WMO GAW

UN environment

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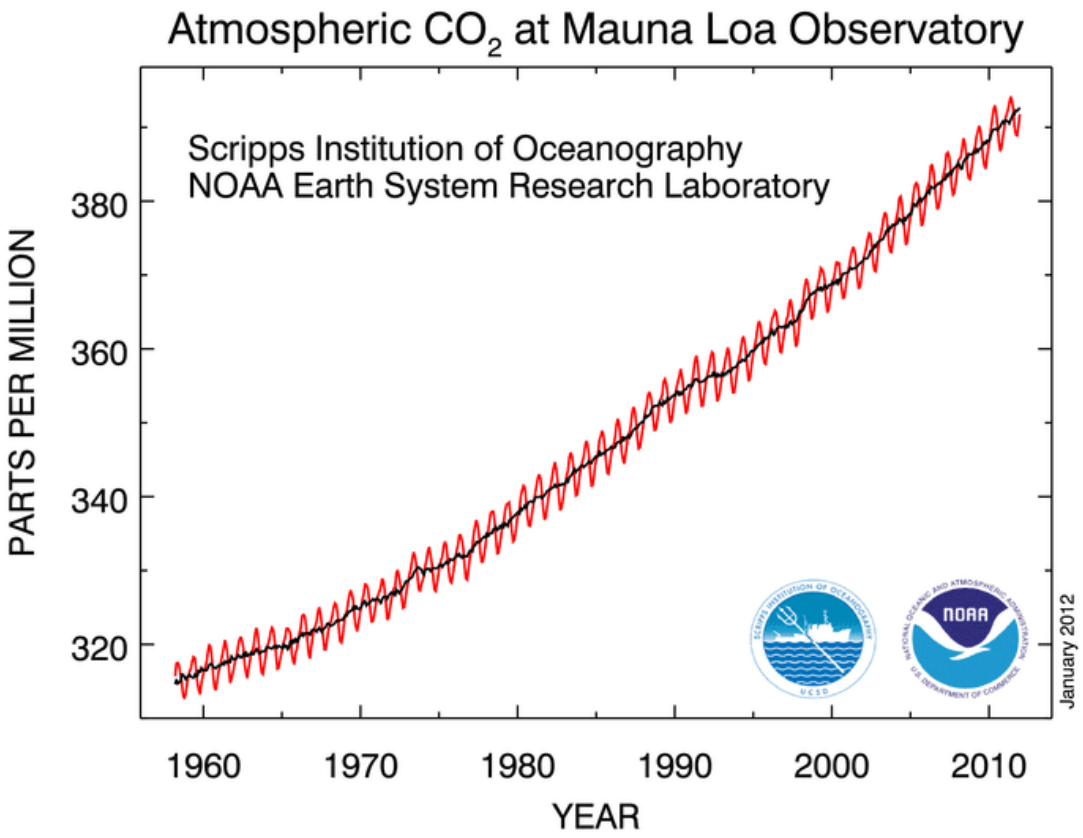
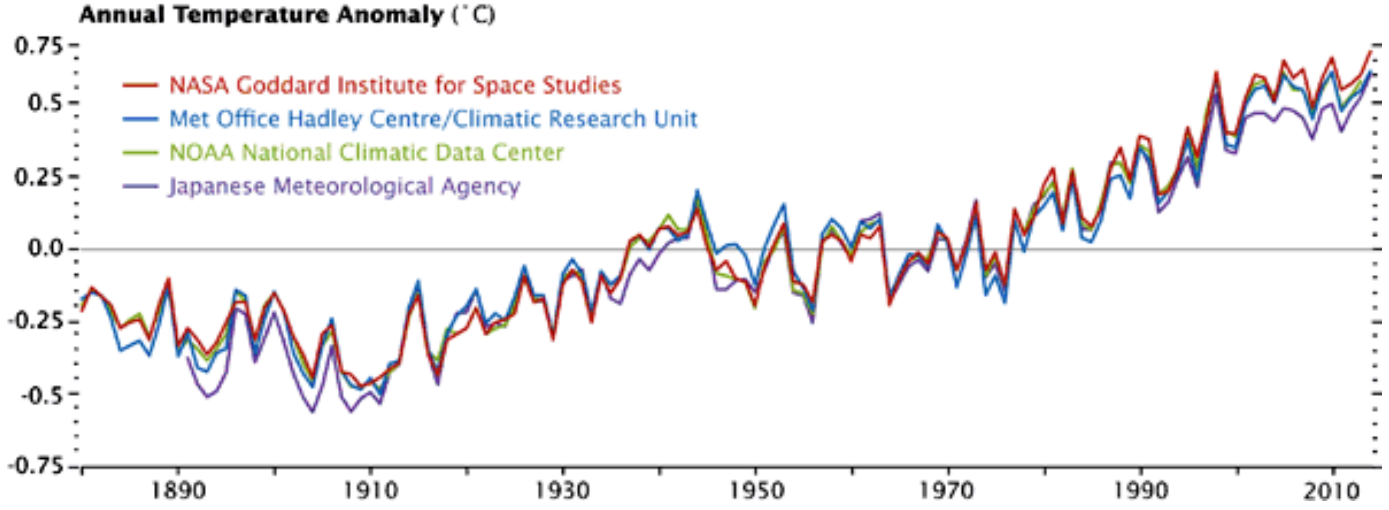
Industrial CH_4 science team lead authors:
Daniel Zavala-Araiza, Rod Robinson
Global stocktake science team lead authors:
Pep Canadell, Philippe Ciais, Florin Vladu
Cross-cutting modelling science team lead authors:
Sander Houweling, Thomas Lauvaux

Environment and Climate Change Canada | Environnement et Changement climatique Canada

United Nations Framework Convention on Climate Change

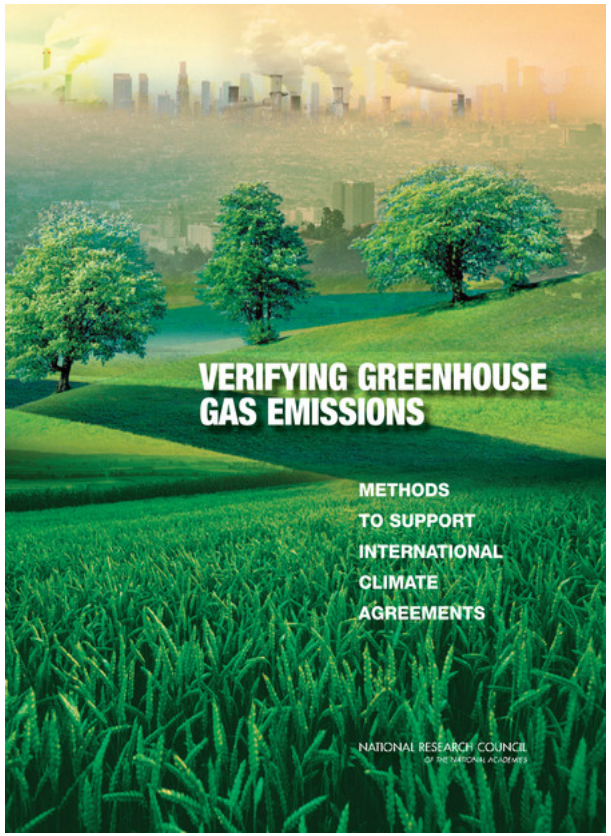
The bedrock of the UNFCCC process is made from the high-precision, long-term, science-based (or evidence-based) info; data records like the "Keeling curve" and the global average temperature records

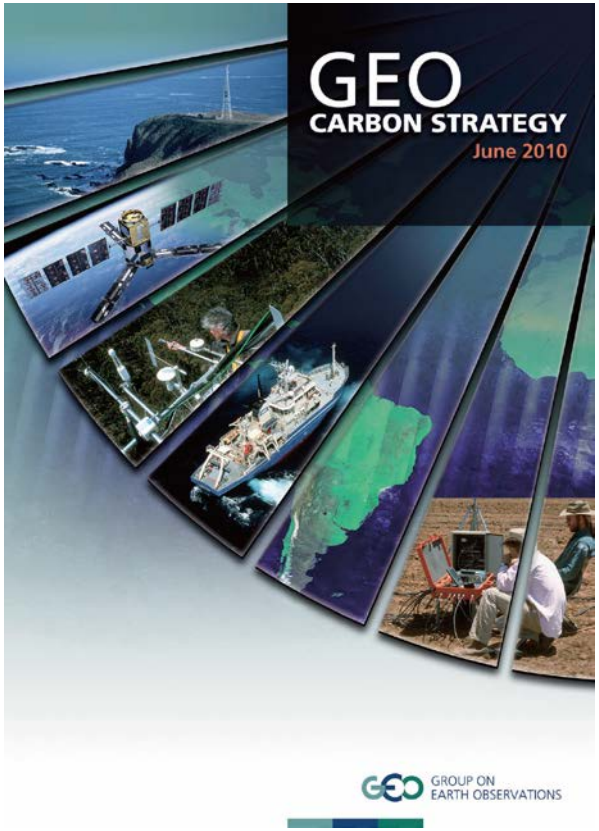


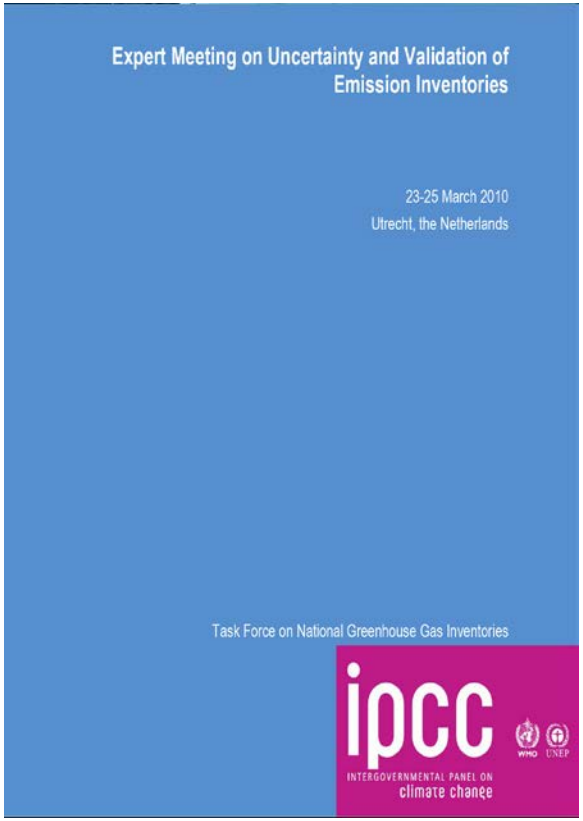


GHG monitoring and reporting in 2010: atmospheric "top-down" versus inventory "bottom-up"

Can atmospheric measurements and models "verify" inventories?







Verify -

1. **to prove the truth of**, as by evidence or testimony; confirm; substantiate:
   Events verified his prediction.

2. **to ascertain the truth** or correctness of, as by examination, research, or comparison:
   to verify a spelling.

3. to act as **ultimate proof or evidence of**; serve to confirm.

4. *Law.*
   a) to prove or confirm (an allegation).
   b) to state to be true, especially in legal use, formally or upon oath.

Paris Agreement and GHG Monitoring: Evolving from "Top-Down versus Bottom-Up" Paradigm

Then (2009)

Binding Multi-national Treaty Commitments

"we will verify your reported emissions"

A grand top-down GHG Information System

Advocates: Science Community!!!

Now (2016)

Nationally Determined Contributions

"we will help you improve your data"

Federation of focused monitoring systems

Advocates: WMO (191 countries),UNEP, Cities (eg, C40), NGOs, Industry (eg, Oil Companies)

World Meteorological Organization
EXECUTIVE COUNCIL
Seventieth Session
Geneva, 20 to 29 June 2018

EC-70/Doc. 4.4
Submitted by:
Chair of Plenary
25.VI.2018
APPROVED

AGENDA ITEM 4: **CLIMATE SERVICES, SUPPORT TO CLIMATE ACTION AND CLIMATE RESILIENCE**

AGENDA ITEM 4.4: **INTEGRATED GLOBAL GREENHOUSE GAS INFORMATION SYSTEM (IG3IS)**

DRAFT DECISION

Draft Decision EC-70/4.4/1

IG³IS SCIENCE IMPLEMENTATION PLAN

The Executive Council decides to approve the IG³IS Science Implementation Plan endorsed by the Commission for Atmospheric Sciences in which the executive summary is provided in the Annex to this decision;

Requests the Secretary-General to provide support to the IG³IS activities and assist in promoting IG³IS with funding agencies, and work with those Members, especially in developing countries, who plan to undertake IG³IS projects, in pursuing extrabudgetary resources to do so;

Urges Members to undertake pilot and demonstration projects that facilitate implementation of the IG³IS Implementation Plan;

Requests Members working with the Regional Associations to assign focal points for the implementation of IG³IS and to scale up the existing initiatives for regional knowledge transfer and capacity building for IG³IS implementation in the Regions;

Requests Members to improve integration of atmospheric composition observations into the national meteorological observing systems;

Requests the Commission for Atmospheric Sciences to coordinate with the appropriate technical commissions, in particular the Commission for Basic Systems, in order to ensure translation of the IG³IS scientific tools into operational services and contribution to WIGOS and GDPFS;

Agrees that the governance of the IG³IS should be established taking into account the Framework Memorandum of Understanding between the WMO and the Secretariat of the United Nations Framework Convention on Climate Change.

- **Support through WMO/GAW and finding new resources** MeteoSwiss
- **Pilot projects**
- **Scaling up and capacity building**
- **Greater integration with Meteorological Services**
- **Working towards operational services (and good-practices)**
- **Strong link to UNFCCC**

WMO GAW

UN environment

In brief:

IG³IS looks to serve users (decision-makers) who are able to take action to reduce emissions of greenhouse gases and pollutants that reduce air quality by providing the best science-based information utilizing socioeconomic data, atmospheric measurements and modelling tools.

Integrated Global Greenhouse Gas Information System

Principles

The foundational IG³IS principles that will enable the achievement objectives and keep IG³IS on course are:

- The ultimate criterion for success is that the information produced **guides additional and valuable emission-reduction actions**

- IG³IS will provide a **common platform, co-developed with stakeholders**, for establishing **benchmarks, good practices** utilizing diverse measurement and analysis approaches inside a **reliable framework**

- IG³IS will take a **unified approach** that combines and analyzes atmospheric concentration measurements together with socioeconomic data and information on natural fluxes to better quantify and attribute greenhouse gas emissions and sinks as well as their trends.

