A modelling study of the climatic importance of vegetation in the tropics: Sensitivity to the specification of soil characteristics

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Vegetation is known to have a strong influence on land-atmosphere interactions, and major changes in tropical land cover, associated primarily with deforestation, have been shown to have significant impacts on the local climate, for example over South America.

This paper describes a series of sensitivity experiments with the Hadley Centre atmospheric GCM (HadAM3) in which the effects of vegetation in the tropics on the mean climate and its variability are explored. An important part of the study has been an investigation of the dependence of these effects on the specification of soil characteristics.

The processes through which vegetation modifies the climate and in particular the soil hydrology will be described. It will be shown that there are large regional differences in the degree to which vegetation influences the mean climate and its variability.

The sensitivity of the results to the specification of soil characteristics, involving soil hydraulic parameters, has been investigated by exchanging the standard soils dataset in HadAM3 with one derived from the IGBP-DIS soil data task. The results have shown that the climatic effects of land cover change depend critically on the specification of the soil characteristics. This emphasises the importance of improving the representation of soil hydraulic parameters in climate models used to predict the effects of land use/cover change.

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