French dataset proposed for the 3rd European source apportionment intercomparison exercise

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RÉPUBLIQUE FRANÇAISE
Ministère de l'Écologie, du Développement durable et de l'Énergie

LCSQA

INERIS
maîtriser le risque pour un développement durable

MINES Douai

L G G E
Laboratoire de Glaciologie et Géophysique de l'Environnement

Atmo Nord - Pas de Calais
Surveillance de la qualité de l'air

LCME
Laboratoire Chimie Moléculaire et Environnement

Origin of the dataset

The **CARA** (PM Chemical Characterization) **program**

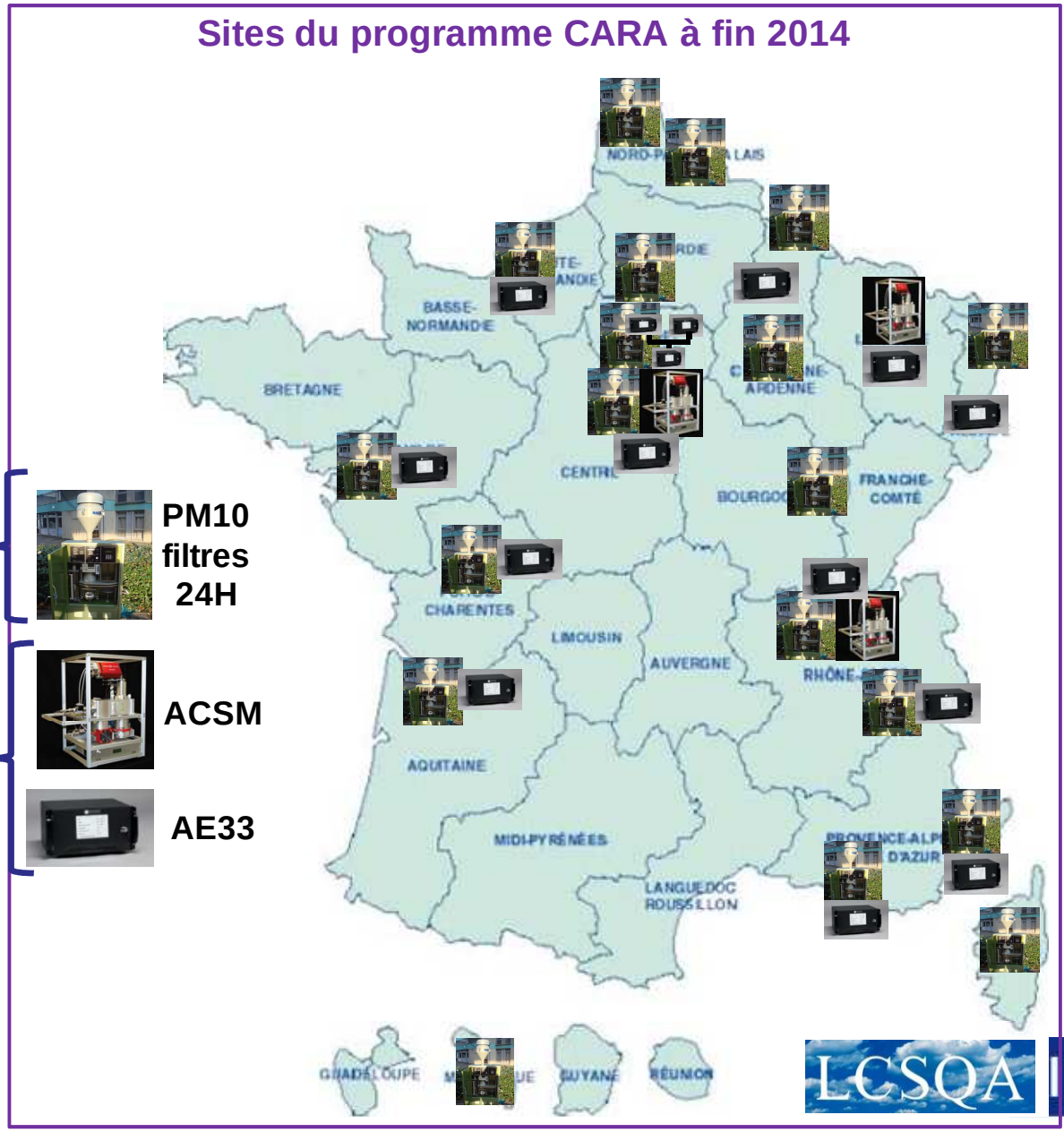
Designed and managed by INERIS, as part of the French reference laboratory for air quality monitoring (LCSQA)

