INTEGRATED CARBON OBSERVATION SYSTEM'S CONTRIBUTION TO SDGS

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Director General, ICOS RI

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Brno, 19.10.2022
Side event: Research Infrastructures' Contribution to SDGs

ICOS INTEGRATED CARBON OBSERVATION SYSTEM

SUSTAINABLE DEVELOPMENT GOALS

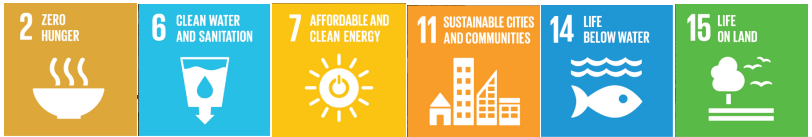
ICOS‘ contributions to the SDGs

A focus on SDG 13: by providing harmonised, high quality greenhouse gas (GHG) measurements across Europe, ICOS contributes directly to SDG 13 ‘Climate Action’. Monitoring GHG emissions and removals is vital to achieve carbon neutrality. Our data along with excellence climate science and active international dialogue enable informed decision-making for global climate strategies.

In addition, ICOS ERIC contributes to several other SDGs in two key impact areas :

Scientific excellence

ICOS provides FAIR data for scientists, students, citizens and policy makers. They support research and innovation to adapt agriculture, water management, energy provision and city planning to the challenges related to climate change and its impacts.



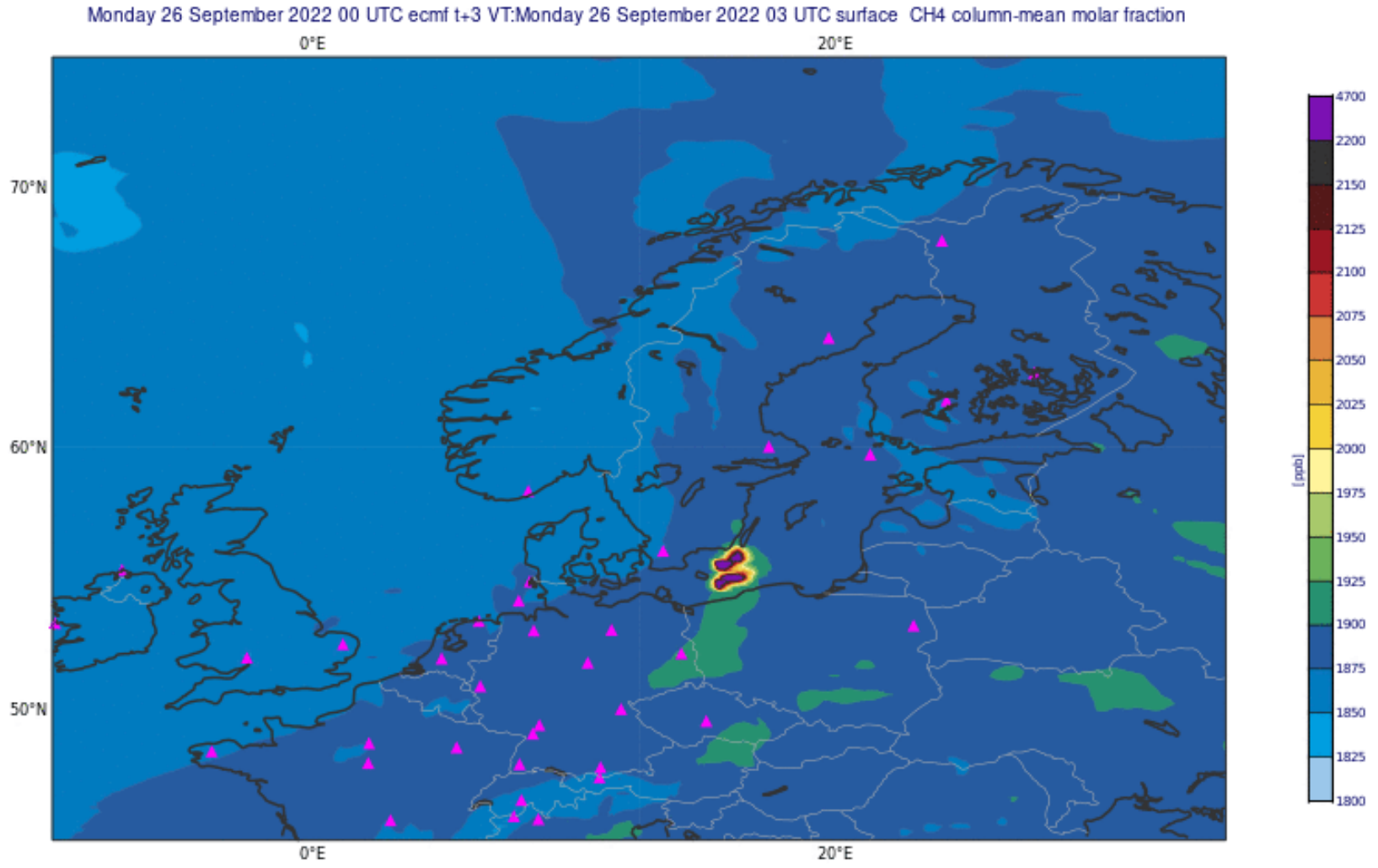
Science generates

more societal impact

Societal impact

Reliable data on GHG fluxes support evidence-based policy making around climate adaptation and mitigation. Direct cooperation with UN organisations such as WMO and UNFCCC and science partnerships around the world support education and strong institutions.

