Global Change:

Working together on the evidence base

Phil Ineson & James Stockdale

Stockholm Environment Institute at York

Welcome to SEI York

The Stockholm Environment Institute at York is one of the constituent centres of the Stockholm Environment Institute, an independent, international research organisation committed to the implementation of practices supportive of global sustainable development.

SEI conducts a comprehensive research, consulting and training programme which focuses on the links between the ecological, social and economic systems at global, regional and national and

Themes

SEI is organised around four themes:

- Reducing climate risk
- Managing environmental systems
- Transforming governance
- Rethinking development

Projects

SEI at York have participated in a number of projects. An A-Z of projects is available.

News

Improved REAP-Petite for Climate Week

Monday 4 March 2013

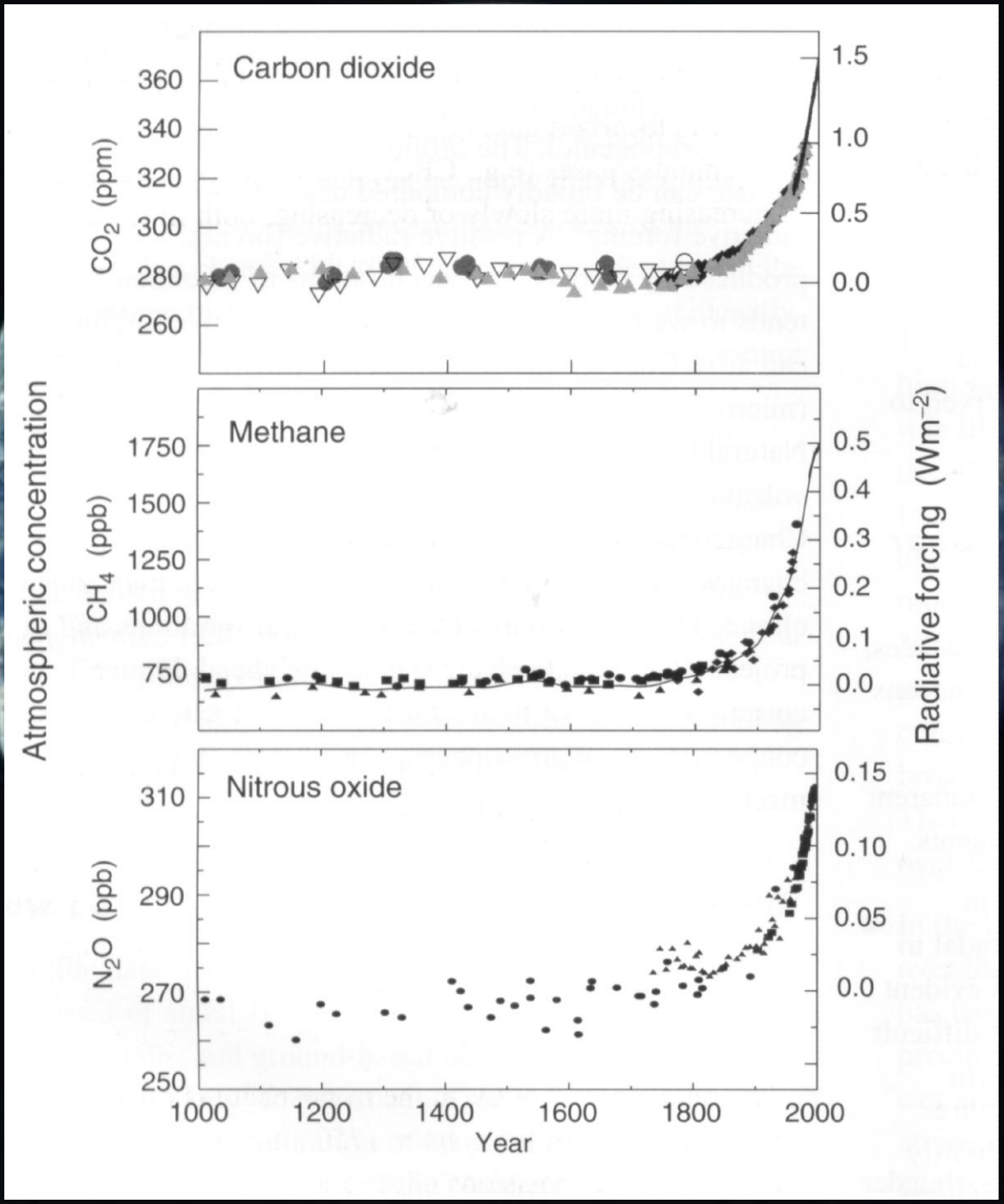
Measure the impacts of your energy, travel, shopping and hobbies

SEI ranked as 6th Environment "Think Tank" in the World

Friday 25 January 2013

SEI improves its position for the third year in a row.

Events


Carbon dioxide
Methane
Nitrous oxide
Atmospheric concentration
CO_2 (ppm)
CH_4 (ppb)
N_2O (ppb)
Radiative forcing (Wm^{-2})
Year
360
340
320
300
280
260
1750
1500
1250
1000
750
310
290
270
250
1.5
1.0
0.5
0.0
0.5
0.4
0.3
0.2
0.1
0.0
0.15
0.10
0.05
0.0
1000
1200
1400
1600
1800
2000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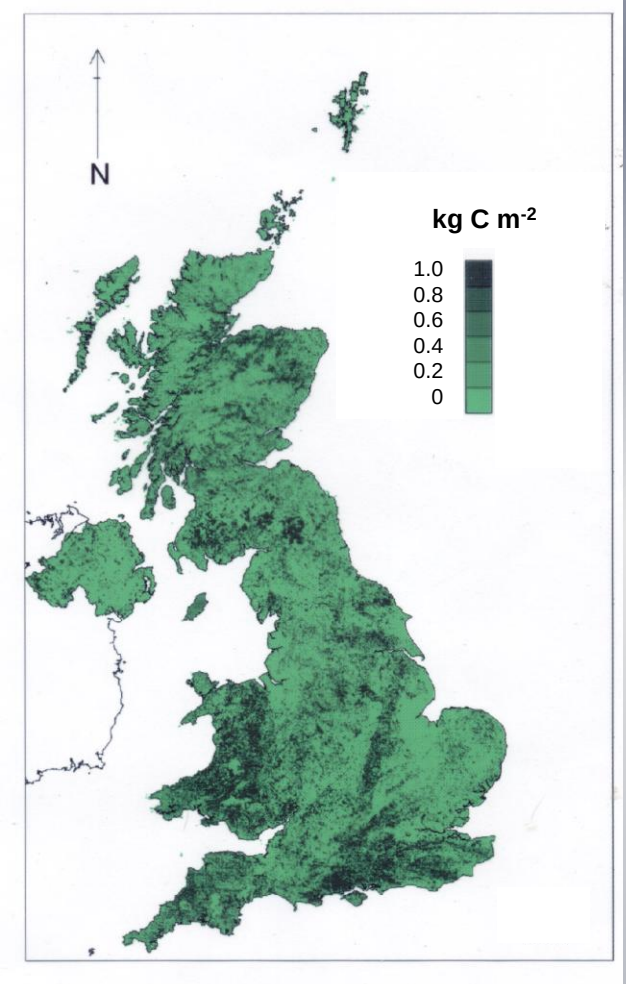
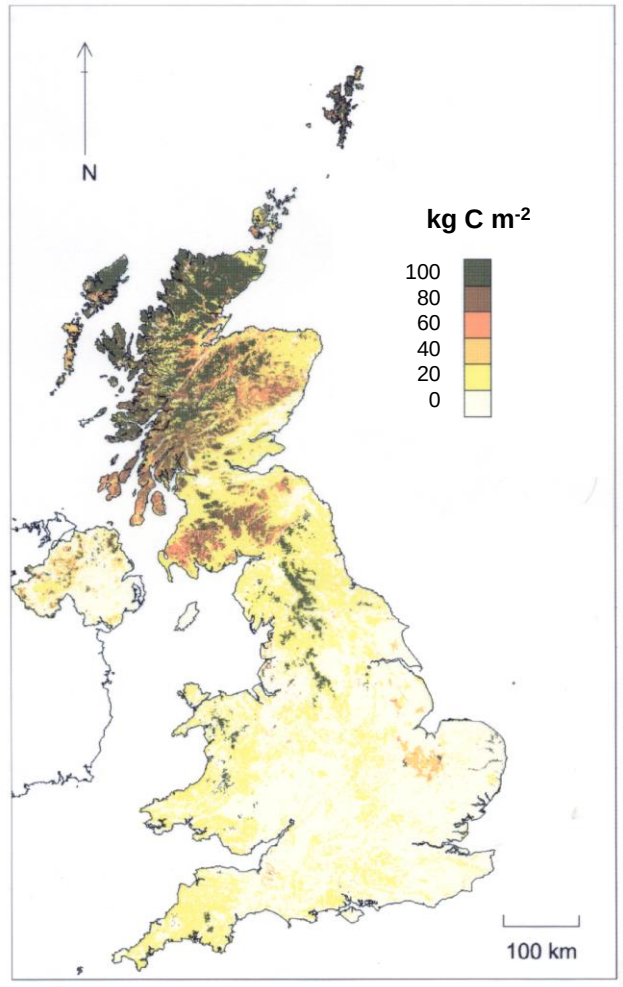
a) vegetation



