Land Ice Working Group session

12 minutes talk + 3 minutes for

Time	Title	Speakers
1:30	LIWG history and highlights	Gunter Leguy
1:48	Using the CESM test framework for CISM development	Kate Thayer-Calder
2:00	Coupled ESM-ISM simulations for ISMIP7	Robin Smith [**Virtual**]
2:15	The Effect of Lateral Viscosity Variations on Local Sea Level and Bedrock Deformation in Antarctica	Kaixuan Kang
2:30	Antarctic meltwater alters future projections of climate and sea level	Shaina Sadai [**Virtual**]
2:45	Taking Science to Action Seriously: An Actionable Science Perspective on Land Ice and Sea Level Rise Projections	David Behar [**Virtual**]
3:00	**Break**	
3:30	Land ice component in the Norwegian Earth System Model: towards CMIP7 and beyond	Michele Petrini
3:45	Using the Community Ice Sheet Model to Inform Ice Core Drilling Efforts in Antarctic Interior and Blue Ice Areas	Fairuz Ishraque
4:00	Impact of elevation feedbacks and climate mitigation on future Greenland ice sheet mass loss	Miren Vizcaino
4:15	Emulating Greenland Ice Sheet Surface Melt Using Graph Neural Networks	Ziqi Yin [**Virtual**]
4:30	Supraglacial Water Signatures Reflect Changes in Ice Dynamics	Rachel Middleton
4:45	Mountain Glaciers in CISM: Current Capabilities and Future Directions	Samar Minallah
5:00	**Adjourn**	

Please, take out your cell phone or computer and make sure you have wi-fi or data access!!!

(for the first talk only ☺)

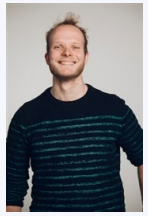
LIWG brief historical facts and highlights

Gunter Leguy , Bill Lipscomb, Kate Thayer -Calder, Samar Minallah, and LIWG collaborators

LIWG
CESM Workshop 2025, June 9th

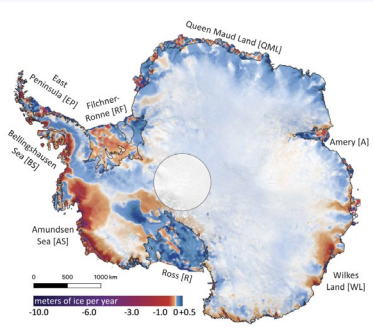
This material is based upon work supported by the National Center for Atmospheric Research, which is a major facility sponsor ed by the National Science Foundation under Cooperative Agreement No. 1852977.

QUIZZ TIME!!



Assessing the influence of the current Antarctic Ice Sheet mass change rate on future forced simulations

Tim van den Akker



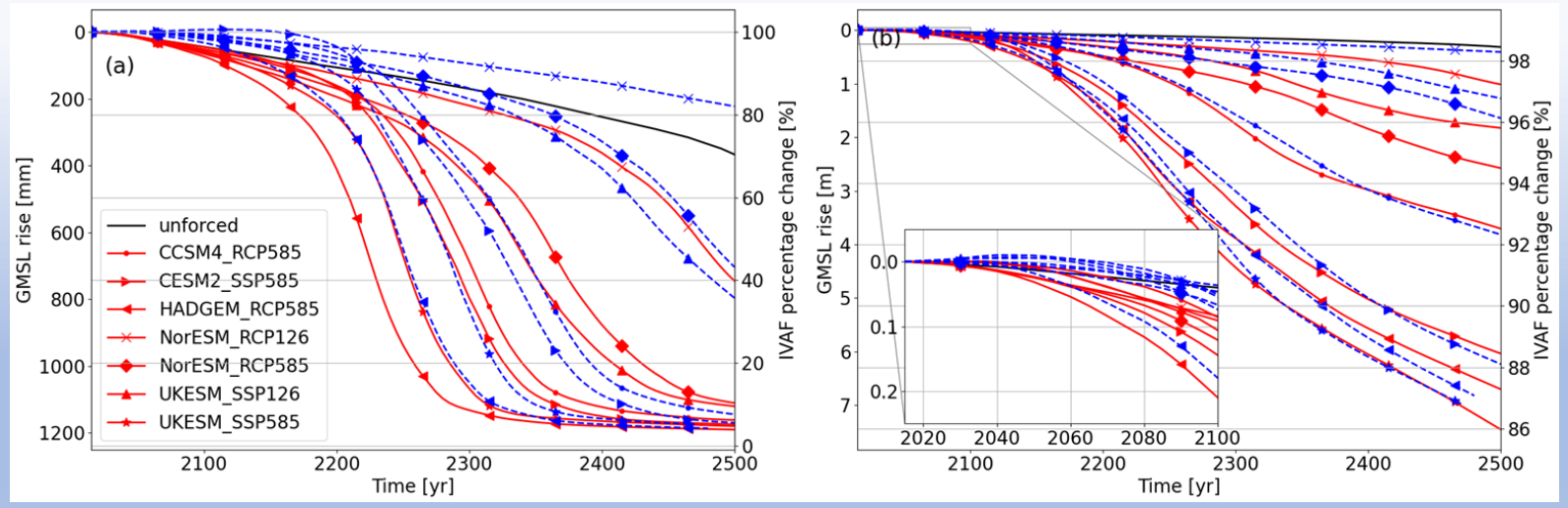
Mass change rates from Smith et al. (2020)