Foto: Danish Defence / UPI Photo / IMAGO


Monday 26 September 2022 00 UTC ecmf t+3 VT:Monday 26 September 2022 03 UTC surface CH4 column-mean molar fraction
0°E
20°E
70°N
60°N
50°N
0°E
20°E
4700
2200
2150
2125
2100
2075
2050
2025
2000
1975
1950
1925
1900
1875
1850
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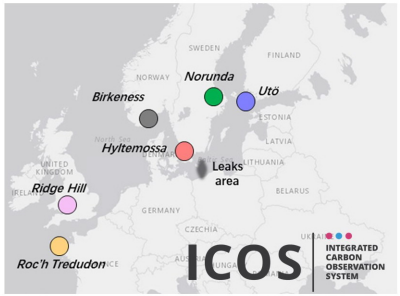
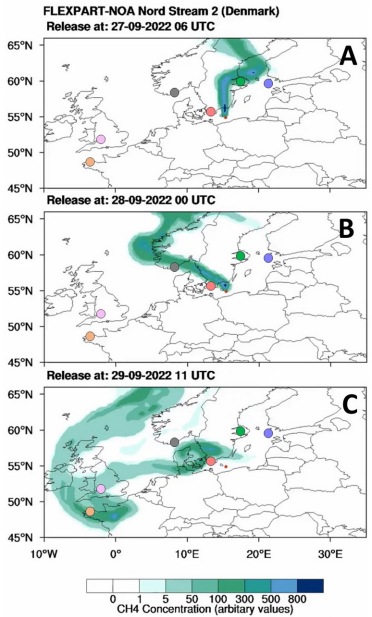
1800
[ppb]

Ingredients for more than 1200 media hits

- A permanent online network is ready to detect surprises
- A well organised data life cycle enables near-real time data provision
- A well connected scientific community that uses the data immediately

Tracking the dispersion of the CH_4 plume over Europe





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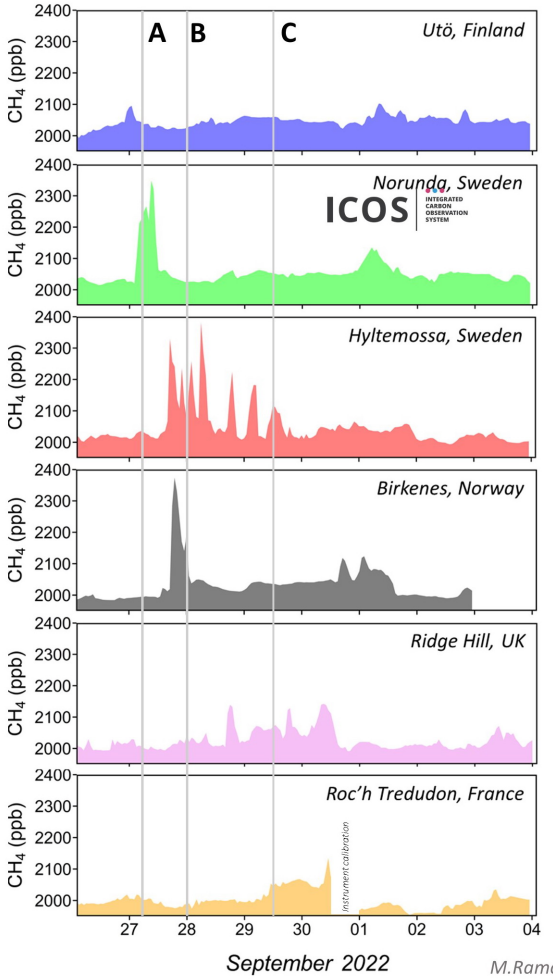

