ON THE MESO-SCALE DISTRIBUTION AND THE VARIATION
CHARACTERISTICS OF AEROSOLS
(8th Report)

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Abstract. Since January 1977, simultaneous concentration measurements of small ions, Aitken particles and Mie particles have been carried out at 5 stations situated within a circle of 20km radius which partly includes the urban area of Tokyo. The correlation coefficients between diurnal concentration curves at 5 stations were calculated and on the basis of the calculation it is deduced that the small ions distribute uniformly and change their concentration in phase over the observation region. The way of distributions of the Aitken and Mie particles are also discussed.

1. Method of Observation and Data Analysis

Since January 1977, simultaneous concentration measurements of small ions, Aitken particles and Mie particles were made regularly at 5 stations situated within a circle of 20km radius. Their locations and abbreviated names are shown in Fig.1. The apparatus with which each station was equipped, consisted of a Gerdien-type conductivity meter, a Pollak counter and a commercial-type Mie particle counter. The measurements were carried out for 7 days every month.

The correlation coefficients between diurnal concentration curves at the 5 stations were calculated for each kind of particles

2. Regional Distribution of Aerosols

The plots of correlation coefficients among 3 stations for small ions, Aitken particles and Mie particles are shown in Fig. 2, 3 and 4 respectively. A similar seasonal variation is seen

Fig.1 Locations of stations
○ : Regularly operated
□ : Temporarily operated
NOD(Noda), URA(Urawa)
TAN(Tanashi), KOE(Koenji)
KAG(Kagurazaka)

Fig.2. Correlation Coef. for small ions

Fig.3. Correlation Coef. for Aitken Particles

Fig.4. Correlation Coef. for Mie Particles

for all 3 kinds of particles, coefficient values being highest in winter and lowest in summer. The average value for the whole period is about 70% for small ions and about 50% for both Aitken and Mie particles. The difference of the concentration values at the 5 stations was found to be smallest and less than 20% for small ions (1978). The high correlation coefficients and the small difference in absolute values combine to indicate that the small ions distribute fairly uniformly and their concentration varies in phase over the observation region, though the region includes areas of different conditions i.e. urban, suburban and rural areas. The Aitken and the Mie particles exhibit a distribution and variation of similar character but the grade of the

Fig.5. Correlation Coef. against distance between stations for small ions

character is lower than small ions.

In 1977 and 1978 stations 60km apart from the center of Tokyo, were added to the 5 stations and the correlation coefficients between a pair of stations including the additional stations were plotted against the distance between them. It was found that the coefficients decreased linearly with increasing distance for small ions (1979).

For the 5 stations, throughout the year 1978, the correlation coefficients between KAG and the other stations were plotted against the distance between them, and shown in Fig.5, 6 and 7 for small ions, Aitken and Mie particles respectively. In the figures, curves were drawn for each month. For the small ions the general tendency that the coefficients decrease with increasing distance is clearly seen in the figure, while such tendency is not so clear for both Aitken and Mie particles.

This results seems to be consistent with the conclusion that among 3 kinds of particles small ions distribute most uniformly over the observation region.

3. Concluding Remarks

In the former report the authors indicated that the Aitken particles exhibited very regular diurnal concentration curves having high value in the daytime and low value at night and this variation character was the cause of relatively high correlation coefficients between stations, and that for the Mie particles, the similar variation character (but less in grade) and the wind dependency of the concentrations combined to cause the high correlation coefficients between stations (1979).

All the results shown in the present paper indicate that over the region the radius of which is a score of kilometer,

Fig.6 Correlation Coef. against Distance between stations for Aitken Particles

Fig.7 Correlation Coef. against Distance between Stations for Mie Particles

small ions, Aitken and Mie particles distribute fairly uniformly and change their concentration in phase. The grade of this distribution character is highest for the small ions and, lower and about equal for the both Aitken and Mie particles.

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