PM2024 Convegno nazionale, Torino, 28-31 Maggio 2024

LIFE20 PRE/IT/000004

Enhancing modelled PM mass closure with CAMx model in the context of the REMY project

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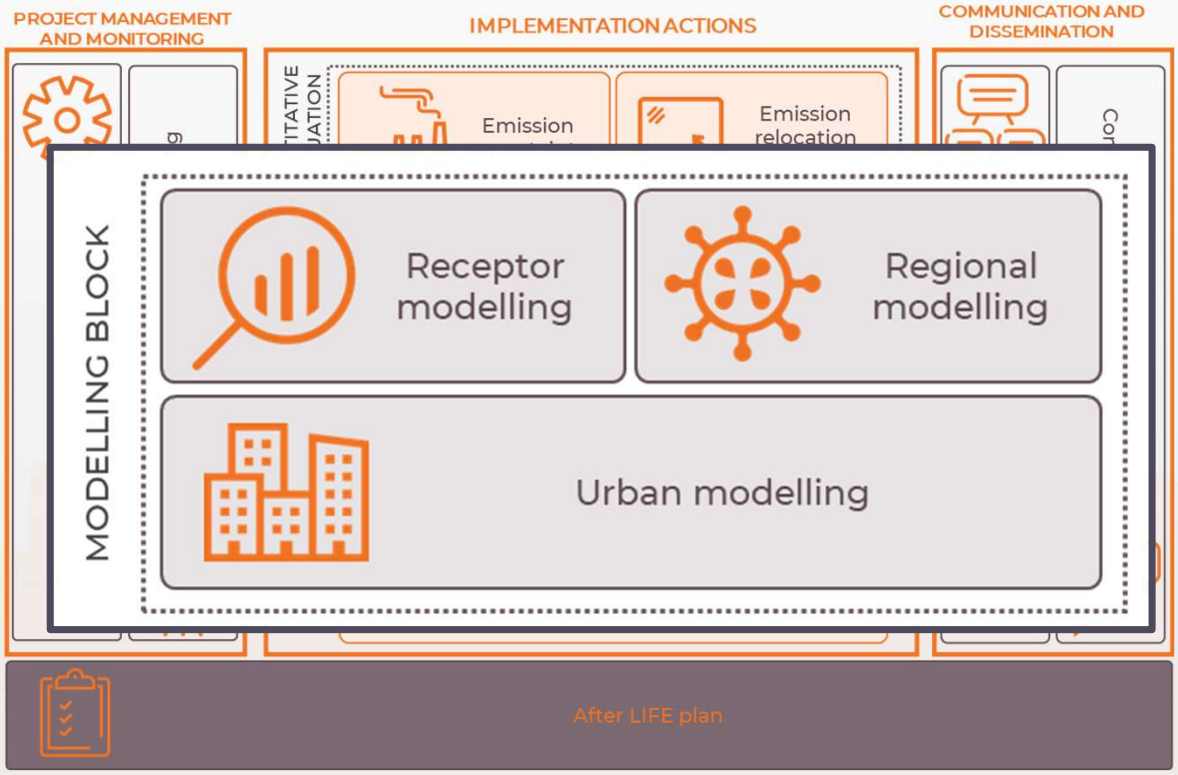
LIFE REMY Project

REMY: Reducing Emission Modelling uncertaintY

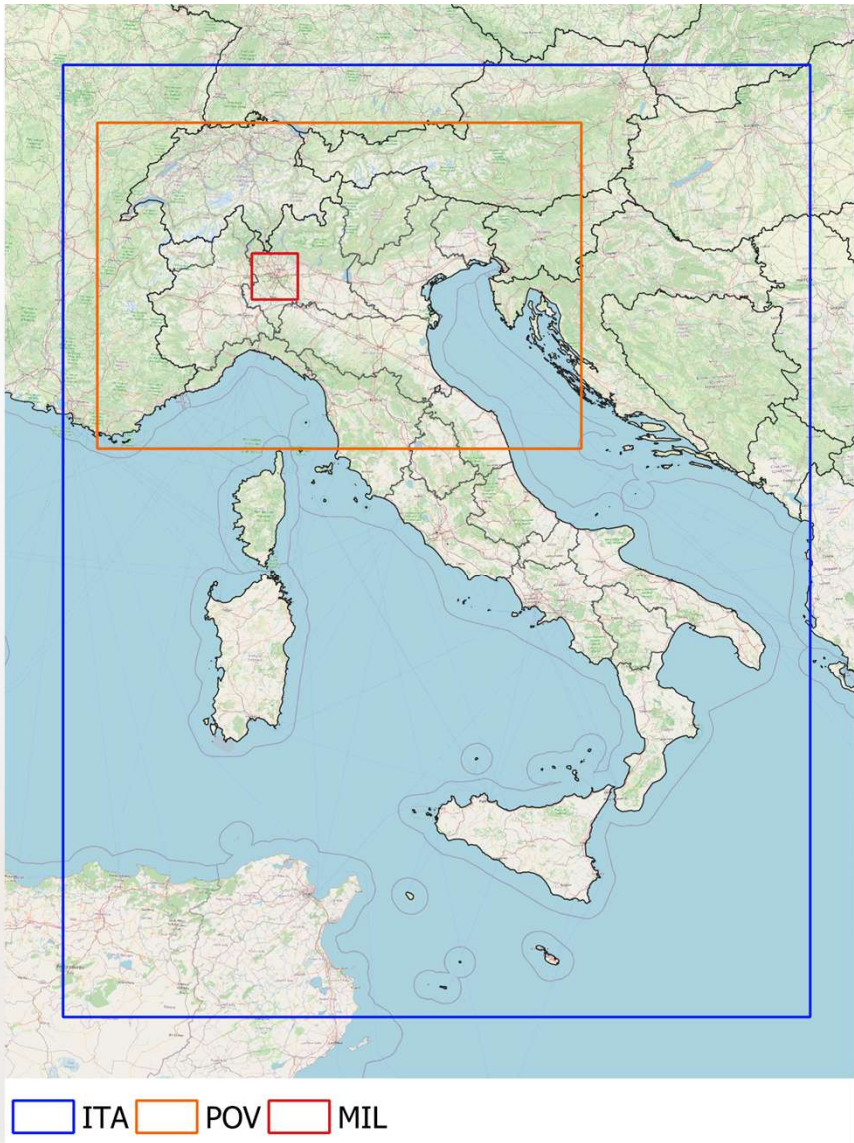
The final goal of the project is to provide recommendations and guidelines for the compilation of emission inventory with the specific aim to improve air quality model performances for assessment, source apportionment and planning.



