

# 4 URBAN PLATFORMS DEDICATED TO AIR QUALITY SURVEY IN PACA REGION

Jonathan Virga<sup>1</sup>, Gaëlle Luneau<sup>1</sup>, Benjamin Rocher<sup>1</sup>, Alexandre Armengaud<sup>1</sup>, Frédéric Pradelle<sup>2</sup>, Céline Pesin<sup>2</sup>, Marie Noëlle Rolland<sup>2</sup>

(1) Atmo PACA  
Le Noilly, 146 rue Paradis  
13006 MARSEILLE  
FRANCE  
[www.atmopaca.org](http://www.atmopaca.org)



**HARMO13**



(2) NUMTECH  
Parc Technologique de la Pardiou  
6 allée Alan Turing - BP 30242  
63175 AUBIERE Cedex  
FRANCE  
[www.numtech.fr](http://www.numtech.fr)

## 1 Atmo PACA is in charge of monitoring air quality in most of the Provence Côte d'Azur (PACA) region.

As per the French "Air and Energy Efficiency" Law (30th Dec. 1996), Atmo PACA has been agreed as one of the French AASQA (Agreed Association for Air Quality Monitoring) by the Ministry in charge of Environment.

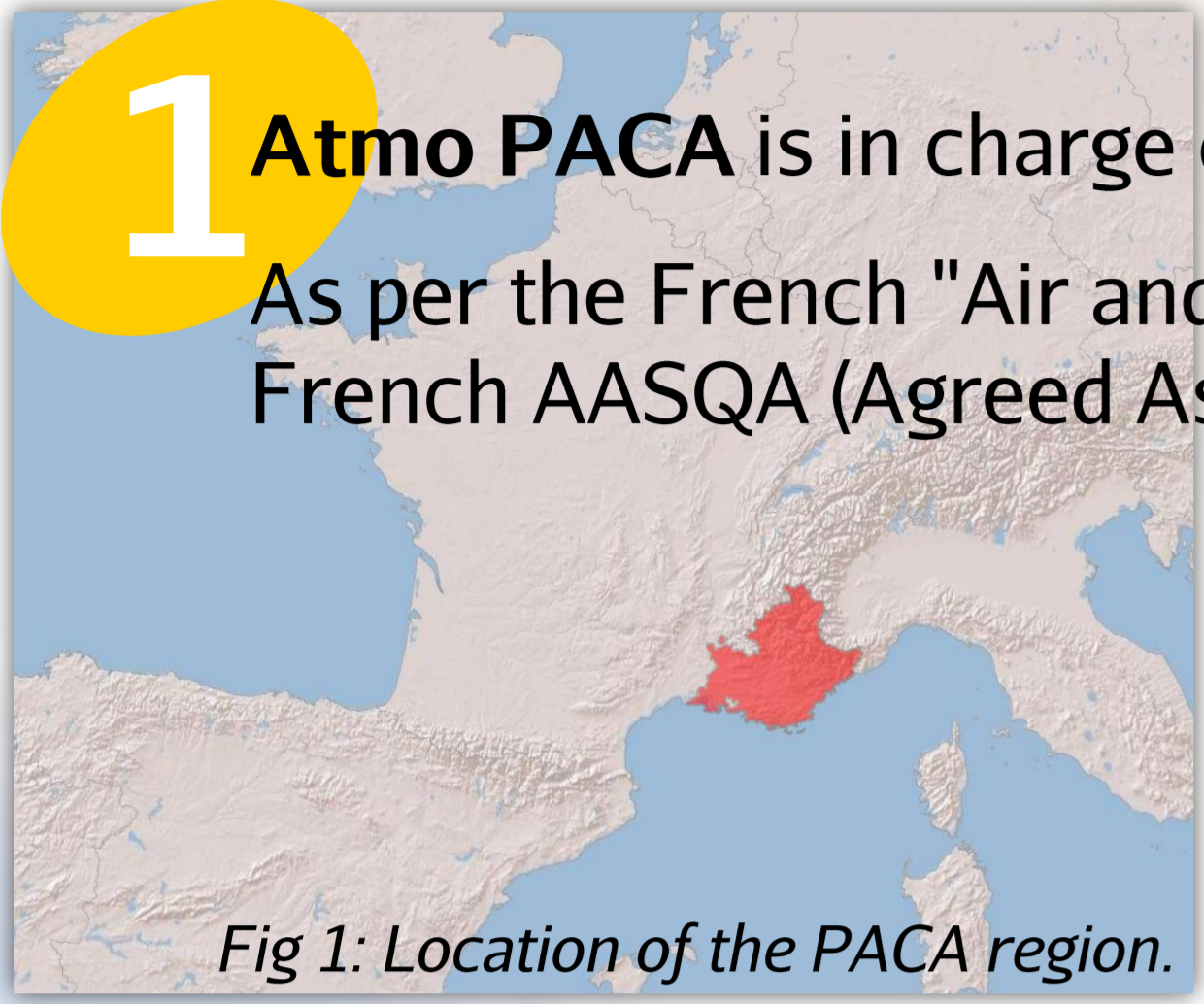


Fig 1: Location of the PACA region.

