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Spectral absorption properties of atmospheric aerosols

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Abstract. We have determined the solar spectral absorption optical depth of atmospheric aerosols for specific case studies during several field programs (three cases have been reported previously; two are new results). We combined airborne measurements of the solar net radiant flux density and the aerosol optical depth with a detailed radiative transfer model for all but one of the cases. The field programs (SAFARI 2000, ACE Asia, PRIDE, TARFOX, INTEX-A) contained aerosols representing the major absorbing aerosol types: pollution, biomass burning, desert dust and mixtures. In all cases the spectral absorption optical depth decreases with wavelength and can be approximated with a power-law wavelength dependence (Absorption Angstrom Exponent or AAE). We compare our results with other recent spectral absorption measurements and attempt to briefly summarize the state of knowledge of aerosol absorption spectra in the atmosphere. We discuss the limitations in using the AAE for calculating the solar absorption. We also discuss the resulting spectral single scattering albedo for these cases.

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