InGOS
Integrated non-CO_2 Greenhouse Gas Observing System

Midterm Review meeting

2 December 2013

Brussels

SEVENTH FRAMEWORK PROGRAMME

InGOS
Midterm Meeting – Agenda

14.00 Welcome (PO)

14.05 Project overview (scientific part)

14.15 Individual work package reports

5 min time for reviewer questions after each WP block

- 14.15 TNA 1–5 (WP 7–11) – overview on facilities
- 14.50 JRA 1–6 (WP 13–18) – overview on scientific activities
- 15.25 NA 2–6 (WP 2–6) – overview on scientific activities
- 16.00 SA 1 (WP 12) – overview on data storage and making them available

16.10 Break

16.25 Project overview and summary (administrative part, including update deliverables/milestones)

16.45 final discussion

InGOS
Project objectives

- Improving and extending the European observation capacity for non-CO_2 greenhouse gases

  - Need to bring together different communities
  - Integrate observation and model development
  - Emissions of non-CO_2 GHG's are very uncertain
  - Future climate change feedback monitoring

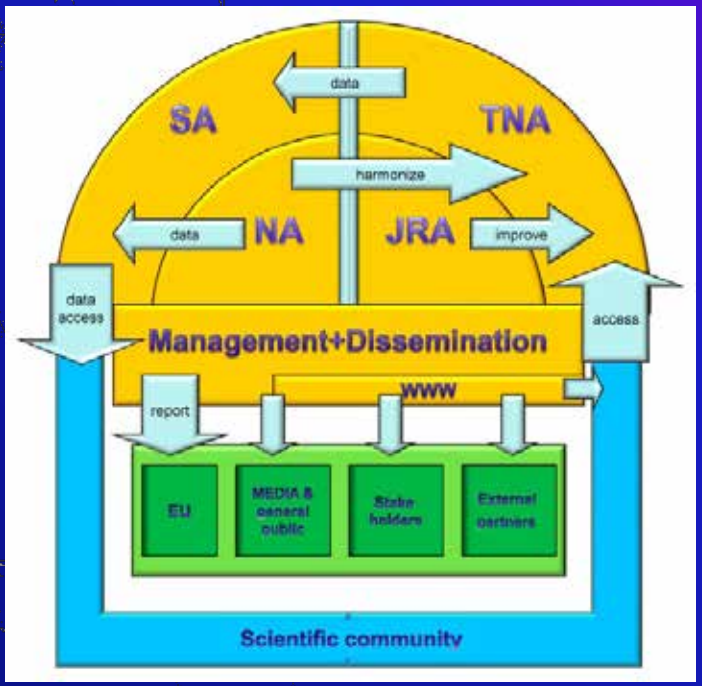
InGOS
Project objectives

By means of:

- Strengthening and supporting existing observations
- Standardizing measurements and quality control
- Developing and applying advanced techniques and data-assimilation methods
- Capacity building in new member states
- Integrating the network with other networks already in place or in development
- Linking ground based network and models to remote sensing data and bottom up inventories

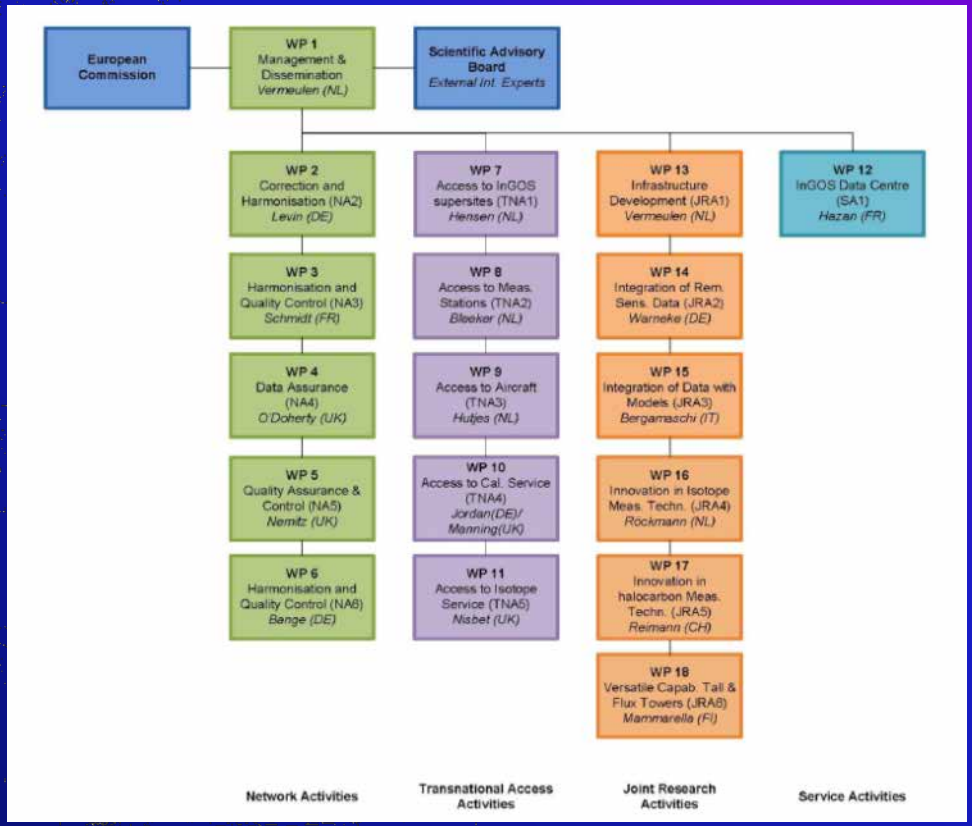
InGOS
Project structure – overview

- IA (Integrating Activity) project
- October 2011 to September 2015
- 34 partners from 15 countries
- Organized in 4 activities
  - TNA: TransNational Activities
  - JRA: Joint Research Activities
  - NA: Network Activities
  - SA: Service Activities
- 18 work packages
- > 130 scientists involved



InGOS
Project structure – overview

- Strategy of the work plan
  - Outreach / cooperation
    - Transnational Activities
    - Summer Schools
    - Conferences/Meetings
  - Innovation
    - Joint Research Activities
    - Modeling
    - Network design
    - Vertical integration
  - Strengthening
    - Network Activities
    - Cooperation
    - Merging networks



InGOS
Project structure – TNA

TransNational Activities, WP 7 – 11

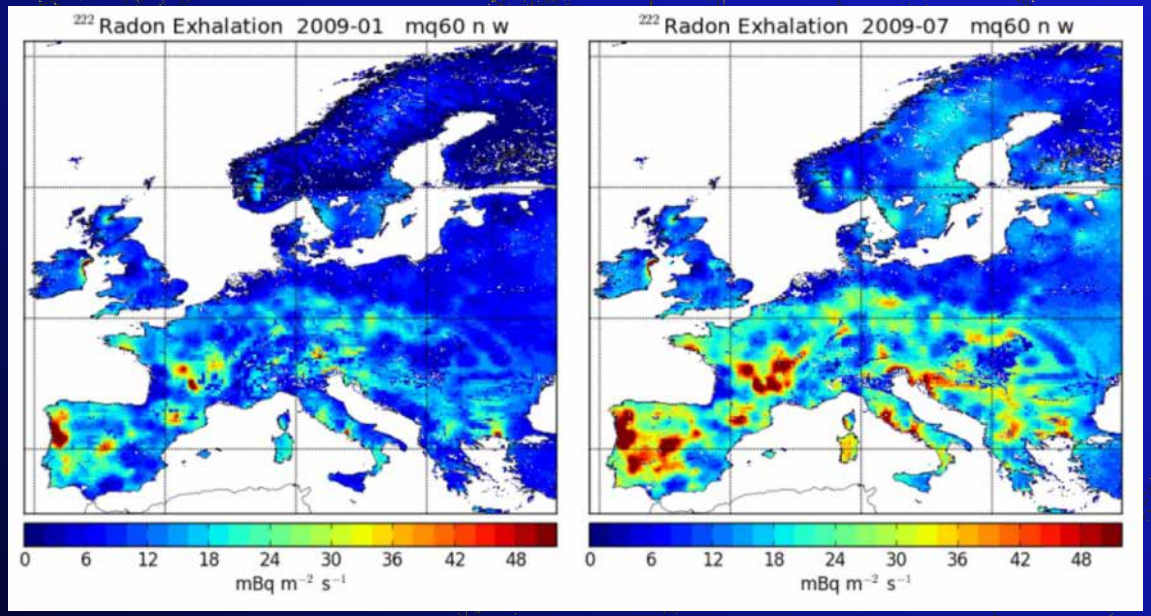
Outreach / cooperation

- Provision of access to infrastructures
  - Measurement towers and stations
  - European partner lab facilities
  - Calibration services
  - Airborne flux platform

InGOS
Project structure – JRA

Joint Research Activities, WP 13 – 18 Innovation

- new instruments (e.g. in situ FTIR, CRDS, DIAL)
- Integration of spatial scales around tall towers
- Integration of flux and concentration observations
- Modeling, network validation and design



InGOS
Project structure – NA

Network Activities, WP 1 – 6

Strengthening of the network

- Project management
  - Meetings
  - Representation at conferences
  - Reporting
  - Financial
  - Consortium management
- Services
  - Database
- Data and method harmonization
- QA/QC of the measurements

InGOS
Project structure – SA

Service activity

- Data centers
  - Atmosphere (ICOS ATC) -> GAW
  - Halocarbons (NILU EBAS)
  - Fluxes (ICOS ETC)
- Provide access to European non–CO_2 gas observations
- Near real time data
  - Dedicated website
- QA/QC controlled data
  - Including measurement error estimates

InGOS
individual WP reports

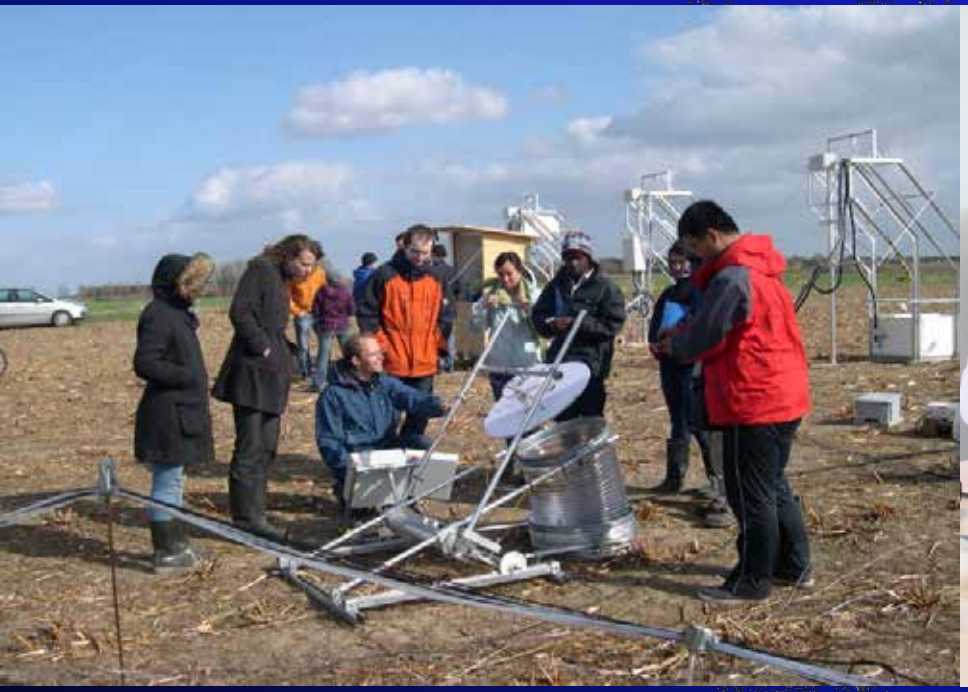
14.15 individual work package reports **(max. 300s each!)** and 5 min time for reviewer questions after each WP block

14.15 TNA 1–5 (WP 7–11) – overview about facilities
14.50 JRA 1–6 (WP 13–18) – overview about scientific activities
15.25 NA 2–6 (WP 2–6) – overview about scientific activities
16.00 SA 1 (WP 12) – overview about data storage and making them available

16.10 pause

InGOS
WP 7 until 9 –
Access to InGOS supersites (TNA 1-3)

WP leader: Arjan Hensen (ECN), Albert Bleeker (ECN), Ronald Hutjes (WUR)




Coca-Cola
zero

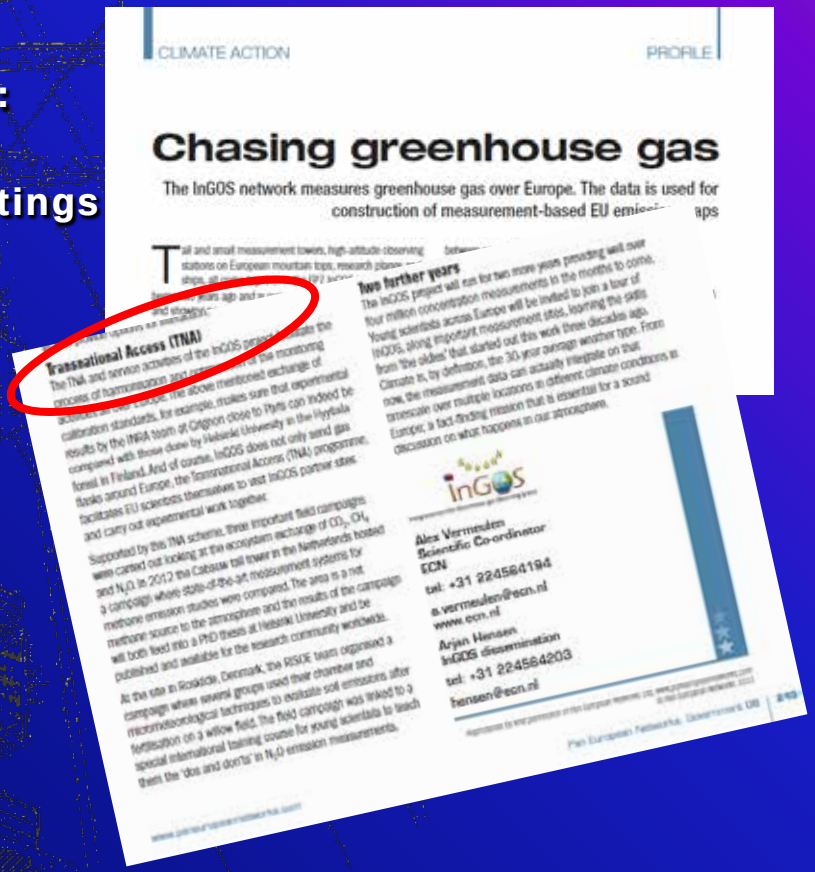
TNA 1-5

Five TNA WP's

1= Supersites
2= All other sites
3= Airplanes
4= Gas flasks
5= Isotopes

Communication

Website
"Direct mail"
Special announcements for the campains at:
Other EU project meeting
Fluxnet workshop/Cost ABBA meetings
Glossy & overpaid magazines....



InGOS

a FP7 infrastructure project

Integrated non-CO_2 Greenhouse gas Observing System

Home | Project Info | Get Access! | Forum | Posts | Contact us | Member area | Log in

Home→Access to Stations, Facilities and measurement Services

Access to Stations, Facilities and measurement Services

One of the most important tasks of InGOS is to give external users access to the stations, facilities and services. In order to get access to the stations and facilities, external users will have to apply through this website. This facilitates the planning and the financial commitments needed in order to provide the support. Users can also in most cases apply for travel and subsistence support. **Read more on TNA in this EU document (PDF) before applying!**

Each application for TNA1 to TNA3 should be accompagnied by a detailed workplan following the **TNA Workplan template (MS Word DOC)**. Please note that consultation of the site PI is always necessary. Travel budget in TNA1 and TNA2 is limited to € 500 per person per application and support is foreseen for at maximum a daily subsistence of €50 per person. The unit of access requested is usually the "research working day" (RWD). The number of units needed should be negotiated carefully with the service provider and is not necessarily equal to the number of measurement days!

Posting your request for access to TNA1 (Supersites) is now possible.

Supersites are (click on the site for more info):

- Cabauw – Netherlands
- Weybourne – United Kingdom
- SMEAR II (Hyytiälä) – Finland
- Risoe willow field – Denmark
- Easter Bush – United Kingdom

The status of all submitted TNA1 requests (pending and closed) can be viewed on the TNA1 Requests

Language

Select Language

Upcoming related events:

16/09/2014
Advancing the science of gas exchange between fresh waters and the atmosphere

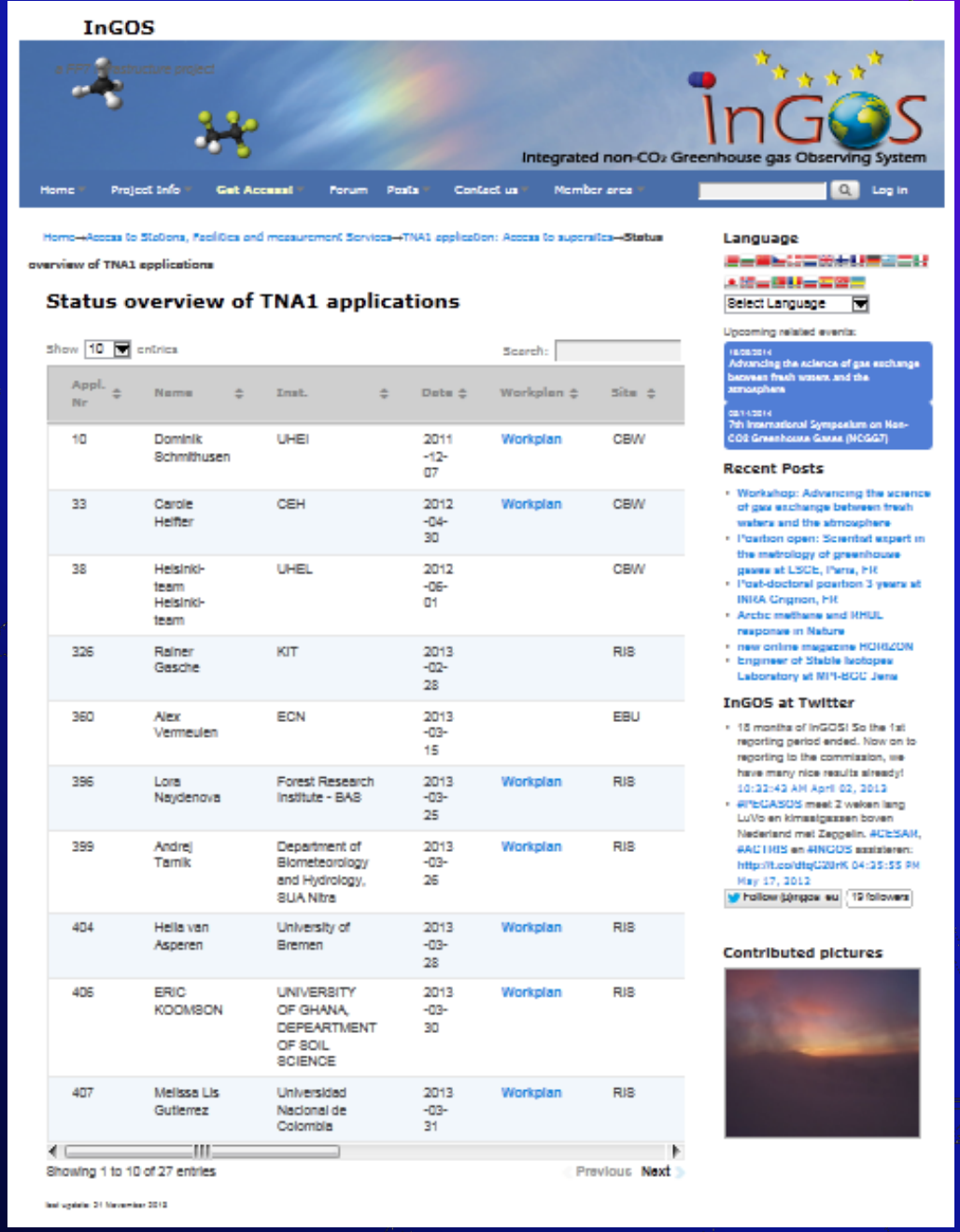
05/11/2014
7th International Symposium on Non-CO2 Greenhouse Gases (NCGG7)

Recent Posts

- Workshop: Advancing the science of gas exchange between fresh waters and the atmosphere
- Position open: Scientist expert in the metrology of greenhouse gases at LSCE, Paris, FR
- Post-doctoral position 3 years at INRA Grignon, FR
- Arctic methane and RHUL response in Nature
- new online magazine HORIZON
- Engineer of Stable Isotopes Laboratory at MPI-BGC Jena

InGOS at Twitter

- 18 months of InGOS! So the 1st reporting period ended. Now on to reporting to the commission, we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Home→Access to Stations, Facilities and measurement Services→TNA1 application: Access to supersites→Status overview of TNA1 applications
Status overview of TNA1 applications
Show 10 entries
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Appl. Nr
Name
Inst.
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Workplan
Site
10 Dominik Schmithusen UHEI 2011-12-07 Workplan CBW
33 Carole Helfter CEH 2012-04-30 Workplan CBW
38 Helsinki-team Helsinki-team UHEL 2012-06-01 CBW
326 Rainer Gasche KIT 2013-02-28 RIS
360 Alex Vermeulen ECN 2013-03-15 EBU
396 Lora Naydenova Forest Research Institute - BAS 2013-03-25 Workplan RIS
399 Andrej Tarnik Department of Biometeorology and Hydrology, SUA Nitra 2013-03-26 Workplan RIS
404 Hella van Asperen University of Bremen 2013-03-28 Workplan RIS
406 ERIC KOOMSON UNIVERSITY OF GHANA, DEPEARTMENT OF SOIL SCIENCE 2013-03-30 Workplan RIS
407 Melissa Lis Gutierrez Universidad Nacional de Colombia 2013-03-31 Workplan RIS
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Language
Select Language
Upcoming related events:
Advancing the science of gas exchange between fresh waters and the atmosphere
7th International Symposium on Non-CO2 Greenhouse Gases (NCGG7)
Recent Posts
Workshop: Advancing the science of gas exchange between fresh waters and the atmosphere
Postdoc open: Scientist expert in the metrology of greenhouse gases at LSCE, Paris, FR
Postdoctoral position 3 years at INRA Grignon, FR
Arctic methane and RHUL response in Nature
new online magazine HORIZON
Engineer of Stable Isotopes Laboratory at MPI-BGC Jena
InGOS at Twitter
Contributed pictures

Who went where

hosts

visitors

	Finland	Denmark	Nethr.	UK	France	Germany	Spain	Sweden	Hungary	Ireland	Poland	Italy	Switserland
Finland	x			3	2						1		
Denmark		x			1								
Netherl			2	x						1			
UK		1		1	x				2	1		2		
France						x							
Germany			5	2			x				1		
Spain					2			x					
Sweden									x			1	
Hungary					1					x			
Ireland											x		
Poland			2									x	
Italy			4	1	3								x
Switserland					1								
Vietnam			1										
Chili			1										
Uruguay			1										
China			1										
USA										1			

TNA1 : 27
TNA2 : 13
TNA3 : 2

Site info booklet

Weybourne observatory

- Coordinates: 52°57'01.5"N 1°07'19"E
- Height: 10 m
- Base level: 21 m ASL
- Country: United Kingdom
- InGOS observations: CH_4, N_2O, SF_6, halocarbons
- Responsible partner: UEA
- Responsible PI: Bill Sturges (w.sturges@uea.ac.uk)
- Website: http://weybourne.uea.ac.uk/

General

Weybourne Atmospheric Observatory (WAO) is a coastal site located on the North Norfolk coastline near Weybourne, North Norfolk, UK. Over the last decades the Weybourne Atmospheric Observatory (WAO) has become established as a world class facility at which fundamental research, background monitoring and teaching have all been successfully carried forward. WAO has been the focus of many international experiments designed to look into the

chemistry of the free troposphere and is currently supported through NCAS composition and NCAS FGAM as a national capability resource.

