

ICOS and the UK

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**National
Oceanography Centre**

NATURAL ENVIRONMENT RESEARCH COUNCIL

Current fate of anthropogenically remobilised carbon dioxide

$1.1 \pm 0.7 \text{ GtC y}^{-1}$



$7.7 \pm 0.5 \text{ GtC y}^{-1}$

+



$4.1 \pm 0.1 \text{ GtC y}^{-1}$

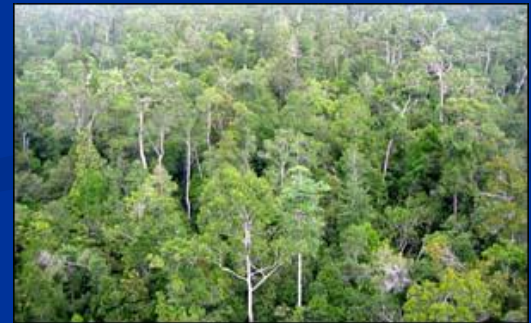
47%



2.4 GtC y^{-1}

27%

Calculated as the residual of
all other flux components



26%

$2.3 \pm 0.4 \text{ GtC y}^{-1}$

Average of 5 models

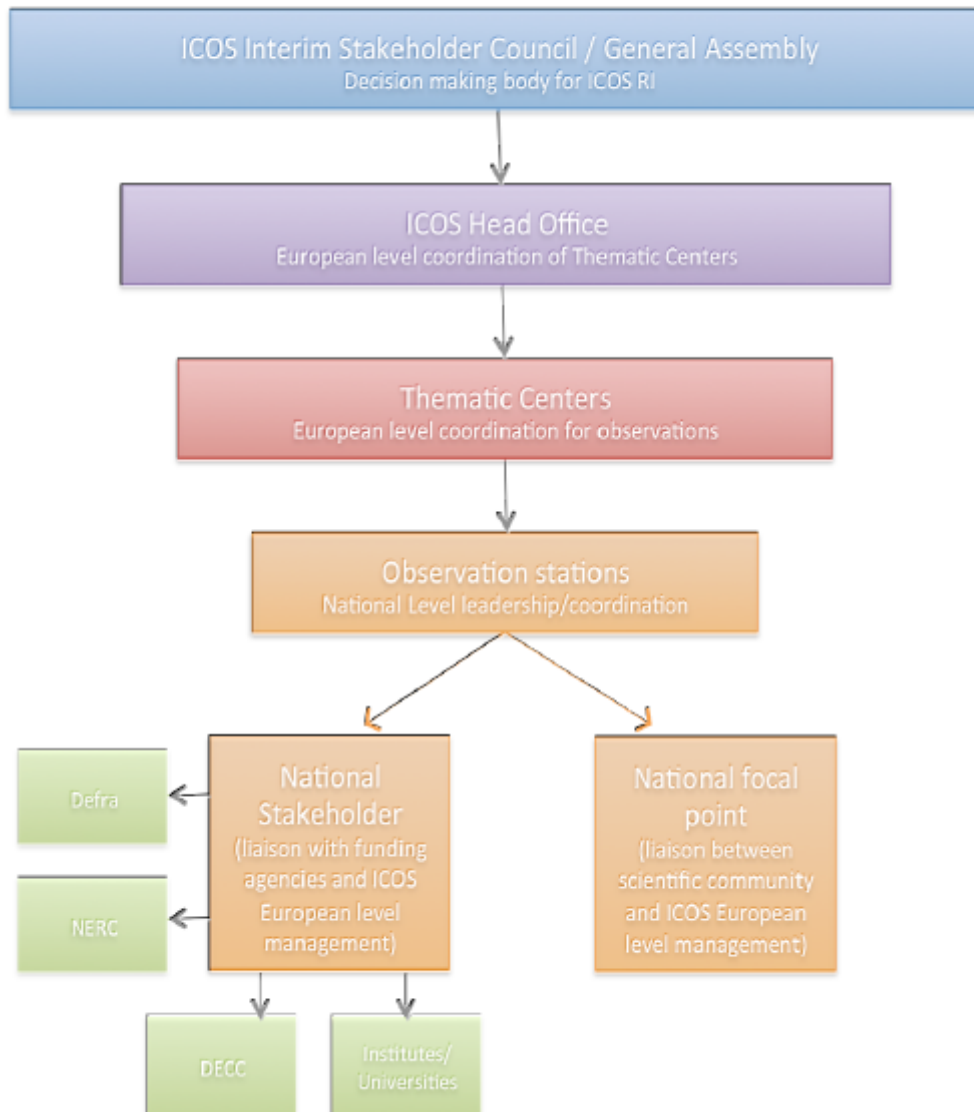


- Future evolution of our actions and terrestrial and marine sinks will regulate
 - Atmospheric CO₂
 - Climate
 - Ocean pH and any associated changes in marine ecosystems
 - Probably the capacity of the oceans to assimilate carbon
- Natural carbon cycle much larger than anthropogenic perturbation
- Need long term joined up programme across countries, agencies, research groups to address this

What is ICOS?

- European Research Infrastructure (like Argo, CERN ...)
- Aligning European efforts to:
 - Understand the greenhouse gas budgets and perturbations
 - Secure longer term funding for measurements
 - Track Carbon fluxes
 - Monitor and assess GHG reduction activities

Management of ICOS



- Semi hierarchical structure
- Science feeds into Thematic Centers
- Thematic Centers responsible for:
 - Data coordination
 - Technology innovation
 - QC
 - Submission to carbon portal
 - Flux calculations and production of synthesis products
- National focal point contact for science community
- National Stakeholder contact for national funders

Legal structure

- ICOS is constituted via an ERIC – European Research Infrastructure Consortium
- An ERIC is a legal agreement signed by funding bodies of participating countries.
- It gives ICOS a legal status – it's not just an informal arrangement.
