

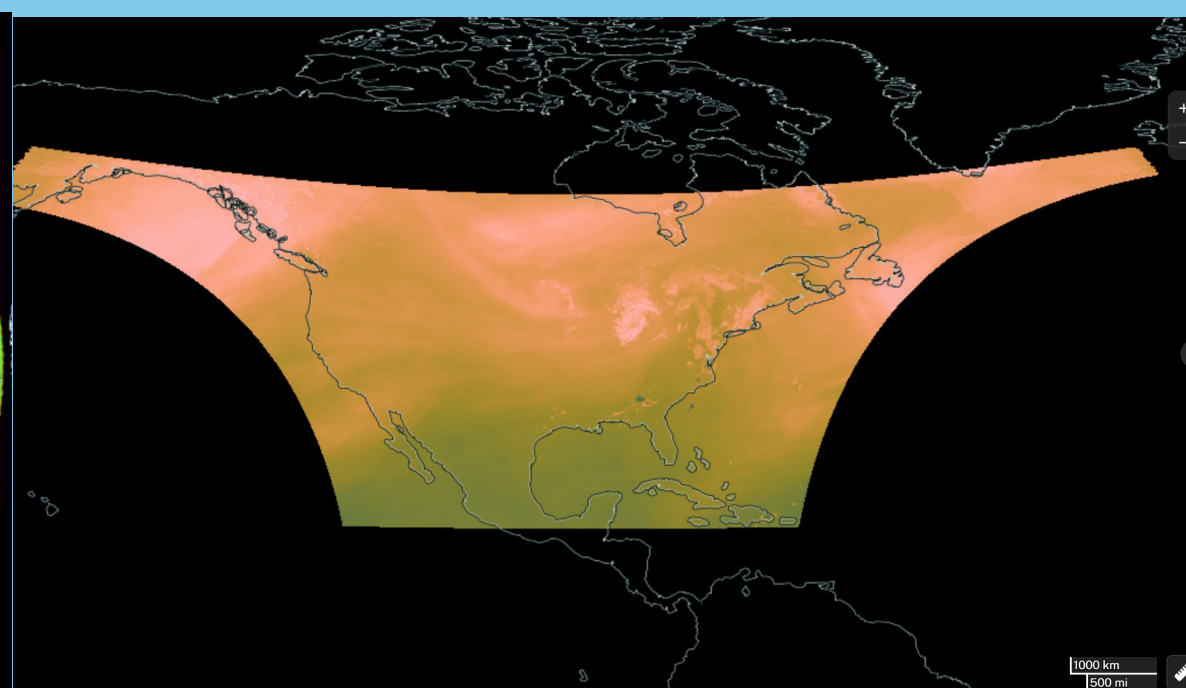
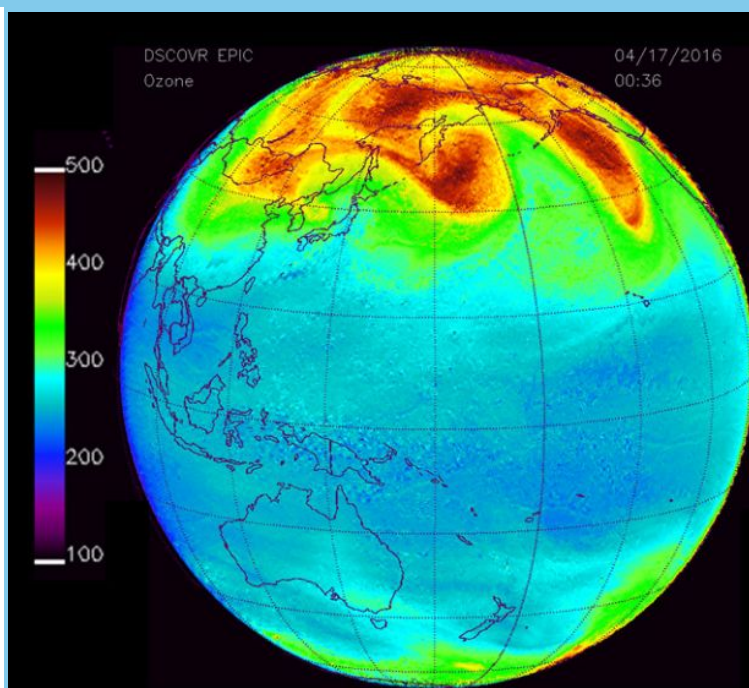
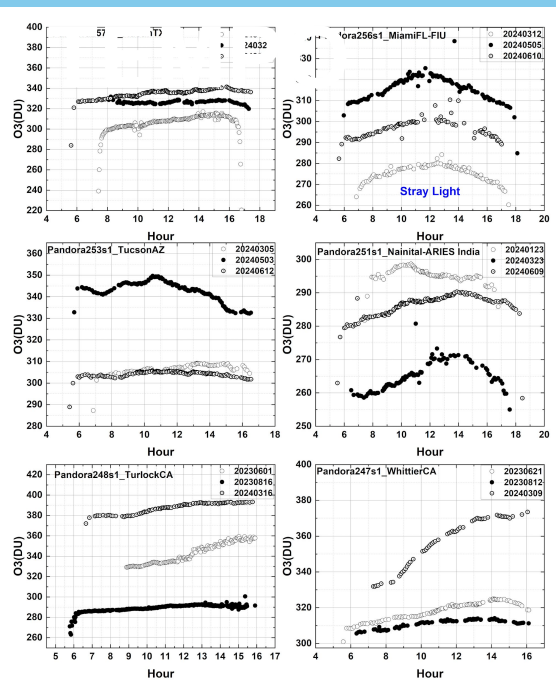
Validation of DSCOV-EPIC Total Column O₃ Retrievals Using Ground-based Pandora and Satellite Data from OMI and TEMPO

Seasonal Variation of Total Column Formaldehyde, Nitrogen Dioxide Over Various Pandora Spectrometer Sites with a Comparison of OMI

