



Run «0 emission» - Focus on particules

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Projet cofinancé par le Fonds
Européen de Développement Régional
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Methodology

- Starting equation

$$C^{\circ}total = a.energy-industry + b.residential + c.natural + d.agriculture + e.maritime + f.non\ road + g.road + h.boundary\ conditions$$

Removing each emission sector, we have the following matrix system: **A.X = B** where X is a concentration

$$A = \begin{bmatrix} 0 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 0 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 0 \end{bmatrix} \quad X = \begin{bmatrix} a \\ b \\ c \\ d \\ e \\ f \\ g \\ h \end{bmatrix} \quad B = \begin{bmatrix} C^{\circ} (0\ industry - energy) \\ C^{\circ} (0\ r\acute{e}sidentiel) \\ C^{\circ} (0\ natural) \\ C^{\circ} (0\ agriculture) \\ C^{\circ} (0\ maritime) \\ C^{\circ} (0\ non\ road) \\ C^{\circ} (0\ road) \\ C^{\circ} (0\ boundary\ conditions) \end{bmatrix}$$

Contributions are given by:

→ contribution for sector < *energy/industry* > : $A = a / \sum(a, b, c, d, e, f, g, h)$

→ contribution for sector < *residential* > : $B = b / \sum(a, b, c, d, e, f, g, h)$

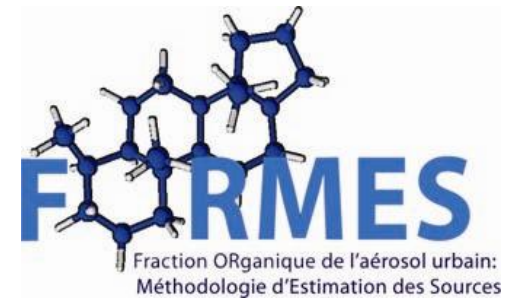
→ ...

The reference run is used for the estimation of the methodology error by:

$$\|error\| = [C^{\circ}ref. - \sum(X)] / C^{\circ}ref.$$

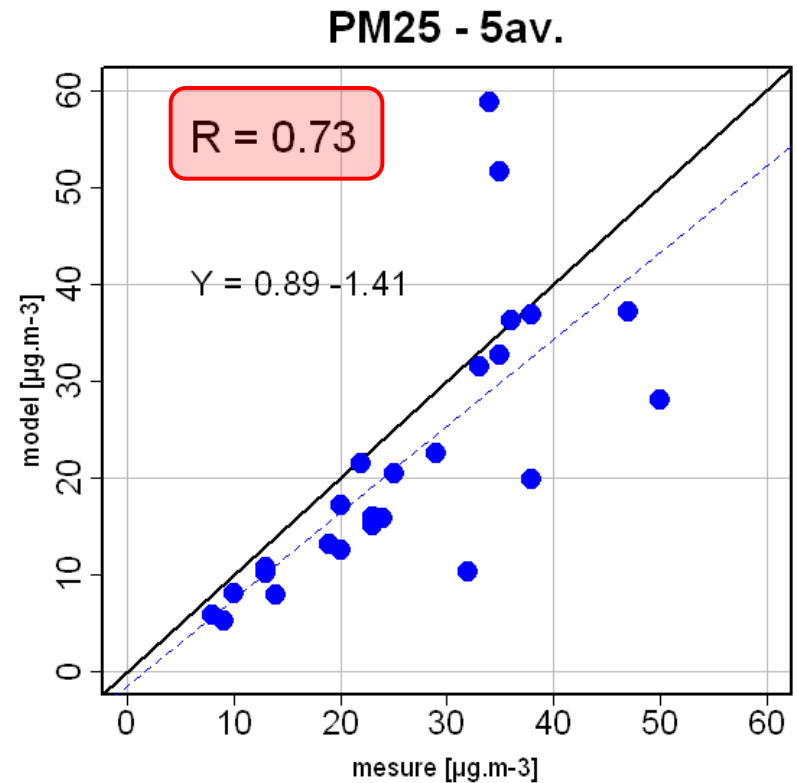
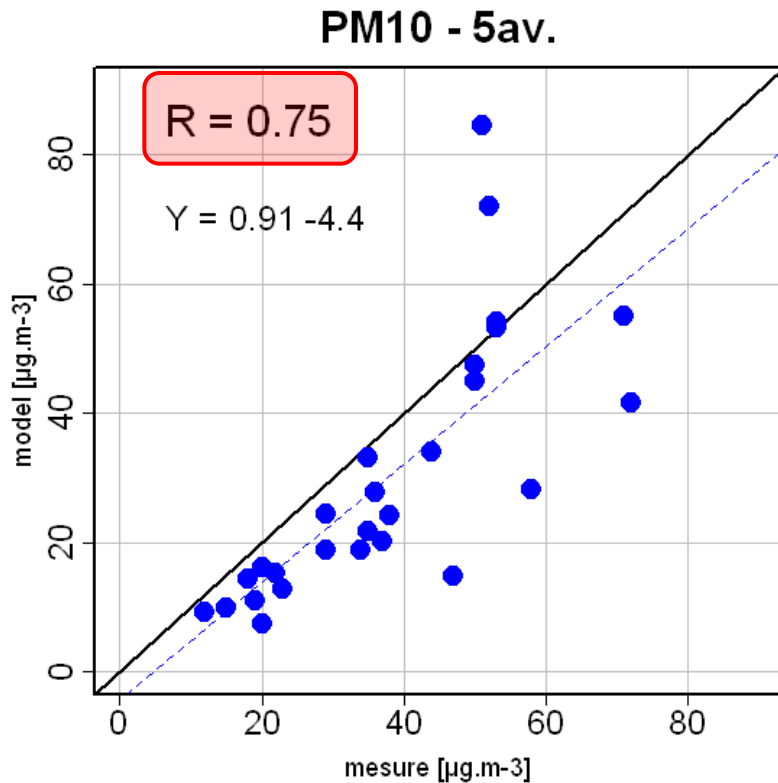
Data

- **Simulation period = speciation measurement period**
 - 1 winter month: February 2011
 - Project APICE : inter-comparison measurement campaign
 - 1 summer month: July 2008
 - Project FORMES
- **Temporal resolution**
 - Hourly / daily / monthly average
- **Spatial extension**
 - focus over “5 Avenues” Marseilles monitoring site
(FORMES and APICE inter-comparison campaign site)
 - APICE area : 100 km x 100 km



