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Quantifying the impact of realistic soil and lake distributions in an Atmosphere-Ocean General Circulation Model simulation of the late Pliocene.

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Model simulations of past climates, such as the late Pliocene, are driven by the boundary conditions that were appropriate at the time - if such data is available. The Pliocene Research, Interpretation and Synoptic Mapping dataset, PRISM3, provides boundary conditions for model simulations of the late Pliocene ($\sim$3.2ma) and has been used in the Pliocene Palaeoclimate Modelling Intercomparison Project (PlioMIP). In the absence of observational constraints, the PlioMIP simulations assumed that Pliocene lake locations and soil parameters were the same as modern – however in reality there are notable differences between Pliocene and modern lakes and soils. Here we present new global datasets of Pliocene lakes and soils, which can be used to provide more accurate forcing data for climate models. The new datasets are used to drive a 350 year simulation with the Hadley Centre atmosphere-ocean General Circulation Model (GCM), HadCM3. It is shown that using the Pliocene lakes and soils datasets have an impact on the modelled temperature and precipitation, although these effects are spatially localised and are often limited to certain seasons. Changes in Pliocene vegetation patterns that can be attributed to using realistic lakes and soils is also discussed.