

Atmos. Chem. Phys. Discuss., referee comment RC2
<https://doi.org/10.5194/acp-2020-1330-RC2>, 2021
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Comment on acp-2020-1330

Anonymous Referee #2

Referee comment on "Development of a new emission reallocation method for industrial sources in China" by Yun Fat Lam et al., Atmos. Chem. Phys. Discuss.,
<https://doi.org/10.5194/acp-2020-1330-RC2>, 2021

The authors developed a new method to allocate industrial emissions onto grid cells based on the areas of blue-roof buildings, which are retrieved from the satellite imagery. This new emission distribution method has been applied to the MIX inventory and evaluated through atmospheric chemistry modeling and comparison against surface observations. Overall, I feel that this study provides new insights into high-resolution emissions mapping, which deserves publication. It has been recognized that the population-based allocation method tends to overestimate anthropogenic emissions over urban areas in China, which could be improved using the method developed in this work to identify the location of blue-roof industrial buildings. My only concern is that the manuscript lacks a detailed description of the blue roof identification algorithm, which is difficult to understand in its current form. And the evaluation results using surface observations need further analysis to illustrate the improvement of the spatial distribution patterns of emission inventories. My comments are as follows.

- 3.1. The description of the emission allocation method should be moved to the method part in Section 2. After reading this section, I am not very clear how the blue roof identification algorithm works. What do you mean by "incorporated the effect of sun position on colour change under different latitudinal position in the satellite images." (lines 175-176 on page 5)? Please explain "In this study, 4 ranges of HSV were identified for the blue roof identification algorithm. Its HSV ranges were 193-230° for H, 17% to 90% for S and 40% to 100% for V." (lines 179-180 on page 5)? The method description needs to be further improved to make it easier for an audience to understand.
- 3.3. The evaluation of the CMAQ simulation only presents the summary of performance statistics that covers all of the surface observation stations. I am curious whether the model performance (e.g., RMSE, MB) is different among urban, rural, and remote background observation stations, which will help understand the improvement of emission distribution patterns over different regions.
- Uncertainty assessment. Table 2 presents the False Detection Rate and False Alarm Rate in the blue roof identification algorithm. Is it possible to incorporate this information to quantify the uncertainties in the emission allocation processes?

- Line 105, page 4. Please explain how the MIX inventory for 2010 was scaled to the target simulation year of 2015.
- Line 108, page 4. "Hong Kong emissions were not presented in the MIX inventory" If I remember it correctly, the MIX inventory includes Hong Kong emissions.
- Lines 289 and 290, page 8. "However, we are also aware that the assumption of the blue-roof method where larger blue-roof has more emissions may not always be sufficient under different resolutions." This looks very interesting, but the manuscript has not analyzed the emission distribution patterns at different spatial resolutions, right? I would like to know how the authors reach such a conclusion.