ARIA Technologies
25 / 04/2018

CHAMBRE FRANÇAISE DE COMMERCE ET D'INDUSTRIE DU MAROC

ARIA TECHNOLOGIES

La qualité de l'air au Maroc et les nouvelles technologies pour l'améliorer

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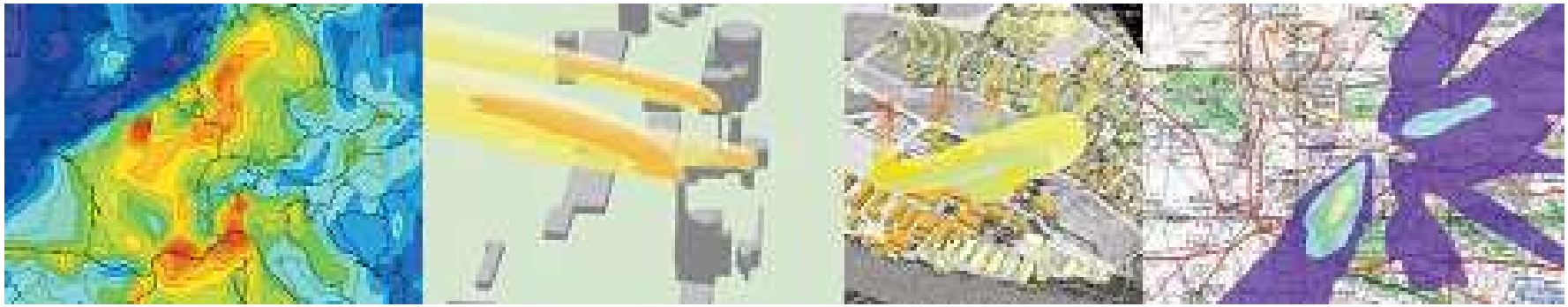
ARIA Technologies

CHAMBRE FRANÇAISE DE COMMERCE ET D'INDUSTRIE DU MAROC

ARIA TECHNOLOGIES

- ➔ **Qui sommes-nous ?**
- ➔ **La pollution un phénomène complexe et universel**
- ➔ **La pollution urbaine**
- ➔ **La pollution industrielle**
- ➔ **L'initiative PCMA : Ecoles des Mines de Rabat / Mines de Douai**



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Notre profile

- **ARIA Technologies SA**
  - **Fondé en 1990 par trois ingénieurs d'EDF R&D**

- **Une PME innovante et indépendante**
  - **Siège à Boulogne-Billancourt**
  - **Bureaux a Grenoble, Toulouse, Marseille and Brest**
  - **Filiales ARIANET (Milan) SIMULARIA (Turin)**
  - **Filiale Rio (Brazil) : ARIA do Brazil**
  - **Des representants au Maroc, en Chine, au Chili, à Singapour, en Inde et en Corée.**

- **Un seul métier : environment atmosphérique**
  - **Logiciel et Système**
  - **Etudes and Conseil**
  - **R&D en collaboration avec les grands laboratoires (IPSL, US-NCAR)**

Notre équipe

Plus d'un quart de siècle d'expériences et d'innovations

Tout le monde est concerné…

Industries

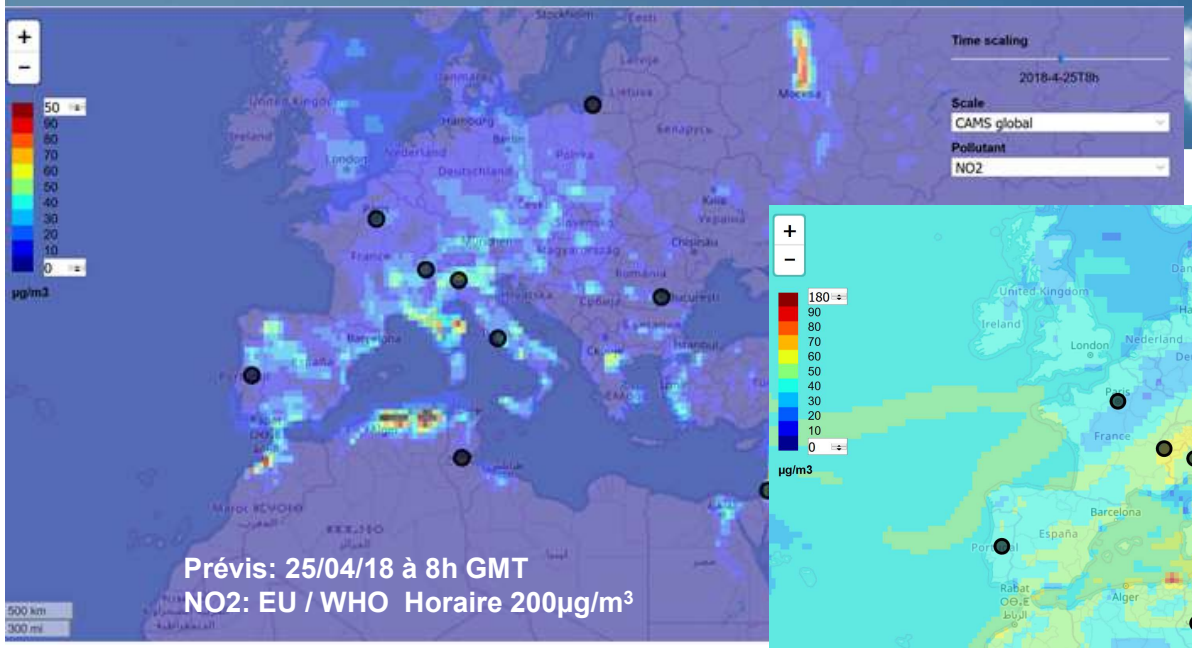
- ➔ **Etudes d'impact**
- ➔ **Système de suivi en ligne**
- ➔ **GES MRV / bilan Carbone**
- ➔ **Energies renouvelables**
  - Eolien
  - Biogaz
  - Solaire

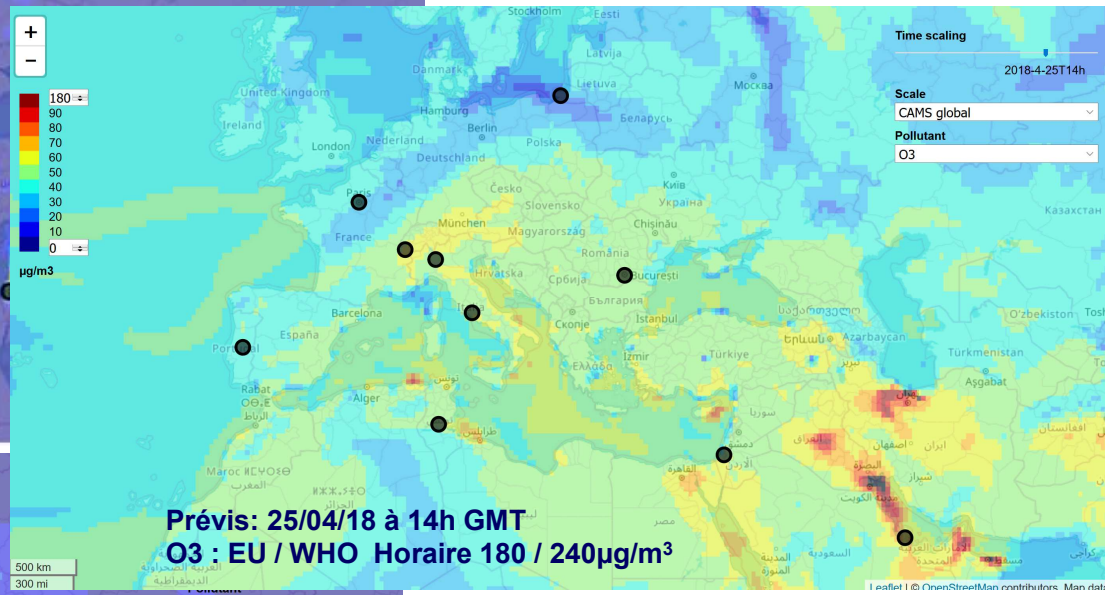
Risque et accident

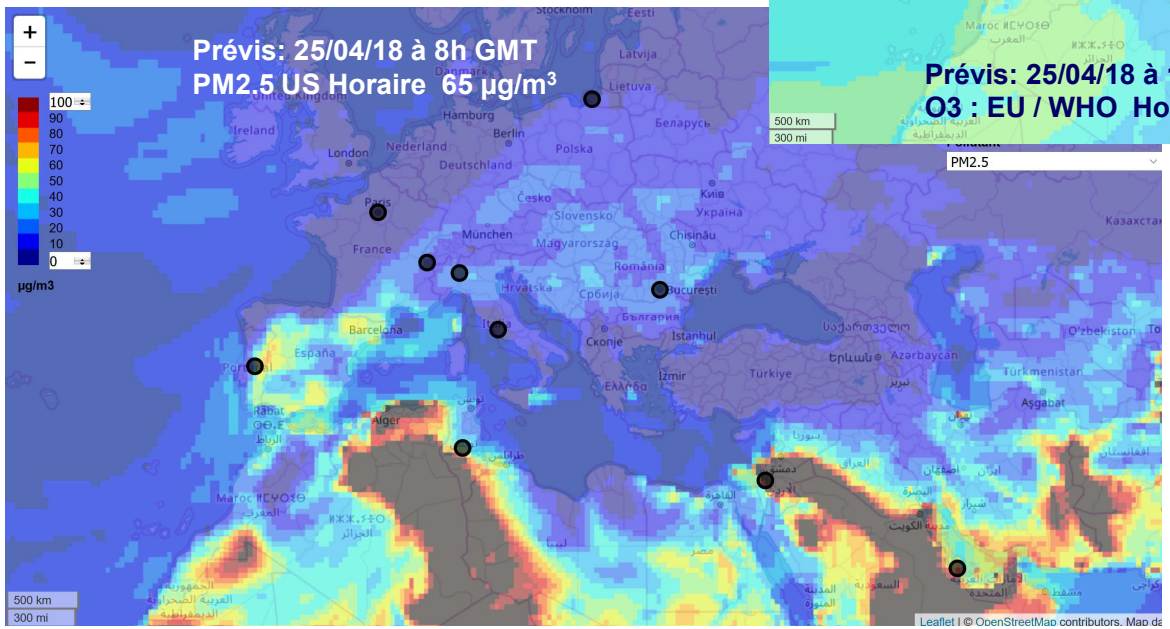
- ➔ **Etudes de Danger**
- ➔ **Préparation PUI/POI et assistance accident SEVESO**
- ➔ **Protection civile et NRBC**

Urbain et régional

- ➔ **Système de prévision de la qualité de l'air**
- ➔ **Aide à l'élaboration de politique performante**
- ➔ **Aide à l'Urbanisme et aux plans régionaux PCAET**
- ➔ **Changement climatique**
  - Vulnérabilité
  - Mitigation
  - Adaptation





