

Statistical characteristics of the duskside mesoscale field-aligned currents without accompanying the large-scale Region 1 current

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During prolonged quiet times the large-scale Region 1 current nearly diminishes except for its near-noon part, and irregular magnetic perturbations exist at latitudes where the Region 1 current disappeared. Our recent event study has shown that the irregular magnetic perturbations on the duskside are a result of highly structured quasi-static field-aligned currents whose typical latitudinal size is 20–30 km, and that those mesoscale currents in the duskside auroral oval are the phenomena that are pertinent to the magnetosphere for a northward IMF condition, not a simple remnant of the typical Region 1. In the present study, in order to clarify detailed characteristics of the mesoscale field-aligned currents without accompanying the large-scale Region 1 we examined large amounts of data obtained by Swarm satellites during three years, i.e., from January 2014 to December 2016. How the occurrence of those mesoscale field-aligned currents is controlled by solar illumination of the ionosphere and upstream solar wind parameters other than the northward component of IMF is presented.

Keywords: mess scale field-aligned current, northward IMF condition, Swarm satellite