The paper describes the development of a comprehensive inventory of anthropogenic emissions of different gases for South America called PAPILA, taking as baseline the global database CAMS-GLOB-ANT v4.1 and enriching it with local information available for Argentina, Chile and Colombia, for the period 2014-2016. Differences at local and regional scales are analyzed and discussed for various geographical areas and emission sectors/categories. The work also provides a flowchart of a general methodology so that any relevant new or updated information can be easily added to the dataset in a standardized and consistent way. In addition, the paper compares the performance of the PAPILA and CAMS-GLOB-ANT v4.1 inventories by means of Air Quality simulations performed with WRF-chem model. They evaluate model results against in situ observations for Buenos Aires (Argentina) in summer and winter 2015, where PAPILA-based simulations showed slight improvements, mainly for the winter period. The authors have done a thorough and careful job in merging different information that has not been previously reported for South America, which is presented as a starting point of an international collaboration that represents a breakthrough for this community. The annual database provided is complete for the years 2014-2016, is accessible to download, and is organized in a user-friendly format. Based on this, I believe the paper could be published in ESSD after the following issues (mostly linguistic, but also technical and regarding conclusions) are revised.	Dear Rafael, We welcome your comments and suggestions, which have helped us improve our manuscript. We trust that we have responded satisfactorily to all comments in this document.
Main Comments: Q1 Language editing needs further investment. I am aware that this is mainly because English is not the native language of the authors, but in many places the writing style complicates comprehension and compromises the quality of the document. In addition, mostly within the Methods section, it is evident that different authors have contributed individually, and the text (and equations used) would benefit of using unified style. See specific comments below.	We have improved all the language and style issues noted by the reviewer. In addition, an English speaker will unify the language of the revised version of our manuscript.
Q2 I understand that the local information from Colombia used in this study considers only a subset of species and categories in comparison with those from Argentina and Chile (Fig. 1). However, it would still be interesting to see a	The analysis of the differences between the emissions reported by local and global inventories for small domains was done in this work only for those local inventories that have implemented their own methodologies for the spatial distribution of emissions. In some cases, these methodologies involve the use of activity data already disaggregated, and in others implementing the

high-resolution comparison within an urban/industrial domain centered in Colombia into Table 2, to at least evaluate the impact of using the proposed methodology which is similar but not identical to the one applied for Chile. Including a simplified description of the similarities and differences between Eq. 2 and Eq. 3 would also be useful.	use of specific proxies, not necessarily the same as those used by global inventories. The PAPILA/CAMS comparative analysis in urban domains evaluates and compares the applied spatial distribution criteria. This is not the case in Colombia, for which the national inventory lacks an implemented spatial disaggregation methodology, and therefore only a comparison was made at the national level finding no advantages to do it for smaller domains. However, from this observation we have noticed that the reason for our decision has not been sufficiently clear in our original manuscript, and we have decided to better clarify it in the last paragraph of section 2.3, replacing the original phrase "(*iii*) urban domains from those countries with local information on the spatial disaggregation of emissions" by "(*iii*) urban domains from those countries that have implemented their own methodologies for the spatial distribution of emissions". In addition, in order to clarify the description of the Eq. 3, we replaced the phrase "using the spatial distribution of sources of the base inventory" in line 223 of the original manuscript was by "using the spatial distribution of sources of the CAMS inventory", while the Eq. 2 is based on the spatial distribution of the Chilean inventory (described in lines 193-194 of the original manuscript).
