

Assessing on Spain's Expected Compliance with 2030 EU Air Quality Standards Using 2014–2024 Observational Data

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Elaborated for:



Results reflect the opinion of authors, not necessarily that of the MITERD



27th Meeting of the Task Force on Measurements and Modelling

Rationale

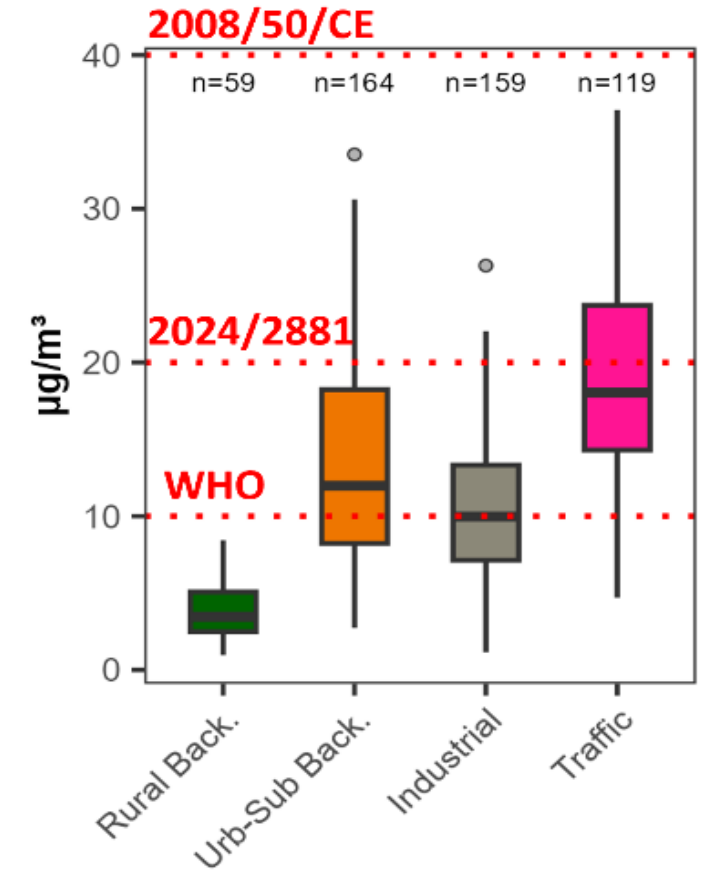
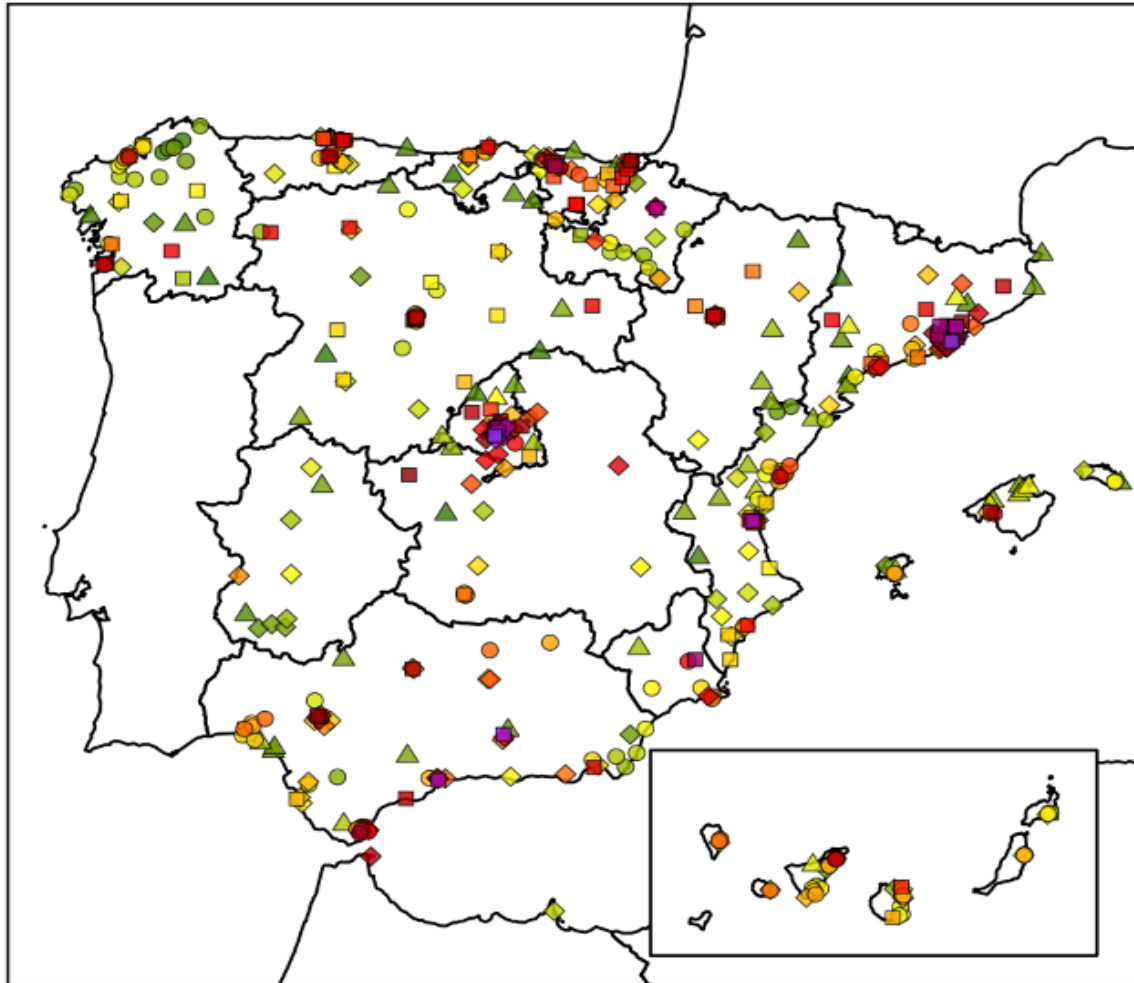
- The most appropriate approach for the 2030 projection are CTM models
- Scenarios can be drawn and compliance evaluated
- This is specially necessary to assess on the most effective measures
- Errors may be relevant, but this is the only way for projections/scenarios
- As a support to complement to the modelling outputs, trend analysis may be used to project the 2030 concentrations under the 'BAU' scenario

Objectives

- 2014-2024 Theil-Sen trend analysis for the critical pollutants: **NO₂, PM10, PM2.5 and O₃** for the whole Spain
- Applying slopes to project 2030 concentrations under 'BAU'
- Identify, sites, cities and regions where add. measures to BAU are needed

