

***Interactive comment on* “Low molecular weight organic acids in aerosol particles from Rondônia, Brazil, during the biomass-burning, transition and wet periods” by A. H. Falkovich et al.**

Anonymous Referee #2

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General Comments:

This study gives detailed information about the size resolved distribution of ions in Rondonian aerosols during biomass-burning, transition and wet periods. Such data is very welcome for a better understanding of the sources and hygroscopicity of these aerosols and their role as CCN. In this respect, it would be interesting to know whether there is also a study under way that gives more detailed information about the composition of the neutral fraction of these aerosols.

There are some parts in the discussion section that should be improved, most impor-

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tantly the discussion of the semivolatility of dicarboxylic acids.

Specific comments:

1) The paper gives very detailed data for the ions. However, the overall composition of the aerosol is not further specified. It would be interesting to have some information about the size resolved water-soluble and water-insoluble organic carbon concentrations (e.g. in Tables 3 and/or 4).

2) Section 4.1: Cluster analysis: Semivolatile and non-volatile species are included in the cluster analysis. A correlation between non-volatile species seems to have quite different implications than a correlation of semivolatile species with other semivolatile or non-volatile ones. A more explicit discussion of the observed correlations with respect to the volatility of the correlating species would therefore be useful.

3) Section 4.3, abstract and conclusion: semivolatility of dicarboxylic acids: The authors seem to imply that the only evidence of dicarboxylic acids in the gas phase comes from front/back filter ratios. However, there are several works that directly sampled the gas phase and found considerable dicarboxylic acid concentrations in this fraction (Baboukas et al., 2000; Kavouras and Stephanou, 2002, Sellegri et al., 2003). To conclude whether the dicarboxylic acids are confined to the particulate phase, these species should be sampled in the gas and in the particulate phase in a way that excludes revolatilization. The sentences stating that the dicarboxylic acids are confined to the particulate phase should therefore be removed or modified. One important factor that influences the gas / particle partitioning of acids is the acidity of the aerosol particles. In neutral or even alkaline particles, the effective Henry's law constant is higher than in acidic ones. While the Rondonian aerosol particles are neutral or even alkaline, rural background sites aerosol particles are usually acidic. Since Limbeck et al. (2001) sampled at a rural background site, this might explain the different findings of the two studies.

4) Page 6881, lines 12 - 18: Does the discrepancy between Figures 6 and 7 not just

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reflect a larger ratio of ions / PM in the 0.56 - 1.0 micron size bin compared with the 0.33 - 0.56 micron size bin?

Technical comments:

Page 6870, line 24: it is not clear from the context what is meant by simple aliphatic acids: mono- and dicarboxylic or only dicarboxylic acids?

Page 6872, line 10: should it be Kirkman et al. (2002)?

Figure 1: the oxalate and nitrate concentrations are hardly visible in this Figure.

Figure 6: In some plots, the concentrations of only some ions are visible (e.g. in Figure 6a, the concentration of K^+ is only visible in two size fractions, the one of NH_4^+ only in three). This should be improved.

Figure 8: should it be FPM instead of PM (below K^+)?

Small typographic errors:

Dataset is sometimes written as dataset and sometimes as data set. A uniform spelling should be chosen.

Page 6876, line 3: MDRO40 instead of MRDO40

Table 5: Acetate instead of acetiate

Page 6880, line 26: processes instead of process?

References:

Kavouras, I. G. and Stephanou, E. G.: Gas/particle partitioning and size distribution of primary and secondary carbonaceous aerosols in public buildings, Indoor air, 12, 17 - 32, 2002.

Baboukas, E. D., Kanakidou, M., and Mihalopoulos, N.: Carboxylic acids in gas and particulate phase above the Atlantic ocean, 105, 14459 - 14471, 2000.

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