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Supplement of

Assessing Measurements of Pollution in the Troposphere (MOPITT) carbon monoxide retrievals over urban versus non-urban regions

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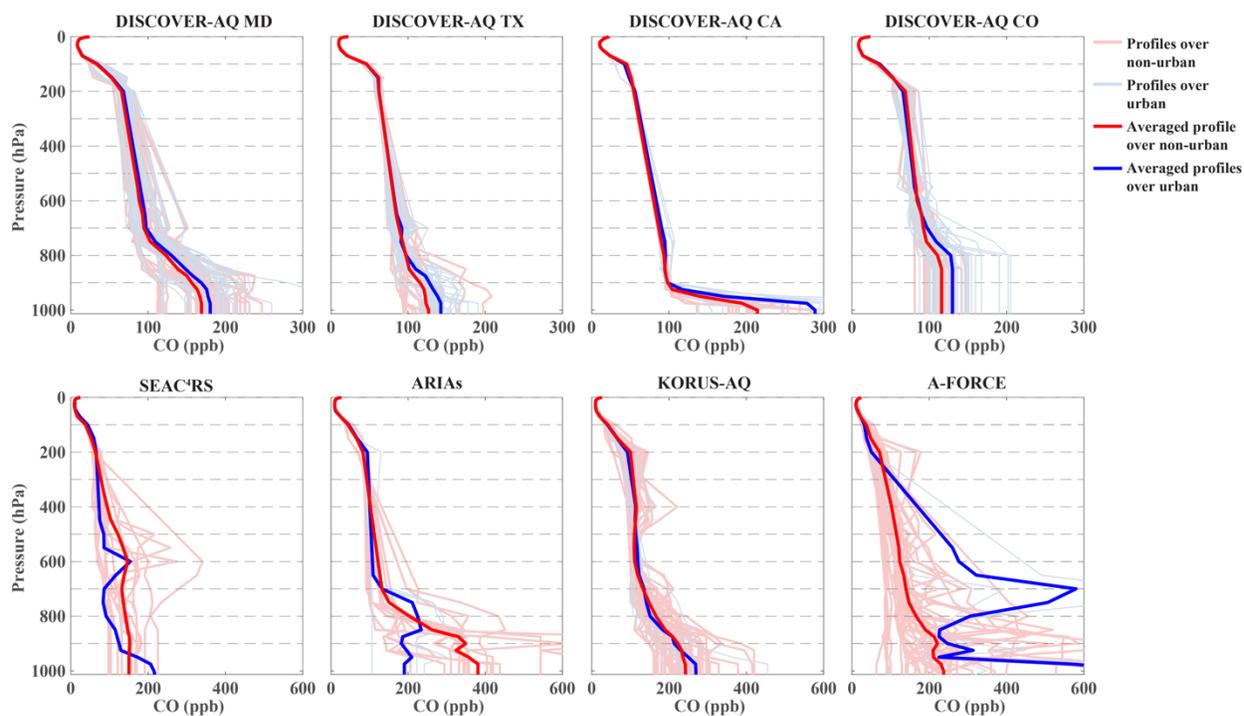


Figure S1. Vertical aircraft profiles over urban (blue) and non-urban regions (red) during the DISCOVER-AQ, SEAC⁴RS, ARIAs, A-FORCE, and KORUS-AQ campaigns.

