

From RAMCES to ICOS-France: The “smooth” transition of the French network for atmospheric GHG monitoring

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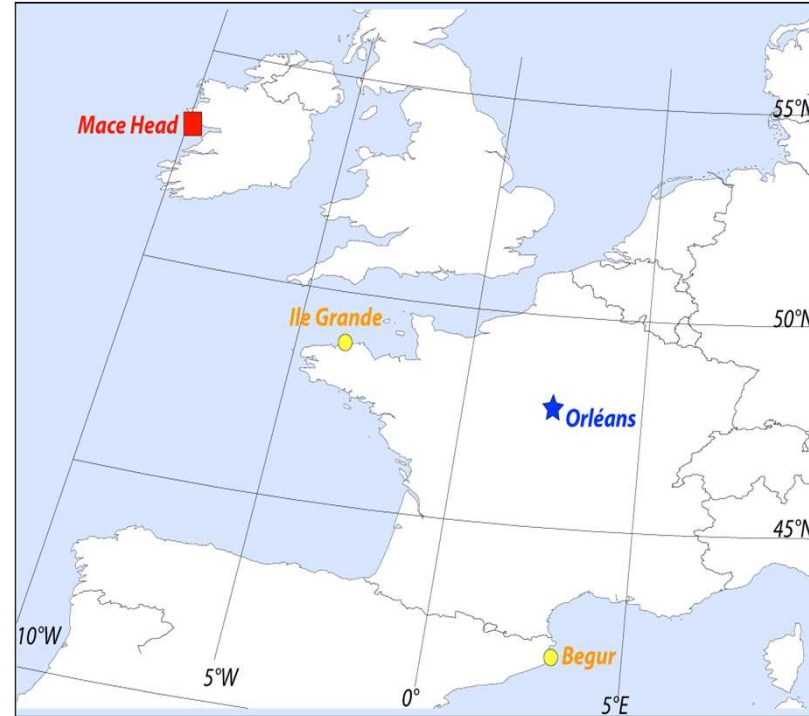
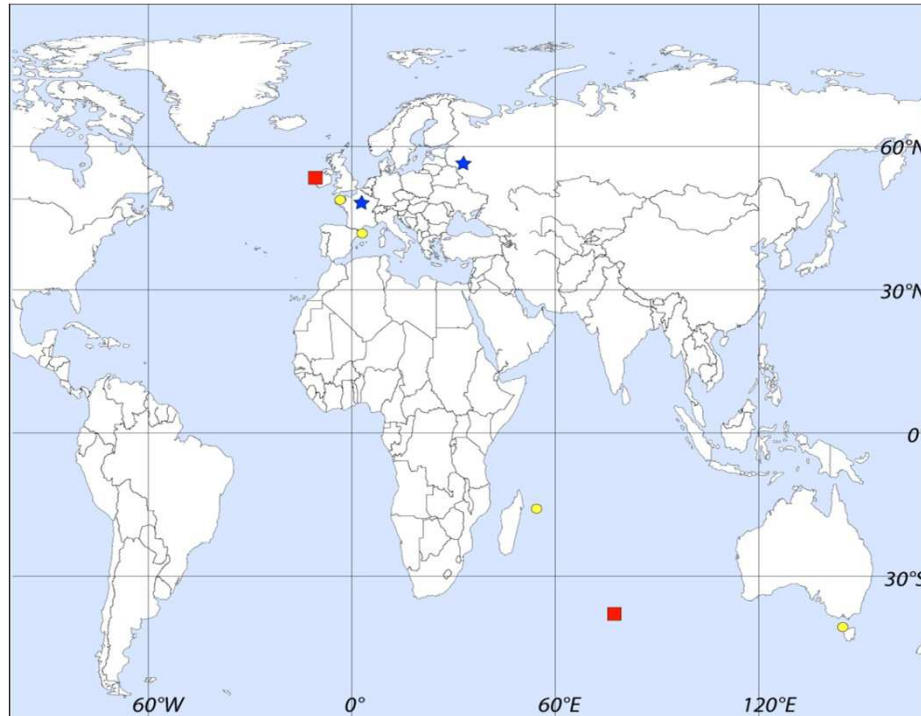


Objectives of RAMCES network

- Long-term monitoring of atmospheric CO_2 , CH_4 , N_2O , SF_6 , CO and H_2
- Understanding the cycle of the major GHG and their role in the climate system
- Quantify the Carbone balance in France and Europe



RAMCES measurement network 2000

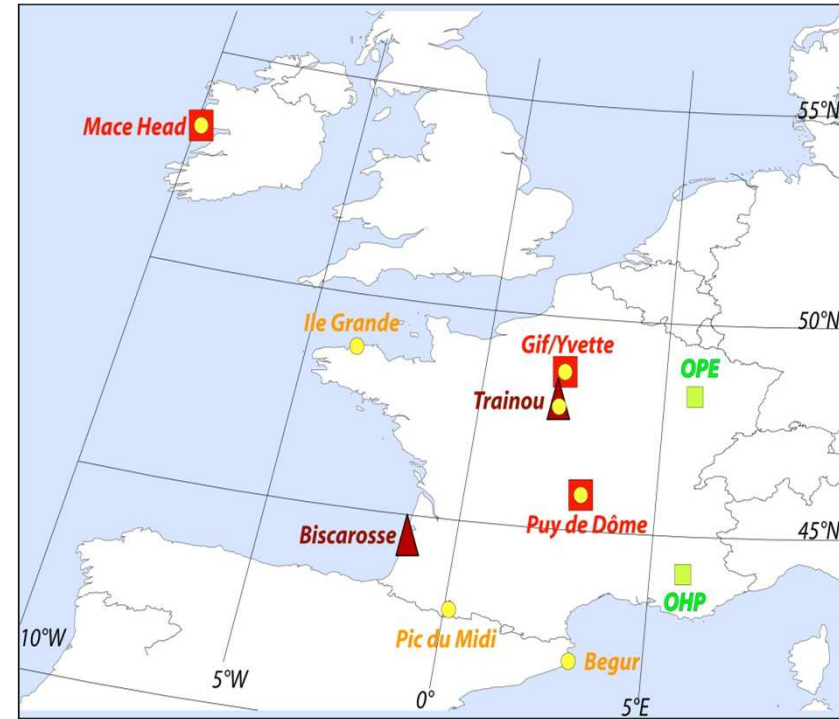
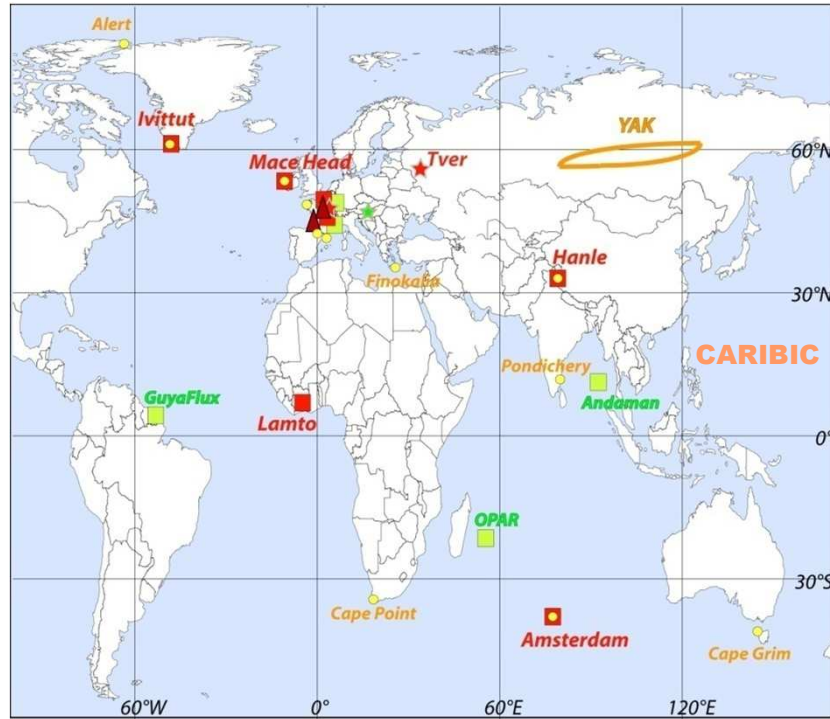


