

ICOS

From science projects to integrated infrastructure

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1. History and Development of Governance

2. Pain

3. Operation and Data

Thanks for Eija Juurola (ICOS ERIC)

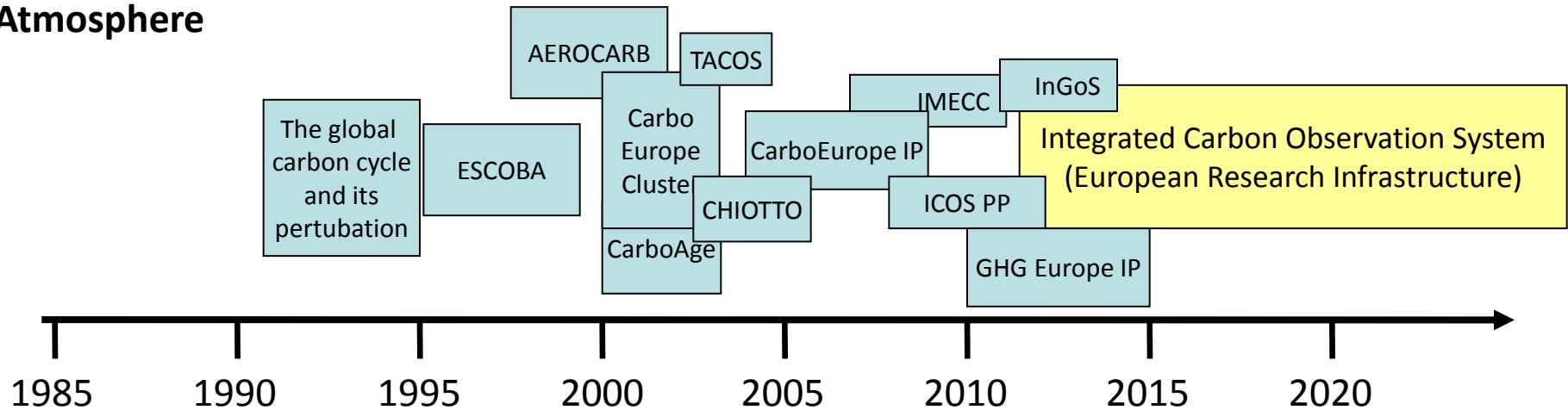


“Astrophysicists have Hubble, nuclear physicists have CERN, biogeochemists have FLUXNET”.

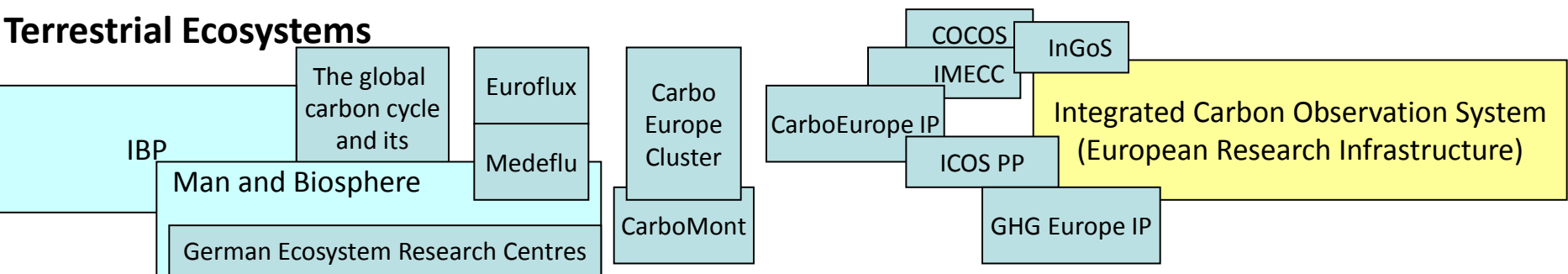
Quotation by a reviewer of a paper in Nature
(Valentini et al., 2000)

