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Air Quality Data in 2010

The Comparison of Cities and Regions in Europe

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Einführung

Die Bekämpfung der Luftverschmutzung ist auch noch heute 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 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 2 bis 3 Jahrzehnten installiert, sodass bei einer Verfolgung der Luftschadstoffdaten über mehrere Jahre ein Trend zur Verbesserung (oder auch Verschlechterung) der Luftbelastung herauslesbar sein sollte. Sanierungsmaßnahmen in Betrieben und bei anderen Emittentengruppen müssten sich jedenfalls 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.

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Introduction

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

To prove the success of measurements of redevelopment at all, the observation of the concentrations of noxious compounds by means of monitoring station networks is useful. In most of the referred monitored areas air quality monitoring station networks have been being installed for 2 – 3 decades. Thus 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 should be able to be recognized. Measurements of redevelopment in companies, factories and other groups of emission sources should manifest in a reduced immission stress of air pollutants.

It is absolutely necessary to determine the trends of pollution through a *longer period of time*, because due to various meteorological influences the immission stress can alter extremely. For instance, a month with mostly rainy weather conditions and high wind speeds will have much less immission concentrations than a month, where the formation of inversion layers can be observed often.

Luftgütevergleiche werden durch das Umwelt- und Technik-Center (früher: Amt für Natur- und Umweltschutz) 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 2010 wurden Städte bzw. Regionen aus Deutschland, England, Frankreich, Belgien, Niederlande, Dänemark, Schweden, Italien, Schweiz, Spanien, Polen, Bulgarien, Tschechien, Ungarn, Griechenland, Lettland, Luxemburg, Portugal und Kroatien mit einbezogen.	Comparisons of the air quality have been carried out by our organization already for a number of years, exactly since 1989. At first only Austrian Cities were compared. During the last years the comparison was extended to other European cities and regions, for there is much interest in such studies. The comparison of the air quality of the year in 2010 comprised cities and regions of Austria, Germany, cities from England, France, Belgium, The Netherlands, Denmark, Sweden, Italy, Switzerland, Spain, Poland, Bulgaria, Czech Republic, Hungary, Greece, Latvia, Luxemburg, Portugal and Croatia.
Die Städte Bukarest und Debrecen liefern seit 10 Jahren keine Daten. Sollten diese noch eintreffen, werden sie in künftigen Städtevergleichen in Form von Zeitreihen mit berücksichtigt.	The cities Bucharest and Debrecen have not been delivering any data for 10 years. In the case of delivery to us they will be taken into account for future reports in terms of time series.
Ab 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 is also extended with 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 ist, da

1. die Zahl der Messstellen sehr verschieden ist (die Anzahl der Messstellen pro Messgebiet ist in der Tabelle auf Seite 19 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).

Den 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 there are critical remarks 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 differs very much (the number of monitoring stations of each monitoring network is mentioned in the table on page 19 and the subsequent graphics),
2. the density of distribution of the monitoring stations is different,
3. the location of the monitoring station 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 the comparative study are thoroughly conscious of these facts. But despite to the raised objections there are also some arguments of continuing the activities:

1. The way of measurement of air pollutants is carried out by the same ore 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 special traffic stressed sampling points. The monitoring station network services were invited to separate such monitoring points in order to reproduce 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, wurde in diesen Bericht für die Jahresmittelwerte auch die mehrjährige *Trendentwicklung* der Schadstoffbelastung seit 1993 für die einzelnen Immissionsgebiete mit aufgenommen. Die Daten von Städten bzw. Regionen, die erst seit kurzem im Städtevergleich integriert sind, wurden dabei auch so weit wie möglich nachgeführt.	3. And finally the evaluations are put to a more objectified basis, if one observes longer term developments and derives from these the trends of the pollutant immission. Since the city of Linz has been carrying out comparisons of the air quality for many years, in this report the *trend developments* for the annual mean value since 1993 for all immission regions have been included. The data of cities or regions which only have been participating the comparison since 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. 3-Stunden-Mittelwert (höchstbelastete Station einer Stadt/Region)
- Max. Einstunden-Mittelwert (höchstbelastete Station einer Stadt/Region)
- Max. Halbstunden-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 und manchmal auch die Auswertungen für max. HMW oder max. 3h-MW. 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 im letzten Bericht, ist der vorliegende Bericht bei den grafischen Auswertungen kürzer gefasst als in den früheren Jahren. Herausgenommen wurden die grafischen Darstellungen für die Perzentile, die max. 3-Stunden-Mittelwerte, die max. Halbstundenmittelwerte und die max. Monatsmittelwerte, da sie im Allgemeinen von nicht so starkem öffentlichem Interesse sind. Neu aufgenommen hingegen wurden die grafischen Auswertungen über 1-Stunden-Mittelwerte, die nunmehr fast überall die Norm für die Bewertung von Kurzzeitbelastungen darstellen.

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. 3-hours mean value (max. stressed monitoring station of a city/region)
- max. 1-hours mean value (max. stressed monitoring station of a city/region)
- max. 1/2-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 individual monitoring network services supported us with immission data of very different completeness, especially referring to the evaluation of the percentiles or sometimes the evaluations of the max. 1/2-hours mean-value or the max. 3-hours mean-value. Often the 98-Percentile was not available but the value for the 95-Percentile was given. Most of the monitoring network services calculate the percentiles from the 1/2-hours mean values of a calendar year, sometimes they were based on the daily mean values.

As already done in the latest report the present report has been shortened in comparison to former years, regarding the graphical evaluations of immission reference values. The graphical presentation of percentiles, max. 3h mean values, max. monthly mean values, 1/2h mean values has not been carried out any more, for they seem not to be of such a public interest as others. On the other hand a new graphical evaluation has been added: Max. 1h mean values, the evaluation standard now for short term stress nearly everywhere.

Sämtliche Werte, von denen ein Teil für die Grafiken verwendet wurde, können nach wie vor aus den Übersichtstabellen im Anhang entnommen werden.

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.

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 2010 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: 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 Belastung (Jahresmittelwerte) einzelner Regionen und Städte ist noch immer sehr unterschiedlich.
   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.

All air quality values partly used for graphical evaluation can be obtained from the overview tables of the annex.

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}.

Comparison over a period of years

One can get a good impression of the development of the air pollutant stress by studying the graphics. For this the immission stress for the area of each participating city and region from 1993 through 2010 are plotted.

The following statements can be given in analysing the data:

1. Some cities and regions have - according to the area - a high monitoring network density. Examples: Berlin, Linz, Vienna. On the other hand very large areas are monitored only by a little number of stations.
2. Due to this fact the comparability between regions is limited.
3. The range of the annual mean immission stress still is very different between the viewed cities and regions.
   In some cities it can be seen that where the pollution stress in 1993 was relatively high, there often has been a visible betterment of the immission situation, while in cities with low immission stress compared to other cities and regions there was nearly no change in air pollution.

4. Es zeigt sich, dass in immer mehr Städten und Regionen die Schwebstaub (TSP)-Messungen abgeschaltet werden. Andererseits werden diese Messungen immer mehr durch Feinstaub (PM_{10}-Messungen abgelöst). TSP-Messungen wurden daher im vorliegenden Vergleich nicht mehr miteinbezogen.

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

   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}: uneinheitlich, tendenziell *gleich bleibend* oder *geringer belastet*

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

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

   CO: Nahezu alle Regionen *geringer* belastet

   O_3: Belastung tendenziell *gleich bleibend oder leicht erhöht*

4. It can be seen that more and more cities and regions do not monitor TSP any more. On the other hand the percentage of monitoring networks including the pollutant PM_{10} increasing rapidly. So TSP measurements have not been included in the present report any more.

5. 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):

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

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

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

   CO: nearly all regions *lower* trend of stress

   O_3: trend is constant or *slightly higher* stressed

Übersicht über die Entwicklung der Schadstoffbelastungen 1993 -2010 [1)]

Beurteilungsbasis: Jahresmittelwerte über alle Stationen einer Region

Overview over the development of the stress of air pollutants from 1993 through 2010 [1)]

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

Austrian Towns, Cities and Regions

	SO_2			NO			NO_2			CO			O_3		
	Stress in 1993 [2)]	Trend last 5 years	Stress in 2010	Stress in 1993 [2)]	Trend last 5 years	Stress in 2010	Stress in 1993 [2)]	Trend last 5 years	Stress in 2010	Stress in 1993 [2)]	Trend last 5 years	Stress in 2010	Stress in 1993 [2)]	Trend last 5 years	Stress in 2010
Linz		==			↘			==			==			↘	
Bludenz		-	2004	1994	↘			↘		-	-	-	1994	==	
Dornbirn		==		1994	==			==		1998	-	2003	-	-	-
Graz		↓		1994	↘			↘			↘			↘	
Hallein		↓		2003	==			==			==			==	
Innsbruck		↘			↓			↘			↘			↗	
Klagenfurt		↓			↘			==			↘			==	
Region Leoben		↘			↘			↘			↘			==	
Salzburg		↓		2003	↘			↘			==			==	
St. Pölten	1994	↘		**1994**	==		1994	==		1994	==		1994	==	
Vienna		↗		**1994**	↘			↘			↘			↘	
Villach		↘			==			==			==			↗	

[1)] TSP measurements are mostly replaced by PM_{10} monitoring (see page 13). 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

European Cities and Regions

	SO_2			NO			NO_2			CO			O_3		
	Stress in 1993 [3]	Trend last 5 years	Stress in 2010	Stress in 1993 [3]	Trend last 5 years	Stress in 2010	Stress in 1993 [3]	Trend last 5 years	Stress in 2010	Stress in 1993 [3]	Trend last 5 years	Stress in 2010	Stress in 1993 [3]	Trend last 5 years	Stress in 2010
Athens	2007	-		2007	-		2007	-		2007	-		2007	-	
Barcelona	1994	↘		1994	🡻		1994	↘			==		1994	↗	
Basel		↘			==			==			-	1999		==	
Belfast		🡻			==			==			==			↘	
Berlin		==			==			↘			==			==	
Birmingham		↘			🡹			==			-	2007		↘	
Bristol		↘			==			==			↗			==	
Brussels	1995	↘		1995	==		1995	↘			↘		1995	==	
Budapest	1996	↗		2003	↘		2003	↘			==		2003	==	
Chemnitz		-	2007		↘			↘			-	2007		==	
Copenhagen		🡹		1994	-	2005	1995	↘			↘		1994	==	
Debrecen		-	2001	1995	-	2001		-	2001		-	2001		-	2001
Dresden		↘			==			↘			-	2007		==	
Edinburgh		==			==			==			↗			↘	
Frankfurt		↘			↘			↘			==			==	
Gothenburg		↘			==			↘			==			==	
Hamburg		↘			==			==			↘			==	
Karlsruhe		↘			==			==			↘			==	
Leeds		↘			↗			↗			↗			↘	
Leipzig		==			==			==			-	2007		==	
Lisbon	1997	↘		2001	↘		1997	==			↘		1997	↗	
Liverpool		↘			==			↗			↗			↘	
London		↘			==			==			↘			==	

[3] ... or year when data were primarily available

	SO_2			NO			NO_2			CO			O_3		
	Stress in 1993 [4]	Trend last 5 years	Stress in 2010	Stress in 1993 [4]	Trend last 5 years	Stress in 2010	Stress in 1993 [4]	Trend last 5 years	Stress in 2010	Stress in 1993 [4]	Trend last 5 years	Stress in 2010	Stress in 1993 [4]	Trend last 5 years	Stress in 2010
Luxemburg	1996	-		1996	-		1996	-		1996	-		1996	-	
Lyon		↓↓			==			==		1994	↘		1994	==	
Madrid	1994	==		1999	↓		1994	↓		1994	↘		1994	↗	
Mannheim		↘			==			==			==			==	
Milan	1994	↓↓		1994	↓		1994	↘		1994	==		1994	==	
Munich		==			↘			↘			↘			==	
Prague	2007	-		2007	-		2007	-		2007	-		2007	-	
Riga	1999	↓		2007	-		1999	↗		2002	↓↓		1999	==	
Rhine/Ruhr Area		==			==			==			-	2005		==	
Rotterdam	1995	↓↓		1995	↓		1995	==		2003	↘		1995	↘	
Sofia	1999	↓↓		2003	-		1999	==		1999	↓		1999	↗	
Stockholm		==		1994	-	2004	1994	==		1994	↘			↘	
Stuttgart	2007	-		2008	-		2007	-		2007	-		2007	-	
Thessaloniki	2007	-		2007	-		2007	-		2007	-		2007	-	
Warsaw	1995	↘		2001	==		1995	==		1995	↘		1995	==	
Wiesbaden		↘			↘			==			==			==	
Zagreb		↓		-	-	-	1994	==		2005	-	2007	1999	↘	
Zurich		==			↘			==			==			==	

Legend:

- slightly stressed (SO_2 < 15, TSP < 30, NO < 30, NO_2 < 30, CO < 1000, O_3 < 30 µg/m³)
- Medium stressed (SO_2 < 30, TSP < 60, NO < 60, NO_2 < 60, CO < 2000, O_3 < 60 µg/m³)
- Highly stressed (SO_2 > 30, TSP > 60, NO > 60, NO_2 > 60, CO > 2000, O_3 > 60 µg/m³)
- – missing data

↘ slight stress decrease
↓ strong stress decrease
== constant stress
↗ slight stress increase
↓↓ very strong stress decrease
↑ strong stress increase

[4] … or year when data were primarily available

	PM10		
	Stress in 2002 [5]	Trend of 5 years	Stress in 2010 [6]
Linz		↘	
Bludenz	2005	↘	
Dornbirn		↘	
Graz		↘	
Hallein		↘	
Innsbruck		↘	
Klagenfurt		↘	
Region Leoben	2003	↘	
Salzburg		↘	
St. Pölten		↘	
Vienna		==	
Villach		↘	
Athens	2007	-	
Barcelona		↓	
Basel		↘	
Belfast		==	
Berlin		==	
Birmingham		==	
Bristol		==	
Brussels		==	
Budapest	2004	↓	
Chemnitz		==	
Copenhagen		↘	
Dresden		↘	
Edinburgh		↘	
Frankfurt		↘	

	PM10		
	Stress in 2002 [5]	Trend of 5 years	Stress in 2010 [6]
Gothenburg		↘	
Hamburg		↘	
Karlsruhe		==	
Leeds		==	
Leipzig		↘	
Lisbon		↘	
Liverpool		↘	
London		↘	
Luxemburg		-	
Lyon		==	
Madrid		↓	
Mannheim		==	
Milan		↓	
Munich		==	
Prague	2007	-	
Riga		↓	
Rhine/Ruhr Area		==	
Rotterdam		↘	
Sofia		↘	
Stockholm		↘	
Stuttgart	2007	-	
Thessaloniki	2007	-	
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)
---	missing data	

[5] If values of 2002 are not available, data of the year mentioned are compared.
[6] If values of 2010 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 2010 [7)]

Beurteilungsbasis: Anzahl der Überschreitungen an der höchstbelasteten Station eines Messgebietes (einschließlich verkehrsbelasteter Stationen) [8)]

Number of days with exceedances of the PM_{10} daily mean of 50 µg/m³ in 2001 through 2010 [9)]

based on the number of exceedances at the peak stressed monitoring station of a region (including traffic stressed stations) [10)]

	PM_{10} number of days >50 µg/m³									
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Linz	62	66	80	46	68	71	41	47	30	45
Bludenz	-	-	-	-	13	45	16	13	12	17
Dornbirn	-	-	38	21	22	40	18	20	14	21
Graz	159	131	131	117	127	113	76	73	57	69
Hallein	-	28	49	26	27	50	20	13	20	29
Innsbruck	-	50	61	52	55	83	46	28	26	29
Klagenfurt	36	58	74	80	82	79	42	33	34	43
Region Leoben	26	7	42	29	36	49	36	25	19	20
Salzburg	-	34	62	34	39	56	25	34	37	41
St. Pölten	-	-	58	79	87	57	23	20	23	38
Vienna	-	57	95	54	92	108	48	39	40	87
Villach	-	24	35	25	29	45	10	9	17	7
Athens	-	-	-	-	-	-	178	163	122	99
Barcelona	-	86	-	47	74	100	97	72	94	23
Basel	11	22	23	16	15	24	12	6	10	11
Belfast	16	7	33	8	5	7	5	7	3	10
Berlin	60	91	117	62	74	71	30	24	39	46
Birmingham	2	1	5	4	5	9	18	10	7	8
Bristol	7	1	9	12	4	6	15	15	7	4
Brussels	52	153	163	127	67	56	56	66	66	45
Budapest	-	-	-	178	160	162	117	96	71	84
Chemnitz	41	20	35	12	59	65	27	19	32	34
Copenhagen	-	59	91	-	-	68	60	59	59	18
Dresden	53	36	53	27	78	49	27	35	42	40
Edinburgh	3	8	2	0	3	2	6	0	3	0
Frankfurt	42	44	51	19	48	24	33	22	36	26
Gothenburg	1	10	12	2	7	13	3	4	0	0
Hamburg	33	43	62	20	45	31	26	18	15	26
Karlsruhe	6	33	33	25	22	34	16	10	20	23
Leeds	3	3	9	4	15	10	11	8	16	11

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

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

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

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

	PM10									
	number of days >50 µg/m³									
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Leipzig	109	63	92	49	82	74	40	40	51	49
London	28	29	61	107	121	157	124	157	47	22
Lisbon	230	222	183	147	180	145	154	82	92	90
Liverpool	4	2	1	14	5	8	11	12	6	2
Lyon	-	83	124	71	153	-	142	79	39	81
Madrid	-	98	-	121	159	181	123	65	35	18
Mannheim	25	44	36	41	43	20	26	12	23	24
Milan	148	177	137	139	152	149	132	115	106	85
Munich	64	75	123	59	107	92	53	60	52	65
Prague	-	-	-	-	-	-	132	84	48	71
Riga	57	74	105	160	88	244	148	126	46	31
Rhine/Ruhr Area	40	48	58	38	21	-	71	68	70	54
Rotterdam	98	103	123	54	30	31	26	12	12	12
Sofia	-	-	225	178	162	-	195	199	106	134
Stockholm	101	113	80	80	80	74	75	77	65	46
Stuttgart	-	-	-	-	-	-	110	14	19	40
Thessaloniki	-	-	-	-	-	-	152	155	80	96
Warsaw	-	-	89	184	162	192	136	133	148	151
Wiesbaden	15	35	19	11	18	32	20	8	13	5
Zagreb	-	-	-	75	89	134	108	116	61	73
Zurich	18	23	38	23	15	39	17	11	11	12

Anzahl der Überschreitungen des 1h-Grenzwertes für NO_2 von 200 µg/m³ in den Jahren 2004 bis 2010

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 2010
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
Linz	0	1	4	4	1	5	3
Bludenz	0	0	0	0	0	0	0
Dornbirn	-	0	0	0	0	0	0
Graz	0	0	4	0	0	0	1
Hallein	0	0	1	3	0	0	0
Innsbruck	0	0	4	0	0	1	0
Klagenfurt	-	1	1	1	0	0	1
Region Leoben	0	0	0	0	0	0	0
Salzburg	0	0	2	1	2	4	3
St. Pölten	0	0	0	0	1	0	0
Vienna	8	24	26	11	17	4	7
Villach	0	0	0	0	0	0	0
Athens	-	-	-	192	56	35	8
Barcelona	13	-	18	22	13	9	0
Basel	0	0	0	0	0	0	0
Belfast	0	4	5	0	3	0	0
Berlin	-	-	-	6	0	8	6
Birmingham	0	2	0	0	3	0	7
Bristol	0	22	13	8	5	11	3
Brussels	24	90	2	2	6	1	1
Budapest	1	25	19	9	1	0	1
Chemnitz	1	0	0	1	0	2	0
Copenhagen	-	-	-	-	-	-	-
Dresden	0	0	0	0	0	0	0
Edinburgh	0	0	0	0	6	0	0
Frankfurt	0	10	3	6	2	16	5

	NO_2						
	number of 1 h mean values >200 µg/m³						
	2004	2005	2006	2007	2008	2009	2010
Gothenburg	2	0	7	1	1	0	3
Hamburg	0	0	26	19	30	29	24
Karlsruhe	5	0	0	0	3	3	4
Leeds	0	0	0	0	8	0	1
Leipzig	1	39	0	0	0	0	0
Liverpool	0	458	0	0	0	0	0
Lisbon	52	-	80	39	20	69	21
London	542	139	686	458	822	486	539
Luxemburg	-	267	-	-	-	-	0
Lyon	35	0	-	139	66	28	181
Madrid	83	-	208	267	119	150	76
Mannheim	0	69	0	0	0	0	1
Milan	47	1	123	-	241	101	25
Munich	11	0	103	69	56	95	192
Prague	-	0	-	1	106	98	56
Riga	0	0	0	0	0	0	0
Rhine/Ruhr Area	0	24	-	0	0	0	1
Rotterdam	10	3	2	0	0	0	0
Sofia	7	450	-	24	155	95	30
Stockholm	0	3	1	3	1	0	3
Stuttgart	-	-	-	5	9	22	6
Thessaloniki	-	3	-	3	1	0	0
Warsaw	0	0	5	17	0	0	1
Wiesbaden	0	0	2	3	1	7	1
Zagreb	0	0	0	0	0	0	0
Zurich	0	0	0	0	0	0	0

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	-	1	-	1	1	-	1
	Dornbirn	1	1	-	1	1	-	-
	Graz	3	7	2	6	6	3	3
	Hallein	2	2	-	3	3	2	1
	Innsbruck	1	2	1	3	3	1	2
	Klagenfurt	1	2	1	2	2	2	2
	Region Leoben	3	5	-	4	4	1	1
	Linz	5	6	1	7	7	5	3
	Salzburg	2	3	2	3	3	2	2
	St. Pölten	1	2	1	2	2	1	1
	Vienna	9	13	2	17	17	4	5
	Villach	1	1	-	1	1	1	1
Belgium	Brussels	7	6	5	10	10	7	7
Bulgaria	Sofia	6	7	2	6	6	4	5
Croatia	Zagreb	6	6	1	-	5	-	5
Czech Republic	Prague	10	21	5	15	20	5	9
Denmark	Copenhagen	1	3	3	-	3	3	3
France	Lyon	4	5	3	8	8	4	3
Germany	Berlin	2	14	5	17	17	2	7
	Chemnitz	-	3	2	3	3	-	1
	Dresden	1	4	3	4	4	-	3
	Frankfurt	4	6	1	6	6	2	4
	Hamburg	7	11	5	17	17	7	6
	Karlsruhe	1	3	-	3	3	2	2
	Leipzig	1	3	2	3	3	-	1
	Mannheim	2	4	-	4	4	2	3
	Munich	1	5	2	6	6	4	3
	Rhine/Ruhr Area	10	21	9	21	21	-	18
	Stuttgart	1	3	-	3	3	2	3
	Wiesbaden	1	2	1	2	2	1	1
Greece	Athens	6	7	3	14	14	7	13
	Thessaloniki	2	3	-	6	6	4	5
Hungary	Budapest	10	12	1	12	12	12	10
Italy	Milan	1	3	1	8	8	5	3
Latvia	Riga	2	3	1	1	3	1	3
Luxemburg	Luxemburg	2	1	1	2	2	2	2
The Netherlands	Rotterdam	7	3	3	3	3	2	3
Poland	Warsaw	6	6	4	7	7	3	4
Portugal	Lisbon	5	5	2	7	7	7	4
Spain	Barcelona	5	8	4	5	5	5	4
	Madrid	9	1	5	22	22	10	13

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

Immissionsgebiete und Bevölkerung

Immission area and population

Country	Monitored Area	immission area [km²]	population
Austria	Bludenz	3	13 775
	Dornbirn	13	45 261
	Graz	128	255 354
	Hallein	27	19 864
	Innsbruck	105	120 147
	Klagenfurt	120	93 306
	Region Leoben	108	24 999
	Linz	96	189 680
	Salzburg	66	148 078
	St. Pölten	108	51 109
	Vienna	415	1 719 730
	Villach	135	59 004
Belgium	Brussels	161	1 101 872
Bulgaria	Sofia	1 344	1 291 591
Croatia	Zagreb	641	792 875
Czech Republic	Prague	496	1 250 000
Denmark	Copenhagen	88	528 208
France	Lyon	48	445.274
Germany	Berlin	892	3 460 700
	Chemnitz	221	243 089
	Dresden	328	517 052
	Frankfurt	248	688 249
	Hamburg	755	1 783 975
	Karlsruhe	173	294 761
	Leipzig	298	518 862
	Mannheim	145	313 174
	Munich	310	1 364 000
	Rhine/Ruhr Area	5 770	8 213 872
	Stuttgart	207	606 508
	Wiesbaden	204	273 477
Greece	Athens	1 948	3 551 370
	Thessaloniki	129	794 330
Hungary	Budapest	525	1 712 556
Italy	Milan	182	1 307 495
Latvia	Riga	307	703 260
Luxemburg	Luxemburg	51	91 000
The Netherlands	Rotterdam	803	1 200 000
Poland	Warsaw	517	1 714 400
Portugal	Lisbon	85	550 000

Country	Monitored Area	immission area [km²]	population
Spain	Barcelona	101	1 619 337
	Madrid	604	3 269 861
Switzerland	Basel	557	489 854
	Zurich	1 086	1 154 359
Sweden	Gothenburg	198	501 429
	Stockholm	48	308 920
U.K.	Belfast	115	277 000
	Birmingham	268	1 010 200
	Bristol	110	416 500
	Edinburgh	262	463 510
	Leeds	552	761 100
	Liverpool	112	441 100
	London	1 572	7 556 900

Quellen für die Immissionsdaten Sources for the immission data

Austria **Bludenz, Dornbirn**	Umweltinstitut des Landes Vorarlberg Montfortstraße 4 A-6901 Bregenz Austria e-mail: *umweltinstitut@vorarlberg.at* Homepage: http://www.vorarlberg.at/umweltinstitut
Austria ***Graz, Leoben, Donawitz***	Amt der Steiermärkischen Landesregierung Fachabt.17 C (Ref. für Luftgüteüberwachung) Landhausgasse 7 A-8010 Graz e-mail: *fa17c@stmk.gv.at* Homepage: *http://www.umwelt.steiermark.at/*
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Austria
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U.K. ***Belfast, Birmingham,*** ***Bristol, Edinburgh, Leeds*** ***Liverpool, London***	The Department of the Environment, Food and Rural Affairs Environmental protection Ashdown House, 123 Victoria St London SW 1E 6DE Homepage: *http://www.airquality.co.uk*

Luftgütevergleich

2010

Jahresmittelwert (Gebietsmittel)

Comparison of The Air Quality

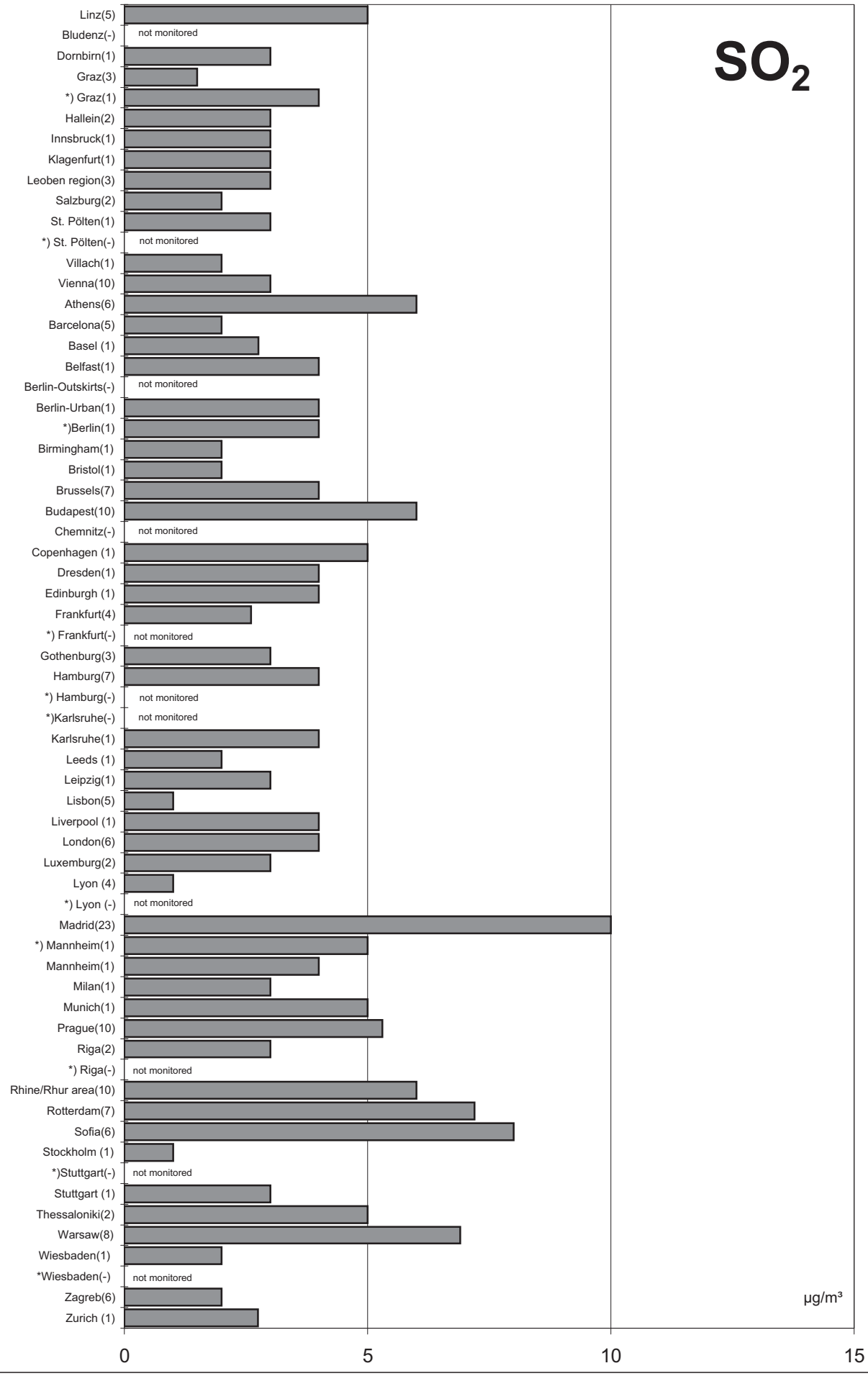
2010

Annual Mean Values

Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)

