Regional and local ionospheric models as input data source for a real-time 3-D IRI modeling

M. Pezzopane\textsuperscript{a,*}, M. Pietrella\textsuperscript{a}, A. Pignatelli\textsuperscript{a}, B. Zolesi\textsuperscript{b}, Lj. R. Cander\textsuperscript{b}

\textsuperscript{a} Istituto Nazionale di Geofisica e Vulcanologia, Via di Vigna Murata 605, 00143 Rome, Italy; michael.pezzopane@ingv.it

\textsuperscript{a} Istituto Nazionale di Geofisica e Vulcanologia, Via di Vigna Murata 605, 00143 Rome, Italy; marco.pietrella@ingv.it

\textsuperscript{a} Istituto Nazionale di Geofisica e Vulcanologia, Via di Vigna Murata 605, 00143 Rome, Italy; alessandro.pignatelli@ingv.it

\textsuperscript{b} Rutherford Appleton Laboratory, Didcot, OX11 0QX, UK; l.cander@rl.ac.uk

Abstract

This paper describes how the joint utilization of autoscaled data for F2 peak critical frequency $f_{0}F_{2}$ and propagation factor $M(3000)F_{2}$, coming from two reference ionospheric stations (Rome and Gibilmanna), the regional (SIRMUP) and global (IRI) ionospheric models, can provide a valid tool for obtaining a real-time three-dimensional (3-D) electron density mapping of the ionosphere.

Preliminary results of the proposed 3-D model are shown by comparing the vertical electron density profiles given by the model with the ones measured at three testing ionospheric stations (Athens, Roquetes and S.Vito). Mostly at the solar terminator the vertical electron density profile extracted from the proposed 3-D model is more representative of the real conditions of the ionosphere than the electron density profile extracted from the IRI-URSI model.

Best results were however obtained for S. Vito, and this is comprehensible considering that the ionospheric station of S. Vito is the test site closest to the input sites of Rome and Gibilmanna, and then it is the site where the assimilation process of the measured vertical electron density profiles is mainly perceived.

In the next future, further additional tests are planned on periods geomagnetically disturbed and considering more than two reference ionospheric stations providing real time data as input for the model.