SMB/climate in CESM2 and beyond

Jan Lenaerts

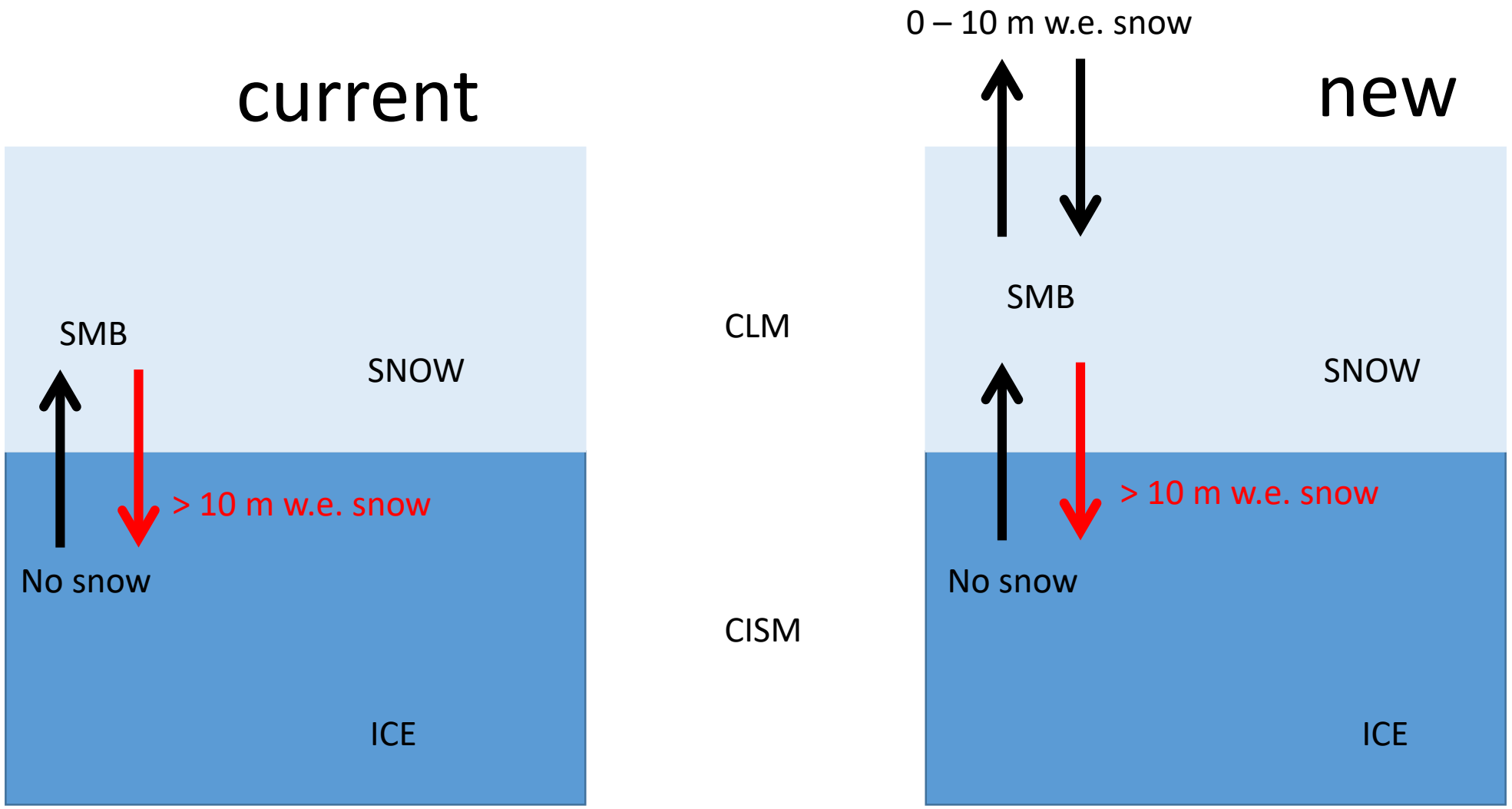
CESM2 ‘tuning’

- N_melt = 0.5 or 1 (1 is default now)
- How to test? Wait for 20th century run? Do dedicated simulations? (issue with snow ‘memory’)
- Greenland tundra problem
  - Repeat IG runs with correct ERA-Interim forcing
  - Include new SCF