By Including the mass change rate

- WAIS collapses ~50 - 100 years earlier
- AIS sea level contribution ~doubles before 2100

Runs including mass change rate in initialization

Runs not including mass change rate in initialization

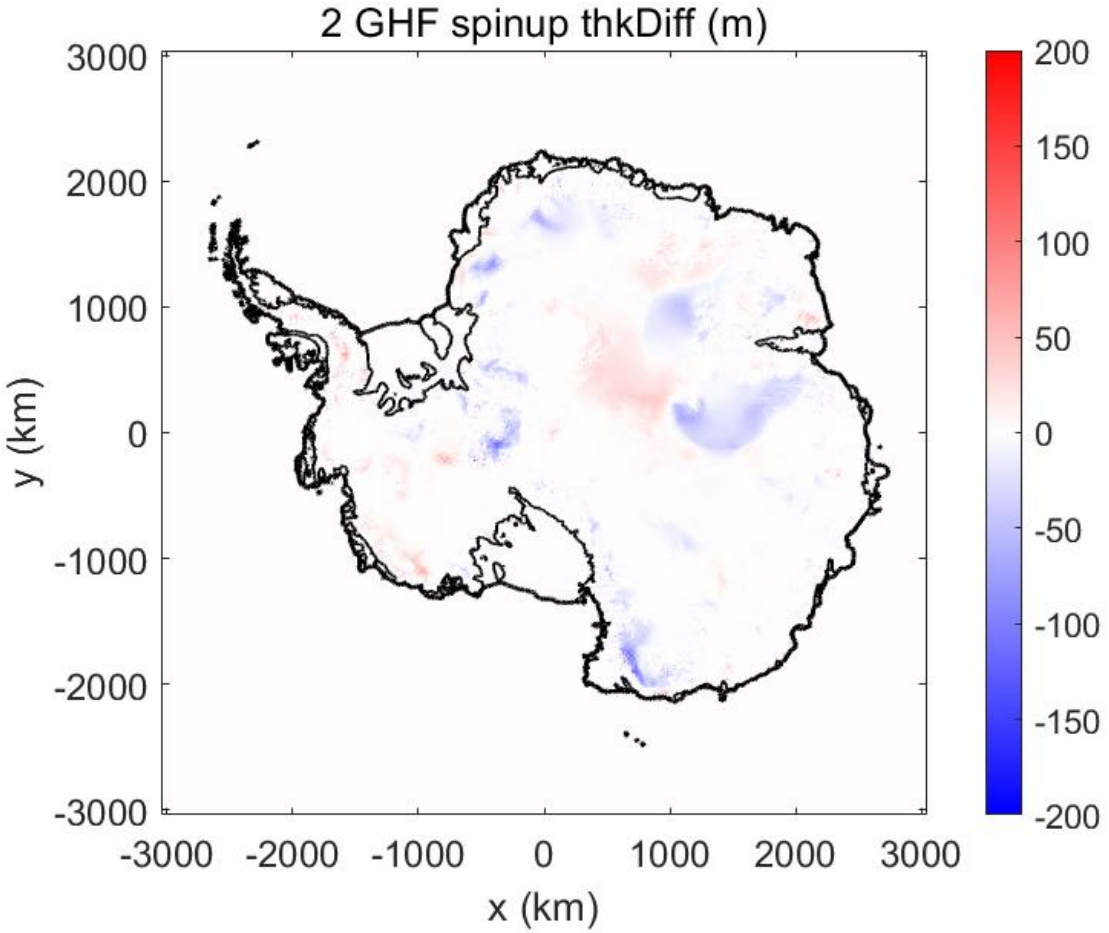


West Antarctic Ice Sheet (WAIS)

Antarctic Ice Sheet (AIS)

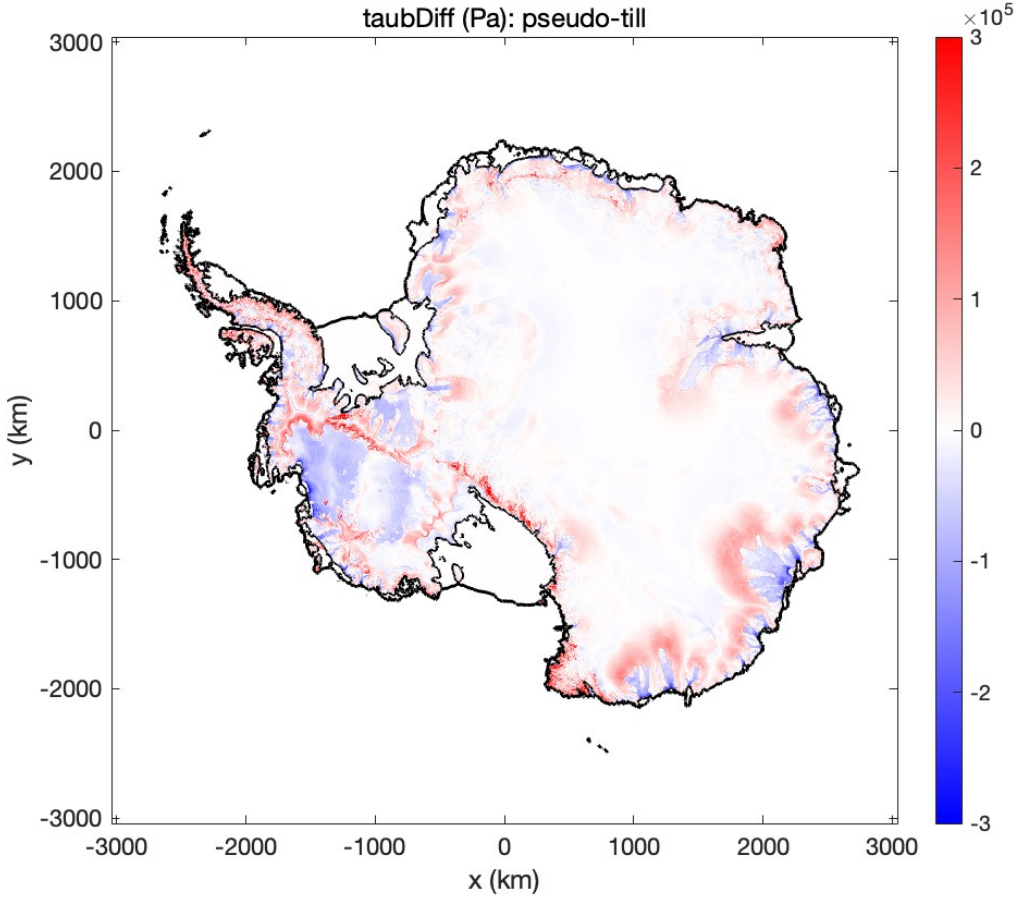
The impacts of Geothermal Heat Flux and basal water pressure

