



Application of source apportionment techniques

ACCEPT-AIR and AIRUSE Life projects



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Development of A Cost Efficient Policy Tool for reduction of Particulate Matter in AIR



Duration: 09/2010 – 08/2014

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Aristotle University of Thessaloniki
University of Thessaly
AXON Envirogroup Ltd.
Technical University of Crete

➤ National authorities will have to re-evaluate their environmental strategies as requirements of lower limit values for PM in air arise.



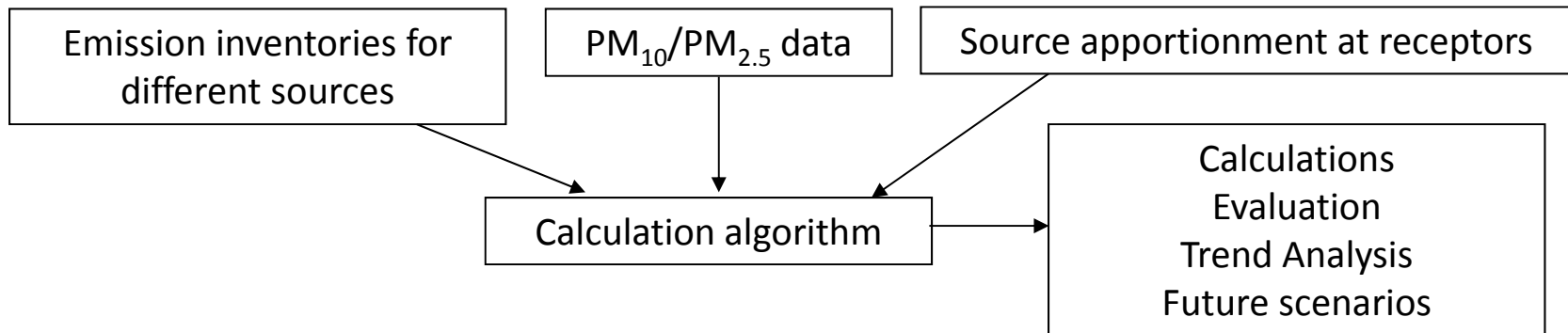
Develop a Policy Tool that will assist National and Regional authorities in Greece to control PM concentration levels.



ACEPT-AIR project objective

is to create a Policy Tool which will:

- ✚ Contain a database of PM concentrations, source apportionment studies results and emission inventories;
- ✚ Create a historical record of control measures / changes in emissions and provide results in measured concentration reductions apportioned to changes in every accounted source;
- ✚ Allow the policy makers to evaluate the effects of control measures applied on specific emission sources as well as plan new ones.





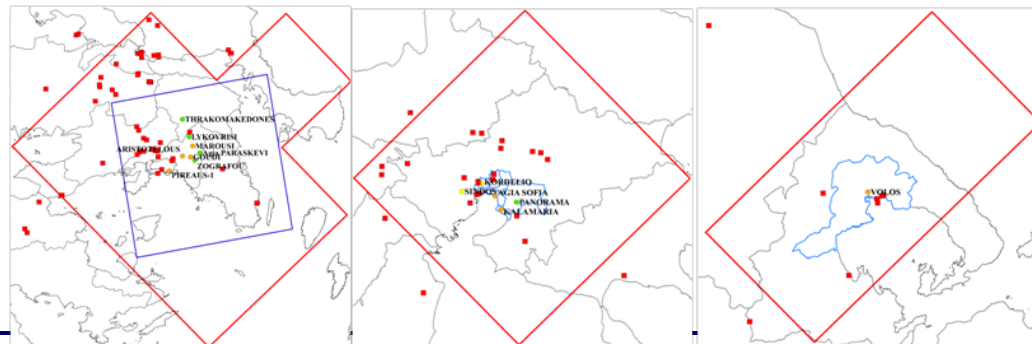
Measurement campaigns

- ✓ Gravimetric PM₁₀ /PM_{2.5} measurements
- ✓ Warm (June-Sept. 2011) and cold period (Jan.-Feb. 2012)
- ✓ 24-hr samples on teflon and quartz
 - Thermo-optical analysis for EC/OC
 - Ion chromatography for major ions
 - Atomic Absorption Spectrometry and XFR for major and trace elements



