

THE PLASMAPAUSE REGION : MODEL SIMULATIONS VERSUS WHISPER & EFW CLUSTER OBSERVATIONS

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ABSTRACT

The four CLUSTER spacecraft penetrate occasionally into the plasmasphere (PLS) when the latter has expanded far enough during an extended quiet period. The electron density profiles derived, during a series of CLUSTER inbound and outbound passes, from the plasma frequency determined 1) from the WHISPER wave spectrae, 2) as well as from all four EFW spacecraft potential measurements, will be presented and discussed for a variety of geomagnetic activity conditions. Field-aligned projections of the locally measured plasma densities into the geomagnetic equatorial plane have been calculated and mapped versus McIlwain's L-parameter. They have also been mapped versus the radial distance, r_m , where the magnetic field intensity is minimum along the magnetic field lines passing through the position of the four spacecraft.

The equatorial density profiles versus r_m are compared with each other, and with those plotted versus L. These WHISPER equatorial density profiles are also compared with those determined using the EFW measurements; we compare them also to those obtained a decade ago by Carpenter and Anderson (1992) from the SFR wave experiment of ISEE-1.

All four equatorial Plasmopause positions, identified as the position of L and/or r_m where $n_{eq} = 150$ electrons/cc, are compared with each other. They are also compared with the empirical expression given by Carpenter and Anderson (1992) for the statistical PP positions determined from their ISEE-1 observations.

The WHISPER and EFW Plasmopause positions are also compared with various theoretical/predicted equatorial PP positions calculated for different magnetospheric convection electric field models, using different numerical simulation codes based on alternative theories/mechanisms for the formation of "Carpenter knee".