



Oceanic control on the existence and stability of a Nordic Seas sea ice cover

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Changes in Northern Hemisphere sea ice cover has been suggested as an important driver for the abrupt fluctuations in North Atlantic temperature occurring throughout the last glacial period. Marine sediment cores from the Nordic Seas (Dokken et al., 2013) have indicated that such variations in the sea ice cover might be induced by ocean circulation changes, but a clear understanding of the dynamics that governs this ocean-sea ice interaction is incomplete. This highlights the importance of dedicated climate model experiments to make sense of the paleoclimate record.

In this study the influence of ocean circulation on the existence and stability of the Northern Hemisphere sea ice cover is explored using a simplified coupled atmosphere-ocean-sea ice model. We find that two stable modes exist; a warm state with a small seasonal sea ice cover in the Northern Hemisphere representing interstadial conditions and a cold stadial state with a large sea ice cover extending to 45N in the Atlantic basin.

By comparing these two different climate states we get a better understanding of the oceanic conditions necessary to form a large sea ice cover in the Northern Hemisphere and review how even small changes in ocean circulation might trigger abrupt retreat of sea ice.

Furthermore, this study emphasizes the importance of internal ocean-sea ice processes for maintaining a stable sea ice cover which also provides insights to the dynamics that control the time-scale of transitions between stadial and interstadial climate.