Results

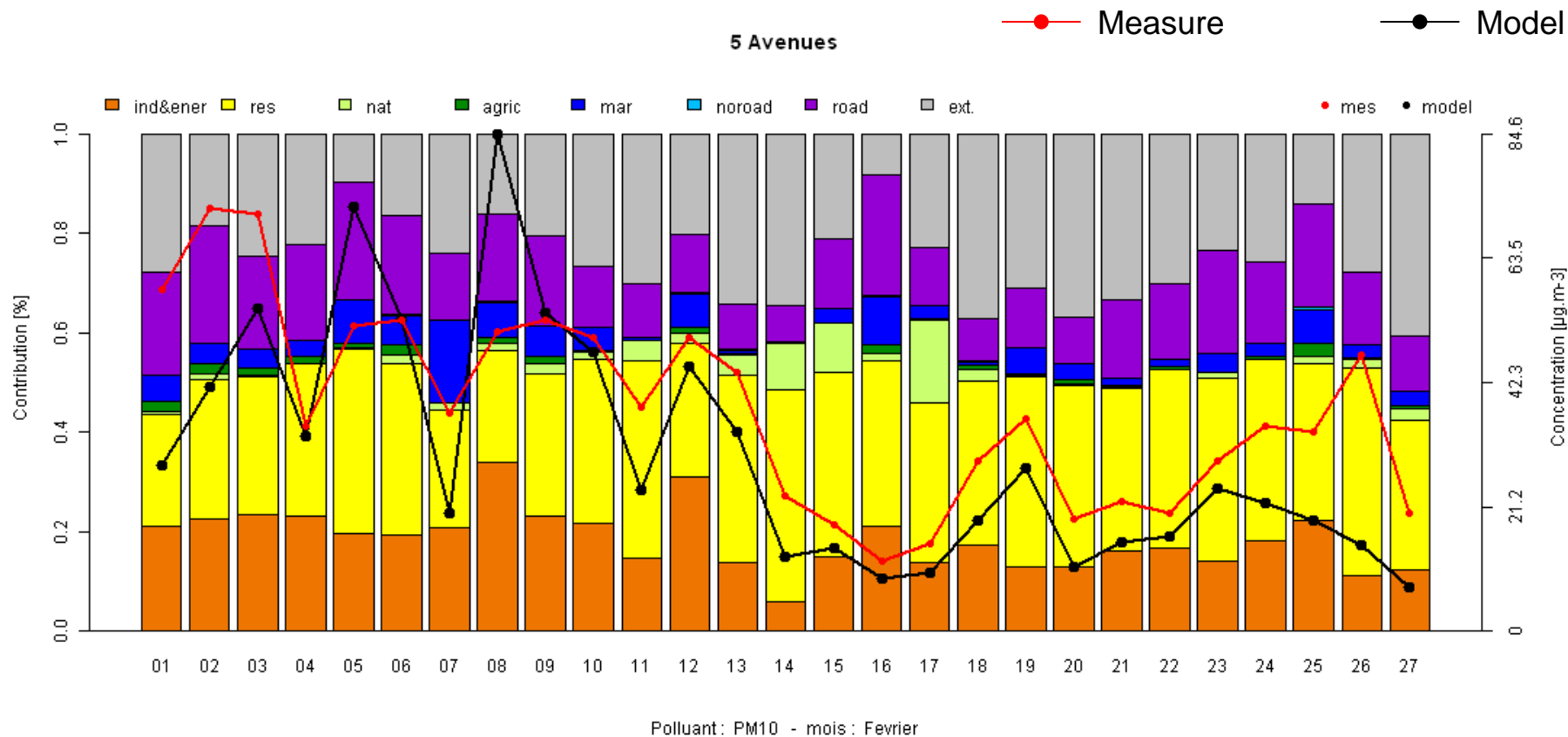
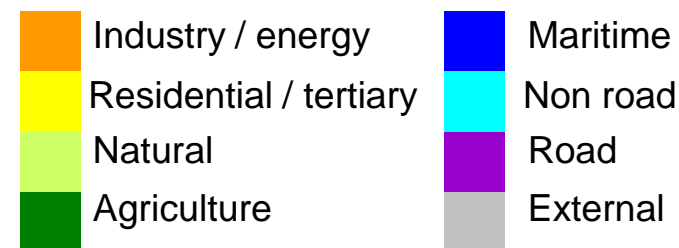
- February 2011 – “5 avenues” site



Reference run - daily data

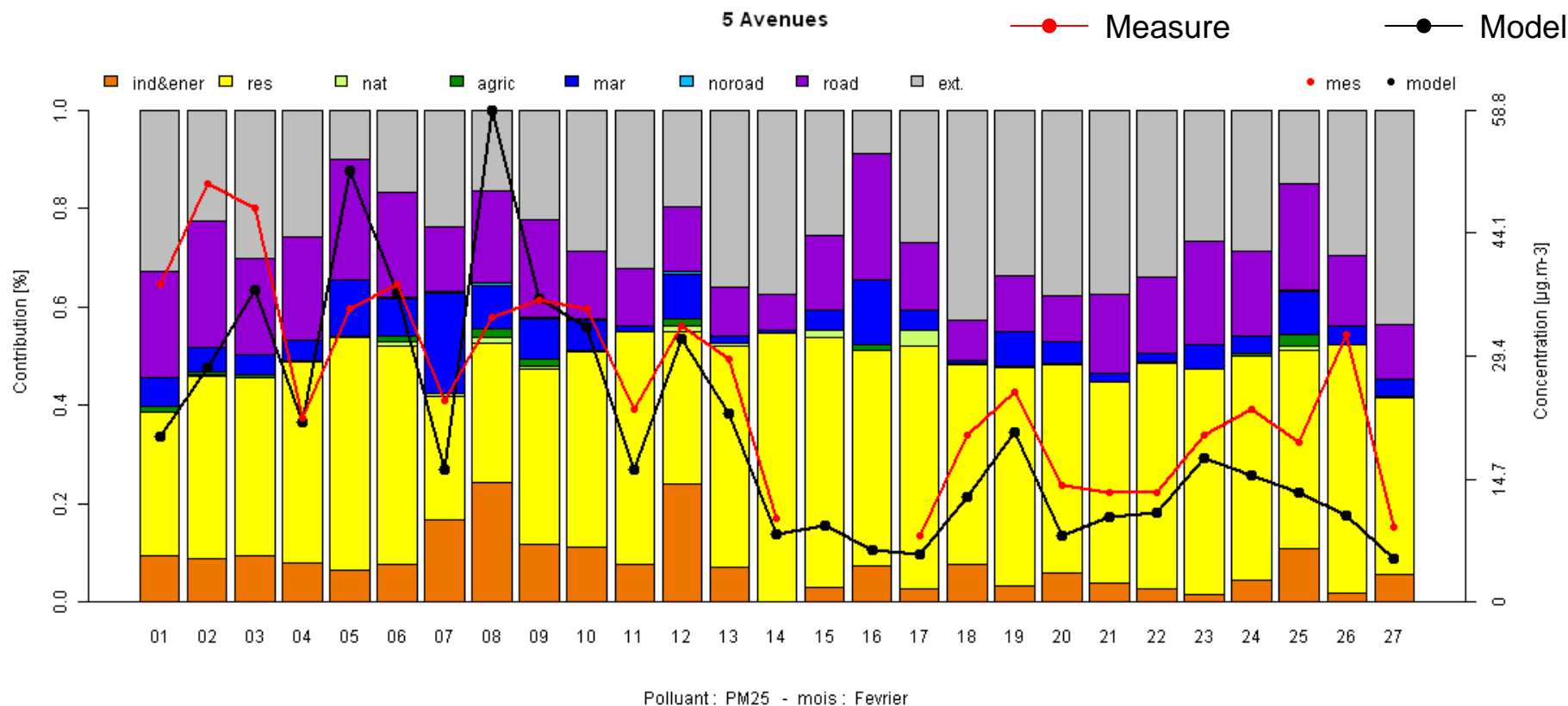
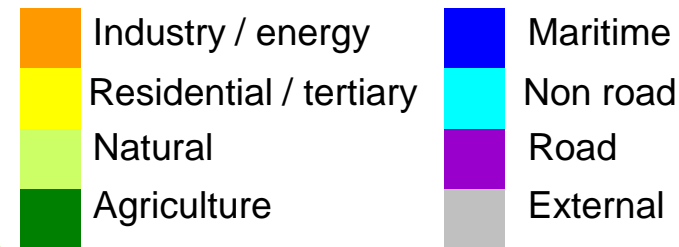
Results

