

Interactive comment on “Simulation Analysis of Local Land Atmosphere Coupling in Rainy Season over a Typical Underlying Surface in the Tibetan Plateau” by Genhou Sun et al.

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Responses to the comments of the Reviewer #2 The author analyzed the local land-atmosphere interaction in the Tibetan Plateau by the aid of regional climate model (WRF) and different land surface parameterizations. It is well-known that it is important to study the planetary boundary processes for the Tibetan Plateau, but the understanding of local land-atmosphere interaction is not enough limited by observations and model's defects in the Tibetan Plateau. The author chose model and parameterizations with good performance validated from in-situ data to further analyze the interactions. The author organized the manuscript well and can be accepted after revisions.

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Major comments: 1. The processes happened in planetary boundary are very important, especially for the high-altitude regions. Its importance for the Tibetan Plateau has not been well documented in the introduction. Please add some descriptions on this. Respond: Thanks. We have added the following discussion on the previous studies on PBL over TP in the introduction. The simulation analysis of the PBL over NamCo (Yang et al., 2015) reveals that the Lake Nam Co enhanced the circulation between the lake and land. A study on the reason for the extremely high PBL in the dry season (Chen et al., 2016) reveals that the PBL growth in the dry season is influenced by the surface heating, weak stability of atmosphere and high upper-level potential vorticity. Xu (2018) assessed the performance of eight PBL schemes in producing reliable PBL characteristics over Nagqu area and found that all the PBL schemes produce warm lower-troposphere and higher PBL. 2. Previous studies focused on the comparisons of land surface processes from the Noah and CLM. Did you compare them with your results? The authors are suggested to add more discussions by comparing with previous studies. Respond: Thanks for your comment. We have compared the simulated Hsfc and LEsfc in this study to the three previous studies which focus on the simulating surface fluxes in the central TP in the rainy season. We found that the Noah could produce relatively reliable fluxes while the CLM produce smaller LEsfc in the rainy season.

3. In section 2.2.2, you mentioned several options for PBL schemes in WRF, but you only choose YSU, MYNN, and BouLac parameterizations. Please explain the reason. Response: Thanks for your comments. The reason why we choose the three PBL schemes is that Xu (2018) studied the performance of eight PBL schemes in simulating the PBL thermodynamics in the rainy season and found that the YSU, MYNN and BouLac could produce relatively reliable simulation of PBL thermodynamics. Besides, the YSU is non-local scheme while the MYNN and BouLac are local ones. The study on the performance of the three schemes could provide valuable information for us. The reason has been added to the manuscript. 4. Figure 6 gives the comparisons among different land surface models and parameterizations. Only from the figure, it is hard to distinguish their different performance. The author can

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draw conclusions with the help of some quantitative criteria. Respond: Fig. 6 is the comparison of PBL energy budgets at site BJ among different land surface models and parameterizations. In addition to Fig. 6, the discussions of frequency distributions of PBL energy budget and the relationship between ET and PBLH based on Fig. 7-10 are also the comparison of the simulations using different LSM and PBL schemes. Some minor comments: 1. Evapotranspiration, is usually abbreviated as ET, and the author wrote as EF. Respond: Thanks. This has been modified. 2. Lines 37-39, the same to words in lines 11-12 from ABSTRACT, and mentioned again in Lines 42-43. Respond: Thanks. This has been modified. 3. Figure 6, the display of colored label is confused. Different colors represent different schemes, and different marks represent different variables. Respond: Thanks. Fig.6 has been modified by assigning one color to each PBL scheme and then using an open icon for CLM and filled icon for the Noah. 4. When mentioned the correlation coefficients, the author should give the significance level, for example for Figure 14. Respond: Thanks for your suggestion. We have done the t-test for the significance level of the linear regressions in Figs. 10 and 14. The t-test for the regression relationships between mean ET and PBLH in Figs. 10 and 14 show that all the relationships pass the significance level.

Please also note the supplement to this comment:

<https://hess.copernicus.org/preprints/hess-2020-199/hess-2020-199-AC4-supplement.pdf>

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2020-199>, 2020.