CAMx Modelling setup

Domain	POV-MIL
CTM	CAMx v7.2
Baseline year	2017

Time period	2017
Meteo	WRF 2017
Boundary conditions	CHIMERE PREV'AIR
Gas Chemical mechanism	CB06r5
Inorganic Aerosol chemistry	ISORROPIA/RADM
OA mechanisms	**SOAP2.2; SOAP3**
Domains	2 nested domains: POV 4x4 km, MIL 1x1 km, 14 vertical levels
Emissions	INEMAR2017 ISPRA2015 EMEP
Biogenic emissions	MEGAN



Road dust resuspension

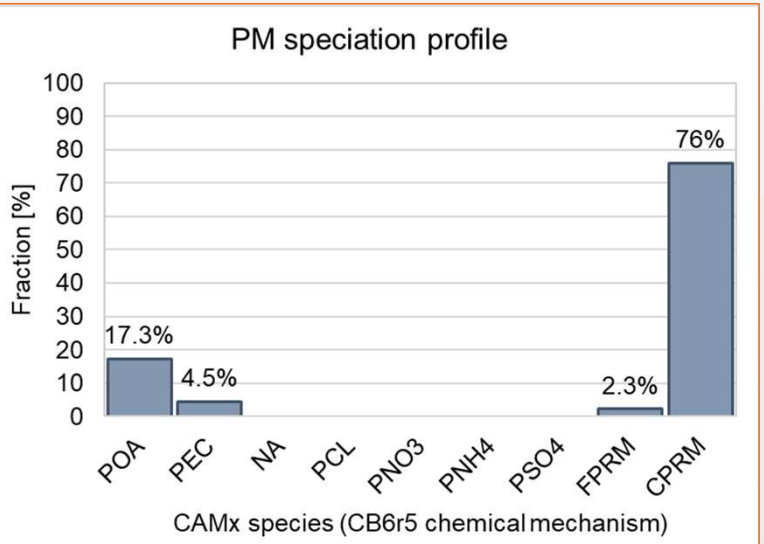
The estimation of road dust resuspension emissions is based on A1 analysis that carried out an experimental campaign in Milan and Barcelona.

The measured road dust resuspension emission factor in Milan was **21.4 mg/v km**, a unique value for all the traffic vehicles and all type of roads.

Resuspension emissions were estimated under the following assumptions:

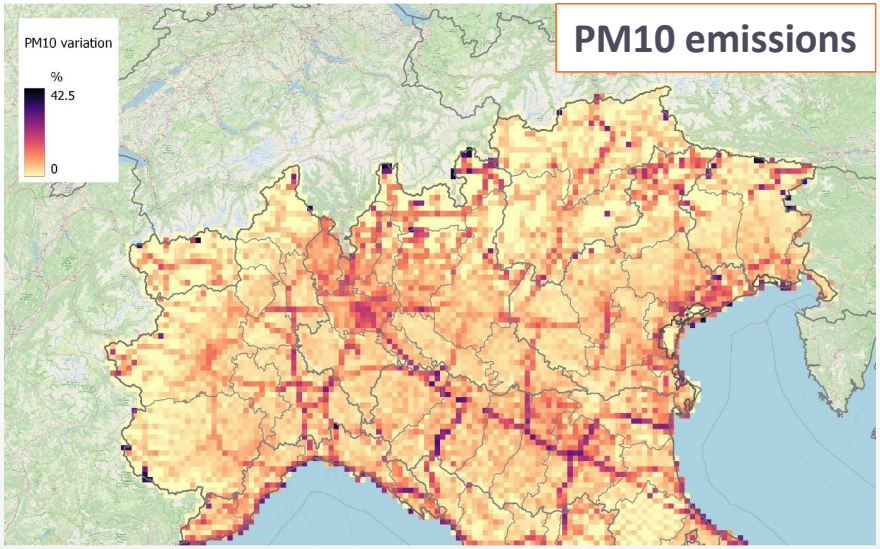
- PM2.5 resuspension emission factor to 24% of total particulate matter (based on US EPA data)
- Elemental carbon and organic carbon fractions: OC=19% and EC=5%
- CAMx model treats EC and OC as fine particulate matter. In the traffic monitoring stations 25% of OC and 16% of EC is measured as coarse fraction, therefore the speciation profile for resuspension emission has been adapted allocating part of EC and OC to the coarse fraction.

Milano campaign: vertical profile method



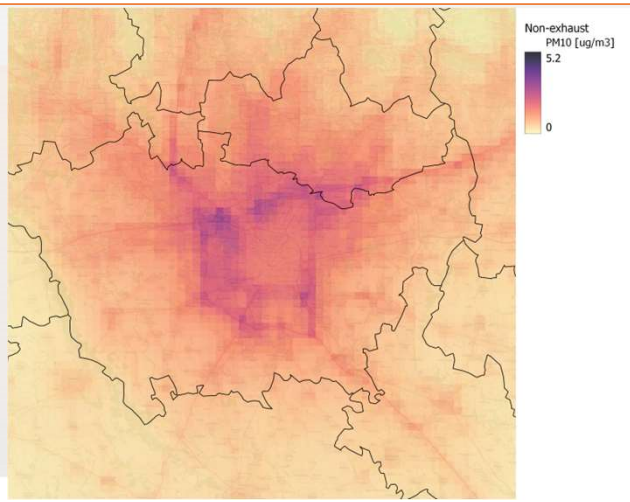
Road dust resuspension

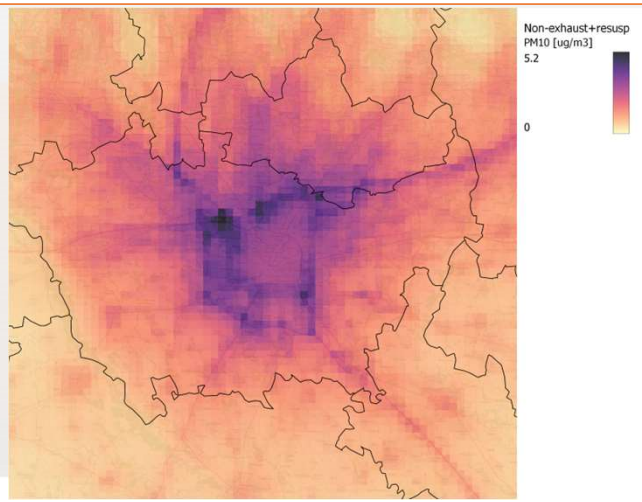
- Estimation of road transport PM10 emission increase equal to +44% (based on the Lombardy region inventory)



PM10 emissions

Non-exhaust PM10 yearly average concentration contribution BASE CASE vs RESUSPENSION SCENARIO





