# Supplementary materials for “High ozone concentrations observed along the Persian Gulf coast by Ozone Monitoring Instrument”

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Fig. S1. Locations where the $\Delta O_3$ (units: DU km$^{-1}$) in the 24th layer of OMI during June–September exceeded 2.0 DU km$^{-1}$.

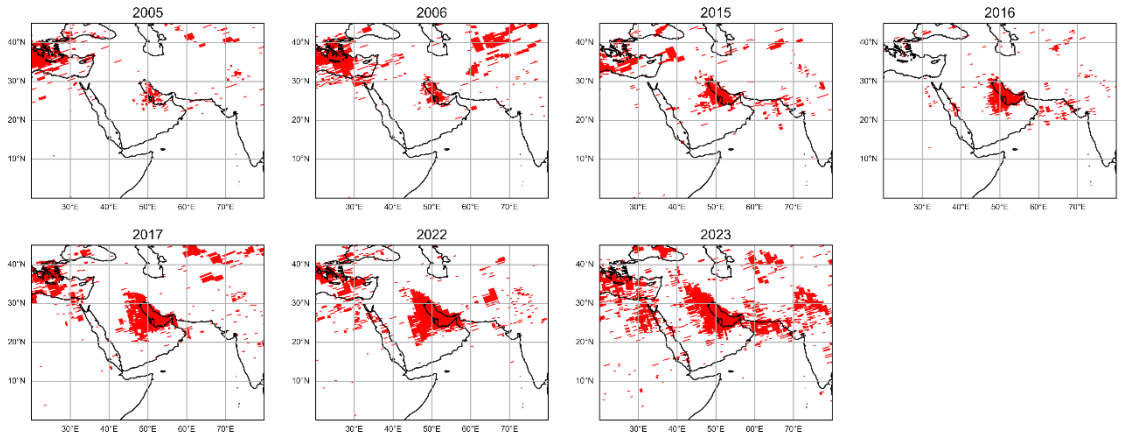


Fig. S2. Map showing the total number of observation points where $\Delta O_3$ exceeded 2.0 DU $km^{-1}$ within the target area over a seven-year period (2005–2006, 2015–2016–2017, and 2022–2023) for each month.