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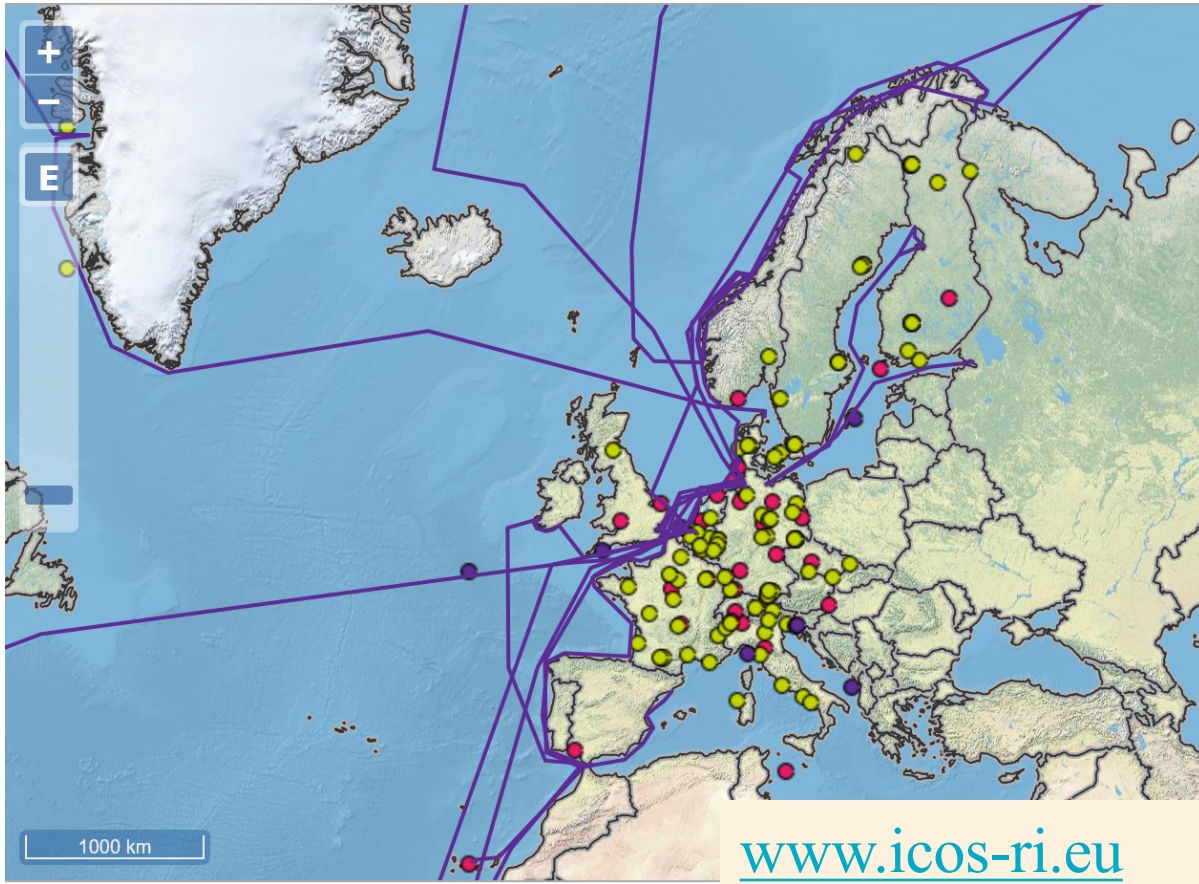
Integrated Carbon Observation System (ICOS)

- Distributed
- In-situ observations of greenhouse gases and the carbon cycle
- >>100 Mio € Investment
- currently 160 stations
- Thematic Centres (Hubs) on atmosphere, ecosystem and ocean observations
- Central Laboratories
- Central data portal
- High scientific excellence
- High societal impact



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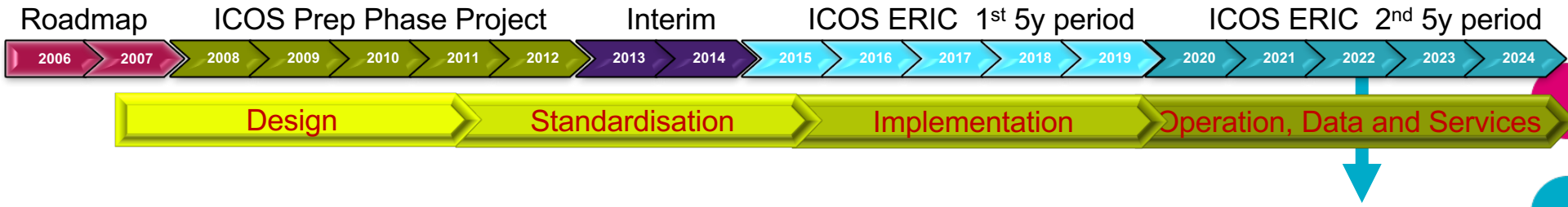
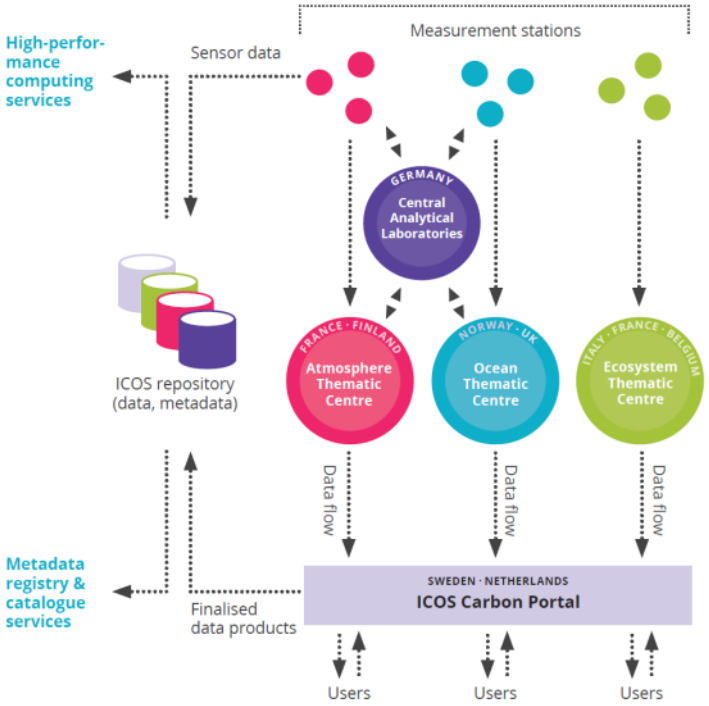


