Global Morphology of Lower-band Chorus Wave Intensity Reconstructed Using multi-year POES Electron Measurements

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Magnetospheric chorus is known to play a significant role in the acceleration and loss of radiation belt electrons. Interactions of chorus waves with radiation belt particles are commonly evaluated using quasi-linear diffusion codes that rely on statistical models, which might not accurately provide the instantaneous global wave distribution from limited in-situ wave measurements. Thus, a novel technique capable of inferring wave amplitudes from POES particle measurements, with an extensive coverage of L-shell and magnetic local time, has been established to obtain event-specific, global dynamic evolutions of chorus waves. This study, using 5 years of POES electron data, further improves the technique, and enables us to subsequently infer the chorus wave amplitudes for all useful data points (removing the electrons which were in the drift loss cone) and to construct the global distribution of lower-band chorus wave intensity. The results obtained from the improved technique reproduce Van Allen Probes in-situ observations of chorus waves reasonably well and reconstruct the major features of the global distribution of chorus waves. We demonstrate that such a data-based, dynamic model can provide near-real-time estimates of chorus wave intensity on a global scale for any time period when POES data are available, which cannot be obtained from in-situ wave measurements by equatorial satellites alone, but is crucial for quantifying the dynamics of the radiation belt electrons.