Geophysical Research Abstracts
Vol. 12, EGU2010-5189, 2010
EGU General Assembly 2010

The impact of natural versus anthropogenic aerosol on atmospheric circulation and cloud cover in CAM3

Robert Allen (1) and Steven Sherwood (2)

(1) Department of Earth System Science, University of California Irvine, Irvine, CA, USA (rjallen@uci.edu), (2) Climate Change Research Centre, University of New South Wales, Sydney, Australia

We examine the atmospheric response to direct aerosol radiative forcing under two idealized surface boundary conditions using CAM3. We impose forcings based on recent observational estimates which exceed those used in most previous studies. We find that aerosols are capable of significantly affecting local and remote atmospheric circulation and that absorbing versus reflecting aerosols lead to opposite circulation changes. Changes significantly affect the ITCZ and subtropical jet locations, and Arctic-Oscillation type responses at high northern latitudes. The latter are due to modulation of stratospheric wave-driving consistent with meridional forcing gradients in mid-latitudes. We also find that cloud cover over land is significantly affected by aerosol solar absorption. Our results suggest (1) recent shifts from reflecting to absorbing aerosol types may have contributed to the observed decadal variations in tropical width and AO; (2) high-latitude responses to aerosol or other mid-latitude forcing will depend on both the meridional and zonal distributions of the forcing; (3) semi-direct (cloud) effects on insolation of land surfaces induced by solar absorption of aerosols
appear significant.