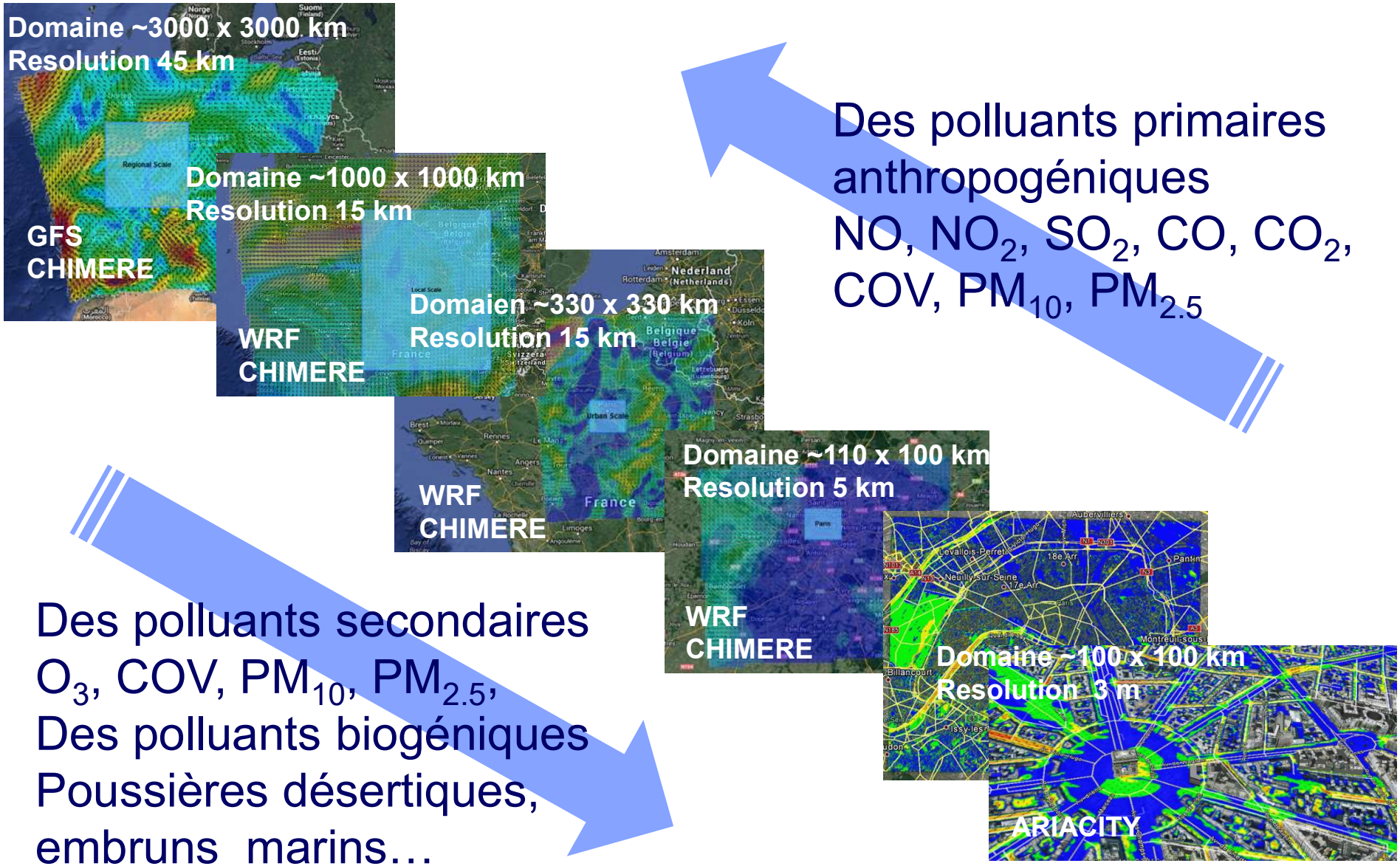


- Prévision à l'echelle mondiale (modèle d'ensemble européen)

Aujourd'hui 25/04/2018

- API de visualisation ARIA : http://project.aria.fr:8000/site/copernicus/

Des approches imbriquées pour une vision multi-échelle
Passer de la 45km à 3m

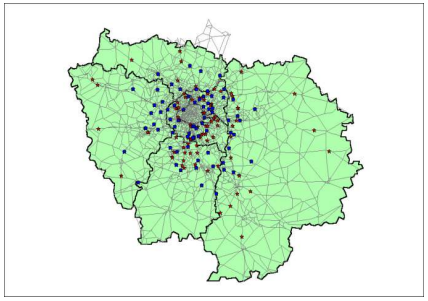


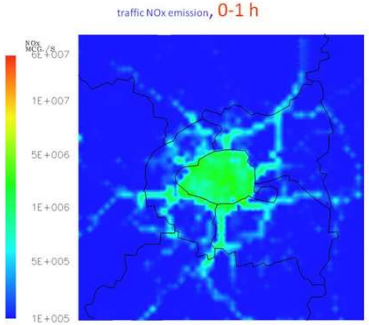
Des polluants primaires anthropogéniques
NO, NO_2, SO_2, CO, CO_2,
COV, PM_{10}, $PM_{2.5}$

Des polluants secondaires
O_3, COV, PM_{10}, $PM_{2.5}$,
Des polluants biogéniques
Poussières désertiques,
embruns marins…

