ANTARCTIC GATEWAY PARTNERSHIP

Refining estimates of the commitment to global sea level rise over the next 500 years

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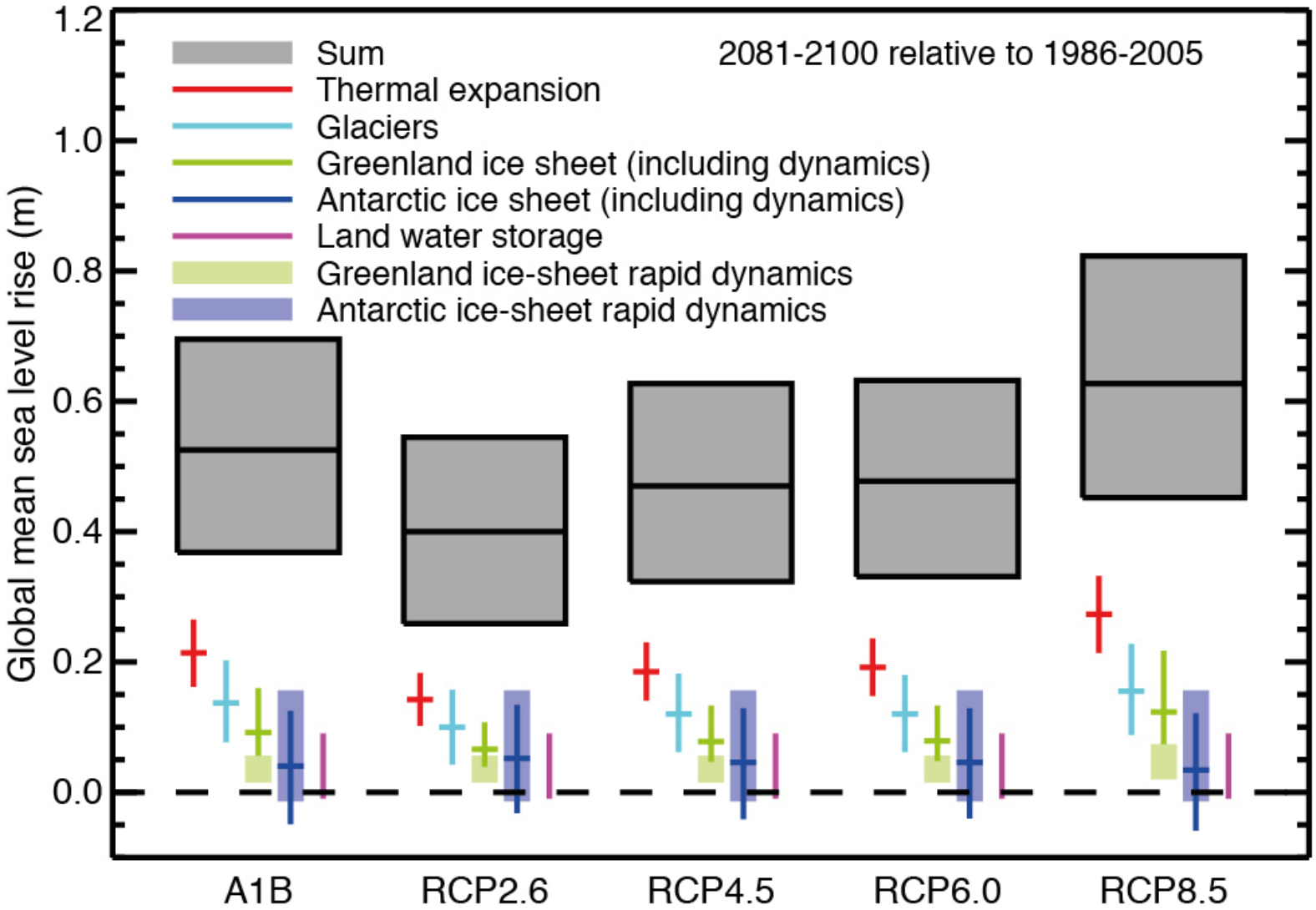
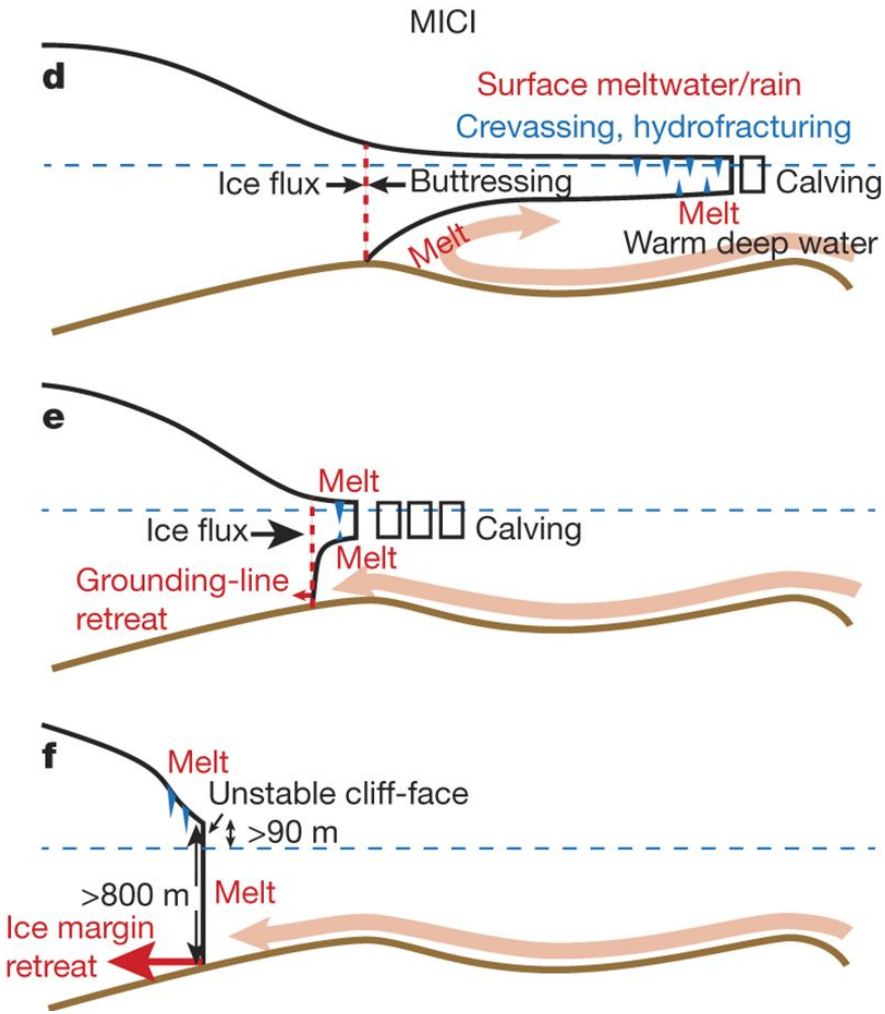
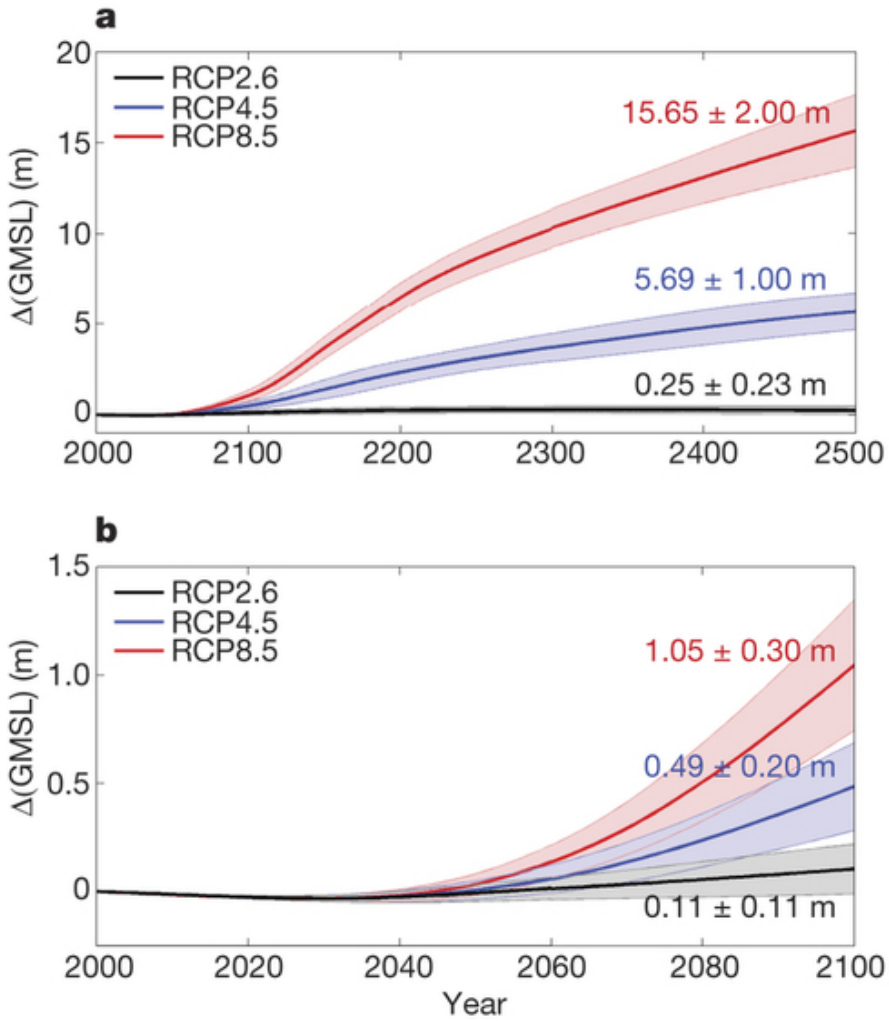
Likely changes in global sea level by 2081–2100?



