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Warm trapped plasmaspheric plume at keV energy confined near the equator

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Cluster perigee observation (at about 4 Earth radius) revealed that the trapped plasmaspheric plasma in a very limited region near the magnetic equator, that was reported by Olsen et al.(1987) at tens eV range, are sometimes heated to more than hundred eV and up to keV, a much higher energy than plasmaspheric ions. Yet, the composition data confirms the plasmaspheric origin, with domination by H^+ and existence of some amount of He^+ without He^{++} or O^+. The pitch angle of this warm plasma plume is nearly 90° and is consistent with the confinement within a few degrees latitude of the equator. In the energy-time domain, this warm plasma plume is structureless although various forms of energy-time (or energy-latitude) dispersion, including signatures of energy-dependent magnetic drift, are sometimes recognized.

Together with this equatorially trapped warm plasma plume, electrostatic wave above the upper hybrid frequency at $(n + \frac{1}{2})f_{ce}$ (Jones et al., 1987) are observed, indicating that the wave is directly related to this plume. The time scales of the plume formation and its decay are both about 1-2 hours, and the wave activity follows the change in the warm trapped plasma. The local time dependence and non-correlation to the substorm activity indicate that this phenomenon is different from the plasmaspheric drain. This phenomenon indicates the specialty of the equator even for hundreds eV ions.