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Title : Global three-dimensional draping of magnetic field lines in Earth's magnetosheath from in-situ measurements

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Understanding where the magnetic reconnection occurs at the Earth's magnetopause is one of the important remaining questions about this phenomena. Since the last decades various models predicting the position of the X-line have been made. These models largely depend on the orientation of the magnetic field in the magnetosheath close to the magnetopause, such as the Maximum Magnetic Shear model (Trattner et al 2007). Therefore understanding how it is structured as a function of the solar wind and interplanetary magnetic field is of pivotal importance. Machine learning was used to collect around 45 million measurements in the magnetosheath at 5s resolution in all available Cluster, MMS, Double Star, THEMIS dataset, and to build detailed maps of the field structure in that region as a function of the IMF orientation. It allowed us to reconstruct for the first time the three dimensional magnetic field draping in the dayside magnetosheath from in-situ data only. Our results reveal how the frozen-in condition constrains the draping around the magnetopause. A comparison of the draping obtained with in-situ data with the one from a widely used magnetostatic model (Kobel et al 1994) was made. Differences of up to 180° were found for cone angle between 12.5° and 45°.

Field

Not in the above

Day constaints

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