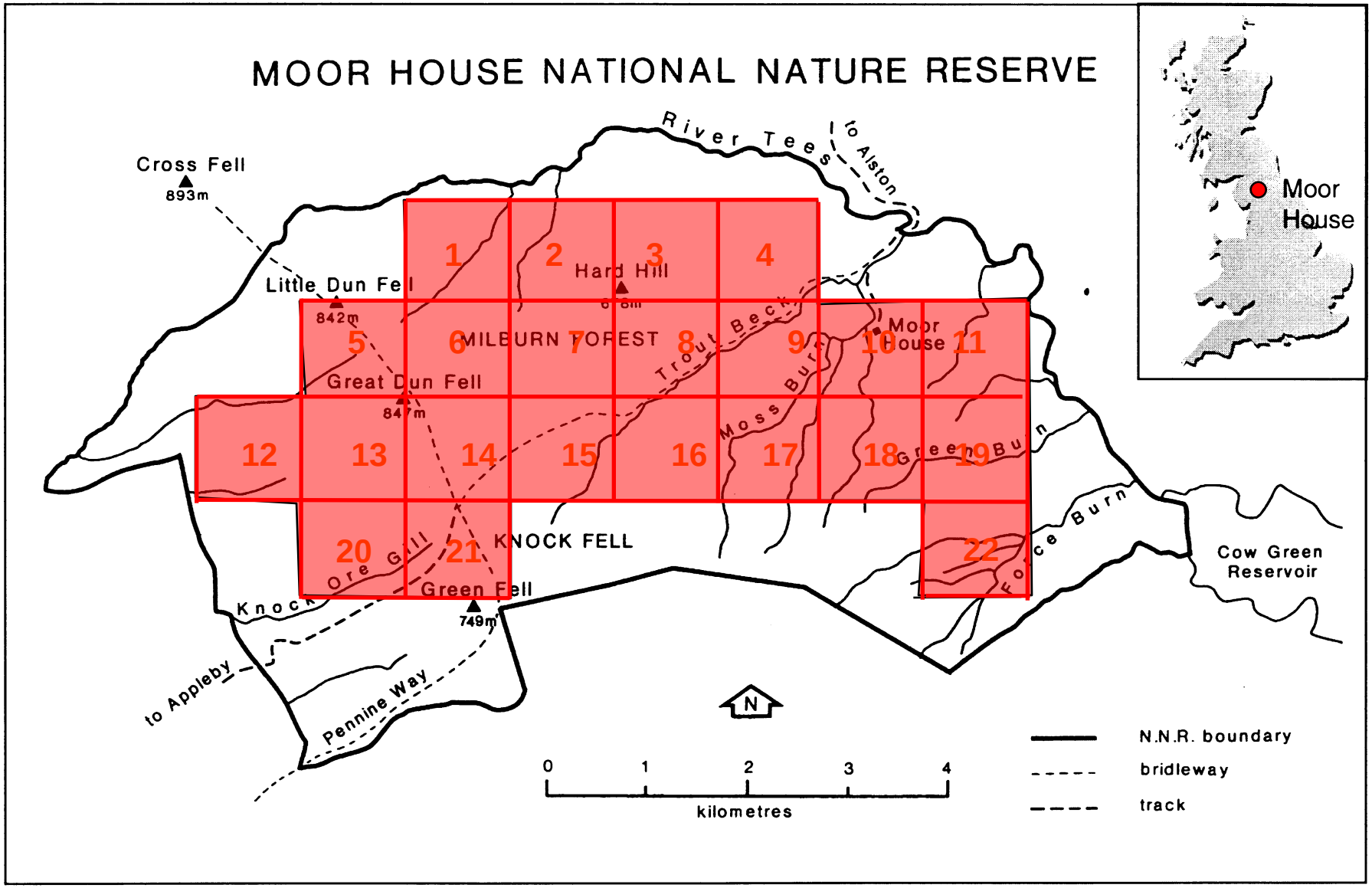
b) soils



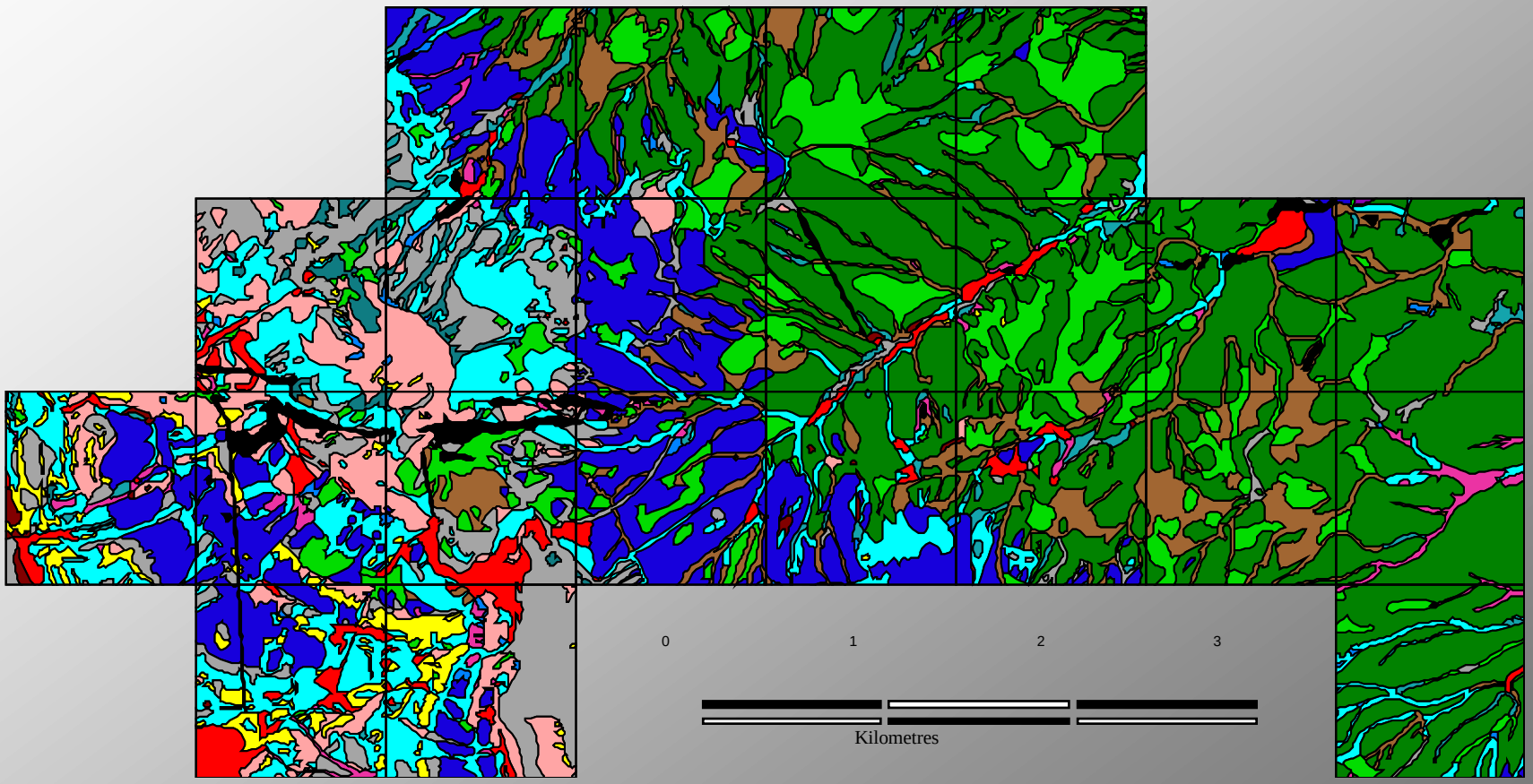
Terrestrial carbon stores in the UK

Moor House: National Nature Reserve, IBP Site & NERC Environmental Change Network Site

