

Supplementary Information for

First observation of tropospheric nitrogen dioxide from the Environmental trace gases Monitoring Instrument onboard the GaoFen-5 satellite

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Supplementary Figures

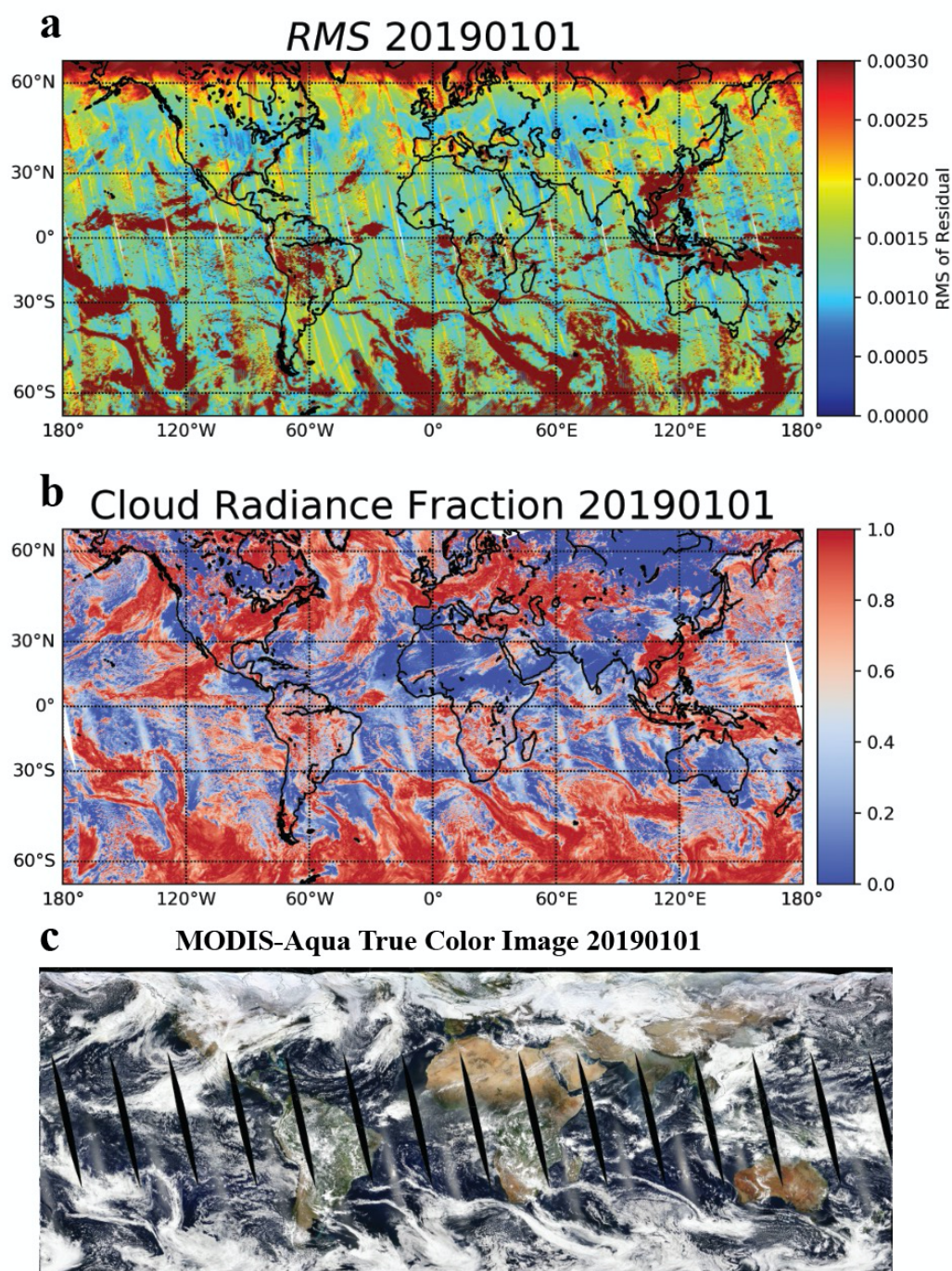


Figure S1. The root mean square of the spectra fitting residual during EMI NO₂ retrieval, cloud radiance fraction from TROPOMI cloud products, and corrected reflectance true color image by MODIS-Aqua on 1 January 2019 were shown in (a), (b), (c), respectively.

