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Transient Electron Precipitation During Oscillatory BBF Braking: THEMIS Observations and Theoretical Estimates

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We use THEMIS data acquired on 17 March 2008 between 10:22 and 10:32 UT to study the mechanism of transient electron injection into the loss cone during oscillatory bursty bulk flow (BBF) braking. During braking, transient regions of piled-up magnetic fluxes are formed. Perpendicular electron anisotropy observed in these regions (presumably caused by betatron perpendicular electroni heating) may be a free-energy source of coexisting whistler waves. Parallel electrons with energies between 1 and 5 keV disappear inside these regions, and transient auroral forms are observed simultaneously by the ground all-sky imager at Fort Yukon. We use quasi-linear theory of electron resonant interaction with whistler waves and also estimate the effectiveness of electron nonlinear capture by strong whistler waves. We suggest that electron injection into the loss cone is caused by: (1) scattering by whistler waves and (2) parallel acceleration of electrons captured by stronger whistler waves.