



The dependence of transpolar arc location on IMF By: a comparison of two large transpolar arc datasets

Anita Kullen (1), Rob Fear (2,3), and Steve Milan (2)

(1) Space and Plasma Physics, School of Electrical Engineering, Royal Institute of Technology, Stockholm, Sweden, (2) Department of Physics and Astronomy, University of Leicester, Leicester, UK, (3) School of Physics & Astronomy, University of Southampton, Southampton, UK

It is well-known that transpolar arc occurrence and motion depends strongly on the interplanetary magnetic field (IMF). The dawn-duskward motion of these arcs is strongly controlled by the IMF By component. Fear and Milan (2012) showed that not only the transpolar arc motion but also the dawn-duskward displacement of the original nightside connection point depends on the direction of IMF By. The best correlations between IMF By and location of transpolar arc nightside connection point was found for a 3-4 hour time delay between these. The results of their study are here reinvestigated using a similar dataset by Kullen et al. (2002) covering another time period. The analysis of the results shows several interesting features. It confirms many of the statistical results in the Fear and Milan (2012) study. However, the best correlation between IMF By and transpolar arc location is found to be with IMF conditions 1-2 hours before the arc occurs. Furthermore, one class of transpolar arcs (bending arcs, splitting from dawn- or dusk oval side around 21 and 3 UT) shows no correlation with IMF By at all. This indicates, bending arcs may form in a different way. A possible connection between bending transpolar arcs and dayside flux transfer events is investigated with help of ionospheric plasma flow patterns using SuperDARN data.