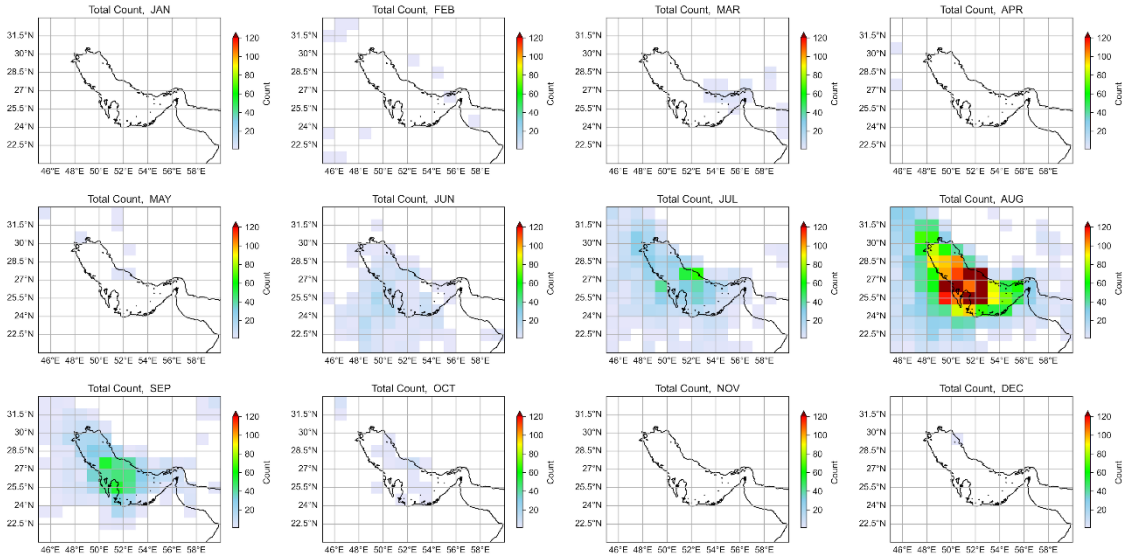
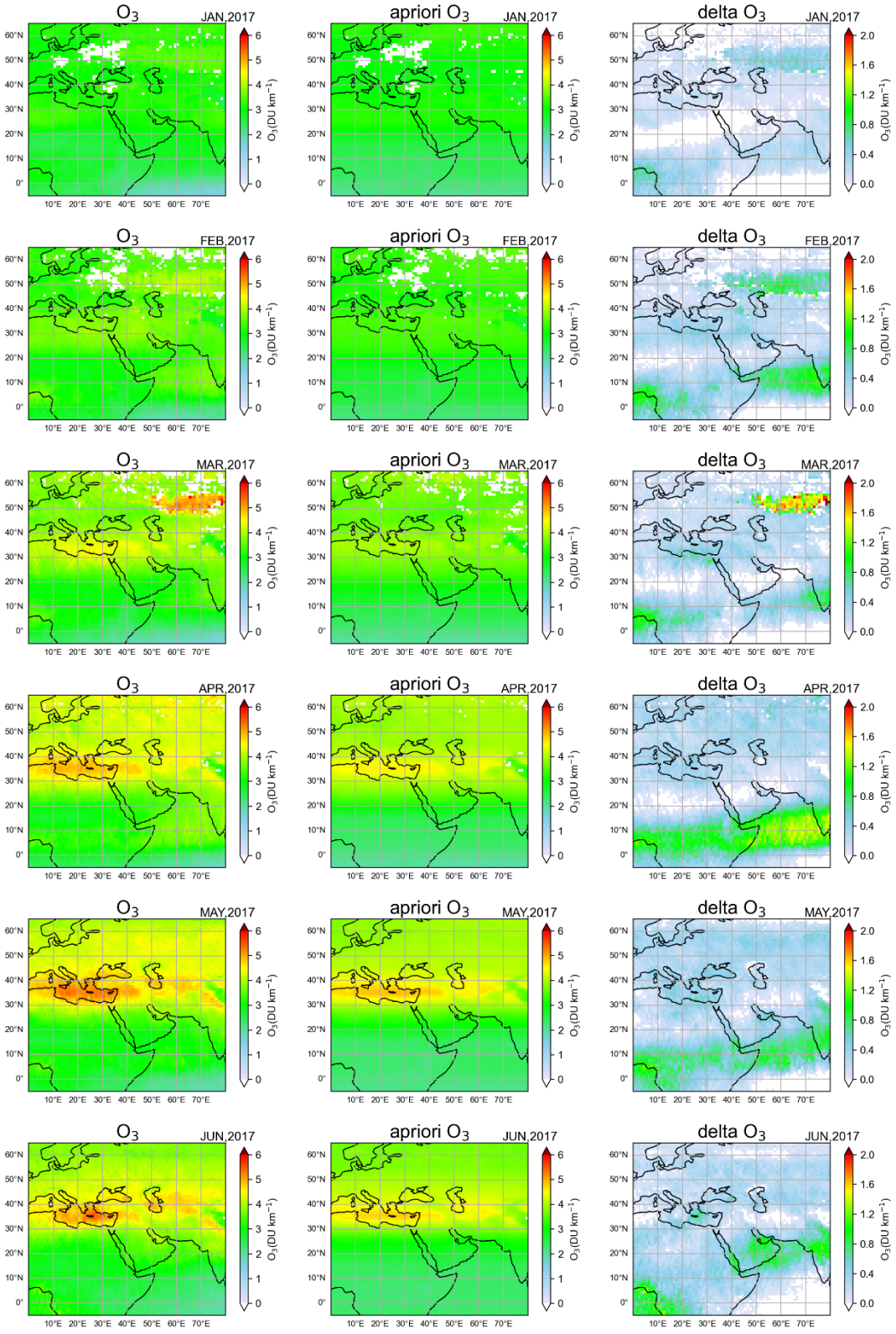


Fig. S3. (left) Monthly average ozone (DU km$^{-1}$) in the lowest layer (approximately 0-3 km) in 2017 from January to December, (middle) a priori ozone (DU km$^{-1}$) for the same months as (left), and (right) ΔO3 (DU km$^{-1}$) for the same months as (left).



