



## **A development of weeks 3&4 forecast through the NCEP GEFS**

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In order to provide ensemble based week 3&4 forecast to support NCEP Climate Prediction Center (CPC)'s operational mission, experiments have been designed through SubX project to investigate potential predictability in both of the tropical, and extratropical areas through: 1) Improving forecast uncertainty for the tropics through stochastic physics perturbations; 2) Considering the ocean's impact by using a 2-tiered SST approach; 3) Testing a new scale aware convection scheme to improve tropical convection. In the tropics, in addition to improving probabilistic forecast, the MJO skills have been improved from average 12.5 days (control – GEFS version 11) to nearly 22 days by applying all three new methodologies. For best MJO skill experiment, RMM2 skills could be extended to 27+ days. In the extratropics, pattern anomaly correlation (PAC) of 500hPa geopotential height for ensemble mean has been used to demonstrate potential predictability of large-scale pattern. Based on this investigation, PAC score is improved from 0.355 (control) to 0.41. CRPS of the Northern Hemisphere raw surface temperature (land only) is improved as well, but not as large as MJO skills and 500hPa ACs. A similar result has been found for CONUS precipitation. The results suggest calibration may be important to surface temperature and precipitation due to large model systematic error (or bias).

New set experiments have been started toward unification of NCEP numerical model through NGGPS project. The configurations are for NCEP next GEFS implementation (version 12) those are FV3 based GEFS with 25 km horizontal resolution (C384) and 64 vertical hybrid levels, out to 35 days, 31 ensemble members. There are many new upgrades comparing to SubX project experiments. A preliminary result has indicated there is potential improvement in terms of MJO skill, extratropical forecast skill for weeks 3&4.