Aims of a European Monitoring Program of Greenhouse Gases

It should provide, in particular for CO_2 but also for CH_4 and N_2O etc. observations over a long time at highest possible precision and comparability

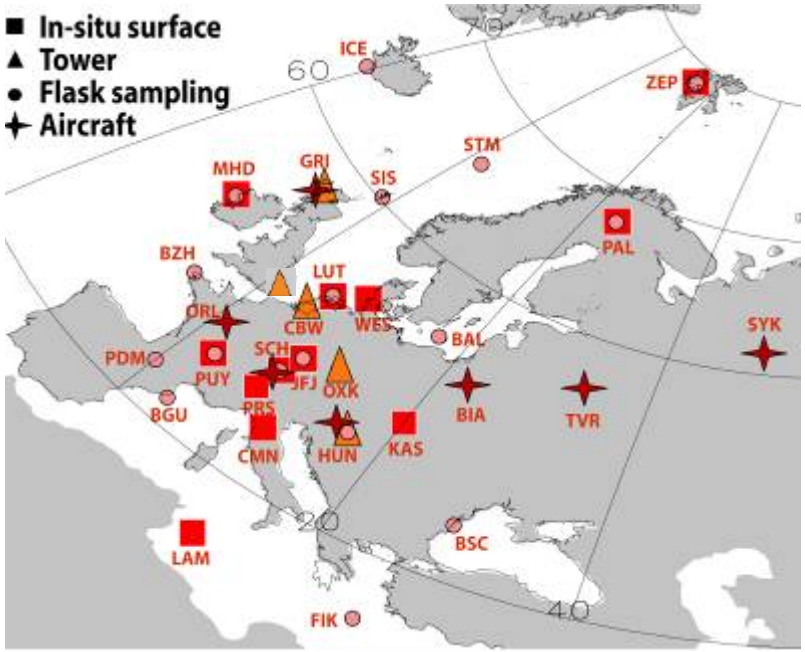
→ as a basis to study the carbon (and nitrogen) cycle and invert integrated regional fluxes from atmospheric observations

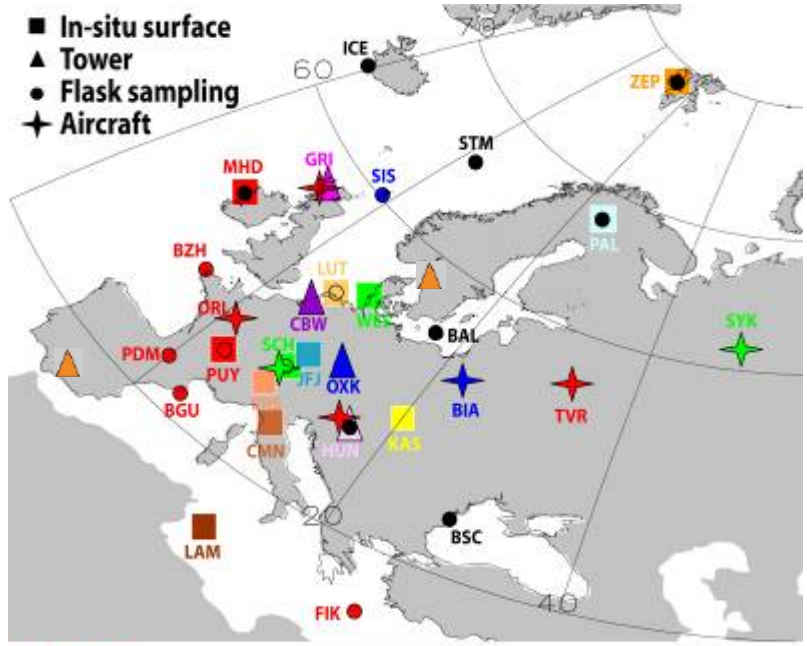
→ for top-down verification of greenhouse gases reductions

Note that today's observations for the basis of future investigations and modeling !!

