



# PGN status and future plans

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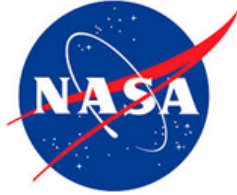
<sup>2</sup>NASA Goddard Space Flight Center, Greenbelt, MD, USA. PGN Head of Operation



# What is the PGN?

- = Pandonia Global Network, <https://www.pandonia-global-network.org/>
- = Ground-based remote sensing network for air quality monitoring and satellite validation
- = Fiducial Reference Measurement in the scope of satellite validation

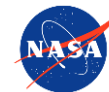
Bilateral project by



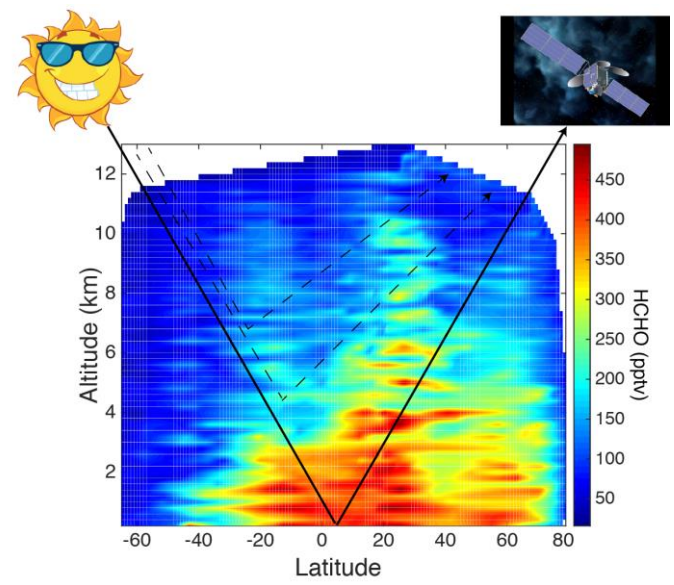
In Progress:  
NIER and PAN



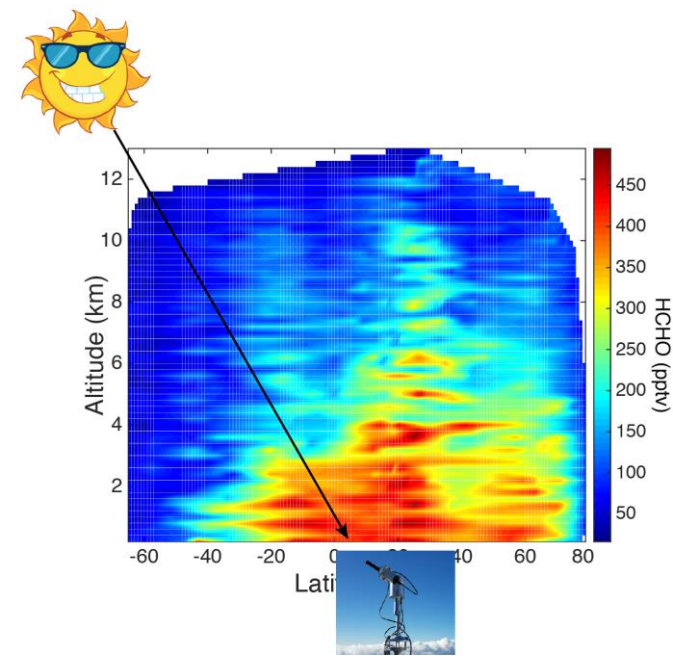
With additional collaborators such as



