Studies of the dynamics of the Upper Atmosphere using UNB-Ionospheric Modeling Techniques

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Abstract:

Different mathematical methods are available to determine the ionosphere delay corrections and then to remove the ionosphere effects from the GPS measurements which are due to instability in the ionosphere. Ionospheric correction is discussed with respect to different positioning applications, namely, single frequency Klobuchar model, dual-frequency ionosphere correction, and network ionosphere correction. The IRI model is a mathematical model using monthly means calculated from an international network of ionosondes and some spaceborne sensors. UNB Ionospheric Modeling Technique computes TEC from GPS observables at both L1 and L2 frequencies in order to provide ionospheric corrections to communication, surveillance and navigation systems operating at one frequency. The software estimates the coefficients of a linear spatial approximation of Total Electron Content (TEC) over each station in addition to the satellite and receiver differential biases, modeling the ionospheric measurements from a dual frequency GPS receiver with the single-layer ionospheric model. In general IRI TEC corresponds relatively well with ionosonde-derived TEC over mid latitudes such as the SKA site, but this model seems to give less accurate results for Indian region. The results verified the use of UNB-Ionospheric Modeling Techniques for future ionospheric research over Indian Region.

Key Notes: Modeling, ionosphere, GPS, TEC