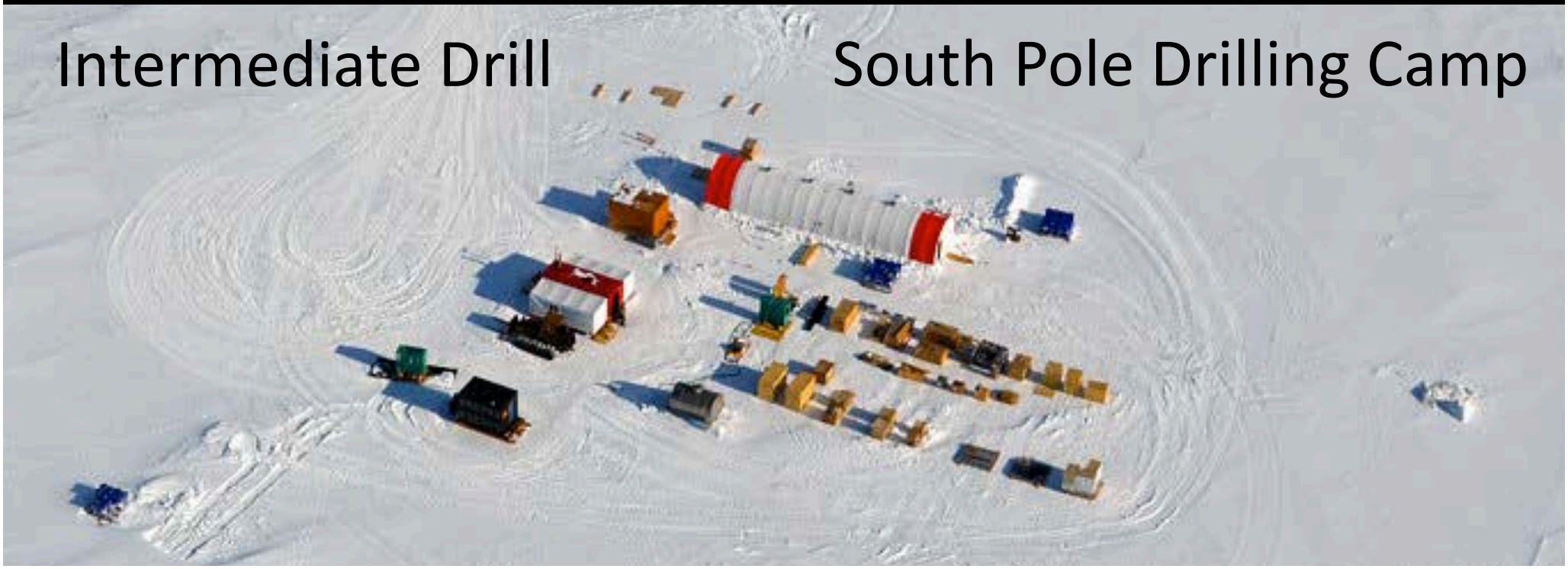
Qaanaaq: An Ice and Sediment Record of Interglacial Warmth and Ice Sheet Response

Osterberg, Winski, Kreutz, Kurbatov, Albert, Axford, Brook, Courville, Mayewski, Miner, Saltzman, Schaeffer, Souney

Driving Research Objectives

- ***Climate forcing*** and ***ice sheet response*** during two key warm periods:
  - The Holocene Thermal Maximum = Transient Response
  - The Eemian = Equilibrium Response

