

Mass Independent Sulfur Isotope Fractionation Discovered in Aerosol of Beijing

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Mass independent sulfur isotope fractionation had been found in present-day sulfate aerosol (Romero and Thiemens, 2003) and in stratospheric volcanic sulfate (Savarino et al., 2003), indicating UV transparency in Earth's atmosphere to a certain content even in present-day.

In this study, multi-sulfur isotope measurement was carried out by SF₆ method on 29 aerosol samples collected from 3 stations in Beijing area from February to August in 2002. The $\delta^{34}\text{S}$ values of these samples vary from 5.6 to 14.9‰ (Fig. 1) and their $\delta^{33}\text{S}$ values vary from 2.3 to 7.2‰. The calculated $\Delta^{33}\text{S}$ values ($\delta^{33}\text{S} - 0.515\delta^{34}\text{S}$) vary from -1.37 to 1.84‰ (Fig. 1). Among them 9 samples show $\Delta^{33}\text{S}$ values higher than 0.20‰, and 6 samples show $\Delta^{33}\text{S}$ values lower than -0.2‰ (Fig.1), indicating clearly the existence of mass independent sulfur isotope fractionation.

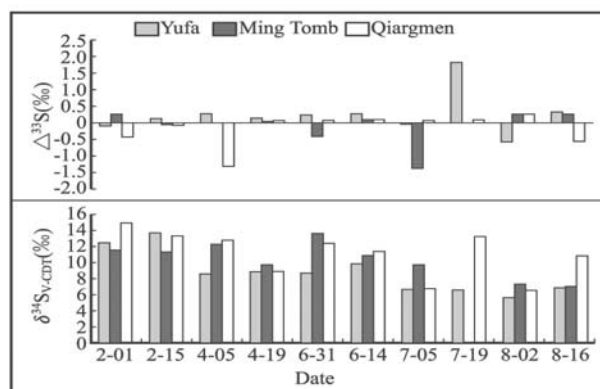


Fig.1: The sulfur isotope composition in aerosols of Beijing

The grade of sulfur isotope anomaly has some correlation with local climate conditions. For example, large $\Delta^{33}\text{S}$ anomalies are found in the samples collected from Ming Tomb station on 5 July and from all three stations on 16 August. Coincidentally, the O₃ and NO₂ contents in atmosphere were also high at these locations in the same time. These phenomena imply that the UV photolysis reaction may generate mass independent sulfur isotope fractionation in present day troposphere.

References

- [1] Romero, A. and M. H. Thiemens (2003) *J. Geophysical Research*, 108(D16), 4524.
- [2] Savarino J., A. Romero, J. Cole-Dai, S. Bekki and M. H. Thiemens (2003) *Geophysical Research Letters*. 30 (21) 2131-2134.