Geophysical Research Abstracts,
Vol. 11, EGU2009-5838-1, 2009
EGU General Assembly 2009

In-situ observations of magnetic reconnection and associated particle acceleration in near-Earth space

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Magnetic reconnection is a universal energy conversion process occurring at boundaries in plasma. Reconnection converts electromagnetic energy into kinetic and thermal energy of plasma as well as accelerates charged particles to non-thermal energies. Energetic particle acceleration during reconnection is important for laboratory plasma, planetary magnetospheres and solar corona. Despite of substantial observational evidence that energetic particles are produced in reconnection regions, the acceleration mechanisms are yet poorly understood. The near-Earth space is an excellent laboratory to study the acceleration mechanisms since multi-spacecraft simultaneous measurements of energetic particles and electromagnetic fields are available in situ. Here we present Cluster spacecraft observations within near-Earth reconnection regions and discuss associated particle acceleration mechanisms.