



Impact of changing convection scheme on cloud feedbacks in the tropics

M. Ringer, C. Senior, W. Ingram

Met Office Hadley Centre, UK

We examine mixed-layer ocean, equilibrium, doubled CO₂ simulations of the Hadley Centre climate model, HadCM3, in which the standard convection scheme is replaced by the Emanuel and Betts-Miller schemes. These two schemes both lead to significantly different cloud responses in the tropics due to climate warming compared to the standard model. For example, the large areas of negative feedback due to increasing low-level cloud in both the Southern Hemisphere Pacific and Atlantic Oceans are greatly reduced with the Emanuel scheme and are reversed with the Betts-Miller scheme. The two schemes also have a large impact on the response of high clouds due to the warming, with the behaviour of both optically thin cirrus and optically thick deep convective cloud changing considerably. The role of SST gradients in the changing cloud responses and feedbacks is explored using idealized, fixed SST perturbation experiments using the three convection schemes in the atmospheric component of HadCM3.