

## ***Interactive comment on “The effect of low density over the “roof of the world” Tibetan Plateau on the triggering of convection” by Yinjun Wang et al.***

### **Anonymous Referee #3**

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I do not recommend this paper for publication in ACP as it does not meet the essential scientific and presentation requirements. The paper is not well organised and overall difficult to read, so that I was tempted to simply reject it on this basis. The reviewer's work is made harder by the paper structure and lack of clear scientific question or goal. I provide hereafter some comments to justify my decision and possibly help the authors in improving their study, although it is not clear to me if it can be made publishable.

My general advice is to clarify the goals, focus on them, on the most essential points and provide the relevant literature and context, but avoiding constantly going back to lots of literature-related discussions. The paper presentation and the way paragraphs are organised should highlight more the goals and the results rather than have them lost in various elements of literature review distilled in every section of the paper.

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## General comments:

It is difficult for the reader to understand what are the goals of this study and why it is new and interesting. Most of the paper resembles a catalogue of various informations with little context or perspectives or a literature review but with an unclear positioning of the present study, losing the reader in lots of information without showing their relevance. There is a lack of hindsight and synthesis work. The description of the figures is usually mixed with too numerous elements from the literature, without much hierarchy in the informations provided.

The authors seem to drag equations from different studies and combine them together without providing any discussion about the underlying assumptions, or even without mentioning the context. Parameters and factors are used out of their context and without proper explanation.

When assumptions are mentioned, they must be justified and it must be clear when they apply and why. The authors must also explain their physical meaning (and their possible limitations), and not simply state with little or no justification “x is negligible” or “we ignore differences between a and b”.

The introduction fails in putting the paper in the broader context and does not highlight well enough the state of the art, the reasons for the present study and its precise goals (e.g. question to answer, parametrisation to improve, etc. and why it’s needed).

The importance of deep convection is mentioned in the introduction, but then it is unclear how much of the “Low cloud cover” actually comes from deep convective clouds (as the definition used here counts any cloud with “cloud base less than 2.5 km AGL” with no restriction on cloud top height). This must be clarified as deep convection is likely to be part of the observed LCC, but cannot be represented by the LES simulations (due to the domain size).

In several occurrences, sentences are hard to understand as they completely lack of

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context so that the reader cannot understand what the authors are referring too. Some typos and English language mistakes / lack of clarity can add to the reader's confusion (for instance LES simulations at "a resolution of 6.4 km x 6.4 km x 6.0 km" or "9-day means" while the total integration time is of 14 hours are both confusing phrases). One of the co-authors is a native English speaker and should then be able to thoroughly proof-read the manuscript and help making it clearer and more readable.

Specific comments:

I believe it is not relevant at this stage to give fully detailed specific comments as the manuscript will need profound refactoring. I give hereafter a few specific comments but the list is far from being exhaustive, a full review will be needed if a deeply revised, restructured and enhanced manuscript was to be provided by the authors.

L 79 : "interrelation between turbulence and convective motion" : what do you mean here ? This is too vague, and should be better introduced. What has been done before and what is different here.

L70-71 : very vague. Delete or rephrase. It is not very clear from the introduction what are the "scientific issues"

Fig1a : Are there blue dots under the red ones? It looks like it. Consider using transparency to make the figure more readable and to fully demonstrate your point.

L114-116 : Why is that? Any idea?

L 154: define the cloud cores here. How do you get them from the model?

L157-158 : justify and explain physical meaning of this assumption.

L158-159 : confusing... Is your model general or only applying to your specific study. Clarification needed. And the sentence must be rephrased.

L 161: how do you know? How where they calculated?

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Subsection 4.1: Equations are used out of context without discussing the underlying assumptions and the situation to which they apply. This should be done everytime it is releveant. It is also unclear what is the goal here. Is it to build equation (6)? Under what assumptions and for what purpose?

L199: There is a lack of discussions of the BL structure in the observations and the model, and a figure like Fig B2 should be in the main part of the paper, and compared with the model results. Make it clear that penetrative convection means here dry convection making it through the inversion and then possibly forming a cloud. Or remove this sentence as more explanations follow it anyway

L213-214: unclear, be more explicit.

Section 4.3: this section must be better organised and clarified. More hindsight is needed to avoid only going back and forward from a specific sub-result to one of several cherry-picked models from the literature. What is the reference you are comparing to? Where are the results from the different schemes? If you decide to not show them this must be made very clear.

L 454 – 455 : This surely cannot be the resolution, but must be the domain size. Specify the corresponding resolution and justify the choice of the model top.

Technical :

Only a few comments here as it is not relevant at this state, again not exhaustive at all (cf. My general comments) I133 : “We analyse in detail the results of control experiment ...” : be more precise by adding “In this section ...” I137: it’s “water vapor mixing ratio” Eq. (2) : partial derivatives should be used here (no Large scale BL advection is assumed as far as I understood) L 456 : replace by 14 hours, this is more readable.

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-273>, 2019.

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