- IG³IS **matures in concert with the evolution of user-needs**, policy and technical skill. This will enable researchers to learn the **value of envisioned information products** and users are introduced to **previously unknown capabilities**

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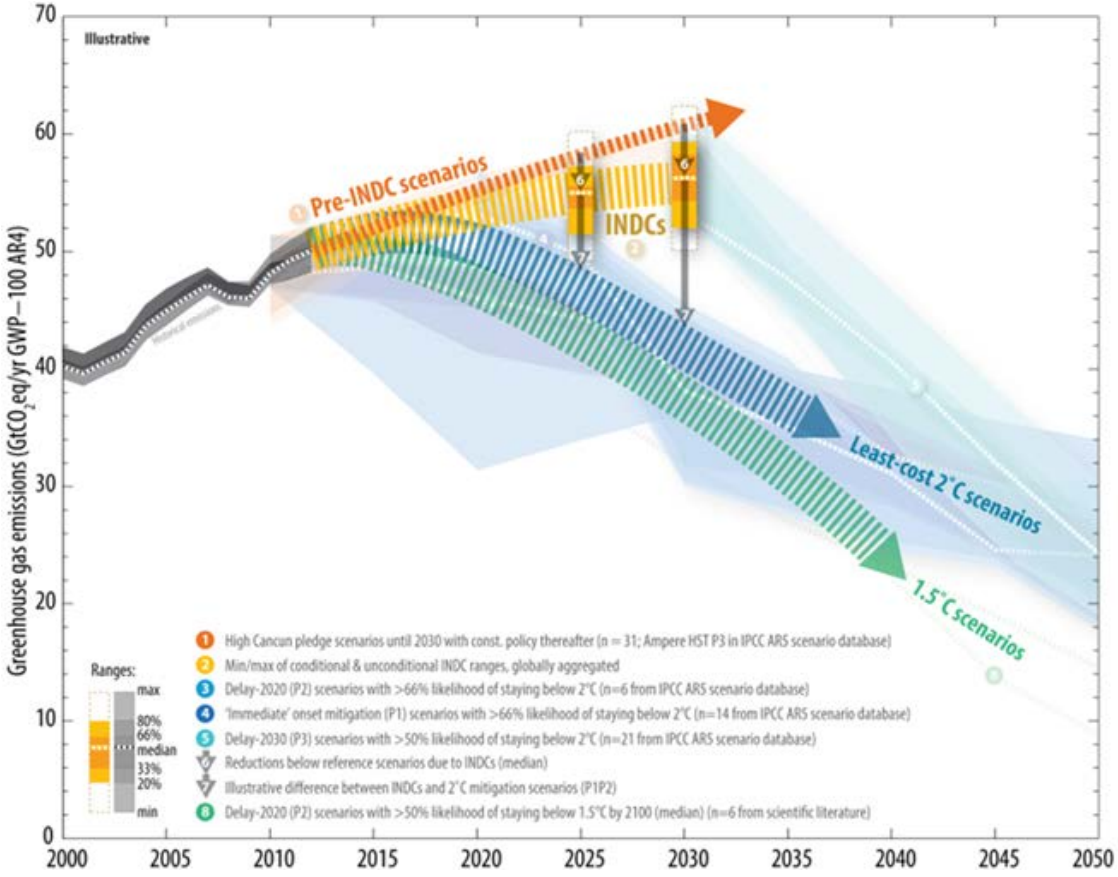
Integrated
Global Greenhouse Gas
Information System

GLOBAL CARBON PROJECT

HOME | CARBON ATLAS | CARBON BUDGET | METHANE BUDGET | RECCAP | URBANIZATION | SEARCH



IPCC Special Report

United Nations

Framework Convention on Climate Change

FCCC/SBSTA/2017/L.21

Distr.: Limited
12 November 2017

Original: English

Subsidiary Body for Scientific and Technological Advice
Forty-seventh session
Bonn, 6–15 November 2017

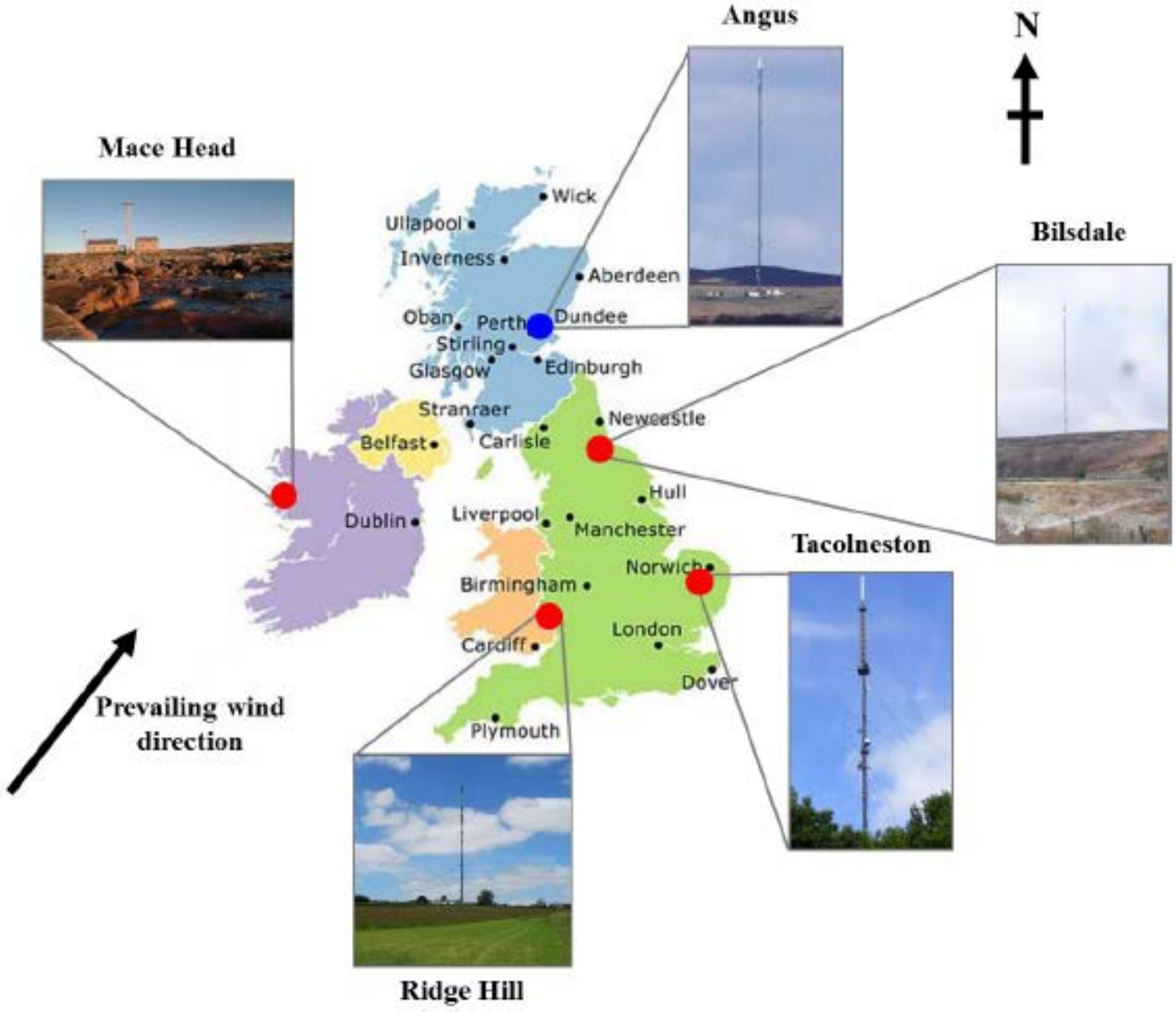
Agenda item 8
Research and systematic observation

Research and systematic observation

12. The SBSTA noted the increasing capability to systematically monitor greenhouse gas concentrations and emissions, through in situ as well as satellite observations, and its relevance in support of the Paris Agreement.[18]

[18] See the section titled "Decision 51 - IG3IS Implementation Plan" in the WMO submission, referred to in paragraph 4(a) above, and the summary report on the Earth Information Day, paragraphs 30 and 31 and 73–86, referred to in paragraph 3 above.

Network in support of national inventory reporting



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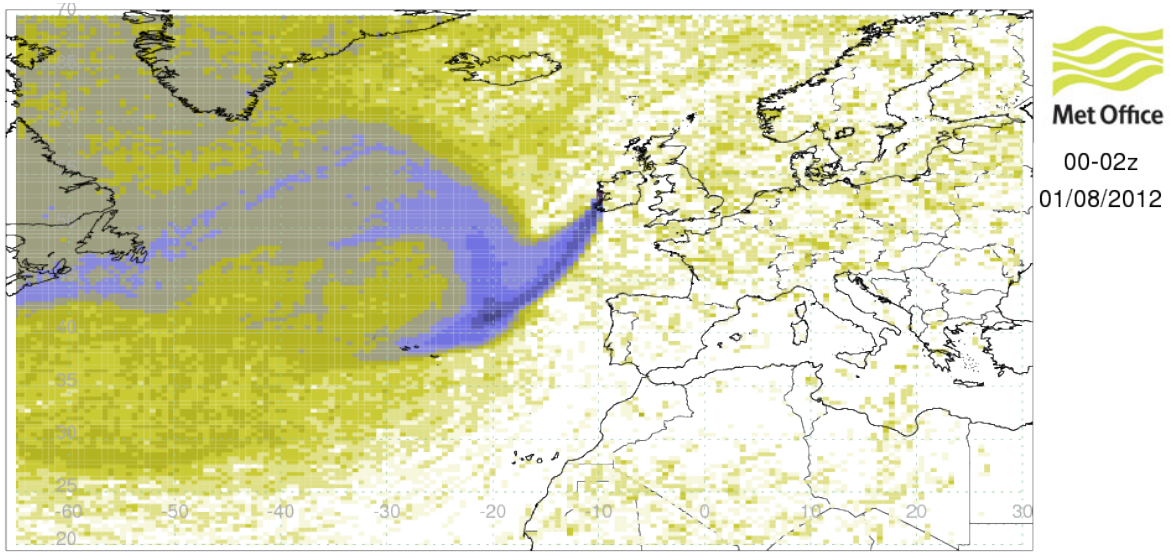
UK Met Office Modelling and Analysis



Met Office

00-02z
01/08/2012

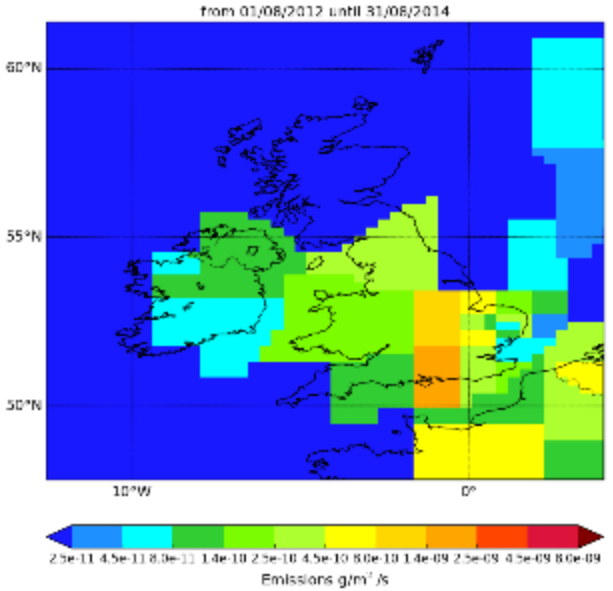
Mace Head air history maps are generated for each 2-hour period between 1989 and 2015

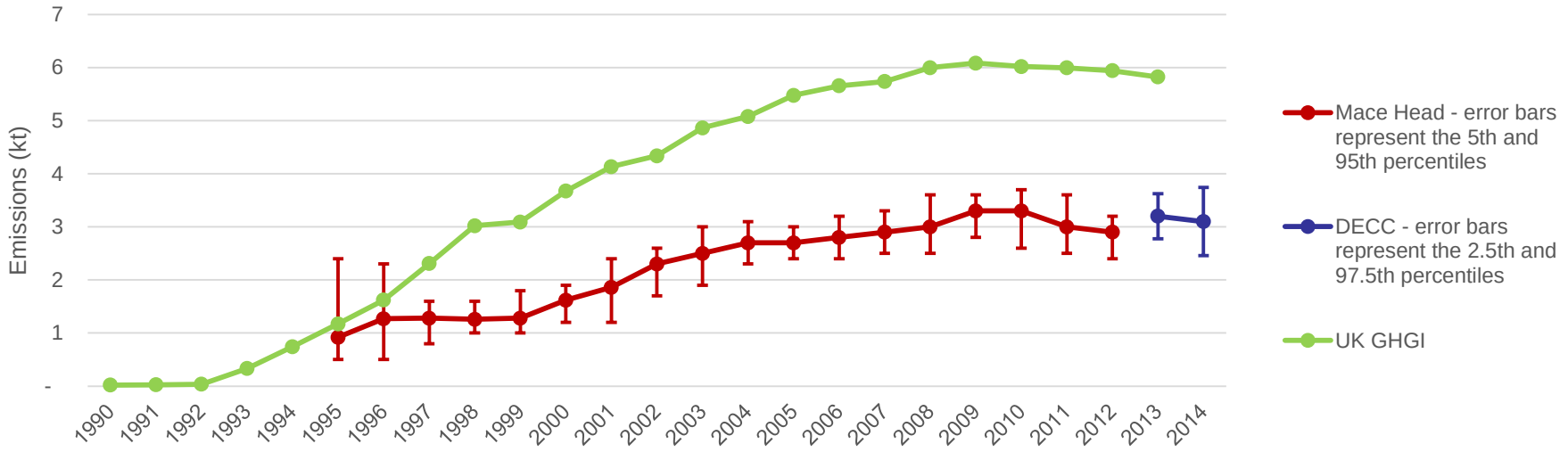
- **Use the NAME transport model driven by 3-D meteorology to understand the recent (3-4 weeks) history of the air arriving at measurement stations**
- **Two stage process:**
  - **Estimate long-term Northern Hemisphere baseline concentrations using Mace Head observations.**
  - **Estimate regional emissions through inversion modelling (InTEM).**

Example from UK report to UNFCCC: HFC-134a

- **Significant mismatch throughout the entire time-series of emissions, approximately inversion is 50% lower than inventory.**

- **Investigated the refrigeration model used by inventory compilers, key variables to be re-considered by BEIS (formerly DECC):**
  - **Refill rate**
  - **Uptake rate**