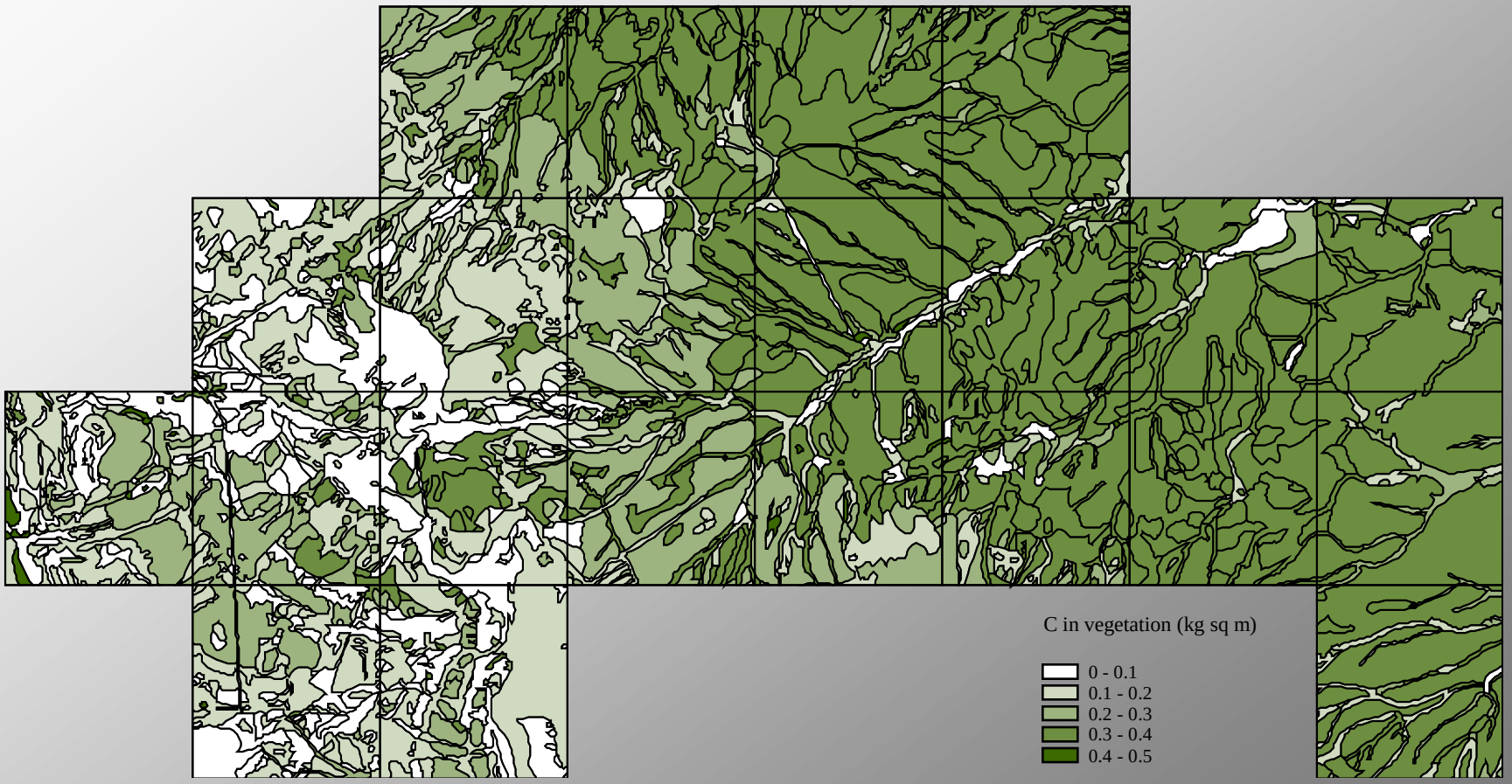
Carbon stores in an upland soil



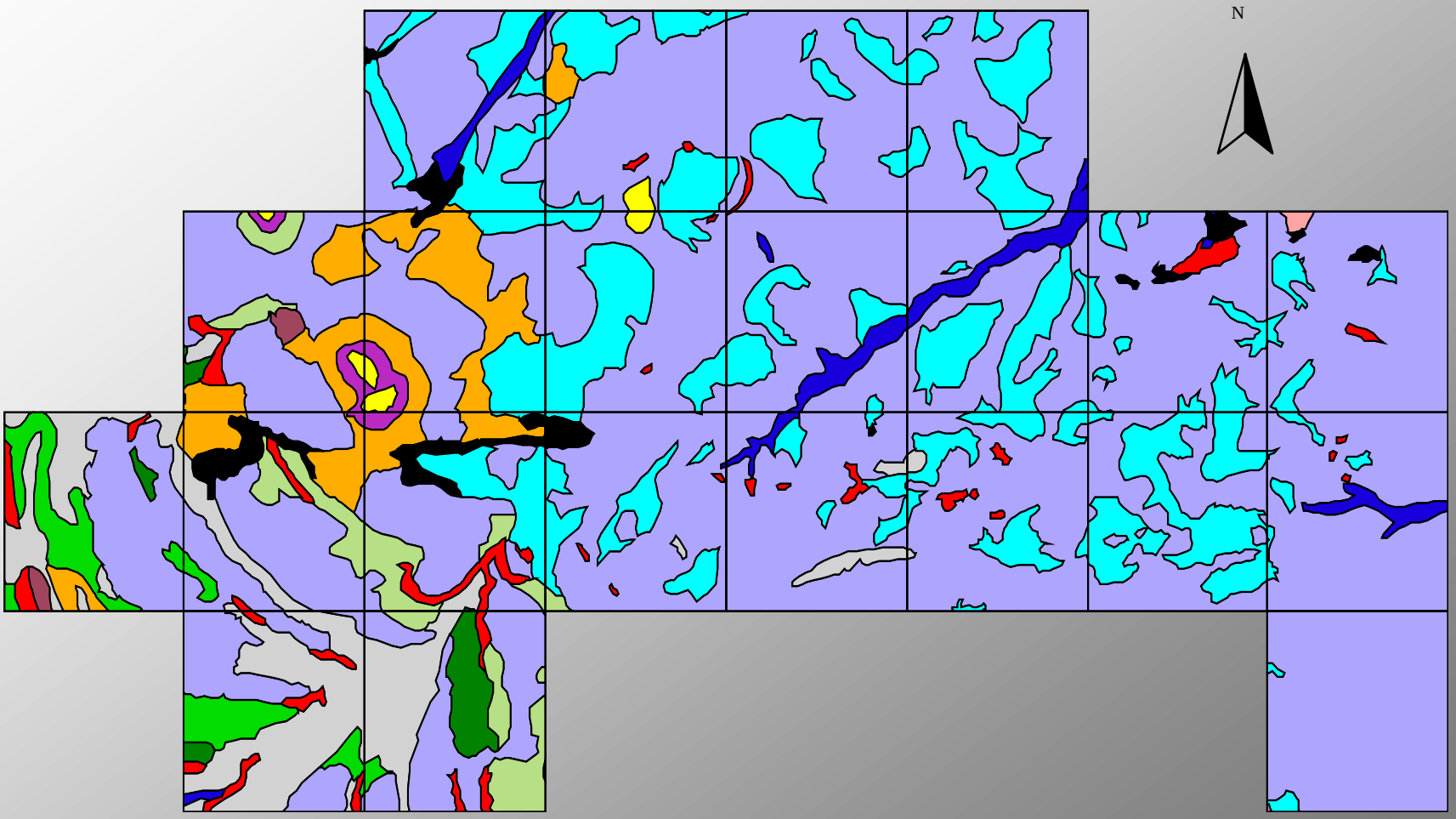
Moor House: Vegetation map



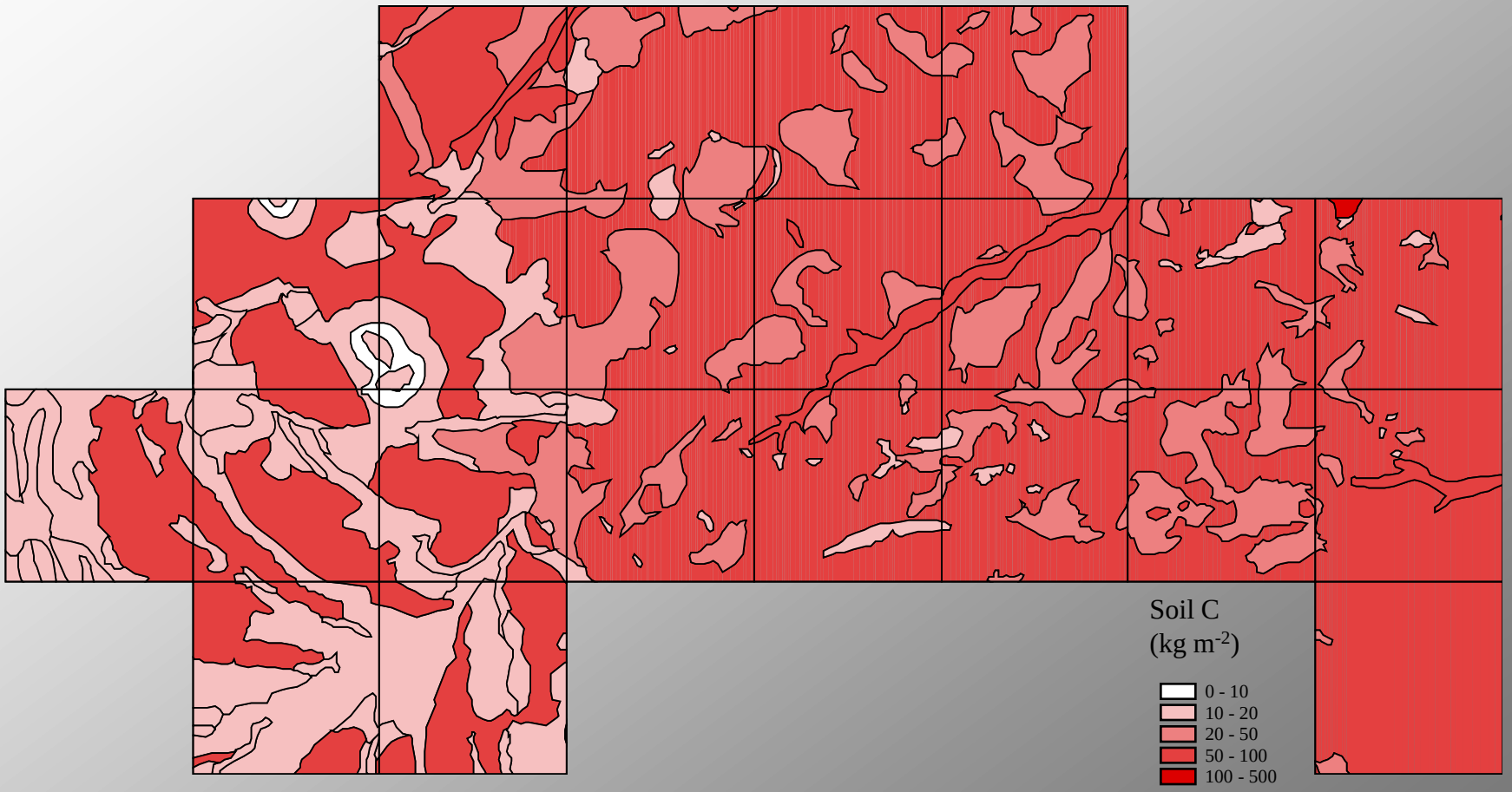
Carbon in vegetation map of Moor House



Soil map of Moor House

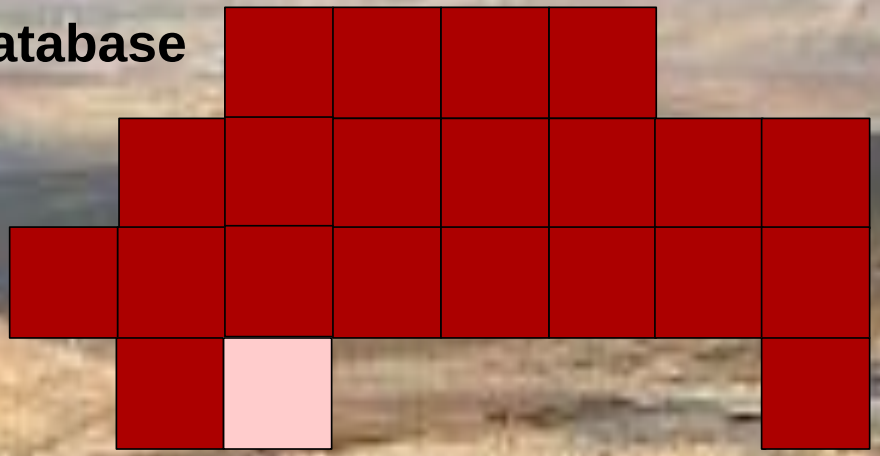


Map of soil C for Moor House



Soil C at Moor House: National database and detailed study