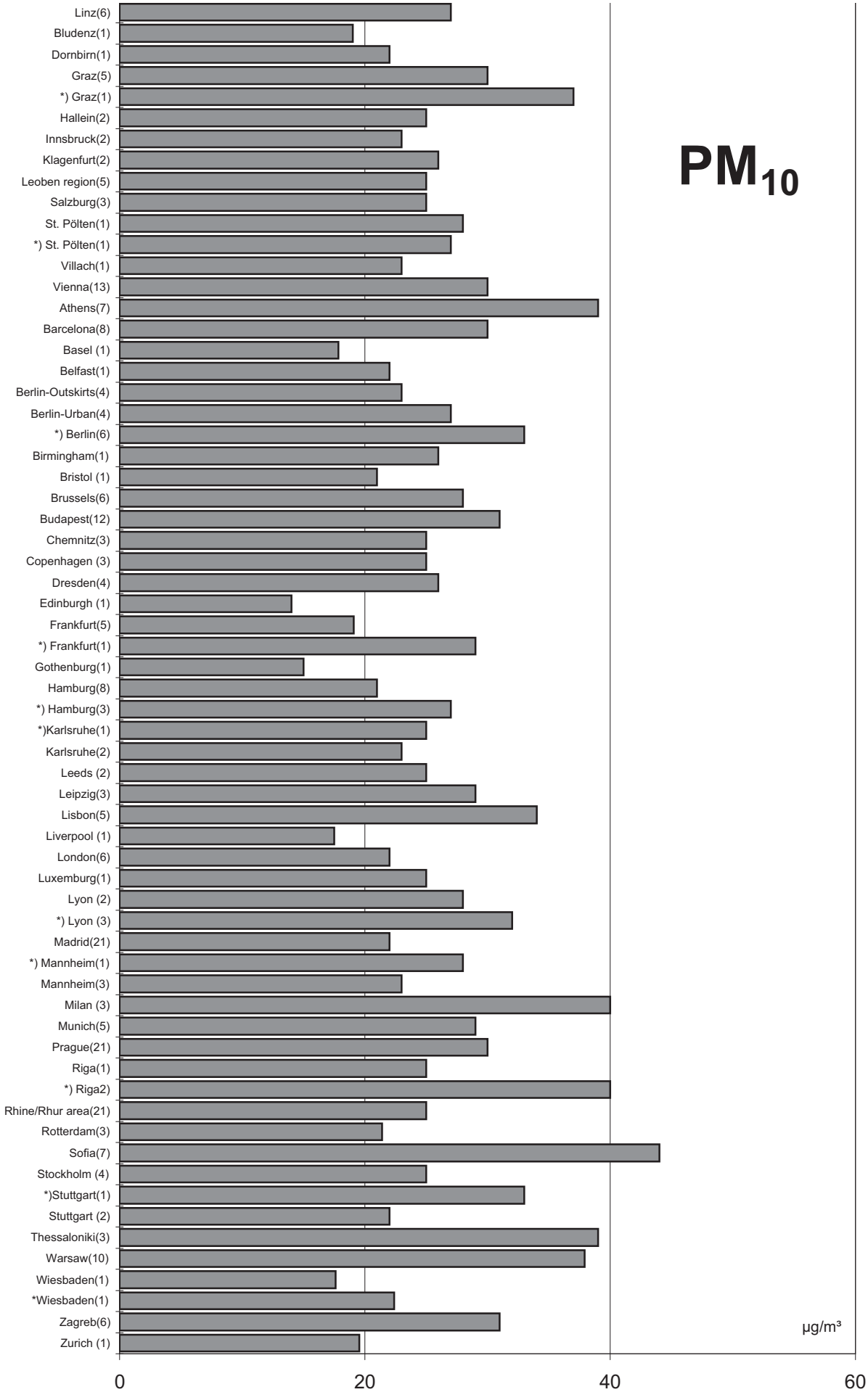


*) traffically influenced monitoring stations

Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)

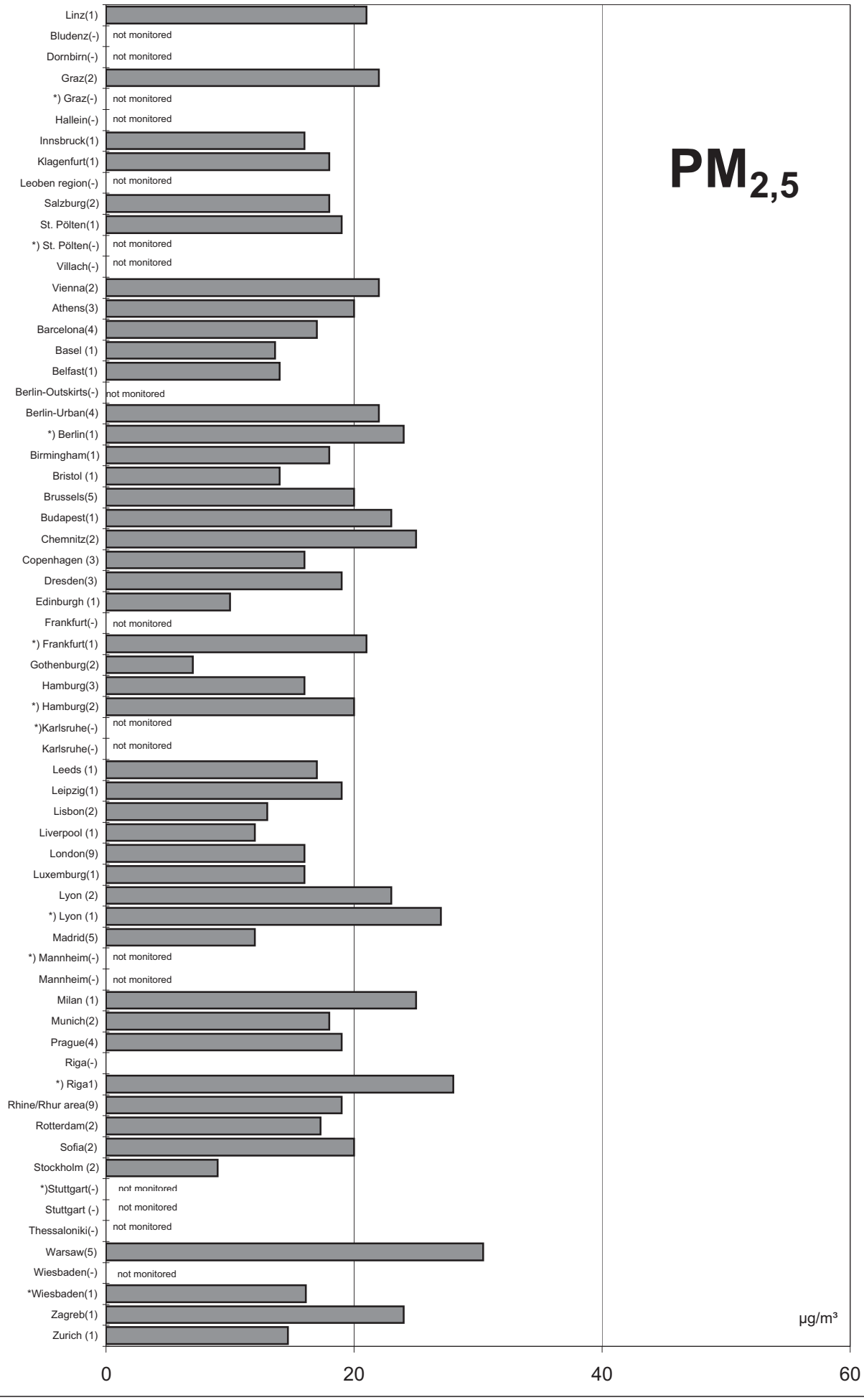


*) traffically influenced monitoring stations

Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)

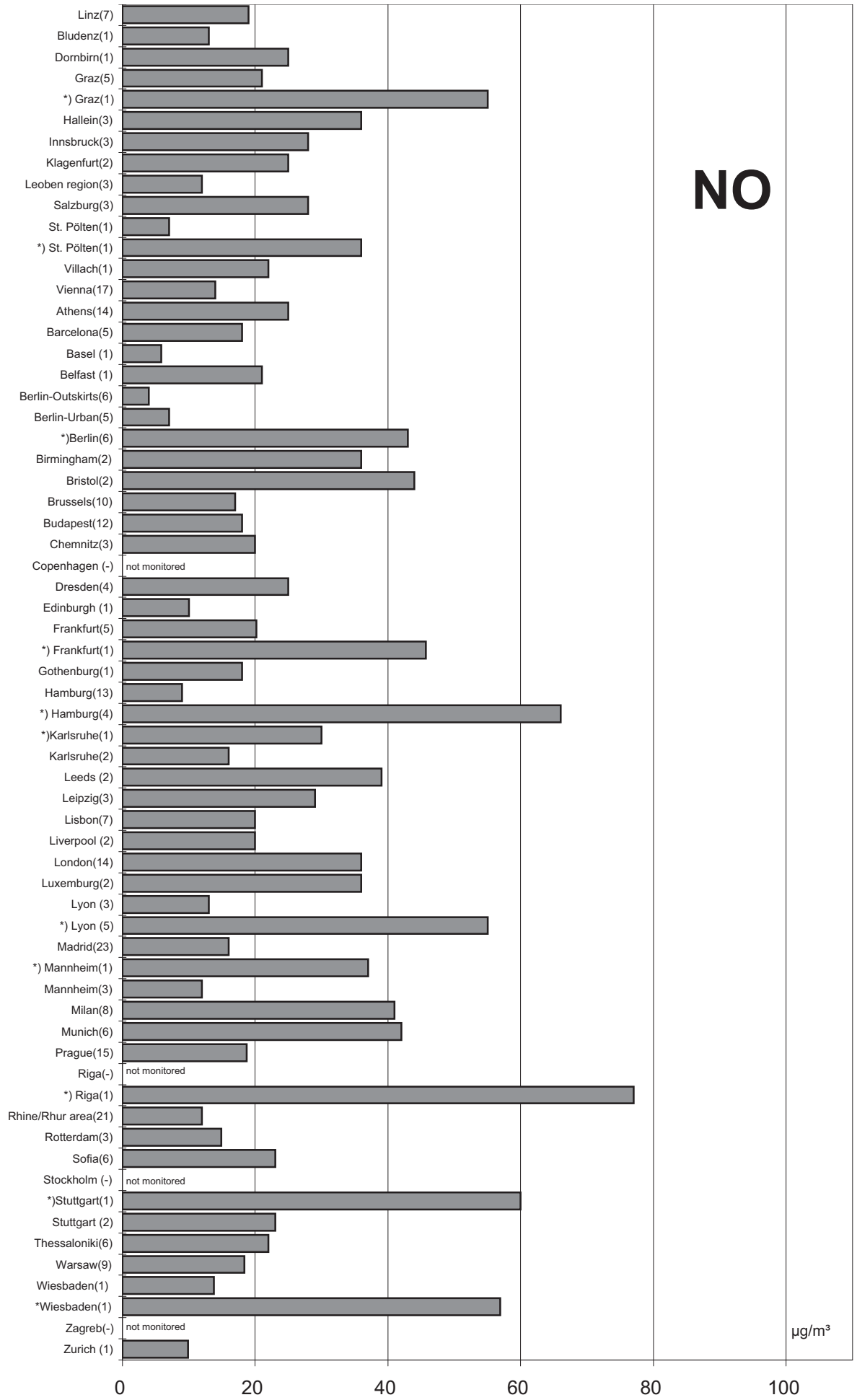


*) traffically influenced monitoring stations

Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)

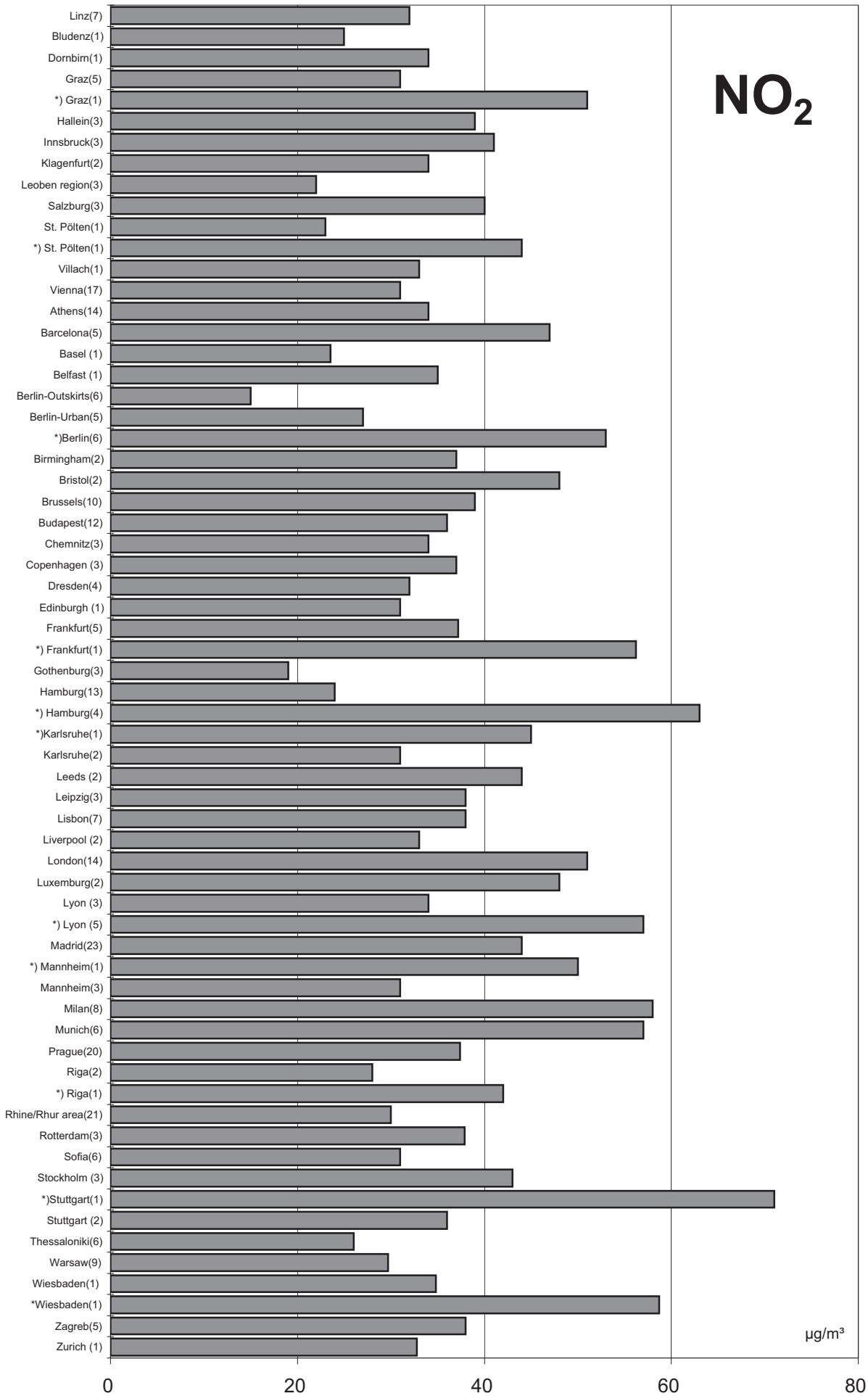


*) traffically influenced monitoring stations

Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)



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Comparison of The Air Quality in 2010

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

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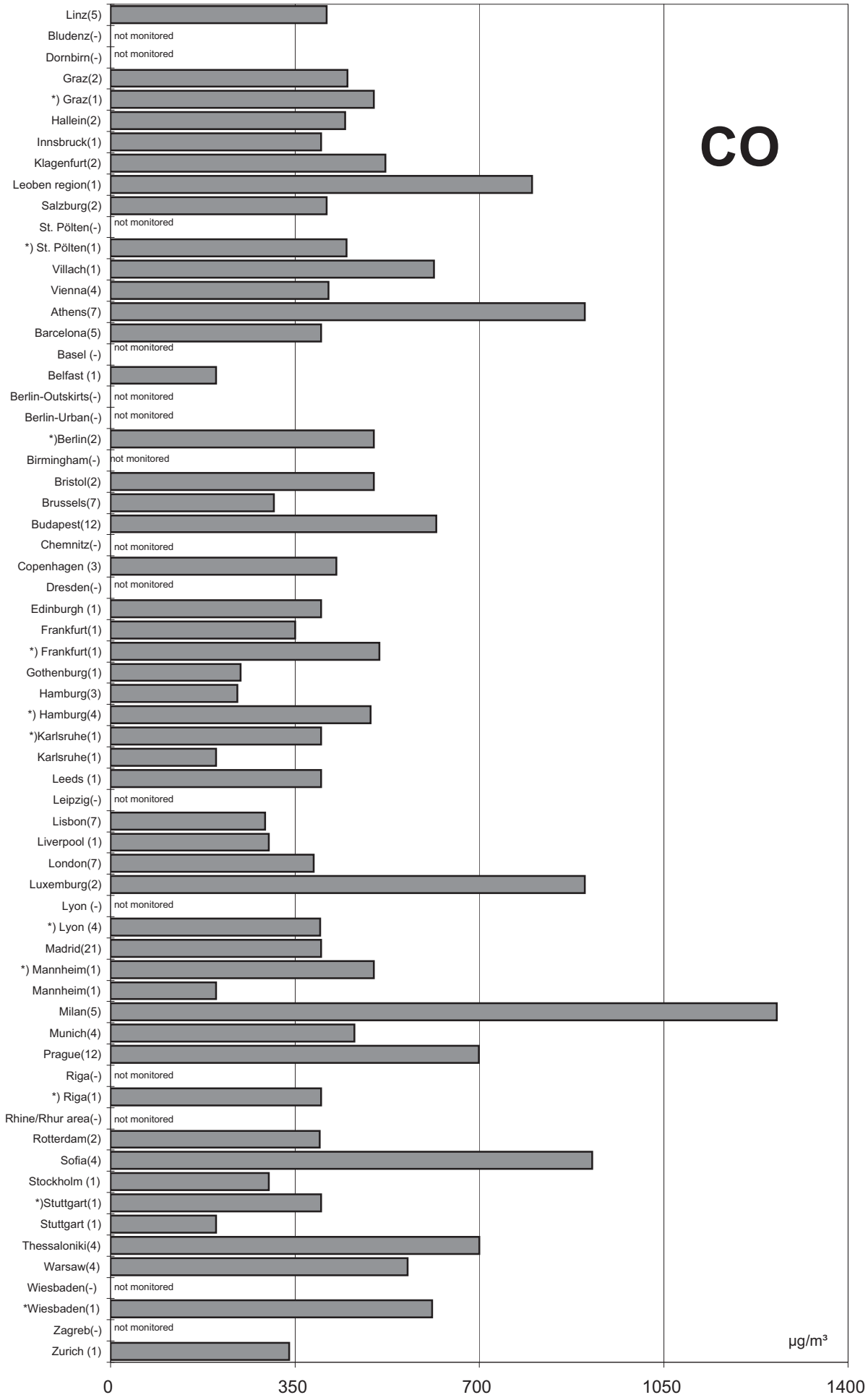

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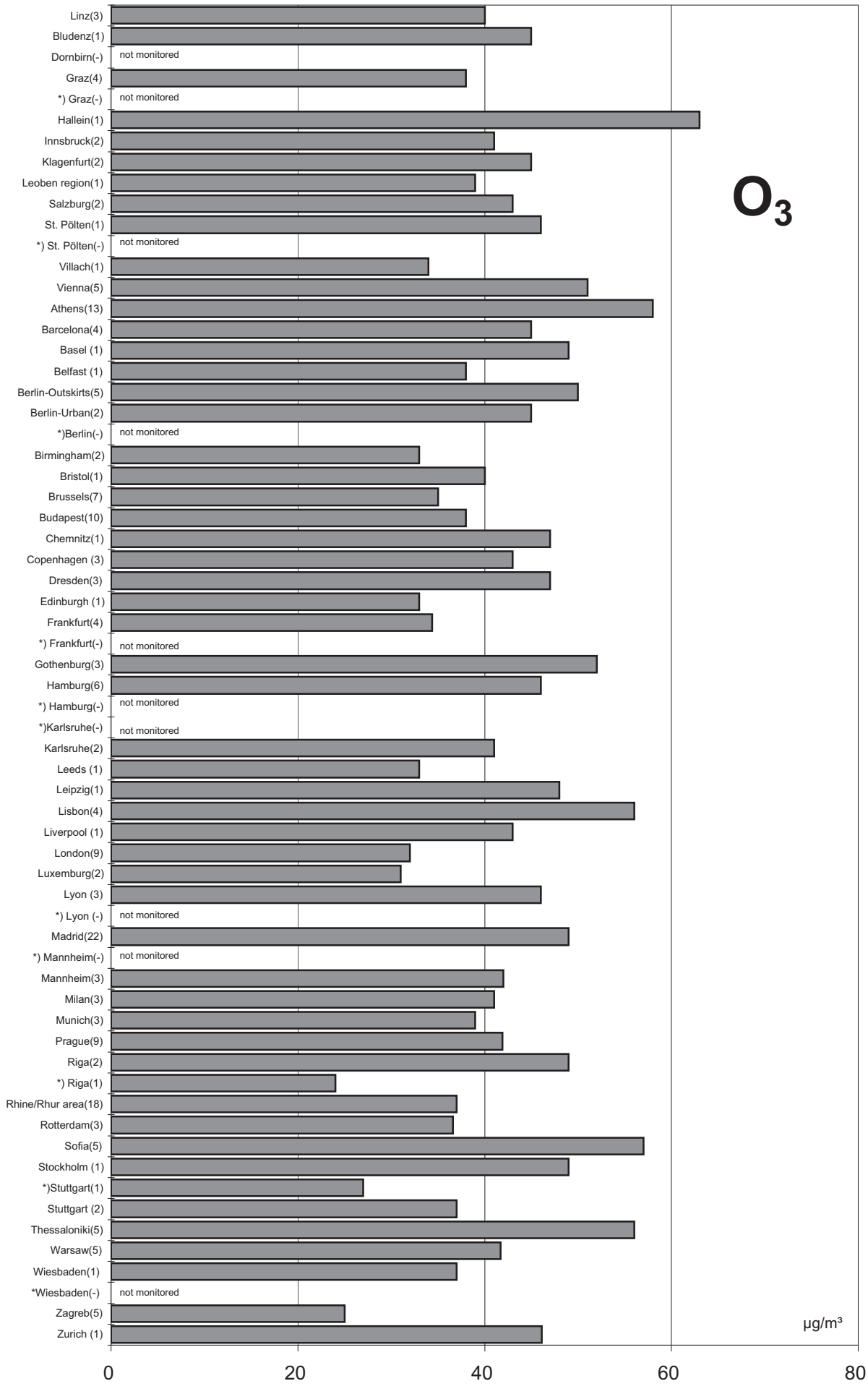
Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)



*) traffically influenced monitoring stations

Luftgütevergleich

2010

max. Tagesmittelwert

Comparison of The Air Quality

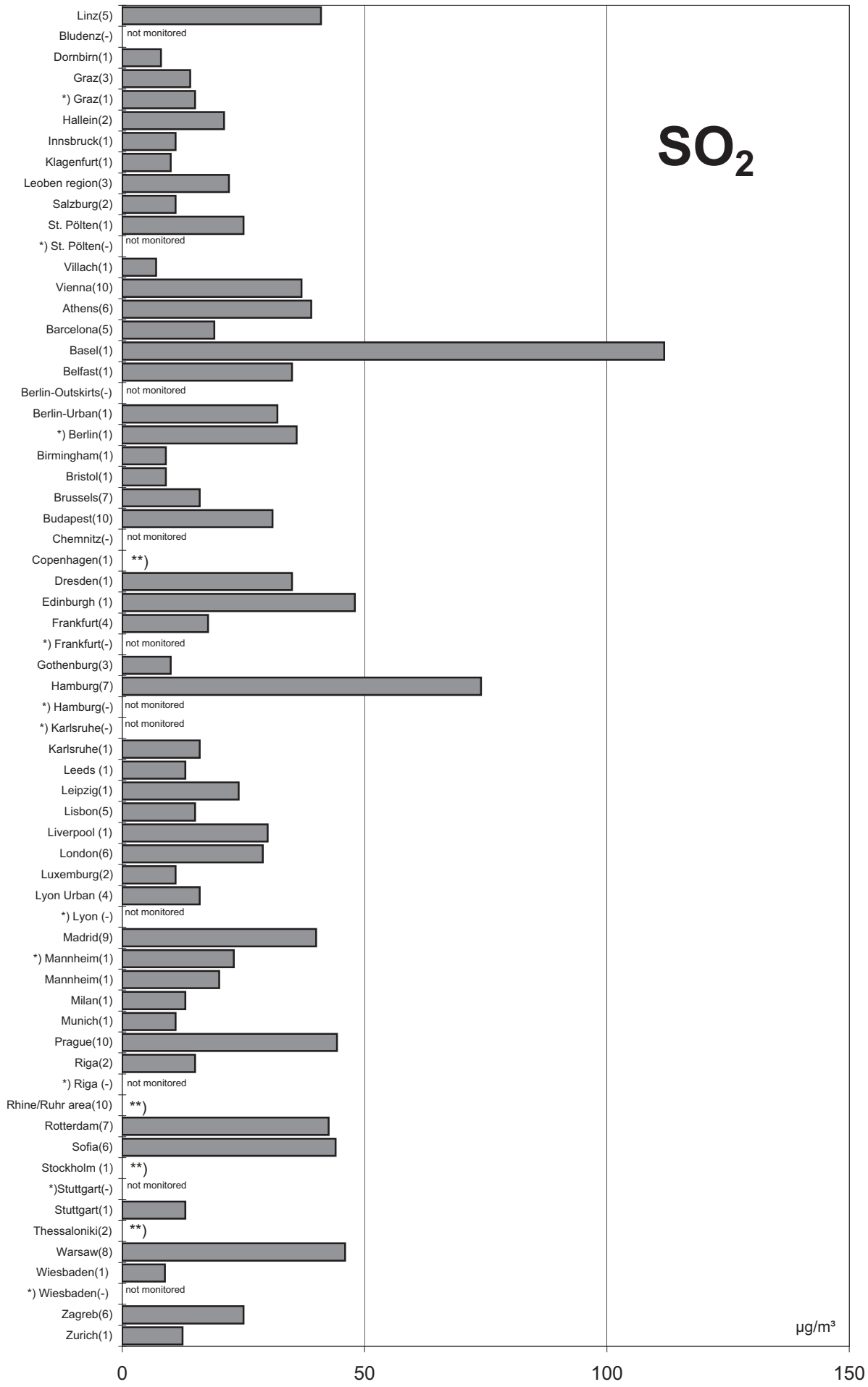
2010

Max. Daily Mean Values

Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)

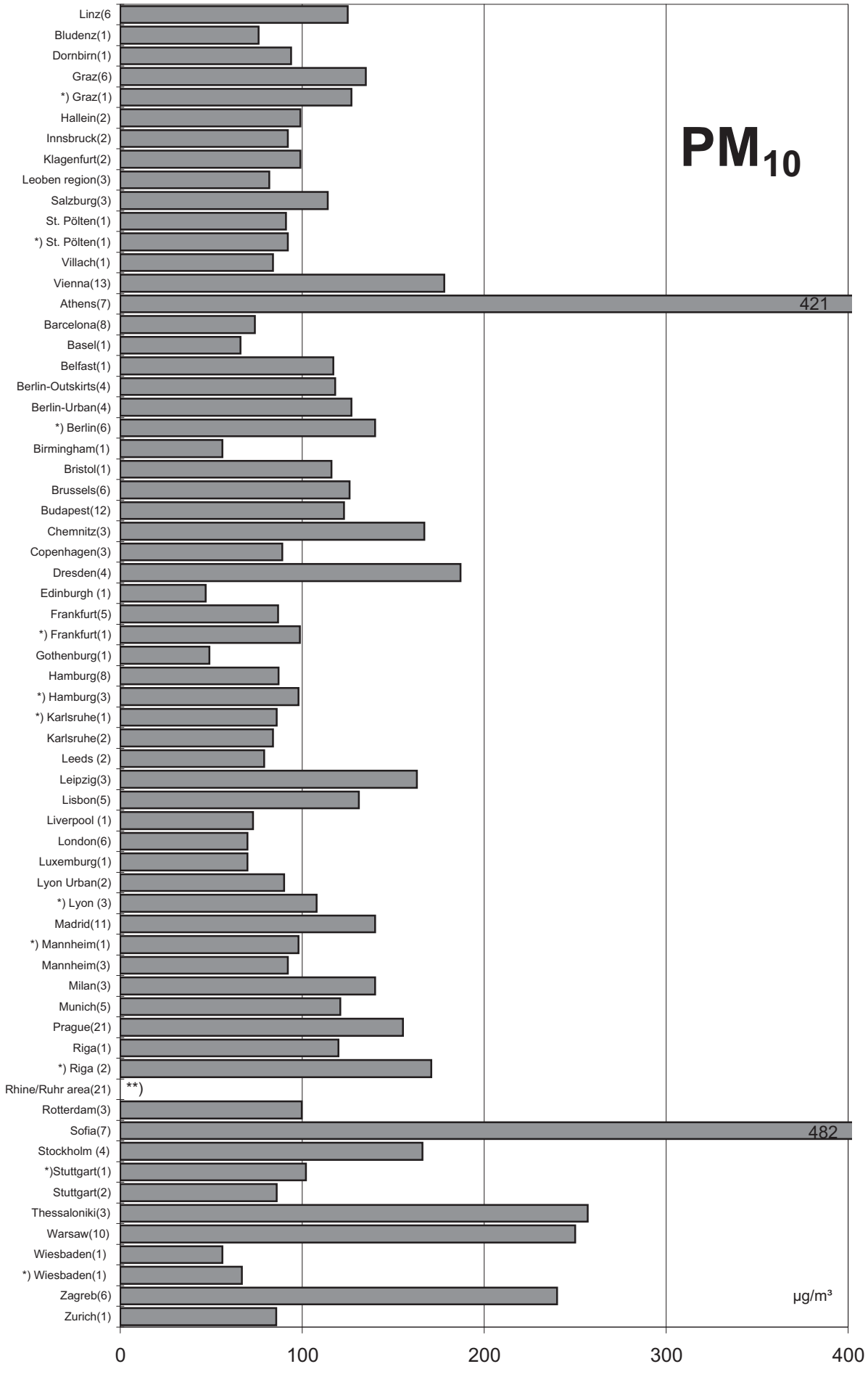


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)

