

Simultaneous ULF Waves, Whistler-mode Chorus and Pulsating Aurora Observed by the Van Allen Probes and Ground-based Imagers

Jaynes, Allison N. (1), allison.jaynes@lasp.colorado.edu; Marc Lessard (2); Kazue Takahashi (3); Craig Kazue (3); John Wygant (5); Eric Donovan (6); and Bern Blake (7).

(1) University of Colorado, Boulder, CO, USA

(2) University of New Hampshire, Durham, NH, USA

(3) Johns Hopkins University, Applied Physics Lab, Laurel, MD, USA

(4) University of Iowa, Iowa City, IA, USA

(5) University of Minnesota, Minneapolis, MN, USA

(6) University of Calgary, Calgary, Alberta, Canada

(7) The Aerospace Corporation, El Segundo, CA, USA

Theory and observations have linked equatorial VLF waves with pulsating aurora for decades, invoking the process of pitch-angle scattering of 10's keV electrons in the equatorial magnetosphere. Recent satellite studies have strengthened this argument, by showing strong correlation between pulsating auroral patches and (1) lower-band chorus observed by THEMIS and (2) 30-100 keV electron precipitation in the vicinity of geosynchronous orbit observed by GOES. Additionally, a link has been made between Pc4-5 compressional pulsations and modulation of whistler-mode chorus using THEMIS. Here we present simultaneous in-situ observations of structured chorus waves and an apparent poloidal field line resonance, from Van Allen Probes, along with ground-based observations of pulsating aurora. We demonstrate the possible scenario being one of ULF pulsations modulating chorus waves, and thus providing the driver for pulsating particle precipitation into the Earth's atmosphere. We also show, for the first time, a particular 3-Hz modulation of individual chorus elements concurrent with pulsating aurora. Such modulation has been noticed in camera data of pulsating aurora for decades.