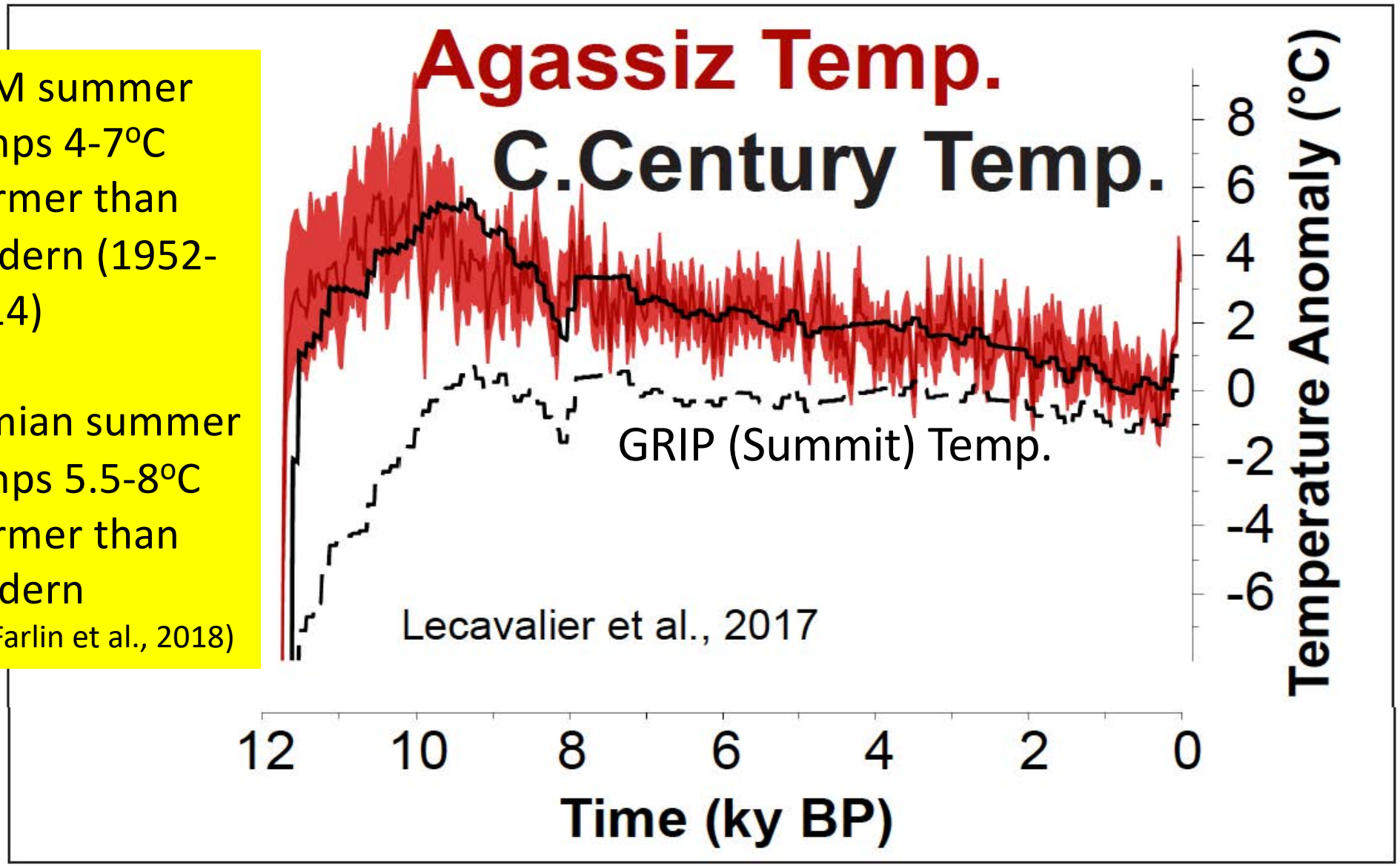
Intermediate Drill South Pole Drilling Camp



