Predictability of cold spring seasons in Europe

M. E. Shongwe (1), C. A. T. Ferro (2), C. A. S. Coleho (3), G. J. van Oldenborgh (1)

(1) Royal Netherlands Meteorological Institute, De Bilt, Netherlands (shongwe@knmi.nl), (2) National Centre for Atmospheric Science, University of Reading, UK, (3) Instituto Nacional de Pesquisas Espaciais, Cachoeira Paulista, Brazil

The seasonal predictability of cold spring seasons (March-April-May) in Europe from hindcasts/forecasts of three operational coupled general circulation models (CGCMs) is investigated. The models used in the investigation are the UKMO GloSea, ECMWF S2 and the NCEP-CFS. Using the relative operating characteristic score and the Brier skill score the long-term prediction skill for spring 2-m temperature in the lower quintile (20%) is assessed. Over much of central and eastern Europe the predictive skill is found to be high. The skill of the UKMO GloSea and ECMWF S2 models significantly surpasses that of damped persistence over much of Europe but the NCEP-CFS model outperforms this reference forecast only over a small area. The higher potential predictability of cold spring seasons in eastern relative to western Europe can be attributed to snow effects as areas of high skill closely correspond with the climatological snowline, and snow is shown in this paper to be linked to cold spring 2-m temperatures in eastern Europe.

The ability of the models to represent snow cover during the melt season is also investigated. The UKMO GloSea and the ECMWF S2 models are able to accurately mimic the observed pattern of snow cover, but the NCEP-CFS model predicts too short a snow season. Improvements in the snow analysis and land surface parameterizations could increase the skill of seasonal forecasts for cold spring temperatures.