Characterization of ionospheric GPS Total Electron Content (GPS–TEC) in low latitude zone over the Kenyan region during a very low solar activity phase. (2012)

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Abstract
The ionosphere Total Electron Content (TEC), derived by analyzing dual frequency signals from the
Global Positioning System (GPS) recorded from two stations in the Kenyan region is studied. Wepresent the mean diurnal, monthly, seasonal, and annual variation in the ionospheric TEC during thelowest solar activity phase for the periods of 2009–2010. Seasonal variations in daytime TEC show asemiannual periodicity, with minimum in June solstice and maxima in March equinox and December solstice. Using mean hourly monthly TEC, we found semiannual variation with two maxima occurring in months of April–March, and September–October. Seasonal variations in the nighttime TEC reveal semiannual periodicity with high background levels observed in the equinoctial months and lobackground levels in solstice. Results of seasonal variations and month-to-month variations in TEC have been compared with the TEC derived from the IRI-2007 model using the NE Quick option for the topsideelectron density. The IRI–TEC is too high for all the seasons except for the March equinox where there seems to be good agreement between observation and model. The model is in good agreement with the monthly variation but overestimates for the months of May, June, July, August and September for all the years studied. The minimum monthly mean is lowest in the model for all the months by about 3–5
TECU in comparison to the GPS–TEC. We attribute this to the fact that the model excludes TEC from the
plasmasphere while the overestimation of TEC has been associated to overestimation of the equatorialion fountain effect and also the inability of the model to predict localized (regional) ionospheric effects arising from electromagnetic forcing at the low latitude.

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