

TESTING THE SHERPA TOOL TO SUPPORT AIR QUALITY PLANS OVER PORTUGAL

A. Monteiro, C. Gama, A. I. Miranda



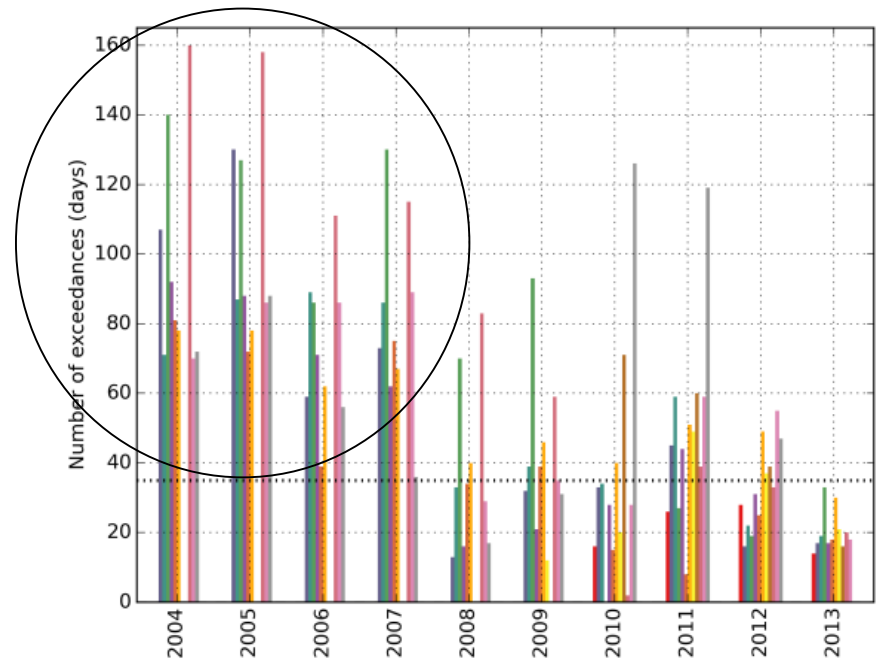
A. Clappier, P. Thunis, E. Pisonni



AIR QUALITY PLANS OVER NORTHERN REGION OF PORTUGAL



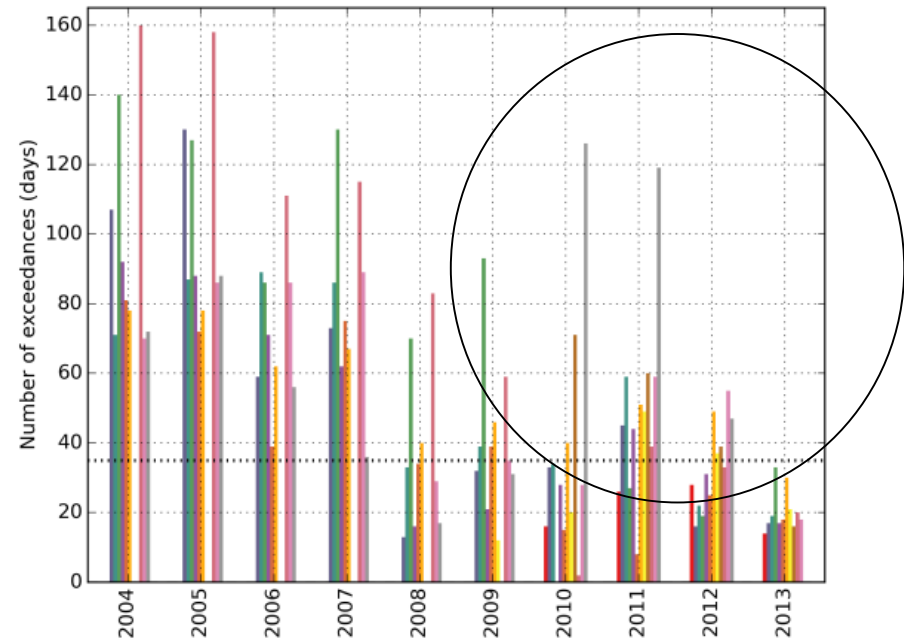
exceedances to PM₁₀ daily limit
over Porto region 2004-2013



