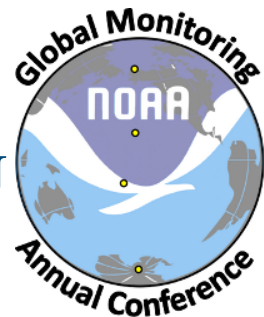


ÉÅÈÎ îÛÕÛÒøÛü ÉãûøÒÕõøÝÛõÝøÛÿ
èøÐÛøÛÕÕ Ðû õüÛ ÆÝøÐđÛÒã ÅÒøòÐã ÅÐÛÿÛ
Òãú ÇøÛÛãüÐÝÕÛ ÇÒÕ ÈòÕÛøÿÛãÛ ëÛõÐÐøÿ



ÀÿÛð îÛøÃÛÝÿÛã
ÉÅÈÎ ÅÒøòÐã èÐøõÛÿ îÛÒÃ
ÉÅÈÎ îÉ îÛÒÃ

ÇÈÅÅ' àÐÝÿúÛø' ÅÈ
ÈÒÐ ‚ ‚ ‚ß

ICOS

•••
INTEGRATED
CARBON
OBSERVATION
SYSTEM



ÉÅÈÎ íÛÕÛÒøÚü ÉãûøÒÕõøÝÚõÝøÛ

- Integrated Carbon Observation System (<https://www.icos-ri.eu/>)
- Pan-European research infrastructure for greenhouse gas and carbon cycle observations
- Long term (>20 years), high precision, high quality observations
- ERIC since November 2015, ESFRI “landmark” since 2016
- Integrates 3 domains: atmosphere, ecosystem and ocean
- All data open access: Creative Commons Attribution 4.0 International (CC4BY)



34 atmosphere stations



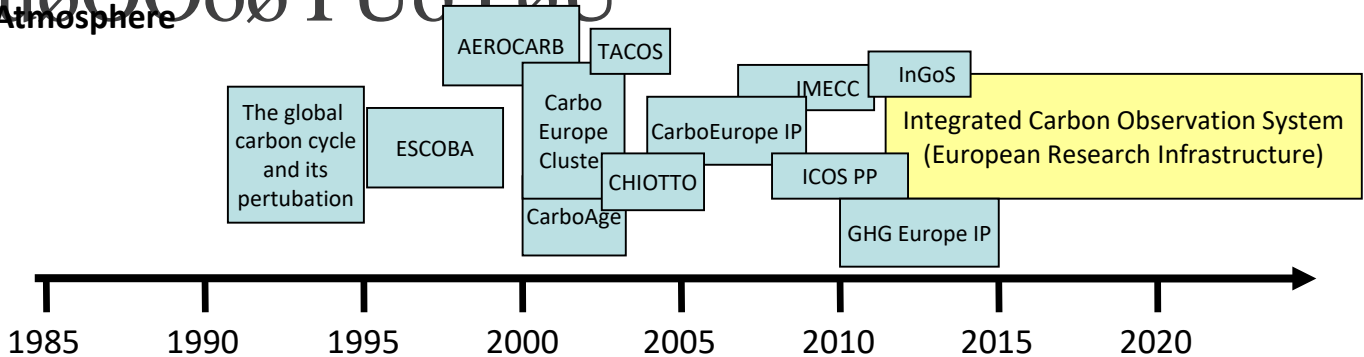
76 ecosystem stations



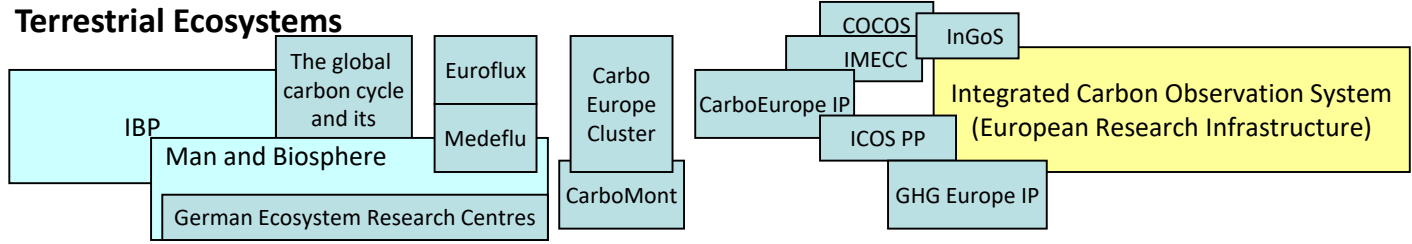
21 ocean stations (incl. ships)

