

Monitoring atmospheric composition in a changing climate: A pathway to informed action

Thursday 9 July

Ballon Generali, Parc André Citroën – Paris 15ème



Copernicus
Europe's eyes on Earth



Funded by
the European Union

Implemented by  **ECMWF**

Intervenants

- **Jean-Louis Caffier** Journaliste pour Néo Planète, Président de l'Association « Climat, Energie, Humanités, Medias »
- **Jérôme Giacomoni** Co-fondateur d'Aérophile
- **Vincent-Henri Peuch** Directeur du service Copernicus Atmosphère à ECMWF
- **Jean-Baptiste Renard** Directeur de Recherche au CNRS
- **Laurence Rouil** Responsable du Pôle Modélisation Environnementale et Décision à l'INERIS
- **Jean-Noël Thépaut** Directeur du Service Copernicus Changement Climatique à ECMWF



Jean-Noël Thépaut

Directeur du Service Copernicus Changement Climatique à ECMWF



Copernicus, the European Union Earth observation and monitoring programme

Monitor the environment

Foster downstream applications in a number of fields



Protect people and assets



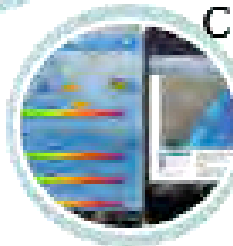
Increase general knowledge on the state of the Planet



Improve environmental policy effectiveness



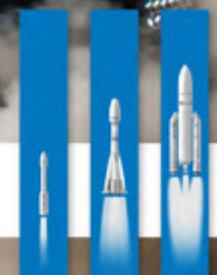
Facilitate adaptation to climate change

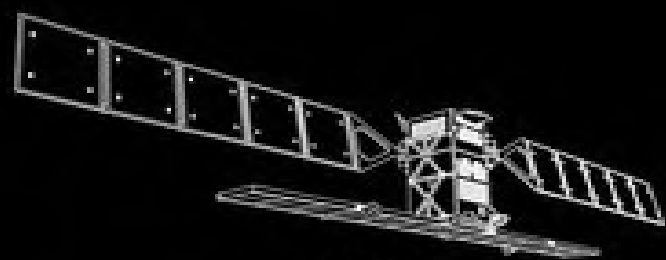


Help managing emergency and security related situations

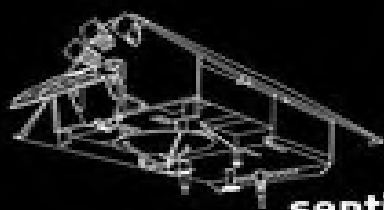


VV05 • Sentinel-2A- June 22th 2015

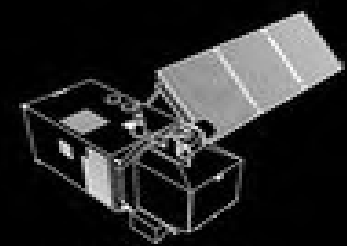




sentinel-1



sentinel-6



sentinel-2



sentinel-5



sentinel-sp



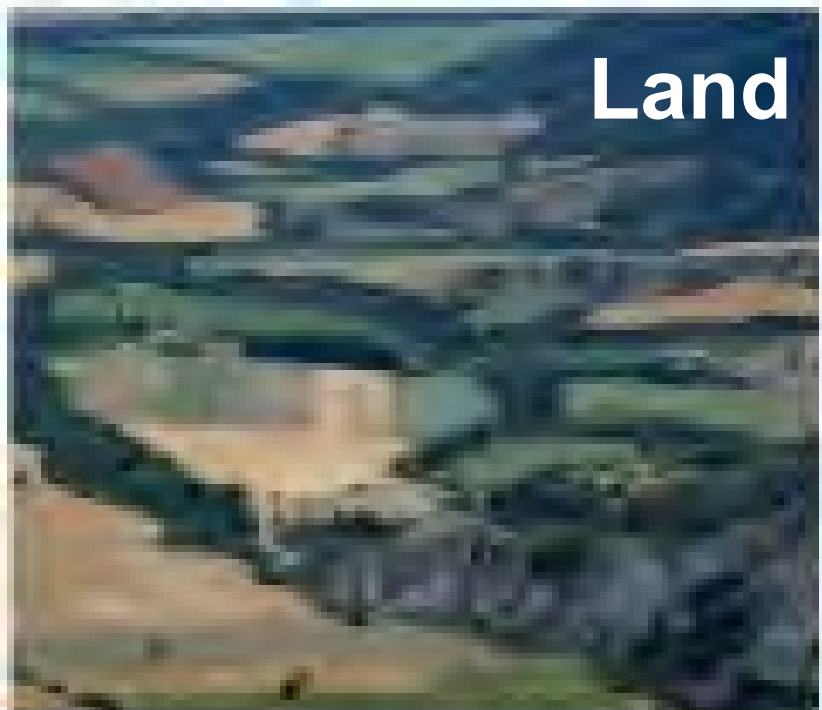
sentinel-3



sentinel-4



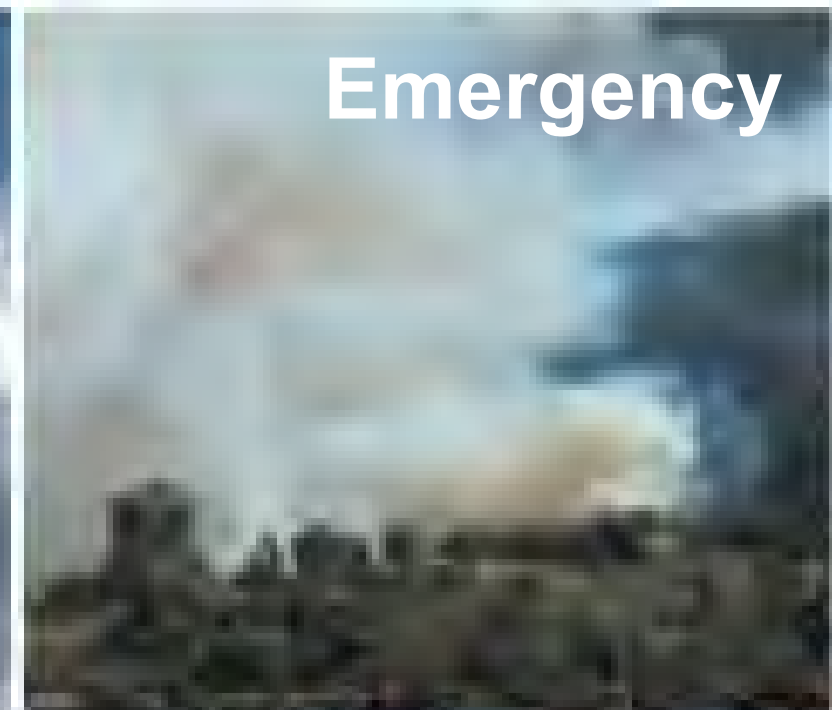
Land



Atmosphere



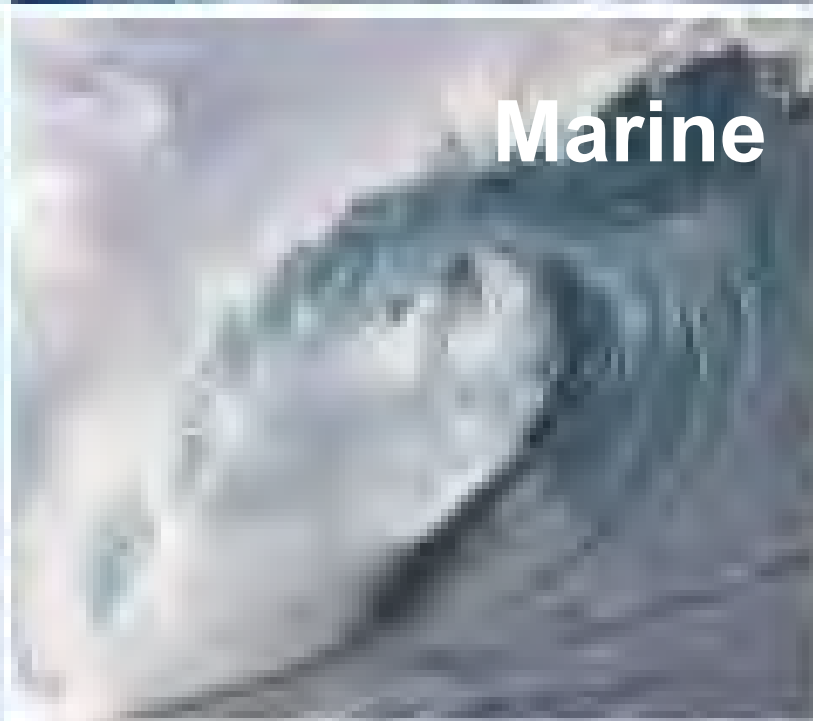
Emergency



Climate



Marine



Security



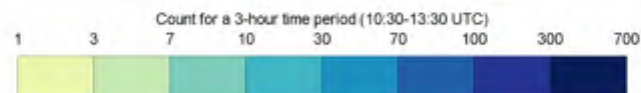
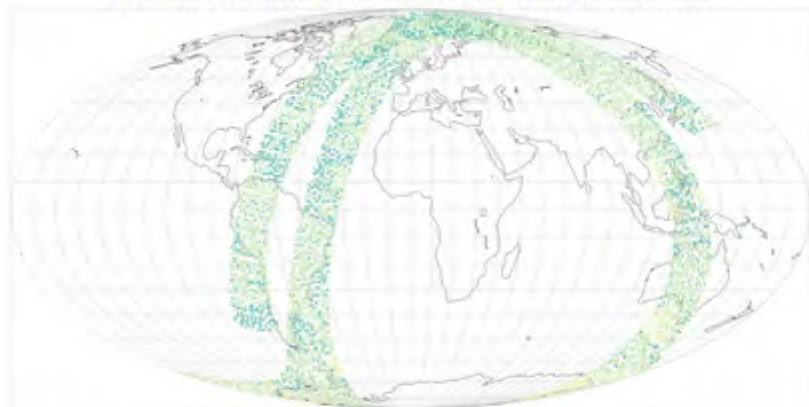


