



Total Electron Content (TEC) and Scintillation Study of Equatorial Ionosphere Over Sipitang Station, Sabah, Malaysia

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The ionospheric disturbances cause significant effects on satellite signals for communication and navigation, which are dependent on the signal frequency and the ionospheric electron content. Ionospheric scintillations, the most significant manifestation of such disturbances, often takes place in equatorial region such as Malaysia.

This paper reports the study and monitoring activity on TEC and ionospheric scintillation in Malaysia with the use of Global Positioning System (GPS) measurements. One dual-frequency GPS receiver has been deployed at the main station in Parit Raja, West Malaysia (Lat: 1.86° N, Long: 103.8° E at an altitude of 7.3 m) and one in Sipitang, East Malaysia (Lat: 5.10° N, Long: 115.56° E at an altitude of 5.5 m). Dual-frequency GPS data was collected during a one month ionospheric experimental campaign, whose data allows for TEC and scintillation computation and analysis.

Fast TEC changes (15 seconds) were computed from combined L1 and L2 pseudorange and carrier phase measurements. However, the scintillation parameter, S4 index was computed as a standard deviation of the received signal power normalized to average signal power every 1 minute, based on 50 Hz sampling data rate (3,000 data samples) on L1. S4 due to ambient noise was also computed in such a way that a corrected S4 (without noise effects) can be computed and used in our analysis.

This paper presents a short term (1 month) TEC and scintillation data collected at these observation sites in Malaysia to determine typical values of TEC and scintillation that may be observed during moderate solar flux conditions.