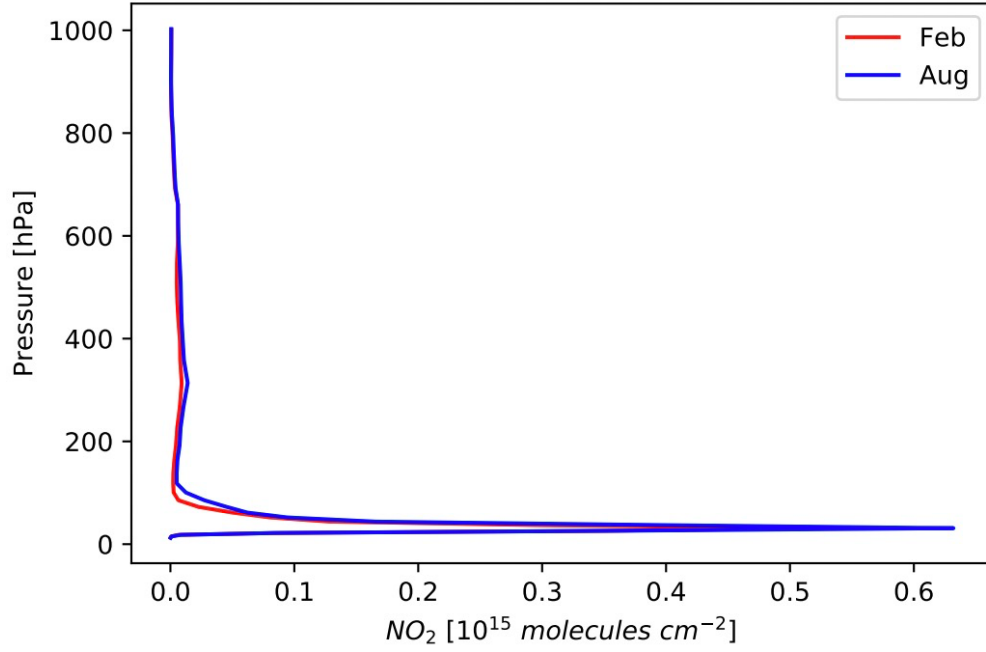


Figure S2. Monthly mean NO₂ profiles simulated by the GEOS-Chem at 15°N, 160°E, remote pacific for February and August 2019.

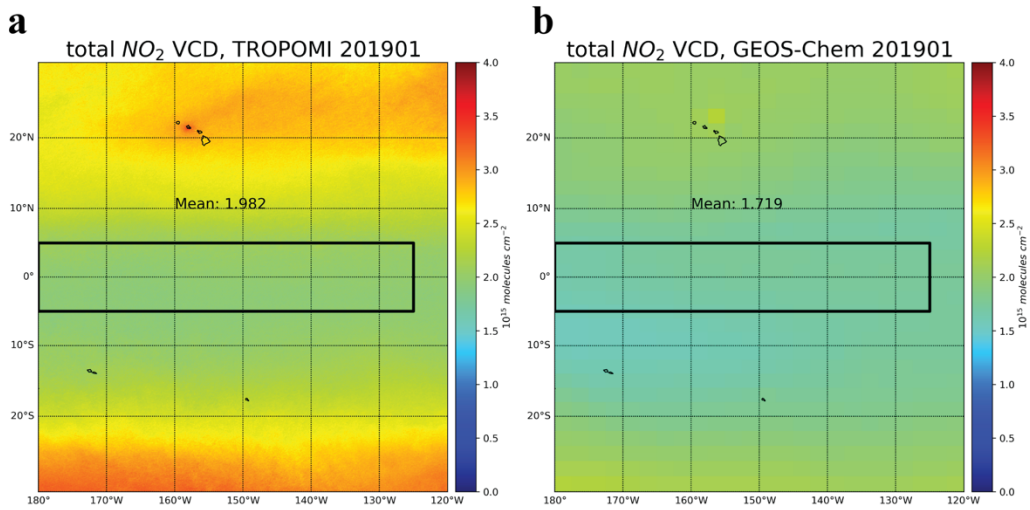


Figure S3. The total NO₂ VCD averaged during January 2019 from (a) TROPOMI observations and (b) GEOS-Chem simulations. The black rectangle denotes the reference sector region for earthshine reference selection. And the corresponding mean value of NO₂ VCD over this region are noted in text.