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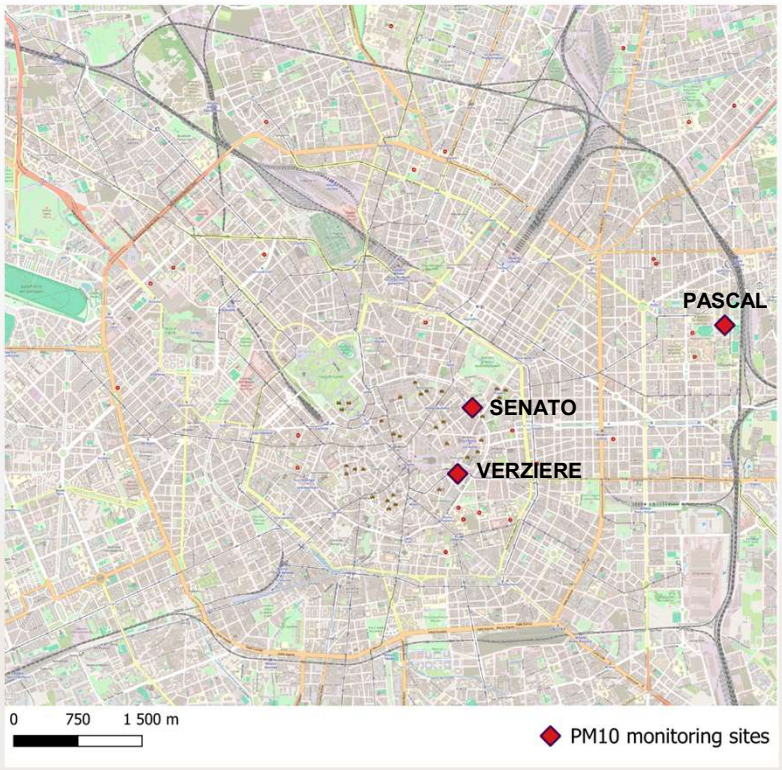
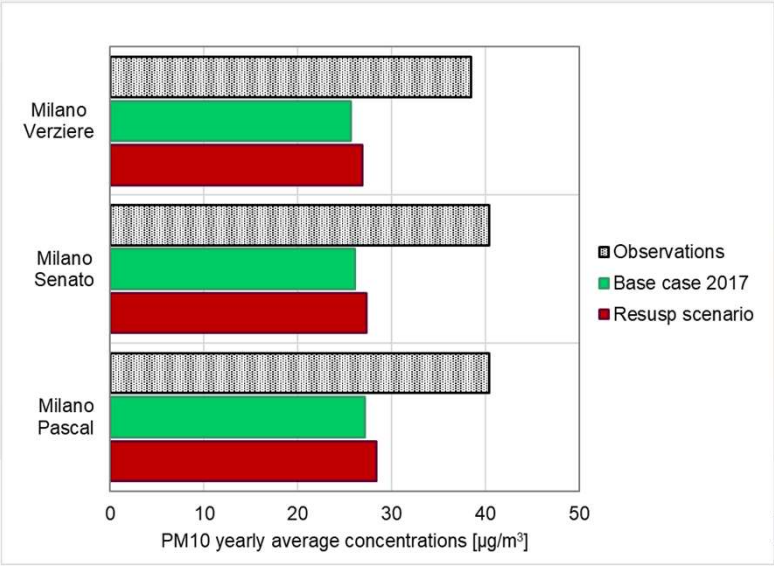
Road dust resuspension

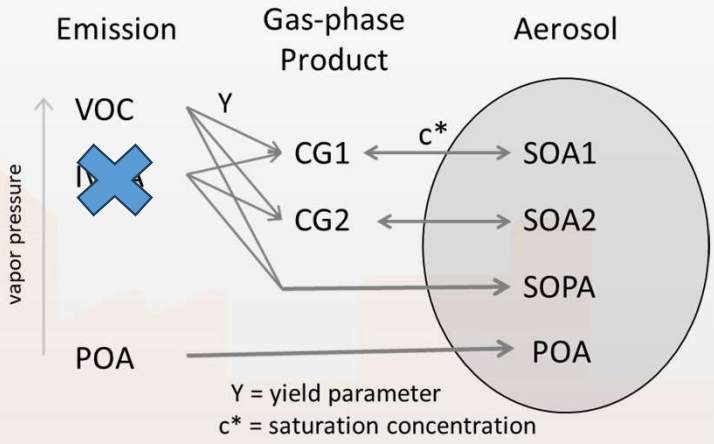


	Scenario	Bias [µg/m³]	Mean Average Error [µg/m³]	Fractional Bias [%]	Fractional Error [%]	Correlation [-]
Verziere	CAMx BASE	-12.83	12.83	-38.80	45.30	0.788
	CAMx RESUSPENSION	-11.39	11.39	-34.10	42.00	0.803
Senato	CAMx BASE	-14.26	14.26	-42.10	48.60	0.757
	CAMx RESUSPENSION	-12.71	12.71	-37.30	45.20	0.780
Pascal	CAMx BASE	-13.26	13.26	-34.40	44.50	0.771
	CAMx RESUSPENSION	-11.67	11.67	-29.60	41.50	0.788

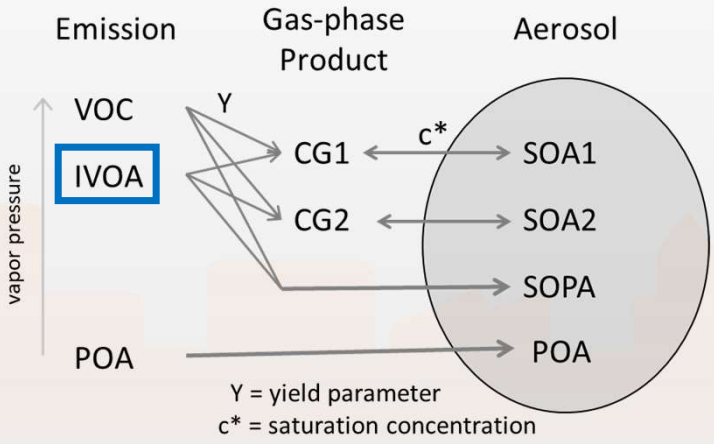


CAMx – OA modelling

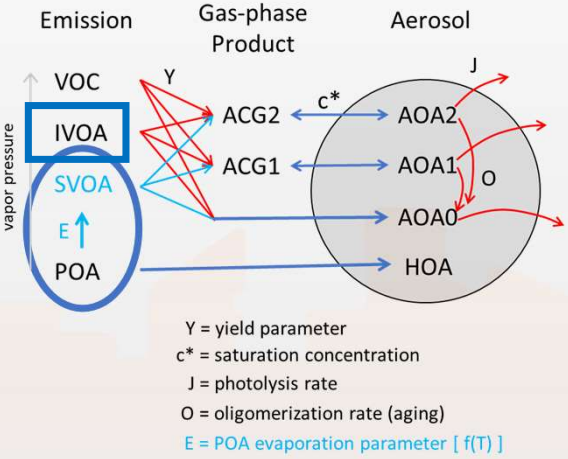
SOAP2 (Basecase)



