Processes missing from models

Antarctic ice sheet uncertainty
- interaction with ocean
- response to atmos. forcing
Centennial-scale Holocene climate variations amplified by Antarctic Ice Sheet discharge

Pelletier et al., 2022.

Global environmental consequences of twenty-first-century ice-sheet melt

Golledge et al., 2019.
Summer air temperatures in the RCM ... remain below freezing ... with little to no surface melt. As a result, substantial oceanic warming ... is required to initiate WAIS retreat.

Antarctic contributions to ... LIG sea level are in much better agreement with geological estimates than previous versions of our model, which lacked these new treatments of meltwater-enhanced calving and ice-margin dynamics, suggesting that the new model is better suited to simulations of future ice response.
Ice shelf hydrofracture & cliff collapse

Larsen B, 2002

Bassis et al., 2021

Clerc et al., 2019

Golledge & Lowry, 2021
Model coupling, physics & resolution:

UKESM

CAESAR
Unified Model atmosphere

JULES
land physics biogeochemistry

TRIPPID
dynamic vegetation

UniCLES
Greenland & Antarctica

CICE
sea-ice

NEMO
ocean physics

MEDUSA
marine biogeochemistry

OASIS-MCT
cooler

Atmos. forcing / MICI:

ICE SHEETS
Transition to marine ice cliff instability controlled by ice thickness gradients and velocity
J. N. Bassi1, B. Berg2, A. J. Crawford1, D. I. Benn1

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Future outlook

Change in future climate due to Antarctic meltwater

Rotational / gravitational feedback:

Revisiting Antarctic ice loss due to marine ice-cliff instability

Sea-level feedback lowers projections of future Antarctic Ice-Sheet mass loss

Smith et al., 2021
Muntjewerf et al., 2021

Muntjewerf et al., 2021