

Spatial distribution of the eddy diffusion coefficients in the plasma sheet during quiet time and substorms from THEMIS satellite data

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During the last decade, a number of studies have shown that turbulent processes in the plasma sheet are very important for the analysis of the formation of quasi-stable plasma sheet configurations. The existence of this turbulence provides a self-consistent approach to study the dynamics of the Earth's magnetosphere, including the plasma sheet stability. The turbulence can also be very important for an understanding of the location of an isolated substorm expansion phase onset. In this study the level of turbulence has been evaluated by calculating the eddy diffusion coefficients using the Time History of Events and Macroscale Interactions during Substorms satellite data. It was found that the value of the eddy diffusion coefficients may vary by at least 3 orders of magnitude, generally ranging from 10^3 to 10^6 km²/s, increasing with the distance from the Earth. The area of low eddy diffusion coefficients, less than 10^4 km²/s, is situated at distances below 12 RE in the tail where we fo