Geophysical Research Abstracts
Vol. 20, EGU2018-12450, 2018
EGU General Assembly 2018

Variability of the Magnetic Field Power Spectrum in the Solar Wind at Electron Scales

Owen Roberts (1), Olga Alexandrova (2), Primoz Kajdic (3), Lucile Turc (4), Denise Perrone (5), Andrew Walsh (6), and Philippe Escoubet (1)

(1) European Space Research and Technology Centre, SRE-S, Noordwijk, Netherlands (o.wyn.roberts@gmail.com), (2) LESIA, Observatoire de Paris, PSL Research University, CNRS, UPMC Universite Paris 06, Universite Paris-Diderot, 5 Place Jules Janssen, F-92190 Meudon, France , (3) Institutio de Geofísica, Universidad Nacional Autónoma de México, Mexico City, México 5 , (4) Department of Physics, University of Helsinki, Helsinki, Finland, (5) Department of Physics, Imperial College London, UK, (6) European Space Agency, ESA-ESAC, Madrid, Spain

At the electron scales the power spectrum of solar-wind magnetic fluctuations can be highly variable and the dissipation mechanisms of the magnetic energy into the various particle species is under debate. In this paper we investigate data from the Cluster mission's STAFF Search Coil magnetometer when the level of turbulence is sufficiently high that the morphology of the power spectrum at electron scales can be investigated. The Cluster spacecraft sample a disturbed interval of plasma where two streams of solar wind interact. Meanwhile, several discontinuities (coherent structures) are seen in the large scale magnetic field, while at small scales several intermittent bursts of wave activity (whistler waves) are present. Several different morphologies of the power spectrum can be identified: (1) two power laws separated by a break (2) an exponential cutoff near the Taylor shifted electron scales and (3) strong spectral knees at the Taylor shifted electron scales. These different morphologies are investigated by using wavelet coherence, showing that in this interval a clear break and strong spectral knees are features which are associated with sporadic quasi parallel propagating whistler waves, even for short times. Meanwhile, when no signatures of whistler waves are present, a clear break is difficult to find and the spectrum is often more characteristic of a power law with an exponential cutoff. The possible sources for the whistler waves at electron scales in the solar wind are discussed.