ACTRiS Data Centre

Updates from ACTRIS DC In Situ Unit

M. Fiebig and the EBAS Team

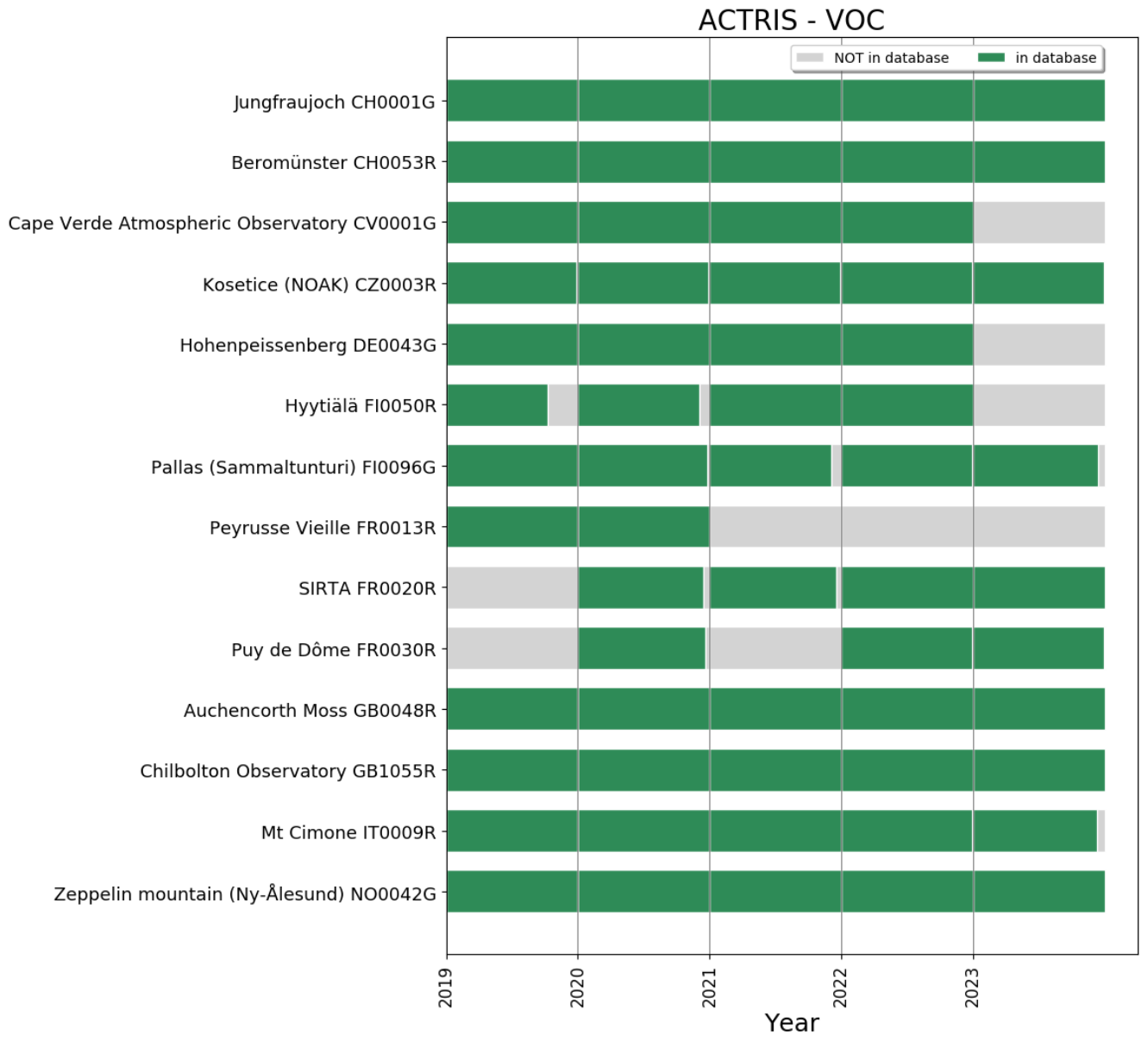
Topics

1. Data submission status.
2. Functions of portal for gas phase
3. Data identification

Data submission status

VOC Data Submission Status - Timeline

- Most expected submissions are in.
- Few long time series still have issues.
- One site stopped reporting



ACTRiS Data Centre

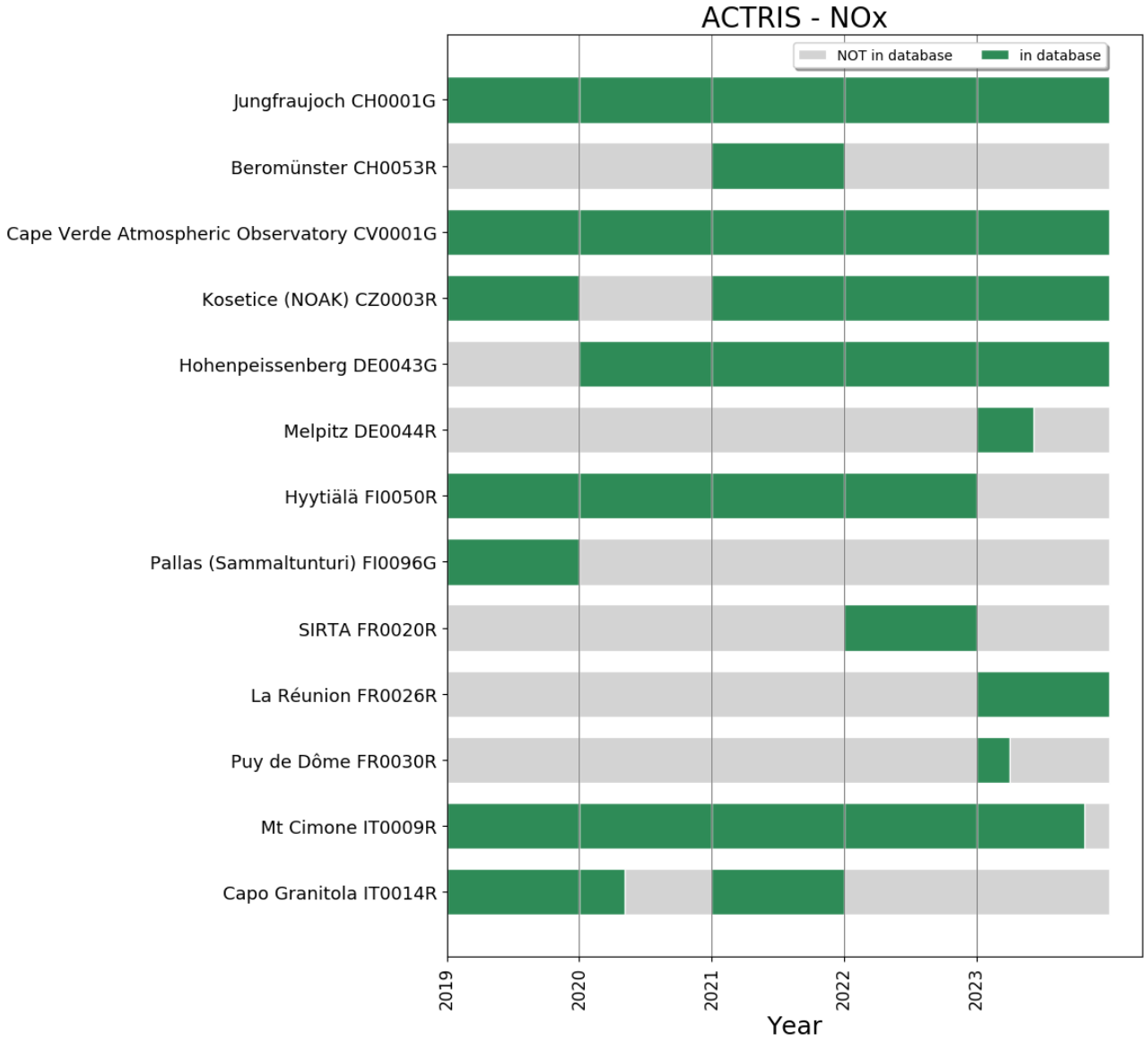
VOC Data Submission Status - Details

No submission
Submitted but not in EBAS (e.g. problem detected, check mantis)
lev0 data are archived in EBAS. lev2 data are approved by TC and are in the EBAS database

	Station			VOC for 2023		Mantis #
			Instrument	lev0	lev2	lev0, lev2
1	CH0001G	Jungfraujoch	online_gc			4125, 4126
2	CH0053R	Beromünster	online_gc			4127, 4128
3	CV0001G	Cape Verde Atmospheric Obs.	online_gc		Resubmitted => TC	4129, 4130
4	CZ0003R	Kosetice (NOAK)	steel_canister			4149, 4150
5	DE0043G	Hohenpeissenberg	online_gc		Resubmitted=> TC	4133, 4134
6	FI0050R	Hyytiälä	PTR-MS		TC reviewed => NF	4145, 4146
7	FI0096G	Pallas (Sammaltunturi)	online_gc			4135, 4136
8	FR0020R	SIRTA	PTR-MS			4147, 4148
9	FR0030R	Puy de Dôme	ads_tube			4123, 4124
			online_gc: No measurement for 2023			4143, 4144
10	GB0048R	Auchencorth Moss	online_gc			4137, 4138
11	GB1055R	Chilbolton Observatory	online_gc			4139, 4140
12	IT0009R	Mt Cimone	online_gc			4141, 4142
13	NO0042G	Zeppelin mountain (Ny-Ålesund)	online_gc			4119, 4120

- Most stations didn't submit level 0, i.e. measurement not traceable.
- Will impact labelling.

NO_x Data Submission Status - Timeline



- More sites than before.
- Several stations not available yet, data at TC.