Q3 Even though the results discussion is mostly focused on comparing the different contribution from the individual sectors for each species Section3.1), I found a bit disproportioned the number of main Figures + Tables (2+1) comparing PAPILA and CAMS emissions in contrast to the Figures + Tables (also 2+1) focused on WRF-Chem air quality results. Note that the main focus of the paper is the development of the regional PAPILA inventory, and not a regional Air Quality study. Indeed, Section 3.1 compares emissions results within many different urban/industrial local domains within Argentina and Chile (Table 2), but the WRF-Chem analysis is centered only over Buenos Aires. Thus, the WRF-Chem simulation in Buenos Aires should be explicitly presented as a single case study analysis, and explicitly mention that the improvements with respect of considering CAMS emissions might not be applicable to the other selected urban/industrial areas within Argentina, Chile and Colombia (which otherwise would require a much larger description and evaluation of the WRF-Chem setup).	Thank you for this comment. As the reviewer mentioned, the intention of the simulations made with WRF-Chem in Buenos Aires was to present a single case study analysis. With this in mind, we have tried to maintain a balance in the manuscript between the main objective of the work and this evaluation exercise, using 2 of the 11 pages of the Results and Discussion section in the original manuscript. We agree with the reviewer that it is necessary to highlight in the text that a broader evaluation is still needed, evaluating the PAPILA dataset in the other regions where local data were integrated in global datasets. To address that, we will include some comments in the general modifications that will be made in the conclusions (see Q4), and the following changes in the other sections: Lines 255-258: the text "The performance of the PAPILA dataset in comparison with that of CAMS as input data to air quality models was assessed using the Weather Research and Forecasting Chemistry (WRF-Chem v4.1.2) regional model. The site chosen for this case study was Buenos Aires, a megacity strongly influenced…", was replaced by: "The performance of the PAPILA dataset in comparison with CAMS can be assessed using both inventories as input data of a regional model, implemented in the whole domain where local data has been integrated into the global dataset. This vast region, that includes the tropical Andes in Colombia, the dry Andes in Southern Chile and the Argentinean plateau towards the Atlantic coast, is characterized by a diverse topographic features and vegetation patterns. In order to capture the differences in boundary layer process and surface energy budget in the whole area, a high-resolution model is needed, setup in each area where the main PAPILA/CAMS datasets changes have been made. As a first step of this verification exercise, we present here a study focused on Buenos Aires using the Weather Research and Forecasting Chemistry regional model version 4.1.2 (WRF-Chem v4.1.2). This megacity is strongly influenced…" In addition, the title of the subsection 2.4 was modified as follows: "WRF-Chem Simulations: case study in Buenos Aires", and the title of the subsection 3.2 was replaced by "Case study: model evaluation and results".
Q4	

Section 5 (Conclusions) is a bit vague, it includes several adjectives that are not commonly used in scientific works (enormous, promising, auspicious, etc.) and focus on highlighting the cooperative effort of a South American community to develop emissions inventories and air quality research. However, the authors do not provide neither arguments supporting the main differences, strengths and/or weaknesses among PAPILA and CAMS, nor suggestions for future improvements of the PAPILA dataset. In other words, I would also expect to summarize in the conclusions the main methodological approaches used in the development of the PAPILA inventory, as well as the most important results of considering an improved inventory with local and high-resolution data. The current conclusion section seems to belong to another paper, or to the main benefits of a research proposal.	The conclusions will be modified and expanded as suggested by the reviewer.
Q5 Finally, I would like to make a personal suggestion (not mandatory but that might increase the usefulness of the PAPILA inventory as input for air quality models): Could you include aerosol information (i.e., PM10 emissions), either from local or global inventories, into the PAPILA dataset? Following the methodology described in this paper, I believe it should be possible. Indeed, you have done so to perform the WRF-Chem simulations in this study based on EDGAR and CAMS. Having said this, I understand this might not be possible at present time (due to data availability or even due to time dedicated to this project) and might be included into the 2nd version of the PAPILA dataset. In addition, a comparison between the PAPILA inventory and satellite information would also be interesting for future (or the current) work.	We agree to expand the presented inventory of reactive gases by incorporating particles, and the idea is to do so in a future version. In relation to the comparison with satellite information, the idea of this project is to improve global inventories with local data, prior to the remote sensing and surface data assimilation exercise.
Minor comments: Q6 L11: I found no need to explicitly mentioning the DOI for the PAPILA dataset on the Abstract. Also, I suggest using evaluation instead of assessment when the comparison between PAPILA and CAMS is mentioned.	We included the DOI following the instructions specified in https://www.earth-system-science-data.net/submission.html#assets.
Q7 L39: Please check if a more updated reference than 2002 is available on this topic. Country restrictions may have changed in the last 18 years.	Modified as suggested: Huneeus, N., Denier van der Gon, H., Castesana, P., Menares, C., Granier, C., Granier, L., Alonso, M., de Fatima Andrade, M., Dawidowski, L., Gallardo, L., Gomez, D., Klimont, Z., Janssens-Maenhout, G., Osses, M., Puliafito, S. E., Rojas, N., Sánchez-Ccoyllo, O., Tolvett, S., and Ynoue, R. Y.: Evaluation of anthropogenic air pollutant emission inventories

	for South America at national and city scale, Atmos. Env., 235, 117 606, https://doi.org/https://doi.org/10.1016/j.atmosenv.2020.117606, 2020a.
