

Status report of air quality in Europe for year 2020, using validated and up-to-date data

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**European Environment Agency
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transport, noise and industrial pollution**



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1 Summary

The *2020 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 2020 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. It also offers a comparison with the situation in the previous three years. For those years, validated data are considered.

Data included in this report was received by 27 April 2021 from the reporting countries. By that date the reporting status of 2020 up-to-date data is summarized in Figure 1. Please see editorial notes at the end of Chapter 1 on additional information on the data used (1.5). The number of stations by country reporting each pollutant is summarized in Table 3.

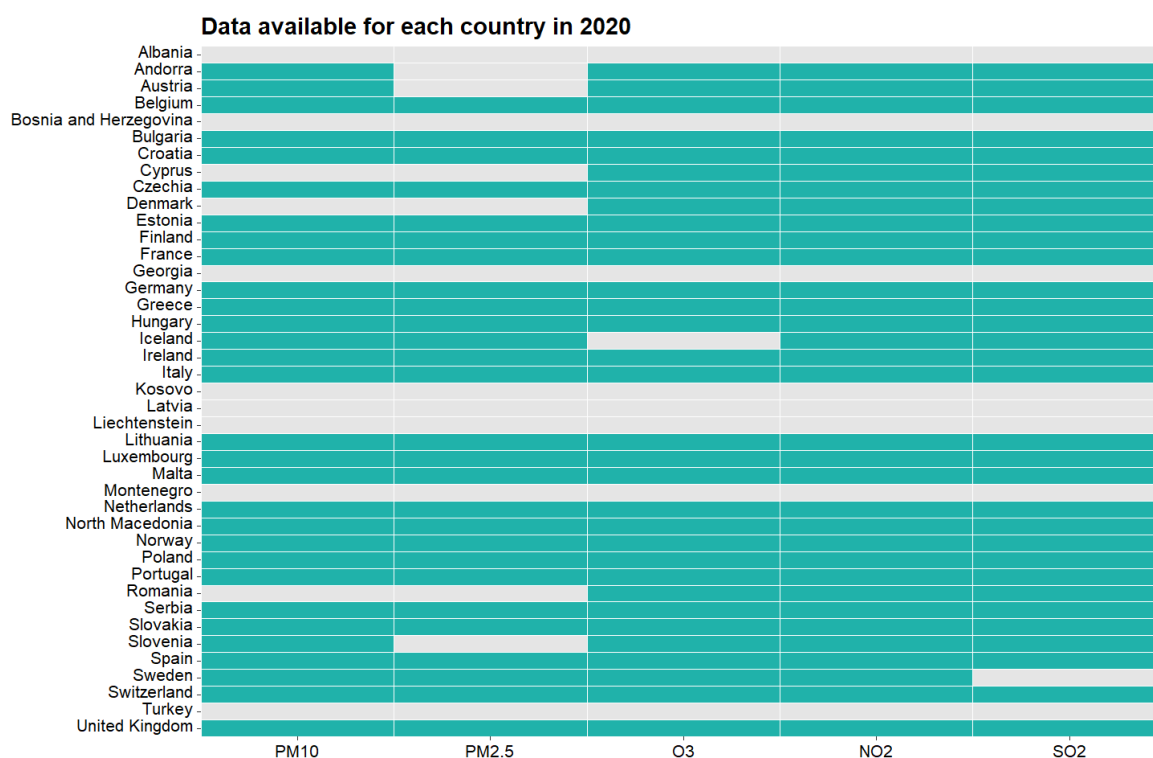


Figure 1: Reporting status of 2020 air quality data by 27 April 2021

The countries included in Figure 1 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) and the United Kingdom ⁽¹⁾; the five other member countries of the EEA (Iceland, Liechtenstein, Norway, Switzerland and Turkey) 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 (UTD data only temporarily) at the EEA's e-reporting database ⁽²⁾. Therefore, this is the source for all maps and figures in the report.

1.1 Particulate matter

For PM with a diameter of 10 µm or less (PM₁₀), concentrations above the EU daily limit value were registered at 10 % of the reporting stations in 8 countries in EU-27 and the UK and in two other reporting countries. For PM_{2.5}, concentrations above the annual limit value were registered at 1 % of the reporting stations in two countries in EU-27 and the UK and two other reporting countries.

The long-term WHO AQG for PM₁₀ was exceeded at 34 % of the stations in 19 countries of the EU-27 and the UK and 5 other reporting countries. The long-term WHO AQG for PM_{2.5} was exceeded at 42 % of the stations located in 15 countries of the EU-27 and the UK and 4 other reporting countries.

1.2 Ozone

13 % of stations registered concentrations above the EU ozone (O₃) target value for the protection of human health. These stations were located in 17 countries of the EU-27 and the UK and two other reporting European countries. The long-term objective was met in only 18 % of the stations. The WHO AQG for O₃ was exceeded in 97 % of all the reporting stations.

¹The United Kingdom left the European Union on 31 January 2020. Data reported by the United Kingdom are included in all analyses and assessments contained herein, unless otherwise indicated. The former "EU-28", "EEA-33" and "EEA-39" are referred to in this report, unless otherwise indicated, as "EU-27 and the UK", "EEA-32 and the UK" and "EEA-38 and the UK".

²<https://discomap.eea.europa.eu/map/fme/AirQualityExport.htm>

1.3 Nitrogen dioxide

Around 1 % of all the reporting stations recorded concentrations above the annual limit value for nitrogen dioxide (NO₂), which is the same as the WHO AQG. These stations were located in 9 countries of the EU-27 and the UK and zero other reporting countries. 89 % of concentrations above this limit value were observed at traffic stations.

1.4 Sulphur dioxide

Only 2 stations (out of more than 1060) in two countries of the EU-27 and the UK and zero other reporting countries measured values for sulphur dioxide (SO₂) above the EU daily limit value. However, 25 % of all SO₂ stations, located in 24 reporting countries, measured SO₂ concentrations above the daily WHO AQG.

1.5 Editorial note

Austria reported more stations than the ones shown in this report. Due to a mismatch between up-to-date data and the data meta-information a bug in the EEA data aggregation module occurred which prevented the complete calculation of statistics for UTD 2020 dataset for Austria. Validated 2020 data from Austria will be available later this year and will be presented in next year's reports.

France reported more stations than the ones shown in this report. Due to a mismatch between up-to-date data and the data meta-information a bug in the EEA data aggregation module occurred which prevented the complete calculation of statistics for UTD 2020 dataset for France. This issue was fixed after the extraction of data was performed for this report. Validated 2020 data from France will be available later this year and will be presented in next year's reports.

According to feedback provided by the Italian authorities, NO₂ data from station CE51 Istituto Manzoni (74 µg/m³); and PM 2.5 data from stations Ceglie Messapica (32 µg/m³) and Torchiarolo ENEL (29 µg/m³) are wrong and will be corrected in the submission of the validated 2020 data.

2 Introduction

The *2020 Status report of air quality in Europe* presents summarized information on the air quality data reported in the previous years. 2020 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 2021 September reporting cycle (validated assessment data for 2020, deadline of submission 30 September 2021). It 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 Directive (EU 2008) (Table 1) and the World Health Organization (WHO) air quality guidelines (WHO 2000, 2006) (Table 2).

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 for each pollutant:

- a European overview of the monitoring stations that reported UTD 2020 data, and of their concentrations in relation to the EU legal standards and WHO AQGs;
- a map with the 2020 UTD concentrations at station level;
- a boxplot graph summarizing for each country the range of concentrations (highlighting the lowest, highest, average and the 25 and 75 percentiles) for PM₁₀, PM_{2.5}, NO₂ and O₃.

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);
- heatmaps with the evolution of the mean and the maximum measured concentrations at country level since 2000 (using validated data for all years up to 2019).

Please be aware that the number of stations can vary once the validated dataset for 2020 is received by 30 September 2021. 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 ₆ H 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 2020 are considered, so no average over the period 2018 - 2020 is presented.

Sources:

EU (2004, 2008).

Table 2: WHO air quality guidelines (AQG) and estimated reference levels (RL) (a)

Pollutant	Averaging period	AQG	RL	Comments
PM ₁₀	1 day	50 µg/m ³		99th percentile (3 days per year)
	Calendar year	20 µg/m ³		
PM _{2.5}	1 day	25 µg/m ³		99th percentile (3 days per year)
	Calendar year	10 µg/m ³		
O ₃	Maximum daily 8-hour mean	100 µg/m ³		
NO ₂	1 hour	200 µg/m ³		
	Calendar year	40 µg/m ³		
BaP	Calendar year		0.12 ng/m ³	
SO ₂	10 minutes	500 µg/m ³		
	1 day	20 µg/m ³		
CO	1 hour	30 mg/m ³		
	Maximum daily 8-hour mean	10 mg/m ³		
C ₆ H 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 (^b)		
Ni	Calendar year		25 ng/m ³	

Notes:

^a As WHO has not set an AQG for BaP, C₆H₆, As and Ni, the RL was estimated assuming an acceptable risk of additional lifetime cancer risk of approximately 1 in 100 000.

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

Sources:

WHO (2000, 2006a).

Box 1.1 Classification of monitoring stations

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 building, 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 most of the pollutants, 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.

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 SO₂, 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.

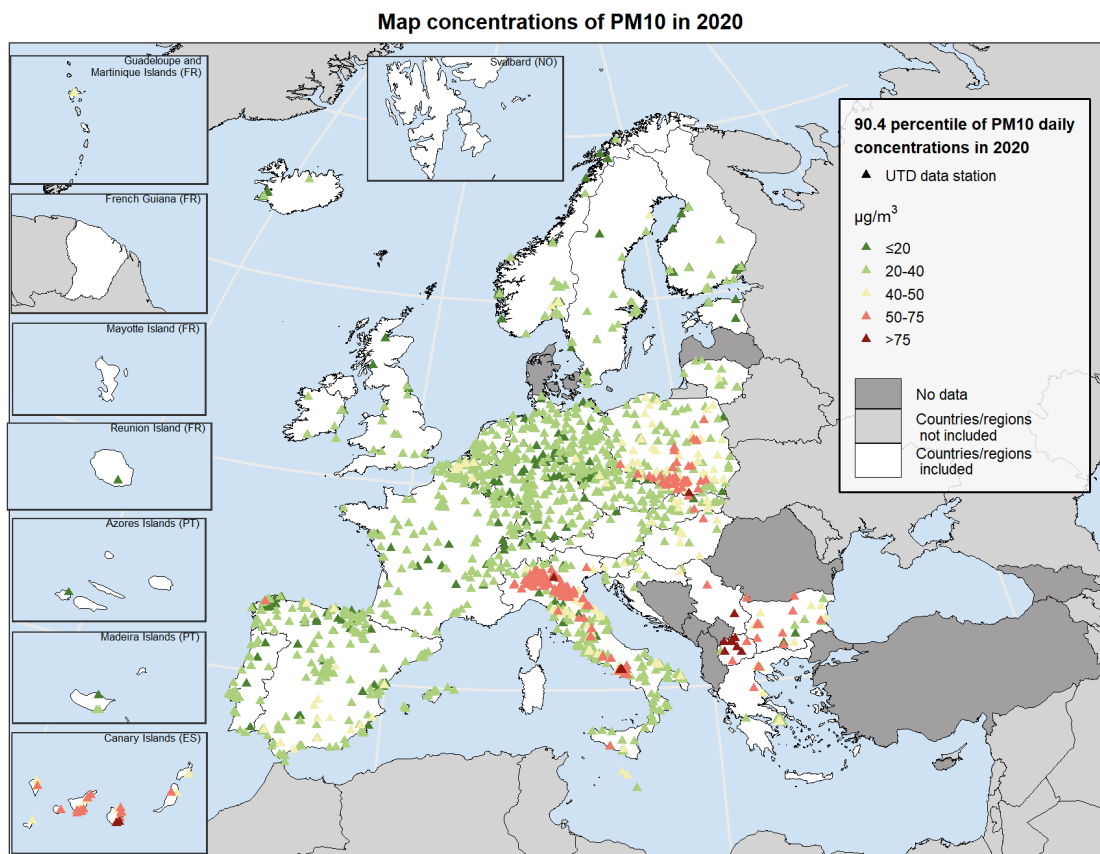
3 Status of particulate matter ambient air concentrations

