

Accepted Manuscript

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

Ronny Badeke, Claudia Borries, Mainul M. Hoque, David Minkwitz

PII: S0273-1177(18)30319-3
DOI: <https://doi.org/10.1016/j.asr.2018.04.010>
Reference: JASR 13711

To appear in: *Advances in Space Research*

Received Date: 8 February 2018
Revised Date: 9 April 2018
Accepted Date: 10 April 2018



Please cite this article as: Badeke, R., Borries, C., Hoque, M.M., Minkwitz, D., Empirical forecast of quiet time ionospheric Total Electron Content maps over Europe, *Advances in Space Research* (2018), doi: <https://doi.org/10.1016/j.asr.2018.04.010>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

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

Ronny Badeke (Ronny.Badeke@dlr.de)¹

Claudia Borries (Claudia.Borries@dlr.de)¹

Mainul M. Hoque (Mainul.Hoque@dlr.de)¹

David Minkwitz (Minkwitz@hs-nb.de)²–

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

¹ German Aerospace Center (DLR), Institute for Communication and Navigation, Kalkhorstweg 53, 17235 Neustrelitz (Germany)

² University of Applied Sciences Neubrandenburg, Brodaer Str. 2, 17033 Neubrandenburg (Germany)

Download English Version:

<https://daneshyari.com/en/article/8131847>

Download Persian Version:

<https://daneshyari.com/article/8131847>

[Daneshyari.com](https://daneshyari.com)