



Deliverable D37 (D5.3)

Service catalog on ACTRIS and IAGOS services for urban sites



RI-URBANS

**Research Infrastructures Services Reinforcing Air
Quality Monitoring Capacities in European Urban &
Industrial Areas (GA n. 101036245)**

By

**NILU, CNRS, CNR-IMAA, EMPA, FMI,
INERIS, IMT Nord Europe & FZJ**



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Deliverable D37 (D5.3): Service catalog on ACTRIS and IAGOS services for urban sites

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1. About this document

This document describes which relevant service tools the European research infrastructures (RIs) ACTRIS and IAGOS have developed which are openly available to be used for urban sites.

Both ACTRIS and IAGOS provides access to a wide variety of high-quality services designed to support a broad range of users and needs, including scientific, technological, and innovation-oriented activities. Several of these services are relevant for urban atmospheric observation and research. The services can be data curation, tools for visualisation, quality assurance etc. We give a brief overview of the major services by these two research infrastructures and a list all relevant available services in the end of the report.

This is a public document and will be distributed to all RI-URBANS partners for their use and submitted to European Commission as an RI-URBANS deliverable D37 (D5.3). This document can be downloaded at <https://riurbans.eu/work-package-5/#deliverables-wp5>

2. ACTRIS services

The ACTRIS services are described in detail at <https://www.actris.eu/catalogue-of-services> and can be broadly categorized into two main areas:

- Access to data services and digital tools, including observational datasets and processed products made available through the ACTRIS Data Centre.
- Access to services, such as data analysis tools, training, instrument calibration and testing, quality assurance, and measurement support, provided by ACTRIS Central Facilities.

2.1 Access to data

As described in [Deliverable D45, Open Research Data](#), RI-URBANS data have been submitted to the three ACTRIS Data Centres (DC):

- In Situ: Aerosol and trace gas in situ data, submitted to the data repository [EBAS](#), hosted at NILU in Norway.
- ARES: Aerosol profiling data, submitted to the data repository [EARLINET](#), hosted at CNR in Italy.
- CLU: Cloud remote sensing data, submitted to the data repository [Cloudnet](#), hosted at FMI in Finland.

These datacentres provide portals for downloading data, APIs for more direct access to data and tools for submission as well as services describing vocabulary, metadata, templates etc. All the data are associated with a DOIs. These repositories are also accessed through the ACTRIS Data Discovery, Virtual Access, and Services ([DVAS](#)).

The ACTRIS DVAS portal gives access to RI-URBANS data as well as other relevant data providers.

Title	Matrix	Variables	Object of interest	Facility	Instruments	Start Time	End Time	Inspect	Download
Aerosol_absorption_coefficient at Barcelona (Palau Reial)	aerosol particle phase	aerosol particle light absorption coefficient	particle phase	Barcelona (Palau Reial)	filter absorption photometer	2009-01-12 23:00:00 UTC	2021-03-31 22:00:00 UTC		
Aerosol_absorption_coefficient at Barcelona (Palau Reial)	aerosol particle phase	aerosol particle light absorption coefficient	particle phase	Barcelona (Palau Reial)	filter absorption photometer	2015-04-02 22:00:00 UTC	2020-09-20 22:00:00 UTC		
Aerosol_absorption_coefficient at Madrid (CIEMAT)	aerosol particle phase	aerosol particle light absorption coefficient	particle phase	Madrid (CIEMAT)	filter absorption photometer	2013-01-13 23:00:00 UTC	2019-12-31 23:00:00 UTC		
Aerosol_absorption_coefficient at Granada	aerosol particle phase	aerosol particle light absorption coefficient	particle phase	Granada	filter absorption photometer	2013-12-31 23:00:00 UTC	2019-12-31 23:00:00 UTC		

Aerosol_absorption_coefficient at Barcelona (Palau Reial) [Code example](#) [Download](#)

Product Information

Variable(s) aerosol particle light absorption coefficient

Product type Observation

Instrument type(s) filter absorption photometer

Timeliness Scheduled

Start time 2009-01-13 00:00:00

End time 2021-04-01 00:00:00

Framework(s) RI-URBANS, ATM0-ACCESS

Matrix Aerosol particle phase

Provenance

Software <https://git.nilu.no/ebas/ebas-io>

Version history

Facility Information

Facility name [Barcelona \(Palau Reial\), ES](#)

Facility type Observation platform, fixed

Coordinates [41.387463, 2.11532](#)

Citation & Acknowledgements

Licence CC-BY-4.0

Citation Savadkouhi, M., RI-URBANS, ATM0-ACCESS, 2009-2021, Aerosol_absorption_coefficient at Barcelona (Palau Reial), data hosted by EBAS at NILU. DOI: <https://doi.org/10.48597/3DNX-228N>

Acknowledgement Data used in this <study/report/figure/etc.> were accessed from EBAS (<https://ebas.nilu.no>) hosted by NILU. Specifically, the use included data affiliated with the frameworks: RI-URBANS, ATM0-ACCESS.

