

Review of manuscript

**Continuous chemical characterization of ultrafine particulate matter (PM<sub>0.1</sub>)**

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This is an interesting paper presenting time resolved measurements of the chemical composition of ultrafine particles (UFP) in a Mediterranean city - it's generally speaking a well written manuscript with some interesting observations and certainly some innovative parts - I do have some mostly minor comments which I outlined below

Lines 148-158: I assume these losses were taken into consideration in the rest of the calculations regarding concentration and composition of UFP- moreover it's not clear to me why visualizers increase with particle size I would expect that because of diffusional losses it would be the other way around

A general comment: So the real innovation of the presented tandem technologies is the measurements of rBC and elements - the rest of the analysis is done by the Aerodyne spectrometer- without necessarily wishing to downplay the significance of this work, what is actually measured by the tandem of the aerodynamic aerosol classifier (AAC) and the single particle soot photometer (SP2-XR, for black carbon) and an Xact625i (for elements) are also used needs to be stressed in the abstract and possibly title - as it stands one gets the impression that the authors have invented an instrument that provides real time size resolve chemically speciated data and ultrafine particles when in fact they combine commercial available instruments to do that the measurements themselves are innovative

Some of the data plotted in Figure 4 are literally illegible- perhaps the organic data need to be separated from the inorganic ions to get a better idea or a better picture of how things look in the reported time series

Figure 5: I find it very interesting and somewhat counterintuitive that we do not see a clear phytochemical signal in the OA (and sulphate) concentrations given that the measurements were conducted in the summer in Greece - this observation is substantially different than many other cited studies by the authors on the diurnal profiles of the chemical composition of UFP in summer- moreover this is contradicted by the discussion that follows in subsequent paragraphs reporting that most of the organic aerosol in the study period is either entirely or partially oxidized, as one might

expect considering the location and season of the measurements . any explanations or thoughts?

Why have the authors not attempted source apportionment of trace elements or metals and refractory black carbon in addition to the organic aerosols ? do they not have sufficient data to do this analysis? Indeed this would have provided some very interesting and potentially valuable data regarding the sources of these species in the ultra fine range

Have the authors attempted to determine size -resolved acidity of UFP given that they have all the necessary information to do these calculations ? several studies have shown that this size range is acidic and it would be interesting to see whether the presented data here corroborate or refute this notion, and more importantly provide for the first time at least to the best of my knowledge in the peer reviewed literature this kind of information