We would like to thank Owen Cooper for his valuable comments. Below point-by-point responses (bold) to every comment (*Italic*).

January 31, 2025 Comments by Owen R. Cooper (TOAR Scientific Coordinator of the Community Special Issue) on: Comparative ozone production sensitivity to NOx and VOCs in Quito, Ecuador and Santiago, Chile: implications for control strategies in times of climate action

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Discussion started: 17 Dec 2024

Discussion closes: 1 Feb 2025

This review is by Owen Cooper, TOAR Scientific Coordinator of the TOAR-II Community Special Issue. I, or a member of the TOAR-II Steering Committee, will post comments on all papers submitted to the TOAR-II Community Special Issue, which is an inter-journal special issue accommodating submissions to six Copernicus journals: ACP (lead journal), AMT, GMD, ESSD, ASCMO and BG. The primary purpose of these reviews is to identify any discrepancies across the TOAR-II submissions, and to allow the author teams time to address the discrepancies. Additional comments may be included with the reviews. While O. Cooper and members of the TOAR Steering Committee may post open comments on papers submitted to the TOAR-II Community Special Issue, they are not involved with the decision to accept or reject a paper for publication, which is entirely handled by the journal's editorial team.

Comments regarding TOAR-II guidelines:

TOAR-II has produced two guidance documents to help authors develop their manuscripts so that results can be consistently compared across the wide range of studies that will be written for the TOAR-II Community Special Issue. Both guidance documents can be found on the TOAR-II webpage:

https://igacproject.org/activities/TOAR/TOAR-II

The TOAR-II Community Special Issue Guidelines: In the spirit of collaboration and to allow TOAR-II findings to be directly comparable across publications, the TOAR-II Steering Committee has issued this set of guidelines regarding style, units, plotting scales, regional and tropospheric column comparisons, and tropopause definitions.

The TOAR-II Recommendations for Statistical Analyses: The aim of this guidance note is to provide recommendations on best statistical practices and to ensure consistent communication of statistical analysis and associated uncertainty across TOAR publications. The scope includes approaches for reporting trends, a discussion of strengths and weaknesses of commonly used techniques, and calibrated language for the communication of uncertainty. Table 3 of the TOAR-II statistical guidelines provides calibrated language for describing trends and uncertainty, similar to the approach of IPCC, which allows trends to be discussed without having to use the problematic expression, "statistically significant".

Thank you. We checked and we believe our format complies with the guidelines.

General comments:

This paper provides useful analysis of the controlling factors of ozone production in Santiago and Quito and these findings are relevant to policymakers. Given the lack of VOC observations in Quito, I find the method for scaling the Santiago observations against Quito CO levels to be acceptable, and I agree with the advice provided by the editor that the study of Quito be treated as a series of sensitivity situations.

Thank you. We improved the scaling method through Monte Carlo simulations for VOCs. We present a sensitivity analysis, as suggested.

Line 448

The authors hypothesize that the diurnal variation of the boundary layer depth has a major impact on ozone levels in Quito, based on previous studies of boundary layer dynamics above Quito and Santiago. This hypothesis seems very reasonable and it would be helpful if the authors can provide some additional information on Quito's boundary layer dynamics, as provided by the cited studies. For example, what is the typical depth of the daytime boundary layer? Does it vary by season? Are there days when the boundary layer is capped, as experienced by Santiago? While further detailed studies are required to improve understanding of this phenomenon, I think the authors could quickly provide some basic analysis to demonstrate the timing of the boundary layer growth. Assuming water vapor measurements are available at the monitoring station, the authors can plot the diurnal variation of water vapor mixing ratio. As the boundary layer grows, dry air from aloft will be entrained to the surface, and the water vapor mixing ration will drop. Such a plot could be added to Figure 12.

Thank you for the useful suggestion. We do have information about the boundary layer depth (PBLh) and evolution in both cities. In the revised version of the paper, we included PBLh and first order dilution constants as model parametrizations and we discussed the differences. We believe this new information is insightful for which we did not add water vapor discussions.

Specific comments

line 27

Non-human populations: While there are plenty of studies that demonstrate the impact of ozone on human and health and vegetation, there isn't much at all on the impacts of ozone on the health of animals. Do the cited studies provide specific analysis of the impact of ozone on animals?

They mostly focus on the impact on human life and plants, so we modified these lines accordingly.

Introduction

When reviewing the impacts of ozone on human health, vegetation and climate, this would be an excellent opportunity to cite the work from the first phase of TOAR: Gaudel et al., 2018, Mills et al., 2018, and Fleming and Doherty et al. 2018.

Thank you. We included these useful references.

Line 63

It would be helpful to cite the recent TOAR-II paper by Putero et al. 2023. While ozone increased in many urban areas during the COVID-19 pandemic, it actually decreased in the free troposphere and at rural high elevations sites.

Included.

Line 525

Please be more specific regarding the climate benefits of PM2.5 reductions. IPCC AR6 concluded that reducing aerosols, which generally reflect sunlight (except for black carbon), would lead to a net warming (Szopa et al., 2021; Forster et al., 2024).

Included.

References

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