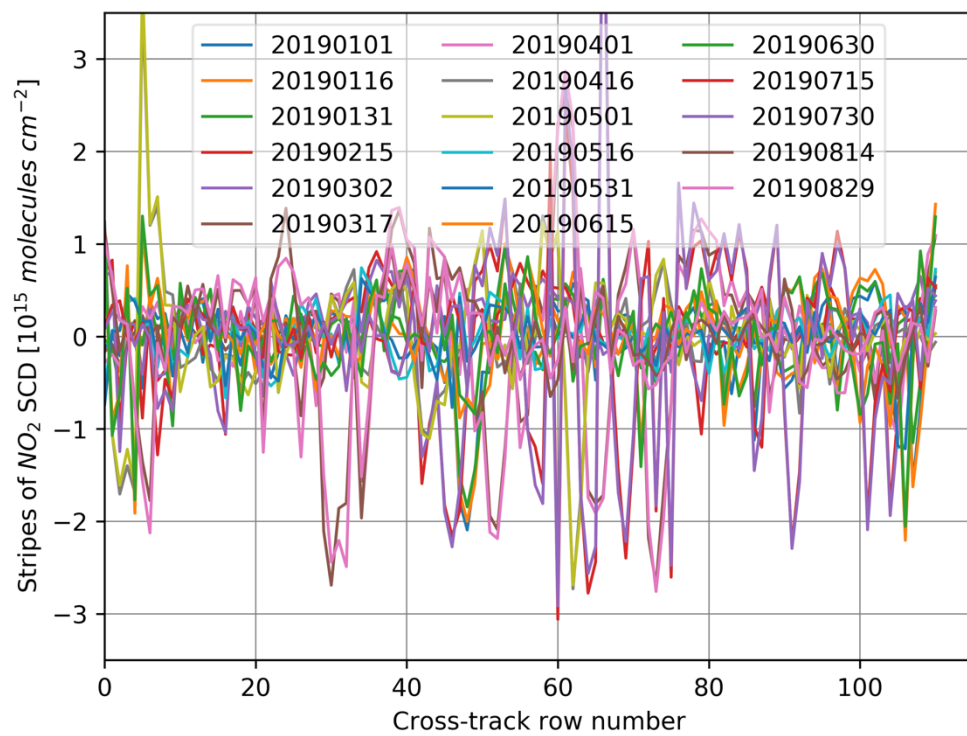


Figure S4. The cross-track bias, i.e., stripes, of EMI NO₂ SCDs. The stripe patterns for different day are shown with different color.