Initialization



Different GHFs impact ice sheet initializations

Forward run

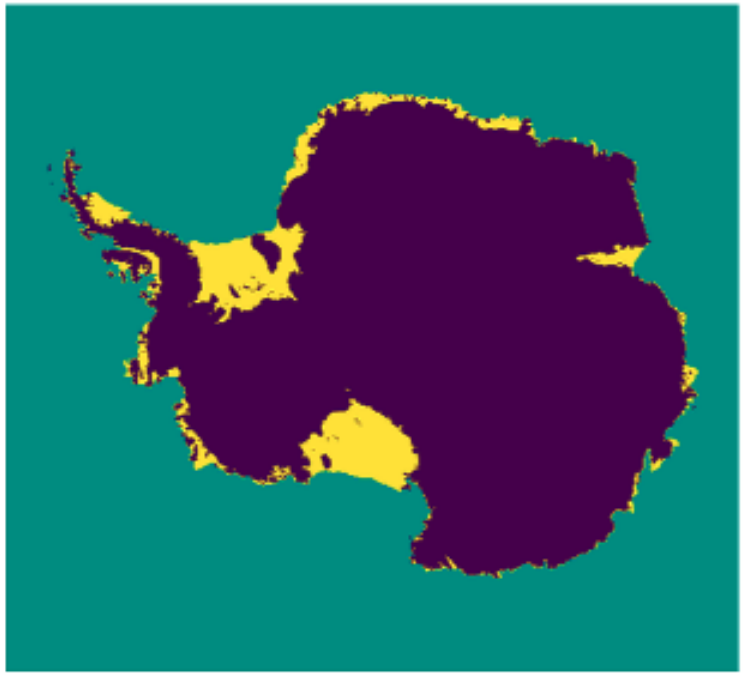


Including basal water in slip boundary condition changes the basal stress

zhang et al., in prep.

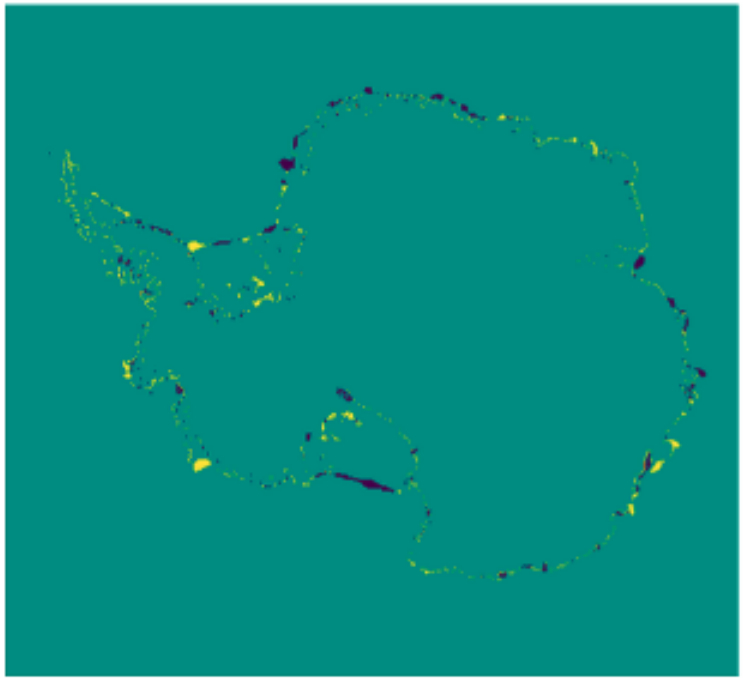
Comparison with observed calving fronts

Simulated grounded and floating ice for a 5000-year Antarctic spin-up



CISM

yellow = floating ice,
purple = grounded ice



CISM versus observations

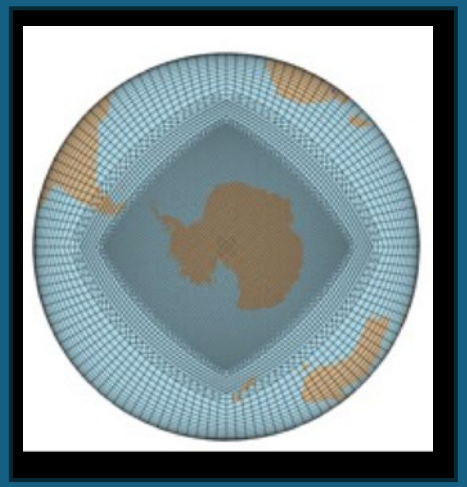
yellow = floating in CISM but not obs,
purple = floating in obs but not CISM

Lipscomb, W., and Millstein, J.