3.1 Status of PM₁₀ concentrations

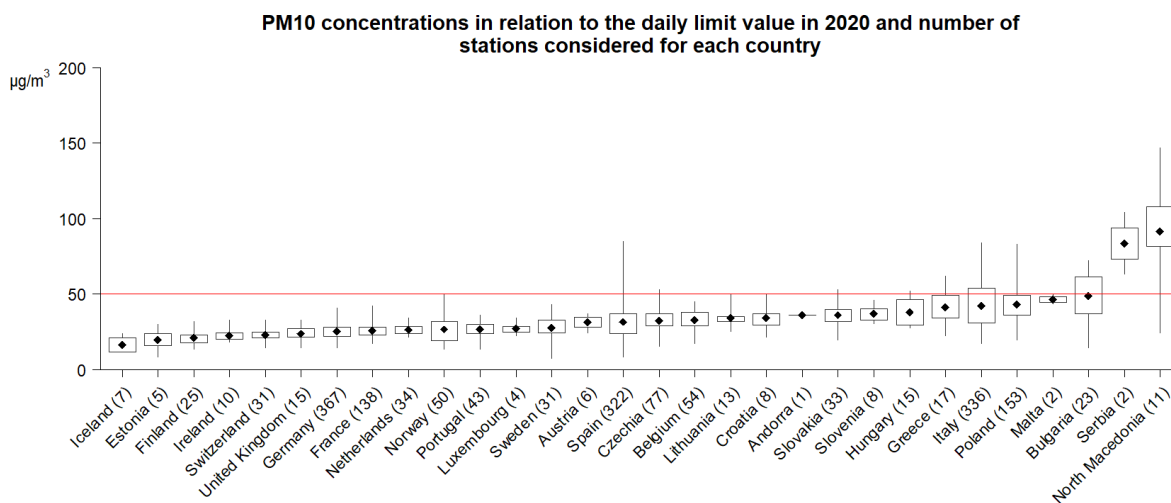
The EEA received PM₁₀ data for 2020, with sufficient valid measurements from 1848 stations for the calculation of annual mean concentrations and from 1841 stations in relation to the daily limit value. The stations were located in all the reporting countries shown in Figure 1.

Eight countries in EU-27 and the UK, and two other reporting countries reported PM₁₀ concentrations above the EU daily limit value (Figure 2). This was the case for 10 % (190) of reporting stations. In total, 94 % of those stations were either urban (78 %) or suburban (16 %).

Concentrations above the PM₁₀ annual limit value (40 µg/m³) were monitored in 1 % (16 stations) of all the reporting stations, located in 2 countries in EU-27 and the UK, and 2 other reporting countries. The stricter value of the WHO AQG for PM₁₀ annual mean (20 µg/m³) was exceeded at 34 % (635) of the stations in all the reporting countries, except in Austria, Estonia, Finland, Iceland, Ireland and Luxembourg (Figure 5).



Note: Observed concentrations of PM10 in 2020. 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 $50 \mu\text{g}/\text{m}^3$ 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. For each country, the number of stations considered (in brackets) and the lowest, highest and average 90.4 percentile values (in $\mu\text{g}/\text{m}^3$) recorded at its stations are given. The rectangles mark the 25th and 75th percentiles. At 25 % of the stations, levels are below the lower percentile; at 25 % of the stations, concentrations are above the upper 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 2: UTD Map and boxplot of PM10 concentrations in 2020 - daily limit value

Figure 3 shows the maps of the 90.4 percentile of PM₁₀ daily mean concentrations (equivalent to the PM₁₀ 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 (2020) is based on UTD data, while the previous three years are based on officially reported validated data (CDR).

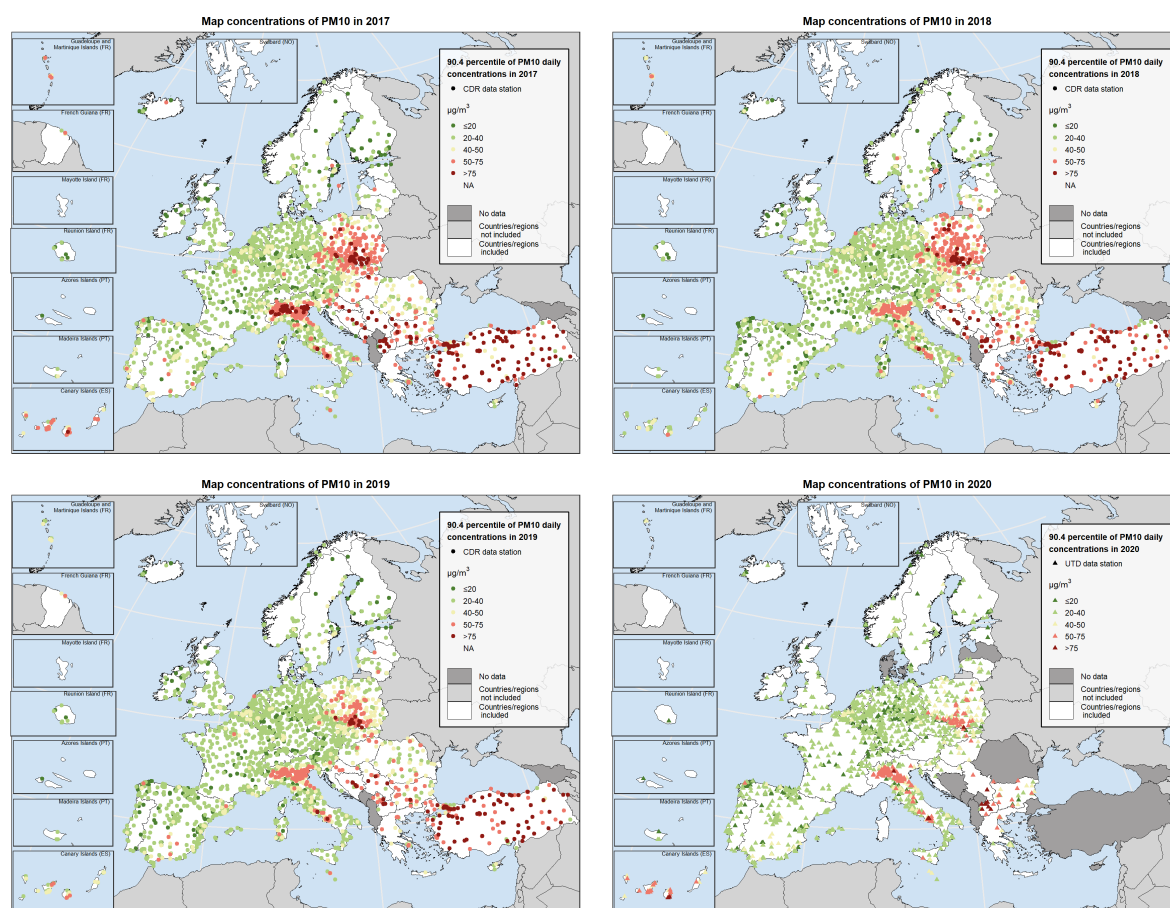
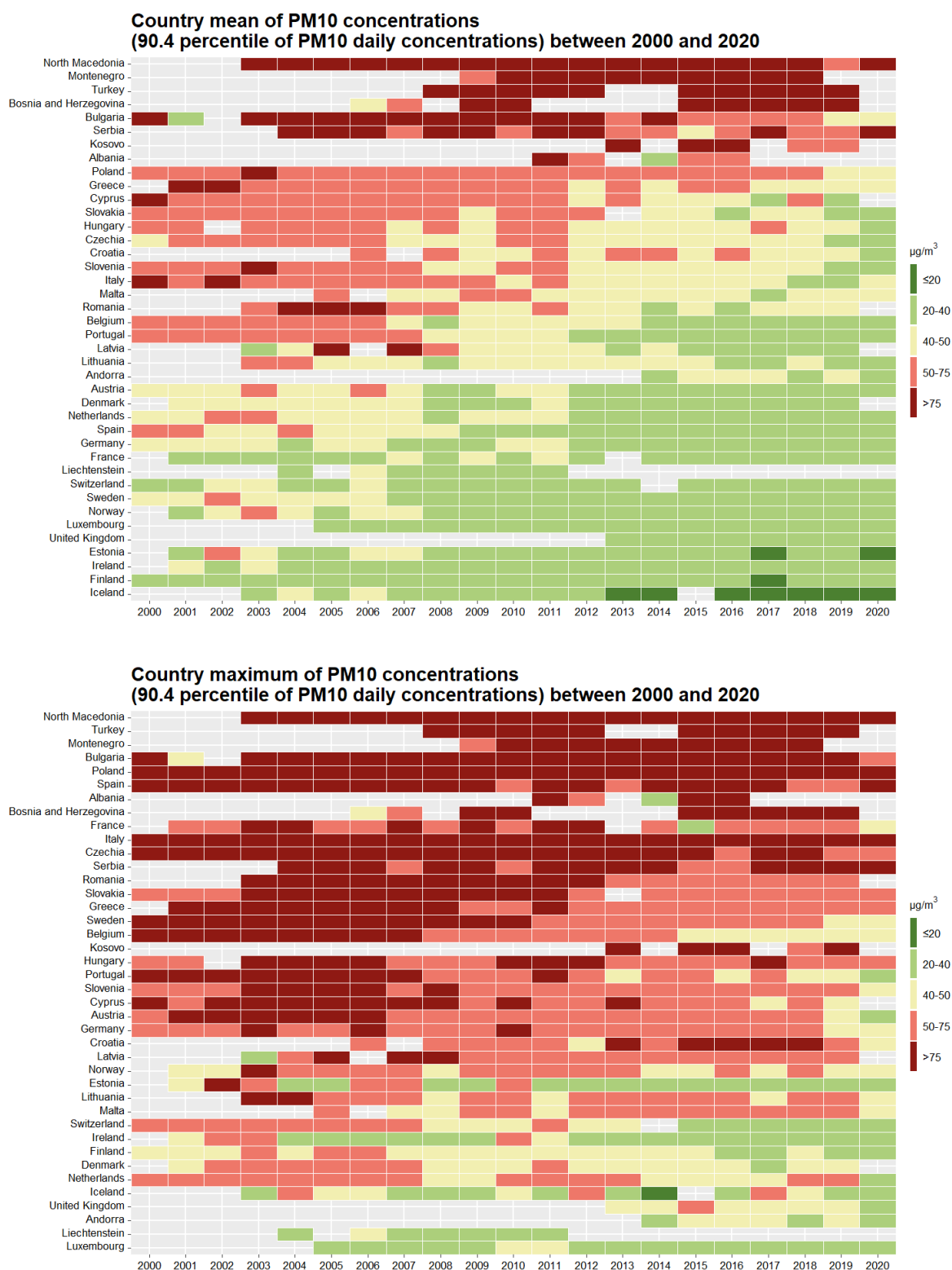


