

モデルと観測から得られるカスプのプロトン降下とオーロラエミッションの分布： メソスケール構造の重要性

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Cusp proton precipitation and auroral emission as derived from models and observations: Importance of the mesoscale structure

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Several recent studies have proposed empirical models of the high-latitude electric potentials expressed as a function of the solar wind parameters. One of the advantages of our empirical model is to provide a reasonable location of the footprint of the reconnection line in the dayside ionosphere. In this study, by using our potential model and assuming several properties about proton population and injection in the source magnetosphere, we have obtained model distributions of the cusp proton precipitation and related auroral emission in the ionosphere. Results of modeling show that the large-scale pattern of the proton precipitation and auroral emission explains spatial relations between the electric field and the collocated particle precipitation which have been reported in previous studies mostly based on data from the noon-midnight passes of spacecraft. Comparison between our modeling result and particle data from the DMSP satellite traversing the cusp longitudinally, however, shows that the observed proton precipitation can have smaller-scale structures than the modeling result. The importance of the mesoscale structure in the cusp is discussed.