Atmospheric Model Working Group whereby the model is freely available to these members of the group who are active in model development and who participate in working group meetings.

(2) Scope of the working group -- It was recognized that the land model is much broader than the traditional representation of surface energy, water, and momentum fluxes in atmospheric models. It includes all terrestrial processes, especially river routing, the carbon cycle, and vegetation change. The scientific scope and application of the land overlaps greatly with the biogeochemistry, paleoclimate, and climate change and assessment working groups. The land model also overlaps greatly with many of the

atmospheric model development projects (e.g., sub grid processes, boundary layer). Keeping all these diverse activities coordinated will become increasingly difficult.