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Radial versus temporal evolution of fast stream turbulence in the solar wind

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The solar wind shows a clear non-adiabatic radial temperature profile indicating that some local sources heat the plasma. Turbulence is one of the physical processes which can dissipate the available energy, representing an additional heat source in the solar wind. However, the radial evolution of turbulence is not fully understood. The spatial and temporal evolution (e.g. decaying turbulence) of fluctuations is rather undifferentiated. Here we analyze the multi-scale properties of turbulence in the same fast wind streams, using data from spacecraft located at $\sim 1AU$ and also at different heliocentric distances. We investigate the radial dependence of fluctuations on the basis of MESSENGER ($\sim 0.4AU$), VENUS EXPRESS ($\sim 0.7AU$), near-Earth probes (ACE/WIND at $\sim 1AU$) and ULYSSES ($\sim 1.4AU$) measurements. For the same streams, the mostly temporal evolution of fluctuations is studied using data from STEREO and near-Earth probes at $\sim 1AU$. The STEREO mission consists of two identical spacecraft, one ahead of the Earth in its orbit, the other trailing behind, with increasing distance between the spacecraft and the Earth in time. The spatio-temporal evolution of correlation length and small-scale intermittency will be presented.