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COSMIC
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Oral
Small-medium scale (up to 50 km) ionospheric plasma irregularities are a ubiquitous feature of the earth’s F region ionosphere. COSMIC radio occultation measurements provide a valuable opportunity to improve upon the incomplete global observational picture of these irregularities. A climatological database of ionospheric irregularities and their characteristics (e.g. magnitude, scale size, gradient, and associated scintillation) has been developed through detection of total electron content (TEC) perturbations by COSMIC precise orbit determination (POD) antennas and associated receivers. Vertical scale sizes ranging from ~1 to 50 km were resolved from 1 Hz TEC measurements stored in podTec files. Amplitude scintillation index (S4) of ScnLv1 files was used as a proxy for the occurrence of smaller scale (<10 km) scintillation producing structures.
Four years of processed data (2007-2008 and 2012-2013) has revealed that irregularities with corresponding scintillation signatures were observed in predominantly low and high latitude regions, while non-scintillation producing irregularities were observed in both mid and high latitude regions. Occurrence and characteristics of scintillation and non-scintillation producing irregularities had a significant dependence on local time, season, solar wind condition, and geomagnetic activity level. This dependence provides insight into the source and generation mechanisms of irregularities observed at particular latitude regions, including gravity wave perturbations and solar wind/magnetospheric sources.
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