ÉÀÈÌ ûøÐÀ ðøÐùUUõO òÐ íUOUOøUü ÉãûøÒÕõøÝÚõÝøÛ

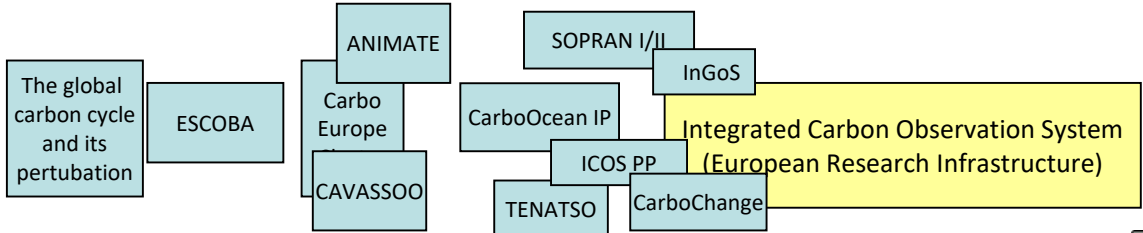
Atmosphere



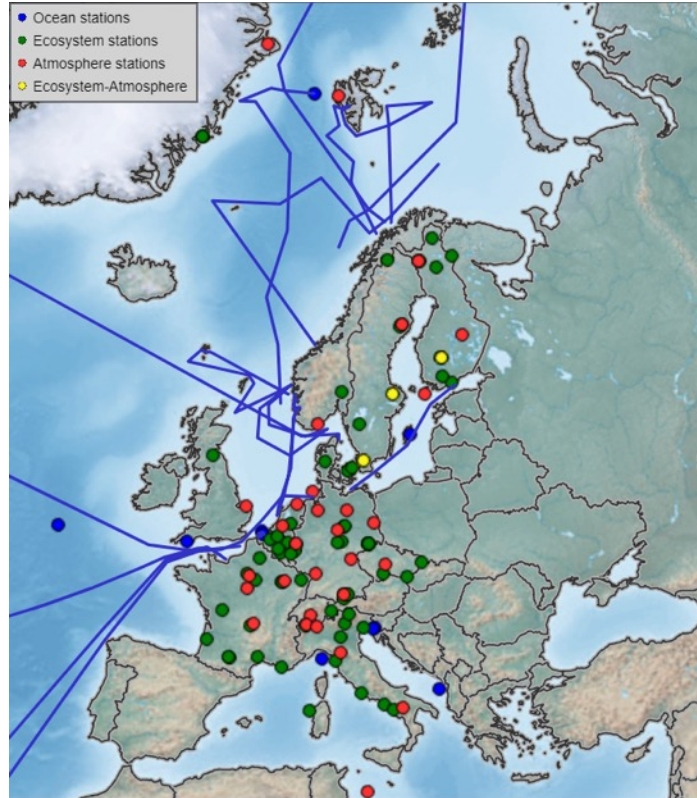
Terrestrial Ecosystems



Oceans



ÉÅÈÎ ÎõÒõÙĐãÕ



131 measurement stations

76 Ecosystem stations

34 Atmosphere stations

21 Ocean stations

including stations in French Guyana, La Reunion, Cape Verde (not visible here)

12 member states

Several countries considering: Hungary, Lithuania, Spain, Ireland, Romenia, Greece, Poland, South-Africa

ATM station spec: <https://icos-atc.lsce.ipsl.fr/filebrowser/download/27251>

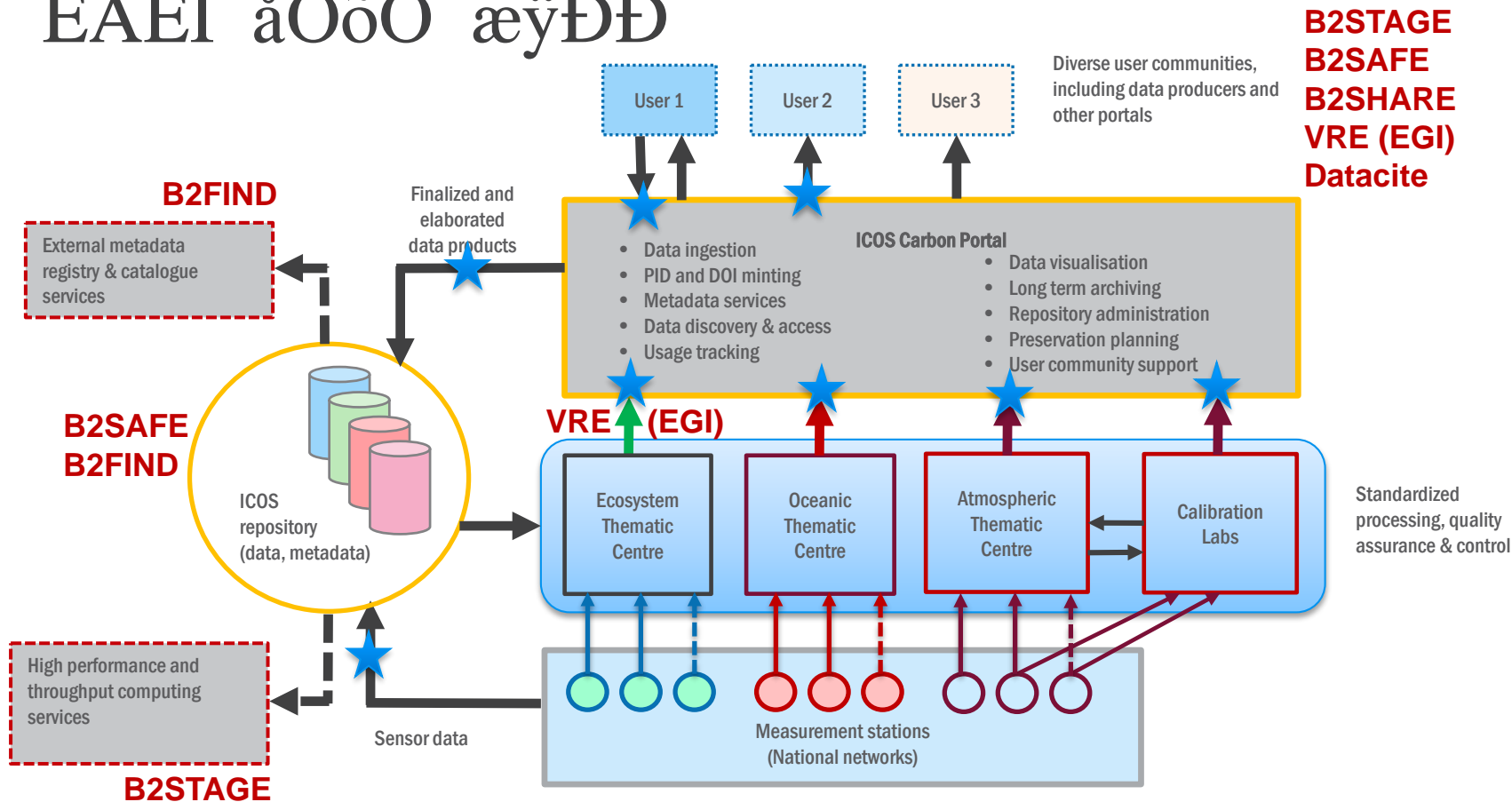
ECO instructions: <http://www.icos-etc.eu/icos/documents/instructions>

ÉÀÈÎ íÉ ÎÛøýÙÚÛÕ òÐ ÑÛÑòÛøÕ

- Uniform station design (for atmosphere following GAW recommendations+)
- Community defined common measurement protocols, standardized instrumentation
- Central data processing at (distributed) Thematic Centers (TC)
 - Full processing chain from raw to full QC'ed product, traceable, transparent
 - PI's contribute metadata, check data, add quality flags
- Central Calibration lab (Germany)
 - Flask and $^{14}\text{CO}_2$ analysis
 - Provision & reassignment of spiked natural air working standards and targets (WMO scales)
- Station networks run by nations -> monitoring station assemblies
- Legal representation in ERIC, Head Office (Finland) plus Carbon Portal (Sweden)
 - Central administration
 - Coordination, together with heads of TCs and MSA chairs
 - Communication
 - International strategy and relations: WMO GAW, SOCAT, Fluxnet,, GEO Carbon and GHG Initiative
 - Central data portal, open access, attribution and usage tracking
- Financial contributions by member states
 - Membership, partially dependent on GDP
 - Station contribution, dependent on domain, Class (I, II, associated)
- Nations contribute to 80% of HO, CP, TC, CAL, rest from member contrib.