AIR QUALITY PLANS OVER NORTHERN REGION OF PORTUGAL

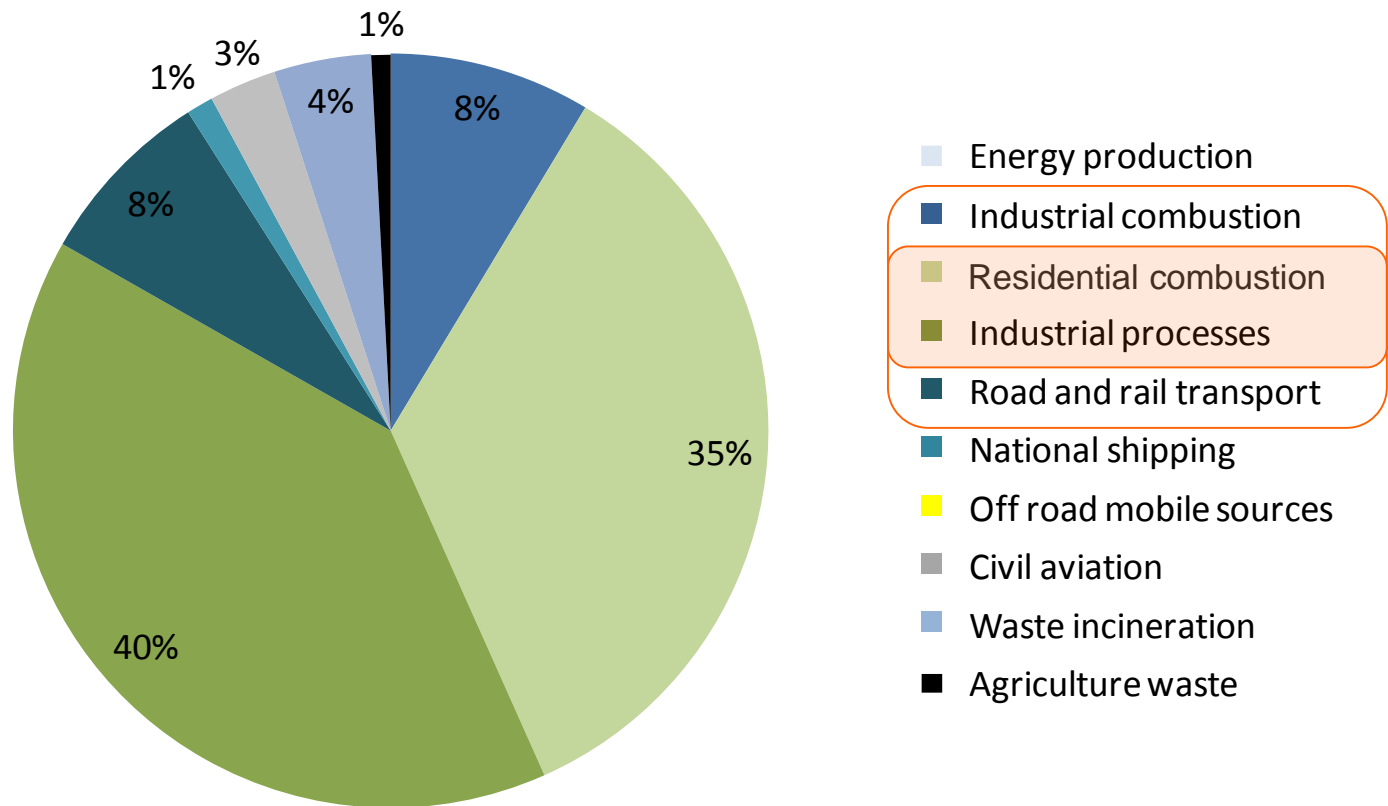


exceedances to PM10 daily limit
over Porto region 2004-2013



AIR QUALITY PLANS OVER NORTHERN REGION OF PORTUGAL

PM10 emissions per activity sector for the Great Porto area



THE AIR QUALITY PLANS OVER NORTHERN REGION

Criteria used for the selection of the measures:

(i) relative contributions of each activity sector

 residential combustion, industry and traffic

(ii) type of monitoring sites (traffic; background...)

 urban and traffic sites

**(iii) actions already planned by municipalities
authorities**

measures were
tested with TAPM
modelling system

AIR QUALITY PLANS OVER NORTHERN REGION

List of measures



Measures designed in the Air Quality Plan	Costs (€)
Introduction of low-emission vehicles for transport of passengers and goods	13,668,042
Improvement of public transport network	147,928,092
Car sharing	
Renewal of the fleet of taxis and vehicles for waste collection	525,186
Decrease the percentage of heavy goods vehicles in circulation	
Car parks peripheral construction	
Strengthening the monitoring of illegal parking	4,800
Low Emission Zones (LEZ)	
Cut-off streets to traffic	14,316,996
Introduction of public fueling stations for natural gas	
Promote the implementation / improvement of industrial air cleaners	12,500,000
Enhanced surveillance of stationary sources	67,500
Emissions reduction from residential combustion	
Reduction of particle emissions from agriculture and forests	1,772
Street sweeping and washing	465,821
Dust emissions reduction on construction sites	
Environmental education and recommendation	144,050

