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Atmospheric Chemistry and Physics Discussions

Interactive comment on "An intensive study of aerosol optical properties in Beijing urban area" *by* X. He et al.

Anonymous Referee #2

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This manuscript describes optical properties of aerosol particles from a long-term measurement period (2 years) in Beijing. Scattering and absorption coefficients were measured and single scattering albedo was calculated. These results were correlated with wind direction and wind speed. The seasonality differences of the optical properties are very interesting as what can be learned from these long term (compared to month-long intensive measuring campaigns) measurements. However, there are three major issues with this manuscript that must be addressed before acceptance to ACP.

1) Put their results in context of earlier studies.

The authors state in the introduction that "the dependence of urban aerosol optical properties on the meteorology in Beijing is rarely studied." However, that is not true. There was a recent intensive campaign in Beijing (CAREBeijing) in 2006 that studied

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many aspects of the Beijing aerosol, including the impact on meteorology. Garland et al., "Aerosol optical properties observed during Campaign on Air Quality Research in Beijing 2006 (CAREBeijing-2006): Characteristic differences between inflow and outflow of Beijing city air," JGR 2009 investigates the relationship between wind speed and direction, and aerosol optical properties in Beijing. In addition to this work, there is the modeling work of Streets et al., 2007 and Chen et al., 2007 as well as many other studies measuring the aerosol optical properties in and around Beijing. This current manuscript does not adequately build upon the current state of knowledge of this subject because it does not acknowledge much of the work that has already occurred on this topic. Thus, the author's should expand their discussion of previous work in the introduction as well as compare their results to this previous work throughout the paper.

2) Increased rigor of data interpretation.

The authors make many statements in this paper that are very strong and not supported with additional data. In particular are the statements about the diurnal cycle of the scattering coeff in the summer being due to production of secondary aerosol formation. While their data may be consistent with that, the authors show no evidence that would lead the reader to this same conclusion. The same is true with the statements surrounding the direct emission of BC. For the increase in scattering during the day in summer, the changes in RH most likely have a larger impact than aerosol formation; however the authors do not delve any deeper into this subject other than to say that both are a possibility. This lack of proper interpretation of their results is the major weakness in their manuscript and must be fully addressed before this manuscript should be considered for acceptance.

3) Proper treatment of RH

In general, the reporting on the optical coeff in this manuscript does not pay close enough attention to relative humidity. In the experimental set-up the authors seem to

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state that the nephelometer has a threshold value of 60%RH (?). I assume that means the RH in the nephelometer can range from 0-60%. Such a set-up is incompletely thought out and does not lead to comparable data. As the scattering coeff can change greatly with RH, it is not acceptable to measure and compare the scattering coeff at different RHs without somehow accounting for the changes in RH. The authors must try to account for these changes in RH and how it may impact the scattering coeff (it seems as if the aetholoemeter was run at a constant RH, if that is not true, then the same sensitivity must be done for the absorption coeff). This changing RH will also impact the single scattering albedo. Both the absorption and scattering coeff must be at the same RH to correctly calculate single scattering albedo; it does not seem as if this is the case with the current manuscript.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 11413, 2009.

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