



An Observationally-Based Method for Simulating Stochasticity in NWP Model Physics

Jian-Wen Bao (1), Cecile Penland (1), Stefan Tulich (1,2), Philip Phil Pegion (1,2), Jeffrey S. Whitaker (1), Sara A. Michelson (1,2), Evelyn D. Grell (1,2)

(1) NOAA/ESRL/PSD, Boulder, Colorado, United States, (2) CIRES, University of Colorado, Boulder, Colorado, United States

We have developed a method that is more general and suitable for accounting for the model physics uncertainty in ensemble modeling systems based on observations and datasets from large-eddy simulations. The essence of the method is a physically-based stochastic differential equation that can efficiently generate the stochastically-generated skew (SGS) distribution that is commonly seen in the statistics of atmospheric variable properties. A critical objective of this development is to upgrade the current operational algorithms in generating the model-error component of ensemble spread with improved ones that are more process-based and physically sound. The ongoing development involves (i) analyses of observations and dataset output from large-eddy simulations to specify parameters required for generating the SGS distribution, and (ii) implementing and testing the newly developed method in NOAA's GEFS. We will use the stochastic parameterization of convection-induced momentum transport at the subgrid scale to demonstrate the advantage of the newly developed method.