

Manuscript number: acp-2015-341

Manuscript title: The regional distribution characteristics of aerosol optical depth over the Tibetan Plateau

Author(s): C. Xu, Y. M. Ma, C. You, Z. K. Zhu

Response to Editor

The reviewer has raised points that need to be addressed before we can make a decision on publication. We therefore invite you to revise your manuscript, taking into account the points raised.

Response

We would like to thank the editor and reviewer for their valuable comments and suggestions, which contribute to improve the quality of our paper. In the response, we present the item-by-item response to the reviewer's comments.

Response to Anonymous Referee #1

General Comments

The revised manuscript has been substantially improved in comparison to the previous versions. I conclude that the authors addressed most of my, and other reviewers' comments, adequately and satisfactorily. At the moment I only have a few minor issues with the presented manuscript that I think should be addressed before the publication. To make things easier I also suggest possible alterations, which the authors are free to use.

Response

Thank you very much for positive evaluation. We greatly appreciate for your valuable and constructive comments and suggestions, which are very helpful to the quality of this manuscript.

Specific comments

1. Page 7, lines 5-11: The authors cite the agreement between CALIOP and AERONET as percentage numbers. What do these numbers indicate? Please clarify.

Response

Thank you very much for your valuable comment. The previous studies have made validations about the uncertainties about the aerosol types using different observations. The agreement (percentage numbers) between CALIOP and AERONET is different from the agreement between CALIOP and airborne High Spectral Resolution Lidar to some extent. We use percentage numbers to show the best agreement, moderate agreement and poorer agreement clearly. We would like to indicate although previous studies showed different percentage numbers, the results were consistent. All the studies showed the classifications of dust aerosols were reliable, and the classifications of smoke aerosols have large uncertainty. Therefore, we showed detailed percentage numbers. We clarified this with the sentences '[Although previous studies showed different results of quantitative validations, these researches indicated](#)

the classifications for dust aerosols were reliable. Moreover, it is necessary to state that the classifications of smoke aerosols presented here are subject to large uncertainty.’. Please see the sentences in Page 7 line 10-13 in the revised manuscript.

2. Page 7, line 23: ERA-Interim horizontal resolution is stated, but what is the vertical resolution? Please provide the number of vertical layers and possibly an approximate vertical spacing at ~4-5 km.

Response

Thank you very much for your helpful comment. We are grateful that you point out this issue which we have ignored before. The vertical layers at different pressure levels are used. We followed your suggestion and added the information about the vertical layers. The sentence is ‘The spatial resolution of ERA-interim reanalysis data is $0.75^{\circ} \times 0.75^{\circ}$, and the vertical layers at 32 different pressure levels are used (including 1000 hPa, 975 hPa, 950 hPa, 925 hPa, 900 hPa, 875 hPa, 850 hPa, 825 hPa, 800 hPa, 775 hPa, 750 hPa, 700 hPa, 650 hPa, 600 hPa, 550 hPa, 500 hPa, 450 hPa, 400 hPa, 350 hPa, 300 hPa, 250 hPa, 225 hPa, 200 hPa, 175 hPa, 150 hPa, 125 hPa, 100 hPa, 70 hPa, 50 hPa, 30 hPa, 20 hPa, 10 hPa).’. Due to the uneven distributions of pressure levels, the approximate vertical spacing was not provided. The information of pressure levels was provided in detail. Please see the sentence in Page 7 line 21-26 in the revised manuscript.

3. Page 10, line 24: “a hot topic” is not professional. Substitute with “is currently a widely studied topic”.

Response

Thank you very much for your helpful comment. We followed your suggestion and changed into ‘is currently a widely studied topic’. Please see detail in Page 11 line 1 in the revised manuscript.

4. Page 14, lines 5-6: Why are there quote marks here?

Response

Thank you very much for your comment. We deleted the quote marks here, and the use of quote marks was improper. Please see detail in Page 14 line 12-15 in the revised manuscript.

5. Page 14, line 29: Remove the word “apparently”. The whole sentence could read: The southern edge of the TP is much higher than the northern edge, therefore the transport of aerosols from the north is seems easier than from the south.

Response

Thank you very much for your comment. We followed your suggestion and removed this word. Please see detail in Page 15 line 7-8 in the revised manuscript.

6. Page 15, lines 9-13: Here the authors jump to discussing southerly advection without mentioning it explicitly. I suggest the following correction: These mountains possibly act as a natural barrier for aerosols passing across the southern edge, and curb the spread of pollution further northward to the main body of the TP.

Response

Thank you very much for your valuable comment and helpful suggestion. We followed your suggestion and changed this sentence into ‘[These mountains possibly act as a natural barrier for aerosols passing across the southern edge, and curb the spread of pollution further northward to the main body of the TP.](#)’. Please see the sentence in Page 15 line 16-18 in the revised manuscript.

