

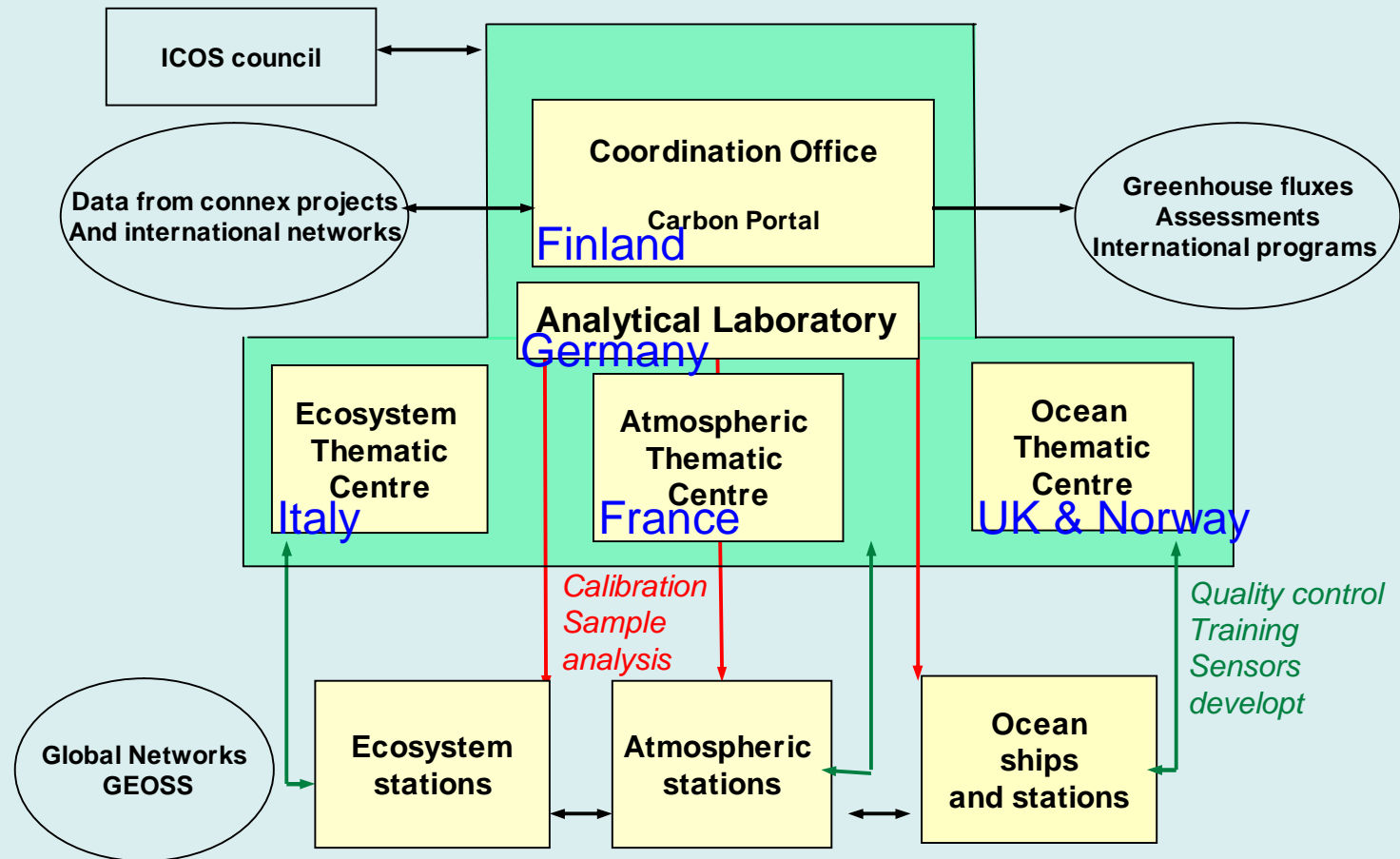
# ICOS

## Integrated Carbon Observation System

*A research Infrastructure to measure,  
understand and predict  
the global cycles of greenhouse gases*

