Geophysical Research Abstracts, Vol. 7, 04826, 2005
SRef-ID: 1607-7962/gra/EGU05-A-04826

Making a global measurement of reconnection from the ionosphere

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Magnetic reconnection (merging) at the boundaries of the Earth's magnetosphere is one of the major processes which controls the flow of mass, energy and momentum within the magnetospheric system. It can be quantified by measuring the flux transfer that occurs at the foot point of the reconnection separatrix in the ionosphere. This paper will present a complete mathematical algorithm for making a global measurement of the reconnection electric field using measurements from both the dayside and nightside ionosphere. For an example event, the foot point of the reconnection separatrix in the ionosphere is identified by a wide range of spacecraft and ground-based instrumentation. This is combined with global measurements of ionospheric convection made by the SuperDARN radars to obtain spatiotemporal measurements of the reconnection electric field and potential in both the dayside and nightside ionospheres, simultaneously.