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Investigation of the role of Wave accelerated electrons in magnetospheric processes.

S. B. Mende, H.U. Frey, C. W. Carlson, and L. M. Peticolas. University of California, Berkeley, CA 74020, USA.

SSL University of California, 7 Gauss Way, Berkeley, USA (mende@ssl.berkeley.edu)

Intense beams of wave accelerated low energy electrons in auroras signify the location of large scale energy input from the magnetosphere. Studying these Alfven wave accelerated (AWA) electron auroras require the monitoring of the auroral dynamics by high resolution (ground- or space-based) imaging while simultaneously measuring the particles at various altitudes to determine the characteristic electron spectrum and to observe the transition of wave Poynting flux into electron energy. The generation of AWA electron auroras is another distinct and presumably transient process by which magnetic energy of the magnetosphere is converted into particle (electron) energy and deposited into the atmosphere. Using the FAST and auroral imaging from the IMAGE spacecraft we examined the latitude of AWA regions prior, at and post substorm onset. Pre and post onset AWA auroras occur mostly at or near the poleward boundary of the auroral oval, near the boundary of open and closed field lines, where steady state reconnection is expected to occur. At onset AWA electrons play a primary role in the surge formation and the break up aurora carrying the largest energy flux. This aurora is located deep in the region of closed field lines. Immediately after onset the poleward propagating auroral surge contains AWA electrons inside the auroral oval latitude range and within the region of the intense precipitating protons. Later the region is located at the poleward edge of the closed field configuration and is closely followed by inverted V type precipitation that carries the largest energy flux.