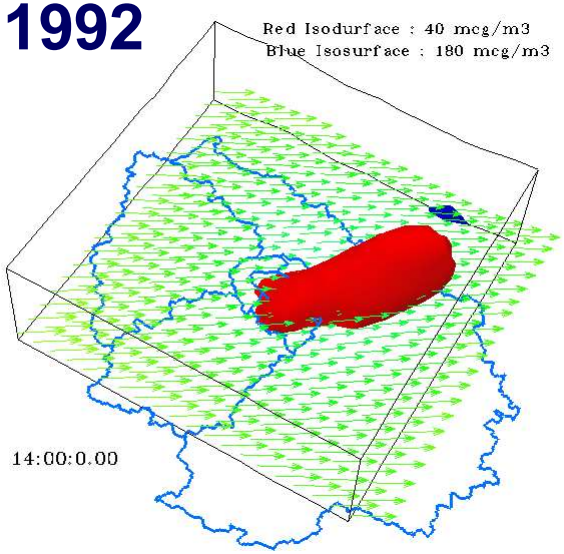
Exemple de formation de l'ozone

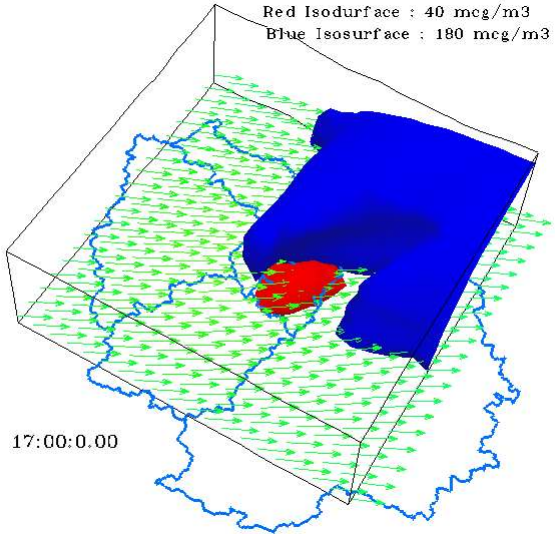
PARIS

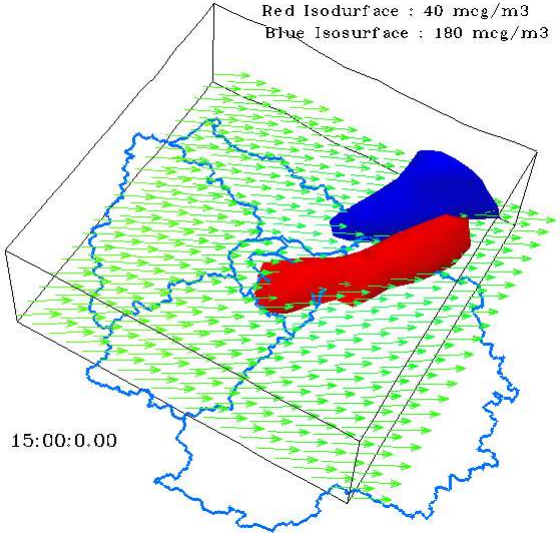


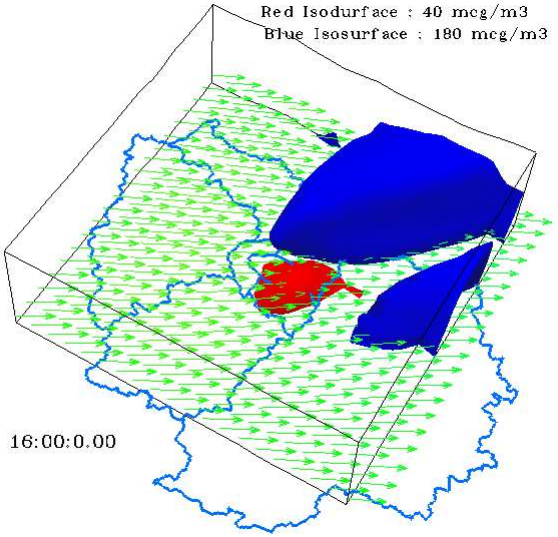


JUL 1992





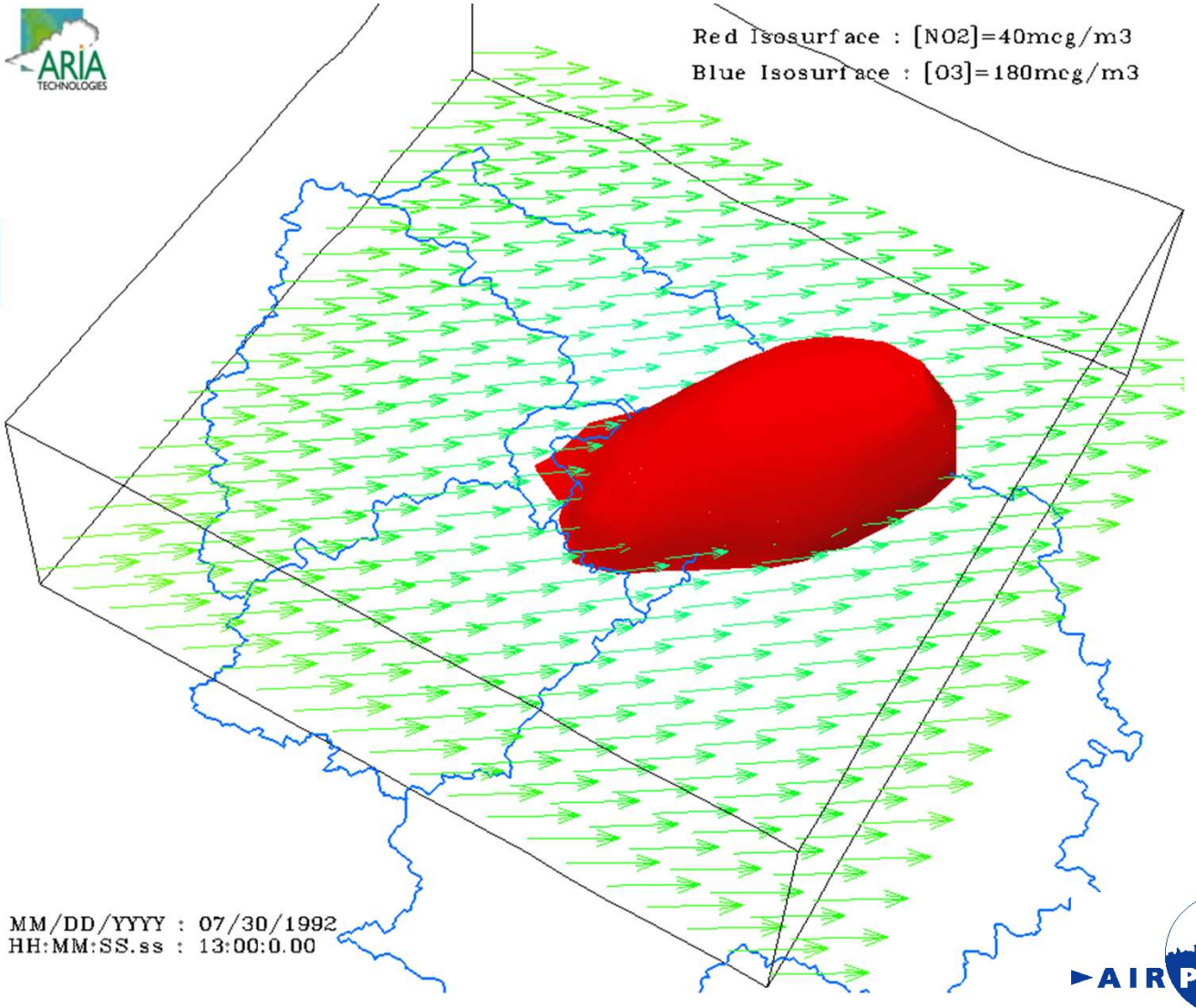




Exemple de formation de l'Ozone

PARIS

La pollution par l'ozone accompagne les étés caniculaires
Aout 2003 ➔
~12 000 décès
+ 55%



Qu'en est il dans les grandes villes ?

" In 2012, 7 million premature deaths annually linked to air pollution"

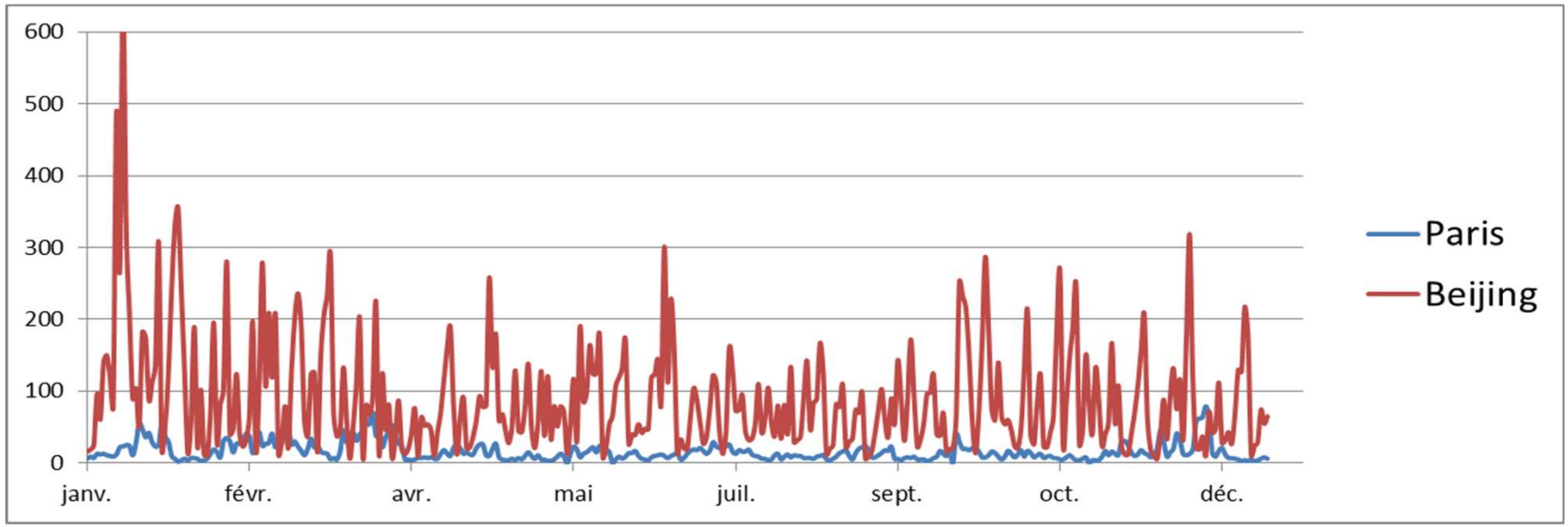
http://www.who.int/mediacentre/news/releases/2014/air-pollution/en/

World Health Organization

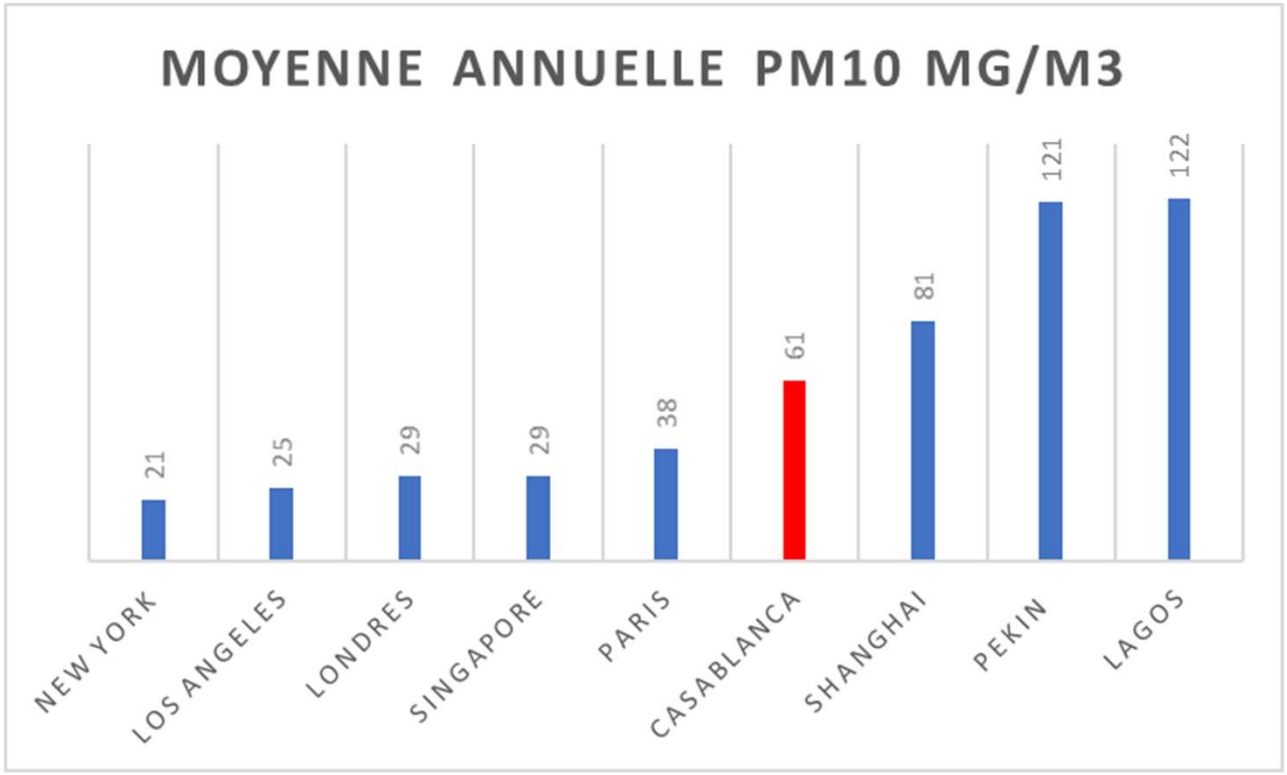
Pékin et Paris

Malgrés quelques épisodes, la qualité de l'air à Paris n'est pas comparable aux grandes agglomérations asiatiques

Séries PM2.5 mesurées à Paris et à Pékin en 2013 (µg/m³).



Et Casablanca ?



Annual mean PM10 µg/m3 - (particulate matter with diameter of 10 µm or less)
Source WHO

