MUNICIPALITY OF LINZ
Dept. for Land Planning, Technology and Environment

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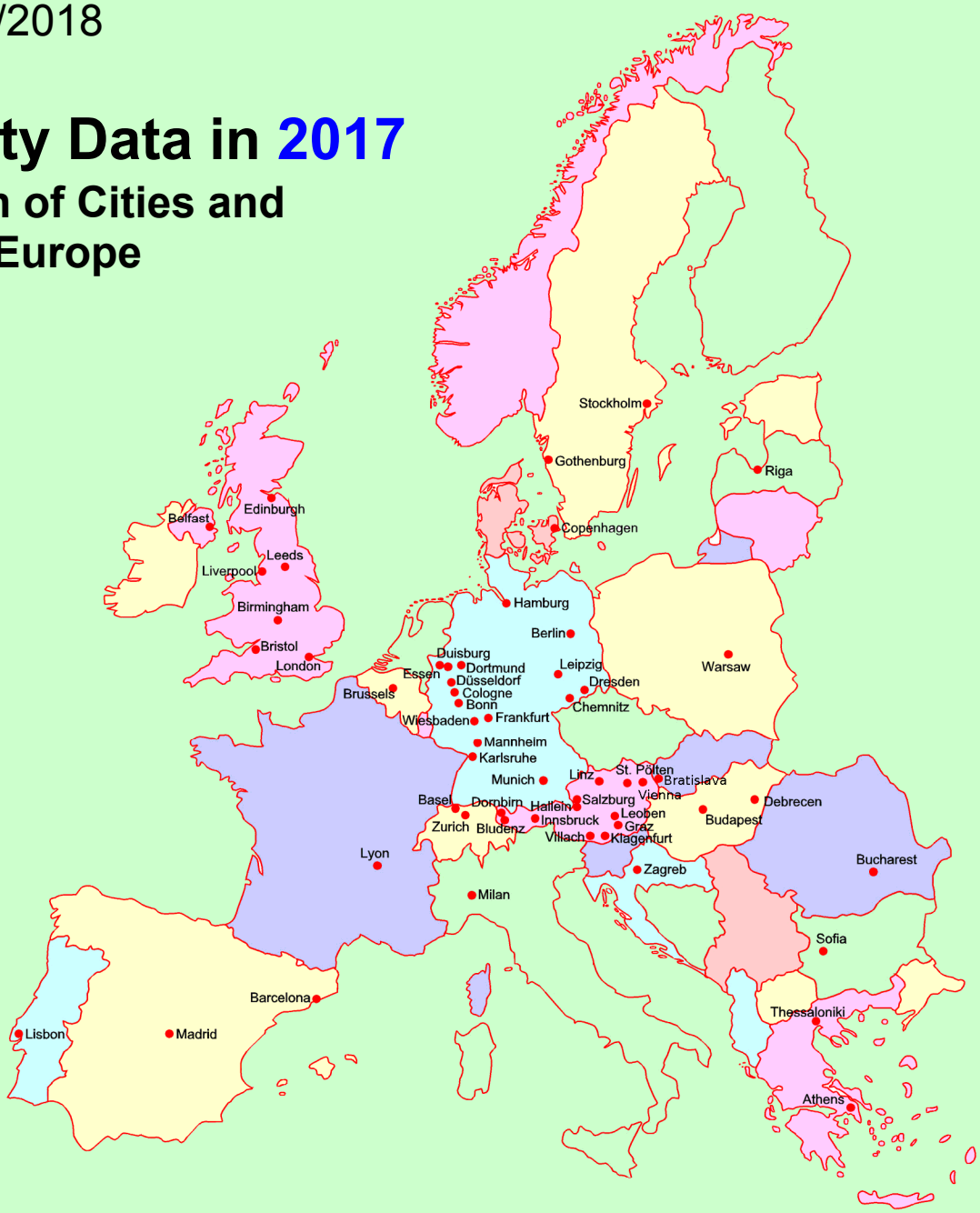
# Air Quality Data in 2017

## Comparison of Cities and Regions in Europe

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# Luftgütedaten 2017 Nationaler und europäischer Städtevergleich

## Einführung

Die Bekämpfung der Luftverschmutzung ist nach wie vor eines der zentralen Themen, mit denen Umweltämter, Umweltbehörden bzw. sonstige für den Umweltschutz tätige Organisationen beschäftigt sind. In Form von regionalen oder nationalen Luftreinhalteplänen wird versucht, die Luftverschmutzung in den Griff zu bekommen und die Luftqualität sukzessive zu verbessern. In den letzten Jahren ist die Belastung an Feinstaub ($PM_{10}$ und $PM_{2,5}$) und Stickoxiden besonders in den Mittelpunkt des Interesses gerückt, da die Grenzwerte für diese Luftschadstoffe in den meisten Ballungsräumen überschritten werden.

Um überhaupt den Erfolg von Sanierungsmaßnahmen nachweisen zu können, ist die Beobachtung der Schadstoffkonzentrationen mit Hilfe von Luftmessnetzen sinnvoll. In den meisten Messgebieten sind Luftmessnetze seit mehr als 3 Jahrzehnten installiert, sodass bei einer Verfolgung der Luftschadstoffdaten über mehrere Jahre ein Trend zur Verbesserung (oder auch Verschlechterung) der Luftbelastung herauslesbar ist. Sanierungsmaßnahmen in Betrieben und bei anderen Emittentengruppen müssen sich langfristig in einer verminderten Immissionsbelastung an Luftschadstoffen manifestieren.

Die Verfolgung *längerer Zeiträume* zur Bestimmung des Belastungstrends ist unbedingt notwendig, da auf Grund von unterschiedlichen meteorologischen Einflüssen die Immissionsbelastungen außerordentlich stark schwanken können. Beispielsweise wird ein Monat mit vornehmlich regnerischer Witterung und viel Wind wesentlich geringere Immissionskonzentrationen aufweisen als ein Monat, in dem häufig Inversionswetterlagen vorherrschen.

# Air Quality Data in 2017 The Comparison of Cities and Regions in Europe

## Introduction

The fight against air pollution is still one of the major topics organisations concerned with environmental affairs, such as national and local authorities are dealing with. Attempts are made to get air pollution under control and increase the air quality step by step establishing regional or national air-cleaning programmes. During the last years the pollutant stress of fine particulates ($PM_{10}$ and $PM_{2,5}$) and nitrogen oxides has become more important, since the European air quality standards of these pollutants are exceeded in most of the agglomerations.

To prove the success of measurements of redevelopment at all, the observation of the concentrations concerning air pollutants by means of monitoring station networks is useful. In most of the referred monitored areas air quality monitoring station networks have been installed for more than 3 decades. By following the air quality data through a longer period of years a trend for improvement (or even a change to the worse) of the air-pollutant stress can be recognized. Measurements of redevelopment in companies, factories and other groups of emission sources should be visible as a reduced immission stress of air pollutants.

It is absolutely necessary to determine the trends of pollution throughout a *longer period of time*, because various meteorological influences can cause an extreme alteration of the immission stress. For instance, a month with mostly rainy weather conditions and high wind speeds will lead to a much lower immission stress in comparison with a month, when the formation of inversion layers can be observed frequently.

| | |
|---|---|
| Luftgütevergleiche werden durch die Stadt Linz bereits seit vielen Jahren durchgeführt, genau genommen seit 1989. Anfänglich wurden nur österreichische Städte miteinander verglichen. In den folgenden Jahren wurde der Städtevergleich aufgrund des großen Interesses auf immer mehr europäische Städte und Regionen ausgedehnt. Im Jahr 2017 wurden Städte bzw. Regionen aus Österreich, Deutschland, Großbritannien, Frankreich, Schweden, Italien, Schweiz, Spanien, Polen, Dänemark, Tschechien, Ungarn, Lettland, Portugal, Rotterdam und Kroatien mit einbezogen. Die Städte Bratislava, Luxemburg, Belgien und Sofia lieferten für das Jahr 2017 keine Daten. | Comparisons of the air quality have been carried out by the City of Linz already for a number of years, exactly since 1989. At first only Austrian Cities were compared. The comparison was extended to other European cities and regions during the last year as a result of growing interest in such studies. The comparison of the air quality of the year in 2017 comprised cities and regions of Austria, Germany, cities from Great Britain, France, Sweden, Italy, Switzerland, Spain, Poland, Denmark, Czech Republic, Hungary, Latvia, Portugal, Rotterdam, Slovakia and Croatia. We did not receive data from the city of Bratislava, Luxemburg, Belgium and Sofia in 2017. |
| Die Stadt Bukarest liefert seit 16 Jahren keine Daten mehr. Sollten diese noch eintreffen, werden sie in künftigen Städtevergleichen in Form von Zeitreihen mit berücksichtigt. | The city of Bucharest has not been delivering any data for 16 years. In case a delivery will follow, it will be taken into account for future reports in terms of time series. |
| Seit dem Jahr 2008 wurde der Luftgütevergleich mit dem lungengängigen Feinstaubanteil $PM_{2,5}$ ergänzt, da diese Partikel erhebliche negative Auswirkungen auf die menschliche Gesundheit besitzen. | Since 2008 the comparison of the air quality has been extended with fine particulate matter $PM_{2,5}$. These respirable particles are responsible for significant negative impacts on human health. |
| Die Größe des Immissionsgebietes und die Bevölkerungszahl wurden ebenfalls seit 2008 in den Luftgütevergleich aufgenommen, um die Messstellendichte miteinander zu vergleichen. | Since 2008 the comparison has been extended by the immission area and the population in order to compare the closeness of the measurement points. |

## Kritische Anmerkungen

Als Kritikpunkt wird immer wieder angemerkt, dass ein Vergleich der Immissionsbelastung aus fachlichen Gründen nicht möglich sei, da

1. die Zahl der Messstellen sehr verschieden ist (die Anzahl der Messstellen pro Messgebiet ist in der Tabelle auf Seite 16 und den nachfolgenden Grafiken angeführt),
2. die Messstellendichte unterschiedlich ist,
3. die Situierung der Messstellen nicht immer vergleichbar ist (In manchen Städten wurde deswegen bei den Schadstoffkomponenten zwischen verkehrsbelasteten Messstationen und anderen Messstationen unterschieden).

Die Autoren sind sich dieser Tatsachen durchaus bewusst. Trotz der erhobenen Einwände gibt es einige Argumente für die Fortführung der Städtevergleiche:

1. Die Luftschadstoffmessungen werden im Allgemeinen technisch in der gleichen oder in ähnlicher Weise durchgeführt. Das bedeutet, dass die Luftüberwachung an bestimmten *Punkten* einer Stadt oder einer Region mit Hilfe automatisch registrierender Immissionsmessstationen durchgeführt wird. Die gemessenen Konzentrationen repräsentieren die Belastung eines mehr oder weniger weiten Bereiches um die Messstation. Die *Art der Probenahme* müsste also *vergleichbar* sein.
2. Die Luftgütestationen sollten an Punkten errichtet werden, die einen größeren Bereich um die Messstation abdecken und nicht nur die Schadstoffbelastung an einem bestimmten Punkt widerspiegeln. Ausgenommen sind besondere verkehrsbelastete Probenahmepunkte. Die Messnetzbetreiber wurden eingeladen, diese Messpunkte getrennt anzugeben, um die wirkliche Situation des überwachten Gebietes wiederzugeben. Wie bereits erwähnt, unterscheiden einige Städte zwischen verkehrsbelasteten und nicht vom Verkehr beeinflussten Messstationen.

## Critical remarks

Over and over again it is critically remarked that it is not possible to compare the pollutant stress between monitoring areas. The following technical reasons are mentioned by some monitoring network services:

1. The number of monitoring stations is very different (see table on page 16 and the subsequent charts),
2. the density of distribution of the monitoring stations is different,
3. the location of the monitoring stations is not always comparable (for that reason in some cities the network services distinguish between traffic-stressed and non-traffic-influenced monitoring stations).

The authors of this comparative study are thoroughly conscious of these facts, but despite the raised objections there are also some arguments of the activities:

1. The way of measurement of air pollutants is carried out by the same or similar technical methods. This means, the results of air monitoring activities are obtained by sampling at special sampling *points* in a city or region by means of automatically recording monitoring stations. The registered concentrations represent the stress of a more or less wide area around the monitoring station. Due to this reason the *method of sampling* itself should be *comparable*.
2. The monitoring stations should be located at points representing a wider portion of the monitored area, not only the pollution stress representative for a focal point. Exceptions are designated traffic stressed sampling points. The runners of monitoring station network services were invited to separate such monitoring points in order to represent the real situation of the monitored area. As already mentioned, some cities distinguish between traffic-stressed and non-traffic-influenced monitoring stations.

| | |
|---|---|
| 3. Schließlich wird eine stärker objektivierende Basis der Auswertungen besonders dann erreicht, wenn längere Zeiträume betrachtet werden und daraus die Trendentwicklung der Schadstoffimmissionen abliest. Nachdem die Stadt Linz internationale und nationale Städtevergleiche schon seit vielen Jahren durchführt, gibt es für die Jahresmittelwerte auch die mehrjährige *Trendentwicklung* der Schadstoffbelastung seit 1993 für die Immissionsgebiete. Die Daten von Städten bzw. Regionen, die erst seit kurzem im Städtevergleich integriert sind, wurden dabei auch so weit wie möglich nachgeführt. | 3. In the end the evaluations are put to a more objectified basis, when long term developments are observed and thereof the trends of the pollutant immission can be derived. Since the city of Linz has been carrying out comparisons of the air quality for many years, this report also contains the *trend developments* for the annual mean values since 1993 for the immission regions. The data of cities or regions which only have been participating the comparison for a couple of years have been updated as far back as possible. |

## Immissionskenngrößen

In der vorliegenden Studie wurden verschiedene Immissionskenngrößen erhoben:

- Jahresmittelwert (Mittel aus allen Stationen einer Stadt/Region)
- Max. Monatsmittelwerte (höchstbelastete Station einer Stadt/Region)
- Max. Tagesmittelwert (höchstbelastete Station einer Stadt/Region)
- Max. Einstunden-Mittelwert (höchstbelastete Station einer Stadt/Region)
- Max. 98-Percentil/Jahr (höchstbelastete Station einer Stadt/Region)
- Anzahl der Überschreitungen des $PM_{10}$-Tagesgrenzwertes an der höchstbelasteten Messstation
- Anzahl der Überschreitungen des $NO_2$-Grenzwertes für den 1h-Mittelwert an der höchstbelasteten Messstation

Von den einzelnen Messnetzbetreibern wurden die gewünschten Immissionsdaten in sehr unterschiedlicher Vollständigkeit zur Verfügung gestellt. Insbesondere betrifft dies die Perzentil-Auswertungen. Oftmals ist auch nicht das 98-Percentil verfügbar, sondern es werden andere Perzentilgrößen (z. B. 95-Percentil) gebildet. Die meisten Messnetzbetreiber berechnen die Perzentile aus den Halbstunden-Mittelwerten eines Jahres, manchmal werden jedoch auch die Tagesmittelwerte dafür herangezogen.

Wie schon in den letzten Berichten ist der vorliegende Bericht bei den grafischen Auswertungen kürzer gefasst als vor dem Jahr 2006. Seit damals wurden die grafischen Darstellungen für die Perzentile, die max. 3-Stunden-Mittelwerte, die max. Halbstundenmittelwerte und die max. Monatsmittelwerte, da sie im Allgemeinen von weniger starkem öffentlichem Interesse sind, herausgenommen. Aufgenommen wurden hingegen die grafischen Auswertungen über 1-Stunden-Mittelwerte, die nunmehr fast überall die Norm für die Bewertung von Kurzzeitbelastungen darstellen.

Es wurde also nur ein Teil der zur Verfügung gestellten Luftgütekennzahlen für die Grafiken verwendet. Die kompletten Datensätze können aus den Übersichtstabellen im Anhang entnommen werden.

## Immission reference values

The present study various immission reference values have been surveyed, such as:

- annual mean value (mean of all monitoring stations of a city/region)
- Max. monthly mean value (max. stressed monitoring station of a city/region)
- Max. daily mean value (max. stressed monitoring station of a city/region)
- Max. 1-hours mean value (max. stressed monitoring station of a city/region)
- Max. 98-Percentile/year (max. stressed monitoring station of a city/region)
- Number of violations of the $PM_{10}$ daily mean standard at the highest stressed monitoring station
- Number of violations of the $NO_2$ 1h mean standard at the highest stressed monitoring station

The runners of air pollution monitoring networks support us with immission data of very different completeness, especially referring to the evaluation of the percentiles. Often the 98-Percentile is not available but the value for the 95-Percentile is given. In most of the monitoring networks the percentiles are calculated based on the *1/2-hours mean* values of a calendar year, sometimes they were based on the *daily mean* values.

Regarding the graphical evaluations of immission reference data the present report has been shortened as already done in the latest reports. Since 2006 the graphical presentation of percentiles, max. 3h mean values, max. monthly mean values, 1/2h mean values have not been carried out any more, as a result of minor public interest. On the other hand the max. 1h mean values are graphically presented now, since they are a widely-used evaluation standard for short term stress.

Only a part of the provided air quality values has been used for graphical evaluation. The whole data set can be obtained from the overview tables of the annex.

## Verglichene Luftschadstoffe

Folgende Luftschadstoffe wurden miteinander verglichen:

$SO_2$, CO, NO, $NO_2$, $O_3$, Feinstaub ($PM_{10}$ und $PM_{2,5}$)

Anmerkung:
Schwebestaub (TSP) wurde nicht mehr ausgewertet, da die Messungen in den einzelnen Messgebieten mittlerweile durch $PM_{10}$-Messungen ersetzt worden sind.

## Pollutants compared

The following air pollutants have been compared:

$SO_2$, CO, NO, $NO_2$, $O_3$, fine particulates ($PM_{10}$ and $PM_{2,5}$)

Remark:
TSP has not been evaluated any more due to the fact that in most monitoring networks the TSP measurements are already replaced by monitoring of $PM_{10}$.

## Mehrjahresvergleich

Ein gutes Bild über die Entwicklung der Luftbelastung geben die Grafiken wieder. Dabei wurde von den am Luftgütevergleich teilnehmenden Städten die Entwicklung der Immissionsbelastung von 1993 bis 2017 aufgetragen.

Nach Analyse der Daten können folgende Aussagen getroffen werden:

1. Einige Städte und Regionen haben ein dichtes Messstellennetz bezogen auf die Größe des Immissionsgebietes. Beispiele: Athen, Berlin, Linz, Wien. Andererseits werden manchmal sehr große Gebiete durch eine geringe Zahl von Messstationen überwacht.
2. Aufgrund dieser Tatsache ist die Vergleichbarkeit einzelner Regionen begrenzt.
3. Die Belastungen (Jahresmittelwerte) einzelner Regionen und Städte haben sich einander sehr angenähert. Einige Städte/Regionen ragen allerdings noch deutlich heraus.
4. Bei einigen Städten kann man erkennen, dass in jenen Situationen, bei denen 1993 relativ hohe Immissionsbelastungen registriert wurden, seitdem oftmals eine deutlich sichtbare Besserung der Immissionssituation eingetreten ist, während in Städten mit niedriger Immissionsbelastung im Vergleich dazu kaum eine Änderung der Luftbelastung eingetreten ist.
5. Es zeigt sich, dass in den Städten und Regionen die Schwebstaub-(TSP)-Messungen abgeschaltet wurden. Diese Messungen wurden von Feinstaub ($PM_{10}$-Messungen und zunehmend PM2,5) abgelöst. TSP-Messungen werden daher seit einigen Jahren nicht mehr in die Auswertungen miteinbezogen.

## Comparison over a period of years

A good impression of the development of air pollutant stress can be received by the graphical evaluations. Therefor the immission stress for the area of each participating city and region from 1993 through 2017 are plotted.

The following statements can be given when analysing the data:

1. Some cities and regions have - according to the area - a high monitoring network density. Examples: Athens, Berlin, Linz, Vienna. On the other hand very large areas are monitored only by a small number of stations.
2. Due to this fact the comparability between regions is limited.
3. The range of the annual mean immission stress between the cities/regions has become lower and lower since 1993. But some cities/regions are still remarkably higher stressed than the rest.
4. In some cities it can be seen that in regions where pollution stress was relatively high in 1993, a significant decrease could be observed, while in cities with low immission stress compared to other cities and regions there was hardly any change of air pollution.
5. It can be shown that cities and regions do not monitor TSP anymore. These measurements were replaced by monitoring the pollutant $PM_{10}$ and more and more $PM_{2.5}$. This is the reason TSP measurements have not been included anymore for a couple of years in the present report.

6. Entwicklung der Langzeitbelastung - Jahresmittelwerte $SO_2$, Schwebestaub (TSP) (nur bis 2004!), NO, $NO_2$, CO, und $O_3$ gegenüber 1993; $PM_{10}$: gegenüber 2001; $PM_{2,5}$: gegenüber 2008:

$SO_2$: Alle Regionen *geringer* belastet

Staub: TSP-Messung in nahezu allen Regionen eingestellt. Wenn vorhanden, ist die Tendenz zu *geringeren* Belastungen (Vergleich nur bis 2004).

$PM_{10}$: tendenziell *geringer belastet*

$PM_{2,5}$: uneinheitlich, tendenziell gleich bleibend oder geringer belastet

NO: uneinheitlich, tendenziell gleich bleibend oder *geringer* belastet

$NO_2$: uneinheitlich, tendenziell *geringer* belastet oder gleich bleibend

CO: alle Regionen *geringer* belastet

$O_3$: Belastung tendenziell *gleich bleibend oder leicht erhöht*

6. Long term development of the air pollution stress - annual mean values of $SO_2$, TSP (only until 2004!), NO, $NO_2$, CO, $O_3$ in comparison with 1993; for $PM_{10}$: comparison with 2001; for $PM_{2,5}$: comparison with 2008:

$SO_2$: All regions *less* stressed

TSP: Nearly no TSP-measurements any more. If there is still monitoring, regions are *less* stressed in tendency (Comparison only up to 2004).

$PM_{10}$: trend is *lower* stressed

$PM_{2,5}$: non-uniform, trend constant or lower stressed

NO: non-uniform, trend of lower stress or constant

$NO_2$: non-uniform, trend is *lower* stressed or constant

CO: all regions trend of *lower* stress

$O_3$: trend is constant or *slightly higher* stressed

## ***Quellen für die Immissionsdaten  Sources for the immission data***

| | |
|---|---|
| Austria<br>**Bludenz, Dornbirn** | Umweltinstitut des Landes Vorarlberg<br>Montfortstrasse 4<br>A-6901 Bregenz<br>e-mail: *umweltinstitut@vorarlberg.at*<br>Homepage: *http://www.vorarlberg.at/umweltinstitut* |
| Austria<br>***Graz, Leoben, Donawitz*** | Amt der Steiermärkischen Landesregierung<br>Abt.15 Energie, Wohnbau, Technik (Ref. für Luftreinhaltung)<br>Landhausgasse 7<br>A-8010 Graz<br>e-mail: *abteilung15@stmk.gv.at*<br>Homepage: *http://www.umwelt.steiermark.at/* |
| Austria<br>***Innsbruck*** | Amt der Tiroler Landesregierung<br>Abt. Waldschutz - Luftgüte<br>Bürgerstrasse 36<br>A-6020 Innsbruck<br>Austria<br>e-mail: *walter.egger@tirol.gv.at*<br>Homepage: *http://www.tirol.gv.at/luft* |
| Austria<br>***Linz*** | Amt der Oö. Landesregierung<br>Direktion Umwelt und Wasserwirtschaft, Abt. Umweltschutz<br>Goethestrasse 86<br>A-4020 Linz<br>Austria<br>e-mail: *us-goethe.post@ooe.gv.at*<br>Homepage: *http://www.land-oberoesterreich.gv.at/125879.htm* |
| Austria<br>**Salzburg, Hallein** | Amt der Salzburger Landesregierung, Umweltschutz<br>Postfach 527<br>A-5010 Salzburg<br>e-mail: *alexander.kranabetter@salzburg.gv.at*<br>Homepage: *http://www.salzburg.gv.at/* |
| Austria<br>***St. Pölten*** | Magistrat der Landeshauptstadt St. Pölten<br>Referat Technischer Umweltschutz<br>Rossmarkt 6<br>A-3100 St. Pölten<br>e-mail: umweltschutz@st-poelten.gv.at<br>Homepage: http://www.noe.gv.at/Umwelt/Luft.html |
| Austria<br>***Vienna*** | Magistrat der Stadt Wien, Wiener Umweltschutzabteilung, MA 22<br>Bereich Luftmessnetz<br>Dresdner Strasse 45<br>A-1200 Wien<br>e-mail: roman.augustyn@wien.gv.at<br>Homepage: https://www.wien.gv.at/ma22-lgb/luftgi.htm |

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|---|---|
| Austria<br>***Klagenfurt, Villach*** | Amt der Kärntner Landesregierung<br>Abt. 8 Kompetenzzentrum Umwelt, Wasser und Naturschutz<br>Flatschacher Strasse 70<br>A-9020 Klagenfurt<br>e-mail: abt8.post@ktn.gv.at<br>Homepage: https://www.ktn.gv.at/Verwaltung/Amt-der-Kaerntner-Landesregierung/Abteilung-8/Schnell%20gefunden |
| Belgium<br>***Brussels*** | Bruxelles-Environnement<br>Avenue du Port 86C/3000<br>B-1000 – Bruxelles<br>Belgium<br>Homepage: http://www.environnement.brussels/ |
| *Bulgaria*<br>**Sofia** | Executive Environmental Agency<br>136 Tzar Boris III Blvd.<br>BG-1618 Sofia<br>Bulgaria<br>e-mail: fonmon@eea.government.bg<br>Homepage: - |
| Croatia<br>***Zagreb*** | Institute of Medical Research and Occupational Health<br>Ksaverska cesta 2<br>HR-10000 Zagreb<br>Croatia<br>e-mail: gpehnec@imi.hr<br>Homepage: www.imi.hr |
| Czech Republic<br>***Prague*** | Czech Hydrometeorological Institute<br>Na Sabatce 17<br>14306 Praha 4<br>Czech Republic<br>e-mail: vaclav.novak@chmi.cz<br>Homepage: http://www.chmi.cz |
| Denmark<br>***Copenhagen*** | Danish Centre for Environment and Energy<br>Department of Environmental Science<br>Frederiksborvej 399<br>DK-4000 Copenhagen<br>Denmark<br>Homepage: http://dce.au.dk/en/authorities/air/ |
| France<br>***Lyon*** | ATMO Auvergne Rhone-Alpes<br>3 Allée des Sorbiers - Activillage<br>F-69500 Bron<br>France<br>e-mail: ALorido@atmo-aura.fr<br>Homepage: www.air-rhonealpes.fr |

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|---|---|
| Germany<br>***Berlin*** | Senatsverwaltung für Umwelt, Verkehr und Klimaschutz<br>Abteilung II – Integrativer Umweltschutz,<br>Fachbereich IIA Atomaufsicht, Strahlenmesstelle, Luftgütemessungen<br>Brückenstrasse 6<br>D-10179 Berlin<br>Germany<br>e-mail: Paul.herenz@senuvk.berlin.de<br>Homepage: *http://www.berlin.de/sen/umwelt/luftqualitaet/index.shtml* |
| Germany<br>***Chemnitz, Dresden,***<br>***Leipzig*** | Sächsisches Landesamt für Umwelt, Landwirtschaft und Geologie<br>Söbrigener Str. 3a<br>D-01326 Dresden<br>e-mail: *Kornelia.Oelke@smul.sachsen.de*<br>Homepage: http://www.umwelt.sachsen.de/umwelt/luft/5693.htm |
| Germany<br>***Frankfurt, Wiesbaden*** | Hessisches Landesamt für Naturschutz, Umwelt und Geologie<br>Rheingaustraße 186<br>D-65203 Wiesbaden<br>Germany<br>e-mail: baerbel.oehme@hlnug.hessen.de / immission@hlnug.hessen.de<br>Homepage: http://www.hlnug.de |
| Germany<br>***Hamburg*** | Freie Hansestadt Hamburg,<br>Behörde für Gesundheit und Verbraucherschutz,<br>Institut für Hygiene und Umwelt, Abteilung f. Luftuntersuchungen<br>Marckmannstrasse 129b<br>D-20539 Hamburg<br>Germany<br>e-mail: *dagmar.goemer@hu.hamburg.de* / annemerike.fiedler@hu.hamburg.de<br>Homepage: http://www.luft.hamburg.de |
| Germany<br>***Karlsruhe, Mannheim***<br>**Stuttgart** | Landesanstalt für Umwelt, Messungen und Naturschutz<br>Baden-Württemberg, LUBW<br>Großoberfeld 3<br>D-76135 Karlsruhe<br>Germany<br>Homepage*: http://www.lubw.baden-wuerttemberg.de/* |
| Germany<br>***Munich*** | Bayerisches Landesamt für Umwelt<br>Bürgermeister-Ulrich-Straße 160<br>D-86179 Augsburg<br>Germany<br>e-mail: Andreas.Falb@lfu.bayern.de<br>Homepage: www.lfu.bayern.de |
| Germany<br>***Rhine Area, Ruhr Area*** | Landesamt für Natur, Umwelt und Verbraucherschutz Nordrhein-Westfalen<br>Wallneyer Strasse 6<br>D-45133 Essen<br>Germany<br>Homepage:<br>http://www.lanuv.nrw.de/umwelt/luft/immissionen/berichte-und-trends/ |

| | |
|---|---|
| Greece<br>***Athens, Thessaloniki*** | Ministry of the Environment & Energy<br>Dept. of Air Quality<br>Patission 147<br>GR-11251 Athens<br>Greece<br>e-mail: *air_quality@prv.ypeka.gr*<br>Homepage: www.ypeka.gr |
| Hungary<br>***Budapest*** | OMSZ (Hungarian Meteorological Service)<br>Air Quality Reference Centre<br>Kitaibel Pál u. 1<br>H-1024 Budapest<br>Hungary<br>e-mail: puskas.monika@met.hu / gyarmatine.e@met.hu<br>Homepage: www.met.hu www.levegominoseg.hu |
| Italy<br>***Milan*** | ARPA Lombardia - Agenzia Regionale per la Protezione dell'Ambiente della Lombardia<br>U.O. Centro Regionale Monitoraggio Qualità dell'Aria<br>Via Juvara 22<br>I-20159 Milano<br>Italy<br>e-mail: m.lazzarini@arpalombardia.it<br>Homepage:<br>http://www.arpalombardia.it/Pages/ARPA_Home_Page.aspx |
| Latvia<br>***Riga*** | Ministry of Environmental Protection and Regional Development of the Republic of Latvia<br>State limited Liability Company "Latvian Environment, Geology and Meteorology Centre" Air and Climate Division<br>165 Maskavas str.<br>LV-1019 Riga<br>Latvia<br>e-mail: Tamara.vasiljeva@lvgmc.lv<br>Homepage: http://www.lvgmc.lv |
| Luxemburg<br>***Luxemburg*** | Administration de l´Environnement, Département Air/Bruit<br>16, rue Eugène RUPPERT<br>L-2453 Luxemburg<br>e-mail: *Serge.solagna@aev.etat.lu*<br>Homepage: *http://www.environnement.public.lu/index.html* |
| The Netherlands<br>***Rotterdam*** | DCMR- Environmental Protection Agency<br>Parallelweg 1<br>NL- 3112 NA Schiedam<br>The Netherlands<br>e-mail: Ed.vandergaag@dcmr.nl<br>Homepage: *http://www.dcmr.nl* / www.luchtmeetnet.nl |
| Poland<br>***Warsaw*** | WIOS Warszawa<br>ul. Bartycka 110A<br>PL-00-716 Warszawa<br>Poland<br>e-mail: t.klech@wios.warszawa.pl<br>Homepage: *http://www.wios.warszawa.pl* |

| | |
|---|---|
| Portugal<br>***Lisbon*** | Comissão de Coordenação e Desenvolvimento<br>Regional de Lisboa e Vale do Tejo<br>Rua Alexandre Herculano, nº 37<br>PT-1250-048 Lisboa<br>Portugal<br>e-mail : ambiente@ccdr-lvt.pt<br>Homepage: http://qualar.apambiente.pt/ / http://www.ccdr-lvt.pt/pt/resultados-na-regiao-de-lisboa-e-vale-do-tejo---2015/9232.htm |
| Slovakia<br>**Bratislava** | Slovak Hydrometeorlogical Institute,<br>Department of Emission Monitoring & Air Quality<br>Jeséniova 17<br>SK-833 15 Bratislava<br>e-mail: viliam.patoprsty@shmu.sk<br>Homepage: http://www.shmu.sk |
| Spain<br>***Barcelona, Madrid*** | Ministerio de Agricutura, Alimentación y Medio Ambiente<br>Plaza San Juan de la Cruz s/N. 6$^{a}$ planta. A-602.1<br>E-28071 Madrid<br>e-mail: *iolivares@mapama.es*<br>Homepage: www.mapama.es |
| Sweden<br>***Gothenburg*** | Environmental Department Gothenburg<br>Karl Johansgatan 23<br>S-414 59 Göteborg<br>Sweden<br>e-mail: helene.olofson@miljo.goteborg.se<br>Homepage: *http://www.goteborg.se/luften* |
| Sweden<br>***Stockholm*** | Environment and Health Protection Administration, Slb–analys<br>Box 8136<br>S-10420 Stockholm<br>Sweden<br>e-mail: *boel@slb.nu*<br>Homepage: http://slb.nu/slb/rapporter/pdf8/slb2018_003.pdf |
| Switzerland<br>***Basel, Zurich*** | Bundesamt für Umwelt, Abteilung Luftreinhaltung und Chemikalien<br>CH-3003 Bern<br>Switzerland<br>e-mail: *rudolf.weber@bafu.admin.ch*<br>Homepage: *http://www.bafu.admin.ch/luft/index.html* |
| U.K.<br>***Belfast, Birmingham,***<br>***Bristol, Edinburgh,***<br>***Glasgow Leeds,***<br>***Liverpool, London*** | Department for Environment, Food and Rural Affairs<br>Nobel House<br>17 Smith Square<br>London SW 1P 3JR<br>Homepage: *http://www.airquality.co.uk* |

## Anzahl der Messstellen — Number of monitoring stations

| Country | Monitored Area | $SO_2$ | $PM_{10}$ | $PM_{2,5}$ | NO | $NO_2$ | CO | $O_3$ |
|---|---|---|---|---|---|---|---|---|
| Austria | Bludenz | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| | Dornbirn | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| | Graz | 3 | 3 | 3 | 6 | 6 | 4 | 2 |
| | Hallein | 2 | 1 | 1 | 2 | 2 | 1 | 1 |
| | Innsbruck | 1 | 2 | 1 | 3 | 3 | 1 | 3 |
| | Klagenfurt | 1 | 2 | 2 | 2 | 2 | 1 | 2 |
| | Region Leoben | 1 | 1 | 0 | 3 | 3 | 1 | 1 |
| | Linz | 4 | 6 | 6 | 6 | 6 | 5 | 3 |
| | Salzburg | 2 | 3 | 2 | 3 | 3 | 2 | 2 |
| | St. Pölten | 1 | 2 | 1 | 2 | 2 | 1 | 1 |
| | Vienna | 7 | 13 | 6 | 16 | 16 | 3 | 5 |
| | Villach | 0 | 1 | 0 | 1 | 1 | 0 | 0 |
| Belgium | Brussels (2016) | 6 | 6 | 5 | 9 | 9 | 6 | 6 |
| Bulgaria | Sofia (2015) | 6 | 7 | 2 | 6 | 6 | 4 | 5 |
| Croatia | Zagreb | 1 | 6 | 3 | 0 | 6 | 1 | 5 |
| Czech Republic | Prague | 2 | 17 | 8 | 14 | 14 | 2 | 6 |
| Denmark | Copenhagen | 1 | 3 | 3 | 3 | 3 | 2 | 2 |
| France | Lyon | 0 | 7 | 2 | 7 | 7 | 1 | 2 |
| Germany | Berlin | 2 | 11 | 5 | 16 | 16 | 2 | 7 |
| | Chemnitz | 0 | 2 | 1 | 2 | 2 | 0 | 1 |
| | Dresden | 1 | 4 | 3 | 4 | 4 | 0 | 3 |
| | Frankfurt | 1 | 3 | 2 | 3 | 3 | 1 | 2 |
| | Hamburg | 6 | 11 | 5 | 15 | 15 | 3 | 4 |
| | Karlsruhe | 0 | 2 | 2 | 2 | 2 | 1 | 1 |
| | Leipzig | 1 | 3 | 2 | 3 | 3 | 0 | 1 |
| | Mannheim | 1 | 2 | 2 | 2 | 2 | 1 | 1 |
| | Munich | 1 | 4 | 4 | 5 | 5 | 3 | 5 |
| | Rhine/Ruhr Area (2016) | 7 | 22 | 12 | 21 | 21 | 0 | 16 |
| | Stuttgart | 1 | 6 | 3 | 6 | 6 | 1 | 2 |
| | Wiesbaden | 1 | 3 | 2 | 3 | 3 | 1 | 1 |
| Greece | Athens | 6 | 11 | 6 | 14 | 14 | 6 | 13 |
| | Thessaloniki | 4 | 4 | 2 | 5 | 5 | 3 | 5 |
| Hungary | Budapest | 8 | 12 | 5 | 9 | 9 | 11 | 10 |
| Italy | Milan | 1 | 3 | 2 | 8 | 8 | 4 | 3 |
| Latvia | Riga | 2 | 2 | 1 | 0 | 2 | 0 | 2 |
| Luxemburg | Luxemburg | n.d. | n.d. | n.d. | n.d. | n.d. | n.d. | n.d. |
| The Netherlands | Rotterdam Rijnmond Area | 4 | 10 | 8 | 10 | 10 | 0 | 6 |
| Poland | Warsaw | 2 | 6 | 4 | 4 | 4 | 2 | 3 |
| Portugal | Lisbon | 2 | 3 | 1 | 5 | 5 | 4 | 4 |
| Slovakia | Bratislava (2015) | 1 | 4 | 0 | 3 | 3 | 1 | 2 |

| Country | Monitored Area | $SO_2$ | $PM_{10}$ | $PM_{2,5}$ | NO | $NO_2$ | CO | $O_3$ |
|---|---|---|---|---|---|---|---|---|
| Spain | Barcelona | 4 | 9 | 7 | 7 | 7 | 4 | 5 |
| | Madrid | 10 | 12 | 6 | 24 | 24 | 10 | 14 |
| Switzerland | Basel | 1 | 2 | 1 | 1 | 1 | 1 | 1 |
| | Zurich | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Sweden | Gothenburg | 0 | 3 | 2 | 3 | 5 | 0 | 2 |
| | Stockholm | 1 | 6 | 4 | 0 | 6 | 2 | 2 |
| U.K. | Belfast | 1 | 2 | 1 | 2 | 2 | 1 | 1 |
| | Birmingham | 0 | 2 | 3 | 2 | 2 | 0 | 2 |
| | Bristol | 0 | 1 | 1 | 1 | 1 | 0 | 1 |
| | Edinburgh | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Leeds | 1 | 2 | 2 | 2 | 2 | 1 | 1 |
| | Liverpool | 1 | 1 | 1 | 2 | 2 | 0 | 1 |
| | London | 3 | 4 | 8 | 9 | 9 | 2 | 7 |

n.d. no data

## Immissionsgebiete und Bevölkerung Immission area and population

| Country | Monitored Area | Immission area [km²] | Population |
|---|---|---|---|
| Austria | Bludenz | 30 | 14.005 |
| | Dornbirn | 121 | 47.420 |
| | Graz | 128 | 283.869 |
| | Hallein | 27 | 21.043 |
| | Innsbruck | 105 | 133.539 |
| | Klagenfurt | 120 | 99.790 |
| | Region Leoben | 108 | 24.915 |
| | Linz | 96 | 205.921 |
| | Salzburg | 66 | 154.820 |
| | St. Pölten | 108 | 54.879 |
| | Vienna | 415 | 1.867.582 |
| | Villach | 135 | 61.662 |
| Belgium | Brussels | 161 | 1.187.890 |
| Bulgaria | Sofia | 1 311 | 1.256.667 |
| Croatia | Zagreb | 641 | 802.338 |
| Czech Republic | Prague | 496 | 1.290.000 |
| Denmark | Copenhagen | 86 | 602.481 |
| France | Lyon | 48 | 513.275 |
| Germany | Berlin | 892 | 3.520.000 |
| | Chemnitz | 221 | 246.353 |
| | Dresden | 328 | 547.172 |
| | Frankfurt | 248 | 741.093 |
| | Hamburg | 755 | 1.860.000 |
| | Karlsruhe | 173 | 305.220 |
| | Leipzig | 298 | 571.088 |
| | Mannheim | 145 | 318.910 |
| | Munich | 310 | 1.530.000 |
| | Rhine/Ruhr Area | 5 770 | 9.963.000 |
| | Stuttgart | 207 | 612.968 |
| | Wiesbaden | 204 | 289.973 |
| Greece | Athens | 1 948 | 3.551.370 |
| | Thessaloniki | 129 | 794.330 |
| Hungary | Budapest | 525 | 1.752.704 |
| Italy | Milan | 182 | 1.351.562 |
| Latvia | Riga | 307 | 641.423 |
| Luxemburg | Luxemburg | 51 | 115.227 |
| The Netherlands | Rotterdam Rijnmond Area | 807 | 1.200.000 |
| Poland | Warsaw | 517 | 1.764.615 |
| Portugal | Lisbon | 85 | 547.733 |

| Country | Monitored Area | Immission area [km²] | Population |
|---|---|---|---|
| Slovakia | Bratislava | 368 | 422.932 |
| Spain | Barcelona | 101 | 1.620.809 |
| | Madrid | 604 | 3.182.981 |
| Switzerland | Basel | 557 | 501.285 |
| | Zurich | 1 086 | 1.185.214 |
| Sweden | Gothenburg | 1 031 | 564.039 |
| | Stockholm (inner city) | 48 | 923.516 |
| U.K. | Belfast | 115 | 339.600 |
| | Birmingham | 268 | 1.101.360 |
| | Bristol | 110 | 454.213 |
| | Edinburgh | 262 | 492.680 |
| | Glasgow | 176 | 599.650 |
| | Leeds | 552 | 766.399 |
| | Liverpool | 112 | 473.073 |
| | London | 1 572 | 8.787.892 |

# Übersicht über die Entwicklung der Schadstoffbelastungen 1993–2017[1)]

Beurteilungsbasis: Jahresmittelwerte über alle Stationen einer Region

***Overview over the development of the stress of air pollutants from 1993 through 2017*** [1)]

*based on the mean of all annual mean values of a region*

| | $SO_2$ | | |
|---|---|---|---|
| | Stress in 1993[2)] | Trend last 5 years | Stress in 2017 |
| Linz | | == | |
| Bludenz | | n.d. | n.d. |
| Dornbirn | | | n.d. |
| Graz | | == | |
| Hallein | | == | |
| Innsbruck | | == | |
| Klagenfurt | | == | |
| Region Leoben | | == | |
| Salzburg | | == | |
| St. Pölten | 1994 | == | |
| Vienna | | == | |
| Villach | | n.d. | n.d. |
| Athens | 2007 | == | |
| Barcelona | 1994 | == | |
| Basel | | == | |
| Belfast | | == | |
| Berlin | | == | |
| Birmingham | | n.d. | n.d |
| Bratislava | 2013 | n.d. | n.d |
| Bristol | | n.d. | n.d |
| Brussels | 1995 | n.d. | n.d |
| Budapest | 1996 | == | |
| Chemnitz | | n.d. | n.d. |
| Copenhagen | | == | |
| Dresden | | == | |
| Edinburgh | | == | |
| Frankfurt | | == | |

| | $SO_2$ | | |
|---|---|---|---|
| | Stress in 1993[2)] | Trend last 5 years | Stress in 2017 |
| Glasgow | n.d. | n.d. | n.d. |
| Gothenburg | | n.d. | n.d. |
| Hamburg | | == | |
| Karlsruhe | | n.d. | n.d. |
| Leeds | | == | |
| Leipzig | | == | |
| Lisbon | 1997 | == | |
| Liverpool | | == | |
| London | | == | |
| Luxemburg | 1996 | n.d. | n.d. |
| Lyon | | n.d. | n.d. |
| Madrid | 1994 | ↗ | |
| Mannheim | | == | |
| Milan | | ↘ | |
| Munich | | ↘ | |
| Prague | 2007 | == | |
| Riga | 1999 | == | |
| Rhine/Ruhr Area | | n.d. | n.d. |
| Rotterdam | 1995 | n.d. | |
| Sofia | 1999 | n.d. | n.d. |
| Stockholm | | == | |
| Stuttgart | 2007 | == | |
| Thessaloniki | 2007 | == | |
| Warsaw | 1995 | ↘ | |
| Wiesbaden | | == | |
| Zagreb | | == | |
| Zurich | | == | |

Legend:

- Slightly stressed ($SO_2$ < 15 µg/m³)
- Medium stressed ($SO_2$ < 30 µg/m³)
- Highly stressed ($SO_2$ > 30 µg/m³)

n.d. no data

[1)] TSP measurements are mostly replaced by $PM_{10}$ monitoring (see page 24). So no comparison of TSP has been carried out since 2004. If you are interested in TSP-values until 2005 please refer to the report of 2005 (available via internet, URL http://www.linz.at/umwelt/4109.asp)

[2)] … or year when data were primarily available

| | NO | | |
|---|---|---|---|
| | Stress in 1993[3)] | Trend last 5 years | Stress in 2017 |
| Linz | | == | |
| Bludenz | 1994 | == | |
| Dornbirn | 1994 | == | |
| Graz | 1994 | ↗ | |
| Hallein | 2003 | ↘ | |
| Innsbruck | | ↘ | |
| Klagenfurt | | == | |
| Region Leoben | | == | |
| Salzburg | 2003 | ↘ | |
| St. Pölten | 1994 | == | |
| Vienna | 1994 | == | |
| Villach | | == | |
| Athens | 2007 | n.d. | |
| Barcelona | 1994 | == | |
| Basel | | == | |
| Belfast | | ↑ | |
| Berlin | | == | |
| Birmingham | | == | |
| Bratislava | 2013 | n.d. | n.d. |
| Bristol | | == | |
| Brussels | 1995 | n.d. | n.d. |
| Budapest | 2003 | == | |
| Chemnitz | | ↓ | |
| Copenhagen | 1994 | n.d. | n.d. |
| Dresden | | ↘ | |
| Edinburgh | | == | |
| Frankfurt | | ↘ | |

| | NO | | |
|---|---|---|---|
| | Stress in 1993[3)] | Trend last 5 years | Stress in 2017 |
| Glasgow | 2014 | ↘ | |
| Gothenburg | | n.d. | n.d. |
| Hamburg | | ↘ | |
| Karlsruhe | | ↘ | |
| Leeds | | == | |
| Leipzig | | == | |
| Lisbon | 2001 | ↗ | |
| Liverpool | | == | |
| London | | == | |
| Luxemburg | 1996 | n.d. | n.d. |
| Lyon | | == | |
| Madrid | 1999 | == | |
| Mannheim | | ↗ | |
| Milan | 1994 | ↗ | |
| Munich | | ↘ | |
| Prague | 2007 | == | |
| Riga | 2007 | n.d. | n.d. |
| Rhine/Ruhr Area | | n.d. | n.d. |
| Rotterdam | 1995 | n.d. | |
| Sofia | 2003 | n.d. | n.d. |
| Stockholm | 1994 | n.d. | n.d. |
| Stuttgart | 2008 | ↑ | |
| Thessaloniki | 2007 | == | |
| Warsaw | 2001 | ↗ | |
| Wiesbaden | | ↗ | |
| Zagreb | n.d. | n.d. | n.d. |
| Zurich | | == | |

Legend:

- Slightly stressed (NO < 30 µg/m³)
- Medium stressed (NO < 60 µg/m³)
- Highly stressed (NO > 60 µg/m³)
- n.d. no data

↘ Slight stress decrease
== Constant stress
↗ Slight stress increase
↑ Strong stress increase
↓ Strong stress decrease

[3] If values of 2002 are not available, data of the year mentioned are compared (for Austrian Towns), … or year when data were primarily available

| | $NO_2$ | | |
|---|---|---|---|
| | Stress in 1993[4)] | Trend last 5 years | Stress in 2017 |
| Linz | | == | |
| Bludenz | | == | |
| Dornbirn | | == | |
| Graz | | == | |
| Hallein | | ↘ | |
| Innsbruck | | 🡻 | |
| Klagenfurt | | ↘ | |
| Region Leoben | | == | |
| Salzburg | | ↘ | |
| St. Pölten | 1994 | == | |
| Vienna | | ↘ | |
| Villach | | == | |
| Athens | 2007 | n.d. | |
| Barcelona | 1994 | == | |
| Basel | | ↘ | |
| Belfast | | 🡹 | |
| Berlin | | == | |
| Birmingham | | ↘ | |
| Bratislava | 2013 | n.d. | n.d. |
| Bristol | | ↘ | |
| Brussels | 1995 | n.d. | n.d. |
| Budapest | 2003 | == | |
| Chemnitz | | 🡻 | |
| Copenhagen | 1995 | 🡻 | |
| Dresden | | ↘ | |
| Edinburgh | | == | |
| Frankfurt | | ↘ | |

| | $NO_2$ | | |
|---|---|---|---|
| | Stress in 1993[4)] | Trend last 5 years | Stress in 2017 |
| Glasgow | 2014 | ↘ | |
| Gothenburg | | == | |
| Hamburg | | == | |
| Karlsruhe | | ↘ | |
| Leeds | | ↘ | |
| Leipzig | | == | |
| Lisbon | 1997 | == | |
| Liverpool | | == | |
| London | | ↘ | |
| Luxemburg | 1996 | n.d. | n.d. |
| Lyon | | == | |
| Madrid | 1994 | ↗ | |
| Mannheim | | == | |
| Milan | 1994 | ↗ | |
| Munich | | ↘ | |
| Prague | 2007 | ↘ | |
| Riga | 1999 | ↘ | |
| Rhine/Ruhr Area | | n.d. | n.d. |
| Rotterdam | 1995 | n.d. | |
| Sofia | 1999 | n.d. | n.d. |
| Stockholm | 1994 | ↘ | |
| Stuttgart | 2007 | ↗ | |
| Thessaloniki | 2007 | ↗ | |
| Warsaw | 1995 | ↗ | |
| Wiesbaden | | ↘ | |
| Zagreb | 1994 | == | |
| Zurich | | ↘ | |

Legend:

- Slightly stressed ($NO_2$ < 30 µg/m³)
- Medium stressed ($NO_2$ < 60 µg/m³)
- Highly stressed ($NO_2$ > 60 µg/m³)

n.d. no data

↘ Slight stress decrease
== Constant stress
↗ Slight stress increase
🡹 Strong stress increase
🡻 Strong stress decrease

[4] If values of 2002 are not available, data of the year mentioned are compared (for Austrian Towns), … or year when data were primarily available

| | CO | | |
|---|---|---|---|
| | Stress in 1993[5)] | Trend last 5 years | Stress in 2017 |
| Linz | | == | |
| Bludenz | - | n.d. | n.d. |
| Dornbirn | 1998 | n.d. | n.d. |
| Graz | | == | |
| Hallein | | ↘ | |
| Innsbruck | | ↘ | |
| Klagenfurt | | == | |
| Region Leoben | | ↘ | |
| Salzburg | | ↘ | |
| St. Pölten | 1994 | ↘ | |
| Vienna | | ↘ | |
| Villach | | n.d. | n.d. |
| Athens | 2007 | ↘ | |
| Barcelona | | ↘ | |
| Basel | | n.d. | n.d. |
| Belfast | | ↘ | |
| Berlin | | ↘ | |
| Birmingham | | n.d. | n.d. |
| Bratislava | | n.d. | n.d. |
| Bristol | | n.d. | n.d. |
| Brussels | | n.d. | n.d. |
| Budapest | | == | |
| Chemnitz | | n.d. | n.d. |
| Copenhagen | | ↘ | |
| Dresden | | n.d. | n.d. |
| Edinburgh | | ↘ | |
| Frankfurt | | == | |

| | CO | | |
|---|---|---|---|
| | Stress in 1993[5)] | Trend last 5 years | Stress in 2017 |
| Glasgow | n.d. | n.d. | n.d. |
| Gothenburg | | n.d. | n.d. |
| Hamburg | | == | |
| Karlsruhe | | ↘ | |
| Leeds | | ↗ | |
| Leipzig | | n.d. | n.d. |
| Lisbon | | ↗ | |
| Liverpool | | n.d. | n.d. |
| London | | == | |
| Luxemburg | 1996 | n.d. | n.d. |
| Lyon | 1994 | ↘ | |
| Madrid | 1994 | == | |
| Mannheim | | ↘ | |
| Milan | 1994 | ↘ | |
| Munich | | == | |
| Prague | 2007 | ↘ | |
| Riga | 2002 | n.d. | n.d. |
| Rhine/Ruhr Area | | n.d. | n.d. |
| Rotterdam Rijnmond | 2003 | n.d. | n.d. |
| Sofia | 1999 | n.d. | n.d. |
| Stockholm | 1994 | == | |
| Stuttgart | 2007 | ↘ | |
| Thessaloniki | 2007 | == | |
| Warsaw | 1995 | == | |
| Wiesbaden | | ↘ | |
| Zagreb | 2005 | == | |
| Zurich | | == | |

Legend:

- Slightly stressed (CO < 1000 µg/m³)
- Medium stressed (CO < 2000µg/m³)
- Highly stressed (CO > 2000µg/m³)
- n.d. no data

↘ Slight stress decrease
== Constant stress
↗ Slight stress increase
↑ Strong stress increase
↓ Strong stress decrease

[5] If values of 2002 are not available, data of the year mentioned are compared (for Austrian Towns), … or year when data were primarily available

| | $O_3$ | | |
|---|---|---|---|
| | Stress in 1993[6] | Trend last 5 years | Stress in 2017 |
| Linz | | == | |
| Bludenz | 1994 | ↗ | |
| Dornbirn | 2015 | n.d. | |
| Graz | | == | |
| Hallein | | ↗ | |
| Innsbruck | | ↗ | |
| Klagenfurt | | == | |
| Region Leoben | | == | |
| Salzburg | | ↗ | |
| St. Pölten | 1994 | == | |
| Vienna | | == | |
| Villach | | n.d. | n.d. |
| Athens | 2007 | n.d. | |
| Barcelona | | == | |
| Basel | | == | |
| Belfast | | == | |
| Berlin | | == | |
| Birmingham | | == | |
| Bratislava | | n.d. | n.d. |
| Bristol | | == | |
| Brussels | | n.d. | n.d. |
| Budapest | | == | |
| Chemnitz | | == | |
| Copenhagen | | == | |
| Dresden | | ↗ | |
| Edinburgh | | ↘ | |
| Frankfurt | | == | |

| | $O_3$ | | |
|---|---|---|---|
| | Stress in 1993 [2)] | Trend last 5 years | Stress in 2017 |
| Glasgow | 2014 | ↘ | |
| Gothenburg | | ↘ | |
| Hamburg | | ↘ | |
| Karlsruhe | | == | |
| Leeds | | ↘ | |
| Leipzig | | == | |
| Lisbon | 1997 | ↘ | |
| Liverpool | | == | |
| London | | ↘ | |
| Luxemburg | 1996 | n.d. | n.d. |
| Lyon | 1994 | == | |
| Madrid | 1994 | ↘ | |
| Mannheim | | == | |
| Milan | 1994 | ↗ | |
| Munich | | ↗ | |
| Prague | 2007 | ↗ | |
| Riga | 1999 | ↗ | |
| Rhine/Ruhr Area | | n.d. | n.d. |
| Rotterdam Rijnmond | 1995 | n.d. | n.d. |
| Sofia | 1999 | n.d. | n.d. |
| Stockholm | | ↘ | |
| Stuttgart | 2007 | ↗ | |
| Thessaloniki | 2007 | n.d. | |
| Warsaw | 1995 | ↘ | |
| Wiesbaden | | ↘ | |
| Zagreb | 1999 | ↗ | |
| Zurich | | == | |

Legend:

- Slightly stressed ($O_3$ < 30 µg/m³)
- Medium stressed ($O_3$ < 60 µg/m³)
- Highly stressed ($O_3$ > 60 µg/m³)
- n.d. no data

↘ Slight stress decrease
== Constant stress
↗ Slight stress increase
↑ Strong stress increase
↓ Strong stress decrease

[6] If values of 2002 are not available, data of the year mentioned are compared (for Austrian Towns), … or year when data were primarily available

| | PM10 | | |
|---|---|---|---|
| | Stress in 2002 [7] | Stress in 2017 | Trend 2013-2017 |
| Linz | | | ↘ |
| Bludenz | 2005 | | ↘ |
| Dornbirn | | | ↘ |
| Graz | | | == |
| Hallein | | | 🡻 |
| Innsbruck | | | ↘ |
| Klagenfurt | | | == |
| Region Leoben | 2003 | | == |
| Salzburg | | | ↘ |
| St. Pölten | | | ↘ |
| Vienna | | | ↘ |
| Villach | | | == |
| Athens | 2007 | | ↘ |
| Barcelona | | | == |
| Basel | | | == |
| Belfast | | | == |
| Berlin | | | == |
| Birmingham | | | ↘ |
| Bratislava | 2013 | n.d. | n.d. |
| Bristol | | | ↘ |
| Brussels | | n.d. | n.d. |
| Budapest | 2004 | | == |
| Chemnitz | | | ↘ |
| Copenhagen | | | ↘ |
| Dresden | | | ↘ |
| Edinburgh | | | ↘ |
| Frankfurt | | | ↘ |

| | PM10 | | |
|---|---|---|---|
| | Stress in 2002 [5] | Stress in 2017 | Trend 2013-2017 |
| Glasgow | 2014 | | n.d. |
| Gothenburg | | | == |
| Hamburg | | | ↘ |
| Karlsruhe | | | ↘ |
| Leeds | | | ↘ |
| Leipzig | | | ↘ |
| Lisbon | | | ↗ |
| Liverpool | | | == |
| London | | | ↘ |
| Luxemburg | | n.d. | n.d. |
| Lyon | | | == |
| Madrid | | | == |
| Mannheim | | | == |
| Milan | | | == |
| Munich | | | == |
| Prague | 2007 | | ↘ |
| Riga | | | ↘ |
| Rhine/Ruhr Area | | n.d. | n.d. |
| Rotterdam | | | n.d. |
| Sofia | | n.d. | n.d. |
| Stockholm | | | ↘ |
| Stuttgart | 2007 | | == |
| Thessaloniki | 2007 | | n.d. |
| Warsaw | | | == |
| Wiesbaden | | | == |
| Zagreb | | | == |
| Zurich | | | == |

Legend:

- Slightly stressed ($PM_{10}$ < 20 µg/m³)
- Medium stressed ($PM_{10}$ < 40 µg/m³)
- Highly stressed ($PM_{10}$ ≥ 40 µg/m³)
- n.d. No data

↘ Slight stress decrease
== Constant stress
↗ Slight stress increase
🡹 Strong stress increase
🡻 Strong stress decrease

[7] If values of 2002 are not available, data of the year mentioned are compared.

| | $PM_{2,5}$ | | |
|---|---|---|---|
| | Stress in 2008 [8] | Stress in 2017 | Trend 2013-2017 |
| Linz | | | ↘ |
| Bludenz | n.d. | n.d. | n.d. |
| Dornbirn | 2013 | | ↘ |
| Graz | | | == |
| Hallein | 2014 | | n.d. |
| Innsbruck | | | ↘ |
| Klagenfurt | | | == |
| Region Leoben | n.d. | n.d. | n.d. |
| Salzburg | | | ↘ |
| St. Pölten | | | ↘ |
| Vienna | 2010 | | ↘ |
| Villach | | n.d. | n.d. |
| Athens | | | n.d. |
| Barcelona | | | == |
| Basel | | | ↘ |
| Belfast | 2009 | | ↘ |
| Berlin | | | == |
| Birmingham | 2009 | | ↘ |
| Bratislava | n.d. | n.d. | n.d. |
| Bristol | 2009 | | == |
| Brussels | | n.d. | n.d. |
| Budapest | 2009 | | ↘ |
| Chemnitz | | | ↘ |
| Copenhagen | | | ↘ |
| Dresden | | | ↘ |
| Edinburgh | 2009 | | == |
| Frankfurt | 2010 | | ↘ |

| | $PM_{2,5}$ | | |
|---|---|---|---|
| | Stress in 2008 [5] | Stress in 2017 | Trend 2013-2017 |
| Glasgow | 2014 | | n.d. |
| Gothenburg | | | n.d. |
| Hamburg | | | == |
| Karlsruhe | 2011 | | == |
| Leeds | 2009 | | ↘ |
| Leipzig | | | ↘ |
| Lisbon | | | == |
| Liverpool | 2009 | | ↘ |
| London | | | ↘ |
| Luxemburg | n.d. | n.d. | n.d. |
| Lyon | | | ↘ |
| Madrid | | | == |
| Mannheim | 2011 | | ↘ |
| Milan | | | == |
| Munich | 2009 | | == |
| Prague | | | == |
| Riga | | | ↘ |
| Rhine/Ruhr Area | | | n.d. |
| Rotterdam | | | n.d. |
| Sofia | | | n.d. |
| Stockholm | | | == |
| Stuttgart | 2011 | | == |
| Thessaloniki | 2017 | | n.d. |
| Warsaw | | | ↘ |
| Wiesbaden | | | ↘ |
| Zagreb | | | == |
| Zurich | | | ↘ |

Legend:

- Slightly stressed ($PM_{2.5}$ < 10 µg/m³)
- Medium stressed ($PM_{2.5}$ < 20 µg/m³)
- Highly stressed ($PM_{2.5}$ ≥ 20 µg/m³)
- n.d. No data

↘ Slight stress decrease
== Constant stress
↗ Slight stress increase
↑ Strong stress increase
↓ Strong stress decrease

[8] If values of 2002 are not available, data of the year mentioned are compared.

## Anzahl der Tage mit Überschreitungen des $PM_{10}$-Tagesmittelwertes von 50 µg/m³ in den Jahren 2001 bis 2017 [9)]

Beurteilungsbasis: Anzahl der Überschreitungen an der höchstbelasteten Station eines Messgebietes (einschließlich verkehrsbelasteter Stationen) [10)]

### *Number of days with exceedances of the $PM_{10}$ daily mean of 50 µg/m³ 2001 through 2017 [11)]*

*based on the number of exceedances at the peak stressed monitoring station of a region (including traffic stressed stations) [12)]*

| | **$PM_{10}$** number of days >50 µg/m³ | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| Linz | 62 | 66 | 80 | 46 | 68 | 71 | 41 | 47 | 30 | 45 | 45 | 25 | 33 | 27 | 23 | 9 | 25 |
| Bludenz | - | - | - | - | 13 | 45 | 16 | 13 | 12 | 17 | 14 | 11 | 12 | 2 | 1 | 5 | 6 |
| Dornbirn | - | - | 38 | 21 | 22 | 40 | 18 | 20 | 14 | 21 | 13 | 10 | 11 | 3 | 2 | 1 | 5 |
| Graz | 159 | 131 | 131 | 117 | 127 | 113 | 76 | 73 | 57 | 69 | 78 | 49 | 44 | 27 | 39 | 39 | 54 |
| Hallein | - | 28 | 49 | 26 | 27 | 50 | 20 | 13 | 20 | 29 | 19 | 18 | 27 | 6 | 1 | 3 | 12 |
| Innsbruck | - | 50 | 61 | 52 | 55 | 83 | 46 | 28 | 26 | 29 | 46 | 23 | 25 | 8 | 18 | 20 | 5 |
| Klagenfurt | 36 | 58 | 74 | 80 | 82 | 79 | 42 | 33 | 34 | 43 | 46 | 27 | 21 | 0 | 17 | 17 | 23 |
| Region Leoben | 26 | 7 | 42 | 29 | 36 | 49 | 36 | 25 | 19 | 20 | 31 | 3 | 4 | 0 | 1 | 1 | 3 |
| Salzburg | - | 34 | 62 | 34 | 39 | 56 | 25 | 34 | 37 | 41 | 31 | 17 | 24 | 10 | 6 | 5 | 20 |
| St. Pölten | - | - | 58 | 79 | 87 | 57 | 23 | 20 | 23 | 38 | 39 | 22 | 21 | 13 | 6 | 6 | 19 |
| Vienna | - | 57 | 95 | 54 | 92 | 108 | 48 | 39 | 40 | 87 | 62 | 35 | 35 | 27 | 14 | 11 | 23 |
| Villach | - | 24 | 35 | 25 | 29 | 45 | 10 | 9 | 17 | 7 | 18 | 2 | 0 | 0 | 5 | 3 | 3 |

\- No Data

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9) Bei den Werten wurden bereits die Korrekturfaktoren berücksichtigt. Diese sind aus den Tabellen im Anhang zu ersehen.

10) Nähere Details zur Unterscheidung zwischen verkehrsbelasteten Stationen und sonstigen urbanen Messstationen siehe Tabellen am Ende des Berichtes bzw. diverse grafische Auswertungen.

11) For the number of exceedances the correction factors already have been considered. One can refer to the tables at the end of the report.

12) For details in order to distinguish between traffic stressed stations and other urban monitoring stations see tables at the end of the report and the graphical evaluations.

| | **$PM_{10}$** number of days >50 µg/m³ | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| Athens | - | - | - | - | - | - | 178 | 163 | 122 | 99 | 101 | 40 | - | - | 89 | 72 | 74 |
| Barcelona | - | 86 | - | 47 | 74 | 100 | 97 | 72 | 94 | 23 | 43 | 42 | 7 | 19 | 22 | 13 | 17 |
| Basel | 11 | 22 | 23 | 16 | 15 | 24 | 12 | 6 | 10 | 11 | 8 | 4 | 5 | 2 | 4 | 0 | 5 |
| Belfast | 16 | 7 | 33 | 8 | 5 | 7 | 5 | 7 | 3 | 10 | 10 | 7 | 5 | 5 | 4 | 7 | 2 |
| Berlin | 60 | 91 | 117 | 62 | 74 | 71 | 30 | 24 | 39 | 46 | 54 | 31 | 55 | 48 | 36 | 18 | 28 |
| Birmingham | 2 | 1 | 5 | 4 | 5 | 9 | 18 | 10 | 7 | 8 | 18 | 17 | 9 | 8 | 6 | 6 | 4 |
| Bratislava | - | - | - | - | - | - | - | - | - | - | - | - | 60 | 41 | 40 | - | - |
| Bristol | 7 | 1 | 9 | 12 | 4 | 6 | 15 | 15 | 7 | 4 | 12 | 8 | 2 | 4 | 3 | 5 | 2 |
| Brussels | 52 | 153 | 163 | 127 | 67 | 56 | 56 | 66 | 66 | 45 | 87 | 55 | - | 33 | 19 | 16 | - |
| Budapest | - | - | - | 178 | 160 | 162 | 117 | 96 | 71 | 84 | 86 | 60 | 64 | 60 | 105 | 46 | 48 |
| Chemnitz | 41 | 20 | 35 | 12 | 59 | 65 | 27 | 19 | 32 | 34 | 39 | 28 | 32 | 36 | 11 | 2 | 7 |
| Copenhagen | - | 59 | 91 | - | - | 68 | 60 | 59 | 59 | 18 | 46 | 29 | 14 | 26 | 22 | 11 | 15 |
| Dresden | 53 | 36 | 53 | 27 | 78 | 49 | 27 | 35 | 42 | 40 | 46 | 22 | 34 | 36 | 21 | 10 | 19 |
| Edinburgh | 3 | 8 | 2 | 0 | 3 | 2 | 6 | 0 | 3 | 0 | 0 | 2 | 3 | 0 | 0 | 0 | 0 |
| Frankfurt | 42 | 44 | 51 | 19 | 48 | 24 | 33 | 22 | 36 | 26 | 42 | 19 | 21 | 17 | 18 | 7 | 16 |
| Glasgow | - | - | - | - | - | - | - | - | - | - | - | - | - | 3 | 0 | 0 | 1 |
| Gothenburg | 1 | 10 | 12 | 2 | 7 | 13 | 3 | 4 | 0 | 0 | 21 | 11 | 17 | 12 | 15 | 13 | 15 |
| Hamburg | 33 | 43 | 62 | 20 | 45 | 31 | 26 | 18 | 15 | 26 | 46 | 12 | 11 | 26 | 18 | 7 | 16 |
| Karlsruhe | 6 | 33 | 33 | 25 | 22 | 34 | 16 | 10 | 20 | 23 | 18 | 8 | 13 | 12 | 7 | 1 | 11 |
| Leeds | 3 | 3 | 9 | 4 | 15 | 10 | 11 | 8 | 16 | 11 | 26 | 18 | 4 | 15 | 13 | 5 | 6 |
| Leipzig | 109 | 63 | 92 | 49 | 82 | 74 | 40 | 40 | 51 | 49 | 69 | 39 | 41 | 43 | 26 | 21 | 21 |
| London | 28 | 29 | 61 | 107 | 121 | 157 | 124 | 157 | 47 | 22 | 57 | 23 | 28 | 14 | 10 | 14 | 6 |
| Lisbon | 230 | 222 | 183 | 147 | 180 | 145 | 154 | 82 | 92 | 90 | 113 | - | 38 | 31 | 66 | 20 | 46 |

- No Data

| | **$PM_{10}$** number of days >50 µg/m³ | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| Liverpool | 4 | 2 | 1 | 14 | 5 | 8 | 11 | 12 | 6 | 2 | 8 | 4 | 6 | 6 | 1 | 0 | 5 |
| Lyon | - | 83 | 124 | 71 | 153 | - | 142 | 79 | 39 | 81 | 93 | 69 | 29 | 24 | 39 | 32 | 20 |
| Madrid | - | 98 | - | 121 | 159 | 181 | 123 | 65 | 35 | 18 | 41 | 22 | 8 | 12 | 16 | 19 | 13 |
| Mannheim | 25 | 44 | 36 | 41 | 43 | 20 | 26 | 12 | 23 | 24 | 27 | 23 | 17 | 17 | 15 | 1 | 12 |
| Milan | 148 | 177 | 137 | 139 | 152 | 149 | 132 | 115 | 106 | 85 | 132 | 107 | 81 | 68 | 101 | 73 | 97 |
| Munich | 64 | 75 | 123 | 59 | 107 | 92 | 53 | 60 | 52 | 65 | 48 | 27 | 39 | 16 | 13 | 7 | 19 |
| Prague | - | - | - | - | - | - | 132 | 84 | 48 | 71 | 68 | 73 | 55 | 59 | 32 | 27 | 48 |
| Riga | 57 | 74 | 105 | 160 | 88 | 244 | 148 | 126 | 46 | 31 | 11 | 25 | 48 | 39 | 27 | 24 | 30 |
| Rhine/Ruhr Area | 40 | 48 | 58 | 38 | 21 | - | 71 | 68 | 70 | 54 | 62 | 41 | - | 24 | 31 | 10 | - |
| Rotterdam Rijmond Area | 98 | 103 | 123 | 54 | 30 | 31 | 26 | 12 | 12 | 12 | - | 16 | 5 | - | - | - | 13 |
| Sofia | - | - | 225 | 178 | 162 | - | 195 | 199 | 106 | 134 | 134 | - | 110 | 105 | 74 | - | - |
| Stockholm | 101 | 113 | 80 | 80 | 80 | 74 | 75 | 77 | 65 | 46 | 58 | 39 | 52 | 36 | 19 | 22 | 31 |
| Stuttgart | - | - | - | - | - | - | 110 | 14 | 19 | 40 | 42 | 15 | 27 | 19 | 3 | 63 | 45 |
| Thessaloniki | - | - | - | - | - | - | 152 | 155 | 80 | 96 | 87 | 92 | - | - | 22 | 61 | 51 |
| Warsaw | - | - | 89 | 184 | 162 | 192 | 136 | 133 | 148 | 151 | 129 | 90 | 75 | 84 | 80 | 85 | 87 |
| Wiesbaden | 15 | 35 | 19 | 11 | 18 | 32 | 20 | 8 | 13 | 5 | 25 | 8 | 11 | 8 | 8 | 2 | 7 |
| Zagreb | - | - | - | 75 | 89 | 134 | 108 | 116 | 61 | 73 | 101 | 87 | - | 92 | 64 | 75 | 61 |
| Zurich | 18 | 23 | 38 | 23 | 15 | 39 | 17 | 11 | 11 | 12 | 11 | 7 | 11 | 3 | 5 | 2 | 7 |

- No Data

## Anzahl der Überschreitungen des 1h-Grenzwertes für $NO_2$ von 200 µg/m³ in den Jahren 2004 bis 2017

Beurteilungsbasis: Anzahl der Überschreitungen an der höchstbelasteten Station eines Messgebietes

***Number exceedances of the $NO_2$ 1h mean value of 200 µg/m³ in 2004 through 2017***
*based on the number of exceedances at the peak stressed monitoring station of a region*

| | **$NO_2$** number of 1 h mean values >200 µg/m³ | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| Linz | 0 | 1 | 4 | 4 | 1 | 5 | 3 | 6 | 7 | 15 | 1 | 4 | 5 | 1 |
| Bludenz | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dornbirn | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Graz | 0 | 0 | 4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hallein | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Innsbruck | 0 | 0 | 4 | 0 | 0 | 1 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 1 |
| Klagenfurt | - | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Region Leoben | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Salzburg | 0 | 0 | 2 | 1 | 2 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| St. Pölten | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | - | 1 | 0 | 0 |
| Vienna | 8 | 24 | 26 | 11 | 17 | 4 | 7 | 5 | 0 | 0 | 0 | 3 | 0 | 0 |
| Villach | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Athens | - | - | - | 192 | 56 | 35 | 8 | 1 | 0 | - | - | 1 | 5 | 23 |
| Barcelona | 13 | - | 18 | 22 | 13 | 9 | 0 | 12 | 5 | 3 | 1 | 2 | 4 | 4 |
| Basel | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

- No Data

| | $NO_2$ number of 1 h mean values >200 µg/m³ | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| Belfast | 0 | 4 | 5 | 0 | 3 | 0 | 0 | 0 | 0 | 2 | 5 | 7 | 10 | 2 |
| Berlin | - | - | - | 6 | 0 | 8 | 6 | 3 | 5 | 8 | 3 | 1 | 3 | 2 |
| Birmingham | 0 | 2 | 0 | 0 | 3 | 0 | 7 | 4 | 0 | 1 | 5 | 1 | 6 | 0 |
| Bratislava | - | - | - | - | - | - | - | - | - | 2 | 0 | 0 | - | - |
| Bristol | 0 | 22 | 13 | 8 | 5 | 11 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brussels | 24 | 90 | 2 | 2 | 6 | 1 | 1 | 3 | 2 | - | 3 | 9 | 3 | - |
| Budapest | 1 | 25 | 19 | 9 | 1 | 0 | 1 | 3 | 4 | 5 | 1 | 2 | 3 | 2 |
| Chemnitz | 1 | 0 | 0 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Copenhagen | - | - | - | - | - | - | - | - | 0 | - | - | - | 0 | 0 |
| Dresden | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 5 | 0 | 0 |
| Edinburgh | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| Frankfurt | 0 | 10 | 3 | 6 | 2 | 16 | 5 | 8 | 5 | 0 | 2 | 12 | 6 | 0 |
| Glasgow | - | - | - | - | - | - | - | - | - | - | 14 | 4 | 6 | 3 |
| Gothenburg | 2 | 0 | 7 | 1 | 1 | 0 | 3 | 8 | 1 | 17 | 2 | 2 | 13 | 3 |
| Hamburg | 0 | 0 | 26 | 19 | 30 | 29 | 24 | 10 | 2 | 5 | 11 | 7 | 11 | 4 |
| Karlsruhe | 5 | 0 | 0 | 0 | 3 | 3 | 4 | 2 | 8 | 0 | 2 | 1 | 0 | 0 |
| Leeds | 0 | 0 | 0 | 0 | 8 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Leipzig | 1 | 39 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| Liverpool | 0 | 458 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lisbon | 52 | - | 80 | 39 | 20 | 69 | 21 | 37 | - | 15 | 20 | 20 | 14 | 74 |
| London | 542 | 139 | 686 | 458 | 822 | 486 | 539 | 229 | 143 | 60 | 60 | 58 | 64 | 38 |
| Luxemburg | - | 267 | - | - | - | - | 0 | - | - | - | - | - | - | - |

- No Data

| | $NO_2$ number of 1 h mean values >200 µg/m³ | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| Lyon | 35 | 0 | - | 139 | 66 | 28 | 181 | 150 | 66 | 33 | 32 | 34 | 18 | 15 |
| Madrid | 83 | - | 208 | 267 | 119 | 150 | 76 | 103 | 52 | 37 | 45 | 95 | 46 | 88 |
| Mannheim | 0 | 69 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 3 | 0 | 0 |
| Milan | 47 | 1 | 123 | - | 241 | 101 | 25 | 132 | 99 | 35 | 31 | 57 | 7 | 11 |
| Munich | 11 | 0 | 103 | 69 | 56 | 95 | 192 | 50 | 27 | 50 | 24 | 30 | 13 | 12 |
| Prague | - | 0 | - | 1 | 106 | 98 | 56 | 51 | 4 | 6 | 5 | 16 | 2 | 1 |
| Riga | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| Rhine/Ruhr Area | 0 | 24 | - | 0 | 0 | 0 | 1 | 0 | 0 | - | 0 | 0 | 0 | - |
| Rotterdam Rijnmond Area | 10 | 3 | 2 | 0 | 0 | 0 | 0 | - | 0 | 0 | - | - | - | 0 |
| Sofia | 7 | 450 | - | 24 | 155 | 95 | 30 | 55 | - | 1 | 1 | 2 | - | - |
| Stockholm | 0 | 3 | 1 | 3 | 1 | 0 | 3 | 1 | 0 | 2 | 0 | 1 | 0 | 0 |
| Stuttgart | - | - | - | 5 | 9 | 22 | 6 | 6 | 3 | 4 | 0 | 0 | 35 | 3 |
| Thessaloniki | - | 3 | - | 3 | 1 | 0 | 0 | 0 | 0 | - | - | 0 | 0 | 0 |
| Warsaw | 0 | 0 | 5 | 17 | 0 | 0 | 1 | 5 | 1 | 8 | 1 | 6 | 3 | 0 |
| Wiesbaden | 0 | 0 | 2 | 3 | 1 | 7 | 1 | 3 | 2 | 1 | 0 | 2 | 0 | 0 |
| Zagreb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - | 2 | 1 | 0 | 0 |
| Zurich | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

- No Data

**Luftgütevergleich**

**2017**

**Jahresmittelwerte (Gebietsmittel)**

**Comparison of The Air Quality**

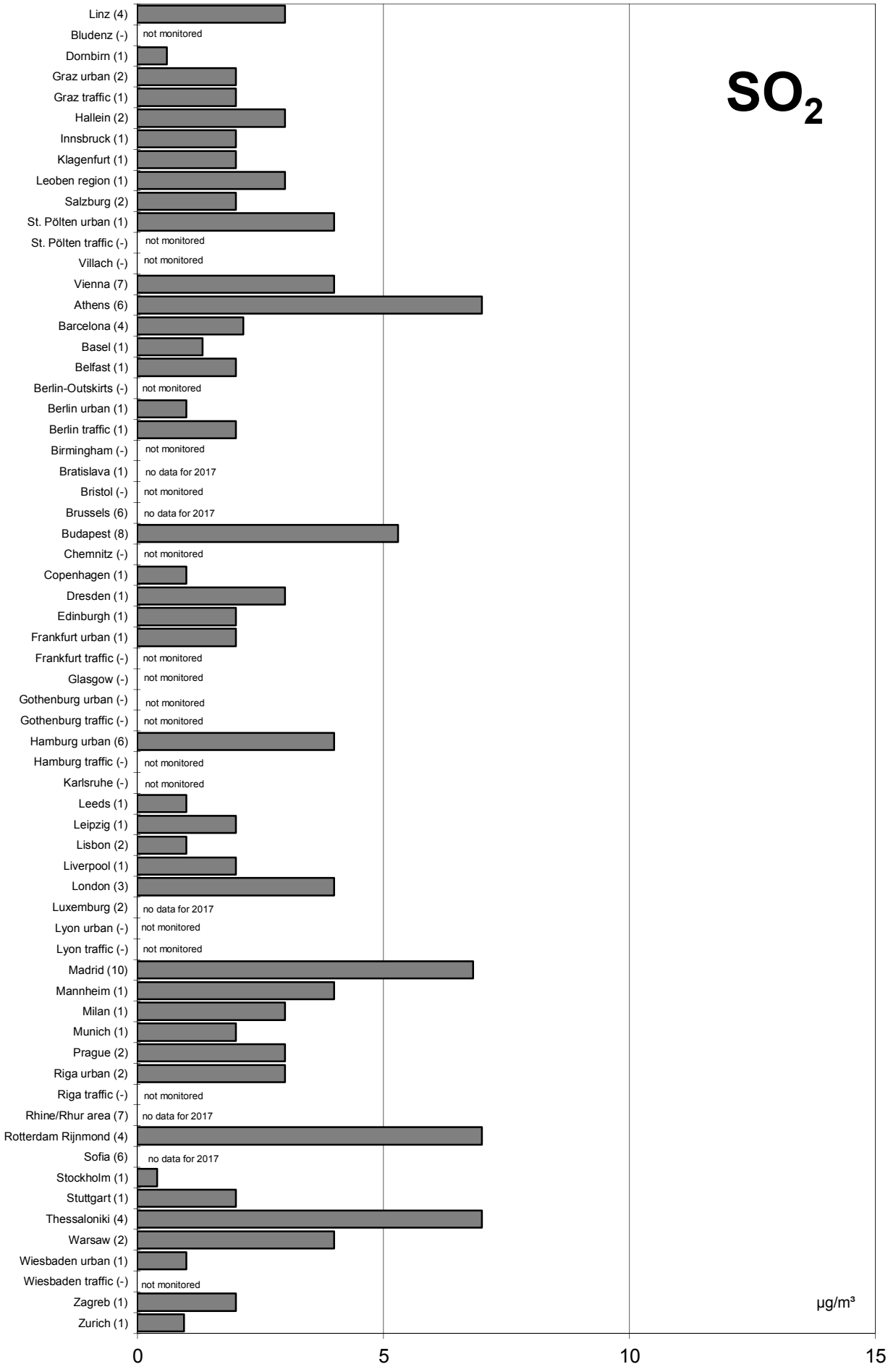
**2017**

**Annual Mean Values**

# Comparison of The Air Quality in 2017

**annual mean values (mean of all monitoring stations of the city/region)**

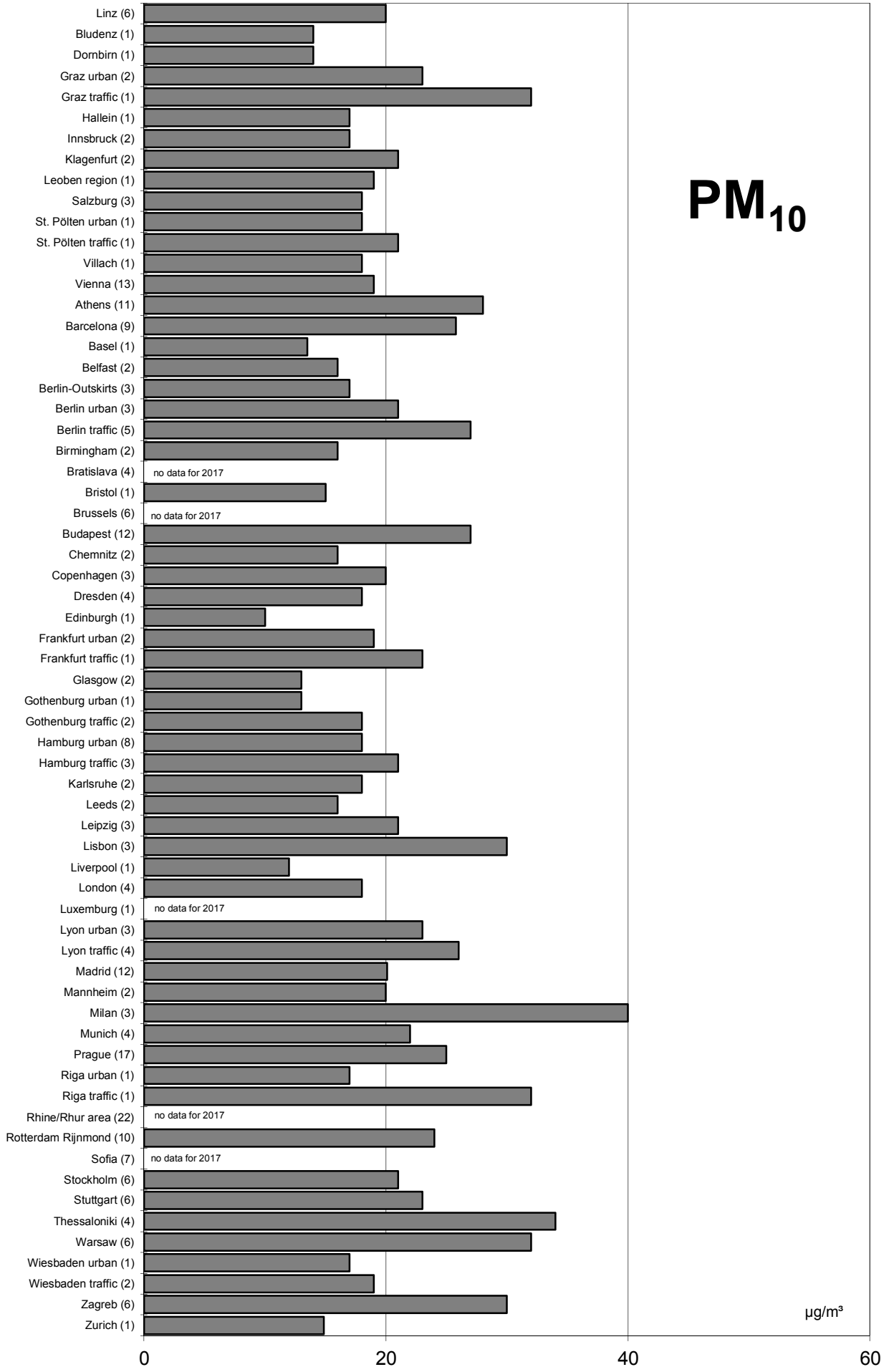
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

**annual mean values (mean of all monitoring stations of the city/region)**

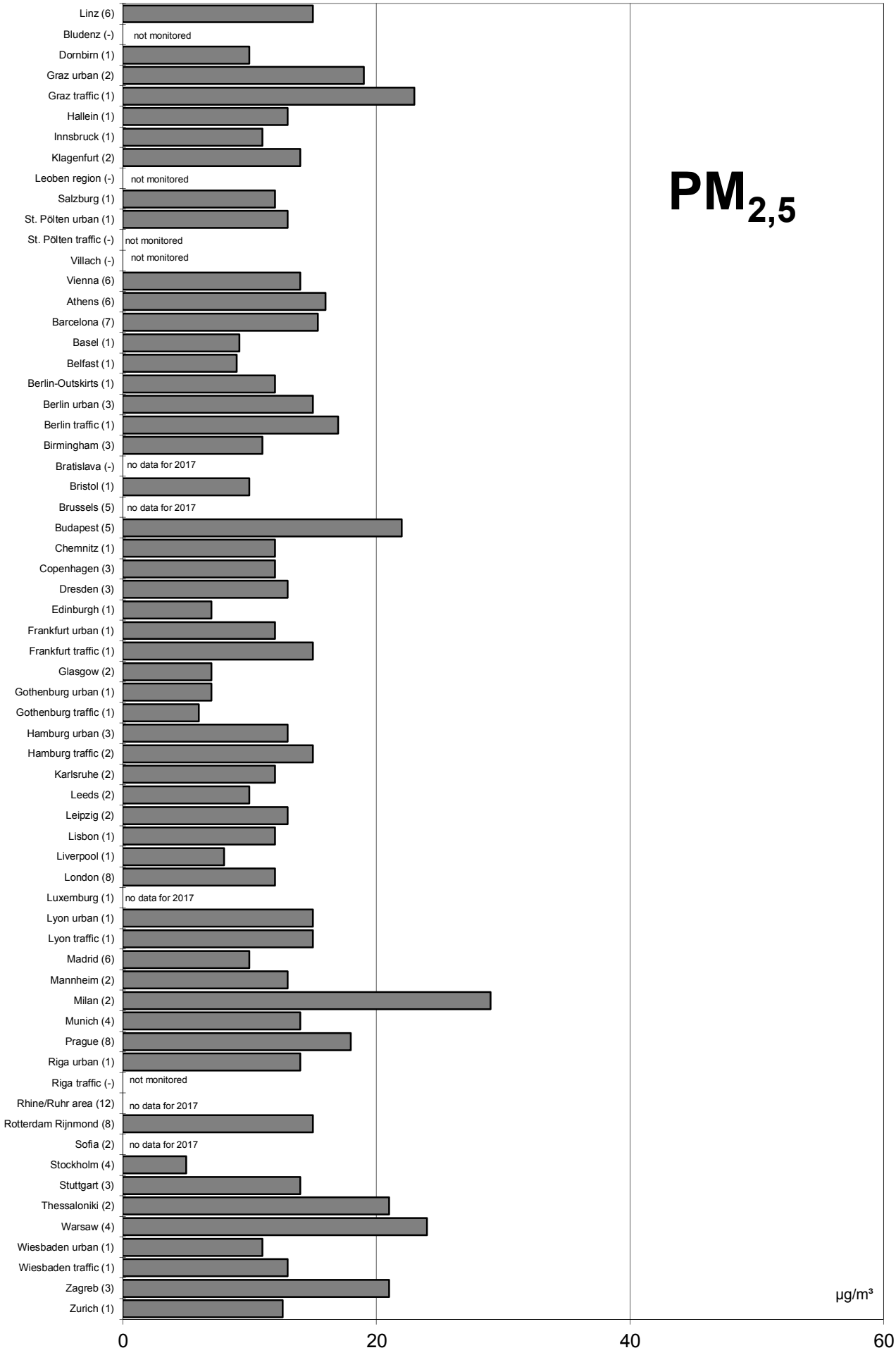
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

**annual mean values (mean of all monitoring stations of the city/region)**

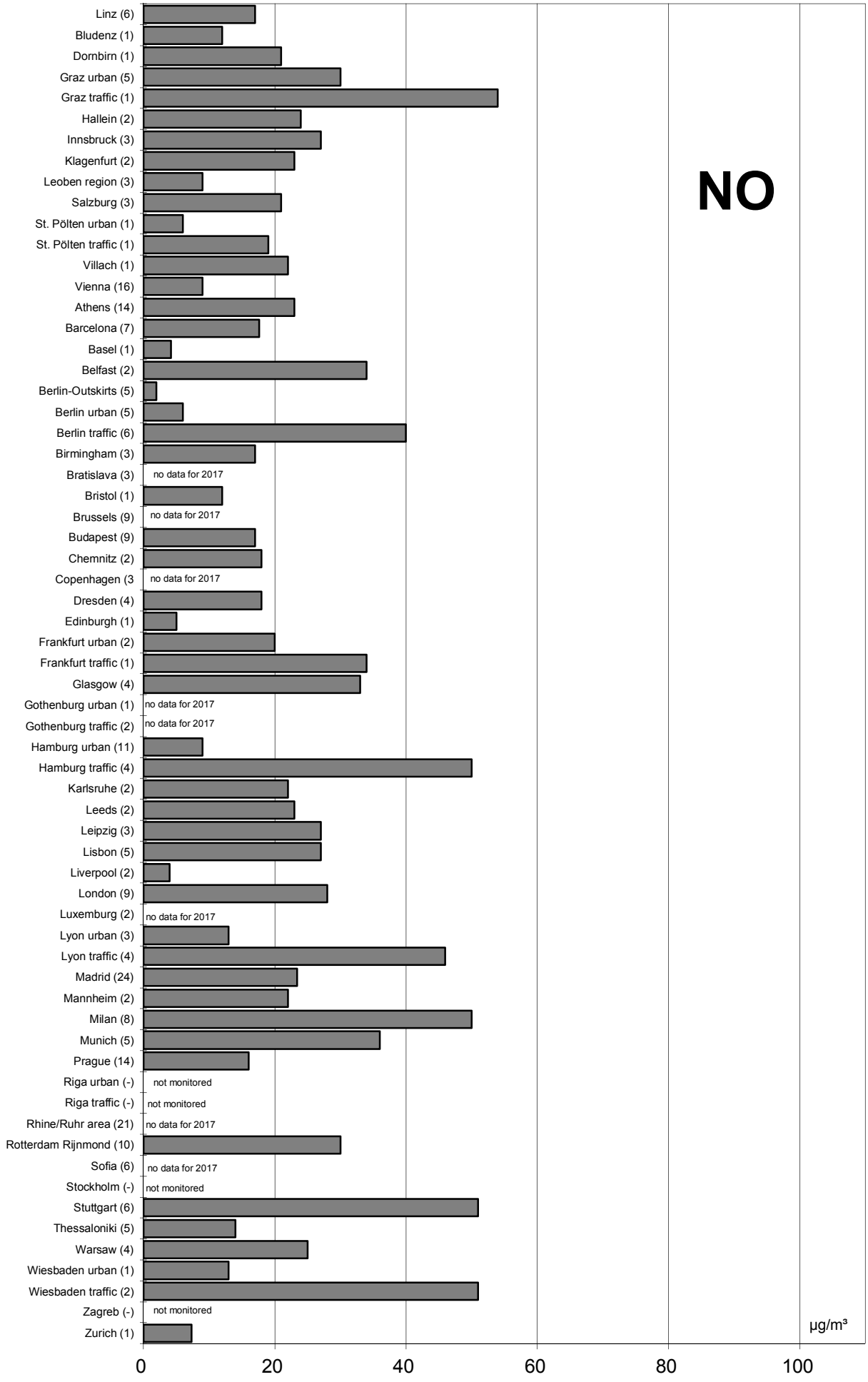
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

**annual mean values (mean of all monitoring stations of the city/region)**

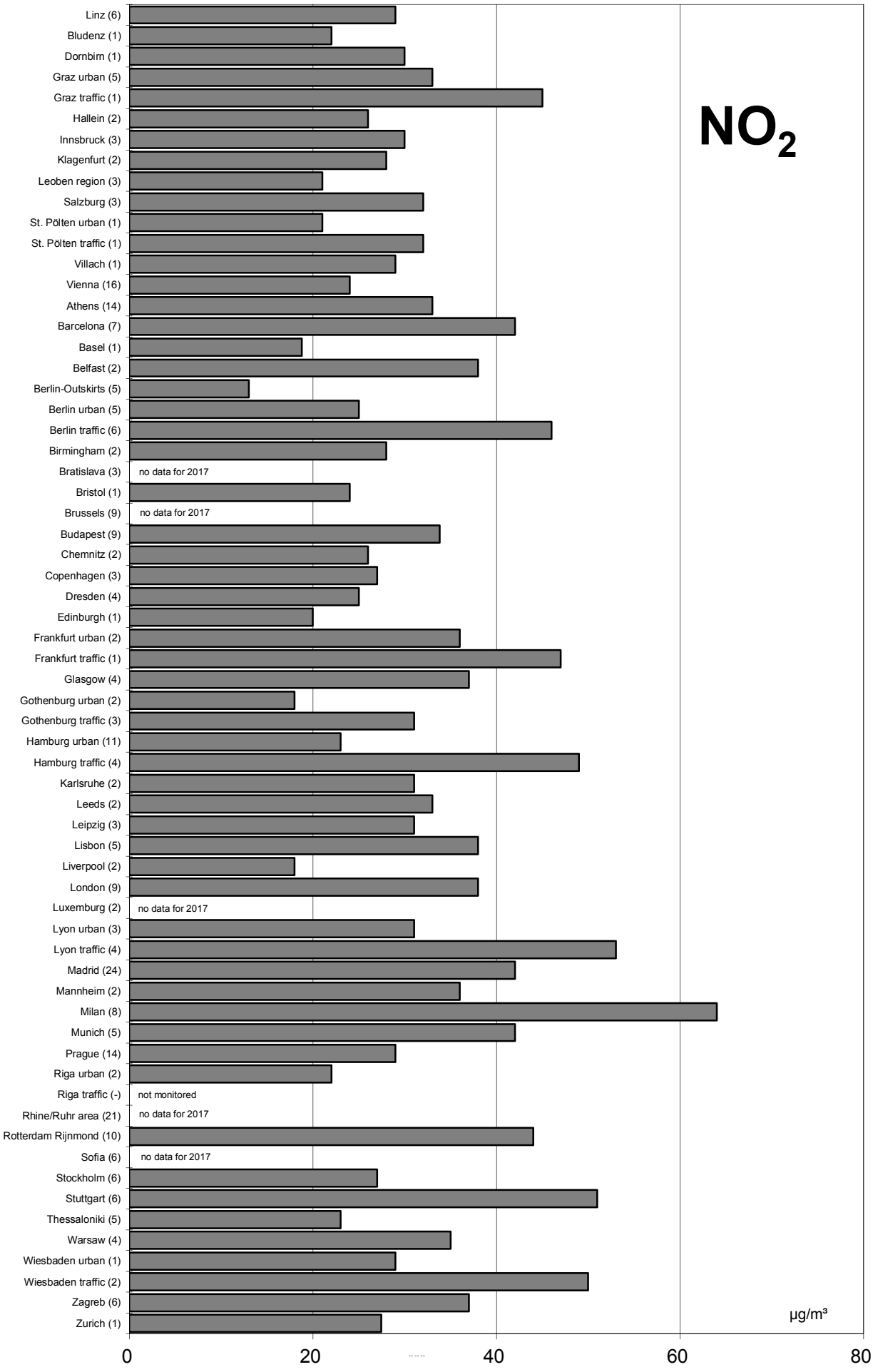
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

**annual mean values (mean of all monitoring stations of the city/region)**

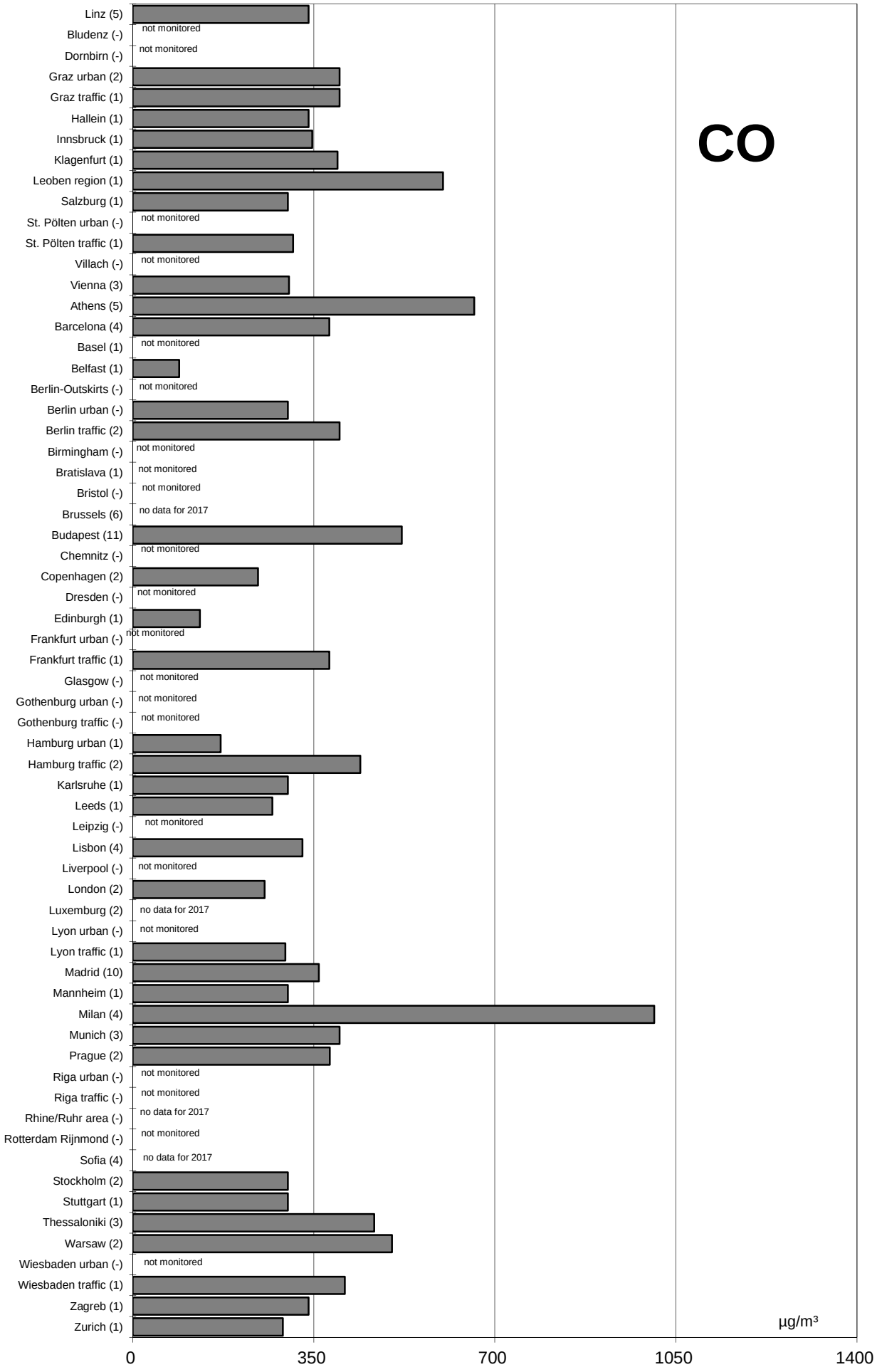
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