1. ICOS is built on long term scientific cooperation

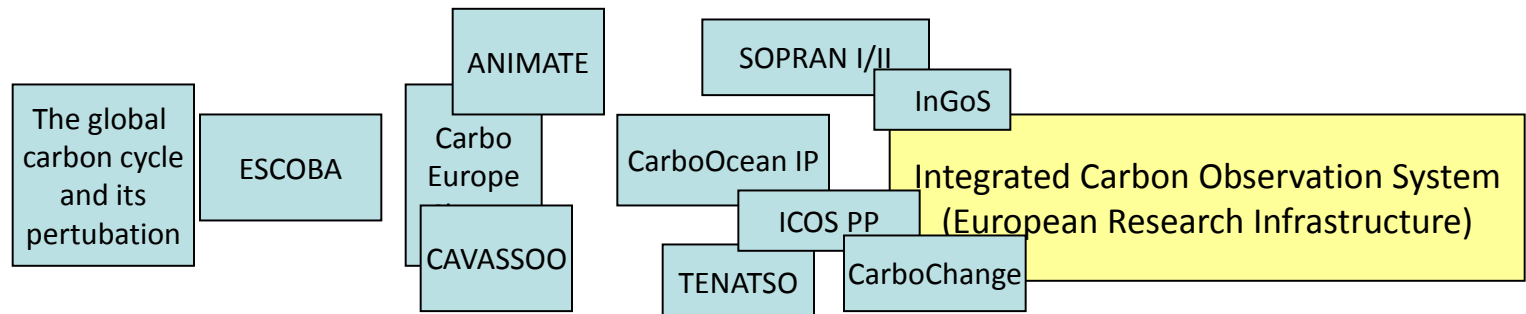
Atmosphere



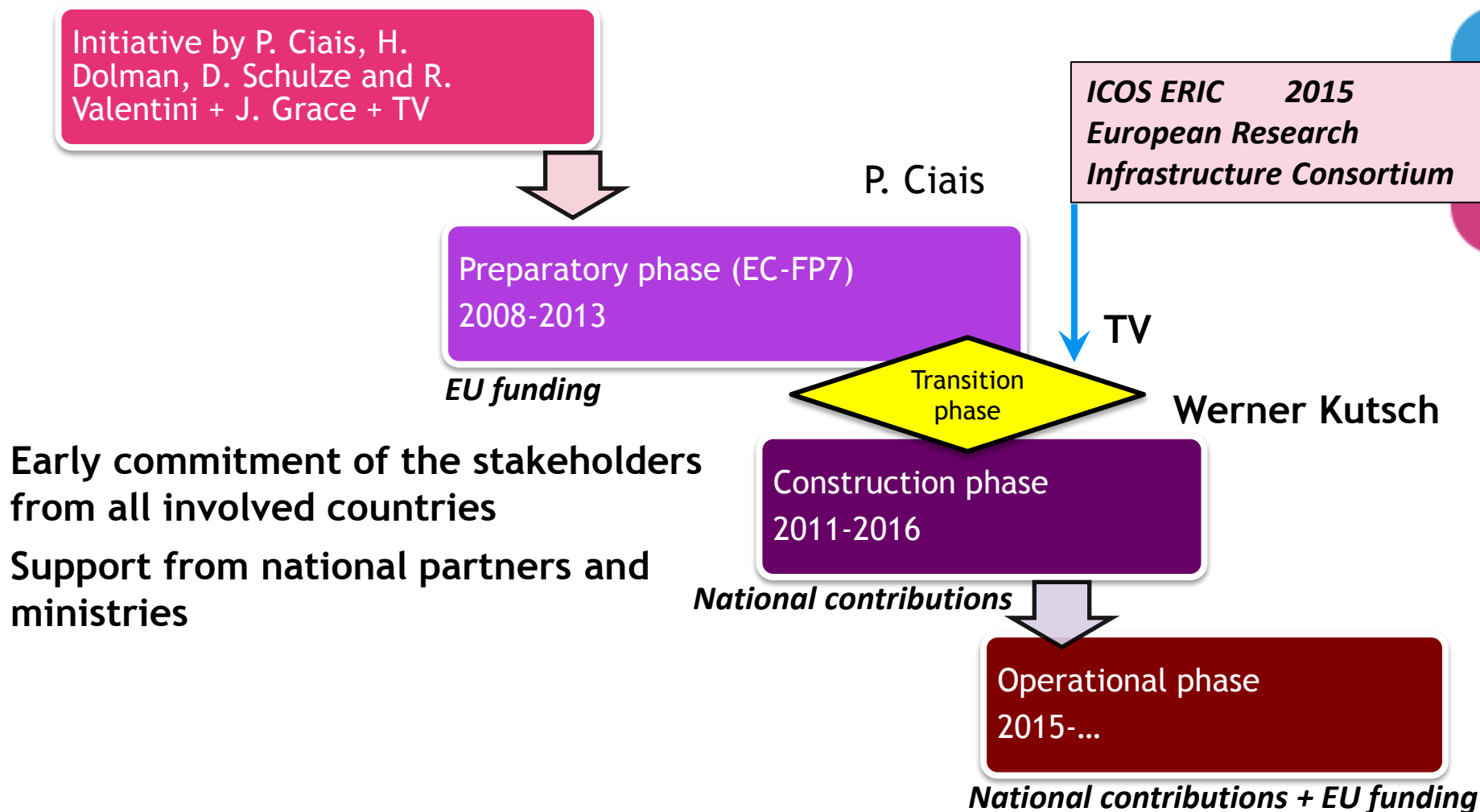
Terrestrial Ecosystems



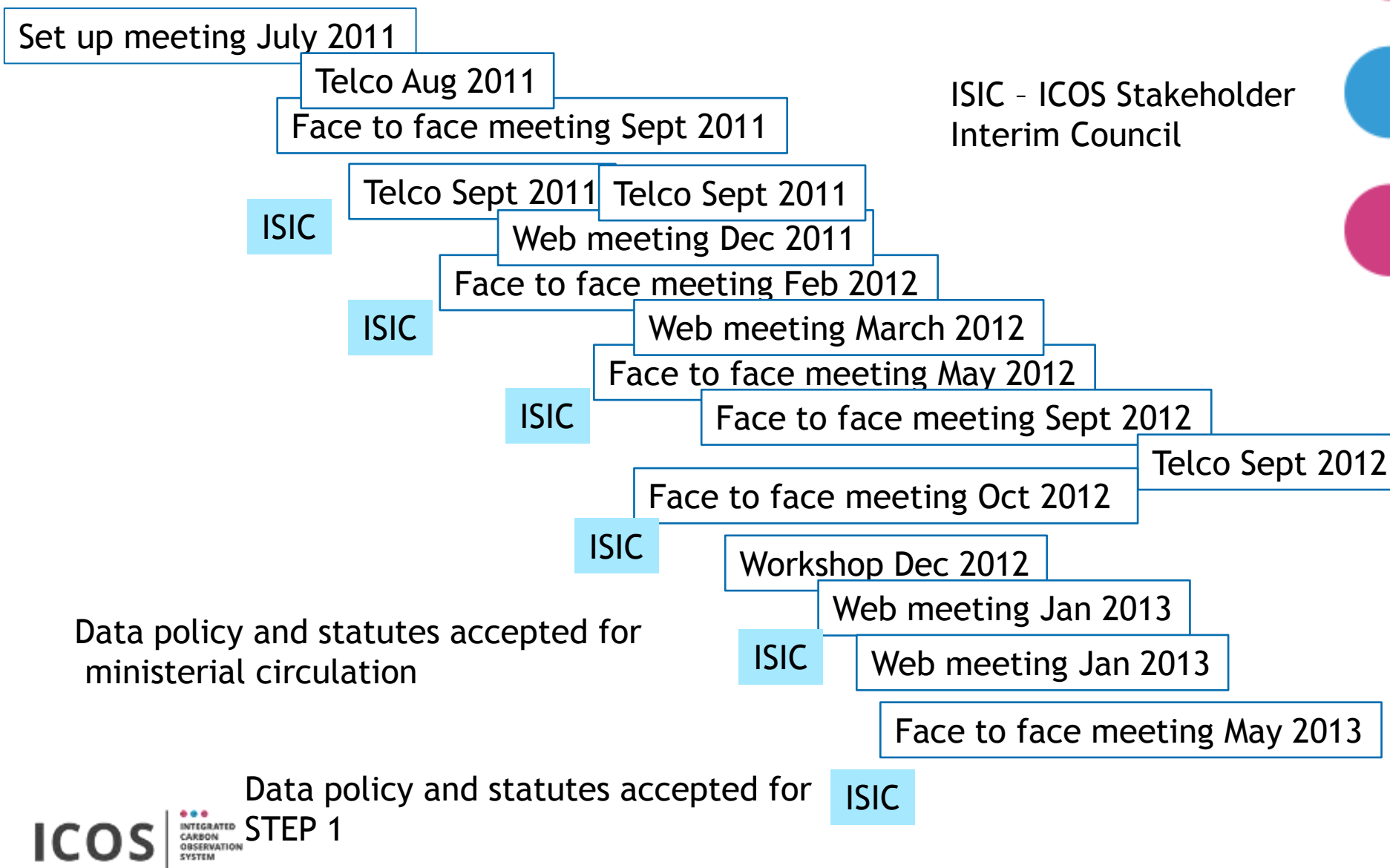
Oceans



Development of ICOS RI



Statutes Working Group 2011-2013



Financial Working Group 2012-2013

Establishment Feb 2012

Face to face meeting May 2012

