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Predictability of temperature extremes in Europe and biases in Rossby wave amplitude

Georgios Fragkoulidis, Onno Doensen, and Volkmar Wirth
Institute for Atmospheric Physics, Johannes Gutenberg University, Mainz, Germany (gfragkou@uni-mainz.de)

This study investigates the medium-range predictability of persistent warm and cold extremes in Europe. To that end, deterministic ERA5 reforecasts for the period 1979-2019 are compared to the reanalysis of the respective period, thus providing a large sample for verification and bias identification. The seasonally-varying Gilbert skill score of both extreme event types reveals that cold extremes in summer exhibit particularly low predictability. A spatial variability also emerges for these scores with persistent extremes in northeastern Europe and Scandinavia generally achieving better predictability compared to other regions of Europe. Composites of basic reanalysis fields and their errors suggest that the aforementioned spatiotemporal variability in predictability is associated with differences in the typical synoptic conditions of each type of event. Moreover, it is shown that summer and winter in Europe suffer from a negative and positive bias in Rossby wave amplitude, respectively. Although the physical processes and model deficiencies involved are not straightforward to identify, we hypothesize that these biases constitute one of the factors that limit the predictability of temperature extremes at weather time scales.