National database

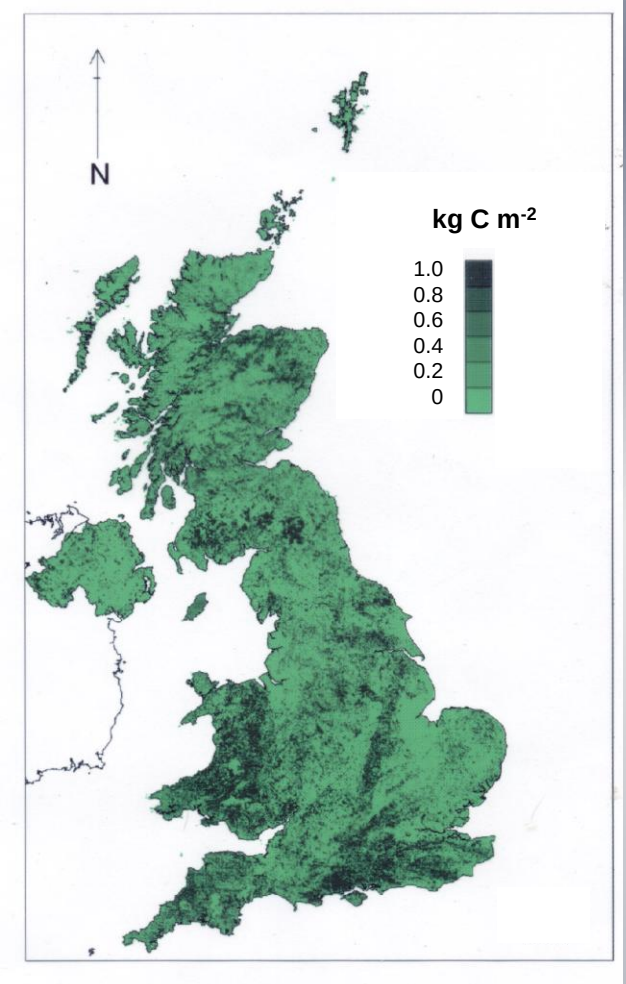


Soil C
(kg C m^{-2})

- 00 - 25
- 26 - 50
- 51 - 75
- 76 - 100
- 101 - 125

Current detailed study

a) vegetation



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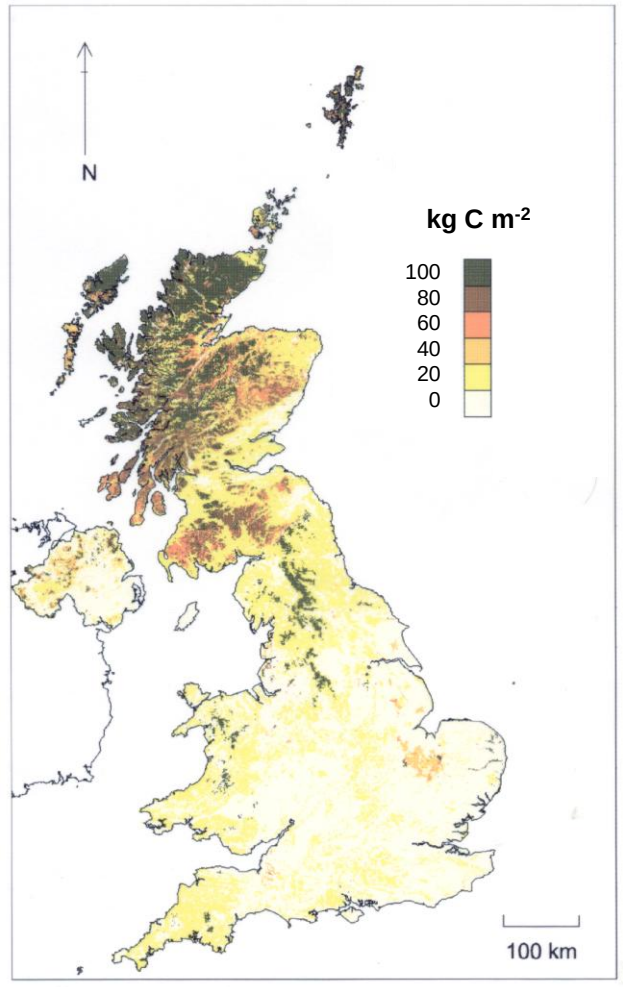


Terrestrial carbon stores in the UK

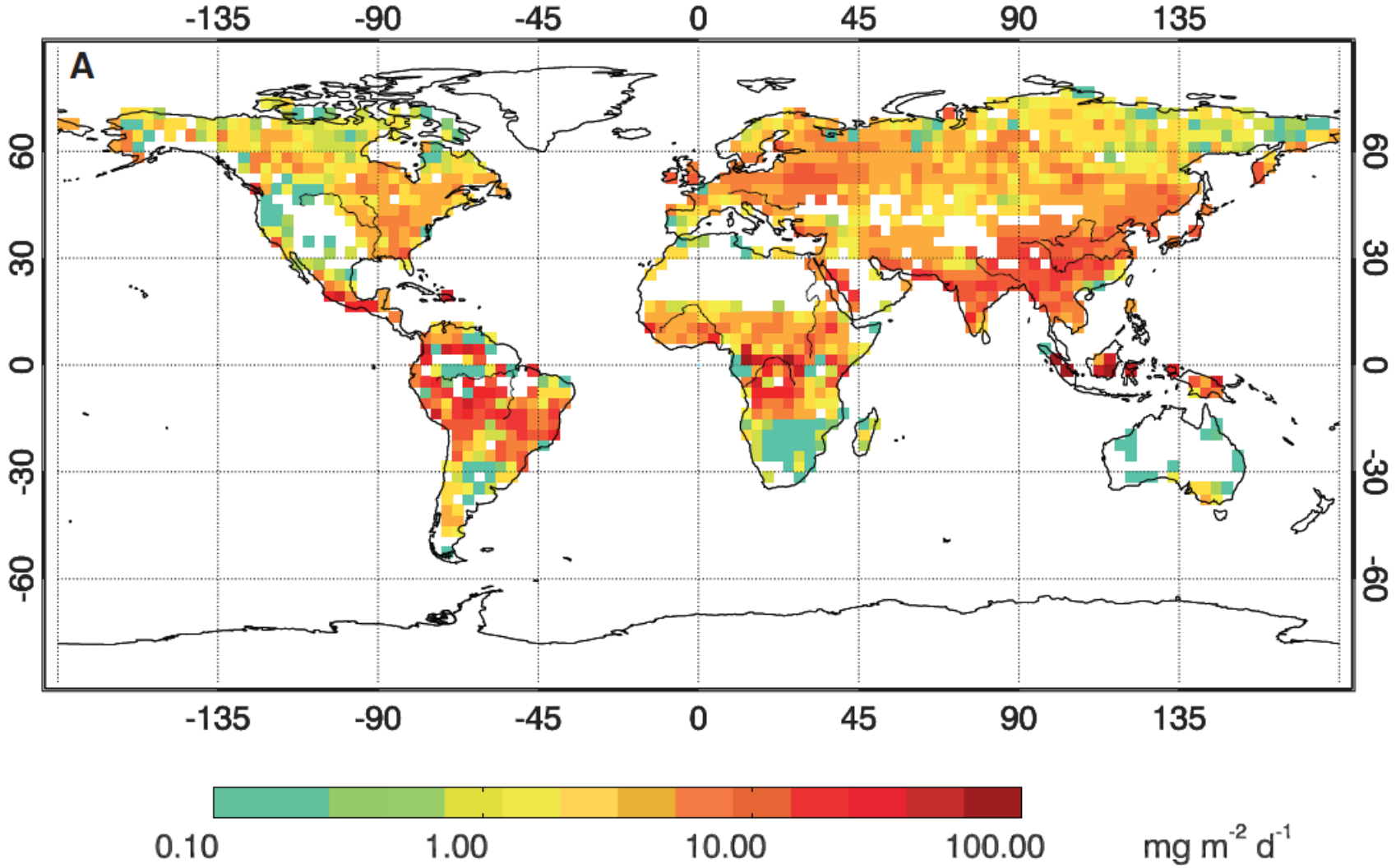
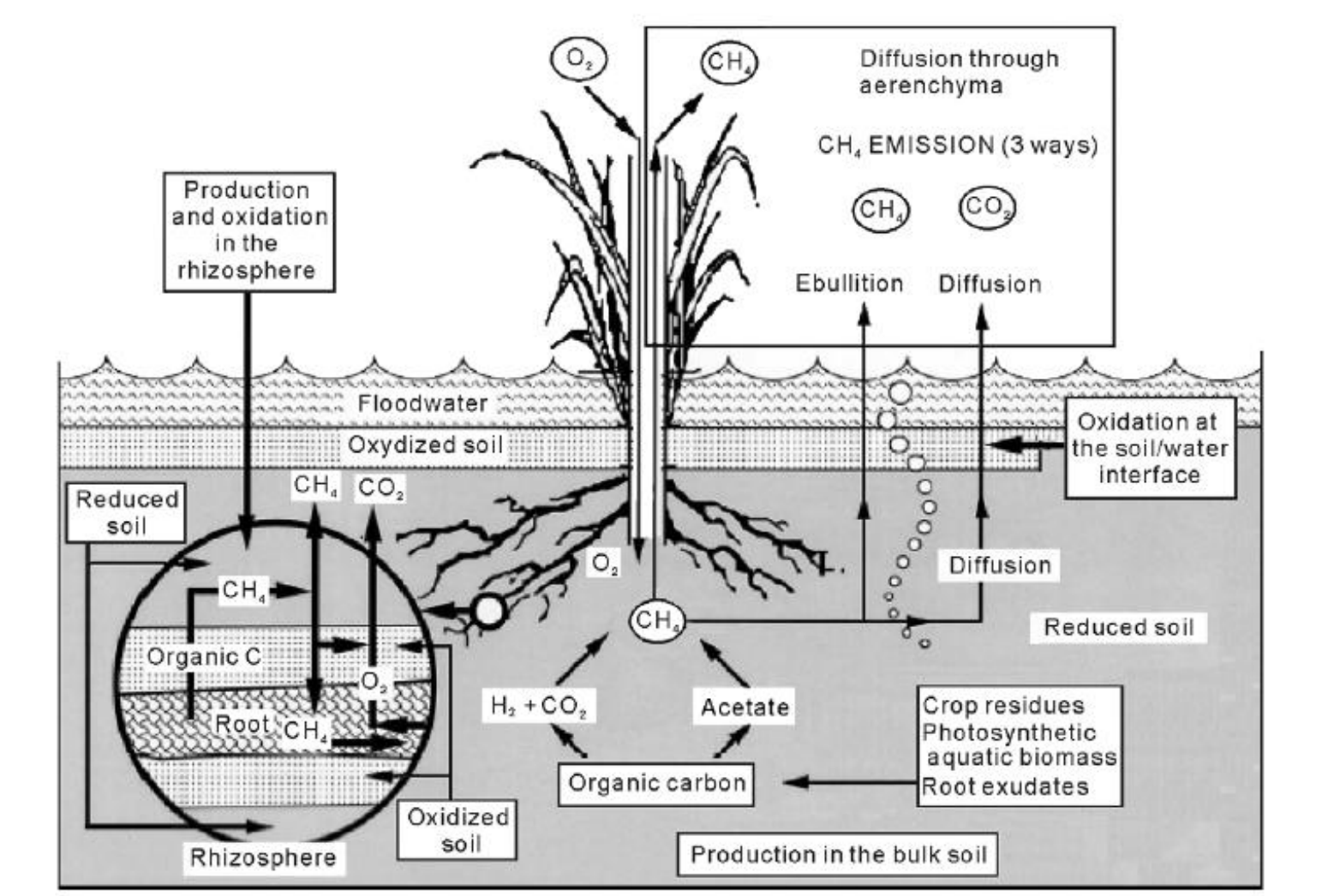


