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Discussions

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Interactive comment on "Understanding and improving model representation of aerosol optical properties for a Chinese haze event measured during KORUS-AQ" *by* Pablo E. Saide et al.

Anonymous Referee #2

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This manuscript provides a detailed analysis of how well a model simulation of a pollution event in the vicinity of the Korean peninsula compares with detailed in situ and remote sensing measurements. The authors do a good job of making use of available airborne, surface, and remote-sensing data sets and multiple model configurations to carefully consider why there was a mismatch between modeled and measured aerosol optical depth (which agreed well) and aerosol mass concentrations (which disagreed by a factor of ~2). This is an important issue; many of the same parameterizations and assumptions found in the high-resolution WRF-Chem model are also used in global chemistry-climate models that estimate aerosol-cloud and aerosol-radiation interactions. Thus careful analysis of detailed case such as this can result in improvements

in model performance for climate studies. And improved model performance to better predict aerosol-health effects is also an extremely important topic. Thus this paper is of interest to a broad spectrum of ACP readers and is entirely appropriate for publication there.

The paper is quite thorough, well written, and clear. I especially appreciate the effort the authors have gone to appropriately compare the model output with the measurements, for example by applying the AMS sampling efficiency curve to the modeled size distributions. The sensitivity of the results to model bin width and to assumptions about hygroscopicity and modal width are important and are especially well described and highlighted. There are few small clarifications needed, as described below. After these minor edits, the paper should be ready for final publication.

Minor Comments:

1) Line 102: Extra space at the end of the sentence. Please run a spell checker to find other small typographic errors that persist. Also please look for occasional random capitalizations of nouns. 2) Line 175: Explain what the "NASA DC-8" is. 3) Fig. 4. The grey trace showing rubidium obscures the underlying BC and OA traces. Can you lighten this or show it as dots rather than as a shaded region? Also please make one of the other traces a dashed line to accommodate color-blind readers. Please check other figures for the same issues. 4) Fig. 9e, the left-most box-and-whisker plot showing measured SSA is off-scale. 5) Fig. 10a, the axis label says "mass extinction efficiency" but the caption says "volume extinction efficiency". I also recommend you plot these parameters on a log scale on the x-axis, as for the other graphs showing size-dependent aerosol properties such as size distribution. 6) On Figs. 8 and 12, you may want to divide the bar height by the logarithmic bin width to put these size distributions on a dN/dlogDp scale. You then don't have to change the y-axis scale and the reader can see that the re-binning conserves the size distribution number.

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