

Deliverable D36 (D5.2)

RI-URBANS Open Research Data (preliminary)



RI-URBANS

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

By

NILU



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Deliverable D36 (D5.2): Open Research Data (preliminary)

Authors: Wenche Aas (NILU), Markus Fiebig (NILU), Cathrine Lund Myhre (NILU), Yong Lin (NILU), Lise Eder Murberg (NILU) & Paul Eckhardt (NILU)

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1. About this document

RI-URBANS participates in the Open Research Data Pilot (ORPD), and this report describes the status of measurement datasets submitted and made available to users in accordance with expectations in the project plan. The report documents the various data sets and the access to the new data sets compiled during the month 1- 24 of RI-URBANS. In total 2500 data sets are ingested into the data base, covering 128 different variables. All these data sets are made available to users, as described in the present report.

This document describes: 1) the general data management of RI URBANS; 2) how to access the RI-URBANS data covered in this deliverable, and 3) the status of the data submission.

This is a public document that will be distributed to all RI-URBANS partners for their use and submitted to European Commission as an RI-URBANS deliverable D35 (D5.2). This document can be downloaded at <https://riurbans.eu/work-package-5/#deliverables-wp5>

This deliverable is showing work in progress and the status of the open data of in-situ measurements. An update of the report will include the status of data deliveries covering the atmospheric column. The final report on data curation within RI-URBANS at the project end will be produced in “D45 (D5.11) Open Research Data (final)”.

2. Introduction

The RI-URBANS project is collecting data from several sources, covering observational data of a range of different compounds, e.g. nanoparticles and atmospheric particulate matter, their sizes, constituents, and gaseous precursors at the ground and height profiles. As an overall goal, the data production within RI-URBANS aims to ensure harmonized management of urban air quality data across Europe and globally using already established service tools from atmospheric Research Infrastructures (RIs). RI-URBANS aims to build a lasting connection between RIs and urban air quality networks, as well as to build capacity on FAIR data management for urban air quality (AQ) networks. This is important for ensuring traceable, comparable, and harmonized data across urban and regional scales.

In the beginning of the project, a [data management plan](#) (DMP) was developed to describe the planned data flow, repositories and their data management routines of the data been produced and collected in this project. The DMP is based on comprehensive [landscape analysis](#) with potential RI-URBANS data to be provided, and which repository they should be submitted to. The DMP provides data curation recommendations for all data generated within the project. Depending on the type of data, RI-URBANS data management involves all units of the ACTRIS Data Centre (Aerosol Remote Sensing, Cloud Remote Sensing, In Situ), but also the data centre of IAGOS (tropospheric gradients in situ data) and national UK data centres (see [DMP](#)).

This first version of the deliverable covers the surface in situ part of data delivery. An extension of this deliverable will also cover data deliveries targeting the atmospheric profiles, reflecting the fact that data management is an ongoing process.

For in-situ data, the RI-URBANS DMP states the use of the ACTRIS DC In Situ unit, which itself is hosted by the [EBAS database infrastructure](#) at NILU. The status of the RI-URBANS in-situ data that have been curated so far and made available in EBAS are compared with what is expected to be delivered from the pilot studies and tasks defined in the project, and to some extent what was presented in the landscape analysis.

RI-URBANS is implementing five pilot studies in nine selected European cities for testing and demonstrating different services. These cities are Athens, Barcelona, Birmingham, Bucharest, Helsinki, Milan-Bologna, Paris, Rotterdam-Amsterdam, Zurich. Both near real time (NRT) and regular annual data are expected from these pilot cities, but the type of data varies between them. These pilot studies are conducted in WP4 (*Pilot implementations for testing and demonstrating services*)

Further, within WP1 (*Novel air quality metrics and advanced source apportionment service tools for particulate matter and nanoparticle*), data from a large number of existing urban air quality supersites were collected from National Air Quality Management systems (AQMS) and compiled by the WP1 who further submitted these to EBAS.

The work in the pilots (WP4) and service tools developed in WP1 will both give important input for scaling up the data deliveries by giving strategic guidance and tools for upscaling the data services beyond RI URBANS (WP5) as illustrated in Figure 1.