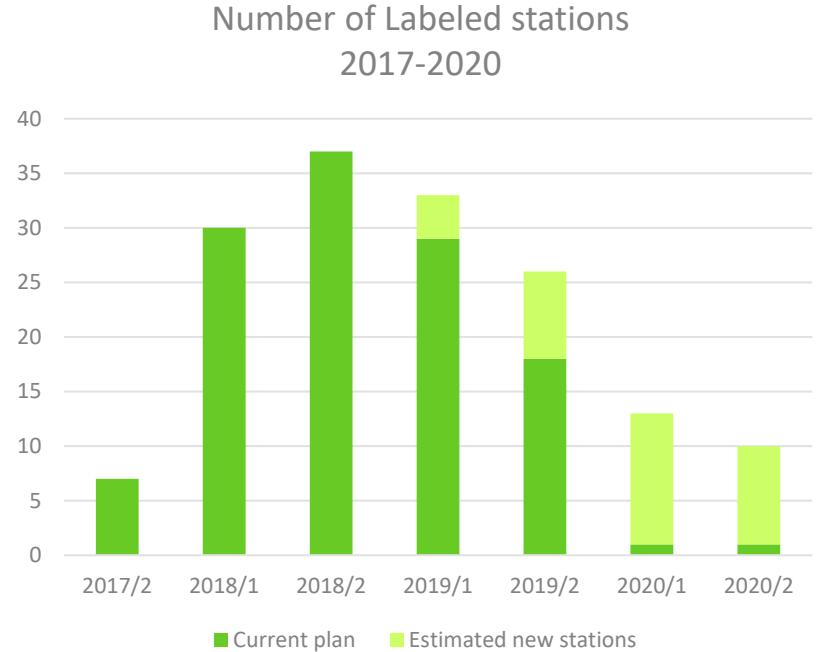
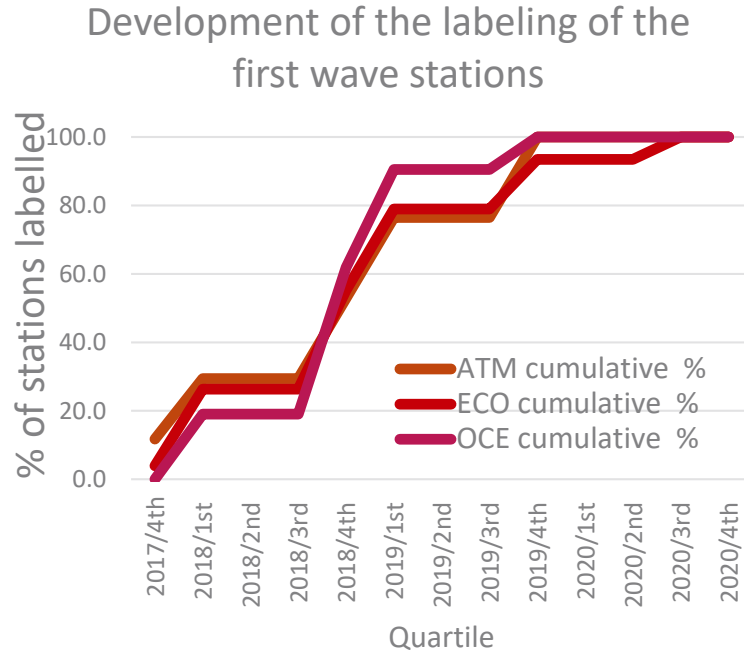
ÉÀÈÎ ãÒõÒ æÿÐÐ

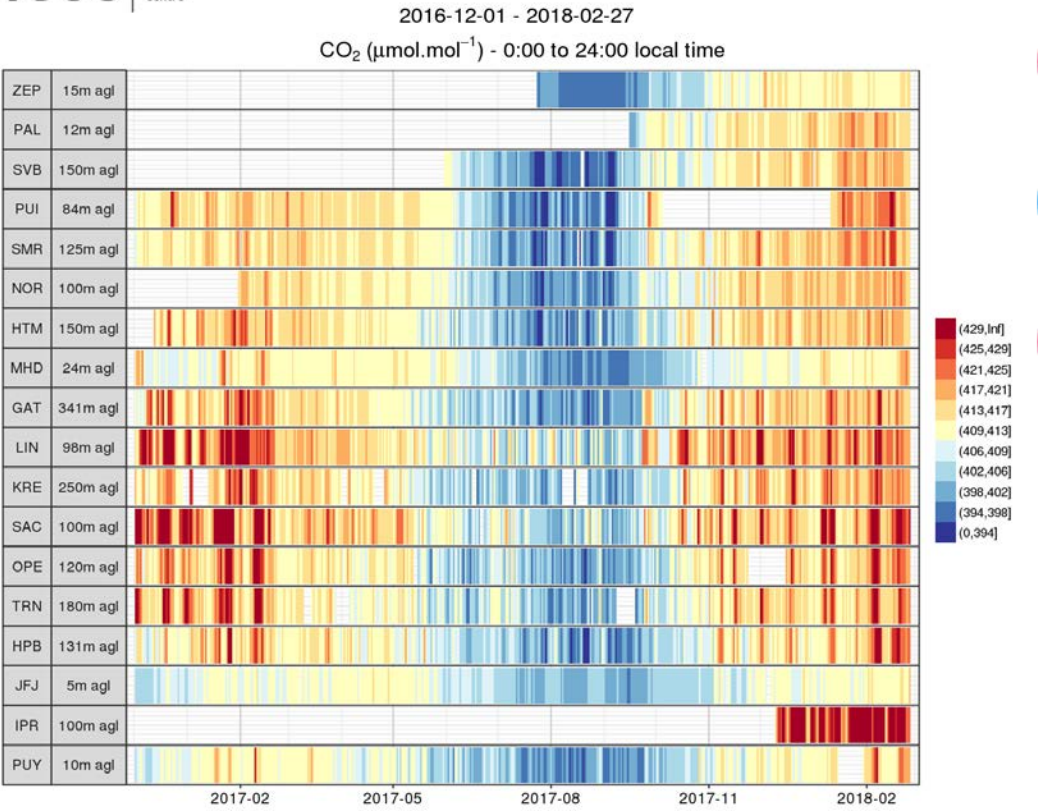
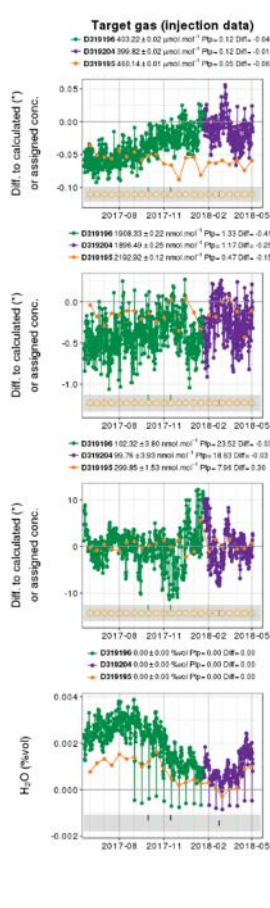
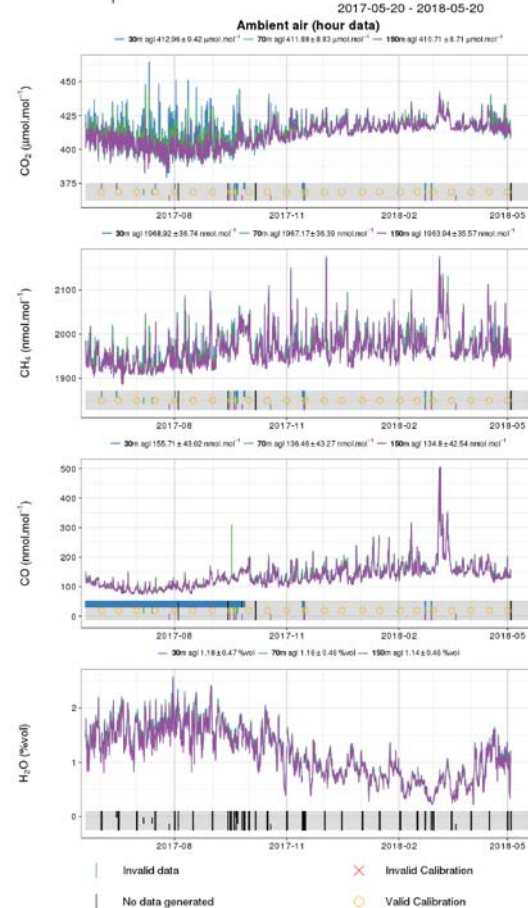


