

Precipitating electron properties and their correlation with the auroral dynamics observed in the mid-night oval by Reimei

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We, the Reimei science observation team, have been reporting the closed correlation between the auroral arcs/bands and the inverted-V type electron signatures from the viewpoint of the meso-scale (a few tens of km) distribution based on the image-particle simultaneous observation results made by the characteristic high-time and -spatial resolutions of Reimei. It is also clearly shown on the basis of the detailed investigations on the energy and pitch-angle distributions that even a continuous signature of inverted-V type precipitating electrons has a number of variations inside the quasi-electrostatic potential structure. Corresponding to these electron signatures, the distributions and variations of auroral emissions also have the remarkable features. Our results also indicate that the electron components accelerated by Alfvén waves have coherent relations with the fine-scale and rapidly varying auroral properties. The latest observations done especially in 2007 reveal that the electrons accelerated by Alfvén waves with high characteristic energies and intense energy fluxes are correspondent with dynamic variations in the auroral emissions typical by fine-scale ray-type auroral distributions with rapid movements/rotations and drastic appearance/vanishing. The characteristic dimension and time scale for these auroral activities are about a few km and less than 1 sec, as presented in the monochromatic auroral images taken every 120 msec by Reimei. It should be noted that the electron measurements covering the full pitch angle range by Reimei enable us to compare the properties between the precipitating and upflowing electron components. In this presentation, we present the observational properties of the fine-scale and rapidly varying auroral dynamics and discuss the correlations with the electron signatures caused by Alfvén wave acceleration processes.