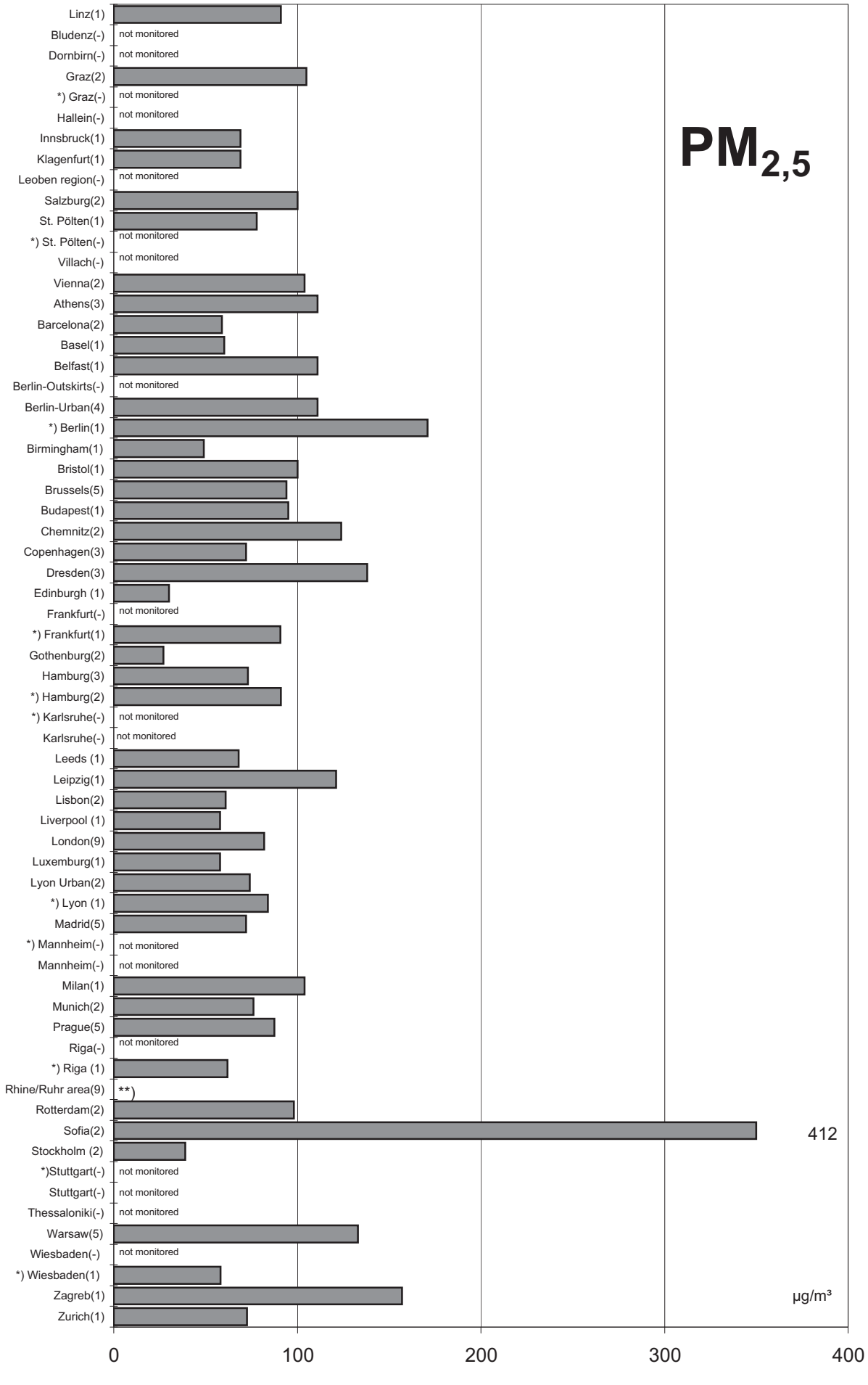


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)

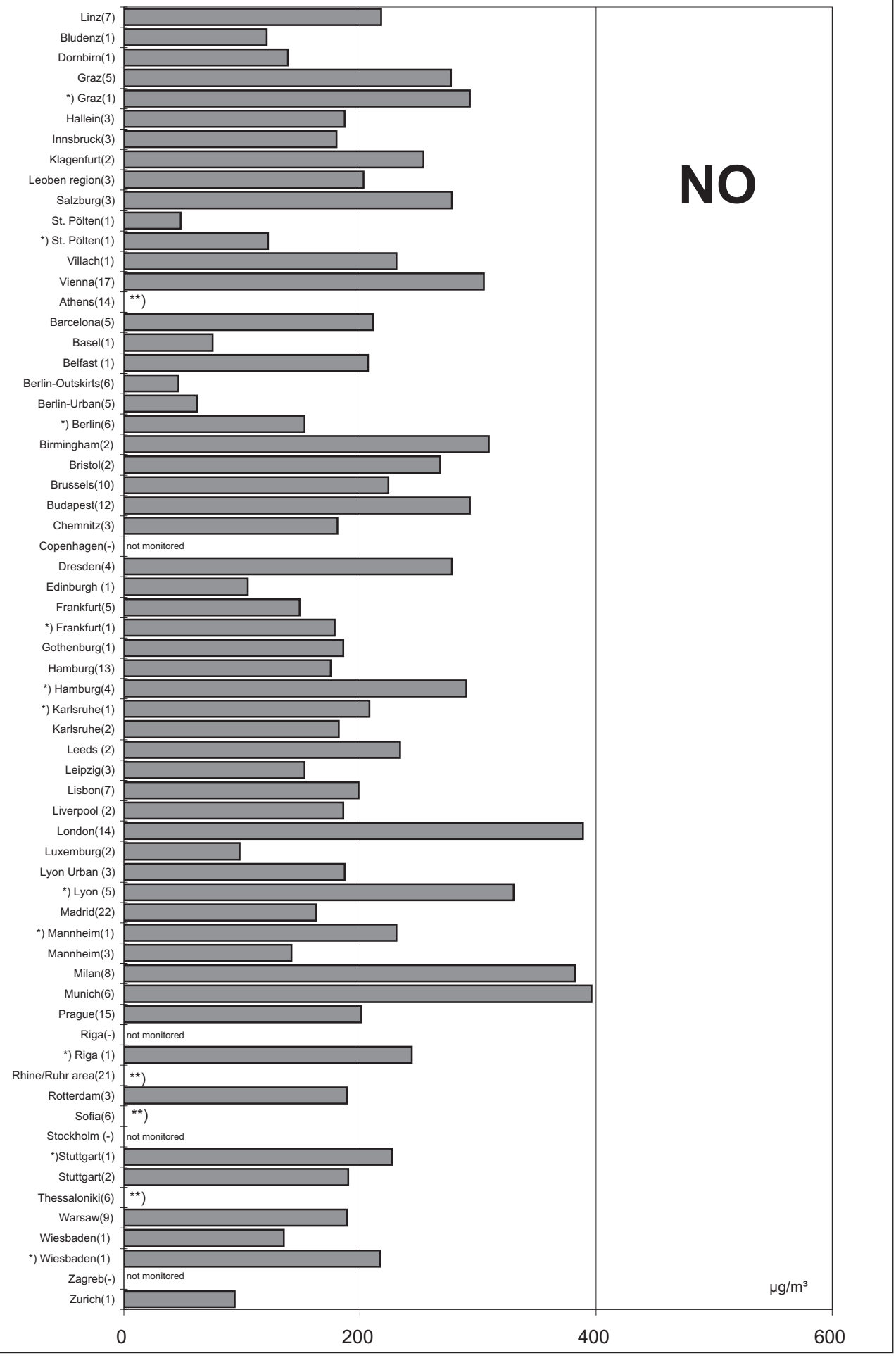


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)



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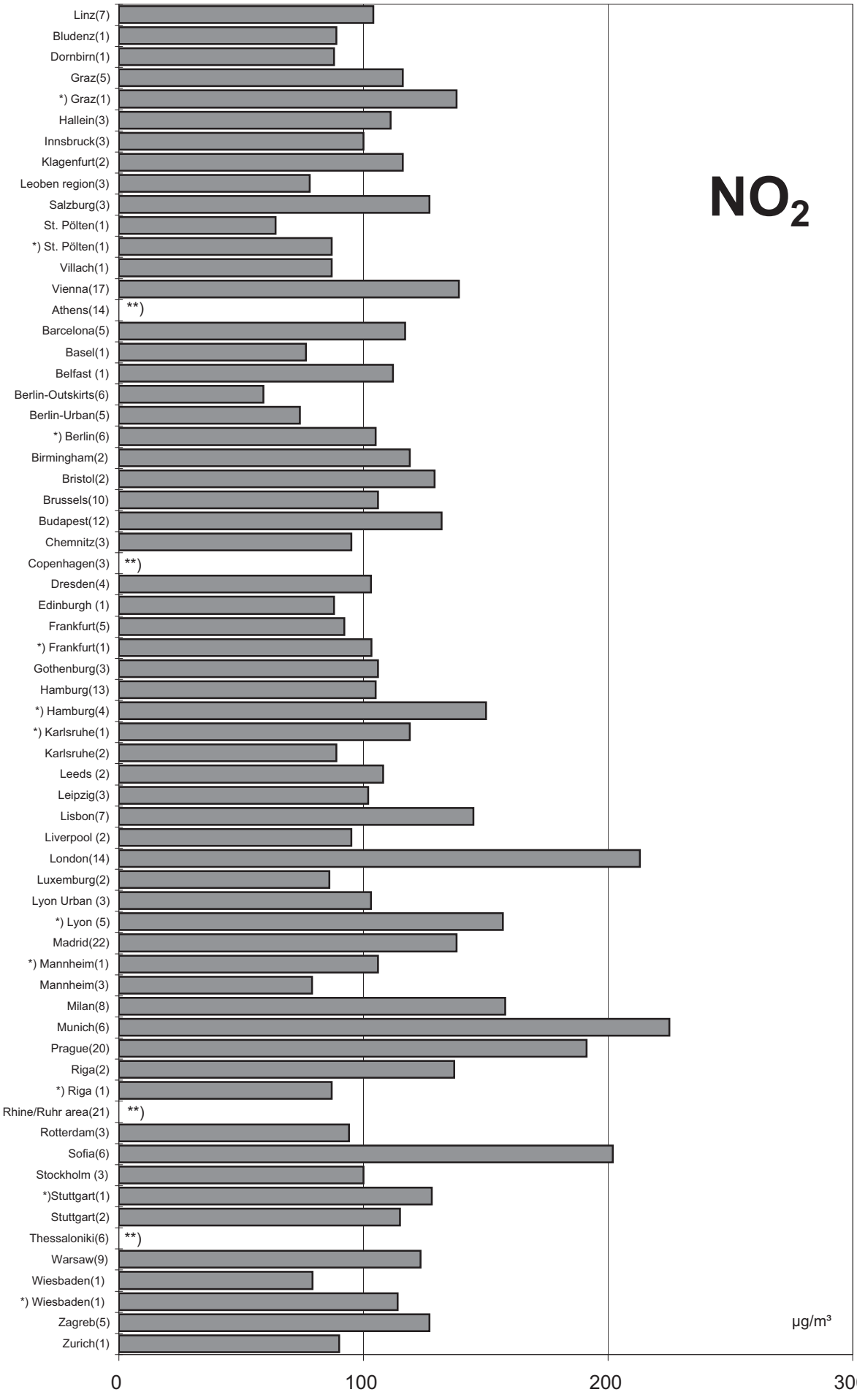
Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)



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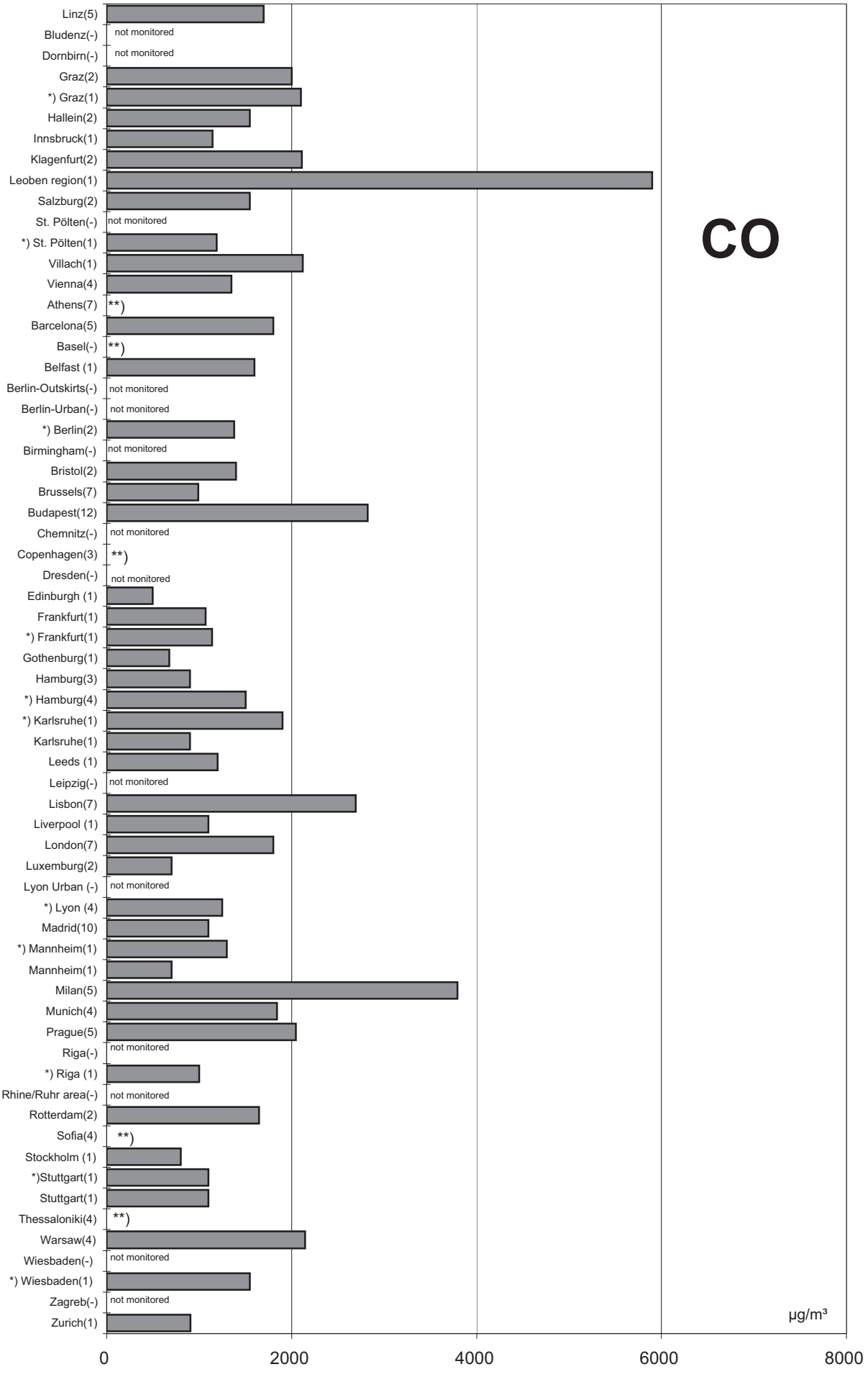
**)no data

Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)

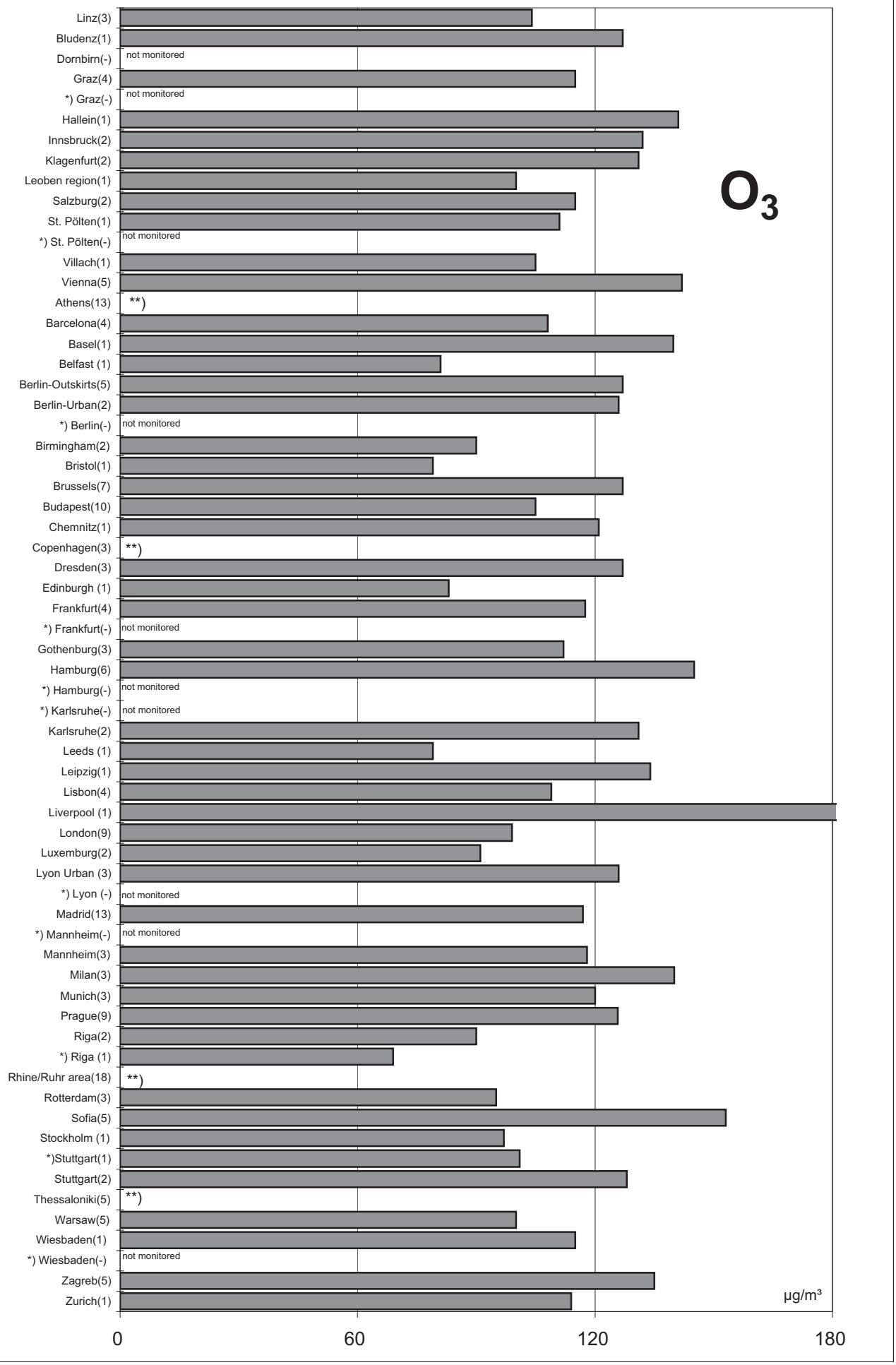


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)



*) traffically influenced monitoring stations
**)no data

Luftgütevergleich

2010

max. 1h-Mittelwerte

Comparison of The Air Quality

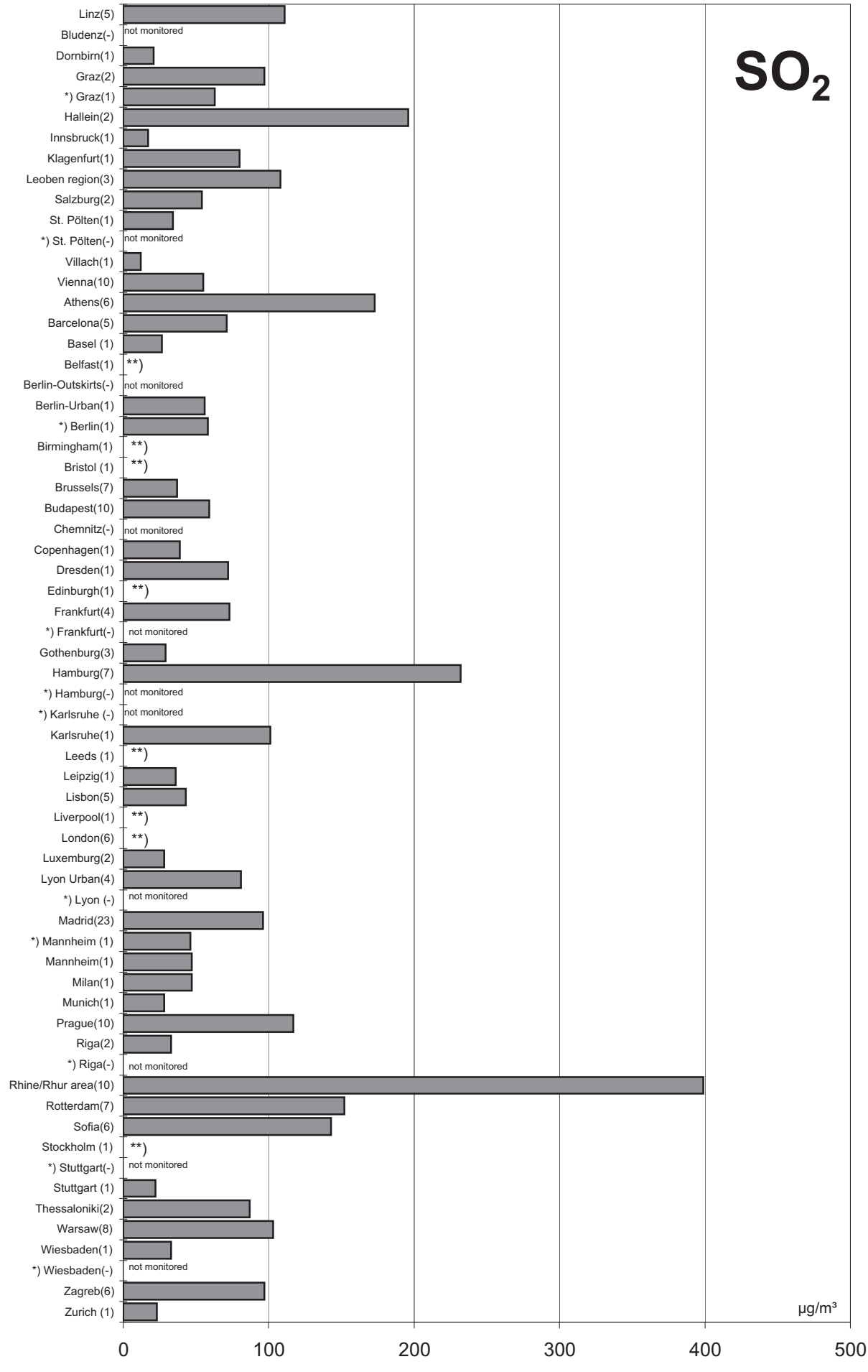
2010

Max. 1h-Mean Values

Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)

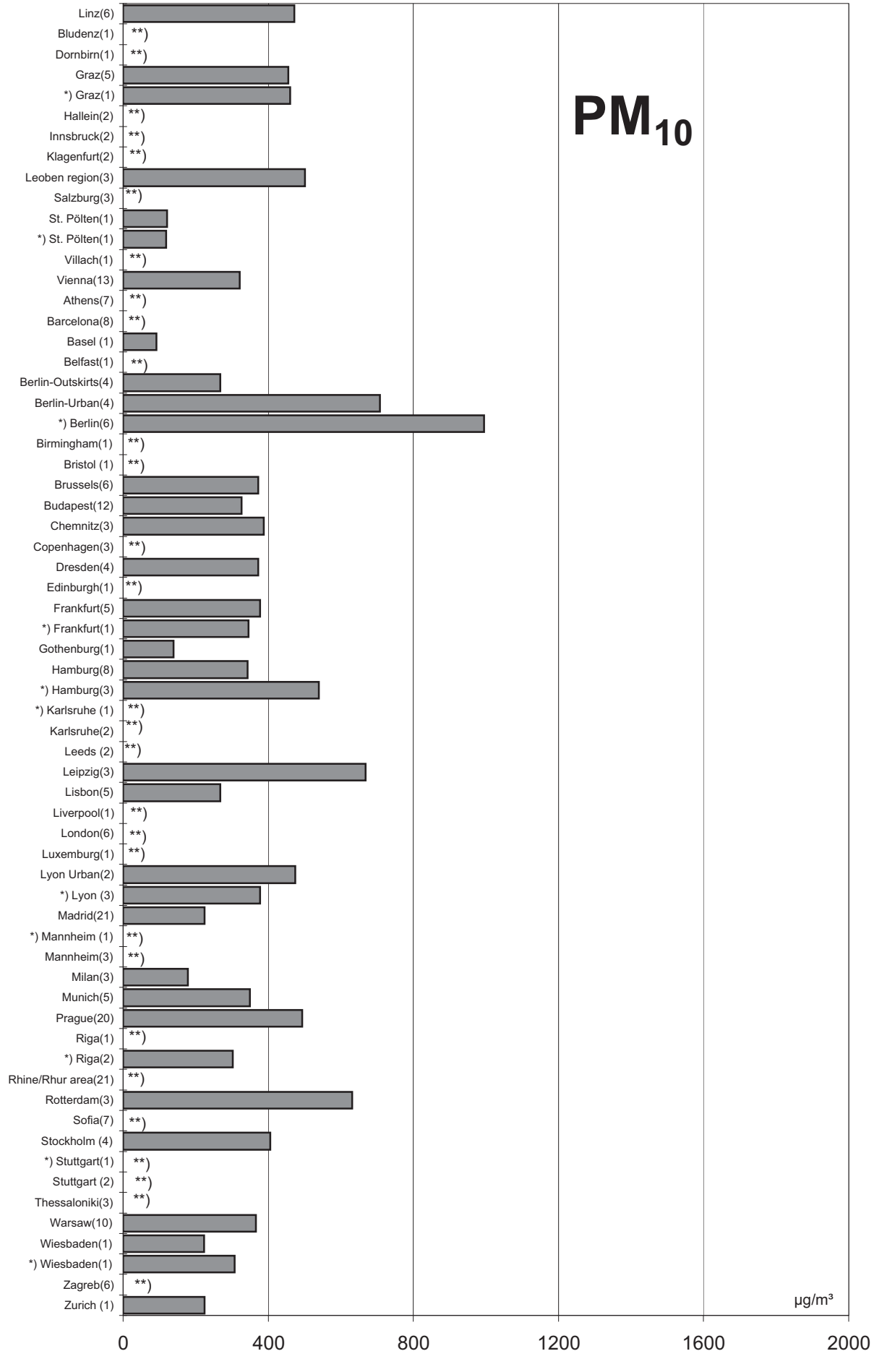


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)

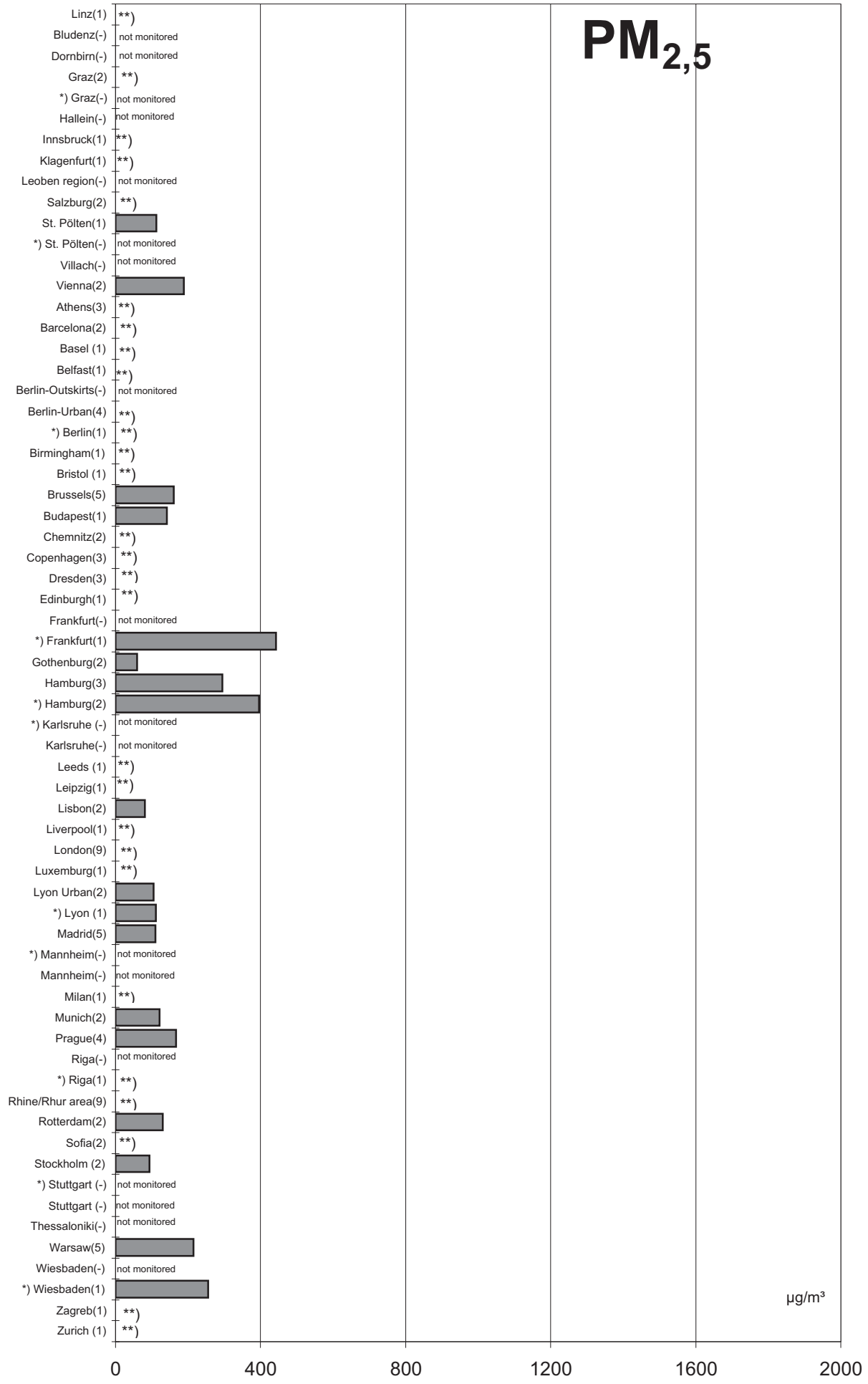


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)

