



Prediction of Global Ionospheric TEC Maps: First results on a UPC forecast product

A. García-Rigo (1), E. Monte (2), M. Hernández-Pajares (1), J.M. Juan (1), J. Sanz (1), A. Krancowski (3), and P. Wielgosz (3)

(1) group of Astronomy and GEomatics (Technical University of Catalonia), Applied Mathematics IV, Barcelona, Spain (agarcia@ma4.upc.edu), (2) Department of Signal Theory and Communications (Technical University of Catalonia), Barcelona, Spain, (3) Geodynamics Research Laboratory (University of Warmia and Mazury), Olsztyn, Poland

A method for short-term prediction of ionospheric Total Electron Content (TEC) has been developed. It is based on using long time series of IGS Global Ionospheric vertical TEC Maps (GIMs) and the application of Autoregressive (AR) models and Neural Networks (NN). In this work, the IGS ionospheric Working Group products provided by UPC analysis center will be used in order to establish a future UPC forecast product with global coverage.

Nowadays, forecasting of TEC is of great interest to improve a wide variety of scientific and technological applications. In fact, there is a request from ESA's water mission SMOS (to be launched in 2009) for using IGS TEC maps, including predicted products. In this context, IGS committed to try to generate a combined IGS predicted ionospheric product.

For that purpose, several stochastic approaches such as Autoregressive (AR) models and Neural Networks (NN) are taken into account to generate UPC forecast product. In this work, first results obtained by using an AR model are presented. More in detail, several AR orders and the use of the Discrete Cosinus Transform (DCT) have been considered in order to obtain a better correlation between past and future TEC values. Moreover and for performance evaluation, the test datasets have been selected considering quiet and disturbed geomagnetic conditions.

Finally, the results of the different approaches have been validated against the corresponding IGS ionospheric VTEC products. Also, they have been compared with the available prediction products generated by the Center for Orbit Determination in Europe (CODE) both for 1-day and 2-days in advance forecasting.