EMS Annual Meeting Abstracts
Vol. 15, EMS2018-549, 2018

Reduction of climate model precipitation bias over continents in summer: method and impact on seasonal prediction skill

Constantin Ardilouze, Lauriane Batté, Michel Déqué, and Bertrand Decharme
CNRM UMR 3589 (CNRS/Météo-France), Toulouse, France

Soil moisture is a well-known source of summer potential predictability at the monthly to seasonal time scale, especially over regions of intense land-atmosphere coupling. However, improving soil moisture initialization in dynamical forecast systems leads to increased temperature and precipitation prediction skill over fewer regions than one could expect (Prodhomme et al. 2016, Ardilouze et al., 2017).

This limitation could originate from model precipitation biases, prone to rapidly spoil the soil moisture anomalies present in the land surface initial conditions. In particular, dry summer biases over the Great plains of North America are a common feature in many climate models.

In order to make the most out of soil moisture as a source of prediction skill, we implemented a method to reduce the precipitation bias throughout the CNRM-CM6-1 climate model integration. The intensity of precipitation intercepted by the land surface is corrected at each time step. This correction consists in applying a multiplicative factor to the simulated precipitation in the SURFEX land surface component of the climate model.

This method leads to a considerably reduced precipitation and 2-meter temperature seasonal bias over Europe and North America but also parts of Eastern Africa. It also reduces the bias in number of days with significant precipitation, although less markedly. Improvements are also found in the diurnal cycle of precipitation.
Results on the model mean climate for evapotranspiration, soil moisture and run-off are discussed. Finally, the impact of such a method is assessed on summer temperature forecast skill, using CNRM-CM6-1 in a summer seasonal hindcast framework.