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# Elusive isotopic properties of deglacial meltwater spikes into the North Atlantic

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The lack of clear isotopic imprint in planktic foraminifers of some major deglacial events has led modellers to explore processes that could explain such a feature, either through a simultaneous temperature change with an opposite isotopic effect (e.g., LeGrande et al., 2006), or due to a partial deep routing of meltwater spikes through hypopycnal flows (e.g., Roche et al., 2007). In contradistinction, large amplitude isotopic shifts, linked for example to Heinrich events, have been unequivocally interpreted as a direct response to meltwater release pulses. However, in both cases, the relatively stringent ecological requirements of planktic foraminifers and isotopic properties of ambient waters may have accounted respectively for the lack or enhanced response. The final drainage of glacial lake Agassiz into the North Atlantic, some 8.4 ka ago, provides an example of the first situation. Oxygen isotope compositions of fossil ostracods suggest an isotopic composition of – 24 to -25 per mil (vs. VSMOW) for paleolake waters, just prior to their drainage into the North Atlantic. This isotopic signature was only been a few per mil lighter than the isotopic composition of the freshwater end-member from surrounding residual ice sheets, and not much different from the isotopic composition of the modern freshwater end-member in the area (-20.3+/-0.4 per mil) that carries an Arctic freshwater/brine imprint. The drainage water spike has thus resulted in a minute difference of the oxygen isotope/salinity relationship in the salinity domain of the planktic foraminifer (*Neogloboquadrina pachyderma* -Np) then abundant off the drainage outlet, in the NW North Atlantic. The resulting -0.1 per mil shift in Np would be barely distinguishable from the high frequency "noise" in Np isotopic-records from such environments. In opposition, during Heinrich events,

sea-ice formation linked to the cooling and freshening of surface waters, could have resulted in the production of isotopically light brines sinking along the pycnocline with the underlying waters, i.e., down to the habitat of Np, as in the modern Arctic Ocean. Thus, the large amplitude isotopic shifts in Np from Heinrich layers could have at least partly responded to such processes and be decoupled from direct salinity-temperature control. References: LeGrande et al., 2006, PNAS 103: 837-842; Roche et al., 2007, GRL 34: L24708.