

ICOS in a nutshell – Good to know for Focal Points and Principal Investigators

1. What is ICOS?

1.1 Mission, strategy and benefits

The Integrated Carbon Observation System (ICOS) is a distributed **Research Infrastructure (RI)** operating standardised, comparable, high-precision and long-term observations about greenhouse gases in Europe and facilitates research to understand the carbon cycle. ICOS-based knowledge supports policy- and decision-making to combat climate change and its impacts.

ICOS brings several benefits to stations and scientists. ICOS provides guidance, training and knowledge exchange, increases international scientific networking and strengthens the scientific communities, advances the standardisation and curation of data and provides the community with support for finding new funding opportunities and applying for multi-disciplinary consortium projects.

1.2 Organisational structure

ICOS RI consists of several parts. The basis of ICOS' operations is the [measurement station network](#) across Europe located in the countries that are [members](#) of ICOS. Each measurement station is managed by a **Principal Investigator (PI)**. Measurement stations in each member country are organised into **National Networks (NN)**, each National Network consisting of all stations in that country. Each NN is managed by a **Focal Point (FP)**, who is a contact person between the NN and the other parts of the RI.

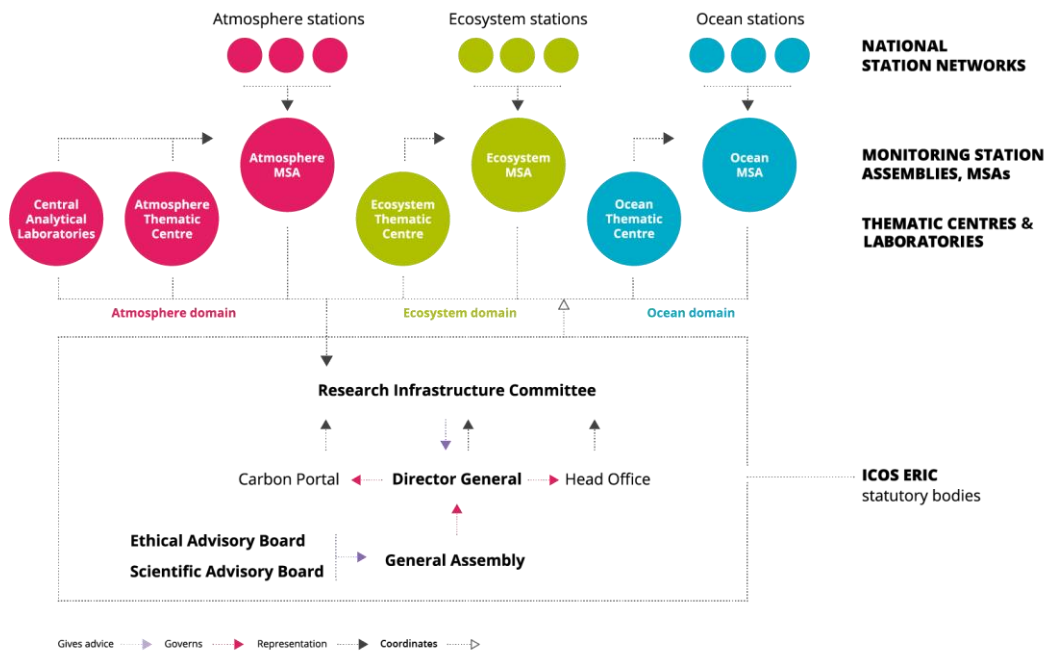
In ICOS, measurement stations are grouped not only based on their location in a certain country, but also based on the type of observations they do. Each ICOS station belongs in one or more of these three domains: Atmosphere, Ecosystem or Ocean. Each domain has a **Thematic Centre (TC)** with experts in observations and data management, and each TC coordinates the observations and supports the stations in their domains. In addition to the Thematic Centres, there are **Central Analytical Laboratories (CAL)** that provide gas analyses and calibration gases for especially atmosphere and partly the ocean domains. TCs and CALs are called **Central Facilities (CF)**. Among CFs, station PIs also have a possibility to get support from each other, as each domain also organises **Monitoring Station Assemblies (MSA)**. MSA is a recurring meeting where PIs of the stations are represented to discuss, develop and improve the scientific and technical basis of the observations. Each domain organises their own MSAs.

