

Interactive comment on “Mass tracking for chemical analysis: the causes of ozone formation in southern Ontario during BAQS-Met 2007” by P. A. Makar et al.

Anonymous Referee #2

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General Comments.

This paper is a valuable contribution to the complex interaction between ozone formation and meteorology concerning land/lake sea-breeze interaction, partly interaction with heat island effects. It presents a detailed case study, which is based on a field campaign, including aircraft observations and ground base mobile observations. The mass-operator method is shown to be an important tool in the model analysis

Specific comments.

The analysis of the impact of the complex meteorological conditions is the main subject of the paper, and all observed concentrations are described under this focus. The

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question could be raised in how far the observed concentrations are due to specific emission phenomena. To highlight/explain this remark, I would like to raise the following points. -In the abstract it is stated that high-resolution modelling is recommended to study local features. However, this can only be carried out with confidence in case a reliable high resolution emission data base is available, and is this the case in this study? -O₃-concentrations are first caused by the emissions of NO_x and VOC, and especially the highest observed concentrations of O₃ depend on the reactivity of the VOC-emissions. This aspect is not addressed in the paper and could be mentioned in the recommendations for a further study. -On page 14249, line 21 etc the four major emission sources are mentioned. Does that mean that other emission sources, like house holds, public solvent use etc are not included in the inventory? -Page 14256, line 17 states that small errors in the placement and timing of local circulation have a large impact on concentrations. What about small errors in emissions, and VOC-reactivity? -Page 14257, line 29, local mixing of NO_x, what about capturing the "right" VOC's? -Page 14260, line 8. How sure are the authors that the underestimation of O₃-concentrations is due to only the meteorology, and not to-for example- to low reactivity of VOC-emissions?

The detailed Case study descriptions under 4.1 are impressive, but it is a bit strange that the important aspect of cloud cover/photolysis is not mentioned. Also the fact that the impact of the lakes is not only the meteorology, but also the fact that the dry deposition of O₃ over water is very small, and there is no NO-titration over the lakes-only in the vicinity of ships, is not mentioned in the paper. See also in the conclusions, page 14271, line 21, the lakes as photochemical production regimes is to part due to the low/zero dry deposition

The differences between the vertical resolution of the meteorology- 55 layers with a lowest layer of ?? meter, and of AURAMS, with 28 layers and a lowest layer of 13.9 m are not clear

There is in this aspect an intriguing remark on page 14244, line 8-10, where it is stated

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that the placement of major emission sources has a significant impact. Does this imply that the location of major emission sources should be made dependent on meteorological conditions/phenomena, and not just on where the ground is the cheapest?

Some small errors -page 14243, line 10: contrasts, not constrasts -Page 14257, line 19, seems missing "and they" compare, etc.. -page 14270, line 9, some of the direction, so insert "the". -page 14271, line 1: lakes has become, better would be has resulted in

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 14241, 2010.

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