NW Greenland Has Strong Climate Forcing: Climate Signal Strongest Near the Coast

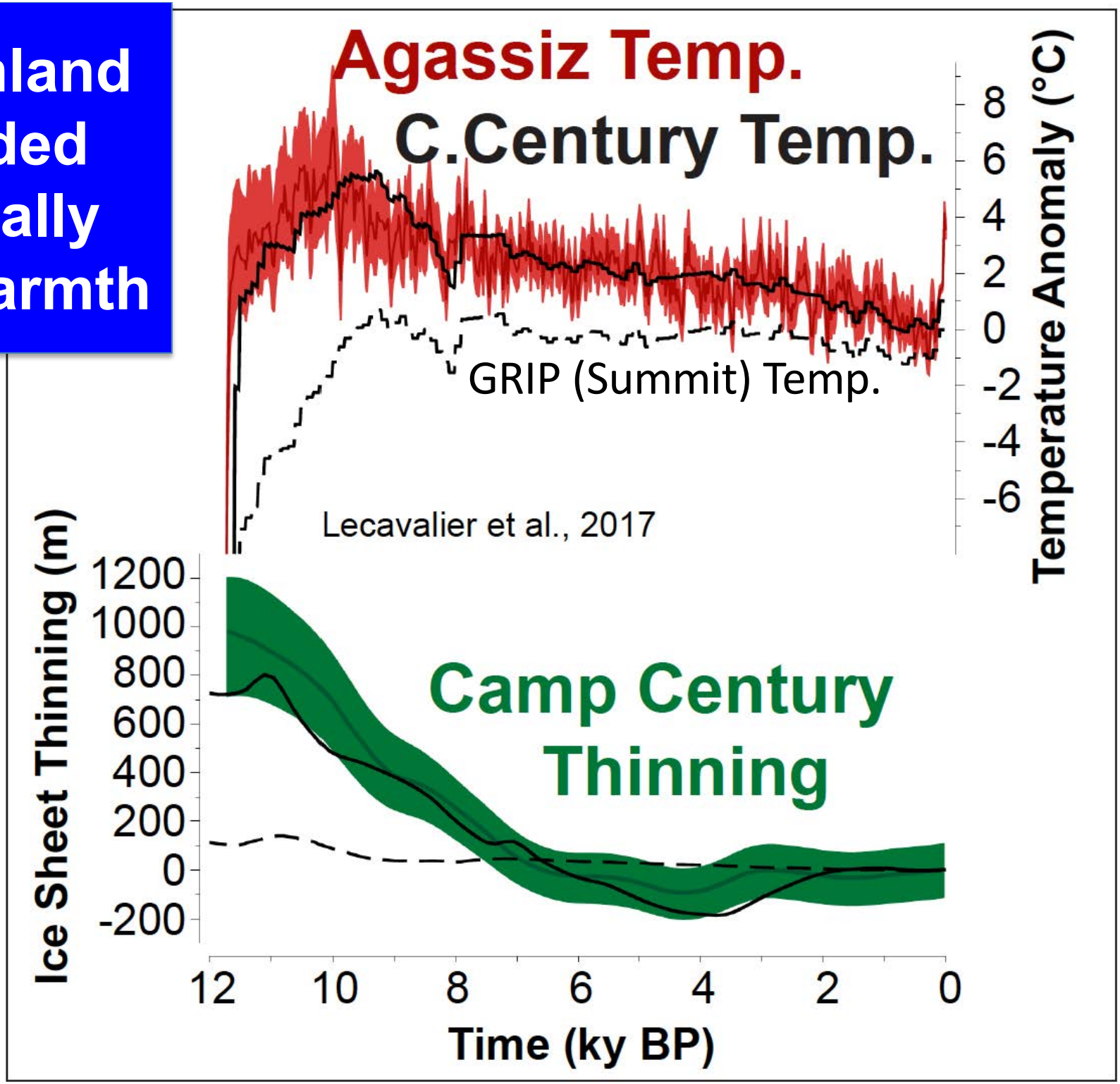
HTM summer temps 4-7ºC warmer than modern (1952-2014)

Eemian summer temps 5.5-8ºC warmer than modern (McFarlin et al., 2018)