SHERPA

A tool to support the design of regional air quality plans

P. Thunis, E. Pisoni, B. Degraeuwe, A. Clappier, G. Maffeis



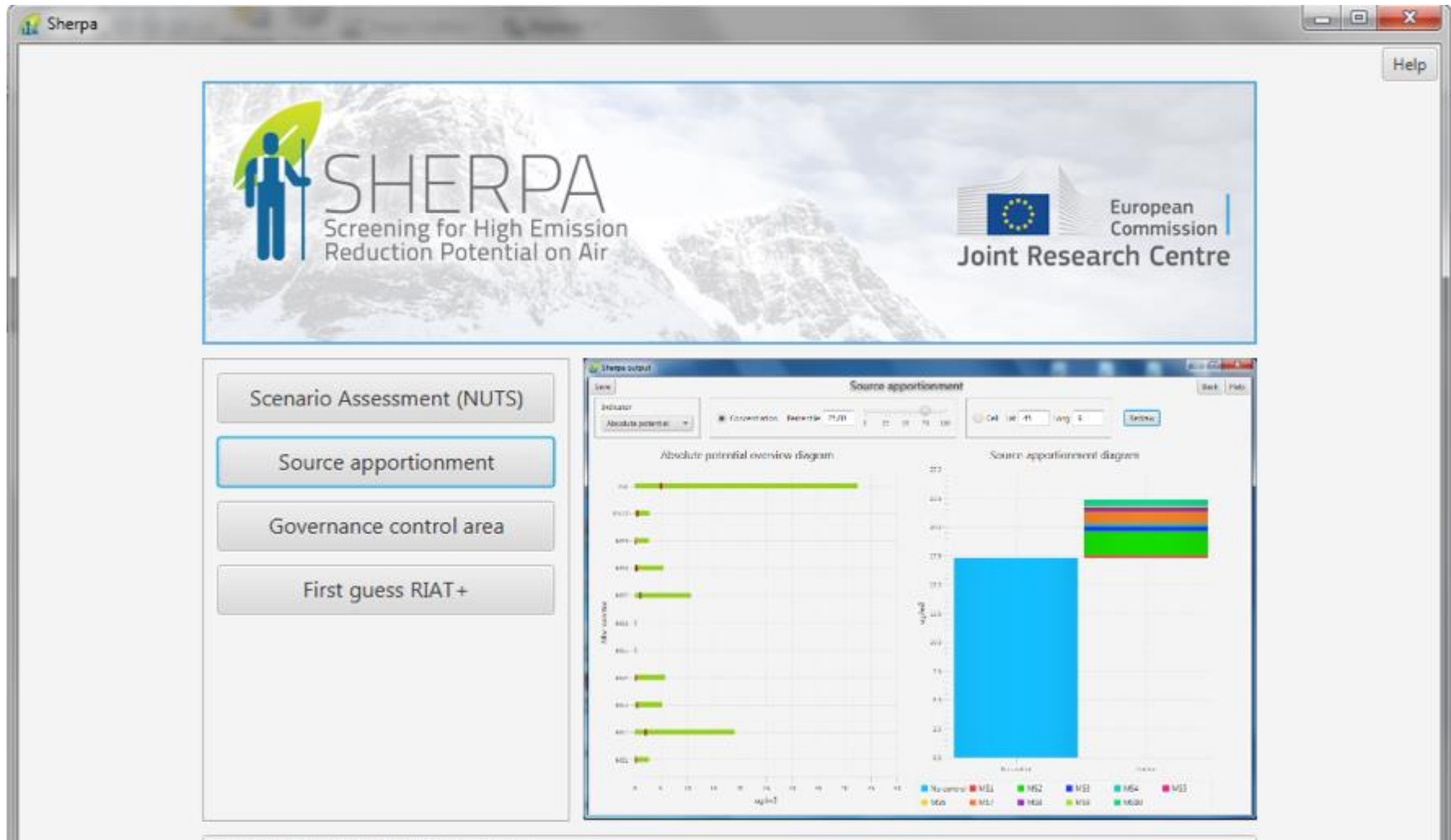
SHERPA

Screening for High Emission
Reduction Potential on Air



 Software developed by TerrAria
under the Contract Procedure
no. JRC/IPR/2014/H.2/0023/NC

Applying SHERPA | Source apportionment



to assess the relative contribution of the various emission sectors/precursors to the overall impact of an emission reduction strategy. SHERPA produces source apportionment estimates in terms of sectors and/or precursors.

WHAT can I control? WHICH sectors/precursors?

Sherpa

Source apportionment

Load config Save config

Back Help

- HUNGARY
- IRELAND
- ICELAND
- ITALY
- LIECHTENSTEIN
- LITHUANIA
- LUXEMBOURG
- LATVIA
- REPUBLIC OF MONTENE
- FORMER YUGOSLAV RE
- MALTA
- NETHERLANDS
- NORWAY
- POLAND
- PORTUGAL
 - CONTINENTE
 - Norte
 - Algarve
 - Centro (PT)
 - Area Metropolitana
 - Alentejo
 - EGIAO AUTONOMA D
 - REGIAO AUTONOMA
- ROMANIA
- SWEDEN
- SLOVENIA

Altitude 24,000 km Off Globe

Reduction table

	MS1	MS2	MS3	MS4	MS5	MS6	MS7	MS8	MS9	MS10	ALL
NOx	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NMVOG	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NH3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PM25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
SOx	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ALL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Air Quality Index