Infrastructure and facilities

The site at Weybourne has the ability to host large scale scientific campaigns with the capacity to provide 3 phase, 32 amp and 16 amp external power. The two well provisioned laboratories are air conditioned and secure. A small office provides the ability to network internally with access to the web. Provision can be made to access computer controlled instrumentation from afar. Active support by the local landowner enables the use of an adjacent grass airfield capable of handling balloon, microlight and small aircraft platforms. Campaign activities are well supported by the local community with accommodation plentiful in the locale.
Supporting trace gas analysis of the atmospheric boundary. Particular expertise in the determination of VOC's, OVOC's, Carbon Dioxide and GHGs. Long term data sets are available for ozone, Carbon monoxide NOx CN and SO2. Sophisticated instrumentation for the measurement of local meteorology including sodar, rass and sonic anemometry are also available on site.

InGOS

WP 7 – Access to InGOS supersites (TNA 1)
WP 8 – Access to European measurement stations (TNA 2)
WP 9 – Access to aircraft for CH_4 flux and concentration measurements (TNA 3)

WP leader: Arjan Hensen (ECN)

WP leader: Albert Bleeker (ECN)

WP leader: Ronald Hutjes (WUR)

TNA1

Supersites = sites with foreseen InGOS intercomparison campaign

Hyytiala, Weyborne, Cabauw, Risoe willo field, Easter Bush

Objectives

- Trans national access including the visits to host the campaigns

Partners and tasks:

- ECN: Cabauw
- UHEL: Hyytiala
- UEA: Weyborne
- RISOE: Willow field
- NERC: Easter Bush

Deliverables:

- Visits!

Interaction

Cabauw

TNA

JRA6

NA5

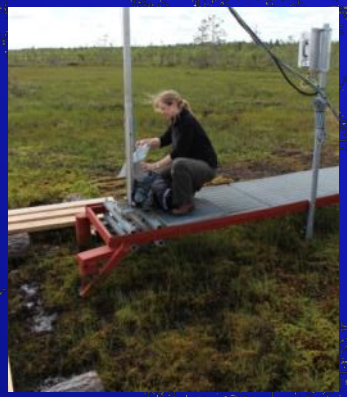
Easter Bush

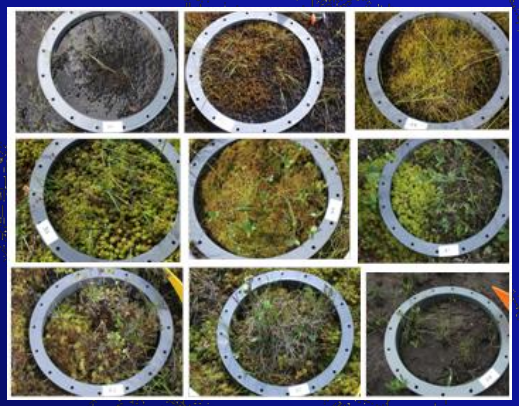
Risoe

First reporting period

WP leader: Albert Bleeker (ECN)

TNA 2 example



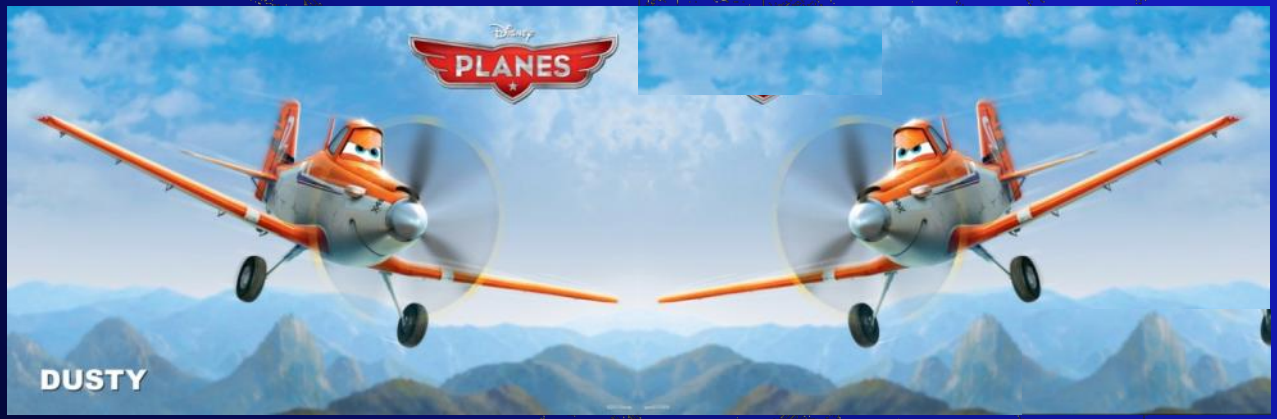


Sodankylä Finland

Link with
MAMM project

Multiple scale:
FAAM measurements
Tower measurements
Chamber measurements
Isotopes

InGOS
WP 9 – Access to aircraft for CH_4 flux and concentration measurements (TNA 3)



TNA 3 highlight

August, 18

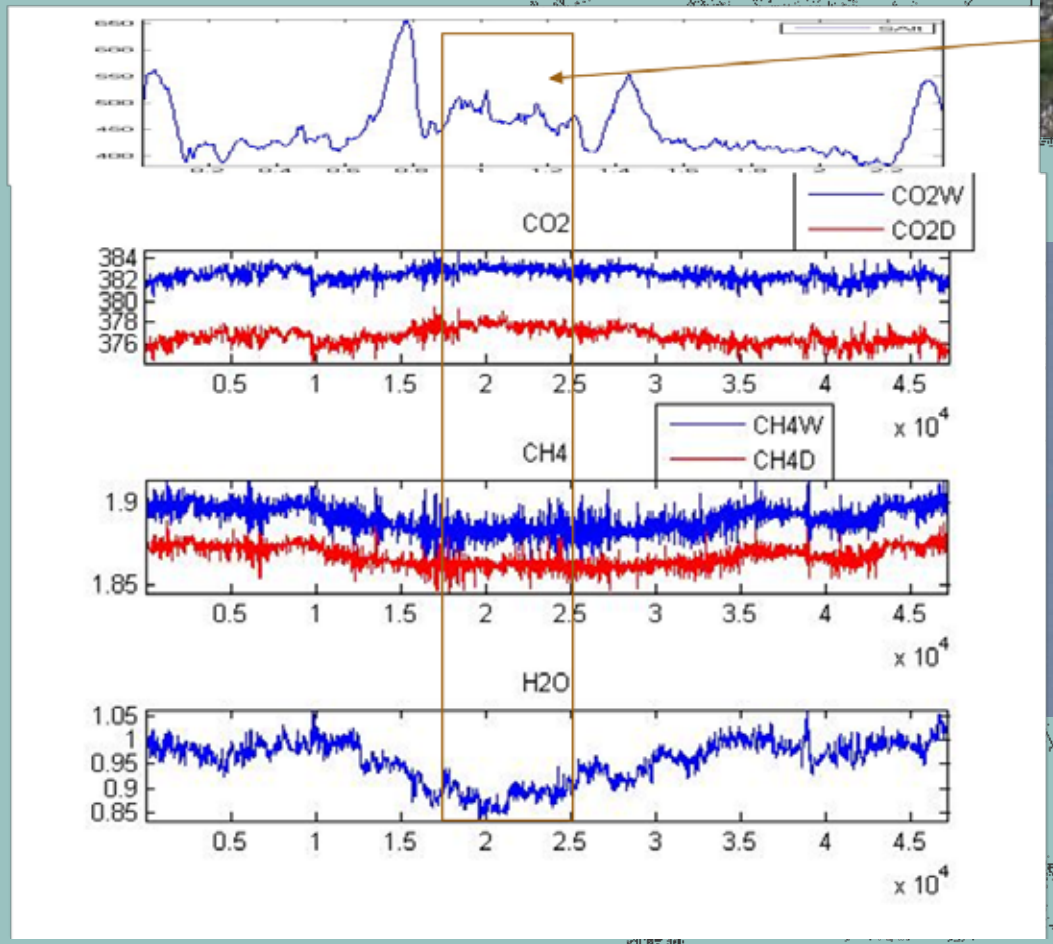
- height, carbon dioxide, methane and water variation along the flight track

height above sea level

CO_2

CH_4

H_2O



InGOS
Integrated non-CO_2 Greenhouse gas Observing System

LUND UNIVERSITY

InGOS
WP 10 – Access to calibration service and Cucumber reference laboratories (TNA 4)

WP leader: Armin Jordan (MPG) /
Andrew Manning (UEA)

Overview WP10: Standard Production / Calibration Service

Institution	University of BRISTOL	MPI-BGC Jena
Filling Site	 Mace Head	 MPI institute building Jena
Standard Production Facilities	 Rix compressor	 compressor and spiking facility
High precision gas analysers	 MEDUSA GC-MS	 GC-ECD/RGA/PDD IRMS
Calibration scales	AGAGE Halo-carbons	NOAA MPI-BGC Jena WMO CH_4, N_2O, SF_6, H_2 CH_4/CO_2 isotopes

Progress and outlook WP10

User projects

- scientific atmospheric monitoring (stations, ships, ICOS)
- laboratory calibration standards
- quality control activities (standards for round robins)

Request status

- MPG standards
  - 47 units delivered (Nov13)
  - requests of further 24 units
- Univ Bristol tank calibration
  - 13 units delivered (Nov13)

MPG TNA service already established in IMECC *project*
Univ Bristol TNA demand will increase when service becomes better known

Summary of service provision WP10

Organisation / infrastructure	unit of access	min.quanty of access	requests by 2013	comment
MPG /standards	calibrated standard	80 units	47 units	provision limited by capacity
Univ Bristol/tank calibration	calibrated standard	80 units	13 units	requests expected to increase
CEA-LSCE/ QC reference lab	QC reference analysis	30 units	0 units	TNA rules inapt for round robin
UEA CRAM / QC reference lab	QC reference analysis	30 units	0 units	TNA rules inapt for round robin
UHEI / QC reference lab	QC reference analysis	24 units	0 units	TNA rules inapt for round robin

InGOS
WP 11 – Access to Isotope service (TNA 5)

WP leader: Euan Nisbet (RHUL)

Overview WP 11

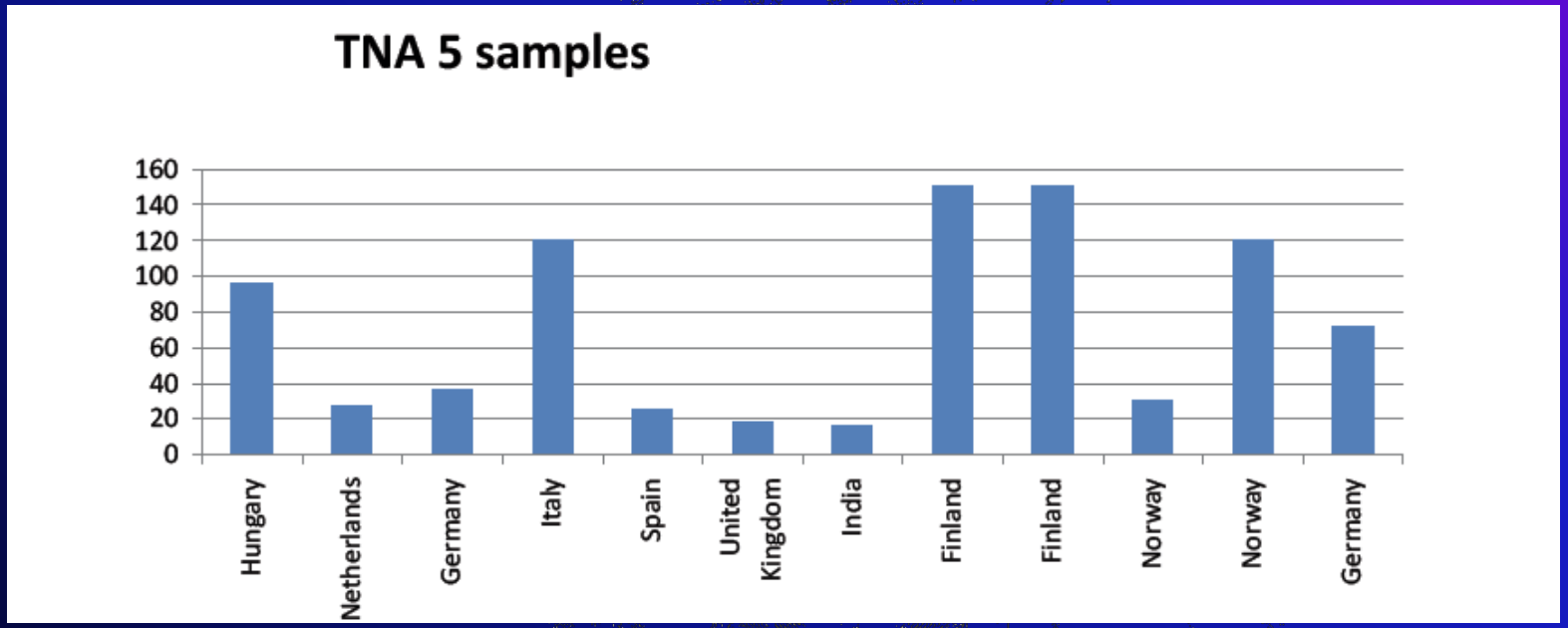
TNA in this work package is provision of methane isotope analysis. infrastructure includes state-of-the-art analytical facilities for analysing methane isotopes at Royal Holloway,University of London (specialising in δ13CCH4) and at Utrecht University (specialising in D/HCH4).

UU and RHUL provide D/HCH4 and δ13CCH4 measurements on flask and bag samples of air sent by many partners. This supply of access to highly specialist analytical measurements makes local and regional methane isotopic source studies possible for those groups.

Typical programs will include 50-100 samples, sent by up to 10 international groups per year. Samples are collected at measurement stations or during field campaigns by partner groups, and then shipped or posted to the analytical laboratories. Isotopic analyses will be carried out by the service labs, forming scientific partnership with collecting groups.

Progress and outlook WP11

TNA 5 - Isotopic studies.
A wide variety of projects - many groups



Examples given here: NILU (Norway) and FMI Finland with RHUL partnerships.

NILU - Zeppelin results help pin down bulk Arctic methane sources

FMI work at Sodankyla explains UK aircraft results as showing 100% wetland increment.

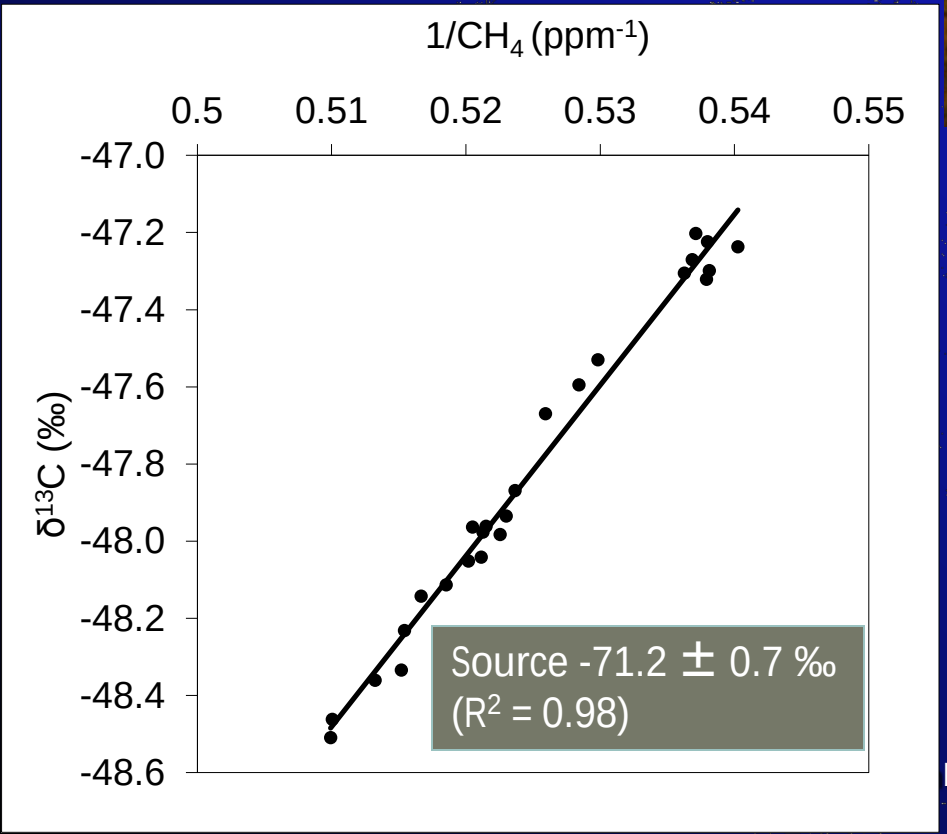
Scientific highlights WP11

Zeppelin TNA – isotopic measurements on samples collected by NILU

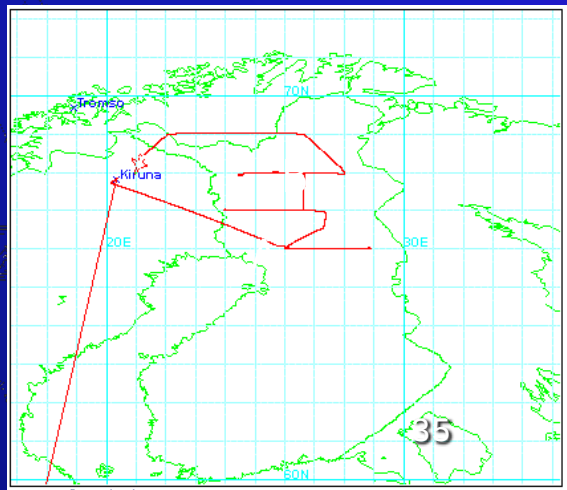
Methane's 'telerhino' nose that sniffs out the Arctic methane budget

Use of UK aircraft at Sodankyla to assess bulk emissions: 17 August 2013

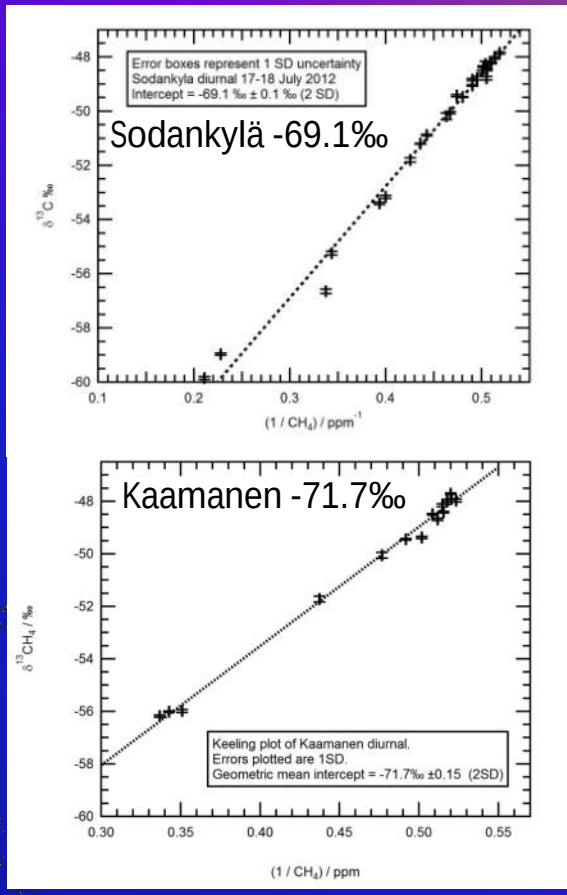
The summer methane increment in air over Arctic Scandinavia is -71 ‰. The Sodankyla TNA results show this signature is 100% from wetlands, not hydrate.



Concentration range : 1851 to 1961 ppb
Highest concentration, lowest $\delta^{13}C$ (1961 ppb - 48.5 ‰ measured at points A and B)



Sodankylä
Air sampled at FMI's Sodankyla bog

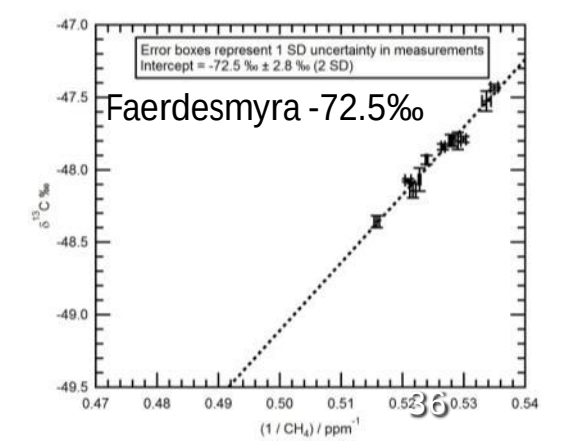


Finnish FMI TNA partnership

Keeling plots measured *in situ* at ground level in Scandinavian wetlands and bogs.

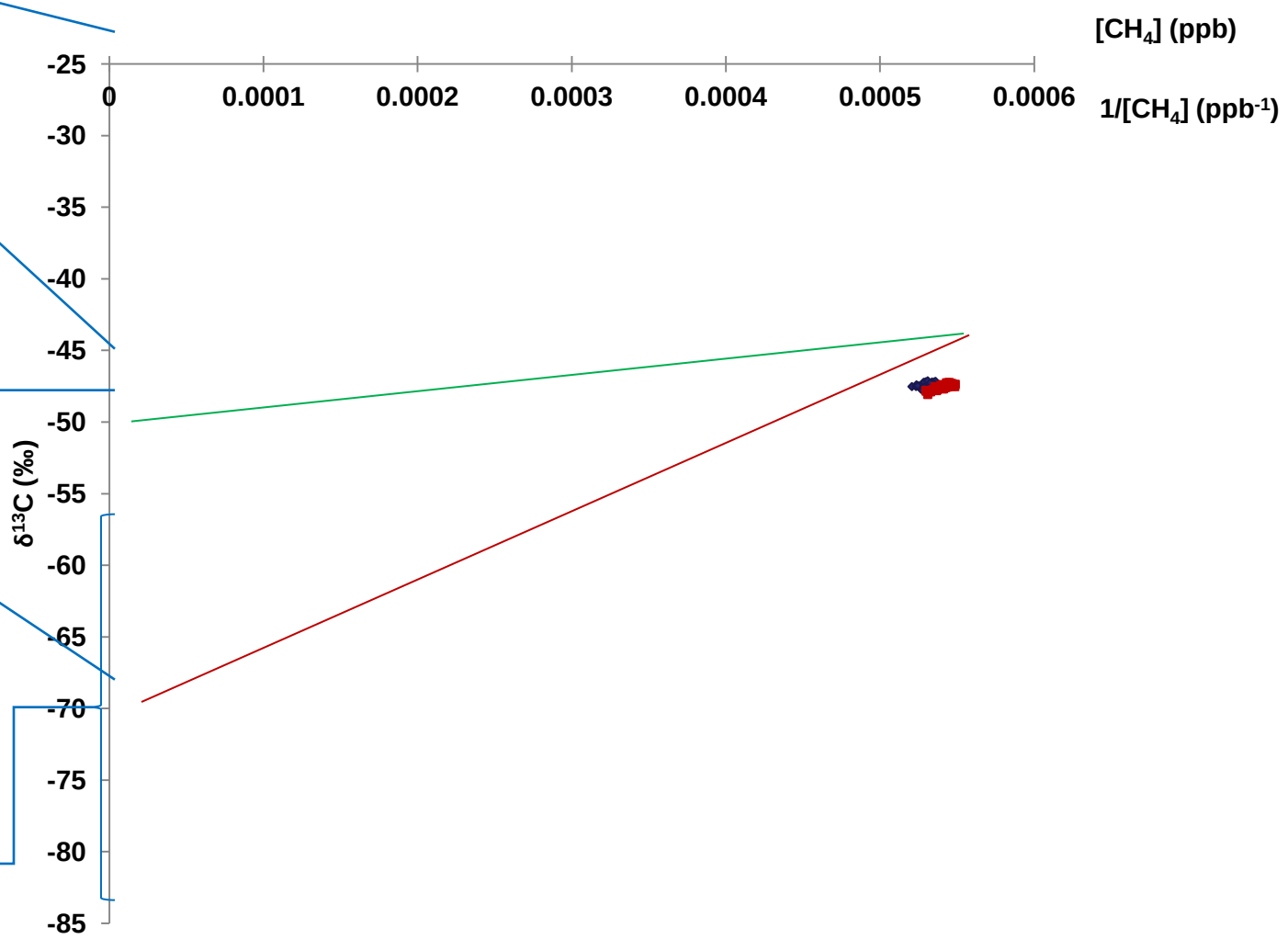
($d^{13}C_{CH4}$ vs $1/CH_4$)

Intercept gives methane source signature. $d^{13}C_{CH4}$ of wetland emissions over northern Finland is -72‰. Further south, around -69‰.



