

グローバルMHDシミュレーションを用いたオーロラの形状と動きの南北両半球非対称性の研究

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Interhemispheric asymmetry of auroral shape and motion reproduced in a global MHD simulation

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We performed a global magnetohydrodynamic (MHD) simulation to model the magnetospheric reconfiguration under a southward interplanetary magnetic field (IMF) condition. Several substorm-like features, namely the formation of a near Earth neutral line, fast Earthward flows and the tailward release of a plasmoid, occur within about 1 hour after a southward turning of the IMF.

The magnetic field line traced from the near-Earth magnetotail is strongly distorted toward dusk (dawn) in the northern hemisphere and toward dawn (dusk) in the southern hemisphere after the substorm onset under the positive (negative) IMF By conditions.

We traced magnetic field lines from different magnetic local times in the near-Earth magnetotail to the northern and southern ionospheres. The footprints on the duskside (dawnside) south hemisphere is widely (narrowly) spaced in the longitudinal direction than those on the north hemisphere for the positive IMF By case. On the other hand, for the negative IMF By case, we found the footprints on the duskside (dawnside) south hemisphere is narrowly (widely) spaced in the longitudinal direction than those on the north hemisphere.

We think these interhemispheric asymmetries in the intervals between the northern and southern footprints corresponded with auroral asymmetries in the conjugate hemispheres.