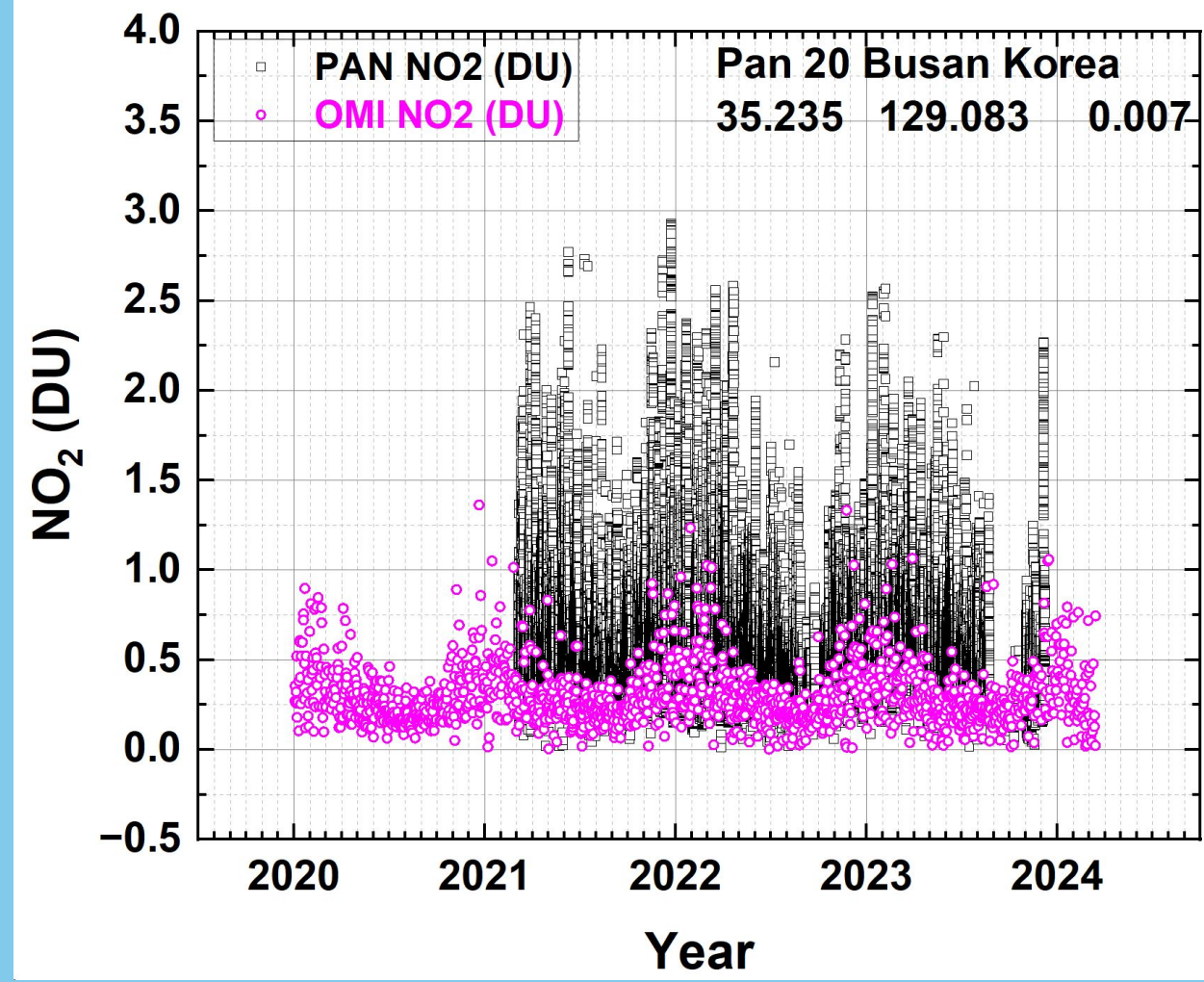
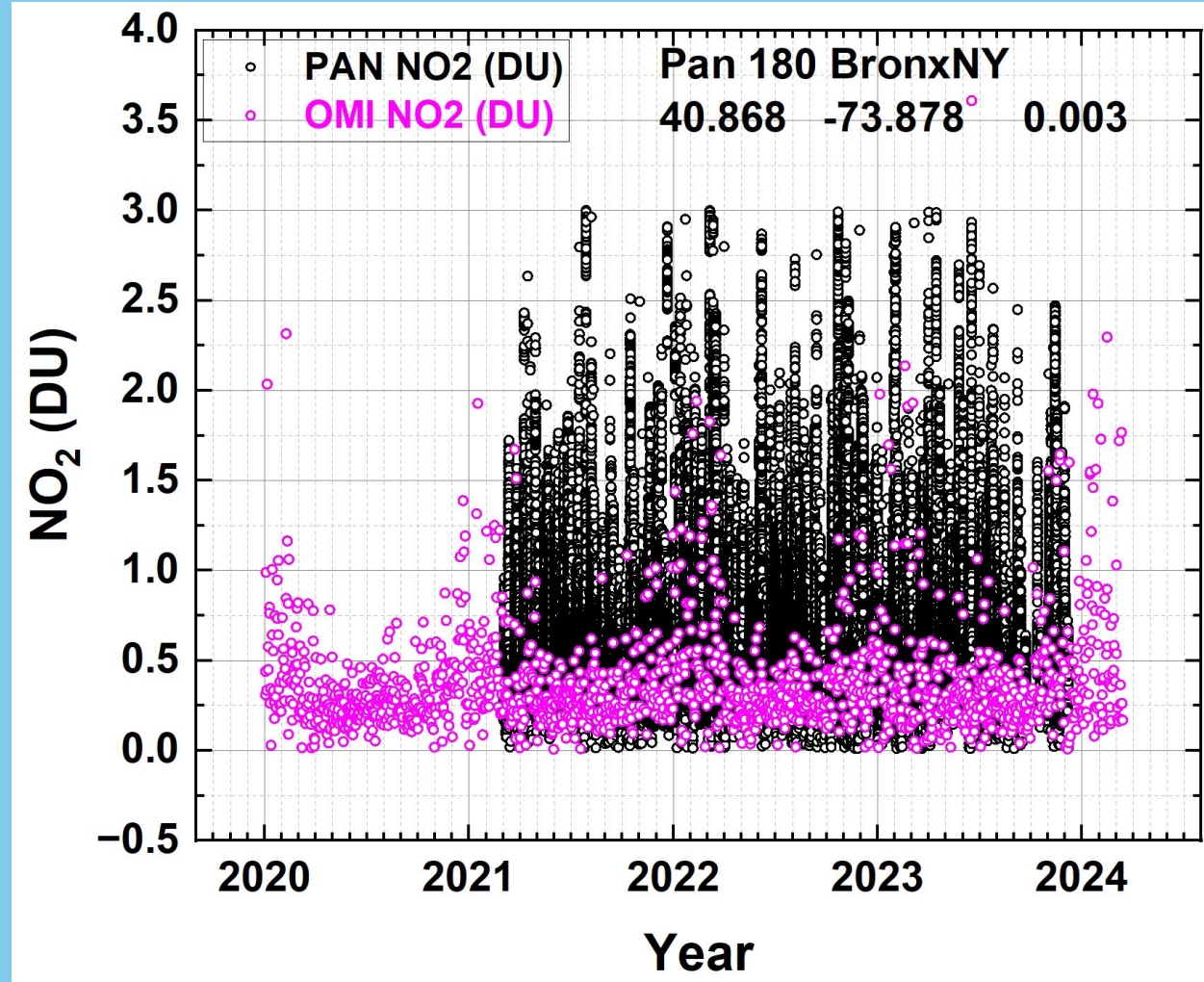
Jay Herman, Jianping Mao, and Liang Huang

PANDORA

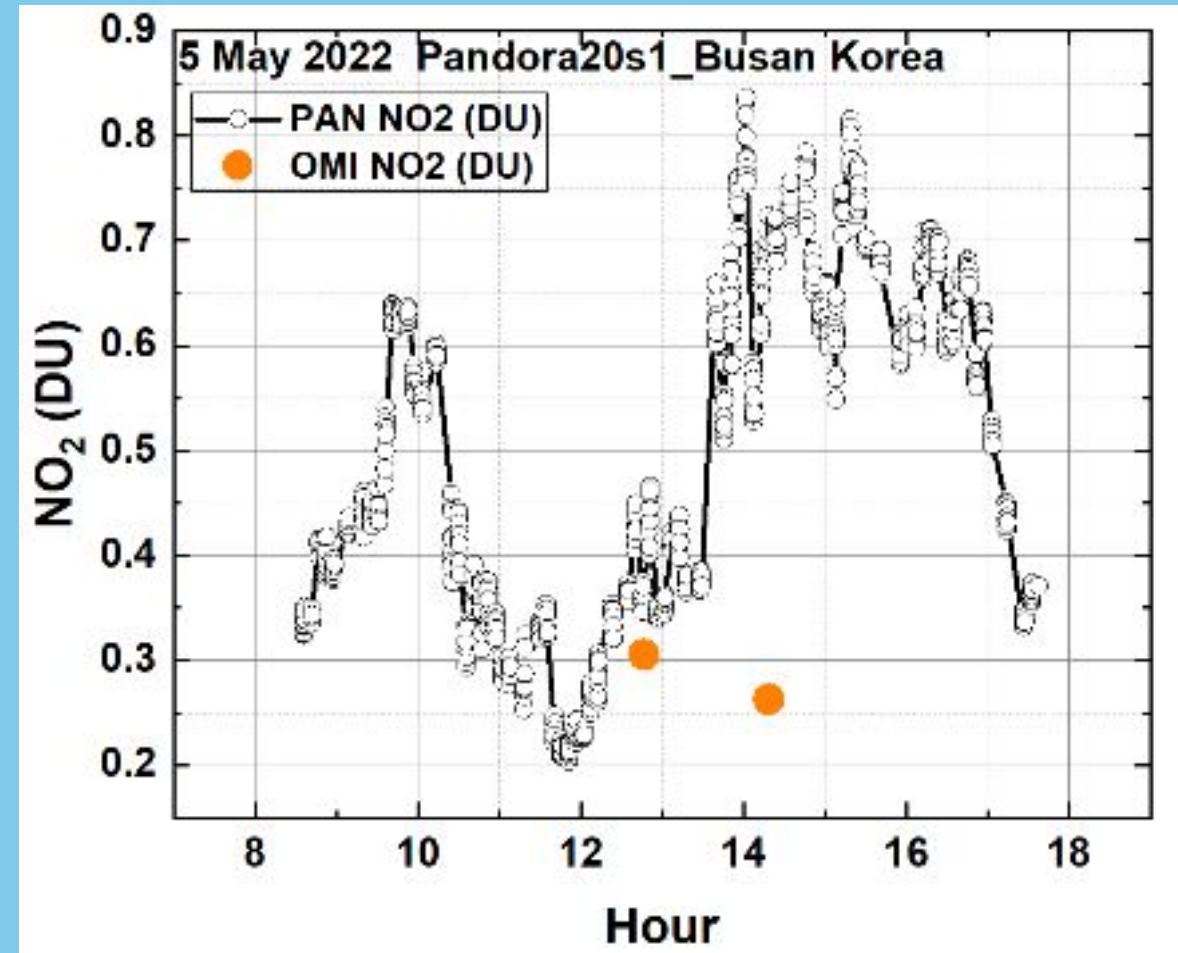
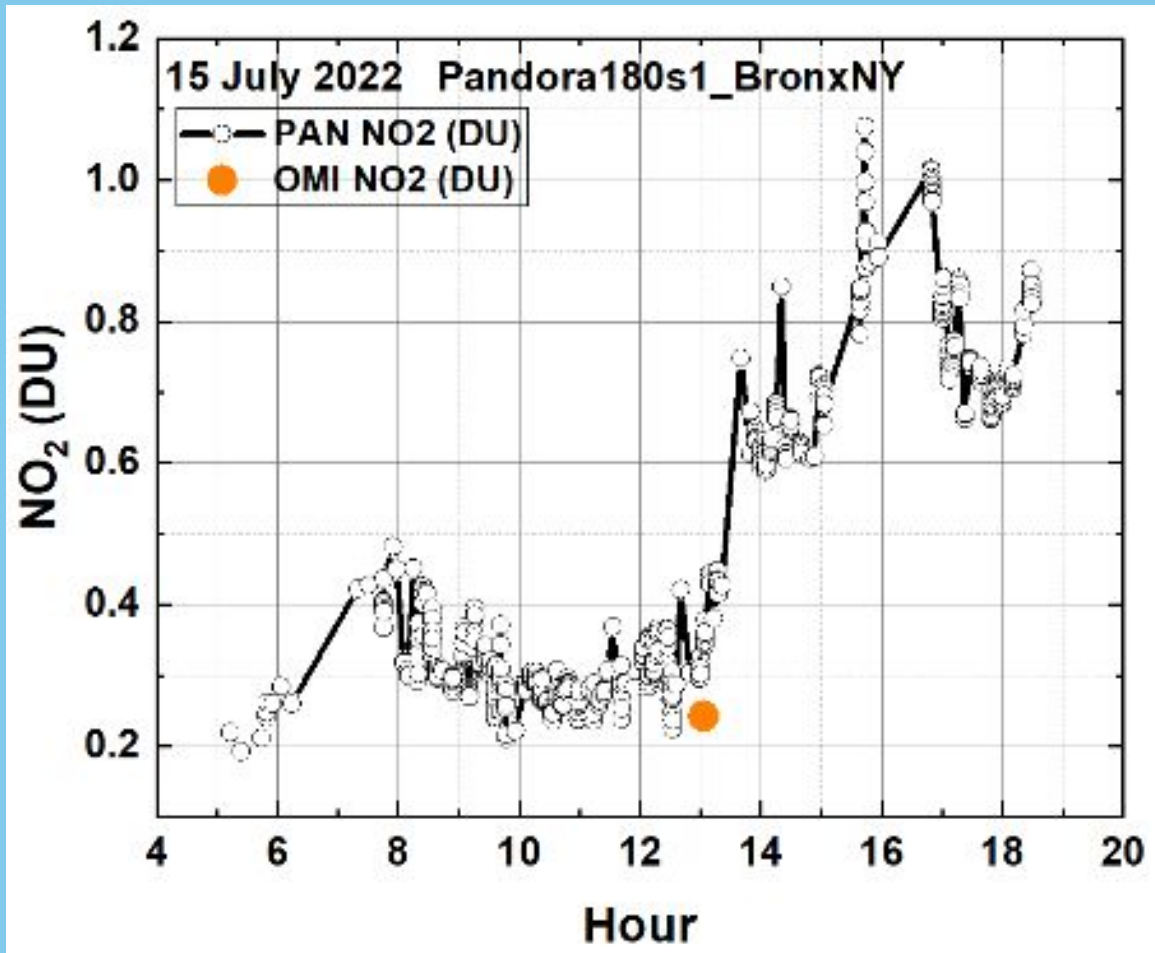
EPIC



