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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 #2

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The paper presents measurements of ozone, carbon monoxide and many aerosol parameters of an episode of high air pollution at the site of Monte Cimone in Italy. Monte Cimone is an important monitoring site of the program GAW which aims to document changes in “background air”. In addition, measurements at Monte Cimone can be used to document high photochemical air pollution advected from the highly industrialized Northern part of Italy (Milan and surroundings). In this study the authors discuss very high air pollution concentrations, which are, however, caused by mixing with a biomass plume and mineral dust (during some days) transported from the Northern part of Africa

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and not advected from the Northern part of Italy. The data analysis merits publication, if the following points are taken into account. 1. Abstract: I strongly recommend to delete the last sentence of the Abstract: “Since in the future it is expected that wildfire and Saharan dust transport frequency could increase due to more frequent and severe droughts, similar events will possibly play an important role in influencing the climate and the tropospheric composition over South Europe”. What means “important role in influencing climate” ? Do the authors think in terms of radiative forcing ? Is such an event important if it occurs once in several years (I have my doubts) ? Without trying to provide (i) information about the frequency of such events (in the present troposphere and its expected increase in future) and (ii) the expected effect on radiative forcing the link to climate remains very weak. I think the paragraph at the end of the paper is adequate but such a sentence is not appropriate in the Abstract. 2. NO_y and (and possibly) NO_x measurements would be useful in this study. Is NO_y measured at Mt. Cimone ? If NO_y measurements are available I recommend to include them in the paper, if NO_y is not measured, I would recommend to include these measurements in the program of the station. 3. According to p.7834, line 21-25, backward trajectories with FLEXTRA 3-D were calculated. Please provide information whether these trajectories support the results of the BOLAM model; if they contradict BOLAM please discuss the reasons. 4. p. 7836, line 12: Did you explain the meaning of the abbreviation “NAAPS” ? If not please explain. 5. p. 7838, line 3 and 4: You reference the papers of Baltensperger et al., Zellweger et al. and Schuepbach et al in a way (such wind systems can efficiently contribute ..) that the (uniformed) readers might get the impression that these studies directly relate to measurements at Mt. Cimone. According to my knowledge, they are based on studies at Jungfraujoch, which is at considerable higher altitude. I also believe that the same types of mechanisms are important at Mt. Cimone but it should be clarified that the studies are based on measurements at Jungfraujoch. The title of the paper of Schuepbach suggests statistical analysis. Is this an important subject in the context of your paper ? 6. In Figure 8 the dates and times of the individual Figures need to be changed (e.g. 07082806 confuses the readers, thus please replace). 7. It

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looks to me, that CO and BC concentrations significantly start to rise about 12 hours prior to the date, when BOLAM data indicate the influence of fire over Africa (see Figure 9). Please comment on this point in the paper. If you attribute this effect to mixing, this probably implies that the BOLAM trajectories have a temporal uncertainty in the order of 12 hours, which should be clarified, since 12 hours is relevant in the context of an event that lasts for two days. 8. According to Figure 10a it looks to me, that sulfate is a rather large contribution in the fine particulates during the BB plume. Please comment (in the revised version of the paper) on the origin of large sulfate concentration in the fine particles during this event. 9. p. 7844, line 22-24: According to my understanding of this sentence you frequently find the effect of North African BB at MTC (... the strongest observation of wildfire product transport to MTC, usually considered representative for the background ...). Is this true ? How often to do find such events ? Please comment, and include such information in the manuscript.

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

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