Atmos. Chem. Phys. Discuss.,
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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Quantifying burning efficiency in Megacities using NO_2 / CO ratio from the Tropospheric Monitoring Instrument (TROPOMI)" *by* Srijana Lama et al.

Anonymous Referee #3

Received and published: 9 March 2020

This study presents new results from TROPOMI for NO2/CO emission factors that provide information about combustion efficiency on urban scales. This is an important result for understanding how well these emissions are represented in standard inventories with subsequent impacts for air quality and climate model predictions. I recommend publication after the comments from 2 other referees and some minor issues from me are addressed.

Following the comment of Ref.#1 in addressing the different NO2 and CO lifetimes, the different seasonality in concentrations should also be addressed. For example, is seasonality removed before computing the background CO? Also, in computing the

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emission inventory ratios, are monthly emissions used when matching to data from a particular month, or do you apply annual averages?

Abstract. The abstract should state that NO2/CO is a proxy for combustion efficiency since combustion efficiency is a well-defined quantity: CO2/(CO2+CO). This would be better than calling it “burning efficiency”, which is confusing since combustion and burning are the same.

Perhaps the title could be: “Quantifying NO2/CO using TROPOMI to characterize urban combustion”

Line 57 – should also reference Tang et al., 2019:

Tang, W., A. F. Arellano, B. Gaubert, K. Miyazaki, and H. M. Worden (2019), Satellite data reveal a common combustion emission pathway for major cities in China, Atmospheric Chemistry and Physics, 19(7), 4269–4288, doi:https://doi.org/10.5194/acp-19-4269-2019.

Line 85 – MOPITT also has a SWIR channel (or near IR) and the multispectral (TIR/NIR) product, with near-surface sensitivity over some land regions, was used in both Silva and Arellano, 2017 and Tang and Arellano, 2017.

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