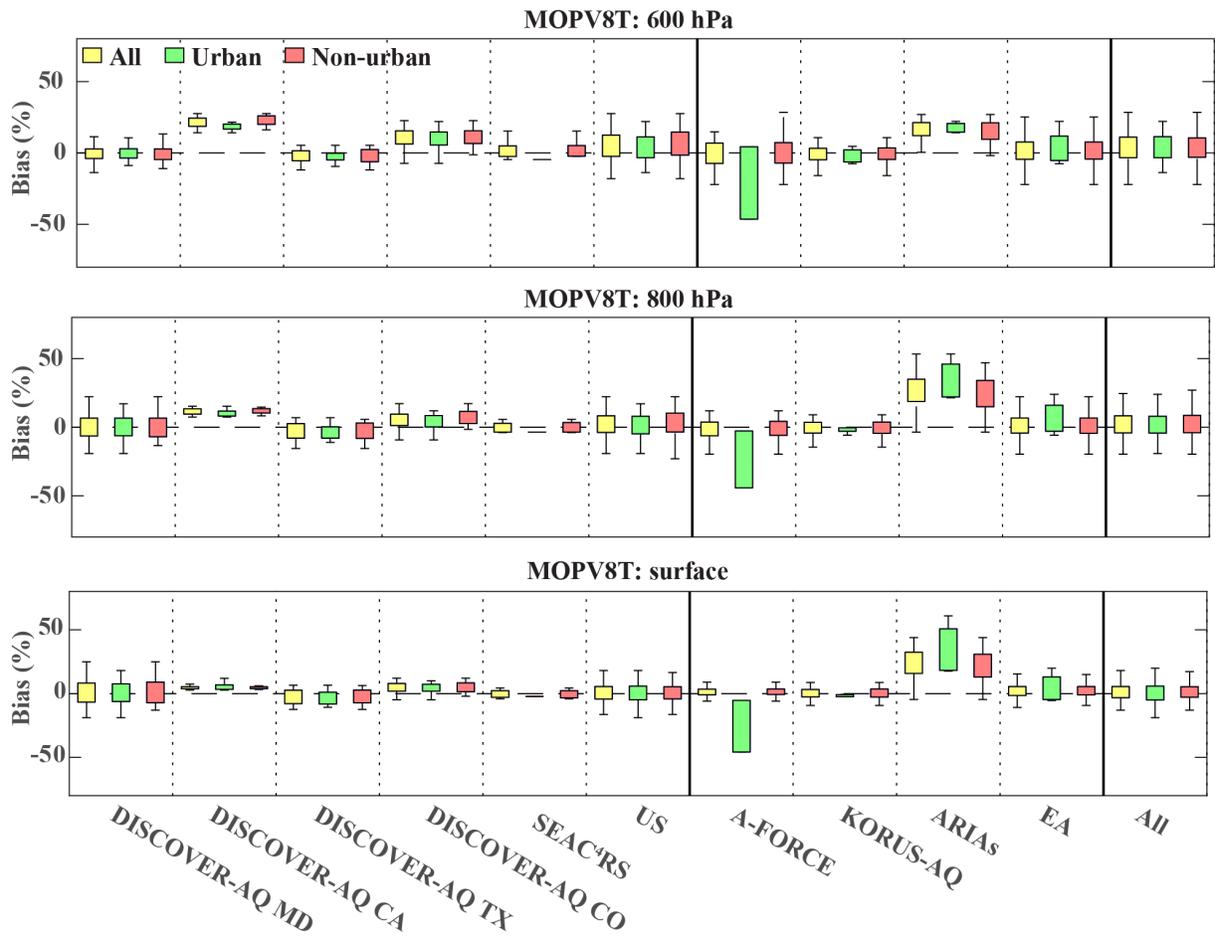


Figure S2. Same as Figure 6 but for MOPITT V8T.

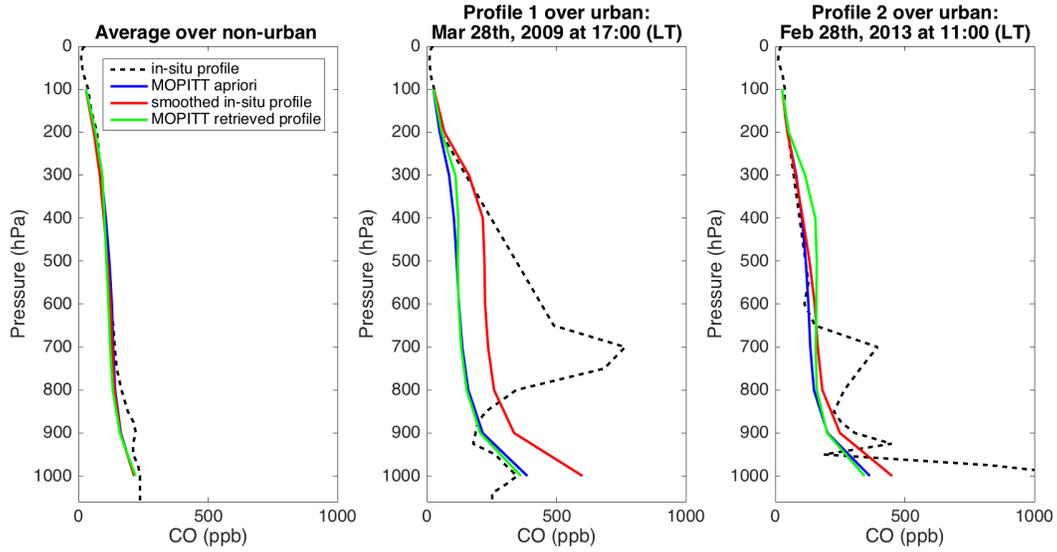


Figure S3. Averaged in-situ profiles (combination of aircraft and reanalysis data as described in Section 2.3), MOPITT a priori profiles, smoothed in-situ profiles, and MOPITT retrieved profiles over non-urban regions and two individual profiles over urban regions during the A-FORCE campaign.