InGOS Midterm Review Meeting
2 December 2013

Scientific highlights WP11



Ingos/Equianos data

InGOS
WP 13 – Infrastructure development (JRA 1)

WP leader: Alex Vermeulen (ECN)

Overview WP 13 (JRA 1)
Infrastructure development

Objectives

- test and further develop new techniques
- prepare new types of instruments with focus on non-CO_2 greenhouse gases

Partners and tasks:

- ECN: Evaluation of the benefits of in situ FTIR for high precision concentration observations
- UoB: Combine in-situ FTIR-measurements with micrometeorological techniques
- CEA/UHEI: Evaluation of the benefits of new optical analyzers
- UEDIN: Evaluation of the use of DIAL techniques in the tall tower network
- UEA: Development of low cost high precision GC equipment

Deliverables:

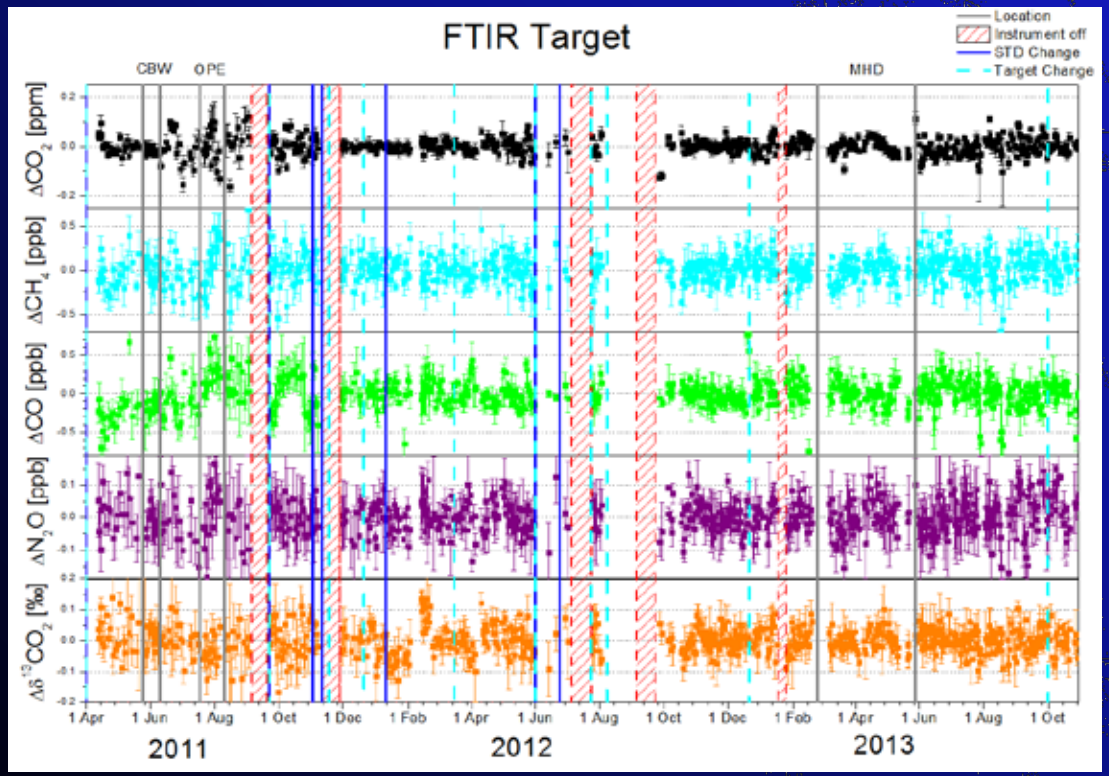
- 8 deliverables, all in reporting period 2 and 3

Progress and outlook WP 13

- Task 13.1: Evaluation of the benefits of in situ FTIR for high precision concentration observations
- Task 13.2: Combine in-situ FTIR-measurements with micrometeorological techniques
- Task 13.3: Evaluation of the benefits of new optical analyzers
- Task 13.4: Evaluation of the use of DIAL techniques in the tall tower network
- Task 13.5: Development of low cost high precision GC equipment

Scientific highlights WP 13

- Edinburgh campaign (joint NA5) FTIR REA vs EddyCorr systems, performed well, publication in progress
- ECN acquired in-situ FTIR, first with improved metal cell, will test cell surface and for operation at Cabauw



1σ

0.05ppm

0.26ppb

0.40ppb

0.09ppb

0.06 ‰

Scientific highlights WP 13

Low cost GC (Perkin Elmer Clarus 500)

1. Laboratory-based PE Clarus 500

Species	Precision (ppb)	WMO goal
CH_4	0.85	2 ppb
CO	0.64	2 ppb
N_2O	0.25	0.1 ppb
SF_6	0.06	0.02 ppb

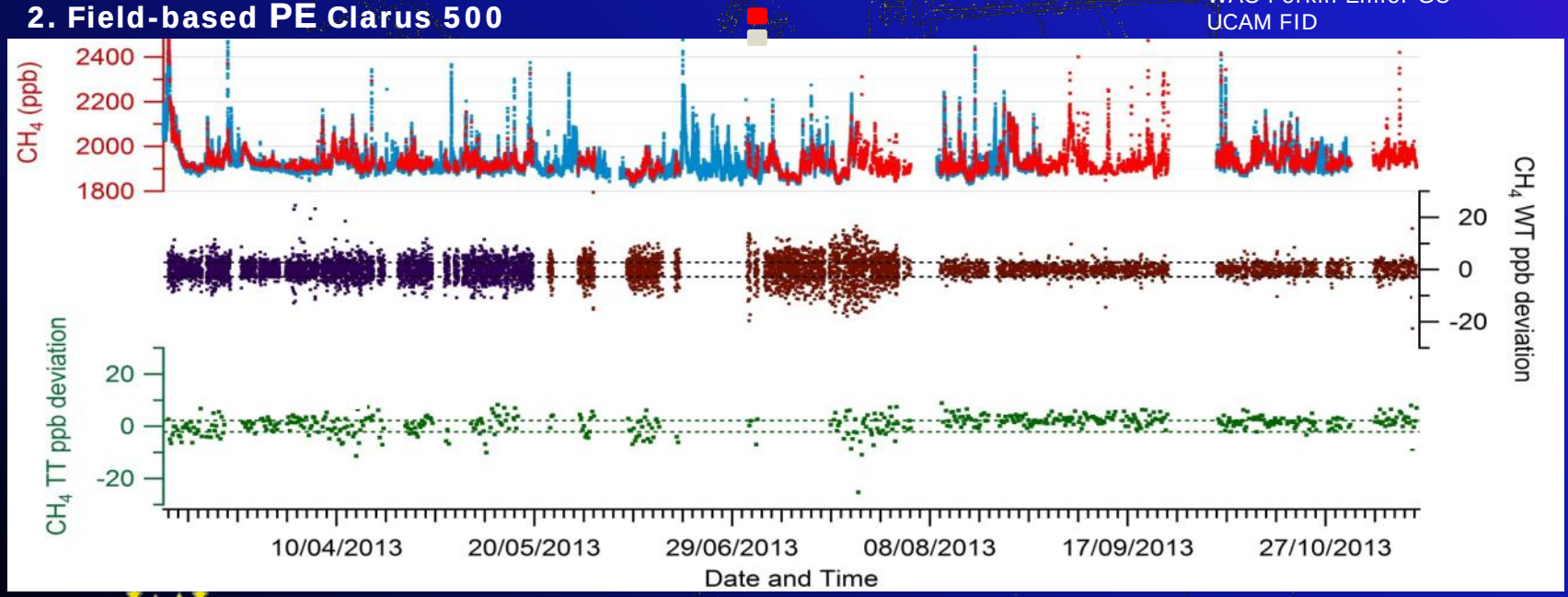
3. Costing

Cost of Perkin Elmer Clarus 500 = £25,000
Set-up costs = £800
Annual consumables = £1,300 (Nitrogen, Argon/Methane, air)

4. Comparisons

Good agreement with Uni Cambridge GC-FID in side-by-side measurements (see Fig. below)
Good agreement with UEA Picarro at nearby tall tower (not shown)

2. Field-based PE Clarus 500



InGOS
WP 14 – Integration of in–situ data with remote sensing (JRA 2)

WP leader: Thorsten Warneke (UoB)

Overview WP14

Overall objective:

To prepare TCCON-Europe CH4 retrievals for an ICOS integration and to demonstrate their importance for ICOS.

Specific objectives

- To develop a standardized data product for XCH4 and tropospheric XCH4.
- To harmonize the QA/QC among the sites within TCCON-Europe.
- To establish the link between remotely sensed (satellite and ground-based) and in situ observations of CH4.
- To validate modeled 3D CH4 fields (provided by JRA3 - WP 15).
- To evaluate the benefits of a potential incorporation of TCCON-Europe into ICOS, specifically for CH4.

Progress and outlook WP14

Milestones (all reports submitted):

MS 50 Correlation of CH4 and HF in the stratosphere determined for all sites and uncertainties quantified.

MS 51 GOSAT target mode observations performed for some sites.

MS 52 Strategy for QA/QC and action plan.

MS 53 Database for XCH4 and tropospheric XCH4 data established.

MS 54 Harmonized QA/QC for TCCON-Europe.

Deliverables (all reports submitted):

D14.1 Protocol on a standardized retrieval method for XCH4 and tropospheric XCH4.

D14.2 Report on the impact of different parameters on the GOSAT (submission in month 24, see amendment request).

Scientific highlights WP14

1) Improved and harmonized QA/QC within TCCON-Europe

- Gas cell measurements are used to monitor the instrumental line shape at all sites.
- A technique has been developed to characterize the gas cells (Hase et al., AMTD 2013) and regular circulation of cells for calibration has been implemented. Non-European TCCON groups have requested to become part of this activity.

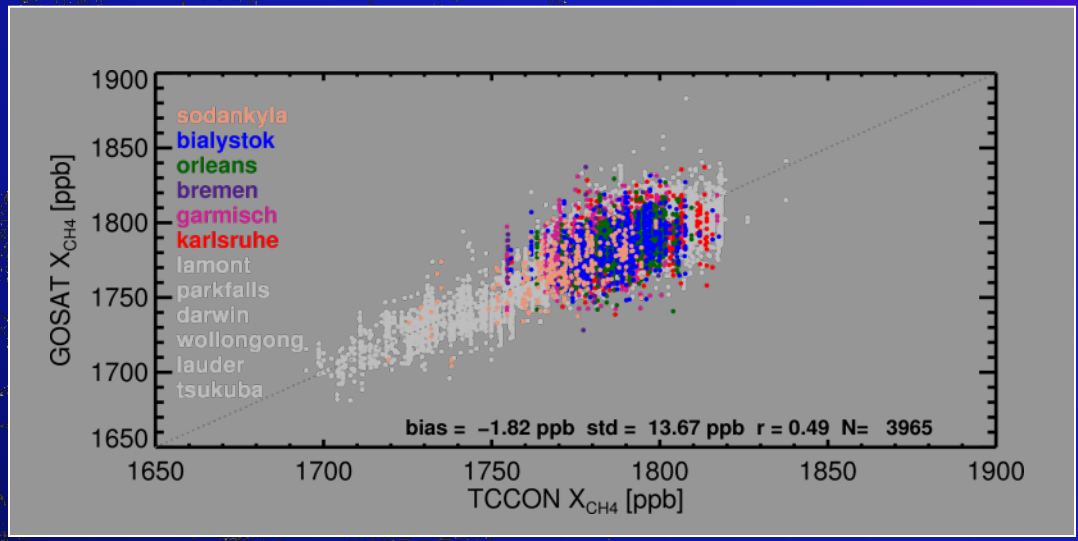
2) Tropospheric XCH4 - a novel dataproduct

- Profile retrievals as well as proxy techniques have been investigated in detail to obtain vertical information of atmospheric CH_4.
- A novel proxy technique based on N_2O has been shown to be advantageous compared to a previously suggested technique (Wang *et al*., submitted to AMTD)
- Profile retrieval has been set up for all sites, but is currently inferior to the novel proxy technique, most likely due to errors in the spectroscopic linelists.

Scientific highlights WP14

3) Validation and calibration of greenhouse gas retrievals from satellites

- The global TCCON dataset has been established as the primary validation resource for space-borne GHG measurements, which has been widely used.
- Without InGOS the operation of several European TCCON sites would not be possible over the time-period 2011-2015.
- Within InGOS multiple linear regression has been used to infer GOSAT-retrieval biases against geophysical parameters (e.g. SZA, H2O). With the bias corrections applied, a mean bias of 0.08 ppb between GOSAT and the 6 European TCCON sites is obtained.



InGOS
WP 15 – Integration of data with models (JRA 3)

WP leader: Peter Bergamaschi (JRC)

Overview WP15

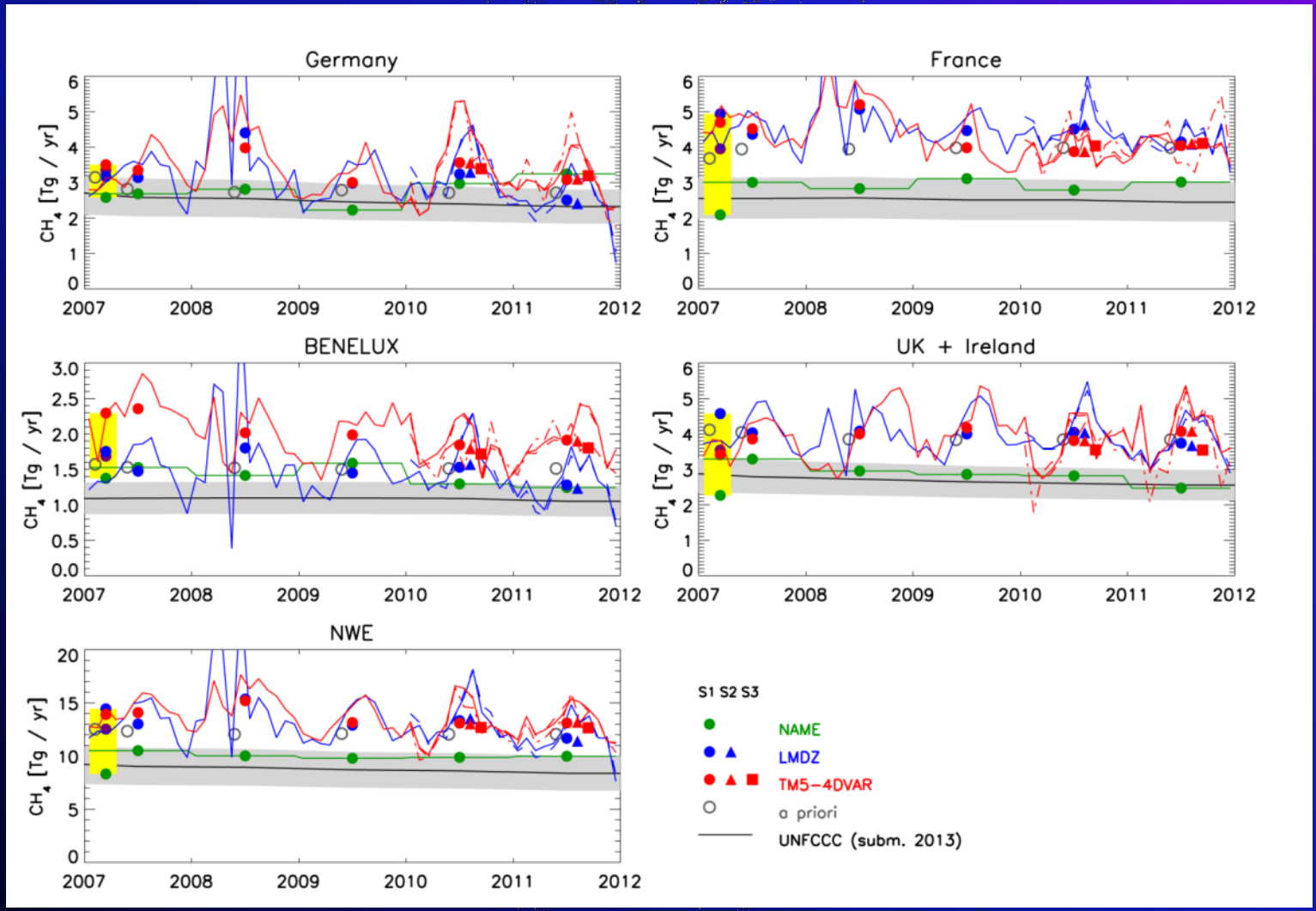
Task	title	task leader, partners
Task 15.1	Modeling of CH_4	JRC-IES (P. Bergamaschi) ECN, MPG, CEA, MET
Task 15.2	Modeling of N_2O	JRC-IES (P. Bergamaschi) ECN, MPG, CEA, MET
Task 15.3	Model validation	MPG (U. Karstens) ECN, CEA, UHEI, JRC-IES, MET
Task 15.4	Link to remote sensing	JRC-IES (P. Bergamaschi) MPG, CEA
Task 15.5	Modeling of halocarbon	EMPA (D. Brunner) NILU, MET
Task 15.6	Modeling of $\delta^{13}CH_4$	UU (S. Houweling) CEA
Task 15.7	Network analysis and optimization	CEA (P. Bousquet) ECN, MPG, EMPA, JRC-IES, NILU, MET

Progress and outlook WP15

- EDGAR CH_4 / N_2O emissions inventory including EPRTR data (used as a priori)
- new ^{222}Rn emission map
- ^{222}Rn + BLH model validation (all model results provided)
- First CH_4 inversions
- First halocarbon inversions

- Update CH_4 inversions
- N_2O inversions
- Network analysis and optimization
- $\delta^{13}CH_4$ simulations

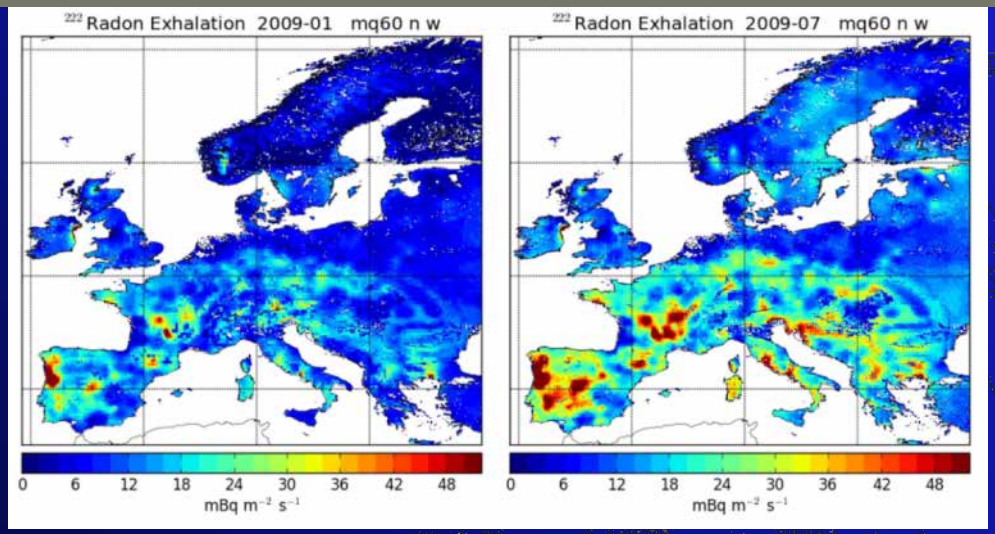
CH_4 emissions - North Western Europe

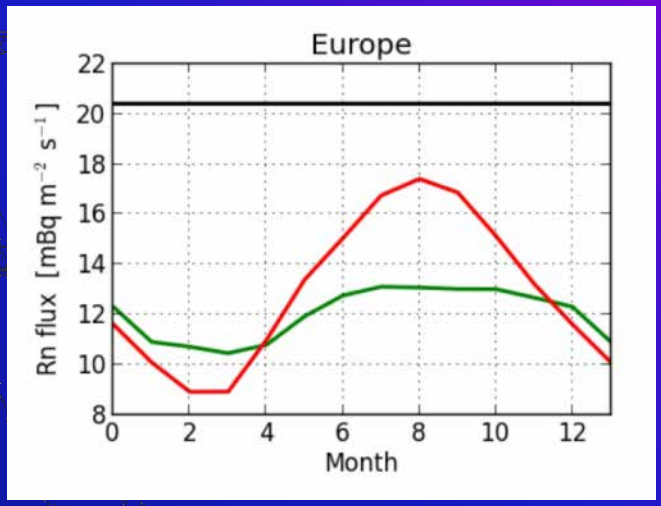


model validation

^{222}Rn tracer for atmospheric transport (especially vertical mixing)

new ^{222}Rn emission map
parameterized by soil type, porosity, moisture and water table





simulations with new ^{222}Rn emission map:
better agreement with observations (especially regarding seasonal variation)

comparison of model boundary layer height with observations
- LIDAR BLH measurements
- Integrated Global Radiosonde Archive (IGRA)

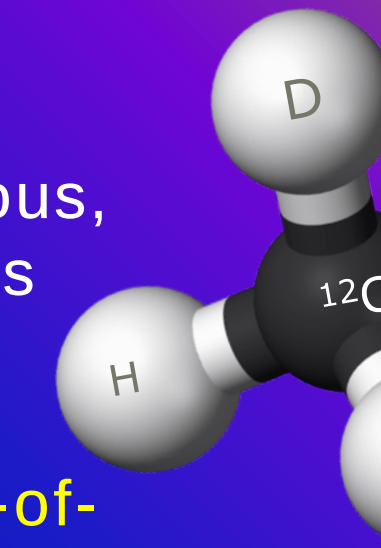
InGOS
WP 16 – Innovation in isotope measurement techniques (JRA 4)

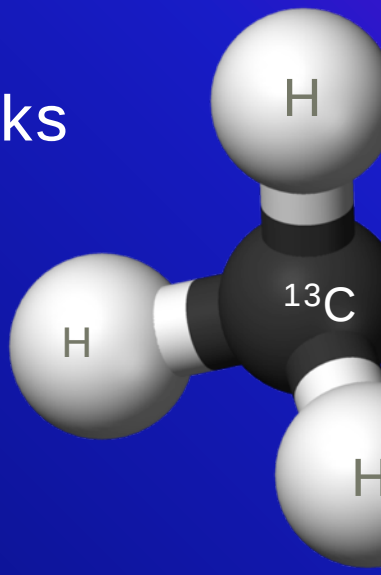
WP leader: Thomas Röckmann (UU)

