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PREV'AIR

An operational system for air quality monitoring and forecasting over Europe

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This platform is proposed by the **PREV'AIR consortium** . **http://www.prevair.org**
Questions about PREV'AIR? Please send an e-mail to frederik.meleux@ineris.fr

ADEME

CNRS - CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

Institut Pierre Simon Laplace

METEO FRANCE

INERIS

DCO - 08/09/2004 - titre - 1

HARMO-10 Crete 2005
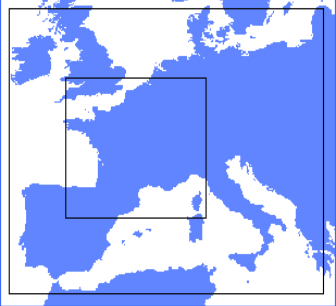
Slide 2

>Two main objectives

- **Diagnostic and prospective studies** in the field of atmospheric air pollution at the European scale
  - **Technical support to the French Ministry for Ecology** in the framework of international negotiations about transboundary air pollution (implementation of integrated policies aiming at reducing pollutant emissions in Europe)
- **Delivery of a daily information related to air quality over France and Europe**
  - **To complement the national air quality monitoring network** (~40 AASQA, >2000 sensors, >700 stations)

Carte des associations agréées

Départements d'Outre-Mer

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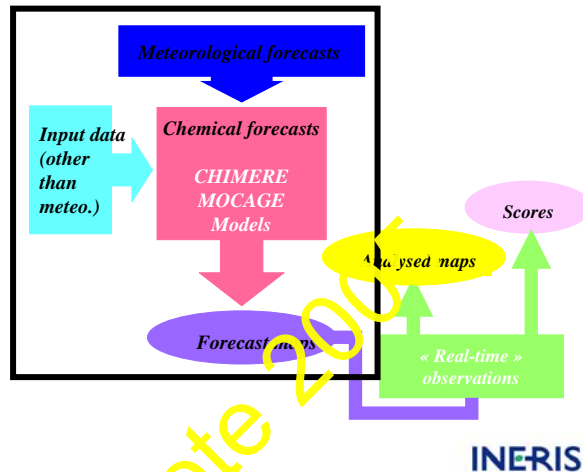DCO - 08/09/2004 - titre - 2

> Modeling platform architecture

3D Chemistry Transport Models...
- **CHIMERE / IPSL-CNRS-INERIS**
- **MOCAGE / METEO-FRANCE**

… Driven by meteorological forecasts
- **AVN / NCEP** global data (+ **MM5** higher resolution forecasts)
- **ARPEGE, ALADIN**

Other input data
- Emissions inventory
  - **EMEP**
  - **EDGAR**
- Boundary concentrations
  - **MOZART+GOCART**
  - **LMDz-INCA**
  - **MOCAGE**
- NRT observations data from local AQ monitoring associations
  (**BASTER / ADEME** database...)

Meteorological forecasts

Input data (other than meteo.)

Chemical forecasts

CHIMERE MOCAGE Models

Scores

Analysed maps

Forecast maps

« Real-time » observations

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>The CHIMERE Model Set-Up in PREV'AIR

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- Domains

	Over Europe	Over France
Horizontal resolution:	**0.5°x 0.5°**	**0.15° x 0.1°**
Vertical resolution:	**8 levels from surface pressure up to 500 hPa**	

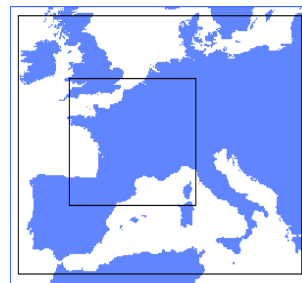- Meteorological forecast data
  - **AVN / NCEP** for initialisation and boundary conditions
  - **MM5** higher resolution forecasts (36km)
- Chemical scheme
  - **MELCHIOR reduced** (~45 species, ~120 reactions)
- Aerosol module
  - Dust, PPM, SOA, nitrates, sulphates, ammonium, Water Contents
  - **25 reactions** (aqueous and heterogeneous phase)

