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Turbulent reconnection and associated particle heating and acceleration in the Earth's magnetosheath

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Magnetic reconnection is a fundamental mechanism of energy dissipation and particle energization in space plasma. Spacecraft observations and numerical studies have established that it occurs in small-scale intermittent structures such as thin current sheets that form spontaneously in turbulent plasma. This kind of turbulent reconnection leads to significant particle heating and acceleration as well as to the dissipation of turbulent energy at kinetic scales. However, the extent of its contribution to turbulent dissipation has yet to be determined. Here we present results from in situ observations made by MMS and CLUSTER in the Earth's magnetosheath. A statistical study of a large number of thin current sheets allows us to establilsh their importance for dissipation while the in-depth study of reconnecting current sheets yields valuable insight into the exact mechanisms of particle heating and acceleration.