**annual mean values (mean of all monitoring stations of the city/region)**

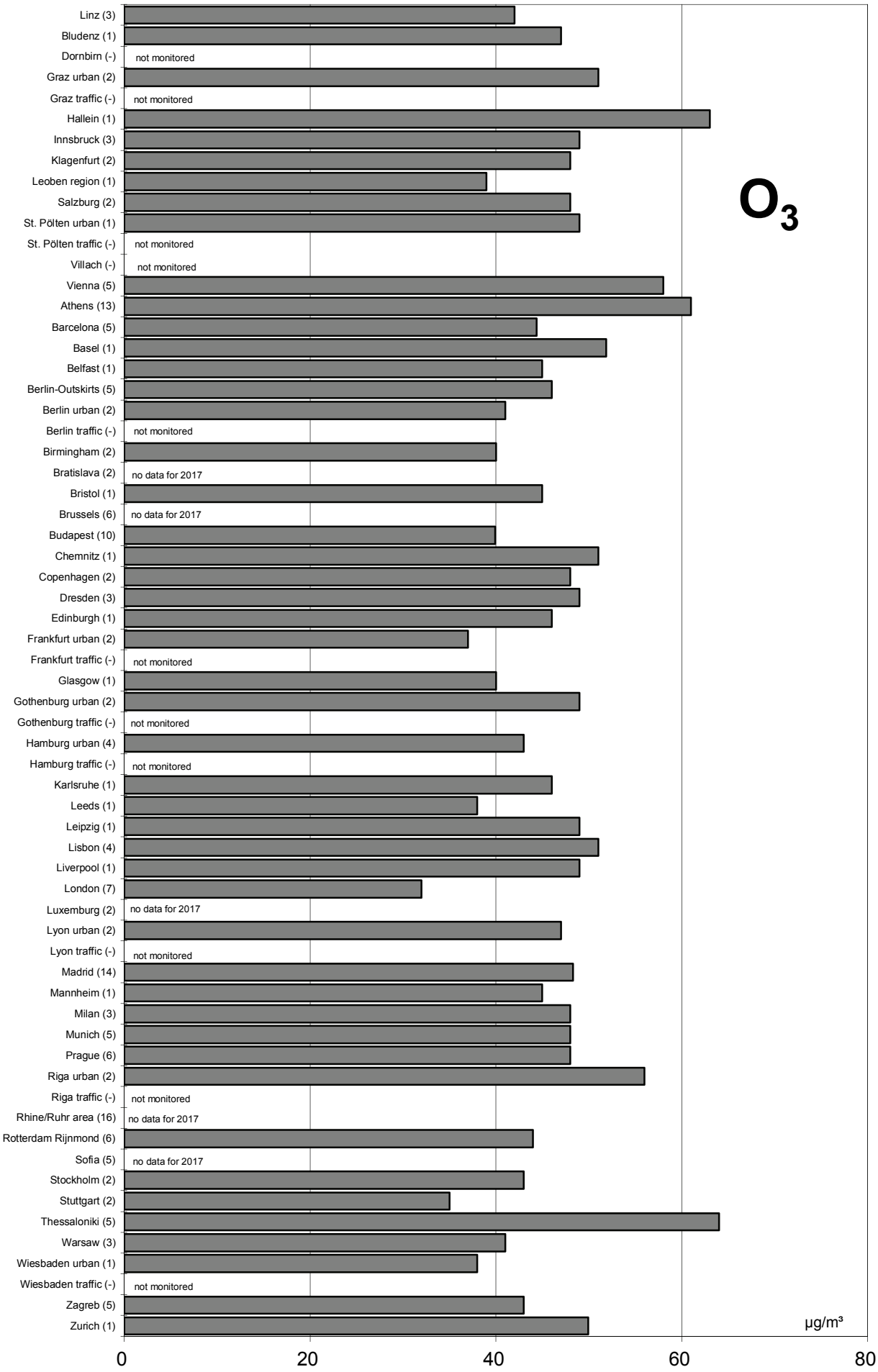
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

**annual mean values (mean of all monitoring stations of the city/region)**

(in parentheses: number of monitoring stations)



**Luftgütevergleich**

**2017**

**max. Tagesmittelwerte**

**Comparison of The Air Quality**

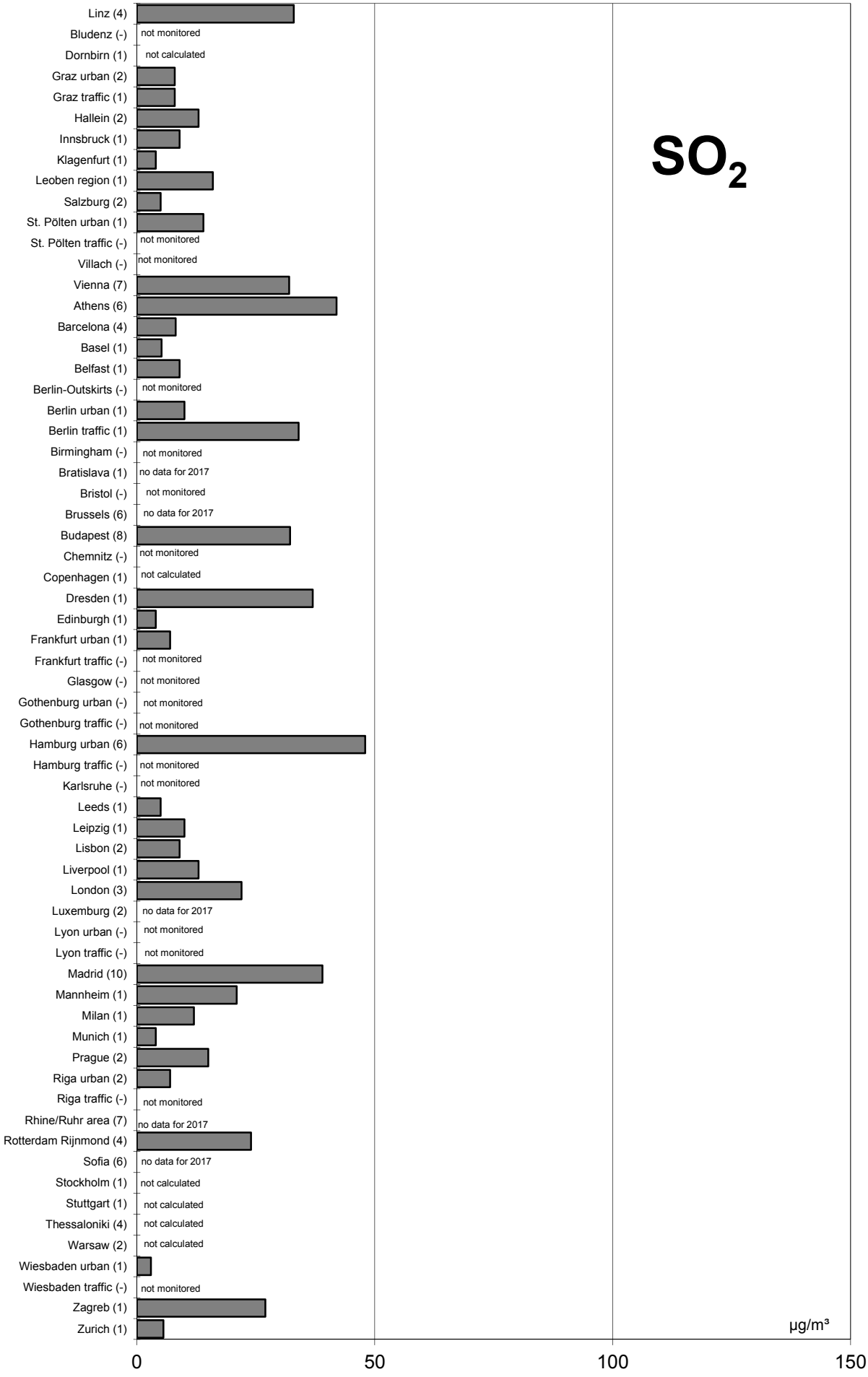
**2017**

**Max. Daily Mean Values**

# Comparison of The Air Quality in 2017

## max. daily mean values (max. stressed monitoring station)

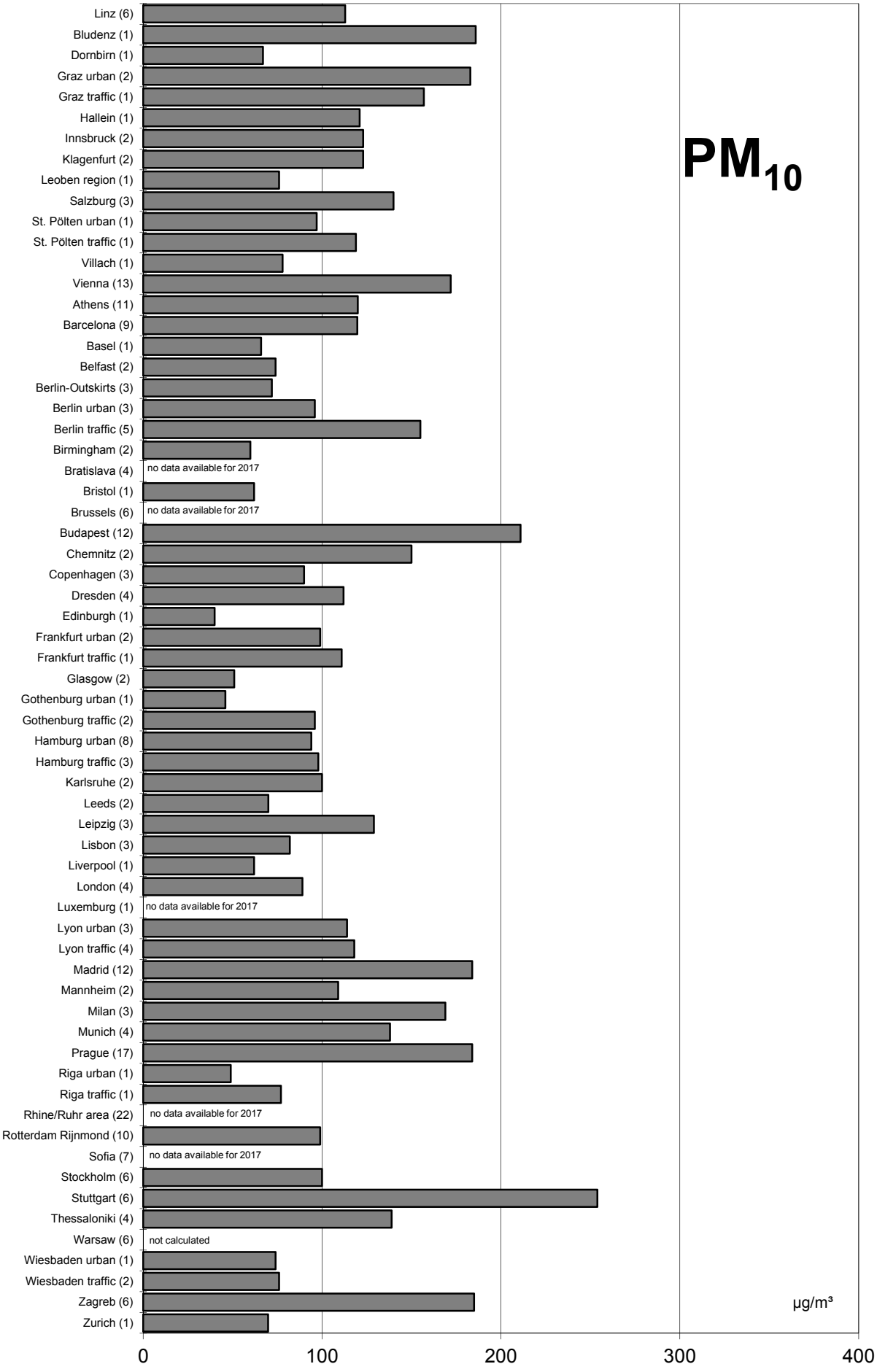
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

## max. daily mean values (max. stressed monitoring station)

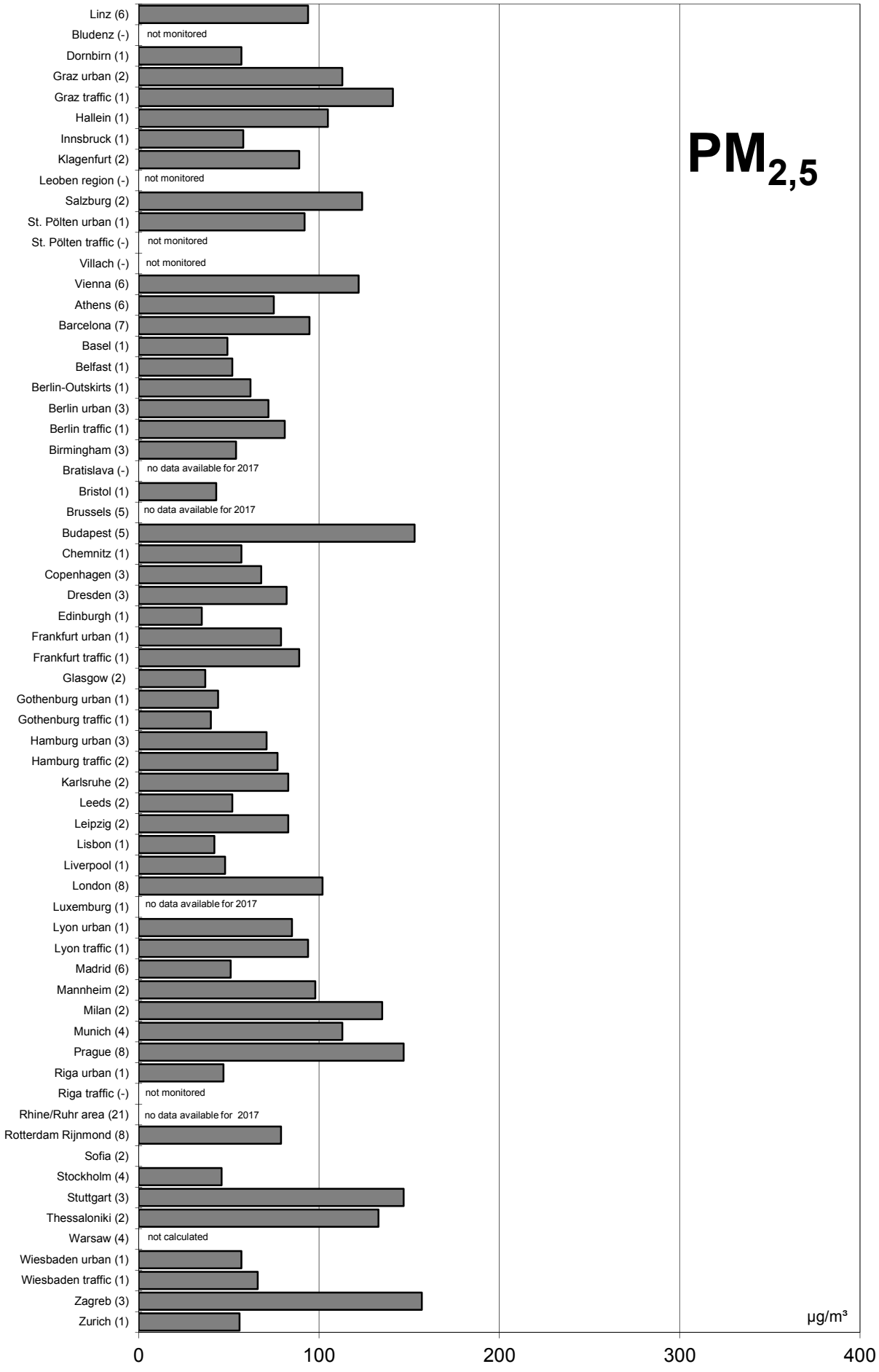
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

## max. daily mean values (max. stressed monitoring station)

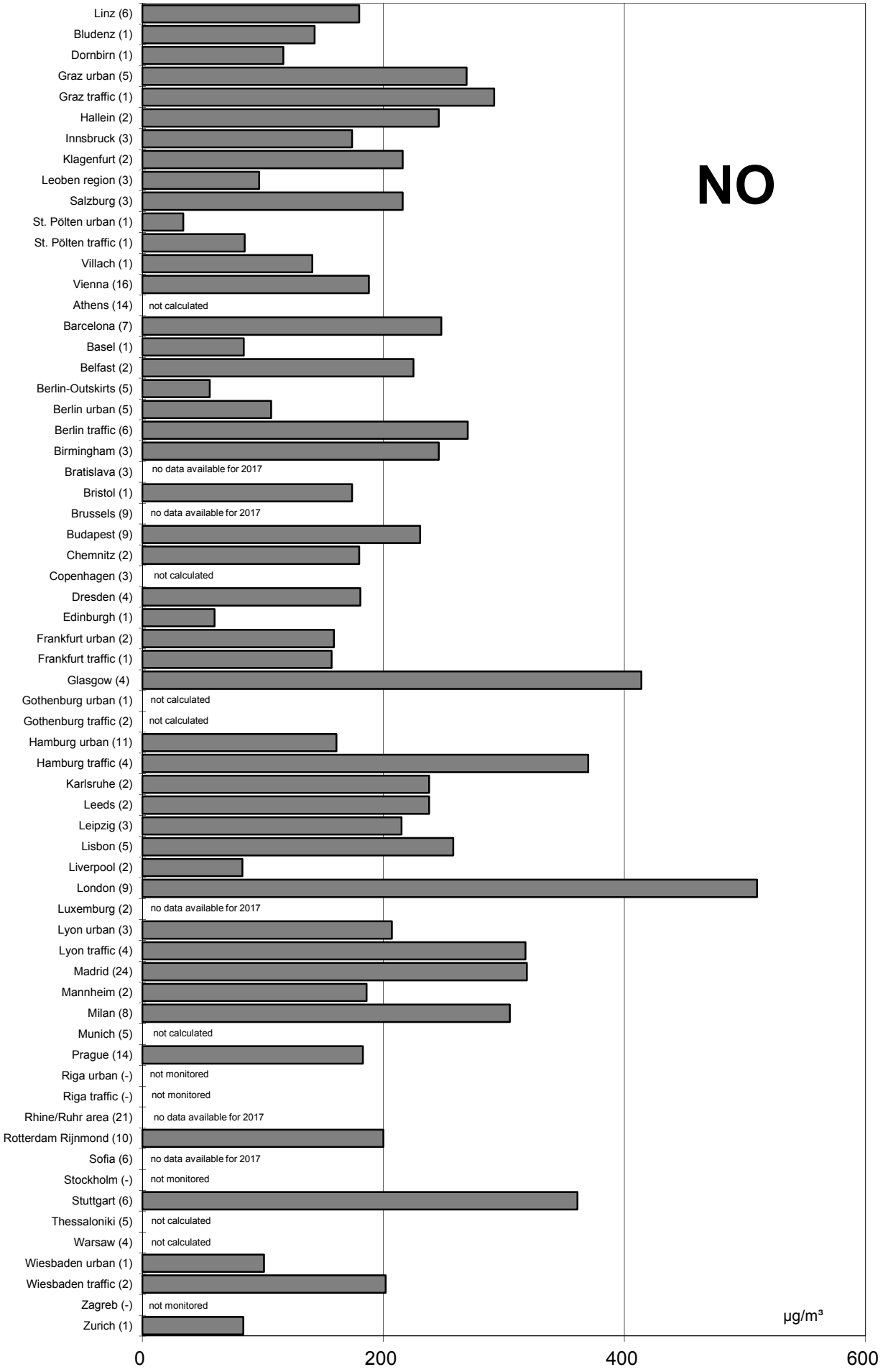
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

## max. daily mean values (max. stressed monitoring station)

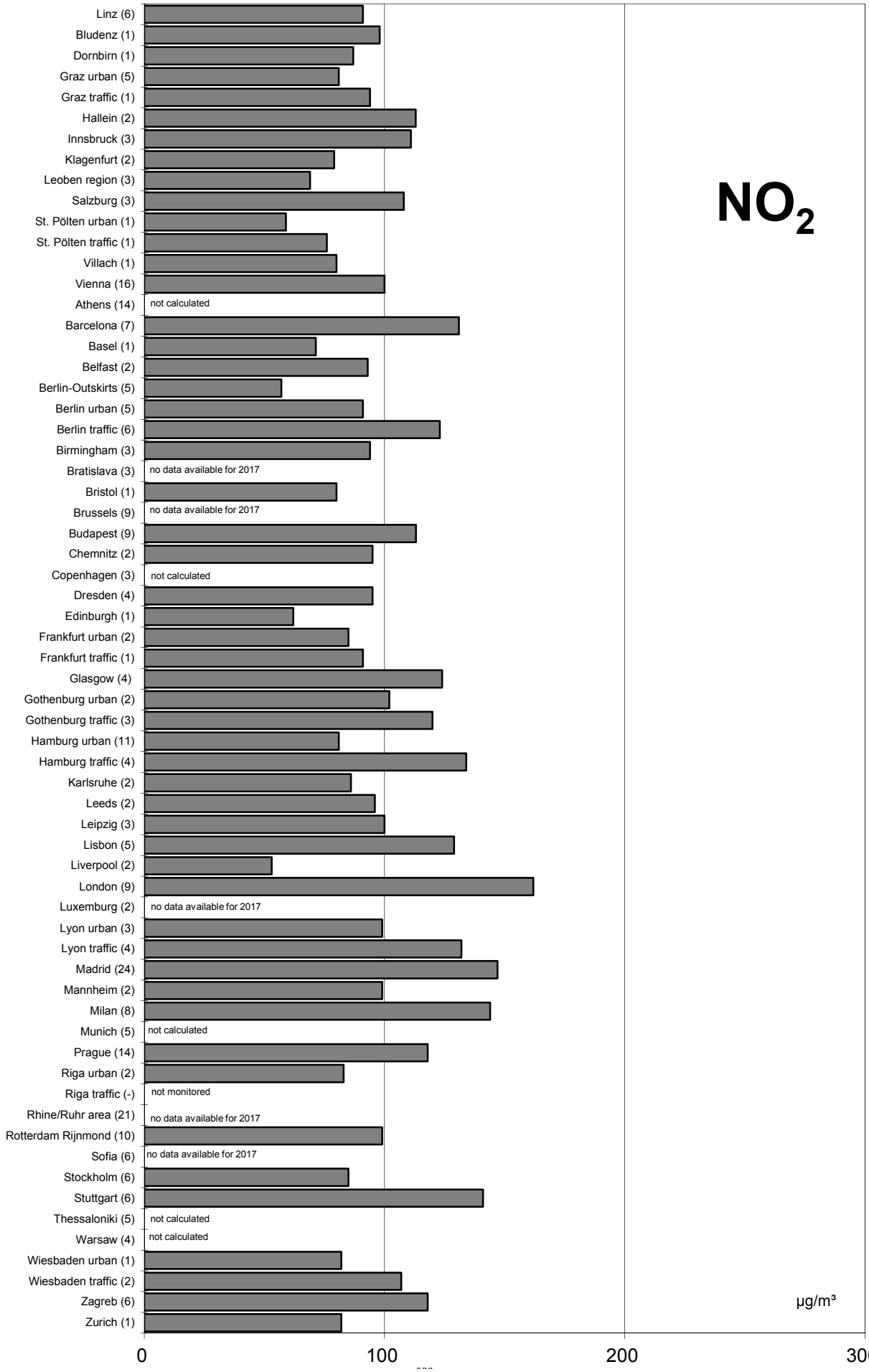
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

## max. daily mean values (max. stressed monitoring station)

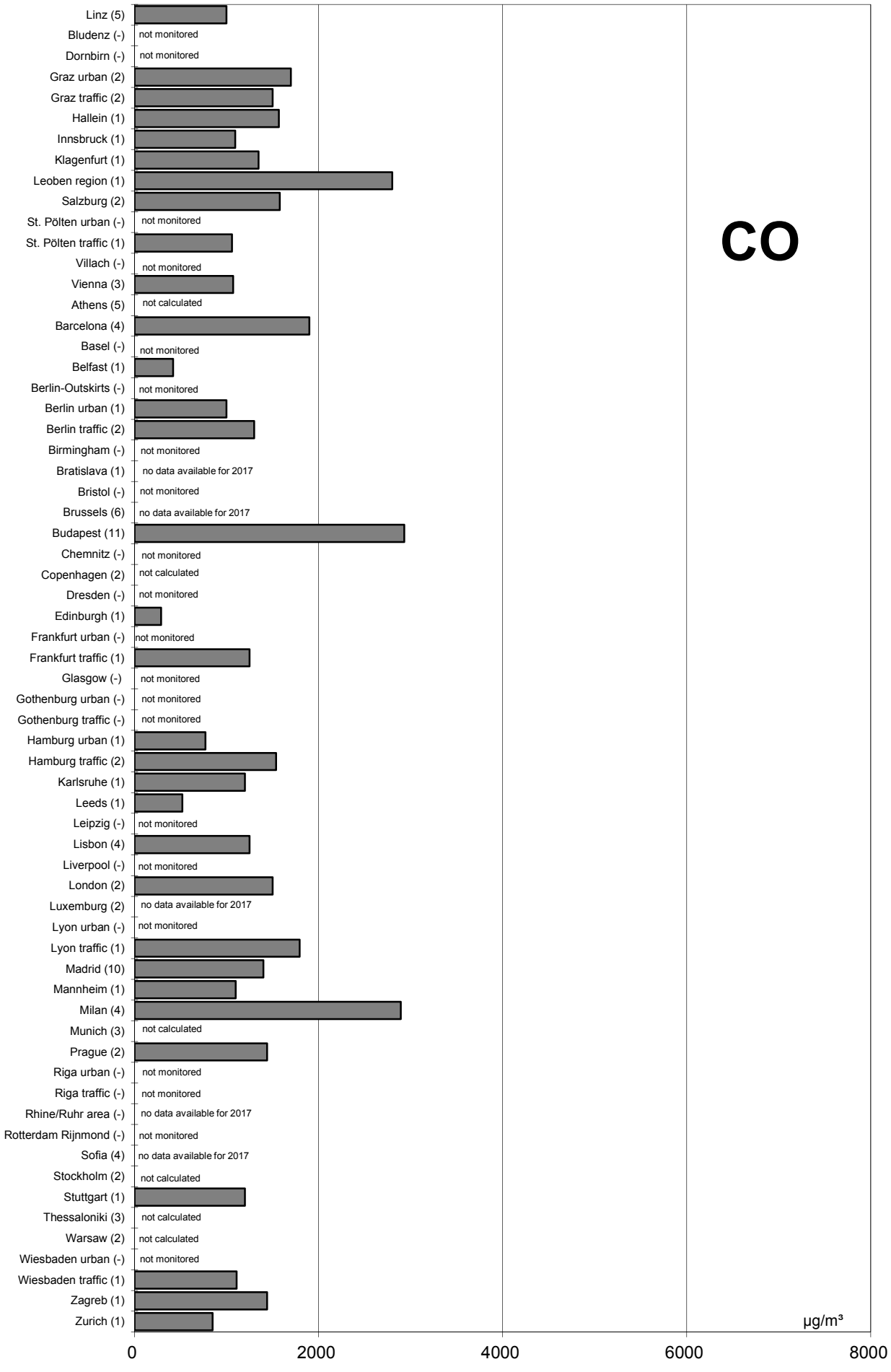
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

## max. daily mean values (max. stressed monitoring station)

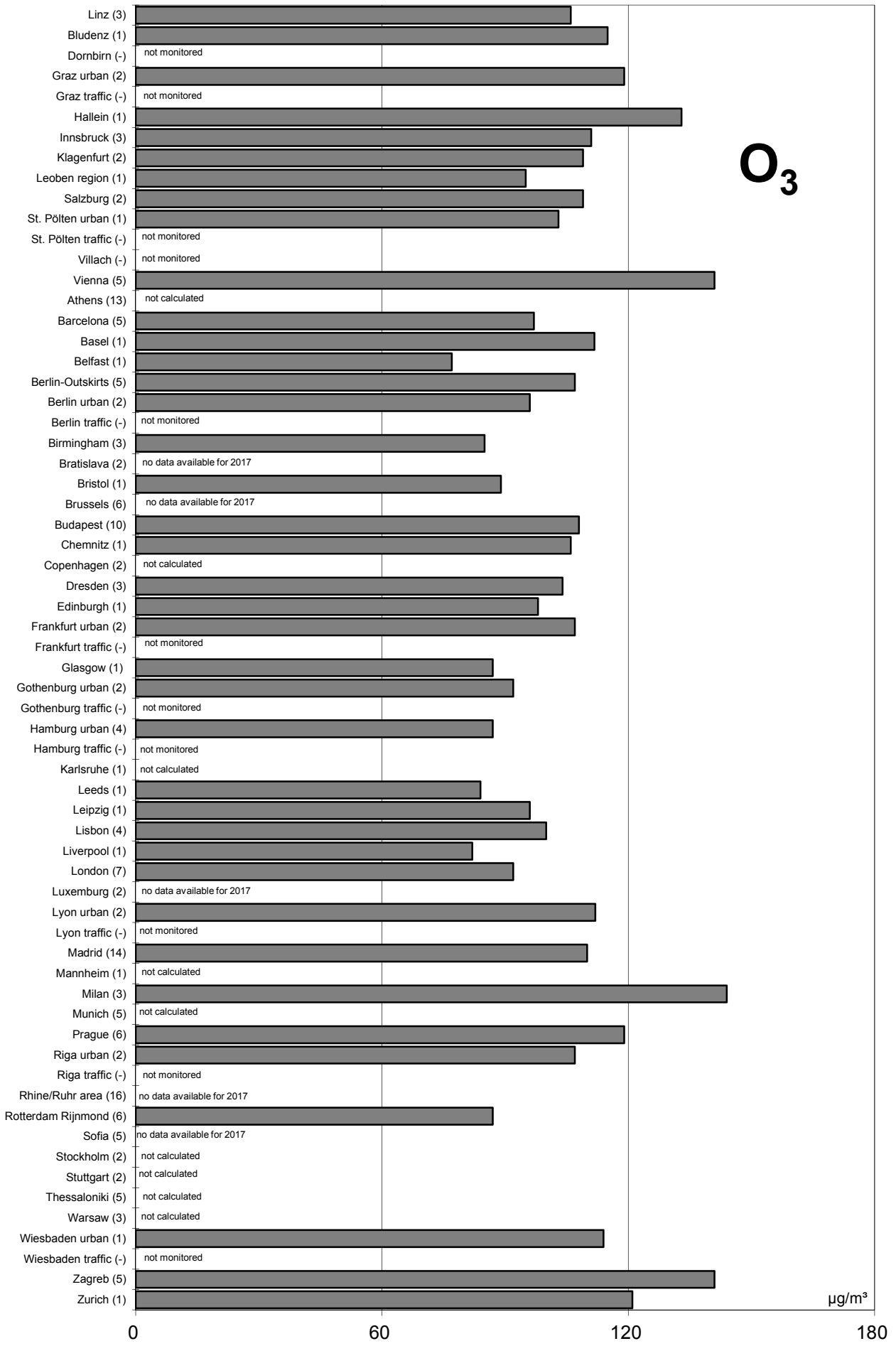
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

## max. daily mean values (max. stressed monitoring station)

(in parentheses: number of monitoring stations)



**Luftgütevergleich**

**2017**

**max. 1h-Mittelwerte**

**Comparison of The Air Quality**

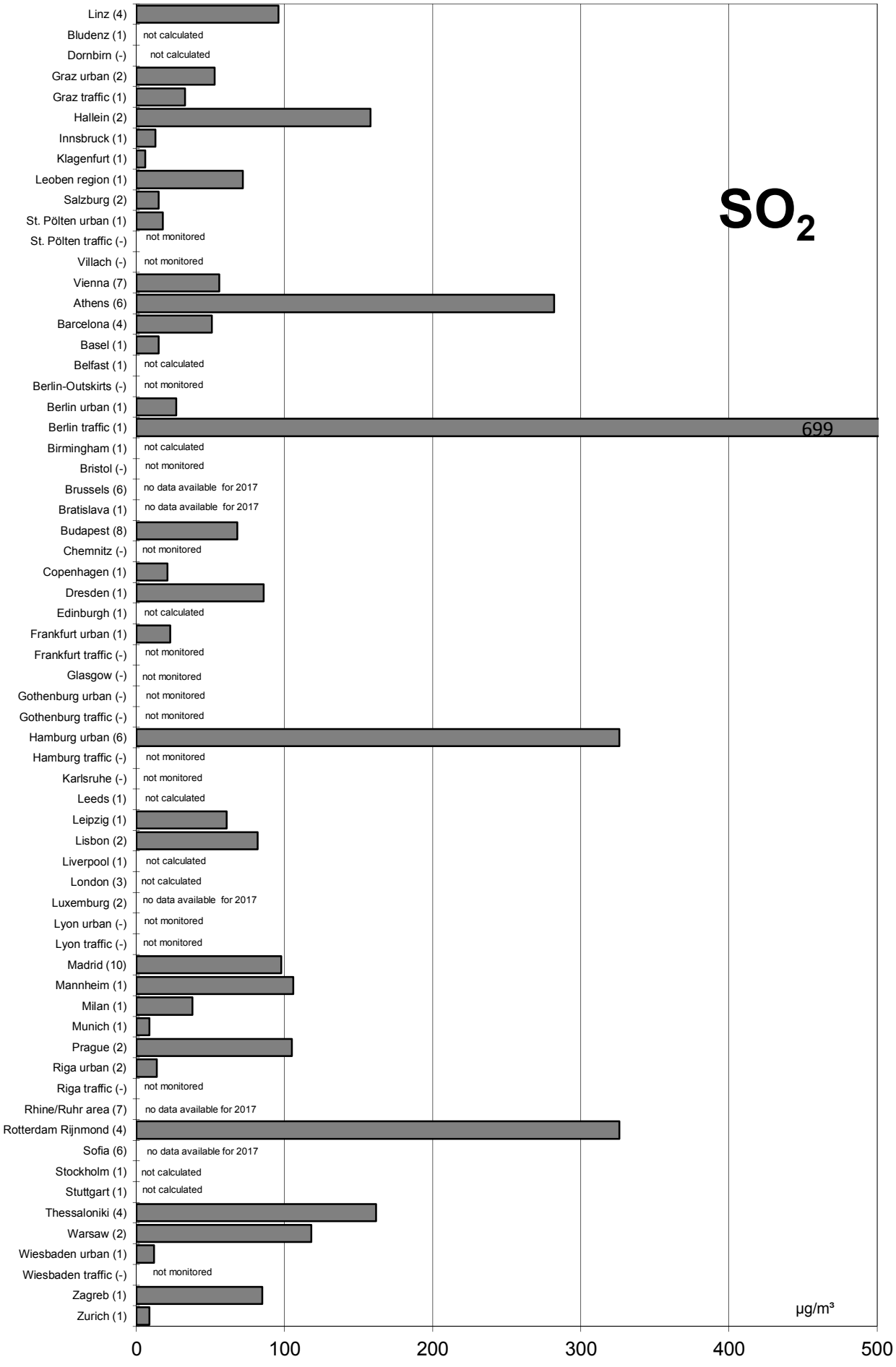
**2017**

**Max. 1h-Mean Values**

# Comparison of The Air Quality in 2017

## max. 1h mean values (max. stressed monitoring station)

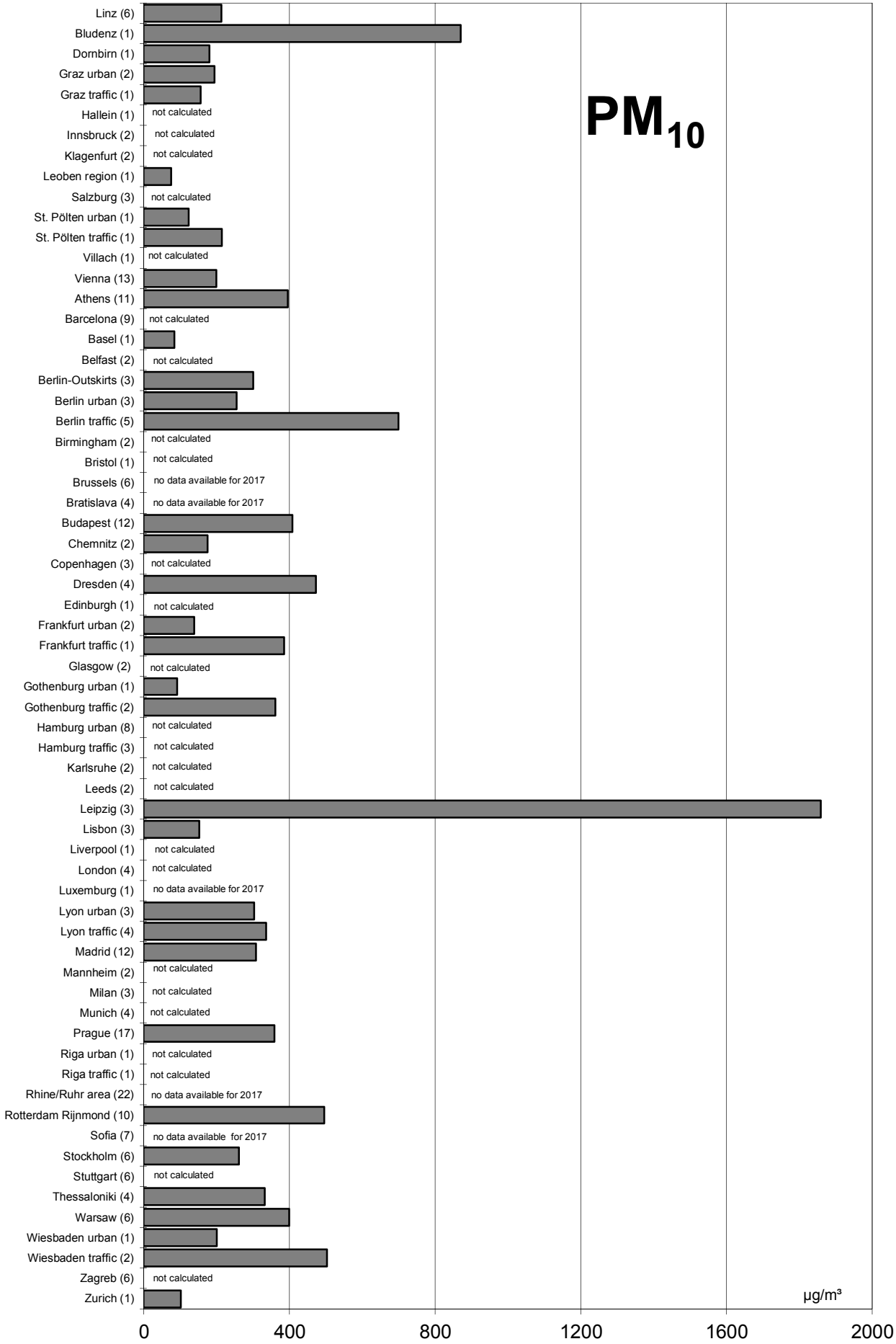
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

## max. 1h mean values (max. stressed monitoring station)

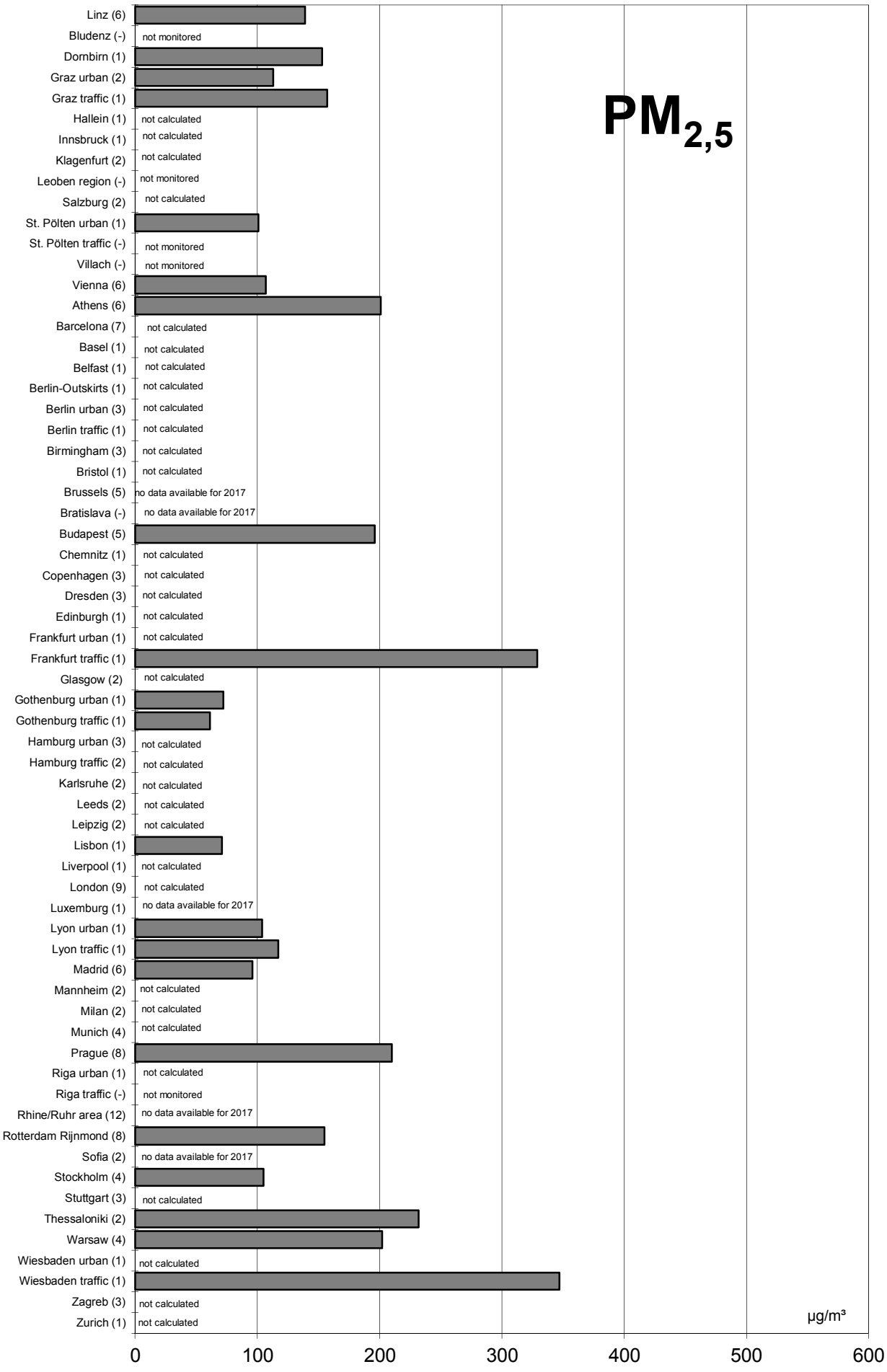
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

## max. 1h mean values (max. stressed monitoring station)

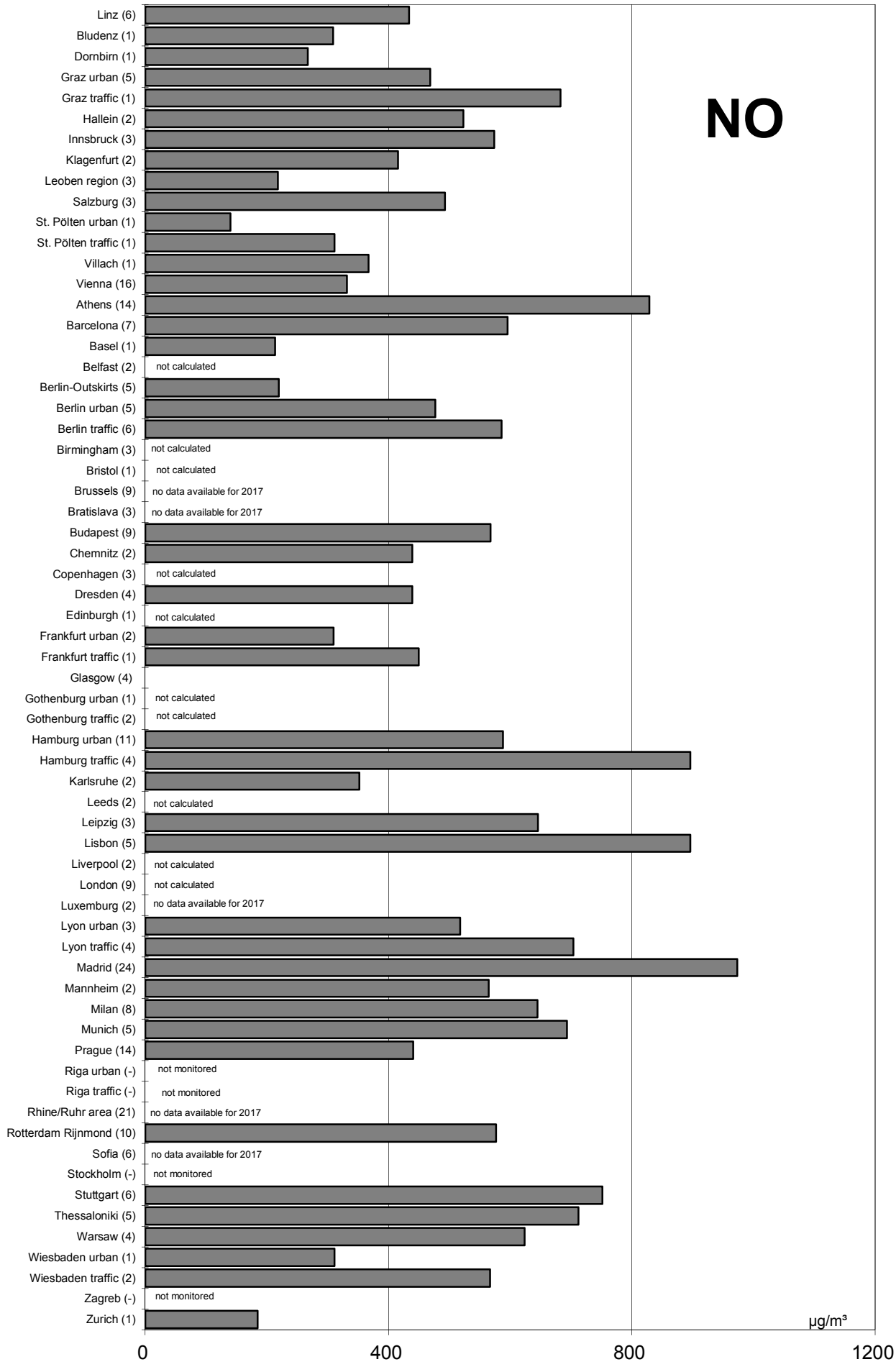
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

## max. 1h mean values (max. stressed monitoring station)

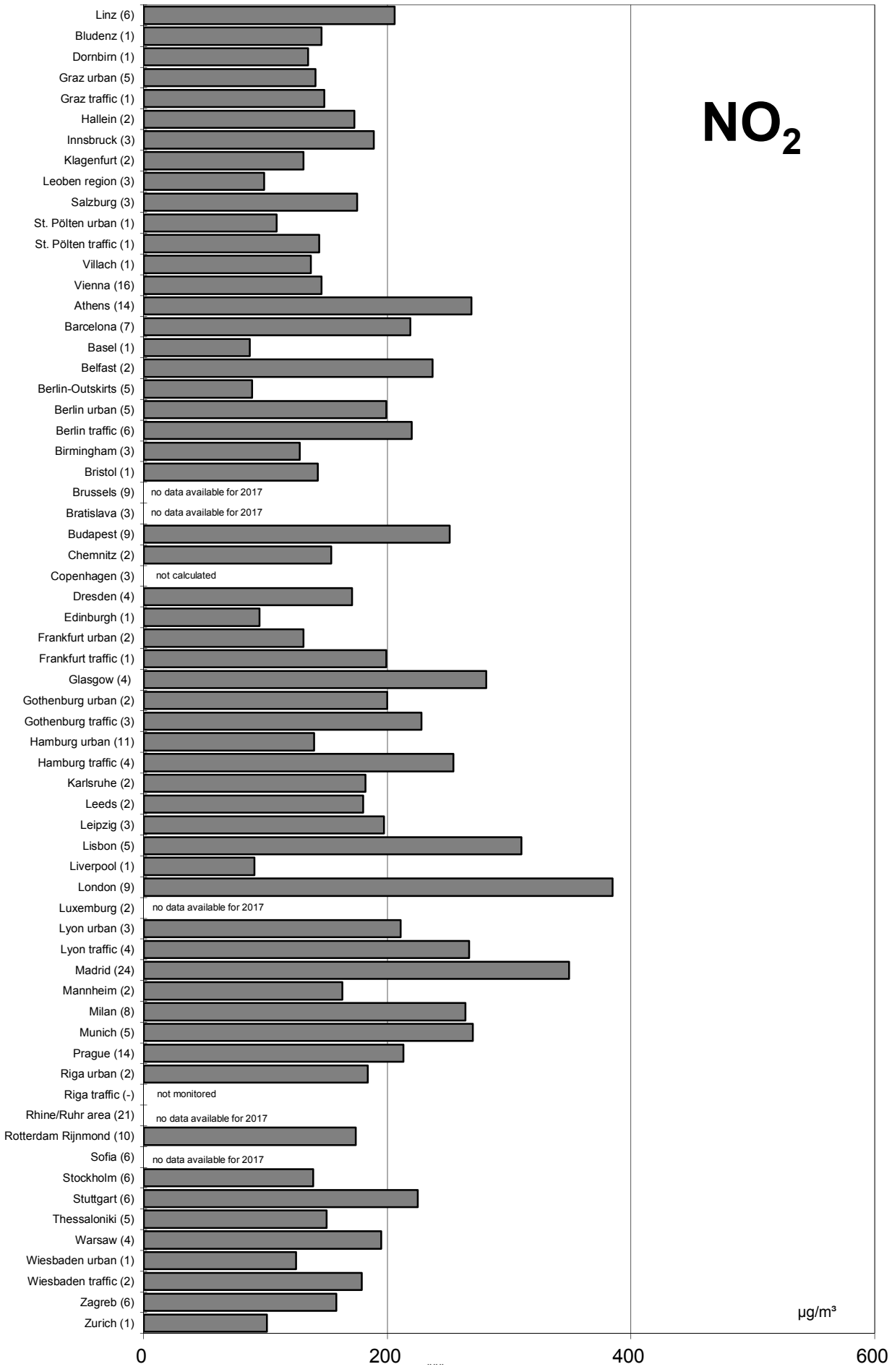
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

## max. 1h mean values (max. stressed monitoring station)

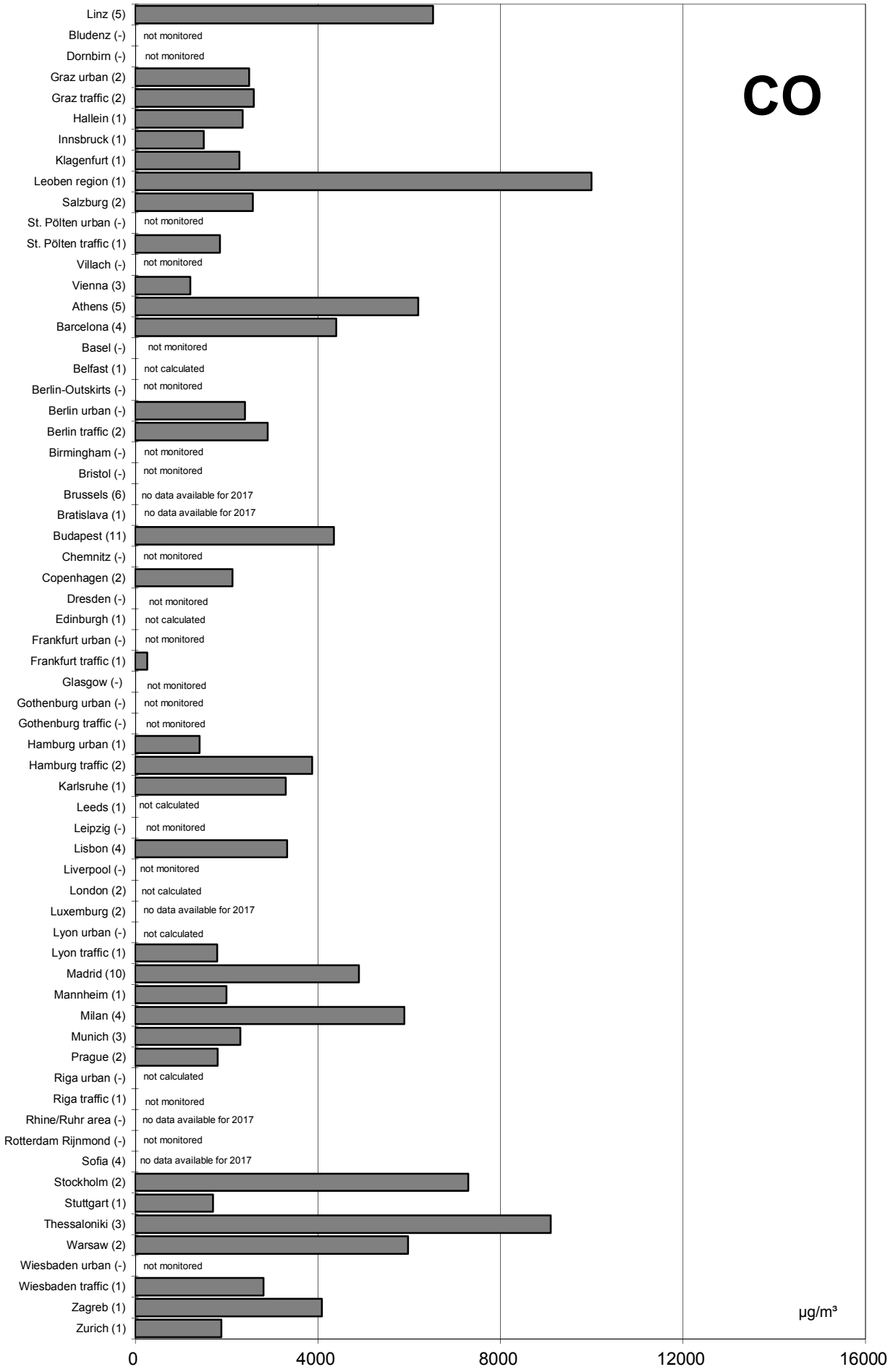
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

## max. 1h mean values (max. stressed monitoring station)

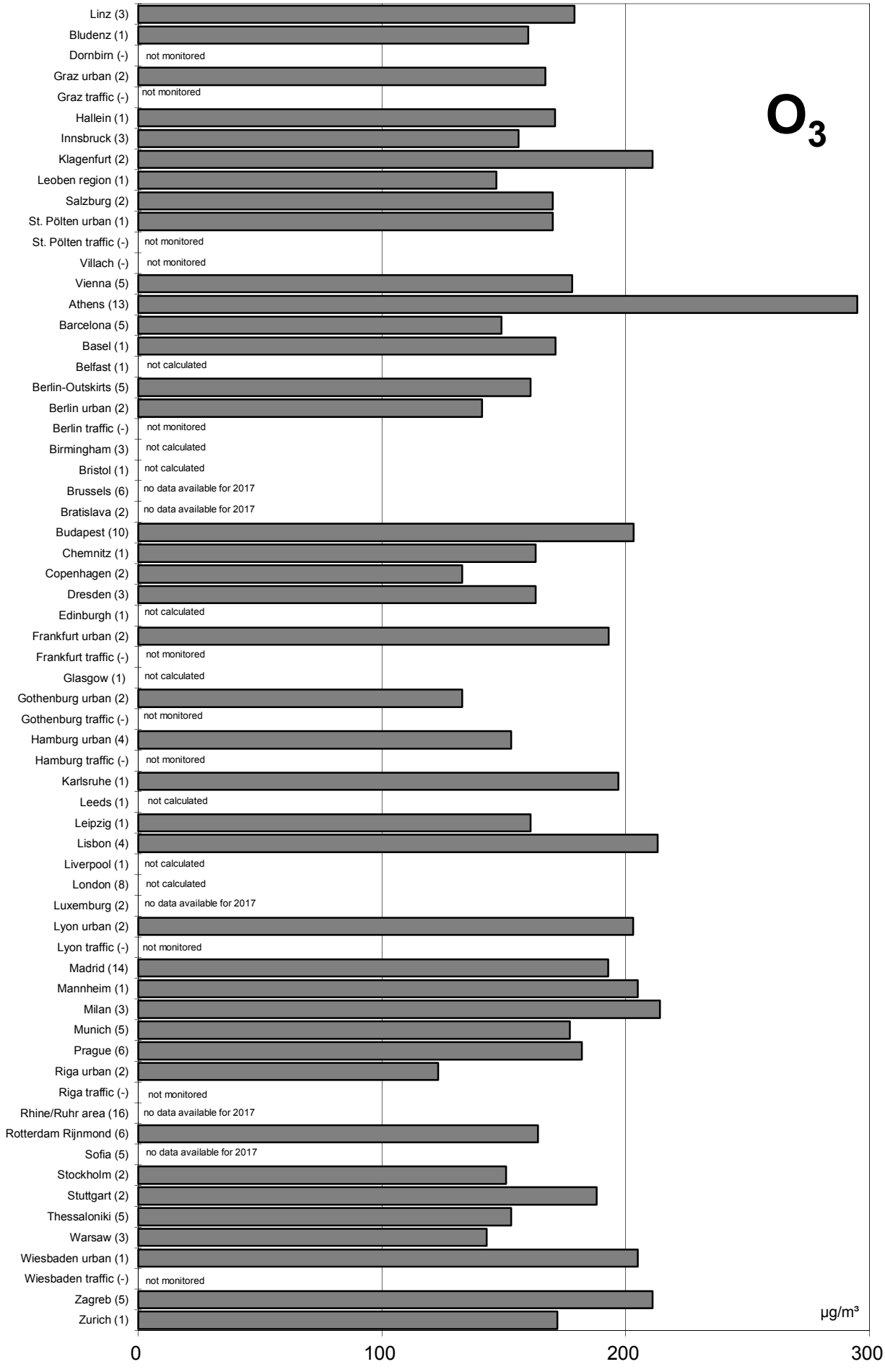
(in parentheses: number of monitoring stations)



# Comparison of The Air Quality in 2017

## max. 1h mean values (max. stressed monitoring station)

(in parentheses: number of monitoring stations)



**Jahresvergleich**

**1992 - 2017**

**Jahresmittelwerte**

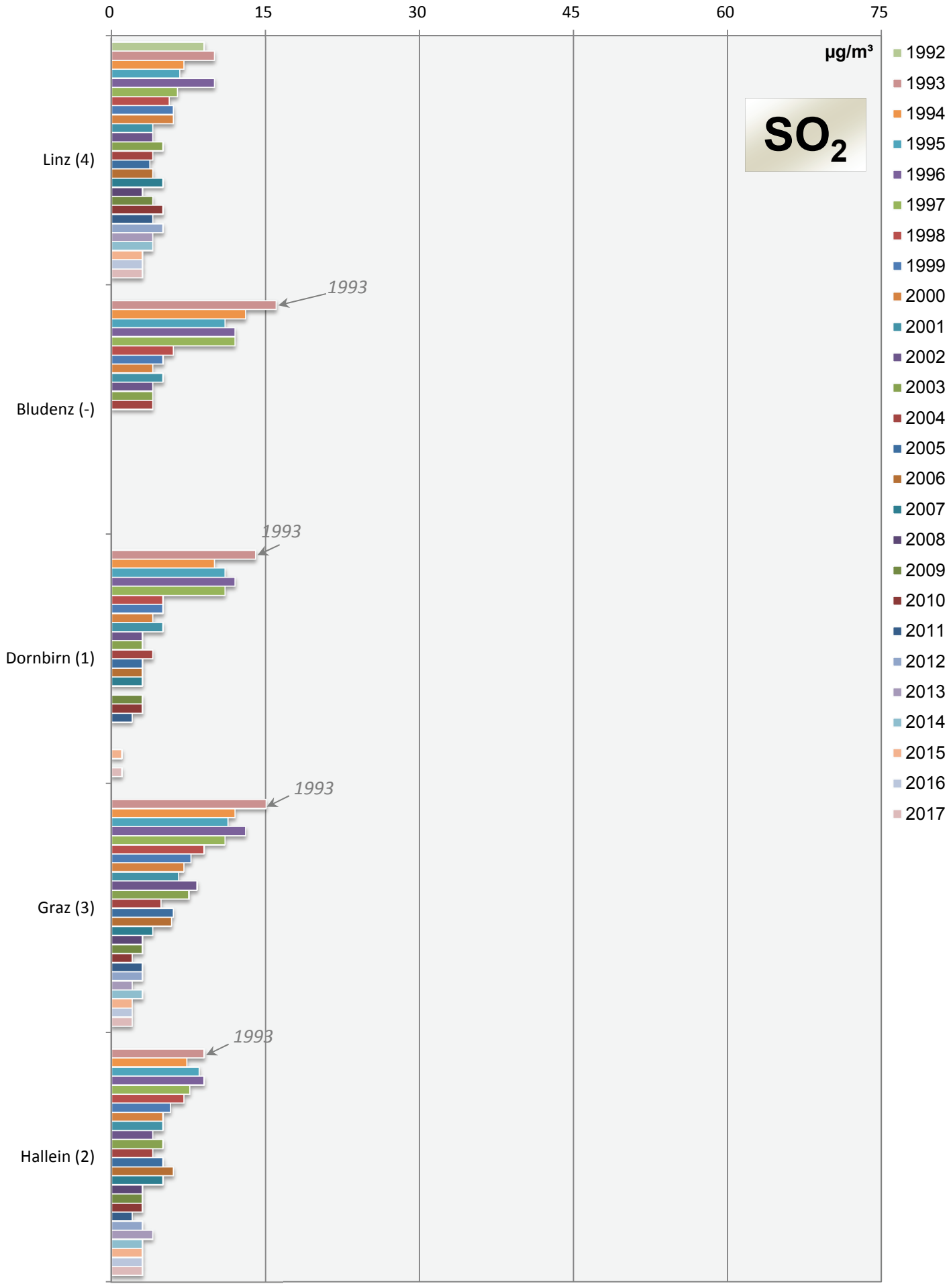
**Comparison of The Air Quality Over The Years**

**1992 - 2017**

**Annual Mean Values**

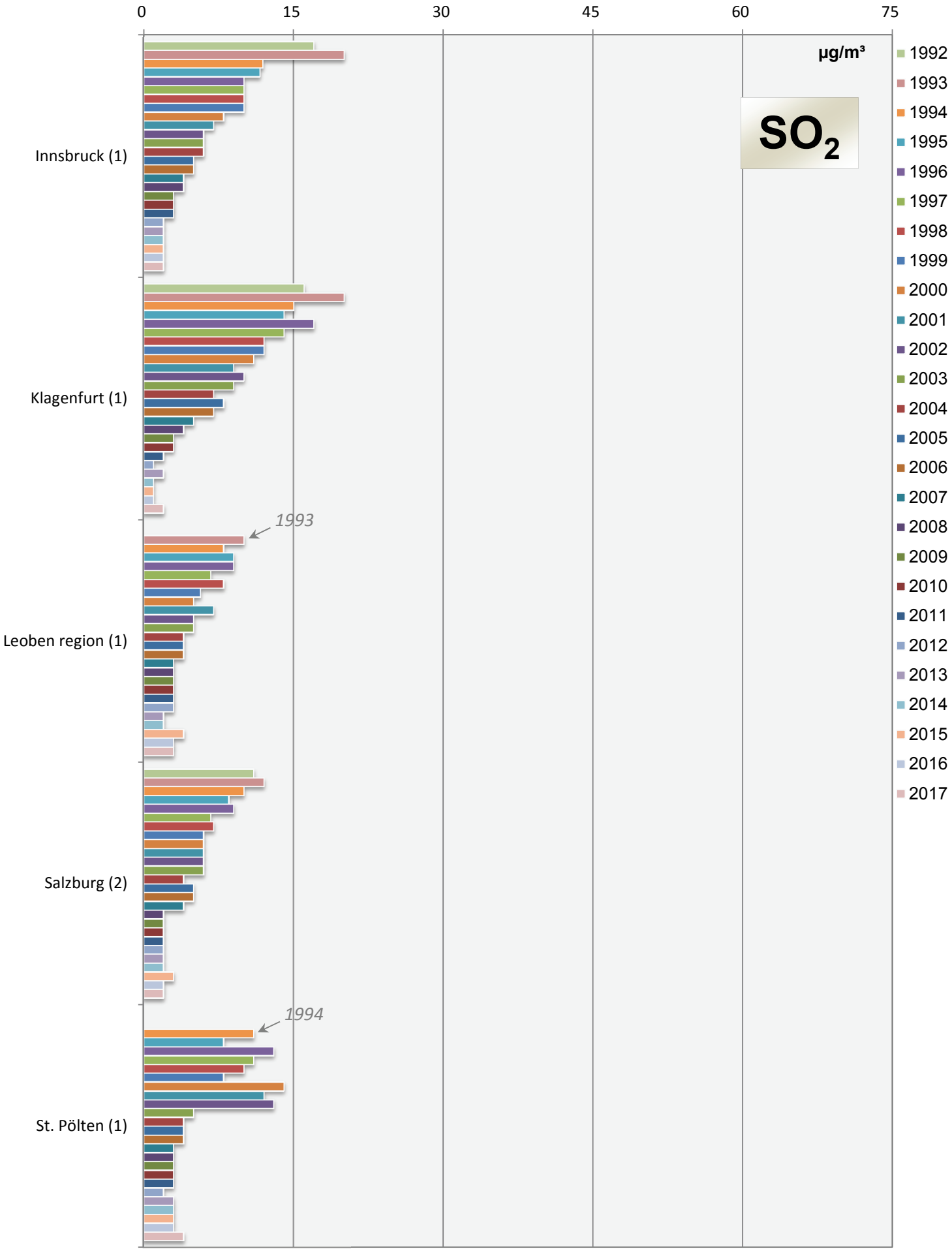
# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)



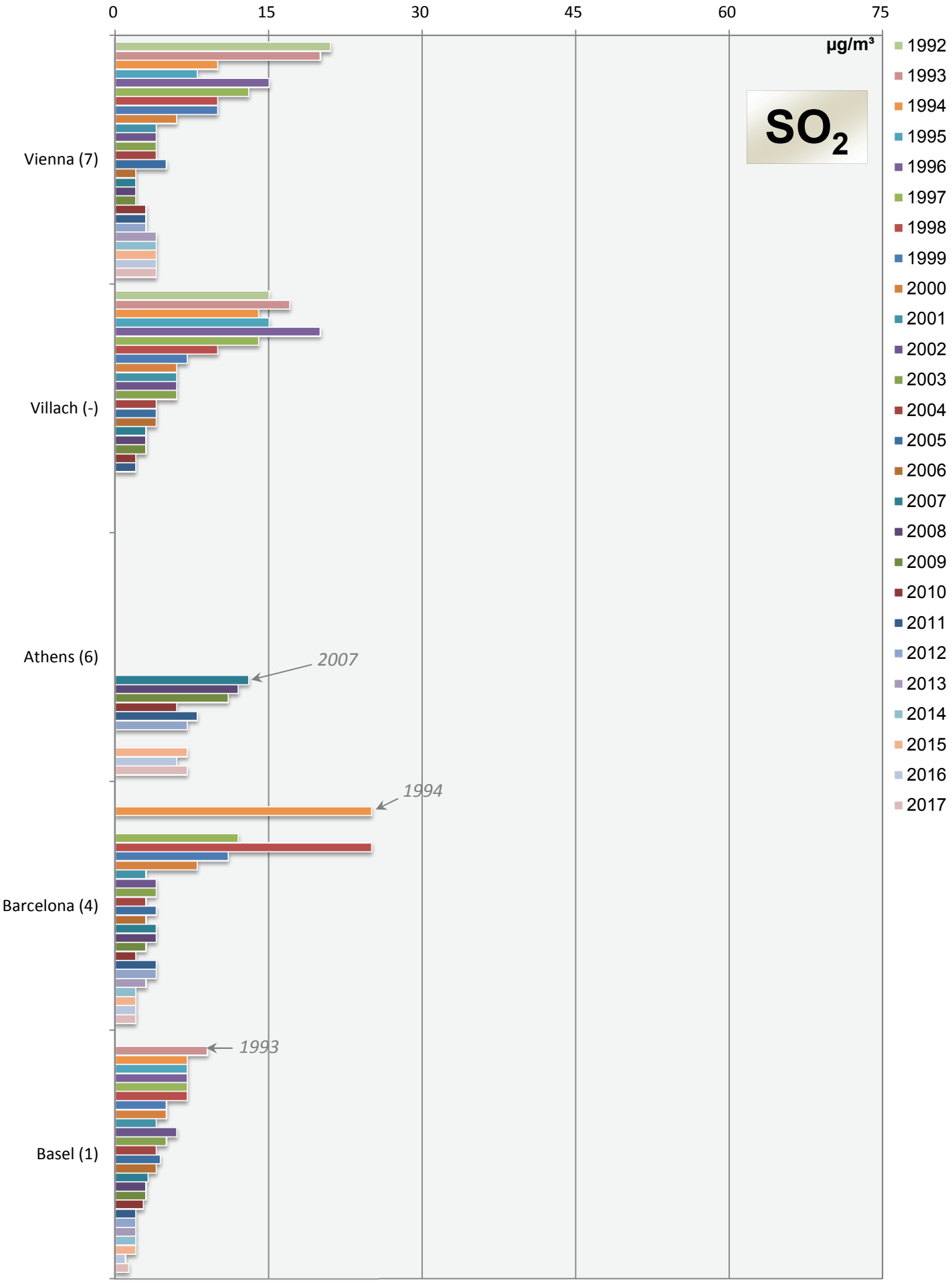
# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)



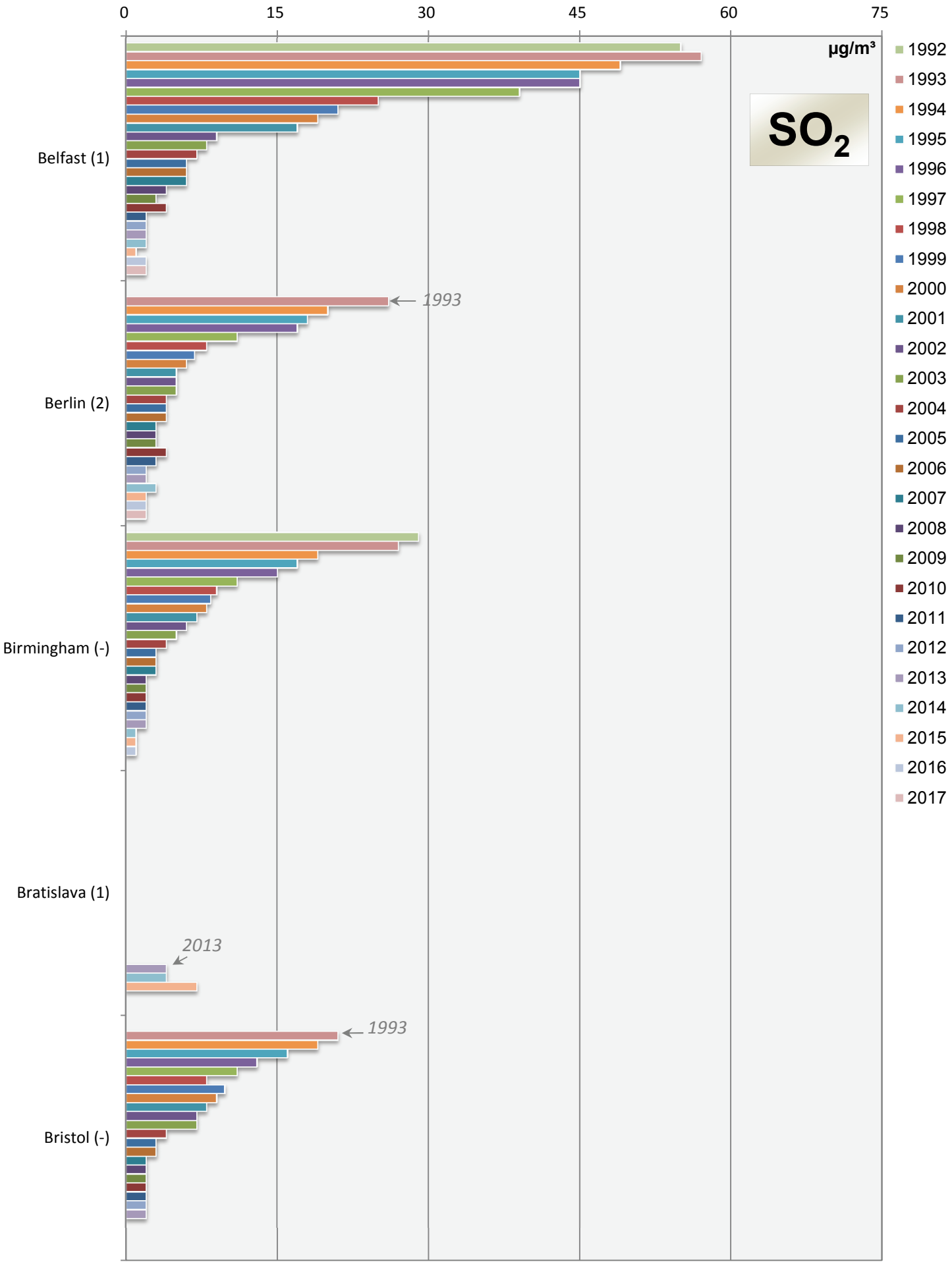
# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)



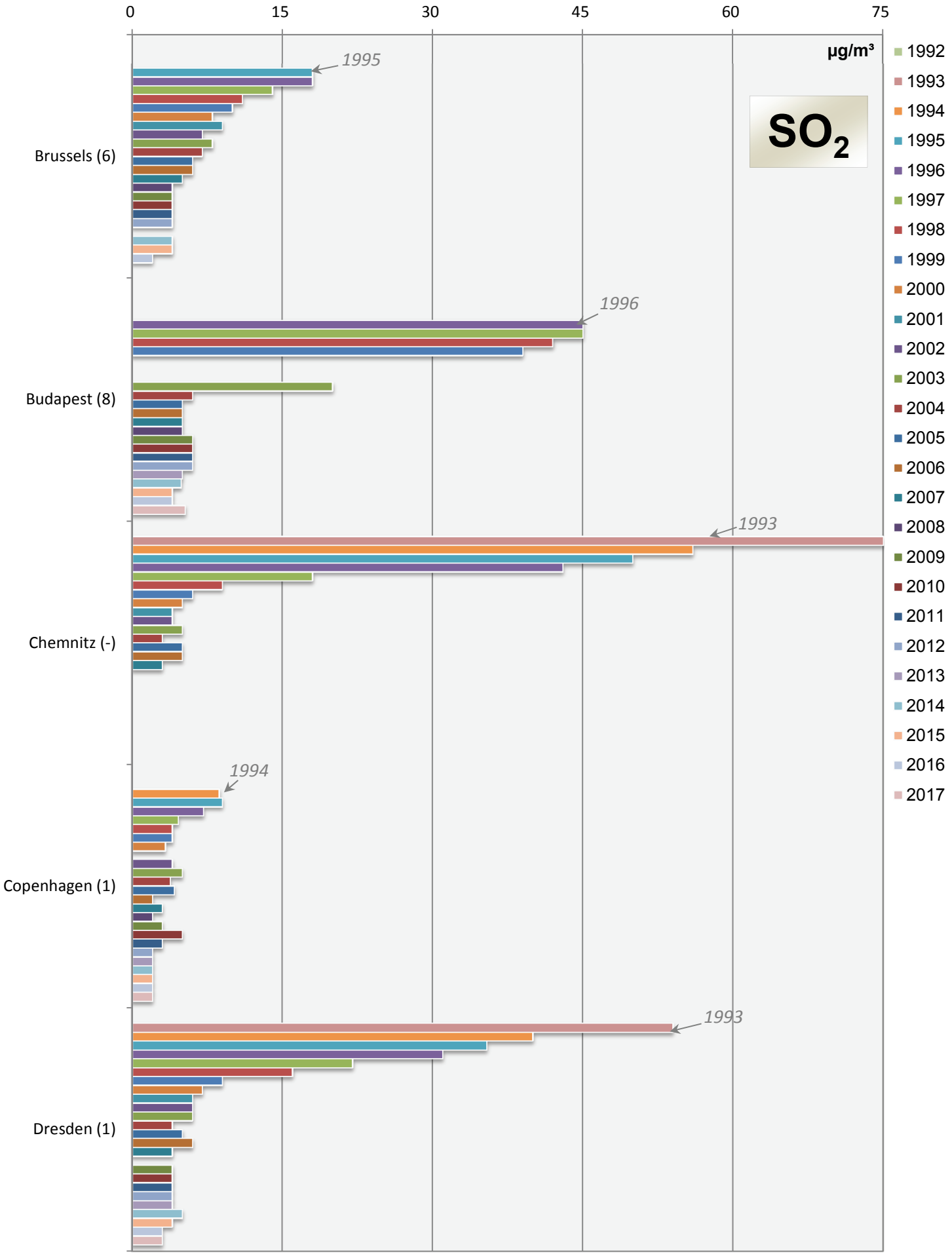
# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)



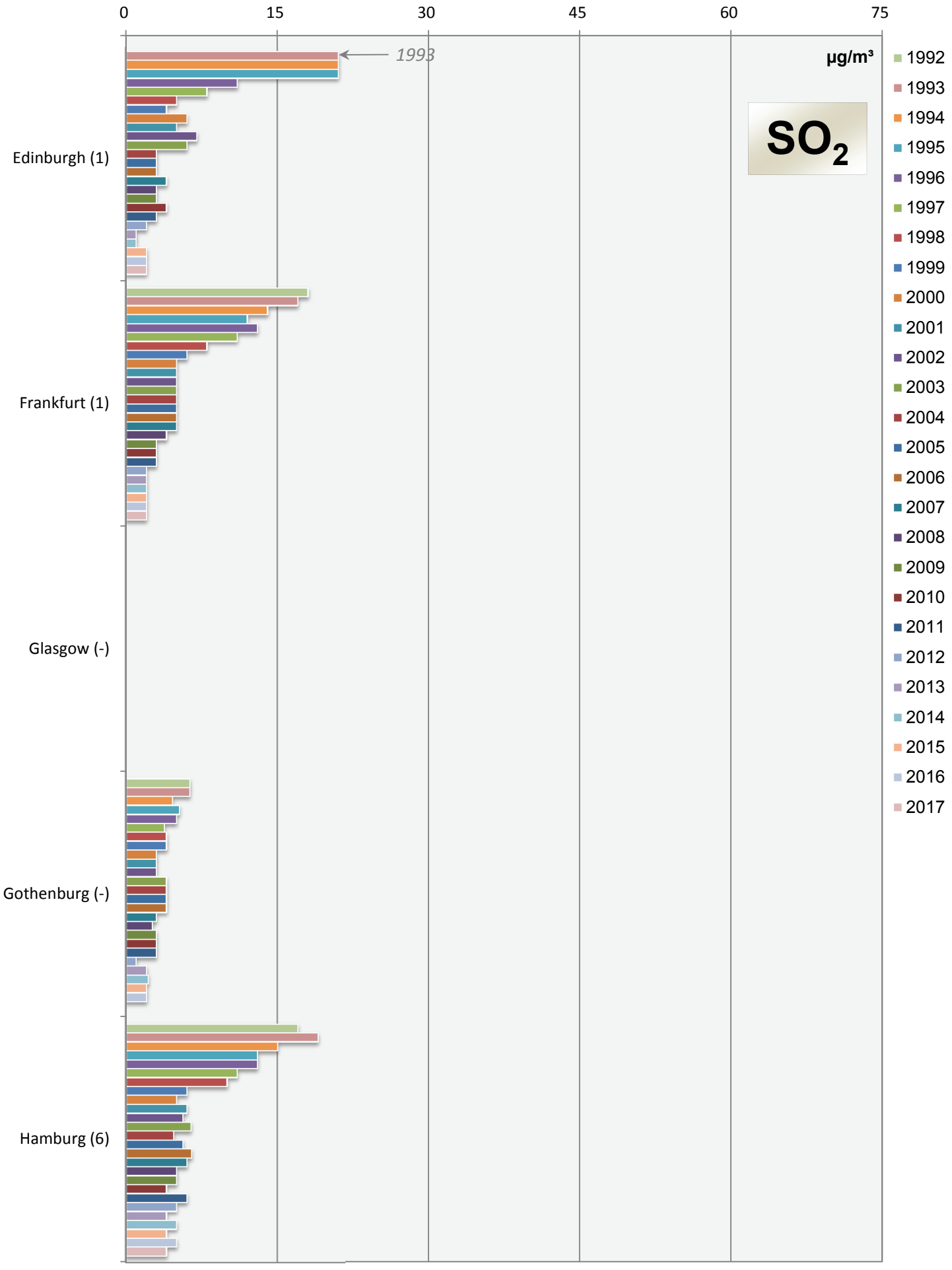
# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)

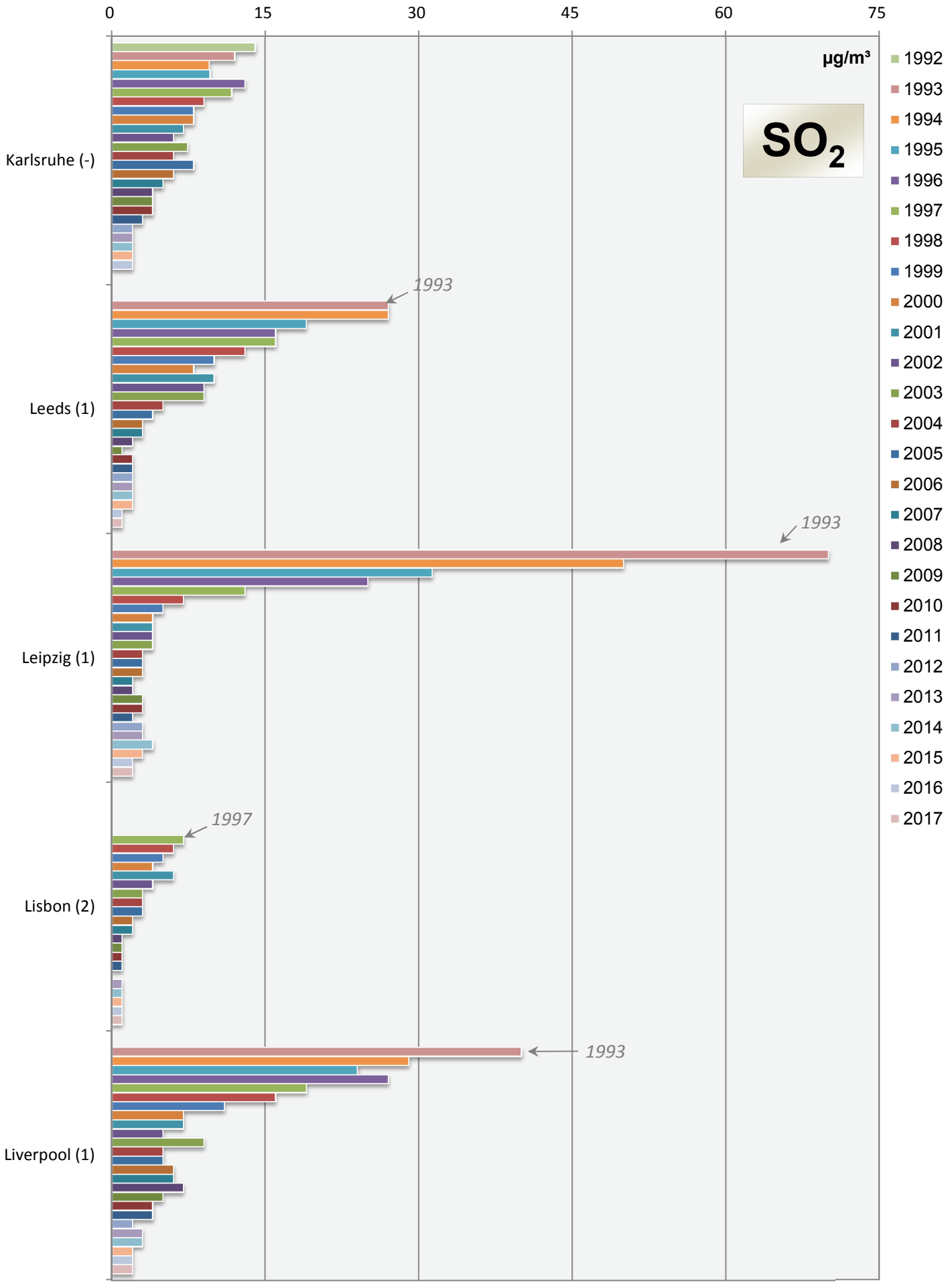


# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)

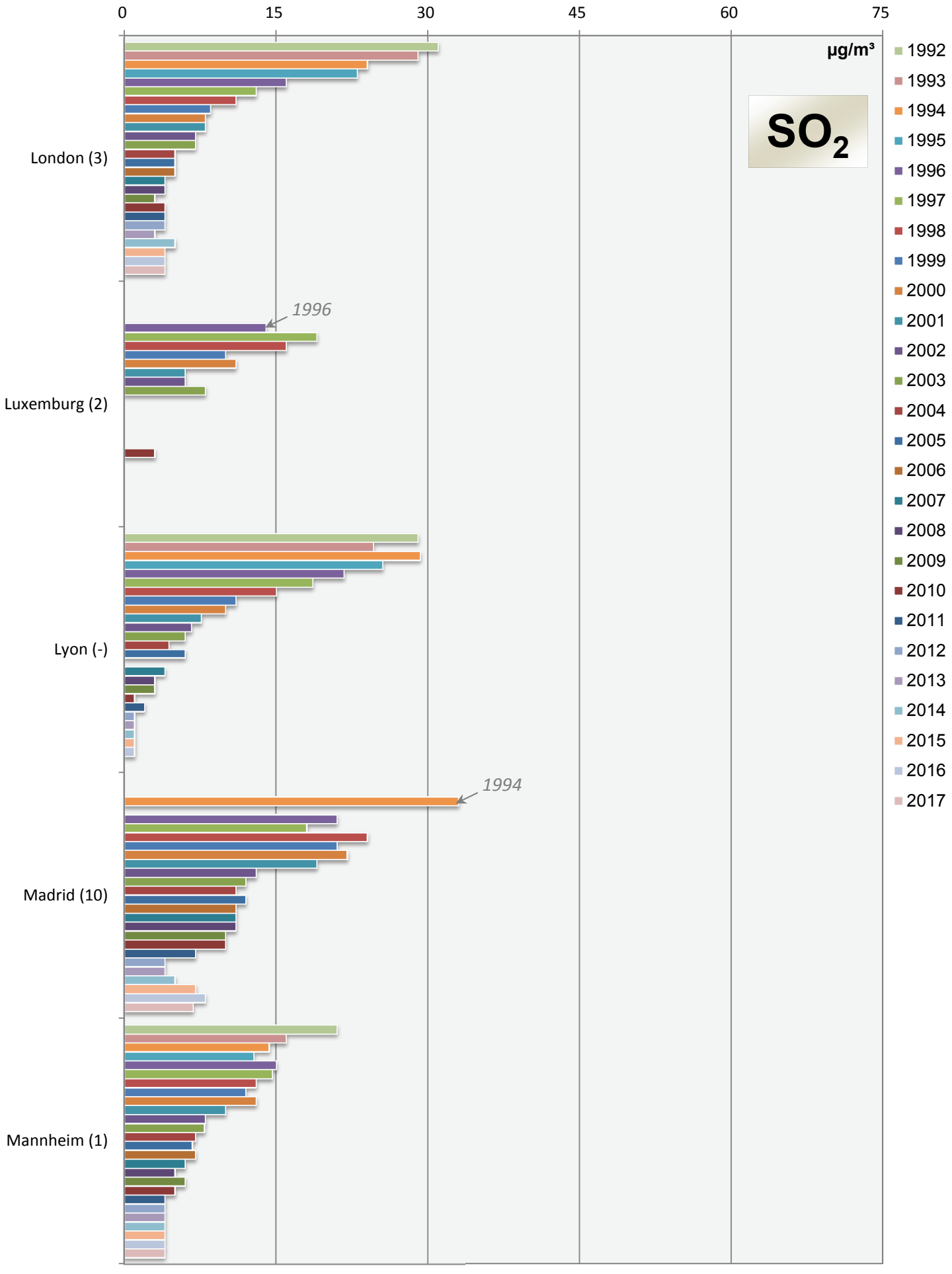


# Comparison of The Air Quality 1992 - 2017
## Annual mean values (mean of all monitoring stations)



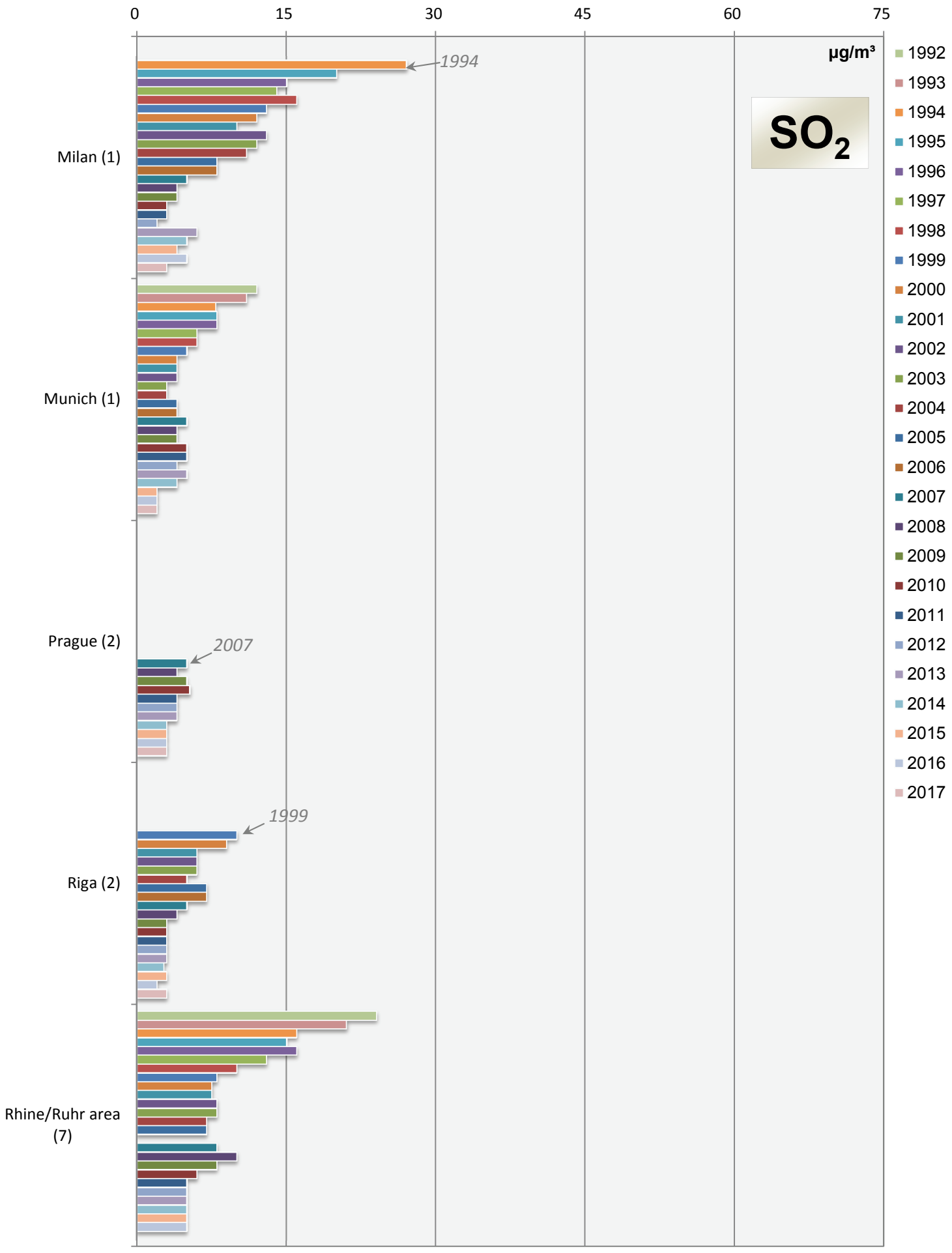
# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)



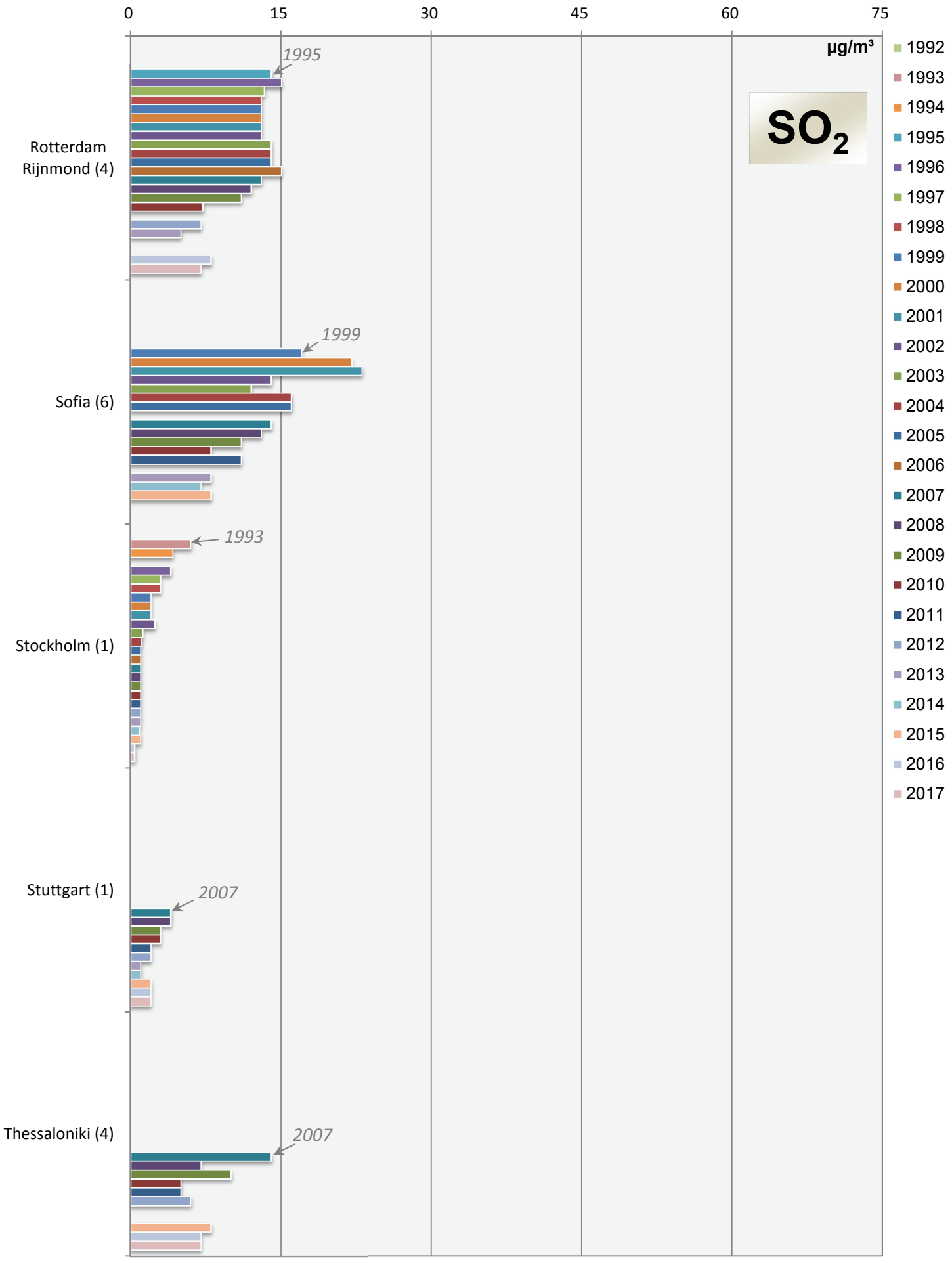
# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)

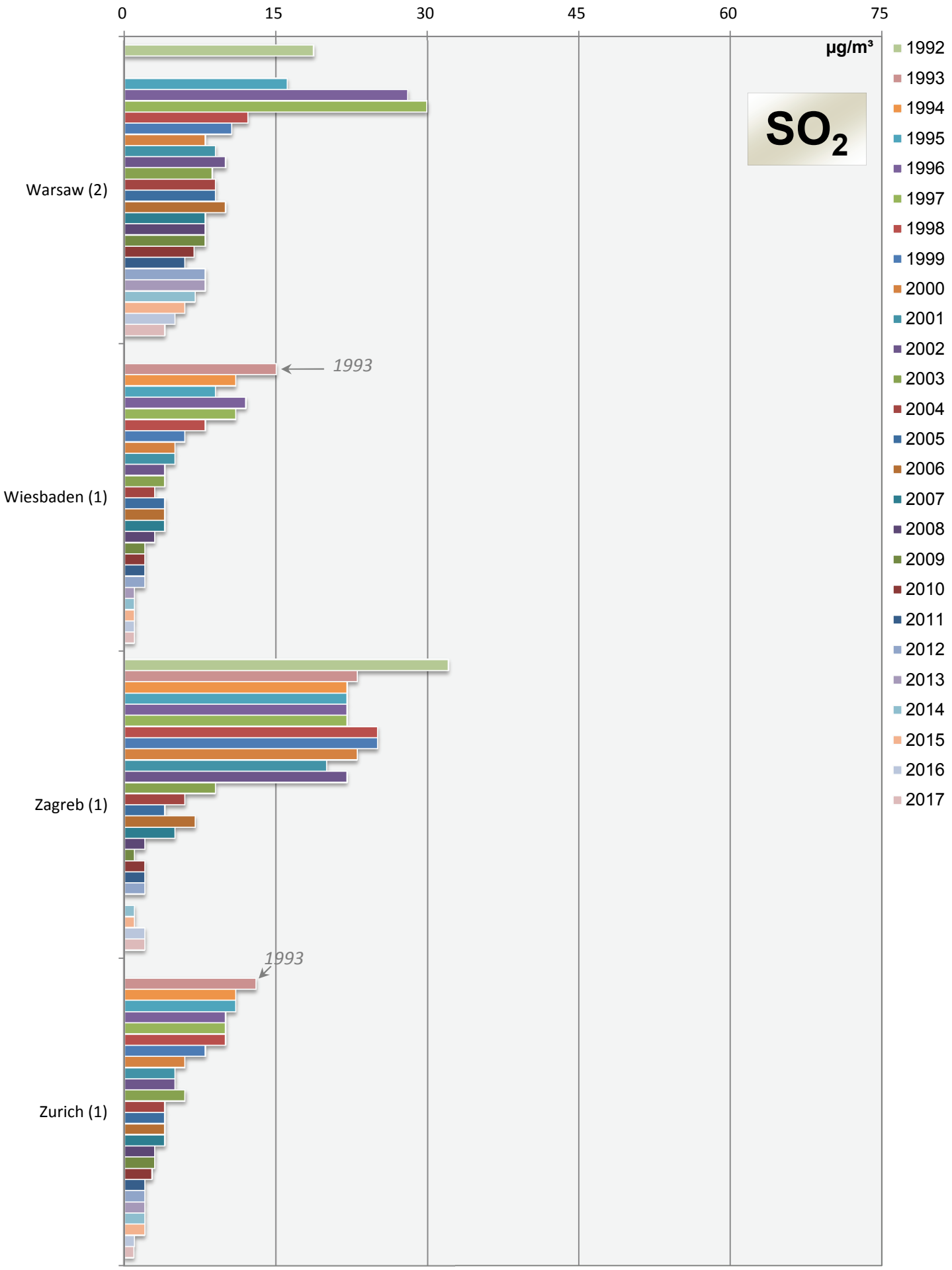


# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)

