Analysis of Ionospheric Scintillation spectral and TEC in the Chinese low latitude region

Guozhu Li (1,2,3), Baiqi Ning (1) and Hong Yuan (4)

(1) Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, China, (2) Wuhan Institute of Physics and Mathematics, Chinese Academy of Sciences, Wuhan, China, (3) Graduate School of Chinese Academy of Sciences, Beijing, China, (4) Academy of Opto-electronics, Chinese Academy of Sciences, Beijing, China (GZLee@mail.igcas.ac.cn)

GPS L-band scintillations and total electron content (TEC) were recorded at Sanya (18.33°N, 109.52°E) for the period July 2004 - July 2005. Automatic recorded raw digital scintillation data are analyzed to obtain the spectral characteristics of irregularities producing ionospheric scintillations, and to estimate the correlation between amplitude scintillation and power spectral density. Concurrent measurements of TEC were used to analyze ROTI, defined as the standard deviation of the rate of change of TEC. Results show that spectral slope and auto correlation interval correspond quite well with amplitude scintillation index (S4) during the generation, evolution and decay phase of scintillation activity, which indicates the formation, evolution and erosion of small-scale irregularities. The statistical results of S4 indices and spectral slopes indicate that the spectral slopes increase with S4 indices for weak scintillation ($S4<0.3$), but for moderate and strong scintillation, spectral slopes tend to be in saturation. It is also find that the large and small scale irregularities coexist when scintillation occurs. In the analyzed dataset, the ratio of ROTI/S4 is found to vary between 0.3 and 8.