Vincent-Henri Peuch

Directeur du service Copernicus Atmosphère à ECMWF

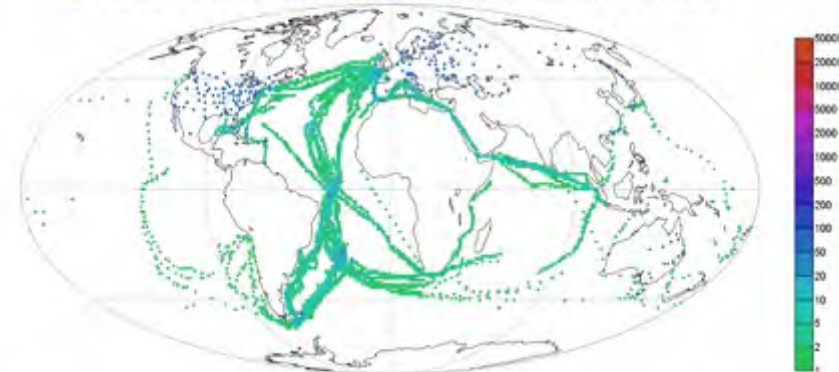


Satellite data assimilated in ERA-Interim



1978

ISPD 3.2.6 and ICOADS 2.5.1 pressure observations assimilated in ERA-20C

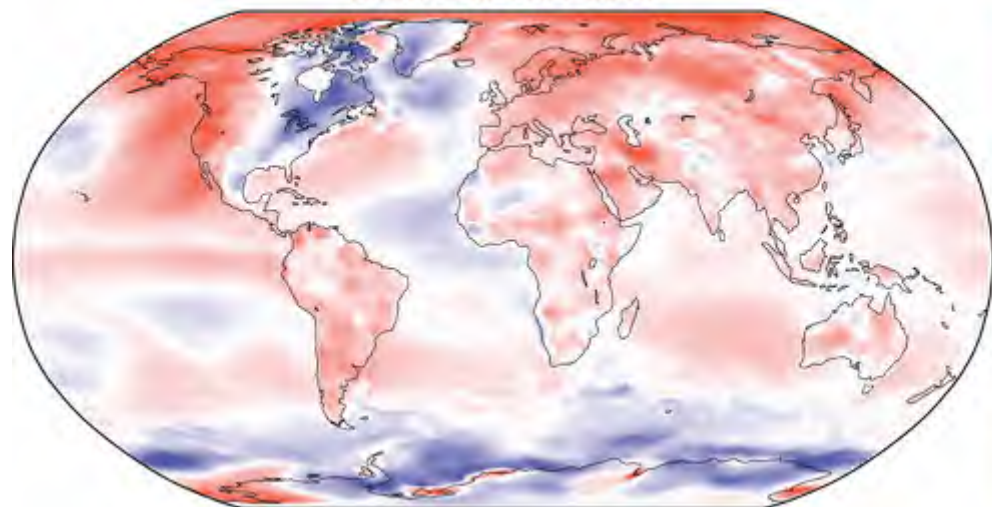


1899

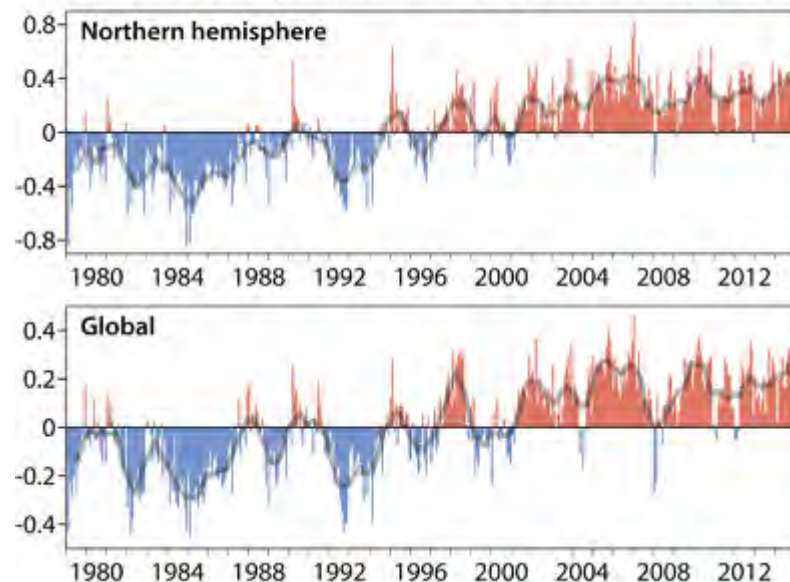
Harvard University, <http://www.met.fas.harvard.edu>

CSIRW

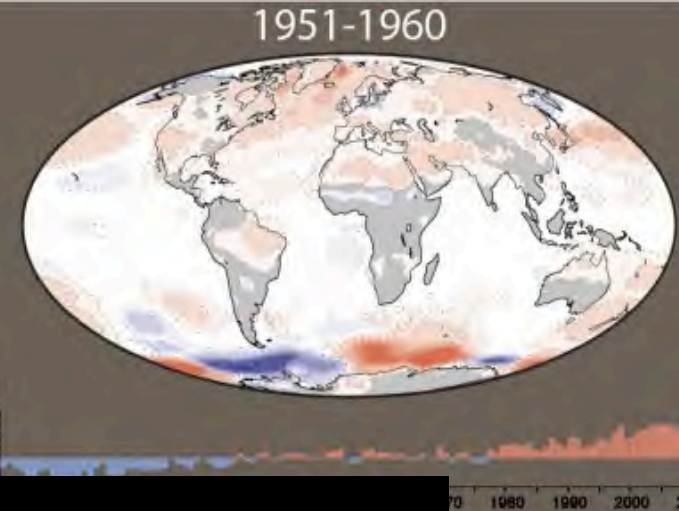
Two-metre temperature anomaly ($^{\circ}\text{C}$) for July 2014 to June 2015 relative to 1981-2010



Two-metre temperature anomaly ($^{\circ}\text{C}$) relative to 1981-2010



The Copernicus Climate Change Service (C3S) will combine observations of the climate system with the latest science to develop authoritative, quality-assured information about the past, current and future states of the climate in Europe and worldwide.



www.copernicus-climate.eu

News

01 Jul 2015 ECMWF Copernicus Services at "Our Common Future under Climate Change"

30 Jun 2015 Copernicus Observations Workshop underway

19 Jun 2015 How to "professionalise" climate change communication

27 May 2015 Copernicus Observations Workshop registration still open

05 May 2015 Copernicus workshop focuses on climate projections

[More News](#)

In Focus: ECMWF Copernicus Services at "Our Common Future under Climate Change"

Paris 7-10 July 2015

The **conference** is the largest forum for the scientific community to come together ahead of the **UNFCCC's COP21**, which will take place also in Paris in December.

As the operator of the Climate Change Service and the Atmosphere Service of the EU-flagship Copernicus Programme, **ECMWF** will be present over the week, and specifically in the shape of two events, one focusing on **The Copernicus Climate Change Service: a European answer to Climate Change Challenges**, to take place on 9 July at the UNESCO building, and the other on **Monitoring atmospheric composition in a changing climate: a pathway to informed actions** to take place at the Ballon de Paris, also on the 9 July. *More details including how to attend here.*

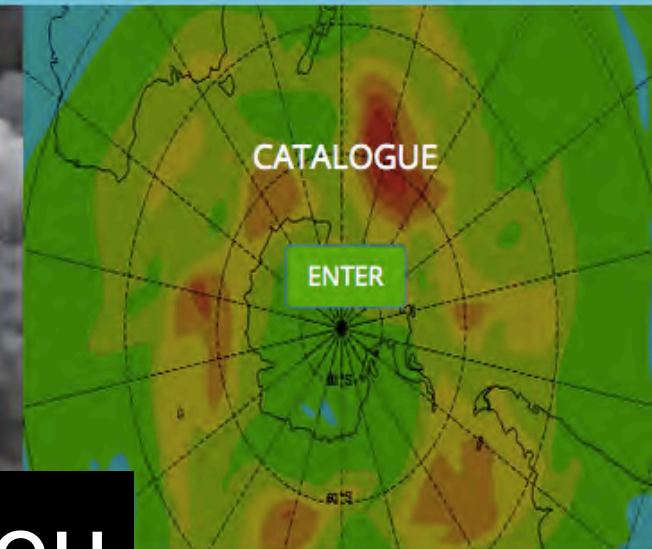


Copernicus Atmosphere Monitoring Service

[NEWS](#)[EVENTS](#)[CATALOGUE](#)[RESOURCES](#)[USER SUPPORT](#)

Supporting the European strategy "Living well within the boundaries of our planet" by combining models and observations to monitor and forecast atmospheric pollution.

