Title: Location and Dynamics of the Plasmapause Compared to the Outer Radiation Belt Electrons

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Abstract: The plasmasphere is a highly dynamic toroidal region of cold, dense plasma around Earth. Plasma waves exist both inside and outside this region and can contribute to the loss and acceleration of high energy outer radiation belt electrons. Early observational studies found an apparent correlation on long time scales between the observed inner edge of the outer radiation belt and the simulated innermost plasmapause location. More recent work using high resolution Van Allen Probe satellite data has found a more complex relationship. The aim of this project was to provide a systematic study of the location and dynamics of the plasmapause compared to the MeV electrons in the outer radiation belt. We used spin-averaged electron flux data from the Relativistic Electron Proton Telescope (REPT) and density data derived from the EFW instrument on the Van Allen Probe satellites. We analyzed these data to determine the standoff distance of the location of peak electron flux of the outer belt MeV electrons from the plasmapause. We found that the location of peak flux was consistently outside but within $\Delta L=2.5R_E$ from the innermost location of the plasmapause at enhancement times, with an average standoff distance $\Delta L=1.0$ +/- $0.5R_E$. This is consistent with the current model of chorus enhancement and previous observations of chorus activity. Finally, we identified "three-belt" structure events where a second outer belt formed and found a repeated pattern of plasmapause dynamics associated with specific changes in electron flux required to generate and sustain these structures. This study is significant to improving our understanding of how the plasmasphere under differing conditions can both shield Earth from or worsen the impacts of geomagnetic activity.