



LIFE 15 IPE IT 013



Air quality assessment in Po Valley and Slovenia for year 2020 with air quality models

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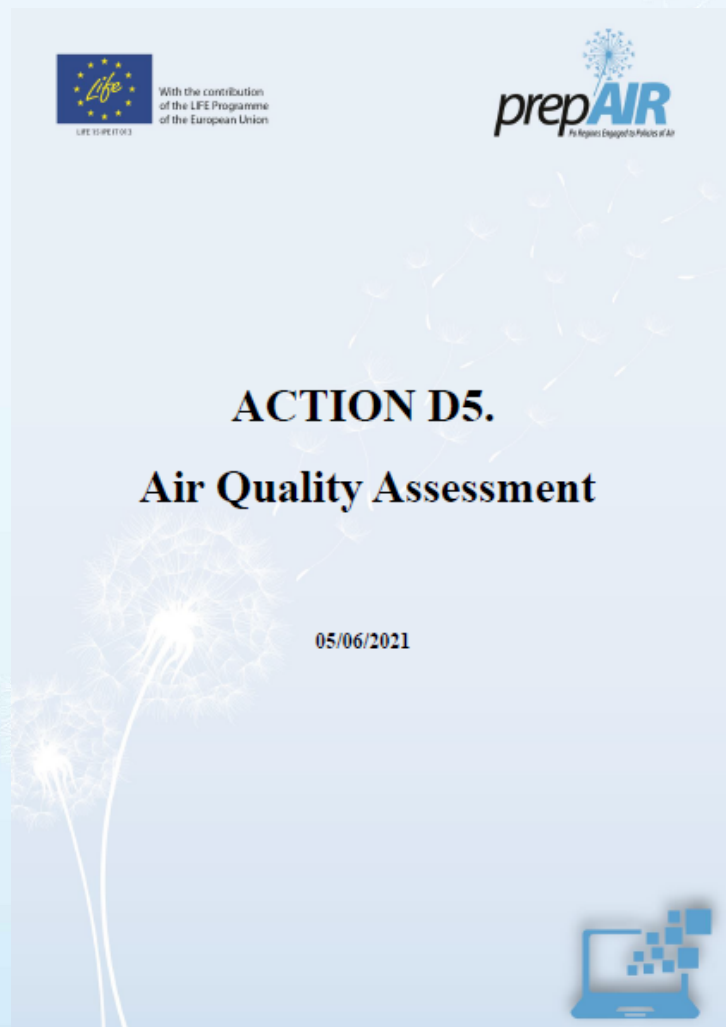
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First air quality assessment (Action D5)



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The report with a detailed description of model, methods and results is available at <https://www.lifeprepare.eu/>



Year 2020: an unfortunately special year

The 2020 pollution episodes, the meteorological context and impact of COVID19 lockdown are described in details in three other reports available at the Prepair web site.

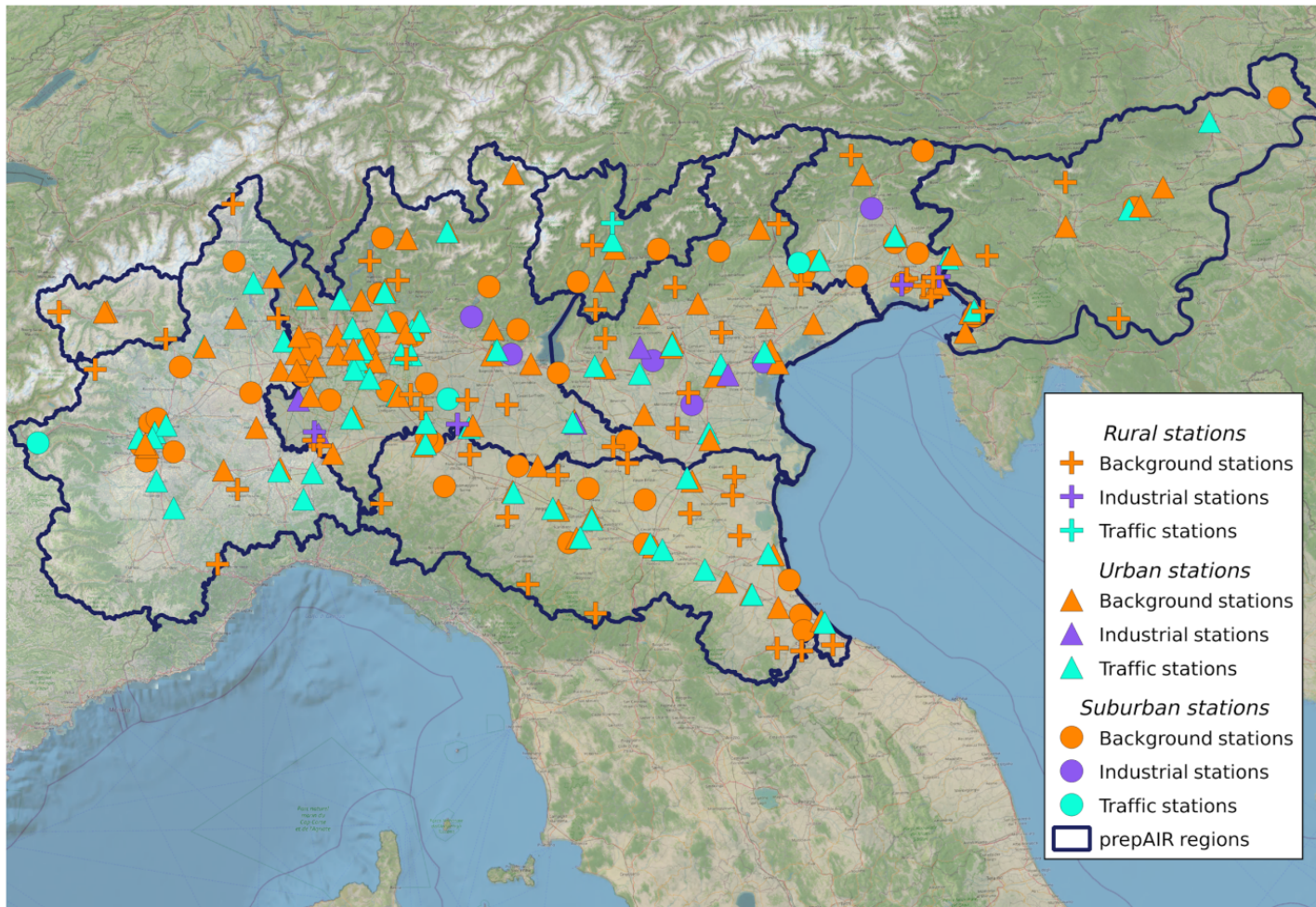
In this presentation, a detail report is available at the Prepair web site, we show the following AQ indicators and population exposure representative of the background concentration:

