

Authors' Responses to Editor's comments

We appreciate the editor's minor and technical comments, as we understand that addressing these will elevate the quality and impact of our manuscript and its consistency with the journals' articles. Similar to the answer to reviewers' comments, here, our response is presented in blue color, and any highlighted change to the manuscript is in red.

Minor comments:

1. Title: Please Adjust it following the ACP guidelines ("Titles should be concise and consistent with the content and purpose of the article. For research articles, ACP prefers titles that highlight the scientific results/findings or implications of the study.")

After the discussion, we selected the following title, which we believe suits the ACP guideline and the manuscript description.

"Long-range transport of air pollutants increases hazardous components of PM_{2.5} in northern South America"

2. The grammar needs to be significantly improved. It seems that different people wrote different parts of the manuscript as the readability of the entire document is not homogenous. Please make sure to improve the readability of the entire document, ideally by a native English person. Below you can find some examples of sentences or paragraphs that need to be improved; however, the list is much longer.

The manuscript was edited to improve readability, as suggested. We also followed apart the technical comment in the second part of this answer.

3. Line 44: "Three primary kinds of LRT of aerosols have been identified in the region". How about marine aerosol?

In this part, we referred to the LRT of aerosols impacting air quality in the Colombian Andes. In this sense, we rewrote the sentence and specify for clarity:

"Particularly in the Colombian Andes, biomass burning, desert dust, and volcanic emissions have been identified as three main sources of aerosols that can impact air quality from distant regions."

4. Figure 2. I suggest using more contrasting colors.

We changed the lines' colors to contrast as suggested and thickened the lines to improve visibility.

5. Follow the ACP guidelines to call Tables and Figures in the main text.

Following the guidelines, we changed "Fig." on L319, L388, L473 and L321 for "Figure" as the figures calls began a sentence. On the contrary, we changed "Figure" to "Fig." on

L330 and L371 because they were in-text calls. In addition, Fig. 8 captions L436 and L330, “Figure S,” were changed to “Fig. S” as in-text calls.

The abbreviation “Tab.” was changed to “Table” on L312 and L323.

6. Figure 8. Maybe "fraction" is more appropriate than "proportion"? It would be nice to be consistent using the brackets in all figures containing multiple panels.

We decided to use “% of compound” to match the legend and not to give space for misunderstanding. Moreover, we used brackets for figures with multiple panels in both the main manuscript and the supplementary material.

Technical comments:

We express our gratitude to the editor for their valuable technical comments, which we have carefully considered. We agreed with the suggested changes or rephrased unclear sentences. The accepted changes are checked (crossed) in the following list.

- L1 and along the text: Replace “of pollutants” by “of air pollutants”
- L7 and along the text: Replace “found that LRT of aerosols” by “found that the LRT of aerosols”
- L9: What do the authors mean with “secondary aerosols trace”?
correction: “secondary aerosol tracers”
- L16: “the Caribbean for dust”. Is this correct? I think the original source are the deserts in northern Africa and not the Caribbean
correction: “Our study identifies the Orinoco and Middle Magdalena Valley as sizeable sources of BB aerosols and the Nevado del Ruíz volcano for volcanic aerosols. Additionally, we found that African dust approached the Andean region via the Caribbean route.”
- L27: Replace “Above all” by “Out of the different air pollutants”
- L30: Replace “Indeed, LRT of PM_{2.5} enlarges overall” by “Indeed, the LRT of PM_{2.5} enlarges the overall”
- L33: Replace “with biomass burning” by “with biomass burning (BB)”
- L38: “PM” needs to be defined.
- L47: Replace “means there is limited” by “limits the”
- L53: Replace “mainly produced from Sahara” with “mainly emitted in the Sahara”
- L54: Replace “These primarily” by “These particles primarily”
- L55: Replaces “land with the Cayenne” by “land e.g., Cayenne”
- L60: Replace “Volcanic activities (eruption and degassing)” by “Volcanic eruption and degassing”
- L83: The following sentence is unclear: “chemical composition through year-frequent high aerosol load events”
The sentence was rewritten for clarity: “This study aims to analyze the impact of inter-annual LRT of biomass burning (BB-LRT), dust (Dust-LRT), and volcanic aerosols (Volcanic-LRT) on PM_{2.5} concentrations and chemical composition in the Aburrá Valley”
- L85: “favorable conditions for transport”. Transport of what?

