



Rapid ocean-driven West Antarctic Ice Sheet collapse under Last Interglacial climate forcings

Helen Millman (1,4), Steven Phipps (2), Nicholas Golledge (3), Chris Fogwill (4), Chris Turney (1), and Alexandre Nobajas (4)

(1) Climate Change Research Centre, University of New South Wales, Sydney, Australia (h.m.l.millman@keele.ac.uk), (4) School of Geography, Geology and the Environment, Keele University, Staffordshire, UK, (2) Institute for Marine and Antarctic Studies, University of Tasmania, Hobart, Australia, (3) Antarctic Research Centre, Victoria University of Wellington, New Zealand

The projected contribution of the Antarctic ice sheets to sea level rise (SLR) under elevated CO₂ levels remains uncertain. During the Last Interglacial (LIG), global mean temperatures were 1–2°C warmer than pre-industrial times. With temperatures projected to increase by 0.3 to 4.8°C by the end of this century (Meinshausen et al., 2011), the LIG can be used as a process analogue for future change.

Here we report results from a series of simulations exploring the effects of elevated CO₂ on the full system response of Antarctic ice sheet dynamics under an LIG climate regime. We use climate model outputs from the CSIRO Mk3L GCM to drive the Parallel Ice Sheet Model (PISM) via offline coupling.

Ice loss ranges from 5.78 to 7.09 m SLE (sea level equivalent) over 20 k years of forcing, with the majority of mass loss occurring within the first 1500 years. Atmospheric forcing alone leads to increased precipitation and subsequent ice sheet growth, and so this rapid mass loss is caused by ocean-warming, which is largely driven by orbital forcing. This ice loss is constrained by topography, with marine ice-sheet instability having significant impacts across key sectors of Antarctica.