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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Size distributions of elemental carbon in a coastal urban atmosphere in South China: characteristics, evolution processes, and implications for the mixing state" *by* Xiao-Feng Huang and Jian Zhen Yu

Anonymous Referee #2

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The paper presents the evaluation of the mass size-distribution of EC concentrations in a megacity in Southern China. While the topics could be in itself interesting, there are several major shortcomings in the approach the authors take.

1) The authors–for technical reasons–do not apply the optical corrections in defining the OC/EC split in their adapted NIOSH method. Although they claim that this does not introduce error to the relative distribution of EC, this is not proven in the paper and presumably it is not true. Many studies have revealed that charring is a very significant process in thermo-optical measurements. It has also been shown that the tendency for

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charring increases markedly with increasing share of heteroatoms (increasing degree of oxidation that occurs upon atmospheric ageing). It is therefore very likely that while freshly emitted soot nanoparticles are not prone to charring, aged oxygenated soot particles and secondary organic aerosol (which are in the accumulation mode) show very high charring efficiency. Thus, contrary to the statements of the authors the uncorrected mass size-distribution measurements should not be reliable even in relative terms!

2) The calculation scheme that the authors present in their paper is basically a reproduction of well-known mechanism that leads to bifurcation of the accumulation mode. The existence of condensation mode and droplet mode is now widely known, but the authors avoid these terms throughout their paper, except on page 10755 where they also give reference for them.

3) For the estimate of the mixing state of EC the authors rely solely on a relative shift in the mass size distribution of EC. Apart from the experimental concerns discussed above the authors simply fail to consider the fact that near the sources a significant fraction of freshly emitted soot nanoparticles rapidly attach to available surfaces by dry deposition, thus severely distorting the relative mass distribution towards larger particle sizes away from the sources. Therefore the authors' approach for calculating the degree of mixing is simply not valid.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 10743, 2007.