Contributing to Europe's green economy by providing timely and accurate information on aerosols, chemical pollutants and greenhouse gases.



www.copernicus-atmosphere.eu

News

07 Jul 2015 [EU flagship Copernicus programme in the spotlight at Paris' Our Common Future under Climate Change](#)

06 Jul 2015 [ECMWF Copernicus Services at "Our Common Future under Climate Change"](#)

03 Jul 2015 [North America impacted by extensive wildfires](#)

02 Jul 2015 [Warm weather and ozone: CAMS supports national air quality forecasting](#)

30 Jun 2015 [CAMS procurements](#)

[More News](#)

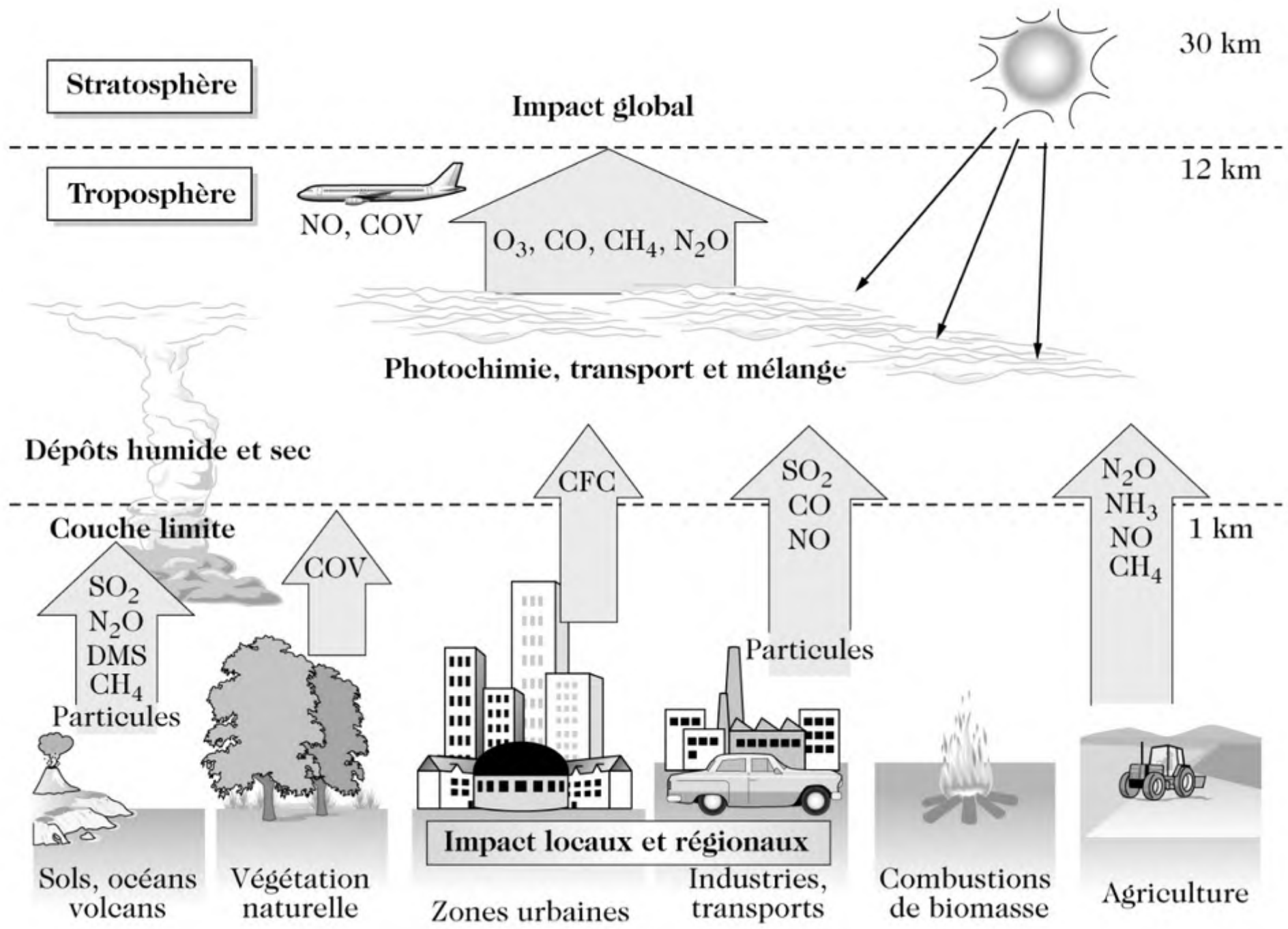
In Focus

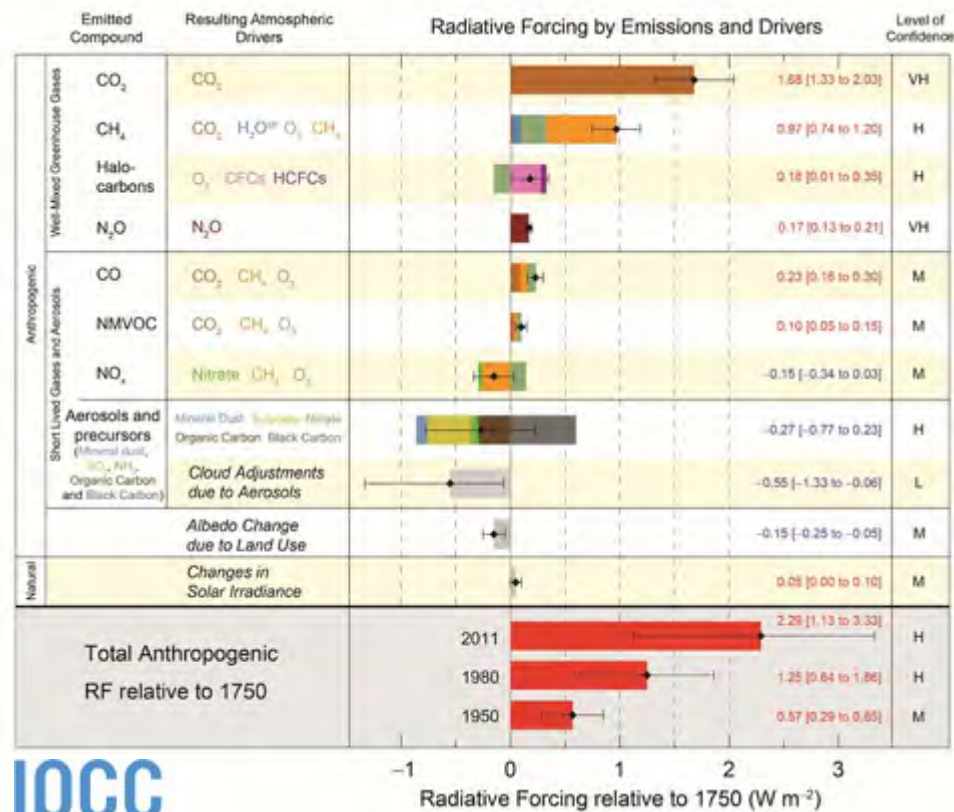


EU flagship Copernicus programme in the spotlight at Paris' Our Common Future under Climate Change

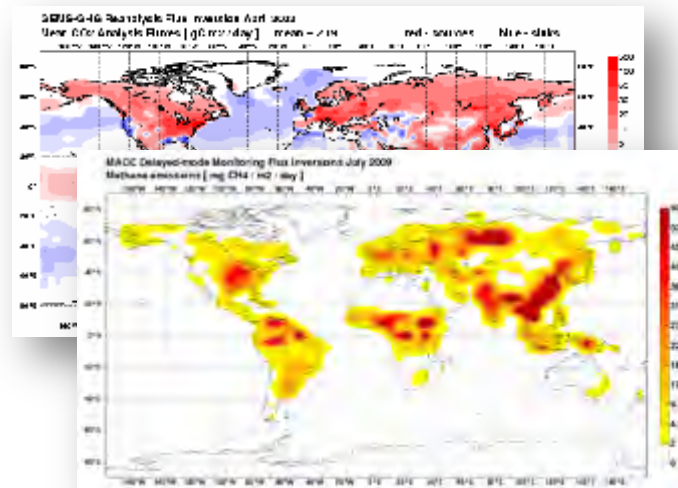
As the very much awaited international scientific conference 'Our Common Future under Climate Change' opens in Paris today, the role and importance of science in the climate change debate are taking front seat. From French Government Ministers to the General Secretary of the WMO, all seem to agree that science and policy making need to work hand in hand if we are not only to tackle the climate challenges, but also to reap the economic...

[Read more](#)