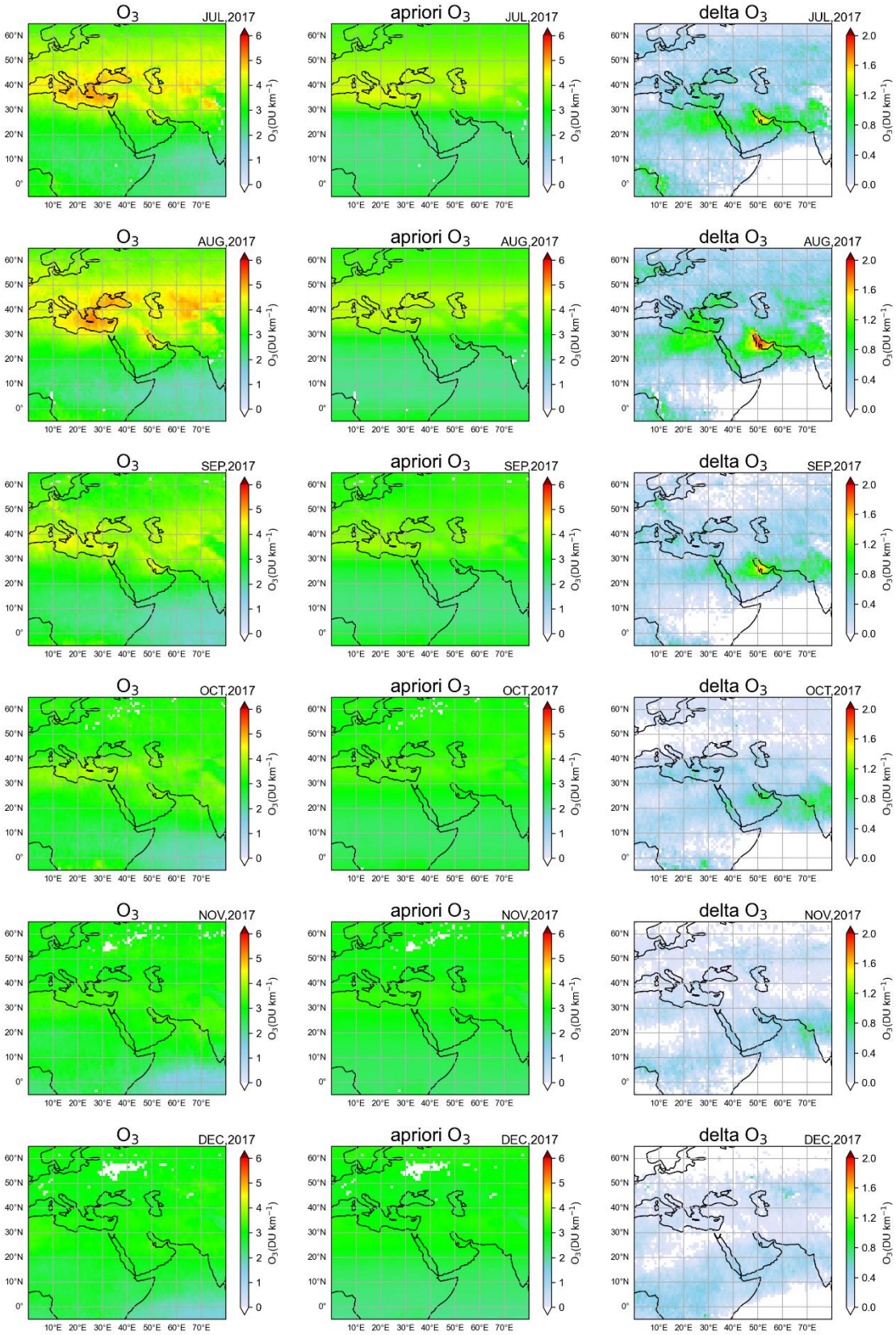

O3 JUL,2017
apriori O3 JUL,2017
delta O3 JUL,2017
O3 AUG,2017
apriori O3 AUG,2017
delta O3 AUG,2017
O3 SEP,2017
apriori O3 SEP,2017
delta O3 SEP,2017
O3 OCT,2017
apriori O3 OCT,2017
delta O3 OCT,2017
O3 NOV,2017
apriori O3 NOV,2017
delta O3 NOV,2017
O3 DEC,2017
apriori O3 DEC,2017
delta O3 DEC,2017
60°N 50°N 40°N 30°N 20°N 10°N 0°
10°E 20°E 30°E 40°E 50°E 60°E 70°E
O3(DU km−1)
0 1 2 3 4 5 6
0.0 0.4 0.8 1.2 1.6 2.0

Fig. S4. Monthly average ozone concentrations (DU) integrated in the 0–3 km altitude at airports where IAGOS observations were conducted other than Kuwait City. (a) Damman, (b) Bahrain, (c) Doha, (d) Abu Dhabi, (e)Dubai, (f) Fujairah, (g) Muscat, (h) Riyadh. The horizontal axis represents months, and the vertical axis represents years from top to bottom: 2005, 2015, 2016, 2017, and 2022.

