

## ***Interactive comment on “Carbon monoxide air-pollution on sub-city scales and along arterial roads detected by the Tropospheric Monitoring Instrument” by Tobias Borsdorff et al.***

### **Anonymous Referee #2**

Received and published: 11 January 2019

### **General comments**

The paper compares carbon monoxide (CO) total column concentrations from TROPOMI with CO column concentrations derived from a WRF simulation including CO as a passive tracer for Northern Iran and Armenia. The analysis indicates that CO emissions from the EDGAR inventory, which were used as input for the WRF simulations, are too low for urban areas and that emission from major roads are missing. The paper presents a nice example of an application of the use of TROPOMI data for model evaluation. However, it suffers from a somewhat too brief description of the research and the lack of details. Adding a more in-depth description of the applied

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methods and some more discussion would make the paper much more useful and also better readable.

### **Detailed comments (including also minor points)**

P 1, l 8: ‘At larger scales’ = ‘For background conditions’?

P 1, l 15: ‘since 13 October’ = ‘on 13 October’?

P 2, l 10: Please explain TCCON and NDACC.

P 3, l 1: What is the ‘true vertical profile’ in the context of this paper?

P3, l 11-20: Please give some more details of the model setup. For example, which chemistry and/or tracer option is applied? How many tracers are considered? Which model resolution is applied? Why does the model domain extend that far towards the South?

P 3, l 13: This particular topography is certainly not applied for the model simulations. So, for which purpose is it shown here?

P 3, l 21: Please add some more information about the EDGAR emissions and how they are applied here.

P 3, l 22-32: The first line of the paragraph seems to be misplaced (or the second and third sentence should be part of the part of the description of the EDGAR emissions).

P 3, l 27-32: At this point it is not clear why this is part of the description of WRF. Please explain this in the context with the WRF tracers.

P 4, l 1-2: Something seems to be missing in this sentence, please reword.

P4, l 1: Please explain the meaning of ‘prior CO sources’.

P 4, l 7-8: Does the interpolation of the WRF output in time and space mean that e.g. the top right of Figure 4 is a combination of outputs at different output times. If so, please mention this and/or give a description how this interpolation was made.

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P 4, l 11 and l 31: at which time(s)?

P 4, l 17-18: This could be determined easily by inspection of the EMWF-CAMS fields.

P 4, l 24: Which ensemble?

P 4, l 13: Since emissions are usually higher during the daytime than during the night, the error due to temporally invariant emissions may depend on the time of the day. Therefore, information on the considered time of the day may be interesting.

P 5, l 15: This should also be mentioned already in section 2.2.

P 5, l 18-19: To what extent did these pollution events show up in the WRF simulations when the original emissions were applied?

P 5, l 31: Does the WRF simulation really 'explain' the observed CO enhancement?

P 6, l 29: The sentence 'The poor capability . . .' is incomprehensible. Why is WRF not able to simulate at city scale. Is it due to the resolution, due to the emissions, or due to something else?

P 7, l 2: What happens if the adapted emissions are applied for the entire episode? Is CO overestimated during observed episodes with moderate CO, or are the results still ok?

P 7, l 5: Please add some sentences on the potential of the method for other regions of the world.

Data availability: The first link does not work and the second one is not really helpful in its current form. Please correct the links and add some explanation (if necessary, add supplementary material).

Figure 3 includes numerous details, which are not necessary or enlarge the figure. Please mention the hour or time interval of the shown orbit.

Figure 4 and Figure 5: Please mention the hour, time interval or orbit(s) in the figure

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caption.

Caption of Fig. 6: Please mention the region shown in this figure also in the caption.

Figures 6: Does this figure display the same region as the lower part of Fig. 2? If not: why? Please mention the time interval in the figure caption.

Caption of Fig. 7: Please mention the date and the time (interval).

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-1185>, 2018.

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