The entire ICOS RI is coordinated by **ICOS ERIC**, where ERIC stands for European Research Infrastructure Consortium. [ERIC](#) is a specific legal entity created by the European Commission, and ICOS was approved with an ERIC status in 2015. ICOS is an environmental ERIC among [other existing ERICs](#). ICOS ERIC consists of the **Head Office (HO)** and the **Carbon Portal (CP)**. Head Office is responsible for coordination, administration, development and communications of the RI. Carbon

Portal is responsible for collecting, storing and distributing ICOS data from the measurement stations and providing elaborated ICOS data products. ICOS ERIC is governed by its **General Assembly (GA)** with delegates from each member country, and GA meetings are held twice a year in May and November. GA appoints the **Director General (DG)**, who is responsible for the implementation of the decisions of the GA. The DG is responsible for managing the staff and activities of the Head Office and the Carbon Portal. The representatives from the HO, CP, CF and MSAs form a high-level advisory body called the **RI Committee (RI COM)**, which advises the DG and the GA on scientific and organisational matters concerning the RI.

Apart from the RI, the GA has established two external bodies to provide advice on scientific and ethical matters: the **Scientific Advisory Board (SAB)** and the **Ethical Advisory Board (EAB)**. The role of the SAB is to develop ICOS RI activities on the scientific level and to analyse the scientific results and impact of the ICOS RI. The role of the EAB is to advise and periodically report on ethical issues, such as scientific ethics, data-related ethical issues, discrimination issues or any kind of conflict of interest.

ICOS research infrastructure



1.3 Financial structure

ICOS RI receives funding from its member countries to ensure its operations. ICOS has three levels of funding:

1. **ICOS ERIC** receives membership contributions from the member countries as well as host premium contributions from Finland, Sweden, the Netherlands and France.
2. **Central Facilities** receive host contributions from their host countries or in-kind contributions from their host institutions (70–80% of their total funding) and station contributions through ICOS ERIC.
3. **National Networks** receive funding from their national governments or in-kind contributions from their host institutions.

2. Three domains, three Thematic Centres

All measurement stations in ICOS belong to one or more **domains**: Atmosphere, Ecosystem or Ocean. Each domain has a Thematic Centre: **Atmosphere Thematic Centre (ATC)**, **Ecosystem Thematic Centre (ETC)** and **Ocean Thematic Centre (OTC)**. France and Finland host the ATC, Italy, Belgium and France the ETC, and Norway and the UK the OTC.

Thematic Centres support stations in completing the labelling process and provide data services such as processing and quality control; training and technical assistance for site management; developing and testing new measurement sensors; instrument setups and methods; and developing new methods for data processing. TCs also cooperate closely with their respective MSAs.

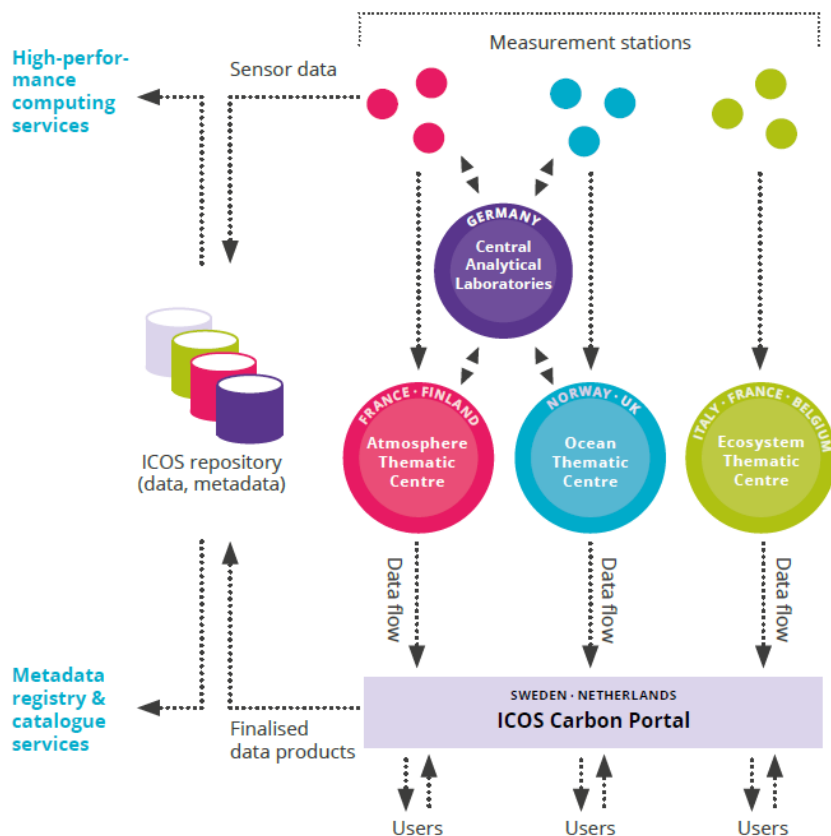
The ATC, ETC and OTC receive online data from the ICOS stations, typically on a daily basis and in near-real-time. TCs ensure that all measurement data from the stations is treated and quality controlled with the same algorithms. After processing the data is properly archived in the Carbon Portal.

