Geophysical Research Abstracts, Vol. 9, 01636, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-01636

Natural dissolved silicon isotopic signal during EIFEX (European Iron Fertilization Experiment): diatom uptake vs. mixing.

A.J. Cavagna (1), F. Fripiat (2), D. Wolf-Gladrow (3), F. Dehairs (1), L. André (2), D. Cardinal (2)

(1) Department of Analytical and Environmental Chemistry, Vrije Universiteit of Brussel, Brussels, Belgium, (2) Department of Geology and Mineralogy, Musée Royal de l'Afrique Centrale, Tervuren, Belgium, (3) Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany (acavagna@vub.ac.be / Fax: +32-2-629-32-74 / Phone: +32-2-629-39-69)

The European Iron Fertilization Experiment (EIFEX) was conducted in a mesoscale cyclonic eddy located in the Antarctic Circumpolar Current. The fate of diatoms' bloom induced by the Fe addition was monitored during 36 days and we measured the dissolved silicon isotopic signature in the surface and mesopelagic layers for the IN-patch and OUT-patch stations. Focalizing on the surface layer of IN-patch stations, especially affected by the iron fertilization and the phytoplanktonic bloom, our results show that the temporal evolution of the dissolved silicon isotopic signature likely functions as an open steady state system rather than a closed Rayleigh-type system. Indeed, the Si isotopic signatures of the surface waters are getting heavier in the course of the bloom, in accordance with the preferential uptake of light isotopes by the diatoms. Applying a steady state open system model, the fractionation factor estimated ($^{29}\varepsilon$) is -0.52 ‰, almost exactly matching the value measured for in-vitro incubations (De La Rocha *et al.*, 1997) and on Southern Ocean waters (Cardinal *et al.*, 2005). When they are compared to nutrient profiles, these results strongly suggest that the fertilized patch was diluted with northern derived waters characterized by lower $Si(OH)_4$ over NO_3 ratios. Our study confirms the interest of the silicon isotope proxy to identify marine biogeochemical processes. We will discuss our data in the light of the implications of this dilution on nutrient, carbon budgets and diatom assemblages during EIFEX.

Cardinal, D.; Alleman, L.Y.; Dehairs, F.; Savoye, N.; Trull, T.W. and André, L. (2005). Relevance of silicon isotopes to Si-nutrient utilization and Si-source assessment in Antarctic waters. *Global Biogeochemical Cycles*, **19**, GB2007, doi: 10.1029/2004GB002364

De La Rocha, C.L.; Brzezinski, M. and DeNiro, M.J. (1997). Fractionation of silicon isotopes by marine diatoms during biogenic silica formation. *Geochimica and Cosmochimica Acta*, **61**, pp. 5051-5056.