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Interactive comment on "The formation, properties and impact of secondary organic aerosol: current and emerging issues" *by* M. Hallquist et al.

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I am submitting the comments below on behalf of **Ottmar Möhler, Bernhard Zobrist and myself**. In particular, we would like to comment on subsection 3.7.4 Ice Nucleation.

This subsection seems to contain only literature up to the year 2006. However, there have been a several new studies that are relevant for the topic discussed here.

1) P.3662, L.26 to P.3663, L.2. There are papers showing, in contrary to what is written, that the homogeneous ice nucleation process itself does not depend on the chemical composition of the droplets (see e.g. Koop et al., Z.Phys.Chem. 2004), but only on the water activity of the solution. There is further evidence that a simi-

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lar dependence is also true for heterogeneous ice nucleation in the immersion mode (Zobrist et al. Atmos.Chem.Phys.2006, Zobrist et al. J.Phys.Chem.A, 2008) and for dust particles with soluble coatings in the depostion/immersion model (Archuleta et al. Atmos.Chem.Phys.2005).

2) P.3663, L.19-22. There is another more recent paper that has studied the effect of long chain alcohols, in solutions of several inorganic salts and the organic solute ethylene glycol (Zobrist et al., J.Phys.Chem.A, 2008).

3) P.3664, after L.23: There have been recent studies on ice nucleation in pure SOA particles as well as on mineral dust particles coated with SOA (Möhler et al., Env.Res.Lett. 2008). SOA significantly reduced the ice nucleation efficiency in both the homogeneous and the heterogeneous ice nucleation case, requiring very large supersaturations before ice particles could be observed. Similar results were obtained for soot particles covered by organic carbon (Möhler et al., Meteorol. Z. 2005) These effects were very recently interpreted by the possible presence of a highly viscous or glassy state in solutions of larger organic molecules (Murray, ACP 2008; Zobrist et al., ACP 2008). Furthermore, Prenni et al. (2009) investigated the ice nucleation behaviour of socondary organic aerosol particles generated by the ozonolysis of 25 different organic compounds. None of these SOA aerosols showed measurable signatures of heterogeneous ice nucleation at a temperature of -30°C.

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