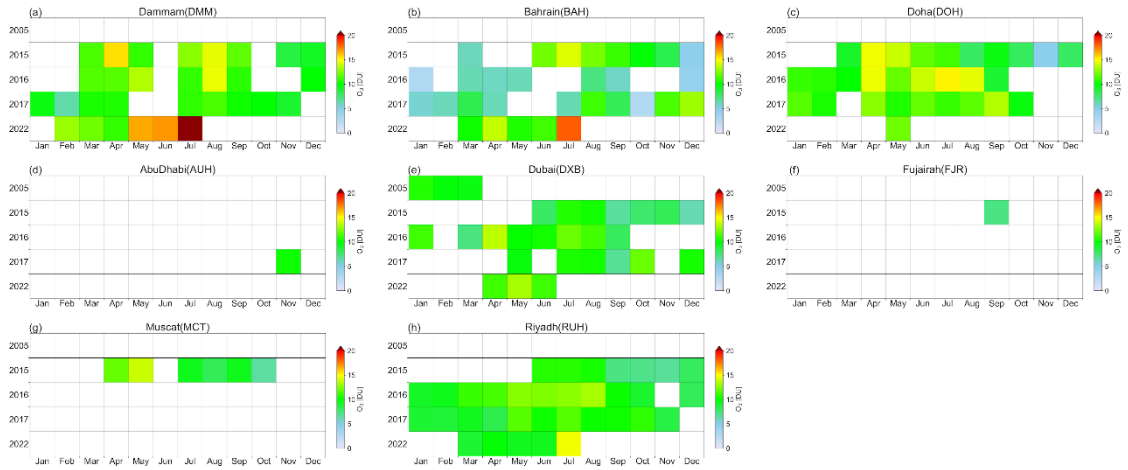


Fig. S5. Ozone profile (red), CO (green), $H_2O$ (light blue), and temperature (purple) observed by IAGOS at Bahrain on July 22, 2015, at 13:54 LT. The scales at the top and bottom of the graph are in the same colors with the lines. The OMI a priori and retrieval ozone values for the matching pairs are shown in dashed blue line and solid light green, respectively. The IAGOS observation time (13:54 LT) is very close to OMI's 13:45. The difference in observation locations was 13.9 km. OMI's layers 22, 23, and 24 correspond to approximately 6–9, 3–6, and 0–3 km, respectively. The values shown in dashed yellow are the average of the IAGOS ozone profile averaged for each OMI layer.

