

Nonlin. Processes Geophys. Discuss., referee comment RC2  
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## **Review of npg-2022-12: Control Simulation Experiments of Extreme Events with the Lorenz-96 Model by Sun et al.**

Anonymous Referee #2

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Referee comment on "Control simulation experiments of extreme events with the Lorenz-96 model" by Qiwen Sun et al., Nonlin. Processes Geophys. Discuss.,  
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The authors propose a method (Control Simulation Experiment) to control the number of extreme events in the Lorenz-96 model. The sensitivity of this technique to the choice of various parameters, such as the forecast lead time in which extreme events are detected or the amplitude of the perturbations. The authors find that the method is effective to reduce extremes and the sensitivity tests show how the perturbations can be tuned in order to reduce the high number of extreme events with a minimized action over the system.

General comment:

The manuscript is clear, the technical details of the experiments performed are well described. The authors provide several references to contextualize their research. This manuscript can be of interest for NPG readers, however my main concern is about the implications of this study in a more realistic context. The Control Simulation Experiment is aimed at reducing the extremes, but the challenge is that the models are able to simulate these extremes and in case of ensemble forecasting how the ensemble should be designed to include extremes. Therefore, I do not see the benefit of reducing the extremes in a simulation, when those states actually take place in the system that the model represents. I suggest including some clarifications in the introduction in this regard as well as in the conclusions to better express the general objective of this research.

Specific comments:

L11: "of the first two authors" can be removed.

L34-35: In line with my general comment, what is the benefit of reducing simulated weather extremes that occur in reality?

L149: (j,j) -> (i,j)

L170: Why only the maximum value is used to define extremes and not the minimum?

L199: When the procedure to generate the perturbation vectors is described and the selection of the ensemble member B is explained, the alternative computation in case an ensemble member B is not found (L208-209) should be indicated here.

L281: It is more correct saying similar or approximately equal instead of equal.

L292-293: The meaning of this sentence is not clear.

Fig.10: Please, indicate the meaning of the triangle in the caption.