

Continuous ground-based observation of aerosol optical properties in Tsukuba, Japan

¹Akihiro Uchiyama, ¹Akihiro Yamazaki, ¹Rei Kudo, and ¹Daisaku Uesawa

¹Japan Meteorological Agency, Meteorological Research Institute, Tsukuba, Japan

Correspondence to: Akihiro Uchiyama (uchiyama@mri-jma.go.jp)

Abstract

In order to investigate optical properties of aerosol, scattering coefficients and absorption coefficients have been continuously measured since January, 2002 using integrating nephelometer (TSI model 3563) and absorption photometer (Radiance Research PSAP, PSAP3 λ) on dry condition at Tsukuba, Japan. Using these data, the recent 10 years trend of aerosol properties and climatology was investigated.

The results show that the aerosol characteristics have seasonal variation and the tendencies to decrease or increase. These tendencies were significant in the confidence level 95%. The extinction, scattering, and absorption coefficients (1/m) had trends to decrease in the period from 2002 to 2012; -6.05×10^{-6} , -4.94×10^{-6} (1/year) at wavelength of 550nm and -1.11×10^{-6} (1/year) at wavelength 526nm, respectively. The Single scattering albedo has the trends to increase in the same period; 4.27×10^{-3} (1/year) at wavelength of 550nm. Asymmetry factors have the trends to decrease in the same period; -2.22×10^{-3} (1/year) at wavelength 550nm. The extinction Ångström exponent has the tendency to increase, and the effective radius has the tendency to decrease. These tendencies are consistent with the tendency of asymmetry factor. The values of absorption Ångström exponent were about 1.0 and have seasonal variation. The absorption Ångström exponent had the trend to increase in the period from 2006 to 2012; 1.15×10^{-2} (1/year). The change of absorption Ångström exponent suggests the change in the composition of light absorbing aerosol.