STUDIES OF THE GPS SIGNAL SCINTILLATION AND LOSS OF LOCK DURING IONOSPHERIC IRREGULARITIES

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The ionospheric irregularities give origin to amplitude and phase scintillations on the GPS receiver signal with larger amplitudes under the Equatorial Anomaly. These scintillations can cause loss of lock of the GPS signal with consequent reduction of reliability and accuracy in the navigation. In this work it was analysed 50 Hz L1 band amplitude GPS data at Cachoeira Paulista (23^{o} S, 45 ^{o} W, -18.07 ^{o} dip latitude), that is under the Equatorial Anomaly, using a GEC Plessey Builder –2 GPS card, and with elevation angles larger than 10^{o}. The data cover the solar maximum activity years of 2000 and 2001. The scintillation percentage of occurrence increased with the solar flux growth, and it was larger for summer solstice. During equinoxes it was observed larger scintillation amplitudes. The losses of lock were determined in function of the S4 scintillation index and the autocorrelation half width (Ax). Larger loss of lock occurrences for S4 between 0.2 and 0.3, and for autocorrelation width ranging from 1 to 2s, was observed for equinoxes and summer solstice, however with lower probability than for larger S4. Almost no loss of lock for winter solstice, when there are few scintillations, was observed. The ionospheric scintillation effects over the GDOP was also analysed.