

ice2sea — estimating the future contribution of continental ice to sea-level rise

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FP7 Cooperation Work Programme 2008

Area 6.1.1.1. The Earth System and Climate

Functioning and abrupt changes

ENV.2008.1.1.1.1. Sea-Level Rise

Trends in contributions from continental ice, processes and links to climate change

Summary of the call

Recent studies have stressed the **importance of continental ice melting in the sea-level rise** observed in the past decades and the **need to have better predictions** of its contribution for the future. Observations indicate that the **melting of the ice is accelerating for glaciers worldwide** and for Arctic ice sheets. Under this topic research should include field studies of key processes (e.g. ice flow dynamics), observations, data gathering and analysis, and modelling to **refine predictions** of the behaviour of glaciers (globally), ice caps, and ice sheets, links to climate change and associated changes of sea level over the next decades and centuries.



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IPCC (2007) on Sea Level Rise

Models used [...] do not include the full effects of changes in ice sheet flow, because a basis in published literature is lacking. The projections include a contribution due to increased ice flow from Greenland and Antarctica at the rates observed for 1993-2003, **but these flow rates could increase or decrease in the future**. For example, if this contribution were to grow linearly with global average temperature change, the upper ranges of sea level rise for SRES scenarios [...] would increase by 0.1 m to 0.2 m. **Larger values cannot be excluded**, but understanding of these effects is too limited to assess their likelihood or provide a best estimate or an upper bound for sea level rise.



ice2sea Consortium

24 financed participants

NERC-BAS, AWI, CSC, DMI, DTU, GEUS, HI, UU, CNRS, MOHC, UIO, ULB, UNIURB, UoB, UoE, VUB, UCPH, ULG, UZH, USP, CECS, ENEA, NPI, IGF-PAS

13 countries

Belgium, Chile, Denmark, Finland, France, Germany, Iceland, Italy, Netherlands, Norway, Poland, Switzerland, UK

Budget

- Overall Budget \approx 13.6 M€ (10 M€ EU contribution)
- EU contribution = 83% for research, 7% for programme management



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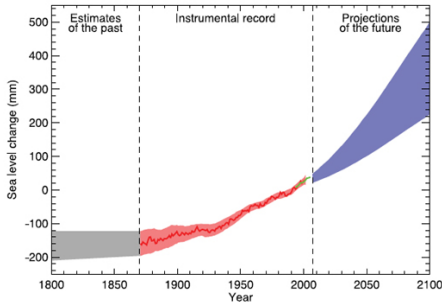
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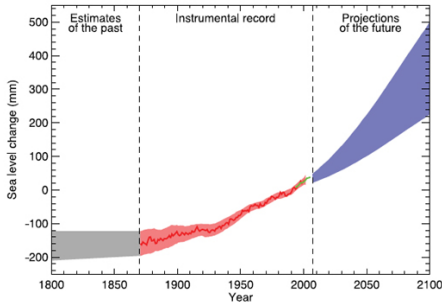
Recent sea-level rise



GLOBAL MEAN SEA LEVEL - IPCC 4TH REPORT

- $\approx 3 \text{ mm / year}$ for the last two decades
- IPCC: large uncertainties concerning future sea level rise

Recent sea-level rise



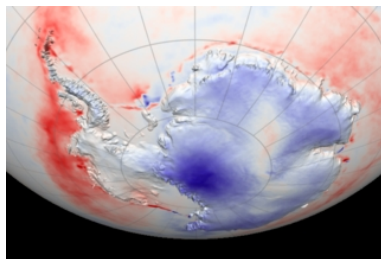
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The Response

Projections and new science

- New projections
- New models / tools
- New experts



The response: time scales

- IPCC 4AR = 100 years
- Inadequate for Delta Committee (Netherlands), Environment Agency (UK)
- Inadequate to inform mitigation debate

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- timescale = 200 years



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Critical Path

Input

- GHG emission scenarios
- Climate projections
- Regionalisation of ocean and atmosphere changes

Output

- Ensemble / intercomparison of glacier/ice-sheet models
- Prognostic coupled model runs
- Uncertainty pathways analysis



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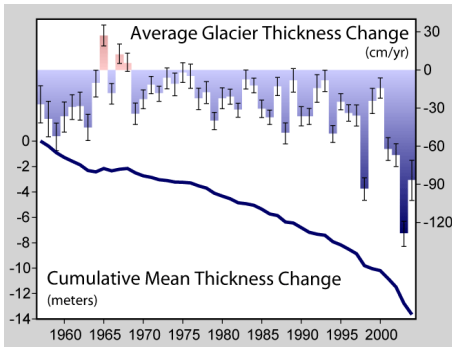
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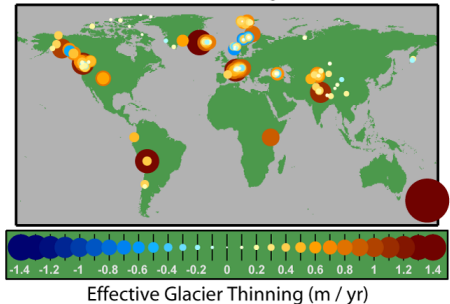