File Information

PID <https://doi.org/10.48597/3DNX-228N>

File name 3DNX-228N.nc

File format 4

File size 3902925 megabytes

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Data Quality Information

Compliance ACTRIS associated

Figure 1 gives an overview of the ACTRIS data portal and example of RI-URBANS data available from here.

The screenshot shows the ACTRIS DC web portal search results for the framework RI-URBANS. On the left, the search filters are visible, with 'RI-URBANS' selected in the 'Framework' dropdown. The main area displays a list of 141 data objects, with the first four rows shown. A table of these results is provided below, with an arrow pointing from the first row of the table to the detailed view on the right.

Title	Matrix	Variables	Object of interest	Facility	Instruments	Start Time	End Time	Inspect	Download
Aerosol absorption coefficient at Barcelona (Palau Reial)	aerosol particle phase	aerosol particle light absorption coefficient	particle phase	Barcelona (Palau Reial)	filter absorption photometer	2009-01-12 23:00:00 UTC	2021-03-31 22:00:00 UTC		
Aerosol absorption coefficient at Barcelona (Palau Reial)	aerosol particle phase	aerosol particle light absorption coefficient	particle phase	Barcelona (Palau Reial)	filter absorption photometer	2015-04-02 22:00:00 UTC	2020-09-20 22:00:00 UTC		
Aerosol absorption coefficient at Madrid (CIEMAT)	aerosol particle phase	aerosol particle light absorption coefficient	particle phase	Madrid (CIEMAT)	filter absorption photometer	2013-01-13 23:00:00 UTC	2019-12-31 23:00:00 UTC		
Aerosol absorption coefficient at Granada	aerosol particle phase	aerosol particle light absorption coefficient	particle phase	Granada	filter absorption photometer	2013-01-13 23:00:00 UTC	2019-12-31 23:00:00 UTC		

The detailed view for 'Aerosol_absorption_coefficient at Barcelona (Palau Reial)' is shown on the right. It includes sections for Product Information, Facility Information, File Information, Provenance, Citation & Acknowledgements, and Data Quality Information. The 'Framework(s)' field is circled in red and contains the value 'RI-URBANS, ATMO-ACCESS'. The 'Matrix' field is also circled in red and contains the value 'Aerosol particle phase'.

Figure 1. Screenshot from ACTRIS DC web portal (<https://data.actris.eu/search>) illustrating data associated with the framework RI-URBANS, accessed 24 June 2025.

In addition to access data from the web portal interfaces ACTRIS has developed machine-to-machine access to data and products through the REST API. There are API services from the different data units as well as from the ACTRIS DC. Figure 2 illustrated in from the ACTRIS service catalogue:

There are tools available for data submission and tutorial videos on how to submit data. There are also various higher level data products (level 3) available. See Table 1 for details.

