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Atmospheric Measurement Techniques Discussions

Interactive comment on "Use of radio occultation to probe the high latitude ionosphere" *by* A. J. Mannucci et al.

Anonymous Referee #1

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This manuscript suggests application of radio occultation retrieved electron density profiles at high latitude region for studying the magnetosphere-ionosphere coupling with illustrations of four sampled magnetic storms of CIR and ICME types. At the first glance of the proposed concept, one might question whether the errors introduced by the local spherical symmetry assumption made for the electron density profile retrievals prevent such application, especially when the errors mainly come from lower altitude part of the profiles. However, the authors have provided careful discussions on that issue on various aspects that have mitigated such concerns. The main point that convinces this reviewer is that the authors suggest to consider the presence or absence of the "E layer dominated ionosphere" (ELDI) rather than its exact magnitude. Similar approach was carried out by study of Es layer at mid- and low-latitudes using the SNR of the

occultation signal rather than retrieved electron density profiles. Thereby it seems feasible to apply COSMIC observations for identifying the high latitude conductance and auroral oval during magnetic disturb periods. However, two major concerns remain to this reviewer's point of view. Firstly, how could we estimate the conductance with information of presence of the ELDI and the exact magnitudes of the electron density could not be obtained? As stated by the authors that the ratio between E- and F-region conductance is important, then it seems that we need some accurate electron densities of the E and F regions. Secondly, the auroral boundaries shown for the four sampled storms are mainly equatorward of the empirical model. The discrepancy prompts the following questions. Can empirical model runs represent the aurora ovations of these four storms well? Could the author try to quickly and generally compare the boundaries given by other observations, SSUSI or DMSP, of the storm events? Such comparison would be more realistic and useful than the comparison made with ovations output from the empirical model.

Giving the suggested clarifications stated herein, a moderate revision of the manuscript is required before publication of the manuscript.

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