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The Magnetotail during geomagnetically perturbed periods

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Abstract

By studying geomagnetic indices and interplanetary magnetic field records, two geomagnetic storm characterized by Dst peak less than -100 nT are researched. Both intervals are characterized by substorm events with important maximum amplitude values (AE index greater than 800 nT) which don't
contribute in the same manner, to build the ring current.
The lack of the satellite data during both geomagnetic disturbances do not allow to estimate the plasmoid energy. Some hours without data could indicate the disappearance of plasma and magnetic field into the plasmasheet.

INTRODUCTION

The geomagnetic perturbed periods analysis have happened since many years ago. Substorms periods have been studied and there are a lot of substorm generation models (Hones, 1985).
In the most frequently adopted model of substorms , a near-Earth neutral line is formed between -10 and -20 Earth radius at substorm onset producing ring current injection, particle energization and the partition of the plasma sheet to form a plasmoid. Fast plasma flux away from the Earth and southward magnetic fields in the distant tail (140 and 200 Re) as observed by Geotail are interpreted as the evidence of plasmoids formation (Slavin et al. 1998).
Two geomagnetic storm periods are analized: 2-4 July, 1993 and 16-20 February 1993. During those, many substorms are detected. Equatorial and Auroral geomagnetic indices are used. Magnetic field data from spacecrafts in the magnetotail provided an opportunity to analize the magnetotail behaviour during substorm times.

DATA SOURCES AND ANALYSIS

Plasma ion density, plasma velocity and magnetic field data as measured in the magnetotail were obtained from the World Data Center A for Rockets and Satellites (USA) and the AE and Dst indices were got by World Data Center C2 for Geomagnetism (Japan). The values of AE with 15-minute time resolution and solar wind data with 5-minute time resolution have been used. Using cubic spline method, Dst hourly values have been adjusted to obtain values at 15-minute intervals.

CONCLUSIONS

This work shows that the presence of ion density and magnetic field variations data obtained from spacecrafts in the distant magnetotail could be related to plasmoids ejections or flux ropes structures. There is a dependency between geotail magnetic events and geomagnetic activity. These data have shown temporal changes some minutes after the other one.

During these perturbed periods our results have shown:
a)Important geomagnetic activity in the auroral and equatorial zones .
b) The existence of plasmoids or flux ropes in the magnetic tail.

REFERENCES

Hones, E.W. Jr., 1985, Plasma flow in the near distant geomagnetic tail:Adv. Space Research 5, 375-389.

Slavin, J.A, Fairfield D.H., Kuznetzova, M.M., Owen, C.J., Lepping, R.P., Taguchi, S., Mukai, T., Saito, Y., Yamamoto, T., Kokubun, S., Lui, A.T.Y. and Reeves, G.D., 1998, ISTP observations of plasmoids ejection: IMP 8 and Geotail, Journal of Geophys. Res. 103, 119-133.

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