

February 7, 2025

Comments by Owen R. Cooper (TOAR Scientific Coordinator of the Community Special Issue) on:

**Surface and tropospheric ozone over East Asia and Southeast Asia from observations: distributions, trends, and variability**

Ke Li, Rong Tan, Wenhao Qiao, Taegyung Lee, Yufen Wang, Danyuting Zhang, Minglong Tang, Wenqing Zhao, Yixuan Gu, Shaojia Fan, Jinqiang Zhang, Xiaopu Lyu, Likun Xue, Jianming Xu, Zhiqiang Ma, Mohd Talib Latif, Teerachai Amnuaylojaroen, Junsu Gil, Mee-Hye Lee, Juseon Bak, Joowan Kim, Hong Liao, Yugo Kanaya, Xiao Lu, Tatsuya Nagashima, and Ja-Ho Koo

EGUsphere [preprint], <https://doi.org/10.5194/egusphere-2024-3756>

Discussion started: 21 Jan 2025

Discussion closes: 04 Mar 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".

## General comments:

Line 154

Here the authors state that the ozonesonde stations have at least 10 profiles per year, which does not tell us the typical sampling rate for each station. As shown in a recent paper published in the TOAR-II Community Special Issue (Chang et al., 2024), accurate detection of ozone trends in the free troposphere is not possible if sample sizes are very low. This issue was further addressed by Gaudel et al. (2024) (another TOAR-II paper) who provided confidence levels for the ozone trends calculated from ozonesondes and IAGOS data across the tropics (see their Table 1); they also provided many details regarding the sampling frequency of each time series. It would be helpful to the reader if the approach of Chang et al. (2024) and Gaudel et al. (2024) is taken into consideration by the authors of the submitted paper. Please provide greater details regarding the sampling frequency at each station, and also provide some discussion regarding your confidence in the reported trends.

Please check the data availability for the ozonesonde sites of Hanoi, Sepang Jaya and Watukosek, as the information provided in Figure S2 indicates that these data sets are incomplete. These sites are part of the NASA SHADOZ ozonesonde network, and the primary database for these data is here:

<https://tropo.gsfc.nasa.gov/shadoz/Archive.html>

According to the SHADOZ database, these sites have data through 2021 or 2022 (see Stauffer et al. 2024 in the TOAR-II Community Special Issue). For your study please download and use the complete time series. Please also follow the SHADOZ data use guidelines at the bottom of the URL listed above.

IAGOS data: The authors state that there are very few IAGOS profiles available over Asia after 2014, however there are actually hundreds of available profiles over East Asia and Southeast Asia, as shown in the recent TOAR-II submission by Lu et al., 2024. For example, I went to the IAGOS database and downloaded all of the ozone and carbon monoxide profiles above northeast China for the period 2015-2022 (this region does not include South Korea or Japan). I found a total of 526 profiles, as shown in the figure below. This is equal to 66 profiles per year, which is a greater sampling frequency than the typical ozonesonde station that launches once per week. Please include the 2015-2022 IAGOS data in your analysis. Please also ensure that the IAGOS data policy has been followed, which is copied below.

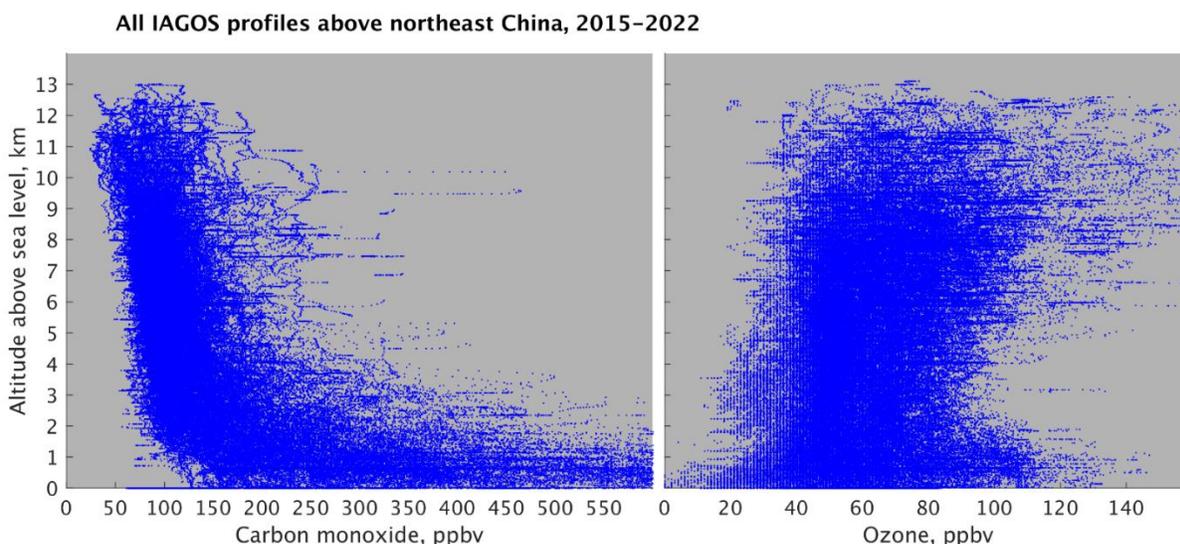
Beijing ozonesonde trends: The supplement shows decreasing ozone above Beijing, according to the Beijing ozonesonde record (Figures S3-S6). This decreasing trend is the opposite of the positive trends reported by other studies using IAGOS data (Gaudel et al., 2020; Lu et al., 2024). Furthermore, Figure S2 shows a very unusual decrease of ozone after 2011 above Beijing, that I have not seen at any other ozonesonde site. Please download all of the IAGOS ozone profiles above northeastern China (1994-2022) and compare them to the Beijing ozonesondes to identify the discrepancy.

Table S1

Following the TOAR-II statistics guidelines, all trends need to be reported with the 95% confidence interval and the *p*-value.

Figure S2

This figure is very difficult to read because it is so small. Please enlarge.



The **IAGOS data use policy** is here:

<https://iagos.aeris-data.fr/data-policy/>

We ask you to inform the data providers, traceable through the metadata connected to the provided DOI, when the data is used for publication(s), and to offer them the possibility to comment and/or offer them co-authorship or acknowledgement in the publication when this is justified by the added value of the data for your results.

In accordance with the IAGOS data policy, users of IAGOS data products are required to:

1. include the following acknowledgements in publications: “MOZAIC/CARIBIC/IAGOS data were created with support from the European Commission, national agencies in Germany (BMBF), France (MESR), and the UK (NERC), and the IAGOS member institutions (<http://www.iagos.org/partners>). The participating airlines (Lufthansa, Air France, Austrian, China Airlines, Hawaiian Airlines, Air Canada, Iberia, Eurowings Discover, Cathay Pacific, Air Namibia, Sabena) supported IAGOS by carrying the measurement equipment free of charge since 1994. The data are available at <http://www.iagos.fr> thanks to additional support from AERIS.”
2. offer co-authorship to the IAGOS Principal Investigators if the IAGOS data play a significant role in the publication
3. identify themselves and provide contact information (valid email address)
4. provide a short description of the intended research

## References

Chang, K.-L., Cooper, O. R., Gaudel, A., Petropavlovskikh, I., Effertz, P., Morris, G., and McDonald, B. C.: Technical note: Challenges in detecting free tropospheric ozone trends in a sparsely sampled environment, *Atmos. Chem. Phys.*, 24, 6197–6218, <https://doi.org/10.5194/acp-24-6197-2024>, 2024.

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