Interactive comment on "Behavior of the iterative ensemble-based variational method in nonlinear problems" *by* Shin'ya Nakano

Anonymous Referee #1

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I struggle to see anything significant and original in this manuscript. For example, it seems obvious to me that monotonic (but slow) convergence can be achieved using sufficiently small step length, when the adjoint is accurately represented at each point (requiring a small spread). The manuscript also lacks a literature survey on previous works on the effects of regularization and the Levenberg-Marquart approach. Apart from the above proposition, I found the manuscript to consist mostly of speculative arguments. There were some lengthy technical developments in the manuscript, but this actually consists mainly of one 2nd order Taylor expansion, and the use of ensemble approximations to model adjoints, repeated several times over with minor variation. I unfortunately did not gain any insights from this analysis, nor the experiments.

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

2020-9, 2020.