- ICOS is an integrated European research infrastructure (accepted to ESFRI and national infra roadmaps)
- national measurement stations (like ICOS-Finland) + European level organisation (ICOS-EU)
- ~ 30 atmospheric and ecosystem sites and ~ 10 ocean sites
- covers both **concentration** and ecosystem-atmosphere **exchange** and **cycles** of **CO<sub>2</sub>**, **CH<sub>4</sub>** and **N<sub>2</sub>O**
- preparation phase till 2011 and operation 2012-2031

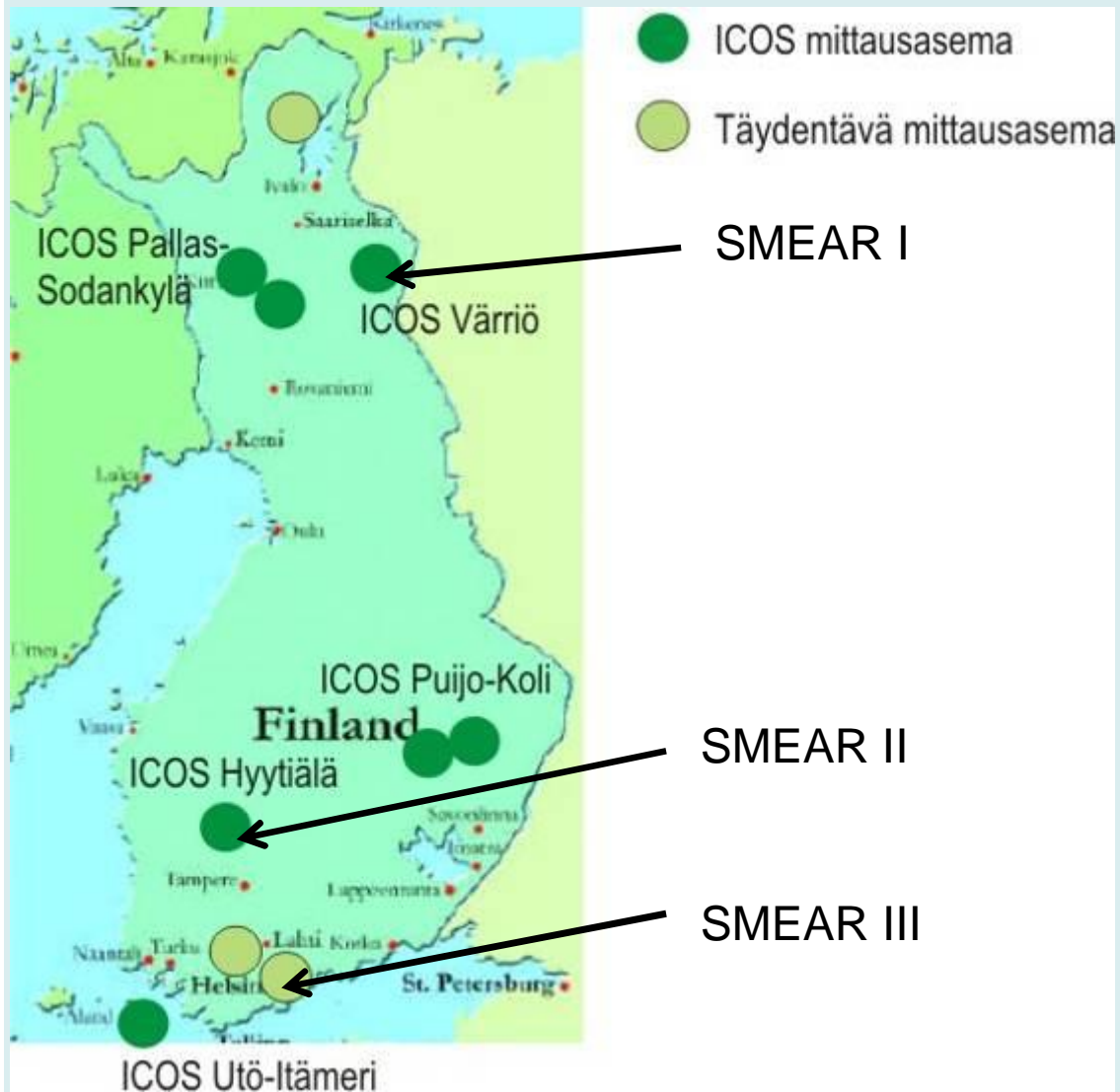
# A network is organized around HQ and 4 central facilities