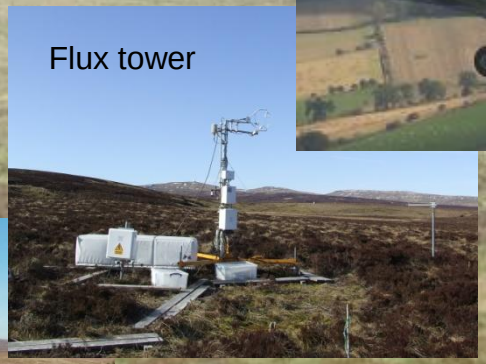
Fig. 3. (A) Logarithmic representation of wetland daily emissions of CH_4 per unit of area inferred from fitting a temperature-groundwater wetland model to SCIAMACHY CH_4 concentrations averaged on a 3° × 3° grid over 2003–2005. The normalized wetland and rice paddy emission distribution was scaled to 227 Tg of CH_4.

GHG production and transport



Lai (2009)


Aircraft


Flux tower


Cloche


Cover box

Annual study - vegetation types

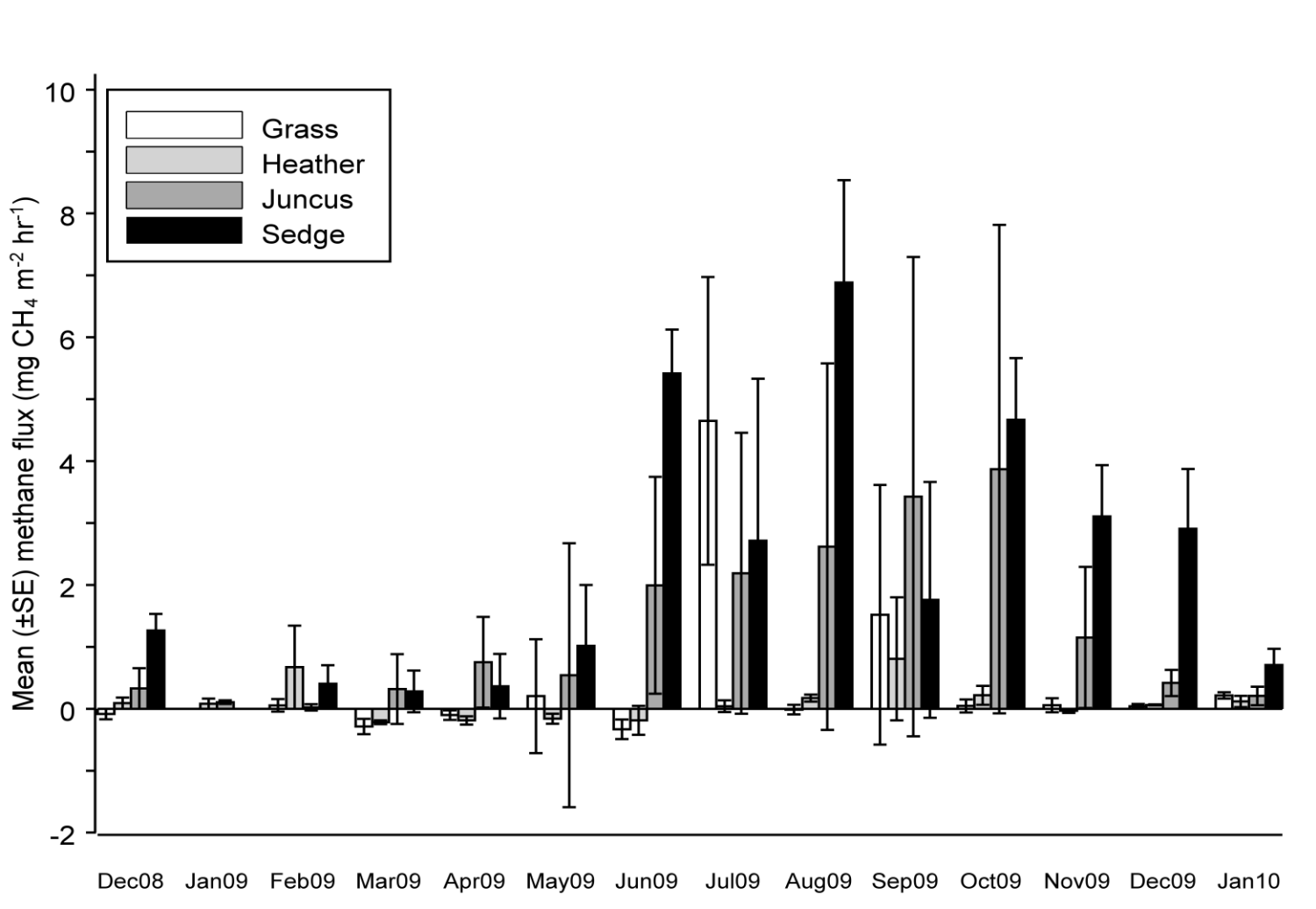
Heather – *Calluna vulgaris*

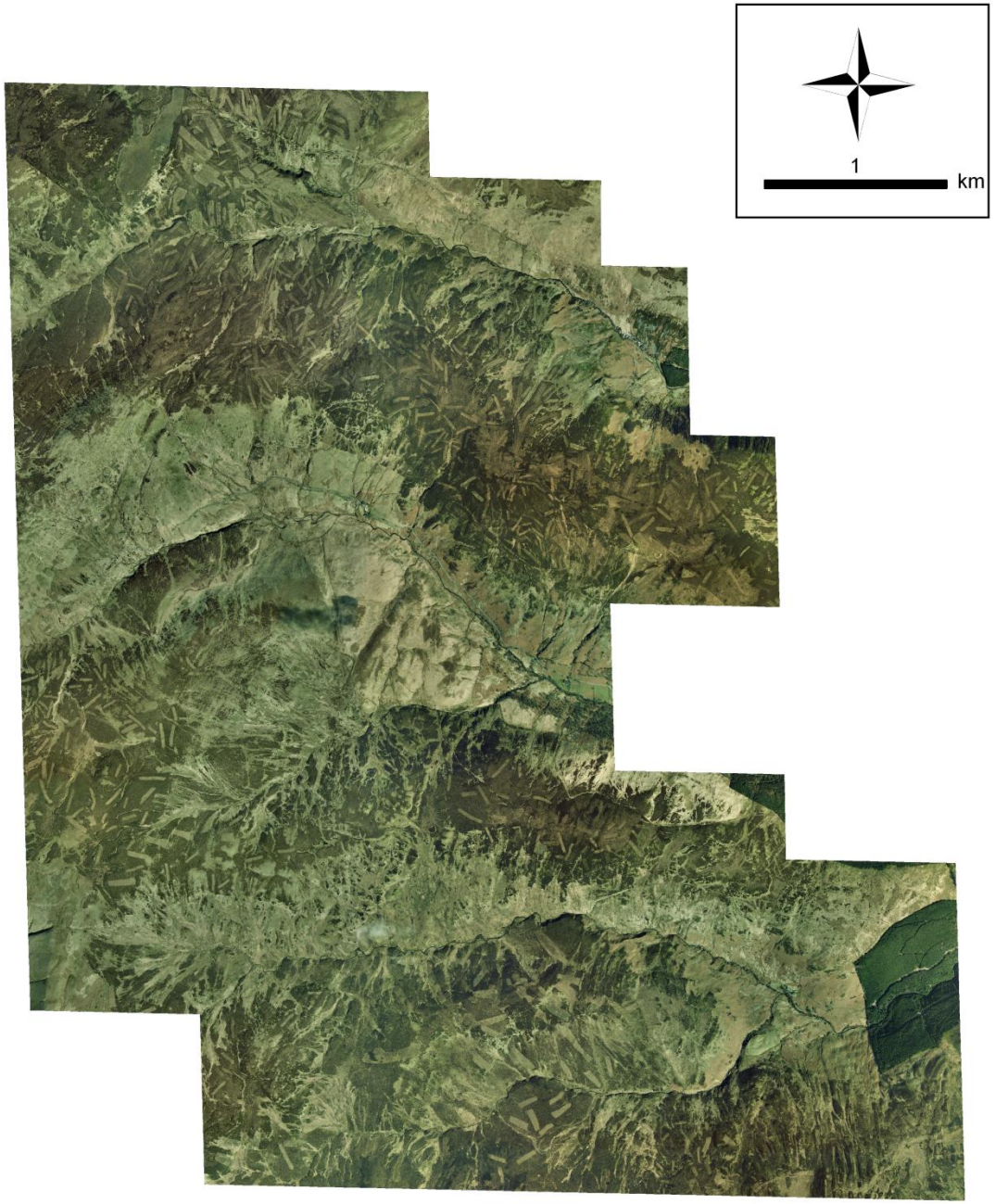
Grass dominated

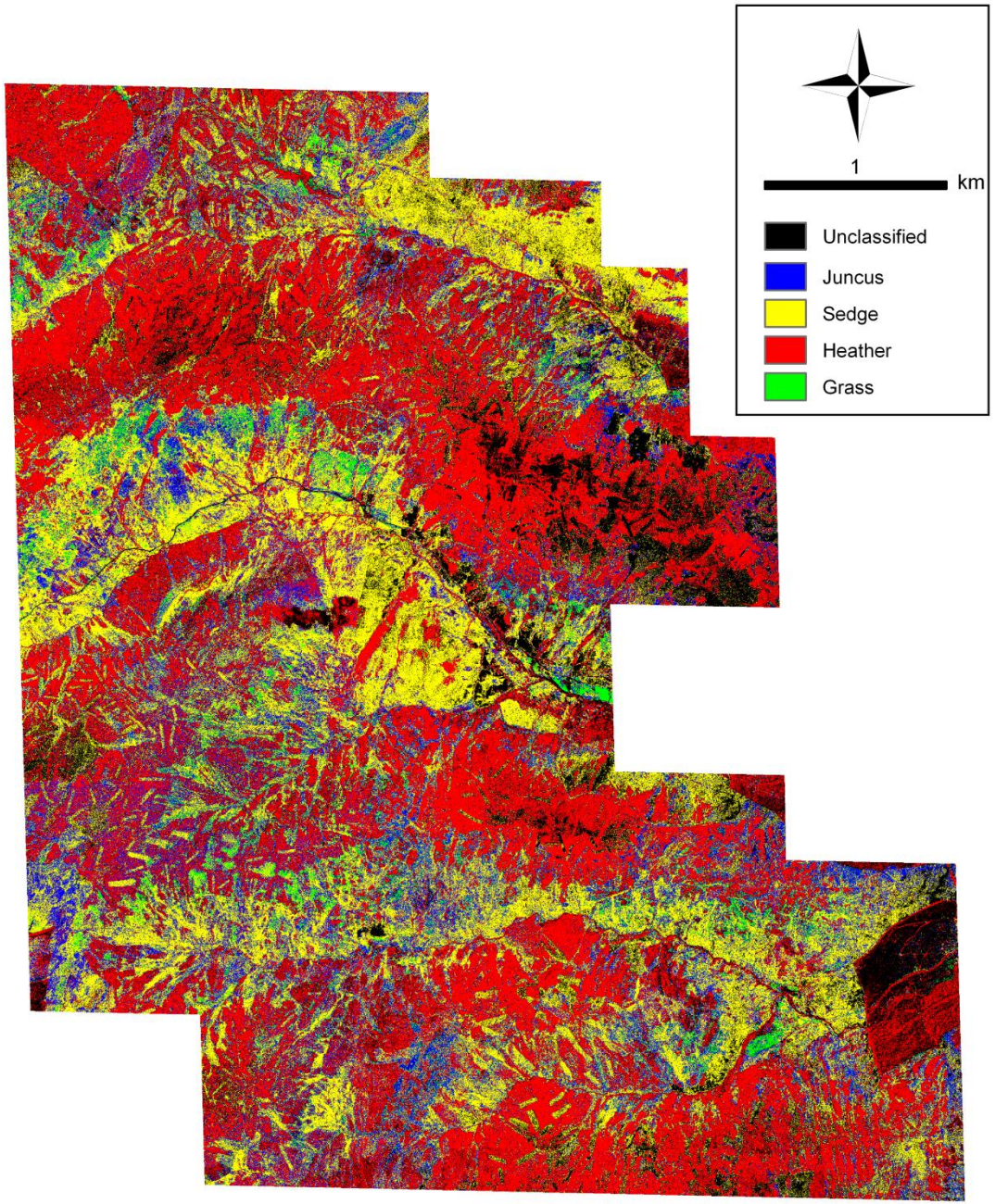
Sedge –*Eriophorum vaginatum*

Soft rush - *Juncus effusus*

Annual study: 2009 – 2010; CH_4

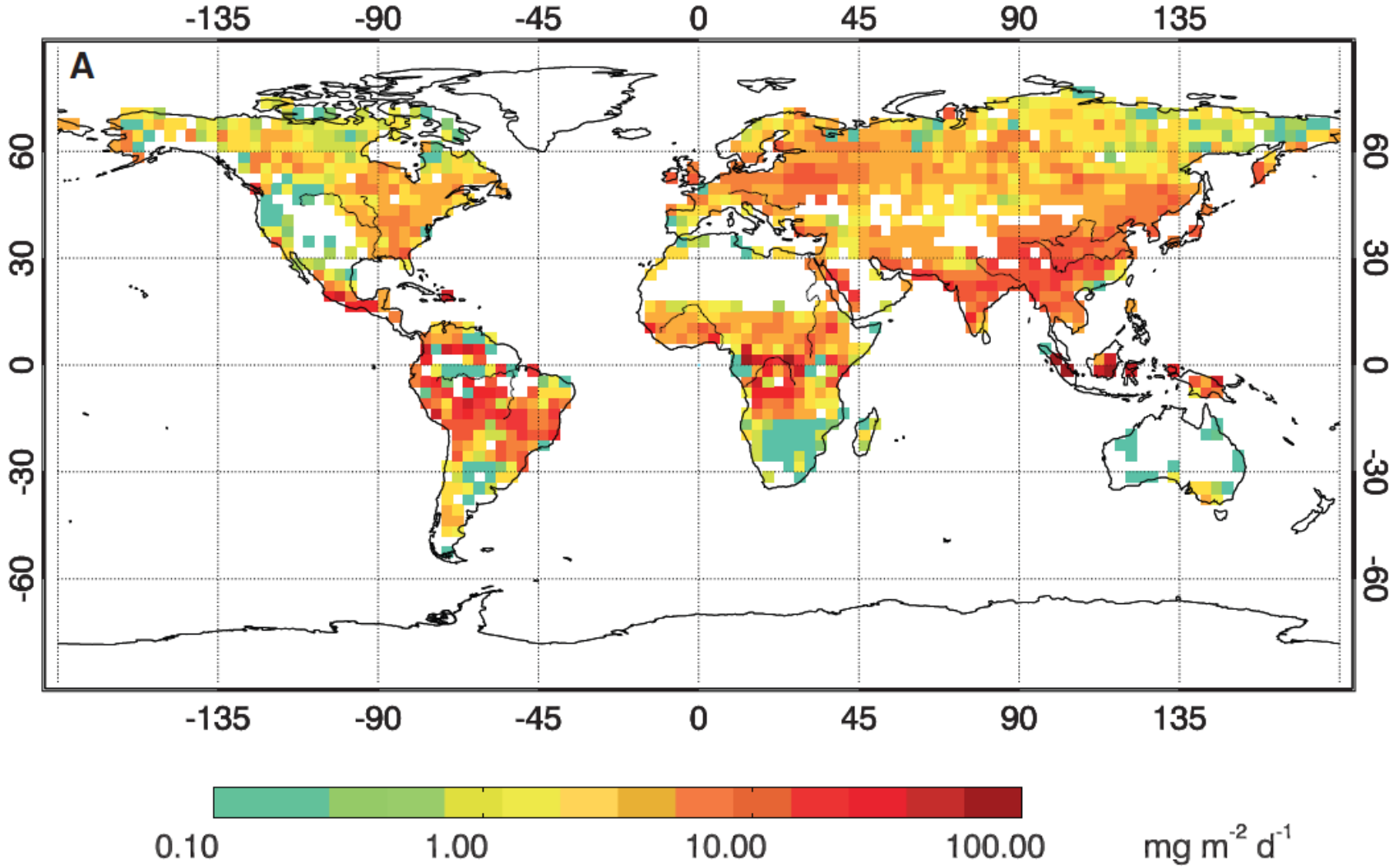



1
km


1
km
Unclassified
Juncus
Sedge
Heather
Grass

Impact of vegetation classification errors on annual landscape estimates of CH_4 and CO_2 fluxes. Different methods of estimating the proportional coverage of each vegetation class provide (i) the best estimate and (ii) the most extreme estimates of landscape fluxes.

Estimate	Proportional coverage (%)				Annual landscape flux (SE)	
	Grass	Heather	Juncus	Sedge	Methane ($g\ CH_4\ m^{-2}\ year^{-1}$)	Respiration ($kg\ CO_2\ m^{-2}\ year^{-1}$)
Best	3.4	34.3	17.9	27.8	9.8 (3.8)	3.5 (0.6)
Lowest CH_4	3.0	40.9	15.5	24.1	8.6 (3.7)	
Highest CH_4	3.0	29.7	15.5	35.3	11.1 (3.8)	
Lowest CO_2	3.0	40.9	15.5	24.1		3.2 (0.6)
Highest CO_2	3.0	29.7	26.7	24.1		3.9 (0.6)



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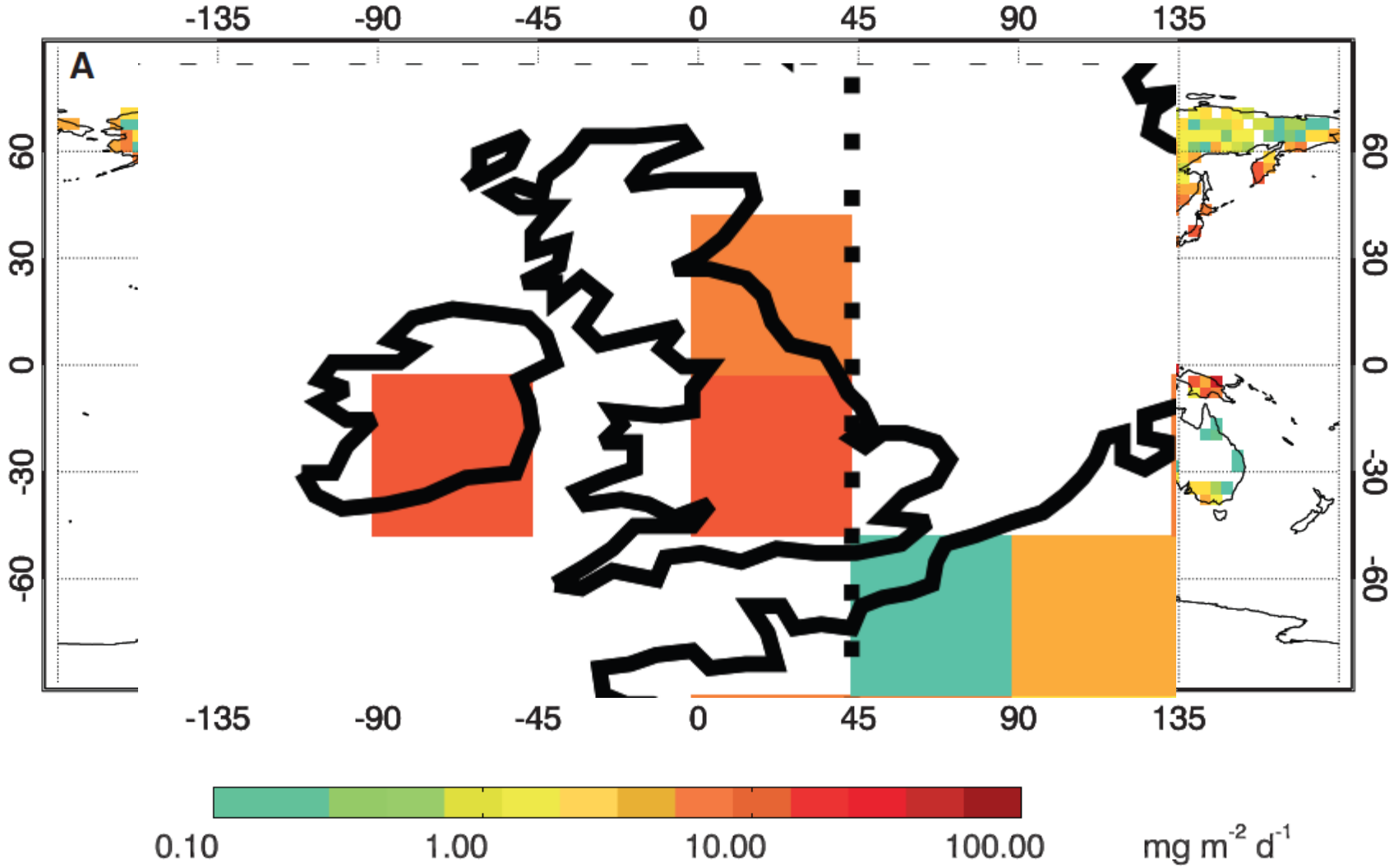
Bloom *et al.* (2010)



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Bloom *et al.* (2010)


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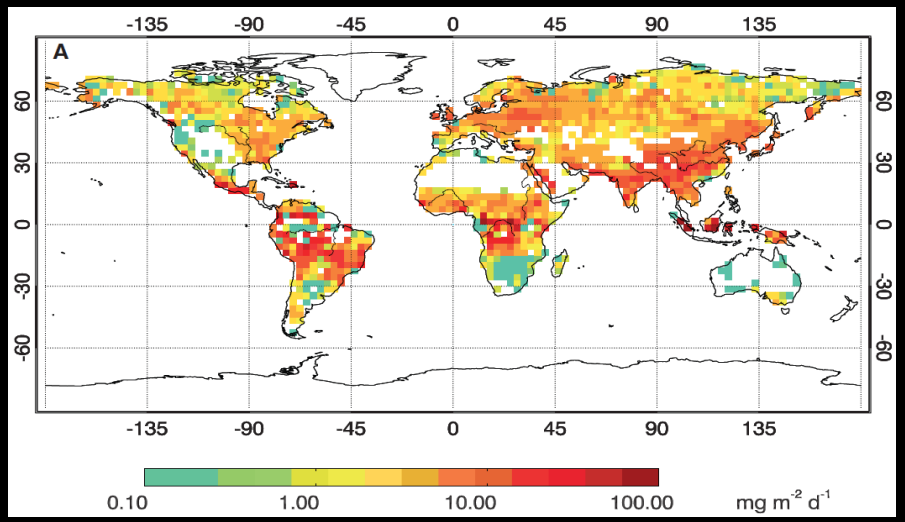
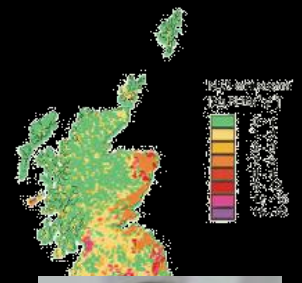
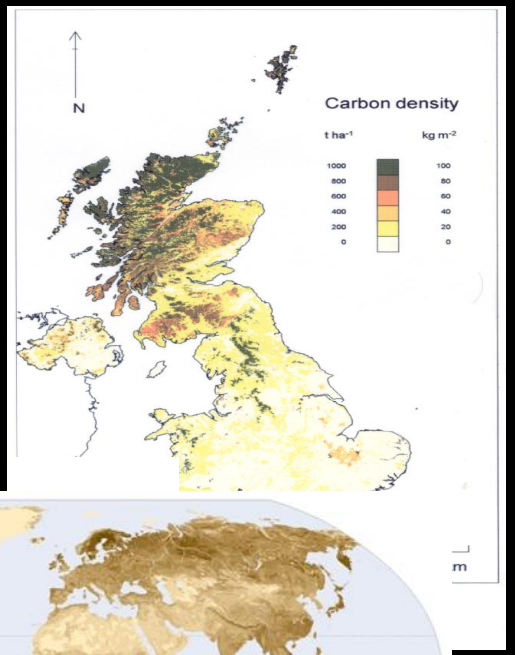
Maps that don’t convey underlying uncertainties





