

Measurement of fluorescence from a single-particle in the ambient air

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It is well known that atmospheric aerosol which influences radiation budgets by scattering and absorbing is significant species. For aerosol measurement, optical techniques are adapted widely. Of the techniques, fluorescence is one of useful techniques for detecting organic compounds in the aerosol particles, especially biological one. In this study, we employed a single-particle fluorescence sensor for the detection of fluorescence particles, to test the possibility for the classification of organic aerosol in the ambient air.

The single-particle fluorescence sensor, WIBS4, is installed a continuous-wave 635nm diode laser for the detection of particles and the determination of particle size. A forward scattering quadrant photomultiplier tube (PMT) used for determination of particle size and shape. The instrument is also utilized two pulsed xenon UV sources emitting at different wavebands (280nm and 370nm) for the detection of fluorescence from an UV-excited particle.

We demonstrated ambient air measurement from April 20 to May 20, 2010 using WIBS4 instrument and PM2.5 mass concentration monitor at the Yokosuka campus of JAMSTEC. In the May 2-4, high mass concentrations of PM2.5 (>50 ug/m³) were observed. From the particle size and shape analysis by WIBS4 instrument in this period, it was suggested that the dust particles were measured. Also from fluorescence analysis, observed particles have fluorescence, suggesting that some dust particles contain the fluorescent compounds.

Keywords: fluorescence, single particle, atmospheric aerosol