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Subseasonal prediction of average vs extreme European land temperatures in S2S hindcasts

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The prediction of extreme events has been a main focus in subseasonal forecasting due to their potentially high impacts. Despite their undebatable significance, it is not clear that extremes are forecast any better than events close to the mean of the climatology. In our work, we address the question of whether subseasonal forecasting systems show different performance for extreme than for average events. For this, we focus on forecasts of area-averaged European land temperatures in 20 years of hindcasts from the ECMWF system. To compare the prediction skill of extremes at both ends of the distribution to that of average events in summer and winter, we use the Extremal Dependence Index (EDI) which is a forecast performance measure suitable for rare events. Our results suggest that there is higher prediction skill for summer warm extremes as compared to average events at lead times of 3 – 4 weeks, with some regional dependence. The same is not true for summer cold extremes, indicating an asymmetry in the processes causing opposite summer temperature extremes. In winter, our analyses indicate that the situation is reversed: here, the cold events are better predicted. The difference in EDI between extreme and average events is, however, less pronounced than in summer. Further, we find that the forecast performance is strongly improved by the most severe and persistent events inside the analyzed period. We hypothesize that the enhanced warm extreme skill in summer is related to persistent flow patterns and land-atmosphere interaction.