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CACGP ABSTRACT:

Radiative flux changes by aerosols from North America, Europe, and Africa over the Atlantic Ocean: Measurements and calculations from TARFOX and ACE-2

Aerosol effects on atmospheric radiative fluxes provide a forcing function that is a major source of uncertainty in understanding the past climate and predicting climate change. To help reduce this uncertainty, the 1996 Tropospheric Aerosol Radiative Forcing Observational Experiment (TARFOX) and the 1997 second Aerosol Characterization Experiment (ACE-2) measured the properties and radiative effects of American, European, and African aerosols over the Atlantic. In TARFOX, radiative fluxes and microphysics of the American aerosol were measured from the UK C-130 while optical depth spectra, aerosol composition, and other properties were measured by the University of Washington C-131A and the CIRPAS Pelican. Closure studies show that the measured flux changes agree with those derived from the aerosol measurements using several modeling approaches. The best-fit midvisible single-scatter albedos (~0.90 to 0.96) obtained from the TARFOX flux comparisons lend support to values derived by independent techniques. In ACE-2 we measured optical depth and extinction spectra for both European urban-marine aerosols and free-tropospheric African dust aerosols, using sunphotometers on the R/V Vodyanitskiy and the Pelican. Aerosol-induced flux changes are being computed from these and related ACE-2 measurements using methods applied in TARFOX. Effects on upwelling and downwelling fluxes will be compared to the TARFOX results.

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