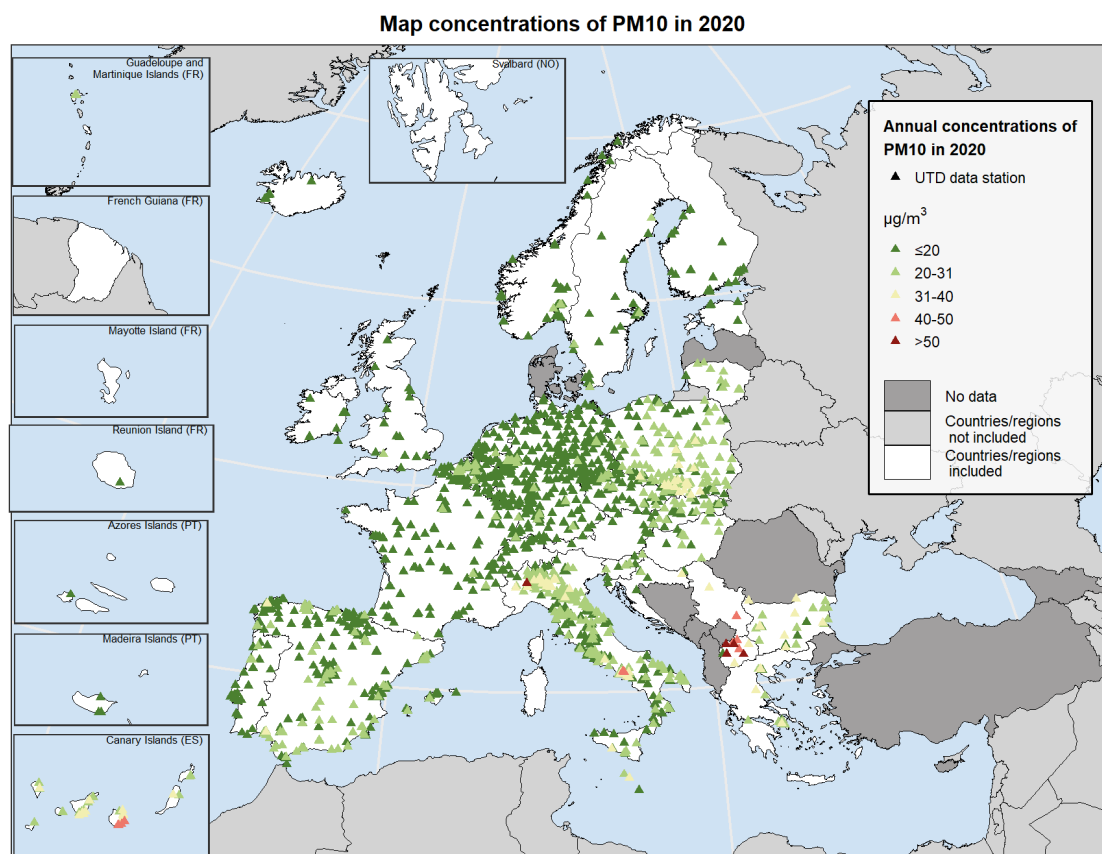
Figure 3: Maps of PM10 concentrations (daily limit value) for the last 4 years

Heatmaps with the evolution from 2000 of the mean (top) and the maximum (bottom) 90.4 percentile of PM₁₀ 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 (2020) is based on UTD data, while the previous years are based on officially reported validated data.

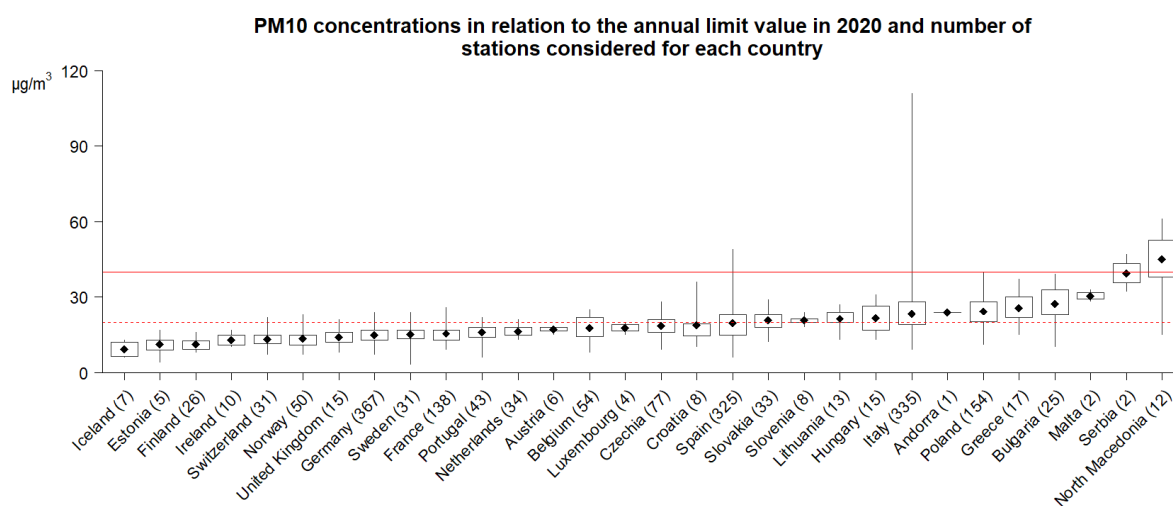


Note: It is important to note that the figure is not based on a consistent set of stations. The number, location and classification of the stations included may vary from year to year.

Figure 4: Evolution of mean (top) and maximum (bottom) 90.4 percentile of PM10 daily mean concentrations (daily limit value) per country from 2000



Note: Observed concentrations of PM10 in 2020. 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 for PM10 (20 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 (in brackets) and the lowest, highest and average values (in µg/m³) recorded at its stations are given. The rectangles mark the 25th and 75th percentiles. At 25 % of the stations, levels are below the lower percentile; at 25 % of the stations, concentrations are above the upper percentile. The annual limit value set by EU legislation is marked by the upper continuous horizontal line. The WHO AQG 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 5: UTD Map and boxplot of PM10 concentrations in 2020 - annual limit value

Figure 6 shows the maps of PM₁₀ 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 (2020) is based on UTD data, while the previous three years are based on officially reported validated data (CDR).

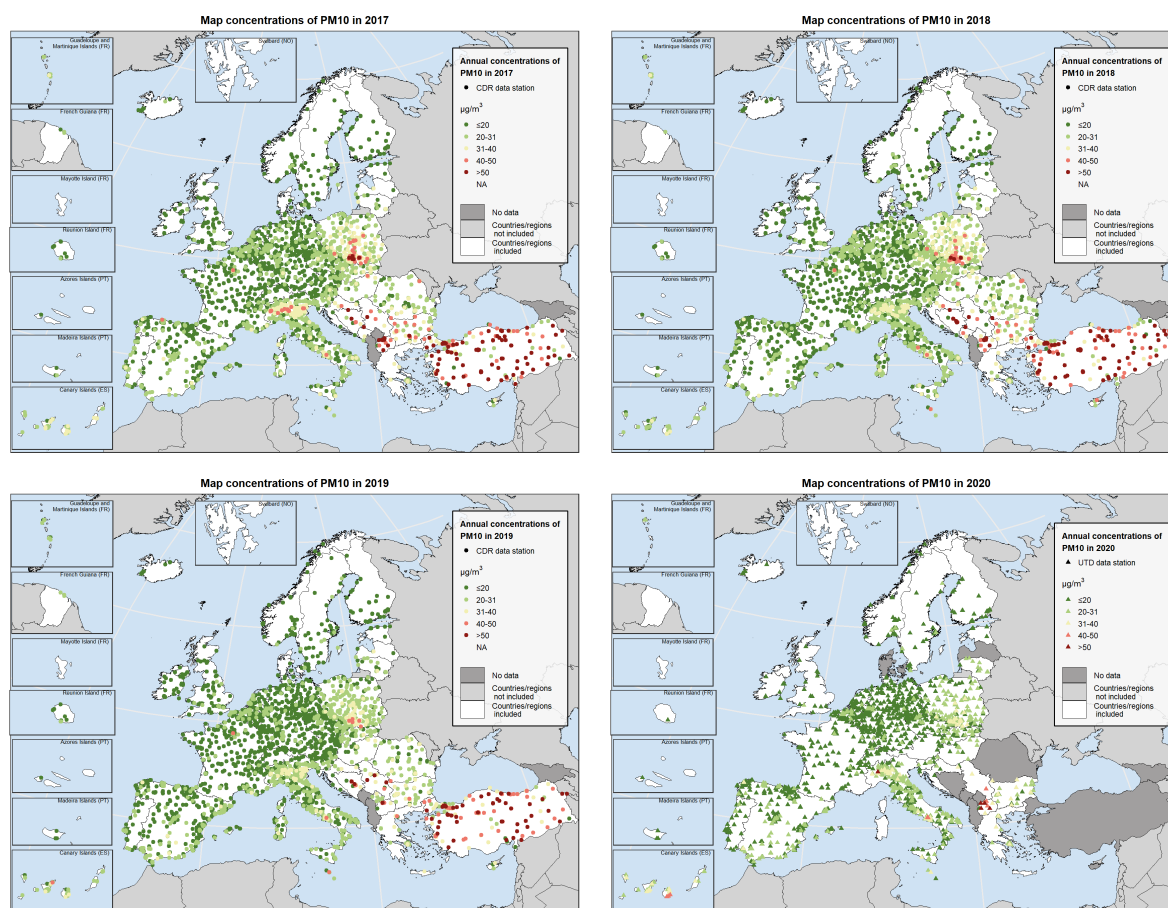
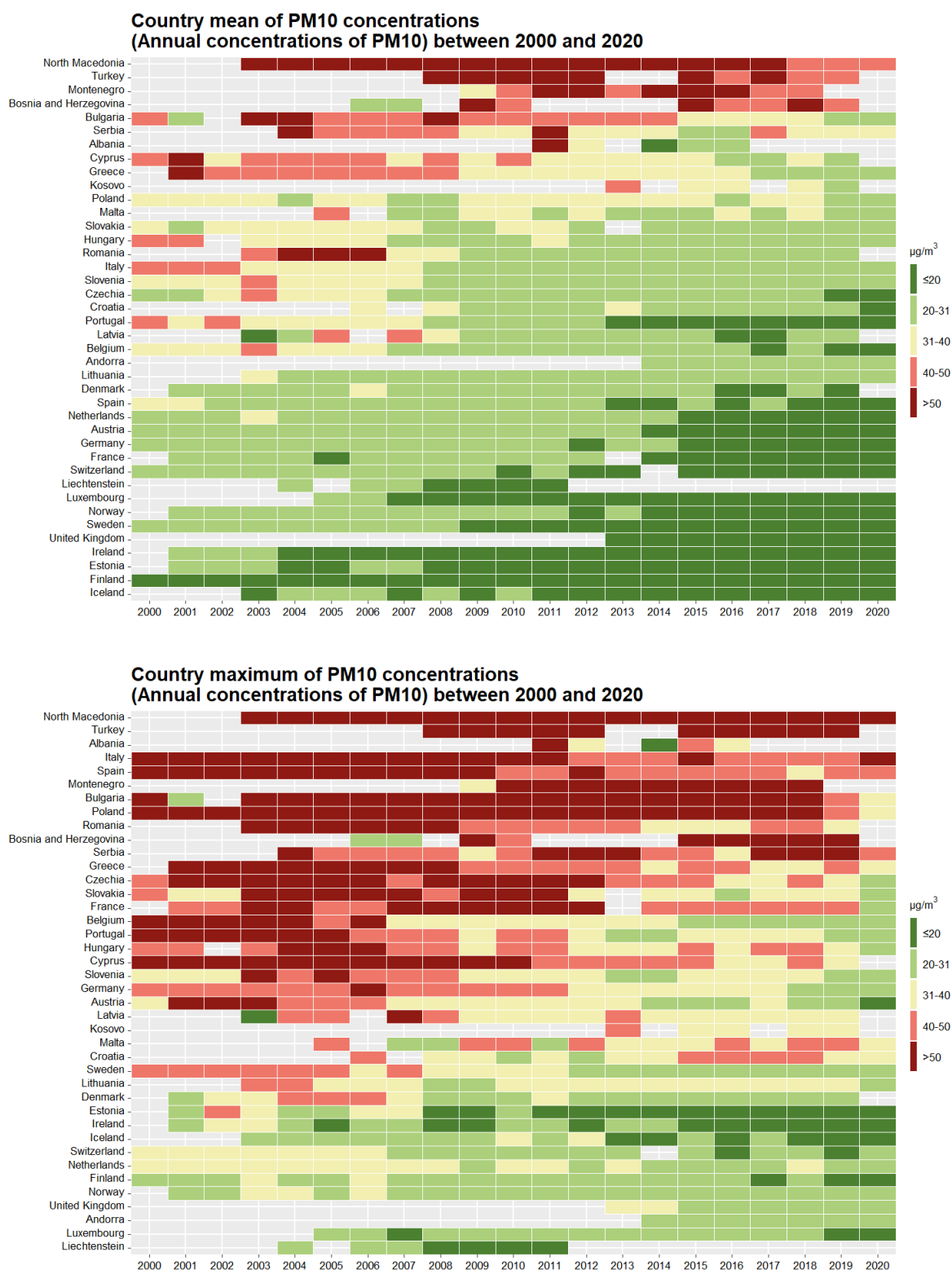


Figure 6: Maps of PM10 concentrations (annual limit value) for the last 4 years

Heatmaps with the evolution from 2000 of the mean (top) and the maximum (bottom) annual mean PM₁₀ 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 (2020) is based on UTD data, while the previous years are based on officially reported validated data.



