Geophysical Research Abstracts,
Vol. 10, EGU2008-A-07933, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-07933
EGU General Assembly 2008

Small-scale characteristics of transpolar arcs

J. A. Cumnock (1,2), A. Kullen (3), T. Karlsson (2), K. Å. T. Sundberg (2), L. G. Blomberg (2)

(1) Center for Space Sciences, University of Texas at Dallas, Richardson, TX, USA, (2) Space and Plasma Physics, School of Electrical Engineering, Royal Institute of Technology, Stockholm, Sweden, (3) Swedish Institute of Space Physics, Uppsala, Sweden

Transpolar arcs (TPAs) are often observed during northward interplanetary magnetic field (IMF); of these, theta aurora are seen when transpolar arcs move in the dawn or dusk direction across the entire polar region in response to IMF By changes. For northward IMF and a By sign change theta aurora are almost always formed in the Northern Hemisphere, regardless of Bx and dipole tilt. This implies that theta aurora form simultaneously in both hemispheres. IMF By does not appear to influence the intensity and duration of the arc. Strongest UV emissions occur in the summer hemisphere and depend strongly on northward IMF Bz, IMF magnitude and solar wind speed.

In the present study we identify arcs above 85 degrees magnetic latitude without regard to IMF, utilizing DMSP F13 SSJ4 particle data. The occurrence and characteristics of these aurora are examined in order to determine the influence of IMF strength and orientation, the solar wind, and Earth dipole tilt. They generally occur as isolated arcs, which are separated from the auroral oval by voids in particle precipitation. They vary in spatial width and are often made up of multiple thin arcs. We also consider the dependence of the small-scale structures associated with TPAs on interplanetary conditions, where a high AE index is associated with more structured, brighter arcs within the TPA. Some of the arcs can be identified as transpolar arcs (Theta aurora) from measurements made by the Polar UV imager. We examine the luminosity of the transpolar arcs. While previous studies of arcs during steady northward IMF show that the transpolar arc luminosity is mainly controlled by the magnetic energy flux of the

solar wind, we expand this to TPAs which occur during a variety of IMF orientations.