

Interactive comment on “Benzene and Toluene in the surface air of North Eurasia from TROICA-12 campaign along the Trans-Siberian railway” by Andrey I. Skorokhod et al.

Anonymous Referee #2

Received and published: 7 February 2017

This manuscript contains a potentially interesting set of measurement data collected across Siberia. It appears that the measurements were properly conducted, and that the presented results are, at least mostly, scientifically sound. While the paper is relatively well structured, the overall presentation of the results needs to be improved here and there before I can recommend acceptance for publication. My detailed comments in this respect are given below.

Section 3.1

Have the authors considered plotting the concentrations in Figure 3 in a logarithmic rather than in a linear scale? In its current form, only the major concentration pikes can be identified from the figure, while potential differences in "background" concentration

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between the different regions are very difficult to see.

The authors could explain a bit more why and how the T/B ratio can be used as an indicator of chemical ageing. Does the chemical activity of toluene mentioned in the text refer to its OH-reactivity? Is OH the only important oxidant for benzene and toluene, and if not, what does this mean in terms of chemical ageing?

I do not understand the meaning of statement "with similar relation for benzene" following Eq. 1.

The same sentence is repeated starting from lines 13 and 17 on page 8. Concerning the follow up of the latter sentence, one cannot infer from this information that benzene emission from motor vehicle exhaust is 25% lower than toluene emission. The logic here is incorrect!

Section 3.2

In the first sentence of page 9, do you mean "Observations in several locations have reported. . . ." ? If yes, then also the beginning of the next sentence need to be modified: "Contrary to these observations, no . . .".

A high pollution level itself cannot be a reason for the lack of observed diurnal cycle because, in principle, also high concentrations could be relatively evenly distributed. I would rather think that a lack of strong local pollution sources (or lack of very high concentrations above the mixed layer) would be the reason.

The times are not usually given in a.m. or p.m (rather 04:00 and 23:00)

Section 3.3

I do not think "meaningful correlation" is proper statistical language. Furthermore, I am not confident that $R=0.6$ can be considered as a high correlation.

Section 4

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What is meant by "one-time maximum permissible concentration"? Also mentioned in section 3.1 and in abstract.

Can the statement made on lines 20-23 considered general, as indicated here? These results are based on few measurement data points, so one would expect somewhat different numbers at some other time when travelling the same measurement route.

There are a few sentences that need to be re-written to make the text more understandable for the reader. A list of these sentences is given below.

Page 2, lines 15-16: Although...as well.

Page 6, lines 7-10: Although... scale.

Page 6, lines 23-25: The observed...power plants.

Page 7, lines 26-27: These values are...

Page 12, lines 12-14: These are... correspondingly.

Finally, there are a number of minor grammatical issues that need to be corrected. Below is a list of suggestions for such corrections:

p 2, l 17-18: ...carried out around the world (e.g. Keymeulen...)

p 3, l 3: meteorology –> meteorological quantities

p 3, l 11: ... previously in Krutzen et al. (1996) and Elansky et al. (2000).

p 3, l 18: ... as well as by complex...

p 3, l 23: ... of the order of one week, which...

p 3, l 26: delete "changing each other"

p 3, l 31: ... clearly seen in Fig. 1 where...

p 3, l 34: According to Fig. 1, the...

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p 4, l 2: scale –> scales

p 4, l 9: VOC concentrations were measured...

p 4, l 16: ... detection limits ... VOCs are...

p 4, line 21: ... Fortner et al., 2009). However, isoprene has been found to be the dominant...

p 4, l 26: ... an ALHA...

p 4, l 29: does not

p 5, l 1: The CO ... with a TE48...

p 5, l 4: The SO₂... with an APSA...

p 5, l 6-7: ... a TE42C... a M200AU...

p 5, l 8: ...0.05 ppb, which makes it possible to measure so-called...

p 5, l 26: ...NO_x concentrations and by an increase in the NO/NO₂ ratio...

p 5, l 27: is –> was

p 5, l 30: ...), being safely...

p 6, l 4: A statistical...

p 6, l 5: are –> were

p 6, l 5: As discussed above, ...

p 6, l 11: are –> were

p 6, l 16: ..towns are located...

p 6, l 29: ... benzene content.

p 7, l 4: divided –> divided

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p 7, l 8: are – > were
p 7, l 13: farther – > further
p 7, l 17: utilize – > utilized
p 7, l 19: latter being . . . chosen based on. . .
p 7, l 25: . . .reaching the values of 45.6 and 36.5 ppb, respectively.
p 7, l 28: . . . a robust. . .
p7, l 30: . . .were in the ranges of 1.8- . . .
p 7, l 32: . . . were found in all the regions, suggesting other important. . .
p 8, l 2: are – > were
p 8, l 13: . . .exhausts were responsible for. . .
p 8, l 20: . . .exhaust was the most significant. . .
p 8, l 24-25: However, toluene levels tended to be lower than those reported in earlier publications.
p 9, l 10: does – > did
p 9, l 13: We found that the surface concentrations . . . were, in general, notably higher in urban. . .
p 9, l 16-17: A closer examination showed that these events were. . .
p 9, l 27: . . . was very poor, except for . . ., the diversity. . .
p 9, l 31: . . .selected, for which. . .
p 10, l 1: are – > were
p 10, l 5: . . ., which was also confirmed by the high T/B ratios. . .

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p 10, l 6: show – > indicate
p 10, l 8-9: . . .was found to be a main pollution source, even though the contribution from industrial source was also important, as seen from the significantly. . .
p 10, l 10: . . . in the medium- . . . were close to. . .
p 10, l 12: is – > was
p 10, l 13: . . .using the TROICA data due to the very limited number of observations collected. . .
p 10, l 19: based on
p 10, l 22: is – > was
p 10, l 25: As mentioned above, . . .
p 10, l 28: employed
p 11, l 2: . . .having the dimension of. . ., respectively, ,,
p 11, l 7: We calculated . . . based on. . .
p 11, l 12: is – > was
p 11, l 13-14: . . .abundances of isoprene . . .and its exceptionally. . .
p 12, l 11: are – > were
p 12, l 14: Vehicle emissions constitute the major. . .in these regions, with typical. . .
p 12, l 16: are – > were

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-858, 2016.

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