

## **Interplanetary Magnetic $B_y$ Effects on the Dynamics of the Auroral Substorm Expansion**

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The expansion phase of the classical substorm consists of a rapid growth of aurora out of a quiet arc in the premidnight sector of the oval, forming the so-called auroral “bulge.” Observations from many ground-based imagers have established that the growth/expansion of an auroral bulge is accompanied by westward surges of auroras on the poleward edge of the bulge, resulting in a predominant westward motion of the bulge. Recently, observations of auroral substorms using the ultraviolet imager (UVI) on-board the Polar satellite indicate that a significant number of substorm auroral bulges actually move eastward. We study such an auroral substorm dynamics by examining possible effects from the interplanetary magnetic field (IMF). It is found that the orientation of the IMF  $B_y$  component (in GSM) is well correlated with the east-west motion of substorm bulges. Detailed results will be presented, followed by a discussion of two possible causes, namely the plasma flows and the configuration of the magnetospheric magnetic field, which are affected also by the IMF  $B_y$  component in a similar manner.

Keywords: substorm; auroral bulge; interplanetary magnetic field; plasma convection.