

Title: Measurements of Energetic Particle Injections during Conjunctions between MMS and Van Allen Probes

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Abstract:

Energetic particle injections are the earthward transport of tens to hundreds of keV particles from the outer magnetosphere into the radiation belts. Although past studies have focused on particle injections, much is still unknown about injections; such as the shape and size of injection regions, and how injections propagate. This study uses conjunctive measurements from the Van Allen Probe and Magnetospheric Multiscale missions, with complementary data from Geostationary Operational Environmental Satellites to examine particle injections. First, energy spectra during close conjunctions which occurred during quiet times were compared between each of the Van Allen probes and the Magnetospheric Multiscale spacecraft. These determined that each spacecraft observes similarly structured energy spectra with the Van Allen probes typically measuring lower flux at the same L-shell. Next, a single event was chosen for examination due to the close spatial and magnetic field proximity of the Magnetospheric Multiscale spacecraft and Van Allen probe B. During this event a dispersionless electron injection was detected by MMS from 50.9 to 233 keV and dispersed injections were detected by the Van Allen Probe A from 32 to 232 keV, by the Van Allen Probe B from 32 to 242 keV, and by both GOES 14 and 15 from 40 to 475 keV. For each dispersed injection, drift velocity tracing was used to determine the injection boundaries, which were consistent within the error in each case, and times which indicated an inwards propagating injection as expected. Energy spectra for Van Allen probe B and Magnetospheric Multiscale were compared throughout the injection which showed a similar, although not identical progression.