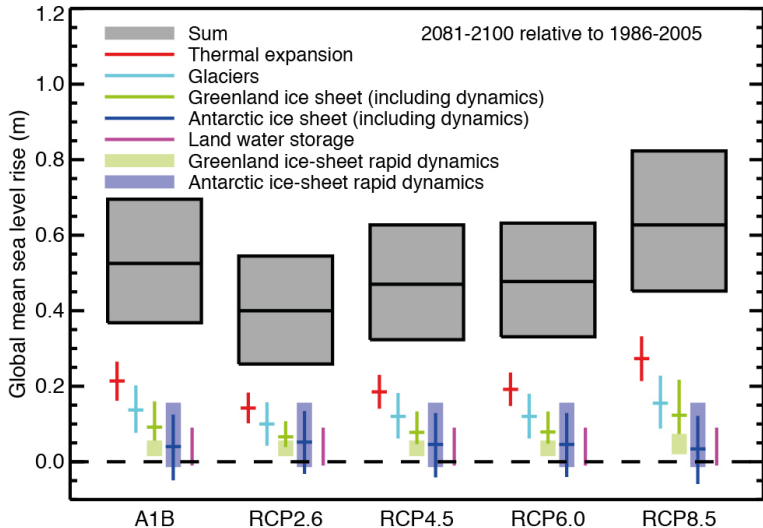


Insights from the past: Using the history of Antarctica to improve projections of global sea level

Steven J. Phipps
Institute for Marine and Antarctic Studies
University of Tasmania

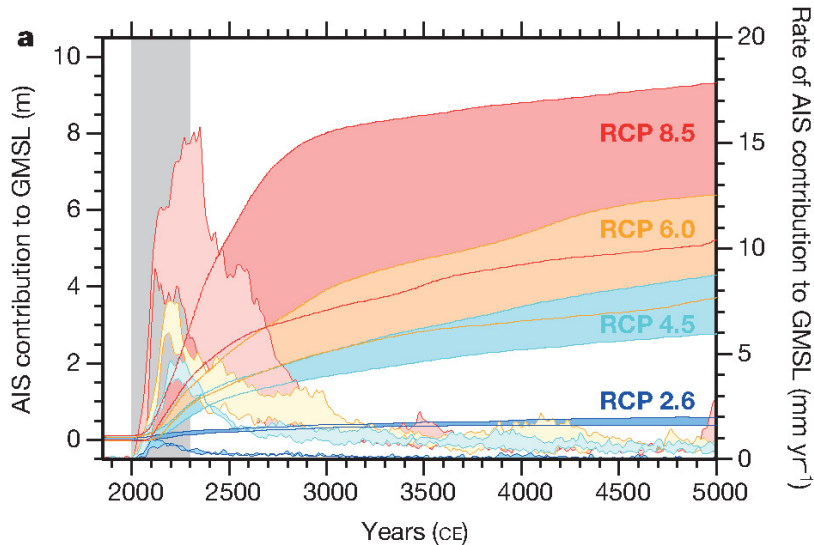
Antarctic Gateway Partnership Annual Research Meeting
9 December 2015

Likely changes in global sea level by 2081–2100



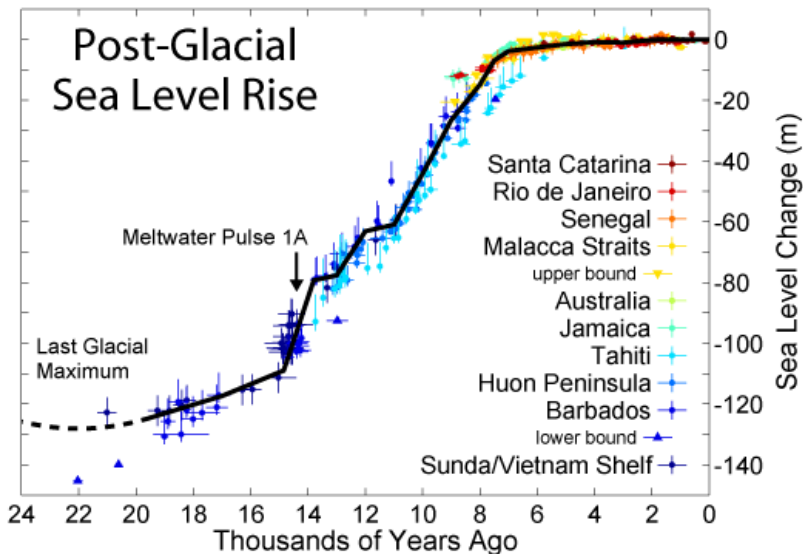
IPCC AR5 WG1 report (2013)

