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An Evaluation of Tropospheric Delay on GNSS Observations

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Abstract

The Global Navigation Satellite System (GNSS) is used to find point locations in latitude, longitude, and altitude which are involved among the satellites and receivers through electromagnetic signals. Due to the refraction of the electromagnetic signals, the signals are delayed than the actual propagation time. In this study, the effect of tropospheric delay on GNSS observations is considered by single-point observation on a primary control point of the Sri Lanka Datum 99 network. The study aims to investigate the total tropospheric delay of GNSS observations affected at different times of the day without considering dry and wet components of the delay. The 24 hours of dual-frequency row data were collected and processed separately on the morning, afternoon, and evening observations using Leica Geo Office 8.4 software applying Hopfield, Simplified Hopfield, and Saastamoinen models to correct the tropospheric delay. Then the purpose was to identify the variation of GNSS observations affected at different times of the day due to the tropospheric delay, by determining the best tropospheric model which can be used to minimize tropospheric delay, and by defining the best time for getting GNSS observations. The Saastamoinen model shows the minimum variation towards the original values of the A166 primary control point. According to this study, morning was the best time for collecting data for GNSS purposes.

Keywords: *Dual Frequency, Hopfield Model, Saastamoinen Model, Primary Control Point, Tropospheric Delay*