

## Relationships of PM<sub>2.5</sub> and BC mass concentrations with optical properties derived from simultaneous skyradiometer/MAX-DOAS observations - from continuous observations at Chiba and Fukue in 2019-2020

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Aerosols, such as PM<sub>2.5</sub> and Black Carbon (BC), have brought a significant uncertainty in the estimation of the Earth's radiation budget. Satellite observations with global coverage have been attempted to estimate surface PM<sub>2.5</sub> and BC mass concentrations, but it is still a challenging task. To verify and improve the accuracy of these satellite products, it is important to clarify the relationship of PM<sub>2.5</sub> and BC mass concentrations with optical properties derived by ground-based remote sensing observations. Under this situation, we conducted simultaneous observations by skyradiometer and MAX-DOAS (multi-axis differential optical absorption spectroscopy), which are ground-based remote sensing instruments, to derive fAOD (fine Aerosol Optical Depth of the partial column below 1 km) and fAAOD (fine Absorption Aerosol Optical Depth of the partial column below 1 km). We found that they showed positive linear relationships with mass concentrations of PM<sub>2.5</sub> and BC, respectively, at Chiba, a suburban site in Japan. Then, a further evaluation of the relationships was performed by comparing observations at Chiba with additional data collected at Fukue, a remote site in western Japan, to discuss the regional characteristics of the relationships. We focused on the two-year period of 2019-2020, when the same types of instruments were used at the two sites. Results confirmed that Fukue data also showed the positive linear relationship between PM<sub>2.5</sub> and fAOD with its slope (fAOD/PM<sub>2.5</sub>) close to that seen at the Chiba site. This result suggests that there is no significant difference in the extinction coefficient per mass between the two sites, while the chemical composition of aerosols might differ. Additional results on the relationship between BC and fAAOD will be also discussed in this presentation.

Keywords: Aerosols, Ground-based remote sensing, PM<sub>2.5</sub>, Black Carbon