Atmos. Chem. Phys. Discuss., 3, S573–S576, 2003
www.atmos-chem-phys.org/acpd/3/S573/

Atmospheric
Chemistry
and Physics
Discussions

Interactive comment on “Hygroscopic properties of different aerosol types over the Atlantic and Indian Oceans” *by* A. Maßling et al.

A. Maßling et al.

Received and published: 20 May 2003

Dear referee,

thank you for a lot of helpful hints and tips concerning my manuscript. Here are my answers to your comments.

Comment number 1: I have reduced the number of figures, especially the time series of hygroscopic growth are taken away and these data are presented in a more comfortable style.

Comment number 2: The abstract was shortened a little, but in my view the relevant details have to be stated in the abstract. Growth factor is defined and the RH is also mentioned for the given values.

Comment number 3: This is right and changed now in the new version!

Comment number 4: The classification is the same as done by the cited authors. But in our paper we have summarized some time periods. For that reason, we have included Table 1 showing a detailed description of all air masses.

Comment number 5: You are right. Detection limits can be found later in the text, but they are useful here, too. This is done. More information about the technique is also included.

Comment number 6: We have taken calibrated sensors and we know about this drift. Measuring RH with high certainty is a big deal. We have now a new High Humidity TDMA under construction, which will be operated by usage of a dew pointer. This system will be placed in a water bath and be operated by values of RH 95% and higher!

Comment number 7: You are right. But our TDMA is fully automized, means sheath and excess air flowrates are adjusted after each scan, so that the aerosol flow measured all the time is always at a defined value. But flows can only be that good as calibrations of the used differential pressure sensors are!

Comment number 8: This is an interesting theme. We cannot measure the absolute pressure within the DMAs. So, for mobility calculation, the ambient pressure was used. But we have done latex calibration under the same conditions as we have them during the experiments. Slightly changing one of the dimensions of one DMA has the same result as taking our correction function, which was determined at several points over the used size range.

Comment number 9: This is discussed now and a plot of the ion balance is presented in the new version.

Comment number 10: O.k., you are right. I have changed Table 1. The detection limits are now included and values below the detection limit are marked.

Comment number 11: I agree. This is done.

Interactive Comment

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

Comment number 12: I have a reference for this and there is now a citation in the text.

Comment number 13: I agree. This is done.

Comment number 14: This is completely right. The growth factors are rather high. This is not due to wrong values in RH, because this was all calibrated. I think, that this is due to internally mixing with sodium chloride. The problem is, that sodium chloride only appears sometimes in the chemistry data at this determined size. Externally mixing is excluded, because for the case that you have pure sodium chloride and pure ammonium sulfate you would separate these modes in the HTDMA-spectra. But we know, that the atmosphere is not a lab and what we see is probably some internal mixing for some time periods leading to those high growth factors. But please realize the uncertainty of growth factor given in the text and that most air masses have stayed for days over the ocean which means that aging plays an important role for interpreting these growth factors. There are now more details given in the text.

Comment number 15: It is simply to allow for three groups of particles simultaneously, where the smallest growth factor is denoted as nearly hydrophobic with values below 1.3. This is now described clearly in the text.

Comment number 16: You are right. The observed bahvior is similar to that of inorganic salts showing deliquescence behavior. But think of the HTDMA-technique described in the text: Particles are always humidified to values greater than 85% RH before exposed to 75%, 55%, and 30% RH. This means we are all the time on the upper curve of the hysteresis! We should not see any deliquescence because particles have already exceeded their DRH. I have included more hints in the text.

Comment number 17-19: Solubility: As discussed in the paper, the uncertainty in calculation of soluble particle volume fractions is very high (˜ 25 %). This makes conclusions much more difficult to draw. For these data, it seems to me, that the solubility calculations do not bring much progress for the paper as they express statements that already were made in the hygroscopic growth section. It is right, that it would be interesting to make some closure studies with the chemistry data by using external and internal mixing, solubility and number fractions. But the uncertainty in chemical data and solubility calculation together do not allow us to make this closure for individual time periods. I have checked this and you can read this in my thesis (dissertation: Maßling, Leipzig, 2001). At the moment, a diploma student is working on a new sectional solubility model. We will try to present these solubility model in an individual paper (hopefully at the end of this year) and then show a comparison of different data (continental site/urban site/INDOEX). For this reason, I have decided to shorten the manuscript by leaving out the solubility section which will be presented in another paper in a more comfortable style. I think, that this manuscript is already long enough and contains a sum of interesting issues.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 135, 2003.