

Investigating the origin of discrepancies in clumped isotope calibrations

WILLIAM F. DEFLIESE¹, ROBERT A. EAGLE²,
JIANWU TANG³, FENGMING CHANG⁴ AND
ARADHNA K. TRIPATI⁵

¹Earth, Planetary, and Space Sciences, University of California, Los Angeles defliese@epss.ucla.edu

²Earth, Planetary, and Space Sciences, University of California, Los Angeles rob.eagle@gmail.com

³Earth, Planetary, and Space Sciences, University of California, Los Angeles jianwu.tang@gmail.com

⁴Key Laboratory of Marine Geology and Environment, Institute of Oceanology, Chinese Academy of Sciences chfm@qdio.ac.cn

⁵Earth, Planetary, and Space Sciences, University of California, Los Angeles atripati@ucla.edu

The mass-47 clumped isotope thermometer has been applied to an increasing number of settings and problems since its introduction in 2006. There remain fundamental questions about the nature of equilibrium $\Delta 47$ -temperature relationships for different minerals, as divergent calibrations have been published. Most calibrations for different materials fall into one of two groups: A ‘steeper’ slope group, similar to the original calibration of Ghosh et al. (2006); and a ‘shallower’ slope group, similar to the calibration of Dennis and Schrag (2010). Differences in acid digestion temperature, measurement technique, as well as interlaboratory differences, may contribute to discrepancies. To address whether a universal calibration may apply to a range of carbonates, we apply a common approach and instrumental setup to materials used in previous calibration studies.

A suite of materials is being analyzed using a common acid bath extraction procedure at 70 °C and 90 °C at the University of California, Los Angeles. These materials include mollusks, foraminifera, and synthetic carbonates grown in the laboratory. We will revisit previously published data from the same samples in comparison with our data generated using a common approach, and attempt to identify the cause of these discrepant calibrations.