Geophysical Research Abstracts
Vol. 16, EGU2014-13940, 2014
EGU General Assembly 2014

A framework for analyzing seasonal prediction through canonical event analysis

Eric Wood, Joshua Roundy, and Xing Yuan
Princeton University, Civil and Environmental Engineering, Princeton, NJ, United States (efwood@princeton.edu)

Hydrologic extremes in the form of wet and dry periods (flood and drought prone periods) have large impacts on society. The ability to predict such periods allows for preparations that can reduce the severity of these events on society. Such preparations require predictions at a seasonal timescales. While seasonal predictions from global climate models can provide forecasts at such timescales; their skill varies seasonally and spatially, which severely limits their practical use.

A better understanding of when and where climate models are skillful is assessed through hindcasts, which are usually limited to less than 30 years and are therefore prone to randomness and uncertainty. Until now, most hindcast analyses used to assess seasonal forecast skill have focused on a single temporal or spatial resolution ? often the model resolution ? even though it?s recognized that the fidelity of forecast skill deceases with lead time. In this work, we analyze ?canonical? forecast events, which are defined as space-time averaged forecasts that range from 2-week forecasts at leads 0 to 7 months to single 8 month seasonal average forecast (52 events), and spatially from forecasts for a single grid to an average forecast for an 8x8 grid area (9 events). Together this results in 468 canonical events per forecast, and 5612 events per year. To better understand the seasonal space-time skill, a probabilistic predictability metric based on model skill was developed across temporal and spatial scales; i.e. for the canonical events. This probabilistic predictability metric is demonstrated using the 28 year hindcast data set from NCEP?s Climate Forecast System version 2 for forecast of precipitation and daily maximum and minimum temperature. Additionally, the attribution of this skill to the El-Nino Southern Oscillation (ENSO) over the contiguous United States is also explored. The results show clear seasonal and spatial patterns of predictability that vary with each forecast variable and provide a better understanding of when and where to have confidence in model predictions. The influence of ENSO on the predictability was the strongest in the cold season, but varied with season and variable. The implications, limitations and extensions of this work for making seasonal predictions more useful are discussed, as well as extensions to multi-model seasonal forecasts systems where the approach may provide insights into how different forecasts may be weighted.