

Interactive comment on “Effect of local and remote sources and new particle formation events on the activation properties of cloud condensation nuclei in the Brazilian megacity of São Paulo” by Carlos Eduardo Souto-Oliveira et al.

Anonymous Referee #2

Received and published: 6 July 2016

This manuscript contains a potentially interesting data set. The methods used in the paper appear scientifically sound, but the analysis presented in the text has serious deficiencies. Therefore, major revisions, as outlined below, are needed before I can recommend accepting this paper for publication.

Section 2.

I think that the methodology section is relatively well described. The only thing I am a bit skeptical is the discussion about the correction needed for DMPS measurements (lines 22-28 on page 4). Applying a correction factor appears justified due to poten-

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tial undercounting of particles. However, the fact that the system does not measure particles larger than 450 nm in diameter is expected to have a negligible effect on this phenomenon (because the fraction of particle number at those size is very small). The authors might consider modifying the text a bit.

Section 3.1.

The comparison of PNC and CCN concentrations to other studies should be made scientifically, not just reporting whether the concentrations observed in other studies had been higher or lower. I recommend that the numerical values of these concentrations, along with those obtained in other studies, will be collected in a Table. There no sense of giving all these numbers in text, rather the text should concentrated on analyzing the differences between this and other studies, and the meaning of these differences.

I understand that the authors compare their PNC data to the earlier Sao Paulo data, but I do not understand the comparison to the Vienna data. Why Vienna and no other urban sites? Also, a reference to Vienna data is missing. I would like to see more urban sites in this PNC comparison.

The comparison needs some logic. There are apparently urban regions of different pollution levels. Is there any systematic pattern between the level of pollution and PNC or CCN concentration? There is enough information in the literature, the authors simply need to have a look at that.

Section 3.2.

This section has several serious problems that need to be fixed.

NO₃ radiacals are active during night time only, so it has very little to do with photochemistry.

The discussion about SOA formation and its connection with NPF is both outdated and partly erroneous, so should be entirely rewritten in light of more recent literature. SOA formation refers to the secondary production of organic particulate matter, while only

a small fraction of SOA participates in NPF in any way (the least volatile of the gas-phase products). Furthermore, SOA formation itself is not dependent on NPF, since the aerosol volume of surface area needed for SOA formation is almost always dominated by particle larger than those in the nucleation mode. As a result, I see no justification for statements like that in lines 13-14 on page 8, or that in lines 18-19 on page 9.

This discussion about atmospherically-relevant nucleation mechanisms (lines 24-28 on page 8) is seriously outdated.

If mentioning banana and apple –type NPF events, they should be defined somewhere.

Section 3.3

The purpose of this section remains unclear after reading it. The authors discuss connections between a number of tracers and source types, but I have a hard time to catch where all this information is used for in the rest of this paper. I recommend shortening the discussion and summarizing the main findings relevant to the rest of this work in the last paragraph.

The sentence in lines 32-34 on page 10 does not make any sense.

Section 3.4

The third paragraph (lines 18-22 on page 13) discusses AR values related many different environments, yet only two studies have been cited. The sources of all the information referred to here should be explicitly given.

The sentences in lines 23-24 on page 13 are very unclear. . . .increase of AR over SS? What has a diurnal period to do with a slope?

A statement like the one given in lines 3-4 on page 14 need a reference.

Lines 9-18 on page 14: The authors refer to studies mentioned in the introduction without specifying them. This is not a good scientific practice of citing other studies.

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The sentence in lines 21-23 starts and ends with a different reference. It remains unclear which information refers to which of these two references.

The sentence in lines 33-34 on page 14 does not make any sense. Furthermore, a citation is missing.

The paragraph in lines 13-22 on page 15 is difficult to follow. The last statement needs a reference. Please rewrite this paragraph.

Finally, the text suffers from rather poor language. Without pointing out individual places in text, there are major problems with many individual sentences, and especially with the use of articles and prepositions (sometimes also with the tense.) After revising the scientific contents of the paper, the authors need to make a very thorough language check out of the text

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-241, 2016.

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