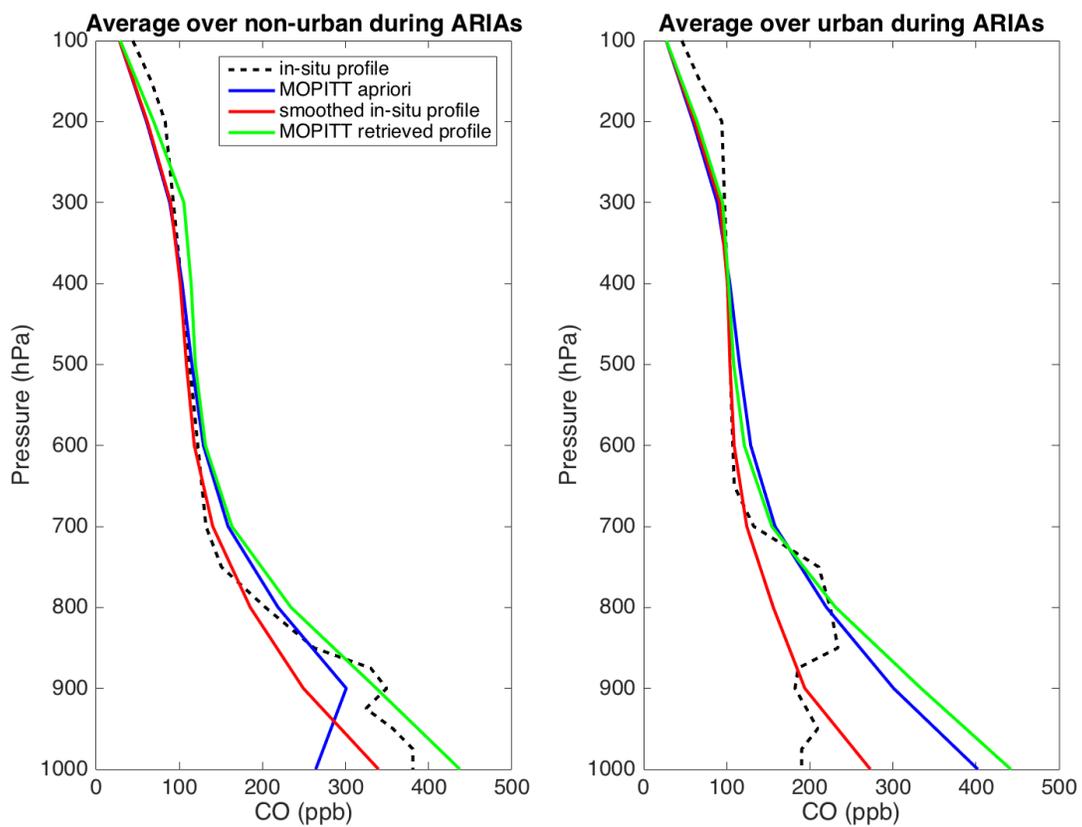


Figure S4. Averaged in-situ profiles, MOPITT a priori profiles, smoothed in-situ profiles, and MOPITT retrieved profiles over non-urban regions and urban regions during the ARIAs campaign.

