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ICOS Sweden RI

2017

Key numbers for the annual reporting of the infrastructure activities (from special terms)

ICOS - Integrated Carbon Observation System - is a European research infrastructure for quantifying and understanding the greenhouse gas balance of the European continent and of adjacent regions. The infrastructure is built up as a collaboration of nationally operated measurement stations in, at present, 12 European countries. ICOS Sweden is the Swedish contribution to this European effort. An ERIC (European Research Infrastructure Consortium) 'ICOS ERIC' has been established as a legal entity for ICOS data release as well as the coordination and integration of the whole research and measurement infrastructure, ICOS Research Infrastructure (RI), that includes the national networks, the measurement station assemblies and the central facilities.

High-precision, standardized observations of the exchange of greenhouse gases and heat between the Earth's surface and its atmosphere form an essential basis for understanding not only our planet's present climate, but also past and future developments. It has also become clear that these studies must be secured beyond the lifetime of a typical research project. The aim of ICOS is therefore to construct, equip, and operate a network of standardized, long-term, high precision integrated monitoring stations for atmospheric greenhouse gas concentrations and fluxes.

ICOS Sweden will be fully integrated with and play an important role in the pan-European ICOS (ICOS RI). ICOS Sweden will also provide data, and compile information on greenhouse gas exchange of typical northern ecosystems to the research community as well as Swedish stakeholders. ICOS Sweden will furthermore provide test sites for national inventory systems and sites and databases for advanced research.

A description of ICOS RI status and progress can be found at the website http://www.ICOS-ri.eu/. A more detailed annual report from the national infrastructure ICOS Sweden is available at the website http://www.icos-sweden.se/documents.html.

Following the special terms for ICOS Sweden's annual reporting of key numbers, this report is divided into two sections: (1) physical users, including site visitors and project PIs and (2) data users. In total, 464 physical users and 164 data users (excluding data users of data product compilations) can be reported for 2017. Table 1 summarizes the keynumbers according to the special term (ref 2015-06020).

Table 1. Keynumbers for the annual reporting of the infrastructure activities (from special terms) for 2017.

General key numbers for the entire infrastructure	
Number of scientific articles and patents infrastructure contributed to (attach list)	69
1. Keynumbers for physical users - *Nyckeltal för fysiska användare.*	
Number of users per institution, other organizations, companies, public or otherwise. For users outside of Sweden, country is also stated	national: 336, international: 72, unspecified: 56
Number of users per subject areas (defined as the SCB-codes on the three-digit level)	Main general field of interest: code 105
Number of female, resp. male users	female: 222, male: 186, unspecified: 56
2. Keynumber for data usage	
Number of users per institution, other organizations, companies, public or otherwise. For users outside of Sweden, country is also stated	see text
Number of users per disciplines (use SCB three-digit codes)	see text
Number of female, resp. male users	female: 21, male: 16, unspecified:127

