

Interactive comment on “Significant variations of trace gas composition and aerosol properties at Mt. Cimone during air mass transport from North Africa – contributions from wildfire emissions and mineral dust” by P. Cristofanelli et al.

Anonymous Referee #1

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General Remarks

The manuscript describes an important issue, the mixing of Saharan dust with other types of polluted air masses that is not easily accessible experimentally. The method of analysis looks sound. The interesting approach based on age analyses should be stressed somewhat more in the Abstract and the Conclusions. Also the role of biomass burning to the future development of the Mediterranean atmosphere is an important aspect that could yield value to this study. The manuscript is clearly written, cites a lot of relevant literature, and should be published after considering a few changes

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suggested in the following.

Specific Comments:

- (1) Abstract: Add a few words about the analysis of the air-mass age.
- (2) P. 4, lines 5-15: The role of O₃ is well known. The authors should introduce this part more in view of the aspects of the air-mass characterization, perhaps condense the more general statements into one or two sentences (including the references).
- (3) P.4, text on BC (or following paragraph): Add a statement on the growing number of fires; I do not know any related literature on the Mediterranean regions, but this has already become obvious from the North American fire statistics.
- (4) P. 5, line 9: Add the recent paper Papayannis et al., J. Geophys. Res. 113 (2008), D10204; doi: 10.1029/2007JD009028
- (5) P. 13, line 23: (Henne et al., 2004): The orographic wind system has been studied for several decades. There have been numerous important papers on this subject. I suggest to cite at least the classical paper by Vergeiner and Dreiseitl (Meteorol. Atmos. Phys. 36 (1987), 264-286) in addition (possibly also others).
- (6) P. 14, lines 2-3: The importance of the orographic venting to the data selection for high-lying stations and the export to the free troposphere was also studied within the TOR and VOTALP projects (e.g., Scheel et al., J. Atmos. Chem. 28 (1997) 11-28; Carnuth et al., Tellus B 54 (2002), 163-185; Furger et al., Atmos. Environ. 34 (2000), 1395-1412; Carnuth and Trickl, Atmos. Environ. 34 (2000), 1425-1434.
- (7) Discussion: Add one sentence to emphasize the importance of the age analysis.
- (8) P. 22, lines 7-15 (and Abstract, p. 3, line 13): I would be careful to relate an ozone decrease to the presence of dust alone. Quite frequently, the air masses overpassing the Sahara desert originate over the remote Atlantic where ozone values of 20-40 ppb have been measured. These low mixing ratios frequently survive during the transport to

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Central Europe either via north-western Europe or (in some cases) the Mediterranean Sea.

Residual Technical Comments:

- (1) P. 3, line 13: "to significantly affect" is another split infinitive.
- (2) P. 6, line 13: Replace "lesser" by "less".
- (3) P. 8, end of line 15: better "Particle-Induced"; still, the hyphenation is not fully consistent throughout the paper.
- (4) P. 11, line 9: Perhaps better "30-min averages" (see (3)); there are more such examples, e.g., on p. 13, line 12!
- (5) P. 13, line 21: Still mismatch! Use either "wind speeds" instead of "wind intensities", or change text in bracket to "median speed 3.4 m/s".
- (6) P. 14, line 10: Change to "wind speeds"
- (7) P. 15, line 8: Replace tilde by "about" or \approx .
- (8) P. 15, line 26: change to "Starting in the evening".
- (9) P. 20, line 26: Comma missing: "....,therefore,....".

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 7825, 2009.