- February 2011 – “5 avenues” site – PM₁₀**



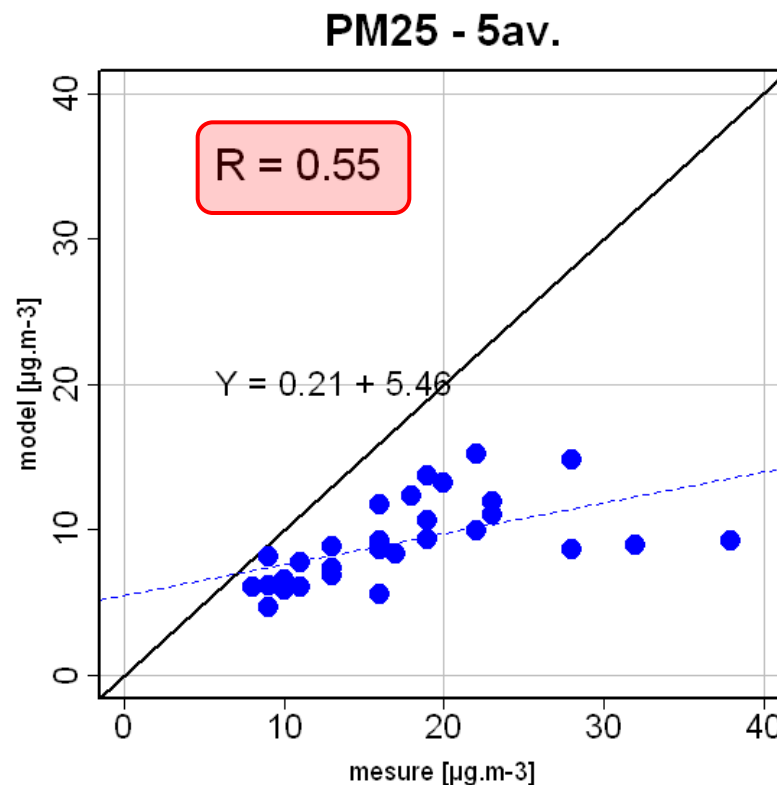
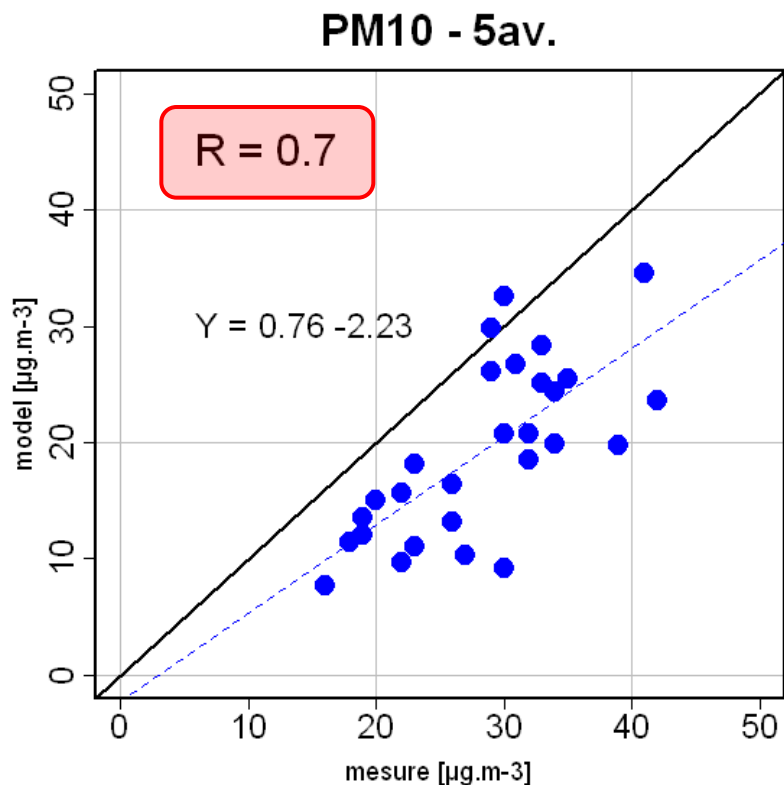
Results

- February 2011 – “5 avenues” site – PM_{2.5}**



Results

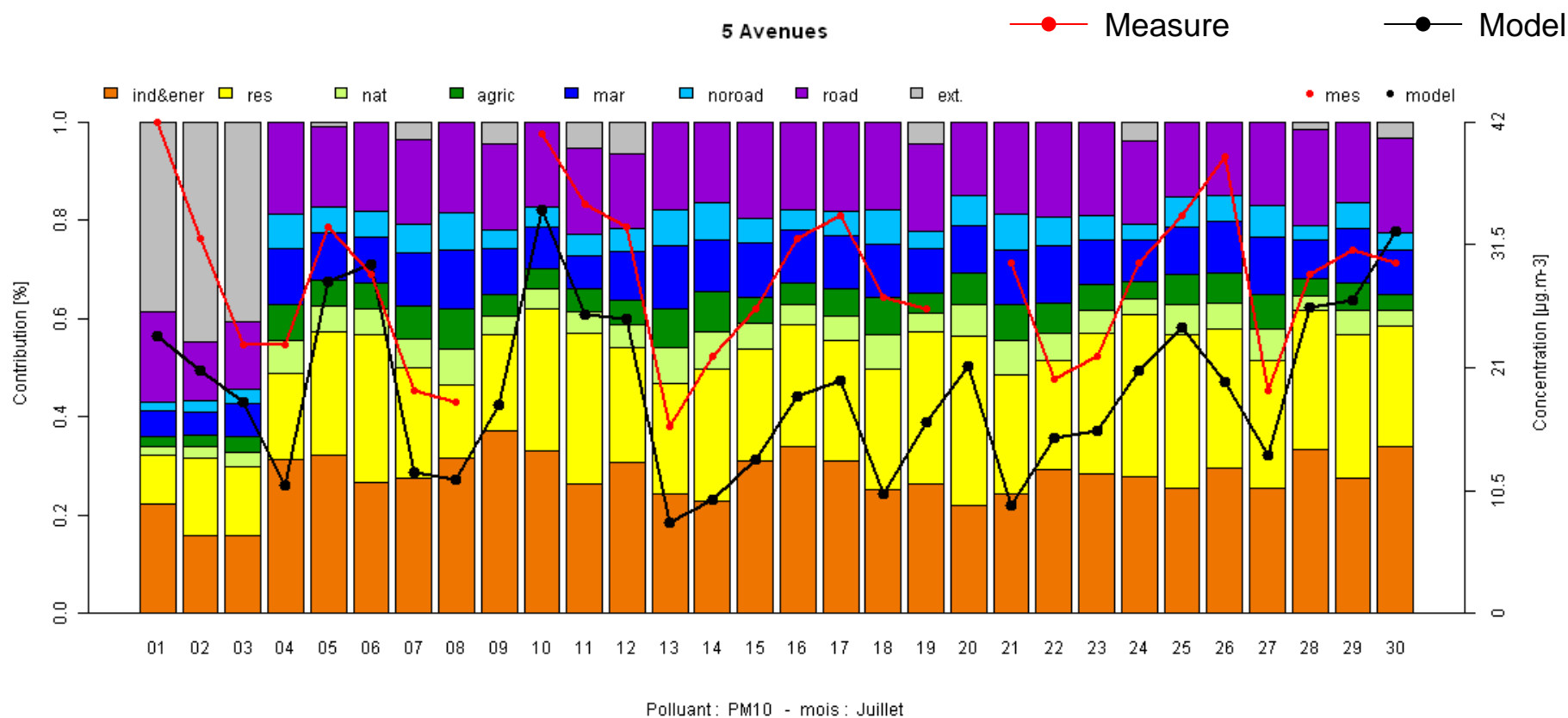
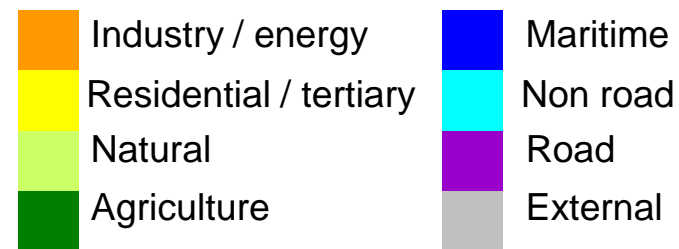
- July 2008 – “5 avenues” site