WP16: JRA4: Innovation in isotope measurement techniques

<u>Overall objectives:</u>

- To assess the scientific potential of continuous, in-situ methane isotopologue measurements for constraining the methane budget on a regional scale
- To evaluate the suitability of different state-of-the-art measurement techniques for continuous unattended measurements of stable methane isotopologues and their potential incorporation into future monitoring networks

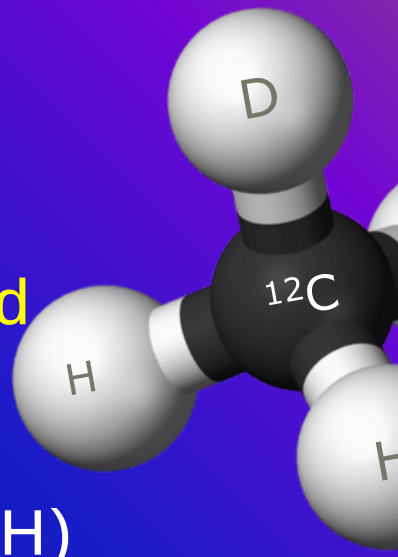


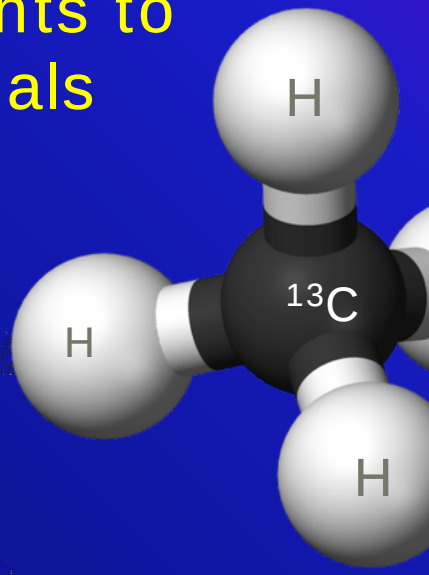


WP16: JRA4: Innovation in isotope measurement techniques

<u>Three tasks:</u>

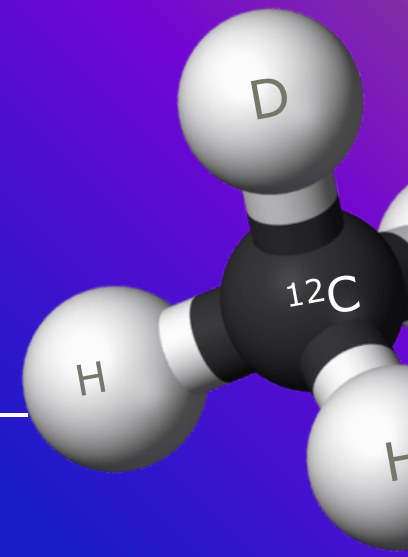
- To carry out *in-situ* (Laser spectroscopy and Isotope ratio mass spectrometry) measurements of $\delta^{13}C\text{-}CH_4$ and $\delta D\text{-}CH_4$
- To determine isotopic signatures (^{13}C and ^{2}H) of CH_4 at a representative rural and urban site
- To link the CH_4 stable isotope measurements to the primary international reference materials (VPDB and VSMOW)

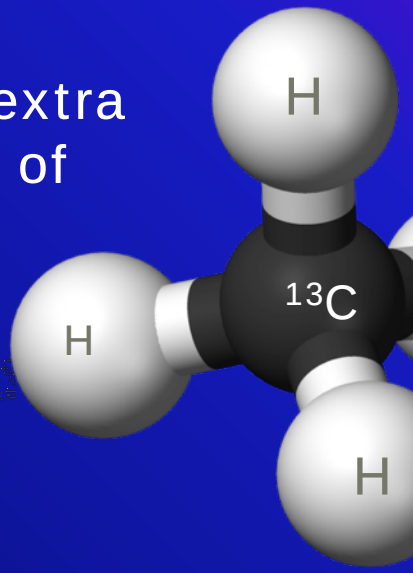




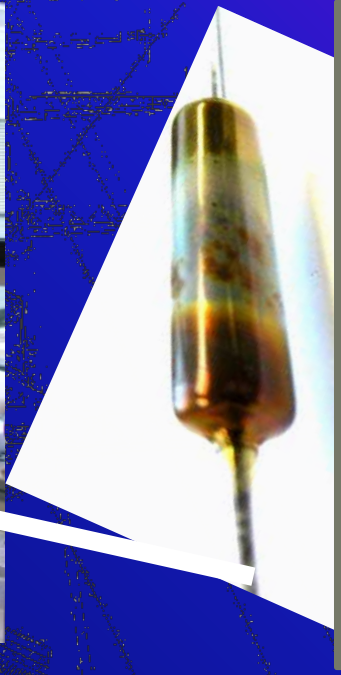
Progress and outlook WP16

- EMPA: Dual QC laser setup under development, pre-concentration achieved, laser performance good, system needs to be completed
- MPG: Production of CH_4 by H_2O + Al_4C_3 established – very promising results for dD calibration
- UU: Commercial system (LGR) not performing well (stability, precision, non-linearity, interferences?); Picarro system available for campaign?
- UU: IRMS system development delayed (excessive extra work with commercial system and long-time sickness of technical staff) – now running with high priority





Progress WP16



reactor

V = 15mL

~1g Al_4C_3

10 µL H_2O

~10 tests

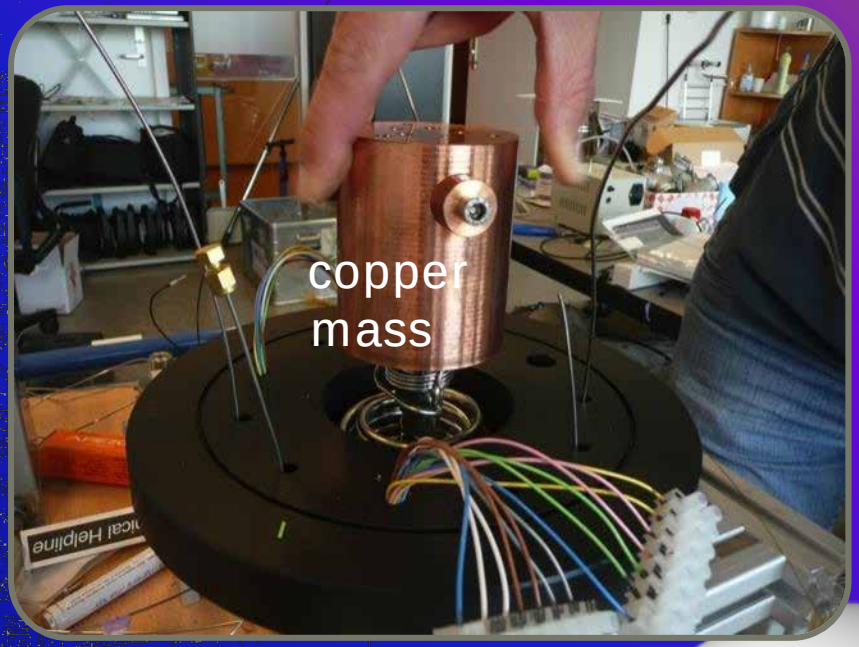
T = 310°C

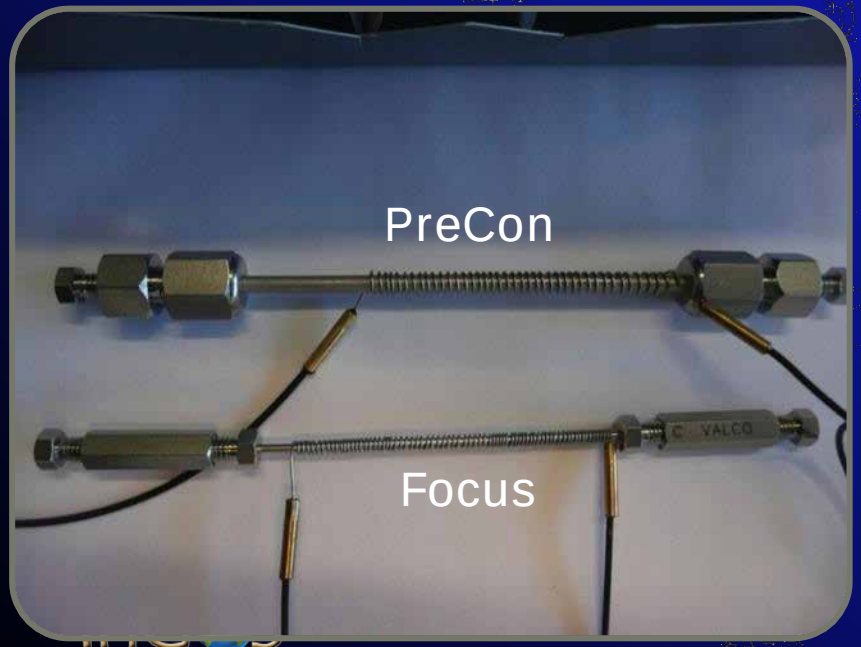
t = ~21h

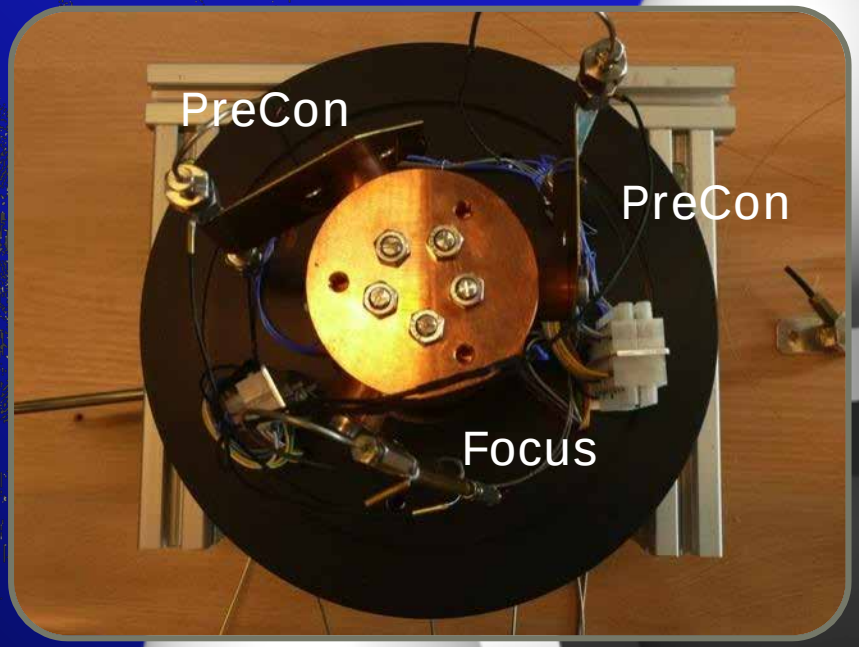
$Al_4C_3 + 6H_2O$ è $3CH_4 + 2Al_2O_3$

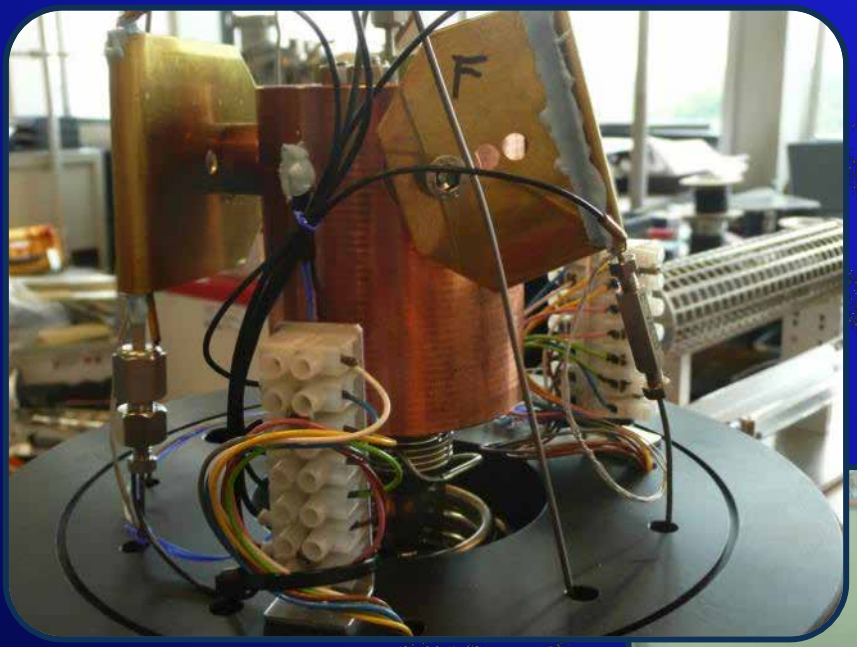
reactor	δ^2H-H_2O	δ^2H-CH_4	offset	reproducibility
react 1	-64.2	-60.7	+3.5	1.0
react 2	-242.0	-238.5	+3.5	0.7
react3	-442.8	-436.0	+6.8	1.1

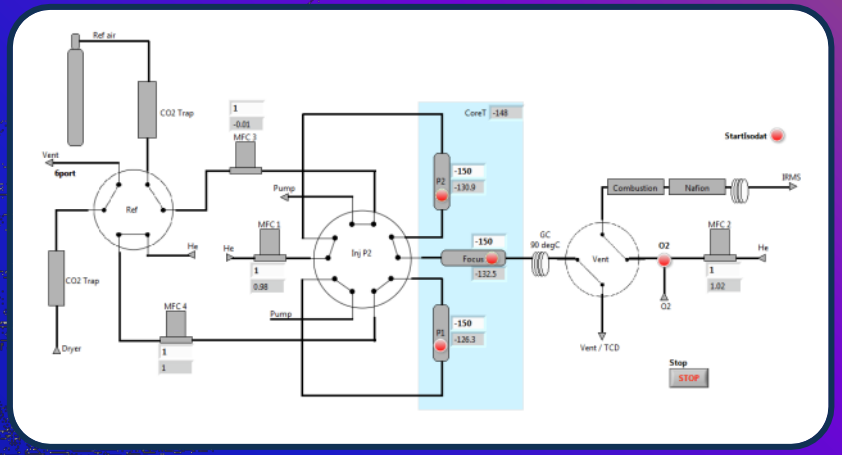

cold head


copper
mass


PreCon
Focus


PreCon
PreCon
Focus




Ref air
CO2 Trap
Vent
6port
Ref
Pump
MFC 3
MFC 1
He
Inj P2
CO2 Trap
Dryer
MFC 4
Pump
CoreT
-148
P2
-150
-130.9
Focus
-150
-132.5
P1
-150
-126.3
GC
90 degC
Vent
Vent / TCD
O2
Combustion
Nafion
IRMS
MFC 2
1.02
Startisodat
Stop
STOP

inGOS

InGOS
WP 17 – Innovation in halocarbon measurement techniques (JRA 5)

WP leader: Stefan Reimann (EMPA)

Overview WP17/JRA5
Innovation in halocarbon measurement techniques

- To detect and quantify “new” halogenated greenhouse gases (GHGs) in the atmosphere, with the aim of creating an early-warning tool for potential threats to the climate and the environment, and to comprehensively determine the occurrence and abundance of all such strong GHGs in the atmosphere, many of which are not presently monitored nor even quantified.

- To implement new Time-of-Flight – Mass Spectrometer (ToF-MS) to evaluate its potential as a new tool for long-term monitoring of halocarbons at ground stations and to use the resulting full scan mass spectra for use as a “virtual air archive”.

- To further develop the existing state-of-the art (GCMS) in Gas Chromatography–Mass Spectrometry technology, developing a more efficient and more precise and accurate European network for halogenated greenhouse gases.

Progress and outlook WP17/JRA5

- New halogenated substances have been detected and will be implemented in continuous measurements

  University of East Anglia (UK), University of Bristol (UK) and Empa (CH)

- Progress achieved for using time-of-light mass spectrometry (GC-TOF) in continuous atmospheric trace gas measurements; work on-going for proof of concept

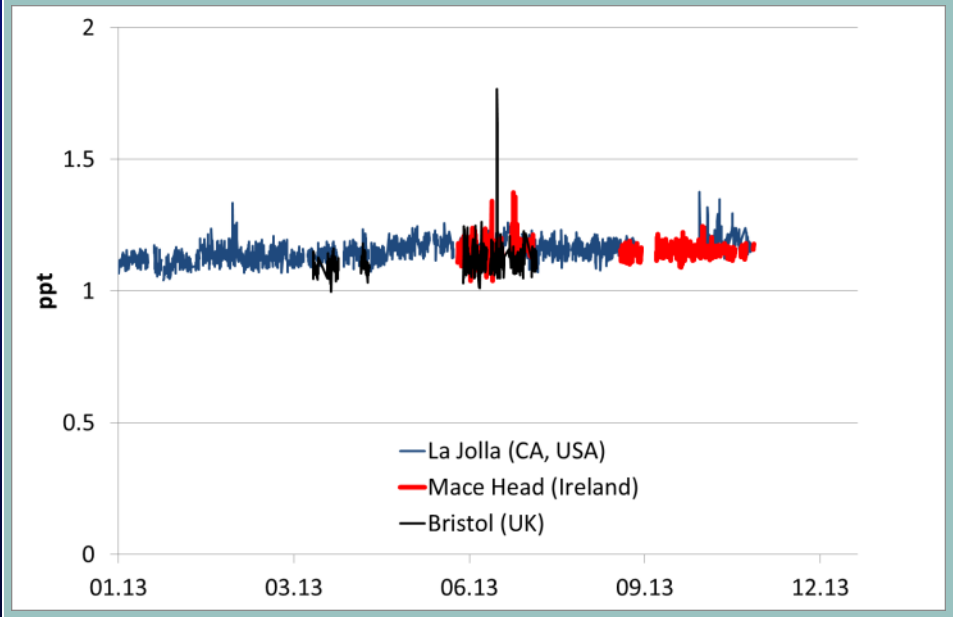
  University of Frankfurt (D), University of East Anglia (UK),

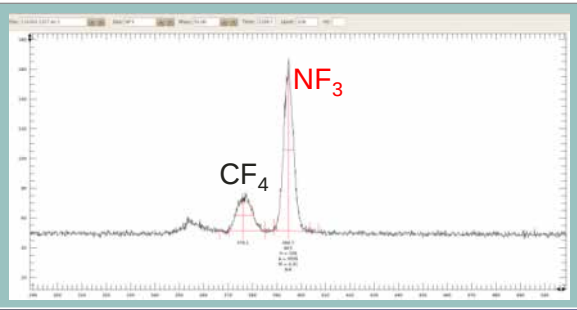
- Trapping systems on GCMSs can be adapted to analyse also the very volatile NF_3: also named “the missing greenhouse gas” and will be implemented in European measurements

  University of Bristol (UK), Empa (CH), NILU (NO)

Scientific highlights WP17/JRA5

New NF_3 Measurements in Europe

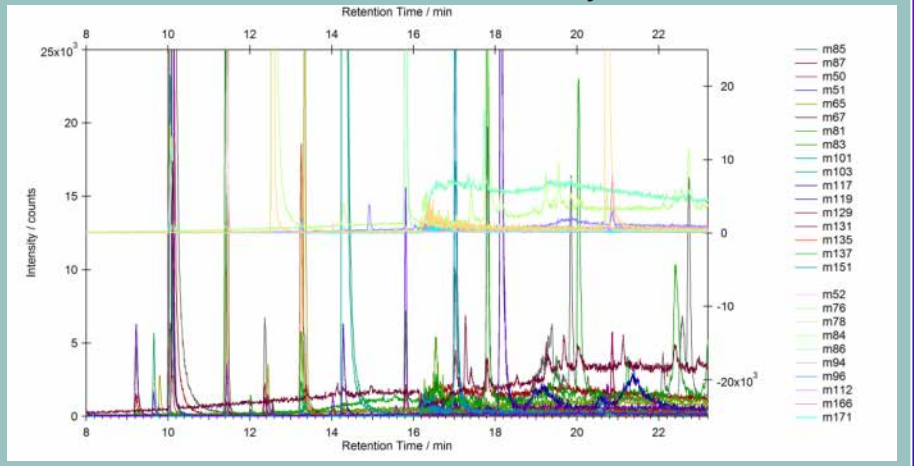


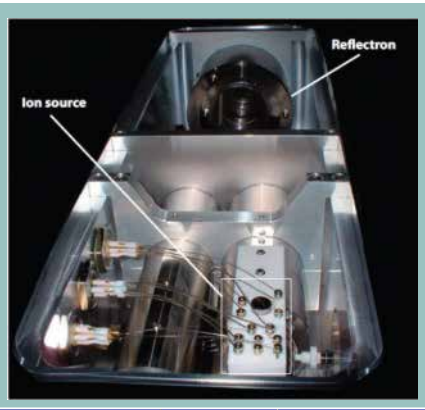


University of Bristol
Empa

New TOF Measurements: Proof-of concept

Halocarbons in air, measured by TOF-MS



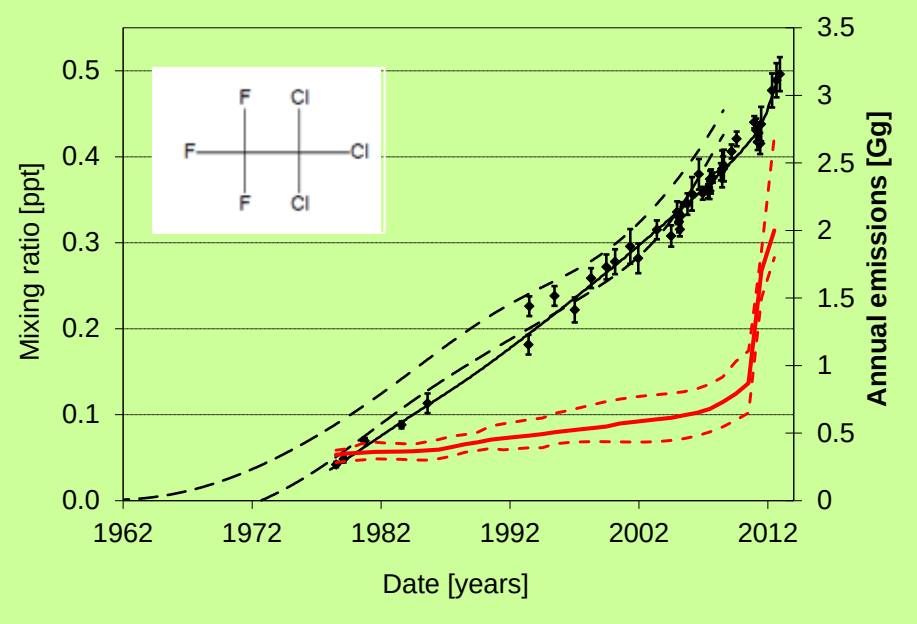


Universities of
- East Anglia
- Frankfurt

Scientific highlights WP17/JRA5

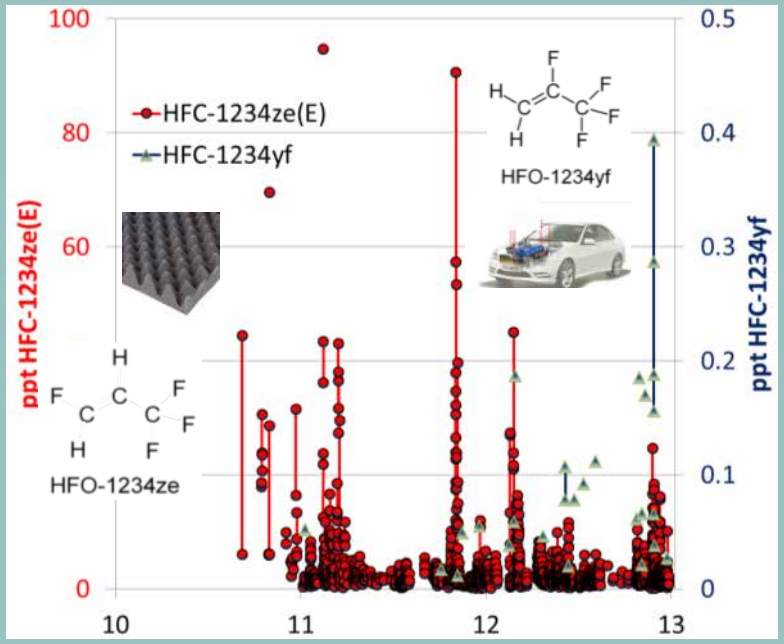
more than 30 additional GHGs identified

"new" CFC-113a:
increasing after 2010:
Sources unknown!



