

Interactive comment on “Size-segregated aerosol mass closure and chemical composition in Monte Cimone (I) during MINATROC” by J.-P. Putaud et al.

Anonymous Referee #1

Received and published: 2 September 2003

This paper deals with aerosol measurements on Monte Cimone (Italy). It is well written, the analytical part is described in detail and the authors have made a special effort to evaluate as precisely as possible the various errors and uncertainties. The results are quite complete with information on both size, volume, gravimetric and chemical characteristics. Thus, this paper is excellent from the point of view of sampling and analytical procedures. Most of the results are more or less those expected and the conclusion are not really original but it confirms with better constrains results previously obtained in Mediterranean atmosphere.

Specific comments:

Figure 1: the authors use the diurnal profile of CO₂ to support the existence of up-

slope flow during daytime. I assume that the idea is to show that the decrease of CO₂ during daytime (due to photosynthetic activity) demonstrate that Monte Cimone is not in the free troposphere at this time. But the text is not explicit on that and the authors should be more precise on the explanation of this figure.

2.2.3 Why is the sea salt mass computed as the sum of Na, Mg and Cl and not from the Na concentration and a standard sea water composition as made to compute the sea salt fraction of K, Ca, SO₄?

The regression between dust mass and Ca is very poor for non Saharan dust periods. Is this regression statistically significant?

3.2 the discussion on the contribution of carbonaceous components for the cascading impactor stage is not so clear since it refers to relative contribution (in %) while figure 6 is in concentration ($\mu\text{g}/\text{m}^3$).

Even if it represents a small fraction of the total mass, the existence of a submicron dust mode in the size mass distribution has been shown (see for example, Gomes et al., JGR, 1990, 13927-13935). These particles are mainly clay minerals (in which soluble Ca is not so abundant) which could also be an explanation of the fact that mineral dust constitute a large part of sub μm aerosol during dust event but with low Ca content. If these particles result from bouncing, Ca should be present as it is on super μm mode.

The discussion on possible reactions between dust and sulphur species is not very convincing. The authors have no real argument to show or not the existence of such reactions. The reference to Schwikowski et al. is surprising since I have not seen in this paper an analysis of pure Saharan dust (the samples were collected at the Jungfraujoch, i.e. after a long transport) and these authors mentioned in their paper that with the available data, it cannot be decided whether the concentrations of NO, SO₄ and NH₄ represent a continental background or an input of anthropogenic material which might have occurred during transport from the Sahara to the Jungfraujoch.

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Thus The formulation used in the conclusion (No interaction between SO₂ and dust could be detected from our measurements) is better than the discussion in page 4111.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 4097, 2003.

ACPD

3, S1442–S1444, 2003

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