Web meeting June 2012

Face to face meeting Sept 2012

Web meeting Sept 2012

Web meeting Nov 2012

Face to face meeting Dec 2012

Financial principles and Membership
Contributions accepted by ISIC

Web meeting Jan 2013

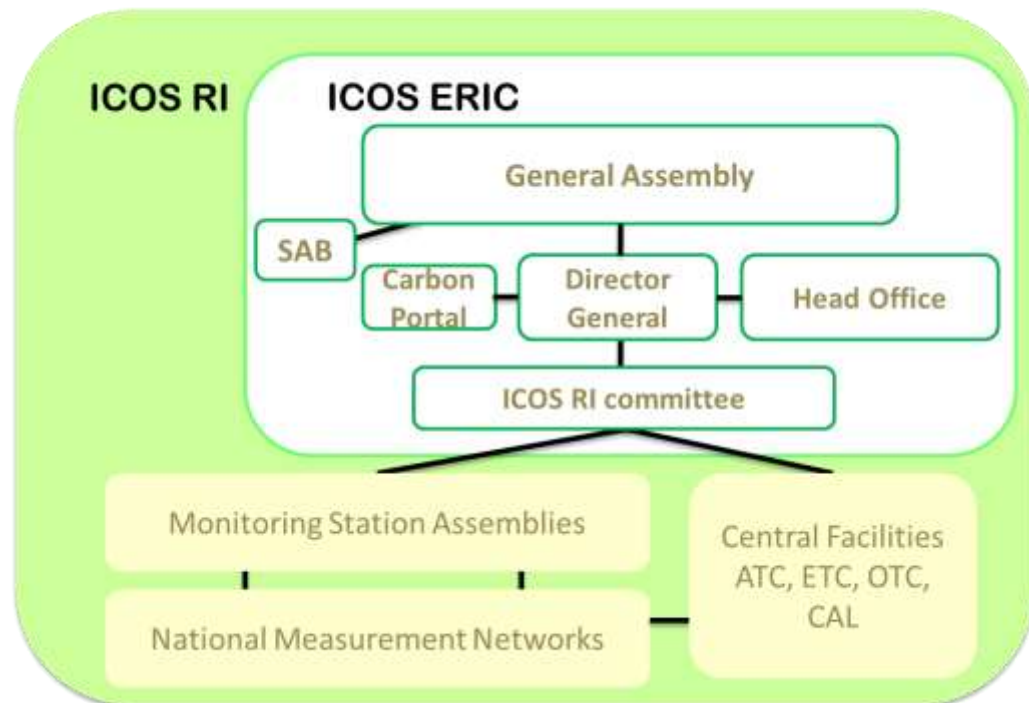
Web meeting April 2013

Internal Financial Rules and Central Facility
budgets approved in ISIC in May 2013