- Founding members: Germany, Finland, Sweden, France, Belgium, Italy.
- Founding observers: Norway, Switzerland.
- UK, Czech Republic, Ireland, Netherlands, still to sign
- Others? (Denmark, Estonia)

Why be part of ICOS?

- By becoming a fully paid member of ICOS member states will benefit from:
 - developments and developing cutting-edge GHG measurement
 - techniques and processes,
 - Support in station instrumentation, protocols and training,
 - Get measurement data in a harmonized and processed pool of open world class GHG database.
 - Access to EU capital funding available through the EU Infrastructure Roadmap
 - Access to national capital funding available through the UK RI roadmap

Chronology

- UK ICOS committee established at UK GHG Townhall January 2015
- Meeting II to shortlist stations April 2015
- Meeting III to sign off report Aug 2015
- Meeting IV in Edinburgh 5 Nov
- NOC providing administrative and legal support

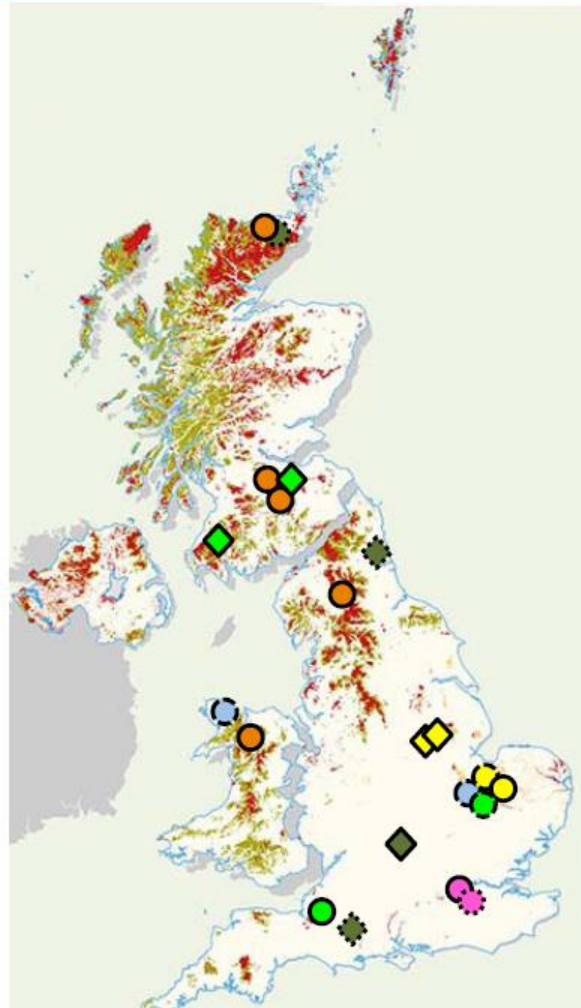
Name	Sector	Employer
Grant Forster	Atmosphere	UEA/NCAS
Tom Gardiner	Atmosphere	NPL
Alastair Manning	Atmosphere	University of Bristol
Andrew Manning	Atmosphere	UEA
Stephan Matthiesen	Atmosphere (GHG programme manager)	University of Edinburgh
David Lowry	Atmosphere	Royal Holloway
Euan Nisbet	Atmosphere	Royal Holloway
Simon O'Doherty	Atmosphere	University of Bristol
Eiko Nemitz	Ecosystem	CEH
James Morisson	Ecosystem	Forest Research
Matt Wilkinson	Ecosystem	Forest Research
Dorothee Bakker	Marine	UEA
Anna Jones	Marine	BAS
Naomi Greenwood	Marine	CEFAS
Phil Nightingale	Marine	PML
Ute Schuster	Marine	University of Exeter
Richard Wood	Marine	Met Office
TBC ⁶	(UK-ICOS project manager)	TBC
Richard Sanders	Marine (UK ICOS Stakeholder)	NOC
Andrew Watson	Marine (UK ICOS Focal Point)	University of Exeter