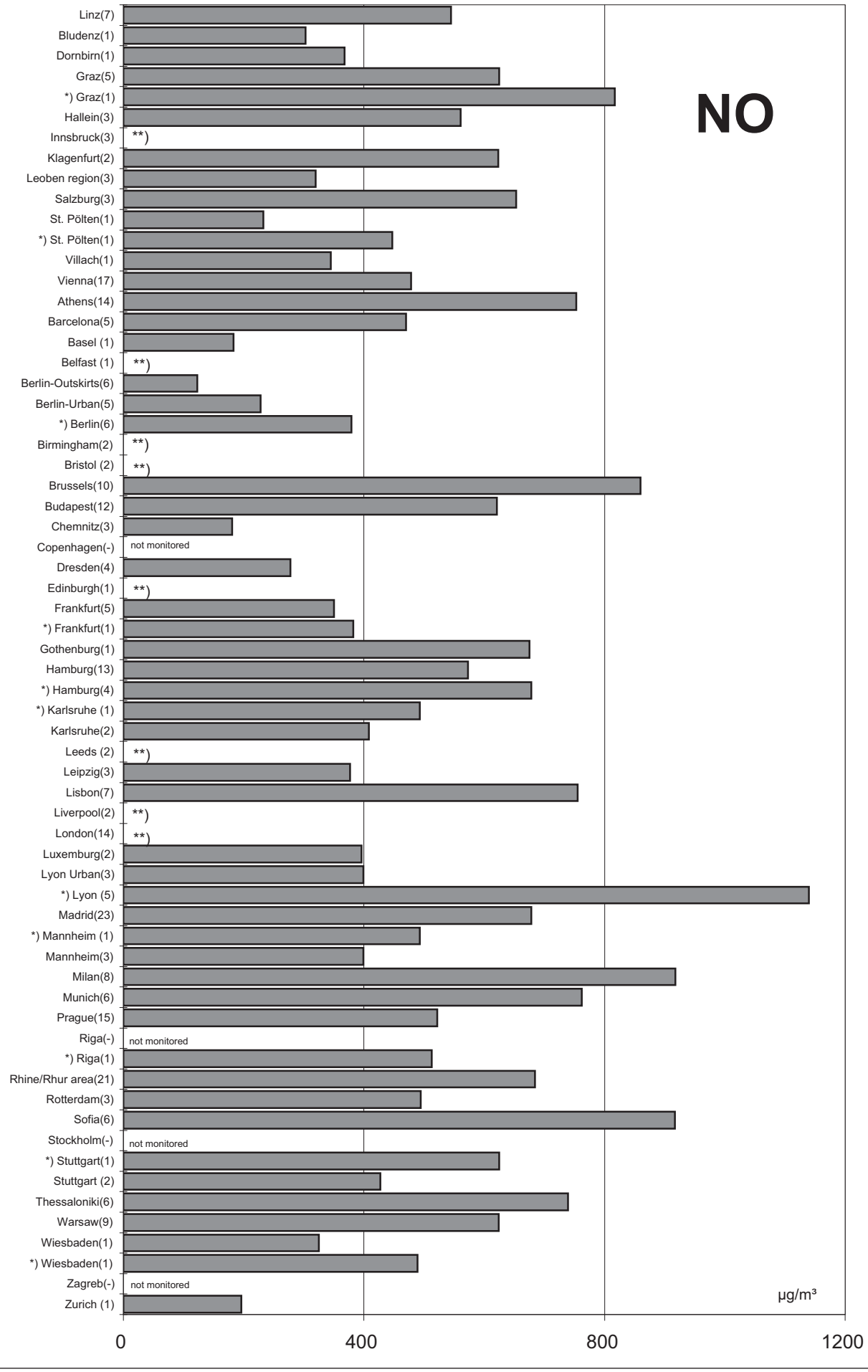


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)



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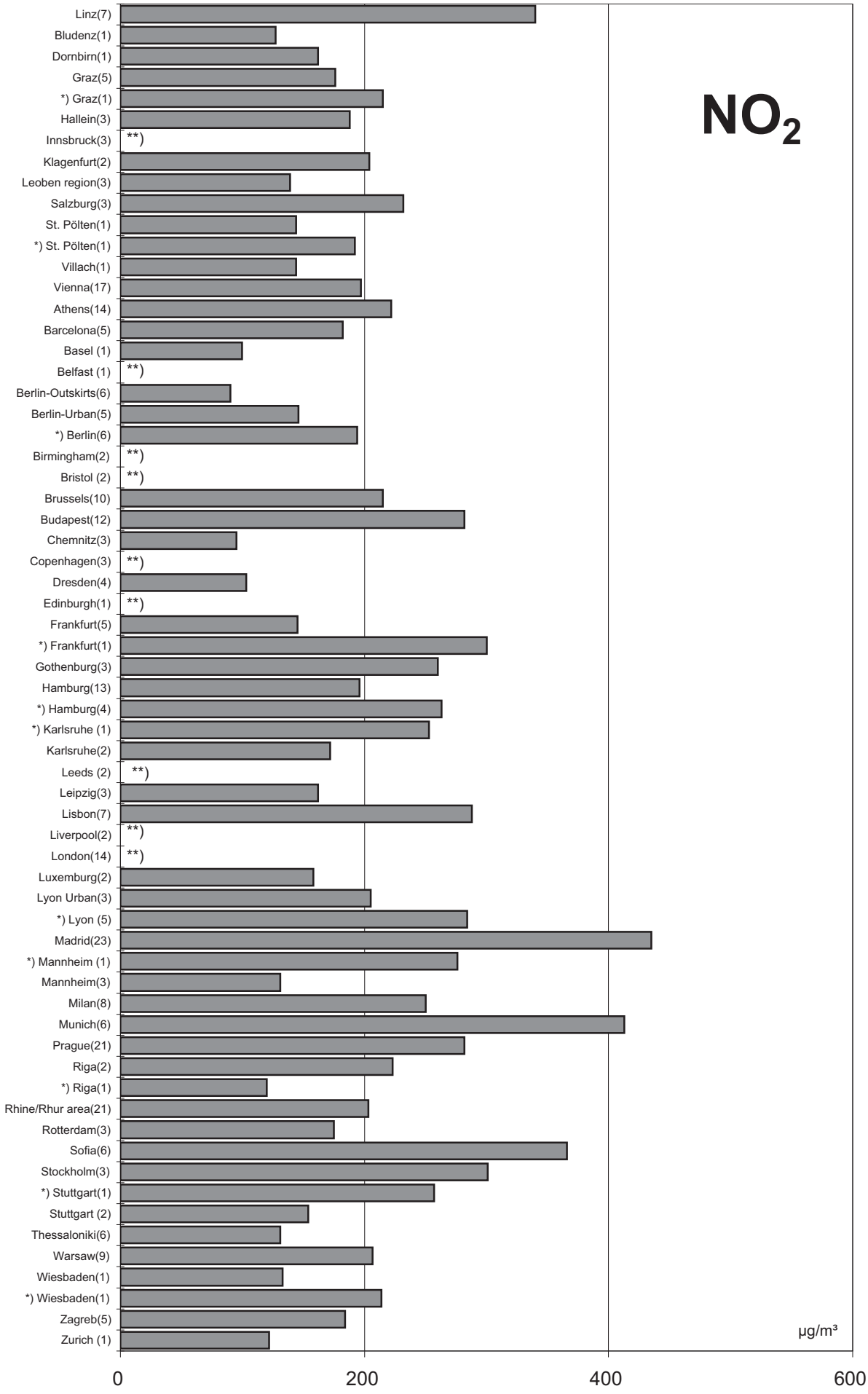
Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)



*) traffically influenced monitoring stations
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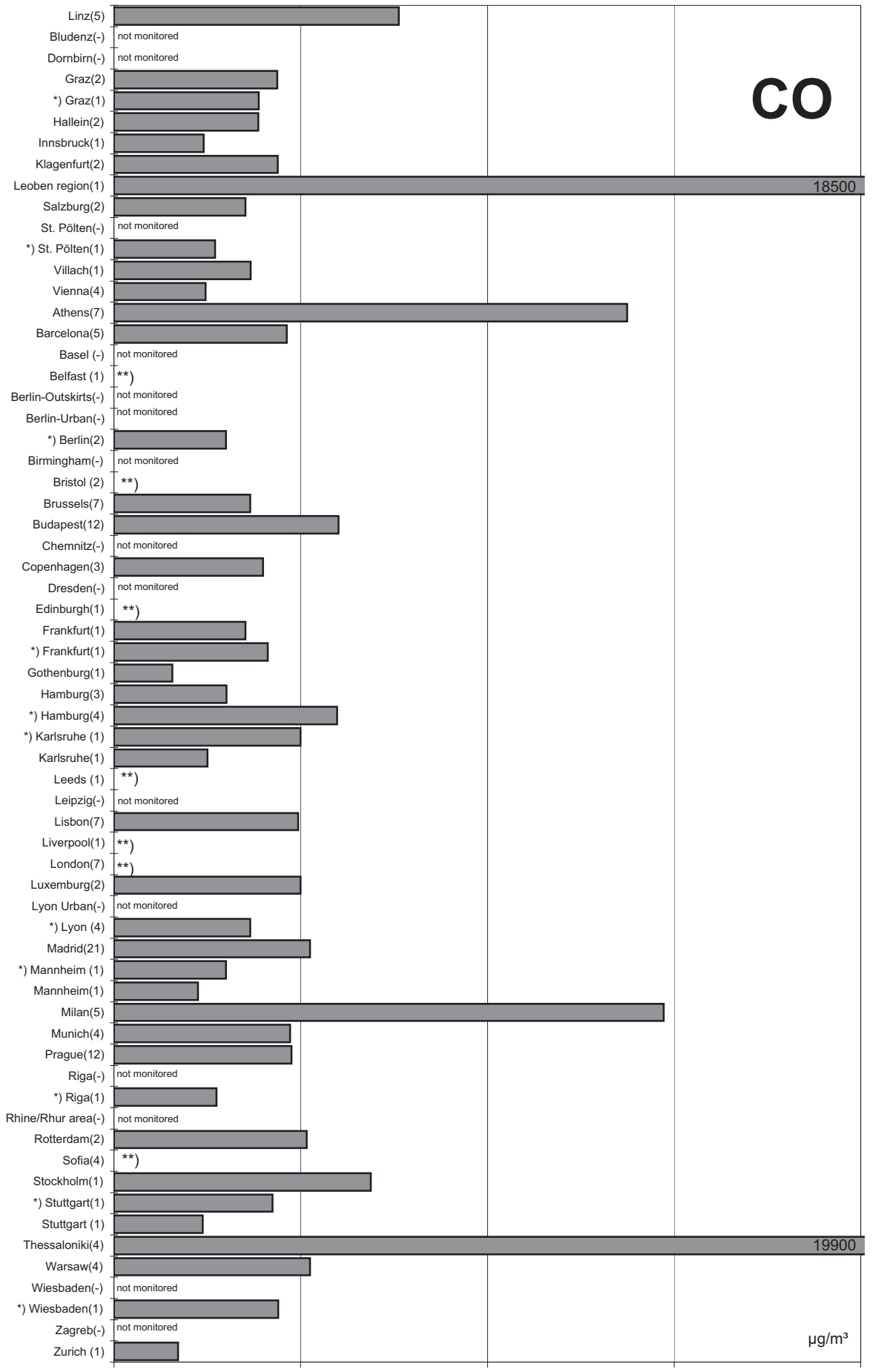
Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)

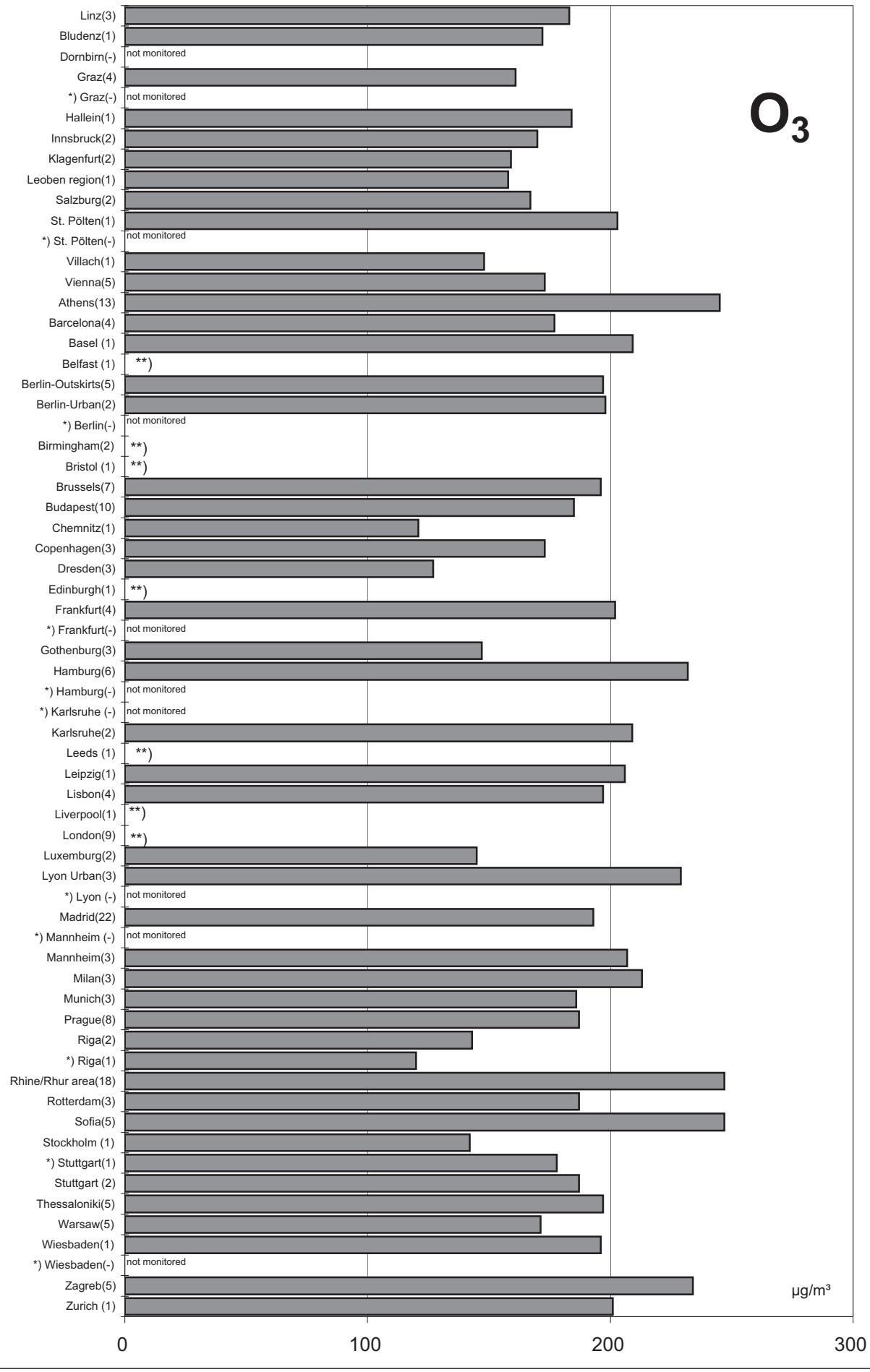


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2010

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

(in parentheses: number of monitoring stations)



*) traffically influenced monitoring stations
**)no data

Jahresvergleich

1992 - 2010

Jahresmittelwerte

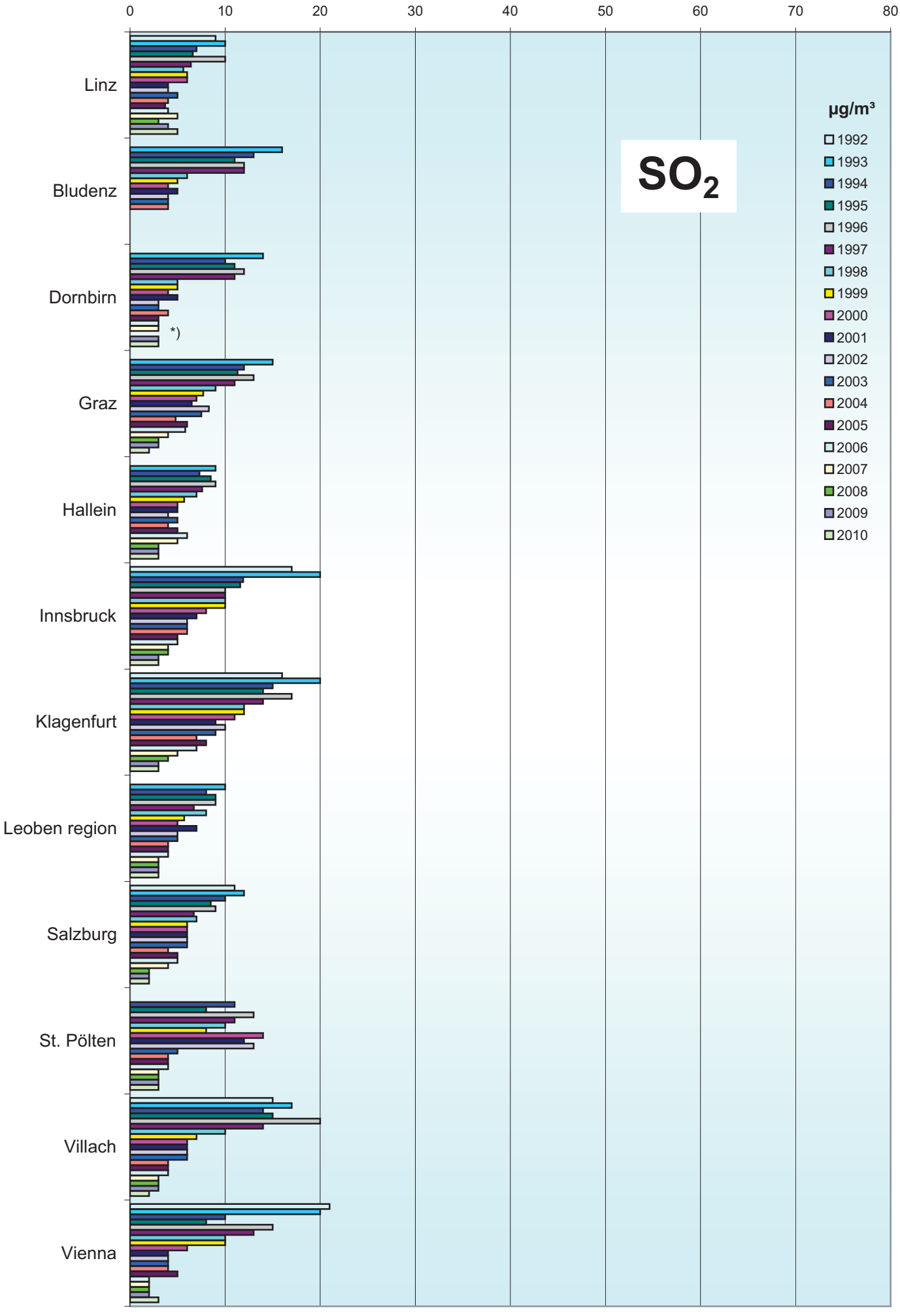
Comparison of The Air Quality Over The Years

1992 - 2010

Annual Mean Values

Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



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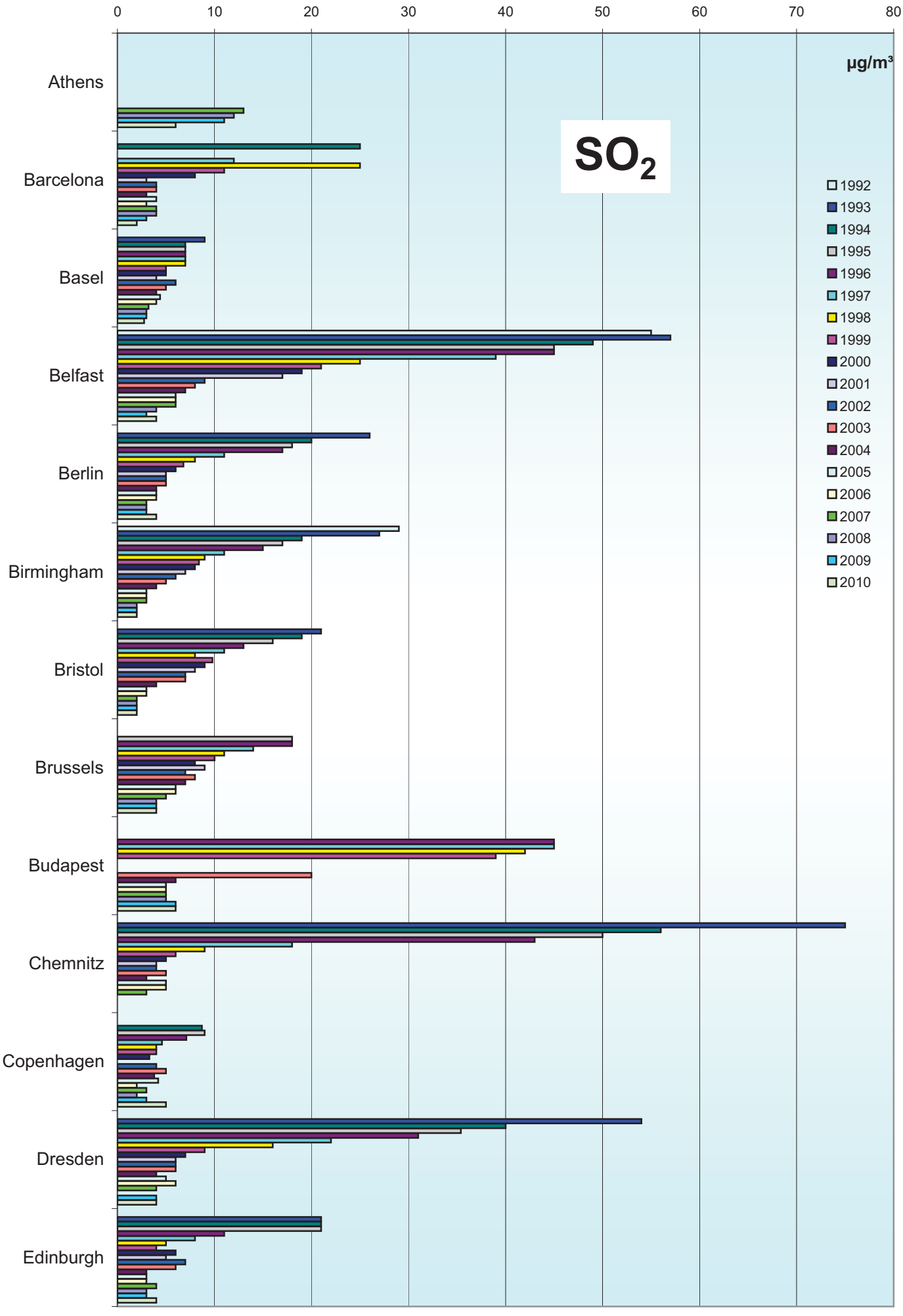
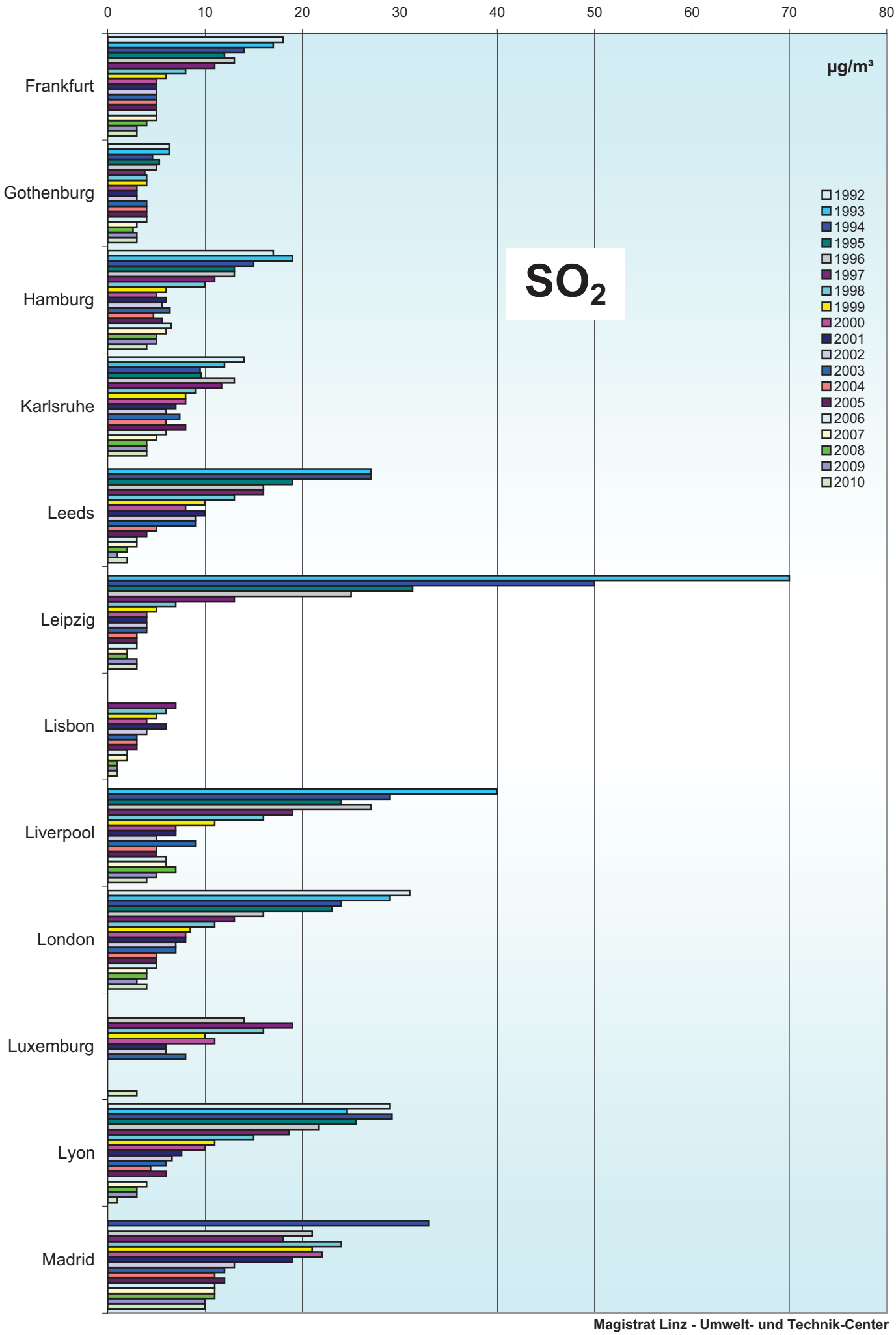
Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



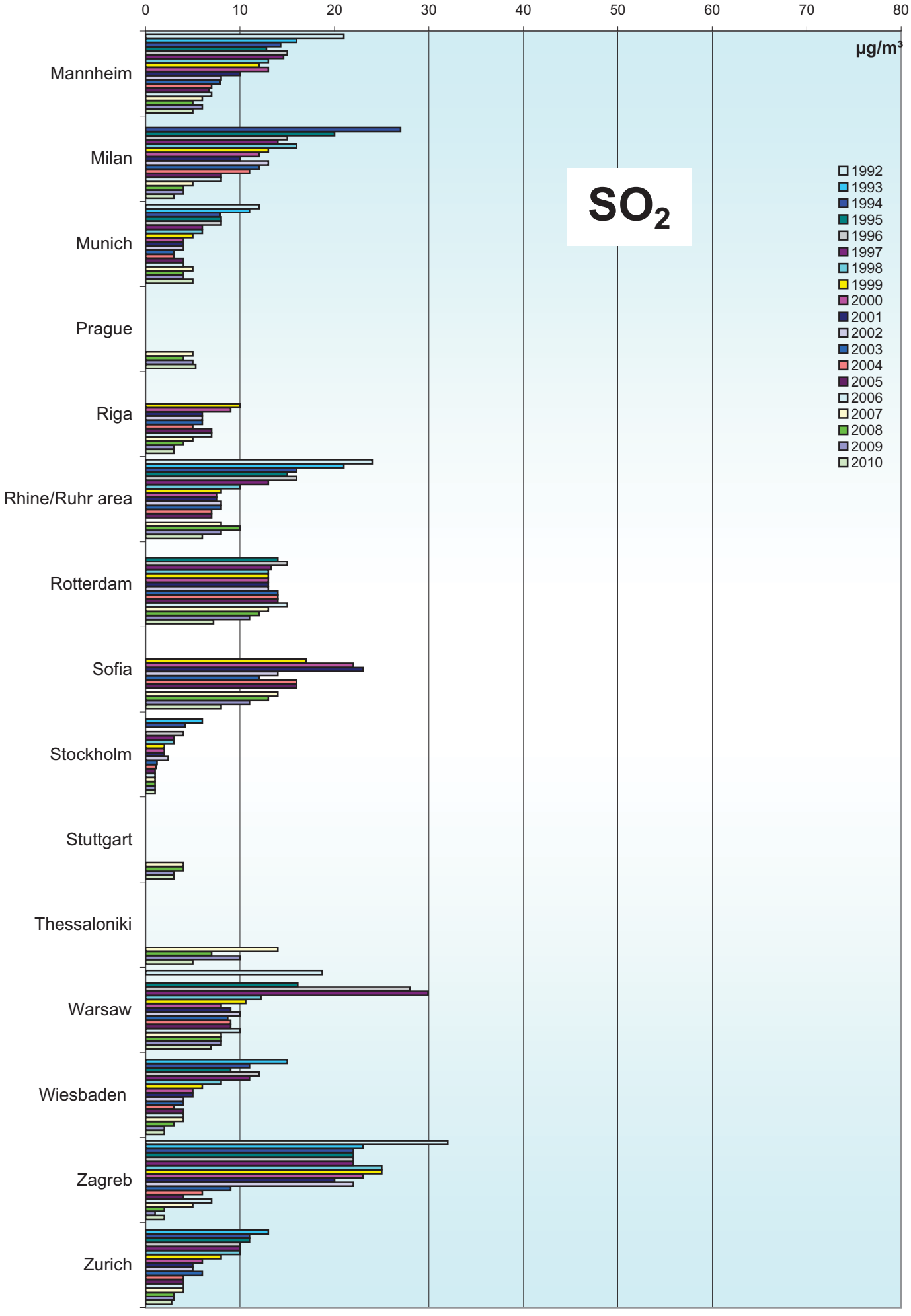
Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