A well-designed reliable data life cycle



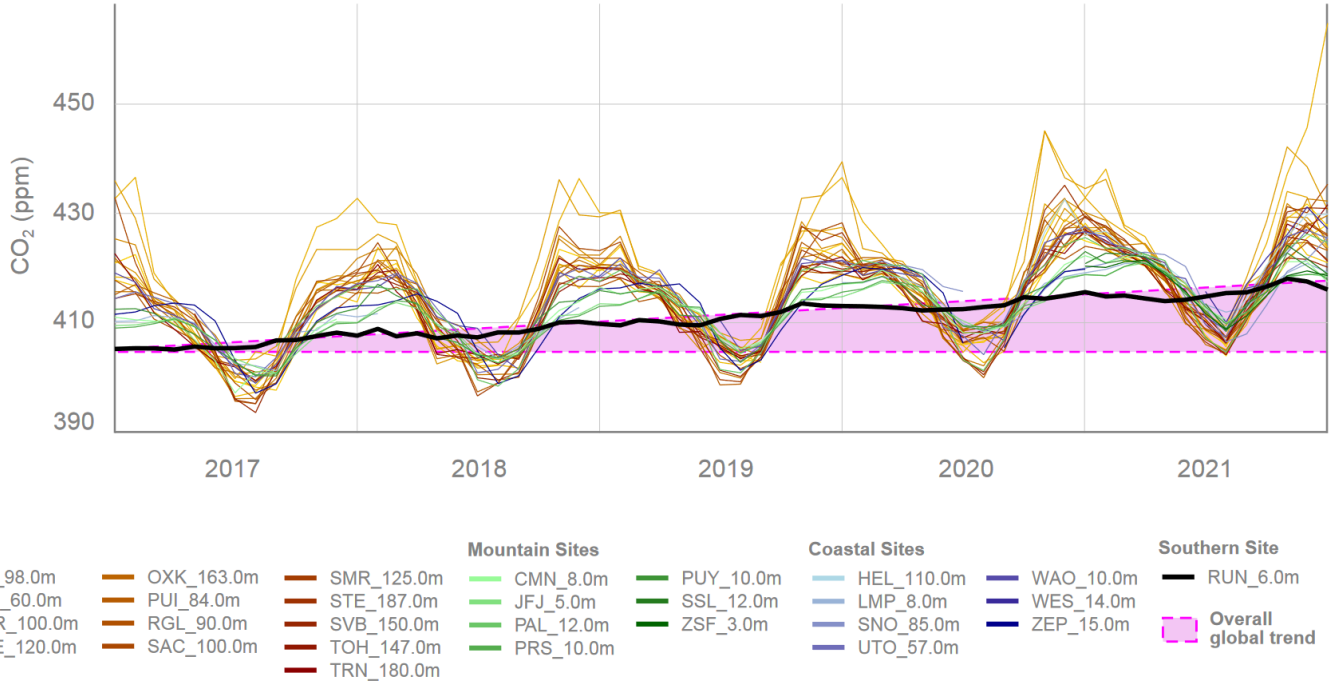
- ✓ Standardized measurements
- ✓ Standardized data processing
- ✓ Centralized quality control
- ✓ Data provenance, curation and archiving
- ✓ Clear open data license
- ✓ Data citation

"The **ESFRI Landmark ICOS ERIC** is of paramount importance to reach the goal of climate neutrality."
ESFRI Roadmap 2021

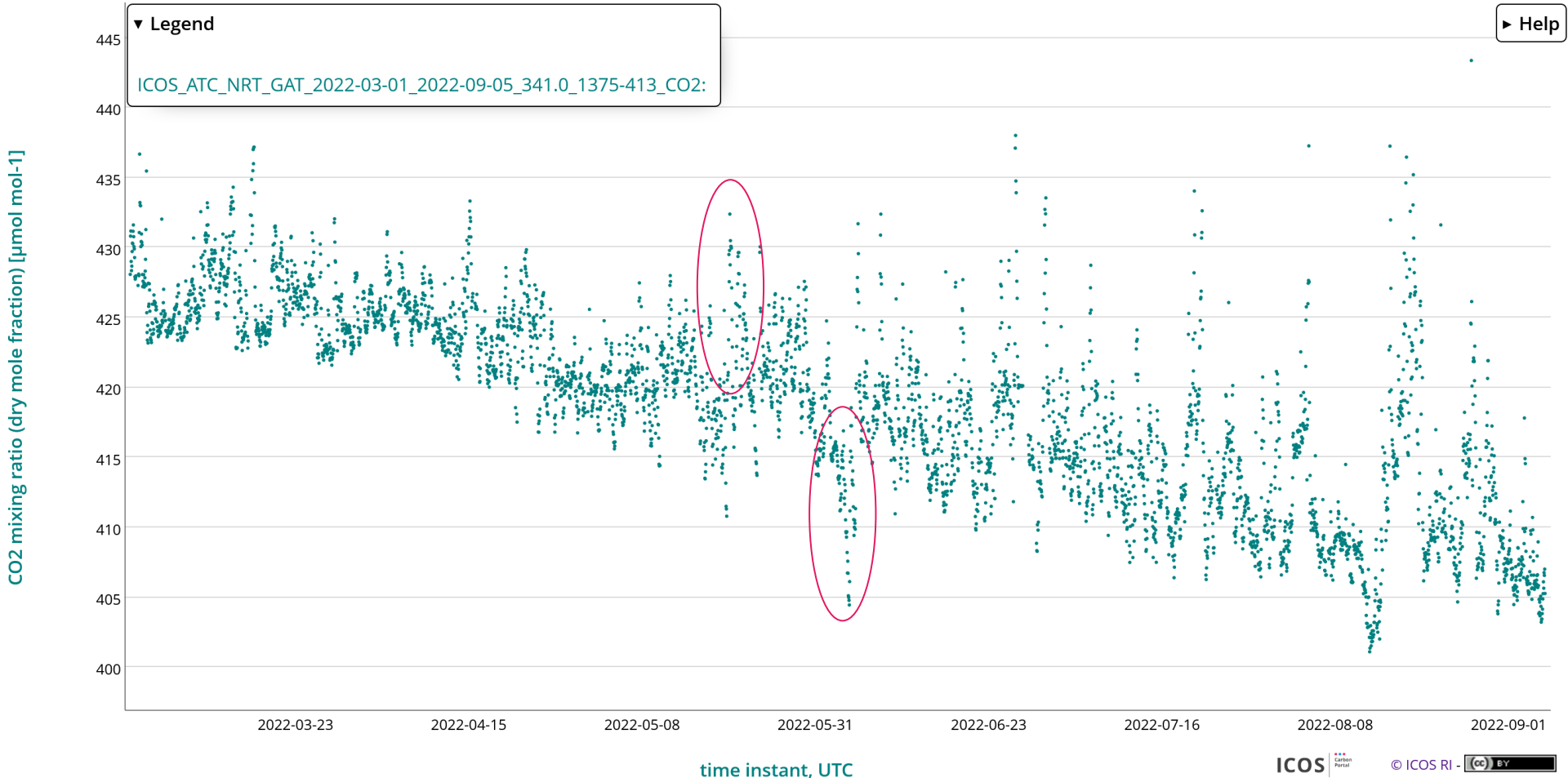
However, there is more...

