PA39) An Asian Dust Storm Measured at Fukuoka, Japan in 2005

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1. INTRODUCTION

In the spring, conditions in the atmosphere over Asia are ripe for both massive dust storms and wholesale movement of large volumes of air across the Pacific Ocean. The combination of dry soils and high winds leads to a spurt of dust storm activity, which coincides with strong winds that carry the dust over the Pacific. This Asian dust storm (hereafter called "ADS")is a serious and growing environmental problem in East Asia as well as the Pacific Basin. In the present study, an intensive measurement for Asian dust storm was carried out at Fukuoka, which is Kyushu's largest and one of Japan's ten most populated cities, in April 2005. Here, we reported a part of measured data.

2. METHODS

For sampling of ambient aerosols, a Low Pressure Andersen Impactor sampler (LPAI) were operated at a height of 15 m above ground level of the Fukuoka Women's University building located in Fukuoka, Japan in the beginning (non-ADS period) and end (ADSperiod) of April, 2005. Aerosol particles were collected onto a half of the 80 mm diameter polyethylene film and a half of quartz fiber filter at 12 stages for 3 days at each period. The more detailed LPAI sampler's set-up and the sampling procedures were already given elsewhere (Ma *et al.*, 2004). The number-size distribution of aerosol particles was monitored by optical particle counter (OPC) (RION, KC-01A). OPC was operated in the dynamic range of > 0.5 ㎛ with four-step cutoff diameter of 0.5-1.0 ㎛, 1.0-2.0 ㎛, 2.0-5.0 ㎛, and >5 ㎛. The flow rate for the OPC was 310^{-2} m^3 hr^{-1}. Elemental components and ionic species were analyzed by Inductively Coupled Plasma Mass (HP2500-300, Hewlett Packard) and Ion Chromatography (ICS 4500, Dionex), respectively.

3. RESULTS AND DISCUSSION

Figure 1 shows the distribution of ADS storm observed points in East Asia provided by Japan

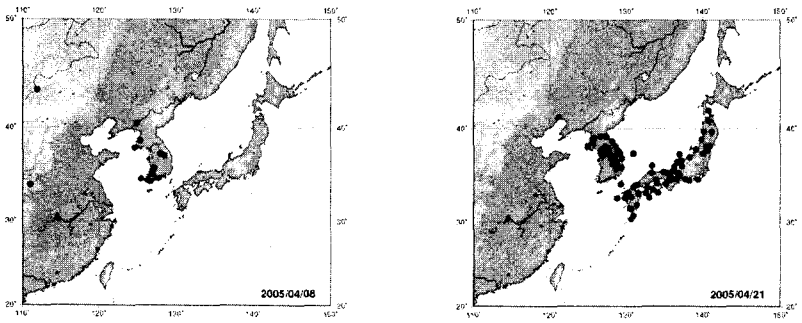

Fig. 1. Distribution of ADS observed points provided by Japan Meteorological Agency on April 8 and April 21, 2005.

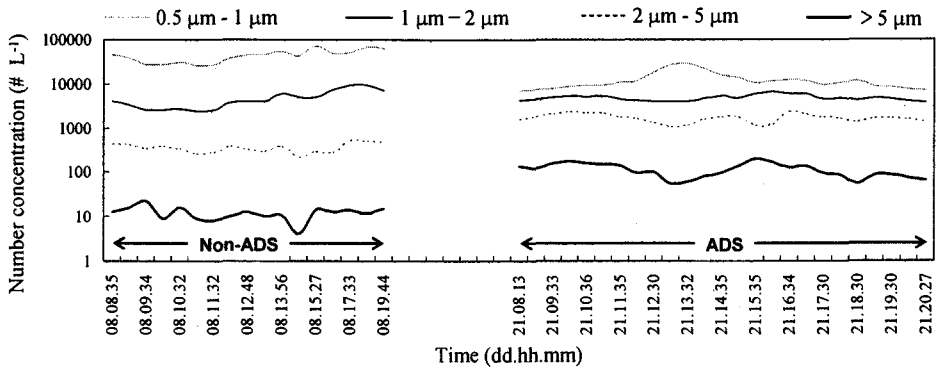

Fig. 2. Time series variation of particle number concentration at Fukuoka, during a non-ADS storm period and an ADS period in Aril, 2005.

Meteorological Agency on April 8 and April 21, 2005. Though a weak ADS was measured on April 8, it was deposited on theChina continent and the west side of Korean Peninsula. However, a dense ADS was widely distributed in Japan Island on April 21.

Figure 2 shows the time series variation of particle number concentration at ground-based site on the southwest of the main island Honshu, Japan during a non-ADS on April 8 and an ADS on April 21, 2005.The particles between 2 ㎛ and 5 ㎛ show a remarkable increase during an ADSperiod. In particular, the giant particles (> 5 ㎛) marked 10 times higher levelin an ADS period than in a non-ADS period.

Figure 3 shows the size segregated soil fraction (1.89Al+1.57Si+1.2K+1.4Ca+1.43Fe), sea-salt fraction ($3.27Na^{+}$) and gravimetric particle mass concentration in two measurement periods. The particle mass concentration on ADS event showing the bimodal distribution is enriched in the coarse fraction (D_p >2.1 ㎛), while that of non-ADS period shows the major peak in the fine fraction. Though the soil fractions of coarse particles were increased in ADS period, they account for relatively smaller portion of particle mass concentration than in non-ADS period.

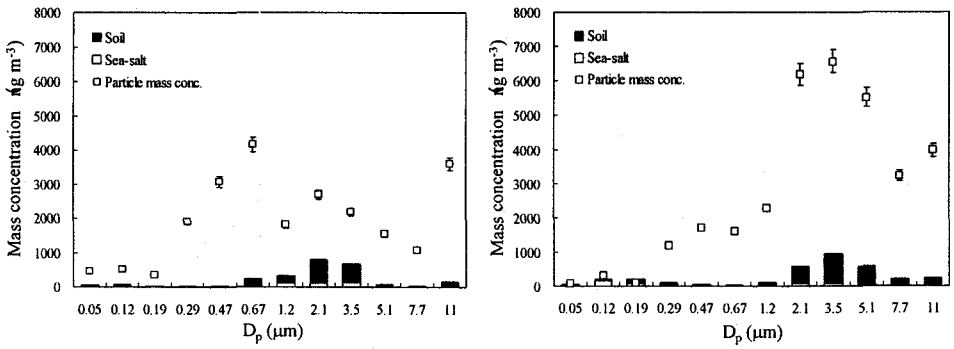

Fig. 3. Size-resolved soil fraction, sea-salt fraction and particle mass concentration during a non-ADS period (left) and an ADS period (right) in Aril, 2005.

REFERENCE

Ma, C.J., Y. Oki, S. Tohno and M. Kasahara (2004) Assessment of wintertime atmospheric pollutants in an urban area of Kansai, Japan, Atmospheric Environment, 38, 2939-2949.