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Session 5B Paper 3
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Extending measured bottomside EDPs to the topside ionosphere and plasmasphere

In the absence of operating topside ionospheric sounders, the task of providing measured topside electron density profiles (EDPs) in real-time is currently residing with the GNSS community deriving bottomside and topside EDPs from occultation measurements. EDPs measured with the ground-based global network of ionosondes are usually considered as "ground truth", and indeed they routinely measure the EDPs up to the peak of the F2 layer, but they cannot measure the topside profile.

We have developed an extension of the measured bottomside profile to the topside by modeling the topside EDP as a Chapman function with a continually varying scale height, i.e., the Vary-Chap profile [Nsumei et al., 2012]. The normalized topside profile, Ne/NmF2, has been modeled using 80,000 measured ISIS-2 profiles. We have now started the verification & validation of these model profiles with profiles derived from GNSS occultation measurements at conjunctions of COSMIC [Anthes et al., 2008] and GIRO Digisondes [Reinisch and Galkin, 2011].

For integration of the topside profile in the IRI electron density model [Bilitza et al., 2014], the topside profile model is expressed in terms of coefficients specifying the profile as a function of UT time, geographic longitude and latitude, and geomagnetic latitude, similar to the Jones-Gallet [1962] expansions for the foF2 mapping.

Currently the IRI-based Real Time Assimilating Model [Galkin et al., 2012] IRTAM provides real time specifications up to hmF2. Once validation of the Vary-Chap topside model is completed, IRTAM will specify the profile from the ground to the plasmasphere.

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