Figure 2 Monthly average CO_2 concentrations measured at 36 ICOS stations between 2017 and 2021.

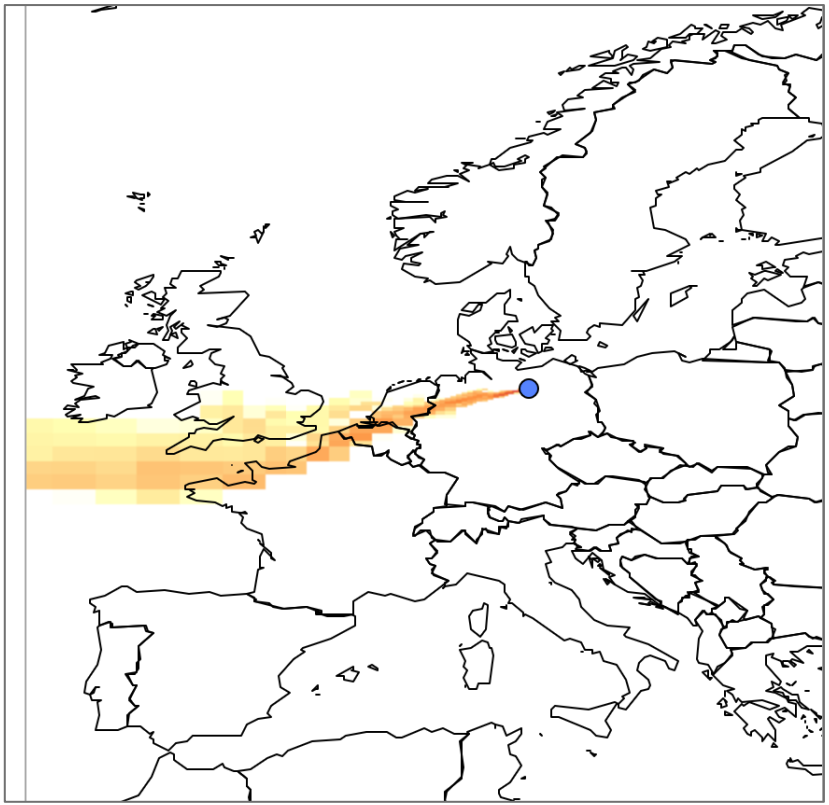
The legend indicates the station's code, and the sampling height in meters above ground. The black line corresponds to the station on the island of Réunion, in the Indian Ocean, the only ICOS site in the southern hemisphere.
This station was not exposed either to biogenic nor anthropogenic fluxes, taking place mostly on the northern hemisphere, resulting in a very weak seasonal cycle. Thus, it shows the overall global trend (highlighted by the pink area).

