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Atmospheric Chemistry and Physics Discussions

Interactive comment on "On the simultaneous deployment of two single particle mass spectrometers at an urban background and a road side site during SAPUSS" *by* Manuel Dall'Osto et al.

Anonymous Referee #2

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This paper presents measurements of single particles at a urban background site and a roadside site in the city of Barcelona (Spain) using two ATOFMS with different inlet configurations. While I do not detect major flaws in the paper, I have just concerns whether the different instrument configurations have an impact on the observed particle types at the two sites, and what are the new points obtained on atmospheric processes by simultaneous deployment of two ATOFMS at two sites. Much of the paper discusses the characteristics of the particle types at the two sites. A natural question to the study would be what causes the differences between these two sites to exhibit different particle types and mixing state. Unfortunately, this paper does not seem to explain

them. Additionally, I echo the concern raised by Referee #1 that the authors have gone to draw too many speculative. I believe that with some major modifications suggested here and as pointed out by Referee #1 manuscript may achieve the adequate standards of ACP for publication.

Specific comments: I use the abstract to illustrate my main concerns of the paper. The authors state in the abstract: . . . . . The different instrument configurations had an impact on the observed particle types at the two sites. . . . . This ATOFMS study clearly shows that the composition of atmospheric fine particles in Barcelona, and likely other Mediterranean urban areas, is complex, with a wide range of local and regional sources combining with chemical processing to produce at least twenty-two different particle types exhibiting different temporal behaviour. The advantage of using two ATOFMS instruments is also demonstrated, with the nozzle-skimmer configuration enabling detection of coarse dust particles and the aerodynamic lens configuration allowing better identification of particles rich in organic carbon and amines.

Since the different instrument configurations have an impact on the particle types, then clarify what impact? The highlighted results above are not really exciting. Given a complex environment in an urban environment like Barcelona, it is not surprised to observe the complex composition of atmospheric fine particles there. In fact, many researches have reported these complexities already. For the advantage of using the two ATOFMS instruments, they have been well known. I suggest the authors to focus on the more conclusive findings of this study.

Page 6: Authors have not detailed the issues related with the potential local sources at the two sampling sites. Is there any difference for the local sources between the two sites?

Page 7, Line 7: It is probably not dry but relatively less humid. Page 7, Lines 16-19: The different instrument configurations are used, and the particle sizes do not have complete overlap for the two instruments. Then how does that affect the unique

particle types to the specific site?

Page 9: Please clarify how to define the local and regional particle types and the principle of particle classification in the main text. Page 9, Lines 19-20: Fig. SI1 presents the temporal trends of ATOFMS particle types. The size distribution of EC particles is given in Fig SI 2 not SI 1.

Page 10, Lines 2-8: The EC signals in the positive mass spectra and near-total absence in the negative mass spectra suggests not freshly emitted. Is that true? References would be helpful. In my opinion, the chemical composition affects the ionization and fragmentation pattern of EC, thus fresh EC particles emitted various sources might exhibit different mass spectra. Actually, the EC signals in the positive and negative mass spectra are observed in fresh particles (Environ. Sci. Technol. 2005, 39, 4569-4580; Atmos. Environ. 2007, 41, 3841-3852).

Page 11, Line 18: LRT-NIT has been defined in Line 9.

Page 13, Line 5: A reference would be helpful. Page 13, Line 18: Two sea salt particle types account for 9.4% and 18.3% of the total particles sampled at RS and UB. The instrument configurations should have an impact on this type particles since the two sampling sites are only 2 km from each other.

Page 15 Lines 13-16: Pb particle type with a large mode (700-900 nm) is likely related to local combustion without any substantial evidence. Page 15: The temporal trend and the diurnal profile of the particle types could identify the local and regional particles, please clarify how to identify? I wonder if the regional particles could also show the diurnal variation. It is not clear to me.

Pages 17-18: Saharan dust particles are only detected at UB, why not at RS? The authors attribute it to the different instrument inlet. However, sea salt particles also show a big size distribution above 1 um, they can be detected at both sites.

Page 21, Line 18: “Zhuang et al., 2012” is not listed in the References.

Page 23: The authors suggest that m/z 118 could not be associated to secondary processes and peaks at m/z 74, 88, 104 and 191 are attributed to organic nitrate. Actually, these peaks could also be attributed oxidized organics.

Pages 15-26: It is also a good idea to discuss the influence of meteorological condition such as T, RH, wind direction, rain, air masses, for example, on the particle types. I recommend the authors obtaining such kind of information to provide in-depth insights into the unique particle types.

Technical corrections: The numbers and captions of the figures are too small to read and should be increased.

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