

## Comment on **essd-2021-216**

Anonymous Referee #2

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Referee comment on "High-resolution inventory of atmospheric emissions from transport, industrial, energy, mining and residential activities in Chile" by Nicolás Álamos et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-216-RC2>, 2021

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The article entitled "High resolution inventory of atmospheric emissions from transport, industrial, energy, mining and residential sectors of Chile" consists of the presentation of a database of emissions from road transportation, residential biomass burning, mining, and energy and manufacturing industries for Chile. It is an original work endowed with great regional and global relevance, which is within the scope of this Special Issue. The database includes original information and incorporates the use of emission factors from biomass burning specific to the region. The work is promising and worth to be published as long as the authors review the aspects mentioned below.

### ***Main revisions:***

The use of the term "sectors" both in the manuscript and in the title, I think it can lead to confusion. For the IPCC, and therefore for the nomenclature used by the EDGAR database (see lines 94, 331, Table 1), the sectors are Energy; Industrial Processes and Product Use (IPPU); Agriculture, Forestry and Other Land Use (AFOLU); and Waste. According to the mentioned nomenclature, what in this work are called sectors are categories and subcategories within those sectors. In particular, the work includes emissions from road transportation, residential biomass burning, energy and manufacturing industries, disaggregating from the latter those from metal industries.

Line 100-101: "The atmospheric emissions for each sector and pollutant are obtained by weighting the total **fuel consumption** (activity level) by an emission factor (EMEP / EEA, 2016), as shown in eq. (1)." The activity level is not always related to fuel consumption. This inventory includes emissions from industrial processes such as mining and other activities from the IPPU sector that are not represented by this sentence.

Line 179-183: Although it is clear why the authors do not apply the IPCC tier 1 EFs, the

guidelines contain other reference factors for different technologies, and it would be advisable for the authors to compare their results with published values. For example, the values reported in Table A1 (please add units) for wet firewood in cook stoves, conventional stoves and catalytic stoves are of the order of non-catalytic ones in the IPCC guidelines. Does this technology represent the average conditions of residential combustion in Chile? In addition, and as far as I can see, the cited study USACH 2014 reports correction factors for particulate matter emissions from wet firewood combustion. It is suggested that the authors add a justification for this choice for species other than PM here.

Table 1: The authors are comparing what they have called Residential sector with the IPCC category 1A4b: Residential and other energy sectors. Are you including emissions from Commercial/Institutional and Agriculture/Forestry/Fishing/Fish Farms?

#### *Section 2.2:*

The estimation of residential emissions from sources other than biomass burning is not detailed in this section. I consider it of great importance for this work to clarify this aspect. If these emissions have been estimated, this should be mentioned and detailed in the methodology. If they have been omitted, the authors should mention it in this section, adapting the rest of the work to what has been done: results, discussion, conclusions, etc. For example, the authors compare their results with those of the EDGAR database without discussing how the aforementioned affects this comparison, or they mention in the conclusions that "future development of this inventory should consider, for instance including the agriculture sector", when it would be more relevant to work on the completeness of the residential emissions inventory.

#### *Section 2.4:*

In addition to downloading this information from the RETC, did the authors do some quality control of it? By applying what methodology were these emissions estimated? Are the results consistent with other national reports? Are they consistent with each other within the database?

*Section 3 (Results):* This section should be reviewed.

Lines 270-271: for several of these species the variation is very small in the 3 years analysed, or unclear as for SO<sub>2</sub>, to affirm that these are increasing and decreasing trends.

PM<sub>10</sub> from industries decreased in the period analysed, while CO<sub>2</sub> and NH<sub>3</sub> from the

sector increased. To what do the authors attribute these results? Is there an increase in industrial activity? Was there any relevant change in the fuels used in that short period?

Lines 277-278: I think that they do not reflect what is seen in Figure 4. The peak in SO<sub>2</sub> emissions in 2016 is more attributed to industrial emissions, while those from mining contribute to an increase that is sustained in 2016 and 2017. This peak is not observed in industrial emissions of other species. In addition, it is observed that emissions from energy decrease in the period. To what do the authors attribute these results?

Line 310: "1480 Kt are emitted" that magnitude seems to be higher than the national total.

### *Section 3.1:*

I suggest reviewing this section in detail. Based on what is reported in Table 2 and the EDGAR database for Chile, I do not obtain the same results as the authors in terms of differences between datasets. In addition, I find discrepancies between what is seen in Figures 4, 7 and 8, in Table 2, and what the magnitudes that the authors describe in the paragraph (e.g. lines 334, 342, 349, conclusions).

Have the authors obtained the EDGAR base biomass burning residential emissions in a separate way from those reported by EDGAR under 1A4b (which also include fossil fuel burning and commercial and agricultural activities)? If not, I suggest adapting this section considering the discrepancies this may introduce. Just as an example, it would be wrong to state that the "differences can partly be explained due to the use of different emission factors in both inventories" (line 336) without highlighting the main discrepancies.

Lines 339-340: However, although the authors claim to have applied correction factors to the EFs of CH<sub>4</sub> and VOCs, they report lower emissions than the EDGAR base. This is expected due to the non-inclusion of fossil sources in residential emissions, however it is not clarified or discussed.

### *Section 4:*

This section does not seem entirely integrated into the rest of the work. It is suggested to reorder it by adding a subsection in section 2 detailing the methodology used for this analysis (which is not clear here), and including in section 4 only the most relevant results. If the authors consider that this analysis is disproportionate in length within the work, they may choose to include what they consider as Supplementary Material.

*Section 6:*

Based on the aspects mentioned in this review, it is suggested to adapt the conclusions of the article.

**Minor revisions:**

It is suggested to unify the way of expressing units: for example, tons appear as tones, tonnes, Kt and tons. Also note that k for kilo should not be capitalized.

It is suggested to unify the use of the thousands separator in the work, the use of “,” or “.” for decimals, and unify the significant figures that are presented within, for example, the same table or section (for example, see the Table A1).

Line 20: “The estimated total annual national emissions of PM10 and PM2.5 are...”, do these magnitudes correspond to the emissions of a particular year or are they the annual average?

Line 28: “uncertainty in activity **data** also”.

Line 48: “air quality - and greenhouse **gases** (GHG)”.

Line 64: “**estimates** from the residential and transport sectors”.

Line 87: “Carbon Dioxides (CO<sub>2</sub>), Nitrogen Oxides (NO<sub>x</sub>), Sulfur Dioxides (SO<sub>2</sub>)” should be carbon dioxide (CO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>).

Table 1: the content of the column “IPCC sector” does not correspond to IPCC sectors but to different categories of the Energy and Industrial Processes and Product Use (IPPU) sectors. As a suggestion, the column title could be “IPCC categories”.

Lines 195-197: It is suggested to expand the explanation provided in these two sentences.

Equation 3: There is an extra \*.

Line 277: "This activity drives the increase in SO<sub>2</sub> emissions from 2015 to 2016", add a reference.

Line 293 (caption table 2): Clarify that these are "annual" emissions and that the units are kilotons "per year".

Line 297: According to Table 2, this magnitude corresponds to kilotons.

Figure 8: it is suggested to unify the order of the categories of the abscissa axis and of the series.