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## ***Interactive comment on “Organic aerosol evolution and transport observed at Mt. Cimone (2165 m a.s.l.), Italy, during the PEGASOS campaign” by M. Rinaldi et al.***

**M. Rinaldi et al.**

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Organic aerosol evolution and transport observed at Mt. Cimone (2165 m a.s.l.), Italy during the PEGASOS campaign

This paper presents results and analysis of aerosol mass spectrometer measurements made at the Mt. Cimone GAW station in June–July 2012. At this high altitude station, organic aerosols (OA) dominated the sub-micron aerosol and were highly oxygenated. Elemental ratio analysis indicates the addition of oxygen atoms during the OA ageing process. Changes in the aerosol loadings and oxidation levels were associated

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with the influence of boundary layer air versus free tropospheric air at the Mt. Cimone site. Boundary layer was characterized by higher loadings and lower oxidations levels while free tropospheric air exhibited lower loadings and higher oxidation levels. Positive Matrix Factorization (PMF) identified three oxygenated organic aerosol (OOA) components associated with relatively fresh OA from the boundary layer, more aged air at high altitudes during stagnation periods, and very aged OA in the free troposphere. I have only comments that are minor in nature that are outlined below. Section 2.2 Were particle velocity and IE calibrations done on site? Did changes in atmospheric pressure not affect the velocity calibrations? How frequently were the IE calibrations done? What is the uncertainty in the AMS measurements?

ANSWER. All the calibrations were done on site, therefore at pressure conditions comparable with the measurements. This assures that pToF measurements presented in the manuscript are reliable and not biased by deployment at high altitude. Details on calibrations and calibrations frequency have been added (page 5 of the revised manuscript). This sentence was also added to the text: “The propagated, overall uncertainty for the total AMS mass concentration is 20–35% ( $2\sigma$ ) according to Middlebrook et al. (2012)”.

p. 14406, L 18, add ‘s’ to measurement

ANSWER. Done.

p. 14409 L. 7 Please describe the common sampling system. How was it designed for reactive gases? Does this mean just using a Teflon sample line or is there more to it?

ANSWER. Accurate description has been added (see page 6 of revised manuscript).

p. 14410, L. 11-17 – Need to reword sentence to more explicitly indicate that the reporting is for percent contribution to PM1.

ANSWER. Done.

p. 14411, L. 7 – I don’t see these ratios listed in Table 1? Why not?

ANSWER. Data for this study have been added in the Table.

p. 14411, L 16 – remove ‘anyway’, remove ‘all’

ANSWER. Done.

p. 14411, L. 17 – is the Cabauw site a mountain site? Why use this location as a comparison? The authors have already indicated agreement with other mountain sites in previous paragraph.

ANSWER. Comparison with Cabauw has been removed.

p. 14411, L. 22 – I would say that the O/C ratio of 0.47 is more than slightly lower than 0.71

ANSWER. We apologize for the confusion. We intended to compare the AA with AI method, therefore the comparison is: 1.49 vs 1.32 (for H:C), 0.47 vs 0.58 (O:C) and 1.77 vs 1.89 (OM:OC).

Figure 3 and 4 – please indicate of the time is local time or something else.

ANSWER. Done.

p. 14415, L. 4 –‘synthetically’?

ANSWER. Removed.

p. 14415, L. 10 – deviation from the -1 slope? Is it expected that the slope should be -1? This sentence is confusing? What is meant by analogy with Ng et al.? What can explain the deviation? – that fragmentation of OA molecules is a dominant process at this site?

ANSWER. The sentence has been rephrased as suggested by the reviewer.

p. 14416, L. 5 – PMF does not allow for ‘fully’ characterizing OA; it merely provides an incremental amount of information.

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ANSWER. “fully” was substituted by “further”.

Supplementary, Figure S5 – The text in the PMF analysis paragraph is essentially a repeat of the Figure S5 caption. Typo in panel a on the x-axis.

ANSWER. The text is now extended according to the request of the other reviewer. The typo was corrected.

p. 14417, L. 6 ‘averagely’ change to on average

ANSWER. Done.

p. 14417, L. 15-16, don’t understand the last part of this sentence.

ANSWER. That part was removed.

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 14403, 2015.

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