

Interactive comment on “Analysis of cirrus cloud over the Tibetan Plateau from CALIPSO data: an altitude perspective” by Feng Zhang et al.

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1. For the interpretation of the first mechanism for the distribution of cirrus with cloud tops below 9 km, in Page 8 Line 7-12, the authors suggest that “the cirrus over the high topographic height areas is concentrated below 9 km” because “. . .the weak sub- sidence above the lower troposphere, limiting the vertical extent of cirrus. . .”. However, the variables, such as the vertical motion, that used for explanation are not appeared in the provided figure. With only the topographic profiles in Fig.1, it would be difficult to imagine the inhibition effect of the radiation cooling. Response: Thank you for the advice. Figure 8 shows the vertical wind averaged from 80E to 90E for each latitude. The contour line is specific humidity. Here we choose to do meridional average from 80E to 90E because this is the main region of the Plateau where terrain

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height exceeds 4500m. The red rectangle shows the weak subsidence below 9 km (300 hPa approximately). This part has been added in the manuscript.

Figure 8. the zonal distribution of vertical winds averaged from 80E to 90E for each latitude. The contour is specific humidity. 2. From Page 9 to 10, the authors use three paragraphs to interpret the second mechanism, which is corresponding to the distribution of cirrus with cloud tops in the range of 9 – 12 km. But two out of three paragraphs are totally citations of opinions from previous papers. (a) Consider reducing the citation and increasing the ratio of analysis based on figures of the current paper. (b) Please add information to describe the wave here. Before using gravity wave acceleration to describe the intensity variation of the wave, the authors should first demonstrate the existence of gravity wave by showing amplitude or phase of the wave. Response: Temperature fluctuation is the main reason for the formation of 9-12 km cirrus cloud. Convective activities are important sources of gravity waves, which is responsible for inducing temperature fluctuations. Minor comments: 1. P1L21 needs to be rephrased, consider changing to “the cirrus clouds with different cloud top heights exhibit obvious difference in their horizontal distribution over the TP...” Response: Thank you for the suggestion. This part has been rephrased. 2. P2L1 “the maximum occurrence for cirrus top below 9 km . . .” is confusing in expression. “Cirrus” or “cirrus with cloud tops in range . . .”? please clarify this concept and rephrase the sentence. Response: Thank you for the suggestion. This part has been rephrased as “The maximum occurrence for cirrus with cloud top height less than 9 km . . .”. 3. P5L17 “. . .from 25° - 45°N and 65° - 105°E. . .”: change to “the TP is defined as the area that covers 25° - 45°N and 65° - 105°E” or similar expression. Response: Thank you for the suggestion. This part has been rephrased. 4. P7L14-15 and P821: leave a space between the number and the unit “km”, as i.e., “9 km”. Response: All the height description without a space between the number and the unit has been corrected. 5. Is it better to replace the colormap used for Figs 1-3a with a sequential or miscellaneous colormap? The current diverging one is not appropriate for describing monotonic trends. Besides, the font size of the “cirrus occurrence number” below

the colorbar should be enlarged. Response: Thank you for the suggestion. All the figures have been replotted. We appreciate Reviewer 2 very much for his constructive comments.

Please also note the supplement to this comment:

<https://www.atmos-chem-phys-discuss.net/acp-2019-1000/acp-2019-1000-AC3-supplement.pdf>

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-1000>, 2020.

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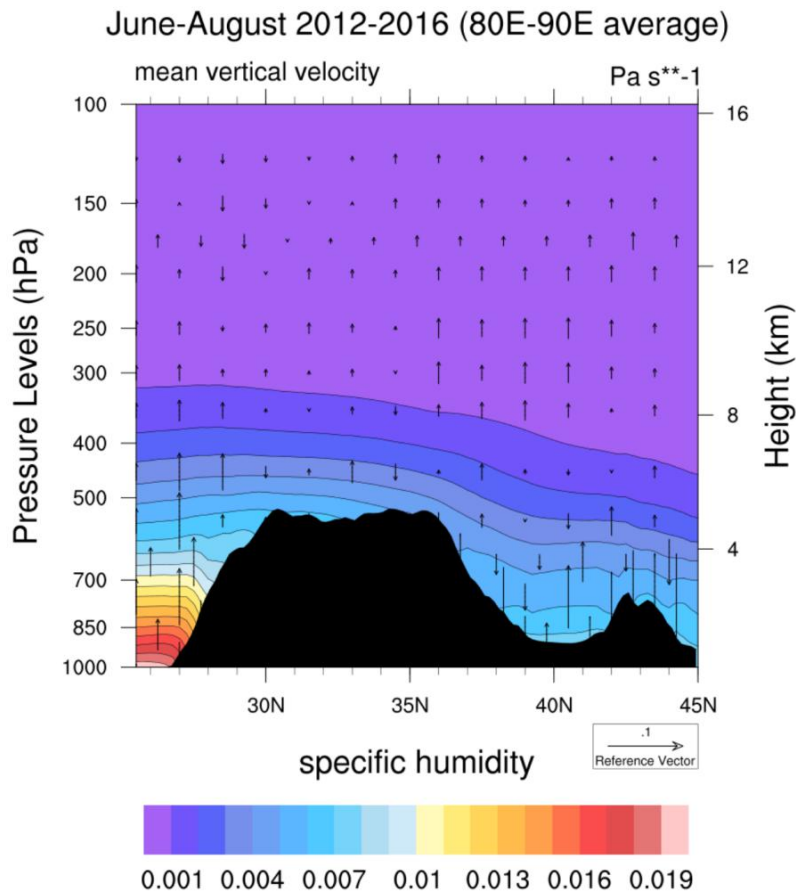


Fig. 1. the zonal distribution of vertical winds averaged from 80E to 90E for each latitude. The contour is specific humidity.

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