

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

Anonymous Referee #2

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Summary:

The authors present a manuscript that uses CALIPSO observed cloud properties, NOAA OLR data, and reanalysis data to examine the geographical distribution of the cirrus cloud over the TP. They classified the cirrus clouds into three types according to their cloud top heights with thresholds of 9 km and 12 km, then attributed the distribution patterns of cirrus corresponding to different cloud top heights to three formation mechanisms respectively, such as the orographic lifting effect, the wave enforcement, and the deep convective detrainment. I found this paper to be interesting and mostly well written and the figures to be well-constructed. I could see including it in ACP with minor improvements in the text. But I think it would be good to make the evidence stronger by adding more quantitative analysis, especially for the first and second sug-

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gested mechanisms, to clarify the coupling between the contributing factors and the cirrus formation.

Specific comments:

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 subsidence 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.

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 that 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.

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...”

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.

3. P5L17 “. . .from 25°E–45°E and 65°E–105°E. . .”: change to “the TP is defined

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as the area that covers 25°N-45°N and 65°E-105°E” or similar expression.

4. P7L14-15 and P821: leave a space between the number and the unit “km”, as i.e., “9 km”.

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.

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