

Dear Authors,

The manuscript “*Can atmospheric chemistry deposition schemes reliably simulate stomatal ozone flux across global land covers and climates?*” presents a thorough and well-structured analysis of ozone deposition and its implications for vegetation. The study is not only scientifically rigorous, but also highly relevant to understanding how different empirical and semi-empirical modeling approaches influence the assessment of air pollution effects. The analysis is very interesting and well-structured and the combination with a clear exposition of key findings, such as variability in stomatal and non-stomatal deposition and the impact of meteorological factors on O<sub>3</sub> uptake, makes this paper a valuable contribution to the field.

The authors have done an excellent job of detailing the methodology, providing transparency in comparing the models. Furthermore, the manuscript effectively highlights the strengths and limitations of different modeling approaches; for example how the models incorporate detailed land cover parameters while others rely only on more generalized assumptions, influencing deposition estimates. This nuanced perspective enhances its scientific relevance. The discussion is well structured and the results are presented in a way that facilitates interpretation, making this study a significant reference for future research on air pollution and its environmental impacts. So I suggest only a minor revision just to make the whole paper clearer and more fluent

## **Abstract**

The abstract is dense and difficult to read, probably due to an excessive amount of condensed information. To improve clarity, it would be useful to simplify the sentences, reducing their length and complexity, and to reorganize the content in a more linear way. A clearer structure, which clearly distinguishes the context, objectives, methods, main results, and implications of the study, would help the reader to grasp the essential message more easily. Furthermore, eliminating secondary details would make the text more fluid and immediate, without compromising the completeness of the information.

## **1.Introduction**

The introduction could be strengthened by discussing the broader implications of the differences between the models for real-world applications, particularly in the context of ecosystem management. And to give the reader a general understanding of whether using one model is preferable to another under certain conditions.

## **2.Methodology**

The methods are mostly well described, but clarity on the consistency of input data across models (e.g., meteorological forcing, land cover) would improve transparency.

The role of non-stomatal deposition (cuticular, soil absorption) could be more explicitly detailed. While the methodology is scientifically sound and well documented, the description of data selection criteria could be more explicit, especially regarding how site inclusion decisions affect the analysis. While the study acknowledges potential errors in the TOAR-II database, adding a small explanation would enrich the manuscript, especially regarding implications for the results.

## **2.3 Stomatal deposition models and their key inputs**

L 158-161: The explanation of the models is done in quite a bit of detail, but the reason why these models were chosen over others is not so clear, it could be explained better.

L 169: I don't understand why some model descriptions are more detailed than others. For example, the MESSy model approach is mentioned briefly compared to others. Standardizing the level of detail for each model would improve readability.

L 178-181: The resistance pattern is not immediately clear; I suggest a modification to improve its clarity.

L 275-282: It is mentioned that factors such as wind speed and solar radiation influence O<sub>3</sub> deposition, but the explanation is not very clear and fluid. It might be useful to introduce a transition sentence to clearly highlight how each factor impacts the different components of deposition.

### **3.2 Vegetation impact and variation with key input data**

In this section, the terms PODy, POD1 and POD6 alternate without a clear transition between them, which could generate confusion in the reader. It would be useful to introduce a more structured analysis of the differences between these indicators. For example, specifying what their implications are in the different ecosystems analyzed. Furthermore, a more fluid connection between the various metrics would help to make the analysis clearer and easier to understand.

## **4. Discussion and Conclusion**

In this section the obtained results are clearly reported, only some passages between the topics (for example, from the discussion of the models to the division between leaves exposed to the sun and shaded) could be made more fluid with connecting sentences. Furthermore, more emphasis could be given on practical implications: for example, the final section could be slightly expanded to underline the impact of the results.