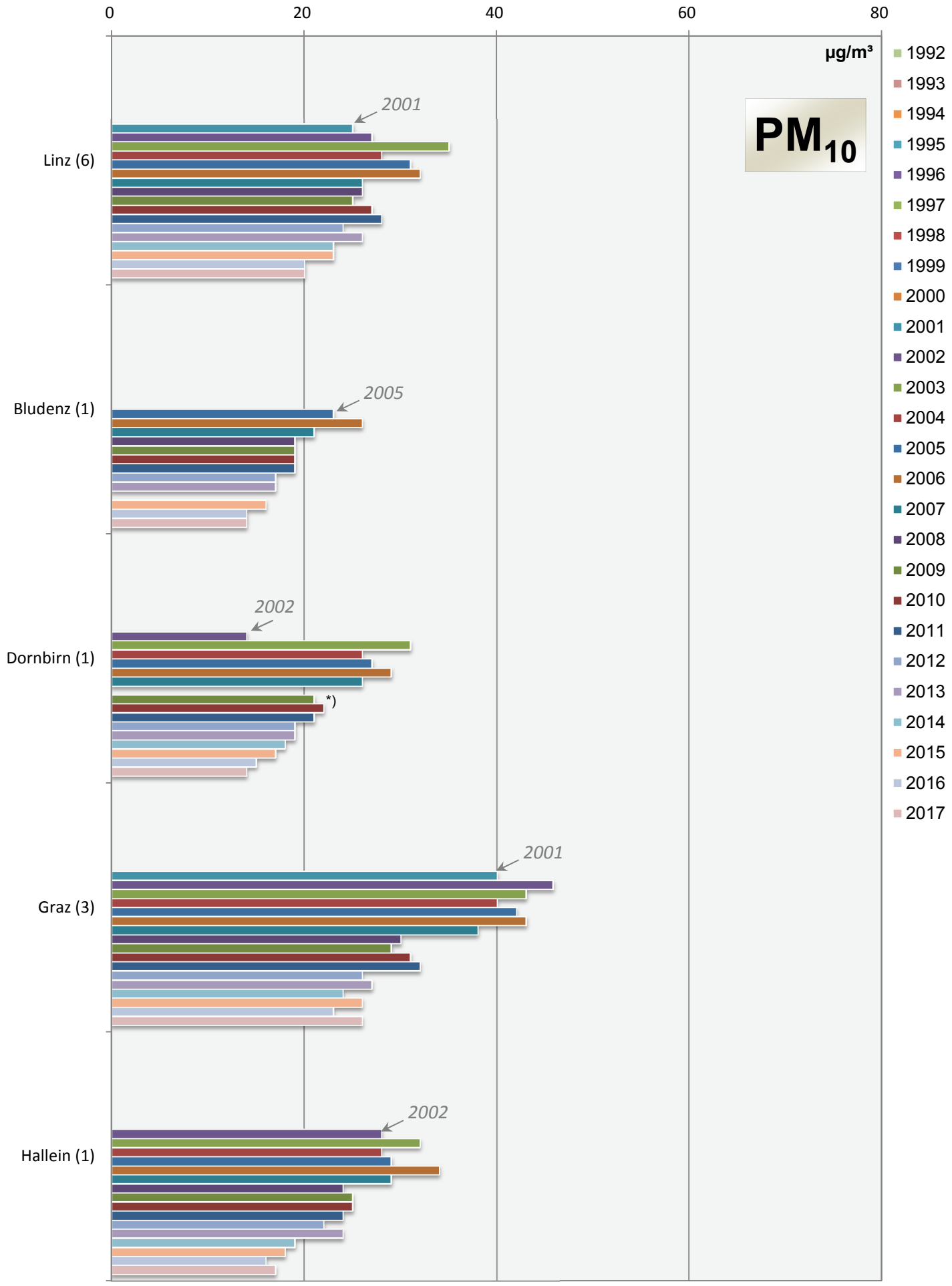


# Comparison of The Air Quality 1992 - 2017
## Annual mean values (mean of all monitoring stations)

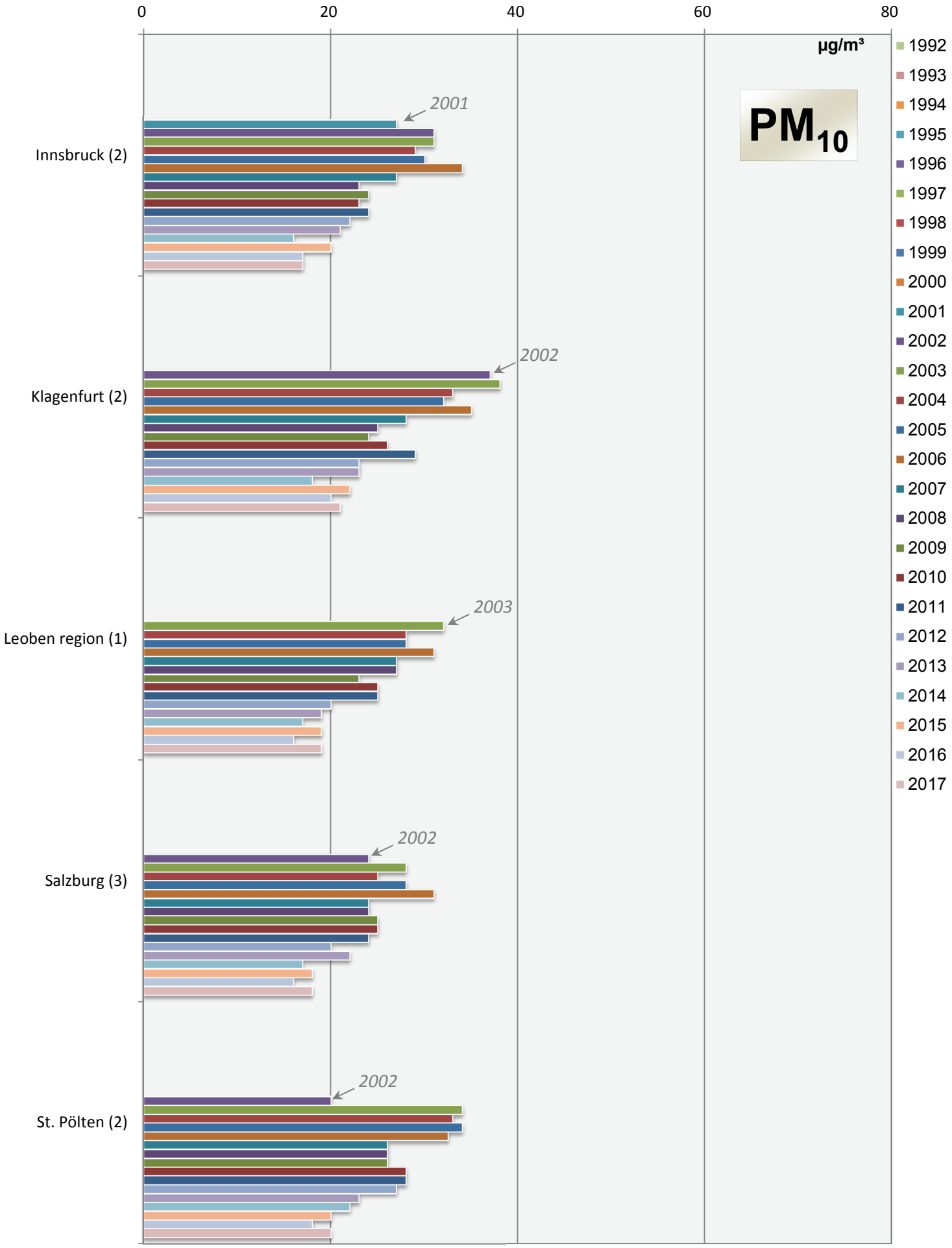


# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)

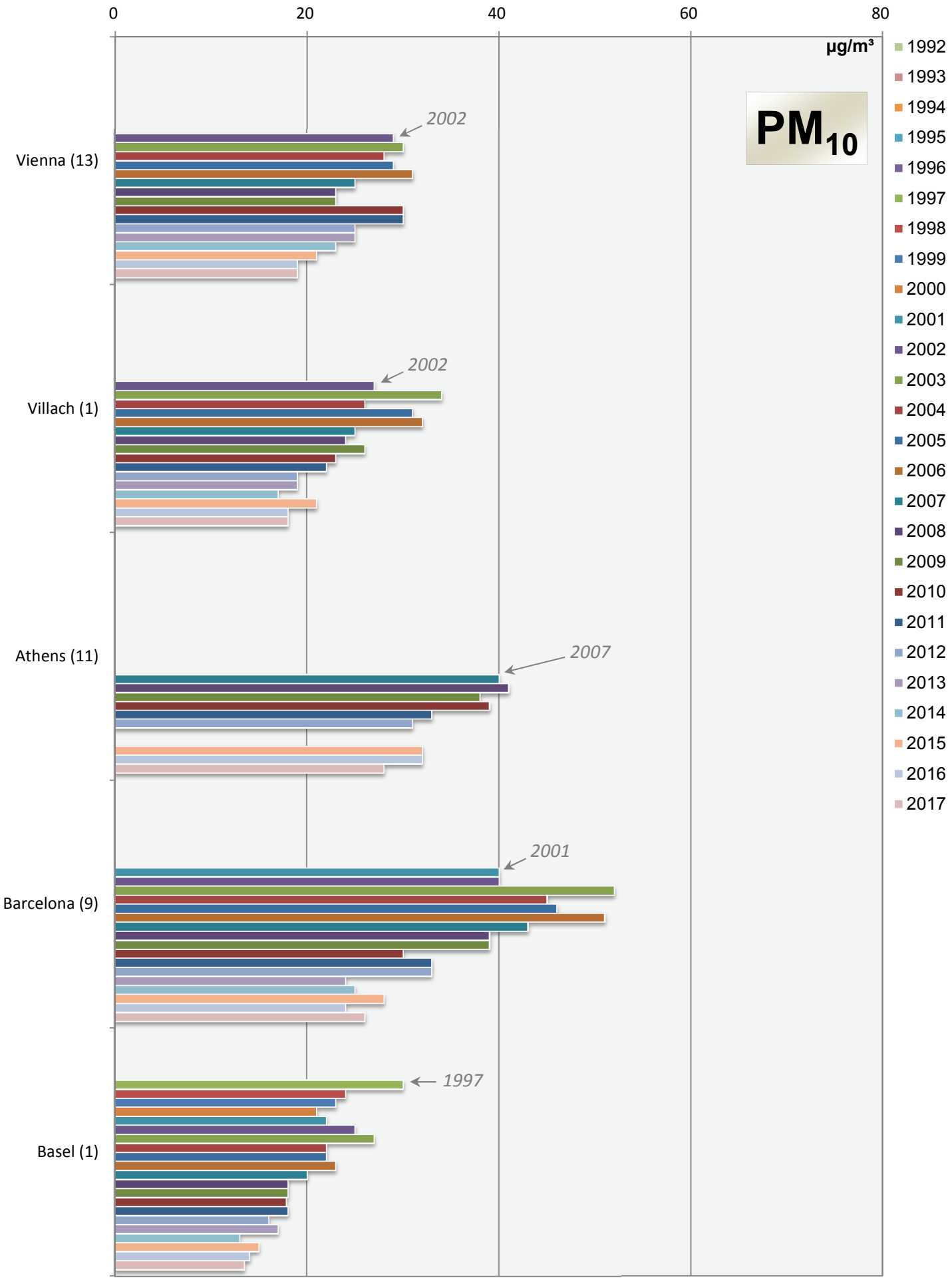


# Comparison of The Air Quality 1992 - 2017
## Annual mean values (mean of all monitoring stations)



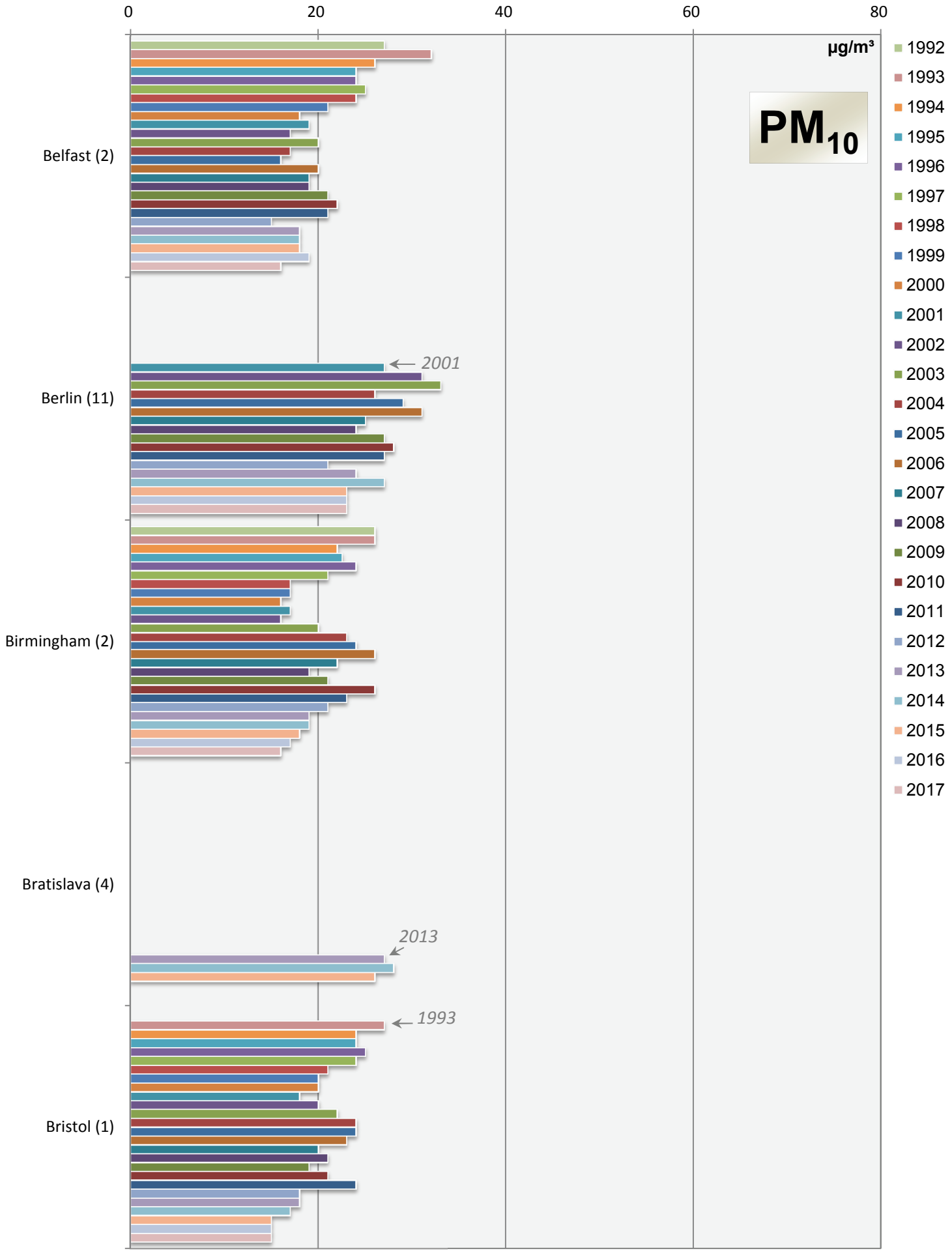
# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)



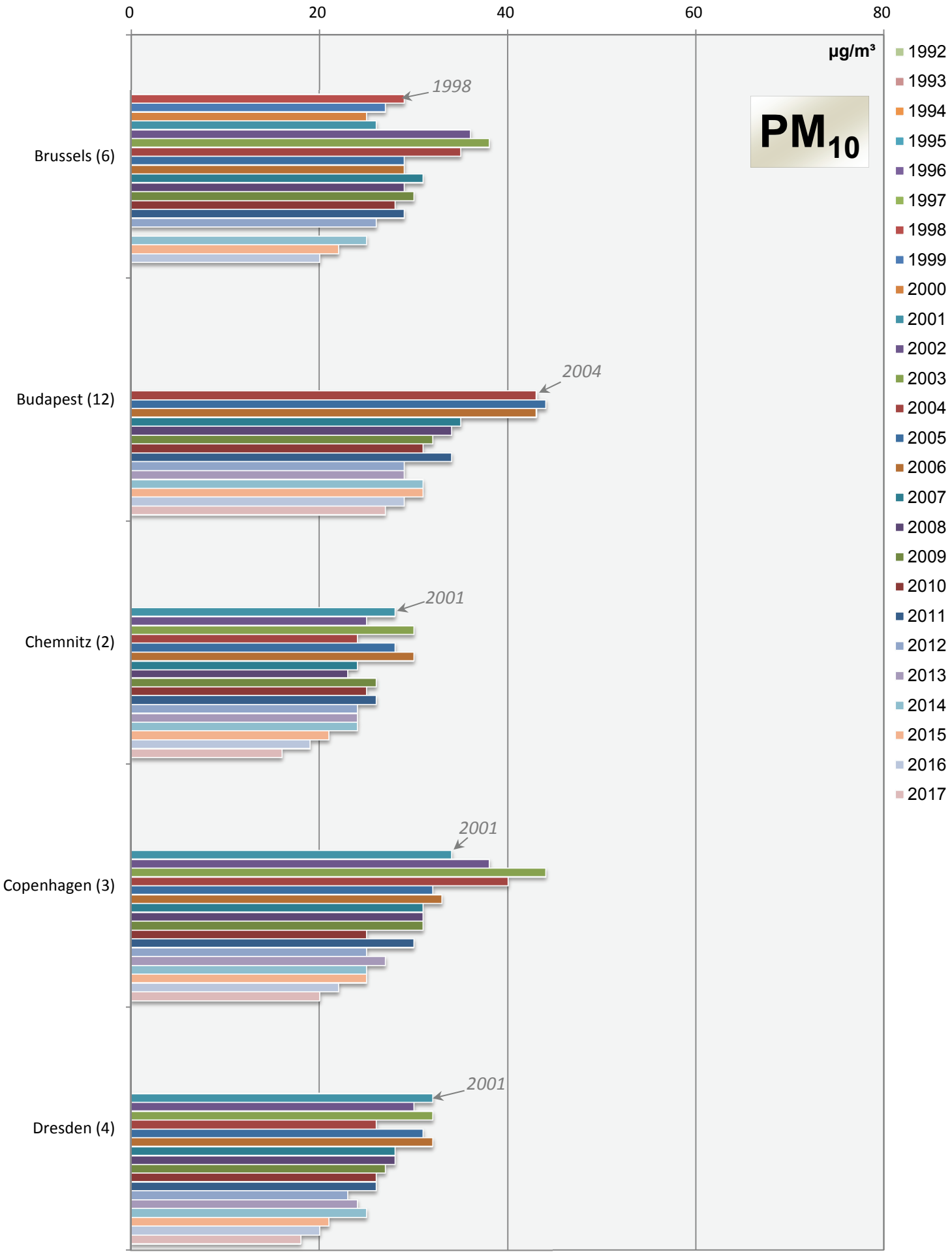
# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)

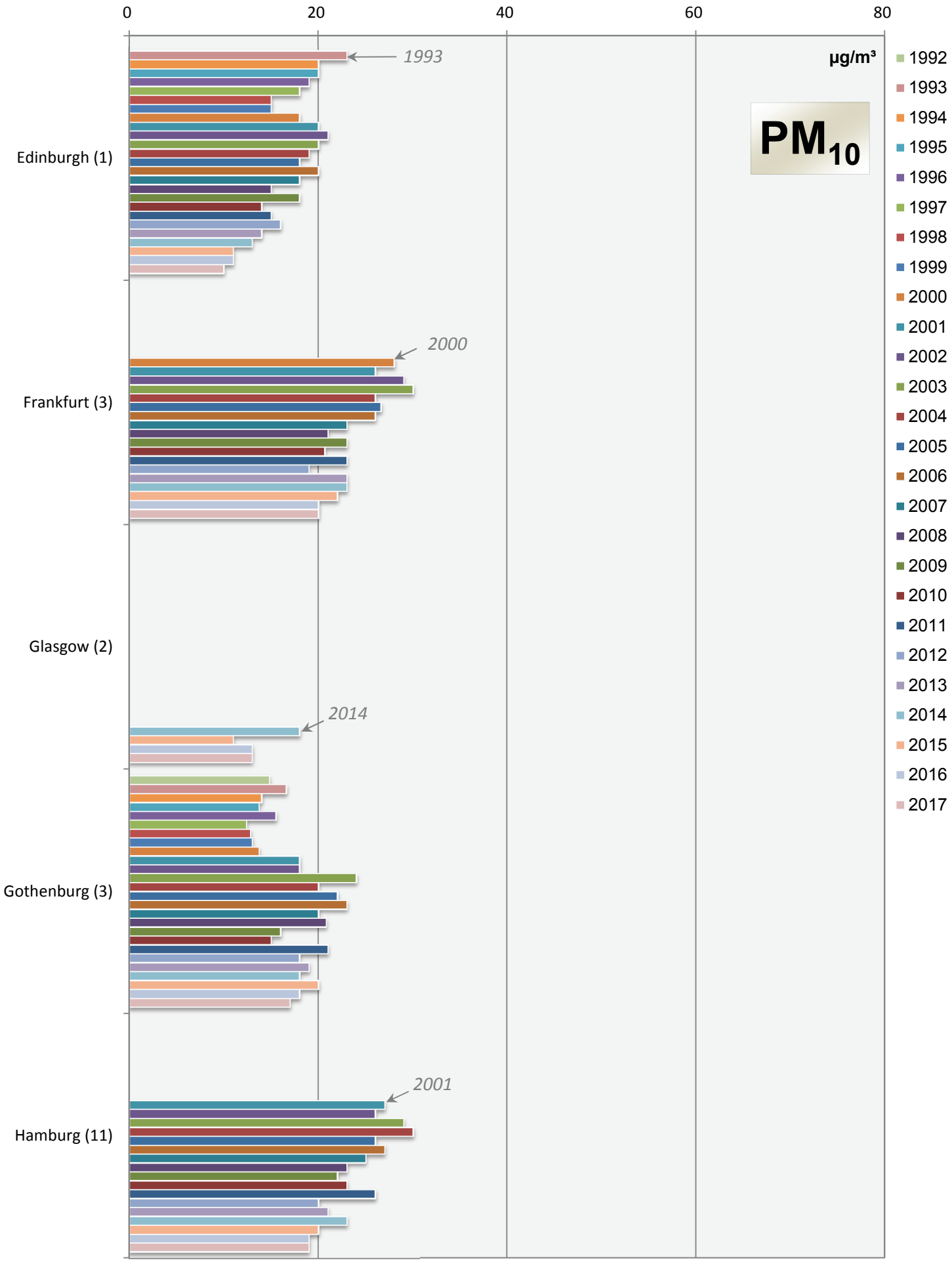


# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)

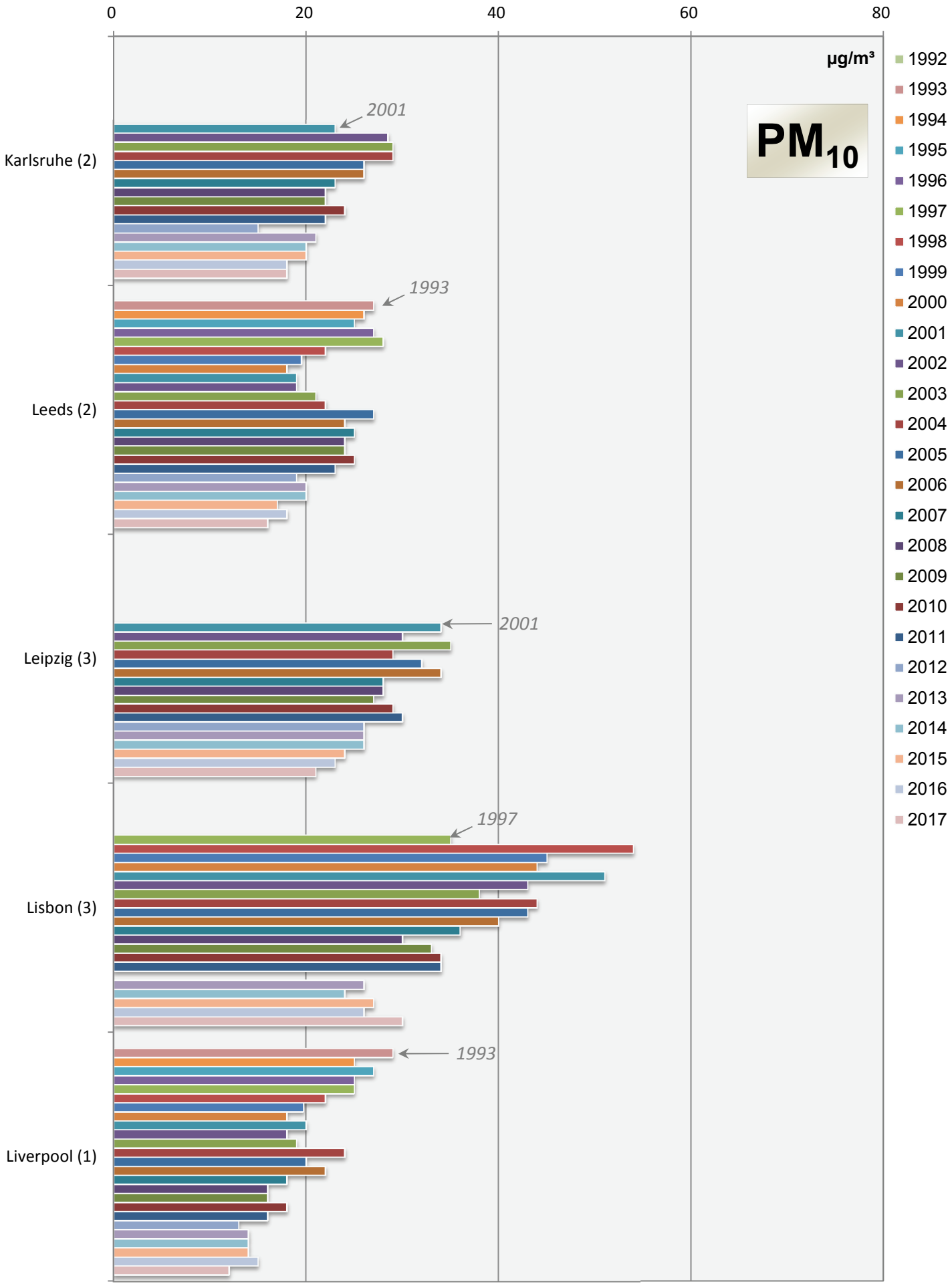


# Comparison of The Air Quality 1992 - 2017
## Annual mean values (mean of all monitoring stations)



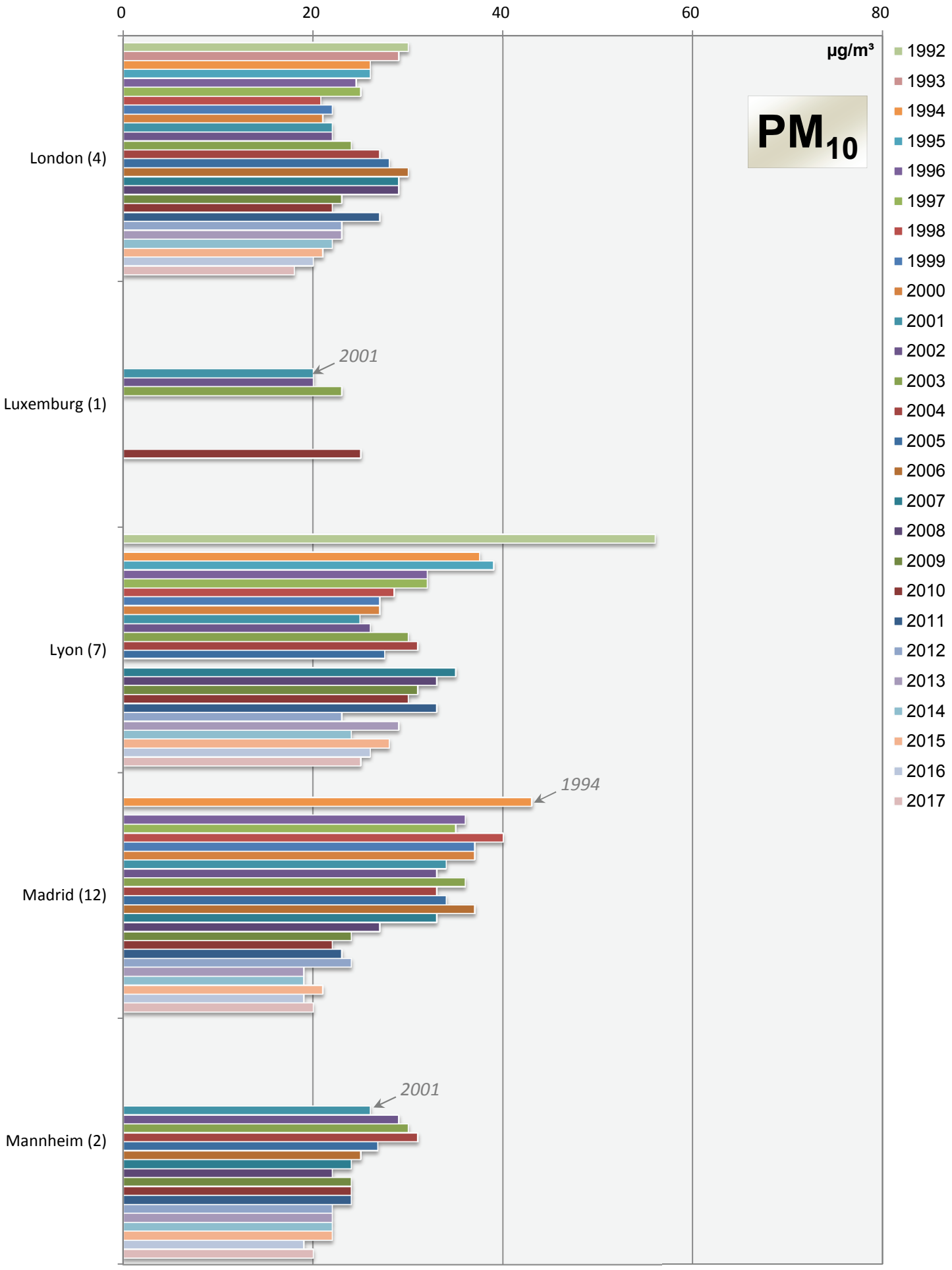
# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)



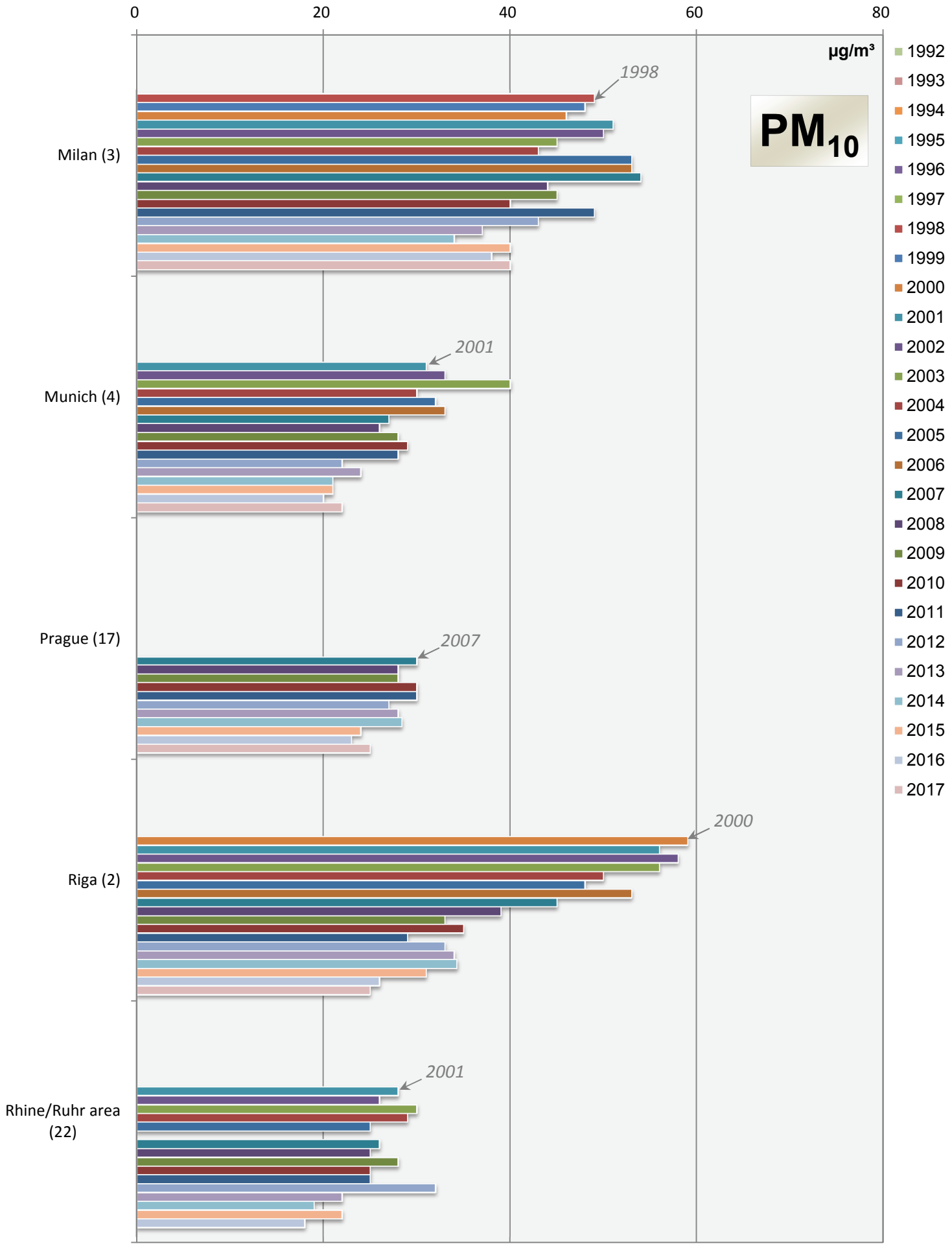
# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)



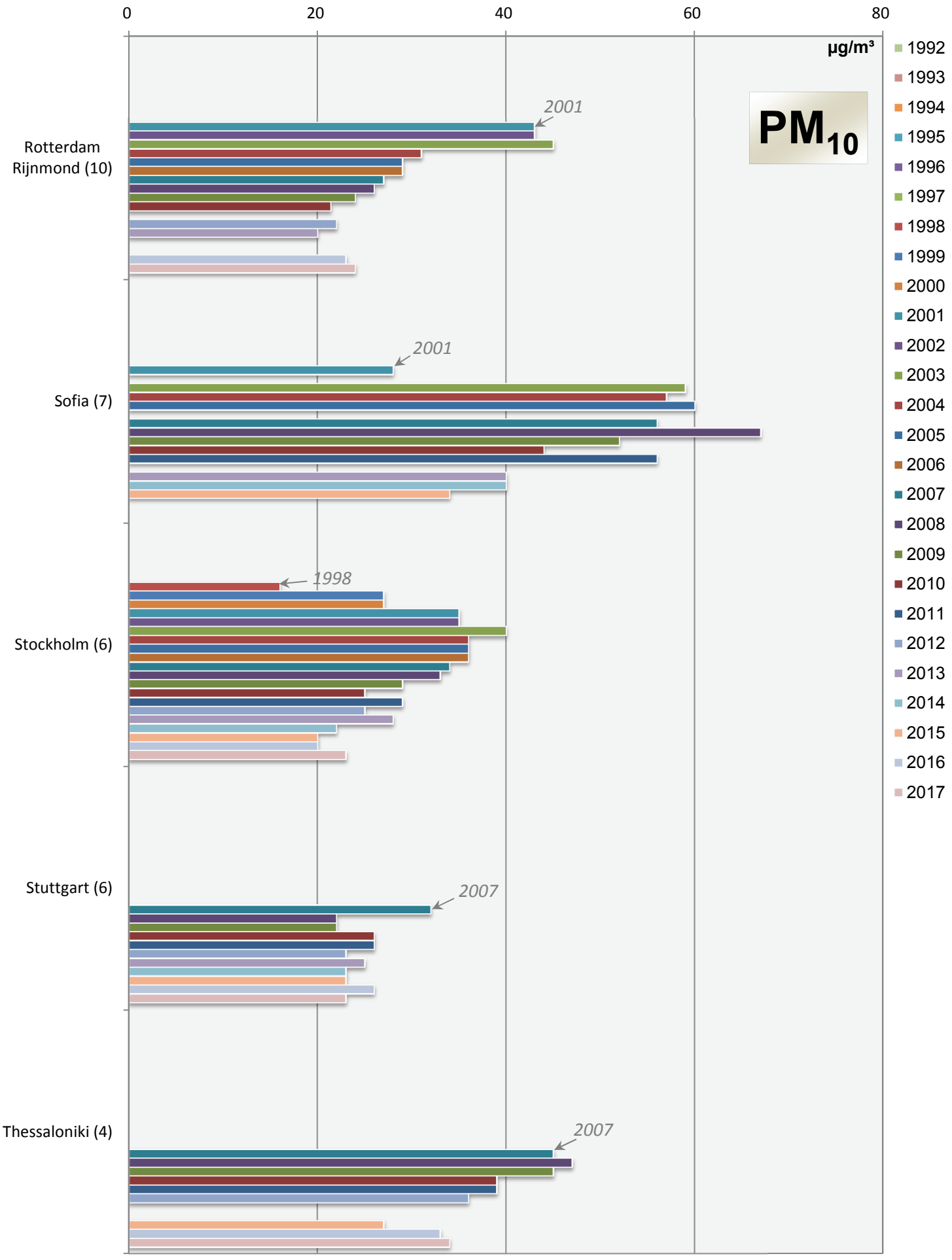
# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)



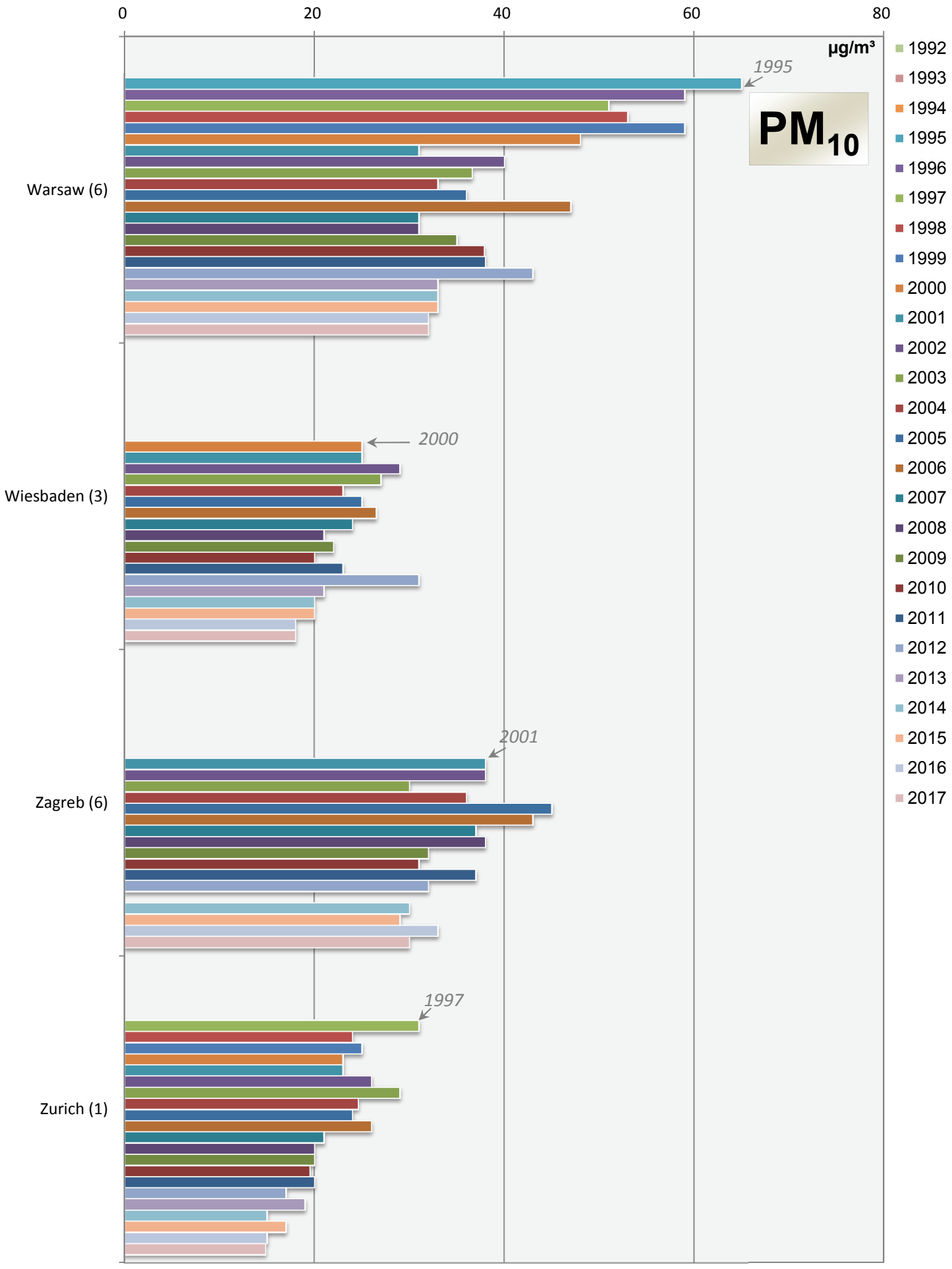
# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)



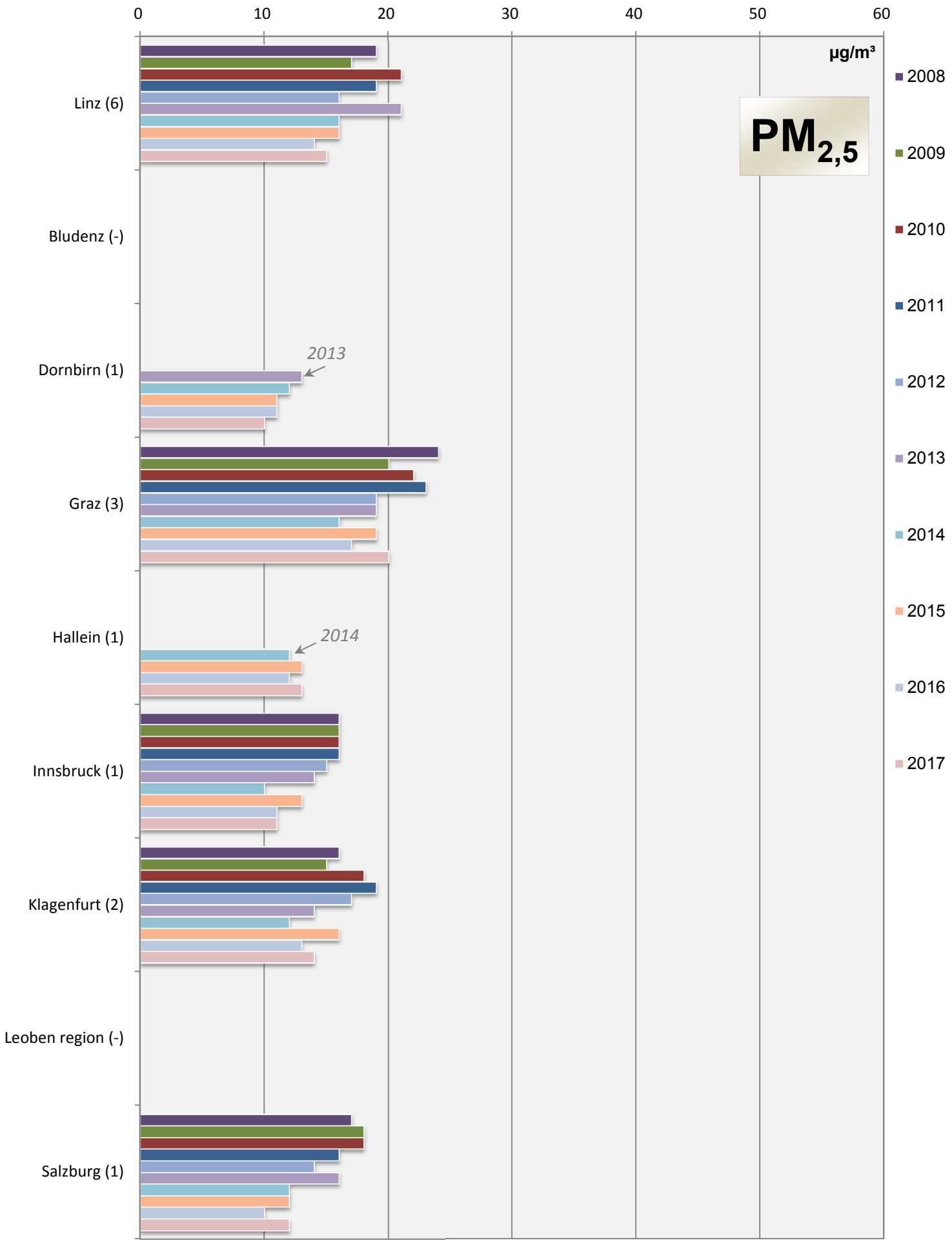
# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)



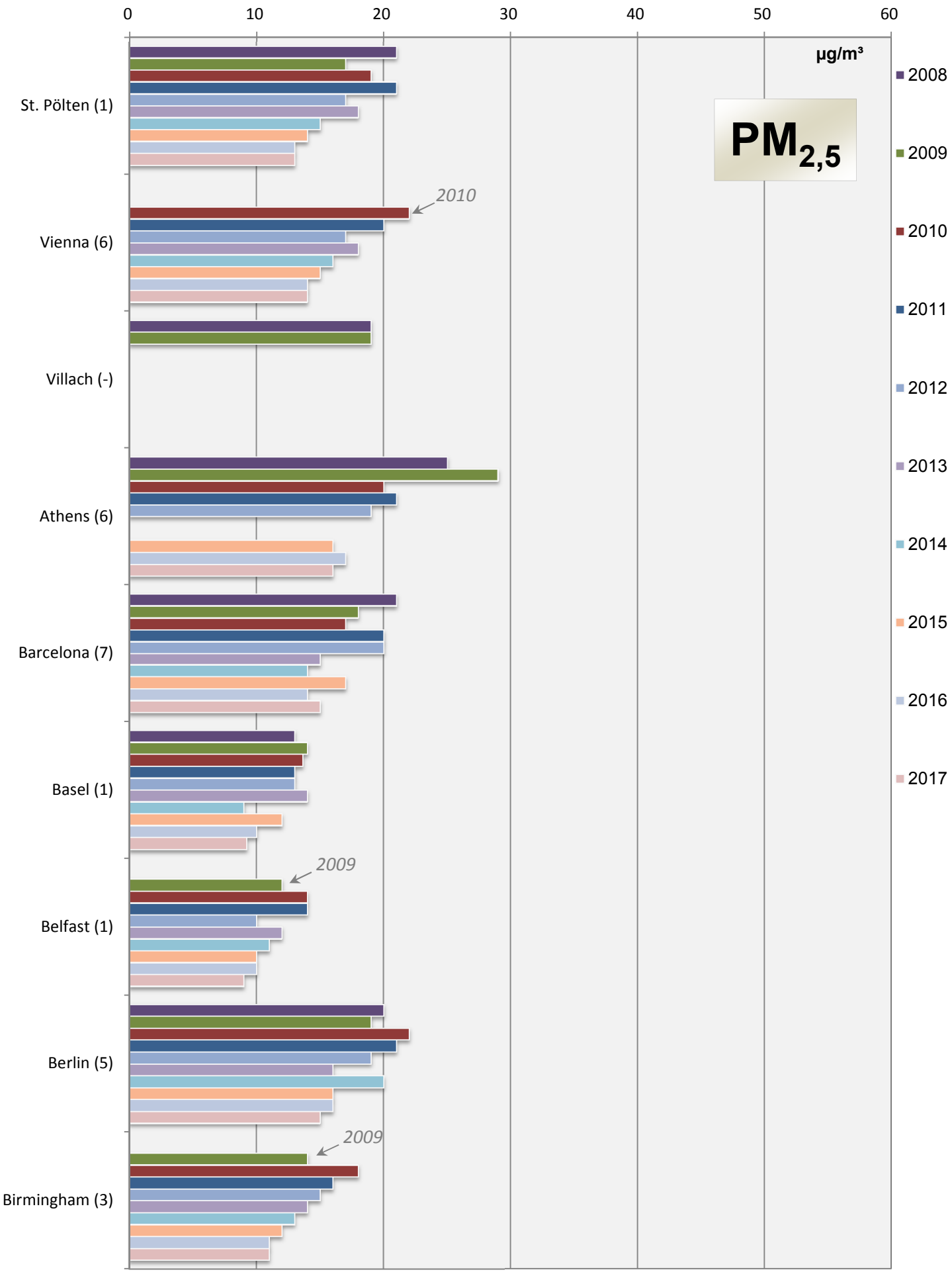
# Comparison of The Air Quality 2008 - 2017

## Annual mean values (mean of all monitoring stations)



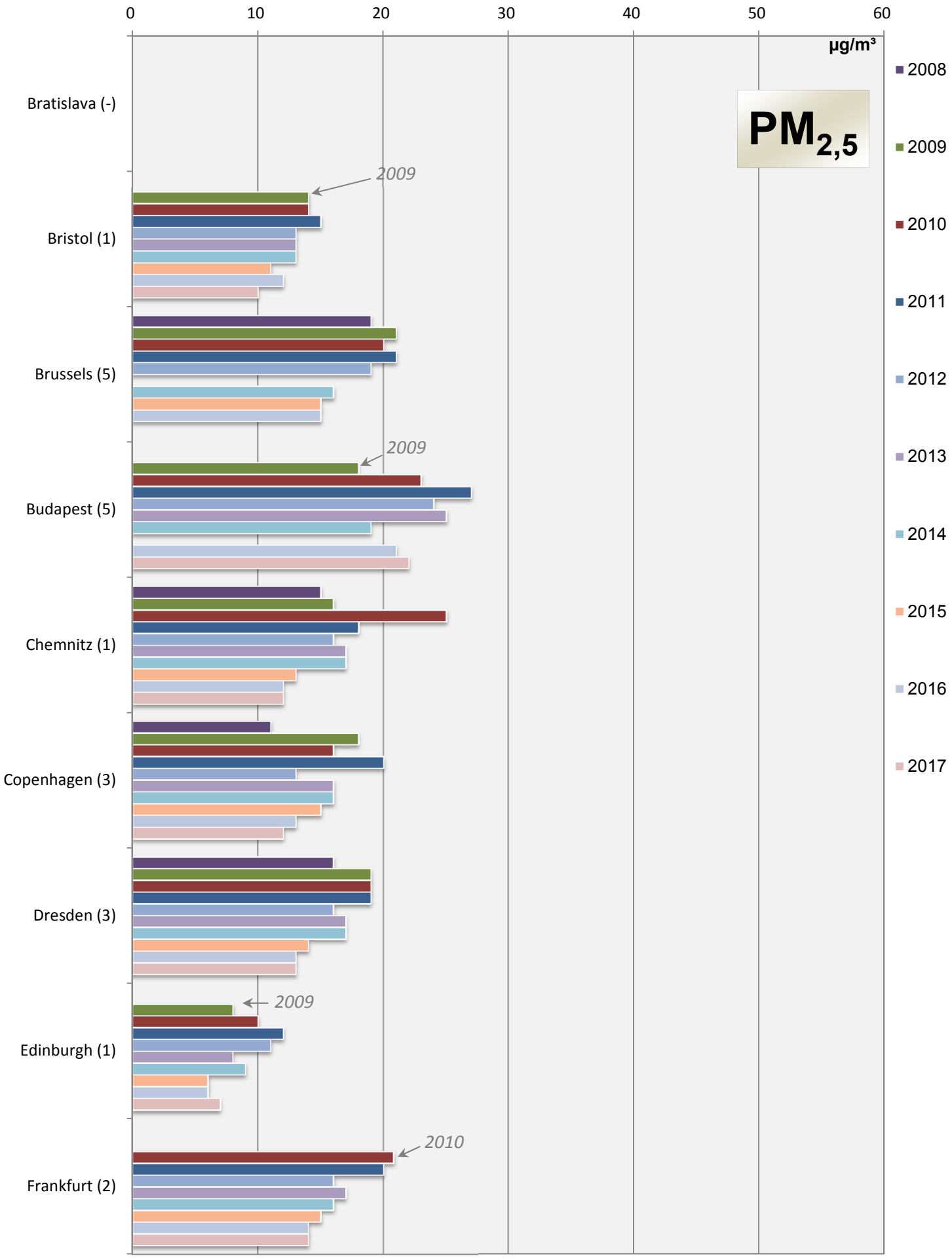
# Comparison of The Air Quality 2008 - 2017

## Annual mean values (mean of all monitoring stations)



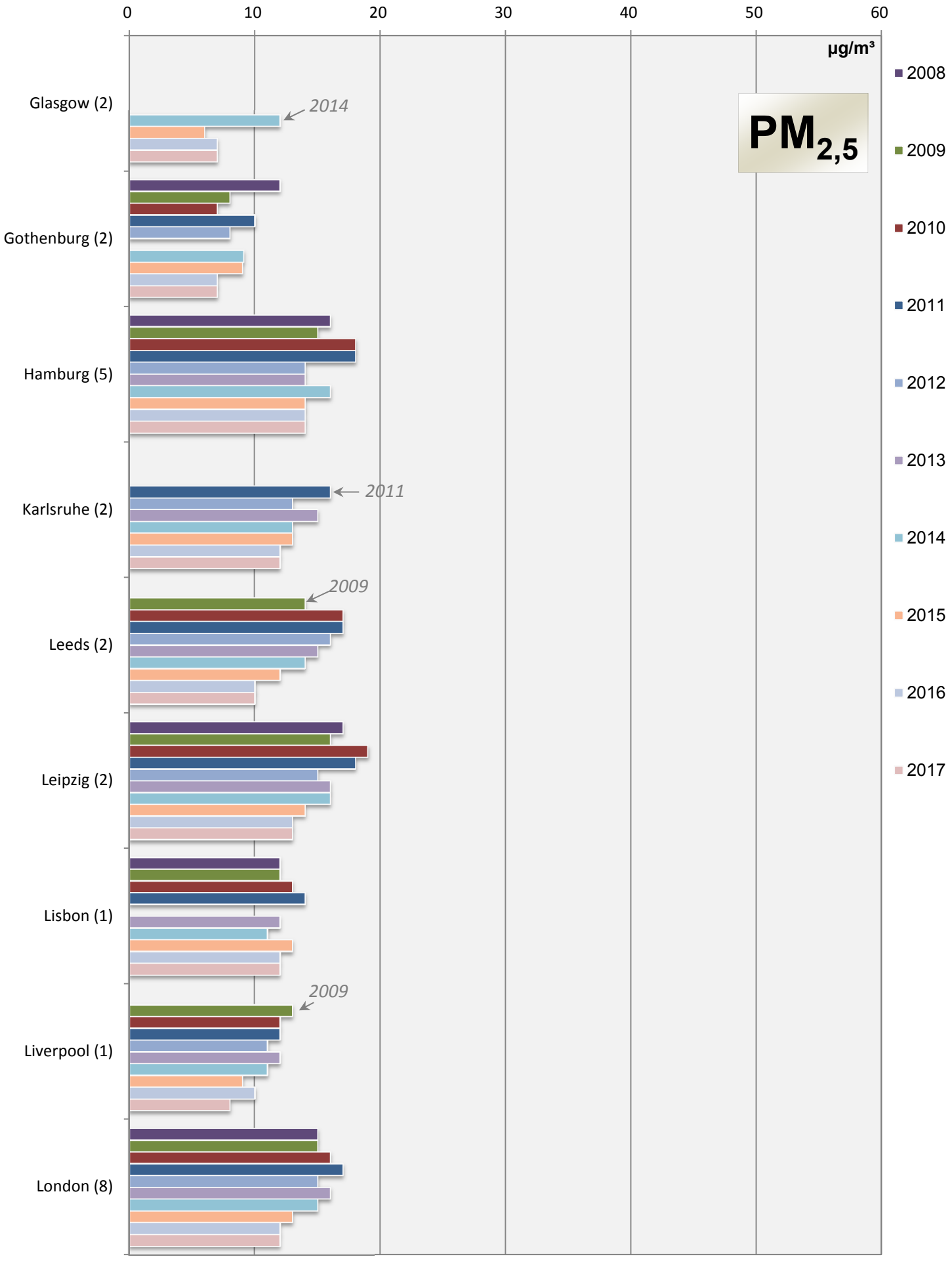
# Comparison of The Air Quality 2008 - 2017

## Annual mean values (mean of all monitoring stations)



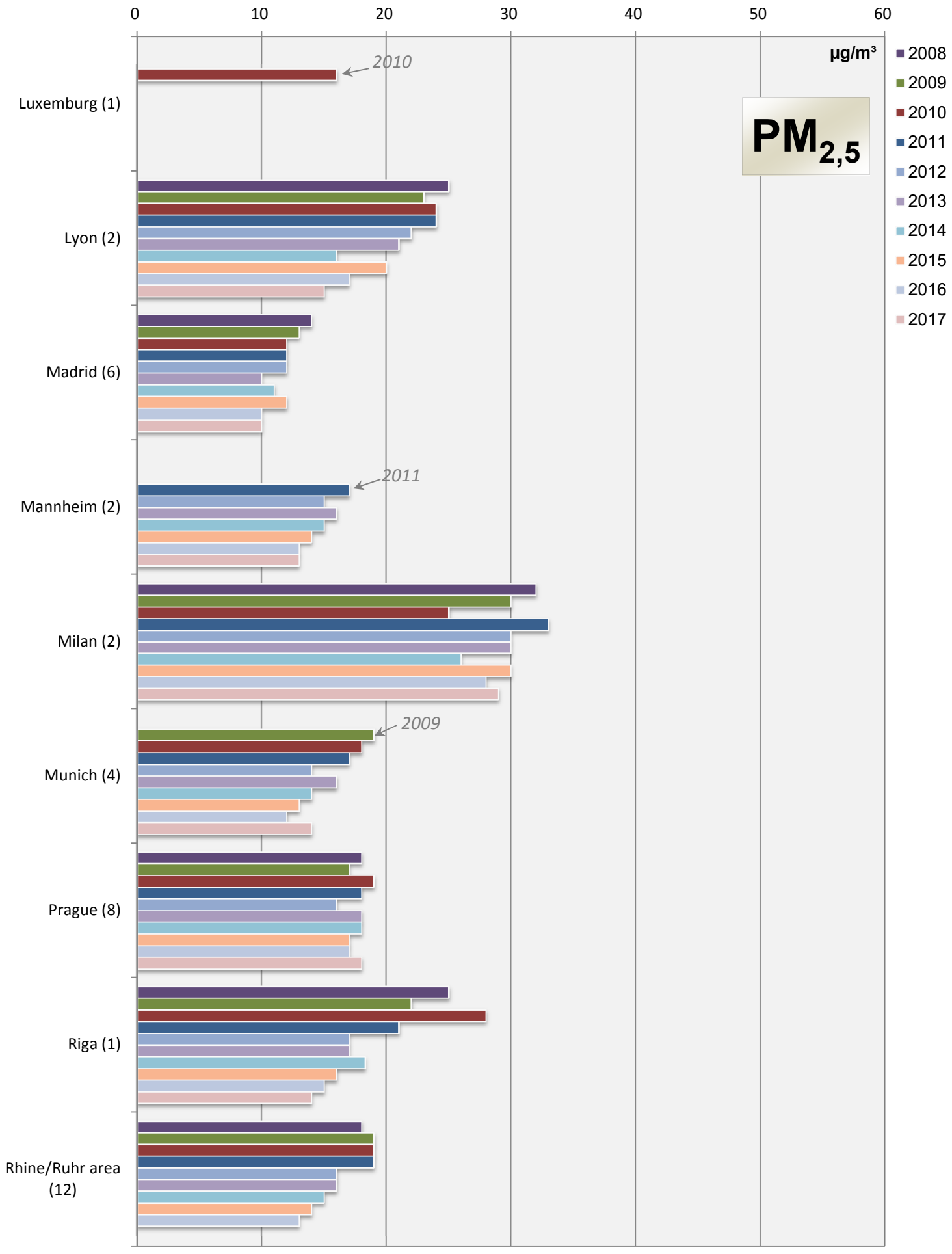
# Comparison of The Air Quality 2008 - 2017

## Annual mean values (mean of all monitoring stations)



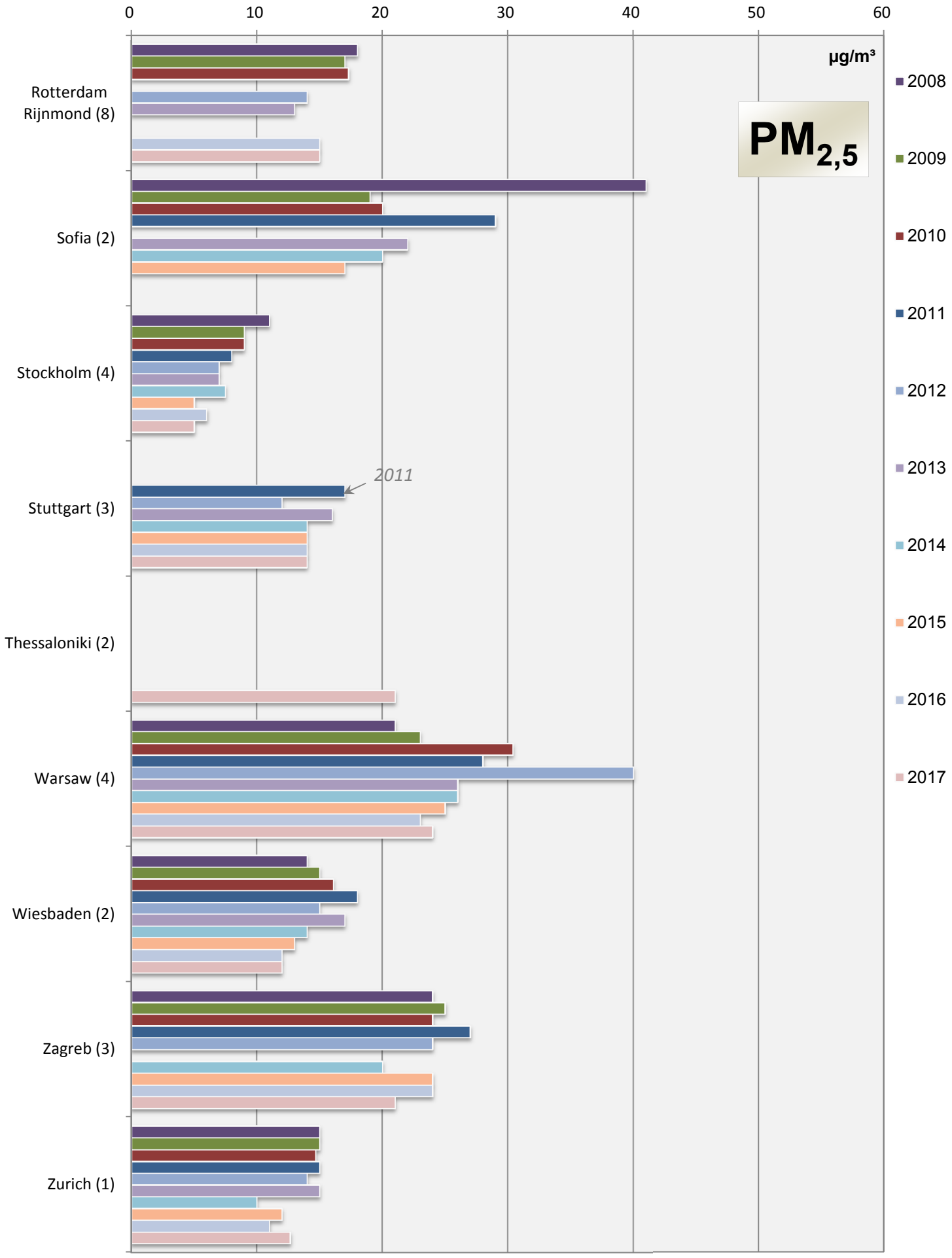
# Comparison of The Air Quality 2008 - 2017

## Annual mean values (mean of all monitoring stations)



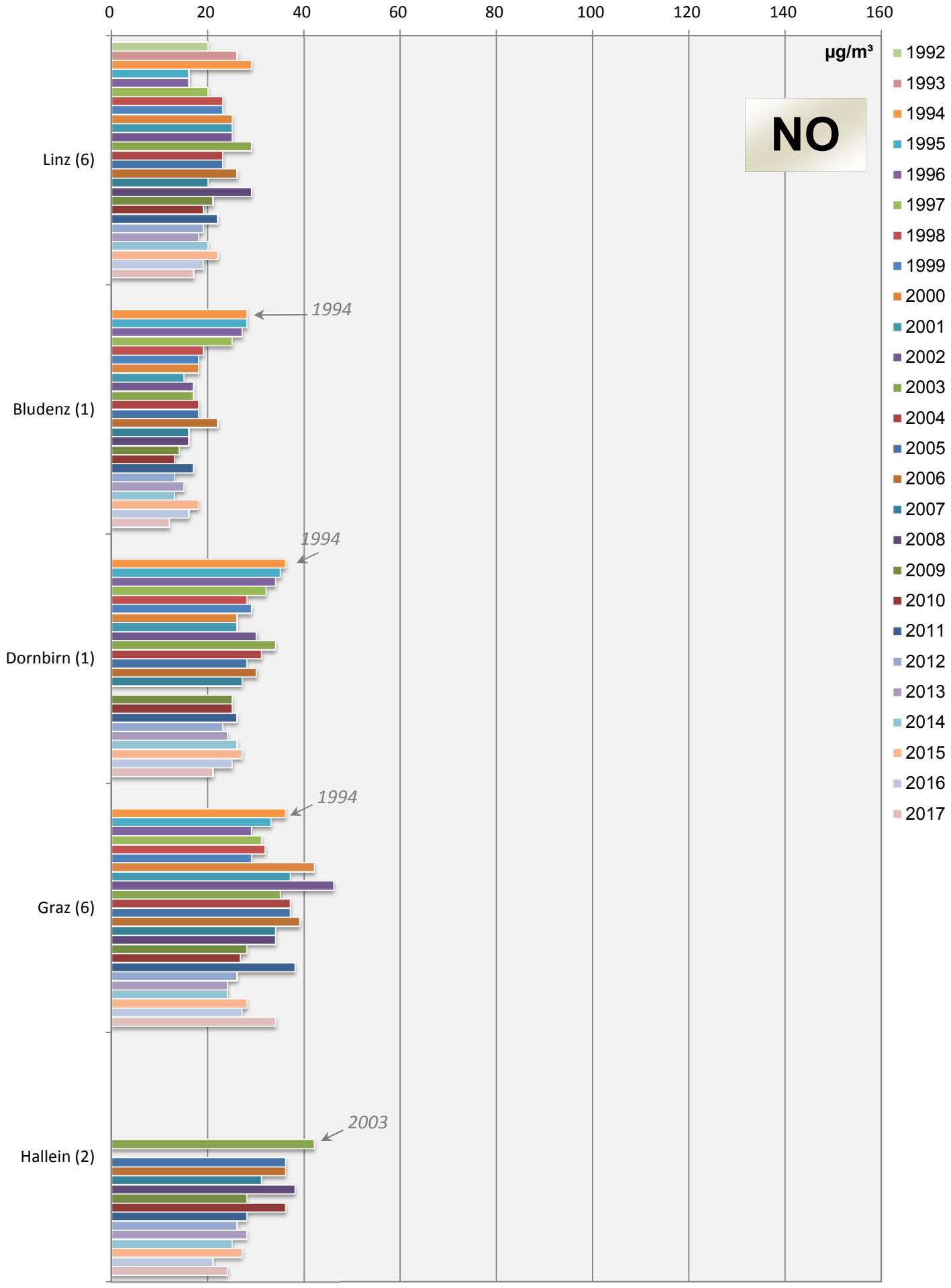
# Comparison of The Air Quality 2008 - 2017

## Annual mean values (mean of all monitoring stations)



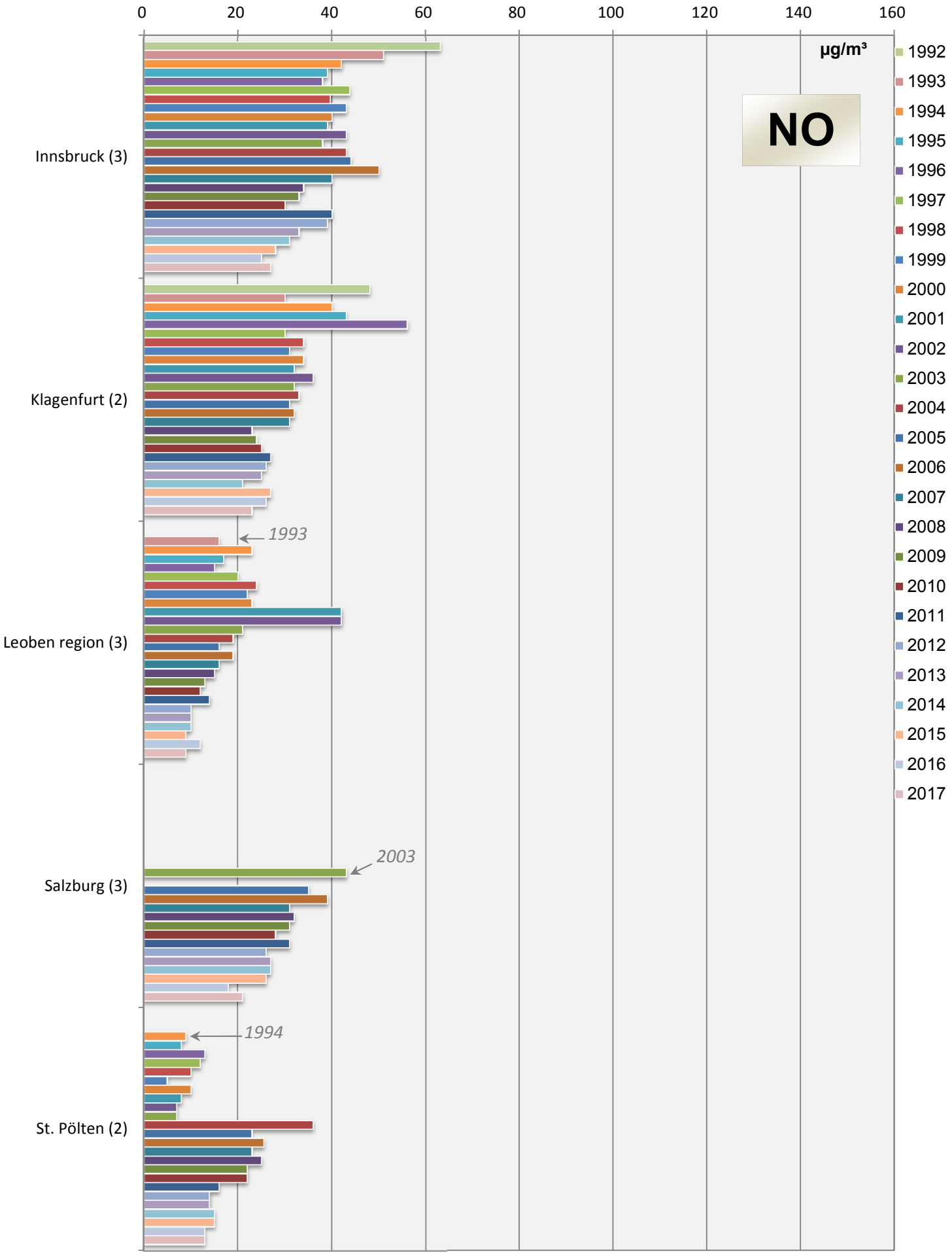
# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)



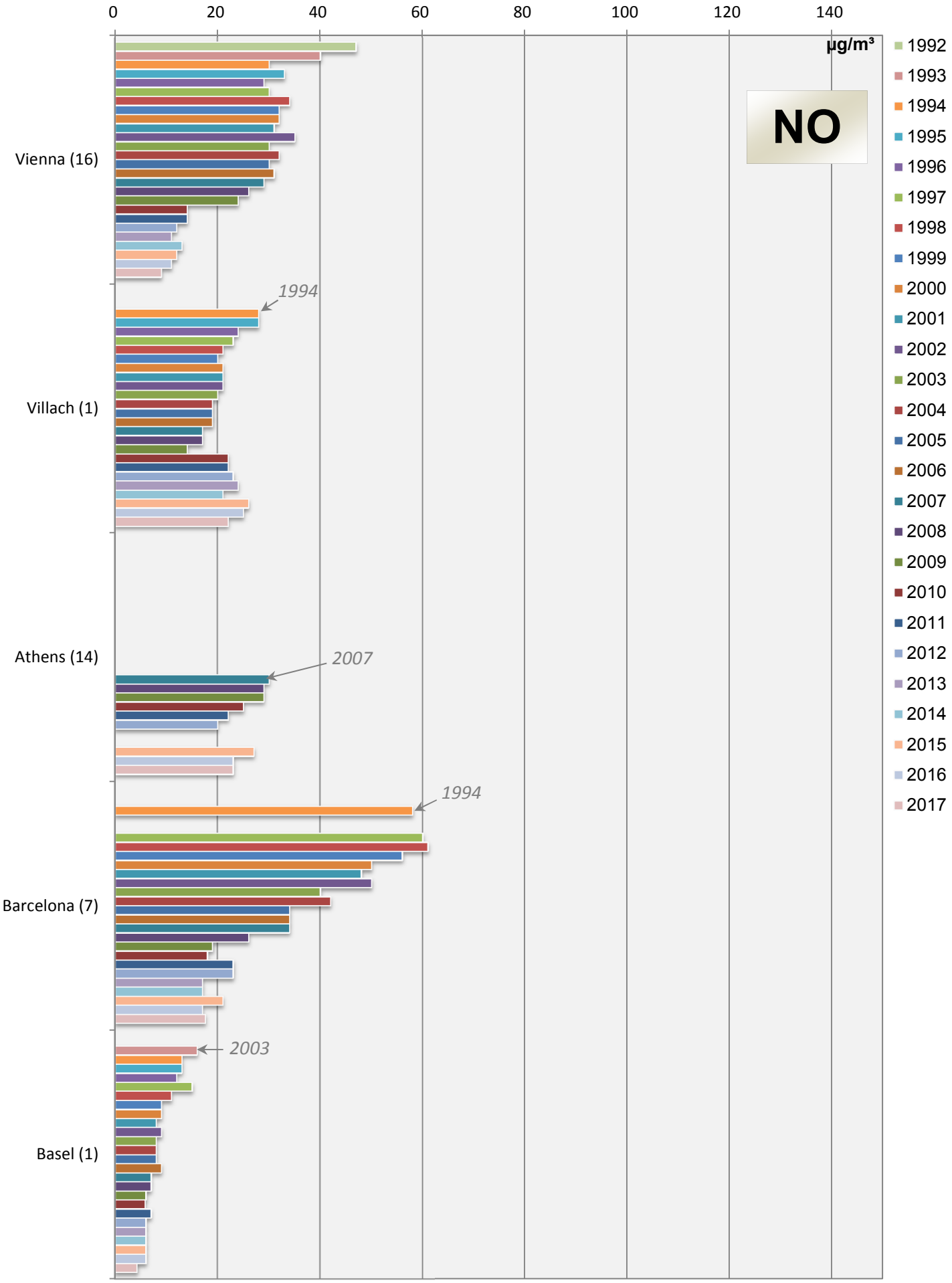
# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)



# Comparison of The Air Quality 1992 - 2017

## Annual mean values (mean of all monitoring stations)



# Comparison of The Air Quality 1992 - 2017

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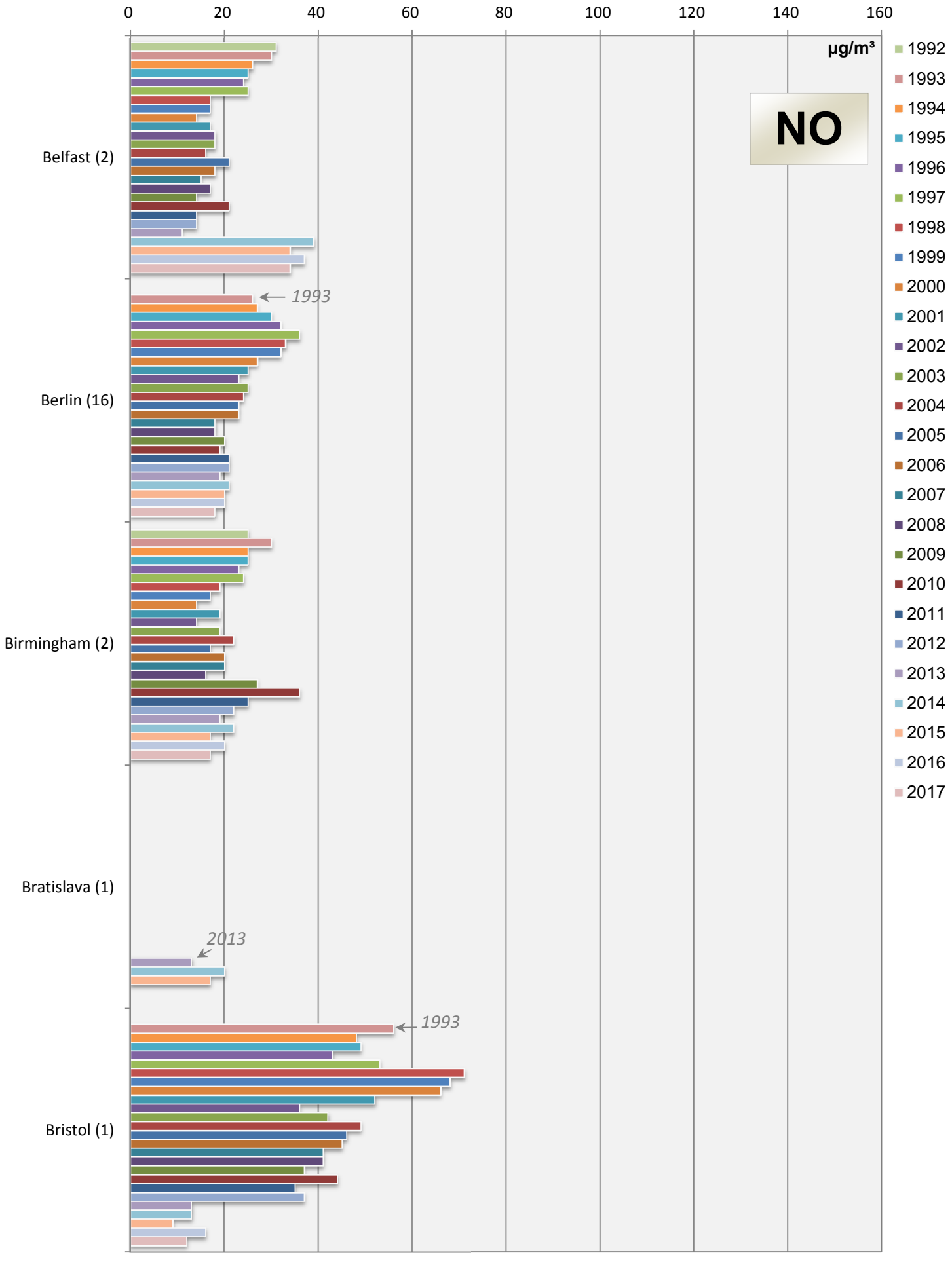

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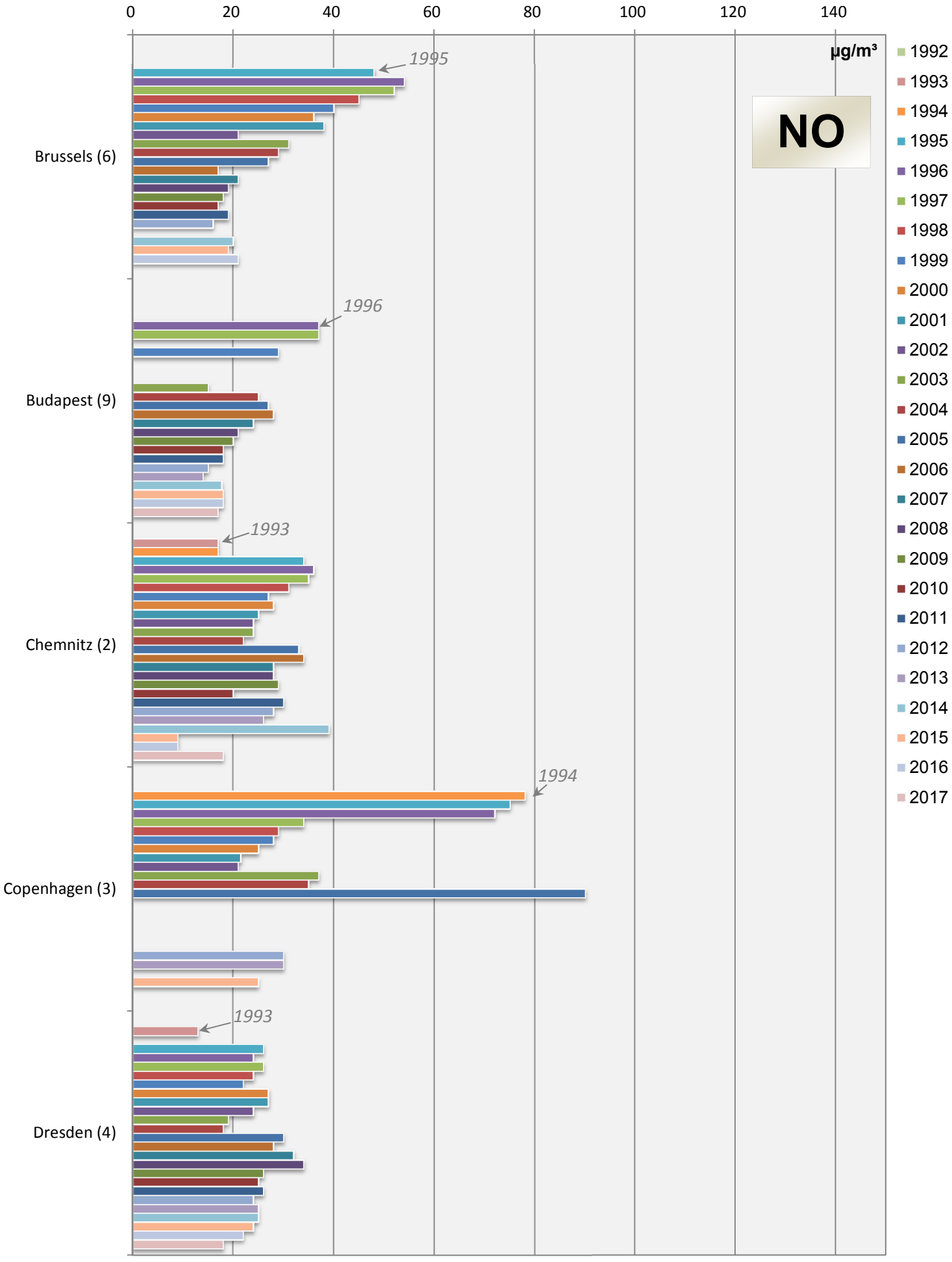

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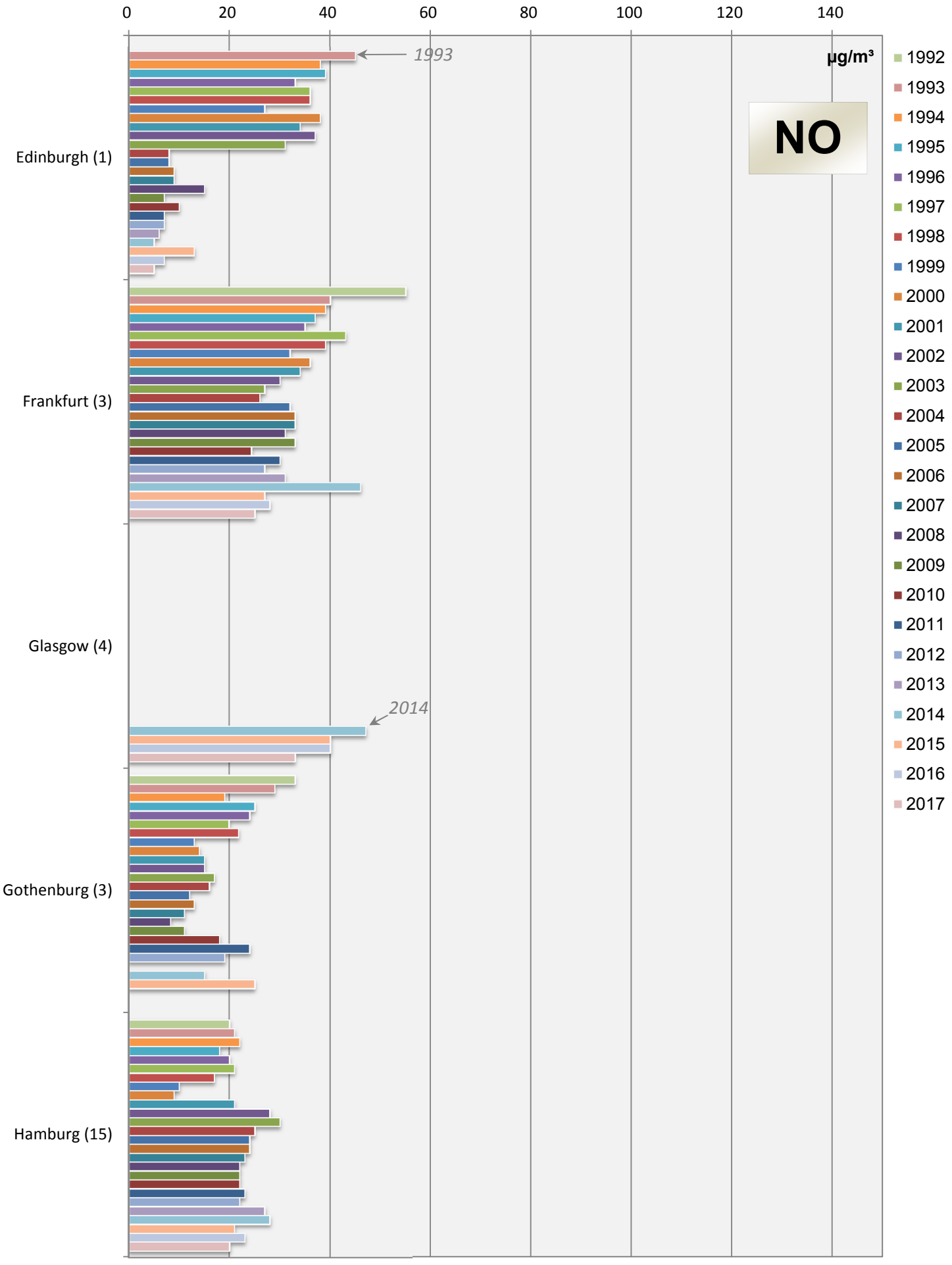

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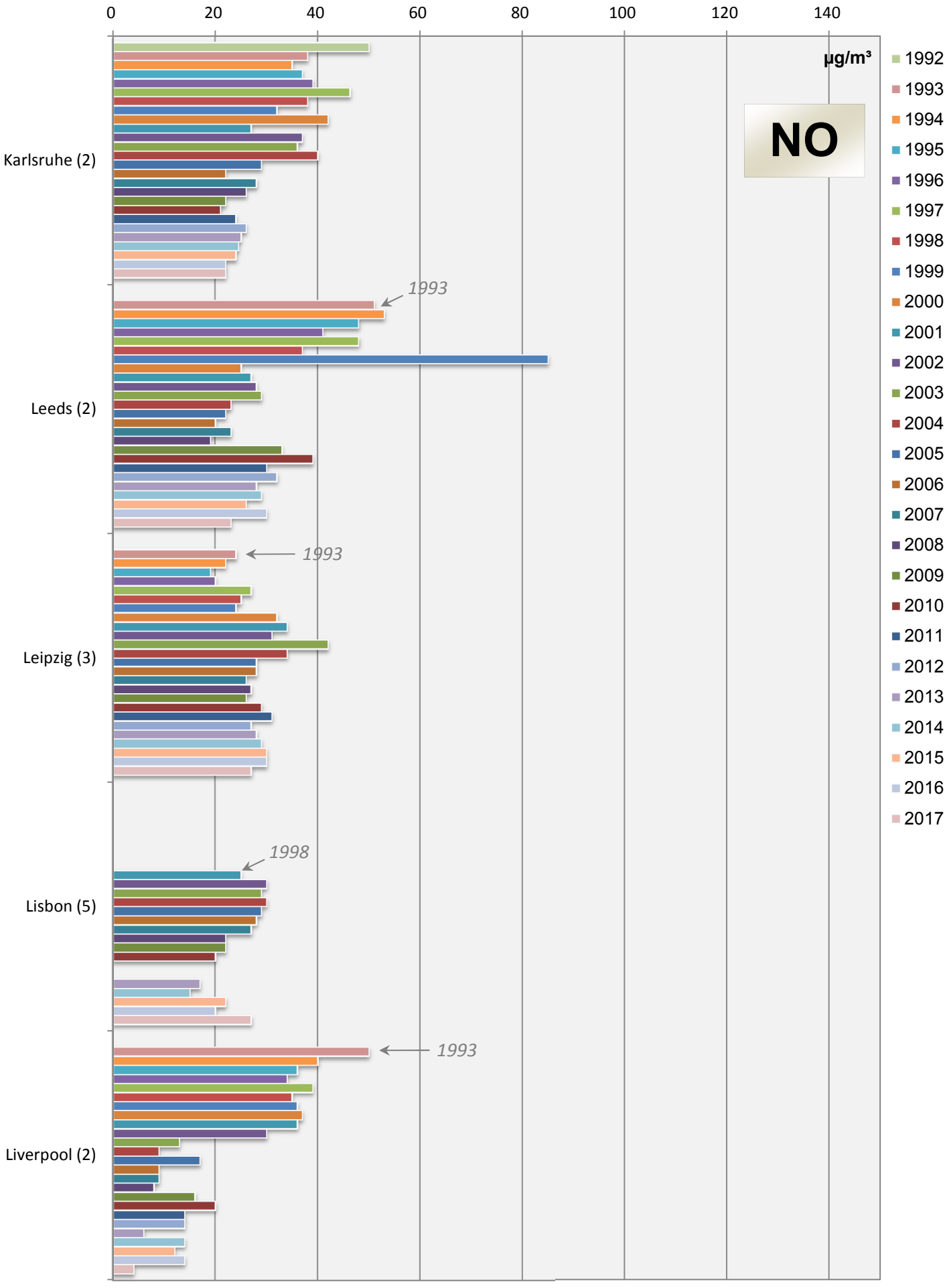

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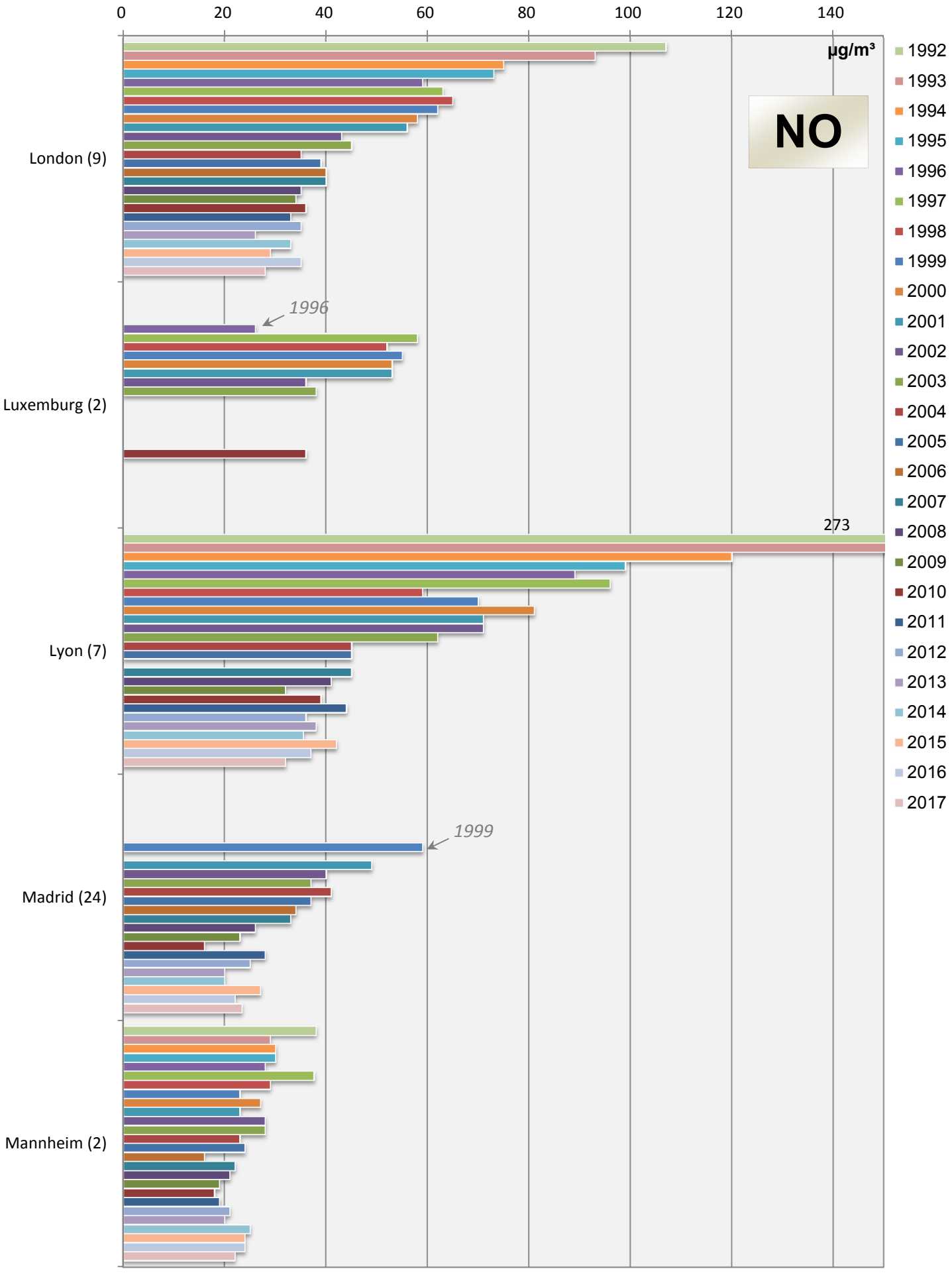

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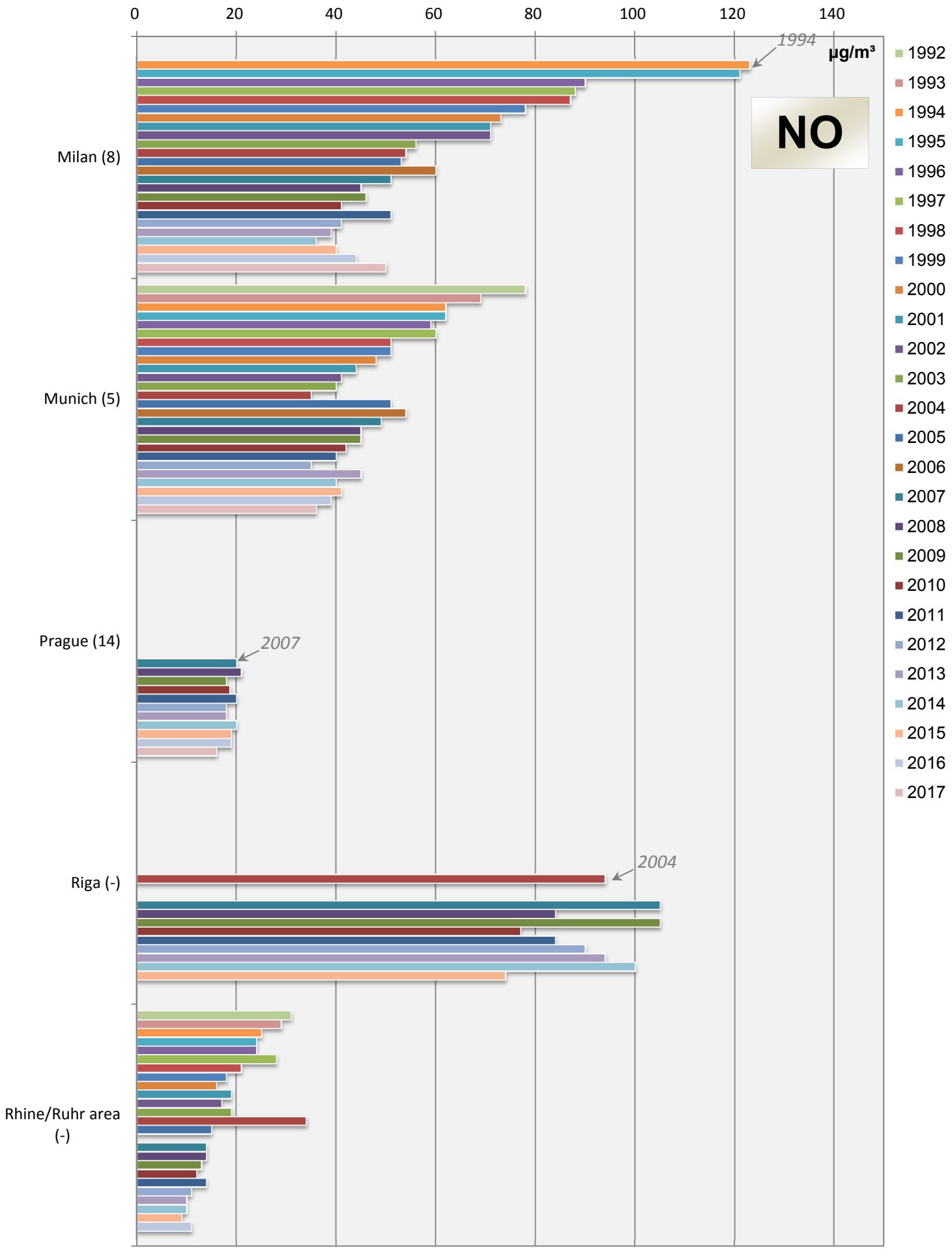

