

LA DIRECTIVA (UE) 2024/2881 DES D'UNA MIRADA AMBIENTAL I DE GESTIÓ PÚBLICA

24 Abril 2026

Com implementar la Directiva 2024/2881

X. Querol¹, J. Massagué², R. Lara¹, C. Reche¹, I. González de Castro¹, A. Alastuey¹, M. Hervás³, R. Javato³, M.J. Cornide³, M. Viana⁴, J. Caballero⁴, D. Cáceres⁴

¹IDAEA-CSIC, Barcelona; ²BSC-CNS, Barcelona,
³INYPSA, Madrid, ⁴MITERD, Madrid

xavier.querol@idaea.csic.es



Amb el suport de:



VICEPRESIDENCIA
TERCERA DEL GOBIERNO

MINISTERIO
PARA LA TRANSICIÓN ECOLÓGICA
Y EL RETO DEMOGRÁFICO

Com es millora la qualitat de l'aire a Europa?

THEMATIC STRATEGY

2008, 2013 (2024)

Emissions levels

new standards

emission sources (natural, anthropogenic..)

Control measures

standards

primary pollutants (SO_2 , NO_x , HC, PM,...)

2005-2010

2030

meteorology, dispersion, transport,...

chemical transformation (secondary pollutants: O_3 , PAN, HNO_3 , H_2SO_4)

minimization strategies

measuring (concentration and meteorology)

Levels in ambient air

target levels

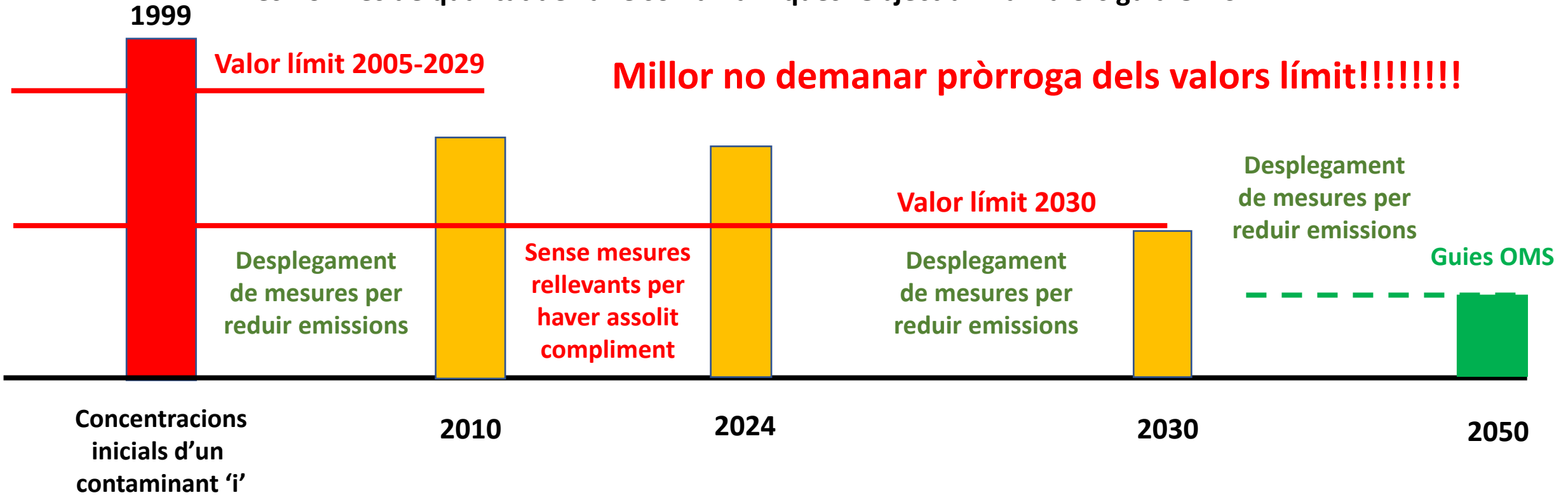
new standards

Local and global effects
Impact on receptors, epidemiology

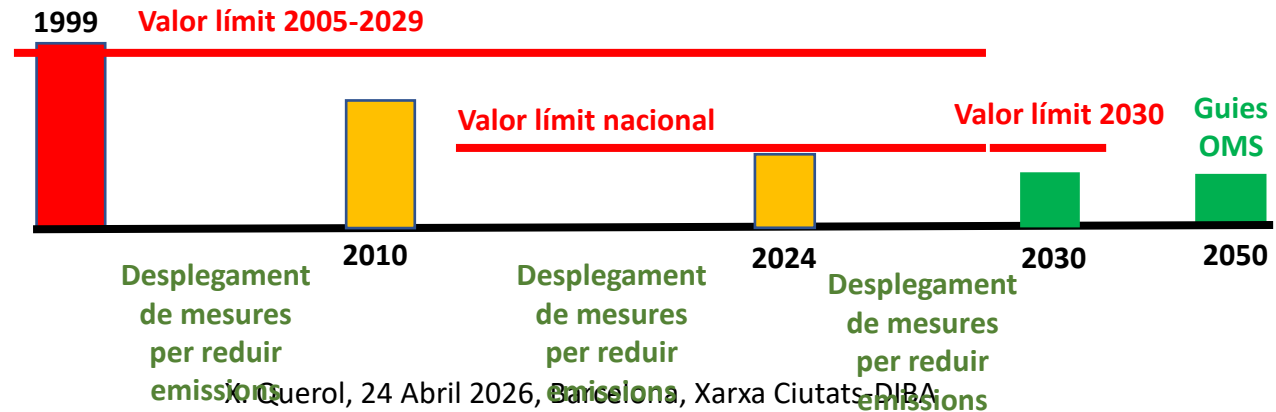
Modelling and integrated assessment

Perquè és important tenir valors límit estrictes?

Les normes de qualitat de l'aire són dinàmiques: Objectiu final valors guia OMS



Estrategia de societats més compromeses



Perquè és important tenir valors límit estrictes?

Emission

ENVIRONMENTAL STANDARDS FOR AIR QUALITY

DIRECTIVES

1996/61/EC, 2008/1/EC, 2010/75/EC

2002/51/EC, 2006/120/EC

1998/69/EC, 2002/80/EC, 2007/715/EC

2001/80/CE

2016/2284/EU

EU 2015/2193

- IPPC Integrated Prevention and Pollution Control, substituted by the Industrial Emissions Directive (IED)
- EURO standards for vehicles

- Large Combustion Plants
- National Emission Ceilings
- Medium scale combustion plants

Ambient air

NEW EU AIR QUALITY DIRECTIVE 2024/2881 WITH LIMIT VALUES FOR

MOTHER DIRECTIVE

20230, EVEN WHEN WHO (REVIHAAP+HRAPIE PROJECTS) IN 2013

1996/62/CE

RECOMMENDED CHANGING LIMIT & TARGET VALUES

Directive 1999/30/EC	• SO ₂ , NO ₂ , NO _x , PM ₁₀ , Pb (PM _{2.5} ??)
Directive 2000/69/EC	• benzene, CO
Directive 2002/03/EC	• O ₃
Directive 2004/107/EC	• PAH, Cd, As, Ni, Hg

(PM2.5) → Directive Clean Air for Europe and Air Quality, 2008/50/EC & 2004/107/EC

NEW DIRECTIVE 2024/2881

Deadlines: 2005-2010, 2015

2030

RD, 102/2011 (RD 39/2017) (Spanish legislation)

Perquè és important tenir valors límit estrictes?

GUIDELINES WHO (2005 & 2021)

	2008/50/EC & 2004/107/EC RD 102/2011*	OMS (2005) Guidelines**		OMS (2021) Guidelines	New Directive 2024/2881 (2030)
Hourly	350* $\mu\text{g}/\text{m}^3$ SO ₂	500 $\mu\text{g}/\text{m}^3$ SO ₂	*24 h/yr		350 $\mu\text{g}/\text{m}^3$ (1 d/yr)
Daily	125* $\mu\text{g}/\text{m}^3$ SO ₂	20 $\mu\text{g}/\text{m}^3$ SO ₂	*3 d/yr	40 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$ (18 d/yr)
Hourly	200 $\mu\text{g}/\text{m}^3$ NO ₂	CE-OMS coincide	18 h/yr		200 $\mu\text{g}/\text{m}^3$ (0 h/yr)
Daily					50 $\mu\text{g}/\text{m}^3$ NO ₂
Annual	40 $\mu\text{g}/\text{m}^3$ NO ₂	CE-OMS coincide	not exceed.	10 $\mu\text{g}/\text{m}^3$	20 $\mu\text{g}/\text{m}^3$ ALV, 50 $\mu\text{g}/\text{m}^3$ DLV
Annual	5 $\mu\text{g}/\text{m}^3$ C ₆ H ₆	CE-OMS coincide	not exceed.		3.4 $\mu\text{g}/\text{m}^3$
MD8h	10 mg/m ³ CO	CE-OMS coincide	not exceed.		10 mg/m ³ (MD8h) 4 mg/m ³ DLV
Annual	500 ng/m ³ Pb	CE-OMS coincide	not exceed.		No changes
Annual	40 $\mu\text{g}/\text{m}^3$ PM10	20 $\mu\text{g}/\text{m}^3$ PM10	not exceed.	15 $\mu\text{g}/\text{m}^3$	20 $\mu\text{g}/\text{m}^3$
Annual	25 $\mu\text{g}/\text{m}^3$ PM2.5	10 $\mu\text{g}/\text{m}^3$ PM2.5	not exceed.	5 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$
Daily	50* $\mu\text{g}/\text{m}^3$ PM10	50** $\mu\text{g}/\text{m}^3$ PM10	** 3 o *35 d/yr	45 $\mu\text{g}/\text{m}^3$	45 $\mu\text{g}/\text{m}^3$ (18 d/yr)
Daily				15 $\mu\text{g}/\text{m}^3$ PM2.5 3 d/yr	25 $\mu\text{g}/\text{m}^3$ (18 d/yr)
MD8h mean 3 years	120 $\mu\text{g}/\text{m}^3$ O ₃	100 $\mu\text{g}/\text{m}^3$ O ₃	25 d/yr	100 $\mu\text{g}/\text{m}^3$	120 $\mu\text{g}/\text{m}^3$ (3 d/yr)
Annual	1 ng/m ³ BaP	0.12 ng/m ³ BaP	not exceed.	0.12 $\mu\text{g}/\text{m}^3$	Limit value!!!

Reaccions judicials més ràpides i contundents per sancionar incompliments 

Perquè és important tenir valors límit estrictes?

29. 6. 1999

EN

Official Journal of the European Communities

L 163/49

1999/30/CE PM10 standards

ANNEX III

LIMIT VALUES FOR PARTICULATE MATTER (PM₁₀)

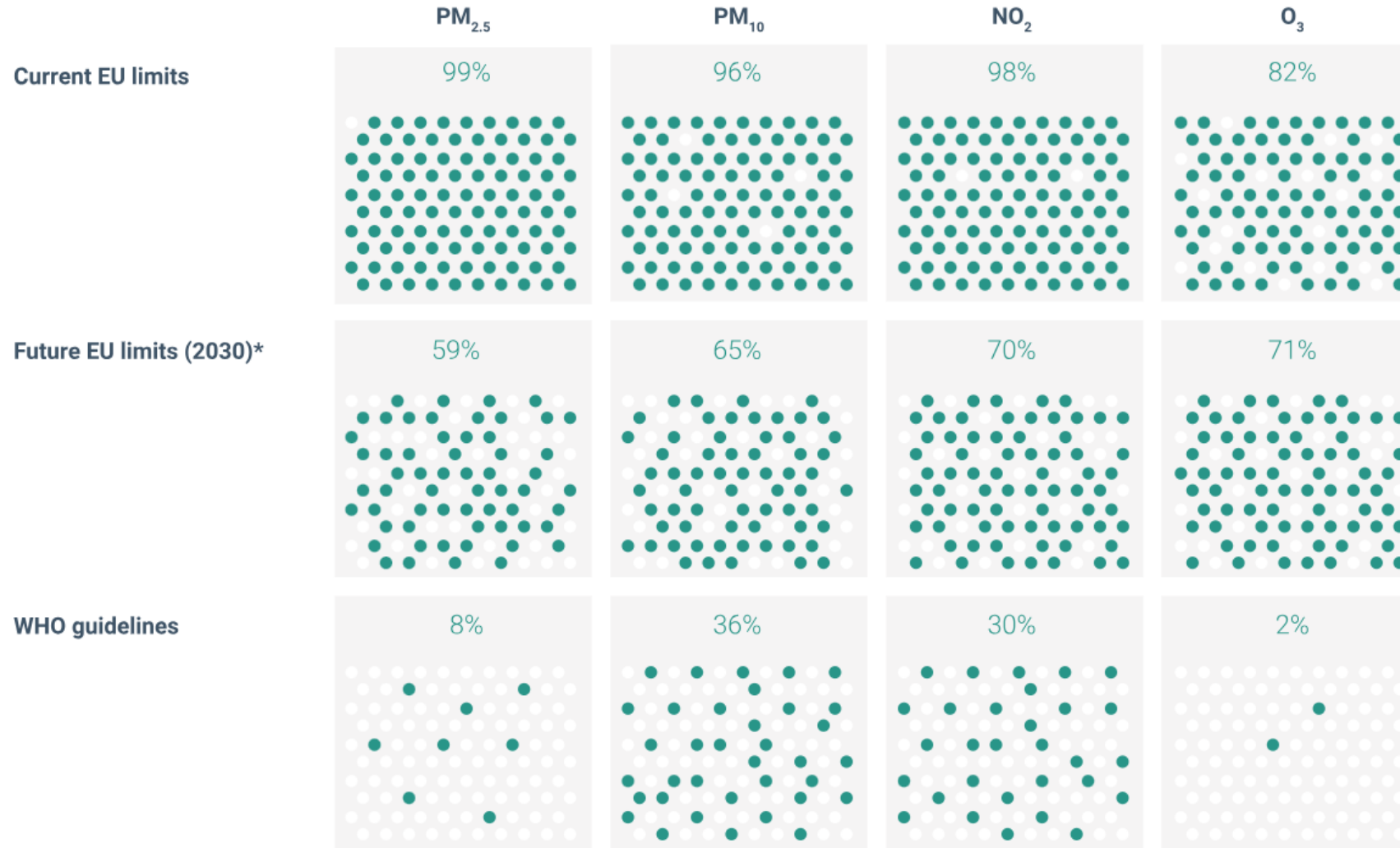
	Averaging period	Limit value	Margin of tolerance	Date by which limit value is to be met
STAGE 1				
1. 24-hour limit value for the protection of human health	24 hours	50 µg/m ³ PM ₁₀ , not to be exceeded more than 35 times a calendar year	50 % on the entry into force of this Directive, reducing on 1 January 2001 and every 12 months thereafter by equal annual percentages to reach 0 % by 1 January 2005	1 January 2005
2. Annual limit value for the protection of human health	Calendar year	40 µg/m ³ PM ₁₀	20 % on the entry into force of this Directive, reducing on 1 January 2001 and every 12 months thereafter by equal annual percentages to reach 0 % by 1 January 2005	1 January 2005
STAGE 2 (*)				
1. 24-hour limit value for the protection of human health	24 hours	50 µg/m ³ PM ₁₀ , not to be exceeded more than 7 times a calendar year	To be derived from data and to be equivalent to the Stage 1 limit value	1 January 2010
2. Annual limit value for the protection of human health	Calendar year	20 µg/m ³ PM ₁₀	50 % on 1 January 2005 reducing every 12 months thereafter by equal annual percentages to reach 0 % by 1 January 2010	1 January 2010
(*) Indicate limit values to be reviewed in the light of further information on health and environmental effects, technical feasibility and experience in the application of Stage 1 limit values in the Member States.				

By 2010 adopting WHO guidelines

Discarded by 2008/50/CE & postponed to 2013 when the 2008/50/CE would have been reviewed

Discarded by the Clean Air Quality package in 2014 & postponed to 2024 (2030) by 2024/2881

Perquè és important tenir valors límit estrictes?



2023

European Environment Agency



Air quality in Europe 2025
April 2025

*The 2030 limit values are presented for comparative purposes only to show the distance to target to achieve these limits by 2030.

<https://www.eea.europa.eu/en/analysis/publications/air-quality-status-report-2025>

X. Querol, 24 Abril 2026, Barcelona, Xarxa Ciutats-DIBA

Perquè és important tenir valors límit estrictes?

Country	Total population	Population above 30 years old (1,000)	PM _{2.5}			NO ₂			Population above 25 years old (1,000)	O ₃		
			Annual mean (µg/m ³)	Attributable deaths		Annual mean (µg/m ³)	Attributable deaths			Peak season (µg/m ³)	Attributable deaths	
				Nr	Nr/10 ⁵		Nr	Nr/10 ⁵			Nr	Nr/10 ⁵
Austria	8,979	6,159	10.1	3,300	53	13.8	780	12	6,750	96.6	1,400	21
Belgium	11,617	7,625	10.1	4,100	54	15.6	1,200	16	8,356	88.4	1,400	16
Bulgaria	6,839	4,975	15.0	9,000	180	15.6	1,500	29	5,287	77.1	930	17
Croatia	3,862	2,699	14.6	3,800	141	13.2	450	16	2,914	101.0	980	33
Cyprus	1,253	799	14.8	690	86	23.9	260	33	903	91.4	140	15
Czechia	10,517	7,270	13.1	6,900	94	12.7	730	10	7,843	95.4	1,800	22
Denmark	5,873	3,802	7.8	1,200	31	7.4	50	1	4,208	80.0	540	12
Estonia	1,332	913	5.6	90	9	7.2	20	1	985	77.1	130	12
Finland	5,548	3,739	4.4	70	1	7.3	50	1	4,088	75.6	440	10
France	65,795	42,817	9.5	20,700	48	12.7	5,000	11	46,453	92.8	9,000	19
Germany	83,235	58,386	9.2	32,600	55	14.3	9,400	16	63,279	93.5	15,200	24
Greece	10,460	7,450	15.8	10,700	144	17.6	2,200	29	7,980	95.0	2,300	28
Hungary	9,689	6,668	13.8	8,600	128	14.5	1,300	19	7,274	96.5	2,000	27
Ireland	5,060	3,121	7.1	530	16	9.1	100	3	3,417	76.7	240	7
Italy	59,030	42,749	14.6	48,600	113	16.5	9,600	22	45,750	103.7	13,600	29
Latvia	1,876	1,303	8.7	820	63	9.9	120	9	1,400	77.3	220	15
Lithuania	2,806	1,958	9.8	1,500	75	10.9	180	9	2,120	77.8	320	14
Luxembourg	645	422	7.4	80	17	13.6	30	7	471	90.8	50	11
Malta	521	357	10.7	170	48	11.4	20	4	401	96.0	60	15
Netherlands	17,590	11,585	9.3	5,300	45	16.0	1,900	16	12,720	85.7	1,800	14
Poland	36,889	25,362	16.1	34,700	136	13.0	3,100	12	27,573	88.2	5,400	19
Portugal	9,848	7,041	9.3	3,600	51	11.7	710	10	7,556	88.4	1,400	18
Romania	19,042	13,001	14.3	17,900	138	16.7	3,600	27	13,960	85.3	2,800	19
Slovakia	5,435	3,695	13.9	3,700	100	11.8	260	7	4,026	93.9	700	17
Slovenia	2,107	1,481	13.5	1,300	86	12.5	140	9	1,592	99.9	340	21
Spain	45,261	31,845	10.9	18,500	58	15.9	5,500	17	34,245	92.5	6,100	17
Sweden	10,452	6,752	5.2	480	7	6.8	60	-	7,444	78.4	740	9
Albania	2,794	1,722	15.8	3,500	200	12.4	310	17	1,951	95.1	680	34
Andorra	80	52	7.8	20	28	14.3	10	11	56	82.7	10	10
Bosnia and Herzegovina	3,464	2,404	21.1	6,200	258	12.9	460	18	2,609	98.4	920	35
Iceland	376	227	3.6	<5	<1	8.4	<5	<1	258	78.3	20	7
Kosovo under UNSCR 1244/99	1,805	933	16.5	2,400	254	13.6	240	25	1,073	85.7	320	29
Liechtenstein	39	27	8.4	10	25	13.6	<5	7	30	98.5	<5	13
Monaco	38	25	10.2	10	52	17.3	<5	16	27	106.5	10	22
Montenegro	618	391	15.1	710	182	11.3	50	13	430	92.7	140	32
North Macedonia	1,837	1,197	22.8	3,600	303	15.7	330	27	1,313	76.7	210	16
Norway	5,425	3,489	5.4	350	9	7.7	80	2	3,856	79.2	380	9
San Marino	34	24	13.8	30	102	12.8	<5	8	26	97.3	10	19
Serbia	6,797	4,717	19.1	10,800	228	16.2	1,400	30	5,119	94.2	1,500	30
Switzerland	8,739	5,968	8.6	1,900	31	14.1	610	10	6,524	100.2	1,200	19
Türkiye (TR)	84,668	46,247	-	-	-	25.1	13,900	30	52,723	84.8	5,800	10
EU27	441,561	303,974	11.4	239,000	78	14.1	48,000	15	328,995	92.2	70,000	21
EEA32 (no TR)	456,140	313,686	11.2	241,000	76	-	-	-	-	-	-	-
EEA32	540,809	359,933	-	-	-	15.8	63,000	17	392,386	91.0	78,000	19
All countries (no TR)	473,606	325,150	11.5	269,000	82	-	-	-	-	-	-	-
All countries	558,275	371,398	-	-	-	15.7	66,000	17	404,992	91.1	81,000	20

All-cause mortality 2023, EU-27

<https://www.eea.europa.eu/en/analysis/publications/harm-to-human-health-from-air-pollution-burden-of-disease-status-2025>

Premature mortality from all natural causes (i.e. excluding accidental and other non-natural causes), which are attributable to long-term exposure to key air pollutants.

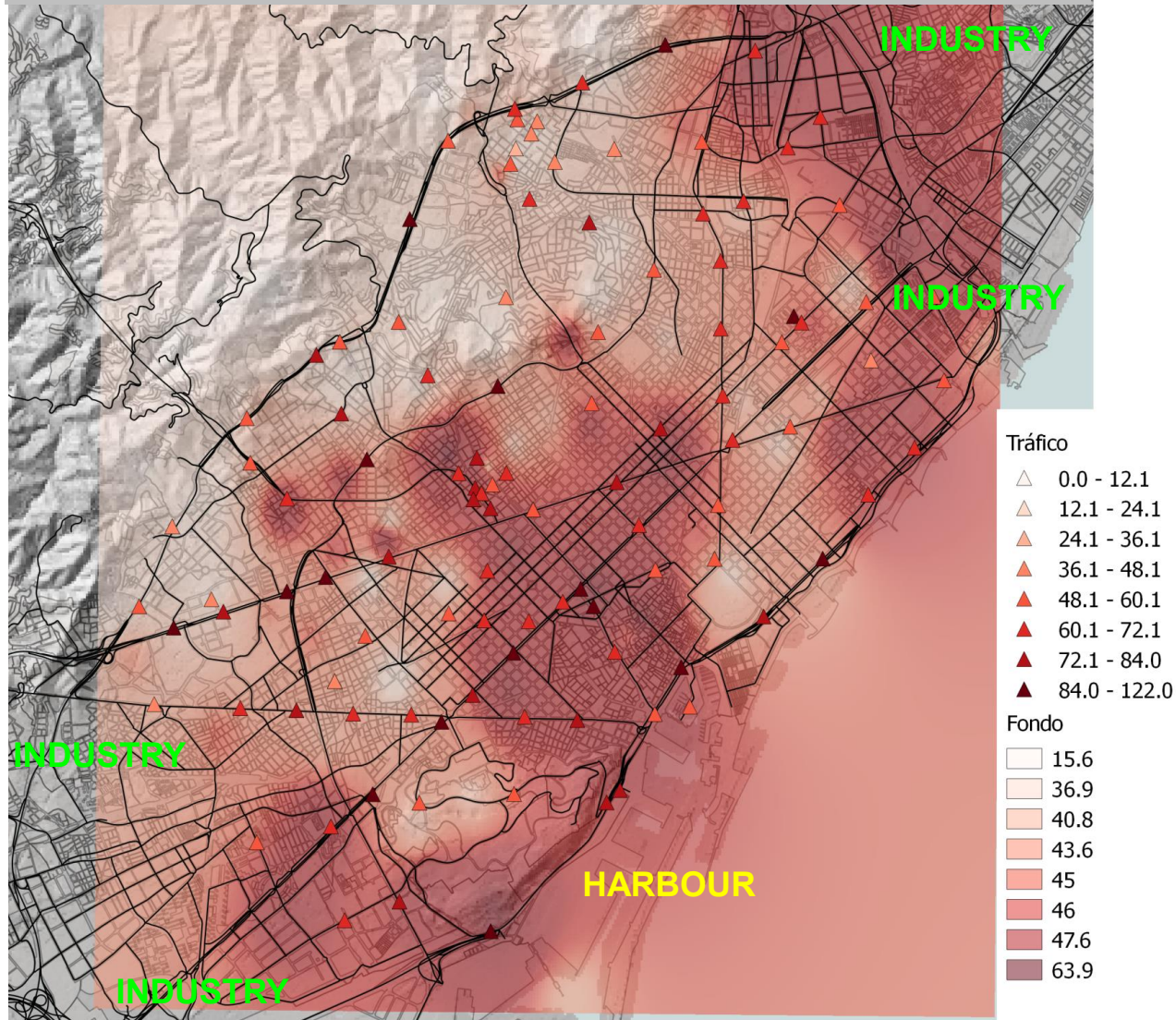
In 2023 in the EU-27:

- 182,000 deaths were attributable to exposure to PM_{2.5} concentrations above the WHO guideline level of 5µg/m³.
- 63,000 deaths (95% CI: 0-137,000) were attributable to exposure to O₃ concentrations above the WHO guideline level of 60µg/m³.
- 34,000 deaths (95% CI: 24,000-95,000) were attributable to exposure to NO₂ concentrations above the WHO guideline level of 10µg/m³.