The sentence was rewritten for clarity: “We characterize meteorologically favorable conditions for the LRT events and involve information from one of the largest registered PM_{2.5} chemical characterization campaigns conducted in the region.”

- L86: Replace “conducted in the territory” by “conducted in the region”
- L103-104: Replace “In the transition period, February and March are characterized” by “The transition period, i.e., February and March, is characterized”
- L107: Add a reference after “PM10”

As suggested, a reference was added: “These conditions modulate the intra-annual variability of PM_{2.5} and PM10 (Mendez-Espinosa et al., 2019)”

- L112: Replace “chemicals on PM_{2.5}” by “the aerosol composition on PM_{2.5}”
- L120-121: Replace “aerosol concentration level and composition in this study by “aerosol mass concentration and composition”
- L122: “GYGHAM” needs to be defined
- L135: Replace “mass spectrometry” by “mass spectrometer”
- L135: “mal/optical transmission (TOT)” is a technique not a sensor

Correction: “Distinct analytical methodologies were applied to determine the concentration of minerals, carbonaceous matter, and ions in the filters. An Inductively Coupled Plasma Mass Spectrometry (ICP-MS) methodology was used for minerals, a thermo optical transmission (TOT) methodology for carbonaceous matter, and an ionic chromatography (IC) for both anion and cations.”

- L183: BB was defined in L33
- L194: “a back trajectories dataset was built from the chemical sampling point”. What does it mean?

The sentence was rewritten for clarity: “a back trajectories dataset was built to estimate pollutants arriving at the chemical sampling point in the AV”

- L204-203: The following sentence is unclear “Furthermore, its products relatively reasonably reproduce PM_{2.5}”

The sentence was rewritten for clarity: “Furthermore, the CAMS’ products reasonably capture PM_{2.5} tendencies and extreme events in the territory (Casallas et al., 2022)”

- L207 and along the text: “long range transport” should be “LRT”
- L218: define “PMF” here.
- L219: Is it not a good idea to write a sentence with “Observe that”
- L226: The following is unclear “during pollution LRT events to identify conditions that”

The sentence was rewritten for clarity: “A regional analysis of meteorological fields was performed during the LRT events to identify atmospheric conditions that favor aerosol transport from the sources of interest.”

- L243: PMF was defined in L218.
- L248: The following is unclear “different LRT classed events”

The sentence was rewritten for clarity: “... during each LRT event”

- L303: The following is unclear “final element comparison”

The sentence was rewritten for clarity: “A final comparison of the characterized compounds was conducted, focusing on the days with a positive contribution occurred for the LRT events”

- L310: Replace “Identification of events” by “Identification of LRT events”
- L312 and along the text: Replace “each kind” by “each type”

- L313: I am not sure that “intensest events” is grammatically correct
- L325: What do the authors mean with “identification threshold”
correction: “identification” was removed
- L335 and along the text: Replace “pollution LRT events” by “air pollution LRT events”
- L352: Replace “proportions of this event” by “proportions of this type of event”
- L390: Replace “Besides” by “Moreover” or something similar
- L436: Replace “Of the” by “Out of the”
- L441-442: What do the authors mean with “head contribution”?
“head contribution” was remove and the sentence was rewrote: “Regarding anions, the high contribution to F⁻ (42.1%) supports the identification of BB-LRT since this is a trace with a long lifetime (Jayarathne et al., 2014)”
- L462: Replace “As expected Satsumabayashi et al. (2004)” by “As introduced by Satsumabayashi et al. (2004),”
- L462-463: The following is unclear “The contribution but not the concentration of SO₂⁻ was surpassed by F⁻ and NO₃⁻.”
The sentence was rewritten for clarity: “As expected, the volcanoes profile in Fig. 8 c, shows a high contribution of SO₄²⁻ (36.9%). However, the days affected by this LRT event did not exhibit significantly higher concentrations than the surrounding days”
- L491-492: What do the authors mean with “suggested for the annual average of the compound”?
The sentence was rewritten for clarity: “. Only the maximum daily concentration for Ni (25.05ngm⁻³) exceeded the air quality standards suggested by the European Commission (2019) for the annual average concentration (20 ngm⁻³).”
- L493: Replace “The (European Commision, 2019)” by “The European Commission, (2019)”
- L494: The following is unclear “for the Cd average.”
The sentence was rewritten for clarity: “The European Commission (2019) set an air quality standard of 5 ngm⁻³ for the Cd annual average concentration.”
- L537: Replace “scavenging of particles in their transport” by “scavenging of particles during their transport”