Measurement of aeolian dust in east China and Japan from 2001 to 2002

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In order to clarify the variation and characterization of dust particles, we started the Japan-China joint project, 'Studies on origin and transport of aeolian dust and its impact on climate'. We set sampling instruments in Beijing, Qingdao and Hefei in China, and Naha, Fukuoka, Nagoya and Tsukuba in Japan, and collected aeolian dust that originated in the desert area of western China. In this study, we collected the aelian dust from February 2001 to 2002 and studied the monthly variation of dust concentrations.

The observation of aeolian dust particles started from February in 2001 in Tsukuba and Naha, March in 2001 in Nagoya, April in 2001 in Fukuoka, May in 2001 in Qingdao, and March in 2002 in Beijing and Hefei. The data of High Volume air sampler show the average dust concentrations in the air during one observation period. The results of each observation station show that (1) those in spring season seem typically high, and (2) the differences of dust concentrations in 4 stations in Japan are not so large, compared with the differences in China and Japan during the usual observation period. This might suggest that the substantial separation process of dust was achieved in China and the dust particles are transported to Japan as a nearly homogeneous mass.

The average dust concentration during the dust storm event (April in 2002) seems to be in the order of Beijing(high), Qingdao, Hefei(low), and Beijing(high), Fukuoka, Nagoya, Tsukuba, Naha. In Japan, the dust concentrations in western area are higher than that in eastern area. This is because the dust is transported from China and the western area is much near to the source. On the other hand, the dust concentration in Naha is smaller. Naha is to the south of Kyushu Island, far from Fukuoka. This fact suggests that there is the main course where the aeolian dust passes through and Naha is out of the main course. The dust was maybe dispersed and diluted around Naha and low concentration was observed there.

The annual aerosol size distribution was obtained using the Andersen low-volume air. The pattern of size distribution differs with place and time. However, a common feature of size distribution is found to be bimodal distribution. That is already reported in the previous paper (Kanai et al., 2002) that one peak at around 0.5um corresponds to anthropogenic aerosol consisting mainly of carbon particles and another at around 4-5um contains the aeolian dust particles, i.e. mineral particles transported from China.

In spring when the dust concentration increases, the larger particles increase rather than smaller particles. This is because the aeolian dust is transported from western China by the prevailing westerlies. On the other hand, the finer particles in winter increased in Qingdao, which suggests that the fine carbon aerosol increased that originated by the combustion of coal in winter.