



## **The High-latitude Aurora During Steady Northward Interplanetary Magnetic Field and Changing IMF $B_y$**

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High-latitude 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  $B_y$  changes. Periods of study were chosen when  $B_y$  changes sign during steady northward IMF, in order to determine the influence of IMF  $B_x$ ,  $B_y$ , the strength of the IMF, the solar wind, and Earth dipole tilt on the occurrence and motion of high latitude TPAs forming theta aurora. For a 4.5-year period there are 55 events for which IMF  $B_z$  is northward for at least 2 hours before, and at least 3 hours after a  $B_y$  sign change. Of these, 19 occurred when the POLAR satellite was over the northern hemisphere for the duration of the event. We find that for northward IMF and a  $B_y$  sign change theta aurora are almost always formed in the northern hemisphere, regardless of  $B_x$  and dipole tilt. This implies that theta aurorae form simultaneously in both hemispheres. IMF  $B_y$  does not appear to influence the intensity and duration of the arc. Strongest UV emissions occur in the summer hemisphere. Evolution time has a fairly complex dependence on solar wind parameters.