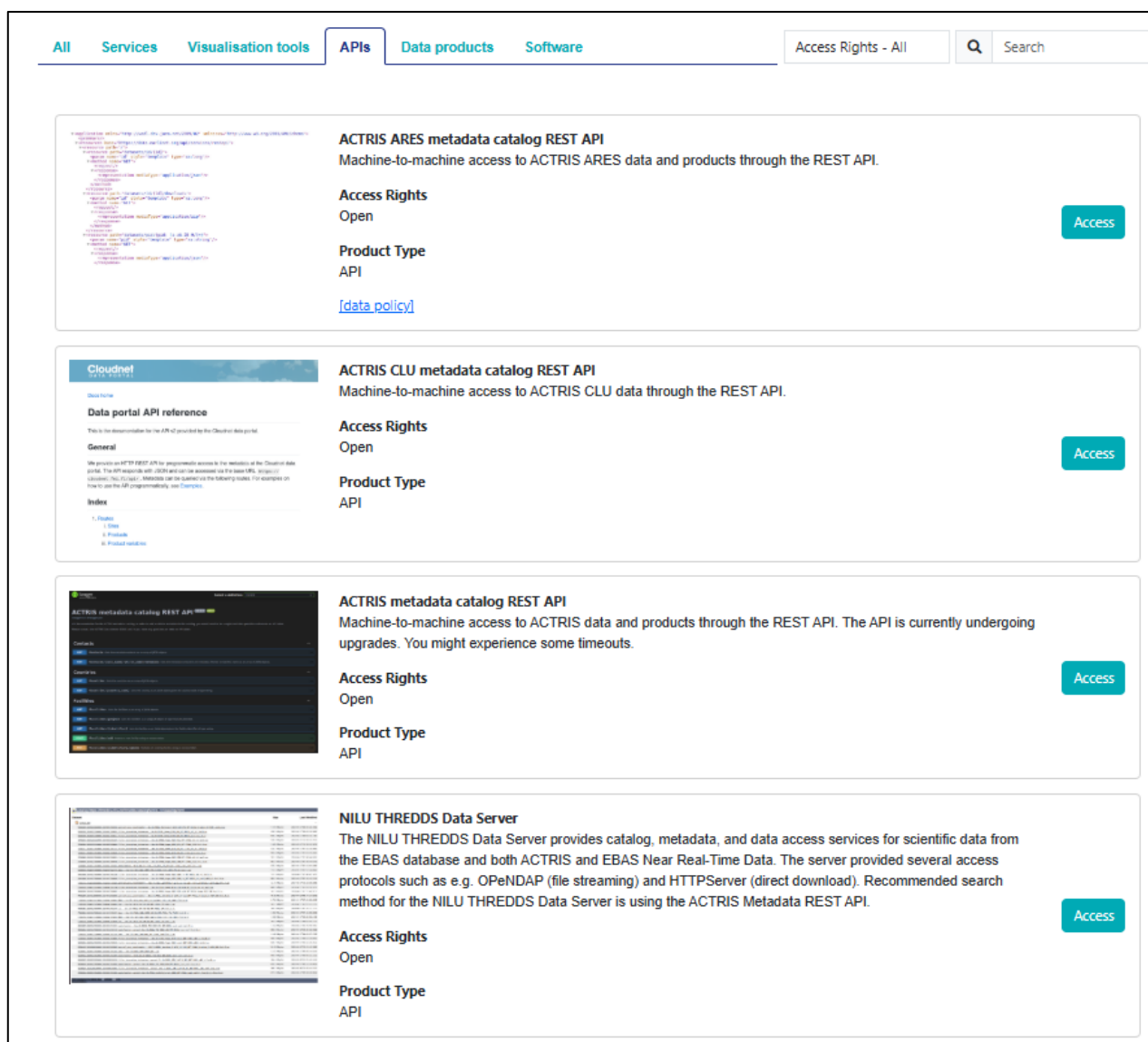


Figure 2. Screenshot from ACTRIS DC web portal on services (<https://dc.actris.nilu.no/services>) illustrating different API service tools, accessed 24 June 2025.

2.2 Visualisation tools

ACTRIS provides several tools to visualise the data and for doing various analysis and like quality assurance and online source apportionment. Figure 3 illustrates the NRT in-situ data from the RI-URBANS site in Barcelona, and Figure 4 shows the ACSM Network visualization tool provided by the ACTRIS Aerosol Chemical Monitor Calibration Centre (ACMCC). This is a visualization web interface to explore data acquired by ACSM at the European scale, and for some stations also aethalometers and source apportionment retrievals. The service tools of NRT source apportionment of fine carbonaceous aerosols is further described in [Deliverable D5 \(D1.5\)](#).

ACTRIS CiGas (Center for Reactive Trace Gases In Situ Measurements) provides a software for VOC data quality checks before final submission, it's called @VOC@ (Atmospheric VOC Assessment Tool) and was developed by EMPA, Figure 5. Registration as user is needed for accessing the software.

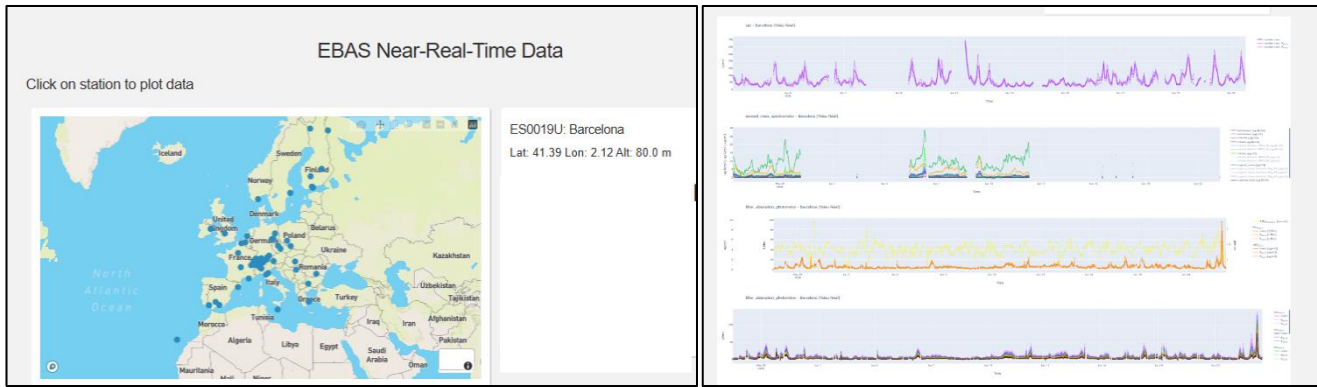


Figure 3. Screenshot from the EBAS NRT web portal (<https://ebas-nrt.nilu.no>) illustrating RI-URBANS data from Barcelona (ES0019U), accessed 24 June 2025.

