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Oral

Equatorial plasma bubbles (EPBs) are known to cause random fluctuations (i.e., scintillations) in the amplitude and phase of GPS signals, which can result in loss-of-lock with one or more satellites. Currently, the agencies around the world that monitor and forecast space weather do not provide routine GPS scintillation predictions for low-latitude regions. The reason that reliable forecasts have not been developed is primarily due to a lack of understanding of the daily variability in EPB occurrence. Accurate EPB forecasts will allow users of satellite communications to adapt to the changing space weather conditions and ensure minimal impact on satellite-reliant activities.

The climatology of EPBs has been extensively studied and correlated with the angle between the magnetic field and the solar terminator, which controls the strength of the post-sunset pre-reversal enhancement in the upward plasma drift. However, day-to-day variability is less well understood. In previous works, the COSMIC RO data appeared to be more sensitive to EPBs than ground-based GPS systems, particularly for stations beneath a low-density ionosphere. Therefore, COSMIC RO data provides a unique opportunity to extend this database and capture unseasonal events not detectable by ground-based GPS stations.

This work presents an unseasonal EPB event in the Southeast Asian longitude sector during July 2014. In the ground-based GPS data in this study, the scintillation was only observed for satellite links with low elevation angles; these data are typically attributed to “multipath” and are removed from statistical analyses. The July 2014 scintillation event was also measured by COSMIC and other nearby ground-based instrumentation, which clearly indicates that the scintillation was due to an unseasonal EPB event. An analysis of the well-known climatology and the prevailing solar wind conditions in this study reveals no clear driving mechanism(s) for this EPB event. Ultimately, building an accurate EPB prediction capability relies on the physical understanding of these unseasonal events.

OSTS session

Regional and Global CAL/VAL for Assembling a Climate Data Record

Meeting name

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