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Interactive comment on “The organic fraction of bubble-generated, accumulation mode Sea Spray Aerosol (SSA)” by R. L. Modini et al.

Anonymous Referee #2

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General

In this work Modini and co-authors present laboratory bubble burst measurements. They conducted the laboratory experiments on NaCl, artificial Sea Spray (SSA) and natural SSA particles (coastal water, Moreton Bay, Australia) with a VH-TDMA (Volatility Hygroscopicity-Tandem –Differential-Mobility-Analyzer) and focused on the determination of an organic fraction in accumulation mode (~ 100 nm). Authors consider important questions on the field and their laboratory measurements could be applicable in certain natural condition. They also tried to compare their results of organic fractions with those of other marine locations (Keene et al. 2007 and Facchini et al. 2008). They suggest that an organic fraction in accumulation mode is remarkable lower in the Australian coastal location than in other locations previously reported. However,

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their experiments are not comparable to the mentioned previous experiments due to the coastal water sampling location and different bubbling method. Before accepting the paper for publications in ACP, the authors should consider carefully the comments and make the appropriate changes into the manuscript.

Specific comments

Introduction:

Authors should highlight that the experiments of authors had clearly different water sampling conditions and particle production methods compared to Keene et al. 2007 and Facchini et al. 2008 experiments.

Volatility Hygroscopicity-Tandem Differential Mobility Analyzer (VH-TDMA), experimental conditions, and results and discussion:

-Did authors measure the particle size distribution or particle concentrations for ultra-pure de-ionized water (i.e. without added salts)? This would be important information in order to see a possible effect of water itself on the GF of artificial sea water. The bubbler is not the only source of impurities.

-Total scan time is for VH-TDMA 1-2h (p. 21408, line 9). This time is very long compared to water residence time (Table 1.). Actually, water residence time is so short (Table 1) that the VH-TDMA practically can catch only one measurement point in the range water residence time. This also leads to main fundamental difference between Modini et al and previous experiments. The VH-TDMA is more or less on-line method whereas impactors are off-line methods and thus impactors would not suffer similar way about the short residence time of water in laboratory experiments. The very short water residence time compared to the time resolution of VH-TDMA might also hinder the detection of possible depletion of organics in the start of the experiments. On the other hand, the long total scan time might lose some composition change information during the total scan.

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In order to strengthen the authors discussion I recommend that authors show relative particle concentrations as a function of time. This kind of information could be in a table for each experiment. Additionally, time and relevant information of each experiment should be tabbed.

-Authors report very low water flow rate compared to the other experiments shown in Table 1. They regulated water flow rate but the regulation in low flow rates was relatively small compared to uncertainties in the methods. Therefore, a possible effect of flow rate regulation on particle composition could be difficult to detect in low water flow rates. Moreover, the water flow rates were much lower than in the experiments of Facchini et al and Keene et al and thus the comparison is not relevant.

Anyway, authors could give an estimate what type of natural conditions their water flow rate could mimic.

-p.21412, line 28: The ZSR approximation states that the individual components of an internally mixed particle uptake water independently of each other if the individual components do not interact with each other.

-p.21413, line 2: remove similar

-p.21413-21414: Please notice that organics do not always decrease the HGF (e.g., Sjögren et al. 2007). Hygroscopic growth and water uptake kinetics of two-phase aerosol particles consisting of ammonium sulfate, adipic and humic acid mixtures" Sjögren S, Gysel M, Weingartner E, et al. JOURNAL OF AEROSOL SCIENCE ,38 , 2, 157-171,2007.

-p. 21413, line 19: ...at a site...? Please, define more accurately.

-Overall, while the analysis has own strengths, the basic restrictions of the methods and measurements should be properly rethought, discussed and taken into account in the analysis, conclusions,.and abstract.

Technical comments p.21408, line 25: than



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