We thank the reviewer for careful reading of our manuscript and constructive comments and suggestions. We have modified the paper, accordingly, please find our responses from below. The changed parts are shown modified in the paper.

This work aims at characterizing time series of fast and slow solar wind, magnetic clouds, CME-driven sheaths and SIRs using permutation entropy, Jensen-Shannon complexity and Hurst exponent analyses. The study is original and innovative and worthy of prompt publication in ANGEO, following a few minor revisions that mainly concern adding clarifications and pertinent references in the manuscript, as well as reorganizing its structure.

1. Introduction (in agreement with Referee #1 remark on Abstract): Since part of the discussion of the paper is made on the local Hurst exponent, I would recommend devoting a paragraph to discussing this in the Introduction. For instance, I feel it would be fair to mention one of the first studies that used the Hurst exponent to study the geospace and specifically the geomagnetic activity, which was published in the same journal as the present manuscript under review (Balasis et al., 2006). In Balasis et al. (2006), the transition from anti-persistent to persistent behavior was associated with the occurrence of intense magnetic storms. Moreover, entropy analysis has also been used in several publications to study the near-Earth electromagnetic environment (for a recent review see Balasis et al., 2023).

We have added Balasis et al. 2006 and 2023 as a reference. We also now discuss the Hurst exponent in the Introduction where these references occur. We thank the reviewer for pointing these relevant papers out.

2. Subsection 2.1: what is the time interval covered by the data considered in this study? For instance, do you analyze time series covering a full solar cycle? Please make this point clear here.

This was indeed missing from the paper. We have now added the years in Section 2.1 (1997 – 2022) and mention that this period covers two solar cycles.

3. Subsection 2.2: at this instance the Hurst exponent along with the fBm model suddenly jumps into the manuscript to characterize the various types of solar wind time series. I think it would be making more sense to introduce the Hurst exponent together with the theory of the other analysis techniques of Permutation entropy and Jensen-Shannon complexity (as given in 2.3) and then move to Figure 1 together with the Results section. It is rather awkward to first apply the Hurst exponent and then introduce the related theory in Subsection 3.4. So, in my opinion, 2.3 and 3.4 should be combined in a common methodological section and presented before Section 3 of the Results.

This is a good suggestion to improve the logical structuring of the paper. We now mention Hurst exponent for the first time already in the Introduction and have moved its more detailed description from Section 3 into a new subsection in Section 2. Examples have now been moved to the beginning of Section 3.

4. Lines 284–285 read: “This trend was identified here in particular for the fast wind that also had throughout the investigated τ range the highest entropy and lowest complexity values.” I am a bit confused, if I understood well, with the suggested link between the highest entropy and lowest complexity, since in my (traditional?) perspective higher entropy values mean a lower organization or a less ordered state of the system under study, which in turn points to higher complexity values also. Therefore, higher entropy means higher complexity! Could you please comment upon this point?

Complexity according to its definition is high for purely ordered and random time-series that give zero complexity. This is explained in Section 2.3 of the paper. It is related to the Jensen-Shannon divergence, which is a measure of similarity between two probability distributions.

5. Lines 285–286 read: “This could stem from the fact that the fast wind is permeated by Alfvénic fluctuations which are inherently stochastic in nature.” Why is that happening? please elaborate / explain a bit this point.

Alfven waves are stochastic fluctuations in the solar wind and they are primarily observed in the fast wind. We have rewritten this part in the manuscript.

6. Last but not least, lines 339-340 read: “The exponents extending to the persistent regime (H > 0.5) were identified mostly in magnetic clouds and for the largest time-scales.” In previous Hurst exponent studies of geomagnetic activity indices, as well as corresponding solar wind variations (e.g., Balasis et al., 2006), persistence was associated with the occurrence of intense magnetic storms, i.e., with an extreme event. What could be a possible extreme event in your case?

This is a very interesting question! We guess that in a solar wind context extreme events could be considered to the Sun generating big eruptions, such as magnetic clouds, instead of a more consistent background of in particular the fast wind. Our analysis however includes time-series recorded only within the structures so in the present study the results tell more about the generation of fluctuations or smaller scale sub-structures within these structures. Magnetic clouds having high Hurst exponents are related likely to values in them having tendency to increase or decrease in coherent manner. In slow wind and sheath time series, an increased Hurst exponent could reflect the smaller scale transiently generated structures. We have included a brief contemplation of this with the reference to Balais et al., 2003 at the end of the Discussion section.