Paper ID: 64533
oral

IAF SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Advances in Space-based Navigation Systems, Services, and Applications (6)

Author: Dr. Nouf Abd Elmunim
Saudi Arabia

# INVESTIGATION OF IONOSPHERIC EFFECTS ON SATELLITE COMMUNICATIONS TO IMPROVE THE ACCURACY OF THE PRECISION GPS POSITIONING.

**Abstract**

The ionosphere is an important source of error that affects satellite communications, particularly the Global Navigation Satellite System (GNSS) / Global Position System (GPS) signals. Total Electron Content (TEC) is the main ionospheric parameter that has significant effects on the propagation of radio waves, causing delay errors to the GNSS / GPS signals. Therefore, investigate the ionospheric structure, the variation, and the delay is crucial to improve the ionospheric model which helps to reduce the GNSS / GPS positioning error and improve the accuracy performance for the precious GNSS/GPS. This research aims to study the variation of ionospheric delay and predictions. The data were derived from the single-frequency receiver using GPS Ionospheric Scintillation and TEC Monitor (GISTM) at the Langkawi station (LNGK) (geographic coordinate of 6.19 N-99.51 E and geomagnetic coordinate of 3.39 S-172.42 E), in the equatorial region over Malaysia. The data recorded during the raising, maximum, and minimum solar phase in the years 2011, 2014, and 2019. Based on the result, the maximum actual measurement of the ionospheric delay was around 8 m. The peak of the ionospheric delay during the diurnal hourly variation was between 13:00 -17: 00 LT, while the minimum was from 5:00 to 7:00 LT. During the solar maximum phase in 2014, the ionospheric delay was comparatively lesser than the period of 2011 and 2019. The ionospheric time series prediction measurements model exhibited maximum difference between and modelled in the post-noon time. During the rising and minimum solar phase (2011 and 2019), the prediction errors were slightly high compared to the maximum solar phase in 2014.