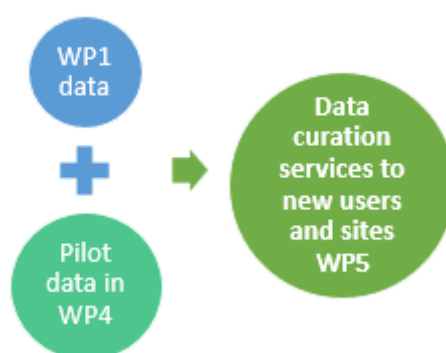


Figure 1. Measurement data production within RI-URBANS

3. Data curation of RI-URBANS in-situ data

Data submission of in-situ aerosol and trace gas measurements to EBAS needs to follow the standardised procedures described in the [Submission Manual](#) to ensure quality and proper rich meta data. The manual contains information about the submission procedure, including file format information, metadata templates, flags used for quality control during data reporting. Furthermore, tools are provided to assist with the submission and final quality control.

In late 2022, RI-URBANS WP5 had a [workshop](#) that was dedicated to implementing the project's DMP by building capacity on the data provider end and train the data providers in the data reporting routines. A data manager knows which and how information is to be archived alongside the data as metadata, but the data provider holds the information content to be archived. Thus, capacity building for data providers is an essential part of any data management concept and to make data [FAIR](#) with the required traceability and documentation.

The workshop provided several presentations and tools to assist in the data submission providers. [An introduction video](#) on how to submit data has been developed.

The ATMO-ACCESS H2020 project has provided a highly appreciated possibility to submit campaign data more easily. This is important for data providers unfamiliar with submitting data. The [homeless data portal](#) is set up to handle both airborne observations, and ground based remote and in-situ data. Quite a lot of relevant data for RI-URBANS has been submitted using this service.

RI-URBANS has provided a substantial number of new sites to EBAS, and together with the data providers, the DC has defined these sites including their associated metadata needed. Further, there are several new instrument types, instrument model, analytical instrumentation that has been used that also needed to be defined in the database to ensure correct documentation of the observations submitted.

4. Access of RI-URBANS data in EBAS

There are four main access points for data that are curated in EBAS:

- 1) **EBAS web portal** (<https://ebas-data.nilu.no>) where data can be searched, viewed in online plots, and downloaded as files. It gives a quick overview of which data are submitted to different programmes. RI-URBANS measurement data can be associated to two Frameworks. 1) RI-URBANS which are quality assured data submitted using the standardised reporting guidelines described above or 2) RI-URBANS_NRT which are following the near real time data protocol, with automatic, but more limited quality control. If the data are following the requirements defined by ACTRIS the data series will also be associated with that framework.

As shown in Figure 2 a substantial number of data series from RI-URBANS project are available in EBAS, to be exact data series from 10 countries, 38 stations, 15 different types of instruments, 128 different components, in total 2500 datasets. Further details of these datasets are found in Chapter 4, and a summary Table in section 6.

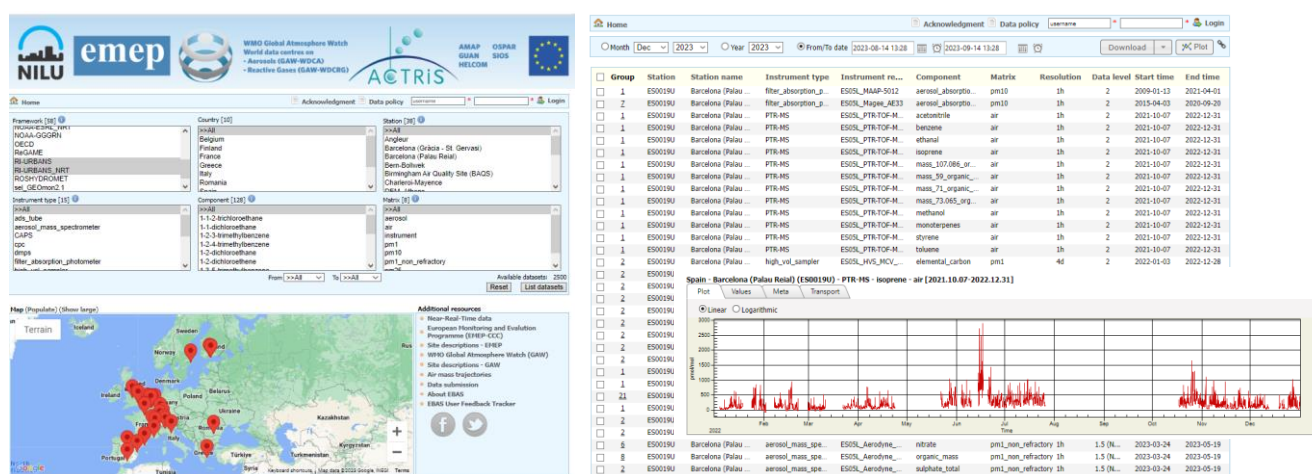


Figure 2. Snapshot from EBAS web portal illustrating data associated with the frameworks RI-URBANS or RI-URBANS_NRT per 19 sept 2023.