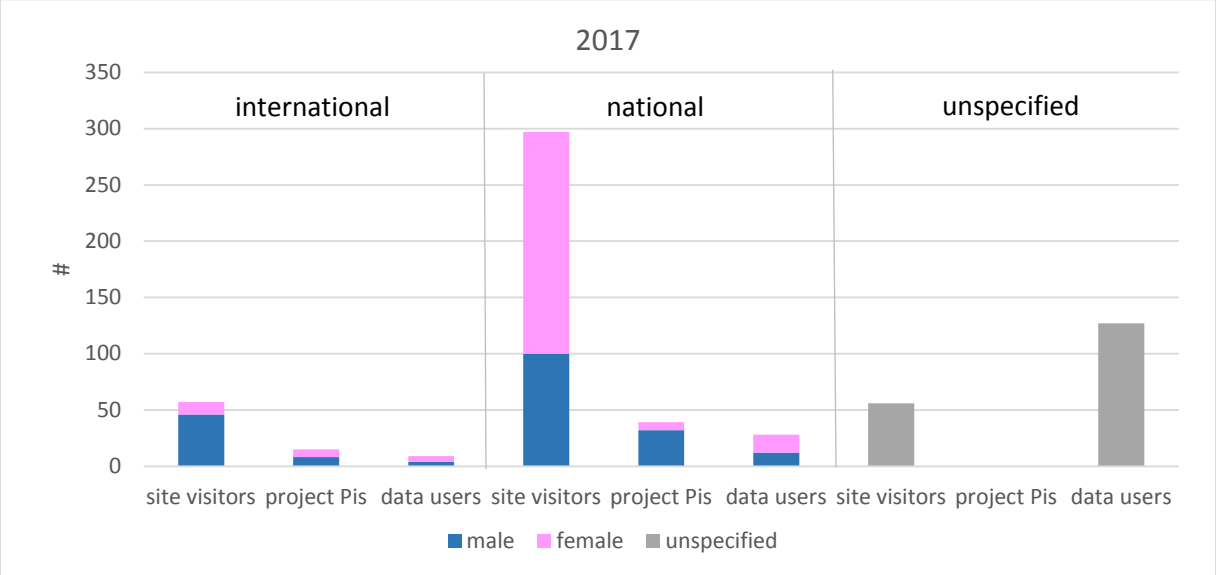

Figure 1. *Total numbers of physical and data users of the ICOS Sweden national infrastructure during 2017.*

1. Keynumbers for physical users

The interest of the physical users of ICOS Sweden included all levels from general interest by the general public and school children, students and other scientists during courses and excursions to scientists carrying out their research at the ICOS Sweden stations.

The combined ecosystem-atmosphere ICOS Sweden sites (module 1 and 2) were of interest for atmospheric physicists who moved their ACTRIS measurements to the ICOS sites. Otherwise, the main focus of visiting scientists is on the ecosystem part of the infrastructure (module 1). Also the ocean station (module 3) attracted international scientists. For courses and excursions, the interest is equally distributed between module 1 and 2, by nature less physical users have been registered for the only ocean site (module 3).

Figure 2 shows the origin of national physical users, Figure 3 shows the origin of international physical users where it was known. Since the main part of international physical users were part of larger excursions, their background could not be evaluated.

