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High latitude ionospheric electric field models comparison

Lauren Orr[1], Adrian Grocott[1], Maria Walach[1], Mai Mai Lam[2], Mervyn Freeman[2], Gareth Chisham[2], and Robert Shore[2]

[1]Lancaster University, Physics, Lancaster, United Kingdom of Great Britain – England, Scotland, Wales (l.orr1@lancaster.ac.uk)

[2]British Antarctic Survey, Cambridge, United Kingdom of Great Britain – England, Scotland, Wales

Modern high latitude ionospheric electric field models have been developed to incorporate advances in data availability, however the use of older spacecraft-based models is still widespread. AENeAS (Advanced Ensemble electron density [Ne] Assimilation System) is a physics-based, thermosphere-ionosphere, coupled, assimilative model, which makes possible thermospheric forecasts. Currently AENeAS uses the Heelis and Weimer electric field spacecraft climatology models but it is possible a more recent electric field model could improve its functionality. Two such models are calculated using line-of-sight velocity measurements from the Super Dual Auroral Radar Network (SuperDARN): the Thomas and Shepherd model (TS18), and the Time-Variable Ionospheric Electric Field model (TiVIE) . Here we compare the electric field models during the September 2017 storm, covering a range of solar wind and interplanetary magnetic field (IMF) conditions. We explore the relationships between the IMF conditions and model output parameters such as transpolar voltage, the polar cap size and the lower latitude boundary. We find the spacecraft-based model electric potential and field parameters to have a significantly higher magnitude than the SuperDARN-based models. We will discuss the similarities and differences in topology and magnitude for each model.