

Geosci. Model Dev. Discuss., referee comment RC1
<https://doi.org/10.5194/gmd-2022-70-RC1>, 2022
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Comment on gmd-2022-70

Anonymous Referee #1

Referee comment on "The AirGAM 2022r1 air quality trend and prediction model" by Sam-Erik Walker et al., Geosci. Model Dev. Discuss.,
<https://doi.org/10.5194/gmd-2022-70-RC1>, 2022

This paper provides a code product for air quality trend analysis. The quality of paper is generally good.

This paper presents a code built in an existing package, which is different from an independent package in R. Nevertheless, the authors should refer to what is the difference between articles published in the Journal of statistical software and manuals in R Archive Network. This paper currently provides too many unnecessary (and repeated) details and is quite tedious, so it must be restructured and shortened.

Instead of providing all the technical details (which can move to supplementary material), the authors should place the focus on convincing the reader their code is more efficient and convenient than directly working with the package `mgcv` in R interface. For people who already use R, I don't see any reason why they should change their mind to use this new code. For people who are new to R, this code is not straightforward enough for new users. I did not see the authors even try to address the issue

Minor issues:

1. l62, a typo for Chang et al. (2021)
2. l236-l242, this paragraph is repeated, it can be removed or point the readers to additional references using spatial features in GAM.
3. Section 2.2.1, the difference between `bam` & `gam` should be mentioned in the first place.
4. Sections 2.2-2.4 can be completely moved to supplement since these are basically the same info as Section 3.

5. I348, daily autocorrelation is expected to have a small impact on long-term trends.
6. I395, is the day of week also a cyclic function?
7. I1399, it looks like the absolute/relative trend only accounting for the starting and ending points. What if the nonlinear trends changed abruptly only over the last few years, such as Fig 32? Is the relative trend estimated by starting/ending points or linear fit for the whole period?
8. I544-I1545, this is not true because chemicals have a lifetime in the atmosphere. Even if the emission is cut-off, the chemicals will not disappear all of a sudden.