

Atmospheric aerosol properties inferred from their external mixing state

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【Outline of survey】

Global climate change is a serious environmental problem confronted by world societies. To date, some important factors regulating the Earth's climate remain unclear, which hinders prediction of future climate and determination of effective countermeasures. One factor is the relationship between airborne particles in the atmosphere (aerosol particles) and climate. Aerosol particles act as nuclei of cloud droplets and ice crystals; they are therefore closely related to cloud and precipitation processes. Moreover, aerosol particles and cloud droplets scatter and/or absorb solar radiation and influence the atmospheric energy balance. This study is designed to elucidate characteristics of aerosol particles according to differences in individual particles and the external mixing state. To achieve this, field observations are undertaken to segregate aerosol particles according to their size and hygroscopicity; then the physical and chemical properties are determined. The importance of the external mixing state of atmospheric aerosols and their relation to climate processes are discussed.

【Expected results】

This study will establish a method to determine both the external mixing state of atmospheric aerosols and the physical and chemical properties of the particles (composition, cloud condensation nuclei activity, and ice nucleation activity). This approach will reveal characteristics of atmospheric aerosol types (e.g., urban and marine) and their underlying aerosol processes. It is expected that the results of this project will contribute to future development of climate models.

【References by the principal investigator】

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- Mochida M., T. Miyakawa, N. Takegawa, Y. Morino, K. Kawamura, Y. Kondo: Significant alteration in the hygroscopic properties of urban aerosol particles by the secondary formation of organics, *Geophysical Research Letters*, 35, L02804, doi:10.1029/2007GL031310, 2008.

【Term of project】 FY2008—2012

【Budget allocation】

80,100,000 yen (direct cost)

【Homepage address】

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