



EGUsphere, referee comment RC2
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Comment on egusphere-2022-87

Anonymous Referee #2

Referee comment on "Ozone, DNA-active UV radiation, and cloud changes for the near-global mean and at high latitudes due to enhanced greenhouse gas concentrations" by Kostas Eleftheratos et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-87-RC2>, 2022

The manuscript presents valid and useful analysis with adequate source data, solid statistical analysis and interpretation and reasonable (but not spectacular or unexpected) conclusions. I am favourable on the scientific merits of this work despite the fact that a very similar analysis (now enriched with more data here) has already been published before by the same first author (I do not see this as an obstacle for publication). I only have the following comments which I would like to see addressed (numbers indicate the respective manuscript lines):

GENERAL

1-3: The title oversells the role of GHGs. The analysis of UV changes is done for simulations with and without time-varying GHGs and without doubt, modelled changes (=increases) of GHGs are driving the UV changes. But the actual UV change is mainly brought about by cloud changes (driven by changes in GHGs) that correctly the manuscript places in primary focus.

100-109: In direct relation to my comment for lines 1-3 and perhaps to justify the prominent insertion of the GHGs in the title, 1-2 additional lines should elaborate on why/how the GHG changes drive the cloud changes (that actually effect the UV changes).

177-178: From the way it is written, I deduce that the reference simulation includes additional 10 years of run for spin-up, while the sensitivity one, no. Is this correct? If yes, does this affect the ozone simulation? Ideally, shouldn't the runs be identical (with only difference the time-varying GHGs)?

267-268: The importance of this comment goes beyond technicalities so I insert it here. Currently the manuscript, throughout the figures, labels the three model runs according to their original names given by the modellers for specific reasons but are not necessary for the journal paper reader (in contrast they make harder following the figure content). The model run labels in the figure must be short and intuitive, for example:

SC1SD-Base02 -> HIS (for historical/hindcast)

RC2-Base04 -> SCE (for time-varying GHGs)

SC2-fGHG-01 -> FIX (for fixed GHGs)

590-592: how many Sigmas is this uncertainty range defined for? please clarify.

TECHNICAL

176: Move the description of the runs in the a different paragraph for easier reading.

179-185: " Furthermore, we have analyzed the ...". The description of the EMAC ARC1SD-base-10 can precede the description of the scenario runs.

186-192: Further escription of the scenario runs must be merged with the previous one in lines 176-179.

211-225: The deseasonalisation definitions and the t-test formula for the correlation coefficient formula may be introduced as a "statistical methods (or formulas)" sub-section in a Data and Methods Section.

256: replace "and of the parameters" with "and the parameters"

408-423: the mathematics (equations etc) used for the statistical tests for difference may be introduced as a "statistical methods (or formulas)" sub-section (same as in comment for lines 211-225) in a Data and Methods Section.