



Investigating different methods of chorus wave identification in the radiation belts for improved understanding of nonlinear interactions

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Earth's radiation belts can be described by two zones containing energetic charged particles; a more stable inner belt, and a highly dynamic outer belt. Wave-particle interactions have been identified as one of several processes responsible for the dynamics of electron populations within the outer region. Being able to describe these mechanisms is becoming increasingly important, given that the highest energy electrons present a risk to functioning satellites; the number of which is steadily growing. However, the dynamics of energetic electrons occur over many different time and length scales. This variability means that it is difficult to create a model capable of real-time prediction.

The most common method used by the international community for reproducing radiation belt dynamics involves Fokker-Planck diffusion models. Whilst, in many cases, these models effectively describe the global changes and interactions within the region, the Fokker-Planck approach depends upon a quasilinear theory. This assumes "small" wave amplitudes; however, recent observations have shown that this assumption may not always hold, with chorus waves being one of the most notable cases of high-amplitude waves. Accounting for this type of wave would require an extension of the modelling to include nonlinear effects.

Within two datasets of differing resolutions, the Van Allen Probe satellites provide multiple years' worth of information on the various waves and background fields inside the radiation belts. In this work, we present preliminary results of investigations comparing the lower resolution 'survey mode' data, with the high-resolution 'burst mode' data, captured during the mission. In particular, the work focusses on identifying chorus wave events in both datasets and assessing whether any major differences occur. Utilising the higher resolution data in conjunction with the survey data allows closer inspection of the larger amplitude waves, and their potential implications for energetic electron dynamics in radiation belt modelling.