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The S2S predictability of European dry summers under prevailing North-Atlantic weather regimes

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Studies looking at the current climate change trend in the Mediterranean have highlighted longer summer droughts and intensification of these events out of season. Dry conditions have been more frequent in vast parts of north-western Europe, Scandinavia and Russia. Understanding if prevailing large scale atmospheric configuration are responsible for anomalous lack of precipitation and how predictable these conditions are, can help quantifying the available time to support containment actions. This information is crucial to plan, for example, mitigation measures and manage sharing of resources among European countries.

The idea of reducing extra-tropical atmospheric flows into a limited number of configurations stems from the principle that, despite the chaotic nature of the atmosphere, a finite number of recurrent, persistent and quasi-stationary states can be identified. These states are often called regimes and their identification can also be regarded as a process-oriented method in which the varying states of the atmospheric circulation are reduced to a few number. Once these regimes are classified they can be used to understand the link between the large scale dynamics and the local weather conditions.

In this paper we use Era Interim dataset to identify the North European-Atlantic weather regimes, which were prevalent during the summers between 1981 and 2017. Observed rainfall from the GPCC network is used to calculate Standardised Precipitation Index (SPI) at different accumulation scales (3,6,12 months) for the same 36 years and the latest of ECMWF seasonal forecasting system (System5) is used to predict SPI at different lead times(1 month to 6 months).

We will show to which degree dry European summers are the outcome of persistent and recurrent atmospheric flow configurations and to which extent the predictability associated to these atmospheric regimes lead to skilful sub-seasonal to seasonal drought forecast.