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Verification of ECMWF seasonal forecasts using Euro-Atlantic weather regimes

Nicola Cortesi (1), Nube González-Reviriego (1), Veronica Torralba (1), Raül Marcos (1), Doo Young Lee (1), Francisco Javier Doblas-Reyes (1,2)

(1) Barcelona Supercomputing Center, Barcelona, Spain, (2) Istitució Catalana de Recerca i Estudis Avançats (ICREA)

This research aims at assessing the goodness of the ECMWF seasonal forecasting system S4 in simulating the four observed Euro-Atlantic weather regimes (NAO+, NAO-, blocking and Atlantic ridge) classified with the ERA-Interim reference reanalysis. Interannual frequencies of occurrence, persistence and transition probability, as well as their impact on 2-m temperature and 10-m wind speed, were compared at monthly time scale.

Results show that S4 is highly skilled at reproducing, for all lead times (up to six months in advance), the spatial structure of the observed regime anomalies, their average interannual frequencies, persistences, transition probabilities and impact on wind speed and temperature, except during autumn months. Spring and summer months perform almost as well as the winter season.

However, S4 shows almost no skill in reproducing the interannual monthly variability of the frequencies of the regimes. Furthermore, S4 forecasts tend to underestimate the monthly frequency of occurrence and persistence of the NAO+ and NAO- regimes, and to overestimate the monthly frequency of blocking and Atlantic ridge regimes. Finally, S4 greatly underestimates the transition probabilities of NAO+ regime to NAO- regime and vice versa, and overestimates the transition probability from NAO+/NAO- regimes to blocking or Atlantic ridge.