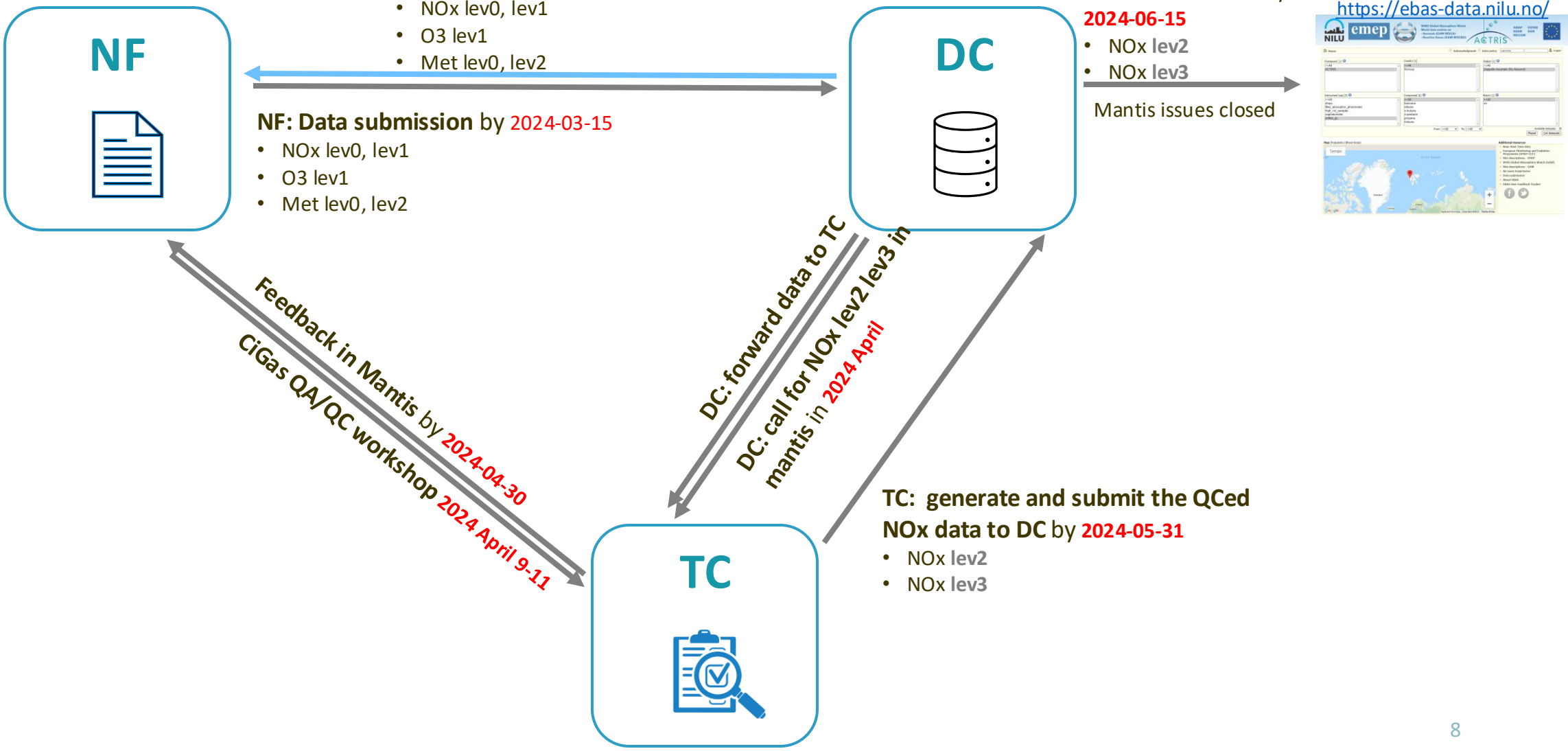
ACTRiS Data Centre

No submission of Nox
Submitted but not in EBAS (e.g. problem detected, check mantis)
The lev2/lev3 data created by TC are in the EBAS database

	Station		NOx for 2023				Mantis #
			lev0	lev1	lev2	lev3	lev0, lev1
1	CH0001G	Jungfraujoch - NO (photolytic)	Met	NO+O3	(#4878)	TC	4736, 4737
		Jungfraujoch - NO2 (laser)	Met	NO2+O3	(#4880)	TC	4738, 4739
2	CH0053R	Beromünster - NO (molybdenum)	NO+Met	NO+O3	lev2(by NF) TC	TC	4820, 4821
		Beromünster - NO2 (CAPS)	NO2+Met	NO2+O3	lev2 (by NF) TC	TC	4822, 4823
3	CV0001G	Cape Verde Atmospheric Obs.		NOx			4743, 4744
4	CZ0003R	Kosetice (NOAK)					4748, 4749
5	DE0043G	Hohenpeissenberg	NOx+Met	Nox+O3			4753, 4754
6	DE0044R	Melpitz	NOx	NOx			4758, 4759
7	FI0050R	Hyytiälä	Met		lev2 (by NF)		4763, 4764
8	FI0096G	Pallas (Sammaltunturi)		O3			4840, 4841
9	FR0020R	SIRTA	NOx+Met, **Re-submitted (corre**	NOx+O3(**Re-submitted)**	TC	TC	4768, 4769
10	FR0026R	La Réunion (chem_photo_Teledyne_T2	NOx+Met, **O3 Re-submitted**	NOx +O3(**Re-submitted**)		TC	4773, 4774
11	FR0030R	Puy de Dôme - T200UP	NOx+Met	NOx+O3			4838, 4839
		Puy de Dôme -42i-TL(molybdenum)	NOx+Met	NOx+O3	in EBAS (EMEP)		4778, 4779
12	GB0048R	Auchencorth Moss - T200UP		NO+O3+aws(lev2)	lev2(by NF) TC	TC	4960, 4961
		Auchencorth Moss - CAPS		NO2+O3+aws(lev2)	lev2(by NF) TC	TC	4958, 4959
13	IT0004R	Ispra	NOx+O3	Met	TC	TC	4783, 4784
14	IT0009R	Mt Cimone -- T200UP	NOx+Met	NOx+O3			4833, 4834
		Mt Cimone -- Tei42TL	NOx+Met	NOx+O3			4788, 4789
15	IT0014R	Capo Granitola	**no NOx measurements for 2023**				4973, 4974

- Some datasets at TC for evaluation and processing.
- Some don't use ACTRIS NOx data workflow.
- Timeliness of data production at TC has improved.

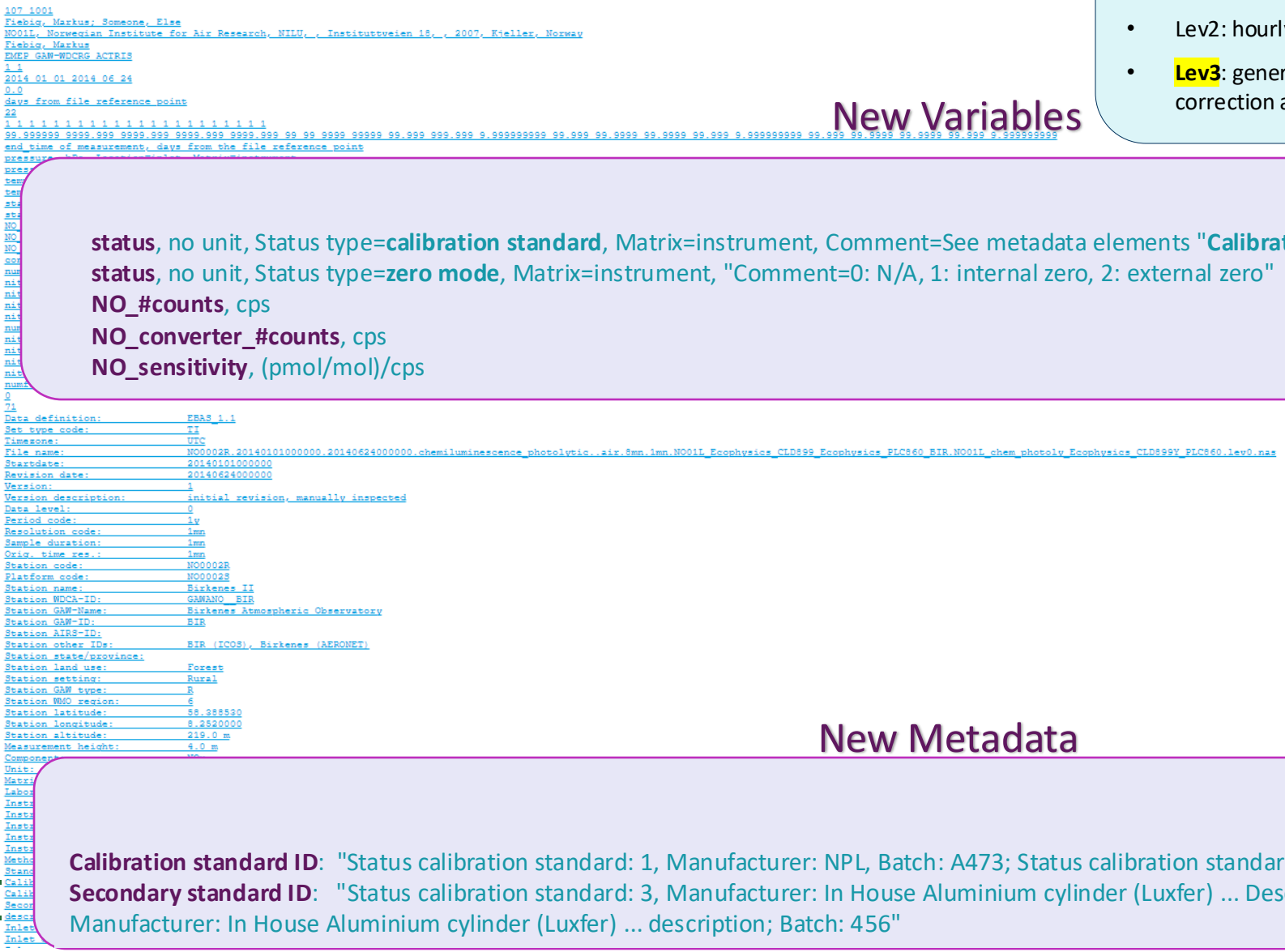
ACTRIS NOx - New data workflow: from instrument to data portal … via TC



NOx data submission – new templates

NOx template level 0

https://ebas-submit.nilu.no/templates/NOx/lev0



Data levels

NEW

- **Lev0**: from instrument, amount fraction, raw counts, flag applied.
- **Lev1**: final parameters, native time resolution, flag applied
- Lev2: hourly averages, offset correction applied, no sample line correction.
- **Lev3**: generated from lev1, hourly average, offset correction applied, sample line correction applied.

