Nonlinear Processes
in Geophysics

Discussions

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Interactive comment on "Compacting the Description of a Time-Dependent Multivariable System and Its Time-Dependent Multivariable Driver by Reducing the System and Driver State Vectors to Aggregate Scalars: The Earth's Solar-Wind-Driven Magnetosphere" by Joseph E. Borovsky and Adnane Osmane

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The authors have added text to the paper to better motivate the reason the complexity analysis was performed.

Concerning the reviewers comments about page 25:The preservation of the correla-

tional structures in the linear combinations S1-S3 is not surprising, but not guaranteed either. The permutation entropy is invariant under any monotonic transformations (for instance, if one scales the time series by a positive real number, or if one were to take the logarithm). However, if one used a linear combinations of non-monotonic functions, for instance some linear combination of trigonometric function, then the permutation entropy would not be invariant. Since the Jensen-Shannon complexity is a function of the permutation entropy, it is also invariant under monotonic transformations. Additionally, if one takes an average around the mean of some time series over a time Tau, one will reduce the noise level for fluctuations with timescales less or comparable to Tau. Thus, the stochastic nature of the signal will be reduced, and the permutation entropy and Jensen-Shannon complexity would move up in the plane towards the chaotic or/and periodic regions.

We have clarified this point in the text on page 7 and 8 and have added a few sentences to justify the use of the Jensen-Shannon complexity on page 7 as well.

Please also note the supplement to this comment:
https://www.nonlin-processes-geophys-discuss.net/npg-2019-2/npg-2019-2-AC2-supplement.pdf