- PM10 annual mean concentration values
- PM2.5 annual mean concentration values
- NO₂ annual mean concentration values
- 90.4 percentile of PM10 daily mean concentration values corresponding to the 36th highest daily mean of the year (AQ EU Directive)

CTM Models and data fusion methodology

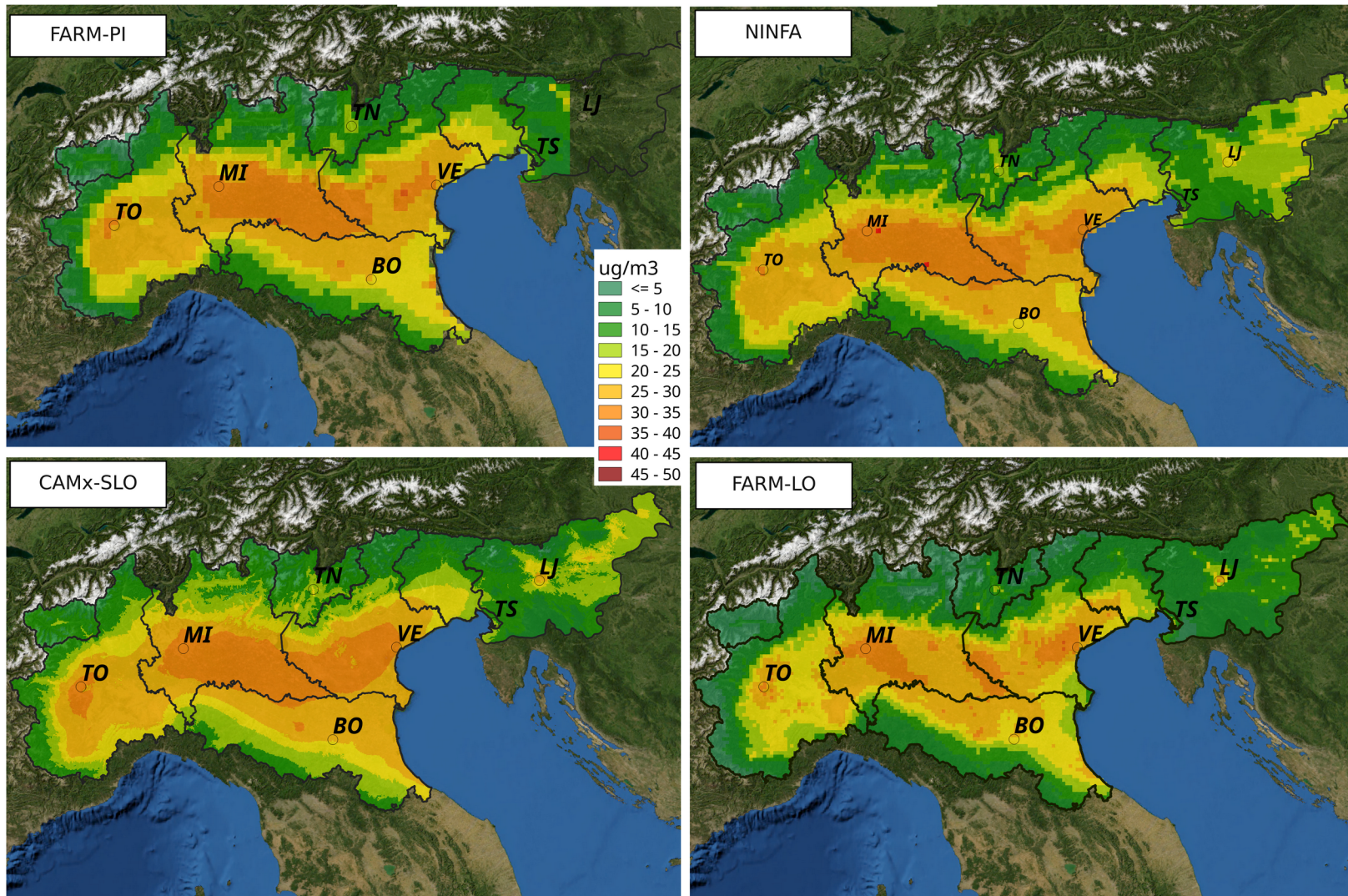
	ARPAE Emilia-Romagna	ARPA Piemonte	ARPA Lombardia	ARSO Slovenia
Model suite	NINFA	FARM-PI	FARM-LO	CAMx-SLO
CTM model	CHIMERE	FARM	FARM	CAMx
Meteo	COSMO-I5	COSMO-I5	WRF	Aladin
Boundary condition	SNPA Model	Prevair	Qualearia	IFS-TM5
Horizontal resolution	5km	8km	4km	4km
Data fusion technique	KED	KED	SCM	KED (from 4km to 1 km)

