

Mo isotopic composition of pelagic ooze from ODP Legs 198 and 208: Investigating a global signature

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Our Mo isotope analysis of various skeletal and non-skeletal carbonates has revealed a large fractionation in the ocean environment. It exceeds the $\delta^{98/95}\text{Mo}$ range of 3δ defined by black shales and Fe-Mn oxy-hydroxides, i.e. the maximum variation found within the significant Mo sinks. It is thus important to characterize the isotopic signatures of different carbonate sinks and to determine the processes leading to the observed fractionation.

Here we present Mo-isotope data of pelagic ooze from ODP-Legs of Shatsky Rise, NW-Pacific and Walvis Ridge, S-Atlantic, documenting the last 70Ma. The isotopic variation is large (2.6‰), ranging from 1.2‰ down to -1.4‰. This is not in agreement with data obtained from contemporaneous Fe-Mn-crusts with uniformly light values of $\sim -0.7\text{‰}$, a result which has been interpreted to show that the ratio of oxic to anoxic sedimentation has not varied by more than 10% over the Cenozoic time [1]. However, as carbonate rocks represent $\ll 1\%$ of the global Mo sink the observed variations stored in the pelagic ooze do not require changes in the global Mo ocean inventory due to mass balance reasons. This favors the assumption that the hydroxides actually reflect a stable ocean-water Mo composition and that further fractionation mechanisms are responsible for the isotopic signature of the deep sea carbonates. Additionally, as the two ODP records correlate well from the Eocene through the Pleistocene, a globally acting mechanism that governs the isotopic signal is implied. Moreover, major changes in the global Mo isotope record are coeval with significant changes in the ocean circulation patterns. Our preliminary evaluation of factors responsible for the observed signature focuses on the global Cenozoic cooling trend and the closing of the Isthmus of Panama.

[1] Siebert *et al.* (2003) *EPSL* **211**, 159-171.

Chemistry of an antarctic subglacial environment: The role of subglacial geochemical processes in global biogeochemical cycles and quantifying subglacial hydrological processes

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Subglacial environments especially the availability of basal water plays an important role for the dynamic of ice sheets. Hydrological processes however are far from being understood as direct observations are hampered through kilometre-thick ice. Over the past years, it also has become more and more evident that despite the cold and isolation wet subglacial environments provide a viable habitat for life. Geochemical and biogeochemical processes in the sub ice environment not only can create and release chemical compounds, subglacial bio/geochemical processes may also play an important role in global geochemical cycles, like the global carbon cycle, or the cycling of iron and fertilization of the oceans.

Here we present the first geochemical measurements of the geochemical composition of basal water and pore water from beneath the West Antarctic Ice Sheet. Our results point towards an oxygen depleted environment in the Upstream C area (Kamb Ice Stream). Geochemical measurements conducted on the subglacial water and sediment also indicate the removal and transport of inorganic carbon from the subglacial environment to the oceans. This removal and transport may constitute a significant flux and release of inorganic carbon across the ice sheet grounding zone into the sub ice shelf cavity.

Our results also point out that subglacial environments are far from being understood and that sample recovery and *in situ* observations will be crucial for understanding subglacial environments and their role for ice sheet dynamic, the interaction between ice sheets, the underlying lithosphere and the oceans as well as the impact of subglacial processes on global geochemical cycles.