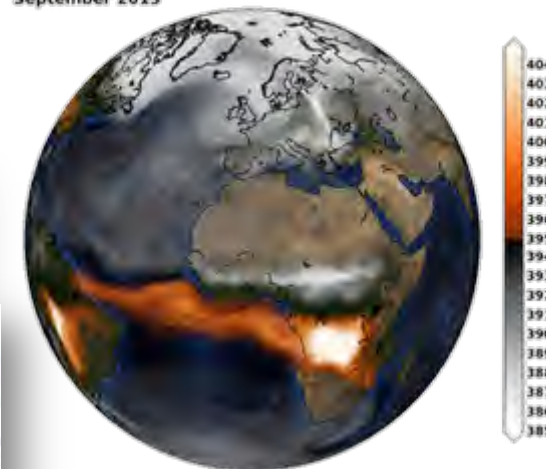




Greenhouse gases distributions and surface fluxes

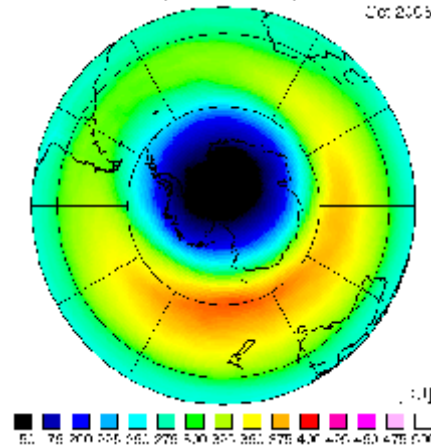


MACC column-averaged dry-air mole fraction of CO₂ [ppm] September 2013

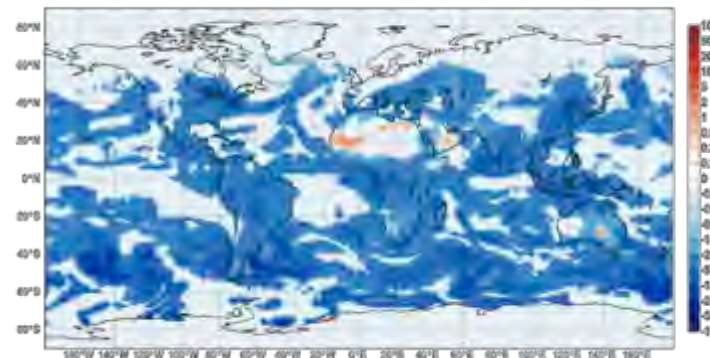


Stratospheric ozone

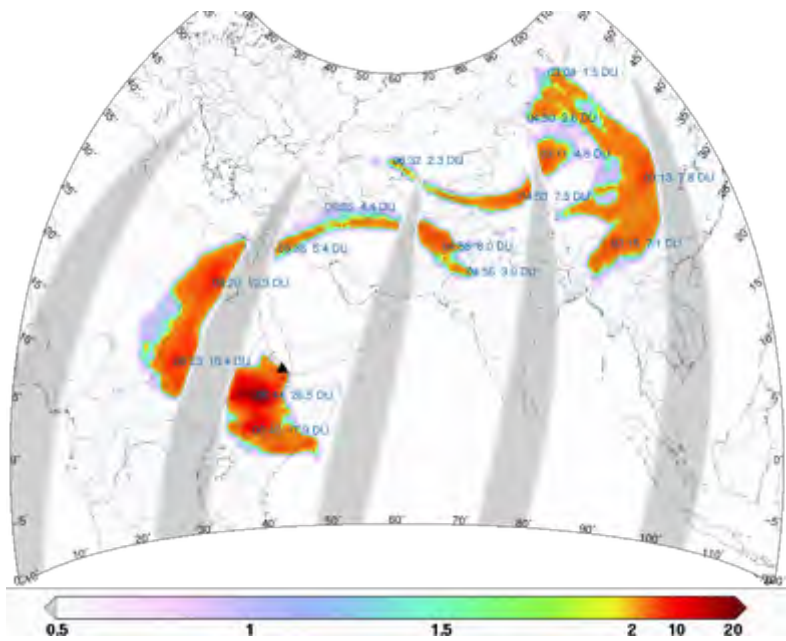
Multi-Sensor Reanalysis Monthly mean db. temp Oct 2005



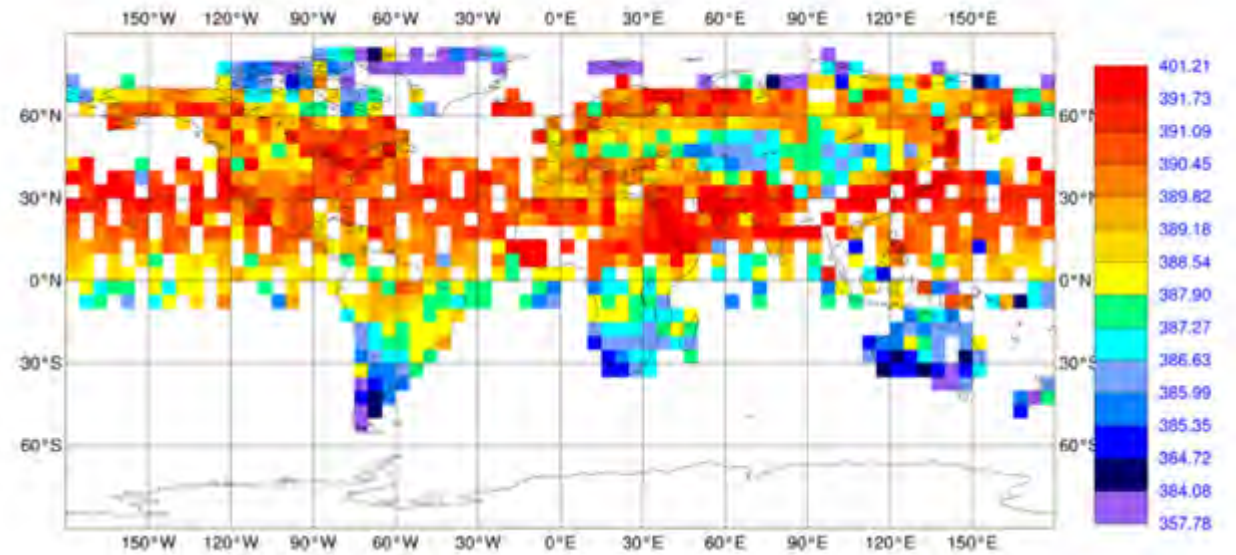
MACC Aerosol Forcing derived from MACC reanalysis Global Monthly Mean December 2012 Anthropogenic SW direct forcing at TOA [Wm-2] min=-31.807 max=4.884 mean=-2.547



