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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Spatio-temporal variations in PM_{10} concentrations over Seoul estimated using multiple empirical models together with AERONET and MODIS data collected during the DRAGON-Asia campaign" *by* S. Seo et al.

Anonymous Referee #1

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General comments:

This paper aims to estimate PM10 using empirical models with remote-sensed aerosol data in Seoul. I think that this paper is generally well written and the conclusion is acceptable and consistent with the previous studies. However, it seems to miss out some of important papers that has already dealt with the issue in question through different approaches, but supported their conclusions. Also, equations are somewhat

needed to clarify.

Specific comments:

P21713, L8: Add Choi et al. (2009), which is a study relevant to the issue in question for East Asia including Seoul, Korea. The study estimated PM10 using MODIS AOD via M1-type model with coefficients obtained from GEOS-Chem, and documented that poor PM10 estimation in spring can be attributed to dust aerosols. Table 1 may include Choi et al. (2009).

Choi, Y.-S., R. J. Park, and C.-H. Ho (2009), Estimates of ground-level aerosol mass concentrations using a chemical transport model with MODIS aerosol optical observations over East Asia, Journal of Geophysical Research, 114, D04204. P21713, L24: Add Song et al. (2009), which reported PM10-MODIS AOD relationship over China.

Song, C.-K., C.-H. Ho, R. J. Park, Y.-S. Choi, J. Kim, D.-Y. Gong, and Y.-B. Lee (2009), Spatial and seasonal variations of surface PM10 concentration and MODIS aerosol optical depth over China, Asia-Pacific Journal of Atmospheric Sciences, 45, 33–43.

P21717: Methodology section needs to add further discussion about PM2.5. Perhaps the upper limit of integration in equation (2) should be replaced by 1.25, and equation (3) has to be replaced by FOD?

P21718, L2: In equation (1), both the extinction efficiency Q_ext and the size distribution n is also function of RH (Seinfeld and Pandis, 2006). This leads to confuse the concept of f(RH) independent of <Q_ext> in equation (3). In equations (1) and (2), you may replace r (radius) by D (diameter) for better presentation. Is H is the same as BLH?

P21719, L24: Can f(RH) from Beijing during the spring be applied to Seoul where chemical compositions are very different?

P21720, L3: The accuracy of AERONET measured Re can hardly be guaranteed. What is the known accuracy?

P21720, L19: What does AE stand for? L22-25: Hard to understand.

P21720, L9: There is no explanation how equation (4) is related with equation (3).

Table 1 mentioned the methods, M1 to M4, which will be introduced later in Table 3. What makes confusion is that, however, M2 in Table 1 uses RH, while in Table 3 M2 does not use RH. Which one is correct?

There is a recent study by Escribano et al. (2014), which pointed out BLH is critical in the AOD-PM relation. Also they found that the misfit in surface reflectance in MODIS algorithm especially in semi-arid region may lead to a spurious MODIS AOD, leading uncoupled relation between PM and AOD. Please at least discuss their findings too in relation with your study.

Escribano, J., L Gallardo, R. Rondanelli, and Y.-S. Choi (2014), Satellite retrievals of aerosol optical depth over subtropical urban area: the role of stratification and surface reflectance, Aerosol and Air Quality Research, 14, 596-607.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 21709, 2014.