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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Long-term volatility measurements of submicron atmospheric aerosol in Hyytiälä, Finland" *by* S. A. K. Häkkinen et al.

Anonymous Referee #2

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The paper describes field measurements of aerosol volatility and other parameters over a time period of more than two years. Seasonal trends of aerosol mass fraction remaining (MFR) at different temperatures are presented. From black carbon measurements and the aerosol MFR measured at 280 °C the authors determine the very low-volatility fraction of organic aerosol. From a correlation analysis with AMS and trace gas data a source apportionment of this low volatility organic fraction was performed.

The determination of the aerosol mass fraction remaining was done the following way. Ambient aerosol was directed through a heated thermodenuder and the remaining particle mass distribution was measured with a DMPS from 20-500 nm. The reference point was another DMPS, which measured the aerosols without treatment in a range from 3-1000 nm. The mass fraction remaining is then given by the ratio of the measured

aerosol mass from the two DMPS within the same aerosol diameter range of 20-500 nm (equation 3). As seen from Figure 3 there is a very large aerosol mass fraction with diameter larger than 500 nm. This means that all particles larger than 500 nm will also partly evaporate in the thermodenuder and some will shrink to sizes below 500 nm. Thus, equation 3 is by no means the true aerosol mass fraction remaining. Therefore, the analysis in this paper is based on a flawed approach and all correlations or apparently observed effects might be artifacts. Even for the MFR at 280°C we can not be sure if a fraction of still relative volatile material from very large particles, that did not have time to completely evaporate, contribute to the so-called non-volatile MFR(non-BC). For this reason I can not support the publication of this paper as it is.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 11201, 2012.