Development

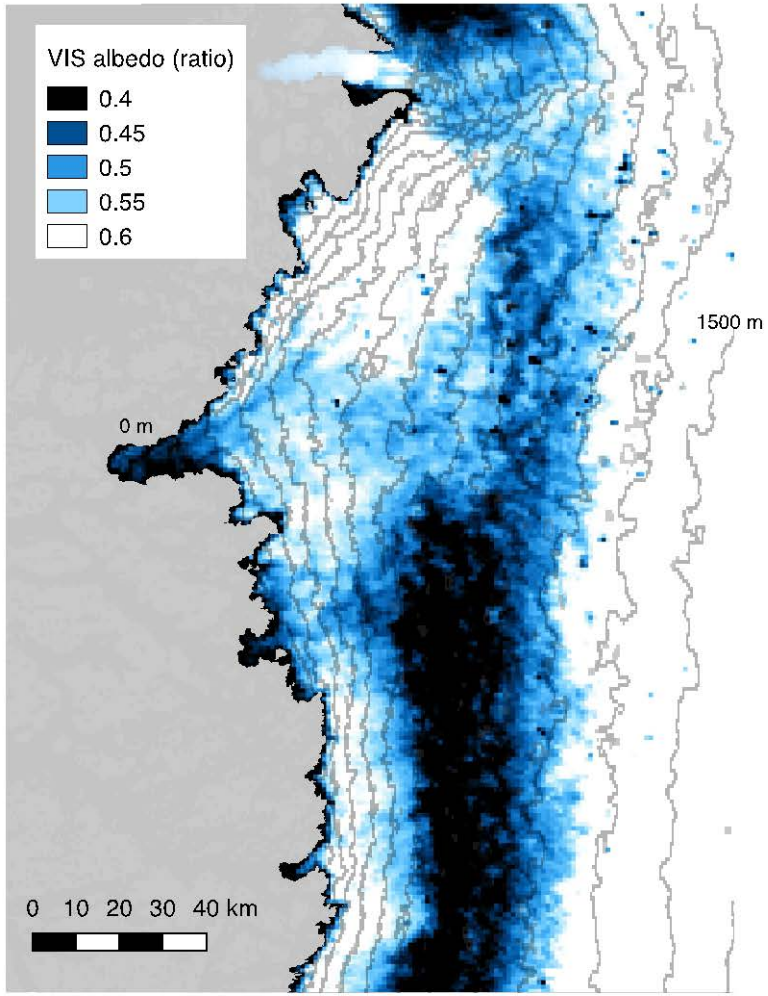
- New SMB formulation
- Water on ice
- Snow -> ice albedo
- Blowing snow sublimation

New SMB formulation

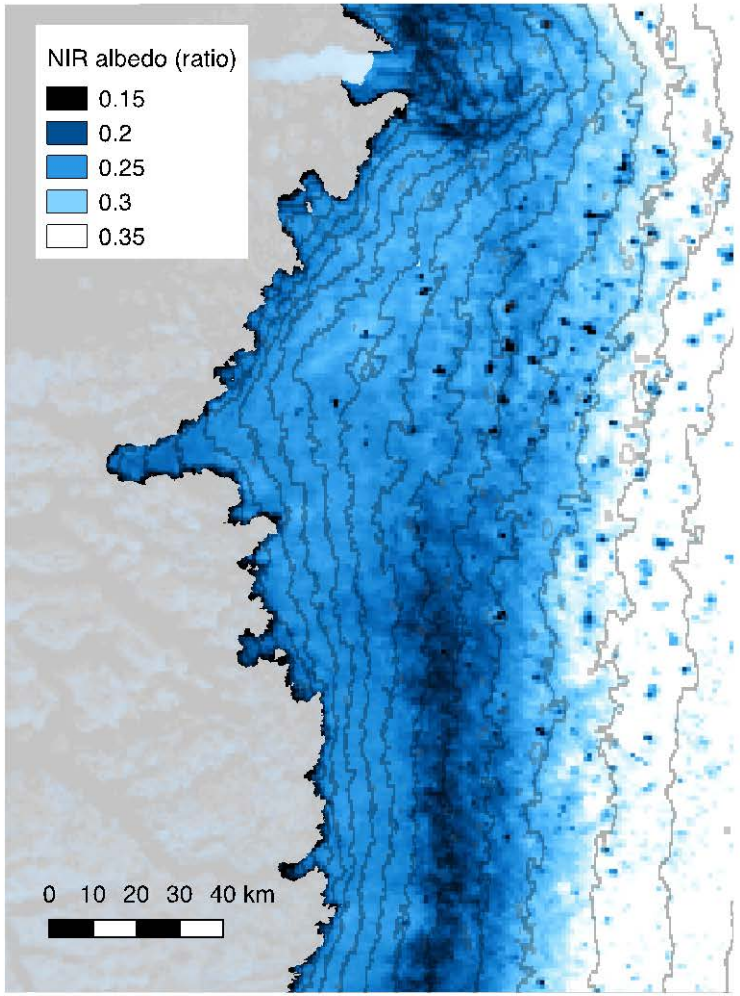


Water on ice

Visible albedo (5% lowest summer value)