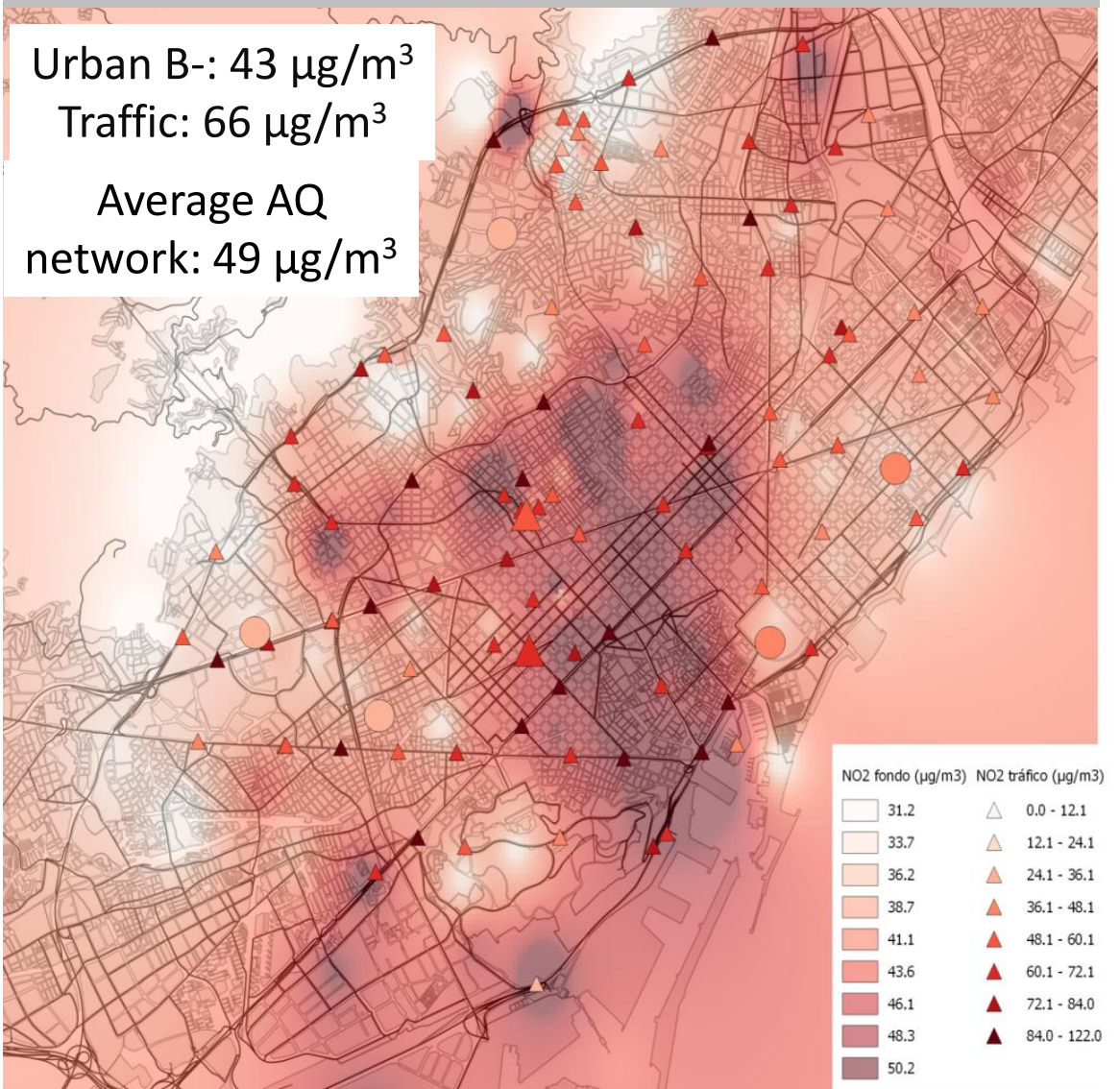
*Harm to human health from air pollution in Europe: burden of disease status, 2024
December 2025*

El problema del NO₂

NO₂ FEBRUARY-MARCH 2017, 225 PASSIVE DOSIMETERS

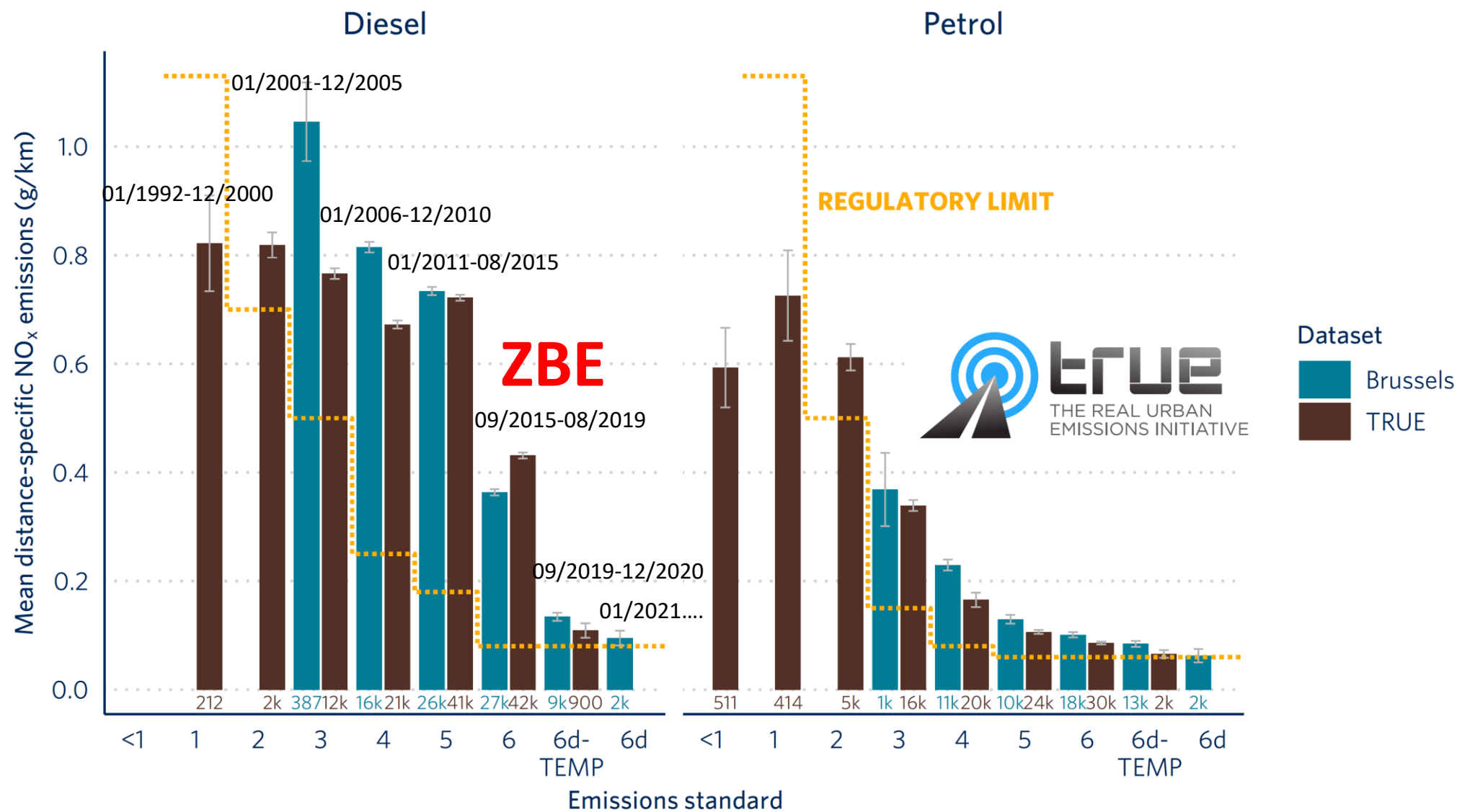


NO₂ JUNE 2018, 233 PASSIVE DOSIMETERS



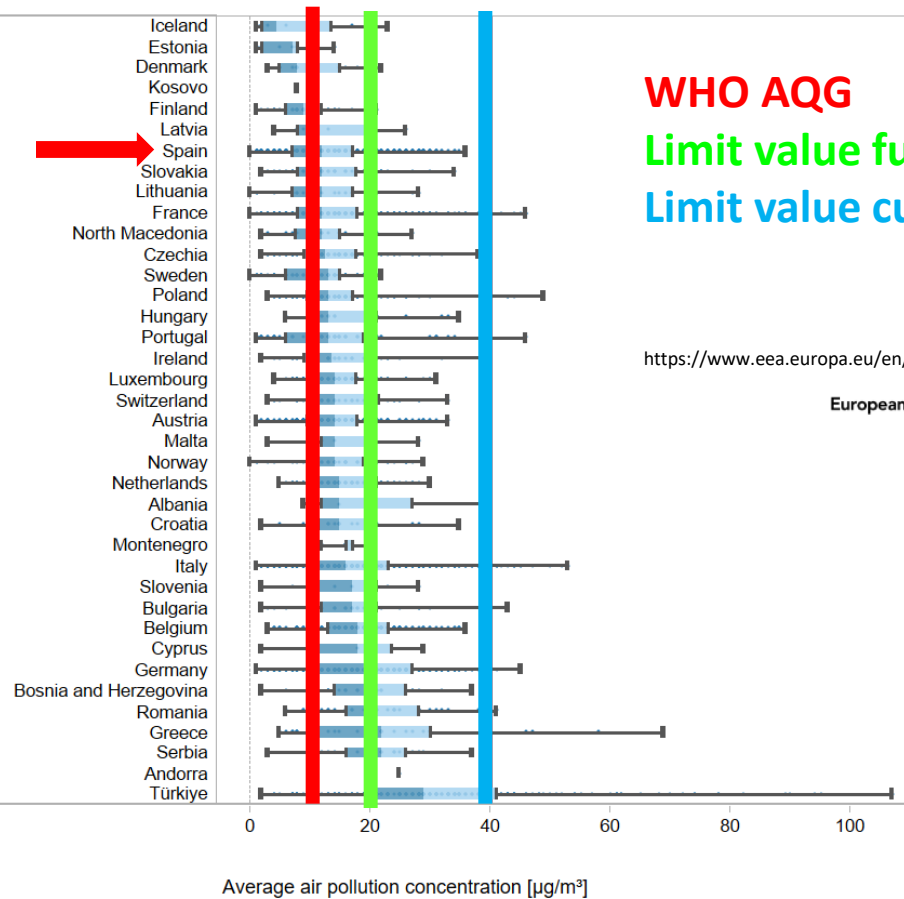
El problema del NO₂

<https://www.trueinitiative.org/media/792040/true-brussels-report.pdf>



El problema del NO₂

2023
Annual Limit Value for NO₂



WHO AQG

Limit value future EU AQ Directive

Limit value current EU AQ Directive

<https://www.eea.europa.eu/en/analysis/publications/air-quality-status-report-2025>

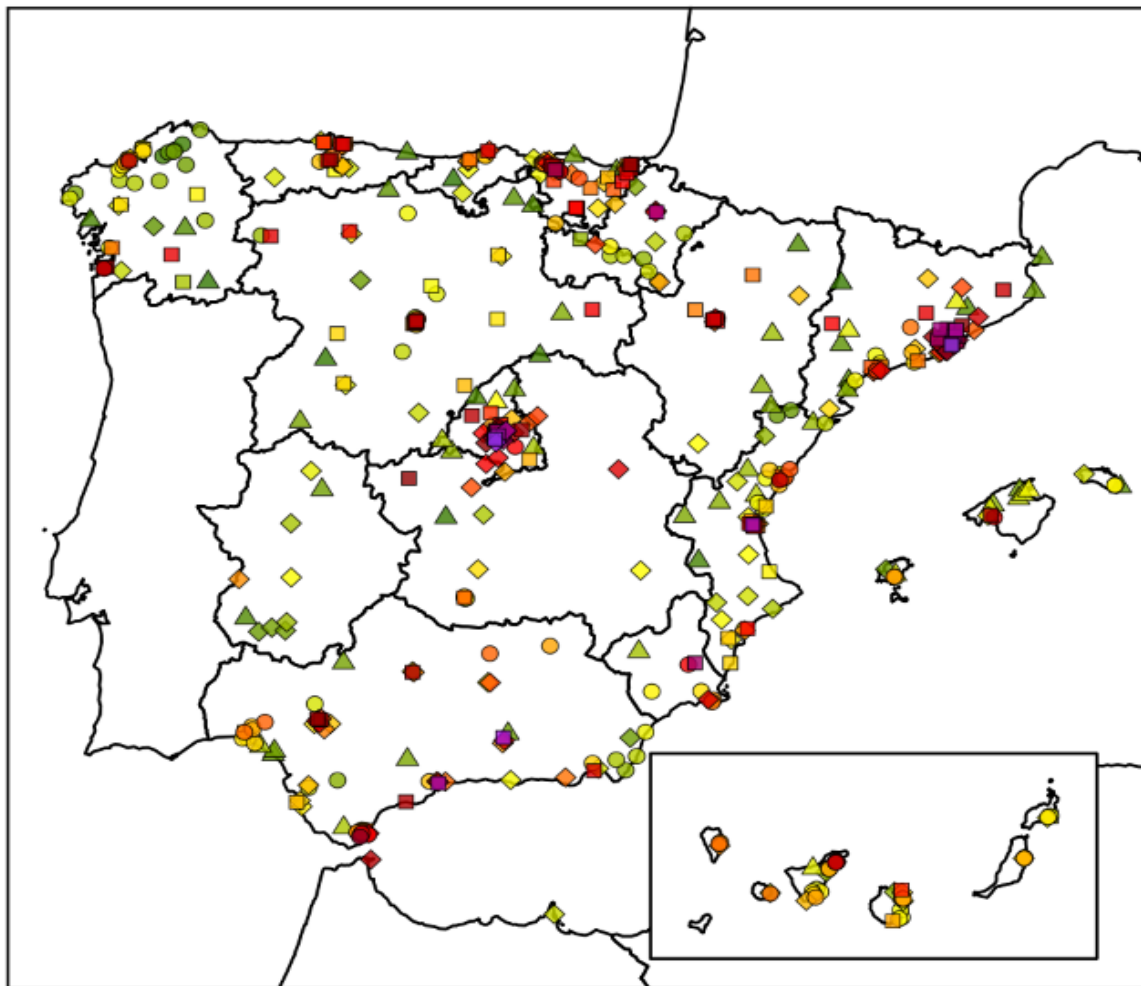
European Environment Agency



9th April 2025

El problema del NO₂

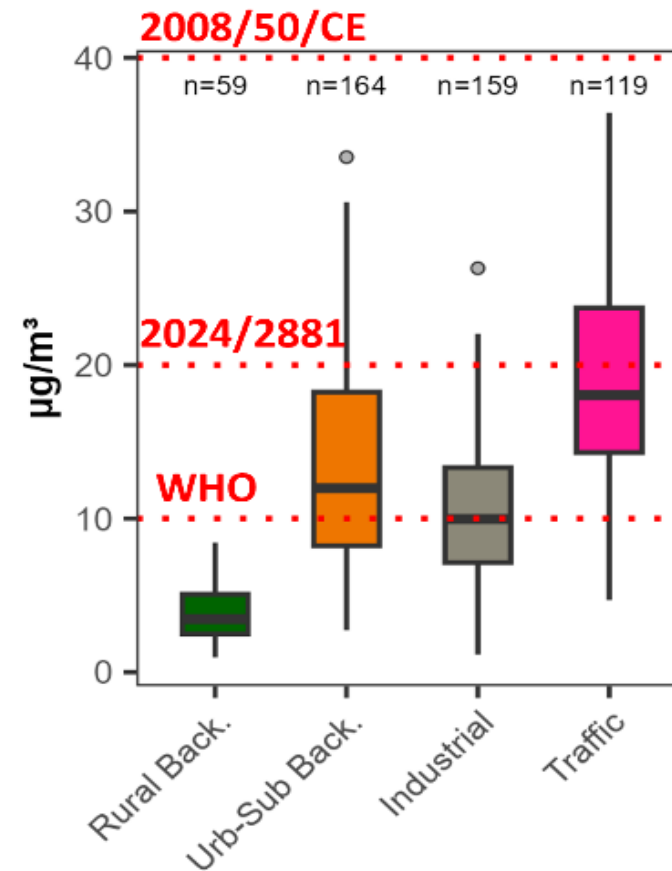
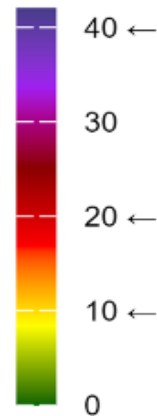
NO₂ Annual Avg. 2022-2024



Station Class

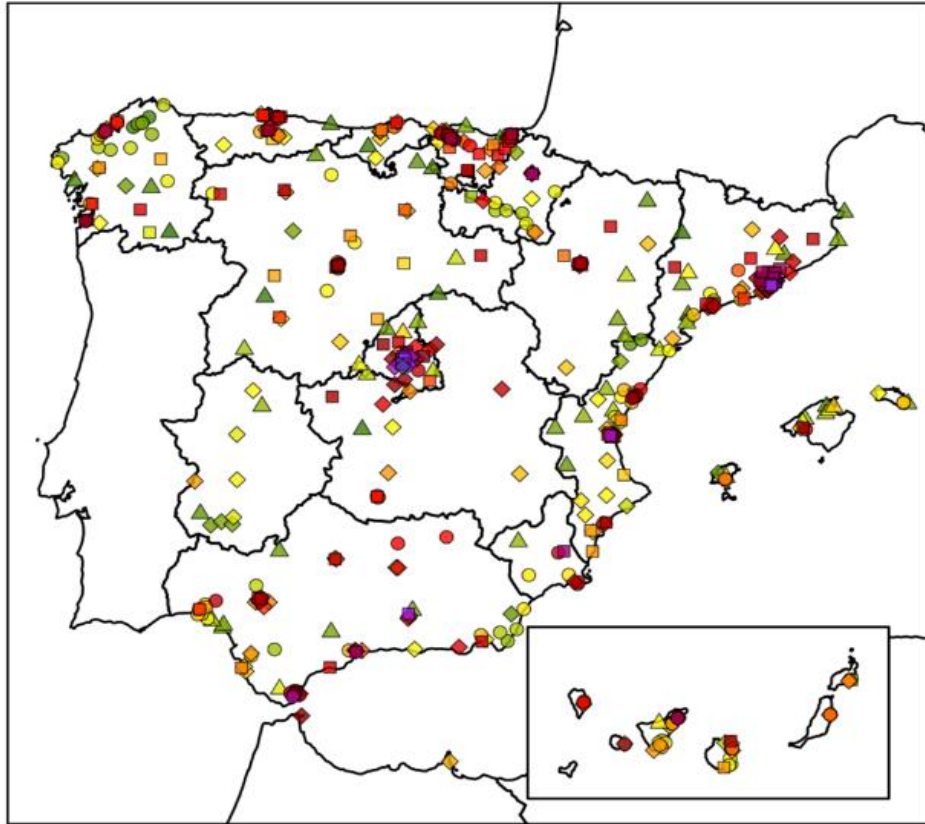
- Industrial
- △ Rural Back.
- Traffic
- ◇ Urb-Sub Back.

µg/m³



El problema del NO₂

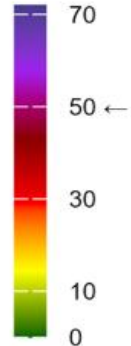
NO₂ daily p95 2022-2024



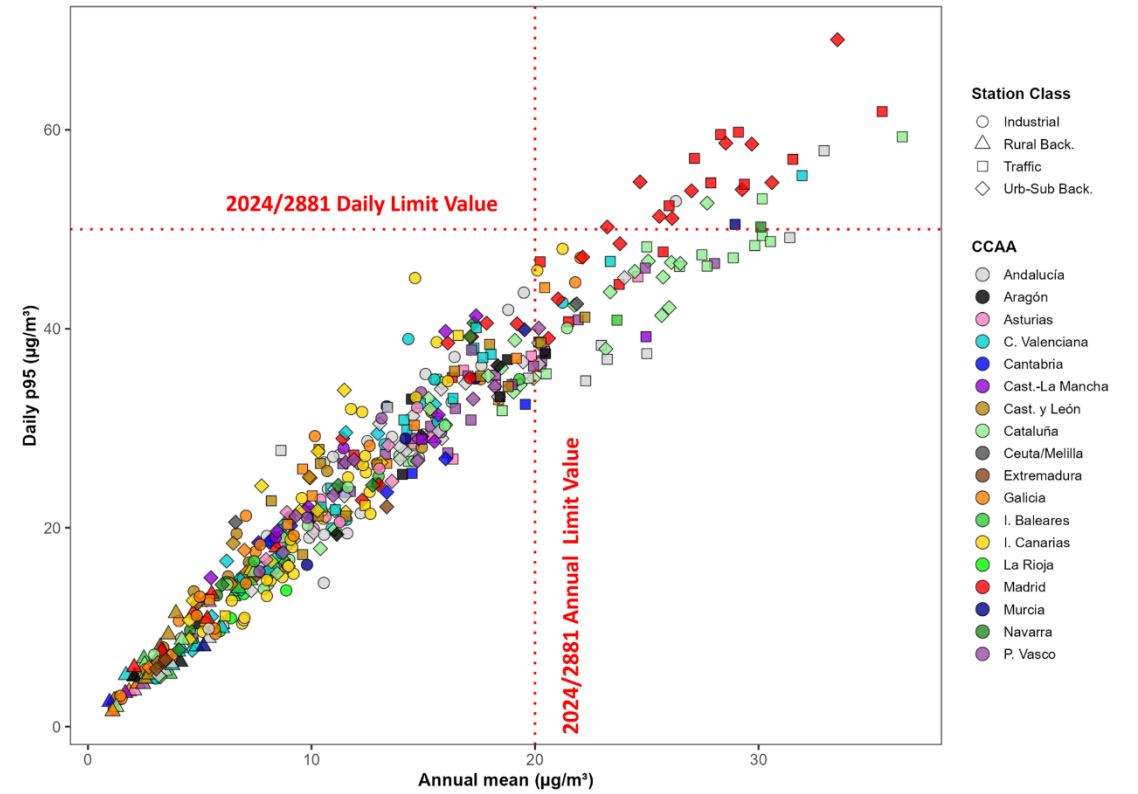
Station Class

- Industrial
- △ Rural Back.
- Traffic
- ◇ Urb-Sub Back.

µg/m³

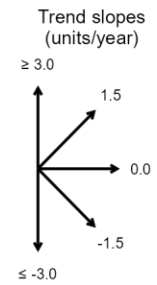
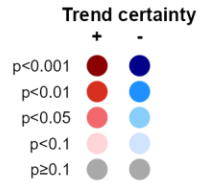
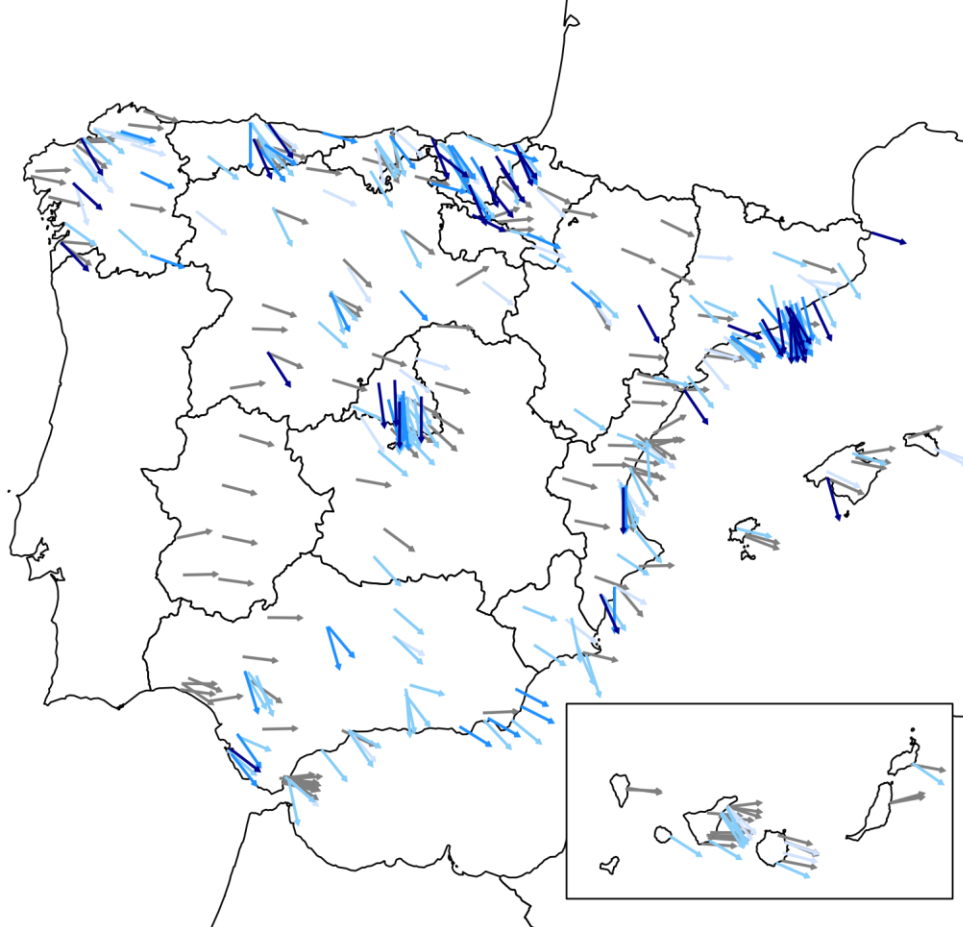


