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# Chorus whistler wave source scales as determined from multipoint Van Allen Probe measurements

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Whistler-mode chorus waves are a particularly important process in outer radiation belt dynamics due to their key role in controlling the acceleration and scattering of electrons over a very wide energy range. The key parameters for both nonlinear and quasi-linear treatment of wave-particle interactions are the temporal and spatial scales of the wave source region and coherence of the wave field perturbations. Both of these scales, the source scale and the coherence scale, are not well-established experimentally, mostly because of a lack of VLF waveform data. We present an unprecedentedly long interval of coordinated VLF waveform measurements (sampled at 16384 s-1) aboard the two Van Allen Probes spacecraft. The cross spacecraft distance varied from about 100 up to 5000 km. Using time-domain correlation techniques, the chorus source regions have been determined to be about 450-550 km for upper band chorus waves with amplitude less than 100 pT and up to 1000 km for larger amplitude lower band chorus waves. The ratio between wave amplitudes measured on the two spacecraft is also examined and reveals that the wave amplitude distribution within a region of chorus element generation can be well approximated by the Gaussian with the characteristic distance r0 around 300 km.
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