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シータオーロラの形成について
Possible Formation Scenario of Transpolar Aurora

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There might be two types of transpolar auroras, they say. 1) One type of the transpolar aurora appears in the pole ward edge of electron precipitations, which expanded from dawn side aurora oval or dusk side aurora oval depending on the IMF by polarity, as mentioned by Makita ea. al. (1991). The evidences were inferred from the satellite particle data together with aurora images taken by the low altitude polar satellites. This type of transpolar aurora, which is associated with relatively intense electron precipitations near the pole ward boundary, tends to become much more luminous, forming so-called theta aurora. 2) Another type of transpolar aurora is theta aurora, which appears under the conditions of strong northward IMF. This type of theta aurora is cause by a sign change of IMF By . (Tanaka et al, 2004) This transition includes a lobe field line replacement from old IMF originating fields to new IMF originating fields, rotation of plasma sheet to the opposite inclination, and reformation of ionospheric convection cell. In the midst of the reconfiguration, old and new convection systems must coexist in the magnetosphere-ionosphere system and 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. The growth of new lobes results in the blocking of the return path toward the 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 accumulate on the nightside. The theta, then, appears at the foot points of these accumulated closed field lines. We have joined NASA IMAGE project, receiving real time telemetry data over Japan from 2000 to 2005. By investigating IMAGE data, we confirmed that two different processes actually exist. In the talk, we like to report our examination and discuss on the relationship between above mentioned two types of transpolar auroras.

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