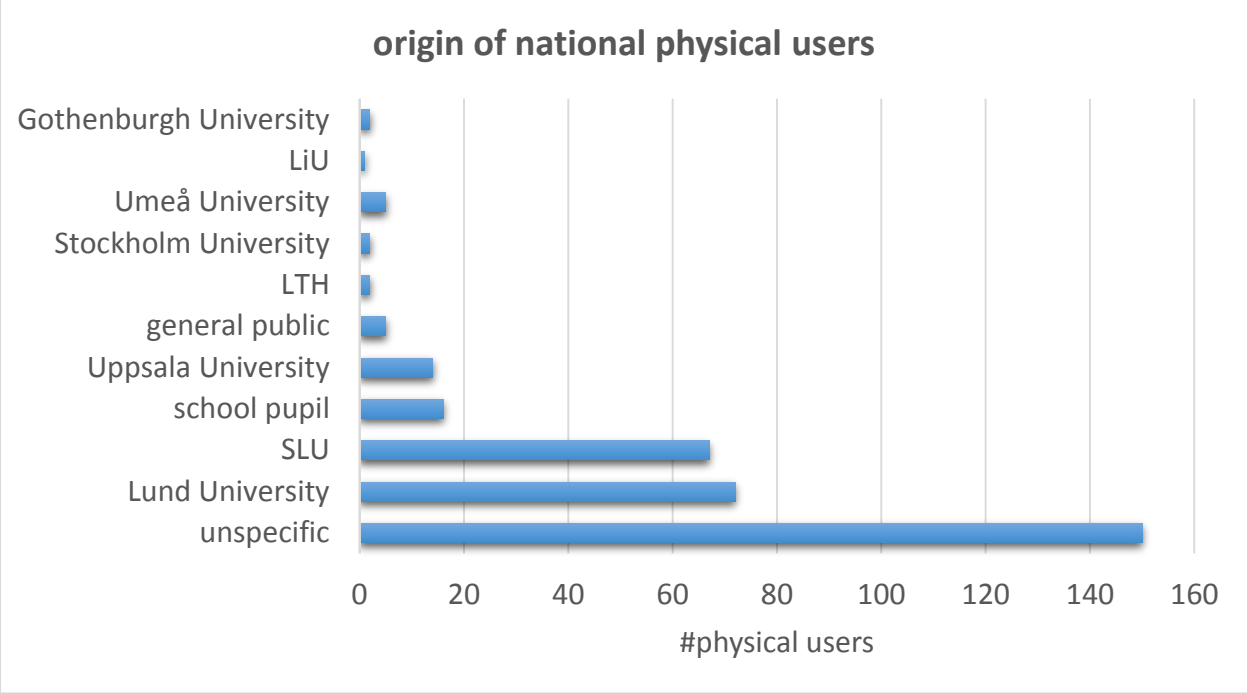

Figure 2. *Number of physical users in 2017 per institution, other organizations, companies, public or unspecific. 'Unspecific' accounts for visitors whose institutional background was unknown.*

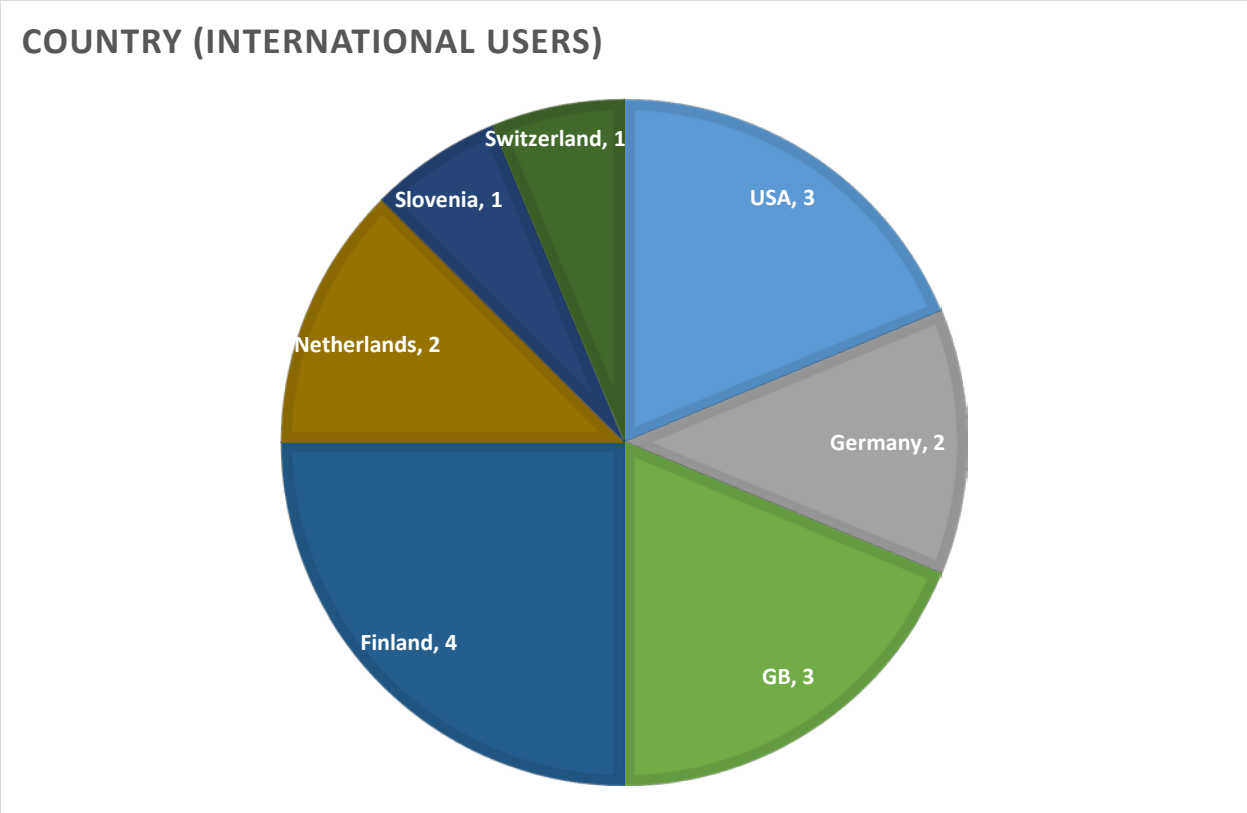

Figure 3. *Absolute number of international physical users of the ICOS Sweden national infrastructure in 2017 per country. For 93% of the international Physical Users, we do not have a closer specification of their origin. The evaluation in Fig. 3 is based on the remaining 7% of international physical users.*

