

## Temporal variations in tropospheric NO<sub>2</sub> vertical column densities from Pandora instrument at Yokosuka, Japan

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Nitrogen dioxide (NO<sub>2</sub>) is a gaseous air pollutant that plays a role in the formation reaction of tropospheric ozone. Though orbital satellites are useful to monitor and identify major emission sources of NO<sub>2</sub>, its low temporal resolution makes it difficult to capture the temporal variation of NO<sub>2</sub>. Therefore, the ground-based Pandora can be an alternative to investigate the high temporal variability of NO<sub>2</sub> at the fixed location by compensating for the satellite observation. In this study, we investigated NO<sub>2</sub> tropospheric vertical column density (TropoVCD) from Pandora (146). Pandora is installed at Yokosuka (35.32°N, 139.65°E), Japan, which can represent the characteristic of an urban area since June 2021. The monthly mean variation of NO<sub>2</sub> TropoVCD showed the highest in winter and lowest in summer due to the reduced solar irradiance in winter (increased lifetime of NO<sub>2</sub>). The seasonally-averaged diurnal variation generally showed an increasing pattern in the morning and a decreasing trend in the afternoon likely due to the viewing direction with less pollution. However, the peak times and magnitude of diurnal variations in NO<sub>2</sub> TropoVCD varied depending on the season (early peak with small variability in the warm season and late peak with large variability in the cold season). A more detailed investigation will be conducted including backward trajectory analysis to identify the main source of NO<sub>2</sub> TropoVCD in Tokyo Metropolitan Area.

Keywords: Pandora, NO<sub>2</sub> TropoVCD, Diurnal variation, Monthly variation