

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

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We estimate the impact of North Atlantic aerosols on the net shortwave flux at the tropopause by combining maps of satellite-derived aerosol optical depth (AOD) with model aerosol properties. We exclude African dust, primarily by restricting latitudes to 25-60 N. Aerosol properties were determined via column closure analyses in two recent experiments, TARFOX and ACE 2. The analyses use in situ measurements of aerosol composition and air- and ship-borne sunphotometer measurements of AOD spectra. The resulting aerosol model yields computed flux sensitivities ( $d\text{Flux}/d\text{AOD}$ ) that agree with measurements by airborne flux radiometers in TARFOX. It has a midvisible single-scattering albedo of 0.9, which is in the range obtained from in situ measurements of aerosol scattering and absorption in both TARFOX and ACE 2. Combining seasonal maps of AVHRR-derived midvisible AOD with the aerosol model yields maps of 24-hour average net radiative flux changes at the tropopause. For cloud-free conditions, results range from  $-9 \text{ W/m}^2$  near the eastern US coastline in the summer to  $-1 \text{ W/m}^2$  in the mid-Atlantic during winter; the regional annual average is  $-3.5 \text{ W/m}^2$ . Using a non-absorbing aerosol model increases these values by about 30%. We estimate the effect of clouds using ISCCP cloud-fraction maps. Because ISCCP midlatitude North Atlantic cloud fractions are relatively large, they greatly reduce the computed aerosol-induced flux changes. For example, the regional annual average decreases from  $-3.5 \text{ W/m}^2$  to  $-0.8 \text{ W/m}^2$ . We compare results to previous model calculations for a variety of aerosol types.