Reference run - daily data

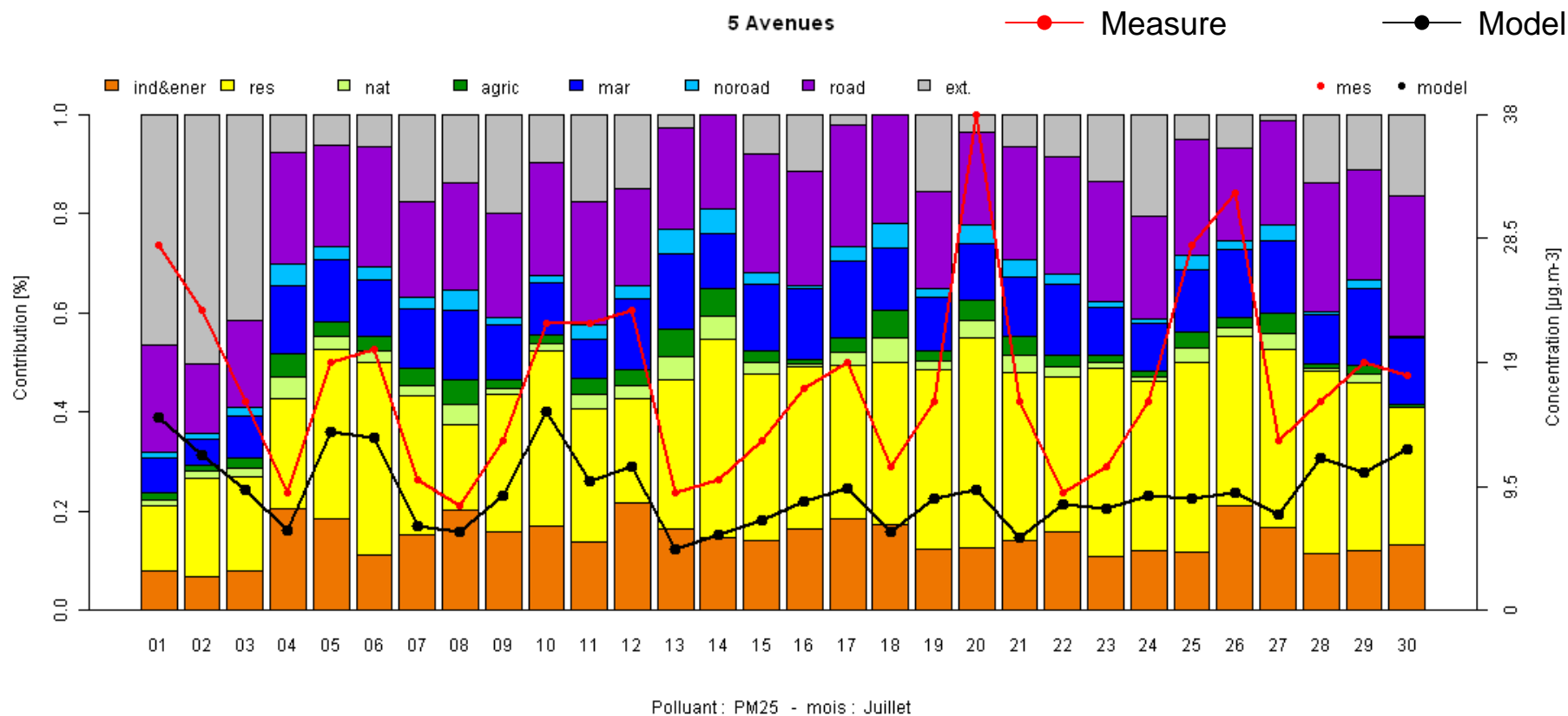
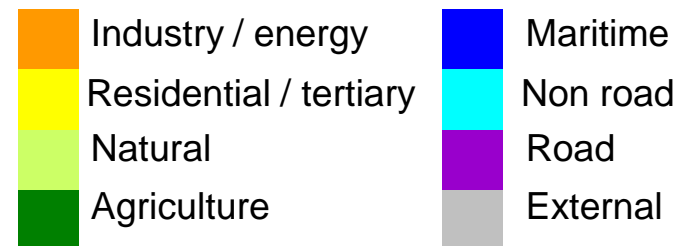
Results

- July 2008 – “5 avenues” site – PM₁₀**



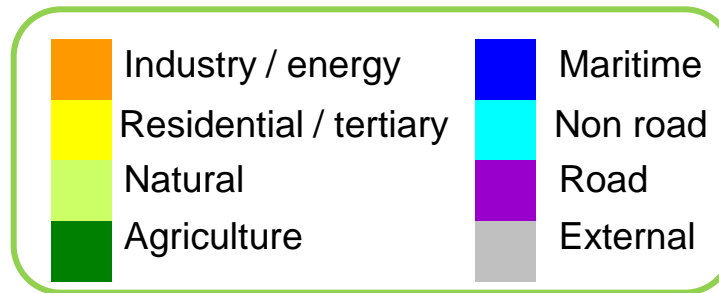
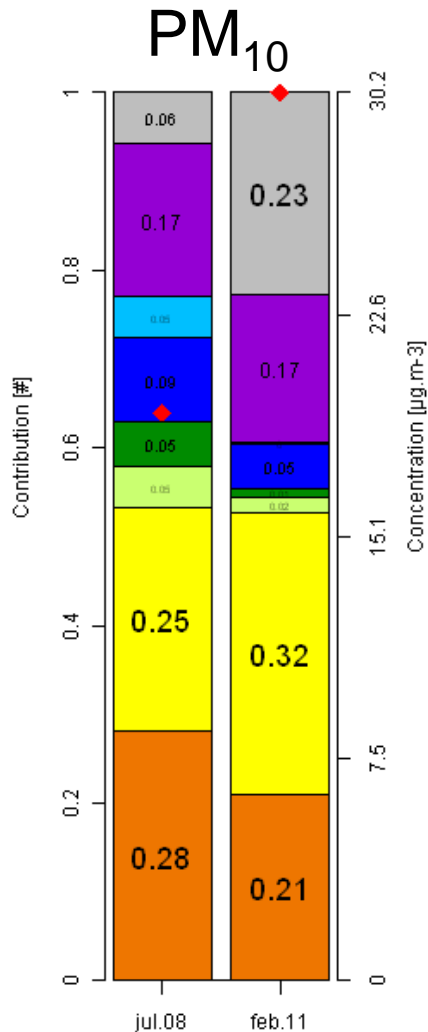
Results

