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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Late-Spring and Summertime Tropospheric Ozone and NO_2 in Western Siberia and the Russian Arctic: Regional Model Evaluation and Sensitivities." *by* Thomas Thorp et al.

Anonymous Referee #1

Received and published: 20 August 2020

General comments: The authors used regional air quality model WRF-Chem to investigate the processes controlling the regional distribution of tropospheric ozone over Western Siberia in late-spring and summer in 2011. They found that surface ozone in the region is controlled by an interplay between seasonality in atmospheric transport patterns, vegetation dry deposition, and a dominance of transport and energy sector emissions. Overall it is an interesting study. However, the presentations in particular of the figure qualities need to be substantially improved before it can be accepted to publish in ACP.

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Major comments: 1. The quality of figures The figure colors or legends need to be carefully selected. Several figures are not clear. For example, very poor visual effect in Fig. 3 and Figure 7. Normally, the darker color may indicate the high concentrations, vice versa. However, the authors used an unusual color style. Page 14: hatching. I don't see any hatching. Not sure what the green colors mean. Fig. 7: the borders are too thick or too strong, making the shadings look less apparent. The color selections in Fig. 11 are very poor as well.

2. Page 15: There are strong biases of the WRF/Chem simulations. Any explanations? It is hard to believe the results with such strong biases.

Minor comments: The authors need to make a thorough check of the manuscript very carefully by eliminating the typos and mistakes.

1. Typos: Page14 to 15, "Figure 1", "Figure 2" should be changed to "Figure 3" and "Figure 4".

2. Page 13, line19 to 20, or example in Kazan, Perm, Yekaterinburg and Ufa It is better to have the locations mentioned in the manuscript marked in Fig. 3.

3. Page 16, line 5 to 9, "The transport sector is the dominant source for NOx in ECL and EH2 over Novosibirisk and Tomsk. . ." This information cannot be derived from Fig. 5 or other figures. Any source to support the statement?

4. Page 21, line 8, "North of 60°N the influence of high latitude gas flaring emissions is evident, which have greatest impact on NO2 in August (Fig. 7t)." This information cannot be reflected in Figure 7t.

5. Page 23, line 15, the latitude and longitude of "Ob valley" should be marked.

6. Page 23, line 17 to 18, "Surface ozone is most sensitive to anthropogenic emissions, particularly those from the transport sector (Fig 9)." cannot be clearly reflected in Figure 9.

7. Page 35, line 5, “Siberian” should be replaced by “Siberia”.

8. For the units which are supposed to be superscript, the authors used subscripts sometimes. Please do the corrections.

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