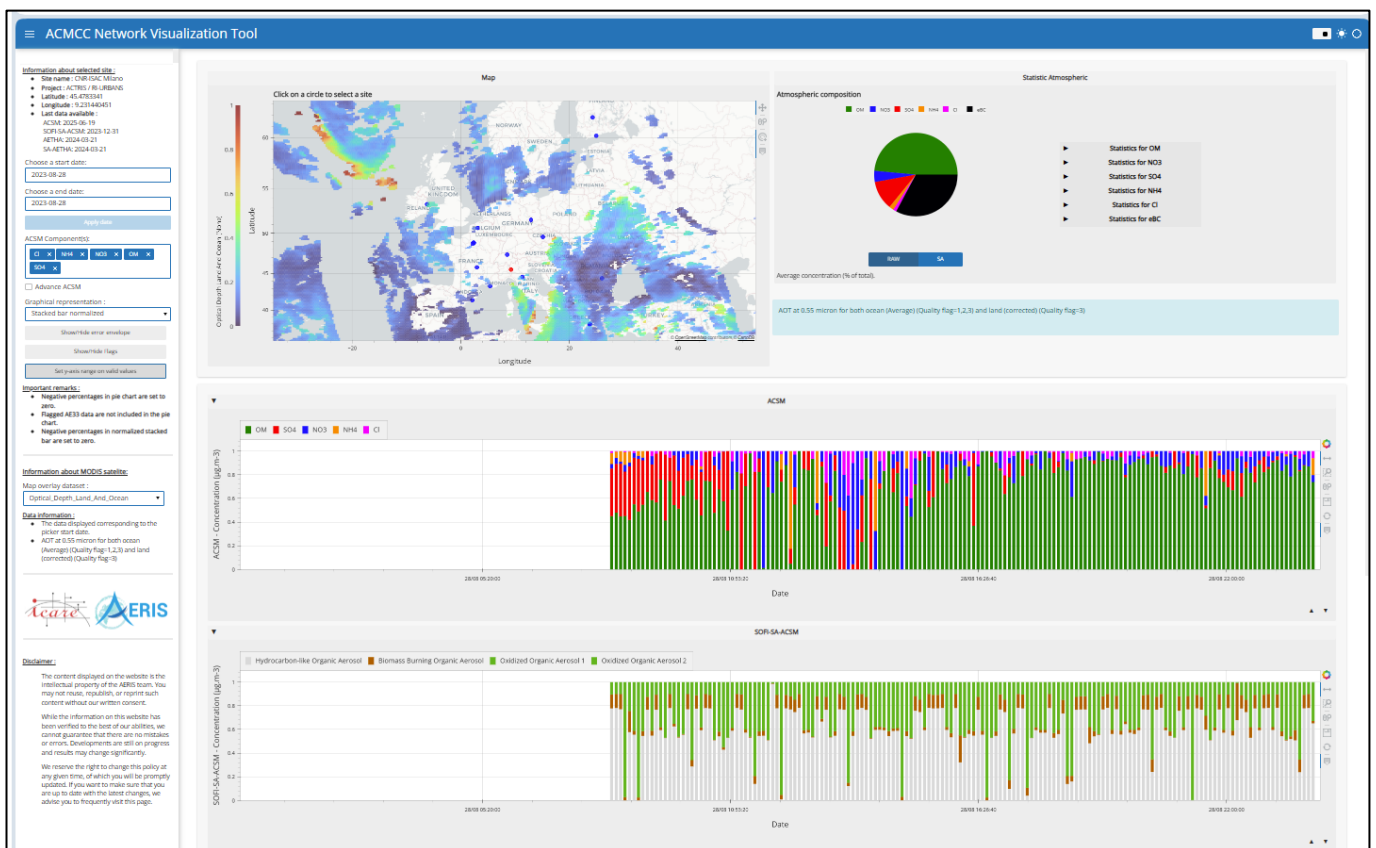


Figure 4. Screenshot from ACTRIS DC web portal on services (https://dataviz.icare.univ-lille.fr/acsm_dataviz) illustrating the ACSM data (middle panel) from Milano including an online source apportionment analysis of the organic fraction (bottom panel) and a model and a map of optical depth from the MODIS satellite (top panel), accessed 24 June 2025.

