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Prospects for better seasonal Arctic sea ice predictions from multivariate initialization

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Predicting the summer Arctic sea ice conditions a few months in advance has become a challenging priority. A good knowledge of the initial sea ice state is necessary to hopefully produce skillful seasonal forecasts. However, most of the intrinsic memory of sea ice lies in its thickness distribution, and homogeneous observational networks of sea ice thickness are limited in space and time. To overcome this problem, we constrain the ocean–sea ice model NEMO-LIM3 with real observations of sea ice concentration using the ensemble Kalman filter. Because of the multivariate nature of this filter, sea ice thickness is globally updated in a consistent way whenever observations of concentration are available. We report the skill of 27 retrospective seasonal Arctic sea ice forecasts (1983-2009) with and without sea ice initialization, using a prescribed atmosphere. The results clearly exhibit the added value of sea initialization for seasonal prediction of the September ice concentration, in particular during the last decade. This suggests that current seasonal sea ice forecast systems could gain predictive skill from a realistic sea ice initialization.