IPCC AR5 WG1 report (2013)

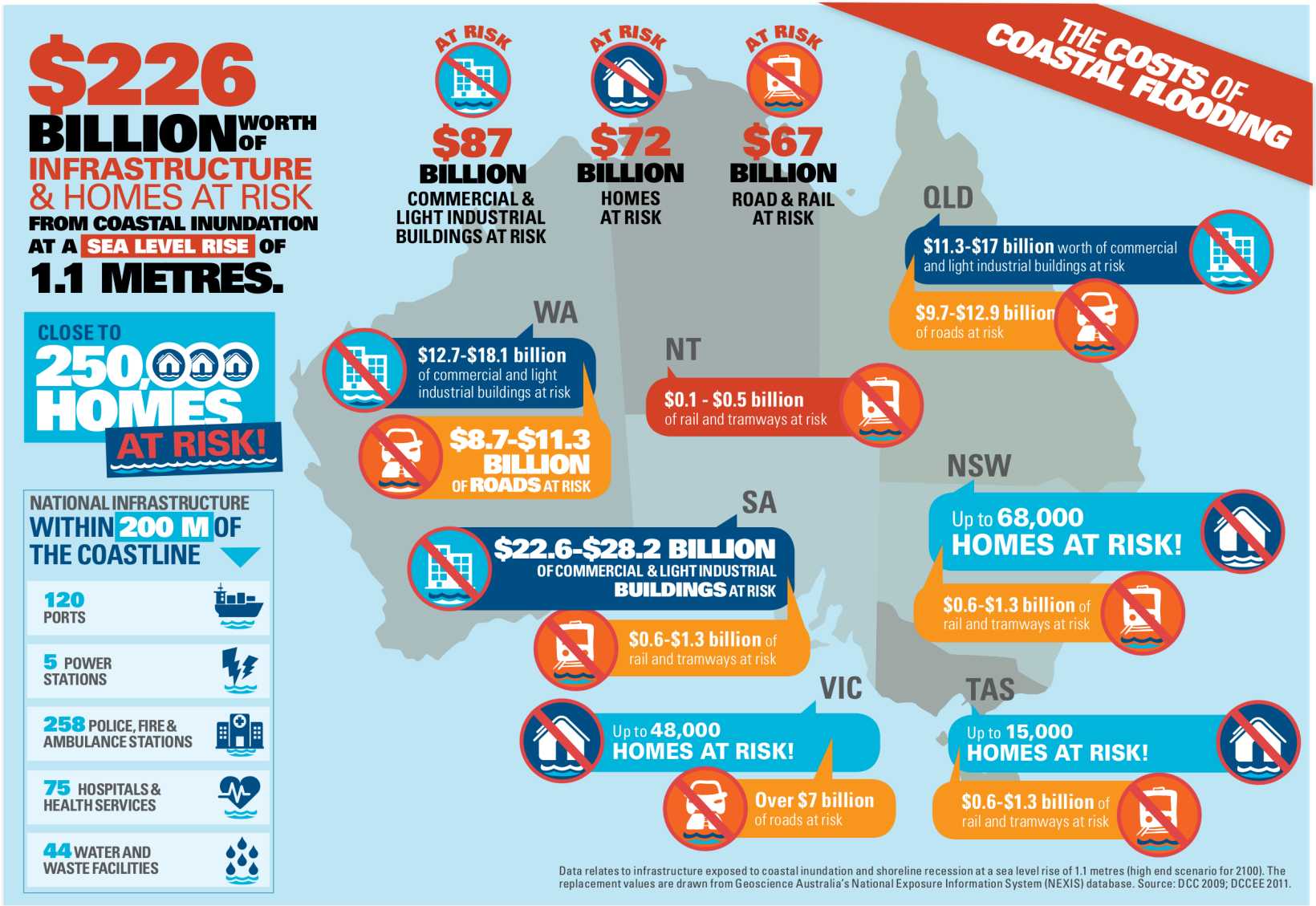
Antarctic contribution to global sea level (2000–2500)





