ICOS SWEDEN
Strategic Plan 2016-2020

ICOS National Network Sweden

Lunds Universitet · Göteborgs Universitet · Stockholms universitet · Uppsala Universitet · SLU · Polarforskningssekretariatet · Vetenskapsrådet

This plan is compiled by the ICOS Sweden Coordination Office and is based on discussions with and recommendations by the ICOS Sweden Board, the ICOS Sweden Scientific Advisory Committee and the ICOS Sweden Station Coordination Group. The plan was endorsed by the ICOS Sweden Board 14 September 2016.

1. Scientific and societal framing of the infrastructure

Climate is changing faster at higher latitudes than anywhere else on Earth. Because of Sweden's latitudinal extent and topography, many of our sensitive ecosystems will change too and some are at risk of being damaged irreversibly. Sweden's geography however also provides an opportunity, probably unique world-wide, to study the impact of climate change on these sensitive ecosystems. ICOS Sweden is essential for the wider ICOS project as it represents a number of important ecosystems at high latitudes including one sub-arctic site.

The existence and mission of ICOS Sweden is determined by the European Union's as well as the Swedish government's strategic investments in research infrastructures. The measurements are of high quality and the products are freely available. The usefulness of the data and sites for science as well as the societal use of the results is a prerequisite for the financing of the infrastructure. Thus, the development of the political outlines for research and infrastructures is framing the strategic decisions for ICOS Sweden.

The Swedish Parliament adopted in 2009 a greenhouse gas emission reduction target of 40% by 2020 as compared to 1990. Furthermore, the Swedish Environmental Protection Agency developed a roadmap towards zero net emissions from Sweden by 2050 and the European Union has adopted emission reduction target in the order of 80-95% by 2050. These are all ambitious targets and it is important that these targets can be verified by independent methods. ICOS Sweden will provide data together with other European observation networks within ICOS RI. The Carbon Portal, which is an integral part of ICOS RI, will perform annual analyses and syntheses of the data that are collected for all ICOS RI. These products will be produced in forms suitable for use in climate policy making.

Research and innovation goes hand in hand and there is a great potential for improvement and development of greenhouse gas measurement technologies and methods within ICOS Sweden. The sites are open for other researchers to test their ideas either independently or in collaboration with ICOS Sweden. Other tangible benefits will include research infrastructure spending across Sweden e.g. the instrumentation for the ICOS Sweden sites were built by a Swedish company.

2. Mission

The mission of ICOS Sweden is to make accurate high quality measurements of greenhouse gas concentrations in water, air, and soil as well as surface exchange fluxes of these gases. These are the drivers relevant to land-lake-atmosphere exchange processes from which we derive understanding of the processes of climate change in this region. All sites within ICOS Sweden are using measurement systems of the same design and adhering to the measurement protocols and quality control procedures decided upon by ICOS RI. This makes data highly comparable and consistent and such data are keys to developing models and estimation methods for characterizing source/sink distributions from local to global scales and from seasons to decennia, and to assessing and monitoring the effectiveness of mitigation activities. ICOS Sweden as an integral part of ICOS RI will provide such data with a focus on Nordic ecosystems. By being a member of ICOS RI and the ERIC, ICOS Sweden provides access to extensive knowledge in the field of greenhouse gas observations from the full European ICOS related measurements and research network.

3. Vision

The ICOS Sweden network for greenhouse gas measurements is a world class research infrastructure that provides advanced research sites, data and services as a basis for enhancing knowledge and informing models of the interactions between land surface processes, including human activities, and the climate system. ICOS Sweden sites are equipped with the best instrumentation available, have well-trained personnel and deliver first class services to scientists using its facilities.

ICOS Sweden will:

- Provide data on greenhouse gas exchange of typical northern ecosystems to the research community.
- Provide test sites for national inventory systems and sites and databases for advanced research.
- Develop and extend the observational structures and instruments to enhance the understanding of the processes by close cooperation with other experimental networks and scientific research areas.
- Have a central role in the support of Swedish biogeochemistry research and will develop collaborations with external data centers like EUDAT and ECDS in order to provide up to date information on available data.

- Be fully integrated with, and play an important role in the pan-European ICOS (ICOS RI).
- Through its participation in ICOS RI, actively contribute to the building up of know-how in the field of greenhouse gas observations and bring this knowledge to the benefit of Swedish research and researchers.
- Provide information to the public on climate change and the Swedish greenhouse gas budget.

4. Strategic objectives

The strategy of ICOS Sweden to achieve the goals of the Vision is outlined below.