Other model configurations:
  - ➜ *meteorology: ECMWF, ARPEGE / ALADIN*
  - ➜ *BC: MOZART, LMDZ-INCA, GOCART*
  - ➜ *See **http://euler.lmd.polytechnique.fr/chimere***

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>The MOCAGE Model Set-Up in PREV'AIR

METEO FRANCE

- Domains

Global Model / Over Europe / Over France

- **Horizontal resolution:** **4°x 4°**   **0.5° x 0.5°**   **0.1° x 0.1°**
- **Vertical resolution:**   **47 levels from surface pressure up to 5hP**
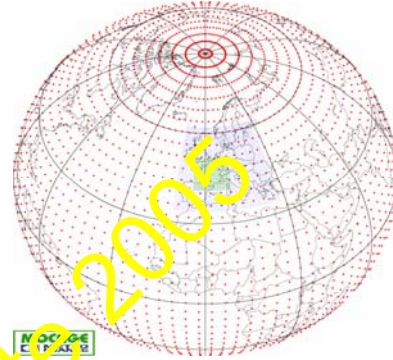- Meteorological forecast data
  - **ARPEGE and ALADIN**
- Chemical scheme
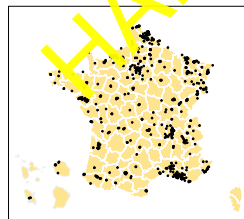 - **RACMOBUS (118 species, 381 reactions)**
- No aerosol module

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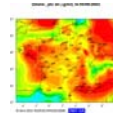## >The Observation Network

41 French AQ related organisms (AASQA)

680 monitoring stations

O_3 NO_2 SO_2 PM10 PM2.5

⇩

Collected in real time to the national **AQ** database **BASTER**

⇩

Downloaded for being used by **PREV 'AIR** for **correction** and **evaluation** processing
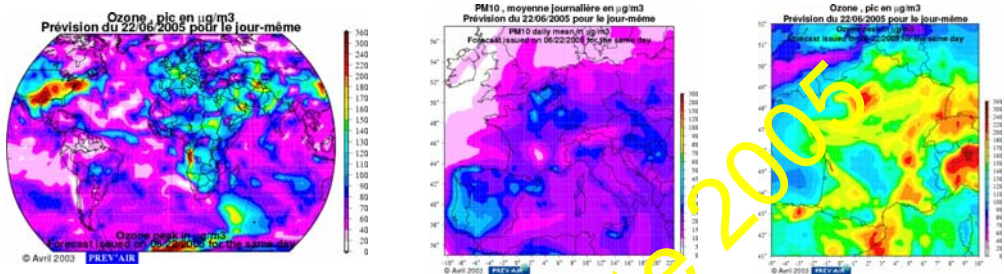
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> **PREV'AIR Outputs: Daily Forecasts**

- **Available at D+0, 01-06 h LT**
- **Daily peak and averaged concentration maps**
  - **D+0, D+1, D+2**
- **Pollutants: O3, NO2, particulate matter**
- **Global scale, Europe, France**

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Slide 2

> **Other Products**

> **"Analysed" ozone maps**

- Modelled concentrations corrected with observations:
  - Observations collected in real-time for 150 stations
  - Statistical adaptation: **kriging method**
  - Available at D+0 for D+0 and D-1