- 2) **ACTRIS data centre web portal** (<https://actris.nilu.no>) where data can be searched, viewed as online plots, and download as files. Here one can access in situ data (as the EBAS web portal) as well as remote sensing data (and numerical simulations). In addition to annual quality assured data, the portal also links to the EBAS NRT web service.
- 3) **EBAS Near real time data service** (<https://ebas-nrt.nilu.no>). At this interactive interface one can view data series available from the last month. It is useful for checking ongoing episodes and to check if the instruments are running properly.

It should be noted that a data stream can disappear from the showcase if it has stopped for more than a month. This is different from what is found in the EBAS web portal described above. There, all the NRT data are available, also if they are not very new. The NRT data will be replaced when a submission of QA/QC level 2 data of the same time series is submitted. The old and replaced NRT data will however be available on request since that is part of the traceability of the data services.

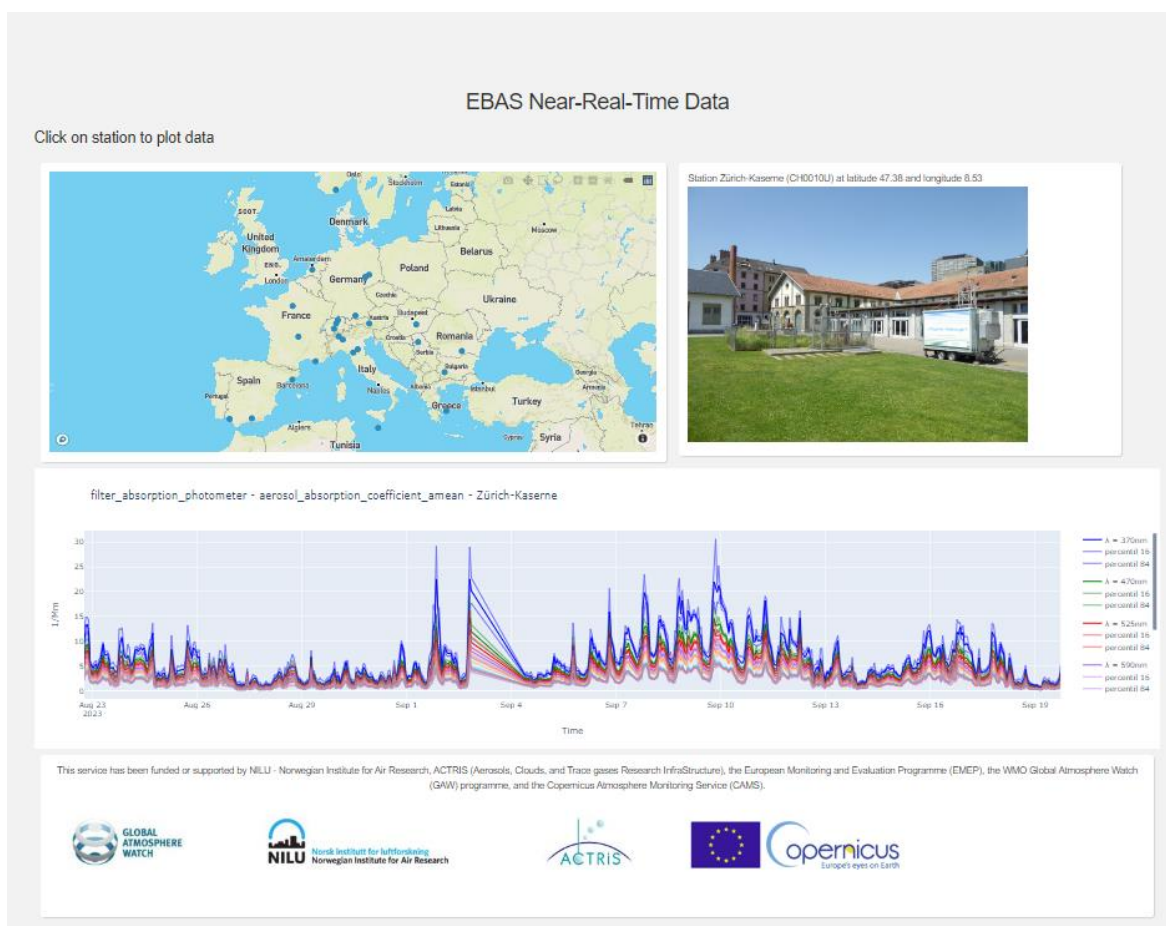


Figure 3. Snapshot from EBAS Near Real time data web portal with a showcase of NRT data of absorption measurement at Zürich-Kaserne (CH0010U) data associated with the frameworks RI-URBANS_NRT per 19 sept 2023

- 4) **EBAS Thredds Data server** <https://ebas.nilu.no/data-access/otheraccess/thredds/>. This is a web server providing (meta)data access either through data streaming using the OPeNDAP protocol or direct download of data through HTTP. The EBAS THREDDS Server provides data in the netCDF format and can be a convenient way of more automatic access to a large number of datasets.