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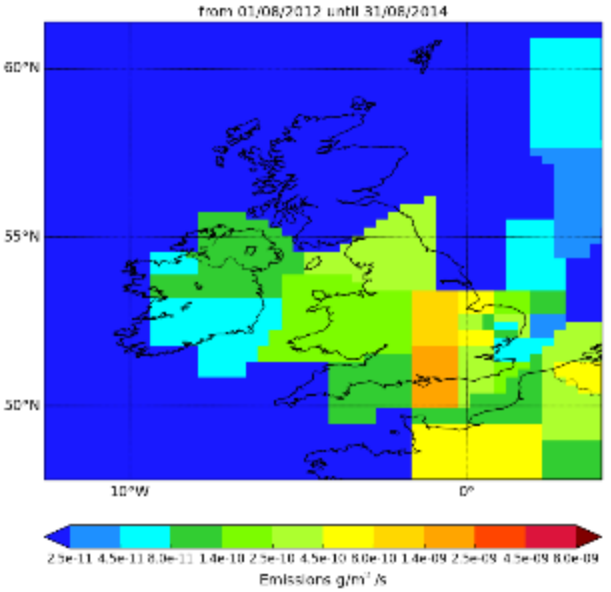
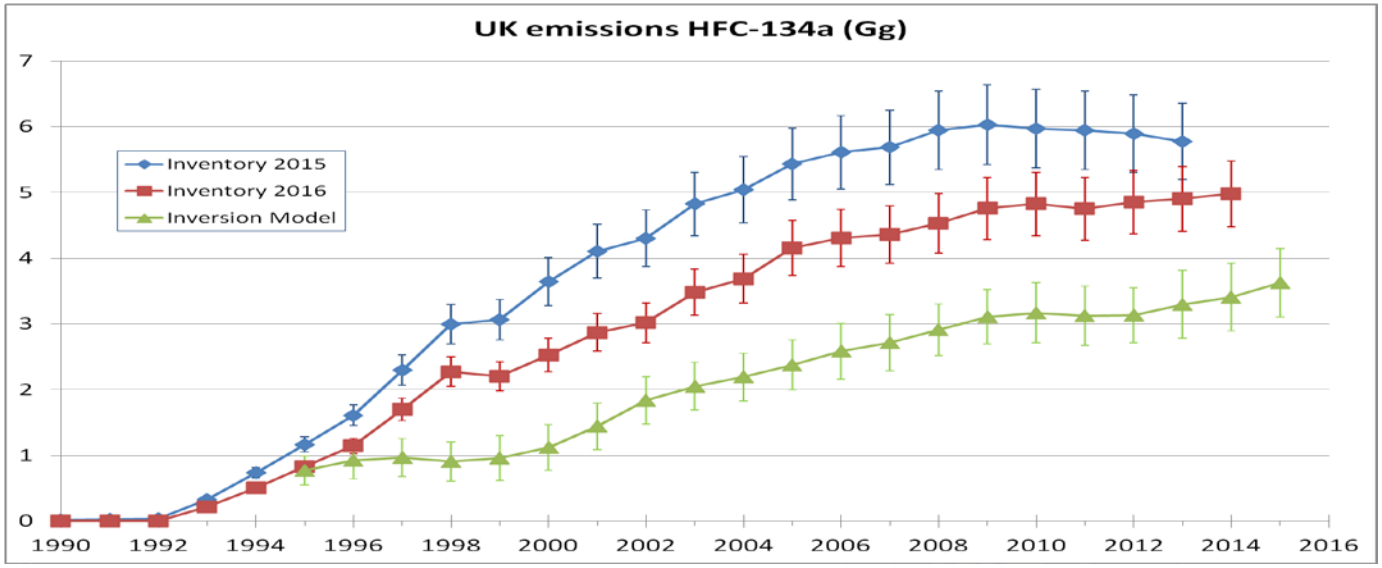
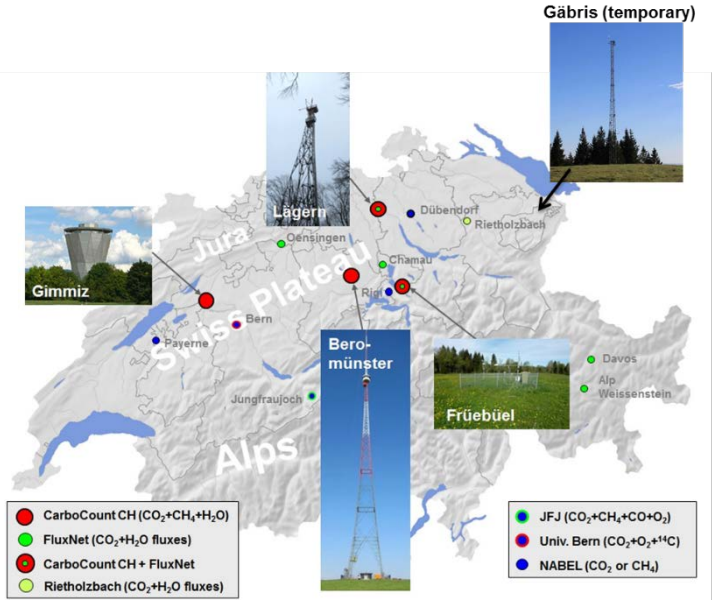




Integrated Global Greenhouse Gas Information System

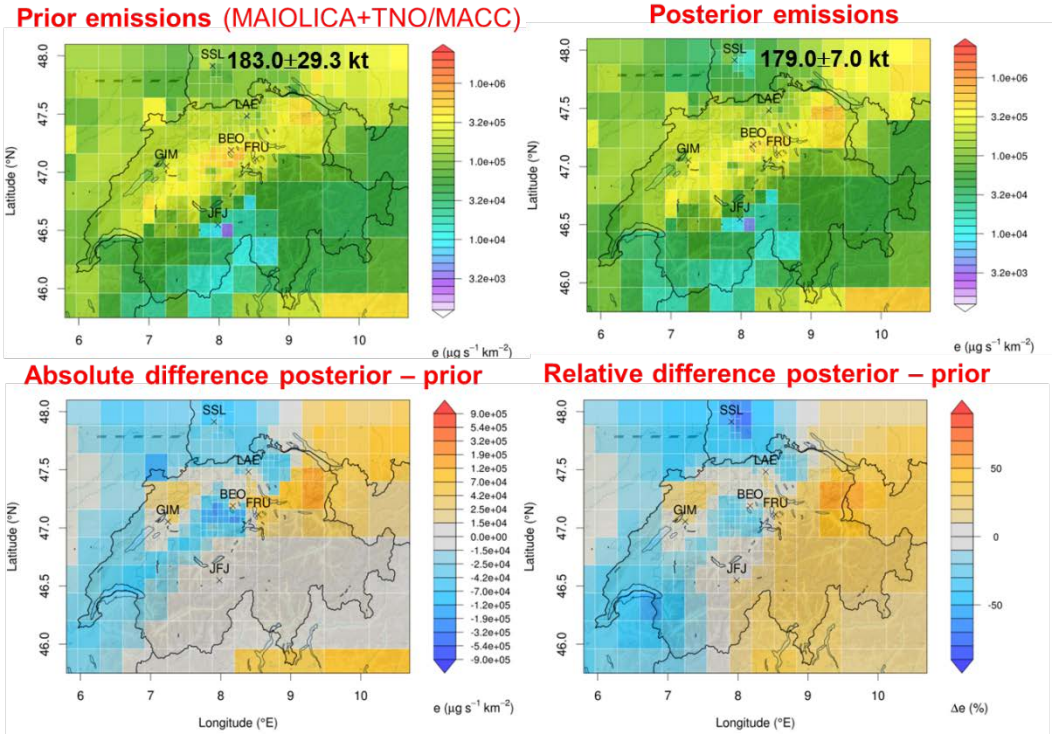
Example from Switzerland



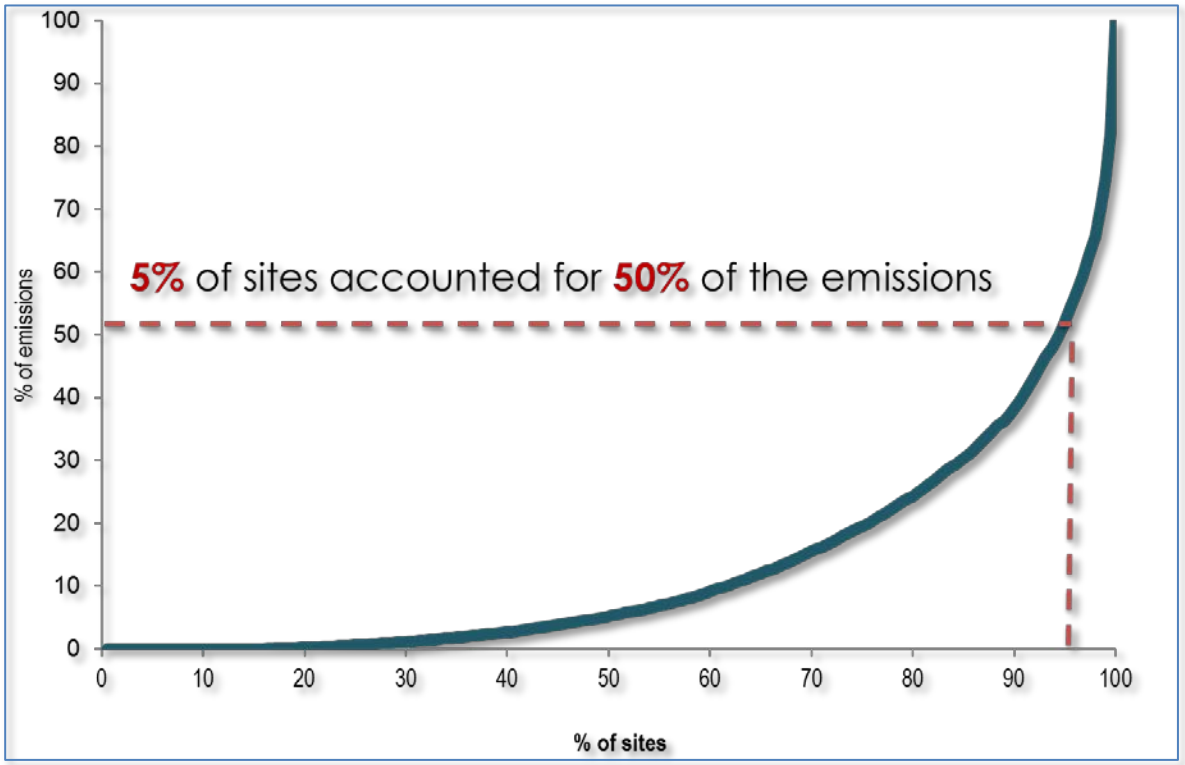
New GHG measurement network established (project CarboCount-CH)

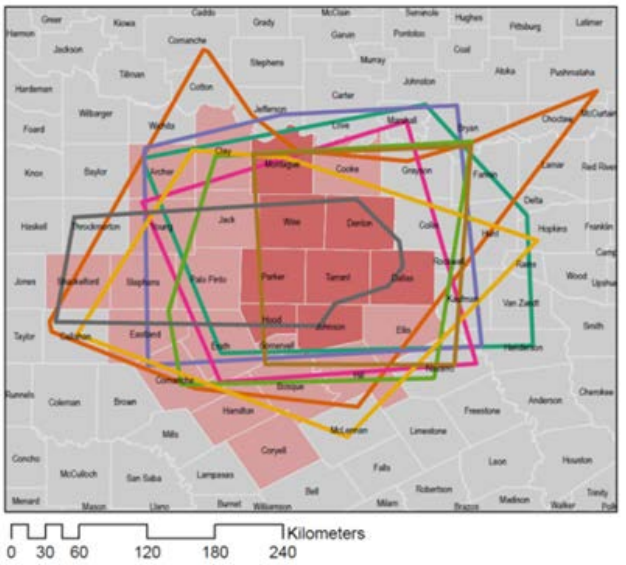
CH_4 emissions in Switzerland 2013

Henne, S.,D Brunner et al.,2016 : Validation of the Swiss methane emission inventory by atmospheric observations and inverse modelling, Atmos. Chem. Phys., 16, 3683–3710, www.atmos-chem-phys.net/16/3683/2016/

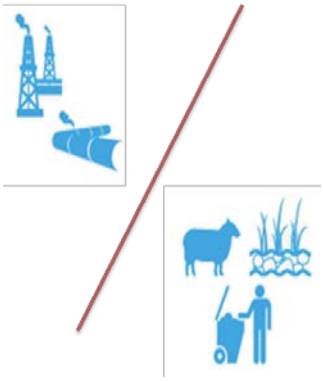


Detect and quantify anthropogenic methane emissions





Multiple flights



Attribution techniques

Integrated Global Greenhouse Gas Information System

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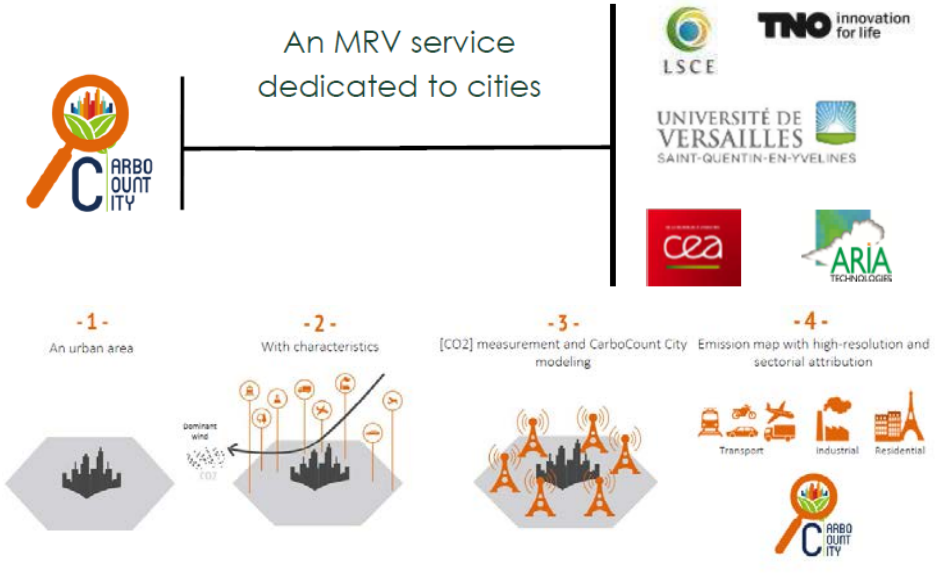
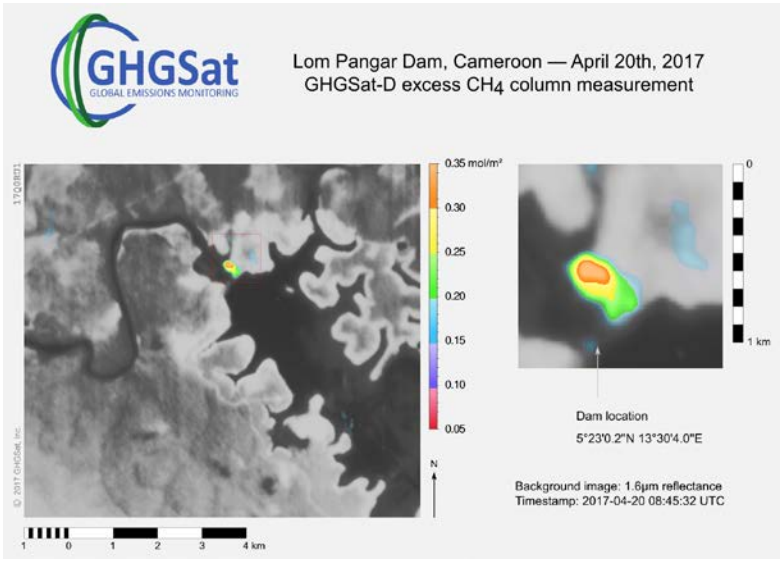
Integrated Global Greenhouse Gas Information System

Growing interest of private sector

GHG monitoring in Urban areas



Source/leak detection of CH_4 from space



Site specific CH_4 monitoring

WMO GAW

Integrated Global Greenhouse Gas Information System

How to best measure GHG **fluxes** and perform **source apportionment**?

How to establish **traceability** and **compatibility** between methods?

How to measure global/regional **GHG concentrations** (and isotopes, etc.)?

