

Seasonal forecasts of the Arctic sea ice with CNRM-CM5.1

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Seasonal forecasts of the Arctic sea ice are performed with the CNRM-CM5.1 atmosphere-ocean global coupled model over the period 1990-2010. 5-month ensemble forecasts of September and March sea ice cover are initialized on May 1st and November 1st from an oceanic analysis built with the ocean-sea ice component of CNRM-CM5.1, namely the NEMO-GELATO ocean-sea ice model, driven by ERA-Interim atmospheric forcing. Skill scores of summer and winter forecasts of the Arctic sea ice extent are promising, and show that at 5-month lead time, sea ice predictability is mainly an initial value problem. These hindcasts also help to identify some mechanisms responsible for sea ice predictability at such time scale. The skill of September forecasts is mainly due to the role played by the volume and ice thickness distribution in spring. Thus, the system was able to predict sea ice anomalies as strong as those observed in September 2007 or 2012 as early as in May. By contrast, March predictability seems mainly due to the initial state of the ocean. Coupled ocean-sea ice processes, which seem to be well simulated in CNRM-CM5.1, also play a role. Such results are refined by investigating March forecasts in the marginal seas of the Arctic. Significantly good skills in the Barents sea, as well as in seasonal ice-free areas like in the Pacific sector, give insight into how sea ice predictability in the central Arctic ocean might be in future projected seasonally ice-free conditions.