P75 WRF ensemble approach to evaluating regional climate responses to land cover change in the Northeastern United States

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Previous studies using WRF to evaluate regional climate responses to land cover change have traditionally relied on selecting a user-defined "optimal" model configuration, typically one with the lowest biases relative to observational temperature and precipitation. However, the performance of an optimal model configuration depends on several criteria, including the climate variables of interest, seasonal and diurnal responses, and lateral boundary conditions. As such, it can be challenging to identify any single model configuration that addresses multiple climate variables of interest as 'best' for their given application.

Here, we explore an alternative method that employs (1) an ensemble of sensible WRF V3.5 model configurations and (2) an end-member extreme approach to evaluate the multitude of climate responses that result from a land cover perturbation. The ensemble members include three land surface model configurations (Community Land Model (CLM4) and two configurations of the Noah-MP land surface model using the BATS and CLASS surface albedo options), two microphysics schemes (WRF Single Moment 6-class and Thompson New), and two shortwave/longwave radiation schemes options (Goddard/RRTM and CAM/CAM). The results of the 12-member extreme ensemble approach provide a range of uncertainty for winter climate responses to land use change in the Northeastern US.