

Phosphorus speciation in marine sediments: a different approach to North Atlantic Heinrich events

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Reactive phosphorus undergoes diagenetic transformation once transferred into marine sediments. The degree of redistribution of phosphorus depends on environmental and early diagenetic conditions, which may be linked to larger scale phenomena, such as bottom water circulation, water column ventilation, and organic carbon flux. Phosphorus phases of the 50 micrometer sized fraction of deep-sea sediments from core SU 90-09 (North Atlantic, 43°31'N, 30°24'W, 3375 m below sea level) have been analyzed using a sequential extraction technique (SPEXMan method)(1) to reconstruct phosphorus geochemistry during Marine Isotopic Stages 3 (2), 5 and 6.

Detrital phosphorus, the phase linked to igneous- and metamorphic-derived material, covaries with the ice-rafted debris record from the same core and from core MD95 2040, showing highest values during Heinrich-type events whereas authigenic and Fe-bound phosphorus phases decrease or even disappear. These findings suggest that during the deposition of Heinrich-type events, environmental parameters significantly changed the redistribution of phosphorus in the sediments. Large freshwater discharges in relation to iceberg surges may have provoked a temporary stratification of the water column. Accordingly, changed chemical conditions in the sediments may have fostered the loss of dissolved phosphorus from the sediments to the water column, in a direct and rapid response to the changing environment.

[1] K.C. Ruttenberg, N.O. Ogawa, F. Tamburini, R.A. Briggs, N.D. Colasacco, E. Joyce (2009) *Limnology and Oceanography: Methods* **7**, 319-333.

[2] F. Tamburini, S. Huon, P. Steinmann, F.E. Grousset, T. Adatte, K.B. Föllmi (2002) *Geochimica et Cosmochimica Acta* **66(23)**, 4069-4083.