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Seasonal prediction of European Summer Heatwaves

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Under the influence of global warming, heatwaves are becoming a major threat in many parts of the world, affecting human health and mortality, food security, forest fires, biodiversity, energy consumption, as well as the production and transportation networks. Seasonal forecasting is a promising tool to help mitigate these impacts on society. Previous studies have highlighted some predictive capacity of seasonal forecast systems for specific strong heatwaves such as those of 2003 and 2010. To our knowledge, this study is thus the first of its kind to systematically assess the prediction skill of heatwaves over Europe in a state-of-the-art seasonal forecast system. One major prerequisite to do so is to appropriately define heatwaves. Existing heatwave indices, built to measure heatwave duration and severity, are often designed for specific impacts and thus have limited robustness for an analysis of heatwave variability. In this study, we investigate the seasonal prediction skill of summer heatwave propensity in the ECMWF System 5 operational forecast system (SEAS5) by means of several dedicated metrics as well as its added-value compared to a simple statistical model. We are able to show, for the first time, that seasonal forecasts initialized in early May can provide potentially useful information of summer heatwave propensity.