SOAP2 + IVOC

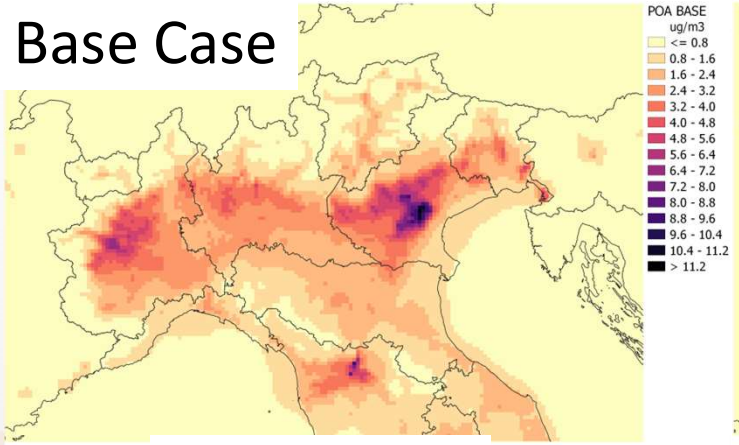


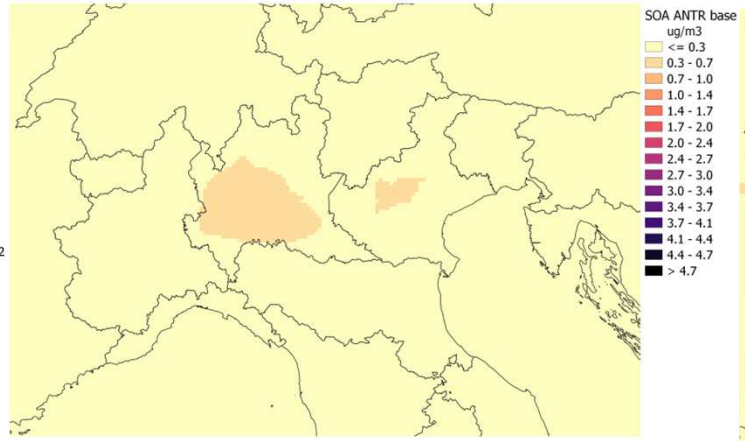
SOAP3

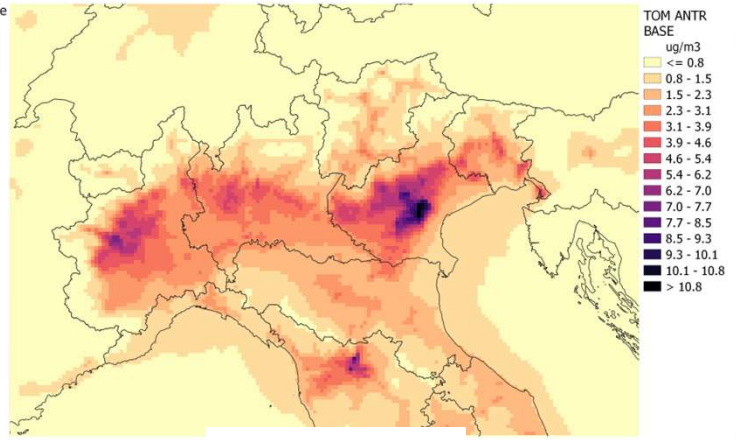


CAMx – OA modelling - Yearly mean concentration

Base Case



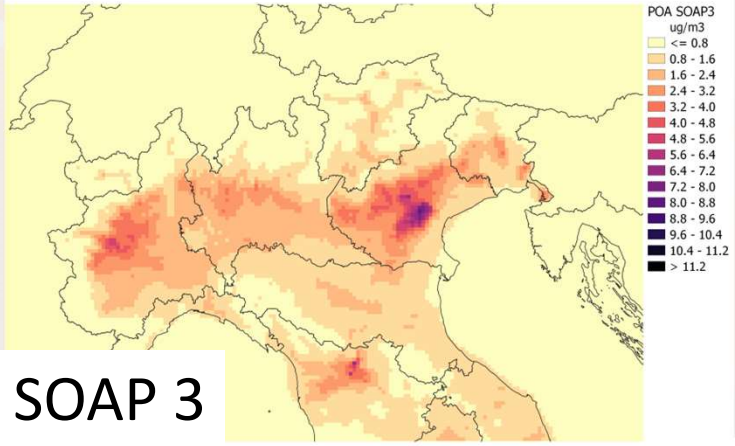


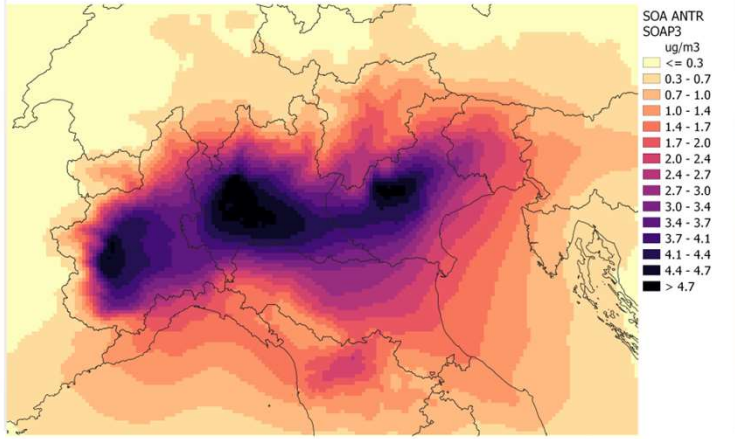


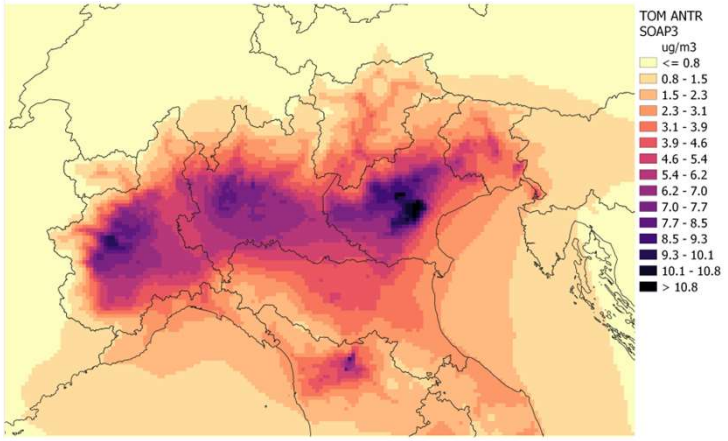
Primary OA