Source apportionment

- ✓ Receptor modeling (PMF and CMB)
- ✓ Emission inventories





ACCEPT-AIR Policy Tool

ACCEPT-AIR

Data Presentation | Scenarios Build-up | DataBase | About | Exit

- Pollutant Measurements
- Emissions**
 - Distributions
 - Time Series
 - Spatial Allocation
 - Daily variation
- Source Apportionment
- Scientific publications

ACCEPT-AIR

PM reduction

ACCEPT-AIR LIFE+09 project is co-funded by the European Commission (LIFE+ Environment Policy and Governance programme) and the Green Fund

Exit

ACCEPT-AIR

PM Concentration Forecast
(based on emission scenarios and PM contribution of emission sources)

Data info
Region: Athens | Year: 2012 | Pollutant: PM2.5

Scenario build-up
Annual average pollutant concentration ($\mu\text{g}/\text{m}^3$): 100

Results
Change in pollutant concentration ($\mu\text{g}/\text{m}^3$): -8.842413
New pollutant concentration ($\mu\text{g}/\text{m}^3$): 91.15759

New PM concentration distribution

Source	% change
R11 ROAD DUST FROM TRAFFIC	-20
R21 VEHICLE EXHAUST	-20
R31 RESIDENTIAL HEATING FROM FOSSIL FUEL	0
R32 INDUSTRIAL COMBUSTION	0
R61 BIOMASS BURNING	-20
R71 INDUSTRIAL PROCESSES	0
R91 WASTE BURNING	0
R101 PORT	0
R111	0
R121	0

ΔC from background in $\mu\text{g}/\text{m}^3$ (see user's guide): 0

Area Type: Urban Background

Source Apportionment Data
Year: 2012

Data export
Filename: Scenario_Ath_PM2.5_2012.xlsx
in: C:\Users\captain\Desktop\ACCEPT-AIR\ACCEPT-AIR\bin\Release

Change folder | Save | Close



Testing and Development of air quality mitigation measures in Southern Europe



CSIC, Institute of Environmental Assessment and Water Research, Spain
(Co-ordinator)

N.C.S.R. "DEMOKRITOS", Greece

University of Aveiro, Portugal

University of Florence, Italy

Ceramic Industry Research Association, Spain

University of Birmingham, United Kingdom

ARPA Lombardia, Italy

Duration: 10/2012 – 09/2016



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Background

- ☐ Diverse emission sources (resuspended dust, African dust, biomass burning) and climatology (strong radiation, high photochemical conversion rates, low rainfall rate) enhance PM levels in Southern Europe.
- ☐ EU specifically addressed the need of effective improvements, however the reduction in emissions require the implementation of mitigation measures appropriate for this area.

Objectives

- Develop and propose effective air pollution mitigation measures for Southern European countries
- Provide the tools to National and Regional authorities to implement the “Thematic strategy on Air Pollution” and to formulate air quality action plans
- Act as a catalyst for the allocation of local, national funds to the implementation of air pollution mitigation strategies



