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2014 年夏季紀伊半島森林域におけるエアロゾル光学特性と化学特性の同時観測
Observation of optical and chemical properties of aerosols at a forest site in Kii Peninsula during summer of 2014

久保寺 亮[1*] ; 中山 智喜[2] ; 鏡味 沙良[3] ; 鄧 彦閣[3] ; 小川 修平[3] ; 持田 陸宏[3] ; 足立 光司[4] ; 青木 一真[5] ; 松見 豊[2]
KUBODERA, Ryo[1*] ; NAKAYAMA, Tomoki[2] ; KAGAMI, Sara[3] ; DENG, Yange[3] ; OGAWA, Shuhei[3] ; MOCHIDA, Michihiro[3] ; ADACHI, Kouji[4] ; AOKI, Kazuma[5] ; MATSUMI, Yutaka[2]

[1] 名古屋大学大学院理学研究科, [2] 名古屋大学太陽地球環境研究所, [3] 名古屋大学大学院環境学研究科, [4] 気象庁気象研究所, [5] 富山大学理学部
[1]Graduate School of Science, Nagoya University, [2]Solar-Terrestrial Environment Laboratory, Nagoya University, [3]Graduate School of Environmental Studies, Nagoya University, [4]Meteorological Research Institute, Japan Meteorological Agency, [5]Faculty of Science, University of Toyama

Aerosols scatter and absorb solar radiation and influence to the radiation balance in the atmosphere. Forests are a significant source of both primary biological aerosol particles (PBAPs) and biogenic secondary organic aerosols (BSOAs). In addition, polluted air masses including sulfate and black carbon (BC) particles may also be long range transported to forest areas in Japan. If the BC particles were coated with inorganic and/or organic materials during the long-range transport, the light absorption of BC could be enhanced due to the lensing effect. However, relations of aerosol optical properties including lensing effect with chemical properties of aerosols in Asian forest area have not been well understood. In this work, optical and chemical properties of aerosols were simultaneously measured in a forest site in Japan.

The observations were conducted from 17 July to 3 September 2014 at the Wakayama Forest Research Station, Kyoto University, Japan (34.06N, 135.52E, around 535 m above sea level), which is located in the central part of Kii Peninsula. Ambient particles were sampled from an inlet placed at 6.4 m above ground level. Absorption and scattering coefficients of PM1 particles were measured using two photoacoustic spectrometers (PASS-3 at λ = 405, 532, 781 nm and PAX at λ = 375 nm, DMT) after passing aerosols through a heater controlled at 300 ℃ or a bypass line by switching ball valves every 10 min. By comparing absorption coefficients at 781 nm with and without heating, increase in BC light absorption due to coating can be estimated. Mass concentrations of non-refractory materials were measured using an aerosol mass spectrometer (AMS, Aerodyne Research). Mass concentrations of elemental carbon (EC) and organic carbon (OC) were also measured by thermo-optical technique using a semi-continuous EC/OC analyzer (Sunset Lab.). Size distributions of particles were measured using a scanning mobility particle sizer (SMPS, TSI) and optical particle counters (OPCs, RION and TSI). Aerosol particles were also collected using an impactor for morphological analysis using a transmission electron microscope (TEM). Optical thickness (AOT) and extinction Angstrom exponent of aerosols were also measured using a Skyradiometer (Prede). In the presentation, relation between the obtained optical properties with chemical and physical properties of aerosols will be discussed.

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