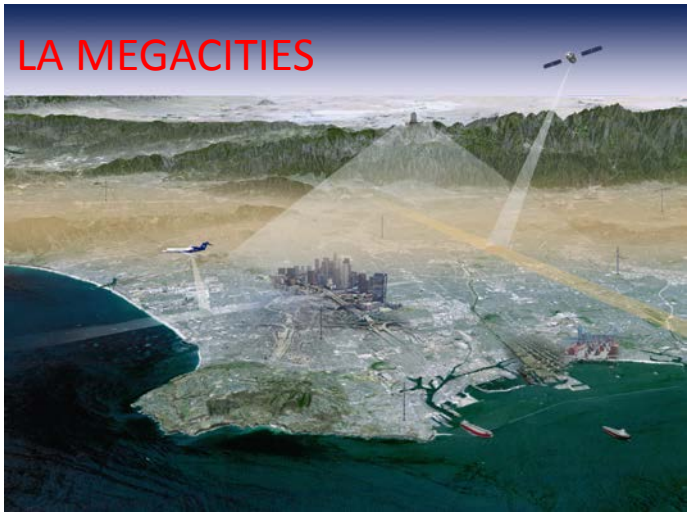
-> Existing peer-reviewed literature and GAW recommendations

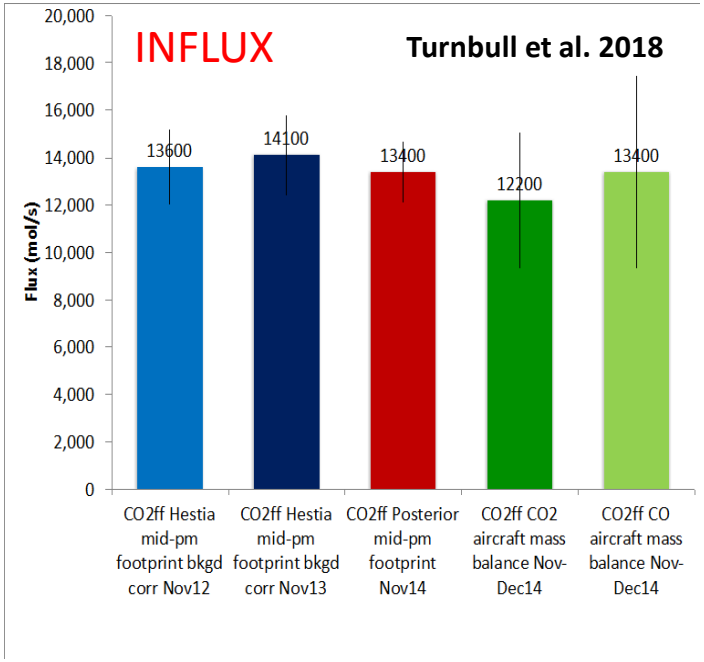
How to establish **traceability and compatibility** between methods?

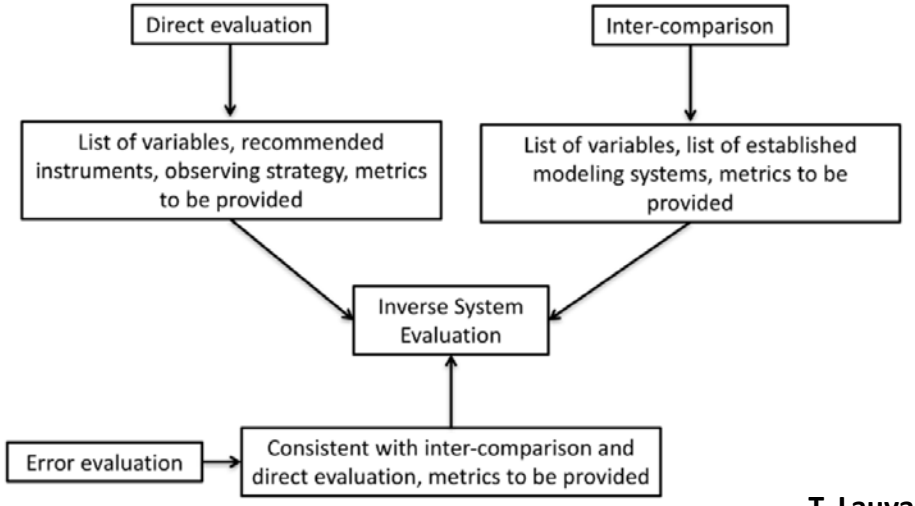
-> WMO scales (and NMI) plus GAW recommendations

Integrated Global Greenhouse Gas Information System

How to best measure GHG **fluxes** and perform **source apportionment**?
How to establish **traceability** and **compatibility** between methods?







T. Lauvaux

Figure 7.1: IG^{3}IS inverse model evaluation strategy, combining results of inter-comparison experiments, with extended benchmarking and error assessment.

- Different observational techniques
- Different modelling frameworks (cross-cutting activity)
- Novel emission data products

Integrated Global Greenhouse Gas Information System

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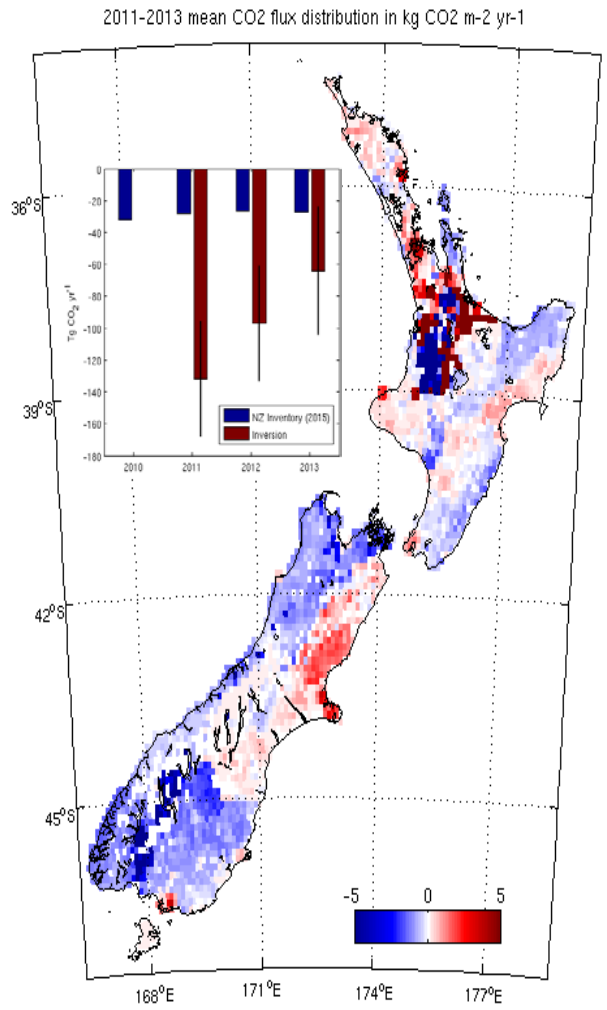
Integrated Global Greenhouse Gas Information System

CO_2 inversion indicates larger land sink in NZ



- Initial inversion using two observation sites indicates larger uptake than prior model or bottom up accounting, particularly in forested regions
- Ongoing work 5 national sites
  - Targeted studies of natural forest, plantation forest, pasture and urban landscapes
  - Detailed bottom-up modelling and atmospheric inversions at national and regional scales
  - Feedback between atmospheric observations and bottom-up information to refine both and provide best estimates of land carbon exchange

Jocelyn Turnbull, GNS Science New Zealand

Atmospheric CO_2 observations and models suggest strong carbon uptake by forests in New Zealand Steinkamp et al, Atmos. Chem. Phys., 17, 47–76, 2017, doi:10.5194/acp-17-47-2017

Integrated Global Greenhouse Gas Information System

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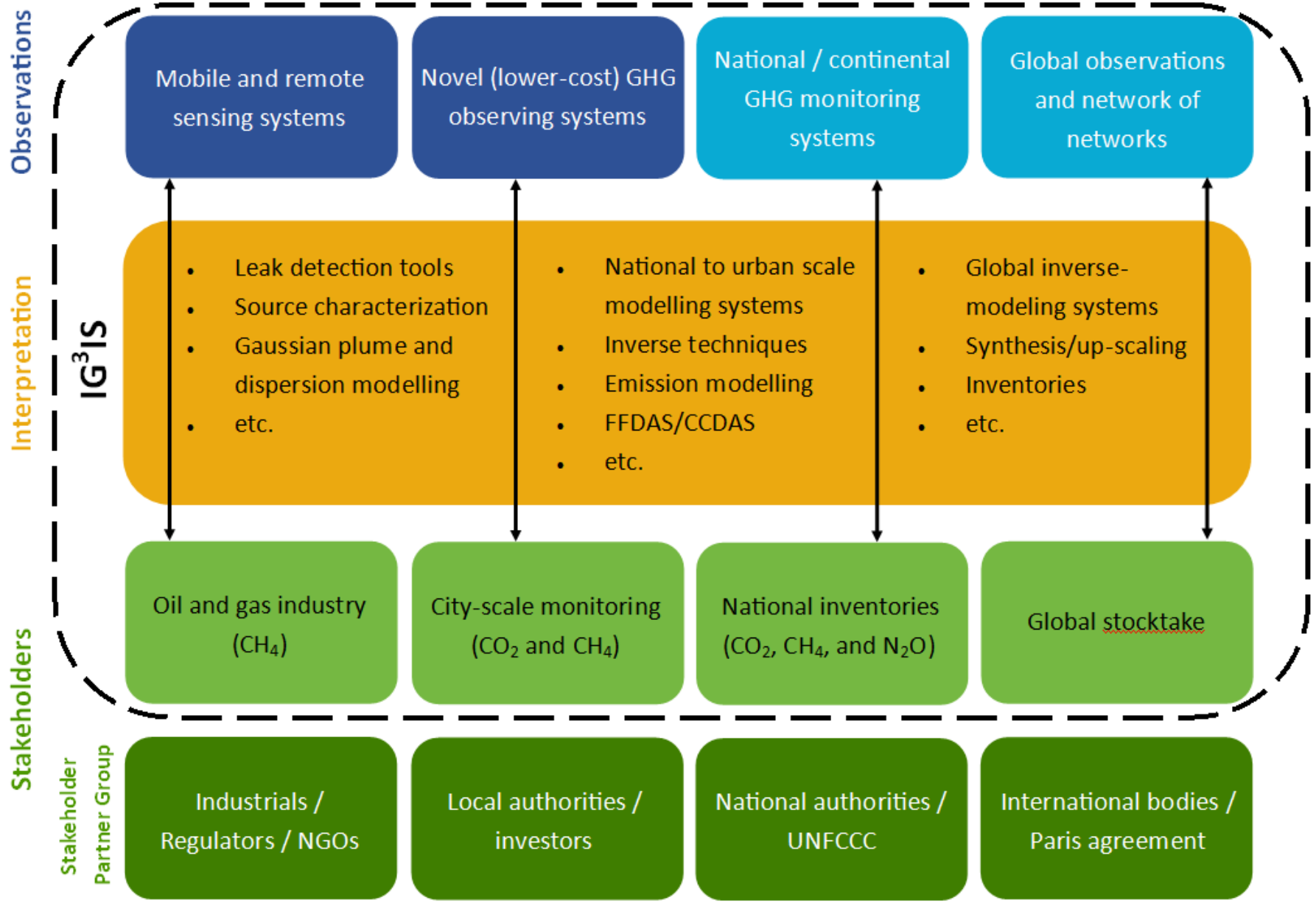
Integrated Global Greenhouse Gas Information System

Objective areas and themes



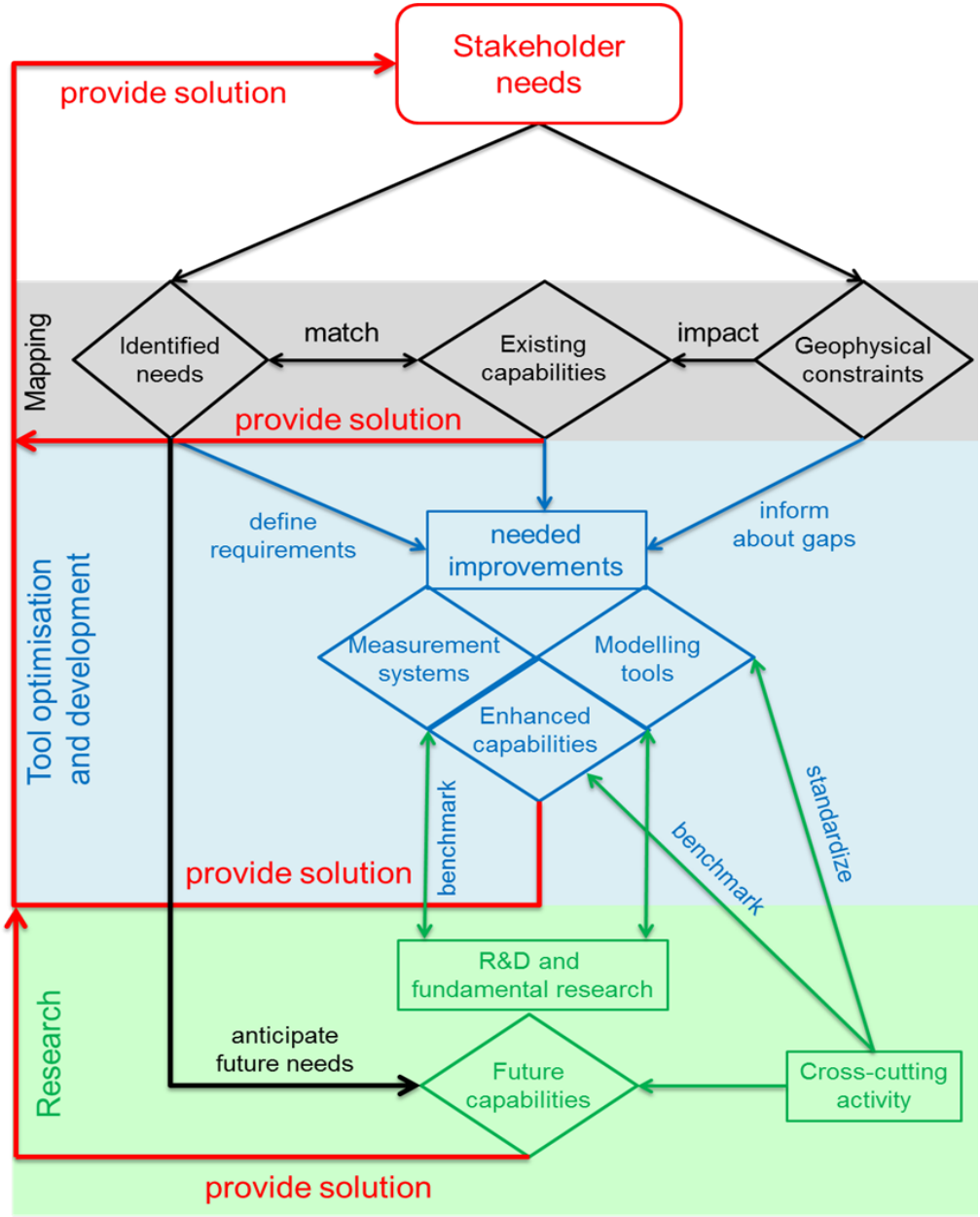
Integrated Global Greenhouse Gas Information System

IG³IS activity map

Map existing skill

Develop new tools

Fundamental research



Integrated Global Greenhouse Gas Information System

Role of the science team(s)

- **Evaluate, endorse, and advise on** the technical merits of **project proposals** looking for IG^{3}IS endorsement and partnership as well as **guide implementation** of IG^{3}IS projects

- **Lead** IG^{3}IS crosscutting activities, research and development activities, and **updating** the IG^{3}IS Implementation Plan

- Keep informed of and **evaluate the scientific developments** in the fields of greenhouse gasses and co-emitted species (e.g., aerosols and reactive gasses), advances in atmospheric measurement techniques, inverse modelling techniques, data assimilation and other scientific aspects

- **Establish, publish and promote best practices** for individual IG^{3}IS activities (observations, inverse modelling techniques, data assimilation); and contribute to the organization of **technical/expert meetings** on IG^{3}IS objectives.