New Variables

status, no unit, Status type=**calibration standard**, Matrix=instrument, Comment=See metadata elements "**Calibration standard ID**" and "**Secondary standard ID**"
status, no unit, Status type=**zero mode**, Matrix=instrument, "Comment=0: N/A, 1: internal zero, 2: external zero"
NO_#counts, cps
NO_converter_#counts, cps
NO_sensitivity, (pmol/mol)/cps

New Metadata

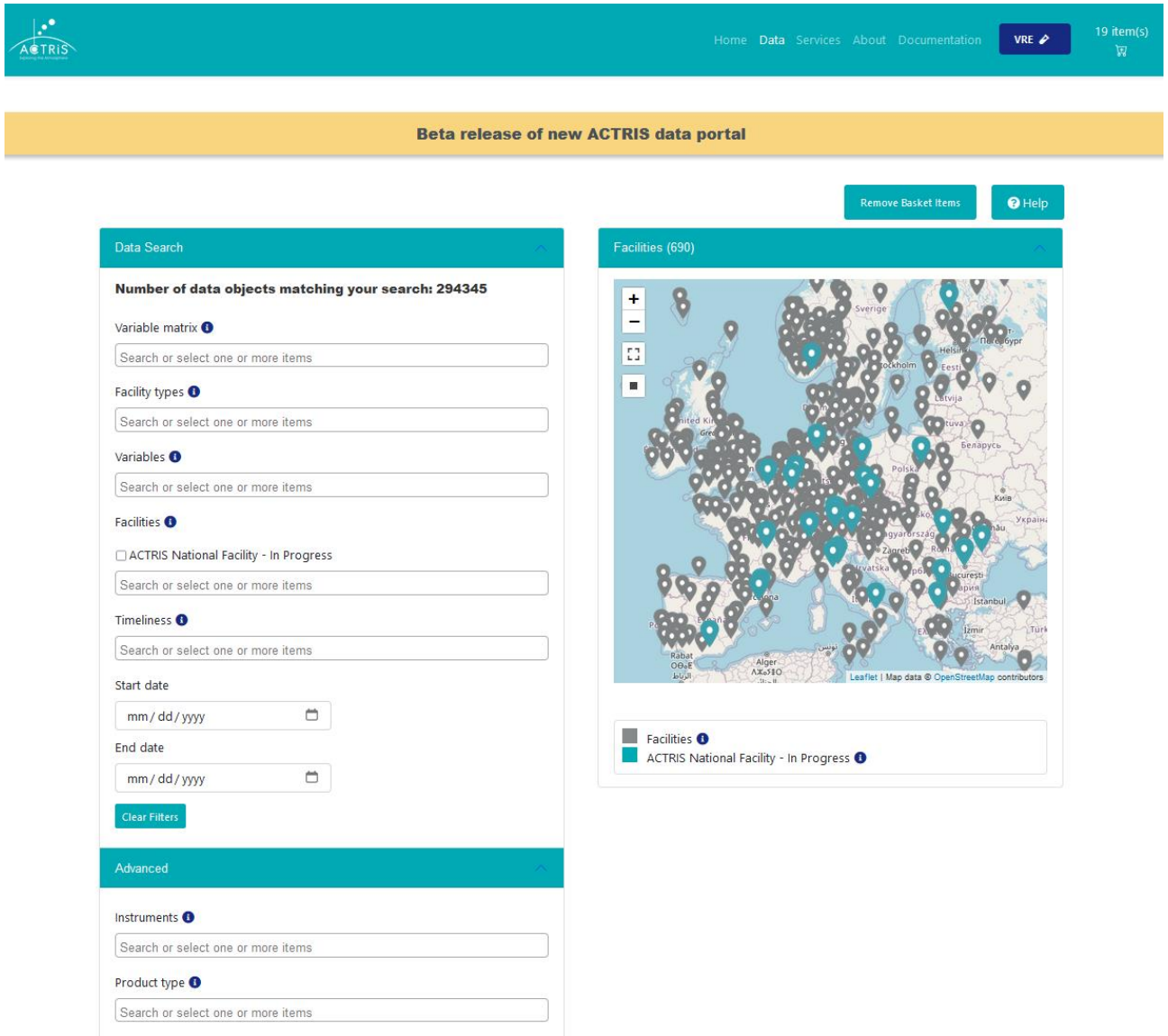
Calibration standard ID: "Status calibration standard: 1, Manufacturer: NPL, Batch: A473; Status calibration standard: 2, Manufacturer: Linde, Batch: D736671"
Secondary standard ID: "Status calibration standard: 3, Manufacturer: In House Aluminium cylinder (Luxfer) ... Description, Batch: 123; Status calibration standard: 4, Manufacturer: In House Aluminium cylinder (Luxfer) ... description; Batch: 456"

Data Reporting Summary

- Still similar issues as compared to previous years (issues on issue tracker not completed by reporting deadline).
- However, improvements are visible.

- From next year, counting will refer to stations in labelling process.

Functions of portal for gas phase


Home Data Services About Documentation VRE 19 item(s)
Beta release of new ACTRIS data portal
Remove Basket Items
Help
Data Search
Number of data objects matching your search: 294345
Variable matrix
Search or select one or more items
Facility types
Search or select one or more items
Variables
Search or select one or more items
Facilities
ACTRIS National Facility - In Progress
Search or select one or more items
Timeliness
Search or select one or more items
Start date
mm / dd / yyyy
End date
mm / dd / yyyy
Clear Filters
Advanced
Instruments
Search or select one or more items
Product type
Search or select one or more items
Facilities (690)
Leaflet | Map data © OpenStreetMap contributors
Facilities
ACTRIS National Facility - In Progress

ACTRIS In Situ real-time data: latest progress

ACTRIS Tracegas In Situ Real-Time Variables

Photo: https://agage.eas.gatech.edu/

gas chromatograph / mass spectrometer (GC-MS)
volatile organic compound concentrations

Photo: https://www.tesscorn-aerofluid.com/

Filter absorption photometerProton Transfer – Mass Spectrometer (PTR-MS)
volatile organic compound concentrations

ACTRIS In Situ station

Continuous data provision:

- 24 h per day.
- 365(366) days per year.
- Except calibration periods.

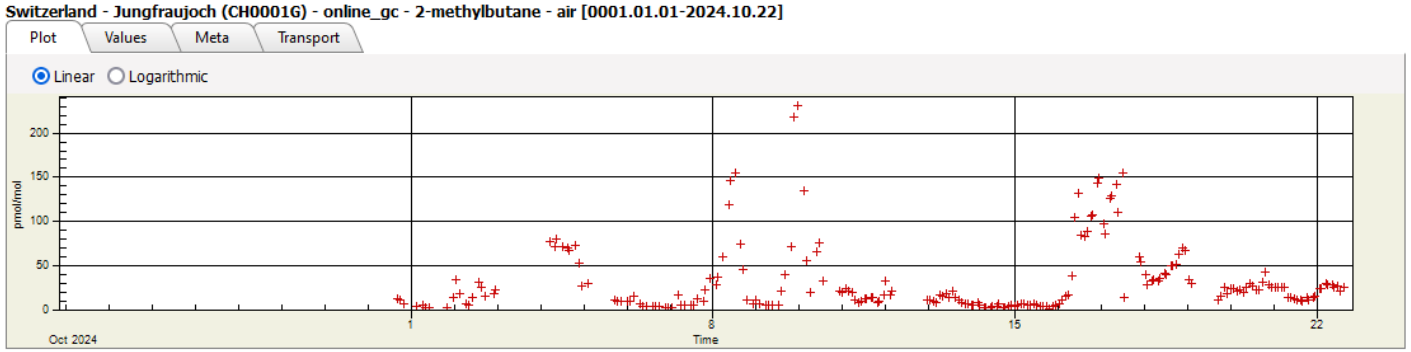
Photo: Teledyne

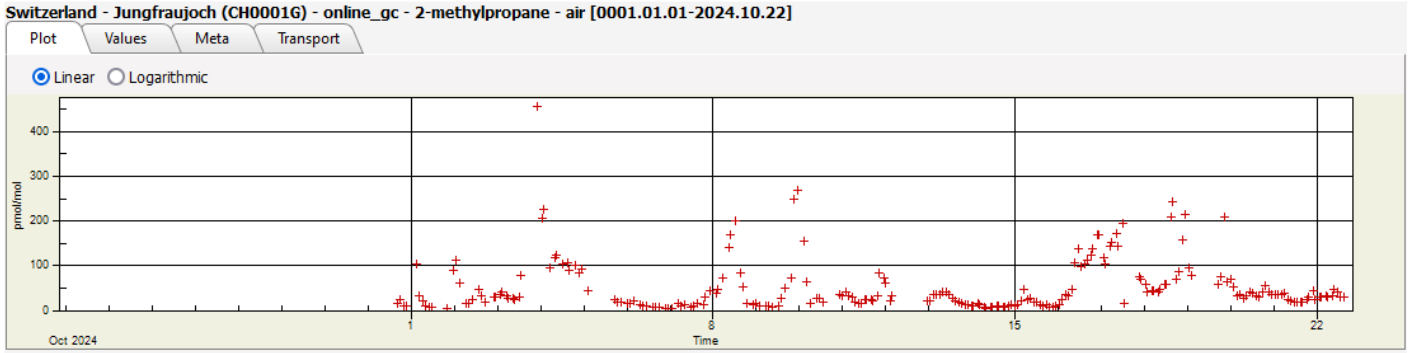
Chemiluminescence detector + photolytic converter
NO, NO_2, NO_x concentrations