Q8 L102: Figure 2 is quoted in the text before Figure 1 (L130). I suggest avoiding pointing at a Figure within the introduction.	Thanks for this observation. To avoid this inconsistency, we have decided to delete the quote of the Figure 2 on line 102 of the original manuscript.
Q9 L161: I do not understand why the trends for Chile and Colombia are specified within the Argentina section.	We appreciate this observation and apologize for the mistake which has already been corrected in the manuscript.
Q10 L202: Please add a reference for this statement	We added the reference Huneeus, N.et al (2020b): Informe a las Naciones. El aire que respiramos: pasado, presente, futuro. Contaminación atmosférica por MP2,5 en el centro y sur de Chile, available in www.cr2.cl/contaminacion/.
Q11 Table1: Consider restructuring this table, I found it quite difficult to read.	The Table was restructured.
Q12 L211: Make reference to the results of section 3.1 where this topic is discussed	The reference was added.
Q13 L263: Specify the version of WRF-Chem used as well as whether you used any spin up time in the simulation.	In the original manuscript, the WRF-Chem version is specified in line 256 as “Weather Research and Forecasting Chemistry (WRF-Chem v4.1.2) regional model”. From this suggestion, we have modified the phrase as follows: “Forecasting Chemistry regional model version 4.1.2 (WRF-Chem v4.1.2)”. The spin up period was added at the end of the first paragraph of the subsection 2.4.1: "All the simulations conducted in this study were performed using a spin up time of two weeks".
Q14 L289: Since PM data is mentioned as existing, why is it not further used for the model validation?	As this first version of the PAPILA dataset does not include PM emissions, we present in the article only the pollutants included in the dataset for which there was air quality data in the two monitoring stations in the city of Buenos Aires, which are CO and NO_x. Aerosols were added to the model to use the chemical scheme that was already tested for the region during the previous simulations, mentioned in item 10, used to adapt the diurnal cycle.
Q15 L288: Is there any reference that used this iterative method or any previous study that contains a description of a similar methodology? Was the iterative method applied only to WRF-Chem simulations based on PAPILA or also when CAMS was used? In case you applied to both, did you get similar results?	Thank you for this observation. From this observation we found that indeed the term "iterative" is not adequate to describe what has been done. We will replace the sentence in lines 287-290 of the original manuscript with the following: "The diurnal cycles were adapted from those reported by Wang et al. (2010), focusing on reproducing Buenos Aires's traffic patterns observed in the two monitoring stations: Parque Centenario and Córdoba". The process of adapting the diurnal cycles is described in greater detail in another article that has not yet been published. The process aimed to adapt the Wang et al. (2010) cycles so that the maximum and minimum traffic levels match with those of

	Buenos Aires, using Puliafito et al. (2017) and EDGARv4.1 emission inventories. Similar cycles were obtained by using both inventories.
Q16 Figure 3: The description of the abbreviations is found much further back in the text (pg 4 and 6), it might be useful reinserting it in the caption of this figure together with a clarification of the sectors included in "Others" for easier interpretation of the figure.	The caption was modified by adding "ENE + IND: energy and industries; RES: residential and commercial combustion; TRO: road transportation; Others: non-road transportation, fugitive emissions, agricultural soils, agriculture livestock, navigation and waste".
Q17 L345: Please refer to the database used. If the SHIP-INTs for B. Blanca do not appear in CAMS, from which global estimate were they extracted? It is not clear.	The dataset used from the coastline of each country outwards is the CAMS. In line 345 we mean that we have not detected activity from the Bahía Blanca port to the offshore in the global inventory (the local inventory does not include emissions outside the coastline). However, from the review process we understood that we have not been precise when describing what is related to navigation, For that reason, this paragraph will be modified to better explain what was done also taking into account the modifications to be made from Q4 of the Reviewer #2.
Q18 L437: Clarify the meaning of the abbreviation "S-emitting", not mentioned above.	"S-emitting" was replaced by "sulfur emitting industries".