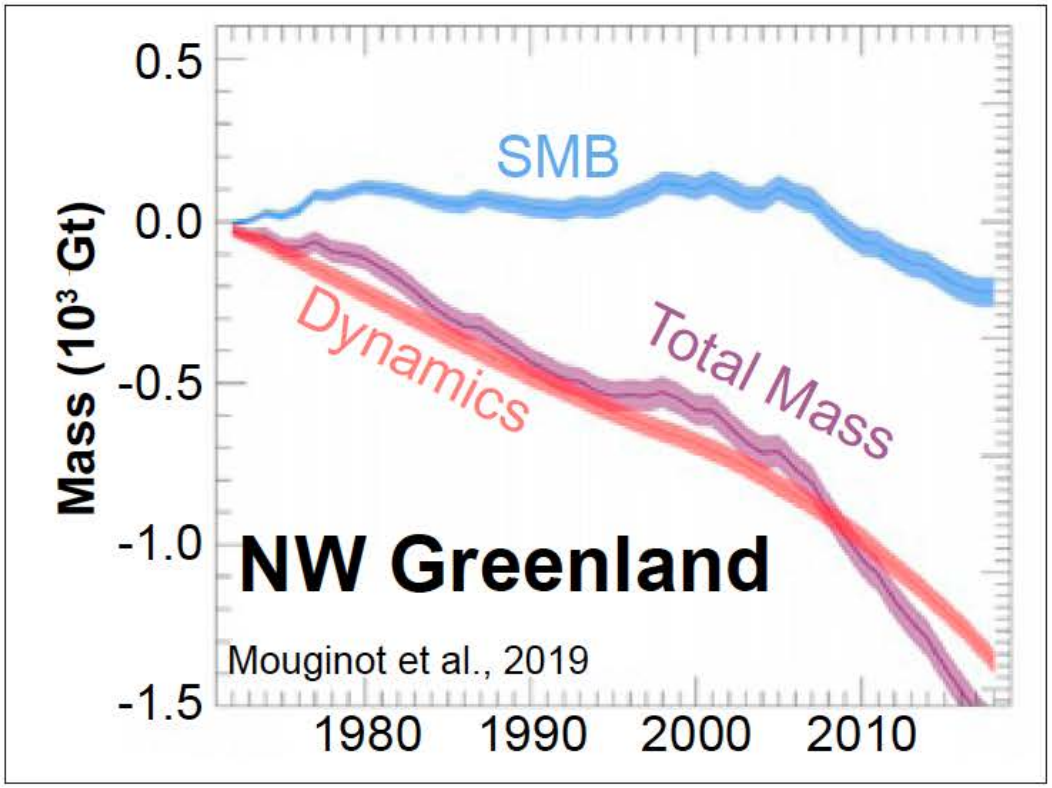


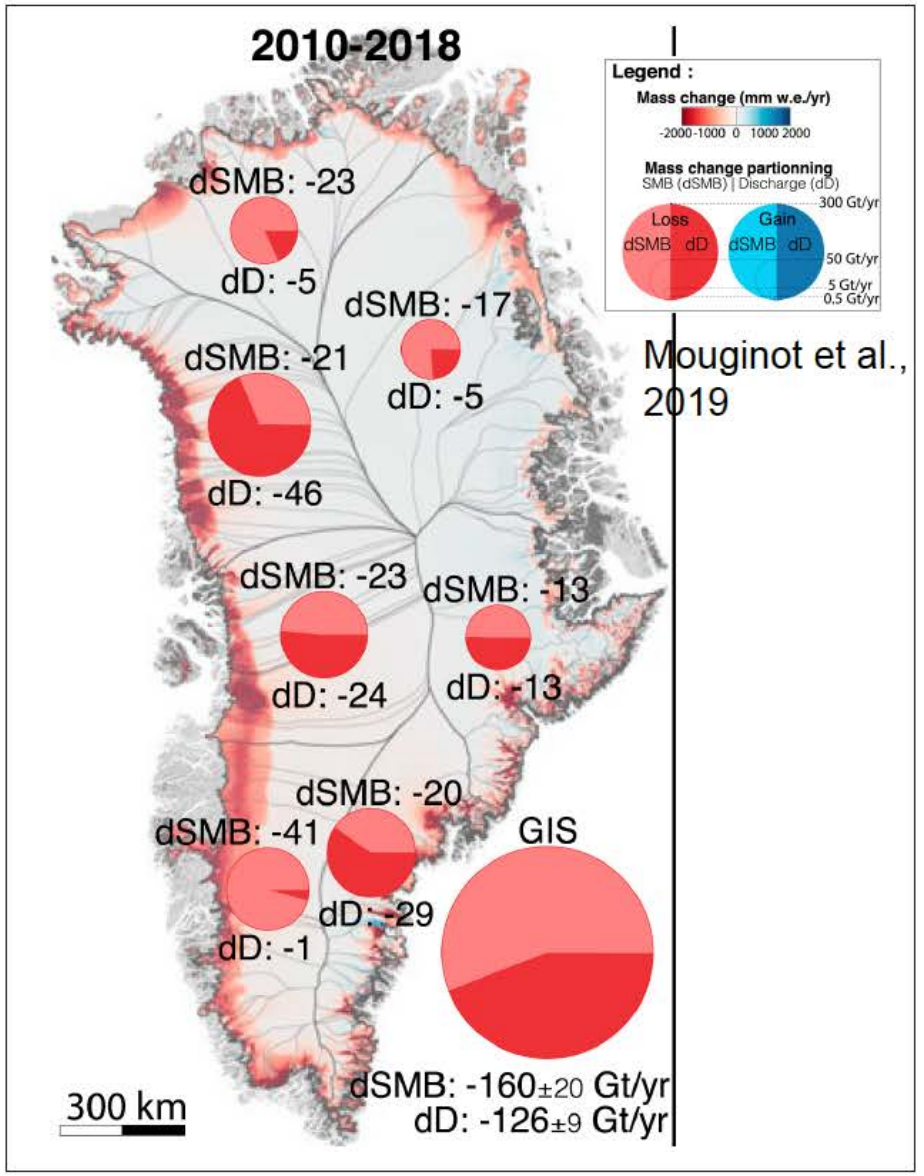
NW Greenland Responded Dynamically to Prior Warmth

~1000 m of Holocene thinning at C. Century!



