

Analysis of the coverage of radio occultation electron density profiles over the Brazilian region

With the development of GNSS (Global Navigation Satellite System) and LEO (Low Earth Orbiting) satellites missions, new possibilities of terrestrial atmosphere investigations emerged, among these the use of the GNSS radio occultation technique. From the GNSS satellites to the receivers at the LEO satellites, the propagated signals are influenced by the atmosphere which causes the refraction of the signal, that propagates as a curved line between the satellites (transmitter and receiver). This effect allows the retrieval of refractive index, that carries several information of the atmosphere composition, such as pressure, temperature and electron density. Since GPS/MET (Global Positioning System/Meteorology) experiment (1995-1997), several radio occultation missions were launched and confirmed the potential of the technique, such as CHAMP (Challenging Mini-satellite Payload) (2001-2008), SAC-C (*Satélite de Aplicaciones Científicas-C*) (2001-2013) and COSMIC (Constellation Observing System for Meteorology, Ionosphere and Climate) (2006-present). COSMIC mission is a collaborative mission between NSPO (National Space Organization) in Taiwan and UCAR (University Corporation for Atmospheric Research) in the United States. The COSMIC constellation (composed by six satellites) provided over 2000 occultations per day with the final configuration. The mission success led to the following mission COSMIC-2, that will be able to track not only GPS, but also GLONASS (Global Navigation Satellite System) and Galileo data. Studies related to the electron density in the ionosphere have particular importance for applications in the Brazilian region due to its high impact on several applications over the large territory extension, located in the equatorial region and affected by the Equatorial Ionization Anomaly (which presents higher intensity at the local anomaly peak, approximate geomagnetic latitude of 15°). In this context, the radio occultation technique can lead to significant improvements in the ionospheric monitoring and comprehension due to its data homogeneity distribution. In this study, we intend to investigate the amount of radio occultation ionospheric profiles over the Brazilian region, considering all radio occultation missions with data

available at CDAAC (COSMIC Data Analysis and Archive Center), since mission's launch until nowadays. COSMIC present a significant higher number of occultations compared to other missions due to the constellation of six satellites and its configuration. Summing up the good spatial distribution of RO electron density observations to the relevance of ionospheric studies to many applications over the Brazilian area, reporting the statistical analysis regarding the coverage, as well as spatial and temporal resolutions, is an important aspect for any future systems focused on using RO data for ionospheric analysis and modeling.