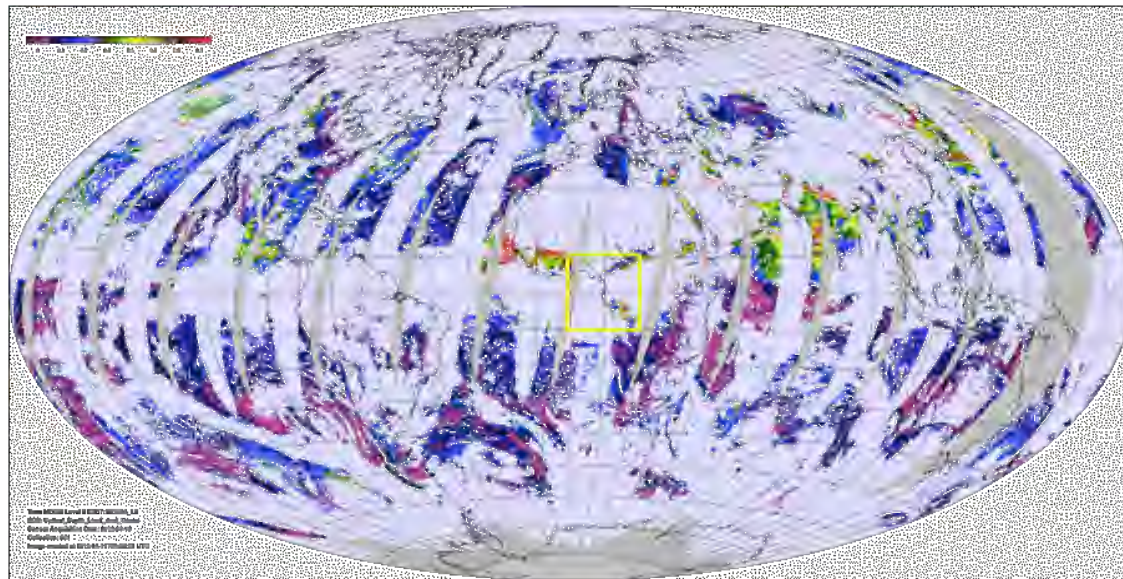
Aerosols radiative forcings



SO₂, GOME-2, SACS, BIRA/DLR/EUMETSAT



CO₂, GOSAT, ACOS/JAXA/NIES

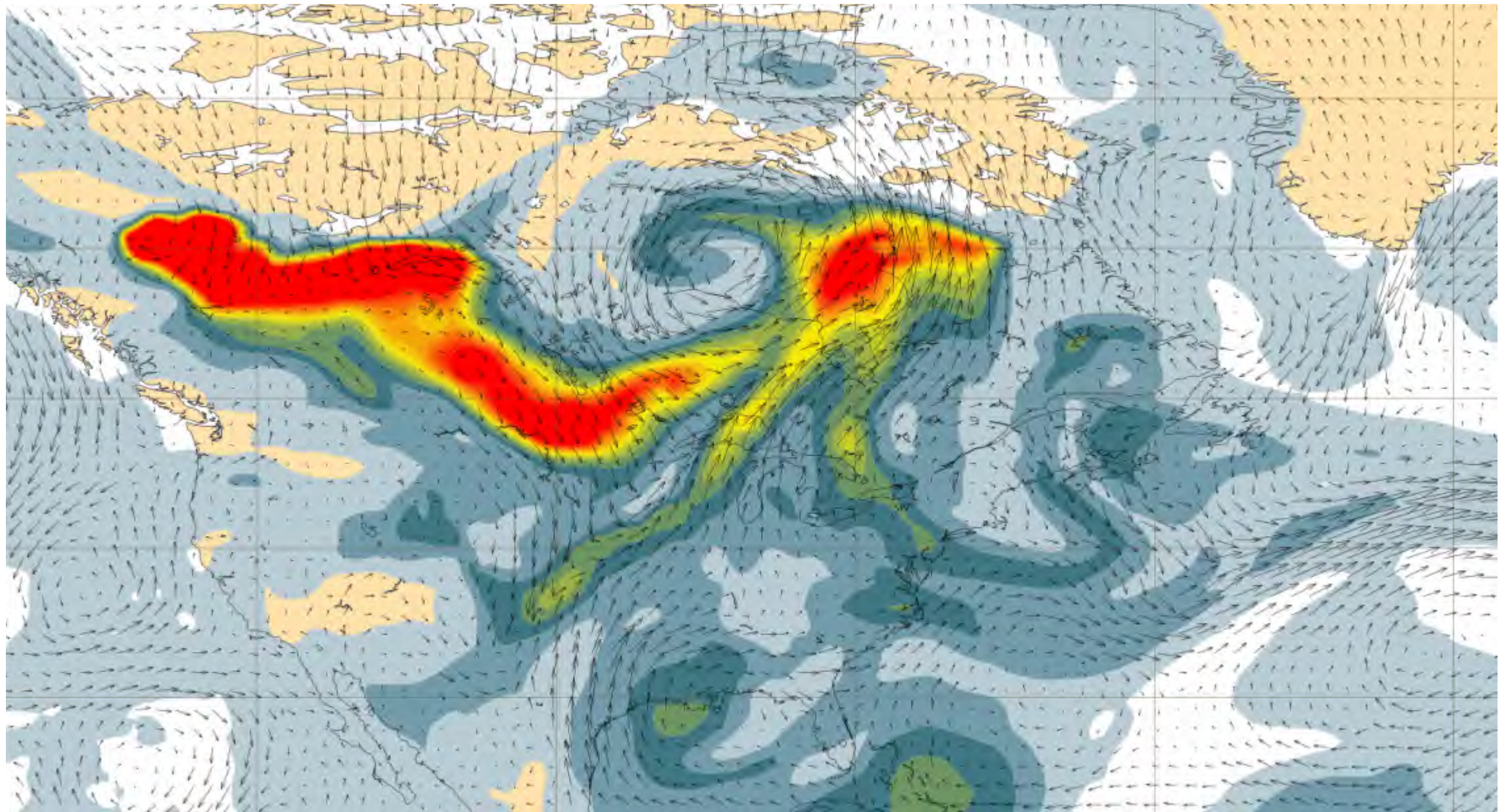


Aerosol Optical Depth, MODIS, NASA

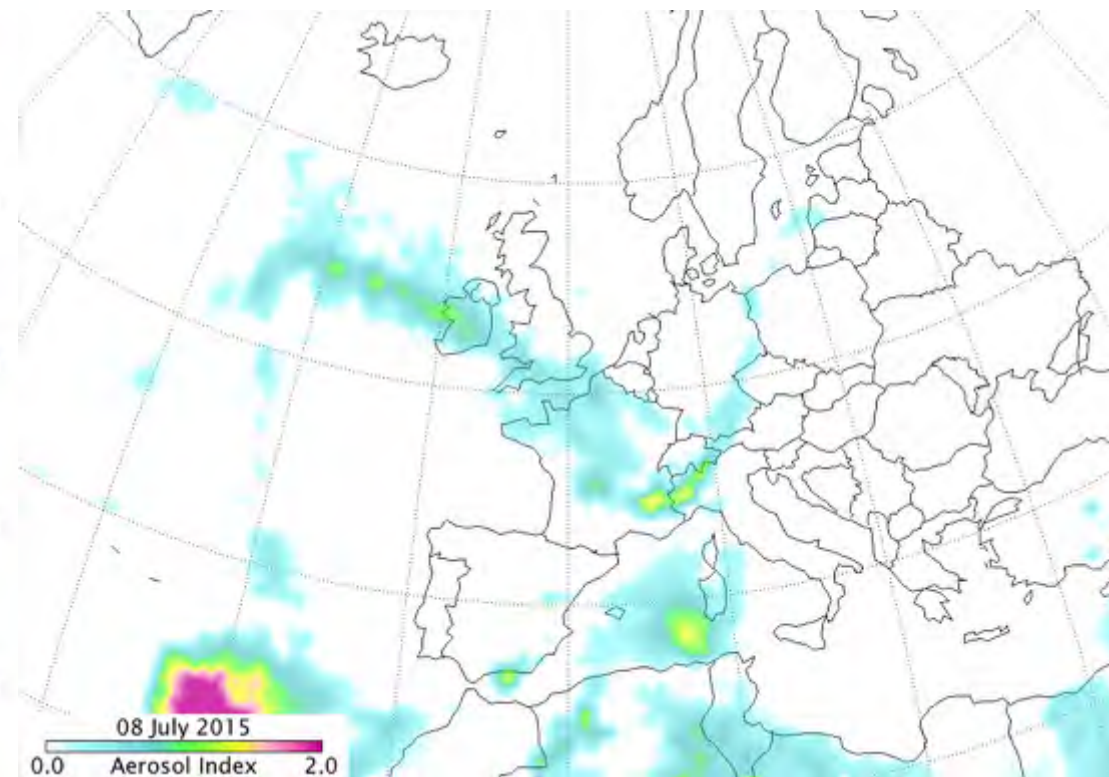
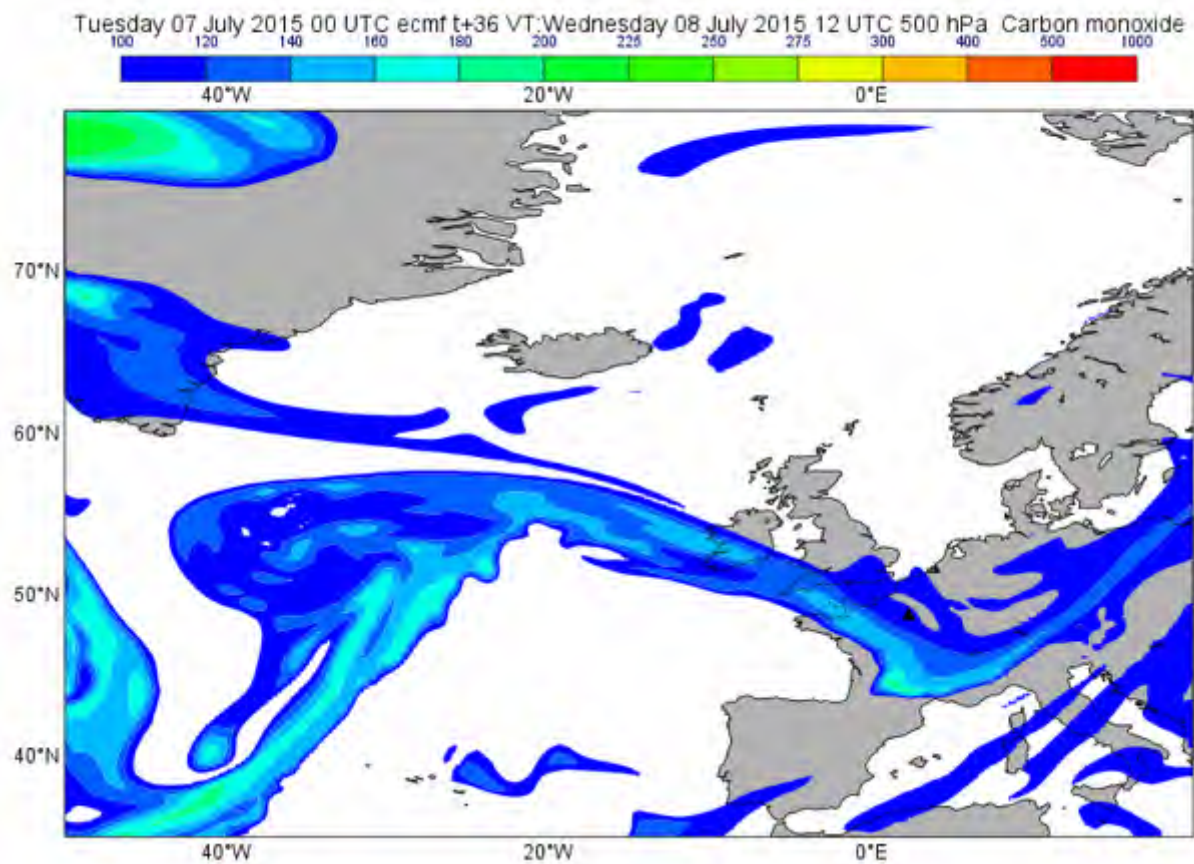


NO₂, OMI, KNMI/NASA

Feux Canadiens (en cours)

