

Interactive comment on “Turbulent Processes in the Earth’s Magnetotail: Spectral and Statistical Research” by Liudmyla Kozak et al.

Anonymous Referee #2

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The manuscript addresses the turbulence processes in the magnetotail using Cluster-2 observations. Spectral, wavelet, and statistical analyses are conducted particularly for the dipolarization events. Significant difference of the spectral indices is found for the intervals before and during the dipolarization. Before dipolarization the spectral index $\sim 5/3$ according to the Kolmogorov model. During the depolarization the type of turbulence motion changes, and a spectral break is present around the proton gyrofrequency. The presence of both direct and inverse cascade process is explained as the possibility of self-organization processes. I find the paper is very interesting. The results are sufficiently new. But I have the following comments and questions that need to be considered before the manuscript can be published.

1. Line 26: "Although magnetic reconnection is not a plasma instability process, it

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requires an instability such as ion tearing instability". This statement is not true.

2. In the Introduction, it is described that the processes of current disruption (CD) and magnetic reconnection are very different in their structure and dynamics. In general, plasma turbulence is important not only to the current disruption but also present in reconnection. For the 3 selected dipolarization events, the paper attributes the event of 2015 to CD. What about the other 2 events? Can you characterize the differences in the turbulence spectra/signatures between the dipolarization structures in CD and reconnection?

3. Page 3, last paragraph: what described in this paragraph for Figure 1 are not shown in Figure 1 (e.g., no components of B are plotted).

4. Dipolarization is a kinetic structure, and the existence of spectral break around the ion cyclotron frequency shows evidence of wave-particle interaction. But the study does not address the turbulence spectrum and direct/inverse cascade from the kinetic point of view. Can you provide analysis for the spectra parallel and perpendicular to the magnetic field?

5. The way the citations are quoted needs to be fixed. They are not at the right places or in the right format. Some other symbols are also messed up. For example, in the description of the range of exponents.

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