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Sensitivity of climate to the West Antarctic Ice Sheet extent in past interglacials

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Earth system models often have difficulty reproducing the warmth of past interglacials, particularly at the polar regions. CO₂ concentrations and orbital configurations do not by themselves reproduce regional climate for interglacial periods such as e.g. MIS 5e, MIS 11, and MIS 31. The West Antarctic ice sheet (WAIS) extent is a key source of uncertainty. Here we use an intermediate complexity model, UVic ESCM, to simulate three different past interglacials (MIS 5e / 127 ka, MIS 31 / 1.07 Ma, mid-Pliocene warm period / 3.2 Ma) with four different ice sheet configurations (present-day, WAIS absent, and two intermediate states) and compare to paleoclimate ice core and sediment proxy data to evaluate their consistency. These experiments offer insight into the sensitivity of climate to the interactions between CO₂ concentrations, orbital forcing, and Antarctic ice sheet extent. Model outputs will be used as boundary conditions for Southern Ocean high-resolution regional ocean model simulations to explore the impact of differences in circulation around the Antarctic continent.

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