Ocean component into ICOS under further design

Blue : potential countries candidates as of 26-05

# ICOS stations in Finland



# SMEAR II

Station for measuring Forest Ecosystem - Atmosphere Relations  
University of Helsinki, Forestry Field Station, Hyytiälä

## TREE

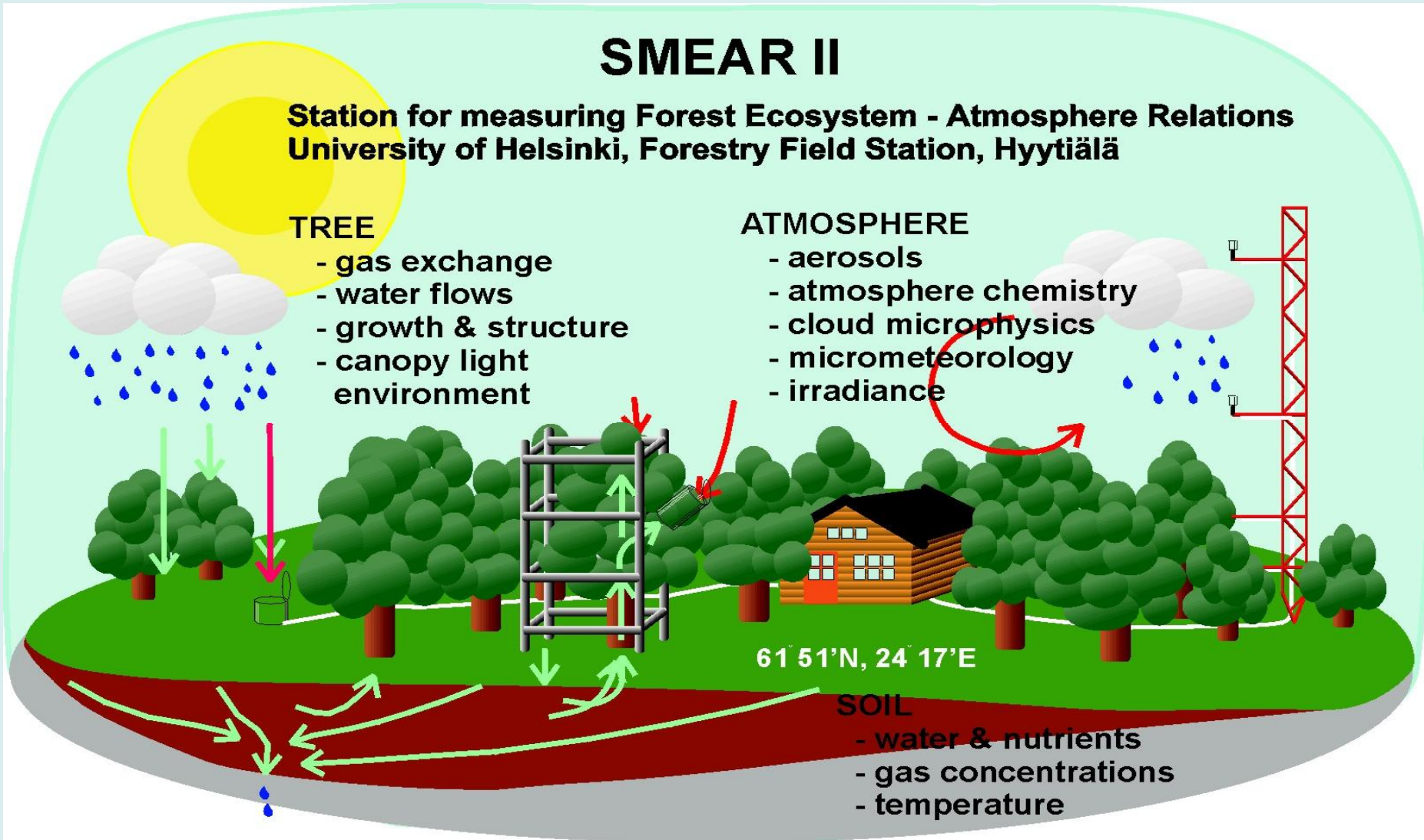
- gas exchange
- water flows
- growth & structure
- canopy light environment