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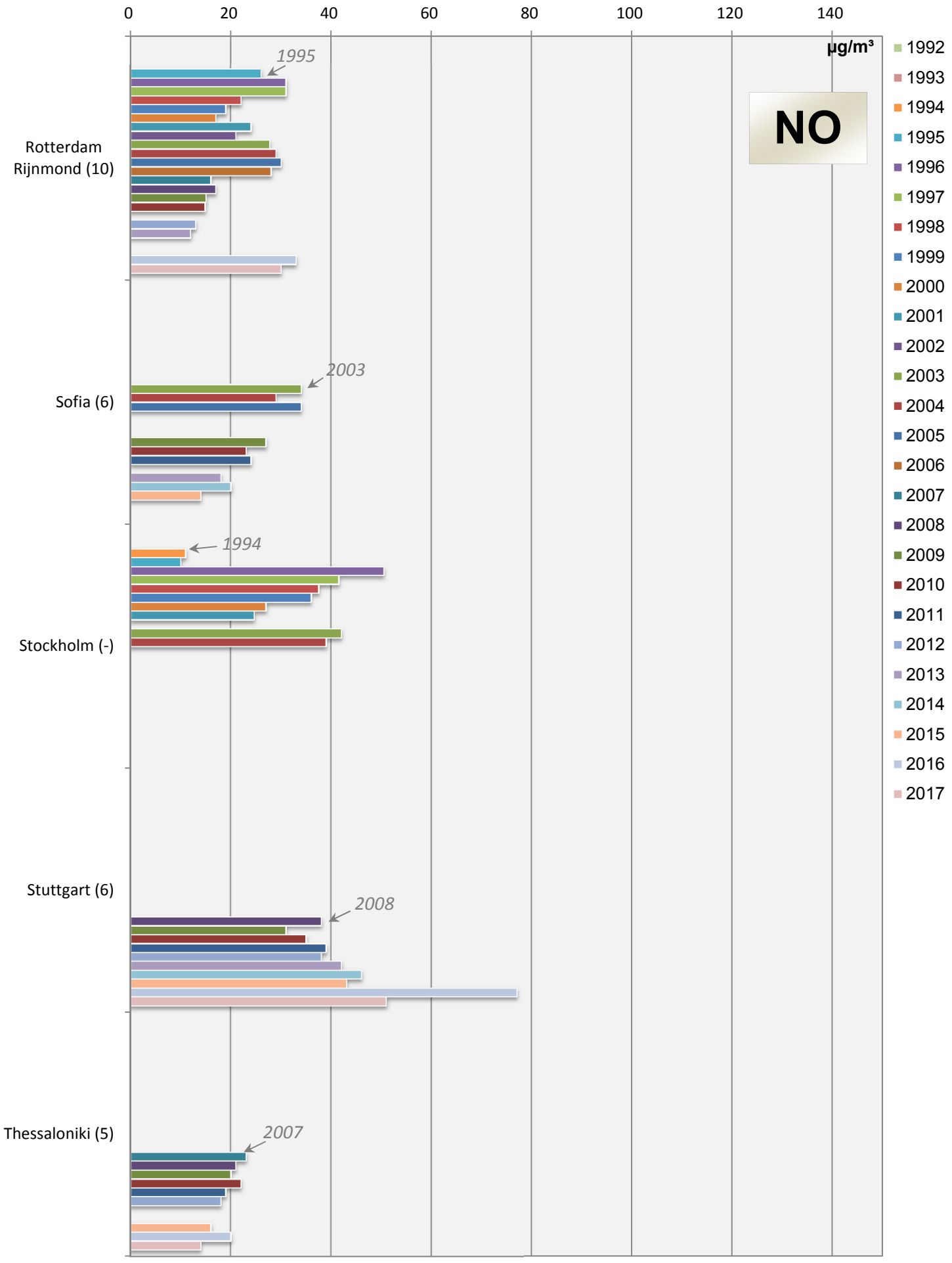

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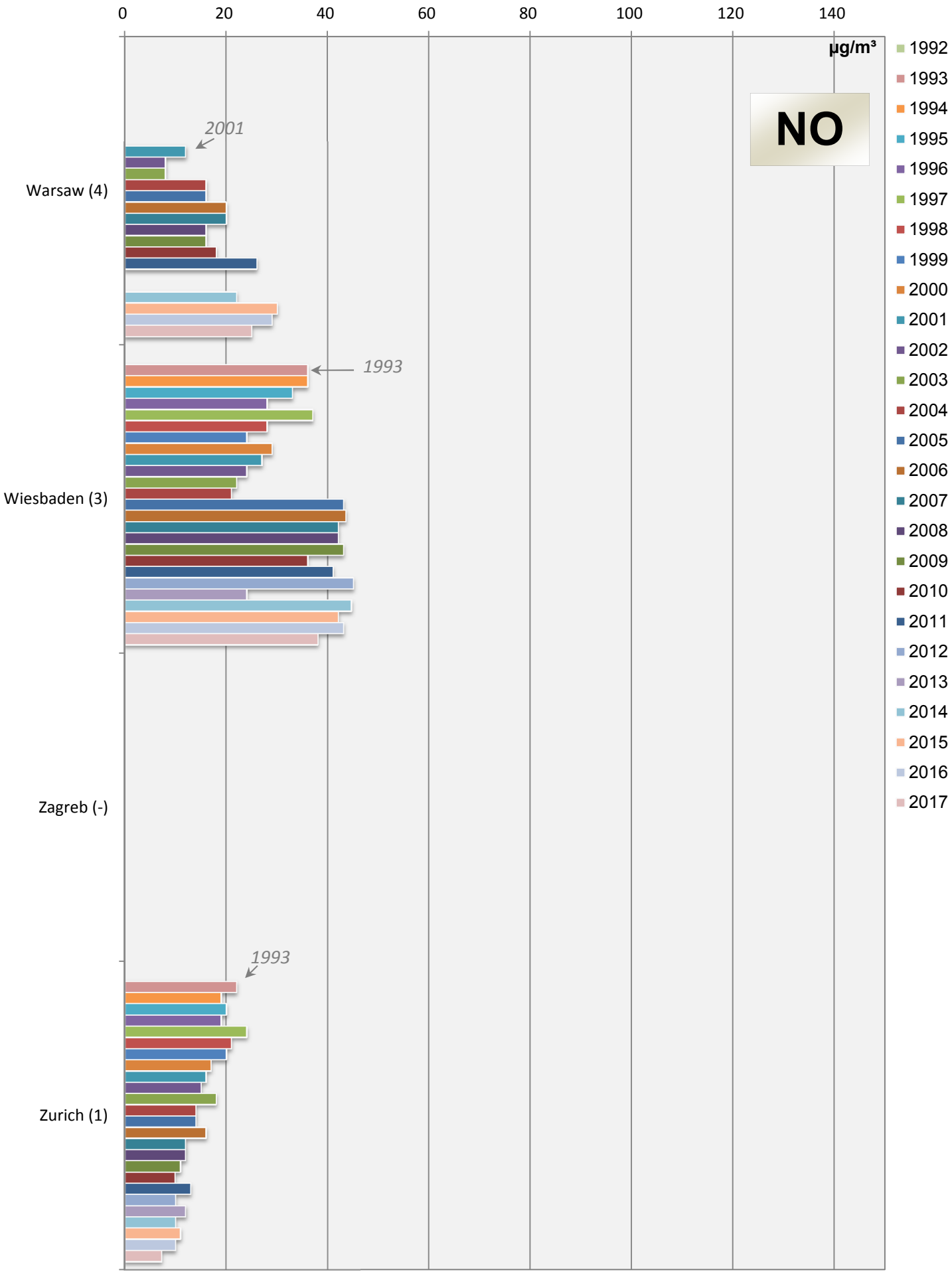

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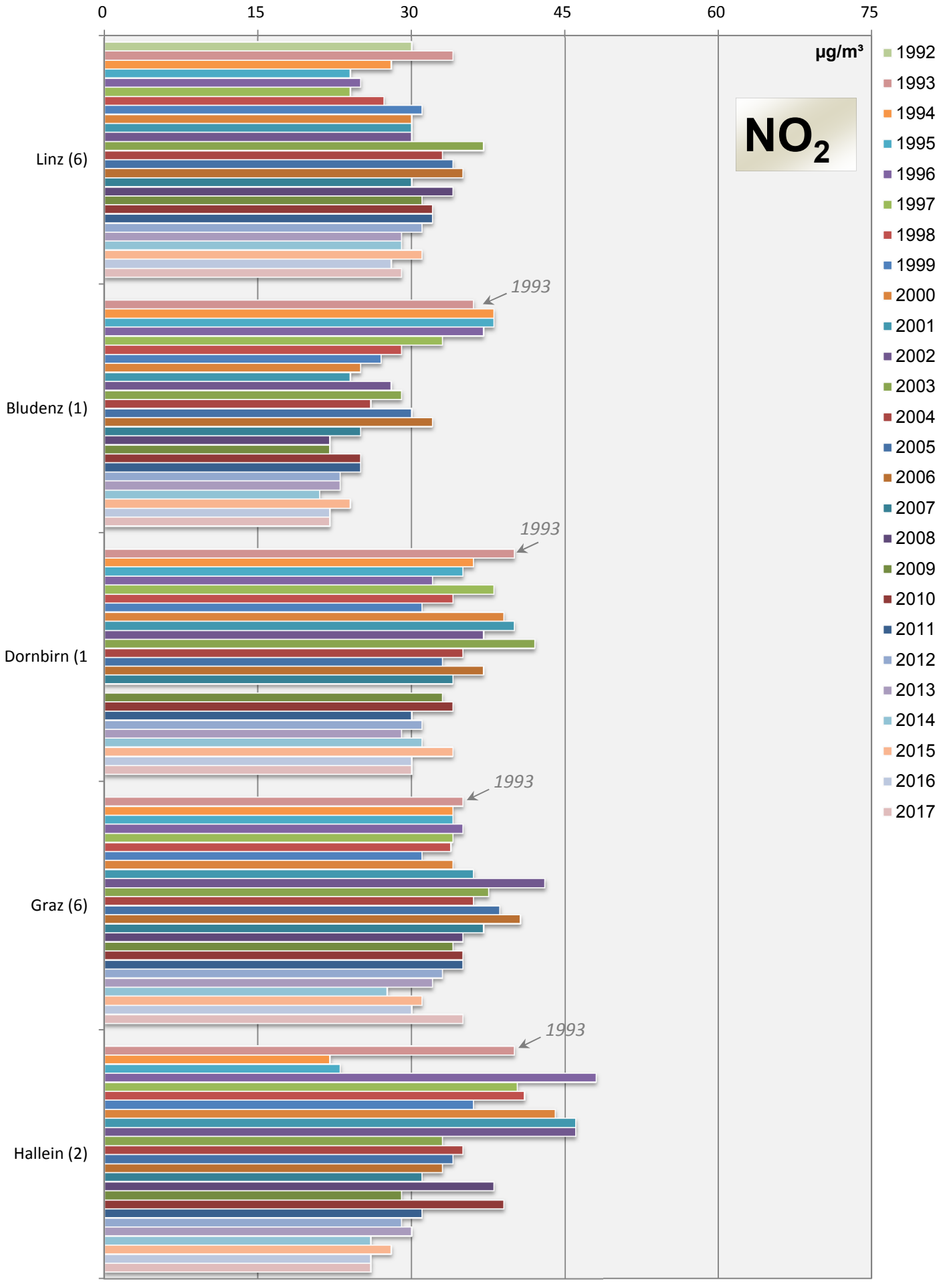

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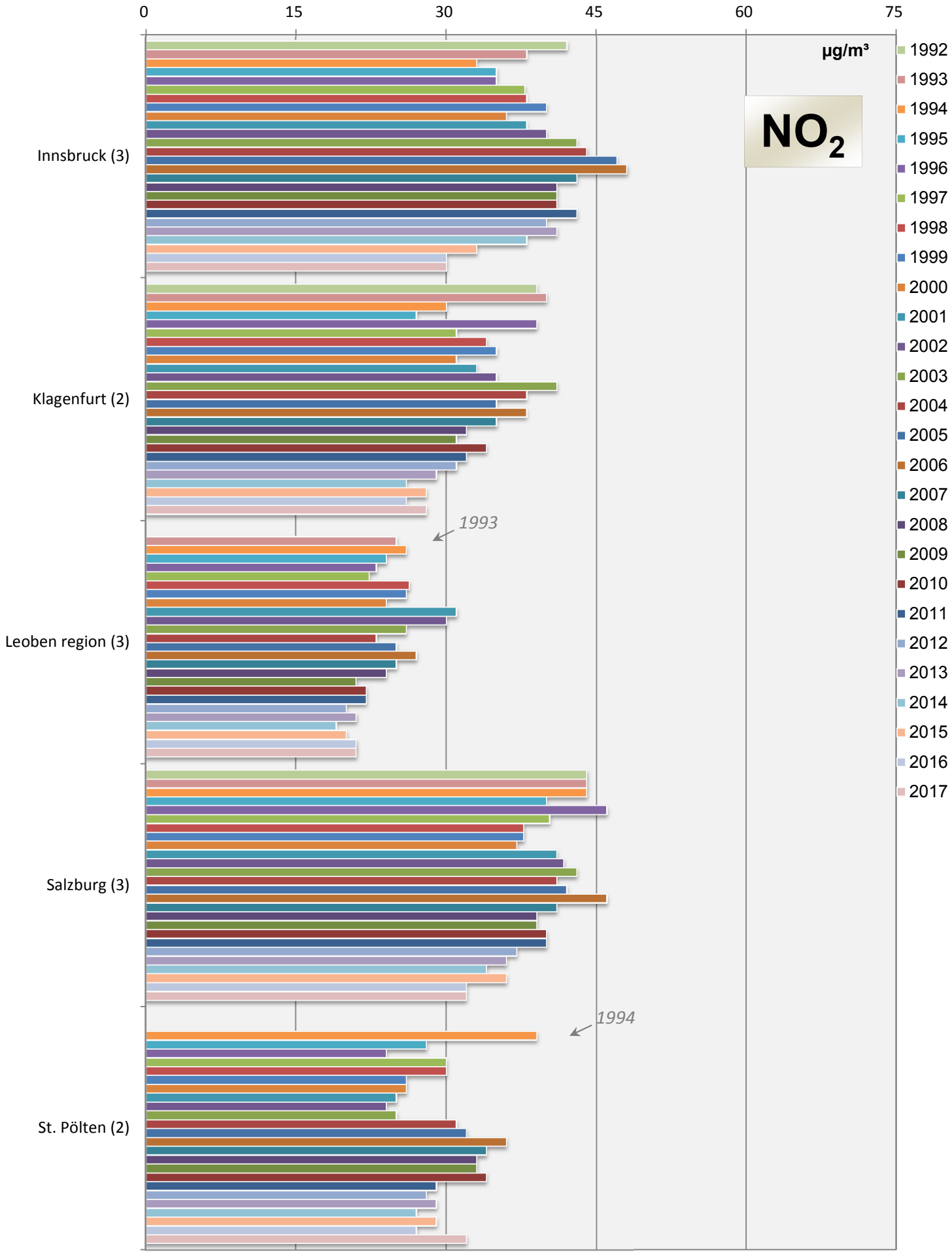

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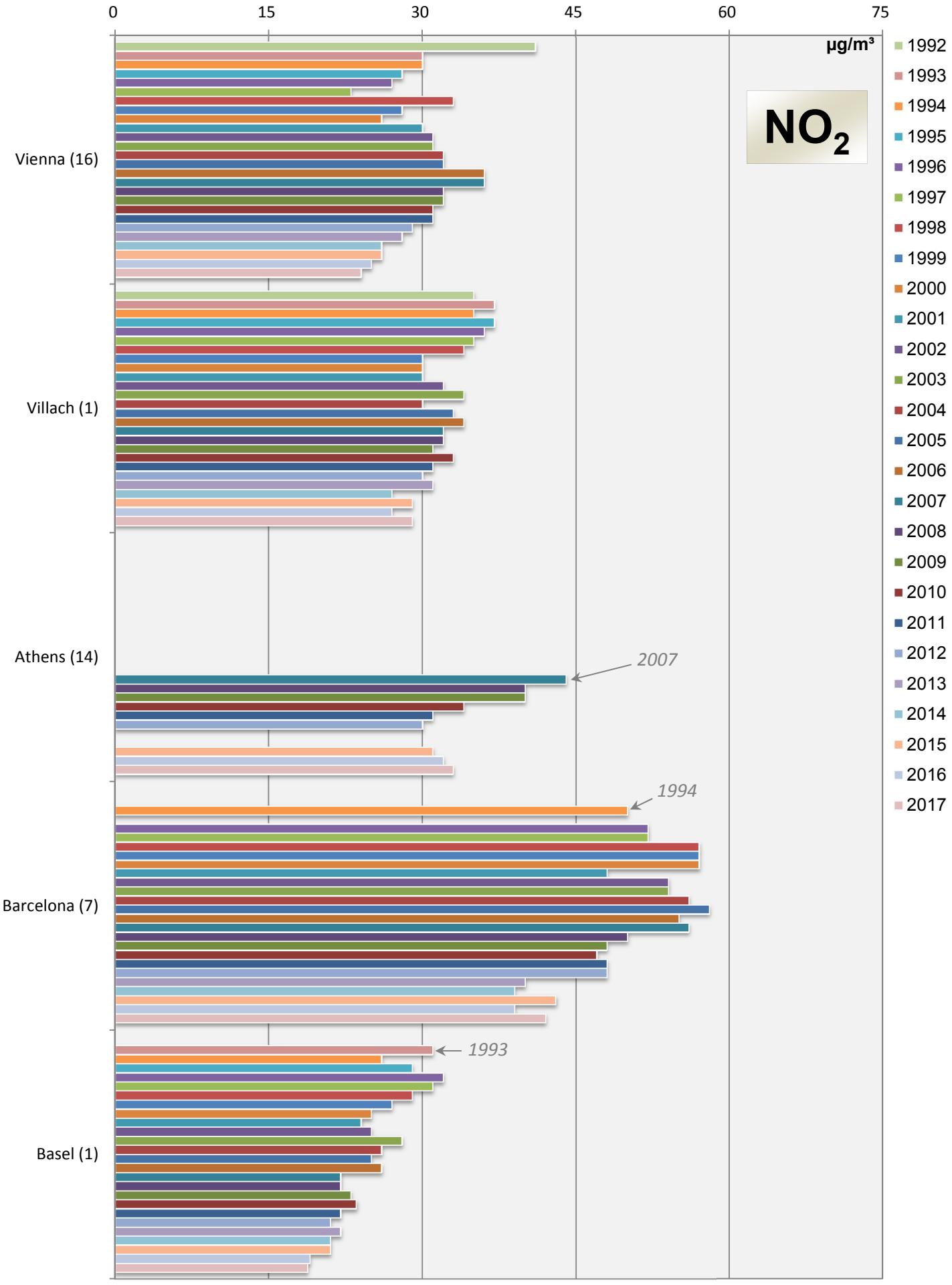

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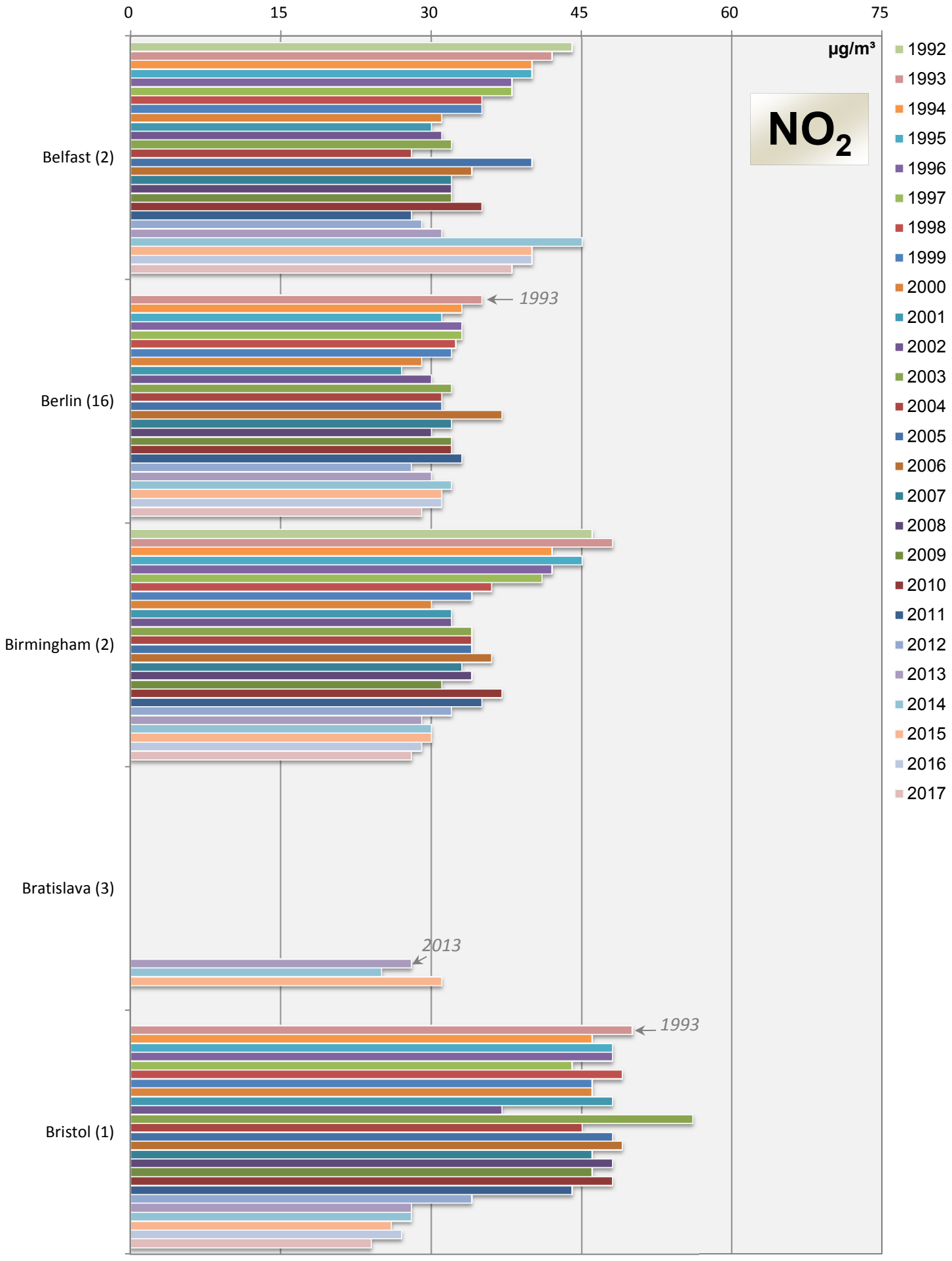

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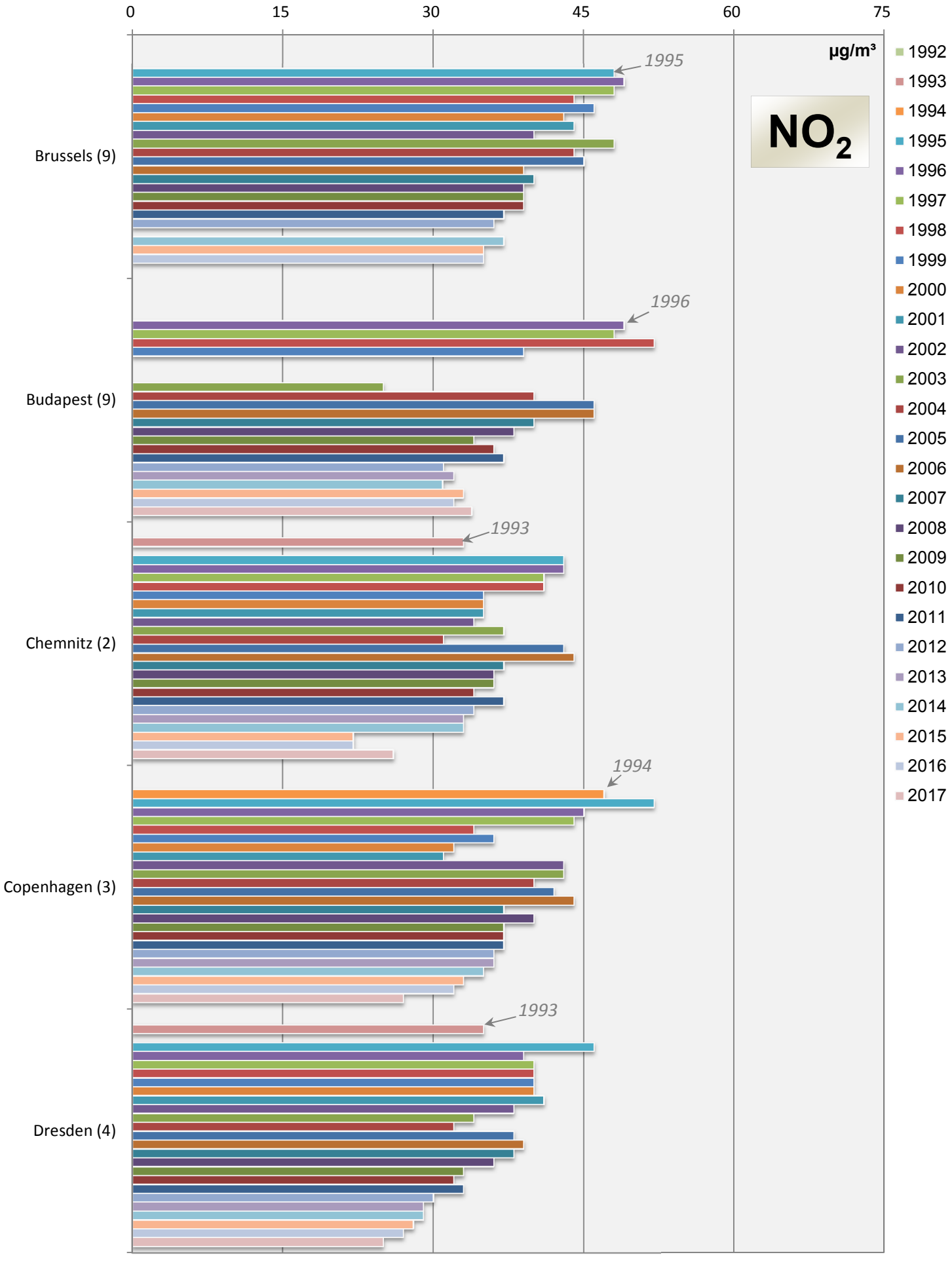

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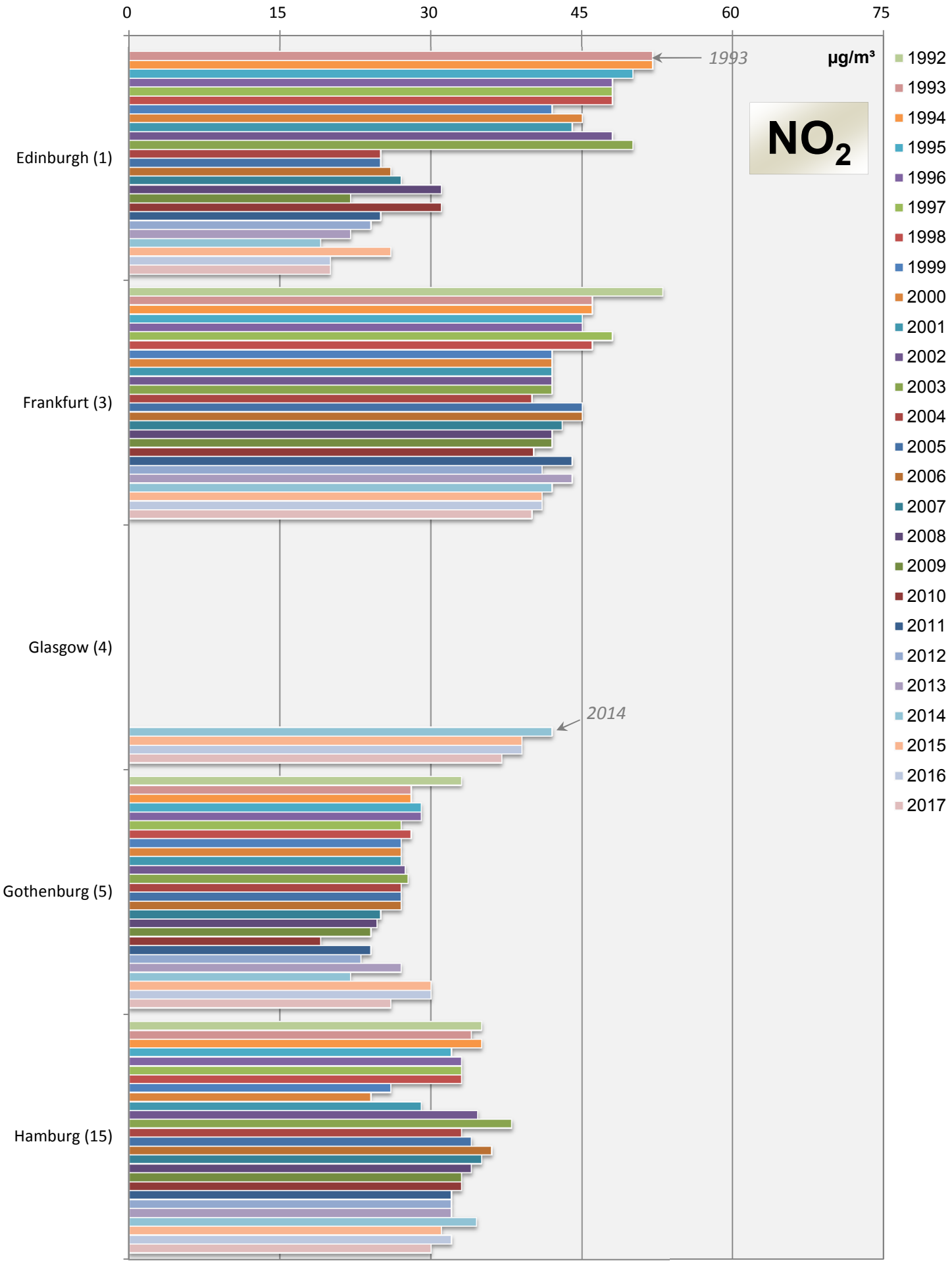

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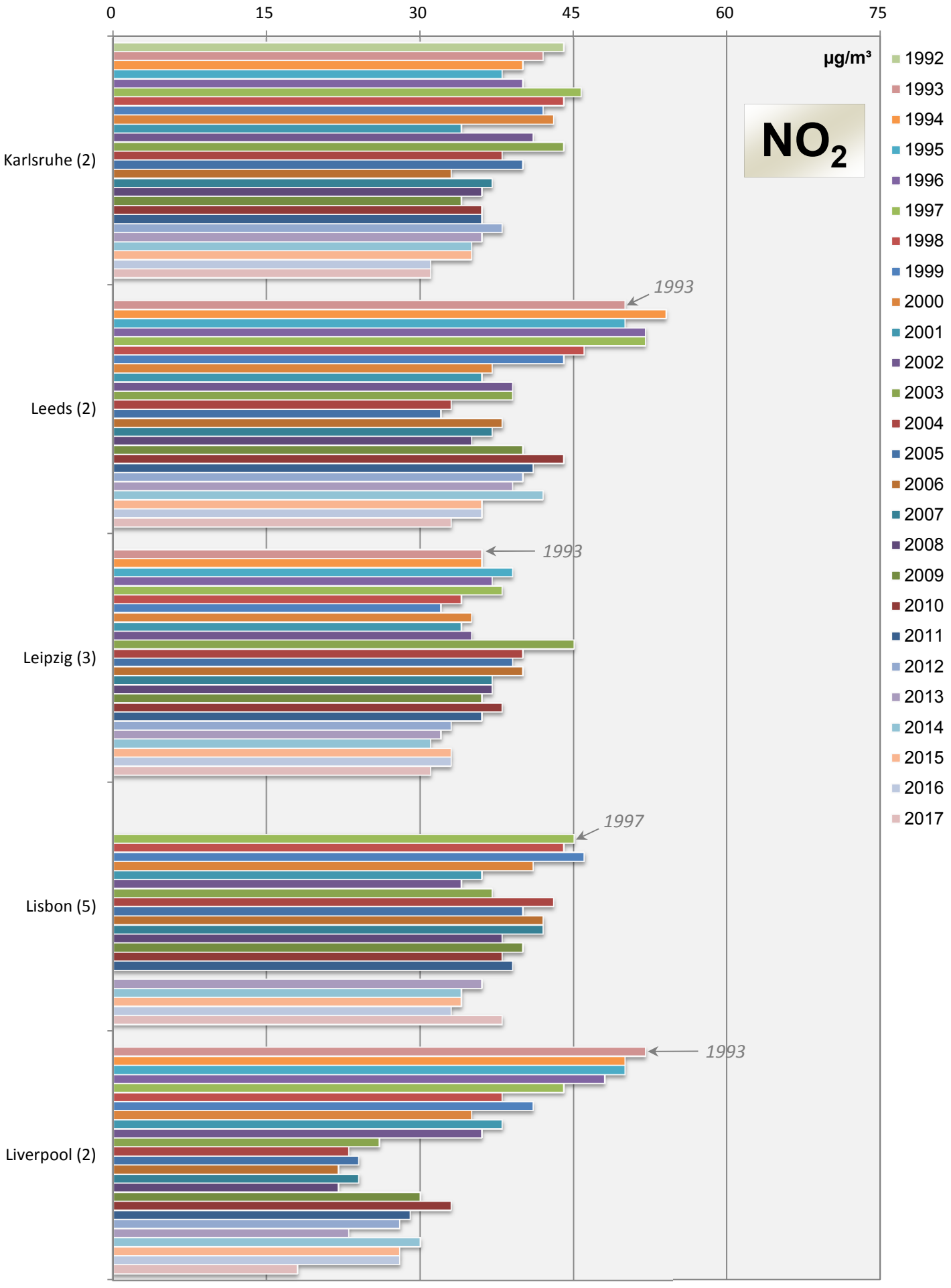

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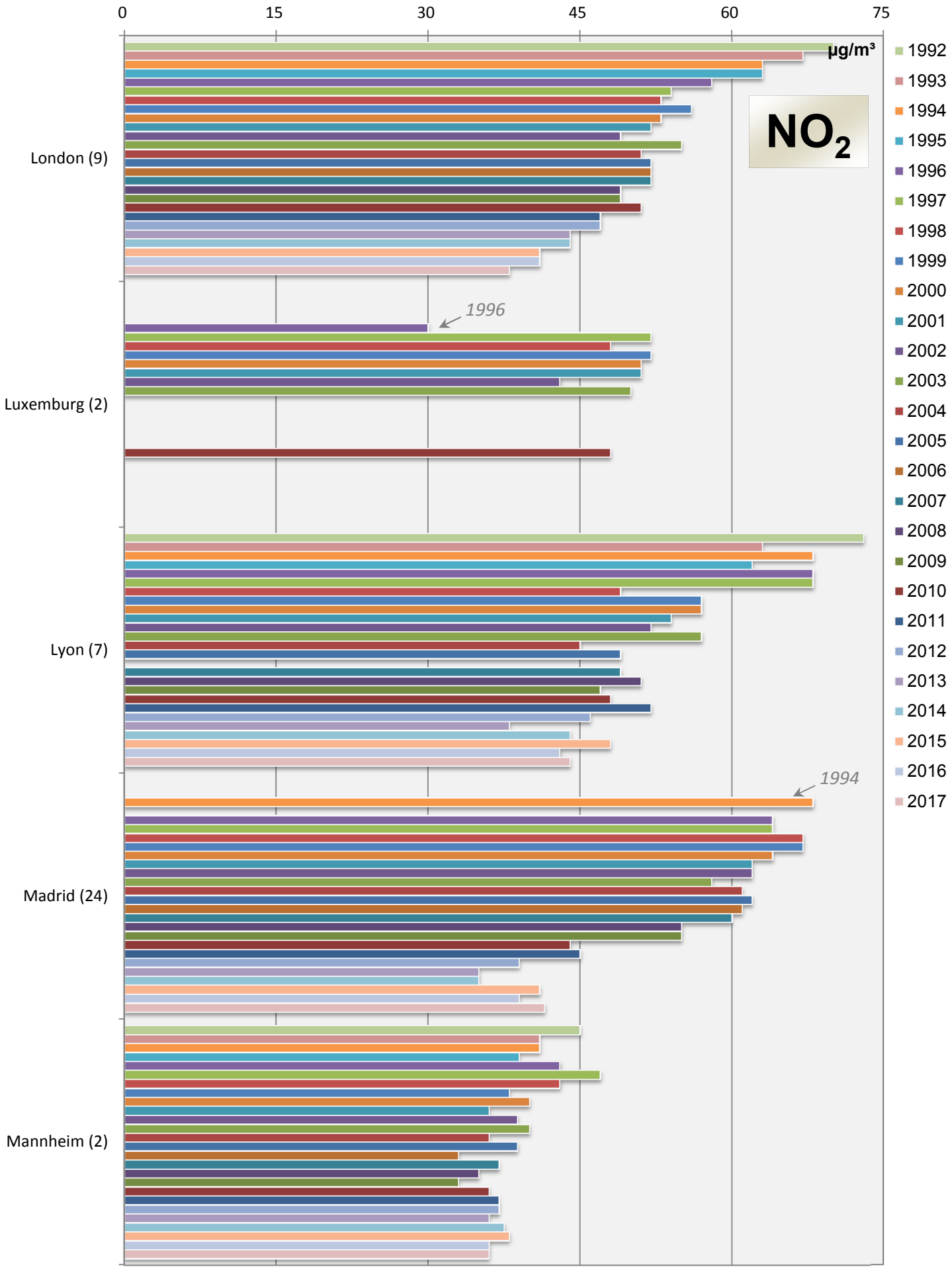

# Comparison of The Air Quality 1992 - 2017

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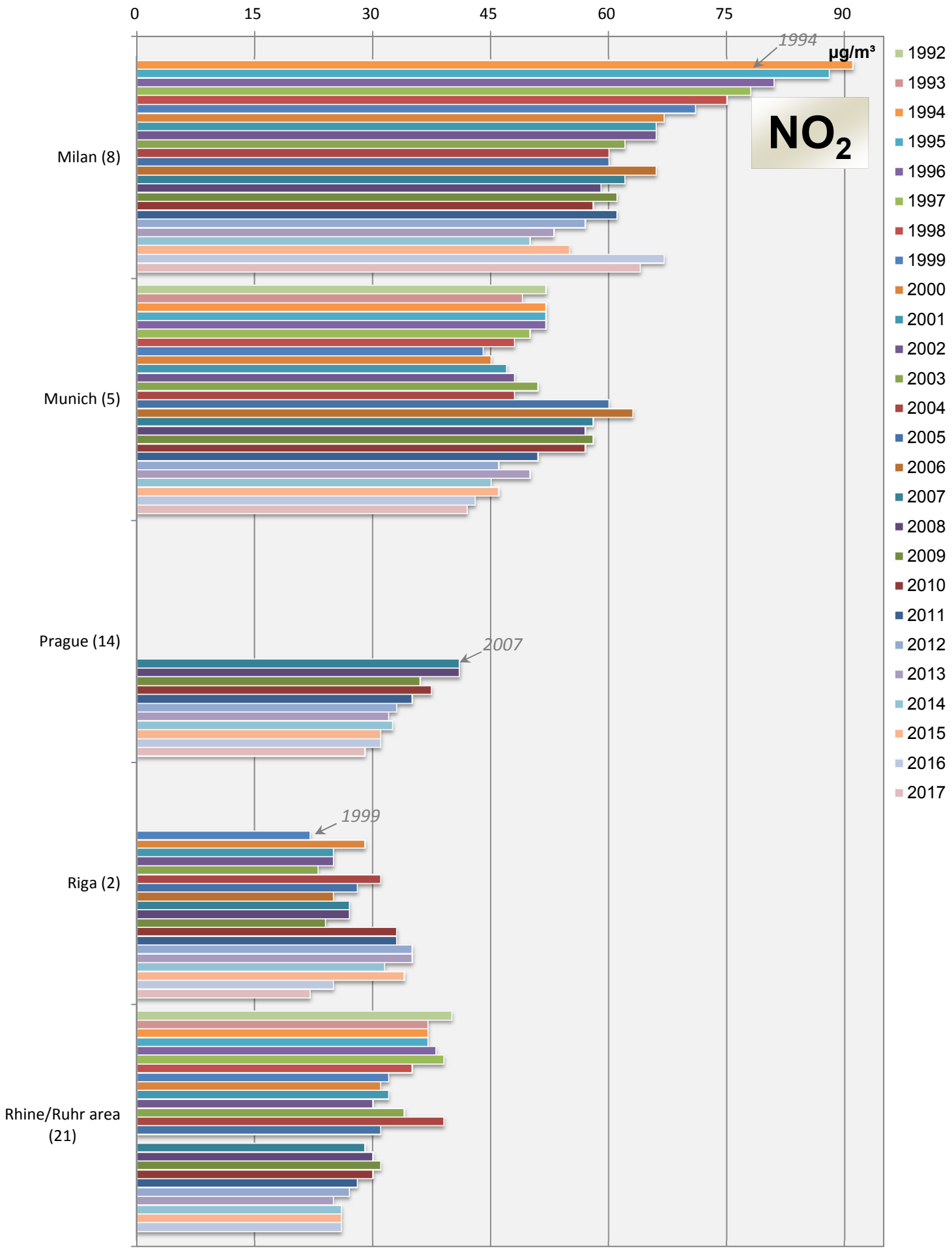
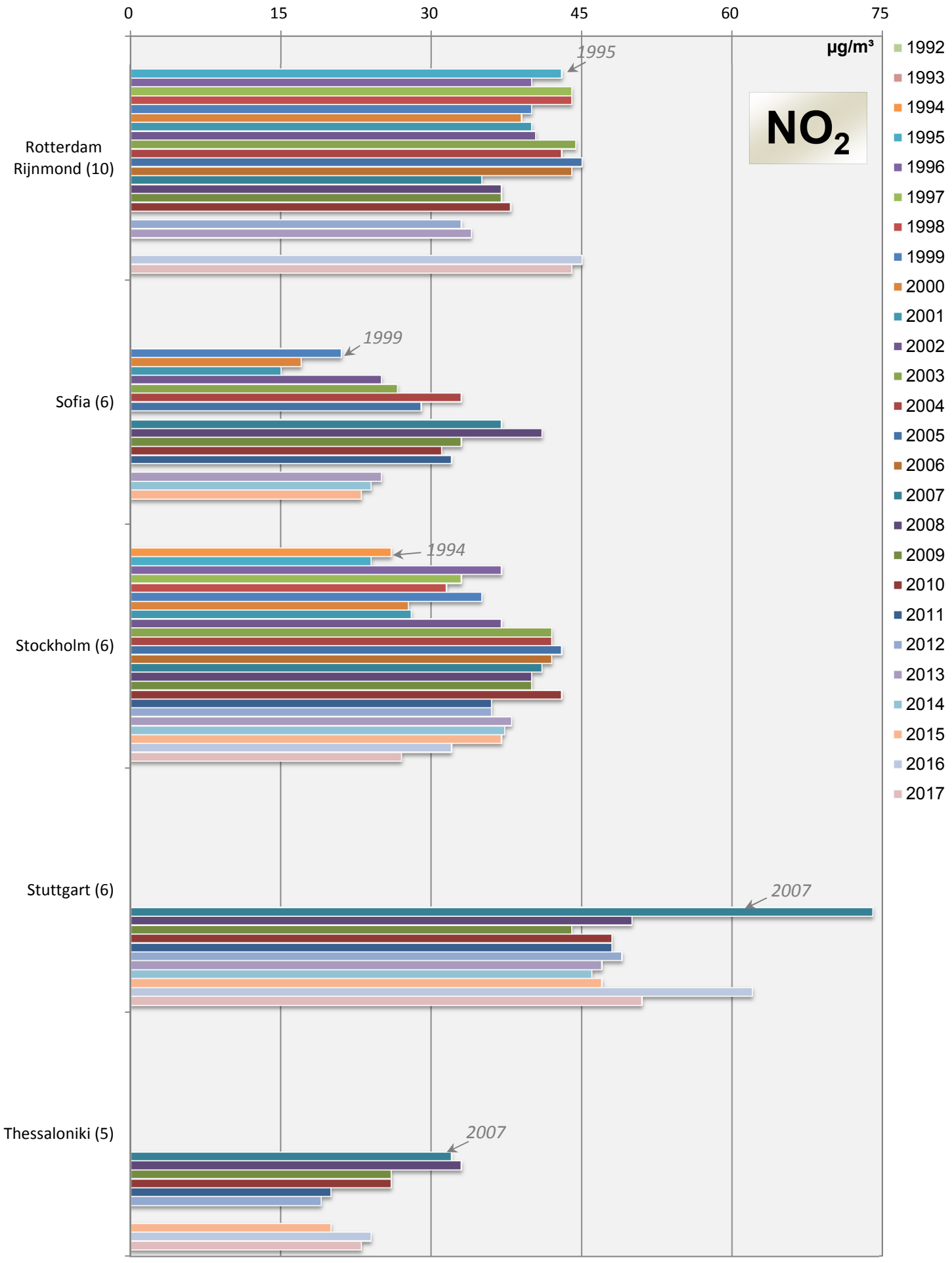


# Comparison of The Air Quality 1992 - 2017
## Annual mean values (mean of all monitoring stations)



# Comparison of The Air Quality 1992 - 2017

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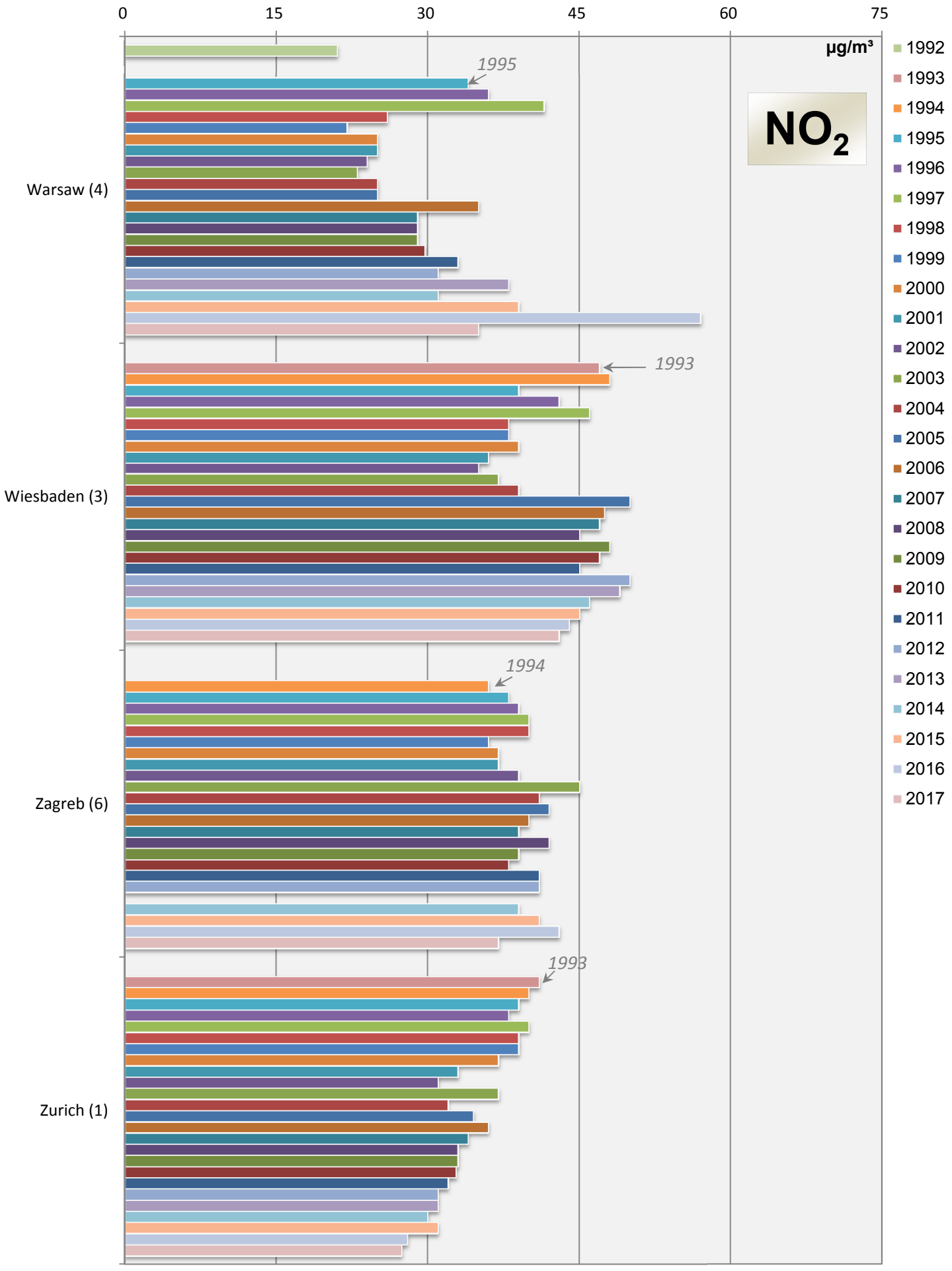

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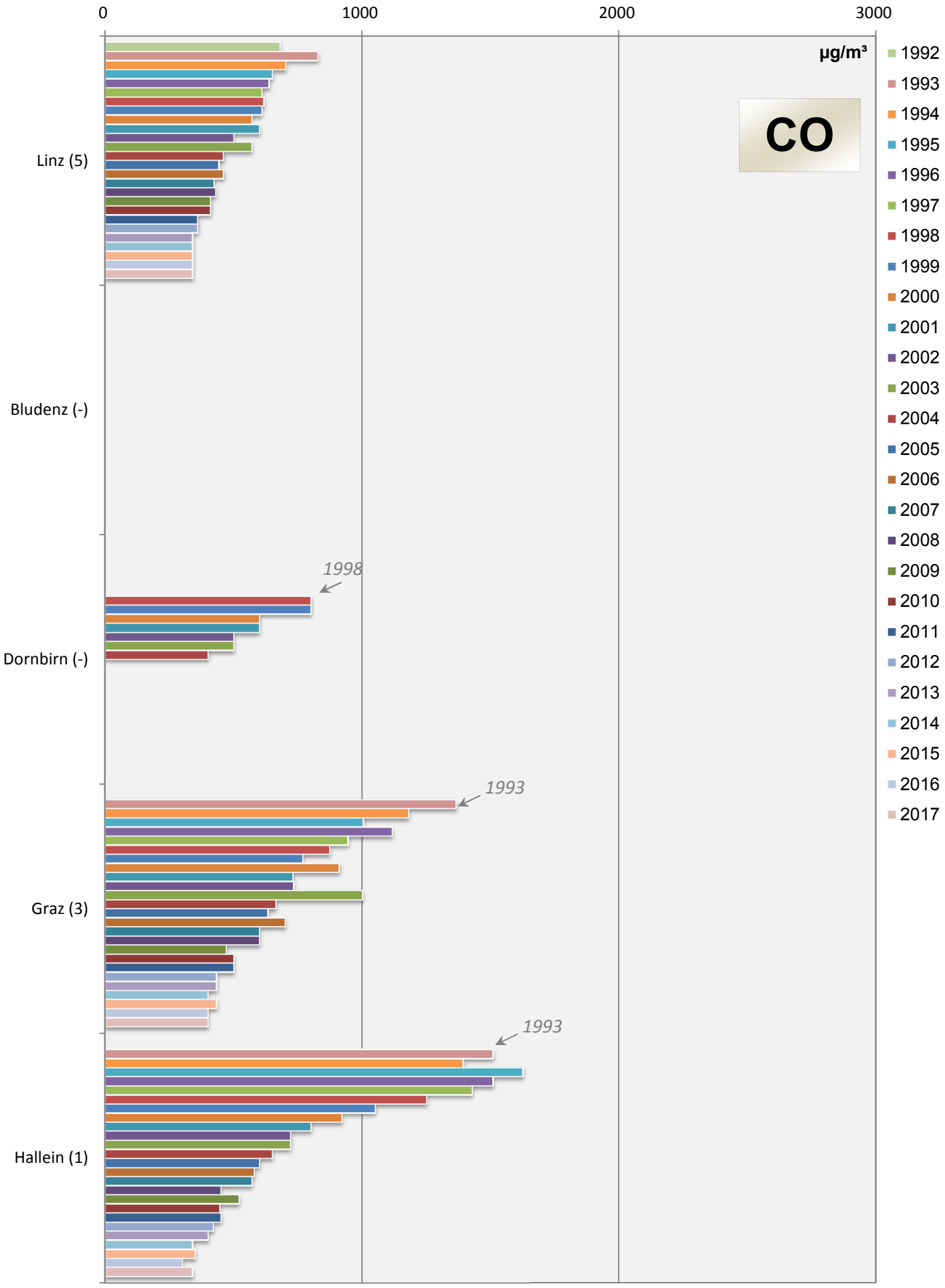

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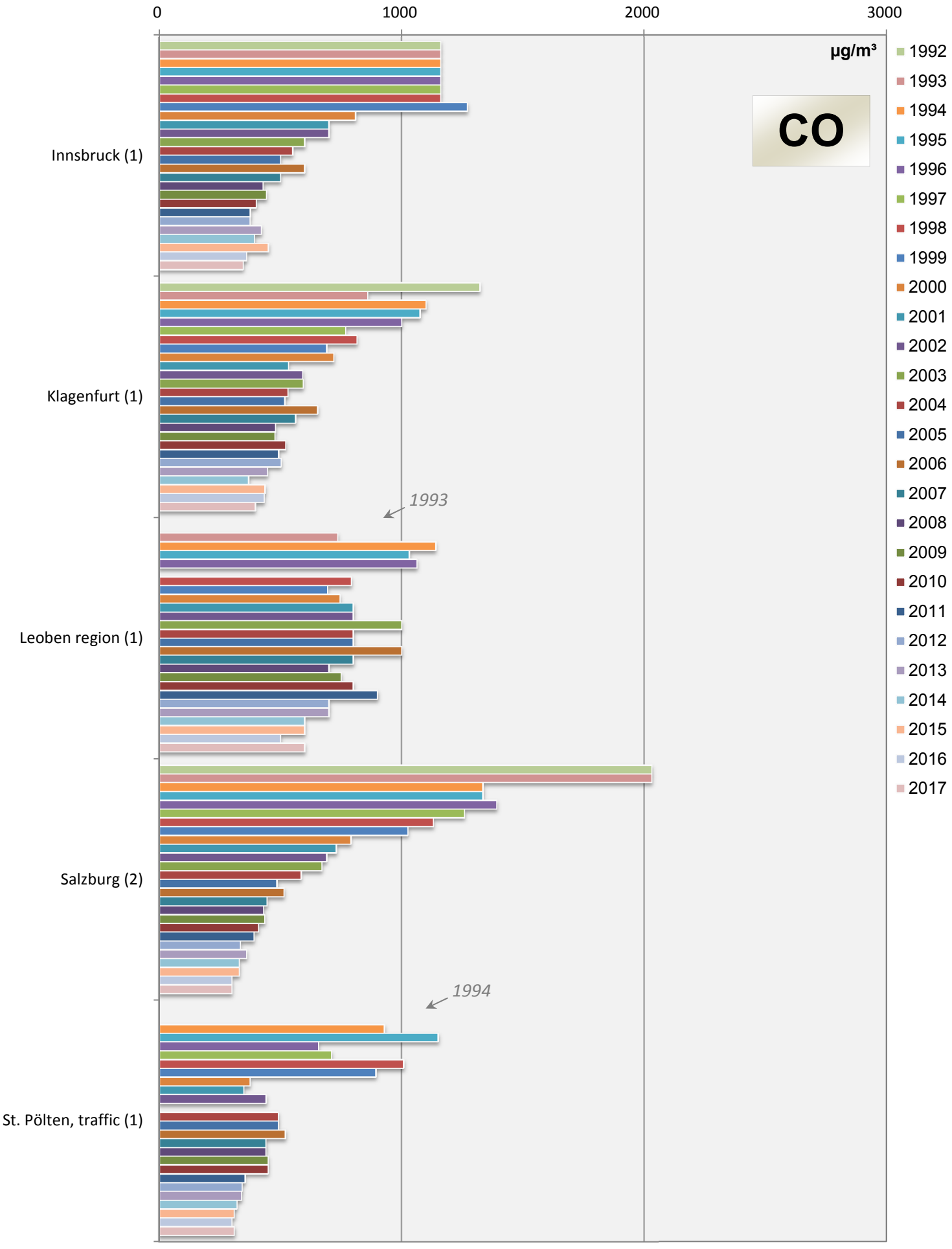

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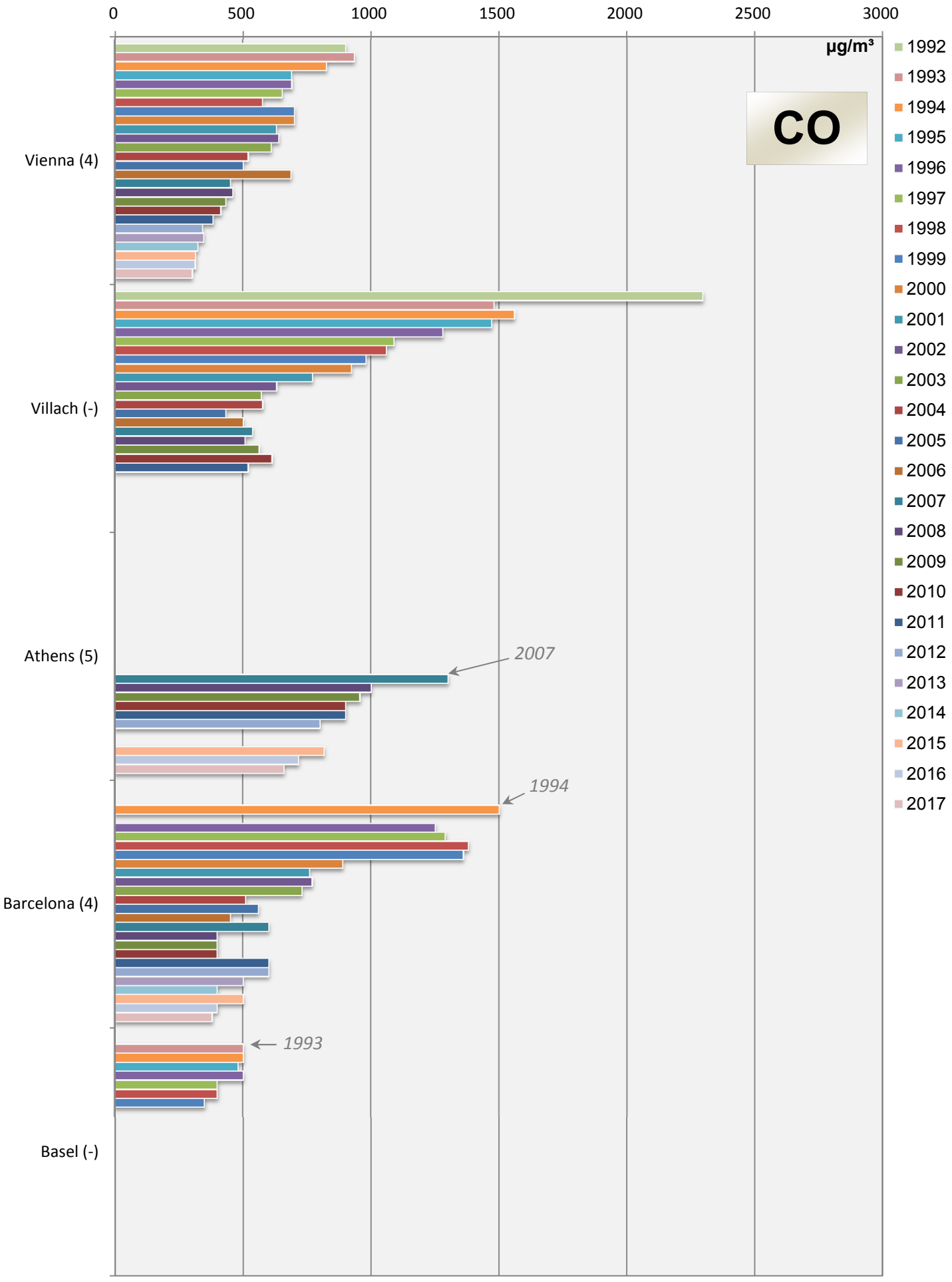

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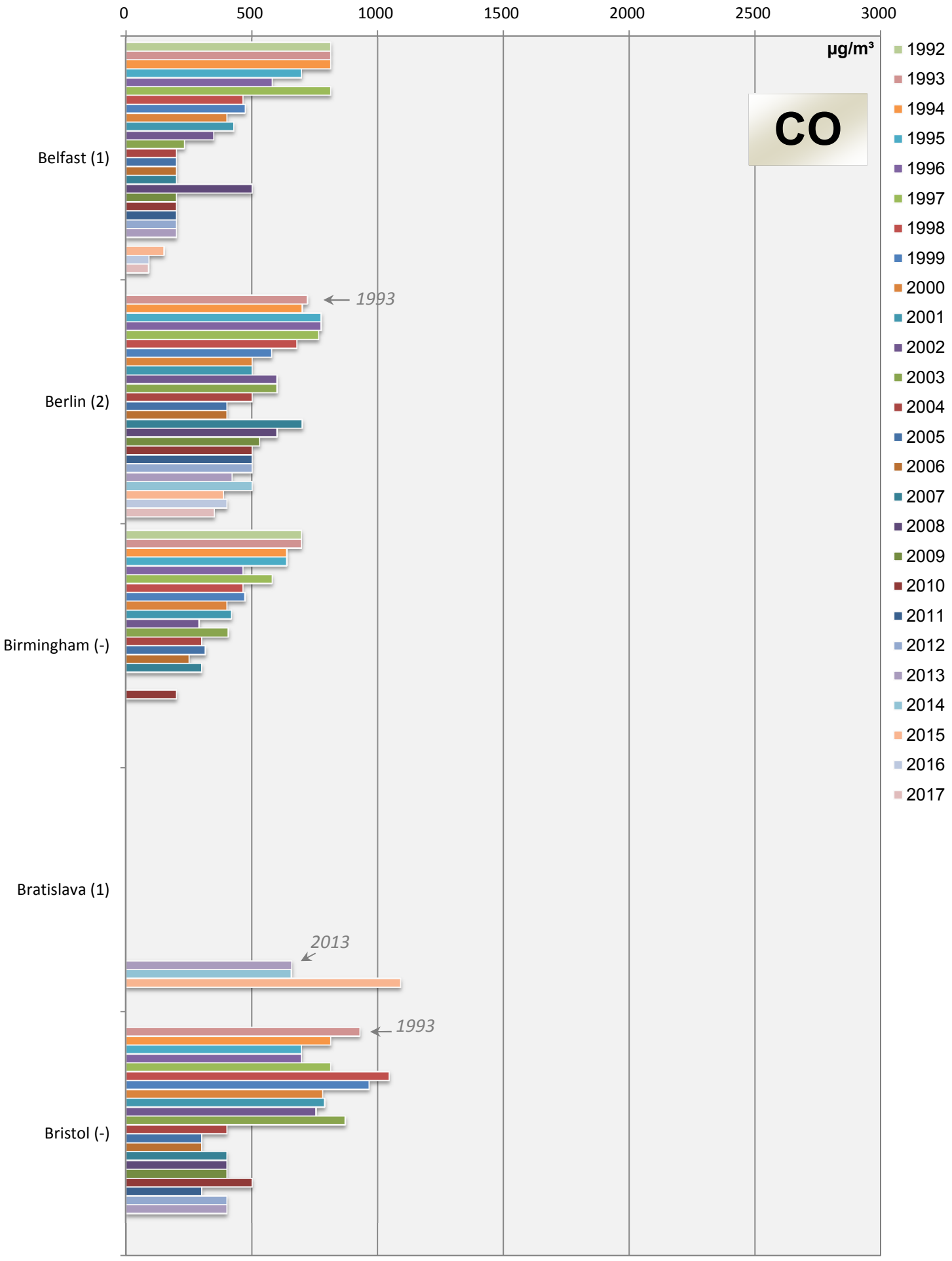

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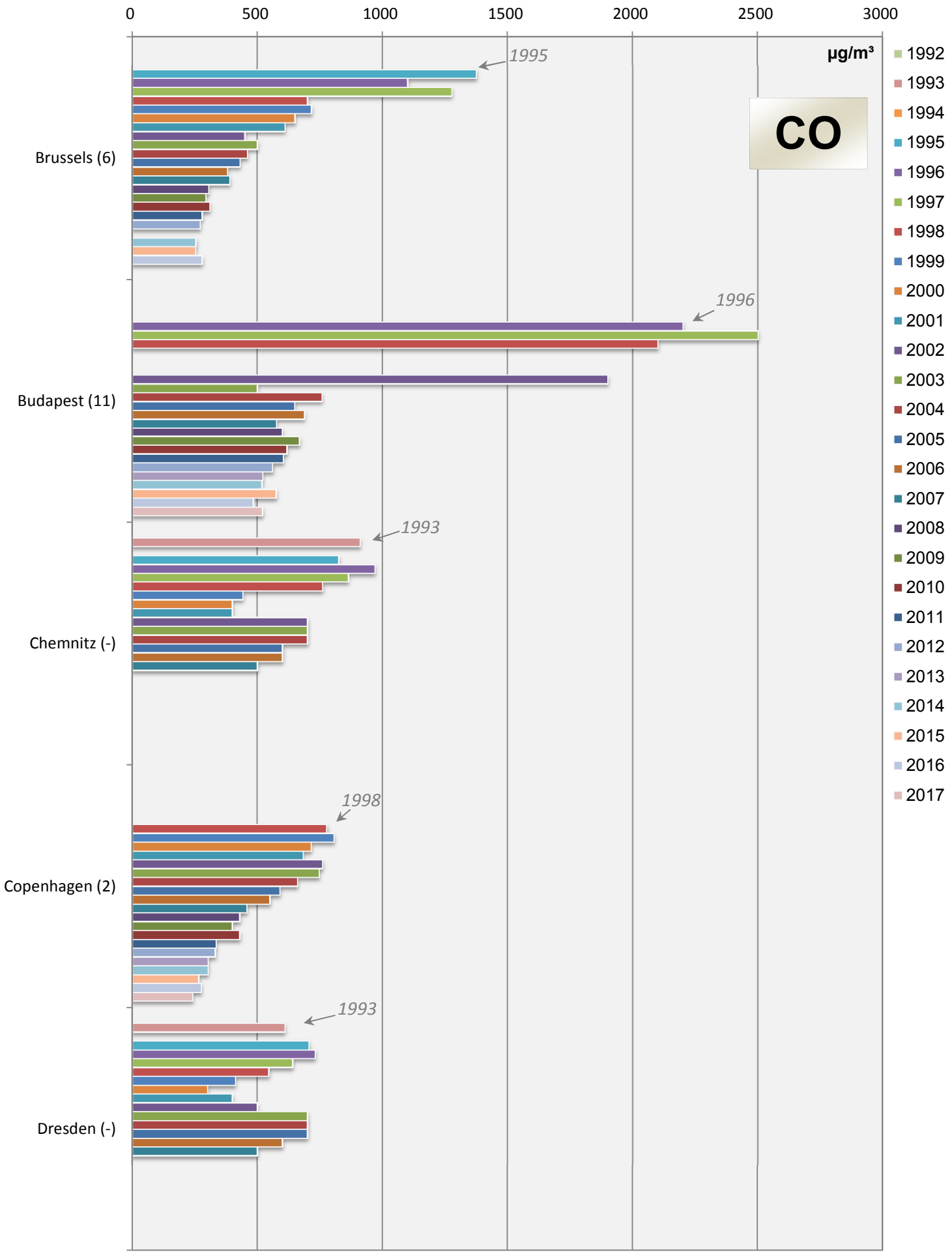

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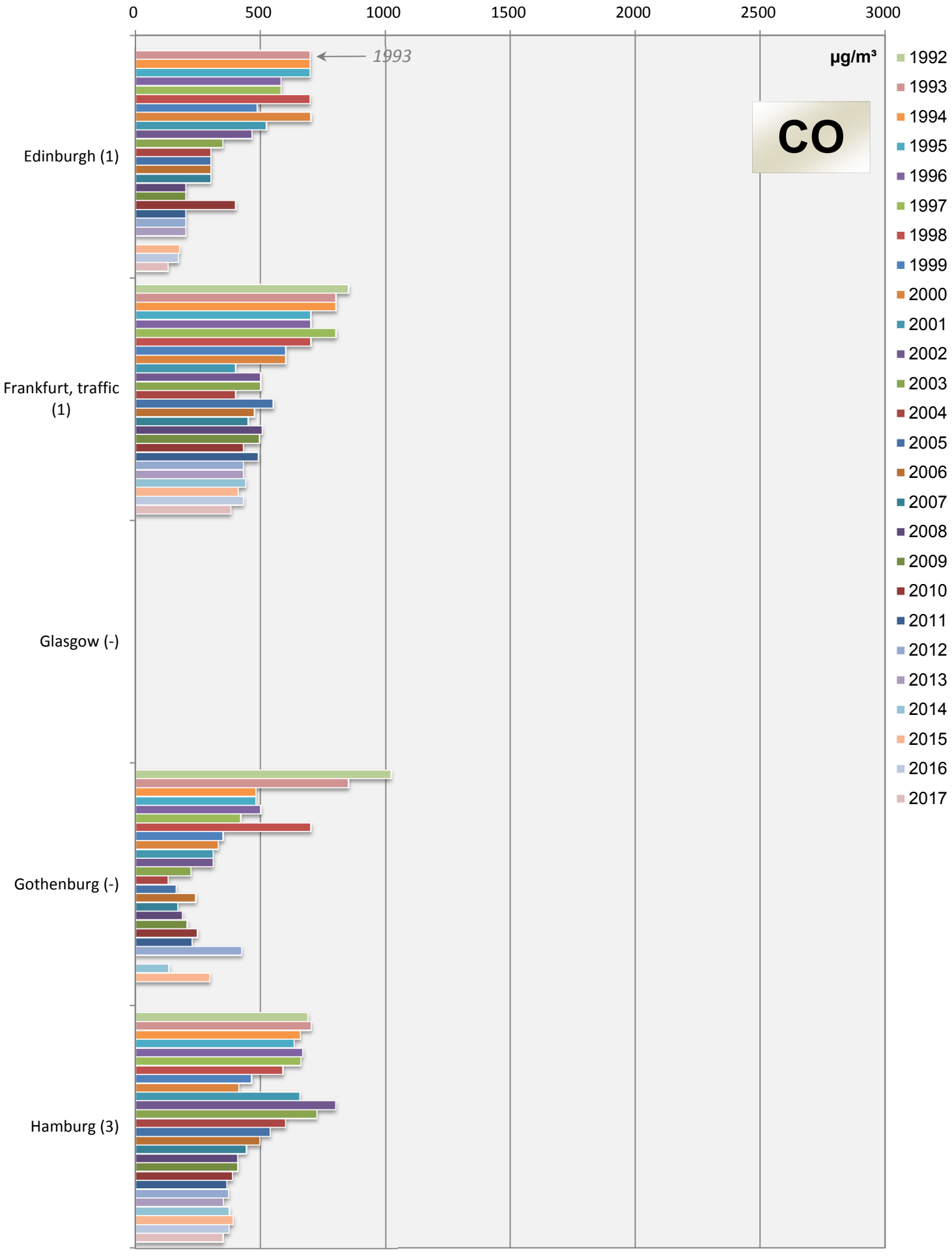

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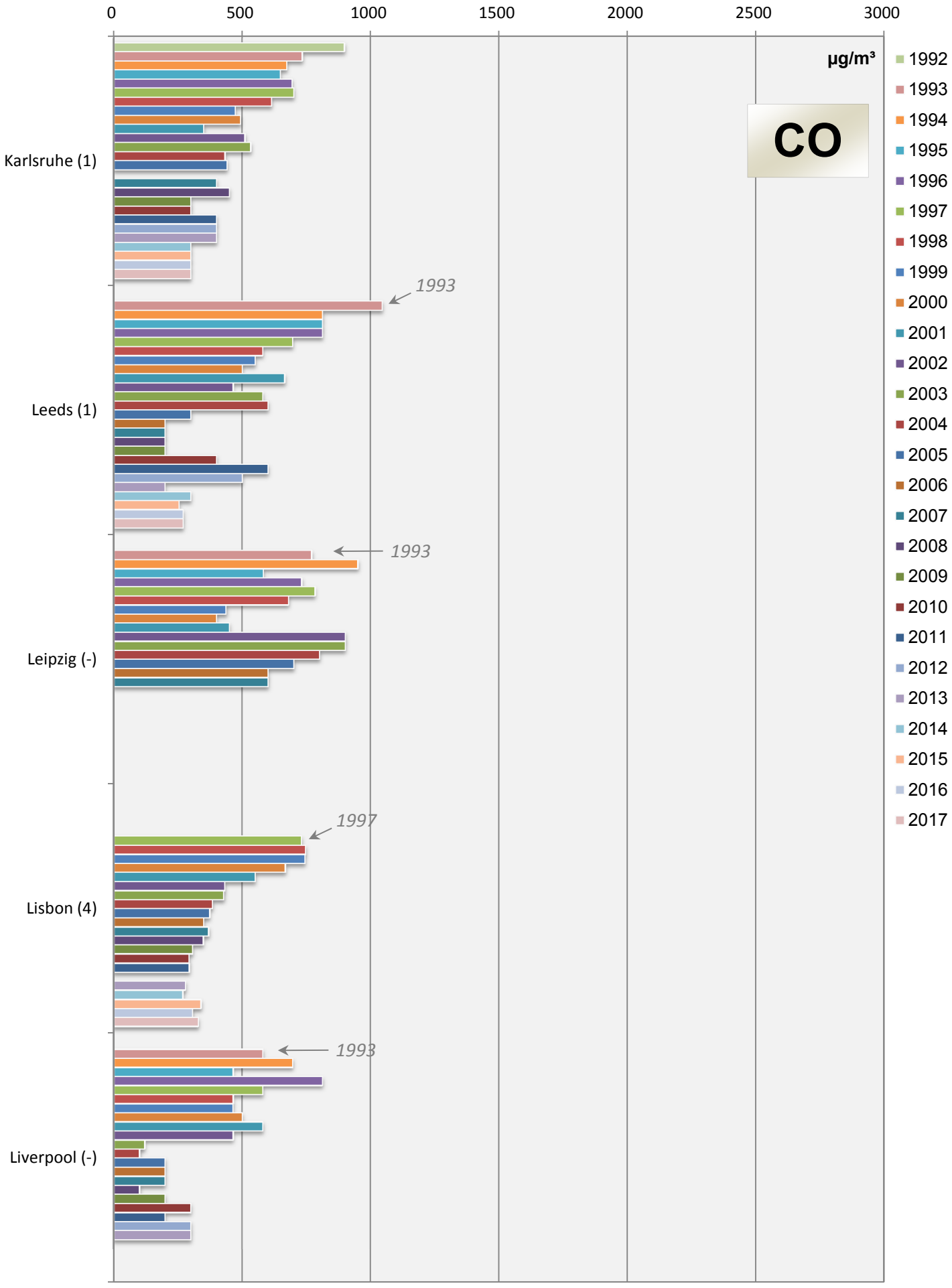

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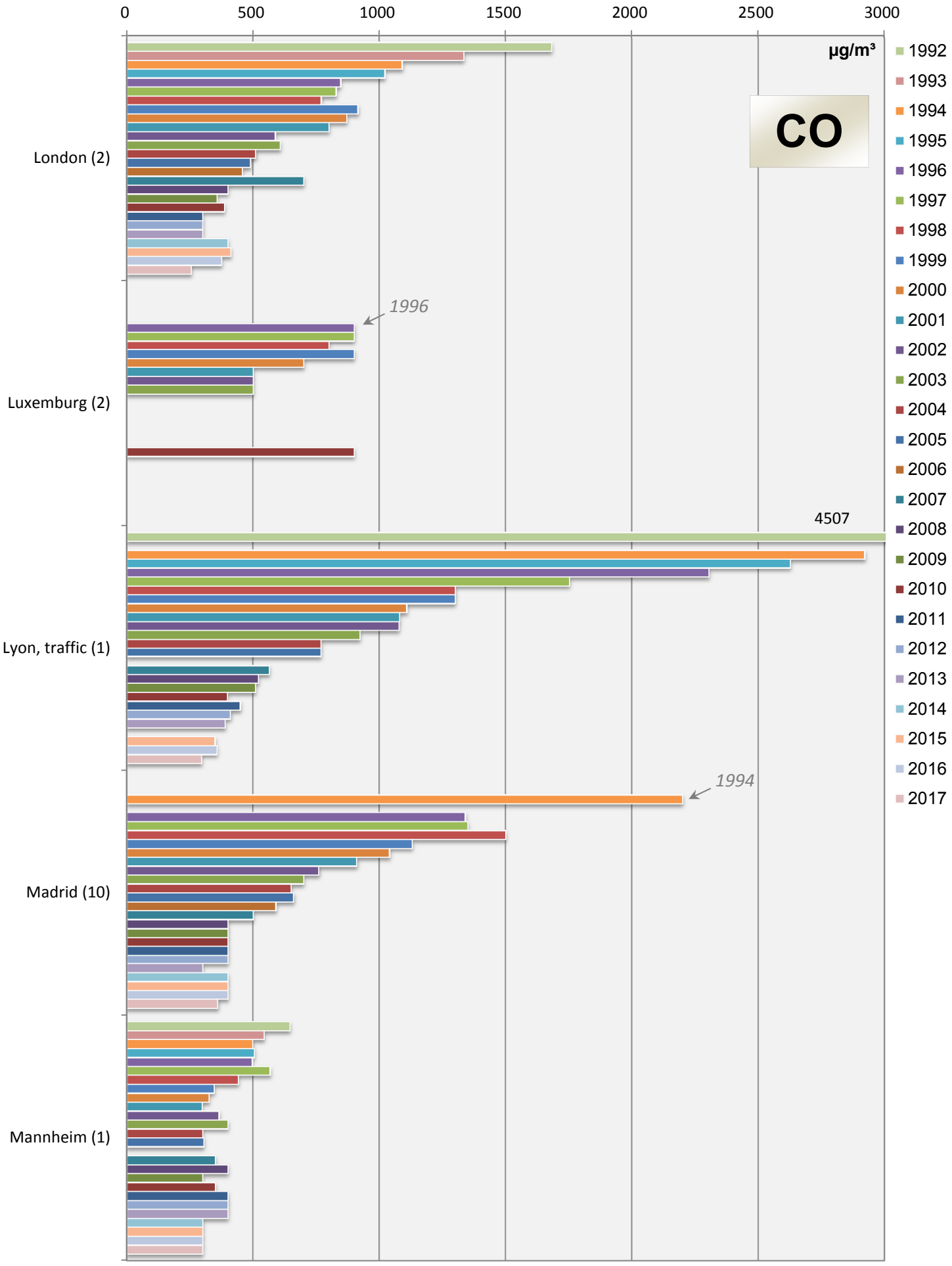

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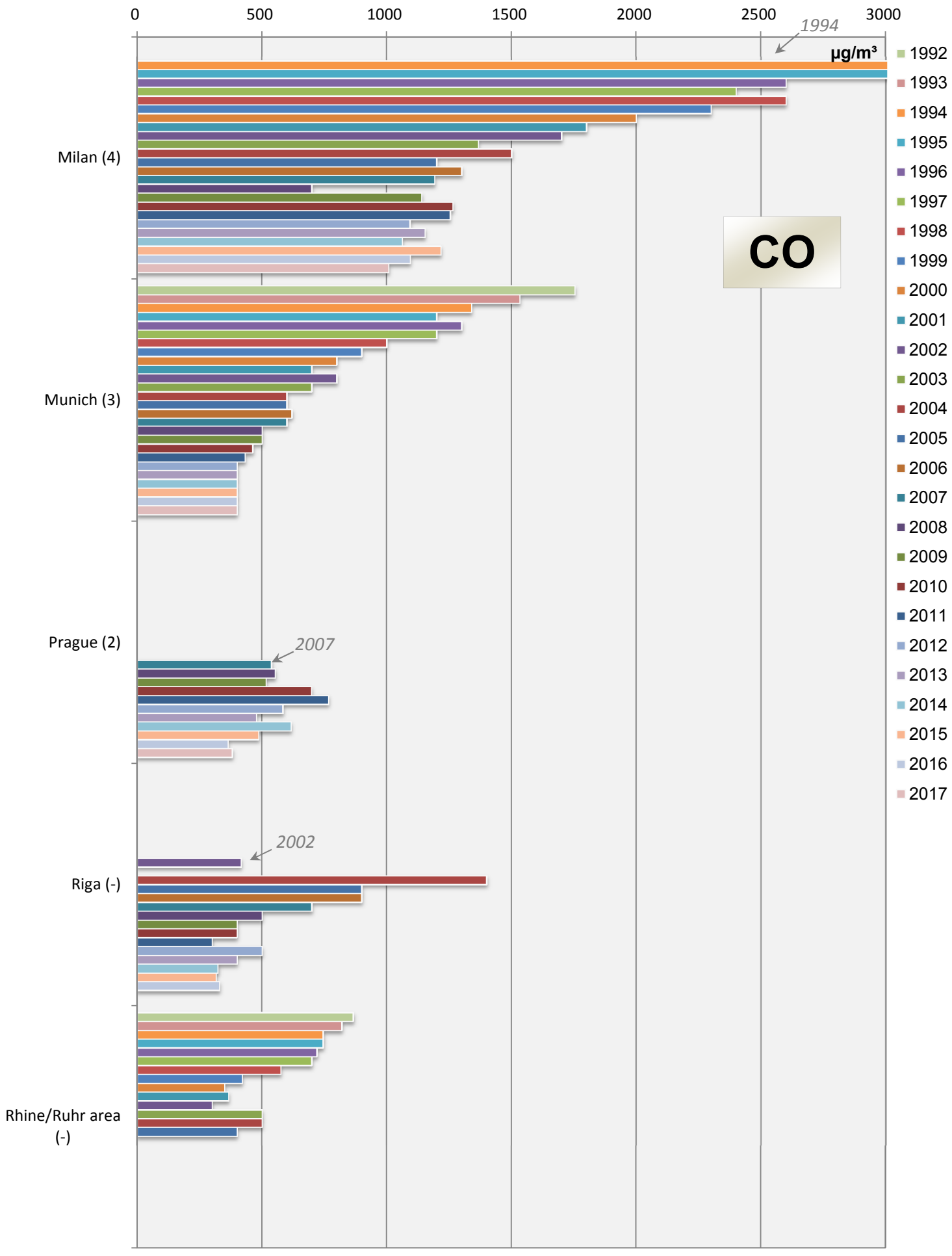

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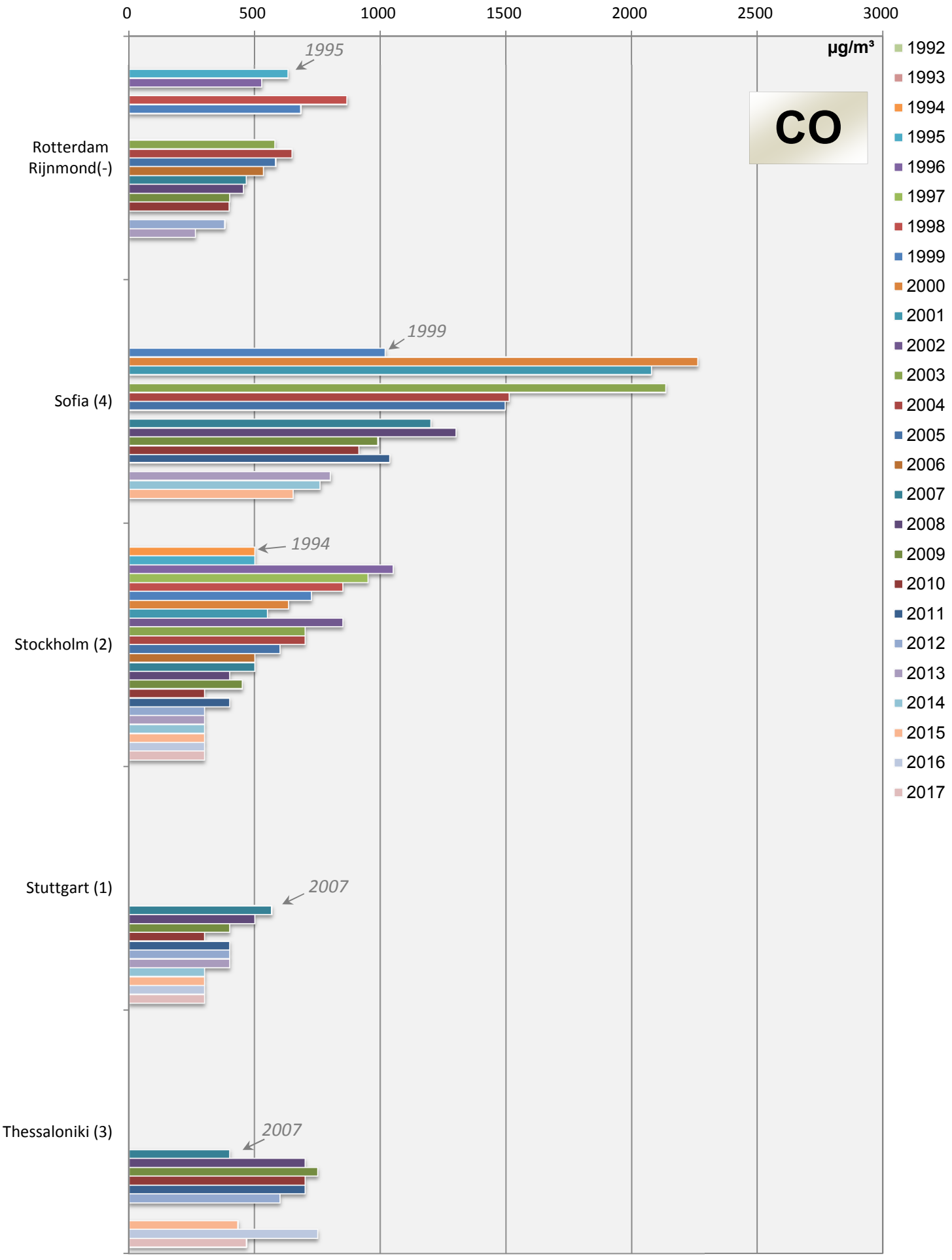

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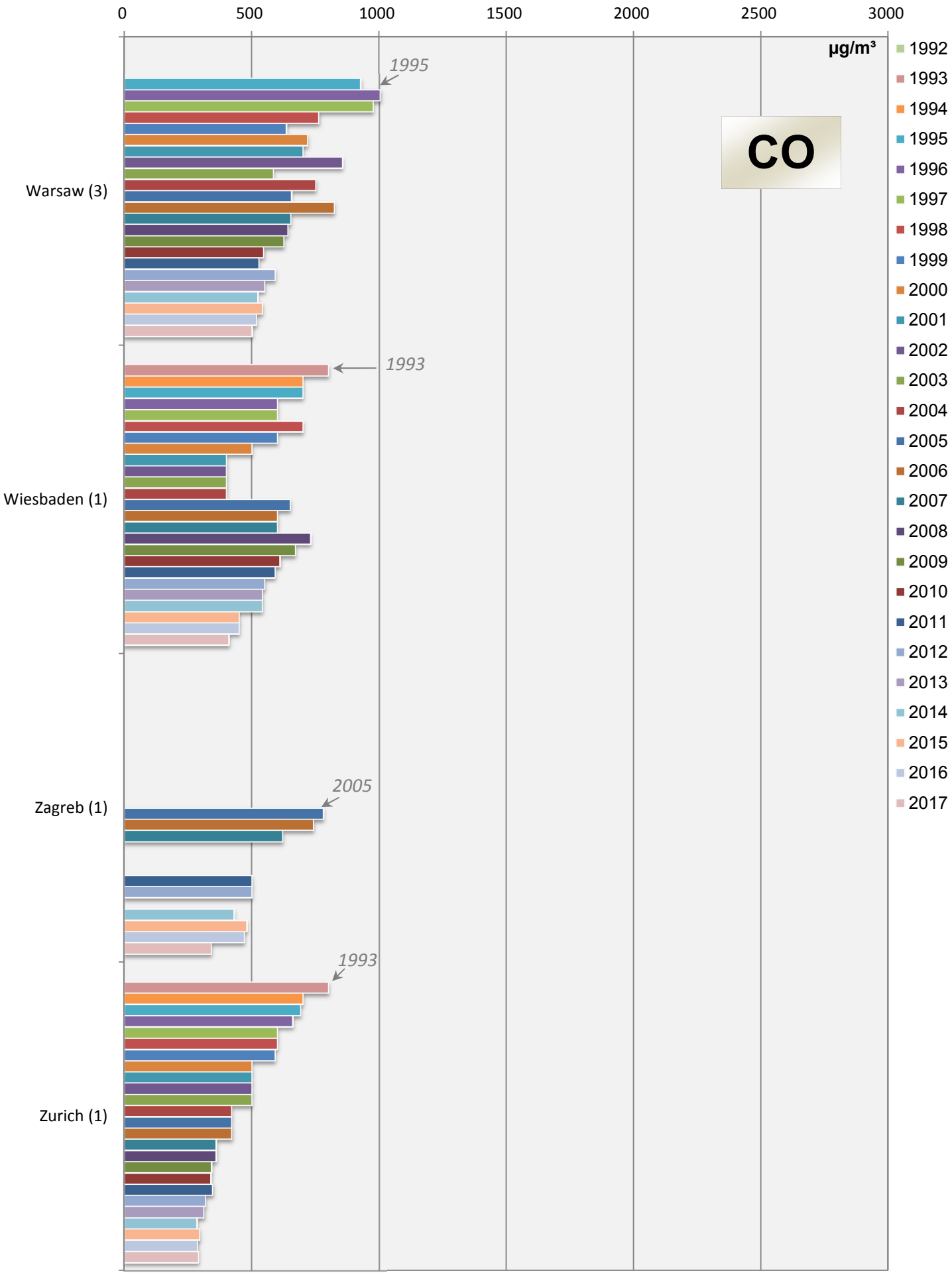

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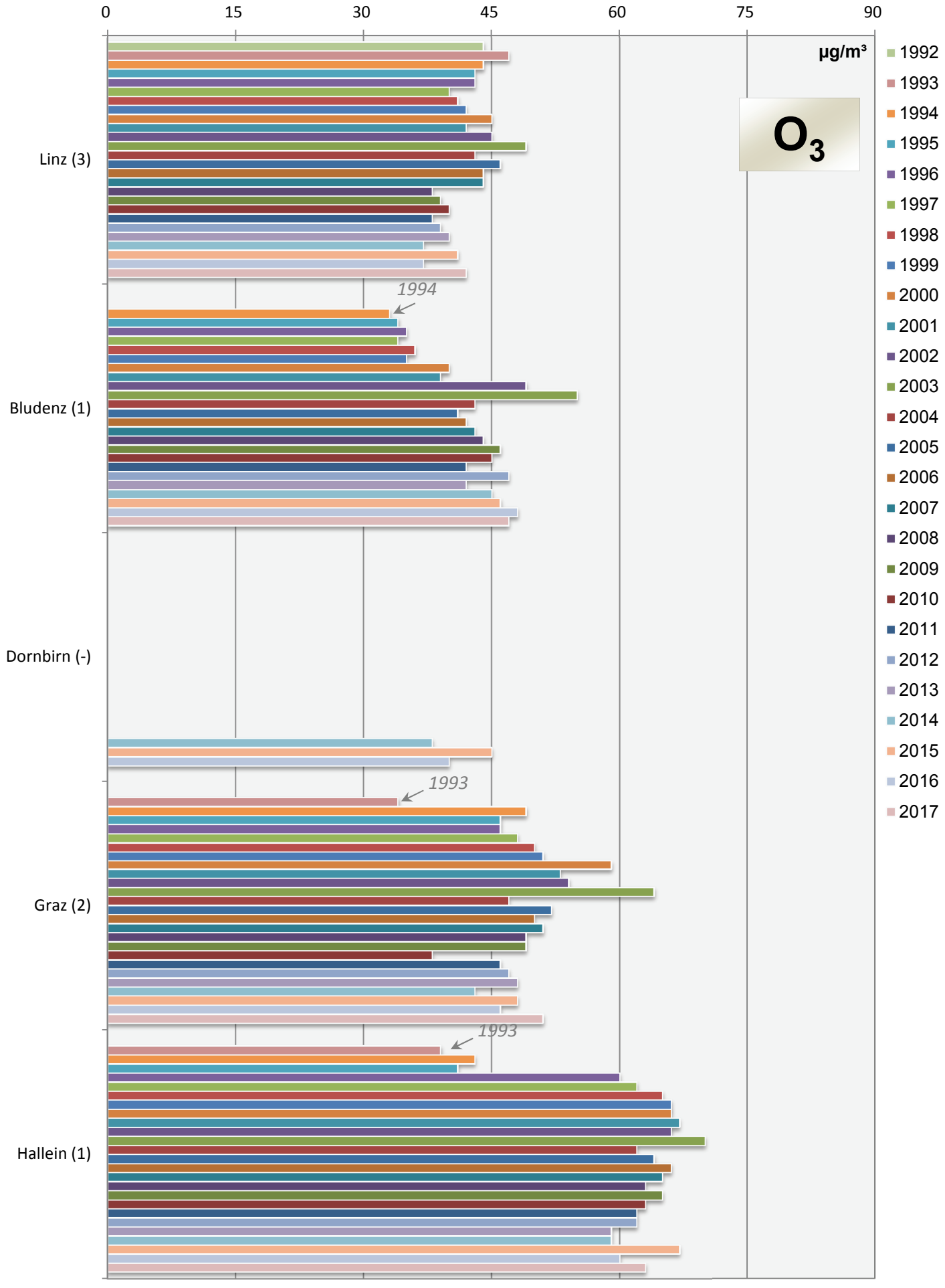

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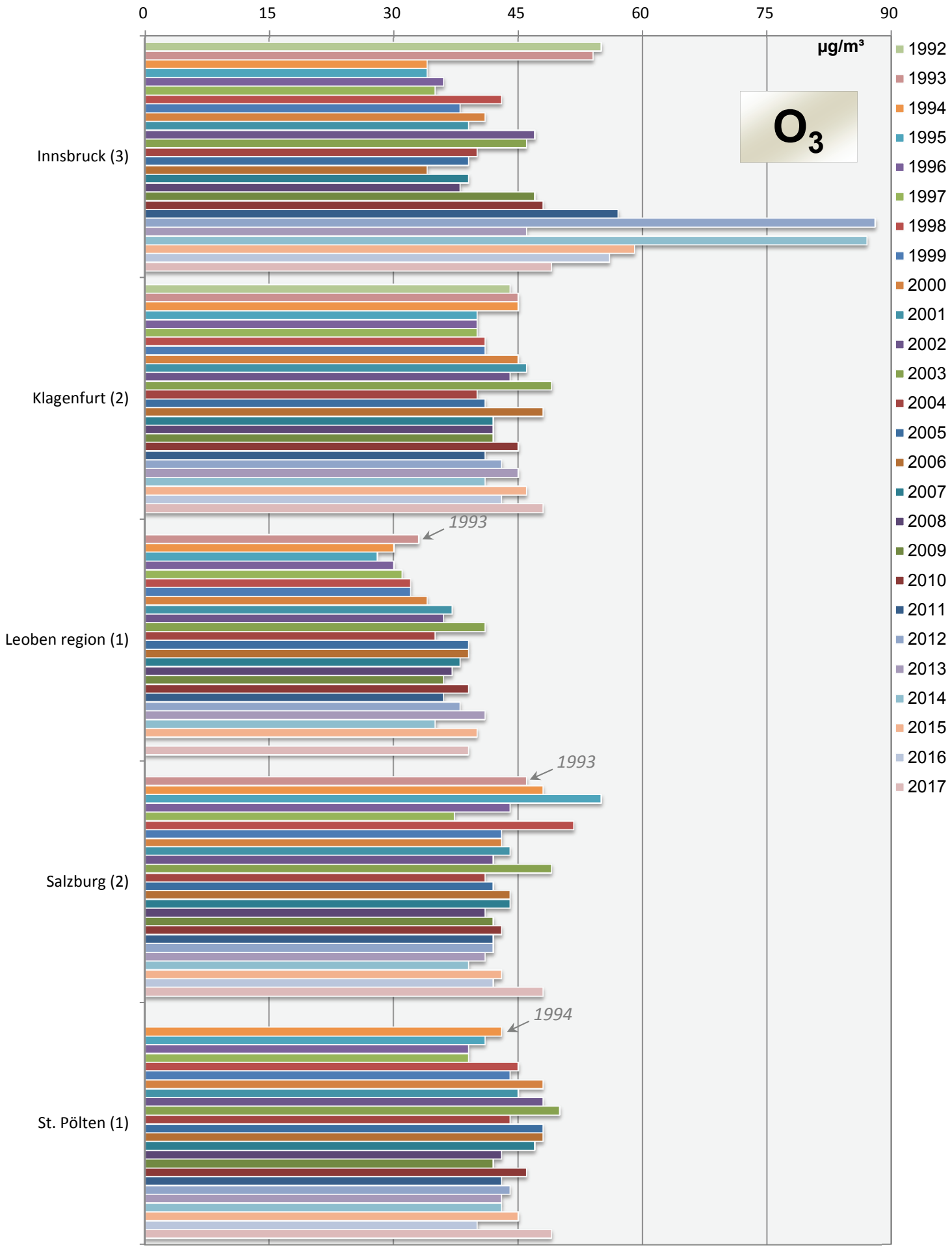

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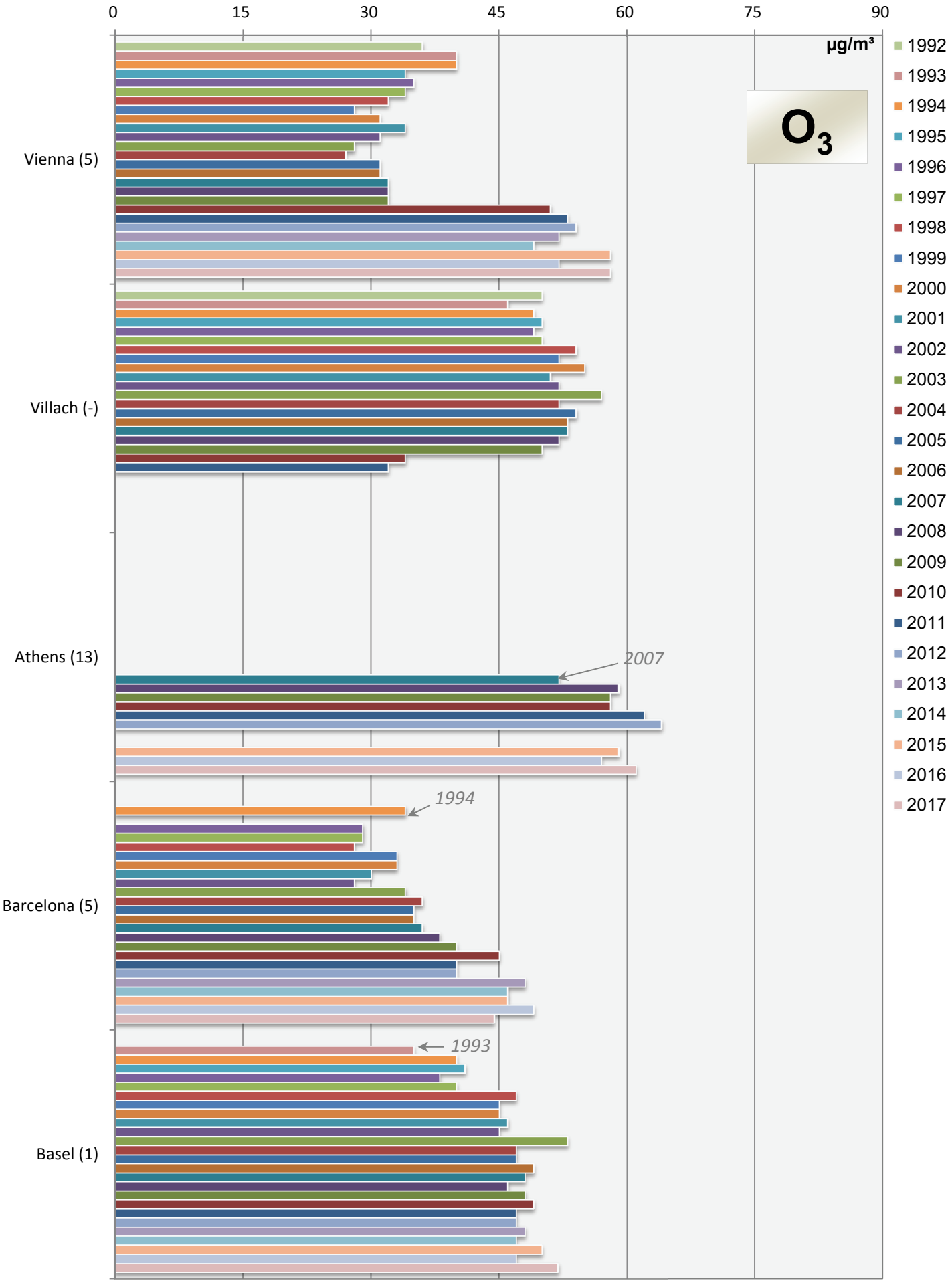

