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Silicium isotopes as a proxy of weathering processes during the PETM

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The end of the Paleocene epoch (55.5 Ma) was marked by an abrupt episode of global warming ("Palaeocene/Eocene Thermal Maximum"; PETM) coincident with a large perturbation to the global carbon cycle. Because the PETM might represent an analogue in the past of the present anthropogenic accelerated emission of greenhouse gases, it has attracted a good deal of interest with both data collecting and modeling efforts. Most of the studies focused on ocean records through sediments, we propose here one of the first study on continental records during the PETM. We focus our study on silcretes sampled in north of France, rocks present on the Paleocene-Eocene boundary and on the silicification formed in the porosity during weathering processes.

Stable isotopes of Si have been used as proxies for understanding the Si cycle and its variations in the past. Here we analyzed silicon isotopes of in situ quartz using a new-generation secondary ion mass spectrometry apparatus. Secondary phases as overgrowths on primary detrital quartz and microcrystals of quartz have been measured. Our results are very unexpected : althought detrital quartz present same values than in other silcretes, secondary phases present very homogenuous signatures far from very negative values that can be reached (-8‰ in [1, 2]). It seems that the origin of silicium is not local as both primary and secondary phases are within the same range. The isotopic fractionnation link to the dissolution/precipitation phase during weathering processes is –1.5‰. The lack of a strongly ^{30}Si-depleted reservoir with negative isotopic values seem to show a low intenisity of alteration during the PETM in continental context.

[1] Basile-Doelsch *et al.*(2005) *Nature* **433**, 399–402. [2] Basile-Doelsch (2006) *Journal of Geochemical Exploration* **88**, 252-256.

Dissolved iron isotopes in the Southern and Equatorial Pacific Oceans

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Iron is a fundamental element linking ocean biogeochemistry and climate. Iron isotopes are a very promising tool for the study of the iron oceanic cycle, notably for tracing its sources to the ocean and for studying its speciation.

Several studies reports iron isotopic data in the marine environment (plankton tows, pore waters, aerosols, seafloor or marginal seas [1-3]). To link these isotopic data together and to fully study the iron isotope marine cycle, we need to document the central reservoir in the marine environment : dissolved iron in seawater.

So far there are only very few available data of dissolved iron isotopic composition in the open ocean [4]. This work will present the first isotopic data of dissolved iron from full depth profiles in the Equatorial Pacific Ocean (EUCFe 2006) and in the Atlantic sector of the Southern Ocean (Bonus-GoodHope 2008), as well as from the Kerguelen Area (Southern Ocean, KEOPS 2005).

These results will be discussed in terms of iron sources to ocean. Potential applications of this new tracer for studying internal oceanic processes, such as biological uptake, will be discussed.

[1] Bergquist & Boyle (2006) *EPSL* **248**, 1-2 54-68. [2] Severmann *et al*. (2006) *GCA* **70**, 8 2006-2022. [3] De Jong *et al.* (2007) *Analytica Chimica Acta* **589**, 1 105-119. [4] Lacan *et al.* (2008) *Geophys. Res. Lett.* **35**, 24 L24610.