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 7: Evolution of mean (top) and maximum (bottom) PM10 annual mean concentrations (annual limit value) per country from 2000

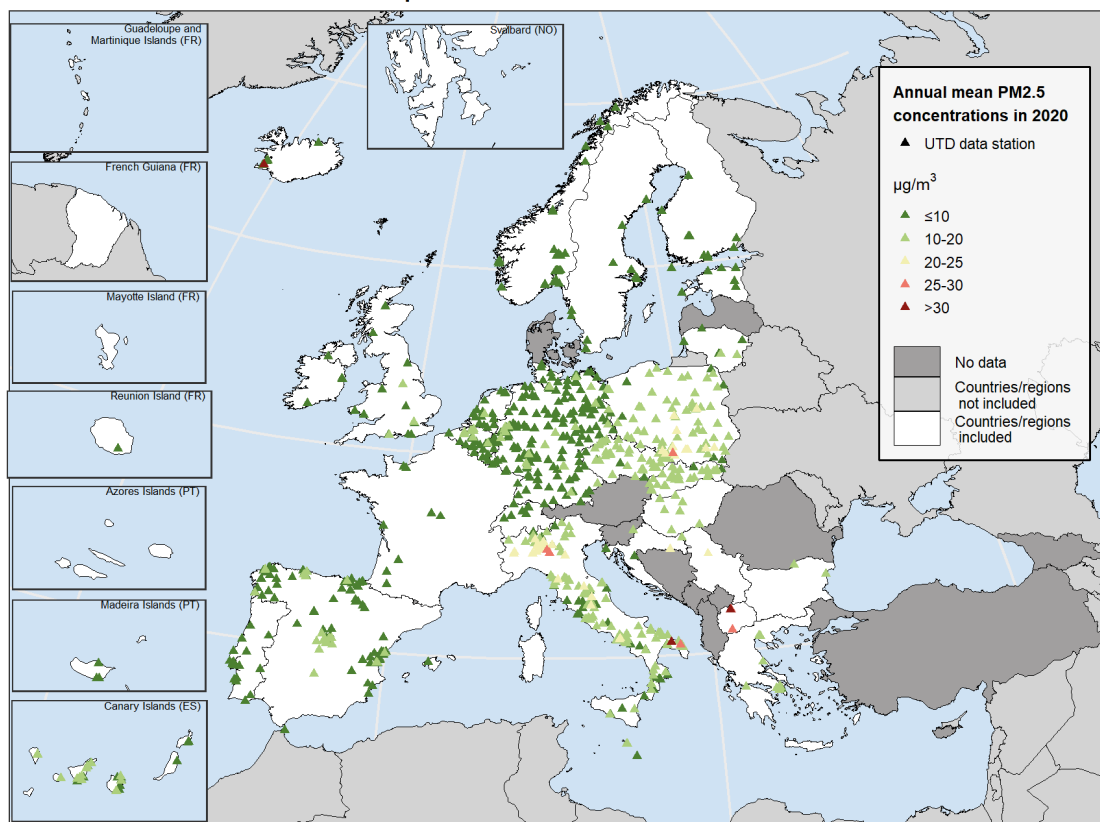
3.2 Status of PM_{2.5} concentrations

Regarding PM_{2.5}, data with sufficient valid measurements were received from 885 stations located in all the reporting countries shown in Figure 1.

The PM_{2.5} concentrations were higher than the annual limit value in two countries in EU-27 and the UK and two other reporting countries (Figure 8). These concentrations above the limit value were registered in 1 % of all the reporting stations and occurred primarily (89 % of cases) in urban (56 %) or suburban (33 %) areas.

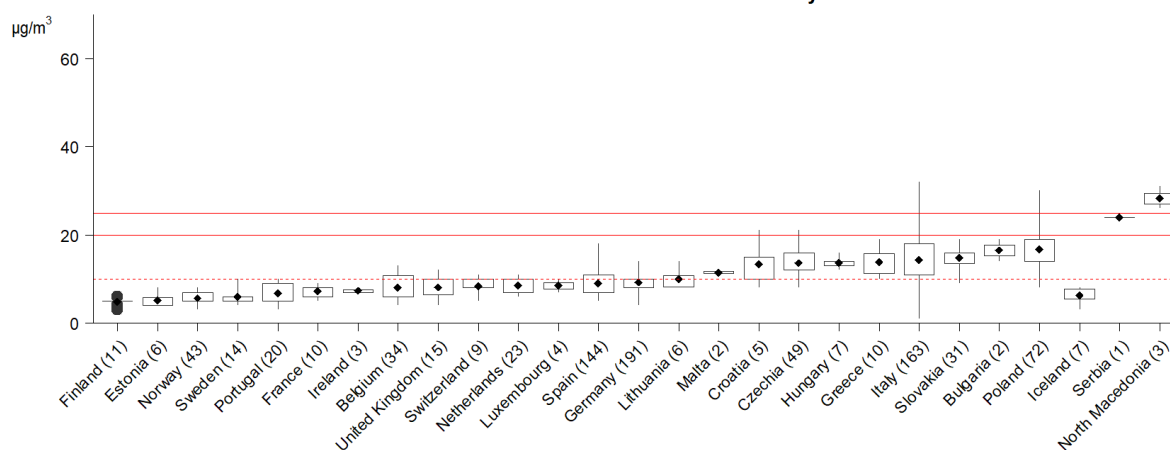
The WHO guideline for PM_{2.5} annual mean (10 µg/m³) was exceeded at 42 % of the stations, located in 19 of the 27 countries reporting PM_{2.5} data (Figure 8). Estonia, Finland, France, Ireland, Luxembourg, Norway, Portugal and Sweden did not report any concentrations above the WHO AQG for PM_{2.5}.

Map concentrations of PM2.5 in 2020



Note: Observed concentrations of PM2.5 in 2020. 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 (25 $\mu\text{g}/\text{m}^3$). The first colour category indicate stations reporting values below the WHO AQG for PM2.5 (10 $\mu\text{g}/\text{m}^3$). Only stations with more than 75 % of valid data have been included in the map.

PM2.5 concentrations in relation to the annual limit value in 2020 and number of stations considered for each country



Note: The graph is based on annual mean concentration values. For each country, the number of stations considered (in brackets) and the lowest, highest and average values (in $\mu\text{g}/\text{m}^3$) recorded at its stations are given. The rectangles mark the 25th and 75th percentiles. At 25 % of the stations, levels are below the lower percentile; at 25 % of the stations, concentrations are above the upper 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 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. Source: EEA, 2020.

Figure 8: UTD Map and boxplot of PM2.5 concentrations in 2020 - annual limit value

The highest value in the boxplot, Iceland ($96 \mu\text{g}/\text{m}^3$), has not been included in the graph for representation purposes.

Figure 9 shows the maps of measured $\text{PM}_{2.5}$ 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 (2020) is based on UTD data, while the previous three years are based on officially reported validated data (CDR).

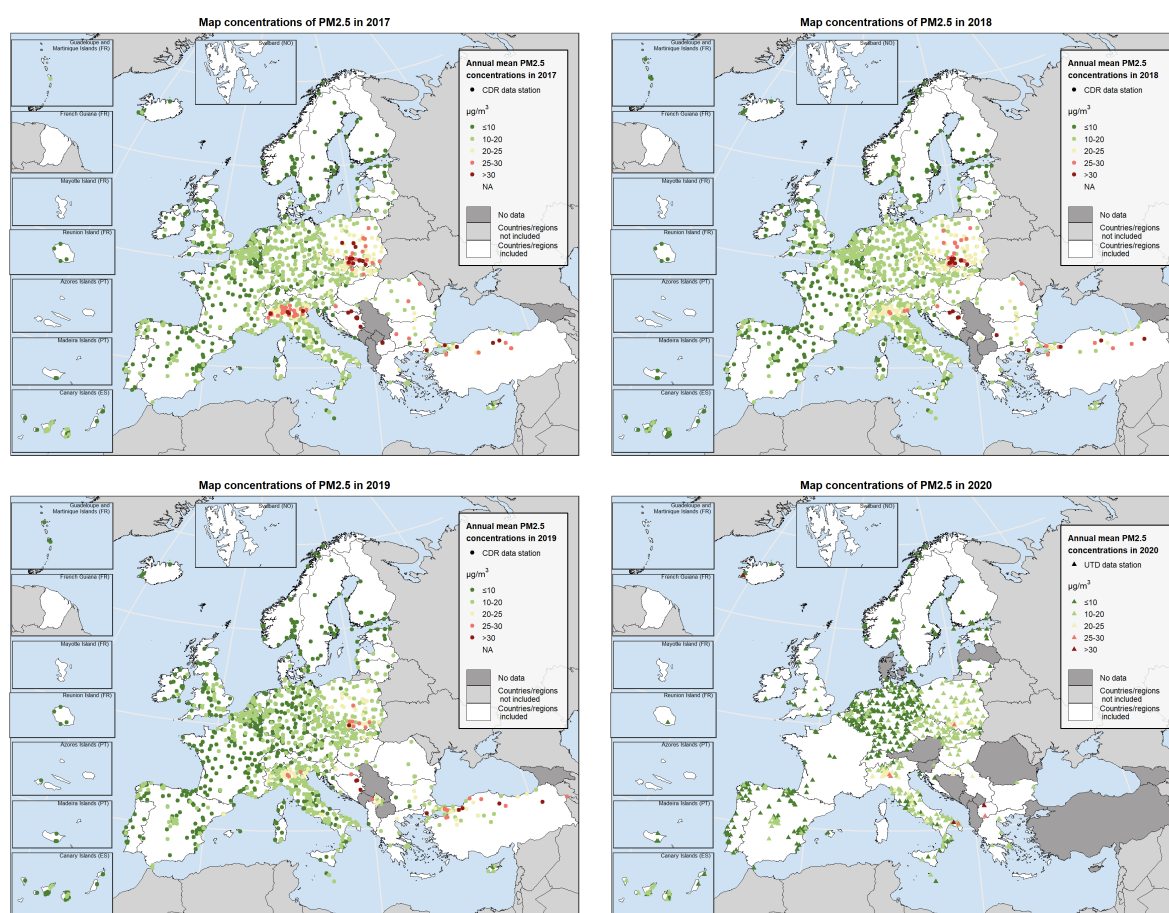
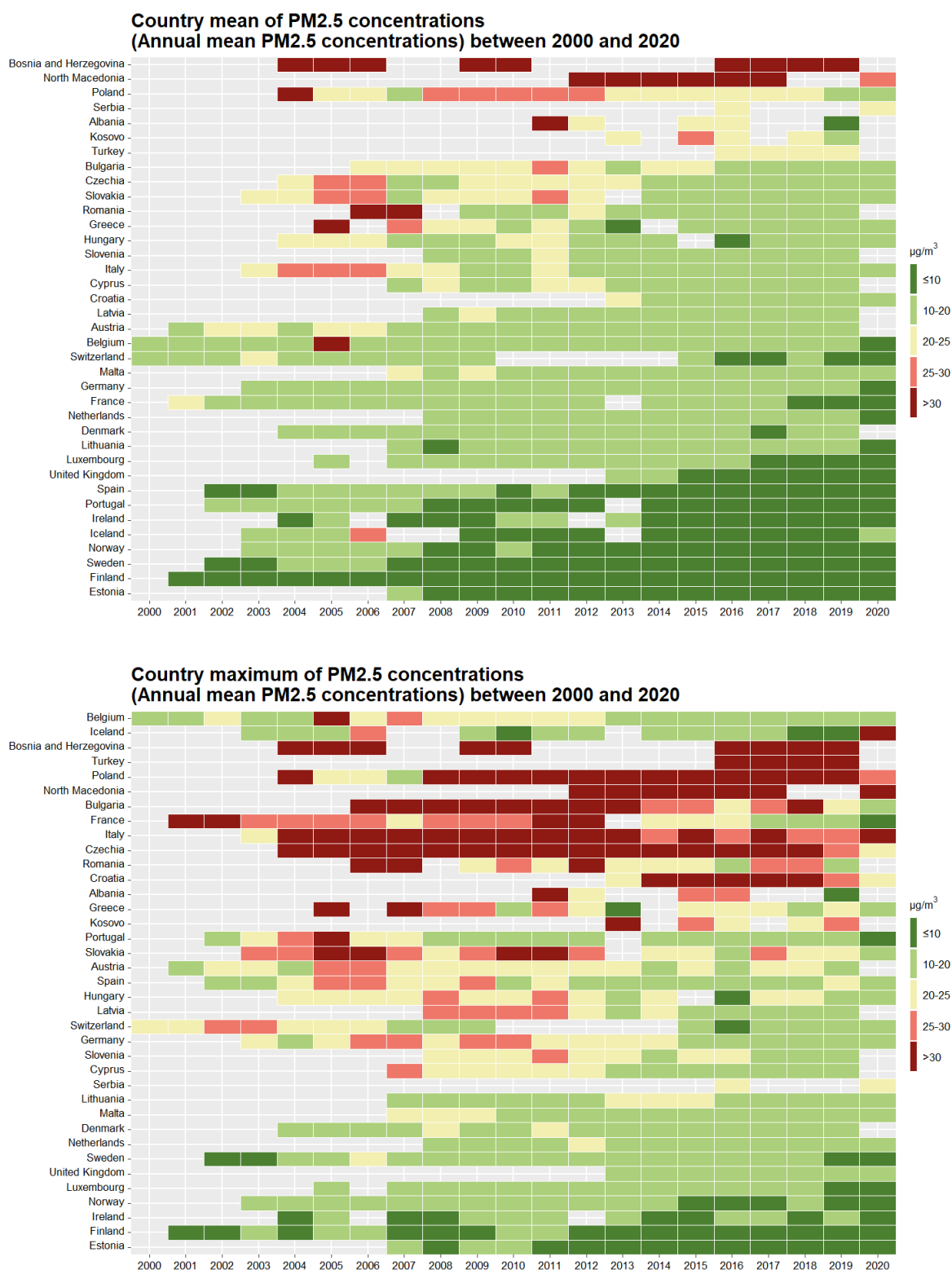