- **Monitoring station**
- ▲ **Tower site**
- **Weekly Flask sampling site**
- **cooperative sites**
- **Airborne Campaign**



Martina Schmidt, GGMT-2011, 25 October 2011

RAMCES measurement network 2011



- **Monitoring station**
- ▲ **Tower site**
- **Weekly Flask sampling site**
- **cooperative sites**
- **Airborne Campaign**

New stations of our network funded by European and national projects



Instrumentation in the RAMCES network

CO₂

CARIBOU _s	TRN	HLE	IVI	GIF
LOFLO	AMS	GIF		
Siemens	AMS			
CRDS Picarro	LTO	GIF	BIS	MHD
CRDS Picarro	PUY	IVI		
Condor	ORL	YAK	CAR	
GC Agilent	GIF	TRN	PUY	

CH₄

GC Agilent	GIF	TRN	PUY
CRDS Picarro	LTO	GIF	BIS MHD
CRDS Picarro	PUY	IVI	

N₂O

GC Agilent	GIF	TRN	PUY
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SF₆

GC Agilent	GIF	TRN	PUY
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CO/H₂

GC PP1	GIF	TRN
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Radon

Rn-Aerosol	AMS	MHD	PUY	GIF
Rn-Gas	TRN			

O₂

Paramag.	IVI
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Instrumentation in the RAMCES network

CO₂

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CH₄

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N₂O

GC Agilent	GIF	TRN	PUY
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SF₆

GC Agilent	GIF	TRN	PUY
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CO/H₂

GC PP1	GIF	TRN
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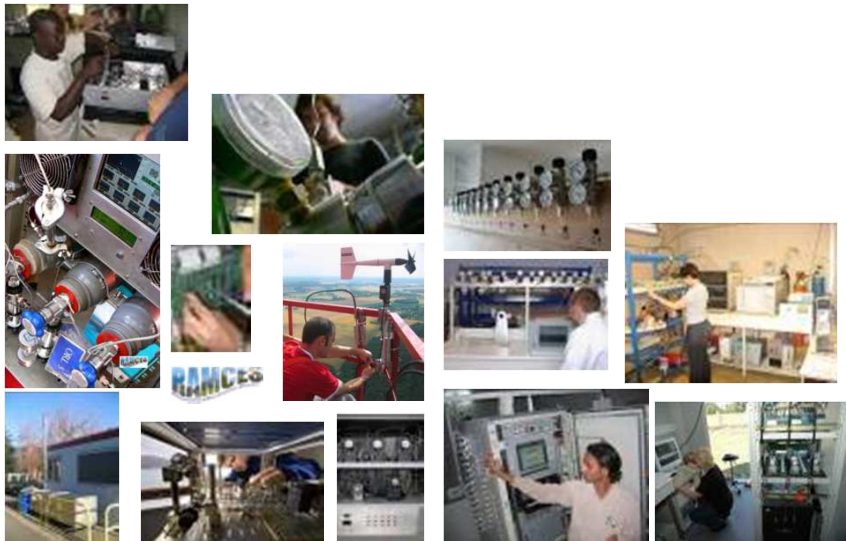
Radon

Rn-Aerosol	AMS	MHD	PUY	GIF
Rn-Gas	TRN			

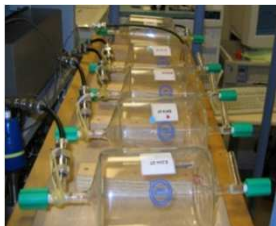
O₂

Paramag.	IVI
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27 Trace gas in-situ analyser at 12 stations (surface +airborne)



Flasks and cylinder analyzing facilities 2010



Flask sampling: about 1800 flasks sampled
12 surface site, 1 airborne sites, ICP
130 boxes shipped



Two GC to analyse CO_2 , CH_4 , N_2O , SF_6 , CO and H_2
+ 2000 flasks analysed
+ 84 cylinders



