

Assimilating GNSS RO observations into NOAA operations

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On May 26, 2020, NWS/NCEP started operational assimilation of the GNSS radio occultation (GNSS-RO) measurements from the FORMOSAT-7/COSMIC-2 mission (COSMIC-2 hereafter) in its Global Forecast System (GFS). This was a result from an extensive data quality assessment and impact studies since the launch of COSMIC-2 in June 2019. Assimilating COSMIC-2 bending angles leads to overall significantly positive impacts, with reduction of model biases and root mean square errors against in-situ measurements, mostly for tropical areas at upper levels. However, working areas were also identified for further improvement especially for the lower level moisture rich areas, where a high percentage of data being rejected due to the discrepancies between the model simulations and observations. Lately, NOAA started introducing GNSSRO observations from commercial vendors and the near-real-time evaluation is underway. These observations complement COSMIC-2 (and other GNSSRO) networks with global distributions. These ongoing studies and implementations have confirmed the importance of GNSSRO to the NWP systems on improving the forecasts as a steering anchor, but also indicating the weakness of current system for maximizing the benefits of these observations (e.g., lower troposphere, observation errors, quality controls). This paper will present the results from above-mentioned studies and introduce ongoing efforts to fulfill the gaps in these working areas.