- **Promote and facilitate research** relevant to IG^{3}IS objectives within scientific community and solicit inputs to IG^{3}IS activities

Integrated Global Greenhouse Gas Information System

Demand mapping for national

Increasing model complexity

Increasing measurement complexity

		Tier 1 Use established (global) model and inversion system, operated by external experts	Tier 2 Use established (global) model and inversion system; develop local expertise to operate the system	Tier 3 Taylored high-resolution modeling and inversion system, operated by local experts
Tier 1	Single representative station in country or station every 500-1000 km	Trend in total emissions in area of influence of site(s)	Total emissions and their trend in area of influence of site(s)	Total emissions and their trend with higher accuracy in area of influence of site(s)
Tier 2	Network of sites covering all parts of country, simple measurement infrastructure	Trend in country total emissions, no separation between anthropogenic and biospheric fluxes	Total country emissions and their trend, no separation between anthropogenic and biospheric fluxes	Total country emissions and their trend with higher accuracy, no separation between anthropogenic and biospheric fluxes
Tier 3	Network of sites covering all parts of country, additional tracers (radon, radiocarbon, isotopes)	Trend in country total emissions, separation between anthropogenic and biospheric fluxes, sector-specific information	Total country emissions and their trend, separation between anthropogenic and biospheric fluxes, sector-specific information	Total country emissions and their trend with higher accuracy, separation between anthropogenic and biospheric fluxes, sector-specific info.

Integrated Global Greenhouse Gas Information System

Demand mapping for urban/subnational

Level of sophistication of urban stakeholder needs

Complexity of solution

Identify major emitters and anomaly detection	Quantification of total GHG emissions	Assessment of GHG emissions per sector	Tracking annual and long-term emission changes	Understand short-term emission changes and spatial patterns	Process understanding of emissions and tracking of mitigation impacts
Inventory validation (A1)	Inventory or emission model (A2)	Sector-specific inventory or emission model (A3)	Continuously updated inventory or emission model (A4)	Temporally and spatially disaggregated inventory or emission model (A5)	Process-based emission model using real-time emission data (A6)
Mobile surveys (B1)	Mass-balance (B2) Radon tracer method (B3)	Multi-tracer ratio observations (B4)	Radon tracer method (B5) Multi-tracer observations (B6)	Mobile surveys (B7) Urban flux towers (B8) Repeated mass-balance (B9)	Urban flux towers (B10) Dedicated field campaigns (B11)
Remote sensing (C1)	DAS using short-term observations (C2)	*DAS using dense observations (C3)* *DAS using multi-species data (C4)*	DAS using long-term observations (C5)	*DAS using dense observations (C6)*	FFDAS DAS using multi-species (C7)

Demonstrated skills

Theoretically tested skills

Future potential skills

DAS = data assimilation system

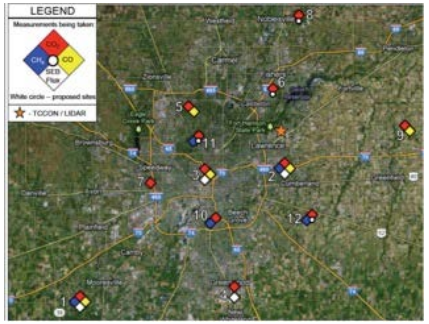
Integrated Global Greenhouse Gas Information System

Growing diversity of research in cities

LSCE · cnrs · cea · Université de Versailles St-Quentin-en-Yvelines · Université Paris-Saclay · ARIA Technologies · ARIA do Brasil · CPRH Agência Estadual de Meio Ambiente · KIT Karlsruhe Institute of Technology · aer · HARRIS · Environment and Climate Change Canada · Institut Pierre Simon Laplace · Climate-KIC

Indianapolis Flux Experiment - INFLUX: NIST · Purdue · Penn State · ASU · Earth Networks · Picarro · GNS · JPL

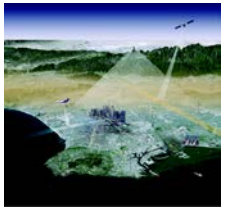
Key "hands-on" scientific collaborations (e.g. PhD students, SOFIE, LoCal)



University of Toronto · Environment and Climate Change Canada · Environnement et Changement climatique Canada

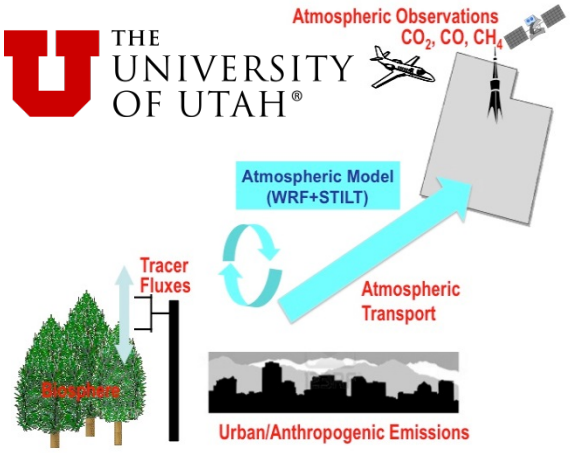
JPL · Earth Networks · ASU Arizona State University · University of Michigan · LSCE · USC University of Southern California · Berkeley Lab · SigmaSpace · AMES Research Center · INMETRO

GURME — The WMO GAW Urban Research Meteorology and Environment Project



FLUXNET — A Global Network — Integrating Worldwide CO_2, Water and Energy Flux Measurements

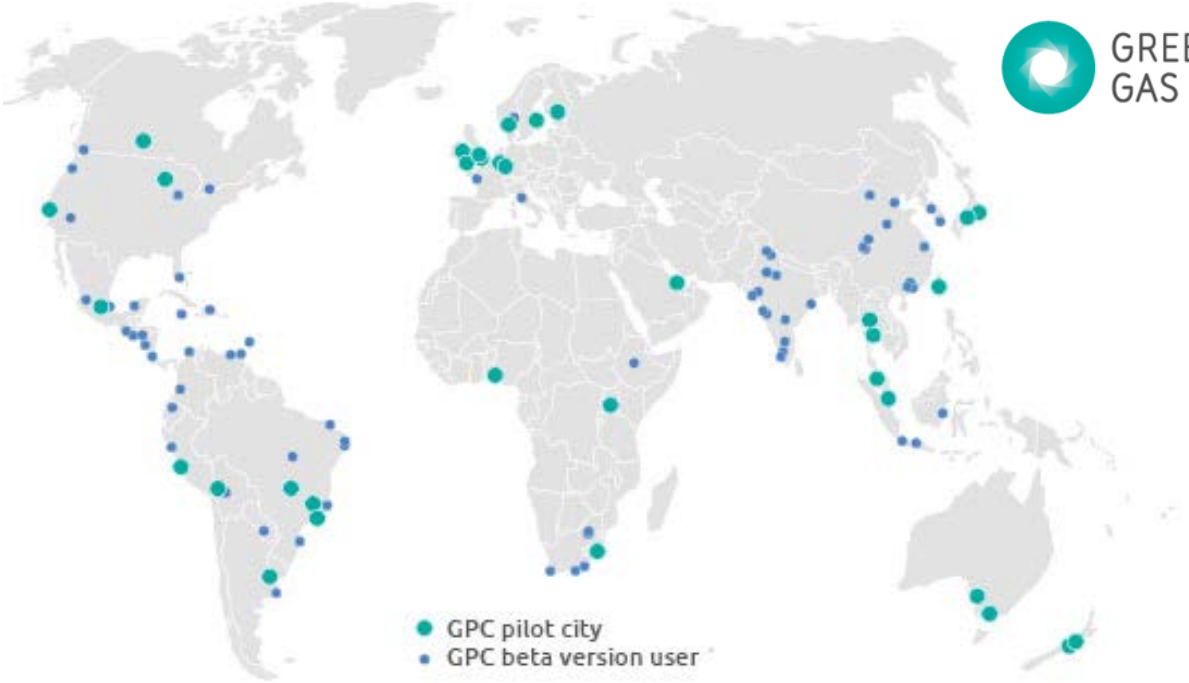
The University of Utah



RINGO | Readiness of ICOS

Integrated Global Greenhouse Gas Information System

Networks of subnational stakeholders



GREENHOUSE GAS PROTOCOL

UNDER 2°

SECRETARIAT THE CLIMATE GROUP

THE WORLD BANK

eit Climate-KIC

Cities are active stakeholders and have ambitions reduction target and mitigation effort

ICLEI Local Governments for Sustainability

C40 CITIES CLIMATE LEADERSHIP GROUP

PIONEERED BY THE ROCKEFELLER FOUNDATION 100 RESILIENT CITIES

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

THE WORLD'S LARGEST COALITION OF CITIES FIGHTING CLIMATE CHANGE

COMPACT of MAYORS

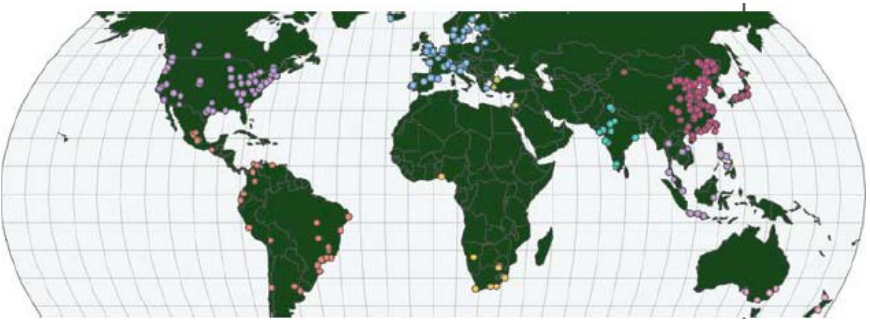
Covenant of Mayors for Climate & Energy

New data product for comparison and city classification

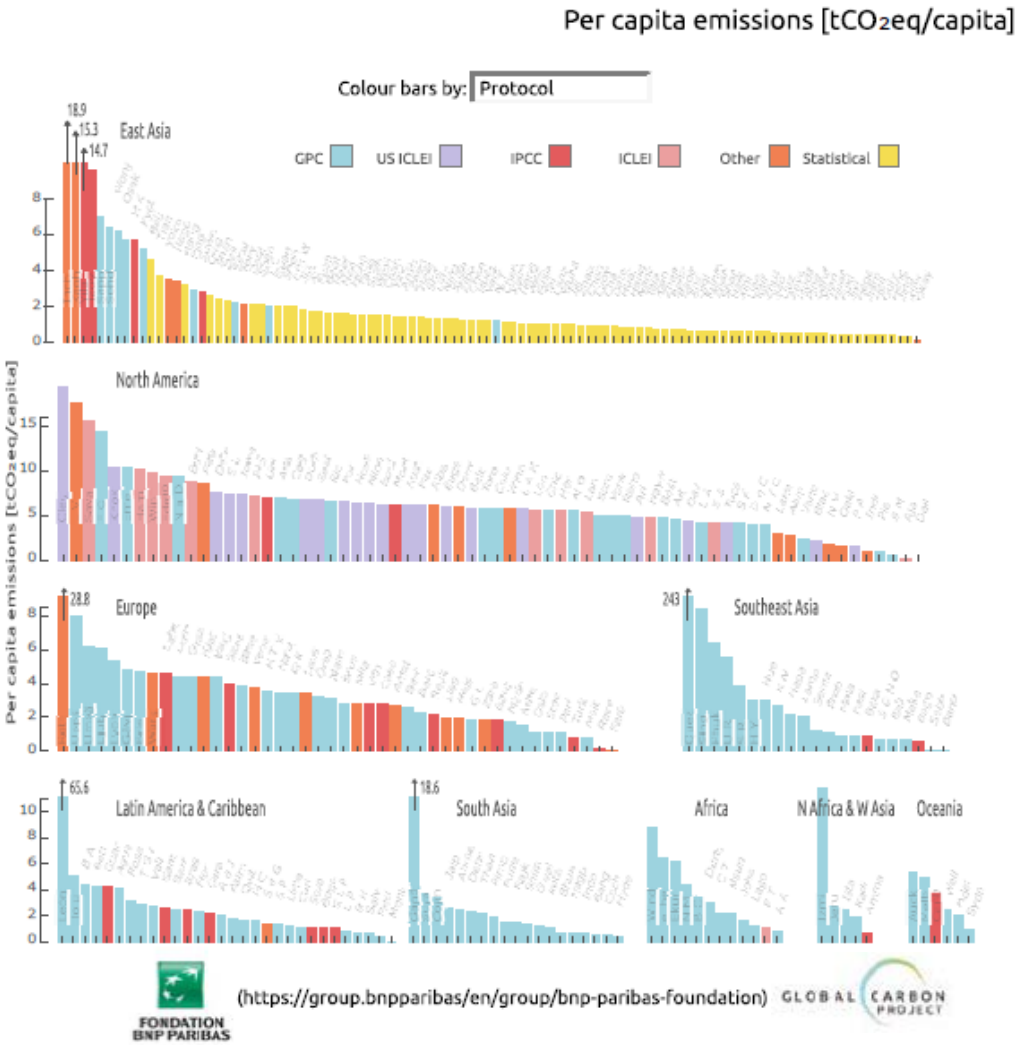
A global dataset of CO_2 emissions and ancillary data related to emissions for 343 cities

Cathy Nangini[1], Anna Peregon[1], Philippe Ciais[1], Ulf Weddige[2], Felix Vogel[3], Jun Wang[4], François-Marie Bréon[1], Simeran Bachra[5], Yilong Wang[1], Kevin Gurney[6], Yoshiki Yamagata[7], Kyra Appleby[5], Sara Telahoun[5], Josep G. Canadell[8], Arnulf Grübler[9], Shobhakar Dhakal[10], Felix Creutzig[2,11]

Accepted in Nature Scientific Data



Dataset available for download here (https://doi.pangaea.de/10.1594/PANGAEA.884141), fully described in Nangini et al. (2018) (https://doi.pangaea.de/10.1594/PANGAEA.884141).