Monitoring stations in Prepair Project



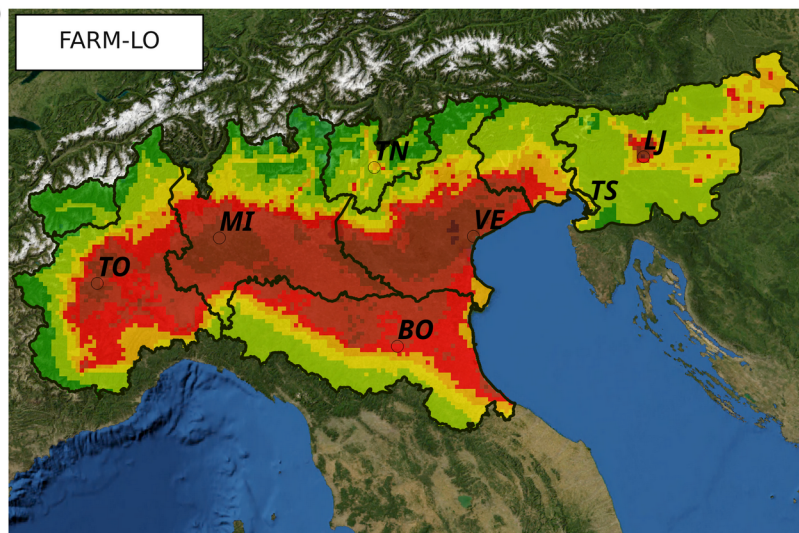
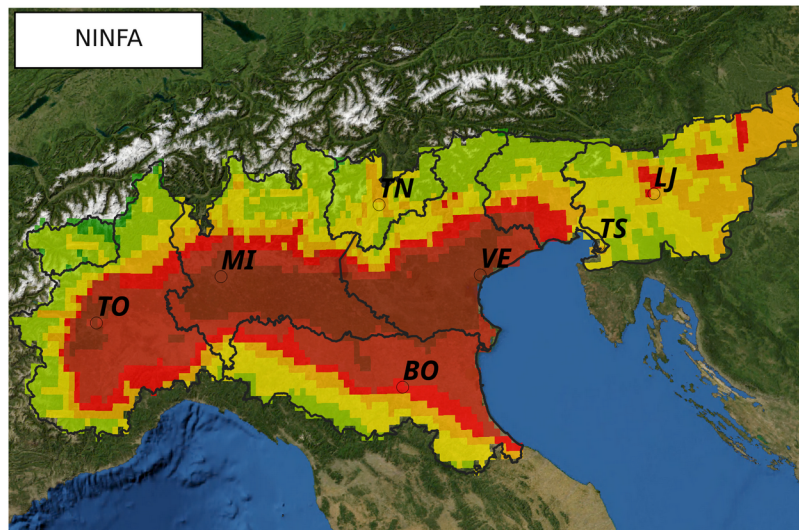
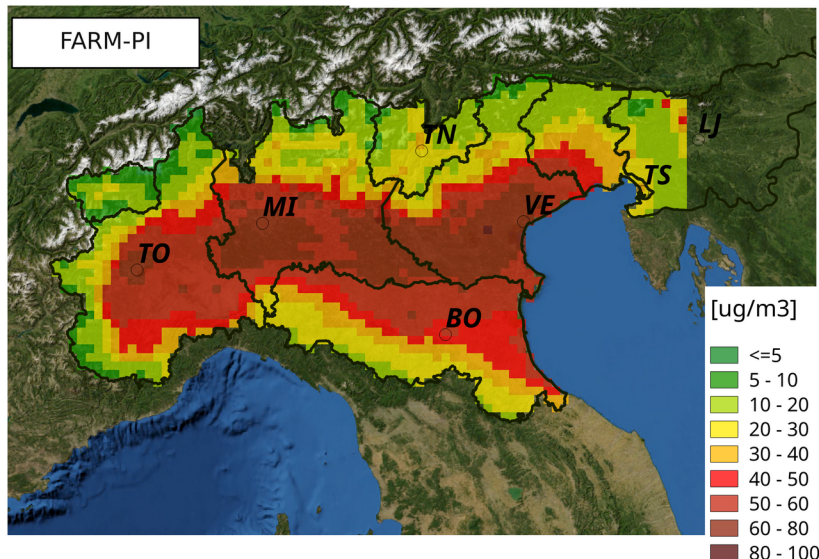
Only background stations were used in the assessment analysis

