Direct generation of random number patterns on unstructured global grids for stochastic physics parameterizations

Ning Wang (1,2), Jian-Wen Bao (1), Georg Grell (1), Haiqin Li (1,3)

(1) NOAA/Earth System Research Laboratory, Boulder, CO, United States, (2) Cooperative Institute for Research in the Atmosphere, Colorado State University, Fort Collins, CO, United States, (3) Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO, United States

The stochastic physics parameterizations have been used operationally in global spectral models, such as ECMWF's IFS and NCEP's GFS, for ensemble forecasting. In these models, the random number patterns, required as input by these stochastic parameterizations, are generated on Gaussian grids. It is important to extend the algorithm that generates the random patterns on Gaussian grids so that random number patterns of the similar desirable stochastic characteristics can be effectively produced on unstructured grids.

We present two newly-developed methods to effectively and efficiently generate random number patterns on unstructured grids. These methods are based the use of different spherical transform methods and have been tested on two commonly used unstructured grids. We will demonstrate the potential advantages of these two methods with numerical experiments that are conducted using the new random patterns.