

# Contrasting contributions to future sea level under CMIP5 and CMIP6 scenarios from the Greenland and Antarctic ice sheets

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# Aim

To assess how the higher climate sensitivity of CMIP6 projections (relative to CMIP5) impacts the sea-level rise contributions of Antarctic and Greenland.

# Method

Same experimental design as CMIP5 inter-comparison for Greenland (see Goelzer) and Antarctica (see Seroussi).

Small CMIP6 ensemble of opportunity ( $3 \times \text{SSP585}$  and  $1 \times \text{SS0126}$  reflecting upper half of ensemble's climate sensitivity).

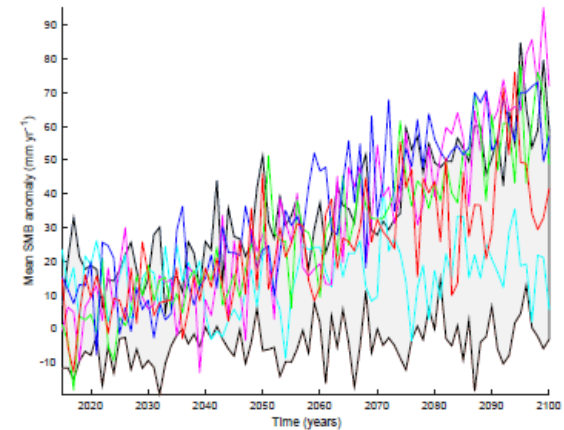
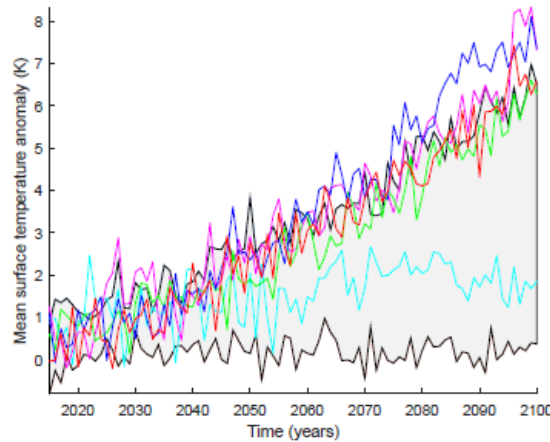
16 ice sheet models for Greenland and 9 for Antarctica.

# Atmospheric forcing from CMIP6 models compared to CMIP5 sample (shaded area)

Surface air temperature

Surface mass balance

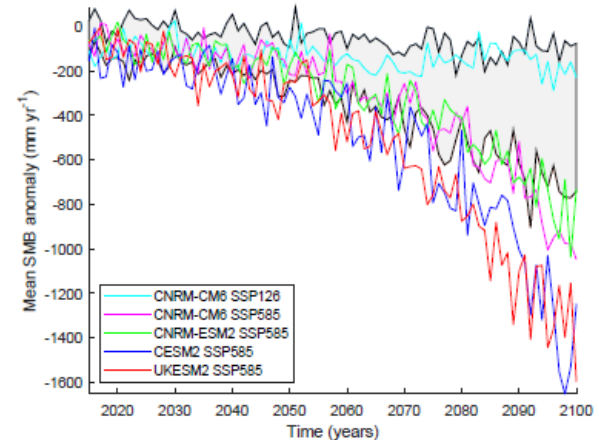
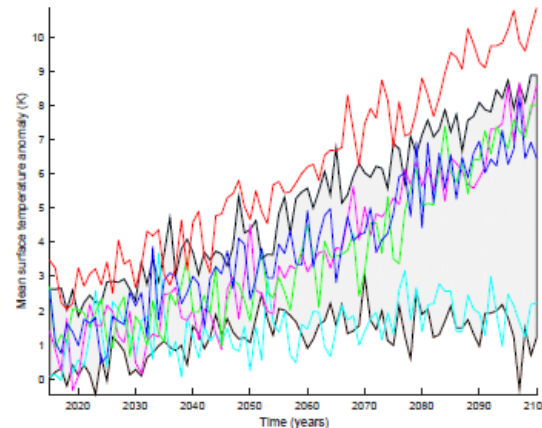
Greenland



(c)