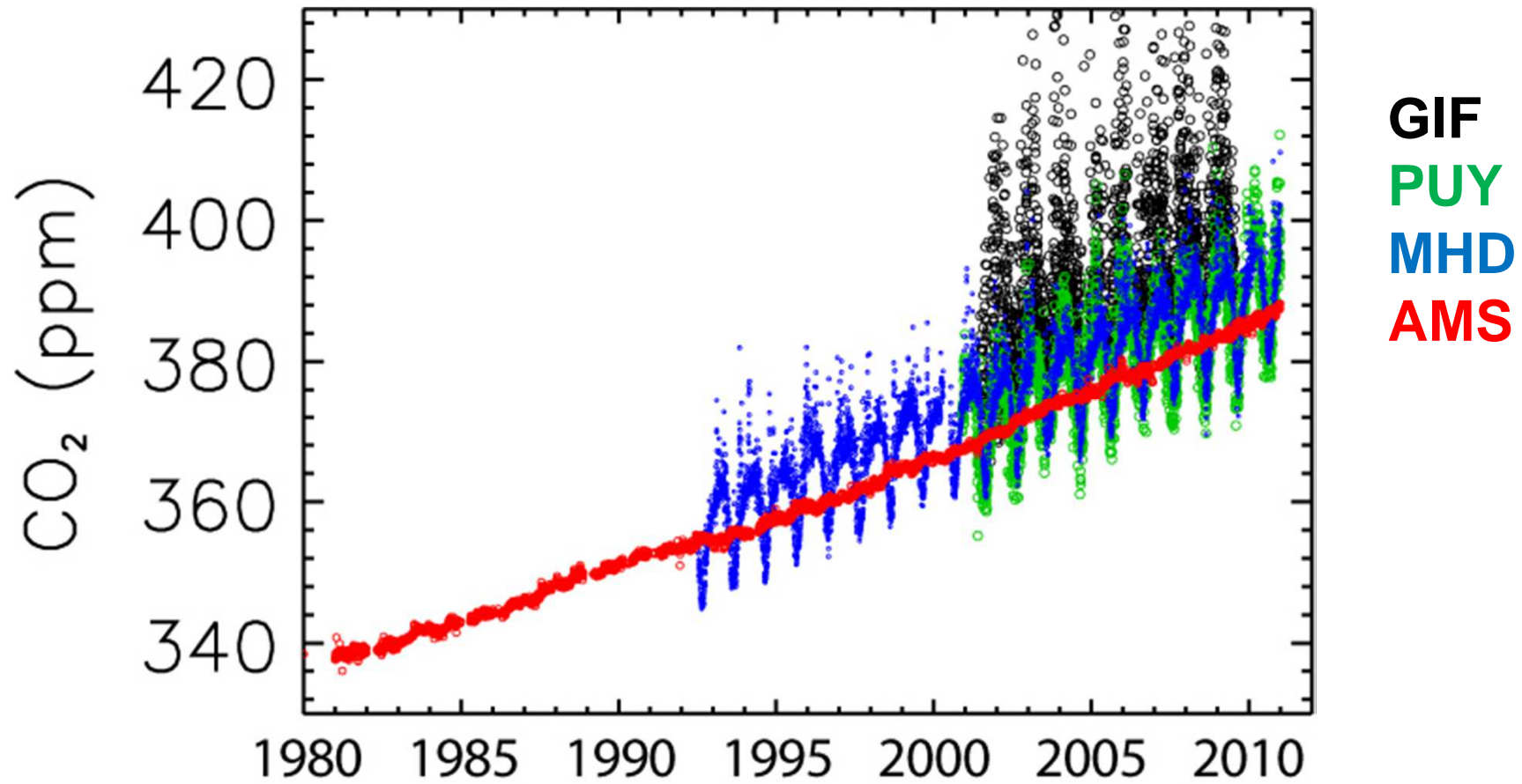
MAT 252 with MPI trapping box (2005)
1800 flasks analysed
20 cylinders analysed



Loflo for CO_2 calibration
80 cylinders analysed



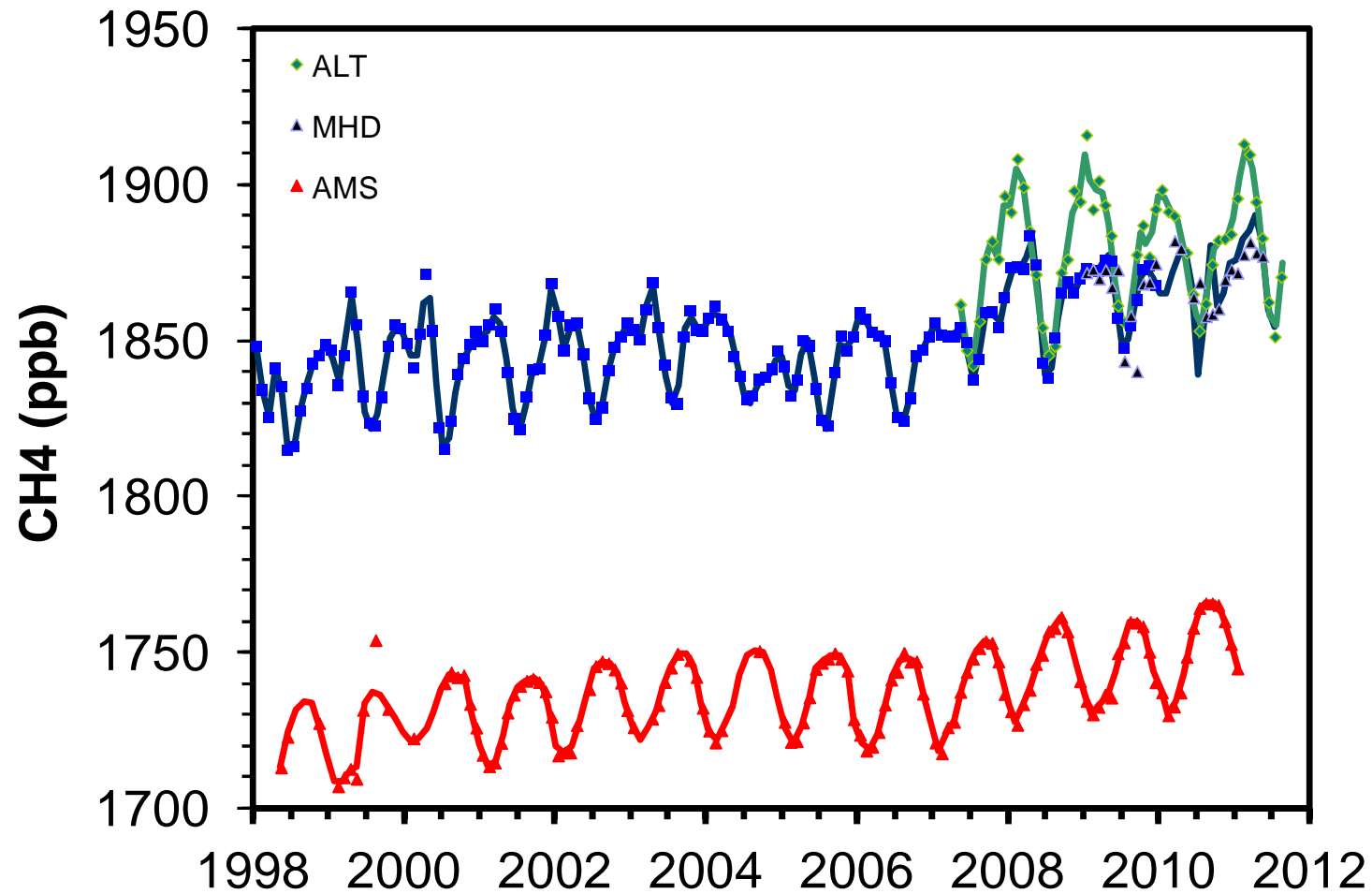
RAMCES Global CO₂ monitoring (in-situ)



