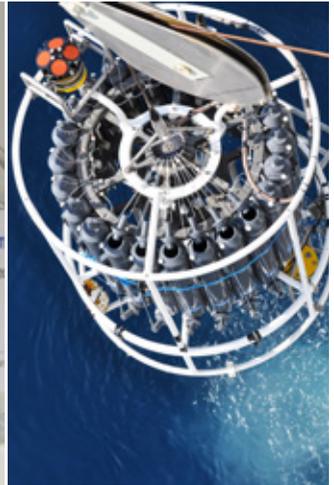


# KNOWLEDGE THROUGH OBSERVATIONS

*Ocean Thematic Centre*





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Photo — Geir Barsteid, Svalbardposten

### Human beings are changing the earth's climate

Humans are causing climate change due to emissions of carbon dioxide and other greenhouse gases. There is no escaping the effects when we add extra carbon dioxide to the atmosphere as the consequences are felt across the world. Some of the most dramatic warming records come from the Arctic, where air temperatures during the last winters have been up to 20 degrees warmer than normal. The changing climate further leads to more extreme weather. Two people lost their lives and many more their homes in Svalbard when an avalanche hit a residential area in 2015.

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Photos front page

Istockphoto

Jill Johannesen, UiB

Emil Jeansson, Uni Research

# CARBON EMISSIONS UNDER THE MAGNIFYING GLASS

During the climate summit in Paris more than 190 countries agreed on a global climate deal with a below 2°C-target. The nations have sent pledges to the United Nations to cut CO<sub>2</sub>-emissions, but how can we be sure that the targets and mitigation actions reported to the UN actually lead to emission reductions?

In order to address this huge challenge a large new European observation system is being established. The task is to monitor greenhouse gas emissions and ensure independent observations in the earth climate system.

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*“After the Paris Climate Agreement, it is critical to observe to what degree mitigation actions lead to reduced greenhouse gas emissions. In order to do so, we depend on having independent and reliable observations of greenhouse gas emissions and CO<sub>2</sub>-concentrations throughout the climate system.”*

Professor Truls Johannessen,  
Uni Research, the University of Bergen,  
Bjerknes Centre for Climate Research

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# A NEW OBSERVATIONAL SYSTEM MONITORING CO<sub>2</sub>-EMISSIONS IN EUROPE

European scientists, national governments, and the European Commission joined forces in 2015, in order to establish the *Integrated Carbon Observation System* (ICOS). The European observation system will measure and assess atmospheric greenhouse gas concentrations ensuring independent and reliable carbon measurements. High quality observations of greenhouse gases will support communities and governments in their efforts to mitigate climate change.

ICOS provides:

- observation stations on land (60), ocean (21), and atmosphere (30)
- standardised high-precision observations
- transparency of data
- visualizations of data
- easy, open, and free access to data

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*Through observations, ICOS aims to provide knowledge on how societies have succeeded in reducing their greenhouse gas emissions and how emissions are regionally distributed.*

The Carbon Portal is the “one stop shop” for all ICOS data: [icos-cp.eu](https://icos-cp.eu)

The ICOS main office is located in Finland.



# IMPORTANT INTERPLAY BETWEEN LAND, OCEAN, AND ATMOSPHERE

It is an important scientific goal for ICOS to contribute to a better understanding of the processes that drive climate change. Oceans and vegetation on land absorb large amounts of CO<sub>2</sub> from the air. Hence, ICOS will not only observe greenhouse gases, but also the natural fluxes of greenhouse gases between terrestrial and ocean surfaces and the atmosphere.

ICOS has established three thematic centres to address the complex interactions that are behind atmospheric greenhouse gas concentrations:

- The Atmosphere Thematic Centre (France, Finland, Germany)
- The Ecosystem Thematic Centre (Italy, Belgium, France)
- The Ocean Thematic Centre (Norway)

The centres are responsible for collecting and processing data from the atmosphere, ecosystems on land, and in the oceans.



#### **Piece by piece**

Chief Engineer Kristin Jackson is analysing CO<sub>2</sub> and salt concentrations from collected water samples from the Norwegian Sea at the ICOS Ocean Thematic Centre, located at the Bjerknes Centre for Climate Research.

Photo —  
Jill Johannesen, UiB

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# OCEANS ARE AN IMPORTANT SINK FOR CO<sub>2</sub>

The oceanic sink offsets approximately one quarter of anthropogenic CO<sub>2</sub>-emissions. The ICOS long-term oceanic observations are essential to understand the present state and to predict future behaviour of the global carbon cycle.

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*The earth surface is covered by more than 70 percent ocean, and the deep ocean stores about 60 times more carbon than the atmosphere. Therefore, the ocean is a critical factor damping the effect of human CO<sub>2</sub>-emissions, which underscores the importance of understanding the interplay between oceans and the atmosphere.*



Photo —  
Emil Jeansson,  
Uni Research

# BERGEN HOSTS THE OCEAN THEMATIC CENTRE

The Ocean Thematic Centre (OTC) coordinates and processes the measurements from the European ocean network. OTC is hosted by Uni Research and the University of Bergen, Norway, as a joint effort in the Bjerknes Centre for Climate Research.

OTC is also responsible for developing the best practise guidelines and protocols to ensure high quality of ocean data.

Currently, twenty-one ocean stations contribute to monitor carbon concentrations in the North Atlantic, Nordic Seas, Baltic

and the Mediterranean Sea. The ambition is to provide near real time ocean data, which will be used to assess the ocean's role in the carbon cycle and uptake of anthropogenic greenhouse gases.

ICOS Ocean Network includes several measuring methods:

- Commercial ships equipped with state of the art carbonate system sensors.
- Permanent observation stations.
- Sampling from research vessels.



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# LEARN MORE ABOUT ICOS OTC

Visit our homepage at [otc.icos-cp.eu](http://otc.icos-cp.eu)

## Contact ICOS Ocean Thematic Centre

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Truls Johannessen  
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