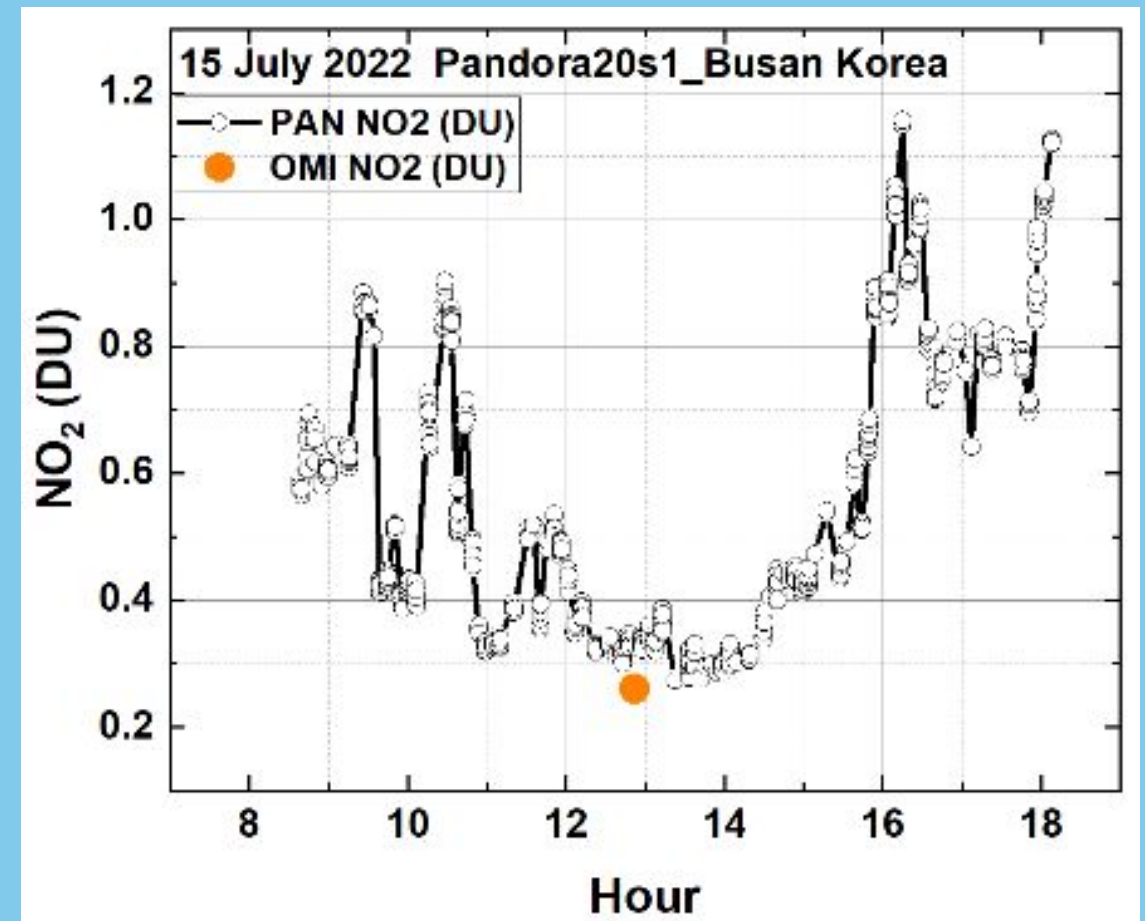
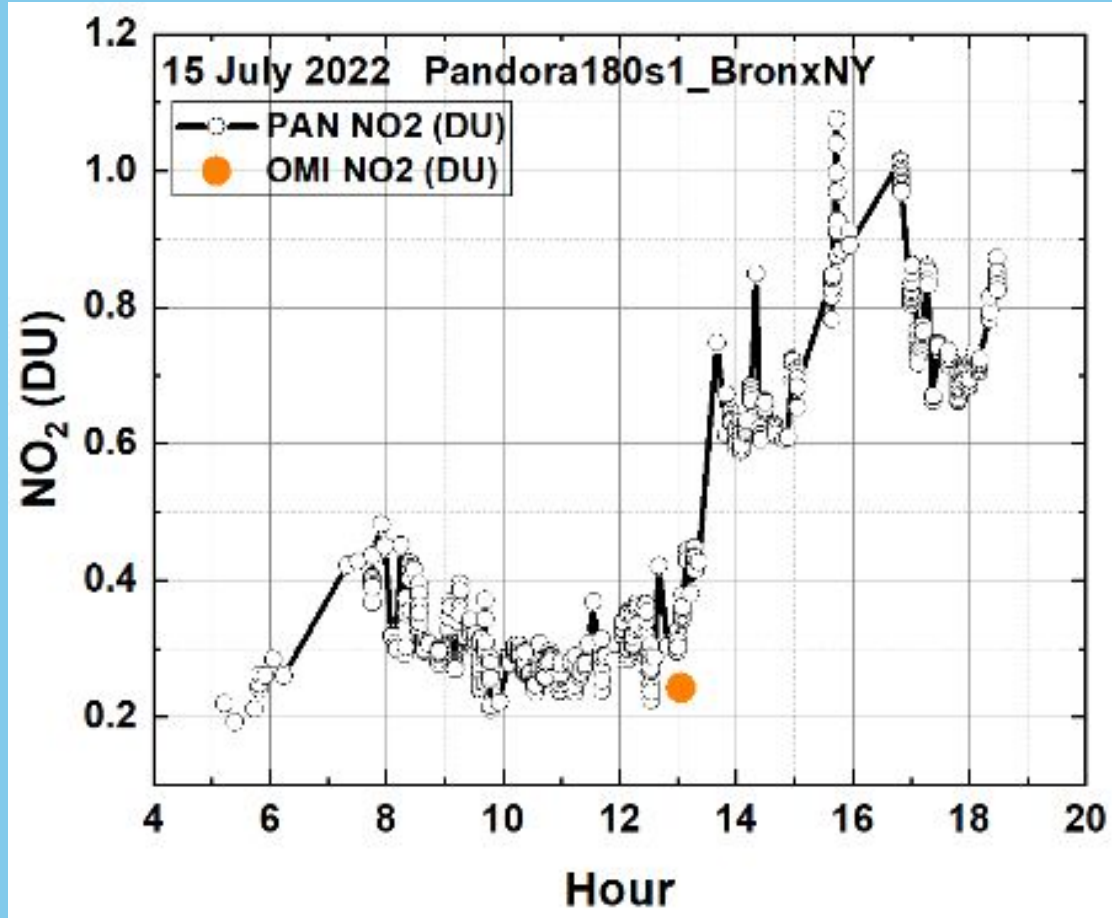
OMI only captures a fraction of the daily values of total column NO_2 and fails to detect the extent of the daily pollution at both the Bronx New York City and Busan Korea sites.



