Operational satellite validation with data from the Pandonia Global Network (PGN)

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Note: views reflected here are of the authors and do not necessarily reflect the views or official policy of the US EPA.
What is the PGN?

= Ground-based remote sensing network for air quality monitoring and satellite validation
= Fiducial Reference Measurement implementation in the scope of satellite validation

Bilateral project by NASA and ESA

With additional collaborators such as

- LUFTBLICK
- SciGlob
- United States Environmental Protection Agency
- ITEFA
- BIRA-IASB
- INOC
- Virginia Tech.
- Environment Canada
- AEMet
- Agencia Estatal de Meteorologia
Network instrument is the Pandora spectrometer system or short **Pandora**
PGN instrument distribution (May 2020)

Currently in process of giving certificates to make instruments “official” (from red to green in map)
Data processing and management

- Data uploaded to PGN server and processed in real time.

- BlickC calibration file
- processing setup

- L0 (partial file) → L1 → L2 → L2fit

- status lines (partial file, operational info, sun search results)

- log files (local file, error, warning, info)

- processing status
- network management data
  - status (operational, hold...)
  - live status (time since last L0)
  - issues (hw.sh.fw, ...)
  - calibration (measured, verified)

- locations
- operation file
- BlickO
- BlickF schedule
Current operational products: Total columns NO2 and O3
NO$_2$ columns daily upload to EVDC (currently 25 sites)

PGN data distribution in GEOMS format through EVDC for Cal/Val purposes, e.g. for S5P/TROPOMI NO$_2$ columns
Satellite validation with PGN data

**Zhao et al.,** Assessment of the quality of TROPOMI high-spatial-resolution NO2 data products in the Greater Toronto Area, Atmos. Meas. Tech., 13, 2131–2159, 2020. (left figure, see also presentation at EGU 2020!)

**Verhoelst et al.,** Ground-based validation of the Copernicus Sentinel-5p TROPOMI NO2 measurements with the NDACC ZSL-DOAS, MAX-DOAS and Pandonia global networks, submitted to Atmos. Meas. Tech. (right figure, see also presentation at EGU 2020 “Quality assessment of two years of Sentinel-5p TROPOMI NO2 data”!)

**Pinardi et al.,** Validation of tropospheric NO2 column measurements of GOME-2 and OMI using MAX-DOAS and direct sun network Observations, submitted to Atmos. Meas. Tech. (see also presentation at EGU 2020 “Validation of tropospheric NO2 columns measurements from GOME-2, OMI and TROPOMI using MAX-DOAS and direct-sun network observations with focus on dilution effects”!)

Next Goals / Outlook

- Make most instruments official PGN
- Optimize instrument uptime in PGN
- Finish and publish new O3/O3Temp/SO2 product
- Make research products such as NO2 tropospheric columns and surface concentrations as well as HCHO total columns, tropospheric columns and surface concentrations operational