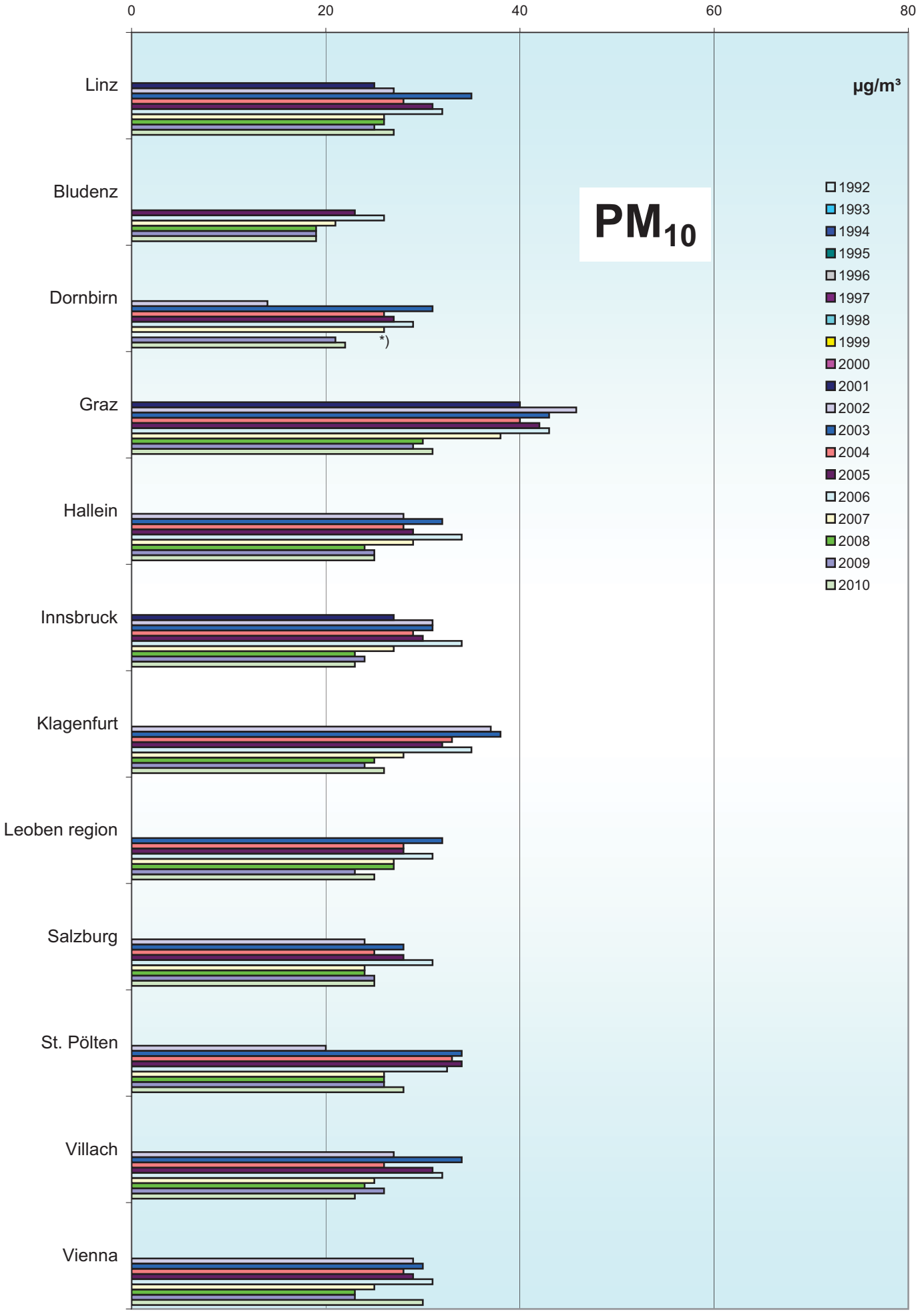
Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



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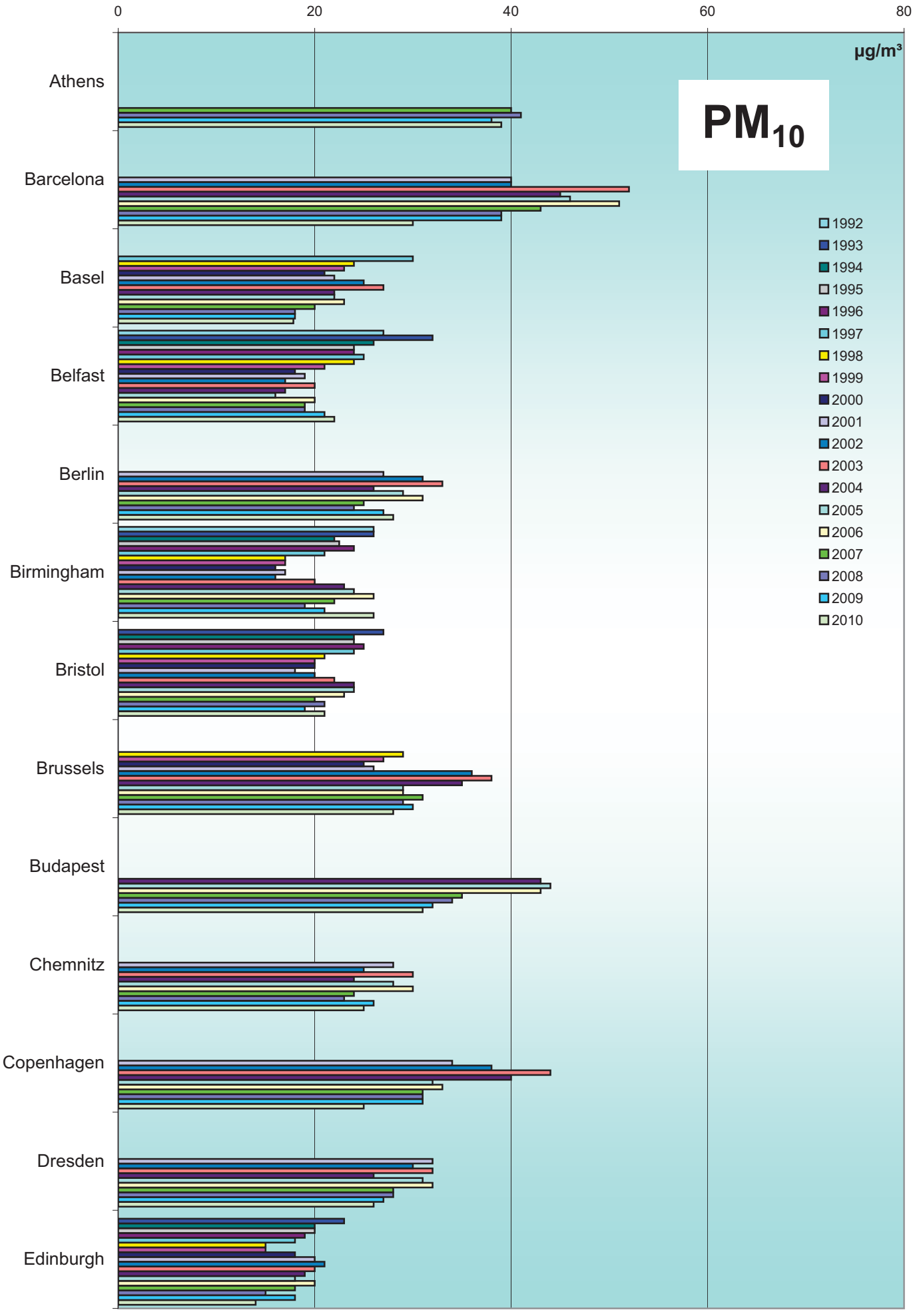
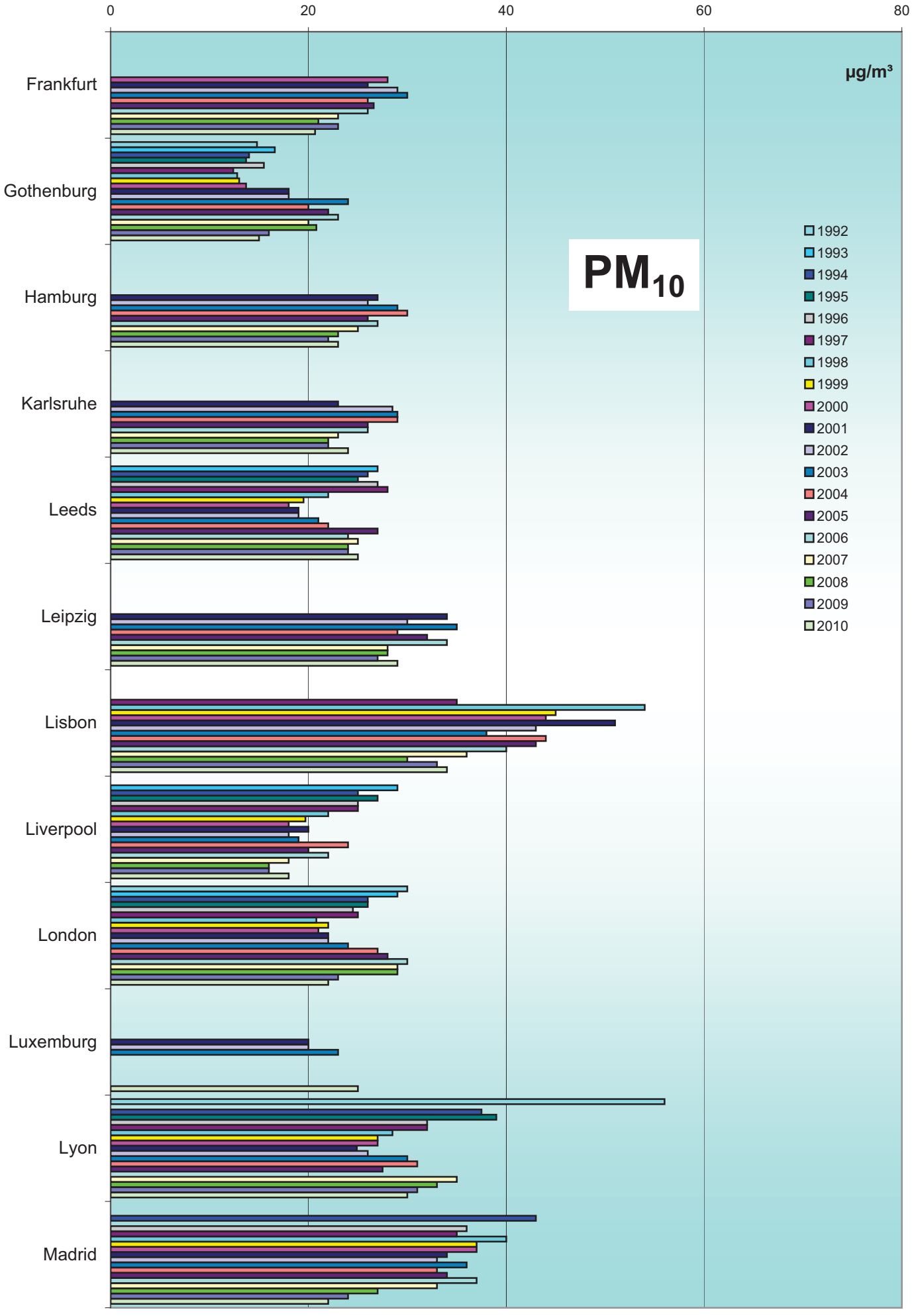
Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



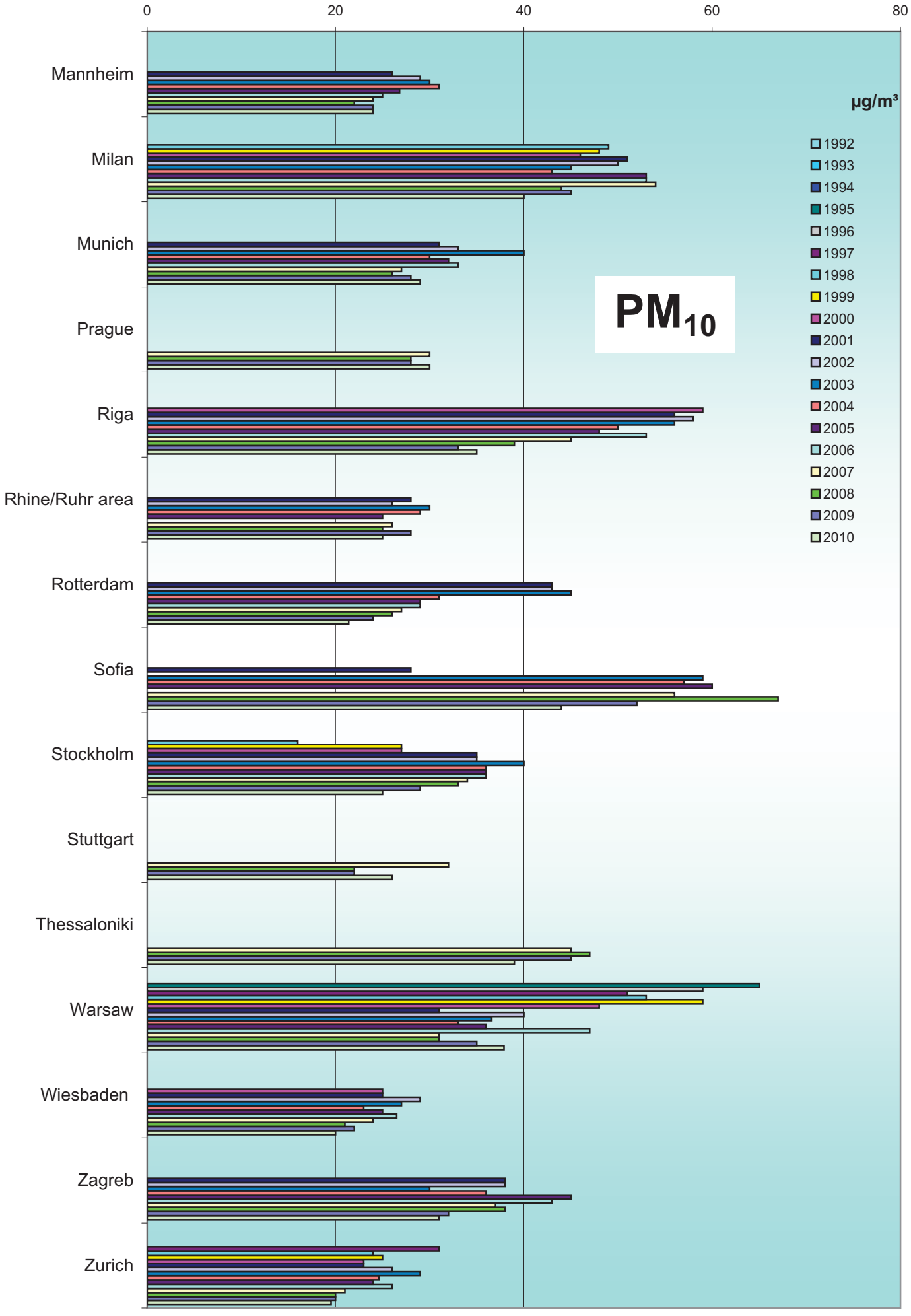
Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



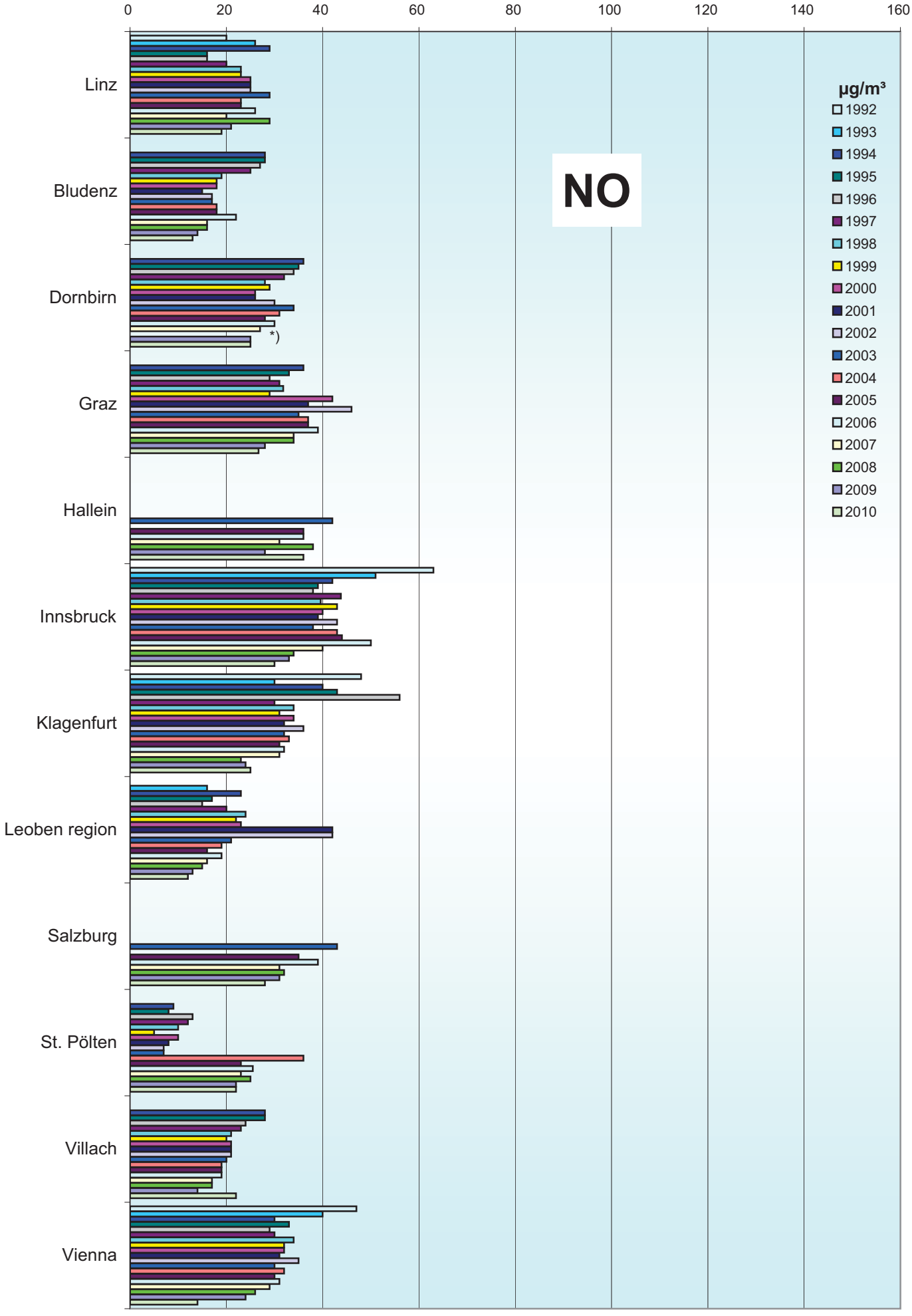
Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



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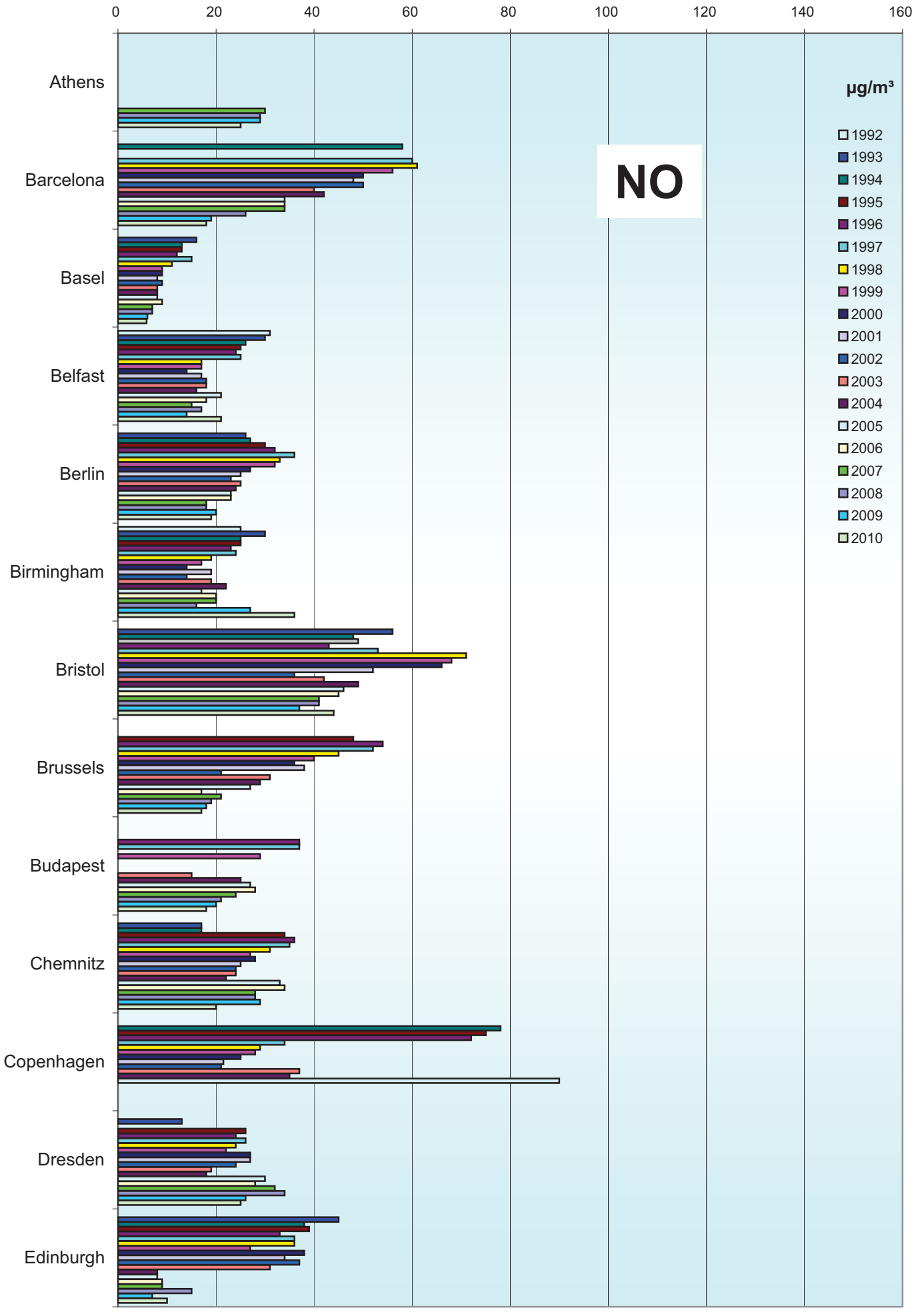
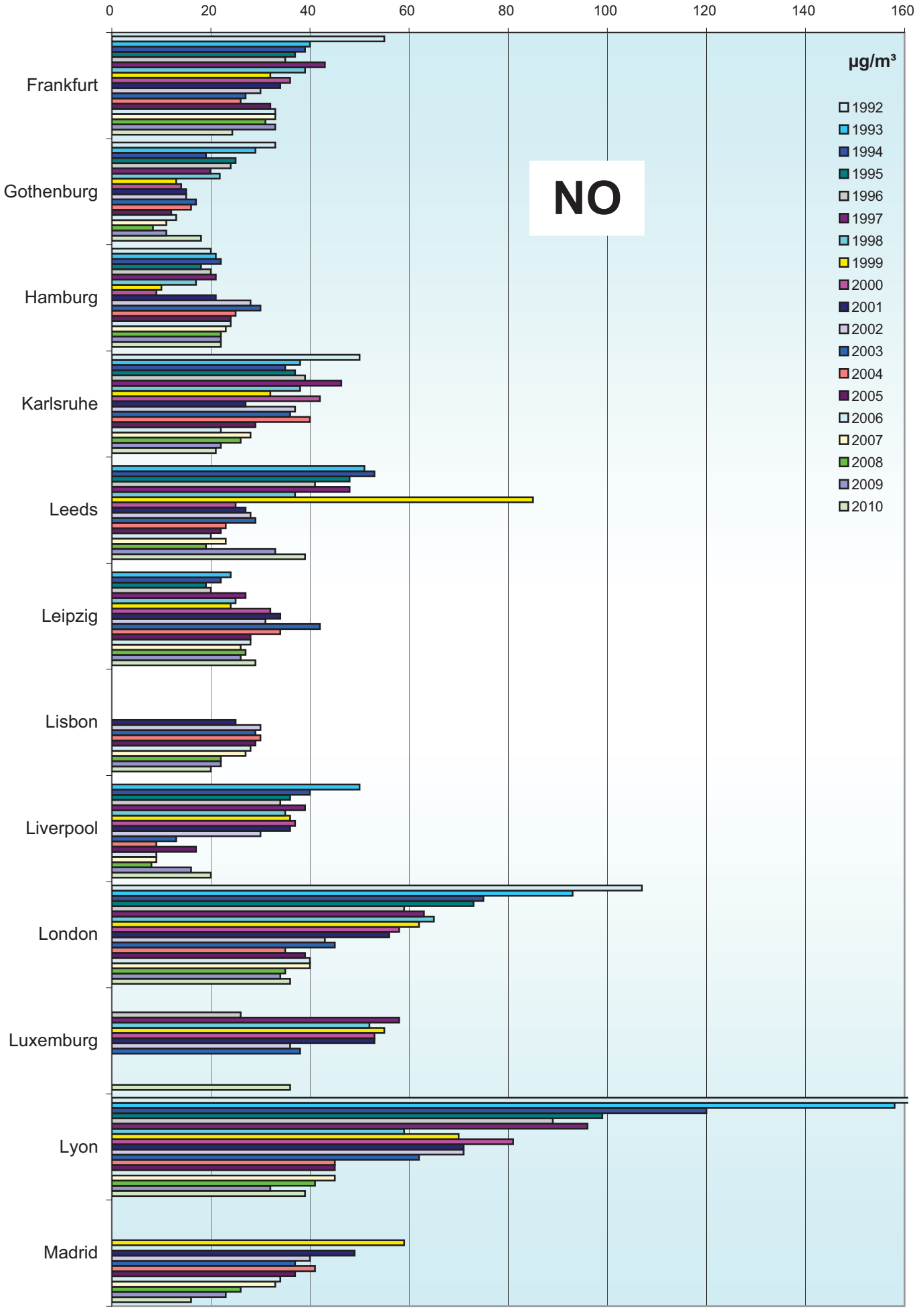
Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