Q19 Figure 5: I would recommend placing a dot with the average value of each time series aside from the median that is already in the plot.	Following your suggestion, we placed a dot with the average values, and we changed the caption to explain this.
Q20 L464: Add the pollutants to which the hourly concentrations correspond to, for more clarity in the sentence.	Modified as suggested.
Q21 L572: The document mentions several times "transparency", but never really specifies what it actually entails.	Transparency is one of the indicators of inventory quality defined by the IPCC, and for this reason it is a well-known term in inventory development. In section 1.4: Inventory quality of Volume 1: General Guidance and Reporting of the IPCC 2006 guidelines, it is defined: Transparency: There is sufficient and clear documentation such that individuals or groups other than the inventory compilers can understand how the inventory was compiled and can assure themselves it meets the good practice requirements for national greenhouse gas emissions inventories. CHAPTER 1 INTRODUCTION TO THE 2006 GUIDELINES
Q22 The "regions" variable of the netcdf files is not described in the metadata nor in the general description of the readme.txt, intuitively we would say that they are time zones but it is not so, please clarify it.	It is true that the variable "regions" is not described in the dataset. We have decided to remove it from the dataset since it does not add information to it. The final product resulting from the full review process will be published as http://dx.doi.org/10.17632/btf2mz4fhf.3 instead of http://dx.doi.org/10.17632/btf2mz4fhf.2.

Language editing comments:	
Q23 L19: Change “relative to” by “in comparison to” or “in relation to”	Modified as suggested.
Q24 L42: the word wood is repeated twice.	Modified as suggested.
Q25 L79: PAPILA acronym is used in the introduction before it is defined.	In the line 79 of the original manuscript the term PAPILA is not an acronym but acts as the name of the dataset (“The dataset presented in this work, hereinafter called PAPILA…”). The acronym is clarified in the first line of the abstract and in line 88 of the original manuscript (Introduction section).
Q26 L90: What is LAC?	The acronym LAC was removed as it is not mentioned in the rest of the manuscript. Instead we have written “Latin America and the Caribbean”.
Q27 L156: The sentence is confusing, please rephrase it.	The paragraph in the original manuscript: "The GEAA inventory has been updated for this work including emissions from IND, which were not covered in the published (Puliafito et al., 2017). With these changes for manufacturing industries, the dataset considers fuel consumption by fuels, petroleum refining and emissions from the production process itself for the main industries, spatially distributed with the location of the main industries and distributing the rest as area sources in the whole territory. In all these categories the combustion of fossil and biomass fuels was considered.", was replaced by: "The GEAA inventory has been updated for this work including emissions from IND, which were not covered in the published (Puliafito et al., 2017). These emissions include (*i*) those from fuel consumption and from production process itself for the main industries, disaggregated by fuel and spatially distributed with the precise location of each facility, and (*ii*) those from fuel consumption of small industries, whose consumption is known by activity and by district, and whose spatial disaggregation of emissions was carried out using the population density of each district as a proxy”.
Q28 L170: Equation indexes and styles for the Argentine emissions are not the same as the one used for Chile and Colombia. Please unify.	In a unified way throughout the manuscript we have used indexes *i* to refer to species, *j* for categories, and *k* for cell grid when applicable. The difference in styles between the equations of Argentina with respect to those of Chile and Colombia is the following: for Argentina, we are showing the expression applied to estimate the emissions of each species *i*, whereas the equations for Chile and Colombia show the spatial disaggregation methodology of emissions that have already been estimated.
Q29 L 189: The sentence is too long, break it down into shorter, more specific segments.	The original sentence “However, given that the local methodology for SO_2 emission estimates is based on sulfur content in fuels and in mass-flow balances in copper production processes, which constitute the main SO_2 emitter activity in Chile (Gonzalez Rojas, 2021), we have considered that the information on sulfur content that is handled locally is reliable, and included

	the spatially distributed emissions as estimated in Chile in our dataset." was broken down as follows: "For the particular case of SO_2, the local methodology for the emission estimates is based on sulfur content in fuels and in mass-flow balances in copper production processes, which constitute the main SO_2 emitter activity in Chile (Gonzalez Rojas, 2021). For this reason, and assuming that the information on sulfur content that is handled locally is reliable, we have included the spatially distributed emissions as estimated in Chile in our dataset."
