ETC-HE Report 2023/2

Status report of air quality in Europe for year 2022, using validated and up-to-date data

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Contents

1 Summary

The *2022 Status report of air quality in Europe* presents summarized information on the air quality data for the protection of health reported in the previous years. The reported 2022 monitoring data used in this analysis was reported as up-to-date (UTD) data, prior to final quality control and validated data reporting by the countries ([1]). It provides information on the following pollutants, regulated by the Ambient Air Quality Directives (AAQD):

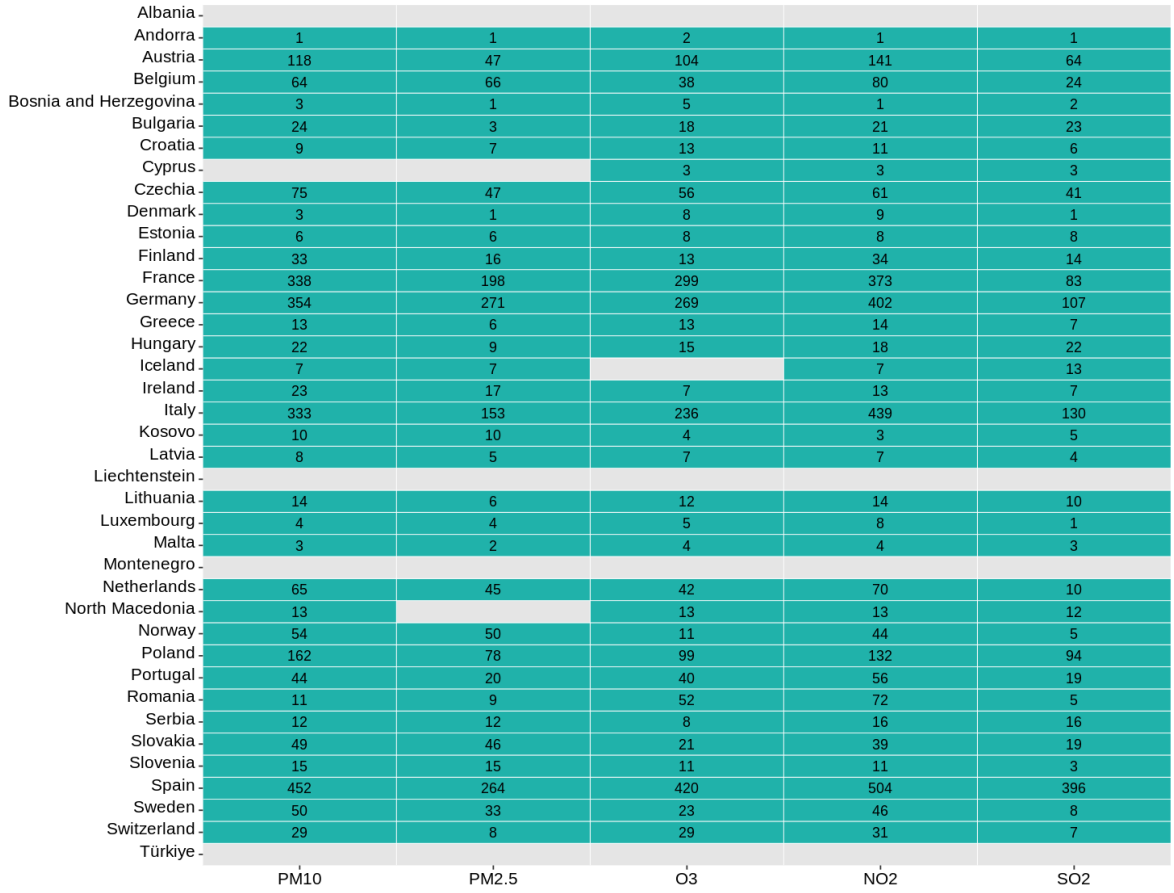
- PM_{10}: Particulate matter with a diameter of 10 µm or less
- $PM_{2.5}$: Particulate matter with a diameter of 2.5 µm or less
- O_3: Tropospheric ozone
- NO_2: Nitrogen dioxide
- SO_2: Sulphur dioxide

It also offers a comparison with the situation in previous years. For those years, validated data are considered.

Data included in this report was received by 20 March 2023 from the reporting countries. By that date the reporting status of 2022 up-to-date data is summarized in Figure 1, where a green box indicates that the referred pollutant was reported by the referred country and a grey box indicates the contrary (that the referred pollutant was not reported by the referred country). Please see editorial notes at the end of this Chapter on additional information on the data used. The number of stations by country reporting each pollutant, with the minimum data coverage for at least one of the aggregations used in the report, is also included in Figure 1, while Table 3 in the Annex summarizes the number of stations, with the minimum data coverage for at least one of the aggregations used in the report, at different country aggregations. Data from stations that do not fulfil the criteria from Box 1.1 are excluded from this report. Please be aware that the number of stations presented in Figure 1 and Table 3, that corresponds to all reported stations fulfilling the minimum data coverage criteria for at least one of the aggregations used in the report, may be different to the one presented in the corresponding boxplots, as there could be some stations not fulfilling the minimum data coverage criteria for the corresponding aggregation.

[1] https://aqportal.discomap.eea.europa.eu/index.php/reporters-corner/

Figure 1: Number of stations, for each country, that in 2022 reported data with the minimum data coverage for at least one of the aggregations used in the report, by 20 March 2023



The countries included in this report and that, therefore, appear in Figure 1, are those with the obligation to report data under the AAQD or that have voluntary reported data. These countries are the EU-27 (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden); the five other member countries of the EEA (Iceland, Liechtenstein, Norway, Switzerland and Türkiye) that, together with the EU-27 form the EEA-32; the six EEA's cooperating countries from the Western Balkans (Albania, Bosnia and Herzegovina, Kosovo under UN Security Council Resolution 1244/99, Montenegro, North Macedonia and Serbia) that, together with the EEA-32 form the EEA-38; and the voluntary reporting country of Andorra.

The air quality data are stored at the EEA's e-reporting database ([2]). Therefore, this is the source for all maps and figures in the report. UTD data is stored temporarily until it is replaced by CDR data.

1.1 Particulate matter

For PM_{10}, concentrations above the EU daily limit value (50 µg/m^3) were registered at 10 % of the reporting stations. These stations were in 15 countries in EU-27 and in 5 other reporting countries. For $PM_{2.5}$, concentrations above the EU annual limit value (25 µg/m^3) were registered at 1 % of the reporting stations. These stations were in 2 countries in EU-27 and in 3 other reporting countries.

The long-term World Health Organization air quality guideline (WHO AQG) level for PM_{10} (15 µg/m^3) was exceeded at 73 % of the stations in 26 countries of the EU-27 and 8 other reporting countries. The long-term WHO AQG level for $PM_{2.5}$ (5 µg/m^3) was exceeded at 94 % of the stations located in 26 countries of the EU-27 and 6 other reporting countries.

1.2 Ozone

24 % of stations registered concentrations above the EU target value for O_3 (120 µg/m^3) for the protection of human health. These stations were located in 18 countries of the EU-27 and 2 other reporting countries. The long-term EU objective (120 µg/m^3) was met in only 13 % of the stations. The short-term WHO AQG level for O_3 (100 µg/m^3) was exceeded in 94 % of all the reporting stations, and concentrations above the long-term WHO AQG level for O_3 (60 µg/m^3) were registered in 99 % of all reporting stations.

1.3 Nitrogen dioxide

Around 1 % of all the reporting stations recorded concentrations above the EU annual limit value for NO_2 (40 µg/m^3). These stations were located in 9 countries of the EU-27 and 0 other reporting countries. 100 % of concentrations above this limit value were observed at traffic stations.

On the contrary, 72 % of stations, located in 27 countries of the EU-27 and 8 other reporting countries reported concentrations above the WHO AQG level of 10 µg/m^3.

[2] https://discomap.eea.europa.eu/map/fme/AirQualityExport.htm

1.4 Sulphur dioxide

For SO_2, concentrations above the EU daily limit value (125 µg/m^3) were registered at 0 % of the reporting stations. These stations were in 0 country of the EU-27 and 1 other reporting countries. However, 2 % of all reporting SO_2 stations measured SO_2 concentrations above the daily WHO AQG level (40 µg/m^3). These stations were located in 7 countries of the EU-27 and 3 other reporting countries.

1.5 Editorial note

Values in Table 4 in the Annex are considered outliers and were not taken into account for the analysis presented in this report.

The ozone data presented for Slovakia 2022 are those that fulfil the data coverage criteria for annual mean, not for the specific aggregation. The peak season O3 concentrations for Slovakia 2022 are not shown due to a processing problem.

2 Introduction

The *2022 Status report of air quality in Europe* presents summarized information on the air quality data reported up to 2022. The 2022 data was reported as up-to-date (UTD) data in a continuous basis prior to final quality control and official reporting of validated data by the countries, which will be done under the 2023 September reporting cycle (validated assessment data for 2022, deadline of submission 30 September 2023). This report aims at informing on the current status of ambient air quality in Europe, based on the most updated data available for the analysis of a complete calendar year. Furthermore, it informs on progress towards meeting the air quality standards established for the protection of health in the Ambient Air Quality Directives (EU, 2004, 2008) (Table 1) and the World Health Organization air quality guideline levels (WHO, 2000, 2006, 2021) (Table 2)([3]).

This report builds on the former EEA "Air quality in Europe report" (EEA, 2020) content, figures and maps regarding the status of monitored air quality in Europe. The report focuses on the analysis of the main pollutants, to allow a meaningful preliminary analysis of their concentration status in Europe. It provides:

- a European overview of the monitoring stations that reported UTD 2022 data, and of their concentrations in relation to the EU legal standards and WHO AQG levels for each pollutant;
- a map with the 2022 UTD concentrations at station level for each pollutant;
- a boxplot graph summarizing for each country the range of concentrations (highlighting the lowest, highest, average and the 25 and 75 percentiles) for PM_{10}, $PM_{2.5}$, NO_2 and O_3.

Furthermore, it provides:

- maps with the situation at station level for the previous three years (using validated data). In this way, any significant change in the spatial distribution of the values above the set thresholds in the legends can be observed (assuming the UTD stations dataset is complete);

[3] Nevertheless, in this report the following standards and guideline levels are not analysed: information and alert thresholds for O_3, alert threshold for NO_2, annual target value for BaP, alert threshold for SO_2, limit value for CO maximum daily 8-hour mean, annual limit value for C_6H_6, annual limit value for Pb, target value for As, target value for Cd, and target value for Ni in Table 1; and hourly air quality guideline level for NO_2, reference level for annual mean of BaP, 10 minutes air quality guideline level for SO_2, air quality guideline level for CO, reference level for annual mean of C_6H_6, air quality guideline level for Pb, reference level for annual mean of As, air quality guideline level for Cd, and reference level for annual mean of Ni in Table 2.

- heatmaps with the evolution of the mean and the maximum measured concentrations at country level since 2000 (or since when available, using validated data for all years up to 2021).

Please be aware that the number of stations can vary once the validated dataset for 2022 is received by 30 September 2023. In some figures like the boxplots, the final order of the countries may vary once the validated data are submitted.

Table 1: Air quality standards for the protection of health, as given in the EU Ambient Air Quality Directives

Pollutant	Averaging period	Legal nature and concentration	Comments
PM_{10}	1 day	Limit value: 50 µg/m^3	Not to be exceeded on more than 35 days per year
	Calendar year	Limit value: 40 µg/m^3	
$PM_{2.5}$	Calendar year	Limit value: 25 µg/m^3	Stage 1
		Indicative limit value: 20 µg/m^3	Stage 2: indicative limit value to be reviewed by the Commission in 2013. It remained unchanged after that revision
		Exposure concentration obligation: 20 µg/m^3	Average Exposure Indicator (AEI) ([a]) in 2015 (2013-2015 average)
		National Exposure reduction target: 0-20 percentage reduction in exposure	AEI ([a]) in 2020, the percentage reduction depends on the initial AEI
O_3	Maximum daily 8-hour mean	Target value: 120 µg/m^3	Not to be exceeded on more than 25 days/year, averaged over 3 years ([b])
		Long term objective: 120 µg/m^3	
	1 hour	Information threshold: 180 µg/m^3 Alert threshold: 240 µg/m^3	
NO_2	1 hour	Limit value: 200 µg/m^3	Not to be exceeded on more than 18 hours per year
		Alert threshold: 400 µg/m^3	To be measured over 3 consecutive hours over 100 km^2 or an entire zone
	Calendar year	Limit value: 40 µg/m^3	
BaP	Calendar year	Target value: 1 ng/m^3	Measured as content in PM_{10}
SO_2	1 hour	Limit value: 350 µg/m^3	Not to be exceeded on more than 24 hours per year
		Alert threshold: 500 µg/m^3	To be measured over 3 consecutive hours over 100 km^2 or an entire zone
	1 day	Limit value: 125 µg/m^3	Not to be exceeded on more than 3 days per year
CO	Maximum daily 8-hour mean	Limit value: 10 mg/m^3	
C_6H_6	Calendar year	Limit value: 5 µg/m^3	
Pb	Calendar year	Limit value: 0.5 µg/m^3	Measured as content in PM_{10}
As	Calendar year	Target value: 6 ng/m^3	Measured as content in PM_{10}
Cd	Calendar year	Target value: 5 ng/m^3	Measured as content in PM_{10}
Ni	Calendar year	Target value: 20 ng/m^3	Measured as content in PM_{10}

Notes:

[a] AEI: based upon measurements in urban background locations established for this purpose by the Member States, assessed as a 3-year running annual mean.

[b] In the context of this report, only the maximum daily 8-hour means in 2022 are considered, so no average over the period 2020 - 2022 is presented.

Sources:

EU (2004, 2008).

Table 2: WHO air quality guideline (AQG) levels and estimated reference levels (RL) ([a])

Pollutant	Averaging period	AQG	RL	Comments
PM_{10}	1 day	45 µg/m^3		99th percentile (3-4 exceedance days per year). Updated 2021 guideline
	Calendar year	15 µg/m^3		Updated 2021 guideline
$PM_{2.5}$	1 day	15 µg/m^3		99th percentile (3-4 exceedance days per year). Updated 2021 guideline
	Calendar year	5 µg/m^3		Updated 2021 guideline
O_3	Maximum daily 8-hour mean	100 µg/m^3		99th percentile (3-4 exceedance days per year). Updated 2021 guideline
	Peak season ([b])	60 µg/m^3		New 2021 guideline
NO_2	1 hour	200 µg/m^3		
	1 day	25 µg/m^3		99th percentile (3-4 exceedance days per year). New 2021 guideline
	Calendar year	10 µg/m^3		Updated 2021 guideline
BaP	Calendar year		0.12 ng/m^3	
SO_2	10 minutes	500 µg/m^3		
	1 day	40 µg/m^3		99th percentile (3-4 exceedance days per year). Updated 2021 guideline
CO	1 hour	30 mg/m^3		
	Maximum daily 8-hour mean	10 mg/m^3		
	1 day	4 mg/m^3		99th percentile (3-4 exceedance days per year). New 2021 guideline
C_6H_6	Calendar year		1.7 µg/m^3	
Pb	Calendar year	0.5 µg/m^3		
As	Calendar year		6.6 ng/m^3	
Cd	Calendar year	5 ng/m^3 ([c])		
Ni	Calendar year		25 ng/m^3	

Notes:

[a] As WHO has not set an AQG level for BaP, C_6H_6, As and Ni, the RL was estimated assuming an acceptable risk of additional lifetime cancer risk of approximately 1 in 100 000.

[b] Average of daily maximum 8-hour mean concentration in the six consecutive months with the highest six-month running average O_3 concentration.

[c] AQG set to prevent any further increase of Cd in agricultural soil, likely to increase the dietary intake of future generations.

Sources:

WHO (2000, 2006, 2021).

Box 1.1 Classification of monitoring stations and criteria used for the assessment

Fixed sampling points in Europe are situated at different types of stations following rules for macro- and micro-scale siting. Briefly, depending on the predominant emission sources, stations are classified as follows:

- traffic stations: located in close proximity to a single major road;
- industrial stations: located in close proximity to an industrial area or an industrial source;
- background stations: where pollution levels are representative of the average exposure of the general population or vegetation.

Depending on the distribution/density of buildings, the area surrounding the station is classified as follows:

- urban: continuously built-up urban area;
- suburban: largely built-up urban area;
- rural: all other areas.

For the pollutants considered in this report, monitoring stations have to fulfil the criterion of reporting more than 75 % of valid data out of all the possible data in a year to be included in this assessment. Reporting stations not fulfilling the minimum data coverage could be found at the Annual AQ statistics table.

Measurement data are rounded following the general recommendations under (EU, 2011). The number of considered decimals are indicated in the legend of the corresponding maps.

The assessments, in the cases of PM and SO_2, do not account for the fact that the Ambient Air Quality Directive (EU, 2008) provides Member States with the possibility of subtracting contributions to the measured concentrations from natural sources and winter road sanding/salting under specific circumstances.

3 Status of particulate matter ambient air concentrations

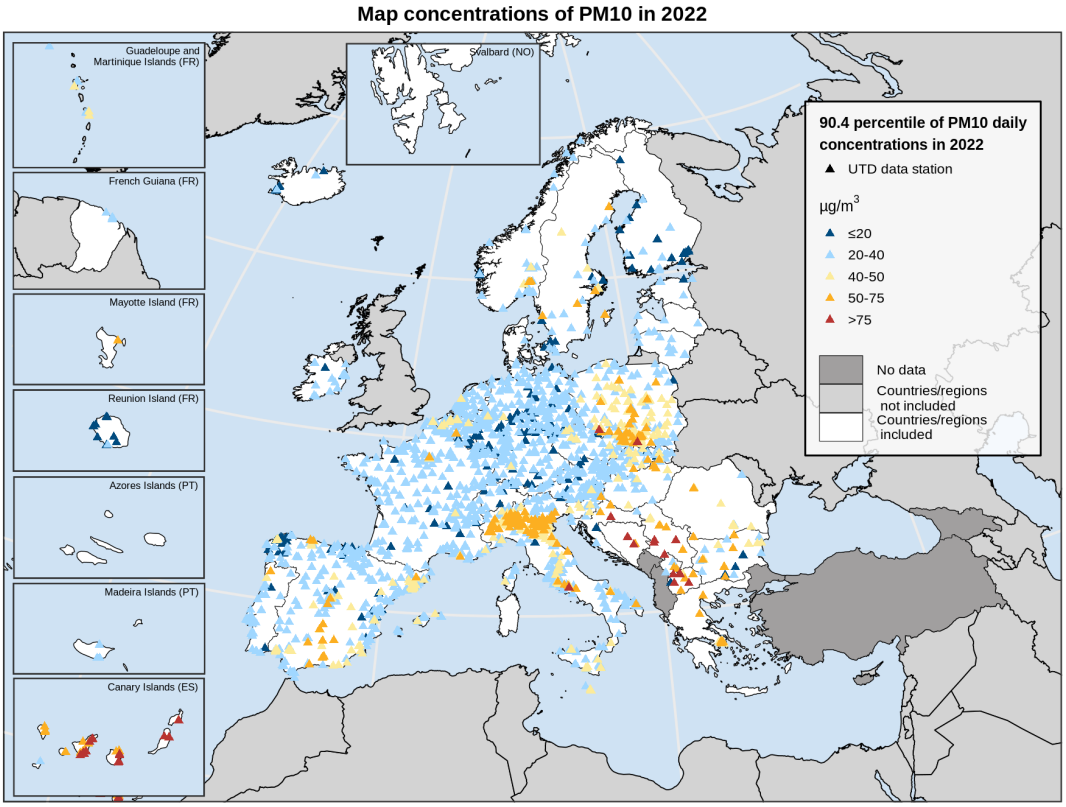
3.1 Status of PM_{10} concentrations

The EEA received PM_{10} data for 2022, with sufficient valid measurements from 2420 stations for the calculation of annual mean concentrations and from 2405 stations in relation to the daily limit value. The stations were located in all the reporting countries shown in Figure 1.

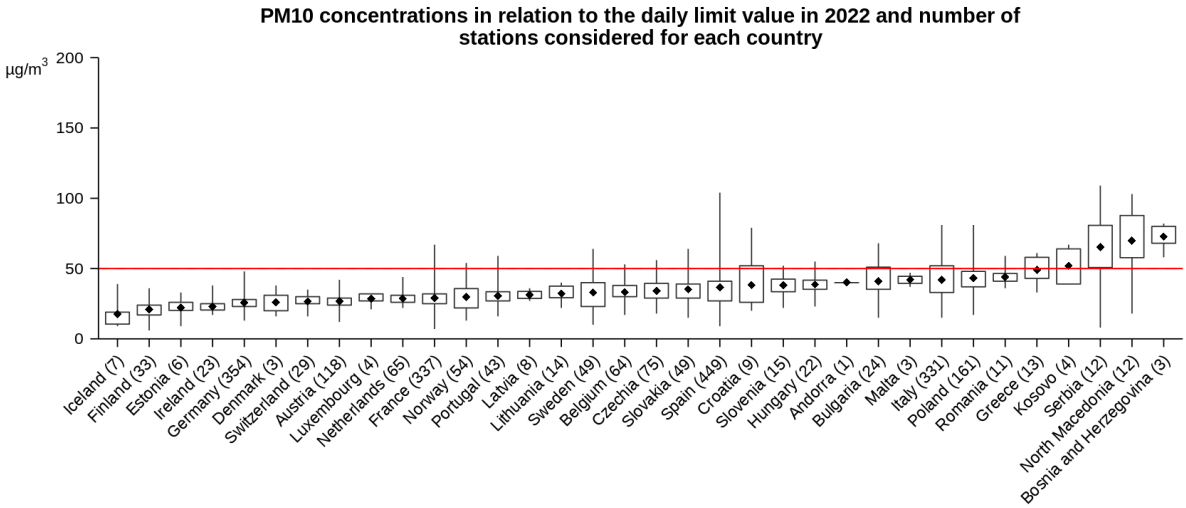
Fifteen countries in EU-27, and five other reporting countries reported PM_{10} concentrations above the EU daily limit value of 50 µg/m^3 (Figure 2). This was the case for 10 % (239) of reporting stations. In total, 93 % of those stations were either urban (74 %) or suburban (19 %). The stricter value of the WHO AQG level for PM_{10} daily mean (45 µg/m^3) was exceeded at 65 % (1555) of the stations in all the reporting countries (Figure 8).