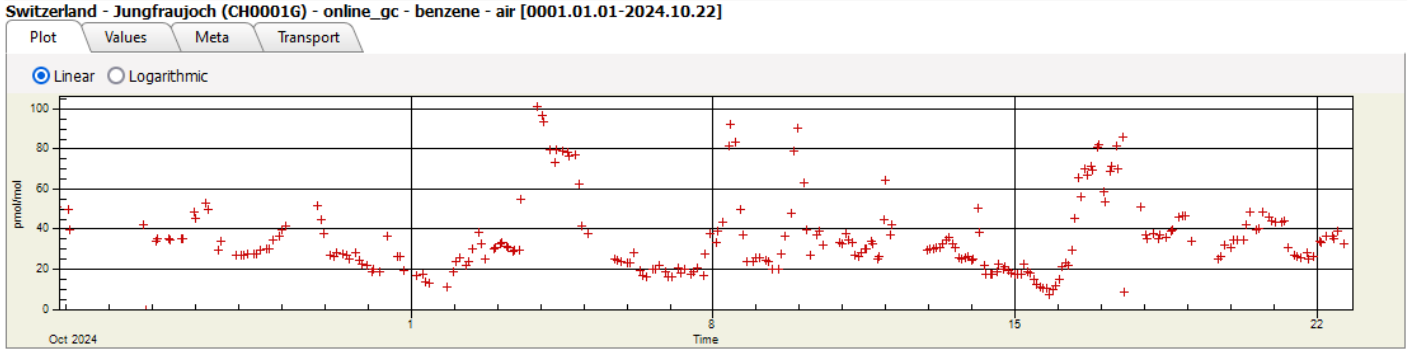
Photo: Thermo Fisher

UV differential absorption photometer
ozone concentration

WP2: First GC-MS Pilot Station Online!







- Pilot station Jungfraujoch.
- First online GC-MS delivers RT data since start of October 2024.

WP2: Detailed Status

GC-MS RT workflow:

- First pilot instrument (Jungfraujoch) online.
- Workflow needs some fixes to resolve a calibration provenance issue.

PTR-MS RT workflow:

- Draft of software exists.
- Needs updates because of needed data format upgrades. Issue discovered during implementation.

WP3: Status

- DAQ software for NO_x, O_3, and auxiliary data exists.
- Developer tested.
- Next step: pilot test at Hohenpeissenberg

- Production software for NO_x drafted (FZ Jülich).
- Production software for O_3 drafted (NILU).

- Full pilot test planned before December 2024.

ACTRIS In Situ Data Identification

The Data FAIRness Principles

Findable

F1: (Meta)data have eternal PID.
F2: Rich metadata.
F3: Indexed in search portal and similar.
F4: Metadata include PID.

Accessible

A1: (Meta)data retrievable by PID with standardised protocol
A1.1: open and free protocol
A1.2: authentication / authorization possible
A2: Metadata always accessible

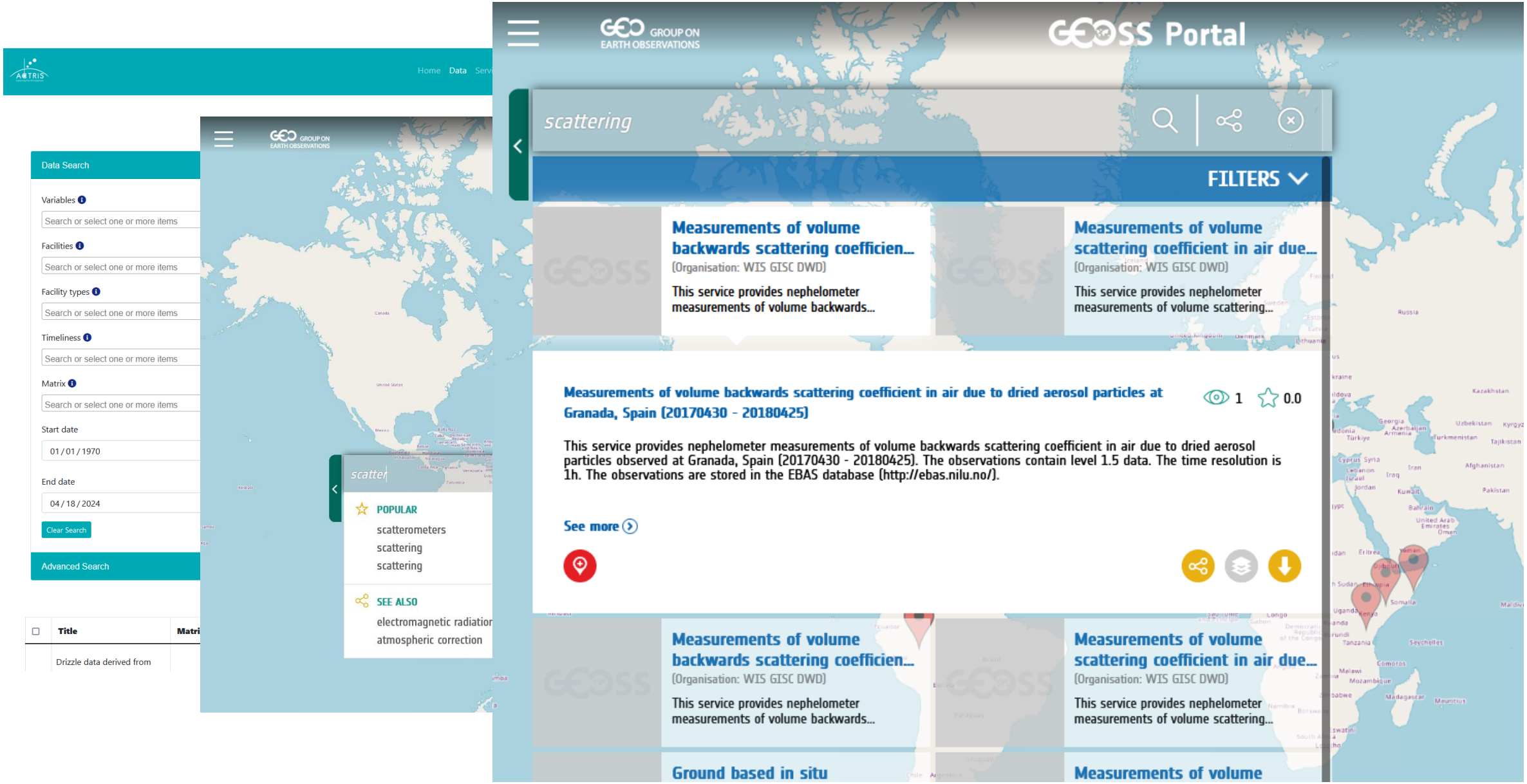
Interoperable

I1: (Meta)data use formal, accessible, shared, broadly appicable language.
I2: (Meta)data use FAIR vocabulary.
I3: (Meta)data include qualified references

Reusable

R1: (Meta)data have a plurality of accurate and relevant attributes.
R1.1: (meta)data have data usage license.
R1.2. (meta)data document provenance.
R1.3. (meta)data meet domain-relevant community standards.

Findable in Data Search Portals



The Data FAIRness Principles

Findable

F1: (Meta)data have eternal PID.
F2: Rich metadata.
F3: Indexed in search portal and similar.
F4: Metadata include PID.

Accessible

A1: (Meta)data retrievable by PID with standardised protocol
A1.1: open and free protocol
A1.2: authentication / authorization possible
A2: Metadata always accessible

Interoperable

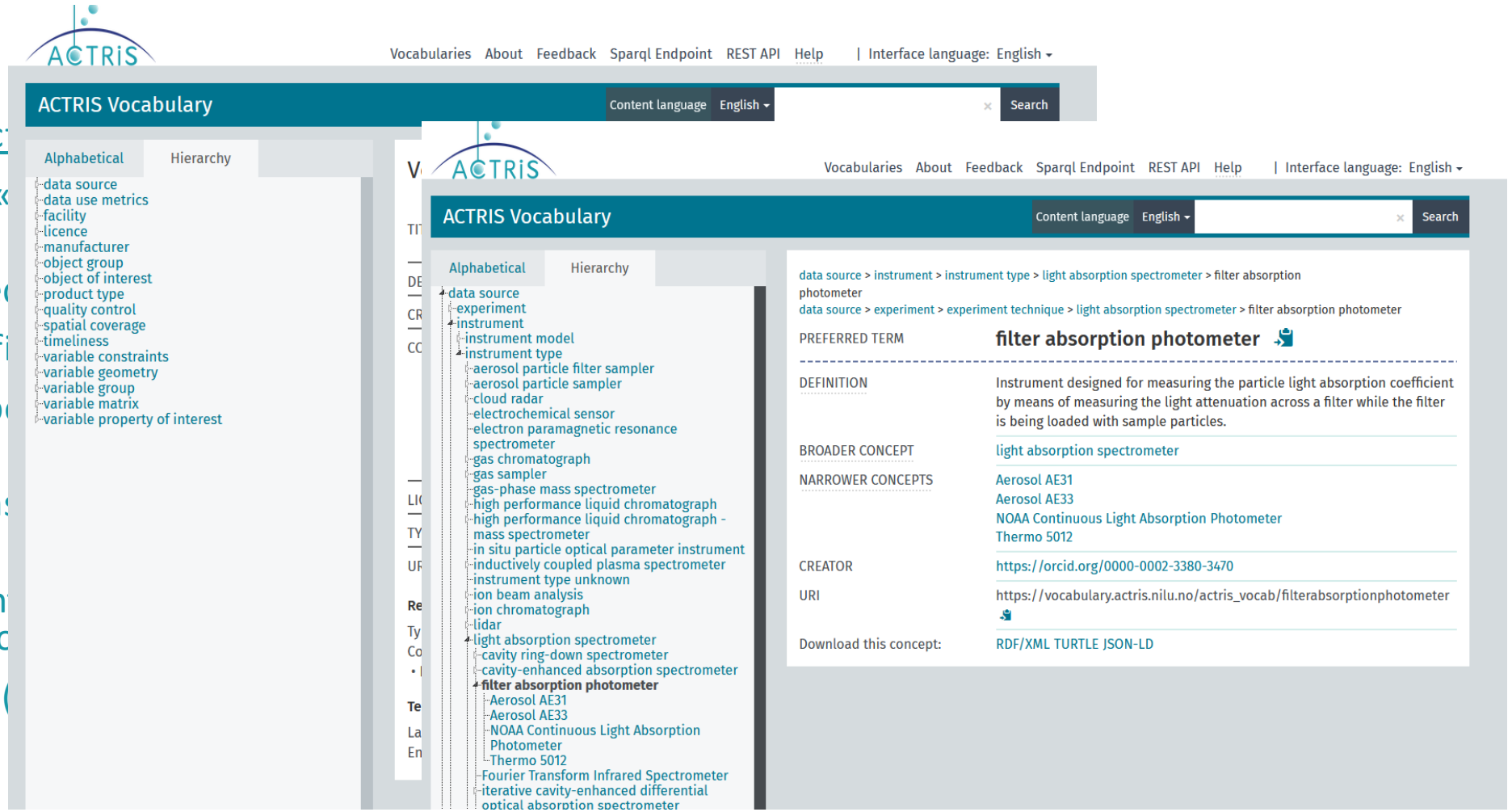
I1: (Meta)data use formal, accessible, shared, broadly applicable language
I2: (Meta)data use FAIR vocabulary.
I3: (Meta)data include qualified references

