Impact of sea ice thickness initialized in April on Arctic sea ice extent predictability

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The impact of the April sea ice thickness initialization on the September sea ice extent predictability is investigated based on a series of perfect model ensemble experiments using the MIROC5.2 climate model. Ensembles with initialization of the April sea ice thickness can accurately predict the September sea ice extent for greater lead times than those without initialization; up to 2 years ahead. The persistence of sea ice thickness correctly initialized in April contributes to the skilful prediction of sea ice extent in the first September, and in the second September through a summer-to-summer re-emergence mechanism. On the other hand, errors in the initialization of sea ice thickness in April cause errors in the predicted sea ice concentration and thickness in the Pacific sector from July to September and consequently influence the predictive skill of sea ice extent in September. The present study suggests that initialization of the April sea ice thickness in the Pacific sector significantly improves the forecast accuracy of the September sea ice extent by decreasing the errors in sea ice fields from July to September.

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