7. Page 15, lines 19-21: I recommend removing these two sentences. They are too speculative and not substantiated.

Response

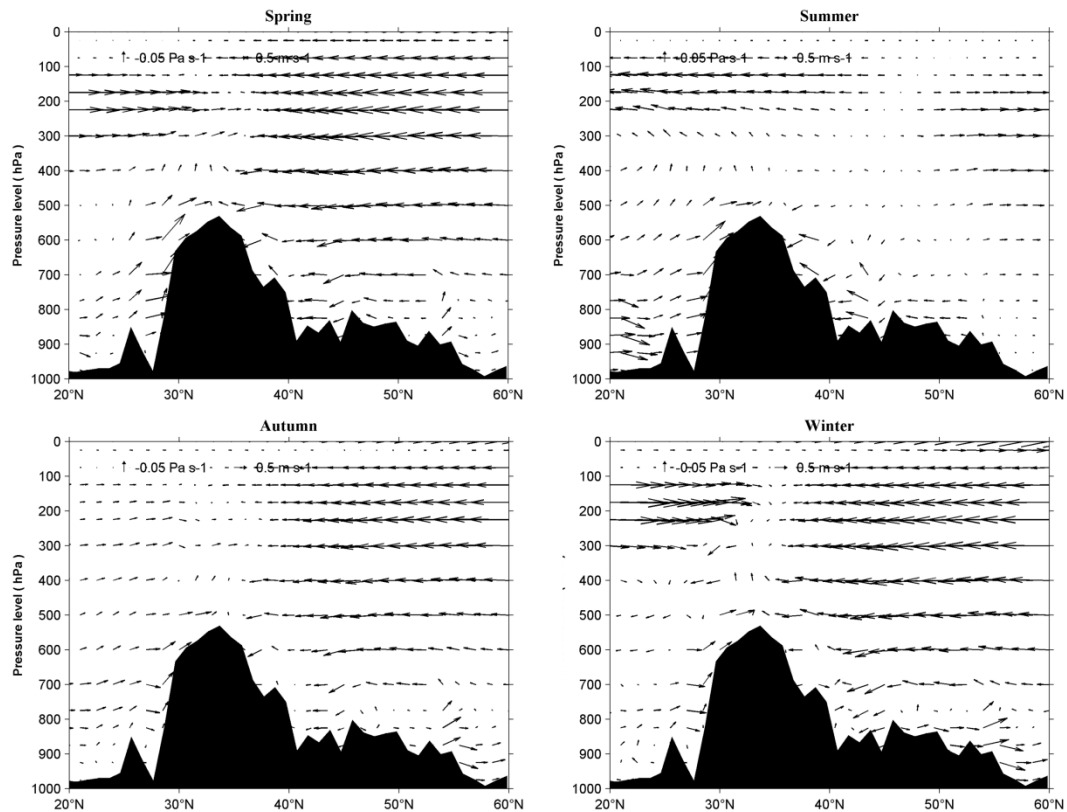
Thank you very much for your comment. We followed your suggestion and removed these two sentences.

8. Page 15, lines 22-23 and Figures 8 and 9: Wind vectors and arrows are difficult to read. Possibly reducing the number of arrows and making them longer would help?

Response

Thank you very much for your valuable and helpful comment. We followed your suggestion and redrew Figure 9 to make it clearer. Please see Figure 9 in the revised manuscript.

We did not change Figure 8 in the revised manuscript, because some pressure levels would lose when reducing the number of arrows. The following figure is the figure with less and longer arrows. Therefore, we did not change Figure 8 at last.



9. Page 16, line 5: Remove the word “primarily”.

Response

Thank you very much for your comment. We followed your suggestion and removed this word. Please see detail in Page 16 line 7-9 in the revised manuscript.

10. Page 17, lines 9-13: This part of text starting with “Although there are...” and ending with “...during autumn and winter seasons.” should be removed. If the authors wish to keep references to Tripathi et al. 2005 and Nair et al. 2007, they should incorporate them somewhere at the end of line 5, page 17.

Response

Thank you very much for your helpful suggestion. We followed your suggestion and removed this sentence.

11. Page 17, lines 16-26: This part of text should be removed. It is repetitive and does not contribute anything new to the manuscript.

Response

Thank you very much for your comment. We followed your suggestion and removed this part.

12. Page 18, lines 17-20: Suggested improvement to this sentence: Dust layer over the TP can reach up to the upper troposphere and lower stratosphere in spring (altitudes of ~11-12 km), while the altitude of dust layer is much lower in other seasons.

Response

Thank you very much for your valuable comment and helpful suggestion. We followed your suggestion and changed this sentence into ‘Dust layer over the TP can reach up to the upper troposphere and lower stratosphere in spring (altitudes of ~11-12 km), while the altitude of dust layer is much lower in other seasons.’. Please see the sentence in Page 18 line 4-6 in the revised manuscript.