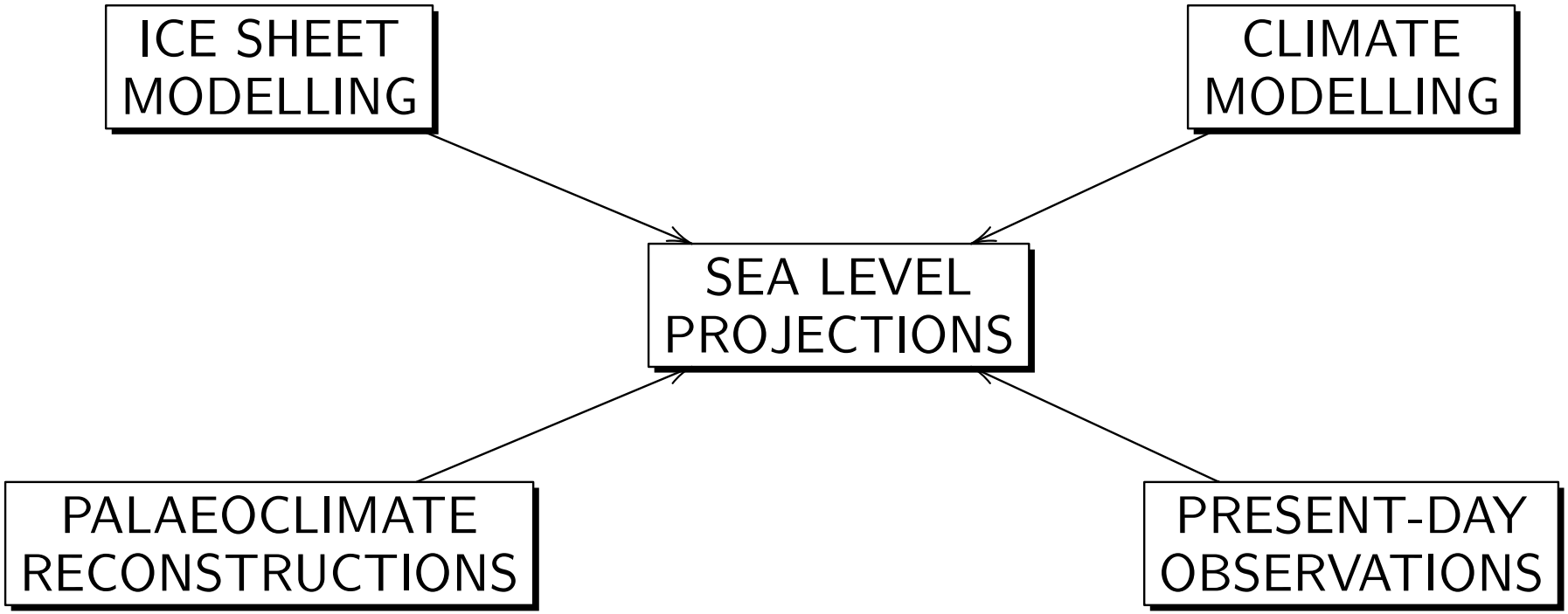
DeConto and Pollard (2016), *Nature*

What are the potential economic impacts?



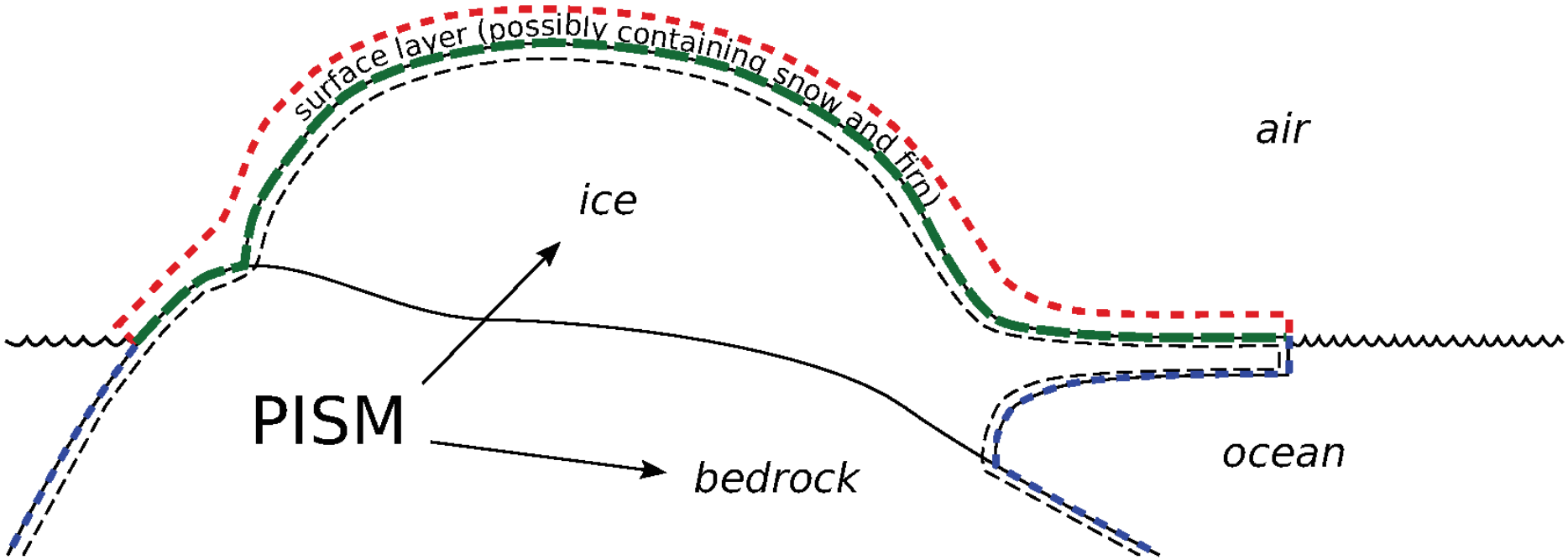
Climate Council of Australia (2014)

Generating robust projections of sea level rise



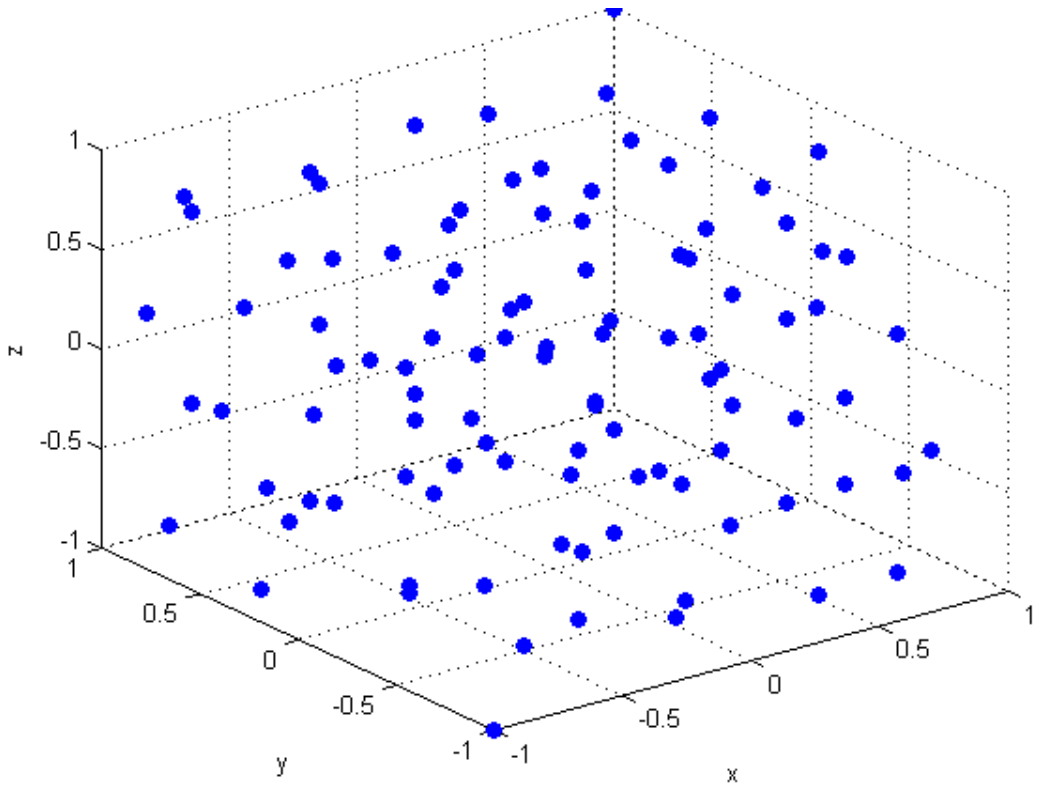
How do we project changes in global sea level?

