



Verification and Research of Ionospheric Scintillation Controlled by the Earth's Magnetic Field

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A mass of S4 index profile reflecting ionospheric scintillation can be obtained by GPS occultation. The upper and lower boundaries of ionospheric irregularities can be approximate determined by the changes of S4 index in the profile. However, there is no definite conclusion about the geometry of ionospheric irregularities, especially the spatial distribution features. It is deduced that the irregularities in F region of ionosphere has distribution characteristics along the direction of magnetic field. Therefore, we used the S4 index provided by a large amount of COSMIC scnLv1 data to calculate the relationship between the ray path in the middle and low latitudes and the magnetic field included Angle-Altitude-Latitude-Occurrence rate to verify the tubular structure of the distribution along the magnetic field of the irregularities in F region. When the occultation ray path is parallel to the magnetic field, the occurrence rate of the high value of S4 index is significantly higher than that when the ray path is perpendicular to the magnetic field; With the extension of latitude from low to medium to high, the central height of high occurrence rate gradually decreases. At the same time, the forward simulation of the collision rate of the random azimuth Angle of a finite long ray across a tubular body in a finite two-dimensional space is also carried out.