WG3 Source Apportionment

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Spatial Source Apportionment A case study for the Milan urban area

Nicola Pepe, Guido Pirovano

Alessandra Balzarini, Maurizio Riva, Anna Toppetti

RSE Ricerca Sistema Energetico

POLITECNICO MILANO 1863

Source Apportionment

S1

S2

S3

Natural Sources

CAMx/PSAT

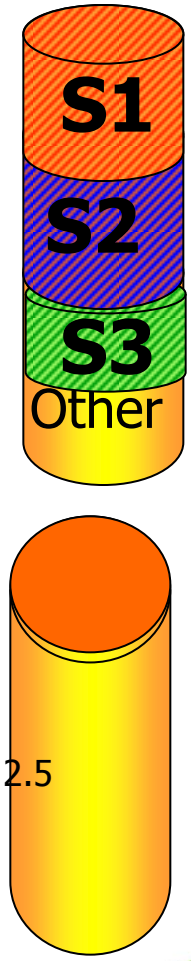
$$\frac{\partial c_l}{\partial t} = -\nabla_H \cdot V_H c_l + \left[\frac{\partial (c_l \eta)}{\partial z} - c_l \frac{\partial^2 h}{\partial z \partial t}\right] + \nabla \cdot \rho K \nabla (c_l / \rho) + \left.\frac{\partial c_l}{\partial t}\right|_{Emission} + \left.\frac{\partial c_l}{\partial t}\right|_{Chemistry} + \left.\frac{\partial c_l}{\partial t}\right|_{Removal}$$

SA

CTM

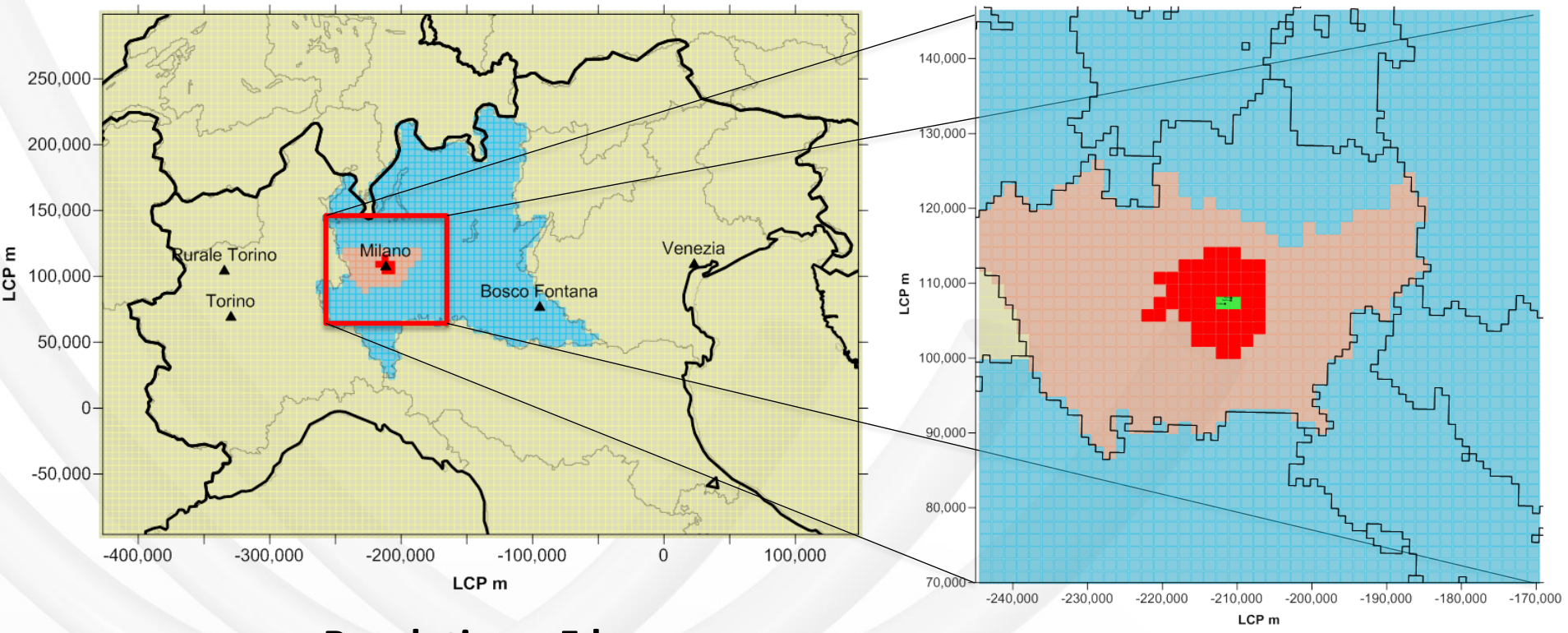
Meteorological model

$PM_{2.5}$



$PM_{2.5}$

Model domain – Po Valley and Milan urban area
Source regions “tagging”



Resolution = 5 km

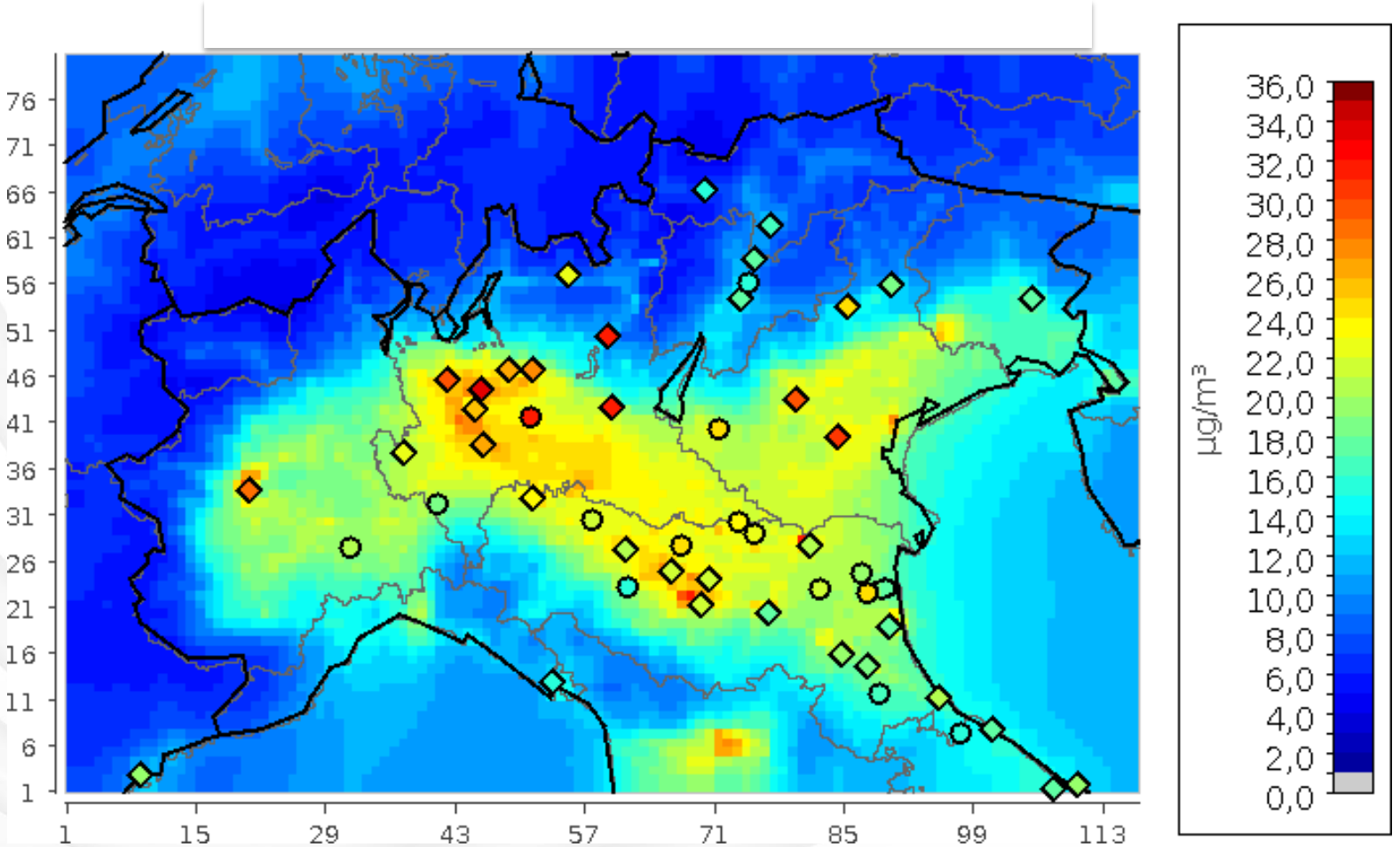
Resolution = 1,7 km

Source categories “tagging”

