



Relationship between strong range SF and ionospheric scintillation in low latitude ionosphere

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The data from the Digisondes and the ionospheric scintillation monitors located at the low latitude station Hainan (109.1°E, 19.5°N geogr., dip lat. 9°N) and Vaino (141.3°E, 2.7°N geogr., dip lat. 11°S) are analyzed to study the ionospheric spread F (SF) and its correlation with the scintillation. According to the Digisonde observation in the low latitude ionosphere, we divide the SF as four types: range SF (R-SF), strong range SF (S-SF), frequency SF (F-SF), and mixed SF (M-SF). The S-SF is characterized by extended range spread on F layer echo traces that significantly extend beyond the local foF2 value. For the Hainan station, the results show that the maximum and minimum of the occurrence of S-SF appeared in nearly the same months as those of the GPS L-band scintillations. The variation of the S-SF occurrence was also similar to that of the scintillation. From 2003 to 2007, both the S-SF and the scintillation occurrences decreased from the high solar activity year to the low solar activity year. The correlation coefficient between the occurrences of the S-SF and the GPS L-band scintillation was as high as 0.93 suggesting associated mechanisms producing S-SF and scintillation. For the Vaino station, the data analysis showed that the occurrence variation of the S-SF was also similar to that of the scintillation. The correlation coefficient between the two phenomena was as high as 0.88, which supports the view of the associated mechanisms to produce S-SF and scintillation. Electron density depletions extending from the bottomside to the topside ionosphere are the most likely cause explaining the high correlation.