

COMPARING BOTTOM-SIDE IONOSPHERIC PROFILES WITH MODIFIED TAYLOR DIAGRAMS

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Abstract

This paper describes and compares two real-time assimilative ionospheric models. In particular, the models' ability to provide accurate profiles of the electron density below the peak of the F2 layer at a mid-latitude location is investigated. The two models are specifically oriented towards several important practical applications of HF radio propagation: HF communications; single site location of HF transmitters, and coordinate registration for OTHR (over-the-horizon radar). The assimilative models used in this study are GPSII (GPS Ionospheric Inversion) [Fridman *et al.*, 2006] and EDAM (Electron Density Assimilative Model) [Angling *et al.*, 2009]. Both use IRI-2007 (International Reference Ionosphere) [Bilitza and Reinisch, 2008] as their background model, and the IRI results are also reported to provide a performance benchmark.

The Digisonde at Grahamstown in the Republic of South Africa (RSA) provides the data for assimilation into the models. Furthermore, GPS data from sub-Saharan Africa has also been used. The other three Digisondes in the RSA (Hermanus, Louisvale and Madimbo) provide the ground-truth observations of foF2, hmF2 and the plasma frequency profile that are used to test the models.

Modified Taylor diagrams are utilized in order to compare and analyse the results. This variant of the Taylor diagram [Taylor, 2001] uses a colour scale to show the bias of the models and the centred pattern RMS difference is replaced by the standard deviation of the errors (model minus observation). The paper describes the formulation and use of modified Taylor diagrams, as well as the results of the model tests.

References

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