**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "A study on the aerosol optical properties over East Asia using a combination of CMAQ-simulated aerosol optical properties and remote-sensing data via a data assimilation technique" *by* R. S. Park et al.

Anonymous Referee #2

Received and published: 17 October 2011

This is a well-written paper presenting an analysis of aerosol distributions over East Asia using the CMAQ regional model and a variety of observations. The model results for aerosol optical depth and single scattering albedo are evaluated with MODIS AOD from the Terra satellite and ground-based measurements (AERONET and lidars). Details are given of how they improved their model over previously published results, through emissions and model configuration.

I recommend publication after addressing the following comments.

Major comment:

I am unclear on how the data assimilation of MODIS AODs is performed exactly. Are only the model calculated AODs adjusted to match the MODIS observations? Or are the simulated aerosol concentrations scaled and AODs recalculated after that adjustment. If only the AODs are adjusted, please include further discussion about what is learned by doing that, aside from producing an AOD distribution that is a bit closer to the observations.

Minor comments:

Section 2.2.1: A sentence on which aerosols are simulated would be helpful. For example, is SOA calculated, are aerosols bulk or for size bins? Is OA, which is mentioned later, only SOA or also primary OC?

Section 2.4: More details should be given on the MODIS AOD products used in the assimilation, including L2 or L3, which variables, and if any quality filtering was applied before use.

Technical corrections: Abstract: spelling "Honk Kong"

p.23811, line 12: "distinctively" should be "distinctly".

p.23815, line 15: "access" should be "assess".

p.23816, line 1: the phrase is usually "ground truth".

p.23820, l.12: CAMQ -> CMAQ; l.16: ADMA -> ADAM

p.23821, l.27: agreements -> agreement

p.23822, l.13: 'greatly capture' would be better as 'capture well'.

p.23823: 'Gobbi' -> 'Gobi', in 2 places. line 24: should be 'generation and transport' (not plural).

Table 5: in the last row the columns are shifted left.

Fig. 2: Explain what magnitude is in last column of table, and give units.

Fig. 7: Either put the x-axis 0 at the left of the plot, or draw a vertical dashed line at 0. Also, the yellow circles are not really visible – make circles and error bars both red.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 23801, 2011.

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