PISM
Parallel Ice Sheet Model



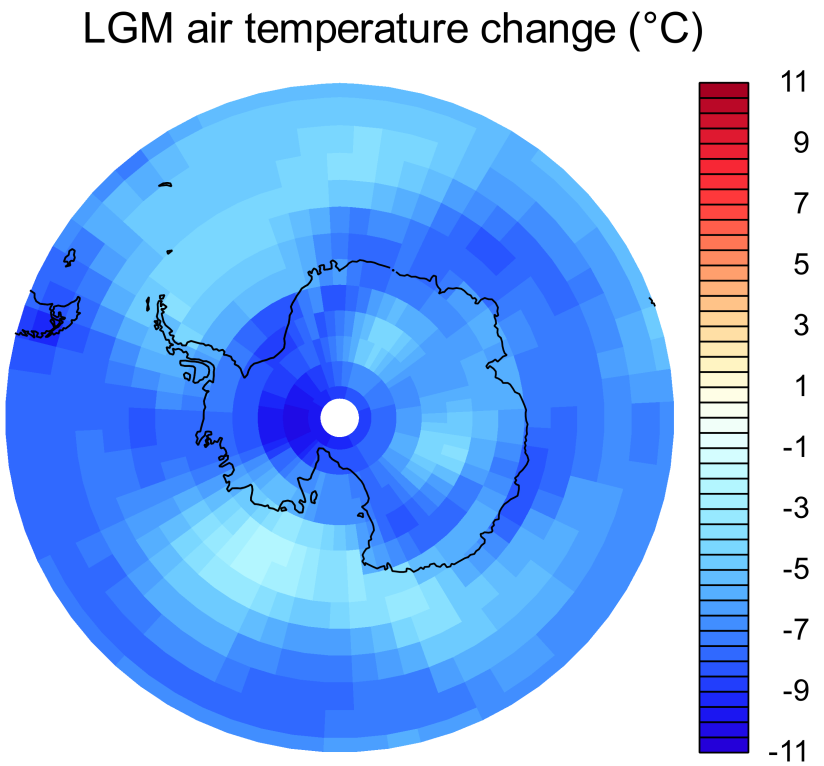
Exploring uncertainty in ice sheet dynamics

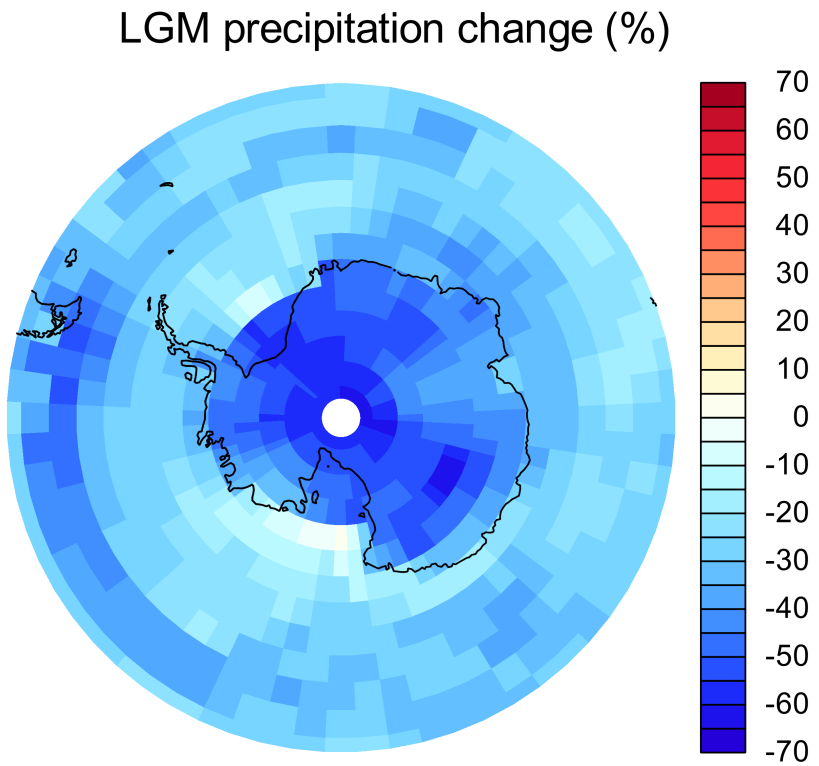
- Problem:
  - There are gaps in our understanding of ice sheet dynamics.
- Solution:
  - Run the model many times, changing the model physics each time to sample as many different physical combinations as possible.



