# Redox-sensitive trace metals during the Neoproterozoic Oxygenation Event

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The transition to a fully oxygenated Earth surface environment during the late Neoproterozoic involved major changes of climatic, tectonic and biological nature and had profound effects on biogeochemical cycling . An increasingly oxygenated Earth's surface would possibly have led to the ventilation of the deep marine environment and to a build-up in the ocean of the redox-sensitive trace metals that are generally more soluble as oxidised complexes, e.g. Mo and V. Because reductive sequestration of these metals results in authigenic enrichment in oxygen-depleted sedimentary facies, ocean anoxic events can affect the budgets of these biogeochemically significant elements [1]. Hence, investigating the trace metal distribution in Neoproterozoic/Cambrian black shales, when a redox stratified ocean [2] and an oxygenated atmosphere coexisted, can shed light on the development and timing of the Neoproterozoic Oxygenation Event (NOE). In this study, we present high resolution trace metal data, with a focus on Mo, V and Mo/TOC ratios in order to constrain changes in the ocean Mo budget during the Neoproterozoic-Cambrian transition [3]. New data from 6 sections in South China and previously published data, covering the Neoproterozoic-Cambrian transitional interval from about 1000 to 500 Ma are used to constrain the timing of the NOE and its possible links to biological evolution.

[1] Tribovillard *et al*. (2006) *Chemical Geology*, **232,** 12-32. [2] Canfield (1998) *Nature*, **396,** 450-453. [3] Algeo and Lyons (2006) *Paleoceanography*, **21.**

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# Oxidation state of chromium in ferropericlase inclusions in lower mantle diamonds determined with micro-XANES measurements

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Redox condition of the Earth's interior is a much-discussed subject these days. The valences of Fe of mineral inclusions in diamond were studied as a possible redox indicator. However, it was found that the valence of Fe in lower mantle minerals is constrained by crystallographic structure. In this study, we focused on oxidation state of Cr in ferropericlase for searching a proper indicator of oxidation state of lower mantle.

Chromium and Fe *K*-edge X-ray absorption near-edge structure (XANES) spectra of natural ferropericlase were measured using X-ray microbeam from a synchrotron radiation source to estimate the valence state of Cr and Fe. These samples were inclusions collected from the lower mantle diamonds. The inclusions were picked up from the host diamonds and buried in epoxy mounts. XANES spectra were recorded in the fluorescence mode at the beamlines BL4A of the Photon Factory, KEK, Japan. Relative content of $Cr^{2+}$, was calculated using the method described by Berry and O'Neill (2004). The obtained results revealed that divalent chromium are present in the materials from the lower mantle and the $Cr^{2+}$ proportion to the total Cr content varied among the samples in the range of 4 to 15%. In this presentation, we will discuss about the redox condition of the lower mantle using valence states of Cr and Fe.

[1] Berry & O'Neill (2004) *Am. Mineral*. **89**, 790-798. [2] Odake *et al*. (2008) *Journal of Mineralogical and Petrological Sciences* **103**, 350-353.