**Atmospheric
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Comment

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 #1

Received and published: 2 October 2011

MS No.: acp-2011-436

Title: 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 Author(s): R. S. Park et al.

General Comments

This paper combined the two models, CMAQ and ADAM (Korean Dust Operational Model), to describe the detailed seasonal variation of aerosol optical depth (AOD) over

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Discussion Paper

Asia and made intensive analysis based on MODIS and AERONET observation data. This paper includes a lot of important messages to understanding the importance of sulfate, nitrate and other aerosols for Asian AOD field, and improving the aerosol radiative forcing estimation. The authors are using MODIS total AOD in order to evaluate the model results, however, MODIS fine-mode AOD cloud be another option for this purpose. It will be important to add some reasons why MODIS total AOD was used instead of MODIS fine-mode AOD. Otherwise, the paper is well written and I recommend for the publication in ACP after minor revisions as described below in details

Minor Comments

1. Page 23808 Section 2.2.1 Model description: How do you initialize CMAQ model?

2. Page 23809 Section 2.2.2 I believe that REAS inventory only covered up to the year 2005. How do you extend REAS emission for year 2006 ?

3. Page 23810 Section 2.2.3 Dust emissions and transport. Kim et al. (2011) reported the ADAM validation for the dust 2007. Do you have another ADAM model validation reports for the 2006 dust or more general evaluation papers?

4. Page 23819 Section 3.1 Figure 5 seems very interesting. Do you use the model and MODIS results for all model grid points? MODIS AOD sensor might have a different sensitivity over land and ocean. Is it possible to separate the symbol (or color) of data point for land and ocean grid?

5. Page 23820 Lines 10 – 14. The authors indicate the several important factors (or problems) to get the better results from CMAQ simulation. I wonder the order of importance to improve the model results.

6. Page 23823 Lines 25 – 26. From Figure 8, I cannot read this message. Sea salt seems only important wintertime over the East-China Sea and east part of Sea of Japan.

7. Page 23833 Line 5. Reference of In and Part is duplicated.

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