5. Overview and access to in-Situ data submitted to RI-URBANS per mid-September 2023

This section includes an overview of the RI-URBANS ground based in-situ data submitted to the ACTRIS data center (EBAS repository) by mid-September 2023. Furthermore, the section includes links with public access to the compiled data sets. The section provides a short description of the data compiled with a list of cities/sites and periods for each pollutant: ultrafine particles (UFP)-particle number size distribution (PNSD), equivalent black carbon (eBC) derived from absorption coefficients, ammonia (NH₃), volatile organic carbons (VOC), aerosol chemistry. 3D measurements have yet not been included.

5.1 The conditions of use of RI-URBANS data

One important requirement for data to be open and FAIR is information on condition of use, and a licence statement. RI-URBANS data are offered to users with the CC-BY-4.0 license, and this information is included in the meta data items. Briefly, with this license the data user can i) Share — copy and redistribute the material in any medium or format and ii) Adapt — remix, transform, and build upon the material for any purpose, even commercially.

Attribution to RI-URBANS is required from users to give appropriate credit. Information on this is included in the files. All scientific articles and reports using data need to acknowledge the project; *“This study is using data that has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 101036245”*

5.2 Overview of in-situ RI-URBANS data sets and access

Data submission in RI-URBANS follow three different pathways:

- 1) In WP1 (see D1 ([D.1.1](#))), a major compilation of datasets from existing AQ supersites was conducted. These datasets have been made available in the RI URBANS Intranet ([RI-URBANS D1 \(D1.1\) DATASETS](#)) and some are compiled in secondary data repositories i.e. using the Zenedo data repository. Most of these data have been (or are being) submitted centrally to EBAS and not by the data owners unless they already have been submitted to other programmes like EMEP, ACTRIS and GUAN. The aerosol data (PNSD, Aerosol absorption coefficients (eBC)) are being reported by IDAEA CSIC, while VOCs and NH₃ by IMT-Nord.
- 2) Annual submission from the RI-URBANS partners using established routines and guidelines in ACTRIS or submitted using the ATMO-ACCESS homeless portal.
- 3) NRT data submission for the pilot studies in WP4. In the description of work (DoW), 5 different pilots should be conducted in nine different cities: Athens, Barcelona, Birmingham, Bucharest, Helsinki, Milan-Bologna (Po Valley), Paris, Rotterdam-Amsterdam, and Zurich focusing on various processes.

Table 1 to Table 8 provides an overview of the ground based in-situ data sets submitted in the framework of RI-URBANS. One should note that data are also submitted to other frameworks such as ACTRIS, EMEP, GUAN but not necessarily been associated to RI-URBANS. Though, those relevant for RI-URBANS, i.e., have been used in WP1, are also included in the tables. These sites are marked in blue (or yellow when part of the data is associated with RI-URBANS).

Detailed information of methods and sampling durations are found in the metadata associated with the data files. Generally, the measurements of aerosols using various types of monitors and for the level 2 data that are available in the web interface these data are aggregated to hourly resolution For the VOCs and ammonia it depends on the methodology. Some observations are from manual sampling with i.e., grab sampler of VOC two times per week or weekly passive samplers for NH₃.

All datasets compiled in WP1 (point 1), including those not yet submitted to EBAS, are openly available in secondary repositories, as an intermediate step before finally uploading them to EBAS. These datasets may also include variables i.e., eBC mass concentration that not yet are implemented in the regular reporting to EBAS but will be a level 3 product derived from the absorption measurements.

The secondary data repositories are:

- eBC mass concentrations and absorption coefficients of 50 sites: Savadkoohi, Marjan, & Pandolfi, Marco. (2023). The variability of mass concentrations and source apportionment analysis of equivalent black carbon across urban Europe [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.7982201>
- Chemical composition measurements from 22 sites using an ACSM instrument: Chen, Gang. (2022). European Aerosol Phenomenology - 8: Harmonised Source Apportionment of Organic Aerosol using 22 Year-long ACSM/AMS Datasets [Data set]. In Environment International (Version 2nd, Vol. 166, p. 107325). Zenodo. <https://doi.org/10.5281/zenodo.6672710>

The website of RI-URBANS is being now modified with a section specific for data access with links to all data compiled and produced, in order to facilitate information of the type of data available and where these can be downloaded. A similar section will be built up for the list of service tools guidance and the links to each one.

