

## ***Interactive comment on “Size-resolved particulate water-soluble organic compounds in the urban, mountain and marine atmosphere” by G. Wang et al.***

### **Anonymous Referee #1**

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#### General comments:

This paper reports valuable measurements of alcohol and acid species in particle phase at three sites, representing three different atmospheric conditions. The size distribution analysis provides likely source information of primary and secondary WSOC components. However, the main focus of the paper is not very clear and some arguments are not supported by evidence. For example, the authors show that acids are more abundant at the marine site than at the continental sites, indicating transport and aging occurs at the marine site. Does the back trajectories show transport of air mass from main land to the Pacific Ocean? If yes, this should be discussed in the text.

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Another example is that fine mode glucose is thought to be from levoglucosan hydrolysis under relatively high acidity in aqueous phase, but the RH and acidity during the measurement periods are not shown. The literature (Seinfeld and Pandis, 1998 and Helle et al., 2007) could not support the argument as well since the conditions in these papers are very different from ambient conditions.

There are six figures in the paper, four of which are repeating size distributions of different species. Similar figures could be condensed into one in order to make room for other figures to show different kind of evidence.

The writing may need improvement as well. For example, in page 7, line 6, the sentence “we feel that their argument may be wrong” is informal. There are grammar mistakes as well (see “technical corrections”).

In general, the measurements are new and important to be added to current literature, but “what is new in this work” needs to be stated clearly and better explained. Polishing the writing will also improve the quality of the paper.

#### Specific comments:

1. Sugar and sugar alcohol are mentioned several times in the paper. What are the differences between “sugar” and “sugar alcohol”? Sugar contains C-OH groups, so is sugar alcohol as well?
2. How are “primary WSOC” and “secondary WSOC” defined? Should list assumptions.
3. Page 6, lines 8-9, is there evidence of biomass burning? Does back trajectories show air mass transports from urban to mountain and ocean sites?
7. Page 7, line 6, re-phrase the sentence “we feel that”.
8. Page 6, lines 3-5, why is levoglucosan lower than “other primary WSOCs” in coarse mode?

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9. Page 6, lines 13-16, is the formation mechanism of levoglucosan the finding of this paper? Should cite literature if not.

11. Page 7, first paragraph, what are the sampling conditions? Are the conditions the same as the conditions in the papers you cite? What is the RH and acidity of sampled aerosol?

12. Page 7, lines 18-19, need citations.

16. Page 8, line 13, is there evidence of long-range transport?

18. Page 9, line 25, is “development of inverse layer” observed? How is “development of inverse layer” related to coagulation?

Technical corrections:

1. Page 2, line 19: “however” is not necessary. 2. Page 6, line 1, delete “to be”. 3. Page 6, line 3, change “on the fine mode” to “in the fine mode”. 4. Page 7, line 20, delete “somewhat”. 5. Page 7, line 28, delete “thus”. 6. Page 8, lines 4-5, grammar mistake “Such a molecular compositions”. 7. Page 8, line 21, delete “in the smoke particles”. 8. Page 10, line 4, typo “levoglucosn”.

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Interactive comment on Atmos. Chem. Phys. Discuss., 10, 17467, 2010.