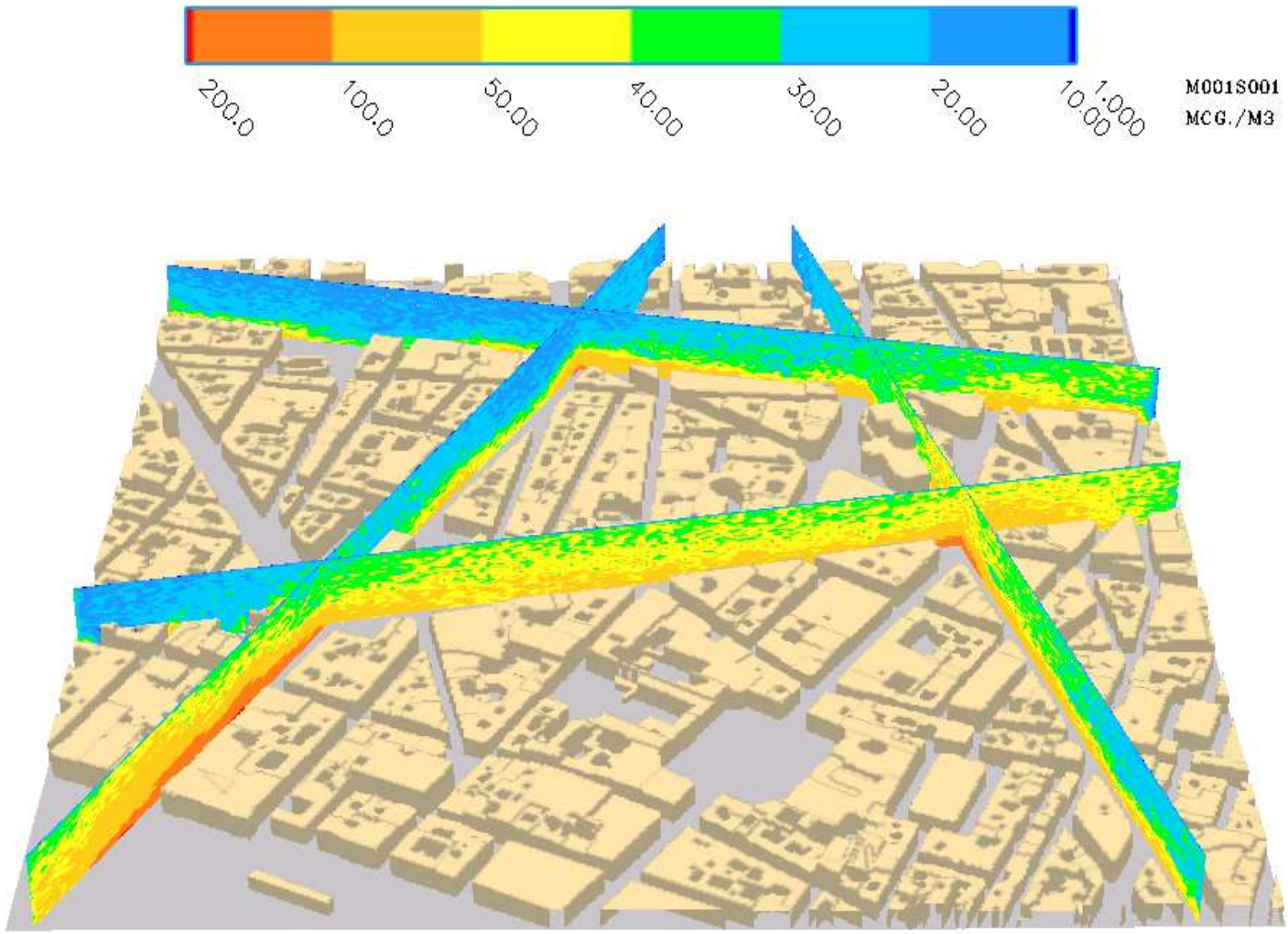
De la ville à ce que nous respirons

See the video at
http://v.youku.com/v_show/id_XNTkOTMyNzYw.html

Visualisation immersive
par construction d'une maquette 3D

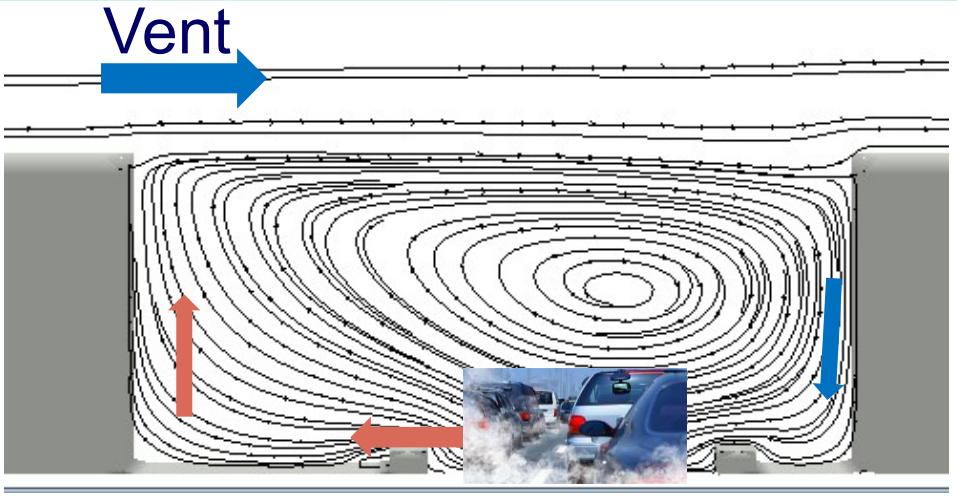
Et 3D

Les fortes concentrations restent près du sol

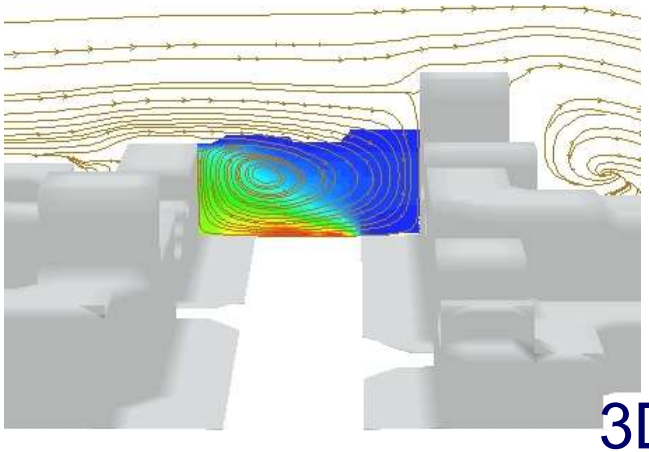


La Pollution urbaine

- Rue Canyon Ecoulement 2D et 3D

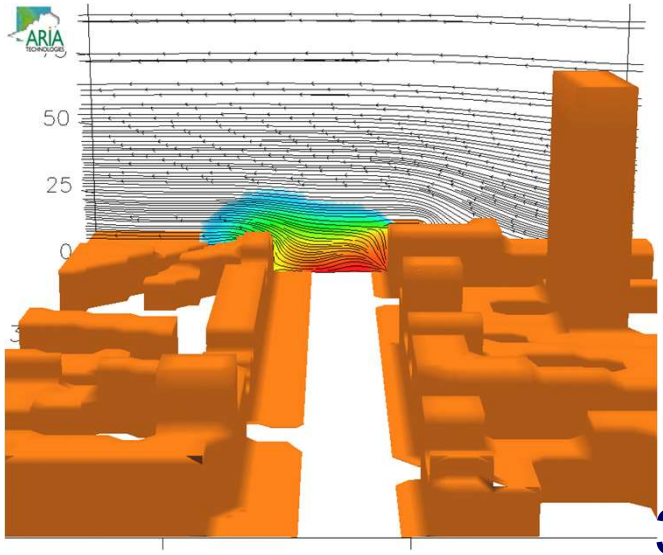


2D



3D

Vent du SW

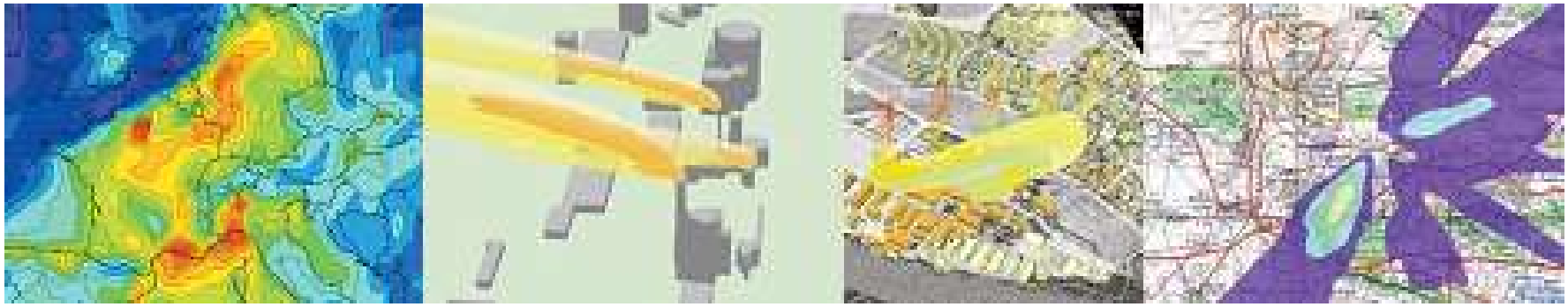


3D

Vent du NE

ARIA Technologies

Industries



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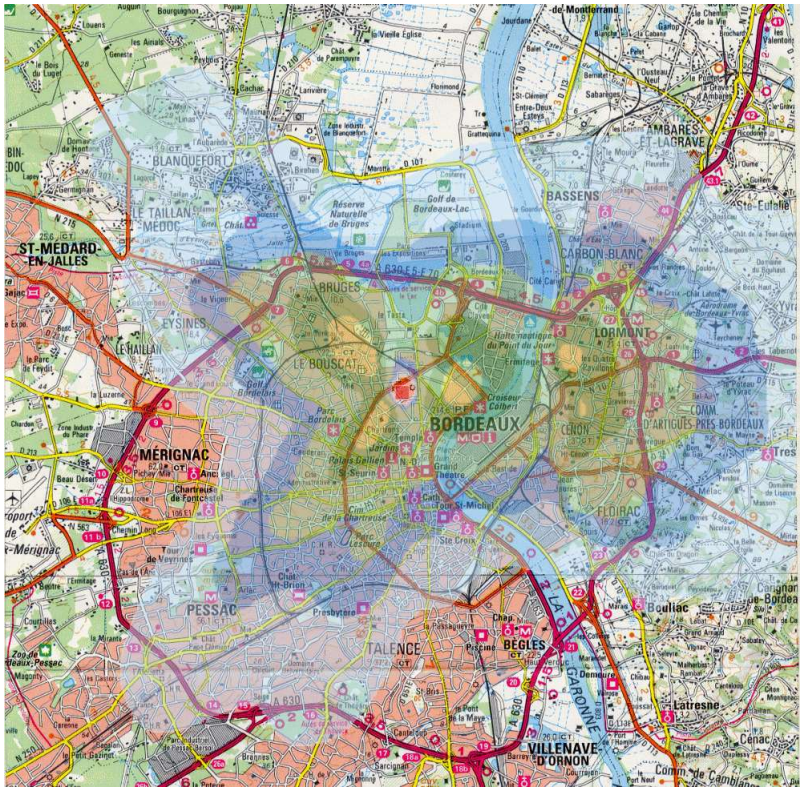
Industrie

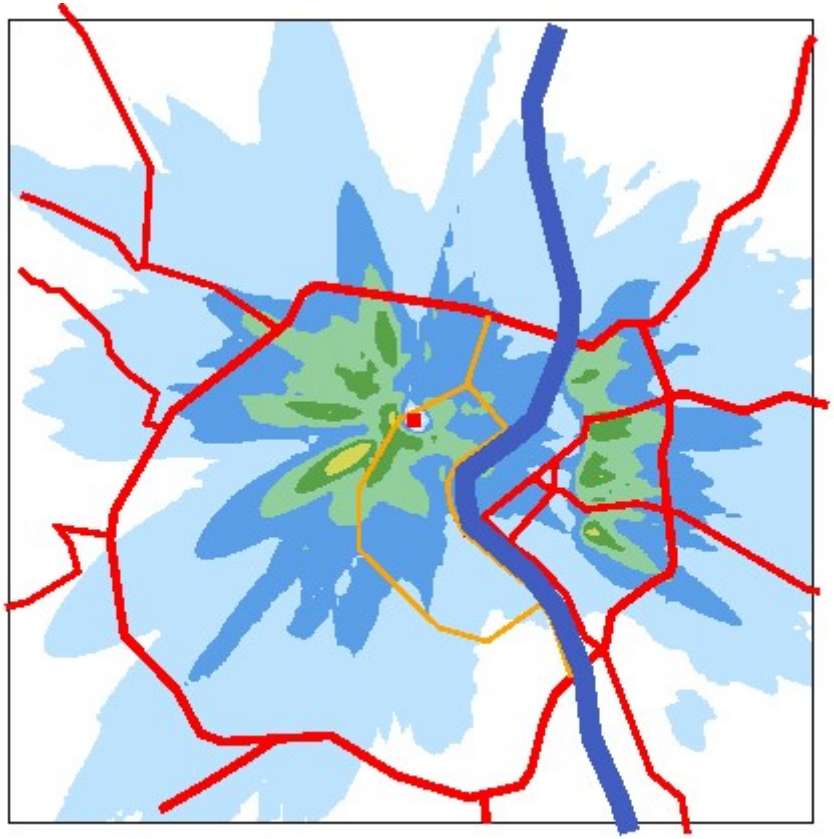
- Site
  - Impact à long terme – *Rejets continus*
    - Comprendre et anticiper – ***L'Étude d'Impact***
    - Suivi et action – ***Auto-surveillance***
  - Impact à court terme – *Rejets accidentel*
    - Comprendre et anticiper – ***L'Étude de Danger***
    - Suivi et action – ***Plan d'Urgence***