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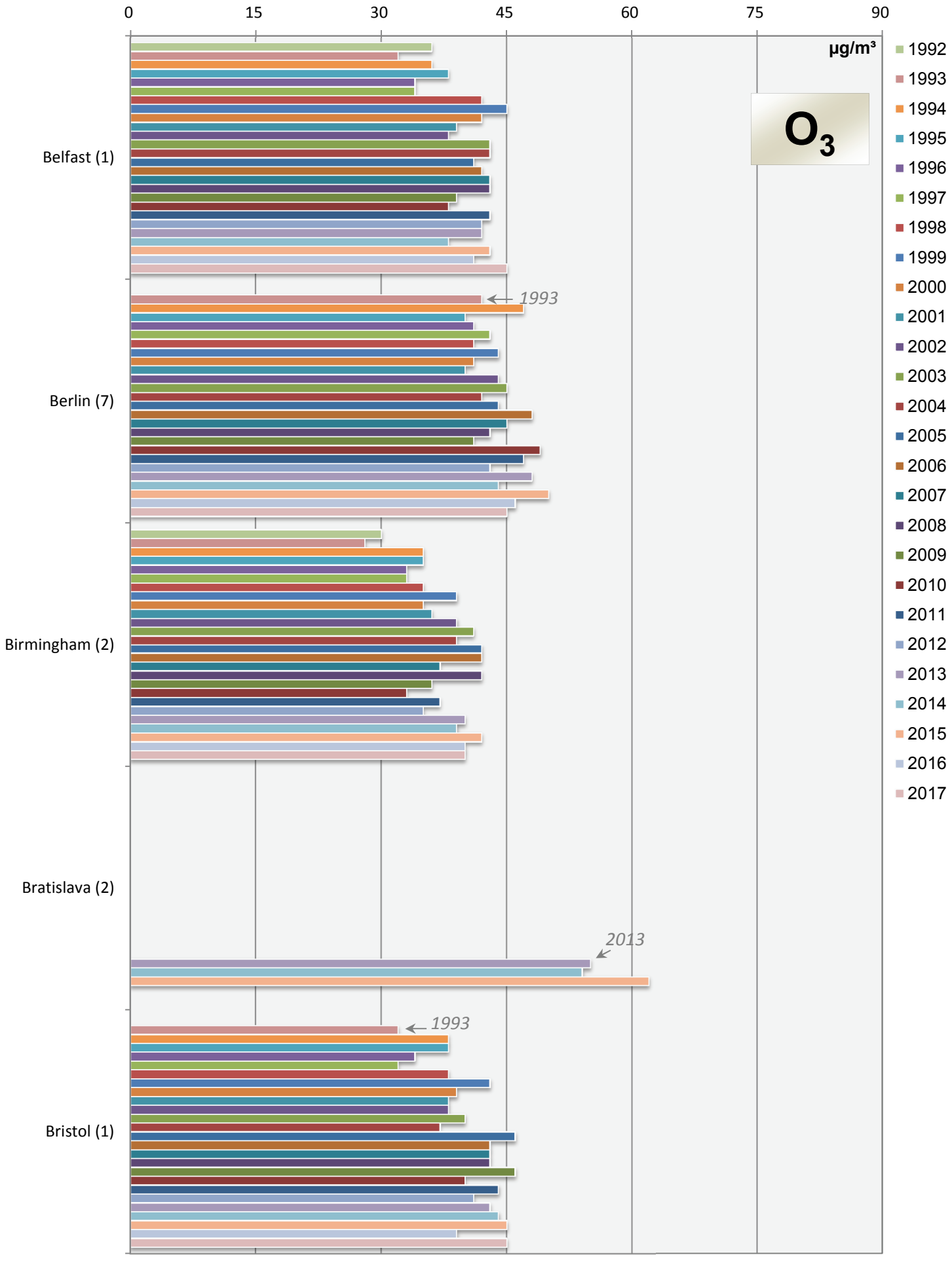

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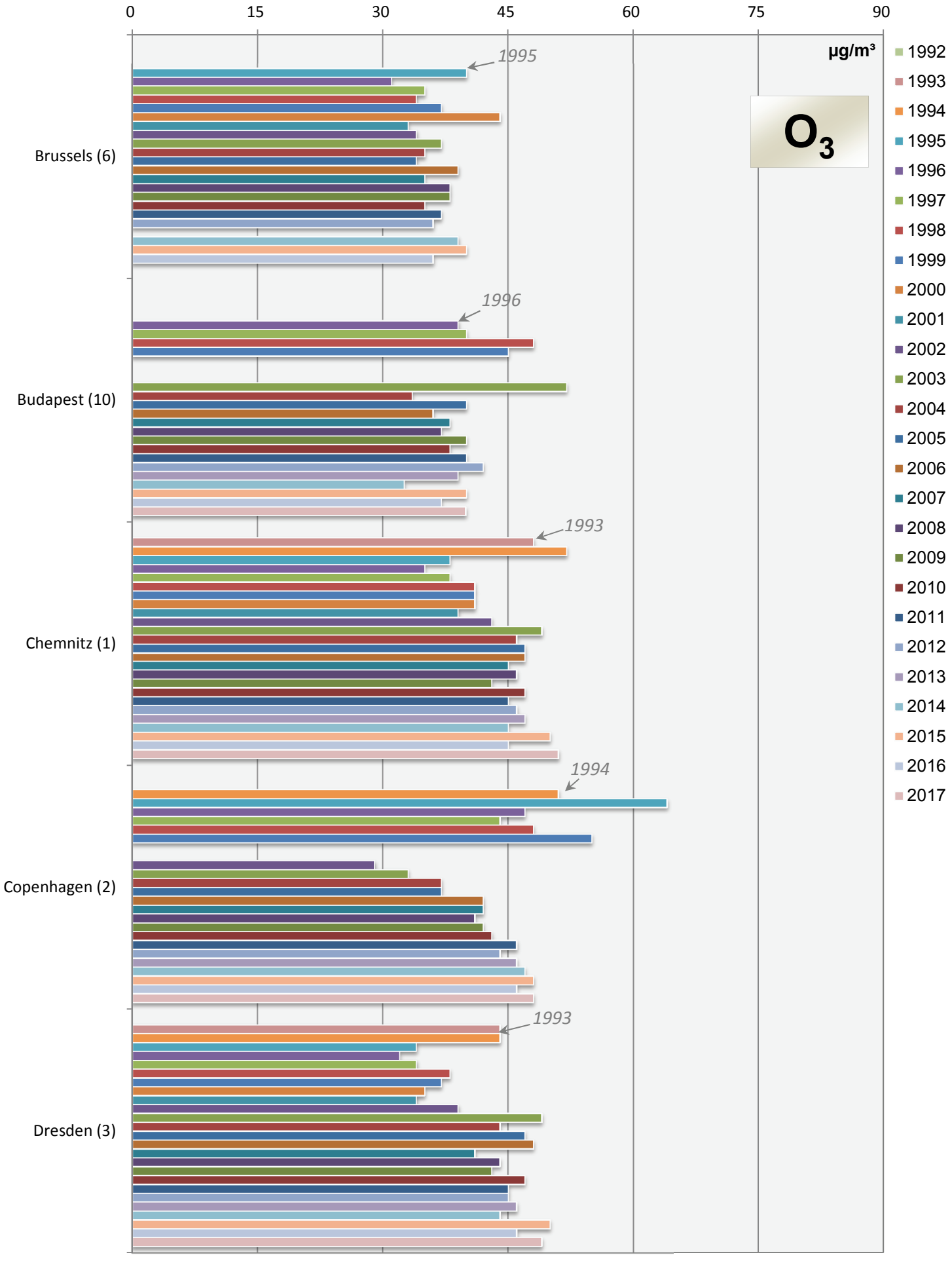

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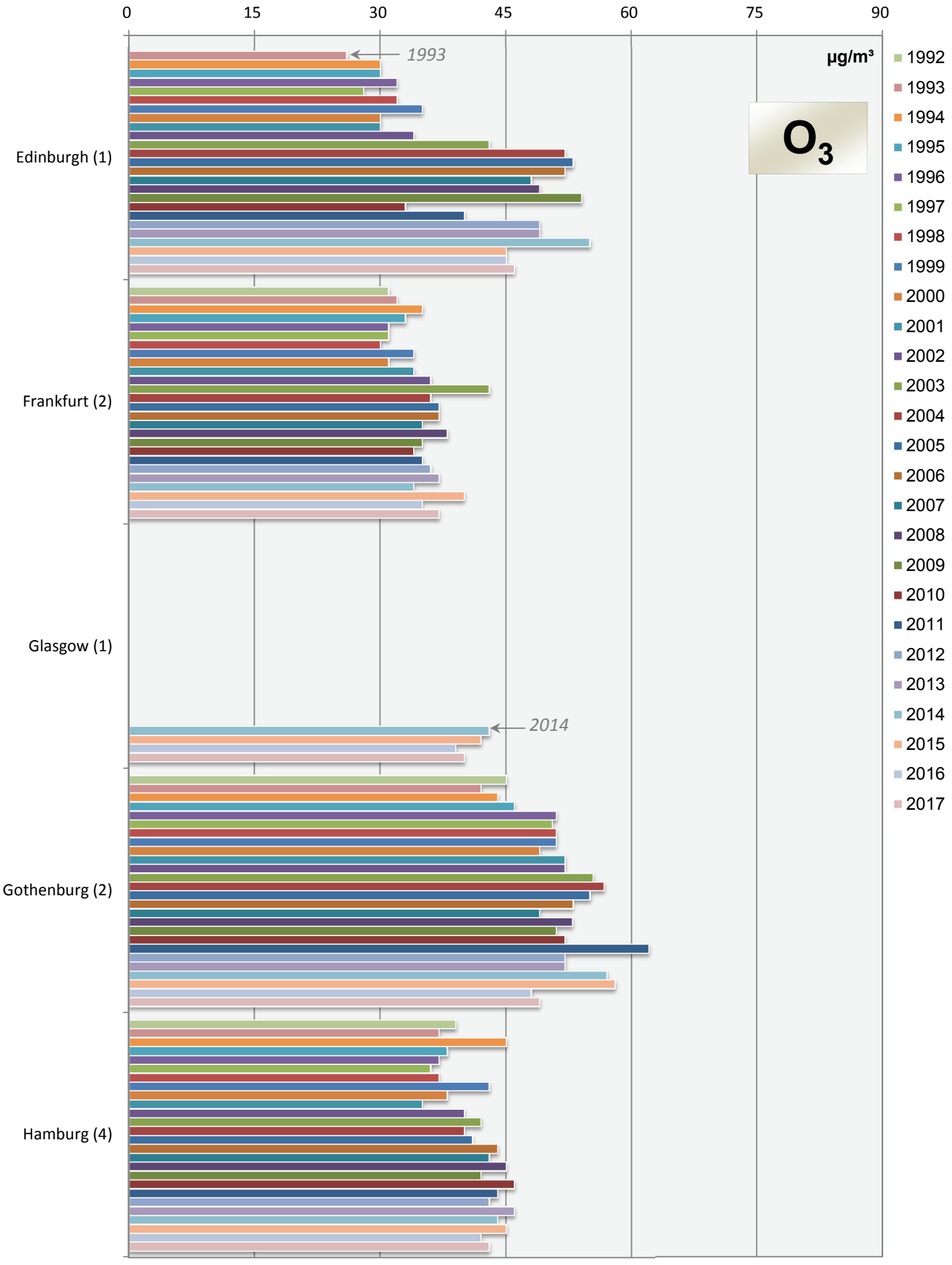

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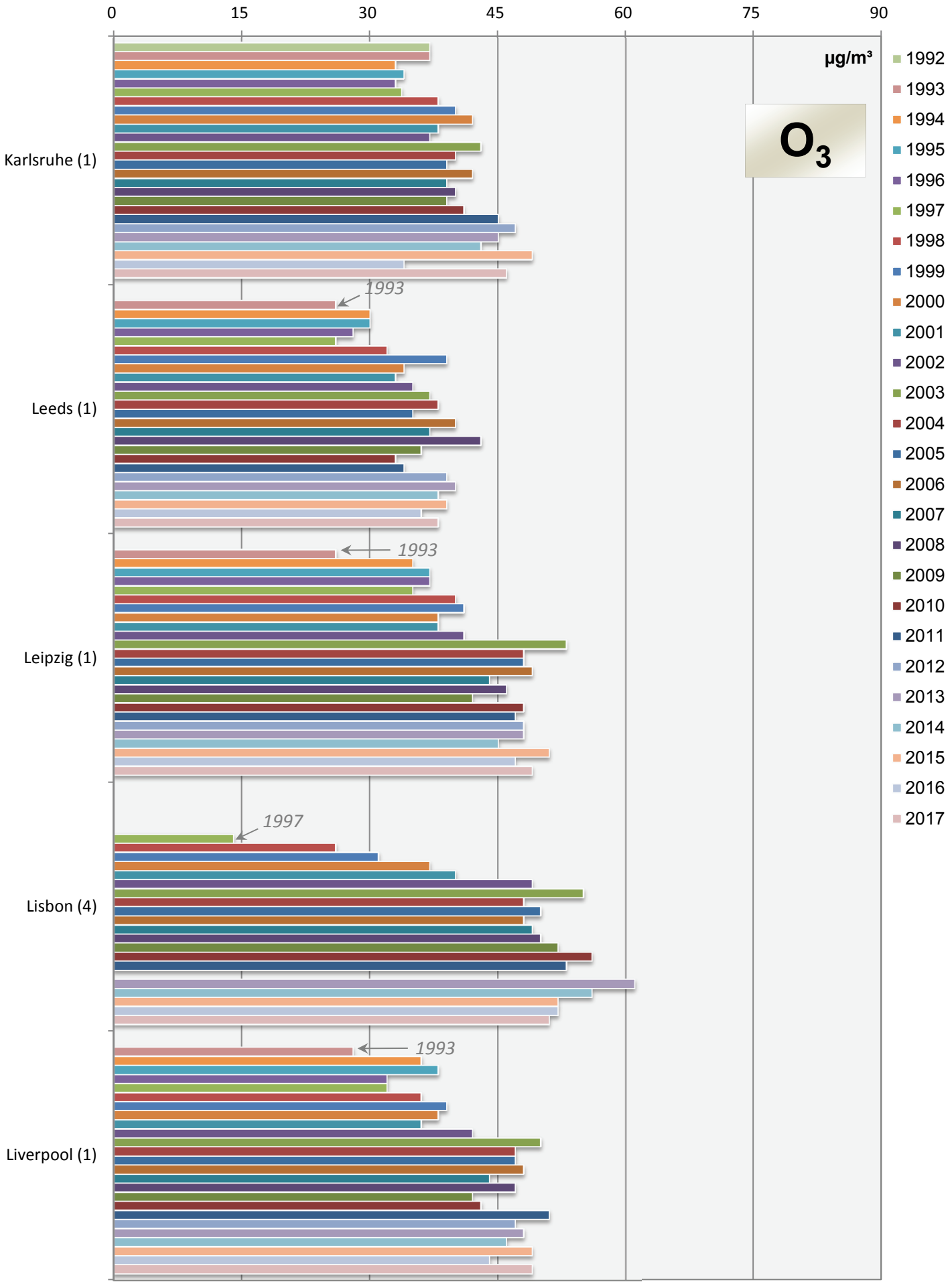

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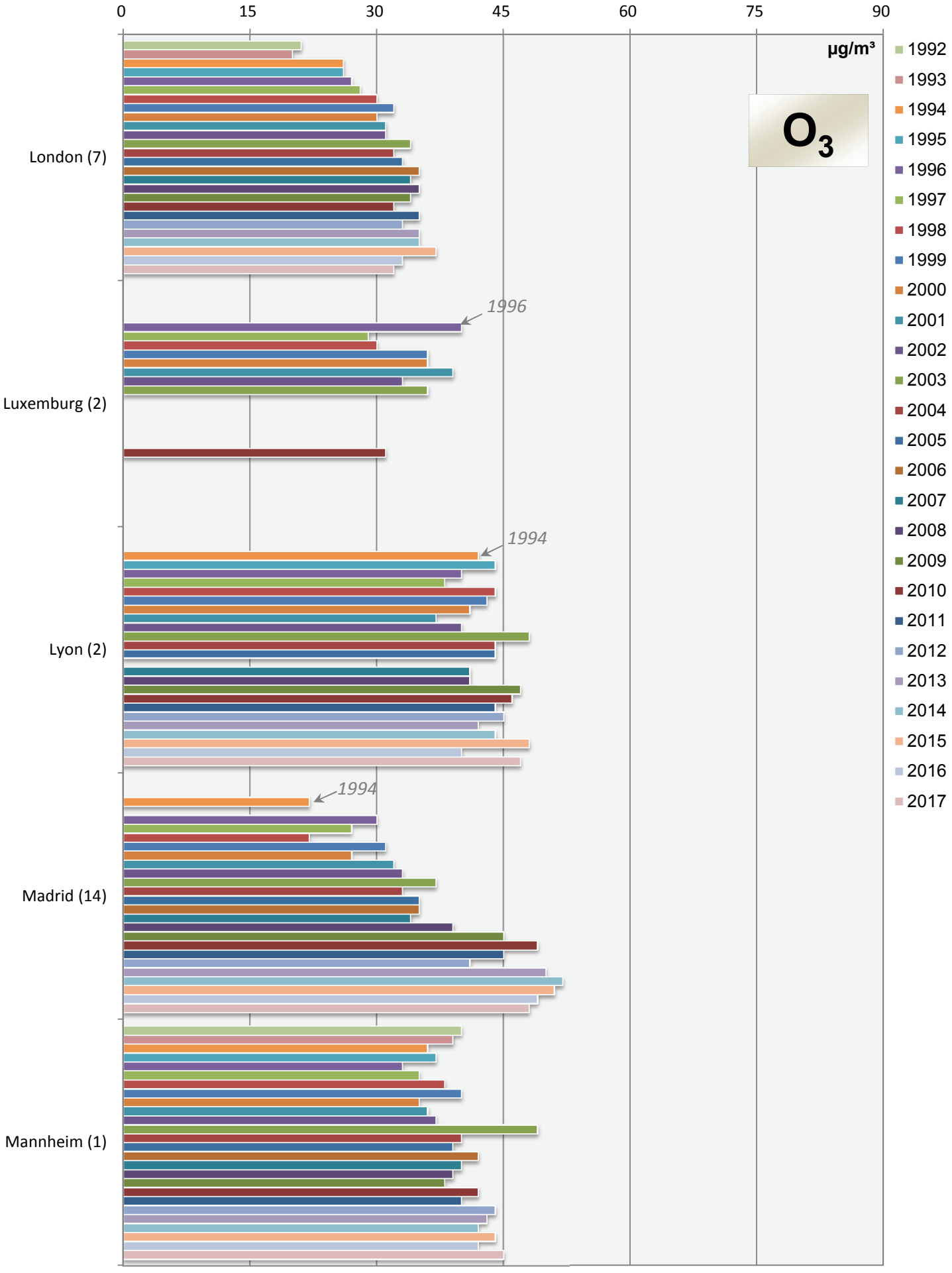

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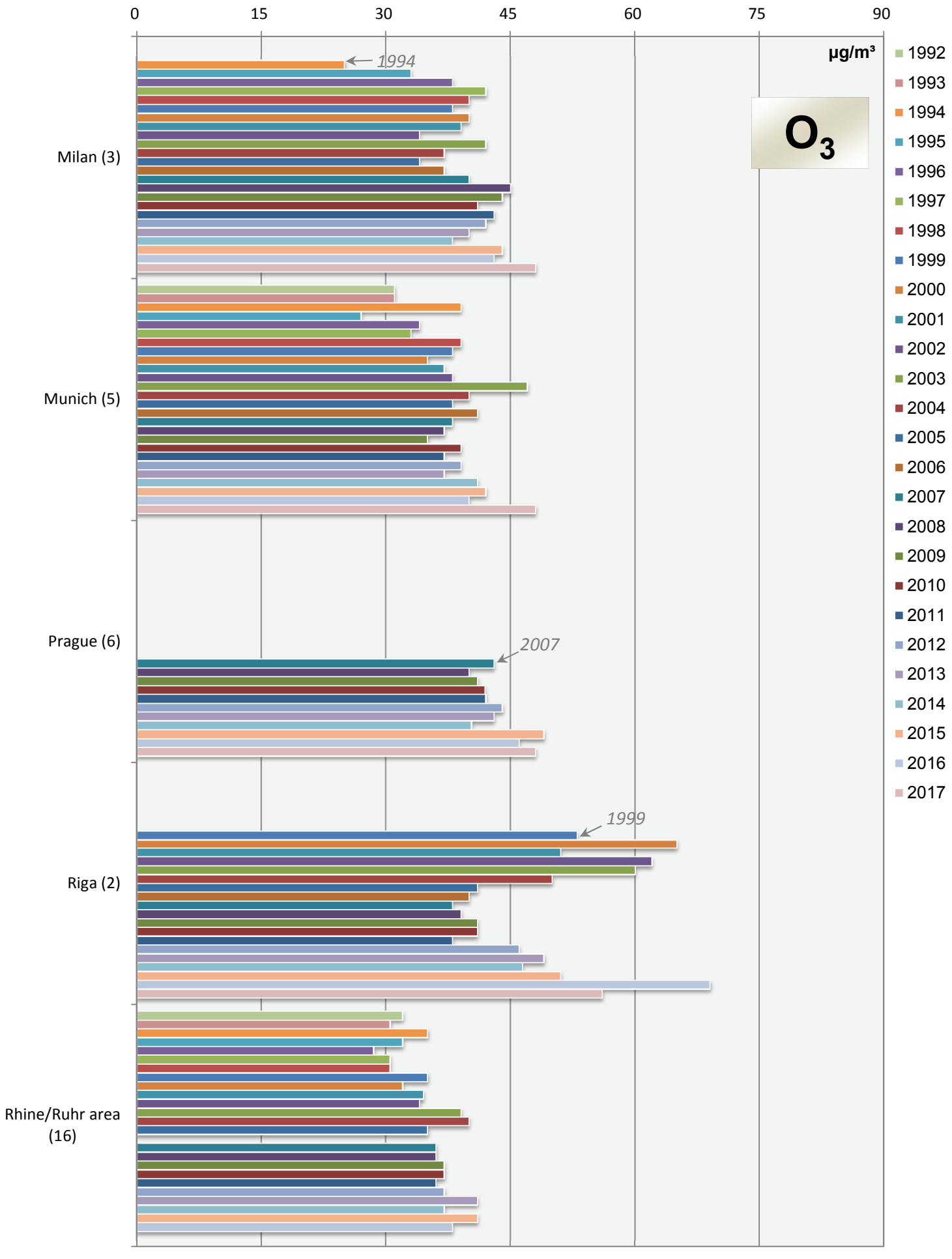

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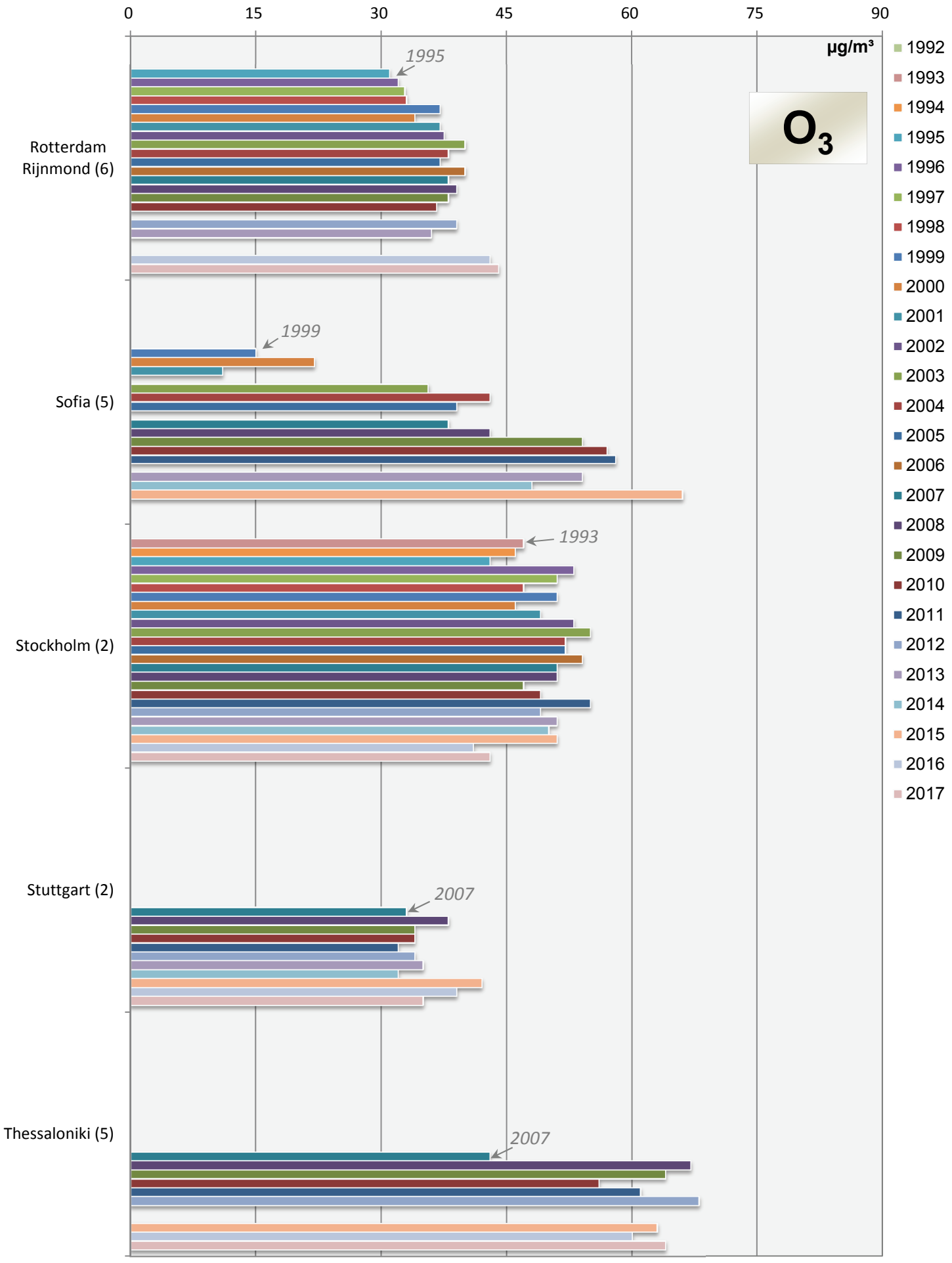

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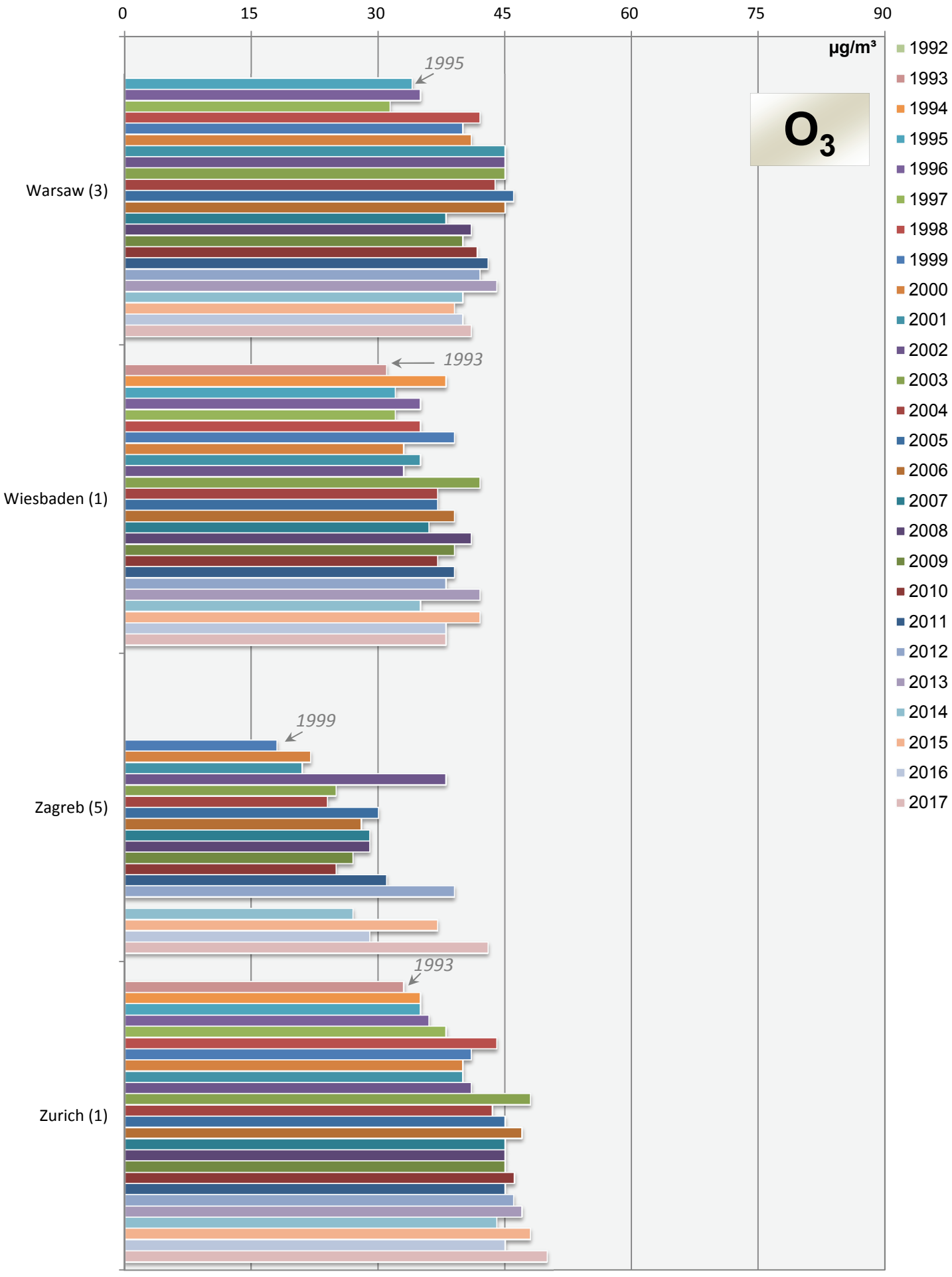


**Jahresvergleich**

**1992 - 2017**

**max. Tagesmittelwerte**

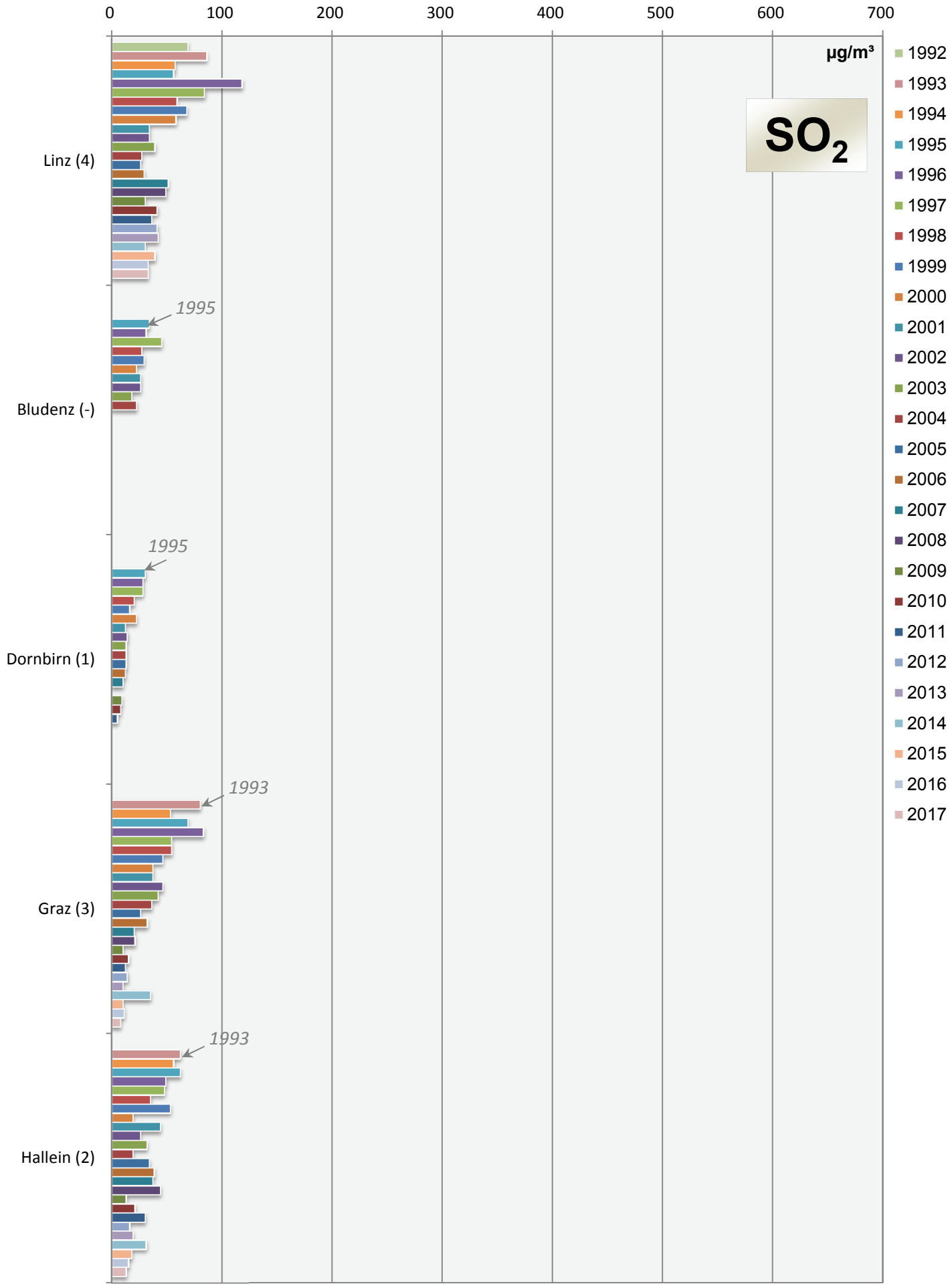
**Comparison of The Air Quality Over The Years**

**1992 - 2017**

**Max. Daily Mean Values**

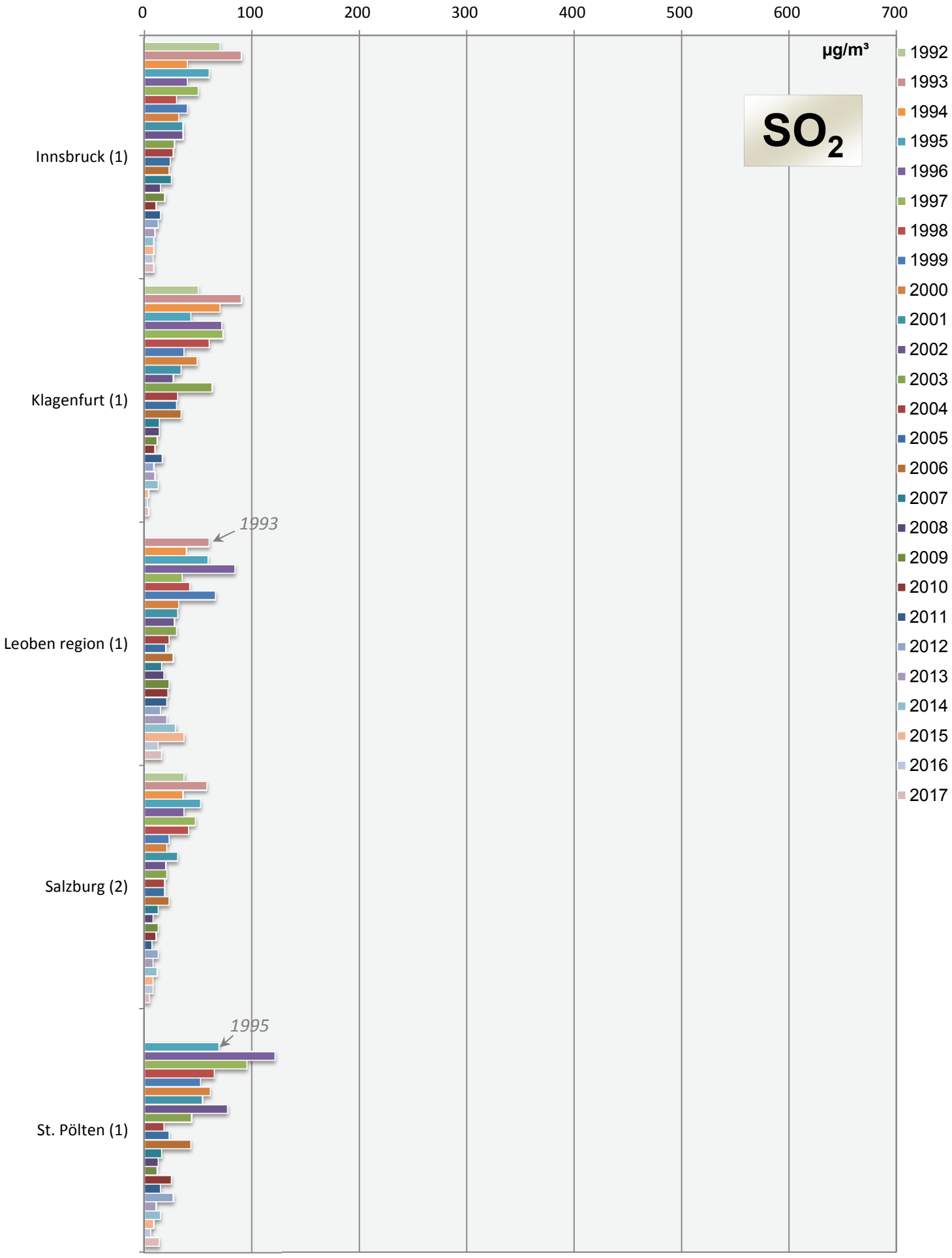
# Comparison of The Air Quality 1992 - 2017

## max. daily mean values (peak-stressed monitoring station)



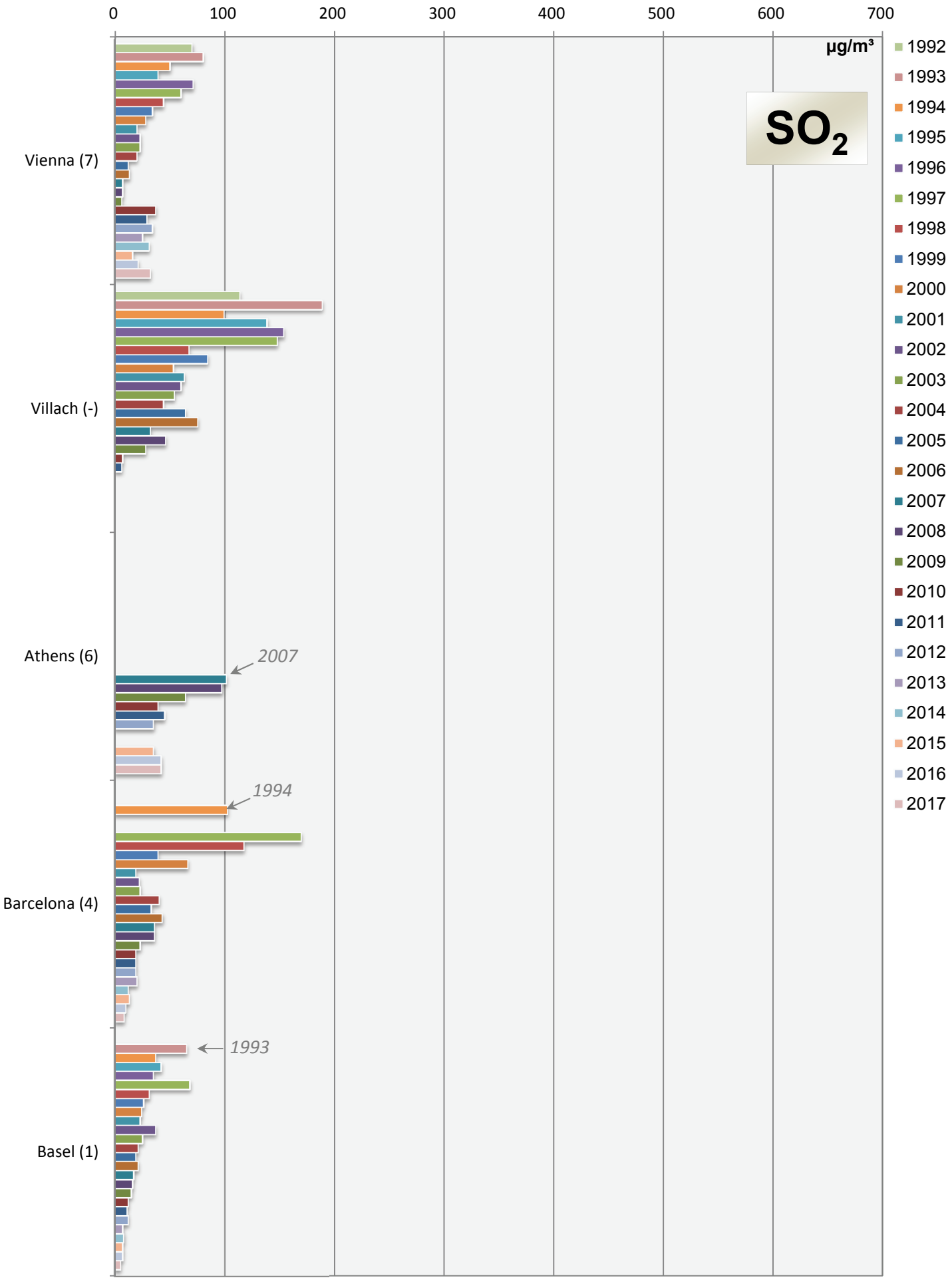
# Comparison of The Air Quality 1992 - 2017

## max. daily mean values (peak-stressed monitoring station)



# Comparison of The Air Quality 1992 - 2017

## max. daily mean values (peak-stressed monitoring station)



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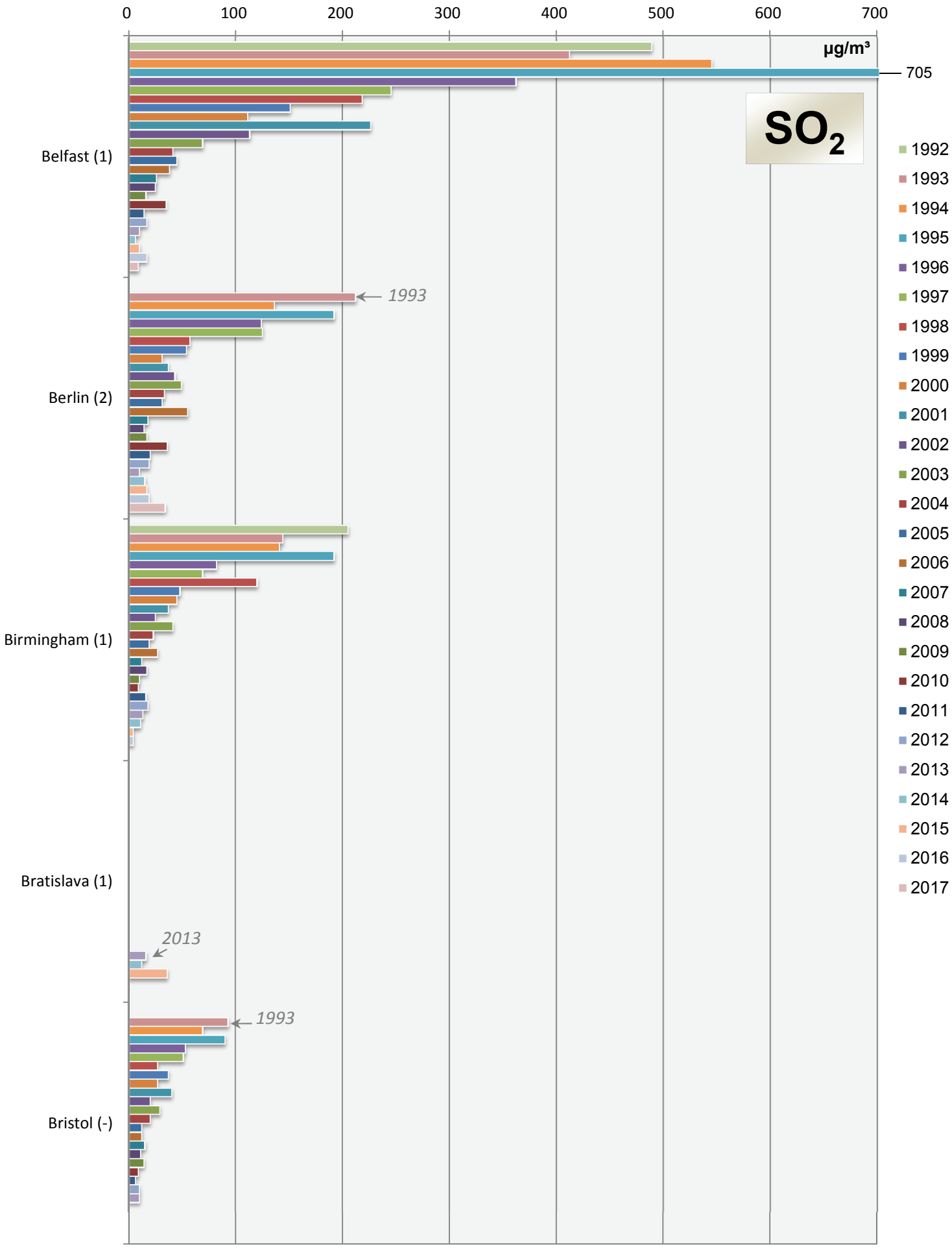

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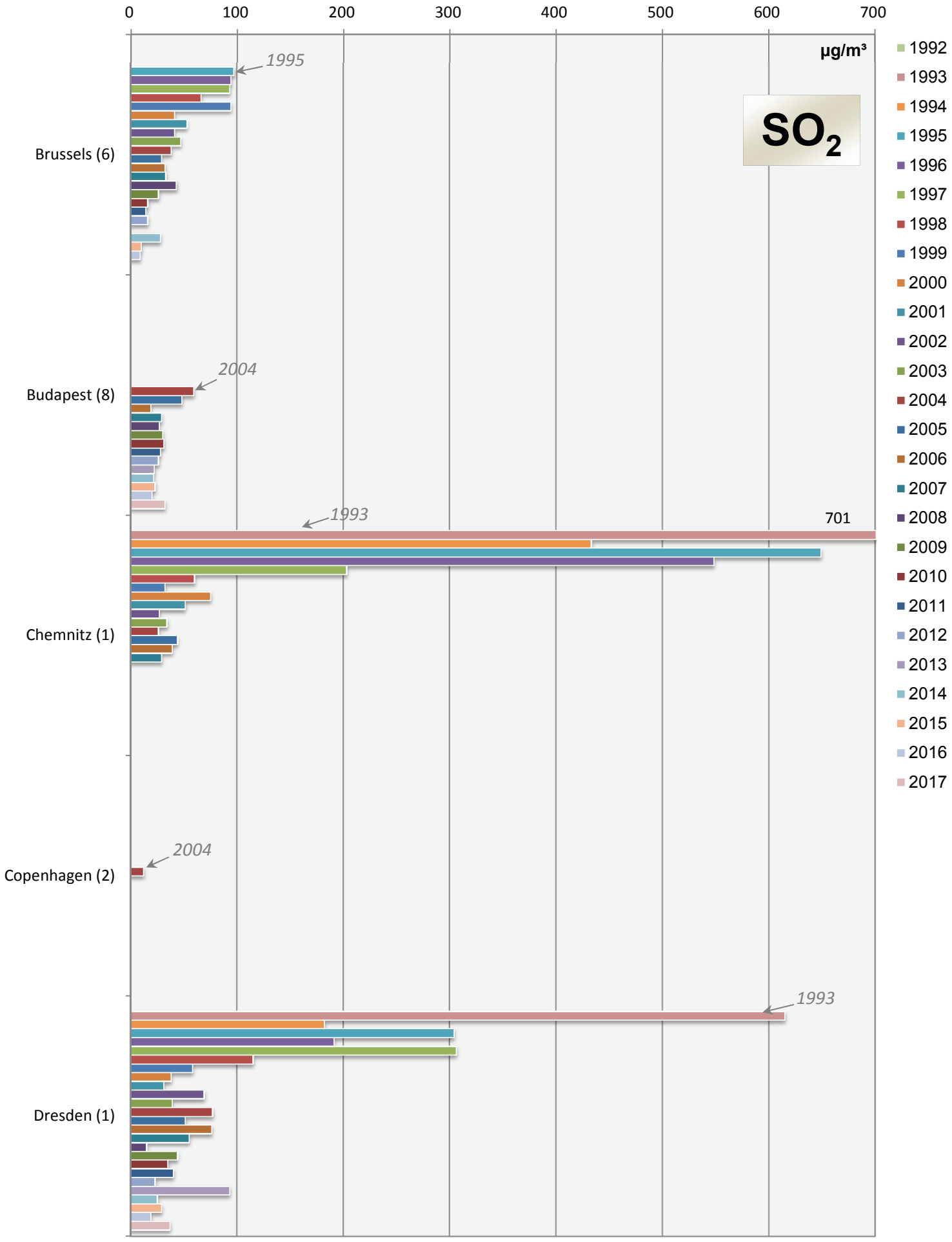

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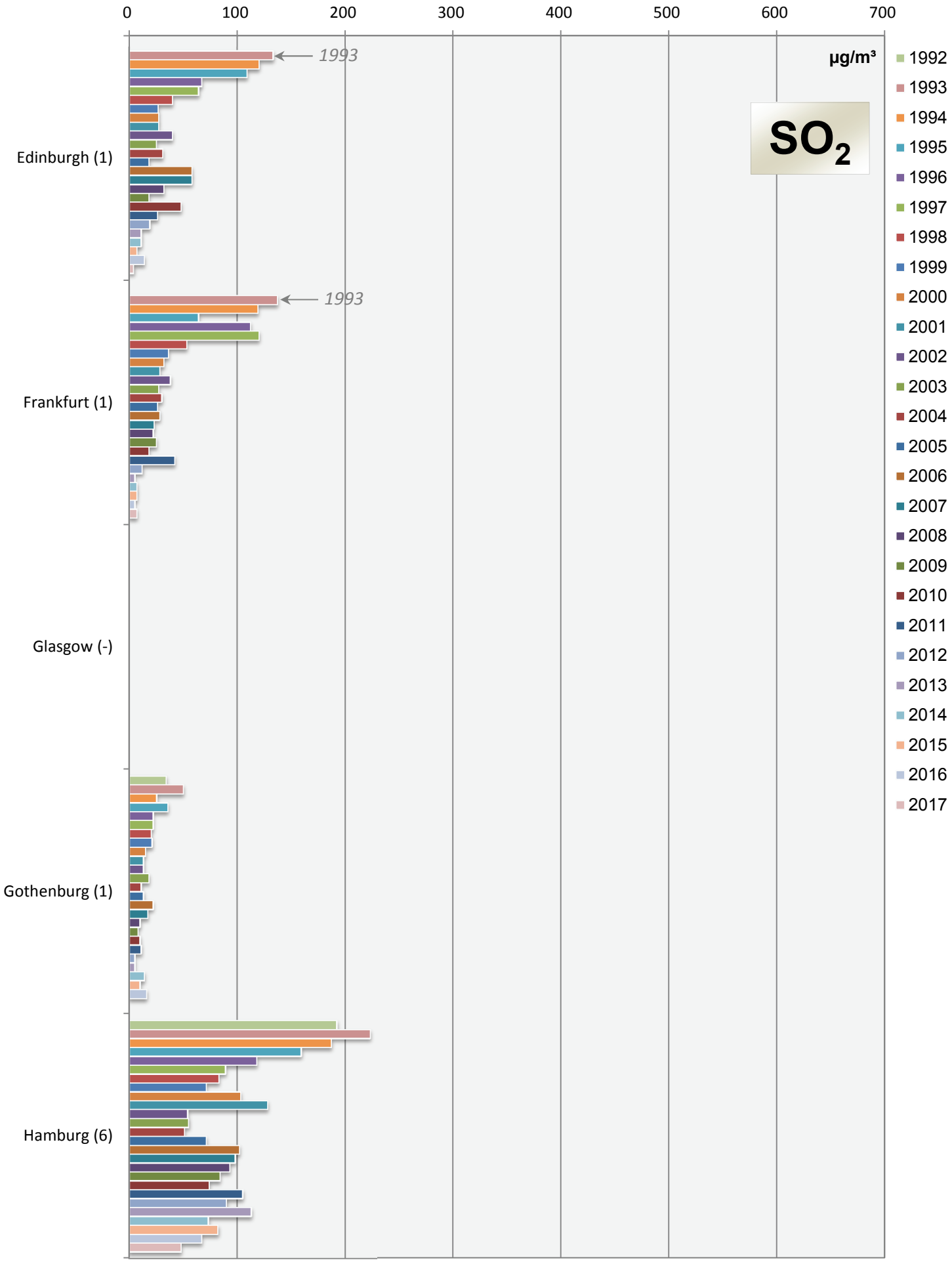

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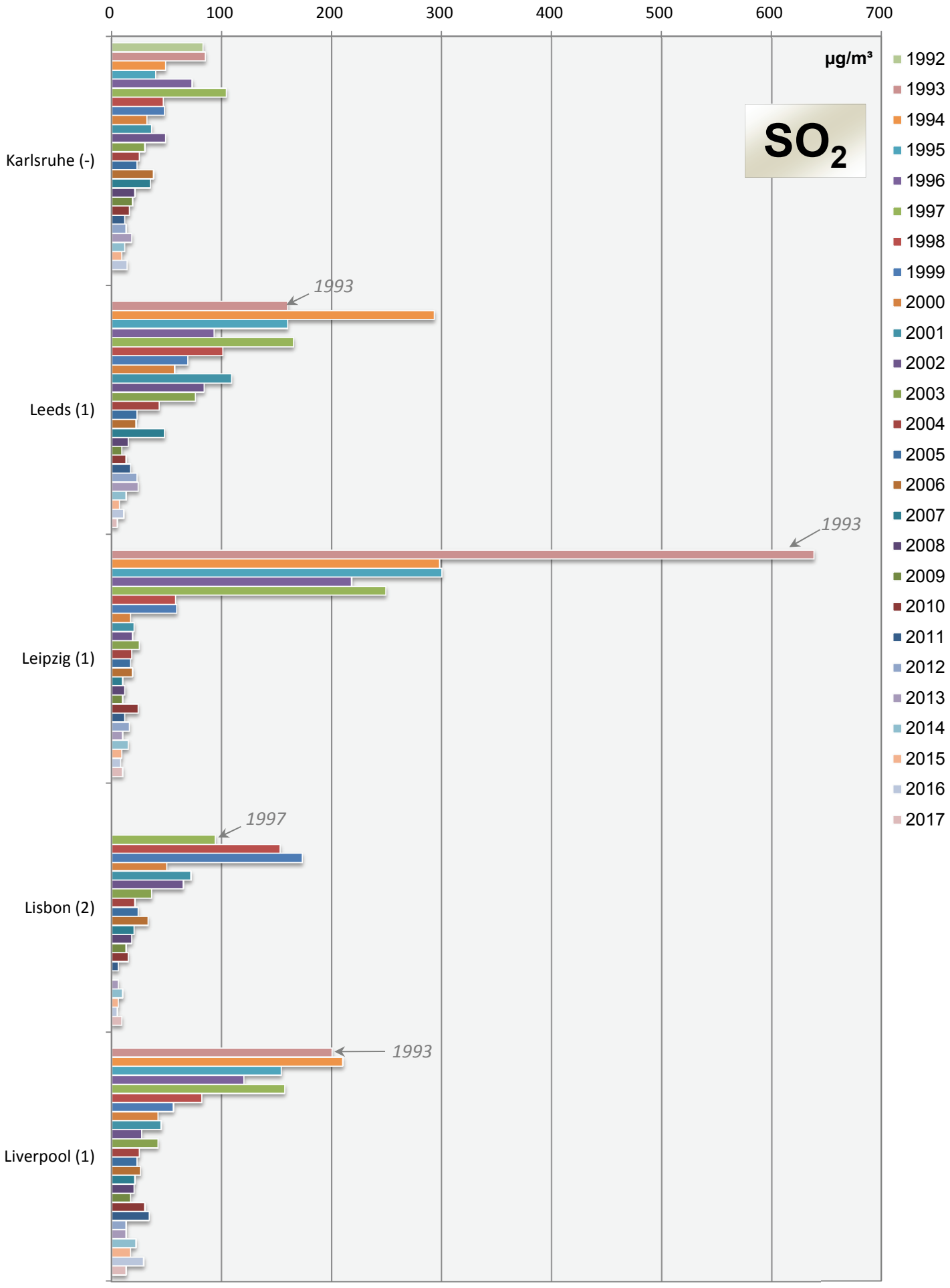
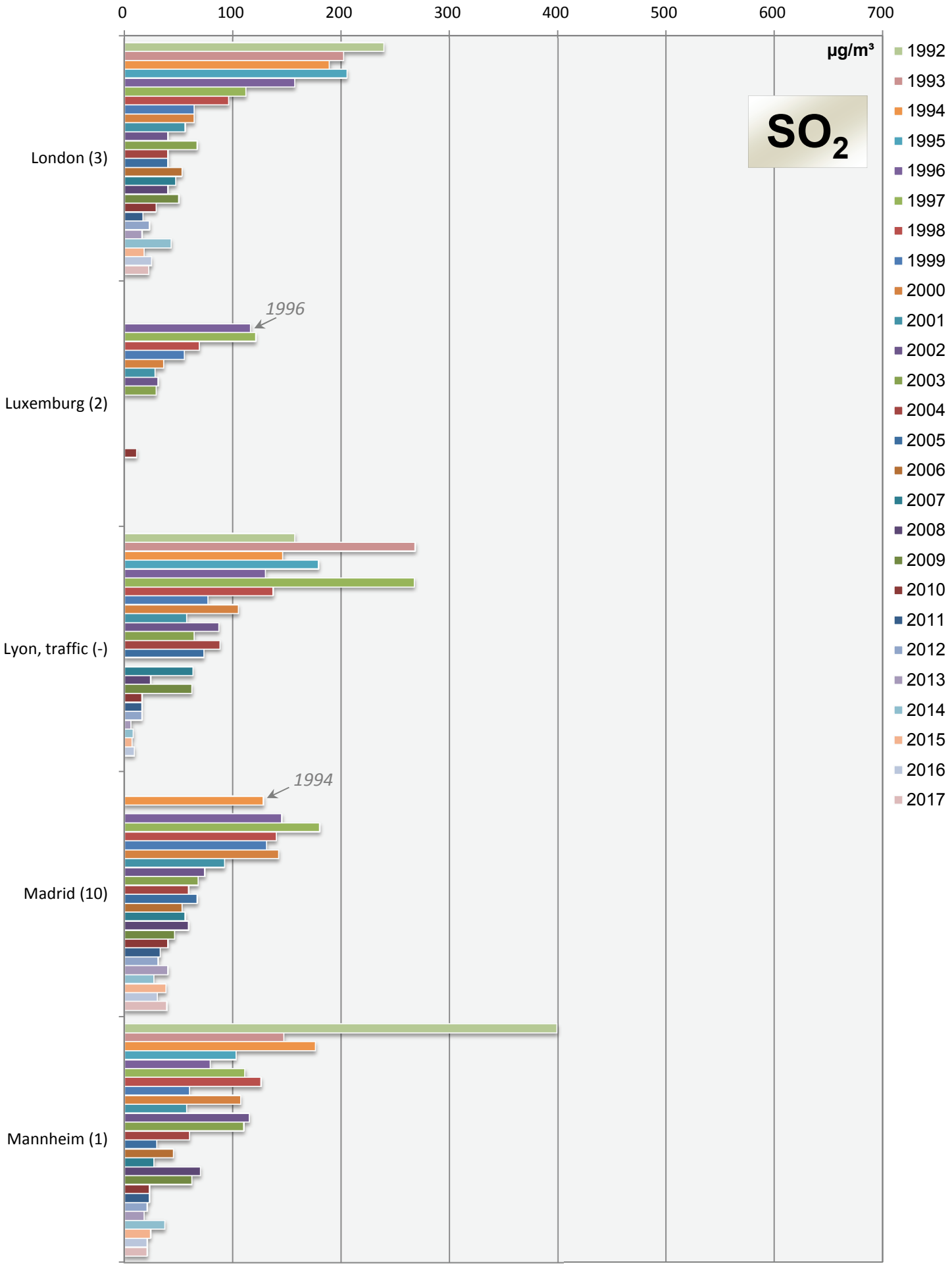


# Comparison of The Air Quality 1992 - 2017

## max. daily mean values (peak-stressed monitoring station)



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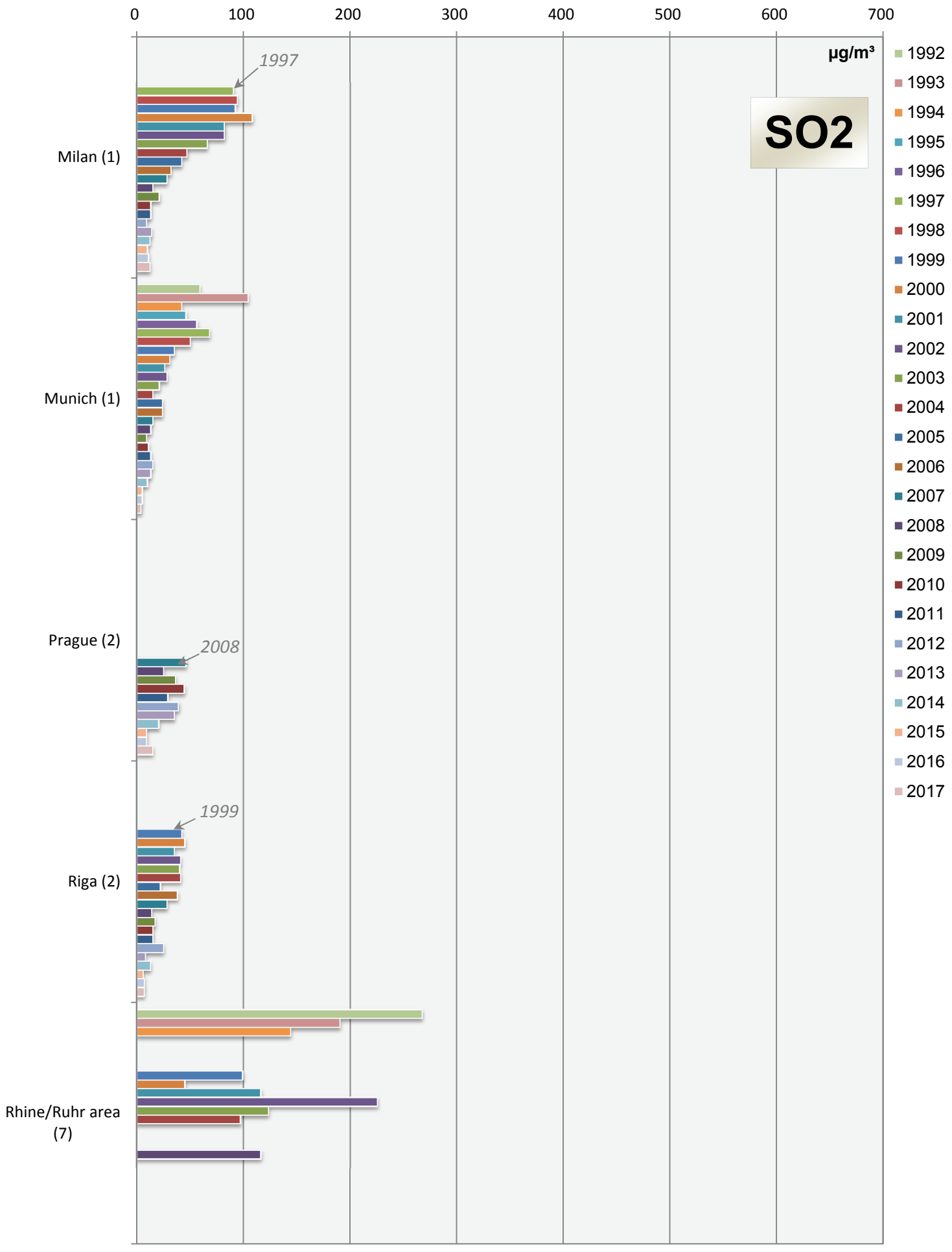

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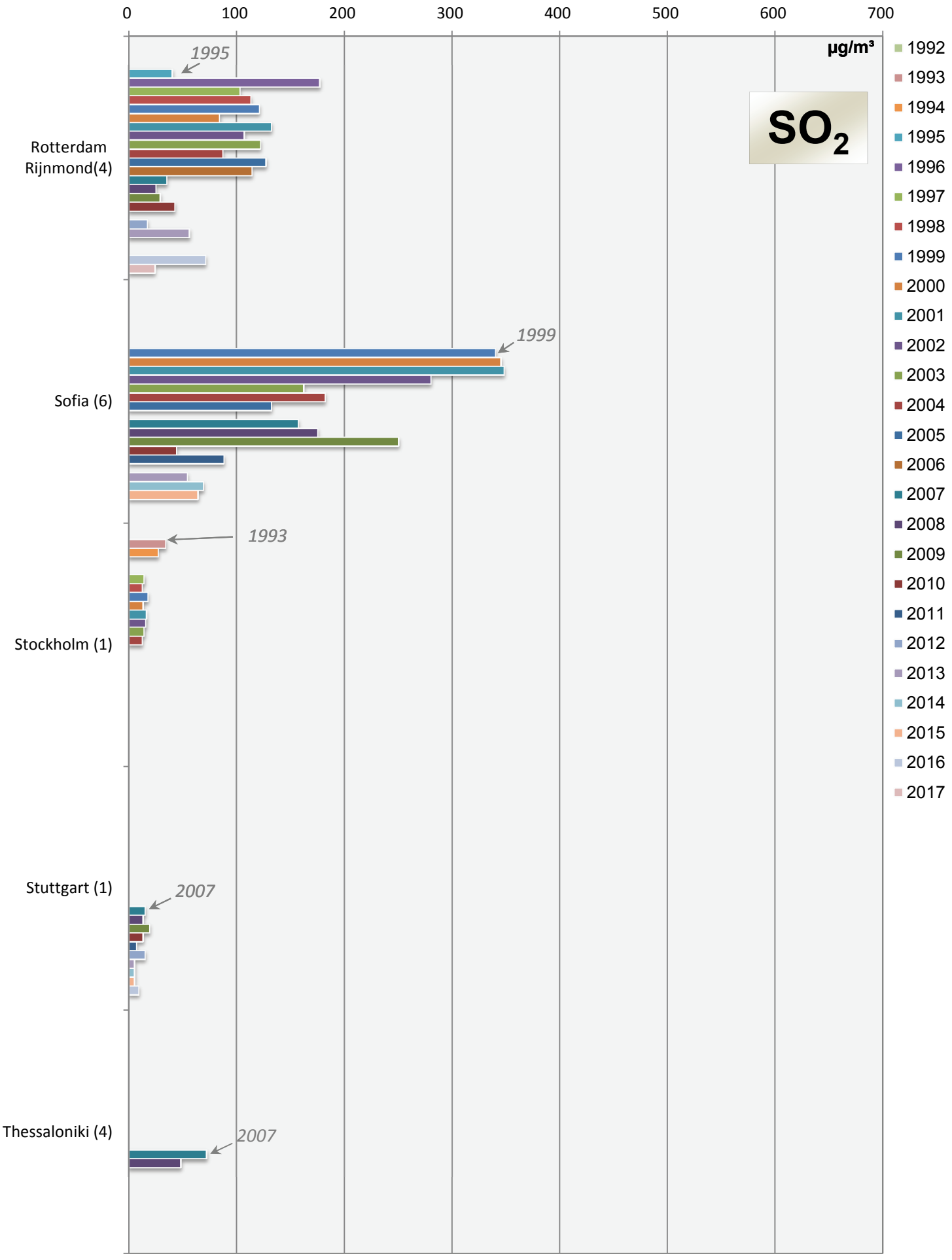

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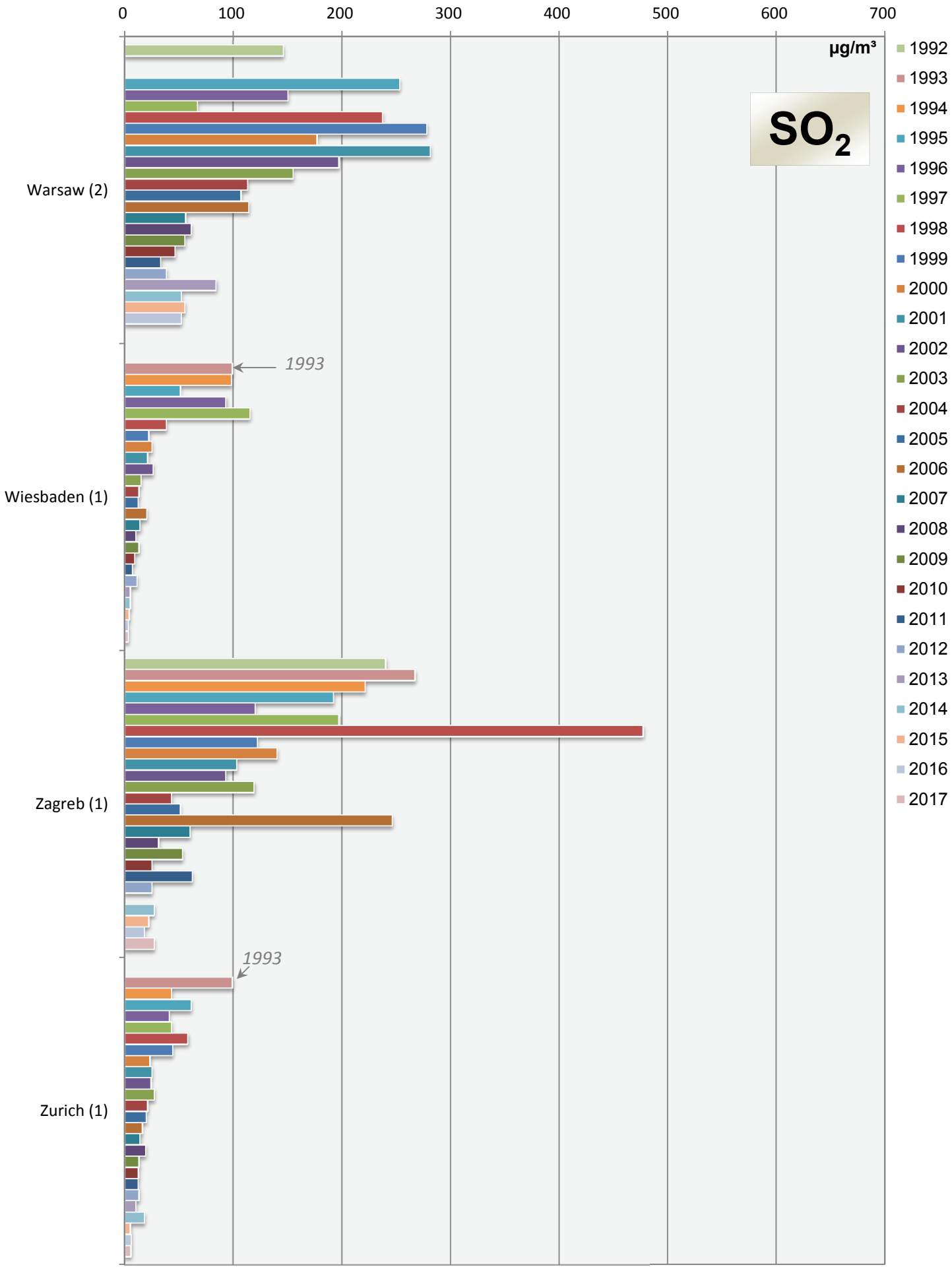

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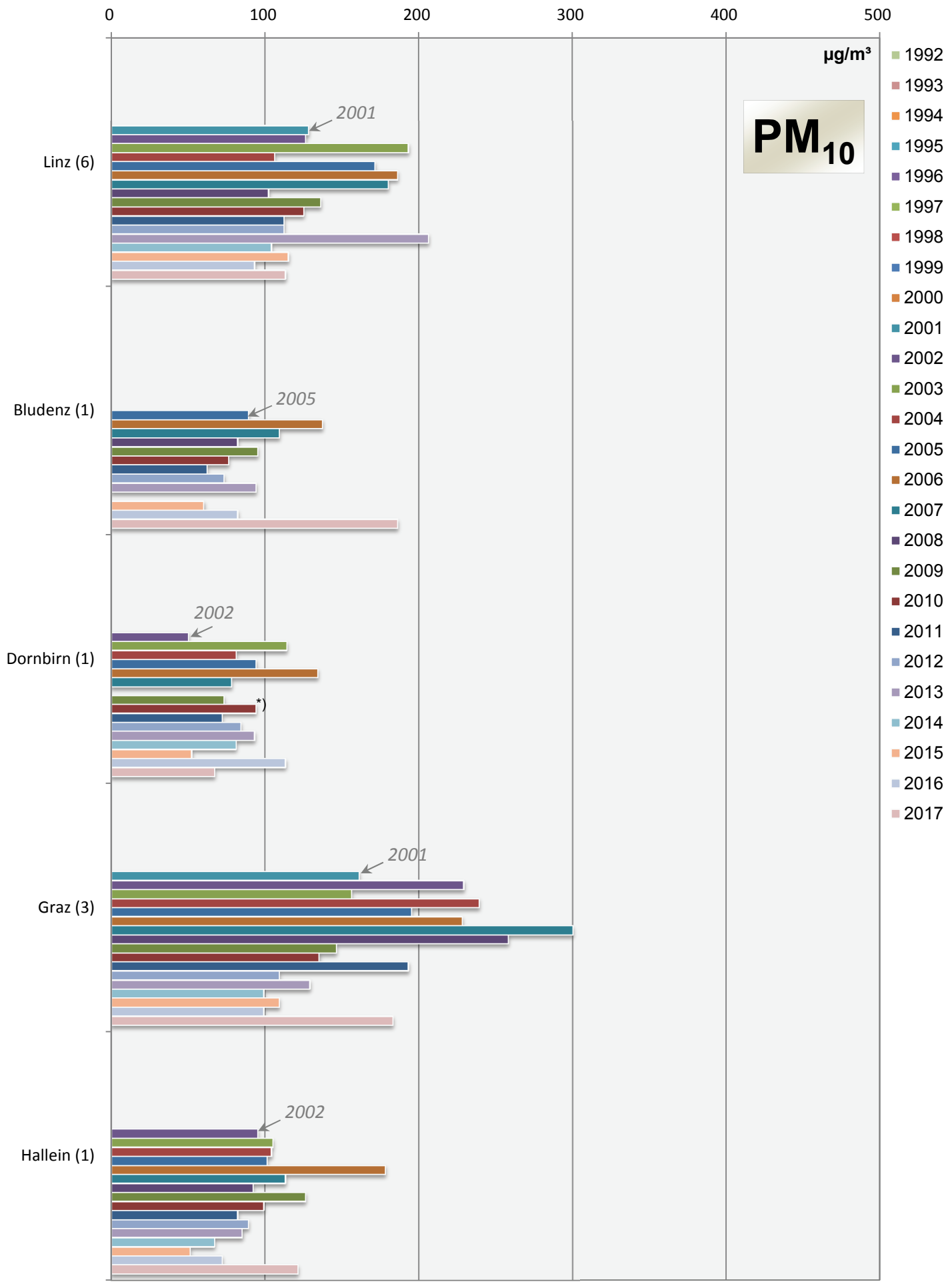

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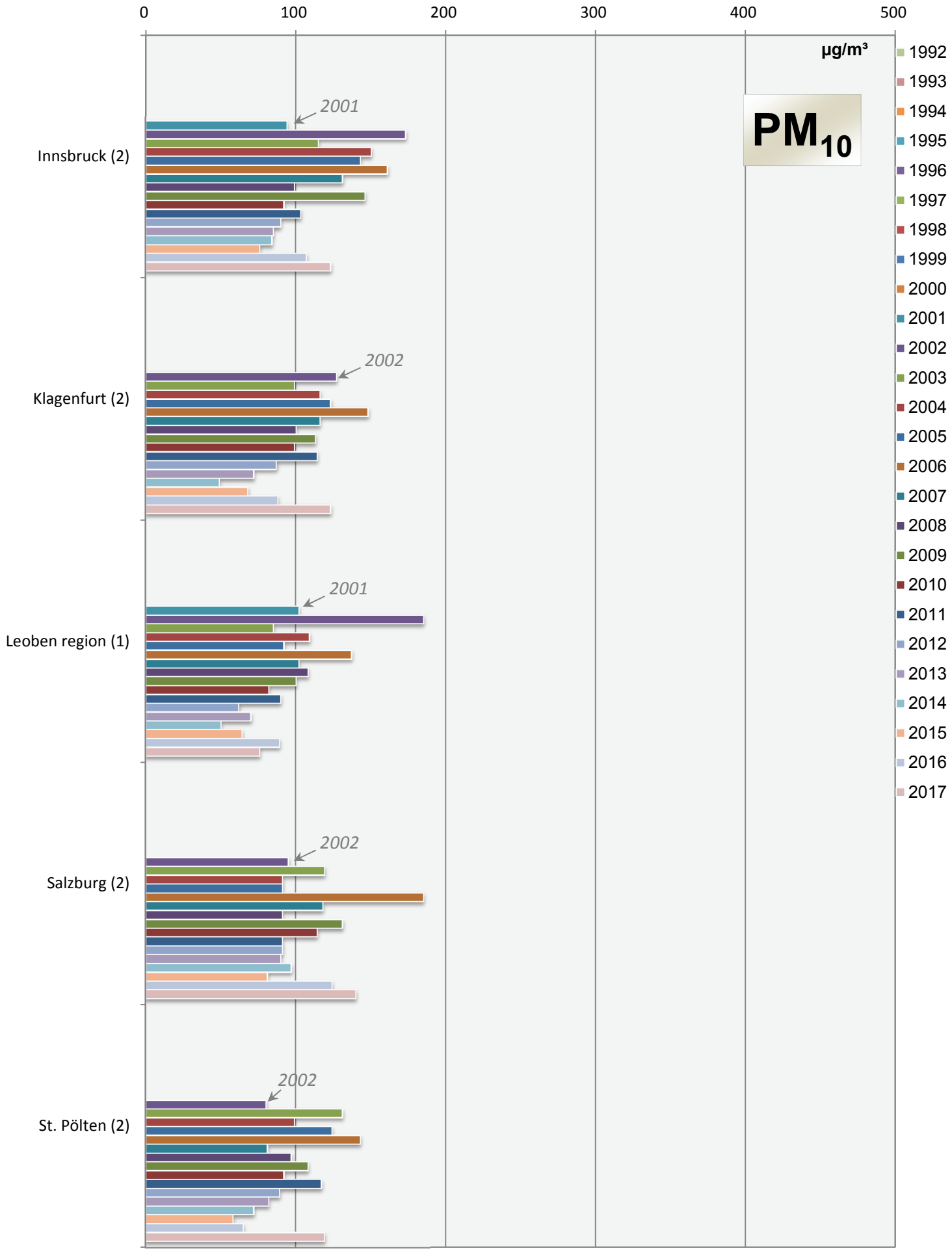

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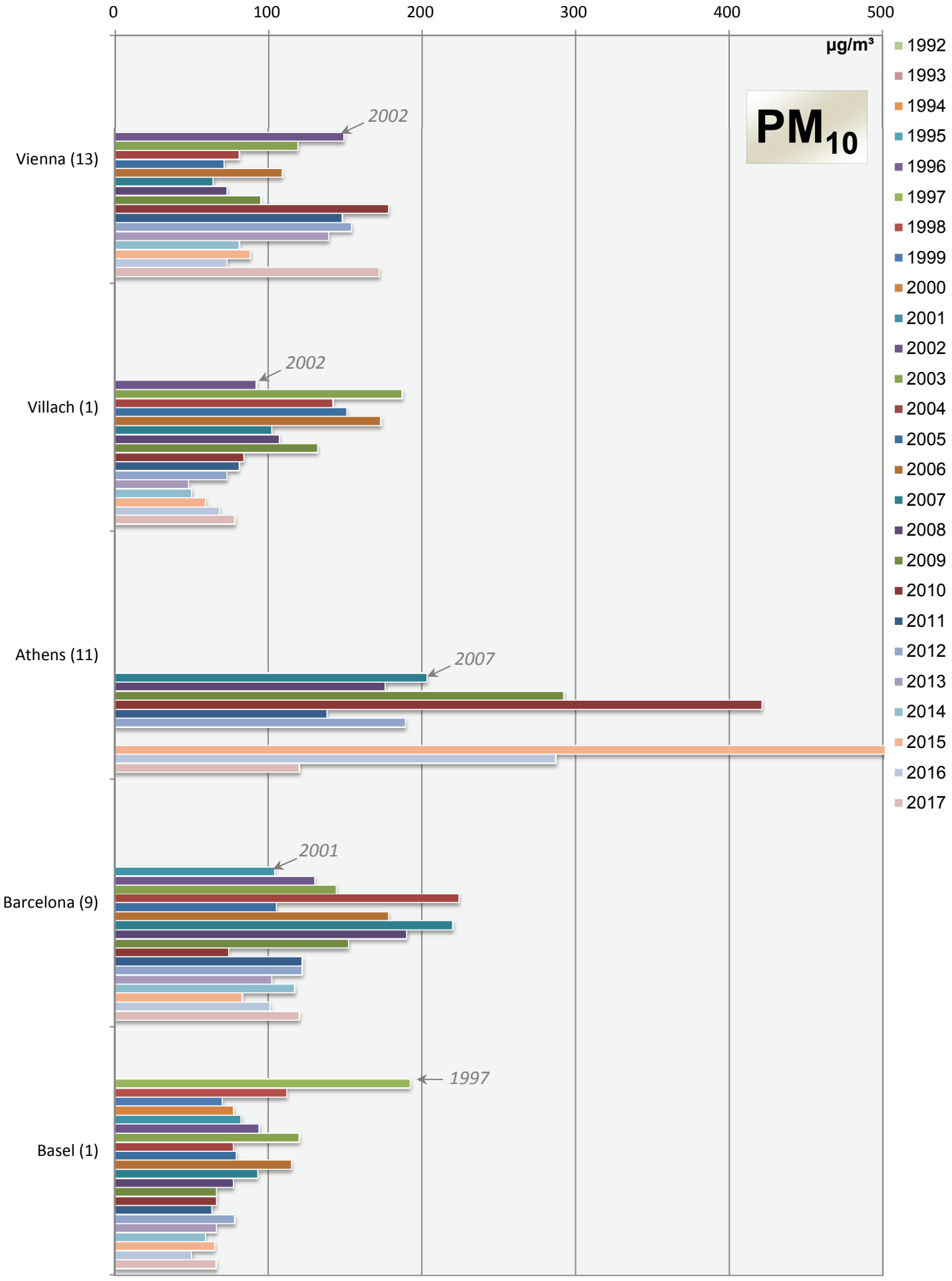

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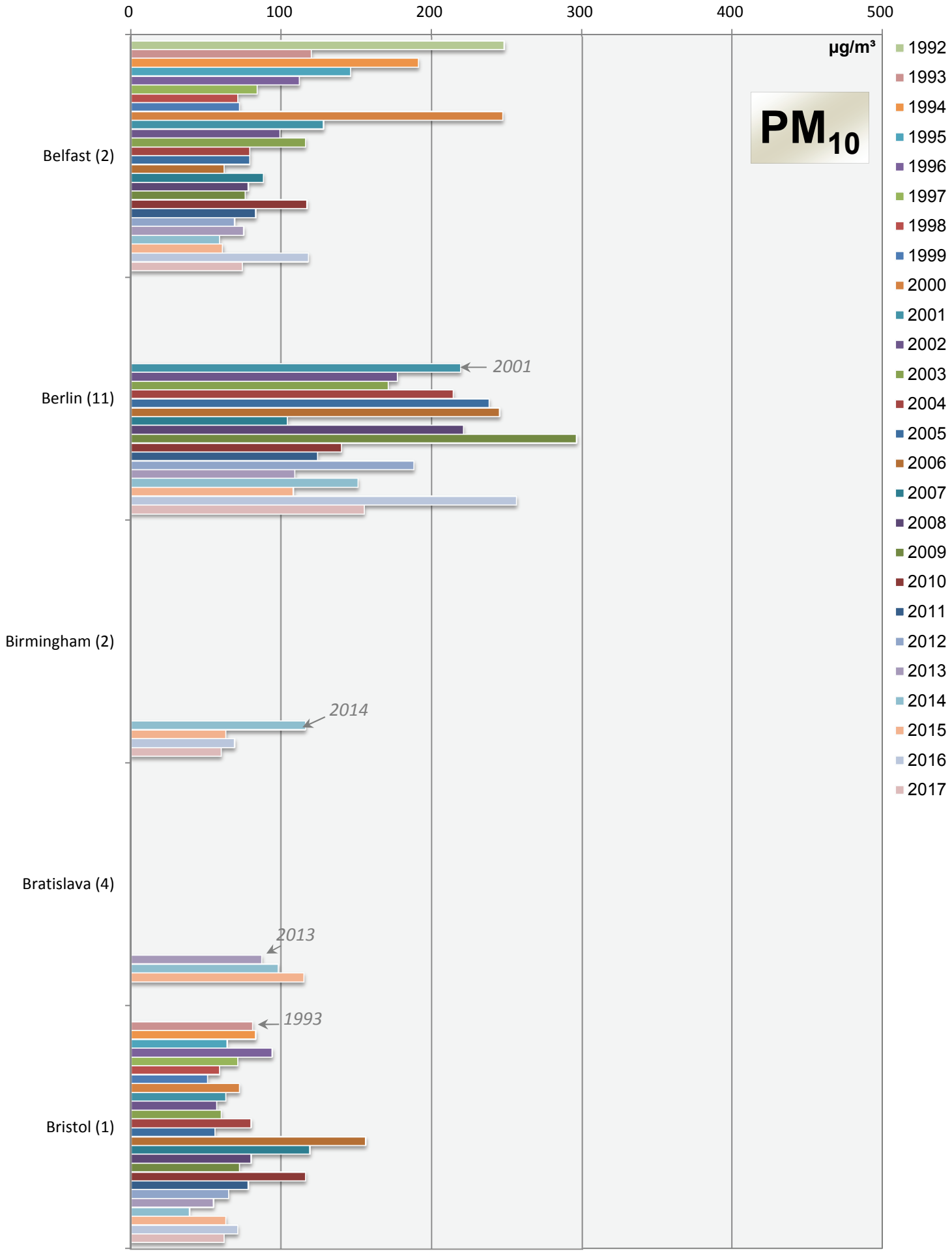

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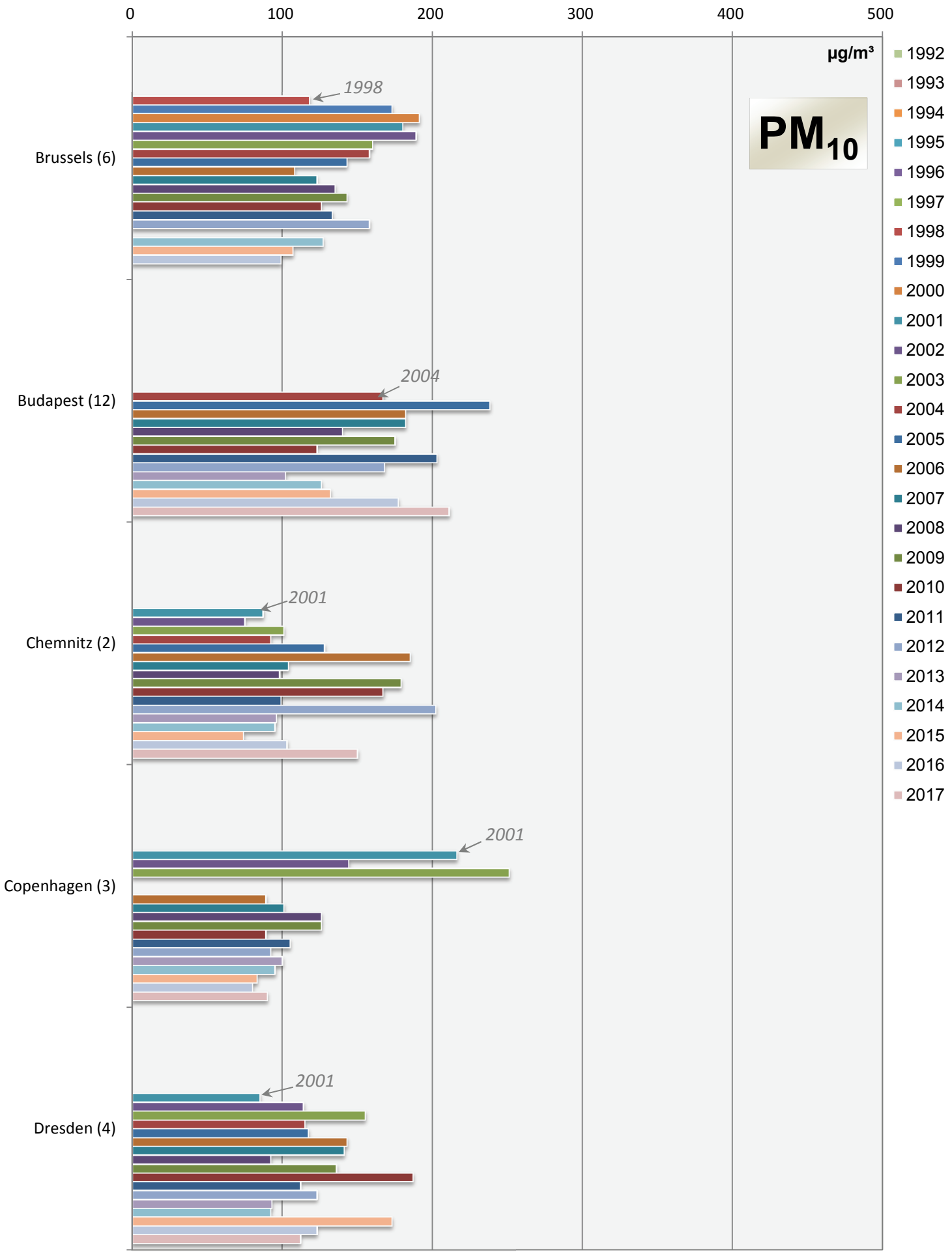

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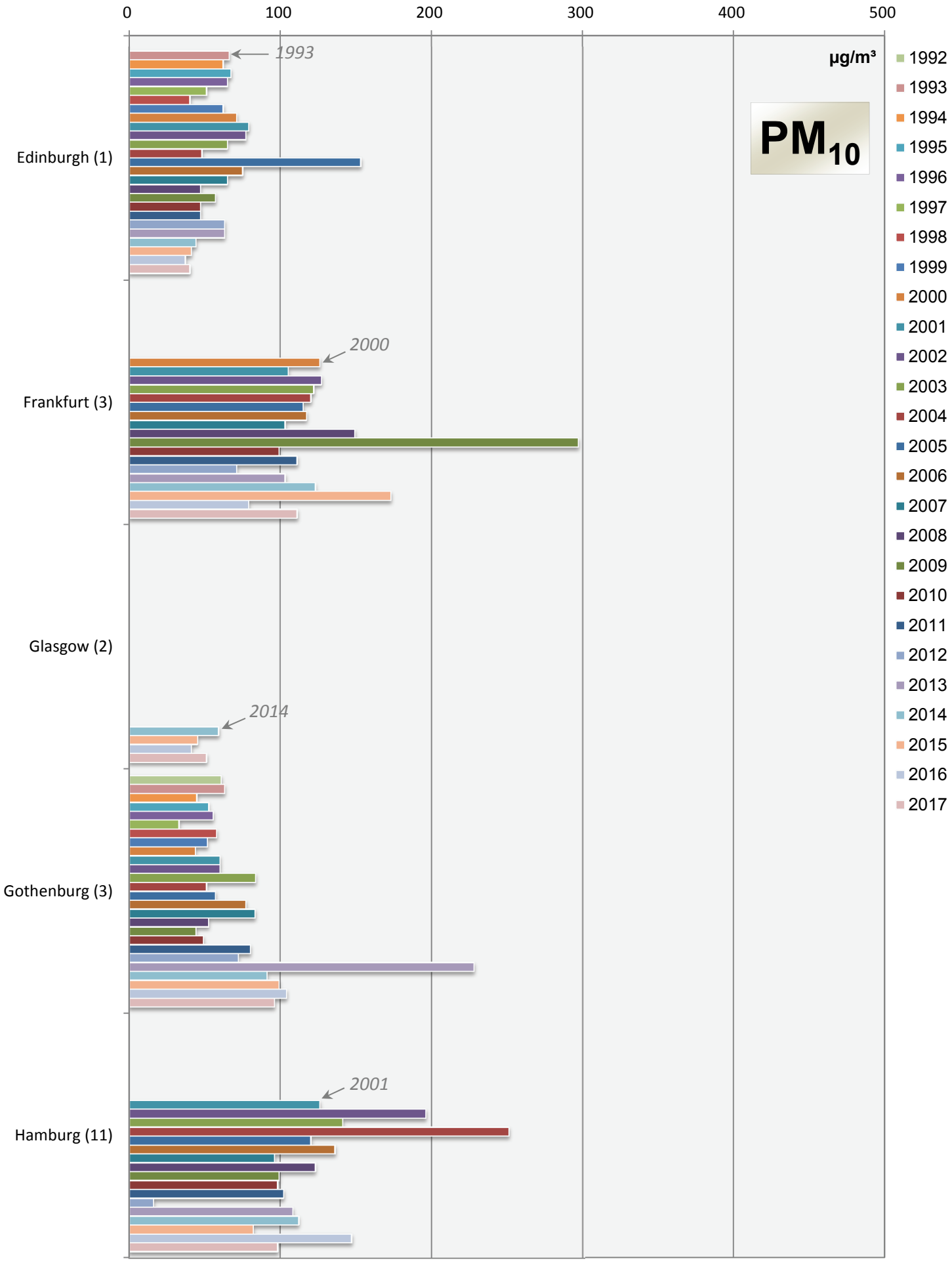

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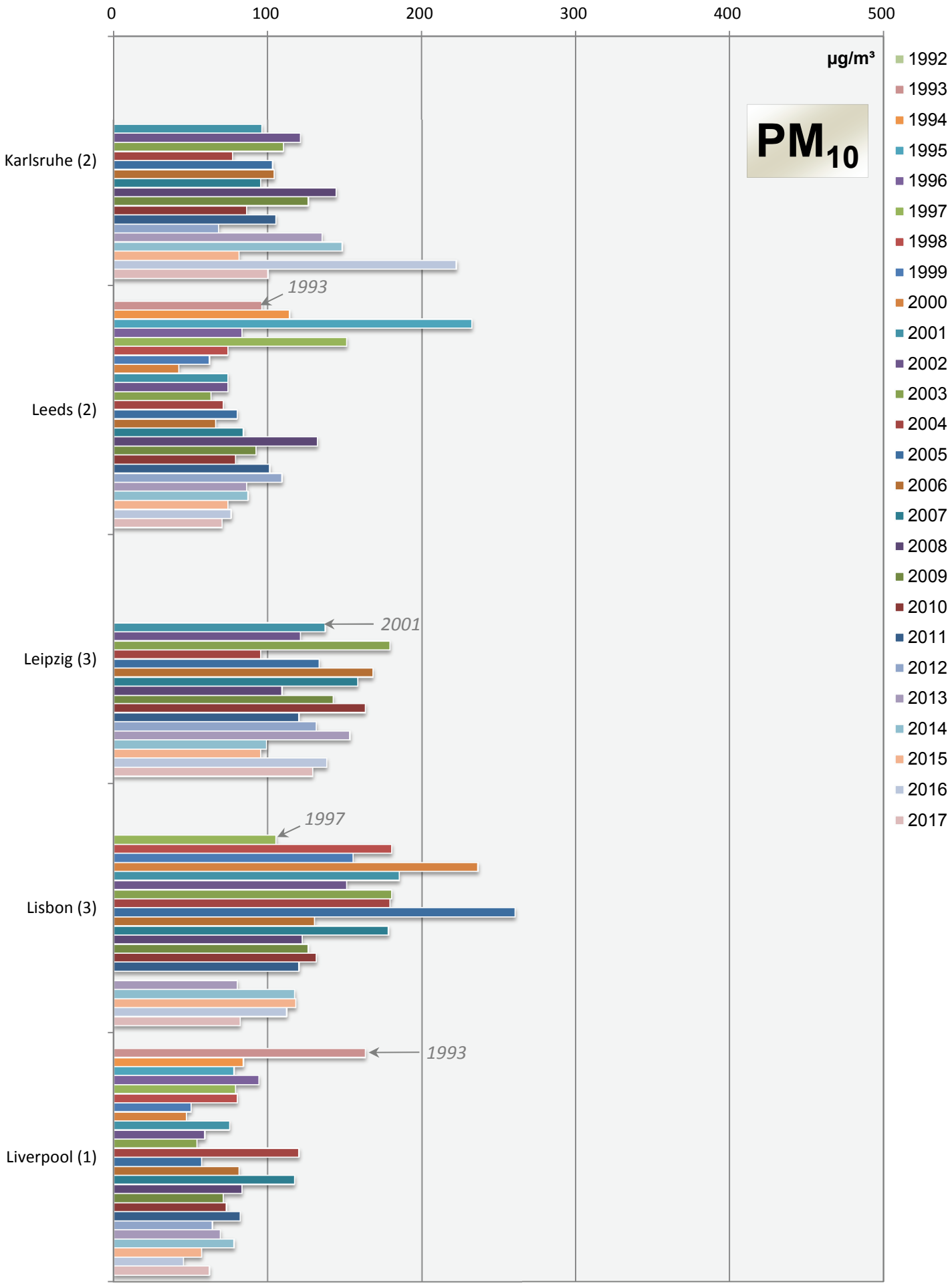