# Why the PGN is needed



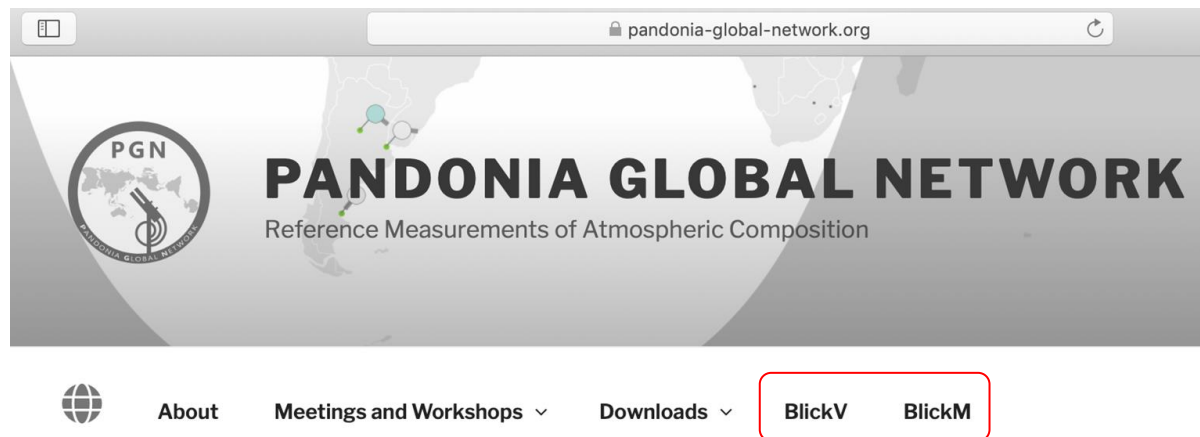
Satellites such as TROPOMI and GEMS measure sunlight reflected from the earth's surface and scattered from the atmosphere. This is complicated and requires assumptions that are not always correct.



Pandora measures direct sunlight. A much simpler problem with a few simple assumptions.

# Pandonia Global Network: Some of what we do

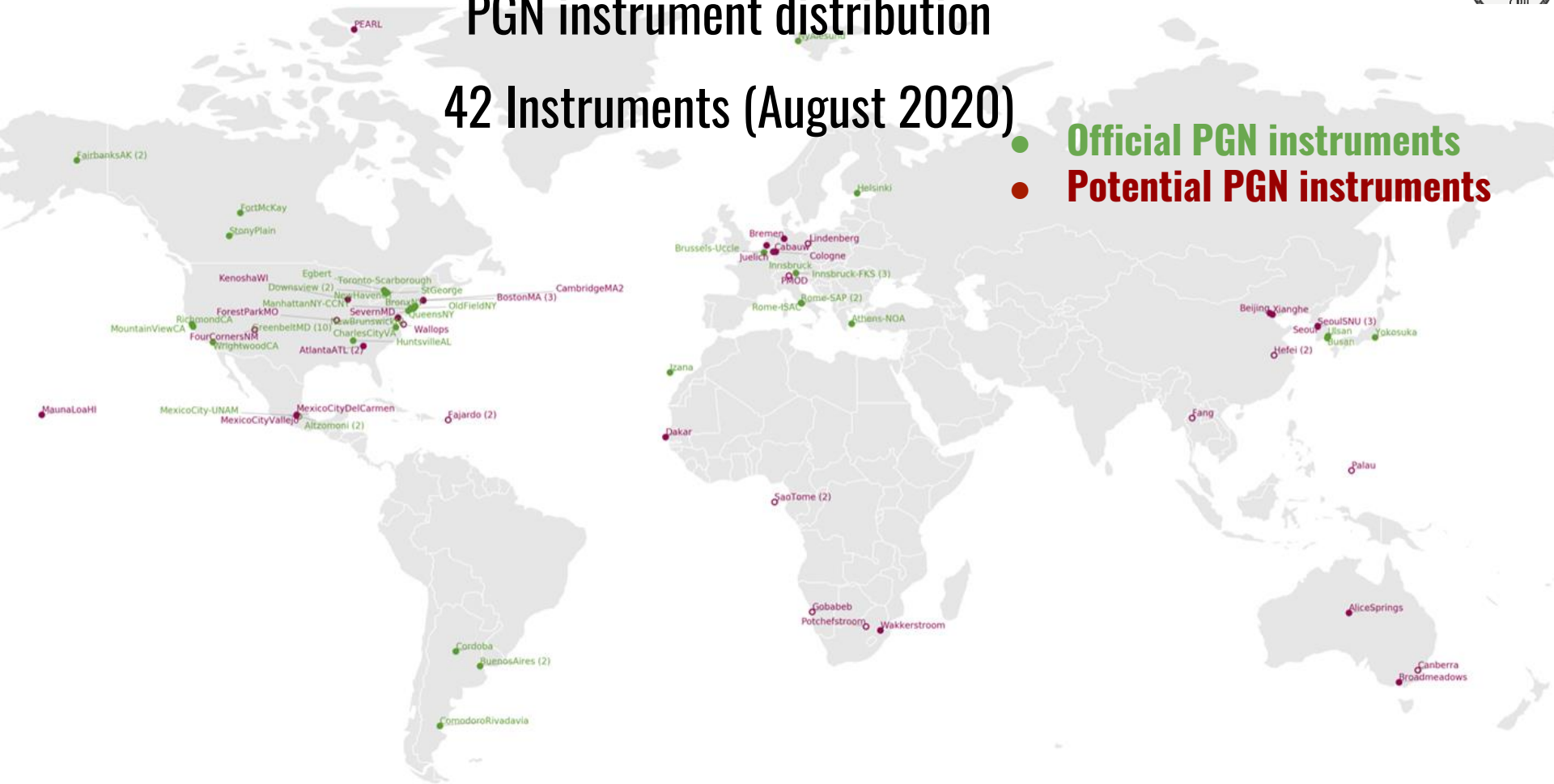
- 1) Calibration and Quality Assurance:
  - a) Laboratory and Field calibration of instruments
- 2) Network operation
  - a) Remote monitoring and repair of instruments: BlickM
- 3) Retrieval
  - a) Production of  $O_3$  and  $NO_2$  Columns: BlickV



