Geophysical Research Abstracts
Vol. 16, EGU2014-2108, 2014
EGU General Assembly 2014

Process-based evaluation of stochastic physics schemes

Claudio Sanchez and Keith Williams
United Kingdom (claudio.sanchez@metoffice.gov.uk)

The interest and usefulness of probabilistic forecasts for the evolution of the atmosphere is growing. They are routinely used to provide the probability of tropical cyclone trajectories, heat waves, colder-than-average seasons and other tailored probabilities. The main tool to produce these forecasts is the Ensemble Prediction System (EPS) where different members of the ensemble aim to simulate a slightly different but plausible evolution of the atmosphere. However, current EPS don't generate enough dispersion amongst ensemble members, so-called 'ensemble spread', thus the system underestimates possible transitions between different weather regimes.

The lack of dispersion and performance of atmospheric models partially comes from an incomplete description of the atmosphere, where some aspects of the interaction between subgrid process and large-scale flow are not fully represented. One of the preferred methods to represent the effects of subgrid variability on the large scale flow is the stochastic physics schemes. These schemes have been proven to be quite successful to increase the ensemble spread of an EPS and in some cases reduce climate biases. However, our understanding of the physical mechanisms that lead to these improvements remains poor.

In this study we aim to understand the impact of the stochastic schemes Stochastic Kinetic Energy Basckscatter (SKEB) and Stochastic Parametrization of Tendencies (SPT) on a variety of atmospheric processes such as Mid-Latitude Cyclones (MLC), Convectively Coupled Equatorial Waves (CCEW), and the MJO. These schemes can produce notable improvements, but they can also produce unrealistic representation of some process. Upgrades based on these findings are proposed and tested.