Elements of UK ICOS

- Observing systems
 - Capital – currently supported via diverse funding streams - request in to NERC for longer term support
 - People – HEIs, NERC, FC
 - Funding – NERC, DECC, DEFRA, FC
- OTC
 - Coordination of observing systems (PML)
 - Technology innovation (NOC)
 - Data Management (UEA)
 - Data Synthesis (Exeter)
 - Engagement with Shipping industry (NOC)
- Subscription (around 50K per annum, ultimately recovered to run OTC)

Terrestrial sites

UK CO₂ flux network – all sites



- Blanket bog
 - Fen
 - Arable
 - Grassland
 - Forest
 - Urban
-
- Site on peat
 - ◆ Site on mineral soil
 - Site operated in partnership with university
 - Site operated by university / Forest Research

Atmospheric sites

DECC & GAUGE tall tower network

Mace Head



Ridge Hill



Heathfield



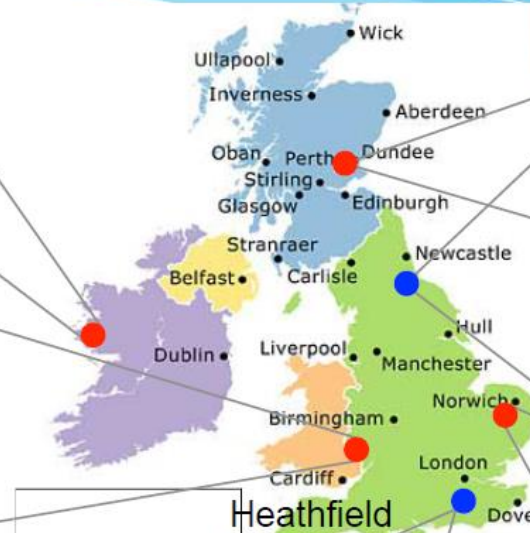
Bilsdale



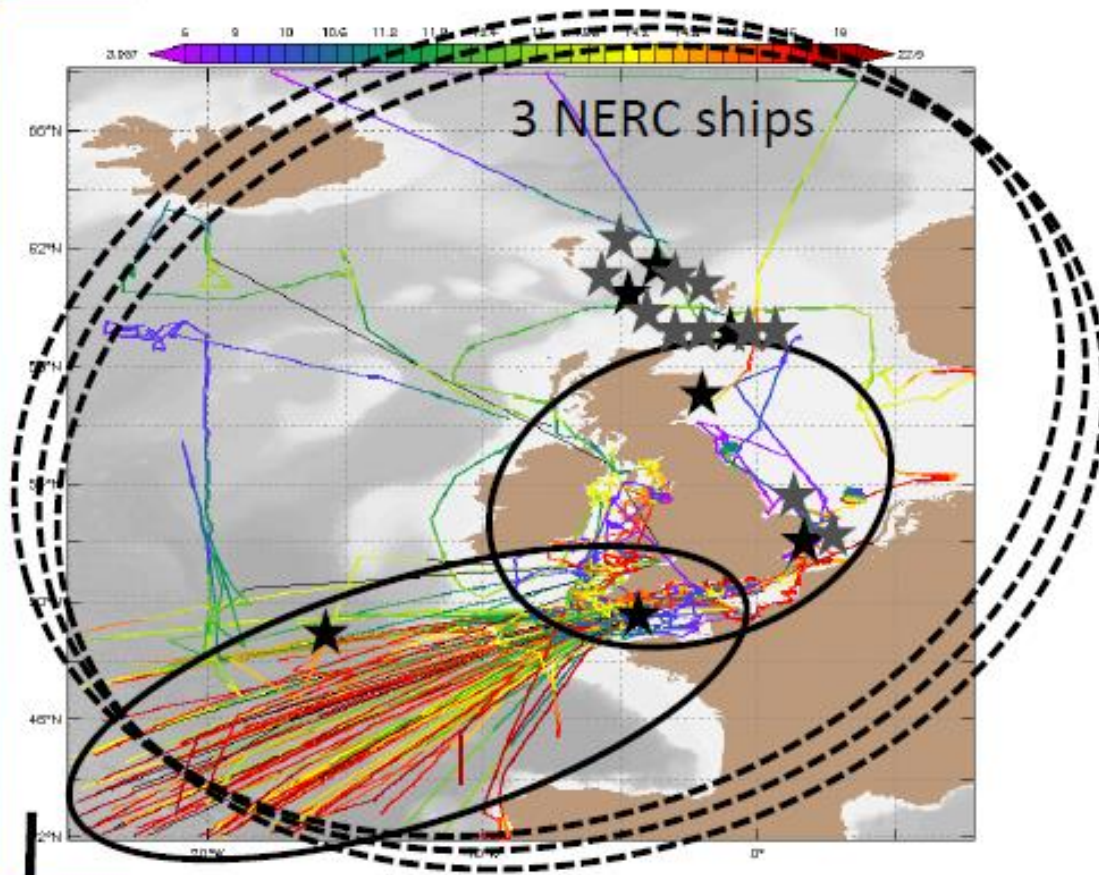
Angus



Tacolneston



Marine sites



UK data only

24.5°N
section

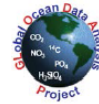
<i>Station Name⁷</i>
<i>Porcupine Abyssal Plain Sustained Observatory</i>
<i>UK – Caribbean VOS line</i>
<i>Western Channel Observatory</i>
<i>James Clark Ross/AMT</i>
<i>Warp SmartBuoy</i>
<i>RV Cefas Endeavour</i>
<i>Marine Scotland⁸</i>

Ocean Thematic Centre (1)