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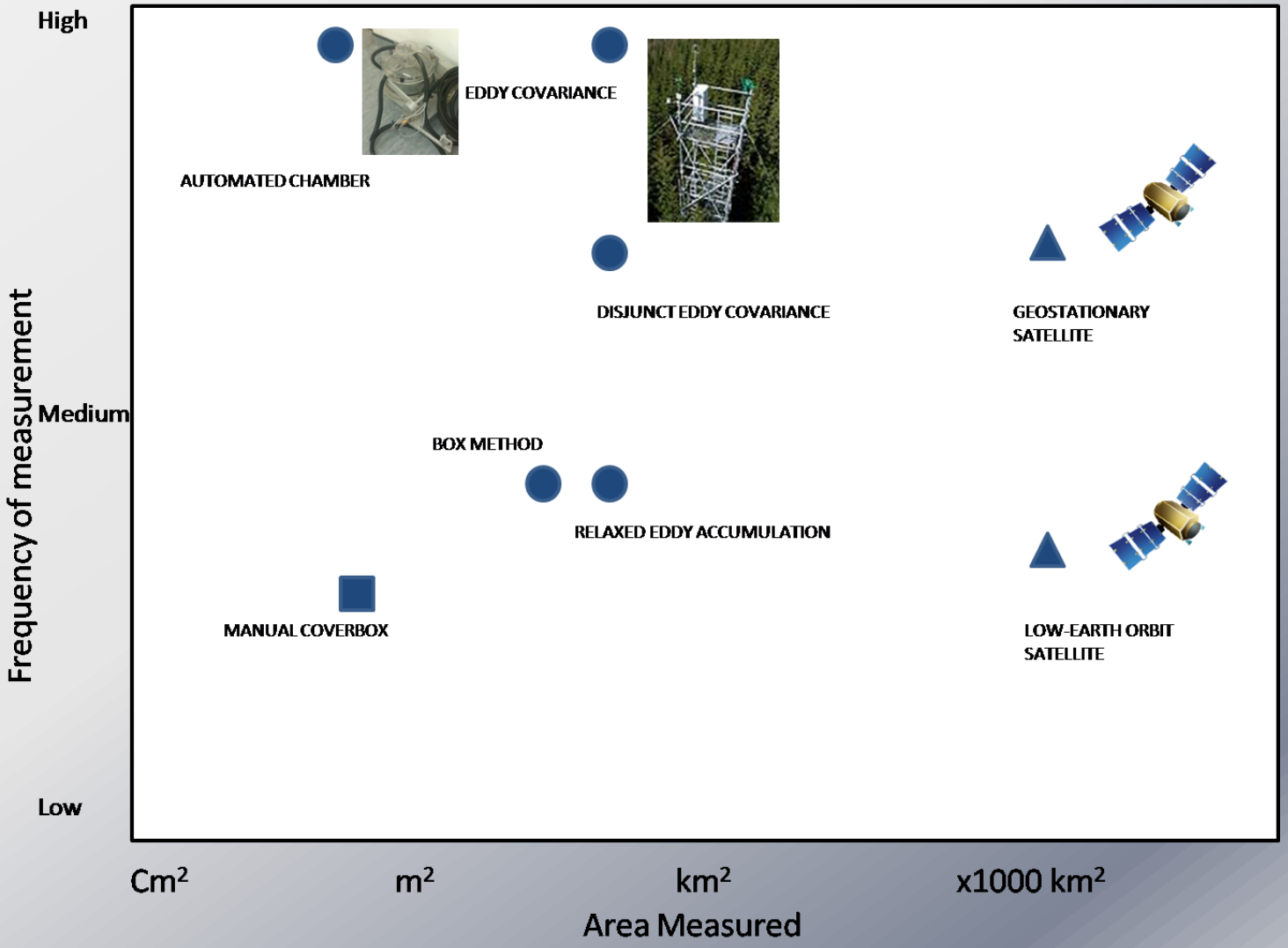
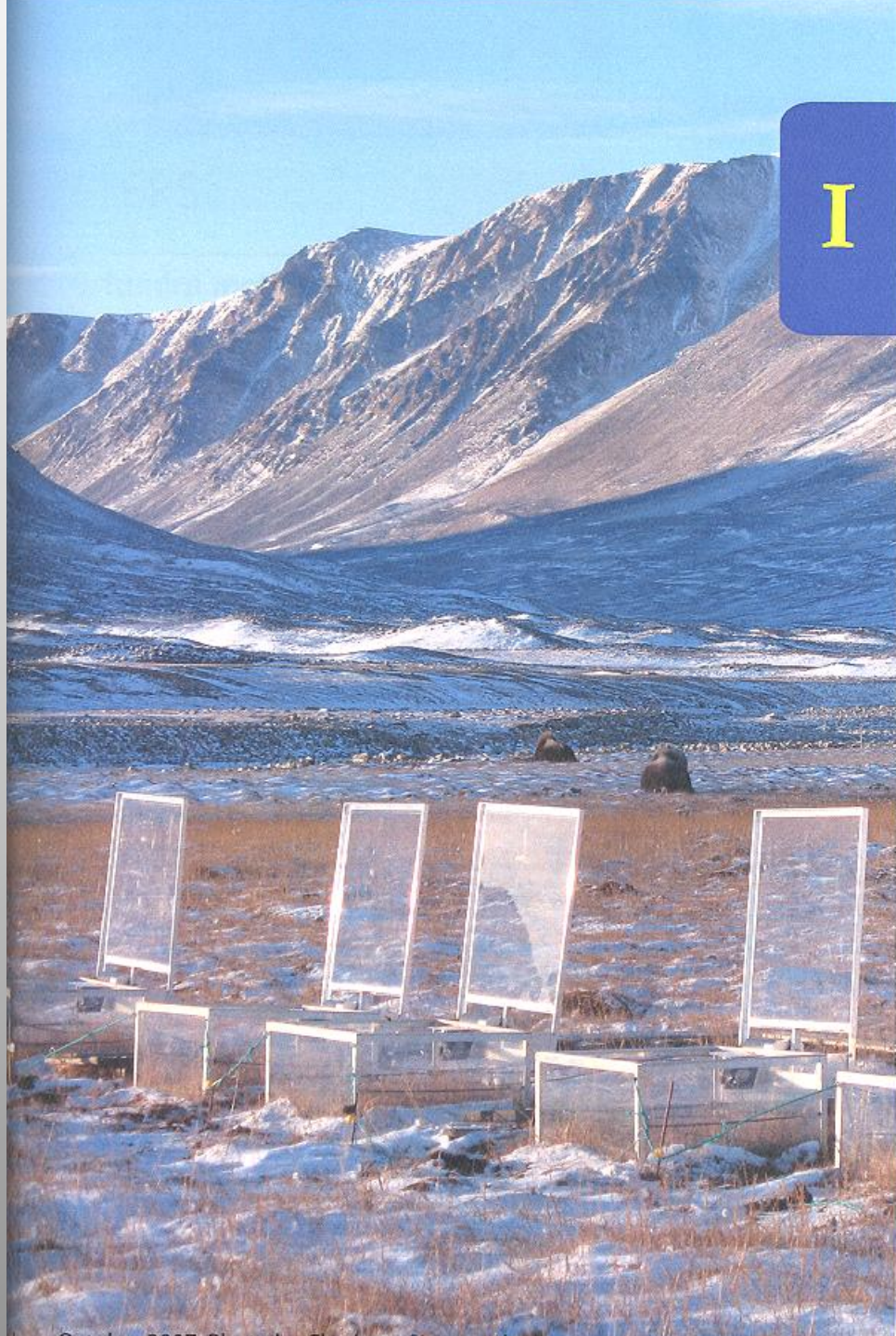
Cover box measurements

Photograph Dave Chadwick, Rothamsted

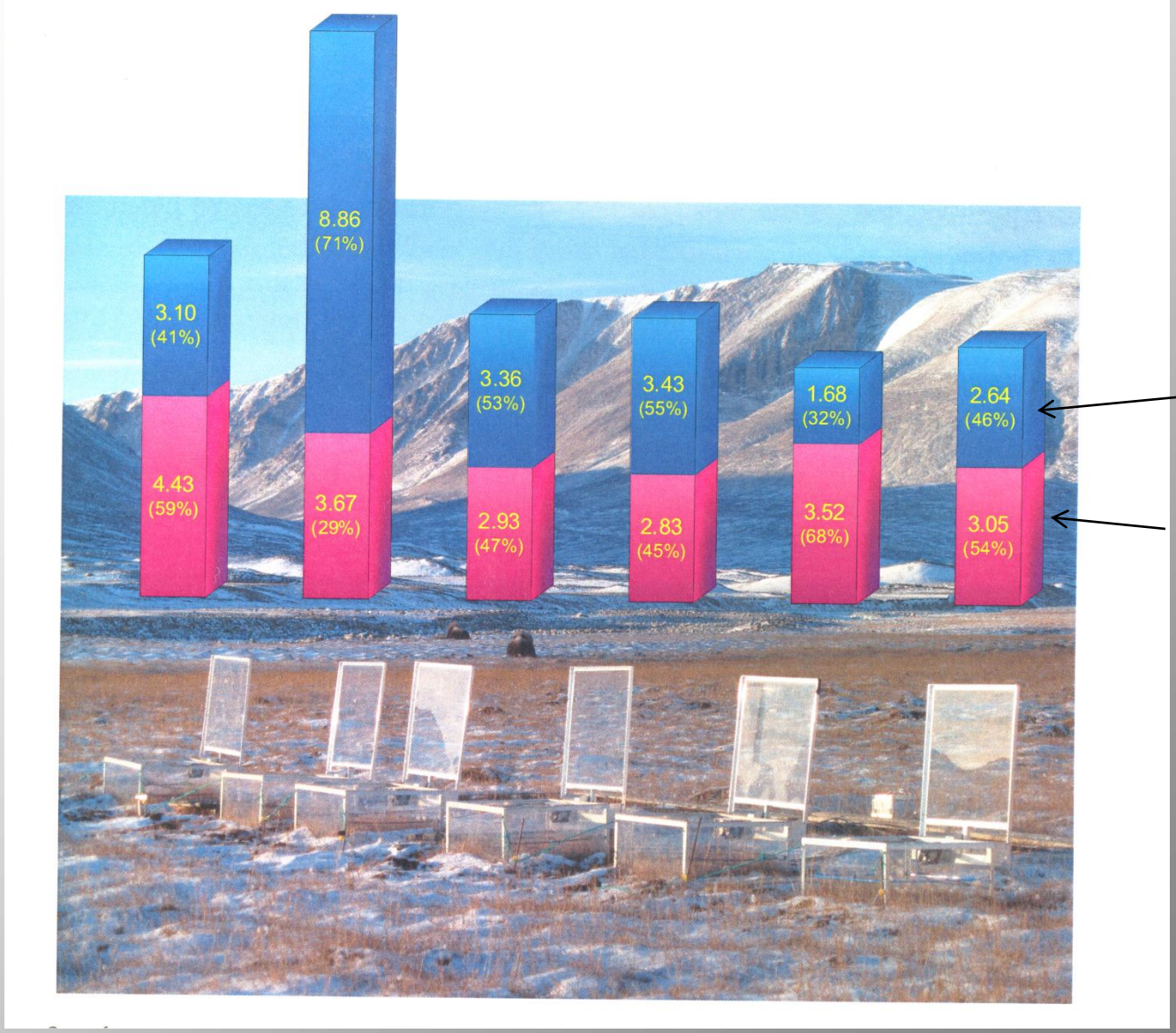
Current gaps in CH_4 flux technology



Mikhail Mastepanov *et al.* (2008)



Seasonal CH_4 emissions from individual chambers (g CH_4–C m^{-2} per period)

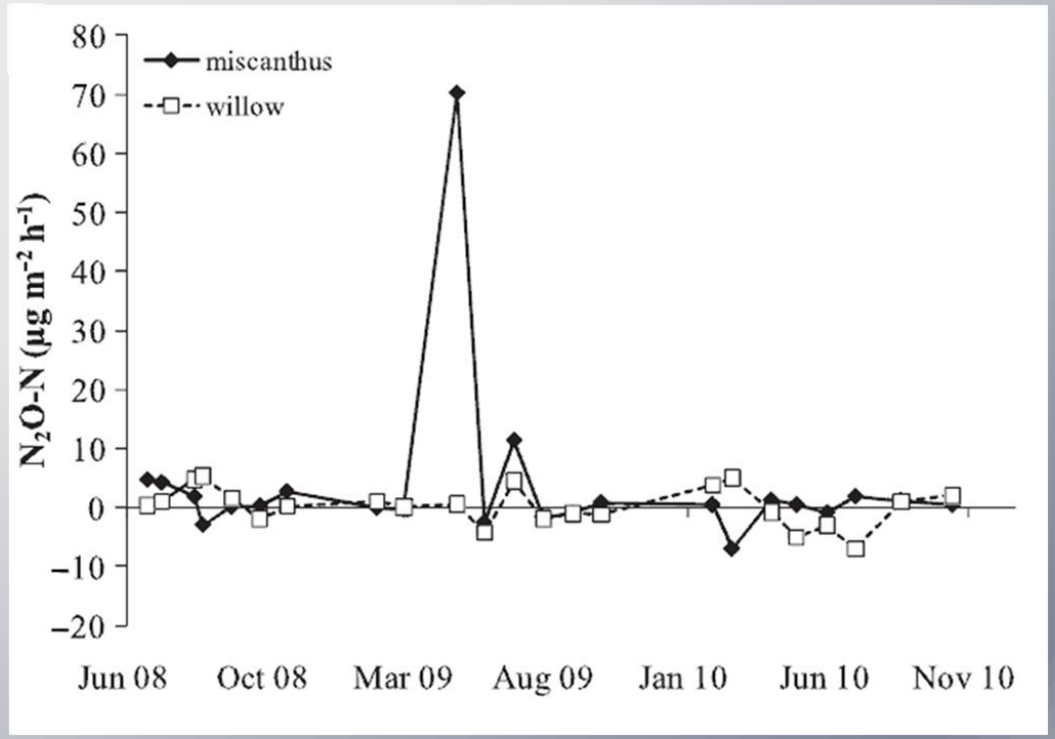


GHG balance for energy crops

Photograph: Niall McNamara

GHG balance of energy crops

- N_2O fluxes in energy crops (Drewer *et al.,* 2011)
- N_2O could be the 'deal breaker' for GHG balance
- Requires more frequent measurements