## ATMOSPHERE

- aerosols
- atmosphere chemistry
- cloud microphysics
- micrometeorology
- irradiance

## SOIL

- water & nutrients
- gas concentrations
- temperature



# ICOS AINEISTOT:

	Core Parameter Continuous (0.5 to 3 hrs)	Core Parameter Periodical (daily to monthly)	Core Parameter Periodical (yearly)	Additional Parameter Continuous (0.5 to 3 hrs)
<b>Atmospheric Sites</b>				
CO <sub>2</sub> concentration	XX			
CH <sub>4</sub> concentration	XX			
N <sub>2</sub> O concentration		XX		XX
SF <sub>6</sub> concentration		XX		XX
CO concentration	XX			
O <sub>2</sub> /N <sub>2</sub>		XX		XX
<sup>13</sup> C in CO <sub>2</sub>		XX		
<sup>18</sup> O in CO <sub>2</sub>		XX		
<sup>14</sup> C in CO <sub>2</sub>		XX		
Wind speed/direction	XX			
Atmospheric pressure	XX			
Atmospheric temperature	XX			
Relative Humidity	XX			
PBL height	XX			
CO <sub>2</sub> flux	XX			
Radon-222				XX
<b>Ecosystem sites</b>				
CO <sub>2</sub> flux	XX *			
H <sub>2</sub> O flux	XX *			
Sensible heat flux	XX *			
CH <sub>4</sub> flux	X *	X		
N <sub>2</sub> O flux	X *	X		
CO <sub>2</sub> vertical profile	XX			
Net radiation	XX			
Global radiation	XX			
Reflected global radiation (albedo)	XX			
Incoming longwave radiation	XX			
Outgoing longwave radiation	XX			
PAR	XX			
Reflected PAR	XX			
Diffuse (global) radiation	XX			
Spectral reflectance	XX			
Soil heat flux	XX			
RH	XX			
Temperature vertical profile	XX			
Wind speed and direction (vertical profile)	XX			
Precipitation	XX			
Soil temperature profile	XX			
Soil Water Content profile	XX			
LAI		X	X	
Sap flow	X	X		
Soil respiration (chamber technique)		XX		
Plant respiration (chamber technique)		XX		
Phenology		XX		
Biomass (above ground)			XX	
Soil carbon			XX	
Stem diameter			XX	
Above-ground NPP			XX	
Litter fall			XX	
N deposition (bulk)			XX	
Leaf N content			XX	
C and N import and export on managed sites			XX	
Land-use history			XX	
Managements and natural disturbances			XX	

XX mandatory with this method/time resolution X different options about method and time resolution \*: Eddy covariance

+ metadata

## MITEN KOOTAAN:

- Tyypillisesti lähetetään tietokantaan kahdesti vuodessa (esim. CARBOEUROPE ja NITROEUROPE)
- SMEAR-data kootaan itselle

## MITEN SÄILYTETÄÄN:

- **ICOS:** SQL; backup: nauha/HD ja toinen serveri
- **SMEAR:** ASCII (raakadata) ja ASCII + MySQL (käsitelty); backup: muu kone ja tietotekniikkaosaston palvelimet joka yö

## **JAKELURATKAISUT:**

- **SMEAR:** Kopiointi kovalevyiltä tai lataus tietokannasta (HY) ja sähköposti tai linkki nettisivulle tai ftp (ulkopuolinen)
- **ICOS:** web-jakelu + yksinkertainen ja nopea rekisteröinti turvallisuussyistä

## **OIKEUDET:**

- **SMEAR:** vapaasti saatavilla (normaalit tutkimuksen pelisäännöt)
- **ICOS:** vapaasti saatavilla