Etudes d'impact

Moyenne annuelle en NO_2



Percentile 98 pour le SO_2



MIN : 0 mcg /m3 MAX :0.609985 mcg /m3

AS3

bpifrance

中华人民共和国科学技术部
The Ministry of Science and Technology of the People's Republic of China

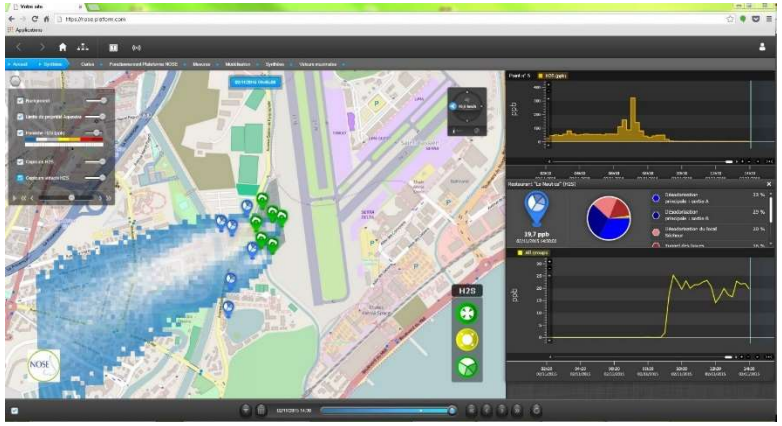
ARIA TECHNOLOGIES

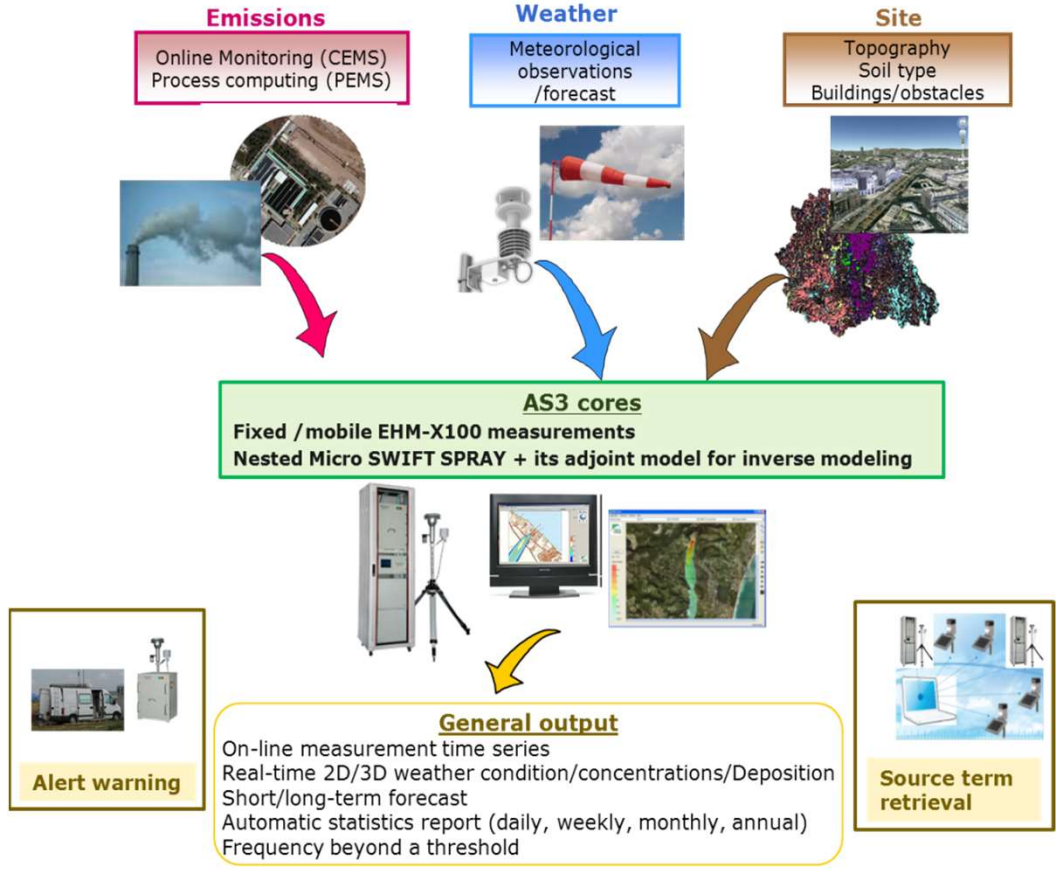
Development of a system (AS3) dedicated to monitoring atmospheric pollutants

Test (Demo) in France and in China

1. **Rive-de-Gier**
2. **Kunshan**

1. **Continuous measurement**
2. **Online supervision**
3. **Forecast and early warning**
4. **Source term retrieval**

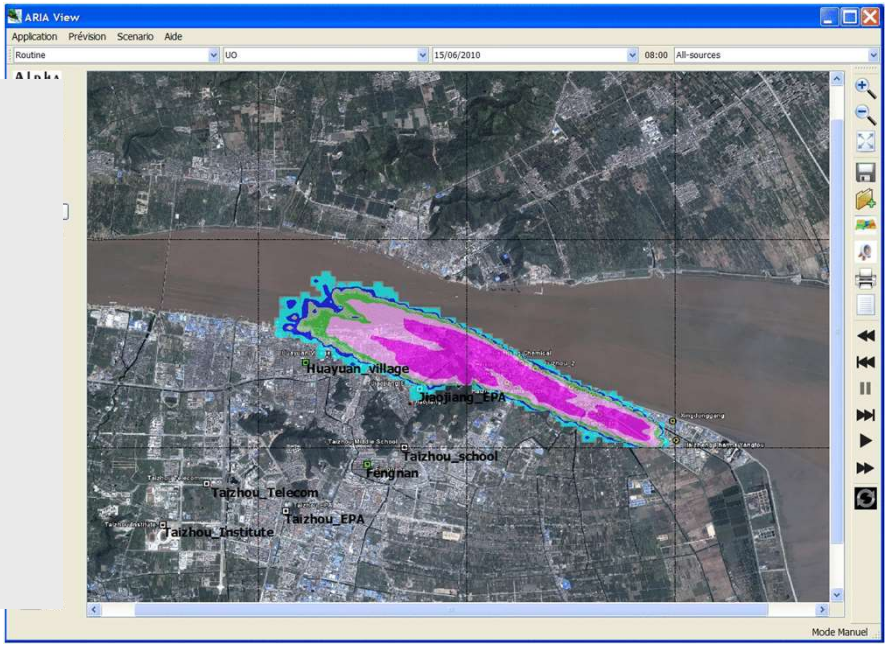




在线监督系统:在线监测，预报预警

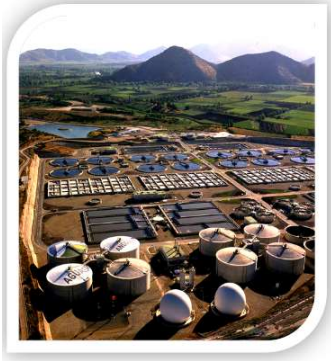
Online supervision system: on-line monitoring, forecast and early warning

- 用于工业园区污染排放实时在线监督及预报系统
- 多污染物并行运算
- 管理排放源，包括移动源
- 给与特定人群(政府，工业主管或公众)提供在线信息
- 在线进行数据统计并生成报告
- 设计监测布点
- 理解污染原因，分析各个排放源的排放量
- 节省大范围监督成本并优化监督质量，
- 另外具有高速并行计算



- Real-time online monitoring and forecasting system for pollution discharge in industrial parks
- Multi-contaminant parallel operation
- Managing sources of emissions, including mobile sources
- Provide online information to specific groups (government, industry executives or the public)
- Online data statistics and generate reports
- Design monitoring Cloth Point
- Understand the causes of pollution and analyze the emissions from each source
- Save a wide range of supervision costs and optimize the quality of supervision, in addition to high-speed parallel computing

Nassau County – Long Island (NY), USA



La Farfana WWTP – Santiago, CHILE

Louis Fargue WWTP – Bordeaux, FRANCE

NOSE PLATFORM®

Real-time monitoring of nuisance odour impact

NOSE PLATFORM® ARCHITECTURE

Real-time data acquisition

Innovative and High Performance Components

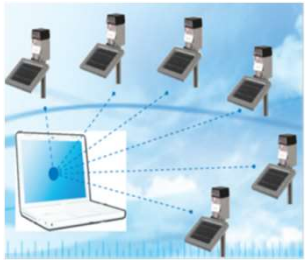
- Micro-sensor network for measurement of stack and ambient emissions
- On-site weather station
- Integrated atmospheric dispersion model (ARIA View)
- Integration of electronic NOSE technology (optional)
- Integration of existing emissions instrumentation (optional)
- Connection to site supervisory system (optional)

System Access – Data Visualization

- Web-based platform eliminates need for dedicated work stations
- Remote connection for Authorized Personnel (User Name & Password)

System Alarms

- Operator alerts if emissions plumes exceed predefined setpoints



NOSE PLATFORM® ARCHITECTURE
Equipment detail

Ambient Air Sensors

Central Radio Antenna & Weather Station

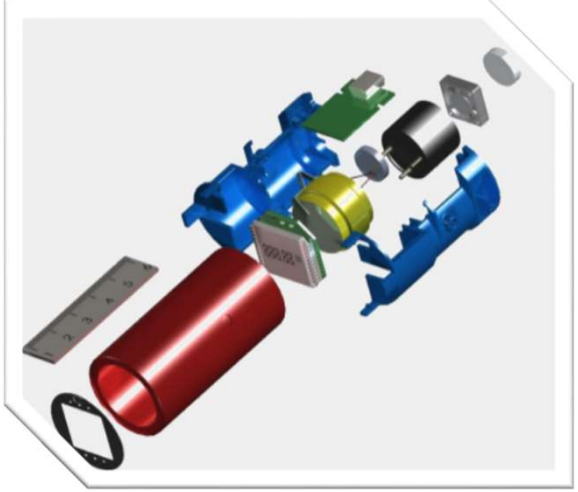
Stack Emissions Sensors

Ultra-sensitive sensors (ENVIRONNEMENT SA), recognized by

NOSE PLATFORM® ARCHITECTURE
Odour Emissions Data Acquisition

Micro-sensors for real-time measurement of pollutant emissions

- Electrochemical (H_2S and reduced sulfurs); NH_3; PID (VOCs);
- Dynamic air sampling / Ultra-sensitive detection (ppb)
- Low electrical consumption
- Solar powered (optional)
- Analog or Wireless radio communication enabled
- Data logger - USB connection



