Welcome

to the launch of the

UK Environmental Observation Framework

17th July 2008

UK-EOF launch 17th July 2008

Bob Watson
Chief Scientific Advisor, Defra

Role of Earth observation

- Vital source of evidence from global to local scale for policy formulation
- Cost effective means of monitoring policy
- Accessible way of communicating evidence to the citizen

UK Environment Monitoring

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Scientific input is crucially important to informed policy formulation and implementation and specifically it is vital to have reliable data sets to assess trends and changes in the environment and to test and initialize theoretical models

- Extensive amount of monitoring in place
- No overarching UK coordination, strategy or framework until today ….
- Outgrowth from the “ 2006 Strategic Analysis” by ERFF

Earth Observational System

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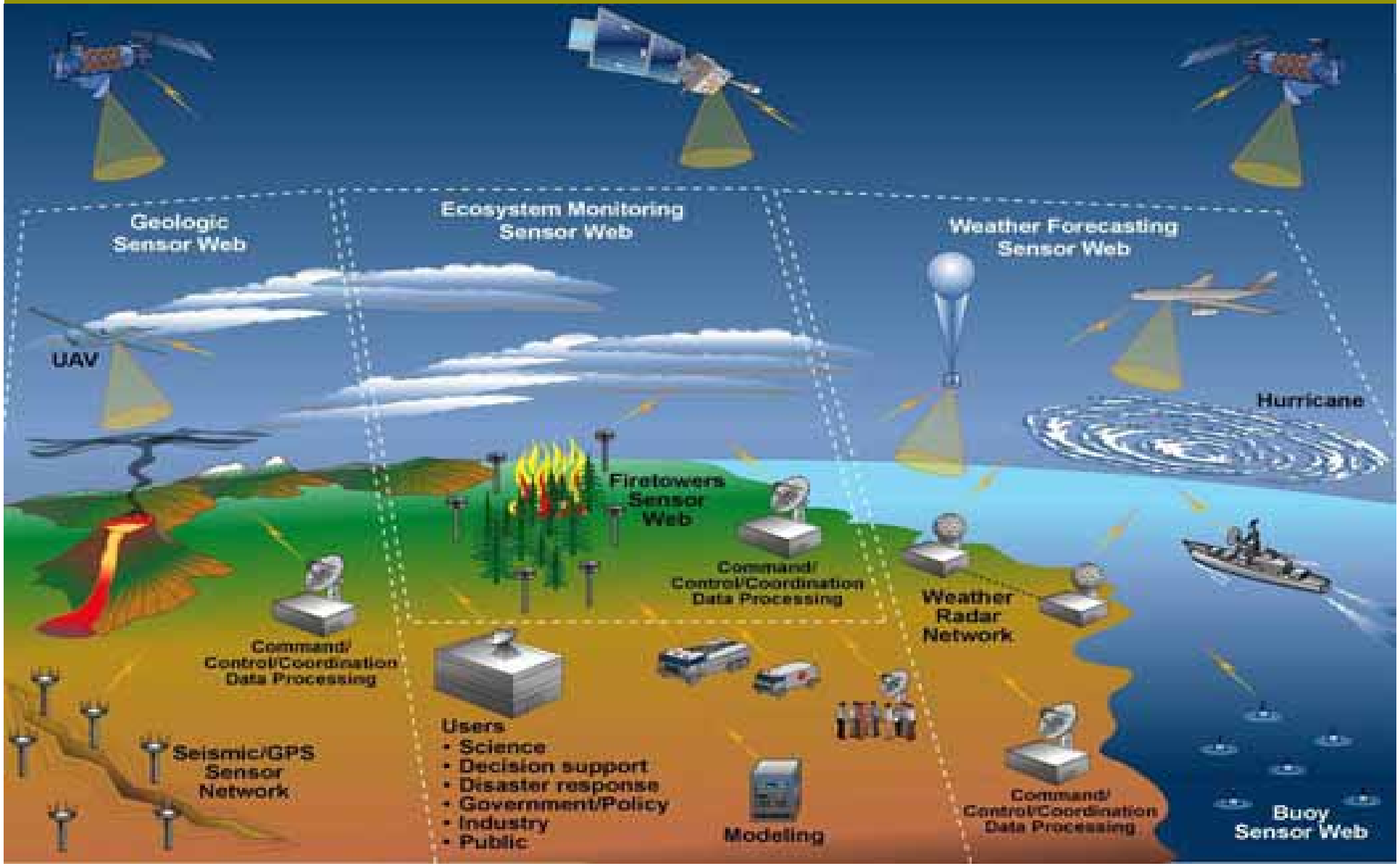
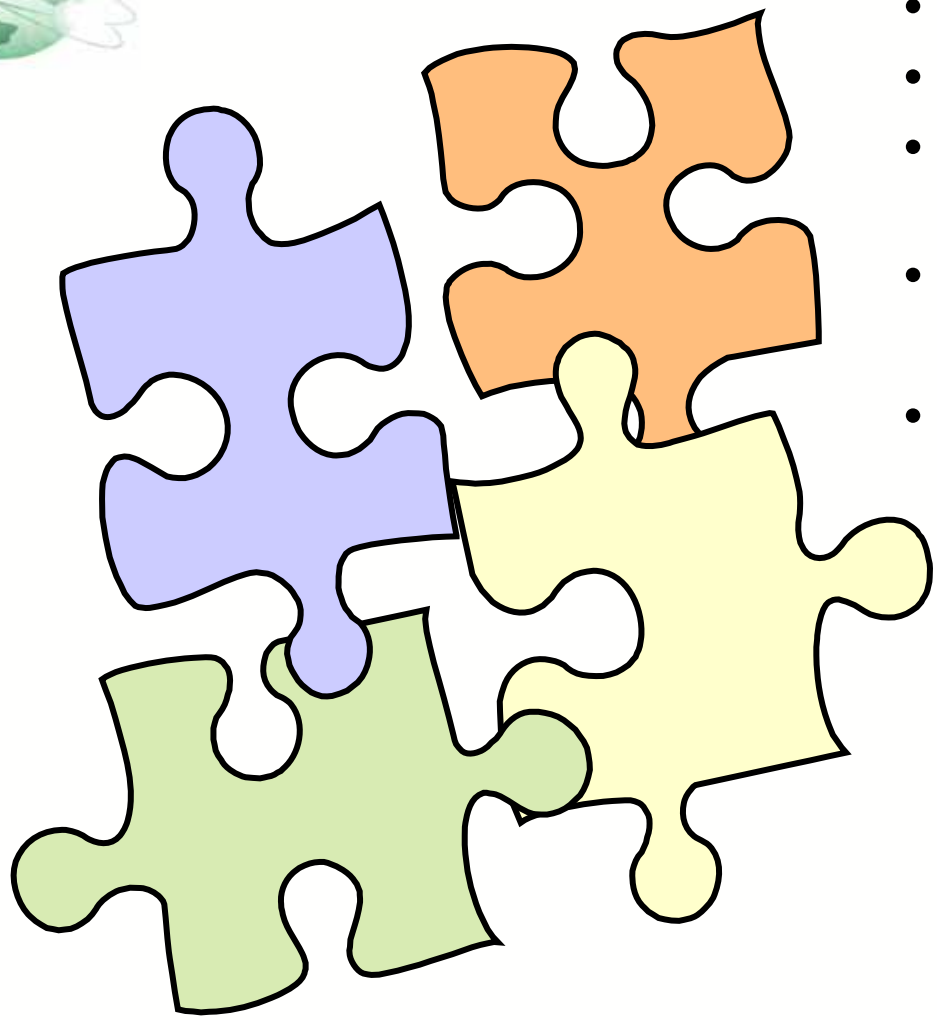


ERFF summary of the current picture

Environment Research
Funders' Forum



- FRAGMENTED
- UNCOORDINATED
- LACKS STRATEGIC DIRECTION
- NO OVERALL OWNER

- Risk of
  - **Missed opportunities for knowledge**
  - **Poor data sharing**
  - **Funding stopped for key time series data**
  - **Duplication of effort**

Refs (ADAS, 2006), (UKMMAS Defra, 2005), GECC (2006)

ERFF review of Environmental Monitoring

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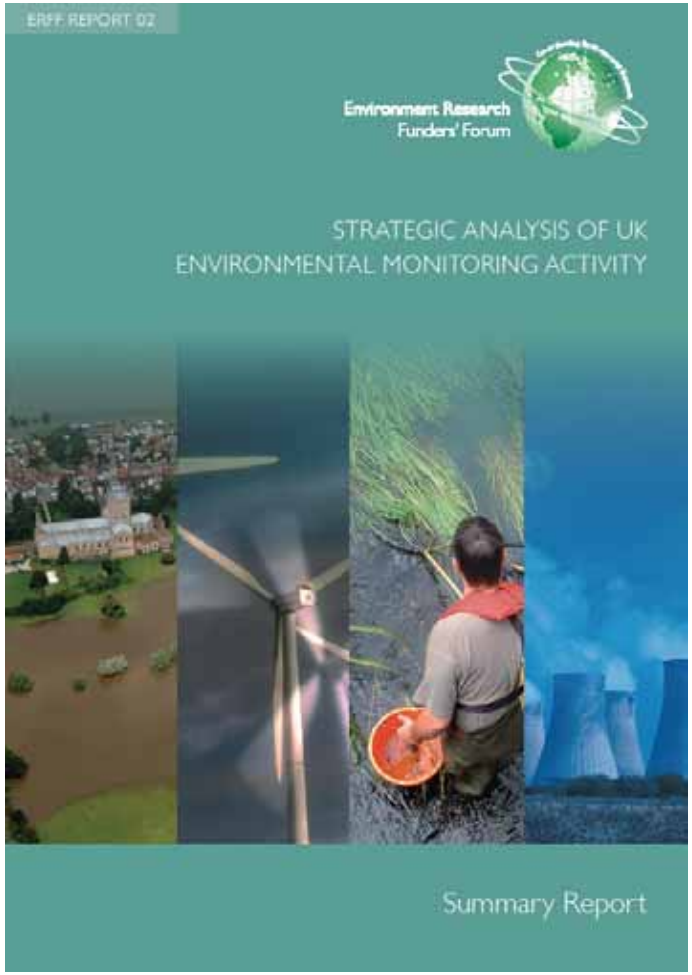
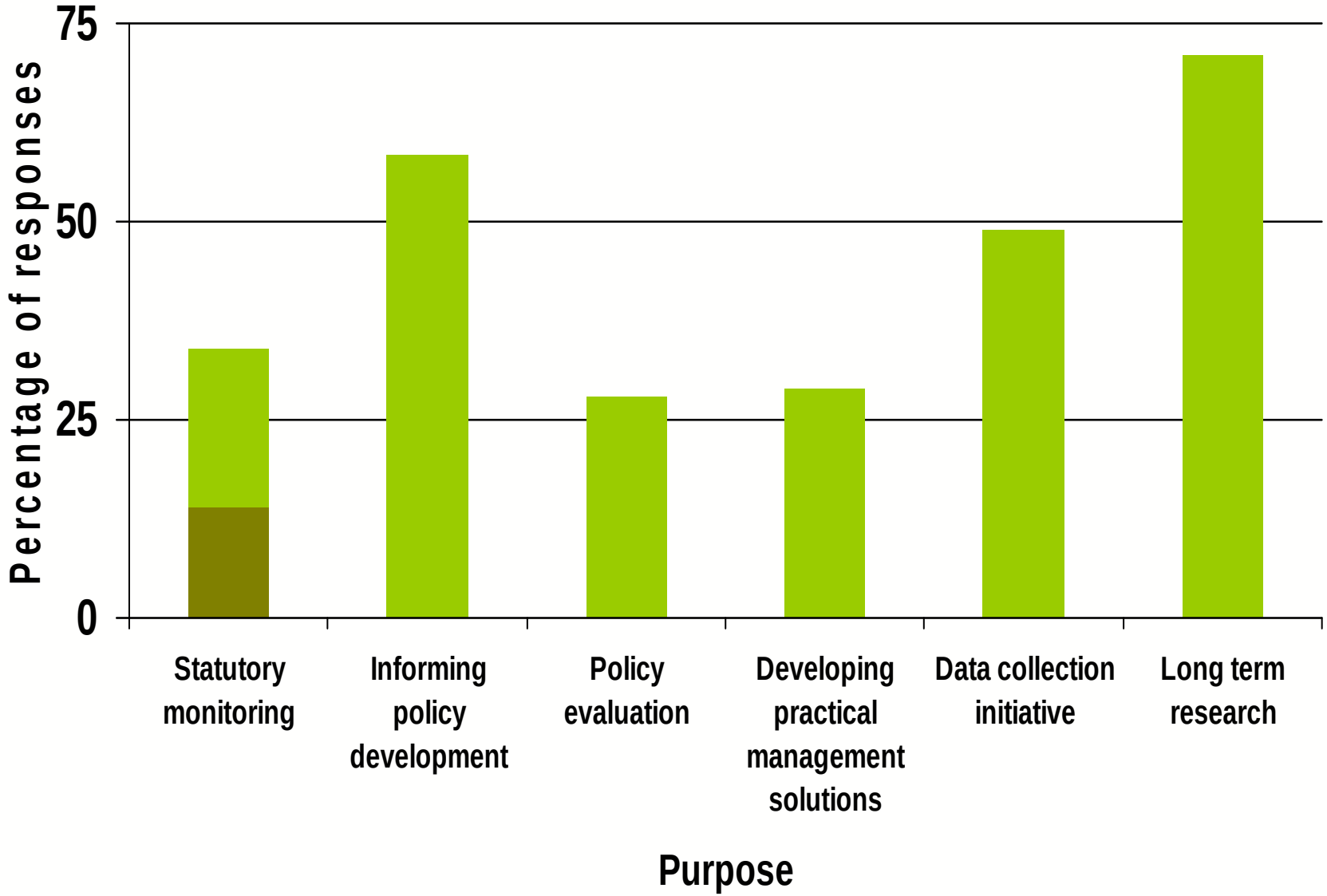


UK Environmental Observation Framework

What's the problem?

- About £500m public money spent per year – yet we do not have an overview of where
- Datasets are under threat but we do not have a way of knowing if these are low or high priority for funding
- >80% of data is not freely available and therefore not reused or shared e.g. for climate work
- We are living in a rapidly changing environment and we need to understand these changes in order to adapt and prioritise action and resources
- UK risks being left out of potentially important observational systems, e.g., GMES, due to an inability to take a rational, integrated and government-wide view of such systems

Purpose of monitoring (study results)



ERFF Strategic Analysis in 2006

- Covered over 50 organisations and 400 monitoring activities
- But still far from complete coverage
- Half Biodiversity, third freshwater environment
- Half running for more than 20 years
- 60% GB/UK level, 40% country, regional, local
- Total investments estimated between €130m and €700m per year

Quality Assurance

- Critical
- Taken very seriously
- Largely bottom-up not top-down
- Peer and regular reviews
- Standardisation (ECN, Protected areas)
- National networks
- Survey Control, National Statistics Code of Practice

National versus Regional/Local

- Coordination of local activities
  - Birds
- Geographically representative of UK
  - ✓ Otters, birds, butterflies
  - ❖ Others species
- Harmonisation/standards
  - ✓ River water quality, Protected sites
- Levels of quality assurance
  - ✓ National air quality network
  - ❖ Extensive local monitoring

Good Practices

- Common Standards Monitoring
  - Protected areas
- Quality assurance
  - Air quality
- Public access
  - EA's "What's in your backyard?"
  - Air quality (real time)
- Organisation of volunteers
  - ✓ Wild birds
  - ❖ Other species

EU extra demands above UK needs

- Air quality (initially)
- Corine Land Cover
- Standardised Reporting Directive (parts of)
- Waste Statistics Regulation (parts of)
- Water Framework Directive (parts of)
- Wildlife (Eurostat questionaires)

Data availability and access

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- ✓ Env Info Reg covers 85% of activities (study)
- ✓ Most raw data available (but with conditions)
  - ➢ With about 20% freely available

<u>Many issues</u>

➢ Value-added	versus	Raw data
➢ Free	versus	Charging
➢ Data ownership	versus	Funding
➢ Confidentiality		

Key issues

Need for:

- Clear vision, strategy and framework for UK – linked to R&D and policy needs
- Ownership, engagement and data sharing
- Standards/protocols (eg ownership, confidentiality)

UK-wide examination/review

- Costs and social benefits
- Overlaps, gaps, duplications, redundancies
- Risks – eg funding, people, knowledge
- Statutory monitoring

Observations

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Examples of Observations that Shaped Policy

Satellite Observations

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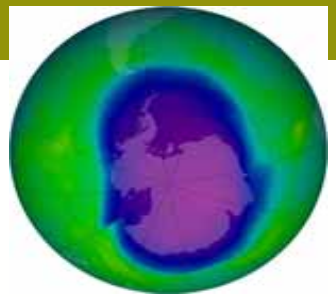
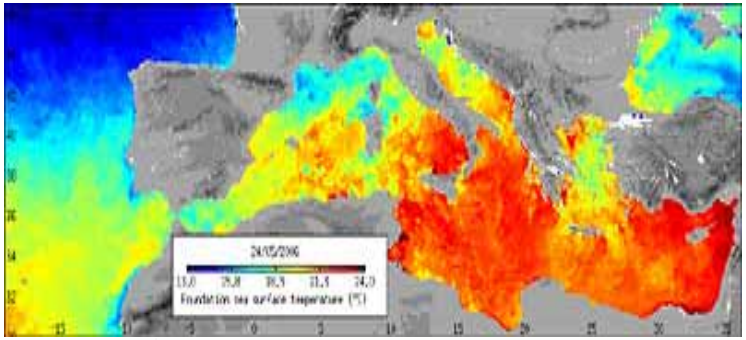
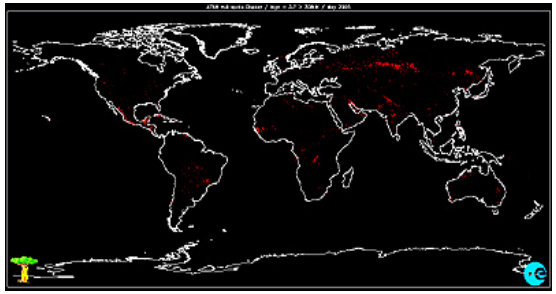