- July 2008 – “5 avenues” site – PM_{2.5}

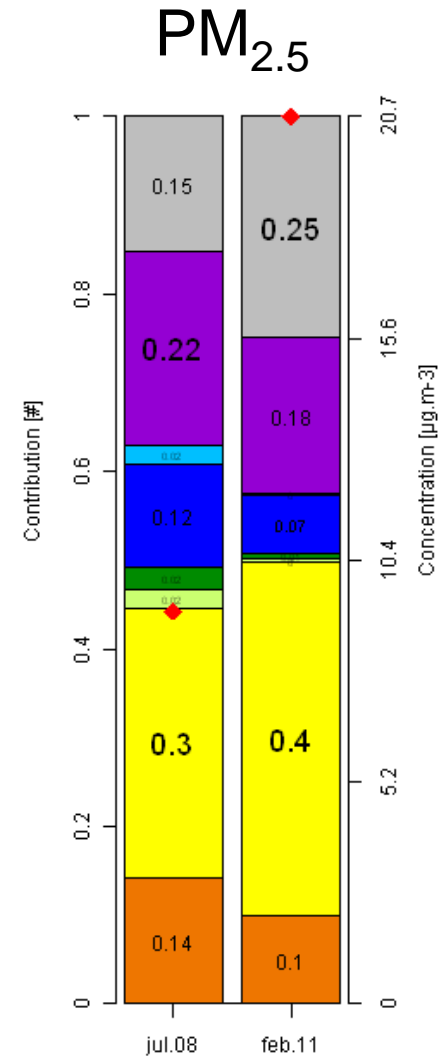


Results

- Monthly average – “5 avenues” site – PM₁₀ / PM_{2.5}



Concentration



mov. mens - PM10

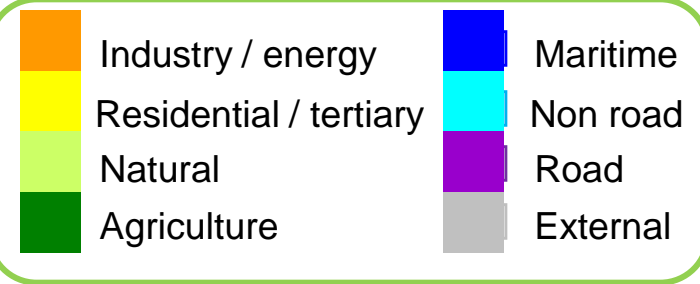
mov. mens - PM25



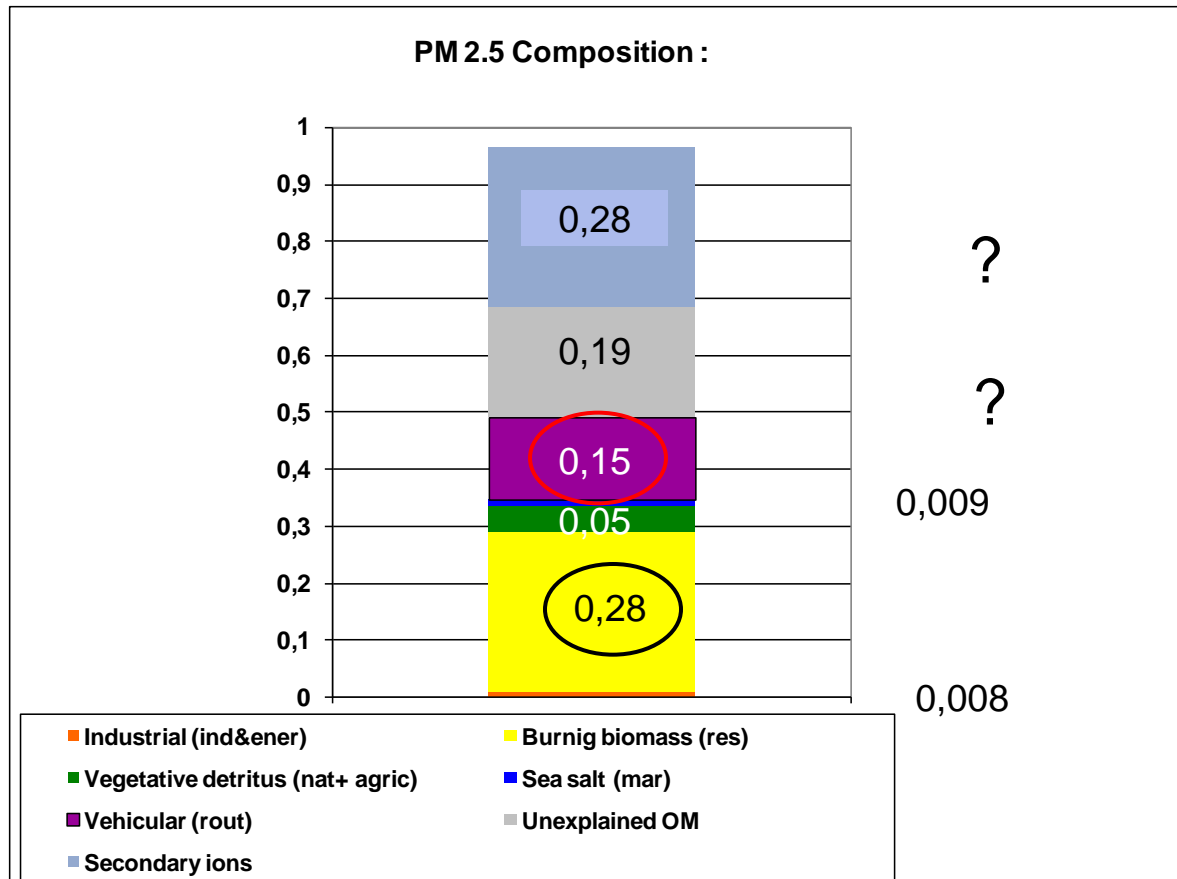
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Results

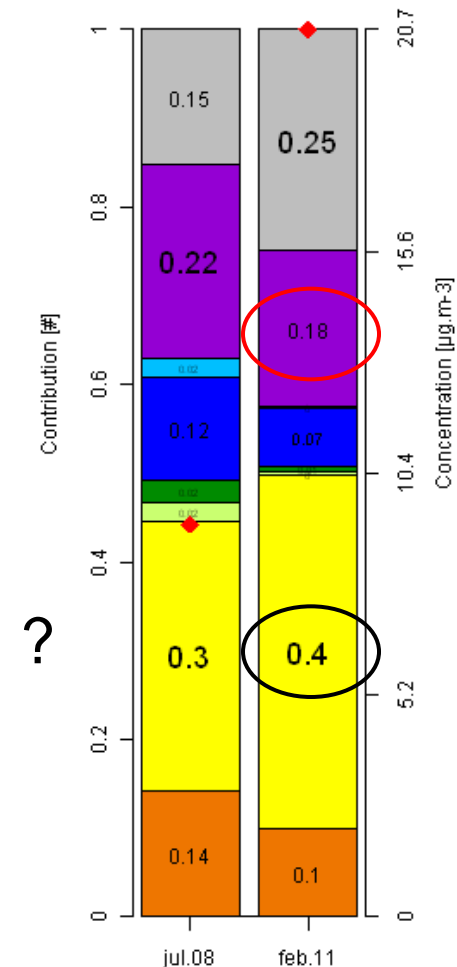
- Monthly average “5 avenues” site : PM_{2.5}



