Abstract submitted to Sixth Scientific Conference of the International Global Atmospheric Chemistry Project (IGAC) September 13-17, 1999 Bologna, Italy

NORTH ATLANTIC AEROSOL RADIATIVE IMPACTS BASED ON SATELLITE MEASUREMENTS AND AEROSOL INTENSIVE PROPERTIES FROM TARFOX AND ACE 2

Russell, Philip B.[(1)] Bergstrom, Robert W.[(2)] Schmid, Beat[(2)] Livingston, John M.[(3)]

[(1)]NASA Ames Research Center, Moffett Field, CA (USA)
[(2)]Bay Area Environmental Research Institute, San Francisco, CA (USA)
[(3)]SRI International, Menlo Park, CA (USA)

We estimate the impact of North Atlantic aerosols on the net shortwave flux at the tropopause by combining satellite-derived aerosol optical depth (AOD) maps with model aerosol properties determined via closure analyses in TARFOX and ACE 2. We exclude African dust, primarily by restricting latitudes to 25-60 N. The analyses use in situ aerosol composition measurements and air- and ship-borne sunphotometer measurements of AOD spectra. The aerosol model yields computed flux sensitivities (dFlux/dAOD) that agree with measurements by airborne flux radiometers in TARFOX. Its midvisible single-scattering albedo is 0.9, which is in the range obtained from in situ measurements of scattering and absorption in both TARFOX and ACE 2. Combining satellite-derived AOD maps with the aerosol model yields maps of 24-hour average net radiative flux changes. Cloud-free results range from –9 W/m^2 near the eastern US coastline in summer to –1 W/m^2 in the mid-Atlantic during winter; the regional annual average is –3.5 W/m^2. Using a non-absorbing aerosol model increases values by ~30%. Including cloud effects using ISCCP cloud-fraction maps greatly reduces the computed aerosol-induced direct flux changes. For example, the regional annual average decreases to –0.8 W/m^2. We compare results to previous calculations for a variety of aerosol types.

Presenter:

Russell, Philip B.
NASA Ames Research Center
MS 245-5
Moffett Field, CA 94035-1000
USA
Phone: +1 650 604 5404
Fax: +1 650 604 6779
e-mail: prussell@mail.arc.nasa.gov
http://geo.arc.nasa.gov/sgg/ACE-2

Oral Presentation

Session: 2, Atmospheric Aerosols