Concentrations above the PM_{10} annual limit value (40 µg/m^3) were monitored in 1 % (29 stations) of all the reporting stations, located in 2 countries in EU-27, and 2 other reporting countries. The stricter value of the WHO AQG level for PM_{10} annual mean (15 µg/m^3) was exceeded at 73 % (1766) of the stations in all the reporting countries (Figure 5).

Figure 2: UTD Map and boxplot of PM_{10} concentrations in 2022 - daily limit value



Note: Observed concentrations of PM10 in 2022. The possibility of subtracting contributions to the measured concentrations from natural sources and winter road sanding/salting has not been considered. The map shows the 90.4 percentile of the PM10 daily mean concentrations, representing the 36th highest value in a complete series. It is related to the PM10 daily limit value, allowing 35 exceedances of the 50 µg/m³ threshold over 1 year. The last two colour categories indicate stations with concentrations above this daily limit value. Only stations with more than 75 % of valid data have been included in the map.

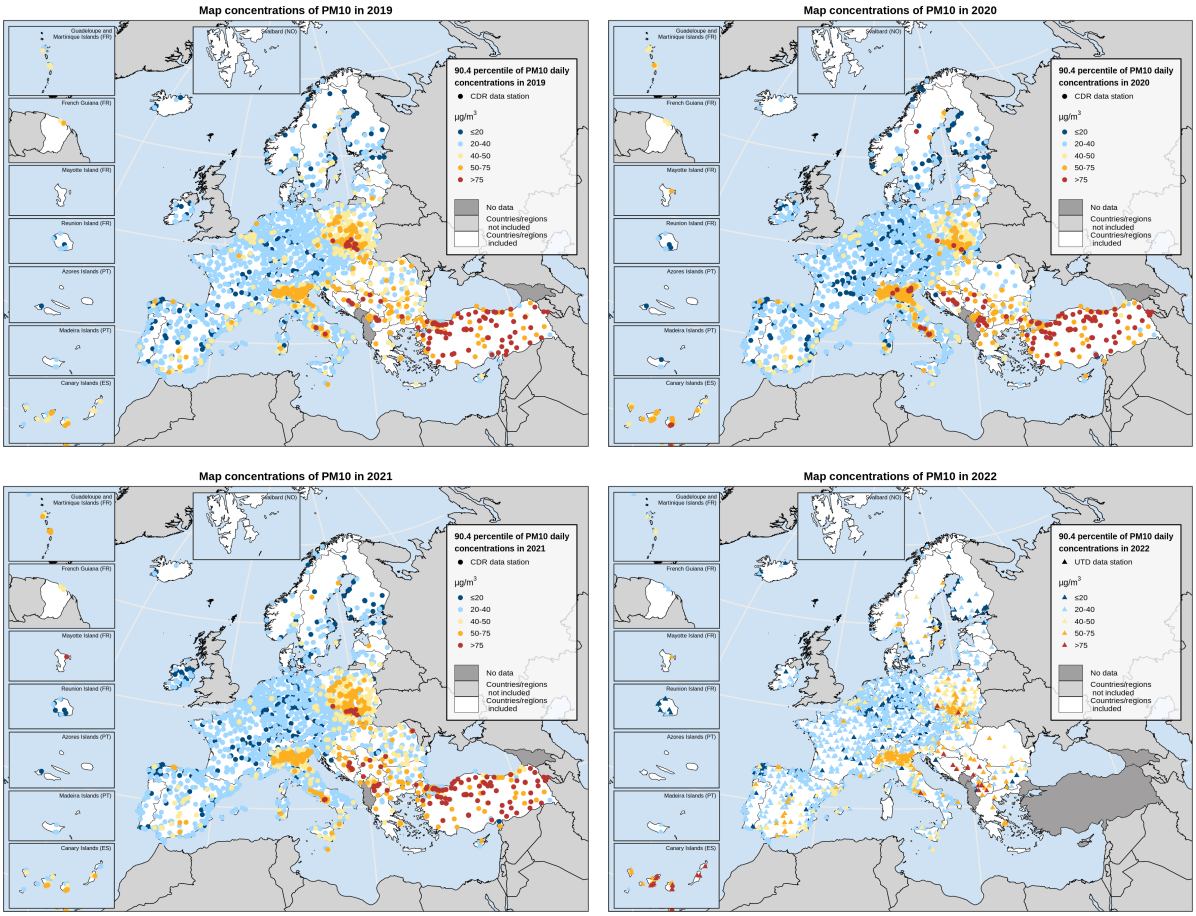


Note: The graph is based, for each country, on the 90.4 percentile of daily mean concentration values corresponding to the 36th highest daily mean in a complete time series. For each country, the number of stations considered for 2022 (in brackets) are given. The boxplot represents the lowest (bottom of the whisker), highest (top of the whisker) and average (black dot) 90.4 percentile values (in µg/m³). The rectangles mark the 25th and 75th percentiles. At 25 % of the stations, levels are below the 25th percentile; at 25 % of the stations, concentrations are above the 75th percentile. The daily limit value set by EU legislation is marked by the horizontal line. The graph should be read in relation to the above map, as a country's situation depends on the number of stations considered.

Figure 3 shows the maps of the 90.4 percentile of PM_{10} daily mean concentrations (equivalent to the PM_{10} daily limit value) for four years. In this way, any significant change in the spatial

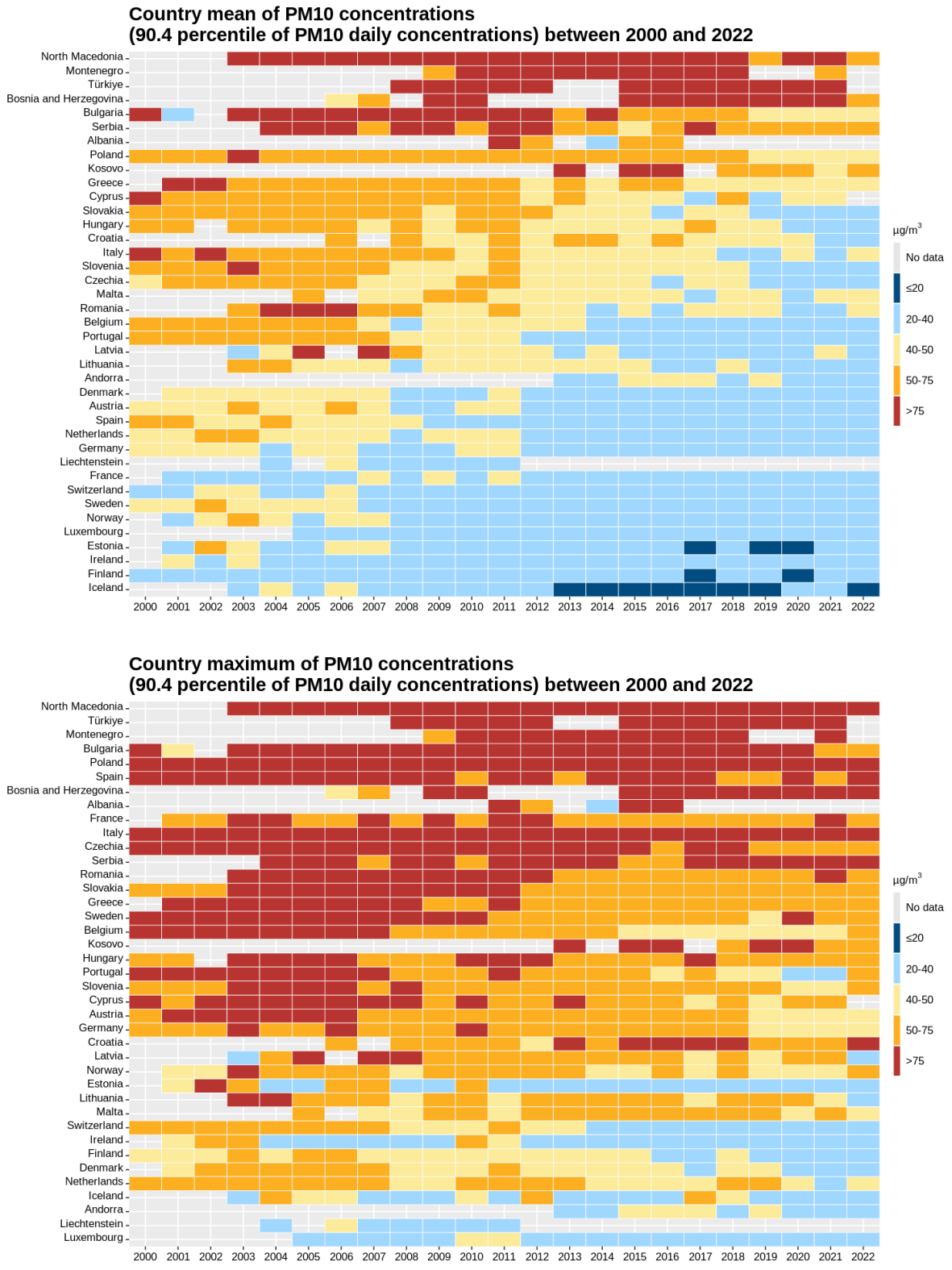
distribution of the values above the set thresholds in the legends can be observed. Note that only the last year's map (2022) is based on UTD data, while the previous three years are based on officially reported validated data (CDR).

Figure 3: Maps of PM_{10} concentrations (daily limit value) for the last 4 years



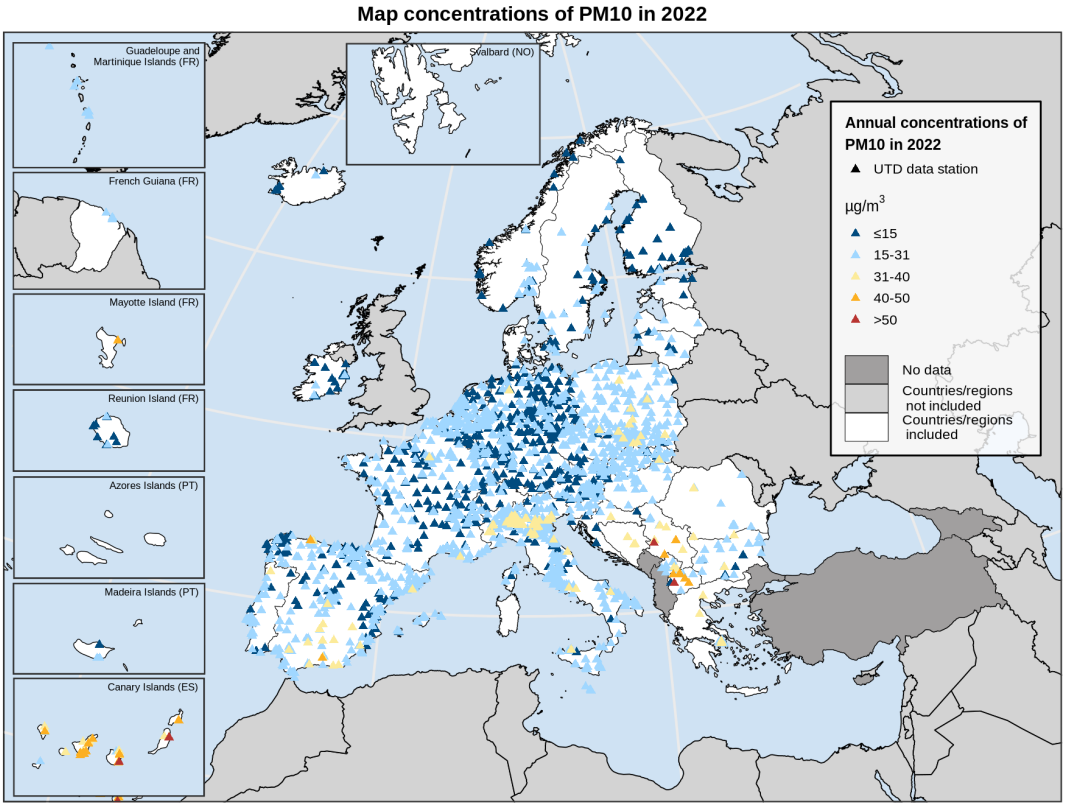
Heatmaps with the evolution from 2000 of the mean (top) and the maximum (bottom) 90.4 percentile of PM_{10} daily mean concentrations at country level are shown in figure 4. In this way, the evolution along years of the average and maximum measured concentration levels can be seen for each country. Note that meteorological variability has a considerable impact on year-to-year changes in ambient air concentrations of air pollutants (EEA, 2020), and the last year (2022) is based on UTD data, while the previous years are based on officially reported validated data.

Figure 4: Evolution of mean (top) and maximum (bottom) 90.4 percentile of PM_{10} daily mean concentrations (daily limit value) per country from 2000

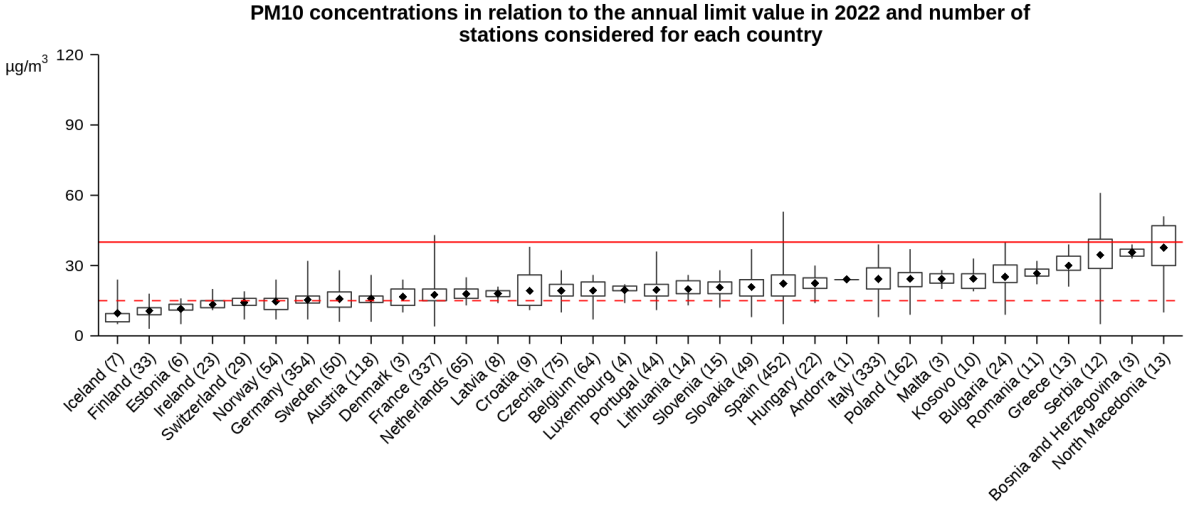


Note: It is important to note that the figure is not based on a consistent set of stations. The number, location and classification of the stations included may vary from year to year.

Figure 5: UTD Map and boxplot of PM_{10} concentrations in 2022 - annual limit value



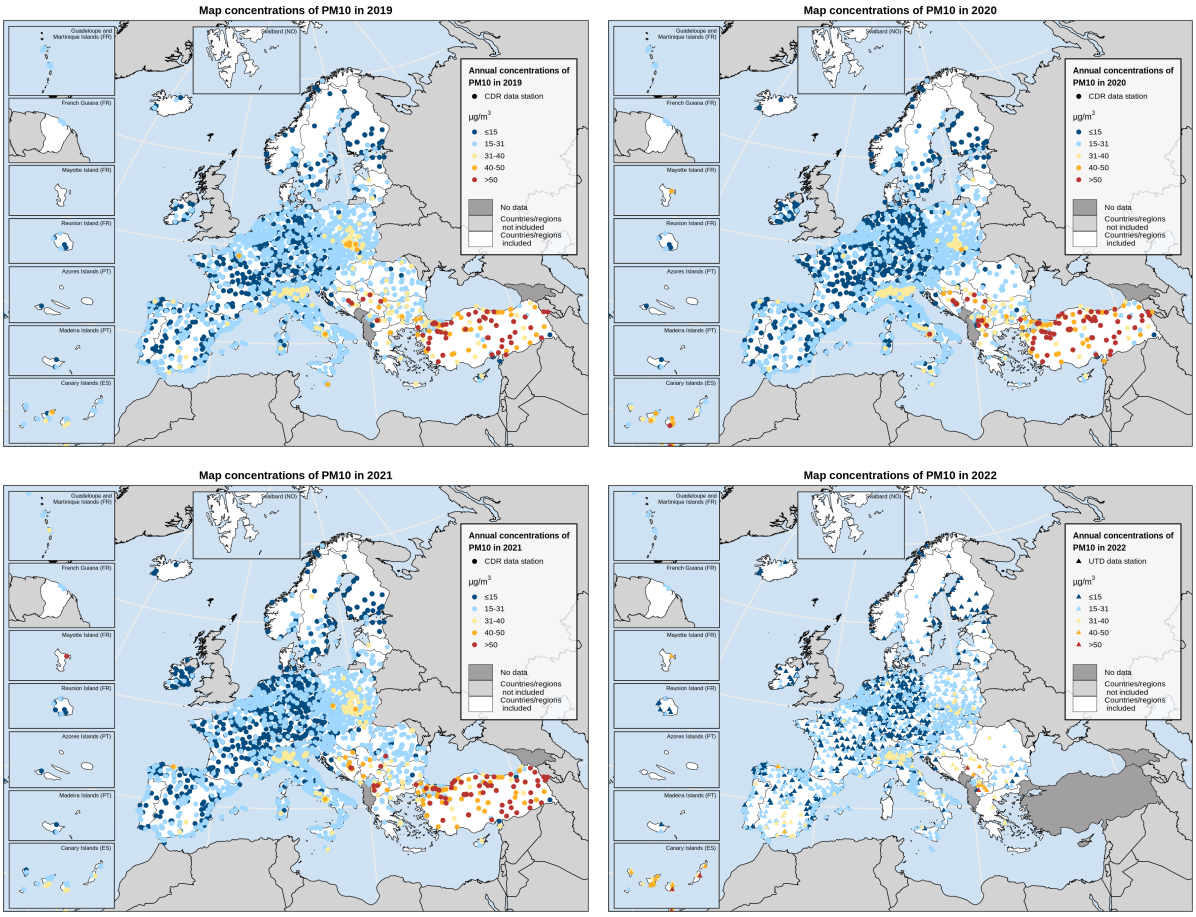
Note: Observed concentrations of PM10 in 2022. The possibility of subtracting contributions to the measured concentrations from natural sources and winter road sanding/salting has not been considered. The last two colour categories indicate stations reporting concentrations above the EU annual limit value (40 µg/m³). The first colour category indicate stations reporting values below the WHO AQG level for PM10 (15 µg/m³). Only stations with more than 75 % of valid data have been included in the map.



Note: The graph is based on annual mean concentration values. For each country, the number of stations considered for 2022 (in brackets) are given. The boxplot represents the lowest (bottom of the whisker), highest (top of the whisker) and average (black dot) annual mean values (in µg/m³). The rectangles mark the 25th and 75th percentiles. At 25 % of the stations, levels are below the 25th percentile; at 25 % of the stations, concentrations are above the 75th percentile. The annual limit value set by EU legislation is marked by the upper continuous horizontal line. The WHO AQG level is marked by the lower dashed horizontal line. The graph should be read in relation to the above map, as a country's situation depends on the number of stations considered.

Figure 6 shows the maps of PM_{10} annual mean concentrations at station level for the last four years. In this way, any significant change in the spatial distribution of the values above the set thresholds in the legends can be observed. Note that only the last year's map (2022) is based on UTD data, while the previous three years are based on officially reported validated data (CDR).