NO₂ - 2022-2024

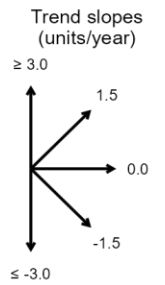
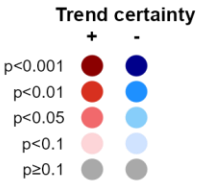
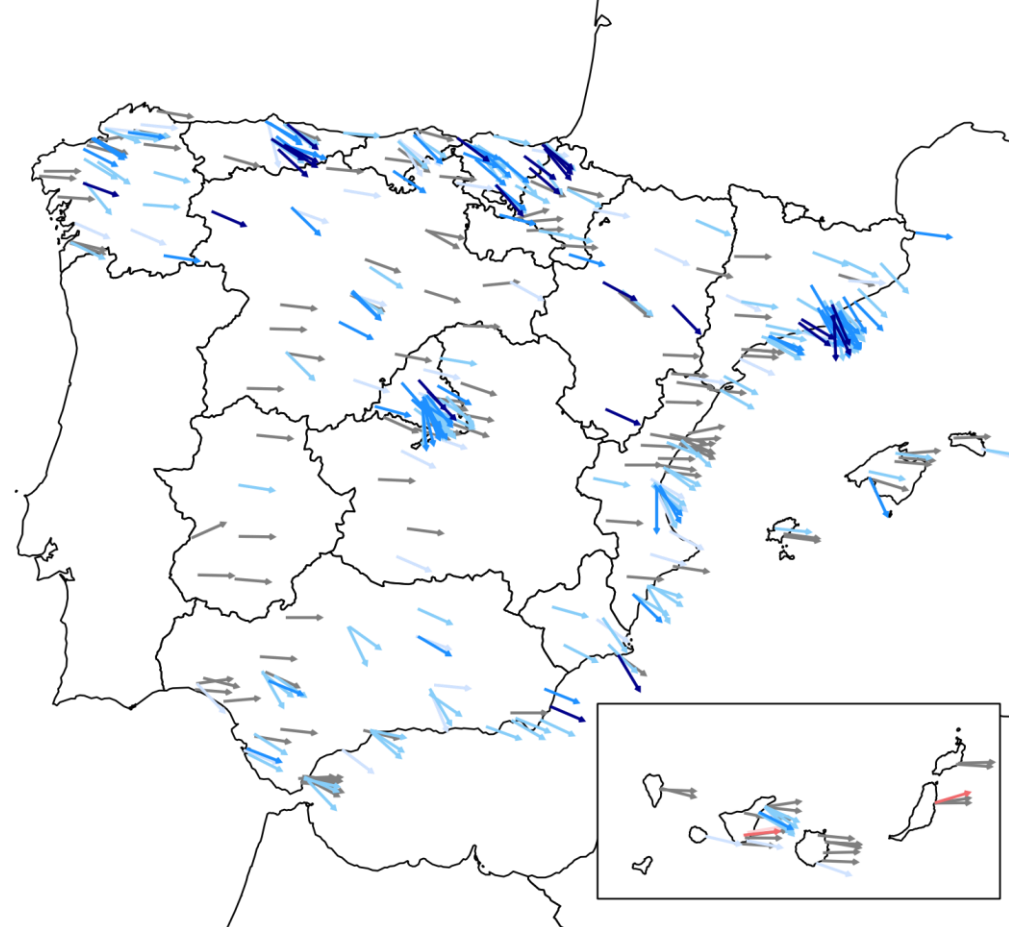


El problema del NO₂

NO₂ - p95 (2014-2024)

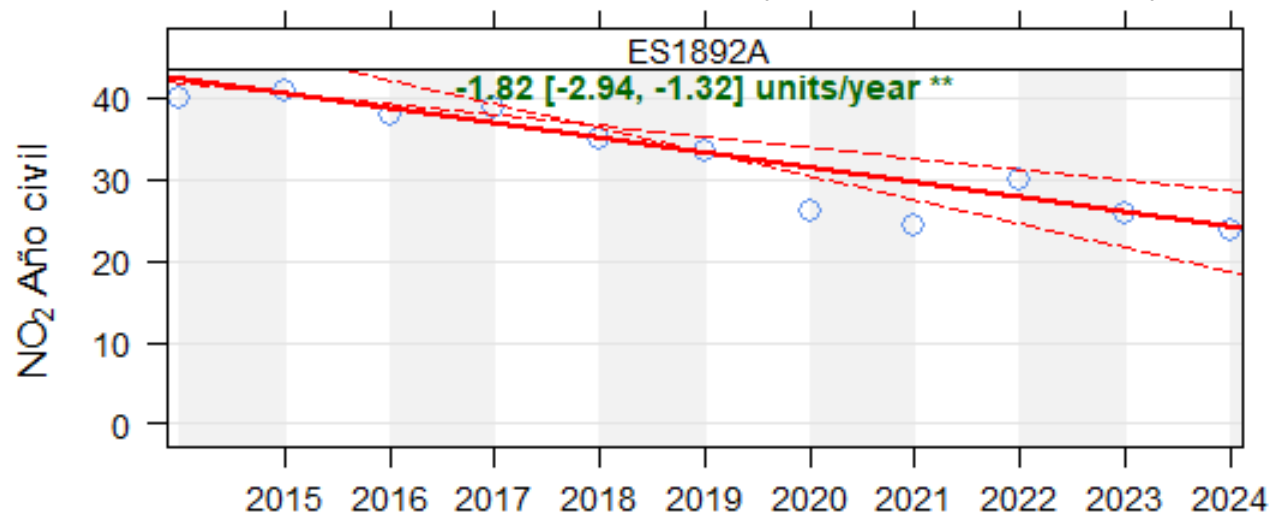


NO₂ - annual_mean (2014-2024)

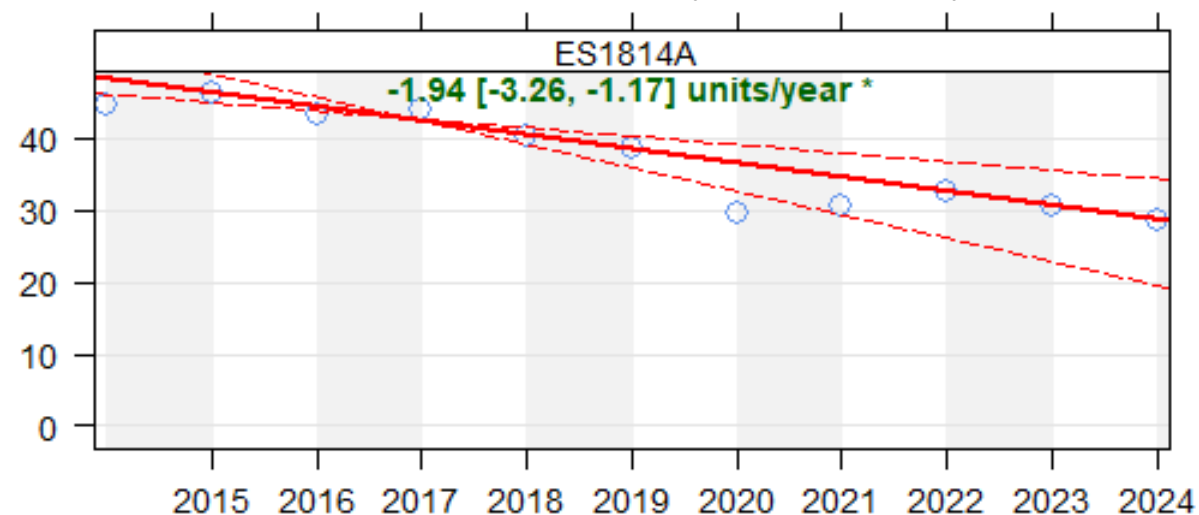


El problema del NO₂

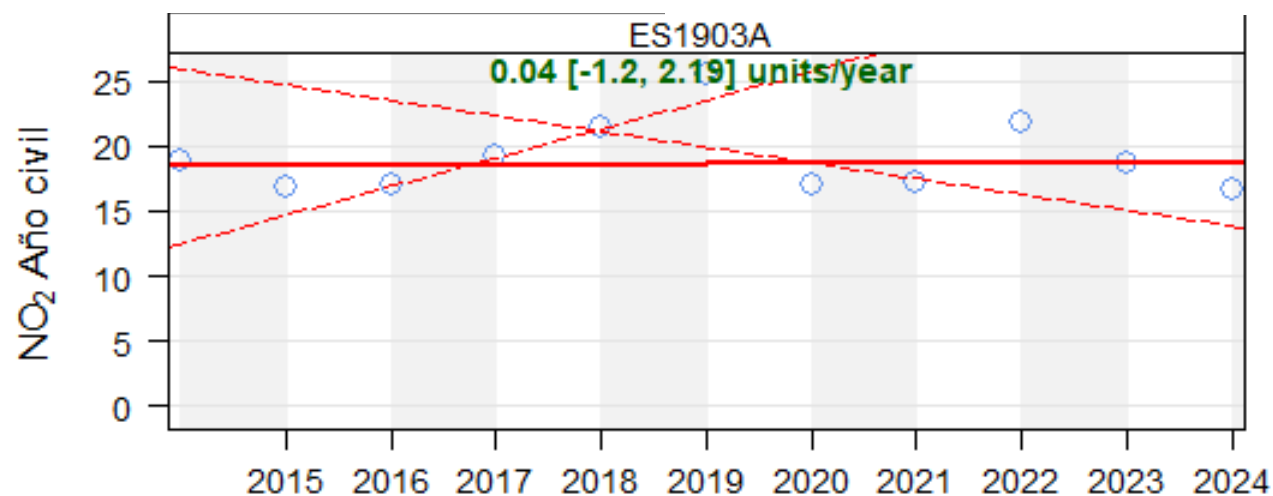
EL PRAT DE LLOBREGAT (JARDINS DE LA PAU)



MOLLET DEL VALLÈS (AP7 KM. 139)

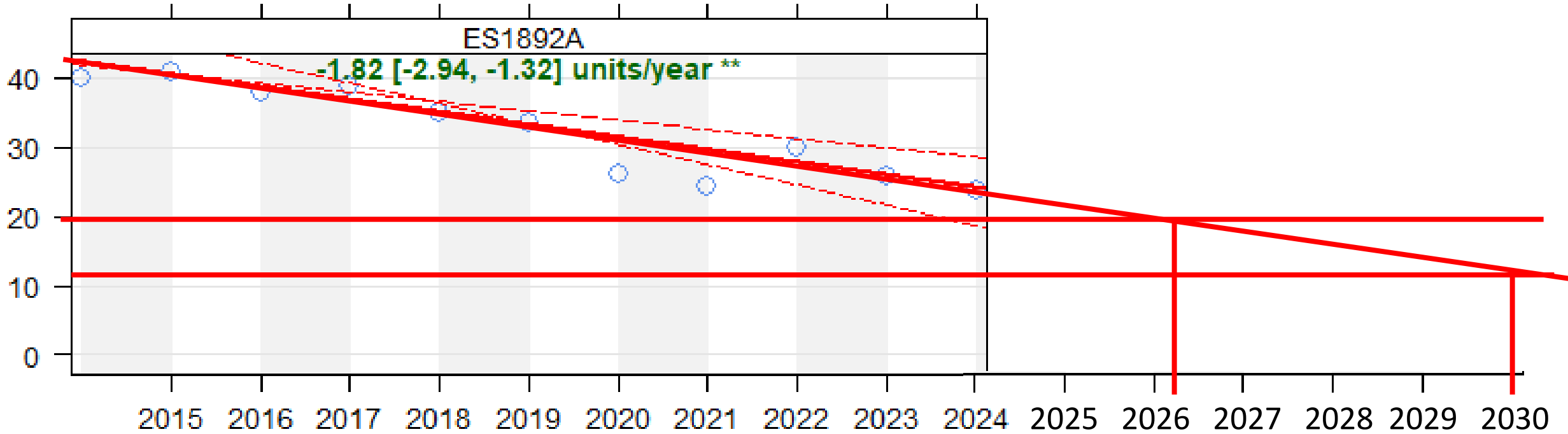


VILADECANS (ATRIUM)



El problema del NO₂

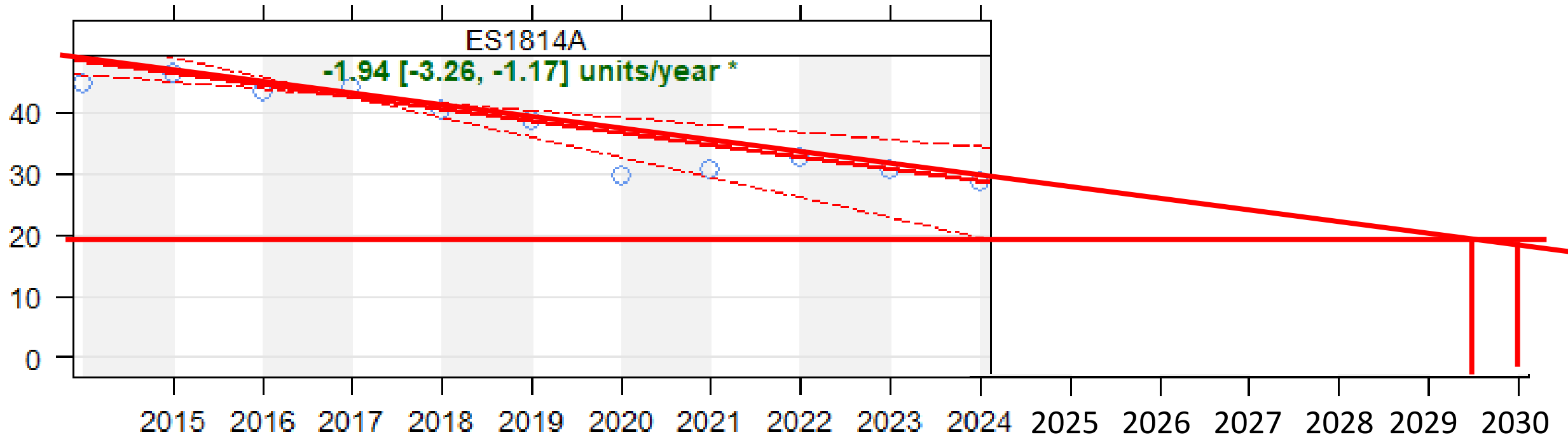
Escenari “Business as usual”



“Business as usual” no vol dir no aplicar mesures, sinó aplicar mesures amb efectivitat semblant a 2014-2024, i si la projecció 2030 supera: fan falta mesures addicionals a BAU

El problema del NO₂

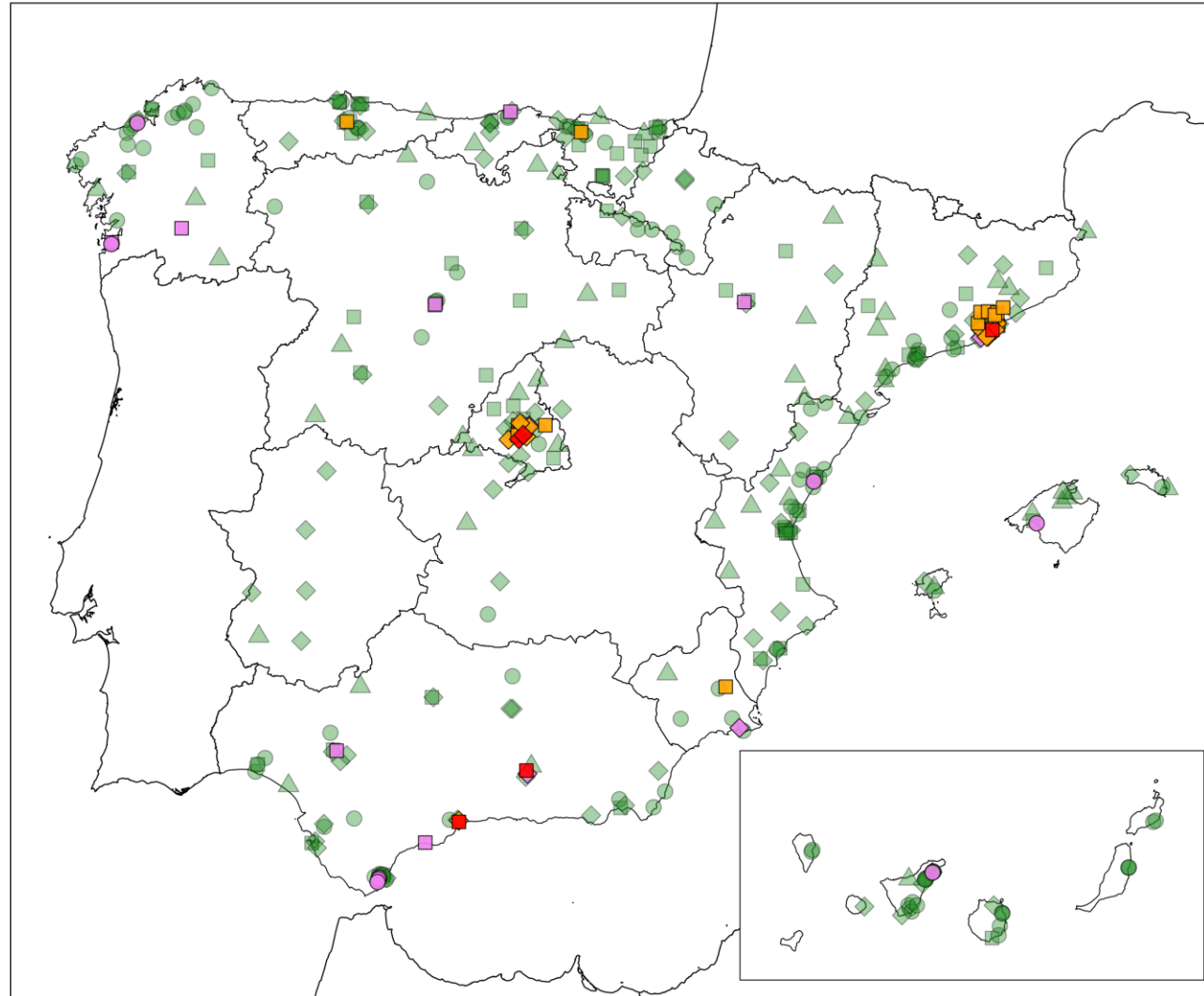
Escenari “Business as usual” no suficient:
ESSENCIAL APLICAR MESURES MÉS POTENTS QUE LES APLICADES FINS ARA



El problema del NO₂

NO₂ (annual average)

VLA: 20 µg/m³ (n = 398)



Compliance 2030 VLA

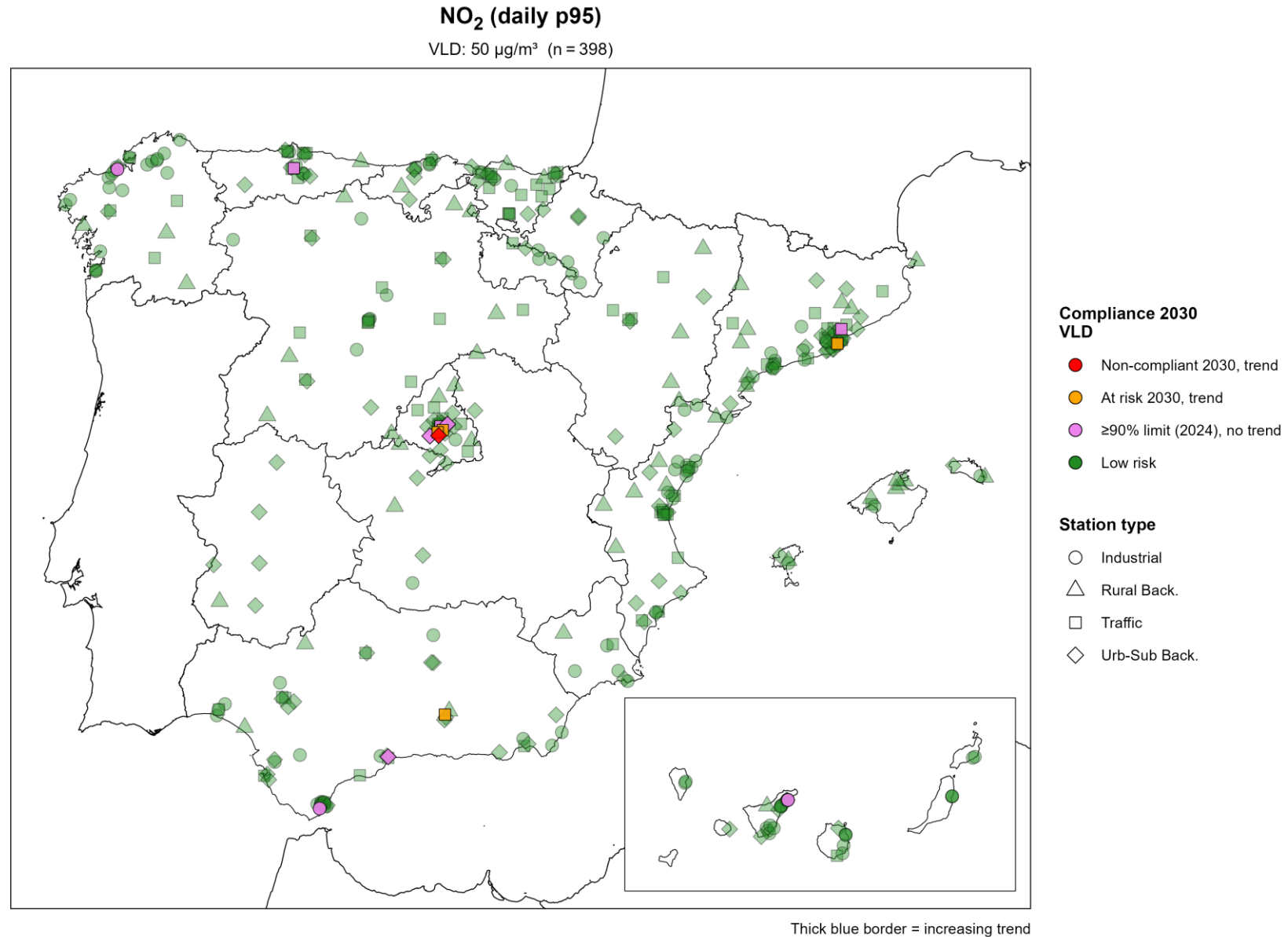
- Non-compliant 2030, trend
- At risk 2030, trend
- ≥90% limit (2024), no trend
- Low risk

Station type

- Industrial
- △ Rural Back.
- Traffic
- ◇ Urb-Sub Back.

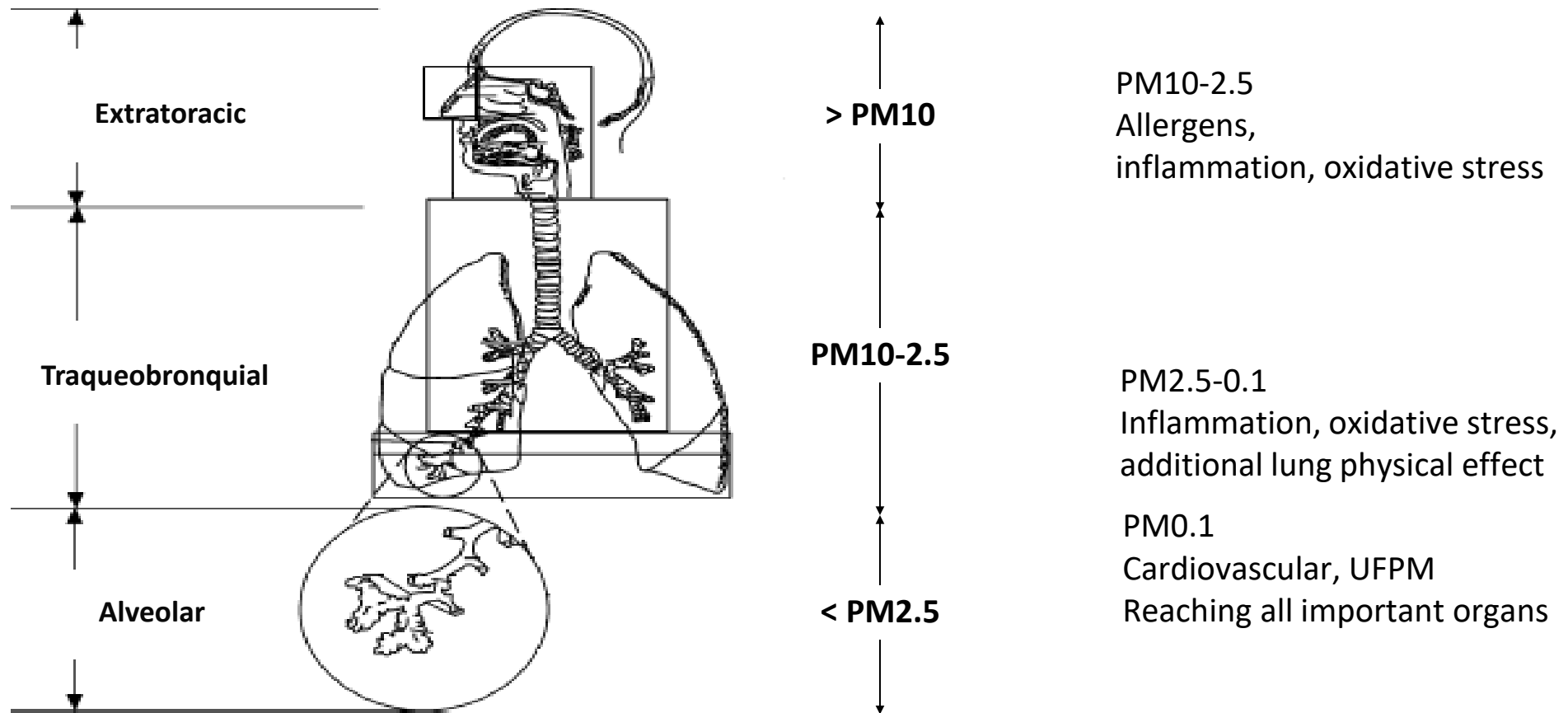
Thick blue border = increasing trend

El problema del NO₂



El problema de les partícules en suspensió (PM)

