Project Details

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Program Element: Focused Science Topic

Topic: Focused science topics for Strategic Goal 3 (Near Earth Radiation): Toward combined models of acceleration, loss and transport of energetic electrons and protons in the magnetosphere

Project Title:
Research on the Properties of Electromagnetic Chorus in Dayside Minimum-B Pockets: Relevance to Energetic Electron Losses and Acceleration

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Summary:
The proposed effort is to study the intensities and properties (direction of propagation, relative frequencies (omega/omega_ce), Landau damping, etc.) of dayside minimum-B pocket chorus using the Cluster, Double Star and Polar plasma wave data. Such a survey has never been performed before, except for a cursory look using OGO-5 analog data done many years ago (1977). It will be argued that the strongest cyclotron resonant wave-particle interactions occur in these dayside regions and/or at large L and these waves may be important for the losses and acceleration of energetic electrons. The study will determine (construct statistical surveys of) chorus properties as a function of phases of the solar cycle. Chorus during ICME-induced magnetic storms and during high speed stream-related geomagnetic activity will be studied on a case basis. It has recently been shown that chorus 0.1 to 0.5 s duration "elements" are composed of even smaller "wave packets". The instantaneous intensity of a wave packet can be an order of magnitude more intense that the time-averaged intensity of the element itself. It was also shown that dayside chorus can also have many interelement gaps such that the chorus "fill factor" (chorus element versus interelement spacings) can be as low as 10%. Thus from the combined two effects, the instantaneous wave intensities determined in the past may have been underestimated by several orders of magnitude. The "typical" dayside wave packet intensities and fill factors will be examined and characterized in this study. The aim of the study is to provide all of the chorus information needed for modelers to explore the role of minimum B pocket/outer L dayside chorus losses and acceleration of relativistic electrons.

Publication References:

no references