



Long-term predictability of winter teleconnection indices and their relationship to seasonal temperature extremes in Europe

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European winter weather is dominated by several low-frequency teleconnection patterns, the main ones being the North Atlantic Oscillation (NAO), East Atlantic, East Atlantic/Western Russia and Scandinavian patterns. Through predicting these patterns, skillful forecasts of weather parameters like surface temperature can be generated, which in turn are used in a variety of applications (e.g., predictions of energy demand). A previous study (Weisheimer et al., 2017) found that the NAO was subject to decadal variability during the twentieth century, affecting its long-term predictability. During recent decades, predictions for the NAO index have shown considerable skill, but this is likely to change during future periods of reduced predictability.

We analyze the century-long ERA-20C reanalysis and ASF-20C seasonal hindcast datasets to find if the other main teleconnection patterns also experience fluctuations in predictability, with potential implications for future skill and development of seasonal forecasting models. By linking the teleconnections to extreme cold and heat wave indices (Russo et al., 2015), we highlight the impact of these large-scale patterns on seasonal surface temperature in Europe during two periods of interest in the middle and end of the century. Our study shows that even though the predictability of the teleconnection patterns themselves fluctuates on a decadal scale, the links to winter surface temperatures are not significantly affected. However, the ability of the seasonal hindcasts to reproduce these patterns is quite limited.

References:

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