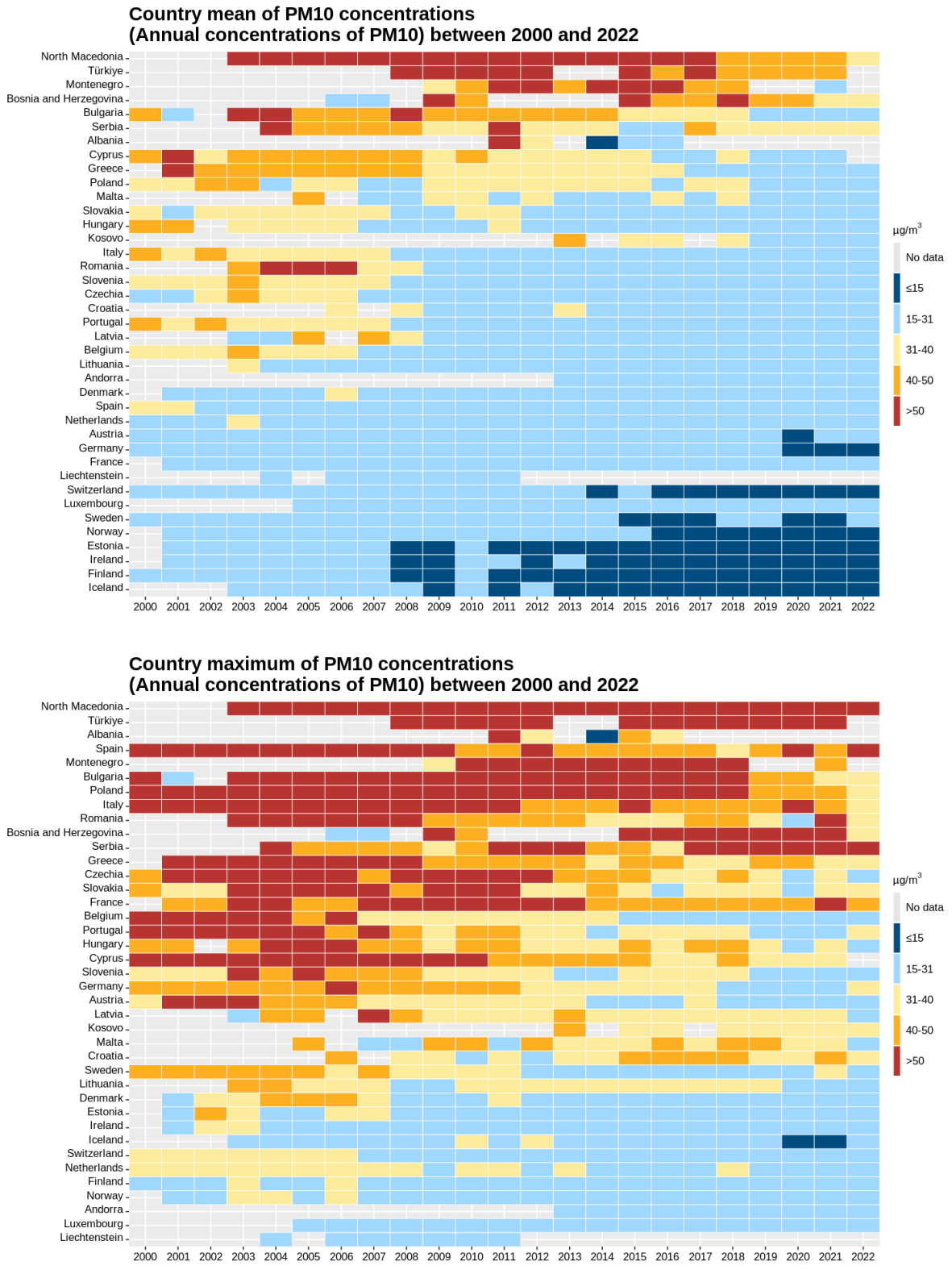
Figure 6: Maps of PM_{10} concentrations (annual limit value) for the last 4 years



Maps for years before 2020 are different to the ones published in previous reports because the bands in the legend have been modified to accomodate the 2021 WHO AQG level.

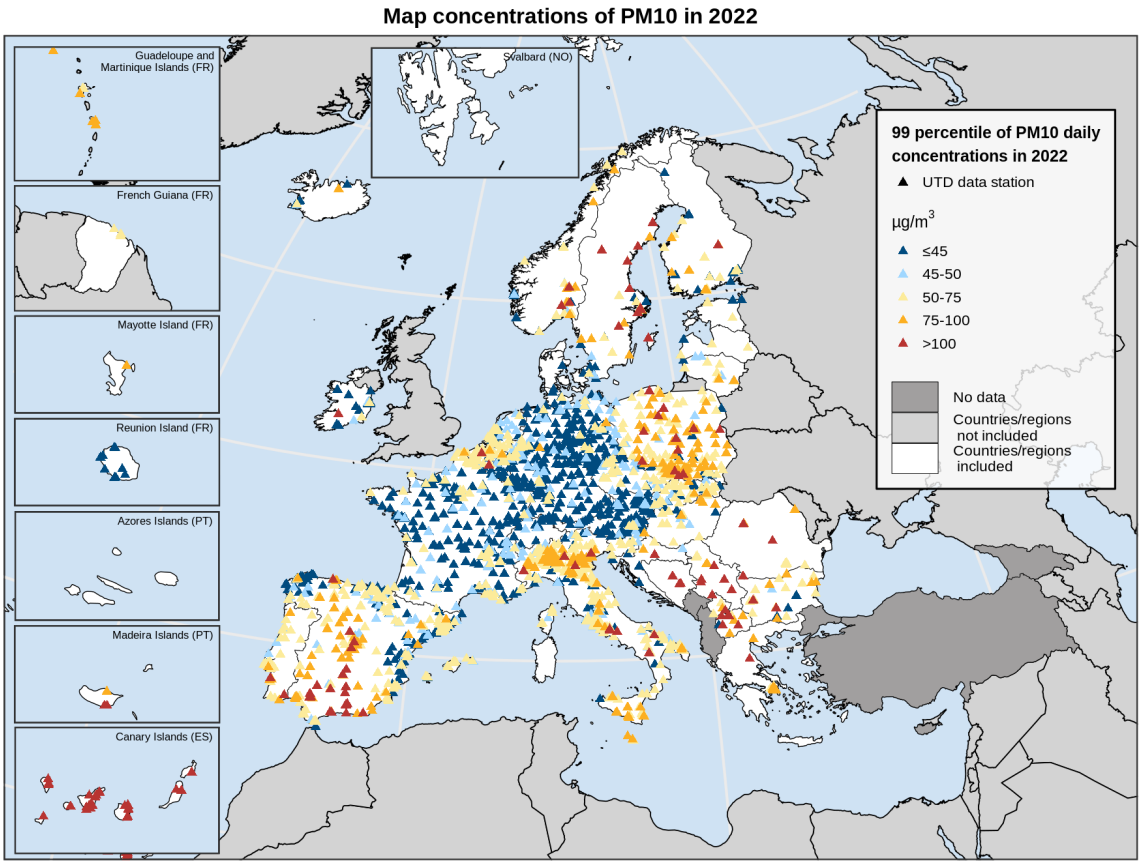
Heatmaps with the evolution from 2000 of the mean (top) and the maximum (bottom) annual mean PM_{10} concentrations at country level are shown in figure 7. In this way, the evolution along years of the average and maximum measured concentration levels can be seen for each country. Note that meteorological variability has a considerable impact on year-to-year changes in ambient air concentrations of air pollutants (EEA, 2020), and the last year (2022) is based on UTD data, while the previous years are based on officially reported validated data.

Figure 7: Evolution of mean (top) and maximum (bottom) PM_{10} annual mean concentrations (annual limit value) per country from 2000



Note: It is important to note that the figure is not based on a consistent set of stations. The number, location and classification of the stations included may vary from year to year.

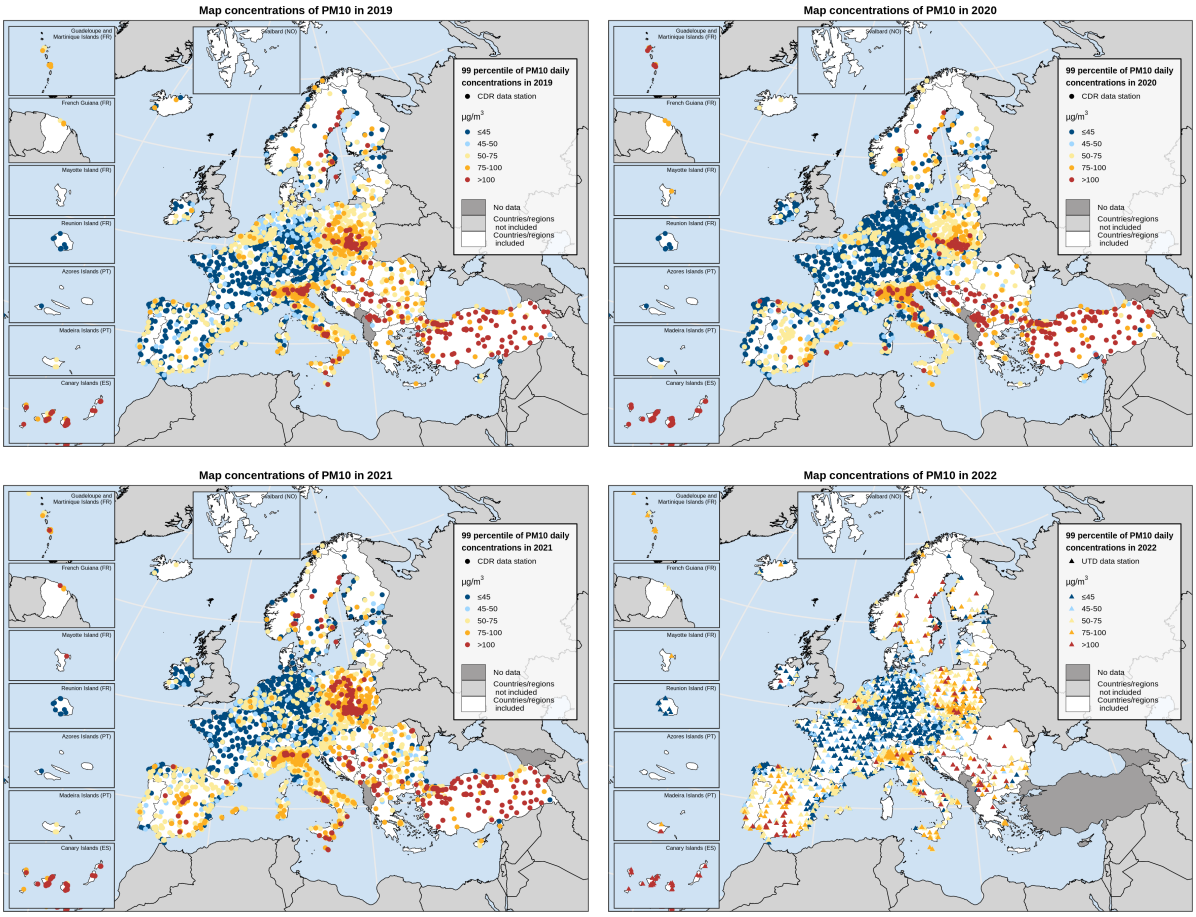
Figure 8: UTD Map of PM_{10} concentrations in 2022 - daily WHO AQG level



Note: Observed concentrations of PM10 in 2022. The map shows the 99 percentile of the PM10 daily mean concentrations, equivalent to 3−4 exceedance days per year, according to the definition of the daily WHO AQG level (45 µg/m³). The first colour category indicates stations with concentrations below this AQG level. Only stations with more than 75 % of valid data have been included in the map.

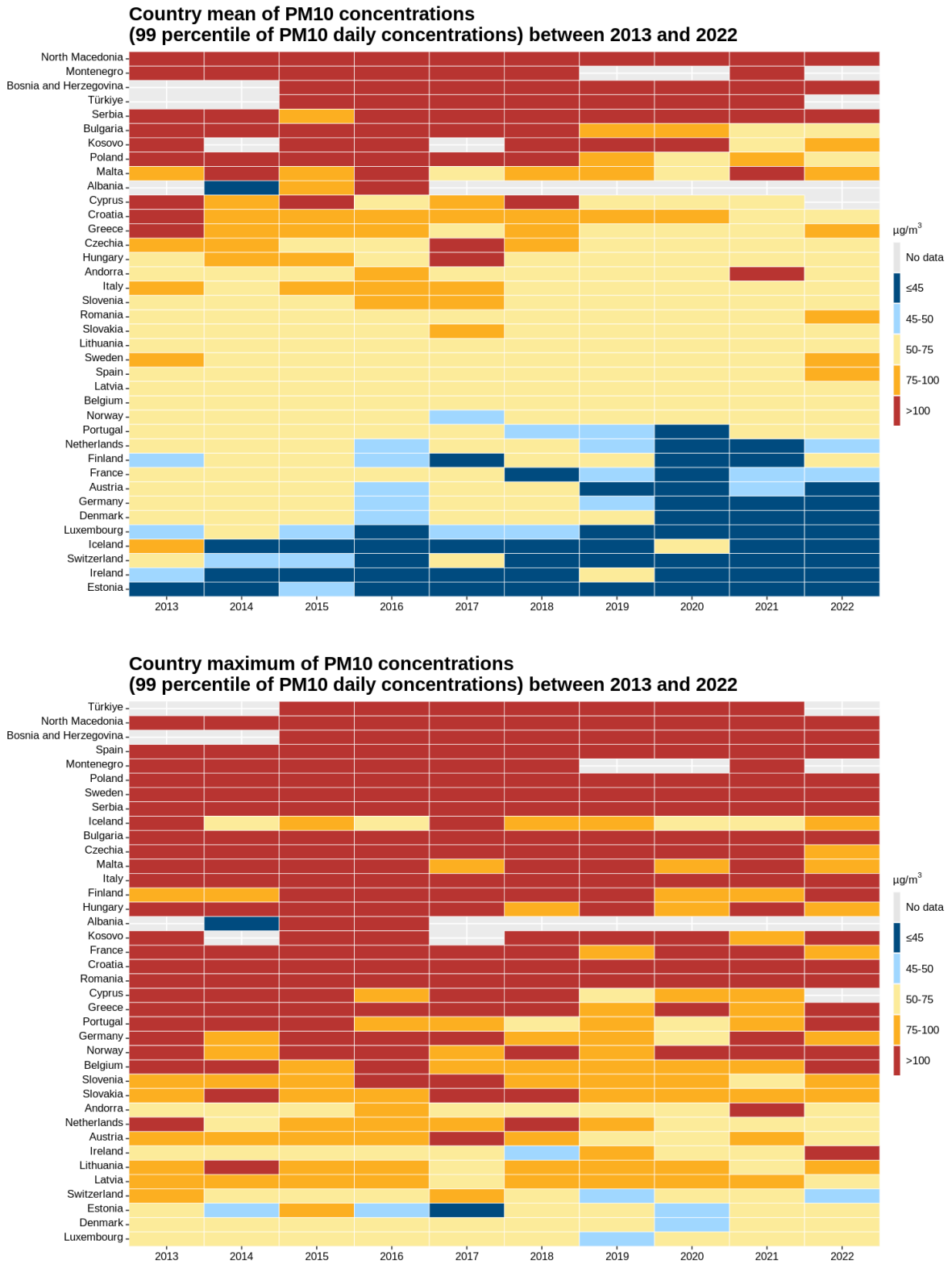
Figure 9 shows the maps of the 99 percentile of PM_{10} daily mean concentrations (equivalent to the WHO AQG level for PM_{10} daily mean level) for the last four years. In this way, any significant change in the spatial distribution of the values above the set thresholds in the legends can be observed. Note that only the last year's map (2022) is based on UTD data, while the previous three years are based on officially reported validated data (CDR).

Figure 9: Maps of PM_{10} concentrations (daily WHO AQG level) for the last 4 years



Heatmaps with the evolution from 2013 of the mean (top) and the maximum (bottom) 99 percentile of PM_{10} daily mean concentrations at country level are shown in figure 10. In this way, the evolution along years of the average and maximum measured concentration levels can be seen for each country. Note that meteorological variability has a considerable impact on year-to-year changes in ambient air concentrations of air pollutants (EEA, 2020), and the last year (2022) is based on UTD data, while the previous years are based on officially reported validated data.

Figure 10: Evolution of mean (top) and maximum (bottom) 99 percentile of PM_{10} daily mean concentrations (daily WHO AQG level) per country from 2013



Note: It is important to note that the figure is not based on a consistent set of stations. The number, location and classification of the stations included may vary from year to year.

3.2 Status of $PM_{2.5}$ concentrations

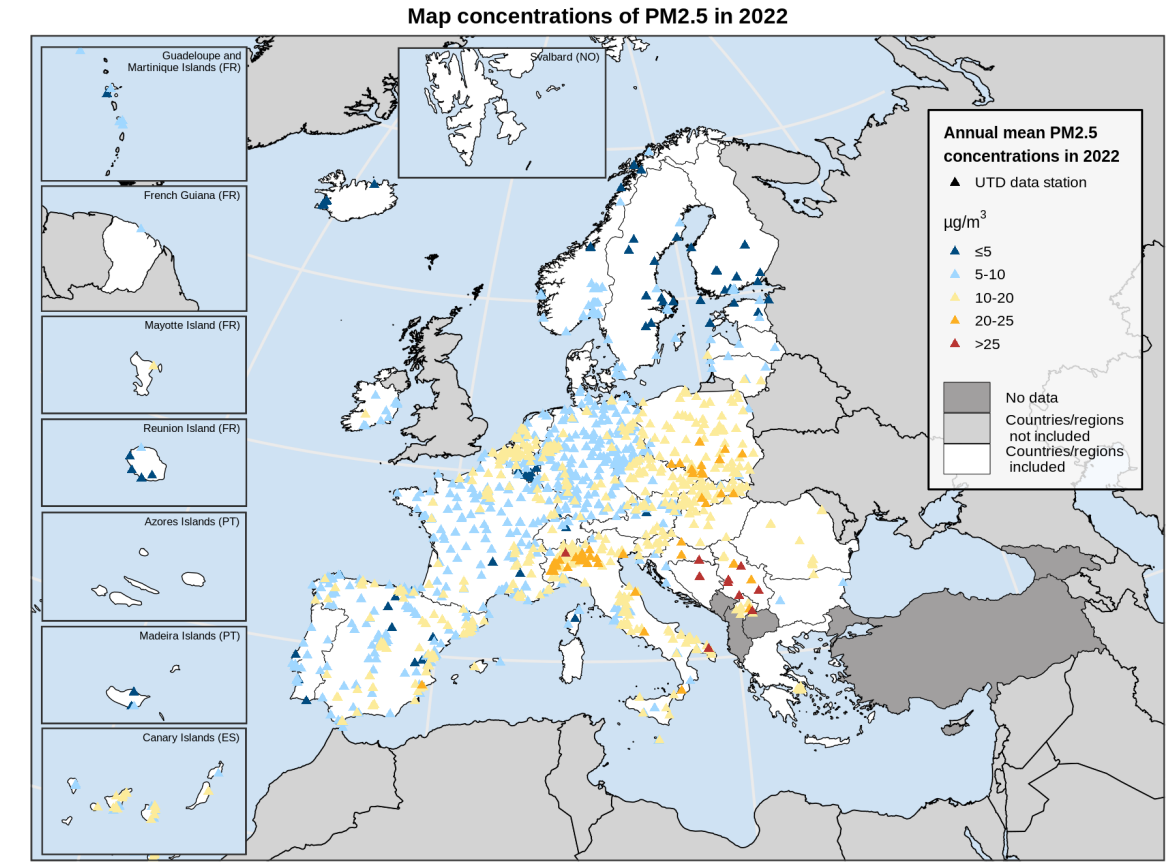
Regarding $PM_{2.5}$, data with sufficient valid measurements were received from 1462 stations for the calculation of annual mean concentrations and from 1449 stations in relation to the short-term WHO AQG level. These stations were located in all the reporting countries shown in Figure 1.

The $PM_{2.5}$ concentrations were higher than the EU annual limit value (25 µg/m^3) in two countries in EU-27 and three other reporting countries (Figure 11). These concentrations above the limit value were registered in 1 % of all the reporting stations and occurred primarily (91 % of cases) in urban (64 %) or suburban (27 %) areas.

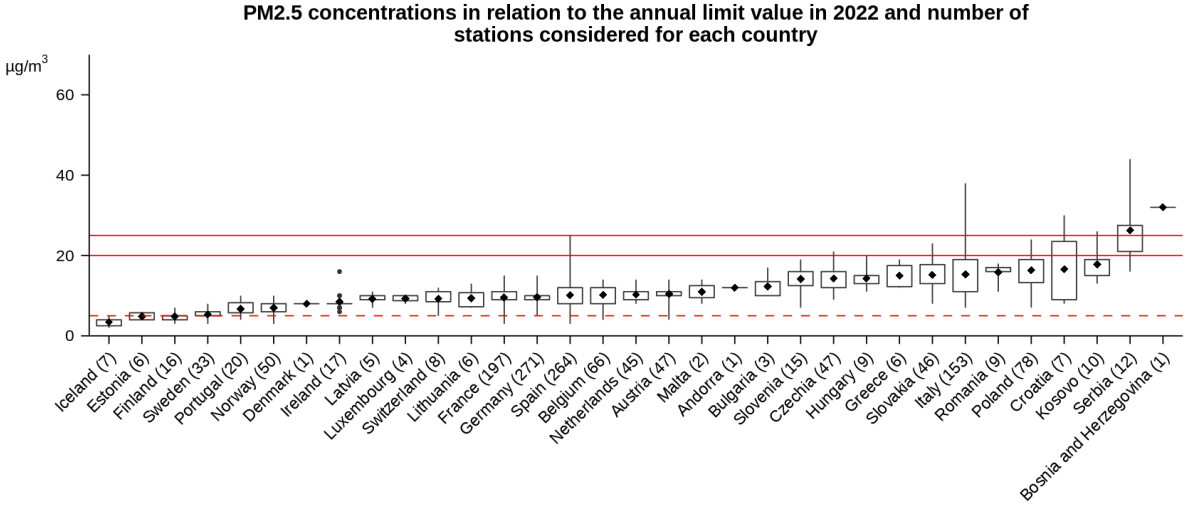
The WHO AQG level for $PM_{2.5}$ annual mean (5 µg/m^3) was exceeded at 94 % of the stations, located in 32 of the 33 countries reporting $PM_{2.5}$ data (Figure 11).

Although the EU has not set any short-term standard for $PM_{2.5}$, the WHO defined in 2021 a daily AQG level of 15 µg/m^3, expresed as percentile 99. It was exceeded at 97 % (1409 stations) of the stations in all the reporting countries (Figure 14).

