Geophysical Research Abstracts
Vol. 17, EGU2015-11758, 2015
EGU General Assembly 2015

Involvement of phase coherence in solar wind turbulence

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The solar wind magnetic turbulence around ion kinetic scales has been extensively studied using Fourier and wavelet transforms. It's well establish that the magnetic spectrum follows a slope close to -5/3 in the inertial range and becomes steeper at ion scales.This steepening marks the transition between the inertial range and the kinetic range but physical mecanism at work are still under debates. The study of Jian et al. (2014) on STEREO data of 2008 revealed the presence of Low Frequency Wave storms (LFW stroms) in the range where the transition occurs. The observation of these waves corresponds to periods of phase coherence between components of the magnetic field and may extend over more than one hour. In the intervals of phase coherence, the turbulent magnetic spectrum is greatly altered and at the classical turbulent cascade superimposed energy excess around the frequency of the wave. We use six years of STEREO data to investigate coupling between waves et turbulence. We observe that wave signature appears more visible when the wave persists over time. For short time wave the spectral signature is less important and can be interpreted as a sharpe transition between two regimes. We show that LFW storms appear only when the turbulence background is low enought. Moreover the slope in the inertial range seems steeper when there is no LFW storms. To complete our study we used WIND data and show that in some cases ion temperature anisotropy and parallel ion plasma beta are in favorable range for the development of the Alfvén Ion Cyclotron instability.