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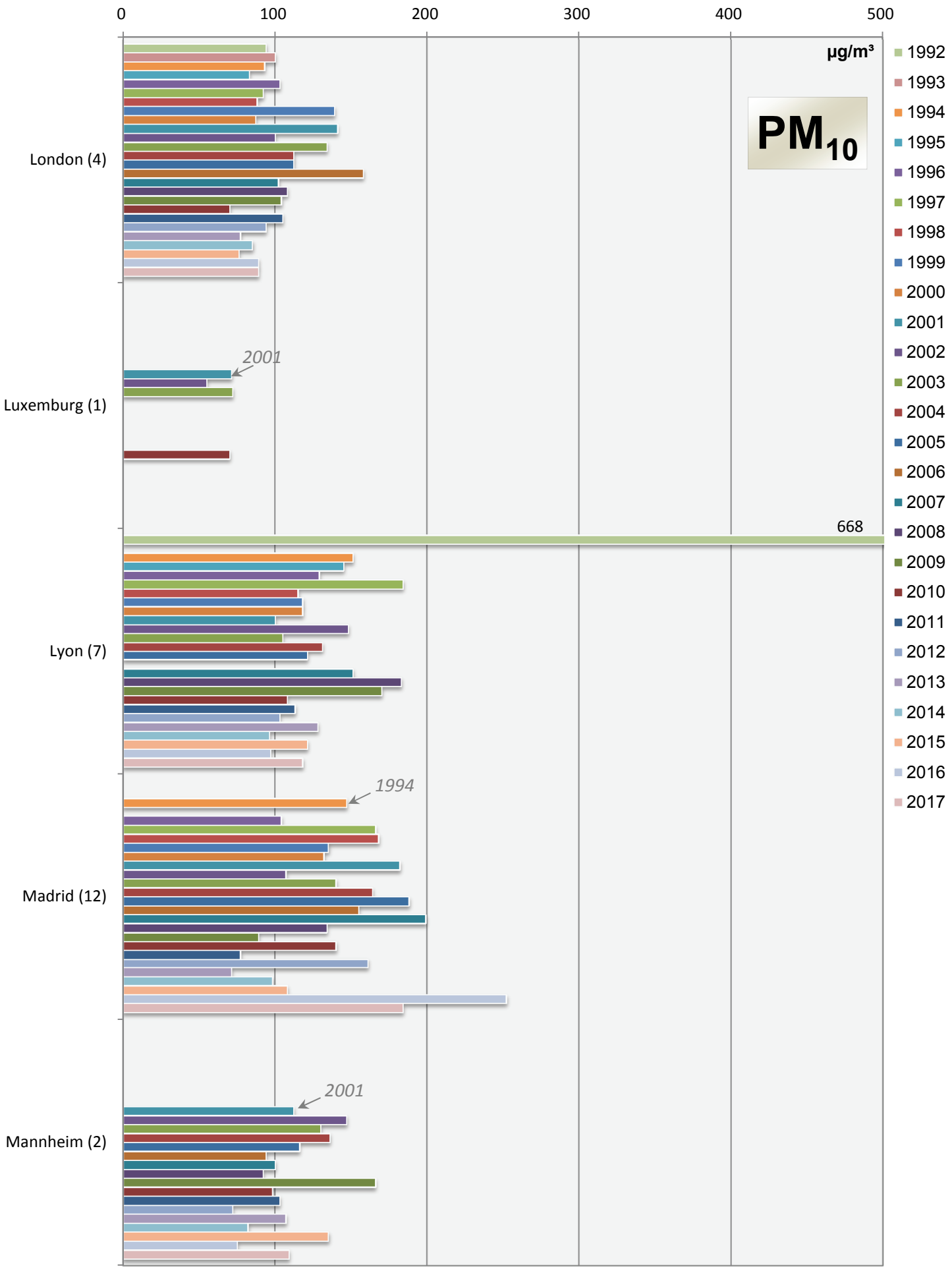

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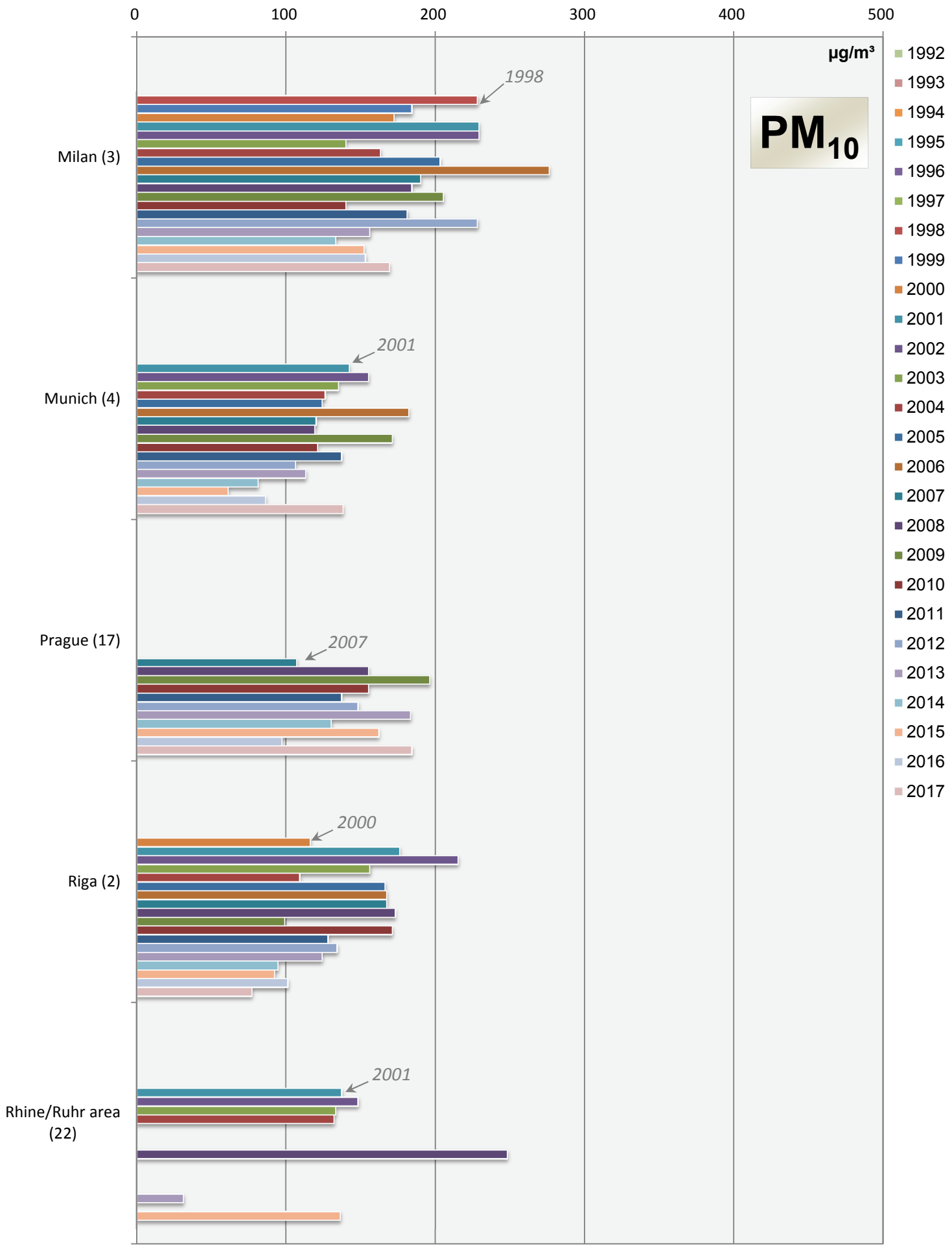

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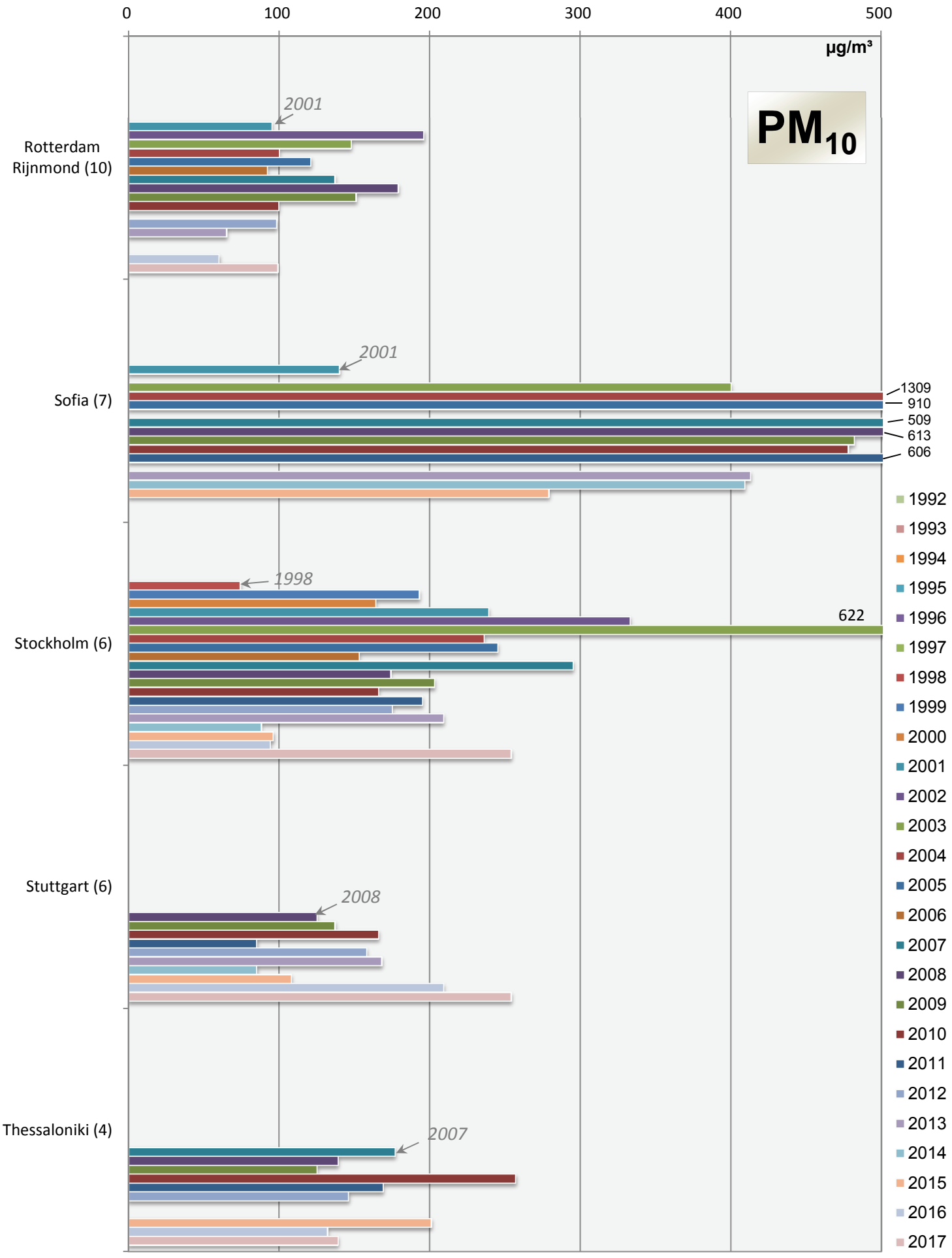

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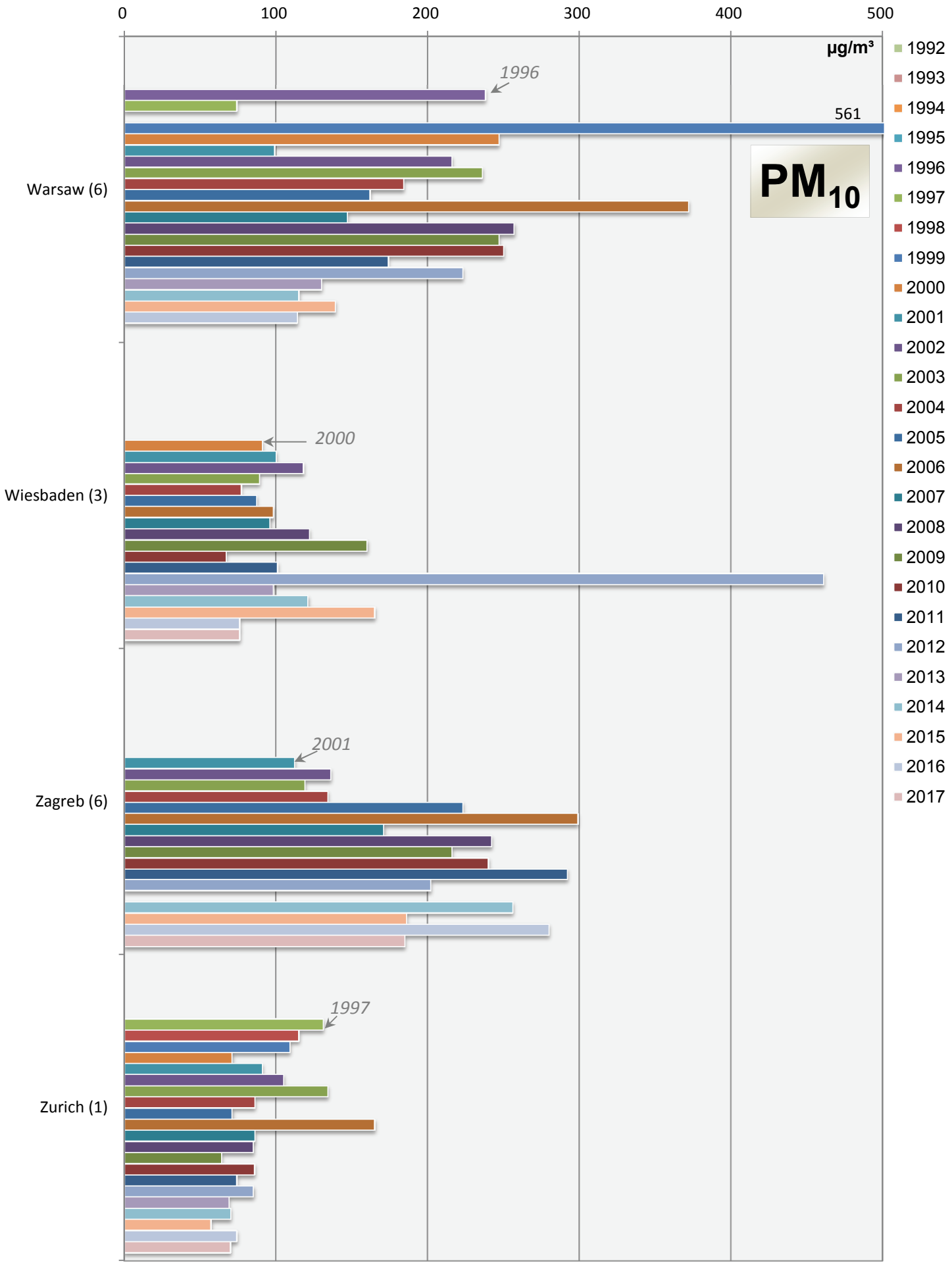

# Comparison of The Air Quality 2008 - 2017

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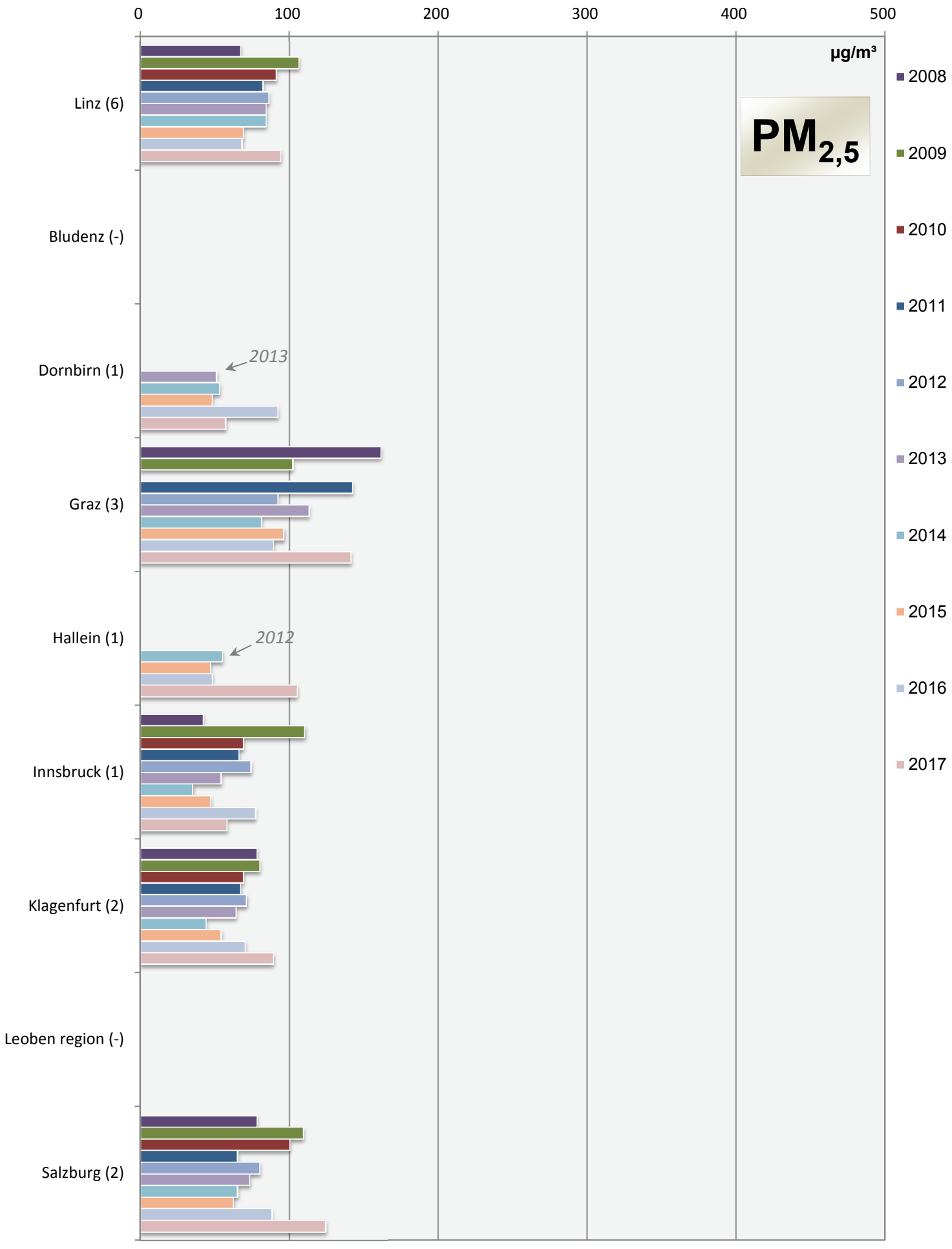

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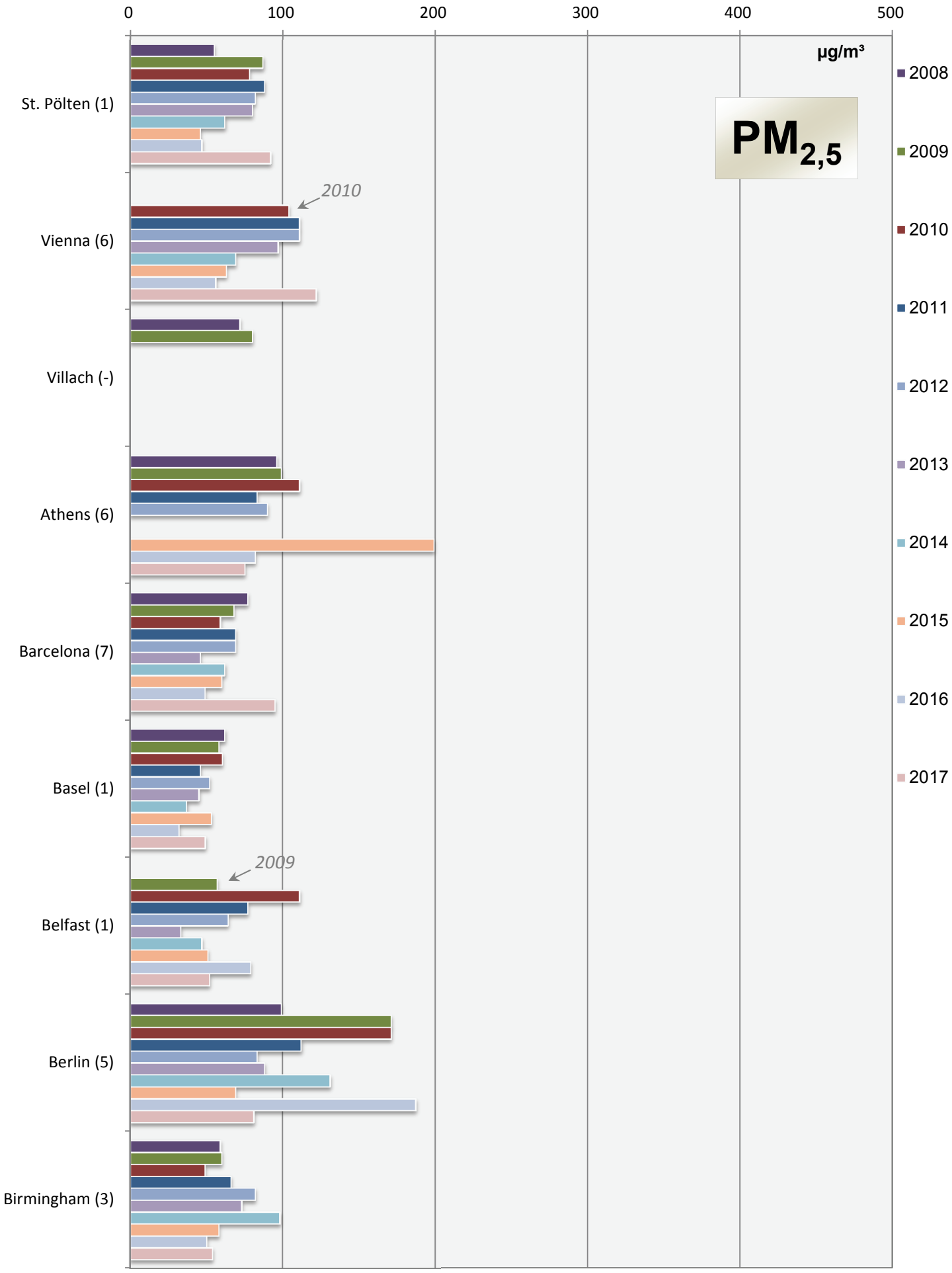
## max. daily mean values (peak-stressed monitoring station)



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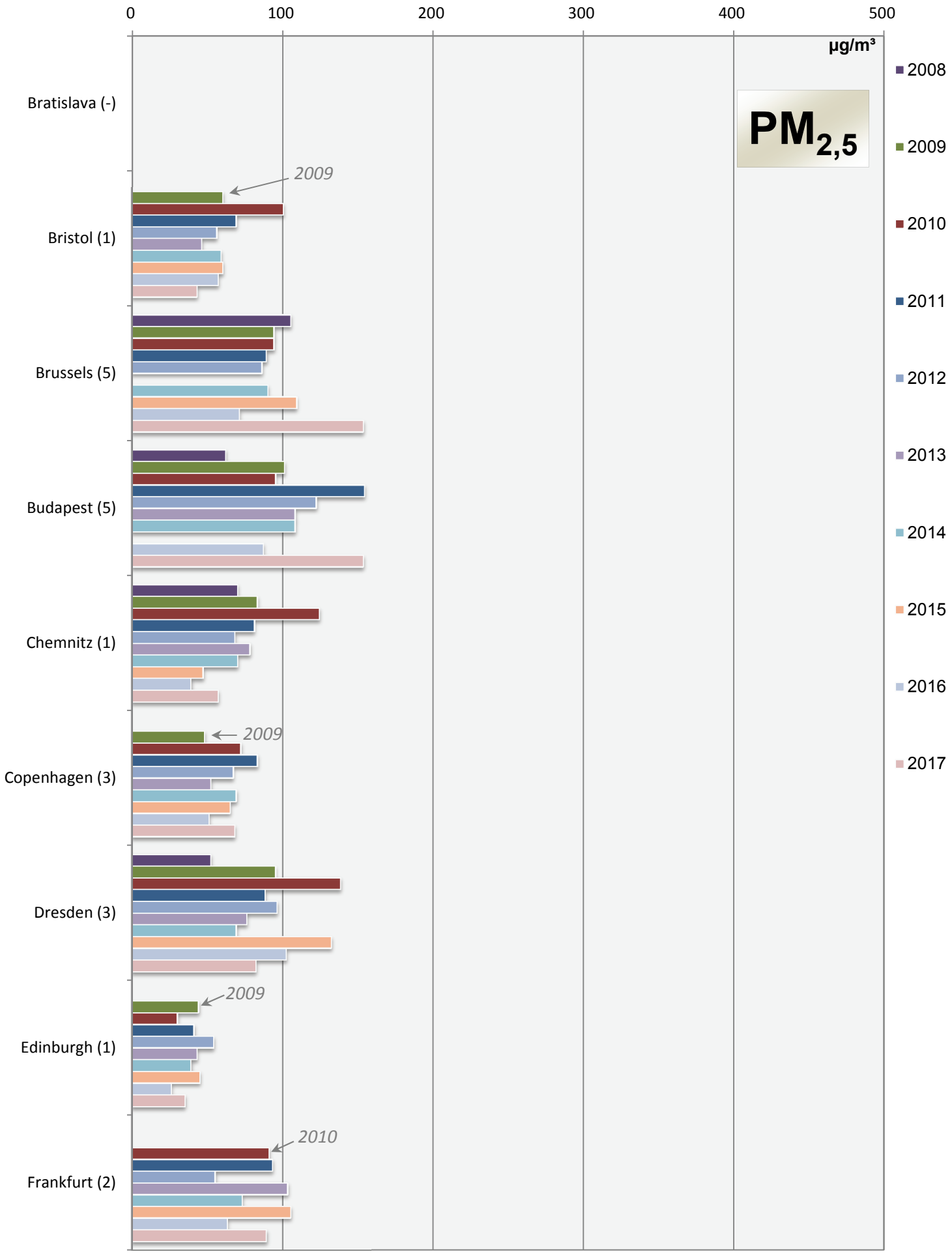

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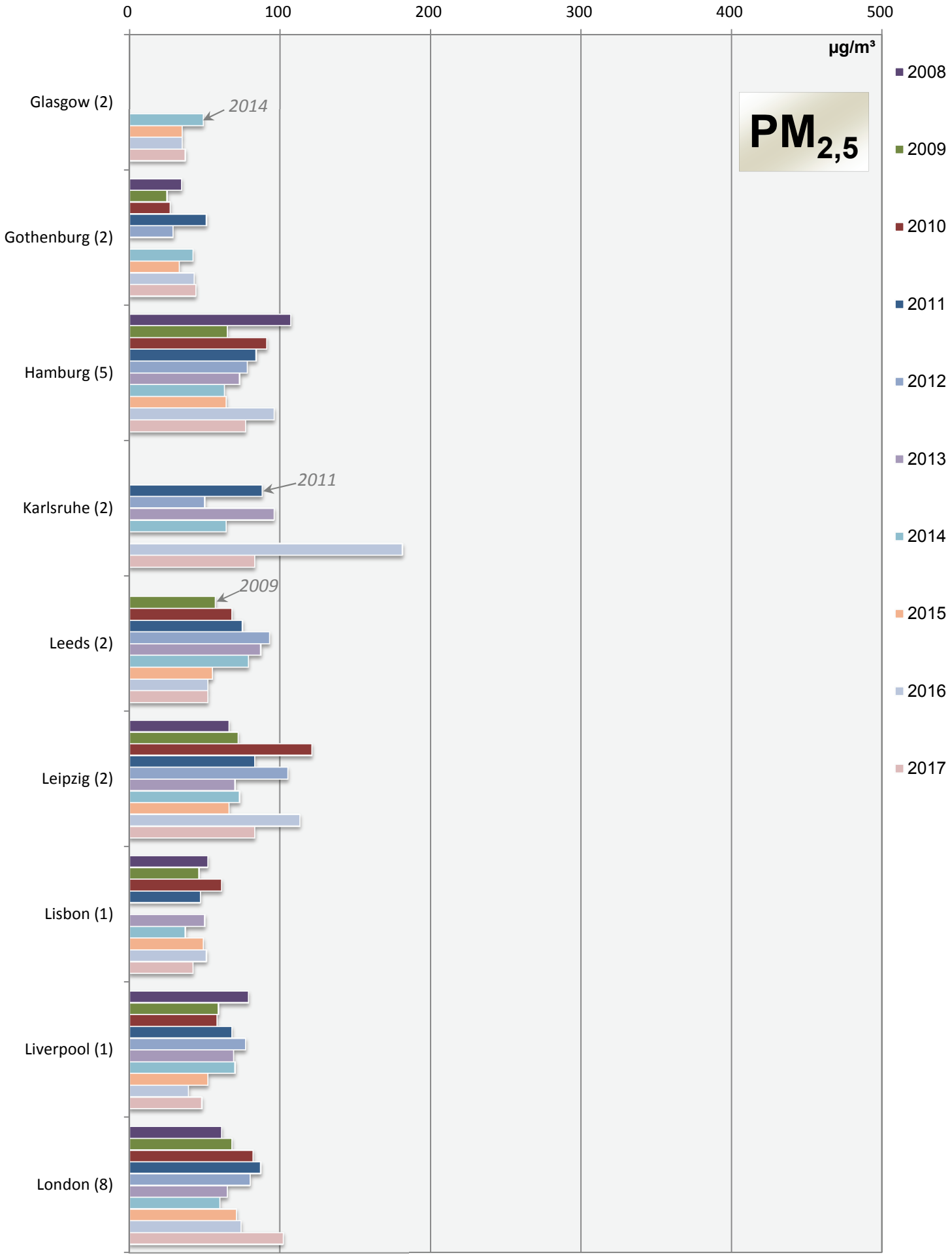

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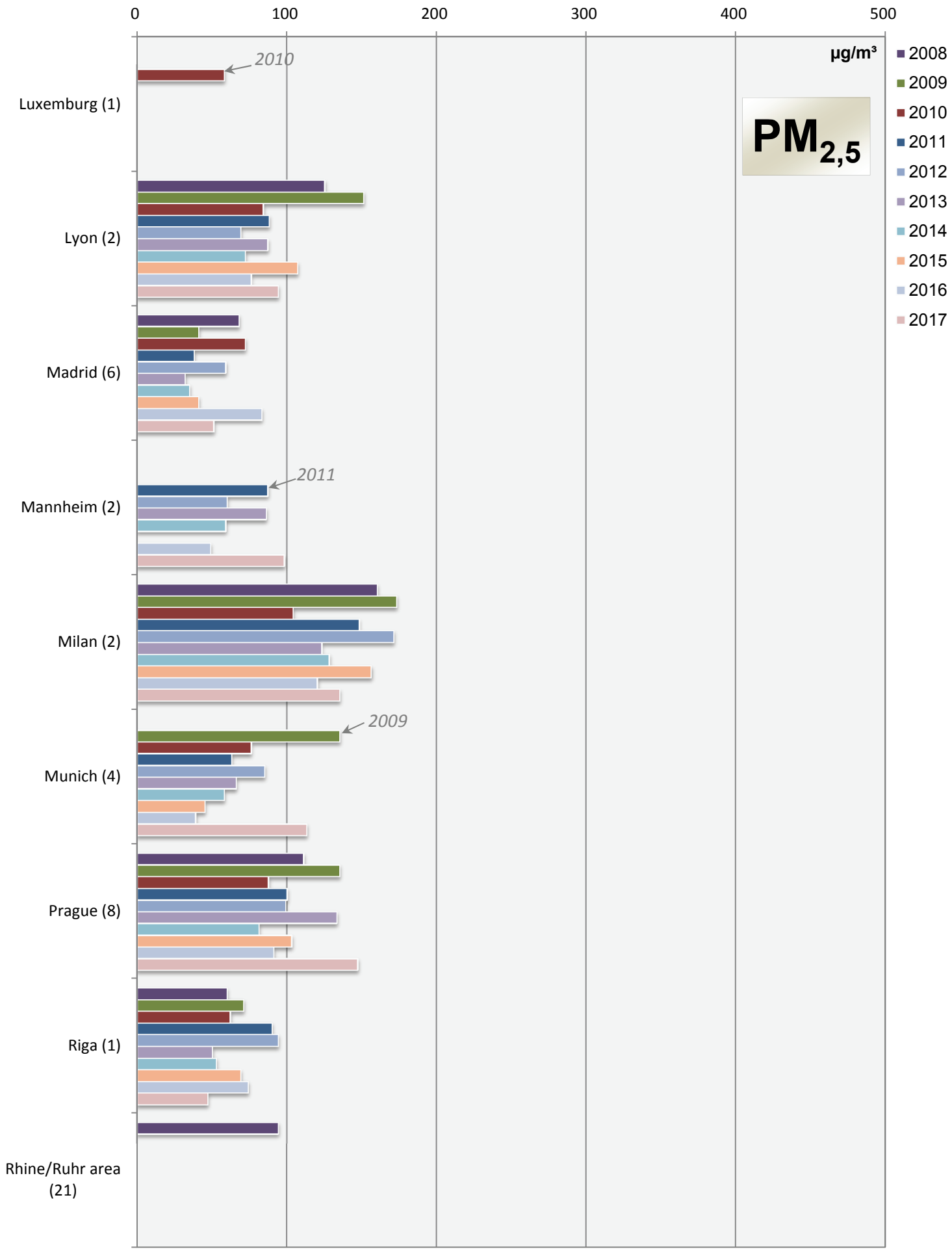

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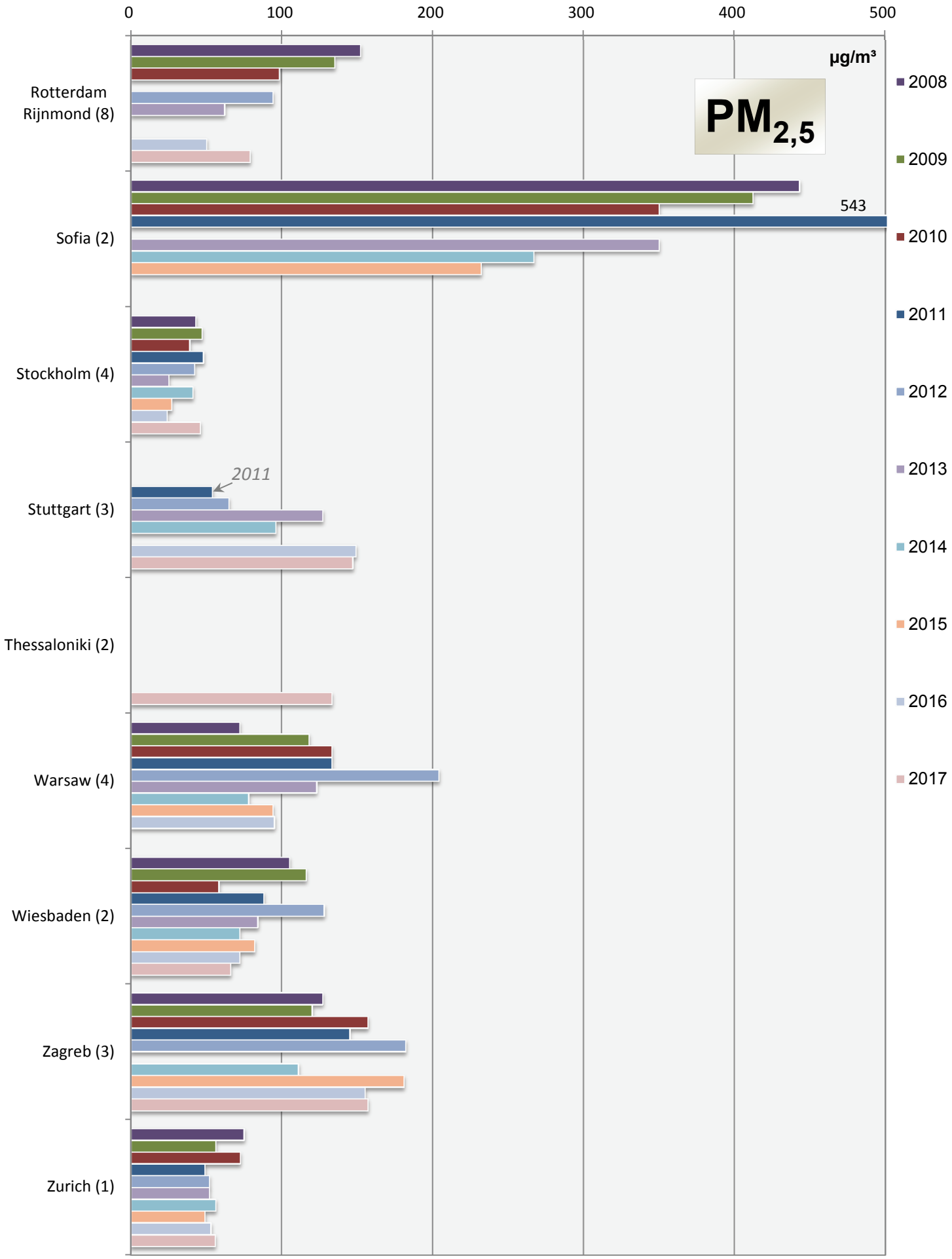

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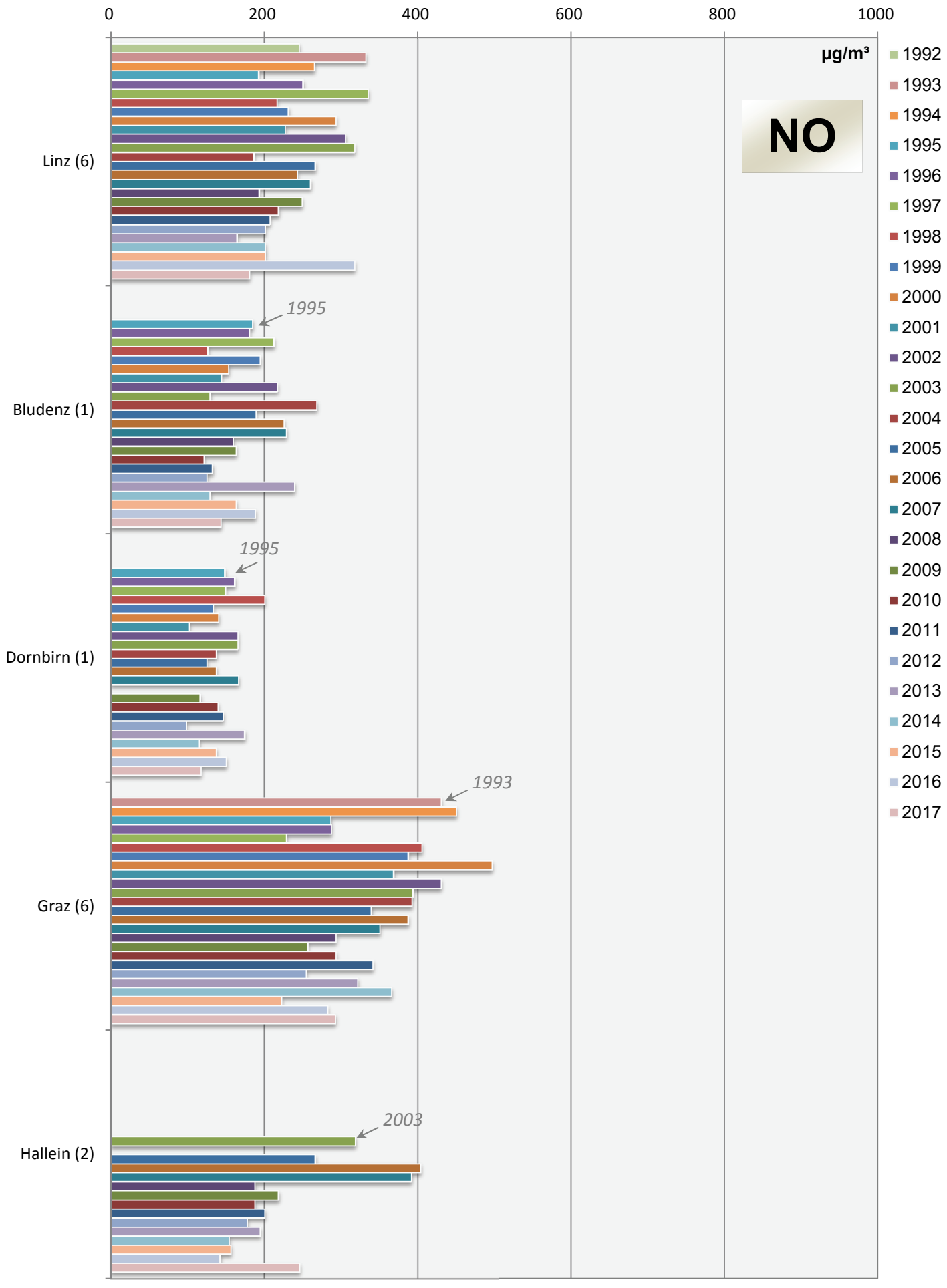

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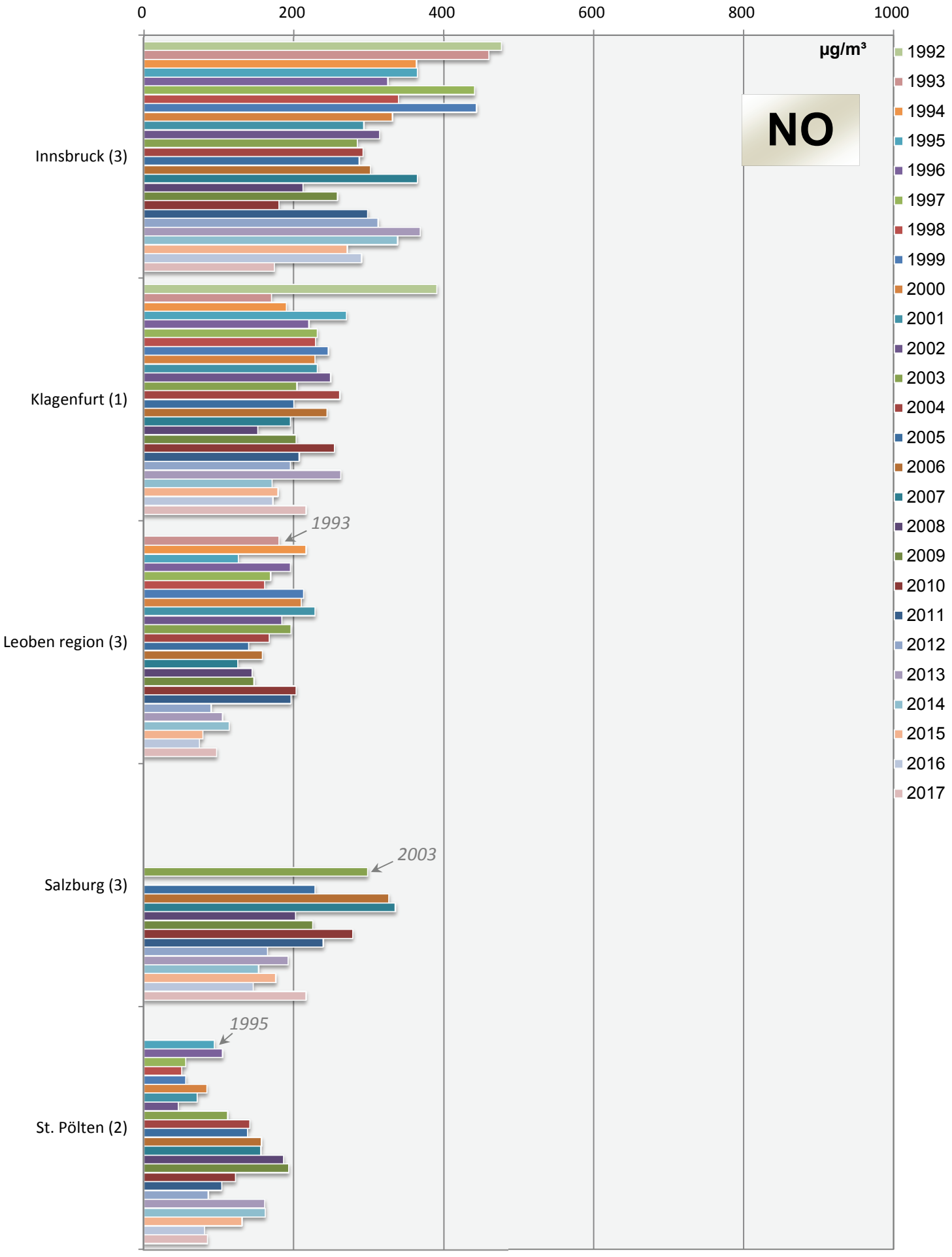

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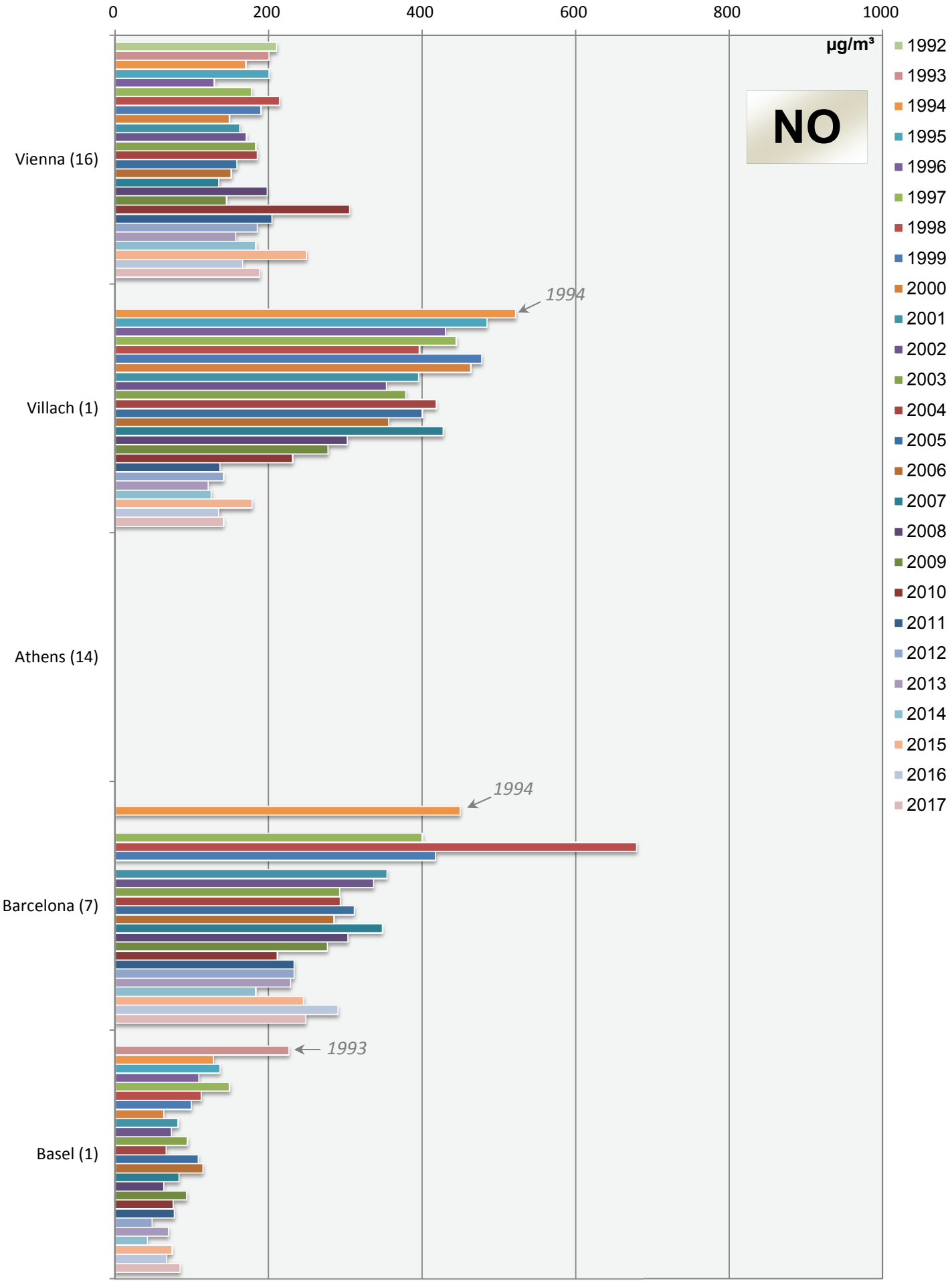

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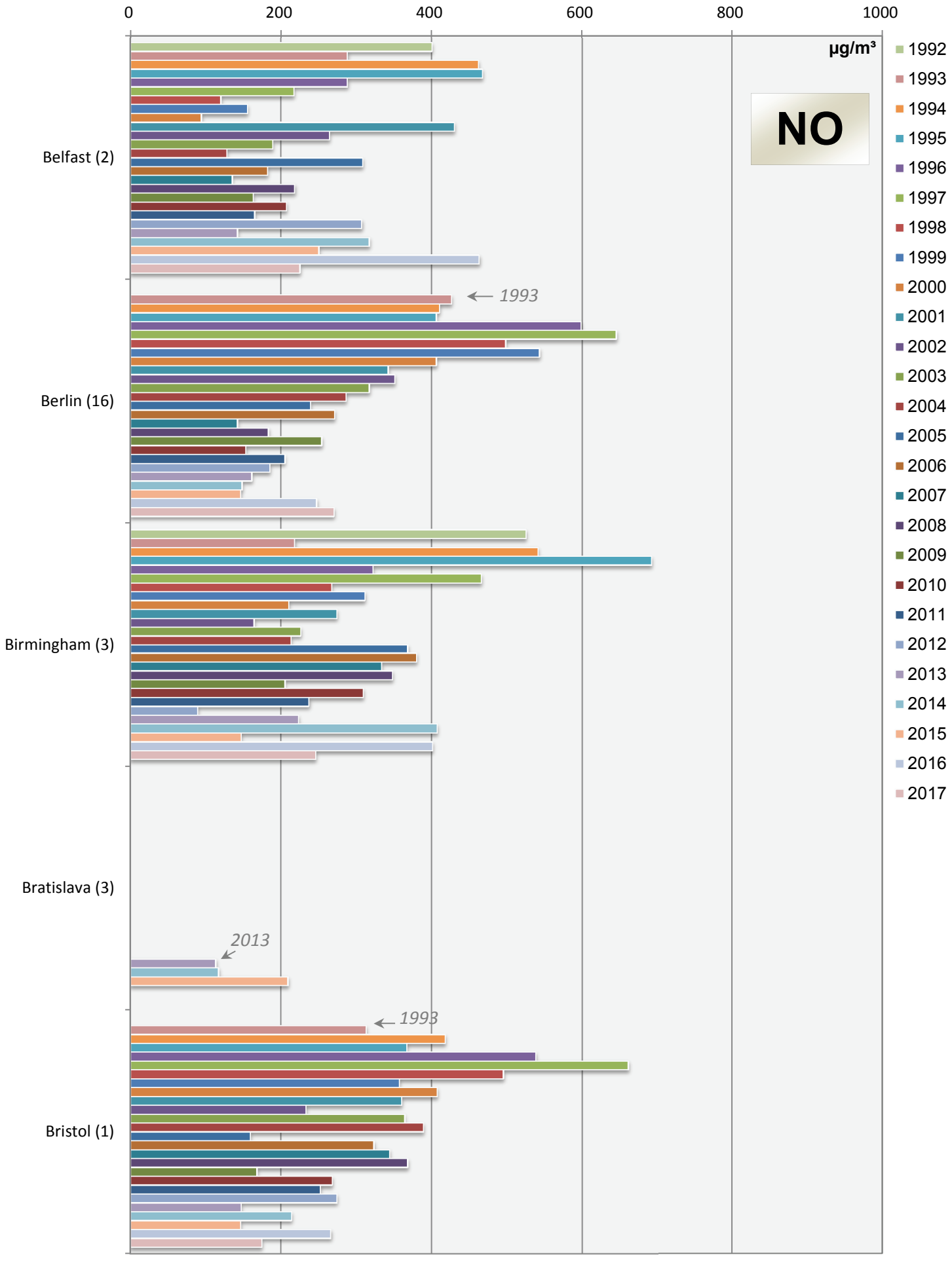

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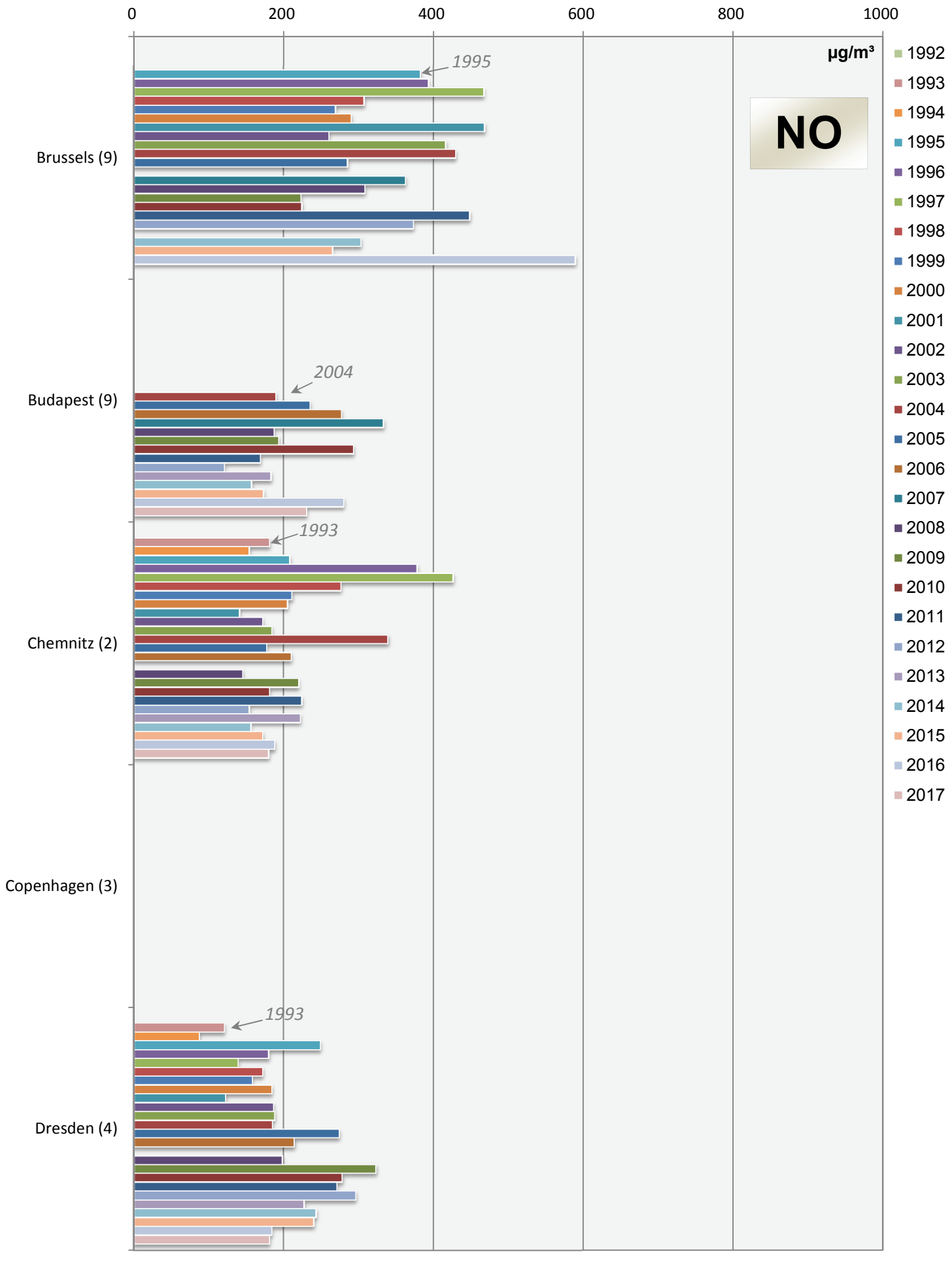

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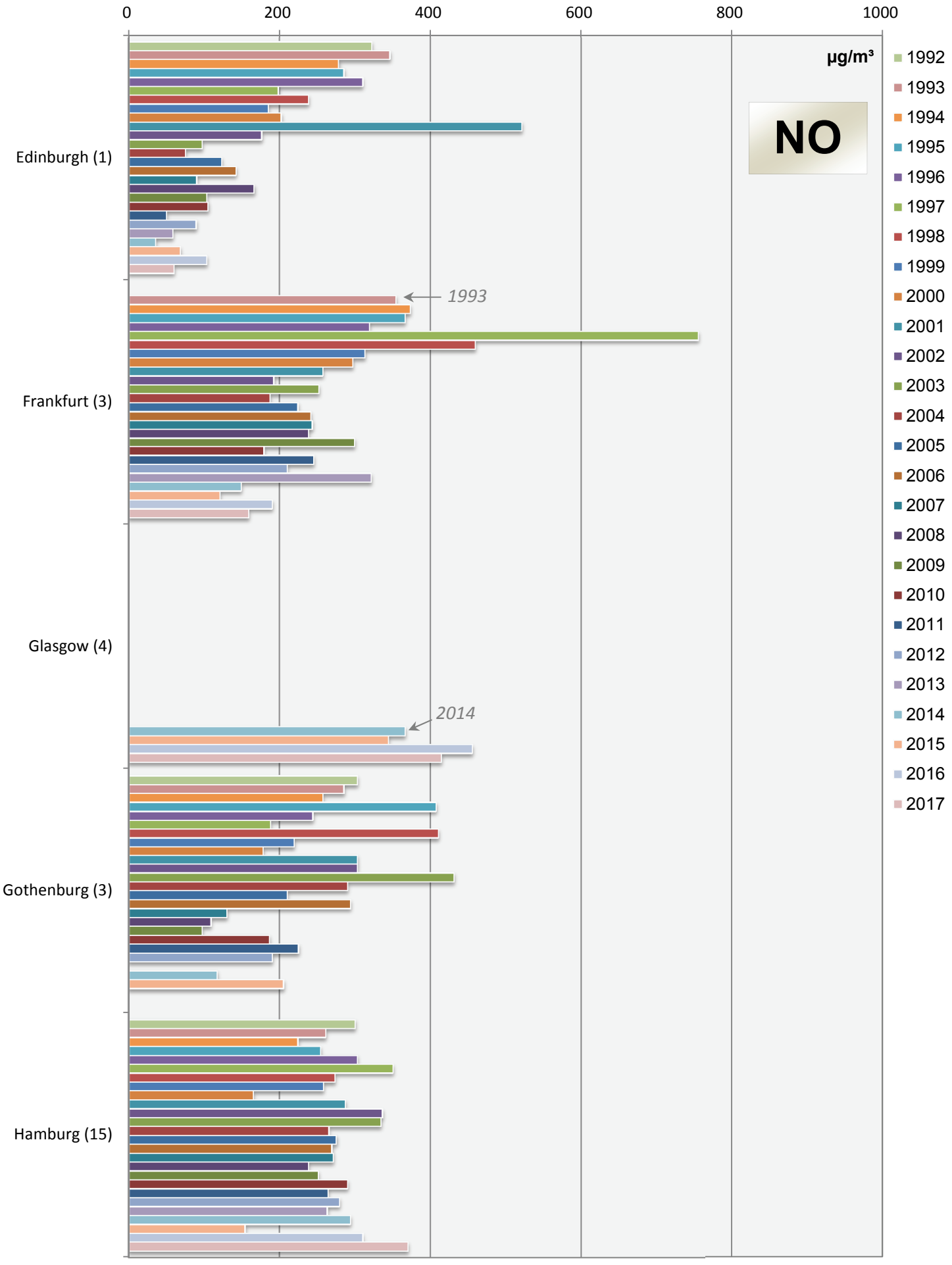

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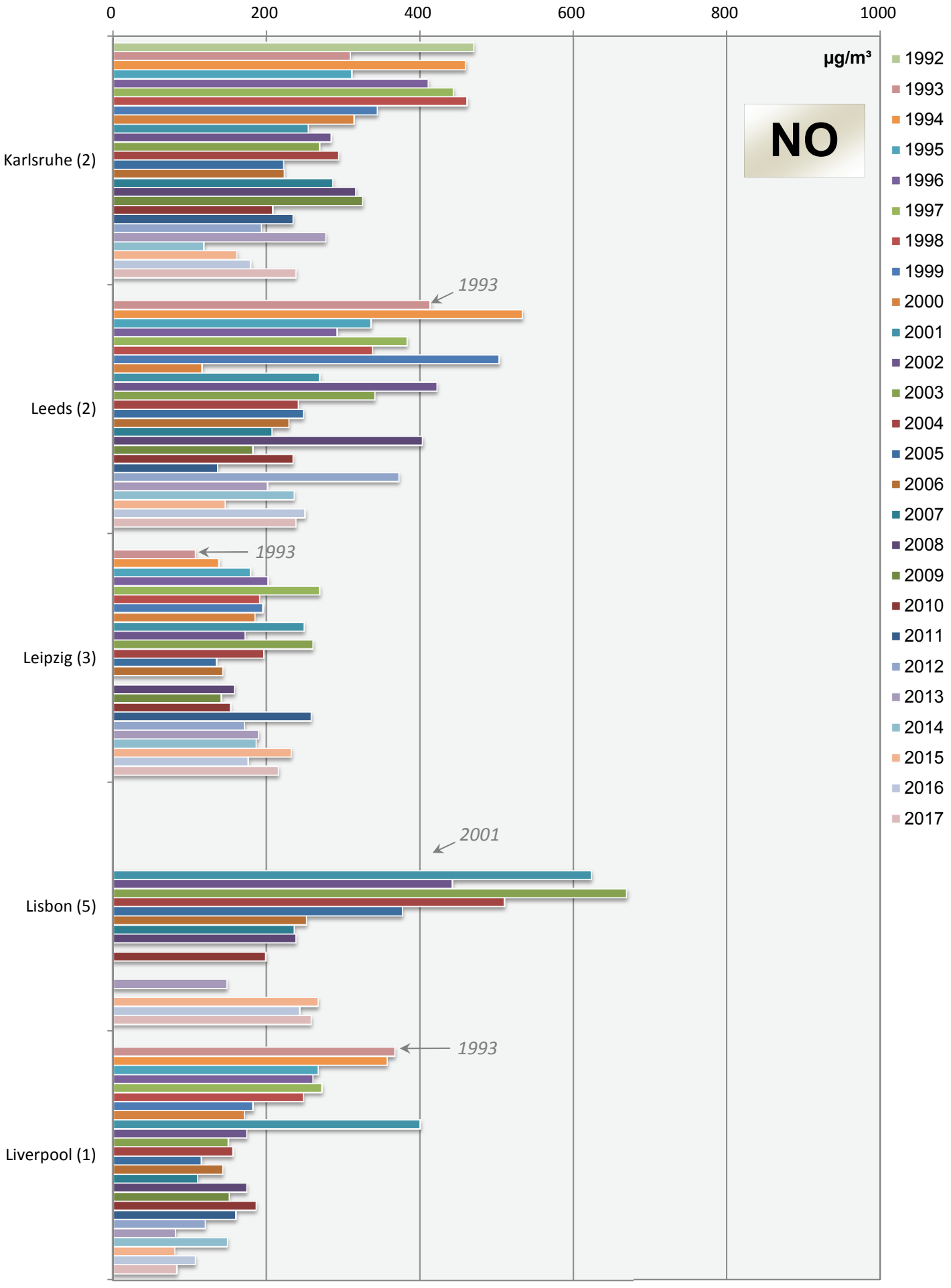

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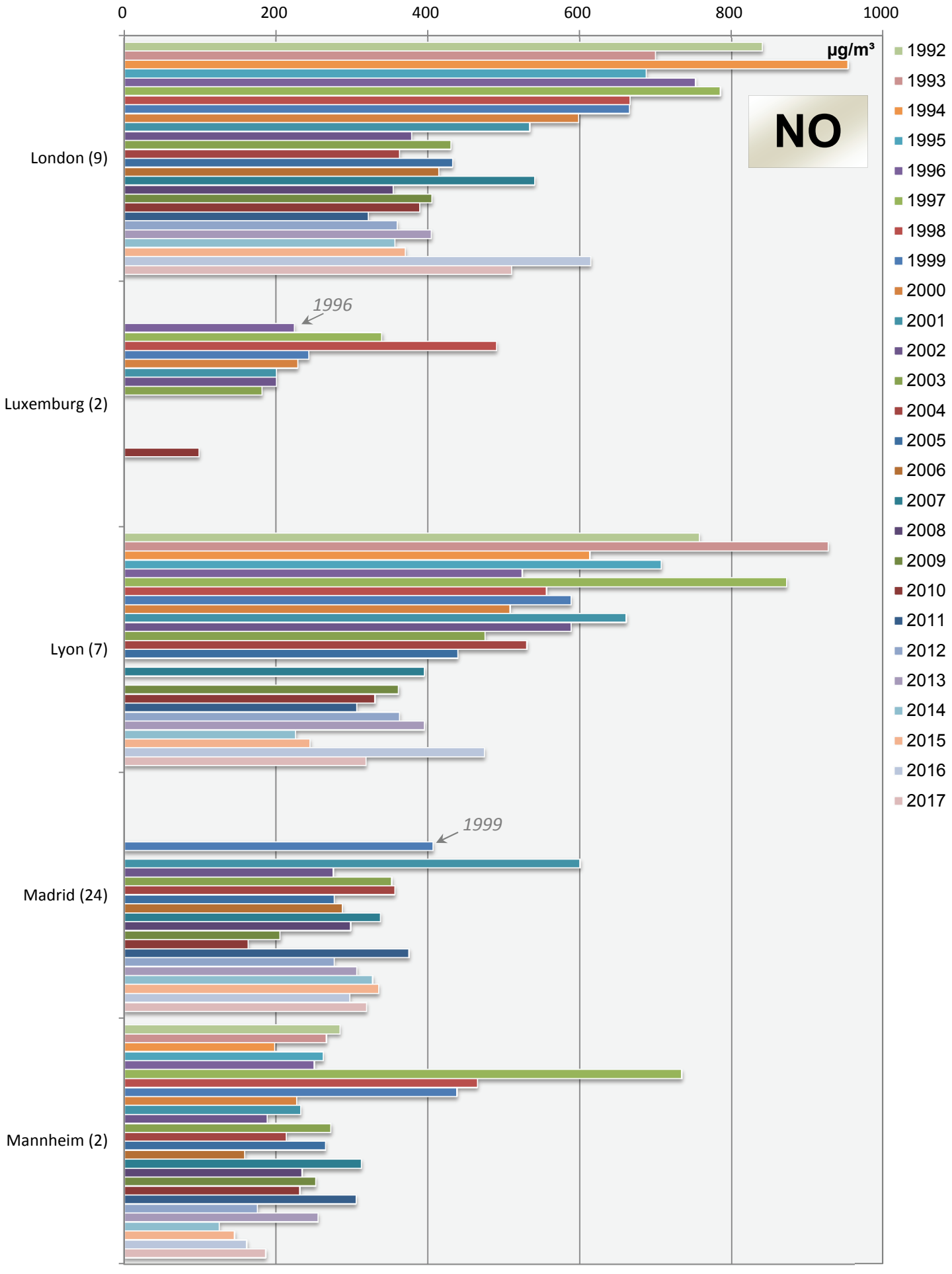

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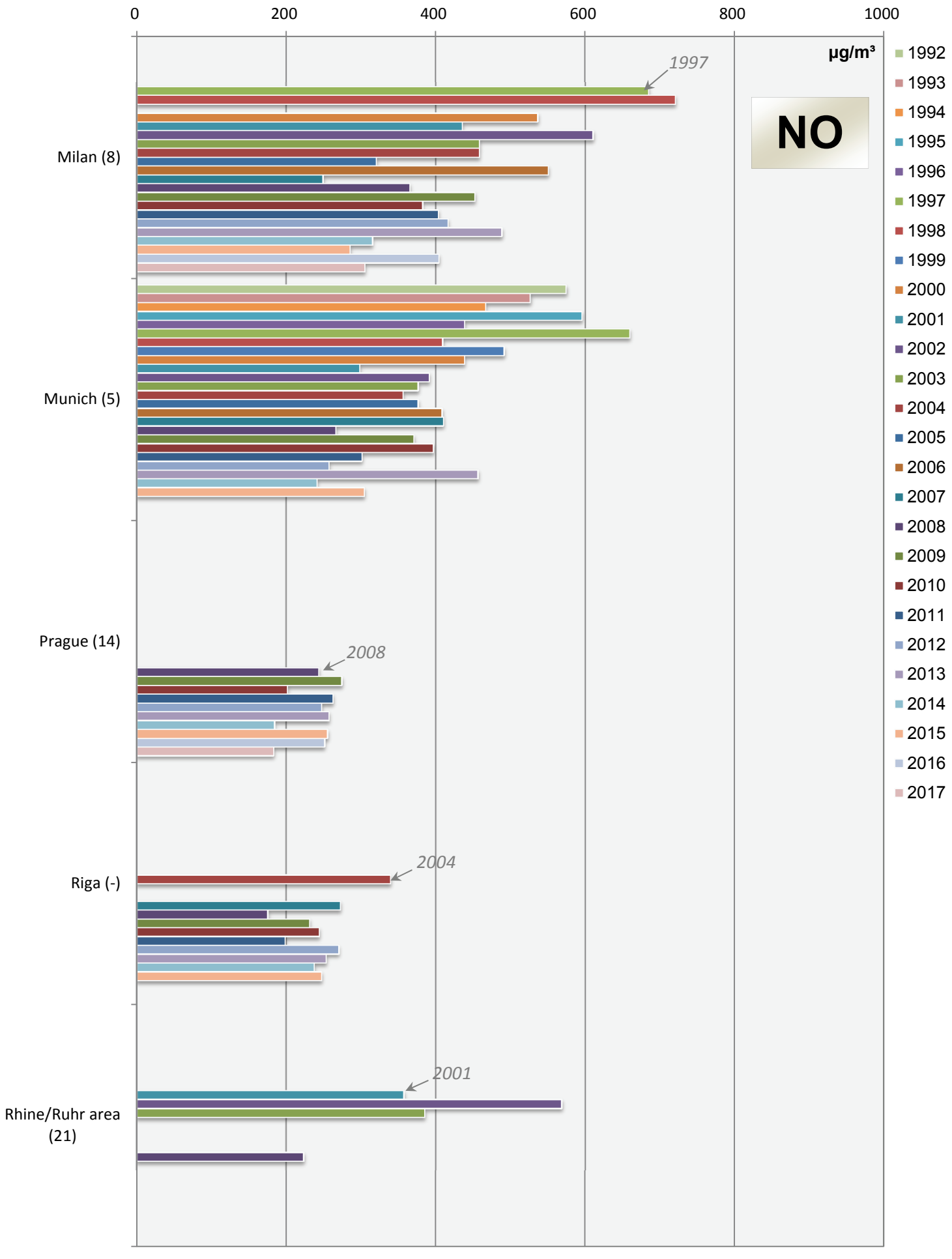

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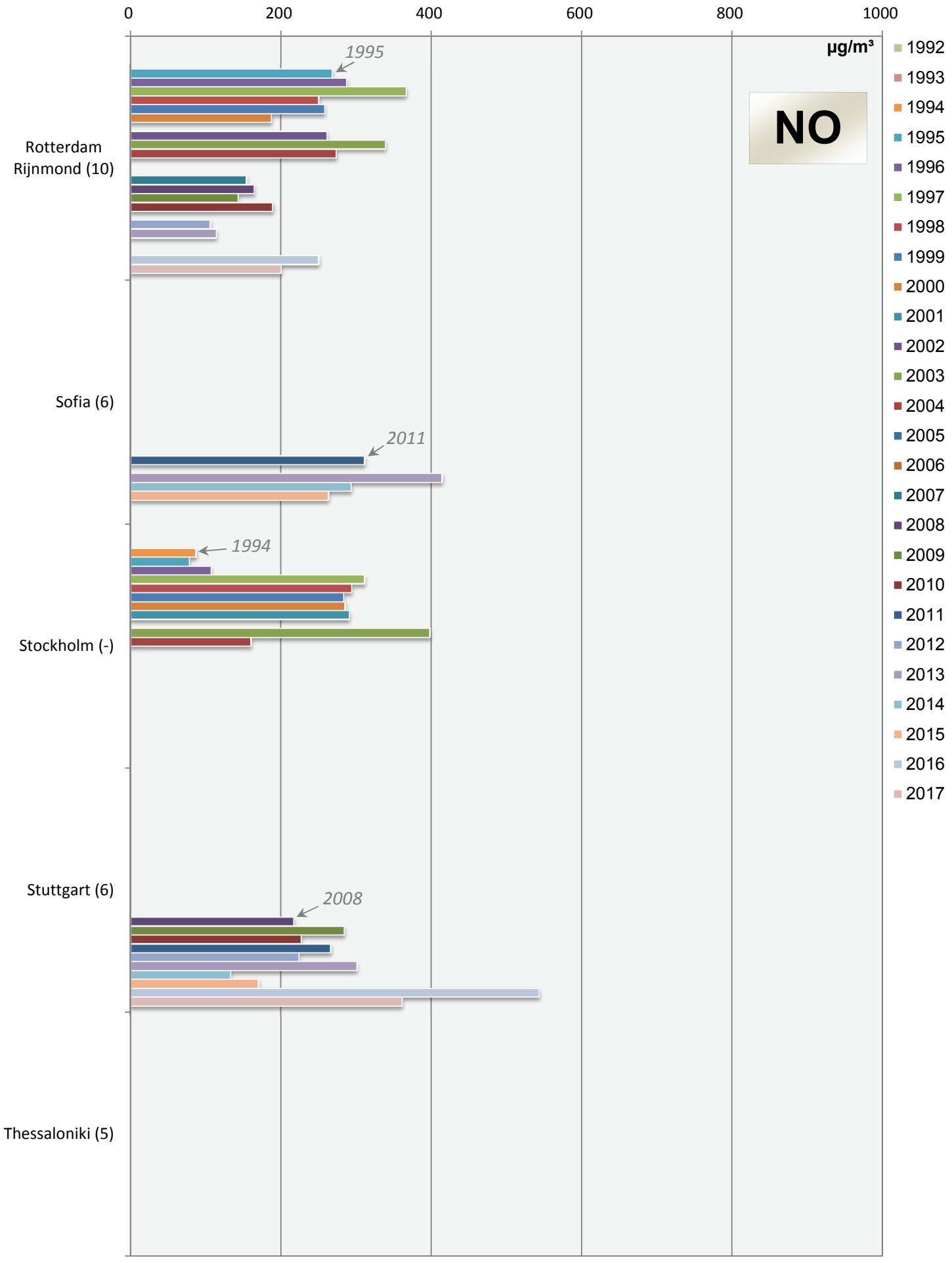

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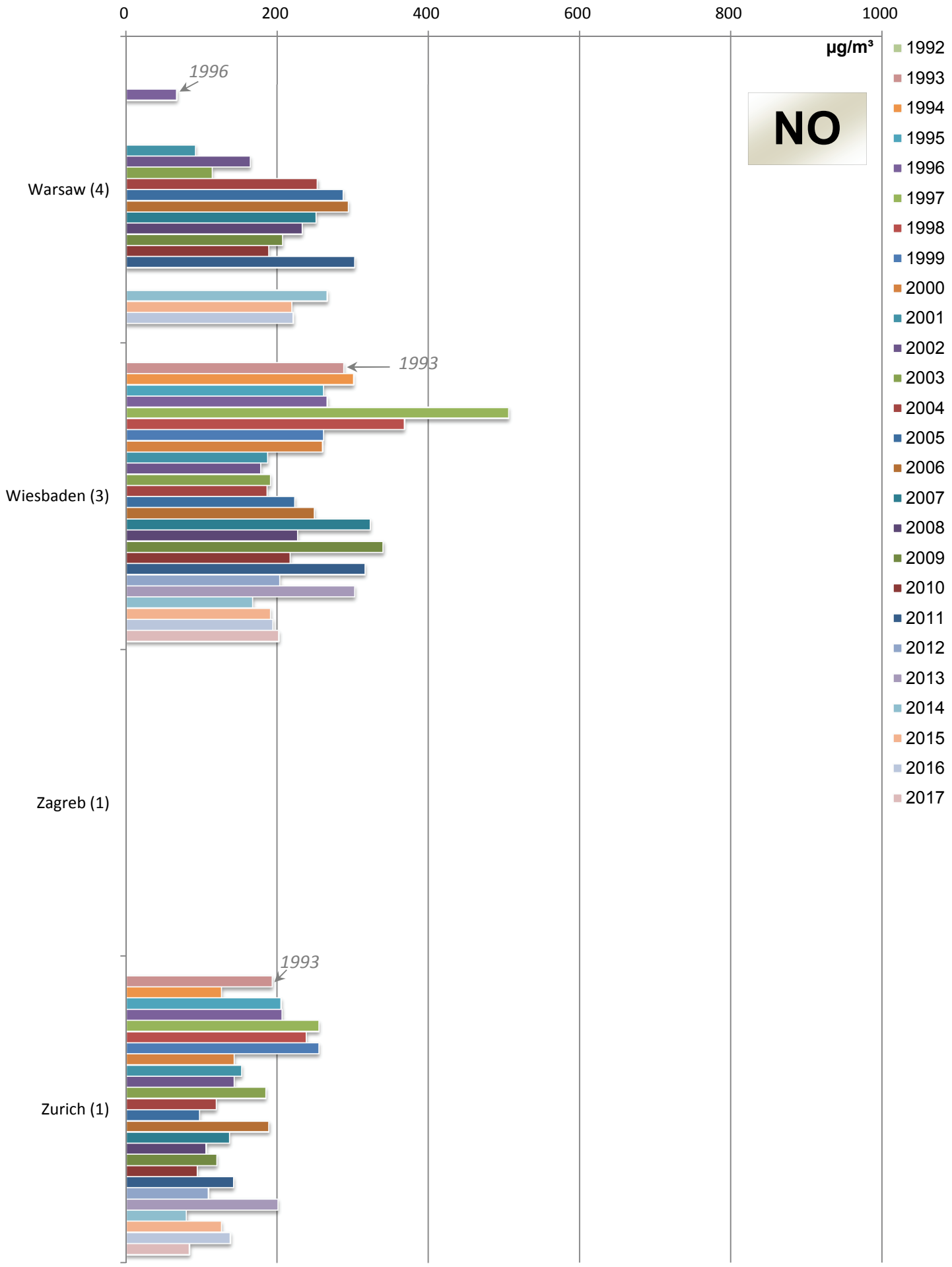

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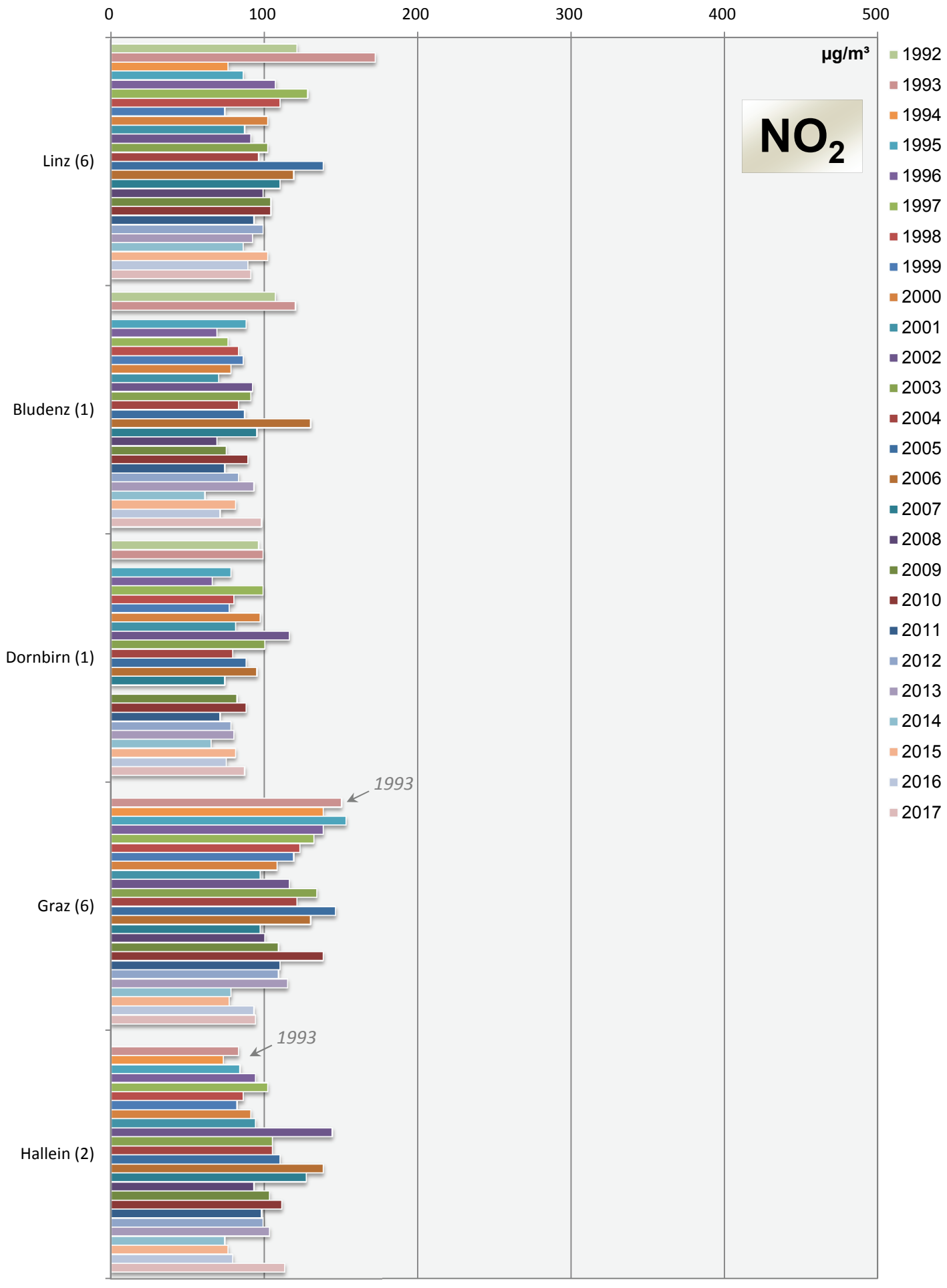

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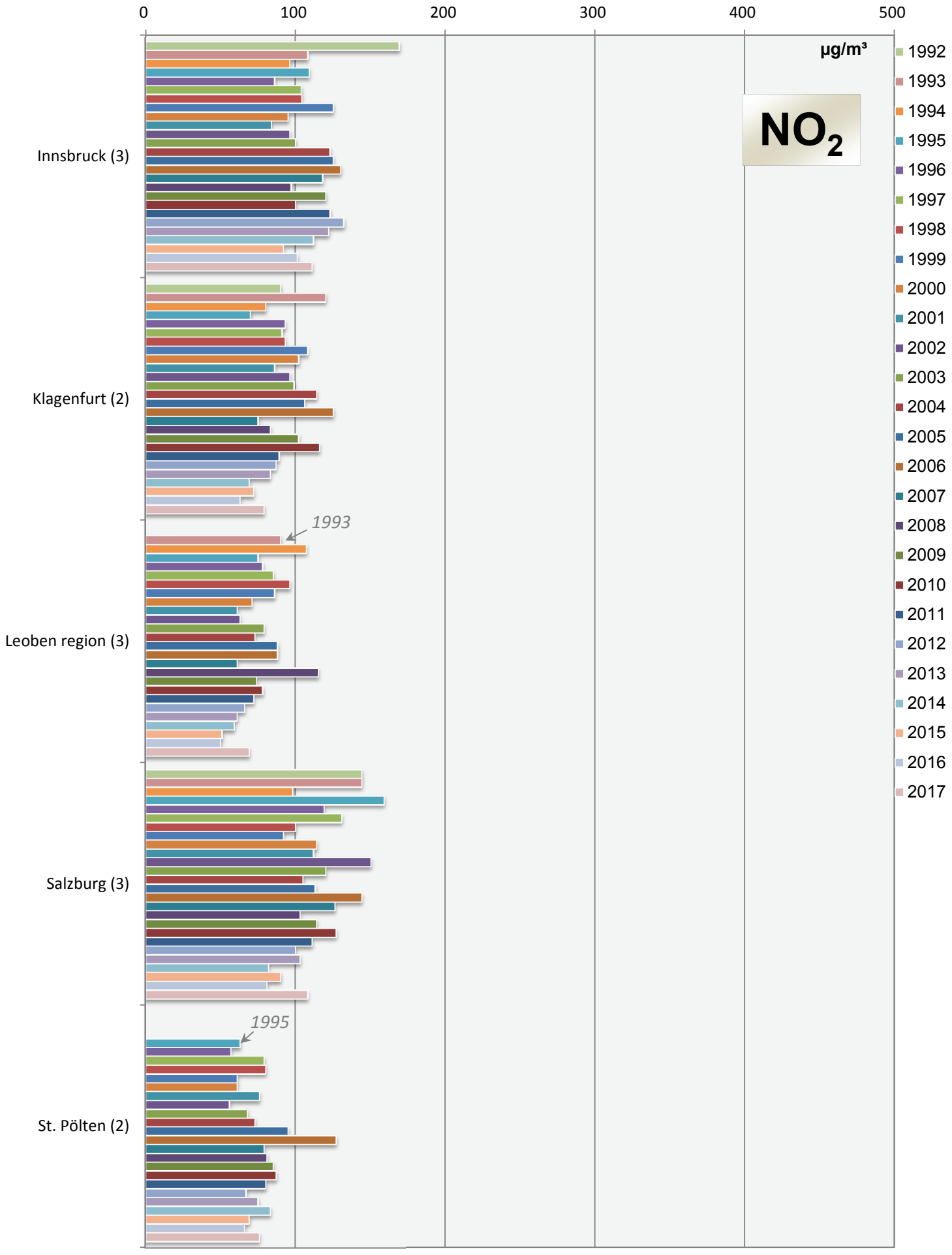

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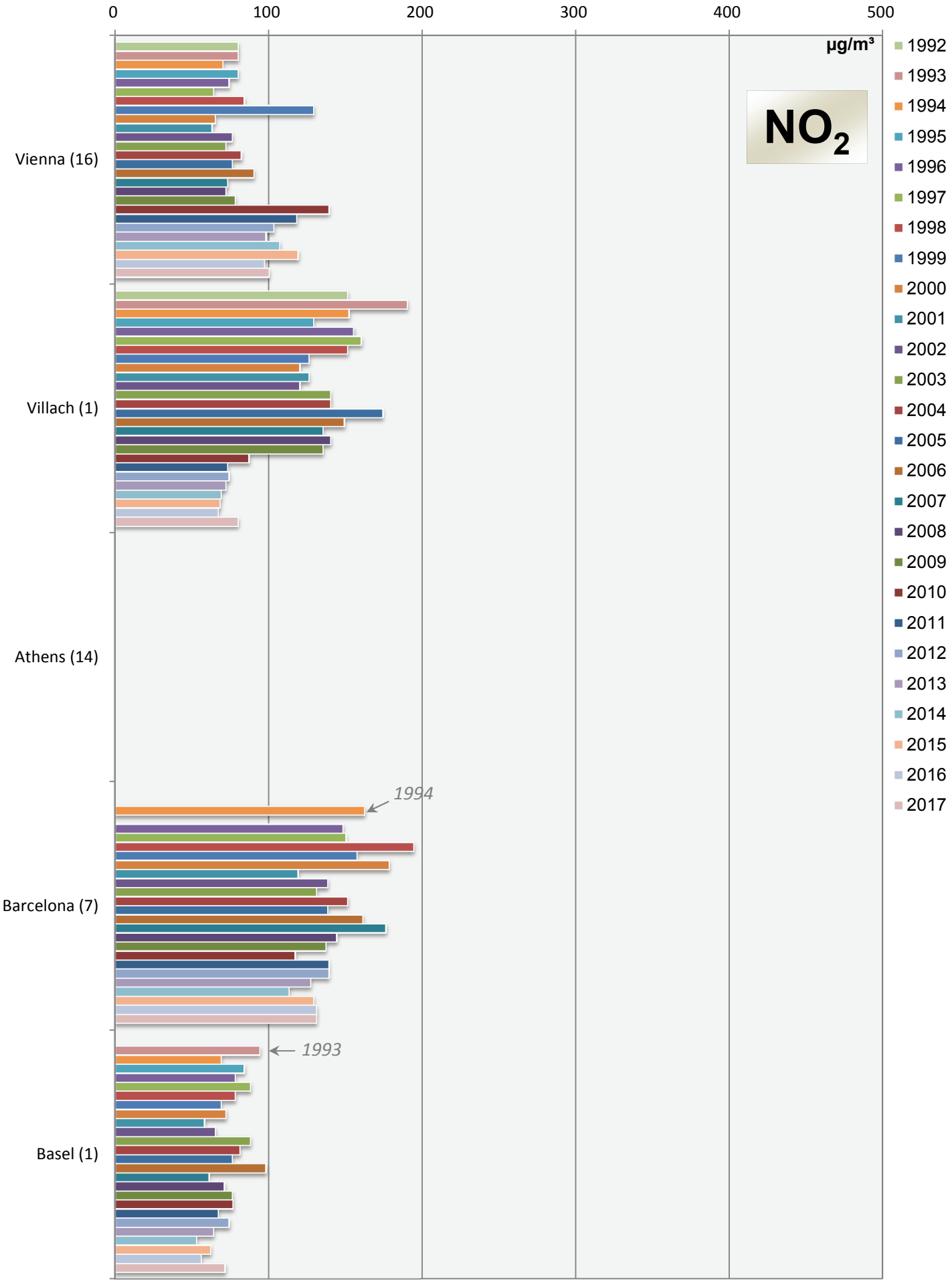

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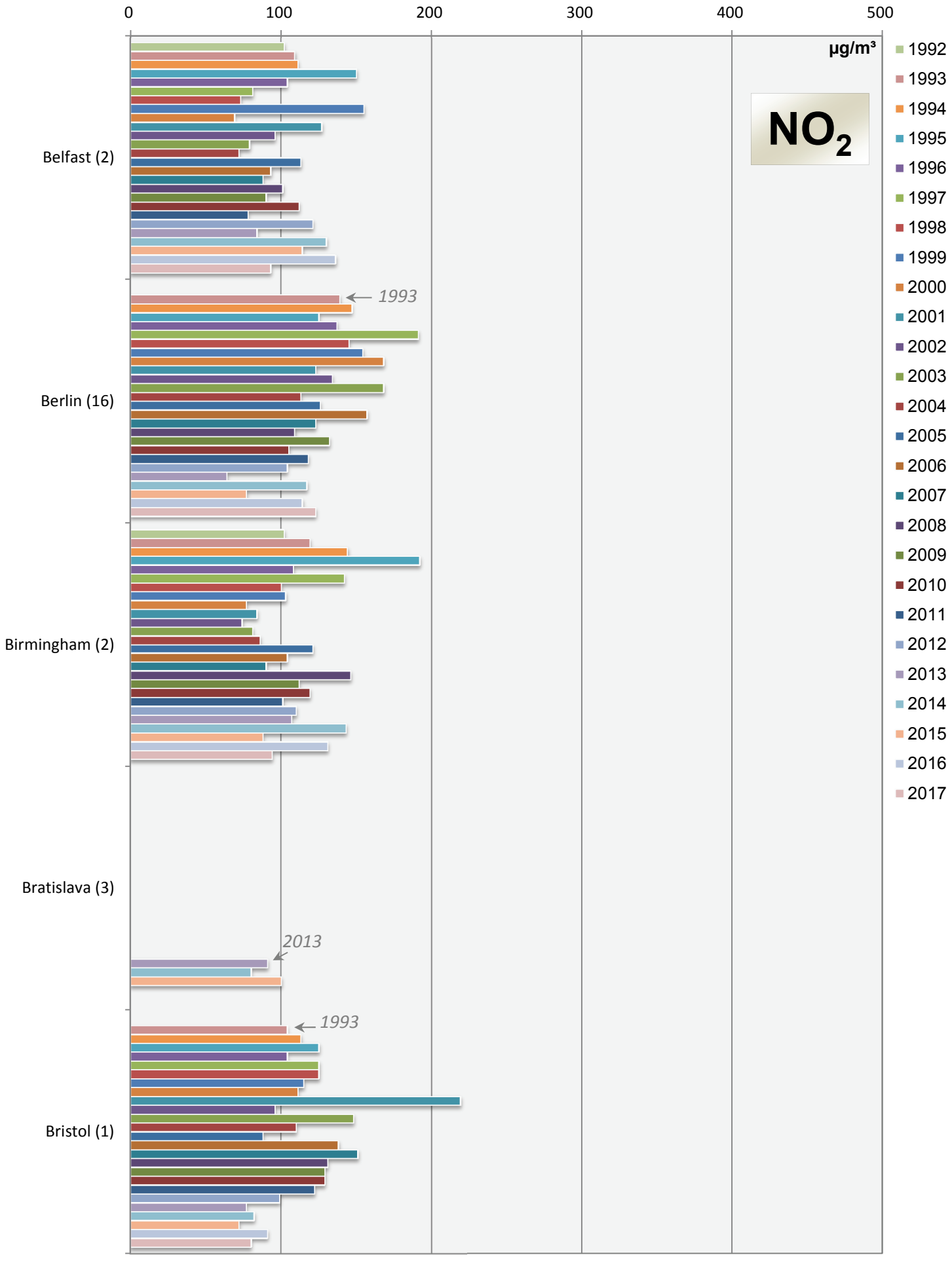

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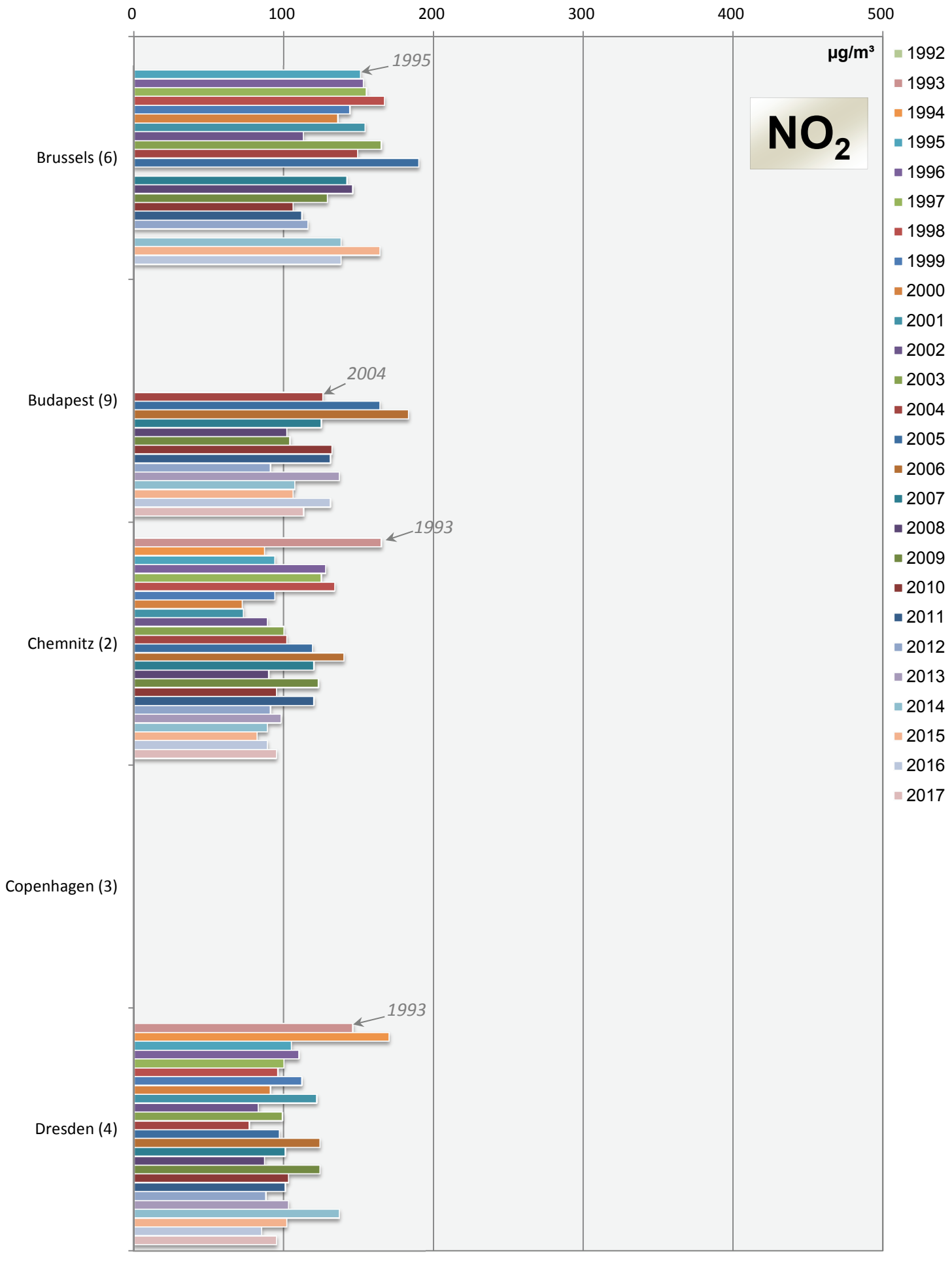

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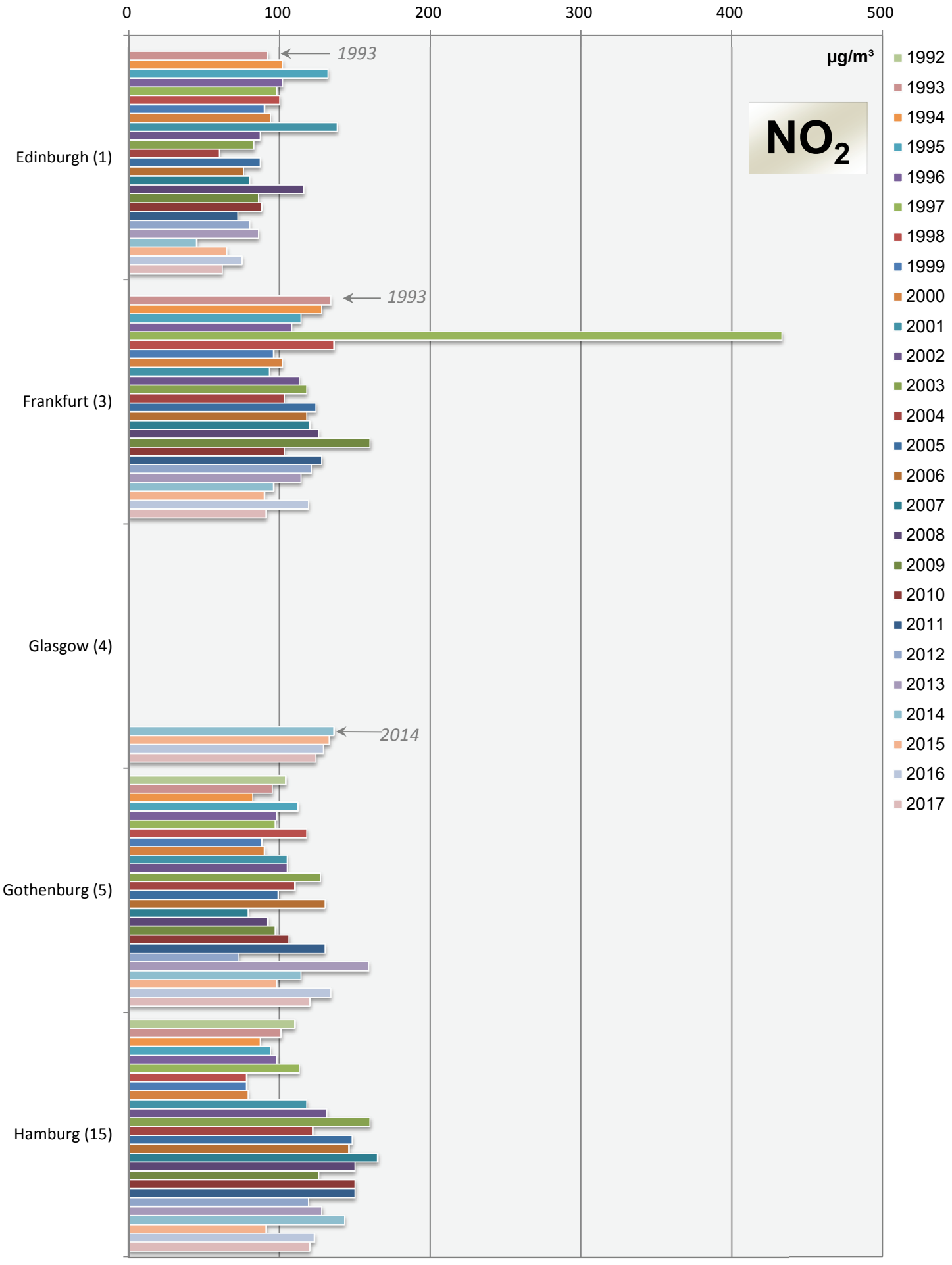

