## Silicon and oxygen isotopes during diagenesis of the Monterey chert

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An important aspect for the evaluation of the use of (Archean) cherts as proxies for environmental conditions at their formation, is the fidelity of  $\delta^{30}$ Si and  $\delta^{18}$ O ratios of cherts during their diagenetic transitions from their precursor material (biogenic opal).

The Miocene Monterey Formation (California) is an exemplary location for the study of chert diagenesis. The Monterey Formation contains a diagenetic silicate sequence from marine biogenic opal-A to opal-CT to cristobalitic chert. This precursor-to-chert transition is due to dissolution-precipitation processes related to interactions of the opal with later diagenetic water [1, 2].

We analyzed  $\delta^{30}$ Si values by MC-ICPMS (Neptune<sup>TM</sup>), and  $\delta^{18}$ O values of cherts by ion microprobe (Cameca 1270) at UCLA. Due to ionprobe matrix effects in opal, their  $\delta^{18}$ O values were taken from literature [1, 3].

The  $\delta^{18}$ O values of the Monterey opal (37‰) and chert (28-34‰) suggest formation temperatures of 15°C and 48±8°C, respectively [1]. The opal has a  $\delta^{30}$ Si value of 1.4‰, and the chert has a more negative value of 0.0‰. Diatomaceous opal formed in highly productive oceans is expected to have high  $\delta^{30}$ Si values, wheras diagenetic fluids expelled from the Monterey Shales during burial are expected to have more negative  $\delta^{30}$ Si values [4].

The chertification process of the Monterey opal has imprinted  $\delta^{30}$ Si and  $\delta^{18}$ O ratios onto Monterey cherts that are different from the initial isotopic values of the biogenic opal. This example illustrates that isotope values of cherts are not necessarily indicative for the environmental conditions that prevailed during initial marine silica deposition.

If the precursor-chert transformation was associated with an external fluid, the isotope ratios of the chert reflect the conditions of this chertification event rather than that of the silica deposition. Such processes will have to be understood and assessed when using O and Si isotopes of cherts for paleoclimate reconstructions.

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## The distribution of neodymium isotopes and REE patterns in the water column of the tropical Atlantic Ocean

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Neodymium (Nd) isotopes and rare earth element (REE) patterns are used as tracers to fingerprint source provenances of water masses. We present full water column Nd isotopic compositions and dissolved REE distributions in seawater of the tropical Atlantic Ocean. Samples were collected during GEOTRACES expedition A11 (R/V Meteor) from Las Palmas (Canary Islands) to Port of Spain (Trinidad and Tobago).

Highly variable REE concentrations and characteristic REE patterns in surface waters can be grouped into different oceanic provinces and reflect prominent local source provenances, such as volcanic islands and dust particles of continental origin. Generally, concentrations in the eastern basin, especially in the vicinity of the Canary Islands and off the coast of NW Africa, are higher than in the western basin. In the area of the Canary Islands shale-normalized REE patterns are characterized by pronounced heavy REE enrichments originating from weathering of the volcanics while further south REE patterns are almost flat as a consequence of Saharan dust inputs.

Nd concentrations in surface waters range from a minimum of 14 pmol/kg in surface waters with reduced salinities (< 33.6 psu) due to freshwater input by the Amazon river to maxima off NW Africa originating from partial dissolution of Saharan dust and ocean island wheathering. This is also reflected in the surface water Nd isotopic compositions, which range from  $\varepsilon_{Nd}$  = - 12.7 to - 8.8. The most radiogenic values are measured between Tenerife and Grand Canary while the Nd isotope composition is least radiogenic in the open ocean surface waters.

In addition to the surface waters we present full water column profiles of Nd isotope compositions and REE patterns including samples from all major water masses of the Atlantic Meriodional Overturning Circulation in the western and eastern Atlantic basins.