Figure 11: UTD Map and boxplot of $PM_{2.5}$ concentrations in 2022 - annual limit value



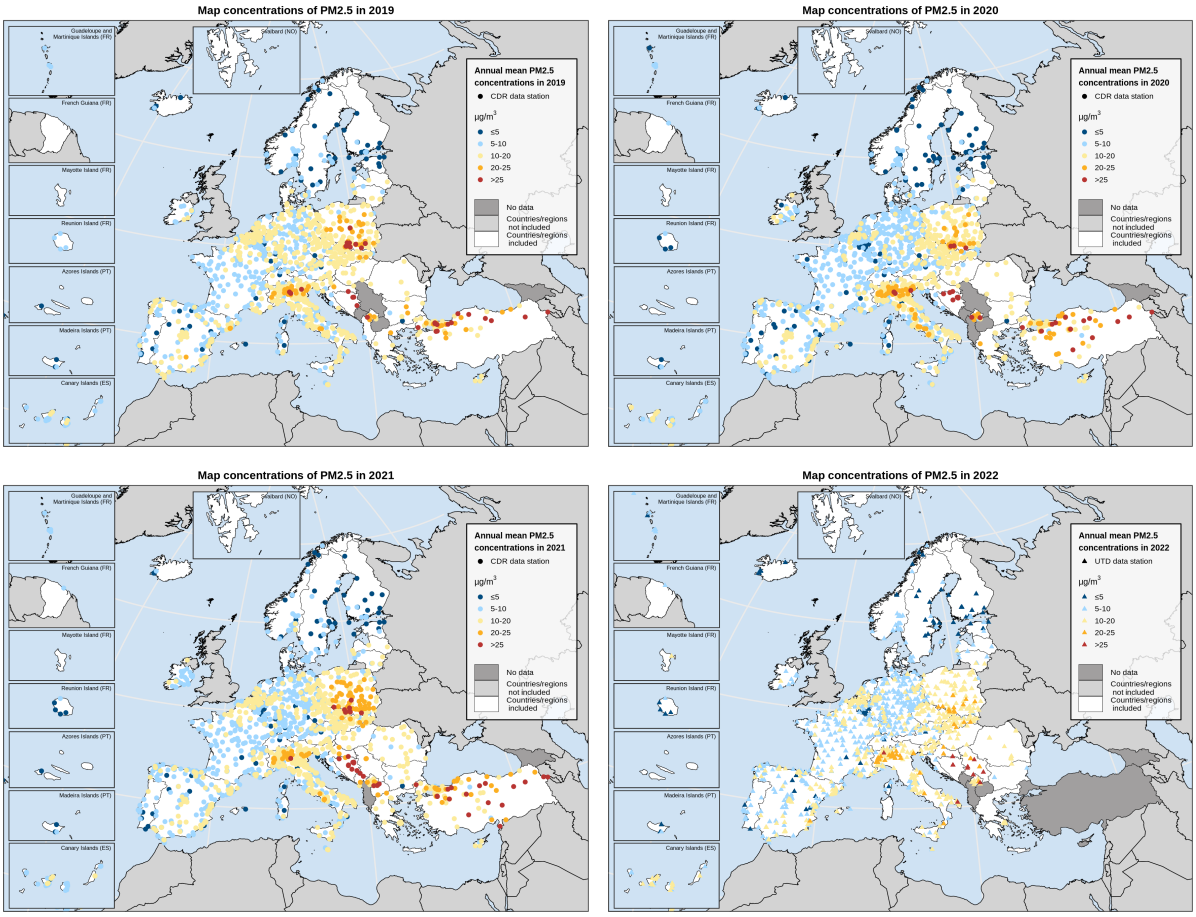
Note: Observed concentrations of PM2.5 in 2022. The possibility of subtracting contributions to the measured concentrations from natural sources and winter road sanding/salting has not been considered. The last two colour categories indicate stations reporting concentrations above the EU indicative annual limit value (20 µg/m³) or the EU annual limit value (25 µg/m³). The first colour category indicates stations reporting values below the WHO AQG level for PM2.5 (5 µg/m³). Only stations with more than 75 % of valid data have been included in the map.



Note: The graph is based on annual mean concentration values. For each country, the number of stations considered for 2022 (in brackets) are given. The boxplot represents the lowest (bottom of the whisker), highest (top of the whisker) and average (black dot) annual mean values (in µg/m³). The rectangles mark the 25th and 75th percentiles. At 25 % of the stations, levels are below the 25th percentile; at 25 % of the stations, concentrations are above the 75th percentile. The annual limit value and the indicative annual limit value set by EU legislation are marked by the upper continuous horizontal lines at 25 and 20, respectively. The WHO AQG level is marked by the lower dashed horizontal line. The graph should be read in relation to the above map, as a country's situation depends on the number of stations considered.

Figure 12 shows the maps of measured $PM_{2.5}$ annual mean concentrations for the last four years. In this way, any significant change in the spatial distribution of the values above the set thresholds in the legends can be observed. Note that only the last year's map (2022) is based on UTD data, while the previous three years are based on officially reported validated data (CDR).

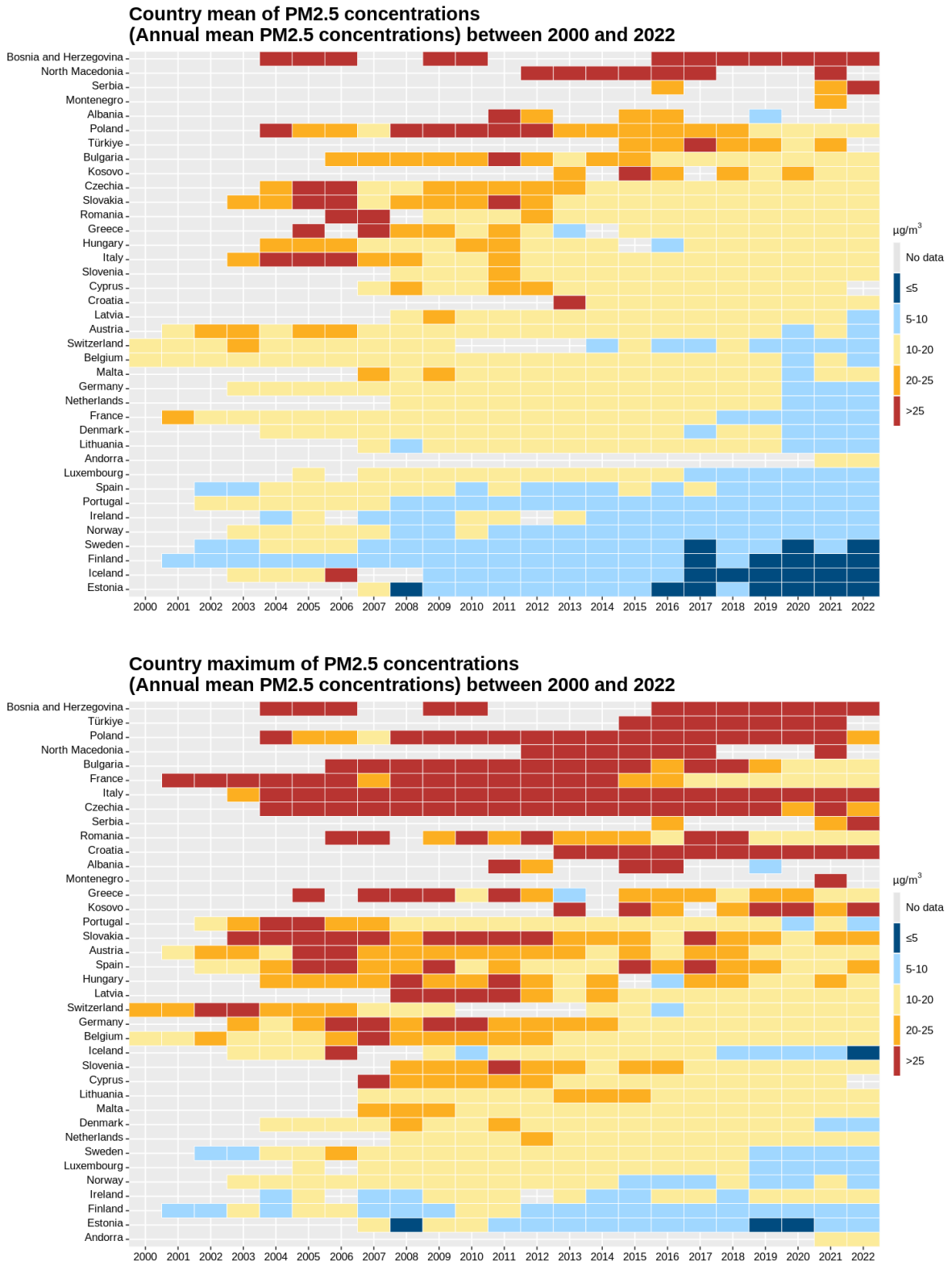
Figure 12: Maps of $PM_{2.5}$ concentrations (annual limit value) for the last 4 years



Maps for years before 2020 are different to the ones published in previous reports because the bands in the legend have been modified to accomodate the 2021 WHO AQG level.

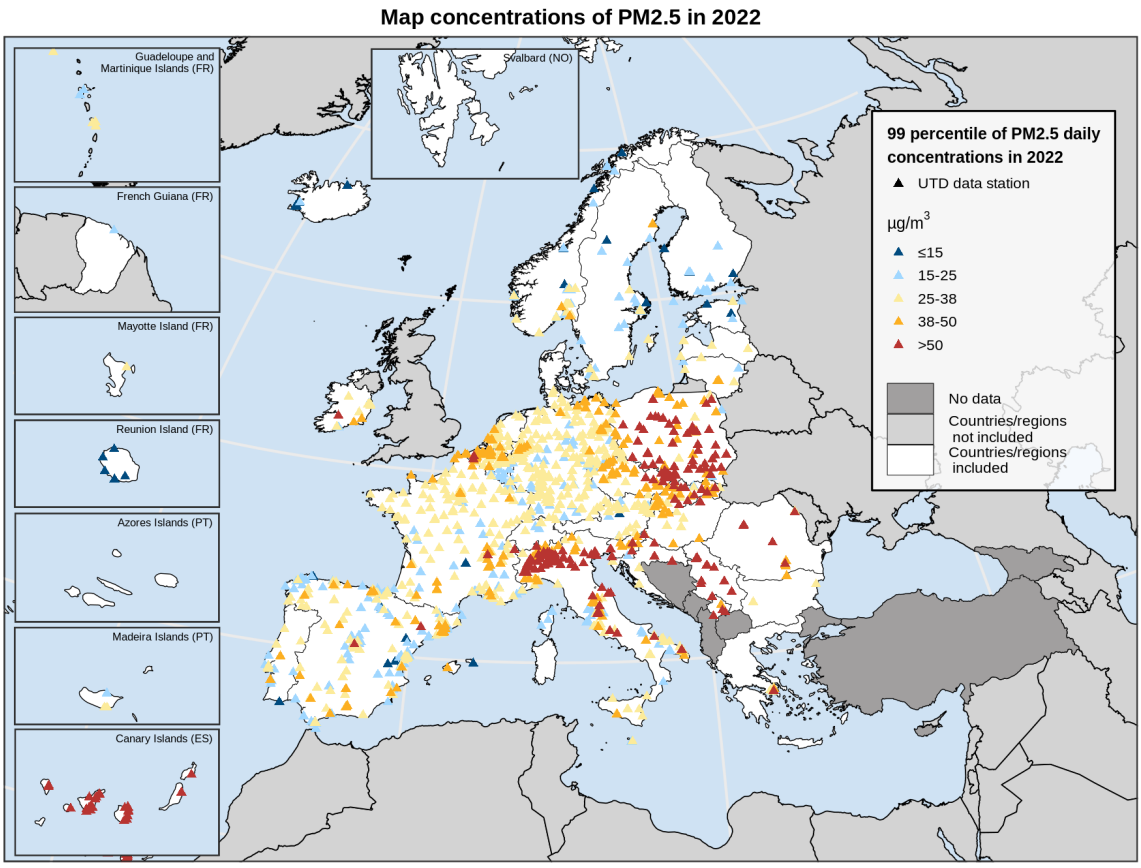
Heatmaps with the evolution from 2000 of the mean (top) and the maximum (bottom) $PM_{2.5}$ annual mean concentrations at country level are shown in figure 13. In this way, the evolution along years of the average and maximum measured concentration levels can be seen for each country. Note that meteorological variability has a considerable impact on year-to-year changes in ambient air concentrations of air pollutants (EEA, 2020), and the last year (2022) is based on UTD data, while the previous years are based on officially reported validated data.

Figure 13: Evolution of mean (top) and maximum (bottom) $PM_{2.5}$ annual mean concentrations (annual limit value) per country from 2000



Note: It is important to note that the figure is not based on a consistent set of stations. The number, location and classification of the stations included may vary from year to year.

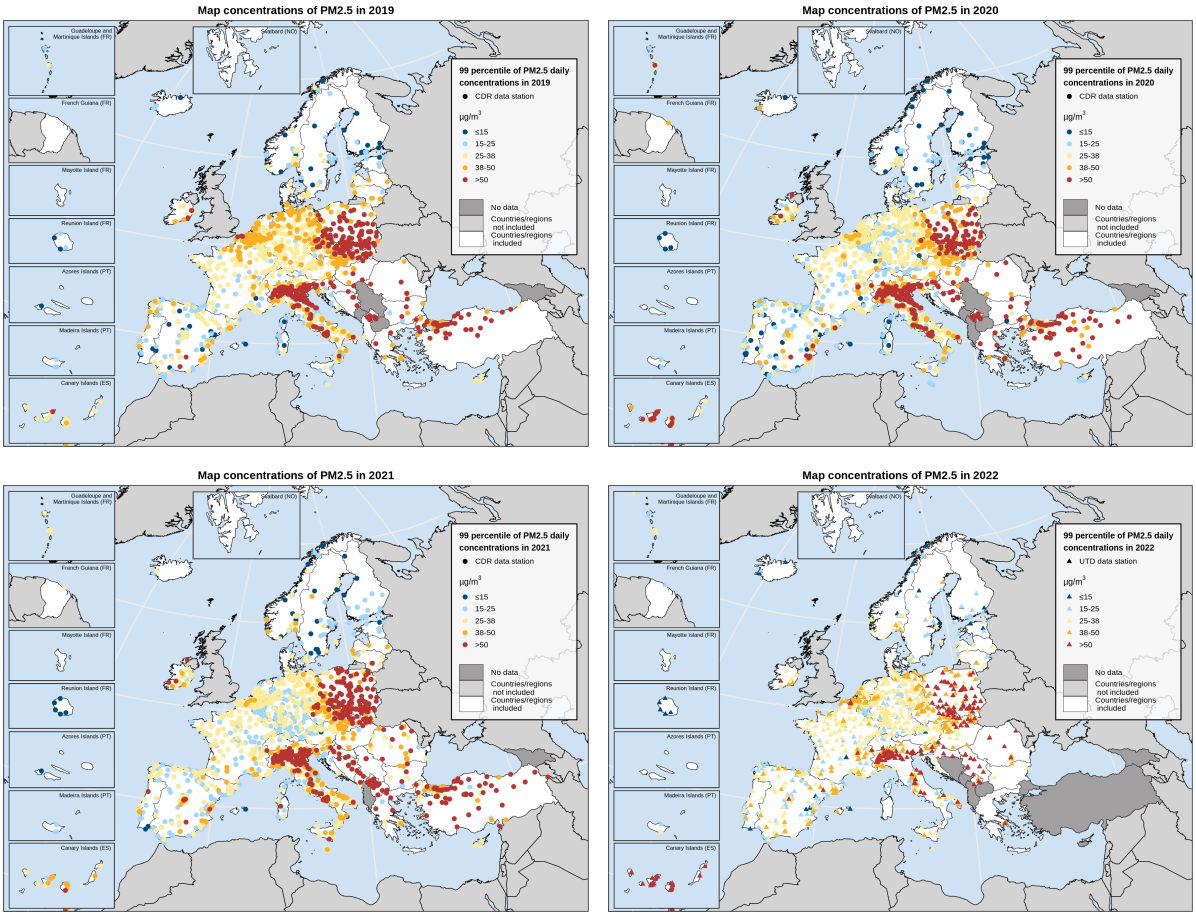
Figure 14: UTD Map of $PM_{2.5}$ concentrations in 2022 - daily WHO AQG level



Note: Observed concentrations of PM2.5 in 2022. The map shows the 99 percentile of the PM2.5 daily mean concentrations, equivalent to 3−4 exceedance days per year, according to the definition of the daily WHO AQG level (15 µg/m³). The first colour category indicates stations with concentrations below this AQG level. Only stations with more than 75 % of valid data have been included in the map.

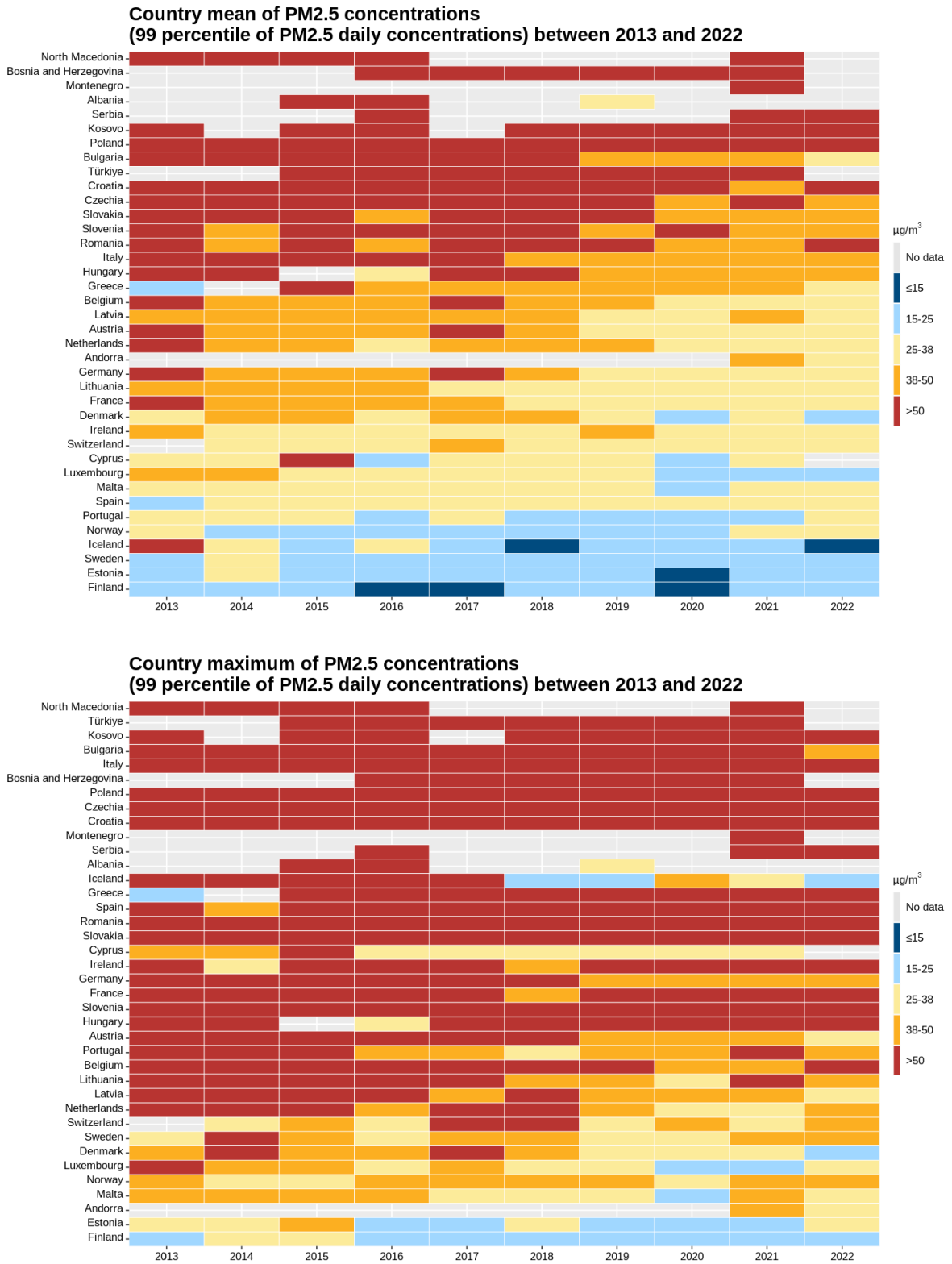
Figure 15 shows the maps of the 99 percentile of $PM_{2.5}$ daily mean concentrations (equivalent to the WHO AQG level for $PM_{2.5}$ daily mean level) for the last four years. In this way, any significant change in the spatial distribution of the values above the set thresholds in the legends can be observed. Note that only the last year's map (2022) is based on UTD data, while the previous three years are based on officially reported validated data (CDR).

Figure 15: Maps of $PM_{2.5}$ concentrations (daily WHO AQG level) for the last 4 years



Heatmaps with the evolution from 2013 of the mean (top) and the maximum (bottom) 99 percentile of $PM_{2.5}$ daily mean concentrations at country level are shown in figure 16. In this way, the evolution along years of the average and maximum measured concentration levels can be seen for each country. Note that meteorological variability has a considerable impact on year-to-year changes in ambient air concentrations of air pollutants (EEA, 2020), and the last year (2022) is based on UTD data, while the previous years are based on officially reported validated data.

Figure 16: Evolution of mean (top) and maximum (bottom) 99 percentile of $PM_{2.5}$ daily mean concentrations (daily WHO AQG level) per country from 2013



Note: It is important to note that the figure is not based on a consistent set of stations. The number, location and classification of the stations included may vary from year to year.

