

## SENSORS FOR AIR QUALITY MONITORING

French outlook

FAIRMODE technical meeting  
Athens, 19-21 June 2017

## French organization for air quality monitoring:



Ministère de la Transition  
écologique et solidaire

The **ministry in charge of environment** defines national policy on air and develops a national air quality monitoring strategy.

Air quality monitoring in French administrative regions is delegated to qualified associations (**AQ networks = AASQAs**)

Sensors for AQ monitoring



The central laboratory for air quality monitoring, the **LCSQA**, is the French National Reference Laboratory (**NRL**)  
 ↳ Scientific support, technical coordination

## Air quality assessment methods

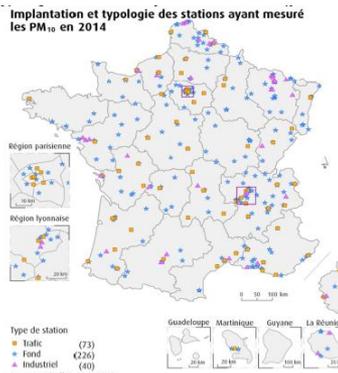
### Regulatory monitoring network



(Source: [www.madininair.fr](http://www.madininair.fr))



(Source: [www.air-lorraine.org](http://www.air-lorraine.org))

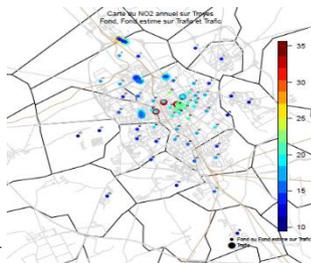


PM<sub>10</sub> fixed monitoring network in 2014

### Supplementary monitoring campaigns



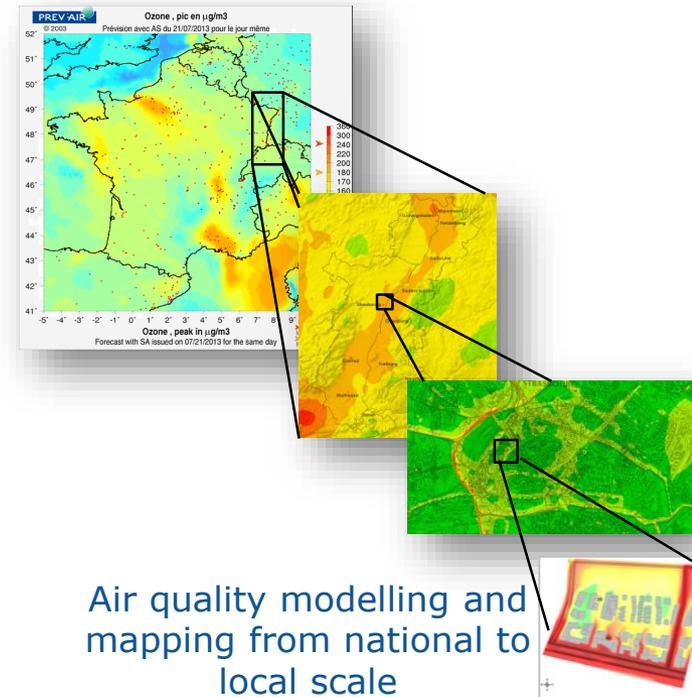
(Source: [www.atmosfair-bourgogne.org](http://www.atmosfair-bourgogne.org))



Example of NO<sub>2</sub> passive sampling survey (Troyes, Atmo Grand-Est)



Source: [www.atmo-reunion.net](http://www.atmo-reunion.net)



