



## Using Mg/Ca on oyster shells as paleoclimatic proxy, example from the Paleogene of Central Asia.

Laurie Bougeois (1,2), Marc de Rafélis (1), Gert-Jan Reichart (3), Lennart de Nooijer (3), Guillaume Dupont-Nivet (2,4)

(1) Université Pierre et Marie Curie, Paris 6, IStEP, Paris, France (laurie.bougeois@upmc.fr), (2) Université Rennes 1, Géosciences Rennes, Rennes, France, (3) Department of Marine Geology, Royal Netherlands Institute for Sea Research, Texel, The Netherlands, (4) Department of Earth and Environmental Sciences, Potsdam University, Germany

Due to their large occurrence in sedimentary records from Triassic to Quaternary, their strong resistance to post-mortem alteration, and the incremental nature of their shell growth, oysters are recognized to be a highly powerful tool to infer infra-annual paleoclimate variations. However, the common use of  $\delta^{18}\text{O}$  in biomineralisation to infer paleotemperatures is hindered by the difficulties in valuating  $\delta^{18}\text{O}$  of sea water ( $\delta^{18}\text{O}_{\text{sw}}$ ). If the  $\delta^{18}\text{O}_{\text{sw}}$  values can be fairly well estimated when working at the million-year time scale, the estimation of the infra-annual variation of the  $\delta^{18}\text{O}_{\text{sw}}$  constitutes a considerable barrier for high-resolution paleo-reconstitutions. This issue can be resolved using the Mg/Ca ratio as a suitable and valuable independent high-resolution paleothermometer in oyster shells. However, if numerous studies provided new paleothermometer using Mg/Ca ratio in calcitic bivalve shells, their application to paleo-studies remains to be established. In this study, we combine incremental  $\delta^{18}\text{O}$  analyses with Mg/Ca ratio on Paleogene oyster shells from the Proto-Paratethys (Central Asia) that is characterized by high seasonal variability. We analysed various species growing in different depositional environments throughout late Paleocene to late Eocene times. Results from both proxies show consistent values from oysters of the same age and of the same species, attesting for the consistent Mg incorporation into shells. However, the Mg/Ca-T calibrations tested in this study reveals the importance of specie-specific effect for the incorporation of Mg, as well as the environment. This enables discarding results inappropriate for existing Mg/Ca calibrations and identifying those yielding meaningful paleo-temperatures. In particular, the consistency of the Mg/Ca temperature proxies yielded by the species *Ostrea (T.) strictiplicata* and *Sokolowia buhsii* shows that, with careful data selection, Mg/Ca provides a reliable infra-annual paleotemperature proxy.