4 Status of ozone ambient air concentrations

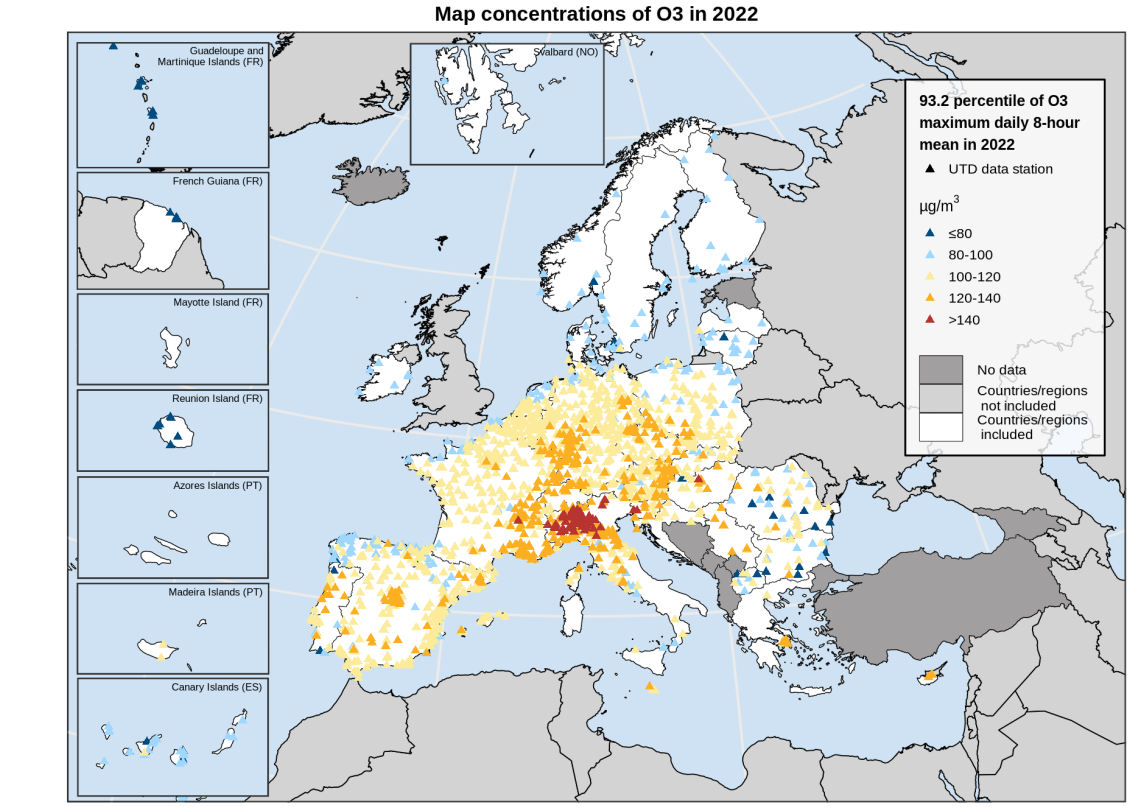
Data for O_3 were reported from 1812 stations for the calculation of EU standards, from 1812 stations in relation to the short-term WHO AQG level, and from 1716 stations for the long-term WHO AQG level. These stations were located in all the reporting countries shown in Figure 1.

18 countries in EU-27 and 2 other reporting countries registered concentrations above the O_3 target value (120 µg/m^3) more than 25 times (Figure 17). In total, 24 % of all stations reporting O_3 showed concentrations above the target value for the protection of human health. In addition, only 13 % (234) of all stations fulfilled the long-term objective (120 µg/m^3). 86 % of the stations with values above the long-term objective were background stations.

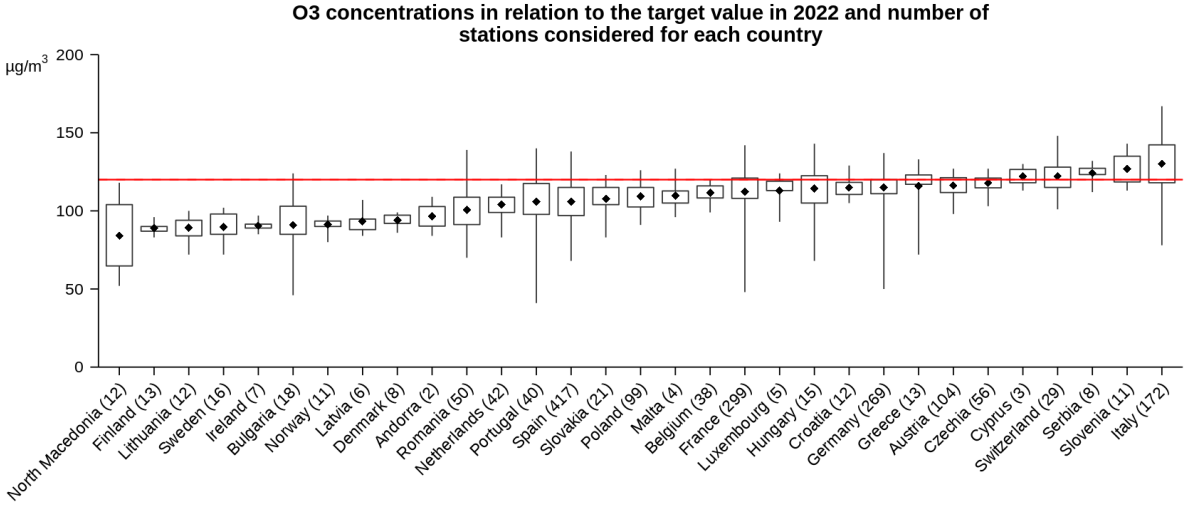
6 % (114) of all stations and only 11 of the 474 reported rural background stations had values below the short-term WHO AQG value for O_3 (100 µg/m^3) (Figure 20), set for the protection of human health. The long-term, peak season([4]), WHO AQG level (60 µg/m^3) was exceeded in 99 % (1693) of all stations located in 24 countries in EU-27 and 6 other reporting countries. Only 0 of the 453 reported rural background stations had values below this AQG level (Figure 23).

[4]The peak season is calculated for each station as the average of daily maximum 8-hour mean O3 concentration in the six consecutive months with the highest six-month running-average O_3 concentration. That means that, for each station, twelve 6-months running averages of the daily 8-h max are calculated (1 August YY-1 to 31 January YY, ..., 1 January YY to 30 June YY, ..., 1 July YY to 31 December YY) and the maximum of those 12 values is selected as the peak season concentration. Please check also Data Dictionary - Vocabulary (https://dd.eionet.europa.eu/vocabularyconcept/aq/aggregationprocess/P1Y-maxP6M-P8H-dmax/view?vocabularyFolder.workingCopy=false&facet=HTML+Representation).

Figure 17: UTD Map and boxplot of O_3 concentrations in 2022



Note: Observed concentrations of O3 in 2022. The map shows the 93.2 percentile of the O3 maximum daily 8−hour mean, representing the 26th highest value in a complete series. It is related to the O3 target value. At sites marked with the last two colour categories, the 26th highest daily O3 concentrations were above the 120 µg/m³ threshold, implying values above the target value threshold. Please note that the legal definition of the target value considers not only 1 year but the average over 3 years. Only stations with more than 75 % of valid data have been included in the map.

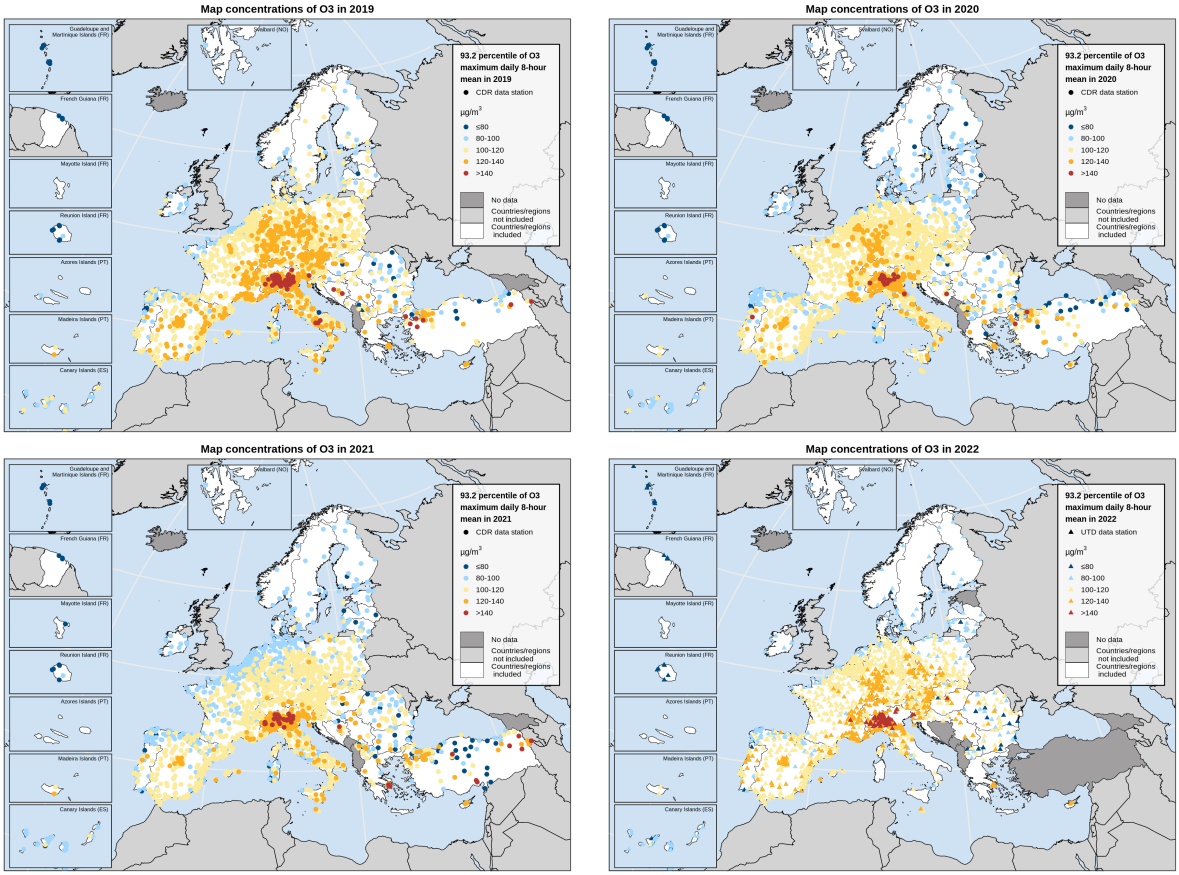


Note: The graph is based, for each country, on the 93.2 percentile of the maximum daily 8−hour mean concentration values, corresponding to the 26th highest daily maximum of the running 8−hour mean in a complete time series. For each country, the number of stations considered for 2022 (in brackets) are given. The boxplot represents the lowest (bottom of the whisker), highest (top of the whisker) and average (black dot) values (in µg/m³). The rectangles mark the 25th and 75th percentiles. At 25 % of the stations, levels are below the 25th percentile; at 25 % of the stations, concentrations are above the 75th percentile. The target value threshold set by the EU legislation is marked by the horizontal line. Please note that the legal definition of the target value considers not only 1 year but the average over 3 years. The graph should be read in relation to the above map, as a country's situation depends on the number of stations considered.

Figure 18 shows the maps of the observed 93.2 percentile of the O_3 maximum daily 8-hour mean concentrations (O_3 target value) for the last four years. In this way, any significant change

in the spatial distribution of the values above the set thresholds in the legends can be observed. Note that only the last year's map (2022) is based on UTD data, while the previous three years are based on officially reported validated data (CDR).

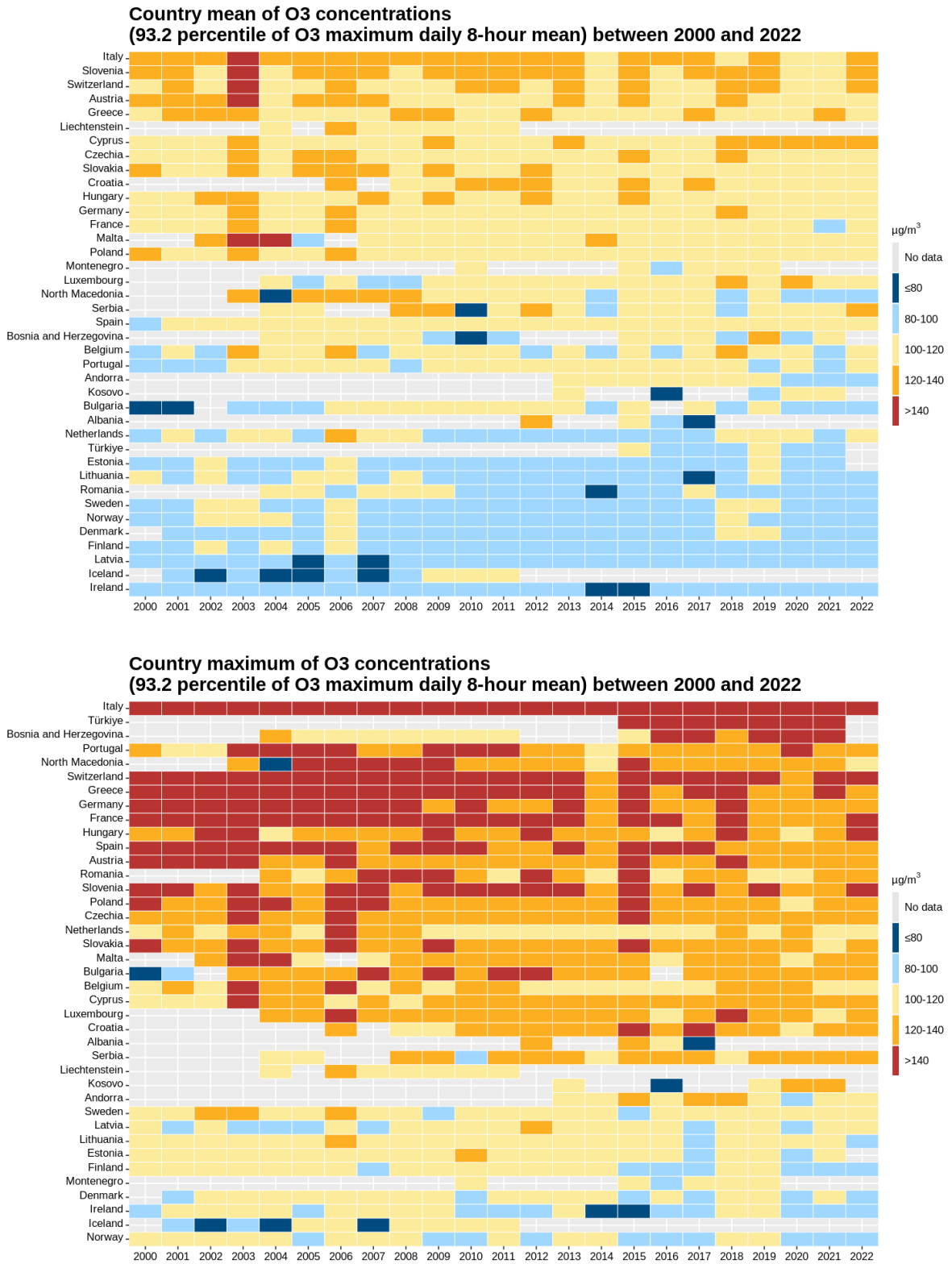
Figure 18: Maps of O_3 concentrations (related to the target value) for the last 4 years



Note: Please be aware that the TV considers the average over 3 years and the maps only show the situation for one specific year.

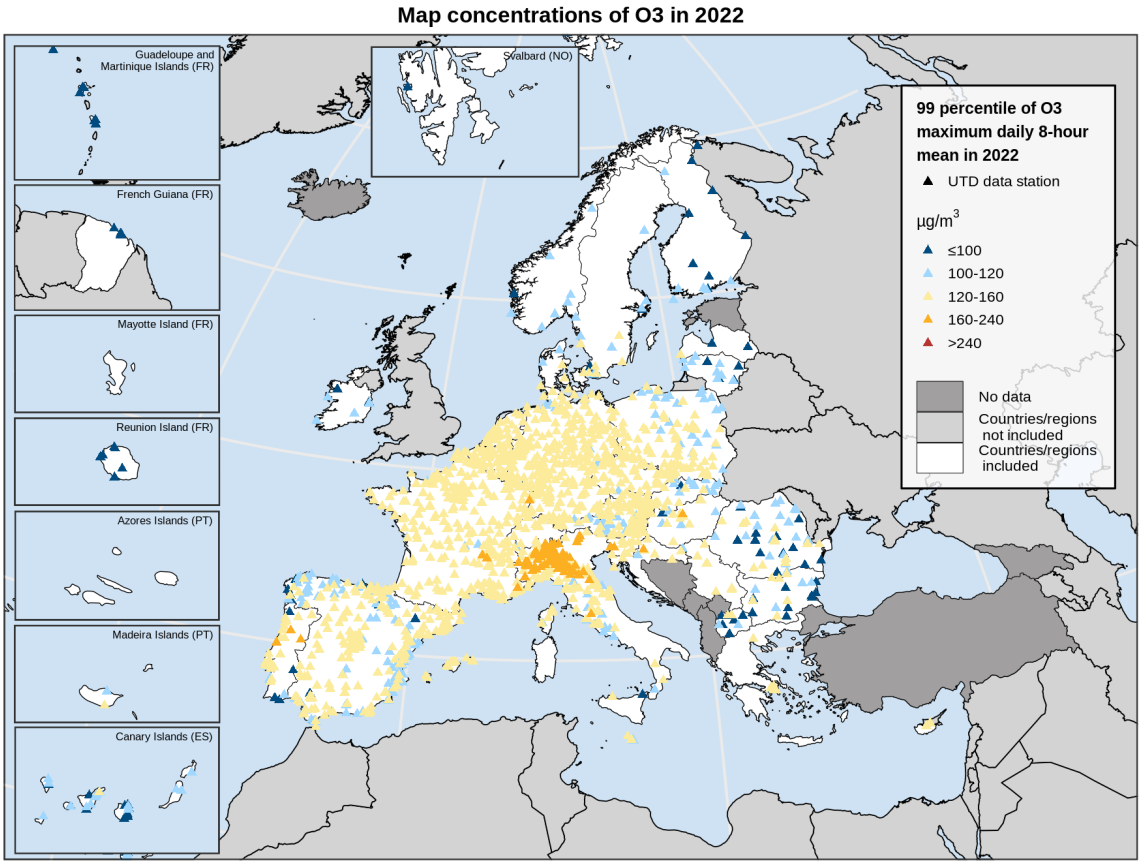
Heatmaps with the evolution from 2000 of the mean (top) and the maximum (bottom) O_3 concentrations (93.2 percentile of the maximum daily 8-hour mean concentration, target value) at country level are shown in figure 19. In this way, the evolution along years of the average and maximum measured concentration levels can be seen for each country. Note that meteorological variability has a considerable impact on year-to-year changes in ambient air concentrations of air pollutants (EEA, 2020), especially for O_3 as higher ambient air temperature leads to enhanced photochemical reactions and O_3 formation. The last year (2022) is based on UTD data, while the previous years are based on officially reported validated data.

Figure 19: Evolution of mean (top) and maximum (bottom) O_3 concentrations (93.2 percentile of the maximum daily 8-hour mean concentration, related to the target value) per country from 2000



Note: It is important to note that the figure is not based on a consistent set of stations. The number, location and classification of the stations included may vary from year to year.

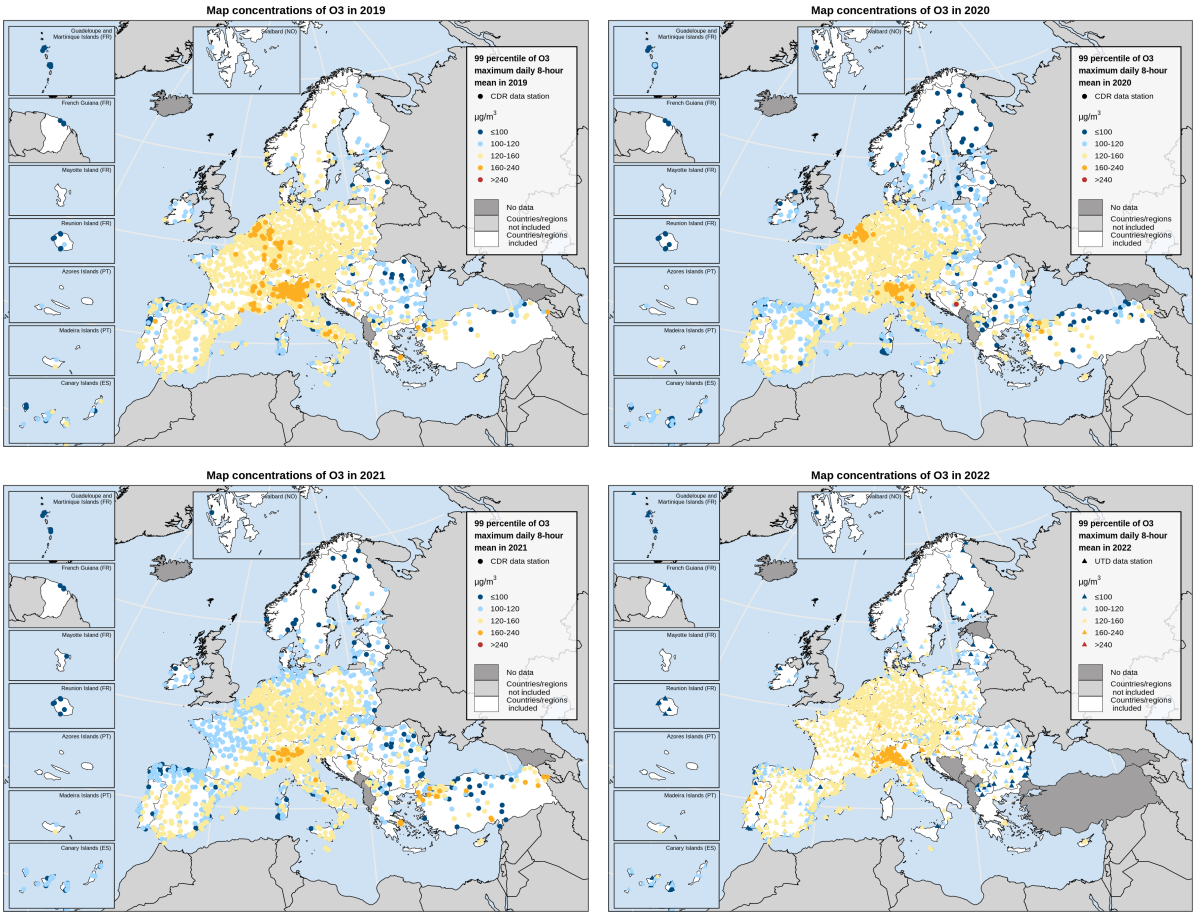
Figure 20: UTD Map of O_3 concentrations in 2022 - short-term WHO AQG level



Note: Observed concentrations of O3 in 2022. The map shows the 99 percentile of the O3 maximum daily 8−hour mean concentrations, equivalent to 3−4 exceedance days per year, according to the definition of the short−term WHO AQG level (100 µg/m³).
The first colour category indicates stations with concentrations below this AQG level.
Only stations with more than 75 % of valid data have been included in the map.

