



Scintillation Hole Observed by FORMOSAT-3/COSMIC

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Ionospheric scintillations can significantly disturb satellite positioning, navigation, and communication. FORMOSAT-3/COSMIC provides the first 3-D global observation by solo instrument (radio occultation experiment, GOX). The GPS L-band amplitude fluctuation from 50Hz signal is received and recorded by F3/C GOX to calculate S4-index from 50-800km altitude. The global F3/C S4 index are subdivided and examined in various latitudes, longitudes, altitudes, and seasons during 2007-2012. The F-region scintillations in the equatorial and low-latitude ionosphere start around post-sunset period and often persist till post-midnight hours (0300 MLT, magnetic local time) during the March and September equinox as well as December Solstice seasons. The E-region scintillations reveal a clear solar zenith effect and yield pronounced intensities in mid-latitudes during the Summer Solstice seasons, which are well correlated with occurrences of the sporadic E-layer. It is interesting to find there is no scintillation, which is termed "scintillation hole", in the E region ranging from 80 to 130km altitude over the South Africa region, and become the most pronounced in November-January (December Solstice seasons or summer months). Other space-borne and ground based observations are used to confirm the existence of the scintillation hole.