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Data-model Comparison for the mid-Pliocene Warm Period

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Modelling results from PlioMIP2 (the Pliocene Model Intercomparison Project Phase 2) focussing on MIS KM5c; ~3.205Ma, suggest that global mean surface air temperature was 1.7 – 5.2 °C higher than the preindustrial. This warming was amplified at the poles and over land. The results are in reasonable agreement with paleodata over the ocean.

Over the land the situation is more complicated. Model and data are in very good agreement at lower latitudes, however at high latitudes an initial data-model comparison shows much warmer mPWP temperatures from data than from models.

Here we consider possible reasons for this data-model discord at high latitudes. These include uncertainties in model boundary conditions (such as CO₂ and orbital forcing), and whether there are local site-specific conditions which need to be accounted for. We also show that the seasonal cycle in mPWP temperatures at these high latitude sites has no modern analogue. This could lead to inaccuracies when comparing model derived mean annual temperatures with quantitative climatic estimates from palaeobotanical data using Nearest Living Relative methods.