

磁気嵐時のオーロラベルト拡大について(2)

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On equatorward expansion of the auroral belt during geomagnetic storms, #2

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It has been known for some time that the auroral belt shifts toward lower latitudes during intense geomagnetic storms (e.g., Akasofu and Chapman, 1963; Kendall et al., 1969; Meng, 1984). Various theories were proposed to account for this equatorward expansion of the auroral belt or the polar cap boundary, i.e., the open-closed field lines, in terms of the effects of the storm-time ring current which increases magnetic flux in the tail, enlarging the polar cap area (e.g., Siscoe, 1979; Stern, 1985; Schulz, 1997). In an earlier presentation in May, however, observations indicate that Dst, a measure of the ring current intensity, is less important than changes in the southward component of IMF. In the present paper, the effects of solar wind dynamic pressure are taken into account.

磁気嵐時にオーロラベルトが赤道側に拡大し、オーロラが中低緯度からも見られることはよく知られている (e.g., Akasofu and Chapman, 1963; Kendall et al., 1969; Meng, 1984)。その理論的解釈として、磁気嵐に伴って発達する環電流が極冠 (tail lobe) につくる磁気フラックスの増大が提案されている (e.g., Siscoe, 1979; Stern, 1985; Schulz, 1997)。前回、これらの環電流磁気フラックスによるベルト拡大は観測 (Dst 指数とオーロラの位置の関係) と必ずしも一致しないことを示し、南向き惑星間空間磁場による磁気圏尾磁気フラックス増大の効果の方が有力な候補であることを述べた。今回は、加えて、太陽風動圧の効果も考慮に入れる。