Sources of Extreme Precipitation over Antarctica

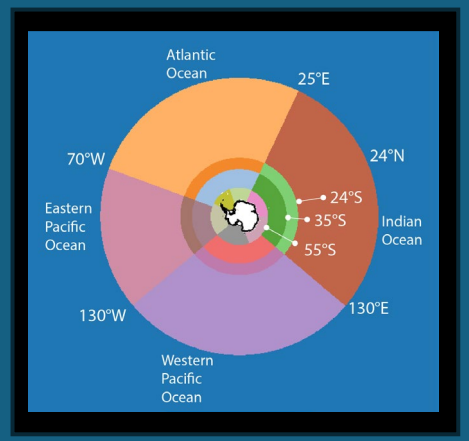
Tri Datta

Setup



Variable-resolution CESM2
with enhanced resolution over Antarctica and the Southern Ocean

Run at high spatial and temporal resolution

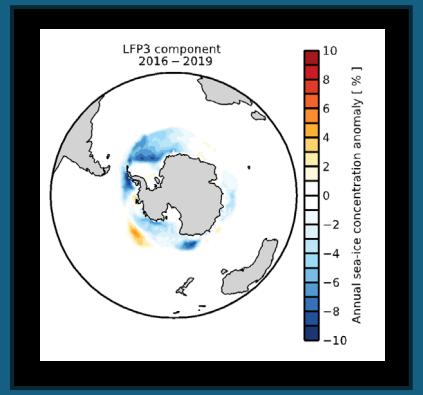


Moisture-tagging capabilities added for multiple regions

Runs

1. Historical Runs (1990-2020)

2. Testing the Impact of Reduced Sea Ice in an ensemble



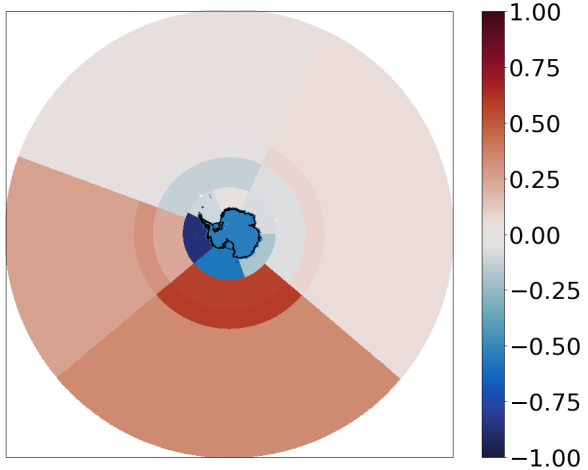
Science Questions

How are moisture sources for extreme events different from the mean?

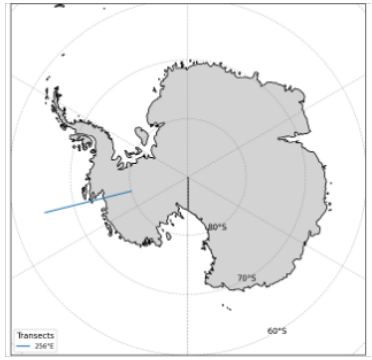
What is the impact of reduced sea ice on extremes events?

