Warm latest Jurassic–early Cretaceous sea-surface temperatures from the tropical Pacific: A data model comparison

K. LITTLER[1]*, C. LOPTSON[2], D. LUNT[2], P. BOWN[3], S. WOODARD[4] AND S. A. ROBINSON[5]

[1]Camborne School of Mines & Environment and Sustainability Institute, University of Exeter, Penryn, UK (*correspondence: k.littler@exeter.ac.uk)
[2]School of Geographical Sciences, University of Bristol, Bristol, UK
[3]Dept. Earth Sciences, University College London, UK
[4]Institute of Marine and Coastal Sciences, Rutgers, New Jersey, USA
[5]Dept. Earth Sciences, University of Oxford, Oxford, UK

Absolute sea-surface temperature (SST) estimates from late Jurassic–earliest Cretaceous are scarce, particularly from the Pacific Ocean. Here we present the first absolute SST estimates for the tropical Pacific spanning this period, based on the TEX_{86} paleotemperature proxy. Reconstructed mean annual SSTs of 29–33°C at two Integrated Ocean Drilling Program sites on Shatsky Rise (IODP Sites U1346 and U1347) suggest very warm conditions at the paleo-equator at this time. Interestingly, the new data suggests slightly cooler SSTs in the equatorial Pacific relative to the proto-North Atlantic at 15–20°N [1]. At all sites very low BIT Index values suggests minimal contamination from terrestrial GDGTs, indicating this is not a source of SST bias. Therefore, the apparent discrepancy could be due to either: 1) a warm pool effect in the proto-North Atlantic relative to the open Pacific; 2) different populations of archaea in the two basins; 3) equatorial upwelling in the Pacific. Comparison to contemporaneous GCM simulations (HadCM3L coupled ocean-atmosphere model with dynamic vegetation) suggest option 1) is the most likely, as the spatial trends seen in the proxy data are broadly replicated in the modeled data. This suggests that the TEX_{86} technique can capture genuine spatial variability in deep time SSTs, helping to ground-truth model outputs of climate variables for ancient greenhouse worlds.

[1] Littler *et al*., (2011) *Nat. Geosci*. **4**, 169–172