SOCAT

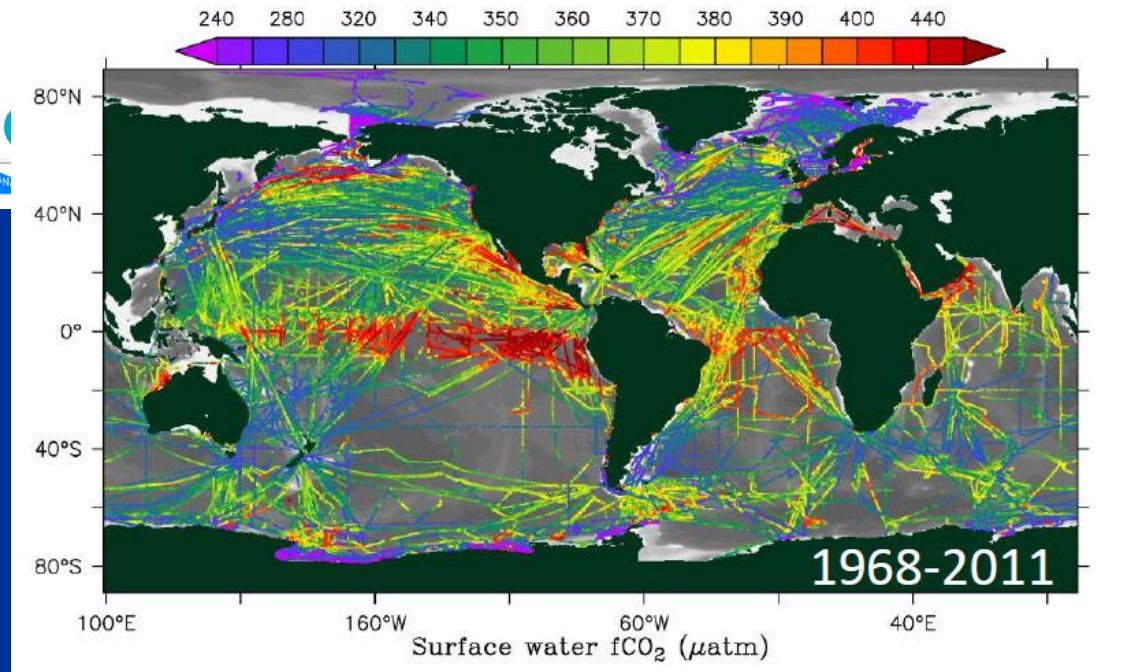


Surface Ocean CO₂ Atlas (SOCAT)
Global Data Analysis Project Version 2 (GLODAPv2)
Surface Ocean pCO₂ Mapping Intercomparison (SOCOM)