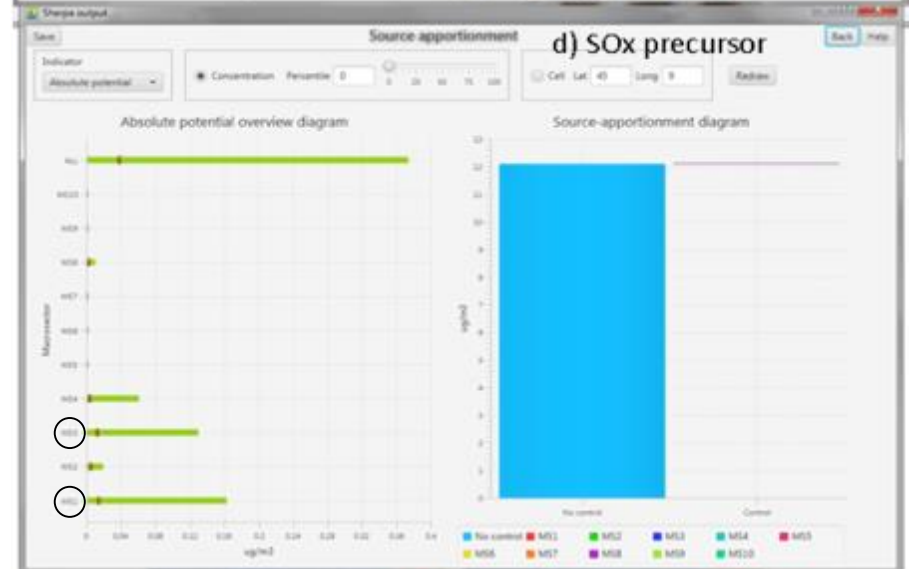
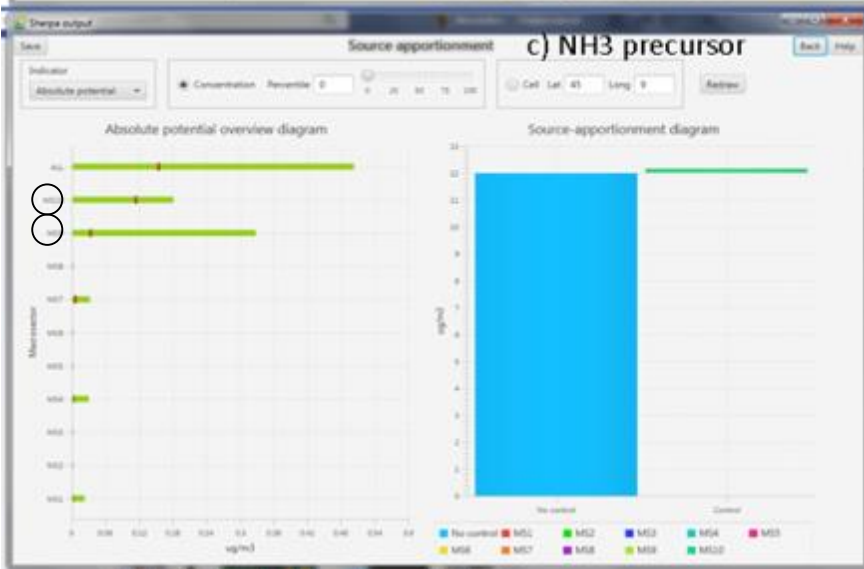
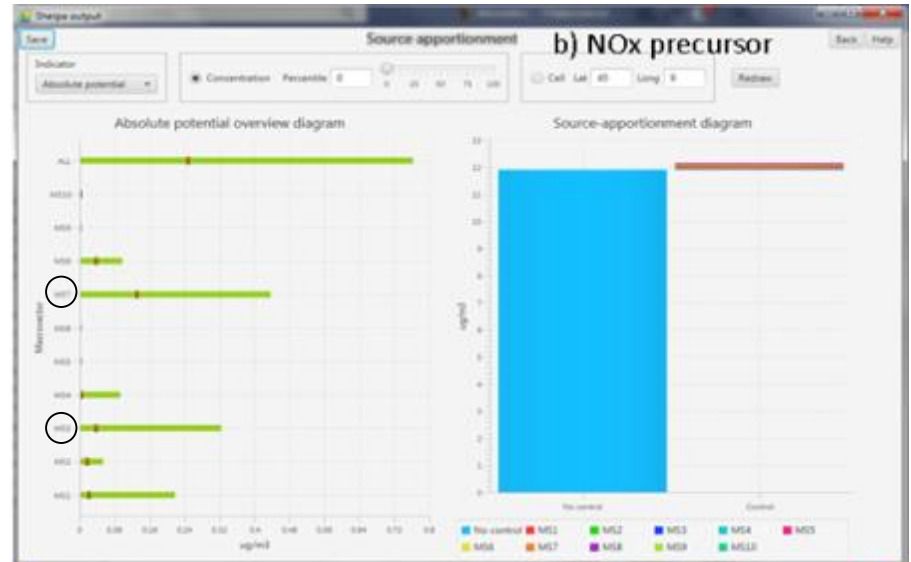
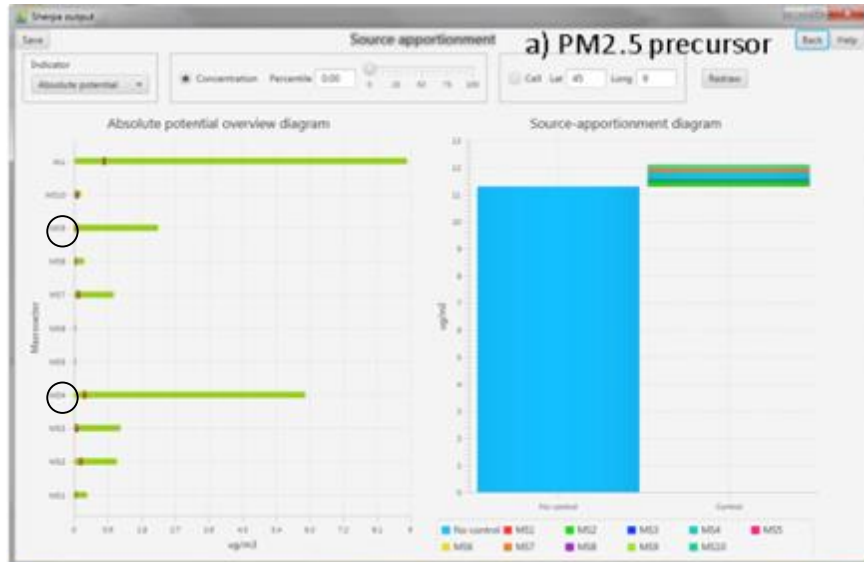
PM10