Diurnal daytime variation for Pandora retrieved total column NO_2 and compared with OMI

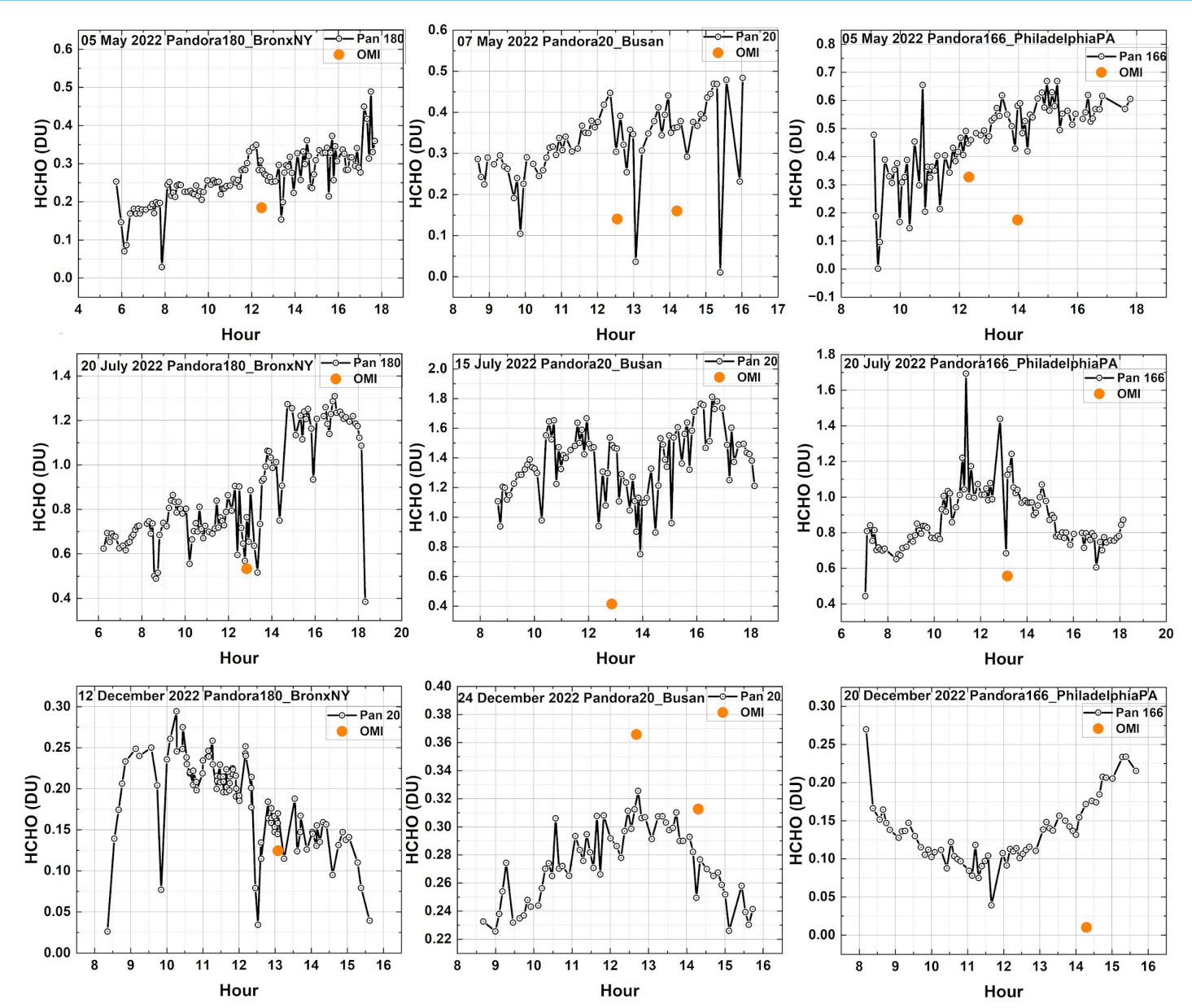


Diurnal daytime variation for Pandora retrieved total column NO_2 and compared with OMI

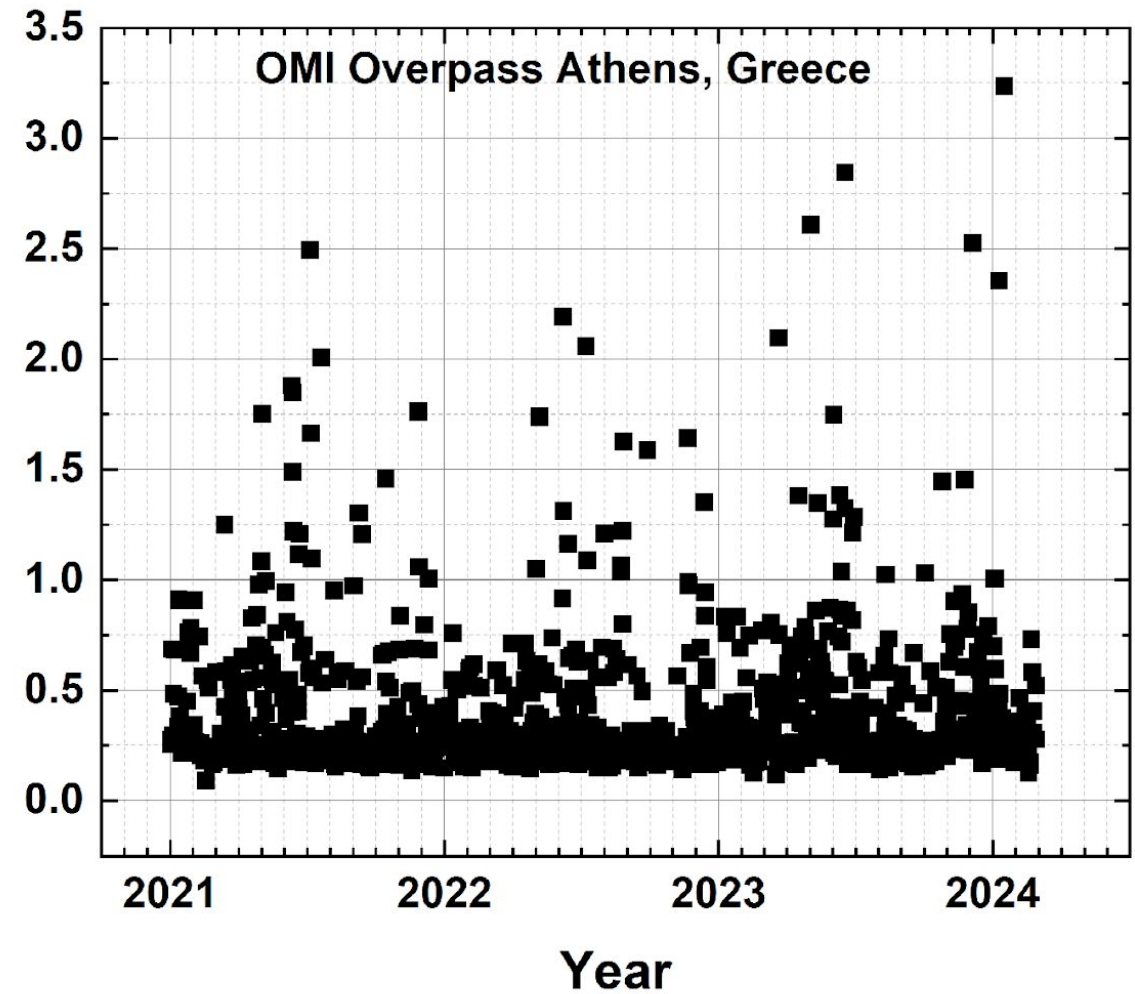
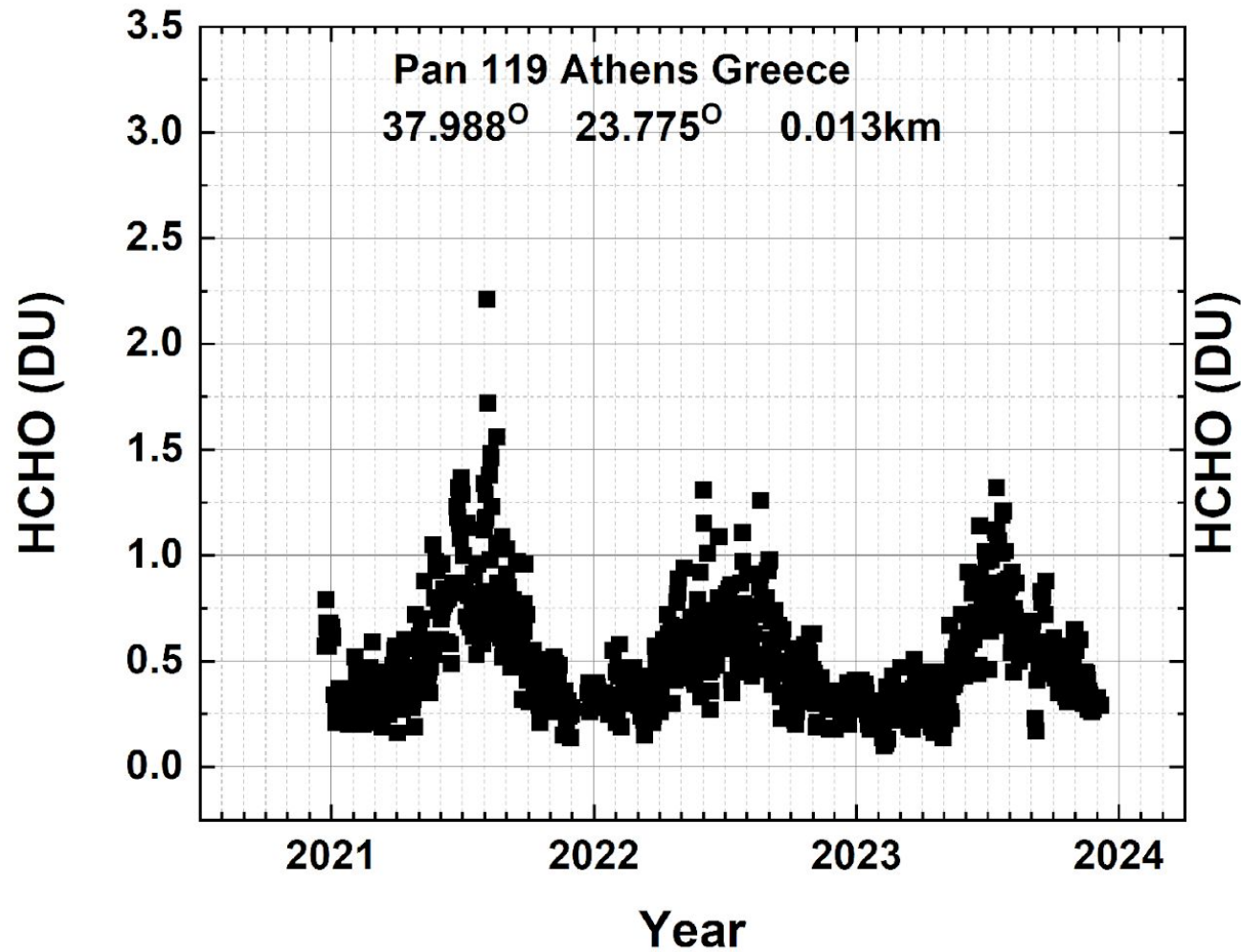