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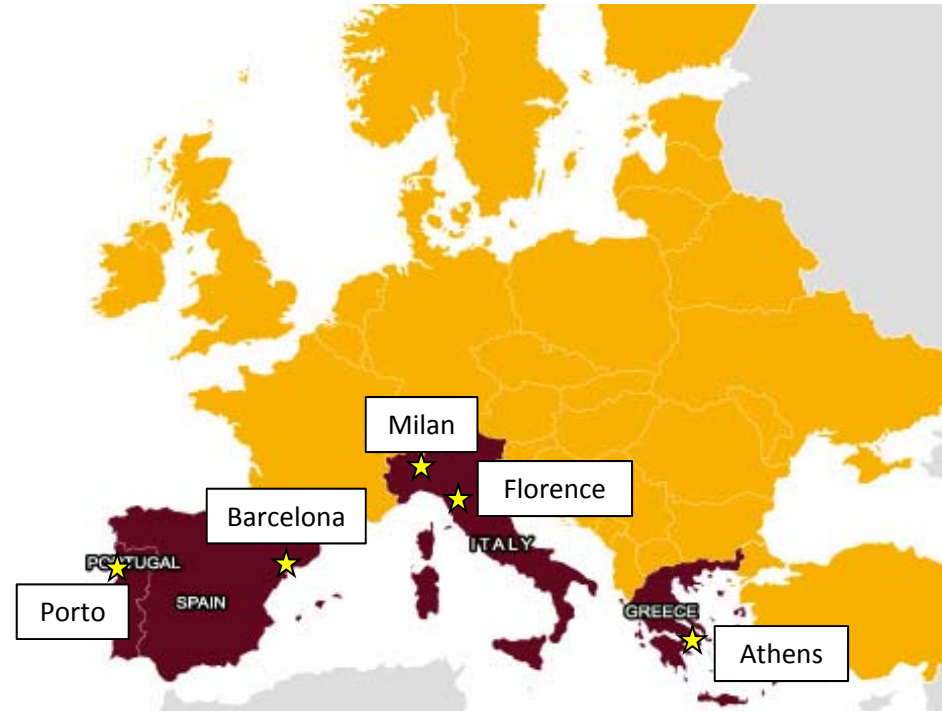


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Focus on specific sources:

- Biomass burning
- Industrial emissions
- Traffic – Exhaust and non-exhaust emissions
- Natural sources (long range transport of African dust and sea salt)



- 📍 Development and testing of air pollution mitigation measures
- 📍 Applicability of measures developed for Northern and central Europe to Southern Europe.



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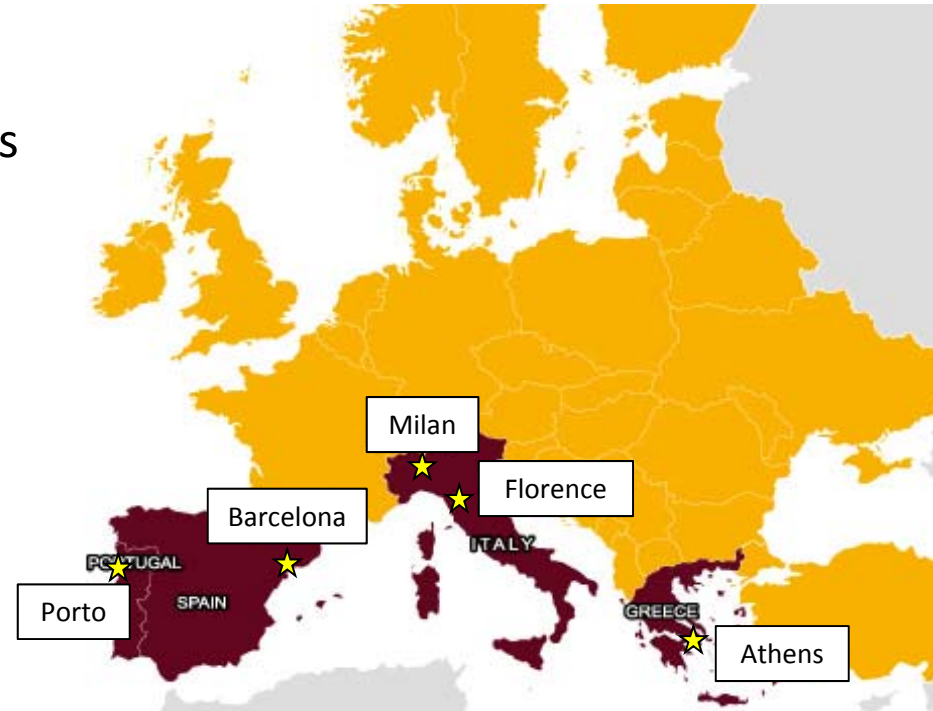
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Measurement campaigns

