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Plasma Physics of Sub-Auroral Ion Drifts: A turbulent Plasmaspheric Boundary Layer[1] EVGENY MISHIN, Air Force Research Laboratory — We present a new scenario of the subauroral ion drifts (SAID) phenomenon based on recent magnetically conjugate Cluster-DMSP-Polar satellite observations and natural analogy with plasmoids penetrating a magnetic barrier. The SAID features are explained in terms of a turbulent boundary layer formed over the plasmapause due to a short circuit of substorm-injected plasma jets (plasmoids). Nonlinear wave-particle interactions provide fast magnetic diffusion at the plasmoid leading edge and define the circuit resistivity. As in a number of laboratory and active space experiments, nonlinear plasma processes, including but not limited to gradient-drift and current-driven instabilities, define the SAID features near the outer/poleward boundary. Near the inner/equatorward boundary and next to the channel dominate anisotropic ion-driven processes. The observed level of lower hybrid/fast magnetosonic waves is in good quantitative agreement with theoretical predictions.

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