Préliminary CMB from Measurements (source : LCP)



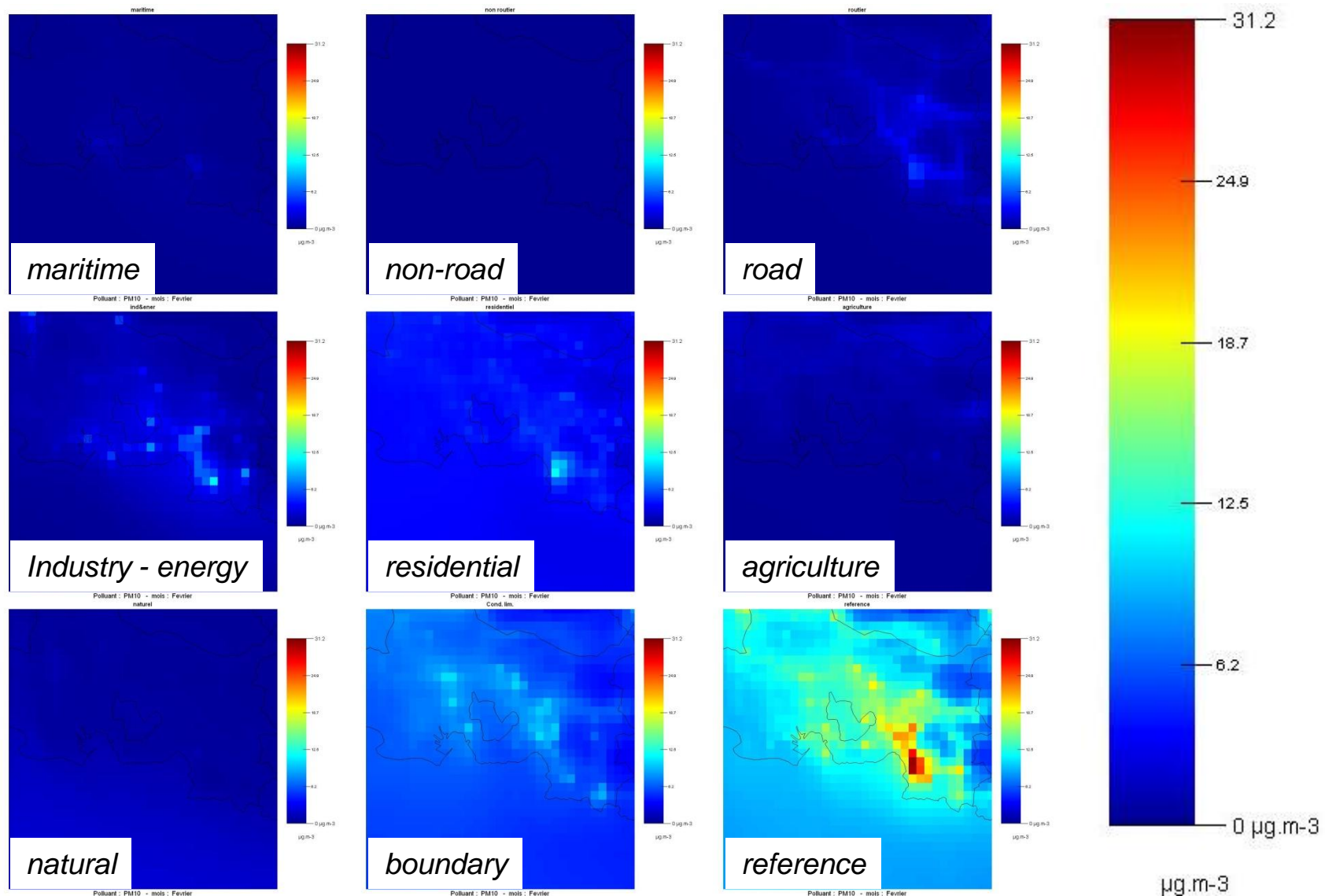
CHIMERE model



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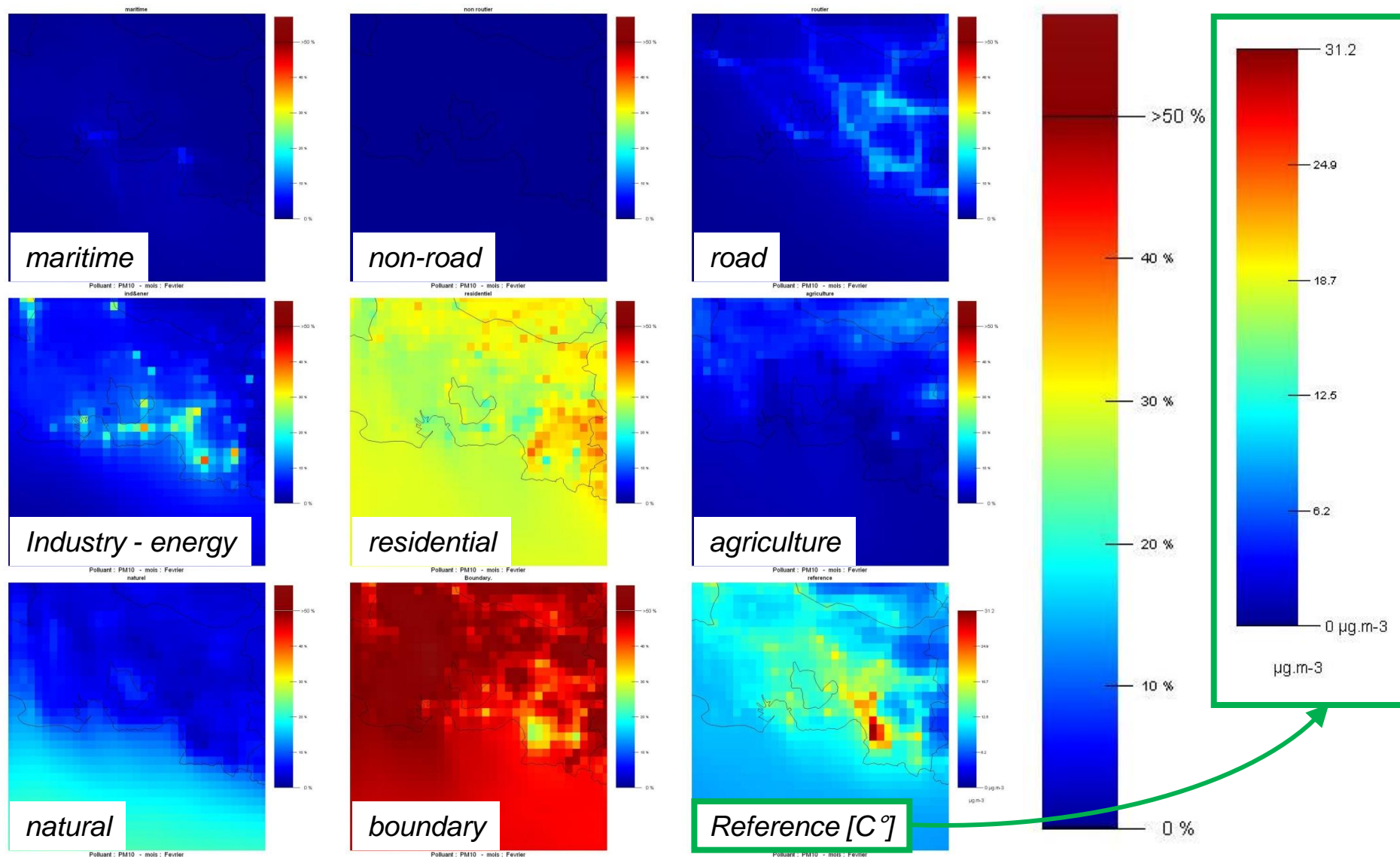
Results

