
Turbulence cascade rate across the magnetosheath: unbiased magnetosheath campaign observations

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Abstract

During the 2023 "unbiased magnetosheath campaign", MMS spacecraft gathered over 300 high cadence data intervals distributed among 14 inbound magnetosheath crossings. This data-gathering campaign aimed to provide an unbiased view of the magnetosheath and to study the evolution of the plasma properties along the magnetosheath crossings, from the bow shock to the magnetopause. We have used this unbiased database to analyze the properties and evolution of plasma turbulence in the magnetosheath. Based on the change of the spectral index with distance to the bow shock, our results indicate that turbulence becomes more developed as the plasma approaches the magnetopause. Conversely, the energy transfer rate across scales does not show a clear dependence with the distance to the bow shock. We also compared our estimations of the turbulence cascade rate in the magnetosheath to those computed from solar wind data at 1 au during the same time period, finding out an increase of several orders of magnitude of the cascade rate downstream the bow shock.

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