Seasonality

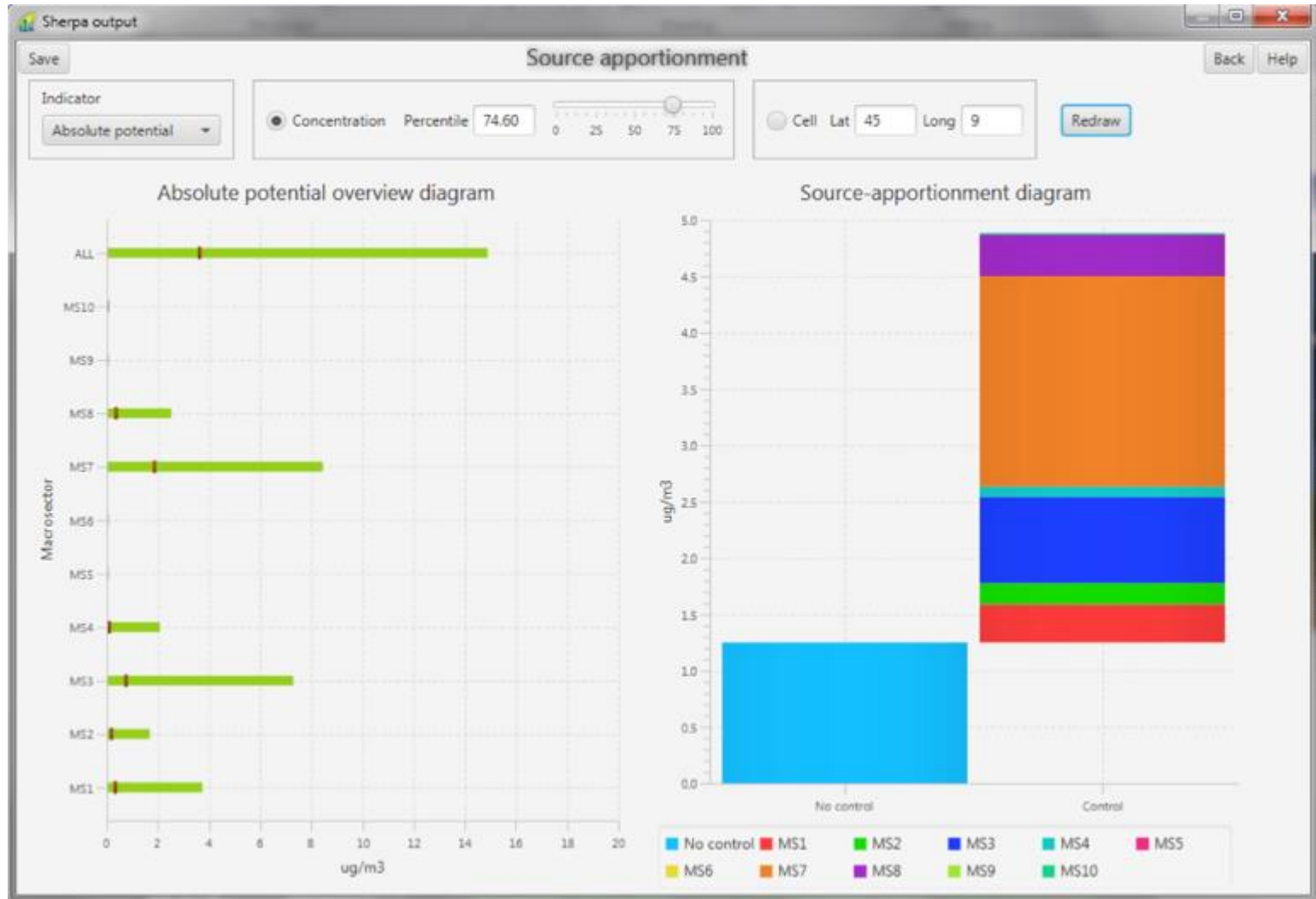
Annual

Diagram

WHAT can I control? WHICH sectors/pollutants?



NO₂ source apportionment very different results!