Reusable

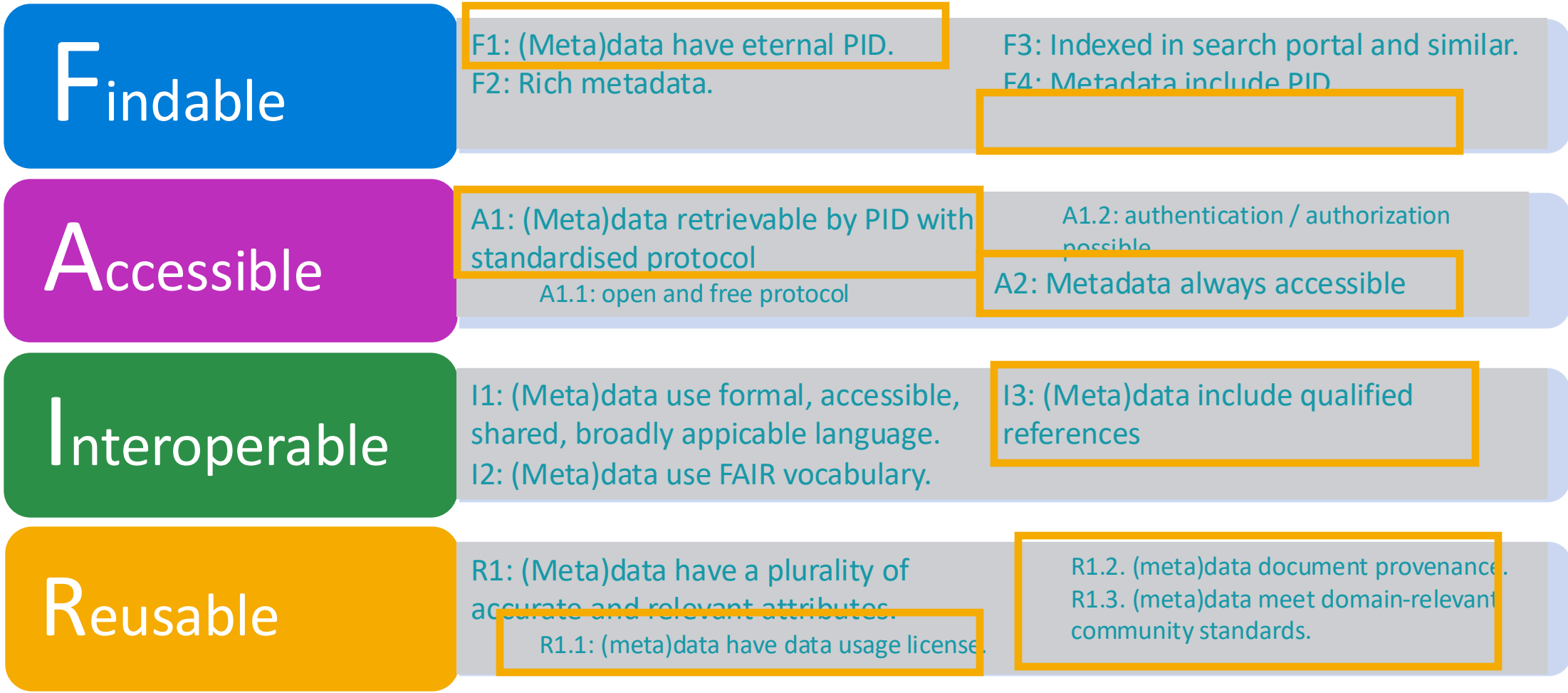
R1: (Meta)data have a plurality of accurate and relevant attributes.
R1.1: (meta)data have data usage license.
R1.2. (meta)data document provenance.
R1.3. (meta)data meet domain-relevant community standards.

FAIR Vocabulary

- https://vocabulary.act
- Well-defined terms («
  freetext.
- Concepts may be use
- All concepts have defi
- All concepts should b
  experts.
- Well-defined relation
  (ontology).
- Website is only the in
  display only part of co
- Underlying database (
  readable.



The Data FAIRness Principles



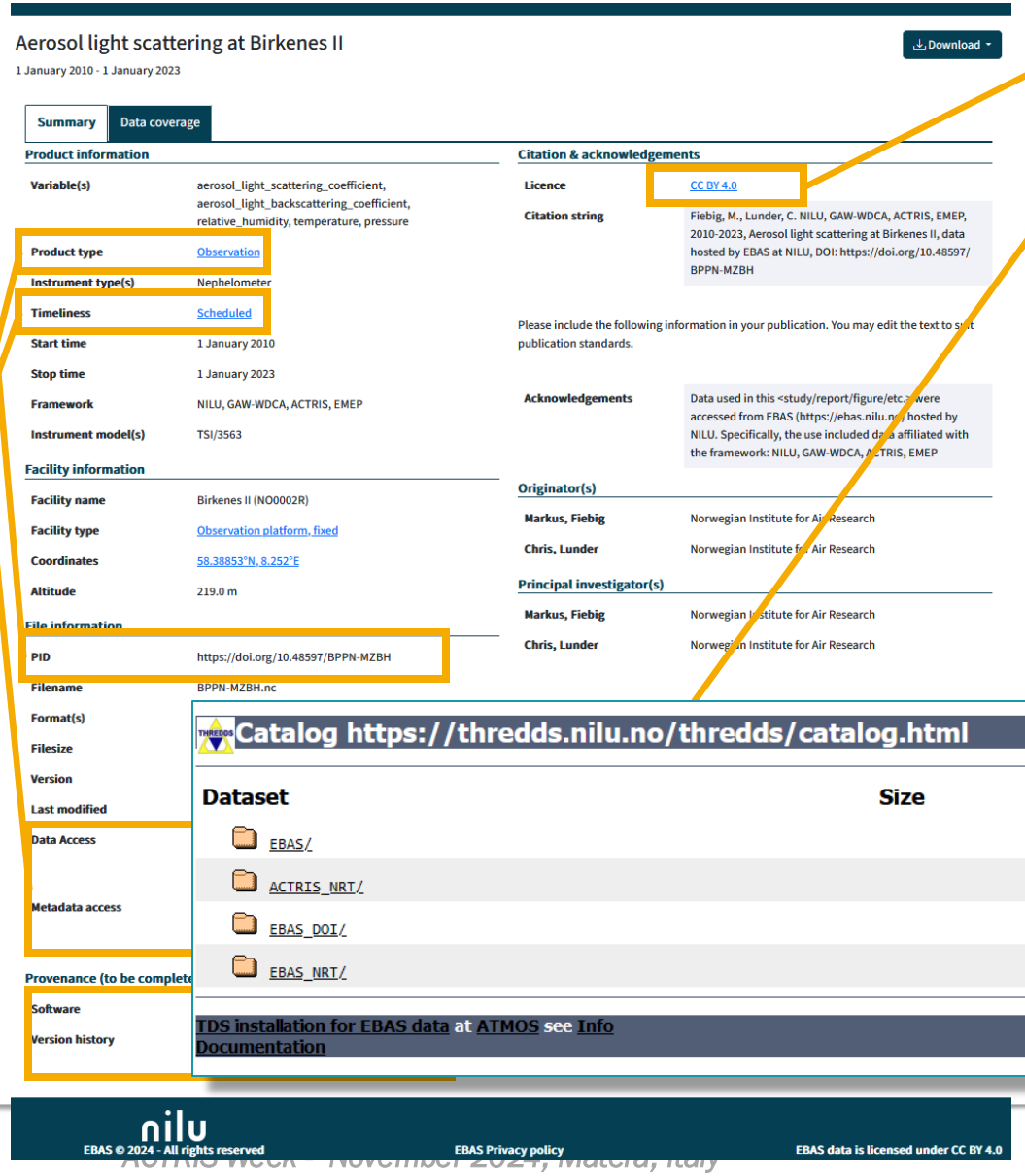
How ACTRIS In Situ / EBAS Landing Pages Implement FAIRness

https://doi.org/10.48597/AMG9-62FQ

F1: (Meta)data have eternal PID.
F4: Metadata include PID

A1: (Meta)data retrievable by PID with standardised protocol

I3: (Meta)data include qualified references



R1.1: (meta)data have data usage license.