Table 1. Annual quality-controlled dataset of aerosol absorption coefficients (eBC) available in EBAS and associated to RI-URBANS, including links with access to the data. Stations that are marked in blue are not associated to the RI-URBANS framework in EBAS, while the yellow sites part of the time series is. (The numbers indicate the fraction of the yearly data coverage; 1,00 indicates 100% yearly data coverage).

Station	City	Site	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Link to EBAS
CH0010U	Zürich	Kaserne									1	1	1	1	1	1	1	1	1	1		EBAS
CH0029U	Bern	Bollwerk												1	1	1	1	1	1	1		EBAS
CH0030U	Lugano	Università					1	1	1	1	1	1	1	1	1	1	1	1	1	0.84		EBAS
ES0019U	Barcelona	Palau Reial						0.97	1	1	1	1	1	1	1	1	1	1	1	0.25		EBAS
ES0020U	Granada	Granada			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		EBAS
ES0021U	Madrid	CIEMAT										0.96	1	1	1	1	1	1	1	1	1	EBAS
ES0027U	Valencia	Burjassot														0.98	1	1	0.93			EBAS
FR0020R	Paris	SIRTA									1	1	1	1	1	1	1	1	1	0.5	1	EBAS
FR0035U	Marseille	Longchamp											0.17	1	1	1	1	1				EBAS
FR0043U	Paris	Hausmann														1	1	1	0.99			EBAS
FR0044U	Paris	13ème														1	1	1	1			EBAS
GB0101U	Birmingham	BAQS																0.75	1	1	0.9	EBAS
GR0100B	Athens	DEM					0.96	0.98	1	0.99	0.99	1	1	1	0.58	1	1	1	1	1	1	EBAS
IT0025U	Milano	Pascal															0.41	0.28				EBAS
RO0007R	Bucharest	RADO-Bucharest I											0.84	1	1	1	1	1				EBAS
RO0010R	Bucharest	RADO-Bucharest II																	0.92	1		EBAS
SE0024U	Stockholm	Hornsgatan 108											0.22	1	1	1	1	1				EBAS
SE0025U	Stockholm	Torkel Knutssonsgatan											0.22	1	1	1	1	1				EBAS
FI0050R	Juupajoki (Hyytiälä)	SMEAR II			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		EBAS
FR0027U	Lille	Villeneuve d'Ascq																		1	1	EBAS
DE0067K	Leipzig	Mitte							0.51	1	1	1	1	1	1	1	1	1			1	EBAS
DE0066K	Leipzig	Eisenbahnstrasse						0.97	1	1	1	0.89	0.83	1	1	1	1	1	1		1	EBAS
IT0004R	Ispira	Ispira	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	EBAS

Table 2. Annual quality-controlled dataset of particle number size distribution data (PNSD) available in EBAS (dark green) associated to RI-URBANS, including links with access to of the data. The datasets marked in light green are not available in EBAS yet due to pending issues with missing metadata or similar. Stations marked in blue are not associated to the RI-URBANS framework in EBAS but reported to ACTRIS and/or EMEP. (The numbers indicate the fraction of the yearly data coverage; 1,00 indicates 100% yearly data coverage). A list of data series (in light green) not yet included are also added to the table as they soon will be available in EBAS.