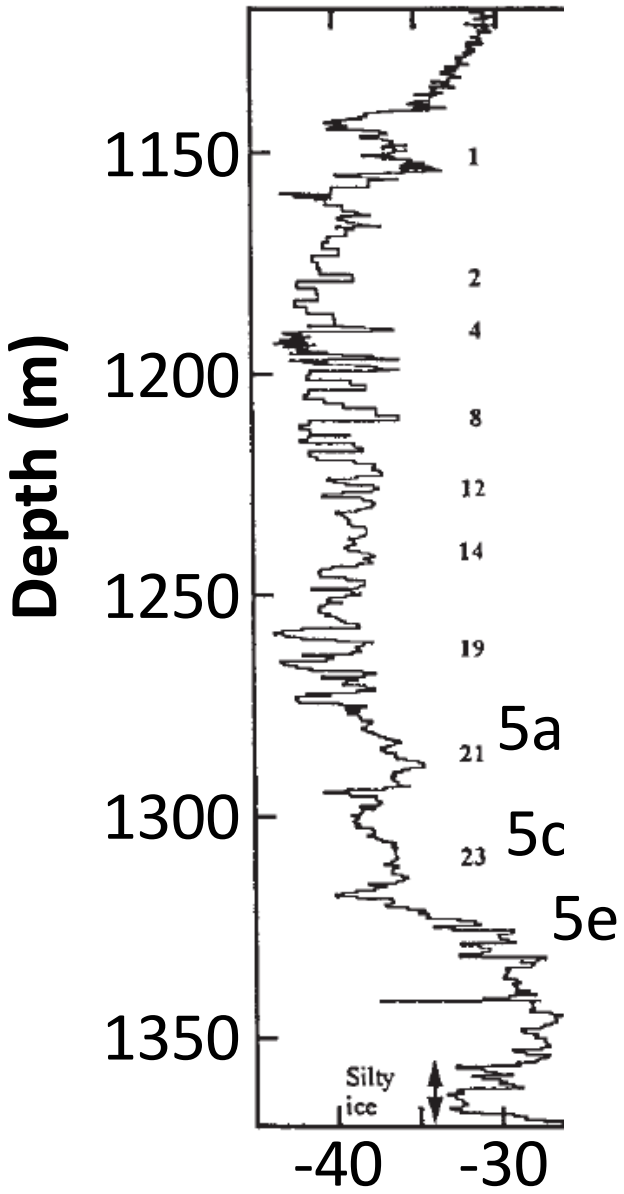
NW Greenland Is Melting Quickly





NW Greenland Has Shallow Eemian Ice

Camp Century Isotopes

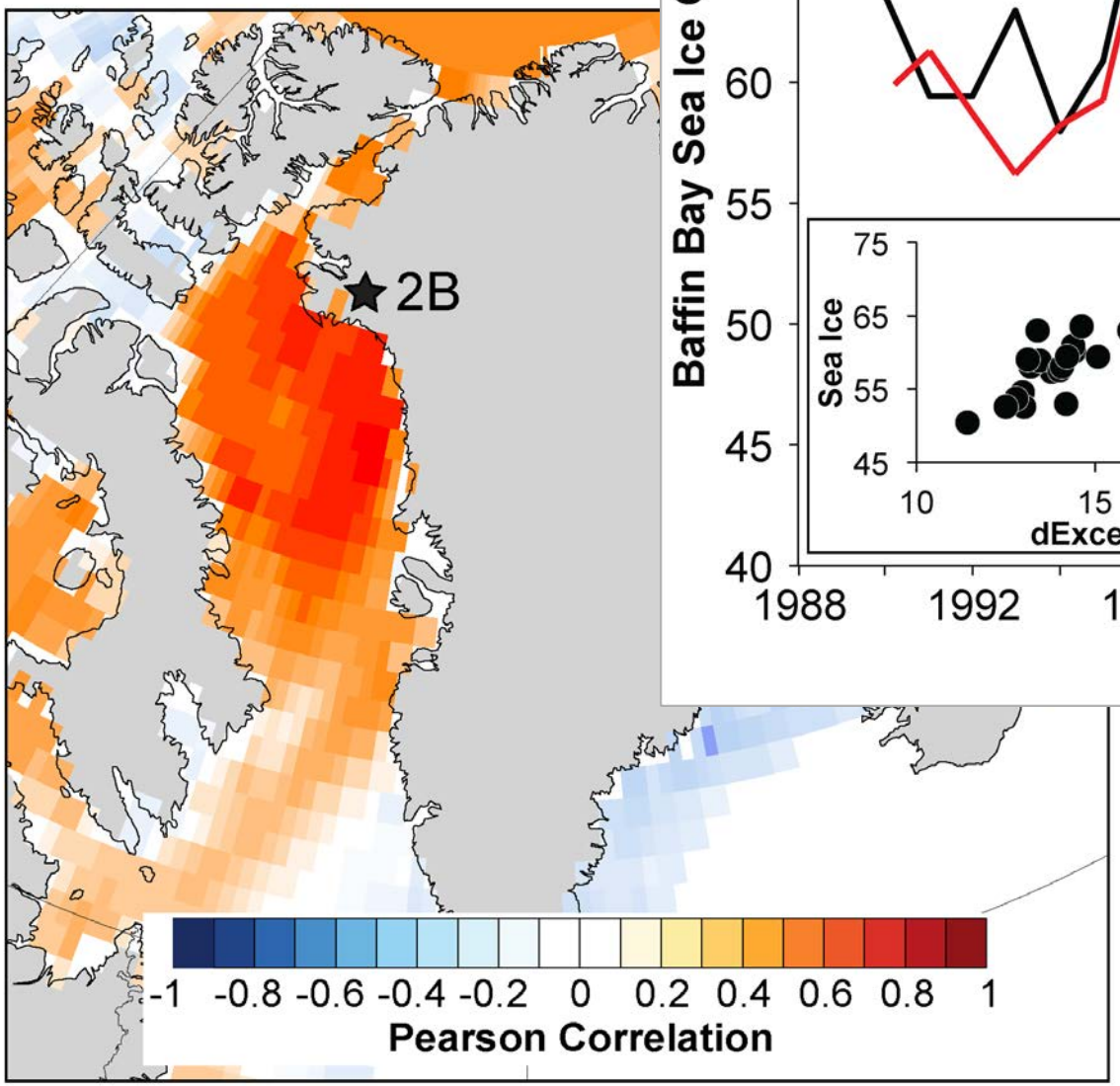


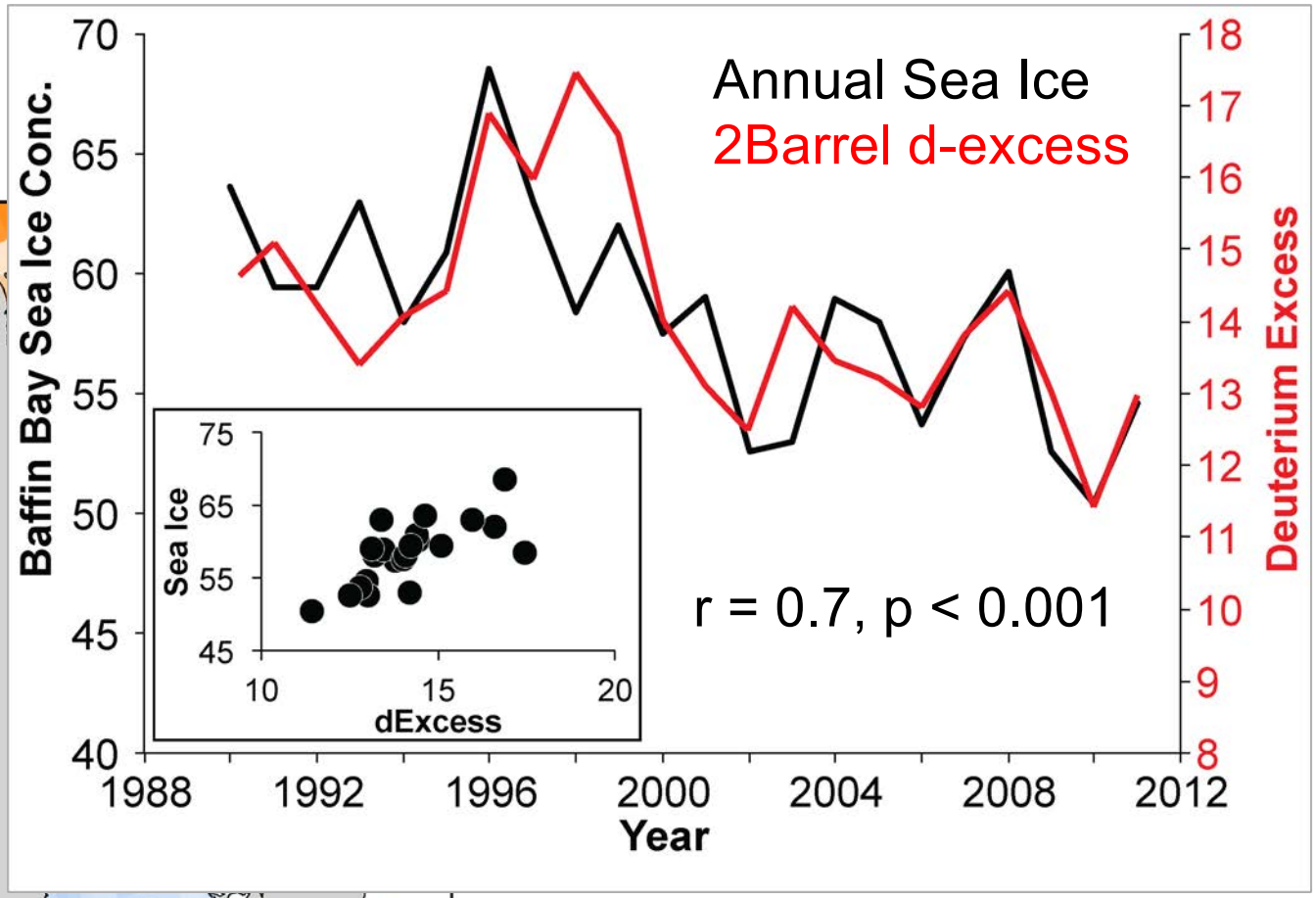