EFFECTES DEL PM



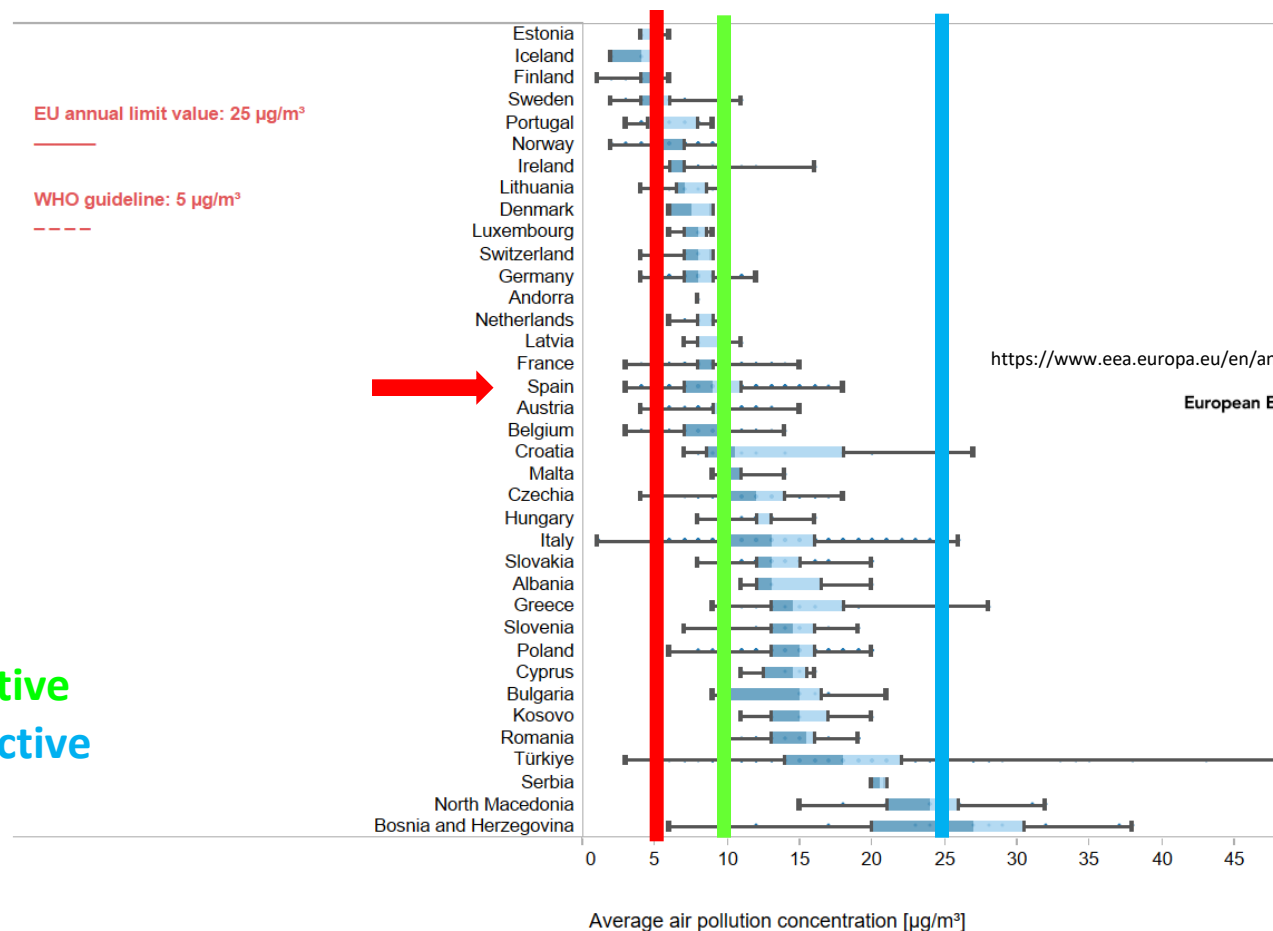
El problema de les partícules en suspensió (PM)

2023
Annual Limit Value for PM2.5

WHO AQG

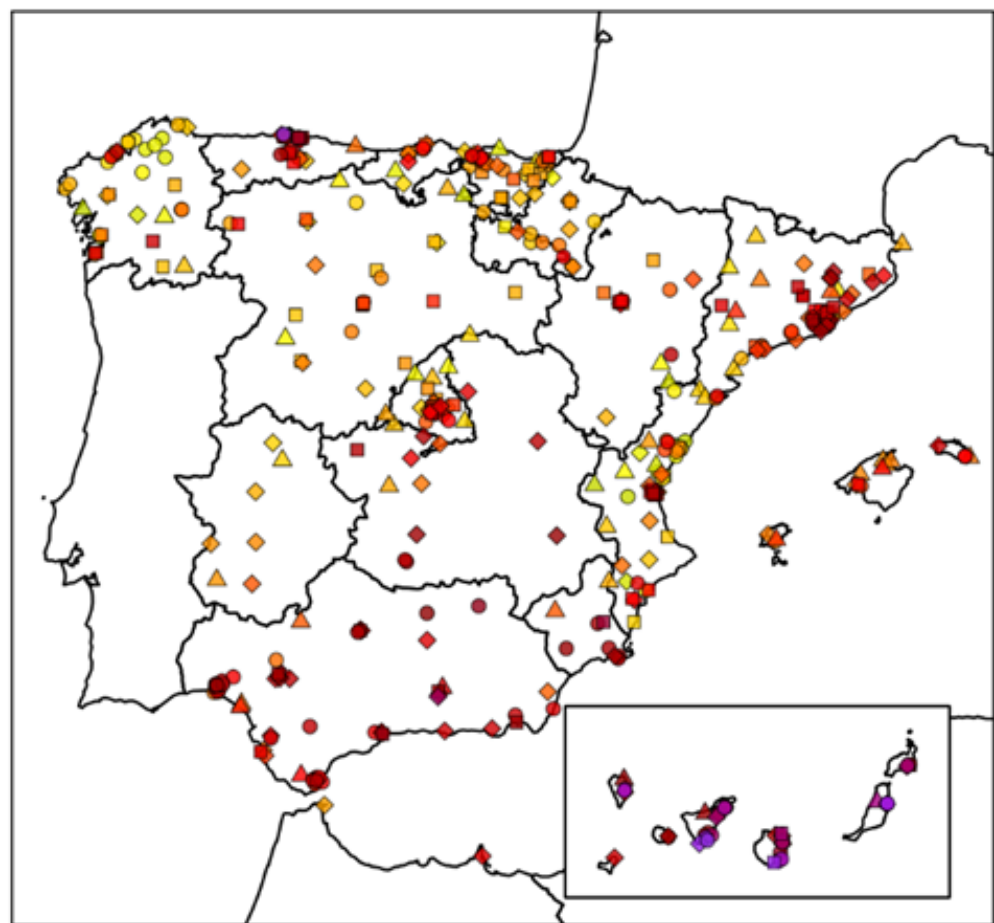
Limit value future EU AQ Directive

Limit value current EU AQ Directive



El problema de les partícules en suspensió (PM)

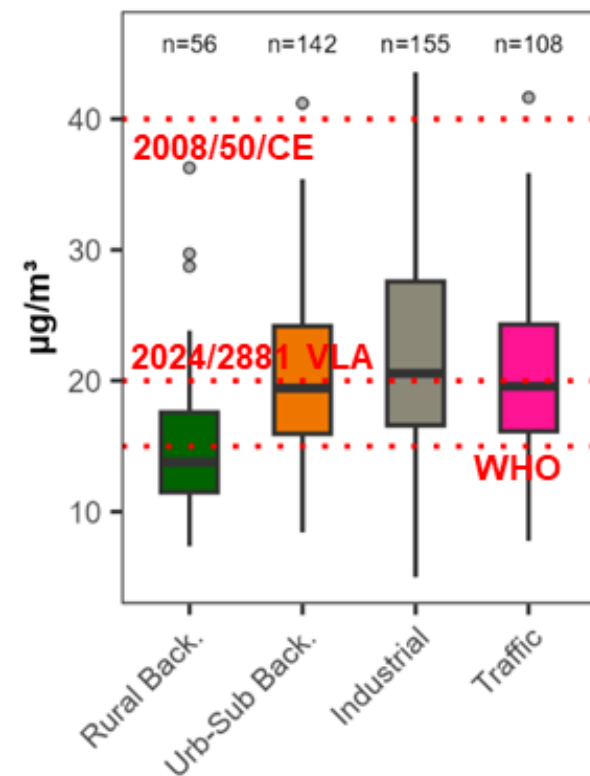
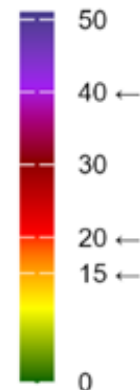
PM₁₀ Annual Avg. 2022-2024



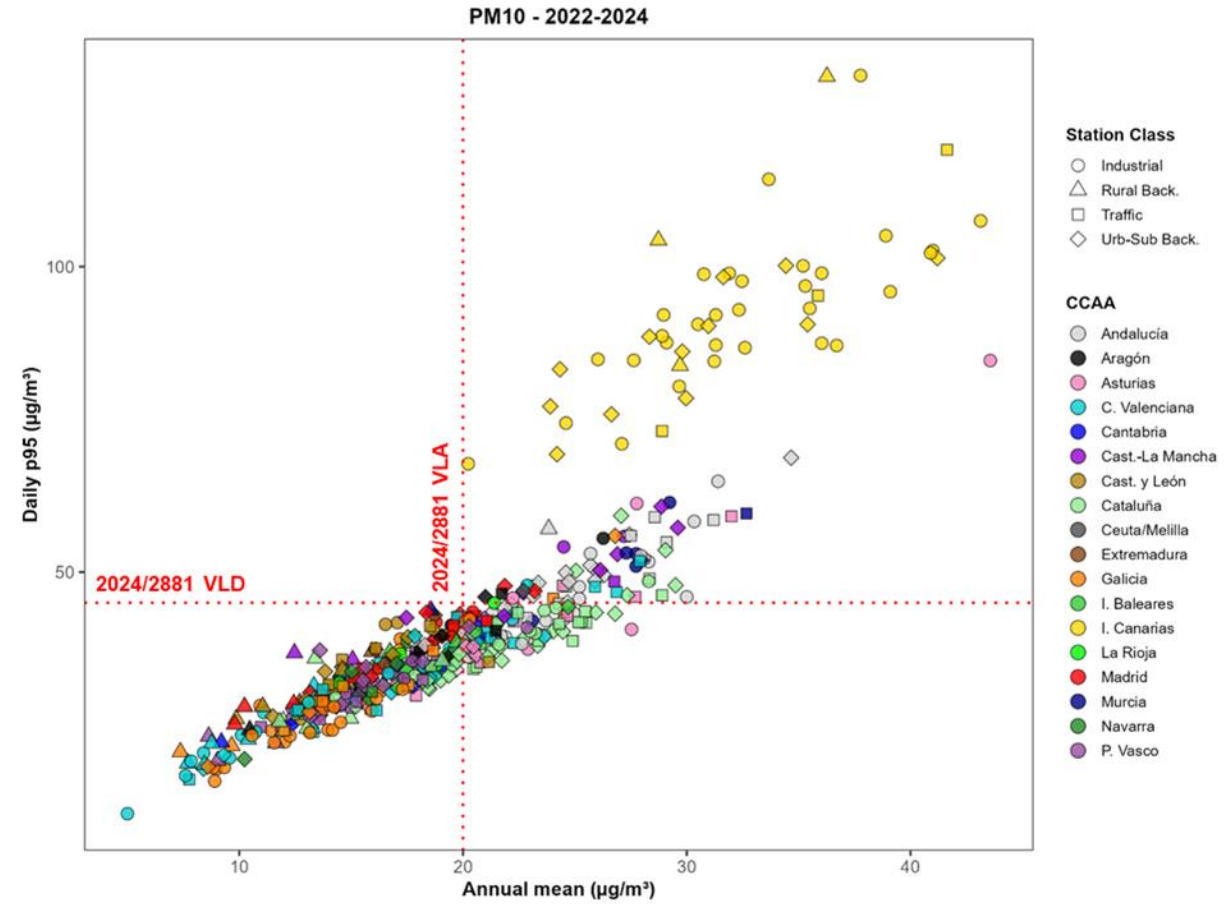
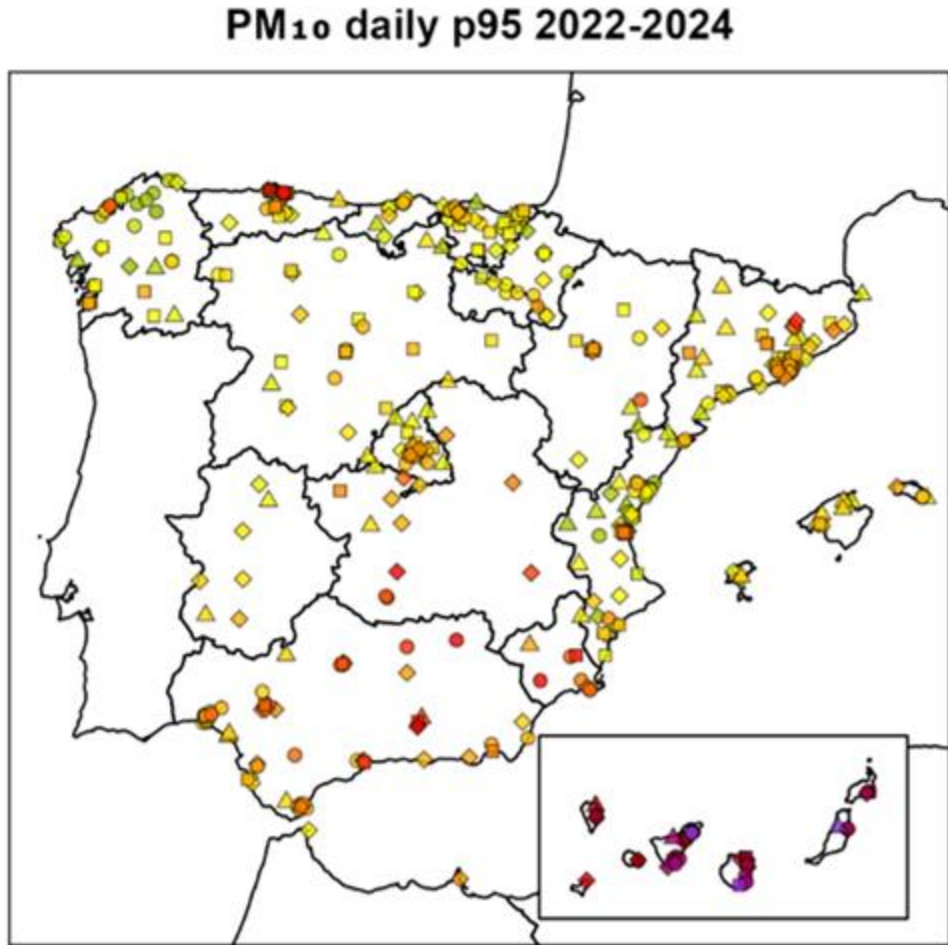
Station Class

- Industrial
- △ Rural Back.
- Traffic
- ◇ Urb-Sub Back.

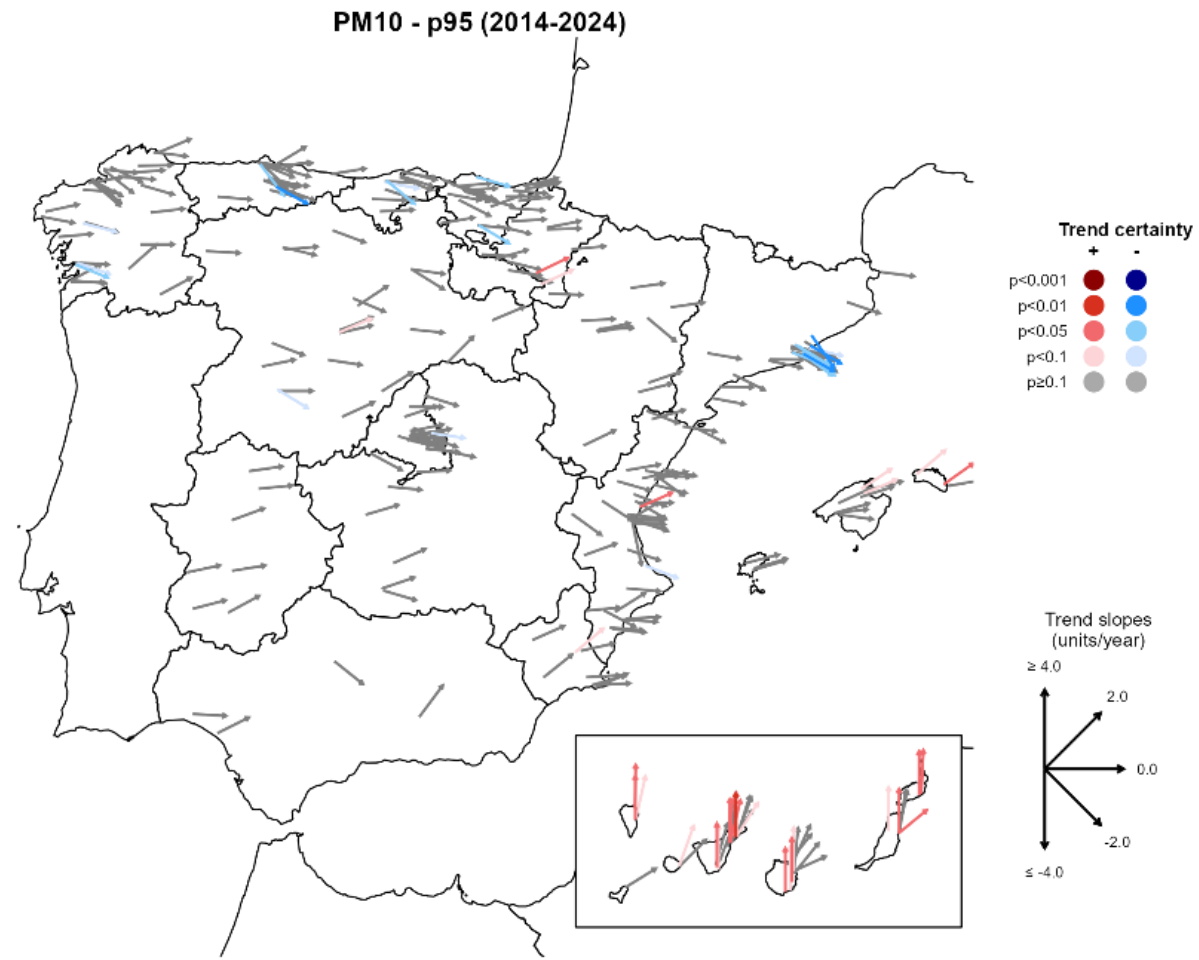
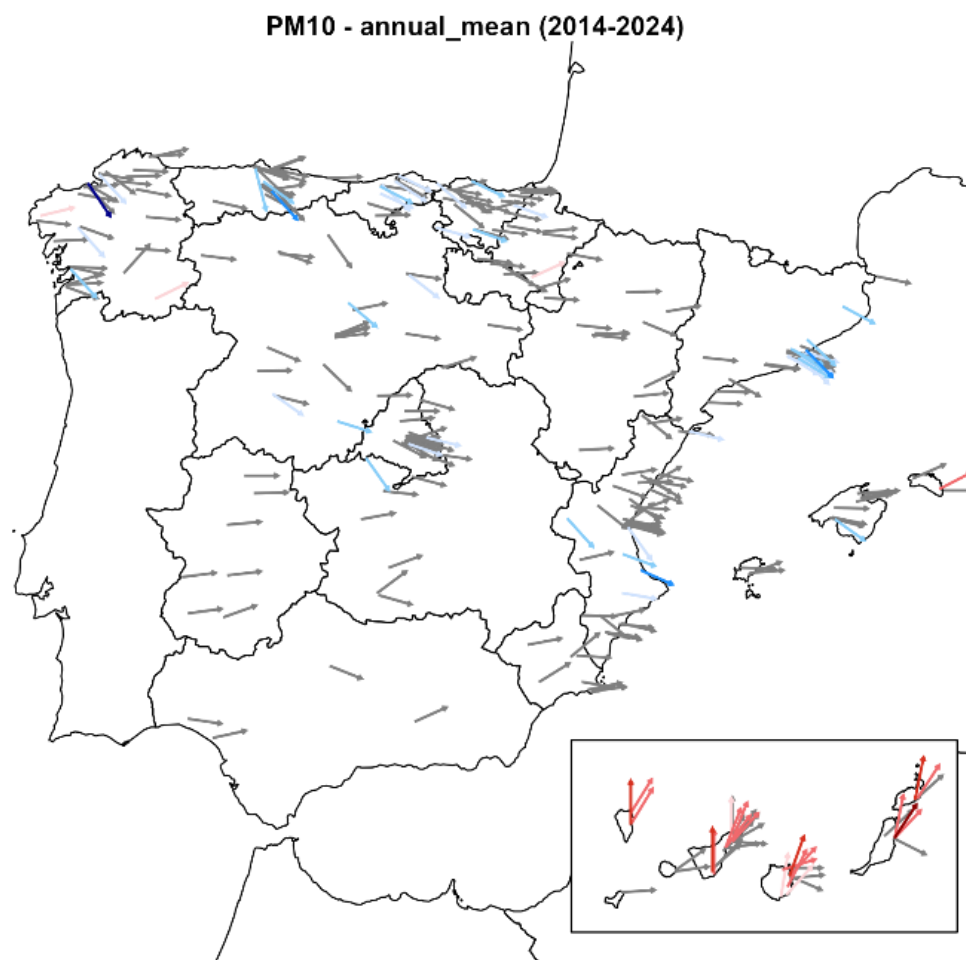
µg/m³



El problema de les partícules en suspensió (PM)

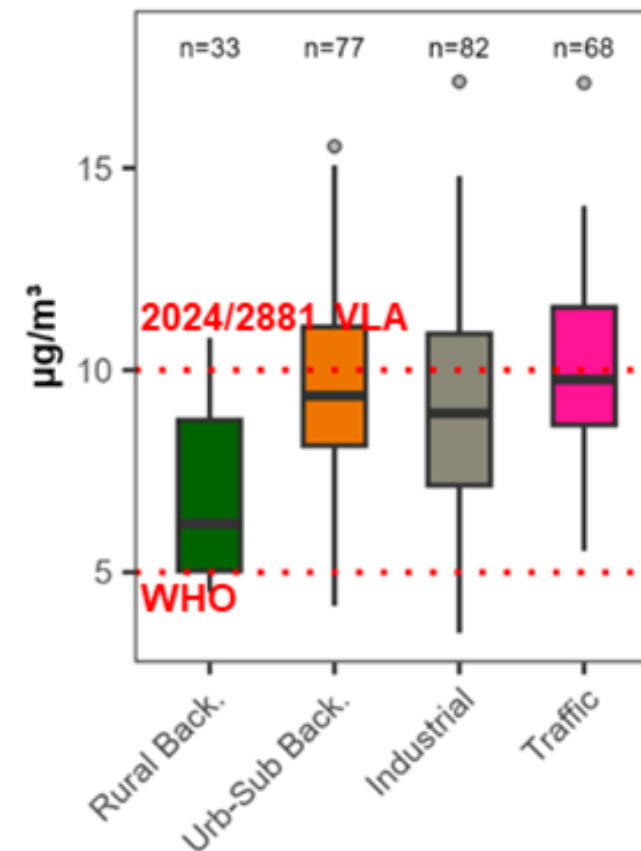
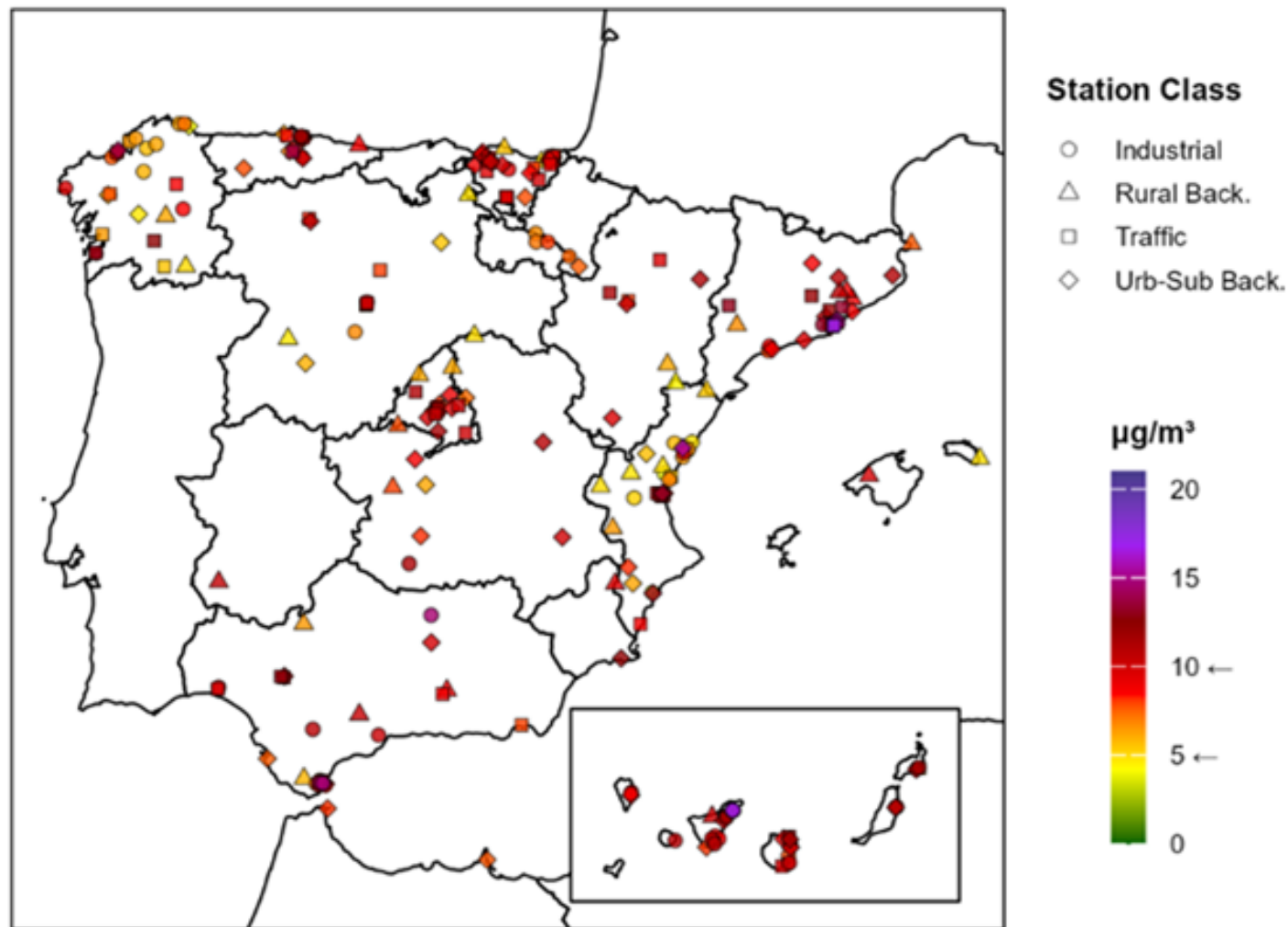