Annual 2020 average PM10 concentration



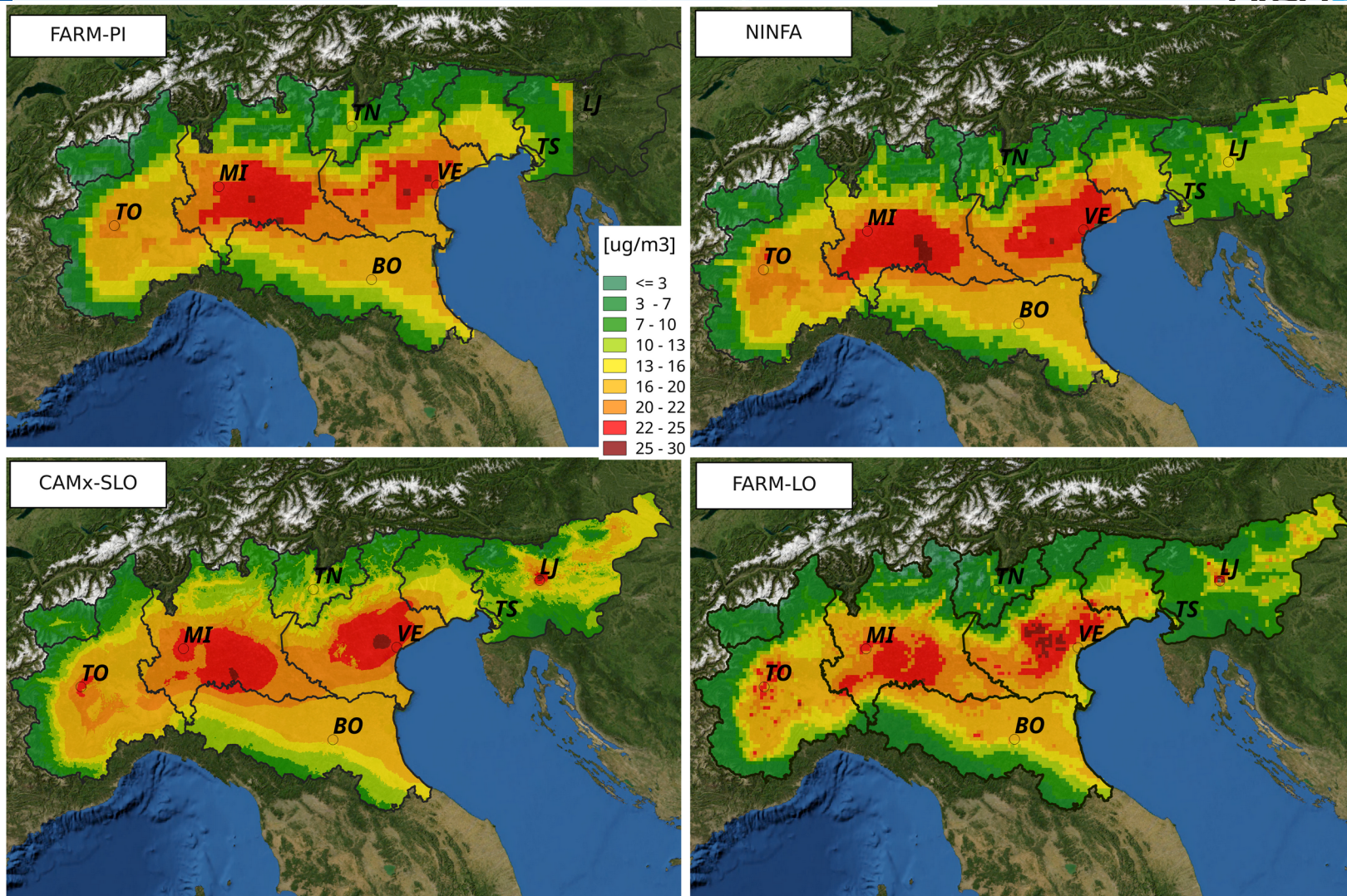
The areas with the highest concentrations are located between the Lombardia, Veneto plains and around the metropolitan agglomerations. **No model estimates annual average concentration above current EU threshold value of 40 $\mu\text{g}/\text{m}^3$**