Ozone monitoring & forecasts

Ice sheets

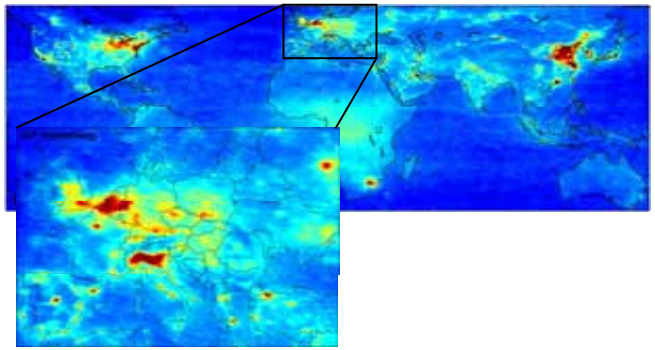


Sea surface temperatures



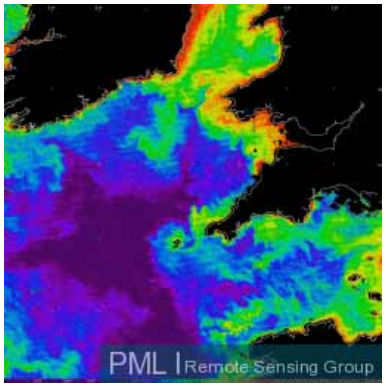
Global fires

Biomass



Nitrogen dioxide

Chlorophyll concentration



Observations

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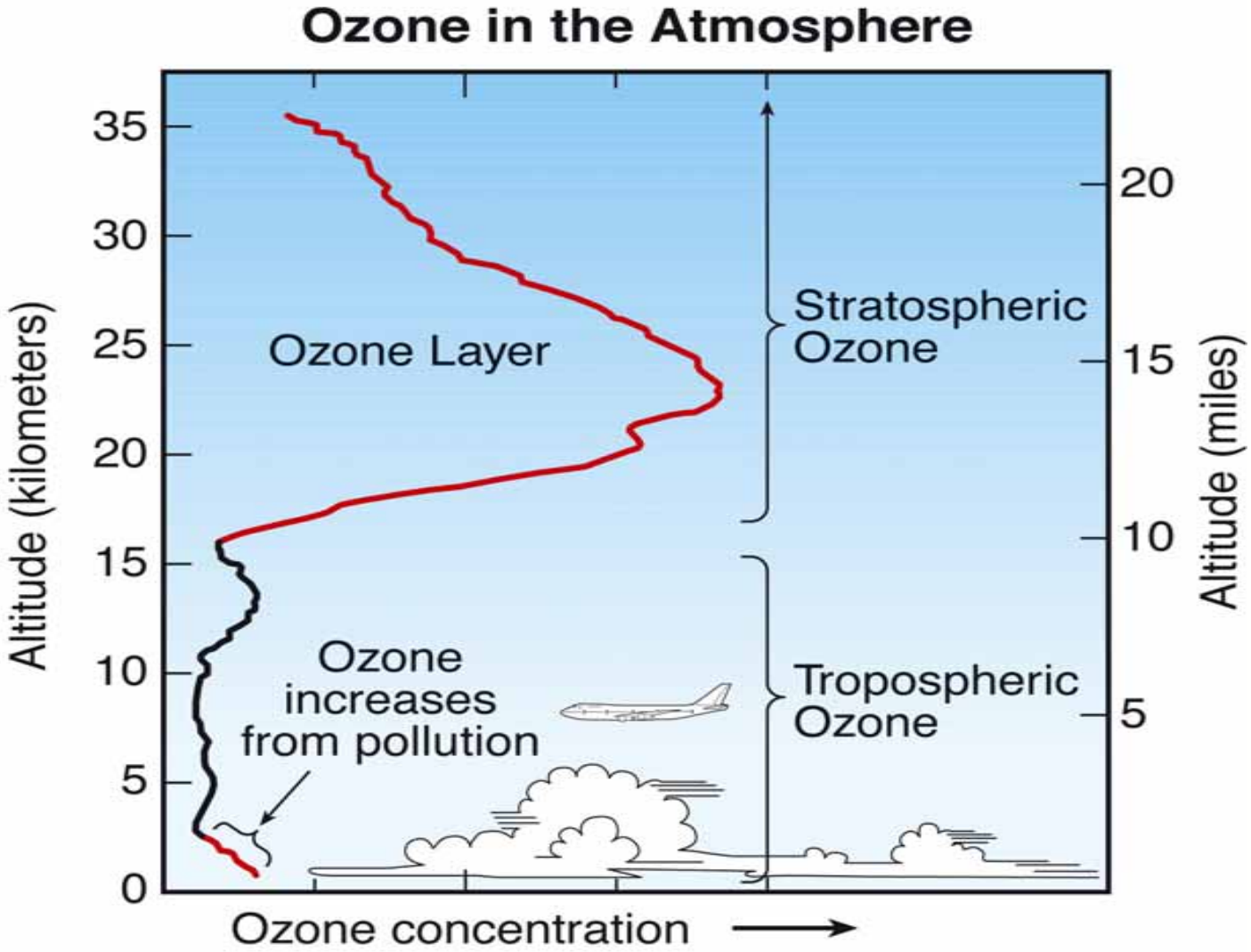
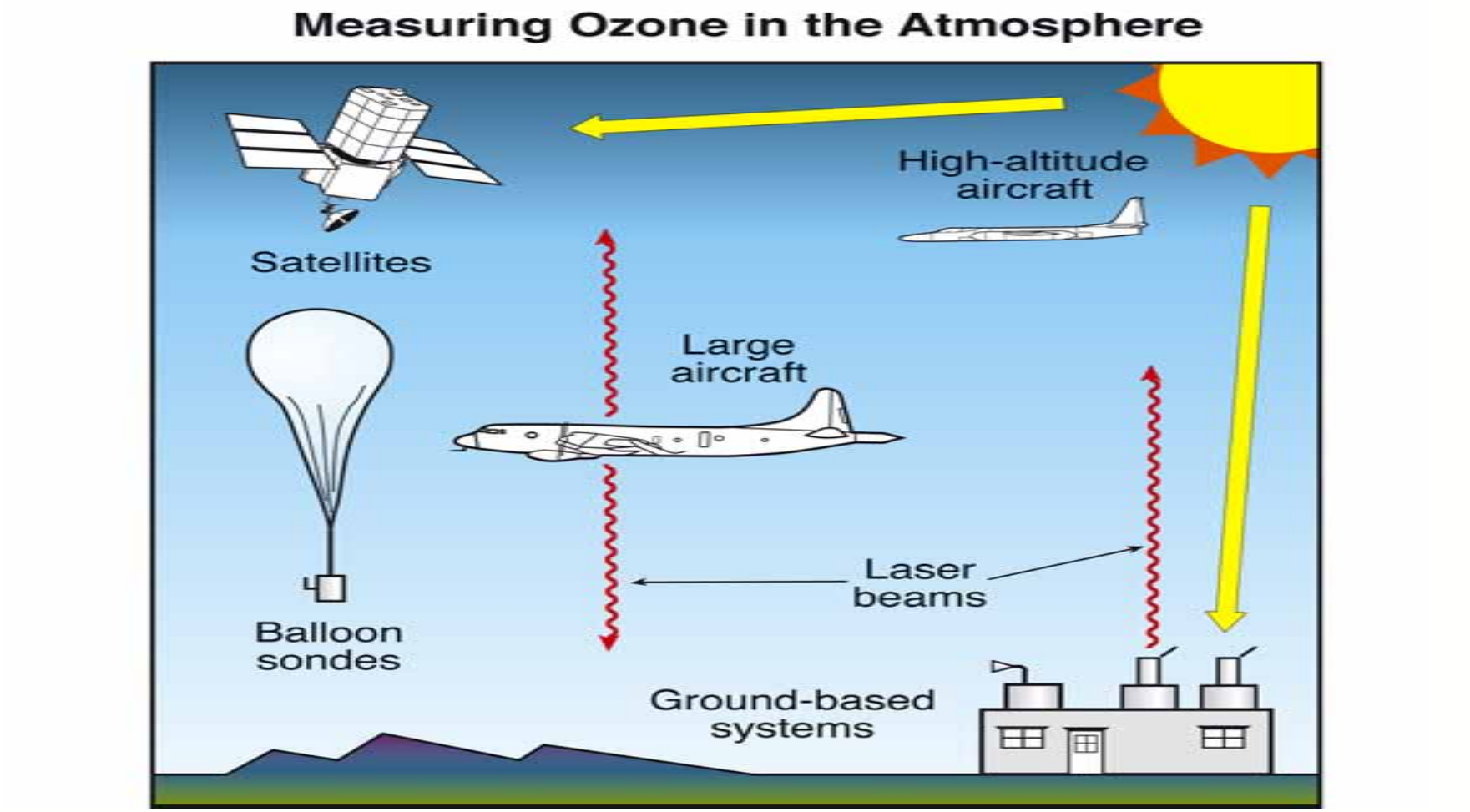
Atmospheric Ozone

Atmospheric Ozone



Total ozone = Dobson units

Stratospheric Ozone Depletion



Joe Farman - British Antarctic Survey at Halley Bay, Antarctica reported low levels of total ozone using a Dobson instrument in the Springtime, i.e., October

Vertical Profile of Antarctic Ozone

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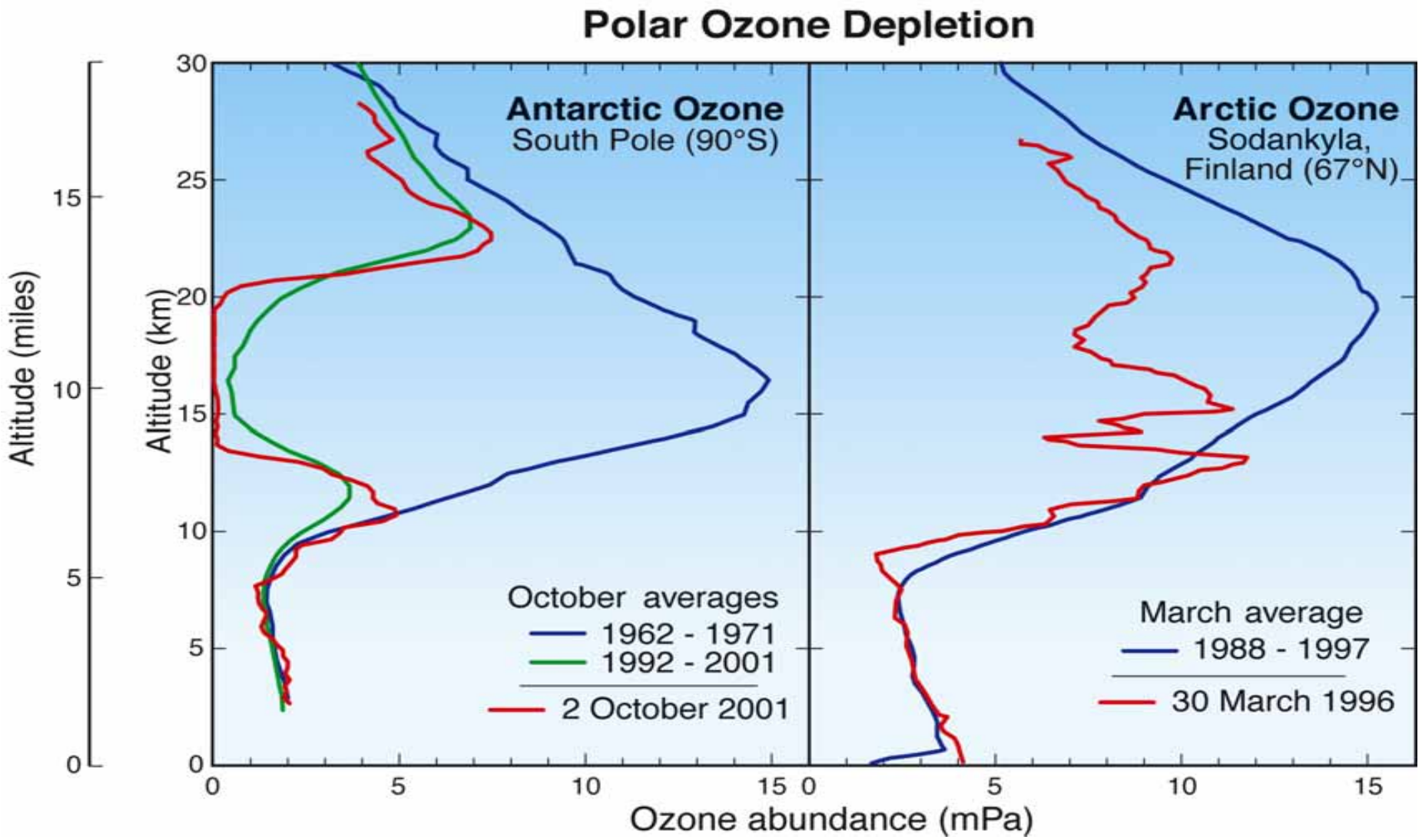
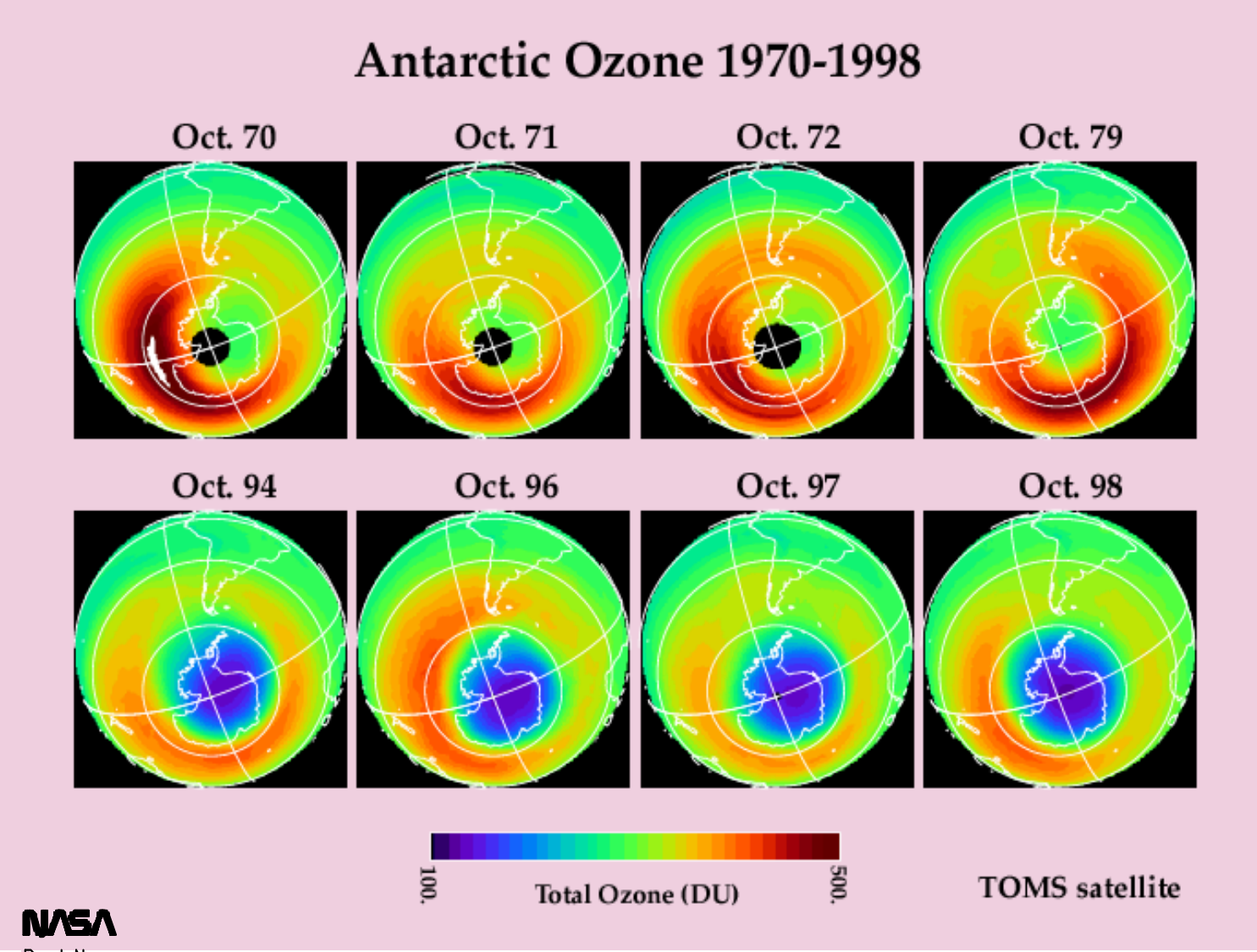
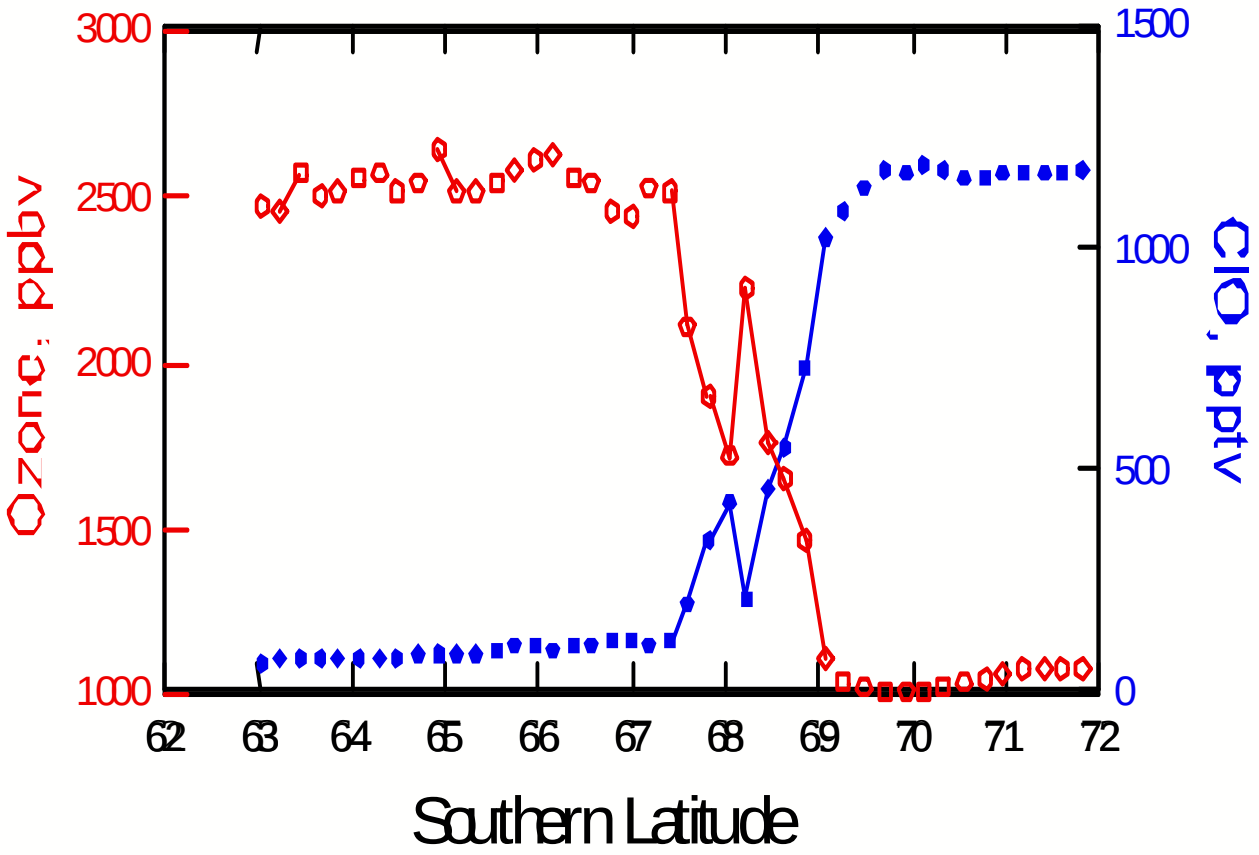


Antarctic Ozone



The smoking gun!



