2007 Fall Meeting
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Effect of land cover classification map resolution in land surface modeling studies

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AB: Evapotranspiration, soil moisture and surface temperature are the key variables controlling the partitioning of energy and water fluxes at the land surface. Over the last two decades, satellite data have been used to constrain these variables in land surface models using data assimilation and parameter calibration methods. For example, the Noah land surface model uses satellite-based land cover information to estimate vegetation parameters and improve its predictions. For simplicity, coarse resolution land cover maps are often used across a range of model resolutions. This study focused on the effect of using coarse spatial resolution land cover classification (LCC) remote-sensing images in land surface models. It was hypothesized that a scaling-threshold exists where high resolution variability is averaged out that can result in significant model prediction errors. To test this hypothesis, a 1 km resolution University of Maryland LCC map was rescaled into several coarser resolution images. Each LCC map was used in a separate Noah model run within the Land Information System modeling framework to estimate evapotranspiration, bare soil evaporation, soil moisture and upper layer soil temperature. Model results were compared using three methods: (1) observing the direct differences; (2) decomposition of the differences into long term, cyclic and random components; and (3) quantifying the overall root mean square error. The direct difference method revealed that increasing biases were introduced as LCC maps were rescaled to coarser resolutions. The decomposition method showed that the magnitude

and the sign of the seasonal and annual variations of time series differences are linked to climatological variables like temperature and precipitation. Both methods also showed that land cover sub-pixel variations have strong effects on the direction of the bias introduced by increased heterogeneity. Root mean square error method showed rescaling to coarser resolution increased the overall bias. The hypothesized scaling-threshold was not found. However all methods showed the resulting biases increases as the LCC map rescaling factors increased.
DE: 1818 Evapotranspiration
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