

Ionospheric irregularity observation by VHF radar and GNSS scintillation monitor at Sanya

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Ionospheric irregularity is an important issue of ionospheric research and application in the low latitude area. A coherent scatter radar operating at 47.5MHz and several GPS/GNSS ionospheric scintillation monitors are co-located at the low latitude Sanya observatory of IGGCAS for the purpose of observing the ionospheric irregularity with different scale sizes. Statistical analysis of irregularity echoes observed by VHF radar and ionospheric scintillation index derived from GPS observation indicates that the ionospheric irregularities mostly appear after sunset and disappear before midnight. Regarding the seasonal occurrence, the E region ionospheric irregularities can be detected by the radar throughout the year, while F region irregularities mostly observed during the equinox month. Analysis of the drift velocity of ionospheric irregularities retrieved from the spaced GPS monitors and beam steering measurement of VHF radar shows that the 3m and 400m size ionospheric irregularities consistently drift from the west to the east with a velocity of about hundred meters per second. With the development of GNSS constellation, a GNSS ionospheric scintillation monitor which can receive multi-constellation satellites signals started to operate at Sanya observatory. The drift velocity calculated from the Geostationary satellite (Beidou and SBAS) observation is in accord with that calculated from the VHF radar beam steering measurement. The multi-constellation GNSS scintillation observation, as an important supplement to the radar observation, has shown good prospect in the ionospheric irregularity monitoring and research.