www.baqunin.eu

Boundary-layer Air Quality-analysis Using Network of INstruments

BAQUNIN supersite

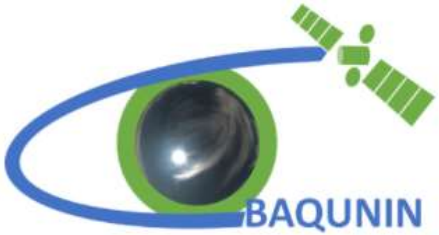
www.baqunin.eu

Boundary-layer Air Quality-analysis Using Network of INstruments

BAQUNIN supersite

To establish an experimental research infrastructure for the calibration and validation of present and future satellite atmospheric products and the in-depth investigation of the planetary and urban boundary layers.

- Sustain the maintenance and operation of **ground based** remote sensing, operating in the **Rome area and covering different environments**
- Acquire, homogenise and distribute **high quality data**
- Perform **inter-calibration** and validation **campaigns**
- Stimulate research in Urban Atmospheric Boundary Layer physics/chemistry by facilitating **inter-connections between research institutes**



www.baqunin.eu

Boundary-layer Air Quality-analysis Using Network of INstruments

BAQUNIN supersite

serco

Stefano Casadio
Anna Maria Iannarelli
Gabriele Mevi
Enrico Cadau
Massimo Cardaci

SAPIENZA UNIVERSITÀ DI ROMA

Marco Cacciani
Annalisa Di Bernardino
Anna Maria Siani

ISAC

Monica Campanelli
Giampietro Casasanta

CNR-IIA

Cristiana Bassani

Onlus SardegnaClima

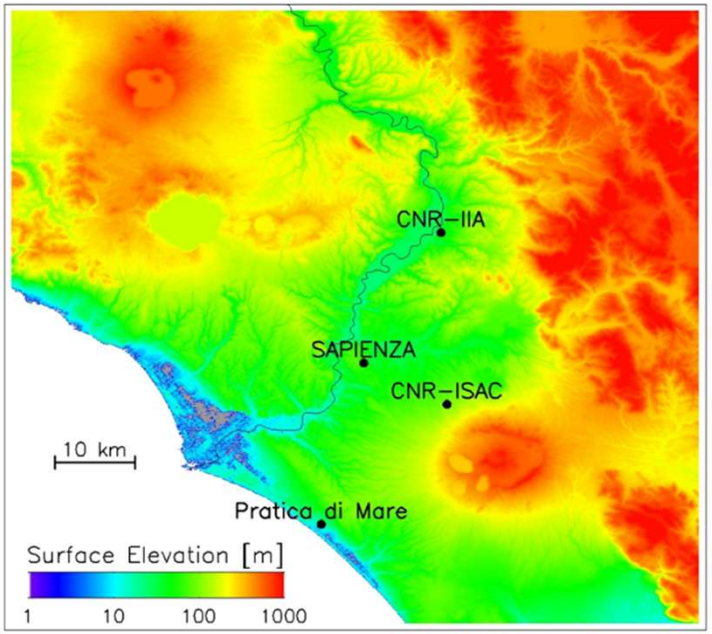
Andrea Murgia

BAQUNIN locations

The BAQUNIN super site is composed by:

- ❑ Urban component (APL Sapienza, Rome)
- ❑ Semi-rural component (CNR-ISAC, Tor Vergata)
- ❑ Rural component (CNR-IIA, Montelibretti)

Figure on the right shows the position of Sapienza, CNR-IIA and CNR-ISAC sites, and of the meteo sounding station of Pratica di Mare (Aeronautica Militare).
The position of the three sites allows an effective monitoring of the atmosphere in Tiber Valley and over the city of Rome.
Each BAQUNIN site is hosting one Pandora and, as the case of Sapienza, a large number of other atmospheric remote sensing devices.

