

PAMIP Webinar Series

Improved teleconnection between Arctic sea ice and the North Atlantic Oscillation due to stochastic process representation

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Abstract

Observational data suggest the existence of a teleconnection between November sea ice in the Barents-Kara region and the winter (DJF) North Atlantic Oscillation (NAO). However, climate models do not straightforwardly reproduce this teleconnection, exhibiting only very weak signals with considerable inter-model spread. We show, using the EC-Earth3 climate model, that while an ensemble of coupled EC-Earth3 simulations shows no evidence of such a teleconnection, the inclusion of stochastic parameterizations to the ocean and sea ice component results in the emergence of a robust teleconnection comparable in magnitude to that observed. While the exact mechanisms causing this remain unclear, we argue that it can be accounted for by an improved ice–ocean–atmosphere coupling due to the stochastic perturbations, which aim to represent the effect of unresolved ice and ocean variability. In particular, the weak signals seen in climate models may to a large extent be due to model biases in surface coupling, with stochastic parameterizations being one possible remedy.



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