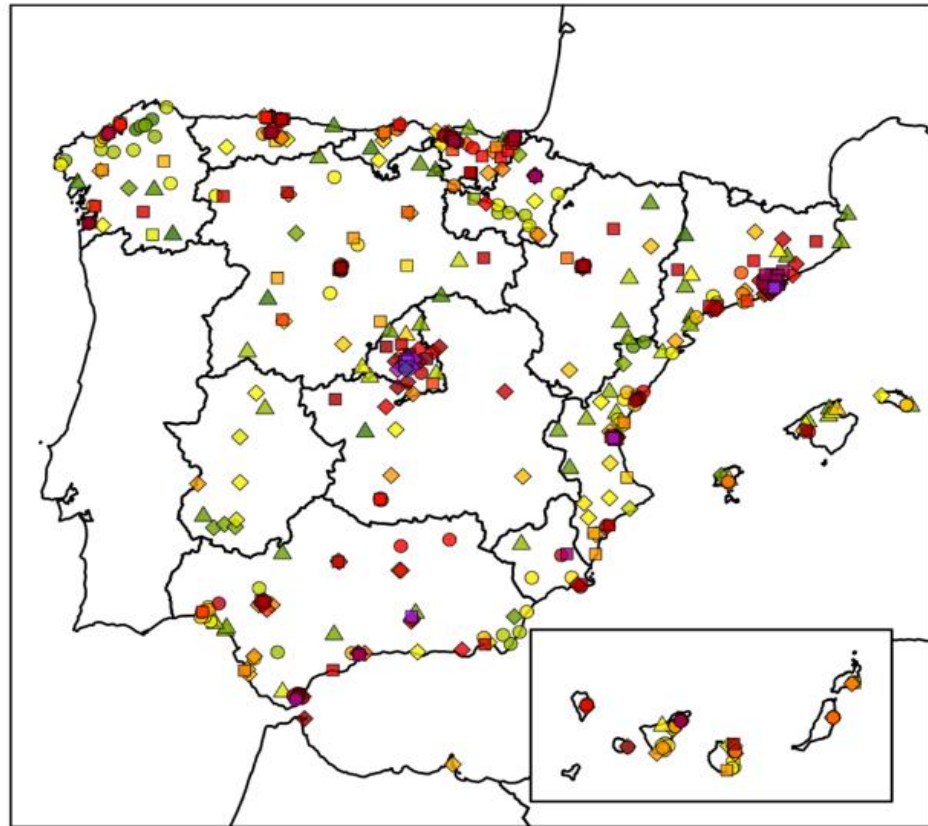
2022-2024 Evaluation: NO₂

NO₂ Annual Avg. 2022-2024

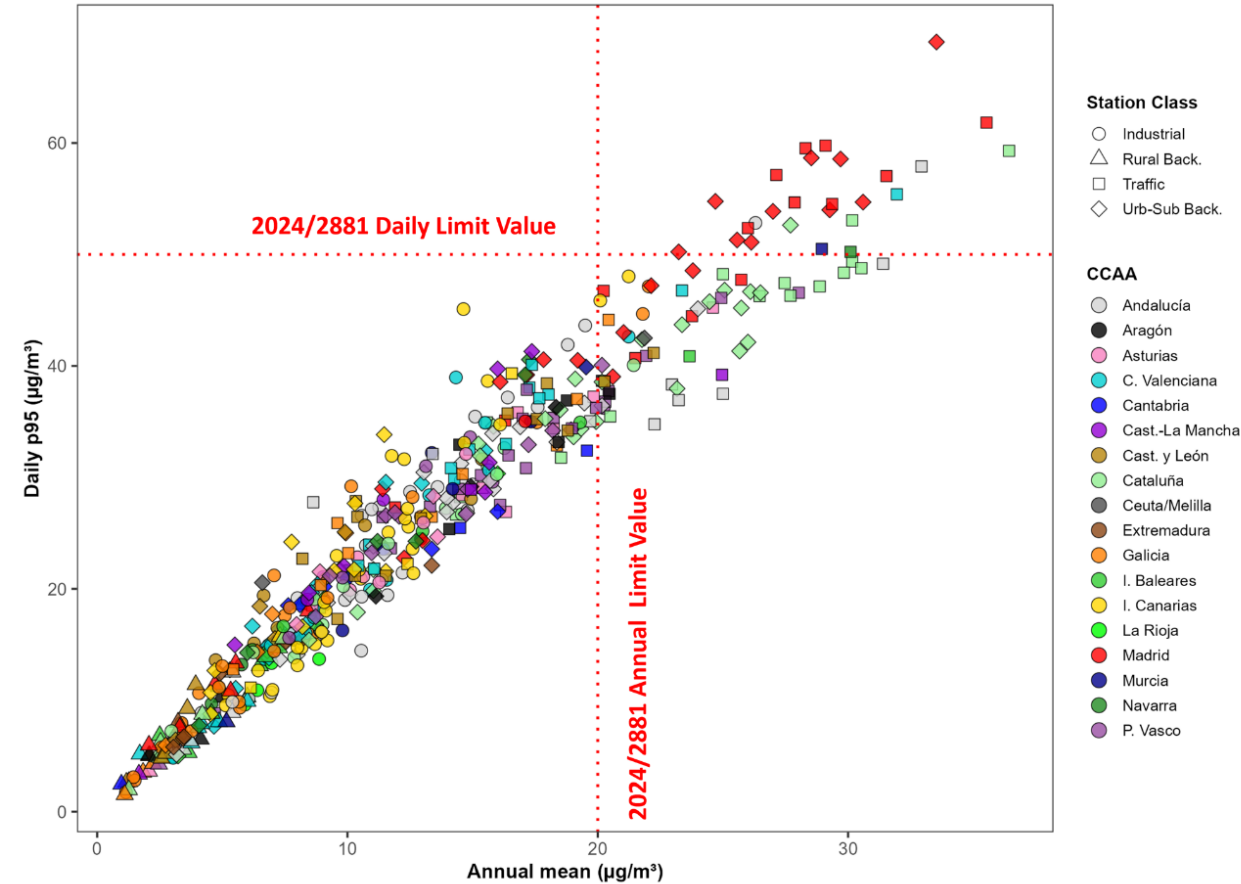


2022-2024 Evaluation: NO₂

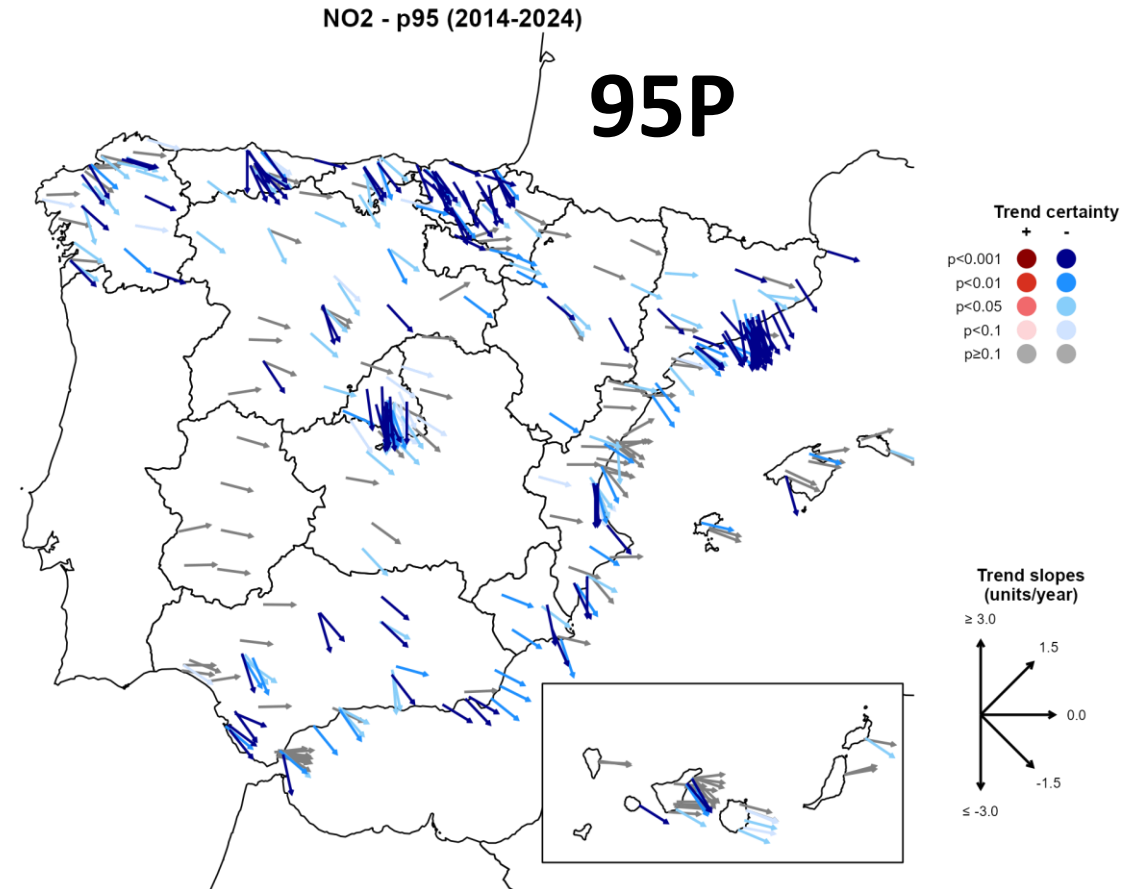
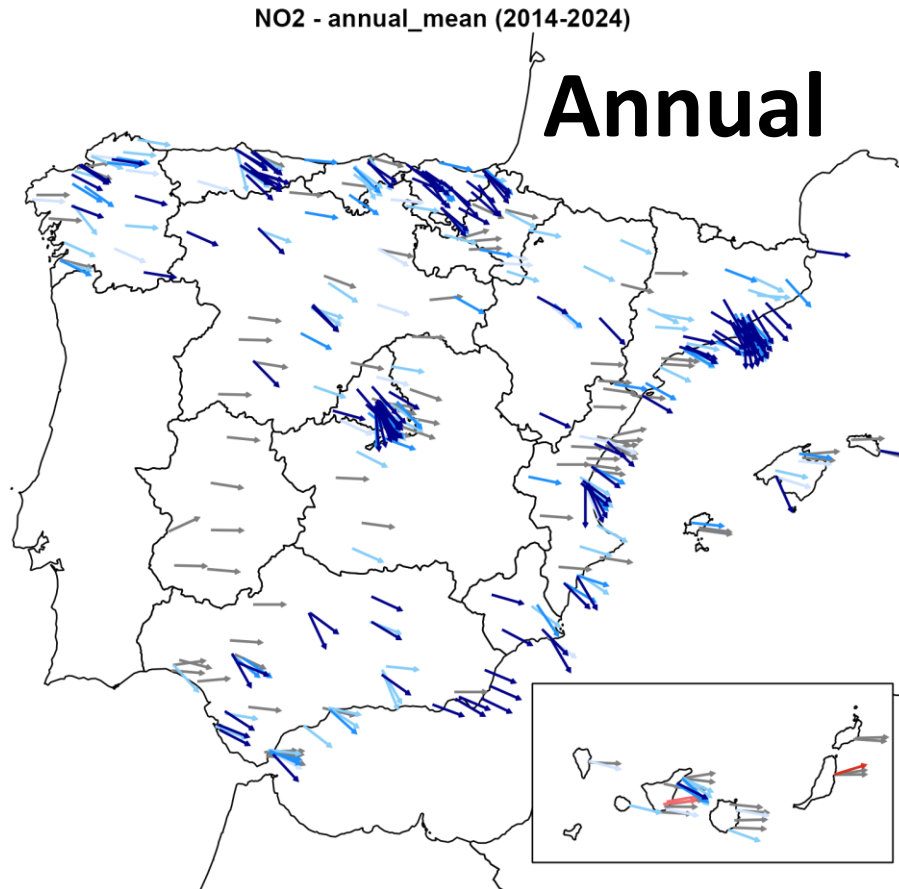
NO₂ daily p95 2022-2024



NO₂ - 2022-2024

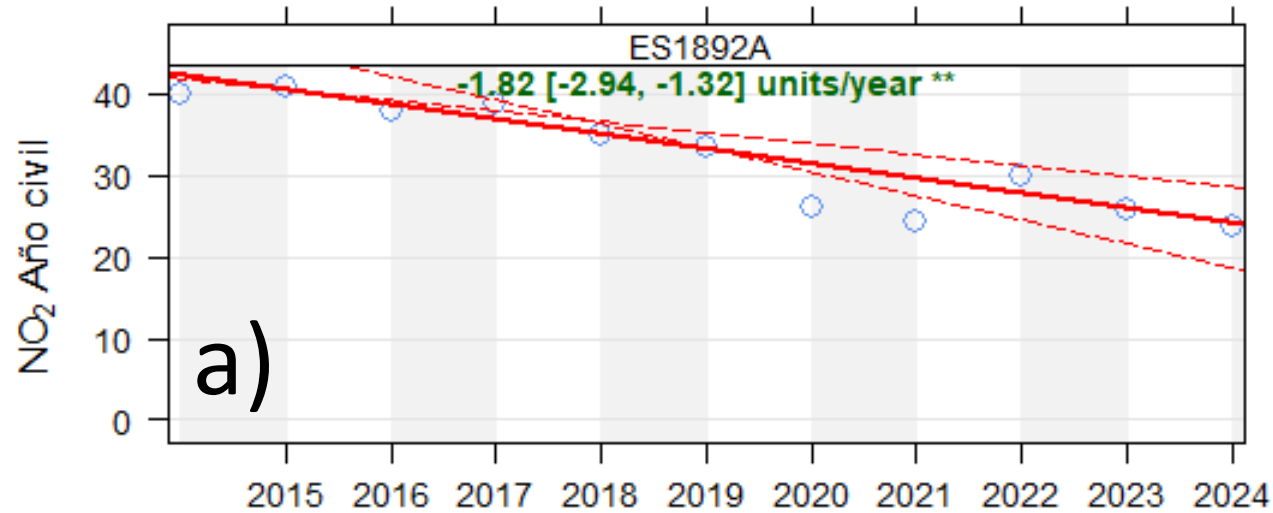


2014-2024 trends: NO₂

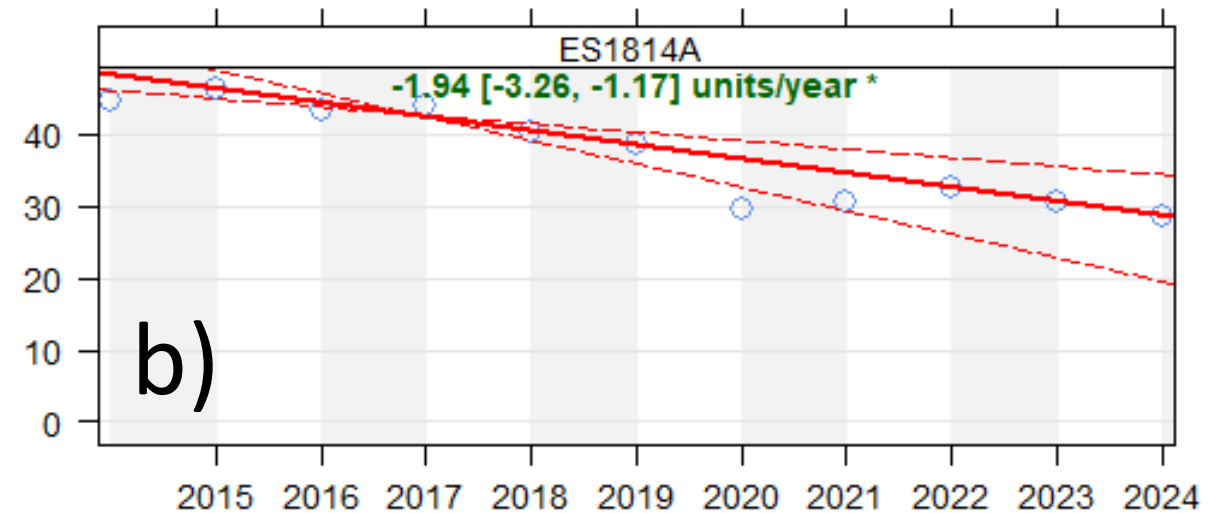


2014-2024 trends: NO₂

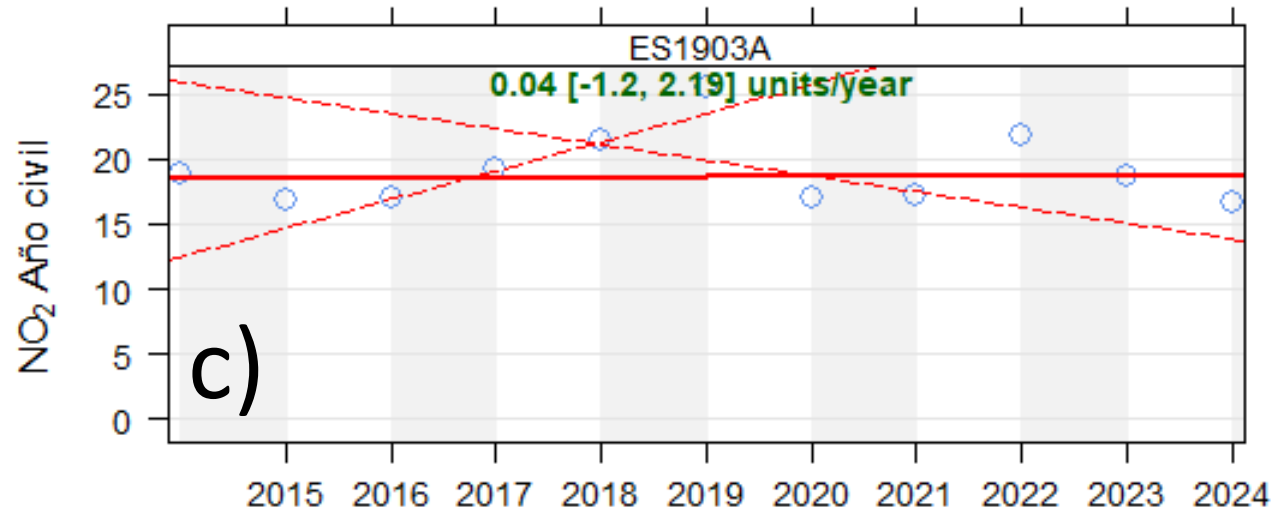
EL PRAT DE LLOBREGAT (JARDINS DE LA PAU)



