Geophysical Research Abstracts, Vol. 7, 02370, 2005
SRef-ID: 1607-7962/gra/EGU05-A-02370

A modified equation for the storm time ring current dynamics

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The storm time ring current dynamics is not only associated to magnetic storms, but also substorm processes play an important role on it. Some results [e.g., Daglis, 1997] show that O+ ions of ionospheric origin populate de inner magnetosphere mainly during the main phase of geomagnetic storms. Furthermore, Sun and Akasofu [2000], emphasizes that substorm processes are crucial in populating the ring current by O+ ions.

The classical equation [Burton et al, 1975] to describe the ring current dynamics is related basically to geomagnetic storms. In this work we introduce and discuss a modified equation for the ring current dynamics to take into account the contribution of substorms processes associated to the electric energy storage in the magnetosphere, not considered in the classical description. Previously, a second order differential equation was proposed by Vassiliadis et al, [1999], to replace the Burton equation. Our new proposal for the dynamic of the ring current will be compared with the previous equations and will be also supported by study cases chosen mainly from the OMNI database.