Geophysical Research Abstracts
Vol. 17, EGU2015-3902, 2015
EGU General Assembly 2015

Maps of average ionospheric vorticity ordered by relationship with the open-closed magnetic field line boundary

Gareth Chisham
British Antarctic Survey, Cambridge, United Kingdom (gchi@bas.ac.uk)

Spatiotemporal variations of ionospheric vorticity are a measure of the dynamical coupling of the magnetosphere to the ionosphere via magnetic field-aligned currents (FACs). Indeed, ionospheric vorticity measurements have often been used as proxy measurements for FACs. Previously, we have determined statistical models of ionospheric vorticity using 6 years of ionospheric convection velocity measurements made by the SuperDARN HF radar network in the northern hemisphere ionosphere and shown that the spatial variation of these probability distributions is well organised according to the well-established large-scale FAC structure in the polar ionosphere. However, to date, these statistical models have been parameterised solely by the state of the interplanetary magnetic field (IMF), and as such do not account for the range of polar cap sizes that occur for a single IMF state. This leads to a distortion of the shape of the resulting statistical maps that makes features in the statistical variations appear smoother than those in instantaneous/short-time averaged measurements. This is because the averaging process does not consider the variable size of the polar cap, by which spatial features in the ionospheric vorticity variation are ordered. Using open-closed magnetic field line boundary measurements determined from FUV imager data from the IMAGE spacecraft, we investigate the parameterisation of the statistical ionospheric vorticity models with polar cap size in addition to the state of the IMF. The results of this analysis have implications for other statistical models determined in this way, such as those for FACs and ionospheric convection.