Name: Lauriane Batté
lauriane.batte@meteo.fr
CNRM-GAME, Meteo-France
CNRM-GAME, Meteo-France
GMGEC/EAC
42 avenue Coriolis
31057 Toulouse Cedex 01
Country: France
Title: Impact of stochastic parameterizations on subseasonal to seasonal forecast quality in EC-Earth
Additional authors: Francisco J. Doblas-Reyes (2,3), Isabel Andreu-Burillo (2), Muhammad Asif (2)
Additional Affiliations: 2 Institut Català de Ciències del Clima (IC3), 3 Institució Catalana de Recerca i Estudis Avançats (ICREA)
Abstract:
Different approaches to stochastic parameterizations have been implemented in the atmospheric component of the EC-Earth3 earth system model to take into account model uncertainties in monthly to seasonal climate predictions. The stochastically perturbed parameterization tendencies scheme (SPPT, Palmer et al. 2009) consists in applying univariate Gaussian perturbations to the wind, temperature and humidity tendencies of the physical processes. The multiplicative noise is defined by a smoothly varying pattern in space and time. A second method currently implemented in EC-Earth3 is the stochastic dynamics technique (Batté and Déqué, 2012). This method consists in adding in-run random tendency error corrections to the prognostic variables, using previous relaxed atmospheric runs to estimate the error correction population from which the perturbations are drawn.

We examine the deterministic and probabilistic prediction skill of the EC-Earth3 Earth system model from weekly to seasonal time scales over a 1993-2009 hindcast period, and the impact of these techniques on results. Focus is set on winter and summer seasons, using 4-month lead hindcasts initialized in November and May of each year. We evaluate the quality of model output variables such as temperature and precipitation as well as atmospheric circulation patterns such as the North Atlantic Oscillation. These results will be compared to improvements obtained by increasing the horizontal resolution of the atmosphere and ocean components to levels never before achieved in long-range forecasting.
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