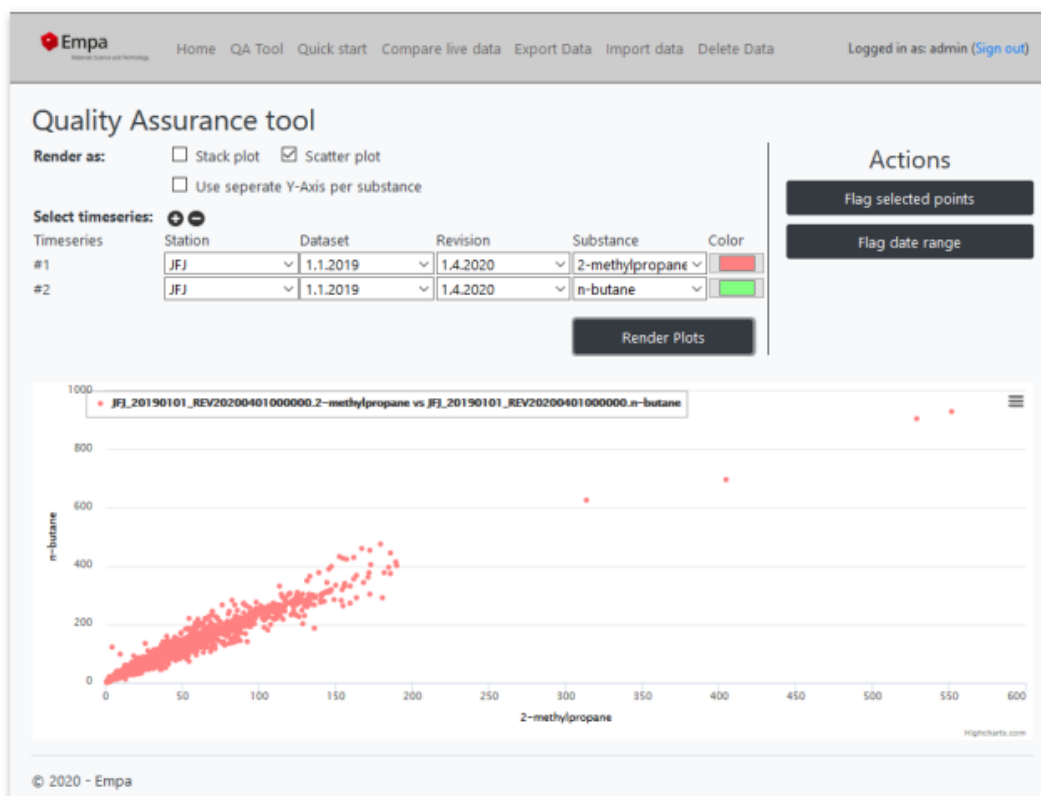


Figure 5. Screenshot of the @VOC@ software tool (<https://voc-qc.nilu.no/>)

3. IAGOS services

The European Research Infrastructure IAGOS (In-service Aircraft for a Global Observing System) provides measurements from compact and automated in situ sensors on board of passenger aircraft monitoring vertical profiles of trace gas concentrations (incl. CO, O₃, NO_x, and H₂O) near airports during take-off and climb-out as well as during descent and landing flight phases between the ground and 10-12 km altitude. The IAGOS profile data provide valuable information that is otherwise not accessible and complement the data provided by surface-based AQMN stations. Details on the services tools most relevant for urban sites was outlined in the RI-URBANS [Deliverable D46 \(D6.1\) IAGOS profiles of air quality parameters](#), and in the service tool [ST9: Measurements of IAGOS vertical profiles by commercial aircraft](#).

The main two services provided by IAGOS are:

- Access to data from commercial aircraft, available through the IAGOS Data Portal.
- Access to support services, such as visualization of IAGOS vertical profiles compared with CAMS regional models for RI-URBANS pilot cities.

3.1 Access to data and products

The IAGOS data is available from www.iagos.org and can be selected using the “IAGOS data portal”. Registration is necessary, an account can easily be created via a personal ORCID among other authentication methods.

For RI-URBANS IAGOS’ vertical profiles data can be accessed at: <https://www.iagos.org/products/> as illustrated in Figure 7. Currently, the pilot cities available are Amsterdam, Barcelona, Milano, Paris, and Zurich. In the first instance, they are compared with the Copernicus Atmosphere Monitoring Service (CAMS) global and regional models, see Figure 7.