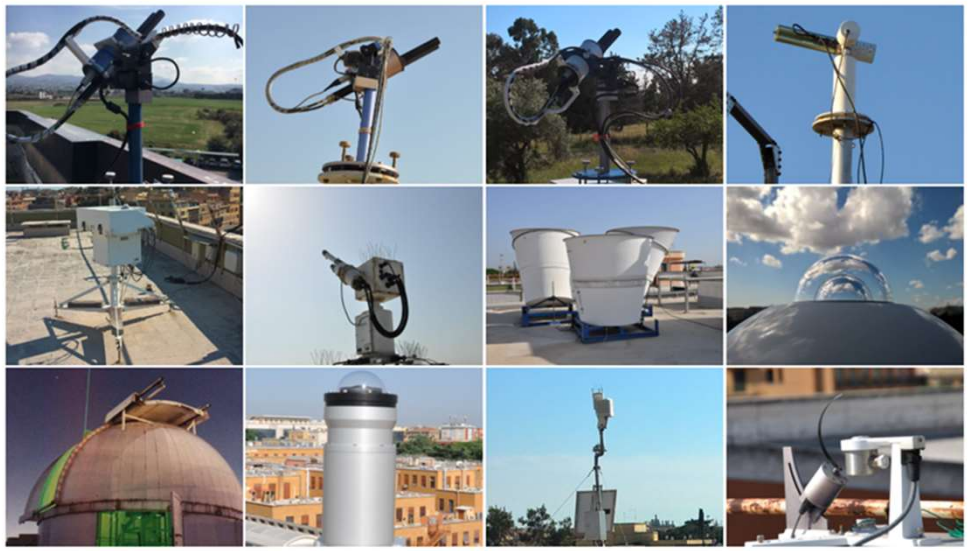


www.baqunin.eu

BAQUNIN instruments

www.baqunin.eu

	Instrument
3	PANDORA #115 #117 #138
1	BREWER #067
2	POM-PREDE #11 #22
1	CIMEL
1	LIDAR Elastic and Raman
1	CEILOMETER (RAP)
1	CEILOMETER (SAP)
1	SODAR
1	PYRANOMETER
1	SKY-CAMERA
2	All sky NASA
1	WEBCAM
2	METEO-STATION
1	MICRO-BAROMETER
1	WRF
1	TROPEX
1	Database



BAQUNIN instruments ...and products

www.baqunin.eu

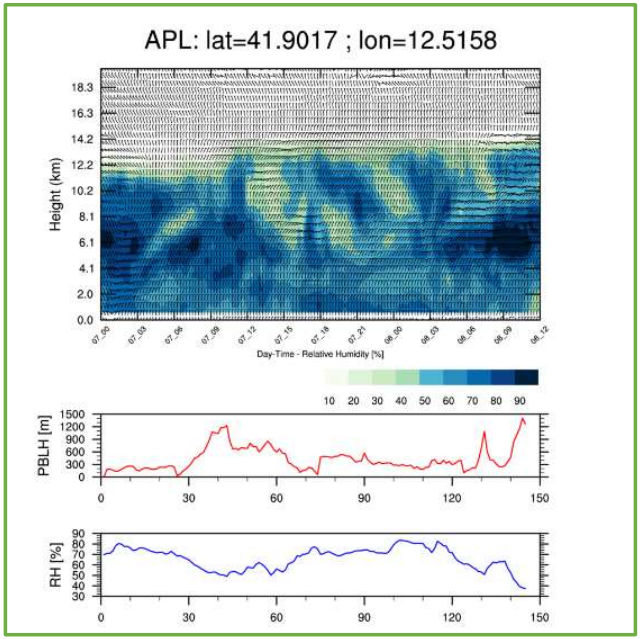
	Instrument
3	PANDORA #115 #117 #138
1	BREWER #067
2	POM-PREDE #11 #22
1	CIMEL
1	LIDAR Elastic and Raman
1	CEILOMETER (RAP)
1	CEILOMETER (SAP)
1	SODAR
1	PYRANOMETER
1	SKY-CAMERA
2	All sky NASA
1	WEBCAM
2	METEO-STATION
1	MICRO-BAROMETER
1	WRF
1	TROPEX
1	Database

