

Mission View of Field Aligned Currents from NASA's ST5 Spacecraft

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Magnetometer data from NASA's three-spacecraft Space Technology 5 (ST5) mission are available from March 27 – June 27, 2006. We transformed the data from the 300 km x 4500 km elliptical orbit frame into the Modified Apex Coordinate System for projection to a common reference altitude of 110 km. When projected as a keogram these magnetic perturbations reveal a pattern of long-lived magnetic “calms” interspersed among numerous variable-length episodic enhancements. The variations are directly related to changes in high-latitude field aligned current (FAC) systems caused by solar wind structuring. The most obvious association is with magnetosonic mach number (Mms) decreasing to values <5 . Many of these occur with recurring high-speed streams, while a few appear with other recurrent features, and a transient in the solar wind. Evidence of equinoctial effects in the FAC response gives way to responses that appear closely linked to summer-enhanced conductance and variations in the radial component of the interplanetary magnetic field projected onto Earth's sunward-tilted dipole. Analysis from the entire mission suggests that FAC responses at high-speed stream interaction regions lead to previously unexplained, impulsive, thermospheric temperature enhancements, reported in the literature.