Geophysical Research Abstracts
Vol. 14, EGU2012-12166-1, 2012
EGU General Assembly 2012

The role of land cover variability on modelled land-atmosphere coupling

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Anthropogenic land-use activities have led to large-scale changes in global vegetation cover over the past centuries, and will probably continue so in the future. This impact is potentially significant, since managed crop lands and pastures are now among the largest ecosystems on earth. Their surface parameters differ largely from those of most natural vegetations they replace.
Land cover changes can range from changes in the state of vegetation to vegetation type conversion. The impact of a changing land surface on climate and climate simulations has recently attracted scientific interest, but process-understanding has yet to be build up.
This study investigates the role of land cover variability and vegetation in controlling the land-atmosphere coupling, and its relation with evaporation and surface temperature. Global atmospheric simulations are carried out with the EC-EARTH climate model using climatological sea surface temperature and sea ice distributions.
It was found that total variance of T2m amplifies mainly in the Northern hemisphere and partly in the tropics. These areas coincide with areas with a negative correlation between soil-moisture and evapotranspiration in spring and summer, i.e. evaporation affects soil moisture by depletion. In these areas a positive impact of time varying LAI values on temperature variability is found. Changes in LAI affect evapotranspiration more strongly in non-water limited, i.e. radiation limited climate regimes, where a change in vegetation properties can translate into evapotranspiration- and subsequent temperature changes.