El problema de les partícules en suspensió (PM)



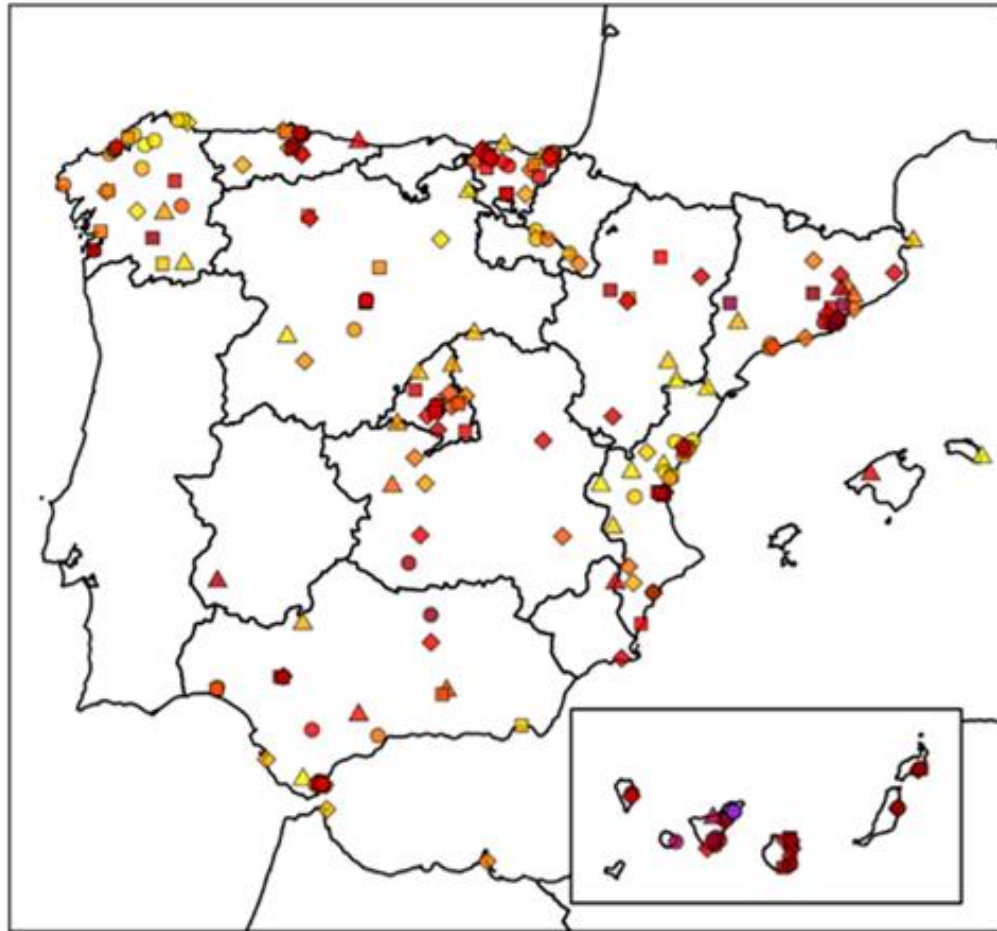
El problema de les partícules en suspensió (PM)

PM_{2.5} Annual Avg. 2022-2024



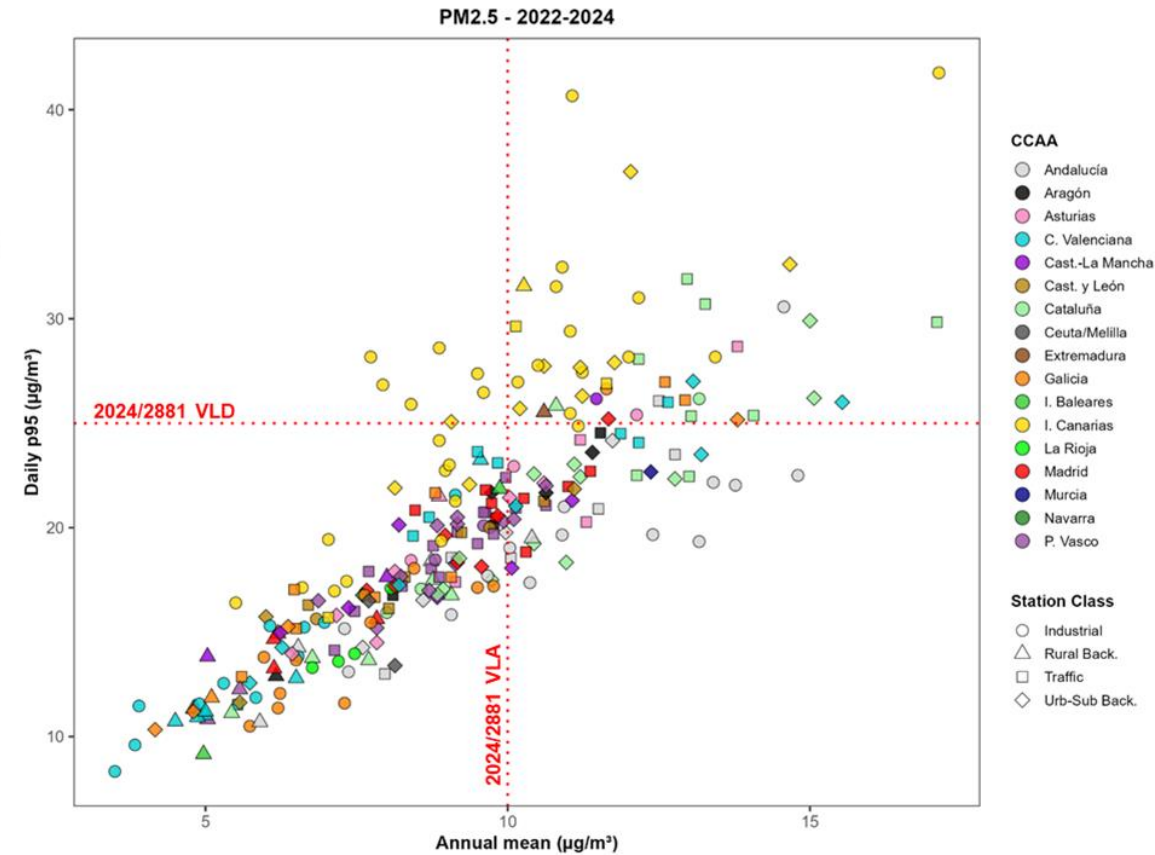
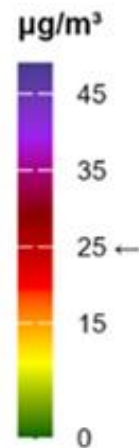
El problema de les partícules en suspensió (PM)

PM_{2.5} daily p95 2022-2024



Station Class

- Industrial
- △ Rural Back.
- Traffic
- ◇ Urb-Sub Back.



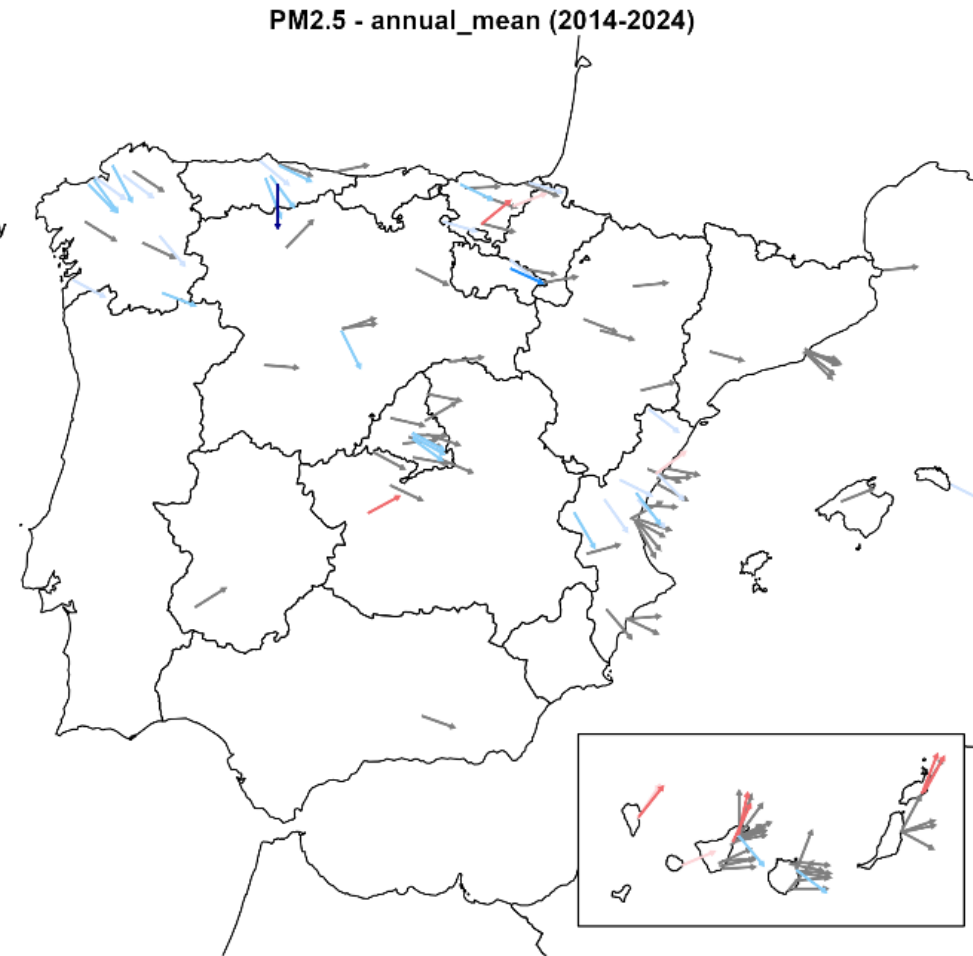
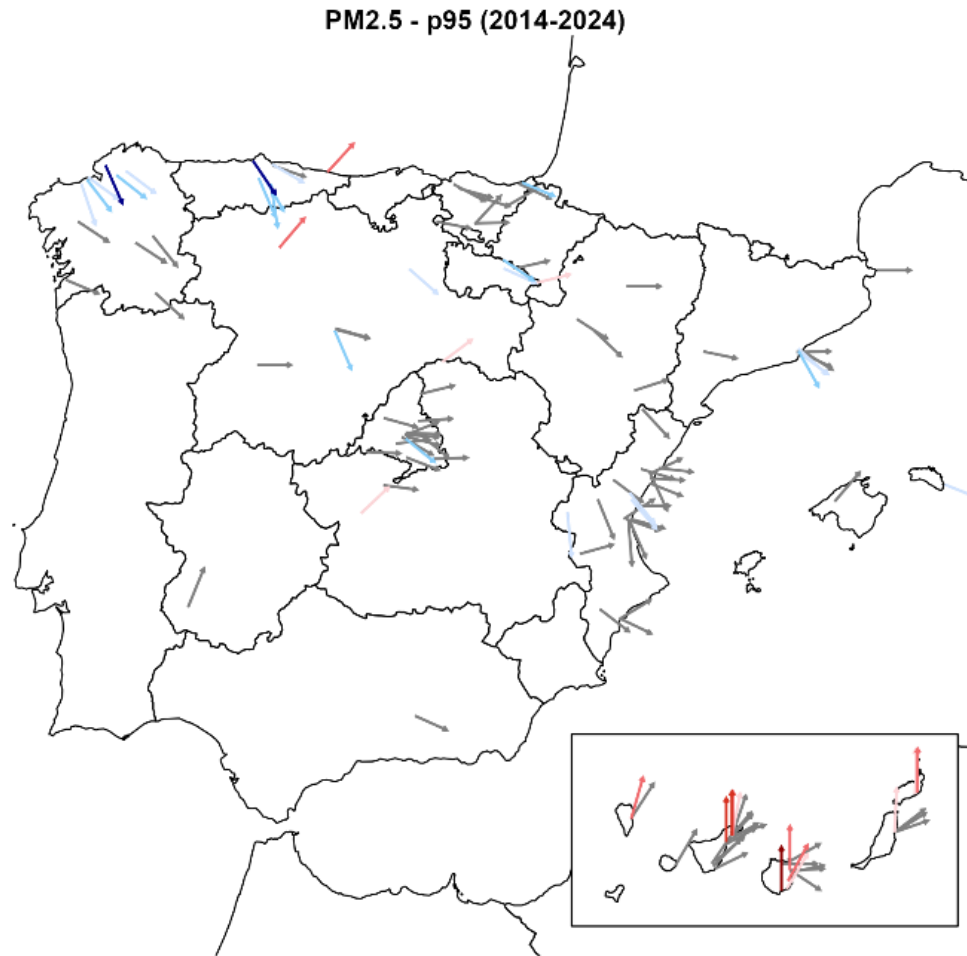
CCAA

- Andalucía
- Aragón
- Asturias
- C. Valenciana
- Cast.-La Mancha
- Cast. y León
- Cataluña
- Ceuta/Melilla
- Extremadura
- Galicia
- I. Balears
- I. Canarias
- La Rioja
- Madrid
- Murcia
- Navarra
- P. Vasco

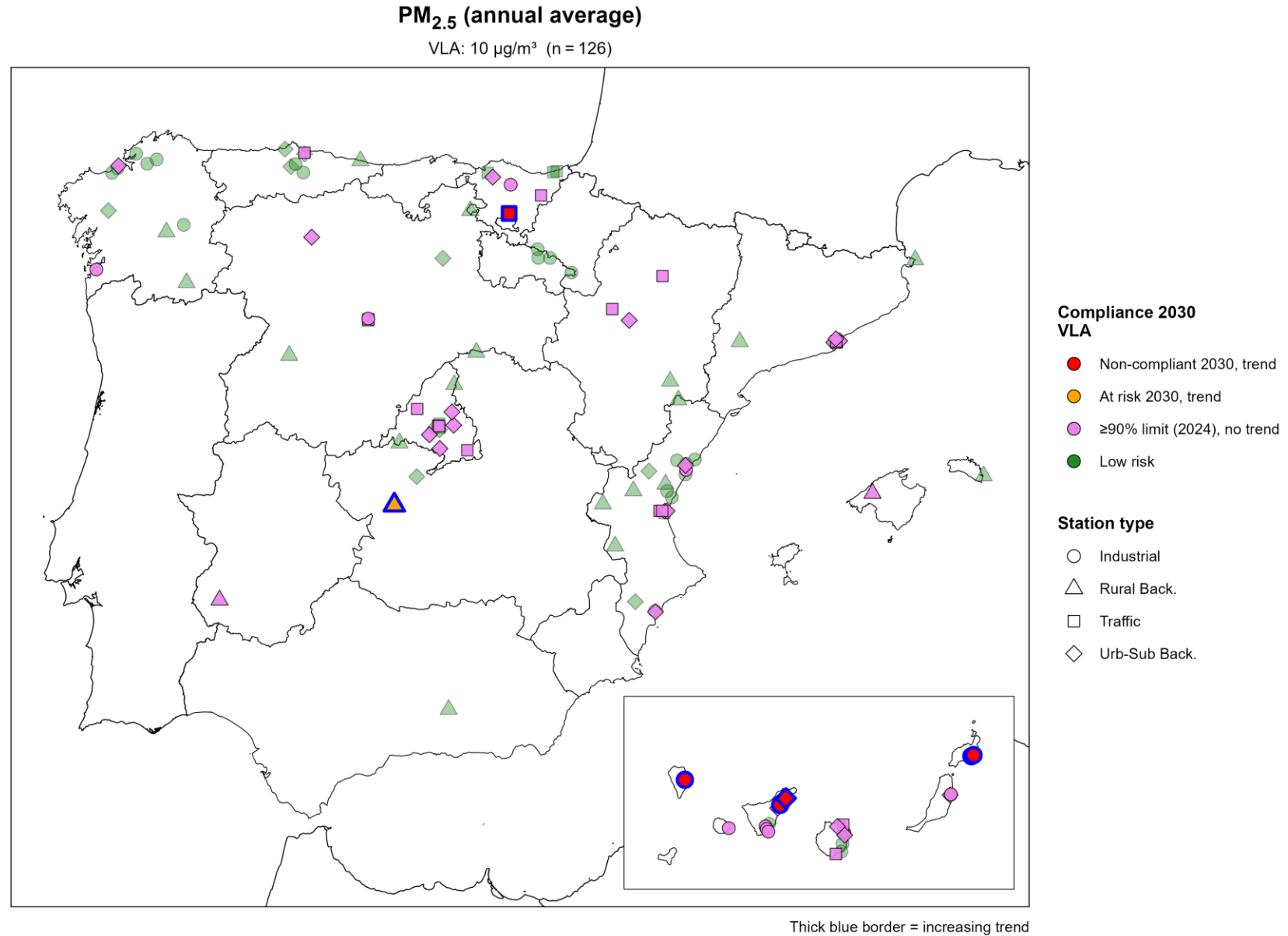
Station Class

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El problema de les partícules en suspensió (PM)



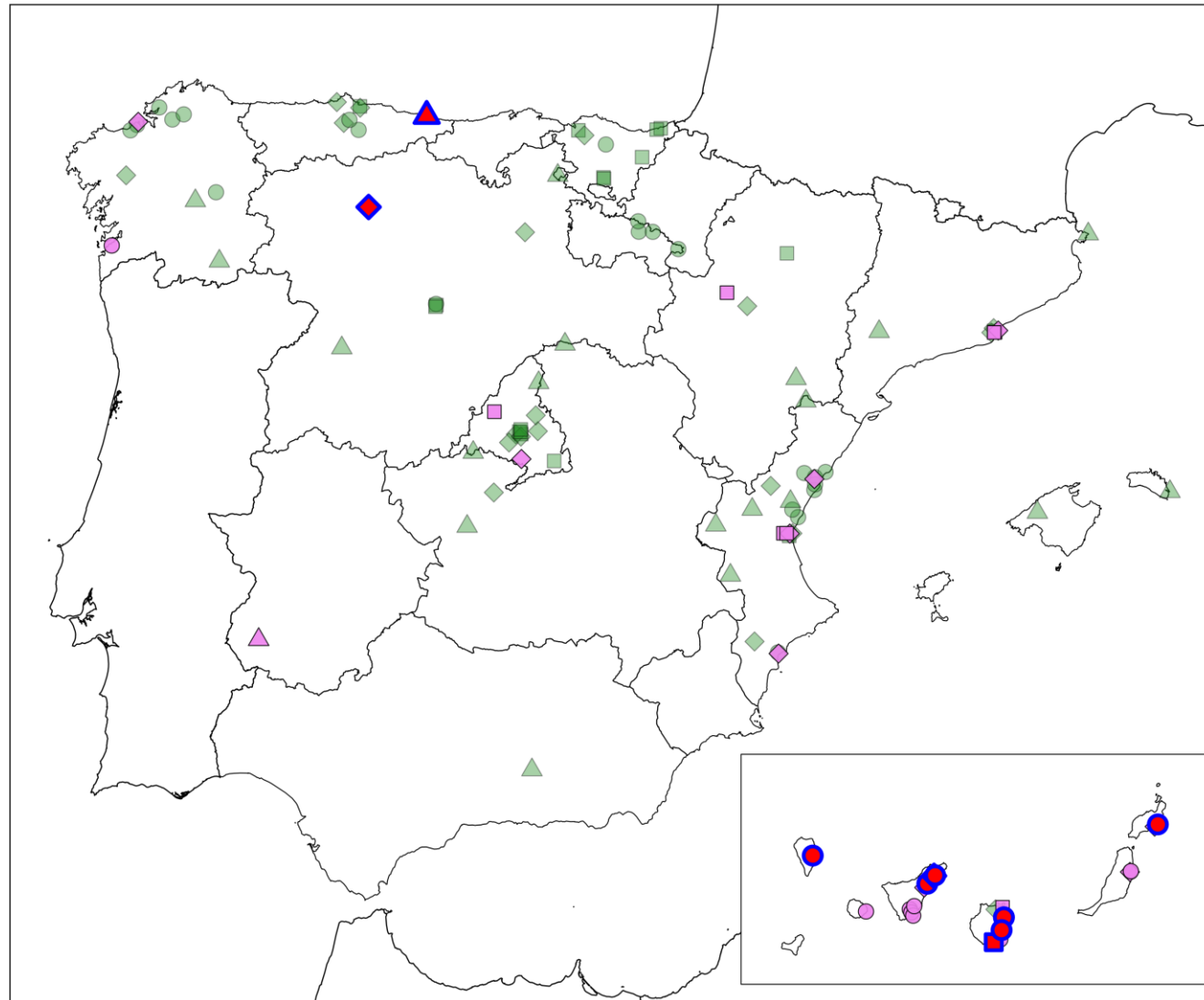
El problema de les partícules en suspensió (PM)



El problema de les partícules en suspensió (PM)

PM_{2.5} (daily p95)

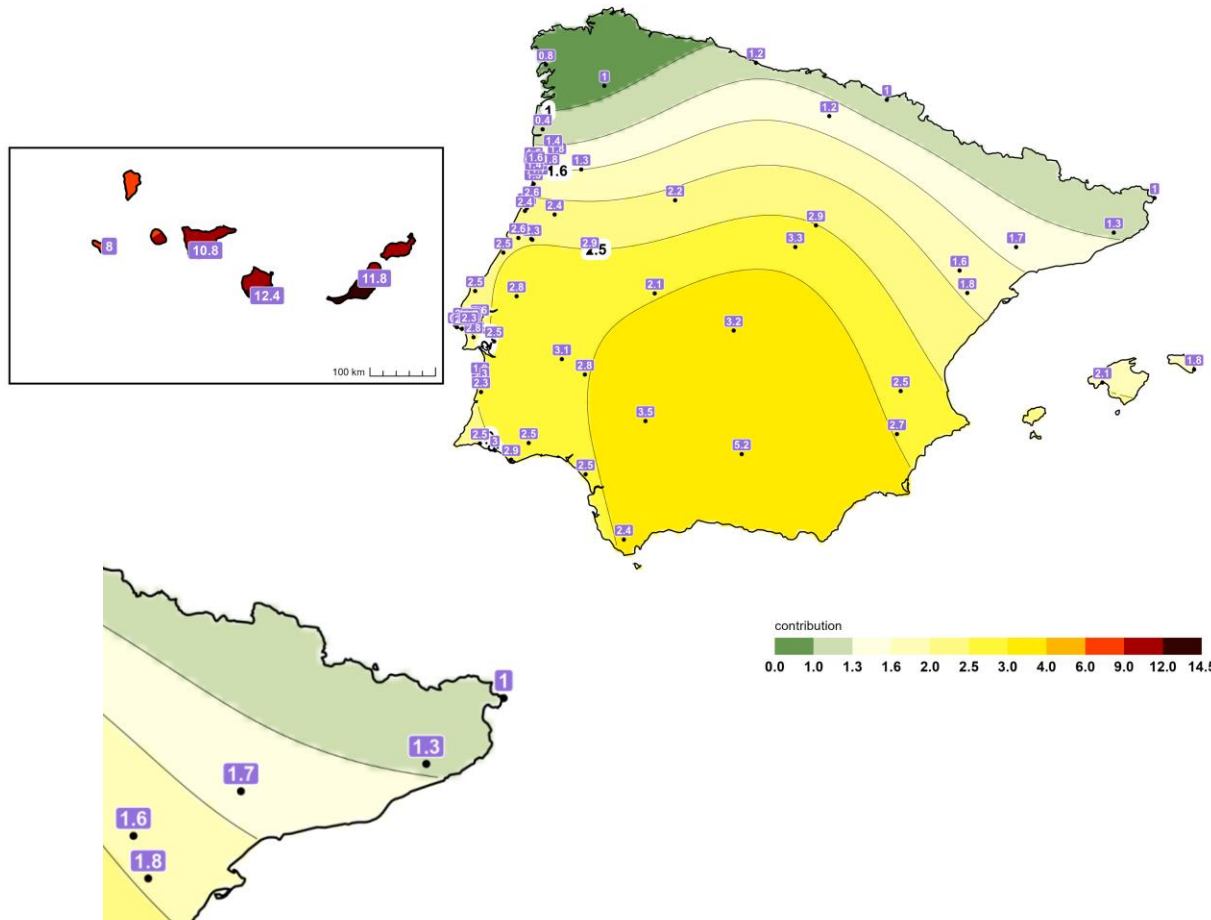
VLD: 25 µg/m³ (n = 126)



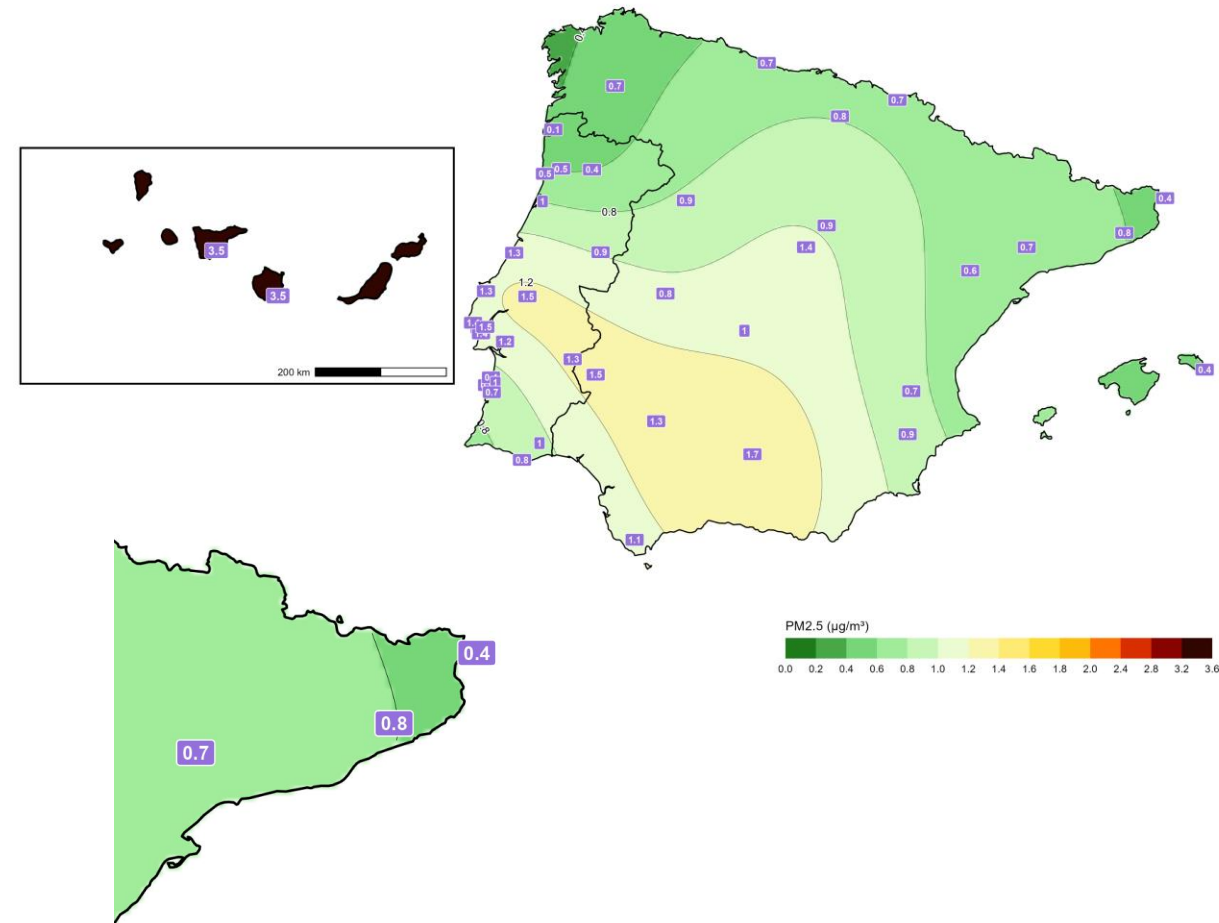
El problema de les partícules en suspensió (PM)

