



## Upgrading the Space Weather Services in CBK PAN

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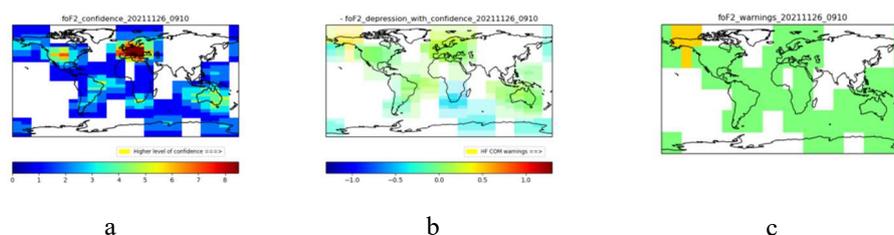
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The Space Research Centre of the Polish Academy of Sciences (CBK PAN) actively participates in the development of space weather services (SWX). As part of the Pan-European Consortium for Aviation Space Weather User Services (PECASUS) [1], CBK PAN traditionally provides global experimental foF2 depression maps and moderate or severe foF2 depression alerts, calculated in near real-time data from ionosonde networks. The scaled data from ionograms obtained by the MZ152 ionosonde located in Warsaw are also a traditional contribution of the CBK PAN. Over the last year, the operational work of PECASUS services included global vertical total electron content (VTEC) maps calculated in the NeQuick ionospheric model for Galileo [2]. VTEC global maps are estimated in near real time and uploaded to the PECASUS dashboard continuously every 15 minutes.

Last year's progress in computing global foF2 maps is as follows. Latitude step changed from 30 to 5 degrees. As a result, the new cell in the maps is 5 degrees latitude by 15 degrees longitude. Additionally, information on the confidence of the foF2 depression estimation according to the actual land cover density with ionosondes has been added. In addition, according to the agreement between the three global SWX centers supplying information to ICAO, the transition to the calculation from the 15-minute to the 10-minute mode is underway. The map of the relative confidence level of foF2 depression is shown in Figure 1a. Figure 1b shows the foF2 depression map, where the confidence level shown by transparency (the richer the color, the higher the confidence of the estimate). The resulting map of possible warning areas for foF2 depression is shown in Figure 1c.



**Figure 1.** Global foF2 maps for 09:10 UT 26 November 2022: a) relative level of confidence; b) foF2 depression where confidence level shown by transparency; c) warnings about the foF2 depression

It should be noted that in order to improve the quality of global SWX services, it is crucial necessary to create the joint databases (servers) of experimental data got by global and regional SWX centers and to provide the near real time access to these data.

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