

Dear Referee #1,

Thanks a lot for your review. We would like to reply to a few of your remarks and will answer in more detail (including specific changes to the manuscript) during the peer-review process.

In the following, your statements are given *in italic*, our reply is **given in red**.

The authors apply an ozone tagging method in a global chemistry-climate model to attribute the origin of surface ozone pollution in Europe with focus on the Po Valley and the Benelux.

Please note that we do not apply a global chemistry-climate model only, but an on-line coupled global-regional chemistry-climate model. This allows us to study air pollution in detail on the regional scale considering also global impacts. In detail, we present the results of the regional instances (focusing on the results with 10 km horizontal resolution) in the manuscript.

The work is carefully done but it's not clear to me that there is anything new in the methods or results. I felt that I was reading a technical report rather than a scientific paper, with a tedious deluge of numbers and figures but no real new insight about the origin of ozone. The source attribution for ozone is consistent with what has been documented in many previous papers.

We would like thank you for pointing this out. While writing the publication we indeed might be lost in some details. Obviously, we have not highlighted the novelty of our work in detail. Therefore, we would like to highlight our novel approach:

- We apply an on-line coupled global-regional chemistry climate-model with a combined NO_y-/VOC source attribution (tagging) and separate four different source regions. Moreover, we distinguish 10 source categories and put emphasize on the role of traffic emissions.**

New insights / Highlight:

- Here we find that the contributions from individual sources which have large NO_x but rather few VOC emissions are lower, if their emissions of NO_x and VOCs are regarded concurrently.**

By design some of our results differ from previous source attribution studies using a NO_x-or VOC tagging only. We discuss this in detail in Sect. 5. Given the novel approach we think the work adds additional information to the topic and most importantly confirms previous findings with a different methodology.

The model is not particularly successful at reproducing observations, so it's not clear to me that the source attribution here deserves any more confidence than previous studies. I don't think that this paper is up to the scientific standards of ACP.

We don't agree with this statement. As mentioned above the methodology is different from previous publications. If we find comparable results, this increases the confidence of the scientific community of our understanding of the contribution of regional/global sources to ozone; it is a piece in the big puzzle of the tropospheric ozone budget.

Maybe I'm missing new scientific insights coming from the paper because they are not properly advertised and/or buried. I couldn't find them in the abstract. I would suggest that

the authors submit a much shorter paper focused on what is scientifically new in their results, and including proper citation to the literature.

We will highlight the novelty of our results in more detail in a revised version and will also state this more prominent in the abstract.

- 1. The introduction discusses at length the difference between perturbation analysis and attribution by tagging. This is an old story and I don't find it particularly interesting. There's nothing wrong with tagging, it just shouldn't be interpreted as a linear response to a perturbation, and we can leave it at that. It would seem more appropriate for the intro to review past relevant studies on attribution of ozone pollution in Europe - this is lacking.*

We agree that the difference between Tagging and Perturbation is an "old story", however from discussions during the review process of previous publications and from discussions on conferences etc. we have the feeling that there is still a lack of understanding of the differences in large parts of the scientific community. Therefore, we would like to highlight the differences again. If the editor/referee #2 agrees with your opinion we are of course happy to rewrite and shorten the introduction.

During the peer-review process we will provide a more detailed answer including also an overview about changes to the manuscript.

Best regards,

Mariano Mertens (on behalf of all authors)