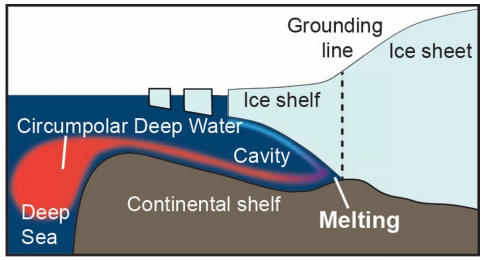
Example of Results for Basin 21 containing Thwaites Glacier

- A lot of moisture originates from the Western Pacific Ocean especially between 35°S and 55°S
- Very little (if any) originates from latitudes below 55°S



Global high resolution modeling
Progress and challenges in the Amundsen Sea Region

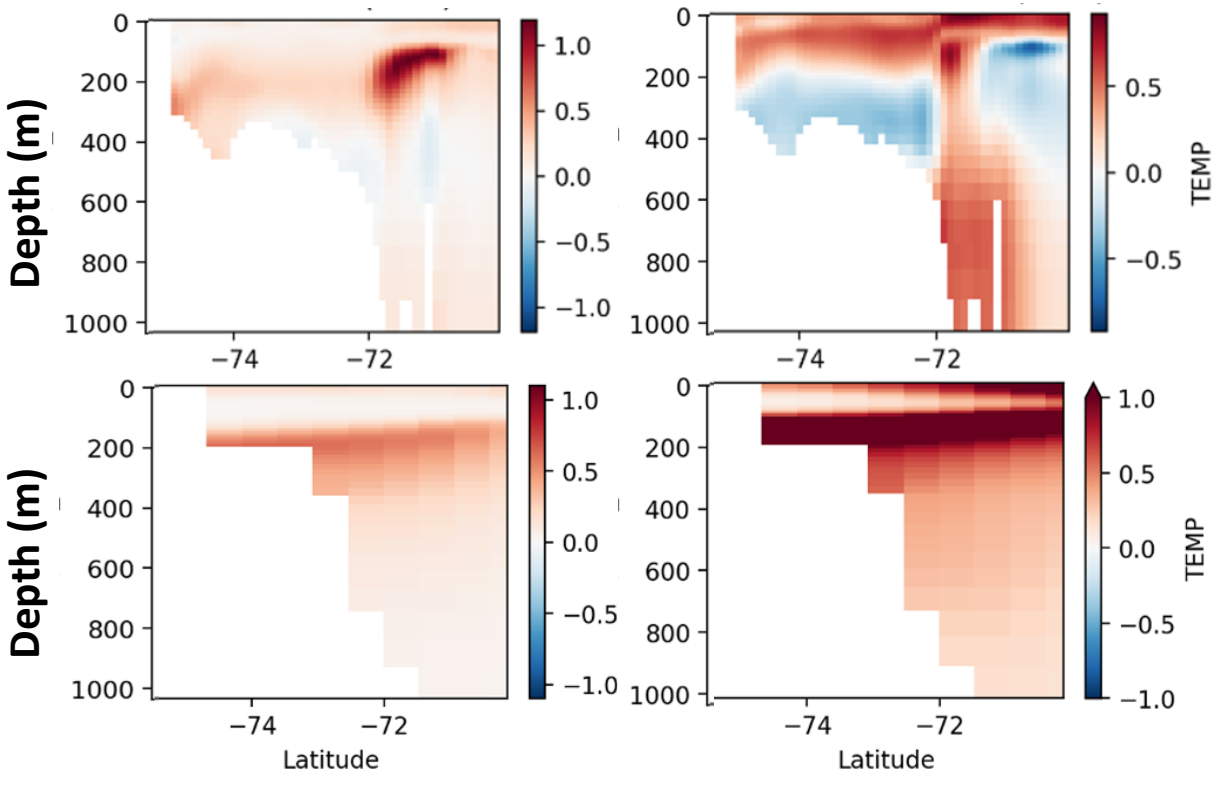




ΔT (Modern - PI) | **ΔT (Future - modern)**

High Resolution (HR)

Low Resolution (LR)



Amundsen Sea Region

- LR shows steady CDW uplift and stronger subsurface warming in future
- Similar magnitude of modern changes on average