Figure 9: Maps of $\text{PM}_{2.5}$ concentrations (annual limit value) for the last 4 years

Heatmaps with the evolution from 2000 of the mean (top) and the maximum (bottom) $\text{PM}_{2.5}$ annual 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 (2020) is based on UTD data, while the previous years are based on officially reported validated data.



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.

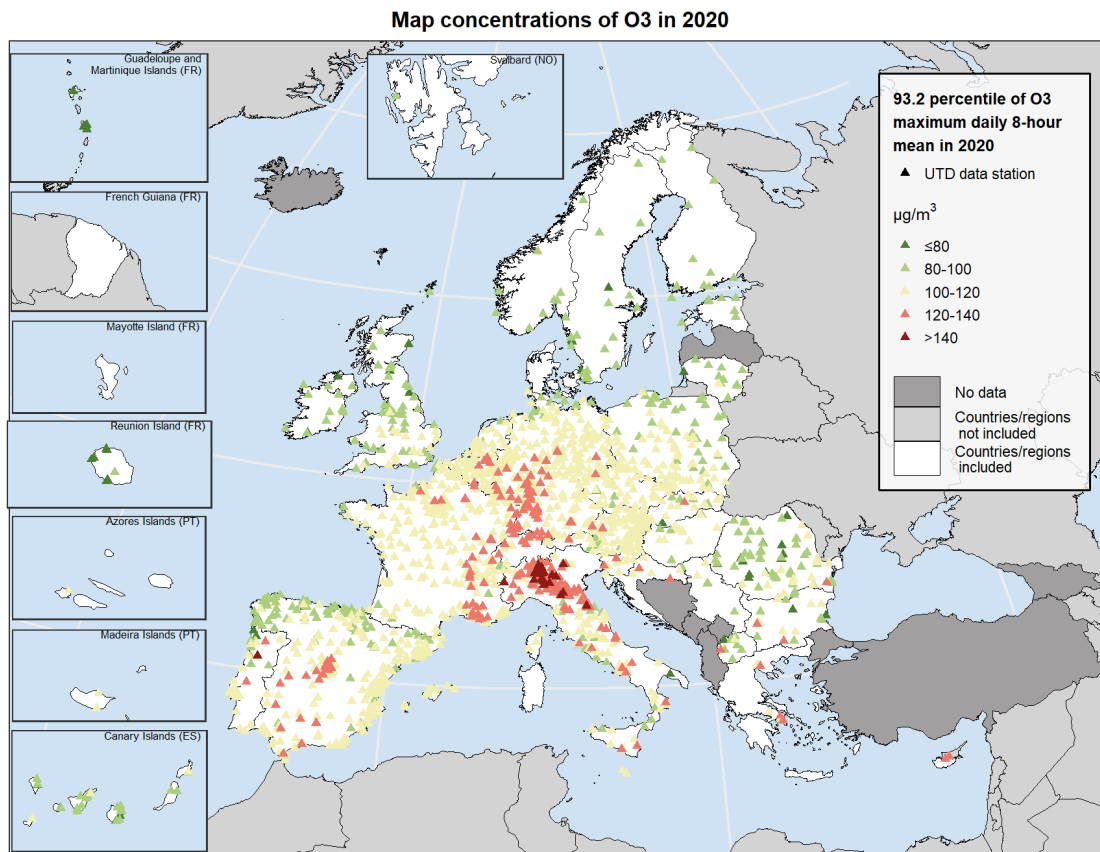
Figure 10: Evolution of mean (top) and maximum (bottom) PM2.5 annual mean concentrations (annual limit value) per country from 2000

4 Status of ozone ambient air concentrations

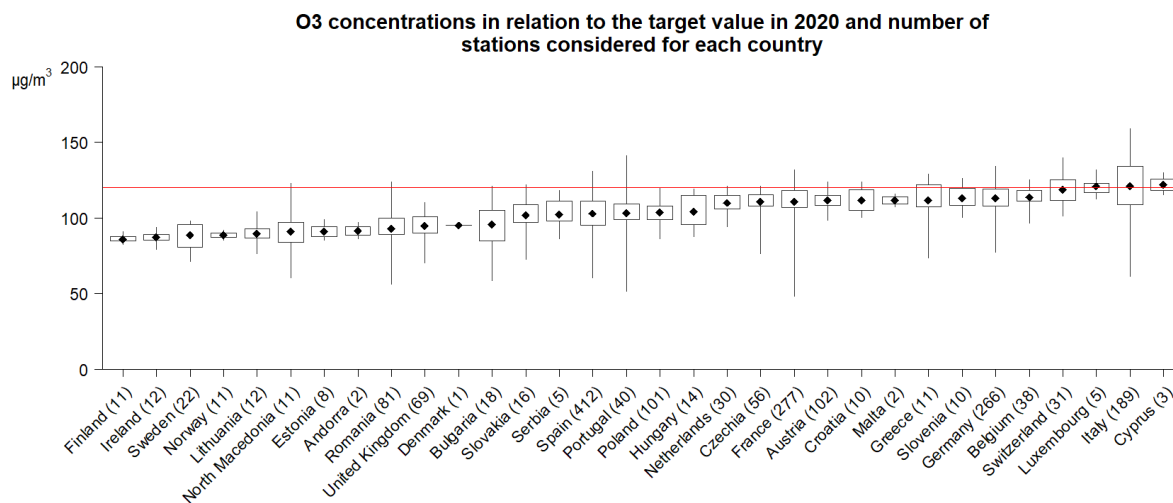
Data for O₃ were reported from 1876 stations in the reporting countries shown in Figure 1.

17 countries in EU-27 and the UK and 2 other reporting countries registered concentrations above the O₃ target value more than 25 times (Figure 11). In total, 13 % of all stations reporting O₃ showed concentrations above the target value for the protection of human health. In addition, only 18 % (340) of all stations fulfilled the long-term objective. 86 % of the stations with values above the long-term objective were background stations.

3 % (61) of all stations and only 6 of the 493 reported rural background stations had values below the WHO AQG value for O₃ (8-hour mean of 100 µg/m³), set for the protection of human health.



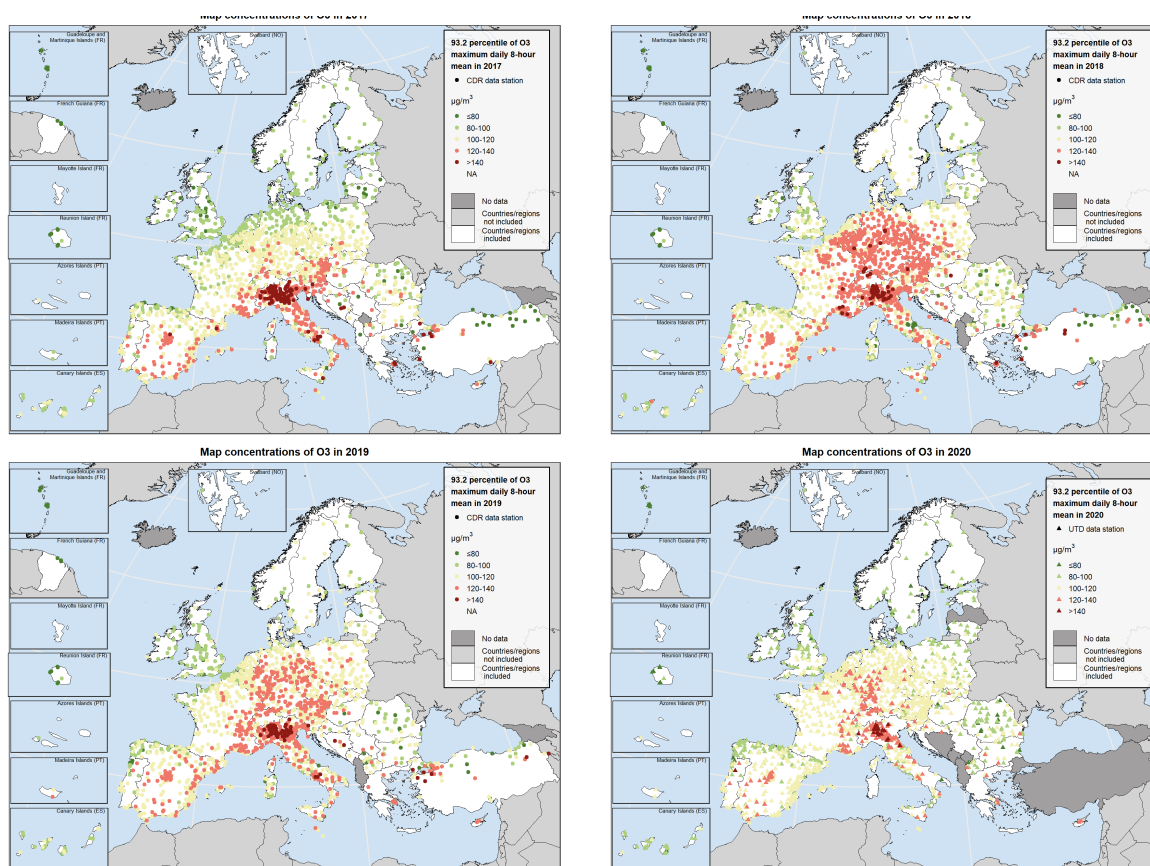
Note: Observed concentrations of O₃ in 2020. The map shows the 93.2 percentile of the O₃ maximum daily 8–hour mean, representing the 26th highest value in a complete series. It is related to the O₃ target value. At sites marked with the last two colour categories, the 26th highest daily O₃ concentrations were above the 120 µg/m³ threshold, implying an exceedance of 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. For each country, the number of stations considered (in brackets), and the lowest, highest and average values (in µg/m³) recorded at its stations are given. The rectangles mark the 25th and 75th percentiles. At 25 % of the stations, levels are below the lower percentile; at 25 % of the stations, concentrations are above the upper 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 11: UTD Map and boxplot of O₃ concentrations in 2020

