Sulfur and oxygen isotopic ratios of sulfate in precipitation at Chugoku region and Chinese desert sand

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Monthly precipitations at 6 sampling points in Tottori and Okayama have been sampled in order to observe seasonal and secular variation of cross-border pollution from China. Oxygen isotope ratio of sulfate ion in precipitation, which is not measured in previous studies of acid rain, is measured in this study in addition to sulfur isotope ratio. Last year preliminary study suggested that there is the forth endmember observed in spring having high oxygen isotope ration in addition to the previously assumed three endmembers, sea-salt, sulfate originated from Chinese coal combustion and sulfate originated from domestic coal combustion. In this study, three non-sea-salt endmembers are estimated as follows: Group A which has high $\delta^{34}S$ ($\delta^{18}O$=+7.0‰, $\delta^{34}S$=+7.4‰) affected by Chinese coal combustion in winter, group B($\delta^{18}O$=+7.0‰, $\delta^{34}S$=-1.1‰) which has low $\delta^{34}S$ mainly affected by domestic oil combustion in summer, and group C which has high $\delta^{18}O$ ($\delta^{18}O$=+17.0‰, $\delta^{34}S$=+4.0‰) observed in spring. Oxygen isotope ratio of non-sea-salt sulfate varies simultaneously with non-sea-salt Sr isotope ratio. Group C may be affected by the component related to the yellow sand, because non-sea-salt Sr isotope ratio becomes high at yellow sand event. Sulfur and oxygen isotope ratios of 11 desert sand samples were measured. Sulfur isotope ratios of desert sand samples range from +4.8 to +11.2‰, and oxygen isotope ratios from -3.7 to +14.0‰. These results do not agree with isotope ratio of group C. Thus, source material of yellow sand may not be directly related to the source material of group C. Further investigation is required to specify the source material of group C.

Keywords: sulfur and oxygen isotopic ratio, sulfate in precipitation, Chinese desert sand