90.4 percentile of PM10 daily concentrations



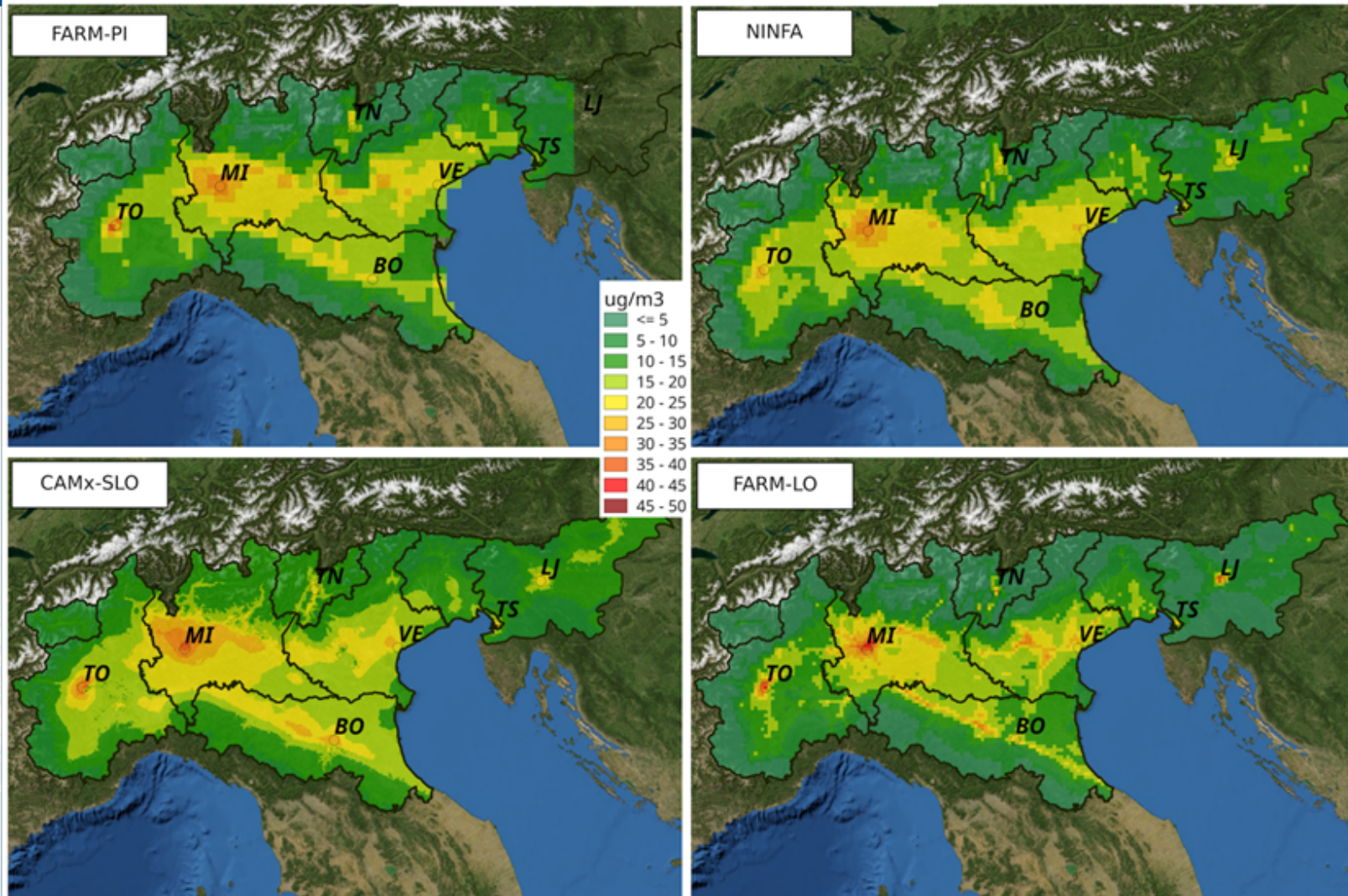
All the models show PM10 concentrations above the EU daily limit value for the flat area of the Po Valley

