

## ESD-2020-8: EDITOR DECISION

Vienna, September 16<sup>th</sup>, 2020

Dear Authors,

First of all, I would like to express great appreciation for the elevation and richness of the debate that took place at the Interactive Discussion. Let us hope that this kind of debate becomes the norm so that many of us wary of this format consider submitting to a journal with open debate as well.

Having taken all the elements of the fruitful Interactive Discussion into consideration, from the relevant referee reports and raised concerns to the careful author responses and my own judgment, it is clear that the significant revisions asked for by the referees and pledged by the authors will greatly benefit the manuscript in its effort to reach out to the intended audience, and to raise the bar from a good work to a higher level of excellence.

The revisions will enable the manuscript to further detach from the traditional utilitarian use of dynamical system techniques to actually enrich the discussion on the physics behind the interesting results, and to provide more mathematical details that strengthen the value of the manuscript, the understanding of the fundamentals and the practical usage and reproducibility. Moving from a paper to consume to a paper to inspire.

While in mathematics the field of dynamical systems is usually looked upon as eminently descriptive, in physical venues it is even more rewarding to complement the powerful beautiful mathematics with concrete physical insights that further connect with the broader Earth System Dynamics community. Indeed as mentioned by one referee, it is not the method per se that provides the insights, but the authors that do so with their physical understanding and wisdom, benefitting from the information that the mathematical analysis has brought out.

Clearer distinctions of this manuscript relative to the prior studies from the team hovering around the used methods will also be highly beneficial, to clear any perception that this would be essentially a case study making use of methods that already have a fast growing body of literature from your team. That is, it will be highly beneficial for the authors to have this work as not only a highly relevant application of the same method to a different problem (a really interesting one for that matter), but also that there is methodological innovation as well - which inherently there is due to the specificities of the problem and adjustments being necessary, but always nice and of added value to be made clearer especially to the less aware audience. That is, reading the prior works by the team one can see how even in that more fundamental level the long-term endeavour of the team is progressing case after case.

On a minor editorial note: as there is divergence between a referee and the authors regarding the notion of "proof-of-concept", I encourage that the authors clearly state the meaning that they intend to convey in the study (and supporting definition reference) to avoid any misunderstanding supported by the definition. The usage of an expression easily prone to misunderstanding due to its pervasive misuse in the literature can lead to different interpretations by different scholars.

Again in this regard, my advice is rooted on the clarity and comfort that is found for instance in the mathematical literature, wherein even in a simple theorem there is an ornate preamble setting the scene and all the associated concepts and contexts with such clarity (even the most obvious aspects) that it renders the whole edifice of a theorem or any other formal structure extremely clear and safe against any misinterpretation.

All in all, encouraged by the overall quality of the manuscript, along with the convergence and clearly positive direction of the revisions, I hereby send the manuscript for revisions ("major" so as to give the authors enough time to carefully craft their revised work without excessive pressure, and to grant the referees another look on the revised manuscript).

Thank you for your attention and best wishes.

The handling editor,

Rui Perdigão