Product
O_3, NO_2, HCHO, **SO_2, O_2** (tot., surf., trop., **PBL profile**)
H_2O (tot., surf., trop., **profile**)
Aerosol Optical Depth
Aerosol Bck/Ext profile, AE, SSA, RI, PF, VSD
UV Dose, UV Index, Radiance
Cloud Mask, CBH, CTH, MLH
Wind Speed and Direction, Turbulence profile
GHG (tot. and surf.)
Surface air temperature, humidity, pressure and wind

BAQUNIN instruments

www.baqunin.eu

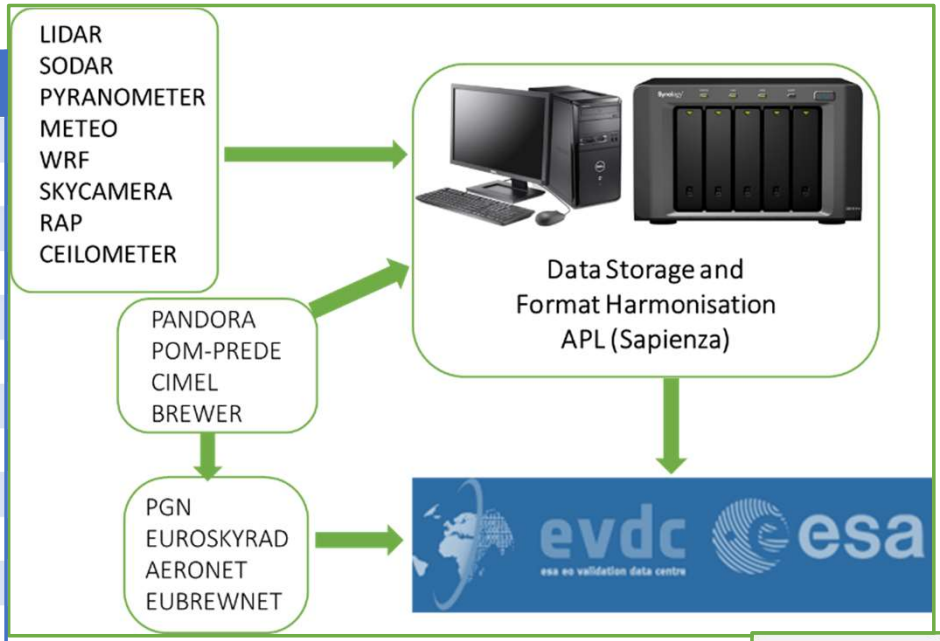
	Instrument
3	PANDORA #115 #117 #138
1	BREWER #067
2	POM-PREDE #11 #22
1	CIMEL
1	LIDAR Elastic and Raman
1	CEILOMETER (RAP)
1	CEILOMETER (SAP)
1	SODAR
1	PYRANOMETER
1	SKY-CAMERA
2	All sky NASA
1	WEBCAM
2	METEO-STATION
1	MICRO-BAROMETER
1	WRF
1	Database
1	TROPEX

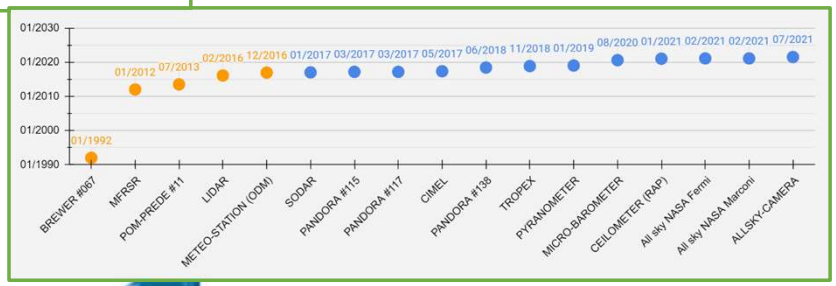


BAQUNIN instruments

www.baqunin.eu

	Instrument
3	PANDORA #115 #117 #138
1	BREWER #067
2	POM-PREDE #11 #22
1	CIMEL
1	LIDAR Elastic and Raman
1	CEILOMETER (RAP)
1	CEILOMETER (SAP)
1	SODAR
1	PYRANOMETER
1	SKY-CAMERA
2	All sky NASA
1	WEBCAM
2	METEO-STATION
1	MICRO-BAROMETER
1	WRF
1	Database
1	TROPEX