Annual 2020 average PM2.5 concentration



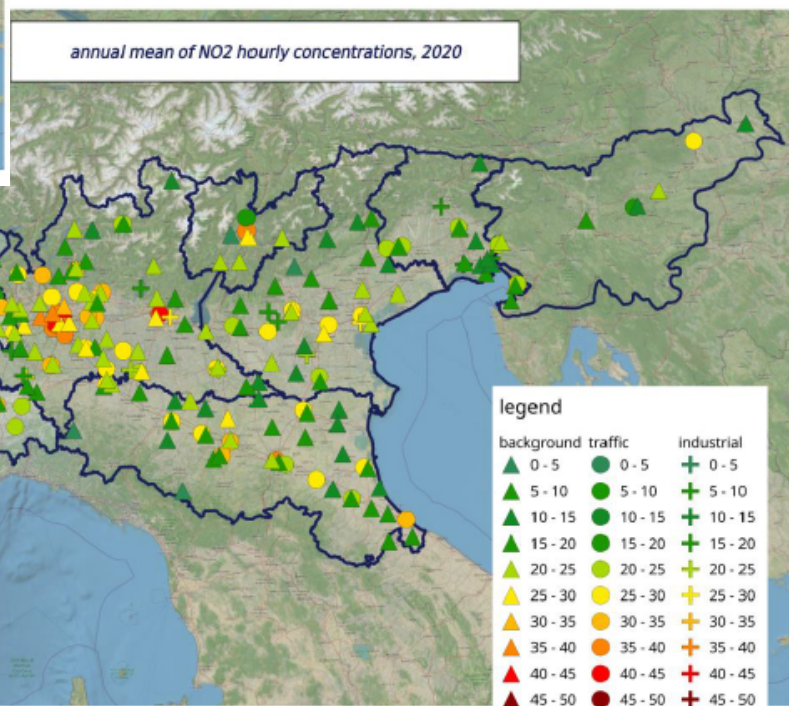
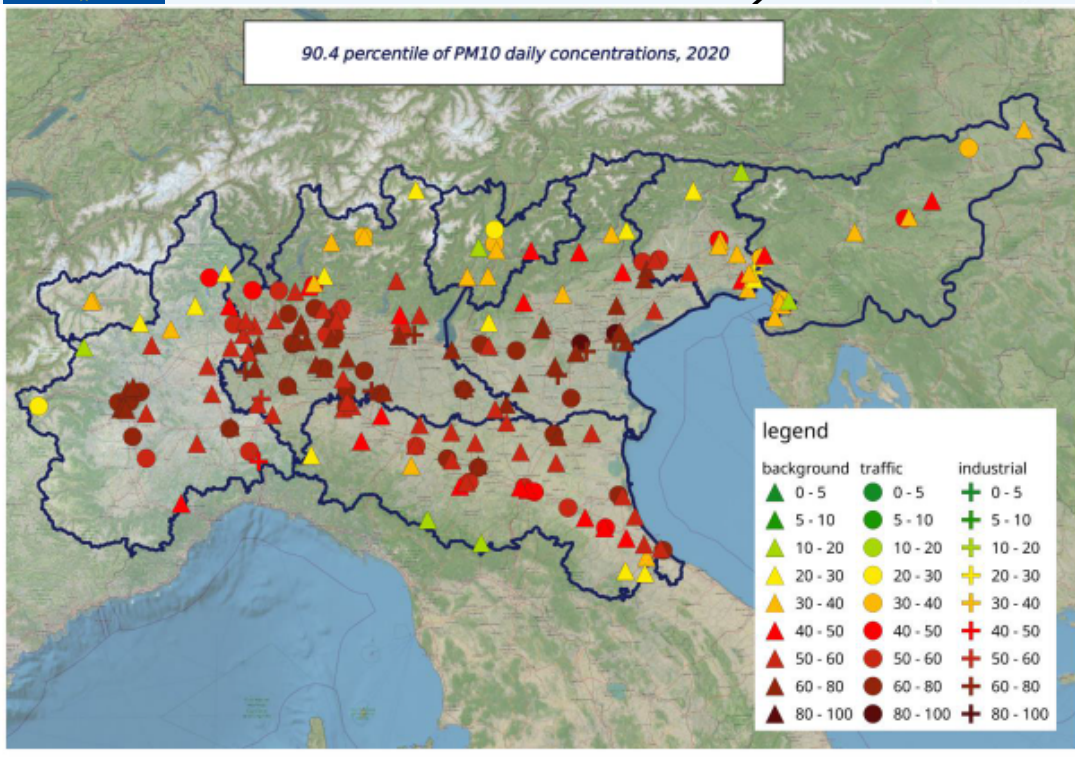
- The PM2.5 concentration is above the current EU annual limit value ($25 \mu\text{g}/\text{m}^3$) only in some small areas in Lombardia, Veneto and Slovenia
- All models estimate average annual values of PM2.5 above $20 \mu\text{g}/\text{m}^3$ in the flat area of Veneto, Lombardia and in northern area of Emilia-Romagna

Annual 2020 average NO₂ concentration



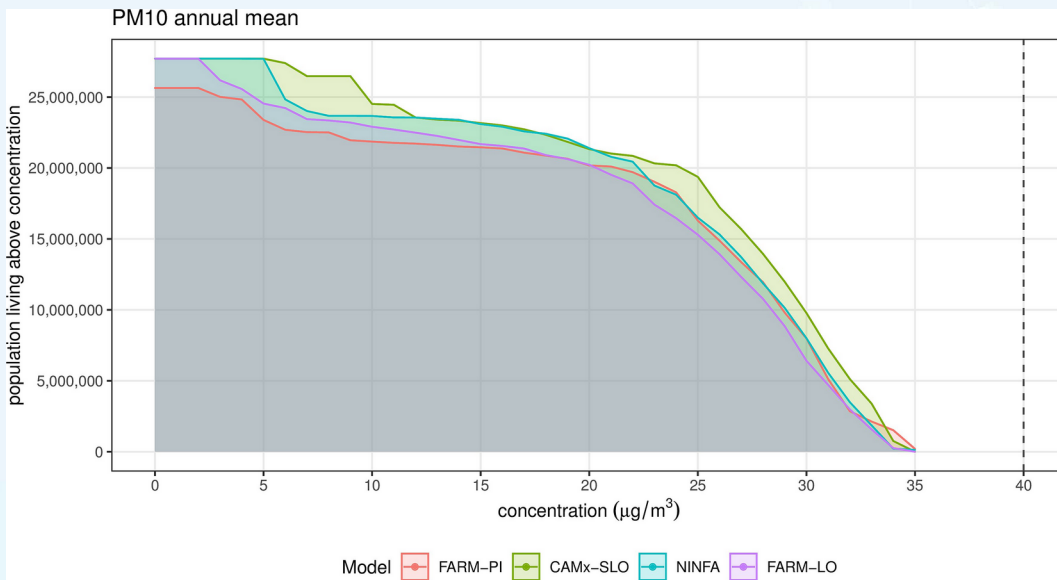
All the models identify the main urban agglomerations as areas with the highest values. Only one model estimates the annual mean of NO₂ concentration above the EU limit value in a very small area around Milan and Turin. The location of the main highways, in particular from the results of the ARPA LO and CAMx-SLO modelling systems are well highlighted