# PGN instrument distribution

## 42 Instruments (August 2020)

- Official PGN instruments
- Potential PGN instruments



# Opportunity for expanded Pandora locations in Asia



We currently have three PGN instrument in the GEMS field of view (Ulsan, Busan, and Yokosuka).

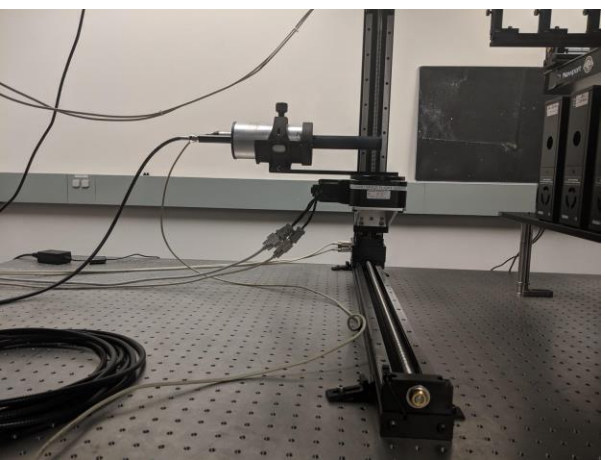
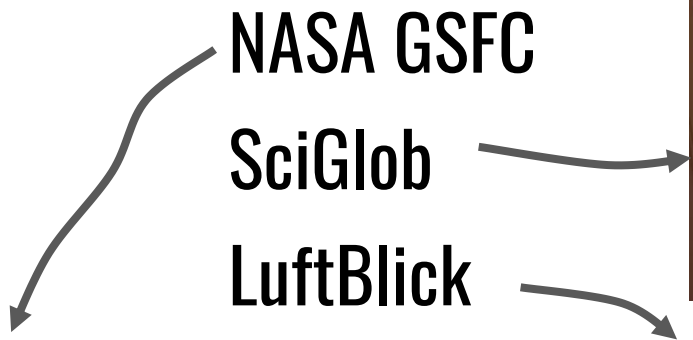
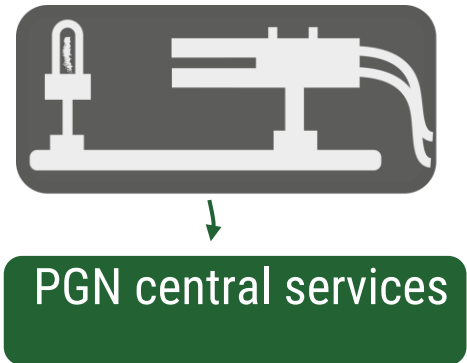
We are processing Pan 27 (Seoul) to add to the PGN.

