The impact of a realistic vegetation annual cycle on climate and hydrology

D. Lawrence and J. Slingo
Centre for Global Atmospheric Modelling (CGAM), University of Reading, Reading, U.K.
dml@met.rdg.ac.uk

The Met Office Unified Model (HadAM3 with the MOSES 2.2 land-surface scheme, including tiling) is used to assess the impact of an imposed vegetation annual cycle on climate and hydrology with particular attention paid to the impacts in monsoon regions. A vegetation annual cycle for each tile in each gridbox has been derived from satellite estimates of Leaf Area Index (LAI) obtained from the nine-year ISLSCP II dataset. An attempt has been made to incorporate an annual cycle for all the physical characteristics of vegetation that are thought to be relevant to the surface climate including LAI, albedo, canopy height, surface roughness, canopy water capacity, and canopy heat capacity.

Two 20-yr model runs with climatological SSTs are compared. In the first run annual mean LAI values are imposed throughout the year, while in the second run the LAI varies according the observed climatological LAI annual cycle. It is found that climate diagnostics such as temperature and evaporation are significantly impacted by the annual cycle of vegetation, but precipitation is largely unaffected. The surface and sub-surface hydrology is also significantly impacted, especially in seasonally arid regions. Variations in surface roughness and LAI leading to changes in evapotranspiration appear to be the most important factors determining the influence of the annual cycle of vegetation on climate.

Wednesday I (Keynote talk)