Face to face April 2013

Pirjo Kontkanen (lawyer): "It's nothing more than establishing private company"

Governance structure of ICOS RI



General Assembly - Members as delegates, decision making body

Scientific Advisory Board (SAB)

- 5 distinguished members

Ethical Advisory Board

- 3 expert members

Monitoring Station Assemblies (MSA) - Domain wise assemblies for Station Pls

RI Committee -formed by representatives of Central Facilities, Head Office, Carbon Portal and MSAs

2. Paradigm changes are painful

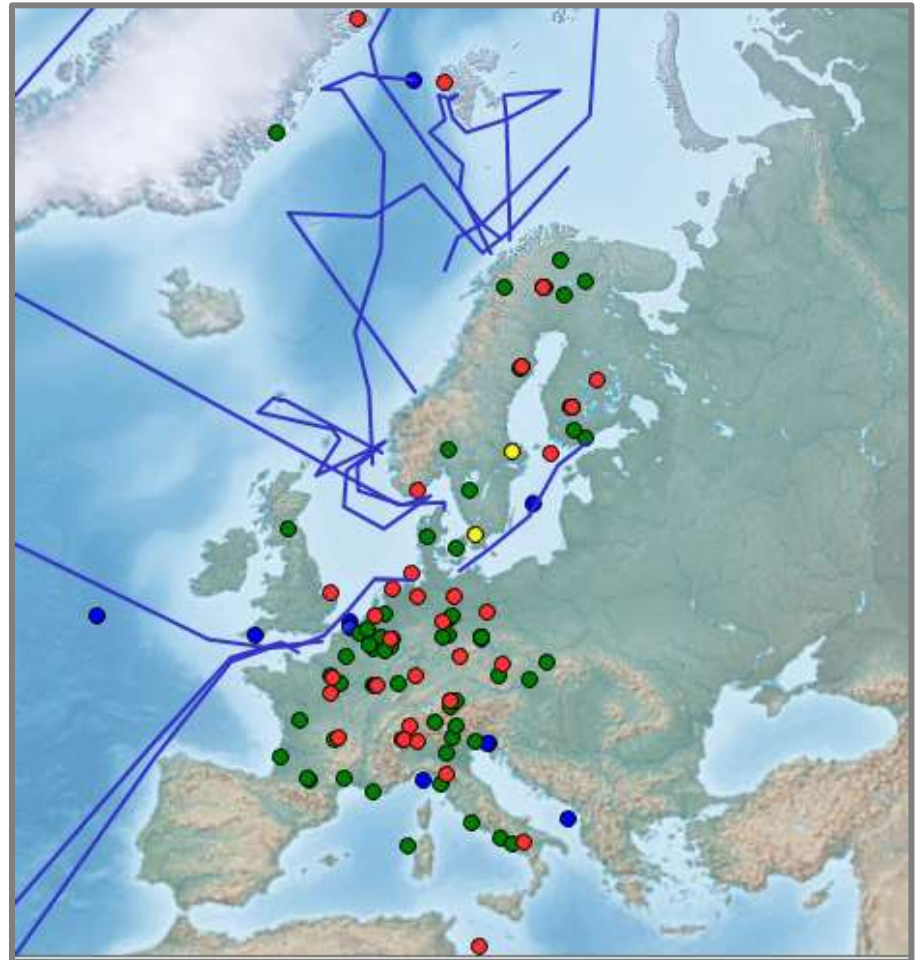
- Understand the difference between the *project management culture* and *management of an operative, permanent organization*.
- Changing from one to the other does not take place in one night, and may be difficult for the researchers.

