

R005-17

A 会場 : 11/27 AM2 (11:05-12:35)

11:05~11:20:00

極域における金属イオン流の3次元シミュレーション

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Three-dimensional metal ion flow in the polar ionosphere simulated by a new ionospheric model

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The temporal evolution of the three-dimensional metal ion flow (MIF) in the polar ionosphere is presented for the first time. Until now, no groups have thoroughly examined the temporal evolution of three-dimensional MIFs in the polar ionosphere, which is crucial for polar sporadic E layer (EsL) dynamics. Here, we developed a new ionospheric model for metal ion dynamics, which incorporates electric fields and winds from a whole atmospheric model. We revealed the time-dependent three-dimensional MIFs in the polar ionosphere, driven by two-cell convective electric fields. The simulated MIFs closely matched observations reported in previous studies and were primarily caused by electric fields. For example, metal ions gather in the evening cell rather than the morning cell in the ionospheric F region owing to the morning divergence and evening convergence electric fields; the narrow latitudinal metal ion concentrations appear in the pre-midnight ionospheric E region owing to downward motions and vertical convergence of ions by electric fields. Our findings emphasize the critical role of electric fields in polar metal ion dynamics and provide valuable insights for interpreting past and future MIF observations in the polar ionosphere.