Archived air measurements
University of East Anglia

New hydrofluoro-olefines
for foam blowing and
mobile air-conditioners



Jungfraujoch measurements
Empa

InGOS
WP 18 – Versatile capabilities combined tall and flux towers (JRA 6)

WP leader: Ivan Mammarella (UHEL)

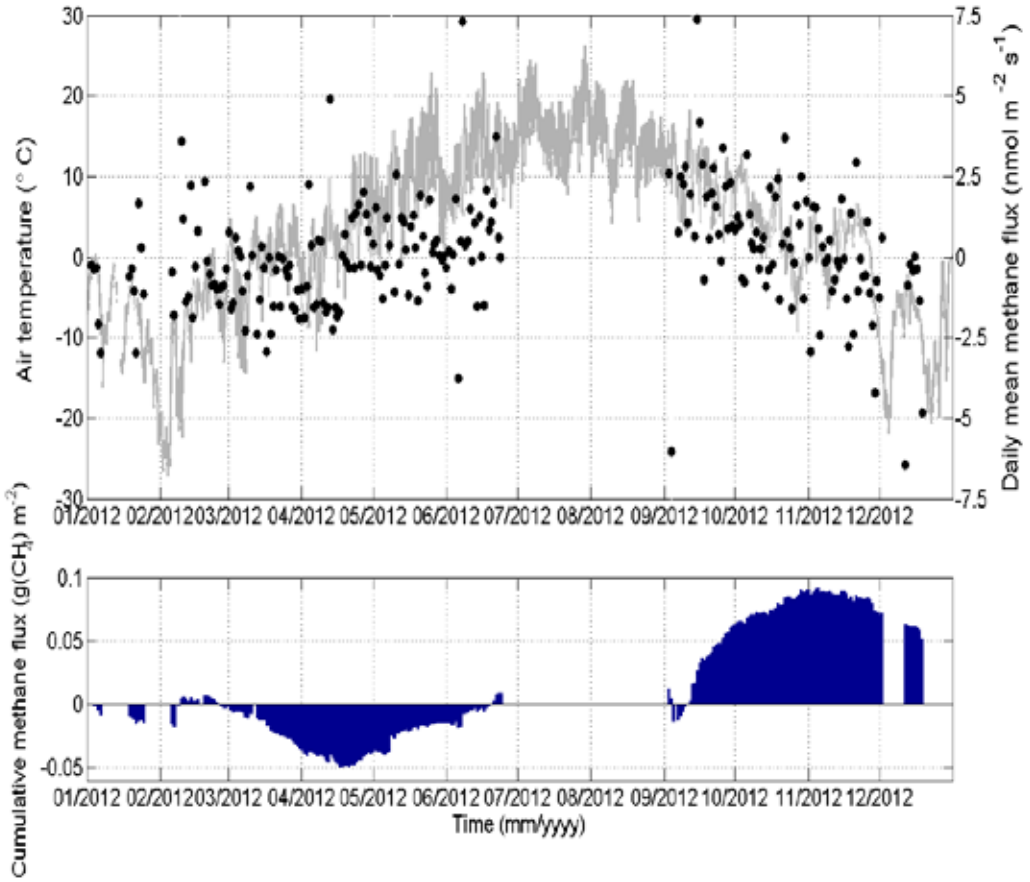
Overview WP18

- Provide new type of data for analysis of CH_4 and N_2O exchange dynamics and annual balances at ecosystem and regional scales.
- How to extend flux-profile method to CH_4 and N_2O (measurement protocol and methodology)?
- How to link tall tower flux measurements to fluxes from ecosystems surrounding the tall tower.
- What is the contribution of storage change to the flux measured from tall towers?
- Tall tower concentration and concentration gradient based flux footprint

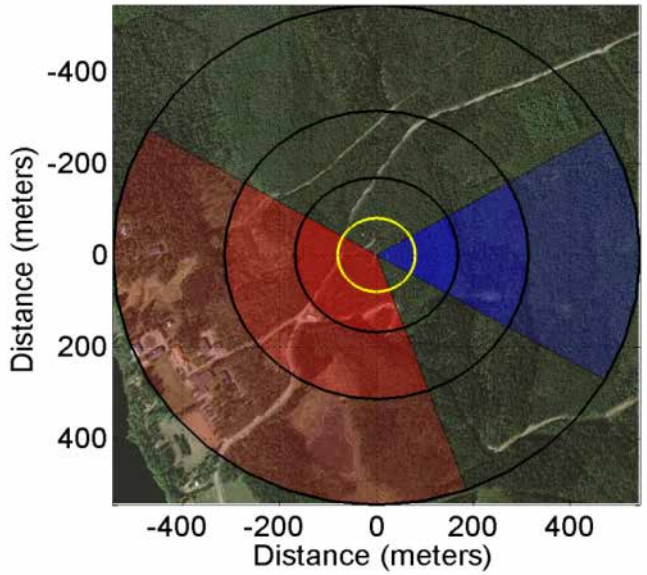
Progress and outlook WP18

- Tall tower flux measurement running at the sites involved in JRA6.
- New footprint model and footprint analysis for JRA6 tall tower sites.
- Methodology to estimate gradient based flux (modified Bowen ratio).
- Flux and concentration data partially submitted to the database.
- Linking short tower and tall tower fluxes >> in progress (Workshop in January 2014) >>> deliverables D18.8 and D18.9

CH4 sources/sinks at Hyytiälä Scots Pine forest (Finland)

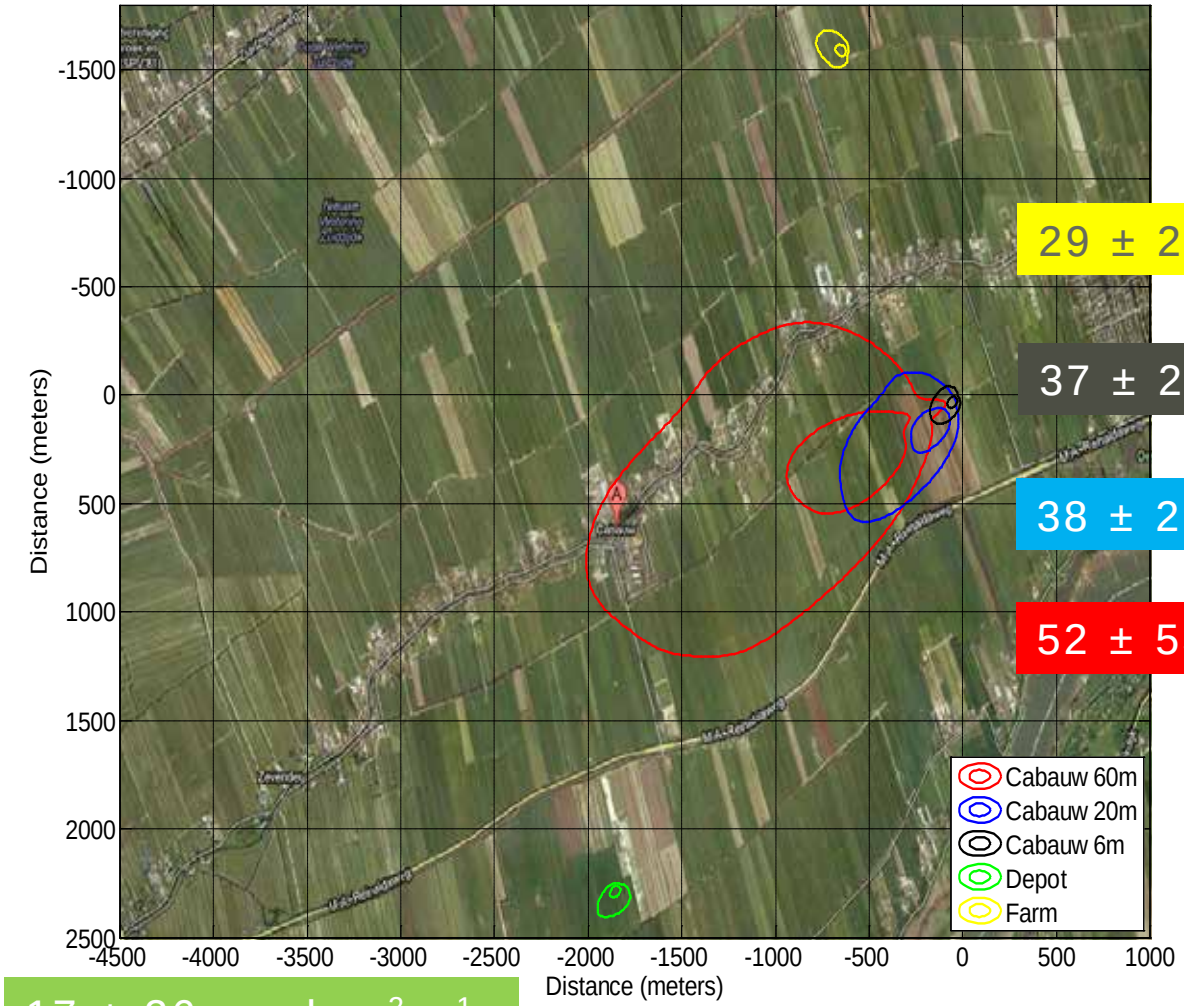


Obukhov-length L=-90 m, stability parameter -0.14222



Day-time footprint

CH4 sources spatial variability at Cabauw (The Netherlands)



29 ± 26 nmol m^{-2} s^{-1}

37 ± 24 nmol m^{-2} s^{-1}

38 ± 29 nmol m^{-2} s^{-1}

52 ± 53 nmol m^{-2} s^{-1}

17 ± 26 nmol m^{-2} s^{-1}

InGOS
WP 2 – Correction and harmonisation of historic concentration measurements (NA 2)

WP leader: Ingeborg Levin (UHEI)

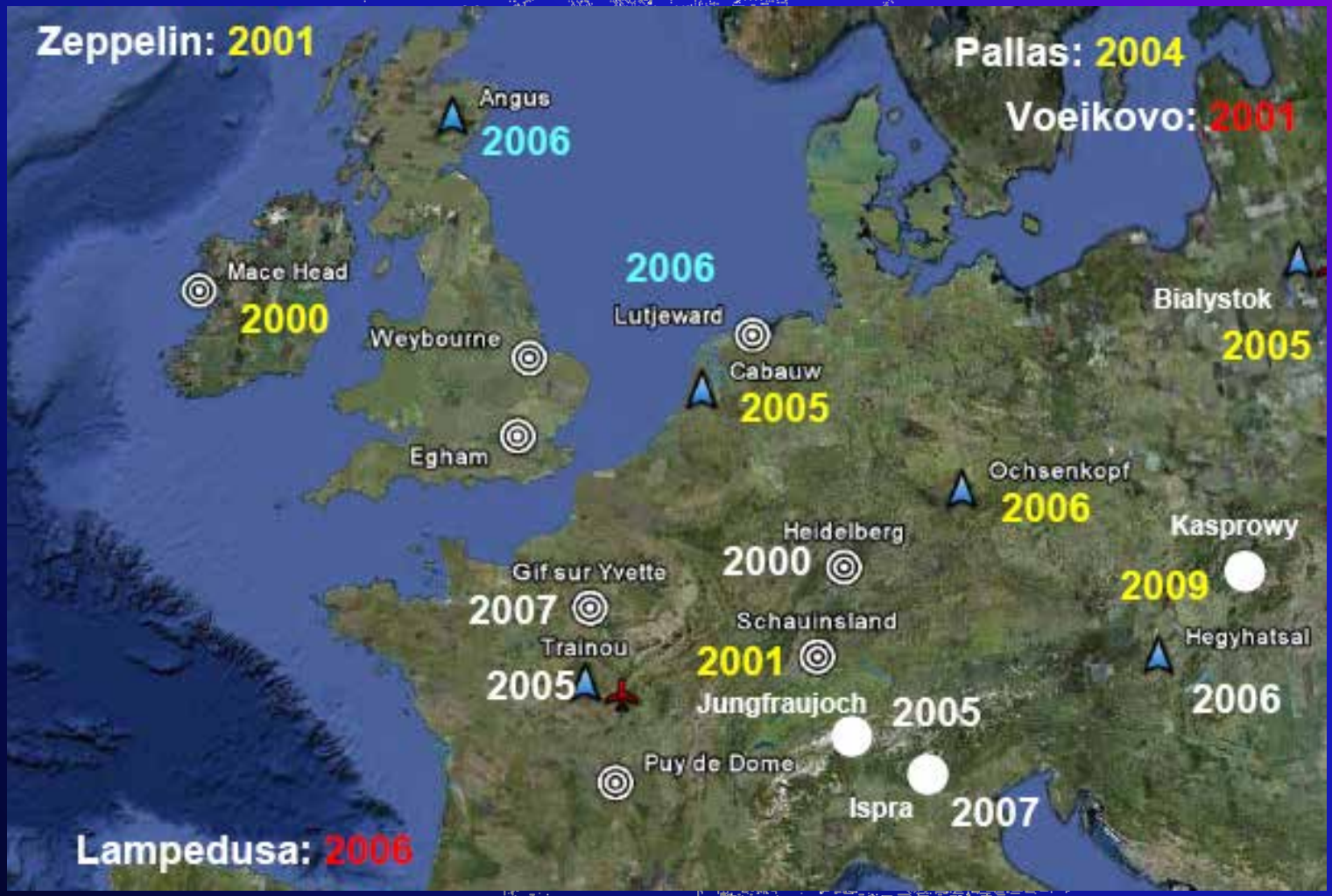
Overview of tasks in WP2 (NA2)

- Harmonise „historical (2001-2011)“ atmospheric CH_4, N_2O and H_2 data sets from up to 22 European stations (→ JRA3)
  - non-linearity corrections
  - error estimates (*was not part of DOW*)

- Set-up of a static filter ^{222}Radon monitor for intercomparison campaigns at 5 stations

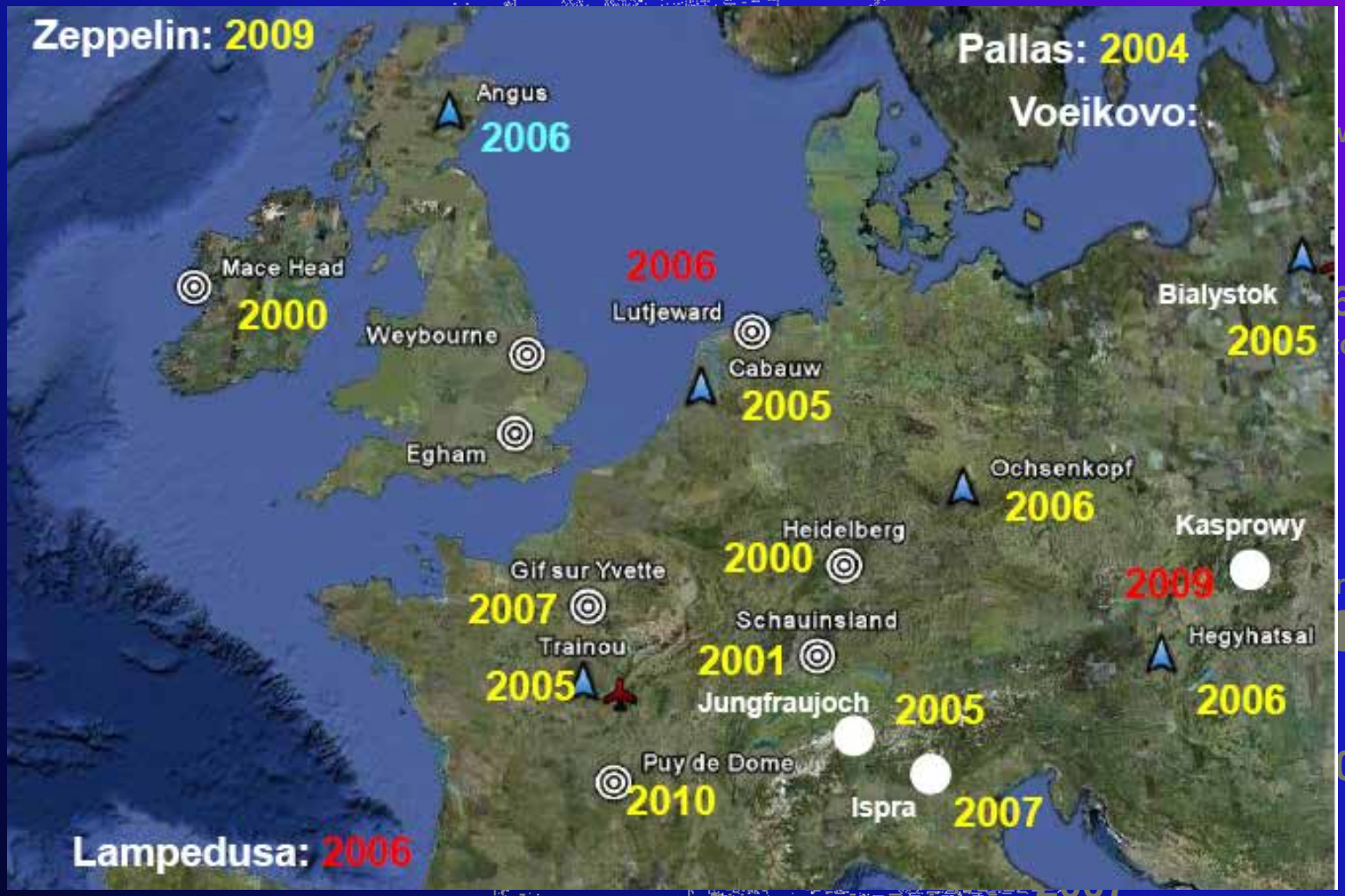
- Determine correction factors for harmonisation of European ^{222}Radon observations (→ JRA3)

Progress of work in WP2: CH_4



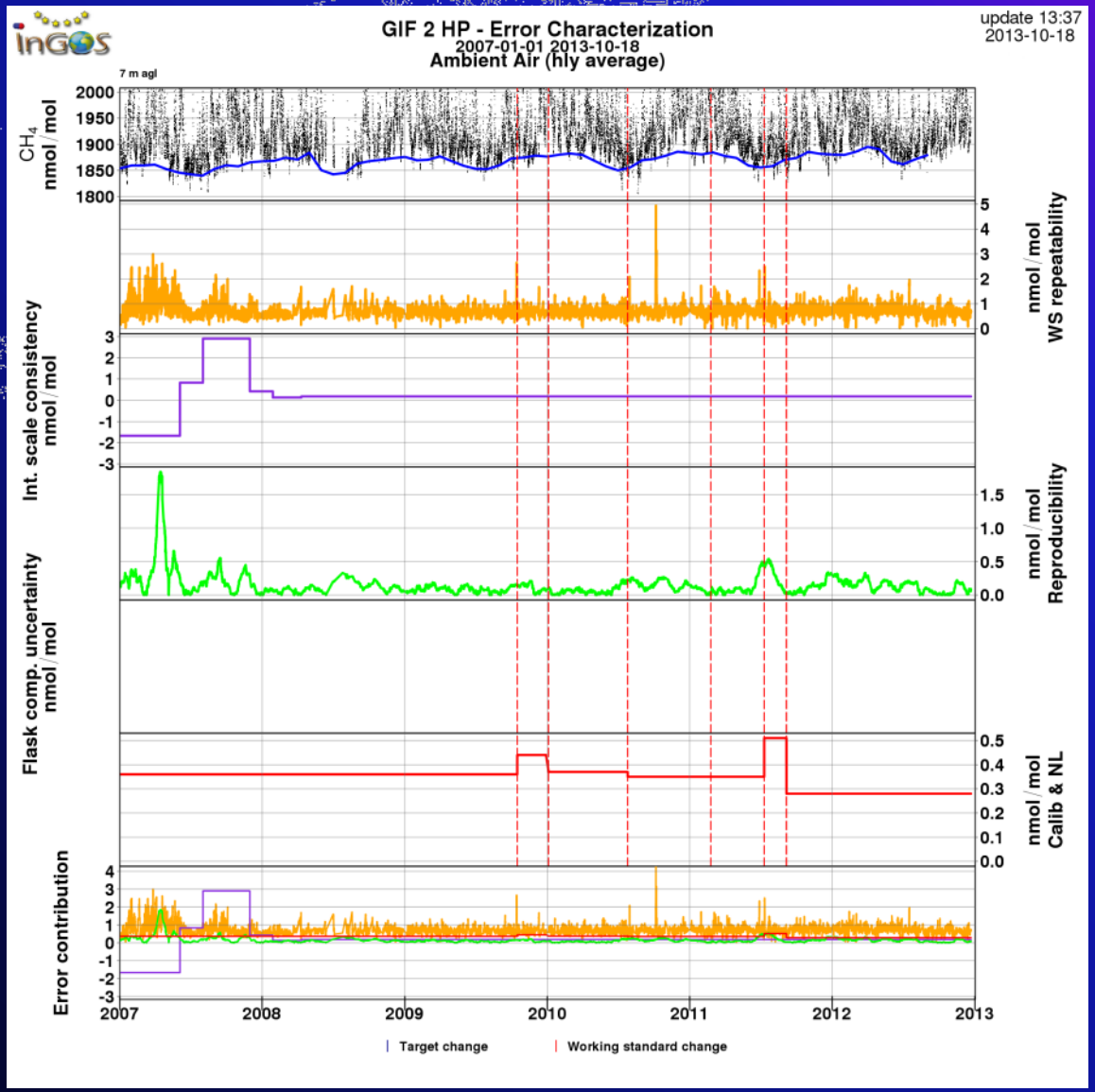
no data | no uncertainty estimates | no uncertainty in data base