Next in line: Additional Seoul instruments

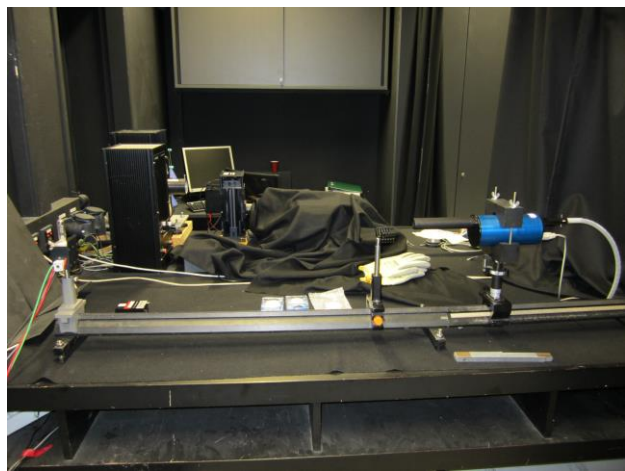
Chinese locations are problematic: the government is unwilling to commit to data sharing and long-term location requirements of the PGN.



# Calibration laboratories

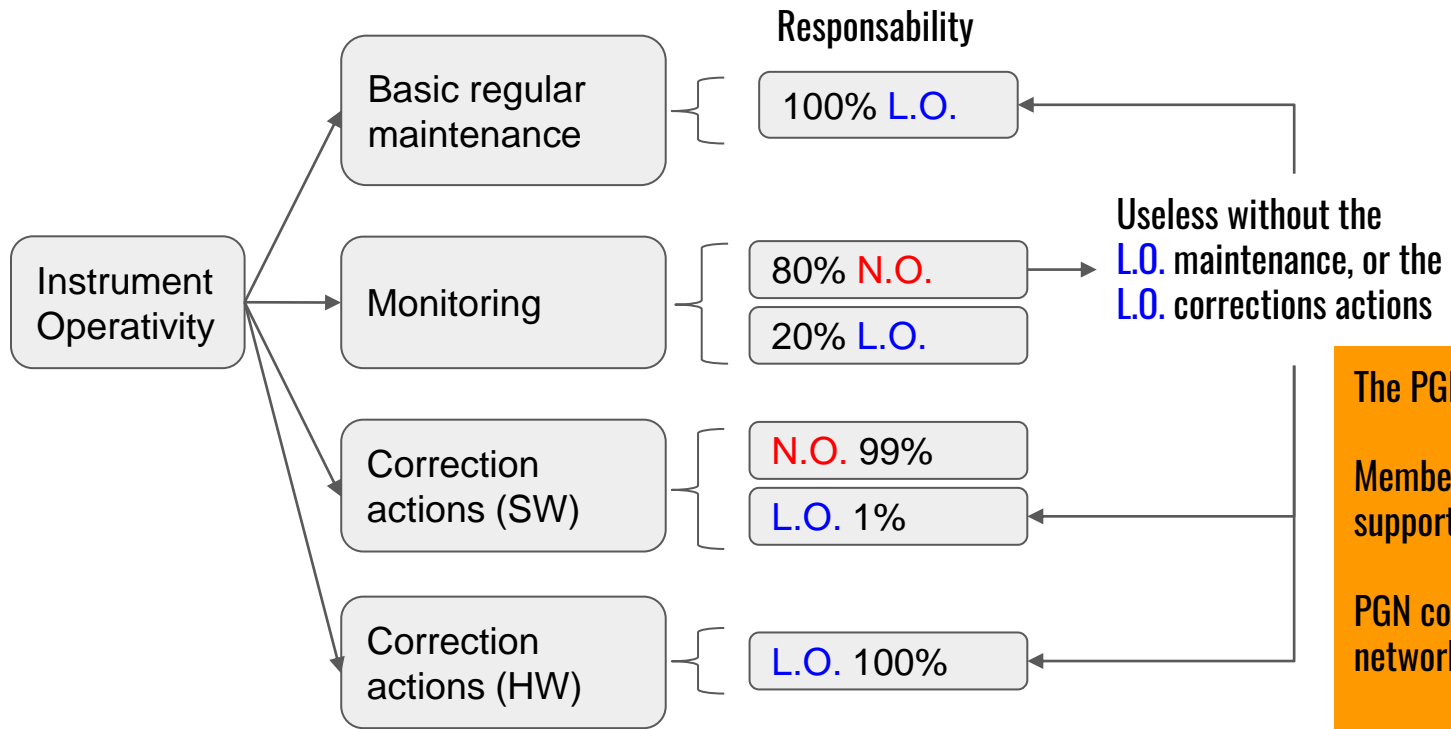


The PGN requires  
standardized  
procedures and  
documentation!





