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Assessment of the Topside Sounder Model Profiler performance

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In this investigation we apply a model-assisted technique to construct the topside electron density profile.This technique is based on the Topside Sounder Model (TSM), which provides the plasma scale height (Ts), O+/H+ transition height (Th), and their ratio Rt=Ts/Th, derived from topside sounder data of Alouette and ISIS satellites. The Topside Sounder Model Profiler (TSMP) incorporates TSM and uses the model quantities as anchor points for the construction of topside density (Ne) profiles. In the present version, TSMP takes the F2 peak characteristics – foF2, hmF2, and the neutral scale height HmF2 at hmF2– from ground-based Digisonde measurements. Previous investigations have demonstrated that HmF2, used in the Digisondes to construct the topside profiles, is smaller than the topside scale height extracted from topside sounder profiles, at middle latitudes. Therefore the Digisonde scale heights have to be adjusted by a factor estimated for each Digisonde location. When the Digisonde scale height is corrected by this factor, the reconstructed topside profiles are close to those provided by TSM. The new TSMP/Digisonde assisted technique of topside profile construction can improve the topside profiles from the worldwide network of Digisonde sounders. Extensive comparison and verification with ground and satellite derived TEC assesses the performance of the proposed technique. A first indication from the comparison with CHAMP reconstructed profiles shows lower density of TSMP/Digisonde profiles between 400 km and 2000 km. Further comparisons with Vary-Chap profiles and RPI

plasmagrams from the IMAGE satellite will lead to useful conclusions concerning the performance of the proposed method up to geosynchronous altitudes.