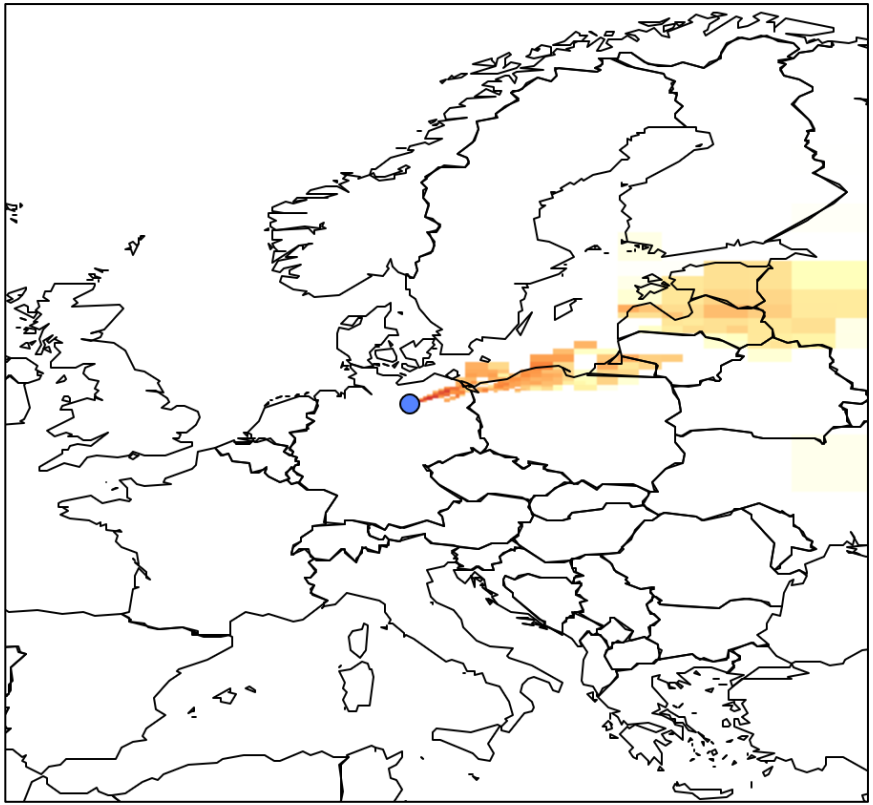


The atmosphere transports a lot of information...



...and we can calculate where it comes from.





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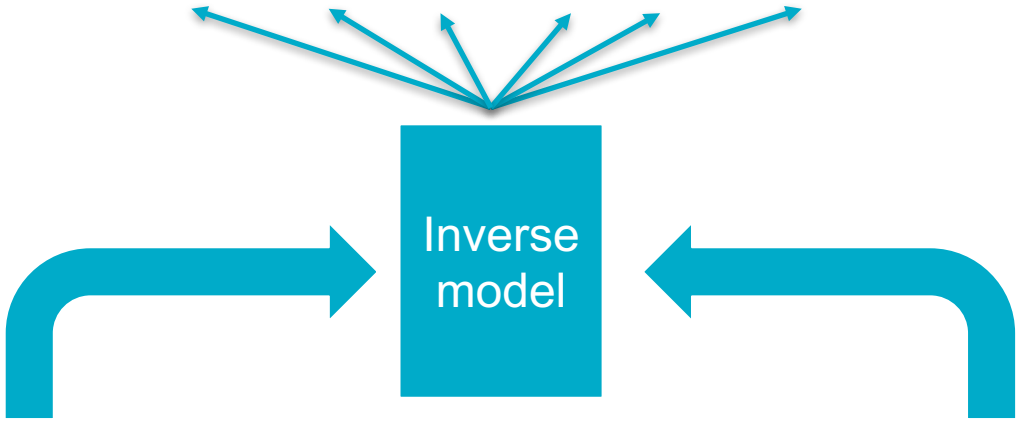
https://stilt.icos-cp.eu/viewer/

Informed society/politics



- Variation in GHG concentration
- Footprint of the measurement

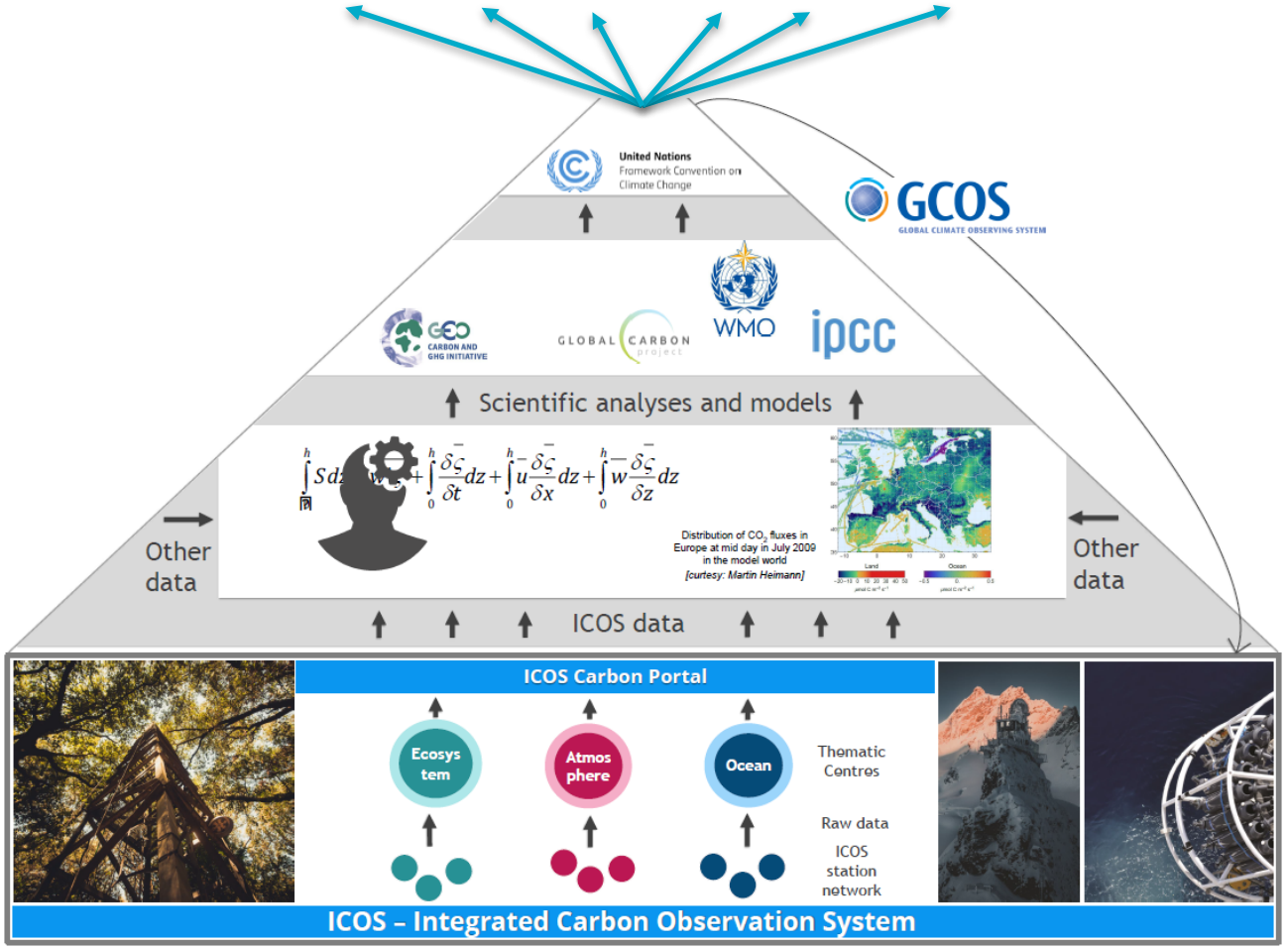
- Prior information on fluxes
- Atmospheric transport