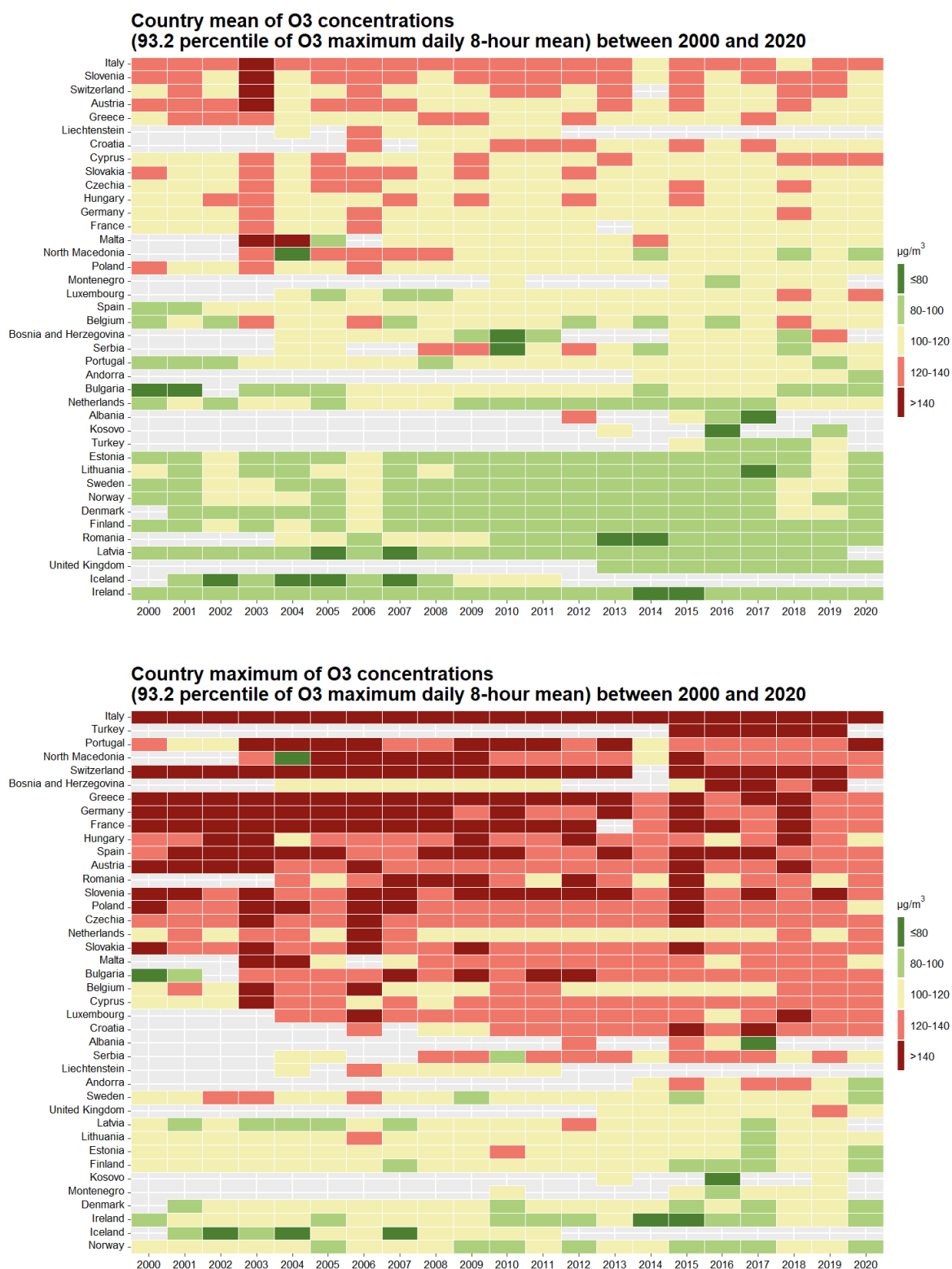
Figure 12 shows the maps of the observed 93.2 percentile of the O₃ maximum daily 8-hour mean concentrations (O₃ target value) for the last four years. In this way, any significant change in the spatial distribution of the values above the set thresholds in the legends can be observed. Note that only the last year's map (2020) is based on UTD data, while the previous three years are based on officially reported validated data (CDR).



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

Figure 12: Maps of O₃ concentrations (related to the target value) for the last 4 years

Heatmaps with the evolution from 2000 of the mean (top) and the maximum (bottom) O₃ concentrations (93.2 percentile of the maximum daily 8-hour mean concentration, target value) 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), especially for O₃ as higher atmospheric temperature leads to enhanced photochemical reactions and O₃ formation. The last year (2020) is based on UTD data, while the previous years are based on officially reported validated data.



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 13: Evolution of mean (top) and maximum (bottom) O₃ concentrations (93.2 percentile of the maximum daily 8-hour mean concentration, related to the target value) per country from 2000

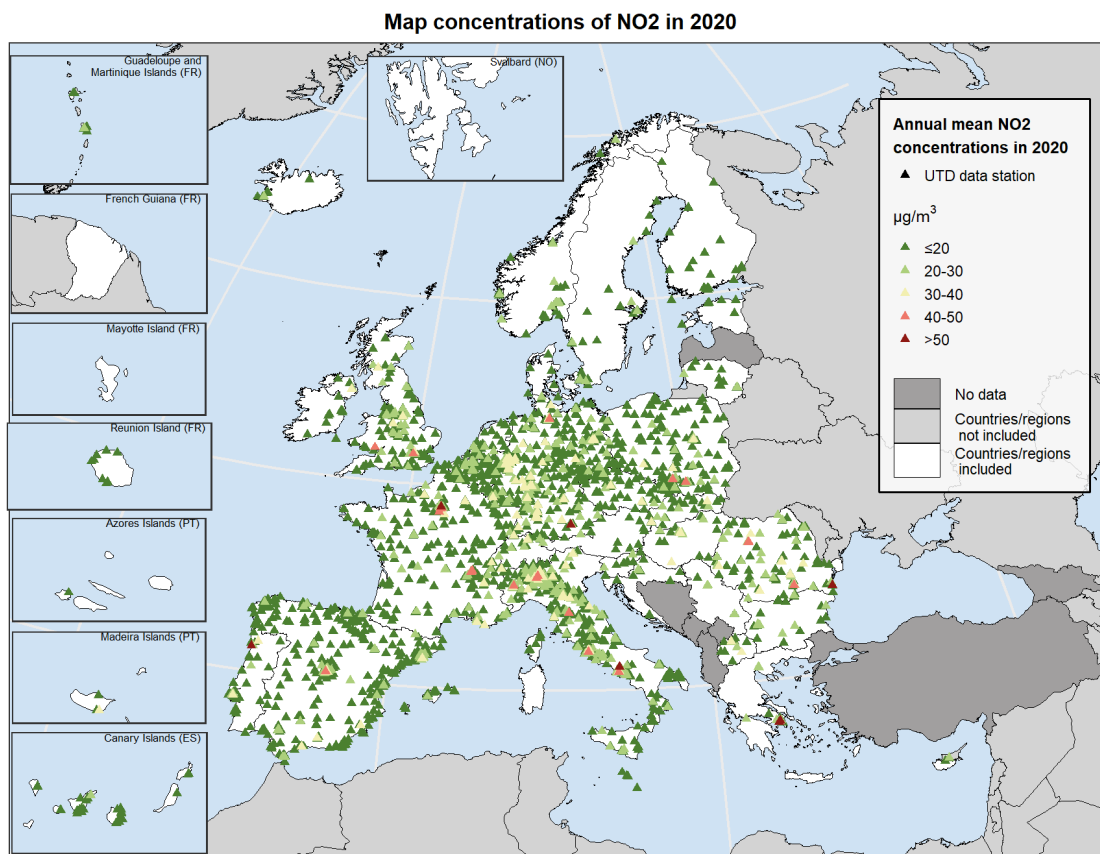
5 Status of nitrogen dioxide ambient air concentrations

The reporting countries shown in Figure 1 submitted NO₂ data from 2554 stations (for the annual limit value) and 2554 (for the hourly limit value).

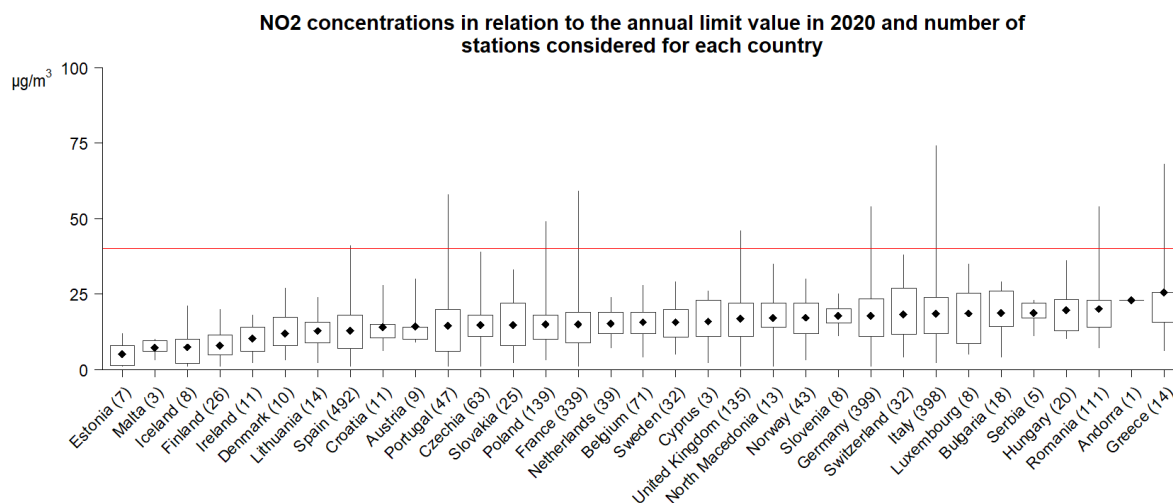
9 of the countries in EU-27 and the UK and 0 other reporting countries (Figure 14) recorded concentrations above the annual limit value (and the equal WHO AQ guideline). This happened in 1 % of all the stations measuring NO₂. Figure 14 shows the measured annual mean NO₂ concentrations.

89 % 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 were observed in 0.2 % (5 stations) of all reporting stations, mostly at urban traffic stations. They were observed in two countries (number stations): Italy (four) and Spain (one).



Note: Observed concentrations of NO₂ in 2020. The last two colour categories correspond to values above the EU annual limit value and the identical WHO AQG (40 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 (in brackets) and the lowest, highest and average values (in µg/m³) recorded at its stations are given. The rectangles mark the 25th and 75th percentiles. At 25 % of the stations, levels are below the lower percentile; at 25 % of the stations, concentrations are above the upper percentile. The limit value set by EU legislation (which is equal to that set by the WHO AQG) 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 14: UTD Map and boxplot of NO₂ concentrations in 2020

Figure 15 shows the maps of the observed NO₂ 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 (2020) is based on UTD data, while the previous three years are based on officially reported validated data (CDR).