- ✓ Gravimetric PM₁₀ /PM_{2.5} measurements
- ✓ 1-year campaigns (1 every 3 days sampling) during 01/2013 – 02/2014
- ✓ 5 sites (3 urban background, 1 urban traffic and 1 suburban)
- ✓ 24-hr samples on teflon and quartz

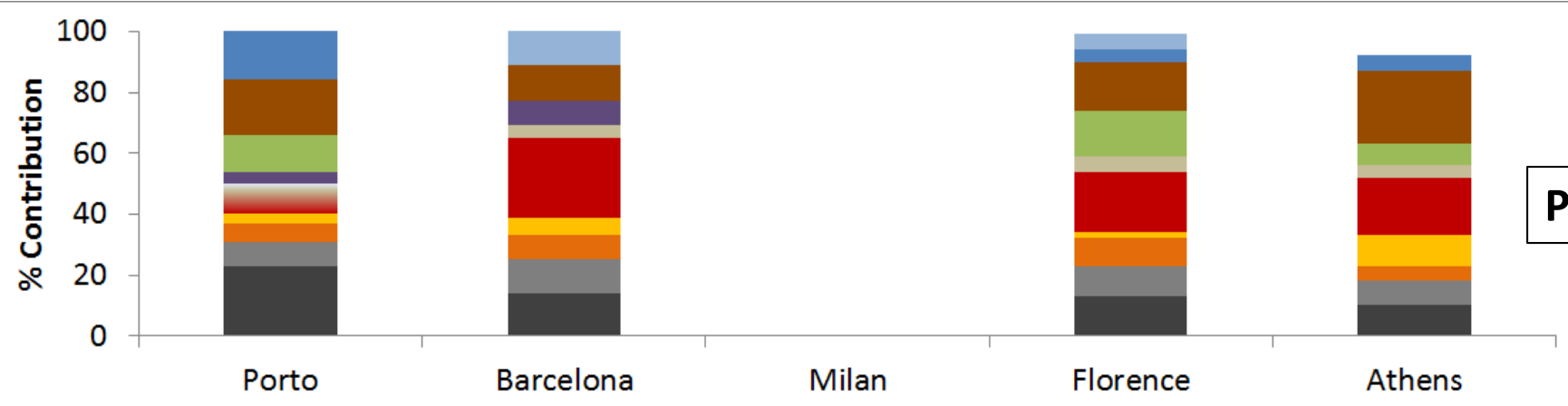


- Thermo-optical analysis for EC/OC
- Ion chromatography for major ions
- PIXE, ICP-MS and ICP-AES for major and trace elements
- CO₃²⁻ in PM₁₀ by acidification with orthophosphoric acid
- Levoglucosan in PM_{2.5} by ion chromatography

