

Solar influence on Greenland temperature anomalies over the past 1000 years

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The surface temperature of the Greenland ice sheet is among the most important climate variables for assessing how climate change may impact human societies associated with accelerating sea level rise. However, the causes of multi-decadal to centennial temperature changes in Greenland are not well understood, largely owing to short observational records. Greenland climate exhibited less warming than Northern Hemisphere (NH) average temperature during the 1960s to 1980s. Thereafter, Greenland has been warming rapidly, whereas the increase in the NH average temperature has been relatively slow. The Greenland temperature anomaly (GTA) relatively to the NH may be linked with the North Atlantic Oscillation/Arctic Oscillation (NAO/AO). Here, we show that the GTA has been caused by solar-induced NAO/AO-like patterns over the past 1000 years. Evidence indicates that the anomaly is likely linked with solar-paced changes in the Atlantic meridional overturning circulation (AMOC) and associated changes in northward oceanic heat transport.

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