Increasing the relevance of GCM simulations for Climate Services

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Abstract

The design and interpretation of model simulations for climate services differ significantly from experimental design for the advancement of the fundamental research on predictability that underpins it. Climate services consider the sources of best information available today; this calls for a frank evaluation of model skill in the face of statistical benchmarks defined by empirical models. The fact that Physical simulation models are thought to provide the only reliable method for extrapolating into conditions not previously observed has no bearing on whether or not today's simulation models outperform empirical models. Evidence on the length scales on which today's simulation models fail to outperform empirical benchmarks is presented; it is illustrated that this occurs even on global scales in decadal prediction. At all timescales considered thus far (as of July 2012), predictions based on simulation models are improved by blending with the output of statistical models. Blending is shown to be more interesting in the climate context than it is in the weather context, where blending with a history-based climatology is straightforward. As GCMs improve and as the Earth's climate moves further from that of the last century, the skill from simulation models and their relevance to climate services is expected to increase. Examples from both seasonal and decadal forecasting will be used to discuss a third approach that may increase the role of current GCMs more quickly. Specifically, aspects of the experimental design in previous hind cast experiments are shown to hinder the use of GCM simulations for climate services. Alternative designs are proposed. The value in revisiting Thompson's classic approach to improving weather forecasting in the fifties in the context of climate services is discussed.

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