



Impact of reduced sea ice cover in the Barents-Kara Seas on wintertime atmospheric circulation in the Euro-Atlantic sector

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Sea ice loss in the Barents and Kara Seas (BKS) during early winter has been suggested as a potential driver of extreme winter conditions, particularly over northern Eurasia. Many observational and model studies agree on a transitional, two-phase atmospheric adjustment process in response to sea ice reductions, even though the timing and character of the response seems to be model-dependent. This study presents results from idealized sensitivity experiments with reduced sea ice conditions in the BKS using a fully-coupled operational seasonal prediction system. Initialized forecast simulations that represent realistic winter seasons of the recent hindcast period (1993-2016) with a well-resolved stratosphere in the atmospheric model component sets this study apart from earlier studies. The experimental set-up allows for taking into account inter-annual variability associated with planetary-scale teleconnections. The focus is on the winter season, both in terms of the introduced perturbation and the analysis, because of the largest effect of sea ice removal on the surface heat fluxes at this time of the year. Results indicate an initial, fast thermodynamic response over the heating area, very much along the lines of previous studies. By February, a prominent anomalous warm Arctic-cold continent pattern of surface temperatures is established. At the same time, sea level pressure and geopotential height anomalies imply a deep, equivalent barotropic circulation response that resembles the negative phase of the North Atlantic Oscillation (NAO) in the Euro-Atlantic sector. These preliminary results invite for a deeper analysis of the response, such as the previously demonstrated linear interference with the climatological wave pattern and changes in the position and intensity of the North Atlantic storm track.