This picture has changed some...Qualitatively still OK

Stratospheric Ozone and ClO

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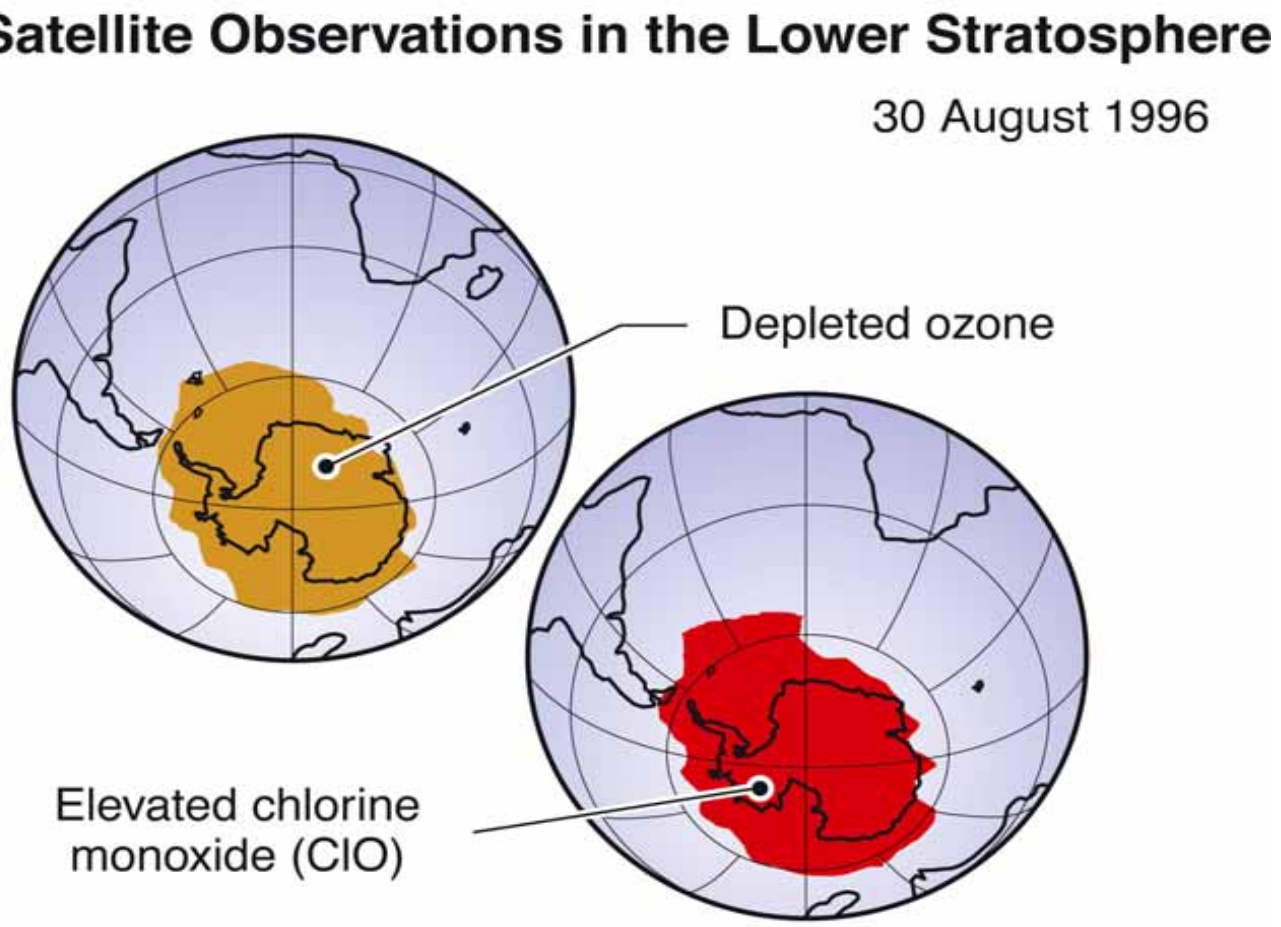
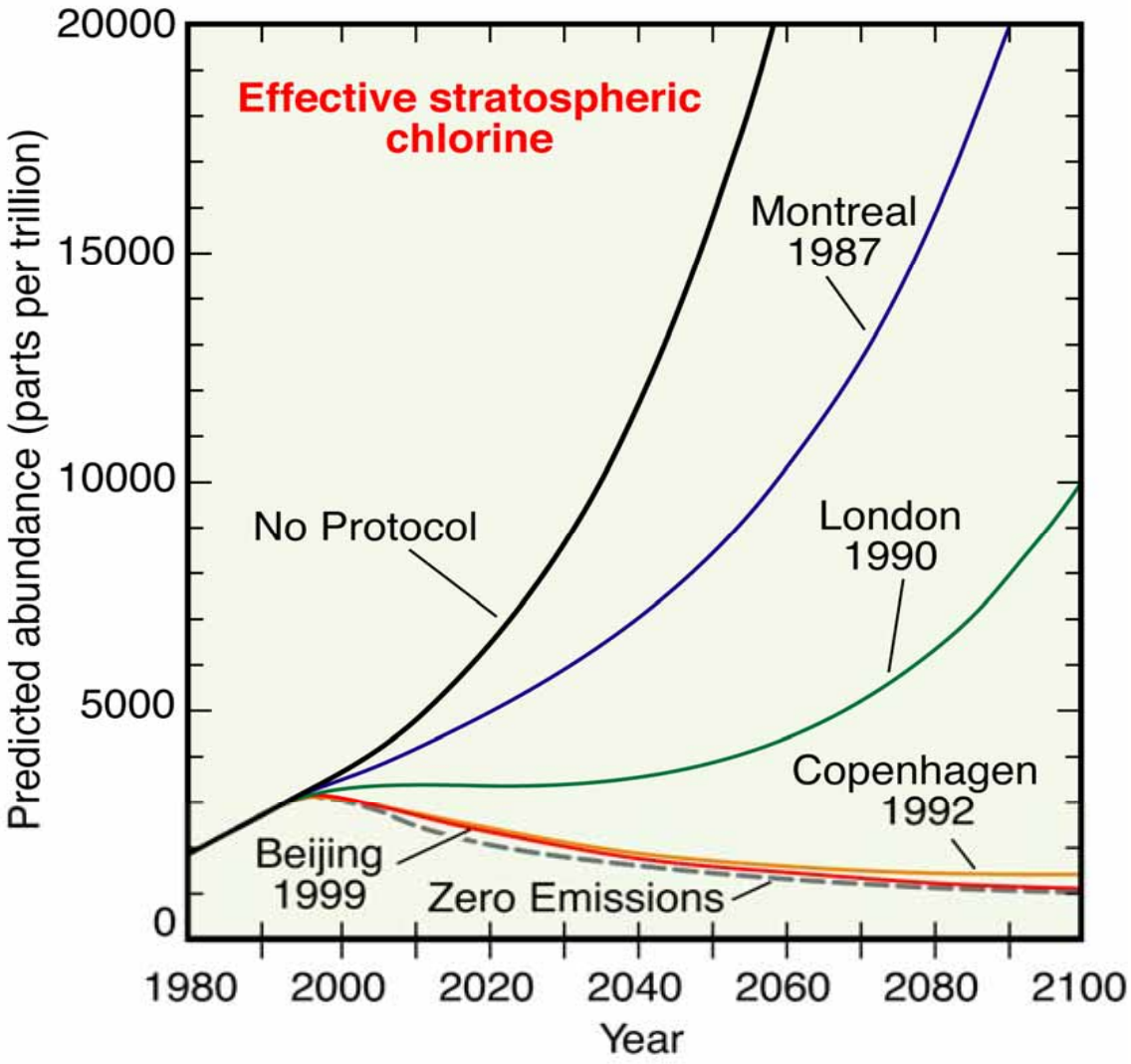
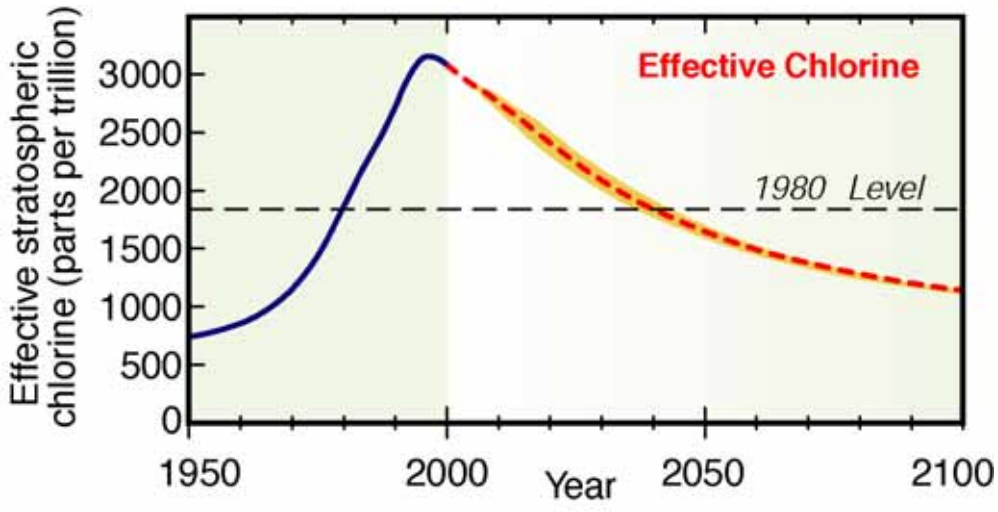


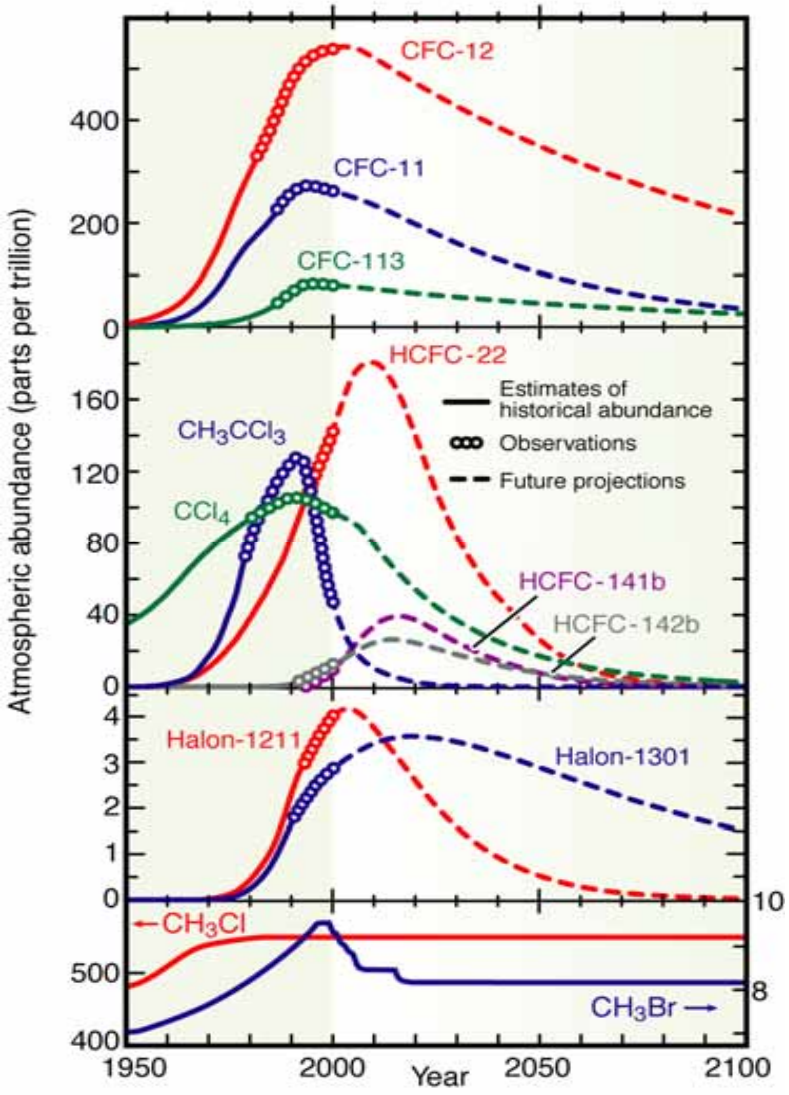
Evolution of Effective Chlorine under the Montreal Protocol



UNEP/WMO, 2002.

Measurements of ozone-depleting gases





- Measurements are the basis of accountability for science and regulation

- Measurements are also needed for ODP of any new gases to be emitted

UNEP/WMO, 2002.

Observations

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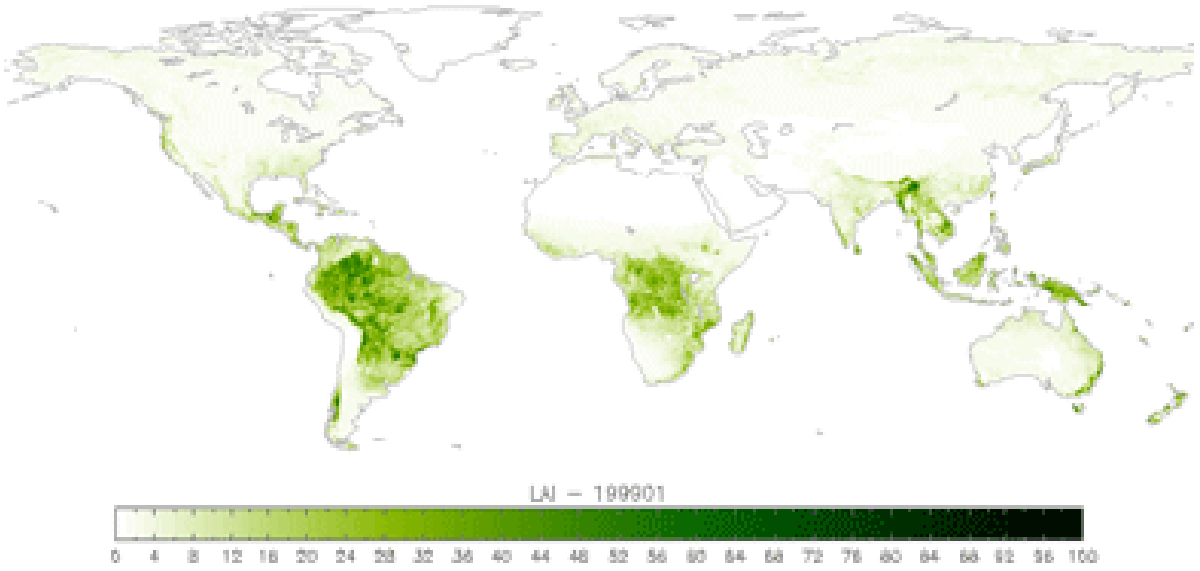
Ecological Observations

Observations



Converting forests to farmlands in Rondônia, Brazil

- 1975 - Healthy natural vegetation
- 1989 - “Fishbone” pattern on the landscape indicates agriculture fields
- 2001 - Agriculture continues to replace forest cover

ONE PLANET MANY PEOPLE Atlas of Our Changing Environment

UNEP

Monitoring agri-environment schemes

GAEC No. 15 Hedgerows

No removal of hedgerows or cutting between 1 March and 31 July

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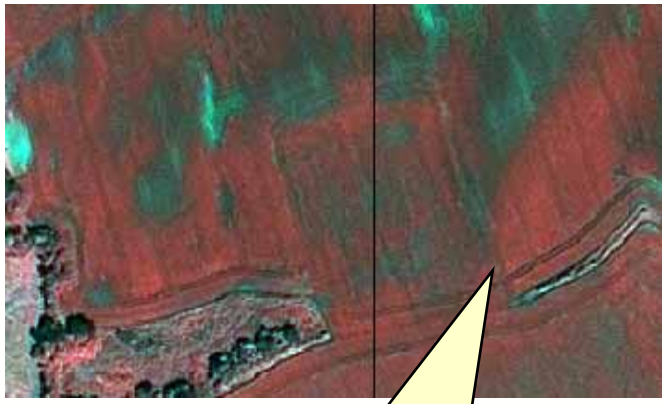
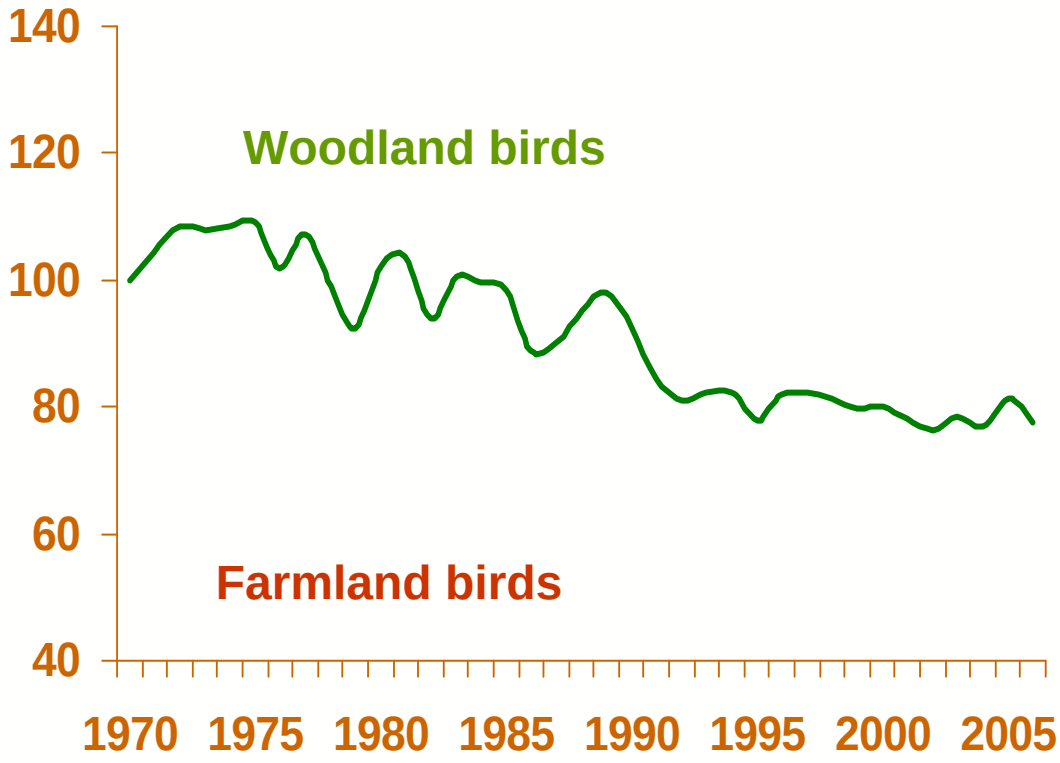


© Space Imaging, Ikonos 2005

Hedge removed together with change to field boundaries

Bird populations

Farmland birds index – communicates to public and Ministers if our polices and actions are working. Index combines lots different data but with science rigour- into a simple index.



