The authors have created an emissions dataset for various chemical species including SO_2, NO_x, CO, NMVOCs, NH_3, PM_{10}, $PM_{2.5}$, BC, and OC for 2008 and 2010. This dataset is composed of different regional inventories (US EPA, Environment Canada, EMEP, TNO, and MICS-Asia) whenever possible and is filled with EDGAR v4.3 when such regional information was not available. As authors argue, it is indeed important for modelers to have these emissions and having as much transparency, as in this paper, is extremely useful. I have several specific comments, followed by some minor ones.

Specific comments

Authors argue that "[a]n analysis of country-specific implied emission factors shows a large difference between industrialised countries and developing countries for all air pollutant emissions from the energy and industry sectors, but not from the residential one (l. 5-7, p. 12870)." However, later in the paper authors explain that for the residential sector, "the range of variation of the implied emission factors is the smallest for SO_2 and NO_x, but the largest for $PM_{2.5}$ and BC (l. 1-2, p. 12890)." It is not clear from the sentence but when you look at Fig. 4, residential sector has the largest difference between industrialised and developing countries for several species. These differences in the residential sector make sense to me but the text has to be consistent. Also, I do not see in Fig. 4 that we find a large difference for all air pollutant emissions from the energy and industry sectors, so please clarify.

I am not quite sure how the disaggregation was done for the Asian region. The authors state that they have done "a raster-resample procedure (l. 13, p. 12879)" but I would like to see a more detailed description of how this was done. I am also curious if the emissions rate at a national level and the region are consistent with the MICS-Asia national and regional values after the regridding or not. If they are the same, I am not sure why the country totals were derived from the gridmaps for the MICS-Asia region, rather than from the bottom-up as done in other regions.

The authors stated that they established seven source categories including aircraft, international shipping, power industry, industry, ground transport, residential and agriculture (l. 1-2, p. 12875) and described that in Table 1. Then why Fig. 2 sectors do not match those mentioned earlier? It would be helpful to maintain some consistency throughout the paper. I would also like to see the same seven categories in Fig. 4 as well.

For the calculated per capita emissions, why is there a difference from the reported EUROSTAT value and how are we supposed to consider these differing values, especially for SO_2 (l. 3-4, p. 12887)?

What does the ranking tell us in terms of the lowest to highest per capita emitters in Table 2? What is the main reason behind Germany-China-USA ranking for most of the species? Is it mainly because of the population? Similarly, are India's carbonaceous particulate matter emissions per unit GDP higher than those of China

because of technology? Or what would be the reason for that? Some additional explanations would be very helpful.

There are some analyses that I cannot understand just from the provided figures. It will be helpful if supporting information (e.g., tables, figures, or values in the text) substantiating the following statements:

1. L. 24-26, p. 12882. "High annual SO_2 emissions are observed for India and correspond to high contributions from the industrial combustion." India SO_2 emissions do not seem to stand out from Fig. 1b but if the large contribution of industrial SO_2 emissions is from India, a quantitative value would be helpful.
2. L. 8-10, p. 12883. "Those industrialised countries with a large share of natural gas as fuel for heating houses and commercial centres (such as Canada) show relatively high emissions of NO_x." In the current figures, there is no way for the reader to differentiate at the country level. Spatial distribution of emissions might be helpful as supporting information.
3. L. 7-9, p. 12884. "In the Middle East NMVOC sources include oil production and in South-Eastern Asia charcoal production. In China, particular high emissions are also associated with the high use of solvents in paints and in Brazil with the use of biofuels."
4. L. 11-16, p. 12885. "A decreasing trend from 2008 to 2010 is observed for Brazil due to decreases in emissions from charcoal production. Emissions from charcoal production are also important for India and some African countries, with country-specific shares varying between 1 and 10%. Western Africa generally emits more PM than the Eastern part because of more industrial activities."
5. L. 23-24, p. 12885. "Figure 2g shows that the largest contributing sector for BC in North America, Europe and the Middle East is road transport, mainly from diesel vehicles." Figure 2g does not provide any information whether the contribution is from diesel vehicles or not.
6. L. 1-3, p. 12886. "China and India emit more BC than Western industrialized countries from the coke ovens and non-metallic mineral industries…"
7. L. 4-7, p. 12886. "Most important sources in Russia include primary solid biomass…"
8. L. 2-3, p. 12891. "The PM emissions from the industry of the other developing countries show a decrease from 2008 to 2010, indicating slow penetration of end-of-pipe abatement." I don't think emissions reductions indicate the penetration of abatement technologies. If this is the case, I believe authors should be able to see the difference in RED variable. Also, in which developing countries is this happening?

Some sentences in the text are very difficult to follow and understand. Please consider rewriting the following:

1. L. 7-11, p. 12870 "A comparison of the population weighted emissions… for aerosols."

2. L. 5-9, p. 12871 “Responsibility of providing…we need to work with (Janssens-Maenhout et al., 2012).”
3. L. 24-27, p. 12871 “For example, … getting larger differences (e.g. for NMVOC emissions).” – Here I was not sure larger differences than what.

Minor comments

1. l. 5, p. 12872. development mitigation policies → development of mitigation policies
2. l. 7, p. 12875. Yevich et Logan (2003) → Yevich and Logan (2003)
3. l. 20, p. 12884. vegetal waste → vegetable waste?
4. L. 25, p. 12885. But also → as well as?
5. L. 7, p. 12889. Is f fuel?
6. L. 25, p. 12890. consistent Wang et al. → consistent with?
7. L. 17-18, p. 12891. only -4% respectively +5% → only -4% and +5%, respectively?
8. p. 12901 and p. 12903. Why Agriculture is labeled 8 and not 7 in tables 1 and 3?
9. p. 12904 Fig. 1 caption US=EPA → US-EPA
10. p. 12904 Fig. 1 caption MIX-Asia → MICS-Asia
11. I think the authors should decide how to refer to this database. On the title it says HTAP_v2. In the paper, there are different versions including HTAP_v2.2, HTAP-v2.2, and HTAPv2.2.