MOLLET DEL VALLÈS (AP7 KM. 139)



VILADECANS (ATRIUM)



Projections 2030: NO₂

31 µg/m³ and no ss tren

22 [15, 25 CI] µg/m³ in 2030, p<0,05

18 [13, 22 CI] µg/m³ in 2030, p<0,05

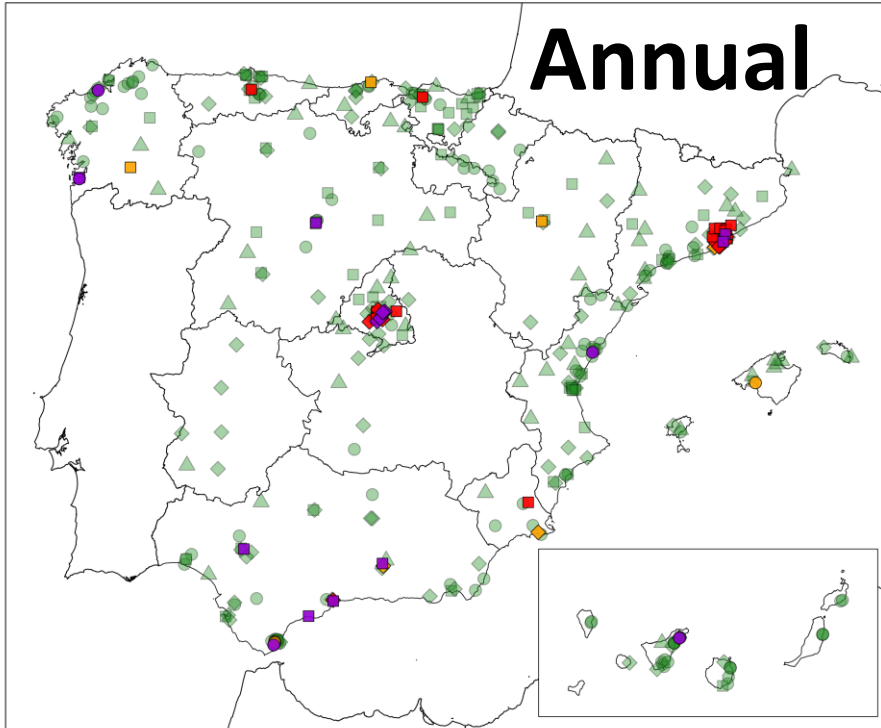
16 µg/m³ and no ss tren

14 [11, 17 CI] µg/m³ in 2030, p<0,05

NO₂ (annual average)

VLA: 20 µg/m³ (n = 398)

Annual



Thick blue border = increasing trend

Compliance 2030
VLA

- Exceeds limit: 2030 (trend) or 2024 (no trend)
- 2030 upper CI exceeds limit, trend
- ≥90% limit: 2030 (trend) or 2024 (no trend)
- Low risk

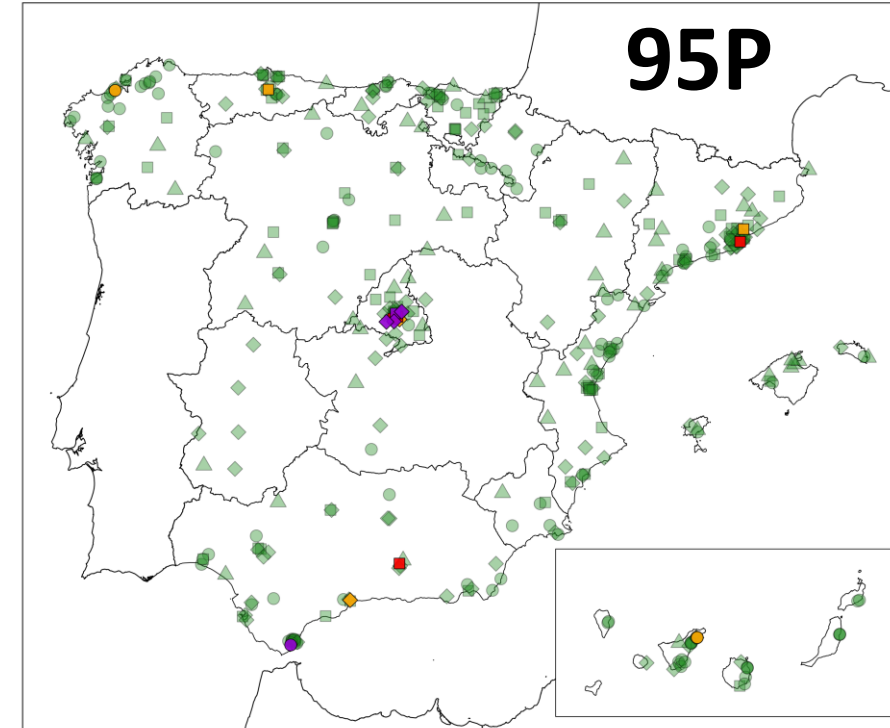
Station type

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

NO₂ (daily p95)

VLD: 50 µg/m³ (n = 398)

95P



Thick blue border = increasing trend

Compliance 2030
VLD

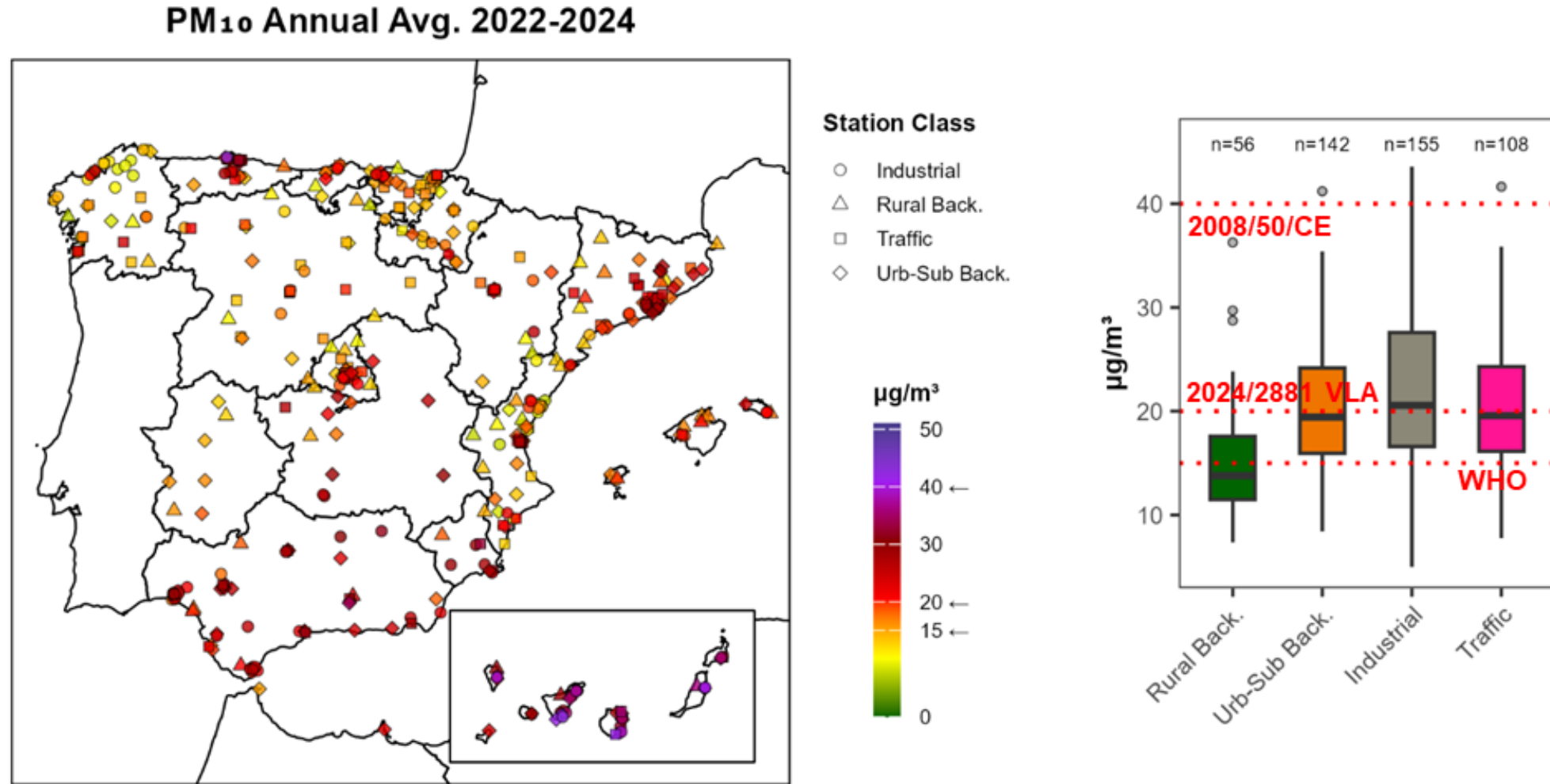
- Exceeds limit: 2030 (trend) or 2024 (no trend)
- 2030 upper CI exceeds limit, trend
- ≥90% limit: 2030 (trend) or 2024 (no trend)
- Low risk

Station type

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

Preliminary results

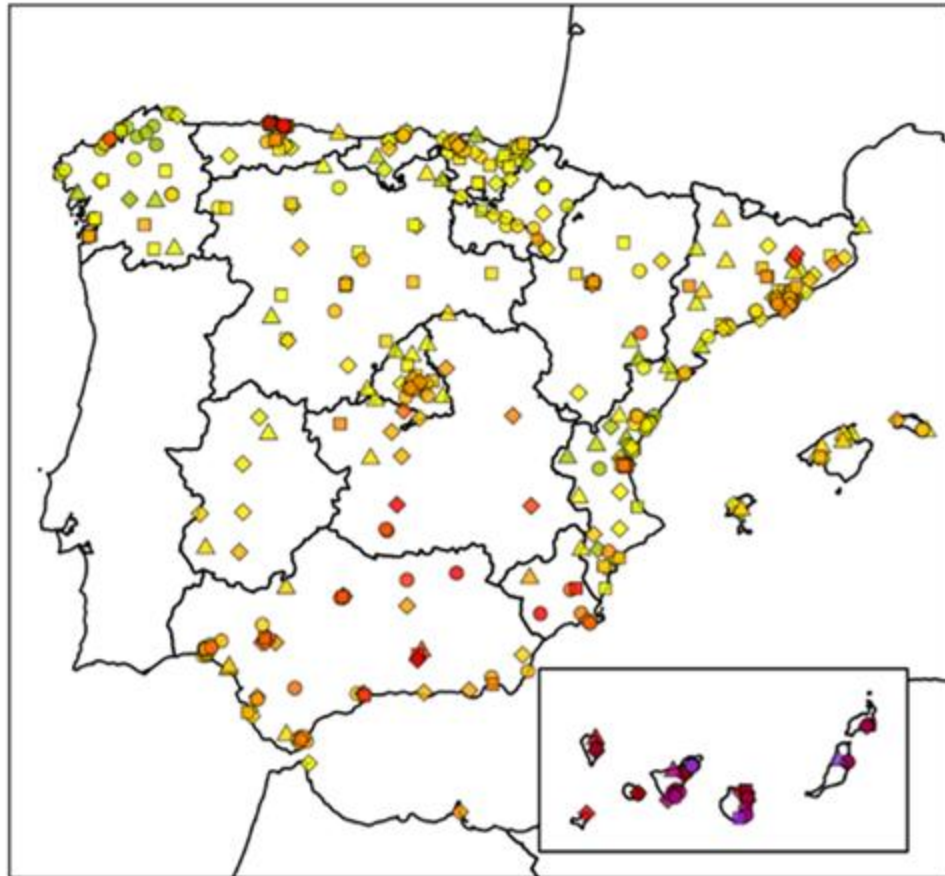
2022-2024 Evaluation: PM10



2022-2024 Evaluation: PM10

Sea salt and desert dust in Canary Is.