+ 8 stations equipped since 2006 for CO₂ in-situ measurements



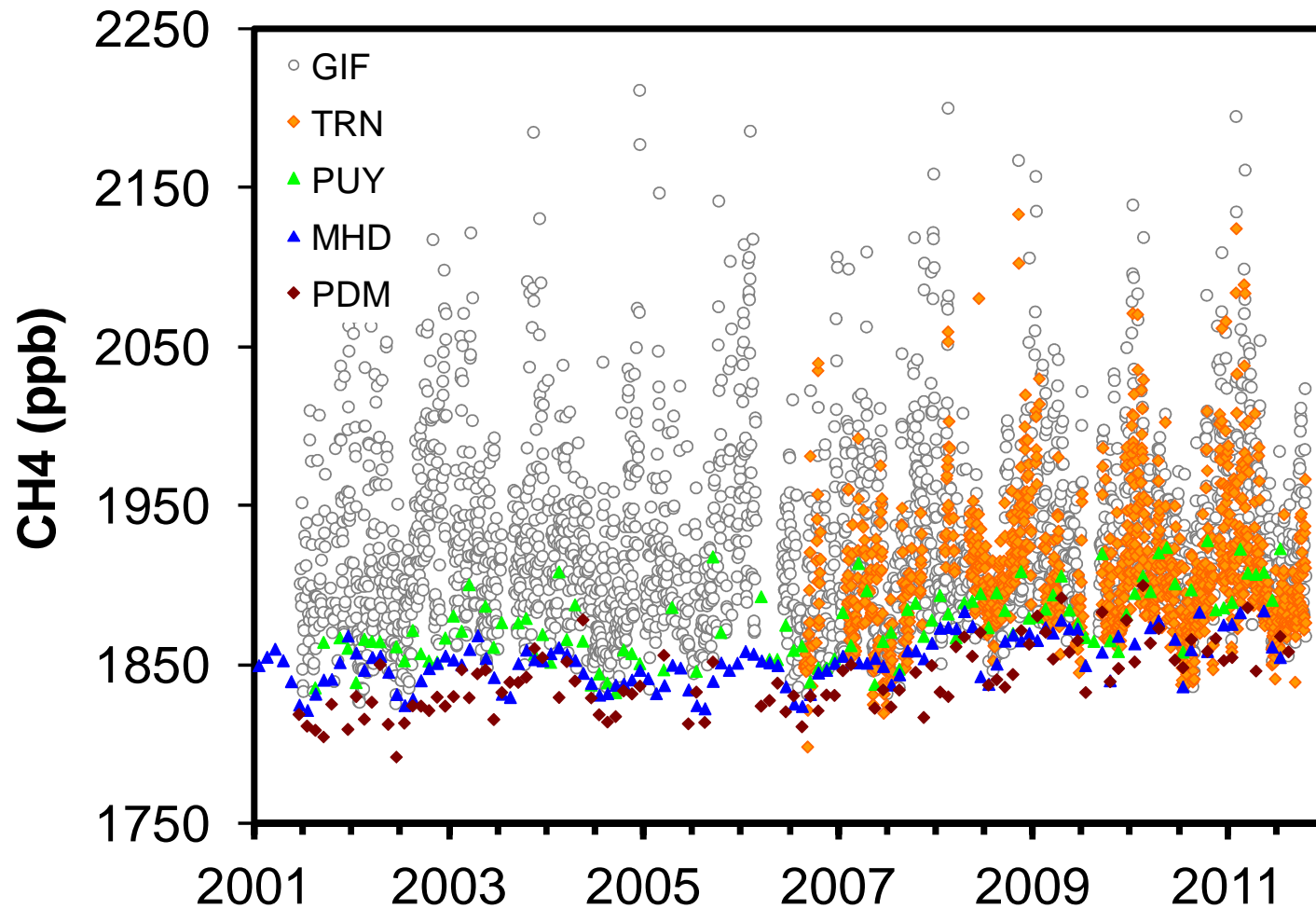
RAMCES Global CH₄ monitoring (flasks)



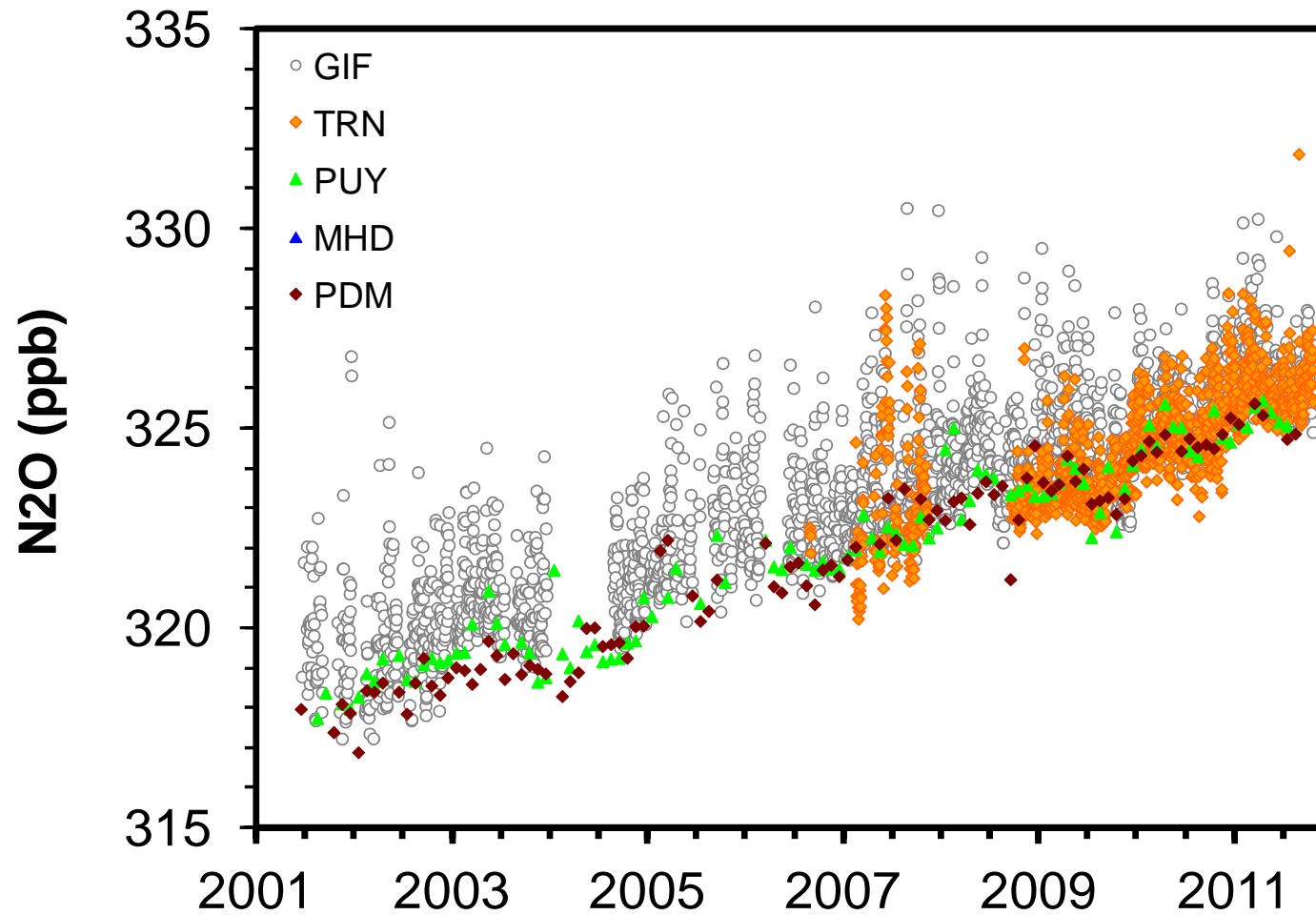
Atmospheric CH₄ mixing ratio showed (larger) increase in 2008



