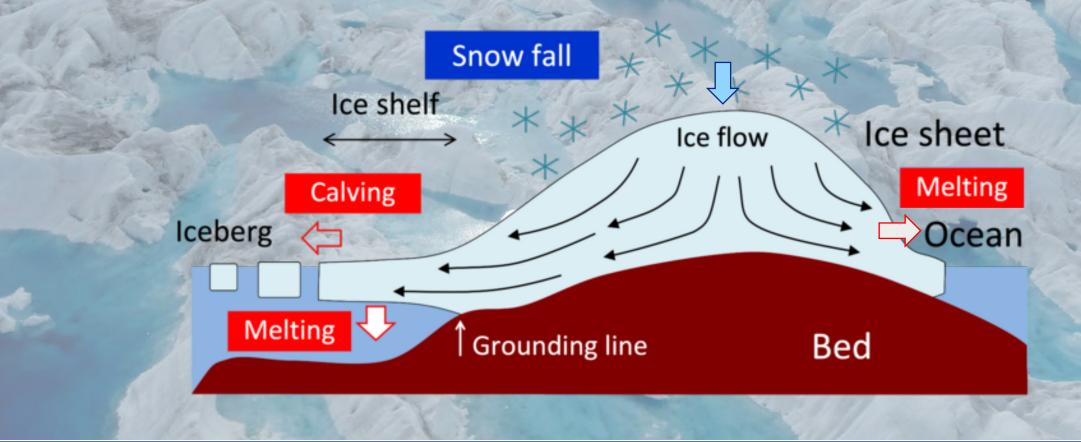
# Monitoring the Greenland Ice Sheet

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# PROMICE GGENET

# What is ice sheet mass balance?



#### GEUS

# Mass balance of an ice sheet



Scenarios (Strauss et al., 2015) 4 °C vs. 2 °C

Osaka

Shanghai

New York

## Why monitor the Greenland ice sheet?

- Sensitive to climate change
- The Arctic warming 3-4 x faster
- Planning requires numbers
- Policymaking requires knowledge

Oversvømmelsesdirektiv, Anden planperiode (2016-2021

rederiksh

Scenarios depend on models

Høje Taas

Copenhagen Danish Coastal Authority Risk Management Plan

Θ

Miljø- og Fødeva



10 - 9,999 kr/år/grid
10.000 - 19,999 kr/år/grid
20.000 - 39,999 kr/år/grid
40.000 - 59,999 kr/år/grid
>60.000 kr/år/grid
0,10 - 0,49 m
0,10 - 0,49 m

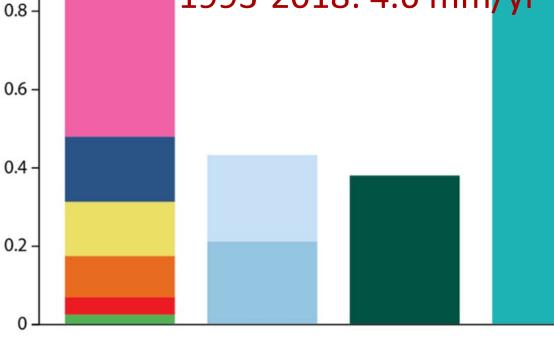
0,10 - 0,49 m 0,49 - 0,99 m 0,99 - 1,49 m 1,50 - 1,99 m >2,00 m

Sea level contribution, mm/y

1.0 -

### <sup>1.2</sup> What is today's rate of sea-level change?

### 2004-2010: 3.0 mm/yr 1993-2018: 4.6 mm/yr



- Greenland ice sheet
- Canadian Arctic glaciers
- U.S. Arctic (Alaskan) glaciers
- Greenland glaciers
- Scandinavian glaciers
- Russian Arctic glaciers

