Optical properties of soot particles influenced by mixing structure

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Soot particles are ubiquitous in the atmosphere and have a strong absorption ability. Soot particles tend to mix with other aerosol particles during ageing in the atmosphere. The aerosol particles of different shapes and size mix with soot particles on various positions, which compromise different mixing structures. Many studies modeled and observed the optical properties of internally mixed soot particles. Some numerical optical models such as the Rayleigh–Debye–Gans approximation, *T*-matrix, and Discrete Dipole Approximation have been used to simulate the optical properties of soot particles. Besides, some experimental methods such as a combination of the single-particle soot photometer and the three-wavelength photoacoustic soot spectrometer have been applied to characterize physicochemical properties of soot and measured their optical properties [1,2]. However, the calculated optical properties of soot particles are still rather inconsistent with observed ones because of their complex shapes and mixing structures.

In this talk, we compare optical properties of soot particles with different mixing structures. We establish an improved internally mixed soot particles model with coatings of different shapes, numbers, and relative positions to soot particles according to their factual morphologies in the atmosphere. The improved atmospheric soot particle models show different optical properties with those in former works, which provide essential improvement to simulate optical properties of atmospheric internally mixed soot particles.

References

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