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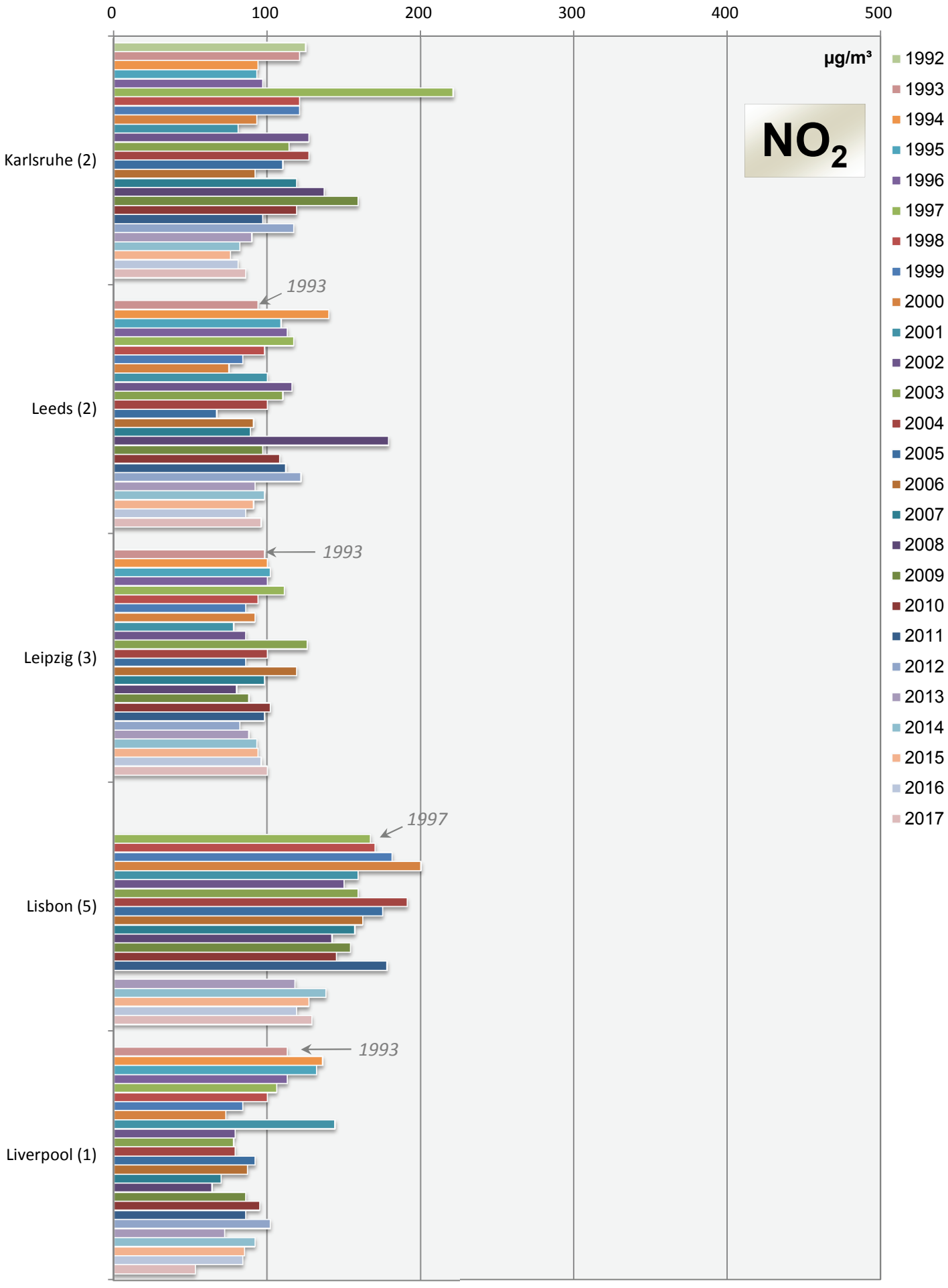

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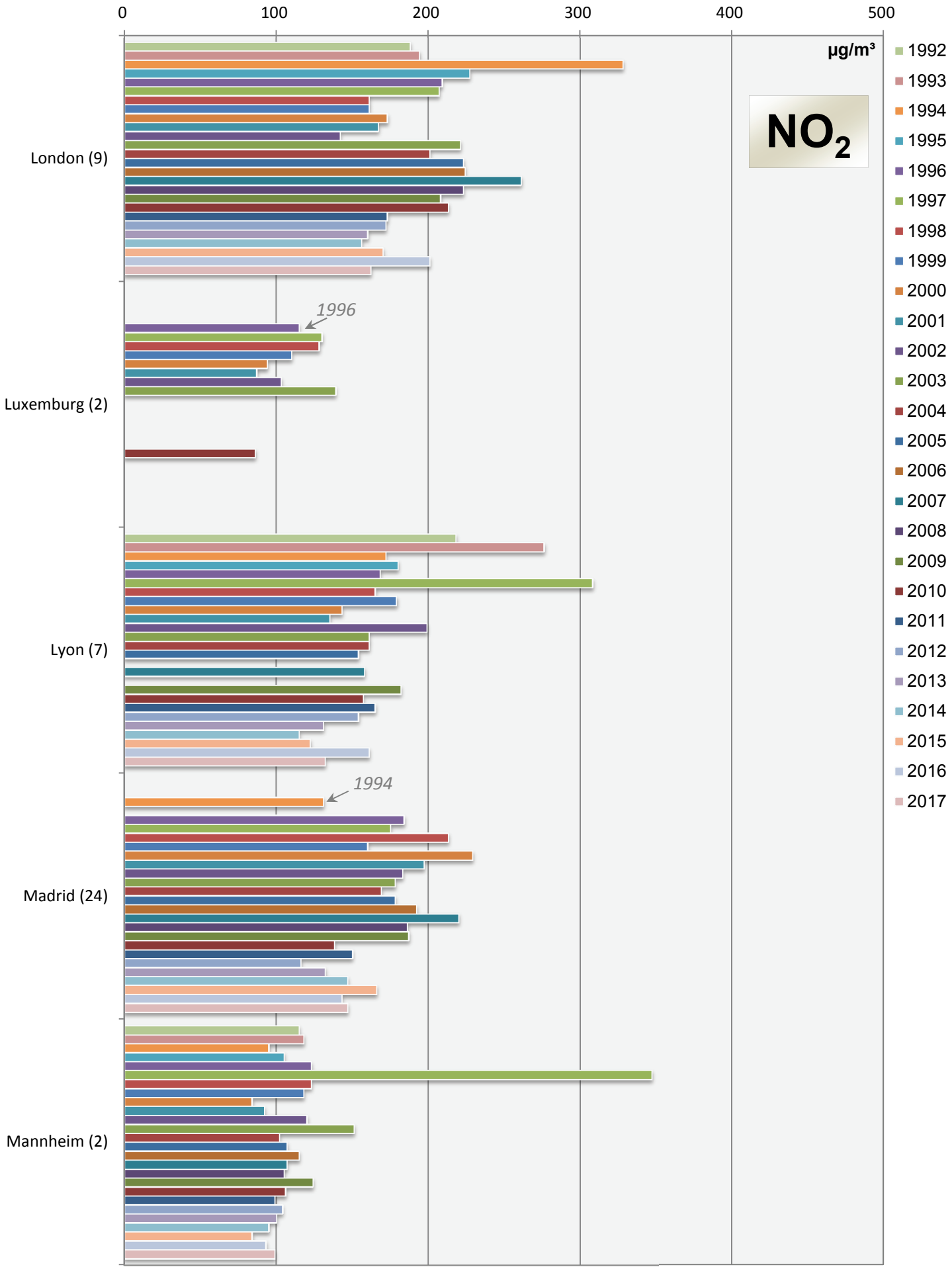

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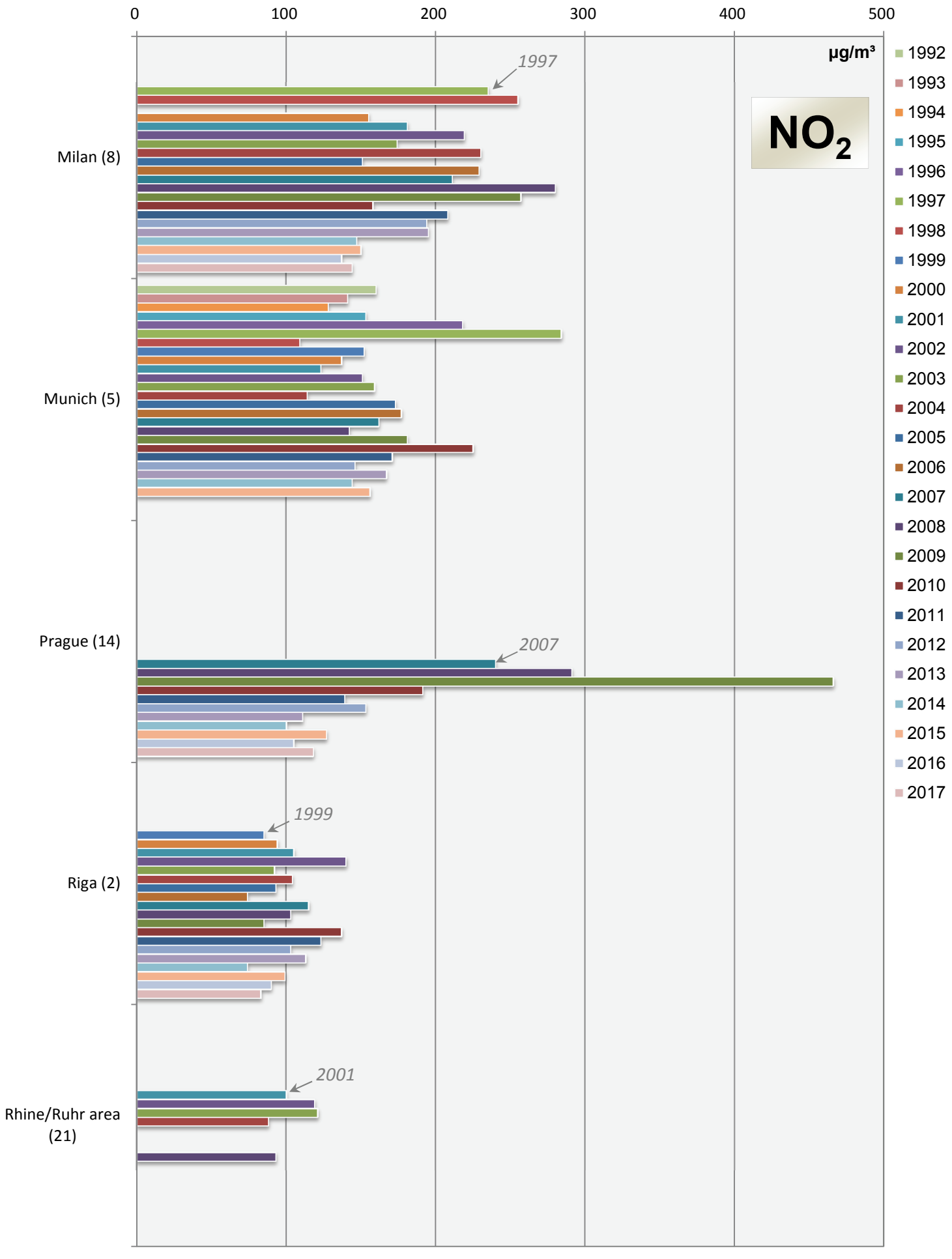

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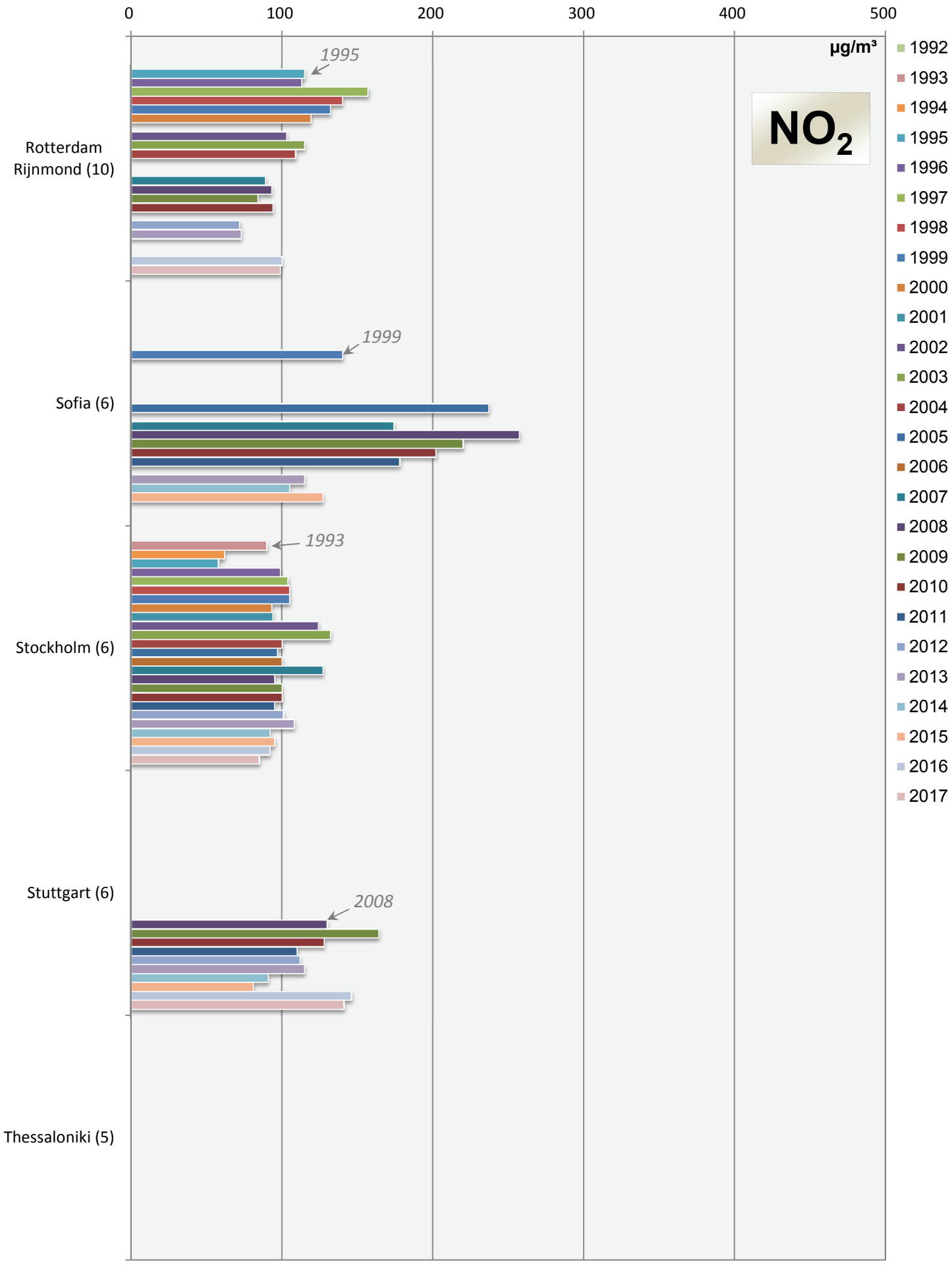

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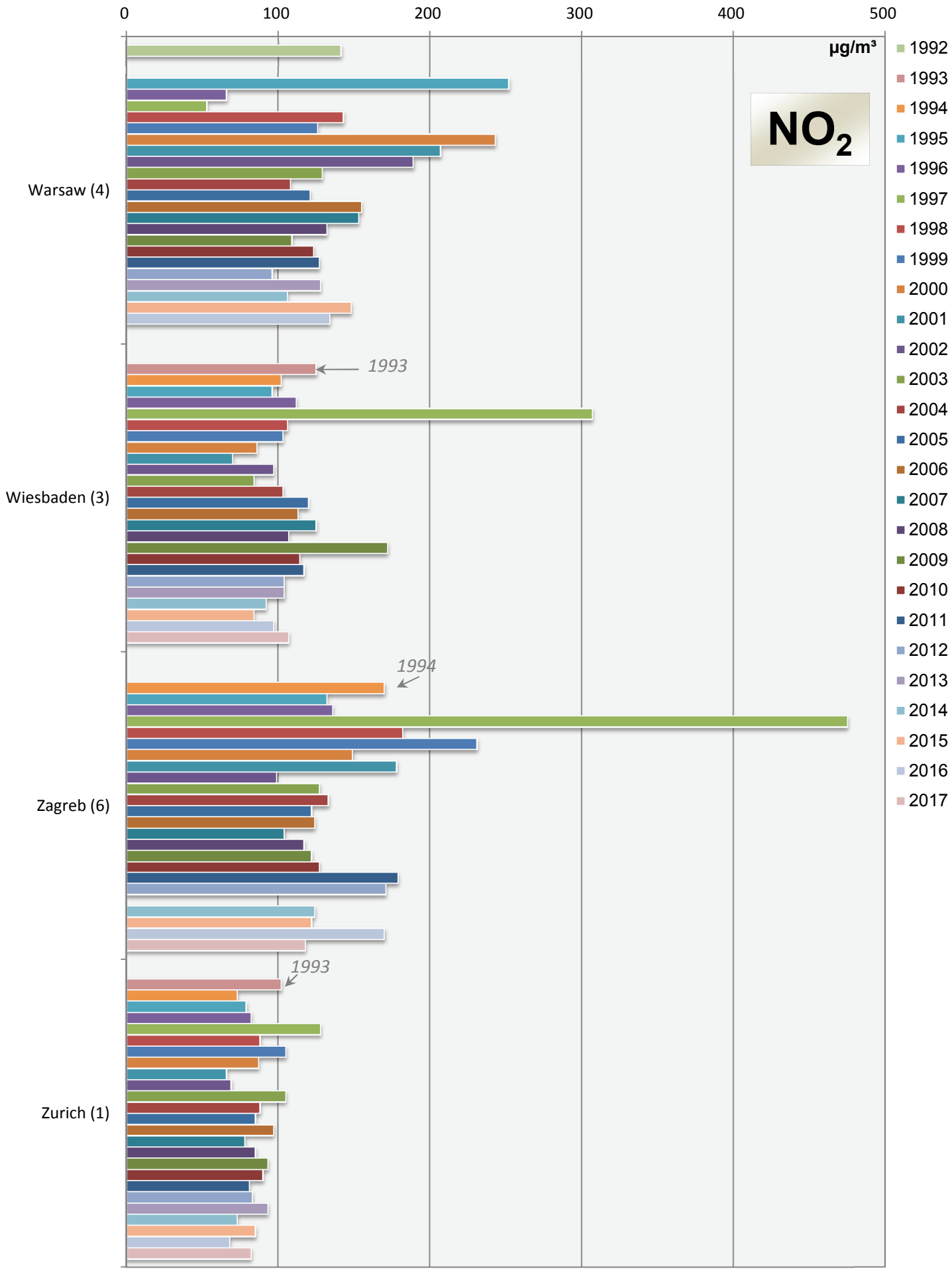

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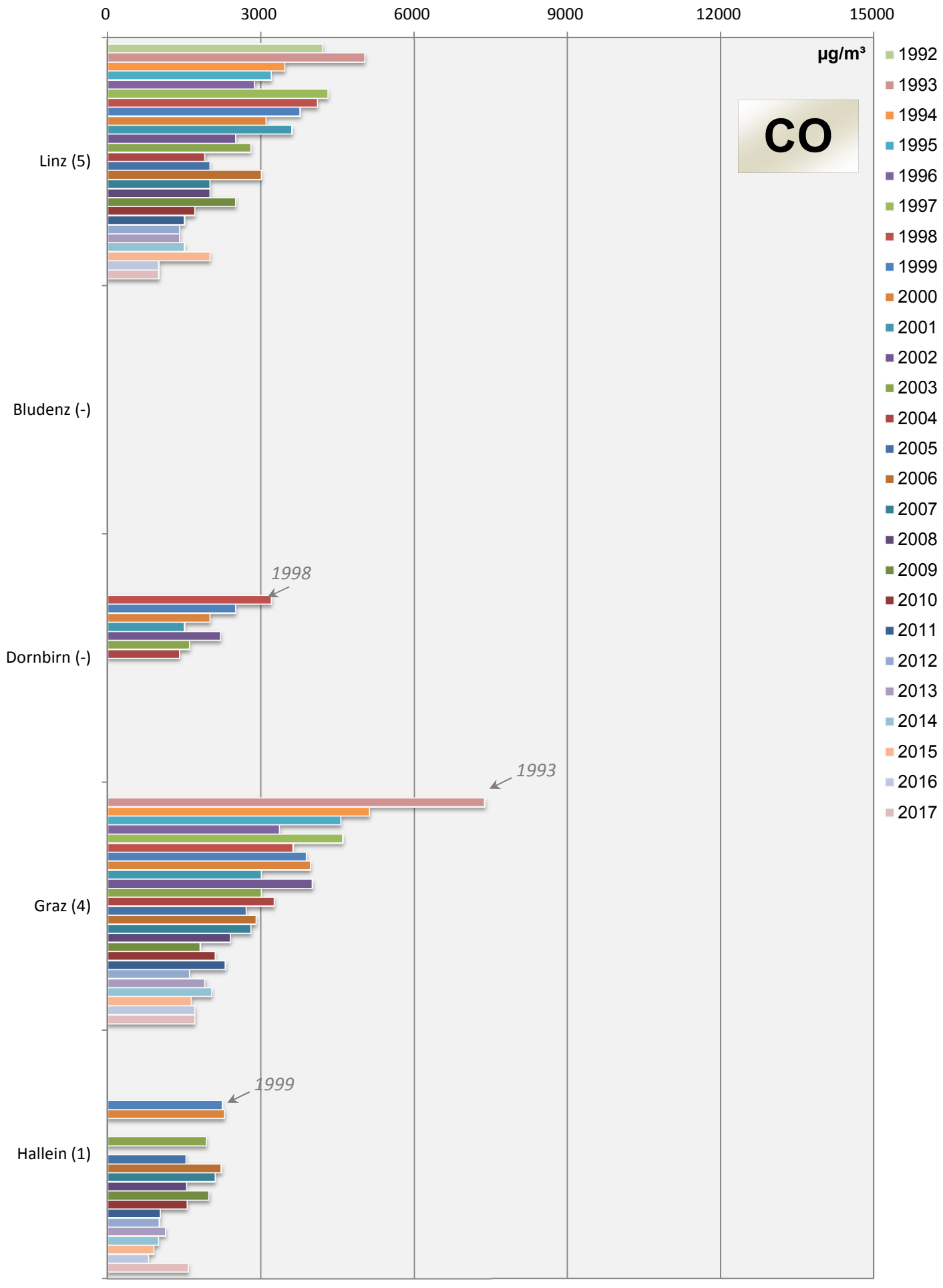

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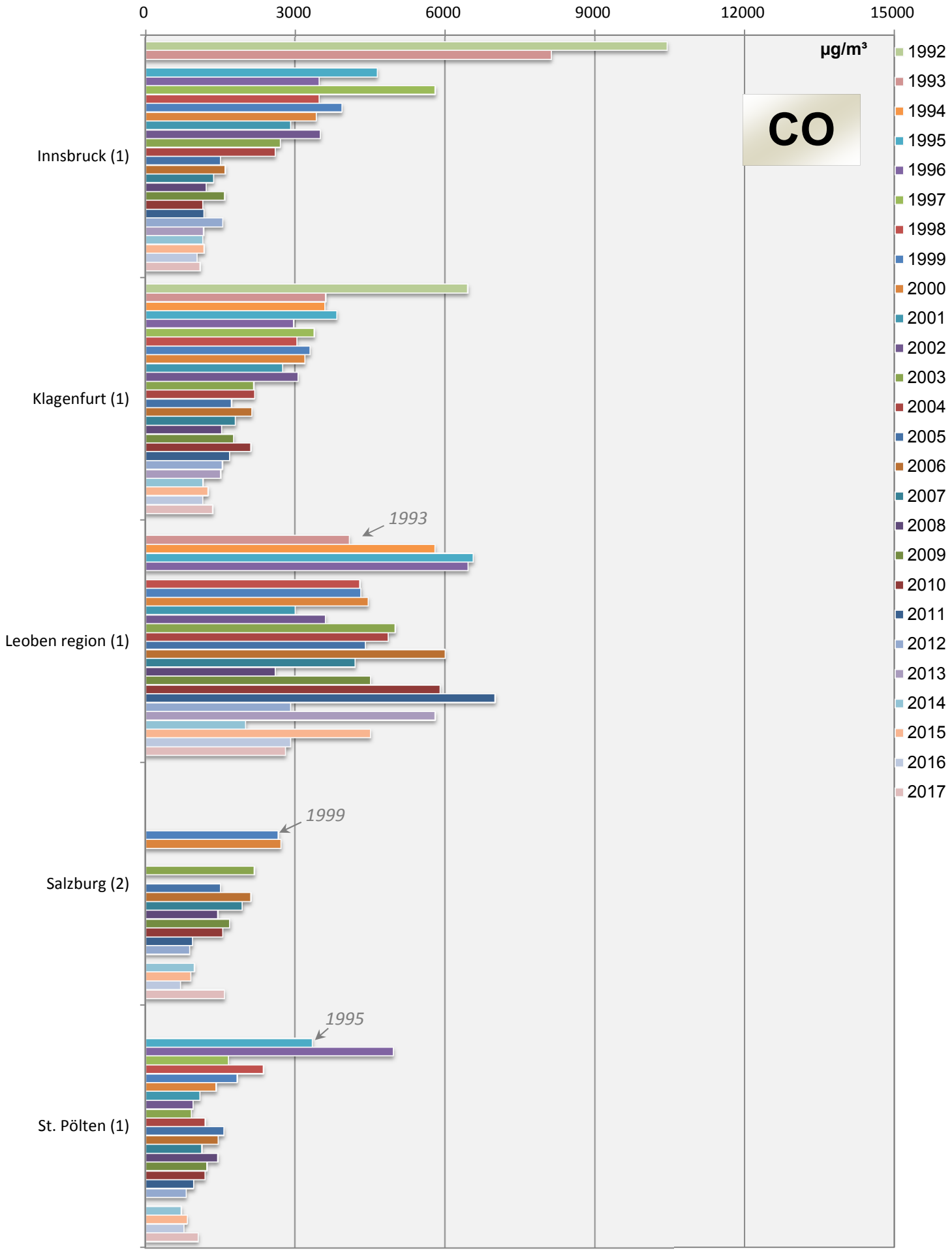

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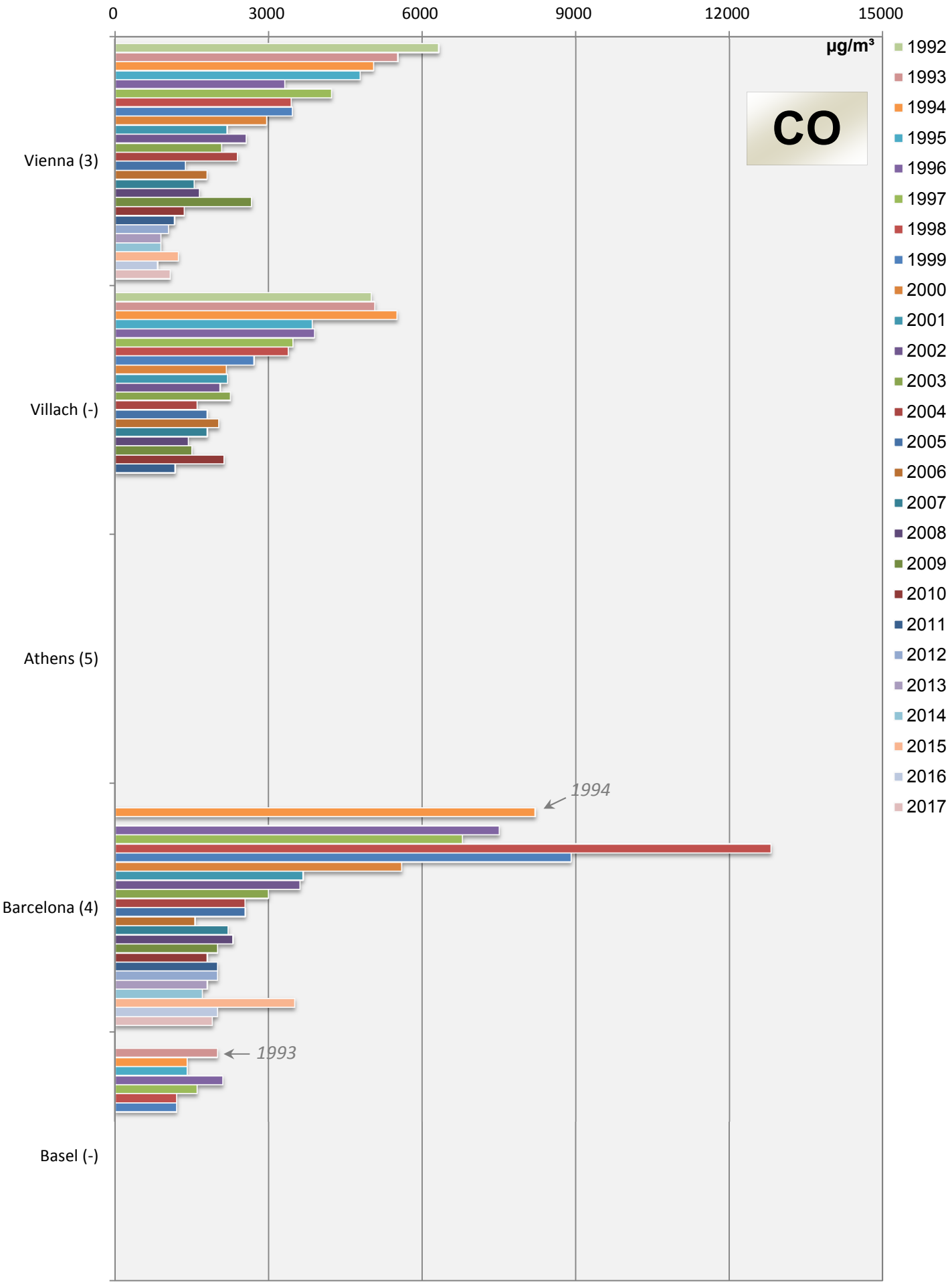

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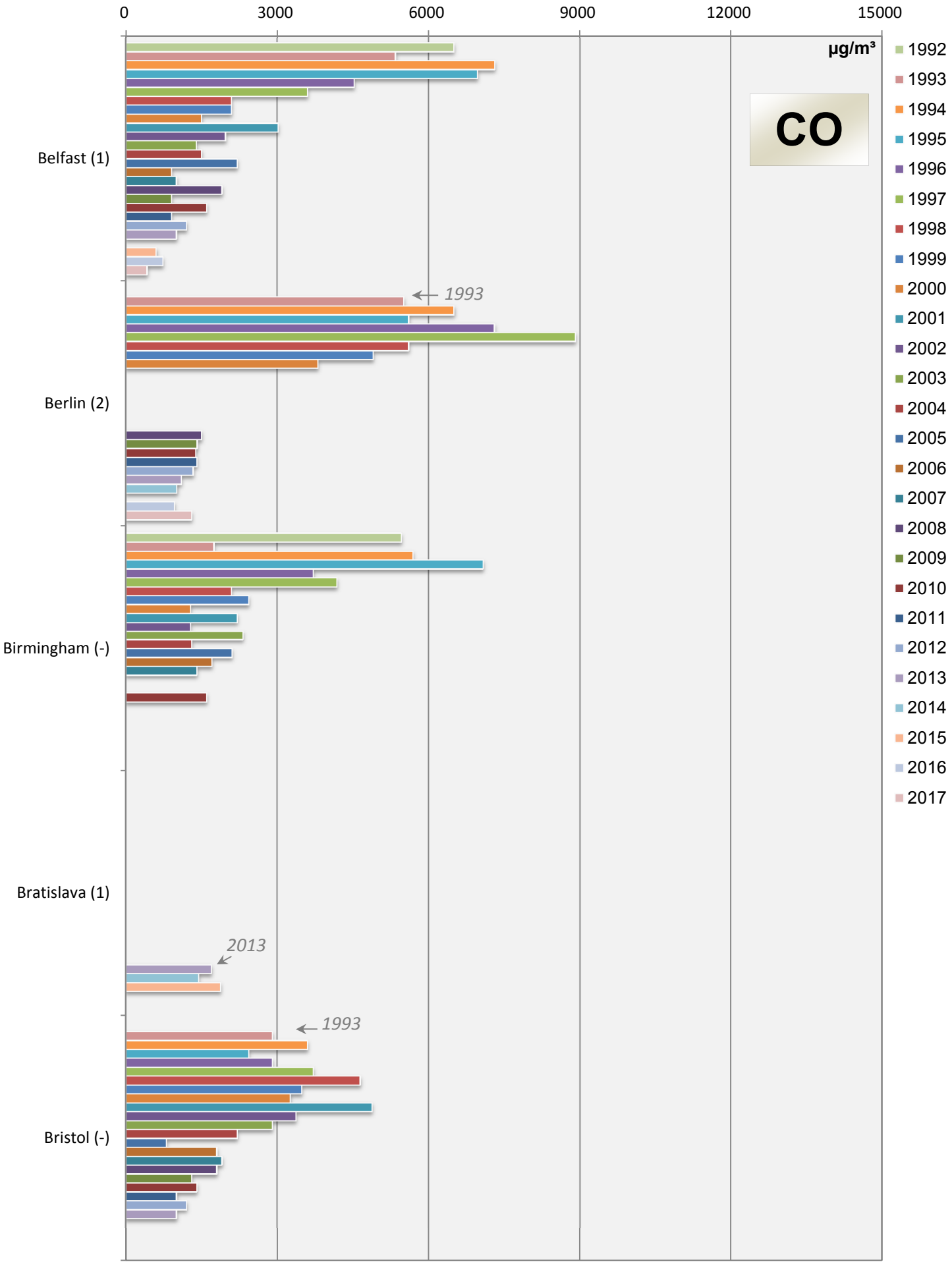

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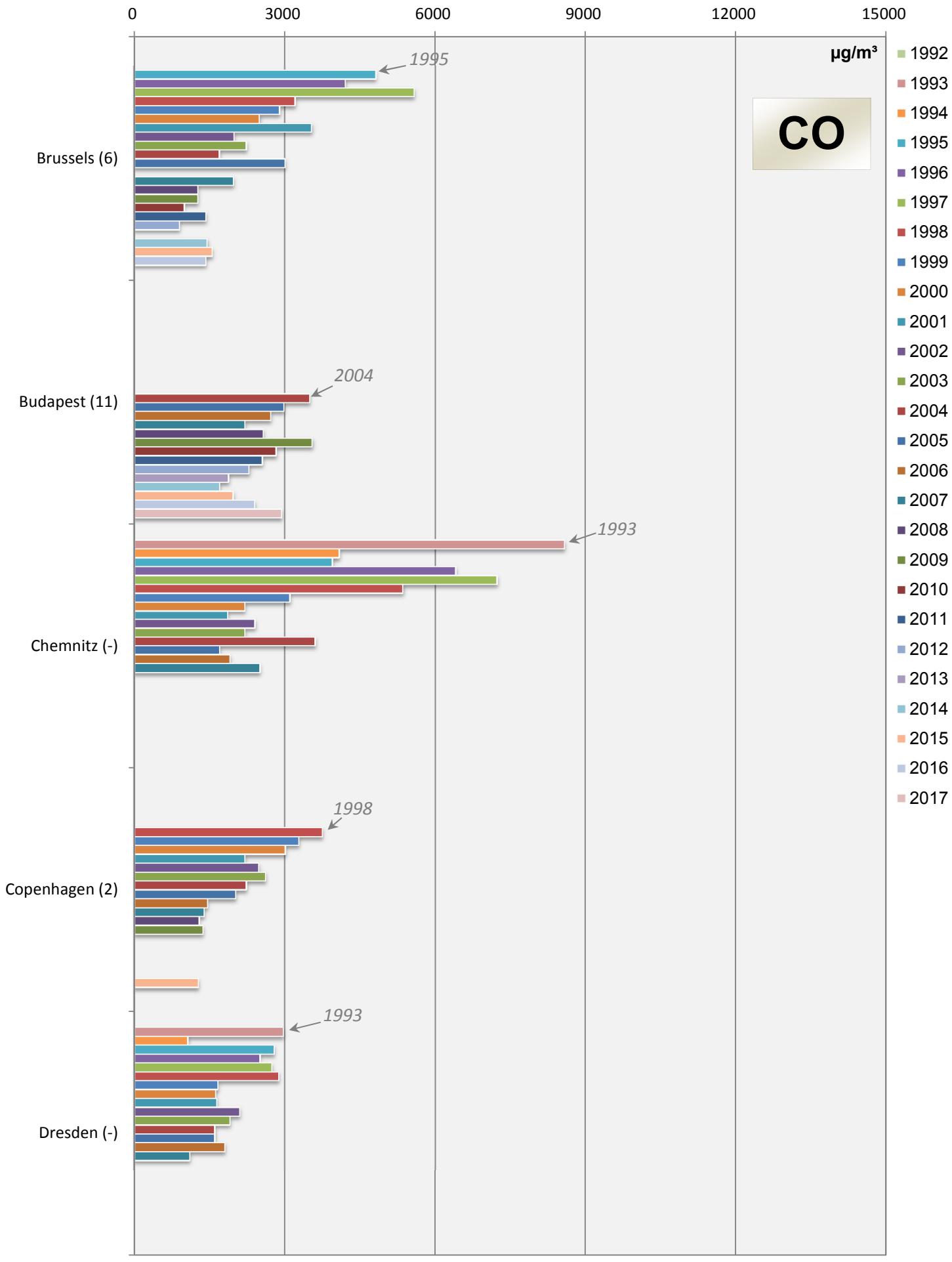
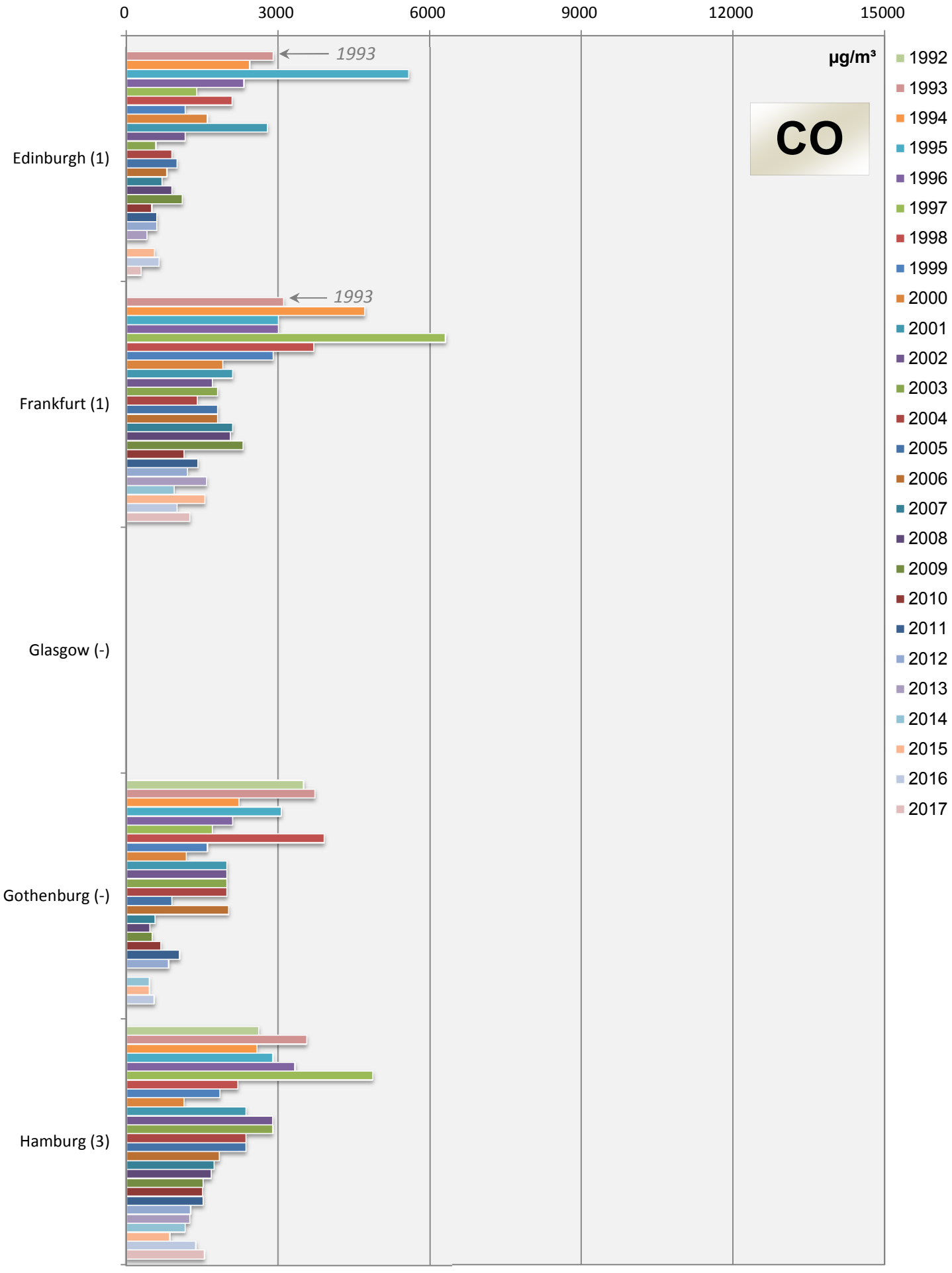
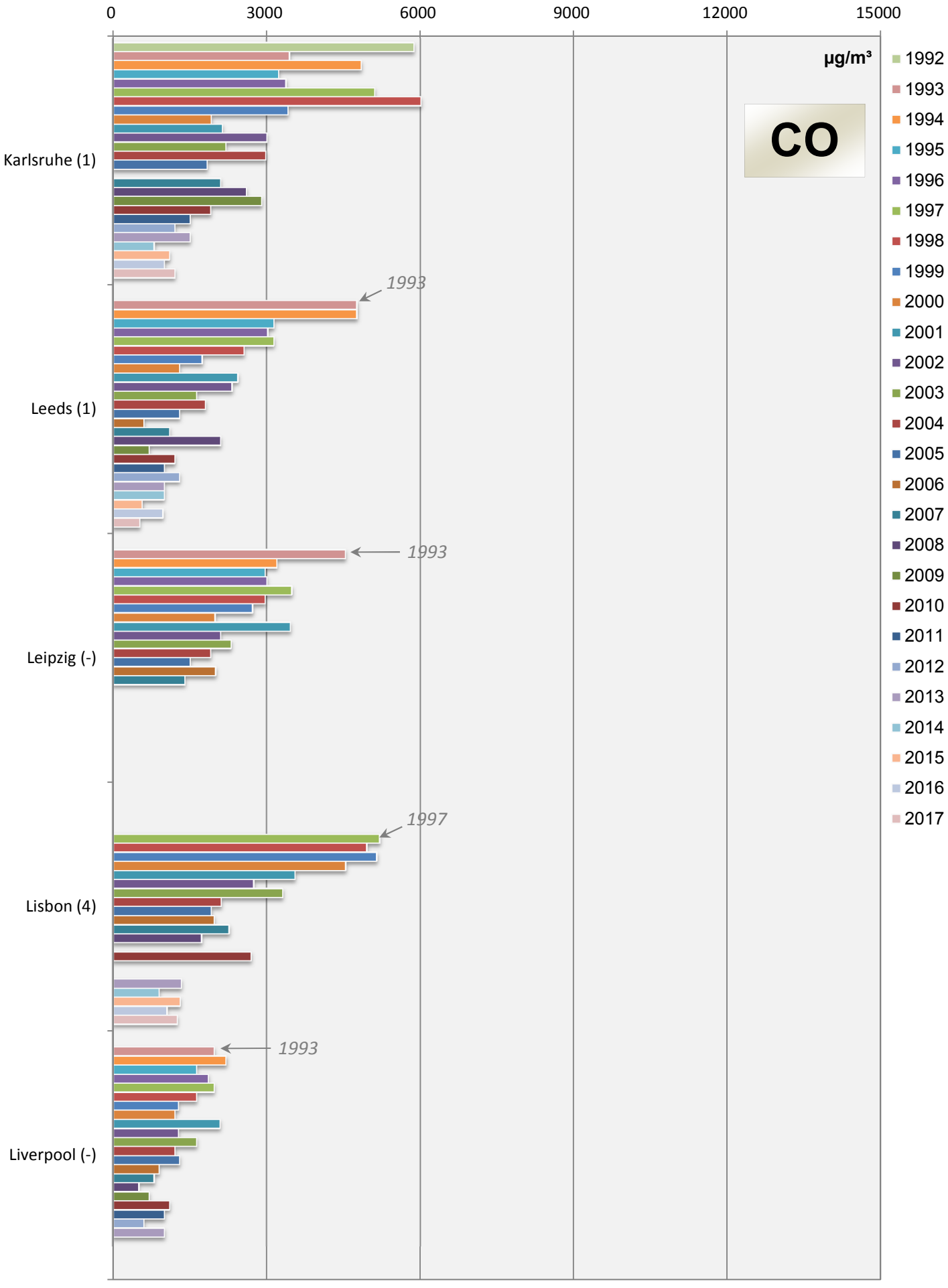


# Comparison of The Air Quality 1992 - 2017

## max. daily mean values (peak-stressed monitoring station)



# Comparison of The Air Quality 1992 - 2017
## max. daily mean values (peak-stressed monitoring station)



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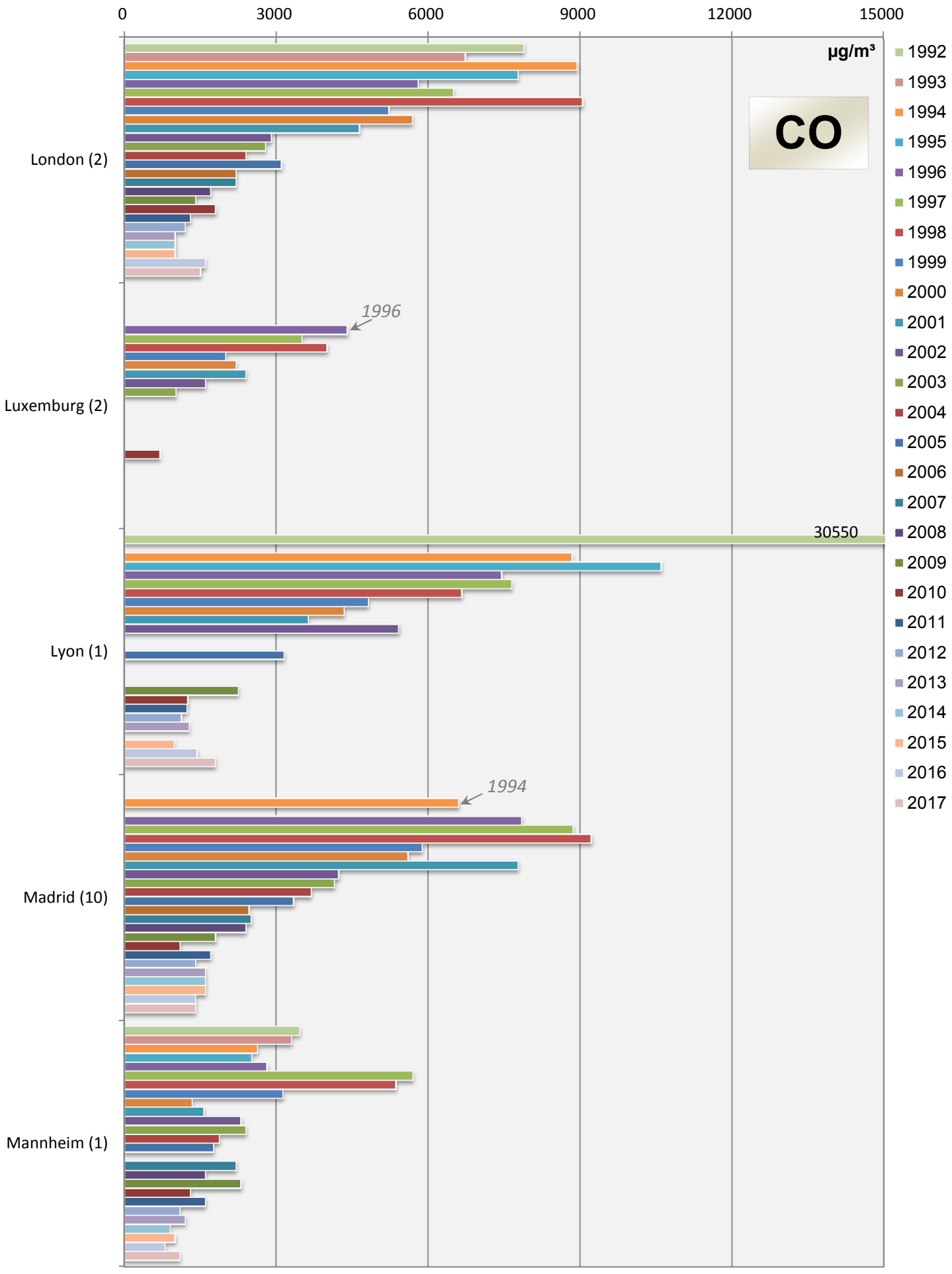

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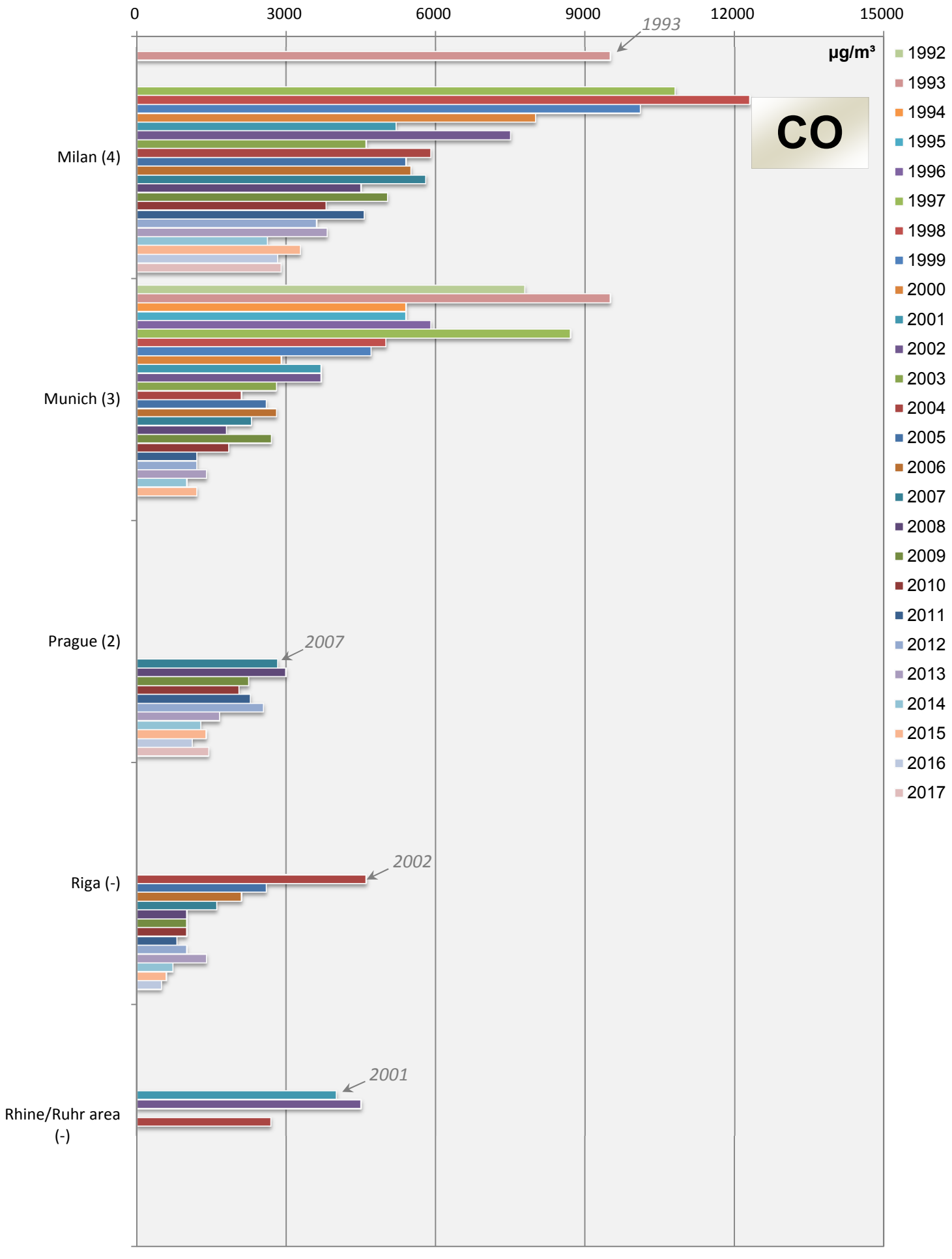

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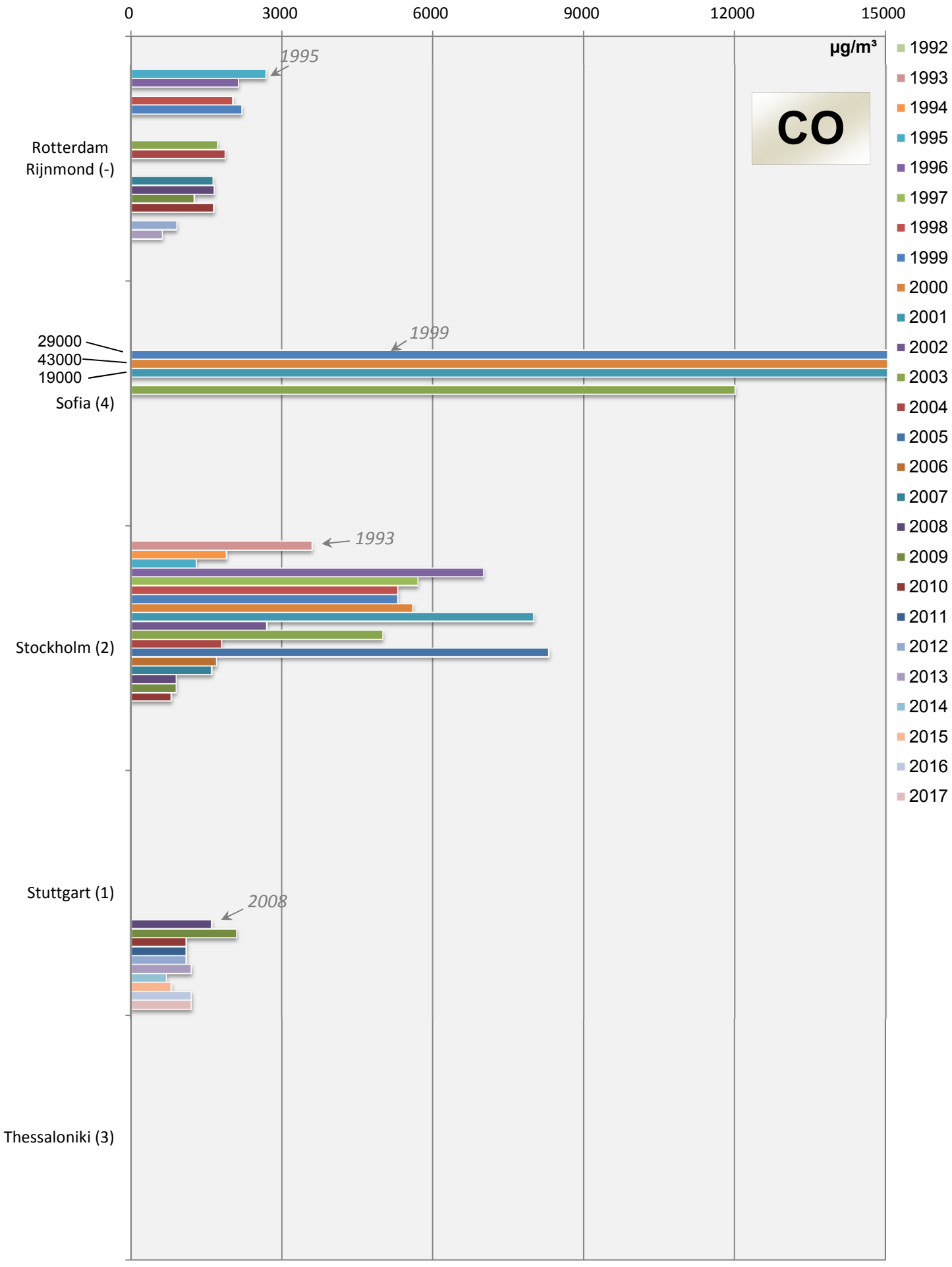

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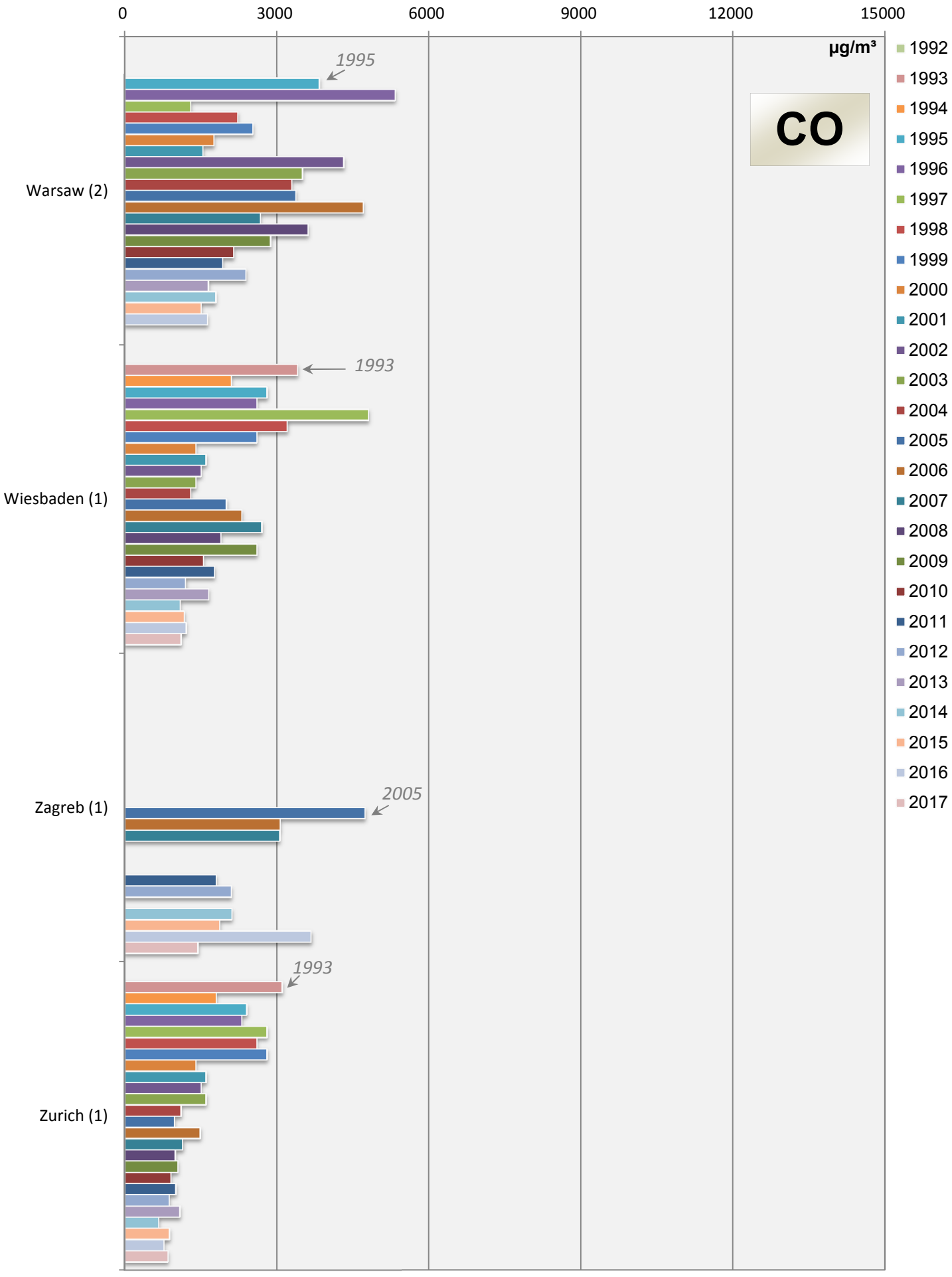

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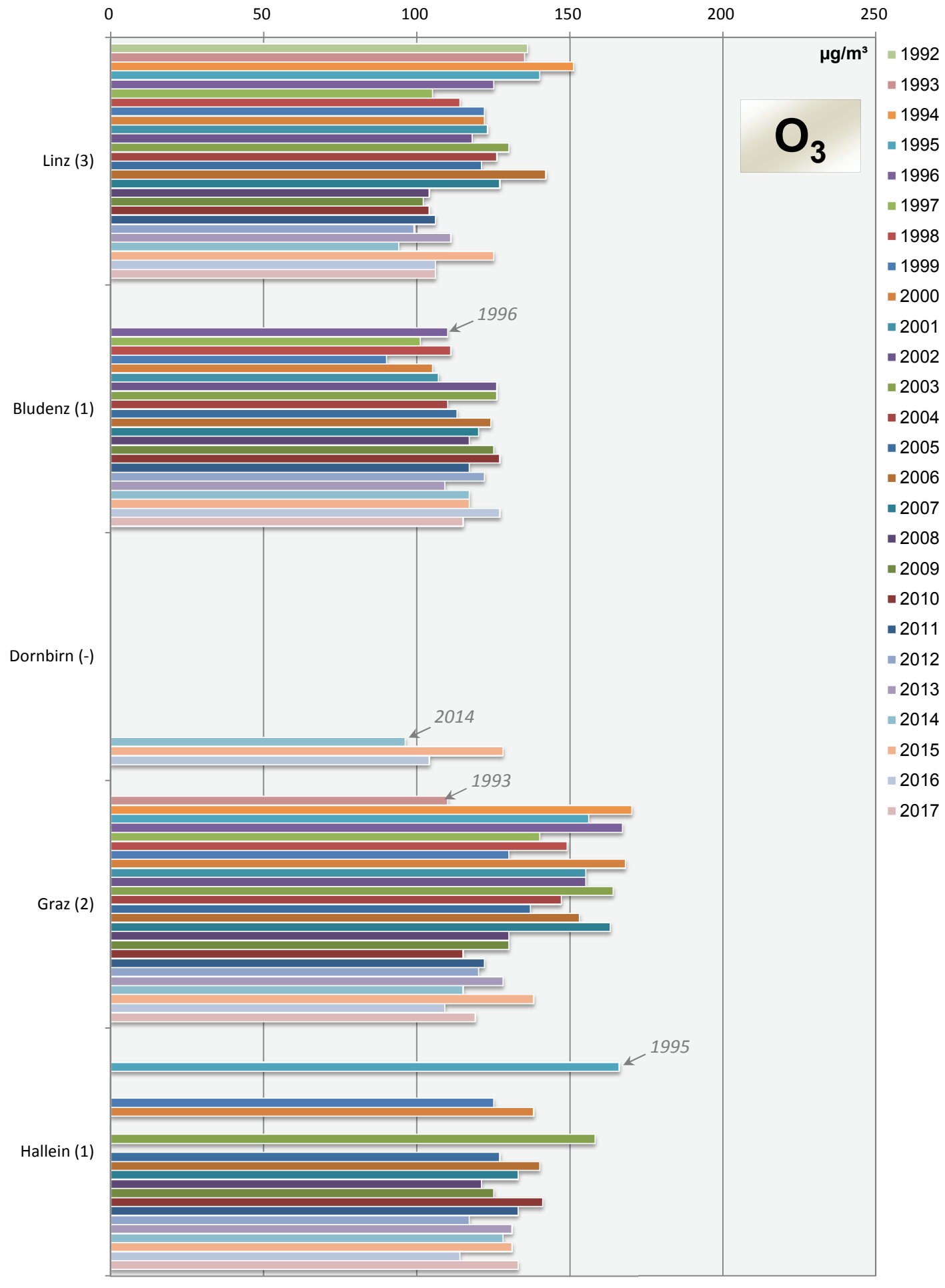

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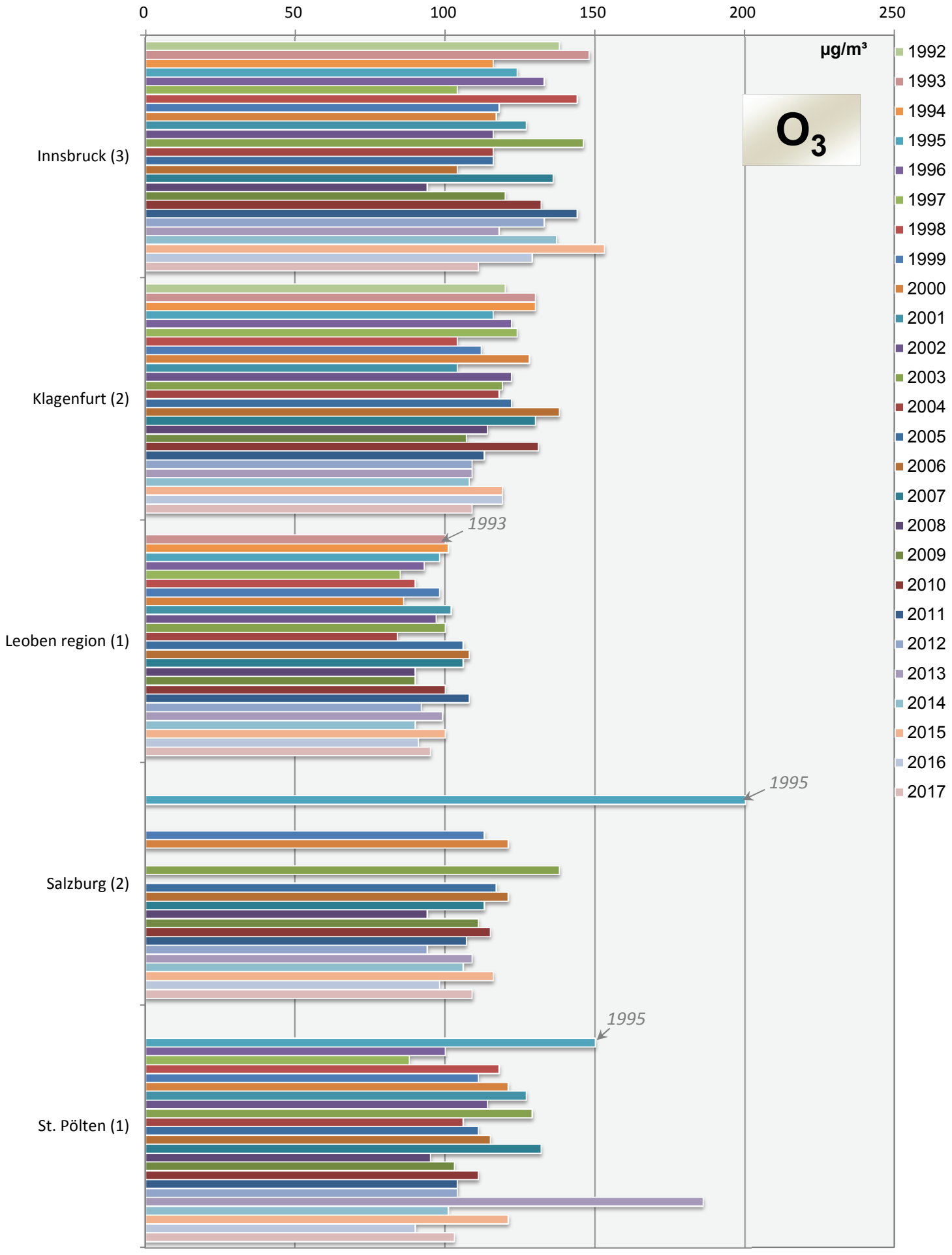

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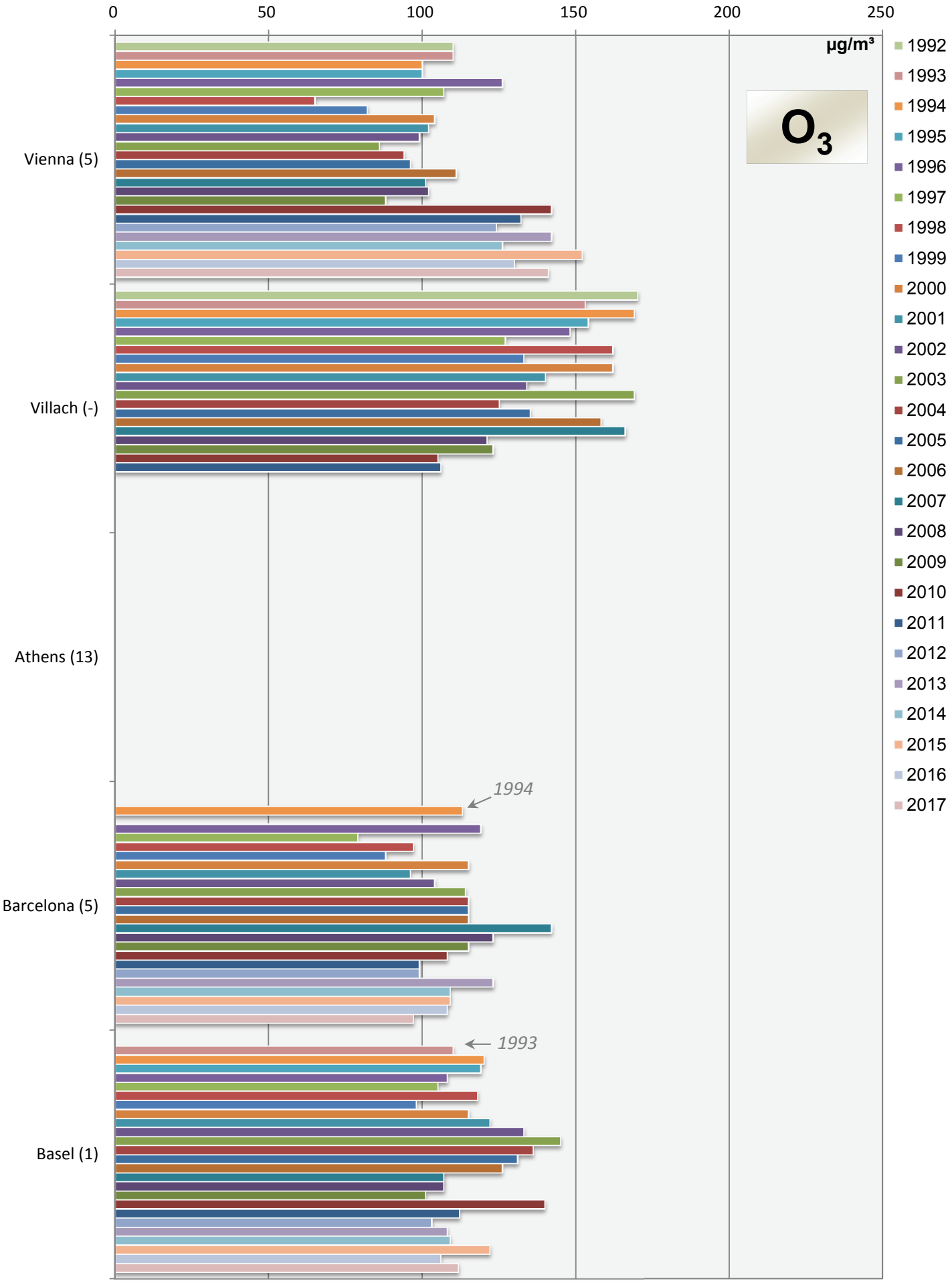

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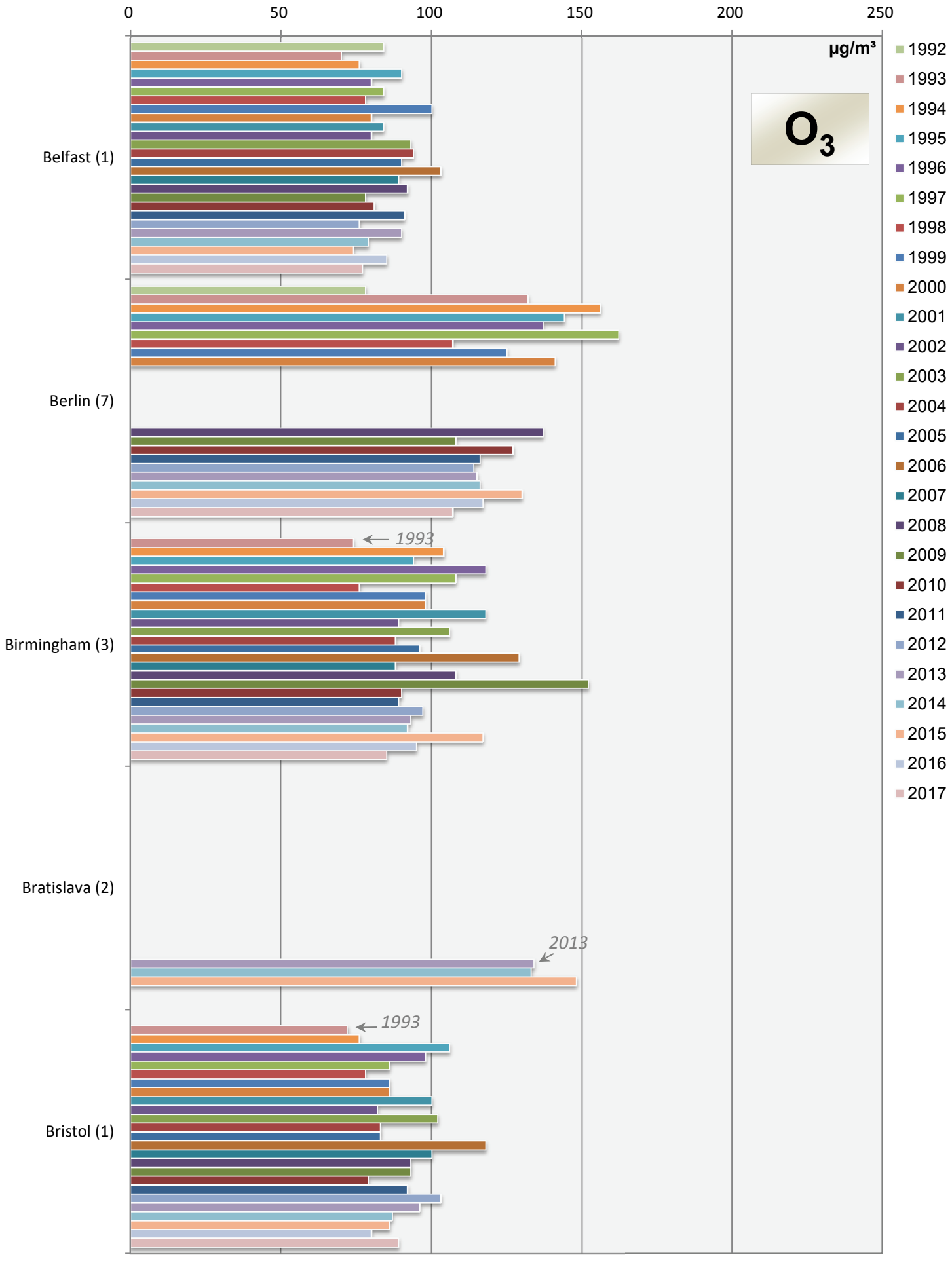

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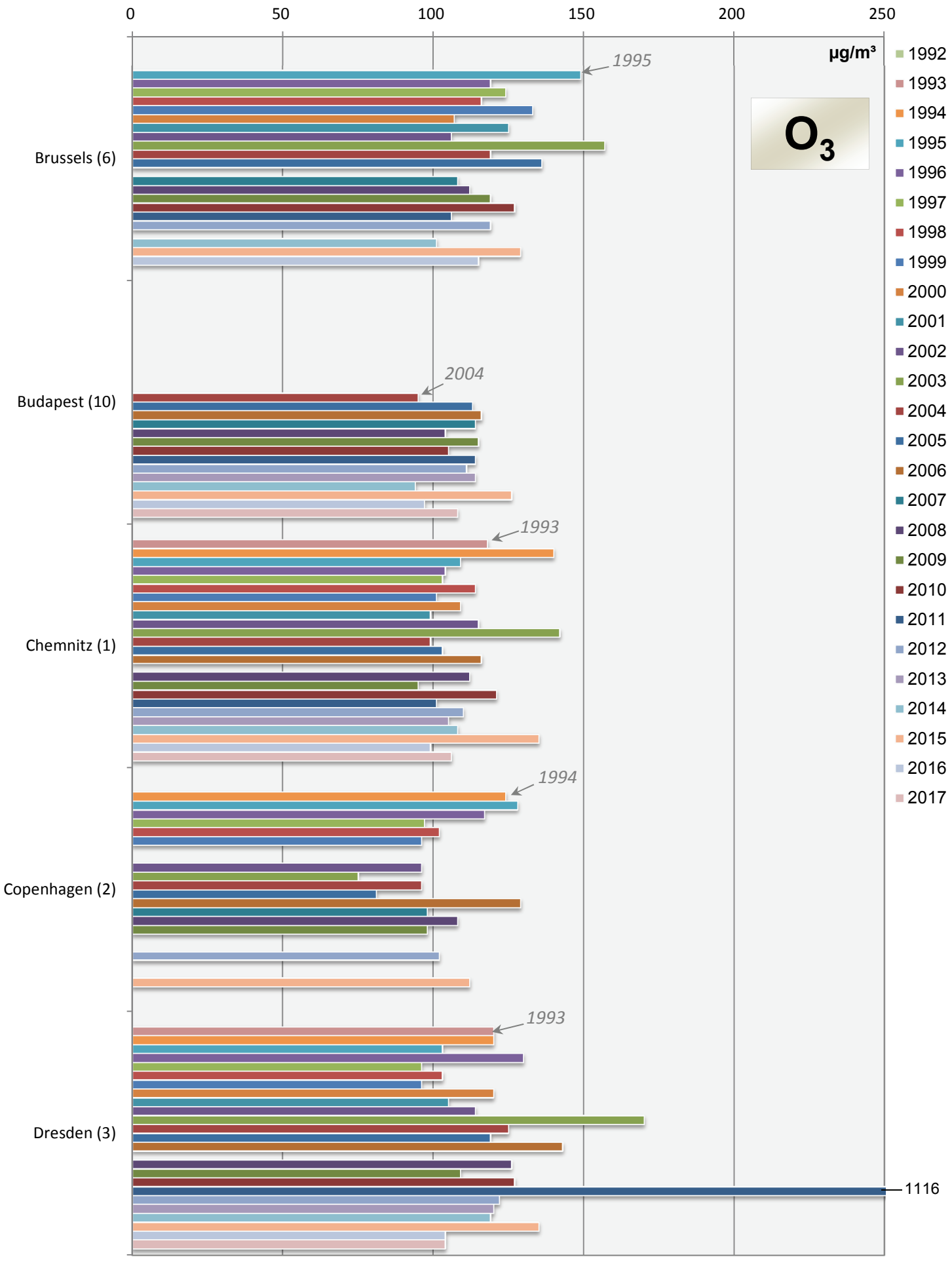

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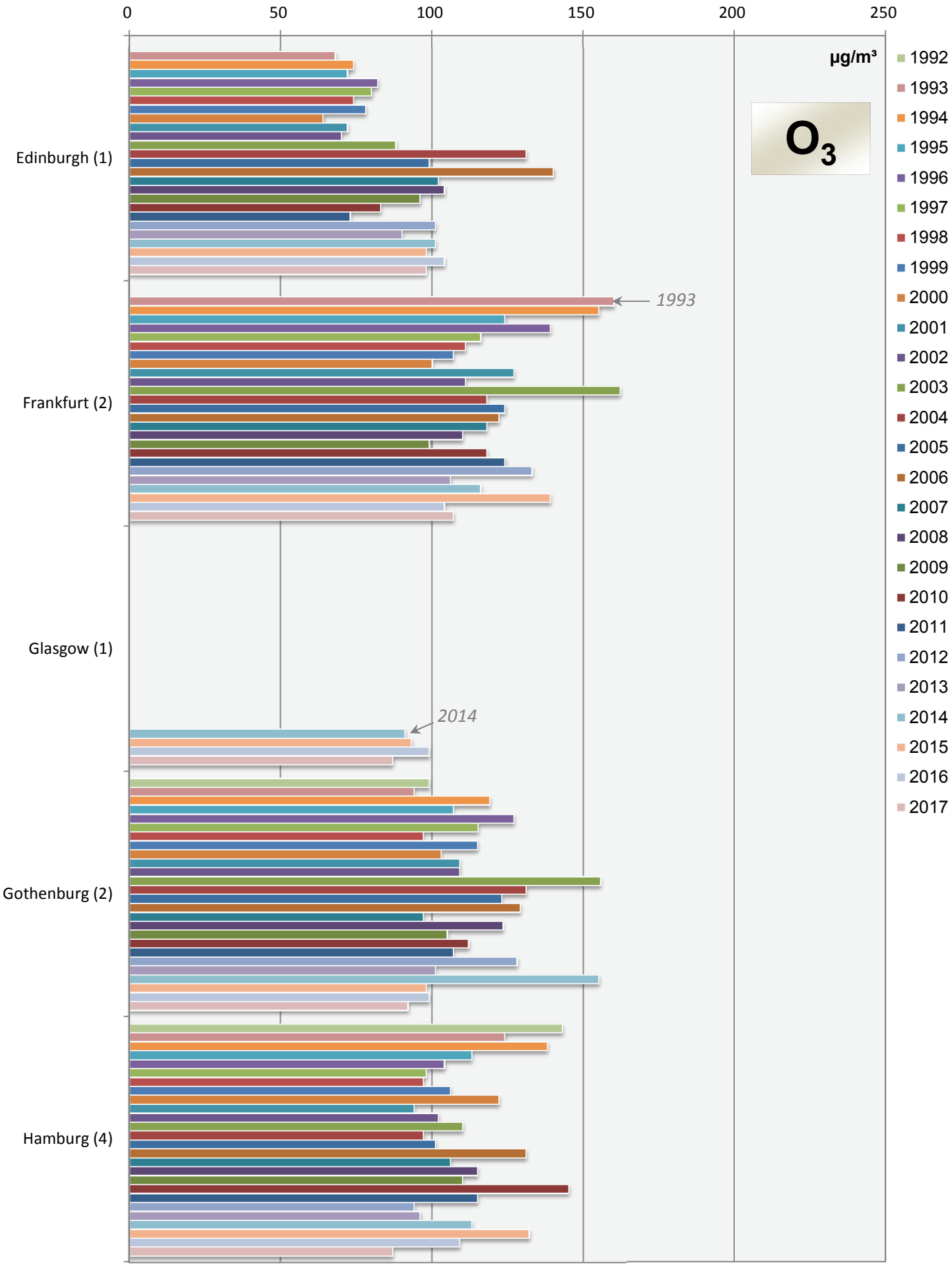

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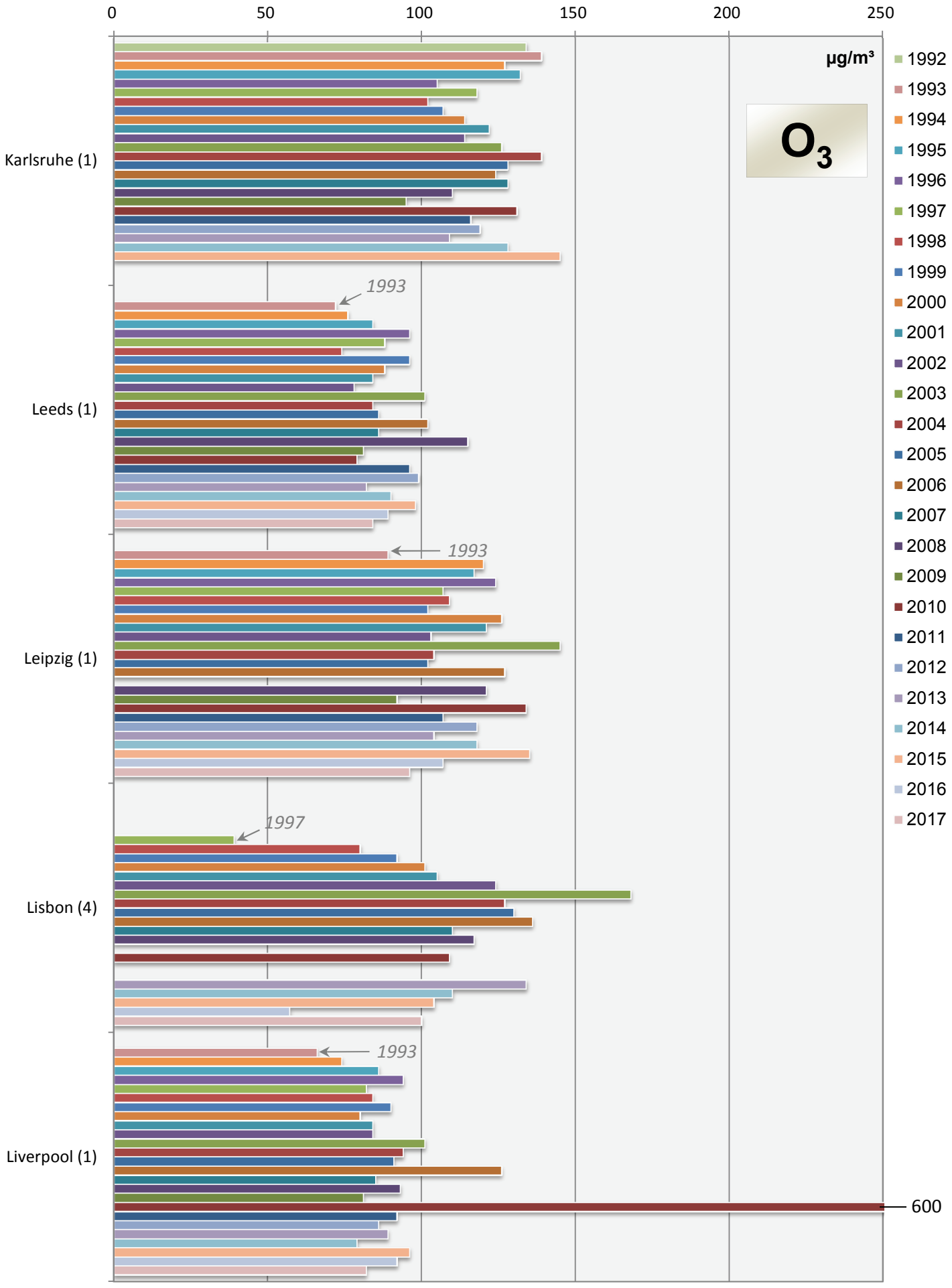
## max. daily mean values (peak-stressed monitoring station)



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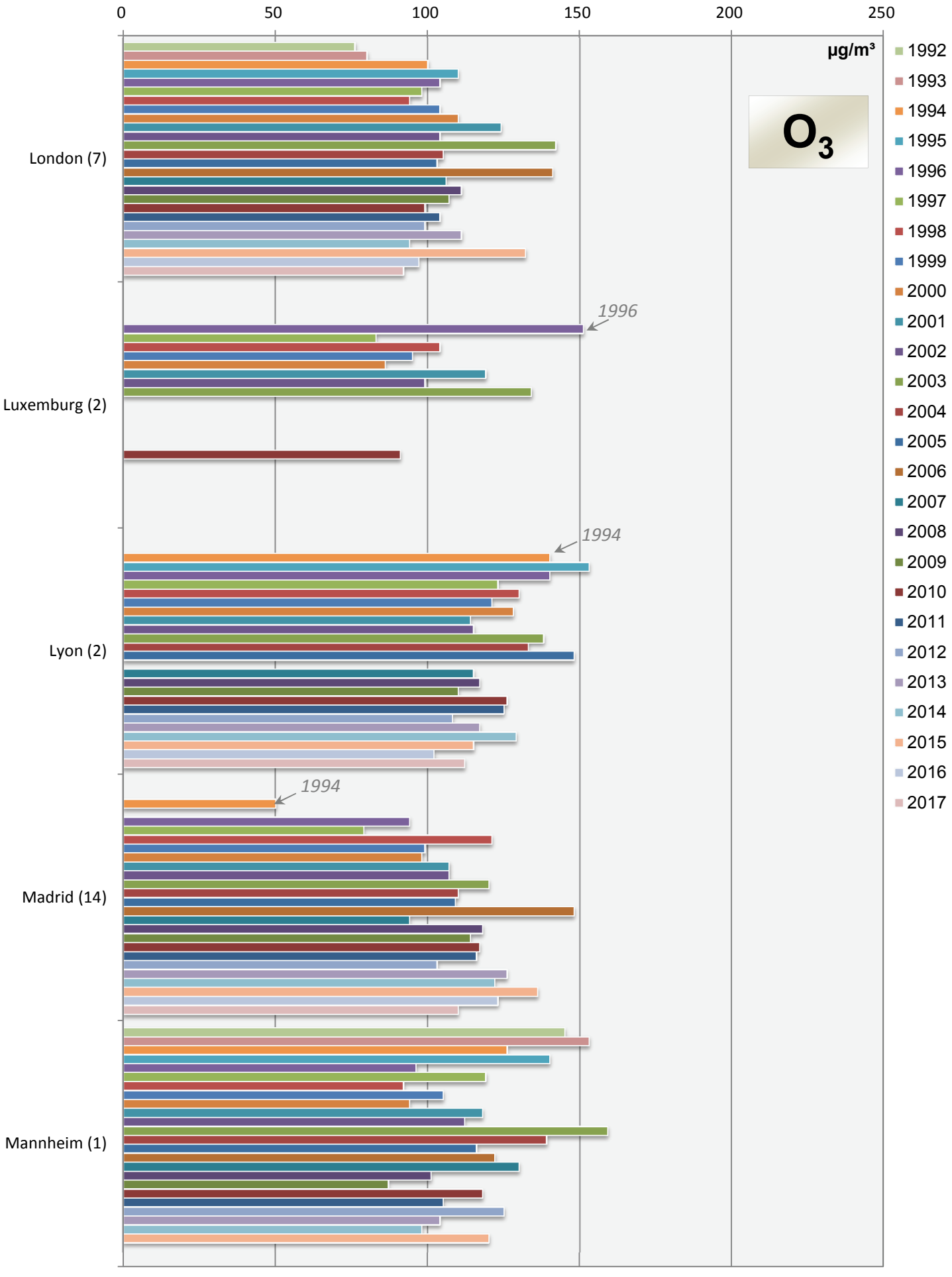

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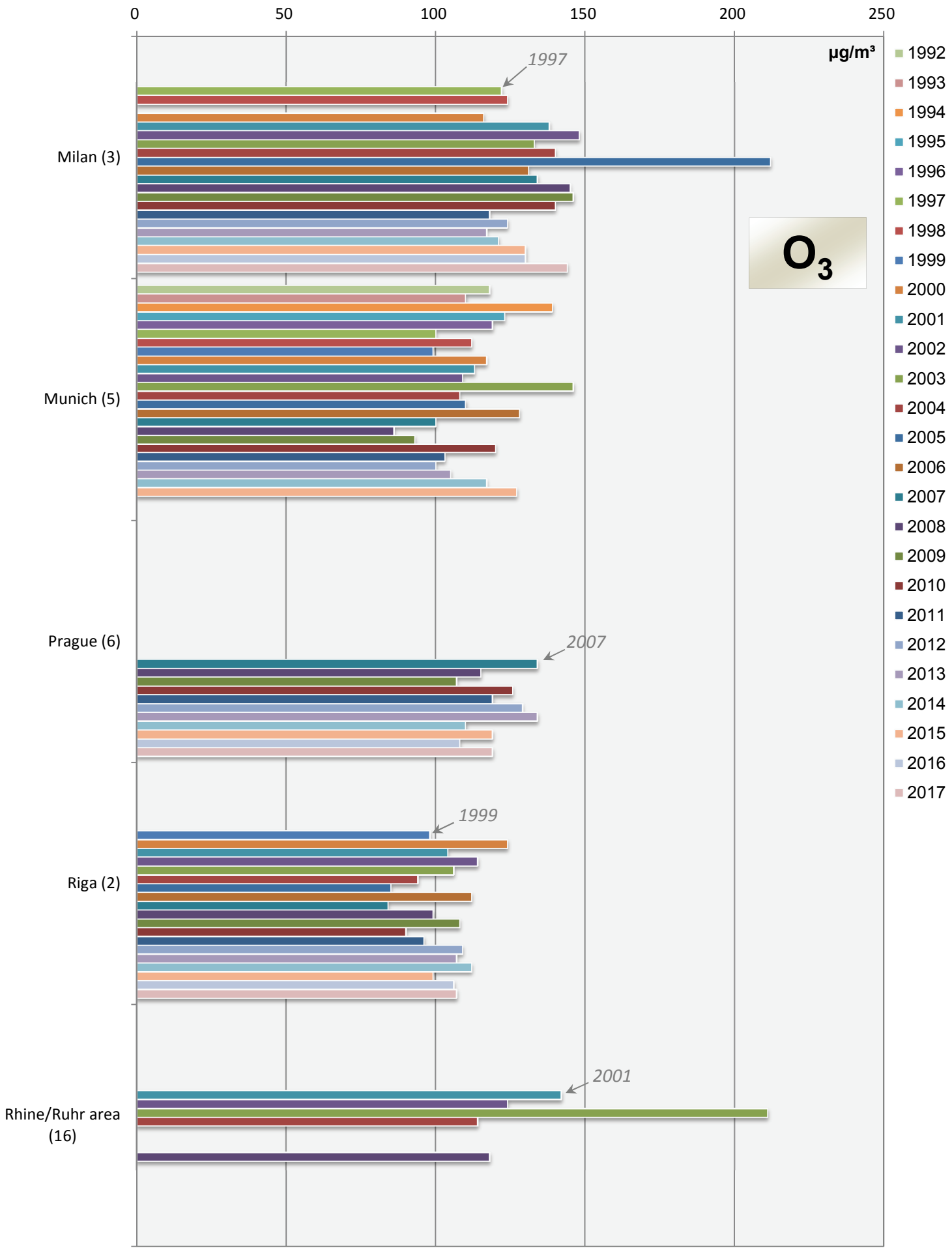

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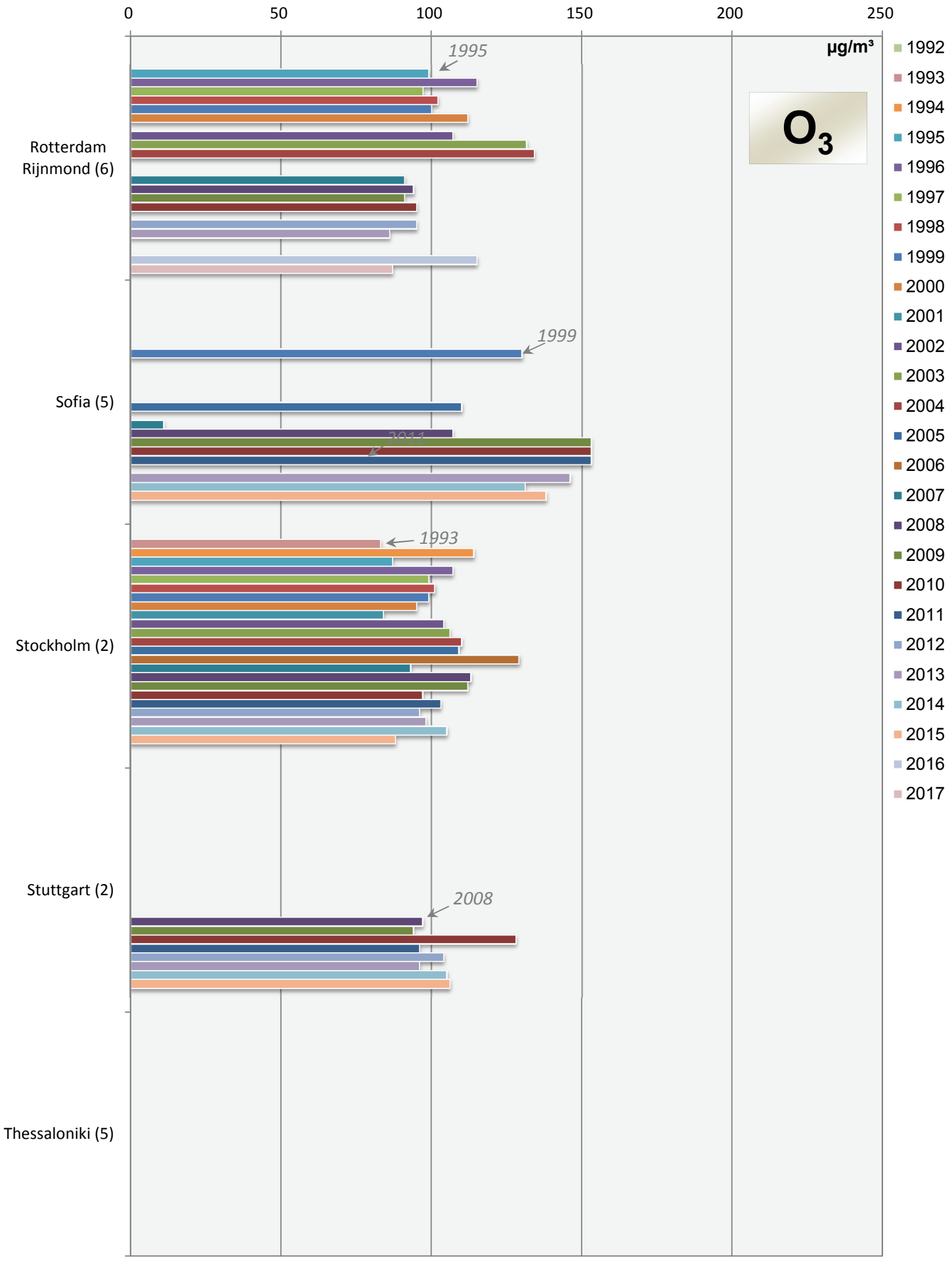
## max. daily mean values (peak-stressed monitoring station)



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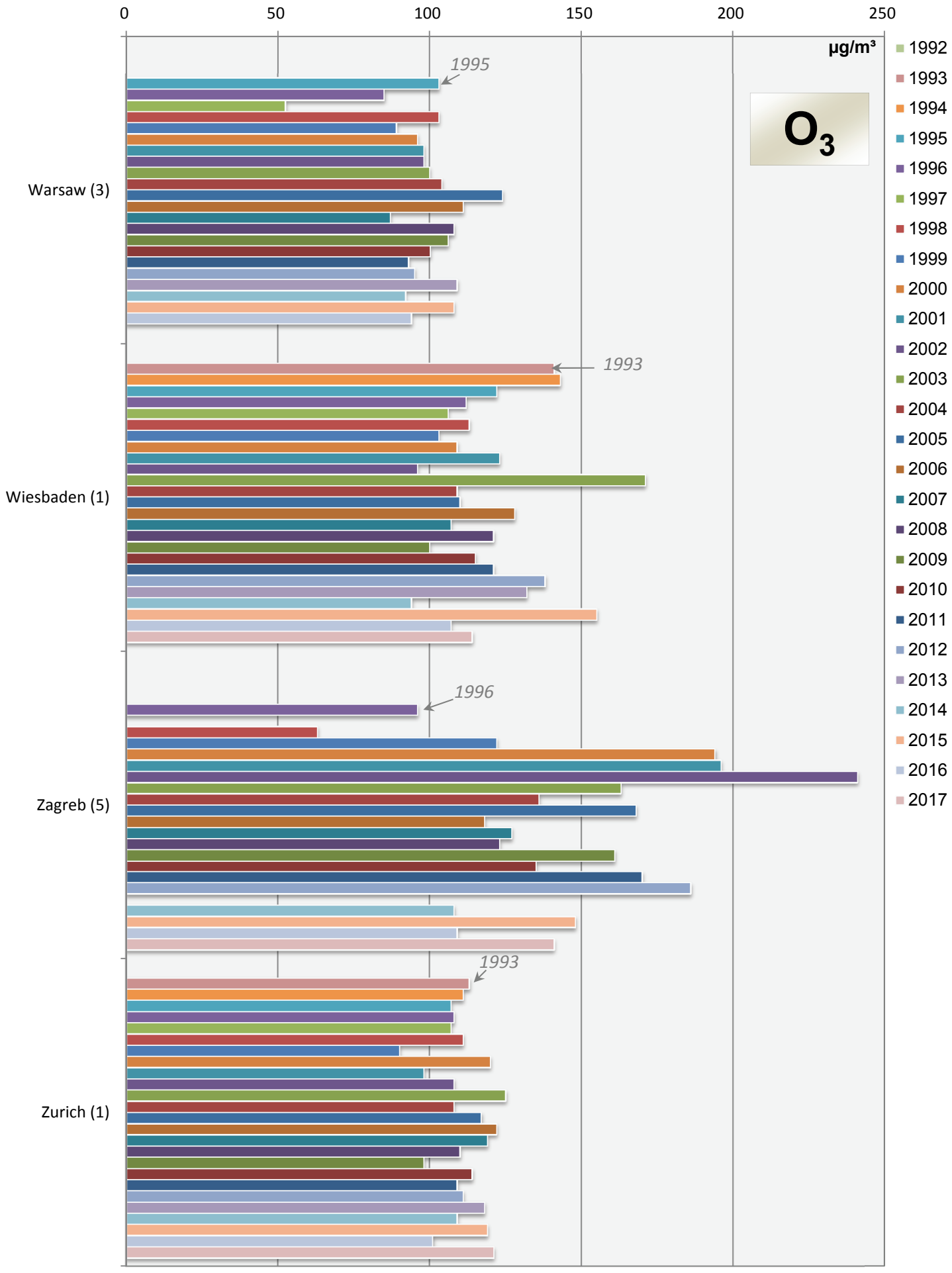


