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Dynamics of the magnetospheric field-aligned current distribution during magnetic storms DIMITRIS VASSILIADIS, BRUCE TEPKE, West Virginia University — Generation of field-aligned currents in a plasma is related to its dynamic stability and energy balance. Once developed, the currents may couple distant regions through particle transport and dissipation of electromagnetic stresses. Field-aligned currents at the magnetosphere-ionosphere interface provide coupling between the plasmas, and are linked to electron precipitation and the development of auroral structures. Closing the currents in the ionosphere are the auroral electrojets with space weather effects on power grids and pipelines. Thus, resolving questions on the location and duration of the currents can help identify how energy incident on the ionosphere is absorbed and transmitted. We use magnetometer data from a constellation of 66 Iridium satellites in the AMPERE project to measure the spatial distribution of the radial current density J_r(MLT, MLAT) on a geomagnetic coordinate grid. In four recent storms we find good agreement between the peak amplitude of J_r and the auroral electrojet indices compiled from ground magnetometer data. Hemispheric conjugacy is observed in each event. Both types of magnetospheric activity are ultimately driven by the convection electric field in the solar wind, $\mathbf{E}=\mathbf{v}\mathrm{x}\mathbf{B}$. To model the solar wind driving we use a magnetohydrodynamic (MHD) model provided by NASA Goddard Space Flight Center's Community Coordinated Modeling Center. We find very good agreement between the observed and MHD time evolution of density J_r during the storms.

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