BAQUNIN instruments

www.baqunin.eu

	Instrument
3	PANDORA #115 #117 #138
1	BREWER #067
2	POM-PREDE #11 #22
1	CIMEL
1	LIDAR Elastic and Raman
1	CEILOMETER (RAP)
1	CEILOMETER (SAP)
1	SODAR
1	PYRANOMETER
1	SKY-CAMERA
2	All sky NASA
1	WEBCAM
2	METEO-STATION
1	MICRO-BAROMETER
1	WRF
1	Database
1	TROPEX

TropEx (TROPOMI Extractor) is a Serco Service providing the extraction of TROPOMI files content on specified **Regions of Interest** (ROIs), producing smaller files more suitable for a reduced region analysis.
TropEx checks every day the last TROPOMI files published on ONDA Hub (www.onda-dias.eu).

ROI name
Aosta
Bologna
Capogranitola
Lamezia Terme
Lampedusa
Lazio
Milano
Napoli
Taranto
Thule

BAQUNIN contribution to…

www.baqunin.eu

Support to satellite activities

- Calibration/validation of satellite missions managed by ESA and other entities
- Correction of atmospheric data for institutional and commercial satellite missions

Environmental protection

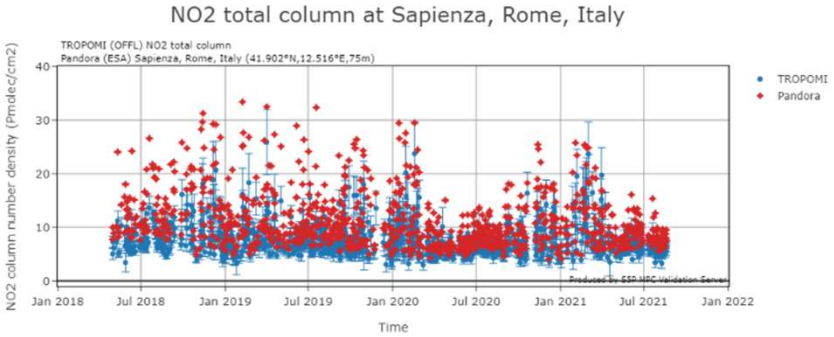
- Contribution to the assessment of air quality levels (vertical profiles and columnar contents)
- Observation and measurement during transport of air masses from severe fires (Pomezia e North of Rome)
- Observation and modelling of medium- and long-range advective phenomena (desert dust, volcanic ashes, and volcanic gases)