Station	City	Site	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Link to EBAS	
FR0035U	Marseille	Longchamp																		1	0.41					EBAS	
GB0101U	Birmingham	BAQS																						0.29	0.42	EBAS	
GR0100B	Athens	DEM																						1		EBAS	
CZ0004B	Prague	Suchdol												0.74	0.96	1	0.98	0.79	1	1	1	0.12	0.92			EBAS	
FI0038U	Helsinki	Kumpula						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		EBAS	
FR0027U	Lille	Villeneuve d'Ascq																					1			EBAS	
FR0020R	Paris	SIRTA														1	1		1		1					EBAS	
DE0063K	Dresden	Nord	0.55	1	1	1	1	0.99	1	0.37	0.69	1	1	0.56	1	1	1	0.95	0.95	1	1	0.29	1	1		EBAS	
DE0064B	Dresden	Winckelmannstrasse										0.08	1	1	1	1	1	1	1	1	1	0.29	1	1		EBAS	
DE0055B	Leipzig	Tropos										1	1	1	1	1	1	1	1	0.99	1	1	1	1		EBAS	
DE0067K	Leipzig	Mitte										0.50	1	1	1	1	0.97	0.99	1	1	1	1	1	1		EBAS	
DE0066K	Leipzig	Eisenbahnstrasse											0.42	1	0.91	0.96	1	0.98	1	1	1	1	1	1		EBAS	
DE0069B	Mulheim	Styrum																1	1.00	0.92	1	1				EBAS	
IT0004R	Ispra	Ispra								1	1	1	1	0.92		1		1	1	1	1	0.72	1	1		EBAS	
ES0019U	Barcelona	Palau Reial																	1	1	1	0.12	1	1		EBAS	
ES0020U	Granada	Granada																	1	1	1	1	1	1		EBAS	
ES0021U	Madrid	CIEMAT														0.54	1	1	1	0.57	0.56	0.66	1			EBAS	
Data series in preparation and soon to be included in EBAS (the EBAS links will be populated with data when data has become available):																											
GR0004U	Athens	NOA															0.35	0.6	0.8	0.48	0.64						EBAS
HU0004U	Budapest	CAAG													0.13	1	0.96	0.54	0.92	0.9	0.96						EBAS
FI0039U	Helsinki	Mäkelänkatu															0.84	0.86	1	1	0.43						EBAS
IT0015U	Lecce	ECO															0.87	0.58	0.73	0.86	0.86						EBAS
GB0021U	London	North Kensington								0.88	0	0.74	0.74	0.91	0.86	0.83	0.85	0.82	0.66								EBAS
GB0022U	London	Marylebone Road									0.76	0.72	0.41	0.87	0.83	0.89	0.93	0.59	0.44	0.36							EBAS
GB0023U	London	Honor Oak Park																		0.08	0.54						EBAS
DE0065B	Langen	UBA										0.16	0.8	0.99	0.76	0.17	0.79	0.41	0.57	0.6	0.86						EBAS
SE0024U	Stockholm	Hornsgatan 108										0.19	0.89	0.96	0.92	0.71	0.63	0.56	0.74	0.68							EBAS
CH0010U	Zurich	Kaserne															0.93	0.85	0.55	0.43	0.05						EBAS

Table 3. Annual quality-controlled dataset of aerosol composition data (from ACSM) available in EBAS associated to RI-URBANS, including links with access to of the data. Stations marked in blue are not associated to the RI-URBANS framework in EBAS, but reported to ACTRIS and/or COLOSSAL. (The numbers indicate the fraction of the yearly data coverage; 1,00 indicates 100% yearly data coverage)

Station	City	Site	2014	2015	2016	2017	2018	2019	2020	2021	2022	Link to EBAS
GB0101U	Birmingham	BAQS						1	1	1	1	EBAS
FR0027U	Lille	Villeneuve d'Ascq			0.22	0.91	0.45	1	1			EBAS
FR0020R	Paris	SIRTA	0.25	0.96	0.25	0.56	0.27	1	0.33	0.29		EBAS
IE0010U	Dublin	Univ. College					0.33	0.48	1			EBAS
RO0007R	Bucharest	Bucharest	0	0.08	0.77	1	0.16					EBAS
ES0019U	Barcelona	Palau Reial	0.62	0.4	0	0.08	0.25					EBAS

Table 4. Annual quality-controlled dataset of EC/OC available in EBAS associated to RI-URBANS, including links with access to of the data (The numbers indicate the fraction of the yearly data coverage; 1,00 indicates 100% yearly data coverage)

Station	City	Site	2022	Link to EBAS
ES0019U	Barcelona	Palau Reial	1	EBAS

Table 5. Annual dataset of NO_x and SO₂ available in EBAS associated to RI-URBANS, including links with access to of the data. (The numbers indicate the fraction of the yearly data coverage; 1,00 indicates 100% yearly data coverage). Light green means submitted, but not in EBAS (e.g. in queue or problem detected)

Component	Station	City	Site	2019	2020	2021	2022	Link to EBAS
NO _x	GB0101U	Birmingham	BAQS		1	1	1	EBAS
SO ₂	GB0101U	Birmingham	BAQS	0.75	1		1	EBAS

Table 6. Annual dataset of NH₃ available in EBAS associated to RI-URBANS, including links with access to of the data. (The numbers indicate the fraction of the yearly data coverage; 1,00 indicates 100% yearly data coverage)

