GPS ASSISTANCE IN MODELLING THE SOUTHERN AFRICAN IONOSPHERE

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1. INTRODUCTION

The ionospheric group in South Africa has developed a number of ionospheric models, mostly of the bottomside ionosphere, used for High Frequency (HF) communications amongst other applications. In addition, the group has focused on developing empirical models for individual parameters that enhance the knowledge and understanding of the Southern African ionosphere. These models have been developed using mostly data from ground based ionosondes, of which South Africa now has a network of four. However, recently the group has expanded its activities to include data from Global Positioning System (GPS) receiver stations, which are currently being installed in many different locations on the African continent. Figure 1 shows the distribution of Ionosonde and GPS dual frequency receivers in South Africa. Currently, this work includes a successful model for the prediction of GPS Total Electron Content (TEC) [1], which has shown that extracting electron density profile information to describe ionospheric behaviour from GPS TEC data will allow for the state of the ionosphere over Africa to be more accurately predicted. This presentation will include details of the current ionospheric models available and how the ingestion of GPS TEC data will increase the accuracy and coverage of these models.

2. REFERENCE

[1] Habarulema J-B, McKinnell L-A, Cilliers PJ, Prediction of global positioning system total electron content using Neural Networks over South Africa, Journal of Atmospheric and Solar-Terrestrial Physics 69 (2007), 1842–1850.
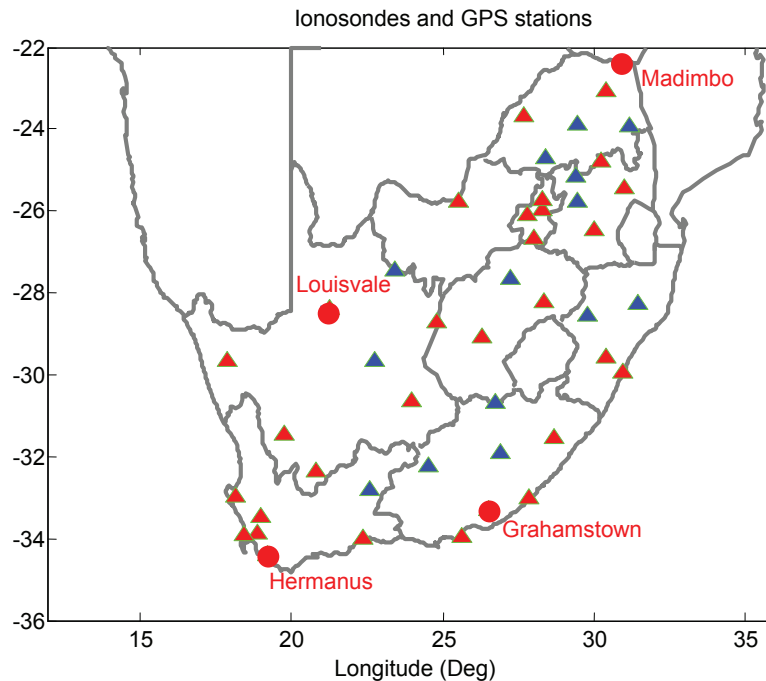
Figure 1. Network of dual frequency GPS base stations (triangles), and Ionosonde stations (Circles) within South Africa.