## 2 Air quality in the PACA region

The pollutants monitored by Atmo PACA are determined on knowledge about their sources, their effects on **health & environment**, and the techniques available for their evaluation. WHO's recommendations, EU directives, French laws and regulations are considered together. PACA region is ranking n° 1 to 3 in France for emissions of NO<sub>x</sub>, SO<sub>2</sub>, VOCs and CO<sub>2</sub>. Combustion (vehicles, heating and industry) and industrial processes are the main sources of emissions in the region.

## 3 Emissions Inventory / Monitoring network / Modelling : complementary approaches

The **inventory of emissions** deals with about hundred pollutants from various sources (human activities and nature). It is an essential step for feeding models, preparing balances per geographic area or per pollutant and maps of emissions with high spatial resolutions.

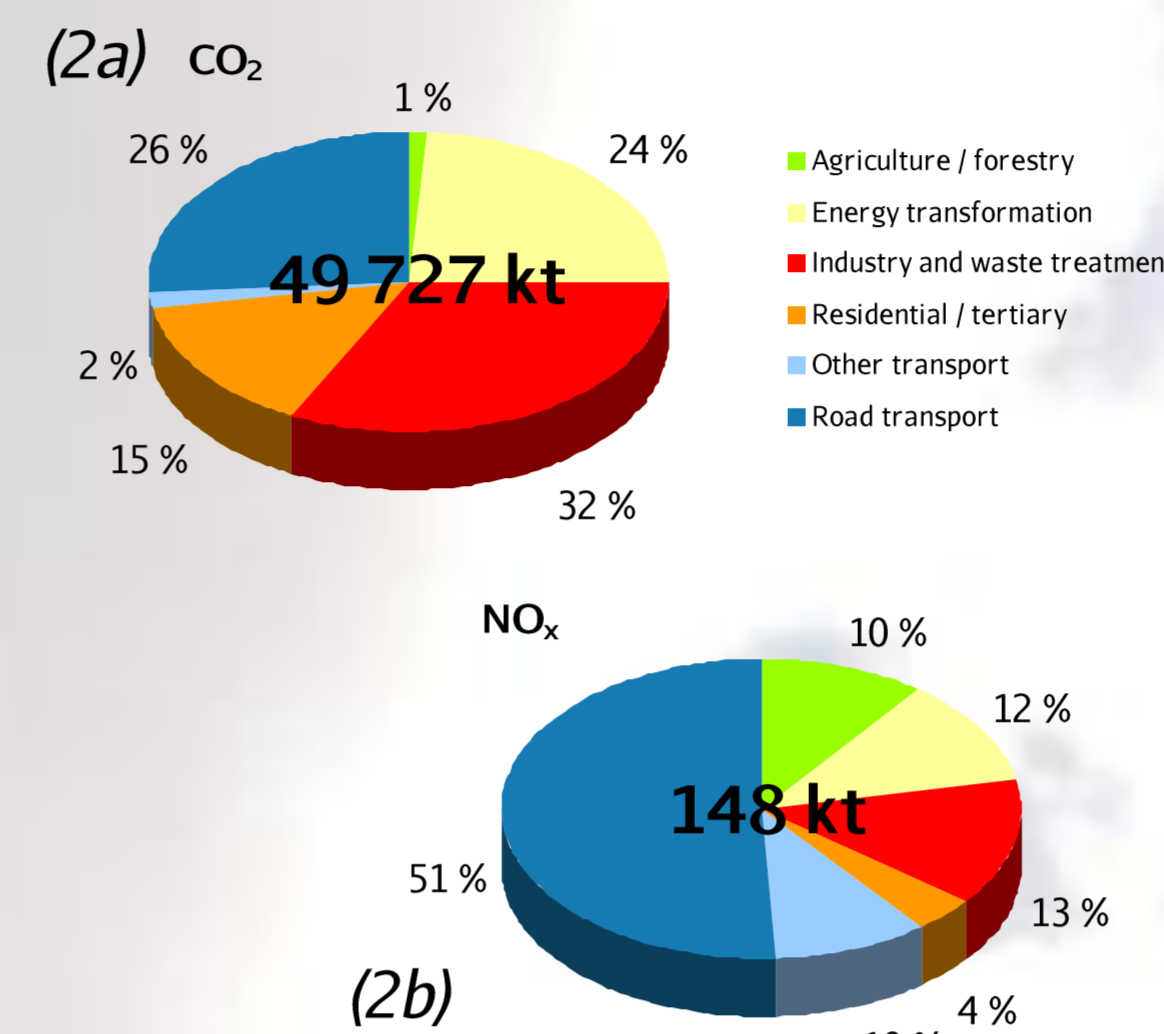
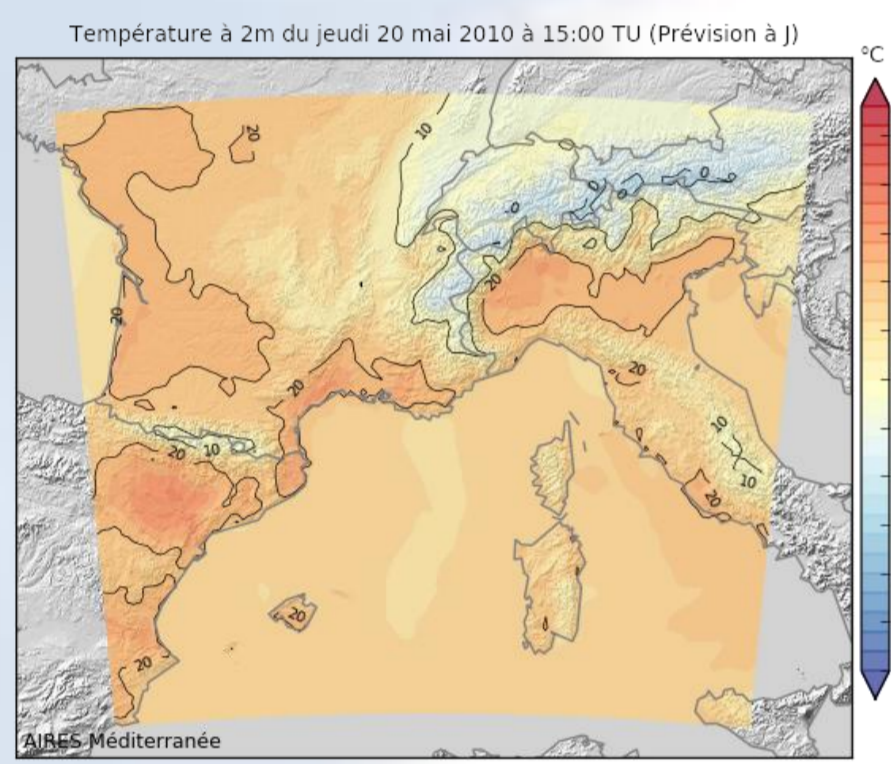