The TC personnel contact info and further information about TCs can be found on their websites:

- Atmosphere Thematic Centre (ATC): <https://icos-atc.lsce.ipsl.fr/>
- Ecosystem Thematic Centre (ETC): <http://www.icos-etc.eu/icos/>
- Ocean Thematic Centre (OTC): <https://otc.icos-cp.eu/>

Together with TCs, **The Central Analytical Laboratories (CAL)** form the ICOS Central Facilities that support the ICOS monitoring activities of the observational networks. Further information about CAL and their contact info can be found in their website:

- The Central Analytical Laboratories (CAL): <https://www.icos-cal.eu/>



3. Labelling process ensures the quality of observations

To reach the goals of providing standardised and high quality data about greenhouse gases across the stations and member countries, ICOS has designed a unique quality-assurance process called station labelling. Once the station fulfils all the criteria set for an ICOS station, it receives an **ICOS label as a guarantee that the data produced are of the highest quality.**

The labelling process starts when a new station is added to the ICOS network. **New ICOS stations are added by the member countries**, and each station must be approved by its host institution and national government. The process starts when a representative of a member country, either Focal Point or General Assembly delegate, officially announces the new station to the Head Office. However, before formally applying to become a labelled ICOS station, the interested party is advised to contact the appropriate Thematic Centre (TC) to discuss the station in terms of network design and station characteristics.

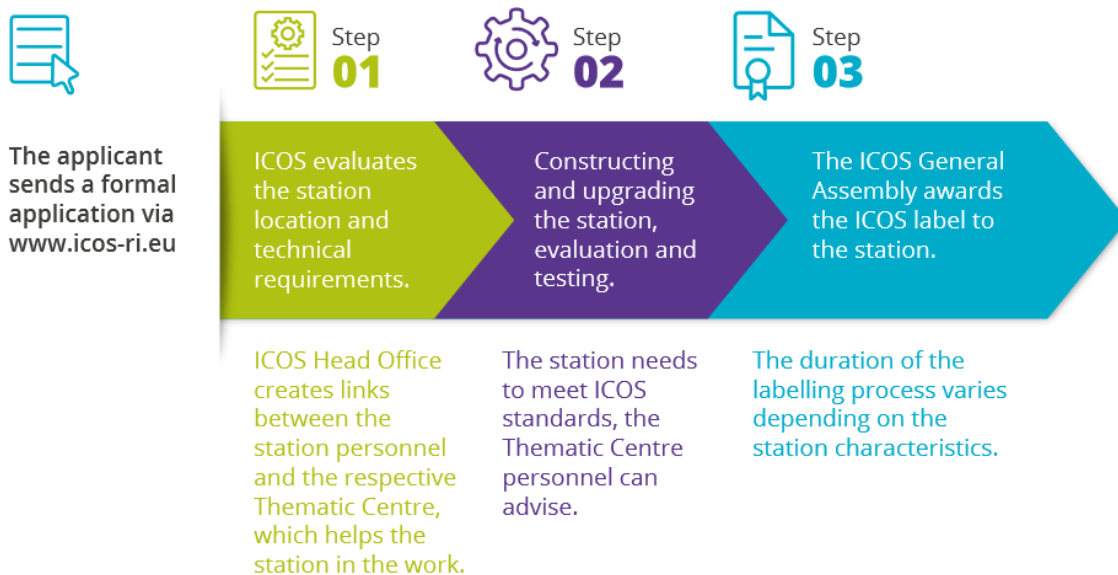
The ICOS station labelling process consists of three steps:

Step 1: Station PI provides the respective TC with required information about the site, the location of the measurement infrastructure and other characteristics of the station. TC evaluates the information.

Step 2: After the station evaluation has been approved, station can enter Step 2. It includes a thorough analysis of the stations compatibility with the ICOS measurement protocols and standards, measurement setup, data transfer and data quality. TCs control the process and support the station's PIs in fulfilling the requirements for ICOS stations.

