Geophysical Research Abstracts
Vol. 16, EGU2014-1778, 2014
EGU General Assembly 2014

Turbulence in the Solar Wind - a Model for Dissipation by Kinetic Alfvén-waves

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We investigate the dissipation of solar wind turbulent fluctuations by kinetic Alfvén waves and the resultant spectral structure. Magnetic power spectra in the solar wind are characterized by the following spectral ranges: An inertial range with a spectral index of 5/3 followed by a steeper range with a variable index, which has an average value of 8/3. Recent Cluster observations show a second spectral break at electron scales and a subsequent dissipation range. Results found by Sahraoui et al. (2009) point to a third power law with a spectral index around 4 in this range. In contrast, observations by Alexandrova et al. (2009) indicate an exponential decay in the dissipation range. The behavior of this small scale cascade and a possible dissipation mechanism are still subjects of recent research. The aim of our study is to describe these observations with a simple model and to investigate the physical mechanism of the dissipation in the solar wind. Our model contains a combination of two processes to describe the magnetic spectrum: An energy transport model from large to small scales and a dissipation model, which extracts energy from the magnetic field fluctuations. As a dissipation model, we use the imaginary part of the kinetic Alfvén wave frequency from an appropriate dispersion relation.