However, the European network, although in some areas dense …

… is very diverse

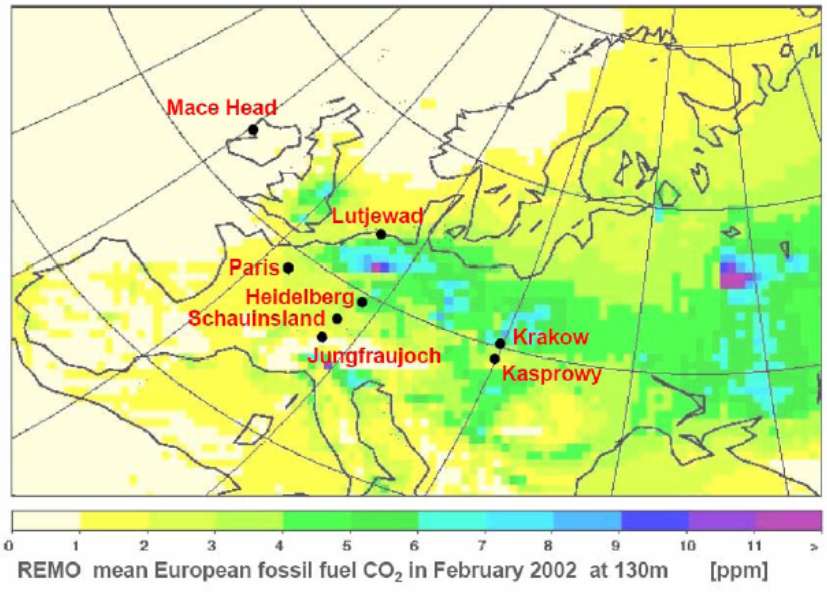




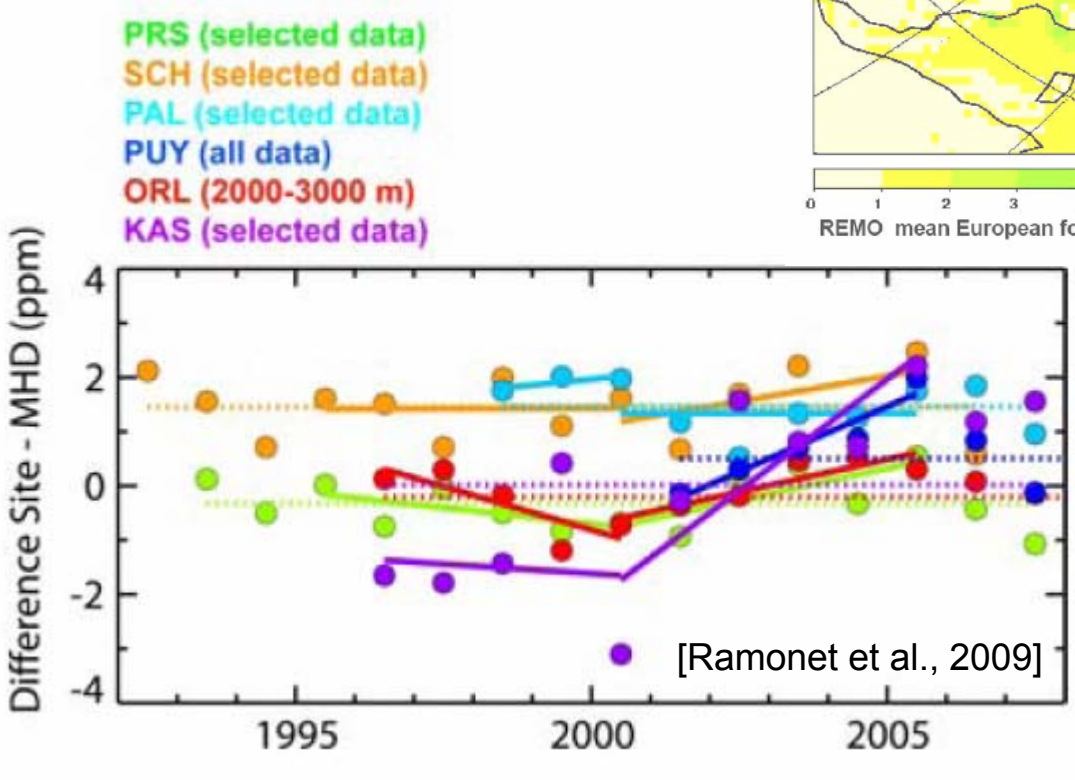
LSCE, France
MPI-BGC, Germany
UBA & IUP, Germany
CIO, The Netherlands
ECN, The Netherlands
UEDIN, Scotland
ELU, Hungary

