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Oral
Radio Occultation (RO) measurements have been an essential part of NOAA’s operational forecasting. NOAA obtains RO data from its flagship Constellation Observing System for Meteorology, Ionosphere, and Climate -2 (COSMIC-2) mission and other RO missions, including data from commercial weather data (CWD) vendors. NOAA Center for Satellite Applications and Research (STAR) continually monitors and assesses the RO data's quality at different processing levels obtained from these different RO missions. This continual monitoring and quality control require building capabilities to process the RO data at various processing steps.
GeoOptics is one of the CWD vendors that provide RO data to NOAA. GeoOptics takes RO measurements from a nanosatellite constellation, Community Initiative for Cellular Earth Remote Observation (CICERO). Currently, NOAA Center for Satellite Applications and Research (STAR) is processing the RO data obtained from different RO data providers, including GeoOptics. Now, GeoOptics provides RO data from two polar-orbiting CICERO satellites. From Dec. 17, 2020, to Jan. 14, 2021, GeoOptics provided ~960 RO profiles per day.
This study presents an independent RO processing system that inverts geometry and phase (Level 1b) GeoOptics data obtained from UCAR to bending angle and refractivity profiles using the Full Spectrum Inversion (FSI) method. We have successfully processed COSMIC-2 geometry and phase to bending angle and refractivity profiles using the same method.
We will use the FSI method to process 31 days of data from 2020-12-15 to 2021-01-14. The quality of the L1b data will be assessed separately for GPS and GLONASS signals, and we will evaluate the quality of the FSI retrievals by comparing with bending angle refractivity profiles calculated from collocated European Center for Medium-Range Weather Forecasts (ECMWF) climate reanalysis version 5 (ERA5) data in the same period. We will also present a profile-to-profile comparison with the UCAR-derived CICERO profiles with those from the FSI retrievals.
The GeoOptics RO data includes data from Global Positioning System (GPS) and the GLObal NAvigation Satellite System (GLONASS). Out of the 960 daily profiles, 848 profiles (88.3 %) were successfully processed to obtain bending angles, refractivity profiles, and 550 profiles passed the internal quality control. Their Signal-Noise-ratio (SNR) ranges from 150 – 1100 v/v at L1 frequencies for both GPS and GLONASS, and from 50 – 500 v/v and 50 – 950 v/v at L2 frequencies for GPS and GLONASS, respectively. Initial validation of the STAR FSI processing shows that the mean bias between STAR and UCAR CICERO bending angle and refractivity is equal to 0.1 % at 8 – 40 km.
Presentation file
adhikari-presentation.pdf
Meeting name
8th International Radio Occultation Working Group Meeting - IROWG-8
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