

Extended-range forecasts of near-surface temperature based on stratospheric predictors

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The potential for using polar night jet anomalies in statistical forecasts of near-surface temperature in specific regions of Europe and North Africa at the extended range is investigated, following the work of Christiansen (2005).

Daily fields of 1000-hPa temperature (12h), minimum temperature (2m) and zonal wind at stratospheric levels in the Northern Hemisphere of NCEP/NCAR (National Centers for Environmental Prediction / National Center for Atmospheric Research) reanalysis data were used in this work, with the spatial horizontal resolution available. The reanalysis data set covers a 48-winter (November to March) period of daily means, from November 1957 to March 2006. The seasonal cycle obtained from the original daily means was subtracted from the time series, resulting in daily anomaly fields and a 15-day running mean was applied in order to filter out short time scales. The influence of variations in strength of the stratospheric polar vortex is also analyzed by means of the Northern Annular Mode Index (NAM).

In this statistical model based on linear regression, predictands are daily temperatures near the surface and NAM Index while the predictors are daily zonal mean zonal wind at several lower stratospheric levels and predictands anomalies in different combinations. Results show statistical significant correlations between the stratospheric circulation and surface temperatures, giving further evidence of how stratosphere-troposphere coupling is important when tropospheric variability and surface forecast are concerned.

Christiansen, B., (2005): Downward propagation and statistical forecast of the near surface weather. *J. Geophys. Res.*, **110**, D14104.