ENEA, Italy
UGM, Italy
CESI, Italy
UKRAK, Poland
UNIBE, Swizterland
FMI, Finland
SU, Sweden

The small atmospheric gradients demand high precision



[Levin & Karstens, 2007]



… and are often dominated by the fossil fuel CO_2 signal !

→ Building an Integrated Carbon Observation System

integrated carbon observation system

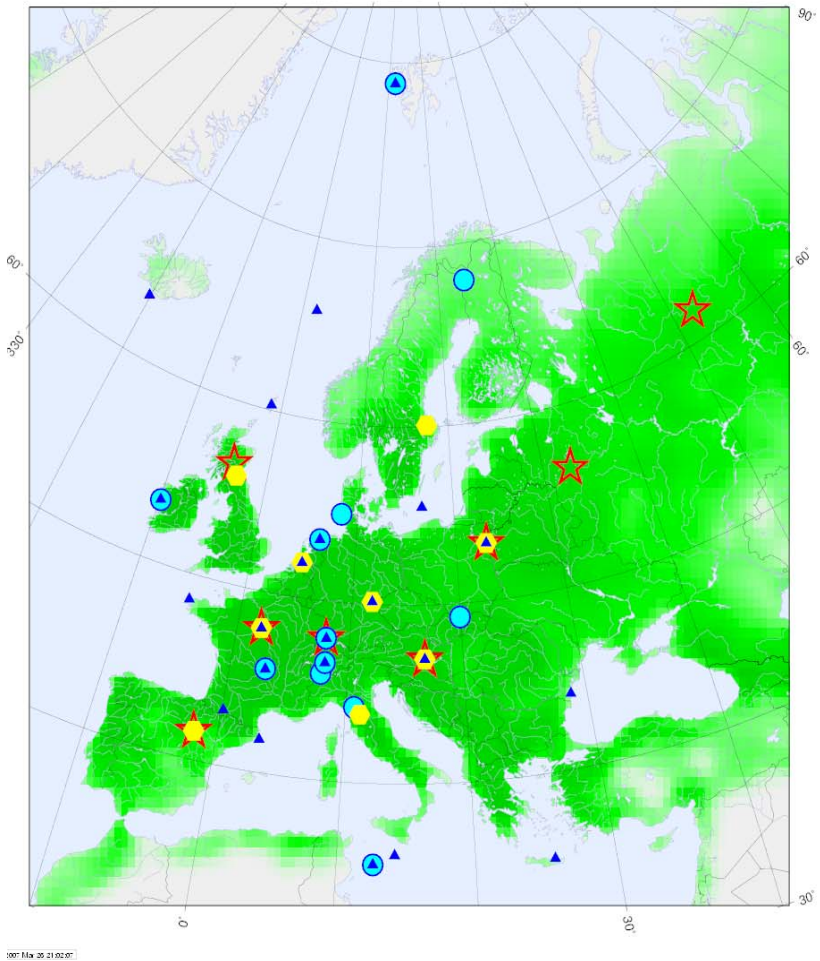
A four-year preparatory project is now running (funded by EU, coordinated by LSCE) …

… but implementation of the Infrastructure and long-term financing must be guarantied by the national governments

