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Scattering and absorption of light by aerosol particles

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This work aimed to review the optical properties of aerosol particles and the approximations developed to describe them. Aerosol particles have a significant effect on the total radiation balance. During the interaction of light with matter, two main phenomena can be observed, scattering and absorption of light, depending on matter's wavelength and optical characteristics of aerosols.

The scattering and absorption processes determine the reduction of light intensity passing through particles. Many aerosol assessment techniques in the atmosphere are based on measuring the scattering of light by aerosol particles. The amount of scattered light depends not only on the wavelength of the light used and the scattering angle but also on the physical parameters of the particles, such as shape, size, and refractive index. Different theories describe the interaction of light with aerosols, depending on the size of the particles that scatter the light. Complex refractive index, scattering and absorption coefficient factors, and approaches describing optical properties of aerosol particles related to their microphysical parameters, among them Raleigh approximation, Mie theory, Raleigh-Debay-Gans, and Van de Hulst approximations, are presented here.

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