Big Science requires organised RIs

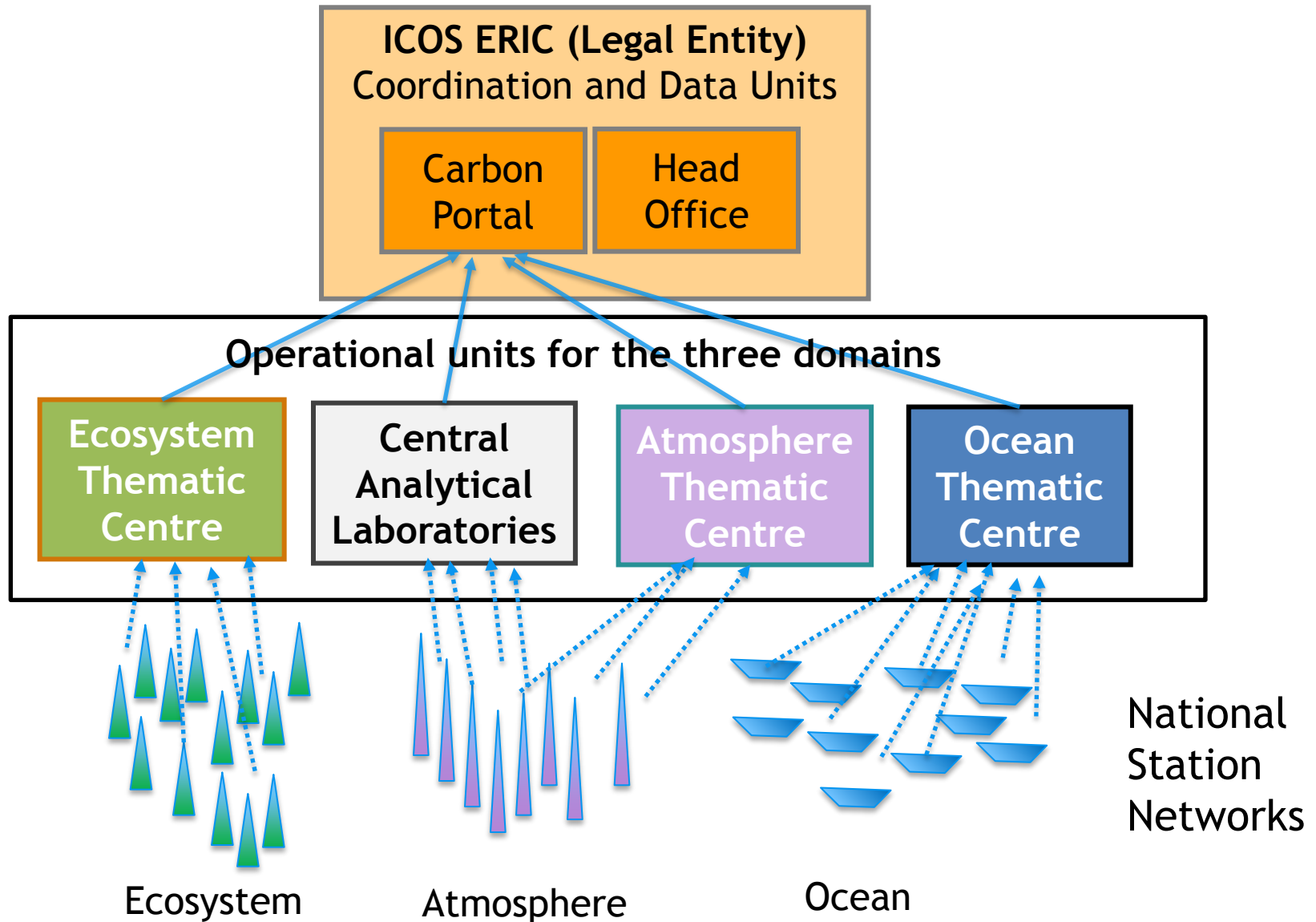
| Attribute | Network | Research Infrastructure |
|-----------------------|---|--|
| Science | Decisions made by scientists, creators, inventors | managers, directors, delegated |
| Design flexibility | flexible, creative | fixed, baselined |
| Fabricated by | in-house craftwork, "make" | industrial approach, "buy" |
| Team | composition predominantly scientists | scientists, engineers, accountants, project managers |
| Visibility of project | private | public |
| Project process | opaque | transparent |
| Success defined by | scientists, creators, inventors, peers | users, managers, reviewers, sponsors, peers |

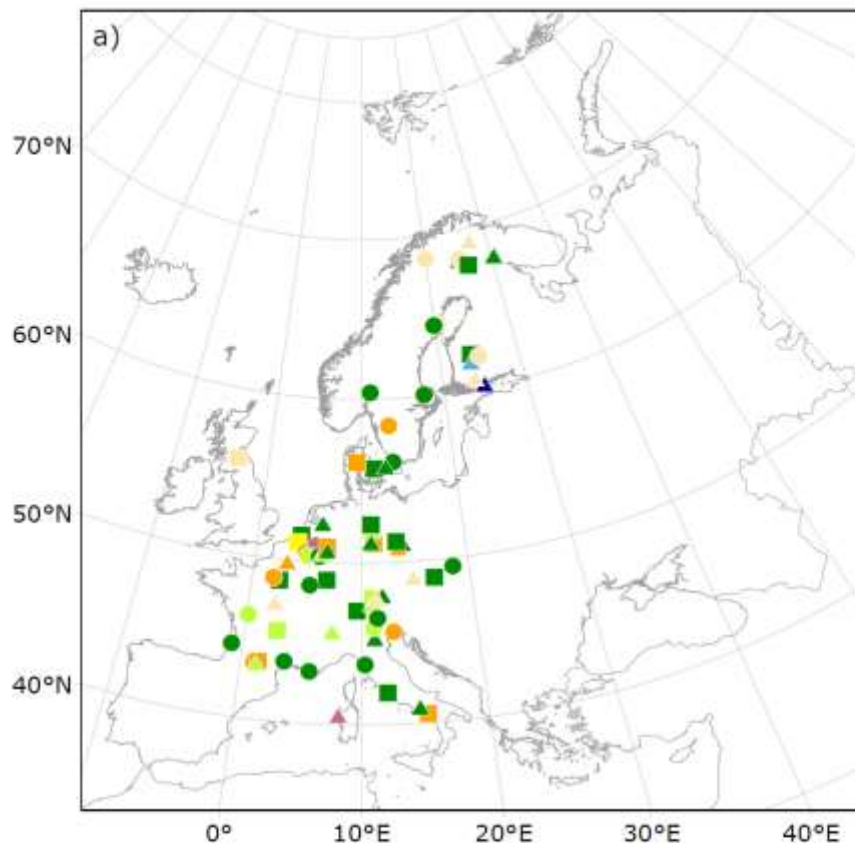
3. Operation and Data

- Standardised and high quality measurements
- Three scientific domains
- 137 stations in twelve countries
- 7 stations labelled (ICOS certificate)
- Head Office in Finland

