PA55) An Orchestrated Study of the Bulkily and Individually Collected Aerosols in Gosan, Jeju

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1. INTRODUCTION

In order to understand sources, mechanisms of transport, as well as the physicochemical characteristics, including the effects on radiation, a considerable number of researches for Asian dust storms(hereafter called "ADS")have been performed during the last three decades. However, a comprehensive understanding of dust particles simultaneously with their source and emission characteristics is still incomplete. Sufficient information on the local dust source is absolutely necessary to understand the complicated aging processes of dust particles.

The investigation of the properties of single particles is an essential prerequisite for understanding chemical reactions in the atmosphere. However, as one of disadvantages of single particle study, it can not fully estimate particle property since generally only a portion of particles is the target of analysis. Hence, in order to complement this drawback of single particle analysis, the chemical analysis of particles has to be simultaneously conducted by collecting many particles on a filter media, followed by bulk-sample analysis. In this study, for the purpose of assessing the characteristics of ADS particles, anorchestrated application of bulk and single particle analyses in receptor area and source assessment was done.

2. METHODS

Particle collections were carried out at the surface-based sampling site at Gosan, which was operated as one of the super sites during ACE-Asia. Ambient particles were arrested on the collected Nuclepore filter set in a 2-stage filter pack sampler on April 12, 2001 when the thick yellowish ADS was recorded by ground-based in-situ monitoring and satellite measurement. Also, for extraneous sample to ADS, another sampling was practiced in the same way on April 30, 2001.

For the detection of elemental components in bulk samples, PIXE analysis was applied. The ultra trace elements in the individual coarse particles whose size was greater than 1.2 ìm were identified by the X-ray microprobe system equipped at Super Photon ring 8 GeV (SPring-8), BL-37XU. By means of this XRF analytical technique, one hundred ninety-four particles collected on 12 April 2001 were analyzed. The more detailed analytical proceduresand experimental set-up of PIXE and XRF were described elsewhere(Ma *et al.*, 2004, 2005).

3. RESULTS AND DISCUSSION

The coarse fraction particles(>1.2μm) in ADS event, as expected, showed higher mass concentration (213.9μg m^{-3}) roughly 14 times than those measured in a non-ADS day(15.4μg m^{-3}). In

particular, the mass concentration of fine mode particles(<1.2μm) in company with coarse particles was also found to be significantly high in ADS event by comparison with a non-ADS day.

Fig. 1 describes the plotting of crustal enrichment factors of elements in coarse dust particles(> 1.2μm). Crustal enrichment factors [$(Mass_{Z,aerosol}/Mass_{Si,aerosol})/(Mass_{Z,sand}/Mass_{Si,sand})$] were calculated by the components in different three local desert sands(Yinchuan, Dulan, and Yanchi). Fig. 2 shows a ternary plot of the relative mass ratios of S, Cl, and Ca in individual dust particles. As shown in Fig. 2, most of the individual dust particles were successfully grouped into four-type.

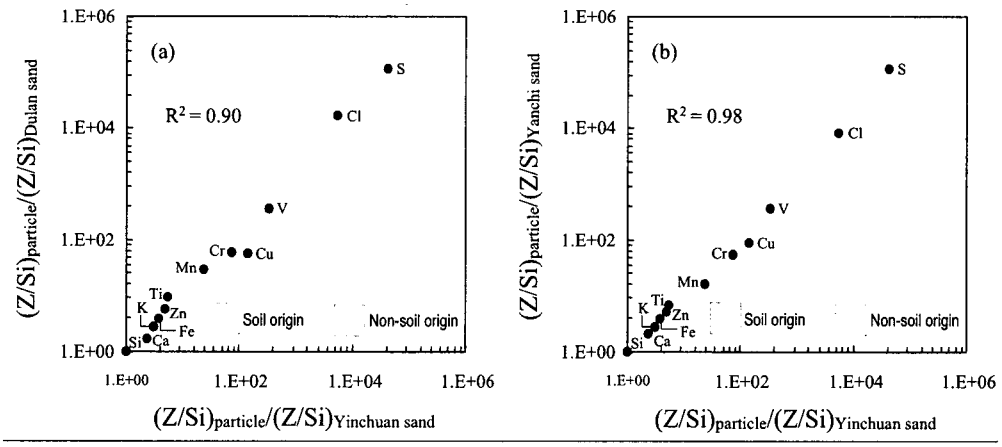

Fig. 1. Crustal enrichment factors of elements in coarse particles(>1.2μm) collected in Asian dust event at ground-based site on the west coast of Jeju Island. Crustal enrichment factors were calculated by the components in different three desert sands ((a): Yinchuan vs. Dulan, (b): Yinchuan vs. Yanchi).

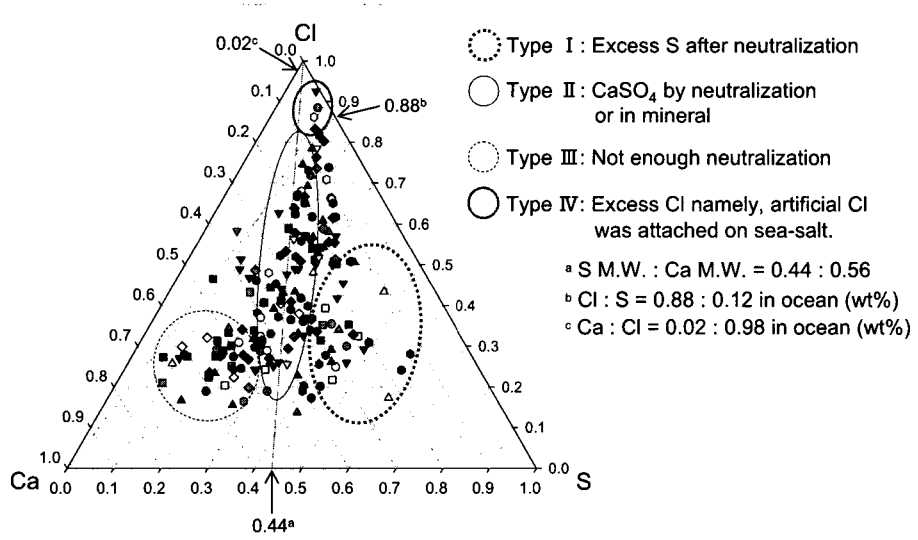

Fig. 2. Ternary plot of the relative mass ratios of S, Cl, and Ca in the dust particles. Total particle number is 194.

REFERENCES

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