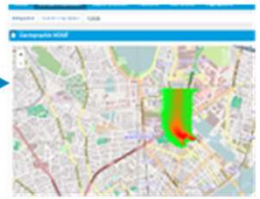
NOSE PLATFORM®
Functional Architecture – Bordeaux

Emissions Sensors

Exploitant STEP LF

RAMSES Control Room

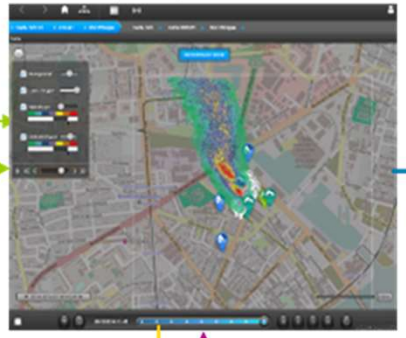
Client Portal
déleg@ction



Data Acquisition Module

Weather Station

NOSE PLATFORM
Proprietary User Interface

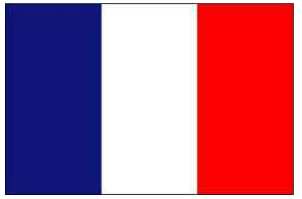


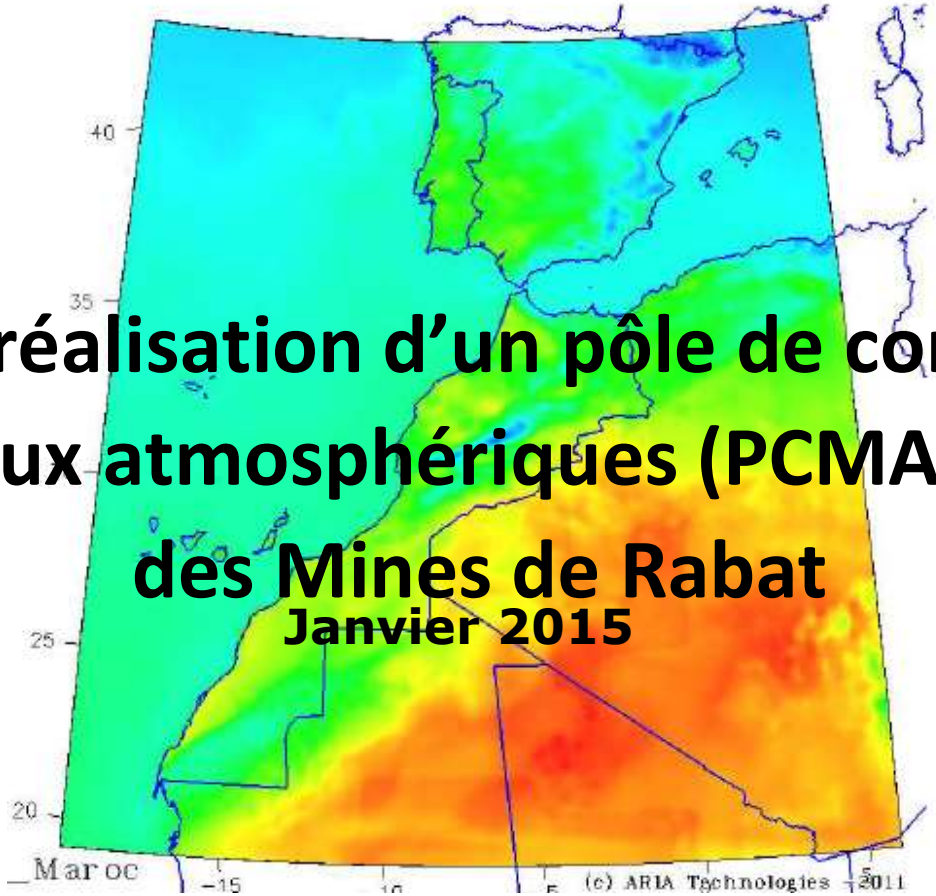
Resident Panel

Process Operations Data

Data Archives

ARIA Technologies

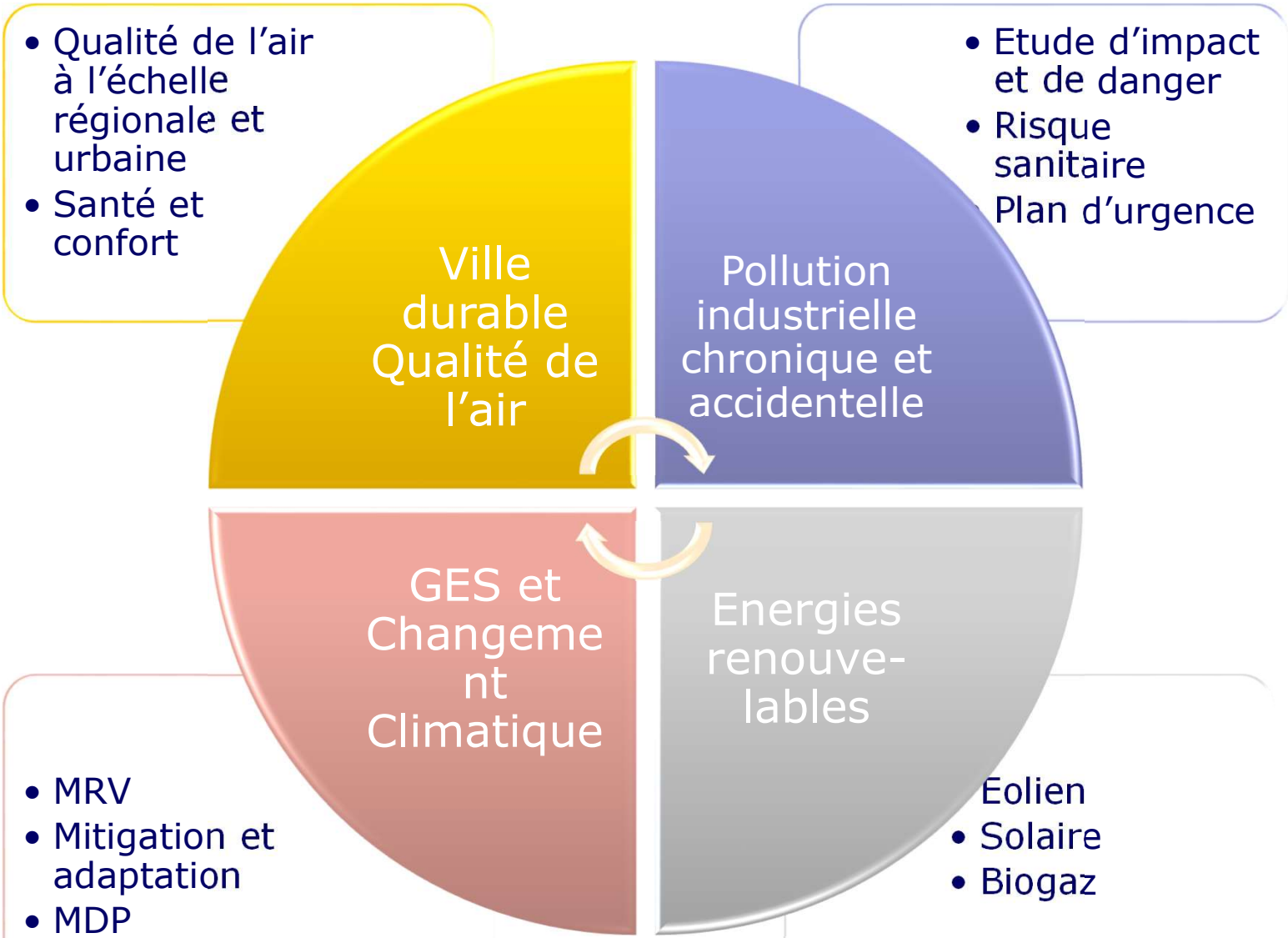




Projet de réalisation d'un pôle de compétences des milieux atmosphériques (PCMA) à l'Ecole des Mines de Rabat

Janvier 2015

Un pôle ambitieux



Réunissant des compétences de haut niveau

Naissance du pôle

INVESTISSEMENT PRIORITAIRE

➔ Ressources humaines

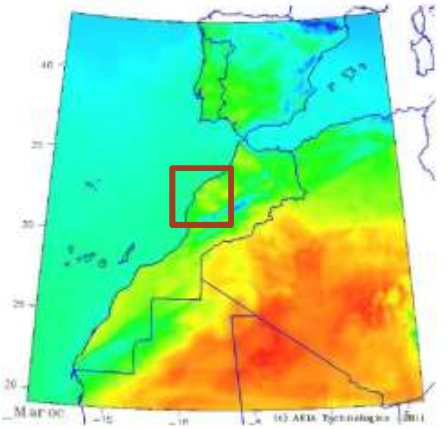
- Encadrants
- Thèses
- Stages d'élèves ingénieurs

➔ Métrologie

Une station multi paramètre intégrée au réseau national et co-géré par la DMN (Météo Maroc)

➔ Modélisation

- Le logiciel CTM « CHIMERE » IPSL/LMD/INERIS
- Etude et prévision
- En lien avec la DMN



Les principaux acteurs

Projet entrant dans la collaboration bilatérale franco-marocaine portée par :

Avec le soutien et/ou la participation de :

Royaume Du Maroc
Ministere Delegue aupres du Ministre de l'Energie, des Mines, de l'Eau et de l'Environnement, Charge de l'Environnement

Ville de Rabat

Pérennisation de la structure

Pérennisation

- ➔ Une station de référence à Rabat
- ➔ Un collège d'experts au service des entités marocaines (services de l'état, secteurs privés) et des organisations internationales,
- ➔ La capacité à répondre à des programmes de recherches internationaux
- ➔ Possibilités de répondre à des appels d'offres nationaux et internationaux

Merci pour votre attention !

Thank you for your attention!