Objectives of ICOS

- Establish an integrated long-term research infrastructure to understand the biogeochemical cycles of greenhouse gases
- Determine regional fluxes from observations and attribute them to processes (≈10 km each day)
- To enable early detection of surprises
- Provide regional budget information for policy support
- Provide access and services for data and flux products

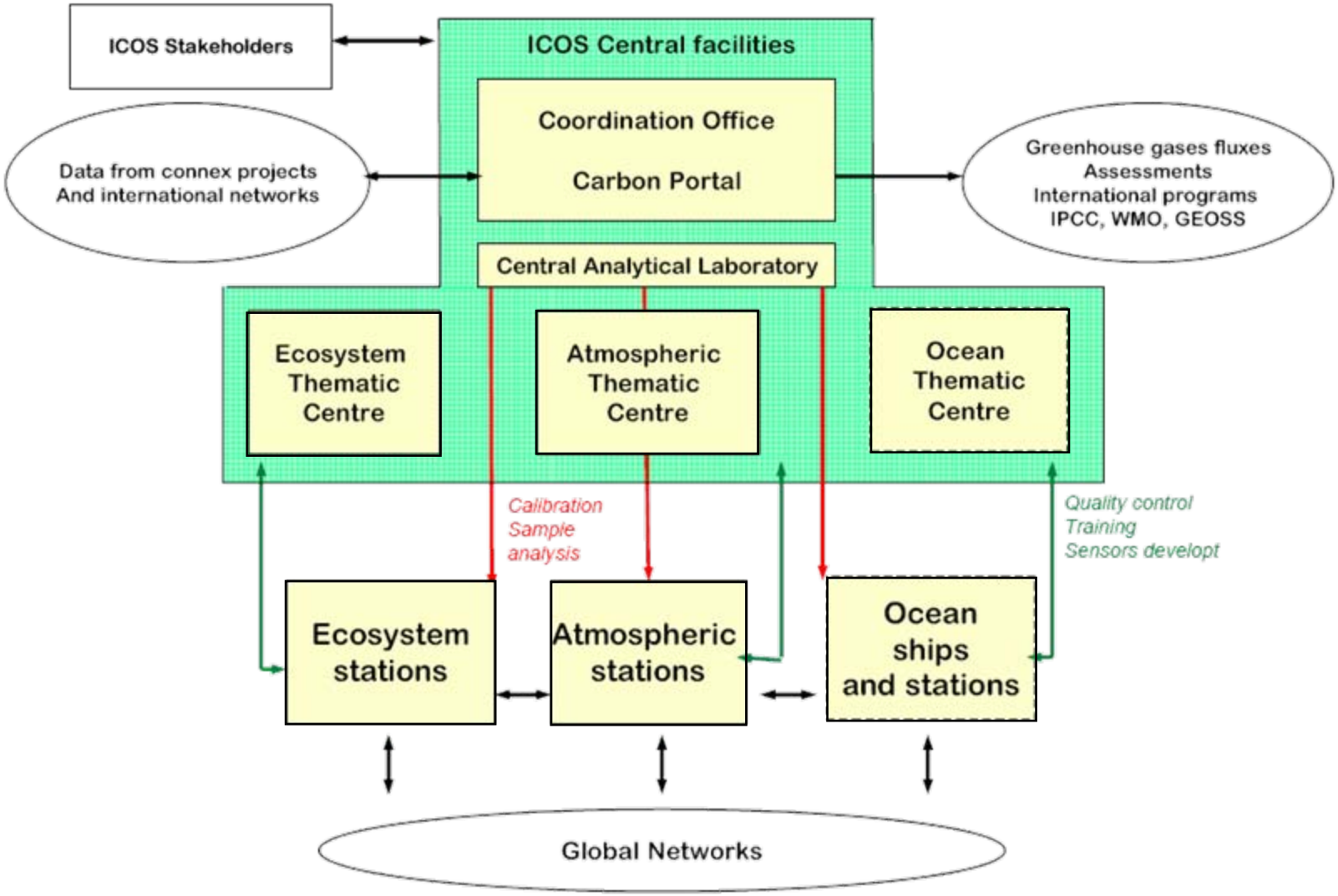
CarboEurope: Starting point for ICOS



ICOS strategy:
Improving the quality and quantity and reducing the costs by

- Standardisation of the measurement systems and protocols
- Calibration of working gases in one Central Laboratory
- Analysis of air samples in one Central Laboratory
- Central data management and quality control