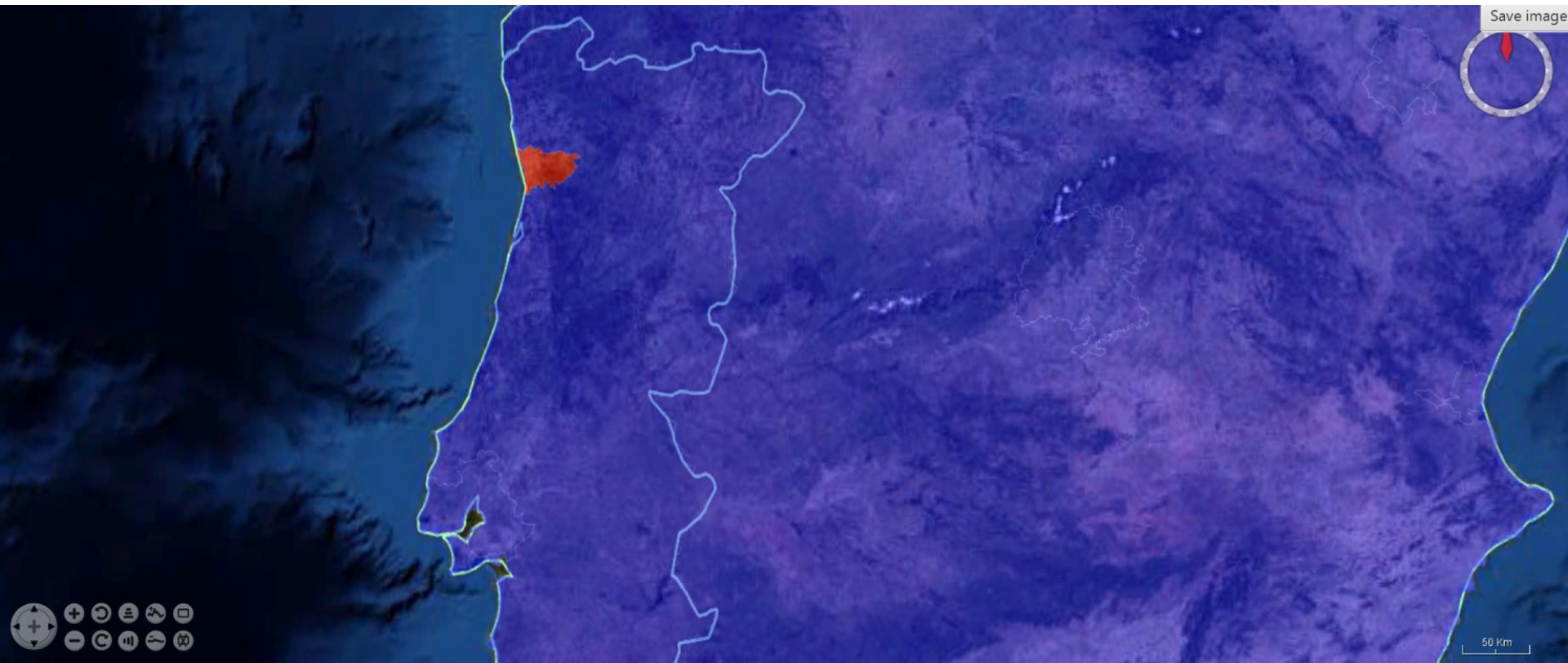


The new version of SHERPA

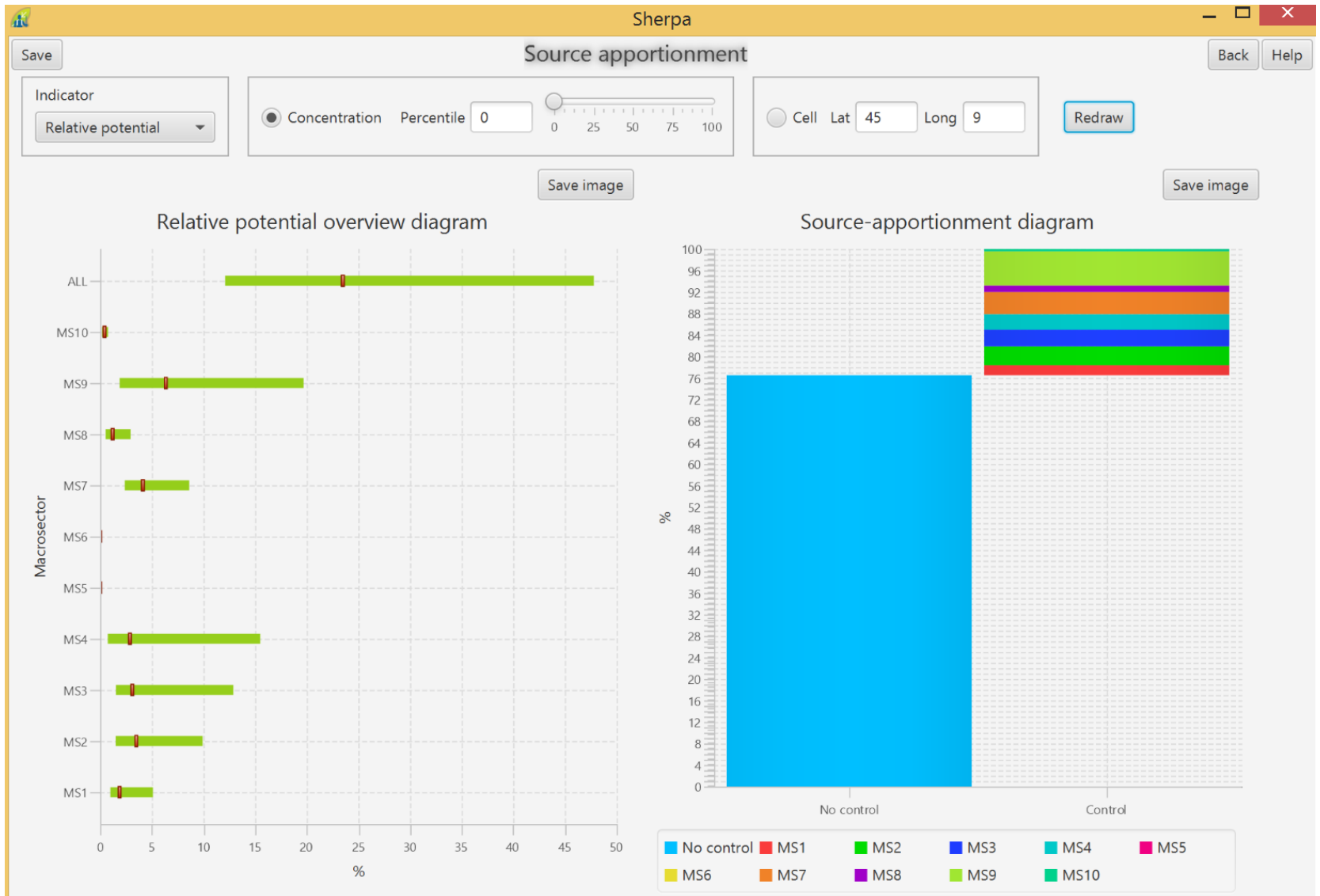
With 112 Functional Urban Areas (FUA)



And Porto is one of the 112 FUA...

