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The warm Pliocene: Bridging the geological data and modelling communities

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

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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, δ18O 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.