Station	City	Site	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Link to EBAS
ES0019U	Barcelona	Palau Reial					0.88	1	1	1	1	1	1	1	1	1	1	0.1	EBAS
ES0028U	Barcelona	Gràcia-St.Gervasi							0.11	1	1	1	1	0.49					EBAS
ES0029U	Erandio	Erandio								1	1	1	1	1	1	1	1	0.19	EBAS
ES0030U	Lorca	Lorca												0.71	1	1	1	0.53	EBAS
ES0031U	La Marina	La marina															0.43		EBAS
ES0032U	Valencia	Bulevard Sud										1	1	1	1	1	0.97		EBAS
ES0033U	Malaga	El Atabal					0.63	1	0.98										EBAS
ES0034U	Malaga	Avenida Juan XXIII								0.97	1	1	1	1	1	1	1	0.96	EBAS
ES0035U	Sevilla	La Ranilla					0.63	1	1	1	1	1	1	1	1	1	1	0.96	EBAS
FI0010U	Juupajoki (Hyytiälä)	SMEAR II			0.17	0.4													EBAS
FR0020R	Paris	SIRTA						0.46	0.34				0.61	1	1	1	0.47		EBAS
FR0041U	Paris	Chatelet														0.81	1		EBAS
FR0042U	Paris	BPEst														0.16	1		EBAS
GB0101U	Birmingham	BAQS														1	1	1	EBAS
IT0025U	Milan	Pascal	0.55	1	1	1	1	1	1	1	1	1	1	1	1	1	1		EBAS
IT0029U	Milan	Via Juvara	0.21																EBAS
IT0030U	Motta Visconti	Motta Visconti															0.34		EBAS
IT0031U	Sannazzaro de' Burgondi	AGIP							0.21	1	1	1	1	1	1	1	1		EBAS
IT0032U	Cremona	Via Fatebenefratelli					0.87	1	1	1	1	1	1	1	1	1	1		EBAS
IT0033U	Pavia	Via Folperti							0.06	1	1	1	1	1	1	1	1		EBAS
IT0034U	Bergamo	Via Meucci															0.87		EBAS
IT0035U	Piadena	Via Cavour							0.49	1	1	1	1	0.58					EBAS

In addition to these sites, it is expected that NH₃ data from the French sites Aquitaine, Normandie, Reims and Strasbourg will be submitted to EBAS in the near future.

Table 7. Annual quality-controlled dataset of VOC data available in EBAS associated to RI-URBANS, including links with access to of the data. Stations marked in blue are not associated to the RI-URBANS framework in EBAS. (The numbers indicate the fraction of the yearly data coverage; 1,00 indicates 100% yearly data coverage)

Station	City	Site	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Link to EBAS	
BE0008U	Liège	Angleur																		1	1	1	0.8			EBAS	
BE0009U	Charleroi	Charleroi-Mayence										1	1	1	1	1	1	1	1	1	1	0.9				EBAS	
BE0010U	Liège	Herstal													1	1	1	1	1	1	1	1	0.22			EBAS	
BE0012U	Charleroi	Lodelinsart																		1	1	1	0.77			EBAS	
BE0015U	Mons	Mons										1	1	1	1	1	1	1	1	1	1	0.99				EBAS	
BE0016U	Mouscron	Mouscron										1	1	1	1	1	1	1	1	1	1	1	0.17			EBAS	
BE0017U	Namur	Namur																		1	1	1	0.7			EBAS	
CH0010U	Zürich	Kaserne	1	1	1	1	1	1	1	1	1	1	1	1	1	0.77	1	1	1					0.49			EBAS
ES0019U	Barcelona	Palau Reial																					0.24	1			EBAS
FI0010U	Helsinki	SMEAR III											0.83														EBAS
FI0039U	Helsinki	Mäkelänkatu																				0.06					EBAS
FR0035U	Marseille	Longchamp																				0.92	0.62				EBAS
FR0038U	Grenoble	Frenes															0.96	1	1	1	1	1	1	1	1		EBAS
FR0041U	Paris	Chatelet																					1	1			EBAS
FR0045U	Lyon	Feyzin stade				0.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.11	EBAS
FR0046U	Lyon	Vernaison									0.76	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.11	EBAS
FR0047U	Strasbourg	Strasbourg Ouest		0.48	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.66			EBAS
GB0010U	London	Eltham								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.95		EBAS
GB0022U	London	Marylebone road								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		EBAS
FR0020R	Paris	SIRTA										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	EBAS

In addition to these sites, there is expected to be VOC data from GB0101U (Birmingham, BAQS) and GR0004U (Athens, NOA) submitted to EBAS in the near future.

Table 8 gives an overview of which sites there are established protocols for NRT data harvesting and which dataset are currently running as they should. Since the NRT data repository is changing from day to day separate links to the different sites are not provided, but a general link to the NRT data is found here: [RI-URBANS NRT-EBAS](#).