Comparison between Pandora and OMI (orange circle) total column HCHO

HCHO (DU)



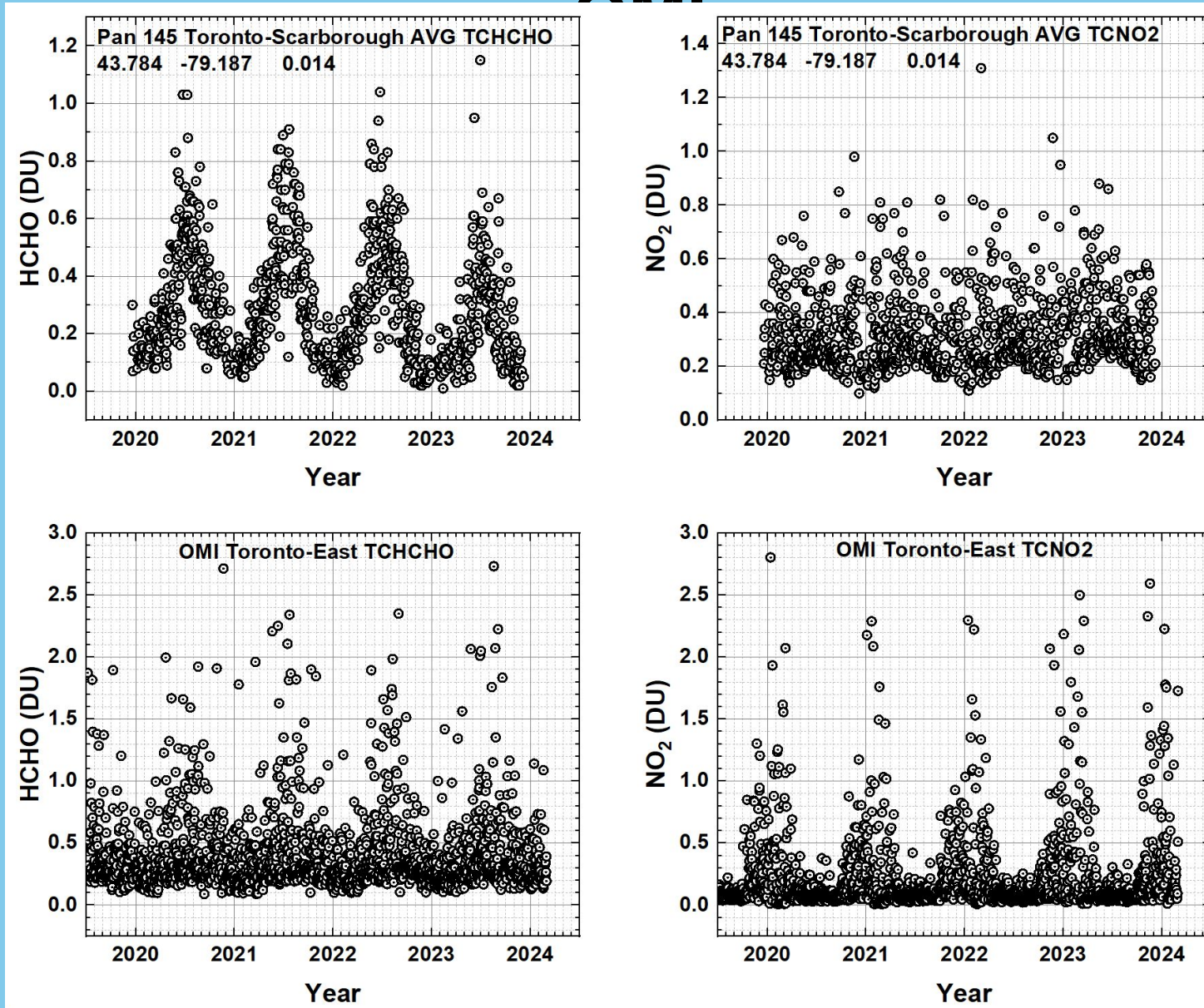
Annual Cycle HCHO Missed by OMI



Athens Greece

Annual Cycle HCHO and NO₂ Missed by

Toronto
HCHO

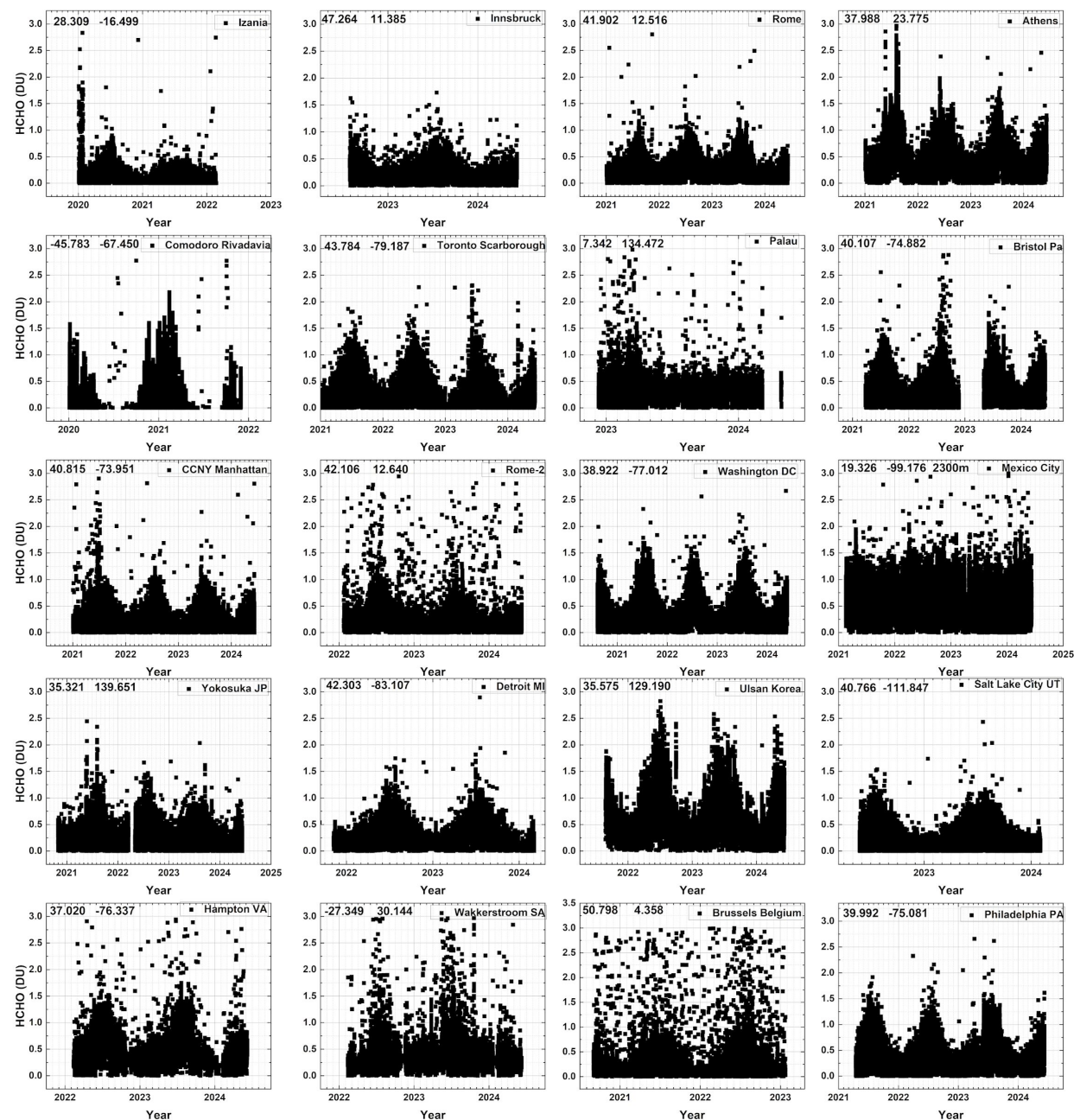


Toronto
NO₂

OMI FOV
includes city
area

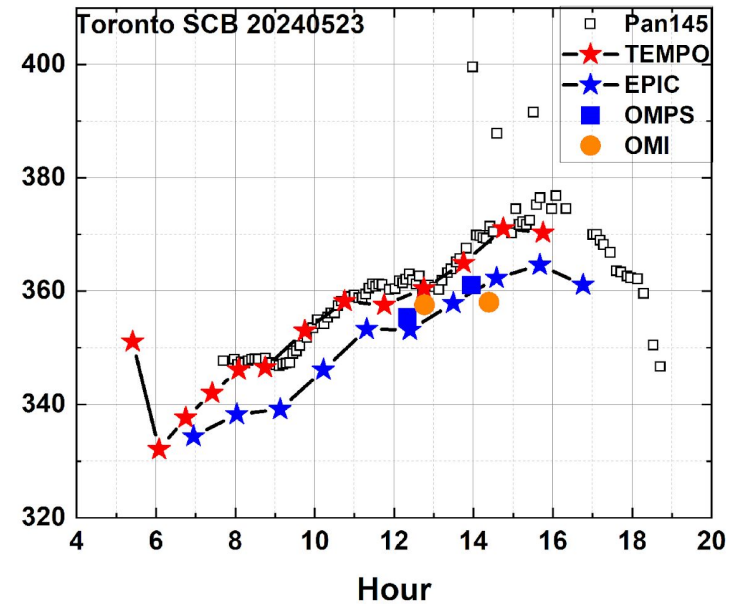
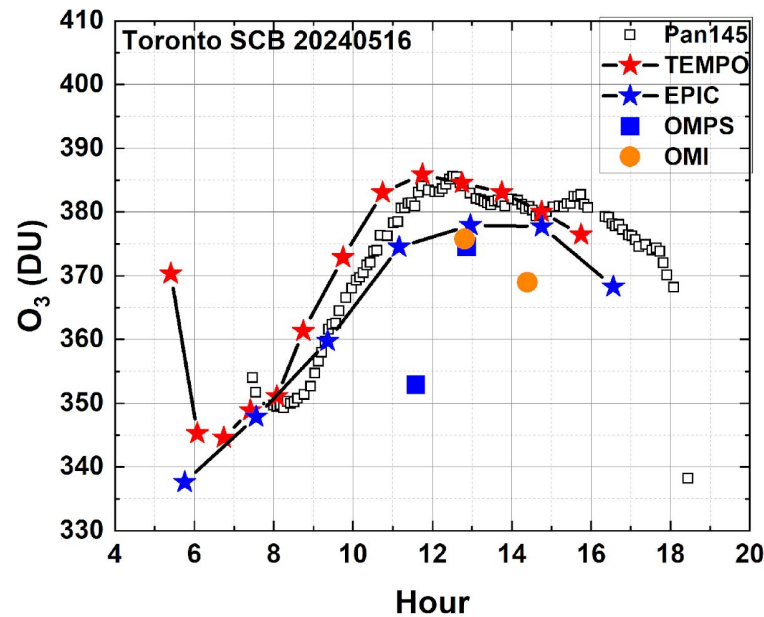
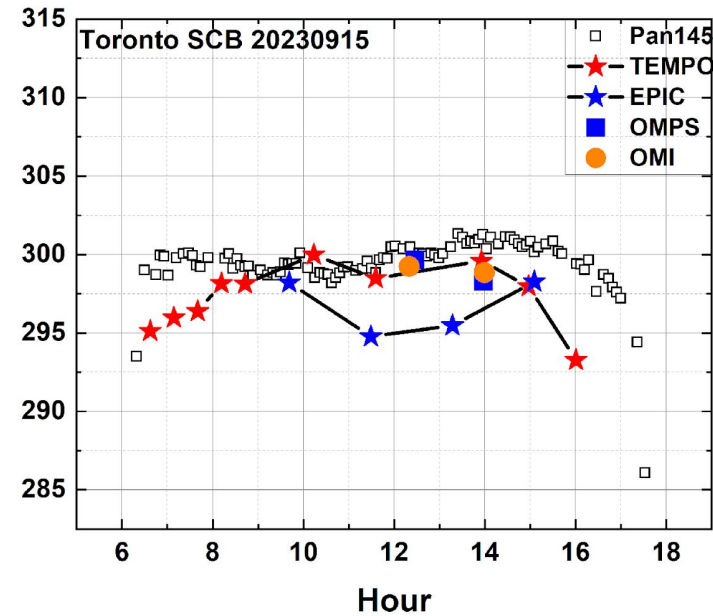
