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Statistical Analysis of EMIC Wave Location in Relation to the Plasmapause from Cluster Observations

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Electromagnetic ion cyclotron (EMIC) wave generation in the inner magnetosphere has been subject to extensive discussion, since this region is important for both radiation belt and ring current dynamics. Theory predicts that regions of enhanced cold dense plasma density immersed in relatively low background magnetic field (such as the outer plasmasphere) should aid EMIC wave growth. Also, they may provide conditions for effective interaction between the waves and relativistic (MeV) electrons leading to energetic particle loss in the ionosphere. In this work, we will present an in-situ survey of EMIC waves in the plasmapause vicinity from Cluster data between 2007-2009 and will investigate the preferable EMIC wave location with respect to the plasmapause as well as the radial width of EMIC wave generation region from a statistical perspective. We identified plasmapause crossings based on electron density profiles from the WHISPER sounder onboard the Cluster satellite. Using an automated Pc 1 detection algorithm, we further identified EMIC waves from simultaneous (with WHISPER) magnetic field measurements by Cluster FGM instruments and investigated relationship between these two data sets.