

## ***Interactive comment on “Optical properties of elemental carbon and water-soluble organic carbon in Beijing, China” by Y. Cheng et al.***

**Anonymous Referee #3**

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The manuscript by Cheng et al. reports mass absorption cross-sections for elemental carbon and optical properties of water-soluble organic carbon for data collected in Beijing, China. The authors compare their data with those from other filter-based studies. The issues with filter-based EC measurements are addressed, but the biases with filter-based absorption measurements are not. Lack et al., *Aerosol Science and Technology*, 2008 and Cappa et al., *Aerosol Science and Technology*, 2008 should be referenced and utilized. A thorough description of the absorption measurement and the quality of that measurement should also be discussed. An uncertainty analysis should be included for all measurements. The manuscript also makes some statements that need more clarification and/or support in order to make their conclusions. For these reasons, I am recommending rejection.

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General Comments: Throughout the paper, mass absorption cross-section (MAC), efficiency, and coefficient are all used. I urge the authors to choose one and be consistent throughout. The statements about SOA dominating the OC need to be backed up more with other data and/or intercomparisons. Only corrected MAC's should be reported. The details of the corrections should be included in the experimental section, but the uncorrected data should not be included in the final tables. Comparisons to other studies should be done using the most standardized method as the reference. The statement about an absorption enhancement by a sulfate coating needs more data to support this statement, e.g., comparison to periods when EC is constant, in order to determine that a correlation between higher EC and sulfate is not the cause of the increased MAC. Further support for coating statements, OC or sulfate, should be supported with data from the denuded vs non-denuded samples if possible. The details of the high and low bounds for the equivalent MAC's should be described in more detail in the experimental section. It is not clear in the method of analysis whether brown carbon is separated from the EC in the absorption measurement, therefore, it is not clear how the data will be biased in the presence of biomass burning. An assessment of brown carbon should also be more carefully addressed, taking into account such findings as were reported in Alexander et al., *Science*, 2008. Finally, there should also be a discussion comparing filter-based measurements with direct measurements, e.g. Cross et al., *ACP*, 2009 and Flowers et al., *ACP*, 2010, and an attempt to clarify the biases and increased uncertainties of purely filter based MAC measurements.

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