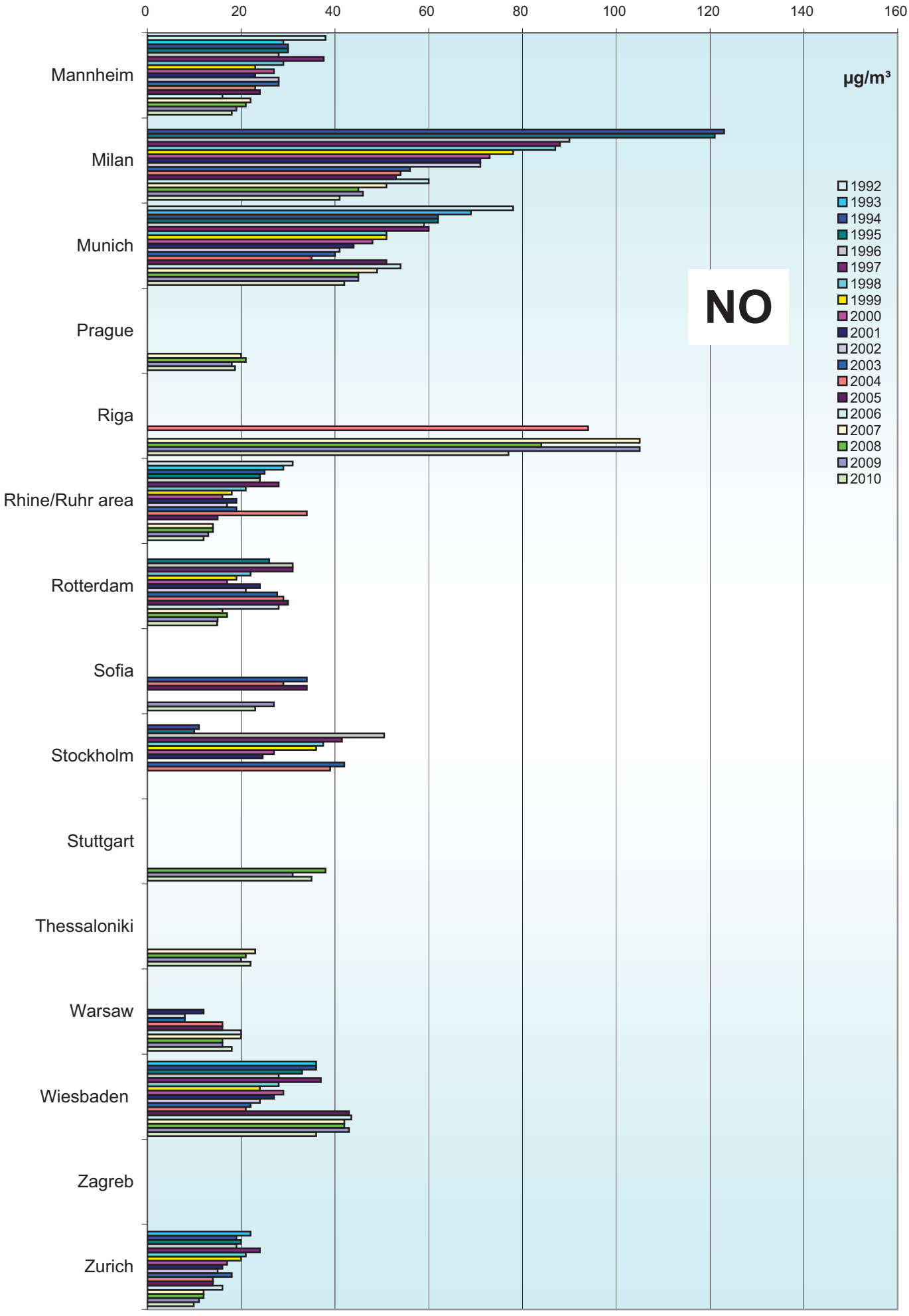
Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



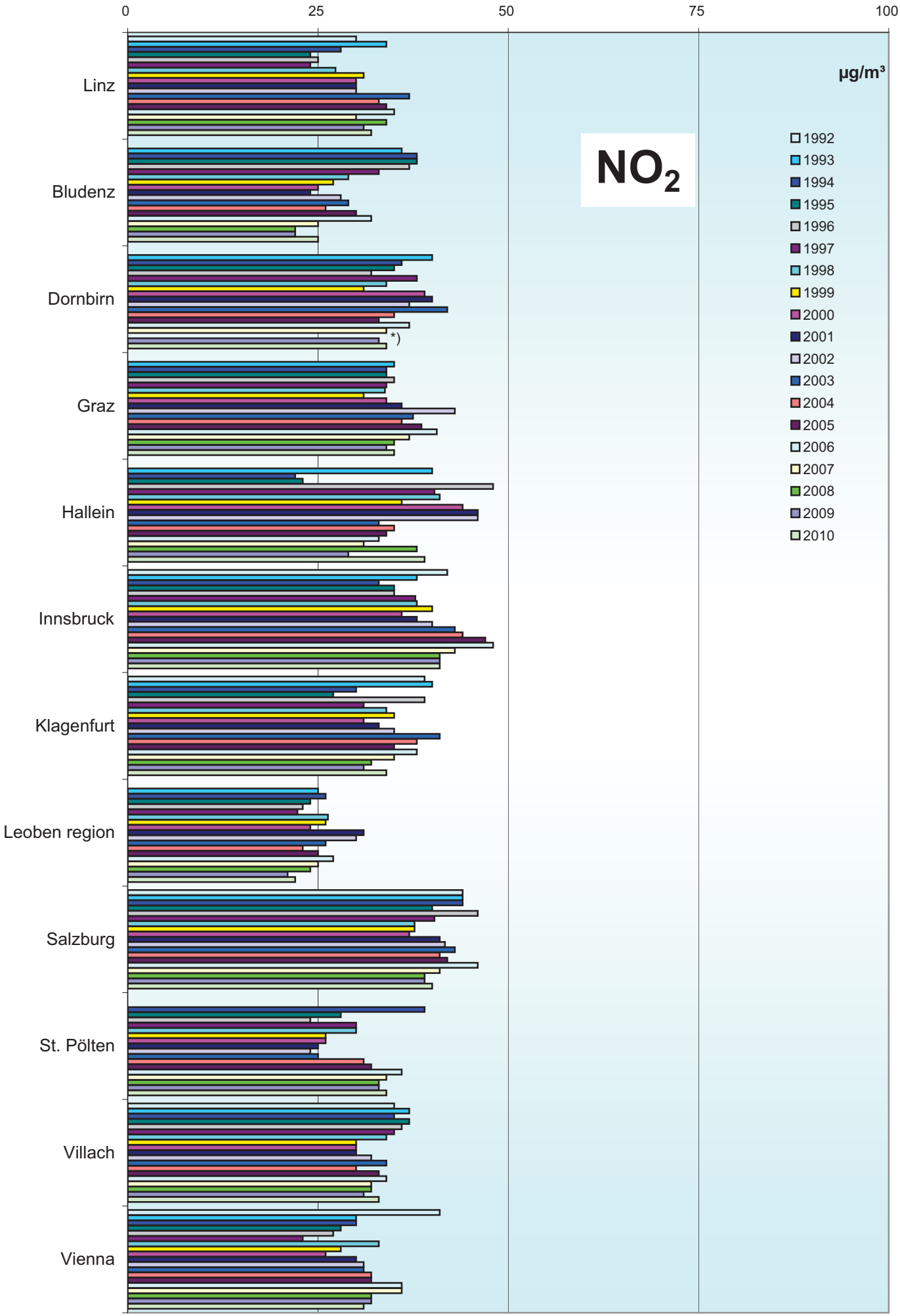
Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



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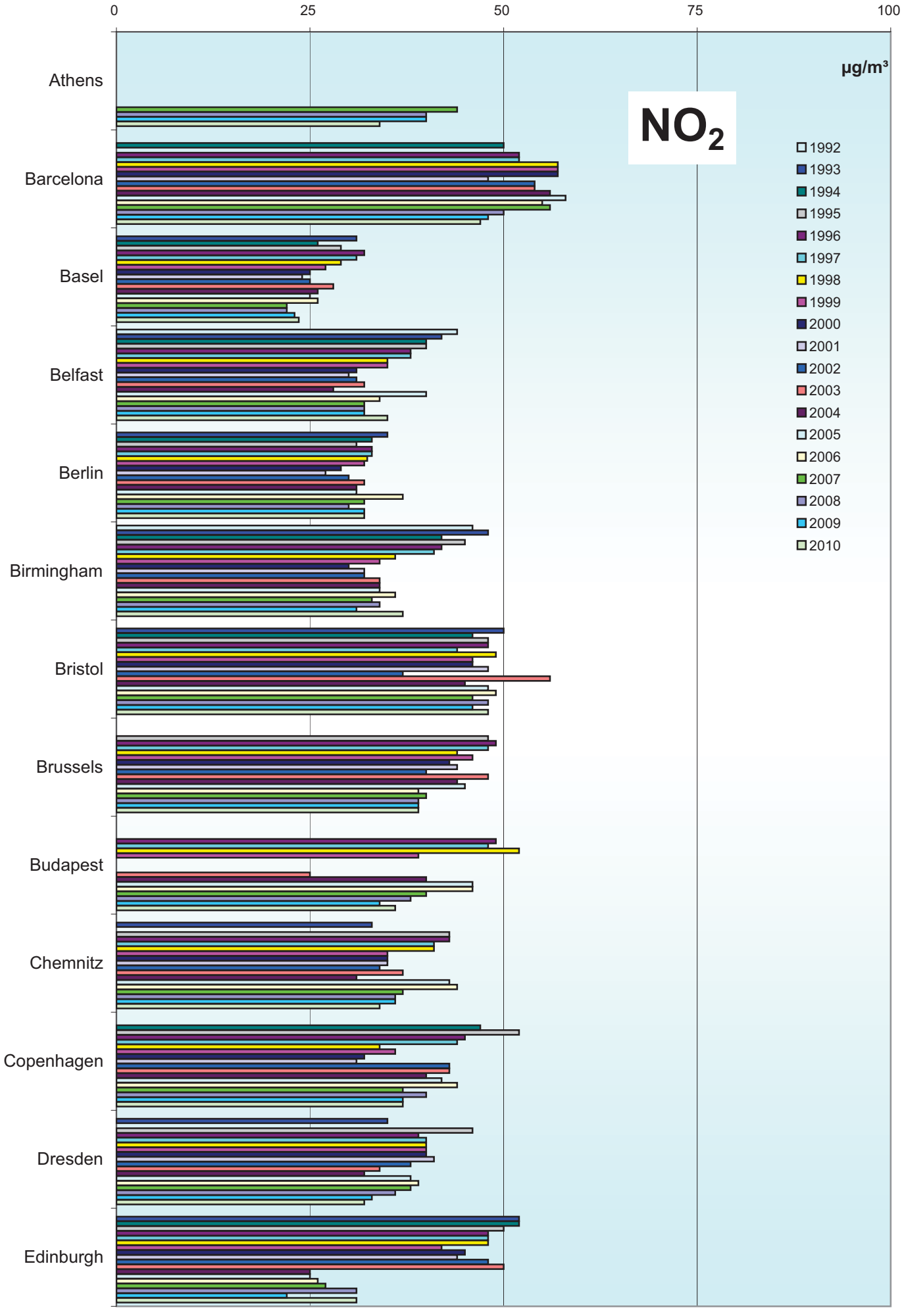
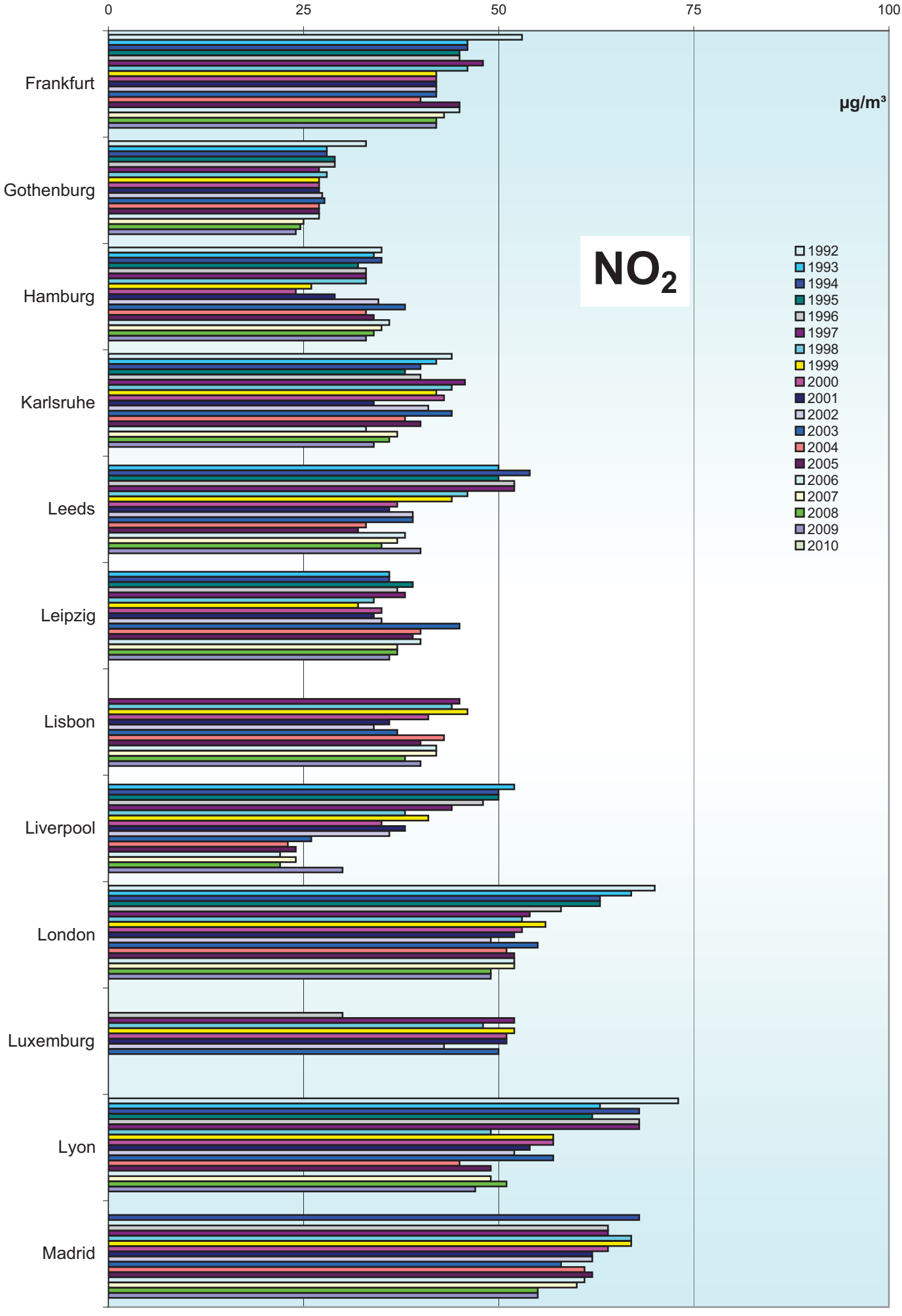
Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



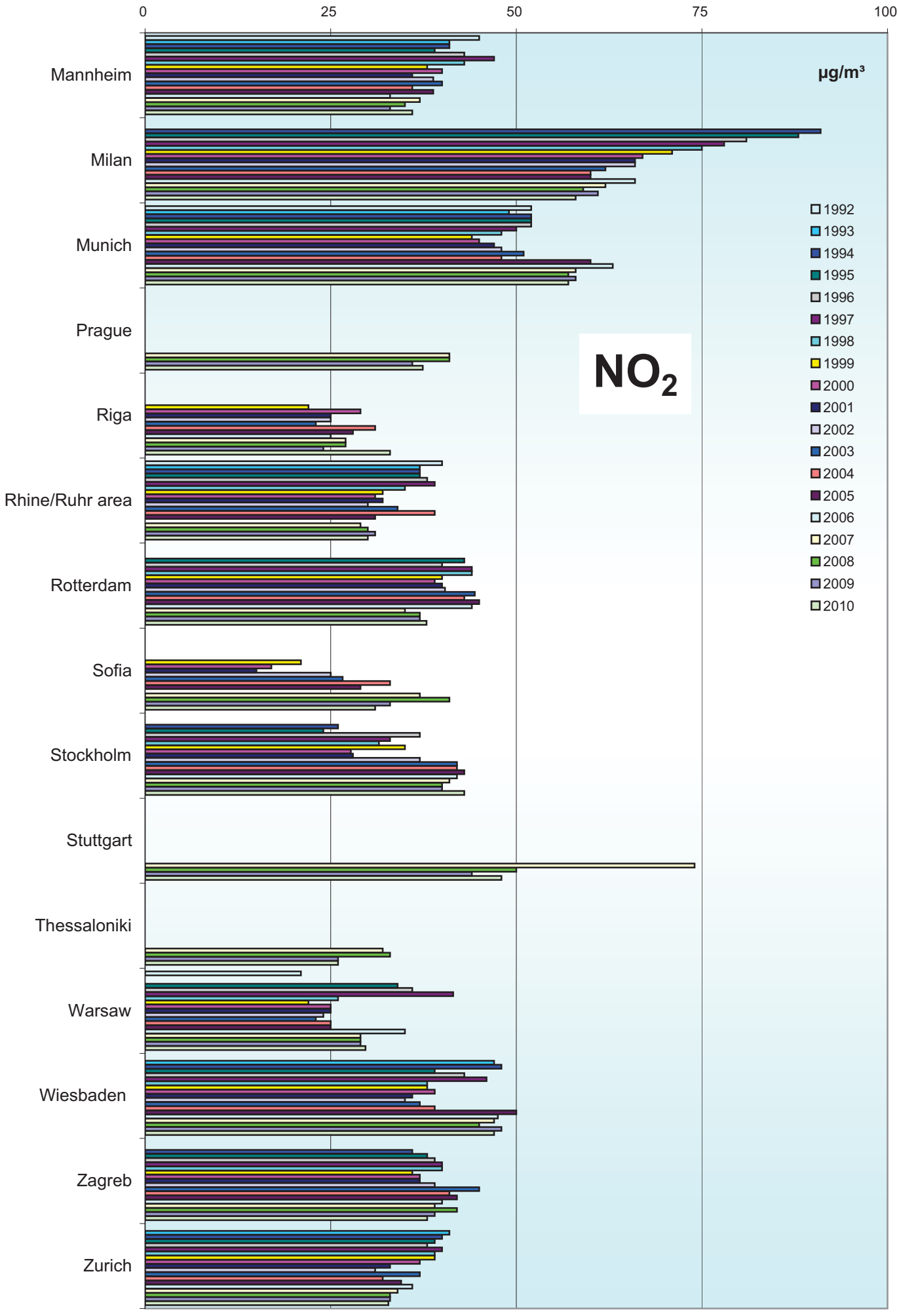
Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



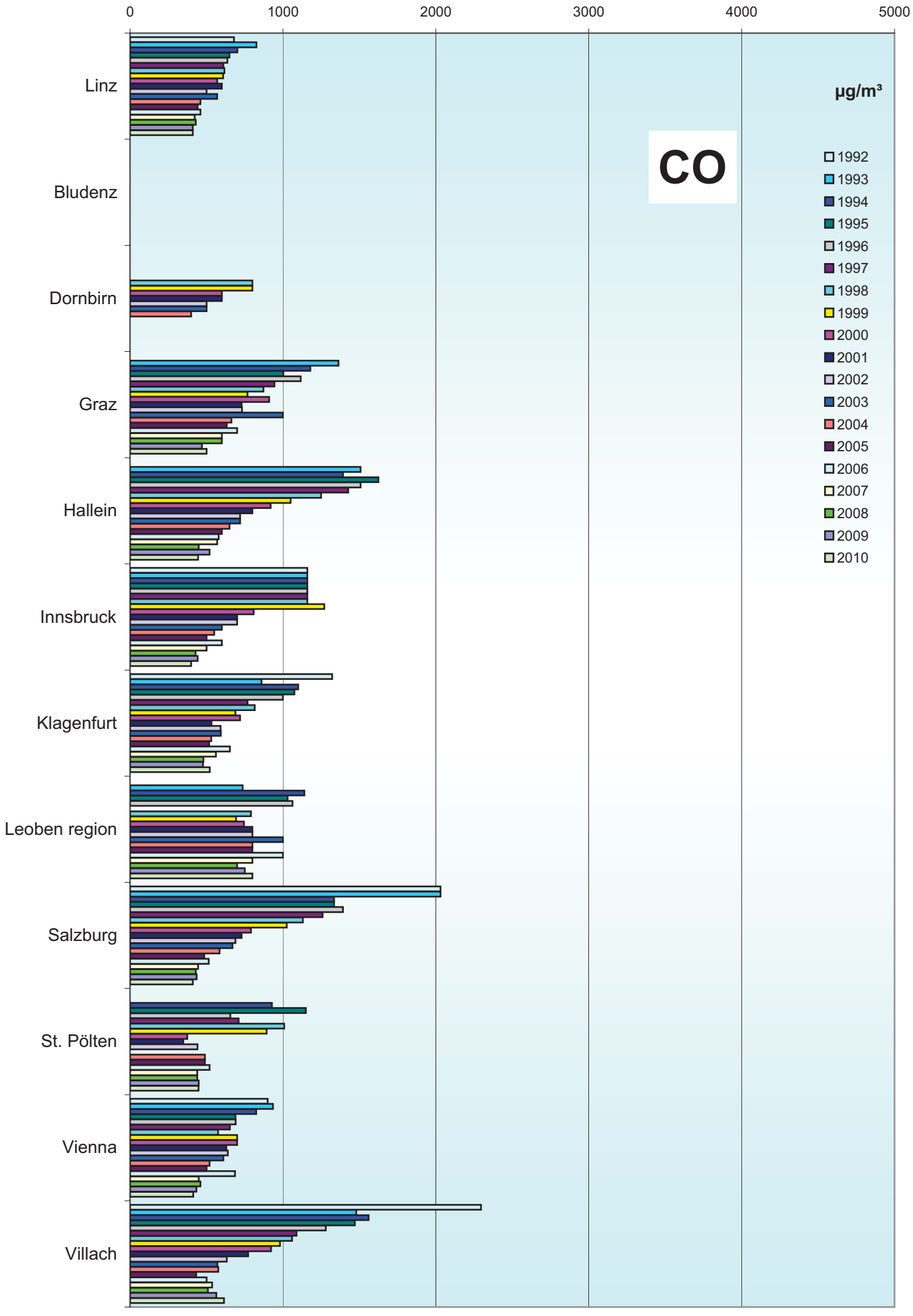
Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



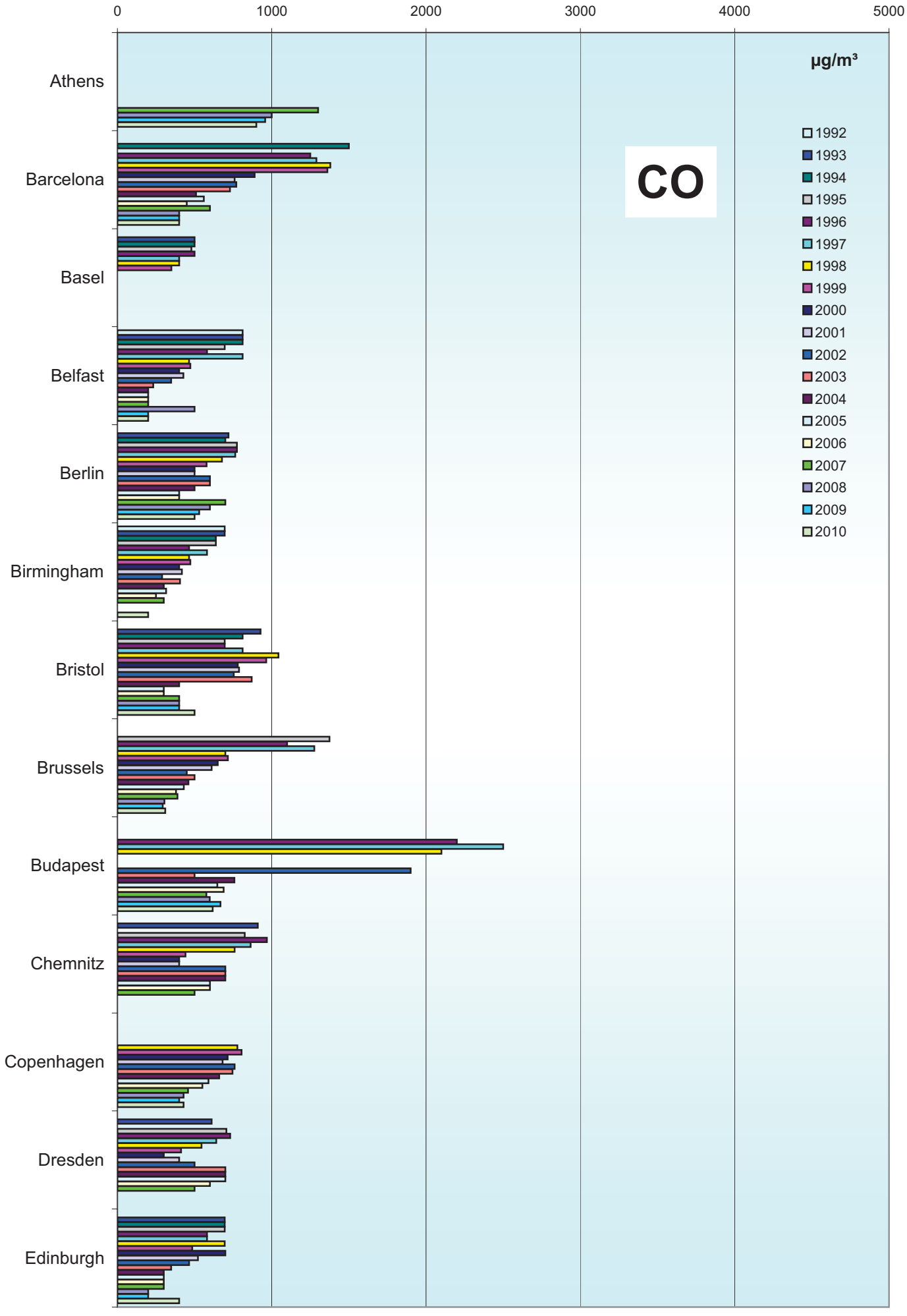
Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



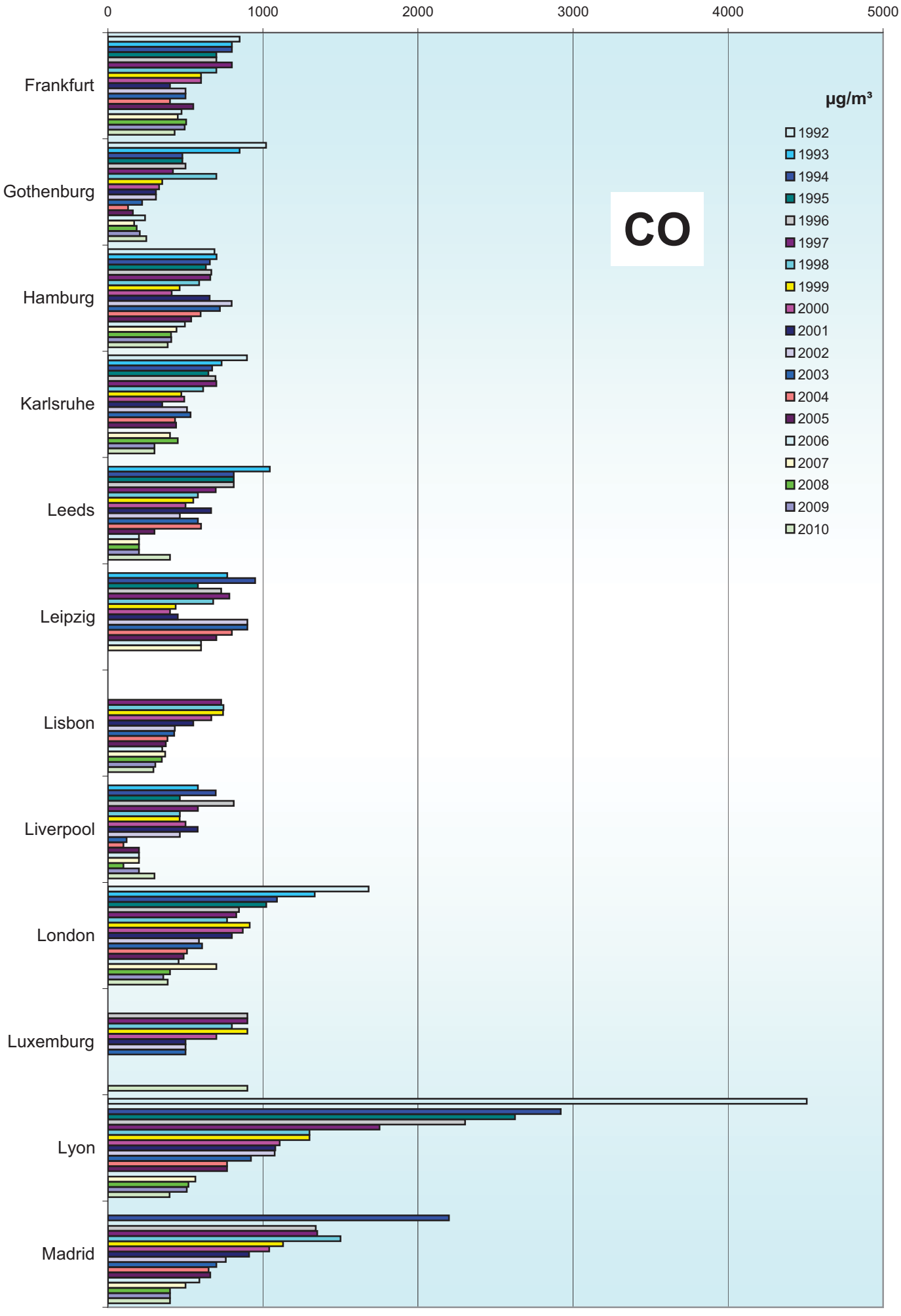
Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