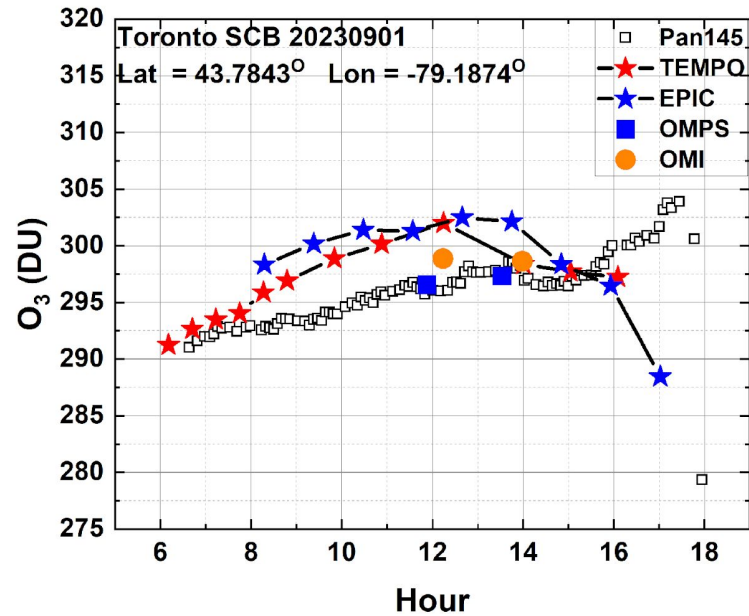
**HCHO at 20 Pandora
sites in Europe, North
America, Korea, Japan,
South Africa, and Palau**

**Mexico City (19.3°) and
Palau (7.3°) are
equatorial and do not
show a strong annual
cycle**



Pandora and Satellite Total Column

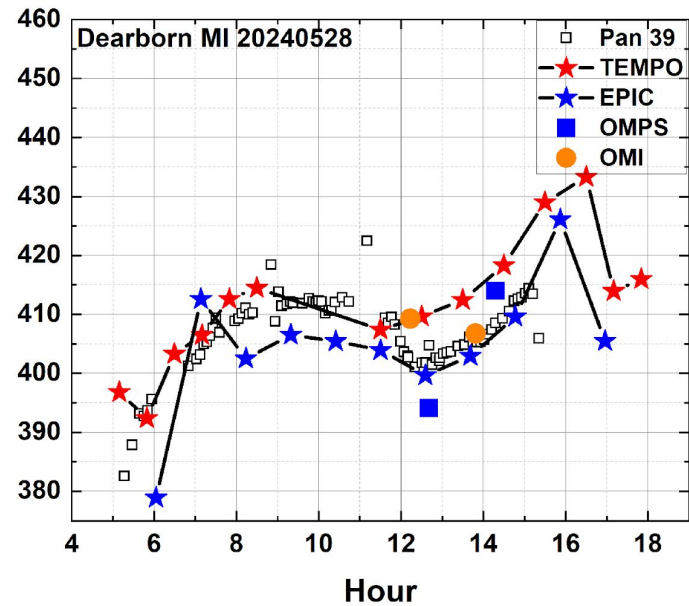
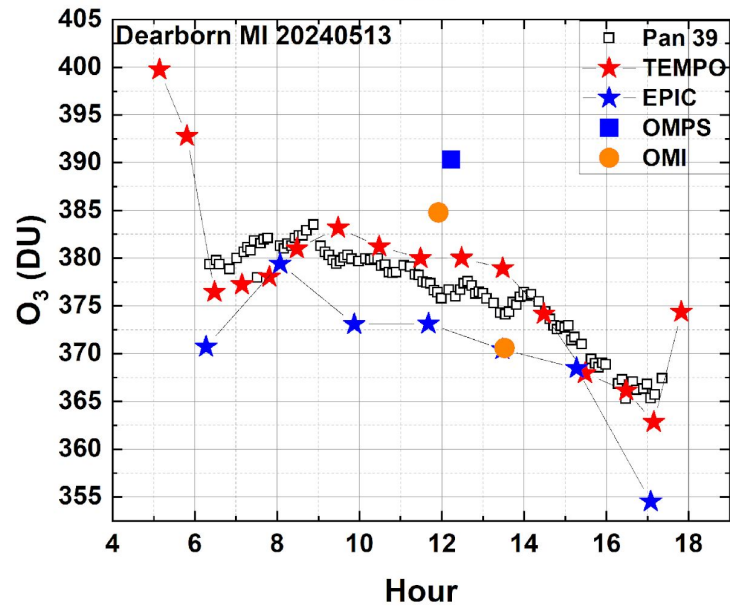
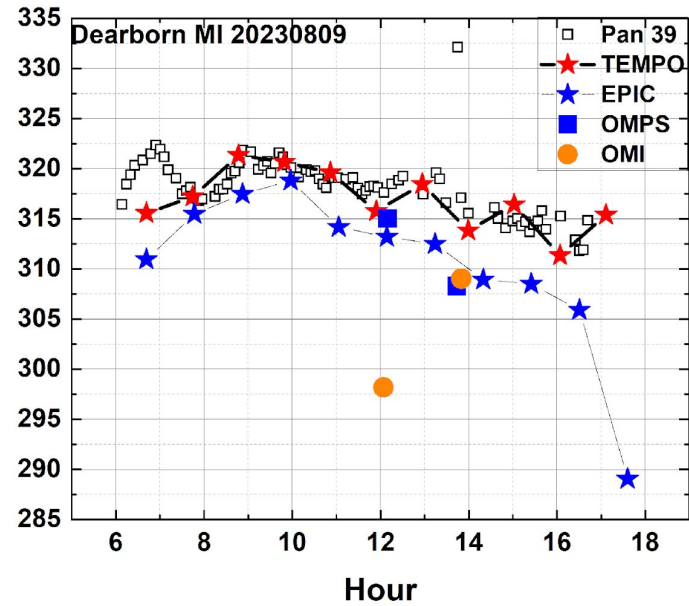
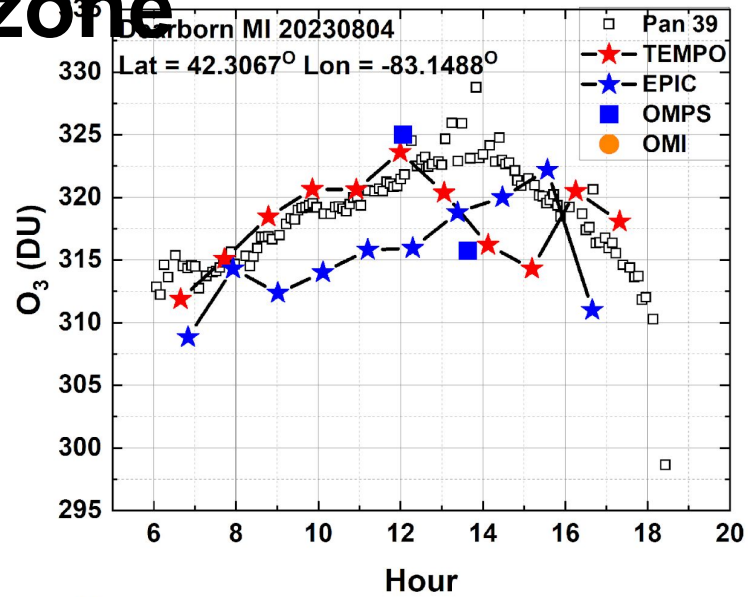
O