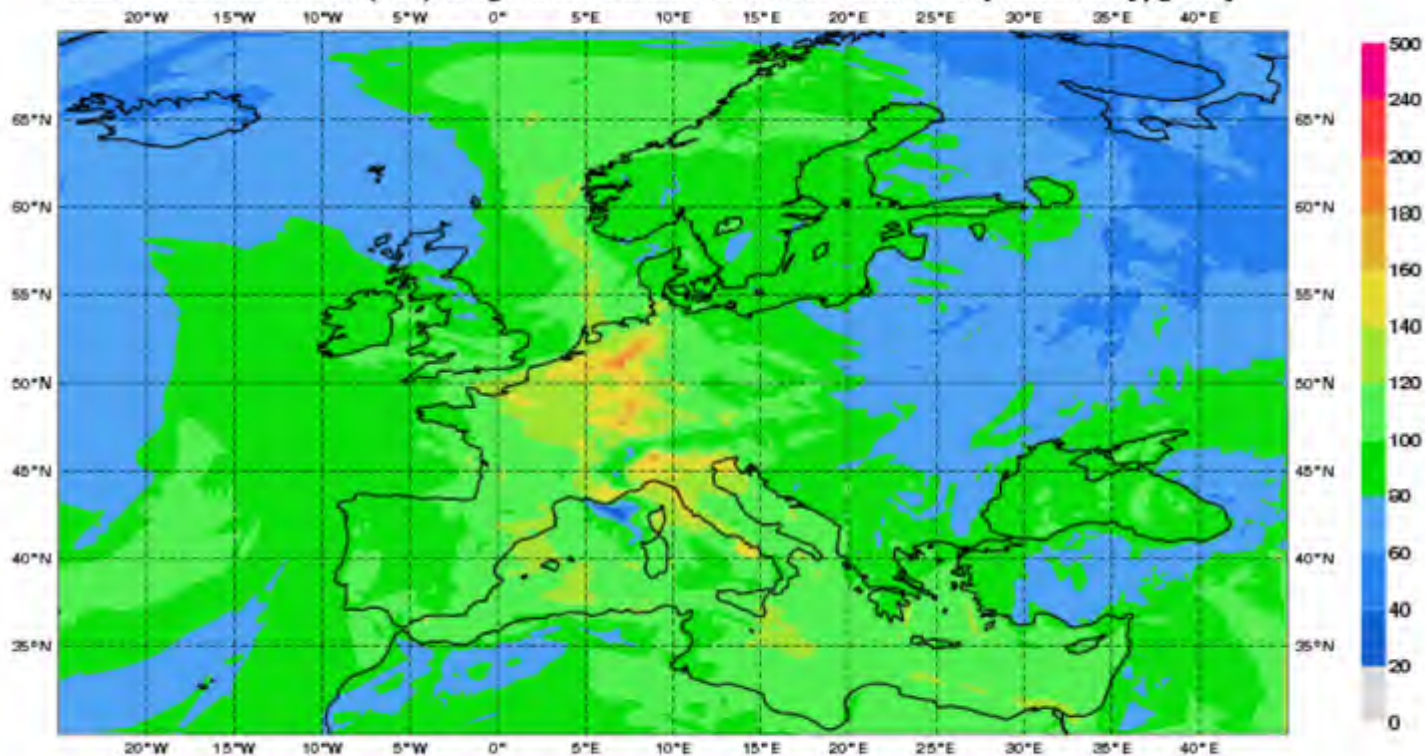


Feux Canadiens (en cours)



Pollution à l'ozone

Wednesday 1 July 2015 00UTC MACC-RAQ Forecast D+2 VT: Friday 3 July 2015
Model: Ensemble Median (N=7) Height level: Surface Parameter: Ozone Daily Maximum [$\mu\text{g}/\text{m}^3$]





Jean-Baptiste Renard

Directeur de Recherche au CNRS

*New light instrumentation for the ground and airborne
measurements of FINE particles and gas*



Light new instruments are necessary for easy ground-based and airborne *in situ* monitoring of fine particles and gas for chemistry and climate studies

Tethered balloons

Meteo balloons

Unmanned Airborne Vehicles

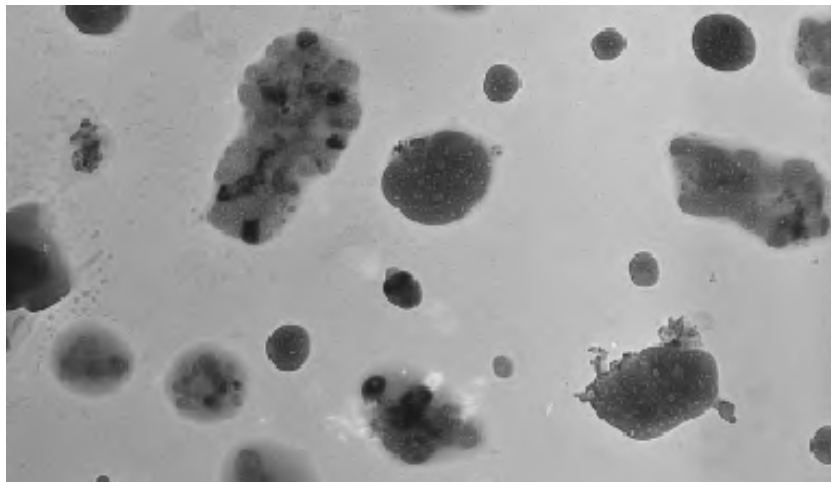


Fine particles:

Particles smaller than $1\ \mu\text{m}$ (PM1) are dangerous for human health

Normative measurements for air quality (PM10 and PM2.5) are given in $\mu\text{g}/\text{m}^3$

They are more sensitive to the heaviest particles => no direct evaluation of the PM1

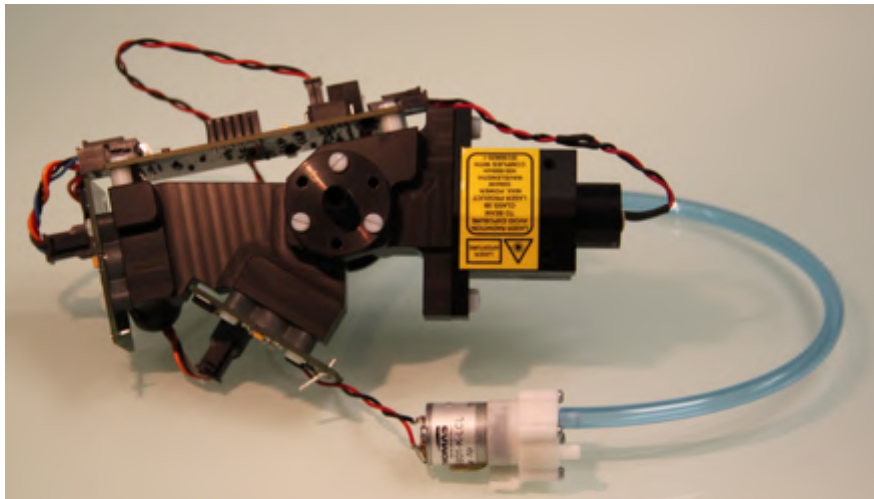


How to measure these fine particles?

Counting systems : provide the particles size distribution and their concentrations

LOAC (Light Optical aerosol counter) is a light aerosols counter (< 1 kg) that be used with all kinds of balloons

Measurements of particle concentrations in 19 size classes in the 0.2 to 100 μm range



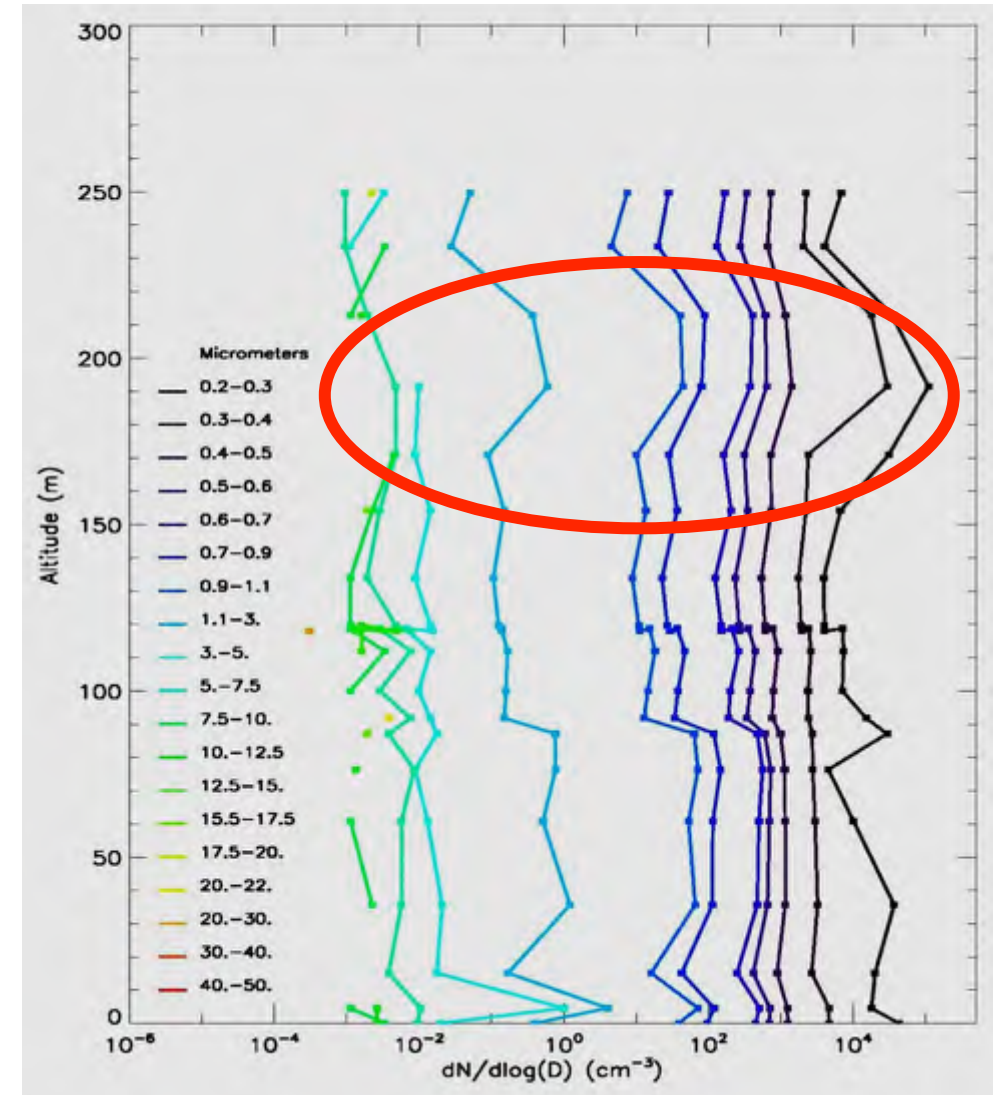
LOAC at the “Observatoire Atmosphérique Generali”



