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Session 6A Paper 2

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Quantifying the Effects of Geomagnetic Storms on foF2 and TEC

We quantify the ionospheric response to 2013 Mar. geomagnetic storm event at 10 ionosonde stations located in the North American and European sectors using GPS TEC and ionosonde foF2 observations. We focus on foF2 and TEC changes during the storm main phase larger than 20% and 50%, respectively, compared to 30-day median. We find that in European sector, both foF2 and TEC response to the storm are mainly positive phase with foF2 increase of up to 100% and TEC increase of 150%. In North America sector, however, foF2 shows negative effects (up to about 50% decrease), while TEC shows positive response (the largest increase is about 200%). In addition, we assess modeling capability of reproducing storm impacts on foF2 and TEC. For the model validation study, we use various model simulations, which are obtained from empirical, physics-based, and data assimilation models, and compare the model simulations with the observations. We quantify the performance of the models using skill scores including RMSE and NRMSE. This study has been supported by the Community Coordinated Modeling Center (CCMC) at the Goddard Space Flight Center. Model outputs and observational data used for the study will be permanently posted at the CCMC website (http://ccmc.gsfc.nasa.gov) for the space science communities to use.