Pols africana contribució mitjana anual 2014-2024

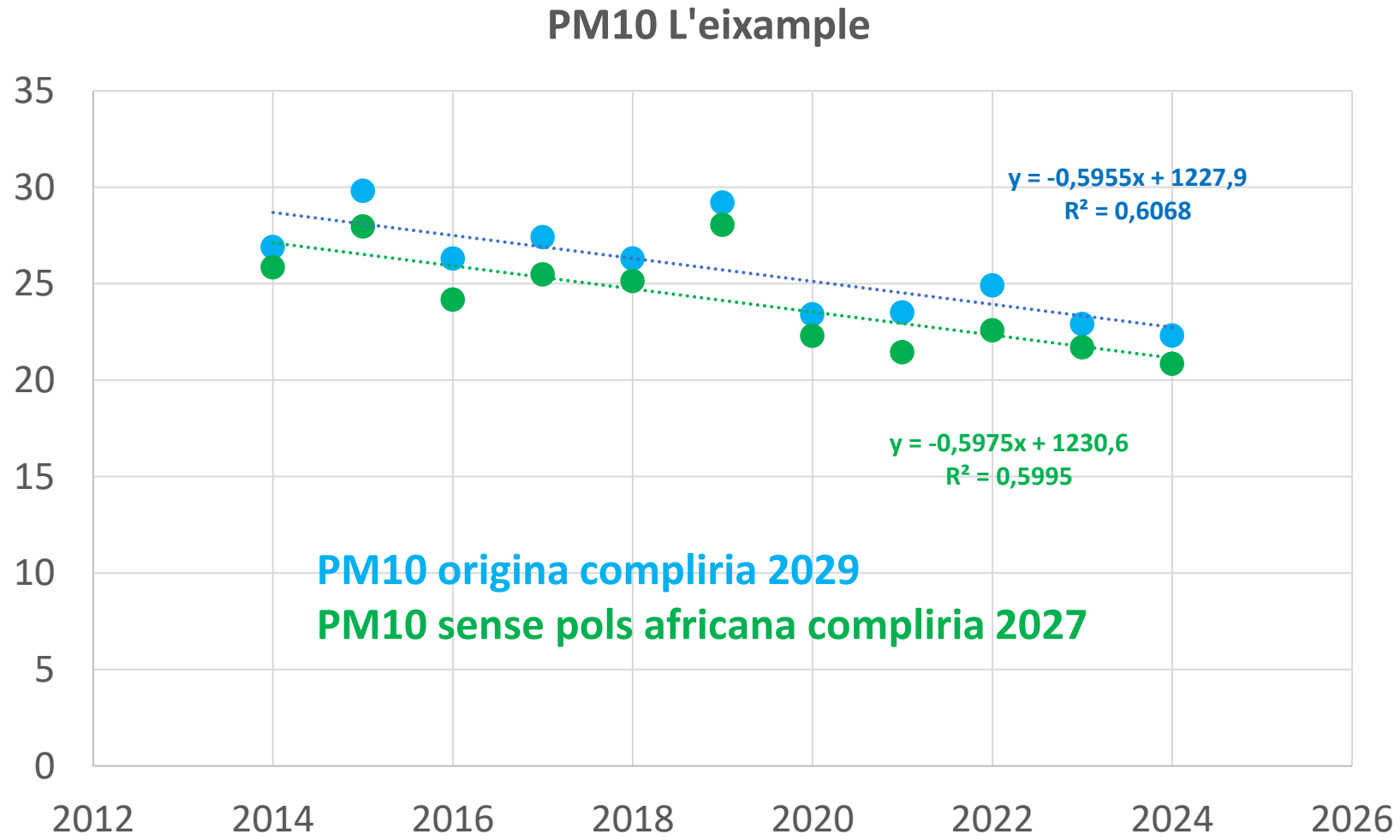
PM10



PM2.5



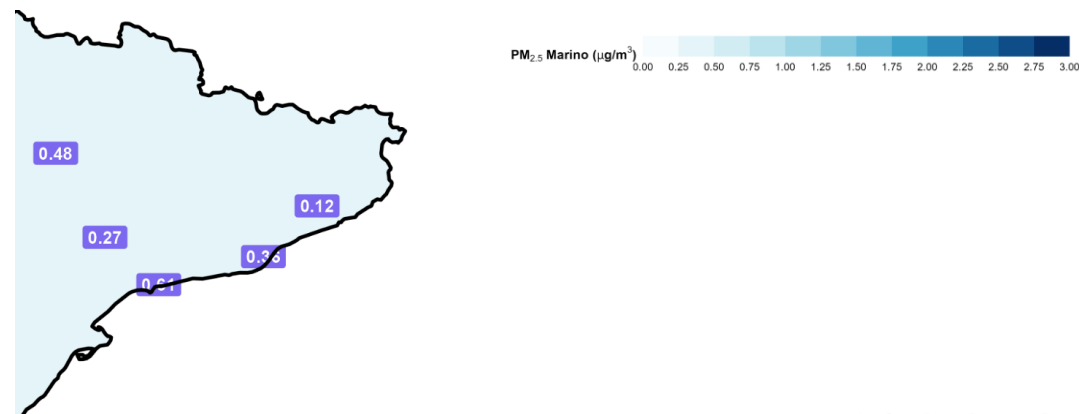
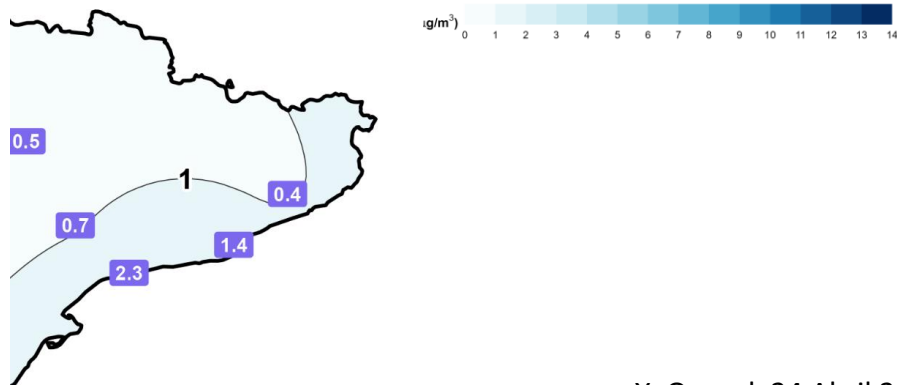
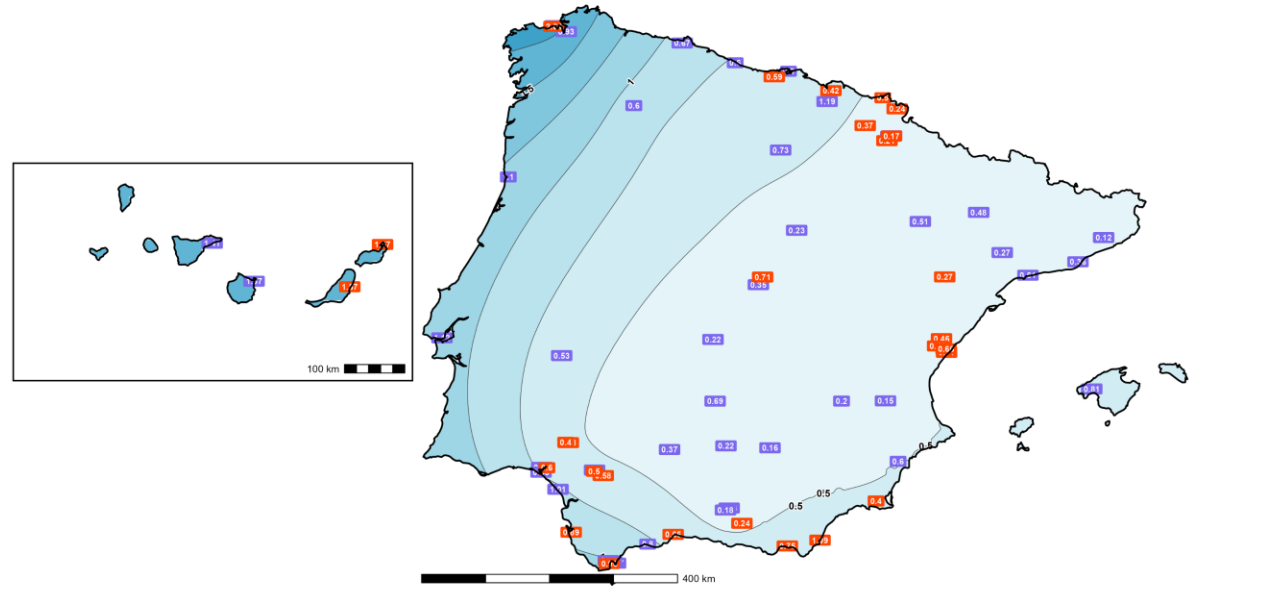
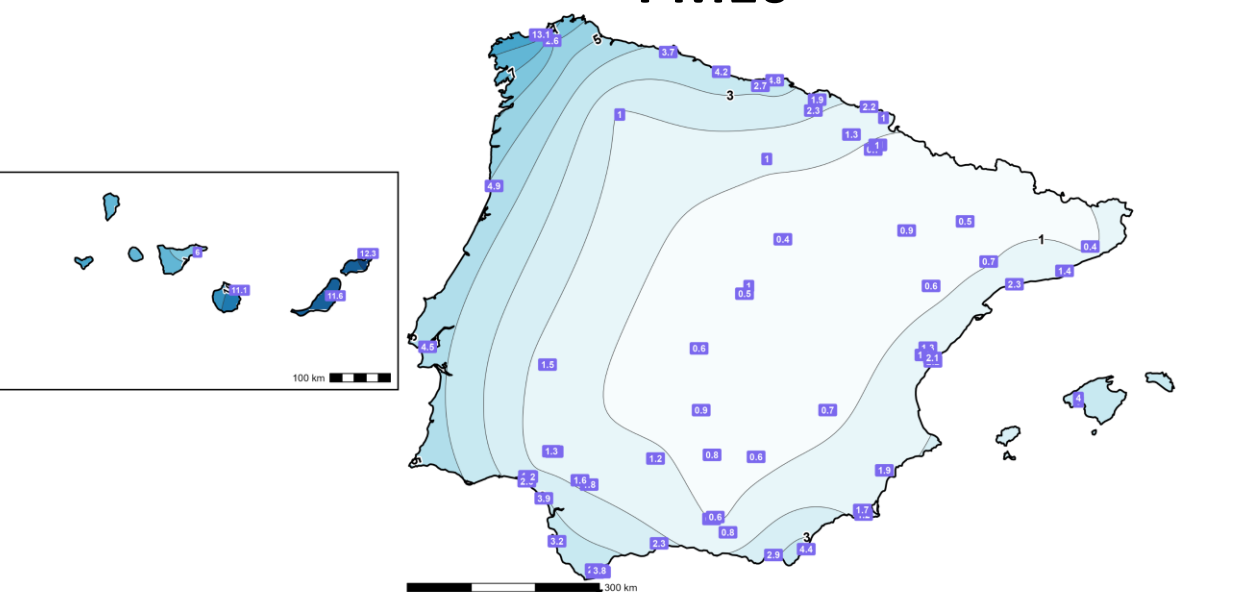
El problema de les partícules en suspensió (PM)



El problema de les partícules en suspensió (PM)

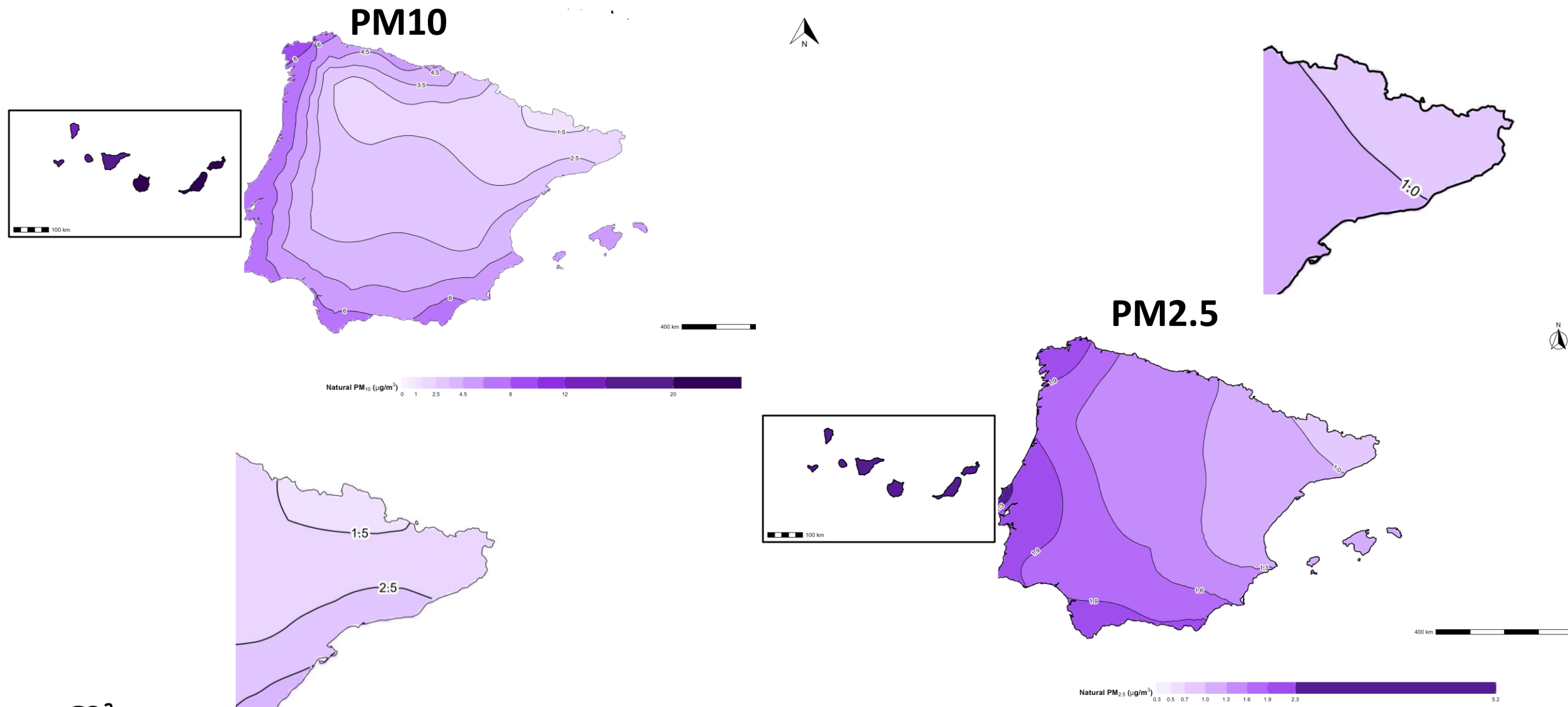
Sal marina contribució mitjana anual 2014-2024

PM10



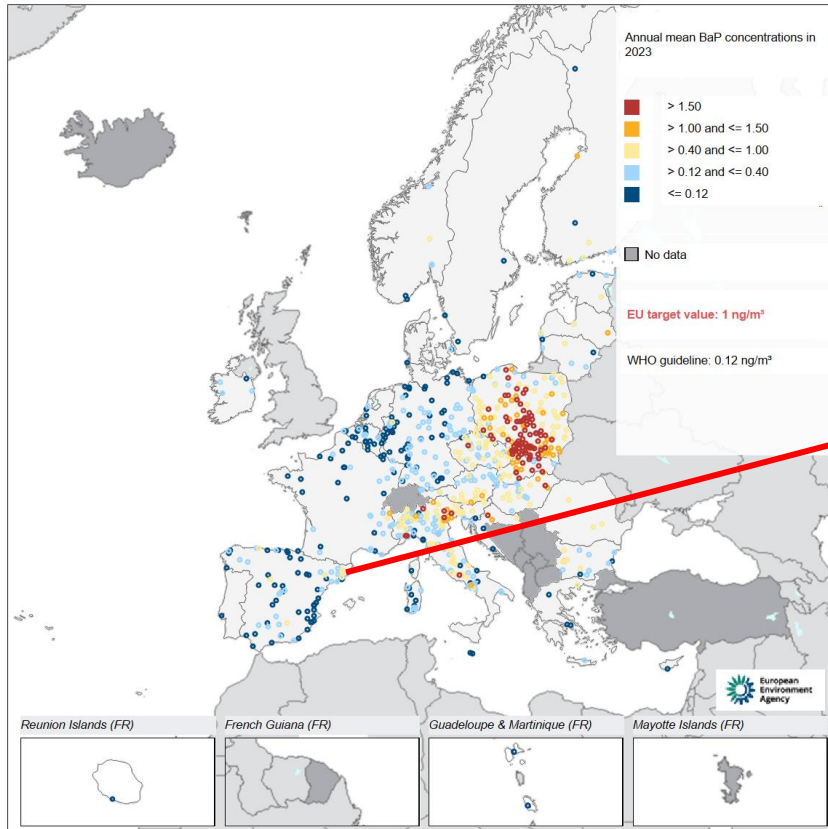
El problema de les partícules en suspensió (PM)

Pols africana+ sal marina contribució mitjana anual 2014-2024

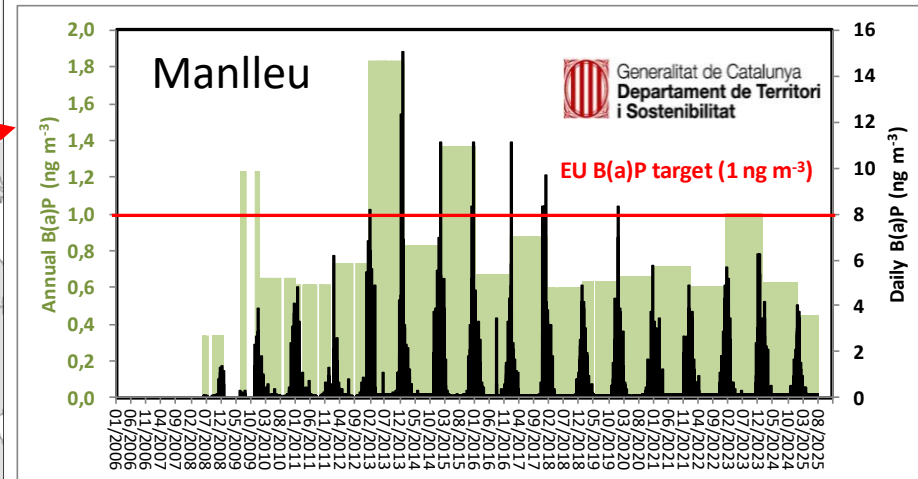


El problema del Benzo[a]pirè

<https://www.eea.europa.eu/publications/europes-air-quality-status-2025>



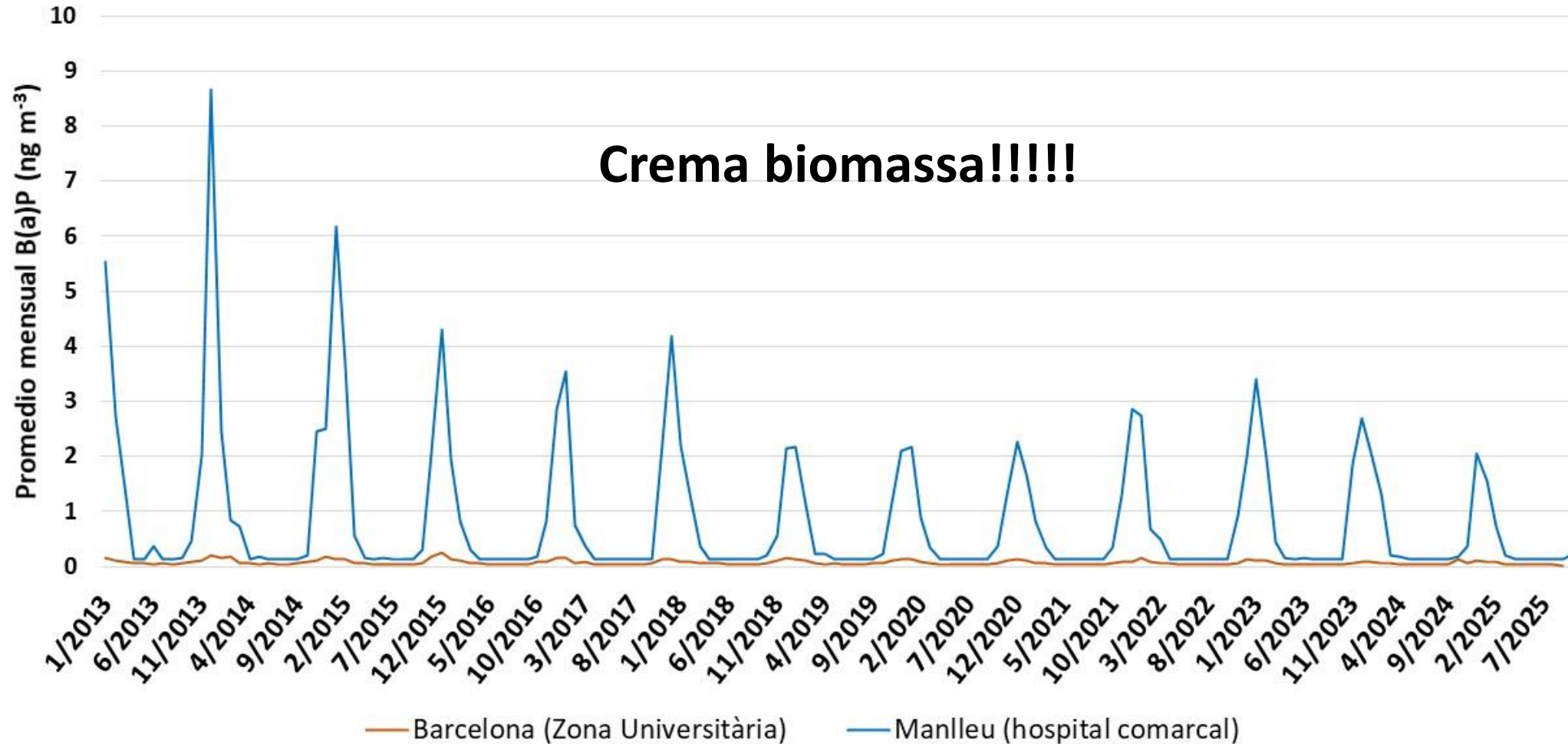
BaP, annual target value 2023



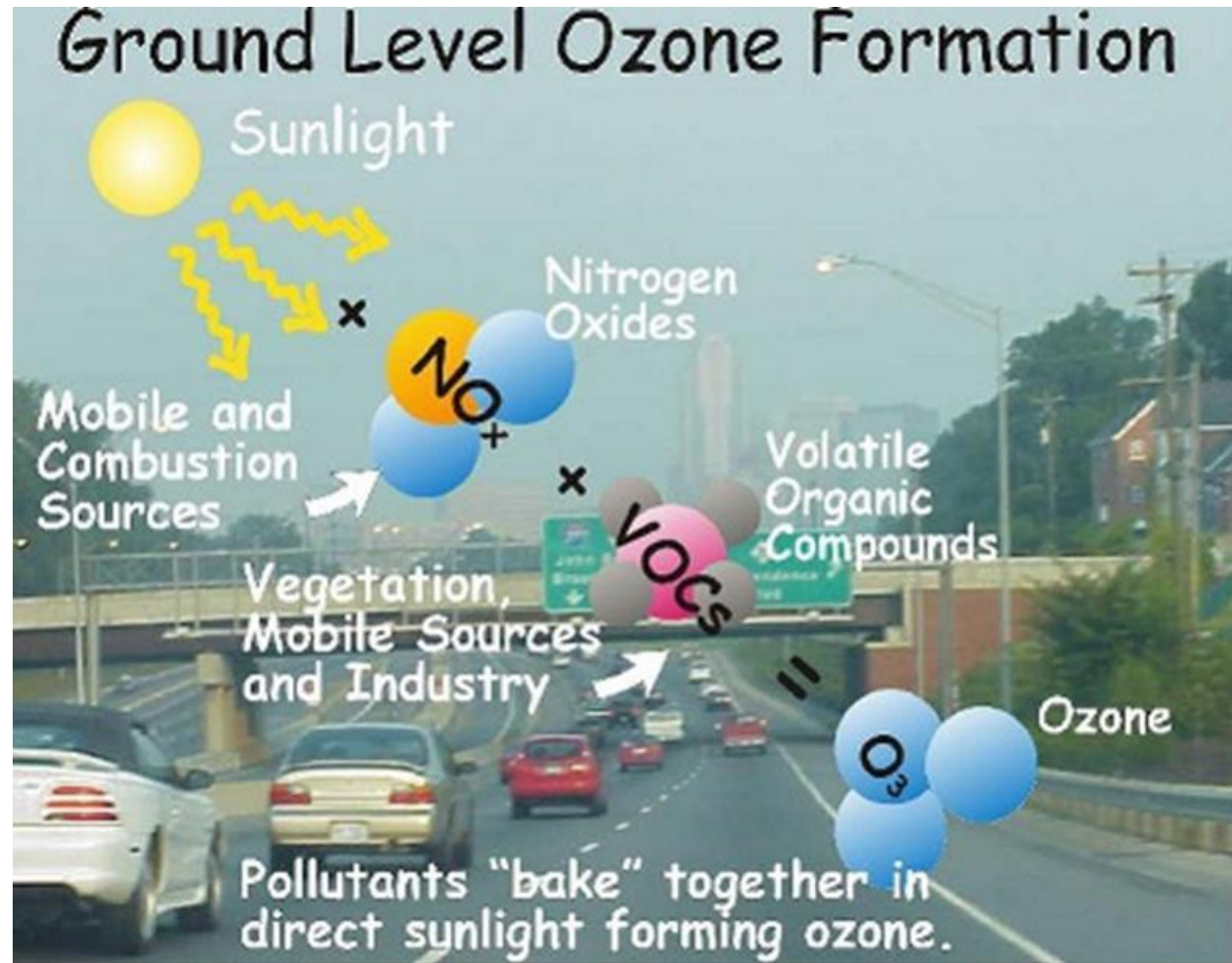
El problema del Benzo[a]pirè

Benzo[a]pirè **Manlleu** i **Barcelona**

Gencat (2025)