Communicating with the Public

'We've never been so happy since we got wild birds'

High resolution mapping of UK summer floods

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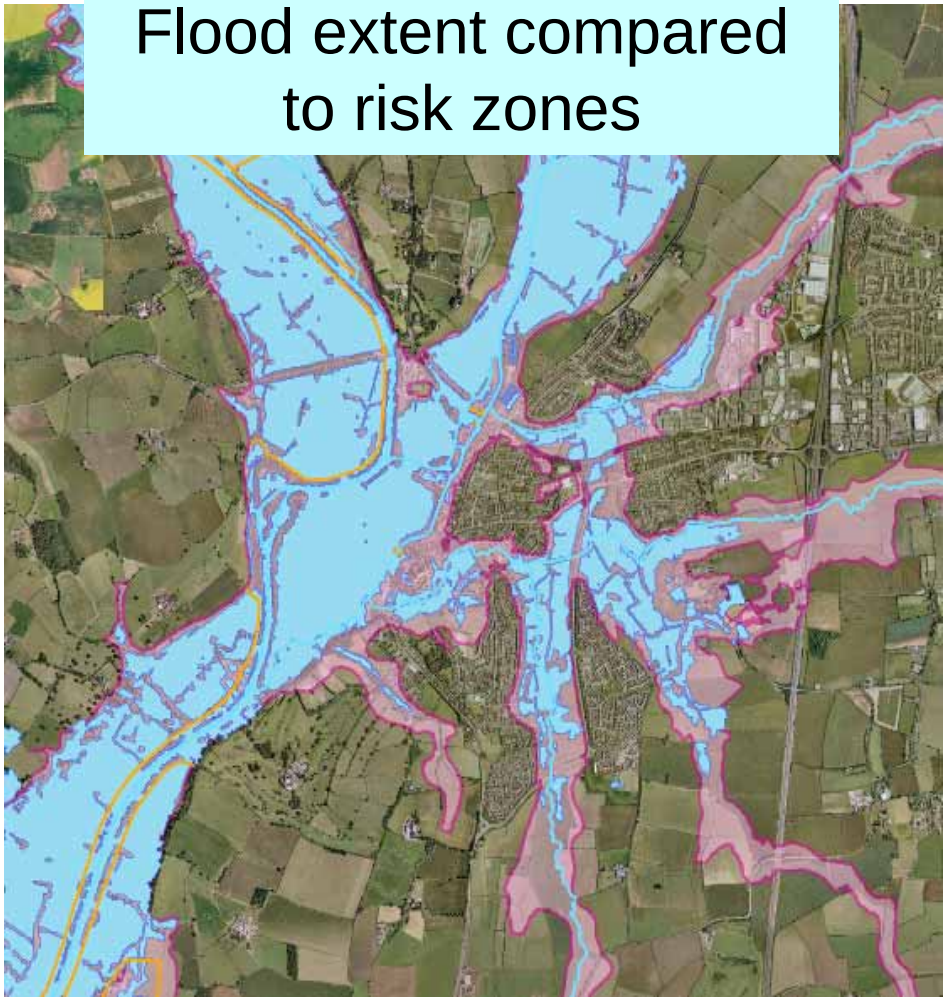
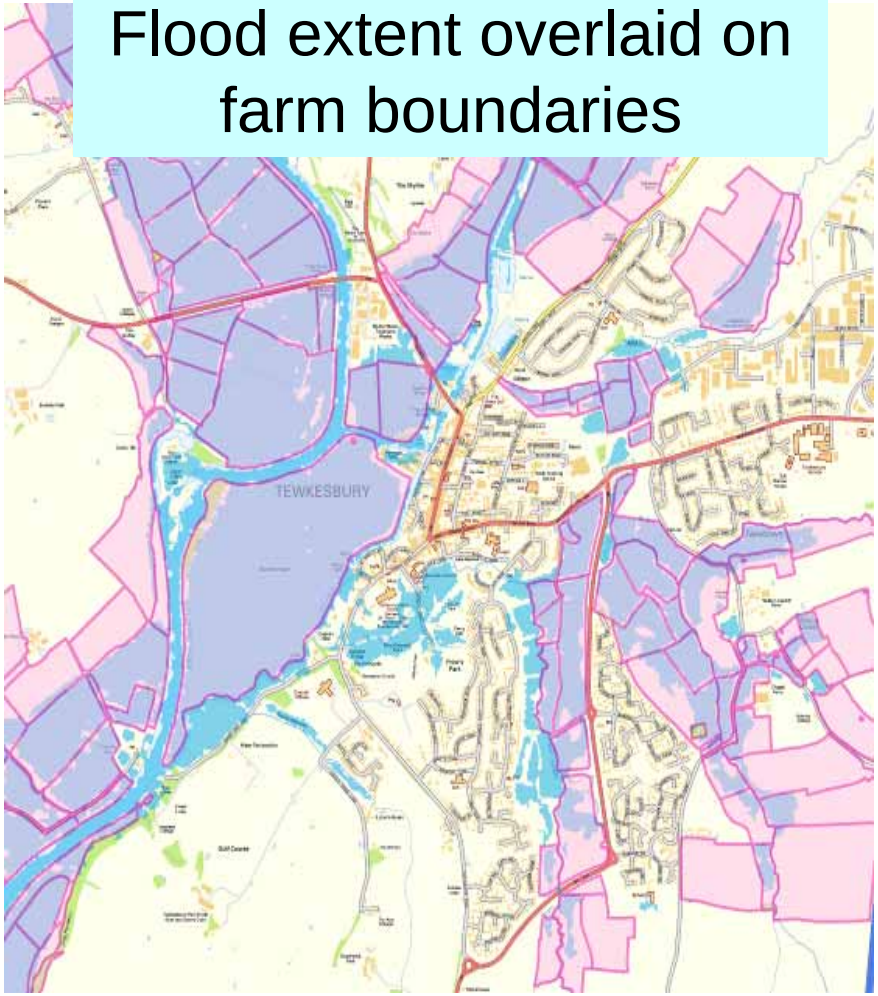
Flood extent compared to risk zones



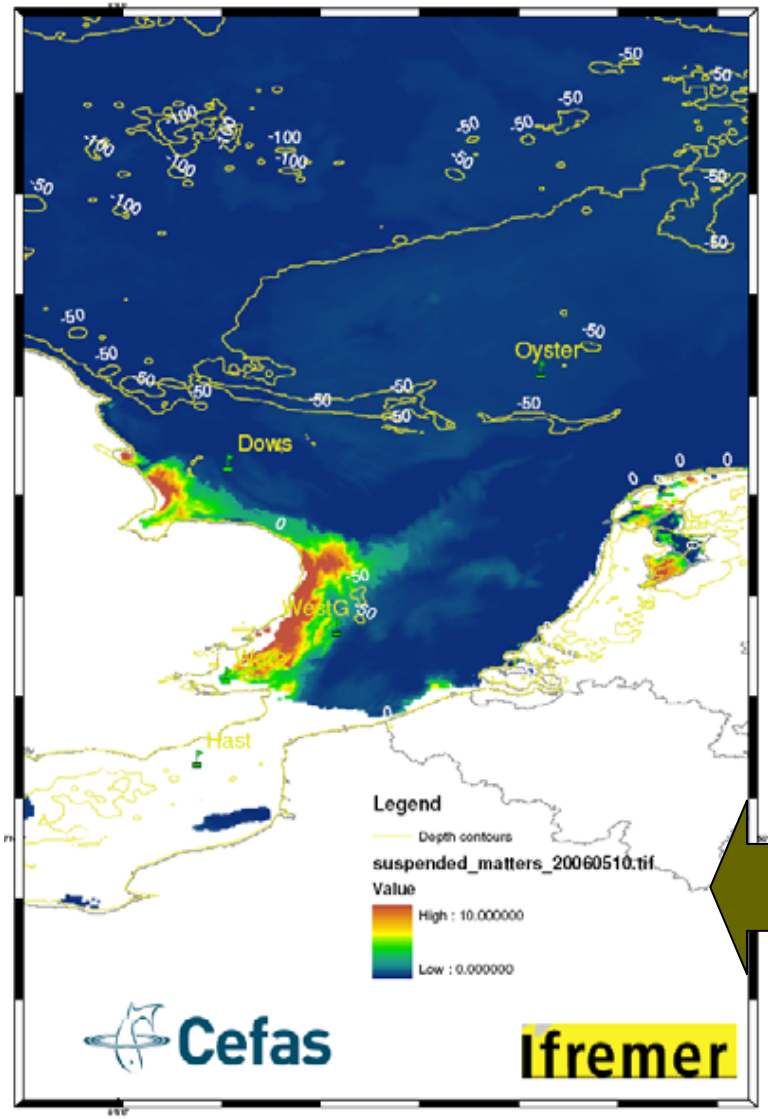
Flood extent overlaid on farm boundaries

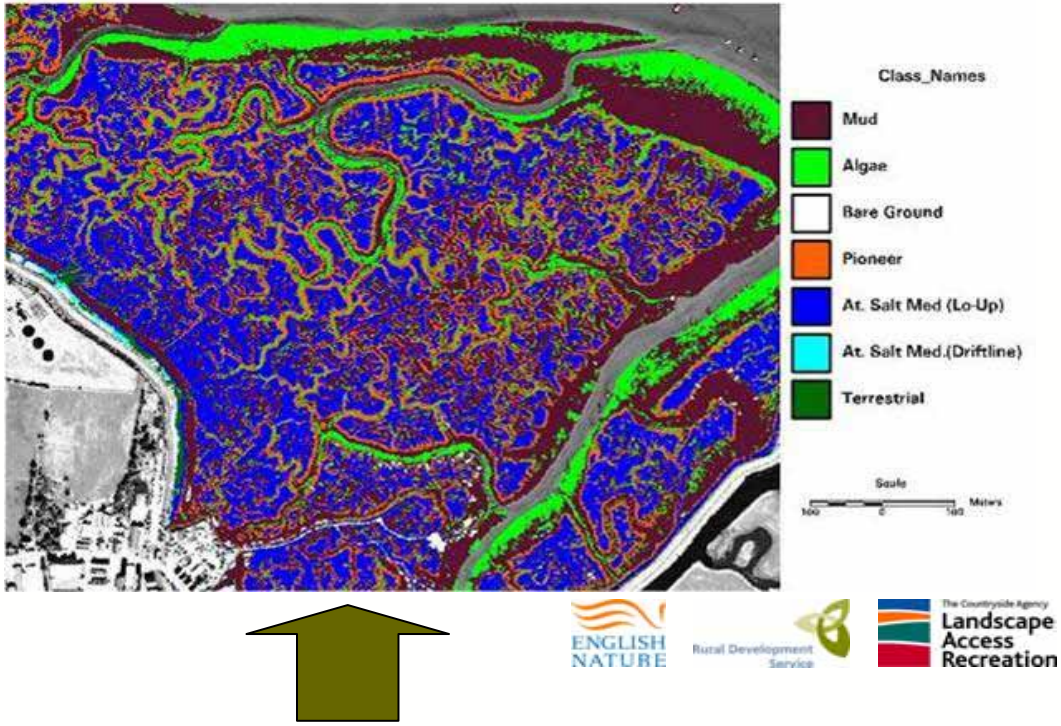


EA flood risk zones

Observed flood extent from TerraSAR-X

Monitoring the marine & coastal environment





Regular monitoring of coastal habitats and water quality

Continuous Plankton Recorder

- See case study in Framework – Box 2
- 77yrs of plankton survey in the North East Atlantic – most extensive marine biological record
- Was set up to help the Herring Fisheries – now a Treasury Target and assists in climate change impacts, eutrophciation and health of the seas indictors
- Defra currently find 48% of the £1m charity. Happy to do so but its under Research monies – can we find a better way?

Observations

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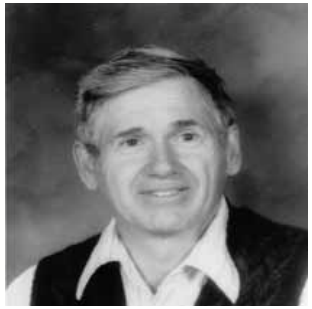
Climate Change

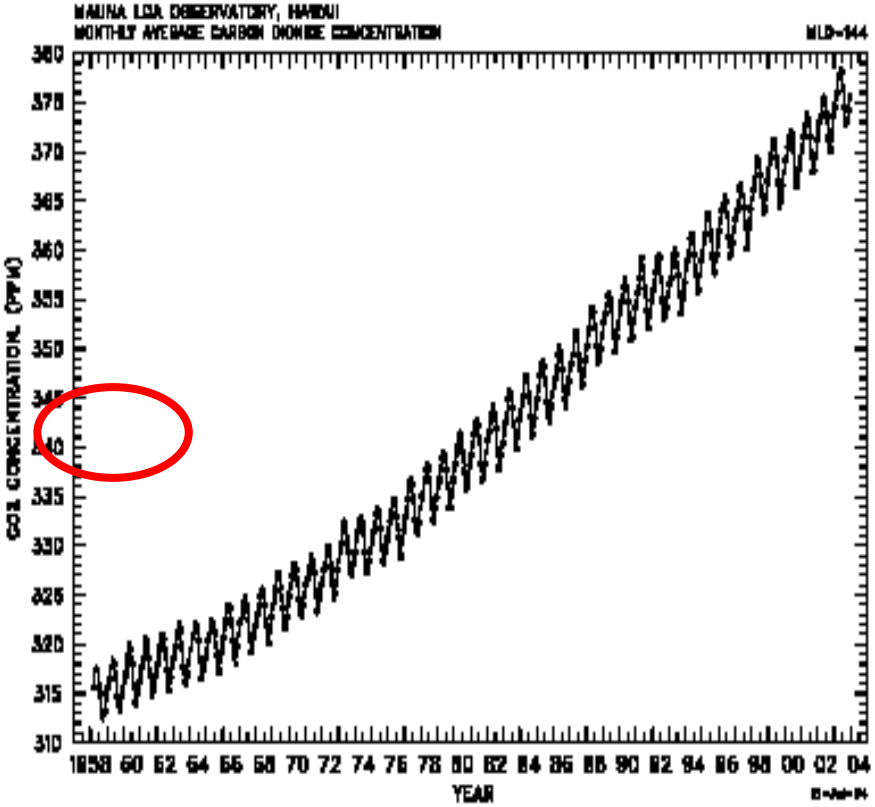
Charles Keeling - measuring carbon dioxide … 1960



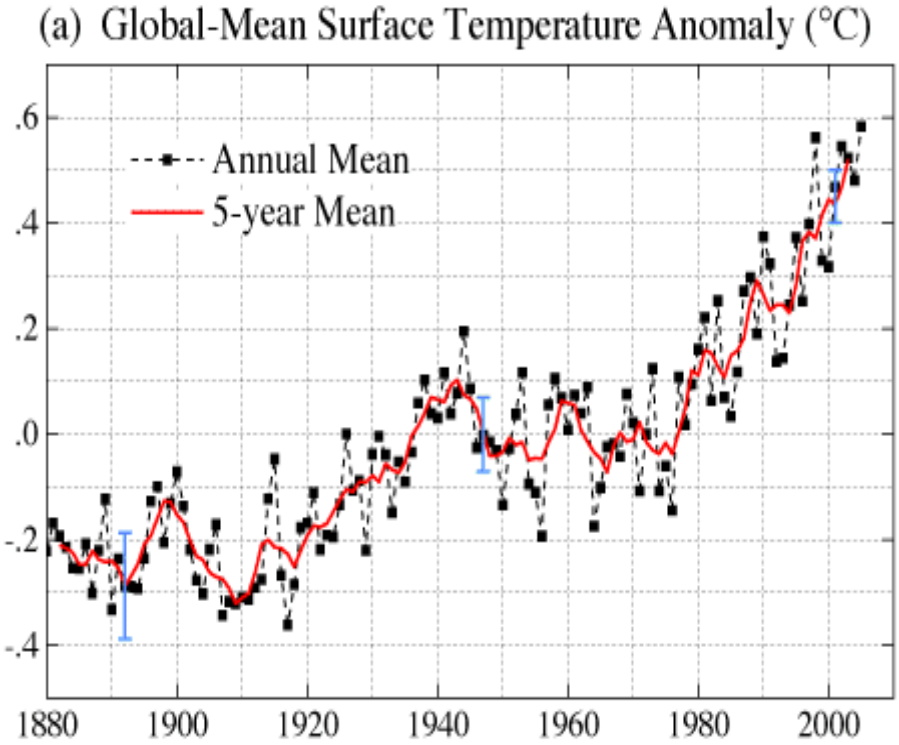
"At the South Pole … the concentration has increased by about 1.3 ppm per year; over the Pacific, the increase appears to be between 0.5 and 1.2 ppm per year."

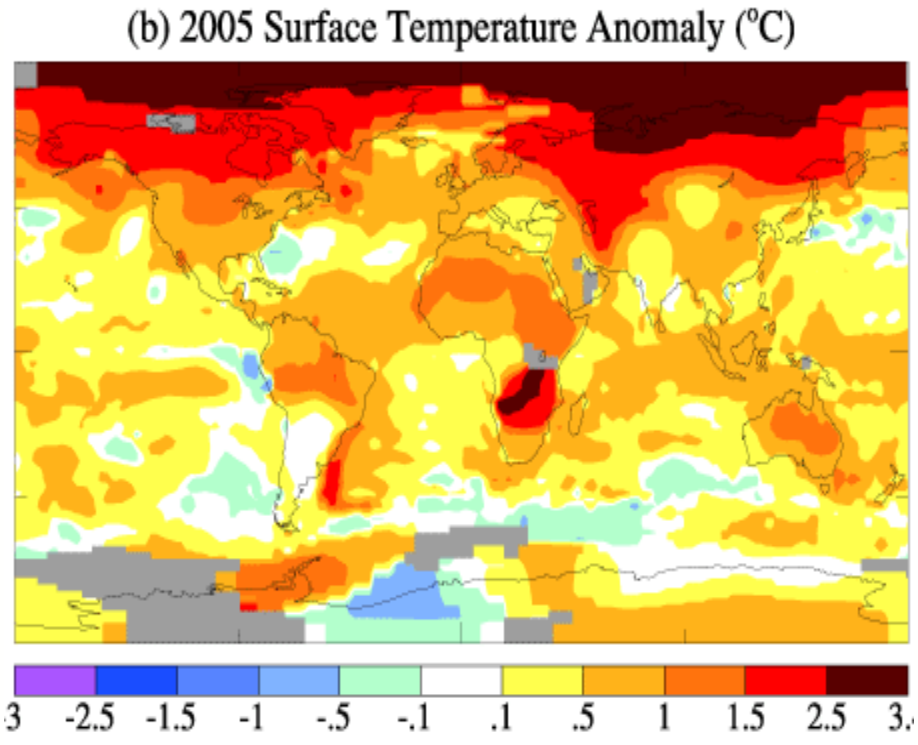
Charles Keeling, 1960

Mauna Loa Observatory, Hawaii



Temperature Records
(Deviation from 1951- 1980 mean)





Source: NASA Goddard Institute for Space Studies Surface Temperature Analysis at data.giss.nasa.gov/gistemp/

Observed changes in physical and biological systems

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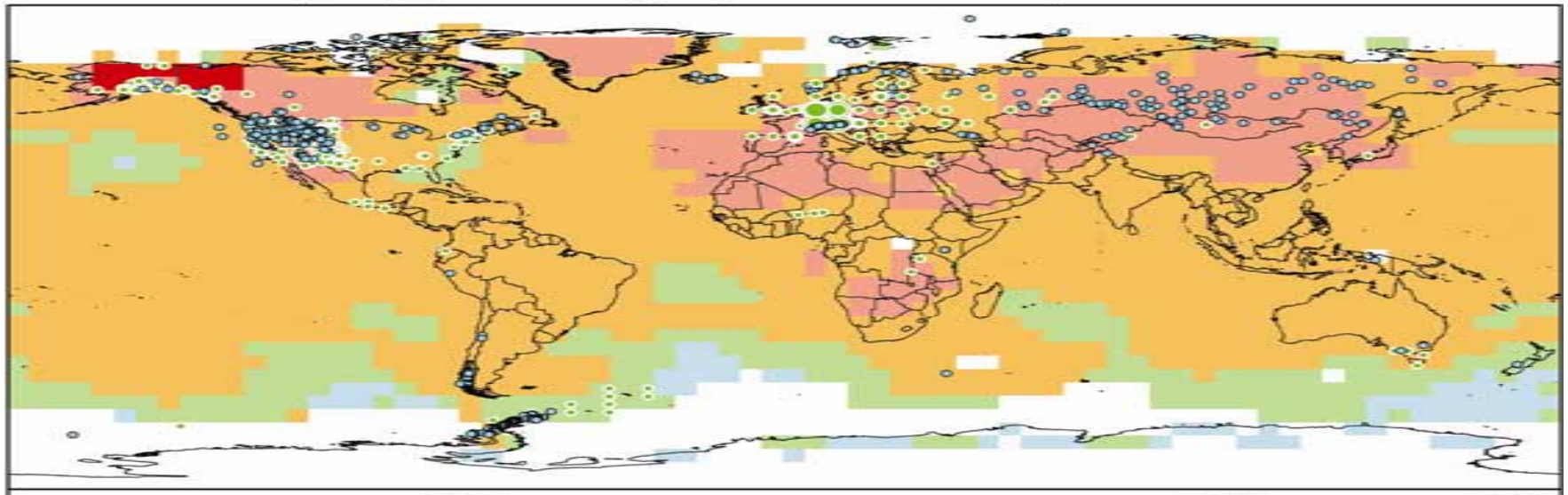
Changes in physical and biological systems and surface temperature 1970-2004



NAM	LA	EUR (28,115)	AFR	AS	ANZ	PR*	TER (28,586)	MFW**	GLO (28,671)
355 / 455	53 / 5	119 /	5 / 2	106 / 8	6 / 0	120 / 24	764 /	1 / 85	765 /
94% / 92%	98% / 100%	94% / 89%	100% / 100%	96% / 100%	100% / –	91% / 100%	94% / 90%	100% / 99%	94% / 90%

Observed data series
- Physical systems (snow, ice and frozen ground; hydrology; coastal processes)
- Biological systems (terrestrial, marine, and freshwater)

Europe ***
1-30
31-100
101-800
801-1,200
1,201 -7,500

Temperature change °C
1970-2004

-1.0 -0.2 0.2 1.0 2.0 3.5

Physical	Biological
Number of significant observed changes	Number of significant observed changes
Percentage of significant changes consistent with warming	Percentage of significant changes consistent with warming

* Polar regions include also observed changes in marine and freshwater biological systems.
** Marine and freshwater includes observed changes at sites and large areas in oceans, small islands and continents. Locations of large-area marine changes are not shown on the map.
*** Circles in Europe represent 1 to 7,500 data series.

