

Interactive  
Comment

## ***Interactive comment on “Continental pollution in the Western Mediterranean Basin: vertical profiles of aerosol and trace gases measured over the sea during TRAQA 2012 and SAFMED 2013” by C. Di Biagio et al.***

### **Anonymous Referee #2**

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The manuscript presents airborne measurements of aerosols and trace gases CO and ozone over the Mediterranean focusing on the vertical distribution of several compounds within a series of vertical profiles between Spain, Corsica and the Gulf of Genova. Ozone and CO values respectively their ratio are used to characterize air masses. Such vertical distribution data over the Mediterranean are very scarce. They show that both Saharan dust and continental pollution are present in large amounts. Several of the compounds measured are not detectable from the ground or from remote sensing techniques although they are possibly crucial for the Mediterranean climate. It is highly

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recommended that such data are getting available.

However, the manuscript has several weaknesses that need some further work especially in the detailed description of the individual profiles.

Generally the graphics of Fig. 6, 8 and 10 lack the size and resolution required. Within the text often a series of profiles are mentioned. For the reader it's difficult to find these profile data without having an indication in which of the different figures these data are contained. Some figures are labelled a or b without having a description in the text. For example V28 in Fig. 10 looks different from V28b in Fig. 6

Specific comments:

Page 8292, section 3.2.: There is a bit of confusion about OPC and PCASP measurements. If another OPC (GRIMM) is onboard, avoid OPC for the PCASP.

Page 8293, STP Conversion: line 7 and 8, ozone is measured using UV absorption. This technique is pressure dependent and pressure has to be taken into account. Does the MOZART instrument correct for pressure over all the altitude ranges?

Page 8296, line 4-6, The text claims northeasterly winds, the data in Fig. 8 show northwesterly winds in altitudes above 1500 m.

Page 8298, line 10: typical of pollution/anthropogenic particles. . . needs more description what is the 'typical spectral variability

Page 8299, lines 18 and 19: The manuscript states that these values are comparable with values measured close to the surface at urban continental sites but the references are taken from rural (Petzold), airborne (Mallet 2005), the proper reference is Mallet 2003, rural to suburban (Wiegner instead of Weigner) rural Po-Valley (Junkermann) airborne, (Hamburger).

Page 8300, section trace gas vertical profiles: The authors discuss ozone in freshly polluted and aged air masses. In freshly polluted air masses ozone is normally titrated

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with coemitted nitrogen oxide. In this case a peak in pollution (without other parameters probably here CO) would be visible together with a reduction of ozone in the same layer, see Figure 10. However, in the vertical profiles these features are not coincident. The particle peak is lower in altitude than the ozone dip. That's looking like a mismatch of the timing in the data. Very similar in V20 the clean layer in the scattering data are between 1600 and 200 m. the concurrent ozone peak is about 100 m lower. Such a timing mismatch can have consequences for the ozone / CO ratio which is used for further analysis.

Page 8302, section 5.3. For the O3 and CO ratios 'typical' values are given. This is not the case for the Aitken to accumulation number ratio. It would be good to have some idea about such 'typical' values.

Page 8303, Section 5.3.1, Profile V19: Contrary to the text the profile shows values 0 of about 3000 Aitken particles up to about 1500 m. the lowest values were measured just above, not below 800 m. This is just above the MBL as indicated and shows a peak in the accumulation mode and in the humidity. The ratio of Aitken to accumulation mode particles rises rapidly above 2500 m. This is not discussed in this section at all. It's mentioned a bit later in the text, but should be included here. Again there is an altitude mismatch between observations of increased Aitken mode particles that are described as fresh emissions and the concurrent ozone measurements.

Page 8304, Section 5.3.2 V20 The CO rich layer is only within the lowest 150 m. no data are presented in Fig. 8. Data in the figure are not always in agreement with the text. Lowest Aitken number concentrations at 380 m are very low, clearly below 1000 in the same altitude also the scattering coefficients are typical for the free troposphere

Page 8306, Line 22 ff. The initial text of the paragraph is confusing, first of all case studies are mentioned in Fig. 10, than several profiles are listed, but finally only two of those are included in the figures.

Pages 8305/8306, High Aitken number concentrations are described as originating

from Valencia. That would require a very intense vertical mixing up to 3000 m. What is the reason for the low values in the marine Boundary layer, despite rather high values of CO (Fig. 10)?

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