The structure of ICOS

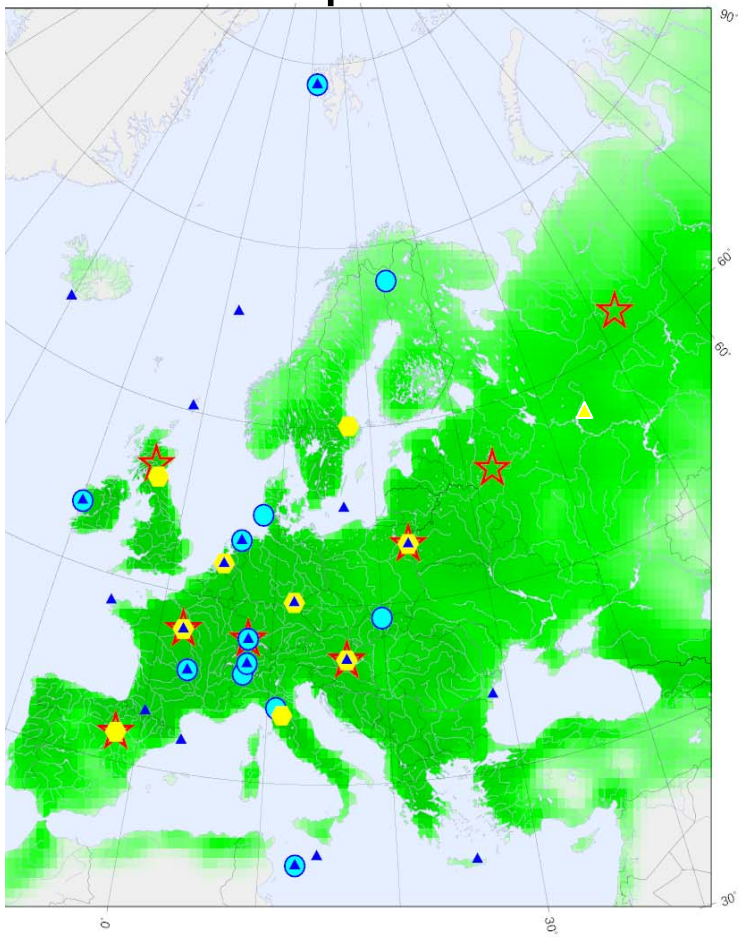


Integrated Carbon Observation System
Atmospheric Component

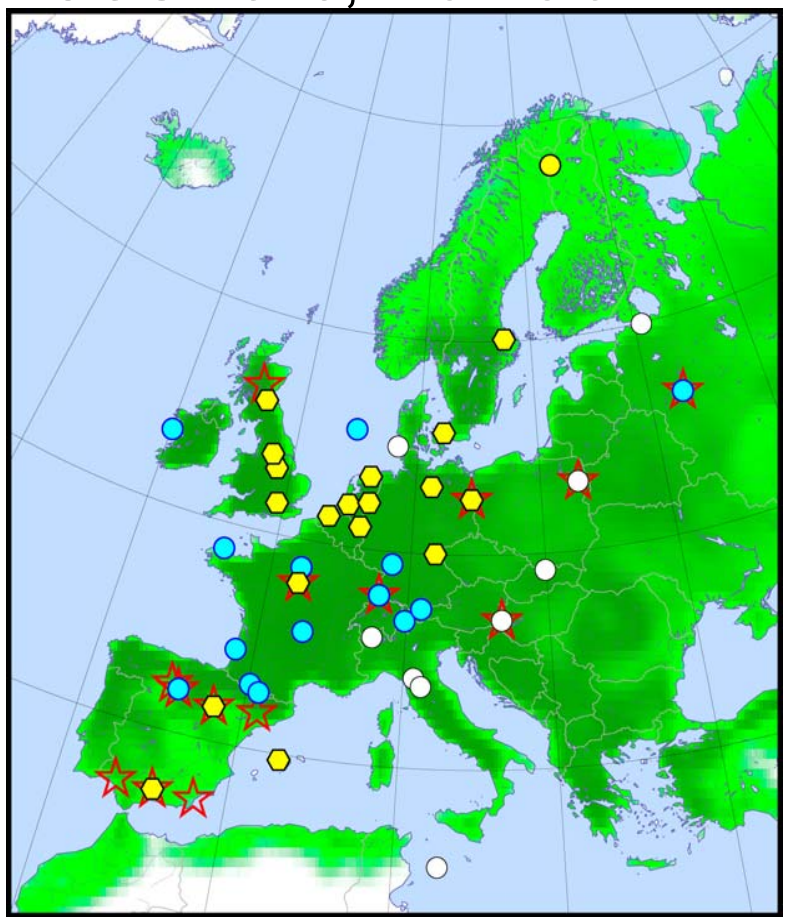
- Station network for atmospheric observations
- Atmospheric Thematic Centre
- Central Analytical Laboratorie(s)
- Central Calibration Laboratory

