



The sensitivity of the tropical circulation and Maritime Continent precipitation to climate model resolution

Reinhard Schiemann (1), Marie-Estelle Demory (1), Matthew S. Mizielinski (2), Malcolm J. Roberts (2), Len C. Shaffrey (1), Jane Strachan (1), and Pier Luigi Vidale (1)

(1) NCAS Climate, University of Reading, Department of Meteorology, United Kingdom (r.k.schiemann@reading.ac.uk), (2) Met Office Hadley Centre, Exeter, United Kingdom

The dependence of the annual mean tropical precipitation on horizontal resolution is investigated in the atmospheric version of the Hadley Centre General Environment Model. Reducing the grid spacing from about 350 km to about 110 km improves the precipitation distribution in most of the tropics. In particular, characteristic dry biases over South and Southeast Asia including the Maritime Continent as well as wet biases over the western tropical oceans are reduced. The annual-mean precipitation bias is reduced by about one third over the Maritime Continent and the neighbouring ocean basins associated with it via the Walker circulation. Sensitivity experiments show that much of the improvement with resolution in the Maritime Continent region is due to the specification of better resolved surface boundary conditions (land fraction, soil and vegetation parameters) at the higher resolution. It is shown that in particular the formulation of the coastal tiling scheme may cause resolution sensitivity of the mean simulated climate. The improvement in the tropical mean precipitation in this region is not primarily associated with the better representation of orography at the higher resolution, nor with changes in the eddy transport of moisture. Sizeable sensitivity to changes in the surface fields may be one of the reasons for the large variation of the mean tropical precipitation distribution seen across climate models.

R. Schiemann et al. (2013), *Climate Dynamics*, doi:10.1007/s00382-013-1997-0