

Review of manuscript angeo-2020-17

“Magnetic field fluctuation properties of coronal mass ejection-driven sheath regions ...”
by Kilpua et al.

This is a very interesting study and this reviewer enjoyed reading the manuscript. The manuscript should be ready for publication in *Annales Geophysicae* after minor revision. Below are the specific comments.

1. Page 3, line 11: Riazantseve et al. (2019) used WIND MFI magnetometer data: the SPEKTR-R spacecraft does not yield magnetic-field data.
2. Page 7, line 15: Please add to the manuscript the formula for how $\delta B/B$ is obtained in the time-series data.
3. Page 7, line 21: The reviewer does not understand the statement “, consistent with the absence of strongly compressive fluctuations.” Please elaborate on this in the manuscript.
4. Page 8, line 15: What is “the ion cyclotron timescale” and how is it calculated? Isn’t the relevant timescale in the spacecraft frame the Doppler-shifted ion gyroradius?
5. Table 2, and elsewhere: Using only 1 hour of data, can you estimate the statistical uncertainty in you value of the inertial-range spectral index? For instance, if you compare your answer to the answer you get for the adjacent hour of data, how big is the variation? Can you comment in the manuscript about whether or not the method you use to obtain the spectral index has less statistical noise than fitting a power spectral density does.
6. Page 1, line 19; Page 3, line 20; Page 7, line 10; Page 15, line 9: The shock was quasi-parallel where the WIND spacecraft crossed it, but the magnetic-field direction in the plasma varies significantly and the shock is quasi-parallel and quasi-perpendicular depending on where it is crossed. Looking at the upstream Alfvénic solar wind for the December 14 2006 shock, the magnetic-field varies in time by about 50° . Hence, the downstream plasma has been shocked in quasi-parallel and quasi-perp fashions and you might not blame its properties on the fact that WIND saw a quasi-parallel shock when it crossed it.

Typos etc.

Page 2, line 32: The sentence “Intermittency in the sheath turbulence grew between the spacecraft.” does not make sense.

Page 4, line 11: The phrase “The Near Shock region extends from the shock to the sheath,” does not make sense: should “to” be “into”?

Table 1, top row: “Oct 24, 2001 should be “Oct 24, 2011”.

Page 9, line 9: “>” should be “<”.

Page 14, line 2: B_z was not discussed in the “Introduction”.