

Paleoenvironmental changes during Marine Isotopic stage 5e in the central Okhotsk Sea: High resolution multiproxy record

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The Last Interglacial (MIS 5e) is a period of rapid global change considered as an analogue for future climate change under increasing CO₂ concentrations. Here we use a high-resolution geochemical approach to constrain paleoenvironmental changes associated with the onset and the demise of this period in the Okhotsk Sea. The MIS 5e in this region was characterized by warmer conditions [1]. Our multiproxy record also reveals that the onset and termination of such period was accompanied by significant changes in the detrital sources (La/Lu ratios), which mark the early MIS 5e, and bottom redox conditions (U/Th ratios), that appears to be the earliest signature of the MIS 5e demise.

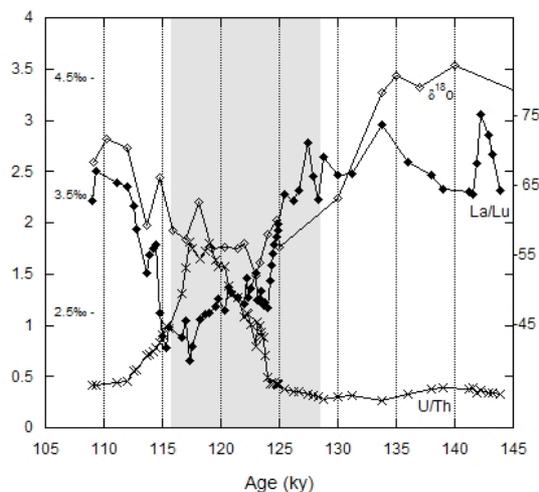


Figure 1: Core MR0604-PC7A age profiles of $\delta^{18}\text{O}$ measured in benthic foraminifera, U/Th ratio and La/Lu ratio. Light-grey bar represent MIS 5e time interval.

[1] Seki *et al.* (2009) *Geochem. Geophys. Geosyst.* **10**, Q10007.

New kinetic studies on the abiotic methylation of inorganic mercury by methylcobalamin

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Chemical methylation of inorganic mercury can occur if suitable methyl donors exist in the environment. In this sense, the methylated form of vitamin B12 (methylcobalamin) is one of the few compounds responsible for mercury methylation in the environment. It is well known that the methylation reaction is fast and first-order for Hg (II) [1] and that the first reaction product, monomethyl Hg (MeHg), can be further transformed to dimethyl Hg (DMeHg). Previous studies have also indicated that several parameters are affecting Hg (II) alkylation by methylcobalamin (pH, temperature, time, Hg (II)/methylCo ratio) [2]. However, the kinetic models of mercury monomethylation and dimethylation reactions are still poorly resolved.

The purpose of this work is to determine the rates and mechanisms of the abiotic methylation-dimethylation processes studying the inorganic mercury alkylation by methylcobalamin under different conditions in order to assess their dependence on some environmental factors. The use of capillary gas chromatography coupled to quadrupole inductively coupled plasma mass spectrometry has enabled the simultaneous determination of four mercury species such as elemental Hg, inorganic Hg (II), MeHg and DMeHg. The influence of Hg (II) and MeHg complexation with major ligands in the reaction media has also been studied. Enriched stable isotopes have also been used to discriminate both methylation and demethylation extent under the various conditions tested. Results demonstrate that the presence of organic (L-cysteine) or inorganic (chloride) complexing agents had a remarkable influence on the kinetics. Under visible light radiation, DMeHg formation and degradation rate increased considerably while reaction yield decreased more than 6-fold.

[1] Chen *et al.* (2007) *Appl. Organomet. Chem.* **21**, 462–467.

[2] Rodríguez Martín-Doimeadios *et al.* (2002) *Appl. Organomet. Chem.* **16**, 610–615.