Johnsen et al., 2001

Camp Century Drilling: 1963-1966

NW Greenland Has Sensitive Ice Core Proxies of Baffin Sector

2Barrel d-excess vs. Annual Sea Ice





Lower d-excess in years with ***Less*** Sea Ice

Osterberg et al., 2015

LETTER

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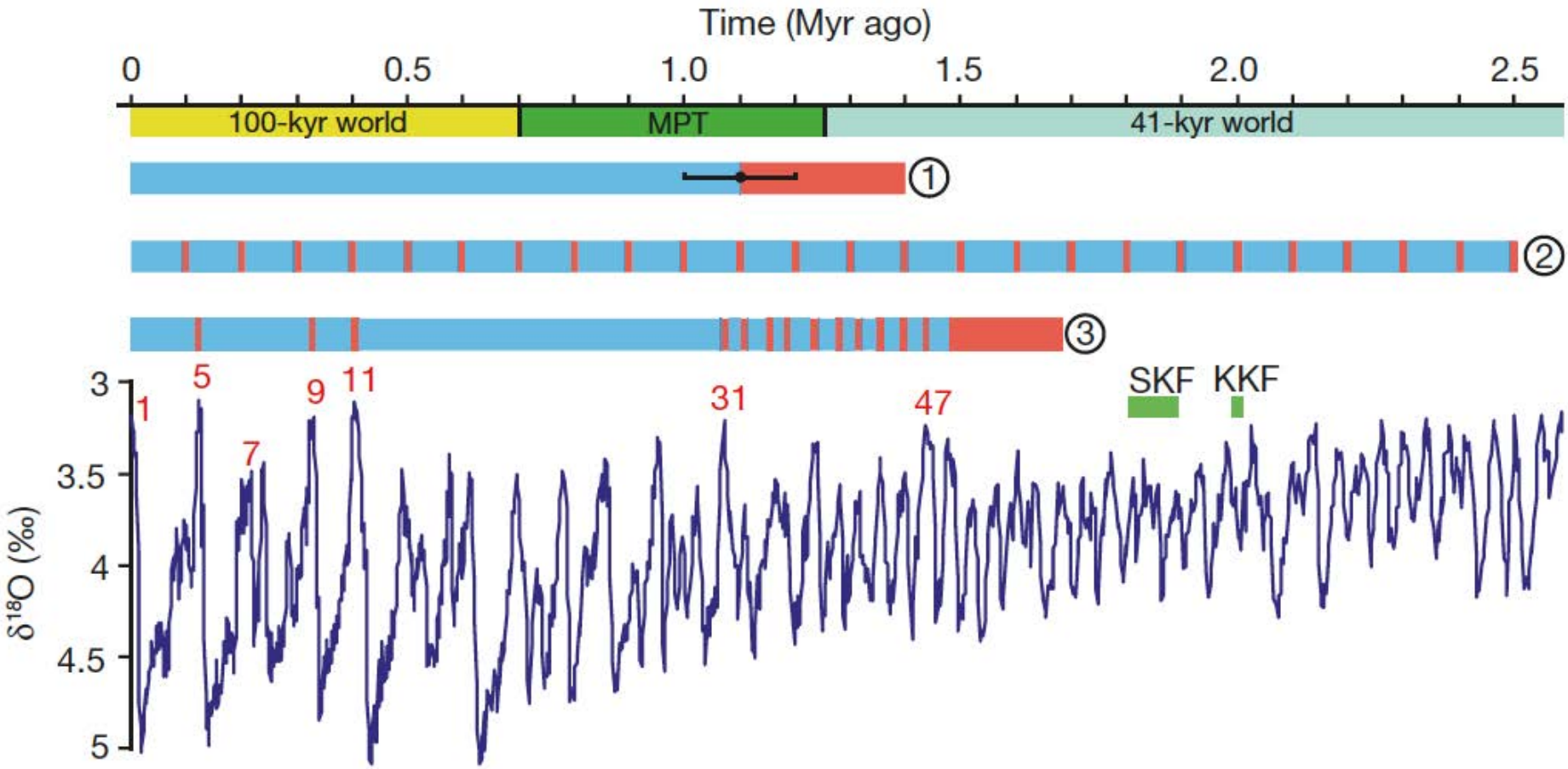
Greenland was nearly ice-free for extended periods during the Pleistocene

