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Statistical properties of bursty bulk flows in the magnetosphere revealed by the Virtual Magnetospheric Observatory

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Fast transient plasma flows in the magnetosphere are usually associated with magnetic reconnection and/or rapid changes in the magnetospheric configuration. Using a common methodology to analyze data from the THEMIS satellites we map the statistical occurrence rate of bursty bulk flows (BBFs) in the magnetosphere.

Such a task involves obtaining and processing of large amount of data (5 THEMIS satellites provide measurements since spring of 2007), then writing custom code and searching for intervals of interests. The existence of a Virtual Magnetospheric Observatory (VMO) offers, however, a less laborious alternative. We discuss how the VMO made our research faster and easier and also point out the inherent limitations of the VMO use.

The VMO's goal is to help researches by creating a single point of uniform discovery, access, and use of magnetospheric data. Available data can be searched based on various criteria as, for example, spatial location, time of observation, measurement type, parameter values, etc. The results can then be saved, downloaded or displayed as, for example, spatial-temporal plots that quickly reveal where and how often was the searched-for phenomenon observed.

Our analysis revealed that the BBFs were found more frequently with increasing distance from Earth and the peak occurrence rate of earthward BBFs was at Xgsm = 29 Re and Ygsm = -2 Re. The tailward BBFs were very rarely observed even between Xgsm = -20 and -30 Re but they occurred over a wide range of local times. The positions with highest BBF occurrence rates differ from previous reports that used IRM and ISEE2 data.

References:
http://vmo.nasa.gov