Fig 2: Source distribution of CO<sub>2</sub> (2a), NO<sub>x</sub> (2b), PM (2c) and SO<sub>2</sub> (2d) emissions in 2004

The **measuring network** includes about 50 sites spread from the Rhône River to Italy, plus few mobile units and means for passive diffusion tubes campaign.

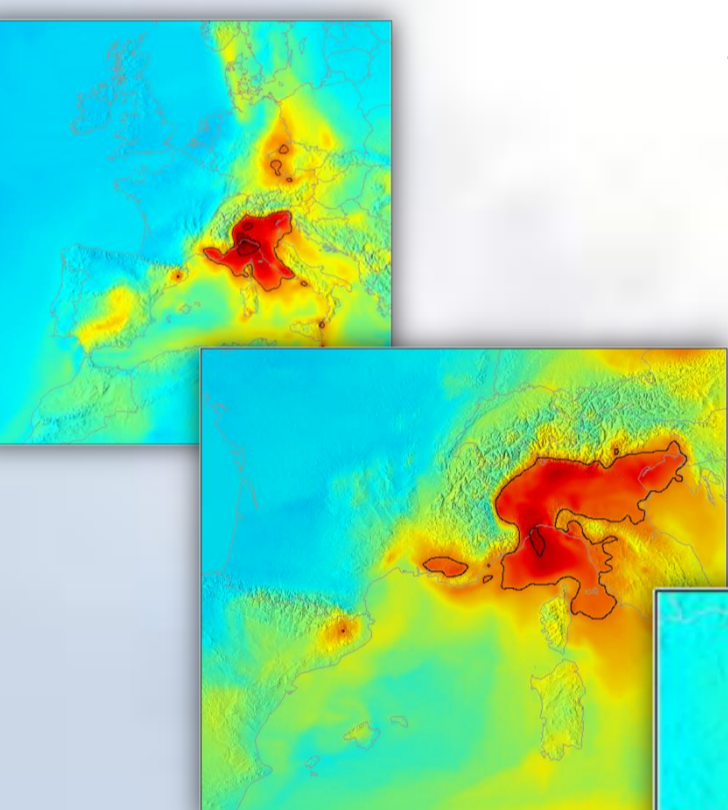


(3a)

Under the name of AIREs Méditerranée, the **modelling system**, including Chemistry & Transport Model, has been developed within an interregional cooperation with Languedoc Roussillon.

It is based over years on several national, EU & international scientific teams & field projects, such as AIRPROCHE, ELFE, ESCOMPTE and PRIMEQUAL (Cros et al., 2004 and Coll et al., 2009)

[www.aires-mediterranee.org](http://www.aires-mediterranee.org)



(3b)

Fig 3: Temperature (3a) and O<sub>3</sub> concentration (3b) forecast from AIREs Méditerranée.

