

Analysis of ionospheric scintillation in Chengdu, China

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The ionosphere is an important part of geophysical space. When wireless electromagnetic waves traverse the earth's atmosphere, they are affected by the ionospheric irregular body, and their amplitude and phase will rapidly shake in a short time^[1], which is called ionospheric scintillation. With the human exploration of extraterrestrial space and the need for space communication, it is also increasingly important to study the characteristics of ionospheric scintillation and its impact on electromagnetic communication^[2-5]. This article uses the observation data received by the GPS scintillation/TEC receiver in the Chengdu (104.07°N, 30.67°E) area of China from January 2018 to December 2019, and writes a data processing program to the received GPS/BDS/GAL The satellite data is processed to extract key data such as S4 (amplitude scintillation index), azimuth, pitch angle and SNR (carrier-to-noise ratio), and analyze and draw a time series map to statistically analyze the occurrence of ionospheric scintillation in Chengdu area^[6]. Features of annual changes and local changes. The results show that the frequency and intensity of ionospheric scintillation events have obvious semi-annual changes. The intensity and frequency of scintillation in spring and summer seasons are higher and more frequent than those in autumn and winter seasons; It mostly occurs in the afternoon hours; the scintillation value of S4 has a significant negative correlation with the SNR, the occurrence of scintillation events has a spatial correlation, and is closely related to the elevation angle and azimuth of the observation point; the annual scintillation events in 2018 More than in 2019, a long-lasting scintillation event occurred at the end of May 2020; further analysis shows that the occurrence of scintillation events increases with solar activity and the rapid changes in the geomagnetic environment, and has a certain positive correlation.

The law of the frequency intensity of the ionospheric scintillation event in May 2018 with the number of days in Chengdu (the figure is obtained by calculating the data received from the satellite by writing the data processing program software)

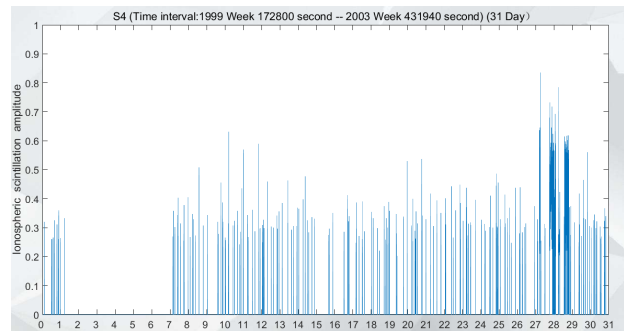


Figure 1. scintillation event

Acknowledgments

This research was funded by Sichuan Science and Technology Program (No. 2019YJ0188), the National Natural Science Foundation of China (No. 61671116, 61771096, 11905026), National Key Research and Development Program of China (No. 2019YFA0210202) and Fundamental Research Funds for the Central Universities (No. ZYGX2019Z006, ZYGX2019J012).

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