An assessment of regional sea ice predictability in the Arctic ocean

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Arctic sea ice plays a central role in global climate, and its evolution on seasonal to interannual timescales is of importance for ecosystems, populations and a growing number of stakeholders. A prerequisite to achieve better sea ice predictions with models is a better understanding of the underlying mechanisms of predictability. Research has shown that sea ice predictability varies greatly depending on the parameter (area, extent, volume), region, initial and target dates, and climate model considered. Here we investigate seasonal-to-interannual sea ice predictability in the EC-Earth 2.3 climate model for predictions initialized from July 1st, which contributed to the APPOSITE project. Consistently with previous studies, we find robust mechanisms of reemergence, i.e. increases in autocorrelation of sea ice properties after an initial loss. A regional analysis indicates that Arctic regions can be classified according to three distinct regimes: the central Arctic seas, the peripheral seas and the Labrador Sea. Central Arctic drives most of the pan-Arctic sea ice volume persistence. In peripheral seas, we find trivial predictability of sea ice area in winter but low predictability throughout the rest of the year, due to the particularly unpredictable sea ice edge location. The Labrador Sea stands out as a remarkable region, with sea ice predictability extending up to 1.5 years if oceanic conditions upstream are known.