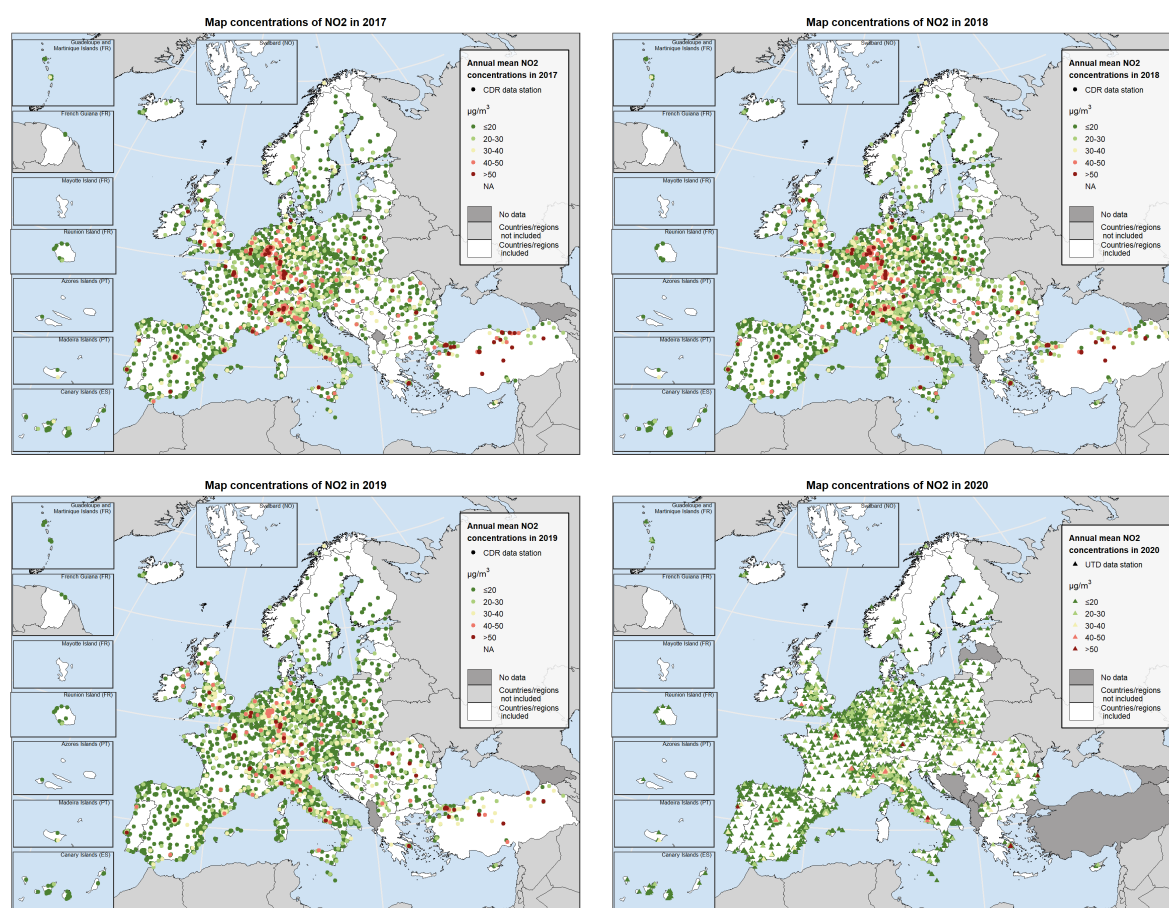
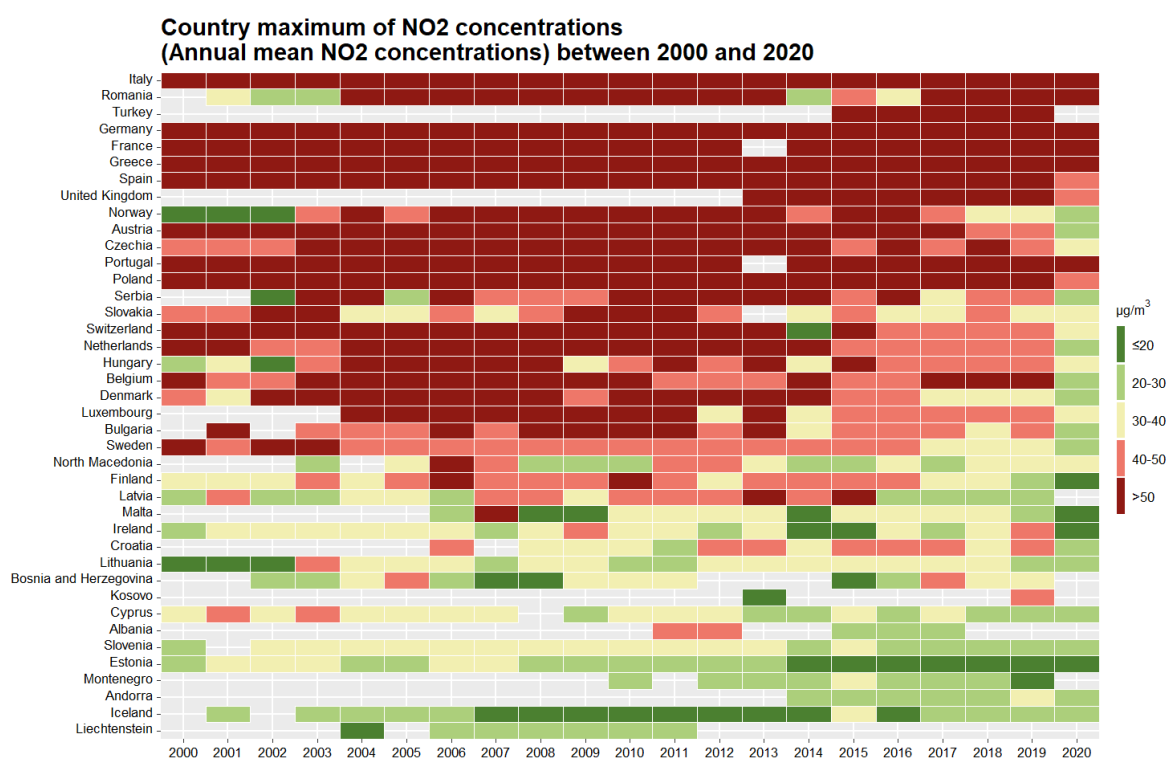
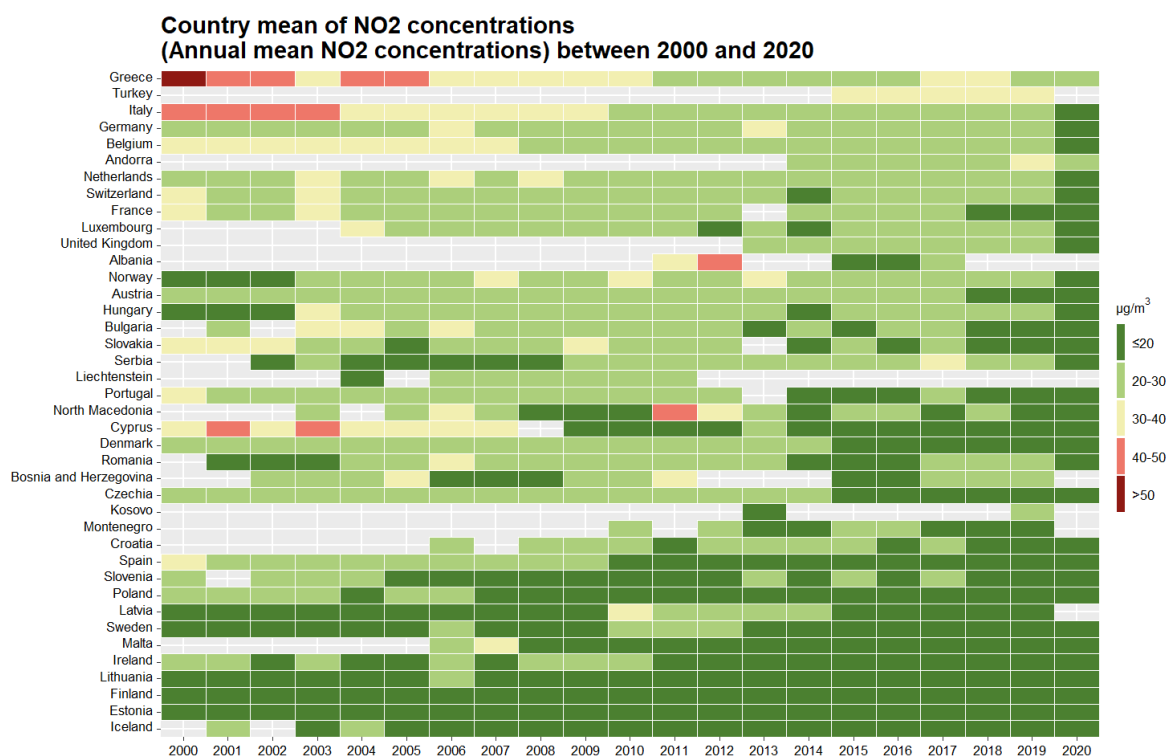


Figure 15: Maps of NO₂ concentrations (annual mean) for the last 4 years

Heatmaps with the evolution from 2000 of the mean (top) and the maximum (bottom) NO₂ annual 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 (2020) is based on UTD data, while the previous years are based on officially reported validated data.



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 16: Evolution of mean (top) and maximum (bottom) NO2 annual mean concentrations (annual limit value) per country from 2000

6 Status of sulphur dioxide ambient air concentrations

The reporting countries shown in Figure 1 reported measurements of SO₂ from 1068 stations for the hourly limit value and 1060 stations for the daily limit value.

4 stations ⁽³⁾ registered concentrations above the hourly limit value; and 2 stations ⁽⁴⁾ registered concentrations above the daily limit value for SO₂.

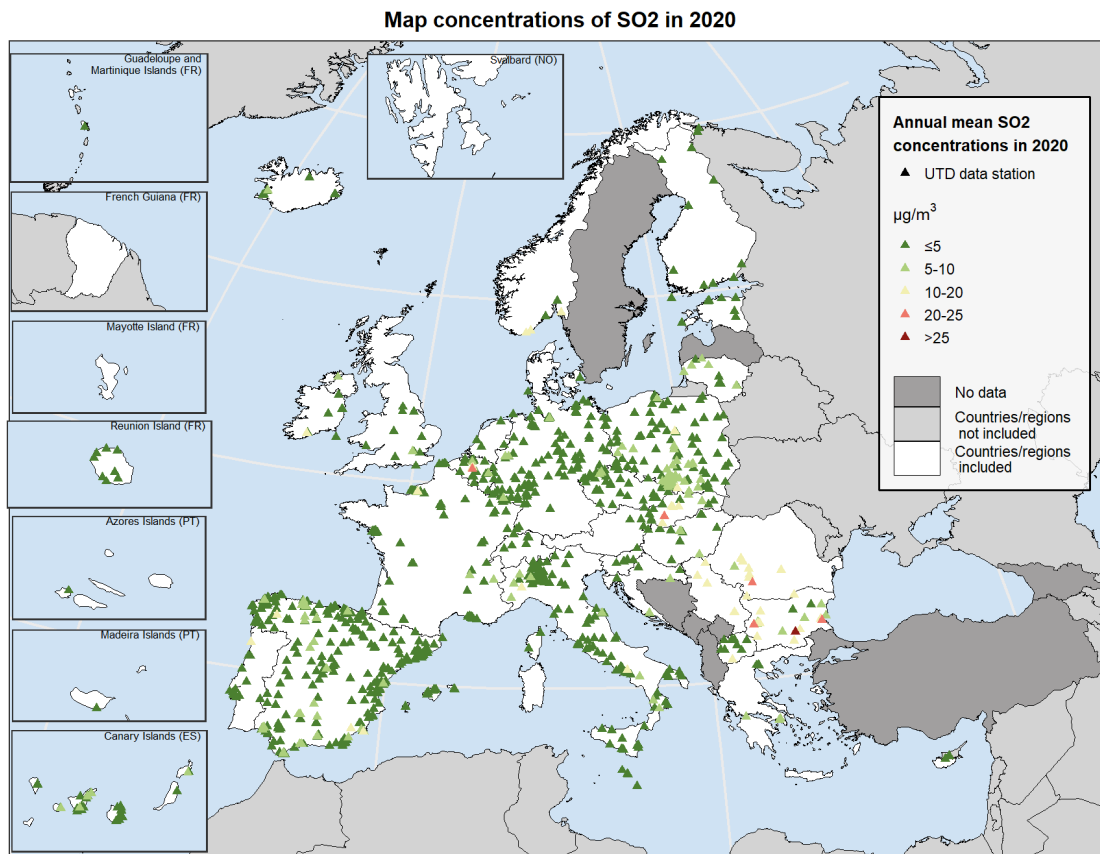
On the contrary, 270 (25 %) of all the stations reporting SO₂ levels, located in 24 reporting countries ⁽⁵⁾, measured SO₂ concentrations above the WHO AQG of 20 µg/m³ for daily mean concentrations.