Q30 L204: Check punctuation marks, the sentence is too long.	A comma was added to make it easier to read.
Q31 L213: Please rephrase	The paragraph "Emissions of CO and NO_x from urban and non-urban road transportation were added under the TRO category. Given that the local inventory reports ENE and IND (including use of solvent) emissions together and that insufficient information foro spatial disaggregation was available, we to report ENE + IND under the IND sector for the case of Chile" was rephrased as "Local estimates of CO and NO_x emissions from urban and non-urban road transportation were aggregated and reported in PAPILA dataset under the TRO category. Given that both the magnitudes and the spatial distribution of emissions from ENE and IND (including use of solvent) are reported in an aggregate way in the Chilean inventory, we decided to report them under the IND category".
Q32 L220: Throughout the text, sometimes the term sectors is used and in some others you refer to categories. Please unify and, in case there is any difference among them, it should be explicitly mentioned.	We appreciate this observation and apologize for the mistake which has already been corrected in the manuscript, unifying the use of the term "categories".
Q33 L227: This sentence could be written in a more concise way.	The original paragraph "Although in this context the country estimates CO, NO_x and SO_2 emissions from solid waste, wastewater and waste incineration, SWD emissions were taken from CAMS. The reason for this decision was that although the magnitude of the emissions was available, there was no information on their spatial distribution and it was not possible to apply the methodology described above, since CAMS considers zero SWD emissions for these species in Colombia" was replaced by "Although in this context the country reports CO, NO_x and SO_2 emissions from SWD, CAMS reports them as zero. The latter precluded the spatial assignment of the locally estimated emissions, and for this reason it was decided to take the SWD category from the CAMS".
Q34 L235: This sentence could be written in a more concise way.	The original sentence "However, we only need to compare two inventories and are also interested in observing the differences in terms of magnitude, we therefore propose a comparison of normalized emissions by category and urban domain normalizing them with respect to those from the CAMS dataset, such as shown in Eq. 4" was replaced by "Since in our work we are interested in comparing only two inventories without losing sight of the differences in

	terms of magnitude, we have adapted this approach by comparing normalized emissions by category and urban domain, normalizing them with respect to those from the CAMS dataset as shown in Eq. 4”.
Q35 L237: The word "such" is redundant.	The word "such" was removed.
Q36 L257: MABA is the City of Buenos Aires? Please define.	MABA corresponds to the Metropolitan Area of Buenos Aires, and the acronym is defined in line 250 of the original manuscript. However, we note that this acronym is not very reader-friendly, and at the suggestion of another reviewer we have replaced it "Buenos Aires", clarifying that Buenos Aires will refer to the big area of the MABA in our article.
Q37 L427: The whole paragraph contains very long and repetitive sentences.	As suggested, and also in accordance with what was indicated by the reviewer # 2, we will modify the text in the revised version of our manuscript.
Q38 L460: I recommend the use of a more technical language to present the results e.g.: "errors in PAPILA results decreased in winter".	The sentence “Thus, the goodness of the PAPILA-based results exhibited for winter were not that apparent for summer” in the original manuscript was replaced by “Thus, the results for the summer simulations were not as conclusive as for the winter simulations”.
Q39 L483: Please rephrase.	The original paragraph “based on the estimates of the EDGARv4.3.2 of the year 2012. This is different from what has been done in this work, since for the three countries 2014 was taken as the base year, and while the same methodology than that used by CAMS was applied to extrapolate to 2015 and 2016 for Chile and some categories for Argentina, locally estimated trends were applied for Colombia” was modified as follows: “In contrast, in our work there were three different situations: (*1*) for Colombia, locally estimated trends were applied based on 2014 local emission estimates, (*2*) for some categories in Argentina we have applied annual estimates for the entire period, and (*3*) for the rest of the categories in Argentina and for the Chilean inventory the same methodology than that used by CAMS was applied, but based on local estimates for 2014”.
Q40 L496: change “often resorted to” by “often used”	Modified as suggested.
Q41 559: The sentence is complex, please rephrase	In the revised version of our manuscript we will restructure the conclusions as suggested in Q4, and we will consider this observation.
Q42 Figure A2: change sites by “monitoring sites”	Modified as suggested.