Interactive comment on "Improving lake mixing process simulations in the Community Land Model by using K profile parameterization" by Qunhui Zhang et al.

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It is an interesting study. Because a 1-D lake model is still much needed to understand the impact of climate changes on global lake systems, a parameterization method that could improve the simulation of lake mixing process will be much valued. But I suggest that the manuscript can be improved in the following directions.

First of all, the comparison between CLM-ORG and CLM-KPP is not exhausted, to day the least. In Subin's CLM-ORG paper, he actually tested the model over a pair of lakes around the globe. In fact, the CLM-ORG performance on high-latitude lakes which this study focused on was not the worst. Thus, the method can become much more

valuable if the authors can apply this method to some more lakes, especially those deep and large lakes.

Second, more information about the study lake is needed. Is Fog 3 Lake a glacial lake or a thermokarst lake? How was the surface friction velocity derived for this lake? Are the effects of lake fetch and wind shielding considered? What is the lake's light attenuation coefficient?

Third, how are CLM-ORG and CLM-KPP calibrated in this study? I know that CLM-ORG has a water mixing parameter that can be used to increase diffusivity for those deep lakes. Can the parameter values of CLM-KPP described here be applied to other lakes?

Forth, I am surprised that the case study did not cover the period of spring water mixing which can have large biogeochemical impacts for high-latitude lakes.

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