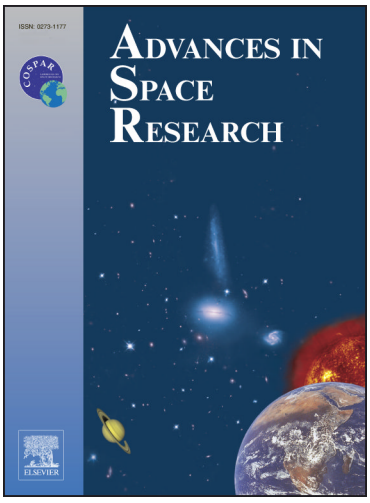

TEC derived from some GPS stations in East African equatorial region and comparison with the TEC from NeQuick2 model

F. Twinomugisha, N. Ssebiyonga, F.M. D'ujanga

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TEC derived from some GPS stations in East African equatorial region and comparison with the TEC from NeQuick2 model

F. Twinomugisha, N. Ssebiyonga, F.M. D'ujanga.
Department of physics, Makerere University, Uganda

Abstract

This paper investigates the capacity of NeQuick2 model in predicting the vertical Total Electron Content (vTEC) over East Africa equatorial region during solar minimum (2010) and solar maximum (2012) phases. This has been carried out by comparing the NeQuick2 vTEC and GPS vTEC from five GPS (Global Positioning System) receivers at Makerere University, University of Nairobi, Mbarara, Malindi and Addis Ababa. The diurnal, monthly and seasonal variations in the measured vTEC have been analysed and compared with the NeQuick2 modeled vTEC. Comparative analysis has shown high correlation between NeQuick2 vTEC and GPS vTEC for both years. The correlation coefficients (R^2) between the predicted and measured vTEC at all the stations were in the range (0.884- 0.953) and (0.881- 0.910) in 2010 and 2012 years respectively. NeQuick2 predicted the diurnal vTEC better for the times 01:00–03:00, Universal Time (UT) (10:00-12:00, Local Time, LT) for all the stations than for other times. There were high discrepancies between the modeled and measured vTEC values as observed between 06:00–16:00 UT (09:00-19:00 LT) over Addis Ababa during the two years in consideration. With regard to the monthly and seasonal vTEC prediction, the NeQuick2 model overestimates both the monthly and seasonal mean hourly vTEC values in almost all the stations except at Addis Ababa. The effects of geomagnetic storm on NeQuick2 model has also been investigated. NeQuick2 model did not respond to the effects associated with geomagnetic storm. There is need to include storm related parameters in the prediction of vTEC using NeQuick2 model.

Key words: Ionosphere; GPS; Total electron content; NeQuick2