Geophysical Research Abstracts
Vol. 13, EGU2011-1983, 2011
EGU General Assembly 2011

Ozone concentration changes in the Asian Summer Monsoon anticyclone and lower stratospheric water vapour: an idealised model study

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Satellite observations and model studies have previously established the impact of the Asian Summer Monsoon on the composition of the upper troposphere and lower stratosphere, where a region of enhanced water vapour and decreased ozone is found in the Monsoon anticyclone. We investigate a potential link between the magnitude of the Monsoon-induced ozone minimum and water vapour concentrations. In three idealised climate model experiments we prescribe ozone climatologies, decreasing or increasing ozone in the anticyclone region relative to the annual cycle during northern hemisphere summer. We discuss the modelled temperature and water vapour response, including the annual cycle and changes of the interannual variability. While water vapour decreases significantly when lower ozone is prescribed, it changes very little when higher ozone is prescribed, illustrating an important asymmetry between forcing and response in the Monsoon anticyclone region.