2. Keynumber for data usage via the Carbon Portal

ICOS certified data via the Carbon portal was not yet available during the report period. However, ICOS Sweden produced quality controlled datasets and has started making these available using the Carbon Portal services. Thus, data from ICOS Sweden stations is available through the Carbon Portal marked as "non ICOS" data. However, statistics about gender and background of a potential Data User downloading data from the Carbon portal are not available through this way.

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- adapt, remix, transform, and build upon the material for any purpose, even commercial under the following terms:
- Attribution: Users must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use

- No additional restrictions: Users may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.

Non-ICOS certified data from the ICOS Sweden national network is available directly from the network in several ways: (i) data download from the ICOS Sweden webpage via the ICOS Carbon Portal, (ii) data requests via the CarboEurope database, (iii) data downloads from the NOAA global greenhouse gas reference network (obsPack; https://www.esrl.noaa.gov/gmd/ccgg/obspack/), or (iv) by contacting the Coordination Office or the station PIs. The obsPack dataset includes data from the Atmospheric stations Hyltemossa and Norunda.

In total, 52 downloads of the obsPack data package have been registered; additionally 92 downloads have been registered via Globalview_v3, and 149 downloads via Globalview_v2. These data packages include not only data from ICOS Sweden, but are compilations of global atmospheric datasets, used for research (comparison with other measurements, inverse modeling, model evaluation, satellite validation) and teaching.

Since data downloads from the Carbon Portal are only counted per downloaded file, without any information on who accessed the file, the following statistics on the data users' background is only based on those with direct contact to ICOS Sweden. Note, that these data requests represent only a small part of potential data users. It is expected that the amount of direct data requests will even decrease in the future, when more data is available via the Carbon Portal. To our knowledge, the subject area of the latter named data users was completely within Geo- and Environmental Sciences (SCB code 105) with large emphasis on hydrological studies.