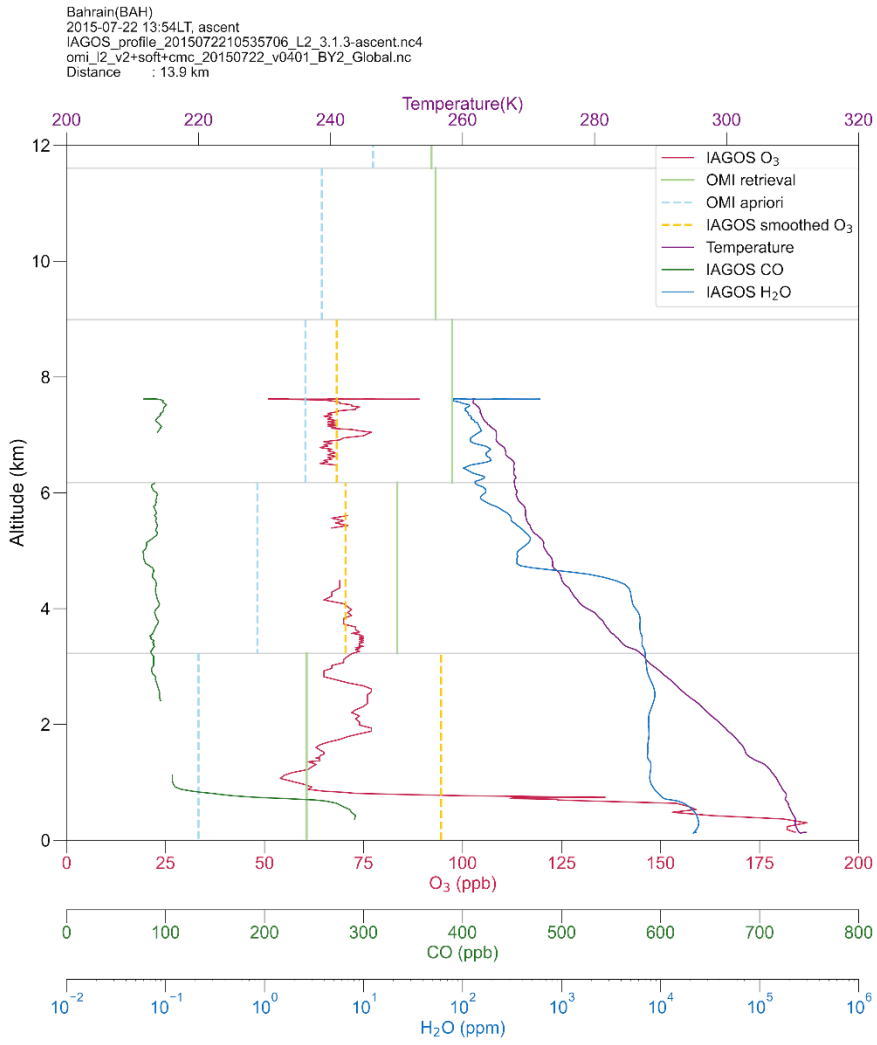


Table S1.

Abbreviations and their full names of satellite sensors in the manuscript.

| Abbreviation | Full name of satellite sensor |
|---|---|
| GEMS | Geostationary Environment Monitoring Spectrometer |
| GOME | Global Ozone Monitoring Experiment |
| GOME-2 | Global Ozone Monitoring Experiment-2 |
| OMI | Ozone Monitoring Instrument |
| OMPS | Ozone Mapping and Profiler Suite |
| TEMPO | Tropospheric Emissions: Monitoring of Pollution |
| TES | Tropospheric Emission Spectrometer |
| TROPOMI | Tropospheric Monitoring Instrument |