Survey of large amplitude whistler mode waves in the inner magnetosphere: RBSP EFW observations

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Recent spacecraft observations have revealed existence of very large amplitude whistler mode waves in the radiation belt, which are characterized by their wave amplitudes exceeding 200 mV/m [Cattell et al., 2008; Cully et al., 2008]. Compared with gradual acceleration by repeated interactions with small amplitude (< 1 mV/m) waves, electrons may be abruptly accelerated up to MeV energy range by relatively few interactions with the large amplitude waves [Cattell et al., 2008]. At large amplitude, nonlinear aspects on wave-particle interactions are important and electrons can be accelerated up to relativistic energy through phase trapping [e.g., Omura et al., 2007]. Multi-satellite observations showed a possible connection between large amplitude whistler mode waves and bursty precipitations of relativistic electrons [Kersten et al., 2011]. Thus, very large amplitude whistler mode waves may play an important role in the radiation belt dynamics and survey of properties of the waves is important. We investigated statistically electric field data of the plasma waves provided by the EFW instrument [Wygant et al., 2013] onboard the RBSP spacecraft. We used the average and peak wave amplitudes in seven logarithmically spaced frequency bands from 0.8 Hz to 6.5 kHz at a cadence of 8 samples/sec (filter bank data). We will show distribution and occurrence of large amplitude whistler mode waves using the filter bank data and will discuss impact of the waves on the radiation belt dynamics.