Near-infrared albedo (5% lowest summer value)

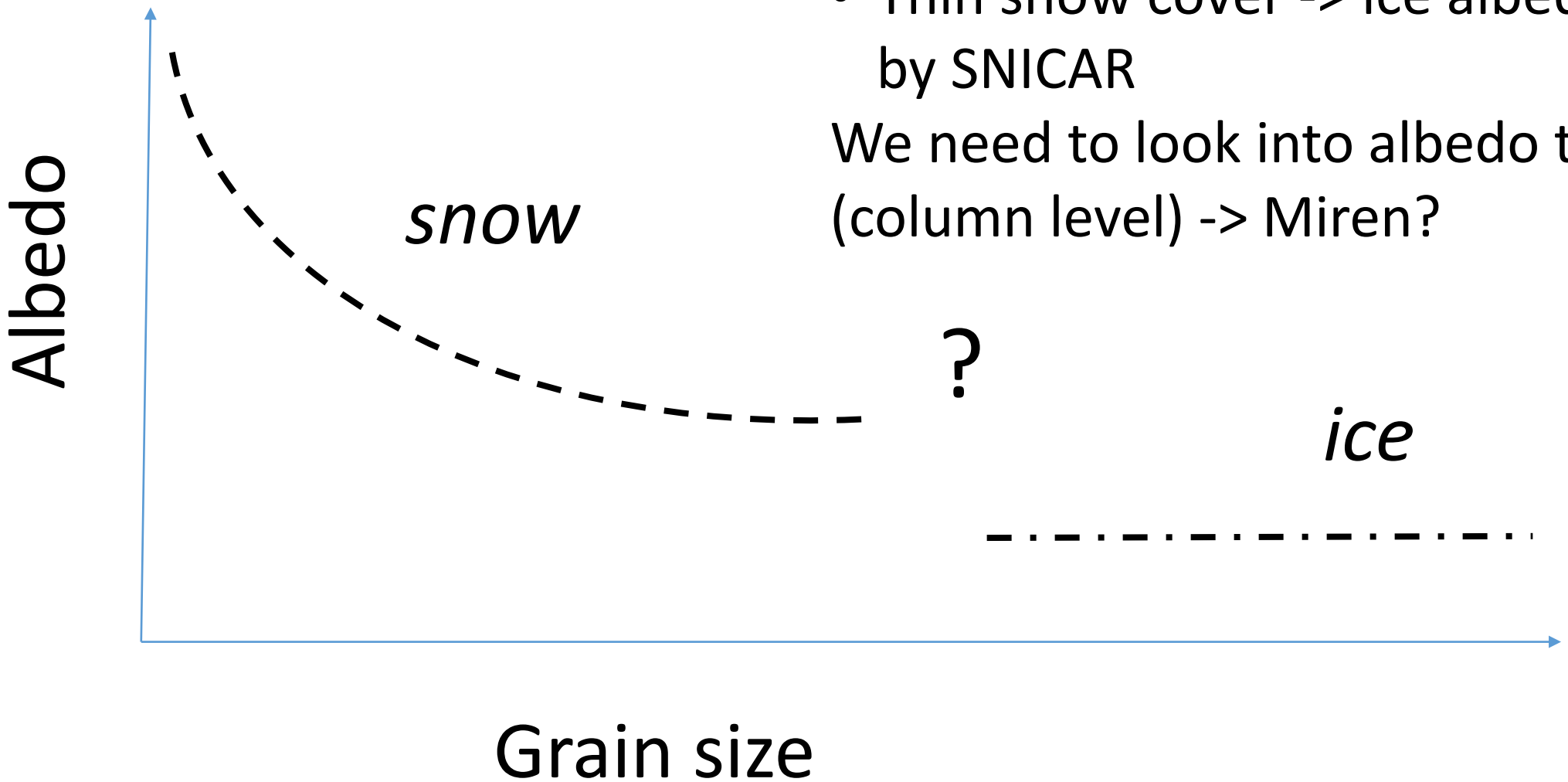


And dust, black carbon, etc?