Toronto,
Canada

Pandora 145
TEMPO
EPIC
OMPS
OMI

Pandora and Satellite Total Column Ozone

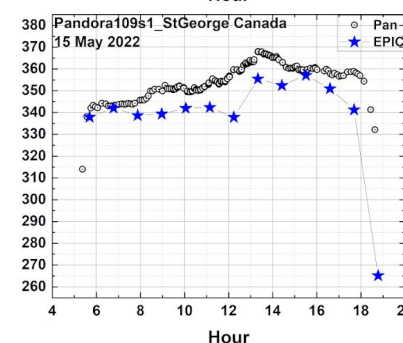
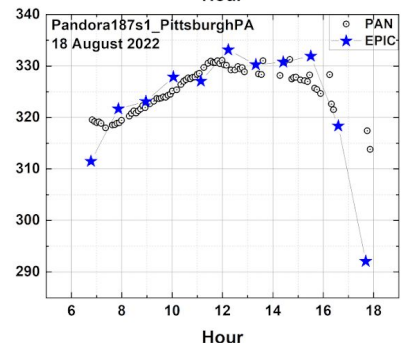
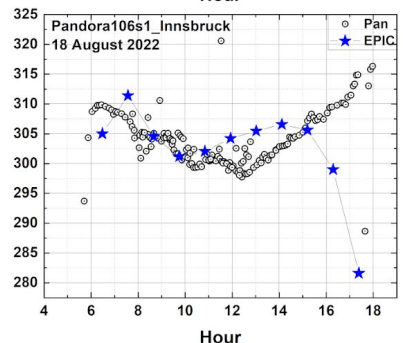
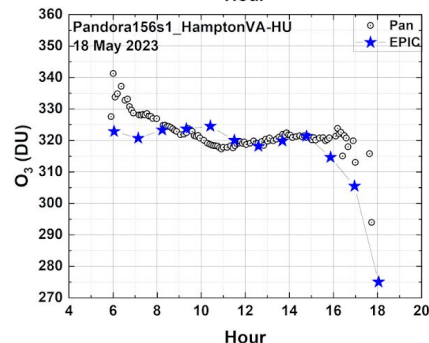
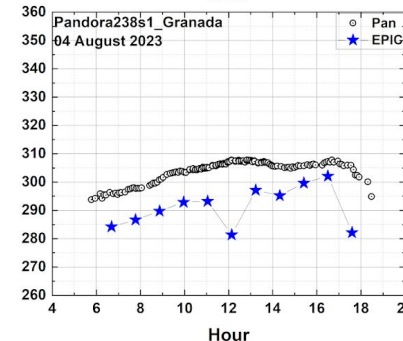
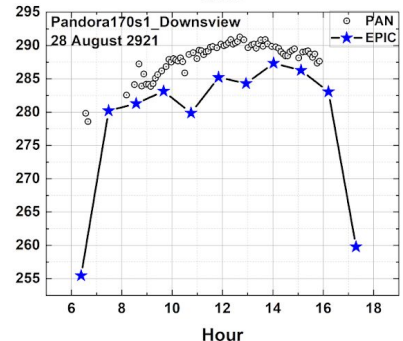
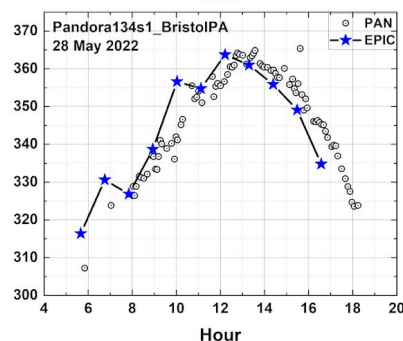
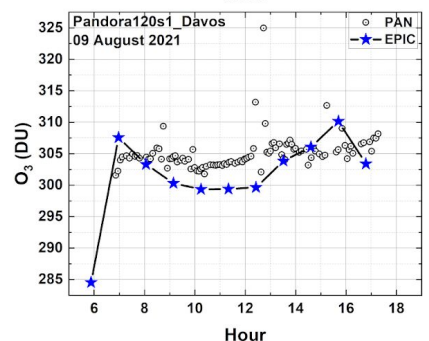
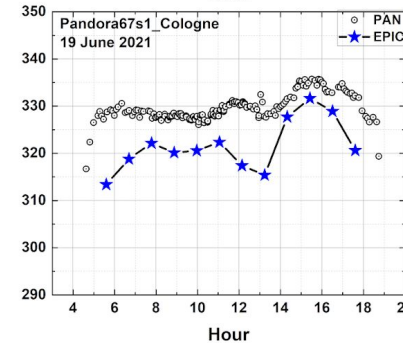
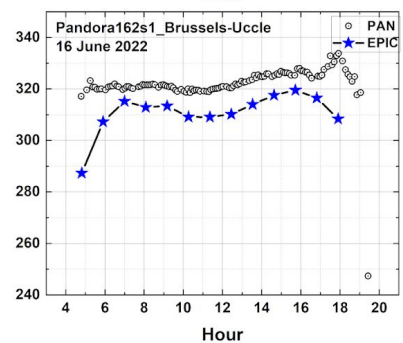
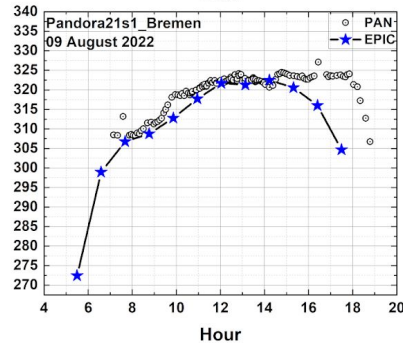
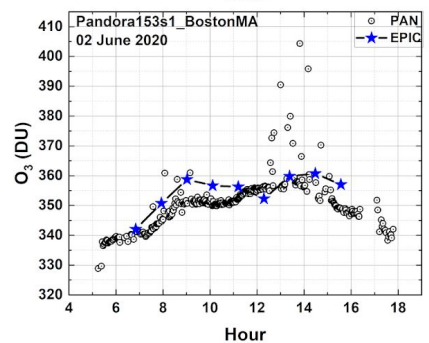
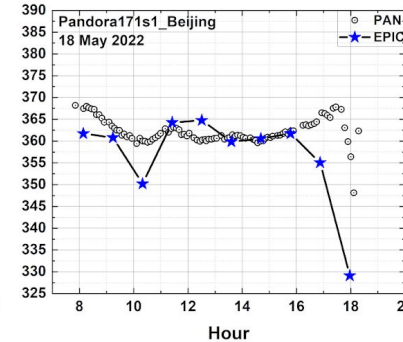
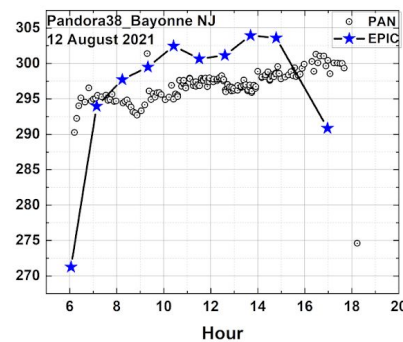
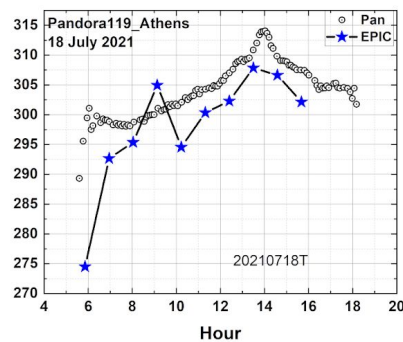
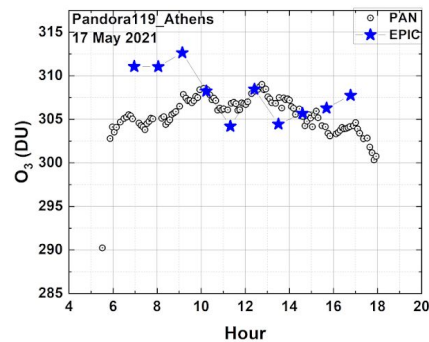
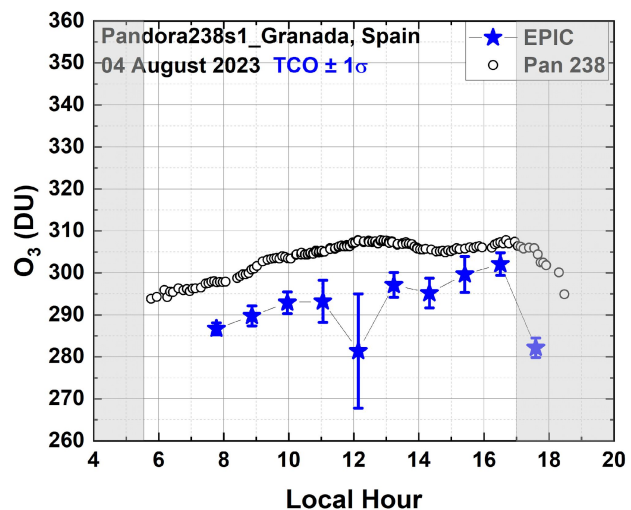