Permanent measurements since May 2013

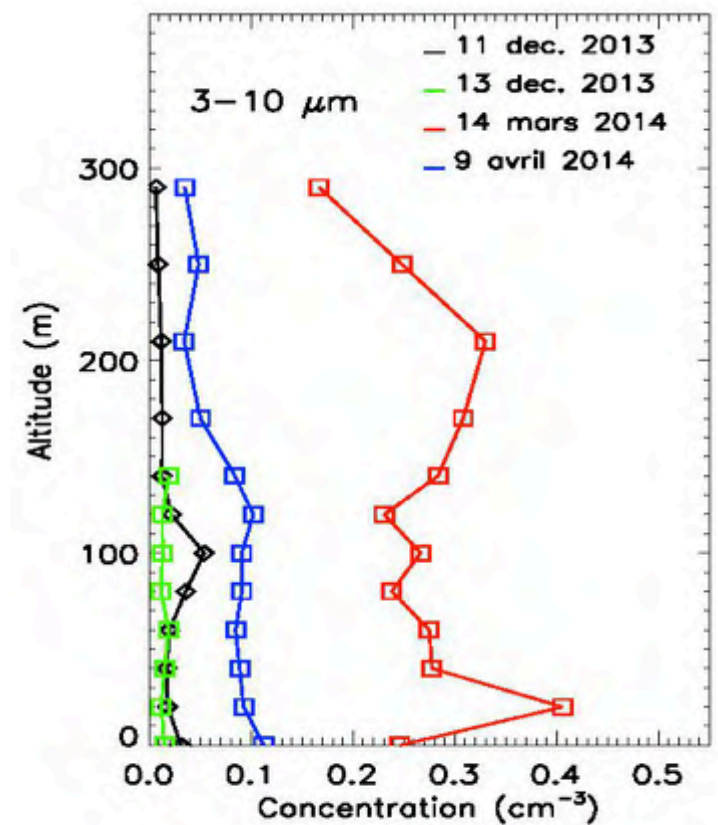
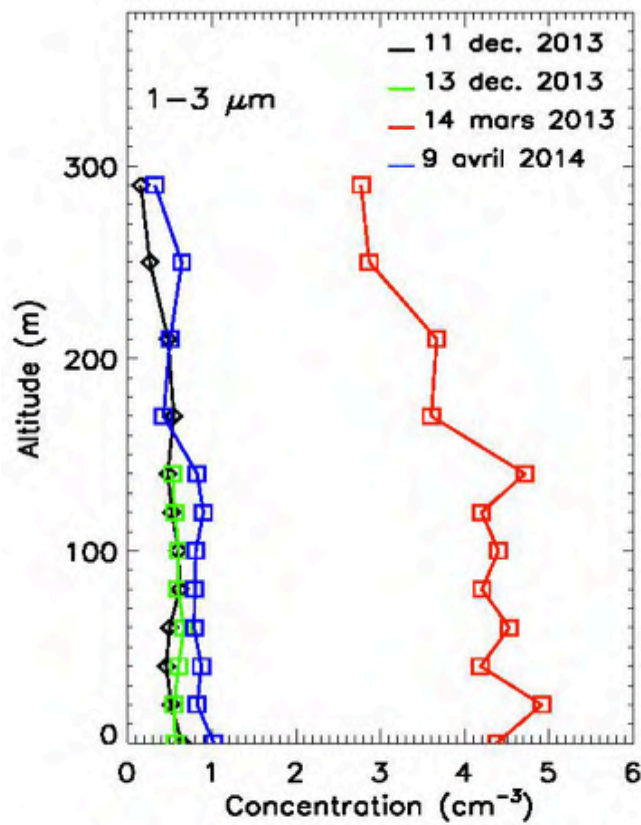
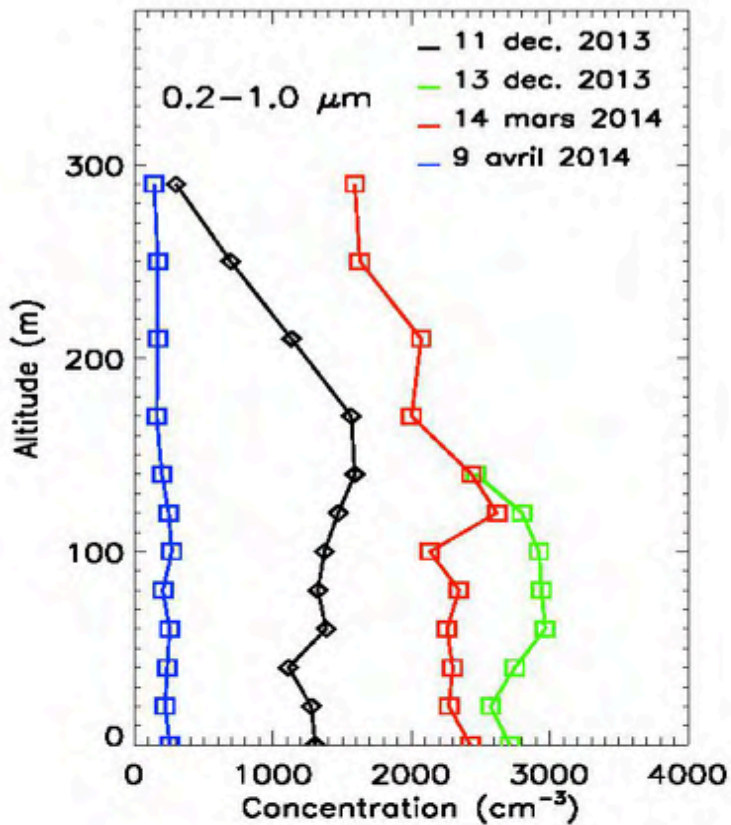
Wi-Fi link to send the data, real-time presentation of the results to the public and on the web (www.ballondeparis.com)

Example : Strong pollution event on 11 December 2013; accumulation layer at an altitude of 200 m, dominating by particles $< 1 \mu\text{m}$



Different evolutions of concentrations with altitude (vertical transport):

- Low pollution in April 2014 (blue curve)
- December 2013 pollution (Black and green curves)
- March 2014 pollution (red curve)



Analogy with the particles concentrations in case of passive smoking

6 millions of particles in the
0.2 – 1 μm range equivalent to
8 cigarettes in a 60 m^3 room

“Rapid” analogy, but very efficient !
Hundreds of interview and citations
in the worldwide medias



A LOAC network start to be implanted in France:

Touristic balloons : OAG (Paris) and Terra Botanica (Angers)

Ground : Palaiseau (SIRTA observatory) and Orléans (labex VOLTAIRE)



LOAC measurements of particles content from ground to mid-stratosphere (35 km) by regular flights (2 or 3 per month) under meteo balloons mainly from France

Better document the nature of the aerosols (chemistry and climate applications)

Measurements strategy with Meteo France under in case of future major (Icelandic) volcano eruption



Development of new light sensors for H₂O, CO, HCl, SO₂ to be carried by meteo balloons and UAV for regular and « low cost » flights:

Monitoring of key species for climate and chemistry
Studies of specific events (like volcano eruptions)





Laurence Rouil

Responsable du Pôle Modélisation Environnementale et
Décision à l'INERIS



Protocole de Kyoto

Roadmap 2050 / Europe 2020

(Politique énergétique de l'UE)

Convention sur le Transport de la Pollution atmosphérique à longue distance (CEE-NU)

Stratégie thématique sur la Pollution Atmosphérique (TSAP UE)

- Directives qualité de l'air
- Directives sur les plafonds nationaux d'émission
- Directives sectorielles

Echelle
Nationale

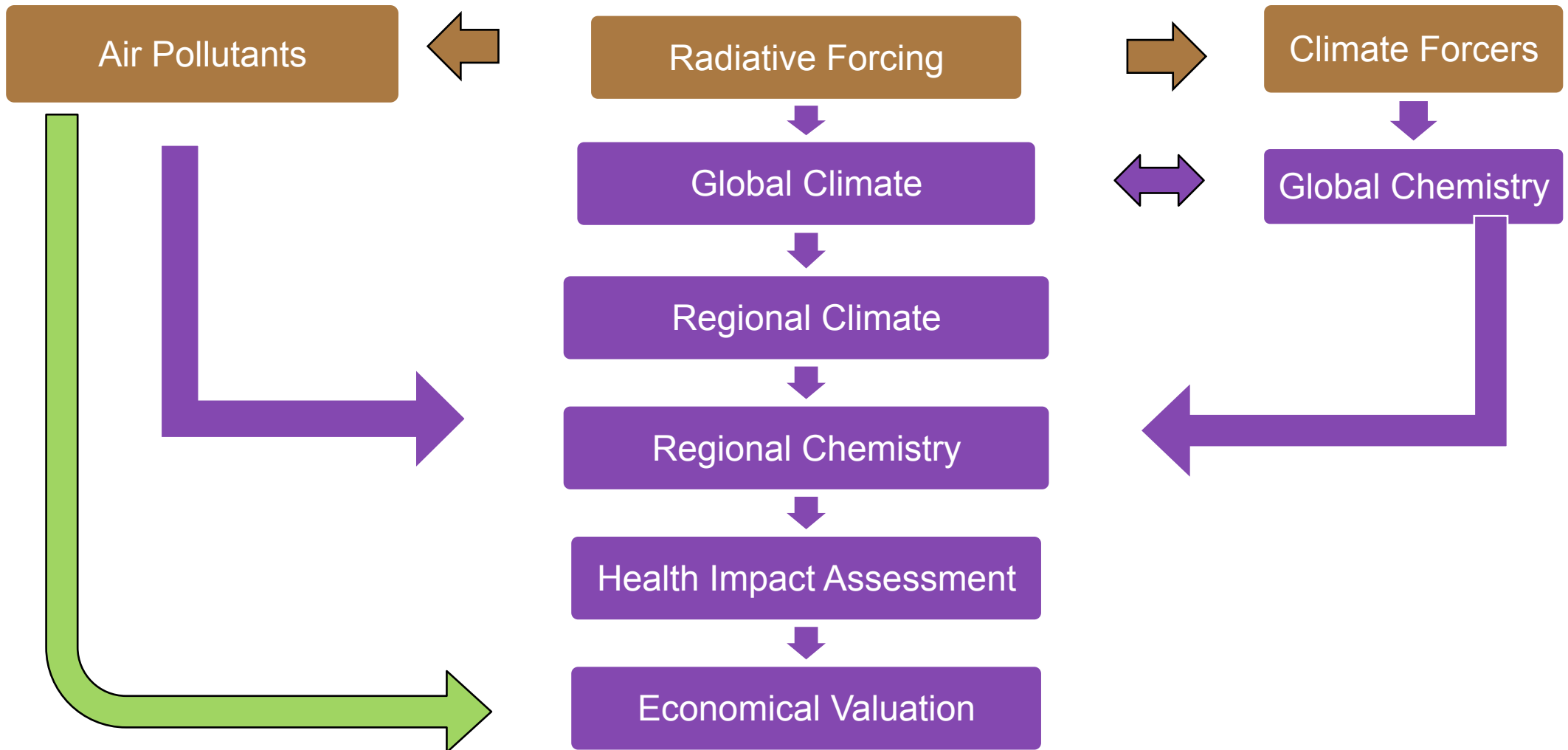
- **Code de l'Environnement**
- **Loi sur l'Air et l'Utilisation Rationnelle de l'Energie (LAURE, 1996)**
- **Lois 'Grenelle 1 &2' :**
(plan particules)
- **Loi sur la transition énergétique pour la croissance verte**
(plan d'action sur la qualité de l'air)