- Antarctic land ice
- Other glaciers
- Terrestrial storage
- Thermal expansion

Snow, Water, Ice and Permafrost in the Arctic

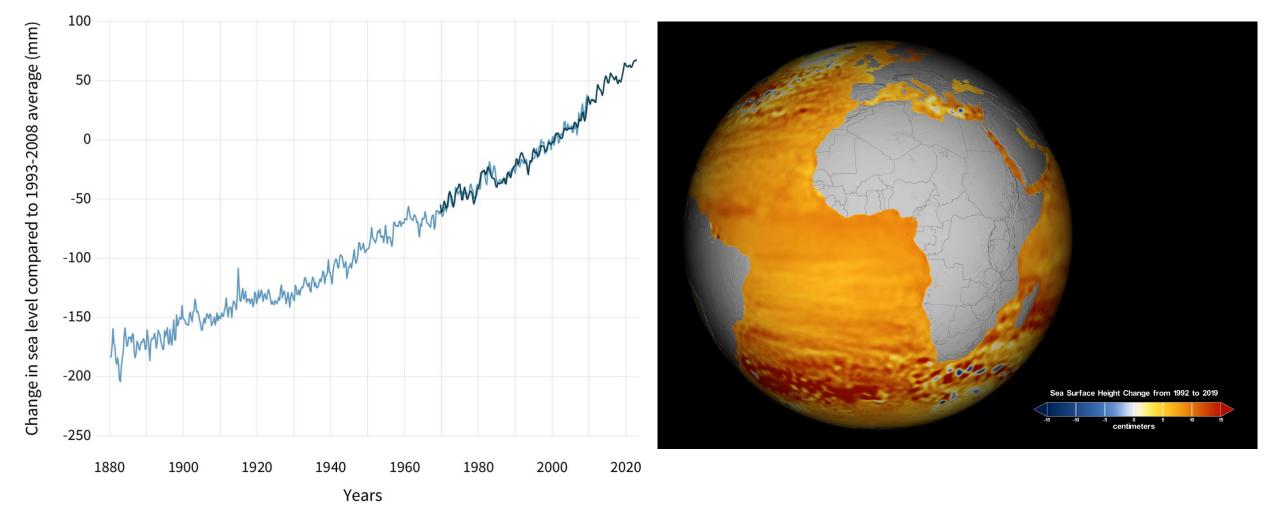
Comparison of Arctic sea level rates 2004–2010 with other global sea level components.

'Scandinavian glaciers' includes both Iceland and Svalbard. 'Other glaciers' includes, for example, Patagonian, Himalayan, African, and Indonesian land ice sources..



