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Comment

## ***Interactive comment on “An empirical model of optical and radiative characteristics of the tropospheric aerosol over West Siberia in summer” by M. V. Panchenko et al.***

### **Anonymous Referee #1**

Received and published: 7 February 2012

The paper is devoted to the development of empirical aerosol model on the base of long-term ground-based and airborne measurements of the atmosphere in West Siberia. The material of the paper is quite interesting. The development of the empirical aerosol model itself can be useful in verification of different aerosol models. The application of accurate radiative scheme for RT modeling and testing different methodic approaches also provides a helpful material, which can be applied in other studies. However, I would recommend to make some important changes in the text before publishing.

Major remarks:

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1. It is very necessary for the authors to significantly improve English language. I am not a specialist in English, however, I see that almost every sentence should be checked.
2. I would recommend to improve the structure of the text. The “part 2” can be moved to the “Introduction” after its stylistic improvement. The “Discussion” part should be added in the text. The “Introduction” is too small. It will be nice to see the brief description of other publications on aerosol vertical profiles and on radiative flux calculation approaches to underline the new features of the proposed approach.
3. It will be helpful if the scheme of the empirical model is included as a separate figure. This will help in better understanding the text. Otherwise there is too many pieces of different information, which is not easy to combine in mind.
4. The abstract should include some details of the proposed aerosol model and the results of radiative calculation.

#### Minor remarks

1. P.138 line 15-19. I think that this statement should be smoothed. We can find the variants in which the model approach has the advantage.
2. P.139.lines 1-5. The new features of the study in comparison with the mentioned publications should be clearly seen. Otherwise one can assume that all the details of the empirical model have already be discussed in other papers. This material can be moved to the “Introduction”.
3. P. 139 Lines 5 – p. 140- line 17. I would recommend to re-write this part ( to organize the material in a better understandable way) to show more logically the main features of the proposed approach. I would recommend to show a scheme of the model for better understanding of the text. This would be very helpful for a reader.
4. P.141. line 11. I am not sure about that. The ratio of soot in total concentration is rather small and its concentration at the end of 1980s can be different. So it is better

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to say that this is a model since 1999.

5. I would recommend to include a special table with the description of the instruments used in this study, the advantages and shortcomings.

6. P. 142 line 16. Can soot absorption play any role in this assumption? This should be discussed.

7. P. 143 line 2. I assume that “external mixing” should be added after the word “fraction”.

8. The subsection 3.2 is too small. I would recommend to give another names to the sections 3.1 and 3.2 and to combine the material after its critical editing.

9. P.143. line 17. I don't understand why you applied the word "use" here.

10. P.146. line 9. It would be interesting to see the Figure describing these results.

11. Subsection 3.4. SSA, asymmetry factor and AOT are the radiative parameters of aerosol. It is better to change the text accordingly.

12. P.146. line 11-14. Please, make a logical connection of this part with the previous ones. Please, describe, how you retrieved these characteristics.

13. P.146 lines 20-23. This is a quite interesting result. Do the SSA changes agree well with other data or models ( in addition to Oklahoma airborne measurements)? Or the difference lies within an accuracy of measurements? Please, add some additional discussion.

14. P.147 line 19. It is better to say “total water vapor content” instead of “total moisture column content”

15. P.148, line 7. Do you use in RT modeling the scattering phase function or asymmetry factor? If you use only asymmetry factor, it is better not to show the additional characteristic here.

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16. P.148. 4.1 Subsection. It would be interesting to see the results of the variant when the radiative parameters are calculated using the exact refractive index and size distribution from the empirical model. Please, discuss this in the text.
17. p.148, line 25 . Please, use “very slightly” instead of “hardly”. "Wavelength>1" is not the interval. Please, change the text.
18. P.149,. line 2. Did you calculate the flux or the dose as was mentioned on page 148? Please, clarify.
19. P. 149 line 1. You used the AOT=0.262 for this sensitivity study. Did you try larger values? The differences can be more dramatic. May be this should be reflected in the text.
20. P.150. The caption 4.2 is wrong. This is not the testing but the final composition of the aerosol parameters. Please, change the caption accordingly. I think that the description of Fig.5 is necessary to add in the text.
21. P. 151. Please change the caption “Summary” to “Conclusions”

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Interactive comment on Atmos. Meas. Tech. Discuss., 5, 137, 2012.

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