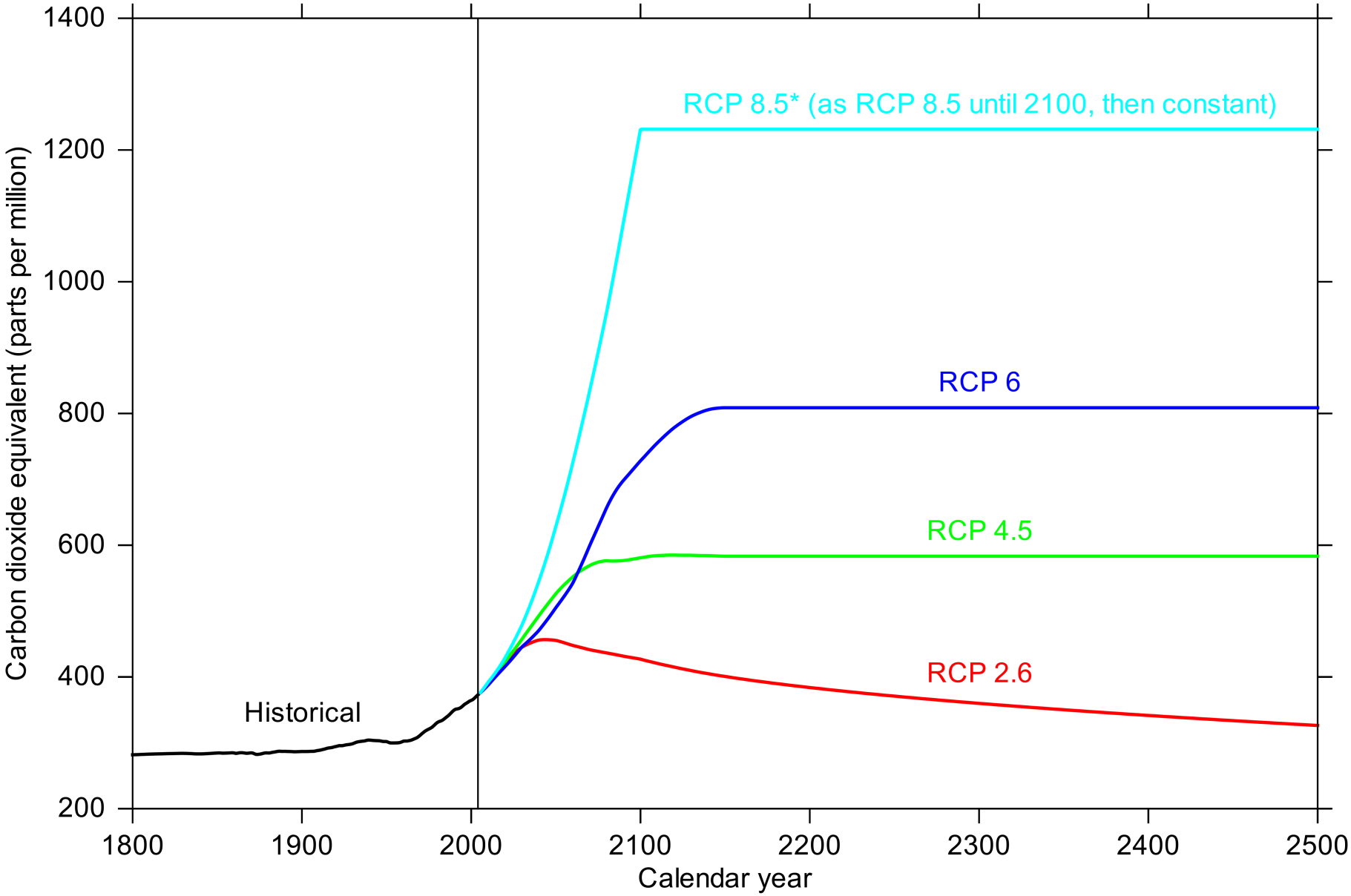
Climate modelling: Simulating the past

- Use the CSIRO Mk3L climate system model to simulate the last glacial cycle, from 130,000 years ago to present.
- During the Last Glacial Maximum (LGM; ∼21,000 years ago), global sea level was around 120 m lower than today.