01 ELE	Power plants
01 OTH	Energy production (other than power plants)
02 BIO	**Biomass burning for residential and commercial heating**
02 OTH	Residential and commercial heating (other fuels)
07 AUT	**Road transport (Cars)**
07 LEG	**Road Transport (Light duty vehicles)**
07 PES	**Road transport (Heavy duty vehicles)**
07 MOT	Mopeds and motorbikes
11 NAT	Natural sources
EMEP	Transboundary sources
OTHER	Other sources (including **agriculture**)

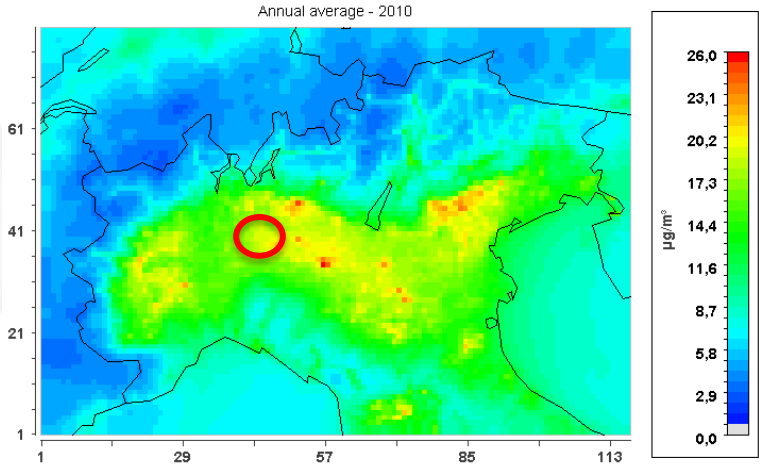
Base Case – Yearly mean concentration

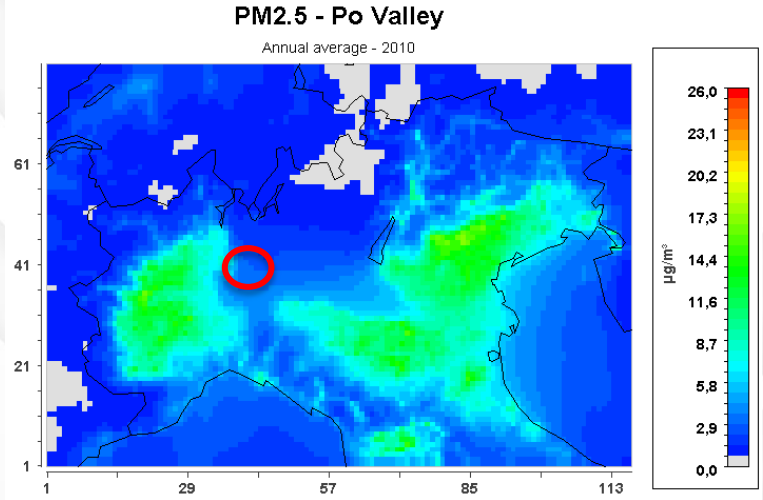
PM2.5

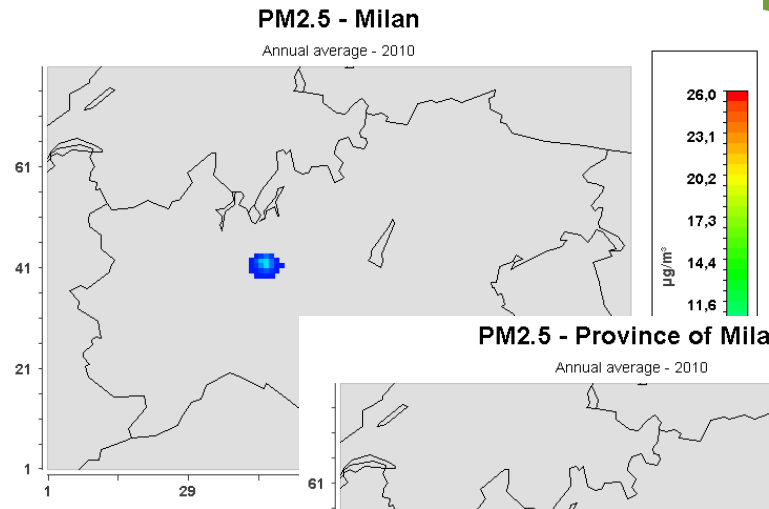


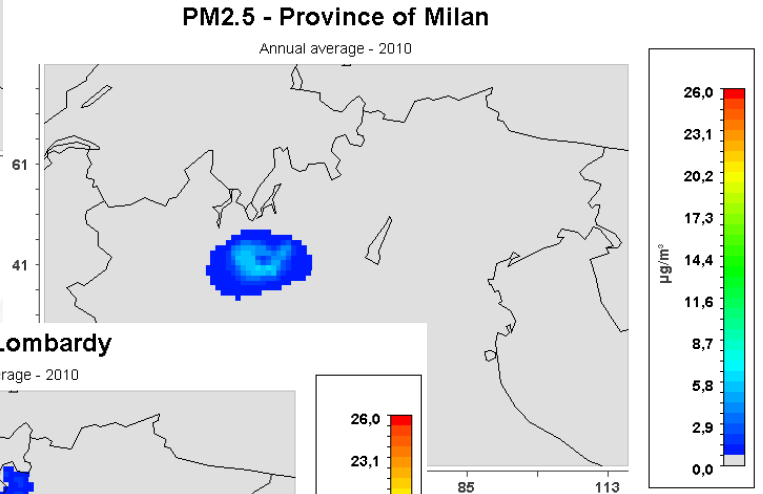
Grid analysis

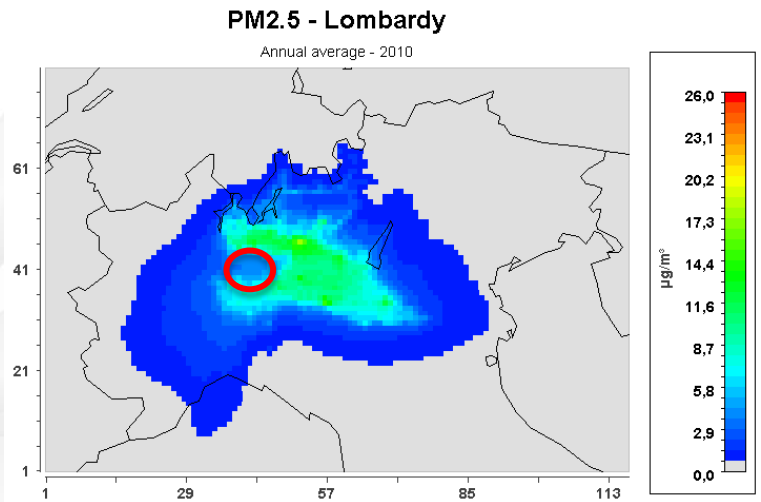
$PM_{2.5}$ yearly mean – Source regions contribution