PM10 and NO₂ concentrations in 2020



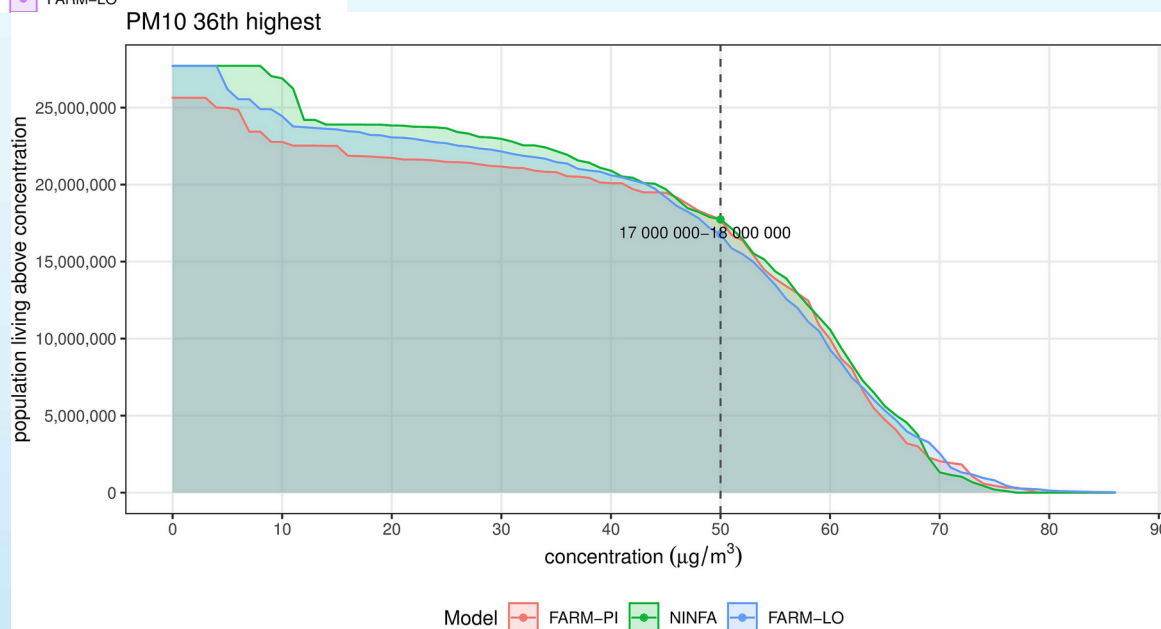
The modelling results are in good agreement with the data measured by the monitoring stations

Population exposure(1/2)



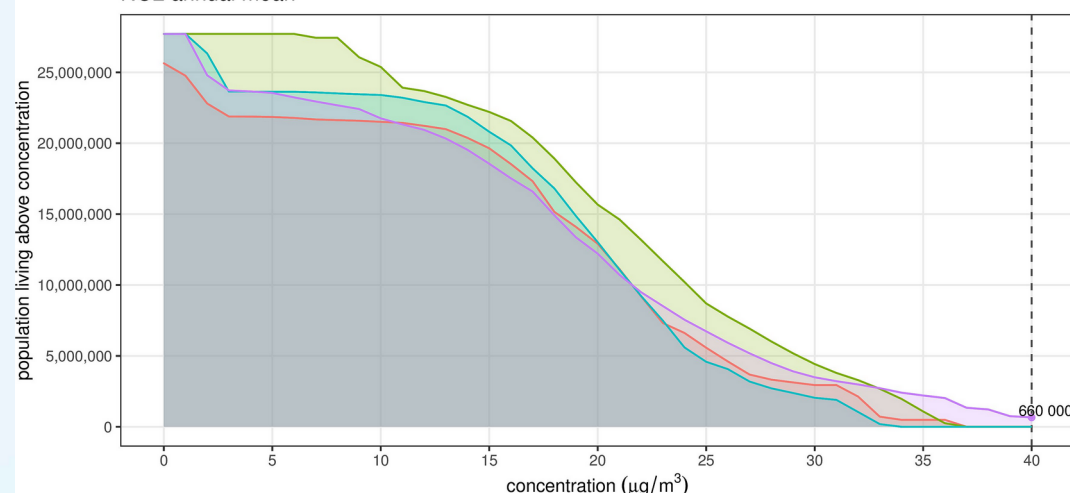
According to all models, in year 2020 no citizens were exposed to values above the threshold for the PM10 annual average

