**Atmospheric
Chemistry
and Physics
Discussions**

Interactive
Comment

Interactive comment on "Evaluation of a regional air quality forecast model for tropospheric NO$_2$ columns using the OMI/AURA satellite tropospheric NO$_2$ product" *by* F. L. Herron-Thorpe et al.

Anonymous Referee #2

Received and published: 14 February 2010

This manuscript presents a detailed comparison of air quality forecast model output with OMI tropospheric NO2 data for the Pacific Northwest region of the United States. In addition, comparisons are made between the NASA and KNMI versions of the OMI NO2 data. Considerable effort has been expended on averaging the model data to the OMI pixels, computing the averaging kernels for the NASA version of the OMI NO2 data, and the application of both these averaging kernels as the ones from KNMI. An interesting result is that application of the averaging kernel in areas with little cloudiness seemed to make very little if any difference in the comparison of model output with

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OMI NO2. In general, the results of the comparisons are well presented. However, the description of the methods used could use to be improved. Details are outlined below. I recommend that the manuscript be published after the improvements listed below are implemented.

Major comments: p. 27070, Eq 4: Need to explain to the reader why ZH_i is subtracted from ZF_i.

p. 27071, lines 2-7: Need to specify that this is the method used by NASA's standard retrieval. Please add an explanation of what KNMI does for the stratosphere.

p. 27071 line 24 through p. 27072 line 9: Need to better explain the overall process of acquiring and employing the averaging kernels. You never say explicitly in this paragraph that you computed the averaging kernels appropriate for the NASA version of the data. Please say that before you mention "We employed the OMI (NASA) averaging kernel....." in line 27. In line 1, you say "This method uses...." without it being clear what method you are talking about. I assume you mean the method of calculating the averaging kernels. Please clarify.

p. 27076, line 24: Here it says that the fire emissions come from something less reliable than Blue Sky, whereas p. 27067, line 25 says the fire emissions do come from Blue Sky. Please make these statements consistent. If something other than Blue Sky fire emissions was used, please explain what it was.

p. 27078, lines 18-20: I don't understand this statement. If for the same value of the total column NO2 the stratospheric component is larger, then the residual is going to be smaller.

Minor Comments: p. 27064, lines 4-6: move "(R=0.75" up to after the word "correlated" and move "(R=0.21)" to earlier in the same line after the word "correlated".

p. 27066, lines 1-2: this is true for the KNMI version, but not for the NASA version.

p. 27066, line 6: change AURA to Aura

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p. 27069, line 17: "spatially averaging the AIRPACT grid to the pixels within the the daily OMI swaths"

p. 27072, line 3, Where should the (Bucsela, 2008) reference be placed? With the previous sentence?

p. 27078, line 22, What does "NASA timelines show a clear anticorrelation with season" mean?

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 27063, 2009.