Step 3: The ICOS General Assembly approves the station on the basis of the labelling report prepared by the TC and the recommendation of the Director General. Station receives official ICOS label.

More specific guidelines for the labelling requirements and labelling process can be found online for each domain: <https://www.icos-cp.eu/about/join-icos/process-stations> (Most recent versions of the documents are linked under the title "Station labelling documents")



4. Focal Point is a manager of a National Network that consists of all the ICOS stations in one country

In ICOS, **Focal Points (FPs) are the links between stations (their PIs) of the National Network (NN) and the rest of ICOS RI. Each FP should stay aware of the status of all ICOS stations (in all domains) in their respective countries** and communicate about the developments to the HO and the rest of the RI, including the national GA delegate. All this is possible by attending the meetings regularly and keeping up with the reporting cycle.

4.1 Regular meetings and annual reporting cycle

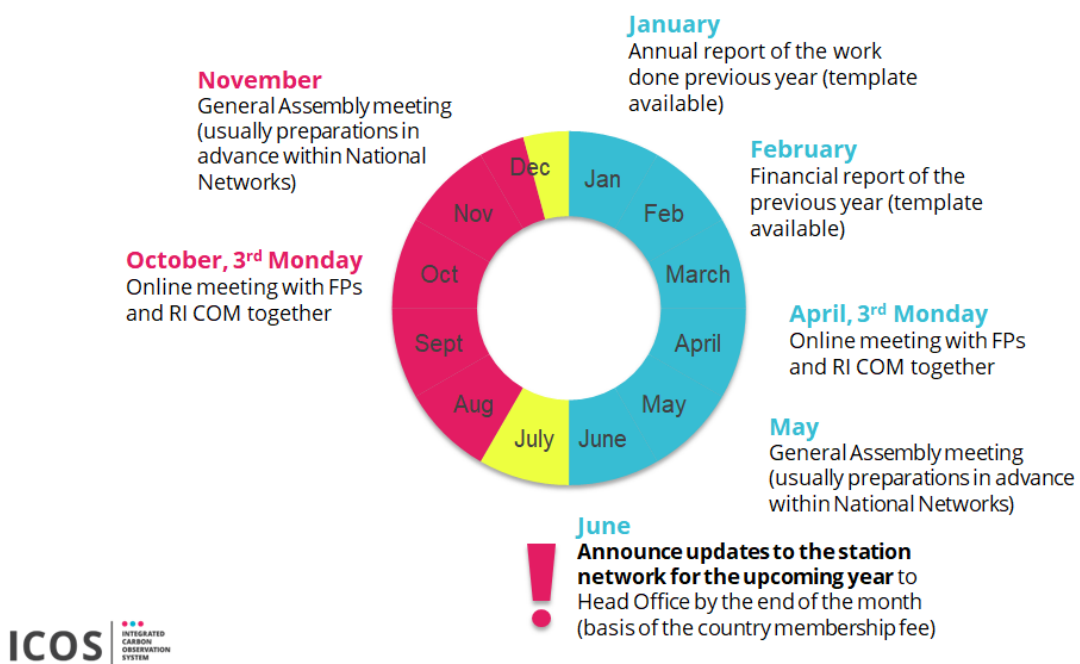
1. All FPs join an **online meeting with RI COM twice a year**, typically in April and October.
2. In January, the FP gives an **annual work report of the NN** to report about developments in the previous year. This follows with an **annual financial report of the NN** (in February). Templates for these reports are provided by the HO.
3. In June, **FPs inform the HO on how many stations the NN will operate the next year**. This is used to calculate the station-based fees of a country.

4. HO Communications unit organises **Comms meetings approx once a month**, 10 times a year for NNs, and FPs are welcome to participate.
5. **New stations are added to the NN in the beginning of each year, and FP announces any changes in the station network to HO half a year in advance.** HO asks FPs every June if there are any expected changes in the station network for the upcoming year, and FP replies to HO by reporting the following info about any new station:
 - **Full name** of the station
 - **Short name** (ID) of the station
 - **Station PI** (name, email, affiliation)
 - **Location** of the station (**decimal latitude** and **decimal longitude** of the station, not applicable for OTC ship lines at this point)
 - **Station type** (e.g. tall tower, forest, VOS)
 - **Station host institute** (name of the university/research institute)
- Personnel in HO to notify: Maiju Tiiri: maiju.tiiri@icos-ri.eu and Elena Saltikoff elena.saltikoff@icos-ri.eu

4.2 Biannual reporting and events

- **The Handbook** is updated once in two years, and FP is responsible for providing the country-specific information in the Handbook.
- **ICOS Science Conference** is organised biannually in September, and FPs can provide materials for the conference to showcase the NN.

