

Observation of GPS phase fluctuations over Tromsø under low solar activity

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This study investigated the GPS phase fluctuations over the high-latitude site, Tromsø, Norway, during the low solar activity years 2007-2008. The index of GPS phase fluctuations, Fp, was used to quantify GPS phase fluctuations. It is noted that the method calculating the Fp index was proposed by Mendillo et al. [2000]. The classes $50dFp < 200$ and $Fpe200$ were set to represent moderate and strong irregularities, respectively. This investigation examined the seasonal and diurnal variations of Fp and the correlation between Fp and the geomagnetic index, Kp. Figure 1 shows that $Fpe50$ and $Fpe200$ occurred more frequently in the equinoctial months. For the diurnal variation, the occurrences of $Fpe50$ were higher during 18:00-04:00 LT. The duration and starting times of $Fpe50$ were shorter and later in summer than in other seasons. In Figure 2, the value of Fp generally increased with an increasing Kp in both daytime and nighttime. Furthermore, through comparing the electron density profiles of EISCAT radar with Fp (Figure 3), $Fpe50$ mainly occurred when the electron density in the E-region was enhanced.

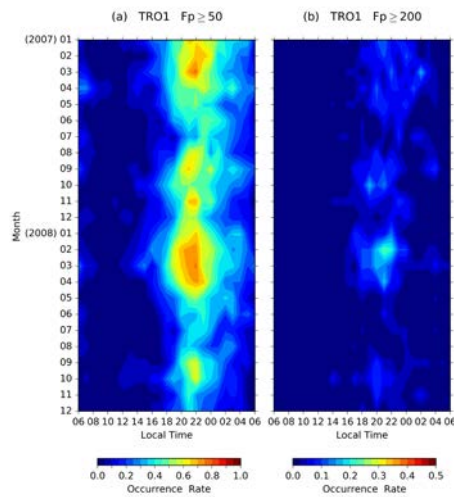


Figure 1. The hourly occurrence rates of (a) $Fp \geq 50$ and (b) $Fp \geq 200$.

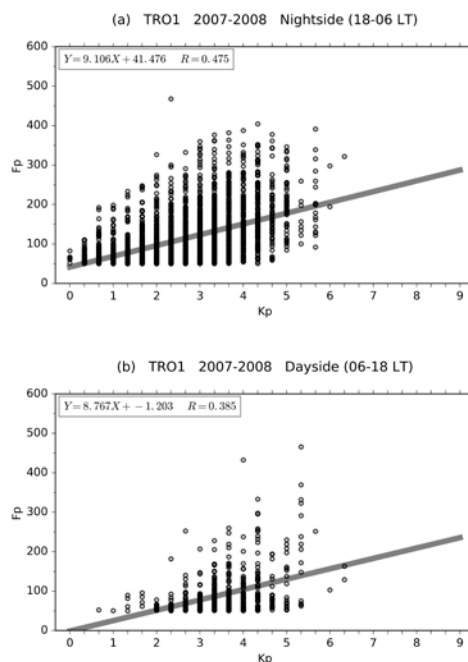


Figure 2. The scatter plots of Fp against Kp for (a) the nightside sector (18-06 LT) and (b) 659 the dayside sector (06-18 LT).

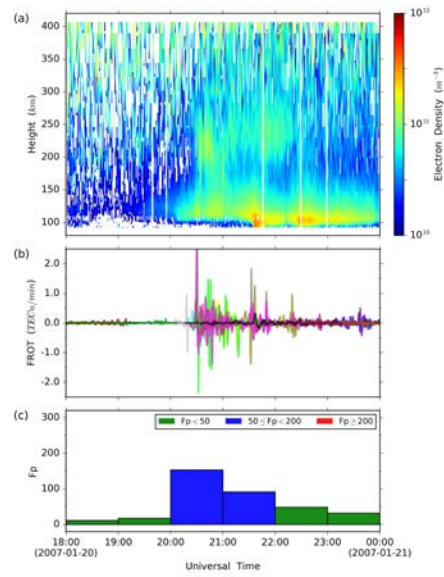


Figure 3. The variations of (a) raw electron density (without calibration) observed by the EISCAT radar, (b) FROT, and (c) Fp during 18-24 UT on 20 January 2007.

References

Mendillo, M., B. Lin, and J. Aarons, The application of GPS observations to equatorial 586 aeronomy, *Radio Sci.*, 35(3), 885-904, doi:10.1029/1999RS002208, 2000.