Poynting vector measurements of whistler-mode chorus with THEMIS: Substructures within chorus source region?

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Whistler mode chorus is most intense electromagnetic waves observed in the terrestrial inner magnetosphere. The waves are observed mostly on the dawnside and are enhanced during geomagnetically disturbed periods. Chorus is observed in the typical frequency range from 0.2 to 0.8 fce with a gap at 0.5 fce, where fce is the electron gyrofrequency. The emissions below and above 0.5 fce are called lower-band and upper-band chorus, respectively. The Poynting vector measurements by various spacecraft directly showed that chorus is observed to propagate from the magnetic equator to higher latitudes, indicating that the waves are generated at the magnetic equator. We have investigated the propagation characteristics of lower-band and upper-band chorus emissions observed by THEMIS near the magnetic equator. Full measurements of wave electric and magnetic fields are used to estimate the Poynting vectors of both lower-band and upper-band chorus, and then their polar and azimuth angles respect to the ambient magnetic field are derived in this presentation, we report on events showing propagation direction deferences between lower-band and upper-band chorus at around the magnetic equator. During the events the lower-band and upper-band chorus are field aligned and have sufficiently larger wave amplitudes compared with those of reflected chorus waves previously reported, indicating that the waves are generated at around the magnetic equator. Our statistical investigation shows that such events are preferentially observed within 3 degrees from the magnetic equator, which indicates that the events are unique to the chorus source region. The events observed by the THEMIS spacecraft imply a possibility that apparent source regions of lower-band and upper-band chorus would be different, i.e., the source region of chorus is composed of two distinct subsets, one responsible for upper-band and one for lower-band chorus generation.