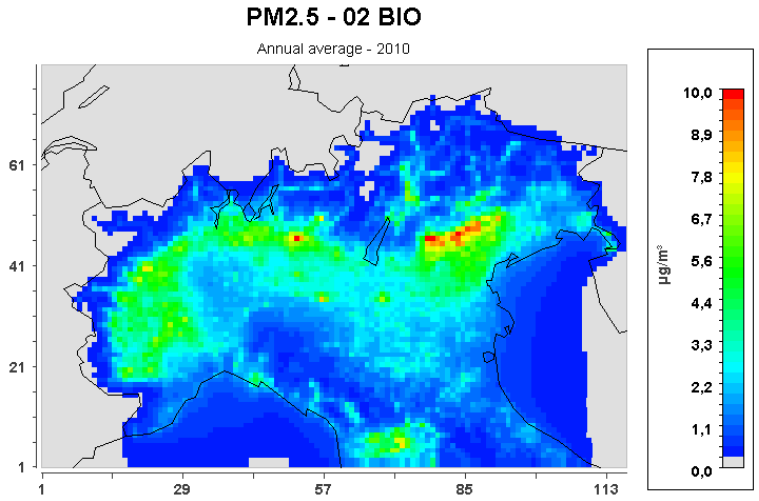


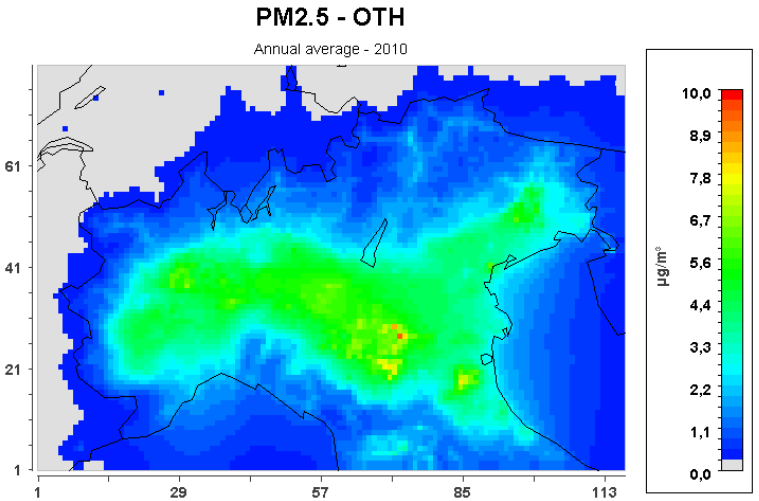


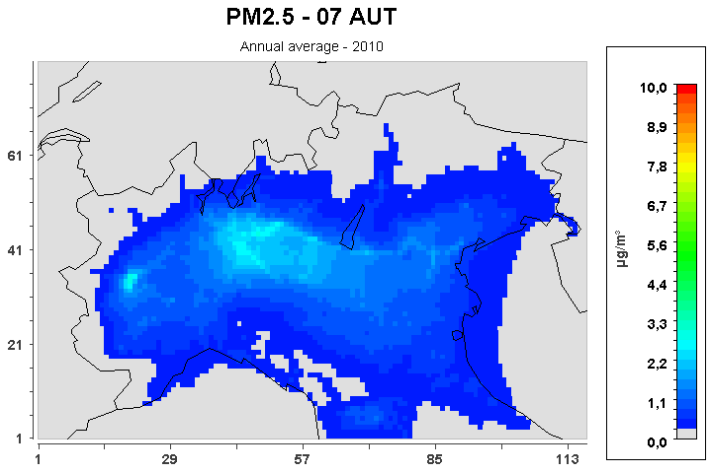


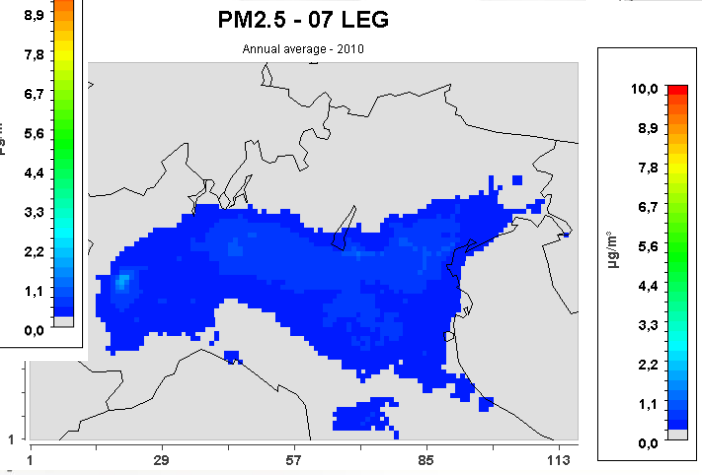
Grid analysis

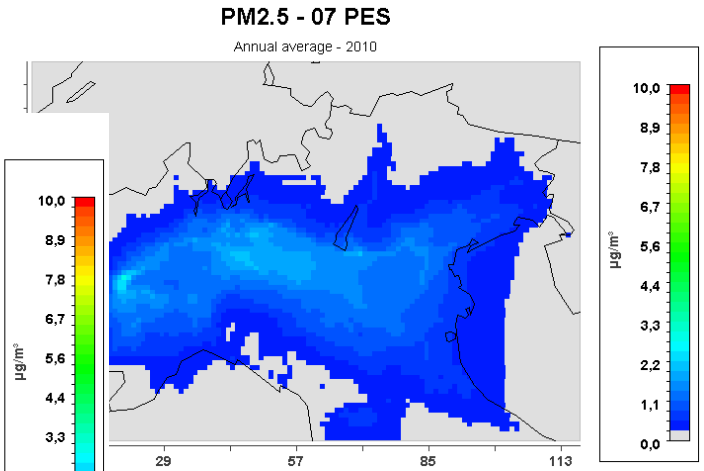
$PM_{2.5}$ yearly mean – Source categories contribution