CH₄ measurement in France (flasks + in-situ)



N₂O measurement in France (flasks +in-situ)



All data will be recalculated to uniform scale and will be available beginning 2011

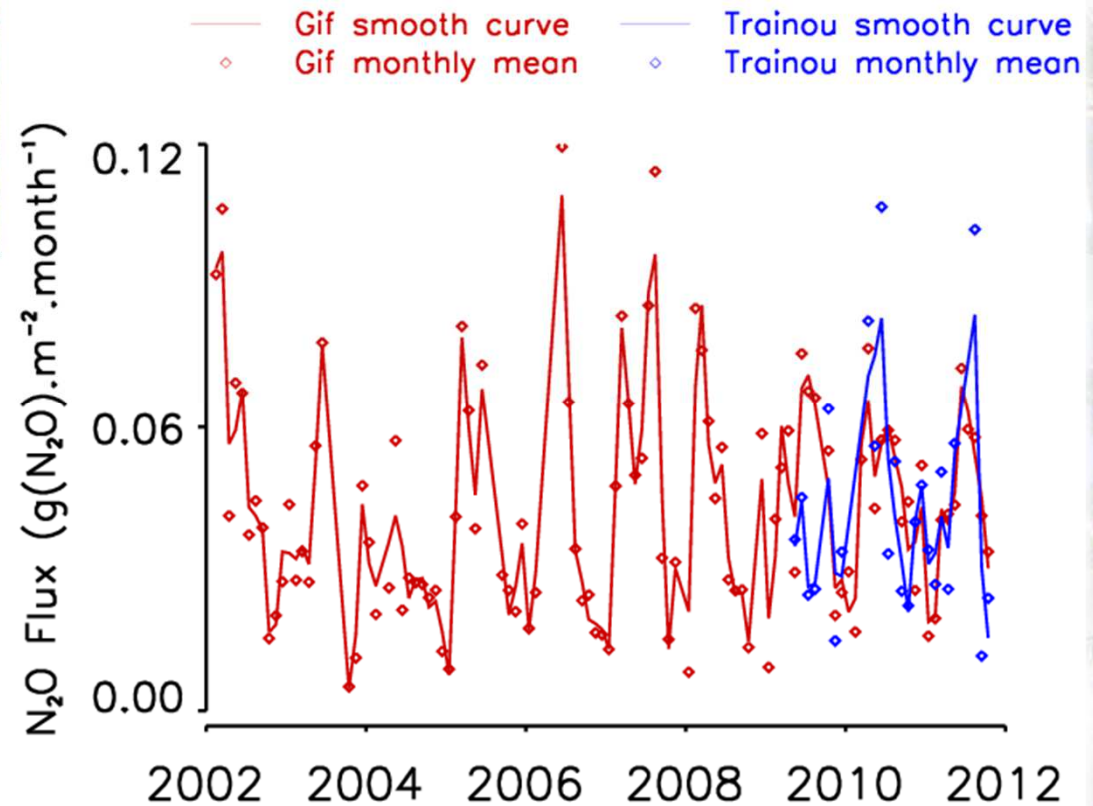


N₂O fluxes around Gif-sur-Yvette station



Calculated from atmospheric measurement by Radon-Tracer-Method

Mean annual N₂O fluxes:
 GIF: 0.52 g(N₂O) m⁻² yr⁻¹
 EDGAR: 0.42 g(N₂O) m⁻² yr⁻¹
 CITEPA : 0.27 g(N₂O) m⁻² yr⁻¹



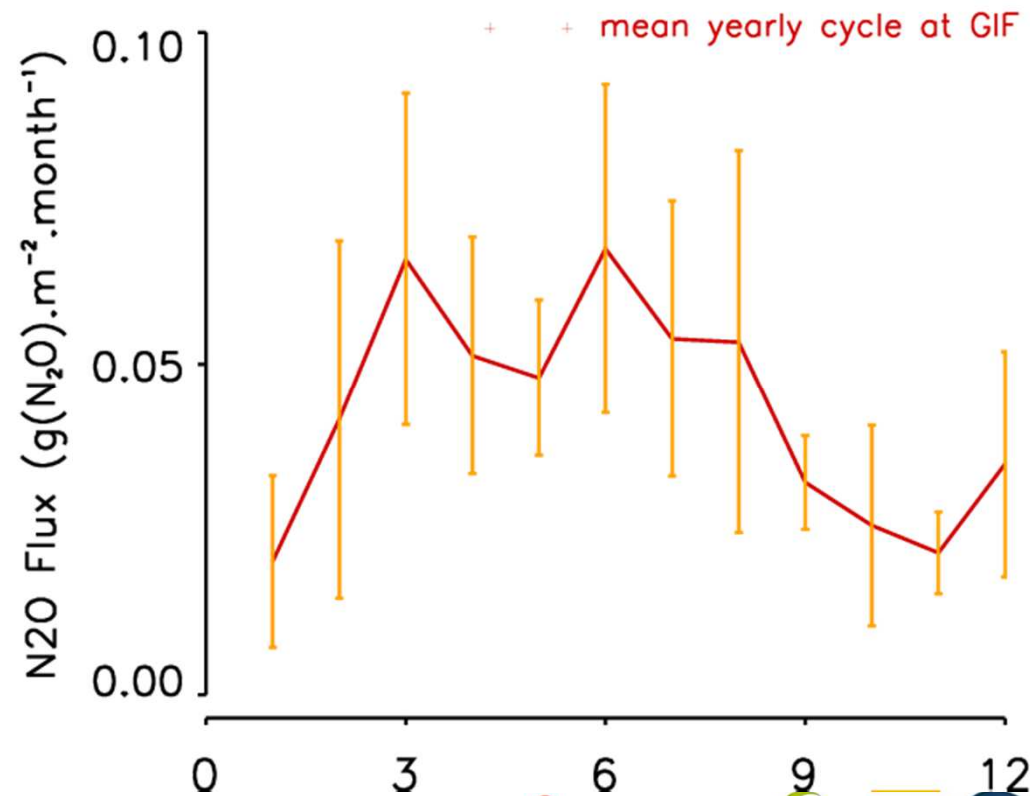
N₂O fluxes around Gif-sur-Yvette station