### Air quality modelling and mapping from national to local scale

## Air quality assessment methods

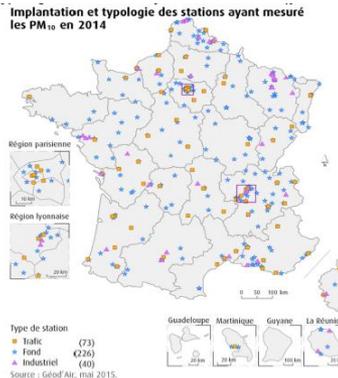
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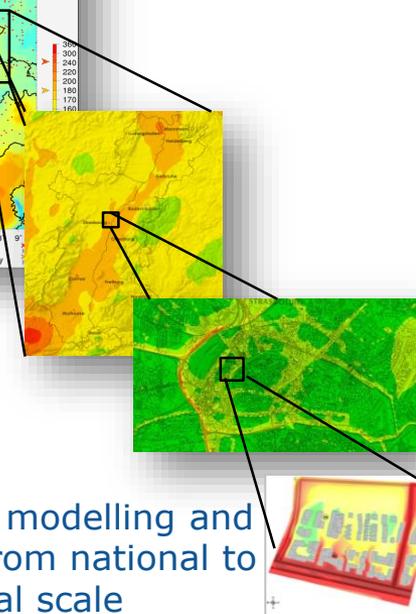
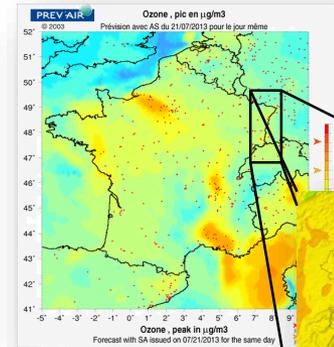
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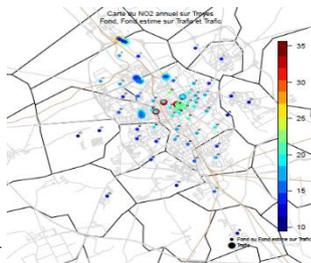


Air quality modelling and mapping from national to local scale

### Supplementary monitoring campaigns



(Source: www.atmosfair-bourgogne.org)



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Which place for the microsensors ?



## At the beginning of 2017:

- **On the national level:**

- ✓ Definition of a protocol for gas sensor evaluation + participation to the CEN/TC264/WG42
- ✓ Laboratory testing (NO<sub>2</sub>, NH<sub>3</sub>)
- ✓ Contact with sensor manufacturers and distributors (in want of a framework for testing and comparing their measurement systems).

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- **In regions:**

- ✓ Local initiatives : projects conducted by a few AASQAs.
  - Fixed sensors: monitoring campaigns for traffic management projects, exposure mapping...
  - Mobile sensors: participation of citizens, educational purpose...
- ✓ The AASQAs are more and more solicited by municipalities/sensor suppliers to deploy devices  
→ difficulty to adopt a position without any clear view of the potentialities AND limitations of sensors.
- ✓ Local authorities may also be directly contacted by start-up offering services based on sensors.

## Many issues

- ✓ **on sensors: capacities and limitations? Application framework?**
- ✓ **on data: need for good practices concerning data collection → validation → processing → combination with other information sources...**
- ✓ **How to take account of new actors: start-up, citizens...?**
- ✓ **How to meet local demand while ensuring good-quality information?**

**⇒ Need for a national strategy on sensors**

**In 2017 (and for next years...):**

- **Creation of a national working group (LCSQA-AASQA) with the following roadmap for 2017-2019 :**
  - ✓ Inventory of sensor techniques
  - ✓ Collection of users' needs and feedback, exchange with manufacturers/distributors
  - ✓ Preparation of a field intercomparison exercise
  - ✓ Guidelines on the use of sensors for air quality monitoring (including QA/QC)
  - ✓ Reflection on the possible inclusion of sensors in the national type approval scheme
  - ✓ Definition of solutions for integrating sensors in the air quality data exploitation chain
  - ✓ Recommendations for including sensor data in mapping and modelling activities

## In 2017 (and for next years...):

- To support this work, part of the LCSQA annual programme of studies needs to be dedicated to sensors :
  - ✓ **Measurement aspects**
    - Technological watch on sensors
    - Development of laboratory evaluation protocol for PM sensors
    - Interlaboratory comparison exercise (to be performed regularly)
    - Influence of signal processing on the sensor response
  - ✓ **Data transmission and use**
    - Acquisition systems and database storage
    - Technological watch and preliminary tests on the use of sensors for air quality modelling and mapping

⇒ **Clear identification of « which tool for which objective »**

**Proposals:**

- **Sharing experience on the use of sensors for modelling and mapping**
- **Sharing datasets for testing methods**
- **Identifying good practices**
  - **Sampling strategy (↔ AQUILA)**
  - **« Calibration/adjustment » issues (↔ AQUILA)**
  - **Interpolation**
  - **Combination with urban/local scale modelling**
  - **Use of sensors for modelling evaluation ?**
  - ....

⇒ **Crucial link with AQUILA concerning technical aspects on the use of sensors (QA/QC !!)**

*NB: In collaboration with WMO, the TFMM (EMEP) will work on a position paper about possible interconnections between sensors and long-term observation networks (EMEP, GAW). Planned for 2018.*