Session: C25 Poster: W77A

On North American decadal climate for 2011-2020

Martin Hoerling[†]; James Hurrell; Arun Kumar; Laurent Terray
[†] NOAA ESRL, USA
Leading author: Martin.Hoerling@noaa.gov

Our poster presents a study on the prediction and predictability of North American decadal climate for 2011-2020. The predictability of North American climate is assessed by taking into account both forced climate change and natural decadal-scale climate variability over the next decade. We estimate the "signal" in North American surface air temperature and precipitation over 2011-2020 associated with the expected change in boundary conditions related to future anthropogenic greenhouse gas (GHG) forcing, as well as the "noise" around that signal due to internally-generated ocean-atmosphere variability. We diagnose structural uncertainty in our estimate of decadal predictability by examining sensitivity to plausible scenarios for the GHG-induced change in boundary forcing, the model dependency of the forced signals, and the dependency on methods for estimating internal decadal noise. Our signal-to-noise analysis is thus different from other published decadal prediction studies in that we do not follow a trajectory from a particular initial state, but rather consider the statistics of internal variability compared to the GHG signal. Our results indicate that the 2011-2020 decadal signal is characterized by surface warming over the entire North American continent, precipitation decreases over the contiguous United States, and precipitation increases over Canada relative to 1971-2000 climatological conditions. The signs of these forced responses are robust across different sea surface temperature (SST) scenarios and the different models employed, though the amplitude of the response differs. The North American decadal noise is shown to be considerably smaller than the signal associated with boundary forcing, implying a potential for high forecast skill for 2011-2020 North American climate even for prediction methods that do not attempt to initialize climate models. However, our results do suggest that initialized decadal predictions, which seek to forecast externally-forced signals and also constrain the internal variability, could potentially improve upon uninitialized methods in regions where the external signal is small compared to internal variability, such as for decadal U.S. precipitation.