شكرا

SYNTHESE



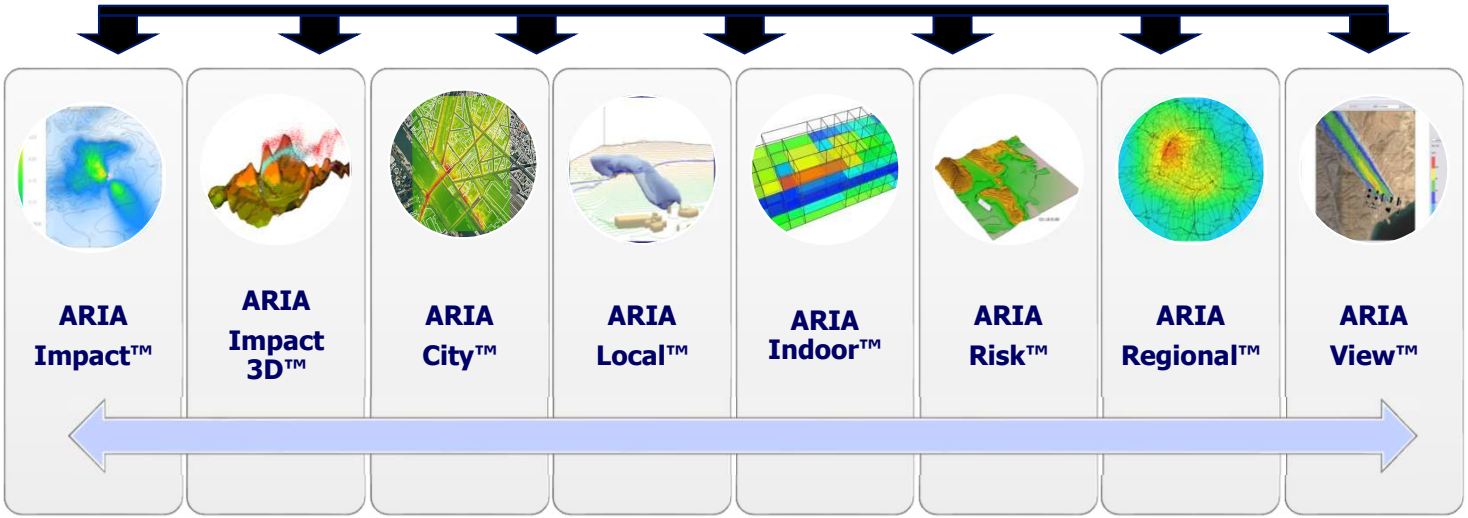


Industrie | **Villes et régions** | **Risques** | **Climat** | **Energies renouvelables**

Etudes et conseil

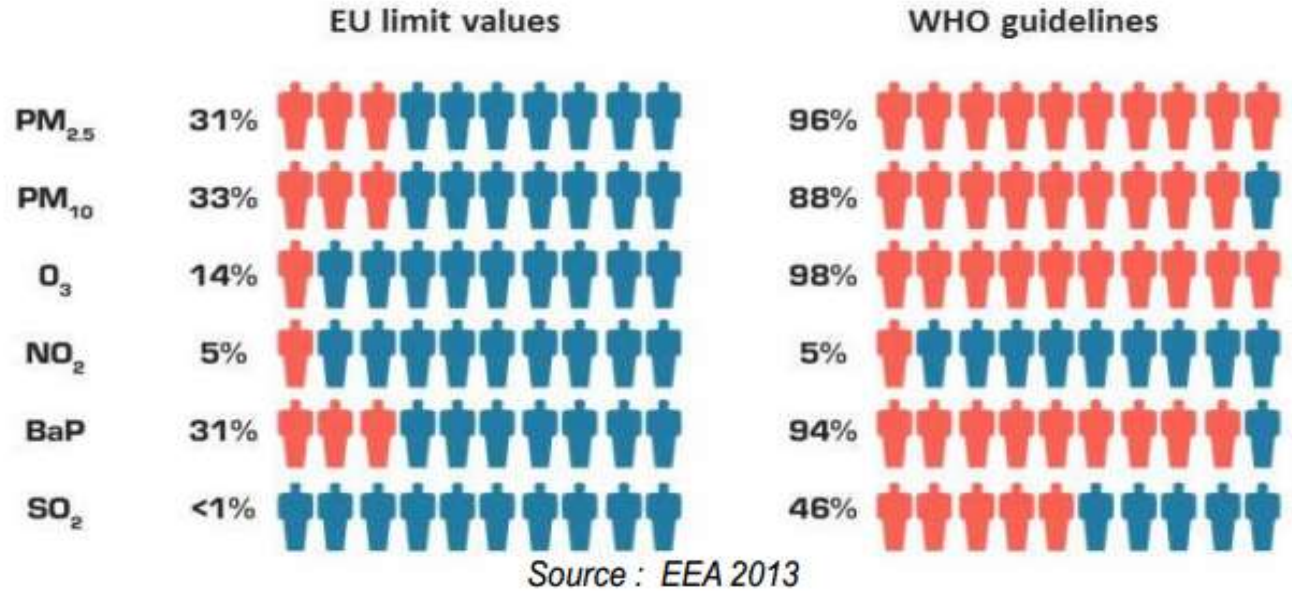
Logiciels et systèmes

R&D
Formation



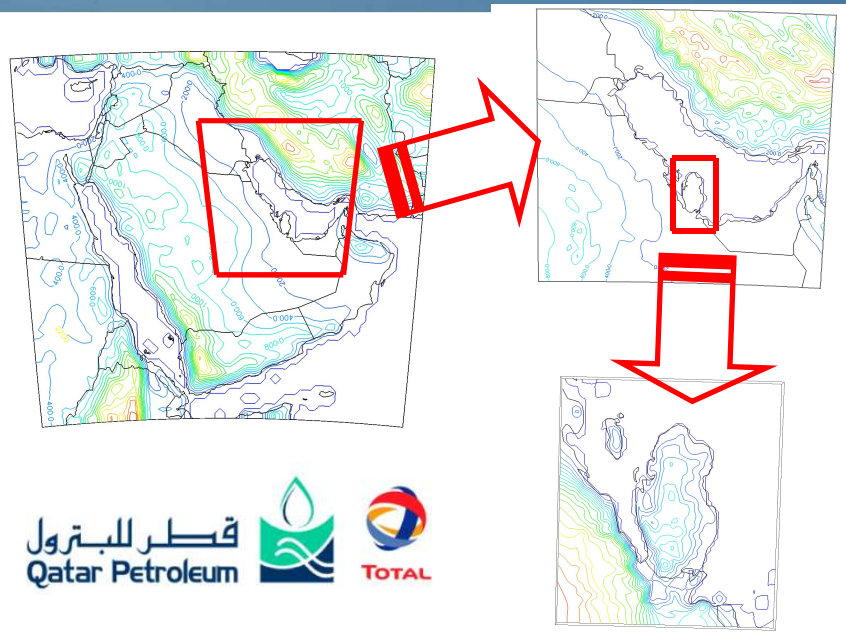
Are we safe in Europe ?

- **In cities, 1/3 of people 's exposition overpass EU standards**
- **WHO considers that 90% of the population are exposed to a significant risk for their health**



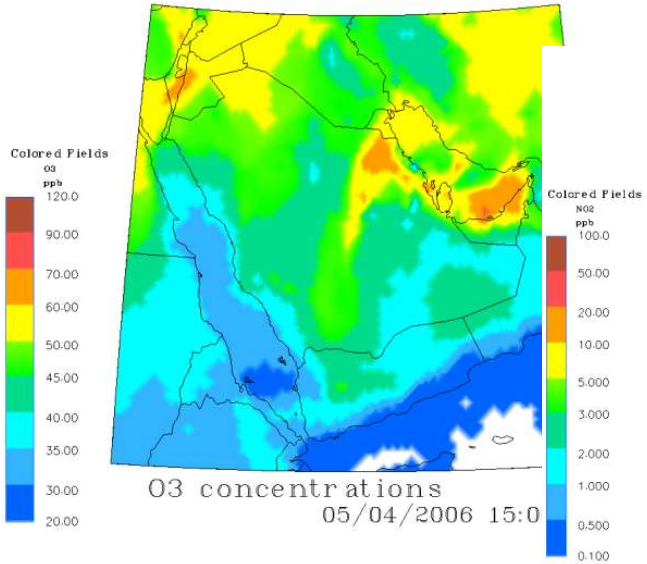
Source : EEA 2013

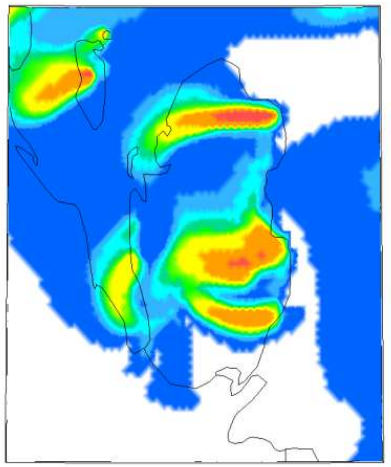
Qatar Air Quality Model : ARIA Regional®



Qatar Petroleum

TOTAL



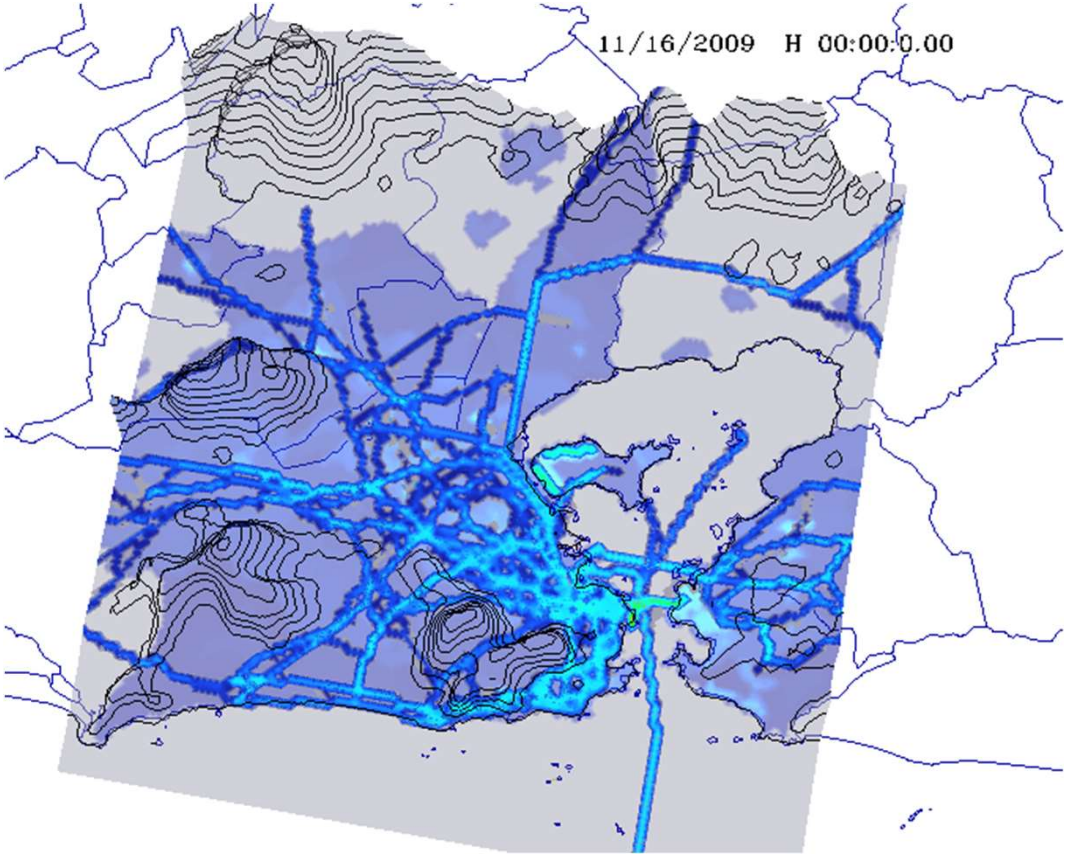


Understanding heavy episodes (NO_2, O_3 and $PM_{2.5}$) !

