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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Composite study of aerosol export events from East Asia and North America" *by* Y. Luan and L. Jaeglé

Anonymous Referee #2

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This is a very well written manuscript that provides useful information on the export pathways of aerosols from East Asia and North America. This is an obvious topic to explore and I wonder why no one has done it before. Perhaps we just needed to wait for many years of reliable satellite observations, which the authors make very good use of. The paper is well suited for publication in ACP and I recommend that the paper be accepted for publication after a minor revision, according to my comments below.

Page 21979 line 2 Technically the ocean east of Asia should be referred to as the "North Pacific Ocean" here and throughout the document.

Page 21980 line 11 Another good reference that discusses summertime lofting of air pollutants and the relationship to convection and mid-latitude cyclones is Kiley and Fuelberg, 2006.

Page 21980 lines 22-23, change to Futhermore, as warm air from the polluted continental boundary layer advects over colder marine air, stable conditions with minimal vertical mixing can be produced

Page 21980 lines 24-25 change to As a result the pollution layers. . .

Page 21981 line 6, change to 25% reached the N. American West Coast.

Page 21981 lines 25-26, change to: . . .we construct composite Asian and N. American aerosol outflow events based on dozens of individual cases in order to. . ..

Page 21982 lines 15-16 If the Modis data is 1x1 degree and then regridded to 2x2.5 degrees, at most the re-gridded product contains five 1x1 grid cells. So I don't see how a 2x2.5 degree grid cell can have as many as 25 valid pixels. How many pixels are in a 1x1 degree grid cell?

Page 21982 line 16, change to This limits cloud contamination and produces statistically meaningful data. . ..

Page 21986 Here SO2 is used as a tracer of outflow events but there needs to be some discussion of the fact that SO2 emissions are decreasing in China and N. America. See Lu et al. 2010 and EPA, 2012.

Page 21989 line 1 Are the export events primarily ahead of, or behind cold fronts? Page 21991 In this section a lot of general statements are made regarding transport and emission processes but no references are given. Please give references for the following: Line 4-5 Here state that the storms are at the start of the storm tracks. Papers by Stohl or Eckhardt would be appropriate. Lines 13-14 please provide a reference that contrasts biogenic emissions in N. America and Asia. Lines 15-16 need a dust reference

Page 21992 lines 2-3 To my eye, it doesn't look like a small summer maximum. I see a broad spring/summer enhancement. Lines 3-4 Change to: meteorological conditions Lines 3-4 You could test the hypothesis of weaker seasonal contrast in meteorologi-

cal conditions across N. America by plotting seasonal average surface temperature, humidity and wind fields for both continents, using your GEOS met. fields.

Page 21992 line 11 Change to: over the Western North Atlantic Ocean

Section 4.3 Here there is a lot of discussion regarding the wet deposition of sulfate. A simple analysis that could shed some light on the wet deposition efficiency in Asia and N. America is to plot the ratio of sulfate to CO with altitude. CO is a conserved tracer that is not wet deposited. If Asia has less wet deposition, then the SO4/CO ratio should decrease with altitude at a smaller rate than above N. America. Also, it would be helpful to state that all discussion of sulfate aerosol applies to the GEOS-Chem simulation and not satellite retrievals.

Page 21996 In the discussion of long range transport of sulfate please also reference the very nice in situ measurements discussed by Brock et al. 2004.

Page 21997 lines 3-4 Measurements of Asian plumes at the US west coast also indicate that Asian pollution mixes with dust emissions [Jaffe et al., 2003; Price et al, 2003]

Figure 3 Are the letters on the x-axis supposed to be there? They are difficult to read.

Figure 11 What is the text on the right hand side of the plots? Are these data all produced by the model?

In general the figures are very tiny and hard to read and most should be enlarged by at least 20%.

REFERENCES

US Environmental Protection Agency (2012). National Emissions Inventory (NEI) Air Pollutant Emissions Trends Data (http://www.epa.gov/ttnchie1/trends/).

Kiley, Christopher M.; Fuelberg, Henry E., An examination of summertime cyclone transport processes during intercontinental chemical transport experiment (INTEX-

A), JOURNAL OF GEOPHYSICAL RESEARCH-ATMOSPHERES Volume: 111 Issue: D24 Article Number: D24S06 DOI: 10.1029/2006JD007115 Published: DEC 16 2006

Lu et al. (2010), Sulfur dioxide emissions in China and sulfur trends in East Asia since 2000, ACP, 10, 6311-6331.

Price H.U.,D.A. Jaffe,P.V.Doskey, I.McKendry,and T. L.Anderson,Vertical profiles of O3, aerosols,CO and NMHCs in the Northeast Pacific During the Trace-P and ACE-Asia experiments, J.Geophys. Res. 108 (D18), 8575, doi: 10.1029/2002JD002774, 2003.

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