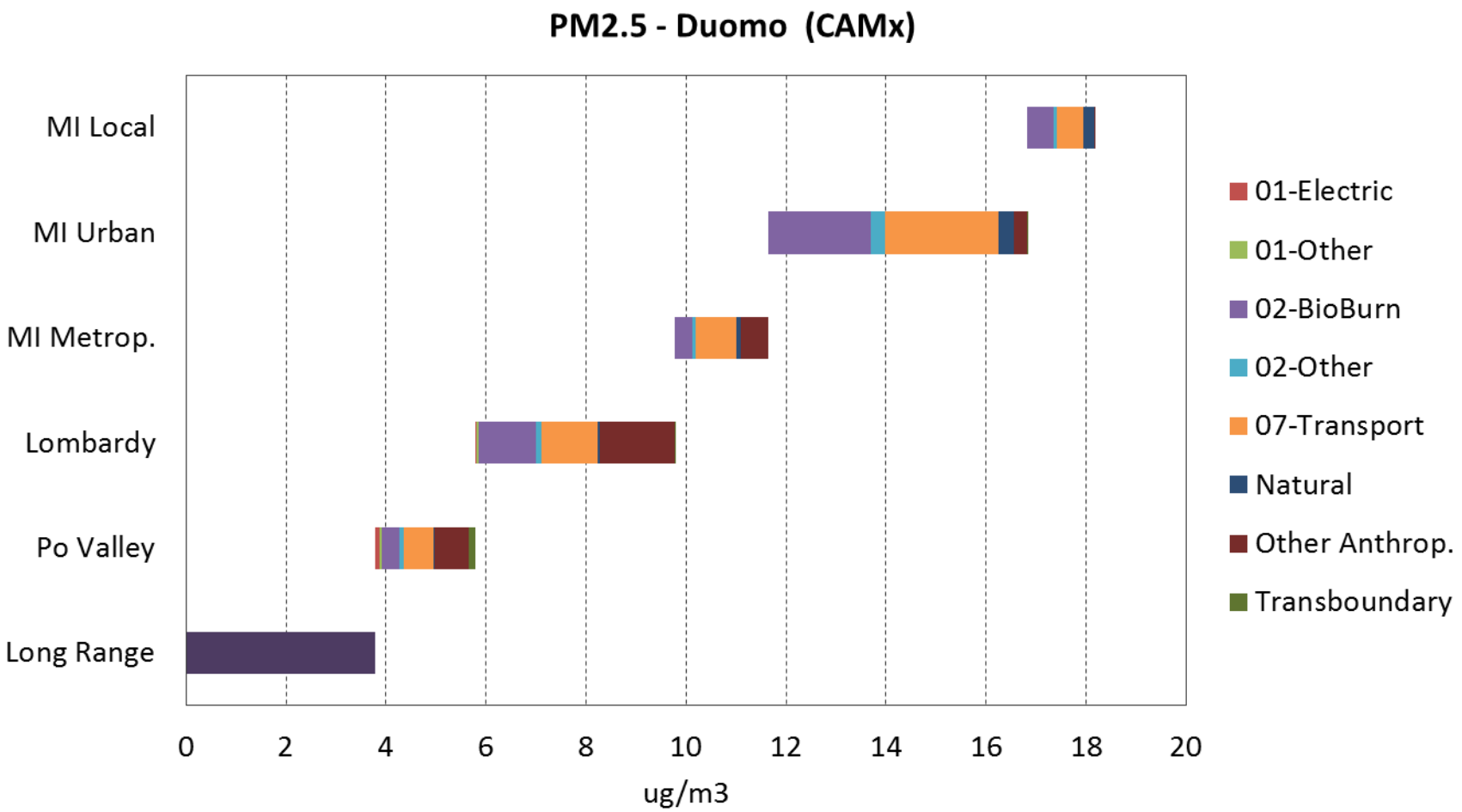






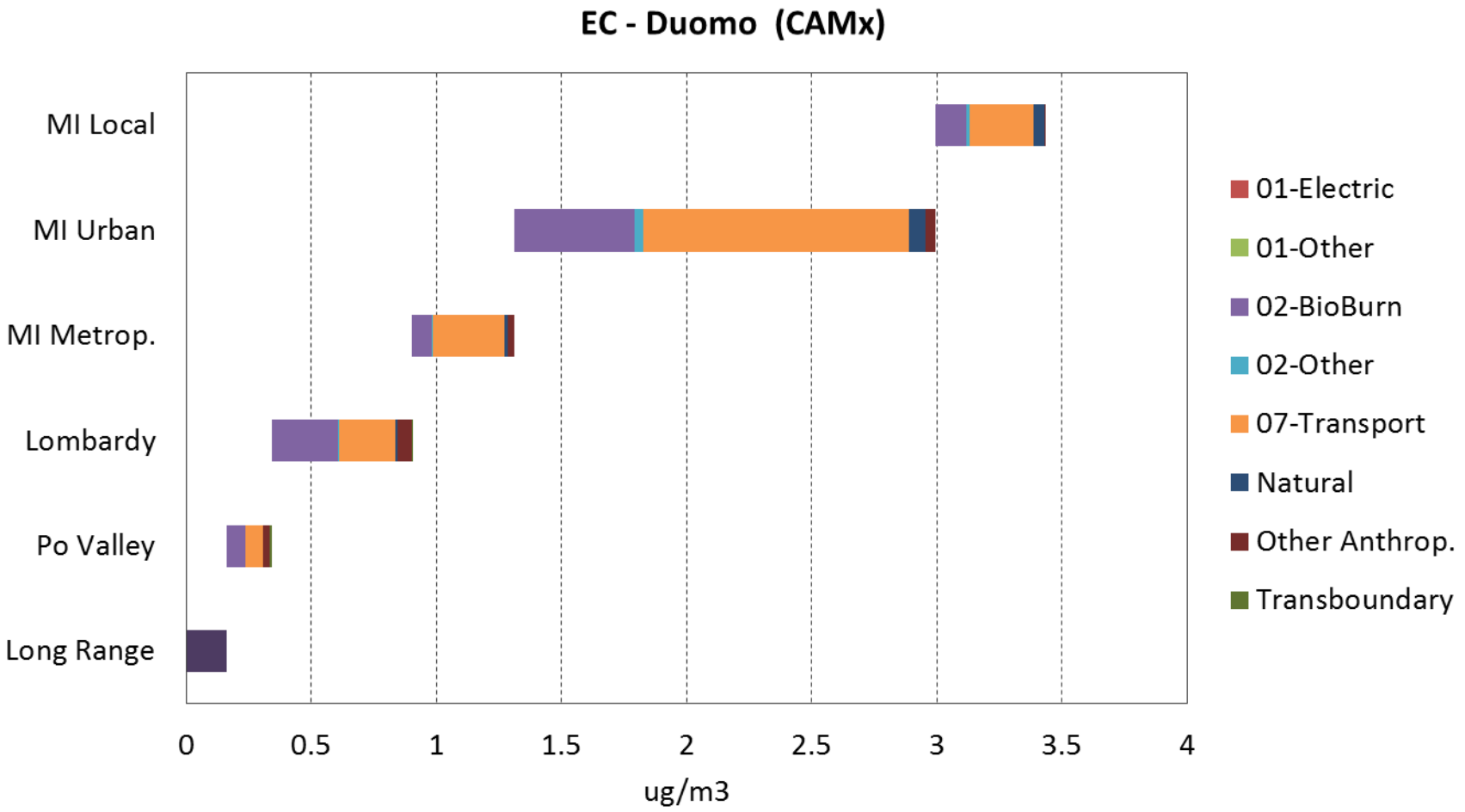
Receptor analysis

$PM_{2.5}$ yearly mean – Source regions/categories contribution



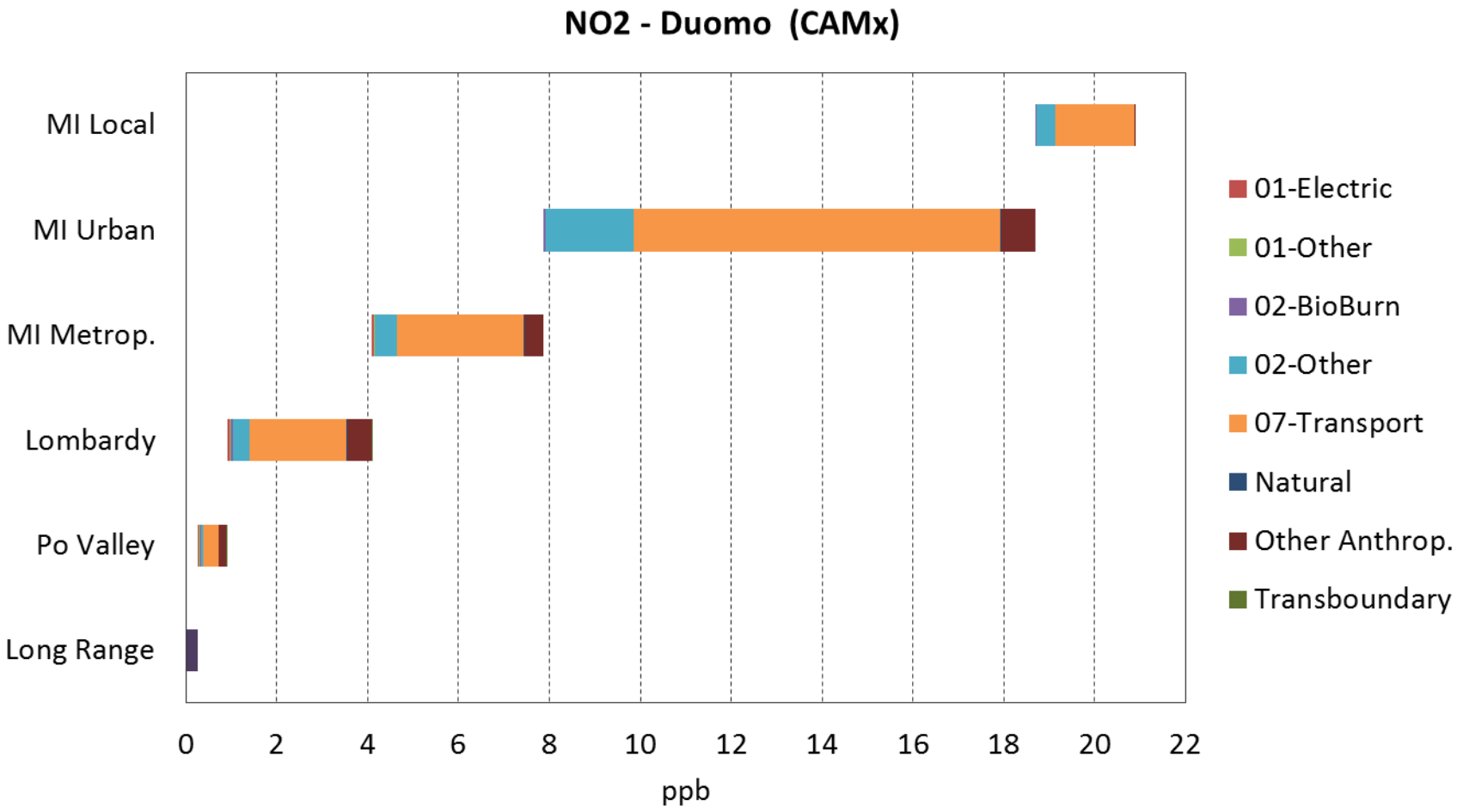
Receptor analysis