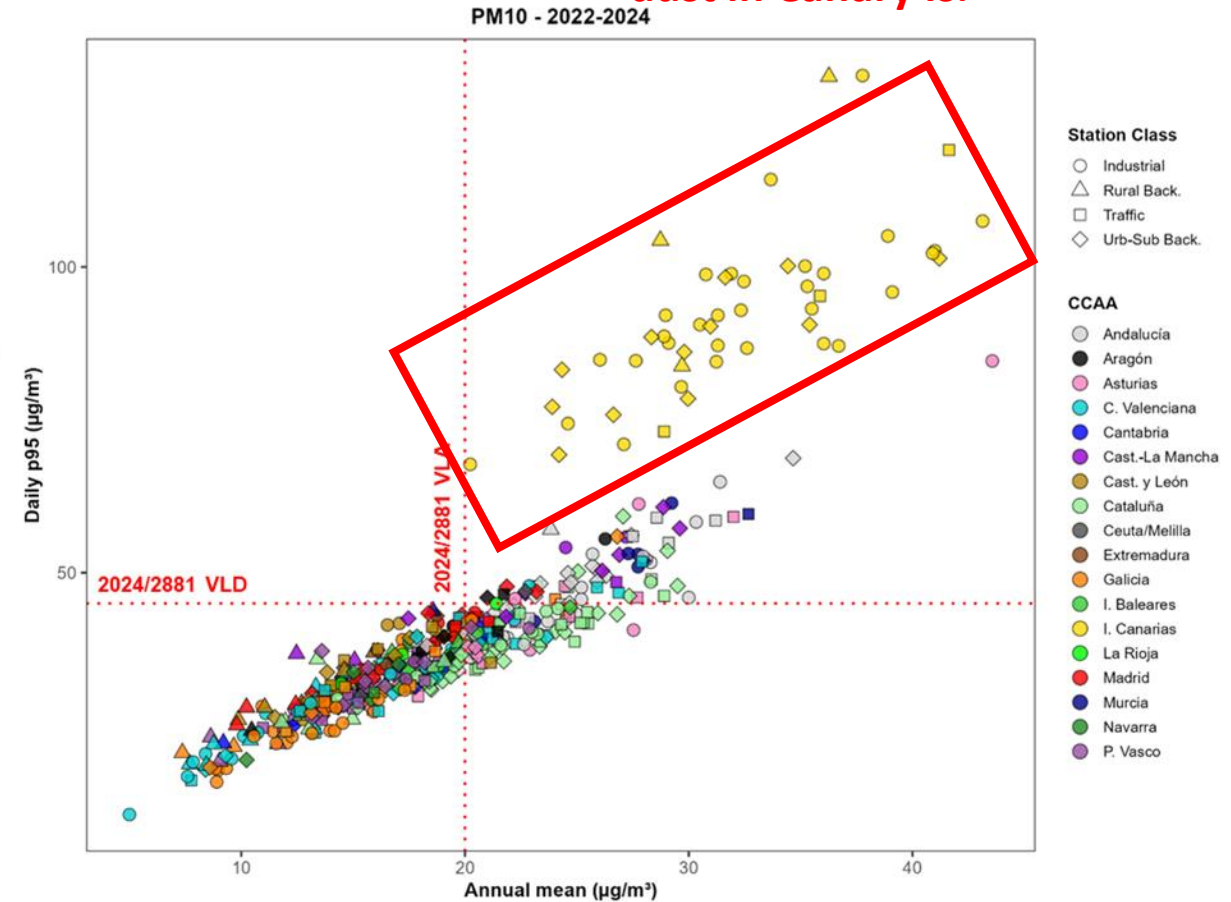
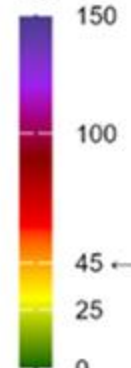
PM₁₀ daily p95 2022-2024



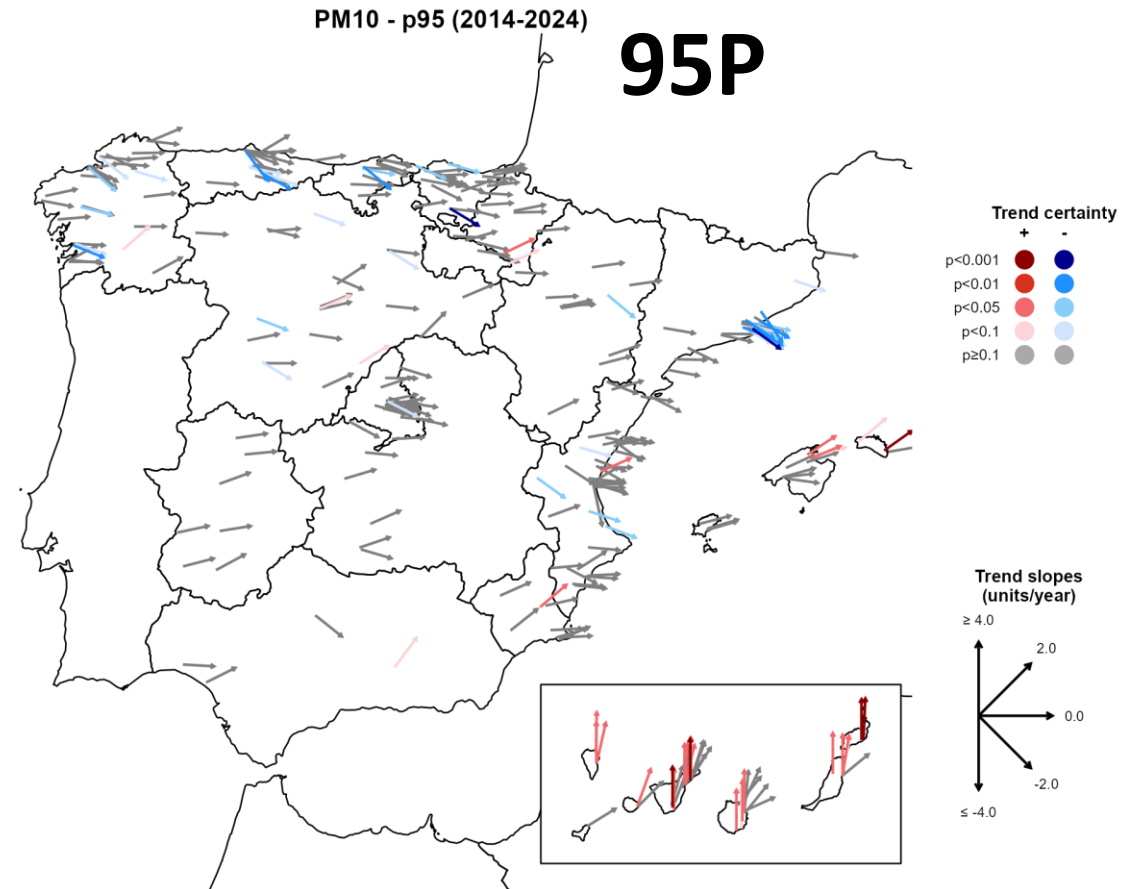
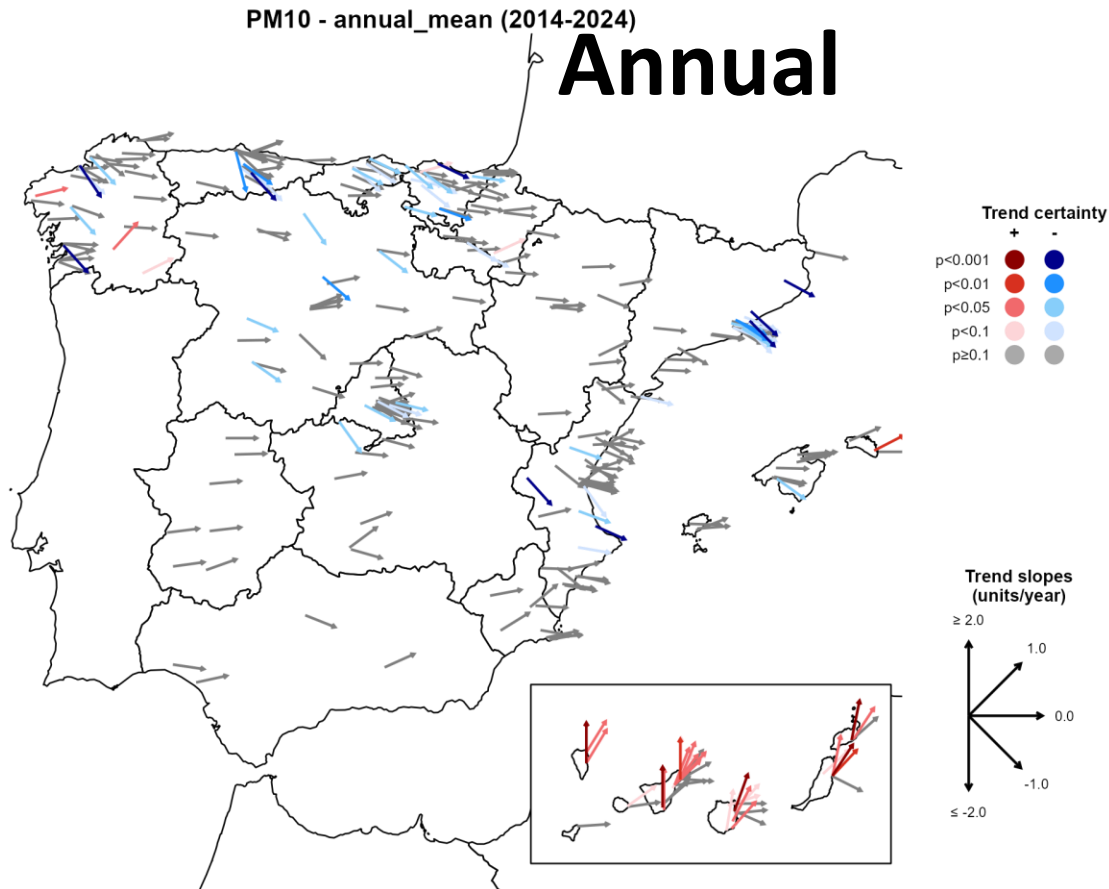
Station Class

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

µg/m³



2014-2024 trends: PM10



Projections 2030: PM10

PM₁₀ (annual average)

VLA: 20 µg/m³ (n = 295)

Annual

Compliance 2030
VLA

- Exceeds limit: 2030 (trend) or 2024 (no trend)
- 2030 upper CI exceeds limit, trend
- ≥90% limit: 2030 (trend) or 2024 (no trend)
- Low risk

Station type

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

Thick blue border = increasing trend

PM₁₀ (daily p95)

VLD: 45 µg/m³ (n = 295)

95P

Compliance 2030
VLD

- Exceeds limit: 2030 (trend) or 2024 (no trend)
- 2030 upper CI exceeds limit, trend
- ≥90% limit: 2030 (trend) or 2024 (no trend)
- Low risk