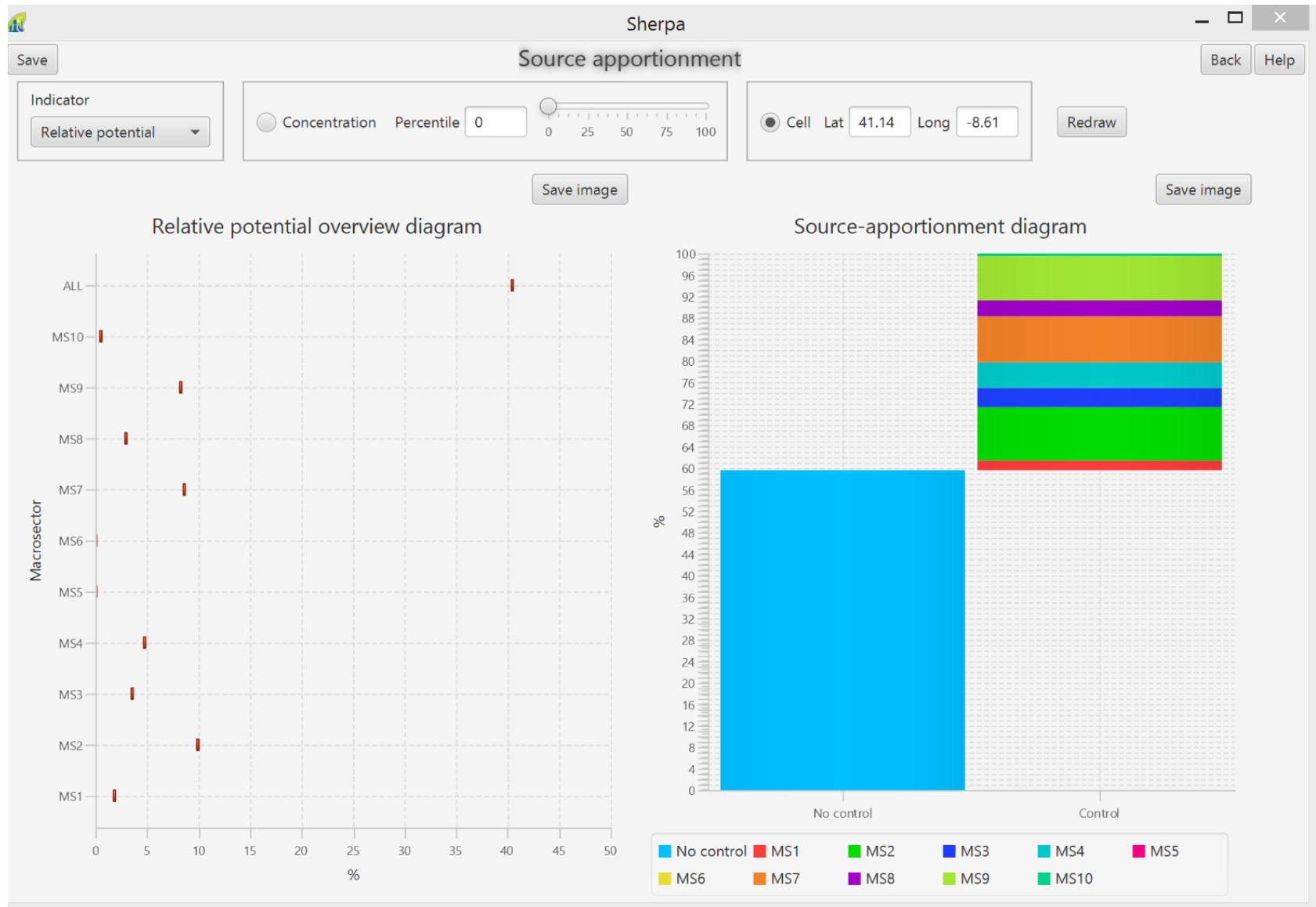


WHAT can I control? WHICH sectors/precursors?



WHAT can I control?

WHICH sectors/precursors?



Applying SHERPA | Scenario assessment



The screenshot displays the SHERPA software interface. At the top, the title bar reads "Sherpa". The main header features the SHERPA logo (a stylized figure with a green umbrella) and the text "SHERPA Screening for High Emission Reduction Potential on Air". To the right, the European Commission Joint Research Centre logo is visible. Below the header, there are four main buttons: "Scenario Assessment (NUTS)", "Source apportionment", "Governance control area", and "First guess RIAT+". The "Scenario Assessment (NUTS)" button is highlighted. Below this, a smaller window titled "Scenario Assessment (NUTS) - NO2 - Annual" is open, showing a map of Europe with a color-coded air quality impact map for NO2. The map shows higher concentrations (red/orange) in central Europe and lower concentrations (blue) in the north and south. A legend on the left of the map indicates concentration levels: 100, 150, 200, 250, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000. A red arrow points to a specific location on the map.

to assess the impact of a given emission reduction scenario (e.g. a specific AQP) on air quality in one region. SHERPA produces an air quality impact map over the selected region and surrounding areas.

How much impact on air quality?

Sherpa Scenario Assessment (NUTS)

Load config Save config

- ▶ ITALY
- ▶ LIECHTENSTEIN
- ▶ LITHUANIA
- ▶ LUXEMBOURG
- ▶ LATVIA
- ▶ REPUBLIC OF MONTENE
- ▶ FORMER YUGOSLAV RE
- ▶ MALTA
- ▶ NETHERLANDS
- ▶ NORWAY
- ▶ POLAND
- ▶ PORTUGAL
- ▼ CONTINENTE
 - ▶ Norte
 - ▶ Algarve
- ▶ Centro (PT)
- ▶ Area Metropolitana
- ▶ Alentejo
- ▶ EGIAO AUTONOMA D
- ▶ REGIAO AUTONOMA
- ▶ ROMANIA
- ▶ SWEDEN
- ▶ SLOVENIA
- ▶ SLOVAKIA
- ▶ TURKEY
- ▶ UNITED KINGDOM

Altitude 59,030 km Off Globe

Reduction table

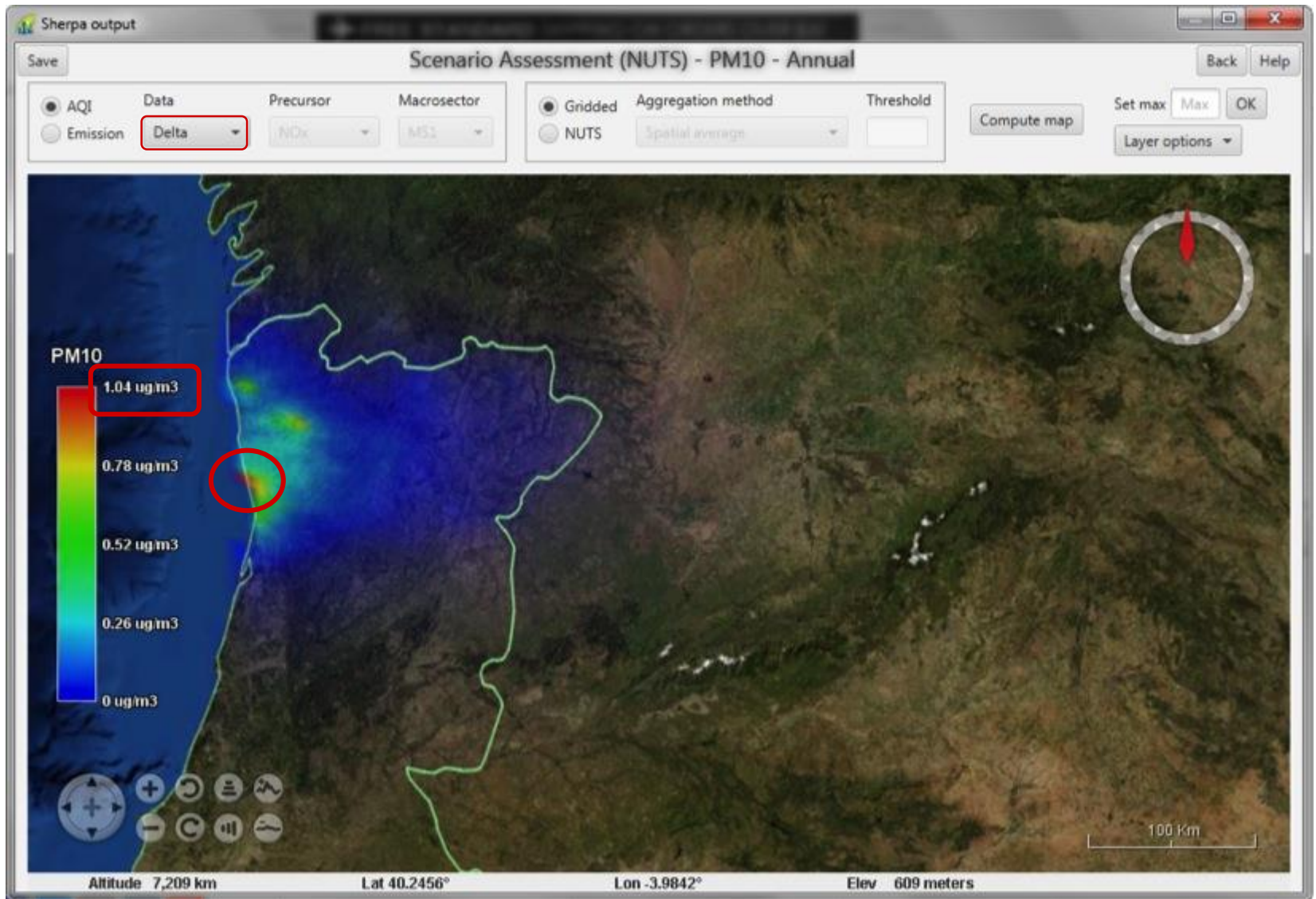
	ALL	MS1	MS2	MS3	MS4	MS5	MS6	MS7	MS8	MS9	MS10
ALL	10	10	10	10	10	10	10	10	10	10	10
NOx	10	10	10	10	10	10	10	10	10	10	10
NMVOC	10	10	10	10	10	10	10	10	10	10	10
NH3	10	10	10	10	10	10	10	10	10	10	10
PPM	10	10	10	10	10	10	10	10	10	10	10
SOx	10	10	10	10	10	10	10	10	10	10	10
AR											
PT											

