

Comment on acp-2022-554

Anonymous Referee #2

Referee comment on "New particle formation and growth during summer in an urban environment: a dual chamber study" by Spiro D. Jorga et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-554-RC2>, 2022

This paper uses a dual chamber set up to investigate new particle formation in Greece. The dual chamber provides a unique way to study perturbations in order ensure results are actually the product of the perturbation. By introducing ammonia in only one of the chambers, the authors are able to conclude that ammonia is one component limiting new particle formation in this area. I think the writing is clear, the conclusions made are reasonable, and the limitations of the study are discussed appropriately. I think it fits well within the scope of ACP and would recommend it for publication subject to a few comments/revisions.

- This work could be improved by more clarity on what is novel here. Ammonia being a key component of new particle formation has been reported before so is the novel aspect of this paper the dual chamber experiments? The location being studied? The findings appear to be the same as that in Pikridas et al (2012). A follow-up study now 10 years later may be warranted, but I think whatever the motivation is, it needs to be made clearer.
- How confident are you in the ammonia mixing ratios stated? Do you account for ammonia's significant wall losses? Do you expect desorption from the walls to impact later experiments?
- I appreciate the authors' attempt to not draw any sweeping conclusions, but I think some broader context could be given. Since you are using a box model, what minimum ammonia concentration is necessary to evoke NPF under the conditions investigated here? How does that compare to ammonia concentrations in the study and any actually measured in the area? This does not need to become a modeling paper, simply a brief discussion of this may help ground this work more in atmospherically relevant conditions.
- Figure 1: Is the delay in the appearance of particles from when ammonia was introduced and the lights were turned on just due to not being able to measure the smallest particles? This seems to align with the average GR given.

- Lines 222-224: Does this refer to both particle wall losses and gas wall losses?
- Line 239: Is this "initial growth rate" from the time you first see the particles at 9 nm or extrapolated back to ~ 1 nm?
- Line 278-280: The sentence beginning with "Unfortunately, we did not..." is confusing.
- Lines 308-310: The sentence starting with "Taking into account..." is also confusing.
- Line 320: How good is this assumption? Is the condensation sink changing much during these experiments?
- Line 48: This sentence seems out of place here.
- Line 179: I think this is the only spelling of "sulphuric" like this.
- Line 221: I don't think this is a full sentence.
- Figure S1: Caption I think has "t=oh" instead of "t=0h"
- Figure S3: There is a typo in the caption.