Integrated Global Greenhouse Gas Information System

Demand mapping for urban/subnational

Level of sophistication of urban stakeholder needs

Complexity of solution

Identify major emitters and anomaly detection	Quantification of total GHG emissions	Assessment of GHG emissions per sector	Tracking annual and long-term emission changes	Understand short-term emission changes and spatial patterns	Process understanding of emissions and tracking of mitigation impacts
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Demonstrated skills

Theoretically tested skills

Future potential skills

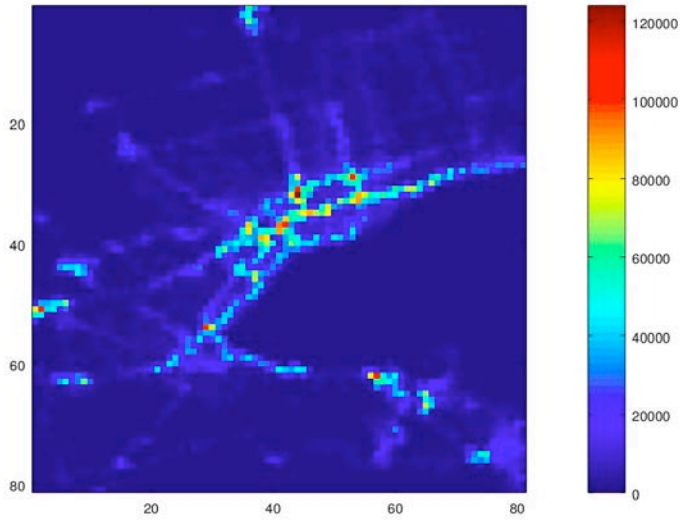
DAS = data assimilation system

Delivering emission estimates in Recife, Brazil

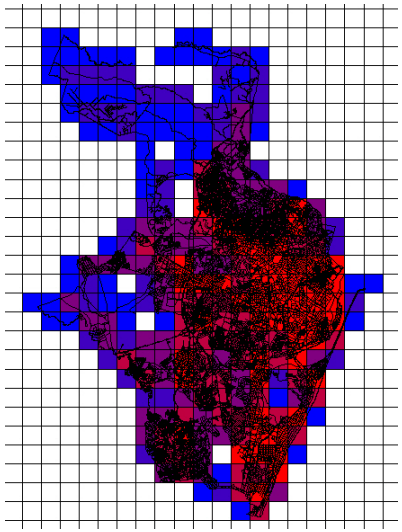
1. **Build emission inventory**
2. Establish modelling system
3. Setup measurement system
4. Analyse data

GREENHOUSE GAS PROTOCOL

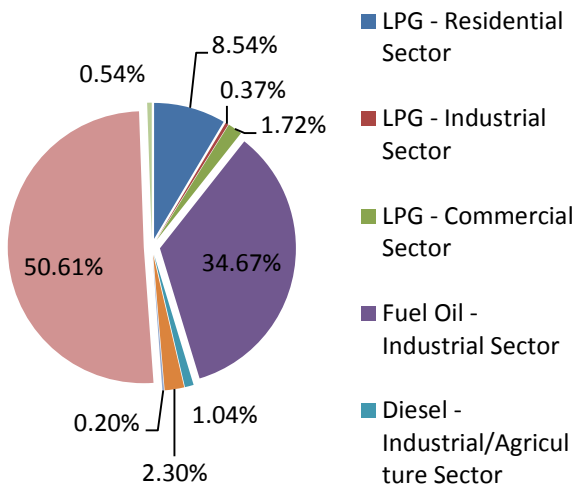
Towards an operational system to spatialize existing GPC inventory data



Toronto, Canada, 0.02°x0.02°
Based on air quality inventory
Collaboration LSCE, UoToronto



Emissions by fuel %



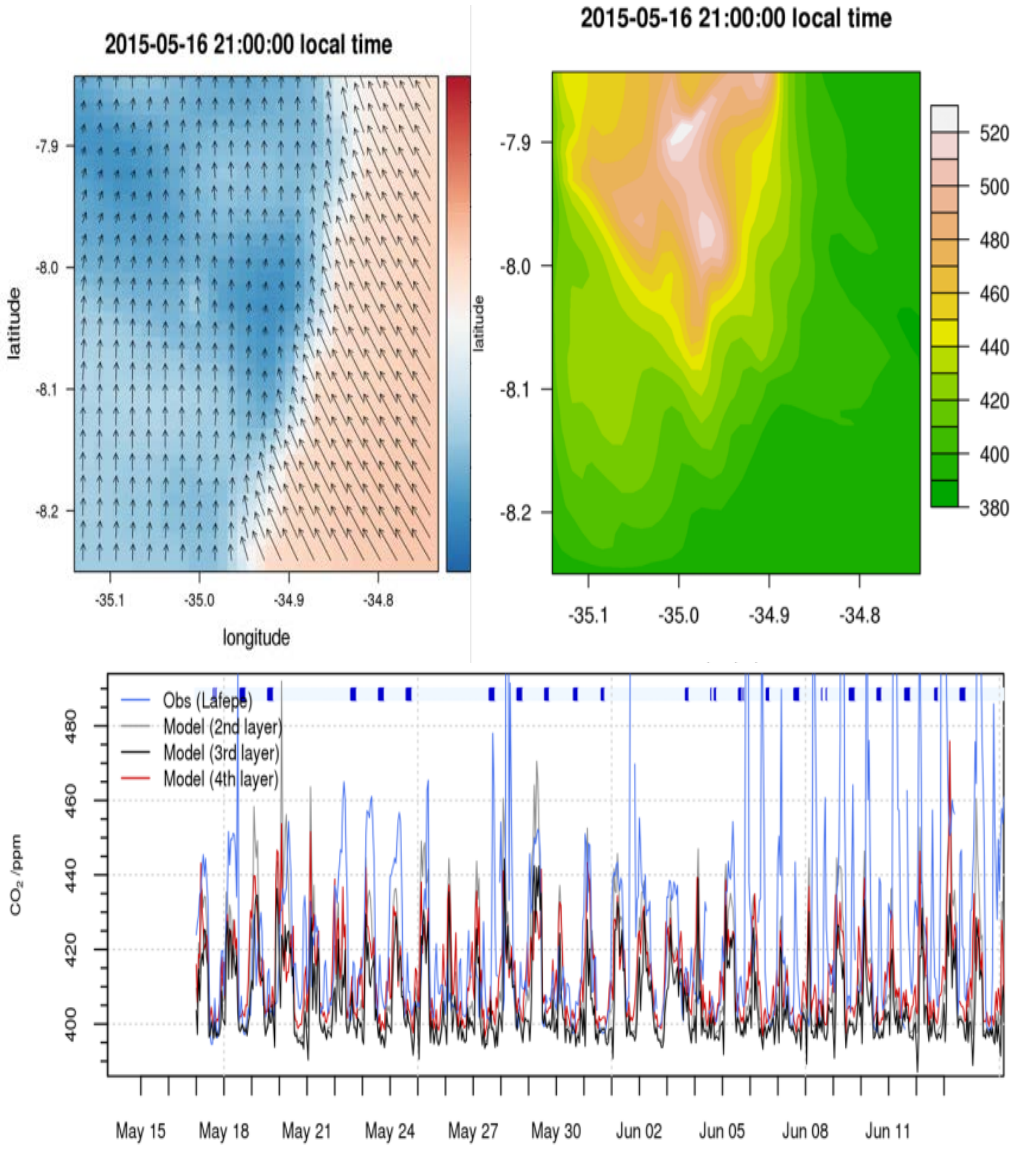
Recife, Brazil,1km x 1km, based on IPCC and GPC
Collaboration LSCE, ARIA tech.

Delivering emission estimates in Recife, Brazil

1. Build emission inventory
2. **Establish modelling system**
3. Setup measurement system
4. Analyse data

Nested domain

	0-6	6-12	12-18	18-24	0-6
Run 1					
Run 2					
Run 3					
Run 4					



Delivering emission estimates in Recife, Brazil

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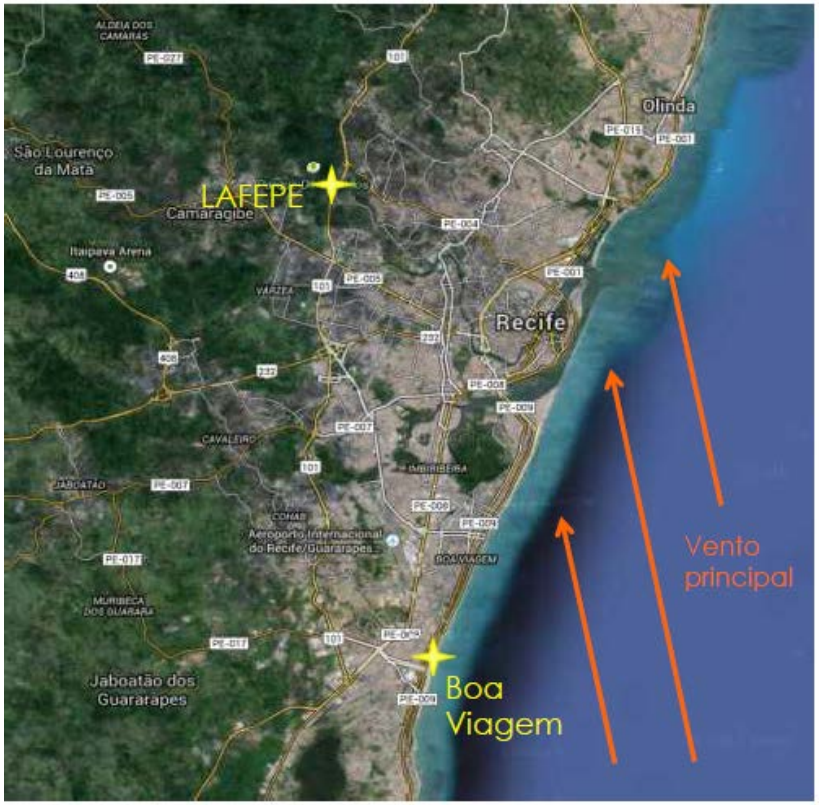

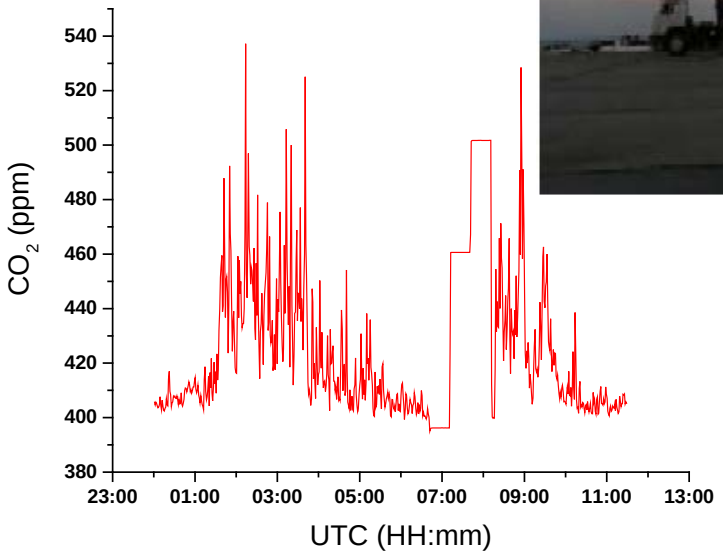

Delivering emission estimates in Recife, Brazil

1. Build emission inventory
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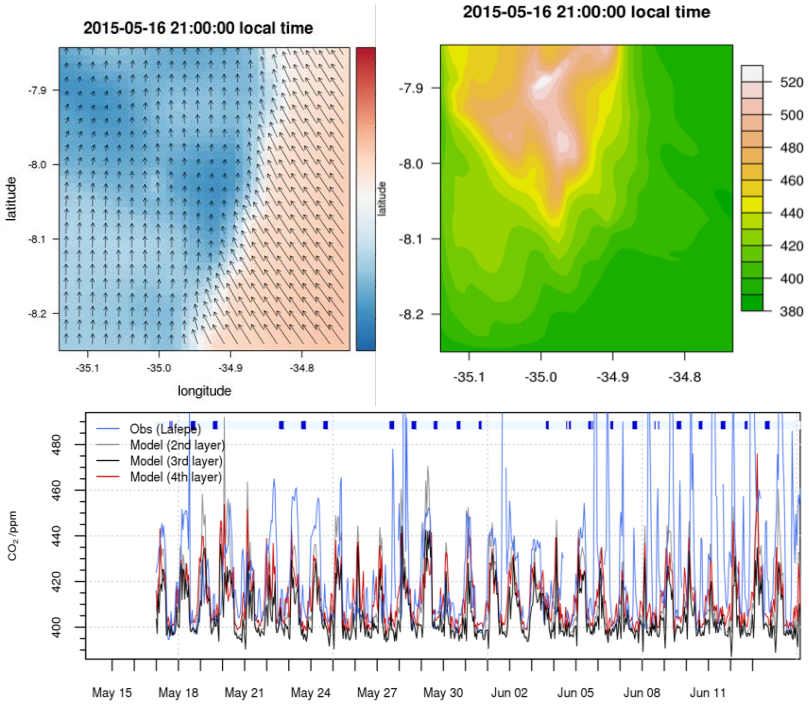
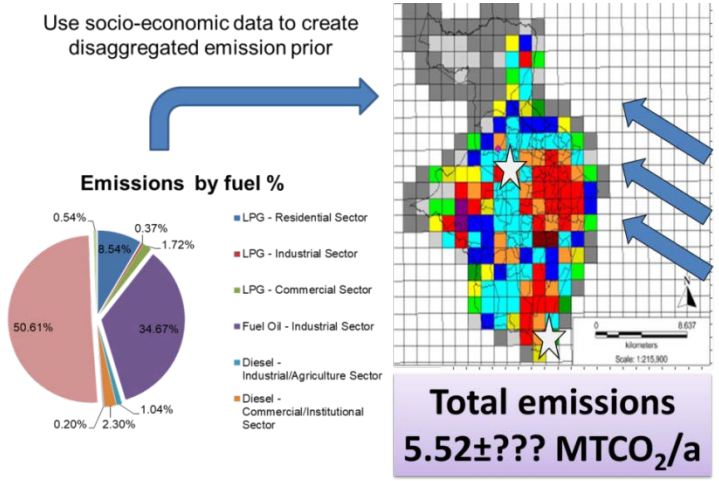
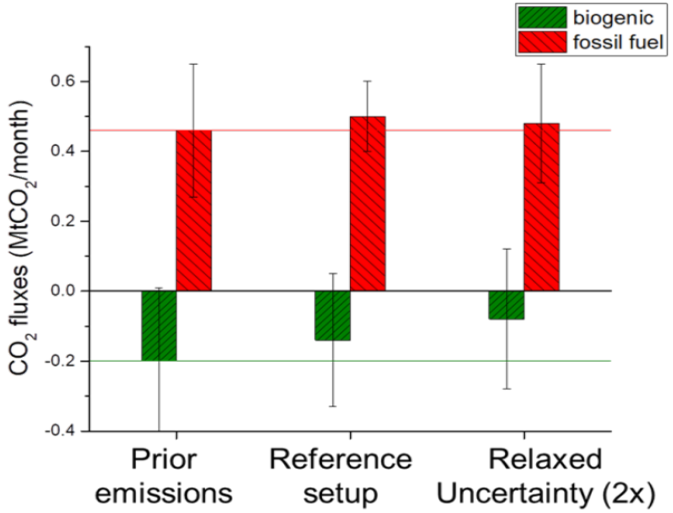
4. **Analyse data**







Inversion estimate
6.0 $MTCO_2$/year (±20%)

