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Sub-seasonal prediction of the 2003 European summer heat wave

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Due to its large socioeconomic impacts, the European summer heat wave of 2003 has been extensively evaluated in terms of its drivers, prediction, and relation to climate change. A strong and persistent anticyclonic anomaly over Europe – possibly related to a planetary wave train emerging from the Caribbean – set the stage for the extraordinary surface temperatures. It has further been shown that the exceptionally hot conditions were intensified by *in-situ* processes such as feedbacks between the land surface and the atmosphere. Concerning the heat wave's predictability, most studies have focused on seasonal anomalies of surface and dynamical tropospheric variables.

In our work, we approach this event from a sub-seasonal prediction perspective. For this purpose, we analyze re-forecasts of the summer of 2003 from a set of different sub-seasonal forecasting systems using the database of the sub-seasonal to seasonal (S2S) prediction project. We evaluate the models' skill in hindcasting both the surface anomalies and the large-scale synoptic situation. In the light of the established interactions between the land surface and the atmospheric dynamical evolution of the heat wave, the analysis reveals the components in the S2S forecasting system that are necessary to predict the event on weekly time scales.