ÎõÒõÙĐã ÿÒòÛÿÙãÛ

- **Two classes of stations: I, II, associated**
 - Class I : full set of parameters + additional parameters
 - Class II: minimal set of measured parameters
 - Associated: minimal set, only step 1, protocol not 100% (only ECO)
- **Only Class I and II qualified stations will deliver “ICOS data”**
- **Two step process**
 - Step 1: Design and setup check by TC
 - Step 2: Construction and operational test, data evaluated by TC and MSA
- **Started in 2016**
- **Now: 11 atmosphere + 3 ecosystem stations approved**

Development of the labeling of the first wave stations





<https://icos-atc.lsce.ipsl.fr/dp>

Hazan et al., 2016: Atmos. Meas. Tech., 9, 4719-4736, doi:10.5194/amt-9-4719-2016, 2016.

ÀÒÐÝõ æÀÉí’’’

- stands for Findable, Accessible, Interoperable, Reusable
- was coined by FORCE11 in 2014, out of discussions in the Life Sciences community
- not a standard, but a set of principles
- has become the new fashion (and Holy Grail!)
- is increasingly called for by funders & policy makers

*FORCE11, 2014 (<https://www.force11.org/fairprinciples>)

ICOS CP is ‘FAIR avant la lettre’, concept paper is from 2013!

The logo for FAIR (Findable, Accessible, Interoperable, Reusable) consists of the letters F, A, I, and R in a bold, sans-serif font. The 'F' is blue, 'A' is pink, 'I' is green, and 'R' is red. Below the letters is a reflection effect.

ÉÀÈÎ ÅÒøòĐã èĐøõÒÿ' ÕPÕõÛÃ ÛÿÛÃÛãõÕ

- ✓ **Semantic web (WEB 3.0), open linked data, the web is the database, everything is a URL**
- ✓ Machines first, humans second
- ✓ Machine actionable through standard http protocol, RESTful API
- ✓ nonSQL, RDF database
- ✓ Open SPARQL endpoint
- ✓ **Metadata based on ontology, all elements have (linked) URIs**
- ✓ Versioned meta data store, roll-back, time dependent queries
- ✓ **Persistent identifiers, linking to data object and metadata: DOI and/or Handle system**
- ✓ **PID based on checksum of data object: Data Integrity control**
- ✓ High granularity of Data Objects
- ✓ Support for versioning
- ✓ Support for collections
- ✓ **Fully scalable and portable (dockerized), ready for the cloud**
- ✓ **Data objects in trusted long term repository (B2SAFE, 2 replicates)**
- ✓ Open software, shared through GITHUB, GPL licence
- ✓ Efficient, robust, flexible and safe
- ✓ NGiNX proxy redirects to services (<https://service.domain.eu>), domain determines RI

ËÛøÒ ÕÛøýÙÚÛ

- Generates dynamic

- Ontology information

- Data Link
- Data Format
- License
- DOI metadata
- Etc.

- Dynamic landing page

- <https://>
- <https://>

- User interface

- <https://>
- <https://>
- <https://>
- <https://>



Collection Landing Page at Carbon Portal

Summary

Title : Global anthropogenic CO2 emissions for 2007 based on EDGARv4.3 and BP statistics 2016
DOI: 10.18160/VG28-H2QA (link)
Collection creator: Carbon Portal

Content

Citation : Karstens, U. (2018, January 25). Global anthropogenic CO2 emissions for 2007 based on EDGARv4.3 and BP statistics 2016 (Version 1.0). ICOS ERIC - Carbon Portal. <https://doi.org/10.18160/vg28-h2qa>
Description : Global anthropogenic CO2 emissions based on EDGARv4.3, fuel type and category specific emissions provided by Greet Janssens-Maenhout (EU-JRC), BP statistics 2016 (<http://www.bp.com/content/dam/bp/excel/energy-economics/statistical-review-2016/bp-statistical-review-of-world-energy-2016-workbook.xlsx>), temporal variations based on MACC-TNO (https://gmes-atmosphere.eu/documents/deliverables/d-emis/MACC_TNO_de1_1_3_v2.pdf), temporal extrapolation and disaggregation described in COFEE (Steinbach et al. 2011).
Item: EDGARv4.3_BP2016_emissions.co2.global.0.5x0.5.1hr.200701.nc



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[üõđÕj°úÒõÒ'ÙÚĐÕ,Úđ'ÛÝ](#)

- Access of data object link triggers:
 - Licence check
 - Usage count
 - https download
- Data links can be harvested and linked transparently into other portals: license check, download and usage count still under full control, no redistribution needed
- Fully interactive search frontend (REST)
- Data cart (in user profile)
- Preview interactive charts/maps (REST)
- Supports versions, collections (subsetting planned)

Exclusive sneak preview:

First ICOS Final Quality Controlled Data Product release

TODAY in this theater!