Land ecosystem data

Ocean data

Emission data

Informed society/politics



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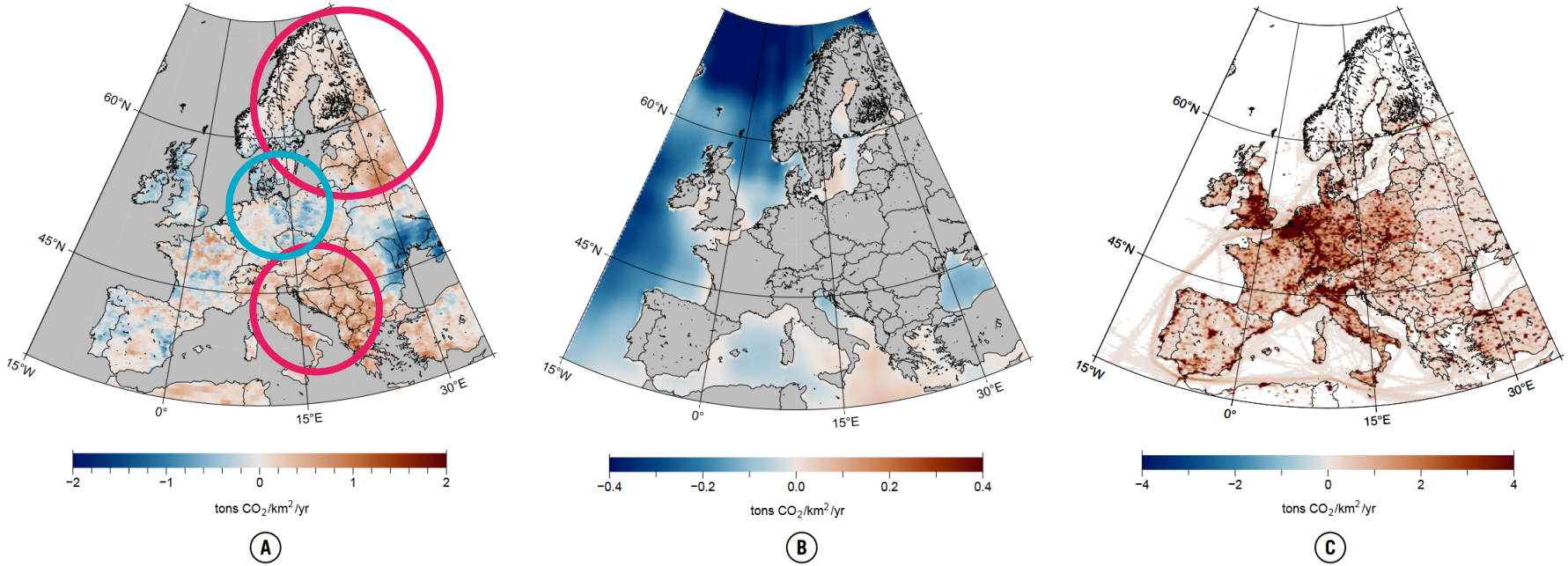
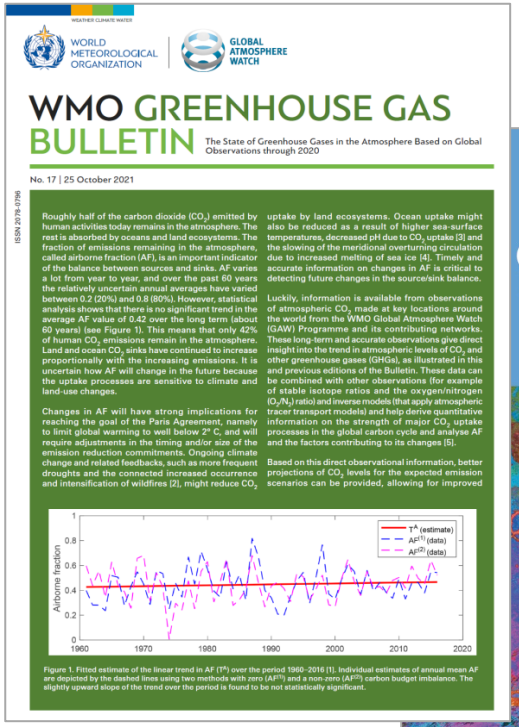