# Global (and local) sea level rise

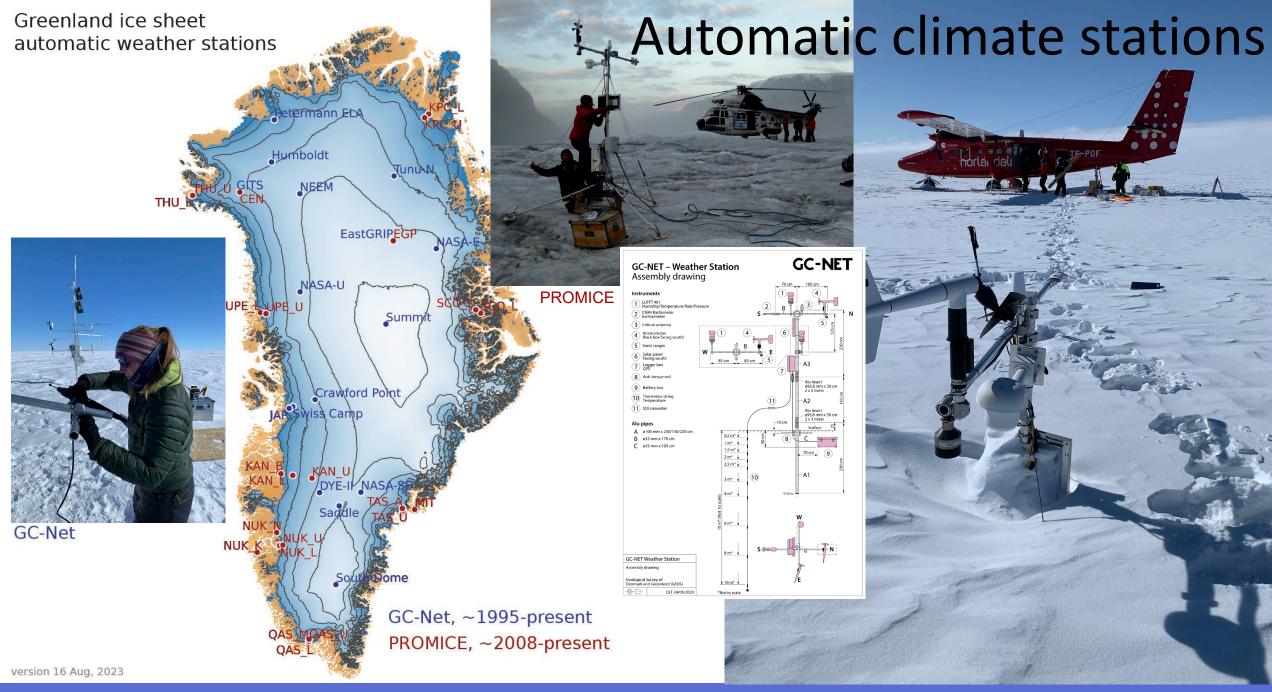
#### **GLOBAL SEA LEVEL**



### How we derive ice sheet mass balance



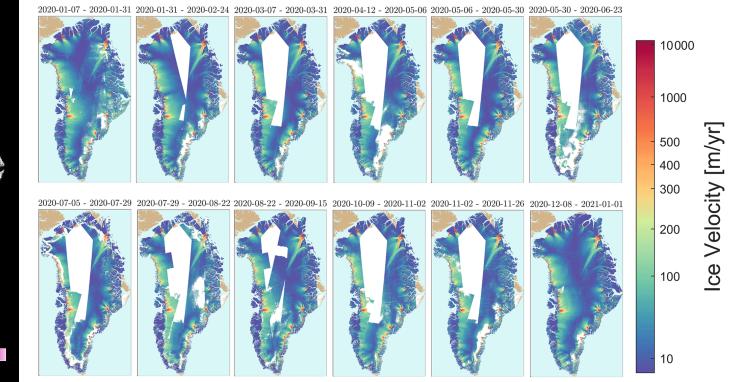
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#### GEUS