ICOS data portal

Search, preview, download data objects

View data cart 3 items

Categories Filters

Clear categories

Data origin

ICOS / non-ICOS data

ICOS

Theme

Atmospheric data

Station of origin

(4 items)

Data submitter

Atmosphere thematic center

Data types

Data type

(3 items)

Data level

2x

Format

Search results Compact view

Data objects 1 to 20 of 42

Sort by

- ICOS ATC CO Release**
Source: Observatoire Pérenne de l'Environnement - **Filename:** ICOS_ATC_L2_L2pre2018_1_OPE_50_0_80_CO.zip (204 KB)
Data from 2016-08-18 to 2017-12-07
- ICOS ATC CO Release**
Source: Observatoire Pérenne de l'Environnement - **Filename:** ICOS_ATC_L2_L2pre2018_1_OPE_120_0_80_CO.zip (210 KB)
Data from 2016-08-18 to 2017-12-07
- ICOS ATC CO Release**
Source: Observatoire Pérenne de l'Environnement - **Filename:** ICOS_ATC_L2_L2pre2018_1_OPE_10_0_80_CO.zip (209 KB)
Data from 2016-08-18 to 2017-12-07
- ICOS ATC CO Release**
Source: SMEAR II-ICOS Hyytiälä - **Filename:** ICOS_ATC_L2_L2pre2018_1_SMR_16_8_311_CO.zip (187 KB)
Data from 2016-12-13 to 2017-12-31
- ICOS ATC CO Release**
Source: Hohenpeißenberg - **Filename:** ICOS_ATC_L2_L2pre2018_1_HP_B_50_0_382_CO.zip (171 KB)
Data from 2017-02-15 to 2017-12-31

ICOS data portal

View data cart 3 items

Categories Filters

Clear categories

Data origin

ICOS / non-ICOS data

ICOS x

Theme

Atmospheric data

Station of origin

SMEAR II-ICOS Hyytiälä x

Data submitter

Atmosphere thematic center

Data types

Data type

ICOS ATC CO2 Release x

Data level

2

Format

Search results Compact view

Data objects 1 to 3 of 3

Sort by ▾

	ICOS ATC CO2 Release	Add to data cart
	Source: SMEAR II-ICOS Hyytiälä - Filename: ICOS_ATC_L2_L2pre2018_1_SMR_125_0_311_CO2.zip (168 KB) Data from 2016-12-13 to 2017-12-31	Preview data
	ICOS ATC CO2 Release	Add to data cart
	Source: SMEAR II-ICOS Hyytiälä - Filename: ICOS_ATC_L2_L2pre2018_1_SMR_67_2_311_CO2.zip (170 KB) Data from 2016-12-13 to 2017-12-31	Preview data
	ICOS ATC CO2 Release	Add to data cart
	Source: SMEAR II-ICOS Hyytiälä - Filename: ICOS_ATC_L2_L2pre2018_1_SMR_16_8_311_CO2.zip (172 KB) Data from 2016-12-13 to 2017-12-31	Preview data

Home Services News & Events Documents About Feedback Log out My Carbon Portal Account

ICOS data portal

Search, preview, download data objects [View data cart 3 items](#)

Categories Filters

[Clear categories](#)

Data origin

ICOS / non-ICOS data
ICOS x

Theme
Atmospheric data

Station of origin
SMEAR II-ICOS Hyytiälä x

Data submitter
Atmosphere thematic center

Data types

Data type
ICOS ATC CO2 Release x

Data level
2

Format
ICOS ATC time series

Search results Compact view

IC0S_ATC_L2_L2pre2018_1_SMR_16_8_311_CO2

[Copy preview chart URL](#)

X axis: TIMESTAMP Y axis: co2 Chart type: scatter

CO2 mixing ratio (dry mole fraction)

time instant

— CO2 mixing ratio (dry mole fraction)

ãÒõÒ ÕõÒõÙÕõÙÚÕ



ICOS Data Statistics

Data object specification filter 🔍

Specification

Format

Data level

Stations

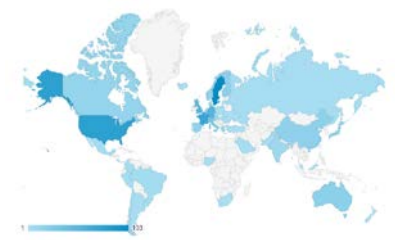
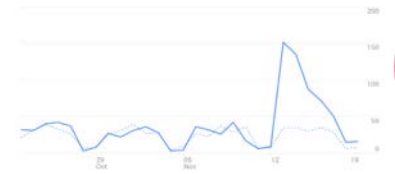
Contributors

