

## ***Interactive comment on “Evolution of gaseous precursors and meteorological parameters during new particle formation events in the Central European boundary layer” by J. Größ et al.***

**Anonymous Referee #1**

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Review of “Evolution of gaseous precursors and meteorological parameters during new particle formation events in the Central European boundary layer”

This paper addresses factors controlling new-particle formation events at Melpitz, Germany using long-term observations. The authors develop an automated method to classify the strength of NPF (unfortunately with no explicit influence of growth in the classification), and use a large pool of classified days to look at the timeseries of factors that may influence NPF.

The work is well-suited for ACP and the results are generally interesting. The writing is

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often sloppy (e.g. comma usage) and could use additionally proofreading. I have specific scientific and writing comments below that should be addressed before publication in ACP.

P2309 L12: I'm not sure how large-scale atmospheric models currently parameterize growth.

P2309 L17: Percentages are fractions, not frequencies.

P2311 L6 vs. L2312 L23: is the lower limit of the APS 0.5 or 0.8 microns?

P2314 L20: Shouldn't the units for A be  $\text{m}^2 \text{W}^{-1} \text{cm}^3$  in order to get the concentration of OH correct?

P2316 L18-19: \*By definition\*  $\text{H}_2\text{SO}_4$  production depends equally on [OH] and [SO<sub>2</sub>] ( $k[\text{OH}][\text{SO}_2]$  for the rate-limiting step), it's just that here [OH] varies more. Please be more accurate in this description.

P2317 L14: “maxima” should be “maximum” here (not plural).

P2319 L9: I'm guessing that  $g(\tau)$  should be  $g(t)$  since you're defining “g” in a general sense (as a function of time).

L12: The event in 2a doesn't grow to sizes close to 100 nm.

L23-24: How does the event in 2d do in the filter? It extends for a long time but does not grow. It seems like these events could have strong responses from the filter too, but aren't necessarily the events you want to find.

P2324 L15-17: You bring up the turbulence and flux here but you haven't introduced Figure 5 yet.

Figures 4 and 5. What are the sigma values on the plot. They are never defined or discussed, I don't believe.

P2324 L22-24 and P2325 L6-8: Why can't the high CS overnight be due to primary

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emissions into a shallow nighttime BL that?

P2326 L9: How can something be proportional to a class?

P2326 L22-23: Did you check that the small particles ( $D_p < 20$  nm) actually don't contribute significantly to the CS? Sometimes they can if the nucleation event is strong and the background is clean.

P2326 L26 and other places: What do you mean by "mean levels"? Mean for the day for each class individually? Mean across all three classes?

Section 5.3: I'm very confused by this section. Where are the results of these tests? Are these the sigma values in the figures? What do they mean? Why no discussion?

Section 5.4: I have concerns with using only the 2-3nm bin for determining J2. (1) If particles are formed above and brought down through mixing, couldn't the particles be larger than 2-3nm before reaching the surface. Events being first observed at sizes larger than 3 nm are not uncommon at some sites. (2) Are the counting statistics good enough for a single bin (esp. the smallest one)?

Section 5.4 second paragraph: What to take from this? What might a correlation of N with  $[H_2SO_4]$  but not N with J2 mean?

P2330 L6: Similar to a comment as before... CS is \*by definition\* important for  $[H_2SO_4]$ ; however, it's the lack of CS variability (relative to  $[SO_2]$  and  $[OH]$ ) that you observe.

P2330 L18: What do you mean by "larger-scale particles"? Larger-diameter particles or particles observed on a regional scale?

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 2305, 2015.