

The F2-layer peak characteristics as modeled by International Reference Ionosphere (IRI) and IRI Real-Time Assimilative Mapping (IRTAM)

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We performed a comparison between the International Reference Ionosphere (IRI) model [1] and the IRI Real-Time Assimilative Mapping (IRTAM) method [2,3] considering the two following datasets: 1) observations of the F2-peak ionospheric characteristics, f_oF_2 and h_mF_2 , measured by 40 ground-based ionosonde stations, located at different latitudes and hemispheres, during the last two solar cycles (from the beginning of 2000 to the end of 2019); 2) f_oF_2 and h_mF_2 values obtained from radio occultation profiles measured from 22 April 2006 to 31 December 2018 by the COSMIC\FORMOSAT satellites constellation.

The study showed that when considering the ionosonde dataset IRTAM improves the representation made by IRI (see Figure 1), while when considering the COSMIC dataset IRTAM and IRI are similar about the f_oF_2 modeling, while IRI is better than IRTAM about the h_mF_2 modeling.

All stations f_oF_2 , Full dataset

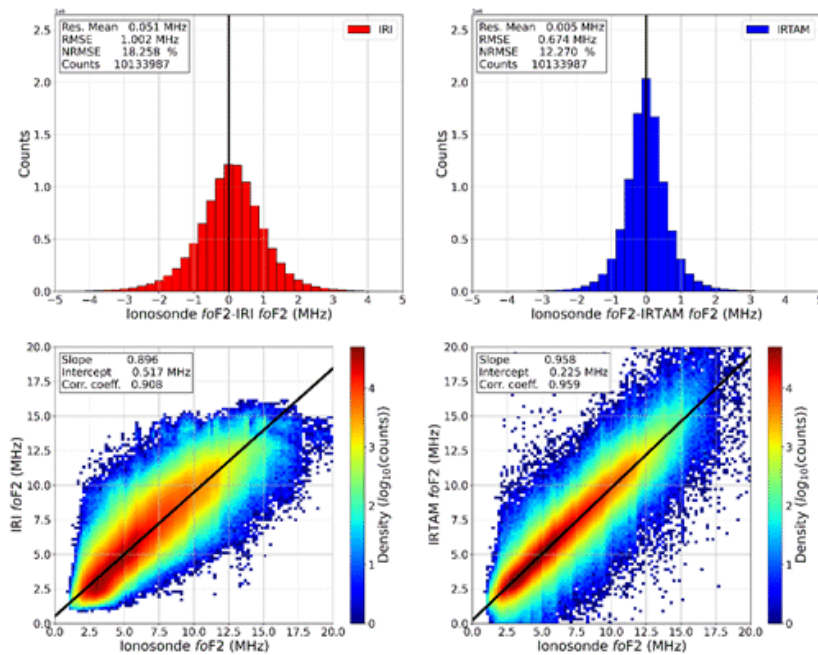


Figure 1. Comparison between IRI and measured f_oF_2 values and between IRTAM and measured f_oF_2 values. Measured values are those recorded by the whole group of considered ionosondes from 2000 to 2019.

References

- [1] Bilitza, D., Altadill, D., Truhlik, V., Shubin, V., Galkin, I., Reinisch, B., & Huang, X. (2017) International Reference Ionosphere 2016: From ionospheric climate to real-time weather predictions, *Space Weather*, **15**, 418-429, doi:10.1002/2016SW001593.
- [2] Galkin, I. A., Reinisch, B. W., Huang, X., & Bilitza, D. (2012). Assimilation of GIRO Data into a Real - Time IRI. *Radio Science*, **47**, <https://doi.org/10.1029/2011RS004952>.
- [3] Galkin, I. A., Reinisch, B. W., Vesnin, A. M., Bilitza, D., Fridman, S., Habarulema, J. B., & Veliz, O. (2020). Assimilation of sparse continuous near - Earth weather measurements by NECTAR model morphing. *Space Weather*, **18**, e2020SW002463, <https://doi.org/10.1029/2020SW002463>.