Sea Levels Have Risen

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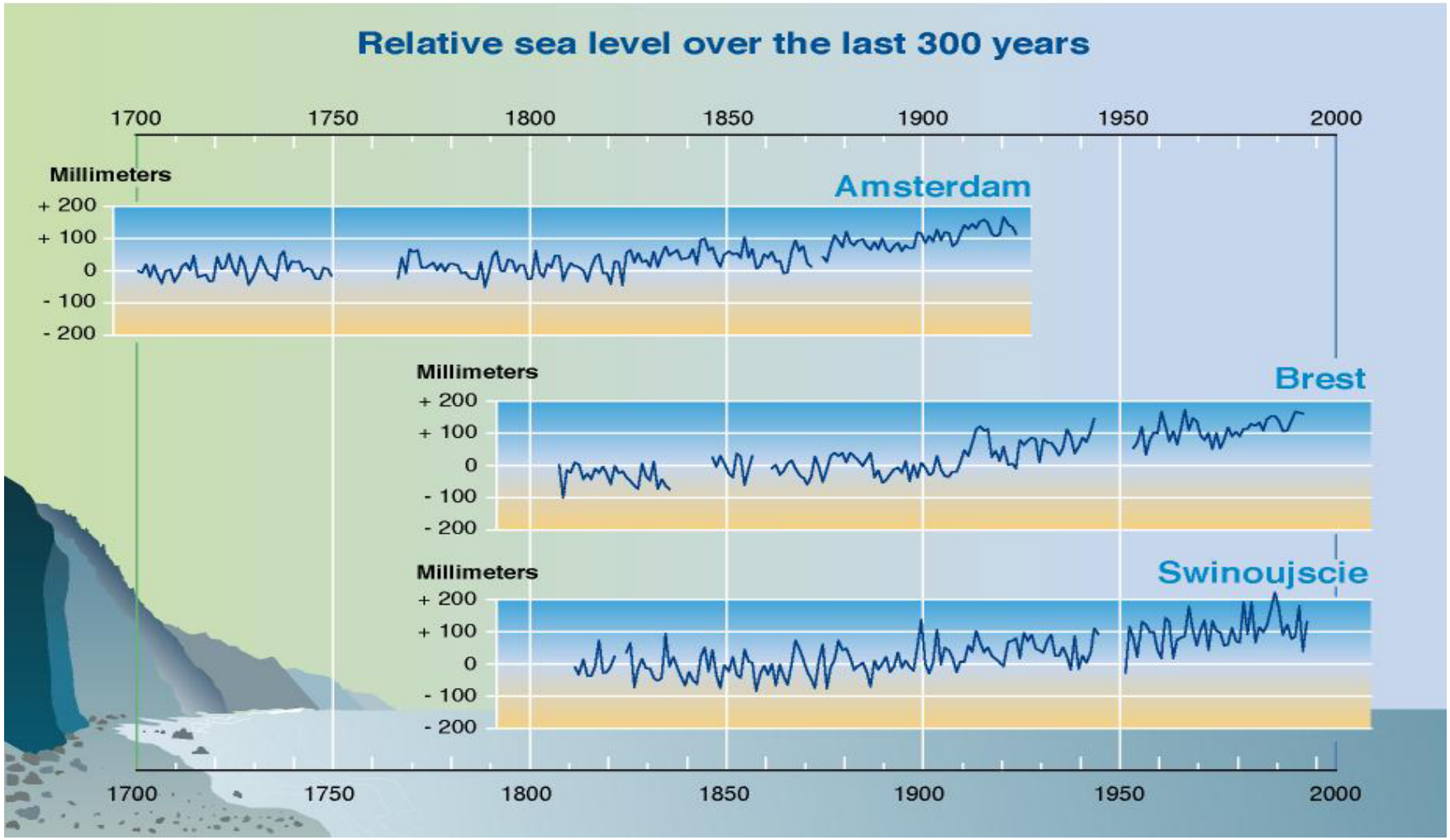
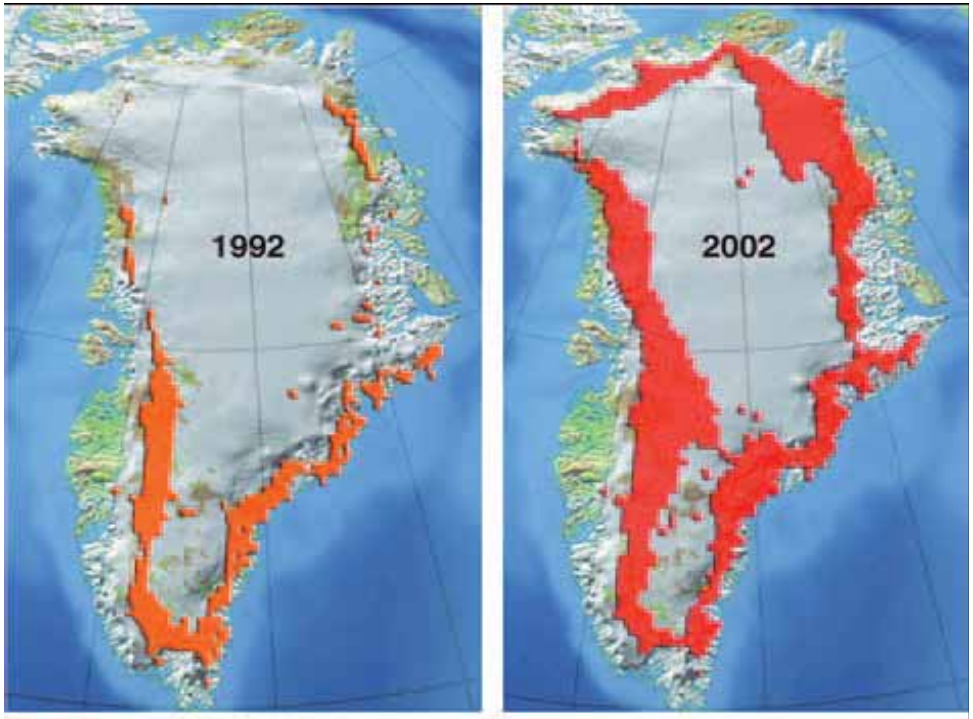
FIGURE 2.5



Observations



30 year forecasts from Mar 2007

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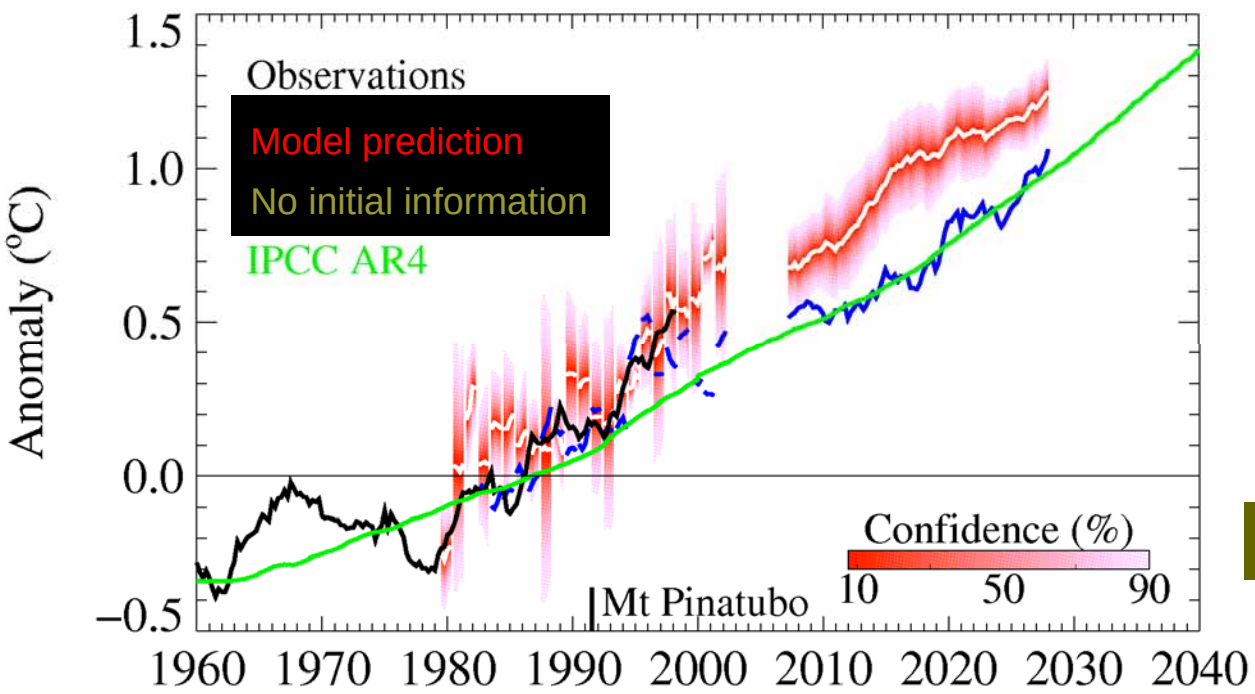
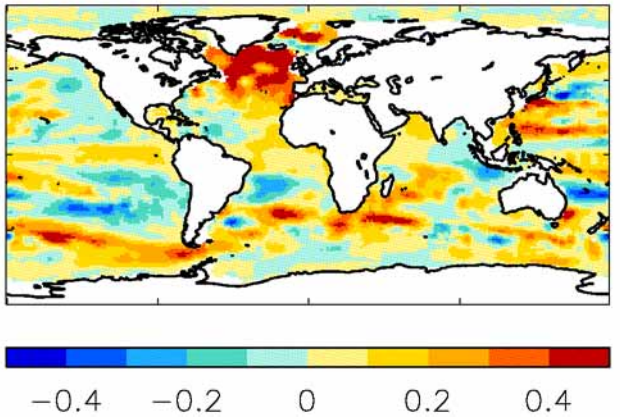
UK 9-year mean Temperature



360m ocean T, March 2007



New challenges

- Marine Bill
- Climate Change Bill
- Ecosystem Services
- --- need to rely on may sources of information and data
- ----need to work together to generate and share this information

UK Environmental Monitoring

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- UK Environmental Observation Framework

  - holds the key(s) to UK progress towards effective monitoring

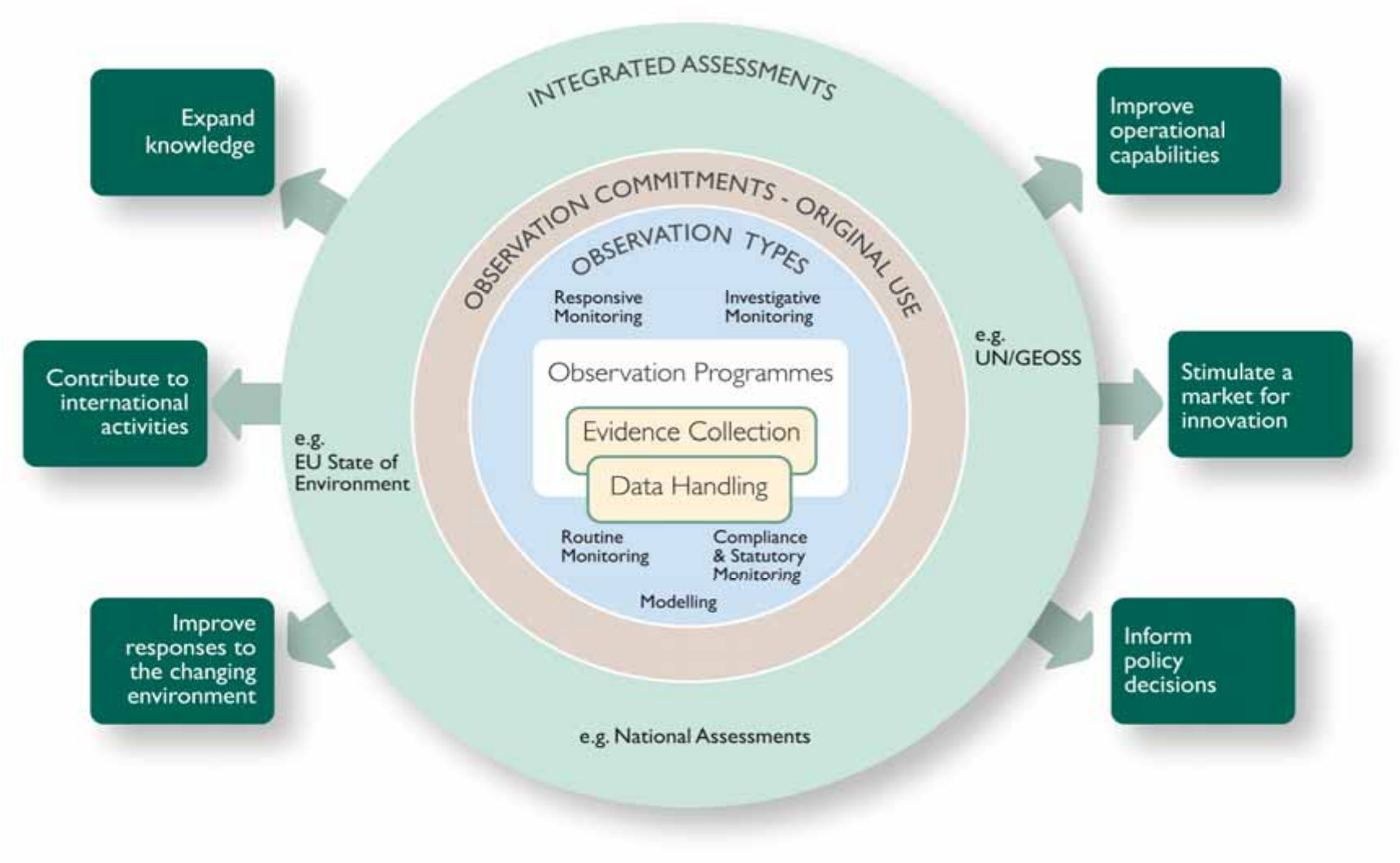
The role of Defra in the UK-EOF

- In response to the 2006 ERFF recommendations Defra will provide the government champion

- Bobs champion / Figure head

- Ian Davidson chairing the Management Group

UK-EOF – concept and outcomes



Note this is schematic only

ENVIRONMENT RESEARCH FUNDERS' FORUM MAIN BOARD

Own framework, collective aspiration and outputs. Ask for the evidence and use the outputs

Biannual meetings

Key funders and senior policy players across government and the Devolved Administrations.

Champion of the UK- EOF Professor Bob Watson, Defra

UK-EOF Management Group
Decision making group to facilitate the workstreams and initiate, advocate and champion the issues.
Responsible for active project management of the work streams, UK-EOF accounting and guidance of the Programme Manager
All parts of the community represented.
Up to 4 meetings per year

Central Coordination

UK-EOF Programme Manager and **Secretariat**

The Community: in clusters
delivering efficient and effective evidence.

Work Programme

WORKSTREAM 1
Collective Aspiration
Articulating the questions
Decision-making framework

WORKSTREAM 2
Knowledge Base
Metadata including costs and quality
Data policy
Sound Science

WORKSTREAM 3
Assessments co-ordination and Knowledge Transfer
Assessments catalogue

WORKSTREAM 4
Financing Mechanisms
Internal
Inter-Departmental
International
Long-term

WORKSTREAM 5
Community
Communications
Annual Conference
Website
Newsletter
Who's Who

The UK-EOF

- WS1 - What are the questions we are asking and how do we deliver them?
- WS2 - Who is collecting what, is there a data policy and is it suitable for reuse?
- WS3 - How do we want to use the data?
- WS4 - Are the financing models suitable?
- WS5 - Community, communications and decision making processes.

Collective Effort Needed

- UK-EOF will not function without the input from all key organizations

- We look forward to this first inaugural workshop to build the community, the networks and the trust to make the UK-EOF the opportunity to take a step change in our attitude and management of environmental observations.

UK Environmental Observation Framework

17th July 2008

Next Generation Environmental Observations

Professor Alan Thorpe

NERC

NERC supports observations of the environment

Satellite measurements – ESA subscription to Earth Observation Envelope Programme: e.g. CryoSat-2 (2009) and EarthCARE (2013)

Ground-based remote – e.g. Chilbolton radars

In-situ measurements - platforms and instruments

Platforms: *Research vessels – NERC operates 4 ships*
Aircraft – BAe 146, Dornier 228, Twin Otters, Dash-7
Bases – in Arctic and Antarctica
Instrumented catchments

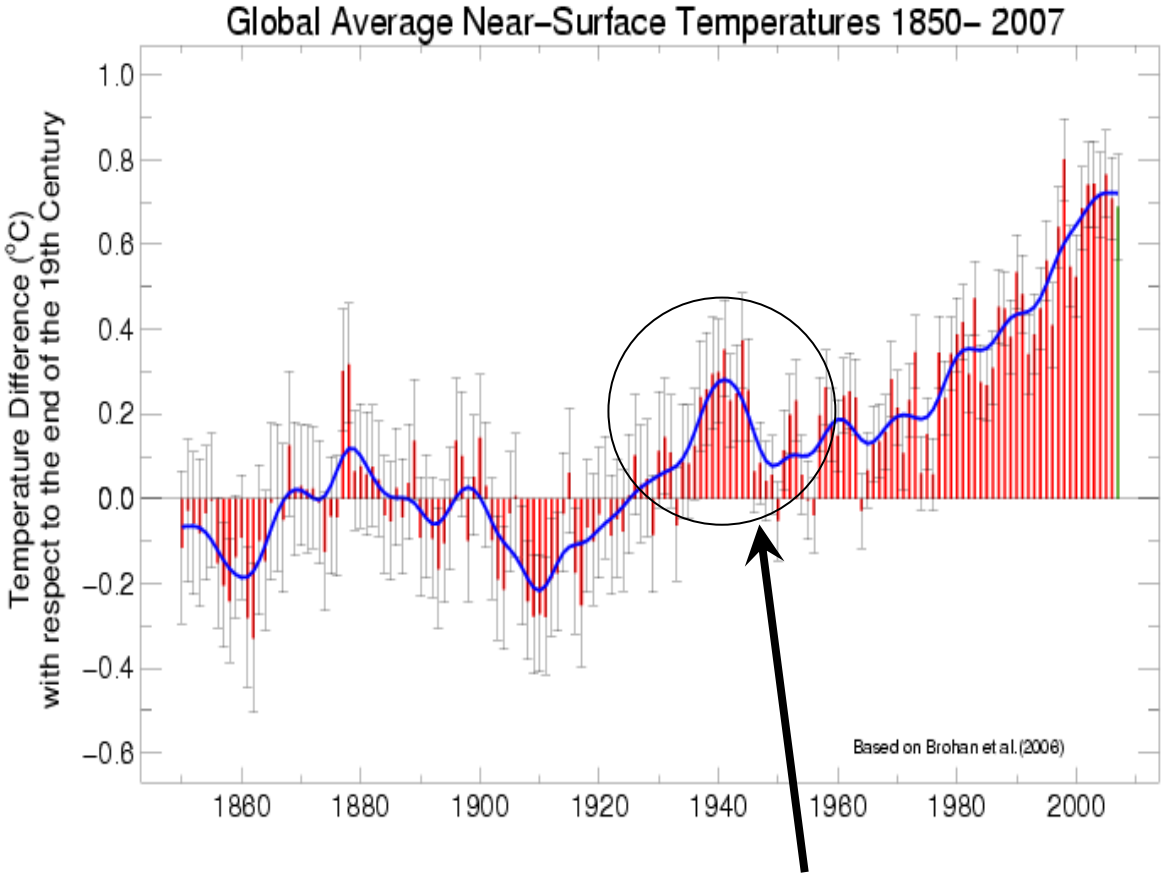
Instruments: *Wide range of field-deployable sensors*
Laboratory instrumentation
Analytical facilities