# Local operators (L.O.) and Network Operators (N.O)



The PGN is a Cooperative Network.

Members of the network provide support to the instruments.

PGN coordinates Operation of the network with Local Operators



# Instrument Monitoring - BlickM

onia-global-network.org

Hello, ACede <span>LOGOUT</span>							
<input type="checkbox"/> pgn only <input type="text" value="Search..."/>							
Pan ID	Location ↑	Status	Live Status	Issues	Calibrations	Hardware	Operator
128	AliceSprings		<div>LO L2 LO</div> <div>s1 10d 28d 42d 10d</div>	<div>htr.zm.fl</div> <div>htr.zm.ge</div>		None	DSantana
141	Altzomoni					None	DSantana
65	Altzomoni		<div>LO L2</div> <div>s1 28d 77d</div>	htr.om		None	MGray
119	Athens-NOA		<div>LO L2</div> <div>s1 53d 53d</div>	htr.zm.ge		None	DSantana
168	AtlantaATL		<div>LO</div> <div>s1 2m</div>			None	SSmith
158	AtlantaATL		<div>LO</div> <div>s1 &lt;1m</div>			None	LShalaby
160	Beijing		<div>LO L2 LO</div> <div>s1 &lt;1m 32d &lt;1m</div>	htr.sp.uv.cm		None	DSantana
155	BostonMA		<div>LO</div> <div>s1 2m</div>	htr.sp.uv.cm		None	LShalaby
154	BostonMA		<div>LO</div> <div>s1 47d</div>			None	LShalaby
153	BostonMA		<div>LO</div> <div>s1 7m</div>			None	LShalaby
26	BoulderCO		<div>LO</div> <div>s1 2m</div>			None	MGray
57	BoulderCO		<div>LO L2</div> <div>s1 3d 3d</div>	<div>htr.om</div> <div>htr.am</div> <div>ch.it</div>		None	SSmith
21	Bremen		<div>LO</div> <div>s1 7m</div>			None	DSantana
112	Broadmeadows		<div>LO</div> <div>s1 &lt;1m</div>	<div>htr.am.fl</div> <div>htr.sh.fl</div> <div>sat.ds.cs</div>		None	DSantana
147	BronxNY		<div>LO L2</div> <div>s1 11d 149d</div>	htr.sh.fl		None	SSmith
162	Brussels-Uccle		<div>LO L2 LO</div> <div>s1 7m 6m 7m</div>			None	DSantana
113	BuenosAires			<div>htr.sp</div> <div>htr.sh.ell</div> <div>htr.tr.dr</div>		None	DSantana

PGN Network Operators monitor all instruments.

Local operators have access to their instruments on the BlickM software

# Instrument Monitoring - BlickM

BlickM tool:

