Seasonal-to-decadal probabilistic forecasts in the ENSEMBLES project

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ENSEMBLES is an ongoing EU project which, among other things, intends to develop a global coupled ensemble based modelling system for climate predictions from seasons to decades and beyond. In the first part of this contribution, results from three different approaches to address the problem of coupled model uncertainty on seasonal-to-decadal time scales will be to presented: (i) a multi-model ensemble built from a combination of different, quasi-independent dynamical circulation models, each with specific benefits and errors, into a single forecast system, (ii) an ensemble including stochastic parametrizations to account for the effects of unresolved physical processes, and (iii) an ensemble based on perturbed physical model parameters. The multi-model system improvement of seasonal to annual hindcasts, compared to single-model prediction systems, and reductions of systematic forecast error using stochastic physical parametrisation will be discussed. Motivated by recent proposals to explore the utility of "seamless" prediction methods across weather and climate timescales, in the second part of the presentation, we propose a novel method to calibrate probabilistic multi-model projections of climate change, based on a reliability diagram analysis of corresponding multi-model seasonal-forecast ensembles.