



Supplement of

Impact of high-resolution a priori profiles on satellite-based formaldehyde retrievals

Si-Wan Kim et al.

Correspondence to: Si-Wan Kim (siwan.kim@noaa.gov)

The copyright of individual parts of the supplement might differ from the CC BY 4.0 License.

List of Figures

Figure S1. Spatial distributions of AMFs from RT model calculations for HCHO retrieval at 19 UTC (12 PDT) in the LA Basin: (a) AMF in the control case (CTL) using top-down VOC emissions, (b) same as CTL except for constant surface pressure, and (c) same as CTL except for NEI11 VOC emission inventory.

Figure S2. Histogram of (left) differences between the default AMF and the AMF derived using constant surface pressure, and (right) differences between the default AMF and the AMF derived using the NEI11 inventory (with lower VOC emissions than our default inventory) at 19 UTC (12 PDT).

Figure S3. Comparison of the AMF in the OMI operational product (filled square at the center of the OMI swath) with the AMF from this study. An OMI pixel is 24 km x 13 km at nadir and the pixel size increases on either side of this point. The OMI AMF is about 1 on average (blue colors in the color scale used here).

Figure S4. Vertical profiles of HCHO number density are shown for various point of interest, similar to Figure 4 in the main manuscript.

Figure S5. Diurnal variations (06 PDT to 16 PDT) of vertical profiles of HCHO mixing ratio, potential temperature, wind speed, and wind direction over the North Pacific Ocean region.

Figure S6. Vertical profiles of HCHO number density averaged for the AMF value intervals (shown in the legends) at 16, 19, and 22 UTC (left to right) as a function of altitude above ground level. Thick lines with symbols are averages and thin dotted lines are one standard deviations. This figure is similar to Figure 5 in the main manuscript except that HCHO number density is shown instead of mixing ratio.

Figure S7. The relationship between the HCHO AMF and model HCHO volume mixing ratio at ~ 200 m altitude. Different colors denote different times. This figure is similar to Figure 6 in the main manuscript except that HCHO number density is shown instead of HCHO mixing ratio.

Figure S8. (Top) AMF at 8 sites in the domain at 9, 12, and 15 PDT without/with aerosol impacts. Filled (open) square denote AMF with (without) aerosol impacts. (Bottom) changes in AMF (%) with time. Black (red) open square denotes changes of AMF between 9 and 12 PDT (15PDT).



Figure S1. Spatial distributions of AMFs from RT model calculations for HCHO retrieval at 19 UTC (12 PDT) in the LA Basin: (a) AMF in the control case (CTL) using top-down VOC emissions, (b) same as CTL except for constant surface pressure, and (c) same as CTL except for NEI11 VOC emission inventory.



Figure S2. Histogram of (left) differences between the default AMF and the AMF derived using constant surface pressure, and (right) differences between the default AMF and the AMF derived using the NEI11 inventory (with lower VOC emissions than our default inventory) at 19 UTC (12 PDT).



Figure S3. Comparison of the AMF in the OMI operational product (filled square at the center of the OMI swath) with the AMF from this study. An OMI pixel is 24 km x 13 km at nadir and the pixel size increases on either side of this point. The OMI AMF is about 1 on average (blue colors in the color scale used here).



Figure S4. Vertical profiles of HCHO number density are shown for various point of interest, similar to Figure 4 in the main manuscript.



Figure S5. Diurnal variations (06 PDT to 16 PDT) of vertical profiles of HCHO mixing ratio, potential temperature, wind speed, and wind direction over the North Pacific Ocean region.



Figure S6. Vertical profiles of HCHO number density averaged for the AMF value intervals (shown in the legends) at 16, 19, and 22 UTC (left to right) as a function of altitude above ground level. Thick lines with symbols are averages and thin dotted lines are one standard deviations. This figure is similar to Figure 5 in the main manuscript except that HCHO number density is shown instead of mixing ratio.



Figure S7. The relationship between the HCHO AMF and model HCHO volume mixing ratio at ~ 200 m altitude. Different colors denote different times. This figure is similar to Figure 6 in the main manuscript except that HCHO number density is shown instead of HCHO mixing ratio.



Figure S8. (Top) AMF at 8 sites in the domain at 9, 12, and 15 PDT without/with aerosol impacts. Filled (open) square denote AMF with (without) aerosol impacts. (Bottom) changes in AMF (%) with time. Black (red) open square denotes changes of AMF between 9 and 12 PDT (15PDT).