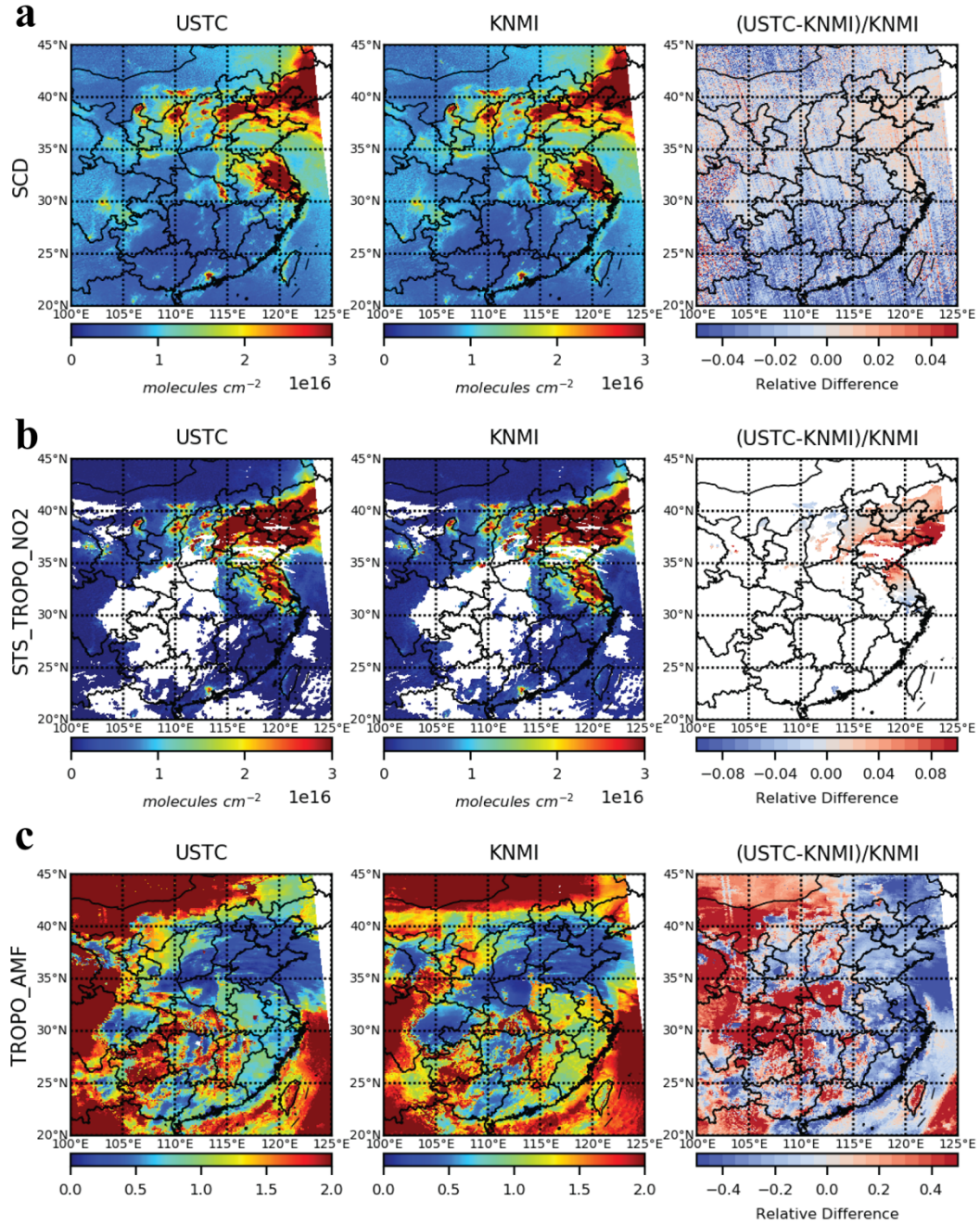


Figure S5. Comparisons of NO₂ SCDs retrieval (a), tropospheric NO₂ retrieval using different stratospheric-tropospheric separation (STS) methods (b), and tropospheric NO₂ AMFs (c) between the EMI NO₂ retrieval algorithm and the operational TROPOMI NO₂ product for TROPOMI measurement on 18 January, 2019. Results from EMI NO₂ algorithm are labeled as USTC (in left panel), while the operational TROPOMI NO₂ are labeled as KNMI (in central panel). The relative differences between two are shown in the right panel. Note that for STS method, USTC algorithm also used AMF and SCD results from the operational NO₂ datasets. Cloudy scenes and unpolluted regions (i.e., cloud radiance fraction larger than 0.5 and tropospheric NO₂ column greater than 2.0×10^{16} molecules cm^{-2}) are masked by white in (b).