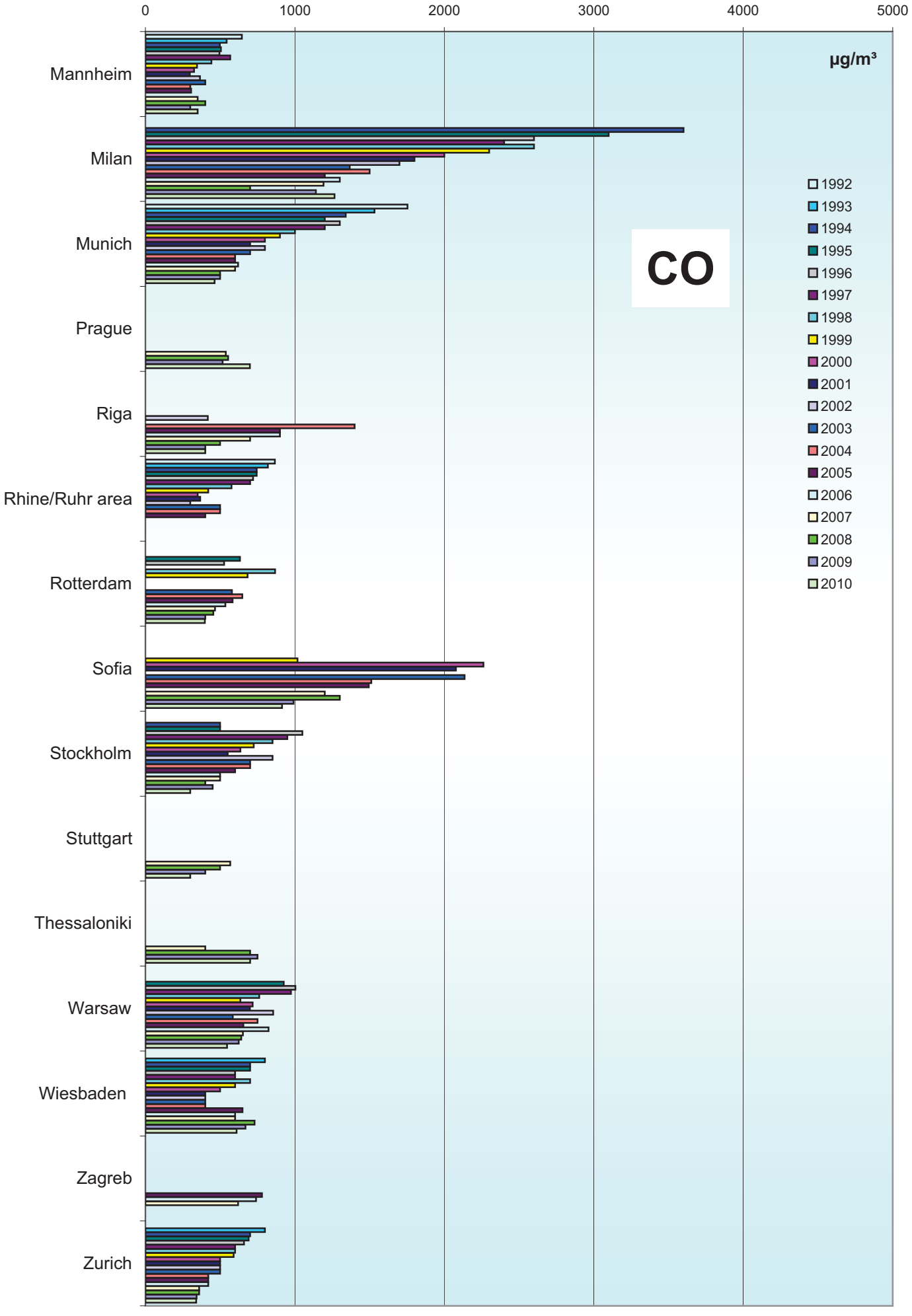
Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2010

Annual mean values (mean of all monitoring stations)



Jahresvergleich

1992 - 2010

max. Tagesmittelwerte

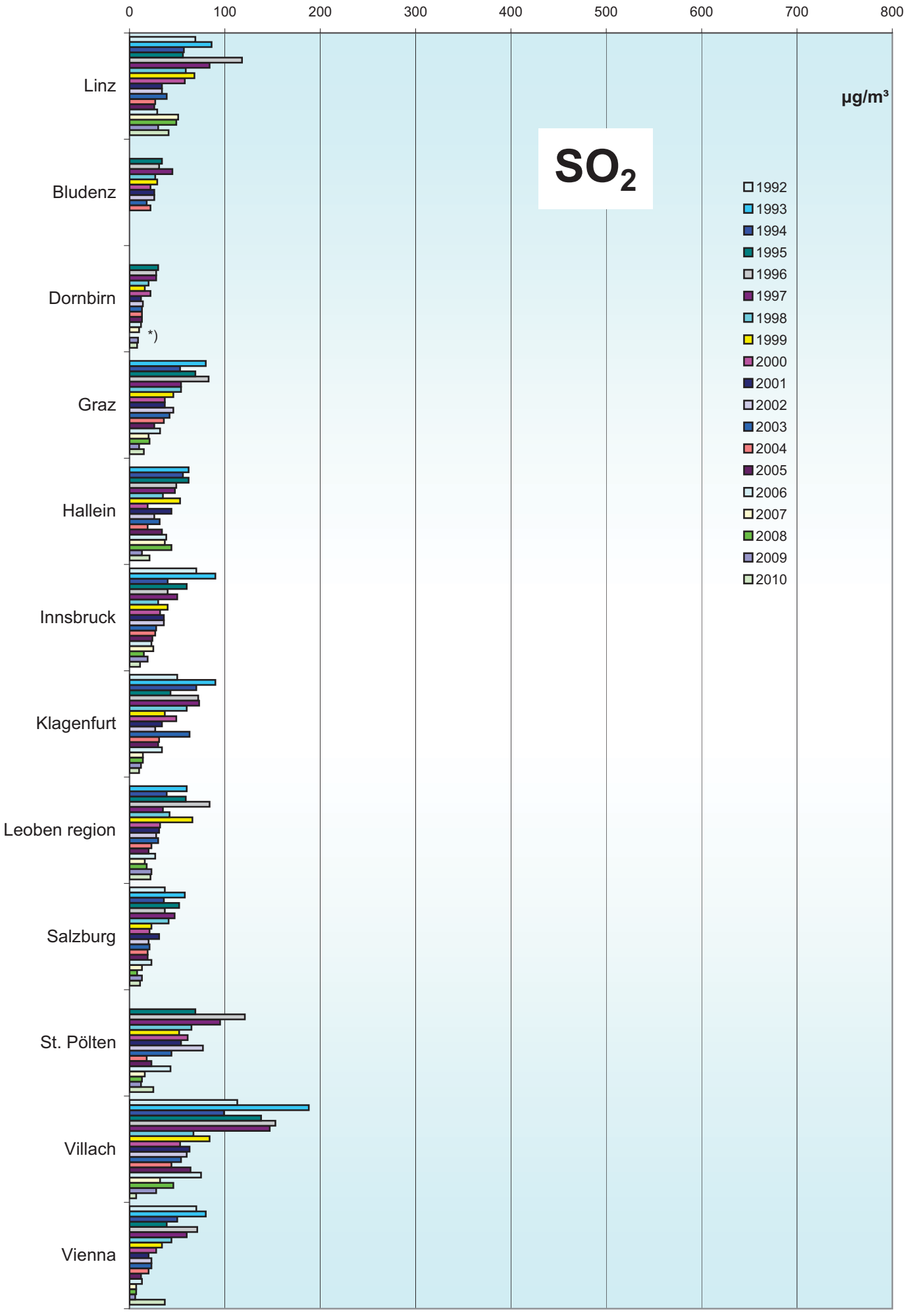
Comparison of The Air Quality Over The Years

1992 - 2010

Max. Daily Mean Values

Comparison of The Air Quality 1992 - 2010

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



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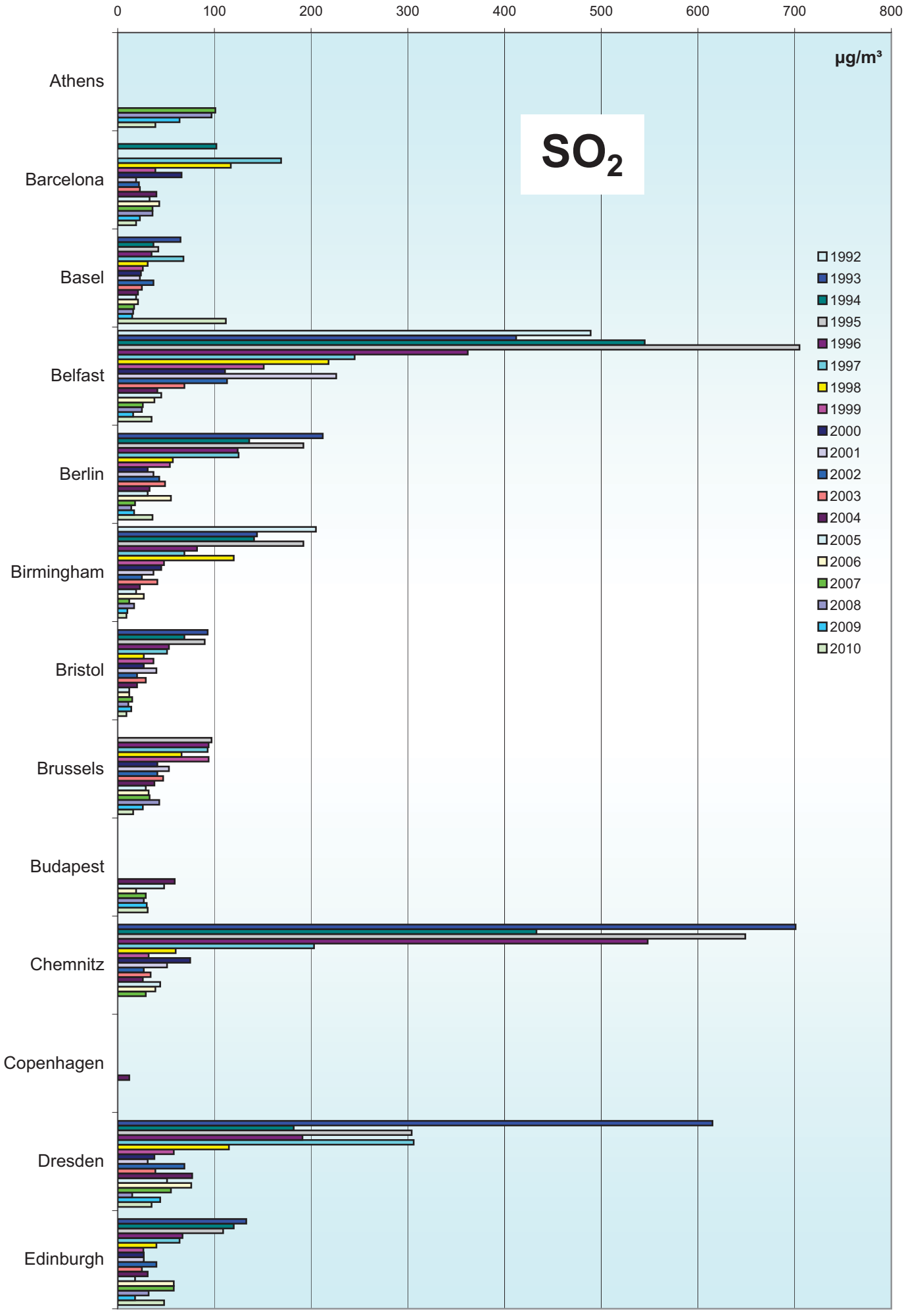
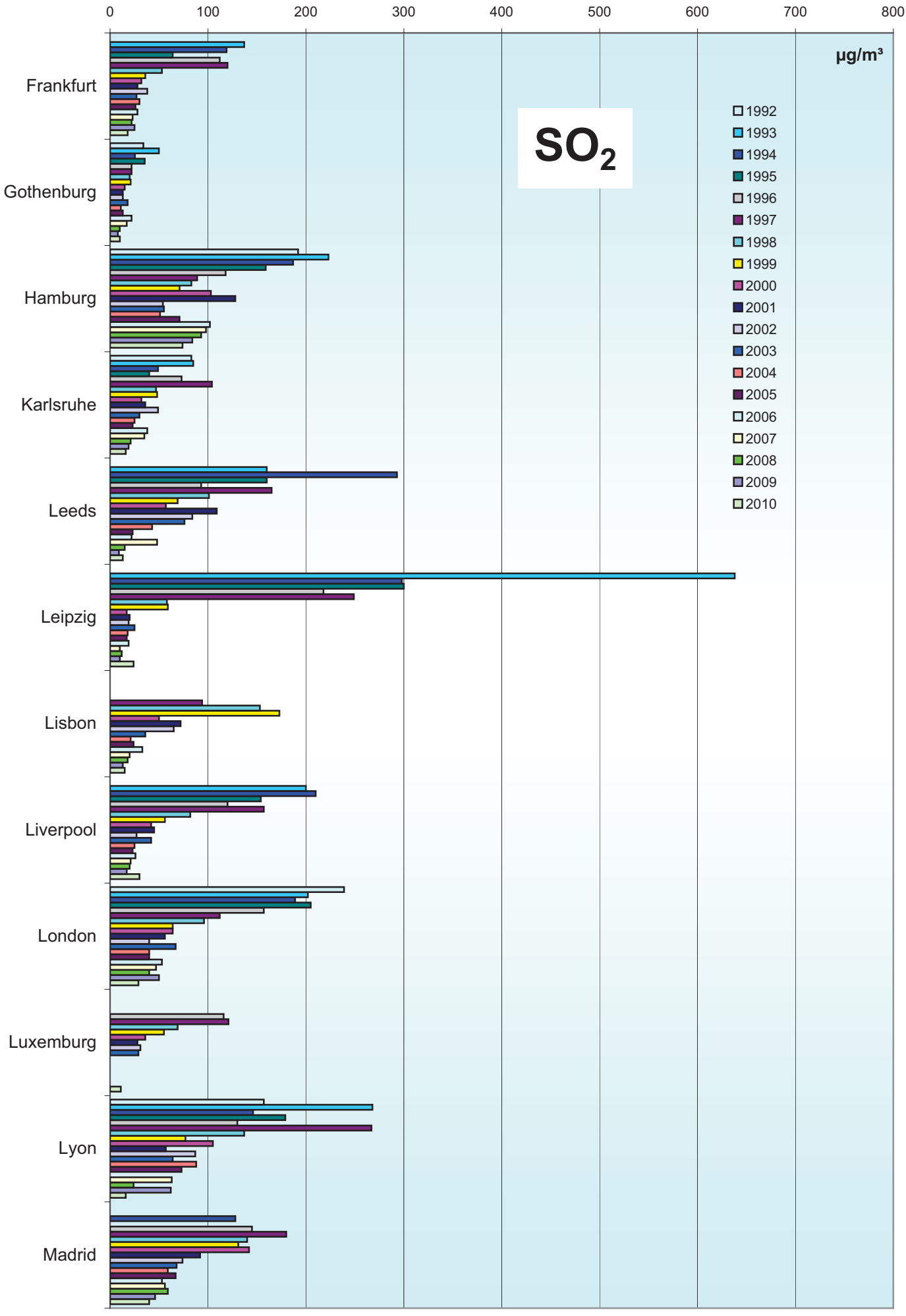
Comparison of The Air Quality 1992 - 2010

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



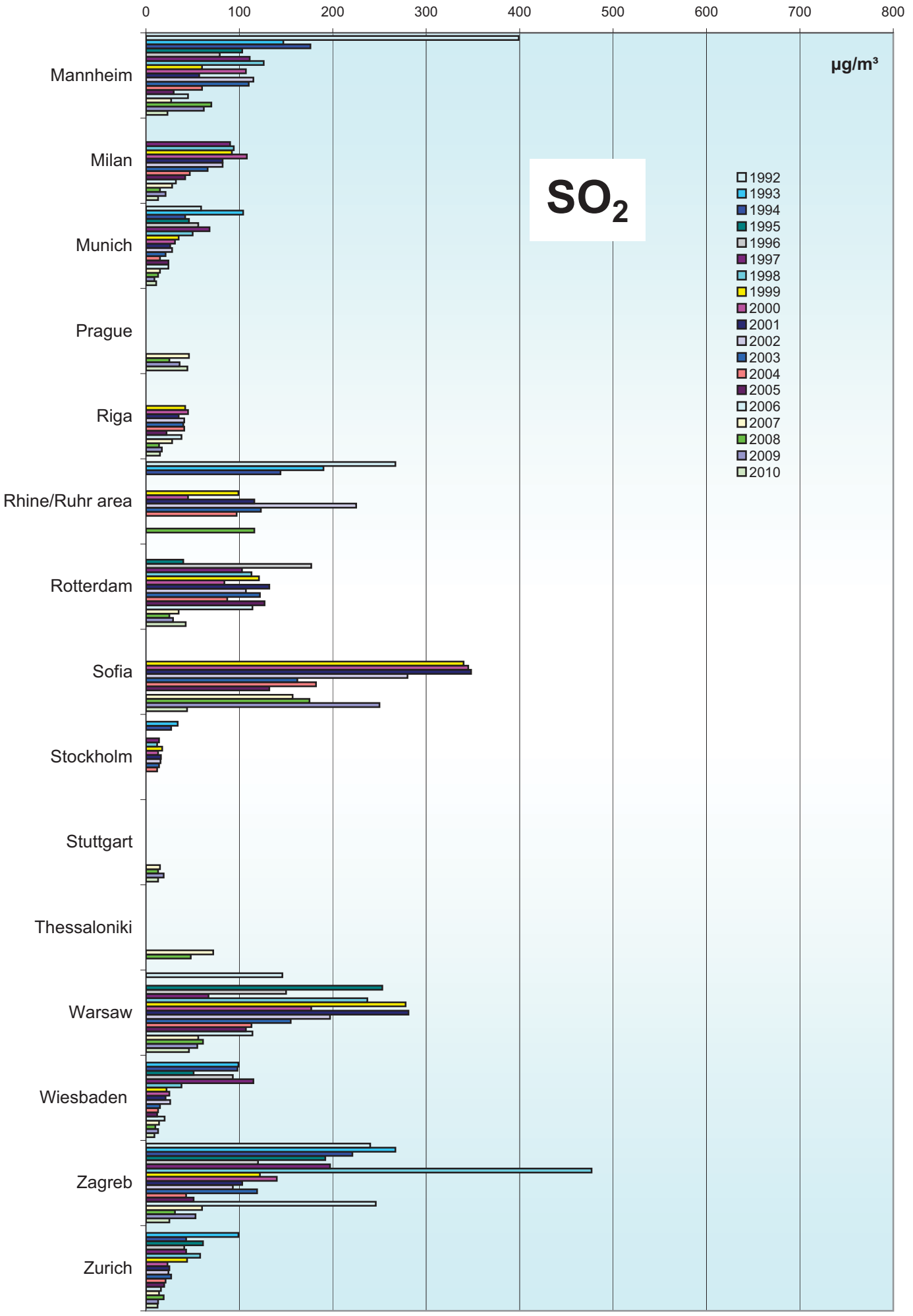
Comparison of The Air Quality 1992 - 2010

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



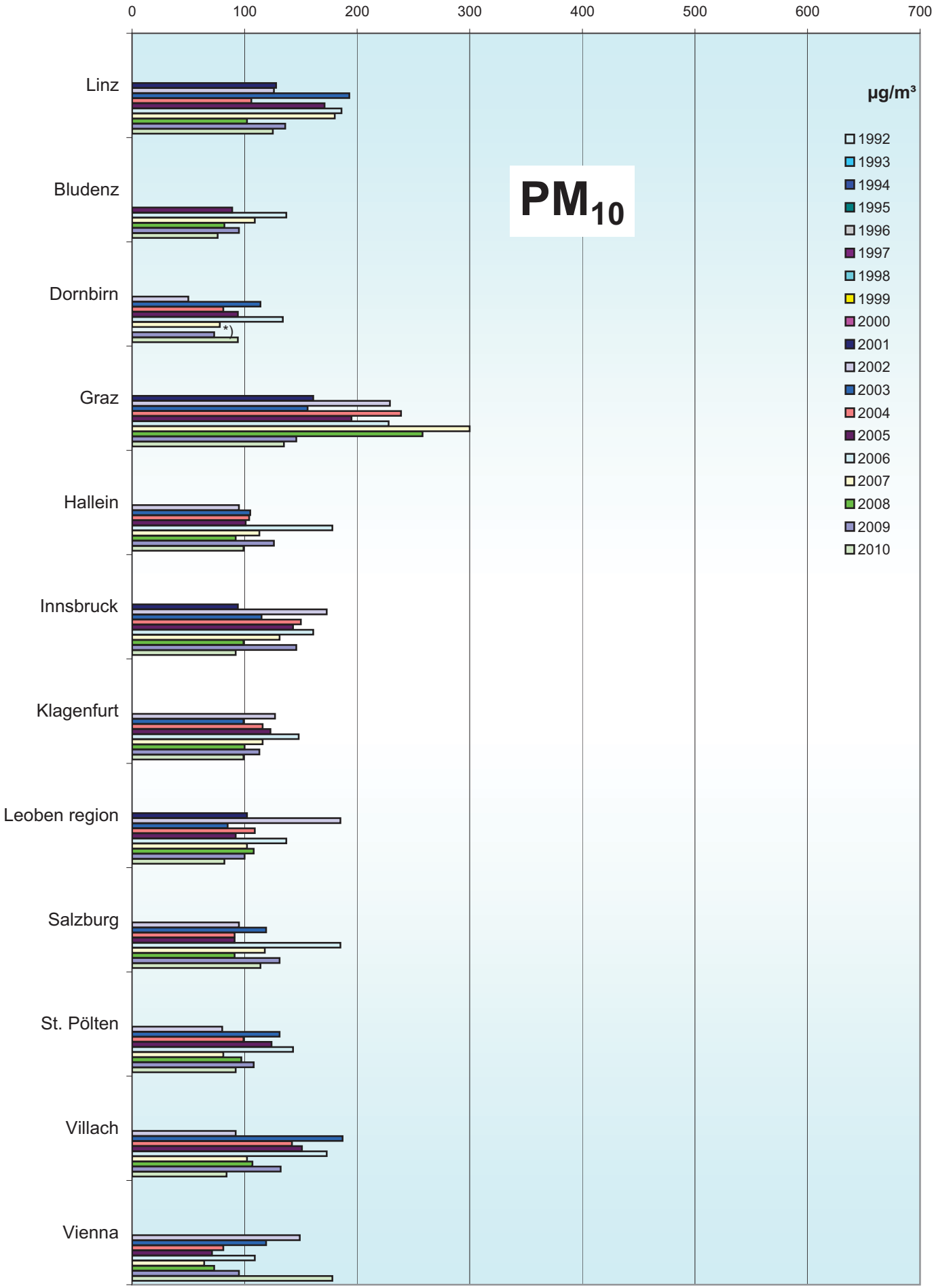
Comparison of The Air Quality 1992 - 2010

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



Comparison of The Air Quality 1992 - 2010

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



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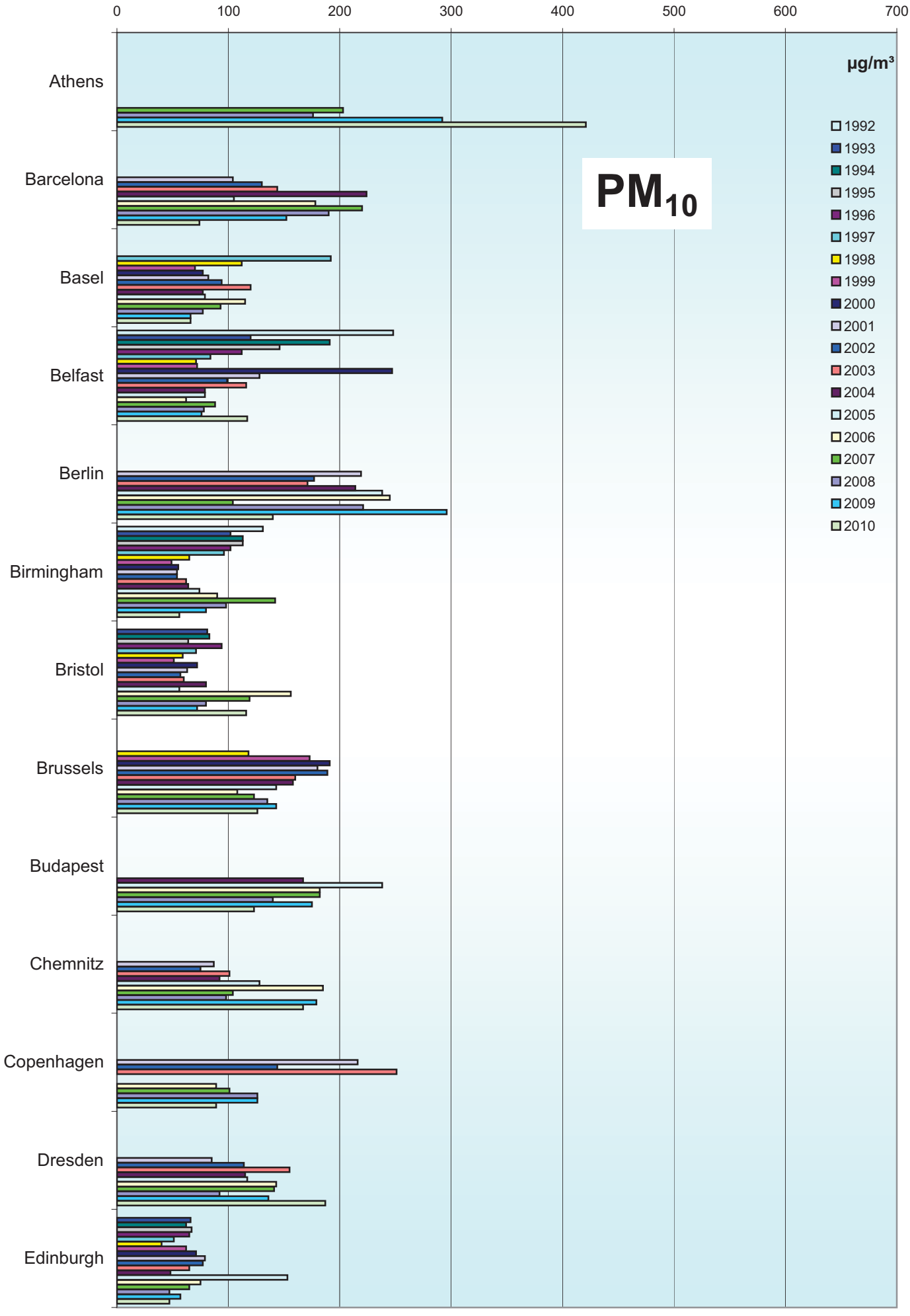
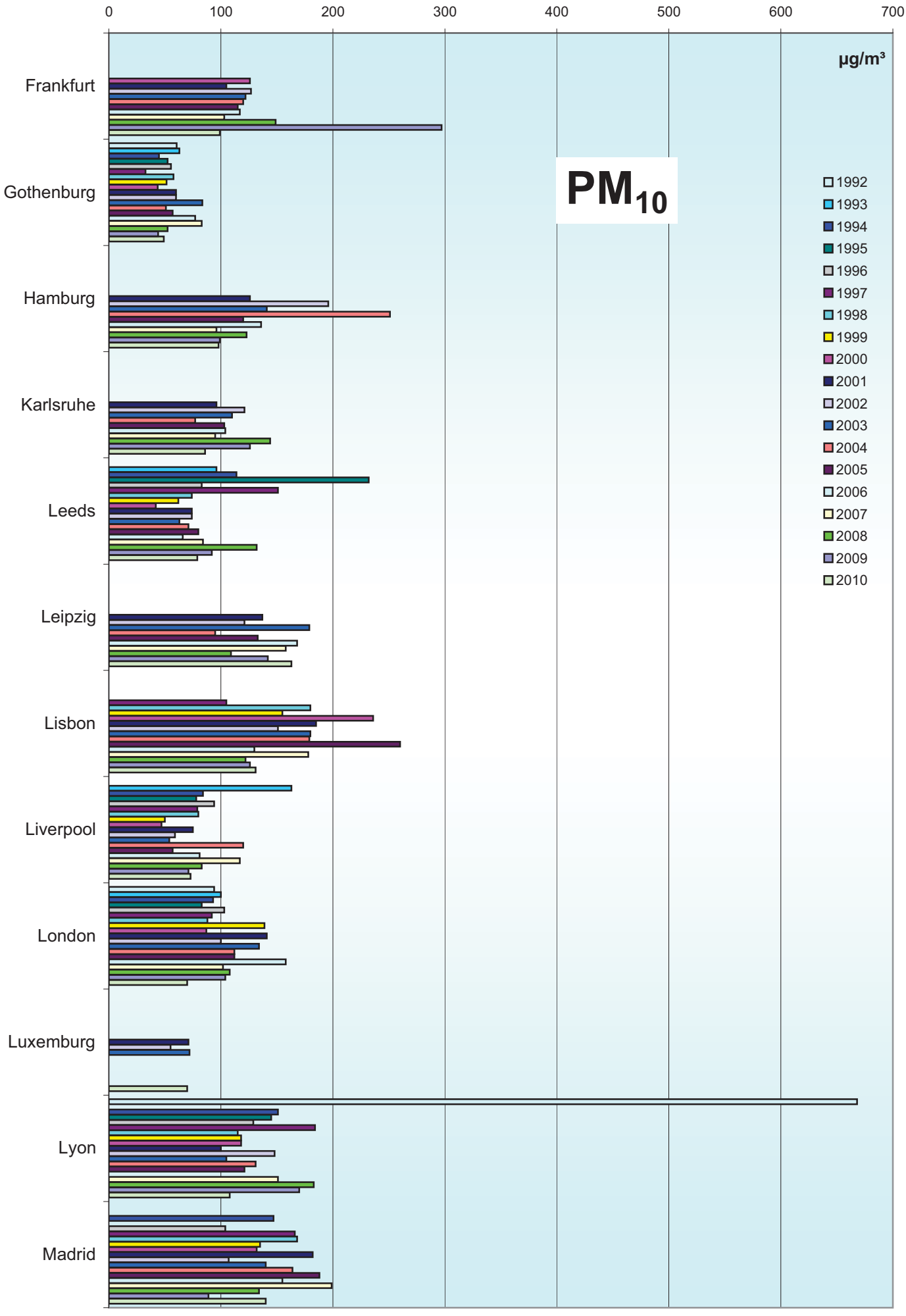
Comparison of The Air Quality 1992 - 2010

