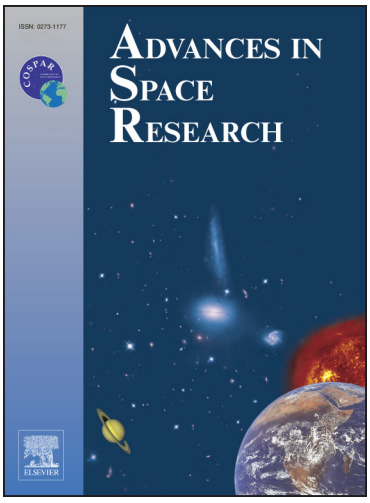

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Application of the IRI model to the HF propagation model with optimization of the ionosphere parameters to day-to-day variation

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Abstract

The HF propagation model, North Ionospheric Model and Ray Tracing (NIM-RT) was developed and tested for a number of years by comparing measured vertical and oblique ionograms over a number of radio links (especially in high latitude area) with the simulated ionograms. The present paper extends the model in order to include:

a) Implementation of the data retrieved from the International Reference Ionosphere (IRI-2012) model into the software for radio channel modeling,

b) The algorithm for IRI data optimization to the real time condition,

c) Results of comparison between simulated and measured ionograms.

Based on these updates, a new software tool called North Ionospheric Model with IRI and Ray Tracing (NIMIRI-RT) was developed, and a number of vertical ionograms corresponding to multiple ionospheric reflections was simulated. The vertical ionograms observed at various ionosondes were compared with the synthesized ionograms, generated by applying NIM-RT in conjunction with initial and optimized IRI data. The ionogram structure simulated by NIMIRI-RT based on the data retrieved from optimized IRI is more reminiscent to the observations than ionograms synthesized with the initial NIMIRI-RT without parameters optimization.

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