Joerg M. Schaefer[1,2], Robert C. Finkel[1,3], Greg Balco[4], Richard B. Alley[5], Marc W. Caffee[6], Jason P. Briner[7], Nicolas E. Young[1], Anthony J. Gow[8] & Roseanne Schwartz[1]



Pronounced summer warming in northwest Greenland during the Holocene and Last Interglacial

PNAS

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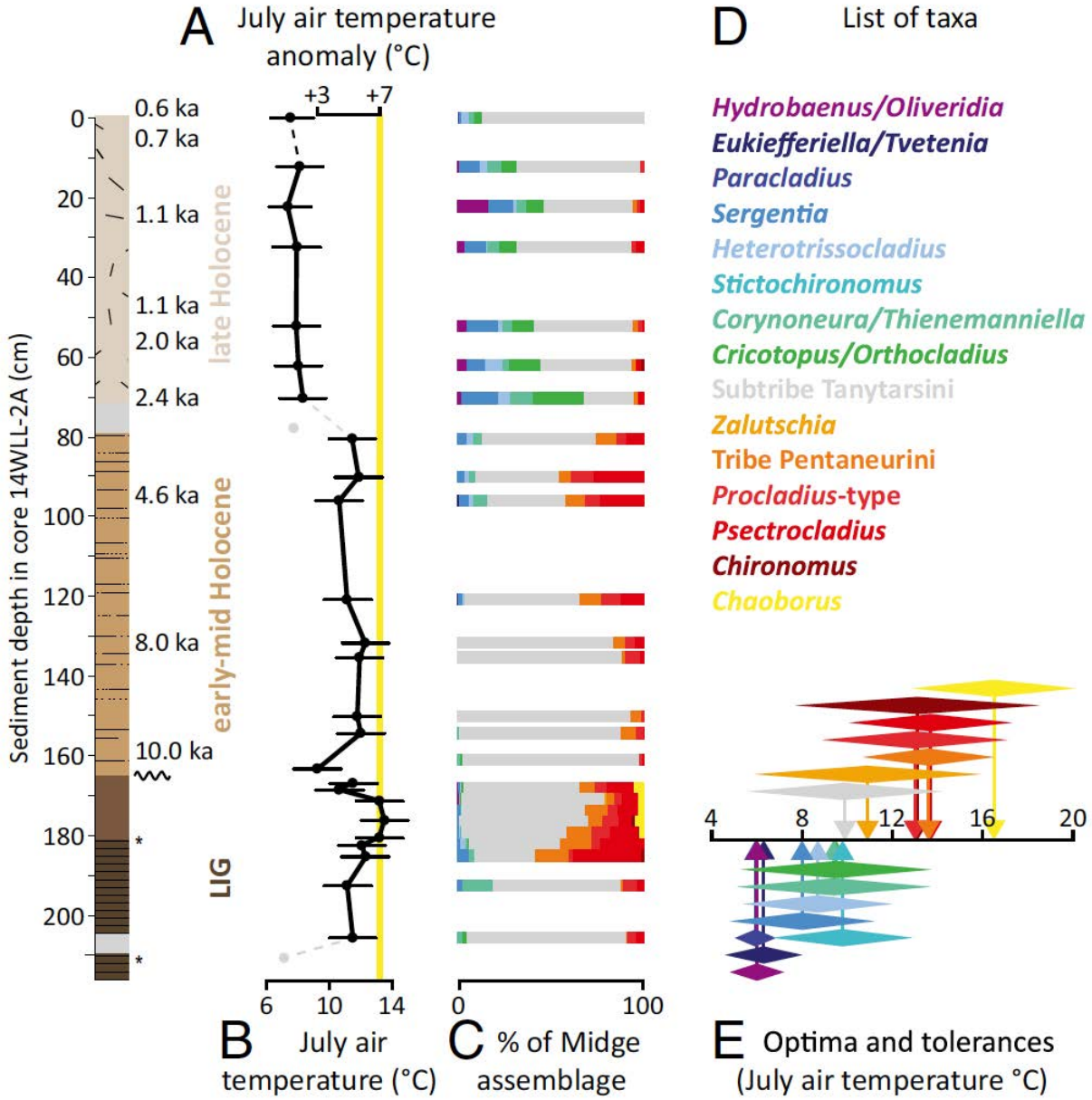
Lake Sediment Record of Holocene and Eemian

- HTM summer temps 4-7°C warmer than modern (1952-2014)
- Eemian summer temps 5.5-8°C warmer than modern



Potential Site Selection of Both Qaanaaq and South Dome with GreenTrACS2