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Predictability of onset, duration, and intensity of hot temperature events in the ECMWF subseasonal forecast system

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Extended range forecasts can directly contribute to positive health and economic outcomes, making sub-seasonal forecasting highly relevant for society. However, the summer temperature prediction skill over Europe (for both average and extreme temperatures) quickly decreases beyond timescales of two weeks. The origins of prediction errors of sub-seasonal forecast systems in the onset, intensity, and duration of hot temperature events are not yet fully understood. We investigate the predictability and drivers of the prediction skill of hot events in the sub-seasonal forecast system of the ECMWF (European Centre for Medium-Range Weather Forecasts). The analysis is conducted over six European regions and for different lead times (7-21 days) during the period 1998-2017. The onset and intensity of hot temperature events is better predicted by the ECMWF model at shorter lead times, but there are lower errors in duration at longer lead times. Compared to ERA-Interim reanalysis data, the ECMWF model overestimates the duration and underestimates the intensity of hot extremes for all European regions and lead times considered. Overall, the errors in hot event duration and intensity increase in the higher temperature percentiles, with large inter-event variability in the errors estimated for the 50-75 percentile range.