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**The Effect of Large $B_y$ on Currents in the Polar Cap**[1] ROBERT ALLEN, SOPHIA COCKRELL, RAMON LOPEZ, DUSTIN BREWER, ELIZABETH MITCHELL, UT Arlington — In the polar cap, plasma flow is driven primarily by **E** x **B** drift. The two-cell convection pattern flows anti-sunward on the noon-midnight line and returns sunward on the equatorward edges of the polar cap. As the magnitude of the dawn-dusk interplanetary magnetic field (IMF $B_y$) grows, one of the cells enlarges as the other shrinks. During these times, we predict that a current will flow out of one pole, travel along the Earth's bow shock, and then into the other pole along open field lines. This current should create a small cell of convection entirely on open field lines. We have used the electron flux instruments and plasma drift meters on DMSP satellites to locate the open-closed field line boundaries and the convection reversal boundaries for comparison with each other. We will present statistics and cases showing how the polar current depends on IMF $B_y$.

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