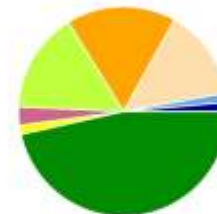


Operational Structure of ICOS

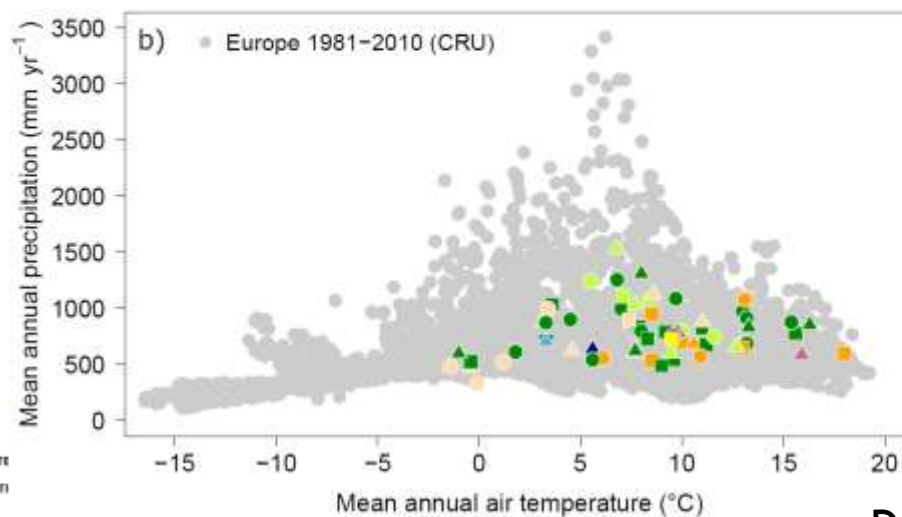
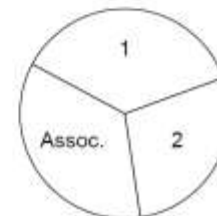




c) Proportional distribution of ecosystem types...



... and station classes among ICOS ecosystem stations



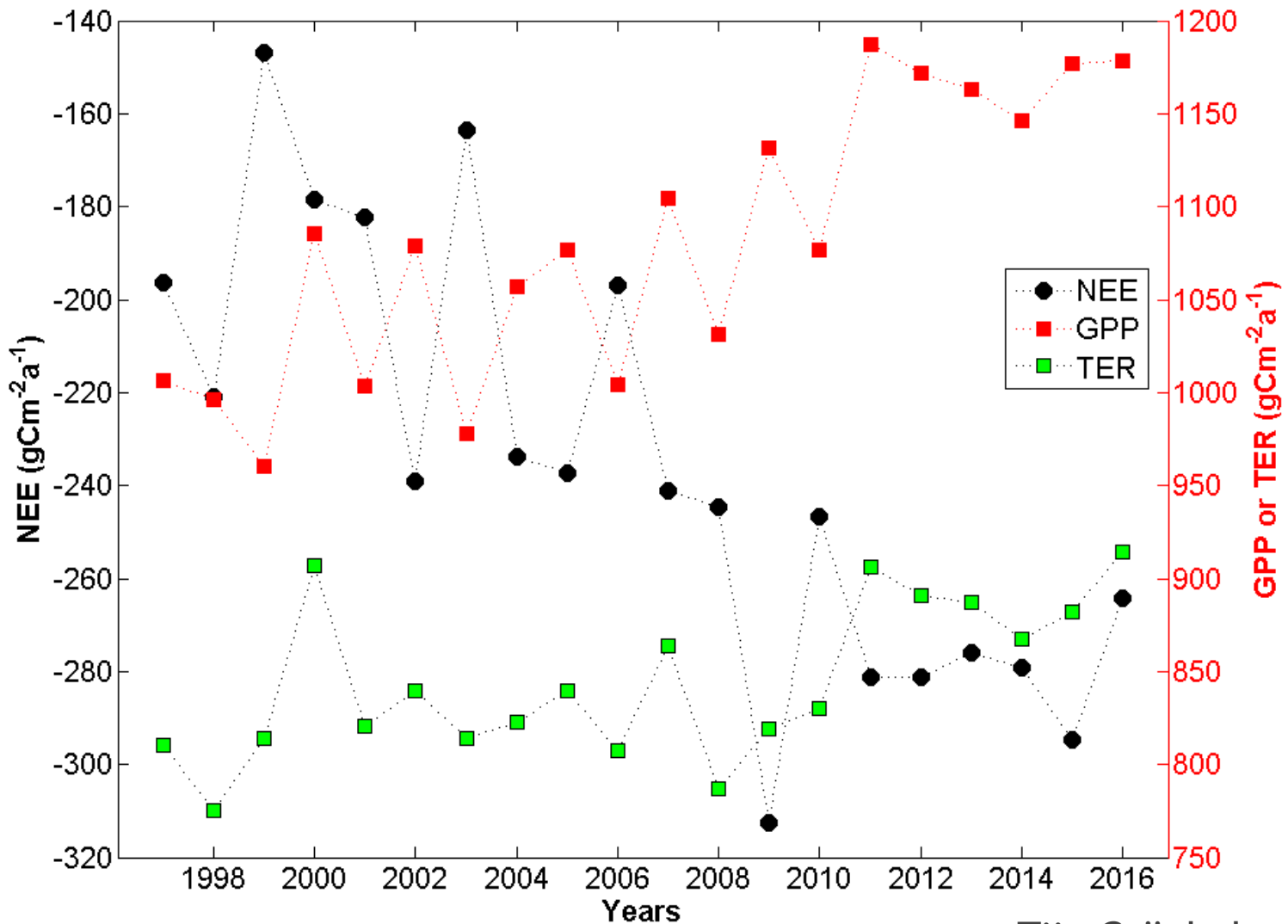
- Long series: Slow trends vs. anomalies
- Single sites vs. synthesis of various sites
- Bottom-up GHG budgets
 - "Direct" upscaling (e.g. neural networking)
 - Upscaling by process models
- Model validations and developments

Science 28 May 1993:
Net Exchange of CO₂ in a Mid-Latitude Forest
S.W. Wofsy et al , Harvard University

The eddy correlation method was used to measure the net ecosystem exchange of carbon dioxide continuously from April 1990 to December 1991 in a deciduous forest in central Massachusetts.

