

A Verification Framework for Interannual-to-Decadal Predictions Experiments

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Abstract

A verification framework is proposed and illustrated for decadal hindcast experiments. Many outside the climate community are eager to use the hindcasts and forecasts for impacts studies and sectoral forecasts that use climate data as an input. However, the climate community is still investigating how to produce and assess the predictions that may or may not contain information on climate variability in addition to climate change. It is therefore crucial that there be a coordinated assessment of the prediction skill of these experiments that can guide their use.

The chosen metrics address key questions about the information content in the initialized hindcasts. These questions are: (1) Do the initial conditions in the hindcasts lead to more accurate predictions of the climate?; and (2) Is the model's ensemble spread an appropriate representation of forecast uncertainty on average? The first question is addressed through deterministic metrics that compare the initialized and uninitialized hindcasts. The second question is addressed through a probabilistic metric applied to the initialized hindcasts and comparing different ways to ascribe forecast uncertainty.

The framework provides information on forecast quality across prediction systems, such that relative comparisons can be made, and provides a baseline against which future improvements can be quantified. Additionally the framework provides guidance on the use of these model predictions, which differ in fundamental ways from the climate change projections that much of the community has become familiar with. This guidance includes correction of mean and conditional biases, and consideration of how to best approach forecast uncertainty.

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