ESD-2016-23: Editor Decision Letter

August 11^{th}, 2016

Dear authors,

Thank your very much for your comments and diligences in response to the reviewer reports.

The scientific questions addressed in the manuscript are relevant to the scope of Earth System Dynamics, and some significant efforts have been made by the authors in addressing such questions.

However, the manuscript would considerably benefit from further elaboration, clarification and revision, with particular attention to the reviewer concerns. In this regard, the diligences conducted in response to the reviewers are an encouraging step forward and should definitely proceed.

Following the fertile discussion stage, I would highlight a few details that merit further discussion: the experiment design, the associated uncertainty debate, and the physical interpretations:

Some readers might wonder why a long model run is argued to be comparable with the statistics that could be drawn from an ensemble. This correspondence is legitimate under ergodic assumptions in a sufficiently representative long-term experiment allowing the invariants of motion to be thoroughly manifested.

The debate on whether the experimental outcome is sensitive to the initial conditions also merits some clarification to the reader. On one hand, the transient dynamics may naturally be sensitive to the initial conditions, particularly in unstable system configurations where uncertainties propagate rapidly. These do not pose a fundamental problem here since transient dynamics are not the object of the study. On the other hand, for a given set of parameters and fixed model structure, the asymptotic behaviour of a dynamical system will define a statistically invariant outcome, consistent with equilibrium statistical physics (e.g. shaped by attractors in dissipative systems). That is, while the transient dynamics are indeed sensitive to the initial conditions, in dissipative systems the asymptotic behaviour will exhibit similar statistical physics irrespective of the initial conditions - for given model parameters and structure.

Further elaboration on the physical context of the problem, the experiments and results would also be highly beneficial to the paper. In this sense, the manuscript would benefit from placing the kinematic lessons into dynamic context, i.e. complementing a motion-descriptive with physical considerations that help the reader better understand the dynamics at play.

On a more specific note (as raised by one of the reviewers), the reported shift in the ITCZ would merit some brief additional comment based on supporting arguments available in the literature.

Overall, there are questions raised by the reviewers that might be wondered by the broader readership. By openly addressing them in the manuscript as done in the peer-review process, the authors will quench potential controversy before it has the chance to ignite.

At this stage, the authors are then encouraged to proceed with their review efforts, paying special attention to the recommendations arising in the peer-review process.

I will be looking forward to the revised manuscript.

With very best wishes,

Rui Perdigão
(ESD Editor)