

Evolution of theta aurora during strong positive IMF Bz and varying IMF By condition

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Formation of the theta aurora, which appears under the condition of northward IMF and greater IMF magnitude, is investigated from the analysis of the numerical MHD simulation. The theta aurora is caused by the transient convection after a sign change of IMF By. This transient convection must include a replacement of lobe field lines from old IMF orienting fields, a rotation of plasma sheet to opposite inclination, and a reformation of ionospheric convection cells. In the midst of these reconfigurations, old and new convection system must coexist in the magnetosphere-ionosphere system. In this stage, the polar cap and tail lobes are continuously encroached by the new open field lines connected to the new IMF. Whereas magnetic field lines accumulated in new lobes tend to rotate the outer plasma sheet in the opposite direction, the old merging cell convection still continues to generate closed field lines that must return to dayside against the new lobe formation. As time progresses, the growth of new lobes results in the blocking of the return path toward dayside of closed field lines generated in the old merging cell to form the kink structure in the plasma sheet. Losing their return path, these closed field lines generated from old lobes accumulated on the night side. The theta aurora appears at the foot point of these accumulated closed field lines. In the presentation, we will demonstrate some observational results brought by satellites and ground based instruments, which support above mentioned hypothesis for theta aurora formation.

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