Secondary OA

Total OA



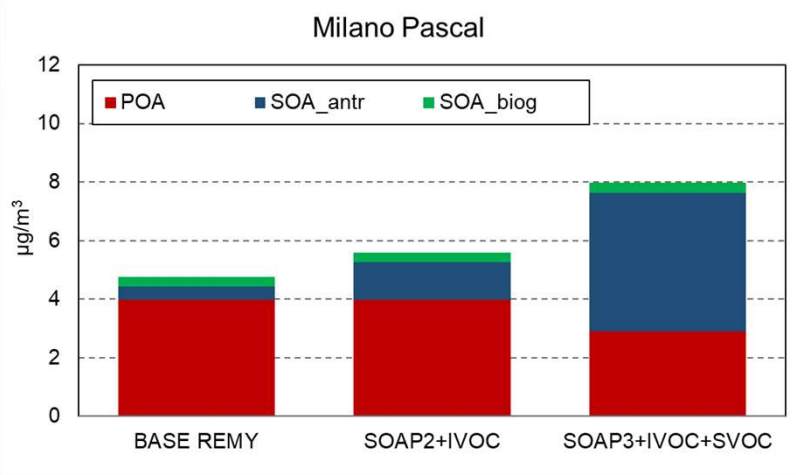




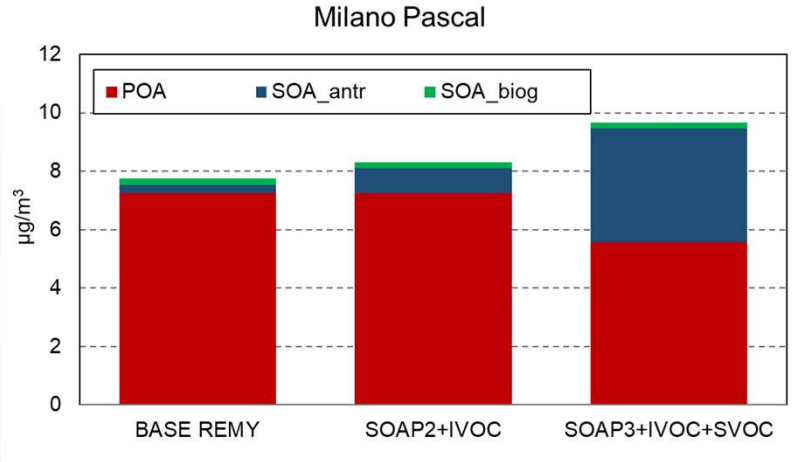
SOAP 3

CAMx results - Milano Pascal (UB site)

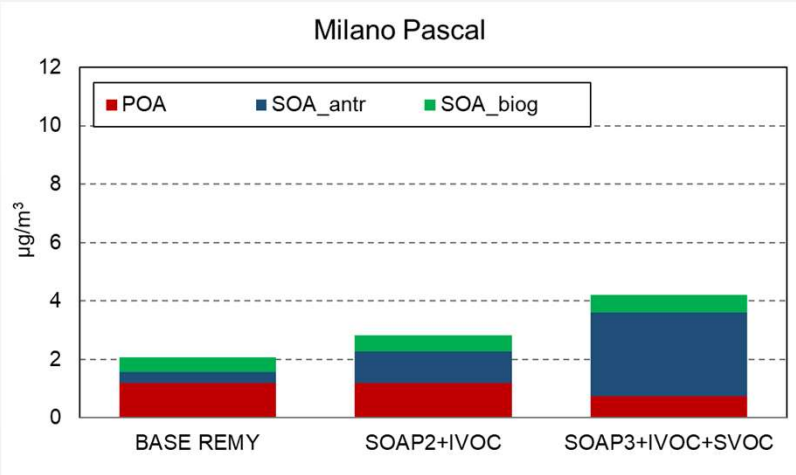
TOM2.5



YEAR

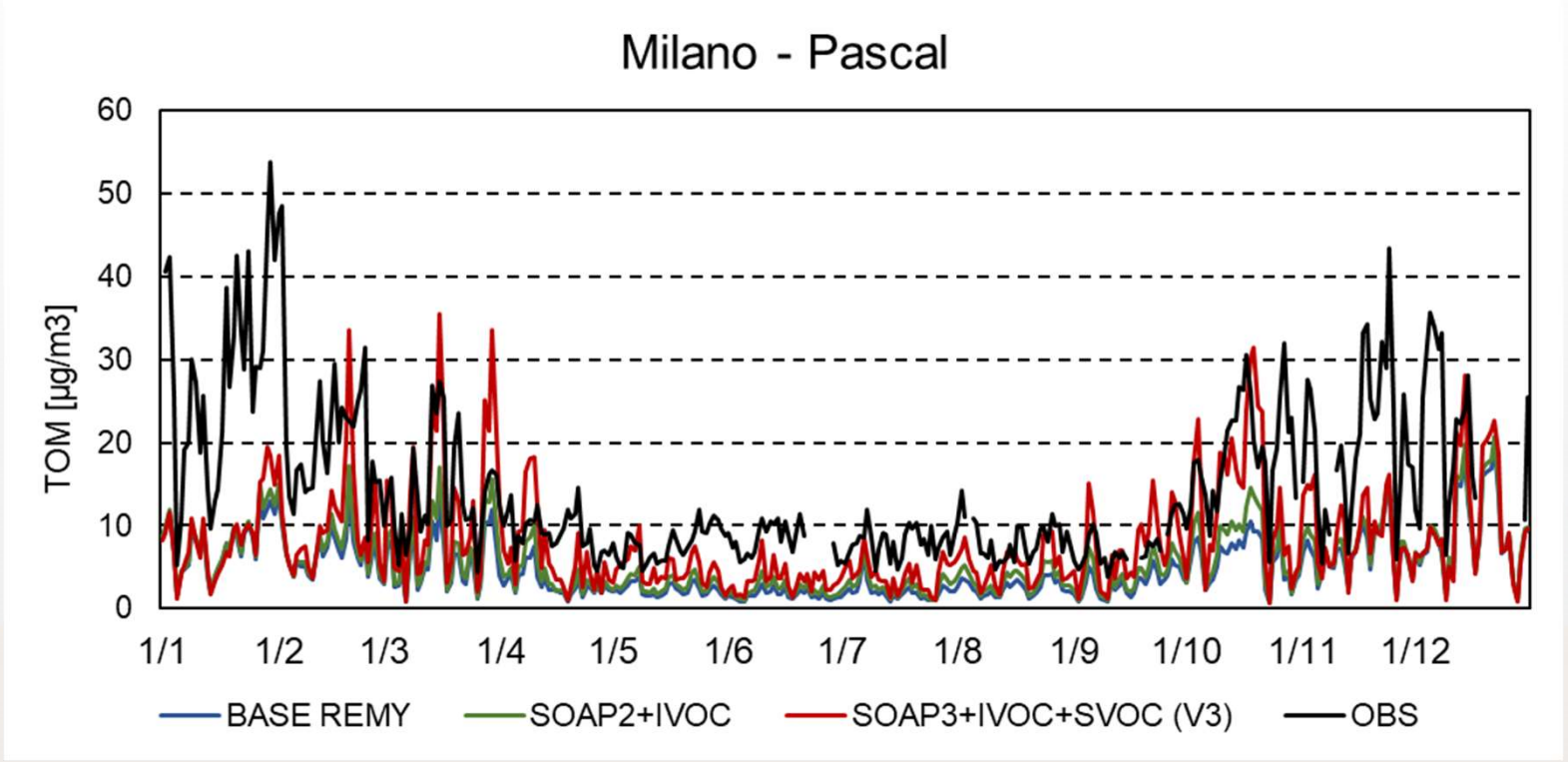


WINTER



SUMMER

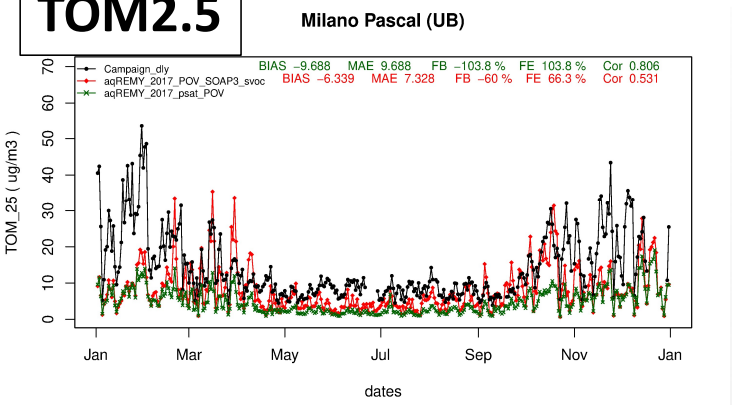
CAMx results - Milano Pascal (UB site)