Data centres – discipline-based: e.g. atmospheric, oceanographic, geological etc


FAAM

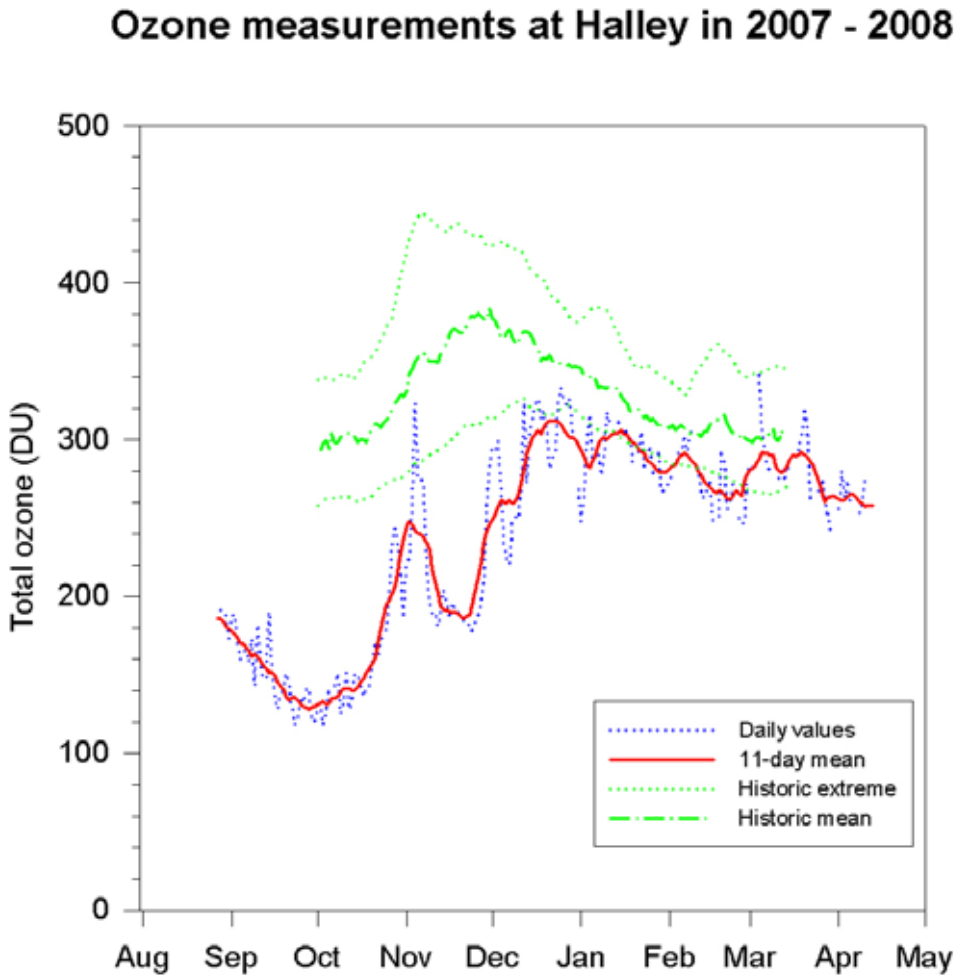
Science and technology challenges

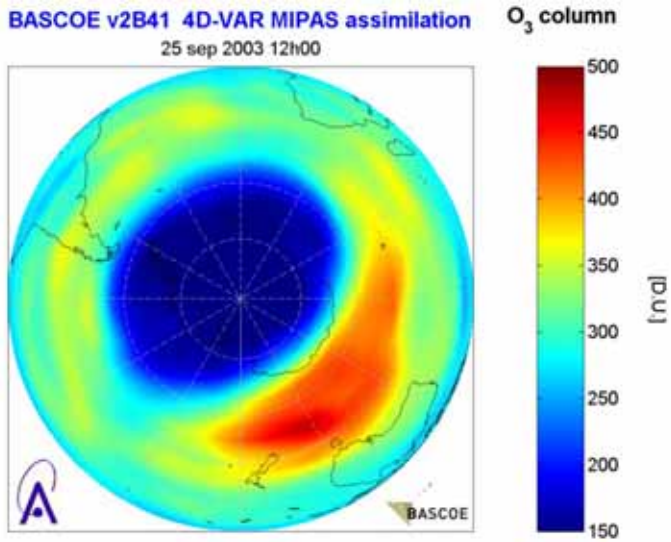
Iconic temperature records –
tried and tested technology!

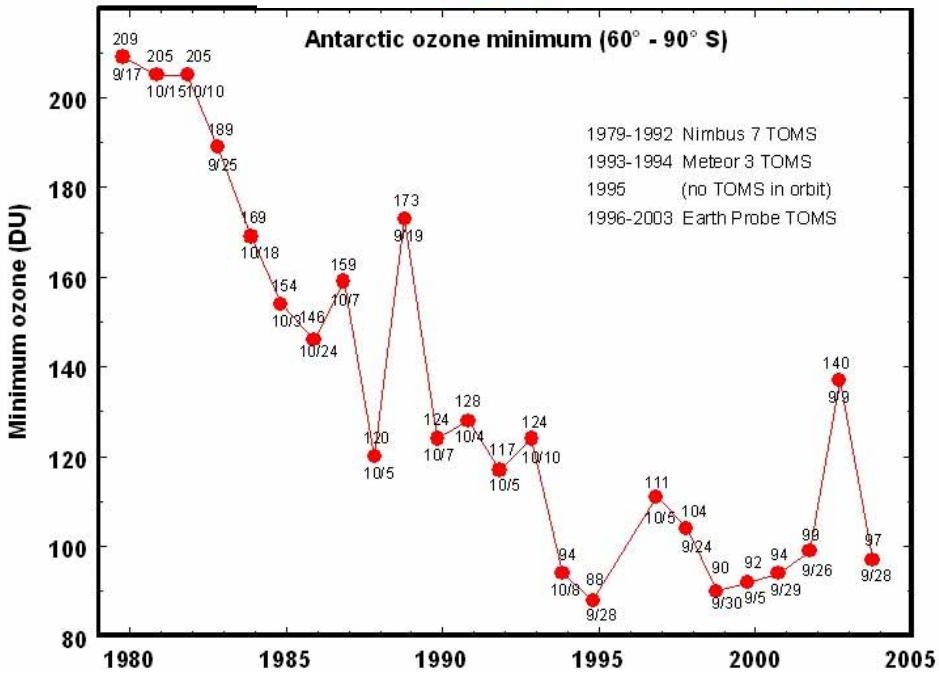


Why is there a dip after WWII?

Measurements at Halley Base Antarctica: Dobson ozone spectrophotometer

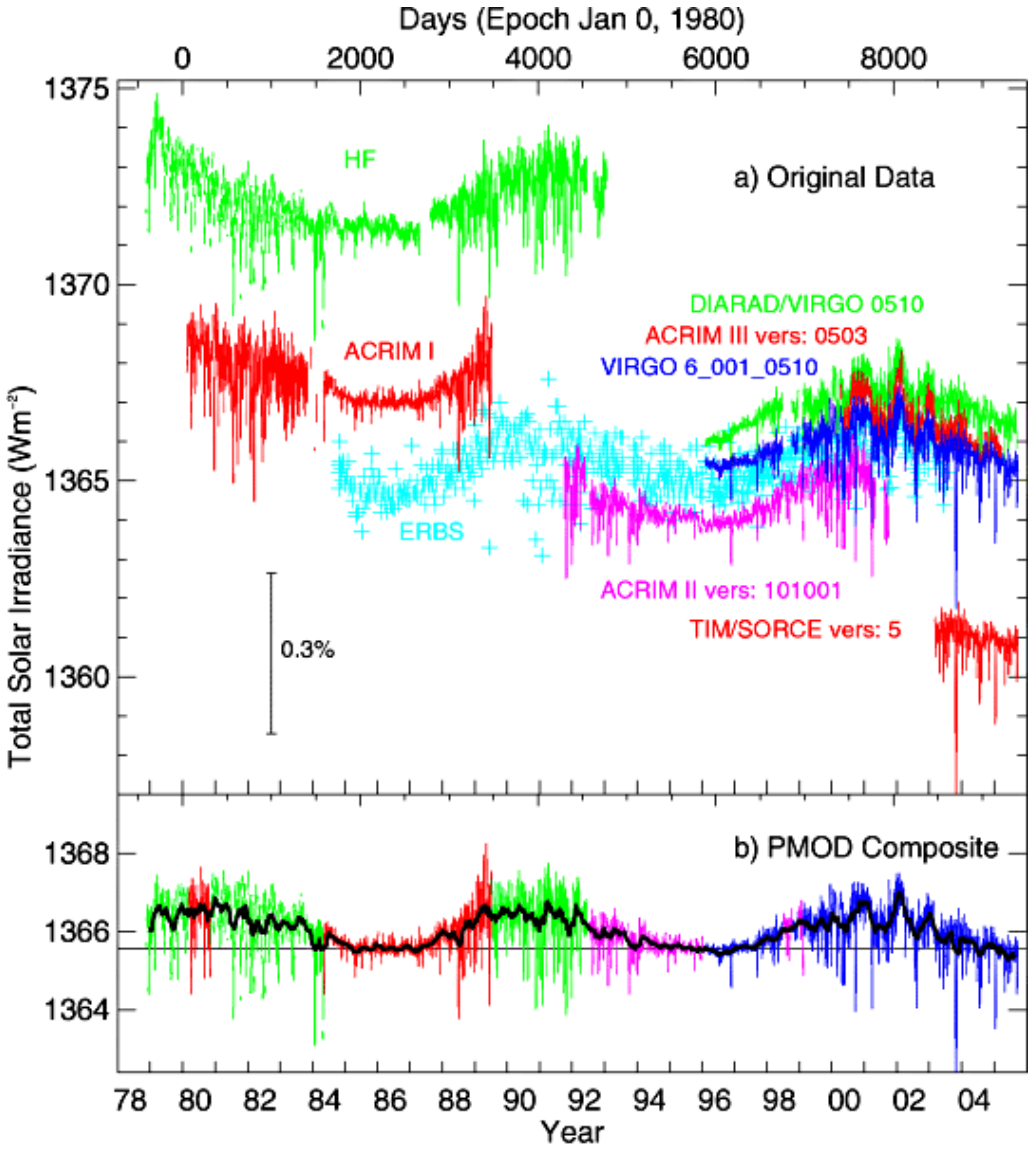




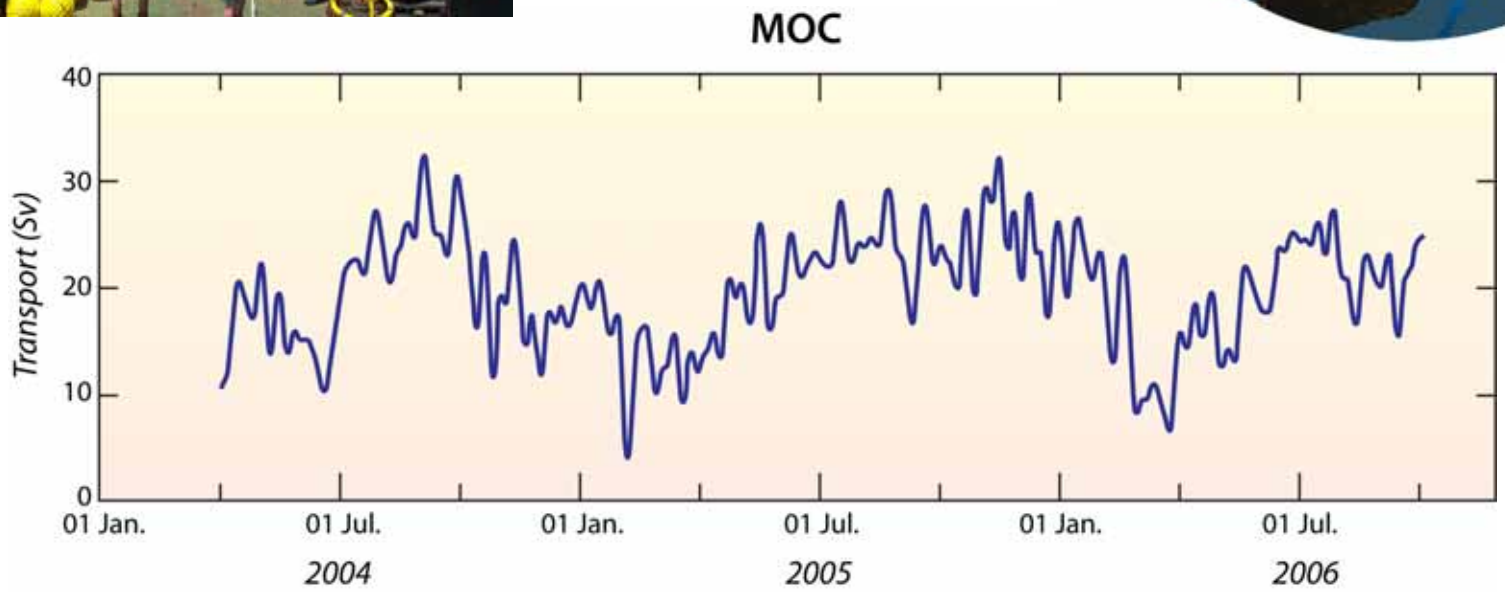


Satellite measurements

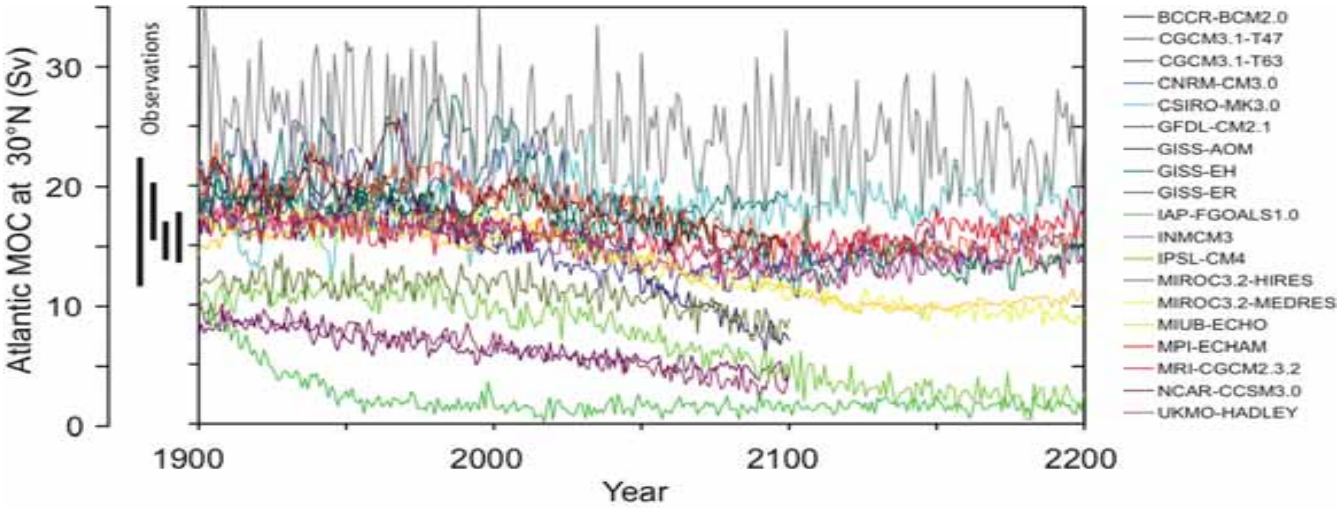
Biases between sensors of total solar irradiance



First continuous, daily measurements of the Atlantic Meridional Overturning circulation



IPCC - MOC projections



'*I recognise that major steps like the Rapid Climate Change programme are critical to improving our understanding and prediction of climate. These major steps take considerable courage and foresight by both scientists and their funders. The leadership shown by NERC is critical to realising these improvements.*'

John Church, Chair of the Joint Scientific Committee of the World Climate Research Programme, 2007.

Countryside Survey

Working in Partnership

NATURAL ENVIRONMENT RESEARCH COUNCIL

- Unique 30-year time series of large-scale rural change in habitats.
- Combines field surveys with the use of satellite imagery.
- Funded by a large consortium headed by Defra and NERC.
- Highest quality ensured through standardised field and laboratory protocols

Perspective

NERC's priority is to make observations for research purposes; researchers use any observations however funded!

Often research observations are highly policy-relevant

Challenges

The transition from research-based to operational observations

Understanding the portfolio of observations made by UK organisations

Linking UK observations to share knowledge and increase efficiency

UK-EOF can help NERC:

Prioritise what long-term measurements NERC should support

Sustain long-term observations – using NERC's new National Capability funding stream and working with UK partners

UK Environmental Observation Framework

17th July 2008

Observations – our window on the environment

- **Doug Wilson**
- **Head of Monitoring and Assessment**

- **UK-EOF Launch – 17th July 2008**

Summary

- Adaptive monitoring programmes
- Drives and informs priorities
- Recognise environmental costs of observations
- Be prepared to use others' data
- Improving the cost estimates

UK Environmental Observation Framework

17th July 2008

ERFF
&
use of evidence for policy

Professor Maggie Gill
Chief Scientific Adviser

Rural & Environment Research & Analysis Directorate

The Scottish Government

A story in 3 parts

- ERFF – the who, the what and the delivery
- Evidence informing policy ⇄ policy informing the collection of evidence
- The importance of observations

Environment Research

Funders' Forum

'Maximising the coherence and effectiveness of UK environmental research funding'

Environment Research
Funders' Forum

ERFF Objectives

- to provide a joined-up approach to UK environmental research strategy
- to determine areas of synergy where joint activities would add value
- to identify and consider taking action on any gaps in environmental research
- to shape UK and international future
- science direction

Environment Research
Funders' Forum

Publications

Co-ordinating Environmental Research

Horizon Scanning Study

Objectives

1. To identify the most important dimensions of uncertainty that could impact on the UK's interests over the next twenty years
2. To frame a shared understanding of the future environment for ERFF members
3. To help ERFF members identify shared priorities
4. To inform individual members' own strategies

Policy discussions

- What areas of policy development will be particularly active in the coming years
  - (2, 5,10, 20 year time horizon)?

  - Which are of high priority?

- Where will the main pressures for policy development come from, taking a
  - DA,UK, EU, global context ?