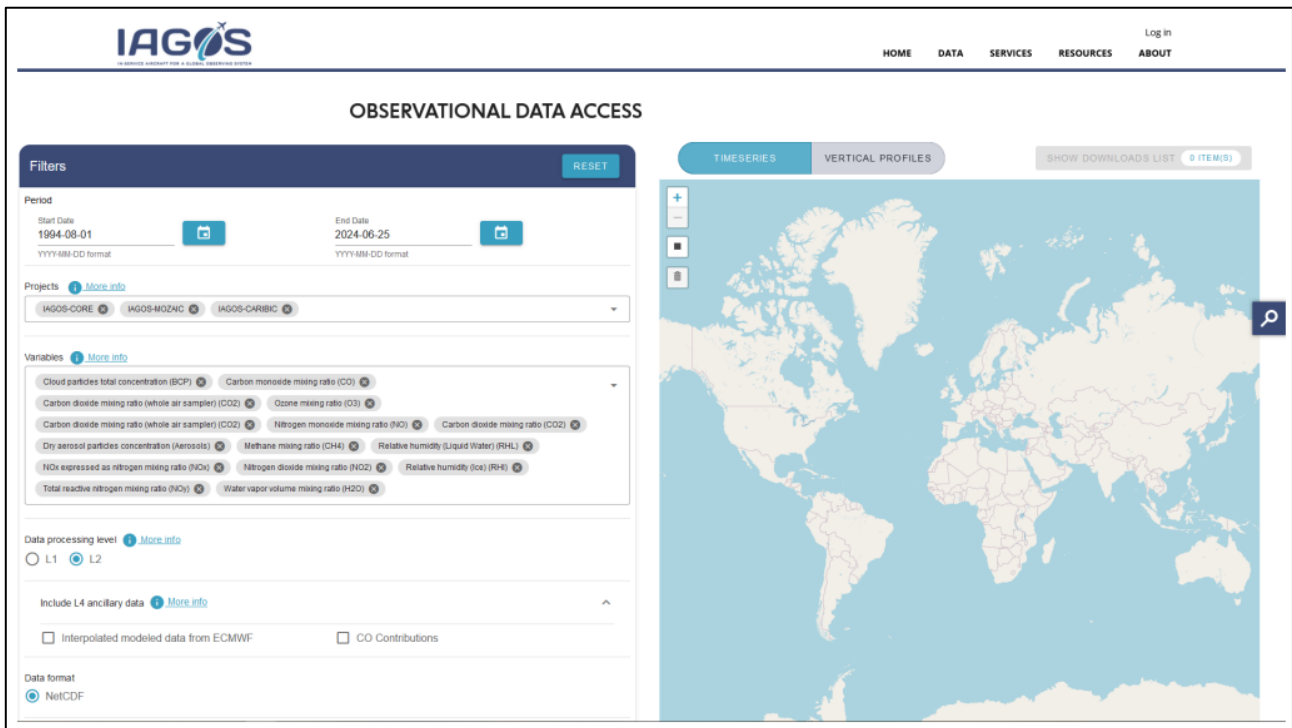


Figure 6. Screenshot of the IAGOS observational data selection web page (<https://iagos.aeris-data.fr/download/>)

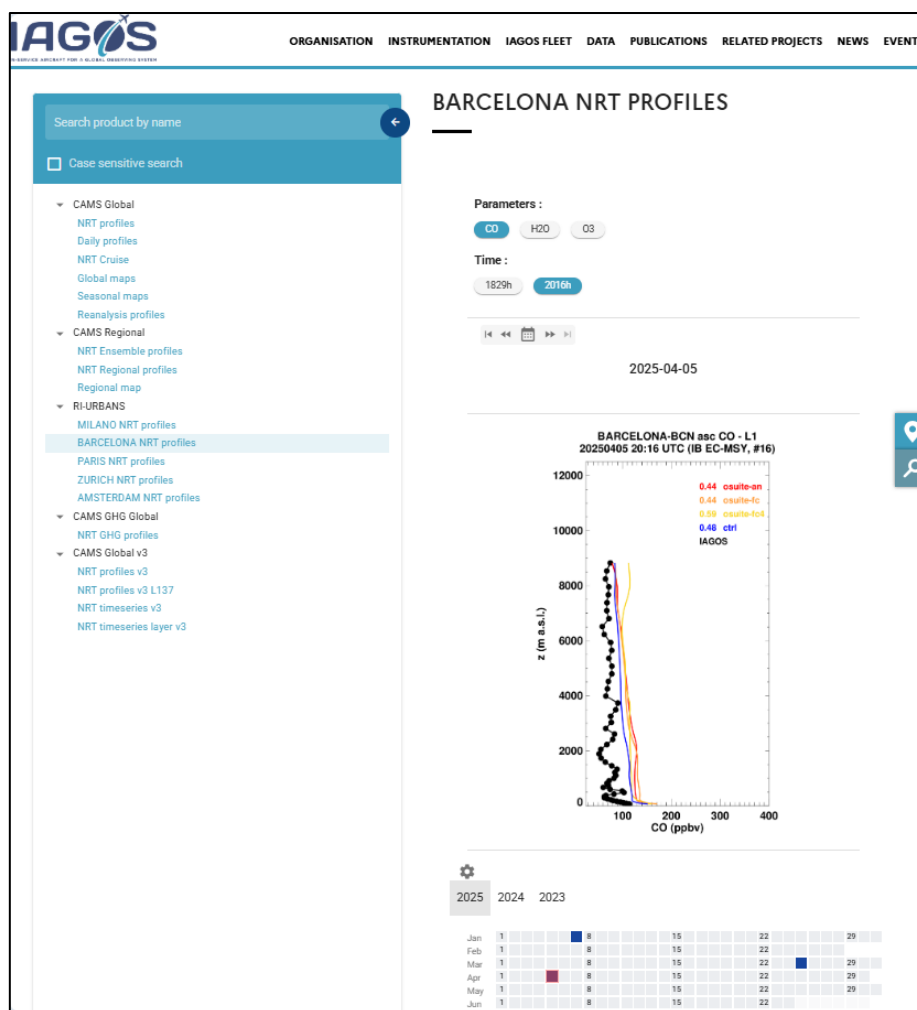


Figure 7. Screenshot from the IAGOS web page illustrating the NRT vertical profiles (<https://www.iagos.org/products/>) with example data from the RI-URBAN site Barcelona. IAGOS data (black) are compared with the CAMS o-suite analysis (red), forecast 0-24h (orange) and 96-120h (yellow), and the control run 0-24h forecast (blue). (Accessed 24 June 2025)

4. Summary

A complete overview of the services available from ACTRIS and IAGOS can be found at their respective catalogue of services:

- ACTRIS: <https://www.actris.eu/catalogue-of-services/services>
- IAGOS: <https://iagos.aeris-data.fr/catalogue/> and from the top menu at <https://iagos.aeris-data.fr>

In Table 1 an overview of the most relevant services available from ACTRIS and IAGOS is listed, including products developed in cooperation with other projects and programmes

