



## **Arctic sea ice loss – two distinct spatial and seasonal patterns related to the ocean state**

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The Arctic sea ice cover has decreased dramatically in recent decades. Typically focus has been on September when decreasing trends are largest and sea ice extent is at the minimum. However, decreasing sea ice trends are now significant for all months. By examining satellite observations of sea ice concentration since 1979 and an observational-based reconstruction of sea ice extent since 1850, we assess ongoing and past change in regional sea ice variability throughout the year. We find two distinct spatial and seasonal patterns of Northern Hemisphere sea ice variability throughout the observational record: summer variability and change inside the Arctic Ocean, and winter variability and change in the seas further south. In regions with largest summer variability, the recent ice loss is typically larger in spring than fall. The enhanced ice retreat in spring appears accelerated by the ice albedo feedback, while rapid fall freeze-up may be due to the strong salinity stratification. The winter variability in the seas further south, being less stratified and more affected by convection, have larger trends in fall than spring, indicating delayed and reduced ice formation in fall. These two patterns of Northern Hemisphere sea ice variability thus appear largely affected by the ocean state.