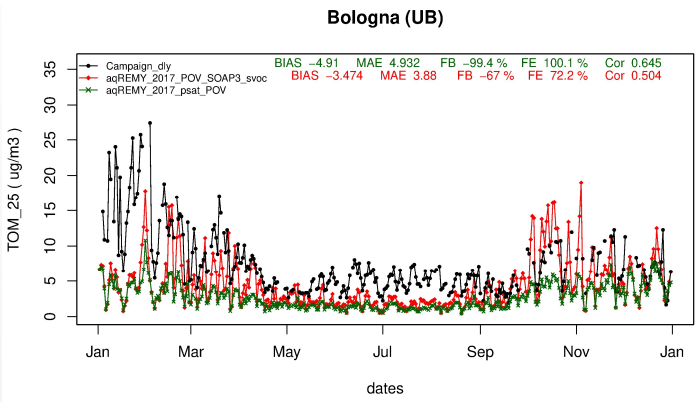


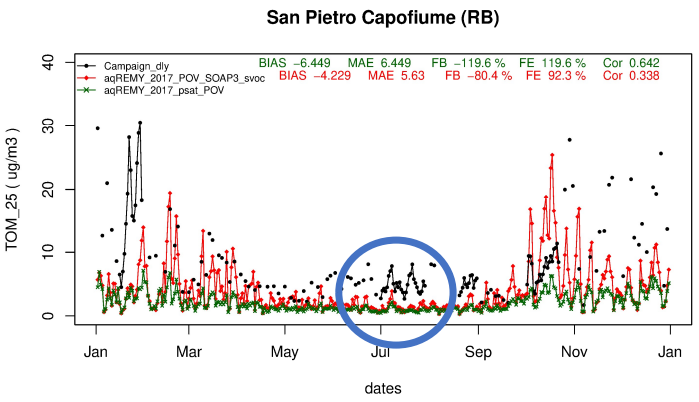
TOM2.5 - DAILY MEAN

CAMx results - Daily mean

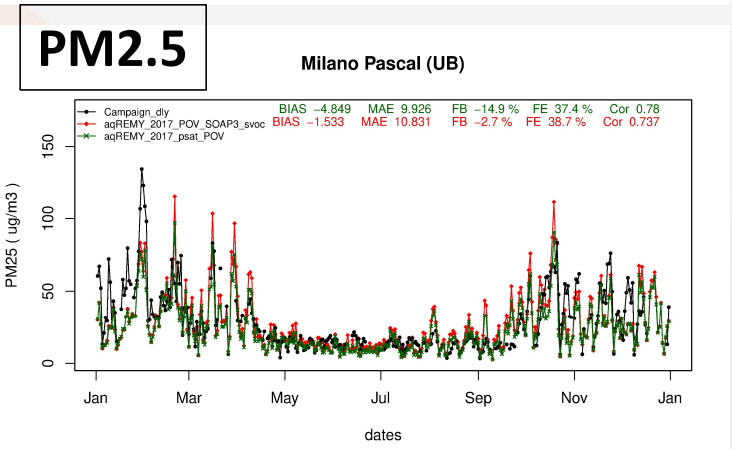
TOM2.5

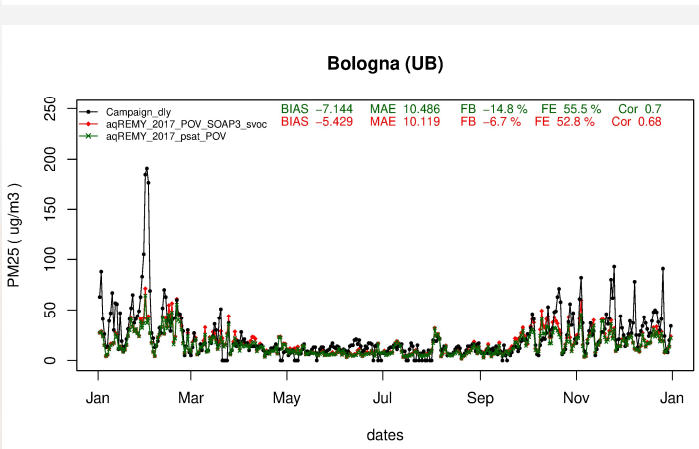


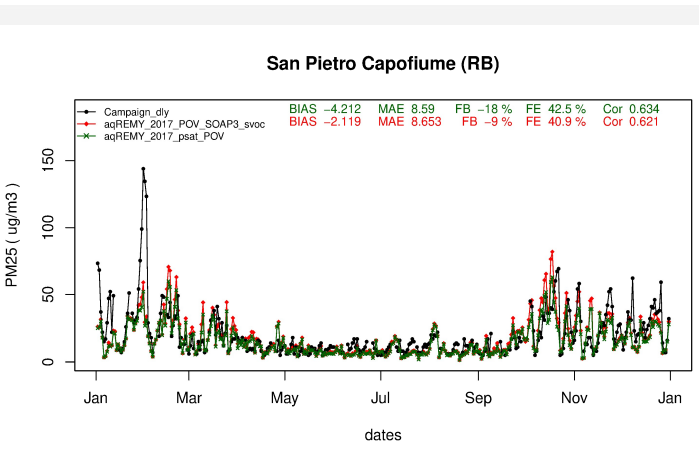


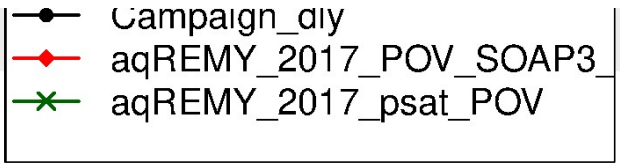