Station type

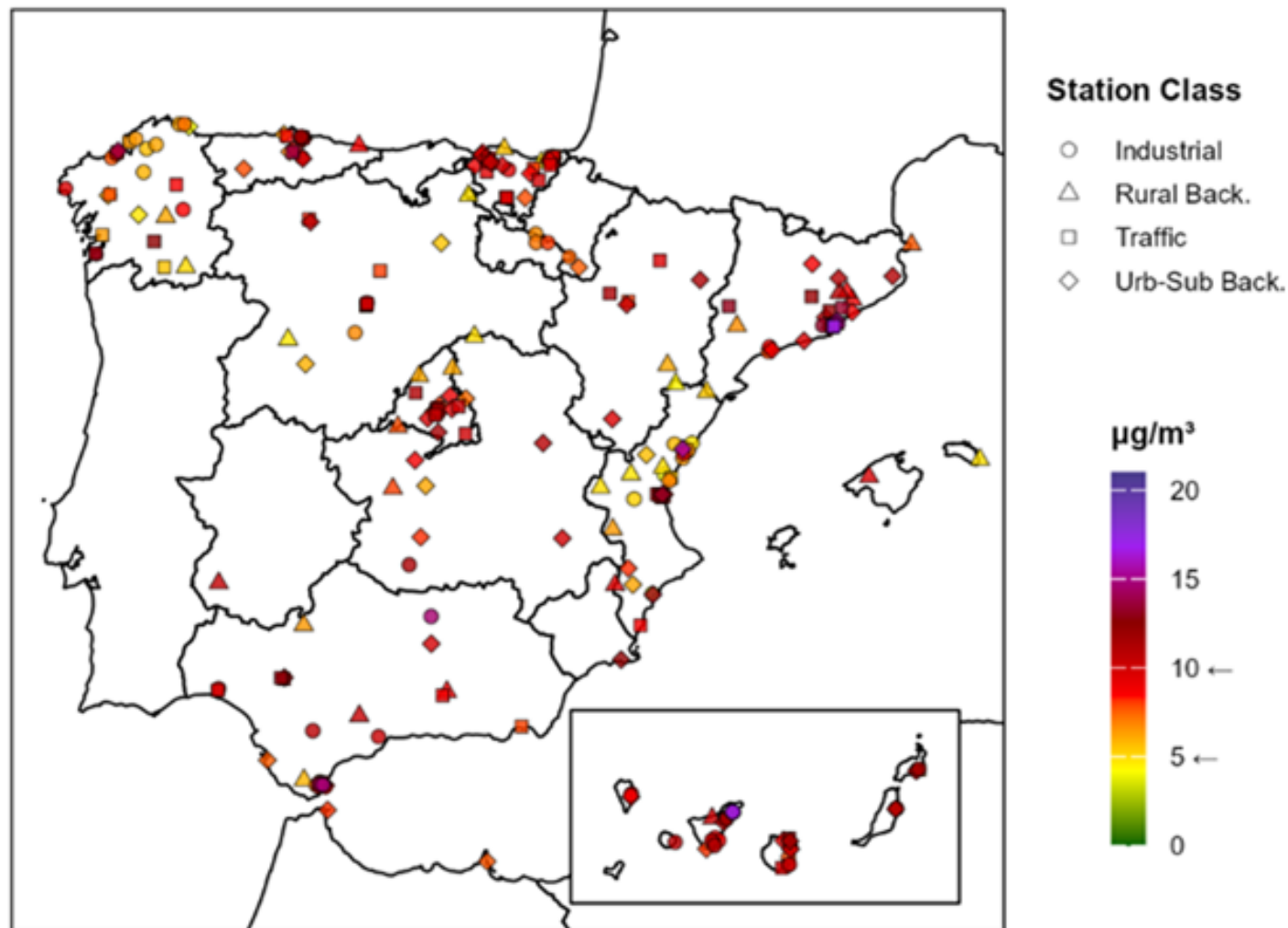
- Industrial
- Rural Back.
- Traffic
- Urb-Sub Back.

