Idealised Arctic and regional sea ice cover predictions: initialisation month dependence

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Abstract

Seasonal to inter-annual predictions of Arctic sea ice cover are important for Arctic communities and industries alike. Based on lagged correlation analysis, a previous study indicated the presence of a melt season barrier, suggesting that the skill of predictions for the September minimum improved sharply when the initialisation was moved closer to the verification time. In this study analysis of a further five climate models corroborates this finding. By initialising idealised forecasts with a global climate model (HadGEM1.2) from January, May and July we also find that initialising predictions in July has strong advantages for the prediction of the September sea ice extent minimum when compared to predictions initialised in May (which is currently widely used to initialise operational summer seasonal forecasts).

Furthermore, we analyse predictions of regional ice cover which indicate that sea ice extent is predictable for far longer in the Pacific and Atlantic regions than in the Arctic basin, where skill in predicting extent is typically lost after the first summer.

In a number of the Arctic's marginal basins, only the July ensembles have significant predictive skill. In contrast, predictability of ice thickness persists for over two years in the central Arctic. This region contains much of the thickest ice and dominates pan-Arctic predictability. The skill of pan-Arctic volume predictions also increases sharply closer to September, causing predictions initialised in May to lose skill more quickly than those initialised in July.