

Constraints on Paleoenvironments and Surface Temperatures in the Neoproterozoic and Paleozoic and Implications for Metazoan Evolution

WILLIAM F. DEFLIESE^{1*}, YAMA DIXIT^{2,3}, GREGORY J. RETALLACK⁴, STEFAN LALONDE³, ARADHNA TRIPATI^{1,2,3}

¹University of California, Los Angeles, USA

²IFREMER, Laboratoire Environnements Sédimentaires, Plouzané, France

³Institut Universitaire Européen de la Mer (IUEM), Université de Bretagne Occidentale, Plouzané, France

⁴University of Oregon, USA

*defliese@epss.ucla.edu

The evolution and development of metazoan life during the Neoproterozoic and Paleozoic was a major critical transition in Earth history. Environmental conditions surrounding this transition are the subject of debate. To shed light on paleoenvironments, we applied the mass-47 clumped isotope thermometer in conjunction with trace element analysis to Precambrian and early Paleozoic sediments from Australia to reconstruct paleoenvironments. Petrography, cathodoluminescence, stable isotope, and trace element data were used to screen for diagenetic alteration. This suite of information was used to reconstruct depositional and diagenetic environments and evaluate the preservation potential for primary temperature signals. In this context, we report evidence for a suite of unaltered paleosols in the Neoproterozoic and Paleozoic and use them to reconstruct a record of climate and temperatures. Results suggest that Ediacaran and Paleozoic terrestrial environments in this region did not experience elevated temperatures.