Save Our Earth

Bridging the Scales in Atmospheric Sciences : Local to Global

Retrieval of Tropospheric Trace Gas Nitrogen Dioxide (NO_2) by exploiting 1st South Asia's NASA Pandora Spectrometer

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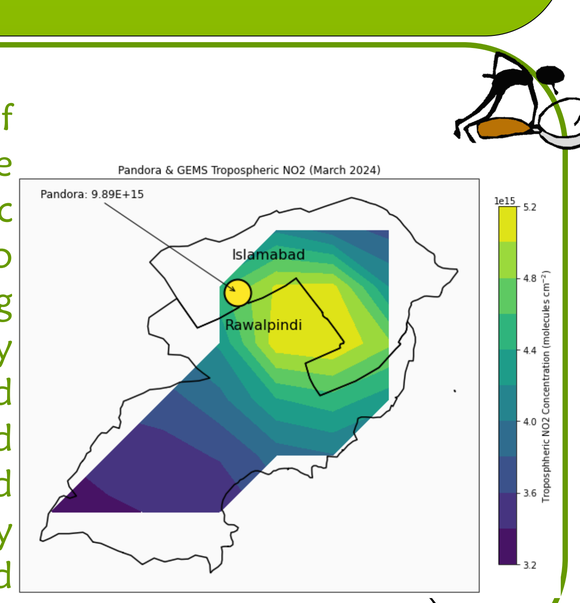
Abstract

Climate change is the result of a sudden shift in atmospheric chemistry. The primary anthropogenic causes of nitrogen oxide emissions are fossil fuel combustion, industrial pollution, and intentional burning. Nitrogen dioxide is an important atmospheric trace gas necessary for the synthesis of tropospheric ozone, short lived climatic pollutant. Short-lived climate pollutants are a key source of concern since they can harm human health while also contributing to global warming. In South Asia, there is an absence of competent ground-based monitoring equipment for assessing trace gas atmospheric profiles. In Pakistan, a NASA Pandora Spectrometer was recently installed to continuously monitor the amounts of these trace chemicals. In this study, two ground-based instruments (the Pandora Spectrometer and the Horriba NOx Analyzer) are evaluated against two satellite-based instruments (OMI and TROPOMI). Pandora tropospheric NO_2 column densities exhibited a correlation of 71 and 77 percent with OMI and TROPOMI, respectively, while Pandora Surface NO_2 concentrations were also highly correlated with Horriba NO_2 surface concentrations. In addition, meteorological inputs such as solar radiation and wind speed followed similar trends to Pandora tropospheric NO_2 column levels.



Results

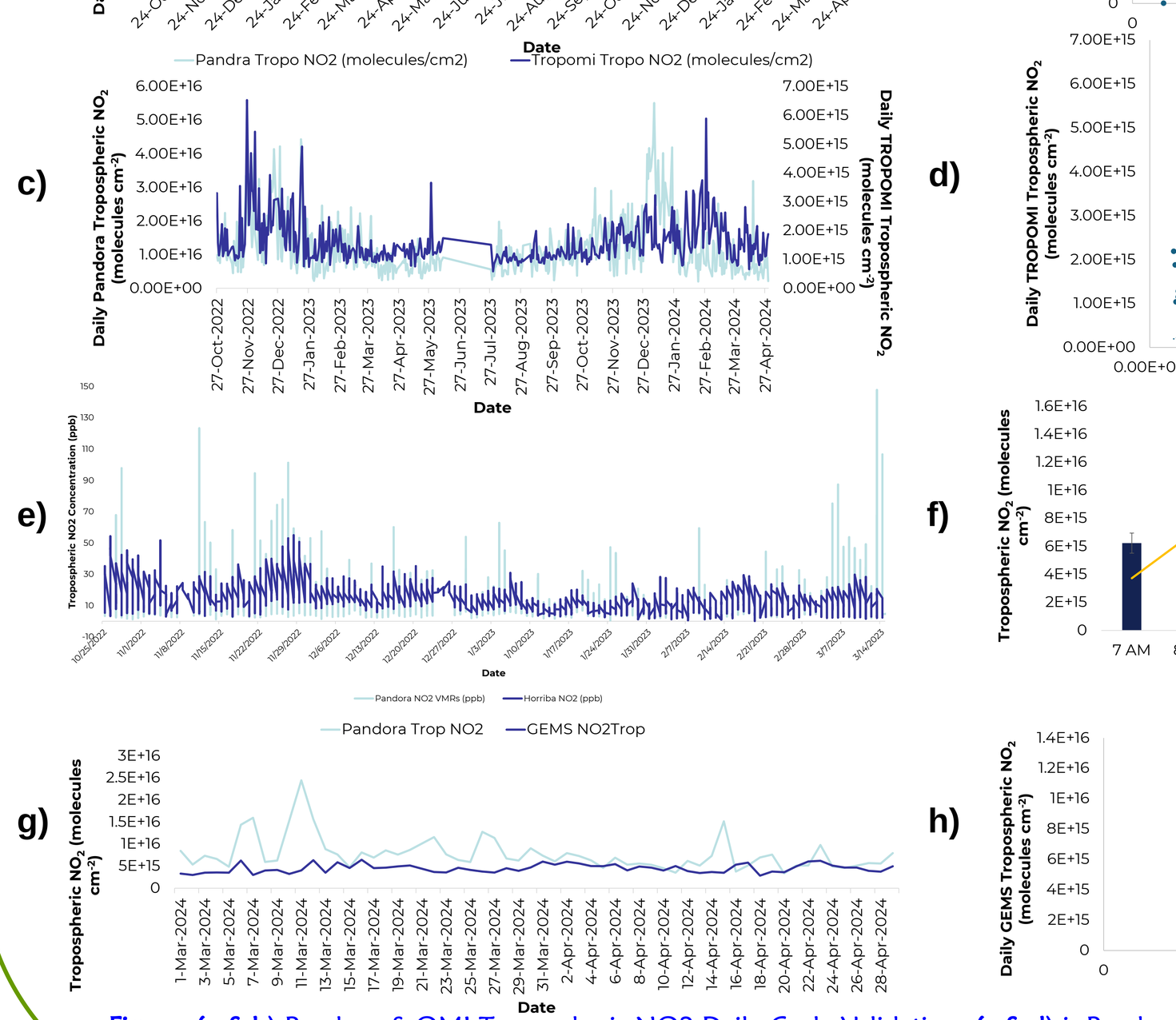


Figure: **(a & b)** Pandora & OMI Tropospheric NO2 Daily Cycle Validation, **(c & d)** is Pandora & TROPOMI Tropospheric NO2 Daiy Cycle Validation, **(e)** Pandora & Horriba Surface NO2 Daily Cycle (ppb), **(f)** Pandora & Solar Radiance (W/m2) **(g & h)** Pandora & GEMS Tropospheric NO2 Daily Cycle Validation

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