

Regional variability in the potential predictability of Arctic climate on seasonal to interannual time scales

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This study presents measures of the potential predictability of key Arctic climate variables, such as sea-ice concentration, thickness, and surface air temperature. The pan-Arctic averages and spatial patterns are considered to determine how spatially variable predictability is in this region.

Analysis is performed on seasonal to inter-annual predictions of present-day Arctic climate integrated with several state-of-the-art global climate models (GCMs) under the “perfect-model” assumption, as part of the APPOSITE project. Start dates were chosen to systematically sample different initial states of the Arctic climate, e.g. high versus low sea-ice coverage, and high versus low Atlantic heat transport.

The predictive skill in the variables considered varies spatially across the Arctic, and across different GCMs. Using a number of potential predictability measures enables us to determine the mechanisms for this spatial variability.

Since these results are obtained by assuming both an unbiased model and perfect knowledge of the initial conditions, they represent an absolute upper limit of predictive skill for the Arctic climate that we can achieve with the current generation of GCMs.