

In this manuscript, the authors use 10-year particle number size distribution measurements from the ATTO during the wet season to demonstrate “quiet NPF”, which does not show a typical banana signature. While the quiet NPF is relatively weak in intensity, it occurs more frequently than the downward transport of aerosol particles during rainfall events. The authors show that the frequent quiet NPF accounts for nearly half of 10–25 nm particle production during the wet season, and it potentially represents an important source of nanoparticles that helps sustaining aerosol number concentration in the Amazon. The research topic is very important and fits the scope of Atmospheric Chemistry and Physics well. Overall, the manuscript is well written. I recommend publication of the manuscript after the authors address the following comments.

Major comments:

Aerosols observed at the ATTO and ZF2 sites can be influenced by anthropogenic emissions occasionally. Such influence, while infrequent, could have non-negligible impact on the analysis of the quiet NPF, because the intensity of the quiet NPF is weak. Have the SMPS data been screened for potential influences from anthropogenic emissions prior to the analysis?

Besides nucleation, growth, and coagulation, dynamics of aerosol size distribution can be influenced by other processes, such as primary emission and deposition. In addition, diurnal variation of boundary layer height and resulting vertical mixing may also play a role. Could the observed temporal variations of aerosol size distribution be partially due to other processes besides nucleation, condensational growth, and coagulation? Please see the comment below for a possible test.

The authors derived GR from the median PNSD during non-event days using the appearance time method within the diameter range of 10 - 25 nm. Does the median PNSD show similar pattern as the normalized distribution in Fig. 1b, at least for the size range of 10-25 nm? I understand the concentration is likely very low, but perhaps the pattern could be revealed by using a logarithmic color scale.

In Eq. (1), the last (i.e., third) term on the right-hand side is essentially J_{25} (formation rate of 25 nm particles). J_{25} is the product of the GR and the size distribution (i.e., dN/dD_p) at 25 nm. In Eq (1), the concentration at 25 nm (i.e., dN/dD_p at 25 nm) is approximated using the average particle concentration between 10 and 25 nm. Such approximation could lead to substantial biases, especially when there are large variations in aerosol size distribution between 10 and 25 nm. I would suggest that the authors calculate the last term on the right-hand side using dN/dD_p at 25 nm. In addition, J_{10} is also given by the product of GR and dN/dD_p at 10 nm. If the variation of aerosol size distribution is dominated by growth and coagulation, J_{10} calculated using the two approaches are expected to agree. Therefore, a comparison of J_{10} derived using the two methods can help corroborate that other processes, such as mixing due to change of boundary layer height, emissions, etc., play a negligible role in the observed temporal variations of aerosol size distribution.

The particles transported by downdrafts are typically greater than ~ 20 nm. Therefore, J_{10} during the events may not accurately reflect the contribution of downward transport. For example, if all particles transported into boundary layer by downdrafts are larger than 25 nm, J_{10} calculated using Eq. (1) is essentially zero. From the perspective of comparing the contributions to CCN, it may be better to compare J_{25} or even J_{50} .

Line 174-175: The particle concentration at 10 nm peaks around 18:00, suggesting the highest J_{10} in the late afternoon with the assumption that the diurnal variation of GR is negligible. However, J_{10} calculated from Eq. (1) is the highest during night (Line 168-169). I am wondering whether such discrepancy suggests processes other than condensational growth and coagulation may also influence the observed temporal variations of aerosol size distribution. Please see the comment above.

Minor comments:

Line 41: The vertical transport of sub-50nm particles by downdraft during rainfall events was first proposed by Wang et al., (2016).

Figure B1: For the y-axis label, “p” should be subscript. In addition, variables are commonly written in italic.