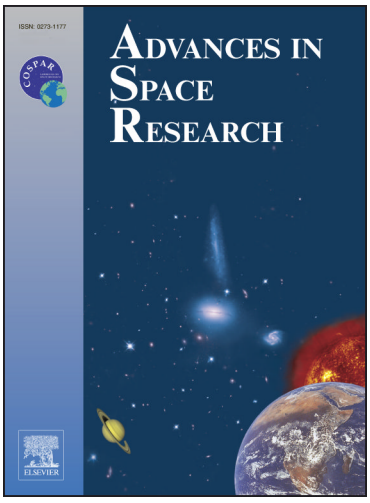

Empirical forecast of quiet time ionospheric Total Electron Content maps over Europe

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Empirical forecast of quiet time ionospheric Total Electron Content maps over Europe

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Abstract An accurate forecast of the atmospheric Total Electron Content (TEC) is helpful to investigate space weather influences on the ionosphere and technical applications like satellite-receiver radio links. The purpose of this work is to compare four empirical methods for a 24-hour forecast of vertical TEC maps over Europe under geomagnetically quiet conditions.

TEC map data are obtained from the Space Weather Application Center Ionosphere (SWACI) and the Universitat Politècnica de Catalunya (UPC). The time-series methods Standard Persistence Model (SPM), a 27 day median model (MediMod) and a Fourier Series Expansion are compared to maps for the entire year of 2015. As a representative of the climatological coefficient models the forecast performance of the Global Neustrelitz TEC model (NTCM-GL) is also investigated. Time periods of magnetic storms, which are identified with the Dst index, are excluded from the validation.

By calculating the TEC values with the most recent maps, the time-series methods perform slightly better than the coefficient model NTCM-GL. The benefit of NTCM-GL is its independence on observational TEC data. Amongst the time-series methods mentioned, MediMod delivers the best overall performance regarding accuracy and data gap handling. Quiet-time SWACI maps can be forecasted accurately and in real-time by the MediMod time-series approach.

Key words: Total Electron Content; empirical model; ionosphere forecast

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