About seventeen millions of citizens were exposed to more than 35 daily PM10 exceedances in 2020



Population exposure (2/2)

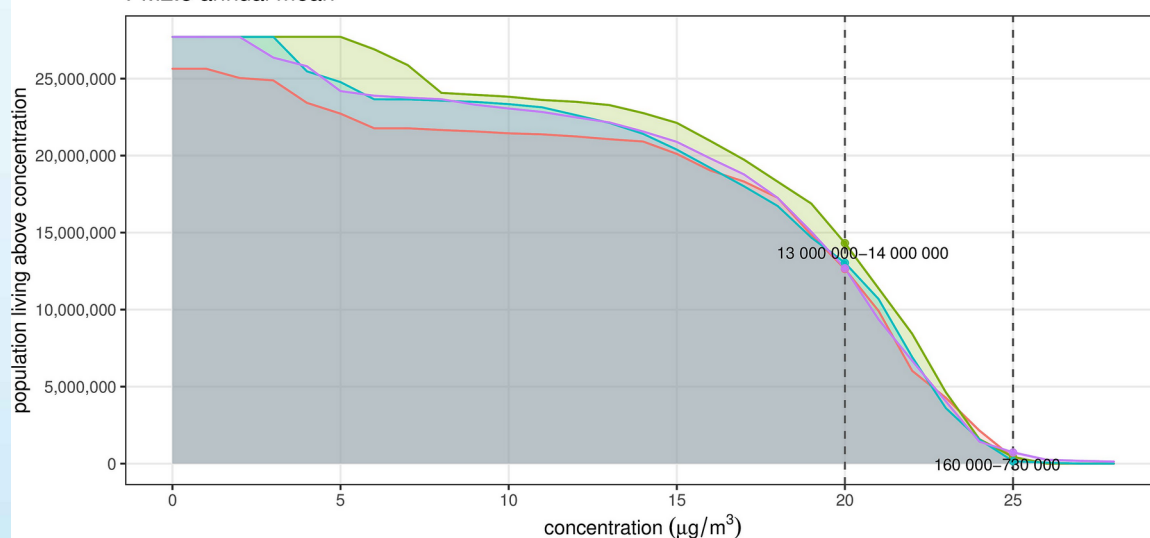
NO₂ annual mean



Model FARM-PI CAMx-SLO NINFA FARM-LO

Only one model estimates that there were inhabitants exposed to values above the threshold for the NO₂ annual average (about 650000 in Lombardia and Piemonte together). The other three models remain below the limits across their domain.

PM2.5 annual mean



Model FARM-PI CAMx-SLO NINFA FARM-LO

2-3% of population was exposed to average PM2.5 annual value above 25 µg/m³ while about 50% of population was exposed to average annual values of PM2.5 above 20 µg/m³

AQ Limit:WHO 2005,2021, AAQ EU 2008

Livelli raccomandati dall'OMS nelle Linee Guida del 2021 rispetto a quelle del 2005 e ai valori limite dell'Unione Europea (Dir. 2008/50/CE)

Inquinante	Intervallo medio	Linee Guida 2005	Linee Guida 2021	Direttiva 2008/50/CE
PM _{2.5} , µg/m ³	Anno civile	10	5	25
	24 ore ^a	25	15	--
PM ₁₀ , µg/m ³	Anno civile	20	15	40
	24 ore ^a	50	45	50, da non superare più di 35 volte per anno civile
O ₃ , µg/m ³	Periodo estivo ^b	--	60	--
	8 ore ^a	100	100	--
NO ₂ , µg/m ³	Anno civile	40	10	40
	24 ore ^a	--	25	--
SO ₂ , µg/m ³	24 ore ^a	20	40	125, da non superare più di 3 volte per anno civile
CO, µg/m ³	24 ore ^a	--	4	--

µg = microgrammi

^a = 90 percentile (es. 3/4 giorni di superamento all'anno).

^b = media della concentrazione media massima giornaliera di O₃ su 8 ore nei sei mesi consecutivi con la più alta concentrazione media semestrale di O₃.

Nota: all'anno civile e al periodo estivo corrisponde un'esposizione a lungo termine, mentre alle 24 ore e alle 8 ore un'esposizione a breve termine.

Conclusions

This first assessment provides a synthetic view on the state of air quality in Po Valley and Slovenia for year 2020. The model simulations and monitoring data are collected every day in **Prepair** data platform

Although the four CTM systems used have different setup (ctm models, resolution, boundary condition, meteorological data and data fusion technique), the outputs are very similar to each other showing the reliability of the assessment.

Almost everywhere the PM₁₀, NO₂ and PM_{2.5} current annual EU limits are respected while more than 50% of citizens live in areas above the EU limit for daily PM₁₀ concentration”

If the new limits proposed by the WHO will be applied only some areas in Apennines, Alps and Slovenia would have the chance to respect these limit values. Further analysis will be done to assess what actions need to be taken to comply with them



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Thank you

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