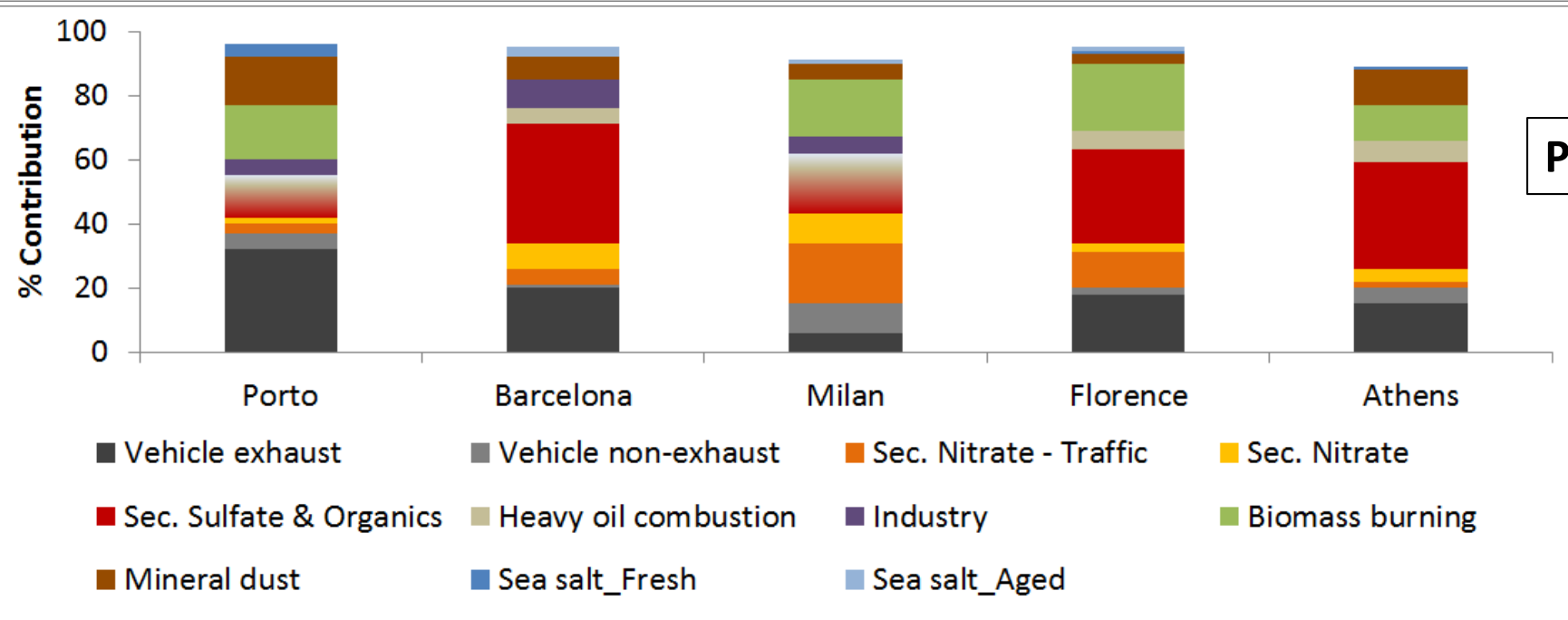




Source apportionment by PMF



PM₁₀

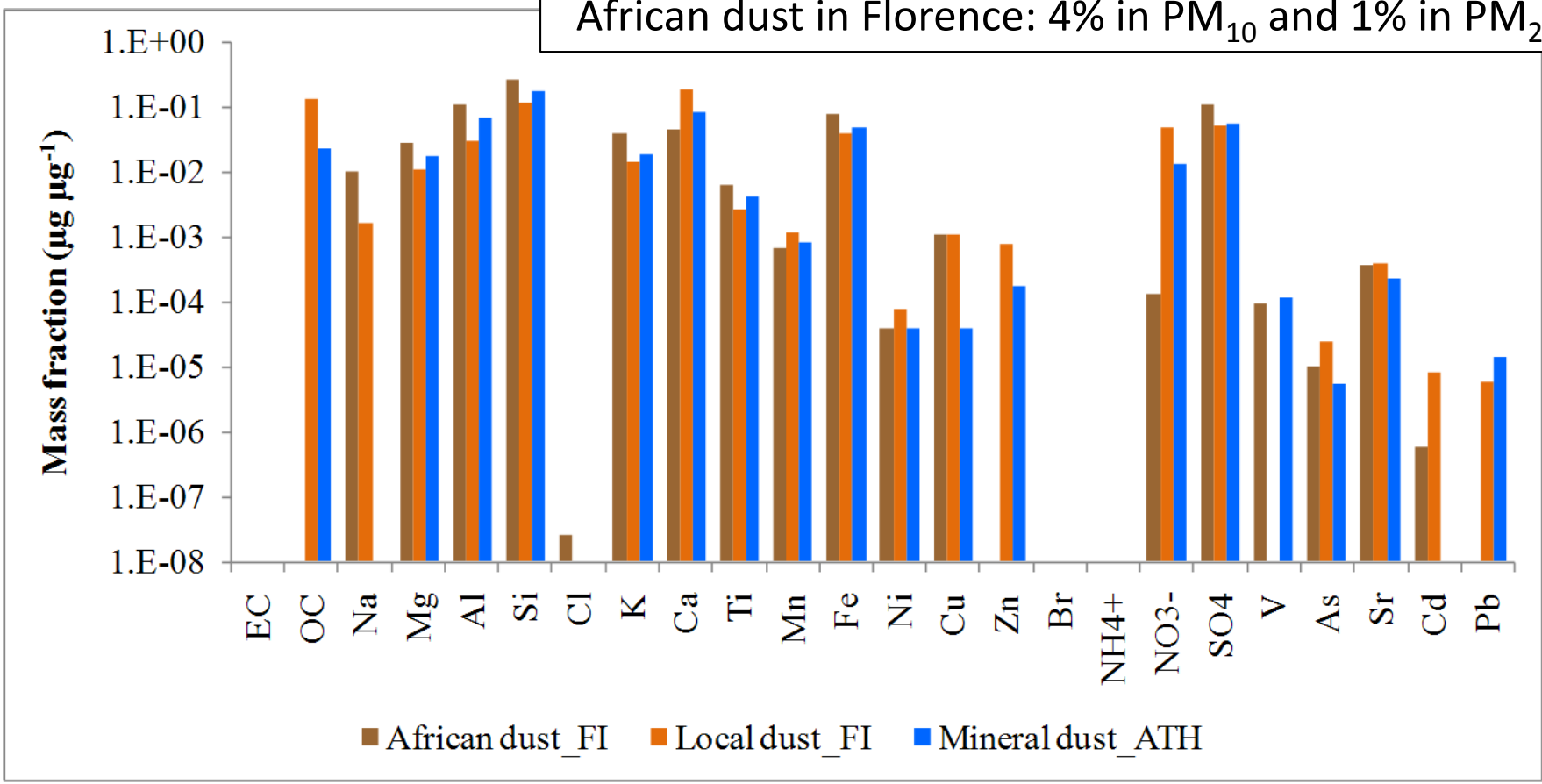


PM_{2.5}



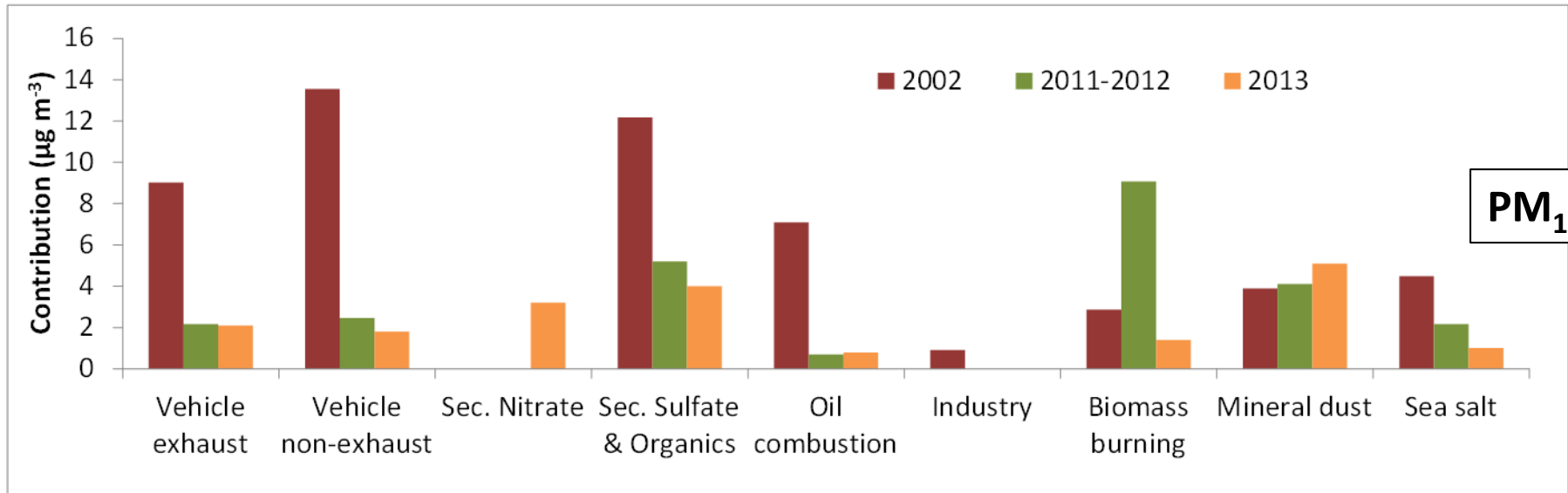