- February 2011 – APICE area (100km x 100km) – PM₁₀ – Concentration**



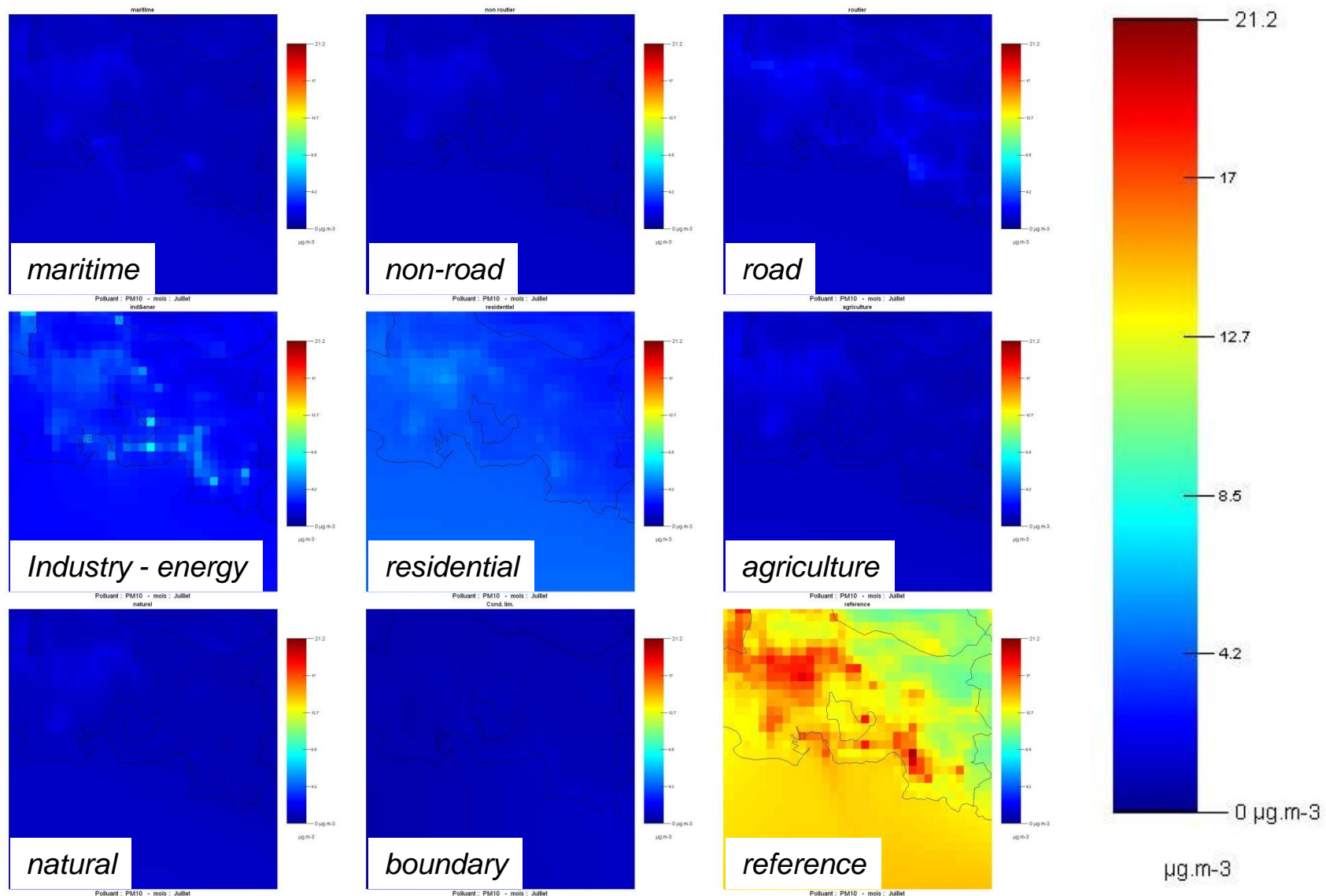
Results

- February 2011 – APICE area (100km x 100km) – PM₁₀ - Contribution**



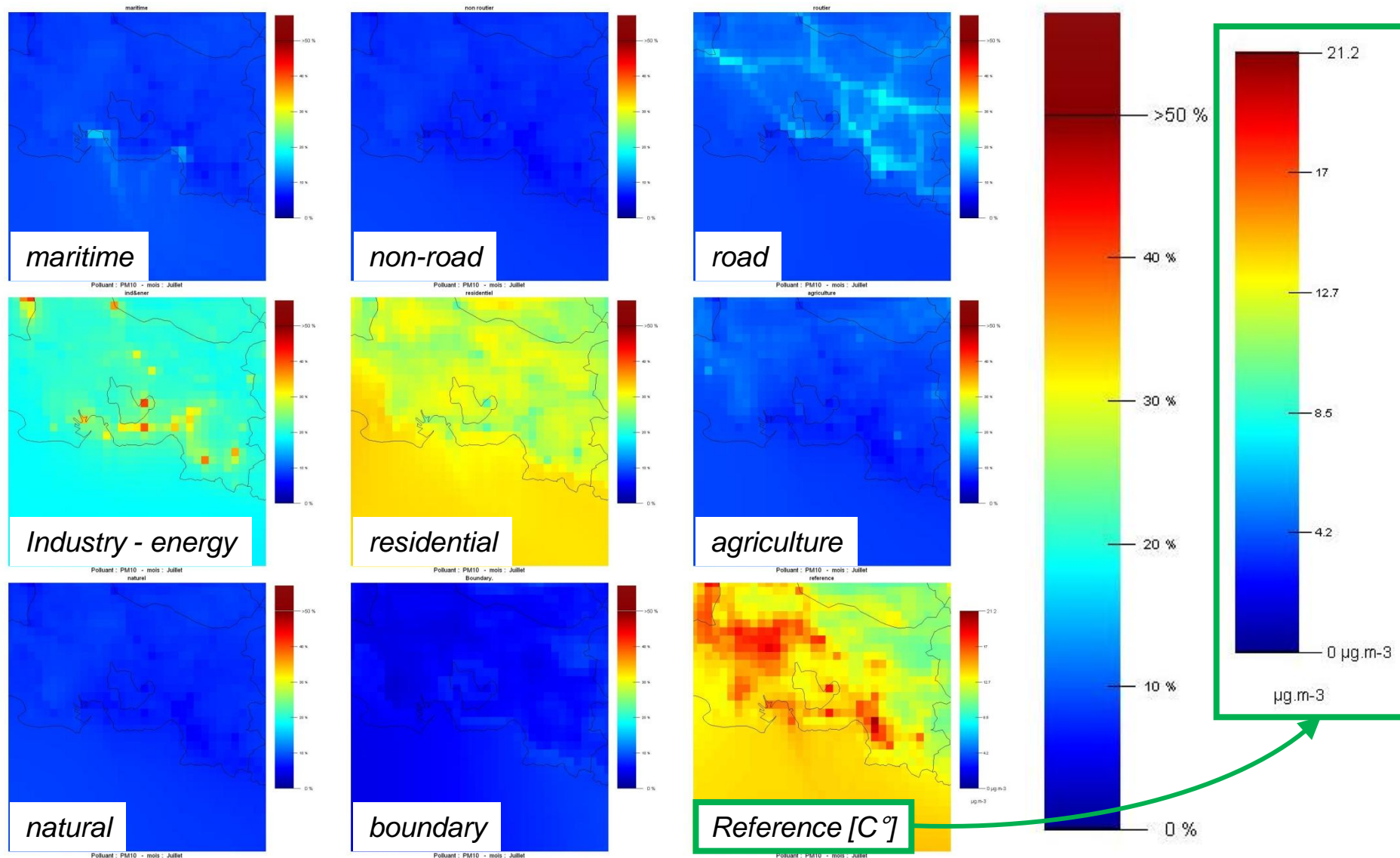
Results

- July 2008 – APICE area (100km x 100km) – PM₁₀ – Concentration**



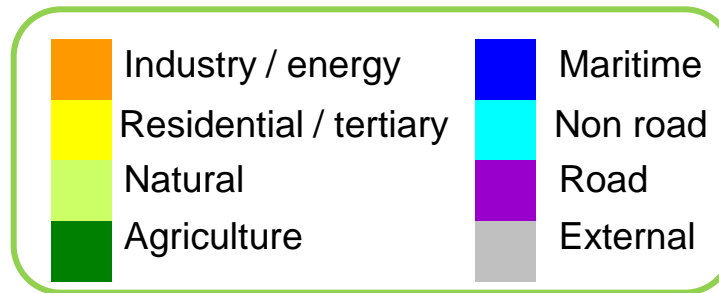
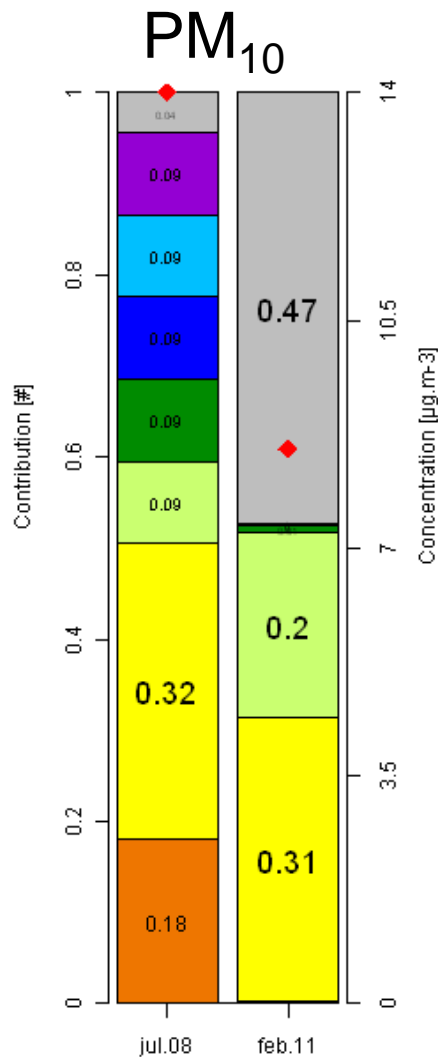
Results

- July 2008 – APICE area (100km x 100km) – PM₁₀ - Contribution

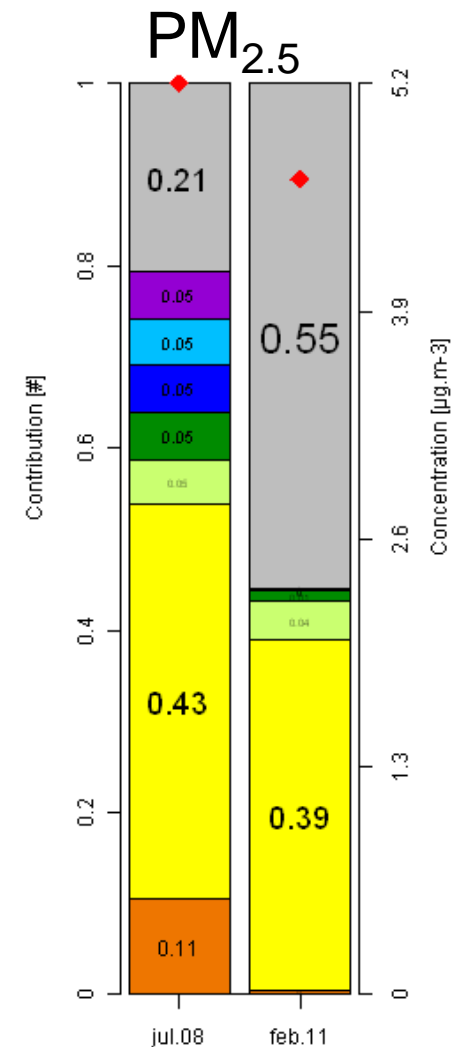


Results

- Monthly average – APICE area (100km x 100km) – PM₁₀ / PM_{2.5}



Concentration





Comming Next

- August 2011 simulation
- CAMx model source apportionment
- Scénarios : régional model + high resolution model



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Thanks for your attention

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ANNEXE – Sector description

GROUP	Description
ENERGY	Public power
	District heating plants
	Petroleum refining plants
	Solid fuel transformation plants
	Coal mining, oil / gas extraction, pipeline compressors
	Processes in petroleum industries
	Extraction, 1st treatment and loading of gaseous fossil fuels
	Liquid fuel distribution (except gasoline distribution)
	Gasoline distribution
	Gas distribution networks
	Comb. in boilers, gas turbines and stationary engines
	Process furnaces without contact
	Processes with contact
	Processes in iron and steel industries and collieries
INDUSTRY	Processes in non-ferrous metal industries
	Processes in inorganic chemical industries
	Process in organic chemical industry (bulk production)
	Processes in wood, paper pulp, food, drink and other industries
	Degreasing, dry cleaning and electronics