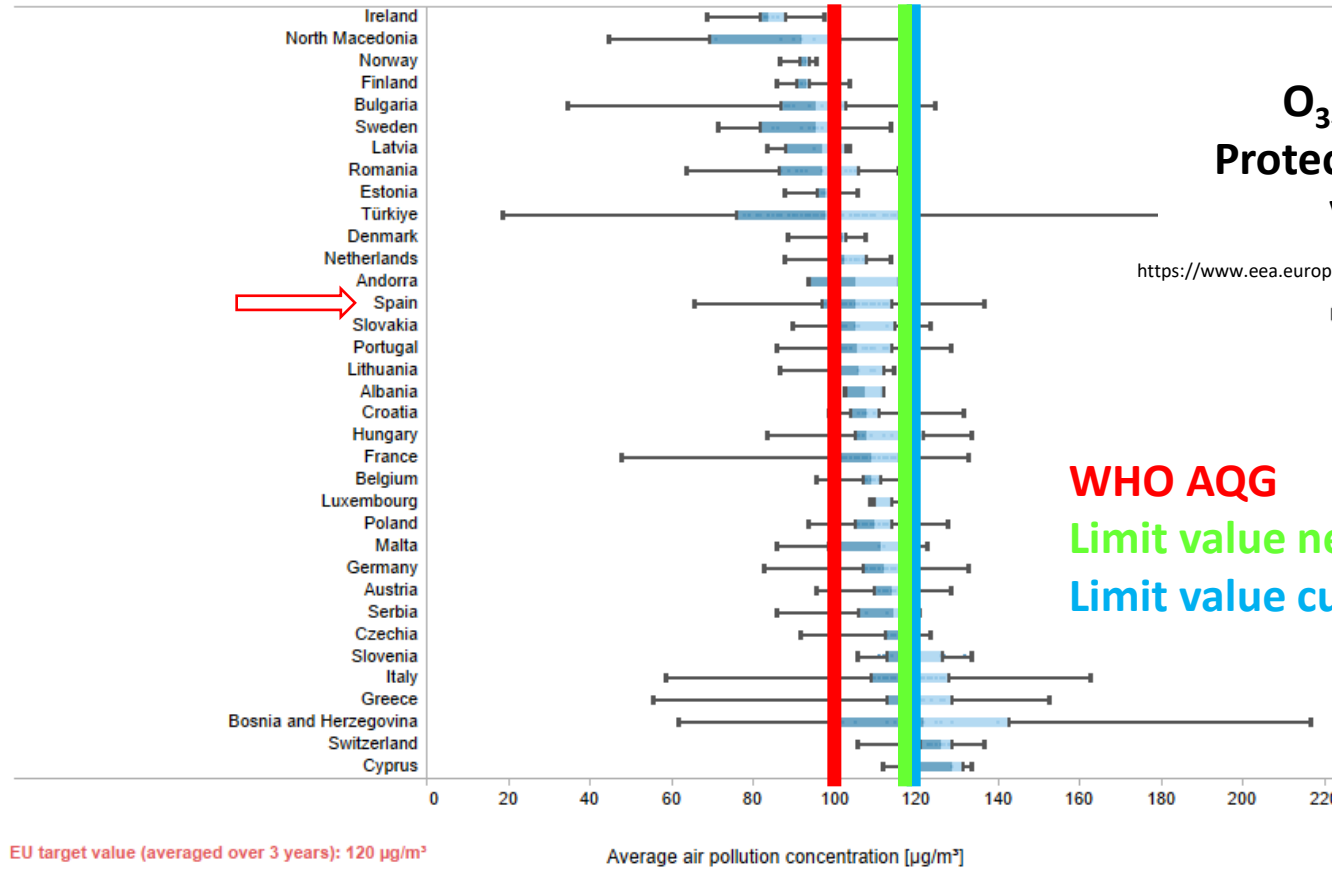


El problema del ozó troposfèric



<http://www.geo.sunysb.edu/ess-workshops/lesson-plans.html>

El problema del ozó troposfèric



O₃, Health Protection Target Value 2023

<https://www.eea.europa.eu/en/analysis/publications/air-quality-status-report-2025>



9th April 2025

WHO AQG

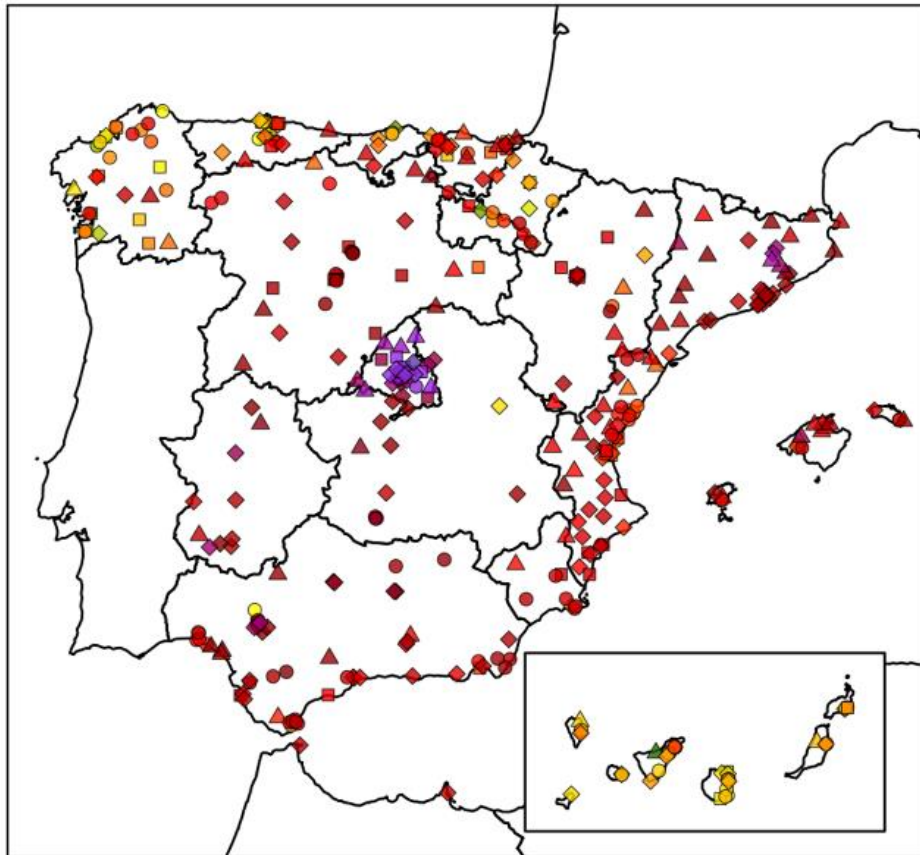
Limit value new Directive >120 MD8h <3d/y

Limit value current EU AQ Directive >120 MD8h <25 d/y

EU target value (averaged over 3 years): 120 µg/m³

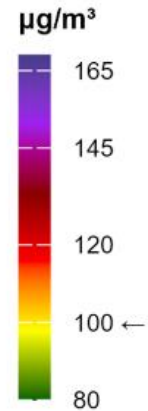
El problema del ozó troposfèric

O₃ MDA8 p99 2022-2024

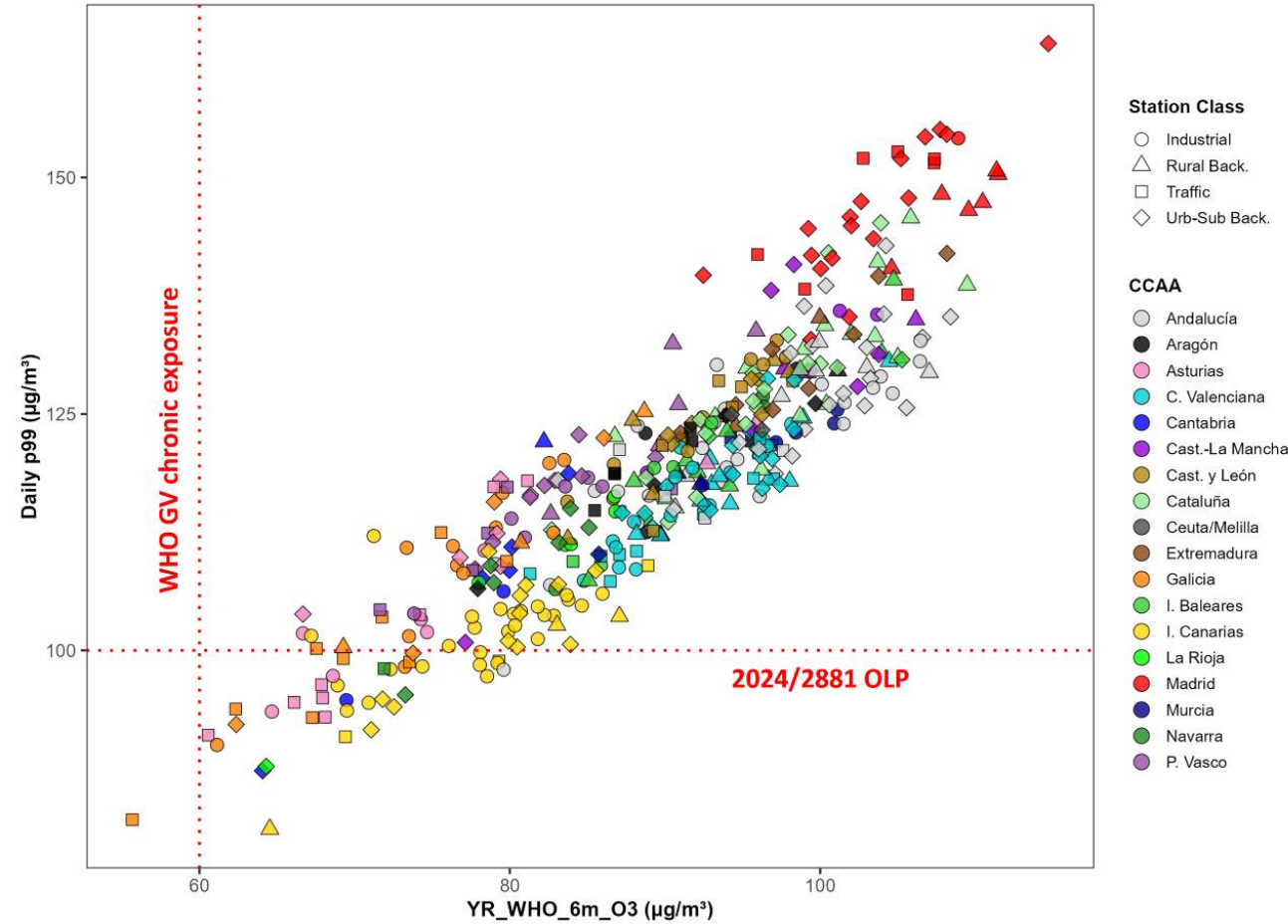


Station Class

- Industrial
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O₃ - 2022-2024



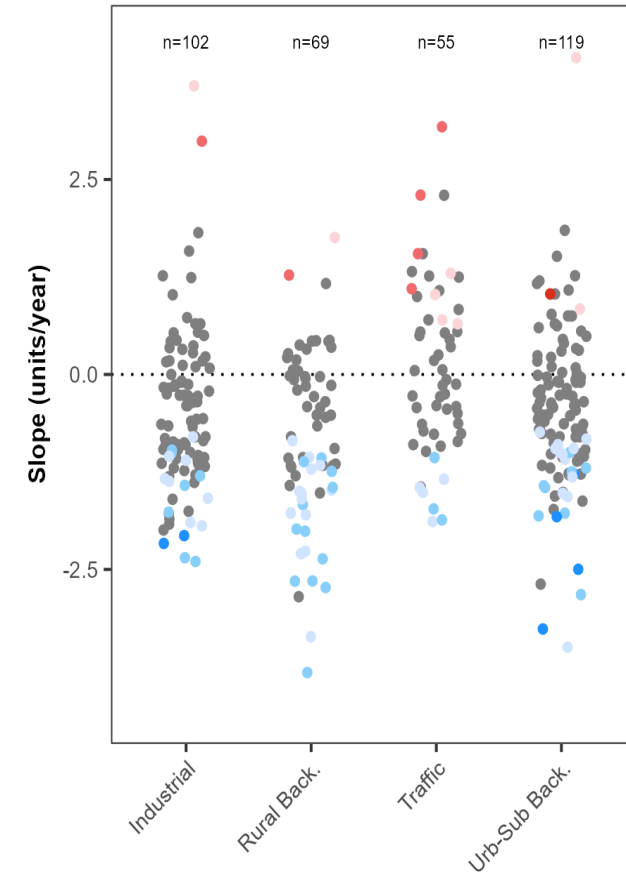
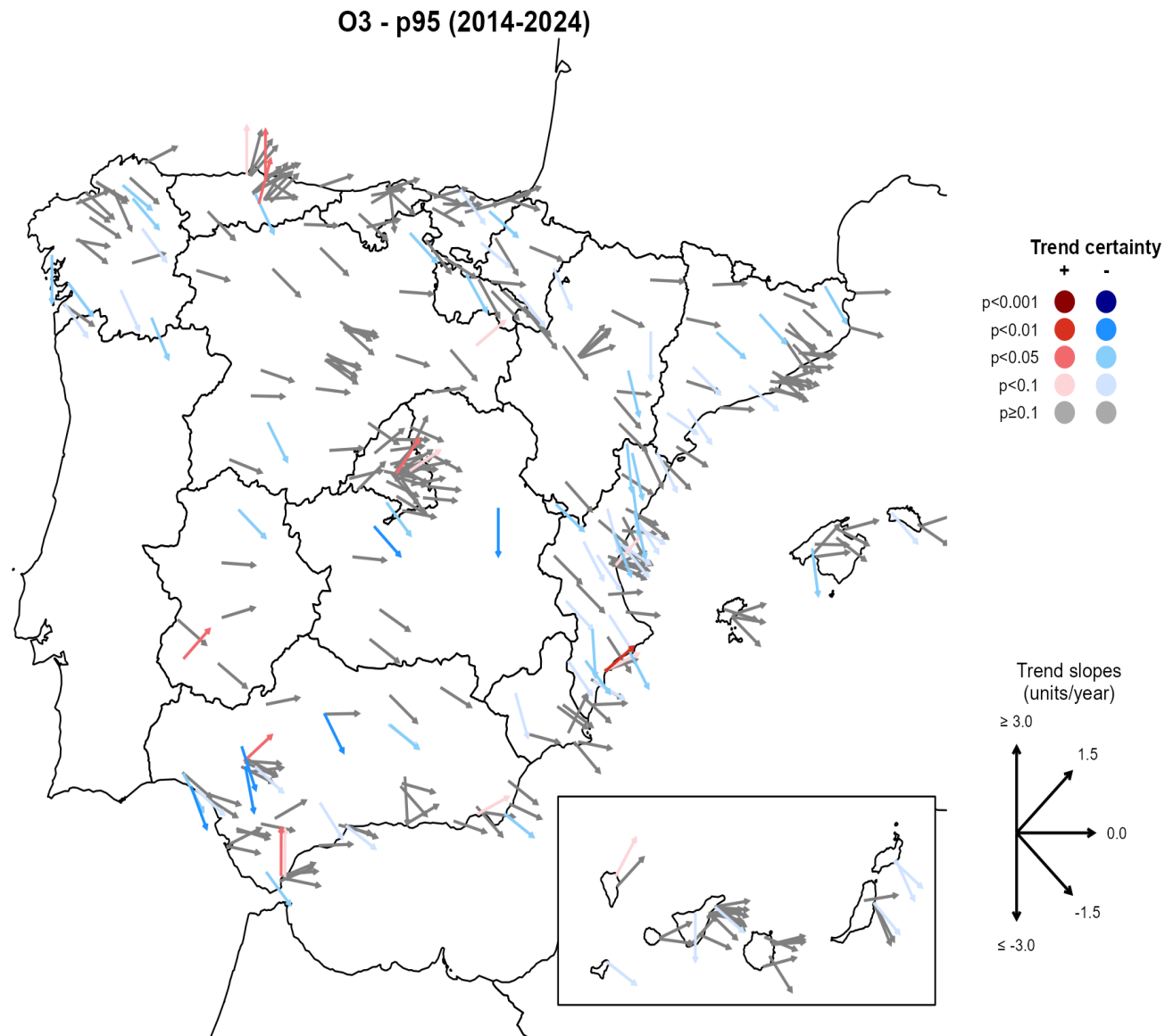
Station Class

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CCAA

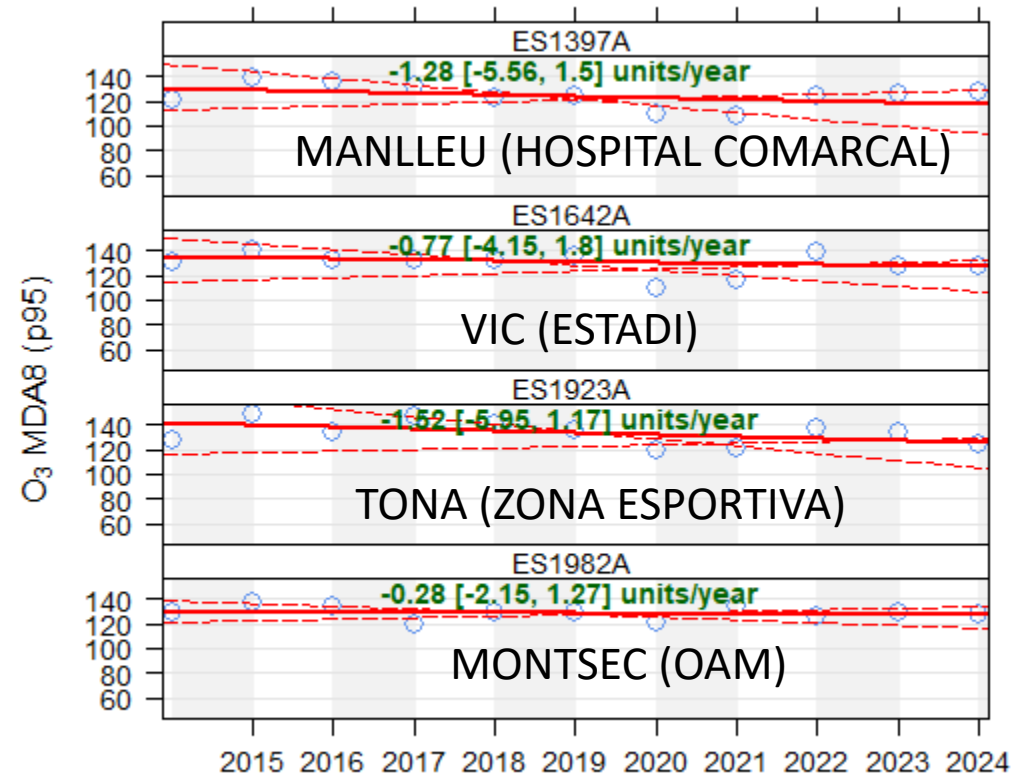
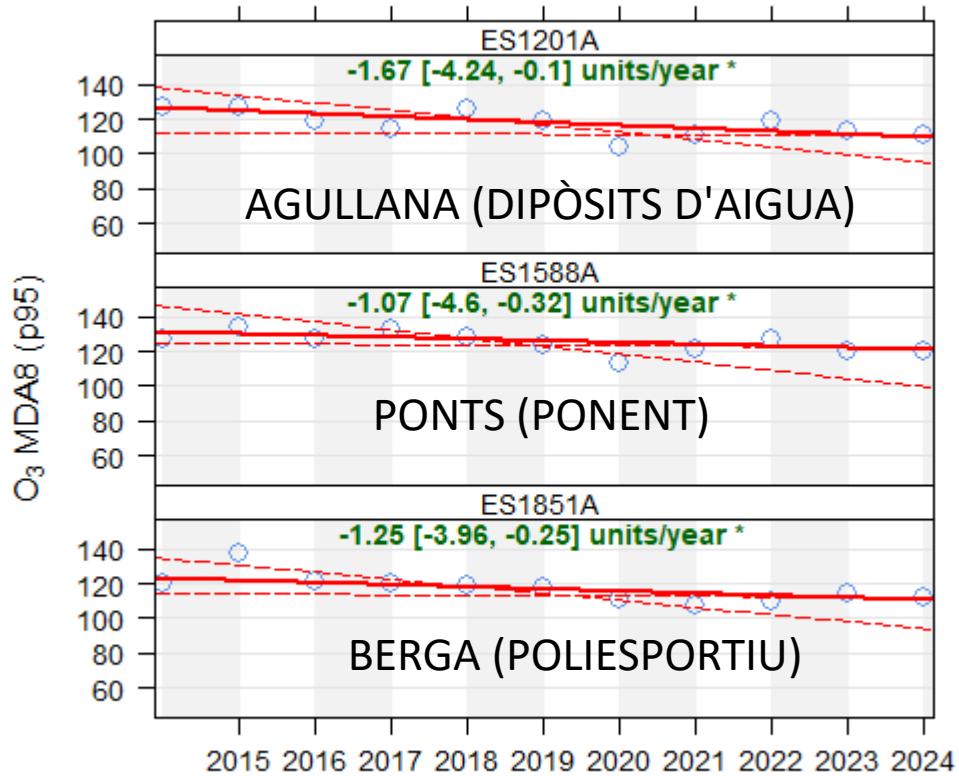
- Andalucía
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- Asturias
- C. Valenciana
- Cantabria
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- Ceuta/Melilla
- Extremadura
- Galicia
- I. Balears
- I. Canarias
- La Rioja
- Madrid
- Murcia
- Navarra
- P. Vasco

El problema del ozó troposfèric



El problema del ozó troposfèric

De les 34 estacions solament 3 tenen tendència decreixent ss!!!!!!



Guies per disseny de plans i selecció de mesures cost-efectives



https://libreria.miteco.gob.es/libro/bases-cientificas-para-un-plan-nacional-de-ozono_3390/



<https://digital.csic.es/handle/10261/385086>



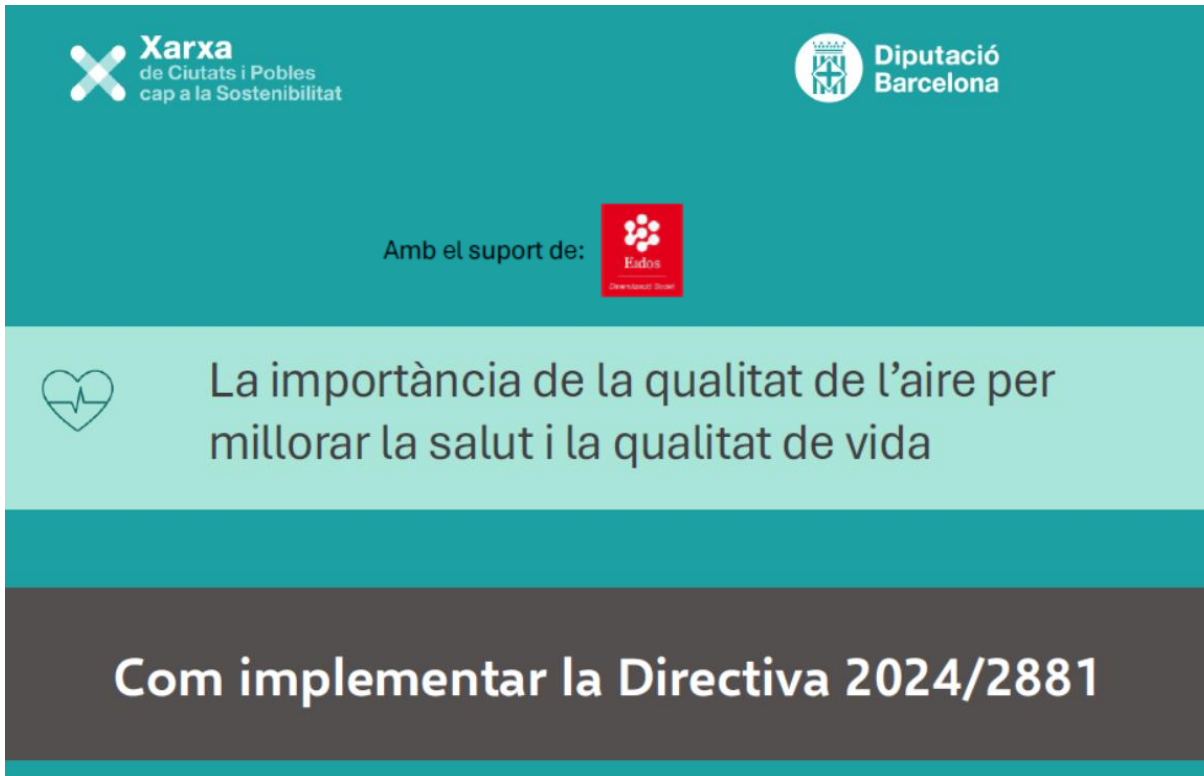
<https://libreria.miteco.gob.es/media/miteco/files/book-attachment-54.pdf>


Consideracions finals


- Era molt necessari tenir una nova Directiva amb valors límit més estrictes
- En alguns casos portem 20 anys de retard
- No deuríem de demanar pròrroga de compliment: retardaria implementació de mesures
- Els valors límit son assequibles però òbviament l'escenari business as usual, no és suficient
- NO₂ sabem el que s'ha de fer i hi ha mesures al respecte
- PM10 i PM2.5: partícules secundaries, i de resuspensió (obres i trànsit) i crema de biomassa domèstica i agrícola
- PM10, PM2.5 i BaP: Plans per zones rurals són necessaris
- O₃ complex, però no impossible. Manca de mesures mostra tendències planes
- Moltes fonts complint VL emissions de NOx però amb una alta densitat de focus (trànsit, indústries, centrals tèrmiques, port, aeroport, agricultura i ramaderia) poden causar un problema greu de precursors d'O₃. Cal aplicar mesures addicionals, la directiva ho preveu


Gràcies per la seva atenció!!!!


xavier.querol@idaea.csic.es



 **Xarxa**
de Ciutats i Pobles
cap a la Sostenibilitat

 **Diputació**
Barcelona

Amb el suport de: 

 La importància de la qualitat de l'aire per millorar la salut i la qualitat de vida

Com implementar la Directiva 2024/2881



 VICEPRESIDENCIA
TERCERA DEL GOBIERNO

MINISTERIO
PARA LA TRANSICIÓN ECOLÓGICA
Y EL RETO DEMOGRÁFICO

 **Generalitat**
de Catalunya

Perquè és important tenir valors límit estrictes?