EC yearly mean – Source regions/categories contribution

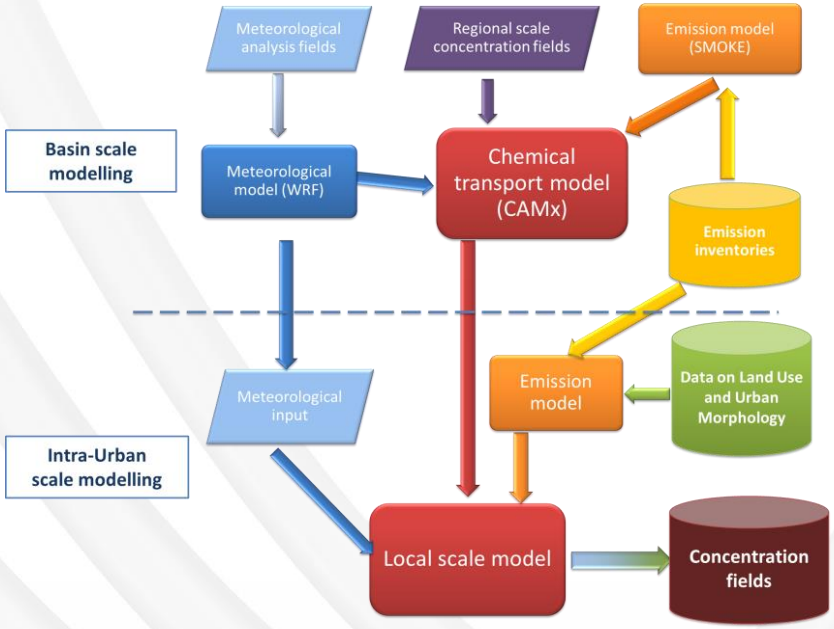


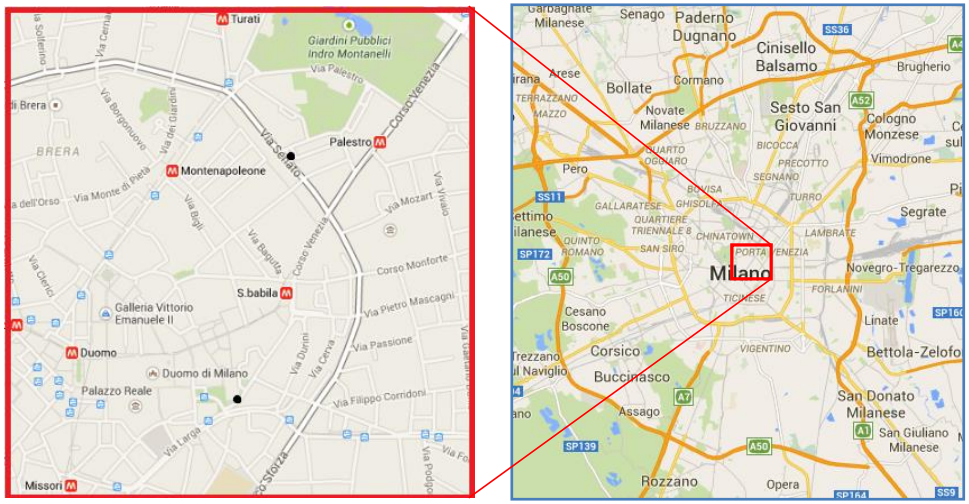
Receptor analysis

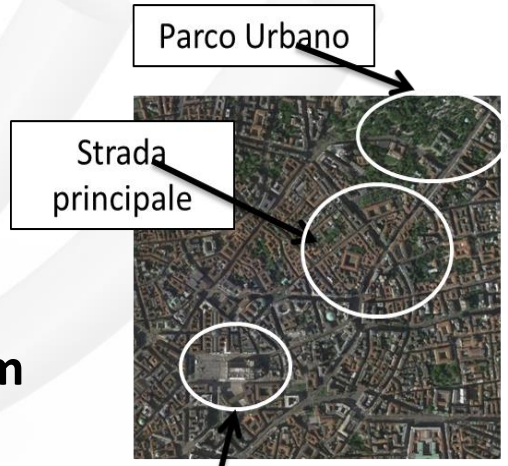
NO_2 yearly mean – Source regions/categories contribution