Progress of work in WP2: N_2O

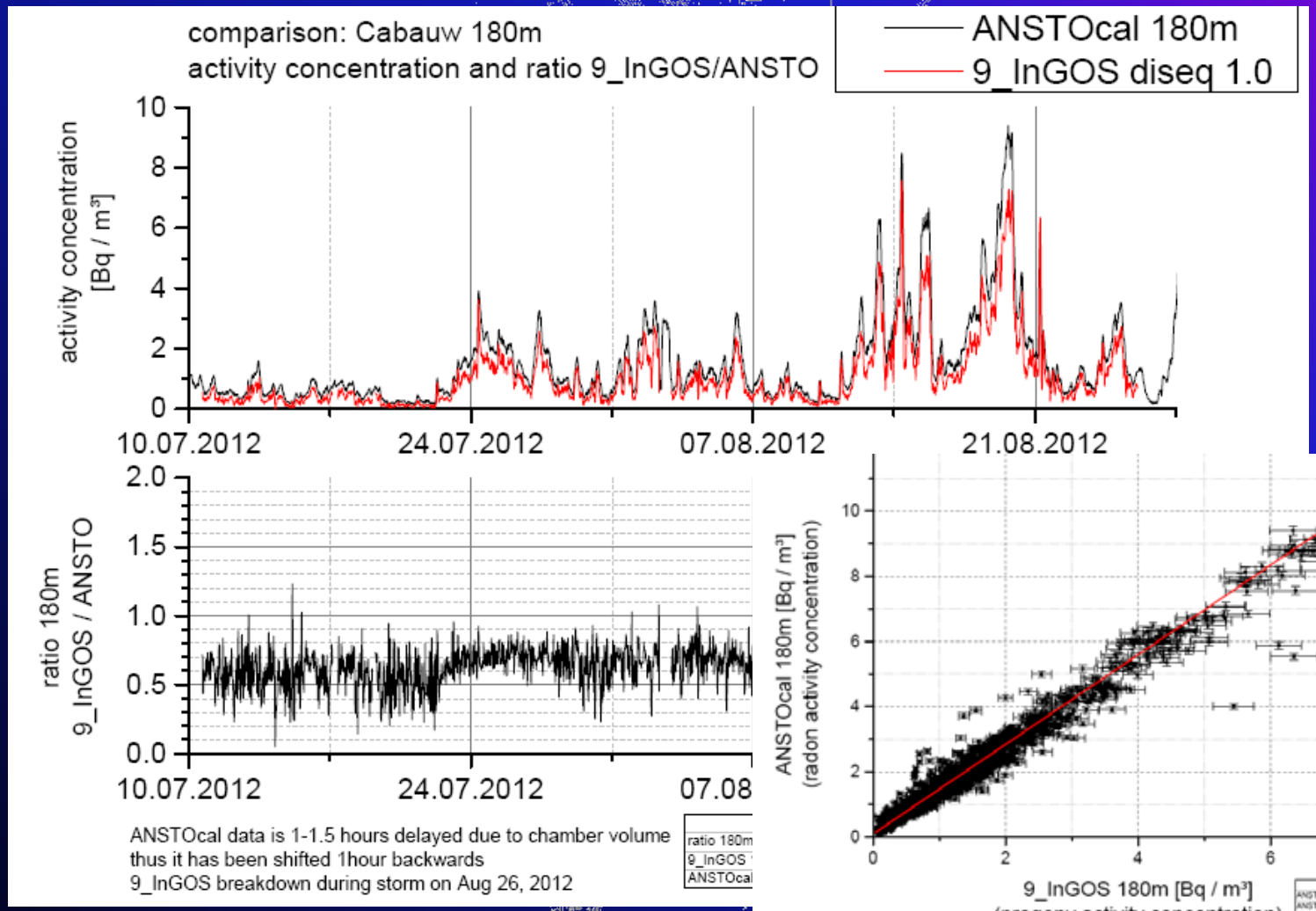


no data | no uncertainty estimates | no uncertainty in data base

Standard (database) output for quality assessment



^{222}Radon intercomparison: Cabauw



InGOS
WP 3 – Harmonisation and quality control of future measurements of CH_4, N_2O, and H_2 (NA 3)

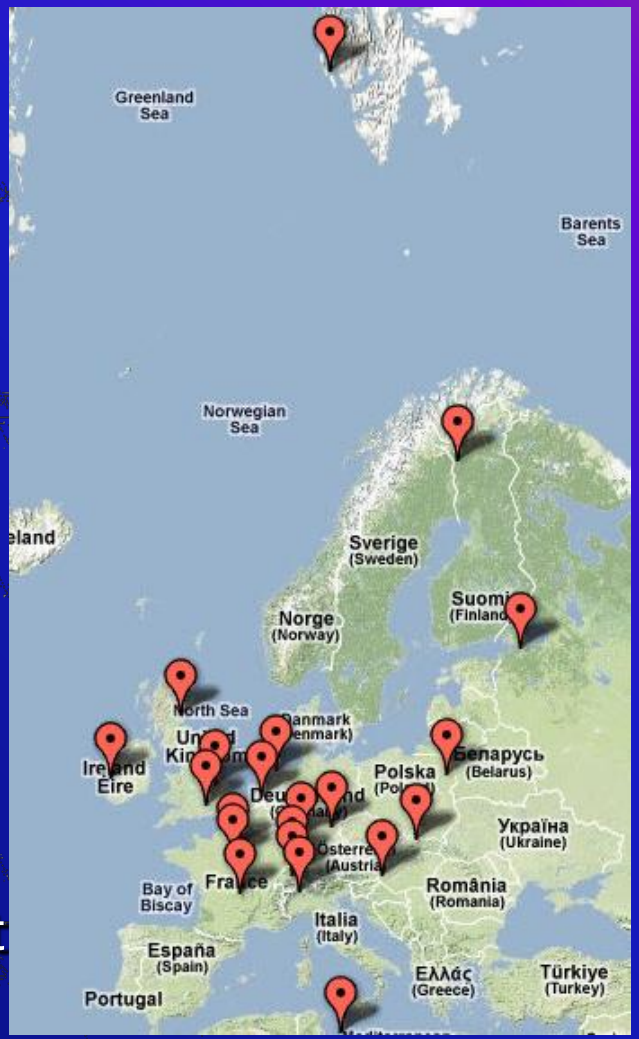
WP leader: Martina Schmidt (UHEI)

NA3: Harmonisation and quality control of future measurements of CH_4, N_2O and H_2

Martina Schmidt

- Network of 21 existing station to make harmonised data available for inverse modelling of European GHG Fluxes (JRA3)

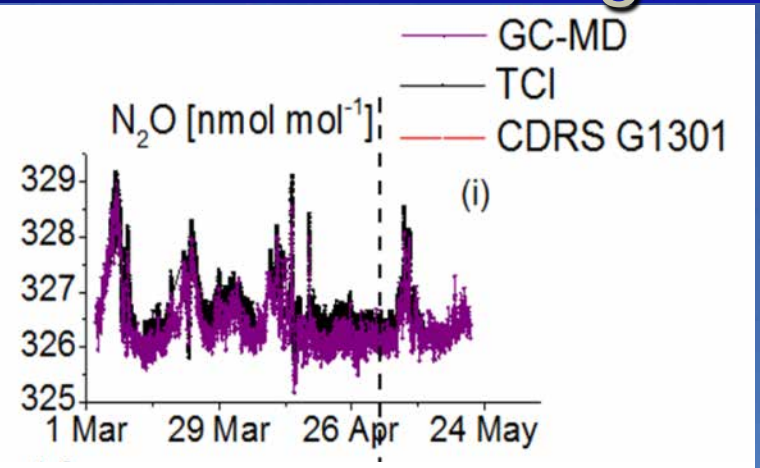
- Improvement of in situ measurement precision (M.Schmidt)
- Near-real time data transmission (J. Tarniewics)
- InterComParison exercises (A.Manning)
- Feasibility study of travelling QC instrumentation (S.Hammer, UHEI)
- Training and Capacity building (E.Nisbet

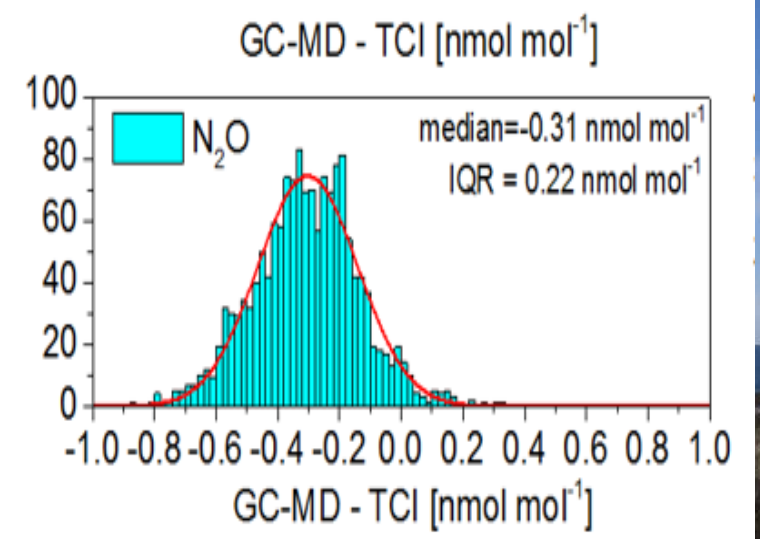


Progress and outlook WP NA3

- Several workshops together with NA2(and JR3)
- Good practice guideline, new software Gcwerks
- NRT (near real time) web page was operational in time, to include stations to NRT took longer as expected (ongoing process to be finished within the next months)
- At several stations new CRDS systems are running for CH_4 measurements and the full data treatment chain can be implemented in the database -> towards ICOS
- Intercomparison program for high pressure gase cylinders was continued, new stations were included, new tank filling is under progress, data treatment is delayed
- Travelling instrument visited Mace Head station

CH_4 and N_2O comparison of InGOS travelling instrument at Mace Head





- Good agreement for CH_4
- N_2O difference explained by scale difference between NOAA&AGAGE
- Paper by Vadag et al. to be submitted soon to AMTD

Vadag et al. 2013

NRT data
http://ingos-atm.lsce.ipsl.fr/resources/nrt

InGOS

Integrated non-CO_2 Greenhouse gas Observing System - Atmospheric Data Center

HOME ABOUT RESOURCES CONTACT

HOME / GIF - NRT DATA VIEW TOOL

GIF - NRT data view tool

This is an interactive time series line chart with optional annotations from the last measurements of N2O and CH4 from Gif-sur-Yvette station. Measurement are hourly resolved. Use the zoom links ("1d 5d 1m" and so on) to navigate into the time serie. Use your mouse to move into the time serie. below the time serie is the zoom range selection area (the area at the bottom of the chart). The outline in the zoom selector is a log scale version of the time series in the chart, scaled to fit the height of the zoom selector. You can also use the selector to move into the time serie. Note that the chart is rendered within the browser using Flash.

POPULAR CONTENT

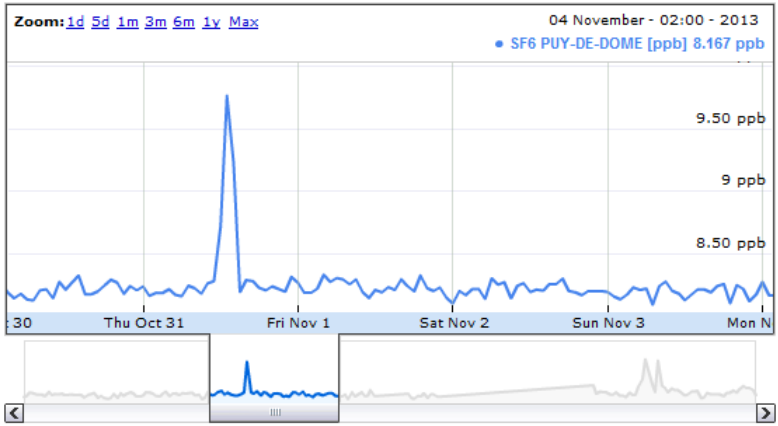
- KAS - NRT data view tool
- Data transfer
- PAL.154.ch4
- KAS.21.ch4
- TRN.3.ch4

CH4

Puy de Dôme

CH4

SF6



InGOS
WP 4 – Data assurance halocarbon measurements (NA 4)

WP leader: Simon O´Doherty (UNIVBRIS)

Overview WP4/NA4
Data Assurance Halocarbon Measurements

- To Establish a calibration matrix that relates the calibration scales of each laboratory to one another. This will enable the creation of an integrated, European halocarbon database

- To Establish a quality assurance system for European halocarbons measurements with a calibration standard centre and a system of routinely comparing secondary(tertiary) and working(quaternary) standards with the primary AGAGE calibration scales maintained by Scripps Institution of Oceanography (SIO).

- To integrate and harmonise trace gas measurements in Europe, with the result of having a sustainable and reliable observation network for highly time-resolved data across Europe.

Progress and outlook WP4/NA4

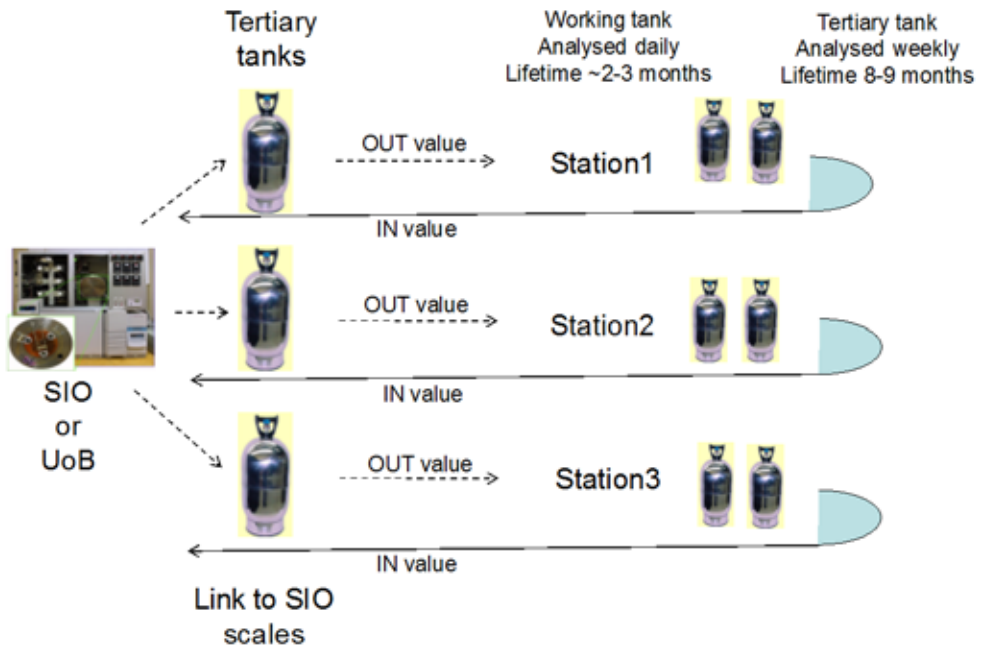
- Calibration standards with a common calibration scale are in use at a number of halocarbon measurement facilities

  University of Bristol (UK), Mace Head (Ireland), Empa (Switzerland), NILU (Norway), University of Urbino (Italy), University of Frankfurt (Germany), University of Krakow (Poland), NUIG (Ireland), Zugspitze (Germany).

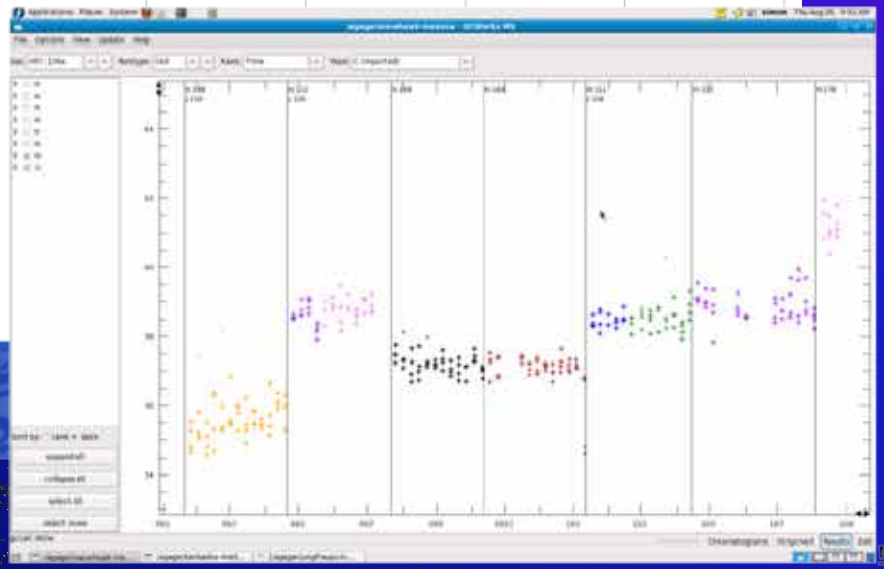
- A round-robin set of calibration standards is currently in progress

Scientific highlights WP4/NA4

Halocarbon Calibration

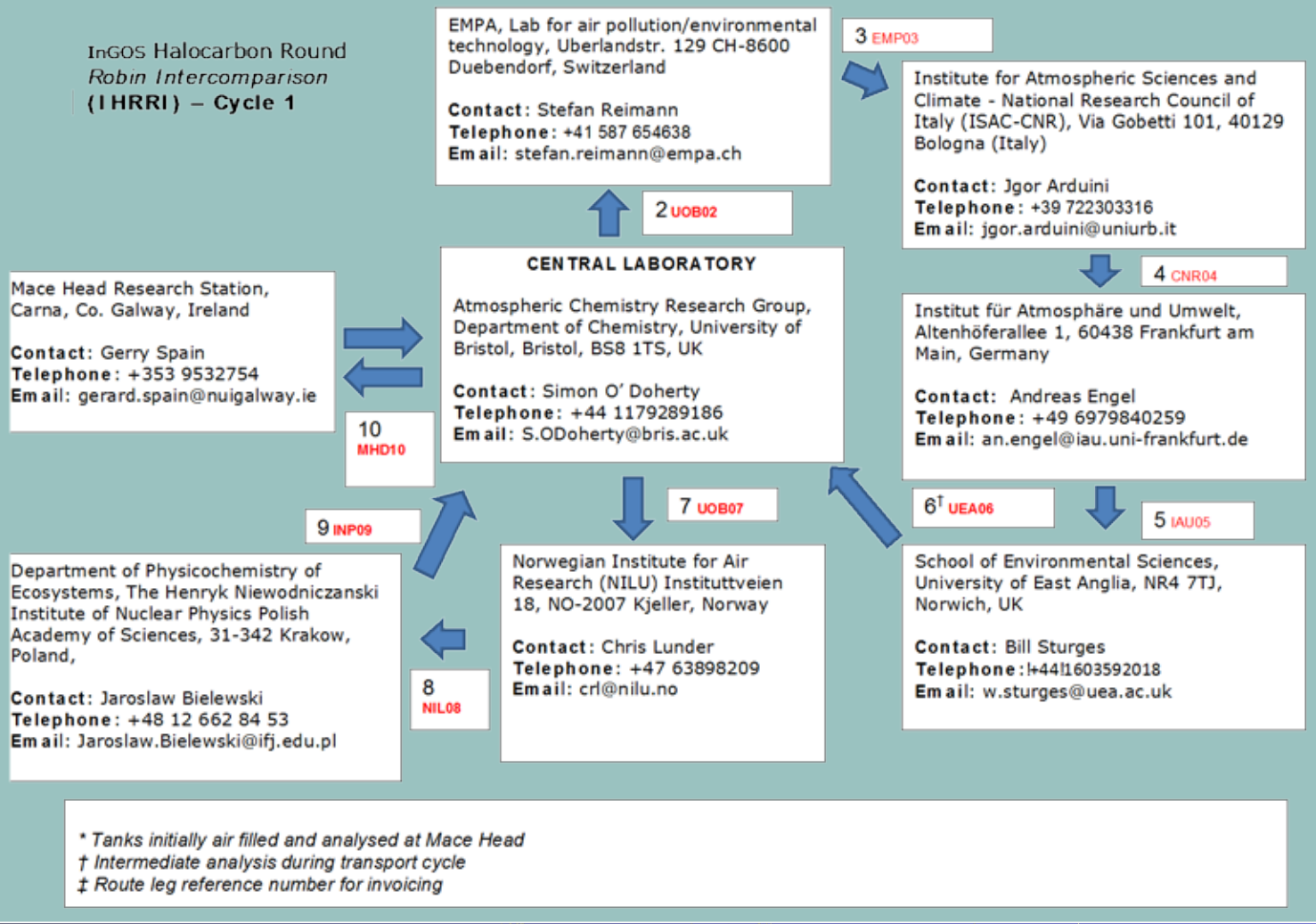


SF_6	SIO-05	CFC-11	SIO-05
CF_4	SIO-05	CFC-12	SIO-05
C_2F_6	SIO-07	CFC-13	SIO-UB-p
C_3F_8	SIO-07	CFC-113	SIO-05
c-C_4F_8	SIO-10-p	CFC-114	SIO-05
HFC-23	SIO-07	CFC-115	SIO-05
HFC-32	SIO-07	H-1211	SIO-05
HFC-134a	SIO-05	H-1301	SIO-05
HFC-152a	SIO-05	H-2402	NOAA-1992-p
HFC-125	UB-98	CH_3Cl	SIO-05
HFC-143a	SIO-07	CH_3Br	SIO-05
HFC-227ea	Empa-2005	CH_3I	NOAA-Dec09
HFC-236fa	Empa-2009-p	CH_2Cl_2	UB-98
HFC-43-10mee	SIO-10-p	CH_2Br_2	NOAA-Jul10-p
HFC-365mfc	Empa-2003	$CHCl_3$	SIO-98
HFC-245fa	Empa-2005	$CHBr_3$	NOAA-Dec09-p
HCFC-22	SIO-05	CCl_4	SIO-05
HCFC-141b	SIO-05	CH_3CCl_3	SIO-05
HCFC-142b	SIO-05	$CHCl=CCl_2$	UB-98
HCFC-124	NOAA-2003B	$CCl_2=CCl_2$	NOAA-2003B
HCFC-123			



University of BRISTOL

Scientific highlights WP4/NA4



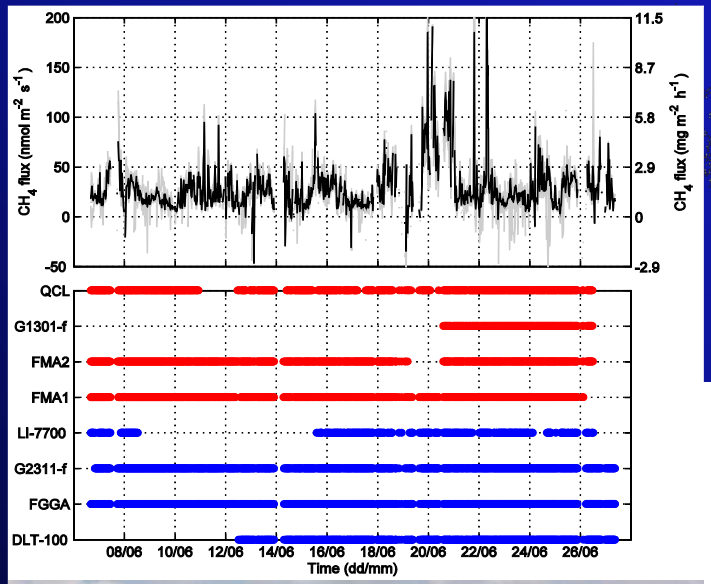
InGOS
WP 5 – Quality assurance and quality control of non–CO_2 gas flux measurements (NA 5)

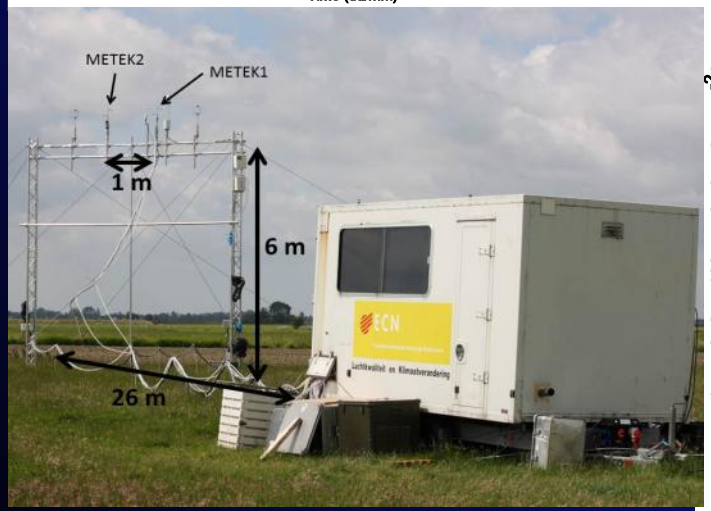
WP leader: Eiko Nemitz (NERC)