Login

General History

Locations History

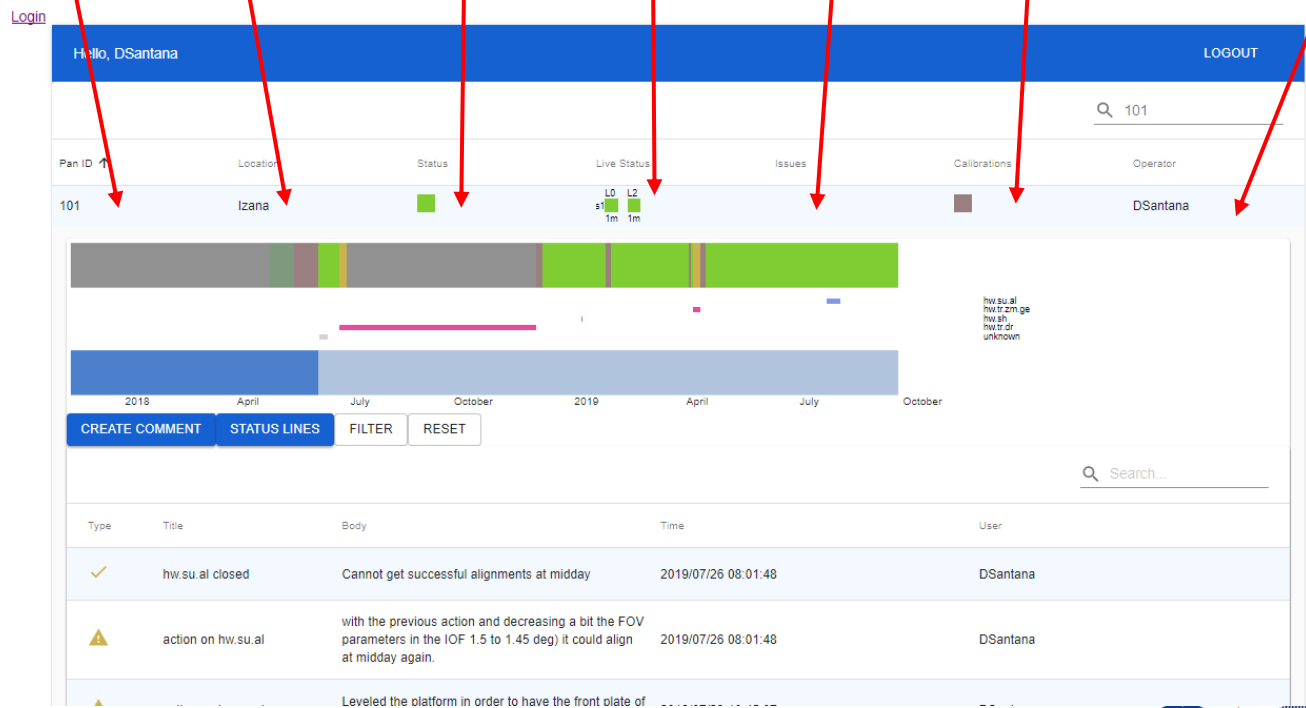
Status History

L0/L2 Live status

Issues History

Lab measurements History

Assigned N.O.

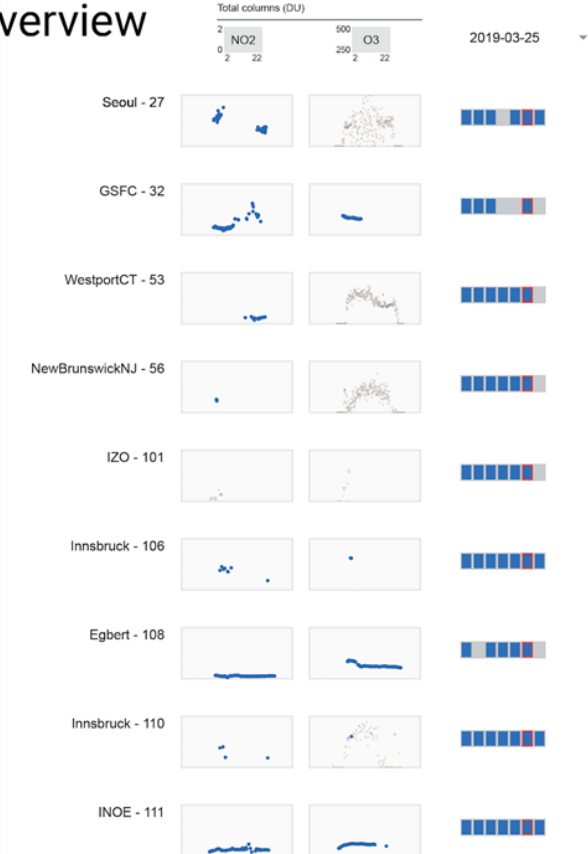


PGN network operators will update instrument status on a weekly basis

# PGN Real Time Data:

[network.org/](http://network.org/)