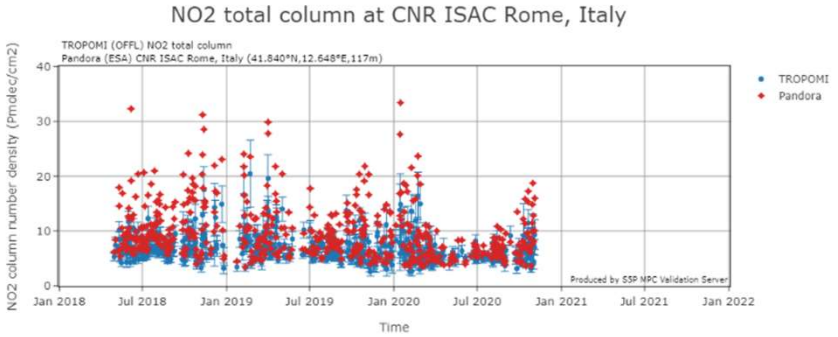
BAQUNIN Cal/Val activities

www.baqunin.eu

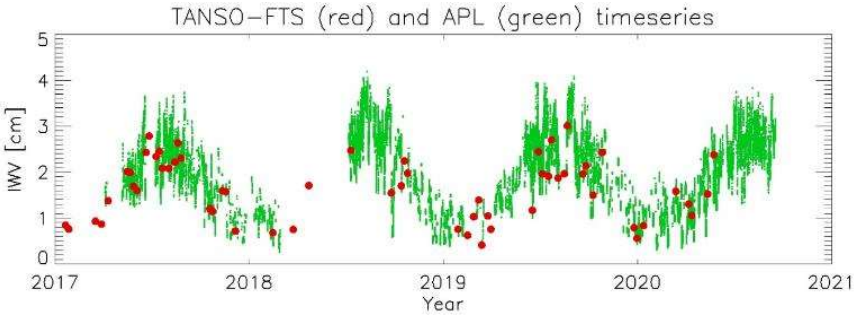
Urban (Sapienza) and **Semi-Rural** (CNR-ISAC) BAQUNIN sites contribution to...

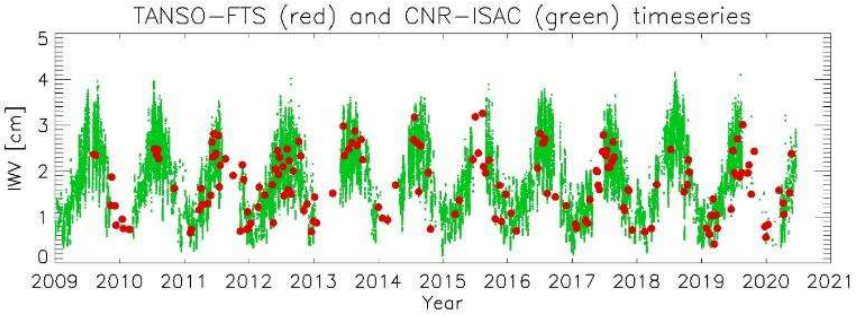
…. TROPOMI NO_2 validation





…. GOSAT TANSO-FTS Integrated Water Vapour





BAQUNIN outreach

www.baqunin.eu

Scientific Articles (published)

- Integrated evaluation of indoor particulate exposure: the VIEPI project, *Sustainability*
- A Street Graph-based Morphometric Characterization of Two Large Urban Areas, *Sustainability*
- Impact of synoptic meteorological conditions on air quality in three different case studies in Rome, Italy, *Atmospheric Pollution Research*
- On the effect of sea breeze regime on aerosols and gases properties in the urban area of Rome, Italy, *Urban Climate*
- A wide-ranging investigation of the COVID-19 lockdown effects on the atmospheric composition in various Italian urban sites (AER – LOCUS), *Urban Climate*
- Advanced NO2 retrieval technique for the Brewer spectrophotometer applied to the 20-year record in Rome, Italy, *Earth System Science Data Discussion*

Scientific Articles (under revision)

- The Boundary-layer Air Quality-analysis Using Network of INstruments (BAQUNIN) supersite for Atmospheric Research and Satellite Validation over Rome area, *Bulletin of the American Meteorological Society*
- Aerosol optical characteristics in the urban area of Rome, Italy, and their impact on the UV index, *Atmospheric Measurement Techniques Discussion*
- Classification of synoptic and local-scale wind patterns using k-means clustering in a Tyrrhenian coastal area (Italy), *Meteorology and Atmospheric Physics*

Conferences/Symposia/Workshops contributions since 2015:

LPS, ACVE, ILRC, IDEAS+QA4EO Task-3, S5p VT, EC VT, EGU, AGU, AISAM

BAQUNIN

www.baqunin.eu

@BaquninProject

Thanks for your attention from the whole BAQUNIN Team!

annamaria.iannarelli@serco.com

SAPIENZA UNIVERSITÀ DI ROMA · ISAC · serco · BAQUNIN · esa · CNR-IIA · Onlus SardegnaClima