

Author's response to interactive comments on:

**“Vista-LA: Mapping methane emitting infrastructure in the Los Angeles megacity”
by V. Carranza et al.**

The authors would like to thank anonymous reviewer #1 for detailed and thoughtful comments on the manuscript. Below we include responses to each comment. Our response is structured in the following format: (1) Referee comment, (2) Author's response, (3) Manuscript (MS) changes. Our responses and MS changes are highlighted in *blue* text. All changes to manuscript text were also tracked and highlighted using “track changes”. The page and line numbers in the author's response and MS changes refer to page and line numbers in the “track changes” version of the manuscript.

Response to Anonymous Referee #1: *Interactive comment*

(Received and published: 21 Aug 2017)

1. **Referee comment:** In general the manuscript describes an important GIS dataset for assisting with the improvement of methane emission estimates in the South Coast air basin. The authors make a strong case for why the methods described will be useful in other areas, especially in California, but even nationally and internationally. At this stage, the dataset does not include emissions themselves; but, the attributes data do include some activity information that will be useful in making bottom-up emission estimates in the future. A table that summarizes, for each major source type, the level of completeness of the activity data included in the dataset would be a useful addition to this manuscript. Are all, most, some, or none of the needed activity data included in the dataset for each of the major source categories included?

- a. **Author response:** This comment is very useful for describing our dataset. Although at this stage, the dataset does not include emissions estimates, a future goal of the data product is to combine both top-down (observation based) and bottom-up (activity based) emissions estimates, along with information provided via state and national reporting programs, to improve methane emissions estimates for the South Coast Air Basin.

The referee requested inclusion of a table that summarizes, for each major source type, the level of completeness of the activity data included in the Vista-LA dataset. We have constructed this table and added it to the Supplementary Information. The attributes data for the Vista dataset do include some activity information that will be useful in making bottom-up emission estimates in the future. The amount of information currently included is indicated in Table S1 using a qualitative assessment (“none”, “some” or “all”), as suggested by the reviewer.

- b. **MS changes:** Please review the added Supplementary Information; the new text includes Table S1 that summarizes, for each major source type, the level of completeness of the activity data included in the Vista-LA dataset.

2. **Referee comment:** Lines 39-40: “Recent studies have shown that mitigating CH₄ emissions yields large near-term climate benefits due to CH₄’s relatively short atmospheric lifetime (Dlugokencky et al., 2011).” Suggested clarification: Methane yields large near-term benefits do to its short lifetime AND its high GWP.
 - a. **Author response:** We included this suggestion in the text in the Introduction.
 - b. **MS changes:** Page 3, lines 37-39: “Recent studies have shown that mitigating CH₄ emissions yields large near-term climate benefits due to CH₄’s relatively short atmospheric lifetime **and high global warming potential** (Dlugokencky et al., 2011).”
3. **Referee comment:** Several of the statements in the Introduction section, added to support the utility of the dataset, appear to be in conflict: a) Urban areas are globally significant sources of methane (line 57); b) Urban methane is mostly from fossil fuel sources (line 72); c) By far, most methane in California is from livestock and waste (Figure 1). Please clarify the text in the Introduction section to explain how statements a) and b) do not conflict with information presented in Figure 1.
 - a. **Author response:** Thank you for pointing out the logical disconnect here. We have amended the text to point out: (1) the discrepancies between inventories and atmospheric observations for CH₄ emissions in cities, and (2) the differences between statewide and city-scale CH₄ emission sources:
 - b. **MS changes:** We have clarified the text as follows to address this comment:
 - i. (a) Page 3, lines 58-59: The comment that “Urban areas are globally significant sources of CH₄ emissions ” is correct and has not been changed. We added to the statement, “**however, correct quantification and source attribution at the scale of individual cities is highly uncertain**” to clarify point 1 above.
 - ii. (b) The text stating that “Urban methane is mostly from fossil fuel sources” has been removed to avoid confusion.
 - iii. (c) Figure 1: Correct, the largest sources of methane in the state of California are from livestock and waste. By contrast, fossil fuel emissions appear to be more important for some urban areas such as Los Angeles. We added a statement to clarify point 2 for cities in general, “**Official CH₄ emission inventories made using bottom-up approaches (e.g., Intergovernmental Panel on Climate Change (IPCC), 2006) are often created for policy and planning purposes at the state and national level (CARB, 2016; EPA, 2016); however, CH₄ sources in cities often differ substantially because of the high density of fossil fuel usage and relative lack of agricultural activities.** ” (page 4, lines 63-66). We also added the following sentence to the caption of Figure 1: “**Note that while Livestock and Waste are the most significant sources of CH₄ in the state of California, atmospheric CH₄ in the Los Angeles urban**

landscape is dominated by CH₄ hotspots from fossil fuel-derived sources (e.g., Hopkins et al., 2016b).”

4. **Referee comment:** In the Introduction section, it would be helpful to mention the CALGEM dataset where other relevant datasets are discussed since CALGEM is discussed in the Discussion section (line 698).
 - a. **Author response:** A good suggestion-- we have now included text that mentions the CALGEM and EPA inventories in the introduction.
 - b. **MS changes:** Page 4, lines 77-79: “Recent efforts have been made to spatially disaggregate these emissions by sector for California and United States inventories, resulting in 0.1° x 0.1° gridded CH₄ emissions products that coarsely represent the city scale (CALGEM: Jeong et al., 2013; EPA: Maasackers et al., 2016).”
5. **Referee comment:** Lines 714-715: “...rice cultivation and coal mining were the only source types contributing >1% of total emissions that were not included.” Statements here were confusing to me. Is the “total” referred here the US total? Please clarify.
 - a. **Author response:** Also a good suggestion. The sentence was modified for consistency with Figure 1.
 - b. **MS changes:** Page 32, lines 766-768: “Although rice cultivation and coal mining contribute >1% to total U.S. methane emissions, these are not significant sources of methane in SoCAB and were excluded from the Vista-LA database.”
6. **Referee comment:** Line 206 and line 239 mark subsections “Data processing and validation:” and “Limitations.” It is unclear why in other parts of the manuscript these subsections are combined. Recommend: Combine these subsections or separate the equivalent subsections to maintain parallel structure with the manuscript.
 - a. **Author response:** The subsections were combined as “Data processing, validation, and limitations” to maintain consistent structure throughout the manuscript.
 - b. **MS changes:** See manuscript page 9, line 219.
7. **Referee comment:** Line 325: “...these data under IPCC Level 3-1B2)” seems to be missing text.
 - a. **Author response:** This was a typo.
 - b. **MS changes:** A period was added to the end of the sentence.
8. **Referee comment:** Line 493: “data was” → “data were”.

- a. *Author response:* The plural form “data were” was used changed in all relevant instances.
- b. *MS changes:* See manuscript.