

Description of the layout

1. Black: Referee's comments
2. Blue: Author's response
3. *Blue, italic*: The revised content in the manuscript and the supplement.
4. Red: line numbers of revised content; revised tables; complemented figures.

Response to Reviewer #1

I now recommend the publication of the manuscript, after consideration of the following three technical corrections:

We thank the reviewer for the recognition. We have revised the manuscript to address the technical corrections and provided point-by-point responses below.

- 1) L. 206: Change to "This introduces an NO_y bias (...)" ("an" is missing)

The missing "an" has been added. The sentence now reads "*This introduces an NO_y bias into the EEA measurements*" in line 206.

- 2) Avoid the use of "NO₂ signals" in lines 669-672 of the revised manuscript. "Signal" usually refers to the input of a neural network (more specifically, the input minus its noise).

Agreed. The "NO₂ signals" has been replaced with "*NO₂ levels*" in lines 510 and 670. The "NO₂ signals" has been replaced with "*NO₂ enhancements*" in line 516.

- 3) I still think the final version should contain a statement like "We purposefully excluded satellite observations as an input feature, because (...)"

The statement has already been given in lines 162–166. It reads "Notably, satellite-derived NO₂ products were deliberately excluded from the input features for two key reasons. First, frequent data gaps in satellite products, due to cloud cover and quality control, would propagate into the model's output, preventing the generation of continuous, gap-free fields. Second, this exclusion allows for an independent evaluation of the model against satellite observations and preserves the potential to use satellite data as an independent constraint in future work." Moreover, we have noted in line 755 of the conclusion and outlook section that satellite observations can serve as constraints for future model optimization.

Response to Reviewer #3

(None)