Overview WP5:
NA5: QA/QC of non-CO_2 flux measurements

- QA/QC micrometeorological flux measurements
  - Expert workshops à #1: Hyytiala 09/2012; #2: 2015
  - Common files à from EC inter-comparisons below
  - QA/QC for ICOS database à joint workshop 2014
- QA/QC chamber measurements
  - Recommendations à in progress
  - Calibration at Hyytiala facility à 2014
- EC inter-comparisons
  - CH_4 à Cabauw, June 2012
  - N_2O à Easter Bush, June 2013
- Summer school à Posznan May 2013

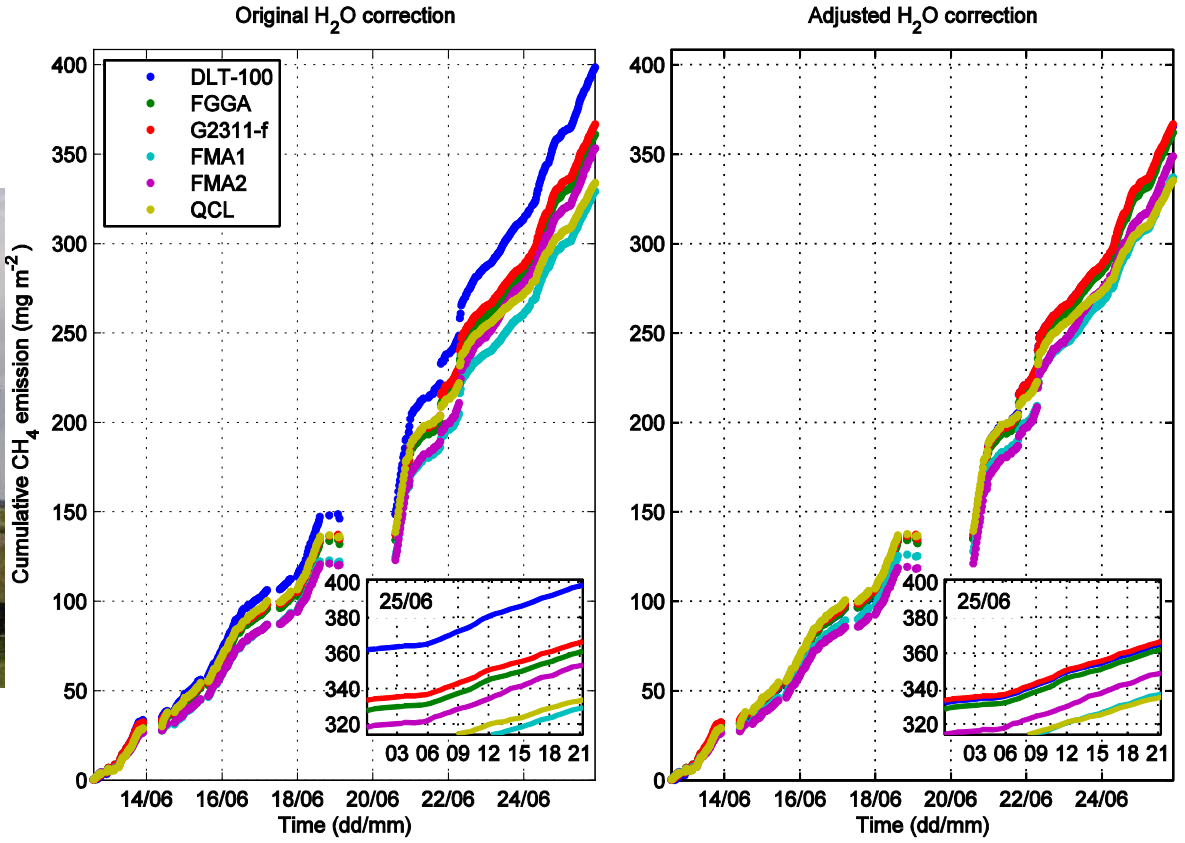
Scientific highlights WP5: EC flux intercomparison for CH_4 (June '12)





Evaluating the performance of commonly used gas analysers for methane eddy covariance flux measurements: the InGOS inter-comparison field experiment

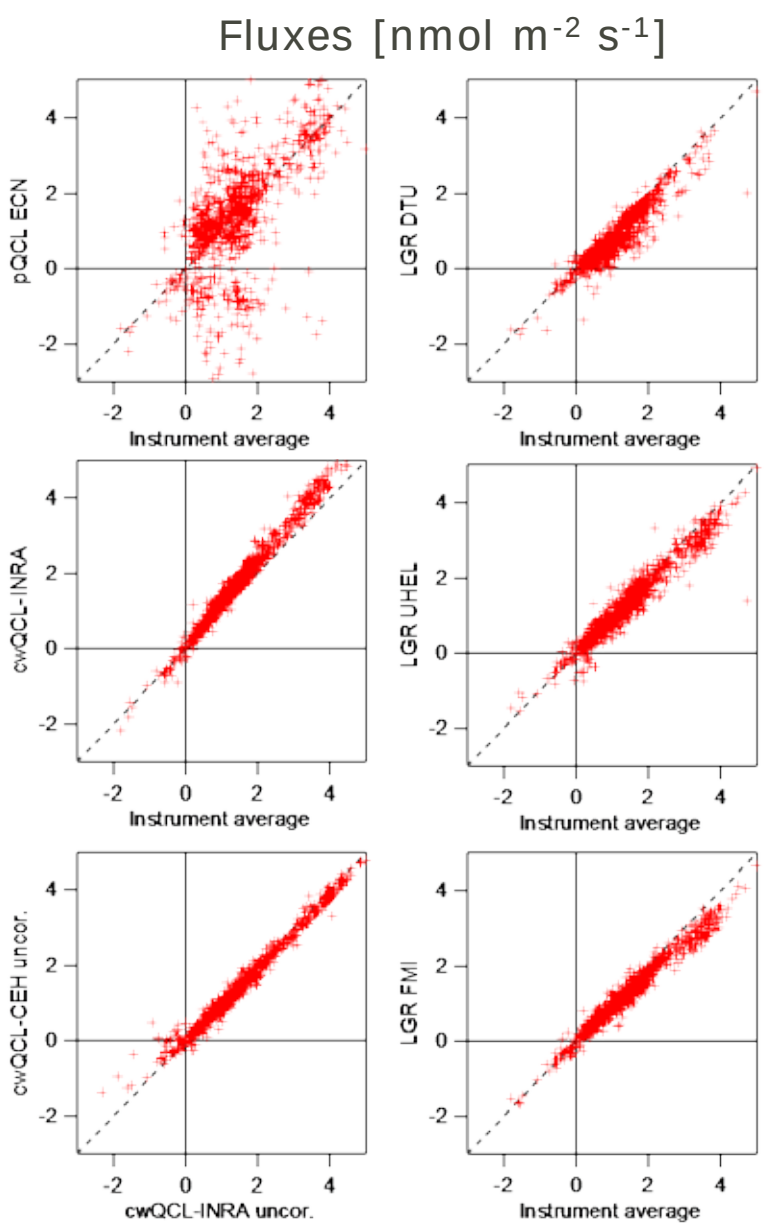
O. Peltola[1], A. Hensen[2], C. Helfter[3], L. Belelli Marchesini[4], F.C. Bosveld[5], W. C. M. van den Bulk[2], J. Elbers[6], S. Haapanala[1], J. Holst[7], T. Laurila[8], A. Lindroth[7], E. Nemitz[3], T. Röckmann[9], A. Vermeulen[2] and I. Mammarella[1]



InGOS

Scientific highlights WP5: EC flux intercomparison for N_2O (June '13)

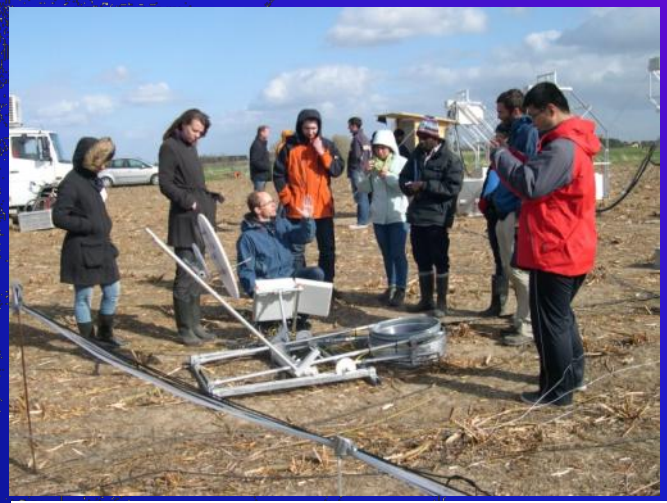
Country	Institute	Instrument	Gas measured	Method
CH, NL, DE, AU	Ecotech/ ECN / Bremen Univ.	Spectronus - FTIR trace gas analyser	all	Relaxed Eddy Accumulation
FR	INRA Orleans	lab-built CW-QCL spectrometer "SPIRIT"	N_2O, CO_2, H_2O	Aerodynamic gradient
IT	West Systems Srl	Trasportable accumulation chamber based fluxmeter.	N_2O, CO_2, CH_4	Dynamic enclosure
FI	FMI	CRD Los Gatos Research	N_2O, CO, H_2O	Eddy Covariance
FI	U. Helsinki	CRD Los Gatos Research + dryer	N_2O, CO, H_2O	Eddy Covariance
DK	DTU	CRD Los Gatos Research	N_2O, CO, H_2O	Eddy Covariance
NL	ECN	Aerodyne Pulsed QCL	N_2O, CH_4, H_2O	Eddy Covariance
FR	INRA Grignon	Aerodyne CW-QCL	N_2O, CH_4, H_2O	Eddy Covariance
UK	NERC – CEH	Aerodyne CW-QCL	N_2O, CO_2, H_2O	Eddy Covariance



Scientific highlights WP5: Summer shool & Skills workshops

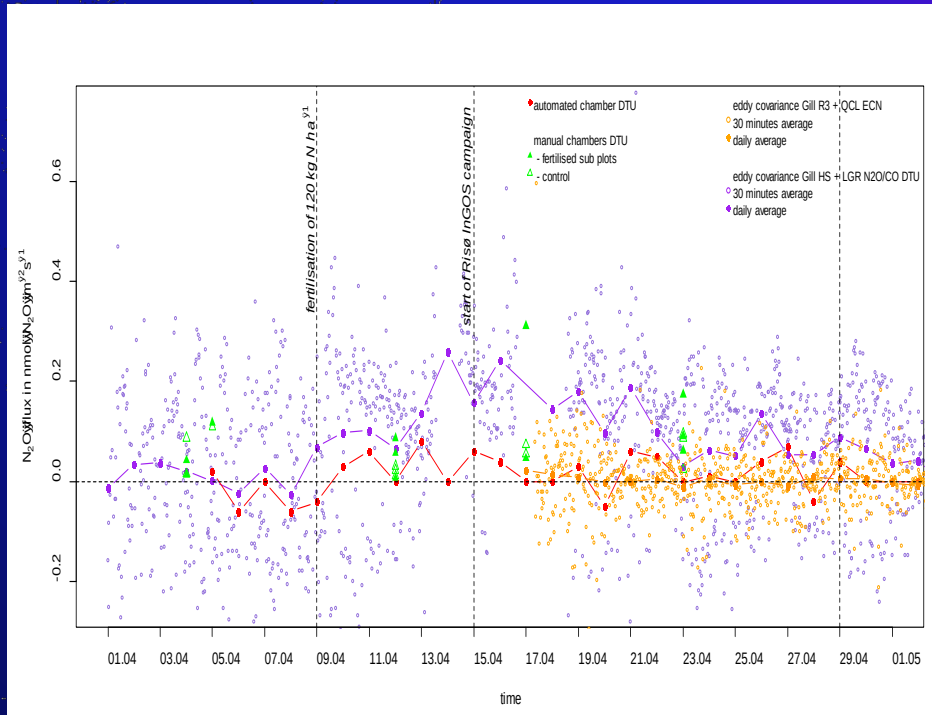
Summer-school Poznan:

- 4-12 May 2013
- Collaboration with ABBA & Mafor Cost Actions
- 45 trainees (21 countries)
- 14 lecturers



Skills Workshops & Intercomparison:

- Focus on Masters/PhD students from Easter Europe and Developing Countries
- KIT: 25-Nov to 5-Dec 2012 (8 participants)
- RISO: 22-25 April 2013 (10 participants)
  - Ø embedded into EC/chamber inter-comparison for N_2O (April 2013)



InGOS
WP 6 – Harmonization and quality control of non–CO_2 GHG measurements in the ocean(NA 6)

WP leader: Hermann Bange (GEOMAR)

Overview WP6

Overall objective

Ø to improve, harmonize and integrate oceanic measurements of N_2O and CH_4 in open ocean and coastal regions

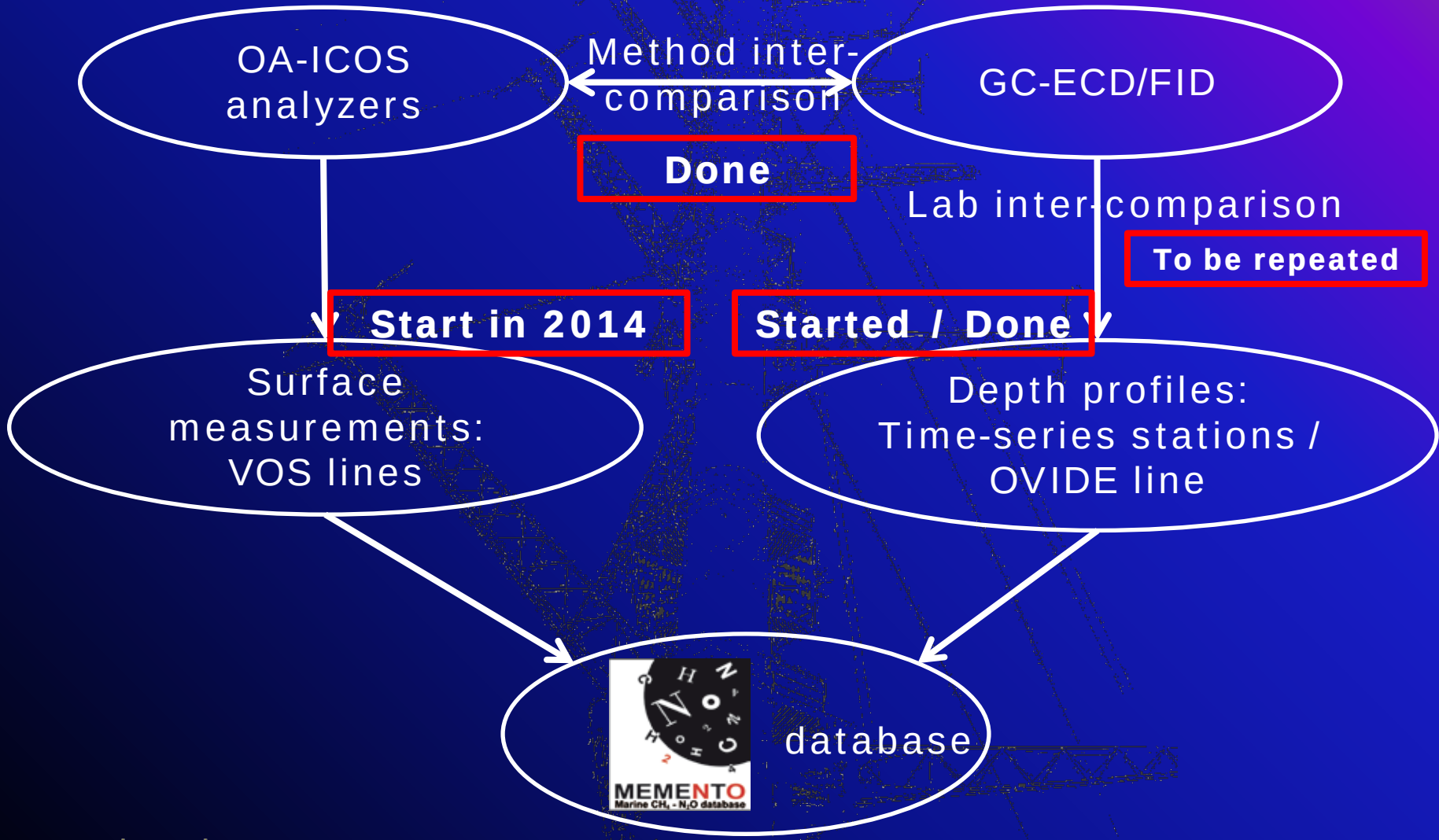
Specific objectives

Ø Establish a network of oceanic N_2O and CH_4 measurements by using different platforms: time-series stations, hydrographic sections and VOS lines
Ø Exchange of scientists between laboratories
Ø Inter-comparison exercises: method (GC-ECD/FID vs. OA-ICOS) and between WP6 partner labs

4 Partners

IFM-GEOMAR, Kiel (now: GEOMAR Helmholtz Centre Kiel); CSIC, Vigo; UiB, Bergen; UEA, Norwich (PI now at U Exeter)

Progress and outlook WP6



Scientific highlights WP6

Ocean Sci. Discuss., 10, 1281–1327, 2013
www.ocean-sci-discuss.net/10/1281/2013/
doi:10.5194/osd-10-1281-2013
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Ocean Science
Discussions

This discussion paper is/has been under review for the journal Ocean Science (OS).
Please refer to the corresponding final paper in OS if available.

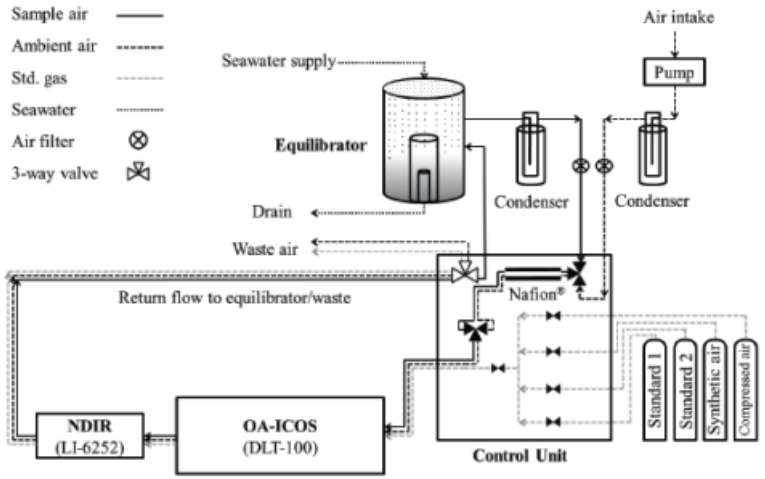
A new method for continuous measurements of oceanic and atmospheric N_2O, CO and CO_2: performance of off-axis integrated cavity output spectroscopy (OA-ICOS) coupled to non-dispersive infrared detection (NDIR)

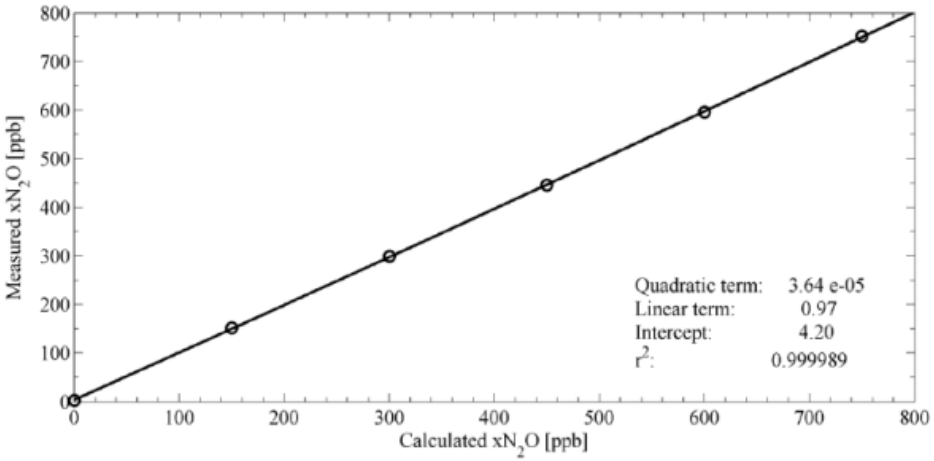
D. L. Arévalo-Martínez[1], M. Beyer[1], M. Krumbholz[1], I. Piller[1,*], A. Kock[1], T. Steinhoff[1], A. Körtzinger[1], and H. W. Bange[1]

[1]Helmholtz Centre for Ocean Research Kiel (GEOMAR), Düsternbrooker Weg 20, 24105 Kiel, Germany
*now at: Institute of Physical Chemistry at the Christian-Albrechts-Universität Kiel, Max-Eyth-Str. 2, 24118 Kiel, Germany

Received: 20 ...
Co...
Pul...

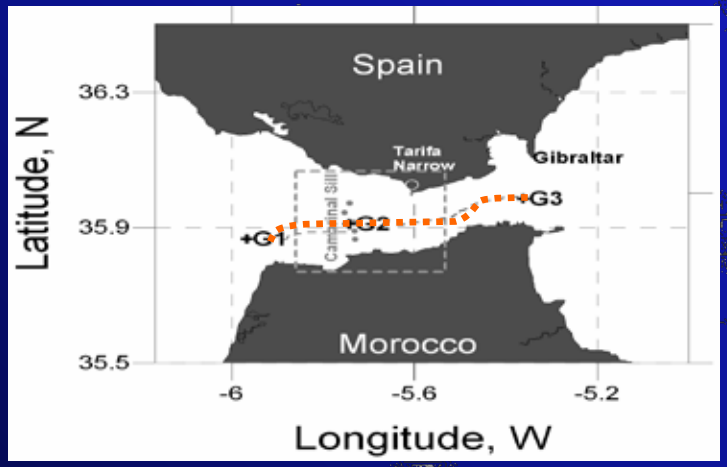
Article accepted on 7 Nov 2013 for publication in *Ocean Science* (open access)



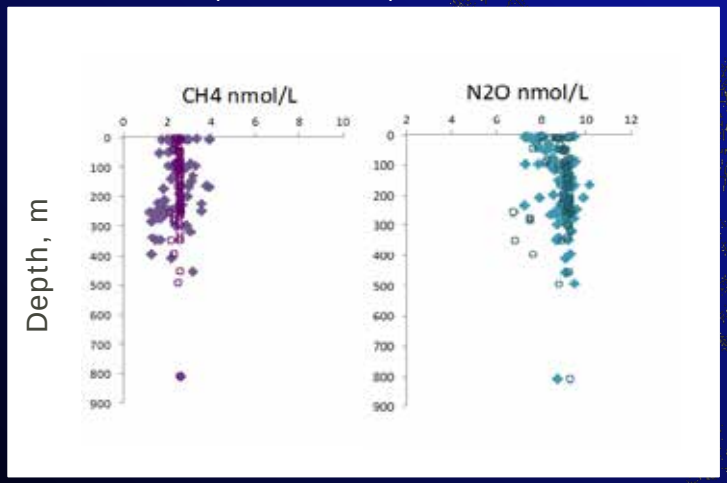


Scientific highlights WP6

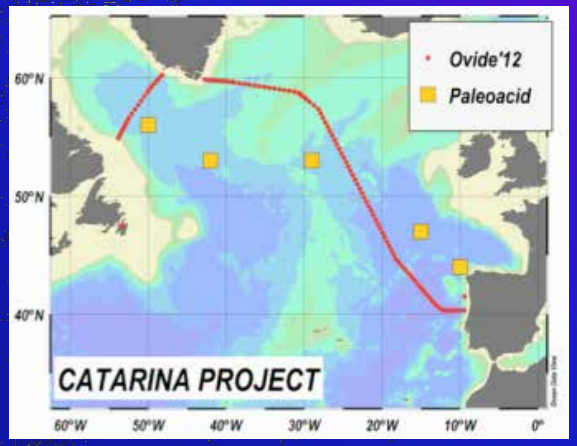
GIFT: Gibraltar Fixed Time-Series Stations



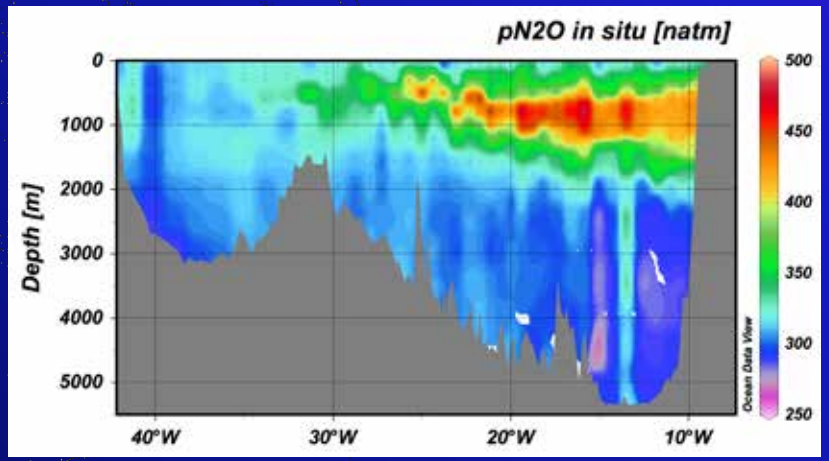
- Sampling cruises in Jul 2011, Aug 2011, Nov 2011, Feb 2012, ...



