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## Single station TEC modelling during storm conditions

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**Abstract content <br> &nbsp; (Max 300 words)<br><a href="http://events.saip.org.za/getFile.py?target="\_blank">Formatting &<br>Special chars</a>**

It has been shown in ionospheric research that modelling total electron content (TEC) during storm conditions is a big challenge. In this work, we established mathematical equations to estimate TEC over Sutherland (32.38° S, 20.81° E), during storm conditions, using the Empirical Orthogonal Function (EOF) analysis method, combined with regression analysis. TEC was derived from GPS observations and the geomagnetic storm occurrence was defined for  $Dst \leq -50$  nT. The inputs for the model were chosen based on the factors that influence TEC variations such as diurnal, seasonal, solar and geomagnetic activity variations, and these were represented by hour of the day, day number of the year, F10.7 and A index respectively, during modelling. The model was developed using GPS TEC data from 1999-2013 and tested on different storms based on storm intensity. Before building the model, TEC values for storms on which the model was tested were removed from the dataset used to construct the model in order to make the model validation independent on data. Comparing the modelled TEC with the observed TEC, it was noticed that the model works well for storms with non significant ionospheric TEC response. High correlation coefficients between the observed and modelled TEC were obtained showing that the model covers most of the information contained in the observed TEC. Furthermore, it has been shown that the EOF model constructed over Sutherland can be used to model TEC variations from the closest GPS receiver stations. This is an important result as it reduces the data dimensionality problem for computational purposes. It may therefore not be necessary to compute TEC data for all the closest receiver stations for regional storm-time TEC modelling since most needed information can be extracted from measurements from one location.

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MSc

**Main supervisor (name and email)<br>and his / her institution**

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