Long-term variation of methanesulfonic acid concentration in the atmosphere at the Oki Islands in the Sea of Japan

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Introduction

Methanesulfonic acid (MSA) is a byproduct of Dimethylsulfide (DMS) oxidation to SO_2 in the atmosphere. Because SO_2 and MSA are finally converted to sulfate, DMS is an important compound as a natural source of sulfate aerosol, which has a relation to radiative forcing. As DMS is mainly produced by algae in the sea, MSA may be a kind of indicator of the interaction between climatic change and primary production in the sea.

Experimental

Aerosol has been collected monthly since 1983 at the Oki Islands, located in 60 km north from the main land Japan. In this work 19-year record of MSA concentration in the atmosphere over the island was made. Sampling was carried out by two sites, which are at a small mountain top and the main port of the island.

Results and Discussion

The data from both sites showed a similar seasonal variation and trend. MSA had a clear peak in May or June, which corresponded to the algal bloom season in the Sea of Japan. Year-to-year variation was also obvious. If we look at the peak value together with El Nino period, it was found that peak value in El Nino period was rather low compared to other year, especially La Nina period. Interaction between El Nino and MSA concentration must be present through the oceanic circulation and temperature anomaly.

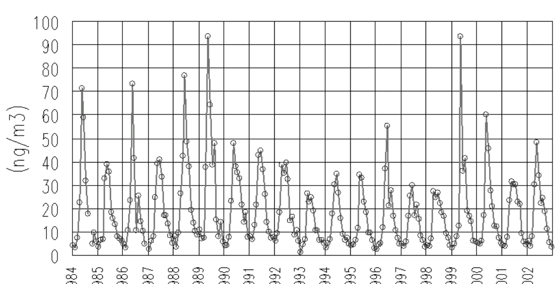

Figure 1. Variation of MSA over the Oki Islands

Reference

Mukai H. et al. (1993) *Atmos. Environ.* **29**, 1637-1648.

Magmatic & Impact Processing on the HED Parent Body: Effects on Iron Isotope Signatures

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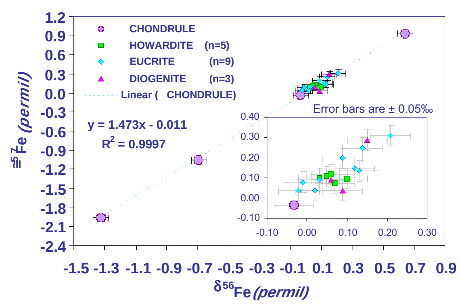
Introduction

The HED meteorite group comprise: (a) cumulate, pyroxene-rich Diogenites, (b) plagioclase-pigeonite bearing basaltic/gabbroic Eucrites, and (c) impact brecciated polymict Howardites. Geochemical, petrologic and isotopic data indicate that the HEDs derive from a single parent body, possibly asteroid 4 Vesta [e.g. 1]. Thus, we can examine Fe-isotope behaviour during magmatic and impact processing within an asteroidal setting. Analytical procedures are detailed elsewhere [2].

Results

(Figure 1): HED samples fall within a narrow range on the 3-isotope plot: $\delta^{56}Fe$ = -0.08 to 0.26‰ including errors (Figure 1) and individual HED sample groups overlap (Figure 1 inset). A selection of Allende chondrules are plotted for comparison.



Discussion

Fe-isotope signatures are tightly grouped and fall on the mass fractionation line already described for Allende & Chainpur chondrules [3], and other solar system samples [4]. Impact processed howardite samples [5] could be expected to show Fe-isotope fractionation due to volatile loss of Fe, but instead show the least span in $\delta^{56}Fe$ values, from -0.01 to 0.14‰ (including error). Eucrites show the greatest range of $\delta^{56}Fe$ of ~0.34‰. Impact processing may homogenise howardite Fe-isotopic signatures, which are derived from eucritic and diogenitic components. Further howardite analyses, which will even out the current sampling bias towards eucrites, may clarify this.

References

[1] Consolmagno & Drake (1977) **GCA 41**: 1271. [2] Mullane et al. (2002) In: Holland & Tanner (Eds.) *Plasma Source Mass Spec*., Royal Soc. Chem. 351-361. [3] Mullane et al. (2003) **LPS XXXIV**, Abs. #1027. [4] Zhu et al. (2001) Nature 412: 311. [5] Bogard D.D. (1995) **Meteoritics 30**: 244.