

What is Pandonia Global Network?

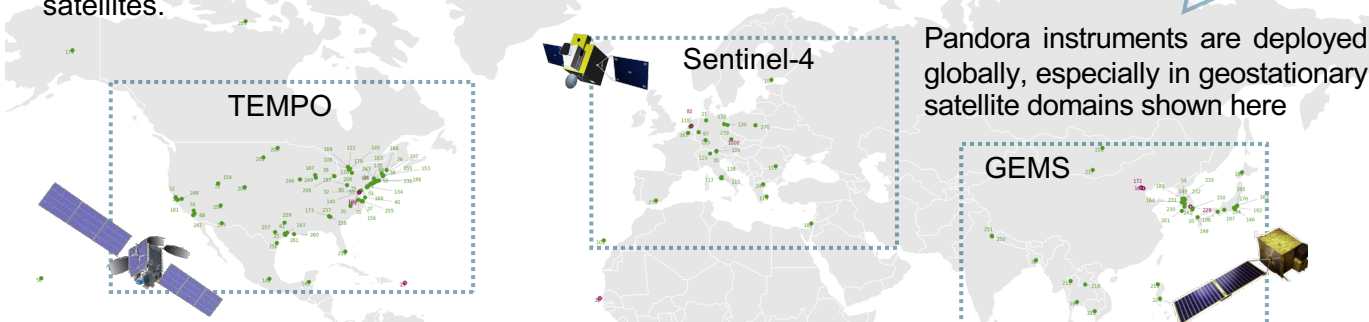
- Pandonia Global Network (PGN) is a joint NASA-ESA global monitoring network with over 180 (quasi-) autonomous Pandora instruments (1).
- Pandora is a ground-based spectrometer that measures atmospheric trace gases by analyzing sunlight absorption in the UV-visible band, designed to validate and augment satellite measurements (2).

Advantages of PGN

- PGN has common standards for instruments, operating routines, quality control and real-time data processing and archiving, which makes PGN data user-friendly and minimize biases across the network.
- PGN provides continuous long-duration measurements at many sites, that are not feasible with aircraft campaigns and have a higher signal-to-noise ratio than satellites.

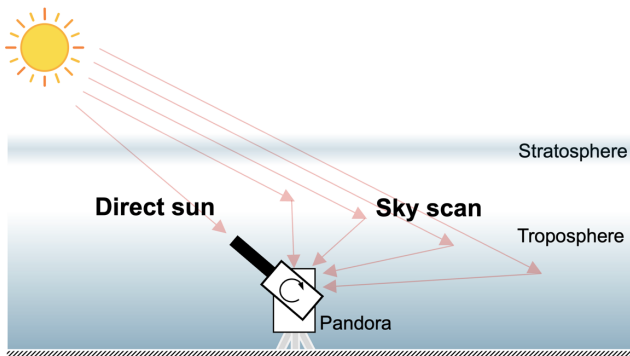


Pandora instrument



Pandora instruments are deployed globally, especially in geostationary satellite domains shown here

What does PGN provide?



The measurements (raw radiances) are uploaded to the PGN central service, corrected and processed to the trace gas abundances with quality flags and uncertainties.

PGN level 0 to 2 products at all sites are freely available on the PGN website:

<https://data.ovh.pandonia-global-network.org/>

Direct sun routine

The Pandora sensor head tracks the Sun, deriving total column density. This routine takes 1 min.

Sky scan routine

The Pandora sensor head scans scattered sunlight at different elevation angles, deriving the trace gas abundance at multiple elevations. The routine includes detailed sky scan (6 mins) and quick sky scan (2.5 mins).

PGN level 2 products

Gas	Routines	Products
HCHO, NO ₂	Sky Scan	Near surface concentration; Lower tropospheric column; Partial column vertical profile.
	Direct Sun	Total column
SO ₂ , H ₂ O, O ₃	Direct Sun	Total column

How are PGN data used?

