Locations of Night-side Precipitation Boundaries Relative to R2 and R1 Currents

Shinichi Ohtani[1]
[1] JHU/APL

The present study statistically examines the location of various precipitation boundaries introduced by Newell et al. [1996] relative to R2 and R1 currents on the night side. Results are summarized as follows: (1) The electron and ion zero-energy boundaries, b1e and b1i, are located mostly inside the R2 current at dusk-to-midnight and near the equatorward boundary of the R2 current or farther equatorward at midnight-to-dawn; (2) The maximum energy flux of ion precipitation (b2i) occurs inside the R2 current irrespective of MLT; (3) The occurrence distributions of the most equatorward (b3a) and poleward (b3b) electron acceleration events indicate that mono-energetic electron precipitation is mostly confined in the upward R1 current at dusk-to-midnight, whereas at midnight-to-dawn it is more widely distributed including the downward R1 current. (4) The transition between structured and unstructured electron precipitation (b4s) tends to occur around the R2/R1 demarcation, but its occurrence distribution has extending tails. (5) The distributions of the poleward boundaries of the electron and ion auroral ovals, b5e and b5i, are centered around the poleward boundary of the R1 current but have extending tails especially at midnight-to-dawn. Result 1 suggests that the overlap between the ring current and the plasmasphere is more significant at dusk than at dawn. Result 2 indicates that the b2i boundary can be used as an identifier of the R2 current. Results 3-5 suggest that the R1 current is more structured than the R2 current and that the FAC structure is more complex at midnight-to-dawn than at dusk-to-midnight.