October 28, 2024

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

Global flux-based ozone risk assessment for wheat up to 2100 under different climate scenarios

Pierluigi Renan Guaita, Riccardo Marzuoli, Leiming Zhang, Steven Turnock, Gerbrand Koren, Oliver Wild, Paola Crippa, and Giacomo Alessandro Gerosa

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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:

At the time of this writing the authors have already received two very thorough reviews from the anonymous referees. Therefore, I will limit my comments to the two topics described below.

1) As stated in the first paragraph of *The TOAR-II Community Special Issue Guidelines*:
"as TOAR papers and the Copernicus journals focus on science and not policy, the submitted paper may be policy-relevant, but not policy-prescriptive."
In light of this guideline, the final sentence of the abstract should be re-written as it could be interpreted as a policy recommendation:
"Therefore, this study emphasizes the need for effective emission mitigation policies of both O_3 precursors and greenhouse gases to preserve global food security from O_3 damages."
For example, the following suggestion shows how the findings from the analysis can be described as policy-relevant, without making any policy prescriptive statements:
"These findings are relevant to policymakers as they indicate the potential impacts of air pollution and climate change on crop productivity and food security."

2) The following discussion is aimed at reporting trends according to the TOAR-II guidelines. While the submission by Guaita et al. (2024) does not specifically report trends (e.g. change in ozone per decade), ANOVA is used in a similar way to quantify the differences between present-day and future ozone projections.
The expression "statistically significant" is used throughout the submitted manuscript, however this expression is now recognized as being problematic and it should be abandoned and replaced by the more helpful method of reporting all trends (or ANOVA results), along with *p*-values and uncertainty estimates (e.g. 95% confidence intervals), followed by a discussion of the trends and the author's opinion regarding their confidence in the trend values. This advice comes from a highly influential paper by Wasserstein et al. (2019), published in the journal, *The American Statistician*, that has already been cited over 1900 times (according to Web of Science). This advice was adopted by the first phase of TOAR (Tarasick et al., 2019) and is also being used by TOAR-II. Some other recent papers on ozone trends that have taken this advice are: Chang et al., 2020; Cooper et al., 2020; Gaudel et al., 2020; Chang et al., 2022; Wang et al., 2022; Chang et al., 2024; Seguel et al., 2024. Because these papers report all trend values, uncertainties, and all *p*-values, and also discuss the trend results, there is no confusion regarding the findings, and one does not even notice that the term "statistically significant" is not used at all. Table 3 of the TOAR-II statistical guidelines provides calibrated language for describing trends and uncertainty, similar to the approach of IPCC.

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