



EGUsphere, referee comment RC2  
<https://doi.org/10.5194/egusphere-2022-1271-RC2>, 2023  
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## **Comment on egusphere-2022-1271**

Anonymous Referee #2

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Referee comment on "Rethinking the role of transport and photochemistry in regional ozone pollution: insights from ozone concentration and mass budgets" by Kun Qu et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-1271-RC2>, 2023

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Review Qu et al., 2022

Qu et al. present an analysis of the O<sub>3</sub> budget in the ABL in two different ways: a concentration budget and a mass budget. They apply the budget calculations to the O<sub>3</sub> budget over the Pearl River Delta based on simulations with WRF-CMAQ. The 2 different ways of calculating the O<sub>3</sub> budget lead to opposing views on the main contributions to the O<sub>3</sub> budget: while photochemistry dominates in the concentration budget, (vertical) transport dominates the mass budget. A tool is developed to calculate the budget contributions. A control simulation is performed, and in addition 3 brute force emission reduction scenarios are carried out. Budget calculation following the 2 methods are performed and the differences discussed.

Unfortunately, the way the paper is written makes it hard to judge its scientific merits, and I cannot recommend acceptance in its current form.

Major comments

- This is a dense paper without much guidance for the reader as to where you are going, which makes it hard to follow, and hard to judge the scientific merits of the work you describe. I had to reread it 3 times and still I am getting lost in the details. Please rewrite it in a more structured way, and indicate the purpose of each section in its first sentence. For instance, in section 2.6 a number of scenario runs seems to appear out of the blue. Where are the results of these runs used/discussed?
- What is actually lacking is an explanation of why 2 different budget methods give such different results. Is it mainly a boundary conditions problem? A change in mass does not lead to a change in concentration when the background concentration is similar over larger regions? Maybe it is discussed in L445-448?

Minor comments

L50 (and throughout MS): O<sub>3</sub> processes --> O<sub>3</sub>-related processes

L74: pls rephrase sentence

L416: "High contributions of ..." Unclear sentence. Please rephrase.

L461: what do you mean by 'a longer time'?