Source apportionment by PMF

African dust in Florence: 4% in PM₁₀ and 1% in PM_{2.5}

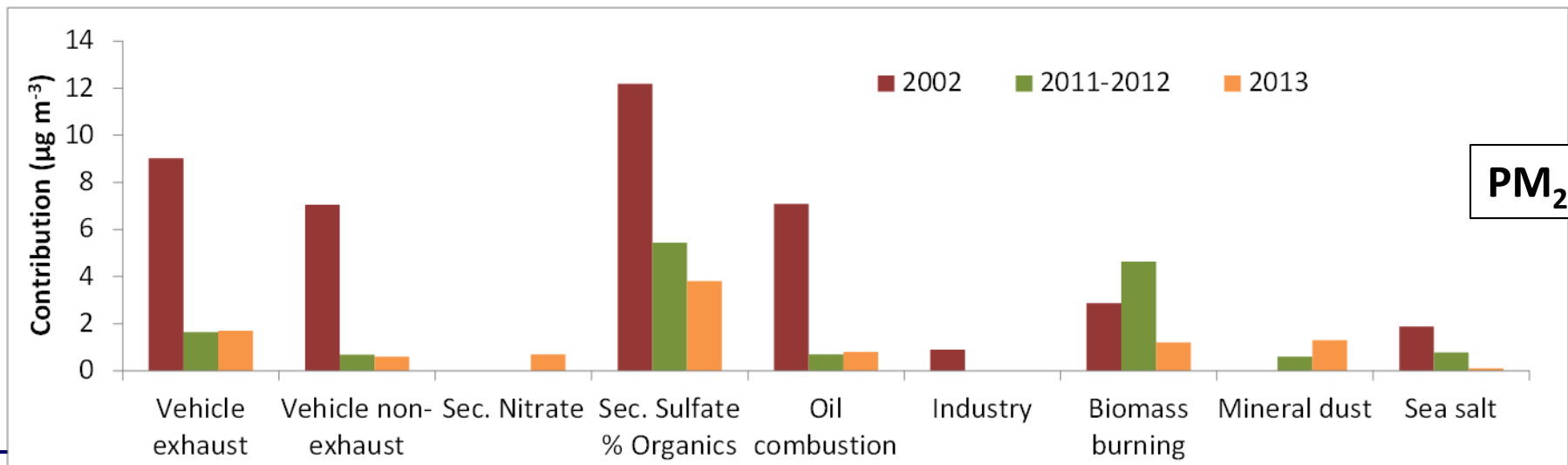




Athens: Source contributions over the last decade



PM₁₀



PM_{2.5}



Thank you for your attention



www.aceptair.prd.uth.gr



<http://airuse.eu>

Supported by the European Commission LIFE+ Environment Policy and Governance programme.