CarboEurope → ICOS

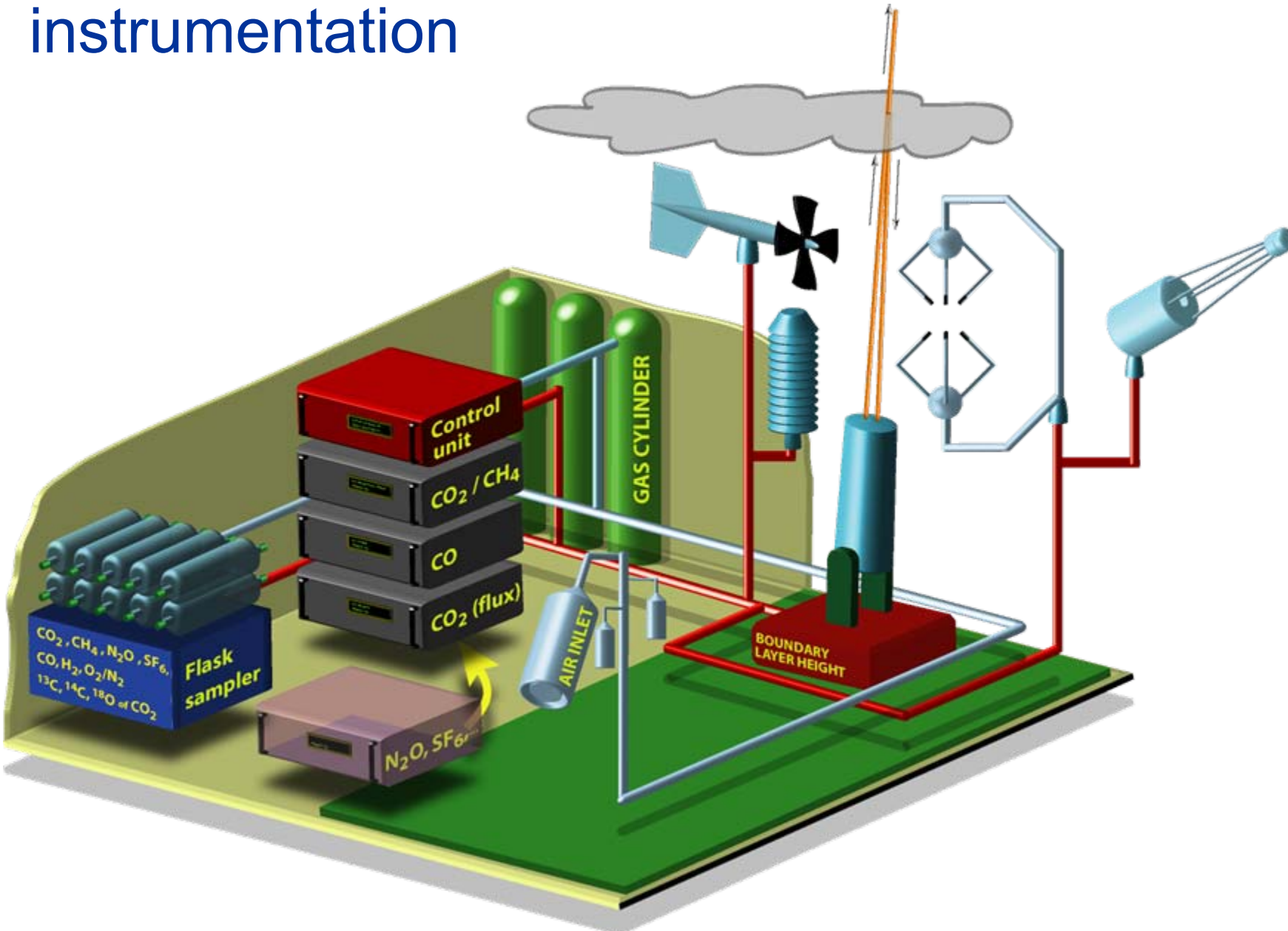
CarboEurope



ICOS 2015, the vision



