

Behaviour of Ca during ultrafiltration of river water

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The behaviour of Ca in a boreal river was studied using different processing and analysis techniques including membrane filtration, cross-flow ultrafiltration, ICP-AES and a Ca-selective electrode.

Studies of freshwater indicate that Ca is retained during ultrafiltration [1,2]. This could be an artefact from the filtration process, a result of colloidal bound Ca or a combination of the two. In any case, it is important to understand the behaviour of the major elements during ultrafiltration, as the result have a direct implication on the interpretation for their role in colloidal biogeochemistry. Colloidal bound Ca may be explained by fibrillar polysaccharides extracted by algae and bacteria. These fibrils bind to each other in different ways depending on the water conditions [3], and may be stabilised by hydrogen or Ca bridges [4].

All fractions from membrane (1µm) and ultrafiltrations (10 and 1kDa) were collected and analysed with ICP-AES and a Ca-selective electrode (Ca-SE).

A complete 1kDa ultrafiltration was performed after passing unfiltered water through a 10kDa filter. During the 1kDa ultrafiltration a conc. factor of 11.8 roughly doubled the Ca-conc. in the 1kDa retentate (colloidal fraction), and 95.4% of the Ca could be measured with the Ca-SE. The remaining 4.6% then yield a conc. of 0.05 mg/l as colloidal bound Ca between 1-10kDa or 8.7‰ of the total conc. The reason for the large enrichment of 'labile' Ca in the retentate must be carefully evaluated as it also may have implications for the retention of trace elements during ultrafiltration.

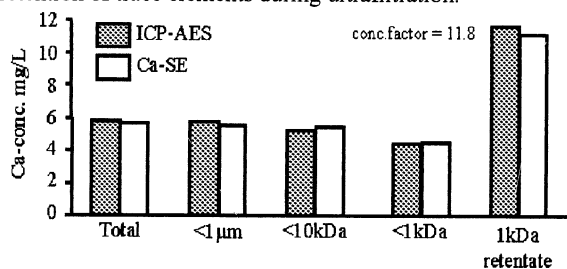


Figure 1. Results from a Ca speciation study this year.

Cenozoic magmas monitor climate change in Northern Victoria Land, Antarctica

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Cenozoic plutons and dykes related to the Ross Sea rifting emplaced in the north-eastern region of the Wilson Terrane, (Antarctica), and triggered local hydrothermal systems in adjacent permeable rocks. Mineral oxygen and hydrogen isotope investigation of these magmatic bodies and their contact country rocks show that the hydrothermal systems were fed by meteoric waters (e. g. Taylor, 1977). Petrographic, chemical and isotopic data from rocks showing meteoric-hydrothermal alteration were used to characterize the isotopic composition of the meteoric waters, provided altitude, latitude, local climate conditions and tectono-thermal histories of the different investigated outcrops were constrained (Dallai et al., 2001). Different and progressively lighter hydrogen isotope compositions (from -80 to -150 ‰) were inferred for waters feeding hydrothermal systems at 42 Ma, 39-38 Ma, and 36-35 Ma, respectively. On the basis of temperature-dependent water-vapor hydrogen fractionation in the atmosphere (Rozanski et al., 1993), present data can be interpreted as a result of climate evolution (deterioration toward lower temperature) during the 42-35 My time span, in agreement with the palaeo-climatic history of the Ross Sea region.

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