

Magnetosphere-ionosphere coupling associated with magnetospheric ion beams

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Recent Cluster studies reported properties of multiple energy-dispersed ion structures in the plasma sheet boundary layer at 4-5 Re using for the first time multiple spacecraft. The ion structures showed a complex fine structure with several beamlets. Here we report other particle and field characteristics that were associated with these dispersed ion structures and their sub-structure and that created a rich phenomenology in magnetosphere-ionosphere coupling. The observations suggest a causal relationship between the magnetospheric ion beams, acceleration and heating of outflowing ionospheric ions (H^+ , O^+), counter-streaming low-energetic electrons, plasma waves, field-aligned currents, Alfvén waves, and possibly the aurora.