

## 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 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?

p. 14406, L 18, add 's' to measurement

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?

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

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

p. 14411, L 16 – remove 'anyway', remove 'all'

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.

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

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

p. 14415, L. 4 –'synthetically'?

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?

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

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.

p. 14417, L. 6 'averagely' change to on average

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