Thick blue border = increasing trend

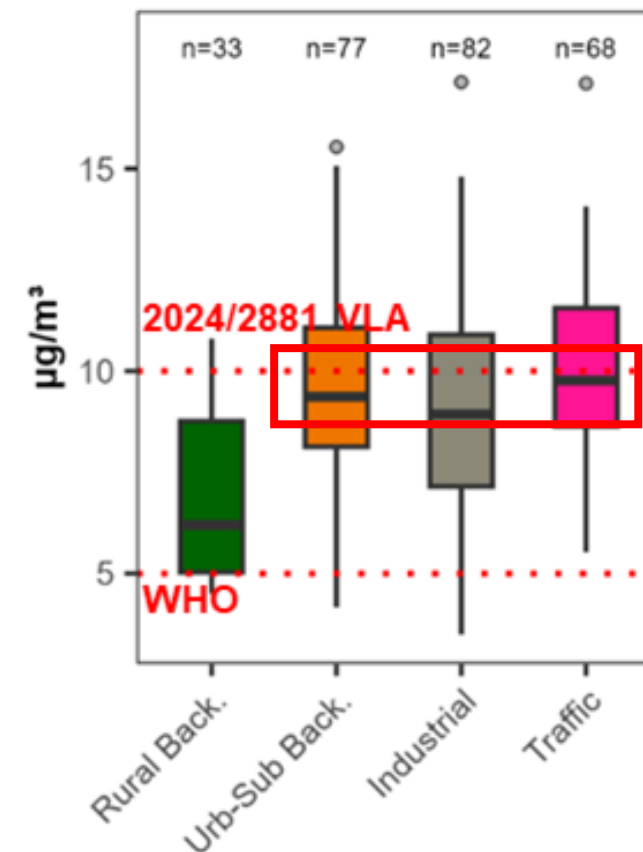
Preliminary results

2022-2024 Evaluation: PM_{2.5}

PM_{2.5} Annual Avg. 2022-2024

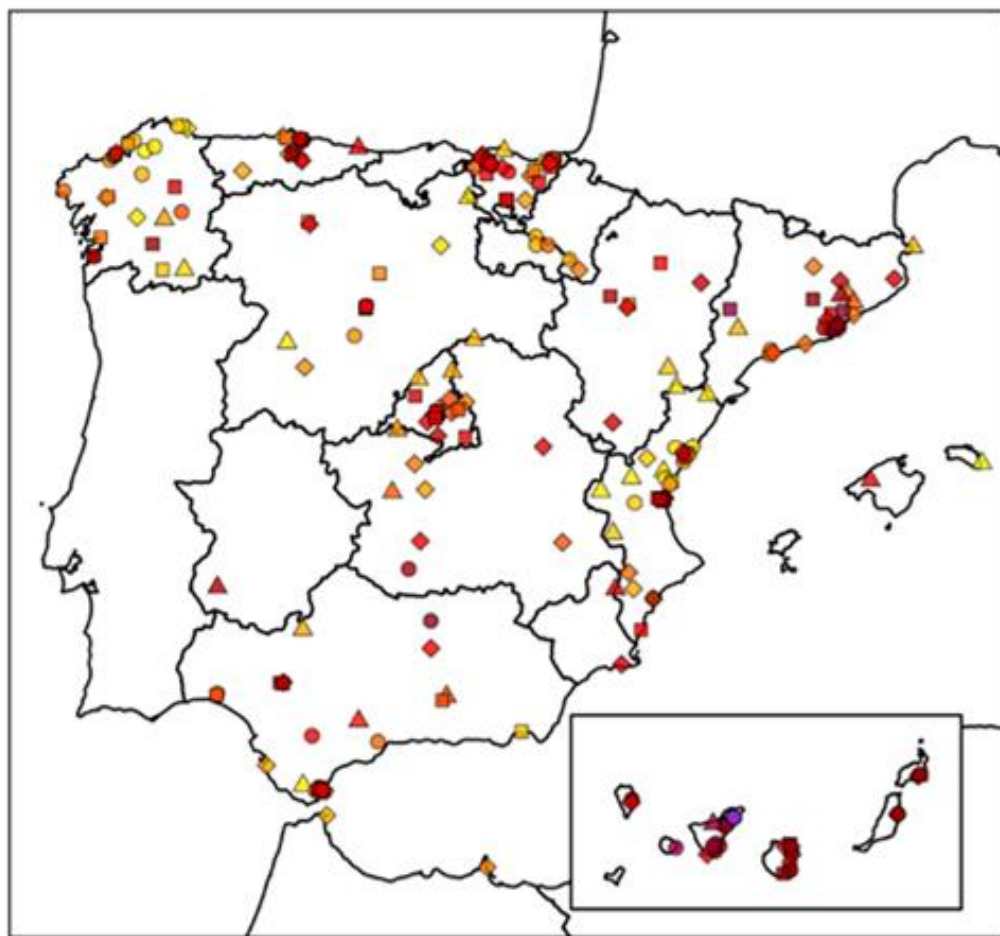


Relevance of
secondary PM



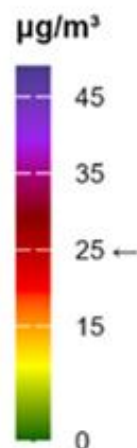
2022-2024 Evaluation: PM2.5

PM_{2.5} daily p95 2022-2024

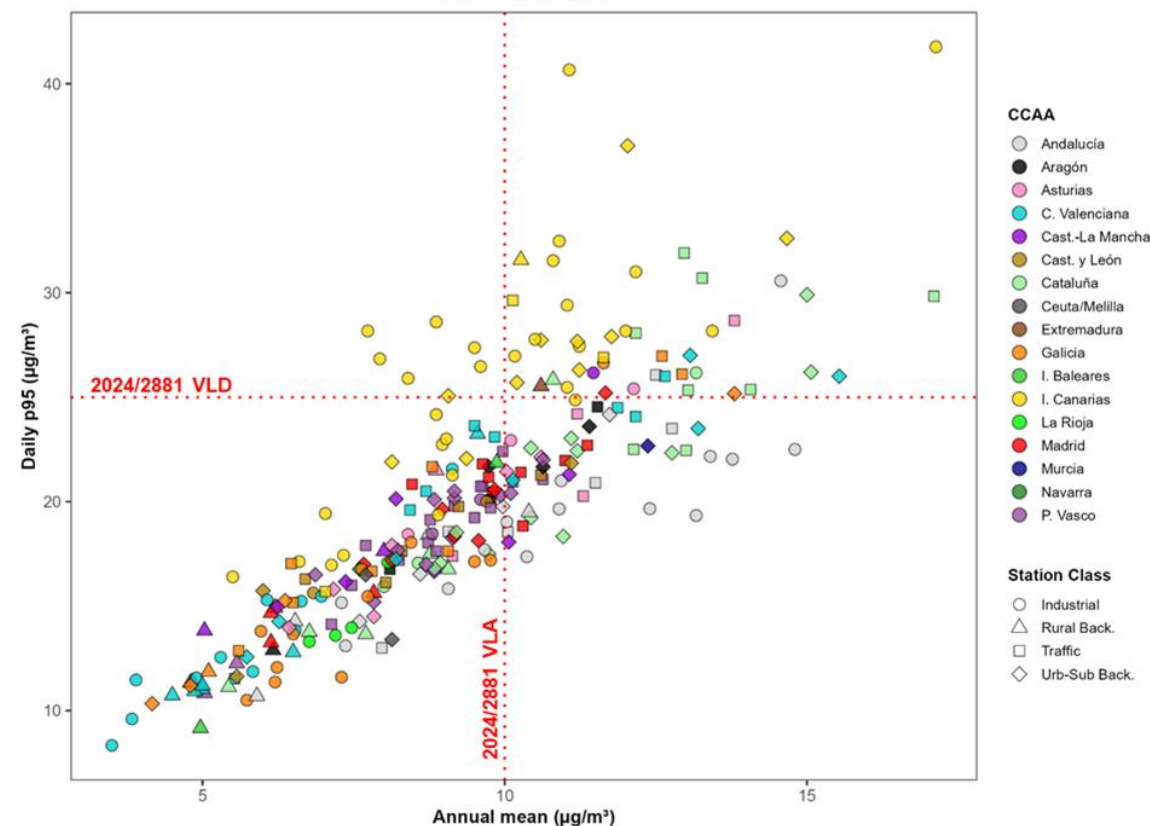


Station Class

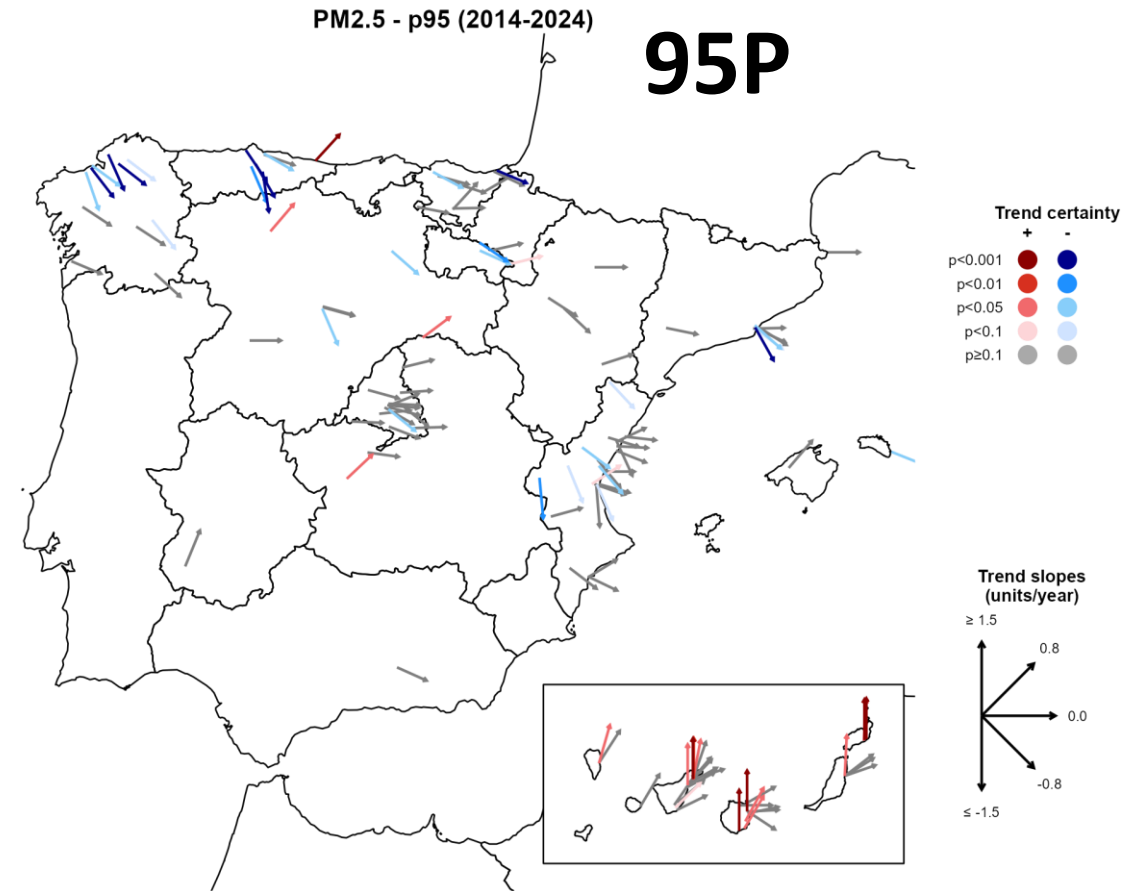
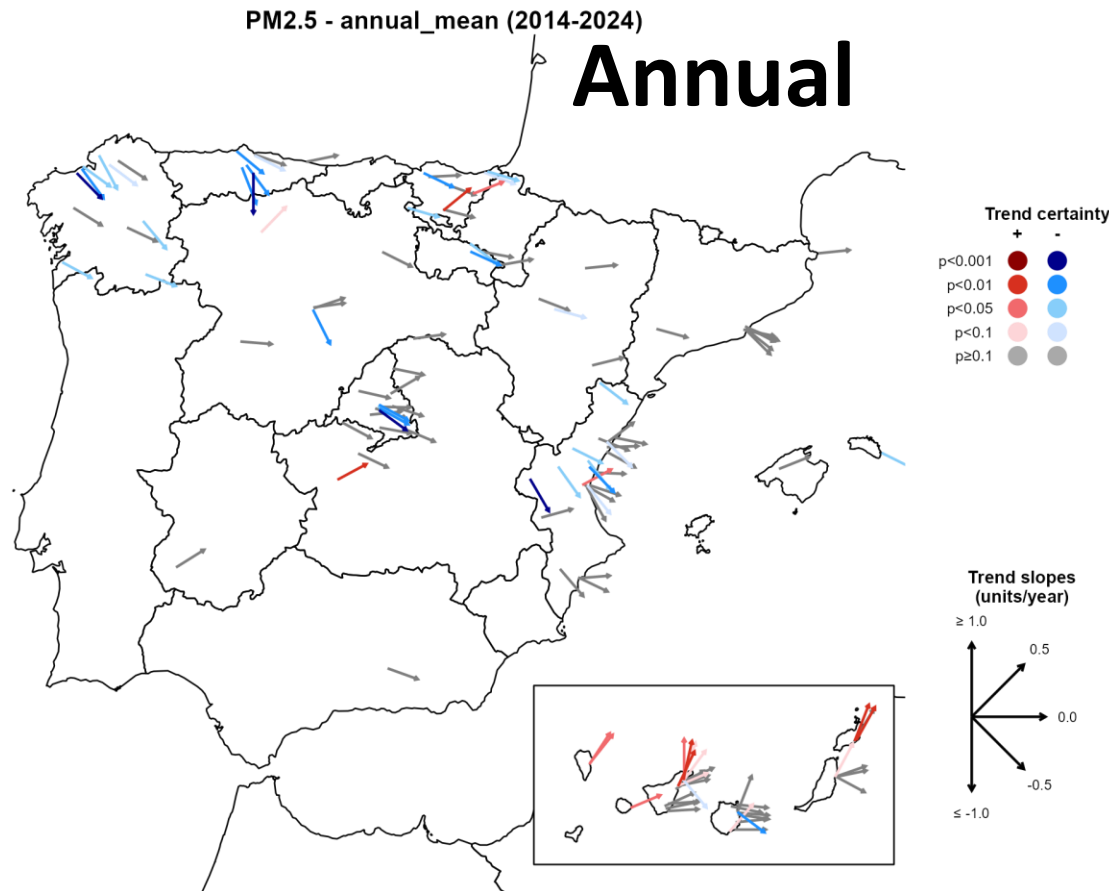
- Industrial
- △ Rural Back.
- Traffic
- ◇ Urb-Sub Back.



PM_{2.5} - 2022-2024



2014-2024 trends: PM2.5



Few sites with >50% data availability!!!!

Projections 2030: PM2.5

PM_{2.5} (annual average)

VLA: 10 µg/m³ (n = 126)

Annual

Compliance 2030
VLA

- Exceeds limit: 2030 (trend) or 2024 (no trend)
- 2030 upper CI exceeds limit, trend
- ≥90% limit: 2030 (trend) or 2024 (no trend)
- Low risk

Station type

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

Thick blue border = increasing trend

PM_{2.5} (daily p95)

VLD: 25 µg/m³ (n = 126)

95P

Compliance 2030
VLD

- Exceeds limit: 2030 (trend) or 2024 (no trend)
- 2030 upper CI exceeds limit, trend
- ≥90% limit: 2030 (trend) or 2024 (no trend)
- Low risk

Station type

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

Thick blue border = increasing trend

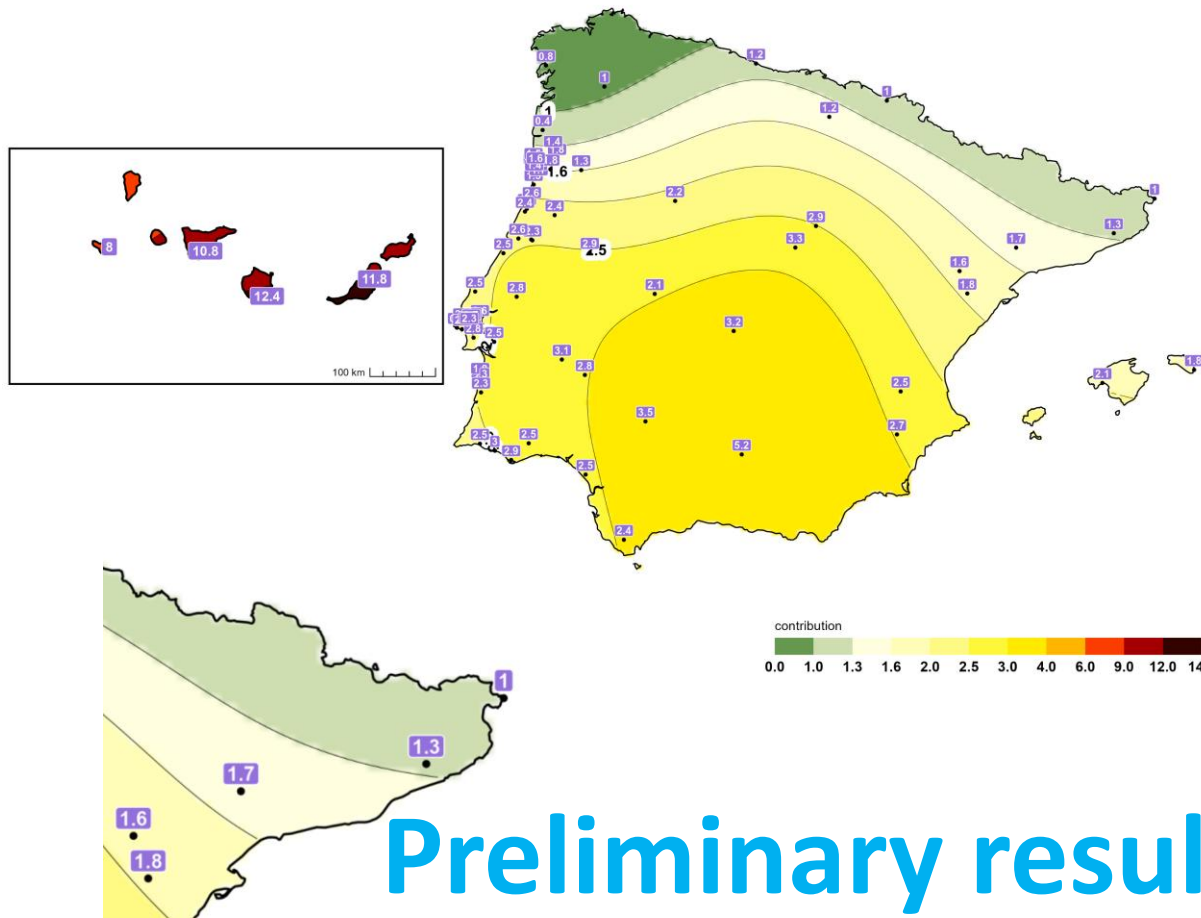
Preliminary results

Few sites with >50% data availability!!!!