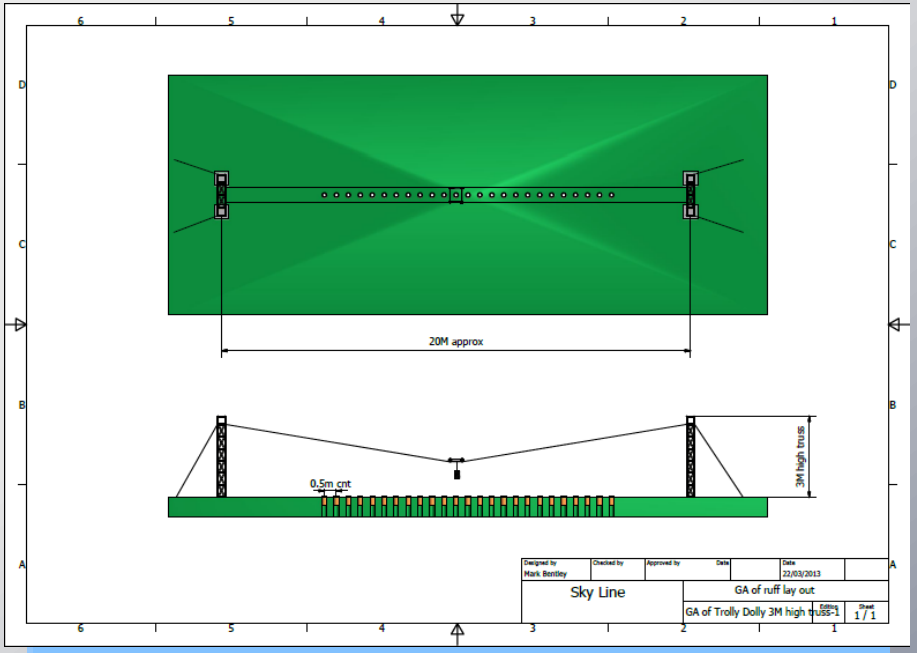
New laser systems: three GHGs at once + isotopomers

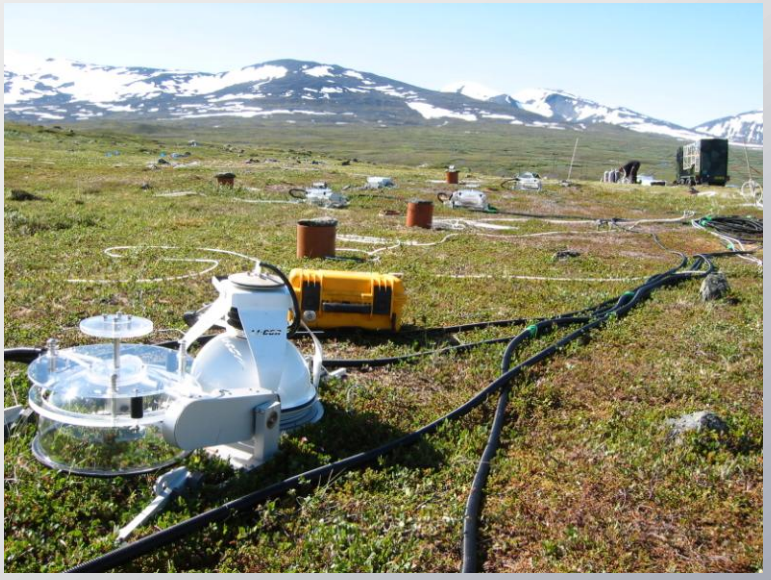
SkyLine: a relatively inexpensive mobile chamber system

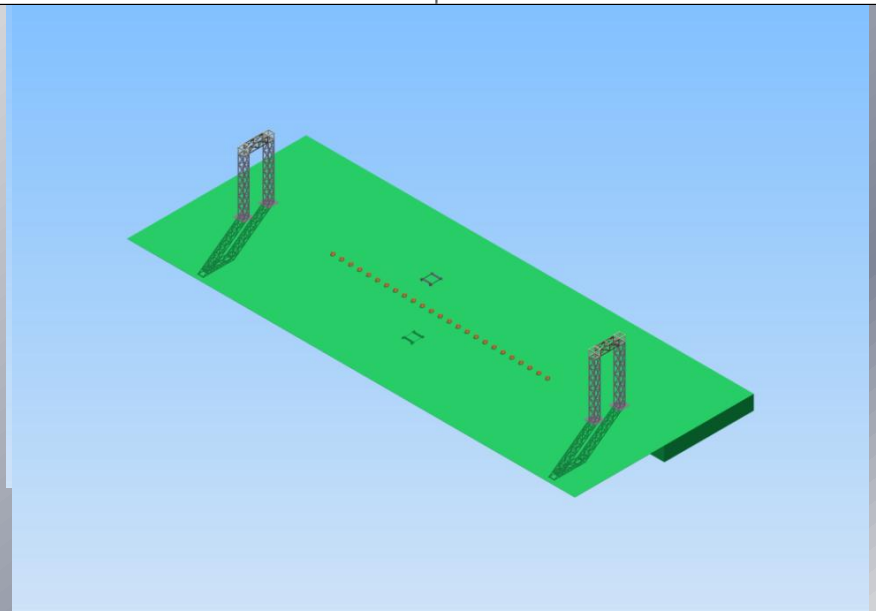
Cost effective versatile automatic trace gas flux system.

SkyLine uses Kevlar cables to suspend a single roving chamber

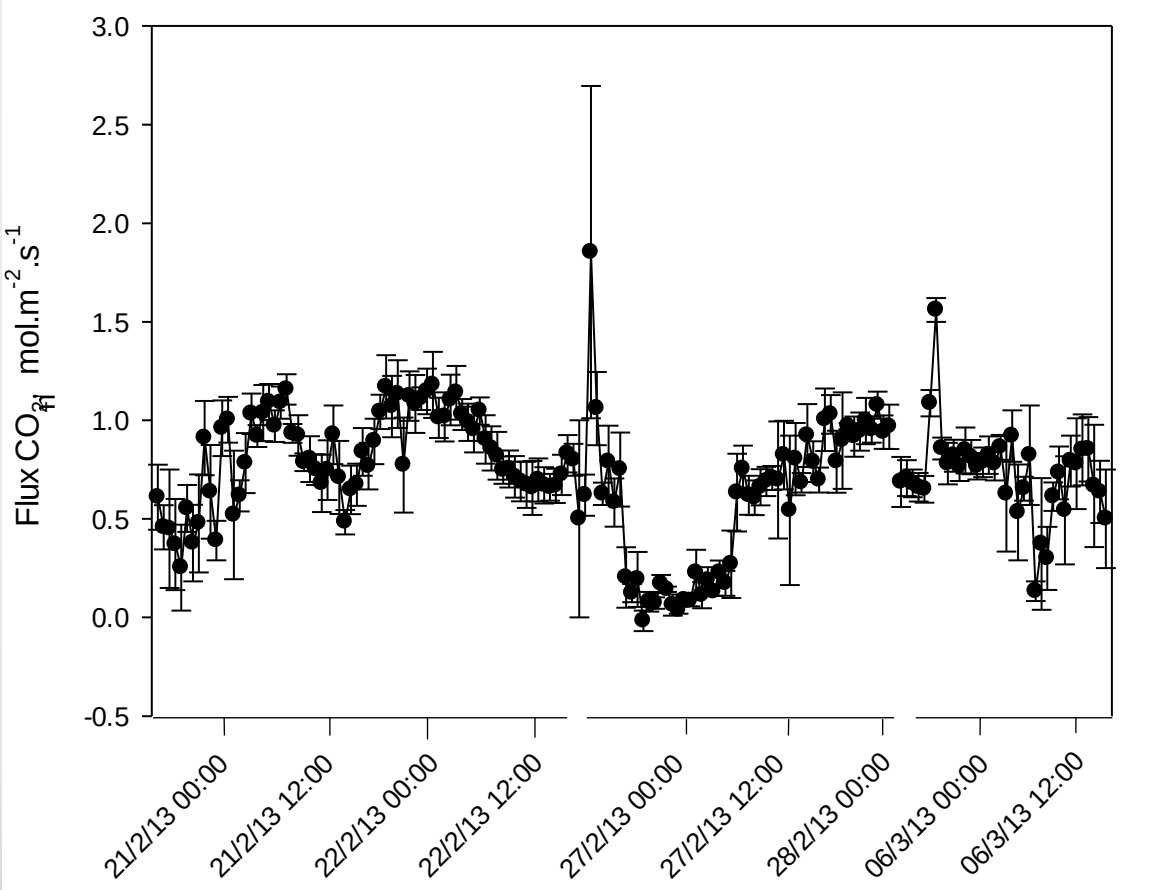
A working prototype has been built





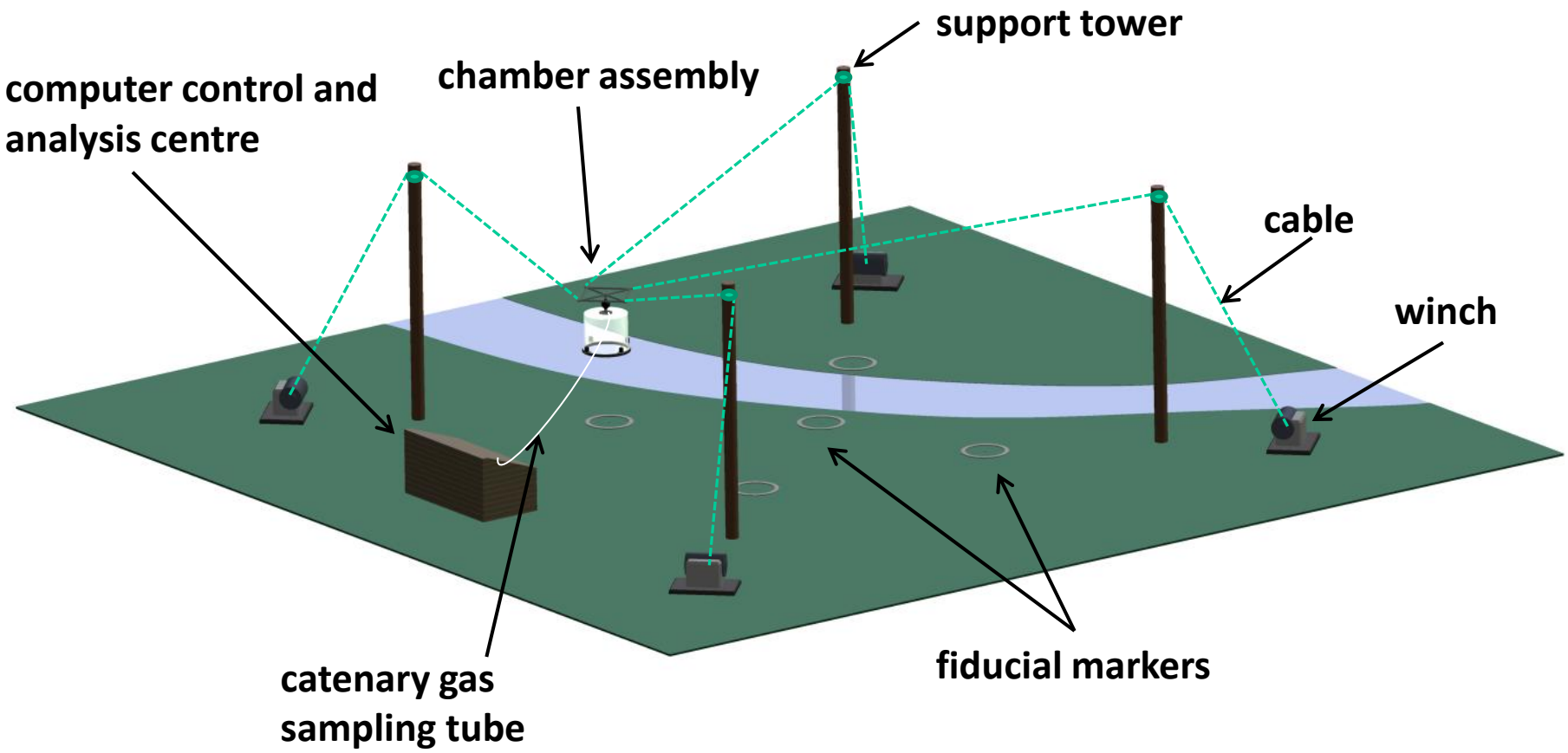


SkyLine: a relatively inexpensive mobile chamber system



Error bars ± 1 SE, n=3

SkyGas: A novel approach to GHG measurements

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Sophisticated engineering and technologies – been used to automate experimental manipulations of ecosystems.


