Light absorption properties of organic aerosols at Fukue Island in 2018 spring

*Chunmao Zhu[1], Takuma Miyakawa[1], Hitoshi Irie[2], Fumikazu Taketani[1], Yugo Kanaya[1]

1. Japan Agency for Marine-Earth Science and Technology, 2. Chiba University

Light-absorbing organic aerosol, also termed as brown carbon (BrC) aerosol, is one of the most understudied aerosol components for its sources and effects on climate change. For a long time, organic aerosols had been deemed to cause cooling on the earth’ s surface. Recently model studies indicated that BrC is accounting for ~1/4 of warming effect by carbonaceous aerosols at the tropopause globally. However, observation about the light absorption properties of BrC aerosols, which are fundamental for climate change prediction, is very limited, especially in East Asia. The SKYNET observational data at Fukue Island were used to derive the Absorption Aerosol Optical Depth (AAOD) based on the aerosol optical depth and single scattering albedo. AAOD of BrC and AAE_{SKYNET}were then derived based on the light absorption characteristic differences among BrC, BC and dust. Teflon (PTFE) filter samples were also collected using the Continuous Particulate Monitor with X-ray Fluorescence (PX375, Horiba Inc.). BrC in the filters were extracted using methanol followed by syringe-filtration to remove black carbon and mineral particles. The light absorption coefficient and Absorption Angstrom Exponent (AAE_{filter}) of BrC were quantified based on measurement of light absorption spectra in the UV-visible light (300–800 nm). The extracts were filtered to remove dusts and black carbon and analyzed for light absorption. We found that AAE_{filter}were generally higher than AAE_{SKYNET}. Vertical profile of aerosol light absorption properties needs to be further studied in the future.

Keywords: Brown Carbon Aerosol, Light Absorption, Skyradiometer, Filter Observation