Os isotopic record of Japan Sea sediments over last glacial maximum

TARUN K. DALAI[1], KATSUHIKO SUZUKI[2],
M. MINAGAWA[3] AND Y. NOZAKI[4]

[1]Marine Inorganic Chemistry, Ocean Research Institute, University of Tokyo, Japan (tarunk@ori.u-tokyo.ac.jp)
[2]Institute for Frontier Research on Earth Evolution, JAMSTEC, Japan (katz@jamstec.go.jp)
[3]Graduate School of Environmental Earth Sciences, Hokkaido University, Japan (mas@ees.hokudai.ac.jp)
[4]Deceased.

Os concentration and its isotopic compostion have been measured in Japan Sea sediments spanning over last glacial maximum (LGM). Analysis of bulk sediments show oscillations of $^{187}Os/^{188}Os$ from 0.935 to 1.042. The maxium $^{187}Os/^{188}Os$ corresponds to the period of last deglaciation and meltwater discharge, whereas the LGM is characterized by lower $^{187}Os/^{188}Os$.

High Os concentrations, significant C_{org}–Os and $^{187}Os/^{188}Os$–Os correlations, and the knowledge that bottom water anoxia prevailed in the Japan Sea (Crusius et al., 1999) during LGM suggest that a major part of Os in these sediments are hydrogenous inspite of significant aeolian contributions to Japan Sea sediments during this period (Irino et al., 2001). Low $^{187}Os/^{188}Os$ during LGM is suggestive of reduced dissolved Os flux from continents due to higher aridity (Oxburgh, 1998). The period of last deglaciation witnessed a rapid increase both in Os abundance and $^{187}Os/^{188}Os$. This excursion occurs in the dark laminations deposited in anoxic bottom water conditions caused by increase in freshwater influx, enhanced productivity and reduced deep water ventillation in the Japan Sea (Tada et al., 1999). Thus, the results on Os and $^{187}Os/^{188}Os$ suggest enhanced dissolved continental Os flux. However, preferential release of radiogenic Os (Peucker-Ehrenbrink and Blum, 1998) during this period can not be ruled out.

The results of this study reinforce the idea that $^{187}Os/^{188}Os$ of marine sediments can be used as a tracer to derive informations on paleoclimate and past weathering fluxes, and to test the climate-weathering feedback (Ravizza et al., 2001).

References

Crusius J., Pederson T.F., Calvert S.E., Cowie G.L. and Oba T. (1999), *Paleoceanography* **14,** 248-259.
Irino T., Ikehara K., Katayama, H., Ono Y. and Tada R. (2001), *PAGES News* **9(2),** 13-14.
Oxburgh R. (1998) *Earth Planet. Sci. Lett.* **159,** 183-191.
Peucker-Ehrenbrink B. and Blum J. (1998), *Geochim. Cosmochim. Acta* **62,** 3193-3203.
Ravizza G., Norris R. N., Blusztajn J. and Aubry M.-P. (2001), *Paleoceanography* **16,** 155-163.
Tada R., Irino T. and Koizumi I. (1999), *Paleoceanography* **14,** 236-247.

Sulphur isotopic composition in groundwater sulphate at Mt. Etna

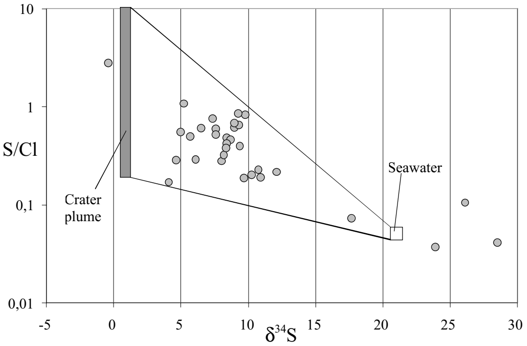
W. D'ALESSANDRO[1], F.A. FERRON[2], G. PECORAINO[1],
F. LE GUERN[2]

[1] INGV-Pa, via La Malfa 153, Palermo, Italy (walter@pa.ingv.it)
[2] LSCE/CEA-Saclay, Orme des Merisiers, 91191 Gif-Sur-Yvette, France (ferron@lsce.saclay.cea.fr)

The Mt. Etna volcano, one of the most active in the world, hosts an important groundwater system. The geochemistry and hydrology of its aquifers has been recently studied in detail (Aiuppa et al, 2003 and references therein), but until now no data on $\delta^{34}S(SO_4)$ were available.

In April 2002, 32 groundwater samples were collected and analysed for their chemical and isotopic (O, H, C and S) composition. Dissolved sulphate displays a rather wide range of $\delta^{34}S(SO_4)$ values from –0.4 to +28.5 ‰ vs. CDT, although 27 of these waters fall in a narrower range (+4 to +12 ‰). These values are most likely the result of the mixing of a marine (+21 ‰ - Rees et al., 1978) and a magmatic (+0.7 to 1.0 ‰ – Allard, 1986) source. The marine source originates mainly from leaching of the recent marine sediments that underlay the Etnean volcanites and secondarily from seawater intrusion (Ionian sea coast) or deposition of sea spray. Also the magmatic source is both direct, through magmatic gas dissolution in the aquifers, and indirect through meteoric recharge, the second pathway being probably prevailing. Aiuppa et al. (2001), in fact, estimated that 54 to 98 % of sulphate in rainwaters derives from the huge summit crater's plume SO_2 output (4500 t/d on average – Bruno et al., 2001).

Three samples have very positive $\delta^{34}S(SO_4)$ values (> 23‰). These sampling sites display a distict smell of H_2S. Fractionation between the two sulphur species could account for the positivisation of the SO_4-S with respect to average Etnean groundwaters.



References

Aiuppa et al., (2001) *Appl. Geochem.* 16, 985-1000.
Aiuppa et al., (2003) *Appl. Geochem.* 18, 863-882.
Rees et al., (1978). Geoch. Cosmoch. Acta, 42, 377-381.
Allard (1986) PhD Thesis Univ. Paris 7.
Bruno et al. (2001) *J. Volc. Geotherm. Res.* 110, 137-153.