Nonlin. Processes Geophys. Discuss.,
doi:10.5194/npg-2015-76-AC1, 2016

Nonlinear Processes in Geophysics
Discussions
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Interactive comment on "Impact of Optimal Observational Time Window on Parameter Optimization and Climate Prediction: Simulation with a Simple Climate Model" *by* A. A. Yuxin Zhao

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Received and published: 28 April 2016

Dear reviewerïijŇ Thank you very much for your generous comments and help, which are very important to improve the quality of this paper and future studies and investigations! This study "Impact of Optimal Observational Time Window on Parameter Optimization and Climate Prediction: Simulation with a Simple Climate Model" is a subsequent investigation of the previous paper "Impact of Optimal Observational Time Window on Coupled Data Assimilation: Simulation with a Simple Climate Model", which has been submitted to the Journal of Climate. And this paper aims to investigate the impact of the observational time windows (OTWs) on the quality of the parameter optimization and climate prediction. You know that the observational time window is not a

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new concept. But I should tell you our thoughts about the OTWs in this study. Normally if we want to estimate the model states at 8a.m. using the EnkF, we will just assimilate the observations right at 8a.m. Other observations beside the assimilation time (For example the observations at 7:55 a.m. or 8:05 a.m.) will be ignored, which is a serious waste of the observational information. So in this study we create the observational time windows that center at the assimilation time (8 a.m.) and collect the observations at both sides of the center time point (right at the assimilation time). And we assume that all the observations including in the OTW are all sampled at the assimilation time (8 a.m.) and assimilate all of them into the model states and parameter being estimated sequentially. But we do not know how to decide the optimal length of OTW, which can mostly improve the quality of the parameter optimization and climate prediction. To investigate the impact of the OTWs on the quality of the parameter optimization and climate prediction, we using a simple coupled climate model without complex dynamics and huge computational cost. And in this study, we do not want to say that the optimal OTWs for climate and parameter estimation are accurate numbers (different models have various results). We just want to show the relationship between the optimal OTW and the corresponding characteristic variability time scale. And the results are generic, not specious for this particular simple coupled model. To investigate the essence of this problem and avoid complexing this study, we just use this simple coupled model with many simplification, which I think will help us more easily get the common conclusion and provide a guideline when the real observations are assimilated into a coupled general circulation model for improving climate analysis and prediction initialization. I do not whether this paper is of an international standard, but I just want to show that the investigation's results and conclusions may provide some guideline for CGCMs. In this paper, we just show the common conclusion from the experiments. As to the complex reason and deeply analysis, they will be deeply investigated and given in the future study. Now the revised paper has greatly improved the grammar and words. And I am so sorry that the previous ones are not fluent and misleading to you and others. As to the title, the "optimal" does not means an accurate number for a particular model.

Different models have various OTWs for different coupled components. We just want to say how to get the "optimal" and its impact and common conclusion on the coupled data assimilation, parameter optimization and climate prediction.

We just want to show some simple results and common conclusion in our experiments and hope that our explanation can answer your questions and comments. And attach please found our revised paper. Thank you very much for your generous suggestions to this manuscript again!

Sincerely yours, Xiong Deng and Co-authors

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