Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)


AAS21-22 会場:106 時間:5 月 19 日 16:15-16:30

# 2012 年秋季に能登半島で観測された雲凝結核の特性
# Characteristics of cloud condensation nuclei observed at Noto peninsula, Japan, in autumn 2012

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Atmospheric aerosols can act as cloud condensation nuclei (CCN) and therefore play an important role in regulating radiative properties and lifetime of clouds. Along with the development of the industrial activities, the loading of atmospheric aerosols tends to increase, especially in East Asia. To access the radiative balance and/or hydrological cycle of the Earth in the future, quantitative evaluations of CCN characteristics are needed based on in-situ atmospheric observations.

In this study, CCN activity of submicrometer-sized aerosols were measured at Noto Ground-based Research Observatory (NOTOGRO), located at the tip of Noto peninsula, facing the Sea of Japan, in autumn 2012. Ambient aerosols were sampled through the PM10 inlet (14.7 m A.G.L.). The dried aerosols were introduced into a differential mobility analyzer (DMA) for size selection, and the resulting monodisperse aerosol was then transferred to a water-based condensation nuclei (CN) counter and a continuous flow thermal gradient CCN counter to measure the number concentrations of CN and CCN, respectively. The CCN efficiency spectra, where CCN number fraction is plotted against the diameter of aerosols, were obtained at four different supersaturations (0.1%, 0.2%, 0.5% and 0.8%). The bulk chemical composition of non-refractory submicorometer-sized aerosols was also measured by an aerosol chemical speciation monitor (ACSM).

Parameters related to the mixing state and hygroscopicity of the aerosols were obtained at high time resolution based on the analysis of the CCN efficiency spectra. The slope of the CCN efficiency spectra (diamter at which 50% of CN act as CCN) for ambient aerosols was not as steep as that for pure ammonium sulfate particles, indicating heterogeneity in the mixing states of the ambient aerosol. The hygroscopicity parameter kappa (Peters and Kreidenweis, 2007), estimated from the CCN activation diameter, suggested that organics contributed on the aerosol mass especially in the size range of less than 100 nm. The bulk chemical composition obtained by ACSM also indicated the large contribution of organics on the total aerosol mass, however, the size resolved CCN measurements provided a clue to the elucidation of the size-dependant chemical composition of submicrometer-sized aerosols.

References:
Peters and Kreidenweis (2007), *Atmos. Chem. Phys.*, 7, 1961-1971.

キーワード: 大気エアロゾル, 雲凝結核, 有機エアロゾル, 吸湿成長パラメータ, 東アジア
Keywords: atmospheric aerosols, cloud condensation nuclei, organic aerosols, hygroscopicity parameter, East Asia