Geoscientific
Model Development
Discussions

Interactive comment on "Simulation of O_3 and NO_X in Sao Paulo street urban canyons with VEIN (v0.2.2) and MUNICH (v1.0)" *by* Mario E. Gavidia-Calderón et al.

Anonymous Referee #2

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This manuscript demonstrates the street scale air quality modelling system and its evaluation for the city of Sao Paulo. The authors present it as the operational forecast system. However, the forecast system implies that the future atmospheric pollution can be predicted. And "forecast system" seems to be an improbable description of it (Line 85), given that you used real-time air quality observations to force your air pollution forecast. The current system is rather suitable for policymaking and future urban planning or post-accident analysis.

The meteorological driver (WRF) evaluation was performed in a slightly opaque manner since the authors did not mention neither the location (and number) of meteorological

observation sites against which the model was evaluated nor the period of evaluation (perhaps of the same time extent as MUNICH runs). It is also unclear if the WRF output from D03 domain only was evaluated.

Perhaps, the authors could try to pinpoint the cause of large NOx and NO underestimation at Pinheiros AQS during Oct 8-9. Could it be associated with local meteorological conditions (probably unaccounted effect of nearby river, inversion etc.) or very local emissions just during those 2 days?

The reasons behind two distinct peaks in NOx and NO observations (not captured by MUNICH) at both AQSs during night time seem to be ambiguous. Did the authors check if those are associated with meteorology? In case they are not related to any issue with meteorology, why did not the authors adjust emissions (one vs. two peaks) to fit the observed concentrations during the nights?

Overall, this study is very interesting. However, the manuscript requires additional clarifications and corrections listed below in the specific comments and technical corrections.

Specific comments:

Line 125: "street links" is confusing definition of roads, in particular for those who have never dealt with VIEN model. Perhaps, you should define it before using.

Lines 127-128: Could you please elaborate a bit on how the vehicular composition was obtained from GPS dataset and CETESB (2015) report? The report appears to be in Portuguese language and it might be hard to understand for those who speak/read English only.

Line 140: The only number which fits the early-mentioned emission factors is 1.46. What is the 0.68 about?

Lines 183-185: "The number of lanes is provided by the OpenStreetMap dataset. . ." and "Most OpenStreetMap streets do not include the number of lanes for this region. . ."

seem to contradict each other. Both sentences should be reformulated to fit the method you actually used in the manuscript.

Lines 196-197: The Ibirapuera AQS (83) does not seem to be the optimal location for background concentration if you look at the mean wind field of upstream region. Perhaps, the mean of observed concentrations from (83) and (94) AQSs would fit better for MUNICH's forcing. Did the authors consider/try such forcing?

Line 276: phrase "MUNICH uses the same emission profile for the weekend and weekdays" is in contradiction with the section 2.3.1 and Figure 1, where emissions for weekdays and weekends are claimed to be different.

Table 4: There are often exceptions, but the fact that the correlation values equal strictly 1 in all 3 cases for ozone is unfortunately hard to believe. Maybe you rounded values or made some error during computations. Adding an extra digit for R values would be a good idea. Since the "Background" concentrations are also observed, it is unclear why authors evaluated and compared them with the street observations and what they tried to achieve by doing that (quality control?).

Line 332: "in MUNICH NOx and NO peak happening before observation." Since you have many models and databases interfaced with each other, such mismatch in simulated concentrations could have happened because you did not match timings of datasets and models having them all, for example, in UTC. Are you sure the models and data were perfectly matched?

Technical corrections:

Line 95: "before of no precipitation in" probably change to "before dry weather conditions in"

Line 136: please add reference for TDM

Lines 146-149: The unit of flux [ug / km / h] is confusing (in Figure 1). Shouldn't it be something like [ug / km*2 / h], typo?

C3

Line 161/ Figure 2: "WRF simulation domains for domains of. . ." please rephrase

Line 196: Cerqueira Cesar (83), should not that be 91 (similar typo in Figure 4)?

Line 220: "rectangle the urban canyon" change to "rectangle is the urban canyon"

Line 229: "adn Paulista Avenue" change to "and Paulista Avenue"

Line 309: "We also perform additional" change to "We also performed an additional"

Line 319: "COV-limited regime" isn't it "VOC-limited regime"?

Line 320: "with lead to" what does that mean, typo?

Line 331: "but still higher than 0.5" it is imprecise as there are R values of 0.4 and 0.2 in the Table 5.

Lines 341, 345: "Note that no O3 observation for Paulista Avenue." seems grammatically incorrect sentence.

Line 386: "As the main source of superficial NO" probably you should write ". . . of elevated NO"

C4