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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Contribution of gaseous and particulate species to droplet solute composition" *by* K. Sellegri et al.

K. Sellegri et al.

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General Comments:

Following comments from reviewer 2, several modifications were made in the manuscript. The experimental methodology is now more clearly described, and Figure 1 has been changed. Unnecessary comments were withdrawn from the text as proposed by the reviewer. The sampling site has been stated in the title and the abstract. The Discussions section is now integrated to the Results section avoiding redundancies. Figure 2, providing similar information as Table 6, was cancelled

Specific Comments

Page 484, description of the experimental set-up has been improved and contradictions corrected. The description of the WAI has been dropped, since the results are not used in this paper. Figure 1 was made more explicit.

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Table 1: One CVI/cascade impactor sample corresponds to an event. During one event, MC and CDI samples have not been regularly sampled on the whole period, resulting in variable number of samples depending on the event. All calculations have been made by averaging the results from the different devices over one impactor sample (one cloud event).

Page 488: Overall, uncertainties lead to an underestimation of the interstitial gas phase. The uncertainties associated with the use of the LWC for CDI results are solved with the relative-to-Na calculations.

Page 489, line 3, 80% by mole is exact (typing error)

Page 489, line 23, According to Table 1 the LWC does not change so much. This sentence has been corrected.

Page 491, line 20 to 27, the puy de Dôme area is surrounded by forests and farming activities. But on a scale of hundreds of kilometres. The high NH3 is not a local artefact but a characteristic of the lower free troposphere. The number of particles and the mass of particles remain close to values found at tropospheric sites (see for example Putaud et al., 2003, report to the EC). We therefore consider PDD as a tropospheric site especially during winter time.

Page 493, line 1 to 5, and Page 493, line 11: Condensed phase has been replaced by liquid phase in the equation and in the text. The partitioning of NH3/NH4 (not the ratio NH3/NH4) has been clarified in the text. It does fit to Table 8. 62% of the species is present as gaseous NH3, while Voisin et al found 90 % being present in the liquid phase.

Table 8: Voisin et al. (2000) and Kasper and Puxbaum (1998) also give Rx values.

Page 494, lines 18 to 28 These lines have been omitted.

Page 495, line 26, The results from CVI do not correspond to scavenged aerosols but to the droplet residues. You are right that we can not evaluate the processing of aerosols

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through cloud cycling with this instrumental set up. However, a minor change in the aerosol composition has been assumed compared to its initial chemical composition in order to be able to derive the contributions of gas and particulate phases to the droplet composition. As it can be confusing though, I followed your suggestions.

Page 496, lines 8 to11: The statement about averaging and comparison of different samples is now discussed in the experimental section.

Page 497, lines 23 to 29: Although surprising from a logical point of view, the degassing of ammonia from an acidic sample is explained by thermodynamics (see comments from referee 1).

Figure 3: The gas-originating Liq and part-originating Liq have not been calculated from Table 9 but directly from the compositions of each phase (4 phases) of the cloud reservoir. However, I find Table 9 in agreement with this figure.

All technical comments have been taken into account.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 479, 2003.