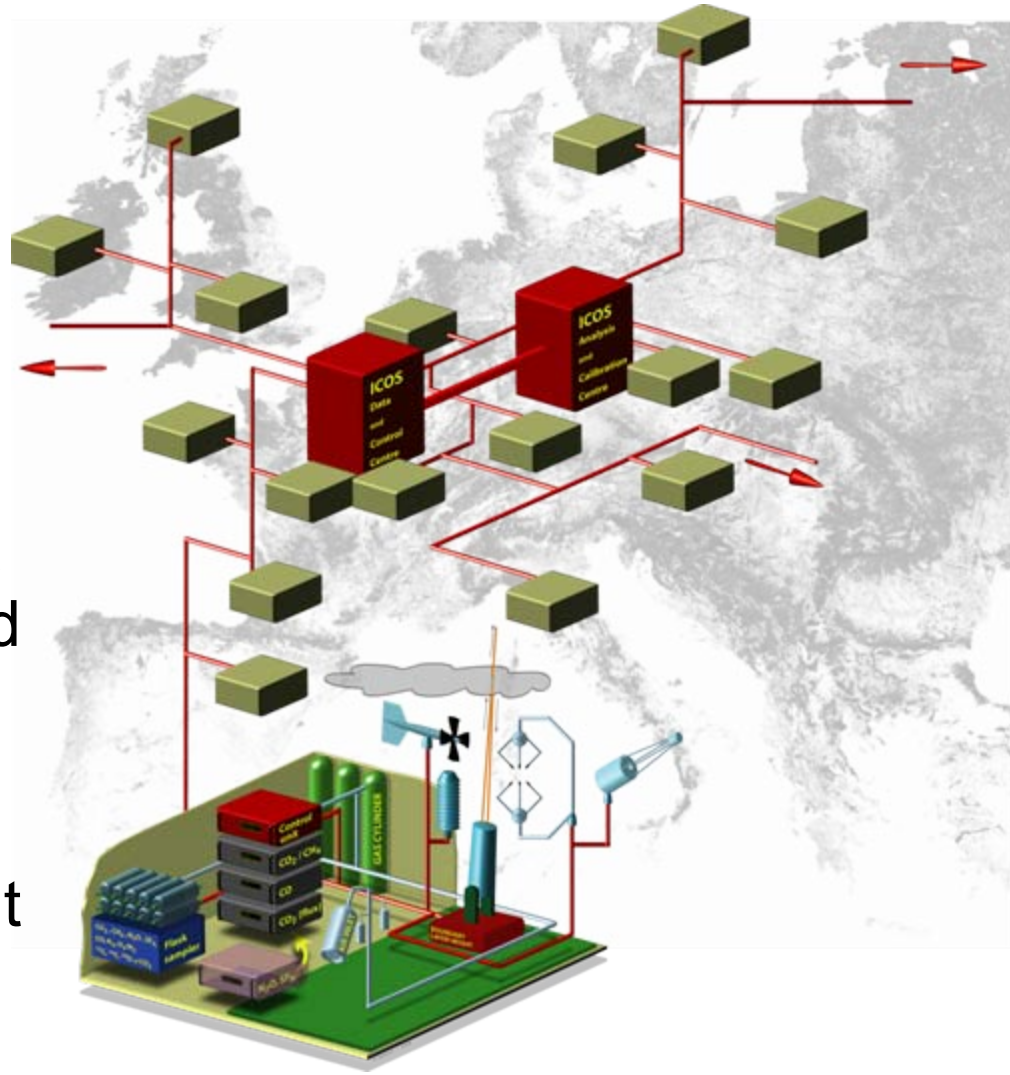
ICOS Atmospheric station with standardised instrumentation