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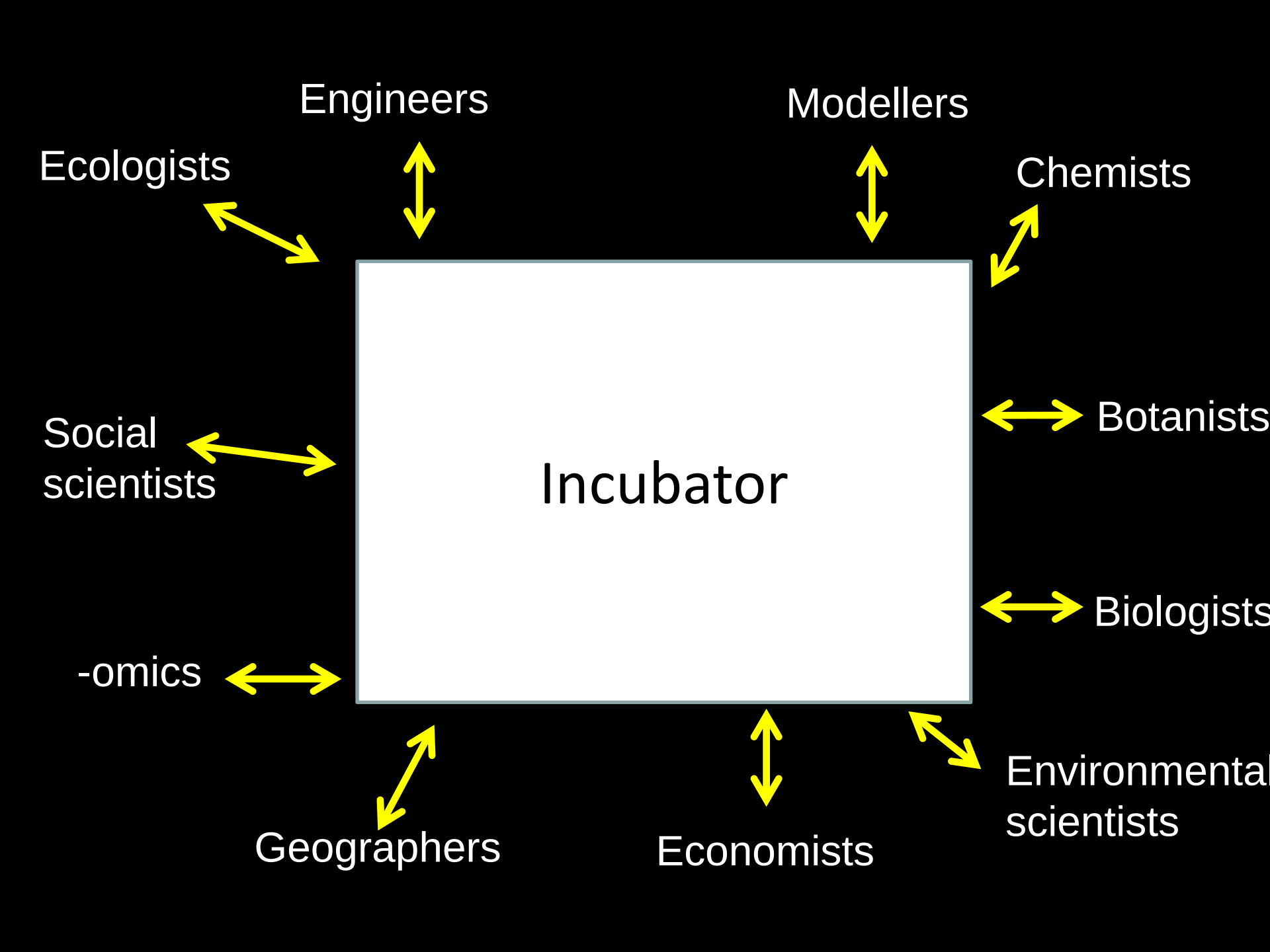
Engineers
Modellers
Ecologists
Chemists
Incubator
Social scientists
Botanists
Biologists
-omics
Geographers
Economists
Environmental scientists

The role of scientists in all this

3.5 Pathways to Impact

- resolve contested parentages
- catch criminals
- predict cancers
- find horesmeat in burgers
- identify germ warfare agents

The role of scientists in all this

3.5 Pathways to Impact

- resolve contested parentages
- catch criminals
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- find horesmeat in burgers
- identify germ warfare agents

3.5 Pathways to Impact

- explain some interesting crystallography patterns
- unravel the secret of life
- create a new form of coffee table decoration?

The role of scientists in all this

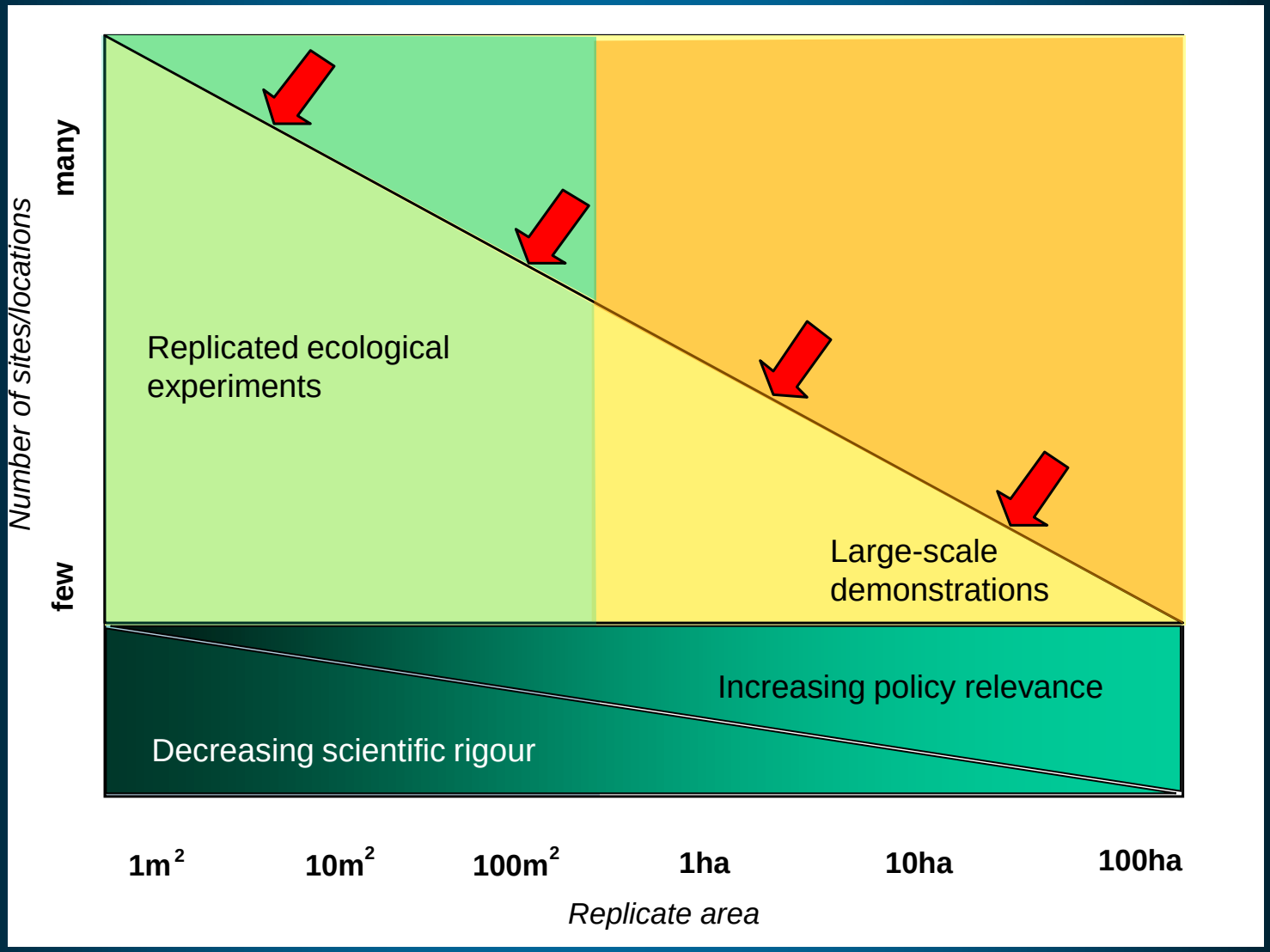
3.5 Pathways to Impact

- resolve contested parentages
- catch criminals
- predict cancers
- find horsemeat in burgers
- identify germ warfare agents

3.5 Pathways to Impact

- resolve contested parentages
- identify criminals
- find horsemeat in beefburgers
- develop transgenic crops
- predict cancers
- identify bacteria on the teeth of dead nuns
- build a ‘Mat Collins’ time machine
- quantify loss of genetic library

Differing needs of scientists and policy makers

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- Funding
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  - Introduction
  - Available awards
  - Funding eligibility
  - Applications
    - Further information
      - **Pathways to impact**
      - How to win money for research
      - Forms and handbooks
      - Science classification
      - Science topics
      - Success rate and grant funding overview
      - Antarctic Logistic Support
    - Assessment process
    - What happens next?
  - Other funding sources
  - Complaints

Pathways to impact

Key messages

1. Science excellence is the primary criterion for assessing proposals.
2. User engagement is key to achieving successful impact.
3. Knowledge exchange is the process by which impact is achieved.
4. The pathways to impact should detail the activities which will help develop potential economic and societal impacts. Plans for engaging with academic audiences may be included in the pathways to impact, but only where these form part of the critical pathway towards economic and societal impact. Academic impacts should generally be described in the Academic Beneficiaries section.

Introduction

All research proposals submitted to NERC must be accompanied by a pathways to impact document that will detail:

Related links

» **Referee guidance**

» **Panel meeting guidance**

External links

» **Research Councils UK - Excellence with Impact (PDF)**

» **Research Councils UK - Pathways to Impact**

» **Science Impacts Database**

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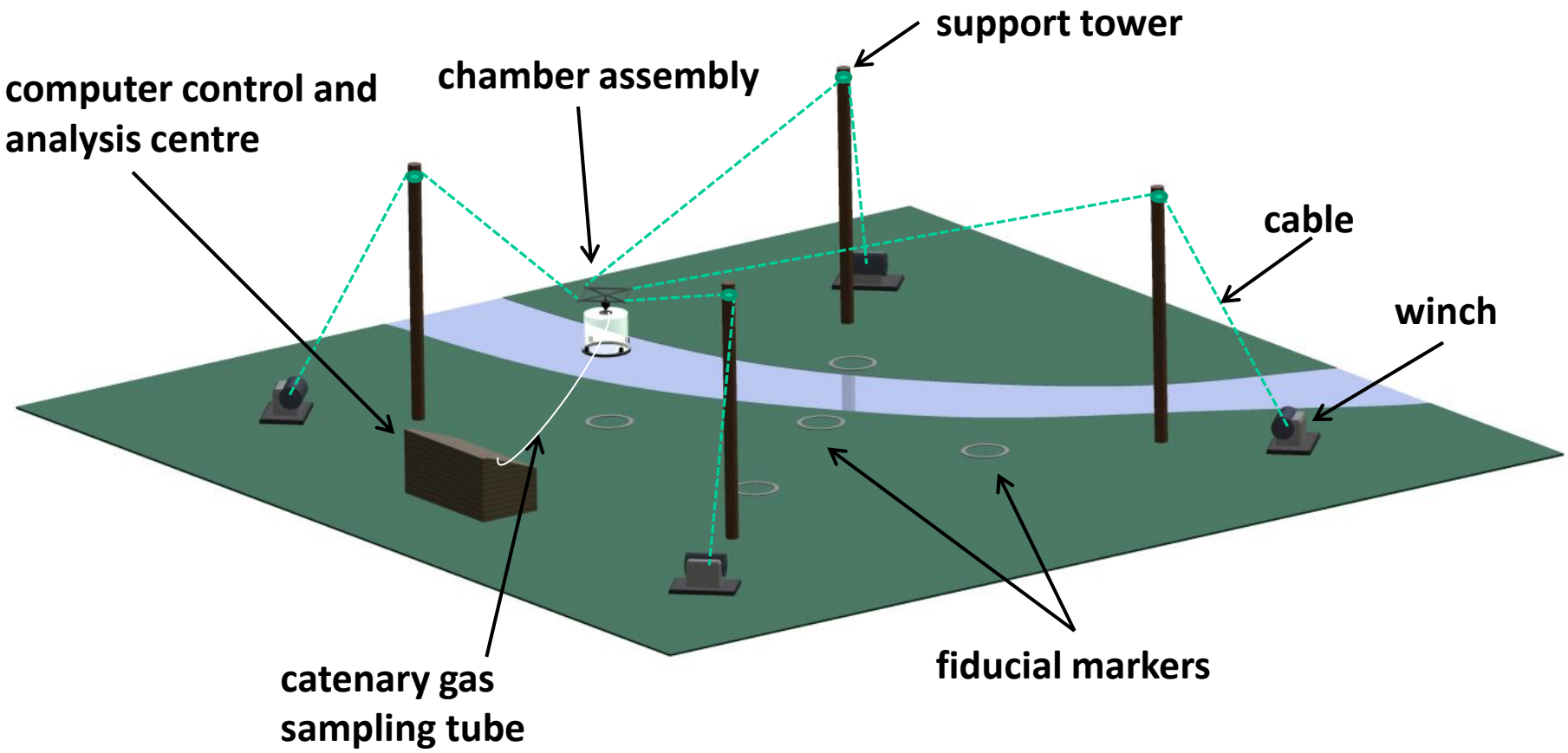
SkyGas: A novel approach to GHG measurements

(collaboration between Aeronautical Physics, Chemistry, Environment & Biology Departments at York)

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York Environmental
Sustainability Institute
The YESI vision
YESI's mission is to enable, support and promote delivery of world class interdisciplinary research on environmental sustainability at the University of York and collaborating organisations for the research community, industry and policy makers.