Antarctic contribution to global sea level (2000–5000 CE)



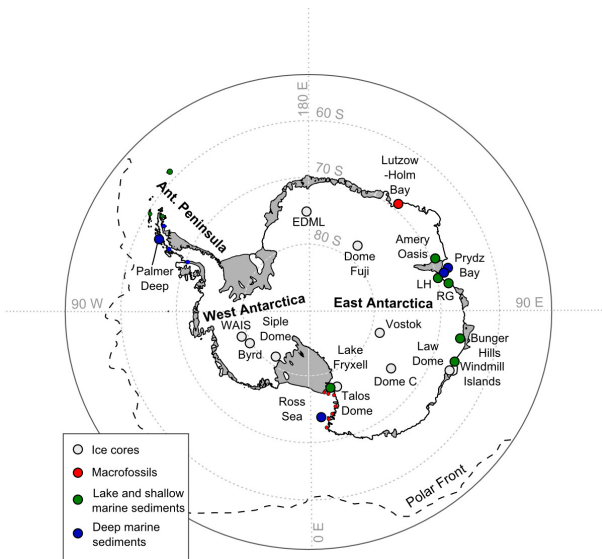
Golledge et al. (2015), *Nature*

Changes in global sea level since the Last Glacial Maximum



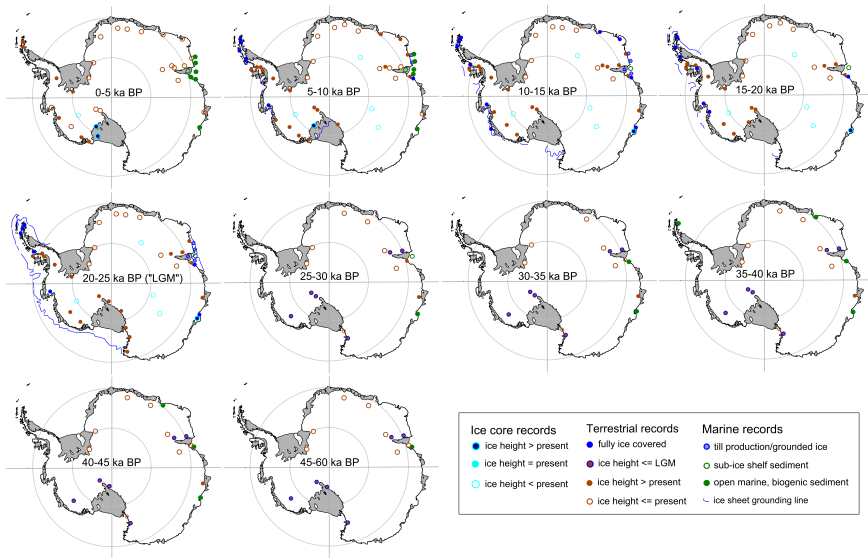
Robert A. Rohde/Global Warming Art

Key Antarctic palaeoclimate records



Duanne White/University of Canberra

The history of the Antarctic ice sheet (60–0 ka)



Duanne White/University of Canberra

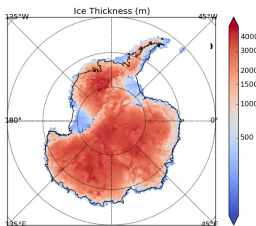
Modelling the Antarctic ice sheet using PISM



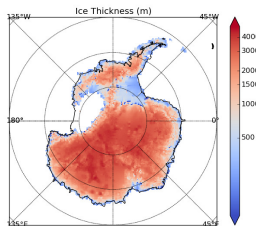
- Open source model, computationally efficient, highly configurable.
- Describes both grounded ice sheets and floating ice shelves.
- Shallow Ice Approximation used to calculate flow of grounded ice.
- Shallow Shelf Approximation used to calculate flow of ice shelves.
- Plastic till used to calculate basal resistance; multiple flow laws available, mostly single power; simple description of basal hydrology.
- Able to produce a realistic simulation of the Antarctic ice sheet, but sufficiently fast that it can be run for long periods.
- CSIRO Mk3L climate system model will be used to generate boundary conditions (air temperature, precipitation, ocean temperature).