Hybrid modelling system



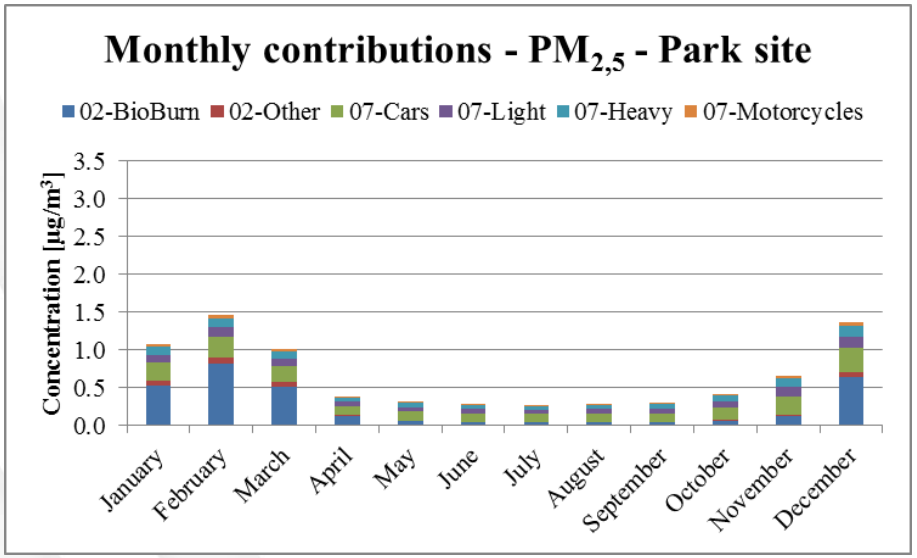


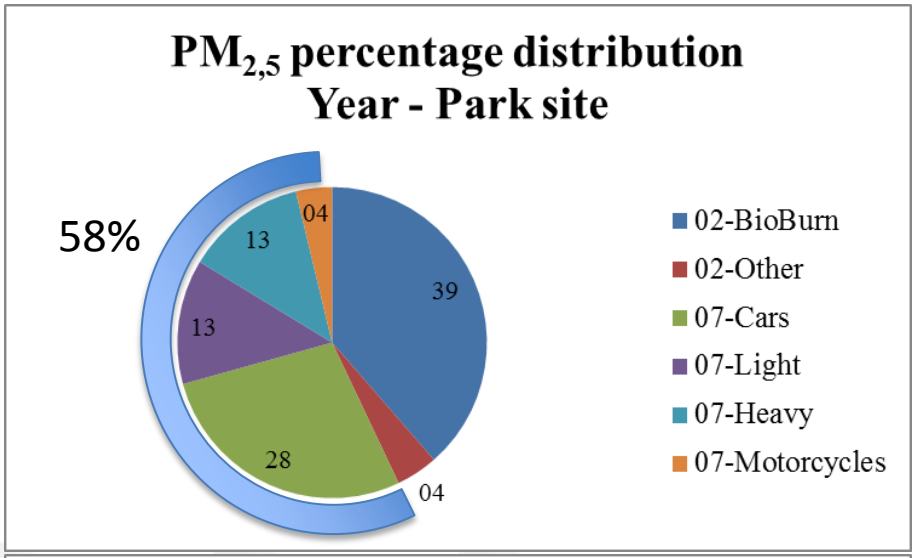


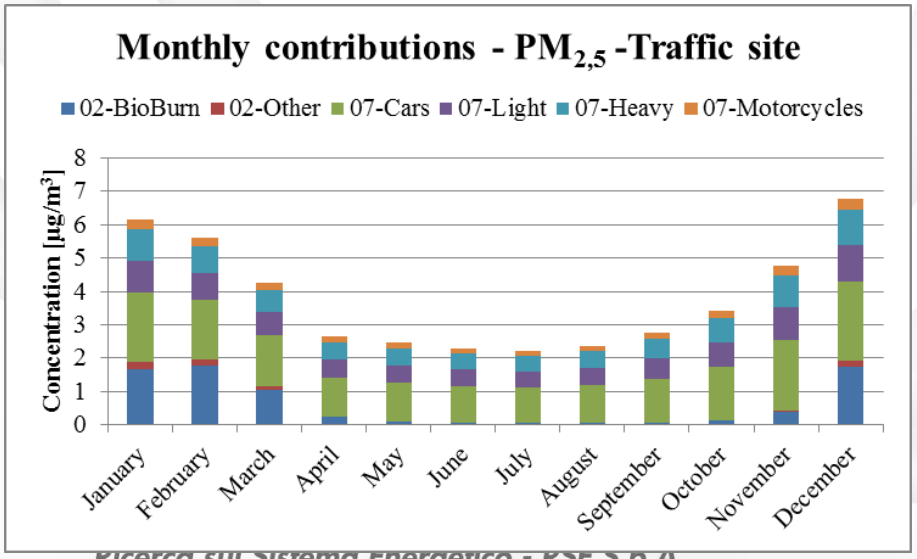
Resolution = 20 m

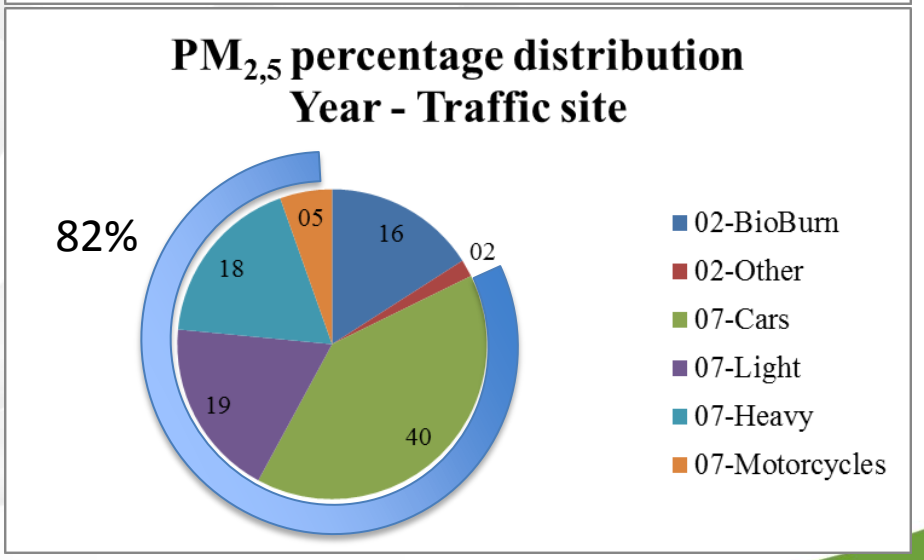
Receptor analysis at Urban scale

$PM_{2.5}$ monthly mean – Local source categories contribution



