COMPARISON OF THE IRI-2020 MODEL PREDICTIONS WITH THE OBSERVATIONS IN THE EUROPEAN-AFRICAN LONGITUDINAL SECTOR DURING THE PERIOD OF 1-9 FEBRUARY 2022

Reznychenko M.O.[1,2], Bogomaz O.V.[1], Reznychenko A.I.[2,3], Kotov D.V.[1]

[1]Institute of ionosphere NAS and MES of Ukraine, Kharkiv

[2]Space Research Centre of Polish Academy of Sciences, Warsaw, Poland

[3]Institute of Radio Astronomy of the National Academy of Sciences of Ukraine, Kharkiv

Variations of the F2 layer peak height and electron density (h_{mF2} and N_{mF2}) were measured using digisonde observations at Pruhonice (50ºN 14.6ºE) and Grahamstown (-33.3ºS 26.5ºE) during the period of February 1-9, 2022 which encompasses the pre-storm days, main storm phase, and the recovery phase. The comparison of observed h_{mF2} and N_{mF2} with those provided by the International Reference Ionosphere (IRI-2020) model was carried out.

Results for Pruhonice. The SHU-2015 model shows very good agreement with h_{mF2} observations over Pruhonice for the pre-storm and post-storm days both during daytime and nighttime. However, some underestimations of the h_{mF2} were observed during the daytime of the disturbed periods on February 3 and 4 (by ~30 km) and early evening hours of February 4 (by ~50 km). In contrast, the AMTB-2013 model provides better agreement with the observations for disturbed periods both during the daytime and nightime. During the pre- and post-storm periods, AMTB-2013 underestimates the h_{mF2} values by ~20-30 km. Both the IRI N_{mF2} sub-models (URSI and CCIR) provide quite good qualitative agreement with the Pruhonice digisonde observations for magnetically quiet conditions. At the same time, significant discrepancies (a factor of ~1.5) are seen during the daytime and nighttime of the disturbed periods.

Results for Grahamstown. The SHU-2015 model shows good agreement with observations over Grahamstown during magnetically quiet conditions and some discrepancies (by ~30 km) during the storm-timed period. The AMTB-2013 model does not show a good agreement with the observations during the daytime of storm and post-storm periods. Discrepancies between the observations and model predictions vary from ~20 to ~60 km depending on the level of geomagnetic activity. A notable difference between the observations and model predictions are seen during the daytime of both disturbed (on February 3, 4 and 5) and quiet (on February 8, 9) periods when the IRI N_{mF2} sub-models underestimate the observed N_{mF2} by almost 2 times.