

Referee report: Low frequency magnetic variations at high- β Earth bow shocks

The authors have carefully responded to all of my previous comments in a satisfying way. There has been a clear improvement in the presentation of the conclusions, validating the solar wind beta values, and determining spatial scales.

The manuscript still has some problems with language and presentation which makes it difficult to read. In particular, the manuscript contains several language errors (not least the abstract) and require a thorough proof-reading.

I recommend the paper for publication after these problems are resolved.

See more detailed comments below:

Title: The authors should consider referring to the "magnetic variations" as "magnetic fluctuations" instead. I think the word "variation" is better suited for large-scale or solar wind driven changes. I also think the term "bow shocks" is somewhat strange and confusing. It's all the same bow shock even if there are several crossings, so the plural form is unnecessary. Maybe "... at the Earth's high-beta bow shock" reads better?

Page 1, Line 2: The Earth's bow shock is not ubiquitous in the universe. Better to say "However such shocks are ubiquitous..."

Page 1, Line 3: "IMF" is an abbreviation and should be explained if used.

Page 1, Line 4-5: "About a hundred high-beta shocks were initially identified during 1995–2016...": Is this initial list crucial to the results of the manuscript? If not, then it should not be in the abstract. The information here is also not consistent with that stated in the paper (2016 or 2017?).

Page 1, Line 5-6: Multi-point observations are presented for three shock crossings by Cluster, not 22. I think the information about these three events which are more closely studied is much more crucial than the (even more initial) list of ~100 crossings.

Page 1, Line 9: "Their polarization has...": This should refer to the sentence before which does not work. Rather say "The wave polarization..."

Page 1, Line 10-11: "Spatial scales...": It should be made clear if this refers to the extent where the fluctuations are found or the scales (wavelengths) of the waves. This information is also repeated in the abstract.

Page 2, Line 30: First mention of "IMF" in text. Should be explained.

Page 4, Line 7: "We scanned 1995–2017 observations by all available spacecraft": The authors removed the mention of other spacecraft (THEMIS, etc), which makes the years 1995-2017 confusing here, since Cluster was launched in 2000. I understand that the final list of 22 events is a selection from the first list of about a hundred events (an exact number would be better). However, the authors must clarify which spacecraft made up the initial list if it is mentioned.

Page 5, Line 15-20: I think there should be a short explanation that HIA/CODIF data in the solar wind may be unreliable and why the OMNI beta-value was rather used. Additionally, now WHISPER data is also used in the manuscript. That instrument should be mentioned and referenced here as well.

Page 5, Line 18: The CIS data guide states that the time resolution of CIS-HIA and CIS-CODIF is 4 s. Can you double-check the time-resolution of the data in your events and rephrase here if needed?

Page 22, Line 32: I'm guessing it should read "low-beta" instead of "supercritical" as all the shocks studied here are also supercritical.

Several more language issues that are not listed here.