Assessing late Pliocene climate variability over glacial-interglacial timescales (PlioVAR)

Erin McClymont1, Sze Ling Ho2, Heather Ford3, Sarah White4, Jeroen Groenveld5, Clara Bolton6, Kau Thirumalai7, Georgia Grant8, Molly Patterson9, Montserrat Alonso-Garcia10, and Babette Hoogakker11

1Durham University, Department of Geography, Durham, United Kingdom of Great Britain – England, Scotland, Wales (erin.mcclymont@durham.ac.uk)
2Institute of Oceanography, National Taiwan University, 10617 Taipei, Taiwan
3School of Geography, Queen Mary University of London, London, U.K.
4Department of Earth and Planetary Sciences, University of California, Santa Cruz, USA.
5Department of Geosciences, Hamburg University, Germany
6CEREGE, Aix en Provence, France
7Department of Geosciences, The University of Arizona, Tucson, AZ 85721, USA
8GNS Science I Te Pū Ao, Lower Hutt 5040, New Zealand
9Department of Geological Sciences and Environmental Studies, Binghamton University SUNY, New York, USA
10Department of Geology, University of Salamanca, Salamanca, Spain.
11The Lyell Centre, Heriot-Watt University, Edinburgh, UK

The Pliocene epoch (~2.6-5.3 million years ago) is one of the best resolved examples of a climate state in long-term equilibrium with current or predicted near-future atmospheric CO2 concentrations, characterised by a globally warmer climate, reduced continental ice volume, and reduced ocean/atmosphere circulation intensity compared to today. Towards the end of the Pliocene, there was a marked increase in glaciation in the northern hemisphere and atmospheric CO2 concentrations declined.

The Past Global Changes (PAGES) PlioVAR working group aimed to co-ordinate a synthesis of terrestrial and marine data to characterise spatial and temporal variability of Pliocene climate, underpinned by high quality data sets supported by robust stratigraphies. Here we present some of the main findings of this synthesis effort, including new assessments of ocean temperatures during the KM5c interglacial, and recent work assessing orbital-scale climate variability across the late Pliocene-early Pleistocene northern hemisphere ice-sheet growth. We outline our approaches to integrating multi-proxy data recording ocean temperatures, d18O and sea-level variability from a globally distributed suite of marine sediment cores. We explore regional expressions of environmental change across this transition, identifying asynchronous trends and patterns in climate changes. We consider how these results might inform our understanding of past climate forcings and feedbacks during both warm intervals of the past and the development of larger ice sheets in the northern hemisphere.