Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

U06-P03 Room:Convention Hall Time:May 24 18:15-19:30

Laboratory and observational studies of properties of aerosols related to climate change

NAKAYAMA, Tomoki[1*] ; MATSUMI, Yutaka[1]

[1]Solar-Terrestrial Environment Laboratory, Nagoya University

Aerosol particles originated from a variety of natural and anthropogenic sources. Primary particles emitted directly to the atmosphere as liquids or solids, while secondary particle formed by nucleation and condensation of precursor gases as well as through reactions in cloud droplets. These particles influence Earth's radiation balance both directly by absorbing and scattering solar radiation and indirectly by acting as cloud condensation nuclei (CCN).

Black carbon (BC) is considered to be the most potent light absorbing material in the visible region of the spectrum. In addition, light absorbing organic carbon (brown carbon or BrC) may also act as sources of significant absorption, especially in the ultraviolet and shorter visible wavelength regions. The optical properties of such particles depend on wavelength, particle size, shape, morphology, and complex refractive index (or chemical composition). Recently, cavity ring-down spectroscopy (CRDS) and photoacoustic spectroscopy (PAS) have been used for direct in-situ measurements of extinction and absorption coefficients of particles suspended in air. We have applied these techniques to observational studies of optical properties of BC and BrC and to laboratory studies of optical properties of secondary organic aerosols (SOAs) generated from a variety of biogenic and anthropogenic volatile organic compounds and those of diesel exhaust particles.

Hygroscopicity is also an important property of aerosols to estimate their direct and indirect effects on the radiation balance. We have measured relative humidity dependence of extinction coefficients using a custom built two channel CRDS system to examine the hygroscopicity of aerosols. In addition, we have involved in several observation campaigns to detect new particle formation events, which have been recognized as an important processes contributing to CCN formation. These studies on the optical and physicochemical properties of aerosols have been conducted in collaboration with many groups in Japan. In this presentation, our recent studies will be overviewed and the future perspective on possible collaborations with other groups with different specialties will be discussed.

Keywords: Aerosol, Optical property, Hygroscopicity, New particle formation, Climate change