	Core Parameter	Core Parameter	Additional Parameter
	continuous	*≈weekly*	*continuous*
CO_2	XX		
CH_4	XX		
N_2O		XX	XX
SF_6		XX	XX
CO	XX		
O_2/N_2		XX	XX
$^{13}C\text{-}CO_2$, $^{18}O\text{-}CO_2$		XX	
$^{14}CO_2$		XX	
wind direction/speed	XX		
wind speed	XX		
atm. pressure	XX		
atm. temperature	XX		
relative humidity	XX		
PBL height	XX		
CO_2 flux	XX		
Radon-222			XX

Role of the Atmospheric Thematic Centre

- Coordinate the atmospheric network
- Provide technical and logistical assistance to the network
- Online atmospheric data handling, processing and archive
- Oversee and evaluate new sensor development



Role of the Central Flask Laboratory

- Measurement of ICOS core parameters for periodical sampling (CO_2, $\delta^{13}C$, $\delta^{18}O$, CH_4, N_2O, SF_6, O_2/N_2)
- Data processing, link to ICOS atmospheric and oceanic centres
- Quality control, ongoing flask inter-comparison programmes with global networks (NOAA-GMD, etc.)
- Routine (leak) check and reconditioning of flasks
- Logistics for flask supply to stations

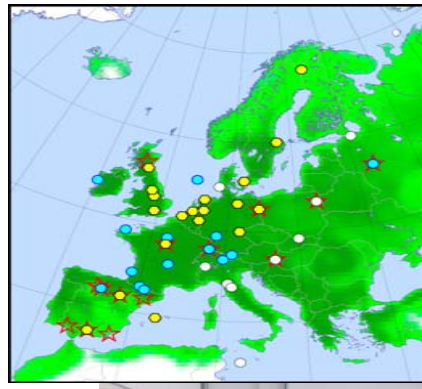
Role of the Central Radiocarbon Lab

Provide the technical and analytical basis to accurately and precisely measure the regional fossil CO_2 component for the European ICOS station network, i.e.

- make available the instrumentation and logistics for routine $^{14}CO_2$ sampling at the ICOS stations
- perform high-precision ^{14}C analyses (incl. AMS for small samples) for the entire European network
- improve the methodology to „measure“ fossil CO_2

Role of the Central Calibration Lab

- Produce high-pressure working gas standards with defined composition for ICOS network (atmospheric, ecosystem and marine stations)
- Provide accurate standard assignments for requested parameters on WMO calibration scales
- Maintain best possible link to WMO-CCLs
- Organize quality control exercises within ICOS monitoring network



Points for the Discussion:

WMO-GAW stations: How to keep the „direct link“ to the WMO-CCLs ?

What to do if WMO station secondaries show deviations from ICOS working gases
or,
is double-check rather an advantage ?

Who does the reporting to the WDCGG ?

… and more ??? to come !