



## **Spread induced by initial perturbations in decadal forecasts: Where are the major sources of uncertainties?**

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A key challenge in producing skilful interannual-to-decadal climate predictions consists in developing and testing suitable initialization methods that produce the required ensemble spread. As initialisation errors propagate and grow during forecasts, an assessment of the spread induced by the initial perturbations is essential in pointing out the regions or climate components for which the initialization should be refined. We have assessed the ensemble spread in three sets of five-year long, five-member ensemble climate hindcasts produced with the EC-EARTH coupled general circulation model. The hindcasts are started every five years from 1960 to 2005, according to the CMIP5 experimental design. In the first experiment, initial perturbations are applied to both the atmosphere and the ocean states while in the two other experiments, initial perturbations are applied to either the atmosphere or the ocean. After a summary assessment of the decadal forecast quality of the EC-Earth system, we present estimates of the ensemble spread in various global and regional atmospheric (temperature, precipitation...) and oceanic (heat content, Atlantic meridional overturning circulation...) variables.