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Pb-Fe isotope variations in North Atlantic sediments across the last deglaciation

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We have measured Pb and Fe isotope ratios by double-spike methods and MC-ICPMS from a well-characterised sediment drill core (DAPC-2; Rockall Trough) in the North Atlantic that covers the last deglaciation (21-6 ka). Conventional environmental proxies record discharges of icebergs and meltwater during break-up of the NW Europe ice sheet, in response to sea-surface temperature increases at 18-17 ka, 500-1000 years before disintegration of the Laurentide ice sheet.

We analysed authigenic Fe-Mn oxide coatings on detrital grains. The coatings were isolated in hydroxylamine hydrochloride after removal of carbonate with buffered acetic acid. Sr isotope ratios of the leaches are used to ensure seawater signatures have been retrieved. Although the coatings, in general, have marginally higher Pb isotope ratios, the coatings and bulk sediments yield similar results, which indicates either that (1) the bulk sediment is dominated by the Pb signature of the coatings, or (2) that the sediment is responsible for the Pb seawater signature. The seawater Pb signal mimics the bulk sediment data and changes dramatically at 18-17 ka during break up of the NW Europe ice sheet (Knutz & Baker, this volume).

Fe isotope analyses were performed on the same leaches to investigate if there is a link between radiogenic Pb and stable Fe isotope variations as, for example, was apparently identified in NADW through study of an Fe-Mn crust by [1]. Fifteen Fe isotope analyses show a range in δ^{56}Fe (relative to IRMM-14) from –1.7 (glacial) to –0.8 per mil (post-glacial) with all values strongly fractionated from crustal values and somewhat lower than most hydrogenetic Fe-Mn crusts and nodules. However, despite having broadly similar (short) residence times in seawater, Pb and Fe isotopes do not correlate. Preliminary data indicates there may be a significant increase in δ^{56}Fe at ca. 15 ka, around the time of the H-1 event and some 2 ka after the major decrease in Pb isotopes. Clearly, the Pb and Fe isotopic systematics are not simply related through changing source inputs. Further data will be presented to confirm if a major change in Fe isotopic composition characterises the last deglaciation.

Reference

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4.63.P14

Isotope biogeochemistry: Carbon-isotope composition of leave tissue and pigments in a C_3-plant

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Stable carbon-isotope composition of a plant reflects the ambient environmental conditions such as climate and the isotopic composition of the source CO_2, in addition to its genes. The isotopic composition of most organic sediments apparently is more or less faithfully preserved this information and is a tool in environmental study. This study addresses the question of isotopic heterogeneity in a plant and its implication in the application of the isotopic tool. We present our preliminary results on investigating the isotopic relationship between leaves and chlorophyll (and other pigments).

We analyzed the isotopic composition of leaves and pigment-extract samples of three varieties of *Ipomoea batatas* (*L.*) Lam., a C_3-plant, grew under identical environmental conditions. The results are shown in Table 1. $\delta^{13}C_{PDB}$ values of leaves samples range from -30.4‰ to -27.8‰, while the values of pigment samples range from -36.9‰ to -32.7‰. This is consistent with the proposition that *Ipomoea batatas* (*L.*) Lam. is a C_3-plant.The values of leaves and pigment samples vary in parallel and leaves are consistently having less negative values by several ‰. The difference confirms previous observation that lipid fraction is generally depleted in ^{13}C in comparision with carbonhydrate and protein fractions. The data are, however, not consistant with the notion that the isotopic composition of pigment fraction simply reflects that of the source CO_2. The implication of the results will be discussed.

Sample ID	$\delta^{13}C_{PDB}$ of leaves (‰)	$\delta^{13}C_{PDB}$ of pigment (‰)
Ipomoea batatas (L.) Lam.Yellow	-30.4	-36.9
Ipomoea batatas (L.) Lam.Purple	-28.0	-33.8
Ipomoea batatas (L.) Lam Green	-27.8	-32.7

Table1 $\delta^{13}C_{PDB}$ of *Ipomoea batatas* leaves and pigments

References

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