

The effect of geothermal heat flux on the deglacial evolution of the Greenland ice sheet

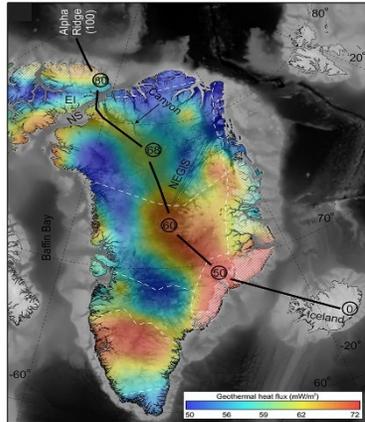
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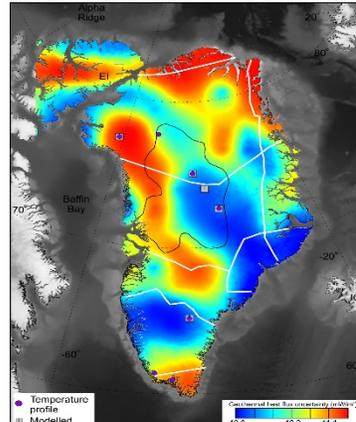
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Geothermal heat flux (GHF)



GHF uncertainty



Martos et al. (2018), inferred from magnetic data

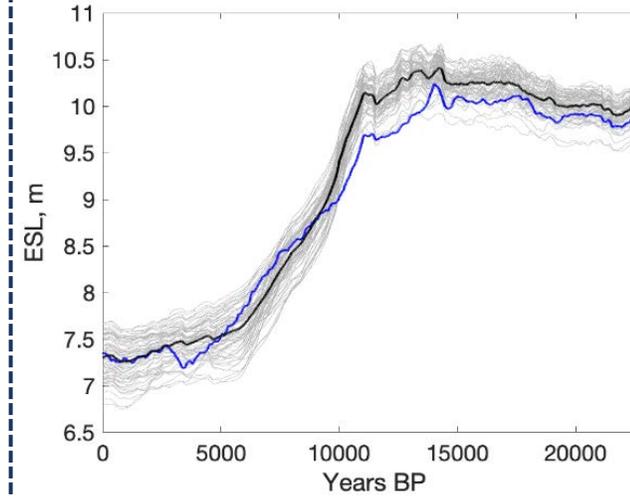
Sampling

- Random vectors from the multivariate normal distribution
- Using 80 samples with 400 km correlation factor

Ice model

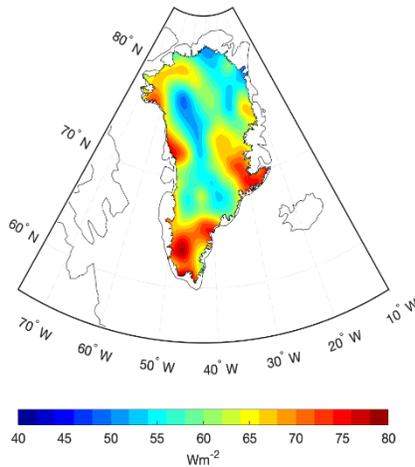
- Used the Parallel Ice Sheet Model (Bueler and Brown, 2009)
- Runs started at 120 ka with 10 km grid resolution

Equivalent Sea Level (ESL)

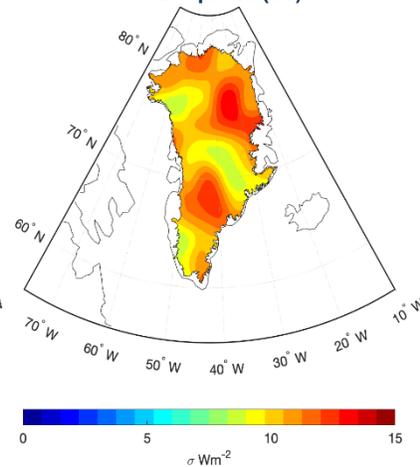


- Grey lines → individual runs (54 out of 80 accepted)
- Black lines → ensemble mean
- Blue lines → output using optimal GHF map from Martos et al. (2018)
- Significant spread in volume due to the variations in GHF

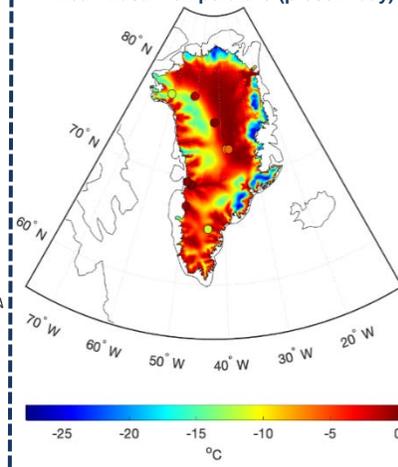
Mean GHF



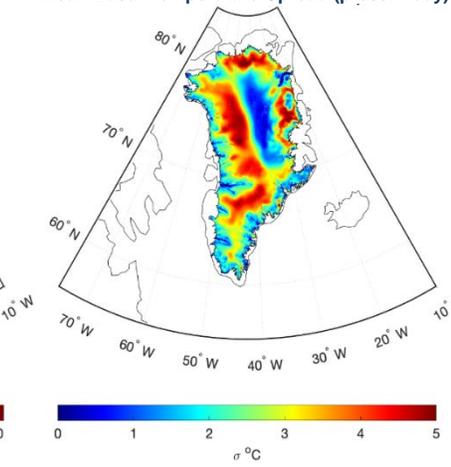
GHF Spread (1σ)



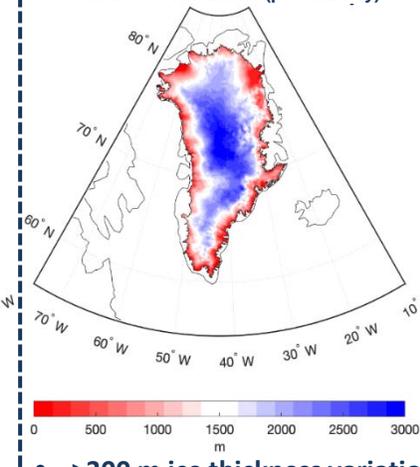
Mean Basal Temperature (present day)



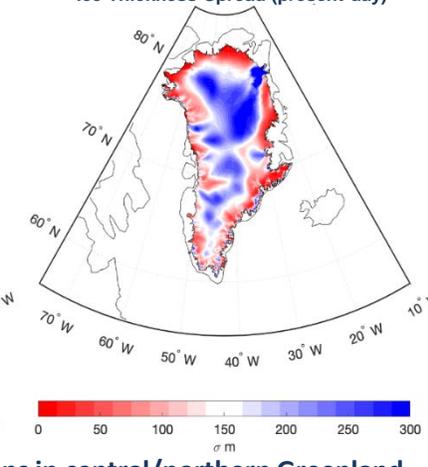
Mean Basal Temperature Spread (present day)



Mean Ice Thickness (present day)



Ice Thickness Spread (present day)



- The average value of ensemble is considered
- 8-15 mW/m² estimated GHF uncertainty

- >5°C variation in basal temperature in some areas
- No clear correlation between spread in GHF and basal T

- >300 m ice thickness variations in central/northern Greenland
- Ice thickness variations show correlation with spread in GHF in central/northern Greenland