Demand mapping for urban/subnational

Integrated Global Greenhouse Gas Information System

Level of sophistication of urban stakeholder needs

Complexity of solution

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Demonstrated skills

Theoretically tested skills

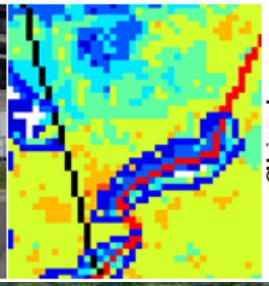
Future potential skills

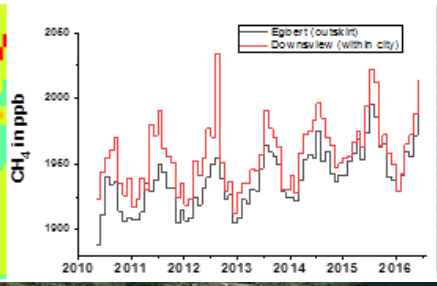
DAS = data assimilation system

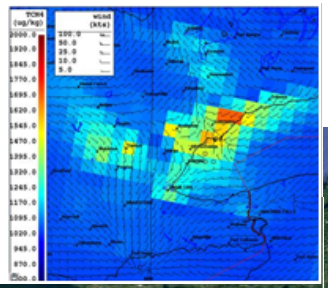
Integrated Global Greenhouse Gas Information System

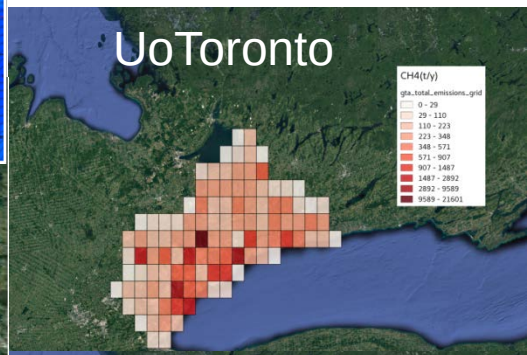
Identifying CH_4 mitigation potential in cities

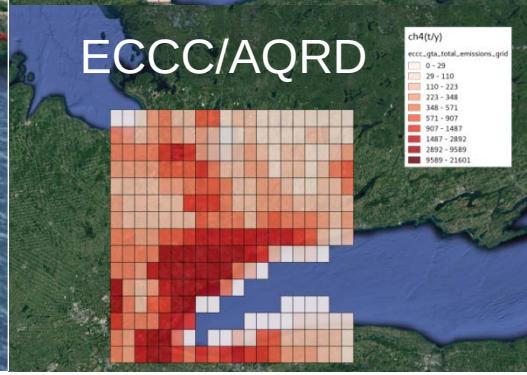
CLIMATE & CLEAN AIR COALITION
TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS











- International coordination (8 urban areas in Europe involved)
- So far ca. 3000km mobile surveys in Greater Toronto (bike and truck)
- First emission rate estimates (local scale modelling)
- High-resolution modelling (and inventories) 2.5x2.5km^2

Environment and Climate Change Canada
Environnement et Changement climatique Canada

Integrated Global Greenhouse Gas Information System

Demand mapping for urban/subnational

Level of sophistication of urban stakeholder needs

Complexity of solution

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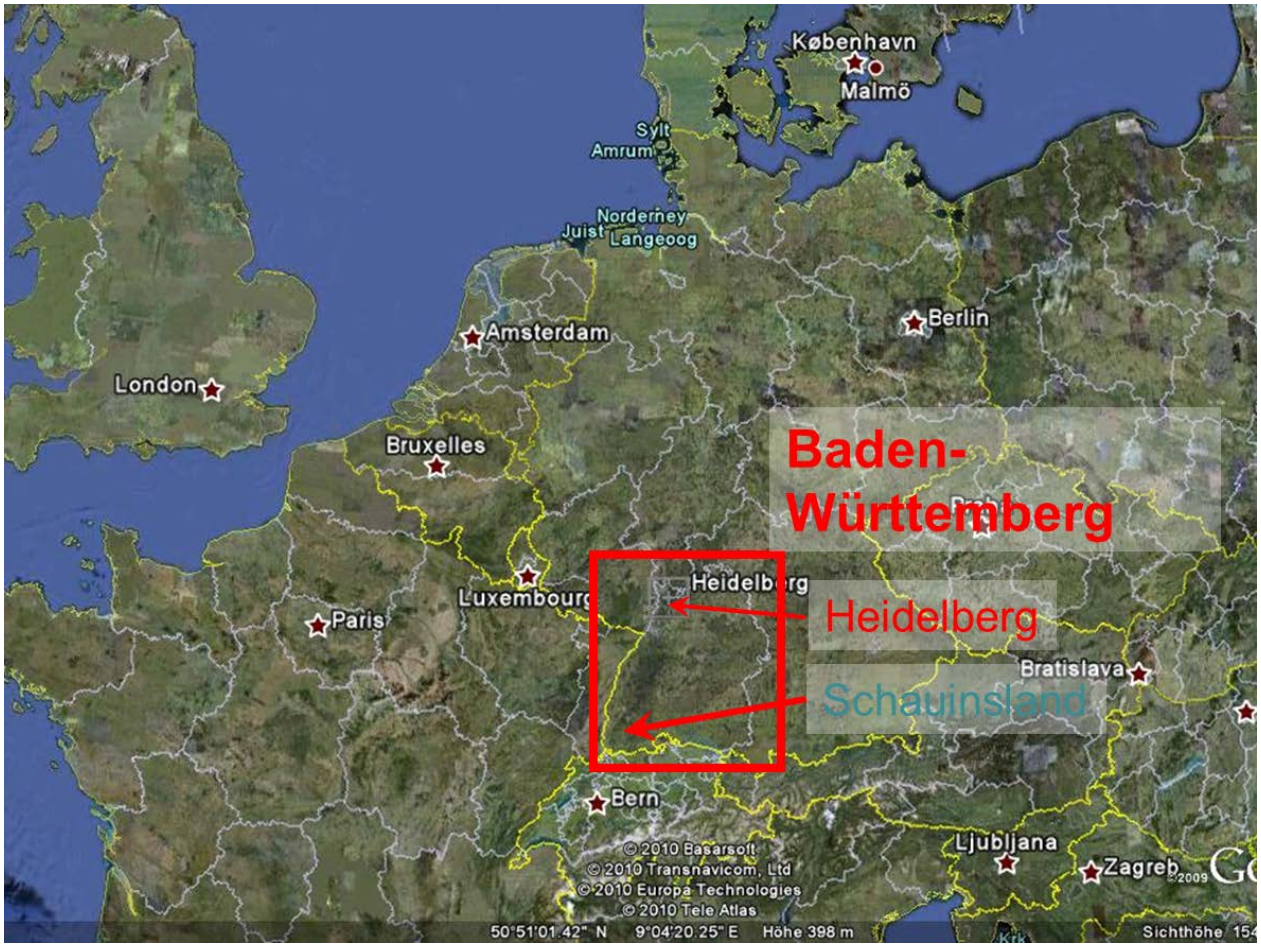
Demonstrated skills

Theoretically tested skills

Future potential skills

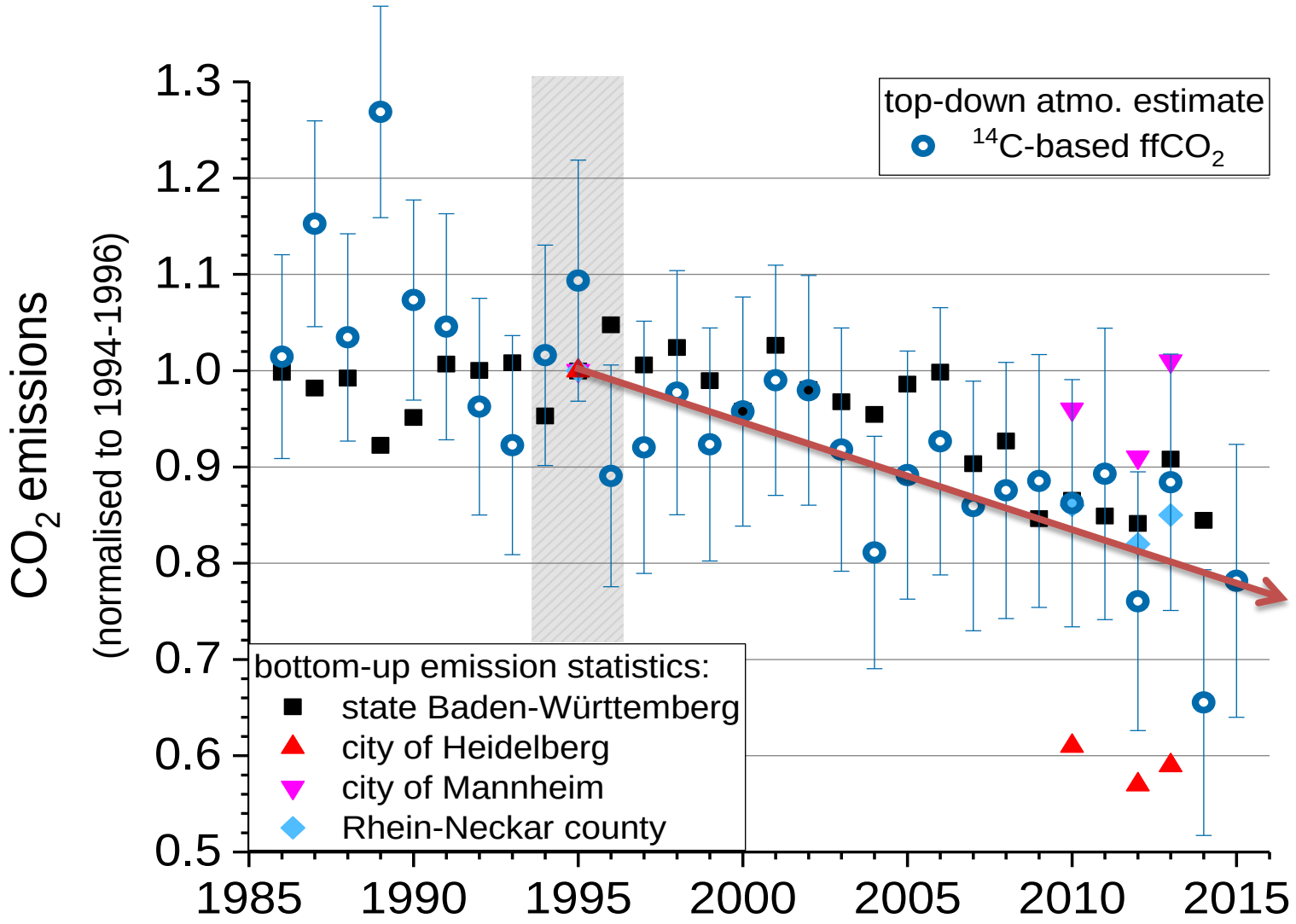
DAS = data assimilation system

Long-term tracking of emission changes



Courtesy: S. Hammer and I. Levin UoHeidelberg, Germany

Long-term tracking of emission changes



Updated from Levin et al. 2011
Philos. Trans. Royal Soc. A
DOI: 10.1098/rsta.2010.0249

Emission data from:

Statistisches Landesamt
Baden-Württemberg

World Meteorological Organization
EXECUTIVE COUNCIL
Seventieth Session
Geneva, 20 to 29 June 2018

EC-70/Doc. 4.4
Submitted by:
Chair of Plenary
25.VI.2018
APPROVED

AGENDA ITEM 4: **CLIMATE SERVICES, SUPPORT TO CLIMATE ACTION AND CLIMATE RESILIENCE**

AGENDA ITEM 4.4: **INTEGRATED GLOBAL GREENHOUSE GAS INFORMATION SYSTEM (IG3IS)**

DRAFT DECISION

Draft Decision EC-70/4.4/1

IG³IS SCIENCE IMPLEMENTATION PLAN

The Executive Council decides to approve the IG³IS Science Implementation Plan endorsed by the Commission for Atmospheric Sciences in which the executive summary is provided in the Annex to this decision;

Requests the Secretary-General to provide support to the IG³IS activities and assist in promoting IG³IS with funding agencies, and work with those Members, especially in developing countries, who plan to undertake IG³IS projects, in pursuing extrabudgetary resources to do so;

Urges Members to undertake pilot and demonstration projects that facilitate implementation of the IG³IS Implementation Plan;

Requests Members working with the Regional Associations to assign focal points for the implementation of IG³IS and to scale up the existing initiatives for regional knowledge transfer and capacity building for IG³IS implementation in the Regions;

Requests Members to improve integration of atmospheric composition observations into the national meteorological observing systems;

Requests the Commission for Atmospheric Sciences to coordinate with the appropriate technical commissions, in particular the Commission for Basic Systems, in order to ensure translation of the IG³IS scientific tools into operational services and contribution to WIGOS and GDPFS;

Agrees that the governance of the IG³IS should be established taking into account the Framework Memorandum of Understanding between the WMO and the Secretariat of the United Nations Framework Convention on Climate Change.

- **Support through WMO/GAW and finding new resources** MeteoSwiss
- **Pilot projects**
- **Scaling up and capacity building**
- **Greater integration with Meteorological Services**
- **Working towards operational services (and good-practices)**
- **Strong link to UNFCCC**

First IG³IS subnational/urban workshop

Discussion on IG³IS - subnational science team

"Why would anyone care about city CO_2 emissions?"

What about the global South?

"What really *is* an IG³IS project"

What about my <insert tool> ?

Philosophical

What's the role of the private sector?

How to measure/model GHGs in cities?
What to do about … ?
… local contamination
… the 'background'
… the biosphere
… transport errors (fix vs. estimate)
… correlation of fluxes
... inventories

Technical

- Which stakeholder groups are the right partner?
- What GHG species and sectors should be target?
- Which cities should be chosen as demonstrators?
- How should we decide on 'new' cities/regions to be considered IG³IS?

What additional data do we need/want?
PBLH, AQ species, ^{222}Rn, …

Do we want one integrated system for emissions or independent approaches?

Who is going to pay for IG³IS projects and the R&D needs?

What should be the 'best practices?