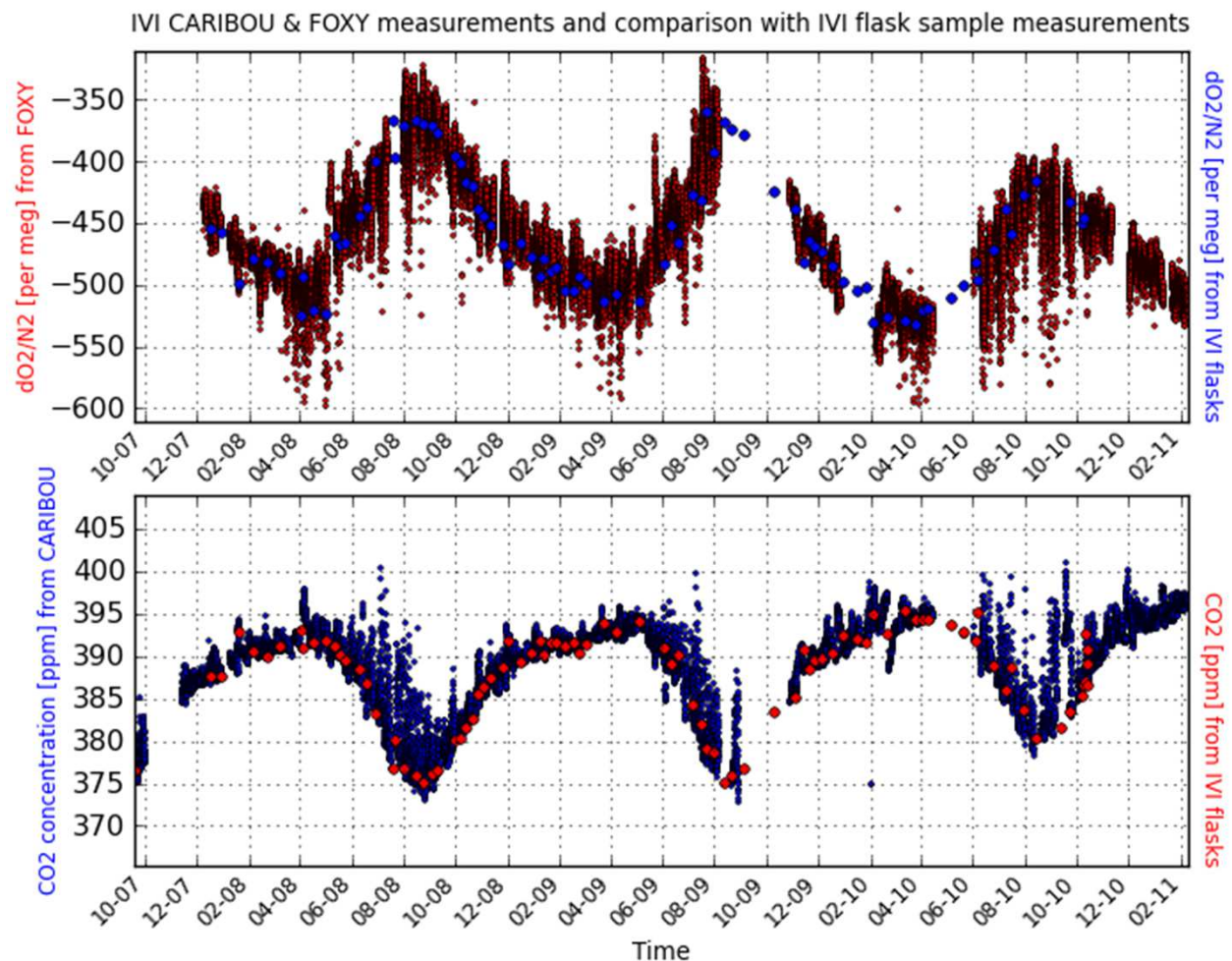
Calculated from atmospheric measurement by Radon-Tracer-Method

Main source of N₂O is agriculture :

- the first application of fertilizer early spring followed by strong N₂O emission
- second culture or tillage of field during the summer



O₂/N₂ at Ivittuut



Computed @ Tue Jul 5 15:46:10 2011 - LSCE - France

More details on the poster of Marc Delmotte



ICOS_France network in 2014



12 Station operated by LSCE/RAMCES Team (2 Level-1 stations)



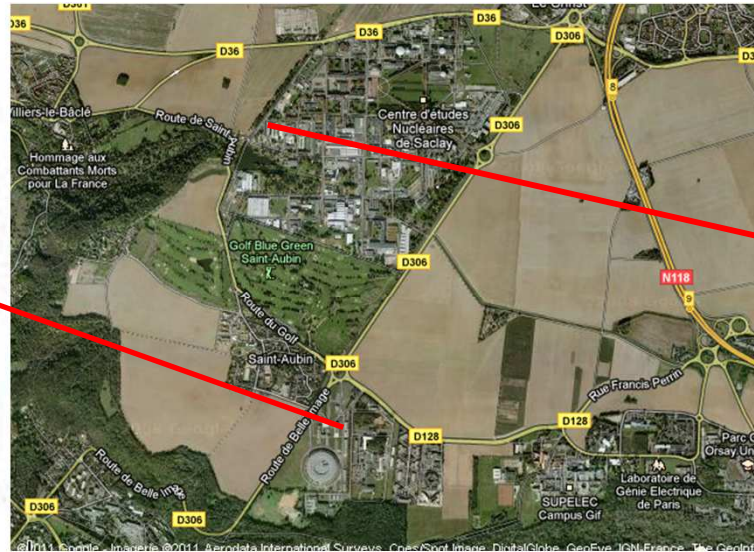
8 Co-operative Station



Martina Schmidt, GGMT-2011, 25 October 2011



GIF or Saclay station



Gif-sur-Yvette

- Air Inlet 7.5 m
- GC (CO, SF6, CH4, N2O, H2, CO2) (2001)
- CRDS (CO2, CH4)
- Radon Analyzer
- Meteorological sensors
- FTIR (sep 2011)
- LGR N2O/CO analyser (2012)
- LIDAR (2012)

