



Improved global model of the electron temperature in the topside ionosphere with corrected satellite data sets

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The latest version of the International Reference ionosphere (IRI) model IRI-2020 includes description of the electron temperature (T_e) using two options (TBT-2012 and Bil-1985), which describe latitudinal, local time, altitudinal and seasonal variations. The TBT-2012 option also includes solar activity variations [1], which is the most pronounced at the equator and nighttime when T_e is close to the neutral temperature.

To obtain global coverage, the data source for the construction of these models was based on in-situ satellite measurements generally using the Langmuir probe technique and its variants which however can be sensitive to possible probe contamination or other influences [2,3]. Thus, in this study we employ large amount of recently available Incoherent Scatter Radar data at Jicamarca, Millstone Hill, Arecibo and Poker Flat to better recalibrate values of T_e from individual satellite mission used for construction of the TBT-2012 model, using similar procedure as described in [4]. Additionally we included data sets that have become available recently from the satellite missions Swarm, CHAMP, and DMSP. Calibration of these data sets is discussed as well, especially in the case of the Swarm data for which we found that the calibration is dependent also on local time and latitude. For inclusion of Swarm and CHAMP data into the improved global model, spherical harmonics of higher order were employed. These datasets also enabled to describe second order effects like hemispheric differences and variation with longitude. We also present a performance of the new model with available T_e data.

References

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