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Interactive comment on "Tuning without over-tuning: parametric uncertainty quantification for the NEMO ocean model" *by* Daniel Williamson et al.

Anonymous Referee #1

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The authors propose a method for narrowing down the parameter space of a numerical model by ruling out parameter values which are not consistent with observations. The procedure is iterative. At each stage of the iteration additional observations are considered. Observational uncertainties are taken into account. The method avoids over-fitting since it does not aim at selecting a single optimal parameter combination which brings the model simulation closest to observations. The manuscript is well written and illustrates the methodology nicely using an ocean model. The main issue in my opinion is that the methodology is essentially a Bayesian parameter estimation procedure and does not deserve a new name. As far as I can see, in a Bayesian formulation, at each step the authors basically rule out parameter values which have a

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Discussion paper

posterior likelihood below a particular threshold. In fact, the whole methodology would be much clearer and more transparent if the authors would acknowledge that what they do is a Bayesian procedure, and write down the prior distributions and the likelihood function. Also in the context of a carefully conducted Bayesian parameter estimation, the modeler would not just blindly select a single optimal value, but explore a range of parameter values which are broadly consistent with observations. In case the authors disagree, they should discuss the relation to Bayesian parameter estimation, highlight what is new in their approach, and indicate the advantage of their methodology. I am very doubtful that there is an aspect to "iterative refocussing" which is not naturally (and more transparently) part of an iterative Bayesian procedure.

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