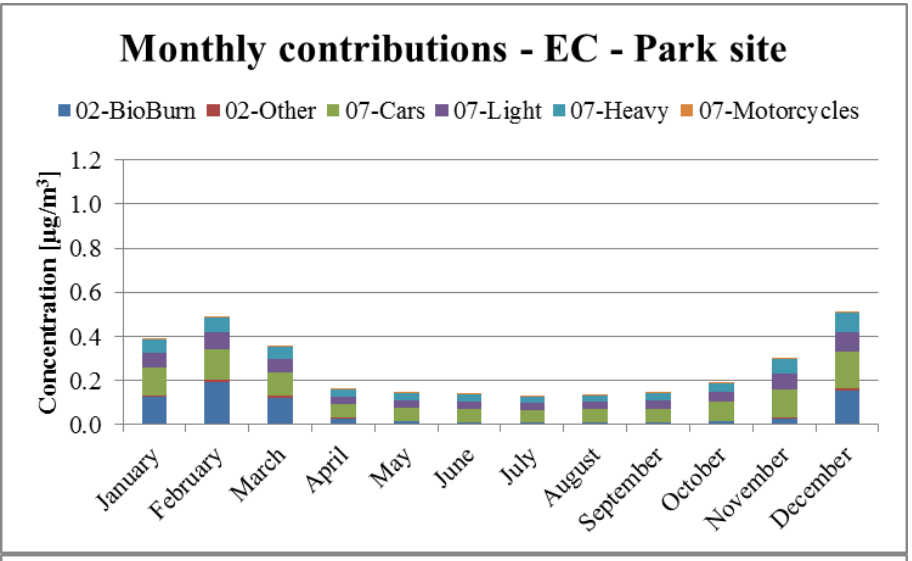


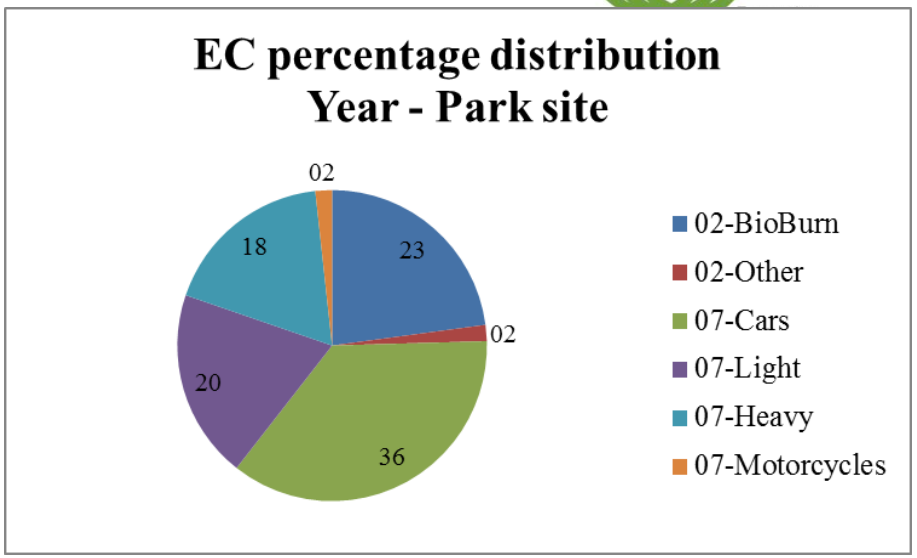


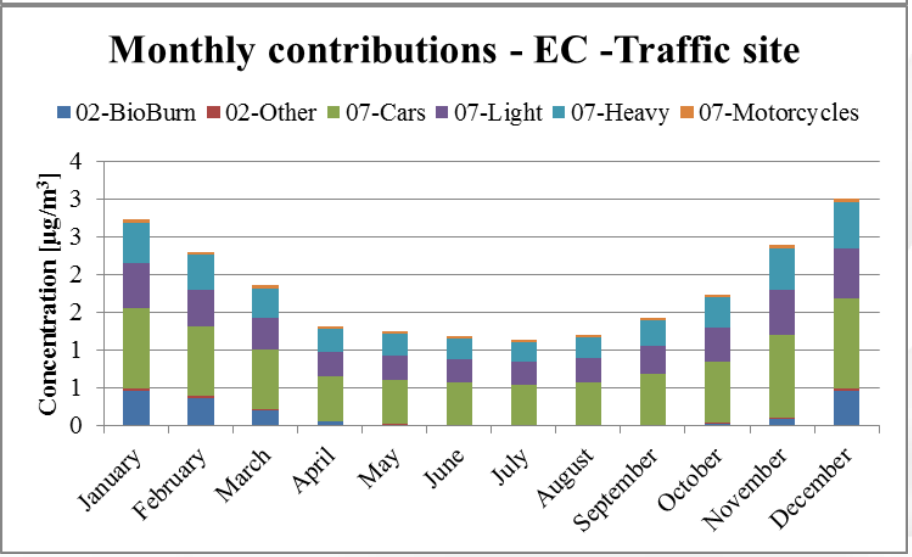


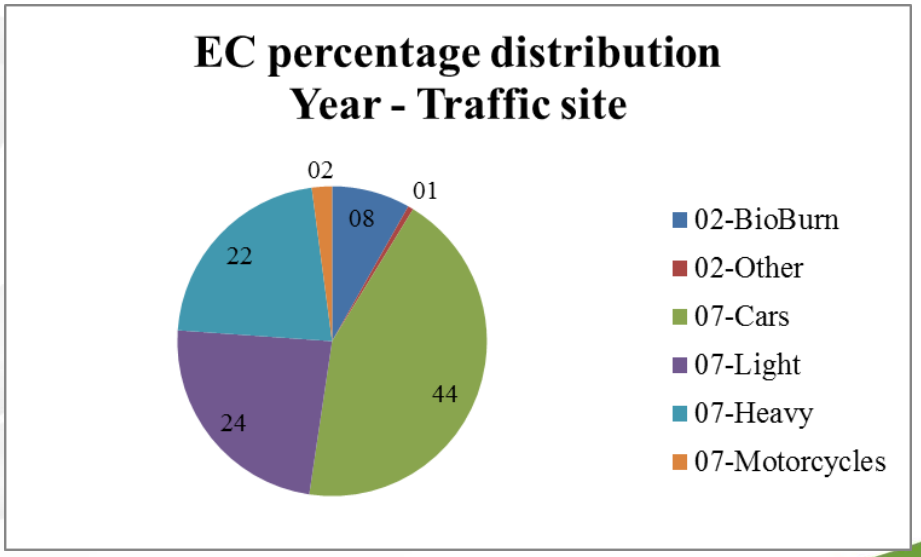
Receptor analysis at Urban scale

EC monthly mean – Local source categories contribution



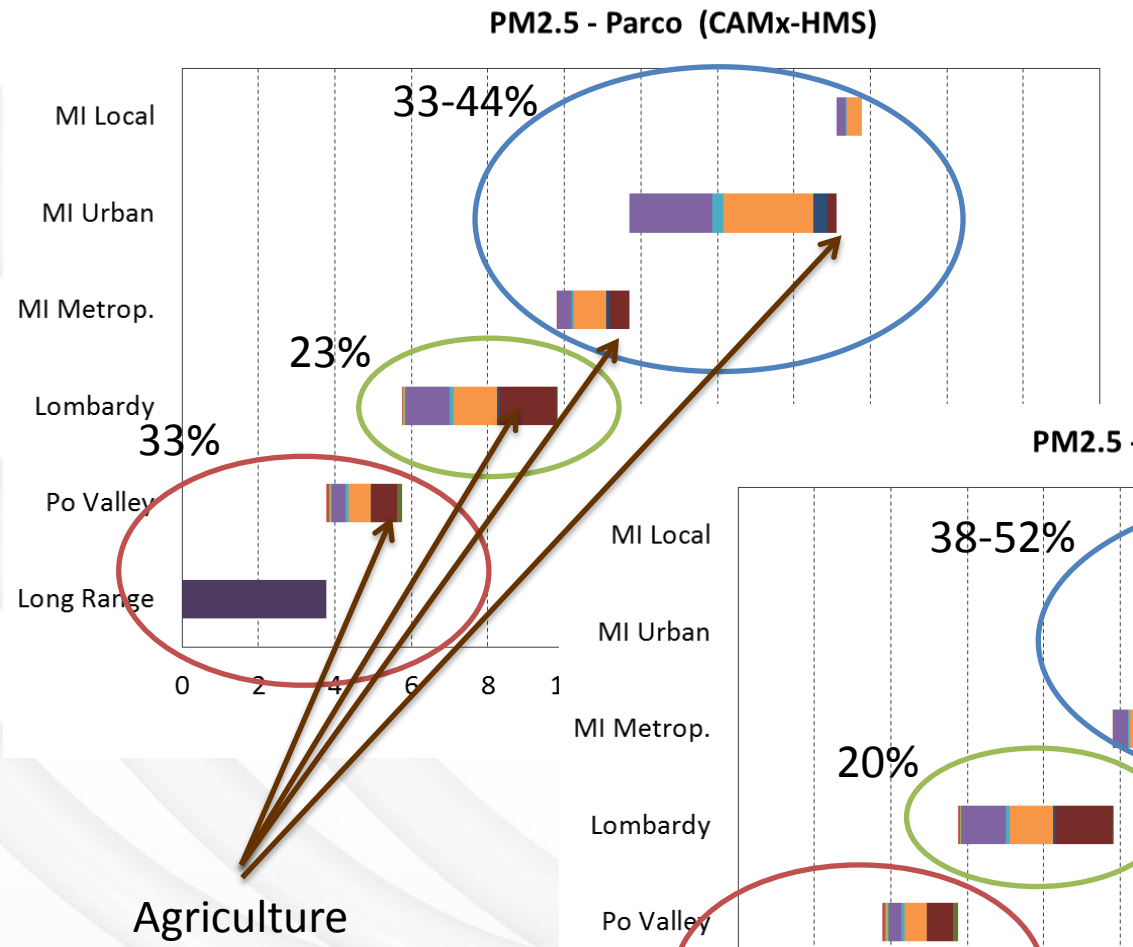


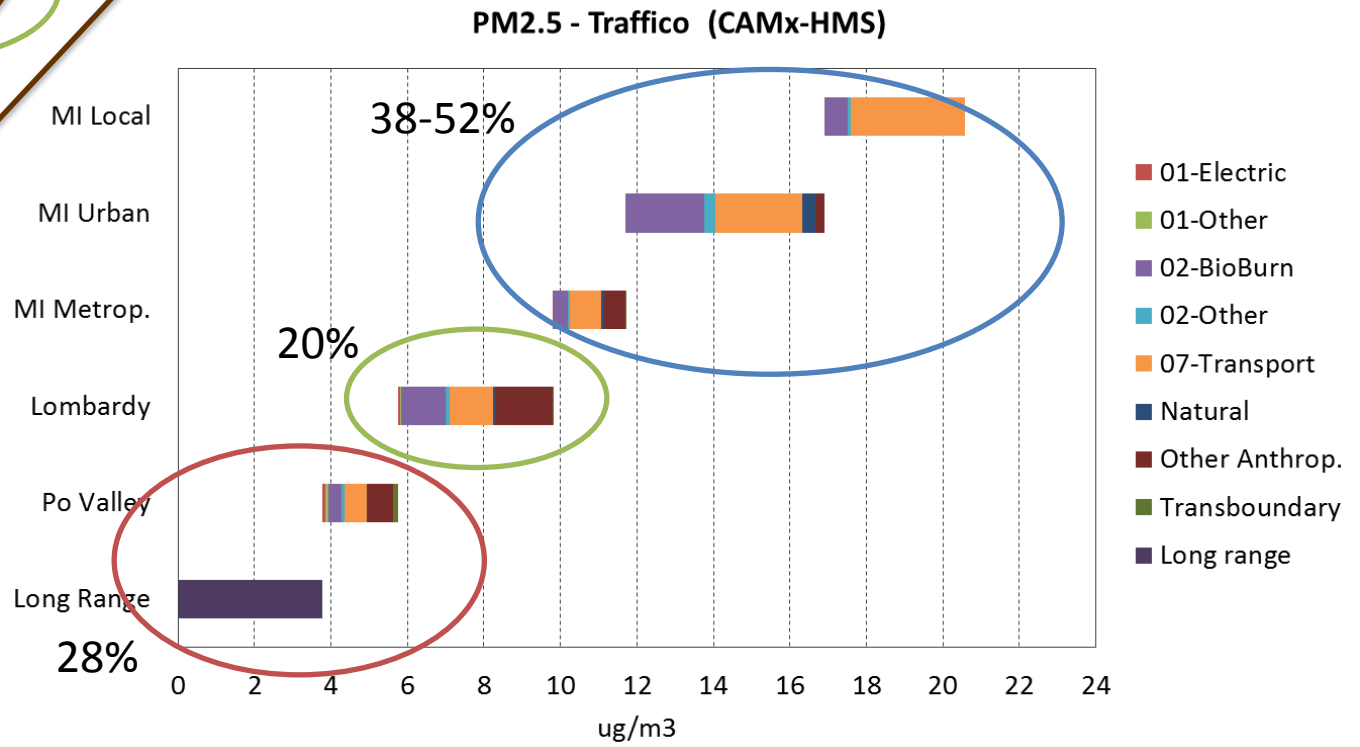