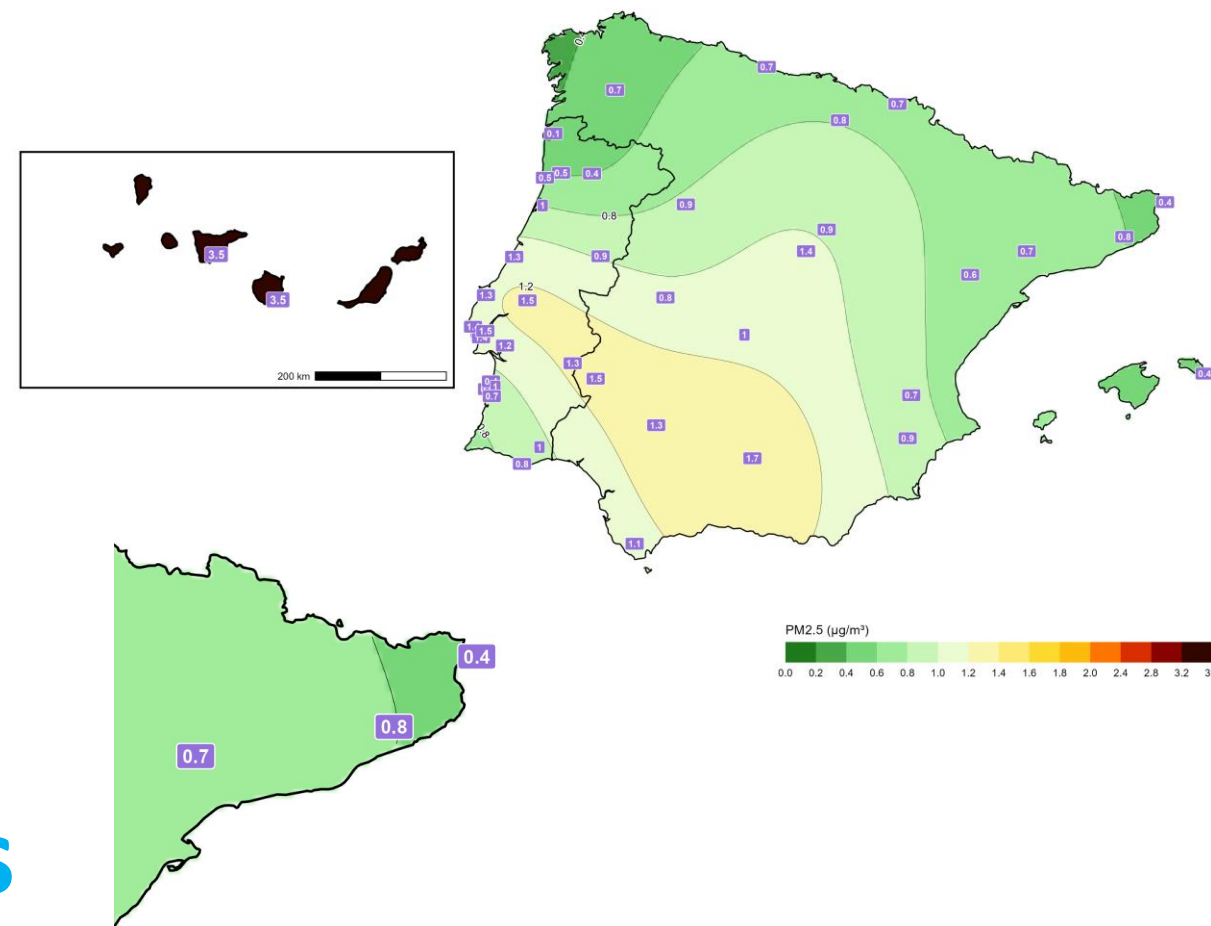
Projections 2030: PM10 & PM2.5

Average annual contribution of desert dust 2014-2024

PM10



PM2.5



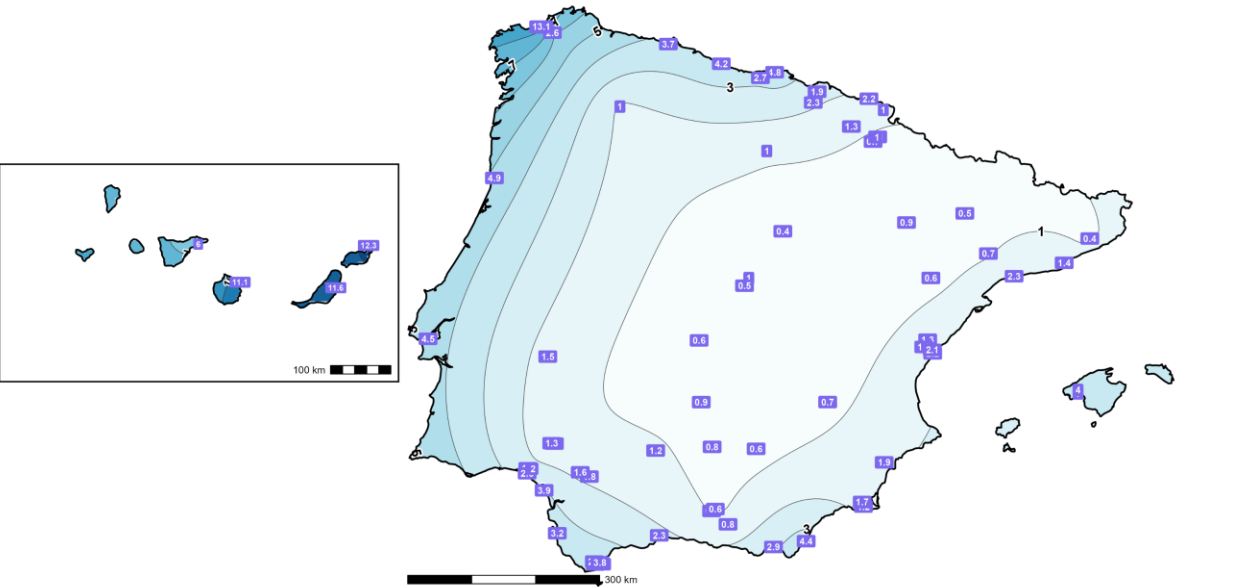
Preliminary results

Projections 2030: PM10 & PM2.5

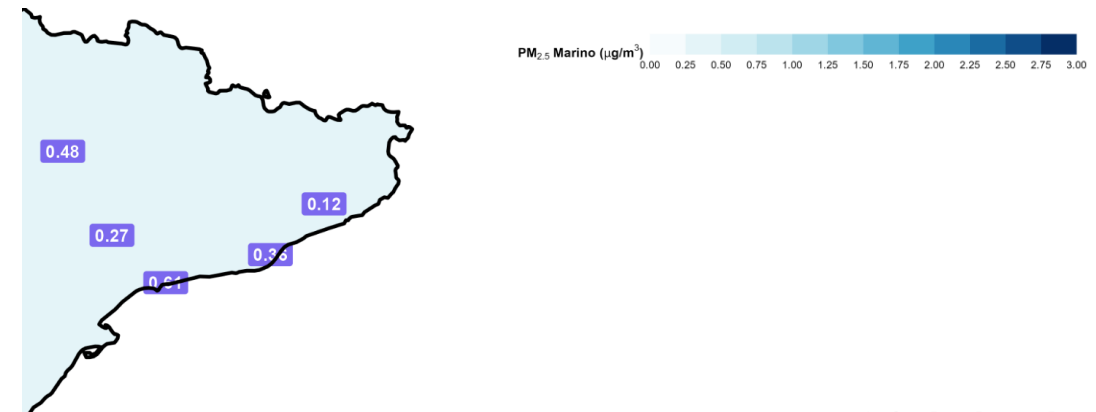
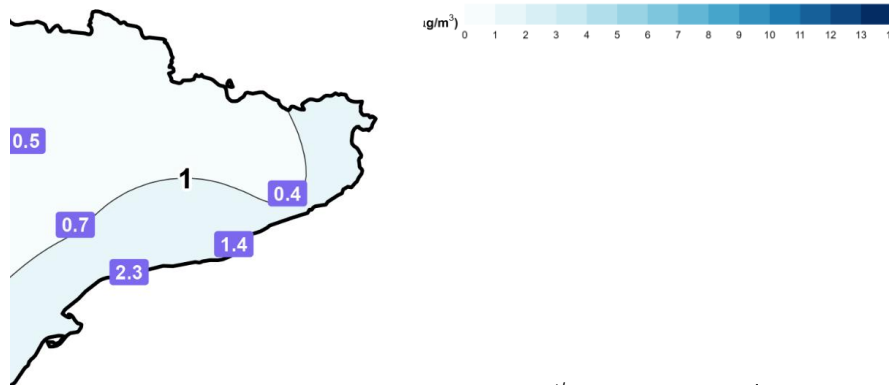
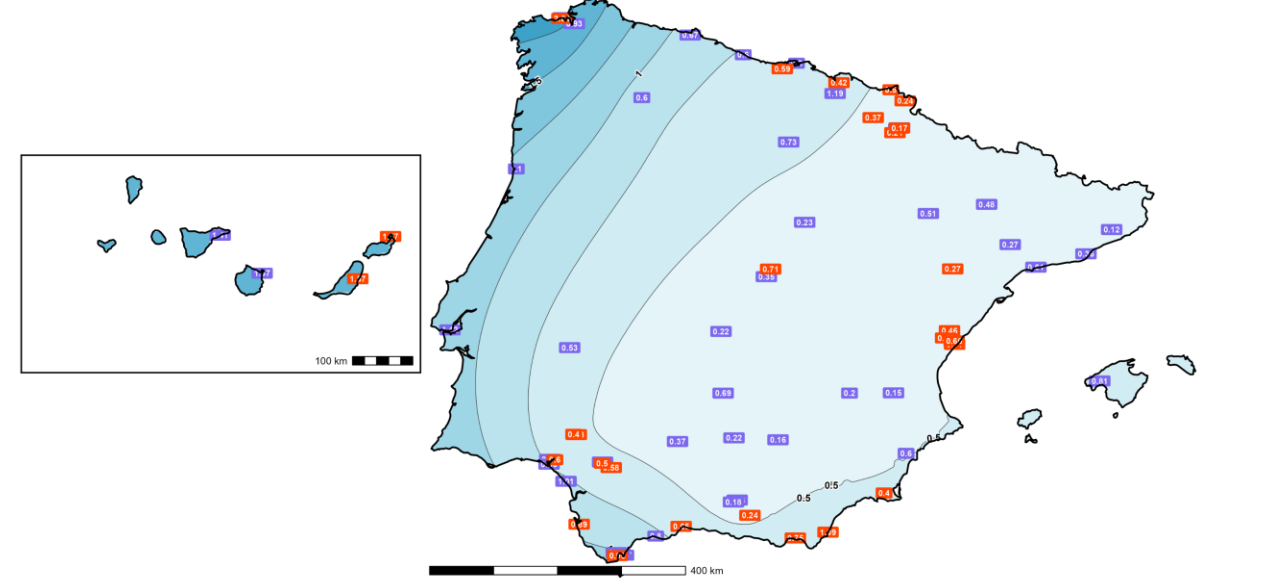
Average annual contribution of sea salt 2014-2024

Preliminary results

PM10

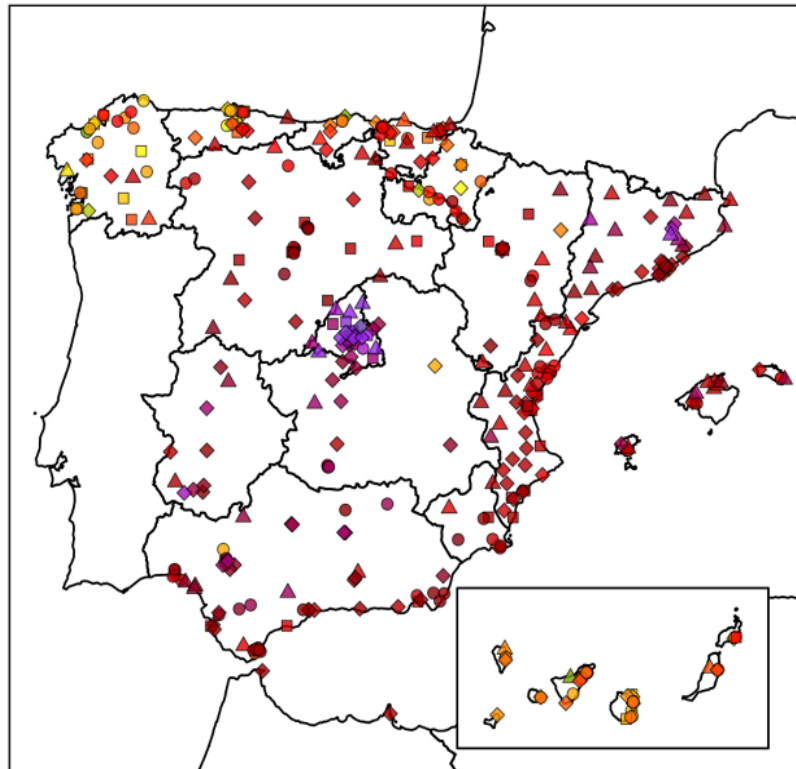


PM2.5



2022-2024 Evaluation: O₃

O₃ MDA8 p95 2022-2024



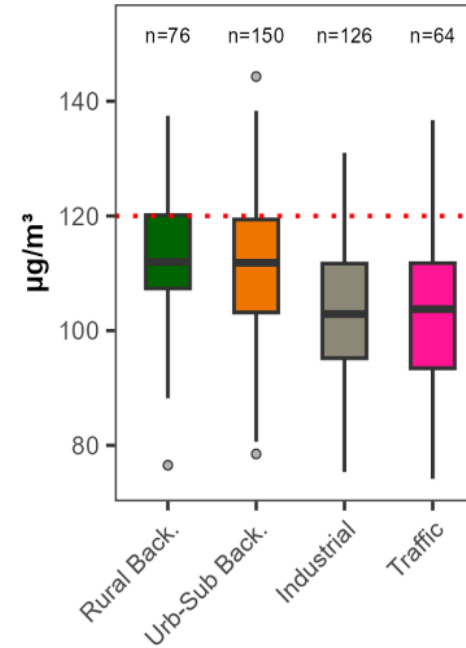
Station Class

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- Traffic
- ◇ Urb-Sub Back.