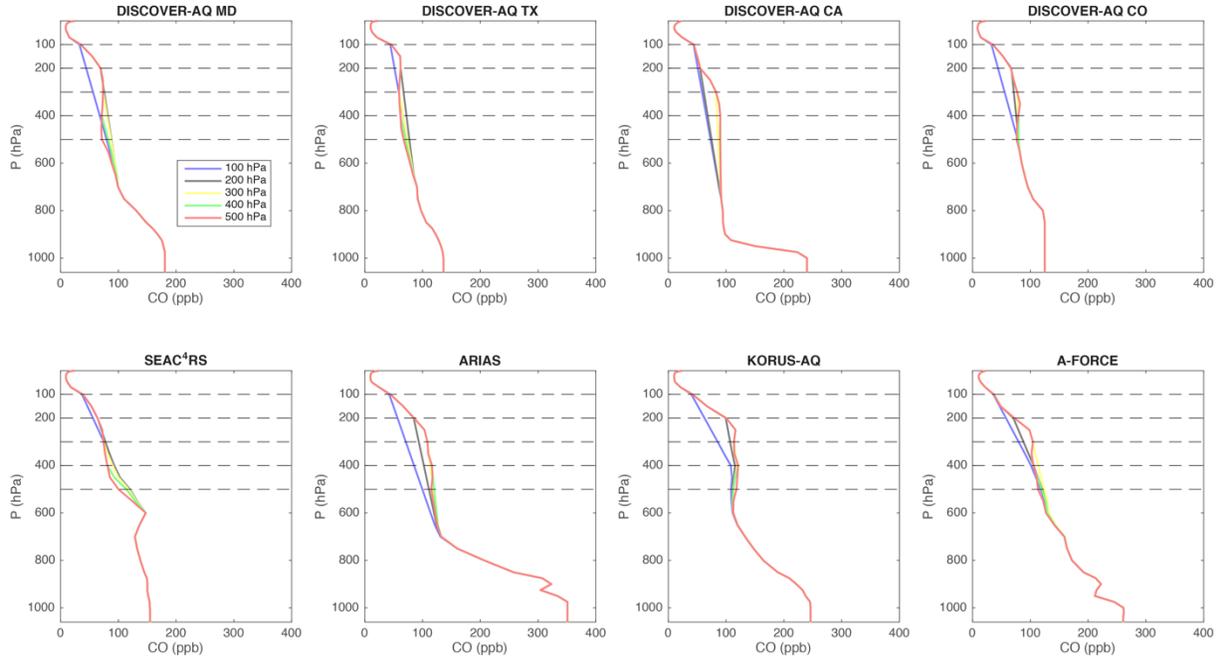


Figure S5. Averaged in-situ profiles (combination of aircraft and reanalysis data as described in Section 2.3) under different assumptions of P_{interp} . For pressure levels below P_{interp} (lower altitude), values are linearly interpolated using the highest-altitude aircraft measurement and reanalysis data at P_{interp} . For pressure levels above P_{interp} (higher altitude), reanalysis data are used directly. For P_{interp} equals 100 hPa, 200 hPa, 300 hPa, 400 hPa, and 500 hPa, the corresponding averaged in-situ profiles are shown by the blue, gray, yellow, green, and red lines, respectively. Taking the P_{interp} equal to 100 hPa (blue line) as an example: for pressure levels below 100 hPa but above the highest-altitude aircraft measurement, the CO values are filled by linear interpolation between CO values at the highest-altitude aircraft measurement and reanalysis data at 100 hPa; for levels above 100 hPa, CO values from reanalysis data are added to the in-situ profile directly.

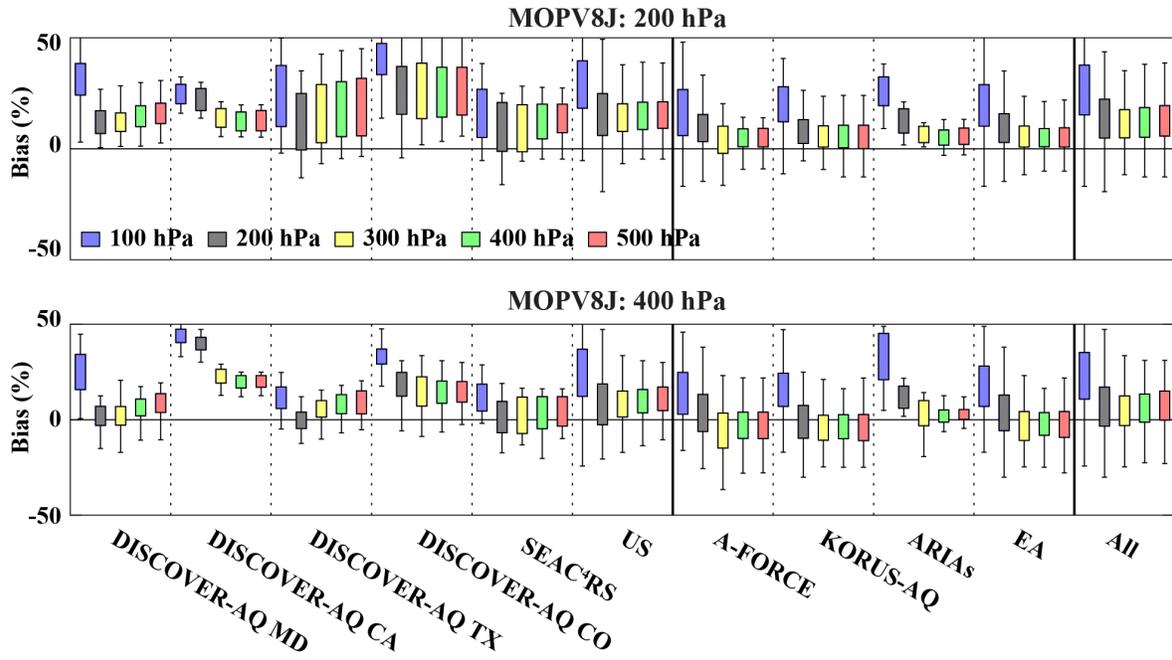


Figure S6. Same as Figure 8 but for 200 hPa and 400 hPa.

