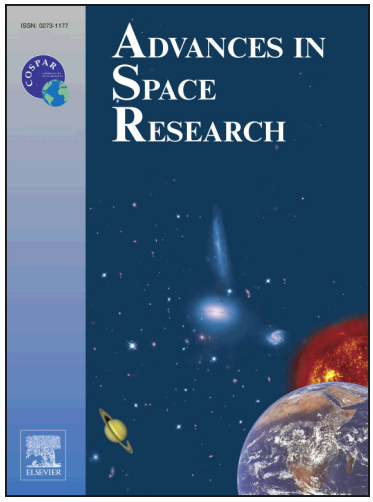

Optical and Radiative-Transfer Properties of Mixed Atmospheric Aerosols

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Optical and Radiative-Transfer Properties of Mixed Atmospheric Aerosols

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Abstract

The optical and radiative-transfer properties of mixed atmospheric aerosols have been investigated. The aerosol medium is considered as a plane-parallel anisotropic scattering medium with diffusive reflecting boundaries and containing an internal radiation source. The basic components are defined by their complex refractive index, a lognormal size distribution and humidity dependence in hygroscopic particles. The aerosol particles are assumed to be spherical, so the scattering parameters in the form of single scattering albedo, asymmetry factor, scattering, absorption, extinction efficiencies and linear anisotropic coefficient are calculated using the Mie theory. The calculations have been performed for individual aerosol particles, internal and external mixing media. Radiation transfer problem through the considered aerosol medium has been solved in terms of the solution of the corresponding source-free problem with simple boundary conditions. For the solution of the source-free problem, the Variational Pomranning-Eddington technique has been employed. The variation of the radiative-transfer properties (partial radiative fluxes at the medium boundaries) have been calculated and represented graphically for the different aerosols with their different mixing states. A comparison of the obtained results versus available published data has been performed and a very good agreement was observed.

keywords: Aerosols optical properties; Mixing states; Radiative-transfer properties; Variational Pomraning-Eddington technique

1 Introduction

Aerosol particles have important influences on Earth's radiative and hydrological balance (Ramanathan 2001). They can modify the microphysical properties of clouds and effect on the cloud formation via cloud condensation nuclei. Aerosol

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