Theme

Country codes

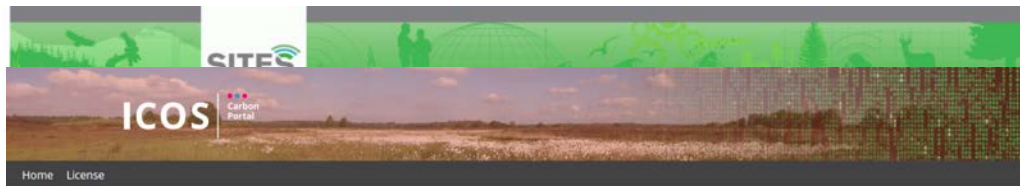
Data objects 1 to 100 of 714 ⏪ ⏩

File Name	Landing Page	Count
National_Carbon_Emissions_2017v1.1.xlsx	G6PjJYC6Ka_numm5J5IO8SV	738
Global_Carbon_Budget_2017v1.1.xlsx	sdIRNhHISEN_BckuQQGpdvE	695
Global_Carbon_Budget_2017v1.2.xlsx	-OrQ3afxxWEwG-LMjDyfvRot	172
EDGARv4.3_BP2016_emissions.co2.global.0.5x0.5.1hr.200908.nc	-Ds8QPPhCs4jTWMyTVyh9C5Xg	74
26NA20050107_CO2_underway_SOCATv3.tab	8LQ1ESJ8_YEF4WR9HoDt8Y	69
26NA20090429_CO2_underway_SOCATv3.tab	-W0-6-DTIVIV6CBEaMrkVwqCn	55
26NA20050107_CO2_underway_SOCATv3	4EBND4n1Csr0BPpyZILP4azd	44
INGOS_CH4_release2014.rar	DWd518nrTllcGS4VRZWOx4V	34
EDGARv4.3_BP1016_emissions.co2.global.0.5x0.5.1hr.2006.nc	7cevZ-6GGvcODTZm06K9XaUg	30
26NA20090713_CO2_underway_SOCATv3.tab	-O5SxtTbnRiH_zXnQ352kgXP	22
EDGARv4.3_BP2016_emissions.co2.global.0.5x0.5.1hr.200903.nc	R472PU24zAd5w7UPRkH6r97	22
LIN_399_20160101.zip	txyYC1YowGoaCkQgoOjuOVX	20
EDGARv4.3_BP2016_emissions.co2.global.0.5x0.5.1hr.201401.nc	01qNk22759d-ONSv7cMXTmap	20
115S20140327_CO2_underway_SOCATv4.tab	-0Wjzcoz-4lJmh375ytDk5FF	19
26NA20050115_CO2_underway_SOCATv3.tab	5WYh1pwoTKlCpTny-11UHkrW	18
06AQ20021126_CO2_underway_SOCATv3.tab	-q1BV5meL7ka5yD2eoby0LRg	18
EDGARv4.3_BP2016_emissions.co2.global.0.5x0.5.1hr.201506.nc	-qk3ouEGZGHRcWL6VPO0hvja	18
EDGARv4.3_BP2016_emissions.co2.global.0.5x0.5.1hr.201201.nc	534iHwwFjGjttbBQuAciCvuk	18



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Depends e.g. on domain calling meta and data service



Data Object Landing Page at Carbon Portal

Summary

Status - OK: Data and metadata are complete.
PID: 11676/wkIGd-bjmxSdbb6mmGOrmEO (link)
Access URL: Available on request
Data affiliation: Test station (fake)
Previous version: not available
Next version: not available

Content

File name: FA-Lso_BM_20171217_L04_F01.csv
Size in bytes: 30
Specification: ICOS ETC Bio Meteo Raw binary
Data level: 0
Format: Raw binary ETC station data
Encoding: plain file
SHA-256 hashsum (hex): c0a88677e6c98e65d275b87a9a618eae610e7c1f8be5b340d721d3d47933e62d

Format

(2 items)

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STILT footprint visualization



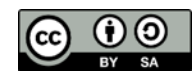
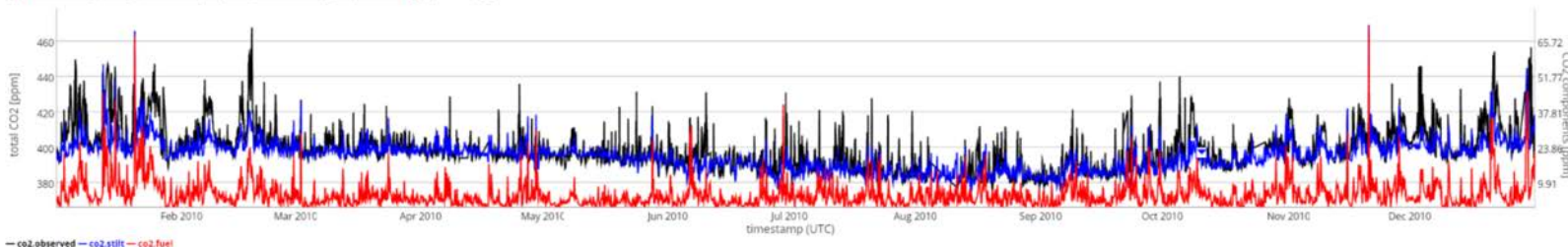
Cabauw (CB4) 2010 (+WDCGG)

Footprint: 2010-10-10 15:00 Show station position

Primary Y-axis: co2.0bserved co2.stilt co2.background

Secondary Y-axis: co2.bio co2.bio.gcc co2.bio.resp co2.fuel co2.fuel.oil co2.fuel.coal co2.fuel.gas co2.fuel.bio co2.energy co2.transport co2.industry co2.others

Playback Playback speed Fast (up to 10 fps)



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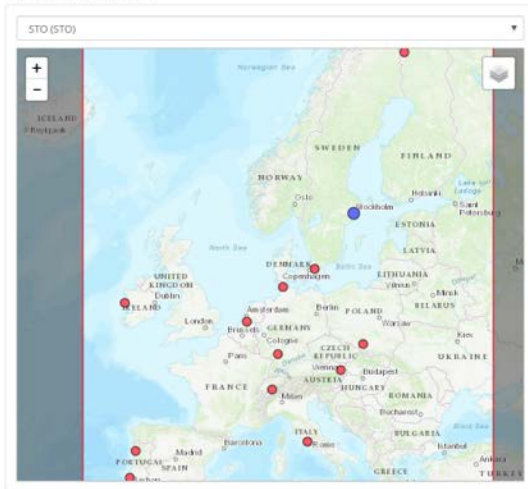
STILT calculation service Job starter

Logged in as alex.vermeulen@nateko.lu.se

STILT calculation service Dashboard

Logged in as alex.vermeulen@nateko.lu.se

Existing STILT footprints



Create new STILT footprint

Latitude (decimal degree)

Longitude (decimal degree)

Altitude above ground (meters)

Site id (usually a 3 letter code)
 [Load data](#)

Start date (YYYY-MM-DD)

End date (YYYY-MM-DD)

[Submit STILT job](#)

Submitted STILT jobs

[Show details](#)

Finished computations

- ★ Site 'ROM'
- ★ Site 'ROM'
- Site 'LUX'
- Site 'JFJ'
- Site 'ROM'
- Site 'ROM'

Computational resources

Node	Free CPUs	Total CPUs
akka.tcp://StiltCluster@localhost:2551	10	10
akka.tcp://StiltCluster@localhost:2553	10	10

