

Interactive comment on “Generalization properties of neural networks trained on Lorenzsystems” by S. Scher and G. Messori

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We thank the reviewers for their constructive comments. As we understand, the main criticisms shared by all reviewers were on the interpretation of our results, and whether the experiments are realistic enough to have real-world relevance. We outline here how we plan to address the main points raised by the reviewers. We will include a detailed point-by-point response when we submit our revised manuscript.

We are planning to:

- Do an extensive network-tuning search for the Lorenz63 model, to objectively find a good architecture. Specifically, we will explore larger (and deeper) neural network models in order to test whether our results also hold for larger models.

- Add more validation metrics for the network used on the Lorenz95 model
- Make it clearer in the manuscript that all results do only apply to feed-forward neural networks
- We argued that the networks do in fact learn sub-networks for different parts of the attractor. We will extend this analysis to more complex networks.
- Redesign our forcing experiments on the Lorenz95 system. Specifically, we will also test whether the network is able to extrapolate to situations just out of the training regime, in contrast to the quite extreme experiment included in the initial submission.
- Repeat the tuning of the network for the Lorenz95 system also with forcing as input, in order to allow a fair comparison.
- Consider expanding at least part of the analysis to networks that do not predict the whole state, but that predict the tendency instead.
- Better contextualize our work relative to the broader literature on generalization of neural networks
- Extend the analysis on generalization to different phase-space regions to the Lorenz95 model as well which, although highly idealized, is more pertinent to real climate models than the Lorenz63 system.

Interactive comment

Interactive comment on Nonlin. Processes Geophys. Discuss., <https://doi.org/10.5194/npg-2019-23, 2019>.

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Discussion paper