Annual clock



5. Principal Investigator manages a station

Principal Investigators (PIs) are the managers of the measurement stations and take care of finalising the labelling process in their station. In this task, Thematic Centres (TCs) are supporting the PIs alongside of the rest of the ICOS RI. **PIs also participate to their respective MSAs** to discuss, develop and improve the scientific and technical basis of the observations.

To stay informed, **please subscribe to the respective MSA email list:**

- Atmosphere MSA email list subscription for atmosphere station PIs: <https://lists.icos-ri.eu/postorius/lists/atmosmsa.lists.icos-ri.eu/>
- Ecosystem MSA email list subscription for ecosystem station PIs: <https://lists.icos-ri.eu/postorius/lists/ecosystem-msa.lists.icos-ri.eu/>
- Ocean MSA email list subscription for ocean station PIs: <https://lists.icos-ri.eu/postorius/lists/ocean-msa.lists.icos-ri.eu/>

Please note that **if the PI of the station changes, please notify both the respective Thematic Centre and Head Office about the change in advance via email.** Personnel in TCs and HO to notify:

- Atmosphere Thematic Centre (ATC) contact Leonard Rivier: leonard.rivier@lsce.ipsl.fr
- Ecosystem Thematic Centre (ETC) contact Dario Papale: darppap@unitus.it
- Ocean Thematic Centre (OTC) contact Richard Sanders: rsan@norceresearch.no
- HO contacts Maiju Tiiri: majju.tiiri@icos-ri.eu and Elena Saltikoff elena.saltikoff@icos-ri.eu

ICOS has also created a **discussion server in Discord**. Discord is an informal communication platform that enables fast info sharing, connecting with other ICOS PIs and getting answers to technical problems you may face in the stations. Discord also offers the possibility to gather new consortia for ICOS-related project proposals. If you are interested in joining the discussion in ICOS Discord, you can register yourself via this link: <https://discord.gg/mvWSfjmqXQ>

5.1 How to manage the station info and labelling process with the online tools

The labeling app (<https://meta.icos-cp.eu/labeling/>) is a web interface that lists all the ICOS stations, their features and labelling status. The following instructions briefly describe the actions needed when a new station or new PI enters ICOS observational network.

1. FP notifies the respective TC and ICOS Head Office (HO) about the new station entering the station network latest in June for the following year. Head Office collects info about all new stations, and in the beginning of each calendar year HO adds new announced stations to the station database and makes them visible in the ICOS station list. After this the station becomes an official ICOS station, it starts the labelling process and host country starts paying station-based fees from it.

2. **PI creates an account for him/herself for the Carbon Portal** station labelling app here: <https://cpauth.icos-cp.eu/login/?targetUrl=https://meta.icos-cp.eu/labeling/>
 - Select the Create Account/forget password tab and use your email address as the username.
 - If your institute supports Edugain, you can also login through the University sign-in and use your university account (start typing your institute name and the choice will appear).
3. HO adds the new station in the labelling app and assigns editing rights to the station PI. After this point the station is also visible in the labelling app for the respective TC. HO notifies PI, FP and respective TC after the new station is added.
4. **PI starts the Step 1** by uploading the requested information and clicking the “Apply for labelling” button in the labeling app. This indicates that PI is ready to submit the required information and work with the TC to prepare for Step 2.
5. TC acknowledges that they received this and have all the information they need to go in Step 1 with the station PI. The labelling process will proceed according to the instructions from each TC. As the process advances, either TC or PI will complete each step by clicking the button in the labelling app according to this diagram: <https://static.icos-cp.eu/share/stations/docs/labelling/labelingStateDiagram.svg>

