



Do high-speed plasma sheet flows contribute to inner magnetosphere dipolarisation? : A multi year statistical study using multi-spacecraft observations

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In the plasma sheet of Earth's magnetotail, magnetic flux is frequently transported via intermittent, high-speed flows – termed “bursty bulk flows” (BBFs). Dipolarisation of the distended magnetic field pervading the night-side magnetosphere is also common. Both of these phenomena play a role in Earth's substorm cycle.

Previous studies have examined concurrent observations of BBF & dipolarisation events to seek evidence of a direct connection between BBFs & dipolarisations. Ohtani et al. (2006) performed a statistical analysis using Geotail & GOES data from 1993 to 2001. They concluded that the majority of cases showed no direct connection of BBF occurrence & dipolarisation at the geosynchronous orbit. Takada et al. (2006) did a similar study of concurrent observations made by one Cluster spacecraft and one Double Star spacecraft, using data from 2004. With this study, dipolarisations observed in the near-geosynchronous region ($X > -8R_E$) were never associated with an observed BBF.

The current work follows a similar line to Takada et al., though considers a larger set of events and uses all Cluster & Double Star spacecraft as appropriate to forming multi-point conjunctions in the magnetotail; the best possible utilisation of multi-spacecraft measurement has been attempted. This study seeks to answer questions raised by Ohtani et al. & Takada et al., such as whether BBFs of the near-Earth tail are ever associated with inner magnetosphere dipolarisation.