

Interactive comment on “Cloud chemistry at the Puy de Dôme: variability and relationships with environmental factors” by A. Marinoni et al.

A. Marinoni et al.

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General Comments:

1- the referee makes a good point here and we have modified the paper accordingly : first by adding median values to Table 3, second by referring to median instead of averages in the discussion p. 857-860, and finally by adding a table showing average values for each of the three categories (Table 5).

2- We now avoid the use of climatology throughout the paper.

Specific Comments:

1. 853; despite its relatively low elevation, long-term record of gases, aerosol and meteorological parameters indicate that in winter the site of PDD is mainly located in the free troposphere (see Sellegri et al, 2003a). We clarify the statement that clouds

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are sampled in the free troposphere by adding information on the particle number concentration, that is a good indicator of the limited influence of BL air. Table 1 is now completed to include information on both air mass origin (based on back-trajectory analyses), sampling conditions for cloud and aerosol sampling time,

2. Table 1 and 2 are now combined and completed to include all the requested informations.

3. 854 line 17; an operator is present at the station and decides whether sampling condition are adequate or not. In any case, the cloud collectors are rather inefficient to sample snow, rain, or even drizzle. This was not changed in the text.

4. 854 line 24; this is now stated in the text at page 6 (2nd paragraph).

5. 855 line 2; right: the dimensional characteristics of all cloud collectors are that described at page 6 (2nd paragraph).

6. 855 line 13-14; right: this is changed in the text. Table 1 now provides these additional informations.

7. 857 Table 3; we add a column with the median value and we use median instead of average in the text, and we include all samples in the statistical analysis. In addition table 4 was removed as the samples are not indeed independent from each other. It is replaced by information on average concentration for the 3 air mass types, later in the paper (Table 4). The ion chromatographic technique was improved in the spring 2001 in order to measure more carboxylic acids: we add this information when available (15 samples); the carboxylic acid (especially maleate, malonate, tartrate...etc..) are not amongst the major species in ionic composition of clouds, so often the minima are below the detection limit.

8. 857 line 10; the data set is now presented with characteristics for air mass categories (Table 5).

9. 858 line 20-28; We do not really understand this comment as the relative proportions

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of the different elements are discussed later in the text.

10. 859 line 3-4; Reduced nitrogen was changed to NO_x and NO_x to HNO₃.

11. 859 line 13 seems correctly scanned to us.

12. 859 line 17; It was not clear in the text that gas-phase measurements were performed simultaneously with cloud sampling. We have now clarified this in the description of methodology and added a proper reference to the work of Sellegri et al., 2003c.

13. 861 line 7; That is true. The phrase was changed.

14. 861 line 13; we removed the comparison to the reference to Facchini et al. (2000).

15. 862 first few lines; Same comment as 12. Our hypothesis is based on the fact that we know from the work of Sellegri et 2003c that CA and nitrate arise principally from the gas phase, whereas sulphate derive from particulate phase. This is now referred to in the paragraph. The same trend is observed from aerosol trend in air masses with different pollution degree.

16. 862 line 17 Table 5; idem as comment 1,2,7,12, 15. The table was not changed but we clarify in the text that the day/night difference is seen regardless of the kind of average (samples or events).

17. 864 line 18; the equation was corrected in the text.

18. 864 line 24 ; that is true: explanation (i) is removed now.

19. 865 line 11-15; this is now specified in the text

20. 867 line 11; we now avoid the use of climatology throughout the paper.

21. 867 line 12; a reference to the particle number concentration, indicator of the free troposphere signature, is now included in the text.

22. 867 line 18; we have inserted the word high.

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23. 867 line 23; This conclusion was removed

24. 868 line 8-9 ; this is now stated in the manuscript and added to Table 1.

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