6. ICOS supports the community with communication and IT services

6.1 Communication services in ICOS

- **ICOS RI website** <https://www.icos-cp.eu/> includes latest news, events, etc. of the network.
- Introductory **National Network webpages** within the ICOS RI website <https://www.icos-cp.eu/observations/national-networks>. Most of the National Network have also their own websites that they manage.
- **List of stations** <https://www.icos-cp.eu/observations/station-network>
- You can **follow ICOS RI in social media**:
 Twitter: https://twitter.com/icos_ri
 LinkedIn: <https://www.linkedin.com/groups/4000356/> (Group) / <https://www.linkedin.com/company/integrated-carbon-observation-system/> (Organisation)
 Instagram: <https://www.instagram.com/icosri/>
 YouTube: <https://youtube.com/c/icosri>
 Some NNs and stations have also their own social media channels.
- **Monthly internal newsletter**, please subscribe here <http://eepurl.com/dOa7Kj>
- Monthly **Communications Network** meetings, participated usually by an appointed communications representative. List of comms reps: <https://fileshare.icos-cp.eu/f/1283287>. If your NN is new to ICOS, **it is recommended for FP to appoint a communications representative** who will take care of the national communications and participate into the Communications Network meetings.

- **Communications materials**, such as Word and PPT templates, graphic guidelines, logos, etc. <https://files.share.icos-cp.eu/f/839>
- In any communications-related matters, e.g. if you need help in advertising your NN/station or are not sure where to find communications material, you can reach the **ICOS Communications team** at icos-comms@icos-ri.eu

6.2 IT services provide platform for ICOS activities

Several IT services are made available for all ICOS RI, including FPs and Pls, to get connected with the community and manage all the ICOS-related actions.

- ICOS uses a cloud-based fileshare system called **Nextcloud** to store and work on documents online. See further instructions on how to ask for an account and get started with Nextcloud here: https://icos-carbon-portal.github.io/filesshare/creating_account/
- ICOS also uses several **email lists** to communicate within the community. Email lists offer both moderated and unmoderated discussions, and possibility to archive and search for messages. You can subscribe to ICOS email lists (**for Pls it is recommended to subscribe to the respective MSA email lists**) here: <https://lists.icos-ri.eu/postorius/lists/?page=1> .

Each FP and a national communication representative **are list owners and/or moderators of their national email lists** (e.g. 'contact-belgium@lists.icos-ri.eu for ICOS Belgium), please seek advice from the previous FP/communications representative to make sure that you will receive the emails sent to the national email list. If your NN is new to ICOS, **FP needs to create a new email list** for their National Network at https://www.icos-cp.eu/emaillist_request in a format of 'contact-country@lists.icos-ri.eu that is visible to the public and has subscription only by list owner, as well as has the FP and/or comms representative as a list owners/moderator. Further information on ICOS email lists can be found here: <https://static.icos-cp.eu/share/docs/sphinx/lists/html/index.html>

- Further ICOS cooperation tools are listed here: <https://www.icos-cp.eu/data-services/community/cooperation-tools>

6.3 Additional resources and more information about ICOS

- The ICOS Handbook 2024 is available here: https://www.icos-cp.eu/sites/default/files/2024-05/ICOS_handbook_2024-accessible.pdf
- Contact information of people in HO, CP and CFs: <https://www.icos-cp.eu/about/contact/head-office-central-facilities>
- Contact information of FPs: <https://www.icos-cp.eu/about/contact/national-networks>
- Data analysis & visualisation tools: <https://www.icos-cp.eu/data-services/tools>

7. Abbreviation list

ATC	ICOS Atmosphere Thematic Centre
CAL	ICOS Central Analytical Laboratory
CFs	ICOS Central Facilities: ATC, ETC, OTC and CAL
CP	ICOS Carbon Portal
DG	Director General of the ICOS RI
EAB	ICOS Ethical Advisory Board
ERIC	European Research Infrastructure Consortium
ETC	ICOS Ecosystem Thematic Centre
FP	Focal Point (contact person of all stations in each ICOS country)
GA	ICOS General Assembly
HO	ICOS Head Office
ICOS	Integrated Carbon Observation System
ICOS RI	ICOS Research Infrastructure
ICOS ERIC	ICOS Research Infrastructure Consortium
MSAs	Monitoring Station Assemblies for Atmosphere stations, Ecosystem stations and Ocean stations
NNs	ICOS National Networks (networks of ICOS stations in each country)
OTC	ICOS Ocean Thematic Centre
PI	Principal Investigator of measurement station(s)
RI	Research Infrastructure
RI COM	Research Infrastructure COMmittee
SAB	ICOS Scientific Advisory Board
TCs	Thematic Centres for Atmosphere, Ecosystem and Ocean domains (ATC, ETC and OTC)

More complete list of ICOS-related abbreviations can be found here: <https://www.icos-cp.eu/about/icos-in-nutshell/abbreviations>