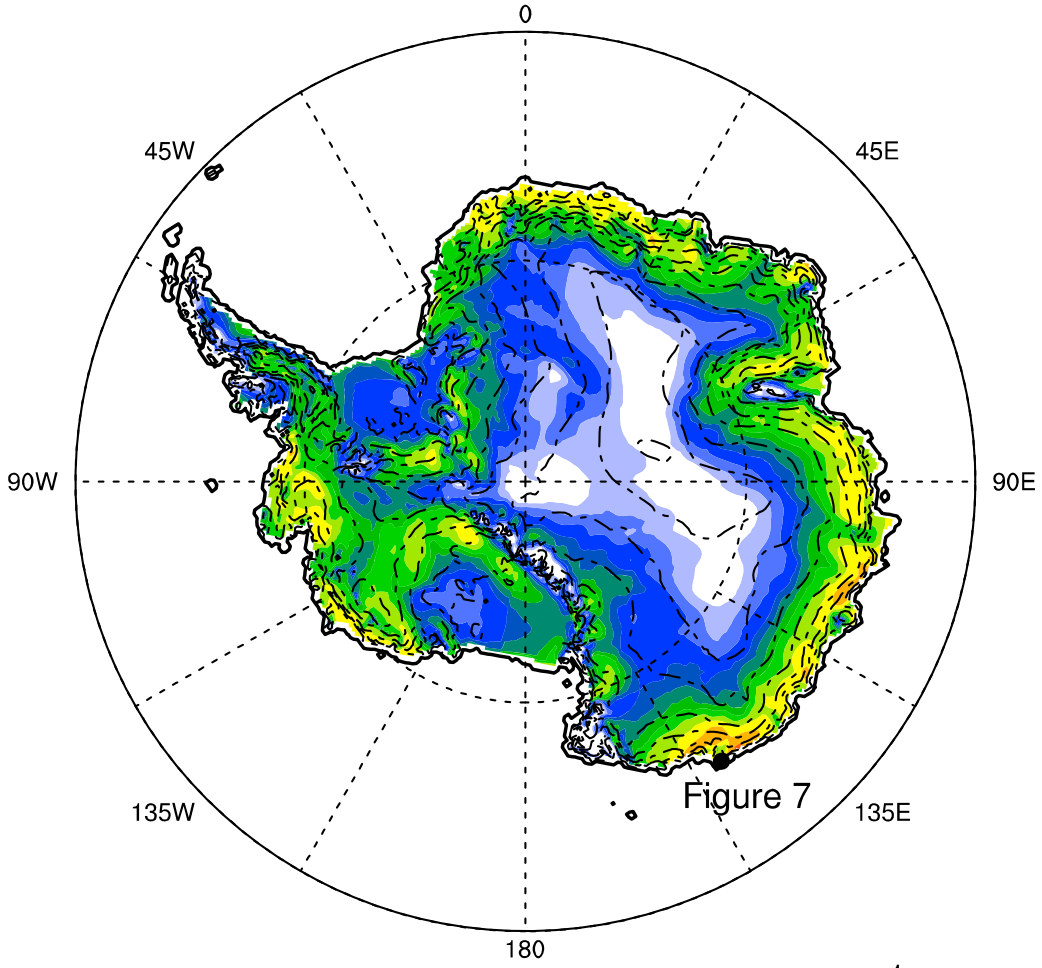
Snow -> Ice albedo

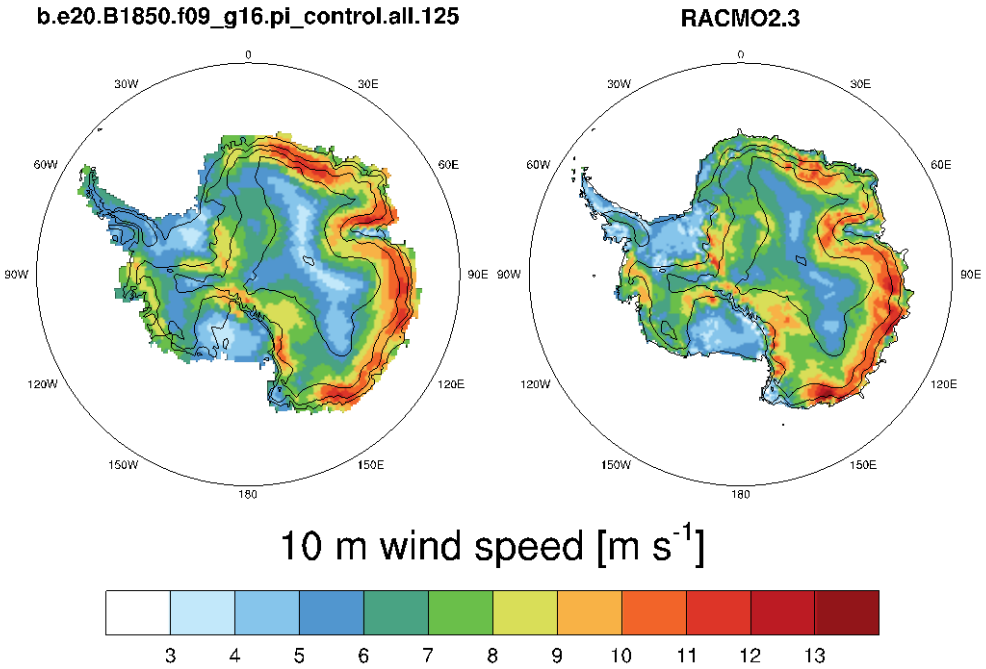
- Fractional snow cover
- Thin snow cover -> ice albedo picked up by SNICAR

We need to look into albedo time series (column level) -> Miren?



Blowing snow sublimation





We need realistic winds (check!)

Mainly important on Antarctica

No immediate necessity to include

Jan/CU (summer 2018)

Development

- **New SMB formulation**
- **Water on ice**
- Snow -> ice albedo
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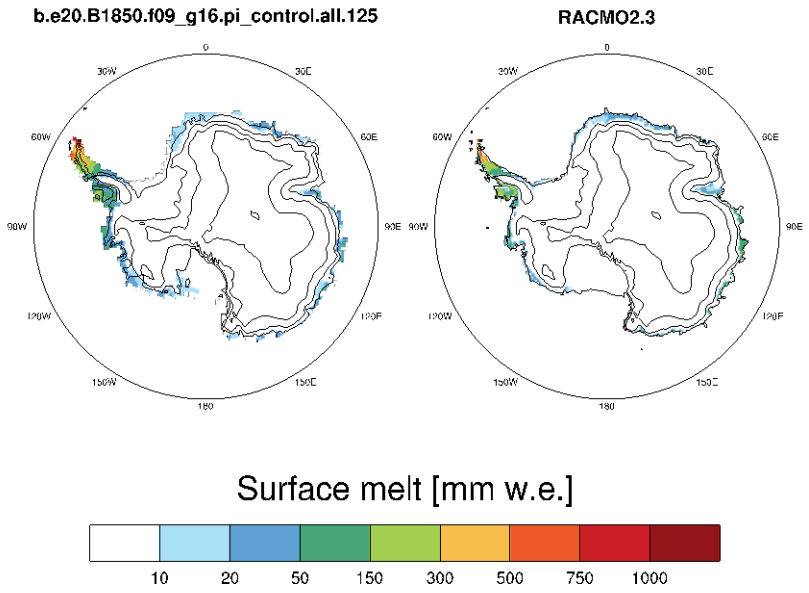
Science

CESM2 simulations (Leo): 1850-2100 with 3 CMIP6 scenarios (BG 1 degree, no interactive ice sheet) – one evaluation paper, one future scenario paper. Focus on Greenland.

High-resolution temporal output for RACMO2 forcing (CESM<->RACMO2) (Jan/IMAU)

MEC / albedo / variability/ etc. (Miren/Raymond)

Antarctic ice shelf melting (Jan/CU)
-> hydrofracture



LIWG diagnostic package

https://docs.google.com/document/d/1FDbuGAYeXc3BHUkmGSc3x4yGrQk7ZsJS-P5PGYpg-30/edit#heading=h.2ynzjd46mmno

Funded by Jan (CU)? NCAR support (e.g. website)?

- Which variables to include in the diagnostic package
- Present day or also paleo? Leo: I would start with PD first
- Comparison with RACMO2 data
- Show integrated mass fluxes? Decide which mask.
- How to define ice sheet runoff?
  - QRUNOFF_TO_COUPLER, is not _ICE variable
  - Solid runoff?
  - Or calculate from components (QICE_MELT, rain on bare ice, QFLX_SNOW_DRAIN, liquid capping flux)
  - Or calculate indirectly, from SMB equation (Kind of hard with current SMB definition)