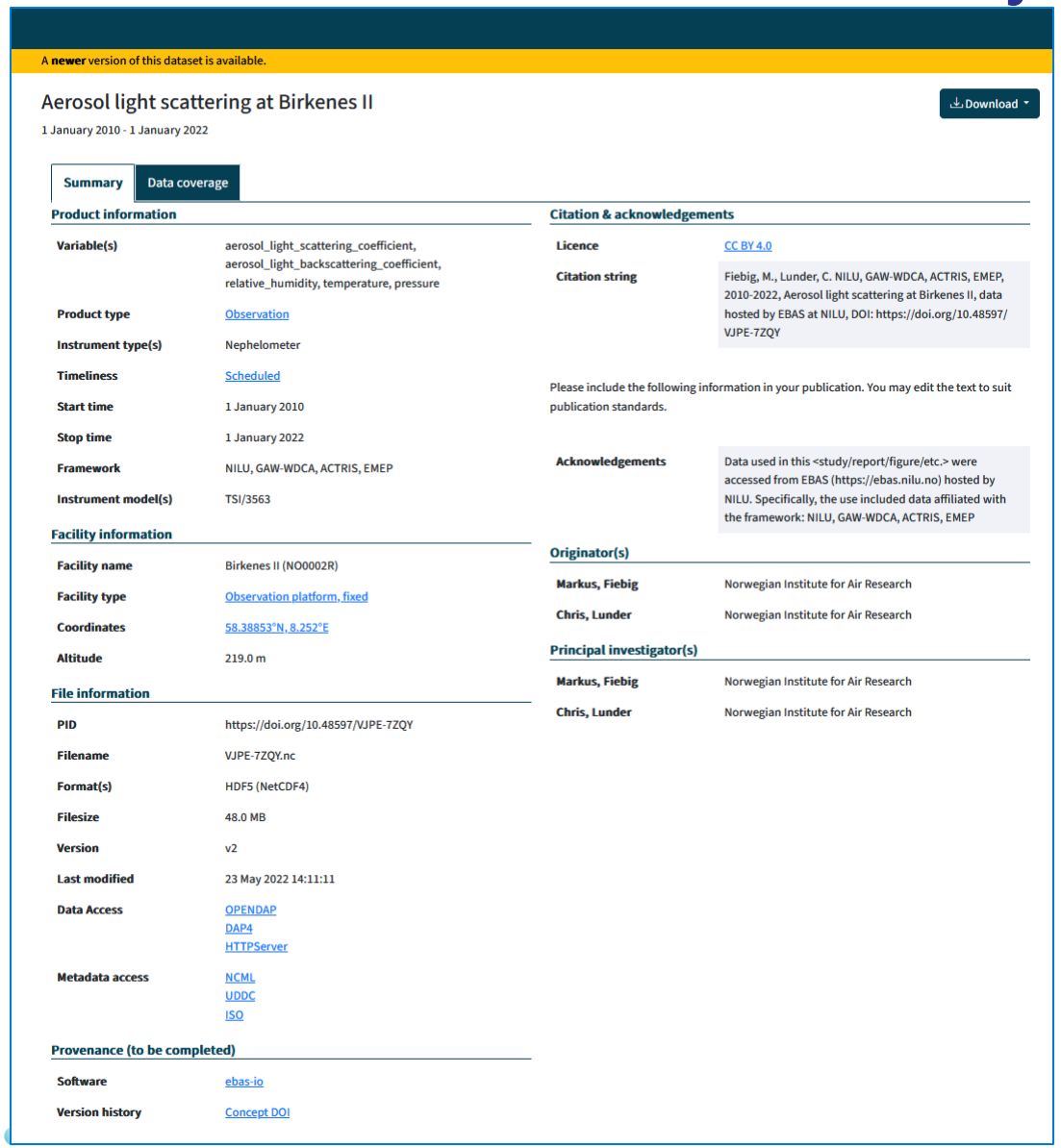
R1.2. (meta)data document provenance.

R1.3. (meta)data meet domain-relevant community standards.

- Page content and presentation carefully crafted to follow ENVRI-FAIR recommendations.
- Example: citation string **recommendation**

ACTRIS
Exploring the Atmosphere

A2: Metadata always accessible



A **newer** version of this dataset is available.

Aerosol light scattering at Birkenes II

1 January 2010 - 1 January 2022

Download

Summary | Data coverage

Product information

Variable(s)	aerosol_light_scattering_coefficient, aerosol_light_backscattering_coefficient, relative_humidity, temperature, pressure
Product type	Observation
Instrument type(s)	Nephelometer
Timeliness	Scheduled
Start time	1 January 2010
Stop time	1 January 2022
Framework	NILU, GAW-WDCA, ACTRIS, EMEP
Instrument model(s)	TSI/3563

Facility information

Facility name	Birkenes II (NO0002R)
Facility type	Observation platform, fixed
Coordinates	58.38853°N, 8.252°E
Altitude	219.0 m

File information

PID	https://doi.org/10.48597/VJPE-7ZQY
Filename	VJPE-7ZQY.nc
Format(s)	HDF5 (NetCDF4)
Filesize	48.0 MB
Version	v2
Last modified	23 May 2022 14:11:11
Data Access	OPENDAP DAP4 HTTPServer
Metadata access	NCML UDDC ISO

Provenance (to be completed)

Software	ebas-io
Version history	Concept DOI

Citation & acknowledgements

Licence	CC BY 4.0
Citation string	Fiebig, M., Lunder, C. NILU, GAW-WDCA, ACTRIS, EMEP, 2010-2022, Aerosol light scattering at Birkenes II, data hosted by EBAS at NILU, DOI: https://doi.org/10.48597/VJPE-7ZQY

Please include the following information in your publication. You may edit the text to suit publication standards.

Acknowledgements	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 framework: NILU, GAW-WDCA, ACTRIS, EMEP

Originator(s)

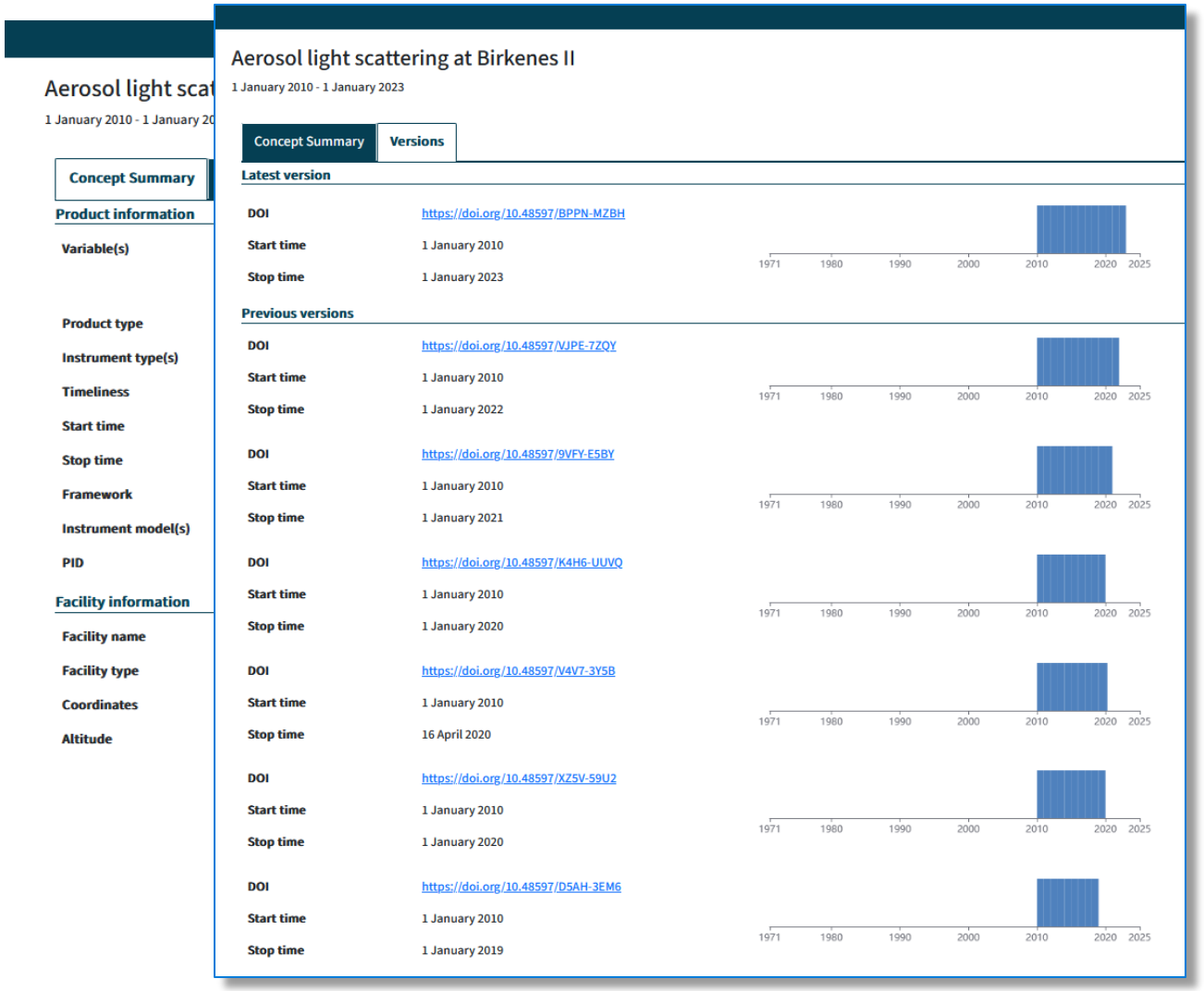
Markus, Fiebig	Norwegian Institute for Air Research
Chris, Lunder	Norwegian Institute for Air Research

