1.3.2 How is turbulent energy dissipated and how does turbulence evolve within the heliosphere?

Description of the objective:

- Measure the turbulence dissipation range and understand its scaling with heliocentric distance and plasma properties (Alexandrova et al., 2007; Bruno & Trenchi, 2014; Chen et al., 2014). Separate the analysis between fast and slow wind and in particular for different plasma beta.
- Distinguish between various heating and dissipation mechanisms. Various kinetic processes: Alfvénic or magneto sonic damping, kinetic Alfvén waves (see above), whistler dispersion, Hall MHD dispersive cascade.
- Study the evolution of the intermittency of the magnetic and plasma quantities (Bruno et al., 2003; 2014).
- Study the evolution of the effective magnetic Reynolds number (Bruno et al., 2015).
- Study the evolution of the MHD rugged invariants (magnetic helicity, cross-helicity, and residual energy).
- Relate the localization of the spectral break between the fluid and the kinetic regimes to the amplitude of the fluctuations at MHD scales: are the scales at which dissipation mechanisms become important related to the energy contained in the inertial range? (Bruno and Trenchi, 2014).
- Explore the radial evolution of the compressible and incompressible third order moment scaling within the inertial range, in order to gain information on the status of the turbulent cascade (Sorriso-Valvo et al., 2007), including: the evaluation of the mean energy transfer rate, the development of the cascade relative to the balance between the inward/outward fluctuations, the dependence on local parameters.
- Understand the origin and the radial evolution of the low frequency 1/f spectrum in fast solar wind and its implications on the characteristics of turbulence, intermittency and dissipation.
- Dissipation at the corona.