



Improved model of the electron temperature with inclusion of recent large satellite data sets

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The most recent version of the International Reference ionosphere (IRI) model IRI-2016 includes description of the electron temperature (T_e) using two options (TBT-2012 and Bil-1985). However, due to the limited data coverage available for the construction of these models only latitudinal, local time, altitudinal and seasonal variations are included (TBT-2012 also includes solar activity variations e.g. [1]).

In this study we will present the development of improved model using the large data sets that have become available recently from the satellite missions Swarm, Champ, and DMSP. Our approach is based on spherical harmonics of higher order and on inclusion of second order effects like hemispheric differences and variation with longitude.

In the case of the Swarm data we will also discuss progress regarding the correction of the absolute electron temperature values with the intend to obtain reliable values of electron temperature for creation of the model. Comparisons of the corrected Swarm values with available incoherent scatter radar (ISR) data shows a substantial improvement. We will also present comparisons of DMSP and Champ LP vs. ISR data and discuss improved description of T_e variation with altitude in the model as another model option.

References

- [1] Truhlik, V., Bilitza, D., Triskova, L., 2012. A new global empirical model of the electron temperature with the inclusion of the solar activity variations for IRI. *Earth Planets and Space* 64 (6), 531-543.