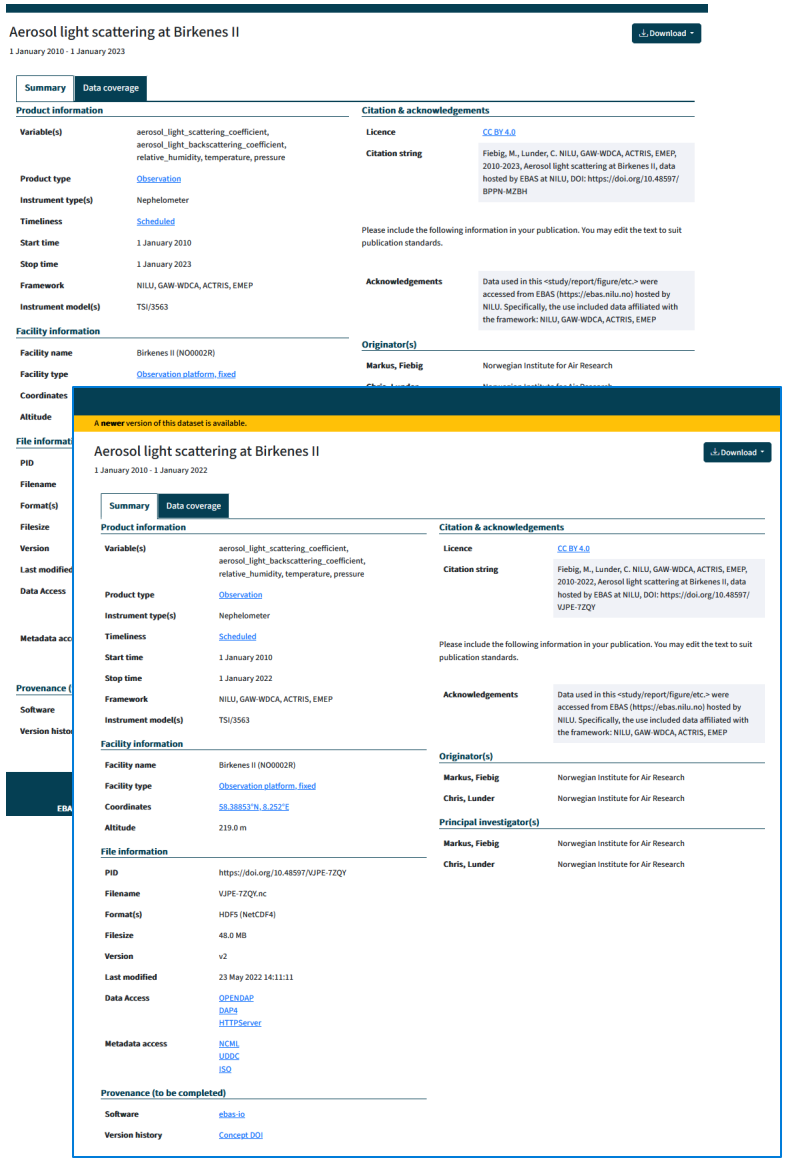
Principal investigator(s)

Markus, Fiebig	Norwegian Institute for Air Research
Chris, Lunder	Norwegian Institute for Air Research

- Each dataset version has its own DOI and landing page.
- Also obsolete dataset versions are still accessible by the same interfaces.
- Obsolete datasets are cleary marked as such.

Landing Page Types: Version and Concept





ACTRiS
Exploring the Atmosphere

Data FAIRness – Are We There?

Each FAIRness requirement is connected to a FAIR Enabling Resources (FER)!

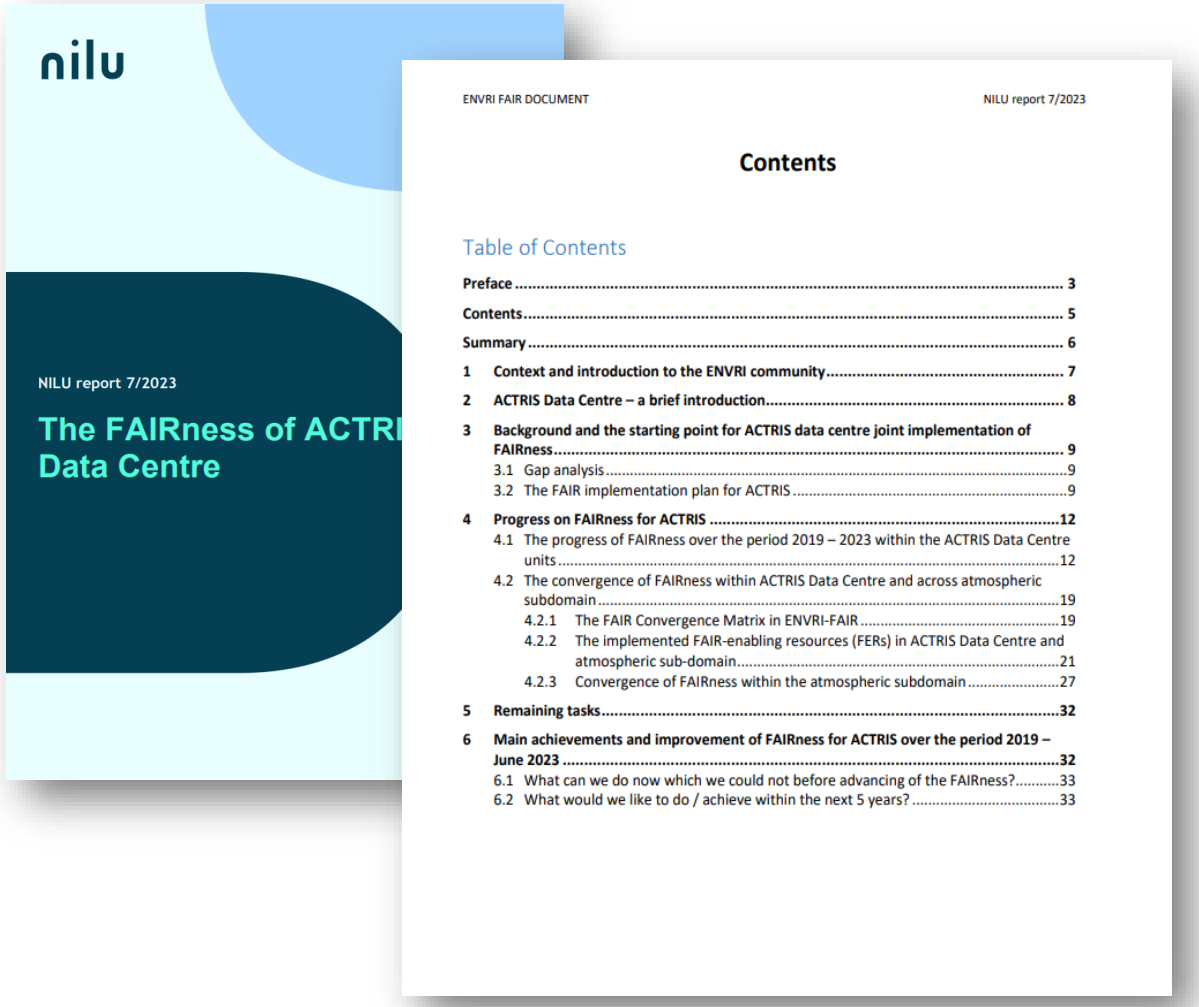
- **Data format / profile**: NetCDF (CF, ACDD)
- **Transfer protocol:** OPeNDAP, DAP4, HTTPserver
- **Metadata formats:** NCML, UDDC, ISO
- **Vocabulary:** Jena-Fuseki, SKOSMOS, I-ADOPT
- …

Data FAIRness works best if a community agrees on using the same FERs.

The process towords agreeing on common FERs is called:

FAIR Convergence

NILU report on FAIRness of ACTRIS Data Center and EBAS



Implementation as part of ENVRI-FAIR and ACTRIS-Norway
Lund Myhre et al, 2024 NILU Brage: The FAIRness of ACTRIS Data Centre (unit.no)

