

Review for the manuscript: New Particle Formation dynamics in the central Andes: Contrasting urban and mountain-top environments by Diego Aliaga et al.

In this study measurements obtained during March 19 – May 31, 2018 (65 days), that correspond to the transition period from the wet to the dry season, are investigated for two sites in the Southern hemisphere (Bolivian Central Andes) including a mountain-top station (CHC) and an urban background site (EAC). The main objective of this work was to expand the current understanding of new particle formation (NPF) in the central Andes by simultaneously comparison of NPF events at the two interconnected sites (with different altitudes) and by additionally application of a recently developed “nanoparticle ranking analysis” (Aliaga et al., 2023) to evaluate the probability and intensity of NPF occurrence simultaneously at both sites, resulting in a joint distribution.

The manuscript is interesting, well written/ illustrated, describes careful experimental work and is worthy of being published in AR.

I have mostly the following minor revisions to suggest:

Minor comments:

In the abstract the four group categories are mentioned regarding the daily maximum concentration of 4-7 nm particles as high at both sites, lower at one etc. In the main text (lines 462-467) other parameters are also considered for naming the groups and this also should be stated. I would suggest adding those names (intense, cloudy etc.) in the abstract (lines 44-45) as well in parenthesis, as it is not very clear to the reader which is which.

For example: (A) high at both sites (intense NPF case), (B) medium at both (polluted), (C) high at EAC but low at CHC (volcanic), (D) and low at both (cloudy).

Also, in the abstract the D) cloudy related group is not mentioned at all. Maybe a line would be nice to be included.

Additionally, I would suggest for lines 461-468 to present the 4 cases as the classification, meaning, 1. intense, 2. polluted, 3. volcanic and 4. cloudy.

Lines 72, 321, 733 etc. A punctuation mark is missing.

Line 334. The parenthesis in reference is not necessary.

Line 547. The long — symbol should be changed to –.

Line 560. J_4 should be J_4

Line 721. “EAC (concentrations” should be “EAC (concentrations”

Line 725. The J_4 values should be 2.2 and 9.2 $\text{cm}^{-3} \text{s}^{-1}$ for CHC and EAC, respectively.

Lines 881-882. Please rephrase. Not very clear to the reader.

Line 917. Add “days” after “Polluted”

In the introduction authors state:

“For example, we need to better understand the chemical composition of the precursor gases involved in nucleation and growth, as well as the composition of the aerosols formed during these events.” But this is not addressed in the current work.

References.

Aliaga, D., Tuovinen, S., Zhang, T., Lampilahti, J., Li, X., Ahonen, L., Kokkonen, T., Nieminen, T., Hakala, S., Paasonen, P., Bianchi, F., Worsnop, D., Kerminen, V.-M., and Kulmala, M.: Nanoparticle ranking analysis: determining new particle formation (NPF) event occurrence and intensity based on the concentration spectrum of formed particles, *Aerosol Res.*, 1, 81-92, <https://doi.org/10.5194/ar-1-81-2023>, 2023.