Echelle
régionale

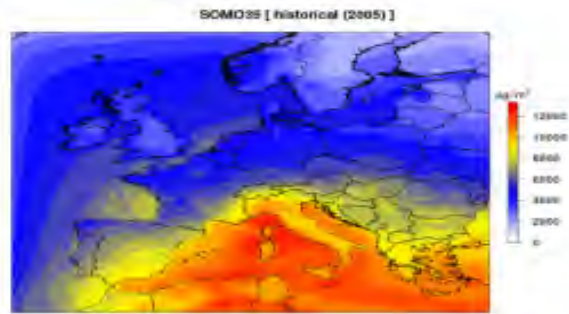
Schémas régionaux Climat Air Energie
(SRCAE)

Echelle
locale

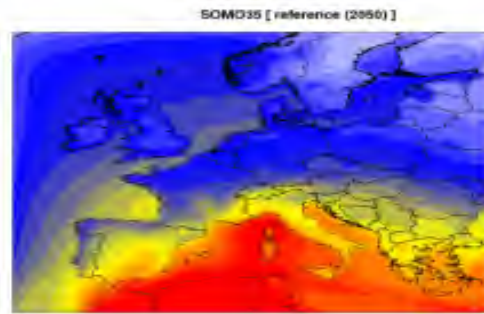
Plans de protection de l'atmosphère (PPA):
Plans de déplacements urbains (PDU):
Schémas de Cohérence Territoriale (SCOT):
Agenda 21, land use plans, ...



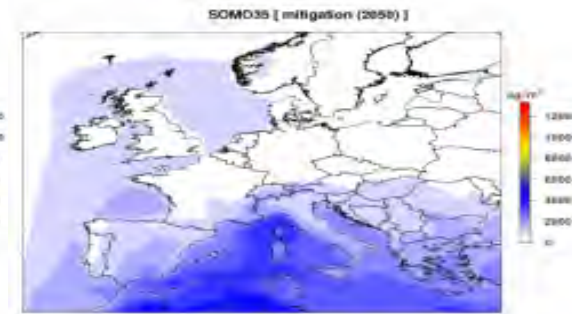
2005



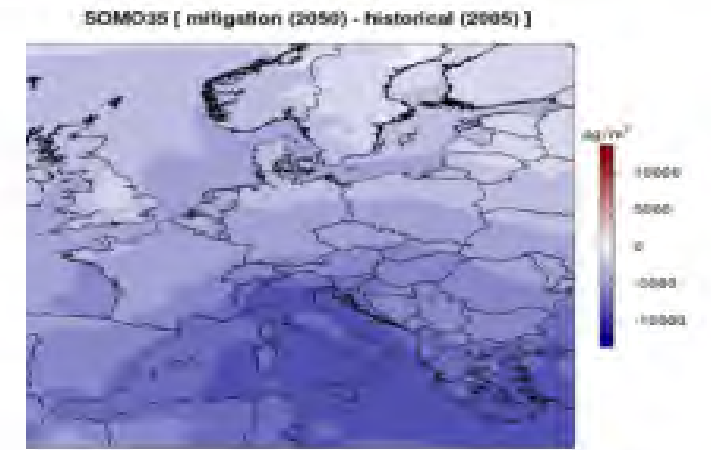
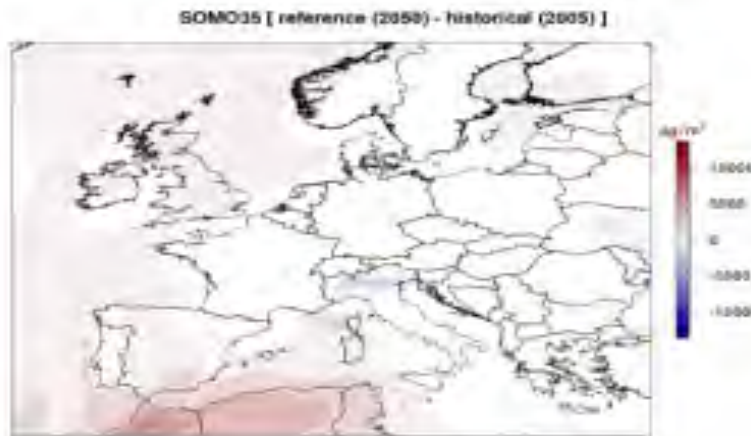
2050 Reference



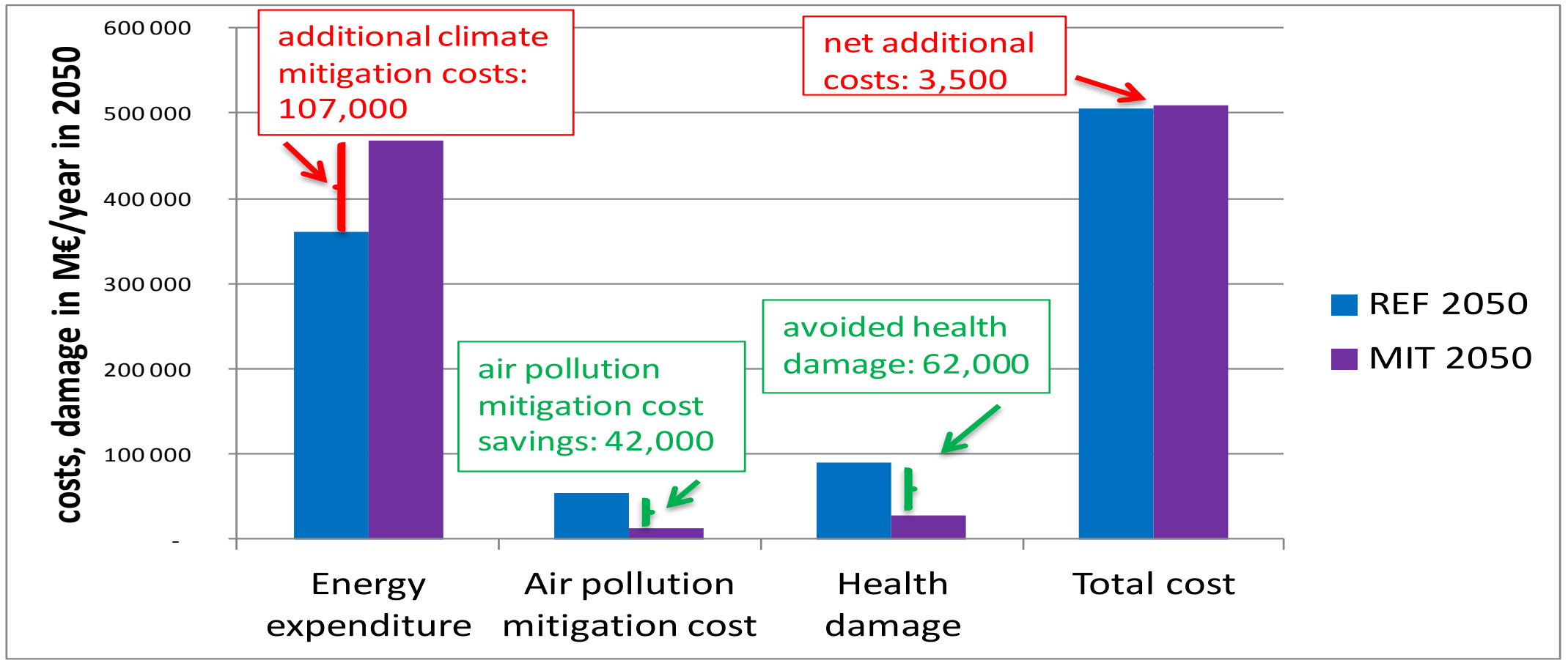
2050 Mitigation



Difference
Avec
historique



status-quo pour la situation de Reference,
diminution importante pour le scénario de
Mitigation



Jean-Louis Caffier

Journaliste pour Néo Planète, Président de l'Association
« Climat, Energie, Humanités, Medias »