The dimensions

Cities and the environment

Economic growth within environmental limits

Costs and benefits of renewable energy

Food Production

Sustainability of the water supply

Changing behaviours

Changing ecosystems

Reducing uncertainty around climate change impacts

Transport and mobility

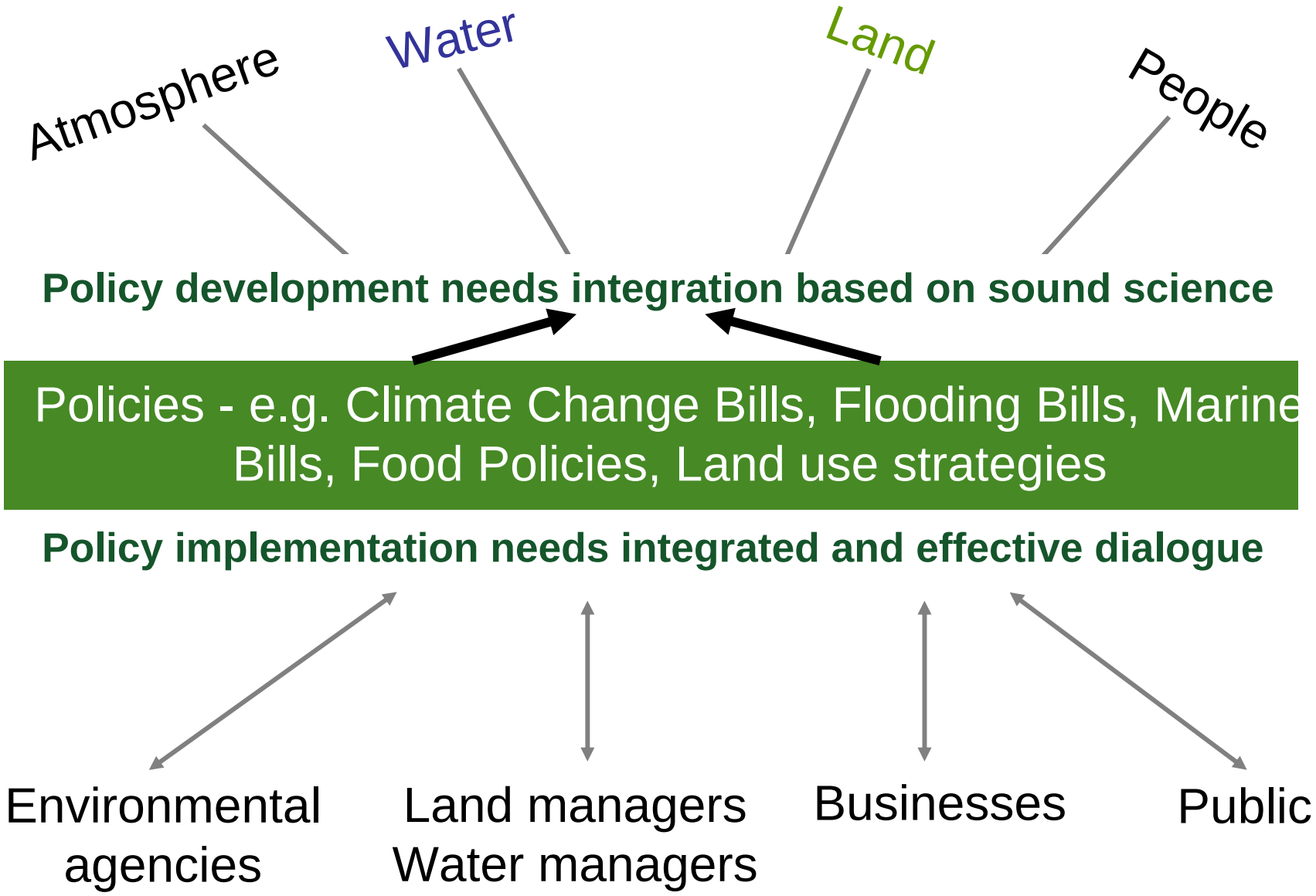
Deploying technology

Consequences of population movement

Horizon scanning outputs

- http://www.erff.org.uk/reports/reports/071212.asp

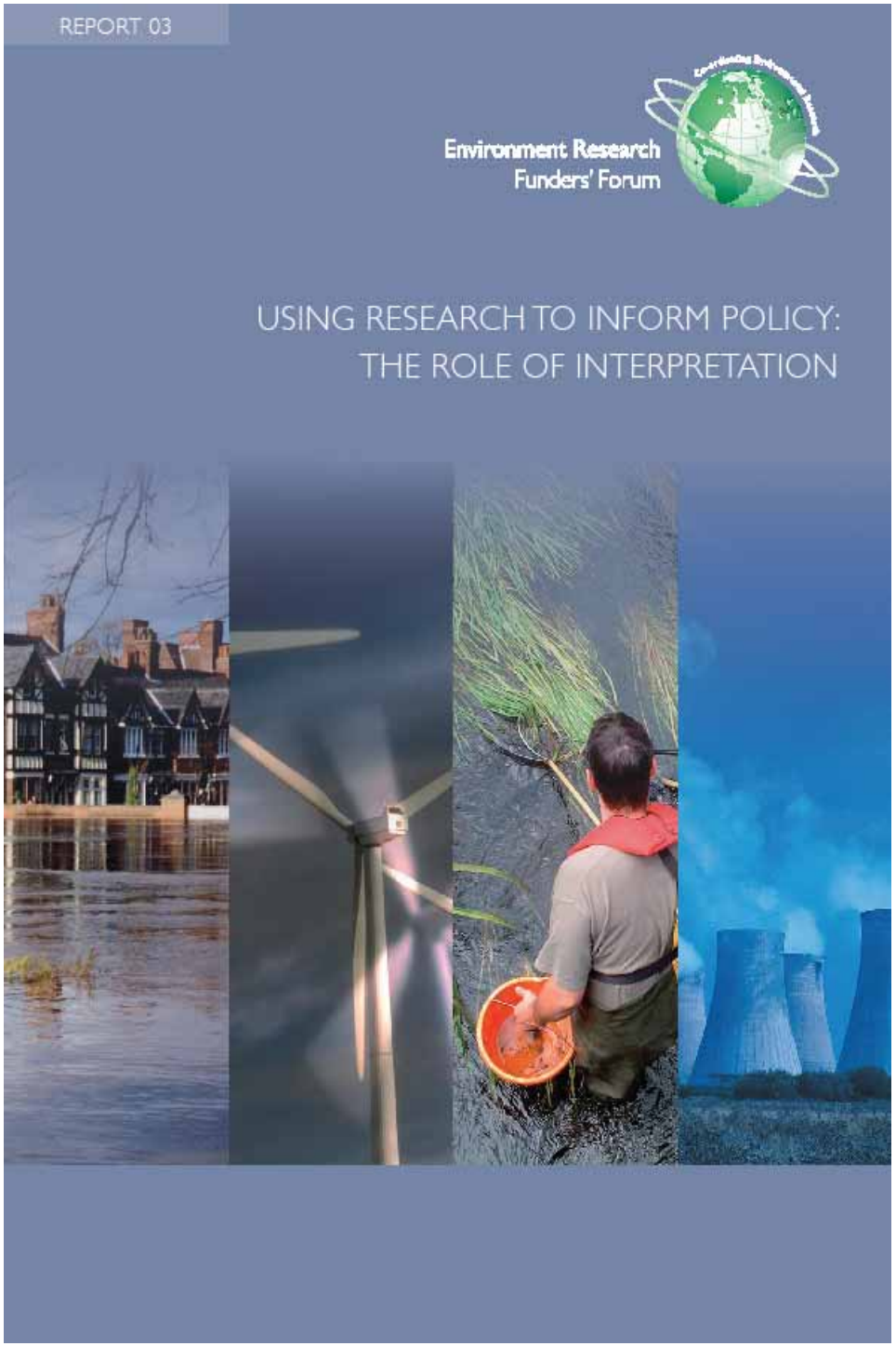
Evidence into policy: policy inspiring evidence


Atmosphere
Water
Land
People
Policy development needs integration based on sound science
Policies - e.g. Climate Change Bills, Flooding Bills, Marine Bills, Food Policies, Land use strategies
Policy implementation needs integrated and effective dialogue
Environmental agencies
Land managers
Water managers
Businesses
Public

Environment Research
Funders' Forum

How do policy makers access evidence?

How do researchers become aware of policy questions?



Findings of ERFF study

- Continuing relationship between experts and policy colleagues valued
- Advisers and policy colleagues require access to findings representing a variety of perspectives
- Assurance of robustness and relevance of research outputs valued








LIVING WITH ENVIRONMENTAL CHANGE

2007-2017 A major interdisciplinary research and policy partnership to tackle environmental change.

Living With Environmental Change

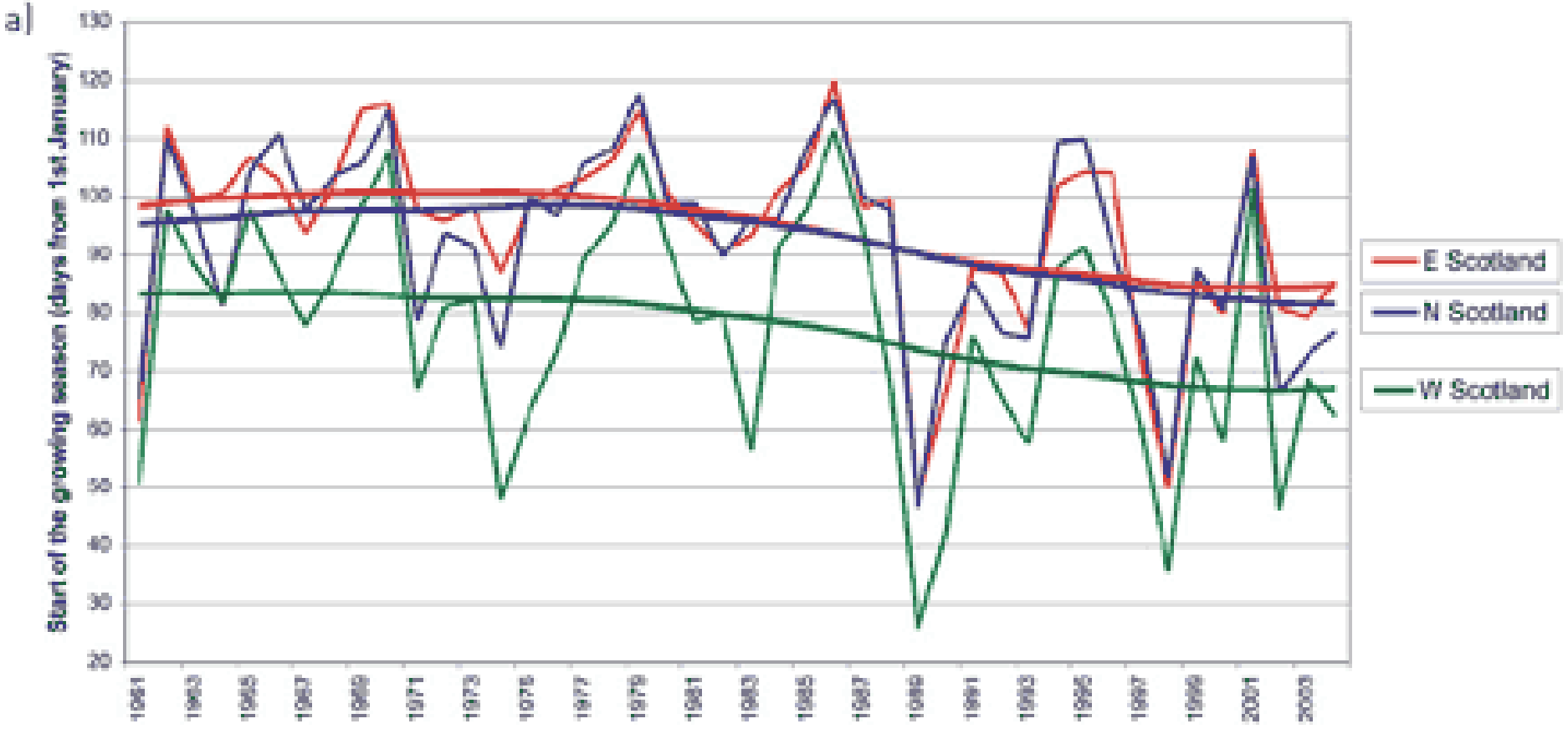
The importance of observations

Observation and monitoring

- Detect trends
- Provide focus for research questions
- Help to communicate science to practitioners

- and are thus a vital part of the interchange of knowledge between science and policy development and implementation

Start of growing season



Source: http://www.sniffer.org.uk/climatehandbook/

Changes to growing season length

Areas of Scotland	1961 (days)	2006 (days)
North	213	234 (+21)
East	217	250 (+33)
West	237	274 (+37)

Source: http://www.sniffer.org.uk/climatehandbook/

Take home messages

- The need for **integrated** science as part of the evidence base for policy development and implementation is increasingly important and increasingly recognised with evidence from monitoring being part of the mix

- Integration needs to be across **disciplines** and scales - both spatial and temporal

- Delivery of this evidence is dependent on effective functioning of **partnerships** such as ERFF focusing on key areas such as environmental monitoring

UK Environmental Observation Framework

17th July 2008

UK Environmental Observation Framework

The UK- EOF Launch

Beth Greenaway

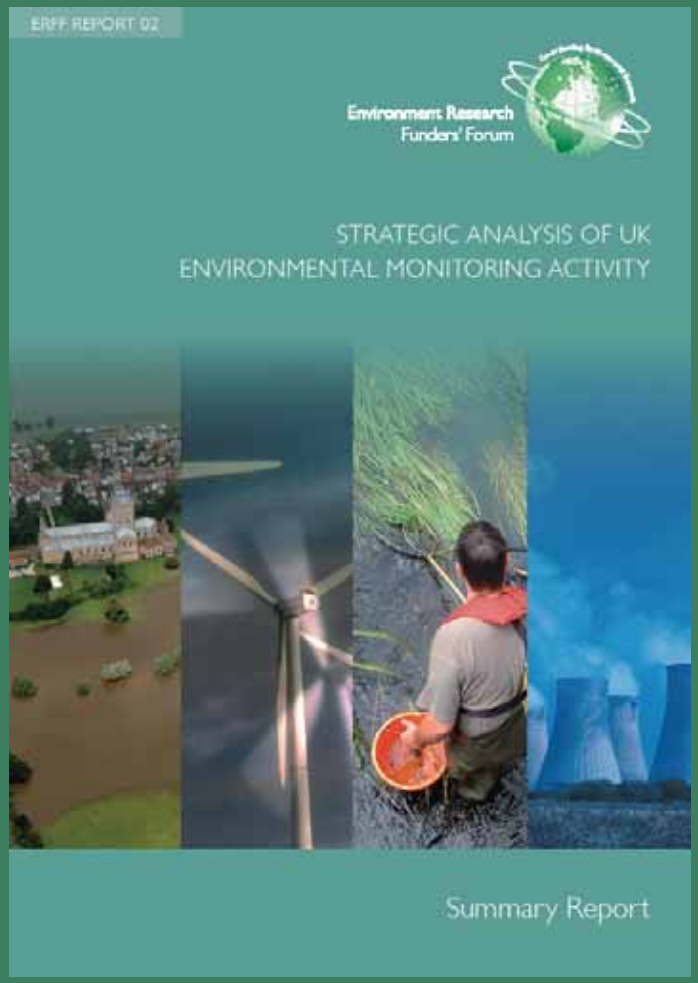
17th July 2008

Environment Research
Funders' Forum

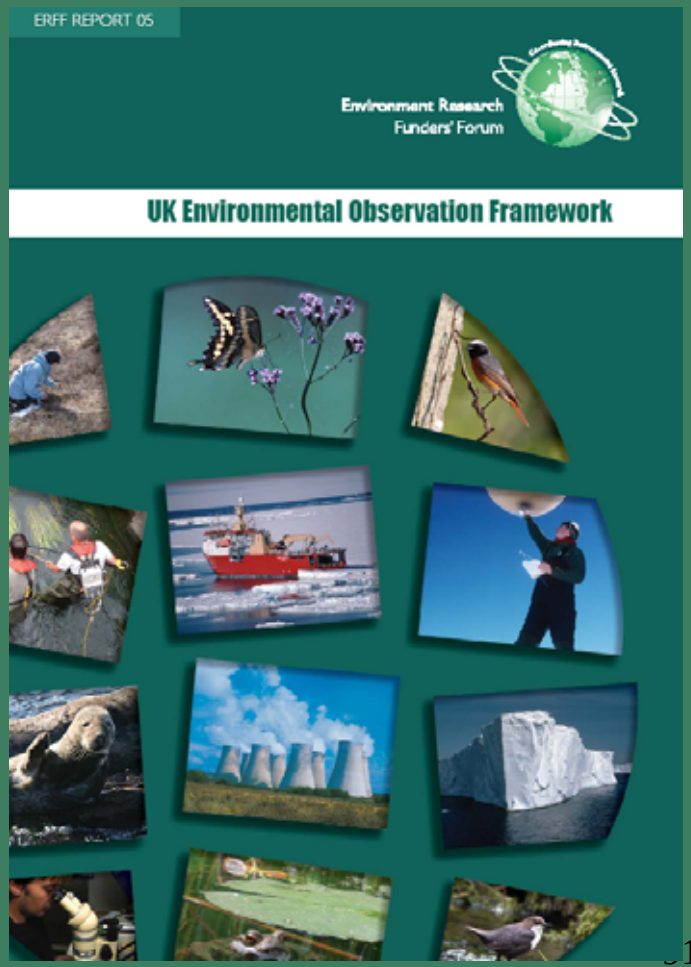
Contents

- Part 1
  - The new strategic UK-EOF
  - Concepts , scope and main outc
  - Who's involved
- Part 2 The Workstreams
- and the team– after lunch!

ERFF review of Environmental Monitoring



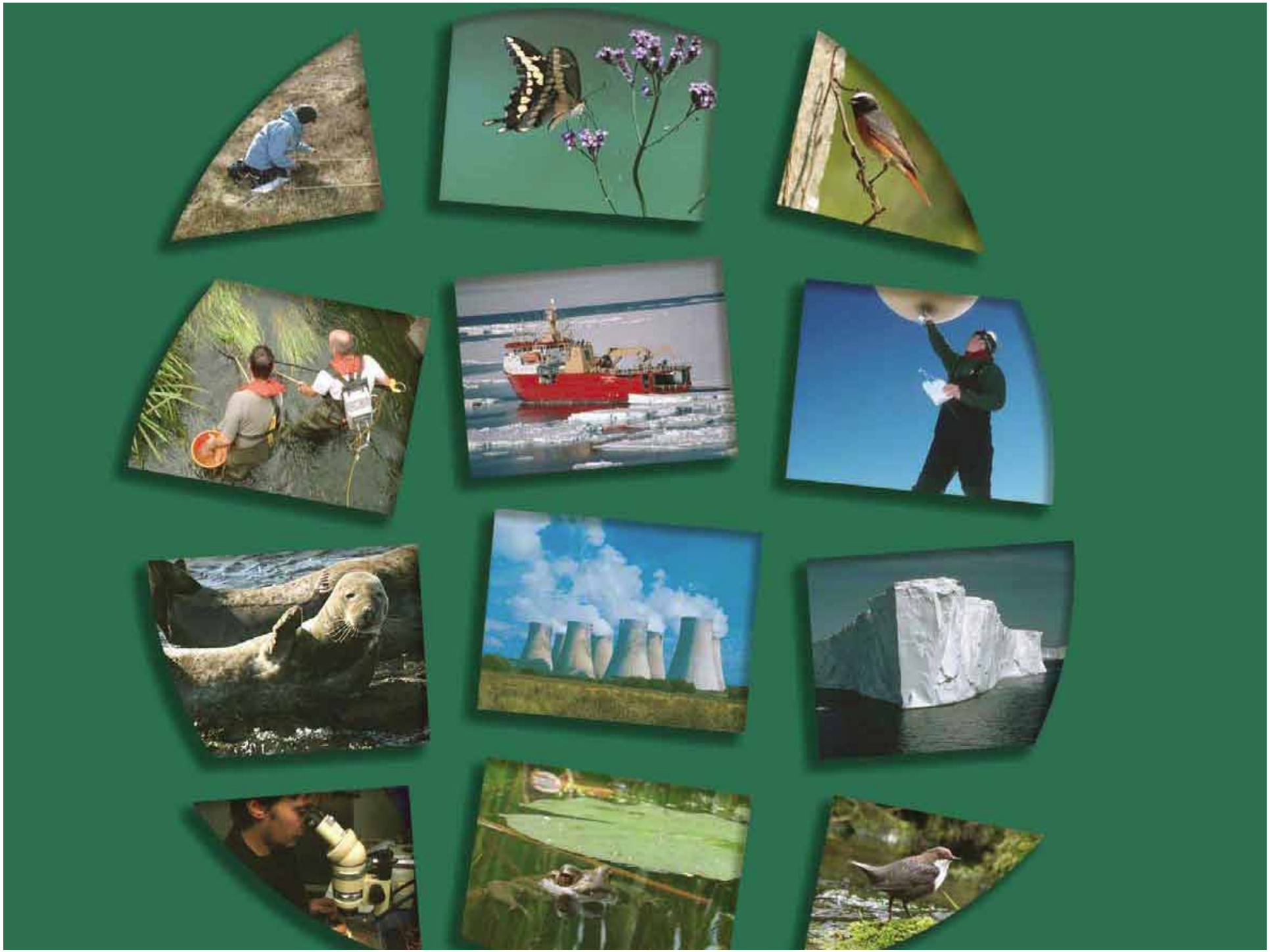
To UK-EOF



The current picture

- FRAGMENTED
- UNCOORDINATED
- LACKS STRATEGIC DIRECTION
- NO OVERALL OWNER
- Risk of
  - Missed opportunities for knowledge
  - Poor data sharing
  - Funding stopped for key time series data
  - Duplication of effort

Refs (ADAS, 2006), (UKMMAS Defra, 2005), GECC (2006)



What's the problem as it is?

