Diagenesis determined by synchrotron X-ray CT - insights from the Ontong Java Plateau

ELIZABETH READ[1*], OSCAR BRANSON[2], SIMON REDFERN[1], CHRISTOPH RAU[3], HARRY ELDERFIELD[1]

[1]Department of Earth Sciences, University of Cambridge, Downing Street, Cambridge, CB2 3EQ, UK (*correspondence: er368@cam.ac.uk)

[2]Department of Earth and Planetary Sciences, University of California Davis, Davis, CA 95616, USA

[3]Diamond Light Source Ltd, Diamond House, Harwell Science and Innovation Campus, Didcot, OX11 0FA, UK

Calcitic tests of foraminifera lie in marine sediments for up to 100s of millions of years before being analysed for isotopic or trace element chemistry for use in palaeoclimatic reconstructions. Paleoproxy records are inherently problematic, due to vital effects, which can be overcome by using species-specific calibrations [1], and diagenesis. Samples collected from the Ontong Java Plateau, Pacific, have been previously described as poorly preserved and so have formed the basis of other studies on diagenesis [2]. Here we study *Globorotalia tumida* from a depth transect across the lysocline using synchrotron X-ray computed tomography (sXCT) and electron microprobe analysis (EMPA) to reevaluate the nature of diagenesis in this area [3].

Using phase contrast sXCT we observed dissolution of higher-Mg calcite chambers with depth. We also observed a thickening of structurally-different crust with depth, found to be chemically distinct using EMPA. From both the sXCT and EMPA we infer that the crusts observed are a diagenetic feature, driven by the simultaneous dissolution of the original foraminiferal test, and precipitation of a secondary crust. Here we show that two simultaneous diagenetic alteration process are occurring with significant impacts for palaeoproxies and palaeoclimatic reconstructions.

[1] Elderfield et al. (2006) *EPSL* **250**, 633-649.

[2] Brown and Elderfield (1996) *Paleoceanography* **5,** 543-551.

[3] Branson et al. (2015) *Paleoceanography* **30,** 1490-1502.