Atmos. Chem. Phys. Discuss., 8, S3816–S3818, 2008
www.atmos-chem-phys-discuss.net/8/S3816/2008/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "The effect of organic compounds on the growth rate of clouddroplets in marine and forest settings" *by* N. C. Shantz et al.

Anonymous Referee #3

Received and published: 17 June 2008

The purpose of this work is to show the influence of organic matter on droplet growth in two environments, forest and marine, relevant for climate changes. The effect of organics on aerosol activation and growth is investigated by a closure approach: the CCN voltage measured in a CCNc counter is reproduced by model simulations of aerosol scattering cross section. The study employes measured aerosol number size distribution and chemical composition, but not a detailed knowledge of the chemical composition of organic matter. The organic matter is assumed to be represented by one specie: adipic acid (which means fixed molecular weight, density, refractive index); by one surface tension and different solubilities. Even if these assumptions are highly unrealistic, the paper succeed in proving that the closure can be achieved only considering the organic mass and properties, especially the solubility. The results of this

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

study do not bring any advance at the level of process understanding regarding the water uptake due to organic species or due to organic-inorganic interactions, but, using ambient data, they reinforce the need of studying the effects of organics. I recommend this work for publication after the clarification of the following points in the manuscript:

-why is used the aerosol scattering cross section for the closure study instead of surface or volume size distribution of ambient particles? The second parameters also include the effect of size, number concentration and chemical composition, but not the refractive index, which is another unknown. If the authors have arguments to support their choice, they have to describe in more details the Mie theory (pg. 9) and the assumptions they use in calculating the scattering cross section, including the values of refractive index used for each specie. Also, they have to discuss why they do not consider the absorption cross section and the effect of black carbon on it.

-how are related the physical and chemical measurements of the aerosol properties performed with different time resolutions? In the present form, the aerosol number size distribution seems to be an average over a time interval. In this case, the authors have to report on graphs the measured variations (standard deviations) as a function of size over the period of time. I have the same comment regarding the variation of measured CCN voltage.

- why any further variation from the empirical adjustment done for a polydisperse sulfate can be attributed only to variations in chemical composition (pg. 11, last paragraph)? why are not used laboratory measurements for the adjustment?

Given the main goal of this work, I also suggest to the authors to show and to discuss more extensively the simulation which considers the measured soluble (WSOC) and insoluble organic aerosol (pg. 18). The definition of WSOC is still a matter of debate, but it is clear that WSOC behaves different from the insoluble carbon, and therefore, it have to be considered separately when it is available. Besides, I suggest to eliminate the simulation for 17 July 2002 since it does not bring any new information to this study.

ACPD

8, S3816–S3818, 2008

Minor comments: -pg. 4, line 8: replace "affect" by "effect"

-pg 9, section 3.2., end of last paragraph: which assumption? Explain better what do you mean with this phrase?

-pg. 20, 1st par., line 6: is k total or organic? please add the right subscript to k. Same comment for k on pg. 21 last paragraph.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 8193, 2008.

ACPD

8, S3816–S3818, 2008

Interactive Comment