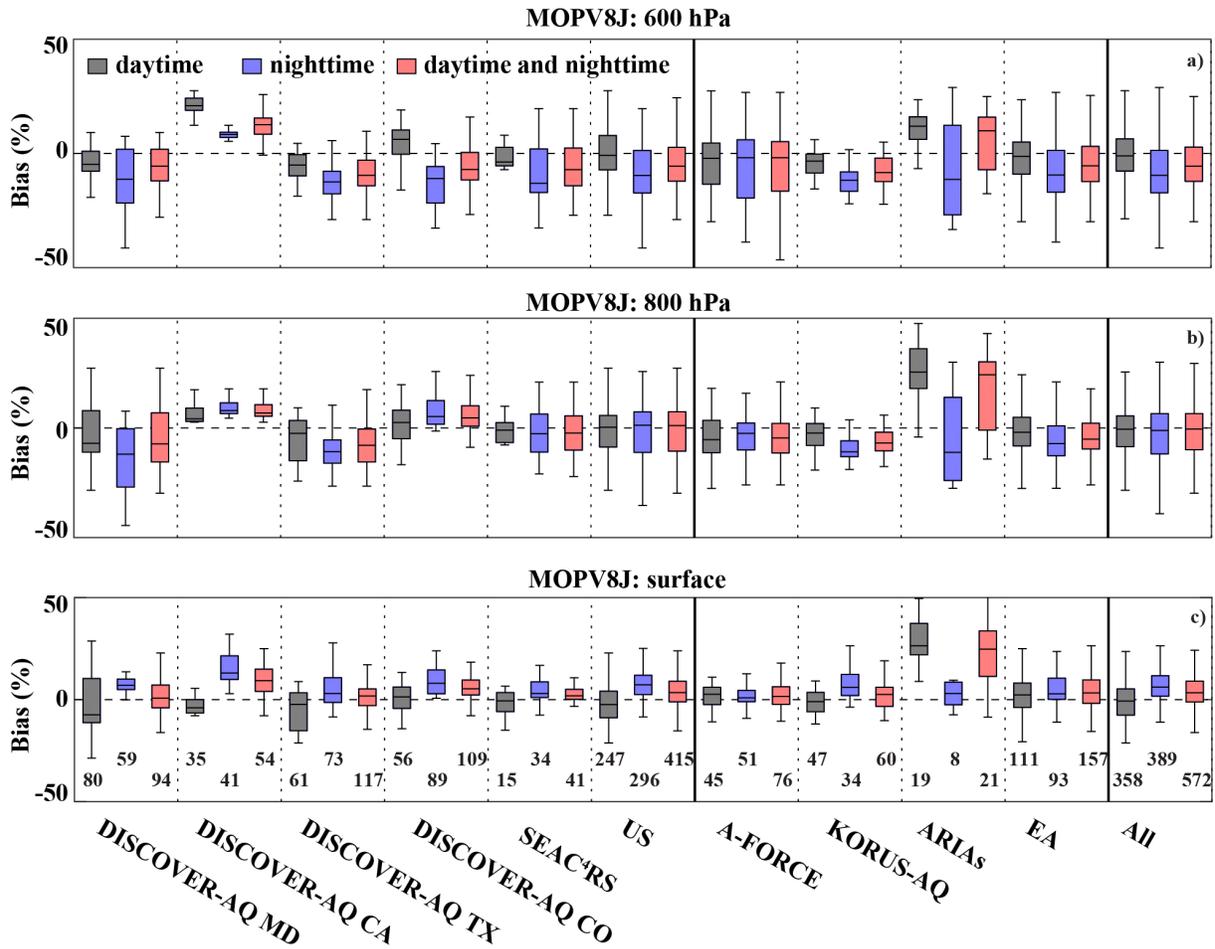


Figure S7. Sensitivity to the inclusion of nighttime MOPITT. Biases (%) for MOPITT daytime retrievals (gray), MOPITT nighttime retrievals (blue), and both MOPITT daytime and nighttime retrievals (red) at 600 hPa (panel a), 800 hPa (panel b), and the surface (panel c) are shown by boxplot (with medians represented by middle bars, interquartile ranges between 25th and 75th percentiles represented by boxes, and the most extreme data points not considered outliers represented by whiskers). The numbers in panel c correspond to the number of in-situ profiles qualified for validation when only use MOPITT daytime retrievals, night retrievals, or both daytime and night retrievals.