Table 8. Status of Near Real time (NRT) data provided. The ACSM instrument measure aerosol chemical composition, while AE33 absorption coefficients and the Mobility Particle Size Spectrometer (MPSS) measure PNSD.

Pilot city	Site	Code	Instrument	Status
Paris	SIRTA	FR0020	ACSM	STOPPED
Paris	SIRTA	FR0020	AE33	OK
Paris	Chatelet	FR0041	AE33	NO DATA
Paris	BPest	FR0042	AE33	NO DATA
Athens	Athens NOA	GR0004	AE33	NO DATA
Athens	DEM_Athens	GR0100	AE33	OK
Bucharest	RADO-Bucharest II	RO0010	ACSM	OK
Bucharest	RADO-Bucharest II	RO0010	AE33	OK
Helsinki	Mäkelänkatu	FI0039	AE33	NO DATA
Helsinki	Mäkelänkatu	FI0039	MPSS	MISSING FILES/VALUES
Po Valley	Milano Pascal	IT0025	AE33	OK
Po Valley	Bologna	IT0022	AE33	OK
Zürich	Kaserne	CH0010	AE33	OK
Zürich	Kaserne	CH0010	AE33 (PSI)	NO DATA
Marseille	Longchamp	FR0035	AE33	OK
Barcelona	PalauReial	ES0019	ACSM	STOPPED
Barcelona	PalauReial	ES0019	AE33	STOPPED
Barcelona	Montseny	ES1778		NO INFO

6. Summary and way forward

The status of RI-URBANS in-situ data per mid-September 2023 is summarized in Table 9, it also provides a link to the data for each pollutant.

Most of the datasets of aerosol absorption coefficients, PNSD, VOC and NH₃ compiled in WP1 (Intranet: [D1 \(D1.1\) DATASETS](#)) are now available in EBAS, though some sites are in process to be available. The offline and online chemical composition data have however not been submitted because they lack quite a lot of the necessary metadata needed. These datasets may be uploaded as secondary dataset to a DOI repository, i.e. at Zenedo. The next step is to increase the regular submission from the national AQ urban supersites. This will be followed up with targeted hands-on online guidance especially for the pilot cities defined in the project.

The pilot cities' contributing to the source apportionment studies in [WP4 task4.1](#) are all submitting NRT data to EBAS (Table 9). However, several sites are not submitting ACSM data. Currently these observations are mainly submitted through the established NExTCloud system at ACMCC. This system is not in compliance with the FAIR principles of data curation. The plan is to move the data flow for all these sites for a more sustainable data curation when the WP4 has established the routines for all the sites. There is also a need to improve the NRT data delivery for PNSD measurements.

There are currently several improvements being implemented at the EBAS DC. Firstly, all the data series are associated with a Digital Object Identifier (DOI). Thus, it will be possible to get access and refer to all the data series just by using the DOI. The landing pages for the DOI will be launched in the near future.

Further, from the absorption measurements it is possible to calculate eBC mass concentration relatively easy. Routines for calculation this have been defined at the ACTRIS DC, and eBC data series will be made available as a level 3 product in EBAS.

Table 9. Summary of RI-URBANS data available in EBAS per mid-September 2023 including a link to get direct access of the quality-controlled data sets (thus not including NRT data). The total number of sites given in parentheses includes those relevant sites that have been reported to other frameworks and those sites expected to be in EBAS soon (See Table 1- Table 8)

Variable	Instruments	#NRT sites	#sites	# data sets (level 2)	Link to dataset (level 2)
Aerosol absorption coefficient (also as input for eBC)	Filter absorption photometers (MAAP, AE33, AE31)	8	18(23)	146	EBAS
particle number size distribution (PNSD)	DMPS, CPC	3	3(27)	597	EBAS
VOC data (111 number of different gas components)	Adsorption, tube, PTR-MS, online-GC, steel canister	-	19(20)	1002	EBAS
NH ₃	Online absorption, CRDS, online IC, chemiluminescence, passive sampler	-	22	24	EBAS
Aerosol chemical composition (NH ₄ , SO ₄ , NO ₃ , organic mass)	Aerosol mass spectrometer (ACSM)	2	1(6)	10	EBAS
NO ₂	CAPS	-	1	4	EBAS
Elemental and organic carbon (EC/OC)	High volume sampler	-	1	18	EBAS
SO ₂	UV- fluorescence	-	1	4	EBAS

In addition to what is included here, there are openly available datasets in secondary data repositories i.e. for eBC (<https://doi.org/10.5281/zenodo.7982201>) and chemical composition (<https://doi.org/10.5281/zenodo.6672710>), which include additional datasets not yet in EBAS. The aim is to make most of these also available in EBAS.