Sensitivity to parameter values

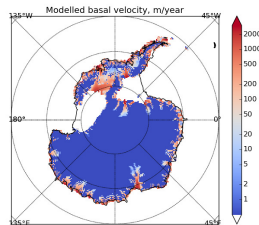
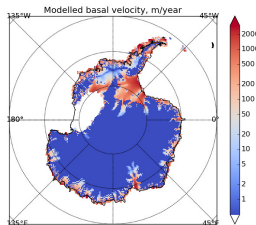
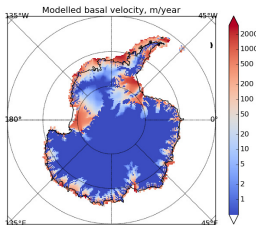
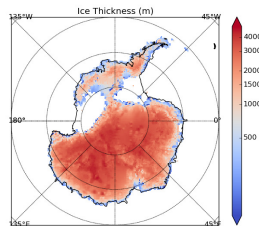
ssa_e = 0.5



ssa_e = 1.5



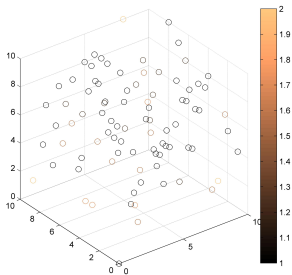
ssa_e = 2.5



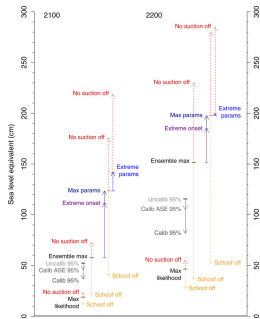
Helen Millman/UNSW

Research plan

- Use PISM to simulate the Antarctic ice sheet from LGM to 2500 CE.
- Run the model many times. Perturb the model physics each time, sampling as many different parameter combinations as possible.
- Identify the model configurations where the simulated evolution of the Antarctic Ice Sheet agrees best with the known history.

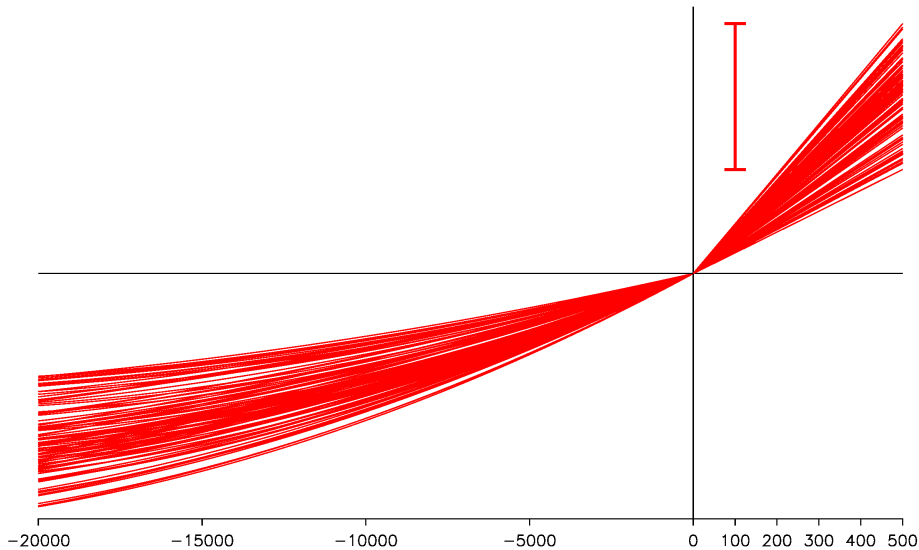


<http://i.stack.imgur.com/h244J.jpg>



Ritz et al. (2015), *Nature*

Constraining projections of global sea level rise



Constraining projections of global sea level rise

