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Using Laboratory Magnetospheres to Develop and Validate Space Weather Models¹ D.T. GARNIER, M.S. DAVIS, M.E. MAUEL, Columbia University, J. KESNER, MIT Plasma Science & Fusion Center — Reliable space weather predictions can be used to plan satellite operations, predict radio outages, and protect the electrical transmission grid. While direct observation of the solar corona and satellite measurements of the solar wind give warnings of possible subsequent geomagnetic activity, more accurate and reliable models of how solar fluxes affect the earth's space environment are needed. Recent development in laboratory magnetic dipoles have yielded well confined high-beta plasmas with intense energetic electron belts similar to magnetospheres. With plasma diagnostics spanning from global to small spatial scales and user-controlled experiments, these devices can be used to study current issues in space weather such as fast particle excitation and rapid depolarization events. In levitated dipole experiments, which remove the collisional loss along field lines that normally dominate laboratory dipole plasmas, slow radial convection processes can be observed. Thus, comparisons between laboratory plasmas and global convection models can be made.

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