

Azimuthal extents of electromagnetic field variations and energetic particle source regions during a sawtooth event

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The multi-satellite (LANL, GOES and THEMIS) and ground-based (THEMIS Ground Based Observatory, GBO) observation show the relationship between the azimuthal extents of field and energetic particle variations at the beginning of a so-called “sawtooth” event on 20 November 2007. In a few min after the substorm onset, dipolarizations at the geosynchronous orbit and positive/negative bays at the ground were observed from post-dusk to pre-dawn in the nightside sector. Dispersionless flux enhancements of energetic electrons and ions occurred only at the midnight and duskward from the midnight, respectively, with a time difference of a few min. These results indicate that (1) the azimuthal extent of the field variations is much broader than that of energetic particle sources, and (2) the source region for electrons and ions is not common, in this event. The fact that the convective (duskward) electric field was observed without the significant evidence of the energetic particle injection from the tail, suggests that it is not a sufficient condition for the injection.