Atmos. Chem. Phys. Discuss., 4, S2868–S2869, 2004
www.atmos-chem-phys.org/acpd/4/S2868/
European Geosciences Union

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Internal mixing of the organic aerosol by gas phase diffusion of semivolatile organic compounds" *by* C. Marcolli et al.

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Received and published: 8 December 2004

To 1) We think that the aerosol population in the lower troposphere is predominantly liquid because a liquid (or an amorphous solid) is the thermodynamically stable phase of the organic aerosol fractions provided that a sufficiently high number of miscible components are present and the inorganic salts tend to stay liquid in complex organic / inorganic mixtures (Marcolli et al., 2004). We concede that mineral dust will be present as solids, and at low RH inorganic salts will effloresce. There will be surely occasions when the aerosol population in the lower troposphere is present in solid form or as solid/liquid mixtures, but we think that liquid particles prevail.

To 2) We add a paragraph to discuss the importance of mixing by gas phase diffusion compared with coagulation. Page 5798, we insert a new paragraph after line 3: “For high particle number concentrations coagulation becomes an important mixing process that will most strongly affect ultrafine particle number densities. An overview of the timescales of mixing by coagulation is given by Kanakidou et al. (2004). The states of mixing resulting from coagulation and equilibration by gas phase diffusion are not equal: a hydrophobic substance will not partition into a hydrophilic particle because of its high activity in such a medium. Coagulation, however, can lead to internal mixtures of species that are not miscible with each other: if a hydrophobic particle coagulates with a hydrophilic one, substances such as alkanes and polyols will be present in the same particle but in separate phases.”

Kanakidou, M., Seinfeld, J. H., Pandis, S. N., Barnes, I., Dentener, F. J., Facchini, M. C., van Dingenen, R, Ervens, B., Nenes, A., Nielsen, C. J., Swietlicki, E., Putaud, J. P., Balkanski, Y., Fuzzi, S., Horth, J., Moortgat, G. K., Winterhalter, R., Myhre, C. E. L., Tsigaridis, K., Vignati, E., Stephanou, E. G., and Wilson, J.: Organic aerosol and global climate modelling: a review, Atmos. Chem. Phys. Discuss., 4, 5855 - 6024, 2004.

Marcolli C., Luo, B. P., and Peter T.: Mixing of the organic aerosol fractions: liquids as the thermodynamically stable phases, J. Phys. Chem. A, 2004, 108, 2216 - 2224.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 5789, 2004.