**Jahresvergleich**

**1993 - 2017**

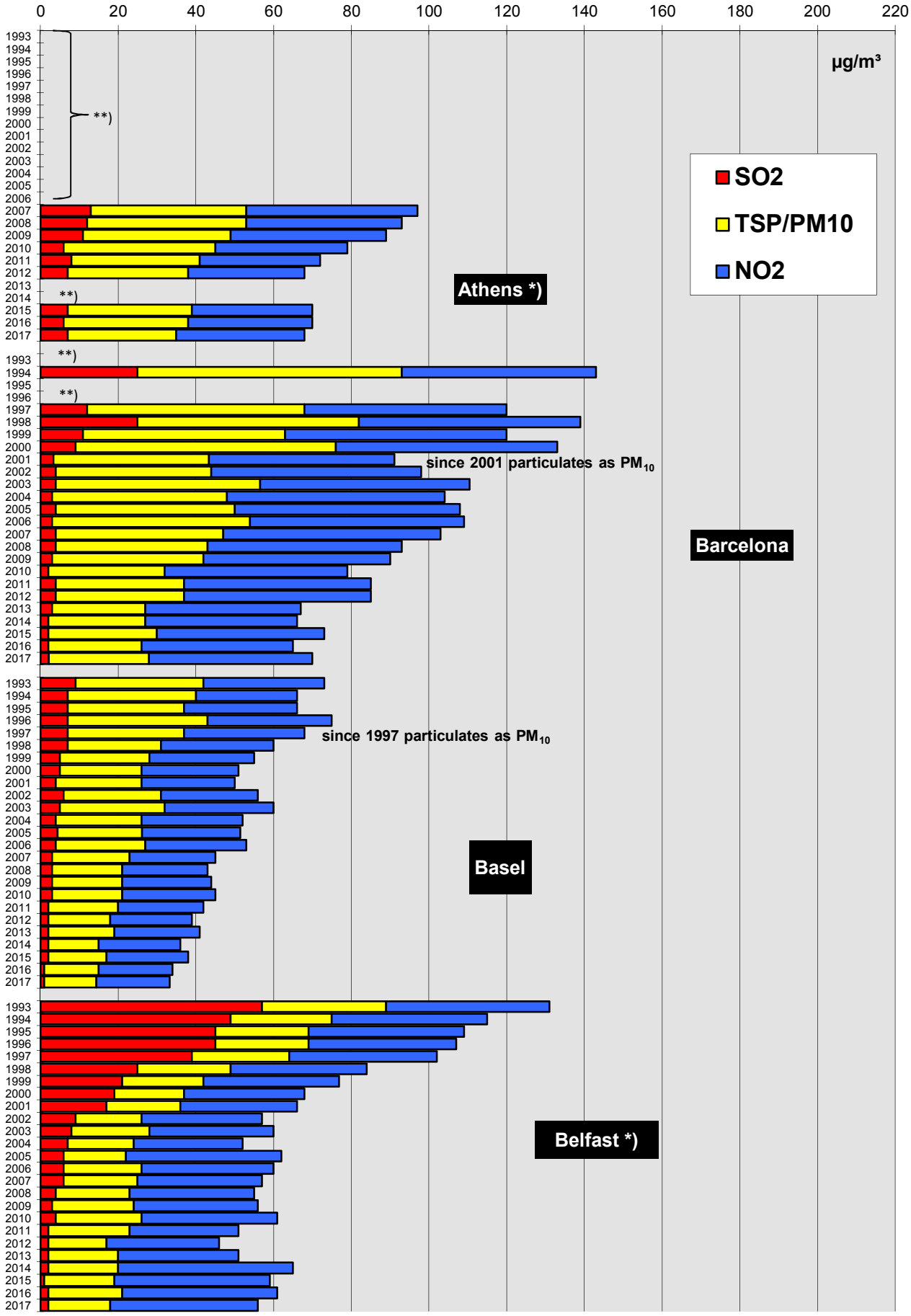
**Jahresmittelwerte, Σ $SO_2$, TSP/PM10, $NO_2$**

**Comparison Of The Air Quality**

**1993 - 2017**

**Annual Mean Values, Σ $SO_2$, TSP/PM10, $NO_2$**

# Comparison Of The Air Quality 1993-2017
## Development of the annual mean values, Σ $SO_2$, TSP/$PM_{10}$, $NO_2$
## (mean of all monitoring stations)




*) particulates calculated as $PM_{10}$ **) no data

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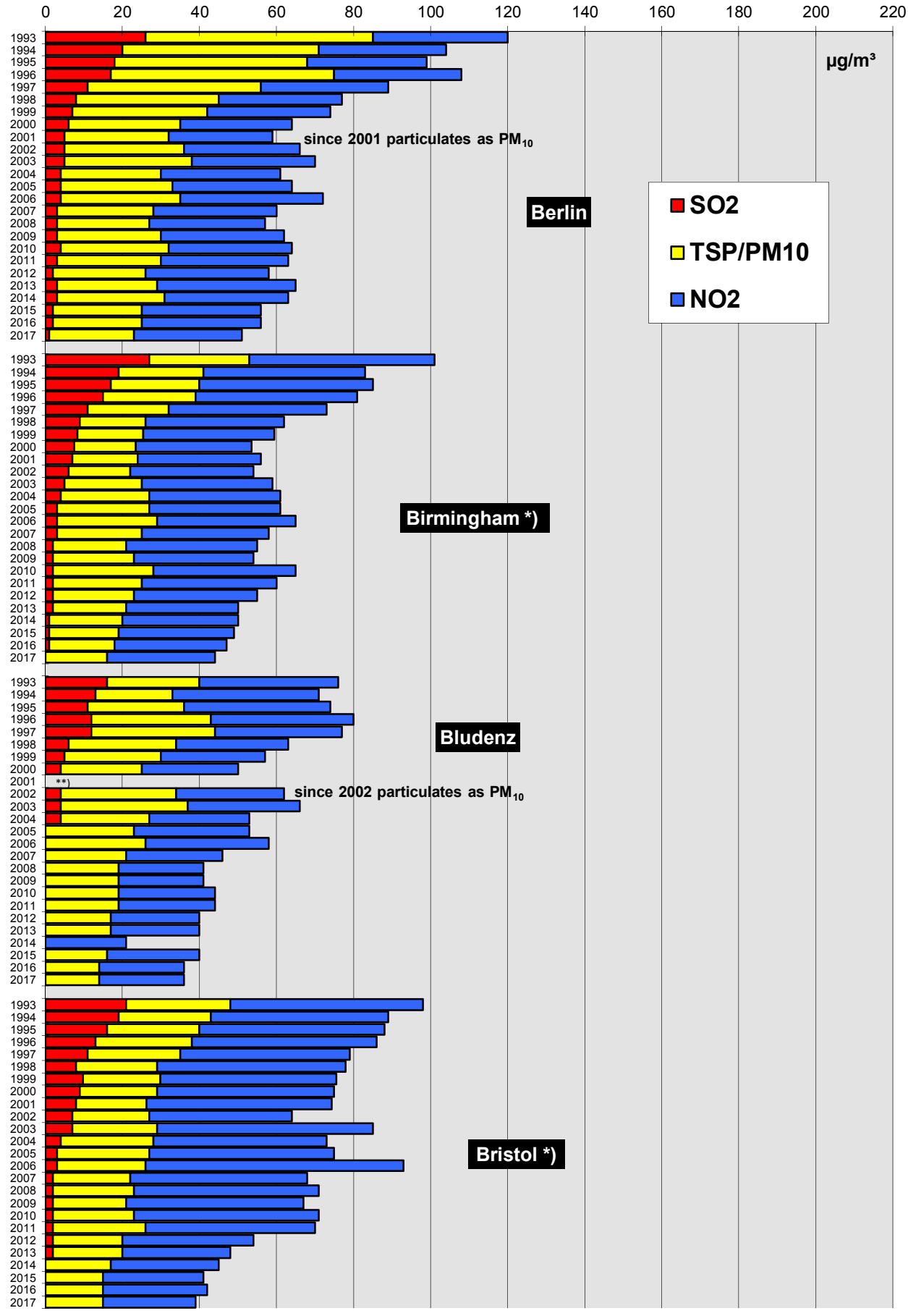


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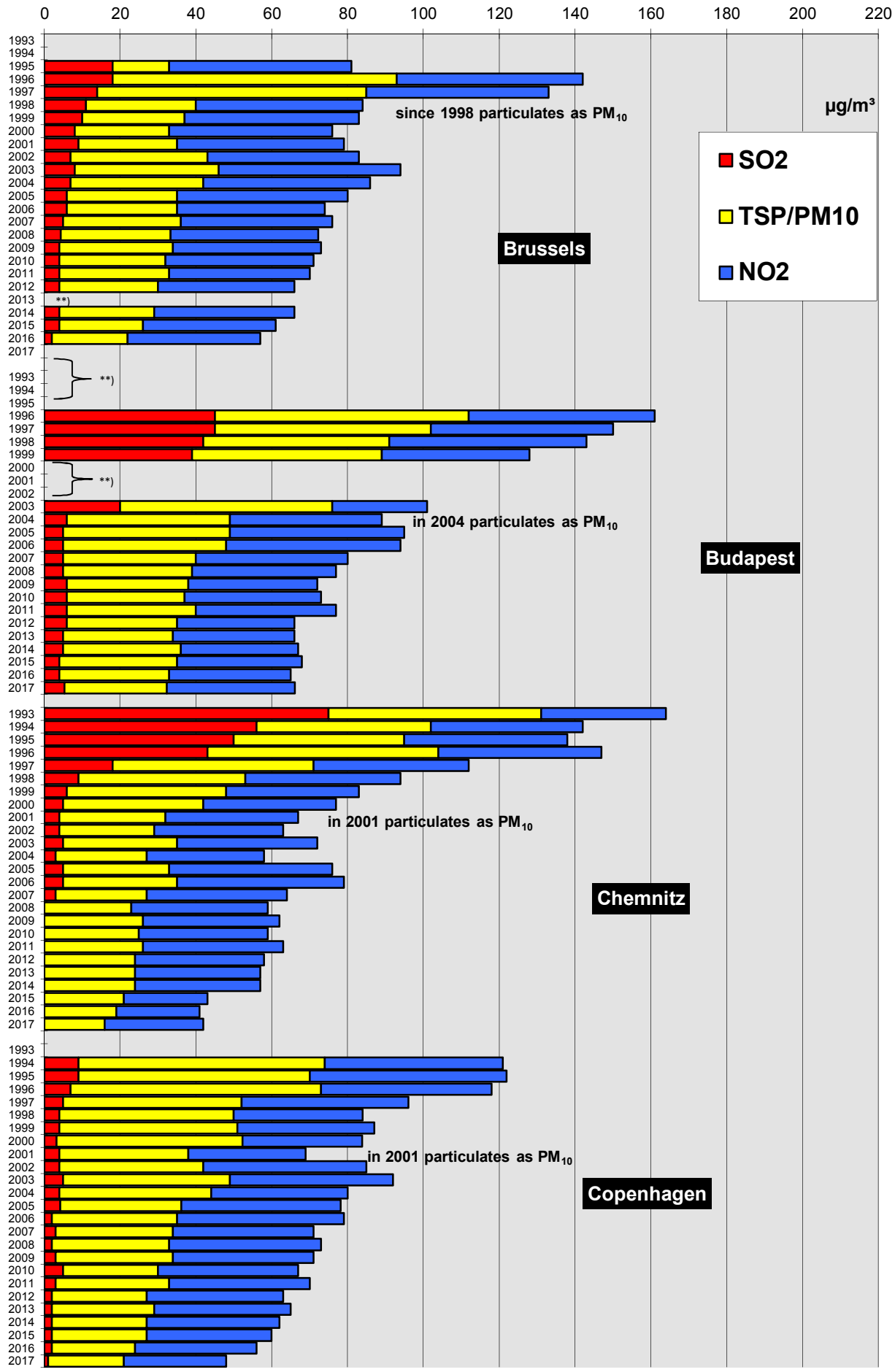
## Development of the annual mean values Σ $SO_2$, TSP/$PM_{10}$, $NO_2$

## (mean of all monitoring stations)

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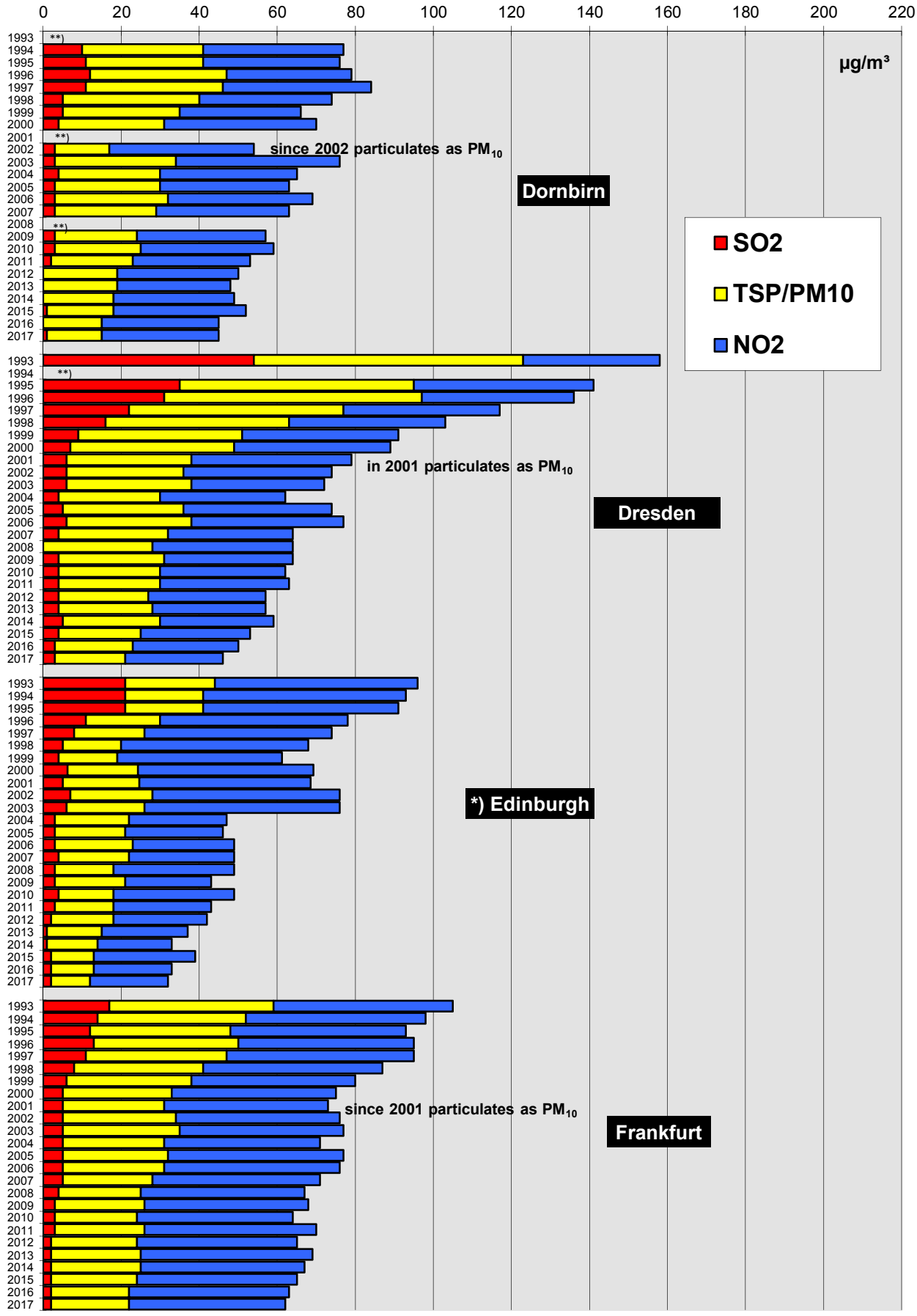


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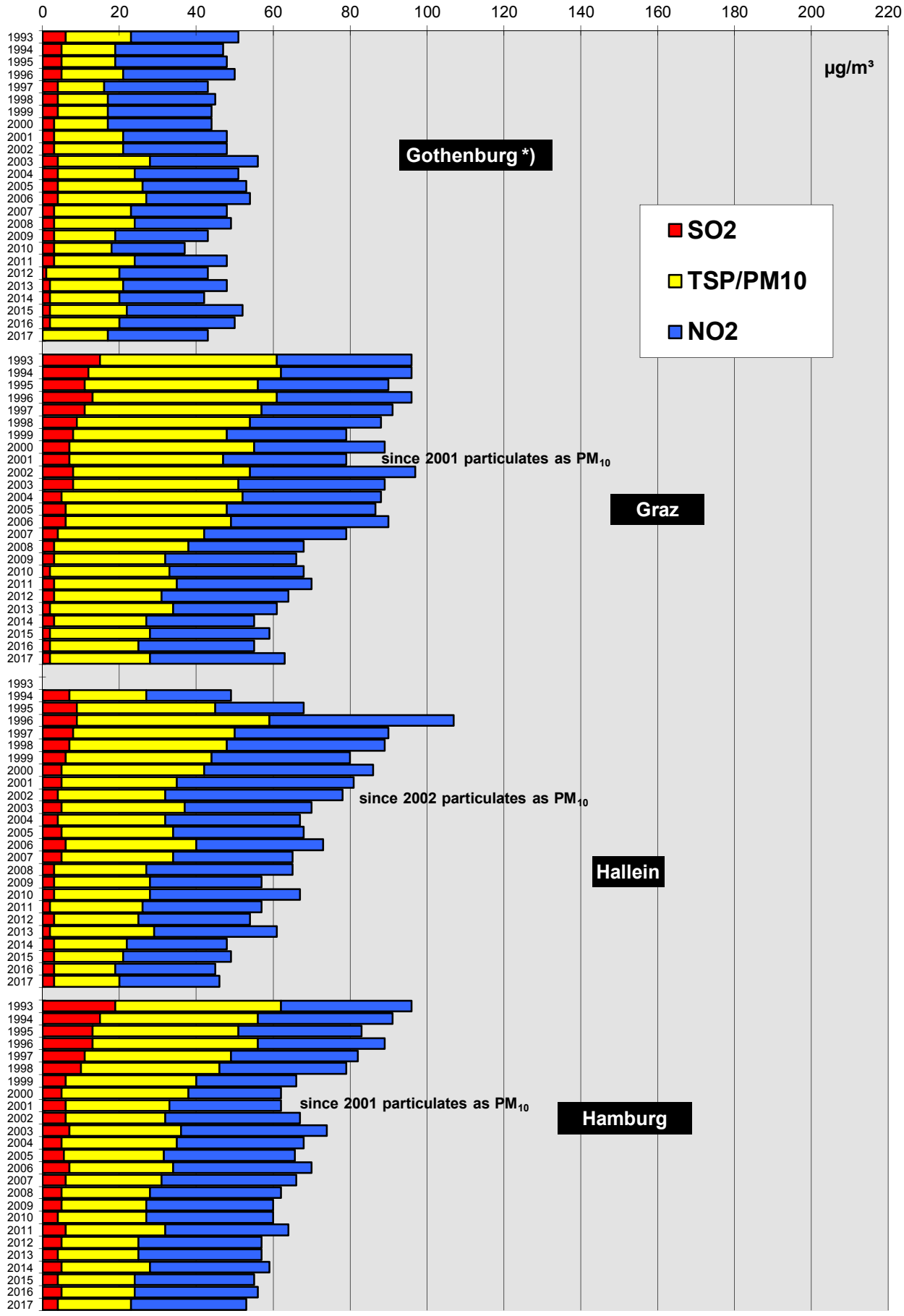


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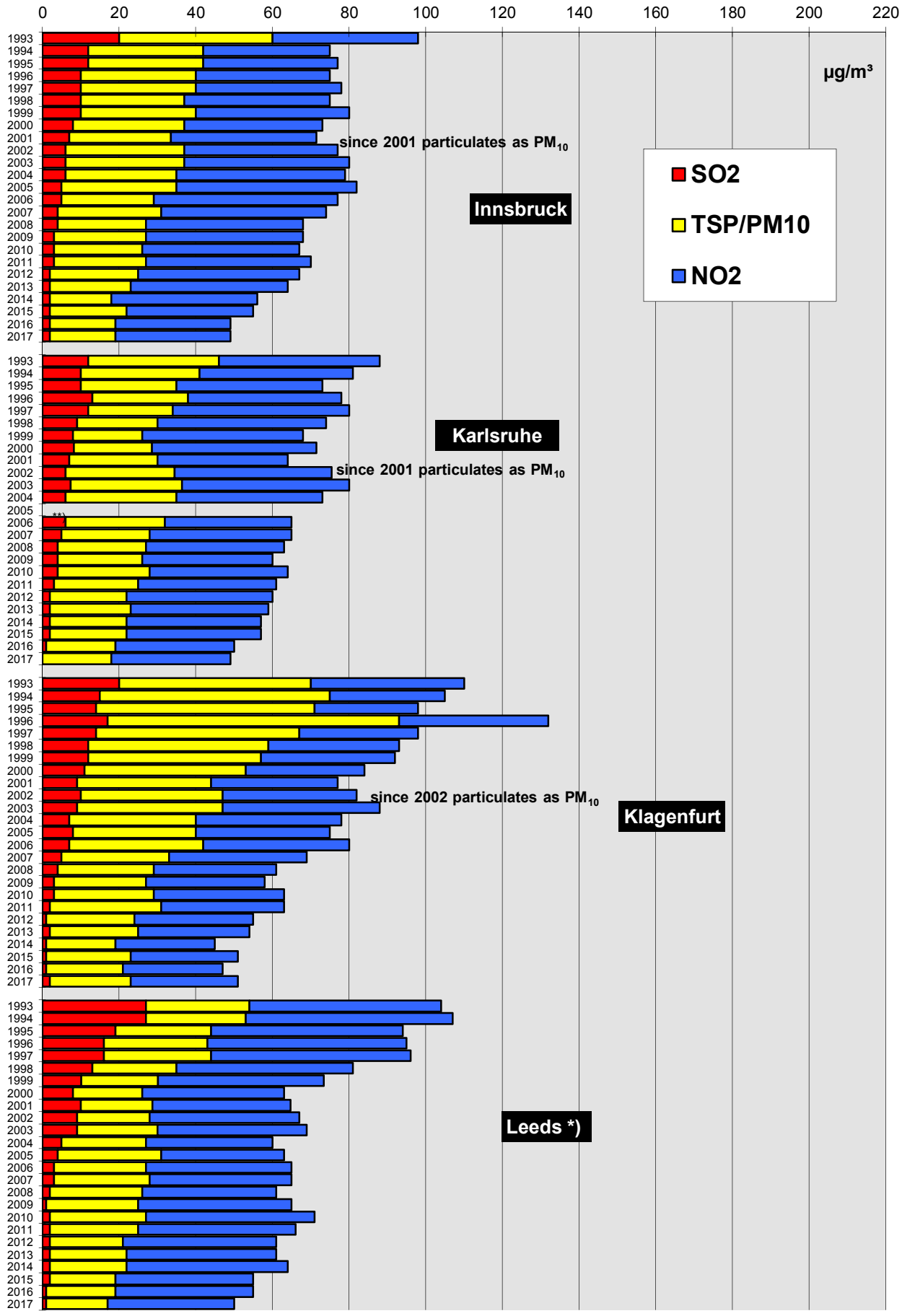


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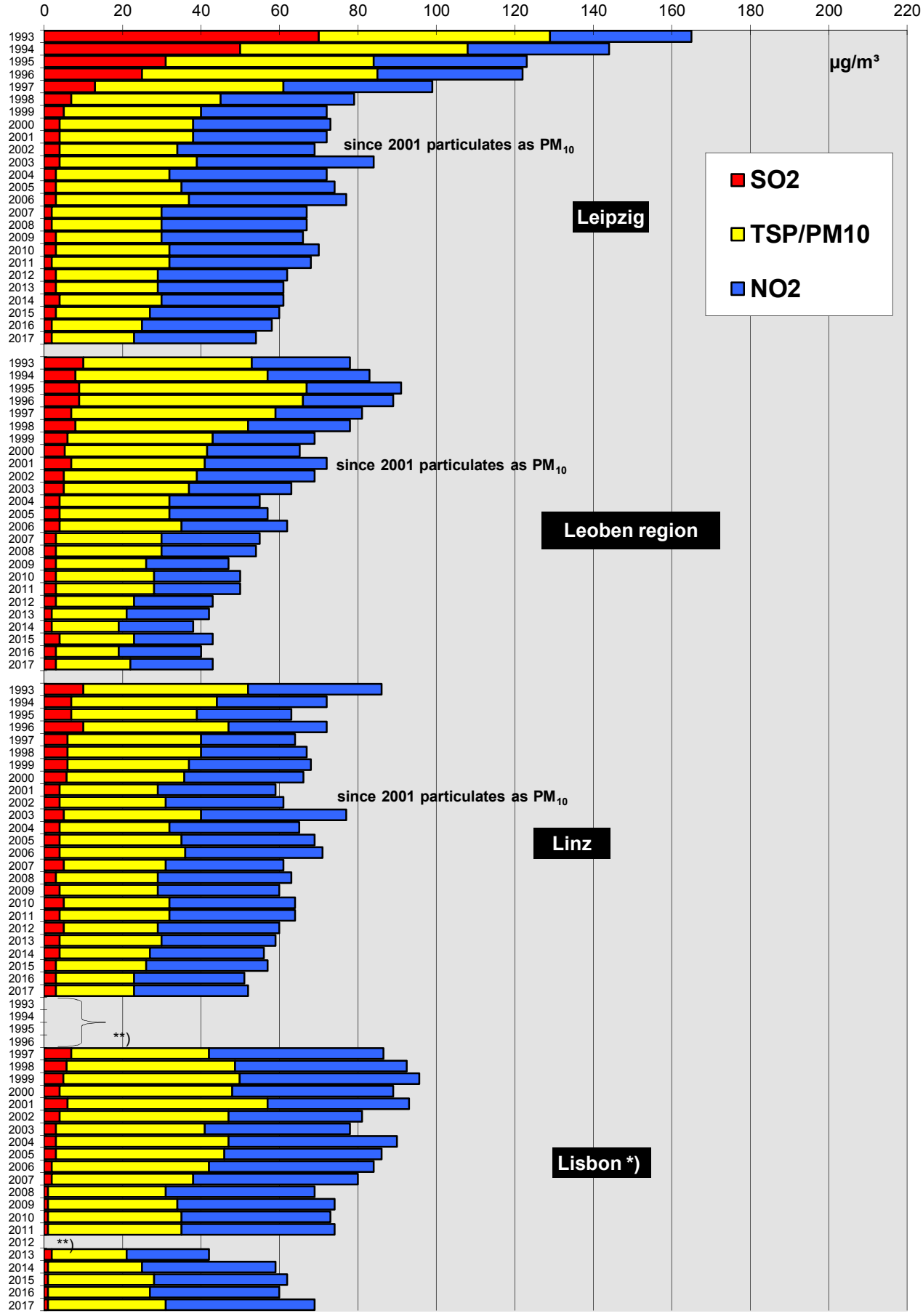


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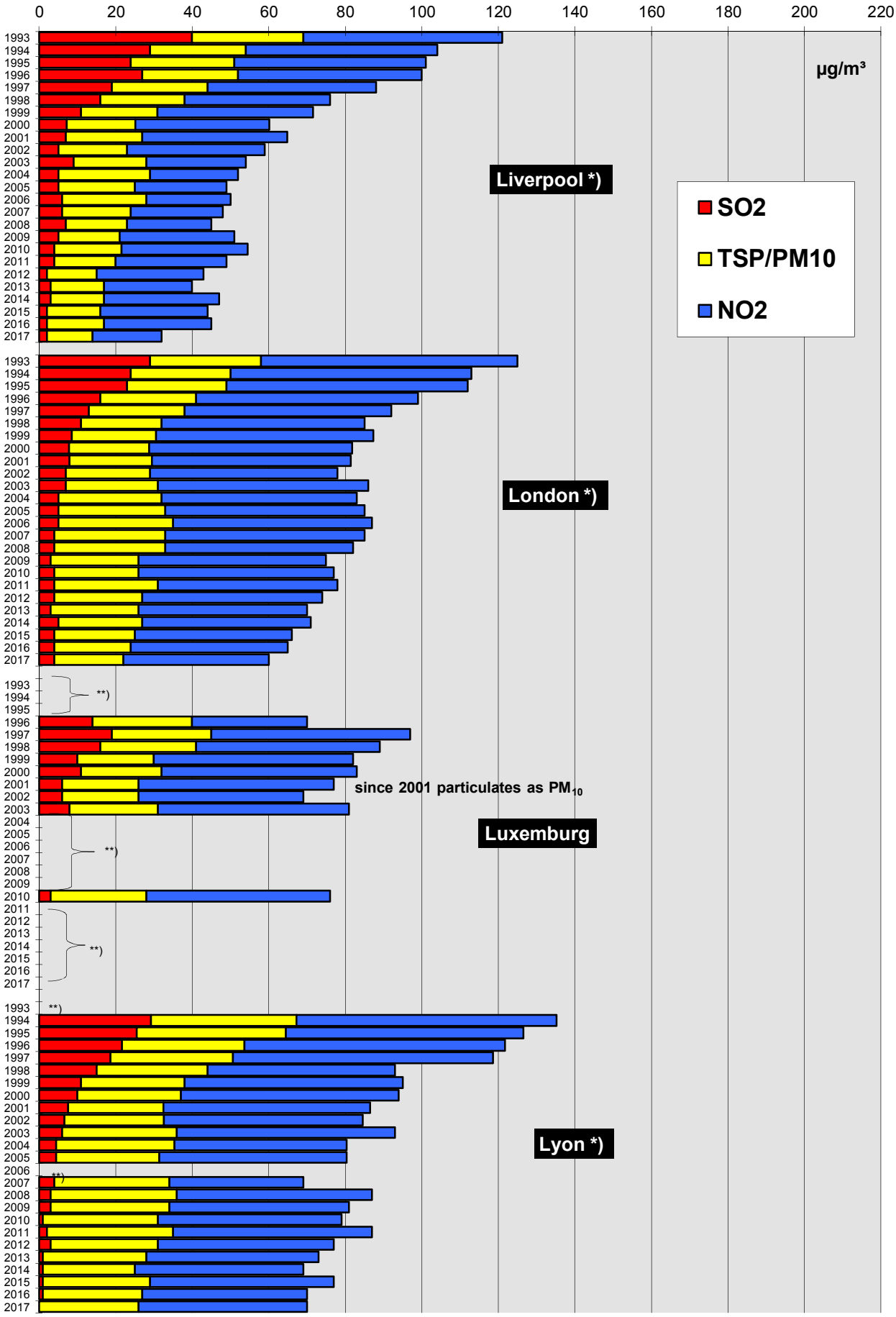


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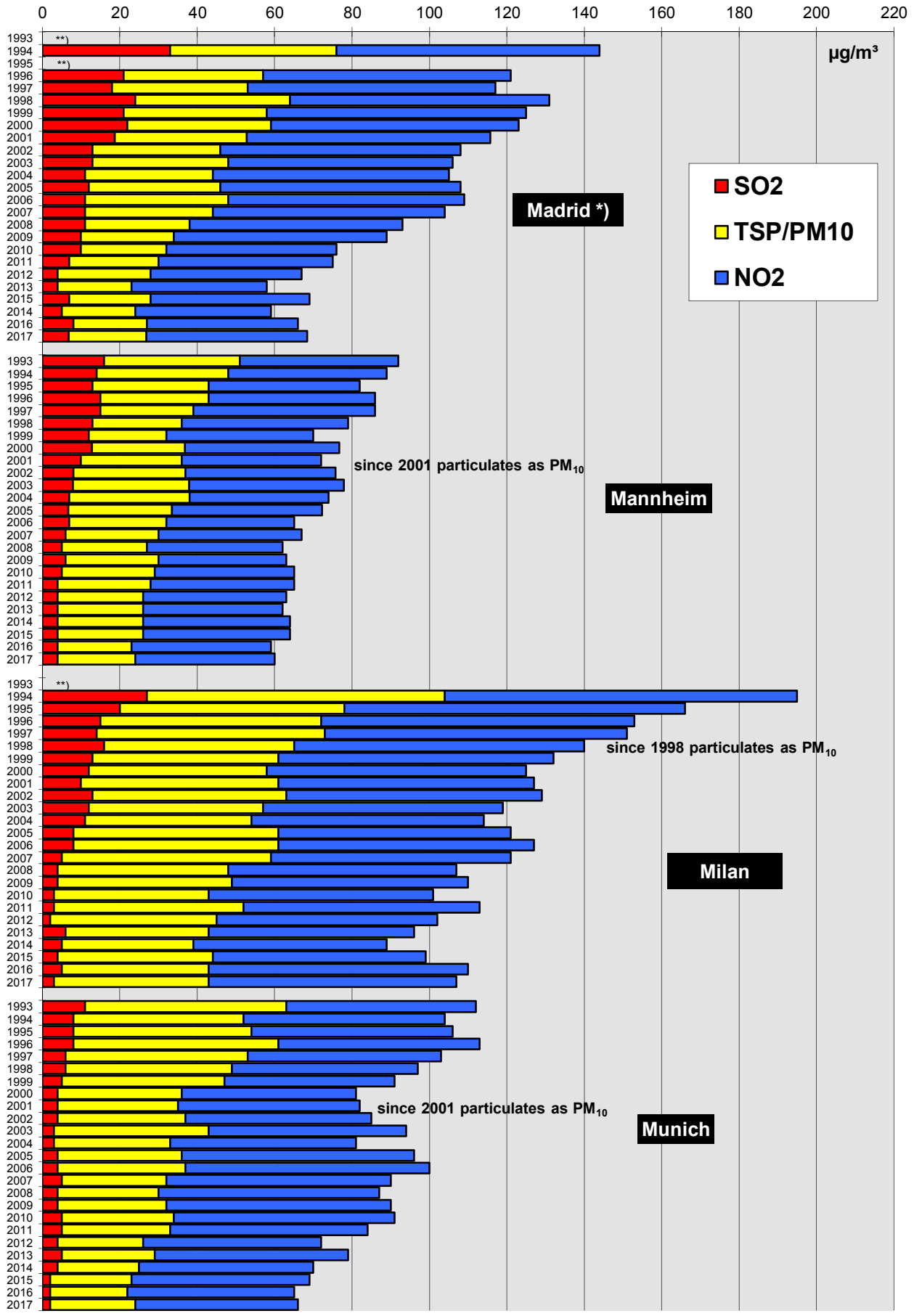


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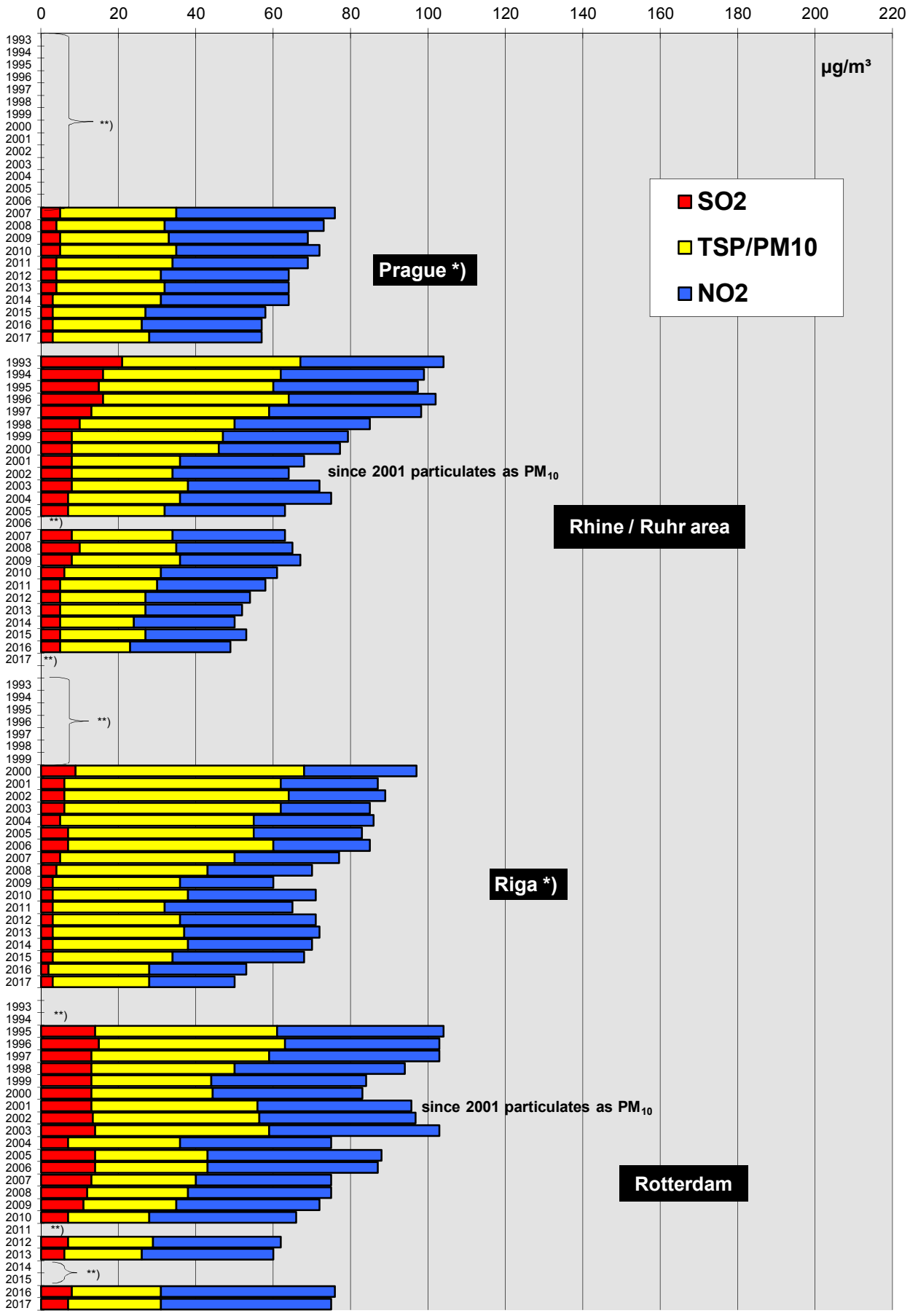


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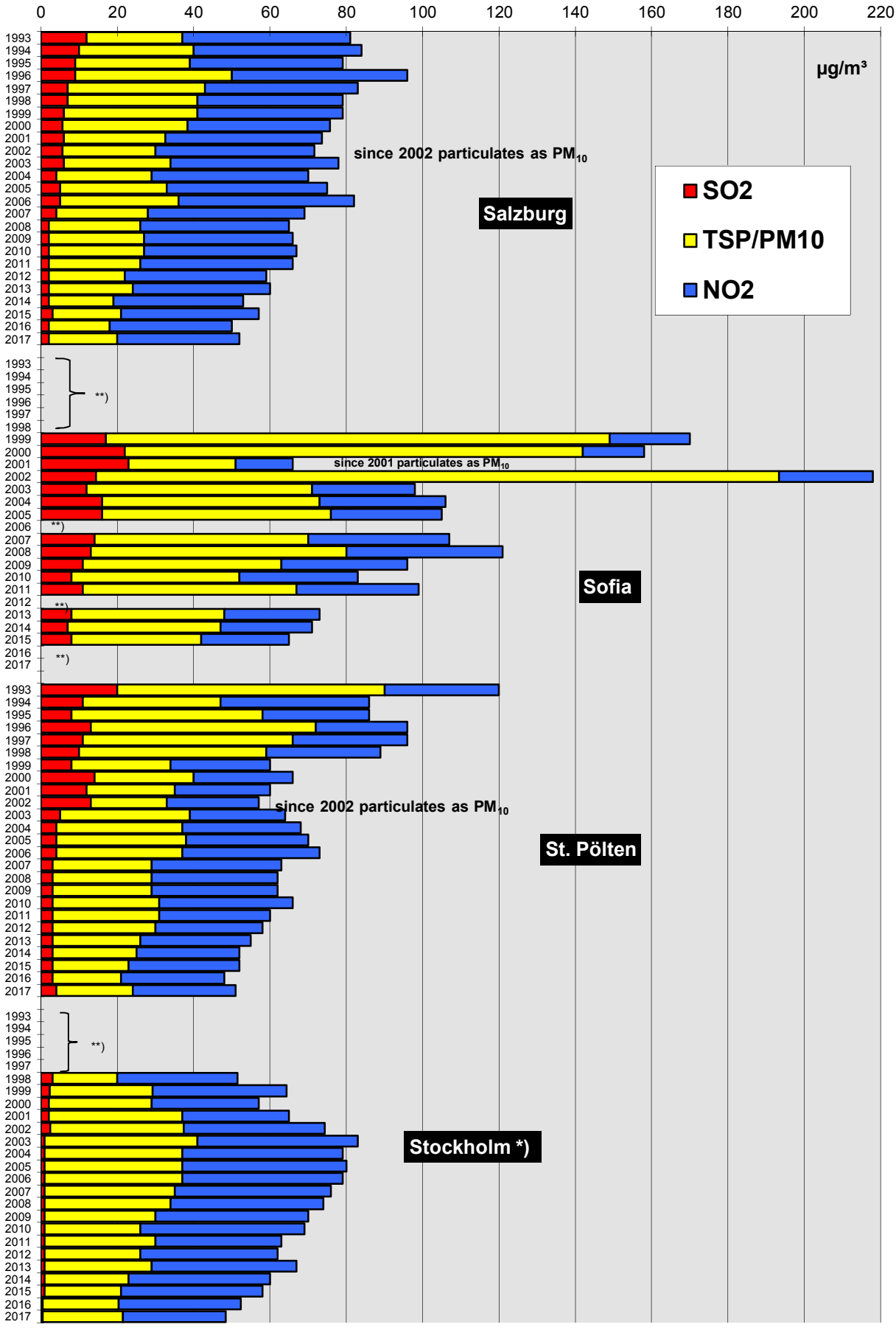


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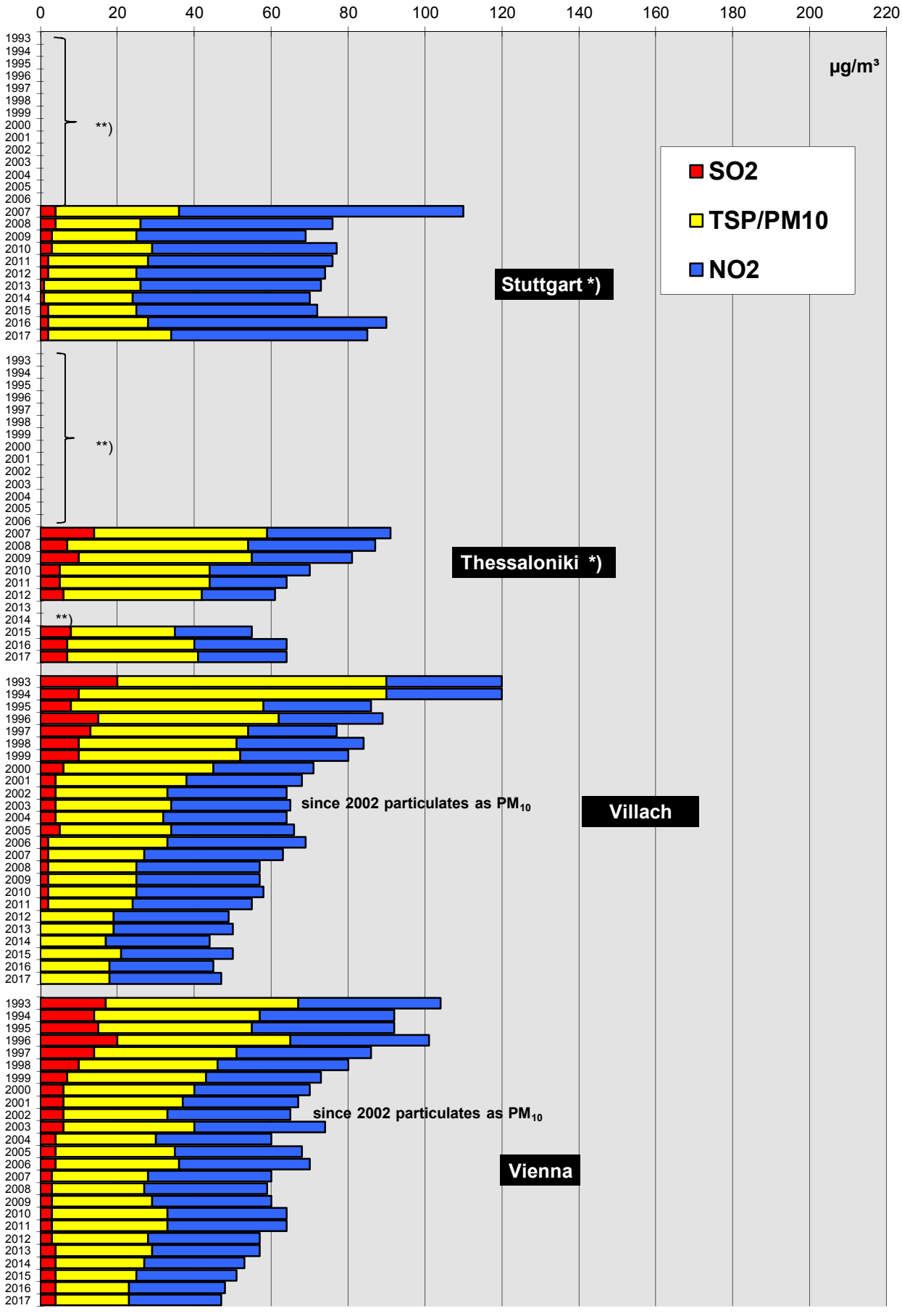


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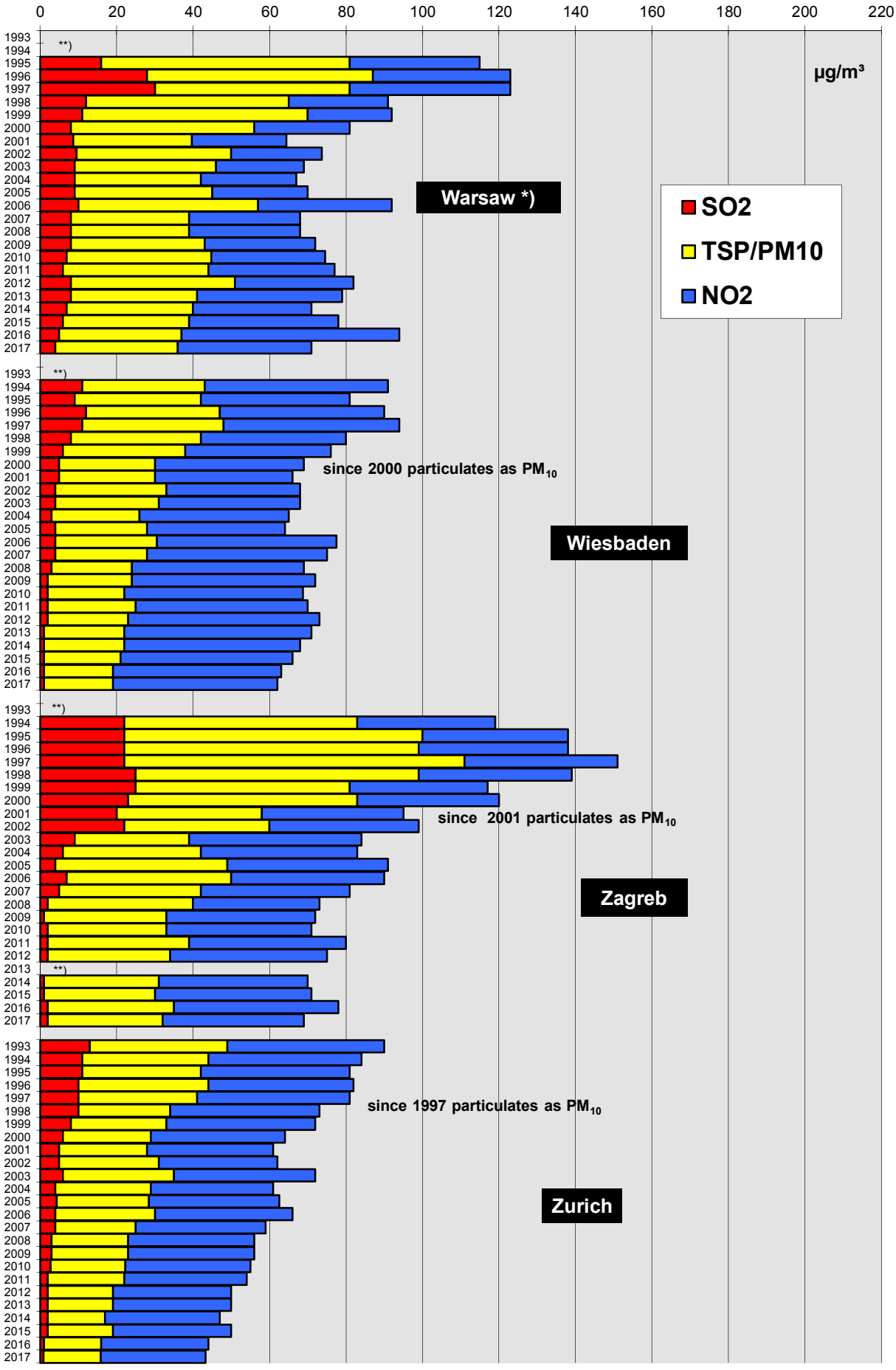
# Comparison Of The Air Quality 1993-2017

## Development of the annual mean values, Σ $SO_2$, TSP/$PM_{10}$, $NO_2$ (mean of all monitoring stations)




*) particulates calculated as $PM_{10}$ **) no data

**Luftgütekennzahlen 2017**

**der einzelnen**

**Vergleichsregionen**

**Immission Reference Values 2017**

**Of All Compared Regions**

## Athens

immission area: 1 948 km$^2$ population: 3 551 370

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 6 | 7 | 15 | 42 | 282 | 34 |
| $PM_{10}$ | 11 | 28 | 48 | 120 | 396 | 116 |
| $PM_{2,5}$ | 6 | 16 | 26 | 75 | 201 | 66 |
| NO | 14 | 23 | 128 | - | 829 | 342 |
| $NO_2$ | 14 | 33 | 107 | - | 269 | 154 |
| CO | 5 | 660 | 2000 | - | 6200 | 3500 |
| $O_3$ | 13 | 61 | 126 | - | 295 | 149 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | β-attenuation |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 1 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 74 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 23 |

## Barcelona

immission area: 101 km$^2$ population: 1 620 809

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year** [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 4 | 2 | 4 | 8 | 51 | 8 |
| $PM_{10}$ | 9 | 26 | 44 | 120 | - | 57 |
| $PM_{2,5}$ | 7 | 15 | 26 | 95 | - | 35 |
| NO | 7 | 18 | 69 | 248 | 596 | 192 |
| $NO_2$ | 7 | 42 | 67 | 131 | 219 | 124 |
| CO | 4 | 380 | 680 | 1900 | 4400 | 1600 |
| $O_3$ | 5 | 44 | 70 | 97 | 149 | 112 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | gravimetrically |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | - |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 17 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 4 |

Comments:
* Gravimetric method (daily resolution)
** Maximum 98 percentile of hourly values , except $PM_{10}$ and $PM_{2.5}$ , daily values
*** CO figures are expressed in mg/m$^3$
Area and population of the municipality of Barcelona (not metropolitan area)
Minimum data capture of 75 % , except for gravimetric $PM_{10}$ and $PM_{2.5}$ with a minimum data capture of 45 %

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Basel

immission area: 557 km$^2$ population: 501 285

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 1 | 2 | 5 | 15 | 6 |
| $PM_{10}$ | 1 | 14 | 31 | 66 | 85 | 47 |
| $PM_{2,5}$ | 1 | 9 | 22 | 49 | - | - |
| NO | 1 | 4 | 11 | 84 | 213 | 40 |
| $NO_2$ | 1 | 19 | 39 | 71 | 87 | 62 |
| CO | 1 | - | - | - | - | - |
| $O_3$ | 1 | 52 | 82 | 112 | 171 | 125 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | FIDAS 200, calibrated with gravimetrical measurements every day |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | - |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 5 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

## Belfast

immission area: 115 km$^2$ population: 339 600

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 2 | 3 | 13 | - | 6 |
| $PM_{10}$ | 2 | 16 | 26 | 74 | - | 44 |
| $PM_{2,5}$ | 1 | 9 | 15 | 52 | - | 25 |
| NO | 2 | 34 | 81 | 225 | - | 93 |
| $NO_2$ | 2 | 38 | 65 | 93 | 237 | 87 |
| CO | 1 | 90 | 120 | 420 | - | 190 |
| $O_3$ | 1 | 45 | 61 | 77 | - | 73 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | TEOM (FDMS) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | - |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 2 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 2 |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Berlin (outskirt stations)

immission area: 892 km$^2$ population: 3 520 000

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | - | - | - | - | - | - |
| $PM_{10}$ | 3 | 17 | 34 | 72 | 301 | 56 |
| $PM_{2,5}$ | 1 | 12 | 28 | 62 | - | - |
| NO | 5 | 2 | 6 | 56 | 220 | 26 |
| $NO_2$ | 5 | 13 | 23 | 57 | 89 | 44 |
| CO | - | - | - | - | - | - |
| $O_3$ | 5 | 46 | 72 | 107 | 161 | 112 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | Grimm EDM 180 |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 0.87* EDM180 + 2.3 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 10 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

## Berlin (traffic stations)

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 2 | 3 | 34 | 699* | 6 |
| $PM_{10}$ | 5 | 27 | 51 | 155 | 699* | 76 |
| $PM_{2,5}$ | 1 | 17 | 35 | 81 | - | - |
| NO | 6 | 40 | 81 | 270 | 586 | 219 |
| $NO_2$ | 6 | 46 | 60 | 123 | 220 | 108 |
| CO | 1 | 400 | 600 | 1300 | 2900 | 900 |
| $O_3$ | - | - | - | - | - | - |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | Grimm EDM180 |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 0.96*EDM180 + 4.3 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 28 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 2 |

Comment: * value is form 1.1.2017 (New Year's Eve fire works)

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Berlin (urban stations)

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 1 | 3 | 10 | 27 | 8 |
| $PM_{10}$ | 3 | 21 | 39 | 96 | 255 | 60 |
| $PM_{2,5}$ | 3 | 15 | 33 | 72 | - | - |
| NO | 5 | 6 | 14 | 107 | 477 | 51 |
| $NO_2$ | 5 | 25 | 37 | 91 | 199 | 69 |
| CO | 1 | 300 | 500 | 1000 | 2400 | 800 |
| $O_3$ | 2 | 41 | 69 | 96 | 141 | 105 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | Grimm EDM180 |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 0.92*EDM180 + 2.4 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicc.): | 14 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

## Birmingham

immission area: 268 km²

population: 1 101 360

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | - | - | - | - | - | - |
| $PM_{10}$ | 2 | 16 | 27 | 60 | - | 52 |
| $PM_{2,5}$ | 3 | 11 | 19 | 54 | - | 35 |
| NO | 2 | 17 | 54 | 246 | - | 95 |
| $NO_2$ | 2 | 28 | 52 | 94 | 64 | 87 |
| CO | - | - | - | - | - | - |
| $O_3$ | 2 | 40 | 61 | 85 | - | 74 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | TEOM (FDMS) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | - |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 4 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Bludenz

immission area: 30 km$^2$ population: 14 005

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | - | - | - | - | - | - |
| $PM_{10}$ | 1 | 14* | 40** | 186* | 871** | 63** |
| $PM_{2,5}$ | - | - | - | - | - | - |
| NO | 1 | 12 | 53 | 143 | 309 | 111 |
| $NO_2$ | 1 | 22 | 54 | 98 | 146 | 77 |
| CO | - | - | - | - | - | - |
| $O_3$ | 1 | 47 | 77 | 115 | 160 | 121 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | Gravimetrically *; Sharp ** |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 6* |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

## Bratislava

immission area: 368 km$^2$ population: 422 932

| | Number of monitoring stations* | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | | | | | | |
| $PM_{10}$ | | | | | | |
| $PM_{2,5}$ | | | | | | |
| NO | | | | | | |
| $NO_2$ | | | | | | |
| CO | | | | | | |
| $O_3$ | | | | | | |

No data for 2017!

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Bristol

immission area: 110 km$^2$ population: 454 213

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | - | - | - | - | - | - |
| $PM_{10}$ | 1 | 15 | 25 | 62 | - | 36 |
| $PM_{2,5}$ | 1 | 10 | 21 | 43 | - | 31 |
| NO | 1 | 12 | 37 | 174 | - | 119 |
| $NO_2$ | 1 | 24 | 45 | 80 | 143 | 59 |
| CO | - | - | - | - | - | - |
| $O_3$ | 1 | 45 | 59 | 89 | - | 72 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | TEOM (FDMS) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | - |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 2 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

## Brussels

immission area: 161 km$^2$ population: 1 187 890

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per day, hour [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | | | | | | |
| $PM_{10}$ | | | | | | |
| $PM_{2,5}$ | | | | | | |
| NO | | | | | | |
| $NO_2$ | | | | | | |
| CO | | | | | | |
| $O_3$ | | | | | | |

No data for 2017!

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

# Budapest

immission area: 525 km$^2$ population: 1 752 704

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [2,3,4] [µg/m³] * |
|---|---|---|---|---|---|---|
| $SO_2$ | 8 | 5 | 15 | 32 | 68 | 18 |
| $PM_{10}$ | 12 | 27 | 91 | 211 | 408 | 92 |
| $PM_{2,5}$ | 5 | 22 | 60 | 153 | 196 | 92 |
| NO | 9 | 17 | 57 | 231 | 568 | 120 |
| $NO_2$ | 9 | 34 | 64 | 113 | 251 | 96 |
| CO | 11 | 520 | 1253 | 2931 | 4385 | 1566 |
| $O_3$ | 10 | 40 | 84 | 108 | 203 | 117 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | β-absorption, Laser light scattering |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | ** |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 48 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 2 |

Comments: * Max. 98 percentile per year is calculated from hourly mean values except the $PM_{10}$. There the max 98 percentile per year is calculated from 24 hourly mean values.

** We use several correction factors for the different type of equipments

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

# Chemnitz

immission area: 221 km$^2$ population: 246 353

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98- Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 0 | - | - | - | - | - |
| $PM_{10}$ | 2 | 16 | 31 | 150 | 175 | 55 |
| $PM_{2,5}$ | 1 | 12 | 22 | 57 | - | - |
| NO | 2 | 18 | 52 | 180 | 439 | 151 |
| $NO_2$ | 2 | 26 | 50 | 95 | 154 | 92 |
| CO | 0 | - | - | - | - | - |
| $O_3$ | 1 | 51 | 70 | 106 | 163 | 113 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | gravimetrically (High-Volume-Sampler, micro balance) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | * |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 7 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

Comments:

* Equivalent factors for the $PM_{10}$ – monitoring method:

| Station | $PM_{10}$-HVS | $PM_{10}$-TEOM |
|---|---|---|
| Chemnitz-Leipziger Straße | 1.0 | 1.0 |
| Chemnitz-Hans-Link-Straße | 1.0 | - |

01.01.2008: $SO_2$-measurment in Chemnitz-Mitte is stopped
01.01.2008: CO-measurment in Chemnitz-Nord is stopped
01.01.2011: mesurment in Chemnitz-Nord is stopped
01.01.2011: $PM_{10}$-TEOM -measurment in Chemnitz-Mitte is stopped
The monitoring station „Chemnitz-Leipziger Straße“ failled out from 20.9.2015 till 1.4.2017 because of an car accident
01.01.2017: The measurment station „Chemnitz-Mitte“ is closed
01.01.2017: The measurment station Chemnitz-Hans-Link-Straße is startet

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Copenhagen

immission area: 86 km$^2$ population: 602 481

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 1 | - | - | 21 | 5 |
| $PM_{10}$ | 3 | 20 | - | 90 | - | - |
| $PM_{2,5}$ | 3 | 12 | - | 68 | - | - |
| NO | 3 | - | - | - | - | - |
| $NO_2$ | 3 | 27 | - | - | - | 79 |
| CO | 2 | 242 | - | - | 2133 | 641 |
| $O_3$ | 2 | 48 | - | - | 133 | - |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | Gravimetically |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 15 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

## Dornbirn

immission area: 121 km$^2$ population: 47 420

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | < 0,6 | | | - | - |
| $PM_{10}$ | 1 | 14* | 33** | 67* | 181** | 55** |
| $PM_{2,5}$ | 1 | 10* | 28** | 57** | 153** | 44** |
| NO | 1 | 21 | 45 | 117 | 267 | 117 |
| $NO_2$ | 1 | 30 | 54 | 87 | 135 | 78 |
| CO | - | - | - | - | - | - |
| $O_3$ | - | - | - | - | - | - |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | Gravimetrically*, Sharp** |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | - |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 5* |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

# Dresden

immission area: 328 km$^2$ population: 547 172

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 3 | 9 | 37 | 86 | 18 |
| $PM_{10}$ | 4 | 18 | 40 | 112 | 473 | 69 |
| $PM_{2,5}$ | 3 | 13 | 31 | 82 | - | - |
| NO | 4 | 18 | 67 | 181 | 439 | 195 |
| $NO_2$ | 4 | 25 | 45 | 95 | 171 | 96 |
| CO | - | - | - | - | - | - |
| $O_3$ | 3 | 49 | 76 | 104 | 163 | 114 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | Gravimetrically (High-Volume-Sampler, micro balance) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | * |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 19 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

Comments:

* Equivalent factors for the $PM_{10}$ – monitoring method:

| Station | $PM_{10}$-HVS | $PM_{10}$-TEOM |
|---|---|---|
| Dresden-Bergstr. | 1.0 | 1.0 |
| Dresden-Nord | 1.0 | 1.0 + f (temperature, humidity) |
| Dresden-Winckelmannstr. | 1.0 | 1.0 |
| Radebeul-Wahnsdorf | 1.0 | 1.0 + f (temperature, humidity) |

01.01.2008: $SO_2$-measurment in „Radebeul-Wahnsdorf“ is stopped

01.01.2008: CO-measurment in „Dresden-Nord“ is stopped

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Edinburgh (St. Leonhards)

immission area: 262 km² population: 492 680

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 2 | 2 | 13 | - | 6 |
| $PM_{10}$ | 1 | 10 | 17 | 40 | - | 29 |
| $PM_{2,5}$ | 1 | 7 | 10 | 35 | - | 23 |
| NO | 1 | 5 | 11 | 60 | - | 24 |
| $NO_2$ | 1 | 20 | 24 | 62 | 95 | 49 |
| CO | 1 | 130 | 150 | 290 | - | 230 |
| $O_3$ | 1 | 46 | 65 | 98 | - | 83 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | TEOM (FDMS) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | - |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 0 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

## Frankfurt (urban stations)

immission area: 248 km² population: 741 093

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 2 | 3 | 7 | 23 | 8 |
| $PM_{10}$ | 2 | 19 | 32 | 99 | 139 | 64 |
| $PM_{2,5}$ | 1* | 12 | 22 | 79 | - | - |
| NO | 2 | 20 | 41 | 159 | 310 | 121 |
| $NO_2$ | 2 | 36 | 52 | 85 | 131 | 83 |
| CO | 0 | - | - | - | - | - |
| $O_3$ | 2 | 37 | 63 | 107 | 193 | 106 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | *gravitmetrically |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 1 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 10 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Frankfurt (traffic station)

immission area: 248 km²  population: 741 093

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 0 | - | - | - | - | - |
| $PM_{10}$ | 1 | 23 | 43 | 111 | 385** | 72 |
| $PM_{2,5}$ | 1 | 15 | 29 | 89 | 329** | 49 |
| NO | 1 | 34 | 60 | 157 | 450 | 167 |
| $NO_2$ | 1 | 47 | 60 | 91 | 199 | 105 |
| CO | 1 | 380 | 580 | 1250 | 260 | 1020 |
| $O_3$ | 0 | - | - | - | - | - |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 1 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 16 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

Comment: ** value is form 1.1.2017 (New Year's Eve fire works)

## Glasgow (incl. traffic station)

immission area: 176 km²  population: 599 650

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | - | - | - | - | - | - |
| $PM_{10}$ | 2 | 13 | 17 | 51 | - | 33 |
| $PM_{2,5}$ | 2 | 7 | 11 | 37 | - | 24 |
| NO | 4 | 33 | 130 | 414 | - | 254 |
| $NO_2$ | 4 | 37 | 71 | 124 | 281 | 103 |
| CO | - | - | - | - | - | - |
| $O_3$ | 1 | 40 | 62 | 87 | - | 73 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | TEOM (FDMS) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | - |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 1 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 3 |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Gothenburg

immission area: 1 031 km² population: 564 039

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | - | - | - | - | - | - |
| $PM_{10}$ | 3 | 17 | 36 | 96 | 362 | 86 |
| $PM_{2,5}$ | 2 | 7 | 13 | 44 | 72 | 27 |
| NO | 3 | - | - | - | - | - |
| $NO_2$ | 5 | 26 | 51 | 120 | 228 | 110 |
| CO | - | - | - | - | - | - |
| $O_3$ | 2 | 49 | 63 | 92 | 133 | 85 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | TEOM |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | VCM |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 15 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 3 |

Comments: Max. 98-percentile per year is calculated from hourly mean values.

## Gothenburg (traffic stations)

immission area: 1 031 km² population: 564 039

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | - | - | - | - | - | - |
| $PM_{10}$ | 2 | 18 | 16 | 96 | 362 | 86 |
| $PM_{2,5}$ | 1 | 6 | 12 | 40 | 61 | 24 |
| NO | 2 | - | - | - | - | - |
| $NO_2$ | 3 | 31 | 51 | 120 | 228 | 110 |
| CO | - | - | - | - | - | - |
| $O_3$ | - | - | - | - | - | - |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | TEOM |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | VCM |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 15 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 3 |

Comments: Max. 98-percentile per year is calculated from hourly mean values.

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Gothenburg (urban stations)

immission area: 1 031 km  population: 564 039

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | - | - | - | - | - | - |
| $PM_{10}$ | 1 | 13 | 19 | 46 | 92 | 37 |
| $PM_{2,5}$ | 1 | 7 | 13 | 44 | 72 | 27 |
| NO | 1 | - | - | - | - | - |
| $NO_2$ | 2 | 18 | 29 | 102 | 200 | 81 |
| CO | - | - | - | - | - | - |
| $O_3$ | 2 | 49 | 63 | 92 | 133 | 85 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | TEOM |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | VCM |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 0 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 1 |

Comments: Max. 98-percentile per year is calculated from hourly mean values.

## Graz (urban stations)

immission area: 128 km$^2$  population: 283 869

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³]**** | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 2 | 2 | 5 | 8 | 53 | 7 |
| $PM_{10}$* | 2 | 23 | 64 | 183 | 194 | 89 |
| $PM_{2,5}$* | 2 | 19 | 47 | 113 | 113 | 64 |
| NO | 5 | 30 | 105 | 269 | 469 | 240 |
| $NO_2$ | 5 | 33 | 55 | 81 | 141 | 83 |
| CO | 2 | 400 | 900 | 1700 | 2500 | 1600 |
| $O_3$ | 2 | 51 | 85 | 119 | 167 | 122 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | continuously / gravimetrically* |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 43 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

Comments:
* $PM_{10}$ and $PM_{2,5}$: gravimetric monitoring method
** Max. 98-Percentile per year is calculated from daily mean values.
**** Max 1h-mean value = static average

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Graz (traffically influenced Don Bosco)

immission area: 128 km² population: 283 869

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] *** | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 2 | 5 | 8 | 33 | 6 |
| $PM_{10}$* | 1 | 32 | 69 | 157 | 157 | 95** |
| $PM_{2,5}$* | 1 | 23 | 54 | 141 | 157 | 73** |
| NO | 1 | 54 | 125 | 292 | 683 | 292 |
| $NO_2$ | 1 | 45 | 64 | 94 | 148 | 101 |
| CO | 2 | 400 | 900 | 1500 | 2600 | 1500 |
| $O_3$ | - | - | - | - | - | - |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | continuously, gravimetrically* |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 54 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | - |

Comments:
* $PM_{10}$ and $PM_{2,5}$: gravimetric monitoring method
** Max. 98-Percentile per year is calculated from daily mean values.
*** Max 1h-mean value = static average

## Hallein

immission area: 27 km² population: 21 043

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 2 | 3 | - | 13 | 158 | 9 |
| $PM_{10}$ | 1 | 17 | - | 121 | - | 73 |
| $PM_{2,5}$ | 1 | 13 | - | 105 | - | 53 |
| NO | 2 | 24 | - | 246 | 523 | 206 |
| $NO_2$ | 2 | 26 | - | 113 | 173 | 93 |
| CO | 1 | 340 | - | 1570 | 2350 | 1040 |
| $O_3$ | 1 | 63 | - | 133 | 171 | 124 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | Gravimetrically and β-absorption |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 0.895 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 12 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

Comments: The measurement station for ozon is a backgroundstation in higher-altitude that causes a higher annual mean value.

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Hamburg (area monitoring stations)

immission area: 755 km² population: 1 860 000

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 6 | 4 | 9 | 48 | 326 | 39 |
| $PM_{10}$ | 8 | 18 | 34 | 94 | - | 61 |
| $PM_{2,5}$ | 3 | 13 | 26 | 71 | - | 49 |
| NO | 11 | 9 | 36 | 161 | 588 | 110 |
| $NO_2$ | 11 | 23 | 43 | 81 | 140 | 74 |
| CO | 1 | 170 | 290 | 770 | 1410 | 510 |
| $O_3$ | 4 | 43 | 67 | 87 | 153 | 97 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | TEOM (7 stations), light scattering + β-absorption (1 station) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 7 TEOM:1; light scattering + β-absorption: 1 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 11 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

## Hamburg (traffic stations)

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile peryear [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | - | - | - | - | - | - |
| $PM_{10}$ | 3 | 21 | 35 | 98 | - | 69 |
| $PM_{2,5}$ | 2 | 15 | 26 | 77 | - | 48 |
| NO | 4 | 50 | 97 | 370 | 896 | 297 |
| $NO_2$ | 4 | 49 | 68 | 134 | 254 | 133 |
| CO | 2 | 440 | 580 | 1540 | 3880 | 1120 |
| $O_3$ | - | - | - | - | - | - |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | Light scattering + β-absorption (1 station), TEOM (3 stations) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | TEOM: 1 light scattering + β-absorption: 1 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 16 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 4 |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Innsbruck

immission area: 105 km$^2$ population: 133 539

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 2 | 5 | 9 | 13 | 7 |
| $PM_{10}$ | 2 | 17 | 36 | 123 | | 56 |
| $PM_{2,5}$ | 1 | 11 | 24 | 58 | | 29 |
| NO | 3 | 27 | 78 | 174 | 574 | 171 |
| $NO_2$ | 3 | 38 | 71 | 111 | 189 | 96 |
| CO | 1 | 347 | 744 | 1096 | 1503 | 983 |
| $O_3$ | 3 | 49 | 80 | 111 | 156 | 156 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | gravimetrically (Digitel HVS) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 1 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 5 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 1 |

## Karlsruhe

immission area: 173 km$^2$ population: 305 220

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | - | - | - | - | - | - |
| $PM_{10}$ | 2 | 18 | - | 100 | - | - |
| $PM_{2,5}$ | 2 | 12 | - | 83 | - | - |
| NO | 2 | 22 | 60 | 238 | 352 | - |
| $NO_2$ | 2 | 31 | 48 | 86 | 182 | - |
| CO | 1 | 300 | 400 | 1200 | 3300 | - |
| $O_3$ | 1 | 46 | 75 | - | 197 | - |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | gravimetrically |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | - |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 11 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Klagenfurt

immission area: 120 km$^2$ population: 99 790

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 2 | 3 | 4 | 6 | 3 |
| $PM_{10}$ | 2 | 21 | 57 | 123 | - | - |
| $PM_{2,5}$ | 2 | 14 | 38 | 89 | - | - |
| NO | 2 | 23 | 74 | 216 | 416 | 177 |
| $NO_2$ | 2 | 28 | 57 | 79 | 131 | 86 |
| CO | 1 | 396 | 725 | 1348 | 2286 | 1138 |
| $O_3$ | 2 | 48 | 87 | 109 | 211 | 127 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | continuously (Sharp 5030) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 1.033yy – 1.315 already applied to data |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 23 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | - |

## Leeds

immission area: 552 km$^2$ population: 766 399

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 1 | 2 | 5 | - | 3 |
| $PM_{10}$ | 2 | 16 | 27 | 70 | - | 47 |
| $PM_{2,5}$ | 2 | 10 | 19 | 52 | - | 40 |
| NO | 2 | 23 | 64 | 238 | - | 93 |
| $NO_2$ | 2 | 33 | 51 | 96 | 180 | 67 |
| CO | 1 | 270 | 310 | 520 | - | 420 |
| $O_3$ | 1 | 38 | 54 | 84 | - | 69 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | TEOM FDMS |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | - |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 6 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

# Leipzig

immission area: 298 km$^2$ population: 571.088

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 2 | 3 | 10 | 61 | 8 |
| $PM_{10}$* | 3 | 21 | 47 | 129 | 1860 | 78 |
| $PM_{2,5}$ | 2 | 12 | 33 | 83 | - | - |
| NO | 3 | 27 | 69 | 215 | 646 | 171 |
| $NO_2$ | 3 | 31 | 50 | 100 | 197 | 84 |
| CO** | - | - | - | - | - | - |
| $O_3$ | 1 | 49 | 67 | 96 | 161 | 110 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | gravimetrically (High-Volume-Sampler, micro balance) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | * |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 21 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

Comments:

* Equivalent factors for the $PM_{10}$ – monitoring method:

| Station | $PM_{10}$-HVS | $PM_{10}$-TEOM |
|---|---|---|
| Leipzig-Lützner Str. | 1.0 | 1.0 + f (temperature, humidity) |
| Leipzig-Mitte | 1.0 | 1.0 + f (temperature, humidity) |
| Leipzig-West | 1.0 | 1.0 + f (temperature, humidity) |

** No measurements of CO since 2008.

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Leoben (Leoben, Donawitz, Göß)

immission area: 108 km² population: 24 915

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³]* | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 3 | 6 | 16 | 72 | 19 |
| $PM_{10}$ | 1 | 19 | 32 | 76 | 76 | 46 |
| $PM_{2,5}$ | - | - | - | - | - | - |
| NO | 3 | 9 | 33 | 97 | 218 | 83 |
| $NO_2$ | 3 | 21 | 47 | 69 | 99 | 68 |
| CO | 1 | 600 | 1100 | 2800 | 10000 | 2600 |
| $O_3$ | 1 | 39 | 63 | 95 | 147 | 111 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | gravimetrically |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 3 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

Comments: * Max 1h-mean value = static average

## Linz

immission area: 96 km² population: 205 921

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 4 | 3 | 14 | 33 | 96 | 37 |
| $PM_{10}$ | 6 | 20 | 48 | 113 | 213 | 84 |
| $PM_{2,5}$ | 6 | 15 | 36 | 94 | 139 | 63 |
| NO | 6 | 17 | 63 | 180 | 434 | 178 |
| $NO_2$ | 6 | 29 | 52 | 91 | 206 | 109 |
| CO | 5 | 340 | 660 | 1000 | 6526 | 1600 |
| $O_3$ | 3 | 42 | 76 | 106 | 179 | 123 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | gravimetrically and continuously |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 1 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 25 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 1 |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Lisbon

immission area: 85 km$^2$ population: 547 733*

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 2 | 1 | 1 | 9 | 82 | 4 |
| $PM_{10}$ | 3 | 30 | 43 | 82 | 153 | 66 |
| $PM_{2,5}$ | 1 | 12 | 19 | 42 | 71 | 33 |
| NO | 5 | 27 | 89 | 258 | 896 | 276 |
| $NO_2$ | 5 | 38 | 84 | 129 | 310 | 161 |
| CO | 4 | 328 | 508 | 1250 | 3323 | 1090 |
| $O_3$ | 4 | 51 | 75 | 100 | 213 | 108 |

| | | |
|---|---|---|
| $PM_{10}$: | Monitoring method(s) used: | TEOM (FDMS): 1 station; Beta-absorption: 3 stations |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | TEOM (FDMS): 1<br>β-absorption: 1 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 46 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 74 |

Comments: * in 2011

## Liverpool

immission area: 112 km$^2$ population: 473 073

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 2 | 3 | 13 | - | 6 |
| $PM_{10}$ | 1 | 12 | 22 | 62 | - | 36 |
| $PM_{2,5}$ | 1 | 8 | 16 | 48 | - | 27 |
| NO | 1 | 4 | 11 | 83 | - | 23 |
| $NO_2$ | 1 | 18 | 27 | 53 | 91 | 42 |
| CO | - | - | - | - | - | - |
| $O_3$ | 1 | 49 | 66 | 82 | - | 76 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | TEOM (FDMS) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | - |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 5 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## London

immission area: 1.572 km$^2$ population: 8 787 892

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 3 | 4 | 9 | 22 | - | 14 |
| $PM_{10}$ | 4 | 18 | 32 | 89 | - | 50 |
| $PM_{2,5}$ | 8 | 12 | 32 | 102 | - | 46 |
| NO | 9 | 28 | 187 | 510 | - | 305 |
| $NO_2$ | 9 | 38 | 98 | 162 | 385 | 125 |
| CO | 2 | 225 | 480 | 1500 | - | 680 |
| $O_3$ | 7 | 32 | 59 | 92 | - | 73 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | GRAV EQ, TEOM (FDMS) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | - |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 6 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 38 |

## Lyon (urban site)

immission area: 47,9 km$^2$ population: 513 275

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 0 | - | - | - | - | - |
| $PM_{10}$ | 3 | 23 | - | 114 | 303 | 87 |
| $PM_{2,5}$ | 1 | 15 | - | 85 | 104 | 62 |
| NO | 3 | 13 | - | 207 | 518 | 141 |
| $NO_2$ | 3 | 31 | - | 99 | 211 | 99 |
| CO | - | - | - | - | - | - |
| $O_3$ | 2 | 47 | - | 112 | 203 | 118 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | TEOM |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | FDMS |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 20 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 1 |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Lyon (traffic site)

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | - | - | - | - | - | - |
| $PM_{10}$ | 4 | 26 | - | 118 | 336 | 86 |
| $PM_{2,5}$ | 1 | 15 | - | 94 | 117 | 49 |
| NO | 4 | 46 | - | 318 | 704 | 336 |
| $NO_2$ | 4 | 53 | - | 132 | 267 | 158 |
| CO | 1 | 295 | - | 1795 | 1795 | 915 |
| $O_3$ | - | - | - | - | - | - |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | TEOM |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | FDMS |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 20* |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 15* |

Comment: *Station near highway

## Madrid

immission area: 604 km$^2$ population: 3 182 981

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year* [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 10 | 7 | 16 | 39 | 98 | 43 |
| $PM_{10}$ | 12 | 20 | 34 | 184 | 308 | 75 |
| $PM_{2,5}$ | 6 | 10 | 15 | 51 | 96 | 35 |
| NO | 24 | 24 | 108 | 319 | 973 | 329 |
| $NO_2$ | 24 | 42 | 87 | 147 | 349 | 175 |
| CO | 10 | 360 | 670 | 1400 | 4900 | 1700 |
| $O_3$ | 14 | 48 | 87 | 110 | 193 | 138 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | Oscillating microbalance |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | Depending on station |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 13 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 88 |

Comments: * Maximum 98 percentile of hourly values

Area and population of the municipality of Madrid (not metropolitan area)

Minimum data capture of 75%

In 2010, Madrid Air Quality Network was restructured in order to meet the new obligations of Directive 2008/50/EC, Due to this fact, the number of stations changed significantly

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Mannheim

immission area: 145 km$^2$ population: 318 910

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 4 | | 21 | 106 | - |
| $PM_{10}$ | 2 | 20 | - | 109 | - | - |
| $PM_{2,5}$ | 2 | 13 | - | 98 | - | - |
| NO | 2 | 22 | 56 | 186 | 565 | - |
| $NO_2$ | 2 | 36 | 53 | 99 | 163 | - |
| CO | 1 | 300 | 400 | 1100 | 2000 | - |
| $O_3$ | 1 | 45 | 76 | - | 205 | - |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | Gravimetrically |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | - |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 12 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

## Milan

immission area: 182 km$^2$ population: 1 351 562

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year* [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 3 | - | 12 | 38 | 10 |
| $PM_{10}$ | 3 | 40 | - | 169 | - | 119 |
| $PM_{2,5}$ | 2 | 29 | - | 135 | - | 84 |
| NO | 8 | 50 | - | 305 | 645 | 260 |
| $NO_2$ | 8 | 64 | - | 144 | 264 | 145 |
| CO | 4 | 1008 | - | 2894 | 5891 | 2634 |
| $O_3$ | 3 | 48 | - | 144 | 214 | 158 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | Beta attenuation |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | None |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 97 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 11 |

Comments: * $SO_2$, $PM_{10}$, $PM_{2,5}$: Max 98-percentile per year of daily mean value
NO, $NO_2$, CO, $O_3$: Max 98-percentile per year of 1 h mean value

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Munich

immission area: 310 km$^2$ population: 1 530 000

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³]** |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 2 | - | 4 | 9 | - |
| $PM_{10}$ | 4 | 22 | - | 138* | - | - |
| $PM_{2,5}$ | 4 | 14 | - | 113* | - | - |
| NO | 5 | 36 | - | - | 693 | - |
| $NO_2$ | 5 | 42 | - | - | 270 | - |
| CO | 3 | 400 | - | - | 2300 | - |
| $O_3$ | 5*** | 48 | - | - | 177 | - |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | β-absorption |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 1.25 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 19** |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 12 |

Comments: * $PM_{10}$ / $PM_{2,5}$: Values from Jan. 1st 2017 are not considered because of fireworks during the New Year's Eve.
** $PM_{10}$-exeedances of limit values: On the highest stressed station considered the deduction of $PM_{10}$-exeedances of limit values caused by winter services like road salt and grit; regulated in § 25 of the 39. BImSchV
*** $O_3$: number of monitoring station: 3 monitoring stations are stations to regulation 39. BImSchV;
2 monitoring stations are only for quality assurance

## Prague

immission area: 496 km$^2$ population: 1 290 000

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile from daily mean per year [µg/m³] ** |
|---|---|---|---|---|---|---|
| $SO_2$ | 2 | 3 | 5 | 15 | 105 | 9 |
| $PM_{10}$ | 17 | 25 | 62 | 184 | 359 | 122 |
| $PM_{2,5}$ | 8 | 18 | 48 | 147 | 210 | 87 |
| NO | 14 | 16 | 70 | 183 | 441 | 128 |
| $NO_2$ | 14 | 29 | 62 | 118 | 213 | 93 |
| CO | 2 | 381 | 682 | 1440 | 1806 | 1107 |
| $O_3$ | 6 | 48 | 79 | 119 | 182 | 94 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | 2 x gravimetrically, 14 x radiometrically, 1 x optoelectronically |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 1 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 48 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 1 |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Riga (urban station)

immission area: 307 km$^2$ population: 641 423

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 2 | 3 | 5 | 7 | 14 | 5 |
| $PM_{10}$ | 1 | 17 | 25 | 49 | - | 39 |
| $PM_{2,5}$ | 1 | 14 | 21 | 47 | - | 34 |
| NO | - | - | - | - | - | - |
| $NO_2$ | 2 | 22 | 32 | 83 | 184 | 78 |
| CO | - | - | - | - | - | - |
| $O_3$ | 2 | 56 | 77 | 107 | 123 | 101 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | β-absorption |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 1.0 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 0 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

Comments: * $SO_2$ - 98% - value of 1- hour's means; $NO_2$ - 98% - value of 1- hour's means; $PM_{10}$ - 98% - value of daily means; $O_3$ - 98% - value of 1- hour's means

## Riga (traffic station)

immission area: 307 km$^2$ population: 641 423

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³]* |
|---|---|---|---|---|---|---|
| $SO_2$ | - | - | - | - | - | - |
| $PM_{10}$ | 1 | 32 | 42 | 77 | - | 64 |
| $PM_{2,5}$ | - | - | - | - | - | - |
| NO | - | - | - | - | - | - |
| $NO_2$ | - | - | - | - | - | - |
| CO | - | - | - | - | - | - |
| $O_3$ | - | - | - | - | - | - |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | β-absorption |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 1.0 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 30 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | - |

Comments: * $PM_{10}$ - 98% - value of 1- daily means (traffic station)

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Rhine/Ruhr area

immission area: 5 770 km$^2$ population: 9 963 000

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | | | | | | |
| $PM_{10}$ | | | | | | |
| $PM_{2,5}$ | | | | | | |
| NO | | | | | | |
| $NO_2$ | | | | | | |
| CO | | | | | | |
| $O_3$ | | | | | | |

No data for 2017!

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Rotterdam Rijnmond Area

immission area: 807 km$^2$ population1.200.000

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 4 | 7 | 9 | 24 | 326 | 19/30** |
| ****$PM_{10}$ | 10 | 24 | 35 | 99 | 775*/496 | 57/64** |
| ****$PM_{2,5}$ | 8 | 15 | 29 | 79 | 722*/155 | 47/47** |
| NO | 10 | 30 | 54 | 200 | 577 | 112/155** |
| $NO_2$ | 10 | 44 | 56 | 99 | 174 | 82/99** |
| CO | 0 | | | | | |
| $O_3$ | 6 | 44 | 65 | 87 | 164 | 82/92** |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | Met One BAM 1020 |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | PM2,5 0.93 and 1.05*** PM10 0.91 and 1.04*** |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if appliccable): | 13 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

Comments:

The highest value are from the fireworks on the first hour of newyears day! The second High Value is without the piek of the fireworks.

** First number is 98 percentiel of the daily values, second number is 98 percentiel of the hourly values.

*** We have used two correction factors in 2017, that is because we have changed to a different brand of filtertape in the BAM 1020.

**** All PM numbers are including the correction factors.

***** The measurements are done in the Rotterdam Rijnmond Area

We have stopped the monitoring of CO since 2017 and we do not have ½ hourly values in our system.

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Salzburg

immission area: 66 km$^2$ population: 154 820

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 2 | 2 | - | 5 | 18 | 4 |
| $PM_{10}$ | 3 | 18 | - | 140 | - | 75 |
| $PM_{2,5}$ | 2 | 12 | - | 124 | - | 63 |
| NO | 3 | 21 | - | 216 | 493 | 177 |
| $NO_2$ | 3 | 32 | - | 108 | 175 | 101 |
| CO | 2 | 300 | - | 1580 | 2580 | 1030 |
| $O_3$ | 2 | 48 | - | 109 | 170 | 121 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | β-absorption, gravimetric |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 0.895 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 20 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

## Sofia

immission area: 1 344 km$^2$ population: 1 256 667

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | | | | | | |
| $PM_{10}$ | | | | | | |
| $PM_{2,5}$ | | | | | | |
| NO | | | | | | |
| $NO_2$ | | | | | | |
| CO | | | | | | |
| $O_3$ | | | | | | |

No data for 2017!

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | β-absorption (6 stations), gravimetric (1 station) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## St. Pölten, urban station

immission area: 108 km² population: 54 879

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 4 | 6 | 14 | 18 | 7 |
| $PM_{10}$ | 1 | 18 | 34 | 97 | 123 | 62 |
| $PM_{2,5}$ | 1 | 13 | 30 | 92 | 101 | 53 |
| NO | 1 | 6 | 10 | 34 | 140 | 35 |
| $NO_2$ | 1 | 21 | 30 | 59 | 109 | 59 |
| CO | - | - | - | - | - | - |
| $O_3$ | 1 | 49 | 77 | 103 | 170 | 117 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | Grimm |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | ---- |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 12 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

## St. Pölten, traffically influenced

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | - | - | - | - | - | - |
| $PM_{10}$ | 1 | 21 | 43 | 119 | 215 | 75 |
| $PM_{2,5}$ | - | - | - | - | - | - |
| NO | 1 | 19 | 30 | 85 | 311 | 96 |
| $NO_2$ | 1 | 32 | 40 | 76 | 144 | 77 |
| CO | 1 | 310 | 510 | 1060 | 1860 | 800 |
| $O_3$ | - | - | - | - | - | - |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | TEOM - FDMS |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | ---- |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 19 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Stockholm

immission area (inner city): 48 km²
area (Stockholm): 220 km² population (Stockholm): 923 516

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per hour/daily [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$* | 1 | 0.4 | 0.6 | - | - | - |
| $PM_{10}$** | 6 | 21 | - | 100 | 262 | - |
| $PM_{2,5}$** | 4 | 5 | - | 46 | 105 | - |
| NO | - | - | - | - | - | - |
| $NO_2$** | 6 | 27 | - | 85 | 139 | - |
| CO** | 2 | 300 | - | - | 7300 | - |
| $O_3$*** | 2 | 43 | - | - | 151 | - |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | TEOM |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | VCM correction |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 31 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

Comments: All stations are situated in the inner city of Stockholm
* $SO_2$: roof level, diffusive samplers -only per month
** $PM_{10}$,$PM_{2.5}$, $NO_2$, CO: street level
*** $O_3$: roof level

## Stuttgart

immission area: 207 km² population: 612 968

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 2 | 3 | - | - | - |
| $PM_{10}$ | 6 | 23 | - | 254 | - | - |
| $PM_{2,5}$ | 3 | 14 | - | 147 | - | - |
| NO | 6 | 51 | 169 | 361 | 752 | - |
| $NO_2$ | 6 | 51 | 88 | 141 | 225 | - |
| CO | 1 | 300 | 500 | 1200 | 1700 | - |
| $O_3$ | 2 | 35 | 62 | - | 188 | - |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | gravimetrically |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | - |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 45 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 3 |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Thessaloniki

immission area: 129 km$^2$ population: 794 330

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per hour [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 4 | 7 | - | - | 162 | 33 |
| $PM_{10}$ | 4 | 34 | - | 139 | 332 | 117 |
| $PM_{2,5}$ | 2 | 21 | - | 133 | 232 | 83 |
| NO | 5 | 14 | - | - | 712 | 165 |
| $NO_2$ | 5 | 23 | - | - | 150 | 91 |
| CO | 3 | 467 | - | - | 9100 | 2500 |
| $O_3$ | 5 | 64 | - | - | 153 | 122 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | β-attenuation |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 1 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 51 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

## Vienna

immission area: 415 km$^2$ population: 1 867 582

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 99,9 Percentile 1h-mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 7 | 4 | 8 | 32 | 56 | 19 |
| $PM_{10}$* | 13 | 19 | 48 | 172 | 200 | 84 |
| $PM_{2,5}$** | 6 | 14 | 39 | 122 | 107 | 64 |
| NO | 16 | 9 | 63 | 188 | 332 | 189 |
| $NO_2$ | 16 | 24 | 58 | 100 | 146 | 110 |
| CO | 3 | 302 | 517 | 1072 | 1203 | 900 |
| $O_3$ | 5 | 58 | 98 | 141 | 178 | 133 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | 7 Stations gravimetric and continuous,<br>6 Stations only continuous (including equivalent factor) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | * |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 23*** |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Comments for Vienna:

* $PM_{10}$ equivalent factor 2017 for the continuous measurement method:

| $PM_{10}$-Messstelle | Zeitraum | Messgeräte-Typ | Kalibrierfunktion |
|---|---|---|---|
| **Taborstraße** | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}895 * y_{roh} - 1{,}3$ |
| **AKH** | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}95 * y_{roh}$ |
| **Belgradplatz** | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}895 * y_{roh} - 1{,}3$ |
| Laaer Berg | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}895 * y_{roh} - 1{,}3$ |
| Kaiser-Ebersdorf | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}895 * y_{roh} - 1{,}3$ |
| **A23-Wehlistraße** | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}95 * y_{roh}$ |
| **Gaudenzdorf** | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}895 * y_{roh} - 1{,}3$ |
| **Kendlerstraße** | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}895 * y_{roh} - 1{,}3$ |
| Schafberg | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}895 * y_{roh} - 1{,}3$ |
| Gerichtsgasse | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}895 * y_{roh} - 1{,}3$ |
| Lobau | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}895 * y_{roh} - 1{,}3$ |
| Stadlau | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}895 * y_{roh} - 1{,}3$ |
| **Liesing-Gewerbegebiet** | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}895 * y_{roh} - 1{,}3$ |

Bold printed monitoruing stations: additionally gravimetrical method used

** $PM_{2,5}$ - equivalent faktor 2017 for the continous measurement method:

| $PM_{2,5}$-Messstelle | Zeitraum | Messgeräte-Typ | Kalibrierfunktion |
|---|---|---|---|
| **Taborstraße** | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}885 * y_{roh} - 1{,}0$ |
| **AKH** | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}885 * y_{roh} - 1{,}0$ |
| **A23-Wehlistraße** | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}885 * y_{roh} - 1{,}0$ |
| Kendlerstraße | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}885 * y_{roh} - 1{,}0$ |
| **Lobau** | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}885 * y_{roh} - 1{,}0$ |
| Stadlau | ab 1.1. | Grimm EDM-180 | $y_{äquivalent} = 0{,}885 * y_{roh} - 1{,}0$ |

Bold printed monitoring stations: additionally gravimetrical method used

99.9-Percentile values (MW1) of $PM_{10}$ and $PM_{2,5}$ are from continuous measurements (including station factor). This applies also for stations with continuous and gravimetrical measurements, because the gravimetric method delivers only daily mean values.

All other particulates values (annual mean, max. MMW and max. daily mean) are derived preferably from gravimetric monitoring.

*** station “Taborstraße“

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Villach

immission area: 135 km$^2$ population: 61 662

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 0 | - | - | - | - | - |
| $PM_{10}$ | 1 | 18 | 37 | 78 | - | - |
| $PM_{2,5}$ | 0 | - | - | - | - | - |
| NO | 1 | 22 | 55 | 141 | 367 | 132 |
| $NO_2$ | 1 | 29 | 55 | 80 | 137 | 77 |
| CO | 0 | - | - | - | - | - |
| $O_3$ | 0 | - | - | - | - | - |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | continuously (Sharp 5030) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 1.033y – 1.315 already applied to data |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 3 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

## Warsaw

immission area: 517 km$^2$ population: 1 764 615

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per day [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 2 | 4 | 10 | - | 118 | 16 |
| $PM_{10}$ | 6 | 32 | 73 | - | 399 | 181 |
| $PM_{2,5}$ | 4 | 24 | 54 | - | 202 | 118 |
| NO | 4 | 25 | 75 | - | 624 | 231 |
| $NO_2$ | 4 | 35 | 64 | - | 195 | 111 |
| CO | 2 | 501 | 869 | - | 5978 | 1646 |
| $O_3$ | 3 | 41 | 62 | - | 143 | 91 |

[1]

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | automatic: optical particle counter+conversion to mass concentration; manual: gravimetric method |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | * |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 87 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

Comments: * optical particle counter-road station: $PM_{10}$ & $PM_{2,5}$: 1.044*x+1.196

optical particle counter- urban background: $PM_{10}$: 0.877*x+2.587, PM2,5: 0.701*x+2.568

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Wiesbaden (urban stations)

immission area: 204 km² population: 289 973

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 1 | 1 | 3 | 12 | 2 |
| $PM_{10}$ | 1 | 17 | 28 | 74 | 201 | 54 |
| $PM_{2,5}$ | 1* | 11 | 20 | 57 | - | - |
| NO | 1 | 13 | 30 | 101 | 311 | 99 |
| $NO_2$ | 1 | 29 | 45 | 82 | 125 | 74 |
| CO | 0 | - | - | - | - | - |
| $O_3$ | 1 | 38 | 65 | 114 | 205 | 110 |

[1]

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 1 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2005 (measured values **including** equivalent factor, if applicable): | 6 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2005: | 0 |

Comments: * monitoring method: gravimetrically

## Wiesbaden (traffic station)

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 0 | - | - | - | - | - |
| $PM_{10}$ | 2 | 19 | 31 | 76 | 503* | 58 |
| $PM_{2,5}$ | 1 | 13 | 24 | 66 | 347* | 46 |
| NO | 2 | 51 | 83 | 202 | 567 | 210 |
| $NO_2$ | 2 | 50 | 63 | 107 | 179 | 104 |
| CO | 1 | 410 | 650 | 1110 | 2810 | 1150 |
| $O_3$ | 0 | - | - | - | - | - |

[1]

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | 1 |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2005 (measured values **including** equivalent factor, if applicable): | 7 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2005: | 0 |

Comments: * value from Jan. 1 2017 (New Year's Eve fire works)

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area

## Zagreb

immission area: 641 km$^2$ population: 802 338

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 20 | 6 | 27 | 85 | 9 |
| $PM_{10}$ | 6 | 30 | 89 | 185 | - | 134 |
| $PM_{2,5}$ | 3 | 21 | 74 | 157 | - | 112 |
| NO | | | | | - | |
| $NO_2$ | 6 | 37 | 55 | 118 | 158 | 91 |
| CO | 1 | 340 | 720 | 1440 | 4090 | 1170 |
| $O_3$ | 5 | 43 | 94 | 141 | 211 | 124 |

| | | |
|---|---|---|
| $PM_{10}$ | Monitoring method(s) used: | HRN EN 12341:2014 (EN 12341: 2014) |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 61 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

## Zurich

immission area: 1 086 km$^2$ population: 1 185 214

| | Number of monitoring stations | Annual mean value [1] [µg/m³] | max. monthly mean value [2] [µg/m³] | max. daily mean value [2] [µg/m³] | max. 1h mean value [2] [µg/m³] | Max. 98-Percentile per year [µg/m³] |
|---|---|---|---|---|---|---|
| $SO_2$ | 1 | 1 | 2 | 6 | 9 | 4 |
| $PM_{10}$ | 1 | 15 | 31 | 70 | 102 | 54 |
| $PM_{2,5}$ | 1 | 13 | 25 | 56 | - | - |
| NO | 1 | 7 | 14 | 84 | 185 | 64 |
| $NO_2$ | 1 | 27 | 43 | 82 | 101 | 74 |
| CO | 1 | 290 | 410 | 849 | 1889 | 615 |
| $O_3$ | 1 | 50 | 83 | 121 | 172 | 123 |

| | | |
|---|---|---|
| $PM_{10}$: | Monitoring method(s) used: | FIDAS 200, calibrated with gravimetrical measurements every day |
| | Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG: | - |
| | Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2017 (measured values **including** equivalent factor, if applicable): | 7 |
| $NO_2$ | Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2017: | 0 |

[1] arithmetic mean value of all monitoring stations of the affected area
[2] max. value of all monitoring stations of the affected area