

Comparison of absorption coefficient and black carbon concentration at Byeongcheon, South Korea using Tricolor absorption photometer (TAP) and Multiangle absorption photometer (MAAP)

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We evaluate the tricolor absorption photometer (TAP) and the multiangle absorption photometer (MAAP) with respect to their response to black carbon concentration ranging 0-7 mg/m³ at KOREATECH located in Byeongcheon, South Korea. While the MAAP employs basically similar principle to the TAP, that is, light extinction through an aerosol particle-deposited filter, it has a unique scheme to get rid of artifacts originating from the scattering effect of the aerosols deposited on the filter. In addition to comparing the absorption coefficients acquired by TAP at three different wavelengths, we also compare the absorption coefficients to the mass concentration of black carbon measured by the MAAP. We also derived absorption Ångström exponents (AAE) and mass absorption cross sections (MACs) by using the absorption coefficients reported by the TAP and the mass concentration reported by the MAAP without performing correction process. We observed that absorption coefficients showed similar trend to the mass concentration of black carbon. Our study finds that using the constant MAC value recommended by manufacturer at the wavelength used in MAAP results in aerosol light absorption coefficients that are different from those reported by the TAP. We also find that black carbon concentration at KOREATECH is as high as urban area although the campus is located in countryside. A discussion on high concentration, along with the results of an inter-comparison between TAP and MAAP will be presented.

Keywords: TAP, MAAP, Black carbon