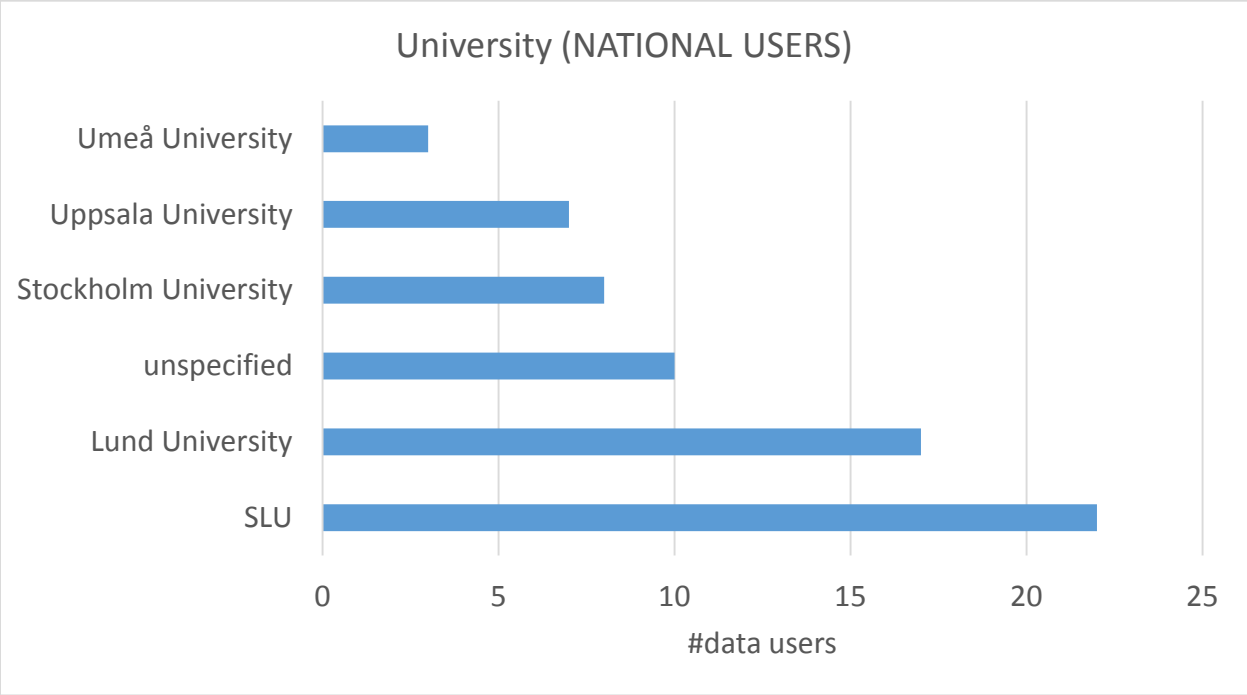

Figure 5. *Percentage of national data users in 2017 per institution, other organizations, companies, public or otherwise.*

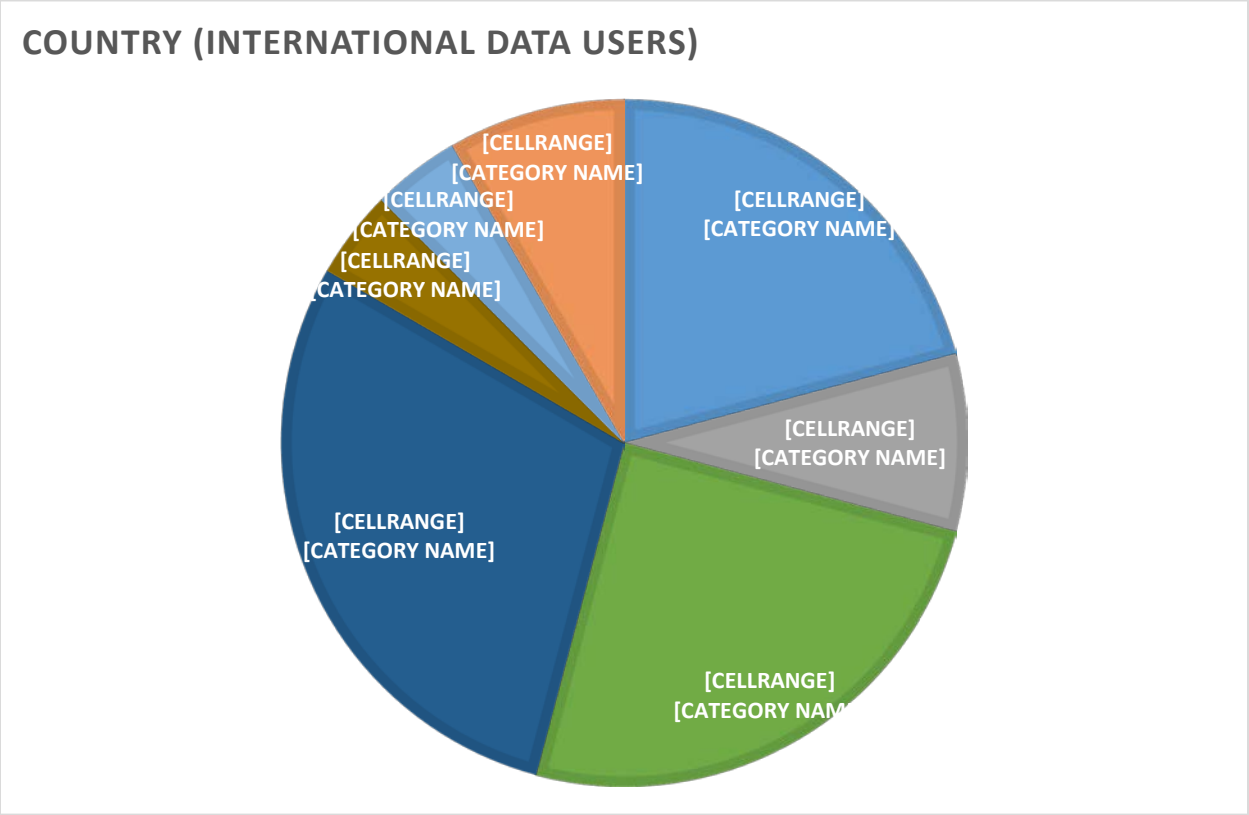

Figure 6. *Number of international data users of the ICOS Sweden national infrastructure in 2017 per country (without data downloads from the Carbon Portal or NOAA obsPack products).*