## 4 Results

In this context, **ADMS Urban** (Mc Hugh et al., 1997) has been implemented over 4 cities and their suburbs in the PACA region. The dispersion code has been tested and the results have been compared to measurements performed by Atmo PACA (passive devices and automatic stations) (Atmo PACA, 2007 and 2009). The validation of the model includes both comparisons with long term measurements (yearly average concentrations) and hourly data.

**5 Improvements** have been tested in considering the link between mesoscale resolution and urban resolution. Since the last four years, Atmo PACA has been working in close cooperation with NUMTECH in order to test and improve the URBAN AIR System (Pradelle et al., 2010).

Fig 5: NO<sub>2</sub> annual mean simulated concentrations and comparison observations versus modelling over Aix-en-Provence and its suburb (5a), Toulon (5b), Antibes and its suburb (5c), Nice and its suburb (5d). Concentrations in µg/m<sup>3</sup>.

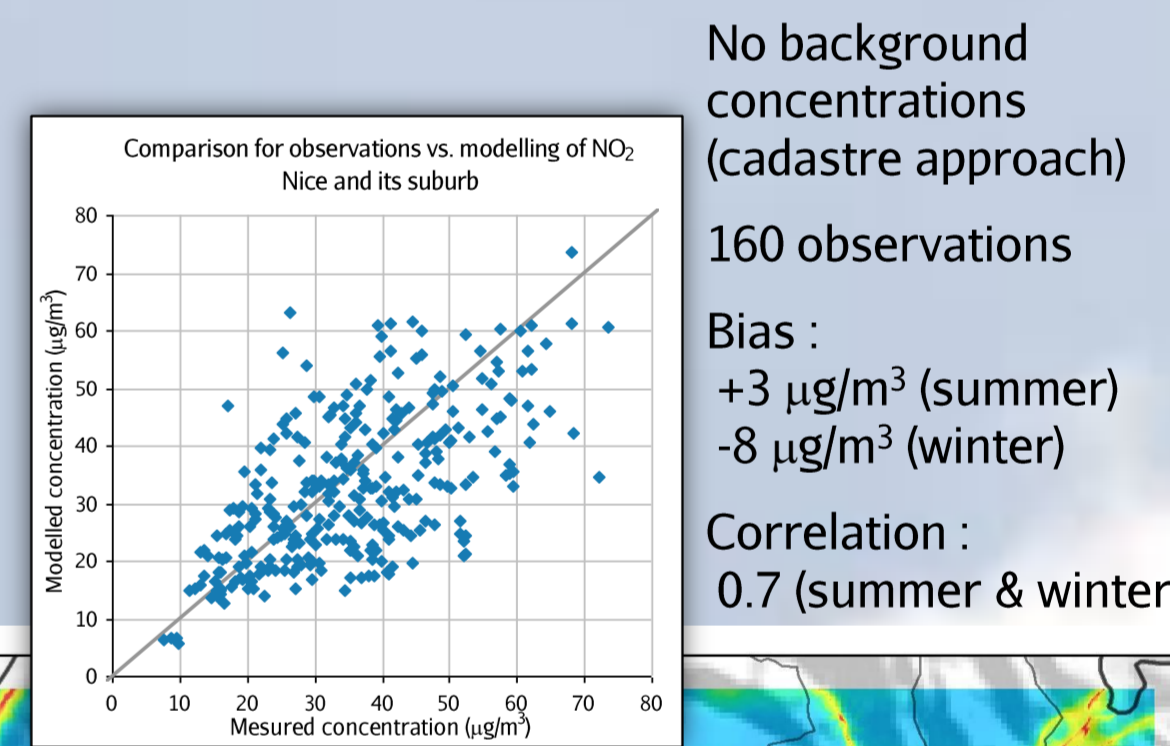
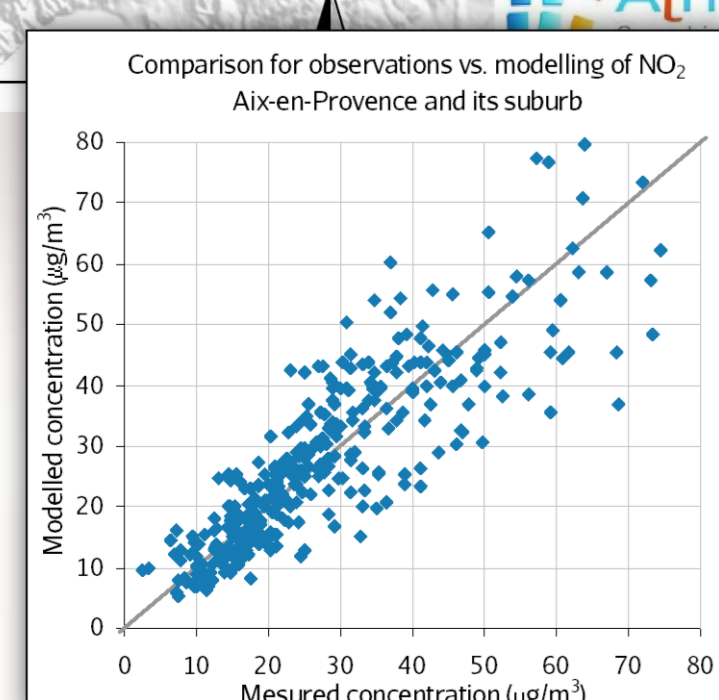
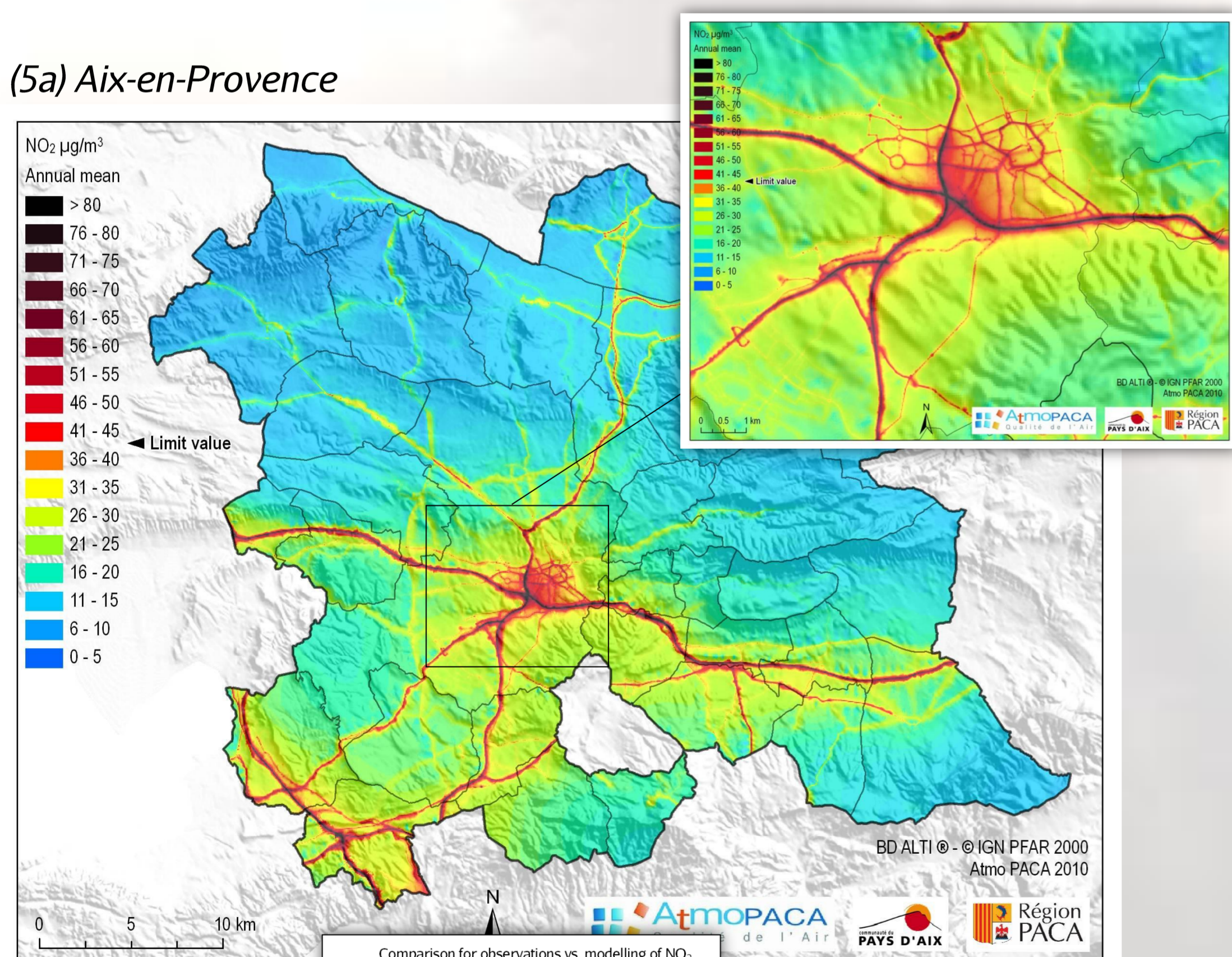
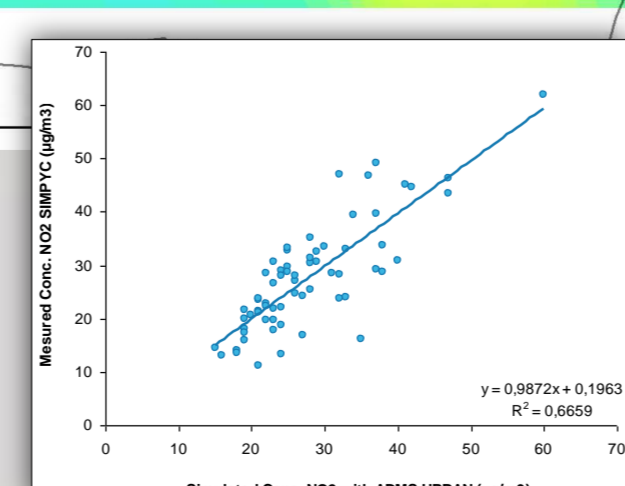
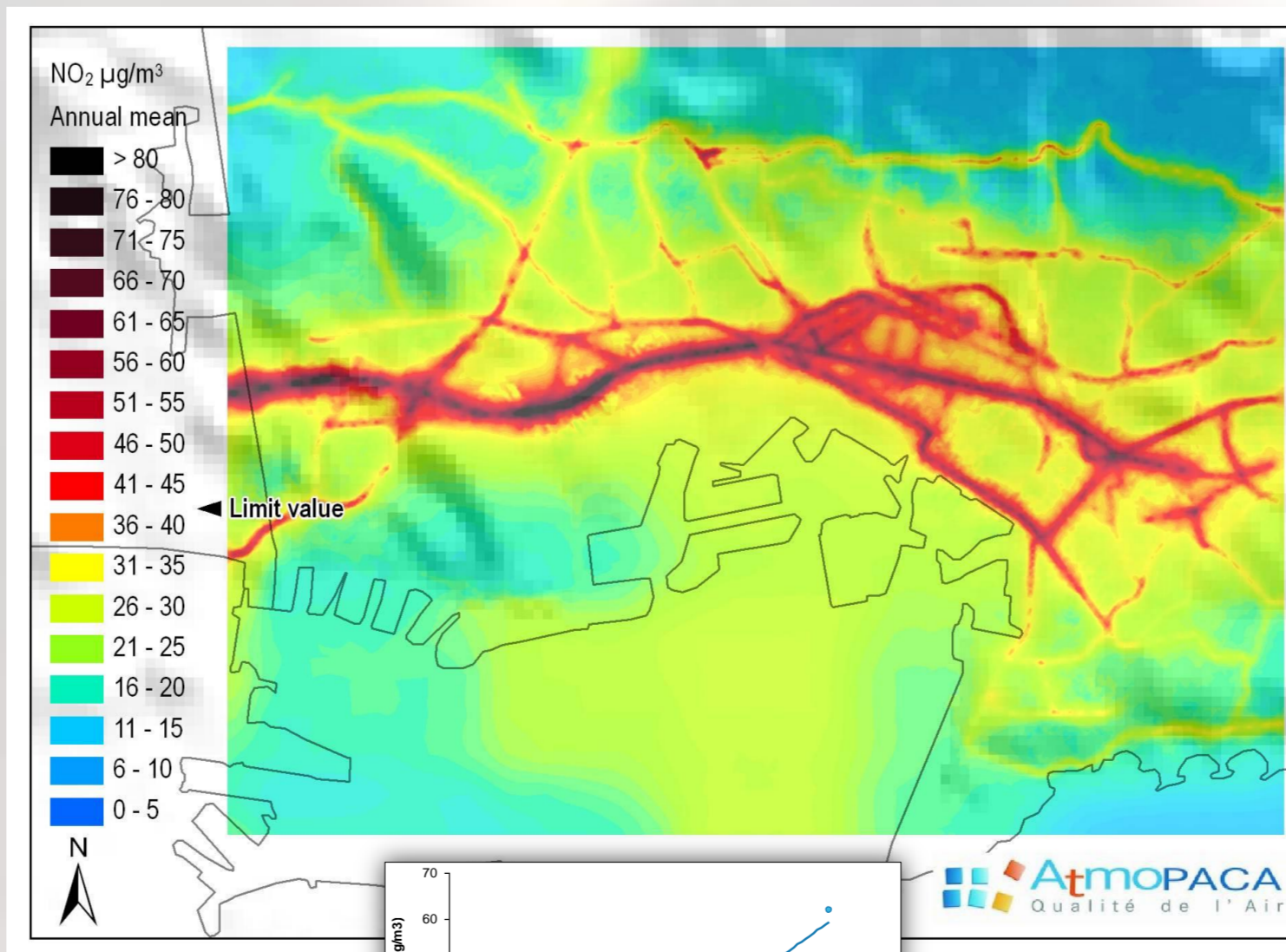


