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Sea-ice edge forecast using damped persistence of probability anomaly

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Accelerated loss of the sea-ice cover and increased human activities in the Arctic highlight the need for meaningful prediction of sea-ice conditions at sub-seasonal to seasonal time scales. There is a large variety in the predictive skill of dynamical forecast systems, which can be benchmarked against reference forecasts based on present and past observations of the ice-edge. However, the simplest types of reference forecasts – persistence of the present state and climatology – do not exploit the observations optimally and thus lead to overestimation of forecast skill. For spatial objects such as the ice-edge location, the development of damped-persistence forecasts that combine persistence and climatology in a meaningful way poses a challenge. We have developed a probabilistic reference forecast method that combines the climatologically derived probability of ice presence with initial (present) anomalies of the ice edge. We have tested and optimized the method based on minimization of the Spatial Probability Score, using observed as well as idealized model data. The damping of persistence takes into consideration the temporal pattern of re-emergence and predictability of ice-extent in the Arctic. The resulting reference forecasts provide a challenging benchmark to assess the added value of dynamical forecast systems.

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