

Calibration of the clumped isotope thermometer for planktonic and benthic foraminifera

A.NELE MECKLER^{1*}, NIKLAS MEINICKE¹, ALISON PIASECKI¹, SZE LING HO¹, ARADHNA TRIPATI², AMANDINE TISSERAND³, STEFANO M. BERNASCONI⁴

¹ Bjerknes Centre for Climate Research and Department of Earth Science, University of Bergen, Bergen, Norway

² Department of Earth, Planetary, and Space Sciences, Department of Atmospheric and Oceanic Sciences, Institute of the Environment and Sustainability, University of California, Los Angeles, USA

³ Uni Research Climate, Bjerknes Centre for Climate Research, Bergen, Norway

⁴ Earth Science Department, ETH Zürich, Zürich, Switzerland

* correspondence: nele.meckler@uib.no

Clumped isotope thermometry promises to circumvent some of the ambiguities of classical foraminifera-based temperature proxies. Based on thermodynamics, this method does not rely on knowledge of other variables. In many types of biogenic carbonates, it has also been proposed to be unaffected by species specific ('vital') effects.

Two calibrations for foraminifera have been published to date [1,2], both suggesting that data from a variety of foraminifera species conform to synthetic carbonate calibrations. However, being derived from natural samples with additional uncertainties in growth temperature, the scatter in the data is relatively large and the calibrations contain only few data points in the cold temperature range (<10°C). More data points are therefore needed. Furthermore, the data sets do not contain a sufficient number of data points for individual species to conclusively address the occurrence of vital effects in foraminifera.

Here we present data from a new study with particular focus on species effects in both planktonic and benthic foraminifera. The data cover temperature ranges of ~1-19 °C and ~1-29 °C for benthic and planktonic foraminifera, respectively. Clumped isotope analyses are performed using a Kiel device for sample processing and the LIDI approach for measurement, both decreasing the required sample size. The results so far suggest no significant vital effects in foraminifera, with the potential exception of large specimen of the benthic foraminifera *Pyrgo spec.*

[1] Grauel, et al. (2013), *Geochim. Cosmochim. Acta* 108, 125-140. [2] Tripathi, et al. (2010), *Geochim. Cosmochim. Acta* 74, 5697-5717.