

The influence of land use changes on 20th century climate

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49 million ha of the global land surface is currently classified as either crops, pasture or grazing, meaning that at least 34 % of the global land surface is subject to direct alteration by human activities. Land cover changes can have both a bio-geophysical and bio-geochemical effect on climate, through altering the surface fluxes of radiation, heat, moisture, momentum and the absorption or emission of greenhouse gases. Previous work, using the third generation Hadley Centre Climate Model (HadCM3; Betts, 2001, Betts et al. 2006) has shown that historical deforestation in temperate regions caused an increase in surface albedo, leading to a net cooling effect on climate, conflicting with the suggestion that land use change is responsible for the warming observed over the 20th century. In contrast, afforestation or reforestation in cold regions was shown to decrease the surface albedo and induce a positive radiative forcing (warming) which could partly or completely offset the negative forcing (cooling) due to carbon sequestration. This presentation will summarise some of the work that is currently being done in the Hadley Centre to investigate the impacts of dynamic land use changes on climate over the 20th century. The impacts on climate can be investigated by comparing model runs where land use changes through time are included, against runs where the land use remains constant. Preliminary results will be presented.