Table 1. Service catalog on ACTRIS and IAGOS services for urban sites

Service	Description	Access Link	Access Right	Product Type
Data access				
ACTRIS Data search	Access to long-term, quality controlled atmospheric measurements data from a range of frameworks including RI-URBANS	https://dc.actris.nilu.no/search	Open	Data portal
ACTRIS ARES Data Portal	Web application providing ACTRIS ARES data and products.	https://data.earlinet.org/	Open	Data portal / Visualisation tool
ACTRIS CLU Data Portal	Web application for browsing, visualising and downloading ACTRIS CLU data.	https://cloudnet.fmi.fi/	Open	Data portal / Visualisation tool
ACTRIS In Situ NRT data	Plotting of In Situ Near-Real-Time (NRT) Data and other NRT data products from the ACTRIS In-Situ (EBAS) database.	https://ebas-nrt.nilu.no	Open	Visualisation tool
IAGOS observational data access	Web application for browsing and downloading IAGOS data.	https://iagos.aeris-data.fr/download/	Registration	Data portal
IAGOS NRT data visualisation	This service displays the most recent profiles at worldwide airports as compared with CAMS models on global and regional scales.	https://www.iagos.org/products/nrt_profiles/#/	Open	Data portal / Visualisation tool
IAGOS data availability	Observational data availability	https://iagos.aeris-data.fr/data-availability	Open	Visualisation tool
APIs				
ACTRIS metadata catalog REST API	Machine-to-machine access to ACTRIS data and products through the REST API.	https://prod-actris-md.nilu.no/index.html	Open	API
ACTRIS ARES metadata catalog REST API	Machine-to-machine access to ACTRIS ARES data and products through the REST API	https://data.earlinet.org/api/services/rest-api?_wadl	Open	API
ACTRIS CLU metadata catalog REST API	Machine-to-machine access to ACTRIS CLU data through the REST API.	https://docs.cloudnet.fmi.fi/api/data-portal.html	Open	API
NILU THREDDS Data Server	The NILU THREDDS Data Server provides catalog, metadata, and data access services from the EBAS database including NRT Data. The server provided several access protocols such as e.g. OPeNDAP (file streaming) and HTTPServer (direct download).	https://thredds.nilu.no/thredds/catalog.html	Open	API
IAGOS REST API	Machine-to-machine access to IAGOS data through the REST API.	https://services.iagos-data.fr/prod/swagger-ui/index.html	Registration	API
Guidelines and manuals				
ACTRIS Vocabulary	The ACTRIS vocabulary server provides controlled terms used within ACTRIS, following the I-ADOPT framework to break down variable names into standardized components. It also links to external vocabularies where possible.	https://vocabulary.actris.nilu.no/skosmos/en/	Open	Service

Recommendations, guidelines, SOP for Aerosols in situ measurements	The recommendations and guidelines are developed by the ACTRIS Central Facility, CAIS-ECAC (Center for Aerosol In-Situ - European Centre for Aerosol Calibration)	https://actris-ecac.eu/measurement-guidelines.html	Open	Service
Measurement, guidelines for NOx and VOCs	This guideline provides recommendations for good measurement practice for the analysis of NOx and VOCs under ACTRIS.	https://www.actris.eu/sites/default/files/Documents/ACTRIS-2/Deliverables/WP3_D3.17_M42.pdf	Open	Service
In-Situ Data Submission Manual	A manual providing guidance on how to prepare and submit data files to the EBAS database. Including instruction videos.	https://ebas-submit.nilu.no/	Open	Service
In-situ Data Submission Tool	A web-based tool to check file formats for data submission to the EBAS database, The tool checks the data files for compliance with the EBAS data format and provides feedback.	https://ebas-submit-tool.nilu.no/	Open	Service
Aerosol Remote Sensing Database Processor	The processor is a tool for uploading files, editing categories and download category-files to the EARLINET database	https://upload.earlinet.org/	Restricted	Service
Cloud remote sensing data submission tool	Cloudnet-submit is an automated tool for submitting data to the ACTRIS Cloud remote sensing data centre (CLU)	https://github.com/actris-cloudnet/cloudnet-submit	Open	Software
Cloud remote sensing data processing	CloudnetPy is a Python package for processing cloud remote sensing data to the ACTRIS Cloud remote sensing data centre (CLU).	https://github.com/actris-cloudnet/cloudnetpy	Open	Software
Data processing, visualisation and analysis including data products				
ACTRIS Virtual Research Environment (VRE)	The ACTRIS VRE provides a cutting-edge platform for accessing, analyzing, and sharing atmospheric data. Designed for researchers in the ACTRIS community and collaborators, the VRE integrates data and computational resources in a cloud-based environment, powered by JupyterHub.	https://dc.actris.nilu.no/vre	Open	Data analysis
ACSM Network visualization tool	This web application provides a visualization web interface to explore data acquired by ACSM at the European scale, and for some stations also aethalometers and source apportionment retrievals.	https://dataviz.icare.univ-lille.fr/acsm_dataviz	Open	Visualisation tool
Aerosol Remote Sensing Quicklook Interface	A Quicklook Interface providing an interface for visualization and analysis of NRT lidar data from ACTRIS ARES database. It allows researchers to easily access and explore lidar measurements, aiding in the interpretation and understanding of atmospheric aerosols.	https://quicklooks.earlinet.org/	Open	Visualisation tool
@VOC@	Web-based tool checking for VOC data	https://voc-gc.nilu.no/	Restricted	Visualisation tool
@VOC@ Tutorial	Tutorial video for using @VOC@, the web-based tool checking for VOC data	https://polybox.ethz.ch/index.php/s/u9WdN81AluL7gO	Open	Tutorial video

