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

New ozone-nitrogen model shows early senescence onset is the primary cause of ozone-induced reduction in grain quality of wheat

Jo Cook, Clare Brewster, Felicity Hayes, Nathan Booth, Sam Bland, Pritha Pande, Samarthia Thankappan, Håkan Pleijel, and Lisa Emberson

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-II 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.

General Comments:

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, tropopause definitions and best statistical practices.

Guidance note on best statistical practices for TOAR 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".

Specific Comments:

The focus of this paper is outside my area of expertise and I do not have any specific comments regarding the details of the methodology or analysis. In terms of comparing the findings of this paper to the findings from TOAR-I, and to the other papers submitted to the TOAR-II Community Special Issue, I did not find any discrepancies. I have listed a few detailed comments below to help with the Introduction.

Line 23
For non-experts, please spell out the full name of FAO (Food and Agriculture Organization of the United Nations)

Line 27
Regions of the world with high ozone concentrations relevant to wheat were identified by the first phase of TOAR (Mills et al., 2018)

Line 34
Fowler et al. (2008) is a very good paper, but it's now a little dated. Current projections of surface ozone evolution are shown in Figure 6.20 in Chapter 6, IPCC AR6 WG-I, The Physical Science Basis (Szopa et al., 2021). They show a lot of variability in surface ozone evolution depending on the emissions scenario. Under the SSP3-7.0 scenario (approximately business as usual) annual average surface ozone continues to increase in most regions (although this figure does not show projections for strong ozone pollution episodes). Another consideration is presented by Zanis et al. (2022), who suggest that climate change could impose a "climate penalty" on surface ozone, with more frequent heatwaves exacerbating ozone in South and East Asia.

Lines 44-46
This sentence on grain protein is difficult to understand, please reword.

References:

Mills, G, et al. 2018. Tropospheric Ozone Assessment Report: Present-day tropospheric ozone distribution and trends relevant to vegetation. Elem Sci Anth, 6: 47. DOI: https://doi.org/10.1525/elementa.302

Szopa, S., V. Naik, B. Adhikary, P. Artaxo, T. Berntsen, W.D. Collins, S. Fuzzi, L. Gallardo, A. Kiendler-Scharr, Z. Klimont, H. Liao, N. Unger, and P. Zanis, 2021: Short-Lived Climate Forcers. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 817–922, doi:10.1017/9781009157896.008

Zanis, P., Akritidis, D., Turnock, S., Naik, V., Szopa, S., Georgoulias, A.K., Bauer, S.E., Deushi, M., Horowitz, L.W., Keeble, J. and Le Sager, P., 2022. Climate change penalty and benefit on surface ozone: a global perspective based on CMIP6 earth system models. Environmental Research Letters, 17(2), p.024014.