

EGU2020-13429

<https://doi.org/10.5194/egusphere-egu2020-13429>

EGU General Assembly 2020

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Effect of model initialization and sea ice data assimilation on the seasonal forecast of September Arctic sea ice extent in a coupled ocean-sea ice model

Keguang Wang¹, Qun Li², Caixin Wang¹, Jens Debernard¹, and Sarah Keeley³

¹Norwegian Meteorological Institute, Norway

²Polar Research Institute of China, China

³European Centre for Medium-range Weather Forecasts, UK

The METROMS is a coupled ocean and sea ice model based on the Regional Ocean Modeling System (ROMS) and the Los Alamos sea ice model CICE. It was employed for seasonal forecast of the September Arctic sea ice extent (SIE) in 2019 in the Sea Ice Prediction Network (SIPN), using a regional configuration of grid resolution 20km for the Arctic, the so-called Arctic-20km configuration. In the present study, we investigate the impact of model initialization and sea ice data assimilation on the seasonal forecast of the September Arctic SIE. The ERA5 atmospheric forcing is used to driver the model. The preliminary results indicate that model initialization plays a very important role in the seasonal prediction of September Arctic SIE. Experiments using different model initializations from climate monthly mean (CMM) and actual monthly mean (AMM) indicate that the AMM generally has a much higher prediction skill. The prediction skill also increases with decreasing prediction time. With a reasonable model initialization, SIC assimilation can significantly improve the prediction skill, particularly within two months. On the contrary, SIT assimilation tends to provide relatively small contribution to the September SIE prediction when model is reasonably initialized, due mostly to the fact that no data is available in the summer period.

How to cite: Wang, K., Li, Q., Wang, C., Debernard, J., and Keeley, S.: Effect of model initialization and sea ice data assimilation on the seasonal forecast of September Arctic sea ice extent in a coupled ocean-sea ice model, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-13429, <https://doi.org/10.5194/egusphere-egu2020-13429>, 2020