Geophysical Research Abstracts
Vol. 19, EGU2017-5455, 2017
EGU General Assembly 2017

The Effects of the Amplification of Numerical Noise through Chaos on Predictability Studies

Brian Ancell
Texas Tech University, Geosciences, Lubbock, TX, United States (brian.ancell@ttu.edu)

Perturbation experiments are used widely within numerical weather prediction model frameworks to study predictability by investigating the effects of initial condition error and data assimilation on atmospheric forecasts. It has been discovered that perturbations within the Weather Research and Forecasting (WRF) model can create numerical noise that propagates horizontally at speeds substantially faster than any realistic physical mode. This noise is very small, and likely does not affect the atmospheric state within model simulations in areas where dry dynamics dominate. However, in areas of moist convection or precipitation, the noise can grow rapidly through chaos by nonlinear processes to significantly alter the state, potentially growing upscale. The growth of noise thus has the ability to cause a misinterpretation of the realistic effects of the perturbation in the first place, causing substantial issues when utilizing perturbation experiments. This work details the propagation and growth of numerical noise in the WRF model for a simulation of convection, and compares it to a number of perturbation experiments for which realistic perturbation growth is expected. The implications of these results in the greater body of literature is discussed.