  > **Statistical adaptation**

- Modelled concentrations corrected with climatology – over the last past years :
  - Statistical adaptation: **kriging method**
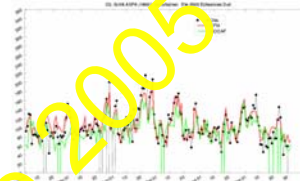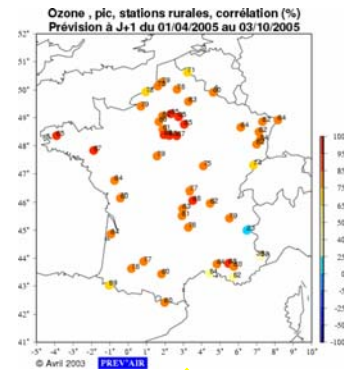 - Available at D+0 for D+0 D+1 and D+2
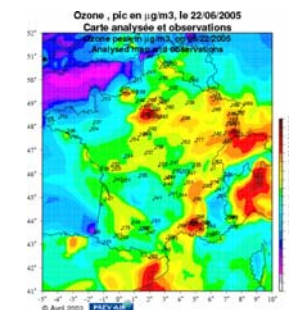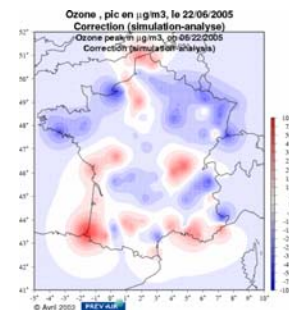
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> Statistics and Scores

DATE	Rural (microg/m3)		Suburban(microg/m3)	
	obs	forecast	obs	forecast
D-1	103	105.4	99.6	104.8
D+0	103	104.9	99.6	104.3
D+1	103	104.3	99.5	103.7
D+2	103	103.9	99.5	103.4
	Norm bias(%)	NMSE(%)	Norm bias(%)	NMSE(%)
D-1	5.5	20.3	8.7	22.8
D+0	5.2	21	8.4	23.7
D+1	4.8	21.2	8.1	24.3
D+2	4.8	22.7	8.2	25.6
	Correlation	E20(%)	Correlation	E20(%)
D-1	0.81	78	0.83	76
D+0	0.79	77	0.82	76
D+1	0.78	76	0.79	74
D+2	0.74	74	0.76	71

Ozone , pic, stations rurales, corrélation (%)
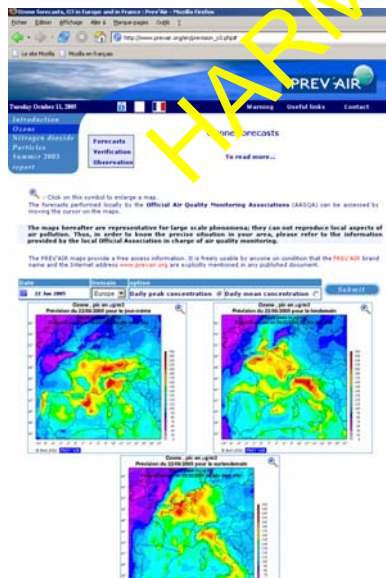Prévision à J+1 du 01/04/2005 au 03/10/2005

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> For ozone the model slightly overestimates the peak values
> The correlation decreases but slowly highlighting the robustness of the model.

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> User Information Exchange

Since the information is daily published on Internet and filed in a database, the Prev 'Air system is opened to all persons and organisation that would like to, personally or professionally, be informed on the continent-wide evolution and trends of pollutant behaviour in the short and medium term.

- PREV 'AIR numerical data
  > Extraction over user-defined domains
  > Available through internet for Air Quality Institutions (user accounts)
- Applications
  > 3D data: Boundary Conditions for Air quality simulations at a local scale
  > 2D data : for Air Quality monitoring and forecast

⇒ **Feedback from Prev 'Air Users**

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>**Future developments**

> **To Improve the system in complex area (mountain, coastal area)**
>> increasing the horizontal resolution
>> using local emission inventories

> **To enlarge the European domain**
>> to take into account Greece and Scandinavian countries

> **To develop our observation network**
>> with surrounding countries
>> with vertical measurements

> **To use an hybrid models**
>> coupling Chimere and Mocage models

> **To use meteorological data from Meteo-France**
>> more accurate forecast over Europe

> **To improve the aerosol module**
>> with a more detailed chemical scheme

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>**Ozone map on French public television**

> For the summer 2005, 18 days with ozone forecasting broadcast

> Up to 6 bulletins a day

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