## Mapping ice sheet velocity

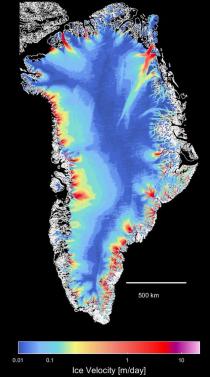


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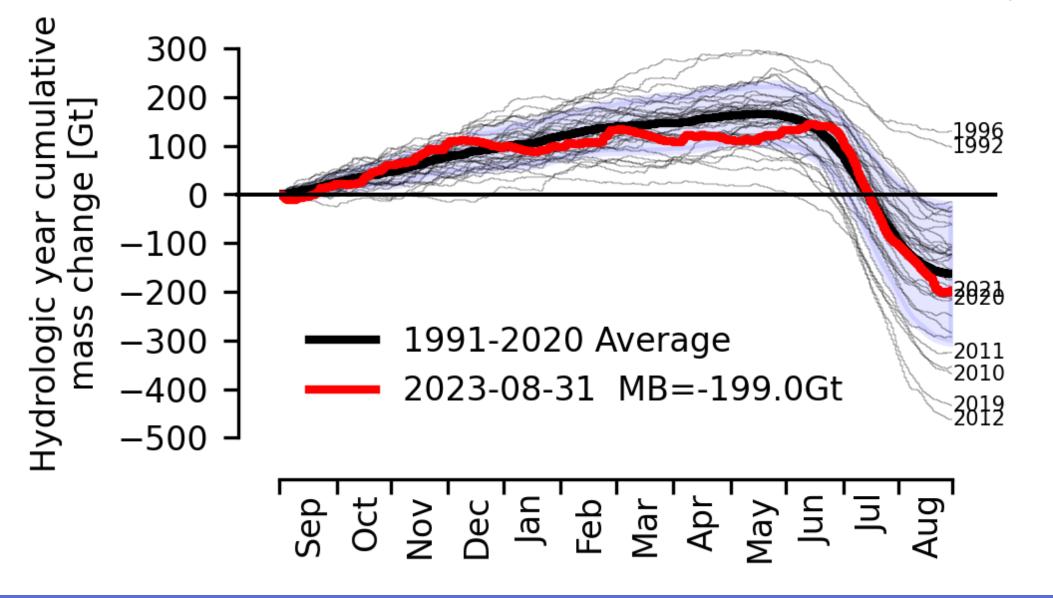
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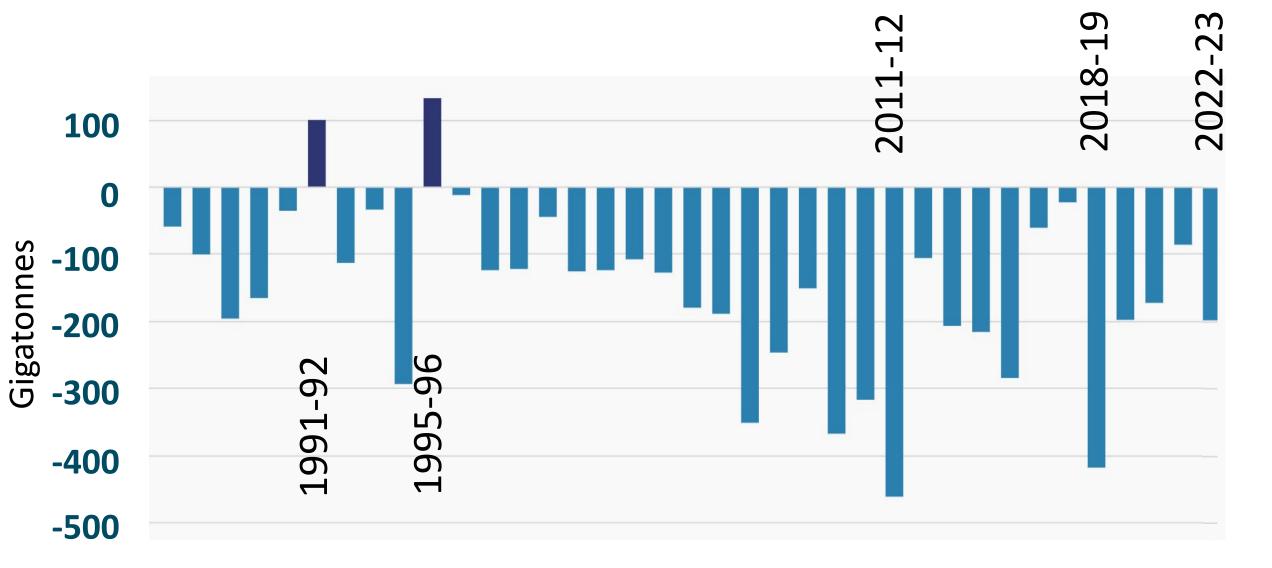


## Total mass balance

# **PROMICE** GC-NET



### Total mass balance 1986-2023 PROMICE GC-NET



### Public outreach

Science

### Operational needs

### Policymakers

### **PROMICE GC-NET** Relevance

...more

STREET

## Synergies - examples

- International climate research
- Weather forecasting
- Hydropower feasibility
- Marine ecosystem modelling
- Monitoring permafrost geohazard
- Mineral exploration green transition
- Accident Investigation Board
- Export of Greenlandic drinking water



