

# Tropospheric Modeling in GNSS Observations

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**Key words:** Deformation measurement; GNSS/GPS; Reference frames; Reference systems; GNSS OBSERVATIONS, TROPOSPHERIC EFFECTS, MODELING.

## SUMMARY

High precision GNSS measurement are required for many scientific applications such as the establishment of geodetic control networks, the monitoring of crustal deformation, strengthening of geodetic networks, as well as vertical control networks, etc. These networks serve to control topographic mapping as well as cadastral, engineering, and other surveys, and the determination of sea level changes. It is of importance to develop the proper strategies and techniques for GNSS observation and data processing to effectively enhance the accuracy of coordinates based on GNSS measurements. Tropospheric effect is one of the GNSS error sources. It can cause significant site displacement during the GNSS observation. Thus to study, the effect of the troposphere on GNSS position determination, dual frequency GNSS observation were done in static mode at three stations (NI02, NI03 and DPR 773) located within University of Nigeria Enugu Campus (UNEC) and processed using four tropospheric models namely Essen & Froome, Saastromoinen, Hope/Field and simplified Hopfield. The data was also processed without any tropospheric model (No Model). The site displacements caused by the tropospheric models were estimated practically by comparing processed GNSS observations with those obtained from Total station observation whose observations are not significantly affected by vertical refraction. This comparison is aimed at identifying the model most suited for GNSS position determination within UNEC. The results obtained showed that the positions given by Saastromoinen model were closest to those given by the TOTAL STATION. We are therefore inclined to recommend this model as the most suitable for processing GNSS observations within UNEC (based on the available results). Further research on this assertion is also advocated.