Figure 17 shows annual mean SO₂ concentrations. Though the annual mean is not linked to the limit values for the protection of human health, it is linked to the vegetation critical level (20 µg/m³ as an annual mean) and provides a comparison of the situation across Europe.

³Italy (two), Bulgaria (one) and France (one)

⁴France (one) and Germany (one).

⁵All reporting countries except Andorra, Austria, Cyprus, Denmark, Luxembourg, Malta, Netherlands and Slovenia.



Note: Observed concentrations of SO₂ in 2020. The map shows the SO₂ annual mean, which relates to the vegetation critical level (20 µg/m³). Only stations with more than 75 % of valid data have been included in the map.

Figure 17: Map of SO₂ concentrations in 2020

Figure 18 shows the maps of the observed SO₂ 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 (2020) is based on UTD data, while the previous three years are based on officially reported validated data (CDR).

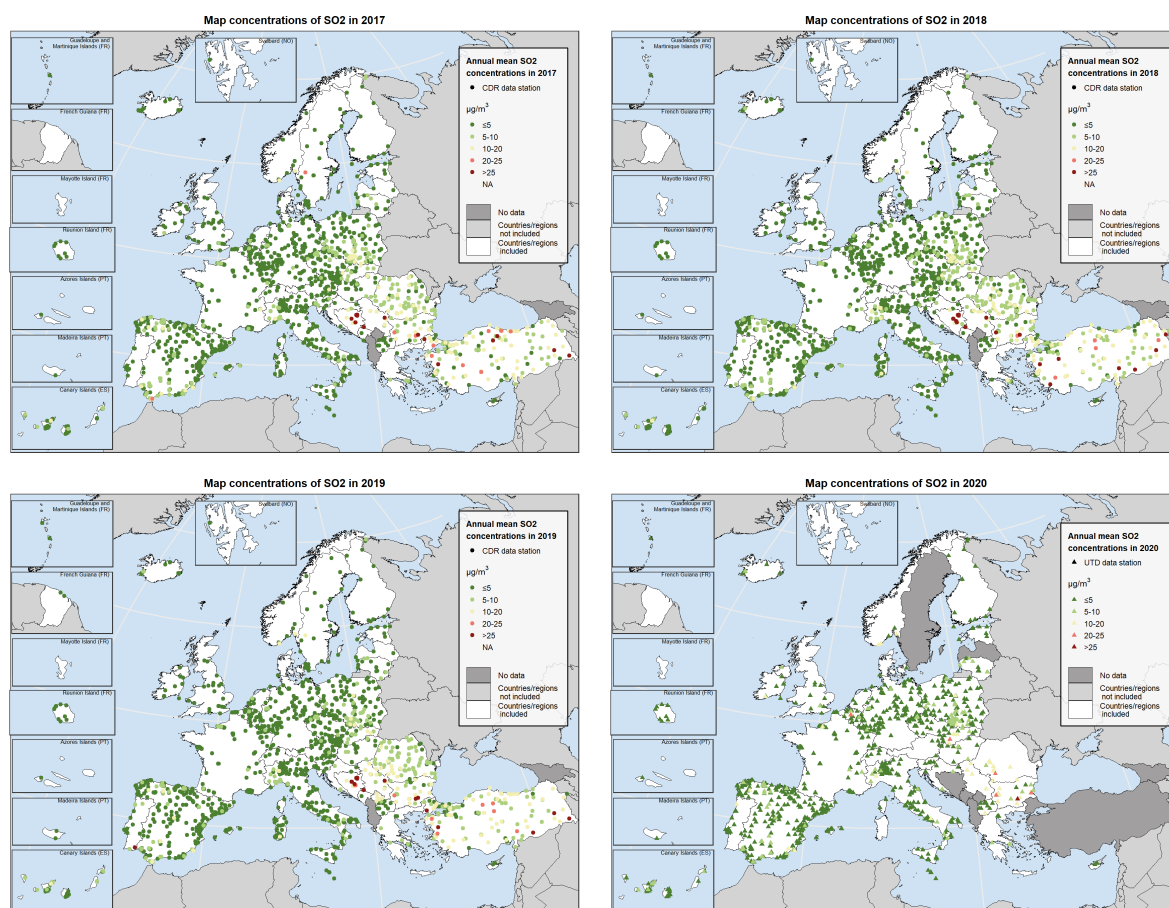
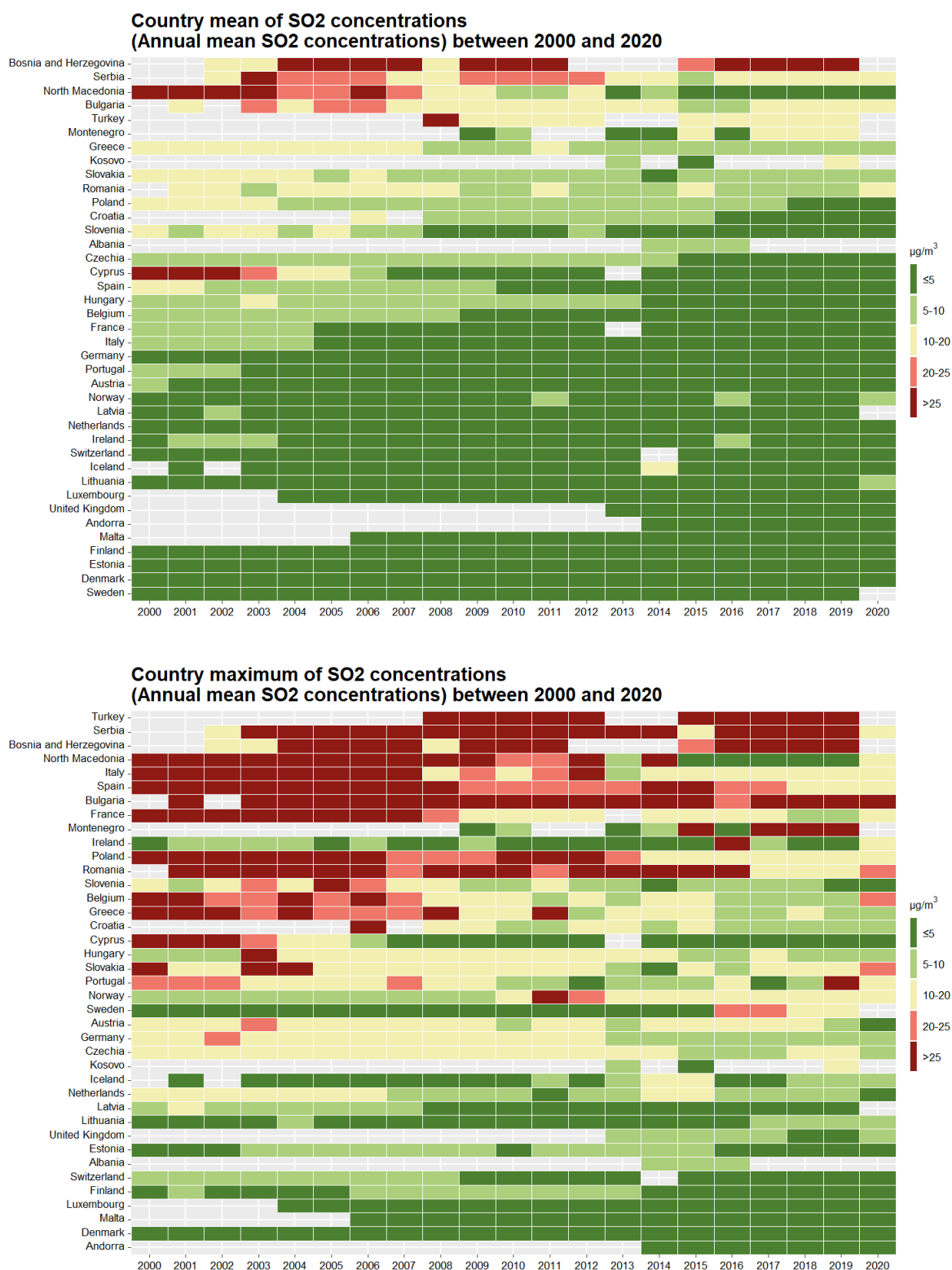


Figure 18: Maps of SO₂ concentrations (annual mean) for the last 4 years

Heatmaps with the evolution from 2000 of the mean (top) and the maximum (bottom) SO₂ annual mean concentrations 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), and the last year (2020) is based on UTD data, while the previous years are based on officially reported validated data.



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 19: Evolution of mean (top) and maximum (bottom) SO₂ annual mean concentrations (vegetation critical level (20 µg/m³) per country from 2000

7 Abbreviations, units and symbols

$\mu\text{g}/\text{m}^3$: microgram(s) per cubic metre

AQG: Air quality guideline

CDR data stations: stations that sent the data to the Central Data Repository

EEA: European Environment Agency

ETC/ATNI: European Topic Centre on Air pollution, Noise, Transport and Industrial Pollution

EU: European Union

NO_2 : Nitrogen dioxide

O_3 : Ozone

PM: Particulate matter

$\text{PM}_{2.5}$: 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

UTD data stations: stations that report up-to-date data

8 Annex

Data included in this report was received by 27 April 2021 from the reporting countries. By that date the number of stations by country reporting each pollutant is summarized in Table 3:

Table 3: Reporting status of 2020 air quality data by 27 April 2021

Country	PM10	PM2.5	O3	NO2	SO2
Albania	0	0	0	0	0
Andorra	1	0	2	1	1
Austria	6	0	102	9	4
Belgium	54	34	38	71	23
Bosnia and Herzegovina	0	0	0	0	0
Bulgaria	25	2	18	18	22
Croatia	8	5	10	11	7
Cyprus	0	0	3	3	3
Czechia	77	49	56	63	42
Denmark	0	0	1	10	1
Estonia	5	6	8	7	8
Finland	26	11	11	26	11
France	138	10	277	339	86
Georgia	0	0	0	0	0
Germany	367	191	266	399	109
Greece	17	10	11	14	6
Hungary	15	7	14	20	14
Iceland	7	7	0	8	10
Ireland	10	3	12	11	7
Italy	337	163	189	398	119
Kosovo	0	0	0	0	0
Latvia	0	0	0	0	0
Liechtenstein	0	0	0	0	0
Lithuania	13	6	12	14	10

Table 3: Reporting status of 2020 air quality data by 27 April 2021 (continued)

Country	PM10	PM2.5	O3	NO2	SO2
Luxembourg	4	4	5	8	3
Malta	2	2	2	3	3
Montenegro	0	0	0	0	0
Netherlands	34	23	30	39	6
North Macedonia	12	3	11	13	11
Norway	50	43	11	43	7
Poland	154	72	101	139	98
Portugal	43	20	40	47	17
Romania	0	0	81	111	9
Serbia	2	1	5	5	5
Slovakia	33	31	16	25	14
Slovenia	8	0	10	8	4
Spain	326	144	412	492	386
Sweden	31	14	22	32	0
Switzerland	31	9	31	32	9
Turkey	0	0	0	0	0
United Kingdom	15	15	69	135	13
EU-27 and the UK	1748	822	1816	2452	1025
Total	1851	885	1876	2554	1068

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