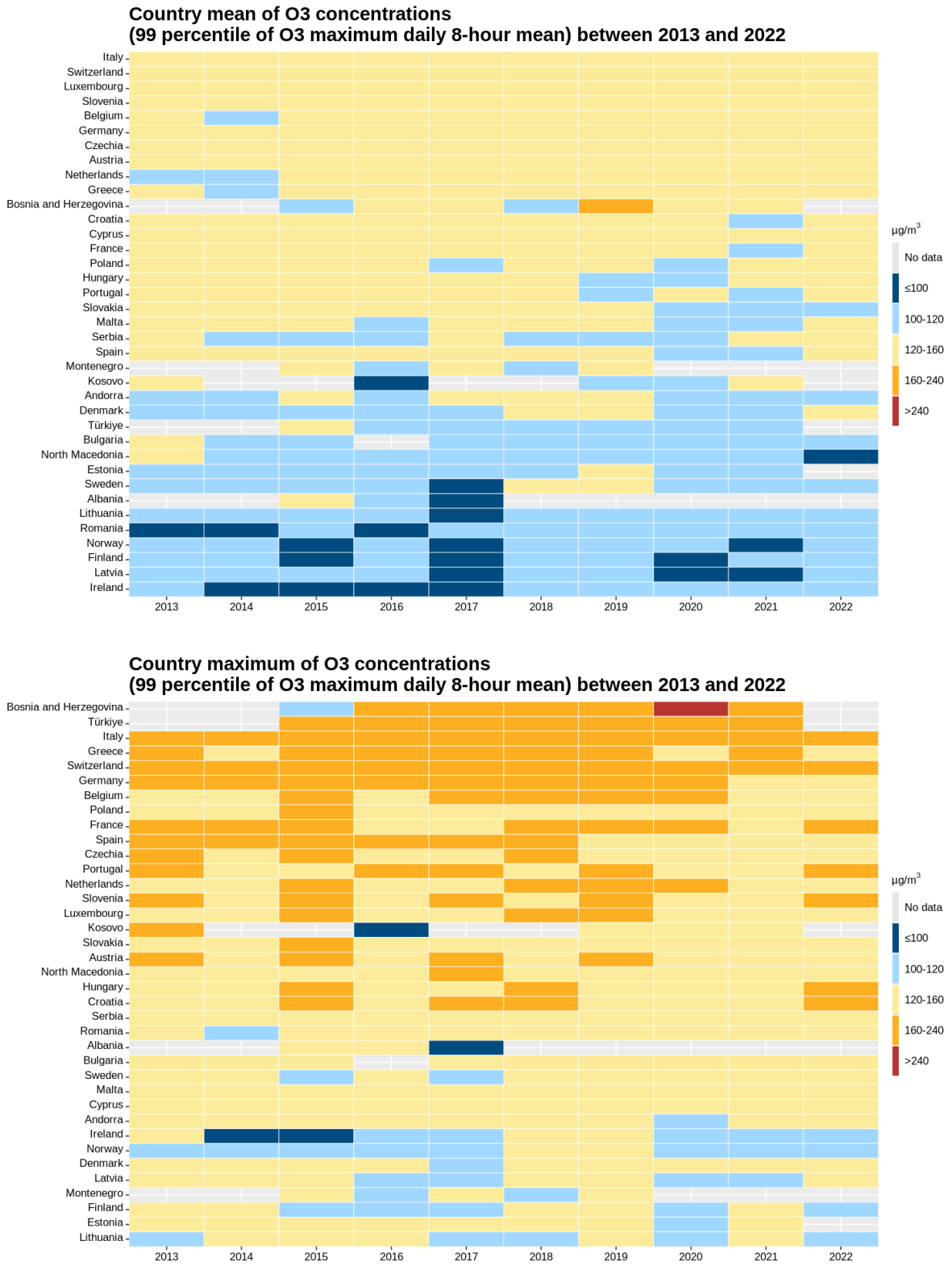
Figure 21 shows the maps of the 99 percentile of the O_3 maximum daily 8-hour mean concentrations (equivalent to the short-term WHO AQG level) for the last four years. In this way, any significant change in the spatial distribution of the values above the set thresholds in the legends can be observed. Note that only the last year's map (2022) is based on UTD data, while the previous three years are based on officially reported validated data (CDR).

Figure 21: Maps of O_3 concentrations (short-term WHO AQG level) for the last 4 years



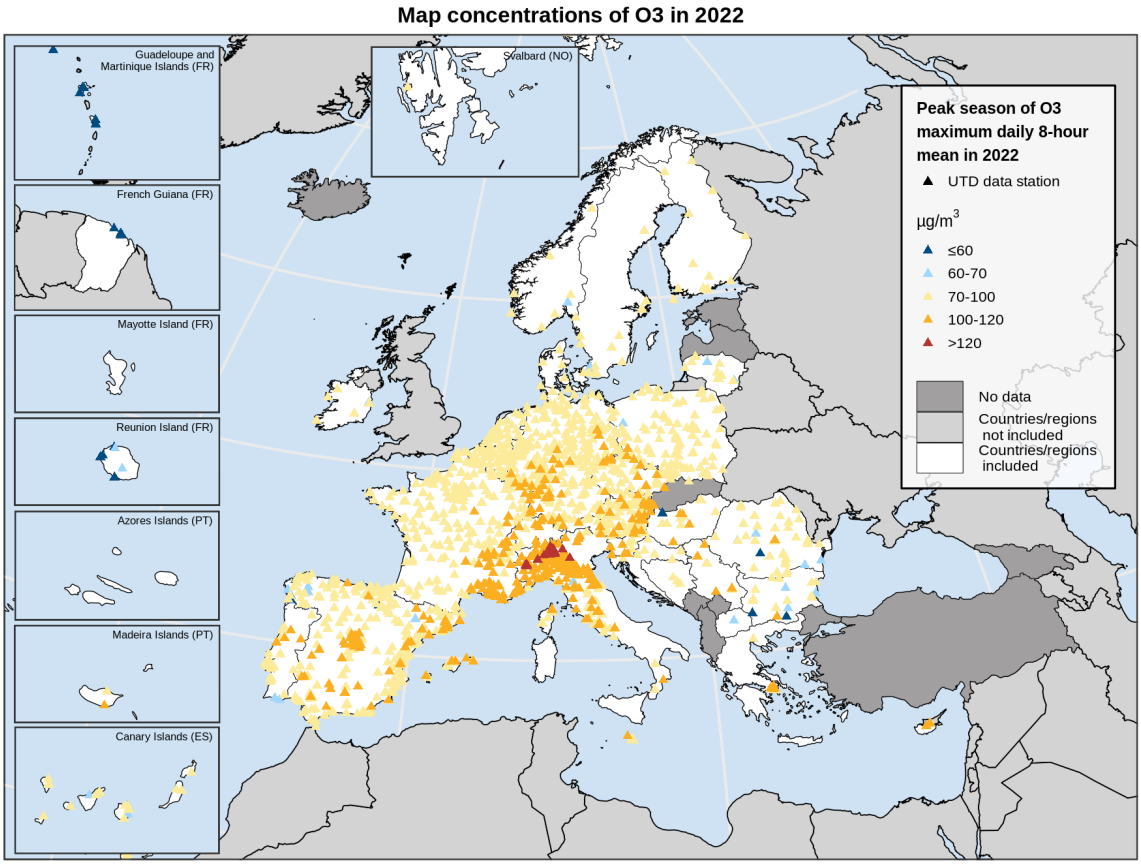
Heatmaps with the evolution from 2013 of the mean (top) and the maximum (bottom) 99 percentile of the O_3 maximum daily 8-hour mean concentrations at country level are shown in figure 22. In this way, the evolution along years of the average and maximum measured concentration levels can be seen for each country. Note that meteorological variability has a considerable impact on year-to-year changes in ambient air concentrations of air pollutants (EEA, 2020), and the last year (2022) is based on UTD data, while the previous years are based on officially reported validated data.

Figure 22: Evolution of mean (top) and maximum (bottom) 99 percentile of the O_3 maximum daily 8-hour mean concentrations per country from 2013



Note: It is important to note that the figure is not based on a consistent set of stations. The number, location and classification of the stations included may vary from year to year.

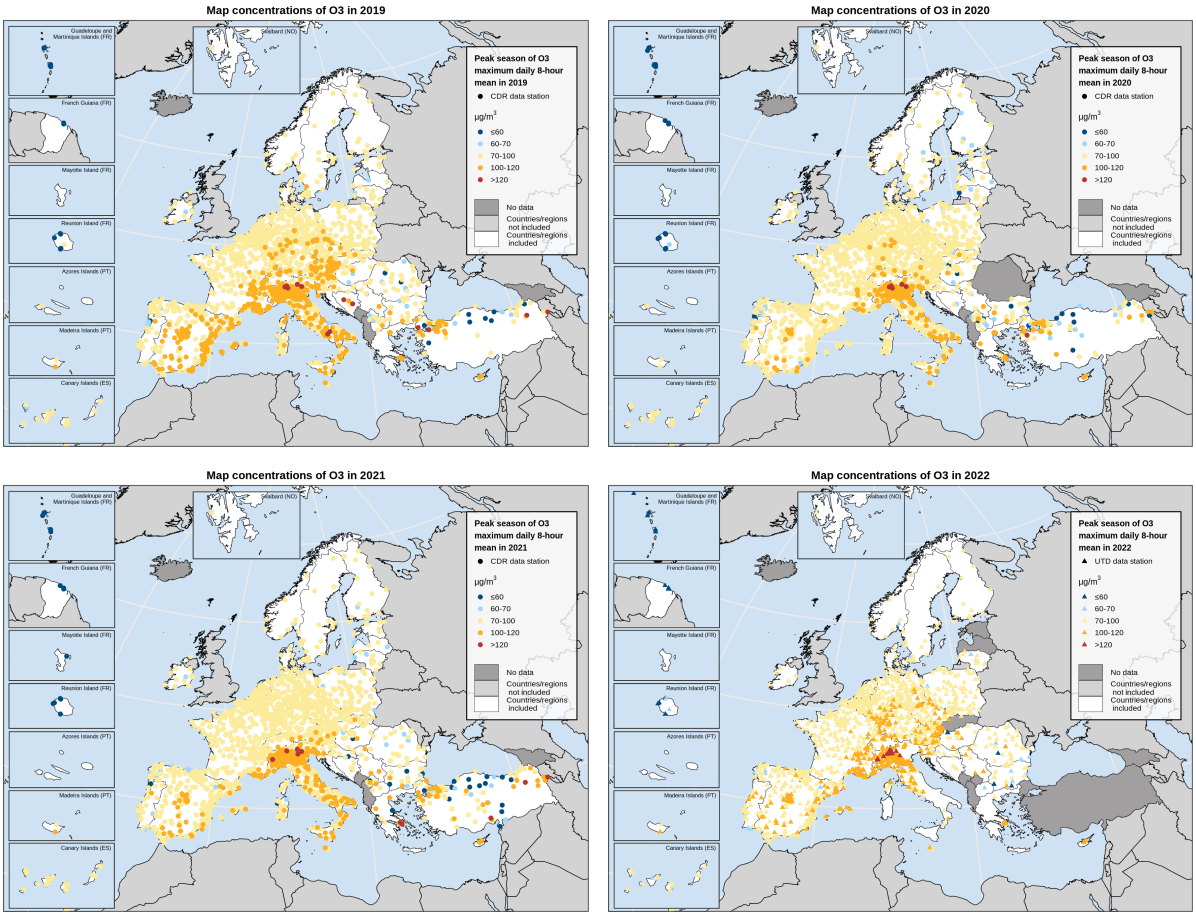
Figure 23: UTD Map of peak season O_3 concentrations in 2022



Note: Observed concentrations of O3 in 2022. The map shows the average of the daily maximum 8−hour mean O3 concentration in the six consecutive months with the highest six−month running−average O3 concentration. The first colour category represents stations fulfilling the peak season O3 AQG level. Only stations with more than 75 % of valid data have been included in the map.

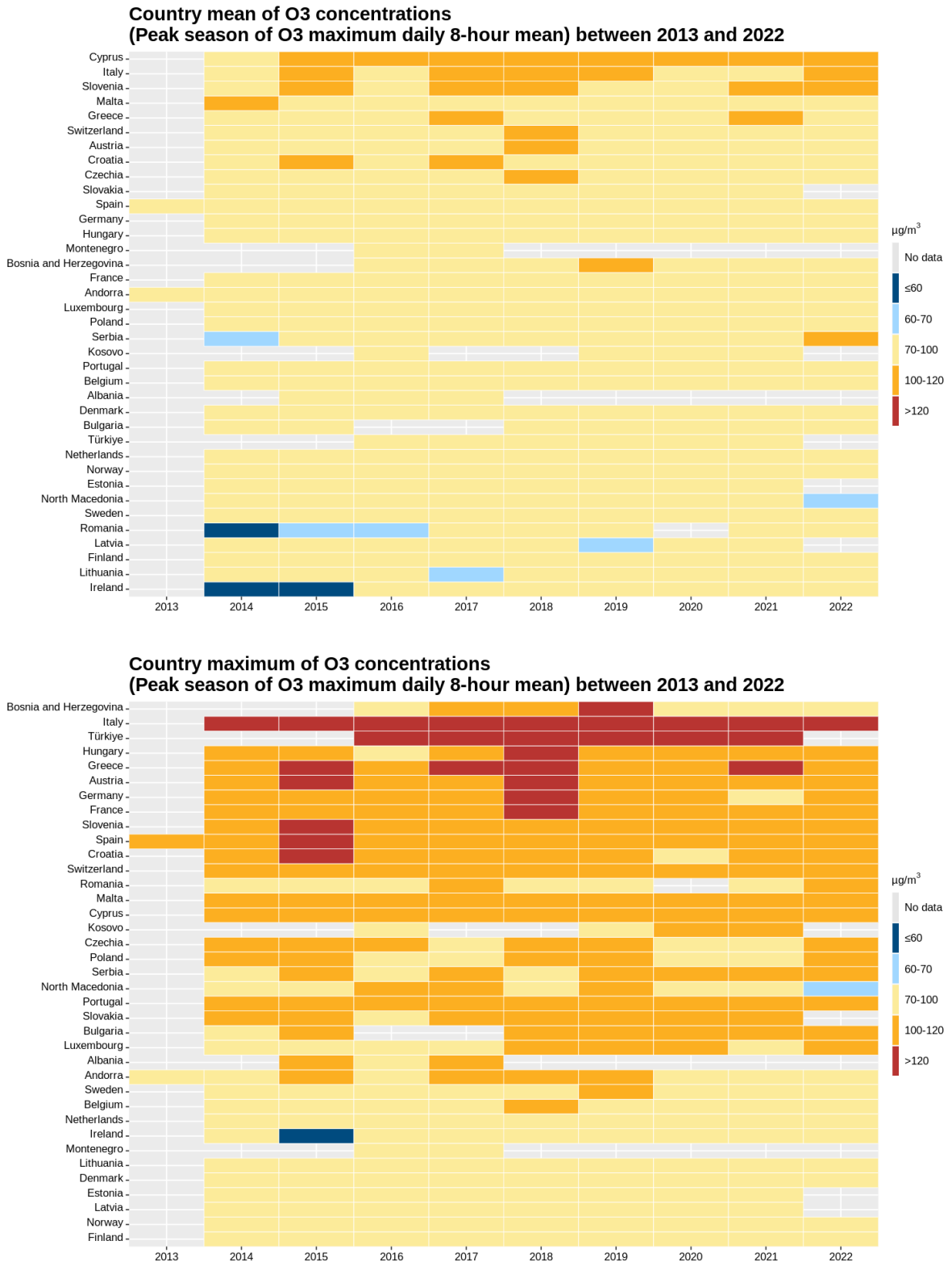
Figure 24 shows the maps of the peak season O_3 concentrations (equivalent to the long-term WHO AQG level) for the last four years. In this way, any significant change in the spatial distribution of the values above the set thresholds in the legends can be observed. Note that only the last year's map (2022) is based on UTD data, while the previous three years are based on officially reported validated data (CDR).

Figure 24: Maps of peak season O_3 concentrations for the last 4 years



Heatmaps with the evolution from 2013 of the mean (top) and the maximum (bottom) peak season O_3 concentrations at country level are shown in figure 25. In this way, the evolution along years of the average and maximum measured concentration levels can be seen for each country. Note that meteorological variability has a considerable impact on year-to-year changes in ambient air concentrations of air pollutants (EEA, 2020), and the last year (2022) is based on UTD data, while the previous years are based on officially reported validated data.

Figure 25: Evolution of mean (top) and maximum (bottom) peak season O_3 concentrations per country from 2013



Note: It is important to note that the figure is not based on a consistent set of stations. The number, location and classification of the stations included may vary from year to year.

5 Status of nitrogen dioxide ambient air concentrations

The reporting countries shown in Figure 1 submitted NO_2 data from 2702 stations for the annual limit value, 2695 stations for the hourly limit value, and 2654 stations for the daily WHO AQG level.

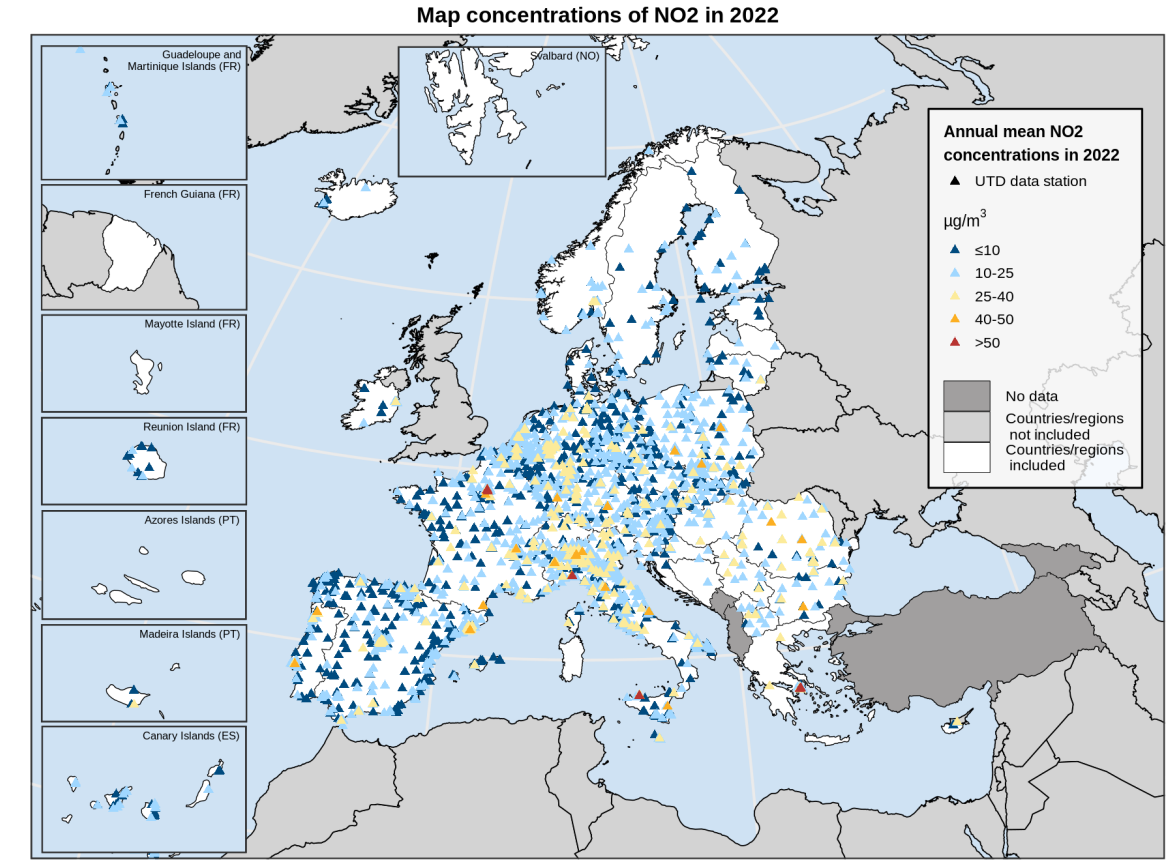
9 of the countries in EU-27 and 0 other reporting countries (Figure 26) recorded concentrations above the annual limit value (40 µg/m^3). This happened in 1 % of all the stations measuring NO_2. On the contrary, 72 % of stations, located in 27 of the countries in EU-27 and 8 other reporting countries reported concentrations above the WHO AQG level of 10 µg/m^3. Figure 26 shows the measured annual mean NO_2 concentrations.