Finished computations

Site id: ROM (lat: 42.01, lon: 12.3), alt: 100, start: 2011-12-25, stop: 2011-12-27, done: 17 of 17 - submitted by alex.vermeulen@nateko.lu.se
Site id: ROM (lat: 42.01, lon: 12.3), alt: 100, start: 2011-12-25, stop: 2011-12-28, done: 25 of 25 - submitted by alex.vermeulen@nateko.lu.se
Site id: LUX (lat: 55.71, lon: 13.2), alt: 100, start: 2012-01-01, stop: 2012-01-08, done: 57 of 57 - submitted by margareta.hellstrom@nateko.lu.se
Site id: JFJ (lat: 46.55, lon: 7.98), alt: 720, start: 2012-08-01, stop: 2012-08-05, done: 33 of 33 - submitted by hardistyar@cardiff.ac.uk
Site id: ROM (lat: 42.01, lon: 12.3), alt: 100, start: 2011-12-18, stop: 2011-12-25, done: 57 of 57 - submitted by margareta.hellstrom@nateko.lu.se
Site id: ROM (lat: 42.01, lon: 12.3), alt: 100, start: 2012-01-01, stop: 2012-01-02, done: 9 of 9 - submitted by margareta.hellstrom@nateko.lu.se

[To the job starter](#)



ICOS Research Infrastructure

Tremendous progress in ICOS Research Infrastructure

- Definition of data lifecycle
- Station design and protocols
- Station qualification (labelling) well underway
- First high quality data products are now available
- 'FAIR' data portal ready
- Globally well connected: WMO GAW, Fluxnet, SOCAT, Geo Carbon and GHG initiative, IG3IS, Copernicus
- Innovations in measurements and data products (RINGO project)

ÎÝÃÃÒøP ,

Strong identification and ingestion
coupled to
Open linked data
are essential elements to easier fulfil FAIR principles

Makes impact analysis, reuse of the data and traceability easy because of

- proper attribution of contributors,
- usage tracking
- licence checking

ICOS Carbon Portal implements many basic and universal elements of a functional data portal in a scalable, portable, modular and (re)usable way, ready for cloud deployment and fully open source (GPL v3):

<https://github.com/ICOS-Carbon-Portal/>

Thank you!

Twitter:

icos_ri, icos_cp

Instagram:

@icosri

Flickr:

icos_ri

Station network:

<https://www.icos-ri.eu/icoscapes>



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Backend:

- MongoDB
- Java and Scala, Akka
- RDF, OWL, SPARQL, Postgres, Eclipse, SESAME

Front end:

- Javascript, Redux, Leaflet, OpenLayers, React, Bootstrap, RESTHeart

Infrastructure:

- NGiNX, Docker, JVM, EGI Cloud, B2SAFE, Ansible

ICOS Carbon Portal

- **Expansion and consolidation of the network**
 - Network design, adaption to new requirements, Paris agreement
 - Integration of TCCON
 - Ensure sustainability
- **Stimulate scientific studies**
 - Support scientific studies, provide platform for modelling and computing through CP
 - Extend user base, connect to society with policy relevant results
- **Innovation**
 - Continuous innovation, new types of observations, instruments
- **Enhance international cooperation**
 - Promoting our standards, federated data portal, extend the user base
 - Closer international cooperation, Fluxnet, SOCAT, IG3IS, GEO-C
- **Communicate Science with society**
 - UNFCCC, IPCC, Paris agreement
 - City, regional networks and data products (forestry, agriculture)
 - General communication on climate change, raising awareness

ÉÀÈÎ ãÒõÒ

- Level 0
 - raw sensor output (either mV or physical units)
- Level 1/NRT
 - calibrated and automatically Quality Assured data
- Level 2
 - final observation data products
- Level 3
 - elaborated data products, ICOS data



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- Combines the benefit of PID with using the data checksum
- Uniquely identifies the data object, avoids duplicates
- Ensures the integrity of the data
- Allows complete transparency of data provenance
 - For observations, intermediate data and model results
- Makes data objects findable independent of storage location
- PID resolves to (dynamic) landing page: link data and metadata
- Avoids
 - data rot
 - unnecessary duplicates

PS:

