Geophysical Research Abstracts, Vol. 7, 03494, 2005
SRef-ID: 1607-7962/gra/EGU05-A-03494

Volcanic influence on the terrigenous component: Susceptibility signal in marine sediments from the Indian Ocean.

A.L. Salomé, L. Meynadier, C.J. Allègre

Institut de Physique du Globe de Paris - Université Paris 7, Paris

(salome@ipgp.jussieu.fr / Fax: +33 1 44 27 37 52)

Magnetic susceptibility of sediments is now widely used as a climate proxy in paleoclimatic and paleoceanographic studies, often in association with the oxygen isotopic variations. These two indicators show fluctuations through time related to Milankovitch frequencies.

In several cores collected all over the Indian Ocean, we show that the relation between susceptibility and climate is not primarily caused by carbonate dilution. (Arabian Sea ODP115-Site 722.....[1]; Somali Basin MD85668.....[2]; Ninety East Ridge ODP121-Site 758.....()[3]; Maldives Islands MD90963.....[4] and Kerguelen area RC11-120 ...[5]). Spectral analyses of carbonate-free susceptibility signals confirm the persistence of a climatic signal even after correction from carbonate dilution.

In the Indian Ocean area, bulk and carbonate-free susceptibility signals are anti-correlated with the oxygen isotopic variations (susceptibility is high when global temperature is low) for all studied sites except for the Somali basin. Although this exception is not yet explained, its understanding could clarify the global processes which generate the variations of susceptibility.

In all cases, the variations of carbonate-free susceptibility (χcf) reflect the composition of the terrigenous component. The existence of different sources of terrigenous and/or magnetic material could explain these variations through time. In this case, χcf variations depict the changes in the proportions of each source as a function of climate.

This study investigates the role of volcanic sources on the susceptibility signal in ma-

rine sediments. Our approach relies on the comparison between mass normalized susceptibility values of weathering products transported by rivers and carbonate-free susceptibility of marine sediments. We measured the susceptibility of sands from very large rivers flowing on rocks representative of the mean continental upper crust and the susceptibility of sands from small rivers flowing on volcanic lithologies. We also studied volcanic rocks and granite from various origin. Weathering products of river flowing on volcanic areas are 10 to 100 fold higher than those flowing on granite areas. We show that rivers sands at the mouth of rivers keep the signature of highest susceptibility zones (mostly volcanic lithologies) and that the carbonate-free susceptibility values of close by marine sediments are very similar. We conclude that weathering of volcanic rocks plays a major role in the variations of the susceptibility of marine sediments.

[.1] M.W. Hounslow and B.A. Maher, J. Geophys. Res. 104, 5047-5061, 1999.

[2]L. Meynadier, J.P. Valet and F.E. Grousset, Paleoceanography 10(3), 459-472, 1995.

[3]J.W. Farrell and T.R. Janecek, Proceedings of the Ocean Drilling Program, Scientific results 121, 1991.

[4] F.C. Bassinot, L. Labeyrie, E. Vincent, X. Quidelleur, N.J. Shackleton and Y. Lancelot, Earth Planet. Sci. Lett. 126, 91-108, 1994.

[5] D.V. Kent, Nature 299, 538-539, 1982.