100 % of all values above the annual limit value were observed at traffic stations. Furthermore, 100 % of the stations with concentrations above the annual limit value were located in urban or suburban areas.

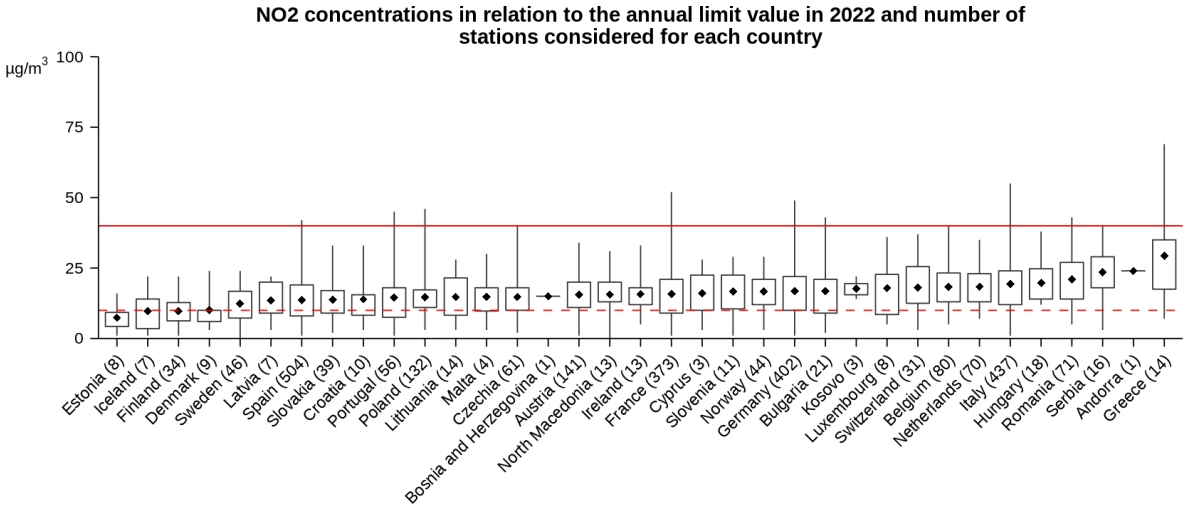
Concentrations above the hourly limit value (200 µg/m^3) were observed in 0 % (1 stations) of all reporting stations, mostly at urban traffic stations. They were observed in one countries (number stations): Italy (one).

Finally, concentrations above the daily NO_2 WHO AQG level (25 µg/m^3) were registered in 78 % (2058 stations) of all the reporting stations in 27 of the countries in EU-27 and 7 other reporting countries (Figure 29).

Figure 26: UTD Map and boxplot of NO_2 concentrations in 2022



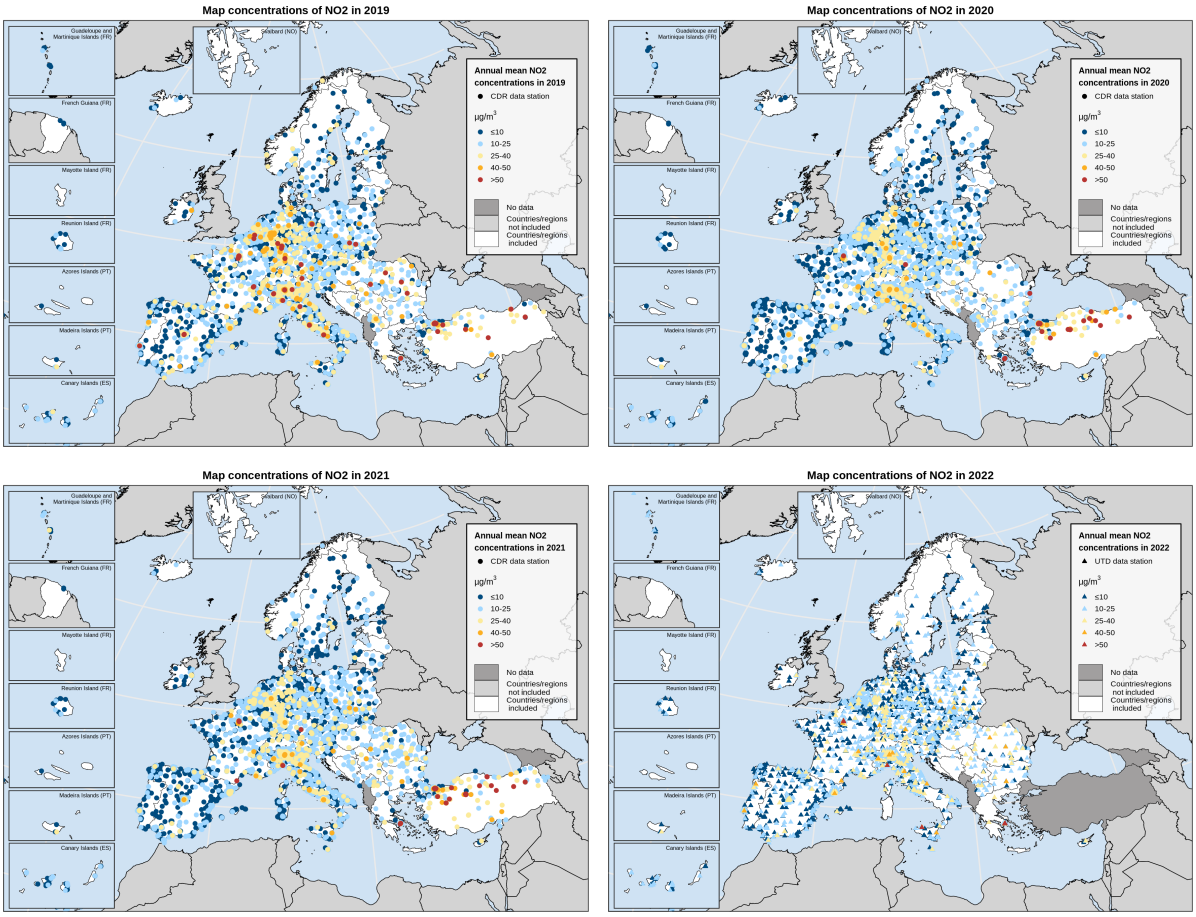
Note: Observed concentrations of NO2 in 2022. The last two colour categories correspond to values above the EU annual limit value (40 µg/m³), while the first colour category indicates stations reporting values below the WHO AQG level for NO2 (10 µg/m³). Only stations with more than 75 % of valid data have been included in the map.



Note: The graph is based on the annual mean concentration values. For each country, the number of stations considered for 2022 (in brackets) are given. The boxplot represents the lowest (bottom of the whisker), highest (top of the whisker) and average (black dot) annual mean values (in µg/m³). The rectangles mark the 25th and 75th percentiles. At 25 % of the stations, levels are below the 25th percentile; at 25 % of the stations, concentrations are above the 75th percentile. The limit value set by EU legislation is marked by the horizontal line. The WHO AQG level is marked by the lower dashed horizontal line. The graph should be read in relation to the above map, as a country's situation depends on the number of stations considered.

Figure 27 shows the maps of the observed NO_2 annual mean concentrations for the last four years. In this way, any significant change in the spatial distribution of the values above the set thresholds in the legends can be observed. Note that only the last year's map (2022) is based on UTD data, while the previous three years are based on officially reported validated data (CDR).

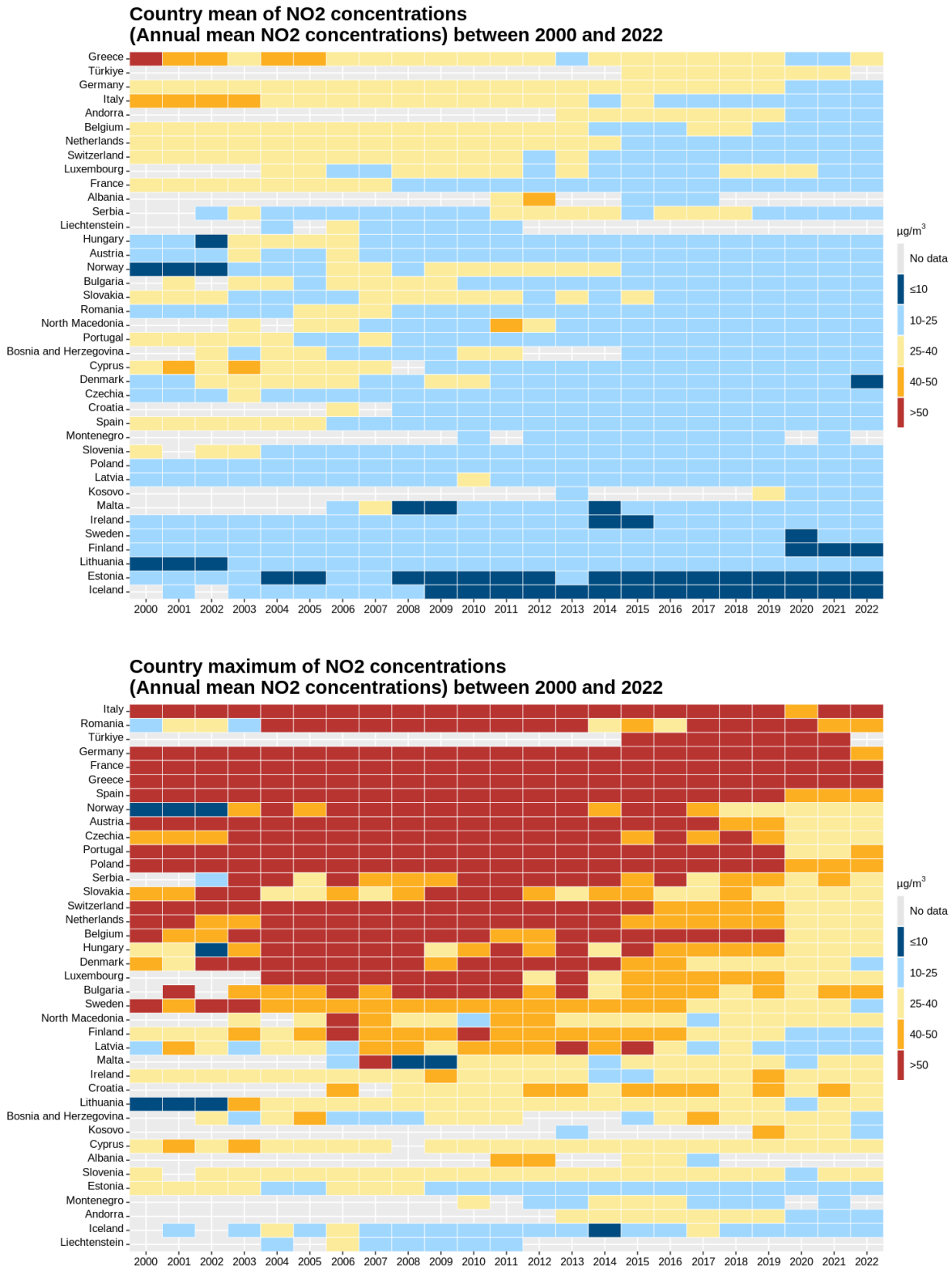
Figure 27: Map of NO_2 concentrations (annual mean) for the last 4 years



Maps for years before 2020 are different to the ones published in previous reports because the bands in the legend have been modified to accomodate the 2021 WHO AQG level.

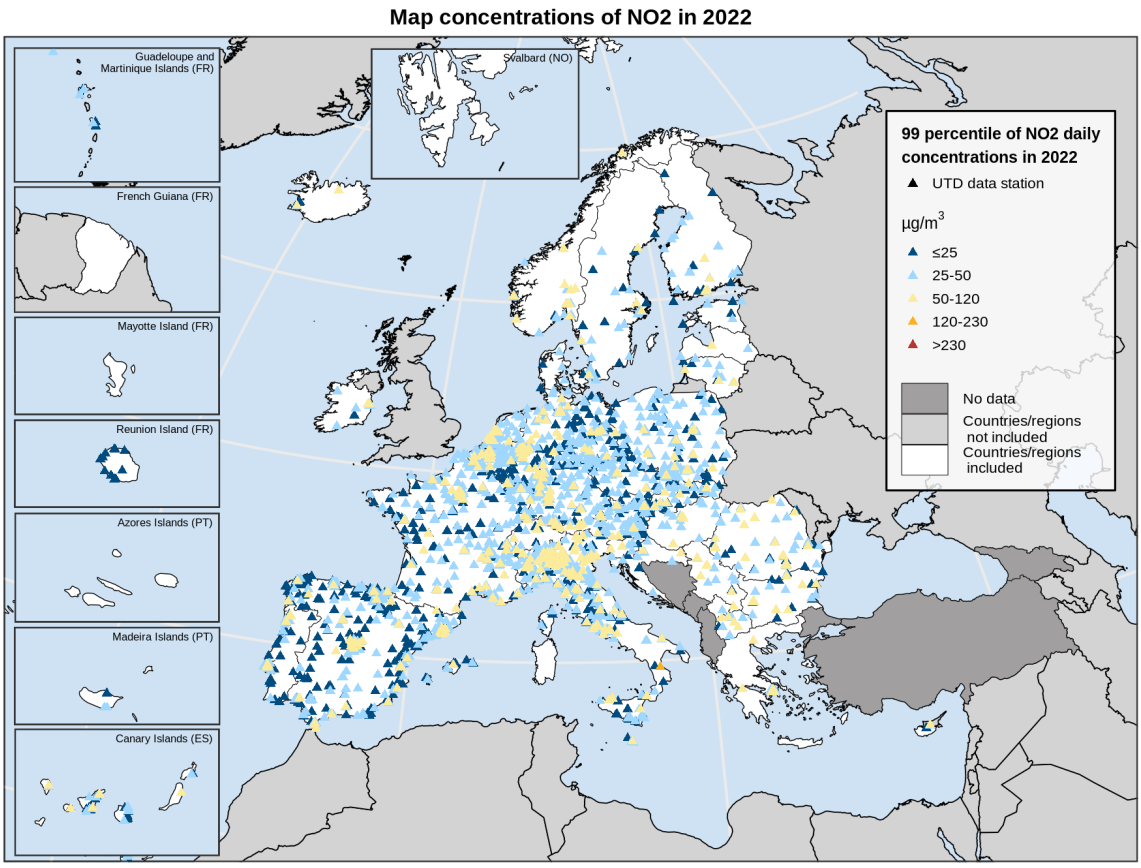
Heatmaps with the evolution from 2000 of the mean (top) and the maximum (bottom) NO_2 annual mean concentrations at country level are shown in figure 28. In this way, the evolution along years of the average and maximum measured concentration levels can be seen for each country. Note that meteorological variability has a considerable impact on year-to-year changes in ambient air concentrations of air pollutants (EEA, 2020), and the last year (2022) is based on UTD data, while the previous years are based on officially reported validated data.

Figure 28: Evolution of mean (top) and maximum (bottom) NO_2 annual mean concentrations (annual limit value) per country from 2000



Note: It is important to note that the figure is not based on a consistent set of stations. The number, location and classification of the stations included may vary from year to year.

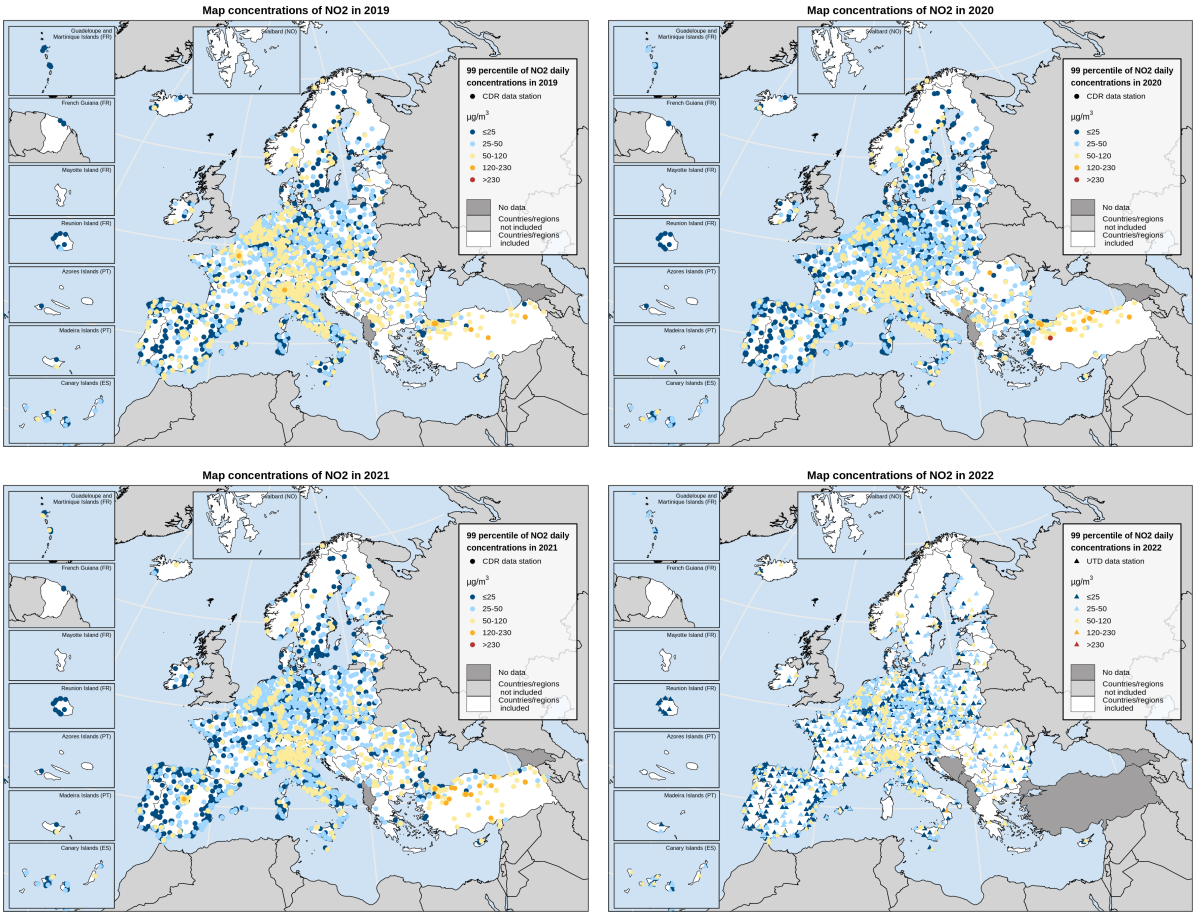
Figure 29: UTD Map of NO_2 concentrations in 2022 - daily WHO AQG level



Note: Observed concentrations of NO2 in 2022. The map shows the 99 percentile of the NO2 daily mean concentrations, equivalent to 3−4 exceedance days per year, according to the definition of the daily WHO AQG level (25 µg/m³). The first colour category indicates stations with concentrations below this AQG level. Only stations with more than 75 % of valid data have been included in the map.

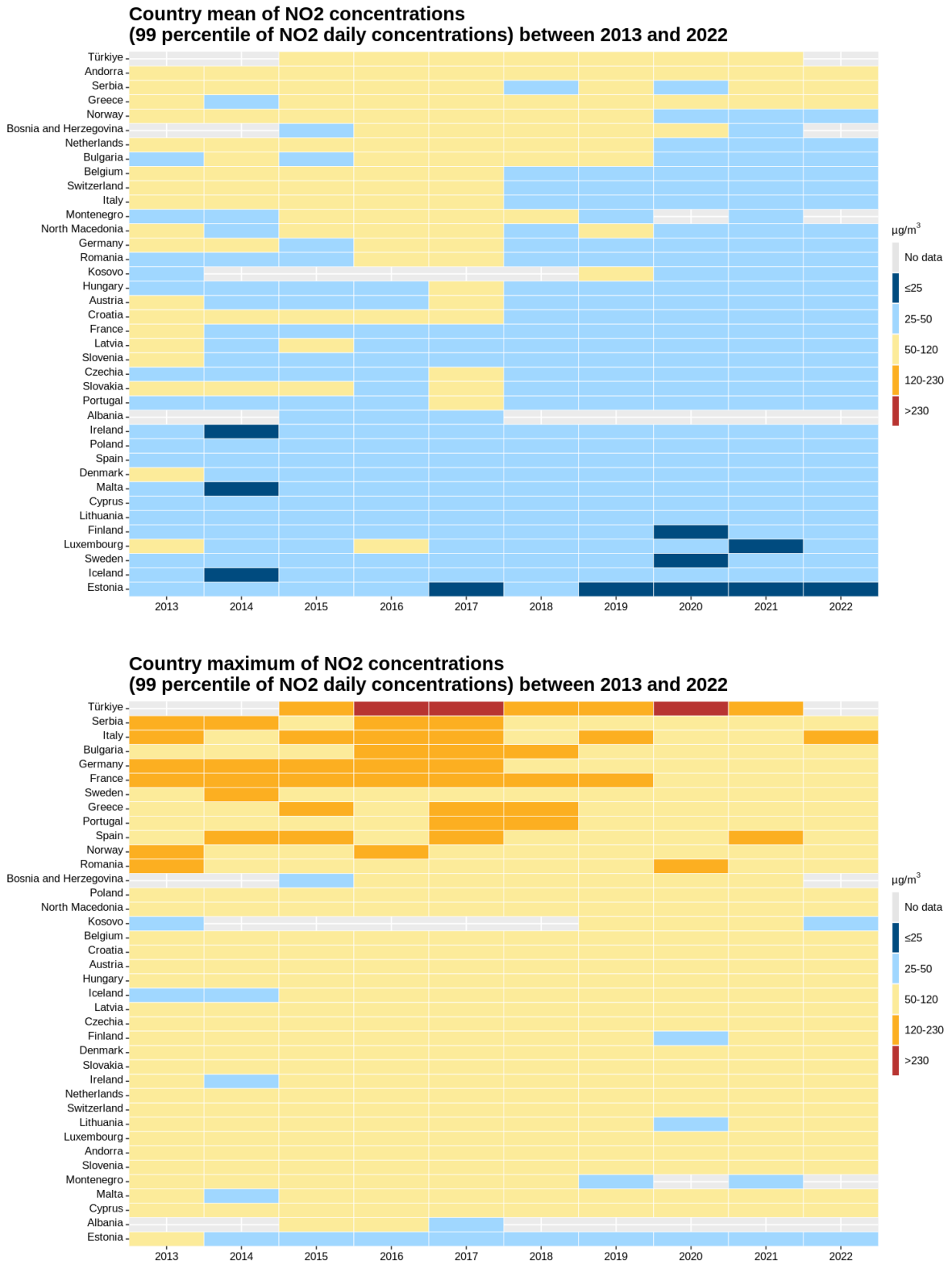
Figure 30 shows the maps of the 99 percentile of NO_2 daily mean concentrations (equivalent to the WHO AQG level for NO_2 daily mean level) for the last four years. In this way, any significant change in the spatial distribution of the values above the set thresholds in the legends can be observed. Note that only the last year's map (2022) is based on UTD data, while the previous three years are based on officially reported validated data (CDR).