PM2.5

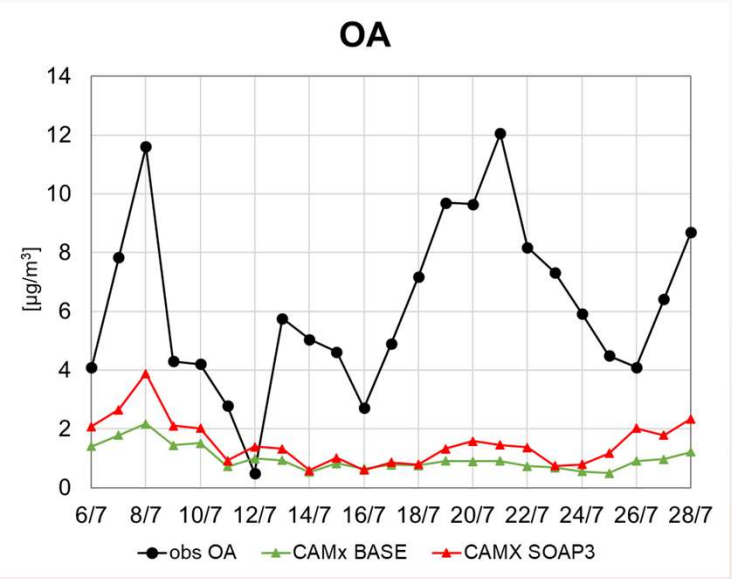


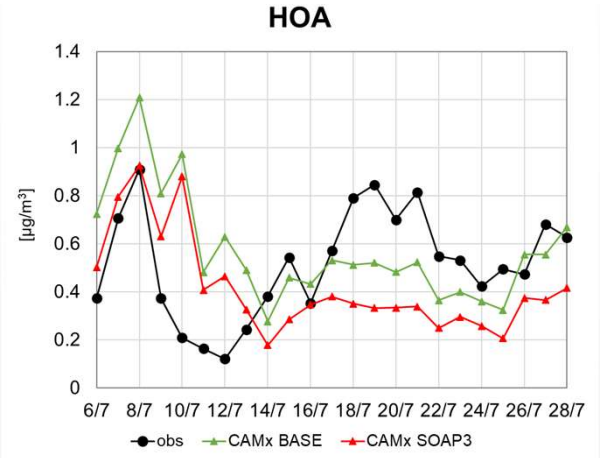


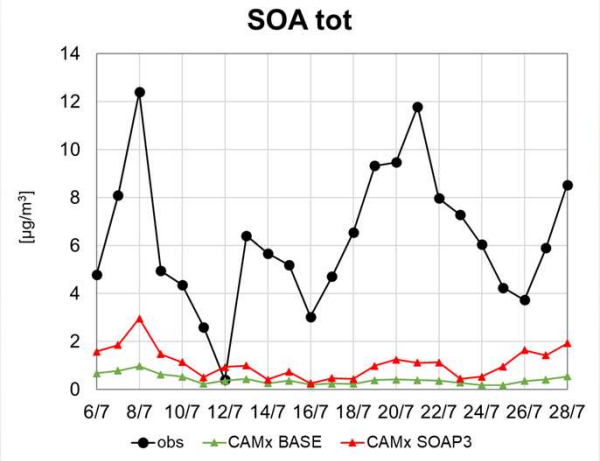


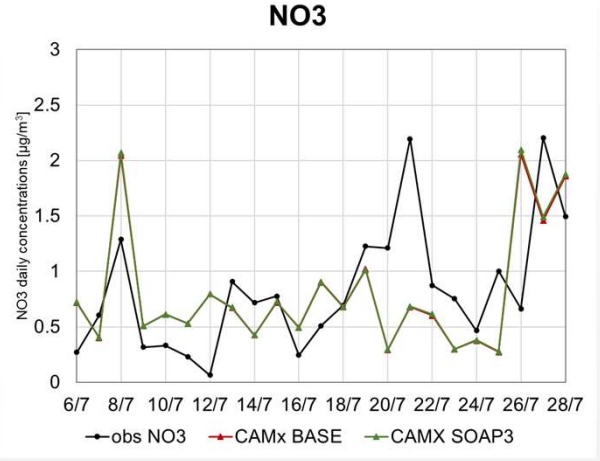


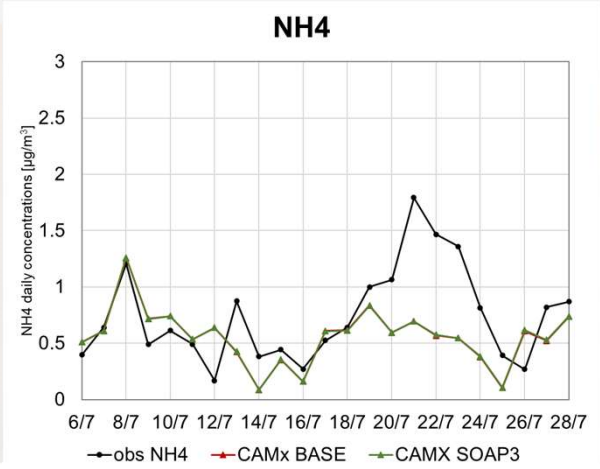
CAMx results - Comparison with ACSM





