

The Turbulent Plasmasphere Boundary Layer and the Outer Radiation Belt Boundary

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We report on observations of enhanced plasma turbulence in the plasmasphere boundary layer formed by reconnection-injected hot plasma jets impenetrating the plasmasphere. Free energy comes from diamagnetic ion currents near the inner boundary of the layer due to the ion pressure gradient, electron diamagnetic currents in the entry layer near the electron plasma sheet boundary, and anisotropic (sometimes ring-like) ion distributions inside, and further inward of, the inner boundary. We also show that nonlinear parametric coupling between lower hybrid waves and between lower oblique resonance and fast magnetosonic waves significantly contribute to the observed VLF whistler waves in the plasmasphere boundary layer. These emissions represent a distinctive subset of substorm/storm-related VLF activity in the region devoid of substorm injected tens keV electrons and could be responsible for the alteration of the outer radiation belt boundary during (sub)storms.