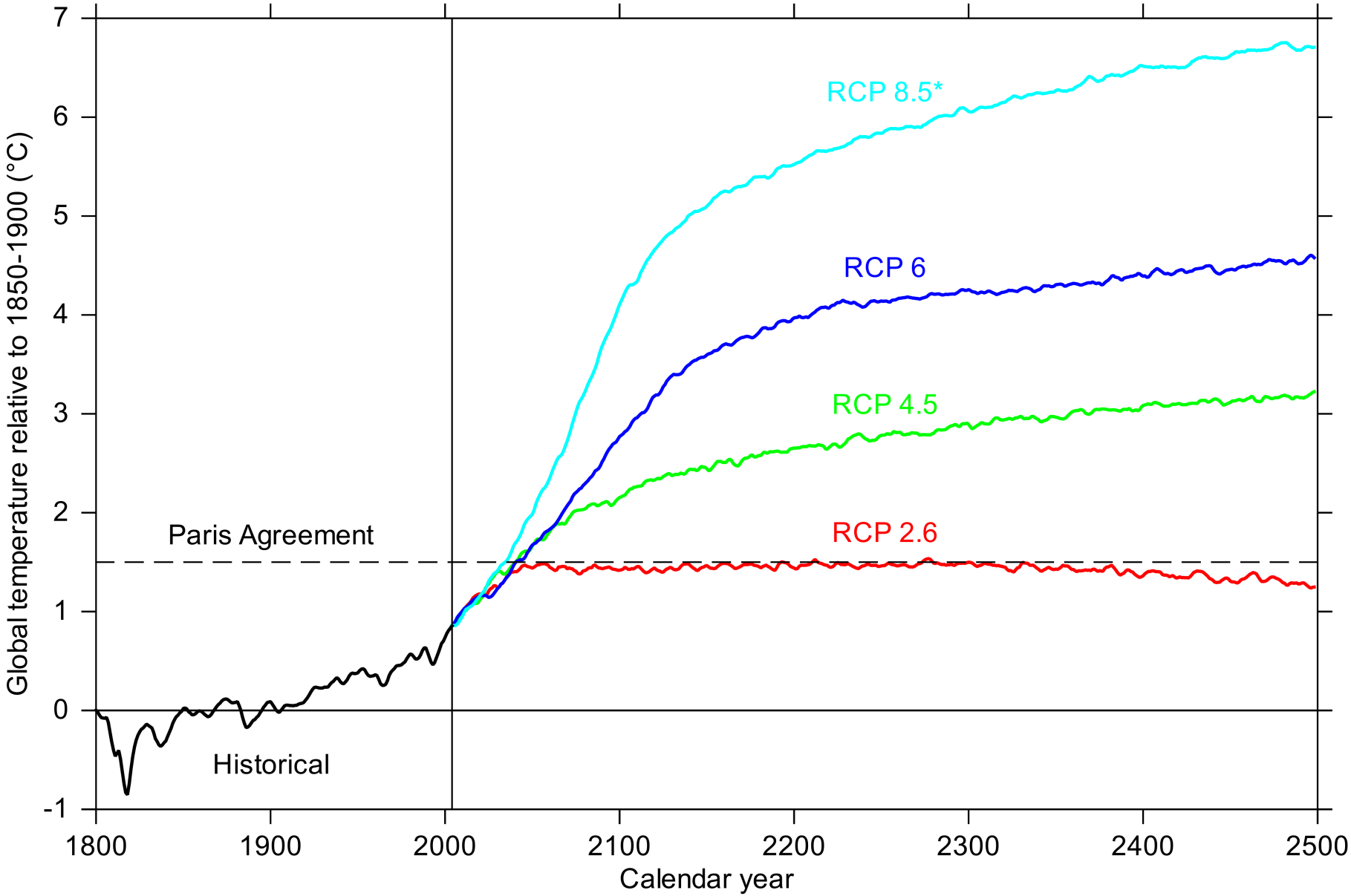




Climate modelling: Simulating the future

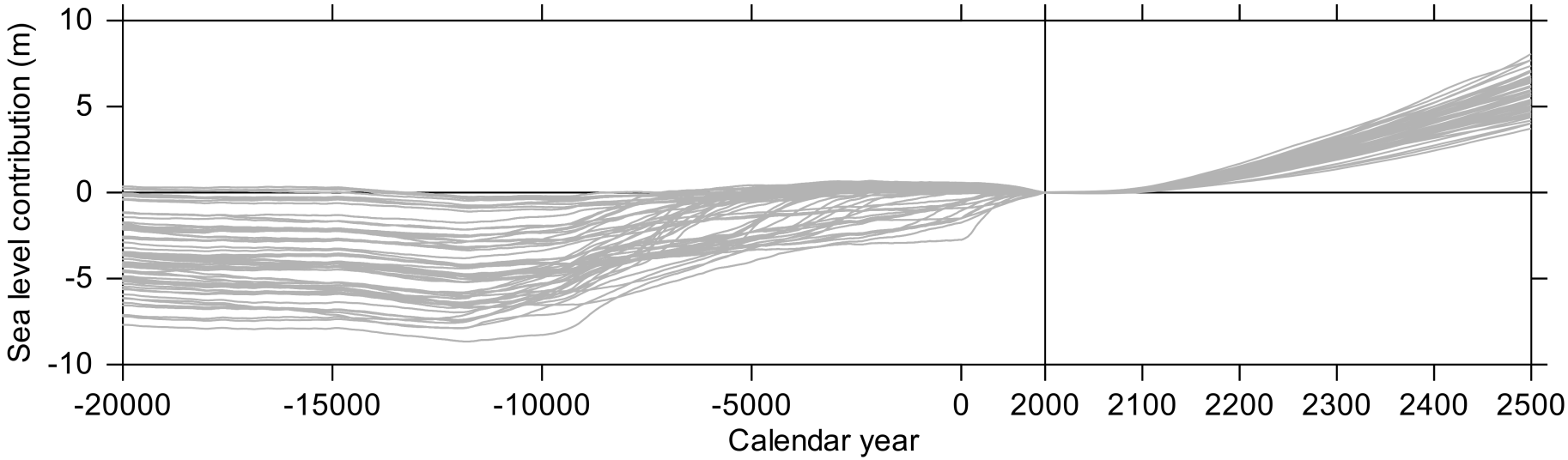


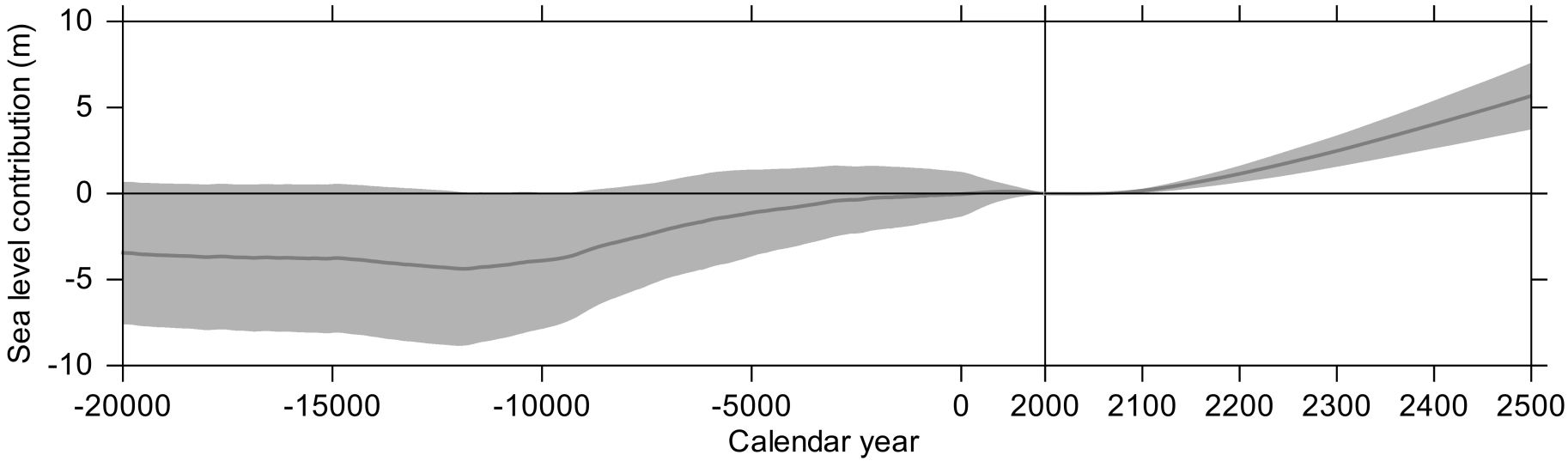
Climate modelling: Simulating the future



Simulated Antarctic contribution to global sea level

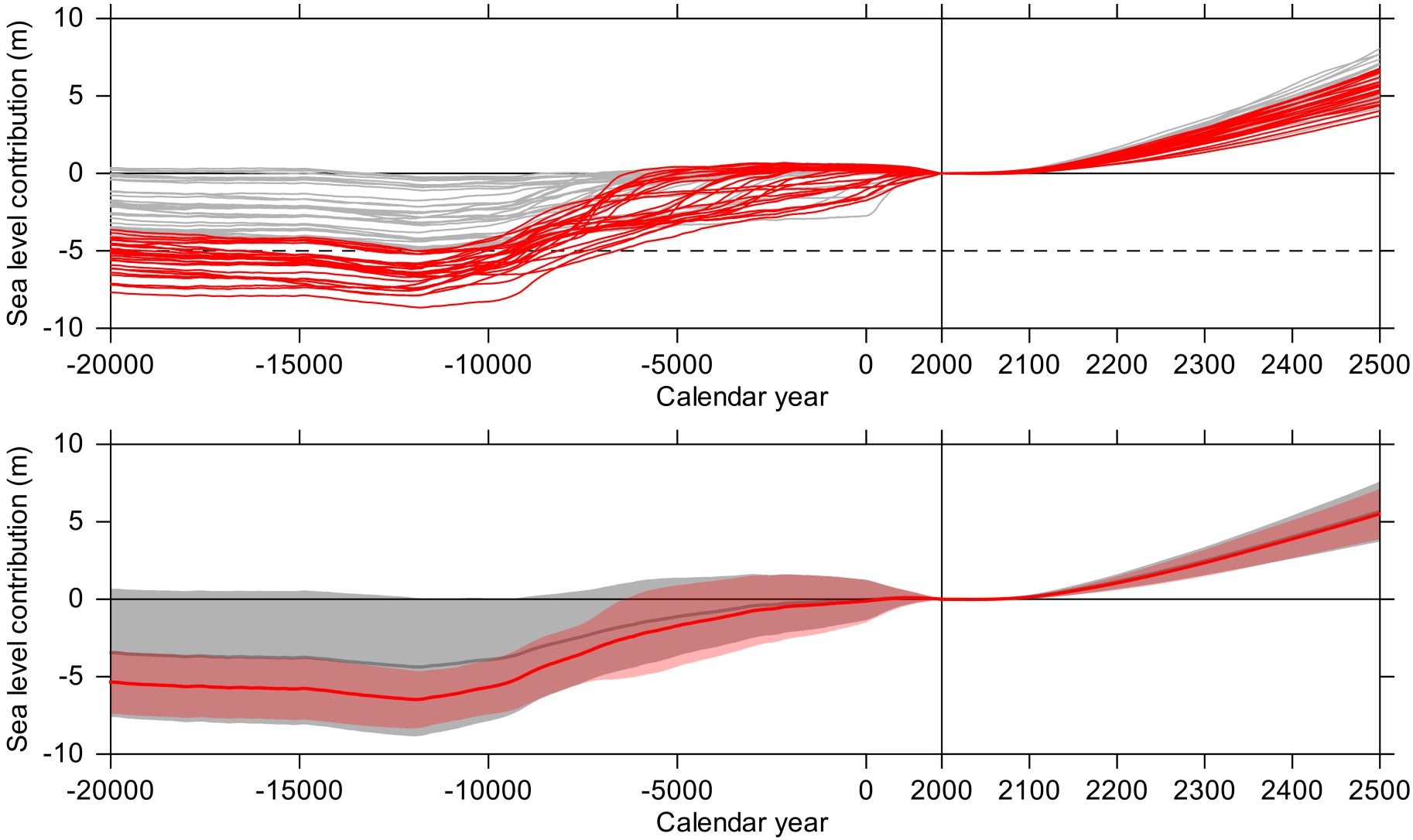
- Use the climate model output to drive 100 simulations using PISM.