Fig 4: Location of the 4 urban platforms.

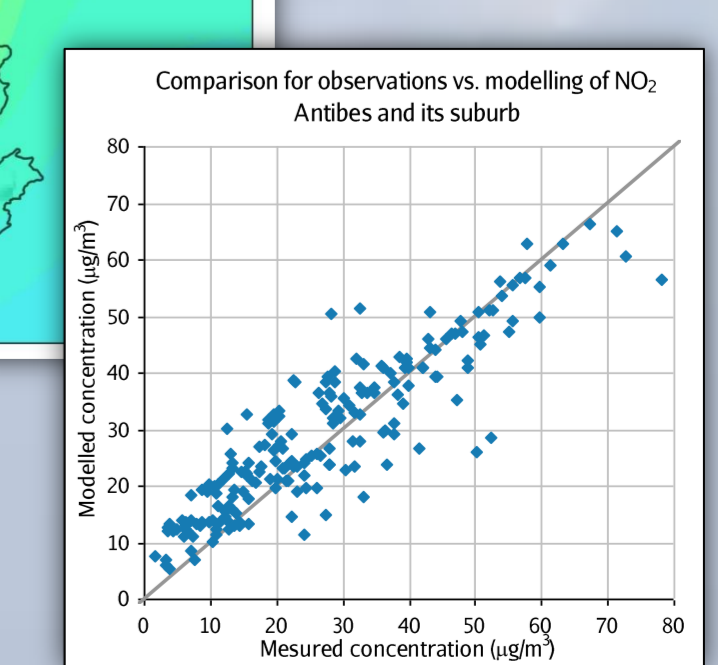
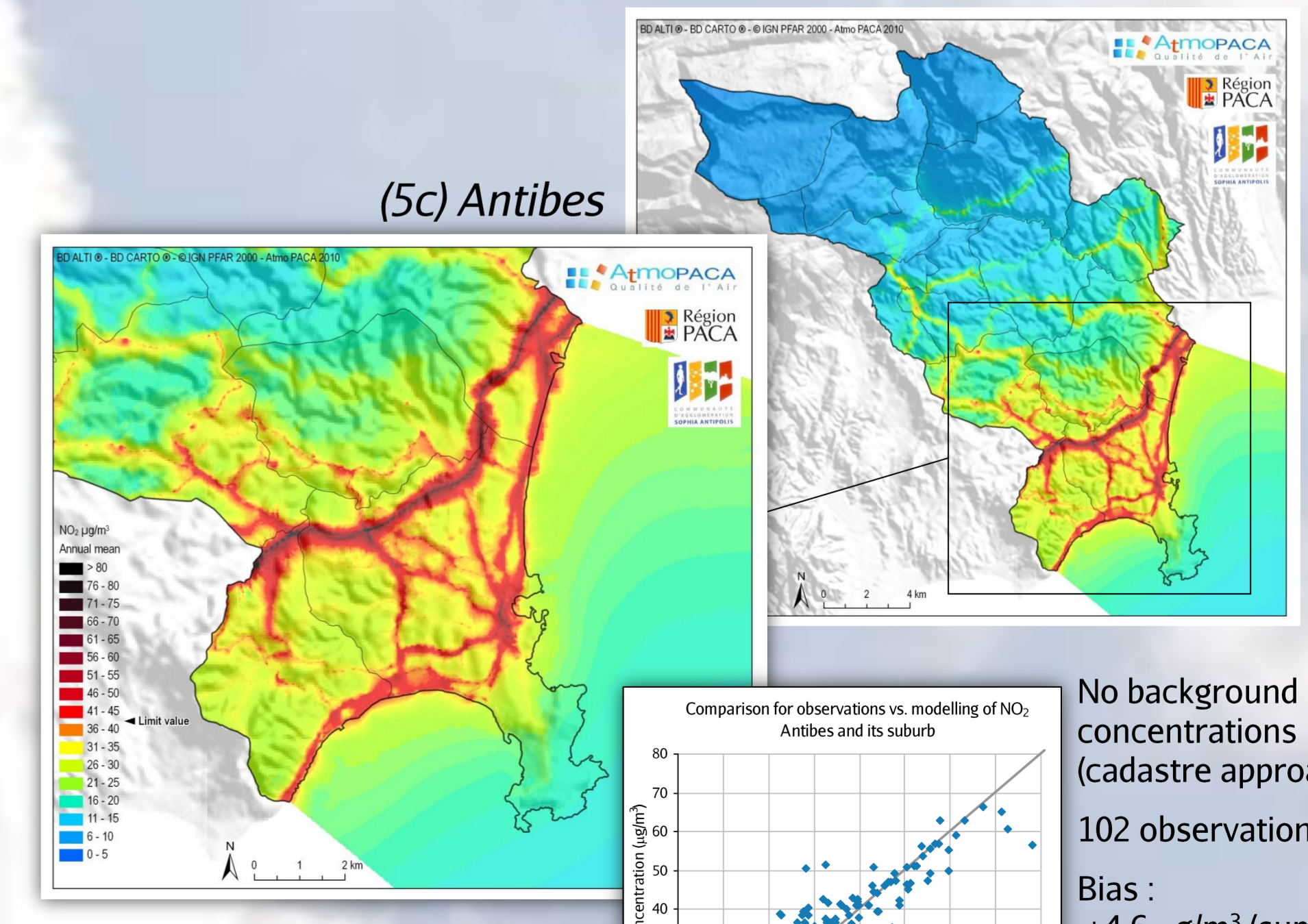
(5a) Aix-en-Provence