- £500m public money spent per year– yet we do not have an overview of where!
- UK risks being left out of international programmes–due to an inability to take a rational UK view over value for money.
- Key datasets are under threat –and we do not have a way of knowing if these are the lowest priority for funding.
- >80% of data not freely available and therefore not reused or shared e.g. for climate work
- We are living in a rapidly changing environment and we need to understand these changes in order to adapt and prioritise action and resources.

Where are we now?

- 2006 recommendation for a top down and bottom up strategy
- One year study funded 07/08
  - 5yr proposal and UK-EOF concept agreed
  - 13 members agreed to fund.
  - Recruitment of staff and details of work streams
  - April 08 Start of UK-EOF

HSE

JOINT NATURE CONSERVATION COMMITTEE

NATURAL ENGLAND

Environment Agency

bbsrc
biotechnology and biological sciences research council

Department for Transport

SEPA
Scottish Environment Protection Agency

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

E·S·R·C
ECONOMIC & SOCIAL RESEARCH COUNCIL

Cyngor Cefn Gwlad Cymru
Countryside Council for Wales

The UK-EOF will

'facilitate the ongoing evidence required to understand the changing natural environment'

Met Office

MRC Medical Research Council

NATURAL ENVIRONMENT RESEARCH COUNCIL

BNSC
BRITISH NATIONAL SPACE CENTRE

DFID Department for International Development

The Scottish Government

EPSRC
Engineering and Physical Sciences Research Council

SCOTTISH NATURAL HERITAGE
DUALCHAS NADAIR ng h-ALBA

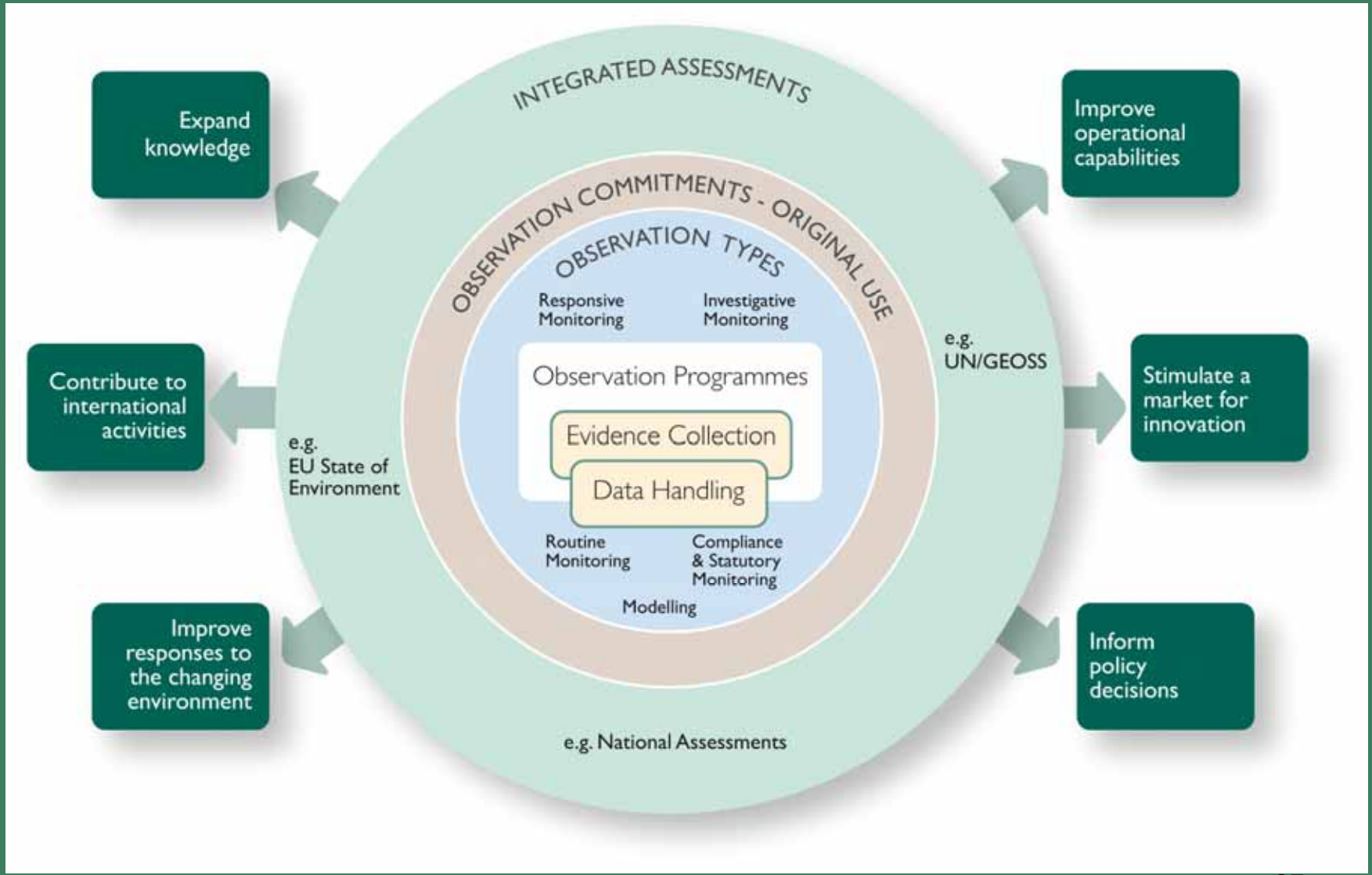
NIEA Northern Ireland Environment Agency
www.ni-environment.gov.uk

FOOD STANDARDS AGENCY

Forestry Commission

defra
Department for Environment Food and Rural Affairs

UK-EOF - concept



Note this is schematic only

UK-EOF outcomes by 2013

- **Develop a holistic picture of what the overall evidence needs are and the role of observations in providing this information.**

Outcomes cont..

- Share knowledge and information on observation plans and programmes (know what by whom, how, why and at what cost).
- Understand the range of assessments that use the observation data, and the tools for effective knowledge transfer
- Enable funding for observation programmes to supporting the long term information needs of the UK and the role of the UK in a global perspective.

Outcomes cont..

- Build a strong community
- providing evidence in the most efficient and effective manner and sharing both data and expertise.
- Encourage technological innovations.

The UK-EOF structure

- **EACH PARTNER** ensuring internal and external arrangements are in place to work with and progress the strategy and its deliverables.
- **SECRETARIAT**
- **HIGH LEVEL BOARD**
- **MANAGEMENT GROUP**
- **OBSERVATION CLUSTERS**
- **DATA AND INFORMATION**
- **AD HOC GROUPS OR WORKSHOPS**

ENVIRONMENT RESEARCH FUNDERS' FORUM MAIN BOARD

Own framework, collective aspiration and outputs. Ask for the evidence and use the outputs

Biannual meetings

Key funders and senior policy players across government and the Devolved Administrations.

Champion of the UK- EOF Professor Bob Watson, Defra

UK-EOF Management Group
Decision making group to facilitate the workstreams and initiate, advocate and champion the issues.
Responsible for active project management of the work streams, UK-EOF accounting and guidance of the Programme Manager
All parts of the community represented.
Up to 4 meetings per year

Central Coordination

UK-EOF Programme Manager and **Secretariat**

The Community: in clusters
delivering efficient and effective evidence.

Work Programme

WORKSTREAM 1

Collective Aspiration
Articulating the questions
Decision-making framework

WORKSTREAM 2

Knowledge Base
Metadata including costs and quality
Data policy
Sound Science

WORKSTREAM 3

Assessments co-ordination and Knowledge Transfer
Assessments catalogue

WORKSTREAM 4

Financing Mechanisms
Internal
Inter-Departmental
International
Long-term

WORKSTREAM 5

Community
Communications
Annual Conference
Website
Newsletter
Who's Who

The UK-EOF in English

- WS1 What are the questions we are asking and how do we deliver them?
- WS2 Who is collecting what, is there a data policy and is it suitable for reuse?
- WS3 How do we want to use the data?
- WS4 Are the financing models suitable?
- WS5 Community, communications and decision making processes.

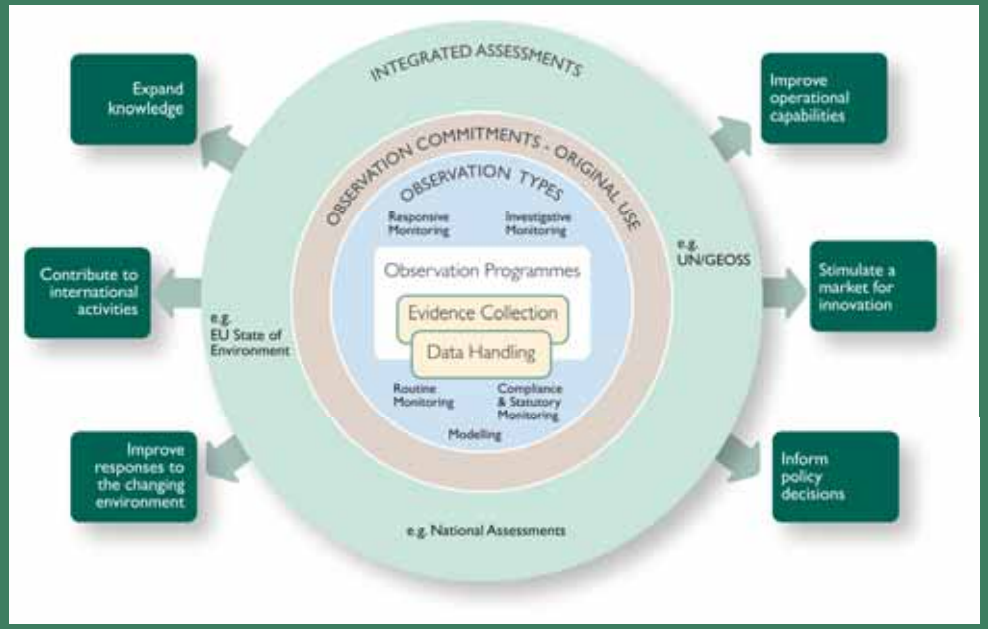
UK-EOF – Outputs 2008/9:

- High level Statement of Need
- Community understood
- Upgrade ‘meta-database’ – scope, contents, search facility
- Data sharing policy instigated
- Cost guidelines issued and used
- Financing mechanisms explored

- Definitions and scope:
  - Environmental
  - Observations

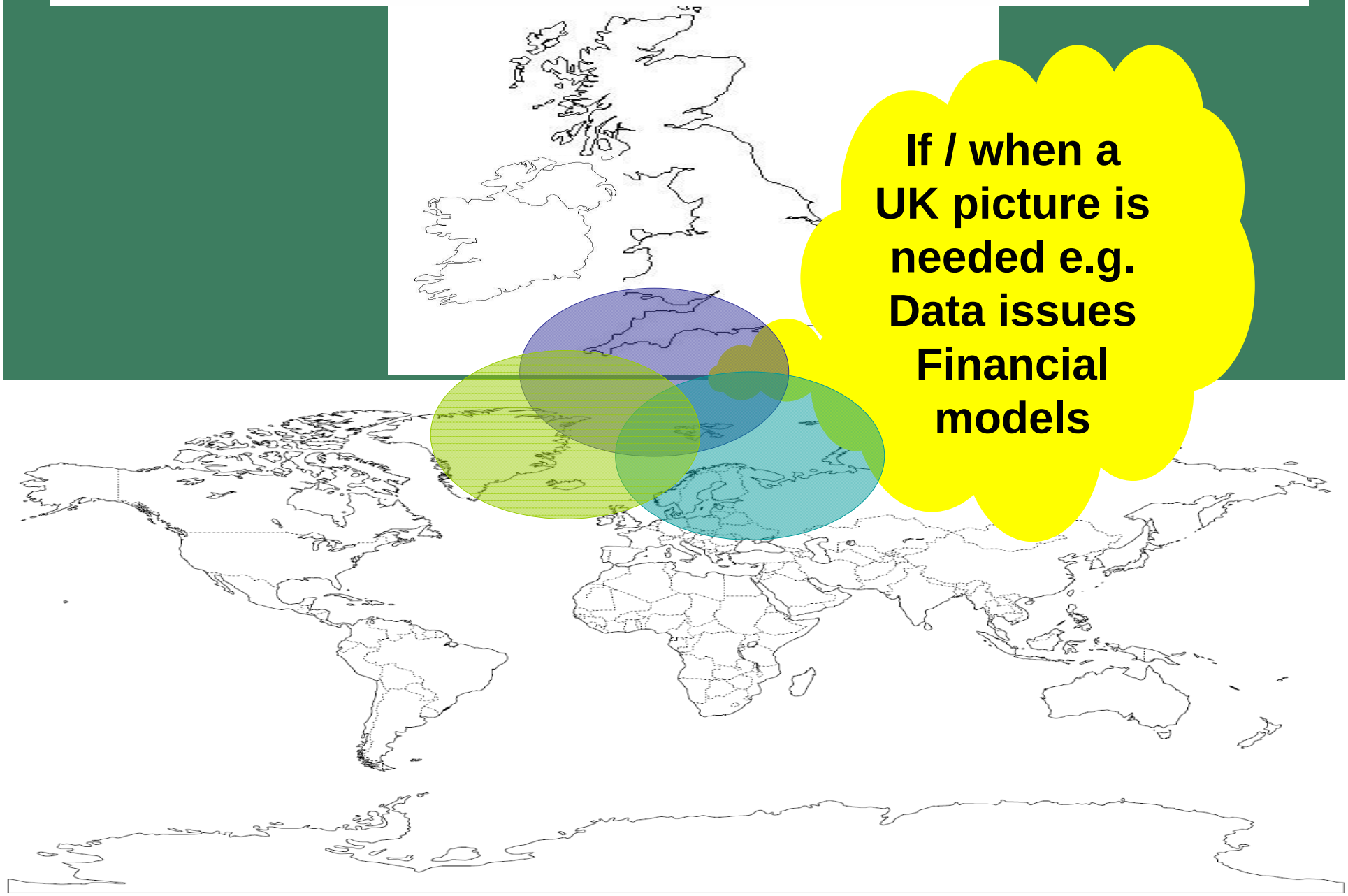
UK-EOF – Concept and Outcomes:

- Improve knowledge
- Improve operational capabilities
- Inform policy decisions
- Improve response to climate change
- Improve UK input to international arena
- Stimulate the market for innovation and technology



- How does this relate to co-ordinating all the UK observations?
- Sector activities – UK coordination – EU or Global

UK Environmental Observation Framework



If / when a UK picture is needed e.g. Data issues Financial models

Who is involved?

Policy Leads: climate adaptation, ecosystem services, resource

Marine, Climate Change DGs,

Government Economists

Resource managers

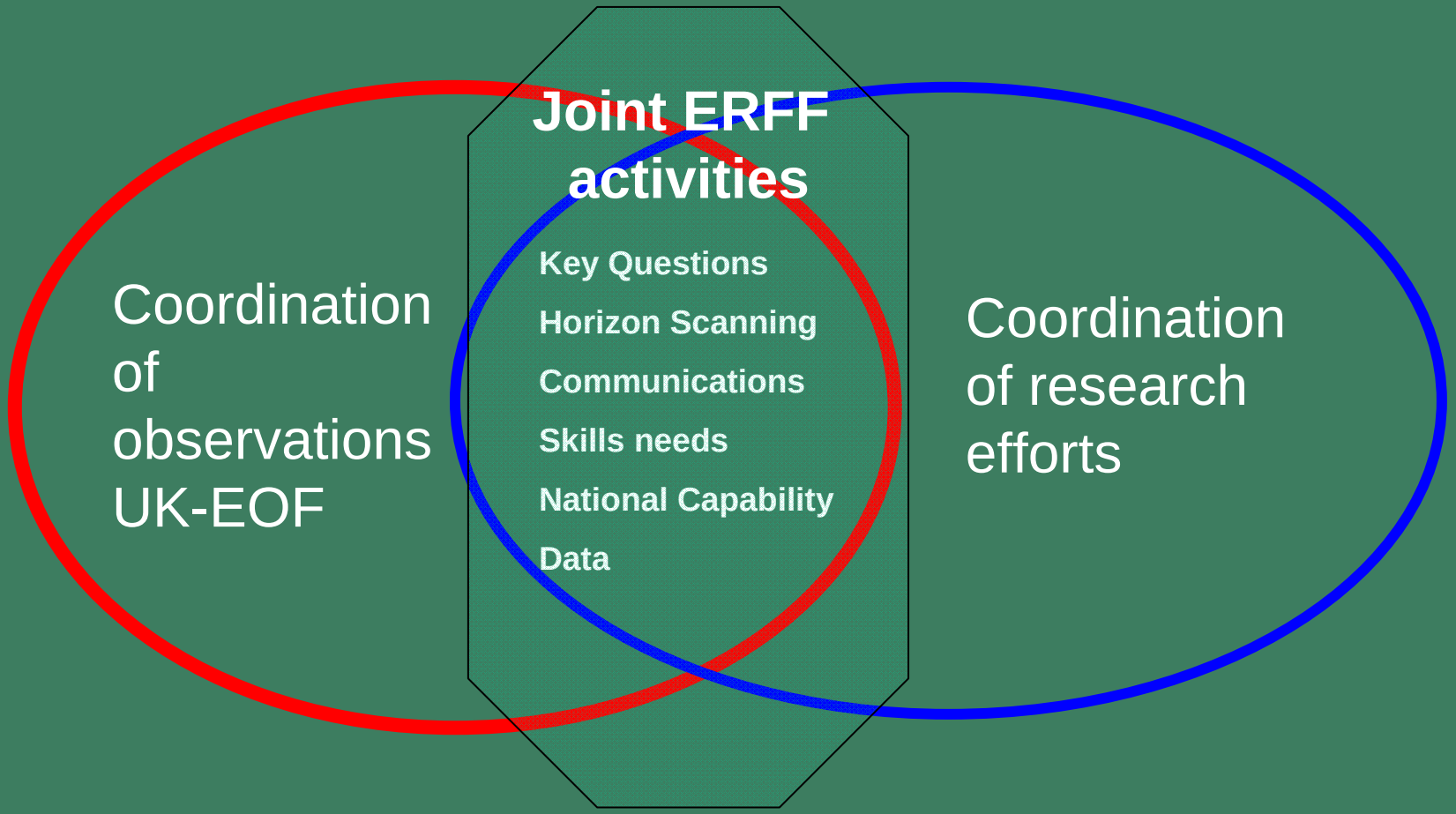
scientists, statisticians modelling community

- NI-
- MOD - Met
- Dfid, Dft, FC,
- NERC, BBSRC, ESRC, BAS, NOCS, PO
- RSPB, Forestry Commission,

The stalls

- Marine – UKMMAS and a database UKDMOS
- Terrestrial – Biodiversity Surveillance Strategy , ECN etc
- Global – what do all those G XXX s mean
- And of course ERFF – other activities and reports available

Evidence Needs: Research and Observation



Summary

- This launch is the ‘end of the beginning’
- We have a large task ahead with at least 50 organisations
- A small core secretariat but mostly input from YOU the partners and community
- Lets work towards the step change we all aspire to

Conclusion

- The UK Environmental Observation Framework is essential.
- It Is taking shape and will begin to deliver ---- this afternoon!
-