Carbon storage in temperate forests can play an important role in determining future concentrations of atmospheric carbon dioxide.

22 years from Hyytiälä, Southern Finland

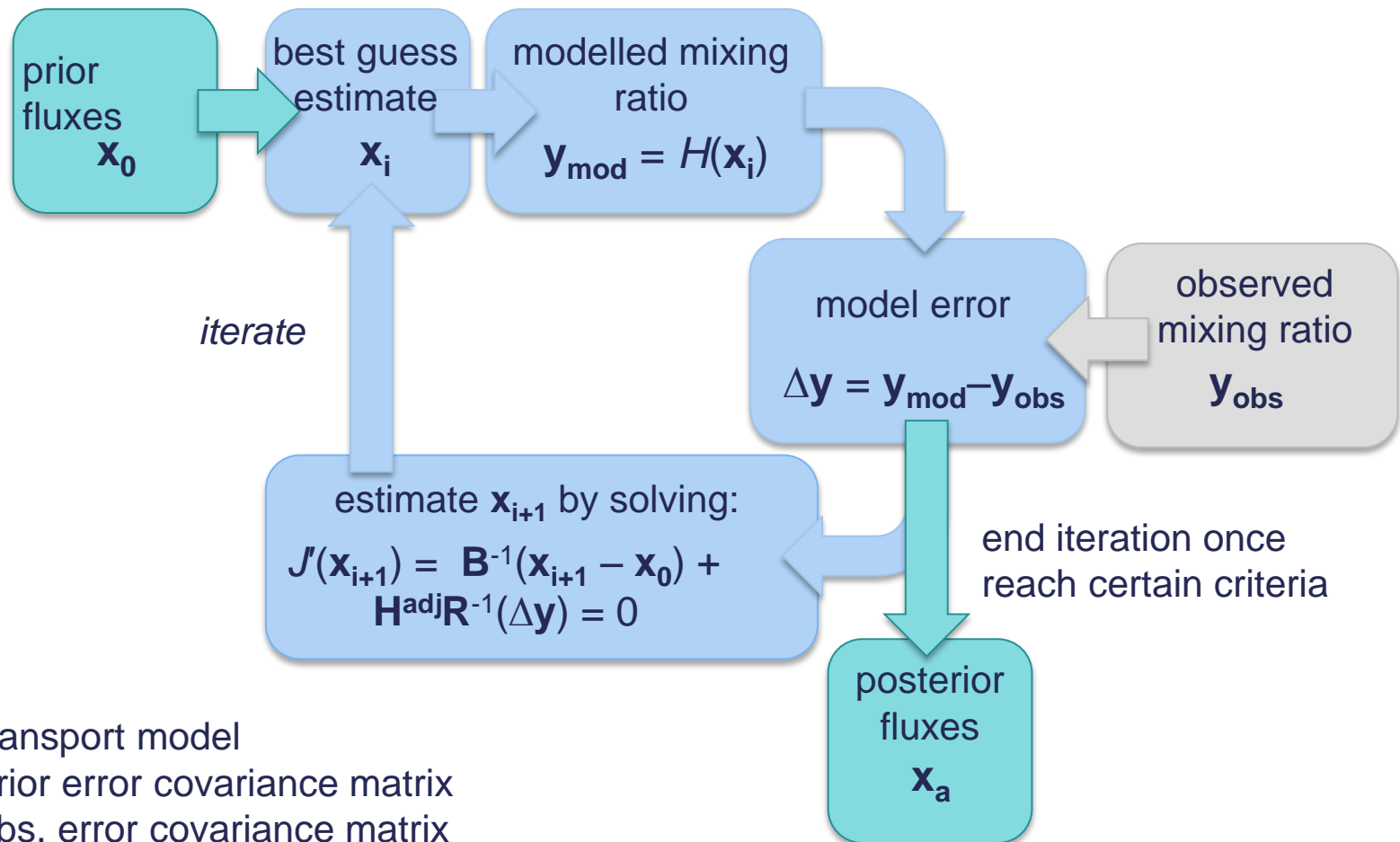


Tiia Grönholm

Atmospheric GHG concentrations

- Cornerstone as such (like Mauna Loa data)
- Top-down GHG budgets

Inversions in a Nutshell

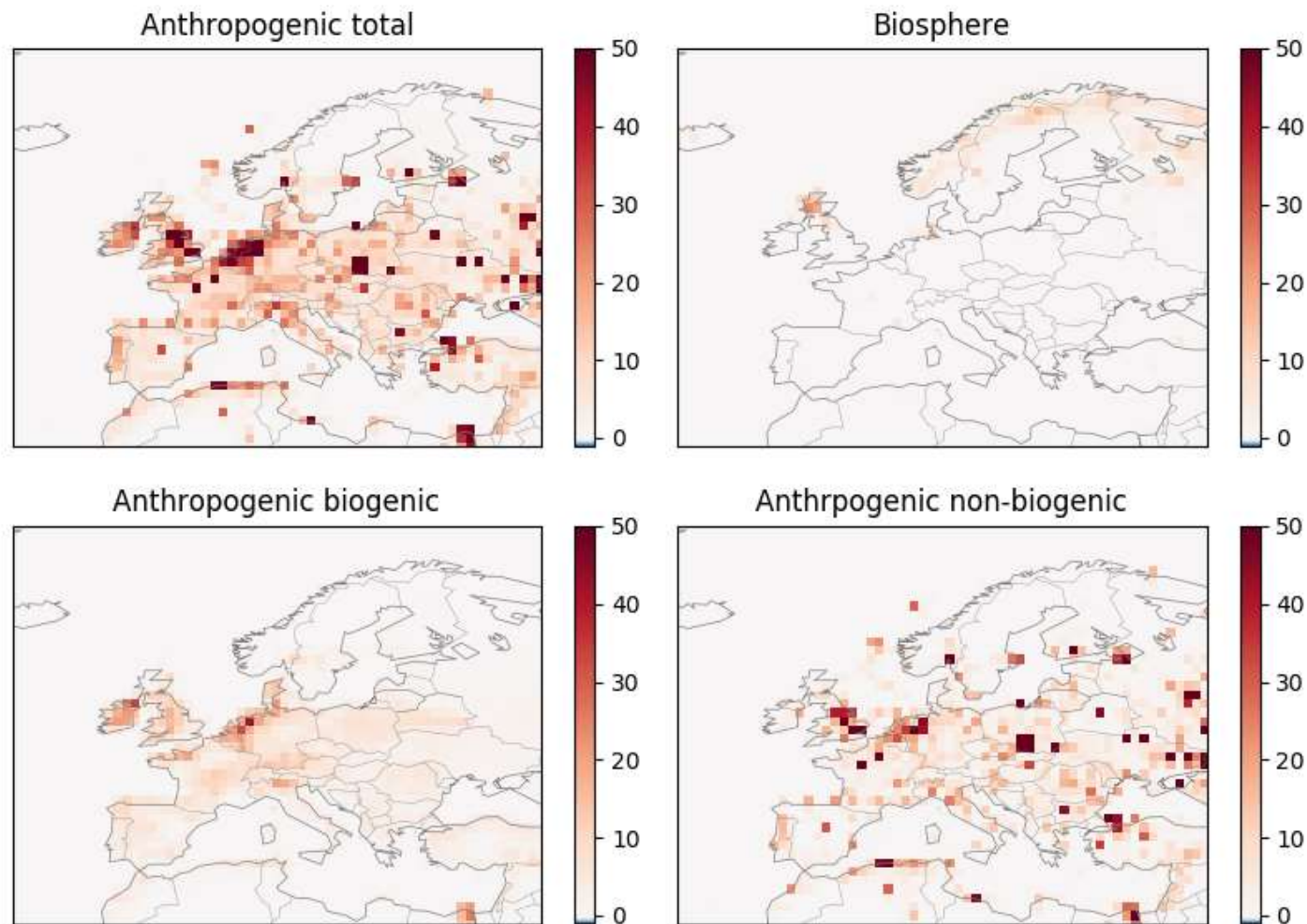


H = transport model

\mathbf{B} = prior error covariance matrix

\mathbf{R} = obs. error covariance matrix

Methane emissions from atmospheric concentrations



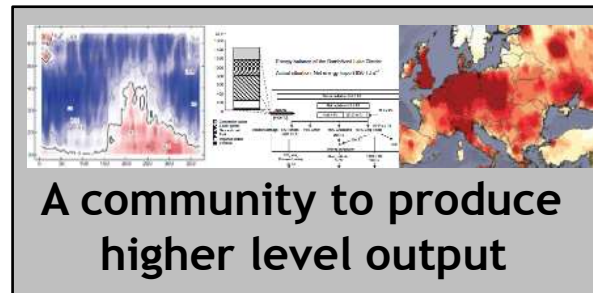
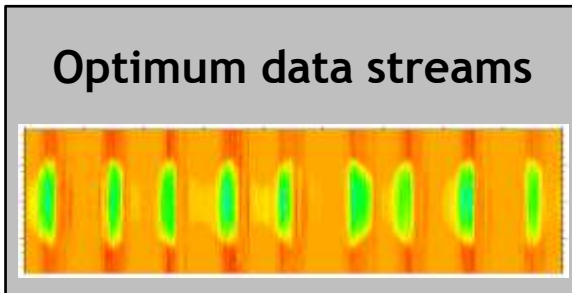
Open data

- Standardised, comparable, high quality data available for wide user communities at ICOS Carbon Portal
- **All data openly available** (CC4.0 BY licence), allowing also commercial use but requiring attribution to original data
- **Easily findable, accessible**, interoperable and reusable (FAIR -principles) encouraging usage of the data also others than scientific
- All ICOS data have persistent identifiers (PIDs) that secure the **recognition of all the contributors**; scientists but also technicians, data managers etc

Summary



Relevant data products



Looking forward

- Strong European Research Infrastructure
- Interesting and wanted partner in different projects
- European pillar of greenhouse gas monitoring in global landscape
- Secure funding for the core activities and future new activities
- Engage new countries in Europe and adjacent regions
- Collaboration with other European RIs