Geophysical Research Abstracts
Vol. 21, EGU2019-351, 2019
EGU General Assembly 2019

Subseasonal Prediction of European Summer Heat Waves in the S2S Hindcast Ensembles

Ole Wulff and Daniela Domeisen

ETH Zurich, Institute for Atmospheric and Climate Science, Department of Environmental Systems Science, Zurich, Switzerland (ole.wulff@env.ethz.ch)

Due to their devastating impacts, the prediction of heat waves beyond the weather forecasting range is of great significance to society. The potential for successful subseasonal predictions of summer heat waves stems for instance from the fact that they are often related to persistent anticyclonic atmospheric circulation conditions. Especially when these systems are embedded in large-scale teleconnection patterns, it is possible to extend predictable lead times before the heat event. Furthermore, it has been shown that the likelihood of reaching extremely high temperatures increases strongly if soils are already dry prior to atmospheric circulations favoring high temperatures. As soil moisture acts as a memory of the near-surface atmospheric conditions, the coupling between the land surface and the atmosphere could provide further predictability in regions where it is strong.
In our study, we investigate the probabilistic skill of a subset of forecasting systems from the S2S database in predicting summer heat events in a number of European regions in the period from 1999 to 2010 on the subseasonal time scale. The skill analysis reveals regional and inter-model differences in the forecast skill and is complemented by an assessment of the drivers of specific heat events and how these are represented in the S2S forecasting systems. To evaluate the ability of the models to simulate the driving mechanisms, we split the hindcast ensembles retaining those members that perform best in forecasting predictors such as the large-scale modes of geopotential height variability, soil moisture, sea surface temperatures, and surface heat fluxes. The skill of the thus created sub-ensembles in predicting 2m temperatures is then compared to the forecast skill of the full ensemble. From this, we assess whether the chosen variable can serve as a predictor of heat waves in the different models. Our analysis reveals large differences between the models and single heat events regarding these relationships.