ENVIRONMENTAL STANDARDS FOR AIR QUALITY

293 °K , 101,3 kPa,

except PM and metals, Evriron. Cond.

Directive 2008/50/EC, RD 102/2011

Hourly	350 µg/m ³ SO ₂	24 times per year
Daily	125 µg/m ³ SO ₂	3 times per year
Annual prot. ecos.	20 µg/m ³ SO ₂	not exceeding annual and mean 1 Oct-31 Mar

Hourly	200 µg/m ³ NO ₂	18 times per year
Annual	40 µg/m ³ NO ₂	not exceeding
Annual prot. vegetation	30 µg/m ³ NO _x	(reported as NO ₂) not exceeding

Annual	5 µg/m ³ Benzene	not exceeding
Mean 8-h max. in a day	10 mg/m ³ CO	not exceeding

Annual	500 ng/m ³ Pb	not exceeding
--------	--------------------------	---------------

Annual	40 µg/m ³ PM ₁₀	not exceeding
Daily	50 µg/m ³ PM ₁₀	n<35 per year
Annual	(25 and 20 (18) µg/m ³ PM _{2.5})	not exceeding
2010-2020	(reducing 20% PM _{2.5}	triennial for mean of urban background)

2004/107/EC, RD 102/2011

Annual	6 ng/m ³ As	not exceeding
Annual	20 ng/m ³ Ni	not exceeding
Annual	5 ng/m ³ Cd	not exceeding

Annual	1 ng/m ³ Benzo[α]pirene	not exceeding
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CRITICAL PARAMETERS (INFRINGEMENTS)

Perquè és important tenir valors límit estrictes?

ENVIRONMENTAL STANDARDS FOR AIR QUALITY

AOT40 [expressed in ($\mu\text{g}/\text{m}^3\cdot\text{h}$)] = as sum of the difference between hourly levels exceeding $80 \mu\text{g}/\text{m}^3$ and $80 \mu\text{g}/\text{m}^3$ along a given period using only hourly values measured between 8.00 and 20.00 h, Central Europe Time (CET), for every day.

Target value

Protection human health

Maximum of 8 h means of a day

$120 \mu\text{g}/\text{m}^3 \text{O}_3$ not exceeding 25 day/year
mean for 3 years

Target Value

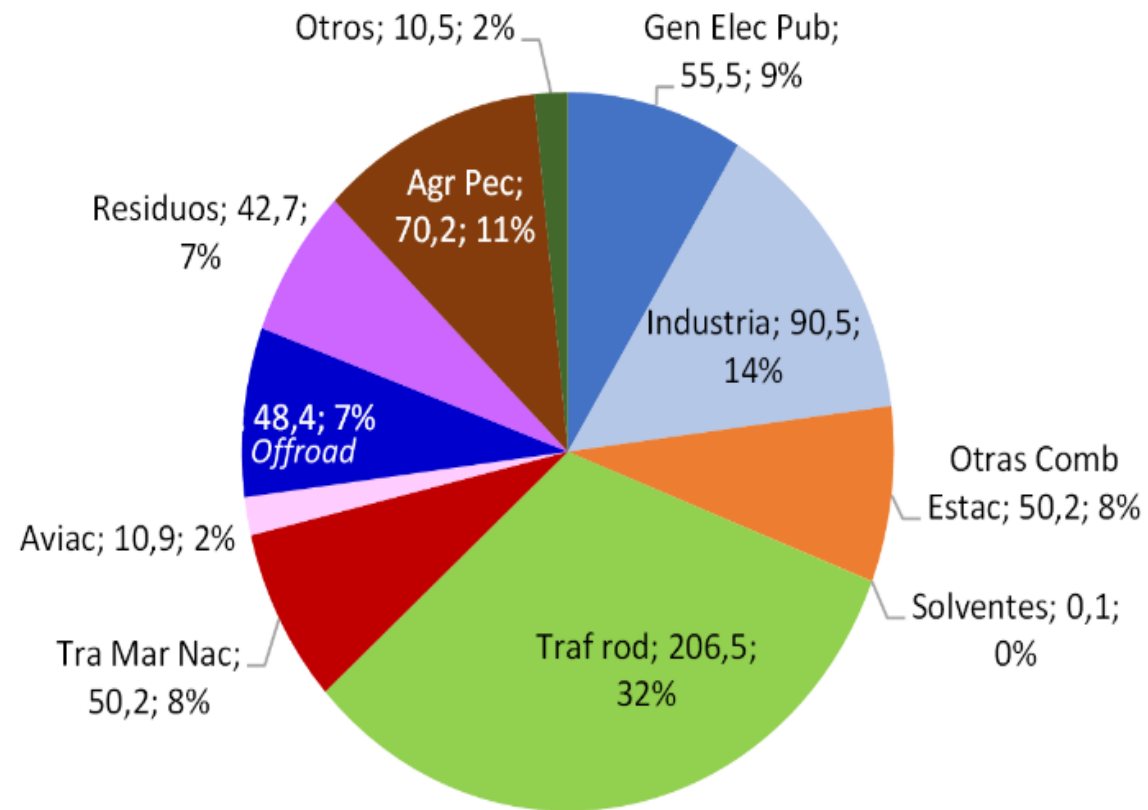
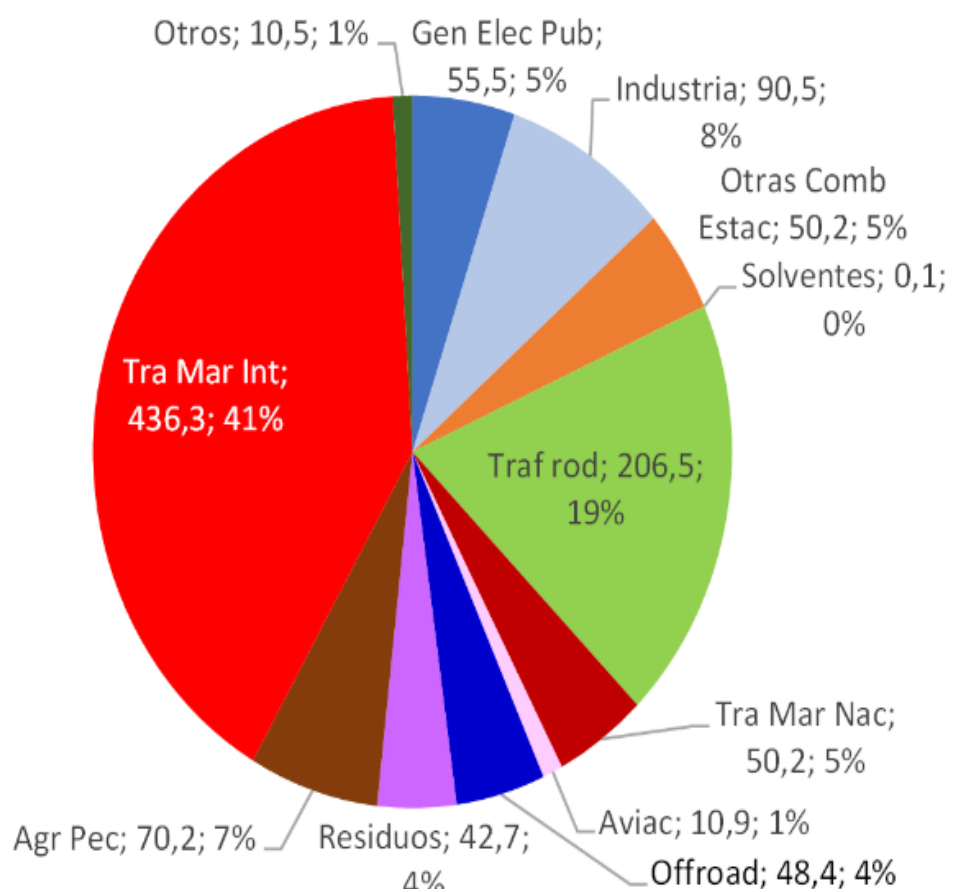
Protection of vegetation

AOT40, hourly values from Mayo to July $18.000 \mu\text{g}/\text{m}^3\cdot\text{h} \text{O}_3$ not exceeding
as a mean of 5 years (c)

Information threshold value: hourly $180 \mu\text{g}/\text{m}^3 \text{O}_3$

Alert threshold value : hourly $240 \mu\text{g}/\text{m}^3 \text{O}_3$

High levels out of and into urban areas



NOx 2023, % kt, MITERD 2025

X. Querol, 24 Abril 2026, Barcelona, Xarxa Ciutats-DIBA

Perquè és important tenir valors límit estrictes?

Kutlar Joss et al., 2017. 20 years of E.U. resistance against science-based «limit values» for PM10 & PM2.5
Int J Pub Health 2017

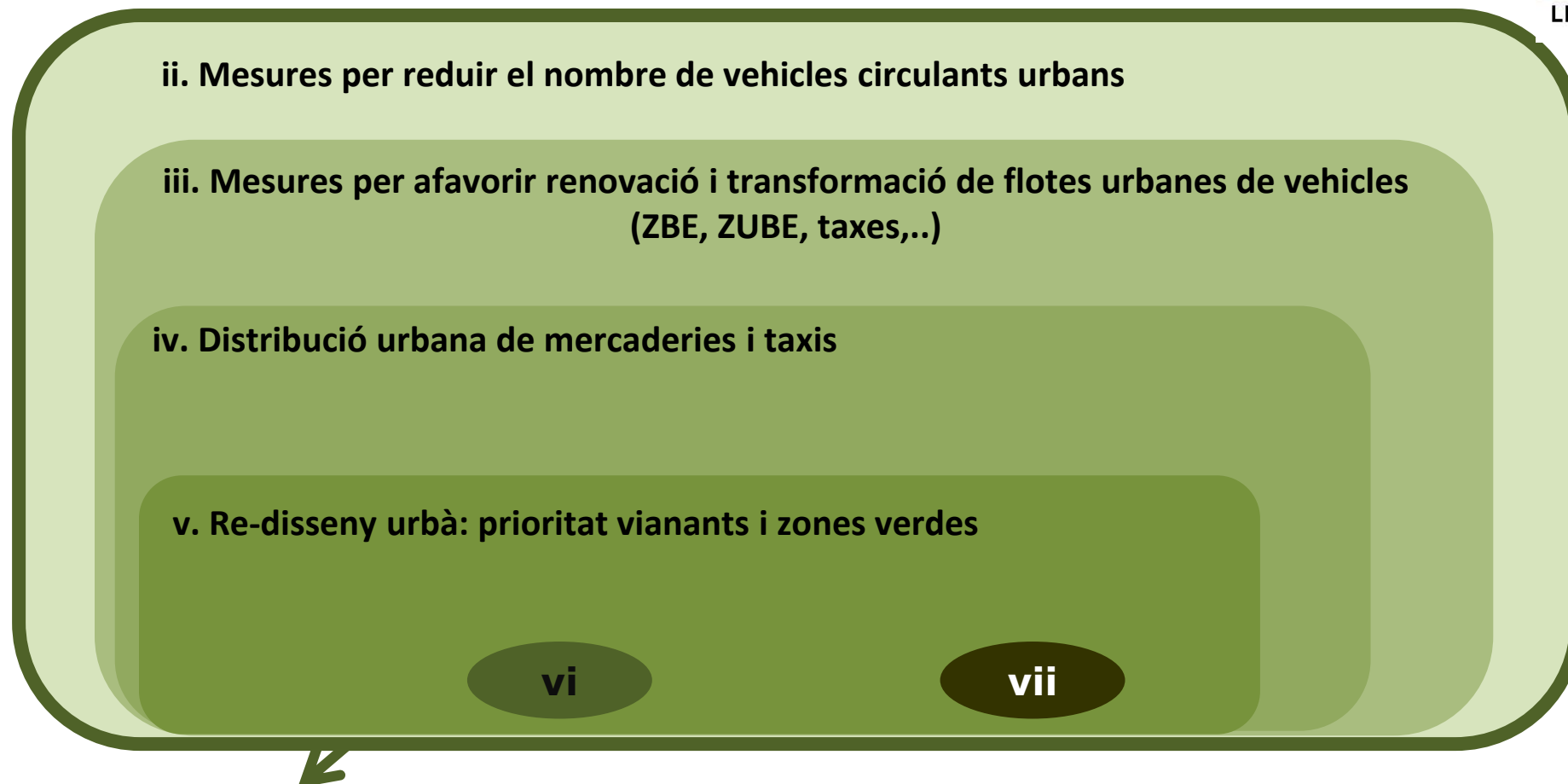
Science-based limit values
to protect human health

Politically set «limit values»

$\mu\text{g}/\text{m}^3$ Annual mean	WHO 2005 AQ Guidelines	WHO 2021 AQ Guidelines	Canada, Iceland, Iran, Australia Switzerland	USA	EU 2030	EU 2005-2029
PM ₁₀	20	15	20	--	20	40
PM _{2.5}	10	5	10 (AUST: 8)	12	10	25

Estratègies de millora de qualitat aire en base a la mobilitat

0. ELS PLANS DE QUALITAT D'AIRE HAN DE TENIR DIMENSIÓ METROPOLITANA



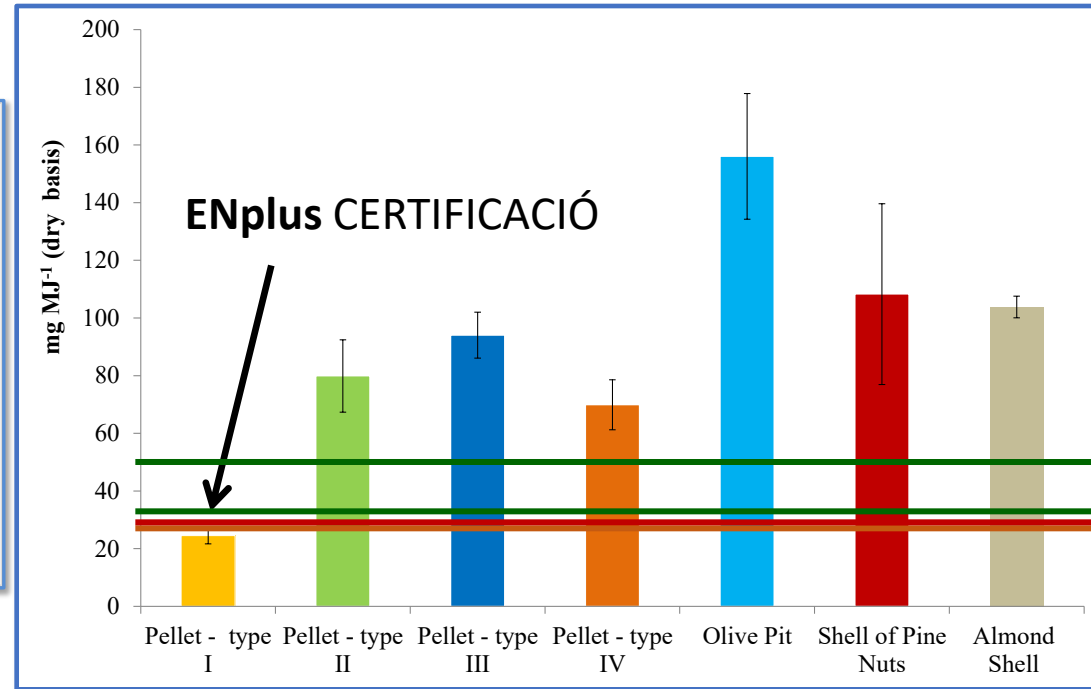
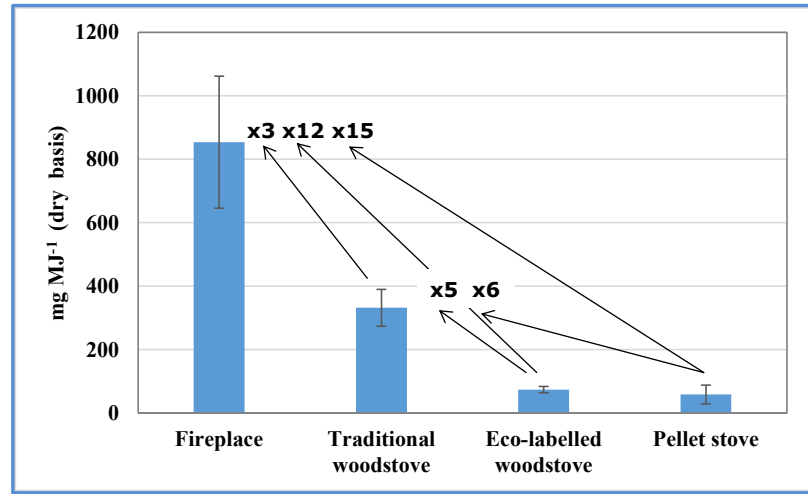
i. Millora del transport metropolità lligats a pàrquings dissuasius i connectant ciutats amb carrils bus

vi. Mesures correctives

vii. Altres mesures no-tecnològiques

Estratègies de reduccions d'emissions crema biomassa

FACTORS D'EMISSIÓ DE PM



1 kg de biomassa correspon aproximadament a 18 MJ

50 mg MJ⁻¹ in Denmark & Switzerland

35 mg MJ⁻¹ wood fuels & 25 mg MJ⁻¹ for pellets in Austria

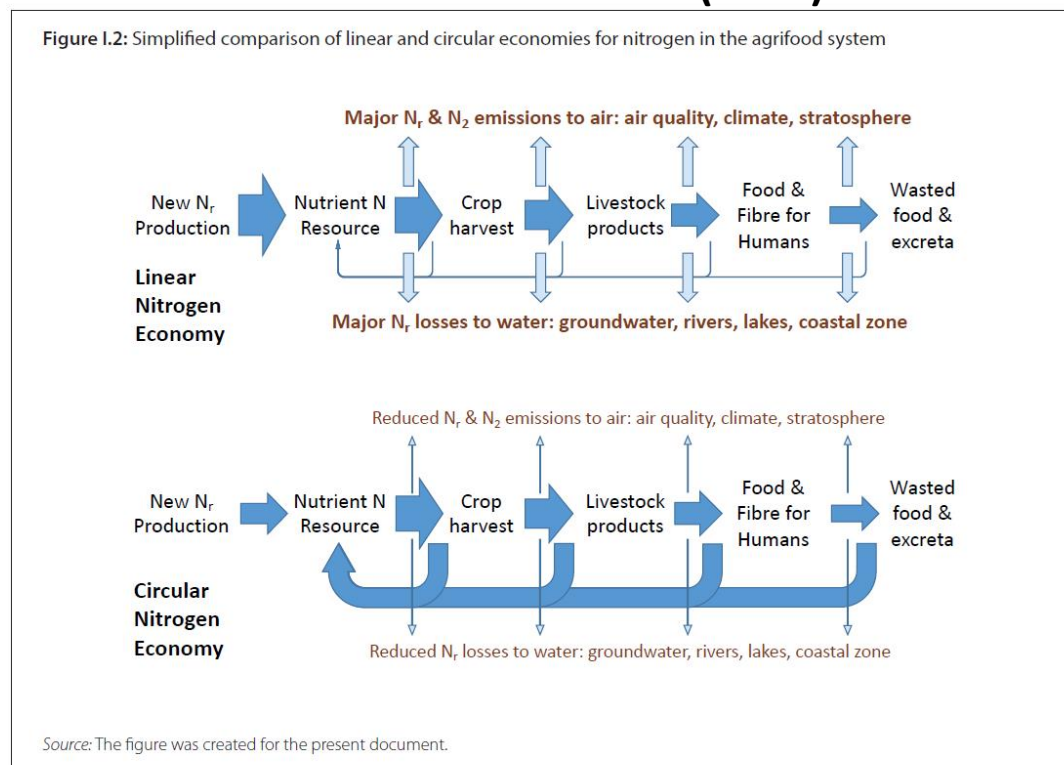
27 mg MJ⁻¹ in Germany

Estratègies de reduccions d'emissions d'amoníac agropecuari

Nitrogen Opportunities for Agriculture, Food & Environment SUTTON ET AL (2022)



SUTTON ET AL (2022)



- La dieta dels animals, que ha de tendir a una baixa dieta en nitrogen
- El disseny de la granja
- La manipulació i magatzematge dels residus
- La gestió dels residus
- L'aplicació del residu com a fertilitzant

El problema del NO₂

- **Mitjana anual:** Prevalença tendències decreixents significatives
- **6 (2 alt risc 4 moderat) estacions de trànsit i 6 (moderat) de fons urbà, totes a Província Barcelona amb risc incompliment del VLA de NO₂ per 2030, de no aplicar mesures addicionals a BAU**

ES1480A, tendència decreixent ss però al 2030: 21 [8, 32 IC] µg/m³) si no s'apliquen mesures addicionals a BAU

EAS0584 no presenta tendència ss i actualment 30 µg/m³

ES1018A y ES1814A tendències decreixents ss 19 [9, 25 IC] i 19 [11, 24 IC] µg/m³ al 2030 si BAU

ES0971A y ES1817A tendències decreixents ss 18 [11, 24 IC] i 18 [10, 23 IC] µg/m³ al 2030 si BAU

ES0694A, ES1983A, ES1453A, ES1679A, ES1929A y ES1983A, tendències decreixents ss 19 [12, 22 IC], 18 [14, 24 IC], 18 [13, 21 IC], 17 [9, 25 IC], 19 [15, 23 IC] i 18 [14, 24 IC] µg/m³

ES1903 no presenta tendència ss i actualment 19 µg/m³

- **P95 diari:** Prevalença tendències decreixents significatives
- **2 estacions de trànsit a Província Barcelona amb risc incompliment del VLD de NO₂ per 2030, de no aplicar mesures addicionals a BAU**

ES1814A no presenta tendència ss i actualment 49 µg/m³

ES1438A tendències decreixents ss , 59 µg/m³ actuals i projecció 42 [13, 52 IC] µg/m³ al 2030 si BAU

P95 anual MAD8h O₃: Prevalença sense tendències decreixents significatives

- 7 rurals molt alt risc incompliment del VO, sinó es prenen mesures addicionals a BAU:
ES1923A y ES1778A (Barcelona) i ES1982A (Lleida), amb P95 de las MDA8h de 126-131 µg/m³, sense tendències decreixents ss
ES1222A (Barcelona), ES1310A y ES1311A (Girona), ES0014R y ES1588A (Lleida), sense tendències i amb valors 119-122 µg/m³
- 1 fonts urbà (Barcelona):
ES1397A amb 126 µg/m³ i sense tendència decreixent ss
ES1910A, ídem amb 118 µg/m³

El problema del PM10

VLA PM10: Prevalença no tendències decreixents significatives

- 5 de trànsit amb alt risc incompliment del VLA:
 - 5 no tendència ss: **ES0559A, ES0971A, ES1148A, ES1480A, ES1817A (Barcelona), actual 24-29 $\mu\text{g}/\text{m}^3$**
 - 2 amb tendència decreixent: ES1438A y ES1891A però amb valors esperats per 2030 de 20 [17, 23 IC] i 21 [17, 25 IC] $\mu\text{g}/\text{m}^3$, però amb descompte natural probable compliment
- 4 industrials amb alt risc incompliment del VLA:
 - ES1663A, ES1870A, ES2011A y ES2012A (Barcelona) amb concentracions actuals 22-28 $\mu\text{g}/\text{m}^3$ totes de Barcelona, sense tendència ss**
- 8 estacions amb alt risc incompliment del VLA:
 - ES0567A, ES0691A, ES0692A, ES0963A, ES1396A, ES1856A, ES1900A y ES2027A (Barcelona) amb concentracions actuals 19-27 $\mu\text{g}/\text{m}^3$, sense tendència ss

Mesurar Cl i Na a PM10 (120 dies any)

VLD PM10: Prevalença no tendències decreixents significatives

- VLD 3 estacions amb risc ES1900A, ES1663A, ES0971A (Barcelona) 46-49 $\mu\text{g}/\text{m}^3$ actuals P95, no tendència ss

El problema del PM2.5

VLA PM2.5: Prevalença no tendències decreixents significatives

- 3 trànsit amb alt risc incompliment del VLA
ES1480A, ES1438A i ES0559A 13-17 $\mu\text{g}/\text{m}^3$ actuals i sense tendència ss
- 3 urbanes i suburbanes en Barcelona:
ES1856A, ES0691A i ES0567A, 11-15 $\mu\text{g}/\text{m}^3$ actuals i sense tendència ss

VLA PM2.5: Prevalença no tendències decreixents significatives

2 trànsit amb alt risc incompliment del VLA:

ES1438A y ES0559A: 26 y 30 $\mu\text{g}/\text{m}^3$ actuals i sense tendència ss

1 fons urbà alt risc incompliment del VLA:

ES0691A 26 $\mu\text{g}/\text{m}^3$ actuals i sense tendència ss