Dearborn
Michigan

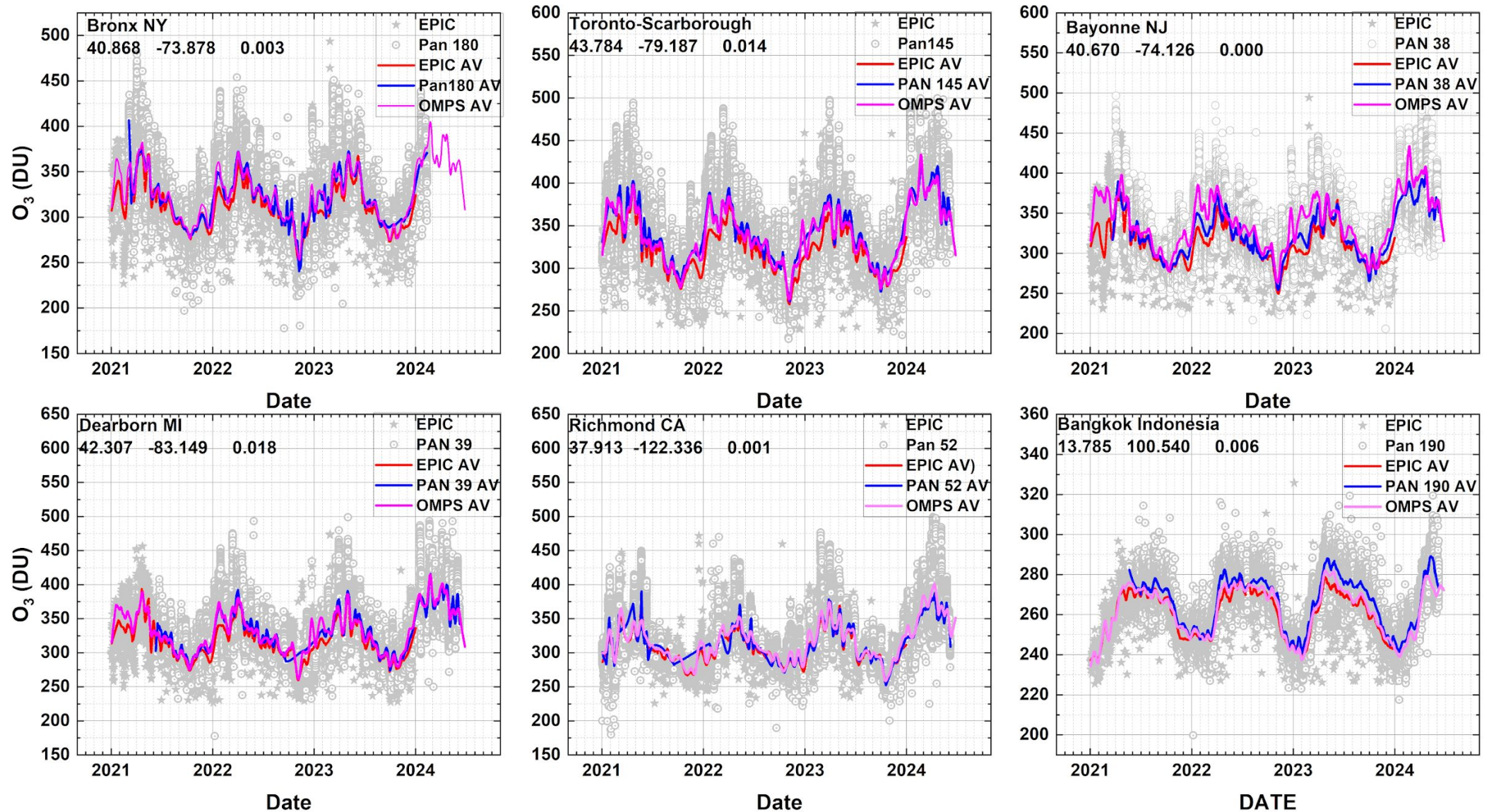
Pandora 39
TEMPO
EPIC
OMPS
OMI

Diurnal Variation TCO

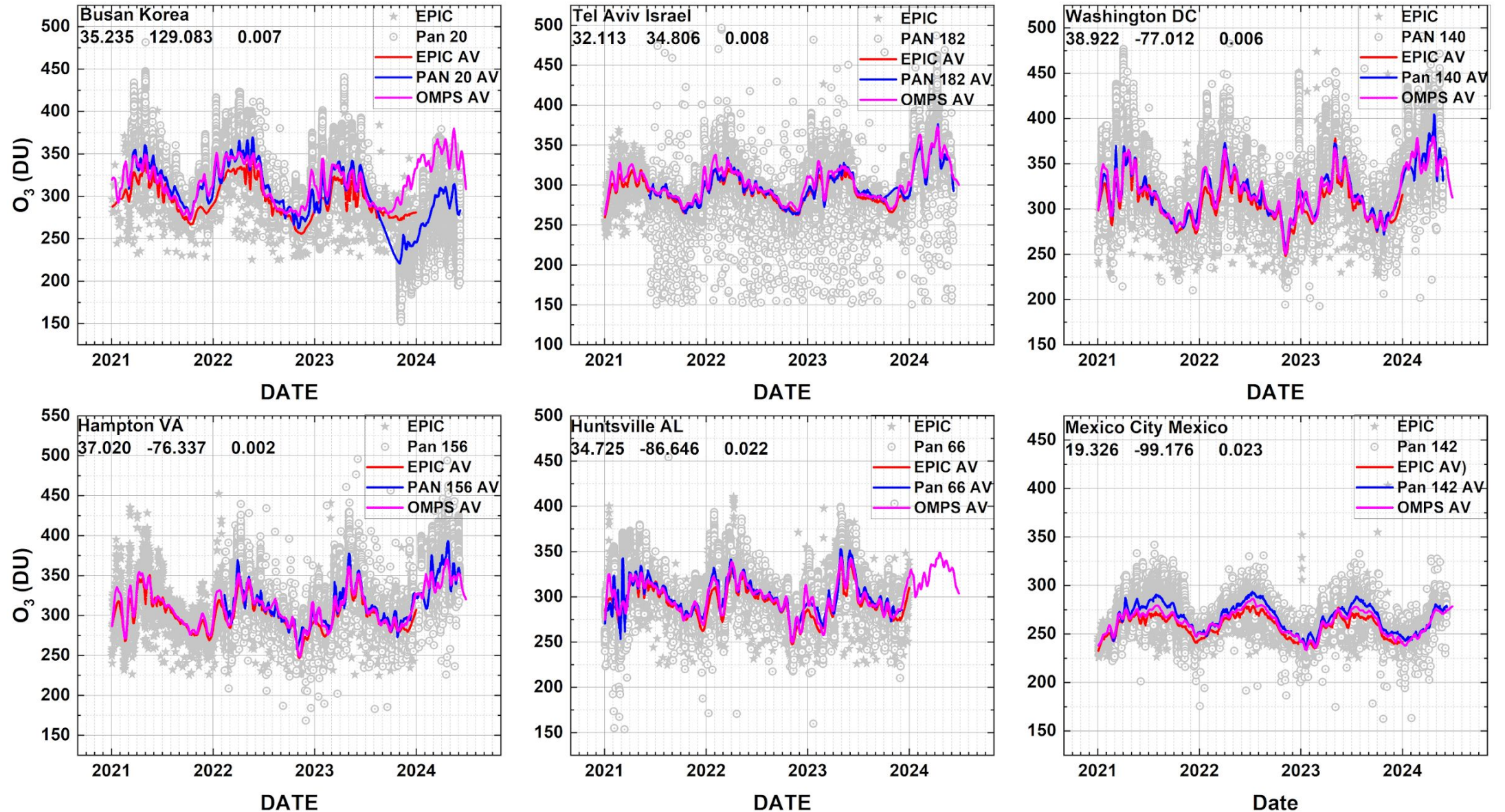
Pandora TCO vs EPIC at 16 Pandora sites in North America, Europe, Canada, Grenada,



Long-Term Validation of TCO at 6 Pandora Sites



Long-Term Validation of TCO at 6 Pandora Sites



Summary

HCHO: Pandora detects an annual cycle not seen by satellite data.

NO₂: Pandora detects more NO₂ than near-noon satellite data suggesting pollution levels are higher than estimated from OMI or OMPS

TCO: Pandora TCO and satellite data agree closely both for diurnal variation and long-term weekly average time series.

Jay Herman, Jianping Mao, and Liang Huang, Validation of DSCOVR-EPIC Total Column O₃ Retrievals Using Ground-based Pandora and Satellite Data from OMI and TEMPO, Frontier Remote Sensing, Submitted, 2024

Jay Herman and Jianping Mao, Seasonal Variation of Total Column Formaldehyde, Nitrogen Dioxide, and Ozone Over Various Pandora Spectrometer Sites with a Comparison of OMI and Diurnally Varying DSCOVR-EPIC Satellite Data, AMT, under review, 2024.