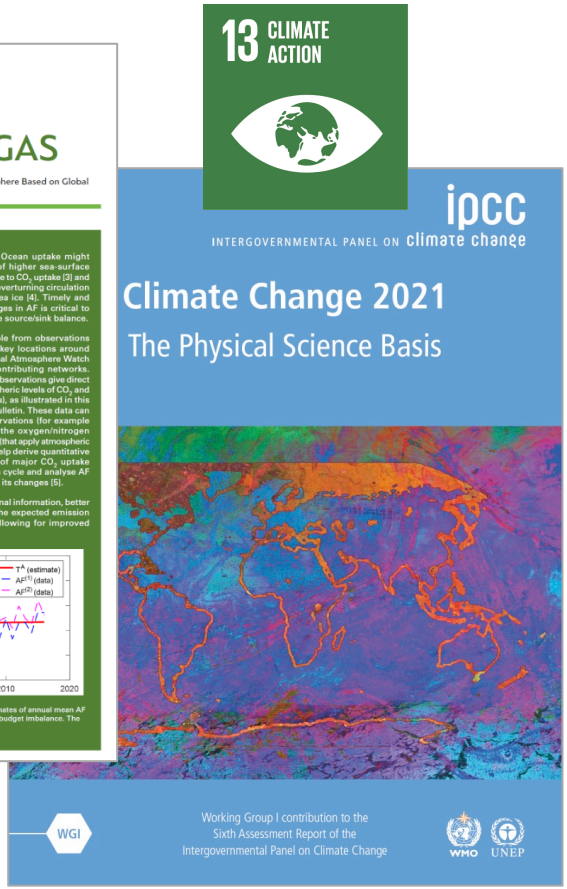
Figure 1 The three major CO_2 fluxes for Europe and adjacent ocean areas in 2021: (A) Biogenic fluxes of land ecosystems, (B) Ocean fluxes, (C) Human emissions of fossil fuels.

(A) Biogenic fluxes of land ecosystems. This map shows the complex pattern of land ecosystem fluxes over Europe. Blue areas symbolise net carbon uptake during the year, reducing the CO_2 load of the atmosphere. Red areas symbolise net carbon loss adding additional CO_2 to the atmosphere. Italy, most of the Balkan States, Scandinavia and the Baltic countries showed carbon losses mainly due to hot and dry summer conditions. (B) Ocean fluxes. This map shows a strong carbon sink in the open ocean while coastal areas as well as the Baltic and the Mediterranean seas show a more complex pattern of both sources and sinks. (C) Human emissions of fossil fuels. This map shows the spatial distribution of fossil fuel emissions. Highest emissions are located in industrial and highly populated areas (cities). Emissions from marine transport can be seen on the major shipping routes.

These maps are highly-integrated products based on observations, inventory data and models. Note that the flux scales of the maps are different: the same colour is twice as high in fossil fuel emissions than land ecosystem fluxes, and ten times higher than ocean fluxes.

Scientific and societal impact





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Between 2010 and 2019, altogether 1273 scientific ICOS-related publications and 27 251 citations of these ICOS-related publications have been counted. The yearly numbers are steadily increasing.

Figure 5. ICOS related publications 2009-2019.

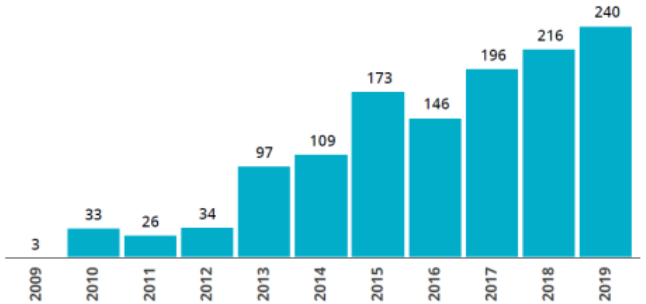
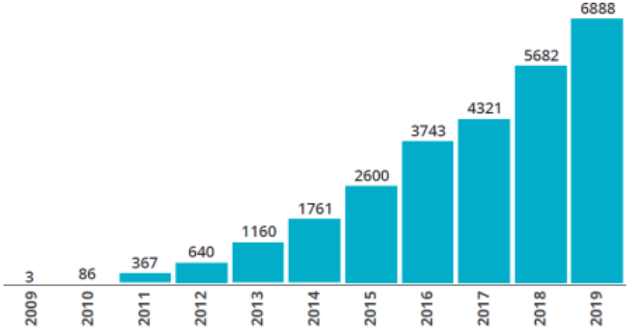


Figure 6. Number of ICOS related citations in publications.



Link to full list of references on ICOS website:
https://www.icos-cp.eu/science-and-impact/society-impact/references

Thank you for your attention!

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