Multi scale Receptor analysis

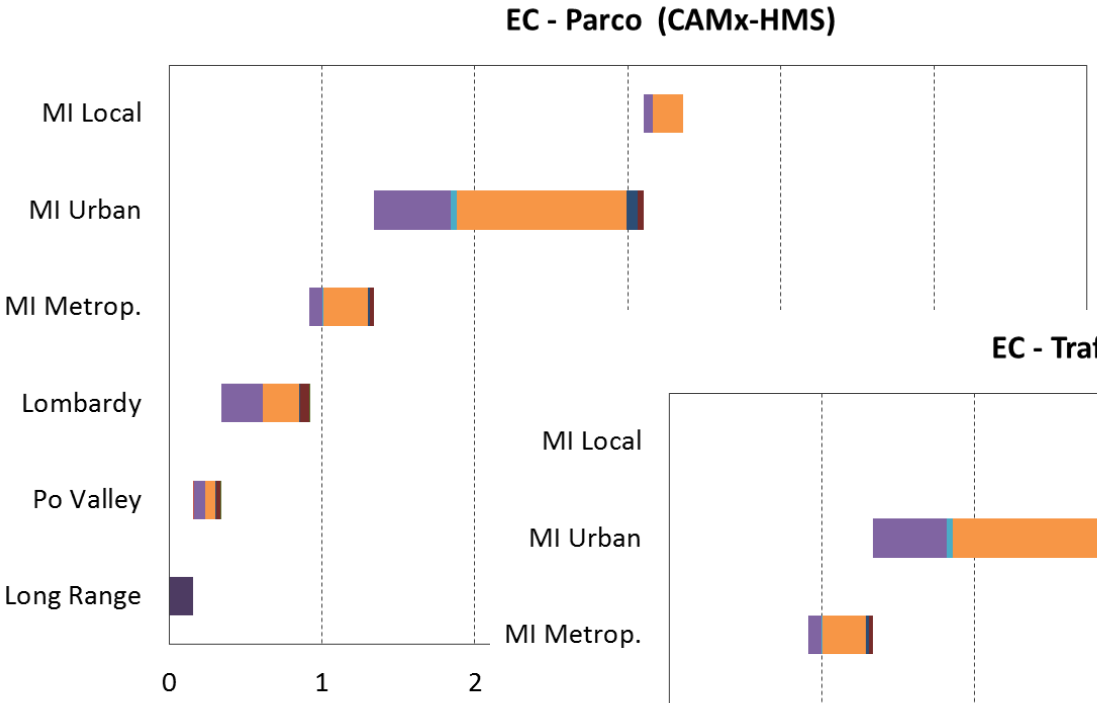
$PM_{2.5}$ Yearly mean – Source regions/categories contribution

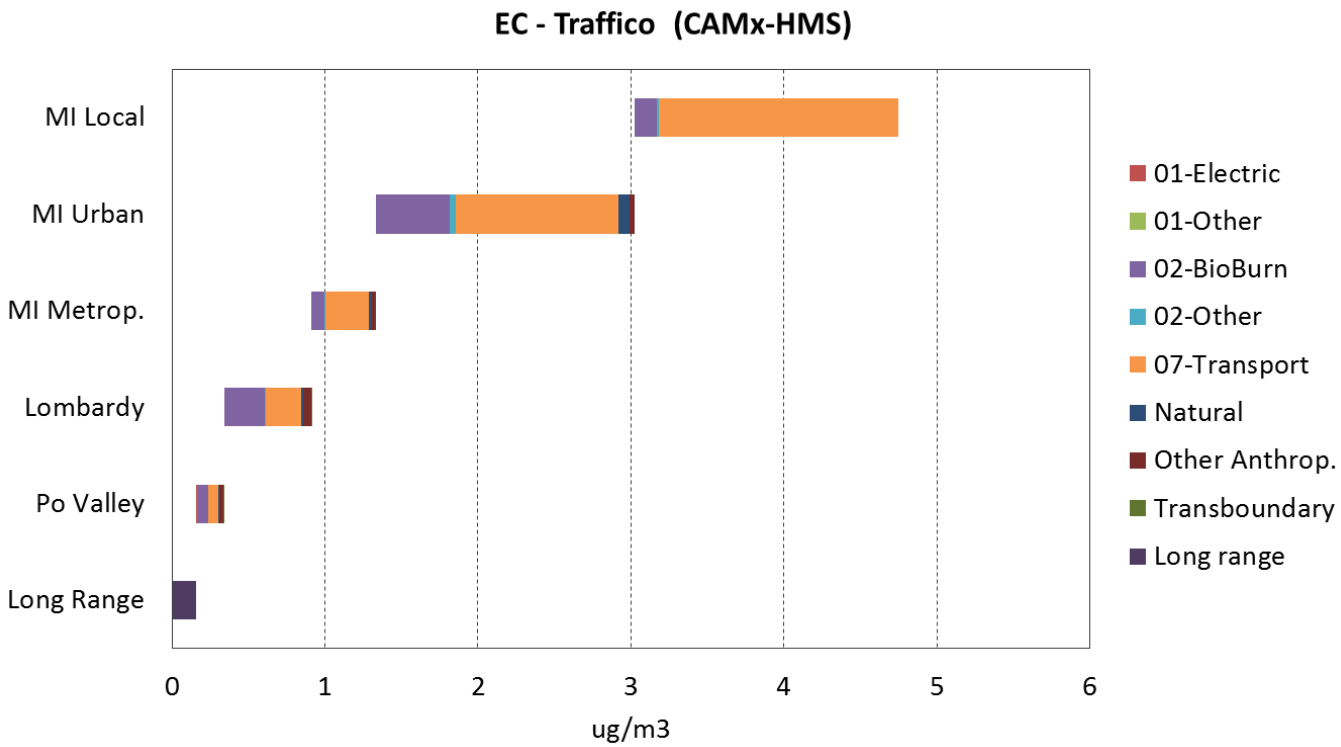




Multi scale Receptor analysis

EC Yearly mean – Source regions/categories contribution





Thanks

guido.pirovano@rse-web.it