Geophysical Research Abstracts
Vol. 15, EGU2013-6023, 2013
EGU General Assembly 2013

The Upgraded European Digital Upper Atmosphere Server: new DIAS products for the high latitude ionosphere, the topside ionosphere and the plasmasphere

Anna Belehaki (1), Ivan Kutiev (2), Bruno Zolesi (3), Ioanna Tsagouri (1), Dimitris Dialetis (4), Pencho Marinov (2), Stefka Fidanova (2), Lili Cander (5), Marco Pietrella (3), Kostas Tziotziou (1), and Angelos Lykiardopoulos (6)

(1) National Observatory of Athens, IAASARS/Ionospheric Group, Palaia Penteli, Greece (belehaki@noa.gr), (2) Bulgarian Academy of Sciences, Sofia, Bulgaria, (3) Istituto Nazionale di Geofisica e Vulcanologia, Rome, Italy, (4) National and Kapodistrian University of Athens, Greece, (5) Rutherford Appleton Laboratory, STFC, Didcot, UK, (6) Hellenic Centre For Marine Research, Network Operation Center, Anavyssos, Greece

Knowledge of the state of the upper atmosphere, and in particular its ionized part, is very important in several applications affected by space weather, especially the communications and navigation systems that rely on radio transmission. To better classify the ionosphere and forecast its disturbances over Europe, a data and model infrastructure platform called the European Digital Upper Atmosphere Server (DIAS) has been established in the National Observatory of Athens by a European consortium formed around eight ionospheric stations, and funded by the European Commission.
The DIAS system operates since 2006 and the basic products that are delivered are real-time and historical ionograms, frequency plots and maps of the ionosphere on the foF2, M(3000)F2, MUF and bottomside electron density, as well as long term and short term forecasting up to 24 hour ahead. The DIAS system supports more than 500 subscribed users, including telecommunication companies, satellite operators, space agencies, radio amateurs, research organizations and the space weather scientific community. In 2012 the system has been upgraded, in close collaboration between the National Observatory of Athens, the Istituto Nazionale di Geofisica e Vulcanologia and the Bulgarian Academy of Sciences, with funding from the ESA/SSA Programme.
The first group of new products results from the implementation of the TaD model (Topside Sounder Model assisted by Digisonde) that makes possible the generation of maps of the electron density at heights up to GNSS orbits, and of TEC and partial TEC maps (topside and plasmaspheric) over Europe. The TaD is based on the simple empirical functions for the transition height, the topside electron density scale height and their ratio, based on the Alouette/ISIS database, and models separately the oxygen, hydrogen and helium ions density profiles. The model takes as input the plasma characteristics at the height of maximum electron concentration that are provided in real-time by the DIAS Digisondes. To further improve its accuracy, we adjust the modeled TEC parameter with the GNSS-TEC parameter calculated at the Digisondes location. This adjustment forces the model to correctly reproduce the topside scale height, even in cases when the scale height at hmF2 is not available. This adjustment is very important for the application of TaD in an operational environment.
The second group of new products consists of long term prediction and of nowcasting maps of the foF2 parameter that cover the whole European region – including Scandinavia. Long term prediction maps have been extended to 80 deg N applying the CCIR coefficients for the region above 65 deg N, while from 32 to 60 deg N we continue to apply SIRM (Simplified Ionospheric Regional Model), as in the case of middle latitude maps that are released routinely by the DIAS system. Between 60 and 65 deg N there is a buffer zone where an interpolation routine is applied. Nowcasting maps are based on the SIRMUP (SIRM updated in real-time) concept, however, a different effective sunspot number (Reff) is estimated for each latitudinal zone, from which a synthetic Reff is calculated.