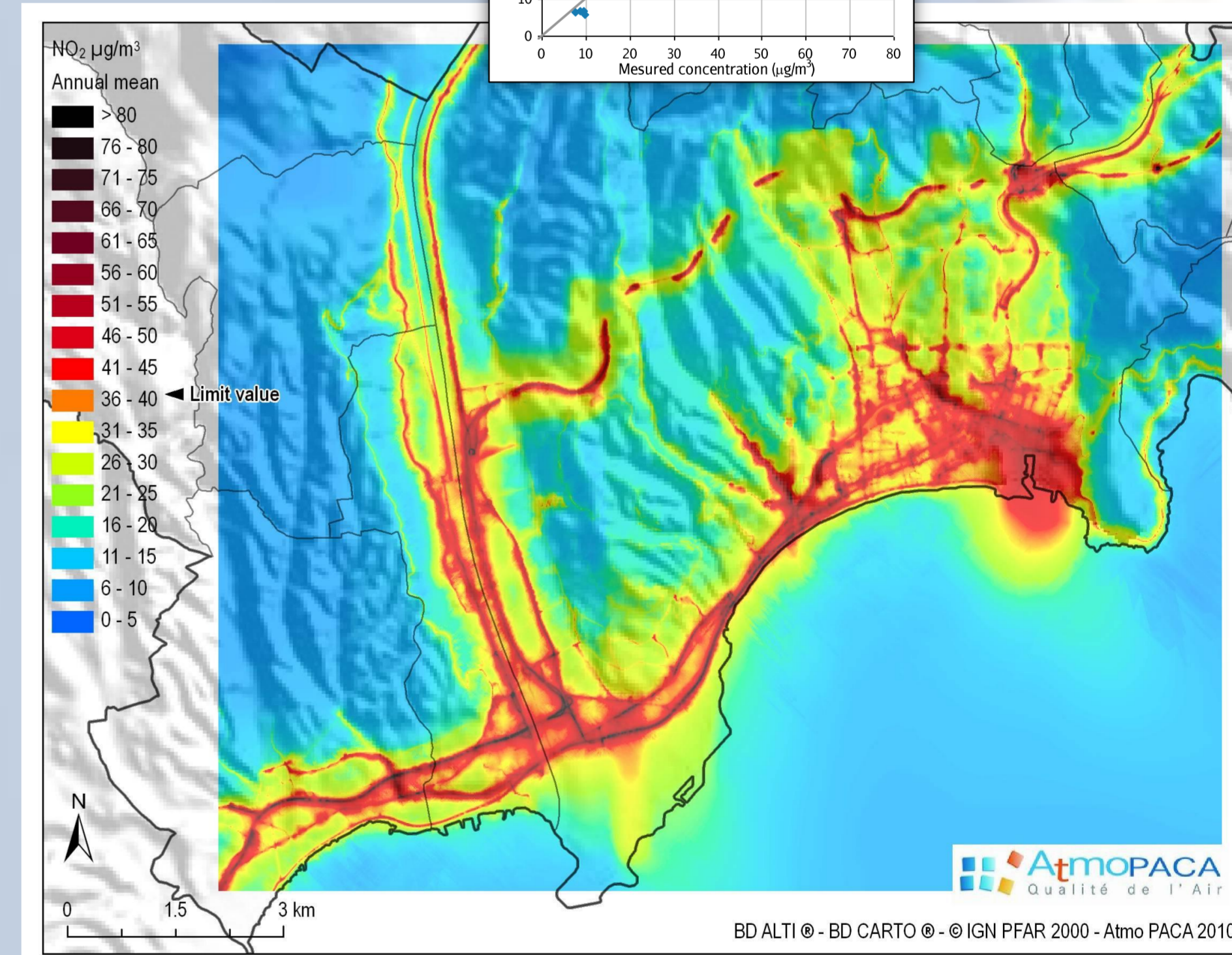
(5b) Toulon



(5c) Antibes



(5d) Nice



References :  
Atmo PACA, 2007: SIMPYC project, Phase II. Analysis of the territory: meteorology, emissions, modeling  
Atmo PACA, 2009 : Pollution atmosphérique et gaz à effet de serre : inventaire des émissions 2004.  
Atmo PACA, 2009: Etat Initial de la qualité de l'air. Projet Tramway-NCA. ([www.atmopaca.org](http://www.atmopaca.org) / Rubrique Publications)  
Cros, B., P. Durand, H. Cachier, P. Drobninski, E. Fréjafon, C. Kottmeier, P. Perros, J. Ponche, D. Robin, F. Saïd, G. Toupan et H. Wortham, 2004: The ESCOMPTE program: an overview. Atmospheric Research, 69 (3-4), 241-279.  
McHugh C., D.J. Carruthers, and H.A. Edmunds, 1997: ADMS-Urban: an Air Quality Management System for Traffic, Domestic and Industrial Pollution, Int. J. Environment and Pollution, 8 (3-6), 437-440.  
Coll I., Lasry F., Fayet S., Armengaud A., Vautard R., 2009 : Simulation and evaluation of 2010 emission control scenarios in a Mediterranean area, Atmospheric Environment 43 (2009) 4194-4204.  
Pradelle F., Armengaud A., Pesin C., Rolland MN., Virga J., Luneau G., 2010 : URBAN AIR System: an operational modelling system for survey and forecasting air Quality at Urban scale, HARMO13, Paris