Comparisons of daily NO_2 V_{tropo} from EMI, TROPOMI, and MAX-DOAS

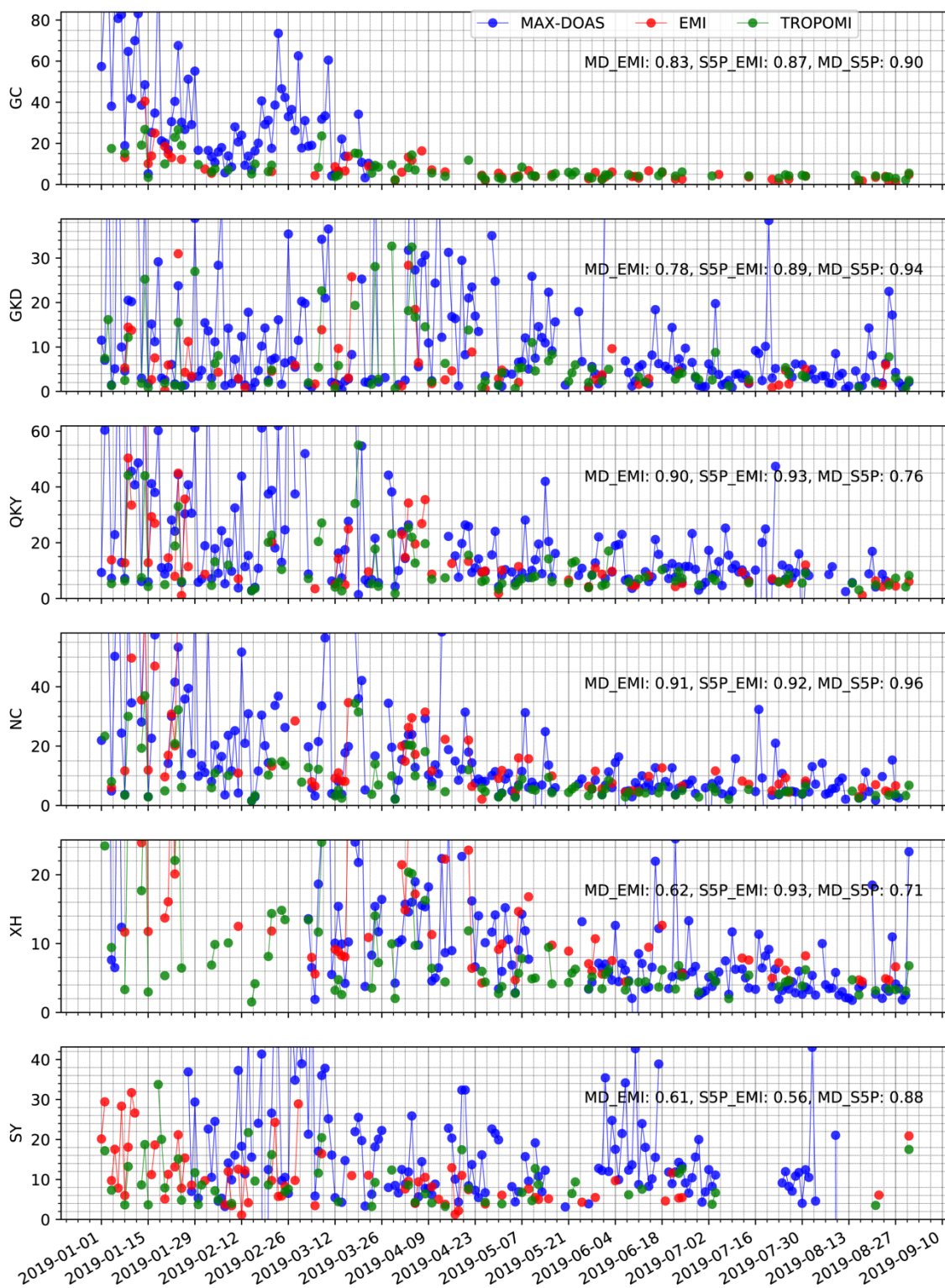


Figure S6. Similar to Fig. 7, but for daily series comparisons between tropospheric NO_2 VCD retrievals from the EMI, TROPOMI/S5P, and the MAX-DOAS instruments. The correlation coefficients (R) between either two of these measurements are indicated by the text.

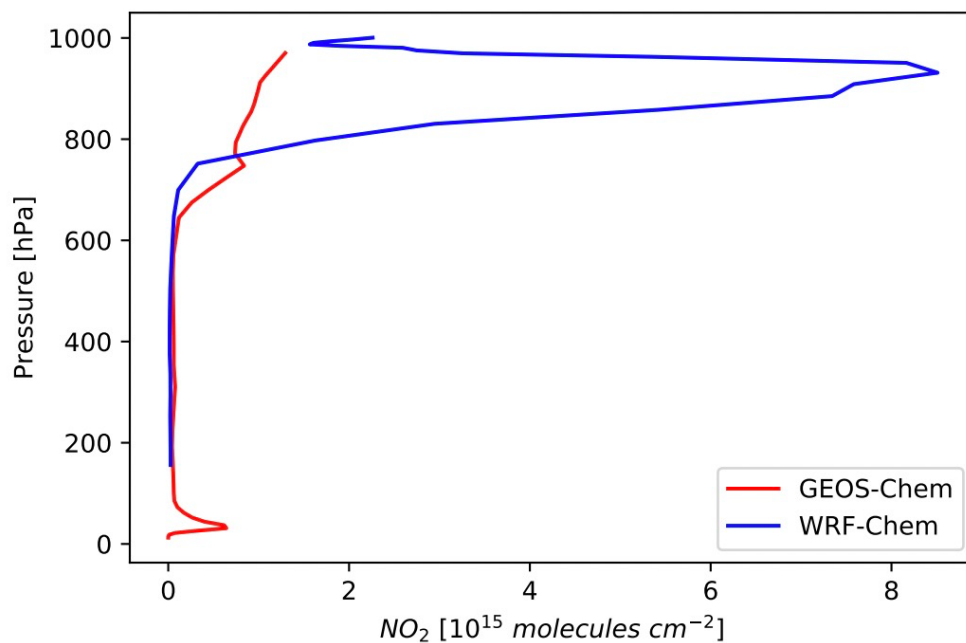


Figure S7. Comparisons of monthly mean NO₂ profiles simulated by the GEOS-Chem and WRF-Chem models. The location is selected at Beijing center for June 2019.