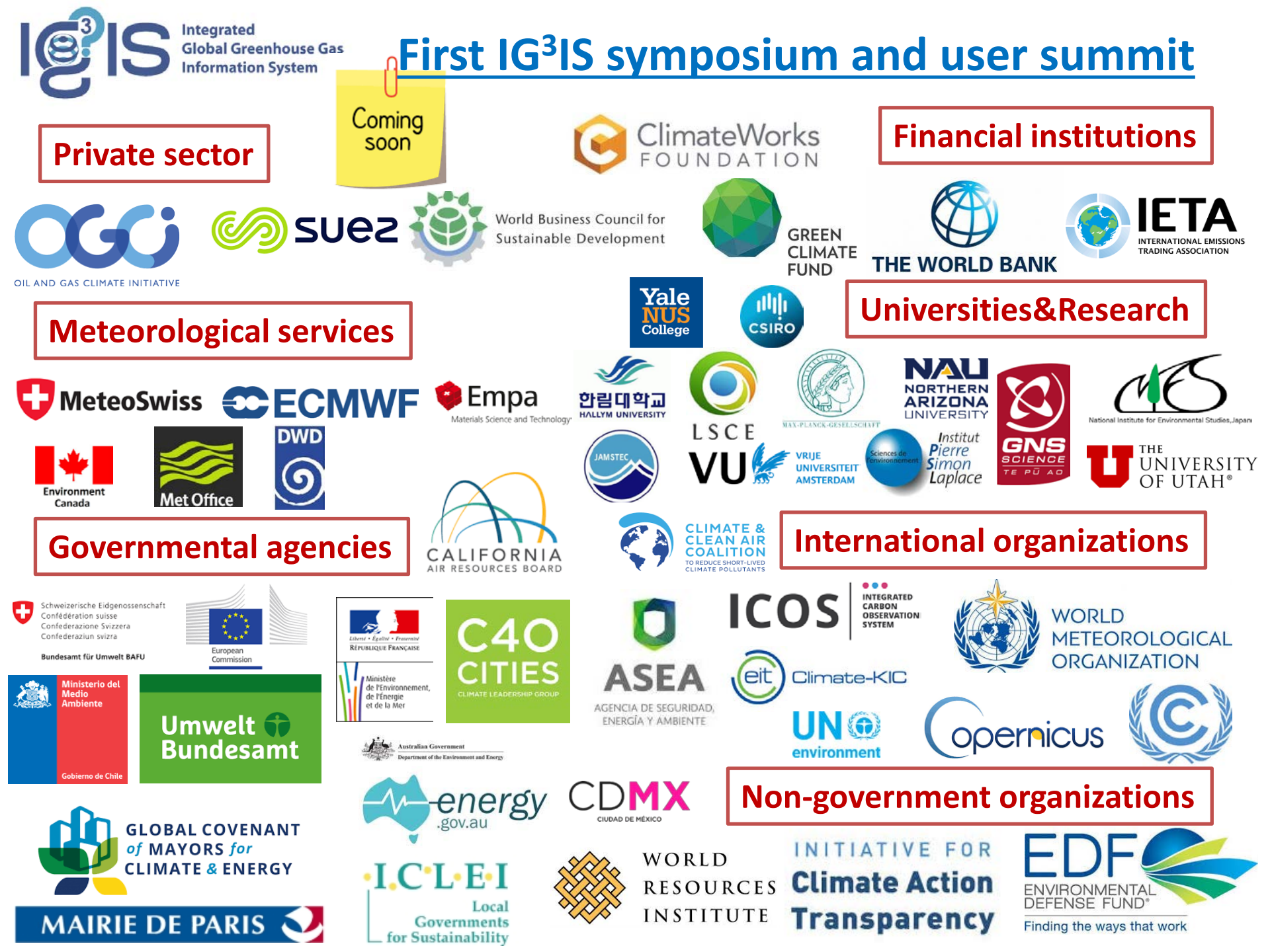
What is WMO's role ?
(What do we want it to be?)

Administrative

How do we make decisions?

First IG³IS subnational/urban workshop

- **Key questions for initial recommendations document identified**
- **Draft for community review paper on urban/subnational IG³IS research**
- **Agenda for first IG³IS symposium and user summit**


IG3IS
Integrated Global Greenhouse Gas Information System
First IG3IS symposium and user summit
Coming soon
Private sector
ClimateWorks FOUNDATION
Financial institutions
OGCI
OIL AND GAS CLIMATE INITIATIVE
suez
World Business Council for Sustainable Development
GREEN CLIMATE FUND
THE WORLD BANK
IETA
INTERNATIONAL EMISSIONS TRADING ASSOCIATION
Meteorological services
Yale NUS College
CSIRO
Universities&Research
MeteoSwiss
ECMWF
Empa
Materials Science and Technology
한림대학교 HALLYM UNIVERSITY
LSCE
MAX-PLANCK-GESELLSCHAFT
NAU NORTHERN ARIZONA UNIVERSITY
National Institute for Environmental Studies, Japan
Environment Canada
Met Office
DWD
JAMSTEC
VU
VRIJE UNIVERSITEIT AMSTERDAM
Institut Pierre Simon Laplace
GNS SCIENCE TE PŪ AO
THE UNIVERSITY OF UTAH
Governmental agencies
CALIFORNIA AIR RESOURCES BOARD
CLIMATE & CLEAN AIR COALITION TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS
International organizations
Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
Bundesamt für Umwelt BAFU
European Commission
Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE
Ministère de l'Environnement, de l'Énergie et de la Mer
C40 CITIES
CLIMATE LEADERSHIP GROUP
ASEA
AGENCIA DE SEGURIDAD, ENERGÍA Y AMBIENTE
ICOS
INTEGRATED CARBON OBSERVATION SYSTEM
WORLD METEOROLOGICAL ORGANIZATION
eit Climate-KIC
Ministerio del Medio Ambiente
Gobierno de Chile
Umwelt Bundesamt
UN environment
opernicus
Australian Government
Department of the Environment and Energy
energy.gov.au
CDMX
CIUDAD DE MÉXICO
Non-government organizations
GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY
MAIRIE DE PARIS
I·C·L·E·I
Local Governments for Sustainability
WORLD RESOURCES INSTITUTE
INITIATIVE FOR Climate Action Transparency
EDF
ENVIRONMENTAL DEFENSE FUND
Finding the ways that work

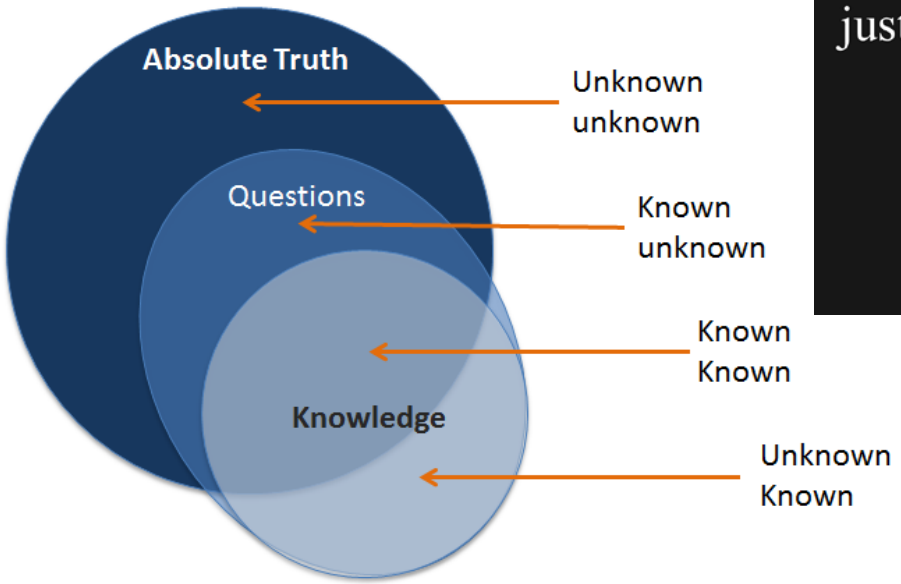
Integrated Global Greenhouse Gas Information System

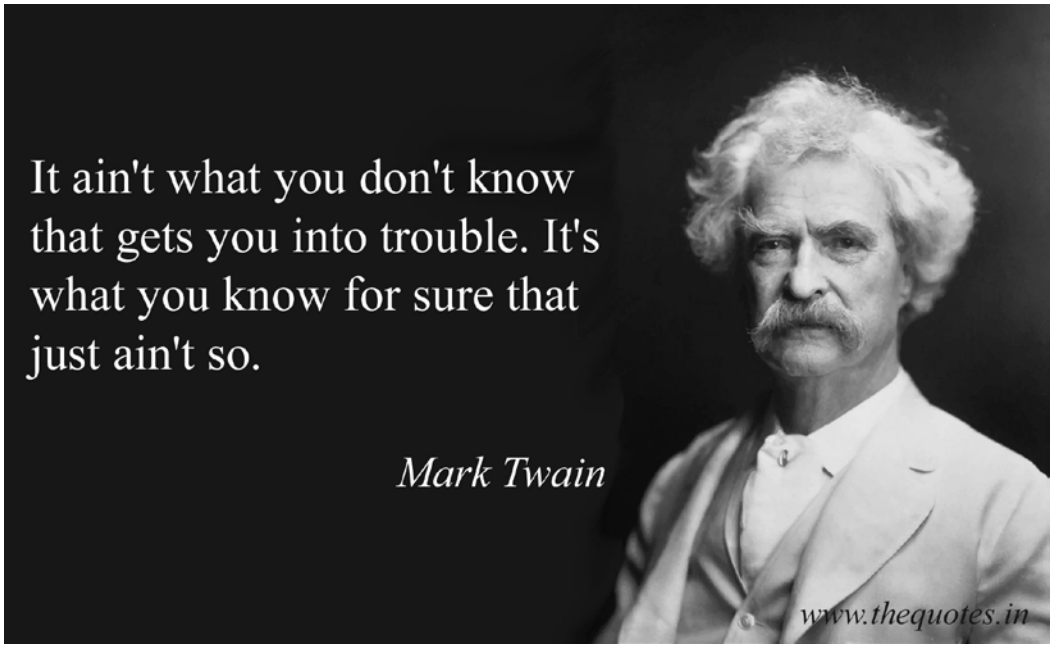
First IG³IS symposium and user summit

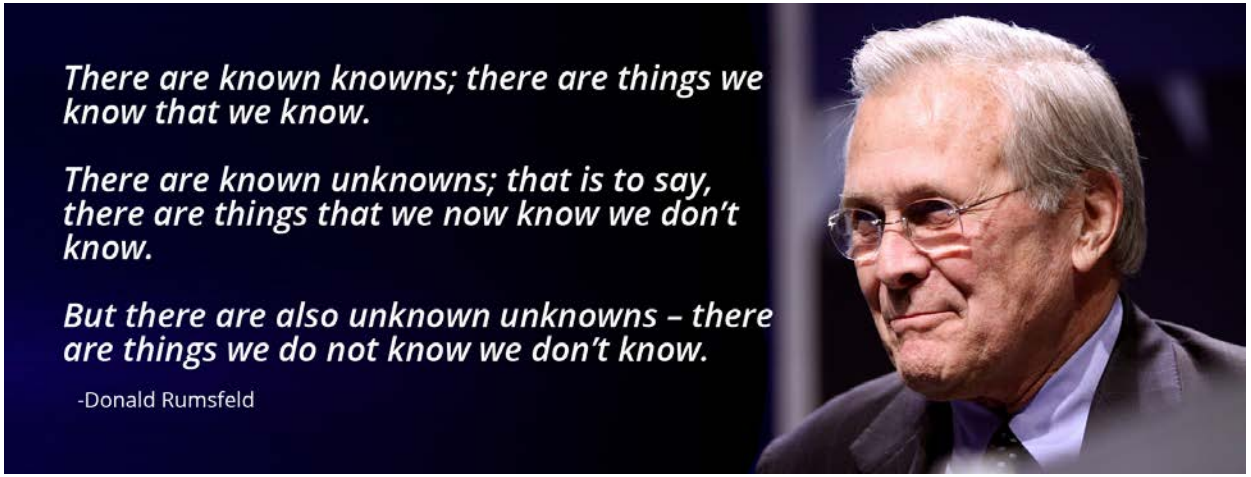
- **Bring together key users from a number of different sectors to engage in ONGOING dialogue with technical developers of IG³IS information.**
- **Stakeholders and users will be invited to articulate their needs for data-driven GHG emission information – TODAY and TOMORROW.**
- **The scientific community developing IG³IS services will present EXISTING CAPABILITIES that can either meet information needs or reframe the user considerations and the landscape of solutions under consideration.**
- **The Symposium and User Summit will also identify gaps between current capabilities and emerging user requirements and guide IG³IS research and development for future PRODUCTS and SERVICES.**

Integrated
Global Greenhouse Gas
Information System

"From 'I guess' to I know"







Integrated
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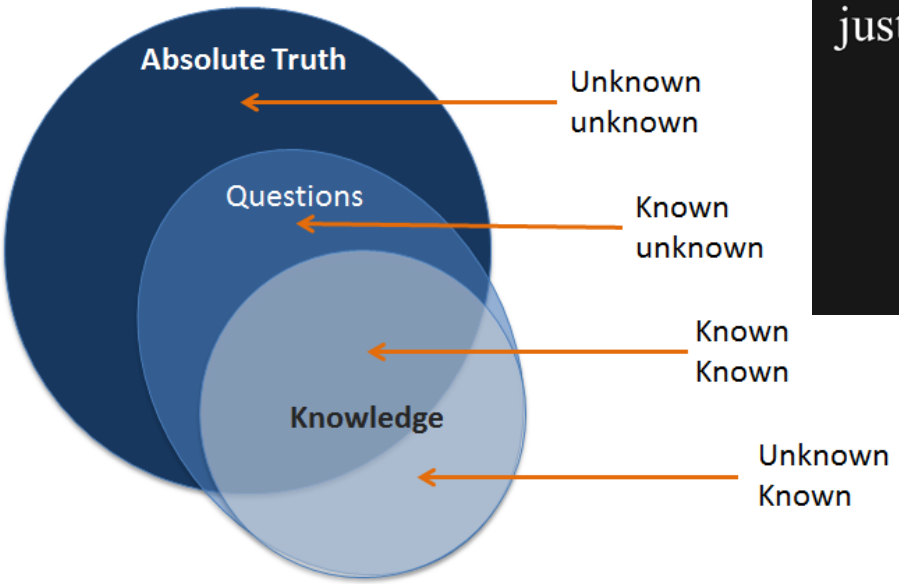
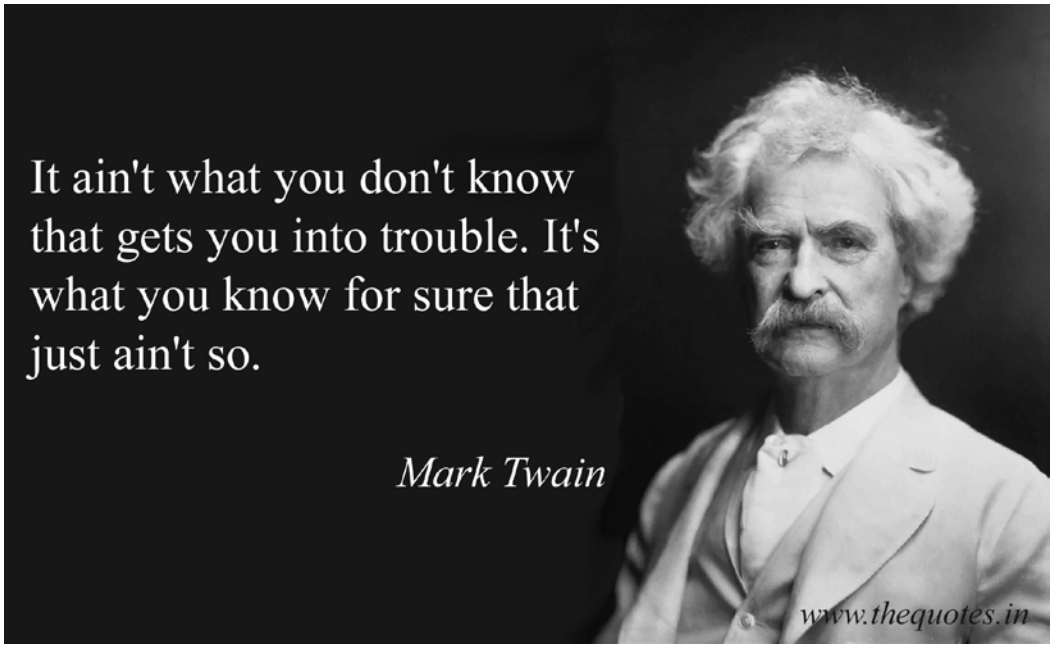
"From 'I guess' to I know"





Thank you