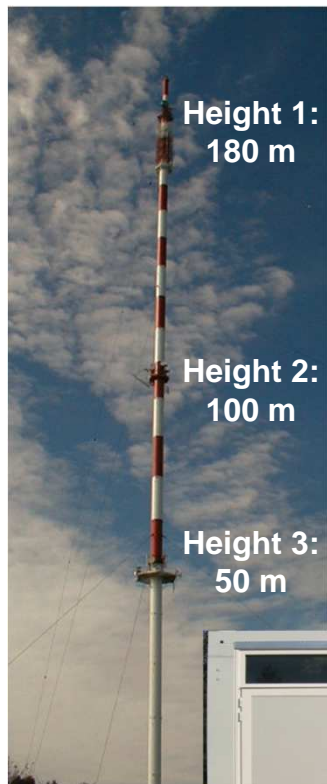
Saclay

- Air inlets 100m, 50m, 10m
- Meteorological sensors
- LGR CO2/CH4 analyser (2012)

=> Comparison during 2012 between GIF and Saclay to decide which will be level 1 station



Trainou station (Orleans Forest)



- GC (CO, SF6, CH4, N2O, H2, CO2)
- CO2 Caribou (Licor)
- Flask samplers
- Flasks 14CO2
- Radon Analyzer
- LIDAR Leopshere

- Constraints for upgrade: Limited place + 12 CAL and carrier gas tanks

Installation of a CO2/CH4 Analyser 2012
Comp. with Caribou (1 year): 2012-2013

- LGR analyzer: N2O/CO : 2013



Upgrade and new level-2 stations

Existing stations

- LTO
- BIS
- MHD
- PUY (May 2011)
- IVI (Aug 2011)
- AMS (Jan 2012)

Equipment

- CO₂/CH₄ analyser (Picarro)
- Meteorological sensors
- Flask Samplers

+ additional instrumentation

New stations

- Brittany (France)
- Corsica
- Crete



NRT check of station data

Home → TRN - Trainou









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- » Home
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- » Documents
- » Media
- » Contact
- » Links

NRT

- » CO2 - 24H
- » CO2 - 15 days
- » CH4 - 15 days
- » Rn222 - 15 days
- » Picarro

Trainou - TRN - France

Last 24H CO2 concentration



CO2 concentration



Trainou



2.1125°E - 47.9647°N

Other data



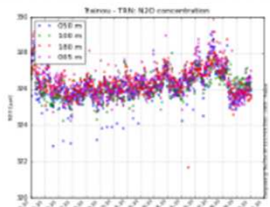
CO



SF6



CH4



N2O



H2



CO2

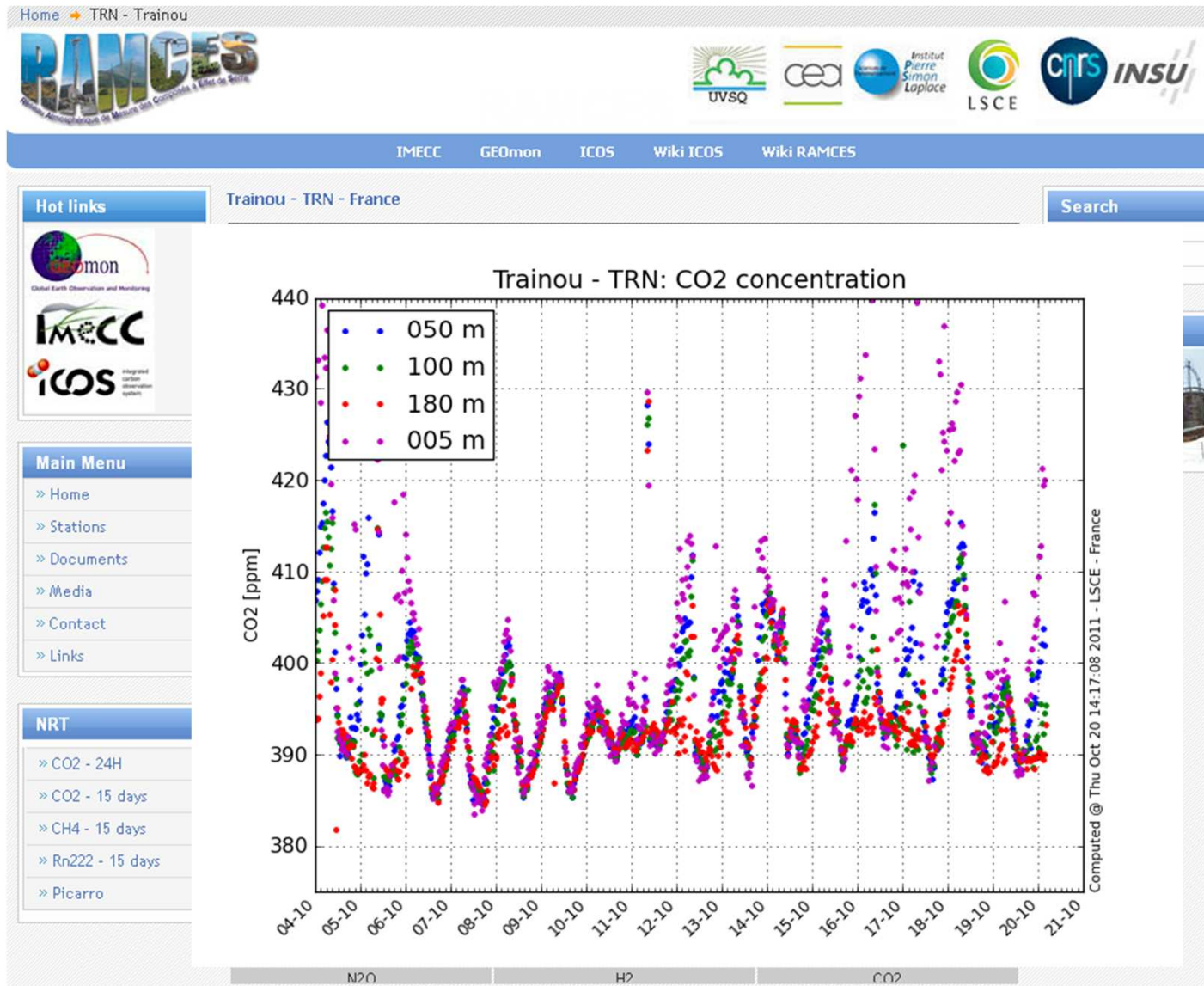
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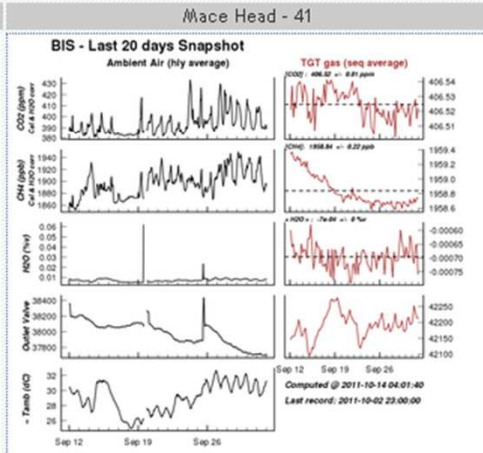
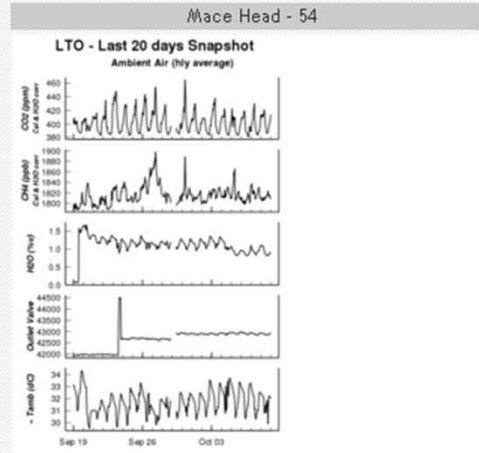
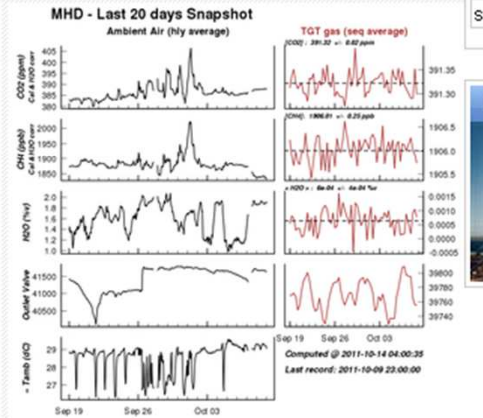
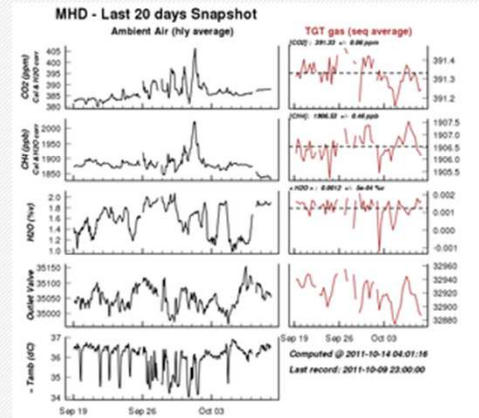
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- » Media
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RAMCES PICARRO Monitoring panel

