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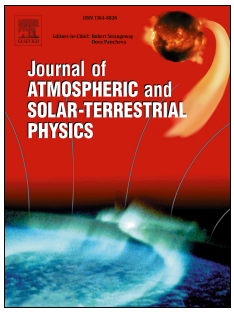

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Ionosonde-Based Indices for Improved Representation of Solar Cycle Variation in the International Reference Ionosphere Model

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Abstract

A new monthly ionospheric index, IG^{NS}, is presented to improve the representation of the solar cycle variation of the ionospheric F2 peak plasma frequency, foF2. IG^{NS} is calculated using a methodology similar to the construction of the "global effective sunspot number", IG, given by Liu et al. (1983) but selects ionosonde observations based on Hemispheres. We incorporated the updated index into the International Reference Ionosphere (IRI) model and compared the foF2 model predictions with global ionospheric observations. We also investigated the influence of the underlying foF2 model on the IG index. IRI has two options for foF2 specification, the CCIR-66 and URSI-88 foF2 models. For the first time, we have calculated IG using URSI-88 and assessed the impact on model predictions. Through a retrospective model-data comparison, results show that the inclusion of the new monthly IG^{NS} index in place of the current 12-month smoothed IG index reduce the foF2 model prediction errors by nearly a factor of two. These results apply to both daytime and nighttime predictions. This is due to an overall improved prediction of foF2 seasonal and solar cycle variations in the different hemispheres.

Keywords: Ionosphere, International Reference Ionosphere, Space Weather,

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