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Poster

In this study, we demonstrate the impact of GPS radio occultation (RO) bending angle dynamic error on tropical cyclones with a global framework, namely, the Global Forecast System (GFS) and the Gridpoint Statistical Interpolation (GSI).
The tropical cyclones are known as poorly observed since they occur mostly over open oceans where conventional observations are usually scarce. Therefore, RO observations are expected to help predict tropical cyclones due to its global distribution and high vertical resolution. However, the RO observations could contain large errors in the lower troposphere over tropical regions due to the presence of large amount of moisture. On the other hand, we want to use as much information and as accurately as possible from the precious observation available from ROs. In this case, the accurate estimate of RO errors is of great importance.
The dynamic errors derived from the COSMIC bending angle standard deviation (STDV) are employed in this study to investigate their impact on tropical cyclones. Three numerical experiments have been conducted over a month-long period with 6-hourly continuously cycles during August 2008, which include a benchmark run CTRL, a RO denial run NORO, and one using dynamic errors DYNE. All experiments assimilate conventional observations and satellite radiance, and differ with each other by RO assimilation. Results show that the DYNE run with dynamic errors assimilated performs the best statistically and individually for both track and intensity forecast. One of the reasons is that DYNE intensifies faster than other runs, which then leads more accurate forecasts of both track and intensity. On average CTRL run that assimilates RO data with static observational errors does not always perform better than NORO.
Investigation shows that the use of dynamic errors positively impact tropical cyclones' forecast through modifying the humidity and other critical fields at low-middle atmosphere. Specifically, CTRL has drier low atmosphere in the inner core regions even than NORO, which does not favor the development of storms. This is because CTRL on average weights too much on RO instead of the co-existing dropsondes. However, adding RO brings in wet effect on average especially to the environment. NORO is too dry to the northwest environment to favor storm's

development.
In summary, the more accurate estimate of RO errors cause DYNE the moistest at low levels and driest aloft for both the inner core regions and environment. The impact of dynamic errors on the moisture filed in turn modifies other relevant thermodynamic and dynamic fields, and eventually lead the DYNE to produce the best forecasts of intensity and track.
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