

Conjugate Observations of Electromagnetic Ion Cyclotron (EMIC) Waves Associated with Traveling Convection Vortex (TCV) Events

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We report on simultaneous observations of EMIC waves associated with traveling convection vortex (TCV) events caused by transient solar wind dynamic pressure (Pd) impulse events. The THEMIS spacecraft located near the magnetopause observed radial fluctuations of the magnetopause and the GOES spacecraft measured sudden compression of the magnetosphere in response to sudden increases in Pd. During the transient events, EMIC waves were observed by inter-hemispheric conjugate ground-based magnetometer arrays as well as the GOES spacecraft. The spectral structures of the waves appear to be well correlated with the fluctuating motion of the magnetopause, showing compression-associated wave generation. In addition, the wave features are remarkably similar in conjugate hemispheres in terms of bandwidth, periodic wave power modulation, and polarization. Proton precipitation was also observed by the DMSP spacecraft during the wave events, from which the wave source region is estimated to be 72-74 deg in magnetic latitude, consistent with the TCV center. The confluence of space-borne and ground instruments including the the inter-hemispheric, high-latitude, fluxgate/induction-coil magnetometer array allows us to constrain the EMIC source region while also confirming the relationship between EMIC waves and the TCV current system.

Keywords: EMIC waves, Traveling Convection Vortex, Transient phenomena