OVIDE: Repeated hdyrographic Section Lisbon-Greenland



- Bi-annual sampling cruises since 1997
- June/July 2012
- Next cruise in 2014



InGOS
WP 12 – The InGOS data center (SA 1)

WP leader: Lynn Hazan (CEA)

The InGOS Data Center

Due to the heterogeneity of the data collected and the different expertises, the InGOS Data Center comprises three data centers

- Atmospheric Data Center, hosted by the LSCE (France)
- Ecosystem Data Center, hosted by UNITUS (Italy)
- Halocarbon Data Center, hosted by NILU (Norway)

The data are accessible via internet. The InGOS Institutional website is a centralized location which points to three websites, one per Data Center.

There are not deliverables or milestones in the WP.

Atmospheric Data Center

The work in this data center is closely linked to the NA2 and NA3 WP. The data center is fully operational since March 2013.

- Database structure is in place. General metadata were gathered.
- First sets of validated historical CH_4 data from NA2 from 18 stations are available
- NRT CH_4 data submission (NA3 WP) are available for a few stations
- Current historical datasets can be downloaded from the website
- NRT data graphs and data files are available on the website
- Ongoing work on uncertainties in NA2 and NA3 WP are taken into account in the database

Ecosystem Data Center

The work in this data center is closely linked to the NA5 and JRA6 WP. The data center is fully operational and integrated in the ICOS-ETC activities.

- Database structure is in place.
- CH_4 and N_2O specific additions have been made to the ancillary and metadata template (BADM)
- Actions have been done to collect non-CO_2 fluxes measurements
- The European Eddy covariance database cluster is ready to receive data from InGOS
- The website presents scientific campaigns data from NA5 WP
- Reflexions are ongoing on how to involve as many sites as possible

Halocarbon Data Center

The work in this data center is closely linked to the NA4 WP.

- Halocarbon data are managed through the EBAS system
- which is harmonized toward related European and
- international projects and programmes
- Data format has been selected (NASA Ames 1001)
- Work in progress to mirror AGAGE data from the CDIAC database
- A test dataset is available (78 time series from 3 stations)
- DECC data can be integrated and 74 datasets from 2 UK stations are available
- The data are forwarded to the WDCGG as EBAS is now a sub-node data center for WDCGG

Project summary: administrative part

Project Management and Dissemination (WP1)

Objectives

- Provide overall project management and coordination towards both, the European Commissions and the Consortium
- Support the implementation of the activities proposed
- Provide training and capacity building facilities (UHEI, Risø, PULS)

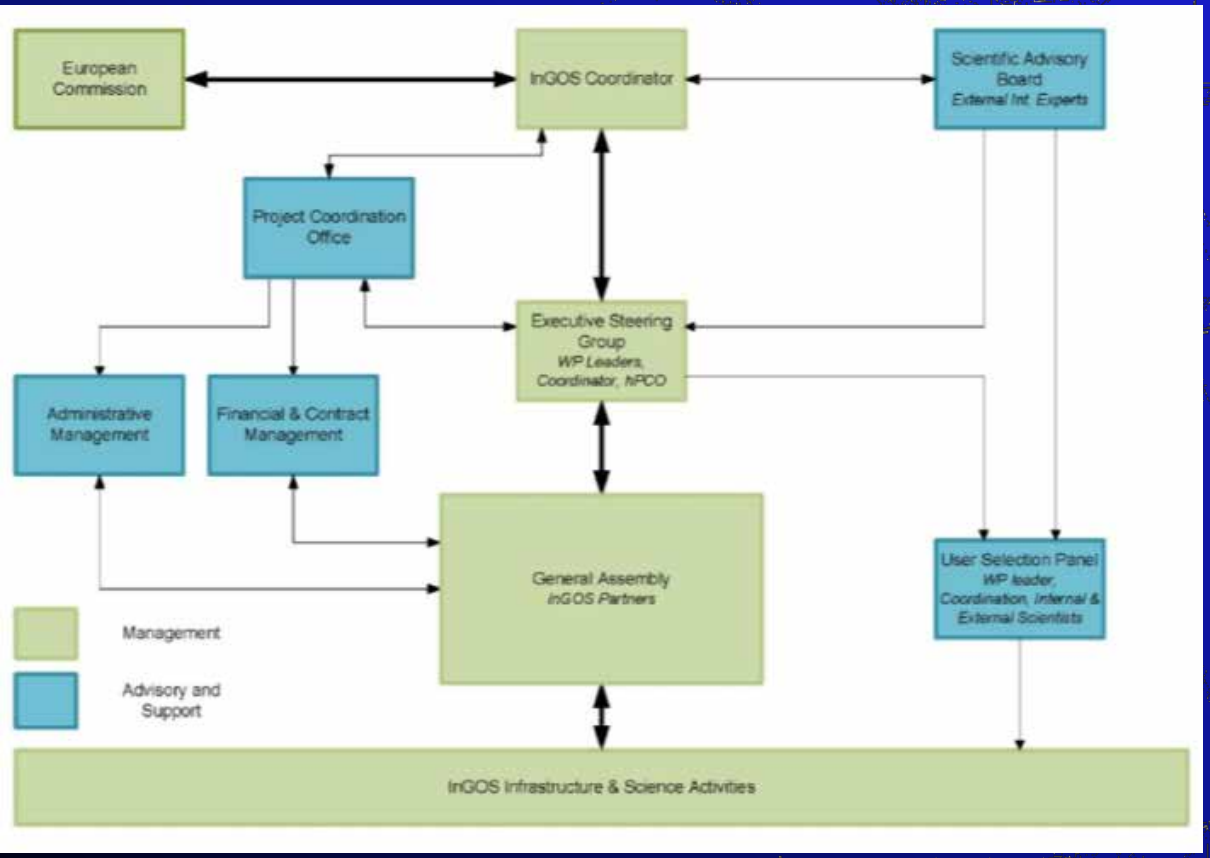
Tasks

- Day–to–day management
  - contractual, legal, and financial
  - maintenance of the web portal
  - managing TNA
  - communication and dissemination
- Coordination and organization of network activities
- Supervising fulfillment of duties
- Communication channel to partners and EU
- Reporting

Team

- Alex Vermeulen, Arjan Hensen, Albert Bleeker, Sylvia Walter

Project Management – Structure and communication



Boards and Committees

- General Assembly
- Executive Steering Committee
  - WP leader
- Scientific Advisory Board
- Gender Committee
- Young Scientists Committee

Communication

- Email
- Tele–conferences – minutes
- Meetings – minutes
- Website

Consortium Agreement

Project Management – Deliverables

- Total: 101 deliverables and 84 milestones

- 1.Reporting Period: 25 deliverables and 35 milestones
  - WP1: 5 deliverables, no milestones
  - WP2: 2 deliverables, 5 milestones
  - WP3: 3 deliverables, 3 milestones
  - WP4: 5 deliverables, 7 milestones
  - WP5: 1 deliverable, 2 milestones
  - WP6: 2 deliverables, 2 milestones
  - WP7 – WP12: TNA and SA without deliverables and milestones
  - WP13: no deliverables, 5 milestones
  - WP14: 2 deliverables, 4 milestones
  - WP15: 3 deliverables, 1 milestone
  - WP16: no deliverables, no milestones
  - WP17: 1 deliverable, no milestones
  - WP18: 1 deliverable, 6 milestones

Project Management – Deliverables

- Total: 101 deliverables and 84 milestones

- 1.Reporting Period: 25 deliverables and 35 milestones
  - WP1: IIII I
  - WP2: II
  - WP3: II I
  - WP4: IIII I
  - WP5: I
  - WP6: I I

Σ = 80 % submitted

- others are in progress

  - WP14: II
  - WP15: II I

  - WP17: I
  - WP18: I

Project Management – Deliverables

- Total: 101 deliverables and 84 milestones

- 1.Reporting Period + 2013: 49 deliverables
  - WP1: IIII I + II
  - WP2: II + I
  - WP3: II I + II
  - WP4: IIII I + III
  - WP5: I + III
  - WP6: I I

  - WP13: + I
  - WP14: II
  - WP15: II I + IIII
  - WP16: + III
  - WP17: I + I
  - WP18: I + IIII

Delay due to:
- Experimental problems
- Hardware delivery delay

Actual forecast delivery date:
- End of the year until month 28

Project management – collaborations

- International project character
- Strengthen networking as one of the main objectives
- Closely connected to several other (EU) projects by:
  - participation in meetings, workshops, etc.
  - Scientific exchange
  - Joint measurements campaigns

  - e.g. ICOS, FluxNet, ACCENT, PEGASOS, ACTRIS, TTorch

Project management – consortium changes

New full partner:

- IC3–CAT
- University of Granada

New associated partner:

- CzechGlobe

New third parties:

- CMCC (associated to UNITUS)
- No progress in Roemenia yet

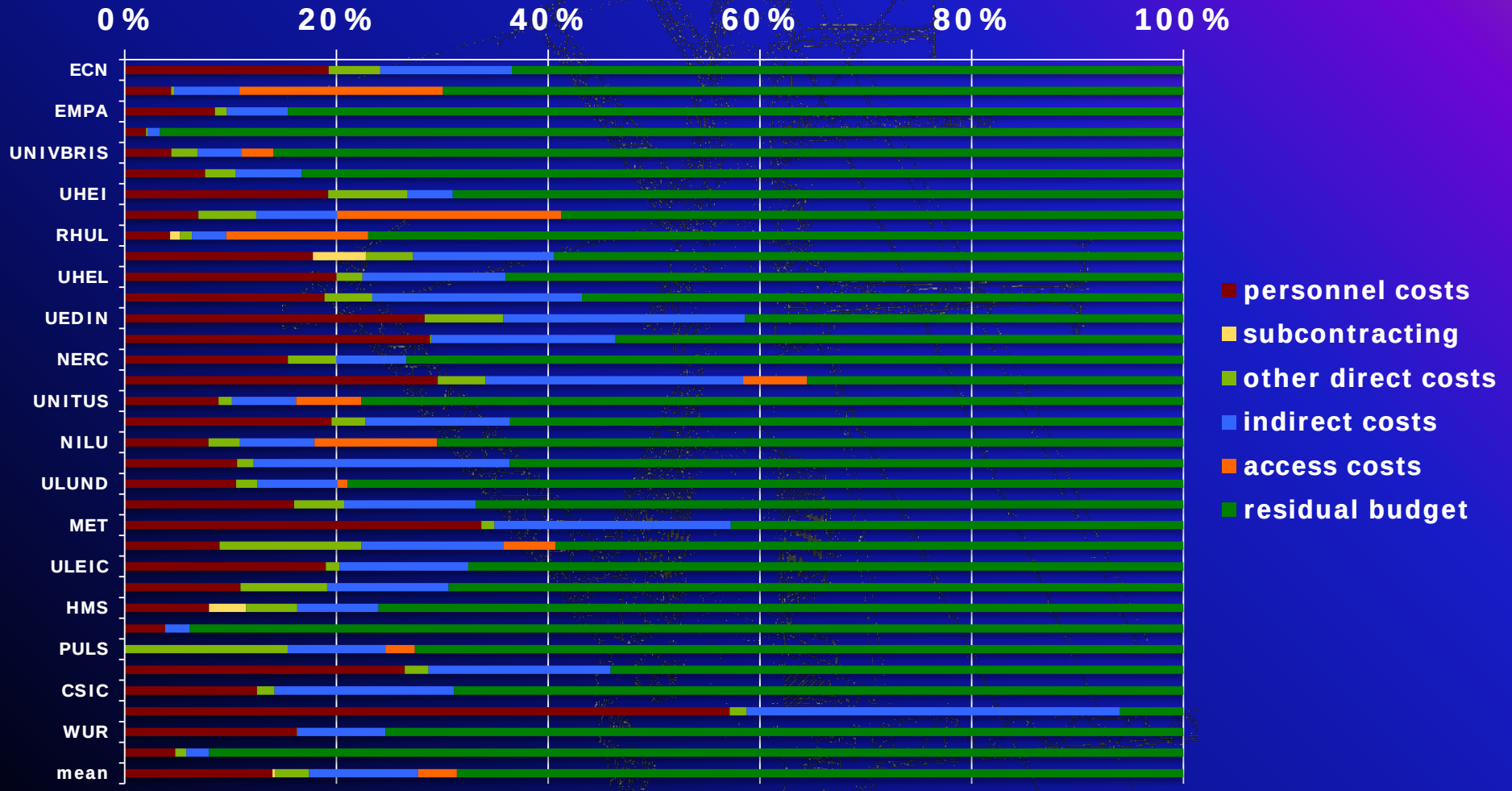
Project management – amendments

- Votes by the consortium during meetings, via email or voting forms on the website
- All agreements with vast majority
- 7 amendments in preparation

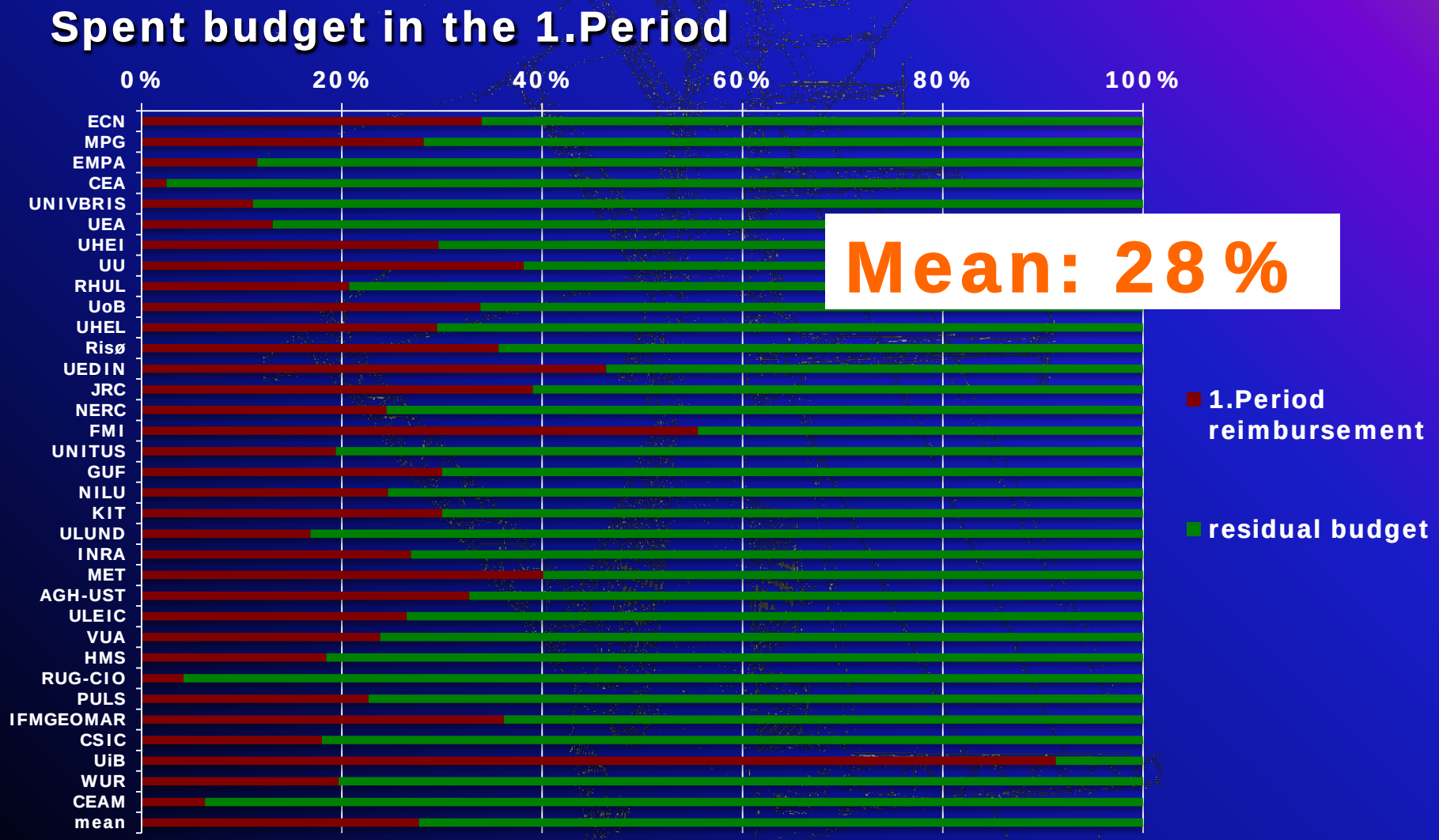
  - 01 - change of coordinator contact (tacit approval, 100%) ✗
  - 02 - change of project name (active vote, 100%) ✗
  - 03 - electronic-only submission form C (active vote, 100%) ✗
  - 04 - CMCC as third party of UNITUS (active vote, 89%) ✗
  - 05 - IC3-CAT as new full partner (active vote, 89%) ✗
  - 06 - University of Granada as new full partner (tacit approval, 100%) ✗
  - 07 - change legal identity of VUA (tacit approval, 100%) ✗

Project management – finances

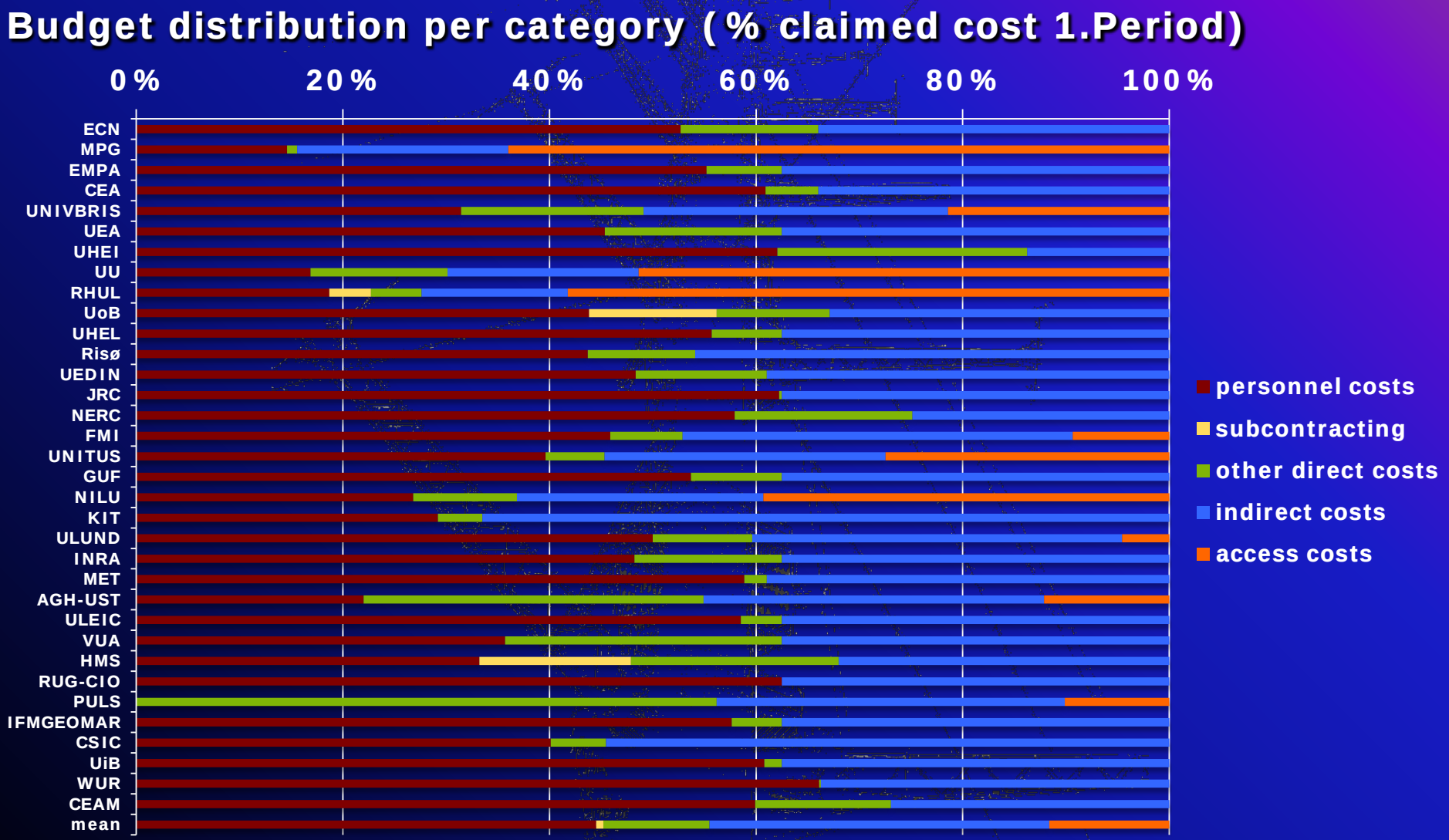
Total budget: 8 million €



Project management – finances



Project management – finances



Project management – reporting

- 1.Periodic Report
  - Submitted in time (31.05.2013)
  - Scientific part accepted without changes
  - Management part accepted without changes
  - TNA access data base had to be updated – done
  - Financial part: additional explanations needed from 5 partners, 5 had to submit an adjusted form C – done

Project management – disseminations

1.Reporting Period

- For starting individual projects and set–up of collaborations
  - 5 papers
  - 1 book
  - 35 oral / poster presentations
  - 1 master thesis
- Dissemination plan for the coming period:
  - At least 20 papers
  - Young scientists tour d'emission
  - Network design workshop/ICOS MSA-Atm, June 2014
  - NCGG7 November 2014
  - Improve reporting by partners
  - Data Assimilation Autumn School, Trieste, Sept 2014
  - Final science conference September 2015