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Local time distributions of the repetition period of rising-tone chorus elements: THEMIS Observations

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Whistler-mode chorus waves most likely occur in the dayside, dawnside, and nightside sectors of the inner magnetosphere owing to the co-location of the drift trajectories of energetic electrons. When the chorus waves are excited by electron anisotropy in the minimum magnetic field region, they propagate along the field lines, possibly interacting with charged particles under some resonance conditions. The most noticeable property of chorus waves is discrete elements. The repetition period of chorus waves is defined as the generation time delay between two consecutive discrete chorus elements. Here we utilize in situ high-resolution magnetic fields from the THEMIS mission to obtain distributions of the repetition period of chorus elements for various local time sectors. These distributions have a peak at lower repetition periods and a long tail at higher repetition periods. We find that the average repetition periods for the dawnside ($3 < MLT < 8$) and the nightside ($22 < MLT < 3$) sectors are 0.56 and 0.68 s, respectively. The repetition periods for the dayside ($8 < MLT < 14$) and the duskside ($14 < MLT < 22$) sectors are about two times of those for the dawnside and nightside sectors. The distributions derived from this study are important to a modeling of wave-particle interactions for radiation belt electrons.