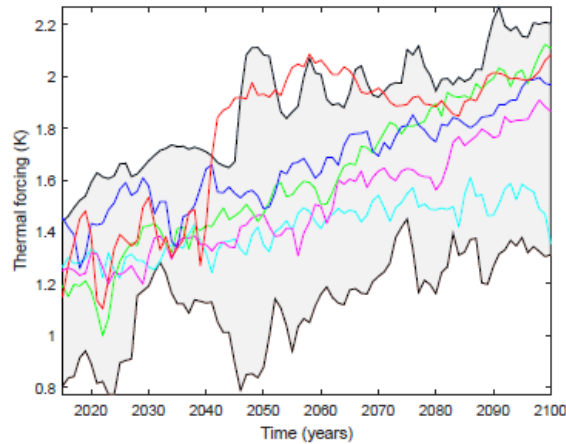
(d) +ve sea level rise –ve fall

Antarctic

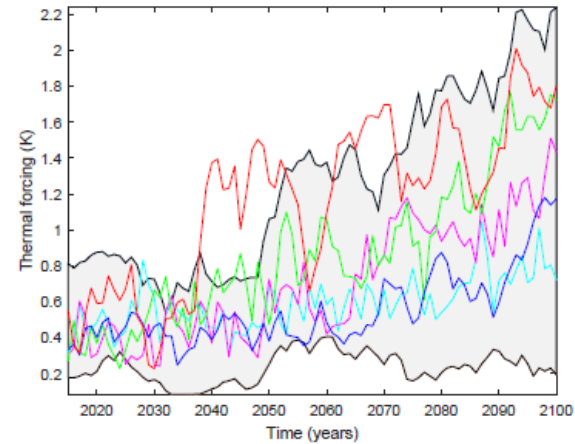


# Ocean thermal forcing from CMIP6 models compared to CMIP5 sample (shaded area)

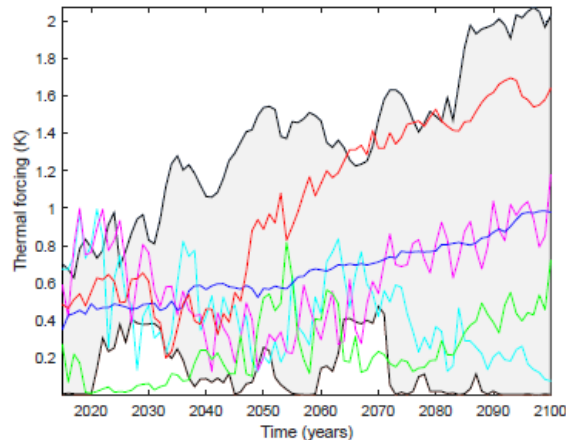
(a) **PIG/Thwaites**



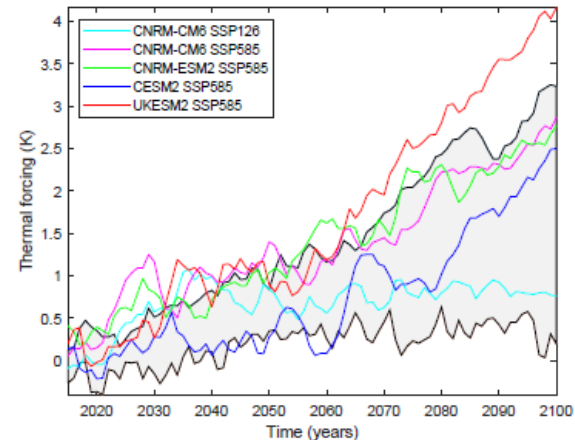
(b) **Filchner-Ronne**



(c) **Ross**

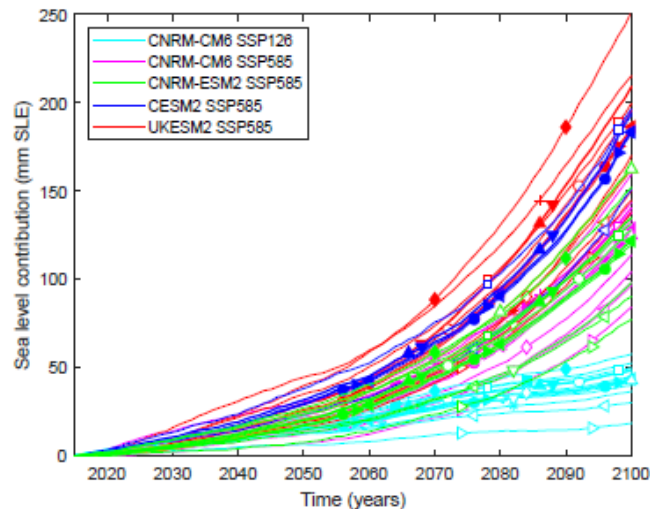


(d) **Greenland**

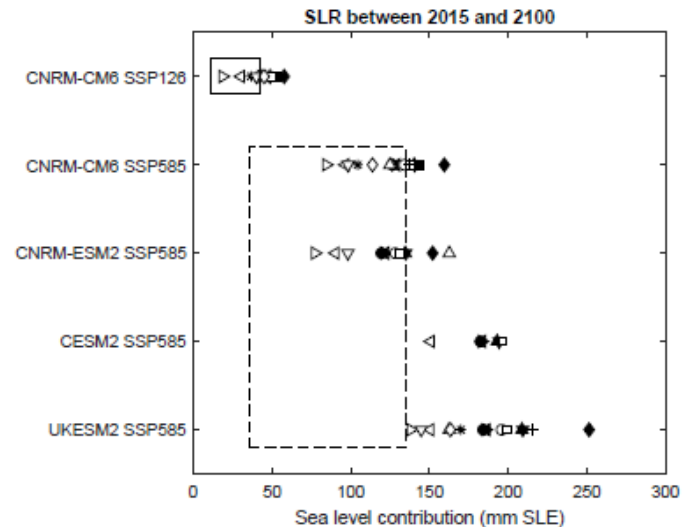


# Greenland SLR from CMIP6 models compared to CMIP5 sample

(a)