➤ Availability

- PGN provides long-term, continuous data records since 2019.

➤ Uncertainty

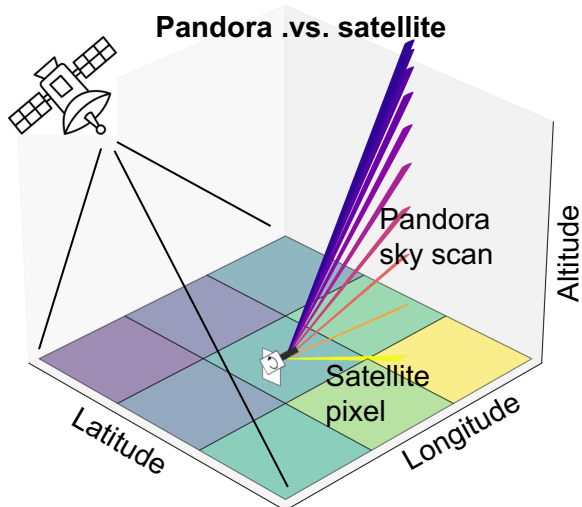
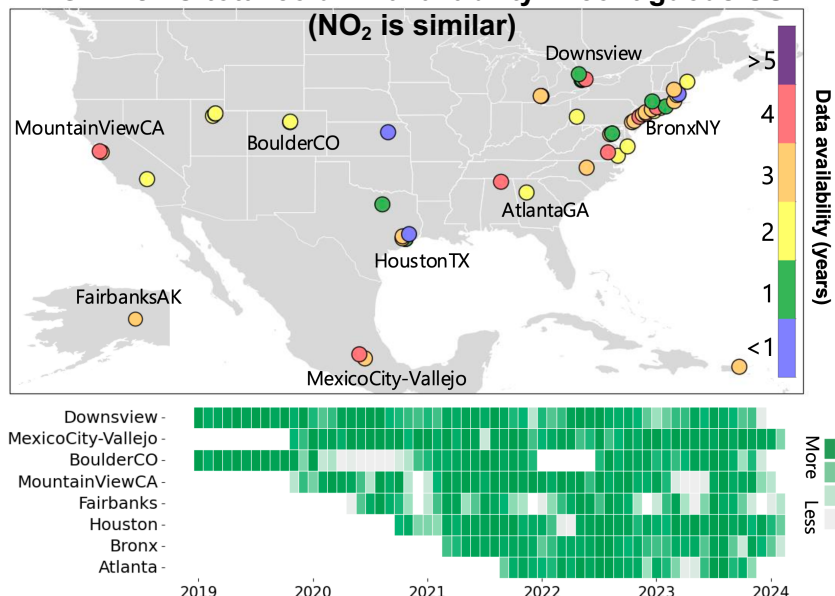
- Uncertainty comes from measured noise, instrumental effects, and spectral fitting residuals.

➤ Limitation

- Thick clouds and aerosol layers (such as fire plumes) can strongly influence PGN retrieval
- PGN profile retrieval uses simplified geometry to calculate air mass factor.

PGN HCHO total column availability in contiguous US

(NO₂ is similar)



➤ Fill the gap of in-situ measurements

- PGN sky scan products provide continuous observations that augment and complement aircraft campaigns.

➤ Validate satellite total column data

- PGN provides trace gas total column observations in the continental scale, supports validation of geostationary satellite products in an hourly basis.

➤ Evaluate model results

- PGN offers long-term, high-resolution, vertical resolved observational constraint on model performances .
- PGN sky scan product directly help improving the satellite product that uses model vertical profile input.

Pandora user manual

To learn more about Pandora measurement routines, retrieval algorithms and the data process workflow, you can find the manual for Blick Software Suit here:

<https://www.pandonia-global-network.org>

References

- <https://www.pandonia-global-network.org/home/about/about-pgn/>.
- <https://pandora.gsfc.nasa.gov/>