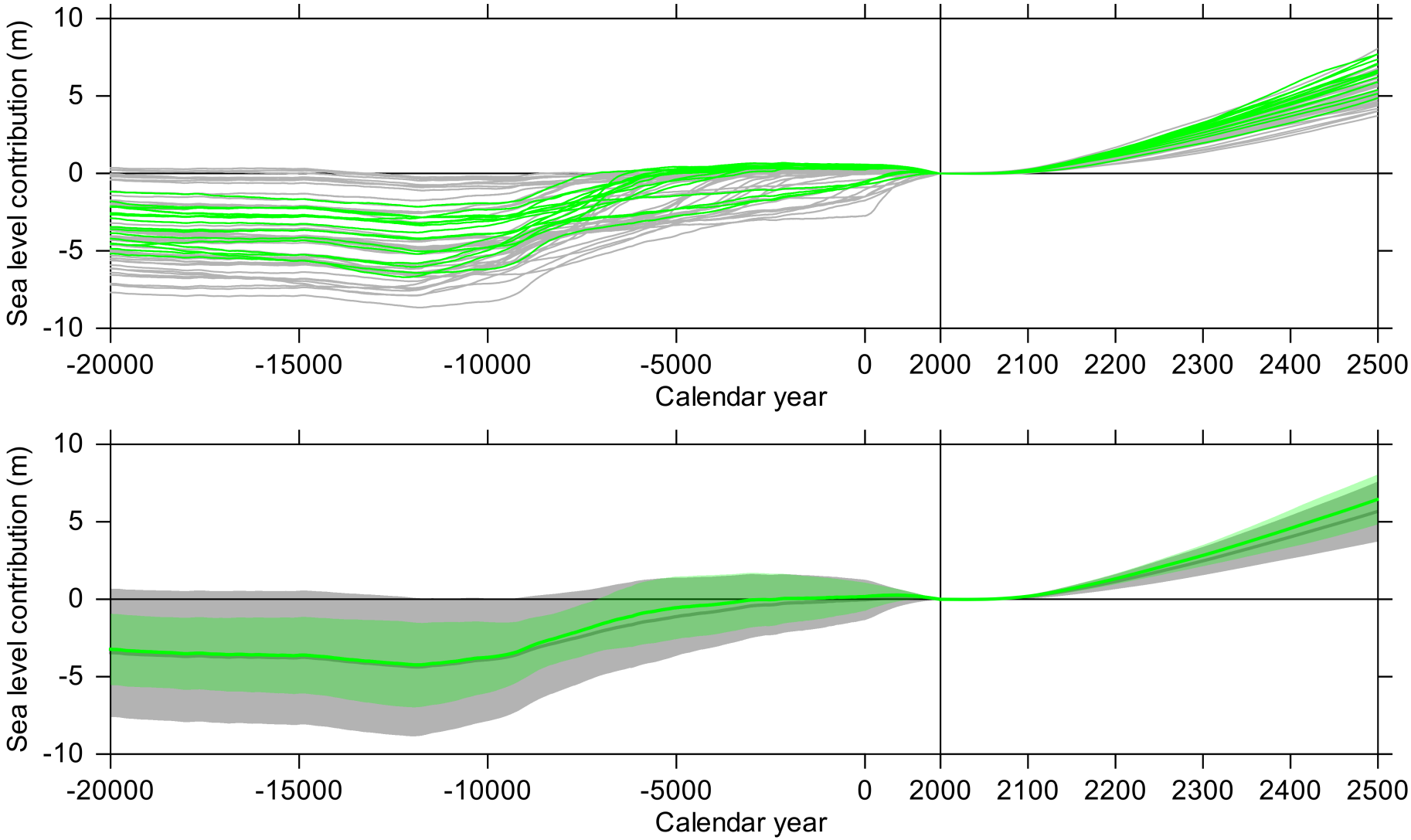
Using information from the past

- The Last Glacial Maximum sea level contribution was at least 5 m.



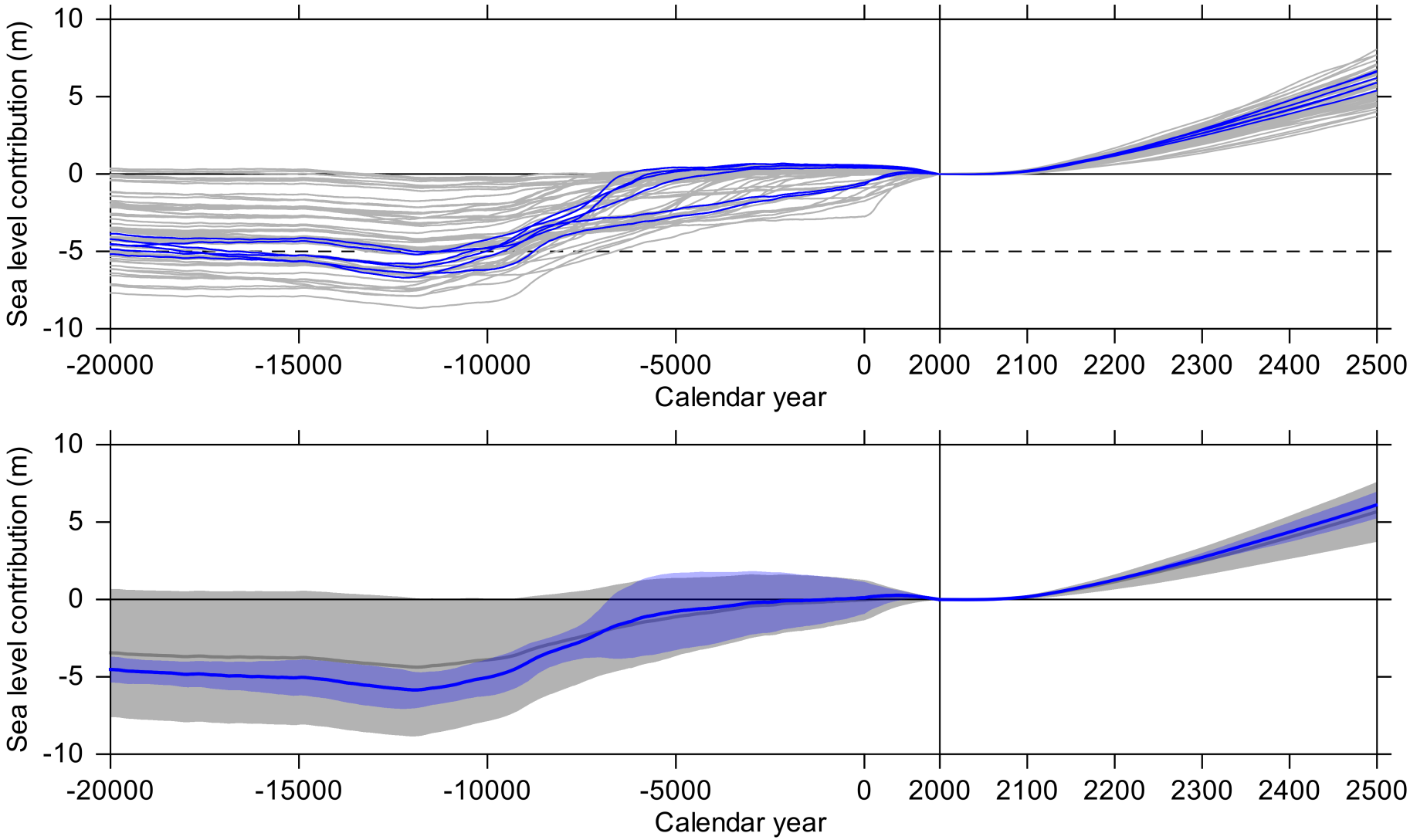
Using information from the present

- The present-day ice sheet should be consistent with observations.



