Statement of work

- Participate in studies to use satellite data to quantify the uncertainty of Global Positioning System (GPS) radio occultation COSMIC-2 refractivity, bending angle, temperature, and water vapor profiles specifically focusing on mid- and lower-troposphere.
- Provide support for using satellite-based Radio Occultation (RO) derived atmospheric profiles for assimilation into National Weather Service (NWS) numerical forecasts and models by providing spatial and temporal COSMIC-2 bending angle and refractivity error estimate for further numerical forecast experiment.
- Quantifying impacts of the optimal estimates of RO bending angle observation uncertainty (known as Local Special Width - LSW) at all the vertical levels for each individual RO profile, and assess its impact of RO data on global numerical weather prediction.

Working list

1. NOAA ICVS (Integrated Cal/Val System) for GNSS-RO Monitor
   - Monitoring RO product parameters and instrument performance at all levels.
   - Routine comparison of profiles with those from radiosondes and model output
   - Near real time and long-term monitoring of the parameters.
2. GNSS-RO L3 MMC Product
   - Construct temperature monthly mean climatology (MMC) from multiple RO missions. The sampling errors for each mission for each individual months are estimated by using NCEP, ERA5, and MERRA-2 reanalysis data. The mean and standard deviation of the mean sampling errors are estimated.
3. Total Column Water Vapor Validation
   - inter-comparison of water vapor profiles using UCAR, ROMSAF and STAR wet profile products to demonstrate the uncertainty caused by using different 1Dvar algorithm.
4. Radiosonde calibration
   - Quantify and calibrate radiosonde temperature and water vapor bias for each individual instrument.

Paper in preparing

- inter-comparison of COSMIC-2 bending angle and refractivity profiles using ROPP and FSI C2 products to demonstrate the "potential structure uncertainty" caused by using different inversion approaches