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Seamless prediction systems prove potential for skillful Arctic sea-ice forecasts far beyond weather time scales

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Abstract

With retreating sea ice and increasing human activities in the Arctic comes a growing need for reliable sea ice forecasts. Recently, the first operational forecasting centers started to integrate dynamical sea ice models into their forecasting systems, thus providing a new generation of "seamless'' systems with the potential to boost our capabilities to predict sea ice weeks to months ahead. Here we assess for the first time the skill of these systems in predicting the location of the Arctic sea ice edge. We find that four out of the six systems are more skillful than a climatology-based benchmark for more than one week ahead. Averaged over the year, the best system provides skillful forecasts up to 1.5 months ahead; for late summer, when human activities in the Arctic peak, skillful predictions are possible even beyond 1.5 months. We argue that skill could be further extended through better initial conditions and more advanced forecast models. Our results highlight the fact that major improvements in the skill of long-term forecasts of Arctic sea ice are possible through investments in forecasting system development.