

## ICOS PROJECT OBJECTIVES

Climate change is one of the most critical issues to which humanity will be faced in the coming decades. It is extremely likely (IPCC, 2013) that the measured increase in global temperatures is due to the increase in the greenhouse gas (GHG) into the atmosphere due to human activities.

Natural ecosystems (oceanic and terrestrial) reabsorb about half of the carbon dioxide emitted by anthropogenic emissions: they behave as carbon sinks. In their absence, atmospheric CO<sub>2</sub> concentration would grow twice as fast. However, processes involved are not well understood and it is not known if, in the future these sinks will increase, decrease or decay. It is thus necessary to better understand mechanisms of greenhouse gas emission and absorption by ecosystems and their long term changes.

**In this context, ICOS project has the following aims :**

1. establish an integrated, long term, CO<sub>2</sub> and GHG observation infrastructure at European scale ;
2. determine CO<sub>2</sub> and GHG fluxes from observations and to relate them to emission and absorption processes.

### Complementary experiments

Stations are open to the development of original experiments. They are a core on which can join complementary experiences, working in synergy with the **ICOS** system.

These experiences may benefit from an access to the infrastructure (power line, tower, internet access) and to the existing data (fluxes, meteo, biometric measurements).

# ICOS

INTEGRATED  
CARBON  
OBSERVATION  
SYSTEM

**ICOS** is structured as an european triple network - atmospheric, terrestrial and oceanic – in which CO<sub>2</sub> and GHG concentrations and fluxes are measured.

In Belgium, **ICOS** has developed an ecosystem network of six stations (three in Flanders, three in Wallonia) over crops, forests, grasslands and heathlands.

**ICOS PARTNERS**  
FÉDÉRATION WALLONIE-BRUXELLES



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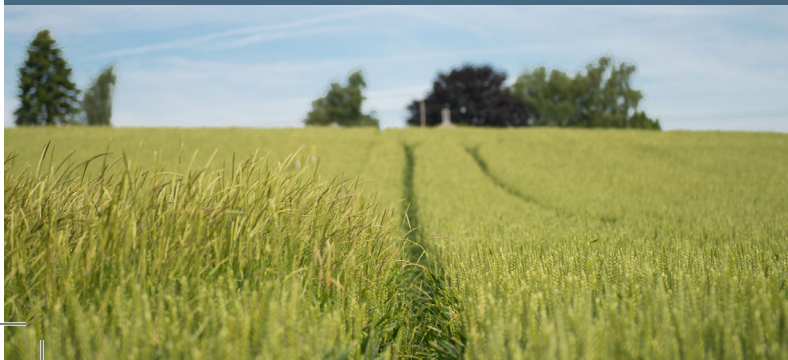


# ICOS

## Wallonia

Integrated Carbon  
Observation System in Wallonia  
[www.icos-belgium.be](http://www.icos-belgium.be)

[www.icos-belgium.be](http://www.icos-belgium.be)  
[www.icos-ri.eu](http://www.icos-ri.eu)





Loncée station ^

## > LONZÉE

STATION  
2004

One of the longest and most complete data series on cropland in Europe

**SITE :** 4 year rotation, typical of central Belgium.

**ADDITIONAL RESEARCH THEMES :** Crop and rotation carbon budget, soil respiration (autotrophic and heterotrophic discrimination), soil carbon content, growth/yield and GHG fluxes modeling, N<sub>2</sub>O emissions, VOC exchanges, nitrogen deposition.

Formerly part of CARBOEUROPE network.

Upgrade in 2014 and official integration in ICOS on November 2017.

## FLUX TOWERS

Flux towers are at the heart of stations. They measure fluxes with the eddy covariance method, which is based on an atmospheric turbulence analysis. This technique requires the capture and treatment of 300.000 measurements every half hour. These fluxes are complemented by a tight follow up of soil and air meteorological variables, as well as an extensive biomass (stems/trunk, leaves, fruit, etc.) and soil sampling in order to

follow up biomass dynamics and carbon and nitrogen content. Integrated over several years/decades, fluxes are representative of the net flux of an ecosystem of several hectares and reveal the budget of all processes at work in the ecosystem. Flux responses to climate, management and climatic anomalies are then analyzed.

BRUXELLES



LONZÉE



DORINNE



VIELSALM

## > DORINNE

STATION  
2010

One of the very few grassland stations in Europe

**SITE :** Intensive grassland grazed by Belgian Blue heifers.

**ADDITIONAL RESEARCH THEMES :** Complete carbon budget, management impact on CO<sub>2</sub> fluxes (stoking density, rotational grazing), soil and enteric CH<sub>4</sub> exchanges, grassland restoration (impact on GHG balance), N<sub>2</sub>O emissions, soil respiration, VOC exchanges, ozone exchanges.

Formerly running on regional fundings.

Expected official integration in ICOS in 2019.

## > VIELSALM

STATION  
1996

One of the longest and most complete data series in the world.

**SITE :** Mature mixed forest (beech, douglas fir, spruce, silver fir, 80 to 110 years). Eddy covariance measurements at 52 m height.

**ADDITIONAL RESEARCH THEMES :** Soil respiration, advection, site water balance, CO<sub>2</sub> and CO<sub>2</sub> diffusion in the soil, VOC exchanges, soil carbon content, nitrogen deposition, dissolved organic compounds flows.

Formerly part of EUROFLUX and CARBOEUROPE networks.

Upgrade in 2014 and expected official integration in ICOS in 2018.



^ Dorinne station

Vielsalm station v