Figure 30: Maps of NO_2 concentrations (daily WHO AQG level) for the last 4 years



Heatmaps with the evolution from 2013 of the mean (top) and the maximum (bottom) 99 percentile of NO_2 daily mean concentrations at country level are shown in figure 31. In this way, the evolution along years of the average and maximum measured concentration levels can be seen for each country. Note that meteorological variability has a considerable impact on year-to-year changes in ambient air concentrations of air pollutants (EEA, 2020), and the last year (2022) is based on UTD data, while the previous years are based on officially reported validated data.

Figure 31: Evolution of mean (top) and maximum (bottom) 99 percentile of NO_2 daily mean concentrations (daily WHO AQG level) per country from 2013



Note: It is important to note that the figure is not based on a consistent set of stations. The number, location and classification of the stations included may vary from year to year.

6 Status of sulphur dioxide ambient air concentrations

The reporting countries shown in Figure 1 reported measurements of SO_2 from 1161 stations for the hourly limit value and 1151 stations for the daily limit value.

1 stations ([5]) registered concentrations above the hourly limit value (350 µg/m^3); and 1 stations ([6]) registered concentrations above the daily limit of 125 µg/m^3 for SO_2 (Figure 32).

On the contrary, 23 (2 %) of all the stations reporting SO_2 levels, located in 10 reporting countries ([7]), measured SO_2 concentrations above the WHO AQG level of 40 µg/m^3 for daily mean concentrations ([8]).

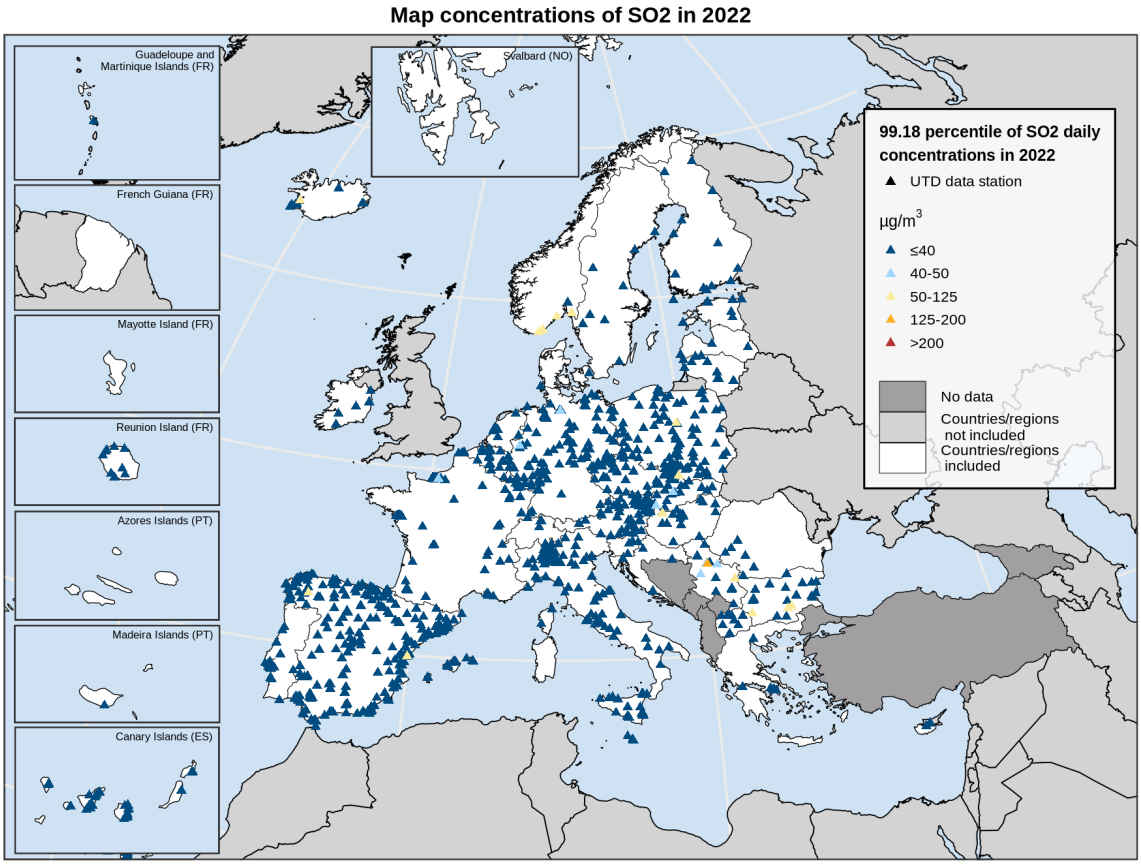
[5] Bosnia and Herzegovina (one)

[6] Serbia (one).

[7] All reporting countries except Andorra, Austria, Belgium, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, North Macedonia, Portugal, Romania, Slovenia, Sweden and Switzerland.

[8] Although the WHO AQG level for daily means refers to the percentile 99 (3-4 exceedance days), here we have used the percentile 99.18 (3 exceedance days), so the daily WHO AQG level can be directly compared with the EU daily LV.

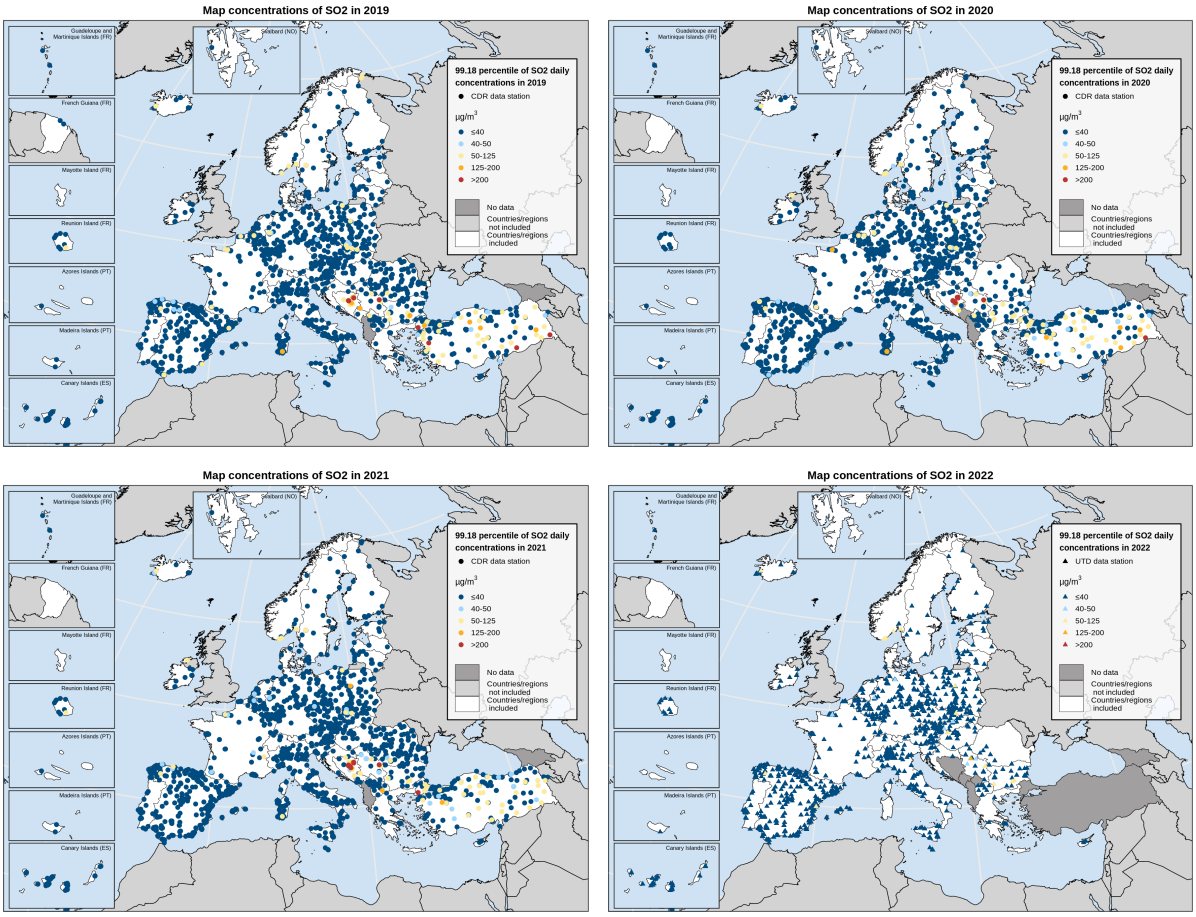
Figure 32: Map of SO_2 daily concentrations in 2022



Note: Observed concentrations of SO2 in 2022. The map shows the percentile 99.18 of SO2 daily means, indicating 3 exceedance days. It relates to the EU daily limit value (125 µg/m³) and to the WHO daily AQG level (40 µg/m³). Only stations with more than 75 % of valid data have been included in the map.

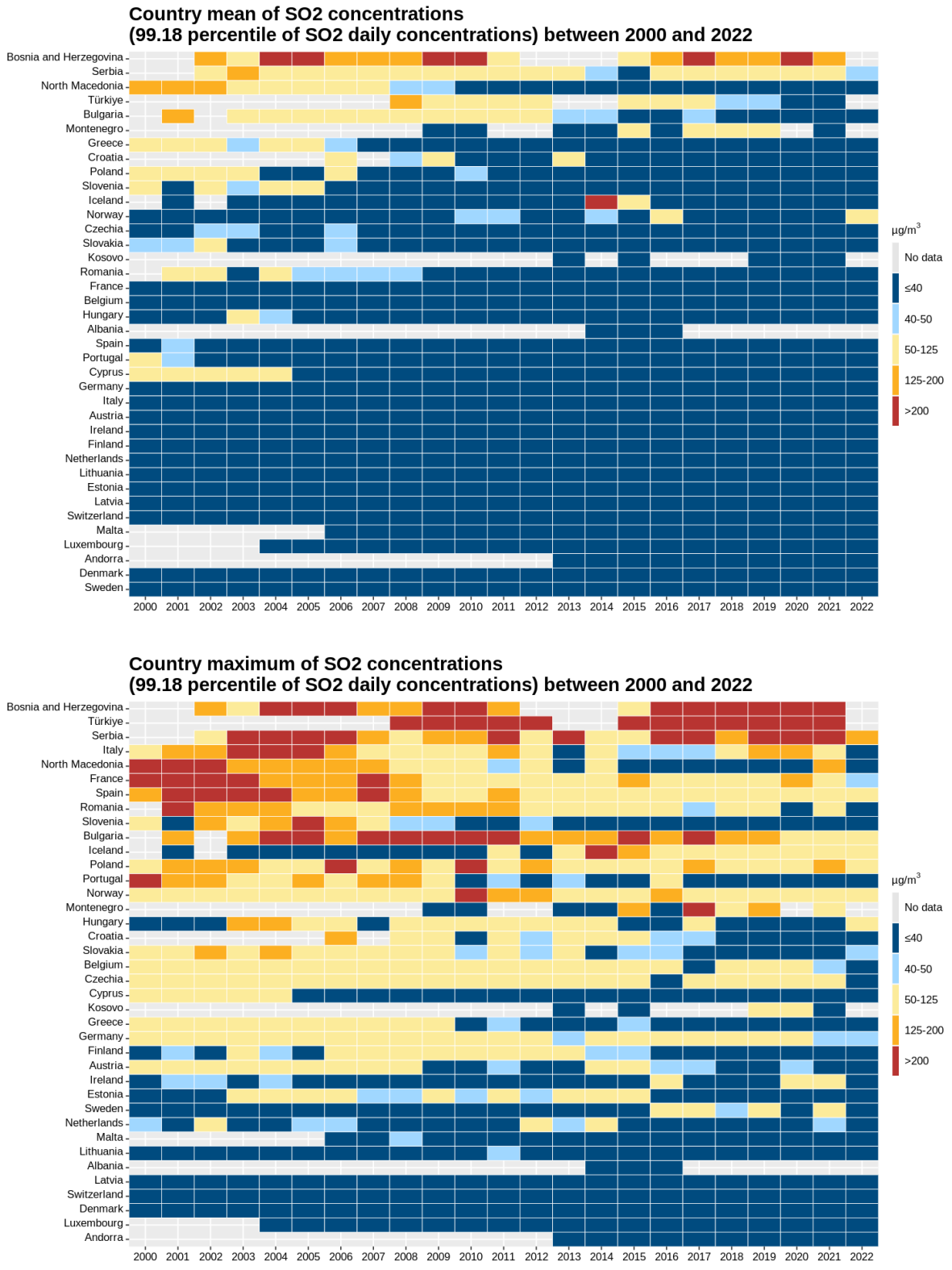
Figure 33 shows the maps of the observed SO_2 daily mean concentrations for the last four years. In this way, any significant change in the spatial distribution of the values above the set thresholds in the legends can be observed. Note that only the last year's map (2022) is based on UTD data, while the previous three years are based on officially reported validated data (CDR).

Figure 33: Maps of SO_2 concentrations (daily mean) for the last 4 years



Heatmaps with the evolution from 2000 of the mean (top) and the maximum (bottom) SO_2 daily mean concentrations at country level are shown in figure 34. In this way, the evolution along years of the average and maximum measured concentration levels can be seen for each country. Note that meteorological variability has a considerable impact on year-to-year changes in ambient air concentrations of air pollutants (EEA, 2020), and the last year (2022) is based on UTD data, while the previous years are based on officially reported validated data.

Figure 34: Evolution of mean (top) and maximum (bottom) SO_2 99.18 percentile of daily mean concentrations (EU LV (125 µg/m^3) and WHO AQG level (40 µg/m^3)) per country from 2000



Note: It is important to note that the figure is not based on a consistent set of stations. The number, location and classification of the stations included may vary from year to year.

7 Abbreviations, units and symbols

µg/m^3: microgram(s) per cubic metre

AAQD: Ambient Air Quality Directives

AQG: Air quality guideline

CDR: Central data repository

EEA: European Environment Agency

ETC HE: European Topic Centre on Human health and the Environment

EU: European Union

LV: limit value

NO_2: Nitrogen dioxide

O_3: Ozone

PM: Particulate matter

$PM_{2.5}$: Particulate matter with a diameter of 2.5 µm or less

PM_{10}: Particulate matter with a diameter of 10 µm or less

RL: Reference level

SO_2: Sulphur dioxide

TV: target value

UTD: up-to-date

WHO: World Health Organization

8 Annex

Data included in this report was received by 20 March 2023 from the reporting countries. By that date the number of stations by country aggregation reporting each pollutant is summarized in Table 3. Data from stations that do not fulfil the criteria from Box 1.1 are excluded from this report.

Table 3: Reporting status of 2022 air quality data by 20 March 2023

Countries	PM10	PM2.5	O3	NO2	SO2
EU27	2292	1374	1836	2590	1112
EEA32	2382	1439	1876	2672	1137
Total	2421	1463	1908	2706	1173

Data not included in this report is summarized in Table 4:

Table 4: Reporting outliers of 2022 air quality data by 20 March 2023

Country	Station EoI Code	Pollutant	Aggregation(*)	Year	Value	Units	Data Coverage
Ireland	IE0028A	C6H6	P1Y	2022	246	ug/m3	82
Italy	IT1766A	CO	P1Y-dx-max	2022	58	mg/m3	84
Italy	IT0895A	C6H6	P1Y	2022	206	ug/m3	95
Italy	IT2026A	PM2.5	P1Y-P1D-per99	2022	373	ug/m3	85
Italy	IT2146A	CO	P1Y-dx-max	2022	57	mg/m3	79
Spain	ES2000A	PM10	P1Y-P1D-per99	2022	577	ug/m3	96
Spain	ES1847A	PM2.5	P1Y-P1D-per99	2022	349	ug/m3	21

(*) https://dd.eionet.europa.eu/vocabulary/aq/aggregationprocess/view

Table 5 summarizes the number of sampling points per country with air quality levels above specific air quality objectives summarized through out this report.

Table 5: Number of sampling points above air quality levels/objectives per reporting country

Levels/Objectives	Andorra	Austria	Belgium	Bosnia and Herzegovina	Bulgaria	Croatia	Cyprus	Czechia	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Iceland	Ireland	Italy	Kosovo	Latvia	Lithuania	Luxembourg	Malta	Netherlands	North Macedonia	Norway	Poland	Portugal	Romania	Serbia	Slovakia	Slovenia	Spain	Sweden	Switzerland
PM_{10} daily LV (50 µg/m^3)	0	0	1	3	7	3	0	2	0	0	0	3	0	7	3	0	0	92	2	0	0	0	0	0	10	2	28	1	1	9	3	1	56	5	0
PM_{10} daily WHO AQG level (45 µg/m^3)	1	20	52	3	21	6	0	56	1	3	19	155	94	13	18	3	6	304	4	6	14	1	3	44	11	37	154	42	11	12	35	12	348	37	9
PM_{10} annual LV (40 µg/m^3)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	3	0	0	18	0	0
PM_{10} annual WHO AQG level (15 µg/m^3)	1	71	53	3	20	4	0	64	2	1	2	234	161	13	21	1	3	310	10	7	11	3	3	54	12	20	160	38	11	11	45	14	366	25	12
$PM_{2.5}$ annual LV (25 µg/m^3)	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0
$PM_{2.5}$ annual WHO AQG level (5 µg/m^3)	1	46	60	1	3	7	0	47	1	2	3	189	270	6	9	0	17	153	10	5	6	4	2	45	0	40	78	15	9	12	46	15	251	11	7
$PM_{2.5}$ daily WHO AQG level (15 µg/m^3)	1	45	66	0	3	7	0	47	1	4	12	191	271	6	9	1	17	151	4	5	6	4	2	45	0	43	78	18	9	12	46	15	251	31	8
O_3 max daily 8h mean TV (120 µg/m^3)	0	33	0	0	1	3	2	18	0	0	0	76	61	8	6	0	0	123	0	0	0	1	1	0	0	0	9	9	4	6	2	7	43	0	19
O_3 long-term objective (120 µg/m^3)	1	100	38	0	7	12	3	56	7	0	4	281	266	11	14	0	5	160	0	2	2	4	4	42	3	7	94	32	24	8	0	11	321	9	29
O_3 short-term WHO AQG level (100 µg/m^3)	1	104	38	0	9	12	3	56	8	0	6	283	268	11	14	0	5	169	0	3	8	5	4	42	4	8	99	36	38	8	20	11	385	11	29
O_3 peak season WHO AQG level (60 µg/m^3)	2	104	38	3	15	8	3	56	8	0	13	275	266	12	12	0	7	166	0	0	11	5	4	41	1	10	96	33	44	8	0	9	398	16	29
NO_2 annual LV (40 µg/m^3)	0	0	0	0	1	0	0	0	0	0	0	10	1	3	0	0	0	11	0	0	0	0	0	0	0	0	3	2	2	0	0	0	1	0	0
NO_2 annual WHO AQG level (10 µg/m^3)	1	108	67	1	15	7	2	44	2	1	16	260	292	13	18	2	10	353	3	5	9	5	3	62	11	36	101	35	63	15	24	8	296	30	24
NO_2 hourly LV (200 µg/m^3)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NO_2 daily WHO AQG level (25 µg/m^3)	1	110	73	0	15	9	2	49	7	5	24	288	327	13	18	3	12	325	1	6	12	5	3	70	11	42	105	35	57	15	26	8	321	33	27
BaP annual LV (1 ng/m^3)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
BaP annual WHO AQG level (0.12 ng/m^3)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
SO_2 hourly LV (350 µg/m^3)	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SO_2 daily LV (125 µg/m^3)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
SO_2 daily WHO AQG level (40 µg/m^3)	0	0	0	0	3	0	0	0	0	0	0	1	2	0	1	1	0	0	0	0	0	0	0	0	0	4	2	0	0	5	2	0	2	0	0
CO daily LV (10 mg/m^3)	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
CO daily WHO AQG level (4 mg/m^3)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C_6H_6 annual LV (5 µg/m^3)	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C_6H_6 annual WHO RL (1.7 µg/m^3)	0	0	1	0	0	1	0	0	0	0	0	2	0	6	2	0	0	13	0	1	0	0	0	0	0	0	3	0	0	0	0	0	1	0	0

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