- **Sea and Land Breeze**
- **VOC due to Oil mining**
- **Importance of industrial sources ➔ Introduction of "Puff – In – Grid" to better catch the industrial plumes chemistry**

AR DO RIO Project

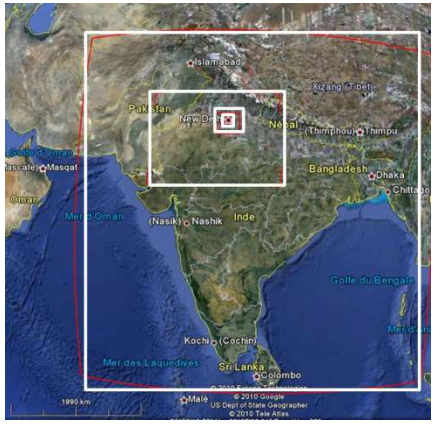
rio2016
Viva sua paixão

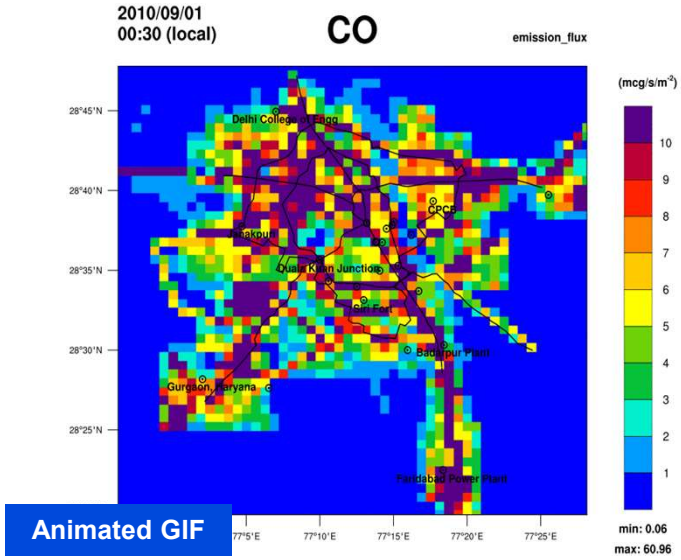


Understanding heavy episodes
(NO_2, O_3 and PM) !

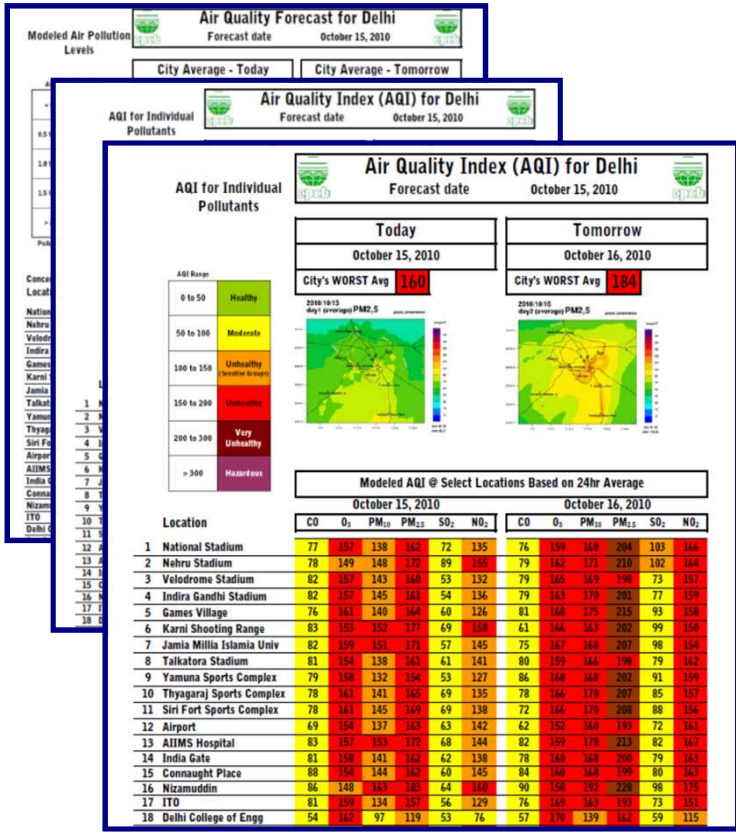
- **Sea and Land Breeze**
- **Complex topography**
- **Port activities**
- **VOC due to bio-fuels**

Air Quality Systems: CWG Delhi project

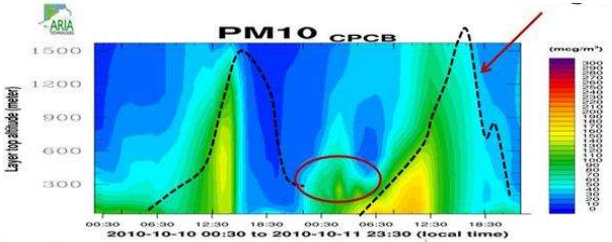




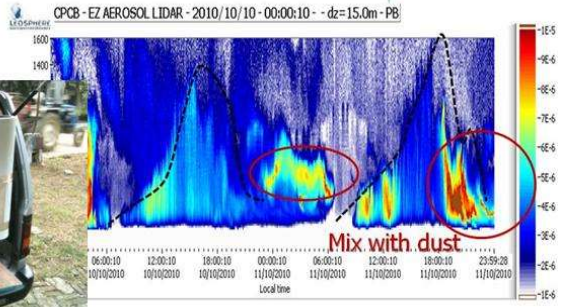
Animated GIF



Clean Air for Delhi and beyond



Forecast results



Particle backscatter lidar observations on October 9th-10th

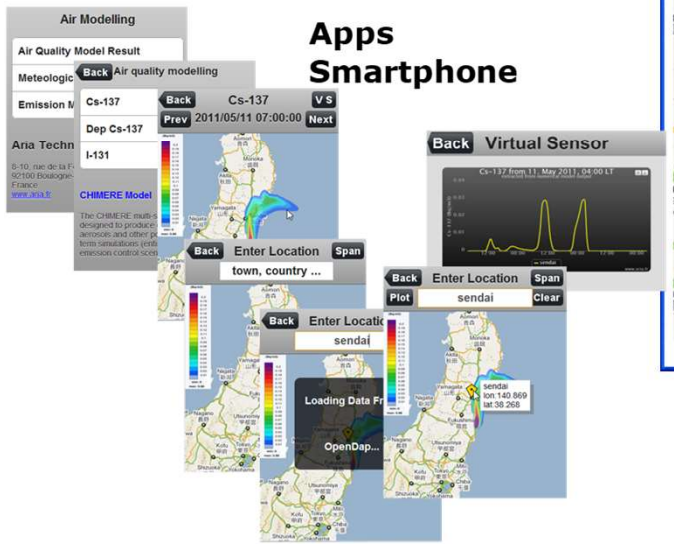
AQI Scale

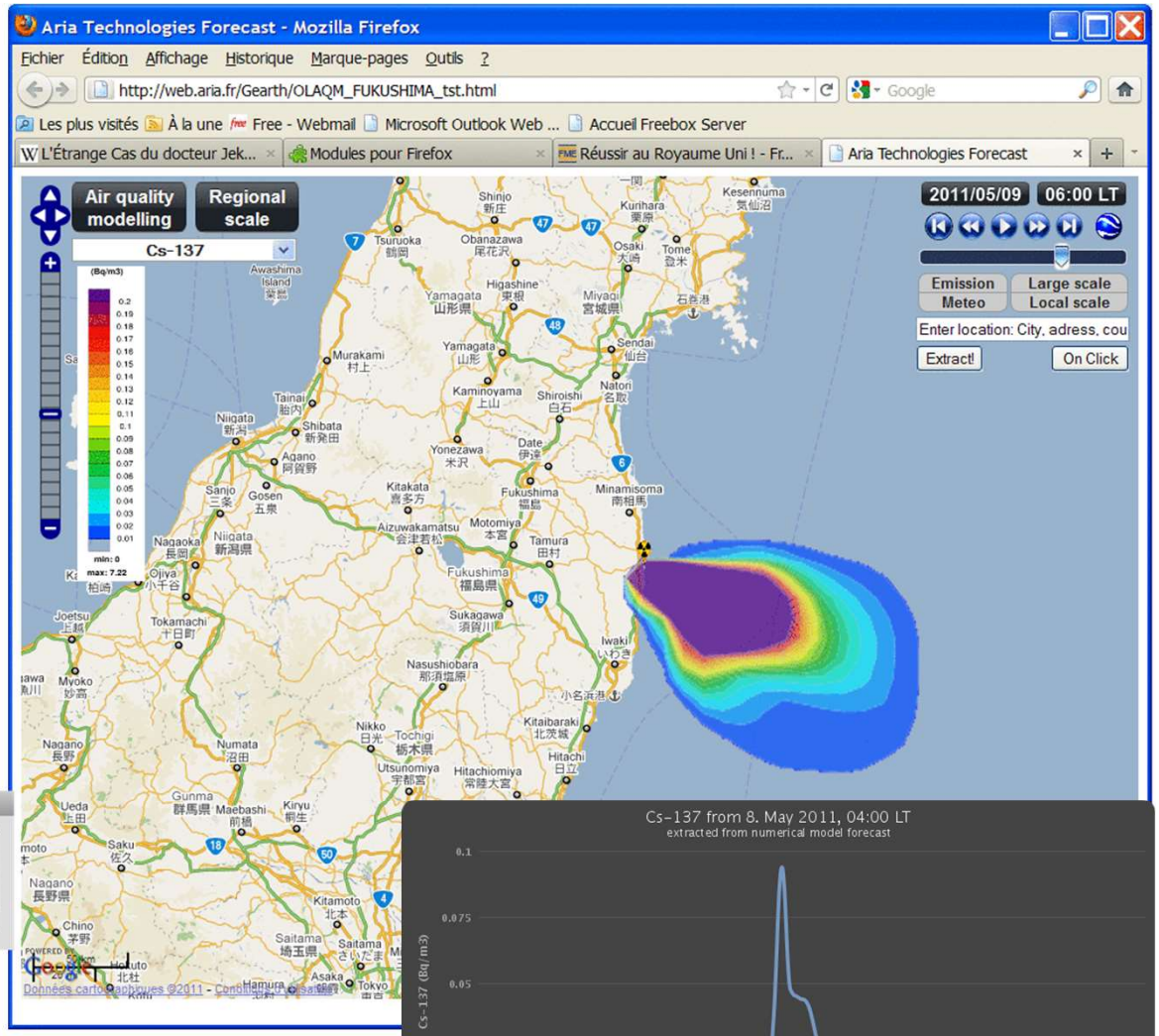
Continental Scale

FUKUSHIMA:

RADIOACTIVE PLUME **FORECAST**

(Hypothetic Source term: 10% of total Core Cs-137)





Accidental release

- Hazardous release Place de la Concorde
- ARIA Risk
  - MSS
  - Full 3D
  - CPU < 3mn

Courtesy of CEA-DAM