

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 #1

Received and published: 11 June 2016

The article deals with the effect of local, remote sources and NPF event on the CCN properties on the basis of observation in a megacity site. Size-resolved aerosol physical and chemical properties were measured, with the assistance of LIDAR and HYSPLIT, to infer the possible aerosol sources during the campaign. CCN activated ratio and activation diameter were then connected to the effects of those sources. The data could potentially contribute to our understanding of NPF and CCN in the polluted urban atmosphere. I recommend to consider the publication of this manuscript after the following concerns/comments have been addressed:

C1

1. A major conclusion of the work is "local traffic emissions showed higher influence on activation parameters than remote sources". However, from Fig 8 to 11, I can not see any data/information related to traffic source. From Fig 11, I will even conclude that remote sources (seasalt/biomass burning) had more significant influence on AR and Dact. These lead to a more serious problem of this work: the influencing sources of CCN were not clearly classified and many terms were used arbitrarily: diurnal, nocturnal, sea salt, biomass burning, NPF, non-NPF and traffic, the scopes of which overlap with each other. For example, in fig 11 and 10, why are diurnal/nocturnal and seasalt/biomburn put in the same figure? I think "diurnal" aerosols also received contributions from seasalt and biomass burning. Does "diurnal" here include both NPF and non-NPF? In Fig 11a, Fig 8b: "average" of what?

I strongly suggest the authors to state clearly which period (day or night) was dominated by which source. This could be possibly added in Table 1, since there are only 14 observation days. Then CCN properties should be calculated again according to the classification of influencing sources.

2. The current source apportionment is not persuasive and could be a weakness of this work. Three sources were identified: biomass burning, seasalt, and vehicle emission. Industrial source was mentioned a few times in the manuscript, but was omitted in the data analysis. Then the "diurnal" is equivalent, by the authors, to local vehicular emission. It is not shown in the text what elements were analyzed with X-ray Fluorescence. Will these elements together with BC allow a more precise source apportionment?

3. Some judgments made in the abstract are not well supported and probably biased. "weak effects of sea-salt and biomass burning aerosols could be observed on activation parameters as sea-salt showed a positive feedback" "vehicular traffic presented most negative effect on CCN activation." "NPF events showed a negative feedback to CCN activation

First, it was not defined in the text what is negative feedback or positive feedback?

C2

compared with what? second, from the Figures I would say sea salt has significant feedback on CCN parameters , but why is the effect claimed to be "weak"? third, it is generally accepted that NPF will eventually has positive contribution to CCN number. it is thus misleading to say NPF showed negative feedback to CCN activation.

4. Activation Ratio is discussed in this work and shown to have a negative "feedback". But what about CCN number increase/enhancement due to a NPF event? how is it when compared to non-NPF or local/remote episodes?

Other specific comments include: 1. There are many very short paragraphs in the text (like in Section 3.1 and 3.3). They should be reorganized.

2. Some terminology may not be used correctly: "Diurnal" or "daytime"? Page 2 line 26: hygroscopic compounds Page 4 line 18: alcohol vapour Page 10 line 2: "frequency of hourly PNCs in three modes", "frequency" or "percentage"?

3. Page 4 line 25-29: is the correction factor 1.3 or 1.15?

4. Some literature citations should be moved to Introduction section, like page 8 line 24-28.

5. Page 15 line 20: "It can be observed that nocturnal samples are most related with water soluble species as $(\text{NH}_4)_2\text{SO}_4$, SOA, NO_3^- and marine air than the diurnal aerosol."—— This is obviously not your observation.

6. There are many other typo- or grammar mistakes in the manuscript.

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

C3