Combining information from the past and present

- Now we apply the LGM and present-day criteria simultaneously.



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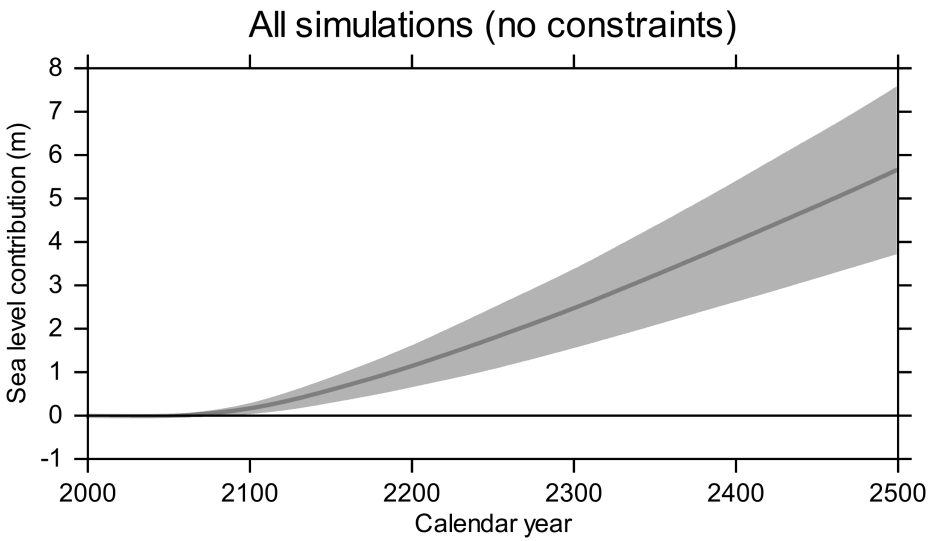

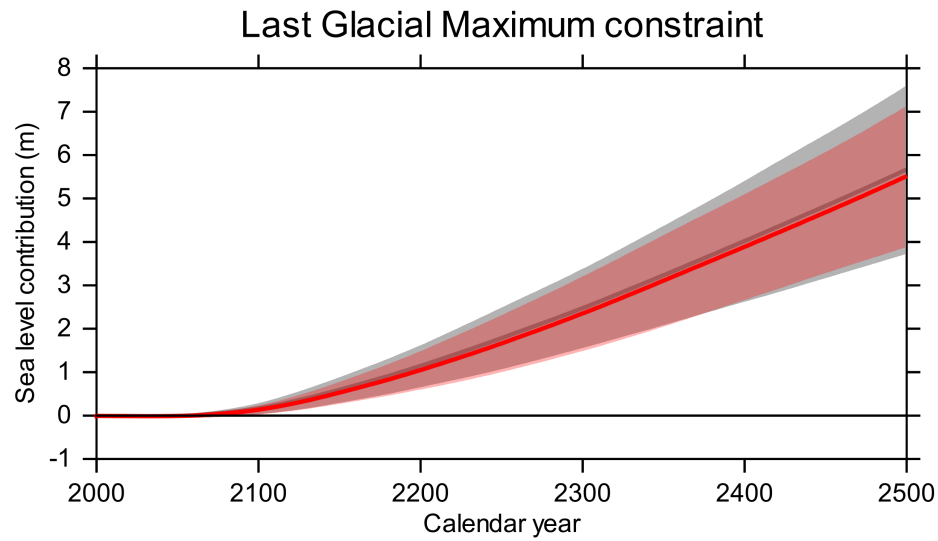

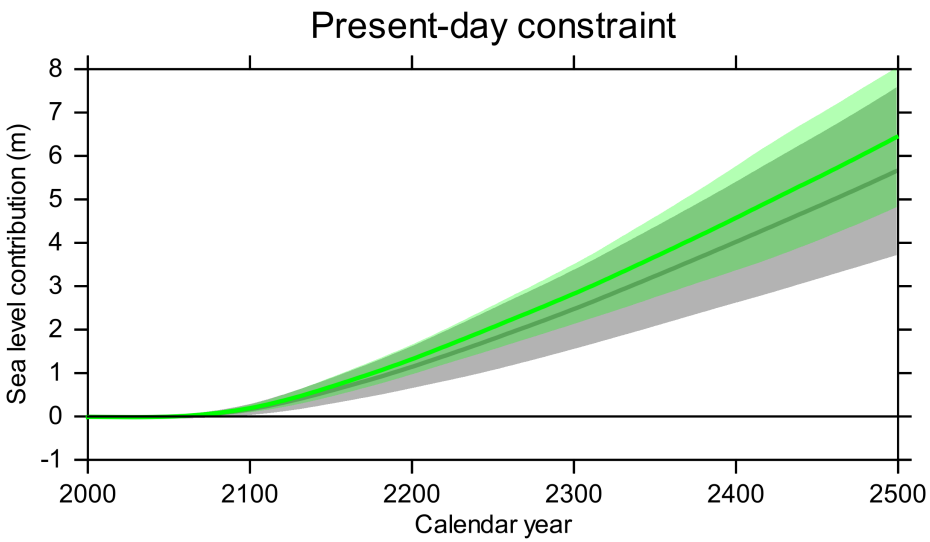

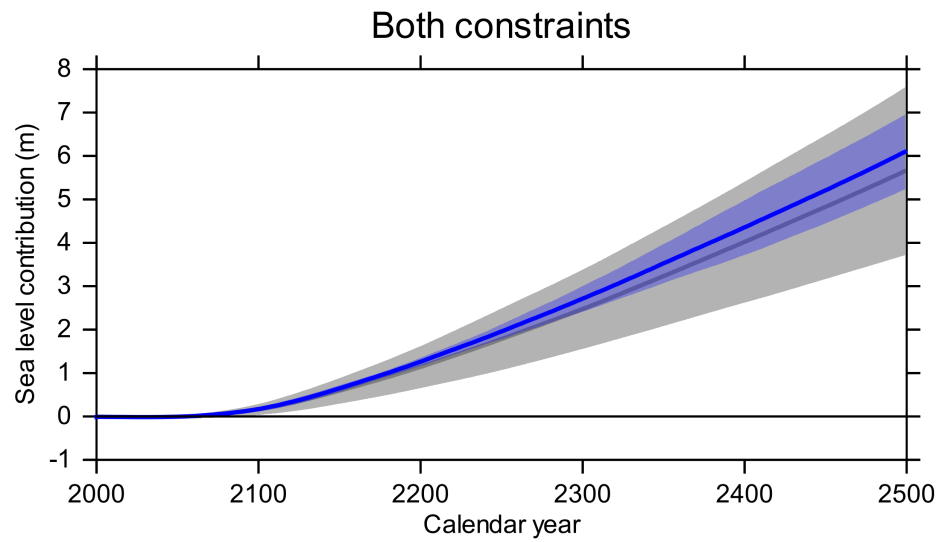

Simulated Antarctic contribution to global sea level