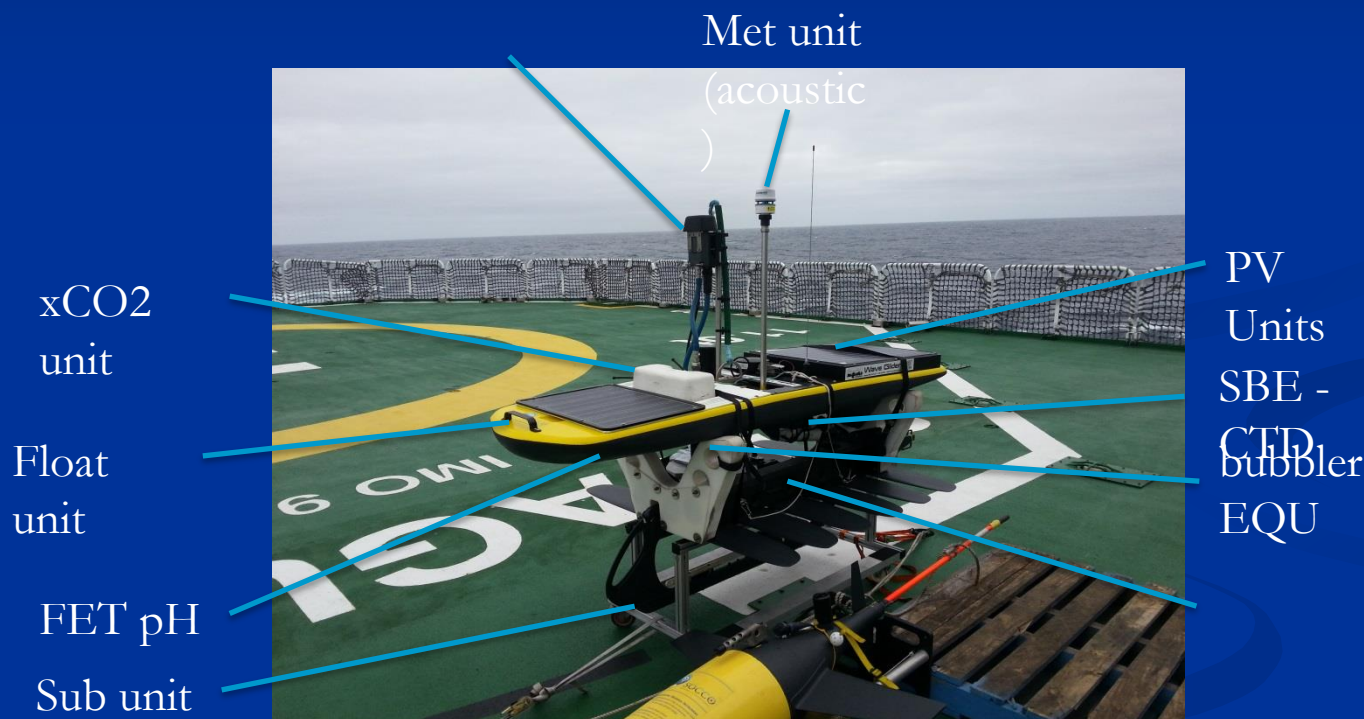
Dorothee Bakker,

Are Olsen, Kevin O'Brien, Mario Hoppema, Robert Key, Alex Kozyr, Steve Jones,
Camilla Landa, Siv Lauvset, Nicolas Metzler, Yukihiro Nojiri, Benjamin Pfeil, Christian Rödenbeck,
Ute Schuster, Karl Smith, Bronte Tilbrook, Rik Wanninkhof, Andrew Watson
and all >>100 international SOCAT, GLODAPv2 and SOCOM contributors



Ocean Thematic Centre (2)

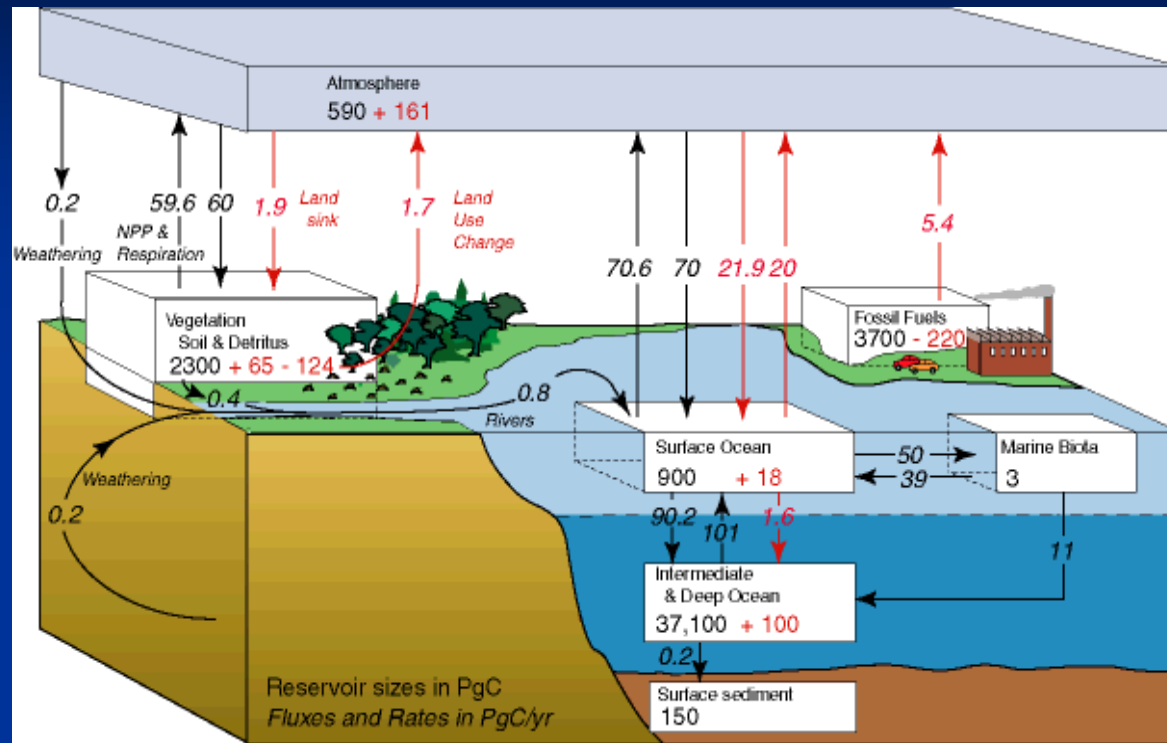
Technology Innovation to tackle southern ocean winter data desert



Summary

- ICOS internationally formally established
- UK Community organised and speaking with one voice - sites selected
- Legal work underway supported by NOC
- Once complete (estimate this autumn) need to pay subscription and give legal life to UK ICOS
- Request that Funding agencies (Marine + others) conduct internal dialogue to agree how to handle this
- NOC can facilitate this discussion

Anthropogenic perturbation is small relative to natural carbon cycle



- Net Ocean and terrestrial biosphere uptake is small difference between some very large numbers
- Hard to measure well – needs coordinated approach at many levels (between agencies, between research groups, between nations)