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The accurate specification of observational errors in data assimilation is one of the most important parameters that can significantly impact the numerical weather prediction (NWP) analysis and forecast. The observational errors of GPS radio occultation (RO) in the current operational data assimilation system, namely, the GSI, are not estimated dynamically as that of many other types of observations.
The recent version COSMIC data presents bending angle standard deviation (STDV) for each individual RO observation. However, the STDVs are subject to tuning and scaling before can be used as dynamic errors. In this study, tuning and scaling were conducted based on the statistical comparison between the static errors and the STDVs to obtain the dynamic errors.
Three numerical experiments have been conducted, which include a benchmark run CTRL, a RO denial run NORO, and one using dynamic errors DYNE, to demonstrate the impact of dynamic errors. These experiments, which all assimilate conventional observations and satellite radiance, have been running over a month-long period with 6-hourly continuously cycles during August 2008. Results show that the use of dynamic errors overall impact the troposphere temperature and moisture fields in positive manners. Specifically, the DYNE on average fit the best to the EC temperature analysis, while both experiments with RO assimilated (CTRL and DYNE) clearly fit better to EC analysis and radiosonde temperature, especially at 200hPa. Removing GPSRO data lead the upper-air analysis system to fit more on the warmer aircraft data at 200 hPa region. Larger moisture biases are found in lower atmosphere in NORO over southern hemisphere. Major humidity RMSE reduction by using dynamic errors are also found majorly over southern hemisphere.
We also performed insightful investigation for tropical cyclones over the tropical regions where are of great importance for RO application. Results will be presented in another presentation.

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