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Sensitivity of Weather Forecasts over North America to Cycling of Initial Conditions

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Ensemble prediction systems should be capable of accurately representing the growth of errors from two general sources, initial conditions and model imperfections. Errors from the initial condition, even random ones, will grow with time as the system's chaotic dynamics will grow the components of the perturbation that project onto the system's growing structures. Model error must also be represented in ensemble prediction system, i.e. the aspect of the error that can be traced back to imperfections in the formulation of the numerical model rather than an error in the initial condition. Failure to represent these correctly will result in ensemble predictions that are biased and/or have insufficient dispersion, leading to a false certainty about future events.

In the present study we will address the influence of initial conditions' cycling and smaller scale adjustments on the performance of a real-time regional ensemble weather prediction system. For this purpose forecasts from an ensemble running over the North-American domain will be used. The ensemble includes perturbations in lateral boundary conditions and physical parameterizations. Performance of the system including both initial conditions cycling and adjustments will be compared to the control system by using both subjective and objective analyses.