	Chemical products manufacturing or processing
	Industry
	Waste incineration
	Solid Waste Disposal on Land
	Open burning of agricultural wastes (except 10.03)
	Cremation
	Other waste treatment
	Paint application
	Other use of solvents and related activities



Industry / energy

Residential / tertiary

Natural

Agriculture



Maritime

Non road

Road

External



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ANNEXE – Sector descriptio

GROUP	Description
	Paint application
	Other use of solvents and related activities
RESIDENTIAL / TERTIARY	Commercial and institutional plants
	Residential plants
	Other
	Household and gardening
NON ROAD	Railways
	Inland waterways
	Air traffic
	Other off-road
MARITIME	Maritime activities
ROAD	Passenger cars
	Light duty vehicles < 3.5 t
	Heavy duty vehicles > 3.5 t and buses
	Mopeds and Motorcycles < 50 cm3
	Motorcycles > 50 cm3
	Gasoline evaporation from vehicles
	Automobile tyre and brake wear
	Road abrasion



Industry / energy

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ANNEXE – Sector description

GROUP	Description
AGRICULTURE	Plants in agriculture, forestry and aquaculture
	Agriculture
	Cultures with fertilizers
	Cultures without fertilizers
	Enteric fermentation
	Manure management regarding organic compounds
	Use of pesticides and limestone
	Manure management regarding nitrogen compounds
	Non-managed broadleaf forests
	Non-managed coniferous forests
	Natural grassland and other vegetation
	Wetlands (marshes - swamps)
	Waters
	Managed broadleaf forests
	Managed coniferous forests
NATURAL	Dust / Sea salts / terrestrail ecosystem / ...



Industry / energy

Residential / tertiary

Natural

Agriculture



Maritime

Non road

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