QUANTIFYING THE SKILL OF ENSEMBLE SEASONAL FORECASTS WITH BOUNDING BOXES

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The intrinsic uncertainties of nonlinear dynamical predictions of weather and climate due to inaccurate initial conditions and imperfect model formulations have lead to operational ensemble systems as the basis for probability based forecasts. Our contribution presents a new approach to assess the realism of uncertainty estimates obtained from ensemble simulations. The bounding boxes of an ensemble from a specific ensemble prediction system defines a region of state space within which the future is likely to fall with a certain probability. Quantifying what that probability is and how it varies with lead time provides both feedback for the modellers and operational information for forecast users. While verifying probabilistic forecasts made with imperfect models is a highly ambitious and complex task, we address somewhat rather simpler questions instead: How useful are the distributions obtained from ensemble forecasts? What is a reasonable size for an ensemble? Can we separate effects of model bias from those of having a small ensemble using the bounding box? What are reliable spatial and temporal scales at which the ensemble is able to capture the verification with a high probability? Results of the application of the bounding box concept to seasonal multi-model ensemble simulations (DEMETER) will be discussed.

See also Judd, Smith, Weisheimer: How good is an ensemble at capturing truth? Q.J.R. Meteorol. Soc., under review.