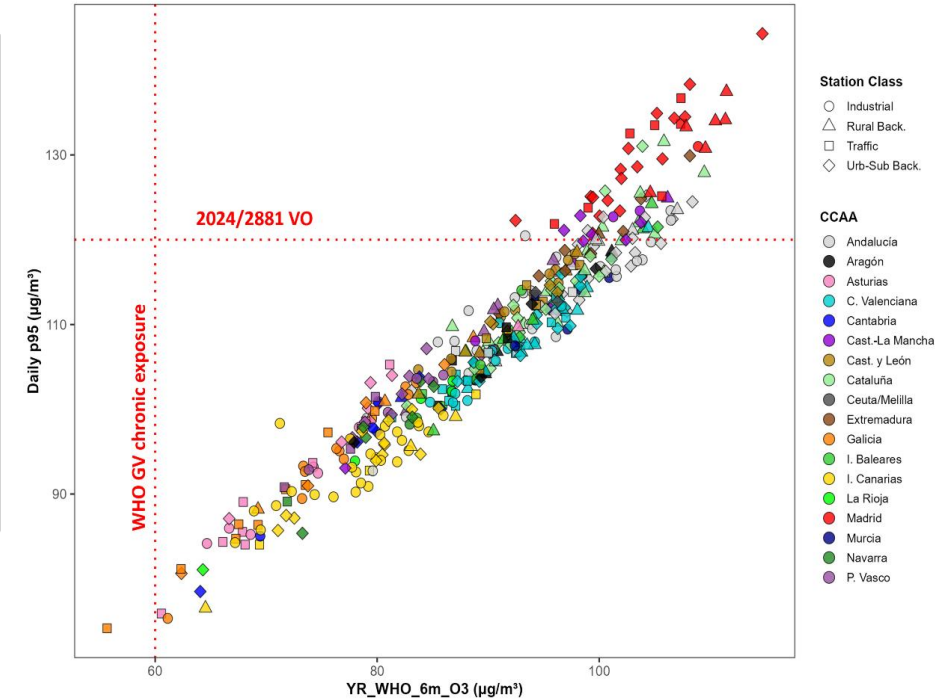
µg/m³

145
135
120 ←
100
85
70

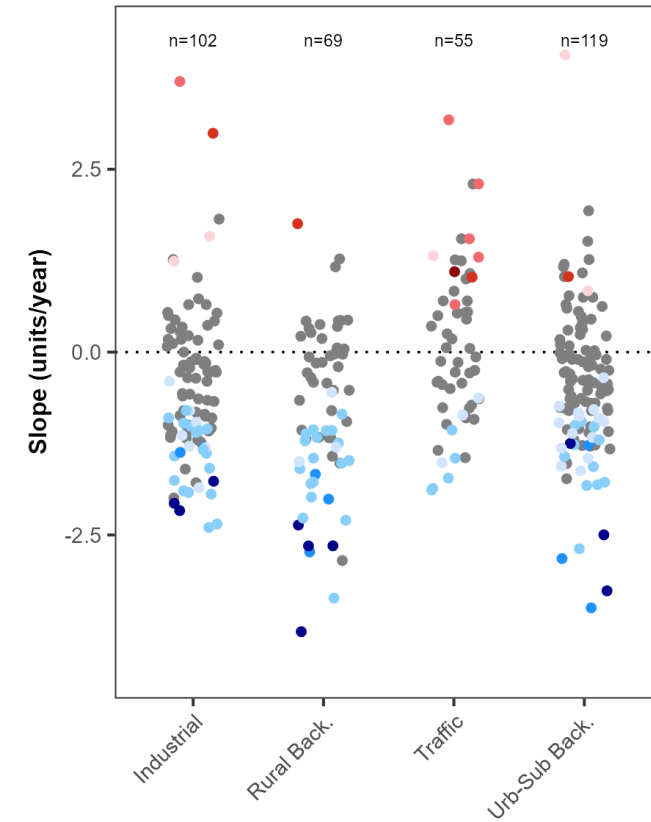
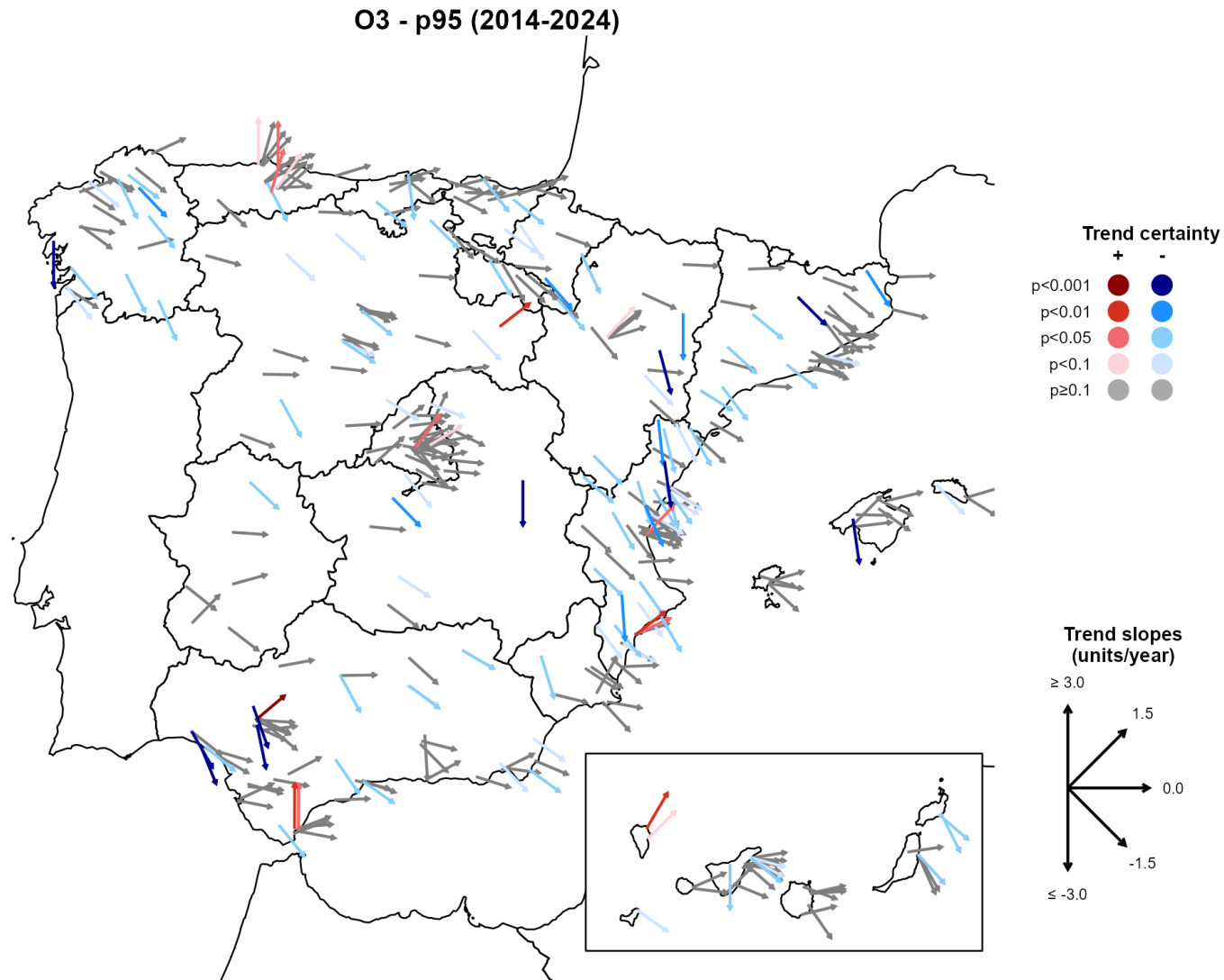
2024/2881



O₃ - 2022-2024

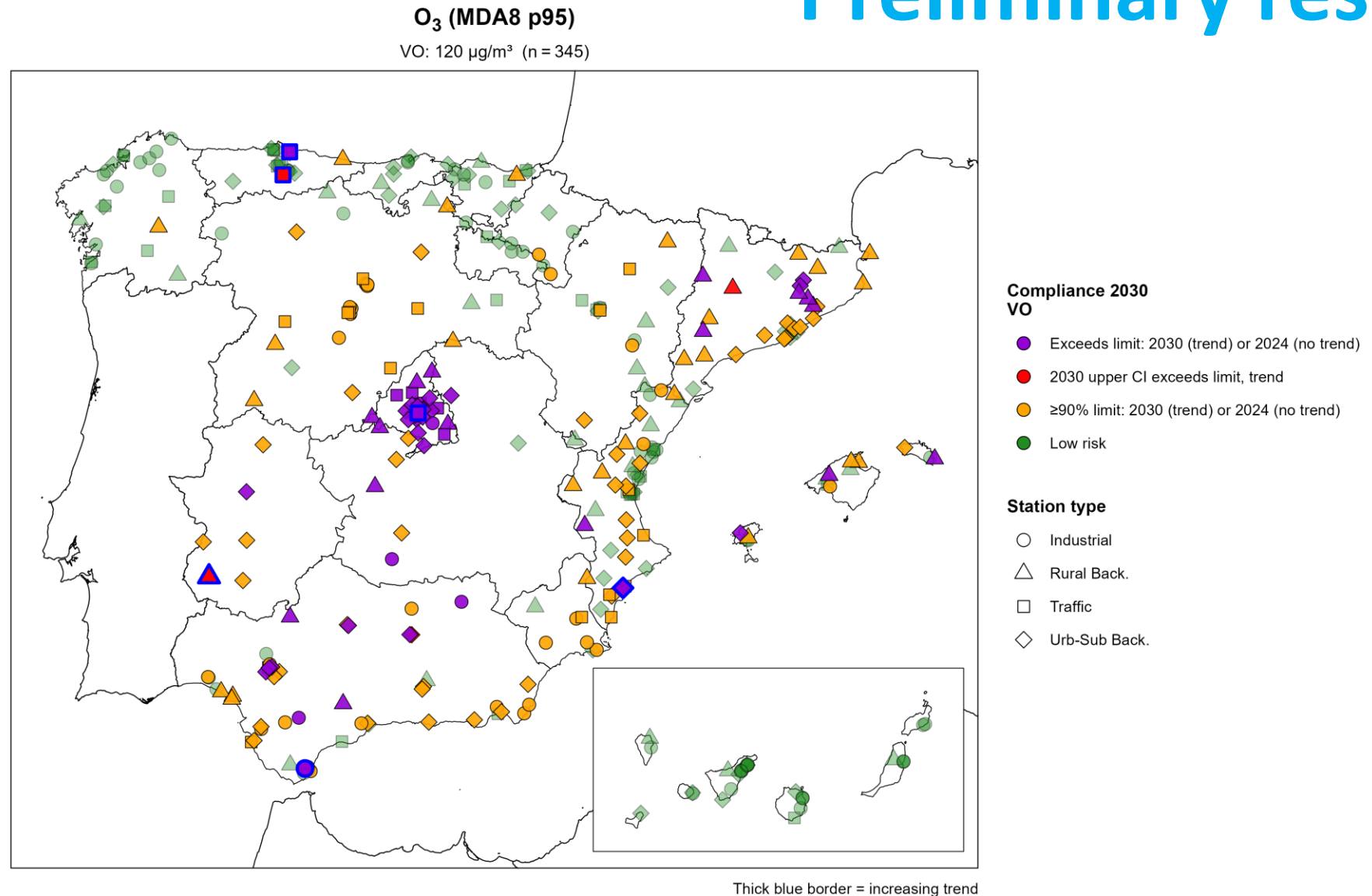


2014-2024 trends: O₃



Projections 2030: O₃

Preliminary results



Final considerations

- Compliance of limit values is reachable, but obviously BAU is not enough in a number of pollutants and cities
- NO₂ we know what measures should be implemented
- PM10 i PM2.5: secondary PM (SOA+SIA) and resuspensión (traffic, construction) & domestic heating and agriculture
- Natural contributions may be crucial to reach compliance in a number of cases
- PM10, PM2.5 i BaP: Plans of rural areas and small cities are very necessary
- O₃ complex, but not impossible. Frequent flat trends since 2014: BAU is not enough
- In a few cases high density of sources meeting emission LVs of NO_x (traffic, industry, power plants, harbour, airport, agriculture) may cause a marked problem of NO_x as precursors of O₃. Additional emission abatement measures are required there
- NECA in the Mediterranean, 20% and 60% reduction 2019-2030 of NO_x from shipping & road traffic have been found by modelling as necessary for O₃
- Additional: Can we organise a TFMM meeting (in Barcelona) on: Can we meet the 2030 limit values? What is better, making efforts now and not reaching compliance? Or asking for postponements?

Thanks to TFMM and all of you for your attention!!!!

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Task Force on Measurements and Modelling