4.1 To strengthen ICOS Sweden's role in Sweden and in Swedish GHG and atmospheric research by:

- Promoting, encouraging, and supporting research utilising and enhancing ICOS data, e.g. GHG inverse modelling, at the national or Nordic level, and garnering the results as input to synthesis reports, for example, developing an annual greenhouse gas index for Sweden or an emission verification system for Sweden.
- Engaging in dialogue with other national or international observation networks, by arranging meetings and workshops and by establishing long time collaborations.
- Ensuring high visibility of and accessibility to ICOS Sweden's and ICOS RI's data products by communicating with users to facilitate and encourage their use in high-profile scientific papers.
- Ensuring and strengthening societal benefits of ICOS Sweden's activities and output through outreach efforts like information meetings, workshops, and training courses.

4.2 To maintain and improve the performance and quality of the measurements by:

- Following the established ICOS protocols.
- Ensuring governance and coordination of ICOS Sweden in order to maintain and strengthen both the internal cooperation and quality of the products, and the external contacts and collaborations.
- Ensuring the expertise of the personnel in ICOS Sweden through education at internal workshops and courses on handling of data and instruments.
- Collaborating with other Swedish and Nordic RIs in order to enhance interoperability.

4.3 To widen the use of the infrastructure with respect to science and development by:

- Identifying regions and land use/vegetation cover classes in Sweden with poor coverage

by measurements (gaps), and additional observables of high importance for informing models, upscaling methods, and filling knowledge gaps.

- Identifying new sites that could be included as new ICOS Sweden sites or ICOS Sweden associated sites based on geographical location (modelling) or, for already existing sites, type of research studied at the site.
- Identifying possible extension of measurements in order to facilitate research within other disciplines (e.g. boundary layer meteorology and physiological ecology) and thereby enable better understanding of related physical processes.
- Contributing to evaluation of new instruments that have potential for superior measurement capabilities, allowing the network measurement systems to evolve with major shifts in technology.
- Encouraging other research groups and industry to utilize the sites to develop and test new environmental measurement technologies.

5. Activities

The buildup of the ICOS Sweden organization and its functions is finished except for the full implementation of the User's Group and continued establishment of links to the Central Facilities. ICOS Sweden became, for most of the measurement systems, fully operational during 2015. The ICOS ERIC is in place and during 2016; we are establishing the links to the international body through the station labelling procedure and other agreements. Over the coming five-year period, there are three activities that we will focus on in order to fulfil the objectives:

- Maintaining the scientific and technical expertise of the personnel,
- promoting highest quality of the station equipment, and
- foster collaboration and outreach activities.

5.1 Maintaining the scientific and technical expertise of the personnel

ICOS Sweden is both a national research resource and a partner of the international ICOS Research Infrastructure. To fulfil our obligations towards the international body, we will continue engaging qualified technical personnel and PIs at our sites. We will see to that they always will be updated on the quality and improvements of the measurements and systems by encouraging participation in meetings, courses, and education. We will also continue our newly started support functions of scientific and technical expertise concerning measurement systems

and data flow. To fulfil our aims concerning the quality of the network and its management, we will continue to engage scientific expertise, mainly with a high research profile, from all consortium partners. These scientific experts are also essential for the outreach and collaboration activities and they will participate by initiating national and international collaborations and research activities, and through other outreach efforts. We sustain personnel specialized in science communication for the outreach activities.

5.2 Promoting highest quality of the station equipment and data delivery

In order to fulfil our obligations to ICOS RI and maintain the quality of our network, we will continuously follow and participate in ICOS RIs development of the instrumentation and protocols. The routines for external projects at the sites will be further developed and we will also setup a data policy for use of non-ICOS data. We will also continuously follow on the human resources strategy when it comes to fair working conditions and security rules.

For the current funding period, we do not have any funding for renewal of equipment. A plan for a general renewal of all instruments and funding of this will be set up. To cover for the instruments that are most exposed to disturbances and breakdowns, some remaining funding for the previous funding period will be used to invest in spare instruments.

5.3 Foster collaboration and outreach activities

To strengthen the role of ICOS Sweden, and make the network more useful for both research and society, collaboration and outreach activities will be increased. The importance of ICOS' role and capabilities will make expansion of outreach essential to ensure ICOS' long-term contributions to understanding climate impacts on ecosystems, greenhouse gas trends, and feedbacks to climate.

Outreach activities will include further development of the User's group, contact with stakeholders, policy makers and the public, both in person and by production of information material. To approach industry and authorities, and promote societal usefulness and relevance, we will compile data and synthesis products that are understandable to a broad audience. Specifically we will identify and feature showcases on how ICOS Sweden data can be used to improve e.g. the understanding of ecosystem functioning, carbon budgets and trends in greenhouse gas concentrations.

We will promote collaborations with other national and international networks and will

participate in research and development projects initiated by ICOS ERIC. We will also initiate research and development of synthesis products specially adapted for Sweden.