Sensitivity of the Antarctic ice sheet to marine climate variability and change

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Future Sea Levels and Coastal Impacts Workshop
15–17 November 2017
Likely changes in global sea level by 2081–2100

IPCC AR5 WG1 report (2013)
How do we project changes in global sea level?

Figure 15: PISM’s view of interfaces between an ice sheet and the outside world
Ice sheet modelling: The case of the ice that won’t melt

DeConto and Pollard (2016), *Nature*
DeConto and Pollard (2016), *Nature*
Marine ice sheet instability (MISI)

Mengel and Levermann (2014), *Nature Climate Change*
Marine ice sheet instability (MISI)

Mengel and Levermann (2014), *Nature Climate Change*
Marine ice cliff instability (MICI)

DeConto and Pollard (2016), *Nature*
Marine ice cliff instability: observational evidence

Wise et al. (2017), *Nature*
Marine ice cliff instability: observational evidence

Wise et al. (2017), Nature
Millennial-scale ice sheet–ocean variability

Weber et al. (2014), Nature
Millennial-scale ice sheet–ocean variability

Weber et al. (2014), *Nature*

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Ice sheet sensitivity to marine climate

Future Sea Levels Workshop 13 / 17
Ice sheet–ocean feedback loops

Hattermann and Levermann (2010), *Climate Dynamics*
Ice sheet–ocean coupling: freshwater fluxes into the ocean

Phipps et al. (2016), *The Cryosphere*
DeConto and Pollard (2016), *Nature*
Future research priorities

- Undertake large-scale observational programs to study the stability of the Antarctic margin.

- Use palaeoclimate data to identify missing processes and incorporate them into ice sheet models.

- Develop coupled climate–ice sheet models to be used for future climate projections.