ReOBS – combining observational data at one site	The ReOBS tool aims to synthesize, analyze and homogenize all the observations of an ACTRIS site in a single NetCDF file	https://reobs.aeris-data.fr/	Open	Data product
MWRpy – Microwave Radiometer data processing	MWRpy is a standalone Python package for Microwave Radiometer (MWR) data processing.	https://github.com/actris-cloudnet/mwrpy	Open	Software
Aerosol Remote Sensing Single Calculus Chain (SCC)	This is a centralized tool for the automatic analysis of aerosol lidar measurements. The SCC is a major component of the ACTRIS ARES responsible for the curation and the processing of the ACTRIS aerosol remote sensing data.	https://www.earlinet.org/index.php?id=281	Open	Services
AERIS/ICARE geostationary data viewer	This web application provides a visualization web interface dedicated to geostationary satellites. It supports multiple products (RGB composites for ash, dust and natural false color, reflectances and brightness temperatures per channel and SAF Now Casting).	https://dataviz.icare.univ-lille.fr/geoview	Open	Visualisation tool
ATMO-ACCESS Time-series analysis	This service allows you to search, analyse and visualise ACTRIS data. It has been implemented in the framework of the European Project ATMO-ACCESS to demonstrate interoperability within the Research Infrastructures	https://services.iagos-data.fr/atmo-access/timeseries	Registration needed	Visualisation and analysis tool
IAGOS Footprint viewer	This is a service for the visualization of footprints and origin of the air masses sampled by IAGOS (characterized by carbon monoxide observations). It is based on pre-generated Level 4 products calculated from the FLEXPART model coupled to different emissions inventories for biomass burning and anthropogenic sources, defining thus the “source-receptor link” model called SOFT-IO	https://services.iagos-data.fr/atmo-access/footprint	Registration needed	Visualisation tool
IAGOS anomalies viewer	This service provides diagnostics and statistics for a better understanding of the long time series, offering the possibility of the creation of a “tailored data set for ESM evaluation/improvement”, and giving the broader context of dedicated campaigns or experiments.	https://services.iagos-data.fr/iriscc/anomalies	Open	Visualisation tool
ATMO-ACCESS FLEXPART products for ground based aerosol and trace gas observations	Discover and make use of the FLEXPART atmospheric transport modeling products for ground-based aerosol and trace gas observations to analyse source regions and emission sources of aerosols and reactive trace gases	https://flexpart-request.nilu.no/	Open	Data product
ACTRIS ARES and EARLINET climatological dataset covering the year 2000-2019	These combined products contain climatological datasets obtained as aggregated products from the fully quality controlled (QC) aerosol optical products). In order to avoid biases due to	https://doi.org/10.57837/cnr-ima/ares/actris-earlinet/level3/climat	Open	Data product

	measurements made on purpose specifically for capturing special events, it is considered only subset of data corresponding to regular schedule and measurements done for satellite validation purposes.	ological/2000_2019/all		
ICARE Data and Services Center for Earth Observation data	CARE emphasis the production and distribution of remote sensing data derived from Earth observation missions from CNES, NASA, and EUMETSAT.	https://www.icare.univ-lille.fr/	Open	Services
Daily Dust Products	Daily dust products from Barcelona Supercomputing Center (BSC), AEMET and WMO. This interactive visualisation tool allows you to access dust forecasts from different numerical models and dust-related observational products.	https://dust.aemet.es/products/daily-dust-products	Open	Data product
VolcPlume portal	The VolcPlume Portal enables near-real time and retrospective tracking of volcanic plume properties from source to global scale. It integrates satellite, ground-based, and in-situ air quality observations to identify volcanic gas and particle signatures. With interactive tools, the portal supports assessment of atmospheric impacts such as air quality degradation, aviation hazards, and climate effects.	https://volcplume.aeris-data.fr	Open	Service
COSIMA	COSIMA is the web version of aerosol behaviour code COSIMA describing the structure and dynamics of irregularly formed or compact particles based on statistical mechanics and fractal scaling laws.	https://data.eurochemp.org/modelling-tools/#cosima	Open	Service
GECKO-A Online	GECKO-A Online is a web facility providing rate constants and thermodynamic properties for organic compounds based on Structure Activity Relationships. Gas phase oxidation mechanisms up to the first generation products can be downloaded. The tool generates mechanisms and properties for most acyclic and monocyclic hydrocarbons and related oxidation products	https://data.eurochemp.org/modelling-tools/#gecko_a	Open	Service
AtChem2	AtChem2 is a standalone, user-friendly tool for running complex atmospheric simulations using the full Master Chemical Mechanism (MCM). It supports long, detailed runs for field campaign, modelling and batch sensitivity studies, with setup simplified by semi-automated scripts and text-based configuration.	https://data.eurochemp.org/modelling-tools/#atchem_2	Open	Software