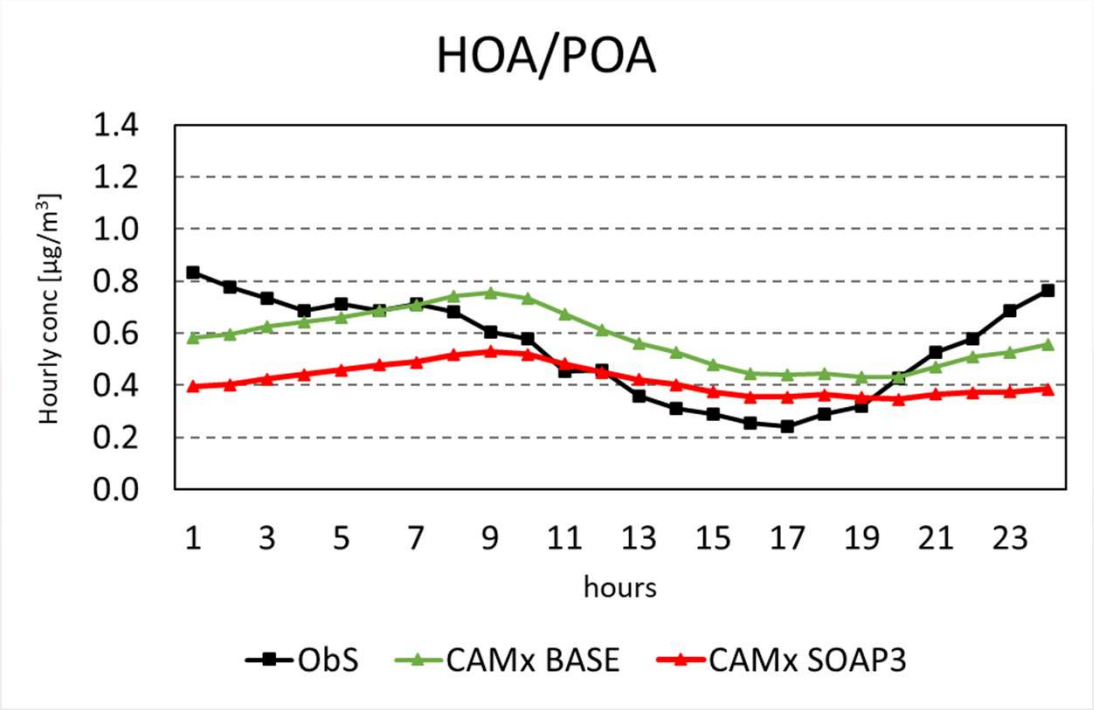


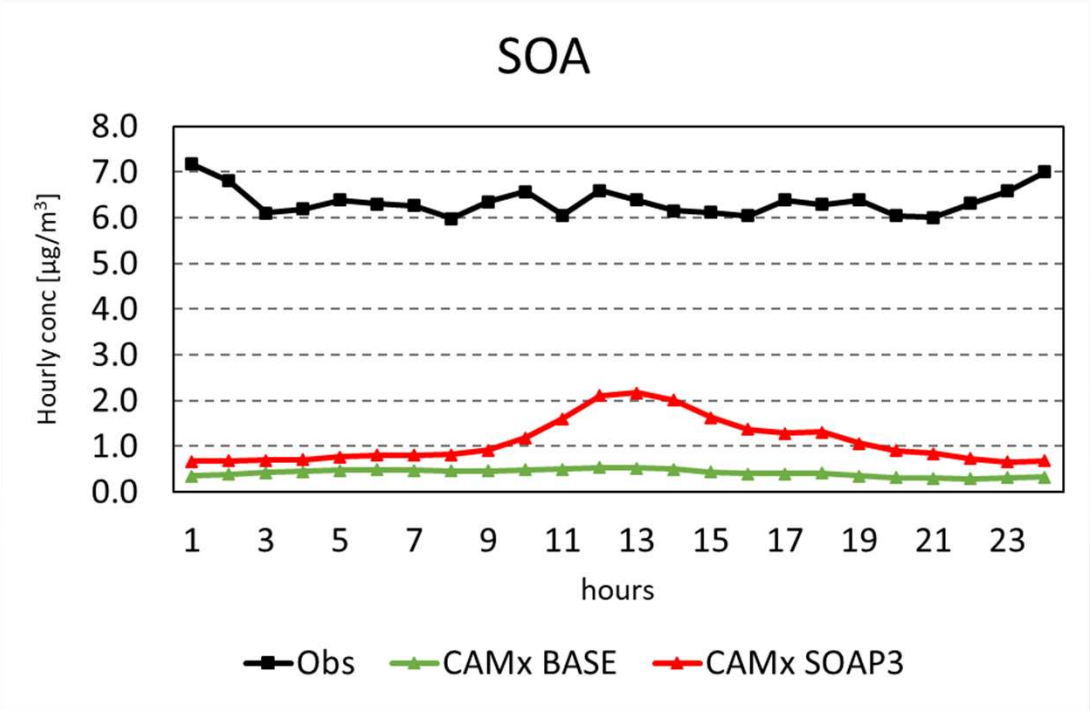




SAN PIETRO CAPOFIUME - DAILY MEAN

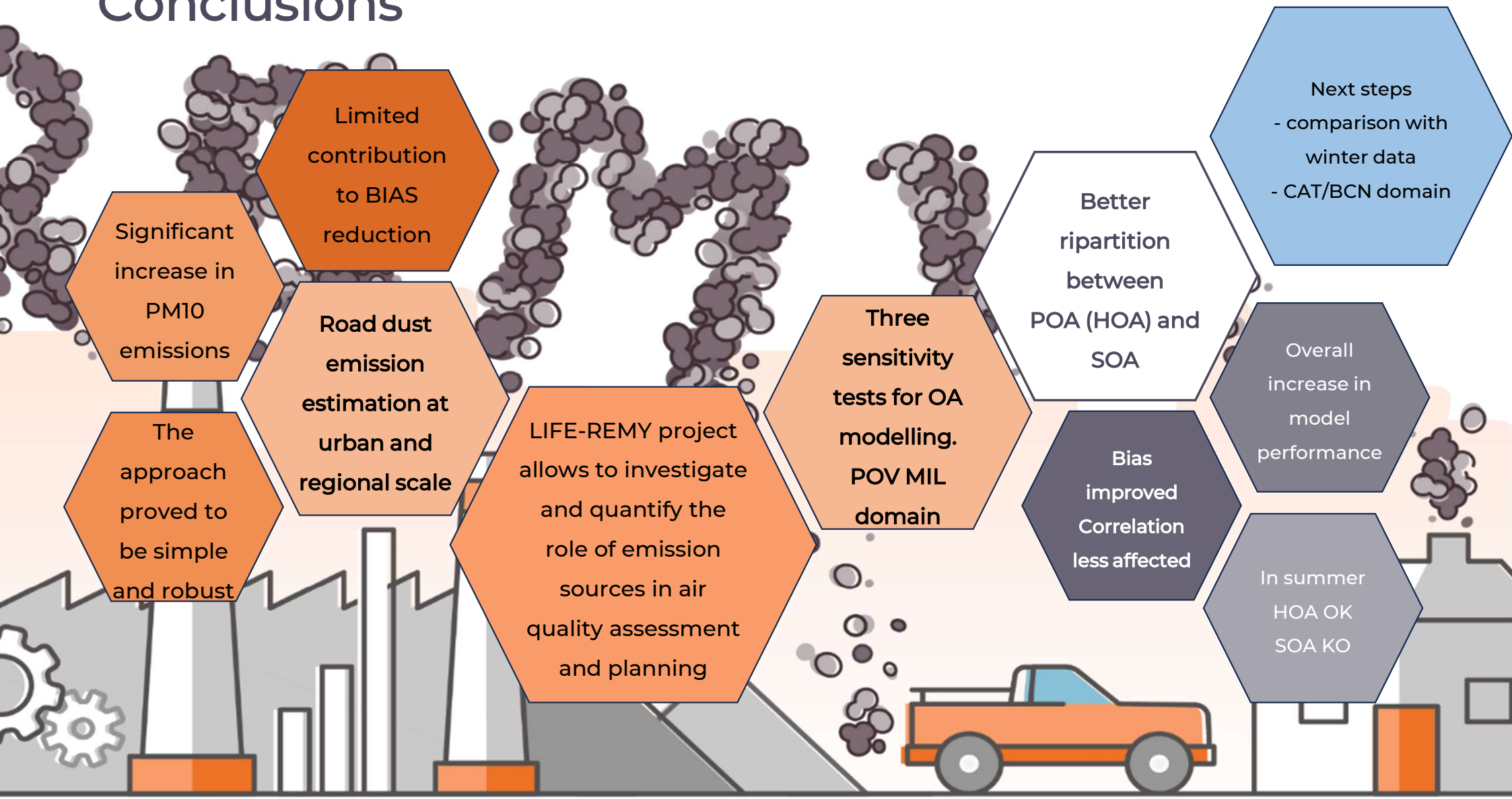
CAMx results - Comparison with ACSM





SAN PIETRO CAPOFIUME – MEAN DAY

Conclusions



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