Interactive comment on “Relating hygroscopicity and composition of organic aerosol particulate matter” by J. Duplissy et al.

Anonymous Referee #1
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I find it to be a strong paper with the exceptions of the apparent motivation and conclusions and as per comment 2 below. The abstract and particularly the conclusions do not describe the results of the paper well and tout the concept of using these data in models as a parameterization for the hygroscopicity of the organic component of the atmospheric aerosol. This concept could be an important application, but it’s unclear that models are currently able to adequately predict the mass concentration of the organic aerosol let alone the level of oxygenation. The paper simply and nicely discusses processes and chemistry, and some of that should show up in the conclusions. The most important contribution is the summary of the KappaOrg with f44 for a variety of conditions.

2. The authors compare their results with those of Chang et al. (2009):
- The authors acknowledge that their data are for subsaturated conditions whereas the Chang et al data were for supersaturated conditions. However, they do not attribute any of the differences (primarily slope) to this fundamental difference. For example, could not solute-solute interactions, which the authors state are neglected in their model (P19318, lines 5-6), be of some consequence? The droplets for the subsaturated conditions will obviously be more concentrated than for the supersaturated conditions. Previous comparisons for chamber SOA have found Kappa estimated from HTDMA to be different than Kappa estimated from CCN (Duplissy et al., 2007; Prenni et al., 2007; Wex et al., 2009). It is important to discuss these discrepancies as well as provide readers with a more complete perspective on the issue.
- It appears that the authors refer to the discussion paper of Chang et al. rather than the ACP version (Volume 10, pp. 5047-5064, 2010). In their ACP paper, Chang et al. state that the range for their KappaOrg to O/C relationship is only valid for 0.3 to 0.6. At the bottom of page 19323, you refer to the relationship from Chang et al as KappaOrg = 0.30 O/C whereas in Chang et al. it is given as KappaOrg = 0.29 O/C.

Minor comments:
P 19312, line 19 – define UNIFAC


P 19313, line 4 – clarification of this statement is needed. Was the higher yield due to increased SOA mass concentration or some other factor?

P 19315, section 2.2 – Consistent with the Mexico discussion, a brief outline here of the instrumentation at the Jungfraujoch would be helpful.

P 19316, lines 4-8 – have these three HTDMAs been compared?

P 19317, line 6 – as follows

P 19319, line 11 – lower

P 19320, lines 10-11 – SOA from a-pinene being discussed here. The reference needs to be clarified.

P 19340, Figure 7 – “sup” should be super.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 19309, 2010.