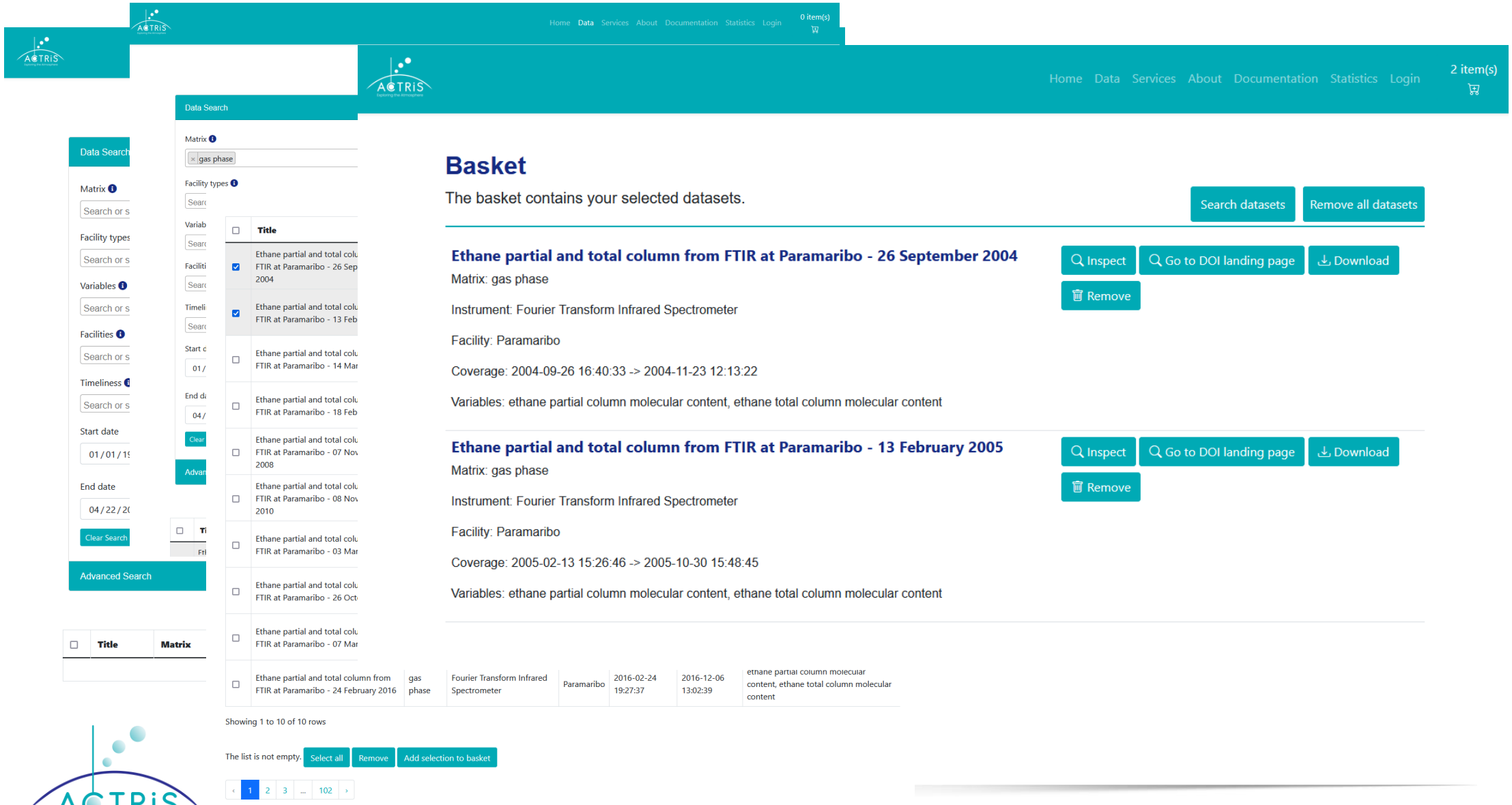
Document the **achievements** and **convergence** of FAIRness within ACTRIS Data Centre and across atmospheric subdomain (ACTRIS, ICOS-atm, SIOS-atm, IAGOS, EISCAT-3d)

Explains

- FAIR Implementation Profile (FIP)
- FAIR-enabling resources (FERs) in ACTRIS Data Centre and full atmospheric sub-domain

How Do I Use This Now?

Ultimate Solution: the New ACTRIS / EBAS Data Portal



ACTRiS
Exploring the Atmosphere

Meanwhile – Classical Quotation of Data

In NASA-Ames file:

```
93 1001
Fiebig, Markus; Lunder, Chris
NO01L, Norwegian Institute for Air Re
Lunder, Chris; Bäcklund, Are
ACTRIS EMEP GAW-WDCA NILU
1 1
2022 01 01 2023 06 23
0.041667
days from file reference point
11
1 1 1 1 1 1 1 1 1 1 1
999.999999 9999.99999 9999.99999 9999
end_time of measurement, days from th
aerosol_light_scattering_coefficient,
aerosol_light_scattering_coefficient,
aerosol_light_scattering_coefficient,
aerosol_light_scattering_coefficient,
aerosol_light_scattering_coefficient,
aerosol_light_scattering_coefficient,
aerosol_light_scattering_coefficient,
aerosol_light_scattering_coefficient,
aerosol_light_scattering_coefficient,
numflag, no unit
0
68
Data definition:                EBAS_1.
Data license:                   "https:
Citation:                       "Fiebig
Set type code:                  TU
Timezone:                       UTC
File name:                      NO0002R
Represents DOI:
Contains data from DOI:         "https:
File creation:
Export state:                   2024040
Export filter:                  exclude
Startdate:                      2022010
Revision date:                  2023062
Version:                        1
Version description:            initial
Data level:                     2
Period code:                    1y
Resolution code:                1h
Sample duration:                1h
```

In NetCDF file:

```
// global attributes:
:Conventions = "CF-1.8, ACDD-1.3";
:featureType = "timeSeries";
:title = "Aerosol light scattering at Birkenes II";
:keywords = "pm10, E                                    aerosol_light
:id = "BPPN-MZBH.nc"
:naming_authority = "no.nilu.ebas";
:project = "ACTRIS,
:acknowledgement =
:doi = "https://doi.
:license = "https://
:citation = "Fiebig,
:summary = "Aerosol
:source = "surface c
:institution = "NO01
:processing_level =
:date_created = "202
:date_metadata_modif
:creator_name = "Mar
:creator_type = "per
:creator_email = "Ma
:creator_institution
:contributor_name =
:contributor_role =
:publisher_type = "i
:publisher_name = "N
:publisher_instituti
:publisher_email = "
:publisher_url = "ht
:geospatial_bounds =
:geospatial_bounds_c
:geospatial_lat_min
```

On landing page:

Aerosol light scattering at Birkenes II

Download

1 January 2010 - 1 January 2023

Summary | Data coverage

Product information

Variable(s)	aerosol_light_scattering_coefficient, aerosol_light_backscattering_coefficient, relative_humidity, temperature, pressure
Product type	Observation
Instrument type(s)	Nephelometer
Timeliness	Scheduled
Start time	1 January 2010
Stop time	1 January 2023
Framework	NILU, GAW-WDCA, ACTRIS, EMEP
Instrument model(s)	TSI/3563

Facility information

Citation & acknowledgements

Licence	CC BY 4.0
Citation string	Fiebig, M., Lunder, C. NILU, GAW-WDCA, ACTRIS, EMEP, 2010-2023, Aerosol light scattering at Birkenes II, data hosted by EBAS at NILU, DOI: https://doi.org/10.48597/BPPN-MZBH

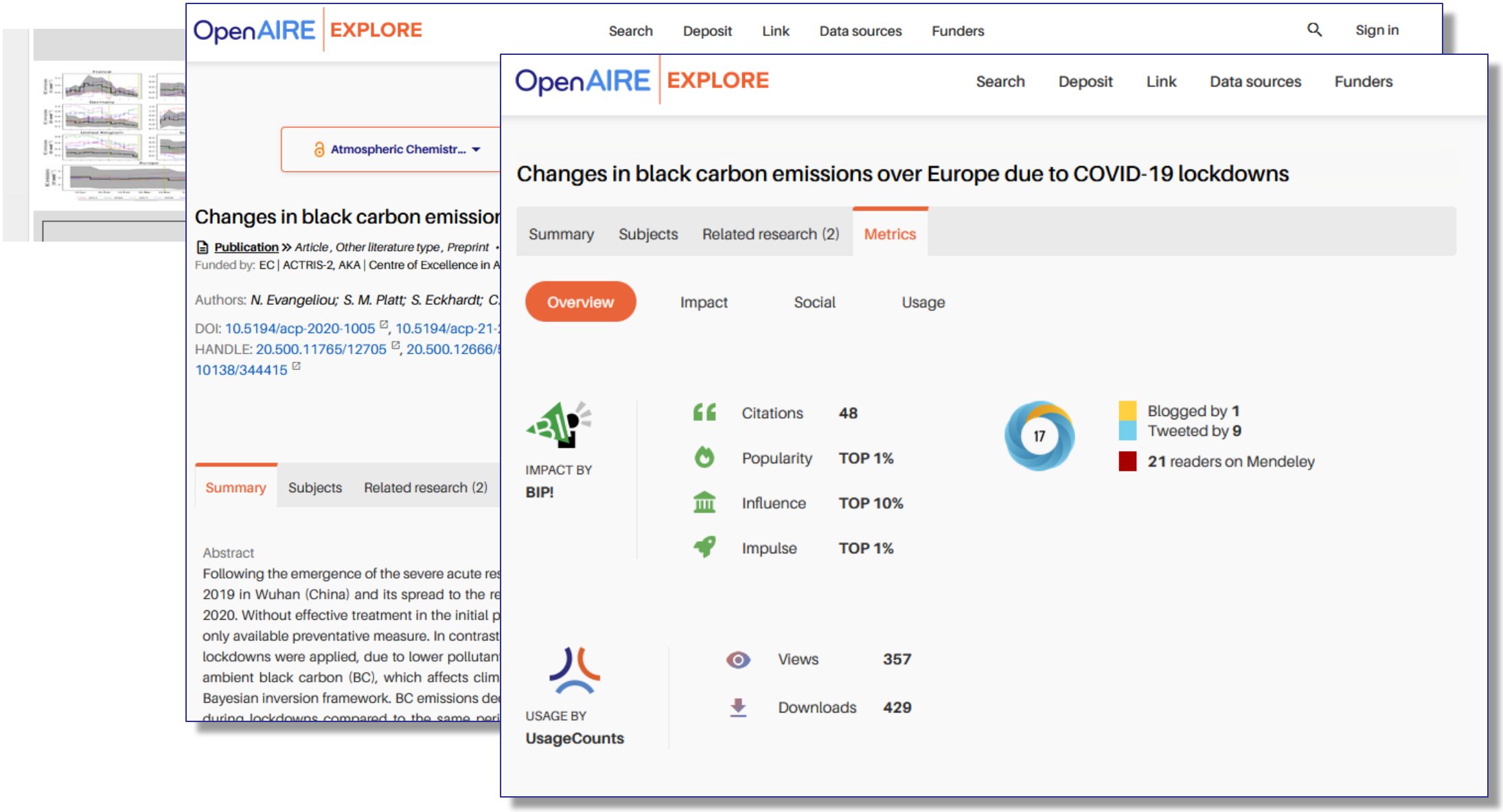
Please include the following information in your publication. You may edit the text to suit publication standards.

Acknowledgements	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 framework: NILU, GAW-WDCA, ACTRIS, EMEP

Originator(s)

ACTRiS
Exploring the Atmosphere

Outlook: See Where Your Data Has Been Used!



Data Analysis in Virtual Research Environment