

Deep water production in the GIN Seas: The Nd record from Feni Drift

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The Greenland, Iceland, Norwegian (GIN) Seas are a key area of modern deep water production. Recent evidence suggests deep and intermediate water was generated continuously in the GIN Seas during the last glaciation and contributed to Glacial North Atlantic Intermediate Water (GNAIW) [1]. However, various attempts to reconstruct GIN Seas surface conditions have resulted in contradictory interpretations [2], thus impeding efforts to determine the role and response of deep water production to specific climate events of the glaciation and deglaciation. To gauge variations in the intensity of GIN Seas deep water production over the last 45 ka, the Nd isotope composition (ϵ_{Nd}) from hydrous/ authigenic FeMn oxyhydroxides in marine sediments was used as an inorganic water mass tracer. The ϵ_{Nd} record, from ODP Site 980 (Feni Drift), is well placed to capture exchanges between the overflow of GIN Seas water and incursion of southern sourced waters (SSW), both of which are identifiable by their distinct range of ϵ_{Nd} .

The ϵ_{Nd} record indicates rapid radiogenic excursions of up to +2.8 ϵ_{Nd} units toward a more radiogenic end member coeval with Heinrich events and the 19 ka meltwater pulse. These shifts most likely reflect incursion of radiogenic SSW in the Rockall Trough when deep water production in the GIN Seas ceased or was dramatically reduced, implying a concomitant reduction of GNAIW in the North Atlantic. The return to less radiogenic ϵ_{Nd} between excursions suggests intermittent deep water production was present in the GIN Seas during the LGM. The ϵ_{Nd} record correlates with the timing of slowdown in meridional overturning circulation (MOC) inferred by ²³¹Pa/²³⁰Th proxy records [3, 4], and testifies to variable deep water production rates and climate cooling in the GIN Seas in response to the rapid advance and retreat of NW European ice sheets.

[1] Yu *et al.* (2008) *EPSL* **271**, 209-220. [2] de Vernal *et al.* (2006) *QSR* **25**, 2820-2834. [3] Hall *et al.* (2006) *GRL* **33**, GL026239. [4] McManus *et al.* (2004) *Nature* **428**, 834-837.

On the growth of calcium carbonate in the presence of Cr(VI)

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Due to its high mobility and toxicity hexavalent chromium Cr(VI) is an environmental pollutant that may pose a serious threat to human health. Sources of Cr(VI) contamination are diverse, ranging from weathering of basalts and amphibolites to industrial activities. The coprecipitation of Cr(VI) may be an effective mean of reducing the mobility of the toxic soluble anion (CrO_4^{2-}), its bioavailability and, consequently, its toxicity. There are strong evidences supporting that Cr(VI) incorporates into the structures of different CaCO_3 polymorphs.

Here, we present data on the crystallization of CaCO_3 in a silica hydrogel medium in the presence of different concentrations of Cr(VI) at 25°C. The crystals obtained have been characterized by using XRD, microprobe and SEM. Our observations indicate that the presence of Cr(VI) in the growth medium (i) has an inhibitory effect on nucleation, and (ii) strongly affects the morphology of calcite crystals (Fig. 1). Furthermore, our results confirm that CrO_4^{2-} incorporates into the calcite structure, most probably substituting carbonate anions.

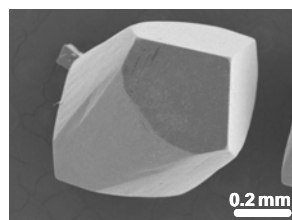


Figure 1: Calcite crystal grown by the silica gel method in the presence of Cr(VI). The initial $\text{CrO}_4^{2-}/\text{CO}_3^{2-}$ ratio in the reactant solution was 0.2.

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