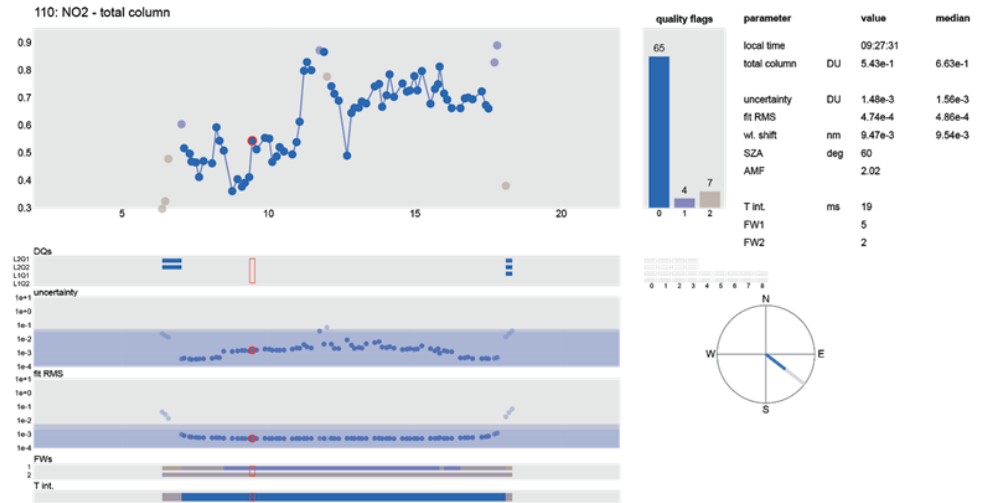
overview



# BlickV <http://blickv.pandonia-global->



**Current operational products:  
Total columns NO<sub>2</sub> and O<sub>3</sub>**



# Example Application: PGN comparisons to TROPOMI

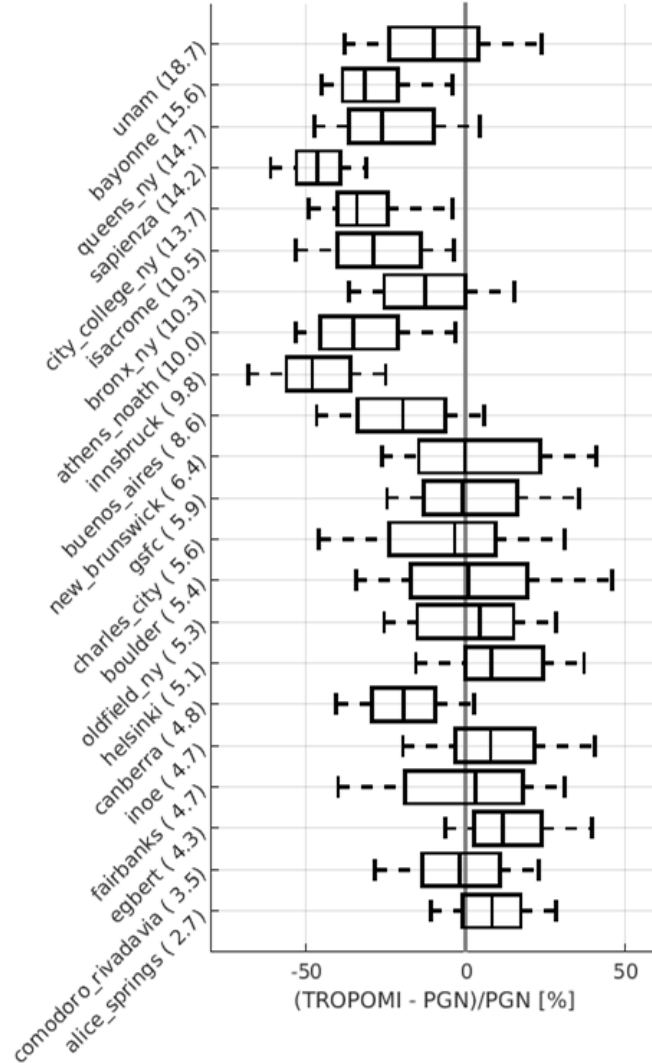
The PGN provides years-long data sets from around the world to compare with TROPOMI

Urban, rural, oceanic, and mountain regions are represented

These comparisons can be used to refine satellite data sets

Verhoelst et al. : Ground-based validation of the Copernicus Sentinel-5p TROPOMI NO<sub>2</sub> measurements with the NDACC ZSL-DOAS, MAX-DOAS and Pandonia global networks,

*Atmos. Meas. Tech. Discuss.*, <https://doi.org/10.5194/amt-2020-119>, in review, 2020.



# PGN Future Plans

- 1) Add existing instruments to PGN.
- 2) Improved retrievals beginning Fall 2020:
  - a) Improved  $O_3$
  - b)  $SO_2$  columns
  - c)  $NO_2$  profiles; Surface  $NO_2$
  - d) HCHO columns; Surface HCHO, and HCHO profiles
- 3) Assist in development of PAN:
  - a) Train network operators and calibration scientists
- 4) 2021 PGN meeting in the US near Washington D.C.