Appendix A – List of peer-reviewed scientific publications that the infrastructure has contributed to

Ala-aho, P., Tetzlaff, D., McNamara, J. P., Laudon, H. & Soulsby, C. 2017. Using isotopes to constrain water flux and age estimates in snow-influenced catchments using the STARR (Spatially distributed Tracer-Aided Rainfall–Runoff) model. Hydrology and Earth System Sciences 21:5089-5110, https://doi.org/10.5194/hess-21-5089-2017

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Ameli, A.A. 2017. Controls on subsurface transport of sorbing contaminant. Hydrology Research 48(5):1226-1239, doi:10.2166/nh.2016.170

Ameli, A.A., Beven, K., Erlandsson, M., Creed, I.F., McDonnell, J.J. & Bishop, K. 2017. Primary weathering rates, water transit times, and concentration-discharge relations: A theoretical analysis for the critical zone. Water Resources Research 53(1):942–960, doi:10.1002/2016WR019448

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Amvrosiadi, N., Seibert, J., Grabs, T. & Bishop, K. 2017. Water storage dynamics in a till hillslope: the foundation for modeling flows and turnover times. Hydrological Processes 31(1):4–14, doi:10.1002/hyp.11046

Askne, J.I.H., Maciej J.Soja, M.J. & Ulander, L.M.H. 2017. Biomass estimation in a boreal forest from TanDEM-X data, lidar DTM, and the interferometric water cloud model. Remote Sensing of Environment 196:265-278, https://doi.org/10.1016/j.rse.2017.05.010

Bidleman, TF., Brorström-Lundén, E., Hansson, K., Laudon, H., Nygren, O. & Tysklind, M. 2017. Atmospheric transport and deposition of bromoanisoles along a temperate to arctic gradient. Environmental Science Technology 51(19):10974–10982, doi:10.1021/acs.est.7b03218

Bidleman, TF., Laudon, H., Nygren, O., Svanberg, S. & Tysklind. M. 2017. Chlorinated pesticides and natural brominated anisoles in air at three northern Baltic stations. Environmental Pollution 225:381-389, https://doi.org/10.1016/j.envpol.2017.02.064

Blackburn, M., Ledesma, J.L.J., Näsholm, T., Laudon, H. & Sponseller, R.A. 2017. Evaluating hillslope and riparian contributions to dissolved nitrogen (N) export from a boreal forest catchment. Journal of Geophysical Research: Biogeosciences 122(2):324–339, doi:10.1002/2016JG003535

Burrows, R.M., Laudon, H., McKie, B.G. & Sponseller, R.A. 2017. Seasonal resource limitation of heterotrophic biofilms in boreal streams. Limnology and Oceanography 62(1):164–176, doi: 10.1002/lno.10383

Bye I.J., North P.R.J., Los S.O., Kljun N., Rosette J.A.B., Hopkinson C., Chasmer L. & Mahoney C. 2017. Estimating forest canopy parameters from satellite waveform LiDAR by inversion of the FLIGHT three-

dimensional radiative transfer model. Remote Sensing of Environment. 188:177-189, doi:10.1016/j.rse.2016.10.048

Cai Z., Jönsson P., Jin H. & Eklundh L. 2017. Performance of smoothing methods for reconstructing NDVI time-series and estimating vegetation phenology from MODIS data. Remote Sensing, 9(12):1271, doi:10.3390/rs9121271

Campeau, A., Bishop, K., Nilsson, M.B., Klemedtsson, L., Laudon, H., Leith F.I., Öquist, M. & Wallin, M.B. 2018. Stable carbon isotopes reveal soil-stream DIC linkages in contrasting headwater catchments. JGR-Biogeosciences, doi: 10.1002/2017JG004083

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