

Comment on **essd-2021-299**

Anonymous Referee #1

Referee comment on "Estimating CO₂ emissions for 108 000 European cities" by Daniel Moran et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-299-RC1>, 2021

My opinion of the technical work performed in the paper is good: an impressive work in data blending. Clearly, one could question and discuss every and single assumption: for instance, I was quite surprised by this one: "Legally, the control of the emissions is likely at the registered address, so there is sense in calling attention to emissions which are controlled from there." and even this one "Emissions from vehicles are apportioned equally to fuel stations as located in OSM" made me a bit uneasy, thinking to the time spent in the past in attributing meaningful traffic flows to road networks.

Nevertheless, the authors have worked in a very transparent way, and all the proxies used are duly justified and accessible. Chapter 7 on the limitations and risks from their approach is overwhelmingly honest and clear. I fully share authors' worry about OSM coverage and reliability, as for many other crowd sourced datasets, and I would like to suggest the authors not stopping to test the use of other more "institutional" datasets (e.g., cadaster, road traffic data, etc.) to improve the robustness of their work. On summary, I think the results obtained are correct, in the sense they logically follow from the set of assumptions taken, a set that is one among many possible ones, chosen as a compromise among feasibility, meaningfulness and robustness.

On the contrary, I am not fully convinced by the use of the results the authors envisage: "Our emissions inventory can support local authorities in their journeys towards climate neutrality in multiple manners. The inventory can help make local and regional sources of emissions more tangible for diverse politicians, city administrations and local communities and provides a good starting point, especially for communities that lack a detailed GHG emissions inventory (lines 698-700)."

The experience from the GCoM and other local initiatives shows that local authorities need: 1) a precise estimation of the emissions they can influence by their policies and 2) tools helping them to evaluate the consequences of their actions. The dataset developed does not seem to offer this feature: for instance, attributing emissions equally to fuel stations does not "see" the effect of local traffic control measures. Even very important measures (such as e.g., closing the whole city to the internal combustion cars) would be

extremely diluted across all fuel pumps of the nation, making difficult for the mayor to show benefits. Similarly for industries: the map shows several hotspots correspondence of the legal address of industries on which local authorities have presumably little influence.

In the results produced, both emissions manageable and unmanageable by local authorities are inextricably mixed and it is very difficult in some cases understanding how the information could support appropriate policies. In extreme cases, the approach taken could even push inappropriate measures: by absurd for instance, a mayor of a small town could be tempted of zeroing traffic related emissions in its jurisdiction simply closing a fuel station (or moving it to the neighbor town).

I would like to suggest the authors to reflect more on the possible uses of their results, and to present them in a more useful way. For instance, instead of showing results per macro-sectors, a finer or different subdivision could be more appropriate, or other solutions could be possible.

On summary: the methodology chosen by authors to distribute national emissions down to the finer jurisdiction is surely one of the many possible ones and overall I think it is correct and transparently justified. But I am not sure it is the most appropriate for guiding local authorities in their decision on emissions control.

Specific comment: please consider changing the terminology used e.g., in the title: there are not 108,000 "cities" in Europe. See e.g <https://ec.europa.eu/eurostat/web/nuts/tercet-territorial-typologies>

Minor: Line 102: IPCC not IPCCC