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Initial statistical results on the spatial variation of energy conversion at the Earth's magnetopause

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We investigate the spatial variation of the energy conversion through the Earth's magnetopause using data from multi-spacecraft Cluster mission. The applicability of multi-spacecraft methods to infer energy conversion depends on the inter-spacecraft distance, which is not constant during the lifetime of the Cluster mission. This limits the usage of multi-spacecraft methods to calculate magnetopause energy conversion. Hence we first validate single spacecraft methods against multi-spacecraft methods using a small data set of magnetopause crossings and conclude that the single spacecraft methods can be employed in estimating magnetopause energy conversion.
The Cluster spacecraft crosses the magnetopause at high latitudes near local noon and along the flanks at low latitudes. We have compiled a database of Cluster magnetopause crossings during 2001 - 2009, containing about 5000 individual crossing events. We use this large data set to examine the spatial variation of energy conversion with respect to the solar wind drivers. We concentrate on the effects due to the solar wind dynamic pressure and the interplanetary magnetic field (IMF) orientation. We compare these statistical results to earlier findings from the GUIMICS-4 global MHD simulation.