Ice sheet impacts

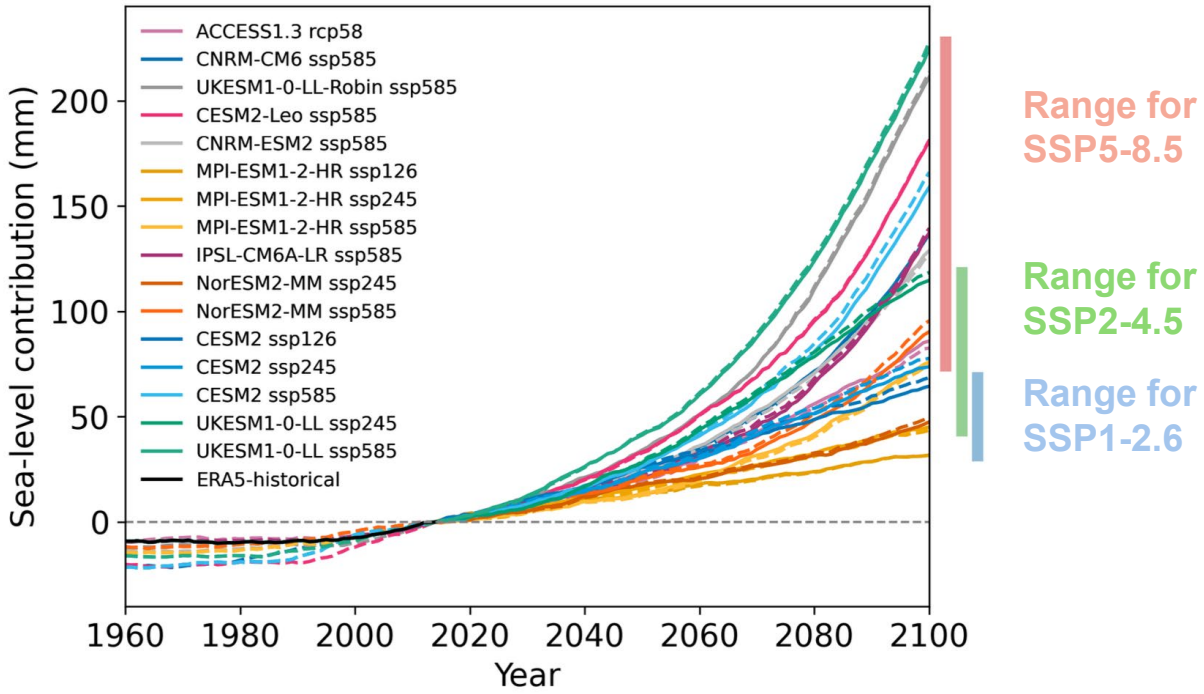
- HR and LR ocean forcing would drive significantly different mass balance outcomes

Berdahl et al. (in prep)

Historically consistent mass loss projections of the Greenland ice sheet

- Use a large range of CMIP6 forcing downscaled with regional climate model MAR.
- Running historical simulation with ESM forcings reasonably reproduce historical ice mass change.
- Sea level change rates until 2100:
  - Increases somewhat linearly when forced with SSP1-2.6 and SSP2-4.5 scenarios varying between 0.6 and 1.1 mm/yr
  - quadruples under SSP5-8.5 scenario to reach up to 3.7 mm/yr over the 2090-2100 period.

Greenland ice sheet sea-level projections



Charlotte Rahlves et al, The Cryosphere, 2025
https://doi.org/10.5194/tc-19-1205-2025.

CESM Impact and Use Survey

Advertised in Dave Lawrence's email sent on 06-06-25

Goal

- Characterize the value of the CESM activity including: model, data, support.
- How does the activities support a range of users and stakeholders and how it is delivering impact in both in terms of science and societally-beneficial applications nationally and internationally.

Link

https://forms.gle/U5LeUQF6V7X35Gib6

Time

10 minutes

Questions about the survey

Meg Fowler mdfowler@ucar.edu

Staying in touch with the LIWG

Website: https://www.cesm.ucar.edu/working-groups/land-ice

Co-chairs

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- Gunter Leguy, gunterl@ucar.edu

Liaisons

- Software: Kate Thayer-Calder, katec@ucar.edu
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Mailing list

https://groups.google.com/a/ucar.edu/g/cesm-liwg/about

CESM Forum

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