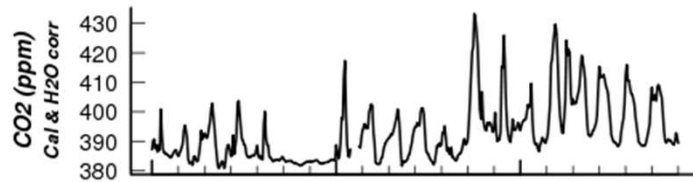
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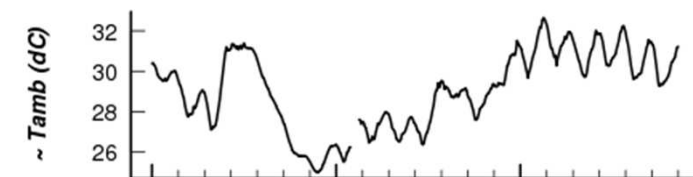
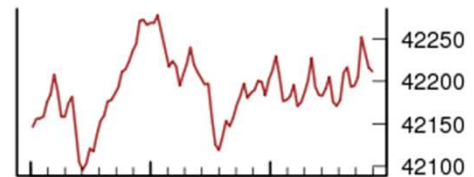
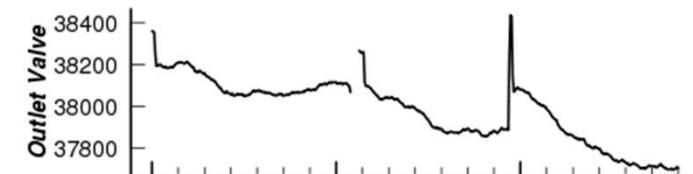
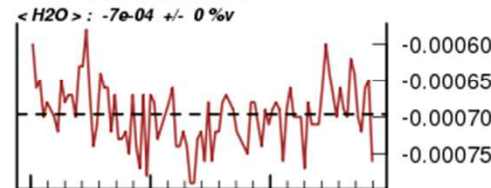
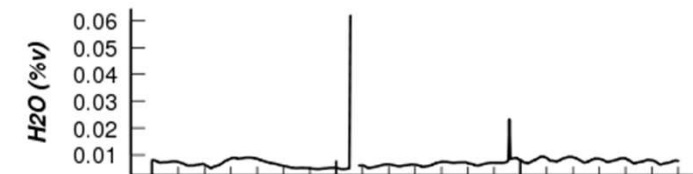
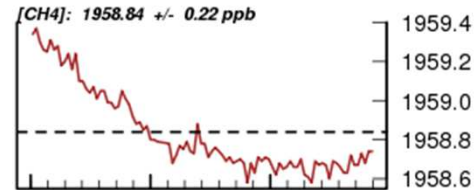
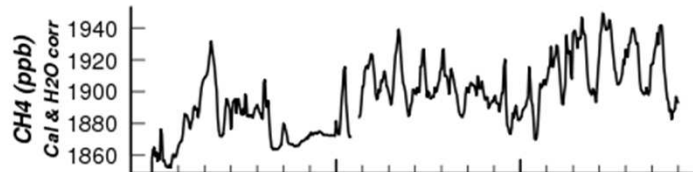
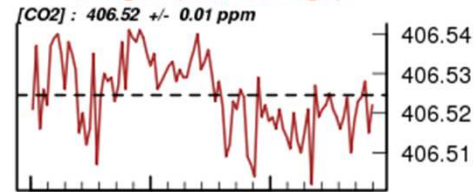
NRT check of station data

BIS - Last 20 days Snapshot

Ambient Air (hly average)



TGT gas (seq average)



Sep 12 Sep 19 Sep 26
 Computed @ 2011-10-14 04:01:40
 Last record: 2011-10-02 23:00:00

TGT Gas

CO2:
 406.52 ± 0.01 ppm

CH4:
 1958.84 ± 0.22 ppb



New challenges to build ICOS/France atmospheric Network

upgrade plan 2012-2015

- 2 Level- 1 stations at Gif and Trainou (France)
- 7 existing +3new Level-2 stations
- the transition period from RAMCES to ICOS/France implicate to continue the old and start new equipment to have at least 1 year overlap
- At most station we are analysing dry air until we have long-term experience of comparison between dry and wet.
- In-situ CH₄ at 9 stations (end of 2011) 12 stations (2014)
- future station standards and flask analysis provided by CAL
- More robust instrumentation ?

Martina Schmidt, GGMT-2011, 25 October 2011