Air Quality Index: PM10

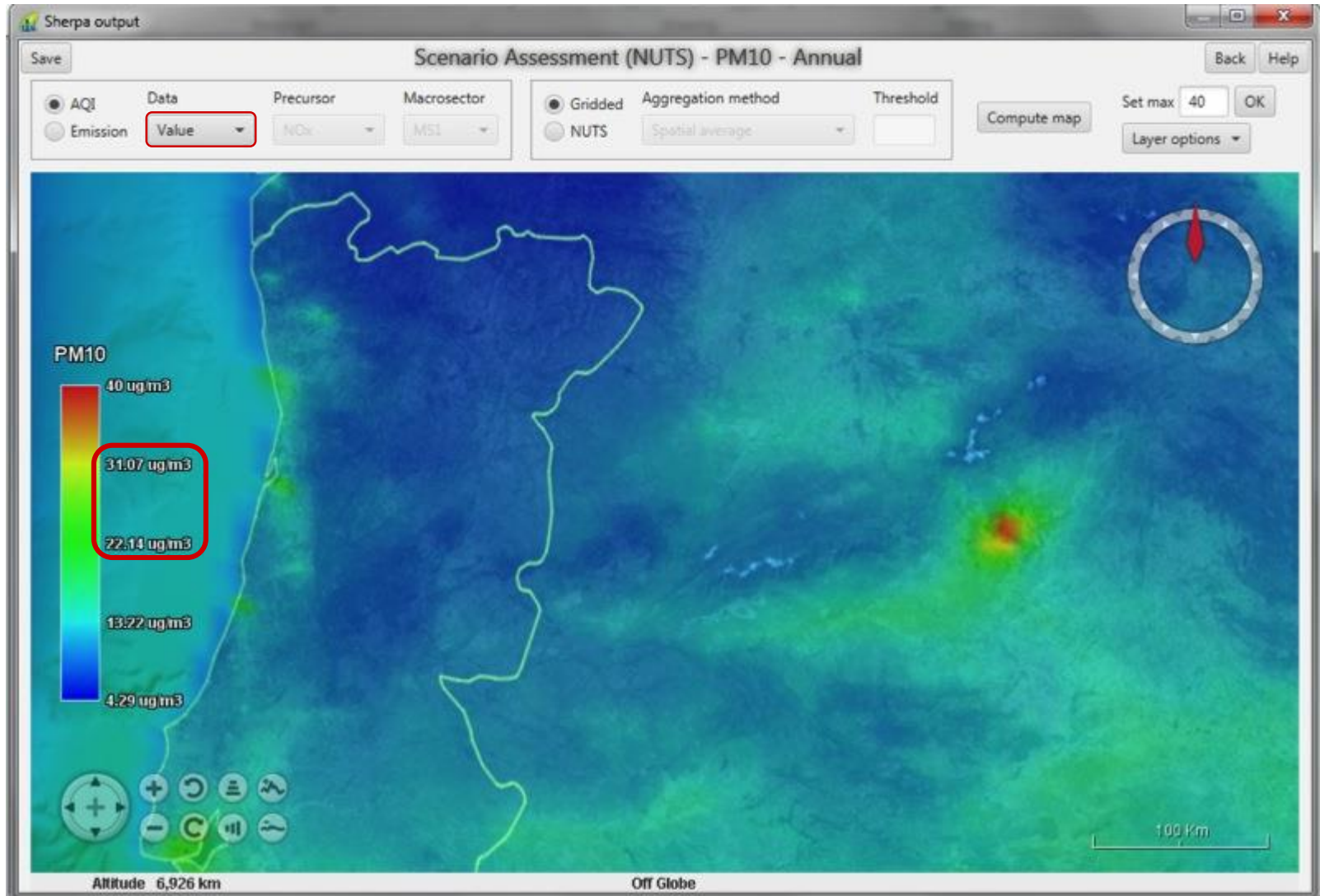
Seasonality: Annual

Map

How much impact on air quality?



How much impact on air quality?



What have we learned with SHERPA?



- The new FUEL version of SHERPA has the detail necessary to better investigate the problem of urban areas



- Highest fraction is non-controllable sources (external/natural sources) of PM10 (critical for AQP!!)



- Different sectors are responsible: not only residential and industrial combustion sectors and traffic! Waste management also appear as an important contributor...



- Missing cost-benefits analysis