(b)

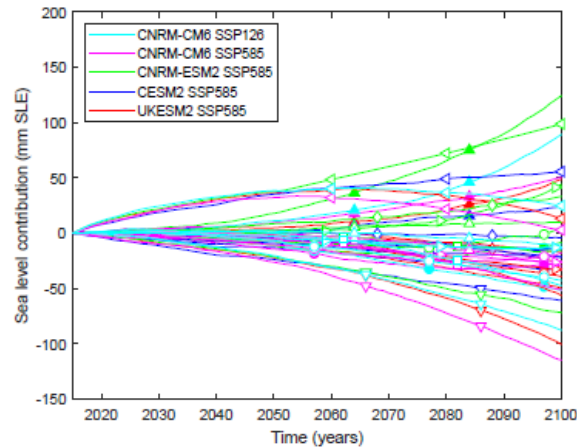


(b) SLR at 2100 for SSR126 & 585. Boxes show CMIP5 ranges.

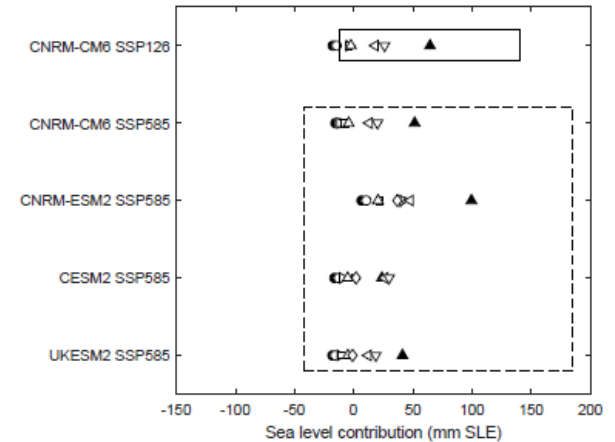
Symbols refer to individual ice sheet models.

# Antarctic SLR from CMIP6 models compared to CMIP5 sample

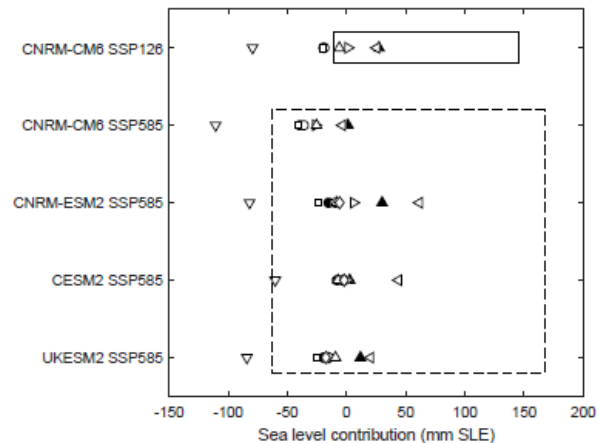
(a) Antarctic



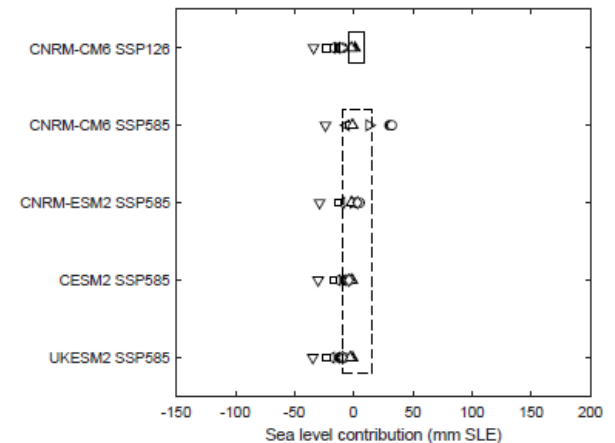
(b) WAIS



(c) EAIS



(d) AP



(b)-(d) SLR at 2100 for SSR126 & 585. Boxes show CMIP5 ranges.

# Summary

CMIP6-forced projections are on the low side of CMIP5-forced range for Antarctic.

This suggests that increased snow accumulation dominates ocean-driven losses.

CMIP6 ranges for SSP162 and SSP585 overlap for Antarctic (as is the case for CMIP5 forcing)

Story for Greenland very much simpler and higher climate sensitivity of CMIP6 models leads to greater SLR than CMIP5. For two CMIP6 models, the range does not overlap with CMIP5.

CMIP6 ranges for SSP162 and SSP585 are distinct for Greenland.