3rd URSI AT-AP-RASC, Gran Canaria, 29 May – 3 June 2022

ICAO space weather advisories: Experiences gathered by the PECASUS service

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The PECASUS (Partnership for Excellence in Civil Aviation Space weather User Services) initiative serves as one of the four global space weather centers that provide the International Civil Aviation Organization (ICAO) with advisories during strong space weather storms. The space weather impact areas of ICAO interest include Global Navigation Satellite Systems (GNSS) and long-distance HF communication (HF COM). In GNSS the parameters to be followed are the scintillation indices (S4 and σ_φ) and the Total Electron Content (TEC), while in HF COM the critical parameters are solar X-ray flux, Kp-index, Cosmic Noise Absorption as measured by riometers at 30 MHz, and depression in the Maximum Usable Frequency (MUF). For each parameter ICAO has given thresholds excesses of which should trigger advisory issuances by the on-duty global space weather center. The advisories contain information about severity of the impact (moderate or severe), its onset time, geographic extent, and expected duration.

In the presentation we will describe the approaches used by PECASUS for space weather monitoring [1 and references therein] with the focus on advisories impacting communication and navigation. During the first two years of official operations, it has appeared that particularly in scintillation and post-storm MUF depressions issuing advisories in a sensible way can be challenging. Both phenomena can have sporadic appearance both in time and in space. In such situations the goal is to provide users with clear and accurate information on prevailing storm conditions without overwhelming them with too many advisories. The Ad Hoc Coordination Group which includes representatives from the four global centers and from the user community is searching consolidated solutions for advisory formulation also in these challenging situations. Some aspects from that work will be discussed in the presentation, as well.

References

[1] Kauristie, K., Andries, J., Beck, P., Berdermann, J., Berghmans, D., Cesaroni, C., De Donder, E., de Patoul, J., Dierckxsens, M., Doornbos, E., Gibbs, M., Hammond, K., Haralambous, H., Harri,A.-M., Henley, E., Kriegel, M., Laitinen, T., Latocha, M., Maneva, Y., Perrone, L., Pica, E., Rodriguez, L., Romano, V., Sabbagh, D., Spogli, L., Stanislawska, I., Tomasik, L., Tshisaphungo, M., van Dam, K., van den Oord, B. Vanlommel, P., Verhulst, T., Wilken, V., Zalizovski, A., and K. Österberg, Space Weather Services for Civil Aviation—Challenges and Solutions, Remote Sensing, 13, 18, https://www.mdpi.com/2072-4292/13/18/3685, 2021.

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