DOIs are PIDs+metadata scheme

PIDs and DOIs all resolve through both Handle and DOI system



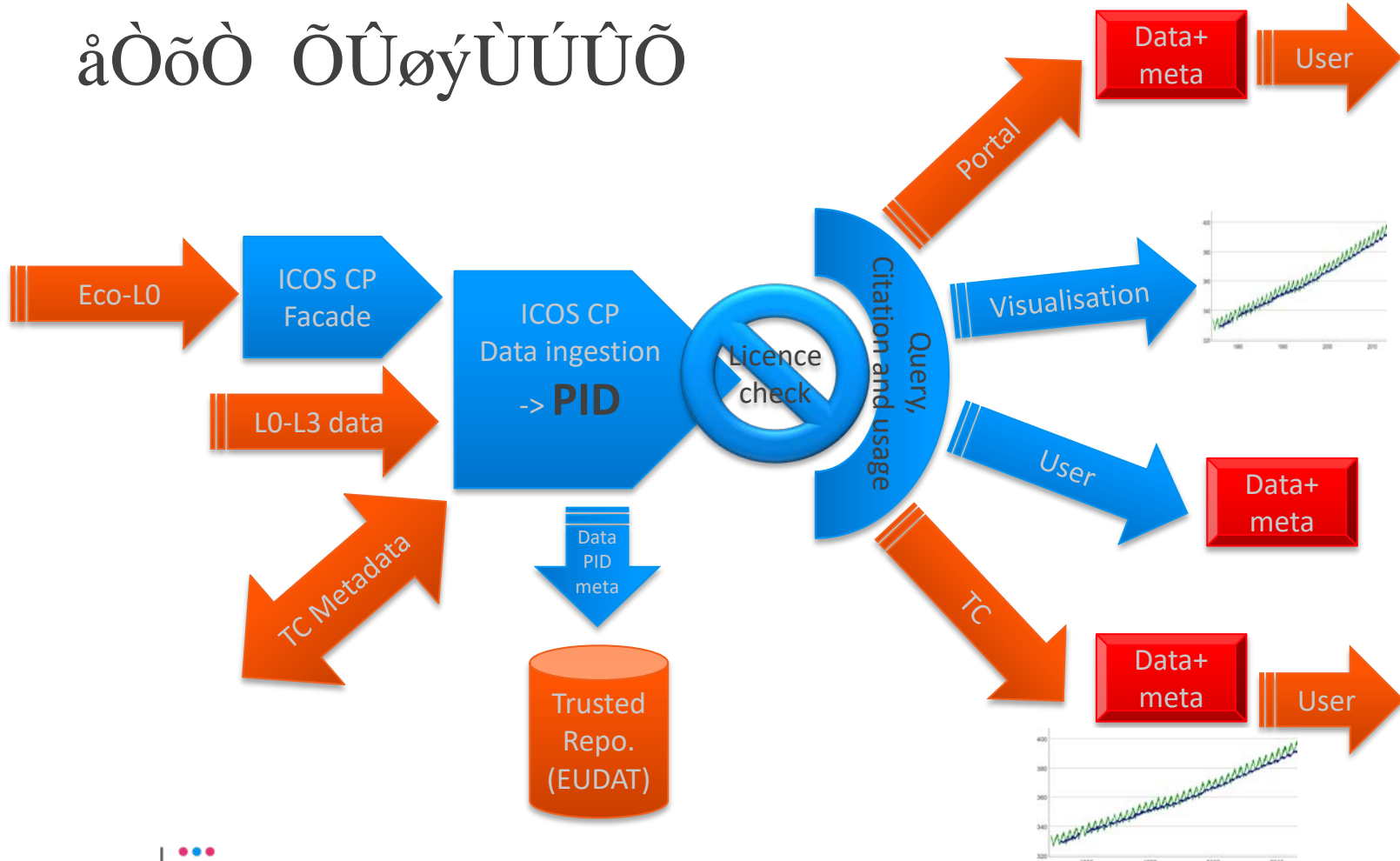
ÈđÛã ̄ýÛøÕÙĐãÛú̄ ̄ÿÛãÿÛú ́úÒõÒ ÕõĐøÛ

- The web becomes the database
- All data and metadata accessible through standard http(s), no drivers required
- Easy to link portals (of portals)
- Data is streamed dynamically, efficient and secure
- License check, usage tracking while streaming
- Services on top create and are triggered by URLs (REST interface) and PIDs as parameters (enable citation of result)

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- Only data objects (DO) of known data type (profile) are accepted
- Ingestion only through machine-to-machine interface
- DO are registered at ingestion with metadata profile
- Data linked to metadata store through profile
- Data on the fly hashed and streamed to trusted repository,
- Only true and complete transfers are kept, then DOI and/or PID minted
- Metadata profile informs on:
 - Provenance
 - Producer
 - Location
 - Time period
 - Data type = Object Specification (URL)
 - Hashsum (SHA256)
 - Evt. version, license

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ICOS Data Licence

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[Fair Use - How and why](#)



[About ICOS - Data Quality](#)



[How to cite](#)



[REGISTER - How and why](#)



[About PIDs](#)

[Log in to accept permanently](#)

I hereby confirm that I have taken notice of the information provided to inform me about the data and good practices of data usage. These guidelines do not define additional contractual conditions.

YES

NO

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- All queries for metadata through SPARQL
- Also ontology (OWL) itself can be queried (machine-to-machine)



Carbon Portal SPARQL Endpoint Access to Carbon Portal metadata

```
prefix cpmeta: <http://meta.icos-cp.eu/ontologies/cpmeta>
prefix prov: <http://www.w3.org/ns/prov#>
select (str(?subTime) as ?time) ?dobj ?spec ?dataLevel ?fileName ?submitterName where{
  ?dobj cpmeta:hasObjectSpec [rdfs:label ?spec ; cpmeta:hasDataLevel ?dataLevel].
  ?dobj cpmeta:hasName ?fileName .
  ?dobj cpmeta:wasSubmittedBy ?submission .
  ?submission prov:endedAtTime ?subTime .
  ?submission prov:wasAssociatedWith [cpmeta:hasName ?submitterName].
}
order by desc(?subTime)
limit 1000
```

Select predefined request
Last 1000 data (▾)

Return type
 JSON CSV XML TSV or Turtle

Make request

1000 rows returned (1365 ms request).

```
time,dobj,spec,dataLevel,fileName,submitterName
2018-05-14T09:40:30.851Z,https://meta.icos-cp.eu/objects/yXdTF-23IQn6imB_jpH1ta7,ICOS ATC Meteorological data csv time series,0,SV8_640_3_20180513.zip,Atmosphere thematic cent
2018-05-14T09:40:30.139Z,https://meta.icos-cp.eu/objects/VCUNHDBDnHmkoG1V14N0_XfV,ICOS ATC Meteorological data csv time series,0,SV8_639_2_20180513.zip,Atmosphere thematic cent
2018-05-14T09:40:29.288Z,https://meta.icos-cp.eu/objects/GFH7GcyOObuByXb78emq_1D6,ICOS ATC Meteorological data csv time series,0,SV8_638_1_20180513.zip,Atmosphere thematic cent
2018-05-14T09:40:28.613Z,https://meta.icos-cp.eu/objects/GFBICeUkSUG82L1tb9g1HnB1,ICOS ATC Meteorological data csv time series,0,SV8_631_4_20180513.zip,Atmosphere thematic cent
2018-05-14T09:40:27.678Z,https://meta.icos-cp.eu/objects/4dkYP960CuBp3KaDnTow0Atk,ICOS ATC Meteorological data csv time series,0,SMR_512_5_20180513.zip,Atmosphere thematic cent
2018-05-14T09:40:26.930Z,https://meta.icos-cp.eu/objects/TPA8VE-yk3JVMAQz8jHr0XJ,ICOS ATC Meteorological data csv time series,0,SMR_364_3_20180513.zip,Atmosphere thematic cent
2018-05-14T09:40:26.020Z,https://meta.icos-cp.eu/objects/mhQmPn3Fz9Pz:KSf08LRbwkA,ICOS ATC Meteorological data csv time series,0,SMR_363_2_20180513.zip,Atmosphere thematic cent
2018-05-14T09:40:25.326Z,https://meta.icos-cp.eu/objects/-GH9M81_Z04PH@qv_ukknVG1,ICOS ATC Meteorological data csv time series,0,SMR_318_1_20180513.zip,Atmosphere thematic cent
2018-05-14T09:40:24.423Z,https://meta.icos-cp.eu/objects/ugfY00Q-Q168y-rrx1ew-vPM,ICOS ATC Meteorological data csv time series,0,OPE_563_3_20180513.zip,Atmosphere thematic cent
2018-05-14T09:40:23.727Z,https://meta.icos-cp.eu/objects/vm9XdglZFuLT8atBzcTmxokU,ICOS ATC Meteorological data csv time series,0,OPE_562_2_20180513.zip,Atmosphere thematic cent
2018-05-14T09:40:22.799Z,https://meta.icos-cp.eu/objects/6qikyRhvli2V5nsYrgy55a10,ICOS ATC Meteorological data csv time series,0,OPE_561_1_20180513.zip,Atmosphere thematic cent
2018-05-14T09:40:22.118Z,https://meta.icos-cp.eu/objects/Mm19rf_G6677pYcYQMOLeWp,ICOS ATC Meteorological data csv time series,0,OPE_560_4_20180513.zip,Atmosphere thematic cent
```