Since 2008

- ✓ **Daily filter sampling and off-line chemical analyses**

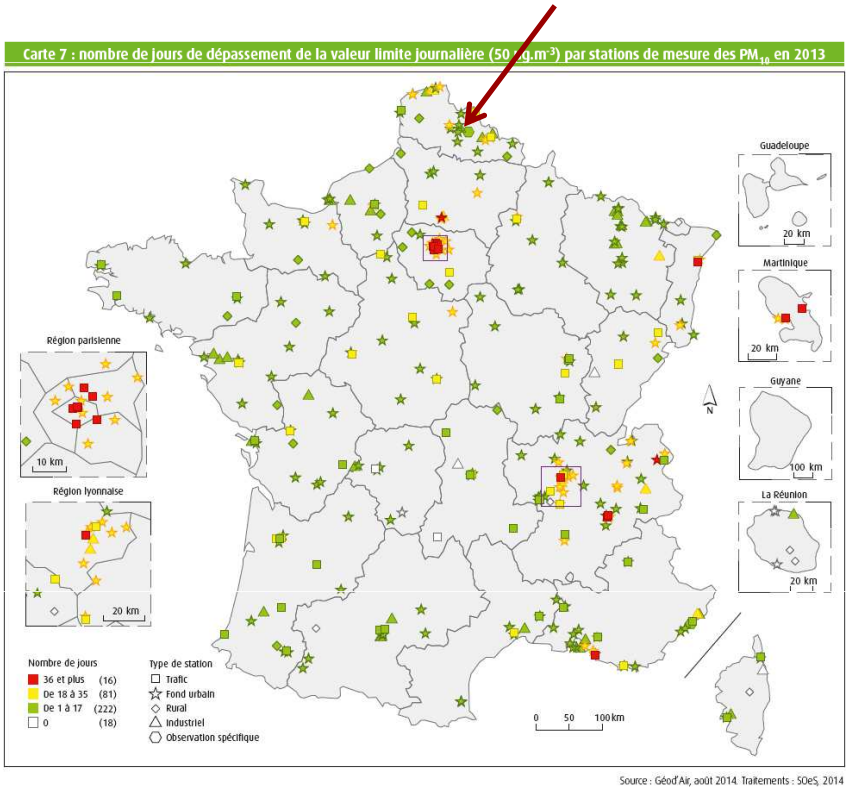
Since 2013

- ✓ **Real-time in situ data**



Dataset summary (as proposed by JRC)

COUNTRY	France
PERIOD	03.2011 to 03.2012
TIME RES.	every 3 days
DURATION OF SAMPLING	24 hours
TYPE OF SITE	Urban background
	PM10
N SAMPLES	116
IONS	ok (8 species)
EC/OC	ok
TRACE ELEMENTS	ok (25 species)
PAHs	ok (15 species)
LEVO/MANN	ok + galacto
HOPANES	ok (10 species)
N-ALKANES	ok (29 species)
CHOLESTEROL	
SOA MARKERS	ok
OTHER	Pristane, Phytane, Glucose



More about sampling

Sampling site

- Urban backgroung
- In a large urbanized area (about 500 000 inh within 100km)
- Several highways in the vicinity
- Several types of industries within a few 10's km (petrochemical, metallurgic, and non-metallurgic)
- Not far away from the sea (about 80-100 km)
- Climate like in Belgium ☺

Sampling procedures

- Daily Hivol (30 m3/hr) on Quartz filter (*Pall-Gelman* 2500 QAT-UP**)** 250 mm diameter
- Folded in half, wrapped in aluminum foil and in sealed polyethylene bag
- Samples kept a low temperature after sampling
- Handling / punching under laminar flow hood before analyses.

Species list

1. **Ionic species** (Na+, NH4+, Ca2+, Mg2+, K+, Cl-, NO3-, SO42-) and **EC/OC**
2. **Trace elements** As, Ba, Cd, Ce, Co, Cs, Cu, La, Mn, Mo, Ni, Pb, Rb, Sb, Sr, V, Zn, Al, Ca, Fe, K, Mg, Na, S, Ti
3. **PAHs** Phenanthrene, Anthracene, Fluoranthene, Pyrene, Retene, Benzo(a)anthracene, Chrysene, Benzo(e)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Benzo(ghi)perylene, DiBenzo(Ah)anthracene, Indeno(1,2,3-cd)pyrene, Coronene
4. **Hopanes** Trisnorneohopane, 17α-Trisnorneohopane, 17α21β-Norhopane, 17α21β-Hopane, 17α21β22S-Homohopane, 17α21β22R-Homohopane, 17α21β22R-Bishomohopane, 17α21β22S-Bishomohopane, 17α21β22S-Trishomohopane, 17α21β22R-Trishomohopane
5. **N-Alkanes** C12 to C40
6. **OA markers** biogenic aerosols: Arabitol, Sorbitol, Mannitol

   Biomass burning: Levoglucosan, Mannosan, Galactosan

Analyses

EC-OC
Sunset lab analyzer with EUSAAR2 protocol. Split EC-OC determined with transmittance

Ionic species
Ionic chromatography (IC, *Dionex* ICS-3000)with AS/AG 17 and CS/CG 12A columns
Samples were soaked for one hour in 10 mL of Milli-Q water
Filtered using 2µm-porosity *Acrodisc* filters

Anhydro sugars
Sugar anhydrides (levoglucosan, mannosan, and galactosan) and sugar alcohols (arabitol, sorbitol, mannitol)
HPLC-PAD (DX500) Methrom colomns (MetroSep A Supp 15 and Metrosep Carb1)
Same extracts as for IC

Trace metals
Al, Na, Mg, K, Ca, Fe and Ti : ICP-AES (IRIS Intrepid, *Thermo-Scientific*)
As, Ba, Cd, Ce, Co, Cs, Cu, La, Mn, Mo, Ni, Pb, Rb, Sb, Sr, V, Zn : ICP-MS (ELAN 6100 DRC, *Perkin Elmer*)
acid digested (HNO_3; HF; H_2O_2) with a microwave oven

Organic speciation
Extraction in high pressure / high temperature solvents mixtures (ASE-200) ;
Preconcentration (Zymark) + filtration (Anatop 0,10 µm)
2 analyses with GC-MS : GC Clarus 500 ; MS 560 – Perkin Elmer
Direct injection + after derivatization (BSTFA + TMCS)

PM_{10} and Metadata

PM10
Daily PM_{10} data obtained from Beta gauge measurements (MP101M-RST)

Gaseous species
NO/NO_2, O3, BTEX

Meteorological data
Temp., Press., rH, WD & WS
Other upon request

Emission inventory
Local / national ones
TNO / EMEP ?