



Decadal predictability of frost days in the MPI-ESM-LR model

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The number of frost days (days with minimum temperature below 0°C) is a typical index for cold temperature extremes defined by the Joint CCI/CLIVAR/JCOMM Expert Team on Climate Change Detection and Indices (ETCCDI). It's predictability on inter-annual to decadal time scales bears economic and societal relevance, e.g. as basis for energy or agricultural policy planning.

As part of the MiKlip initiative for decadal prediction, annually initialised ensemble hindcast experiments with the Max-Planck-Institute Earth System Model in a low resolution configuration (MPI-ESM-LR, T63L47) have been carried out. For a period of 35 years (1961-1995) we analyze the number of frost days per season and grid point on a 5° x 5° longitude-latitude grid for the northern hemisphere stemming from ten/three ensemble member hindcasts produced with two different initialisation strategies. The ensembles are interpreted as probabilistic predictions of historically equiprobable three-category events (below normal, normal, above normal) and as such are compared to frost day counts from HadEx2 and the 20th Century Reanalysis. Prediction skill over climatological forecasts and uninitialised climate projections is assessed for various lead times using the Ranked Probability Skill Score (RPSS).