

NPG _ Rabiou et al:

The reviewers have made many constructive and detailed comments and suggestions for specific changes. The revised paper incorporates some of the suggestions and the replies by the authors address some of the concerns. However there are outstanding issues and in its present form the paper is not suitable for publication in NPG and needs major changes for further consideration. The authors should address the following:

1. The comment by Reviewer 3 on the overlap with Ogunsua et al., 2014 needs careful and detailed examination. The reply by the authors points toward a way to resolve the seeming and potential overlap, and the following are possible steps:

- Highlight at least two main results/conclusions of each paper
- Describe how these results of the two papers are distinct from each other and are complementary
- Discuss how the two papers together have led to a better understanding of the dynamics of the ionosphere (preferred but optional)

2. The SOC related discussion - introduced in response to a comment by Reviewer # 1 - does not integrate well with the rest of the paper. Further the discussion is based mainly on papers on SOC in the magnetosphere, indicating the need for more detailed analysis in the case of the ionosphere. The paper should limit the SOC related discussion to a brief mention, preferably in the Discussion/Conclusion

3. The paper should be made more concise by making the text more specific and avoiding parts that may not be needed for a clear presentation of the new science results.

4. It is not sufficient to refer to books or general media in replies to Reviewers. For example, "acoustic motions of the atmosphere electromagnetic emission" does not strike as a particularly informative or valid statement and would lead to questions and issues which are not directly relevant to the paper. Such statements should be avoided, or described in relevant detail.

Other comments:

Lyapunov exponents characterize the divergence of neighboring trajectories, thus requiring well defined trajectories for their computation. The reconstructed phase space (Fig 5) does not seem amenable to such computations and in fact a Lyapunov exponent that corresponds to the time resolution of the data very likely may not be reliable, as it indicates lack of reliable convergence. For example, random noise would have an exponent close to the inverse of the time resolution. In the case of the magnetosphere the convergence is reached in ~ 4 time steps in the time delay space (Vassiliadis et al GRL, 1991). The phase space is better defined when reconstructed using singular spectrum analysis (Sharma et al. GRL 1993) and the convergence would be improved. The authors should examine the convergence of the Lyapunov exponents presented in the paper.

Overall the use of widely used terms needs some care to bring out the connection to the broader physics framework. For example, complexity is a general term, Lyapunov exponents are properties of trajectories in phase space and thus reflect dynamical behavior, while entropy is a thermodynamic variable requiring averages over dynamical time scales. The paper will benefit from a careful consideration of the relationship between "Determinism and stochasticity".