Scope: glaciers and ice sheets

Glaciers

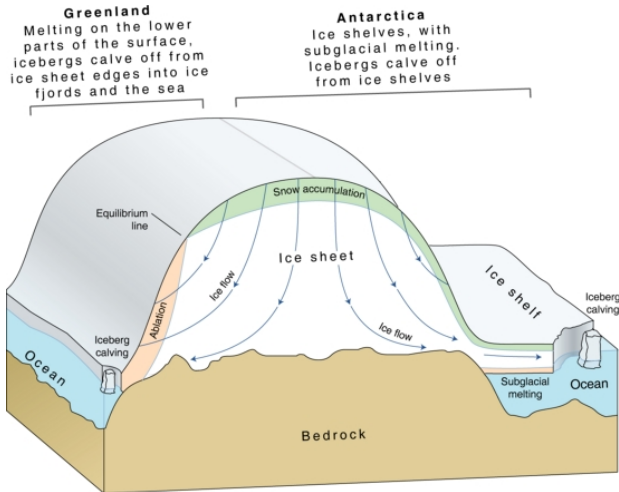


Mountain Glacier Changes Since 1970

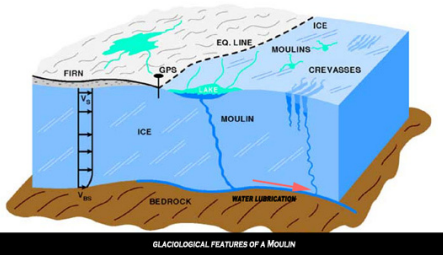


Scope: glaciers and ice sheets

Antarctica – Greenland



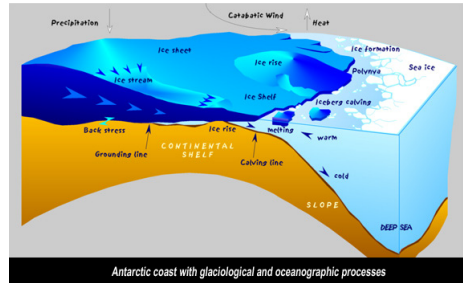
Process Understanding



- Basal lubrication via surface meltwater

Tools for model improvement

Field work – ensembles / intercomparisons

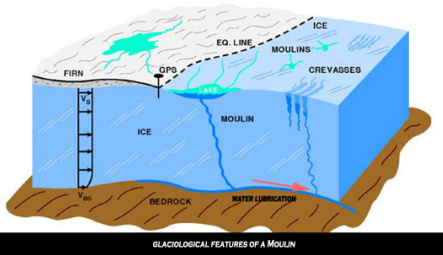


- Grounding lines and WAIS^a instability
- Calving processes

^aWest Antarctic Ice Sheet



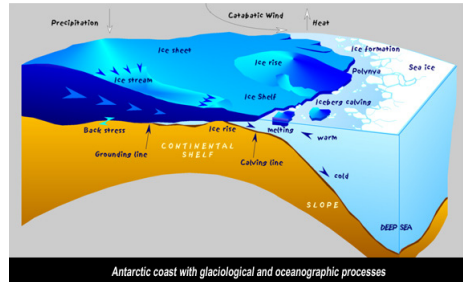
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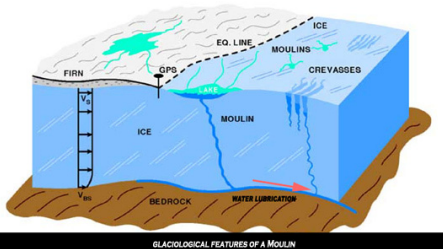


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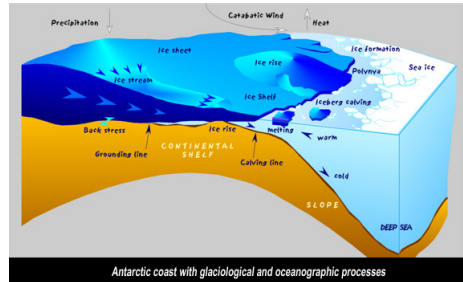
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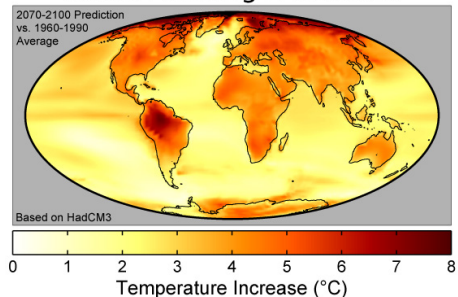


Scope: atmosphere/ocean-modelling

Projections

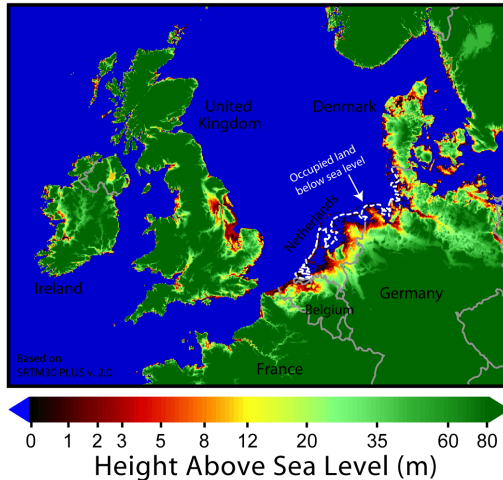
- Regionalisation of Global Circulation Model output
- Delivery of heat to ice sheets and glaciers
- Temperature change and circulation change
- Determining drivers of ice-loss

Global Warming Predictions



Scope: regionalisation

Sea Level Risks - North Sea



Deliverables – Outreach

- Stakeholder review
- Student/early-career scientist development
- Delivery to policymakers and advisors



www.ice2sea.eu