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



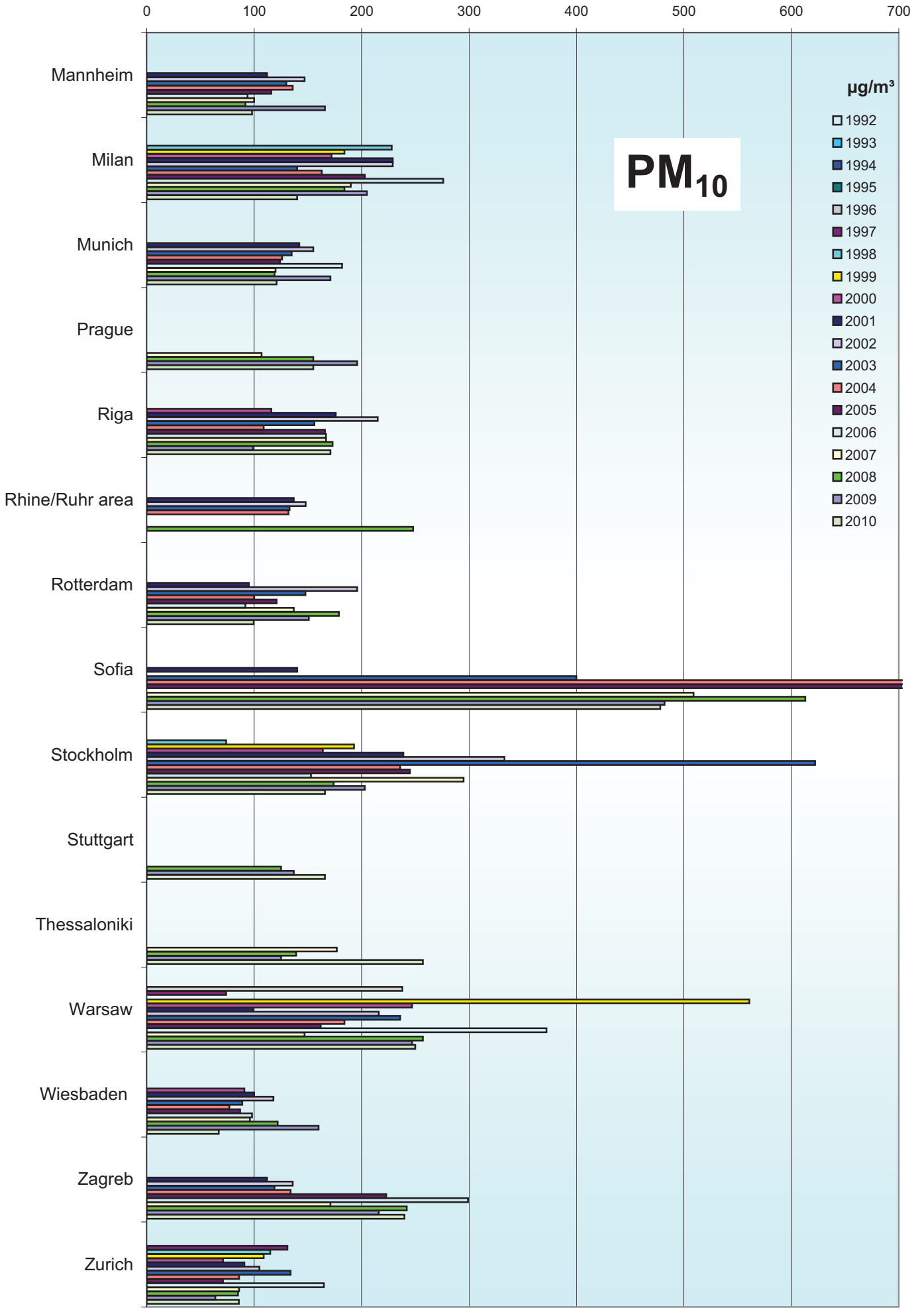
Comparison of The Air Quality 1992 - 2010

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



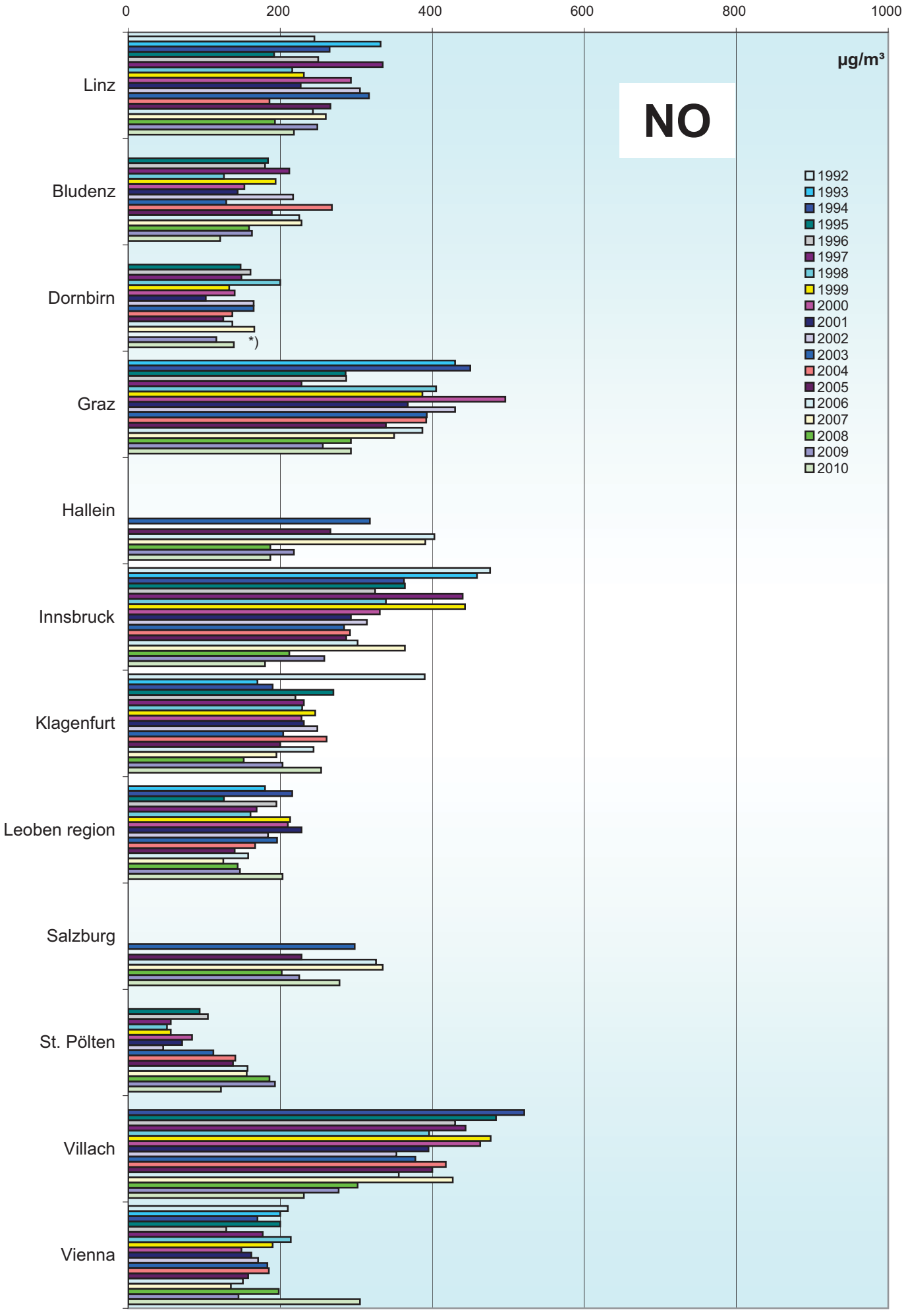
Comparison of The Air Quality 1992 - 2010

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



Comparison of The Air Quality 1992 - 2010

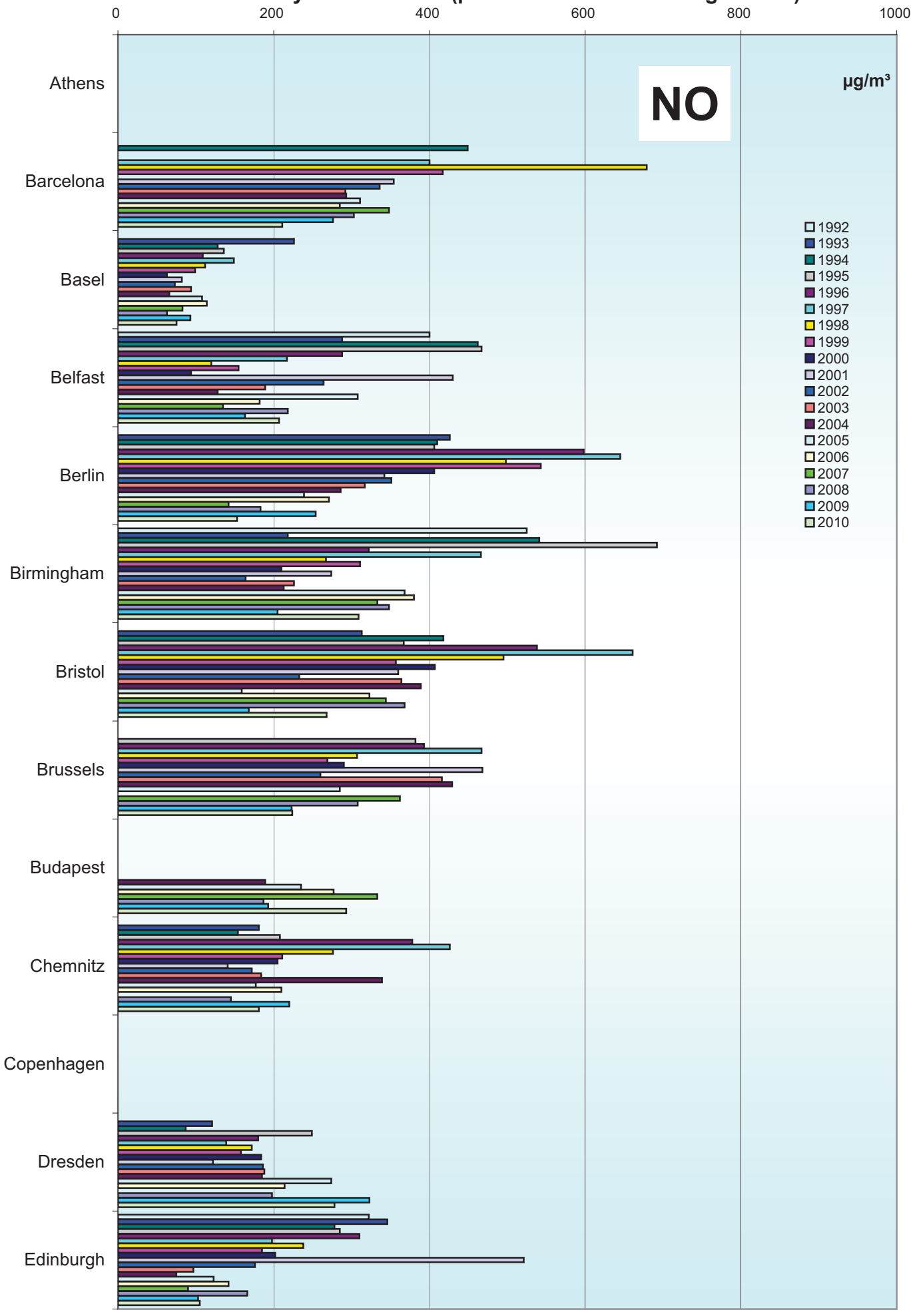
max. daily mean values (peak-stressed monitoring station)



*) data of the year 2008 are not used for the comparison, because the street near the measurment point was closed for 11 months

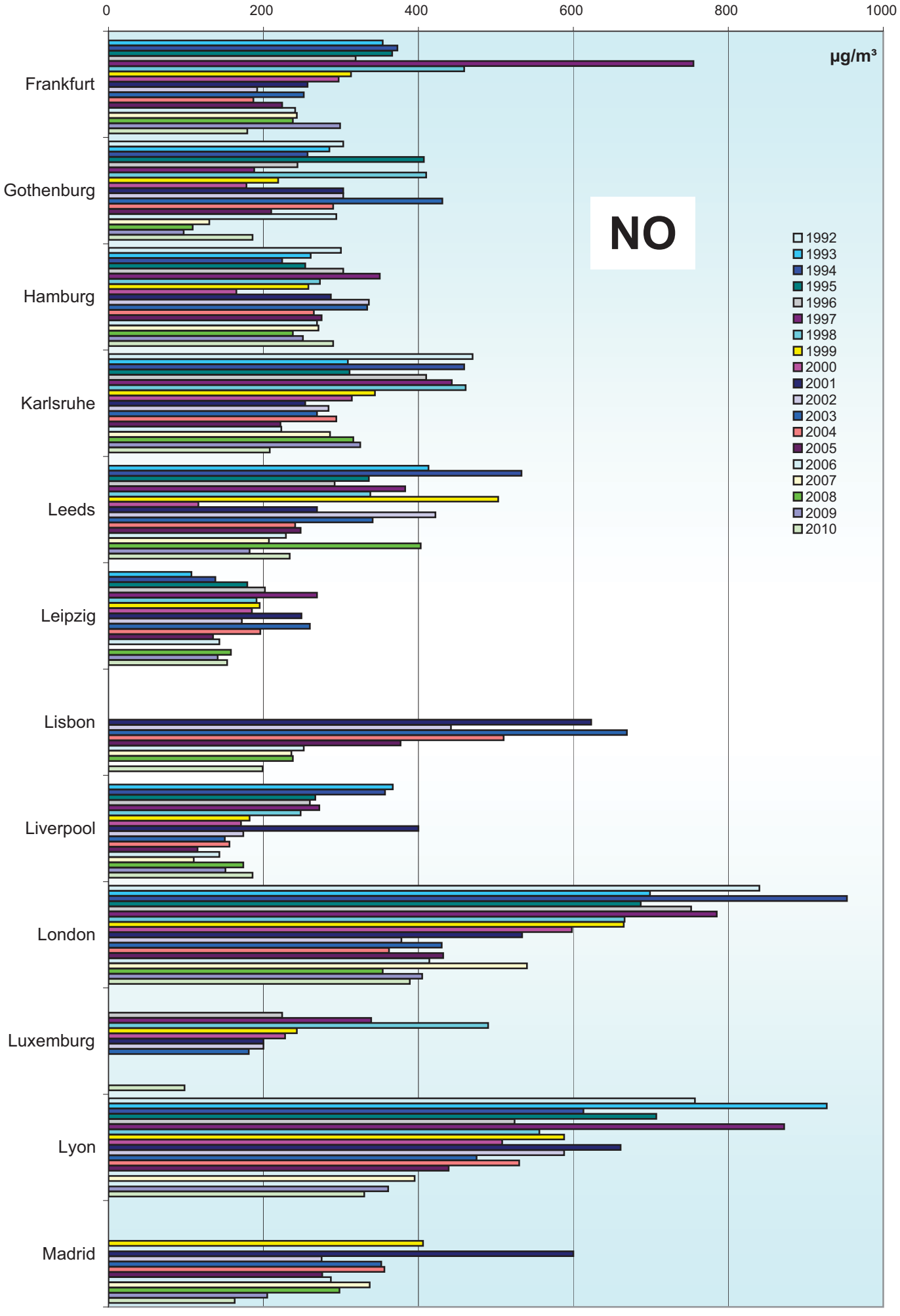
Comparison of The Air Quality 1992 - 2010

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



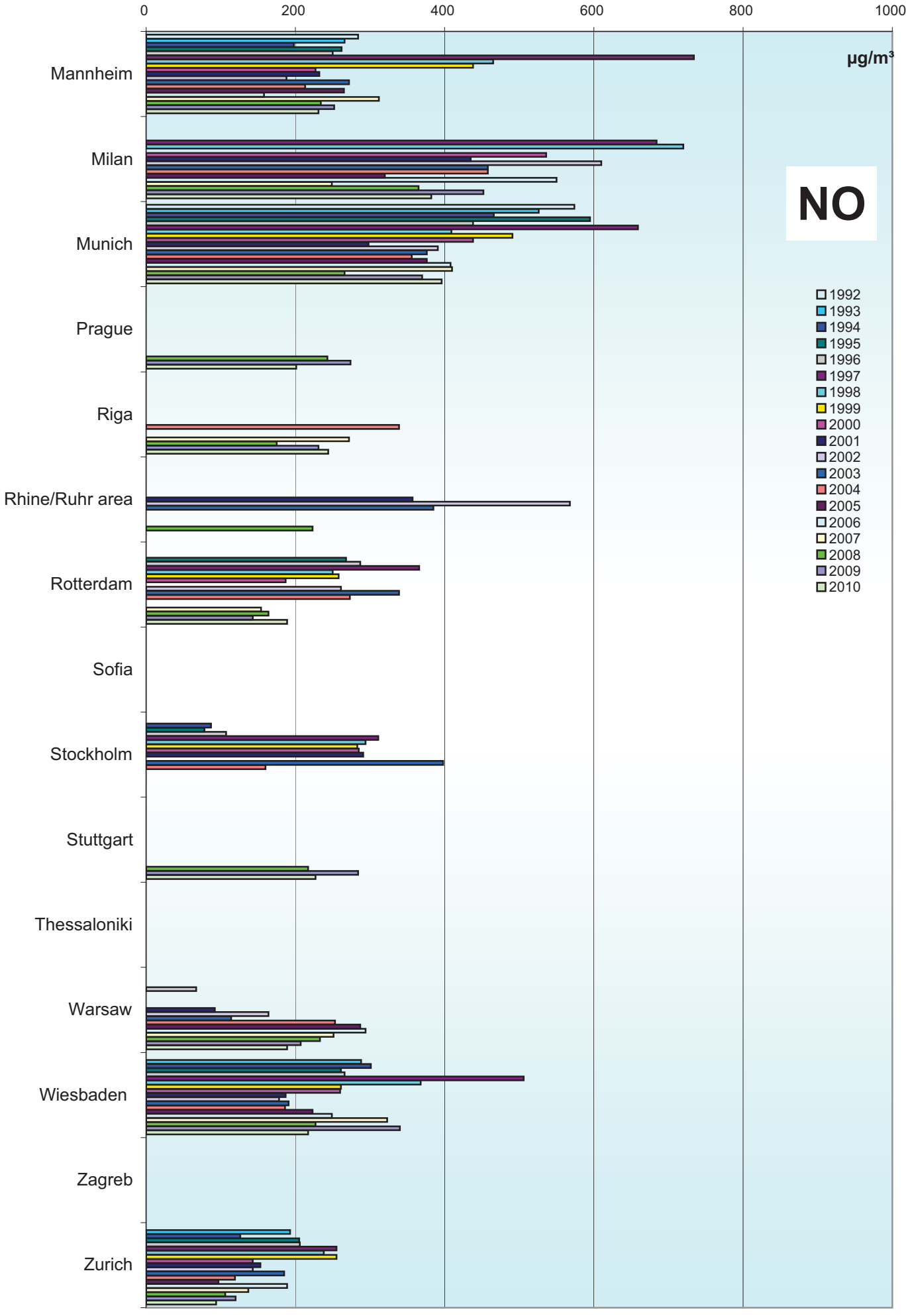
Comparison of The Air Quality 1992 - 2010

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



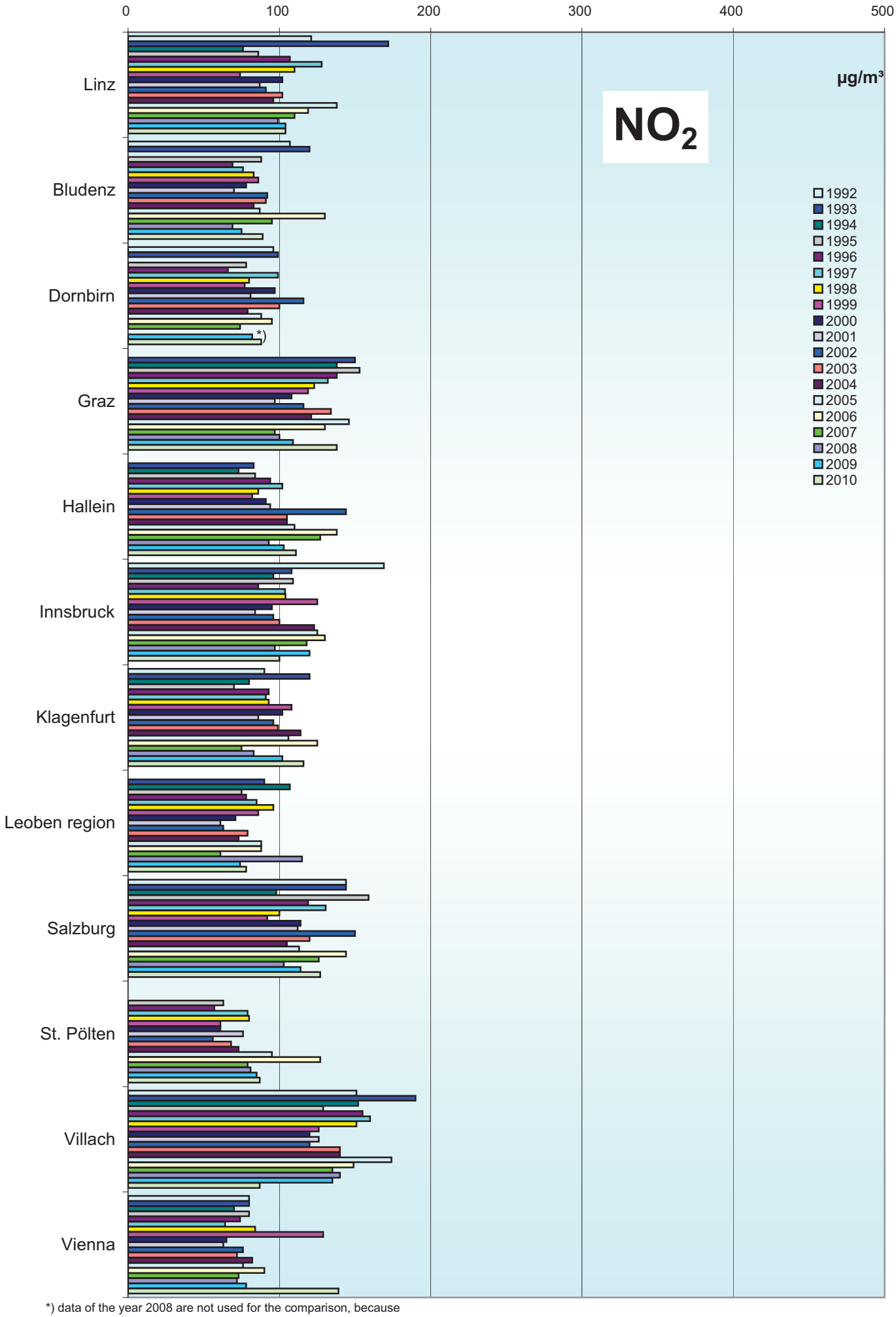
Comparison of The Air Quality 1992 - 2010

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



Comparison of The Air Quality 1992 - 2010

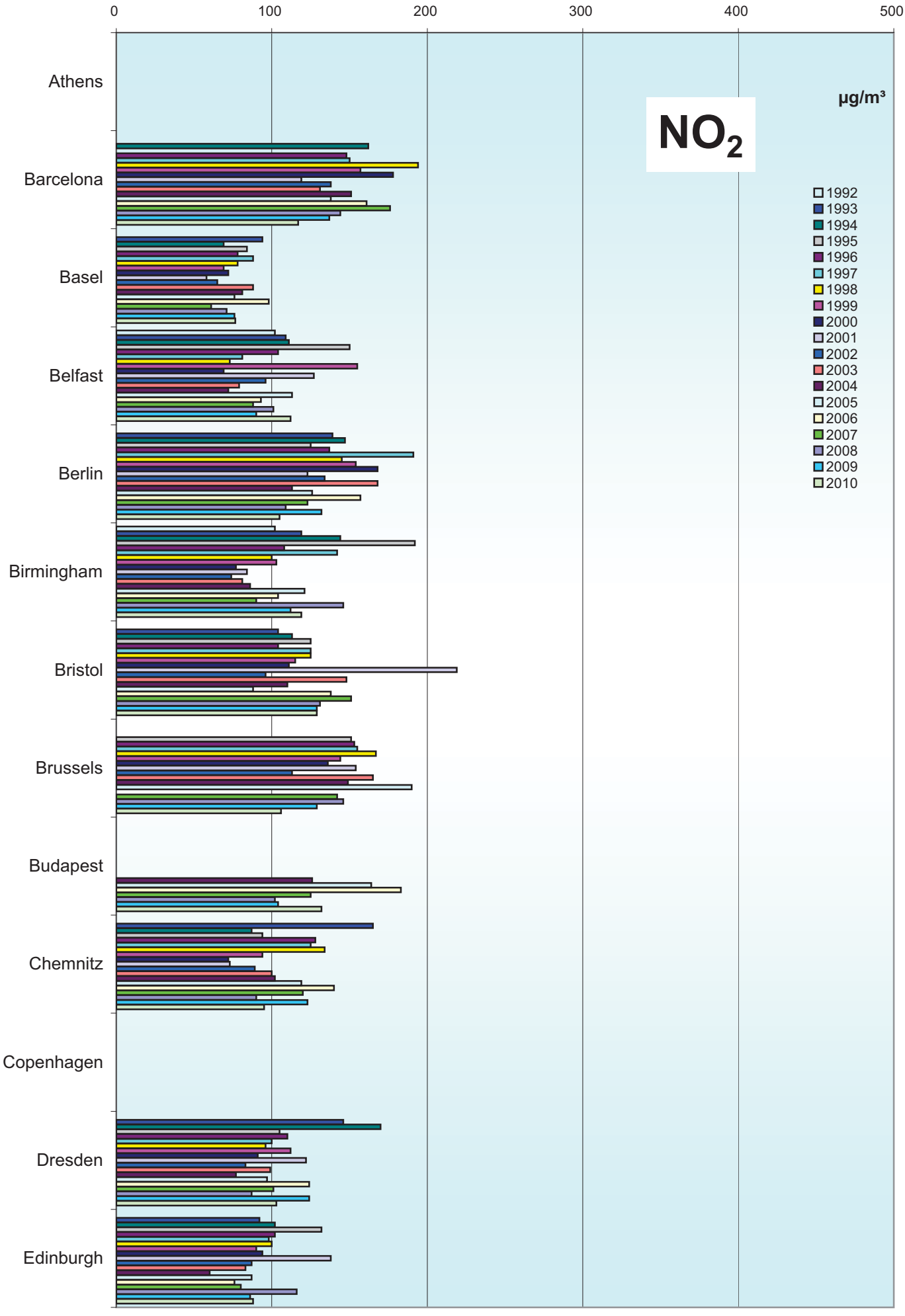
max. daily mean values (peak-stressed monitoring station)



*) data of the year 2008 are not used for the comparison, because the street near the measurment point was closed for 11 months

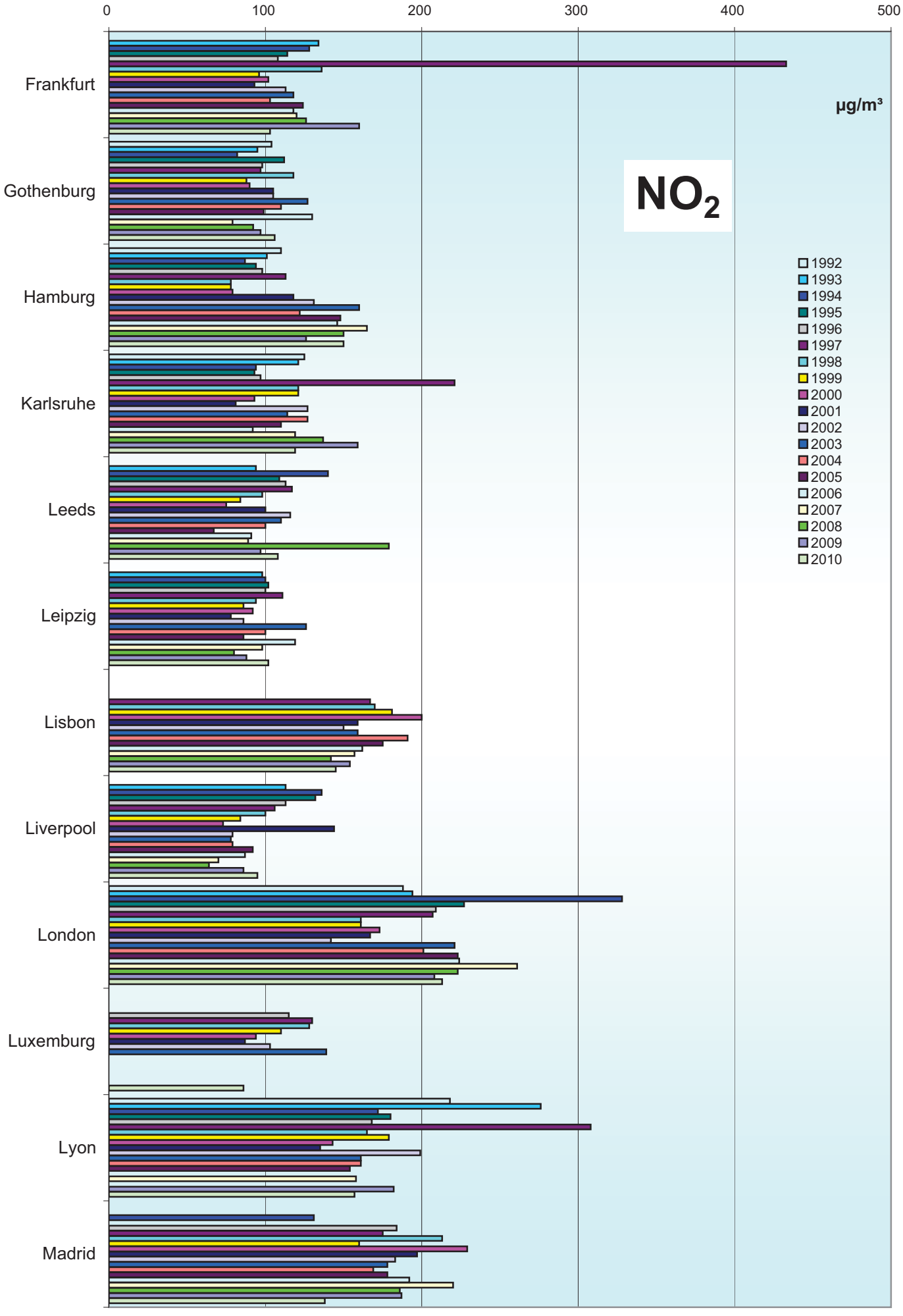
Comparison of The Air Quality 1992 - 2010

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



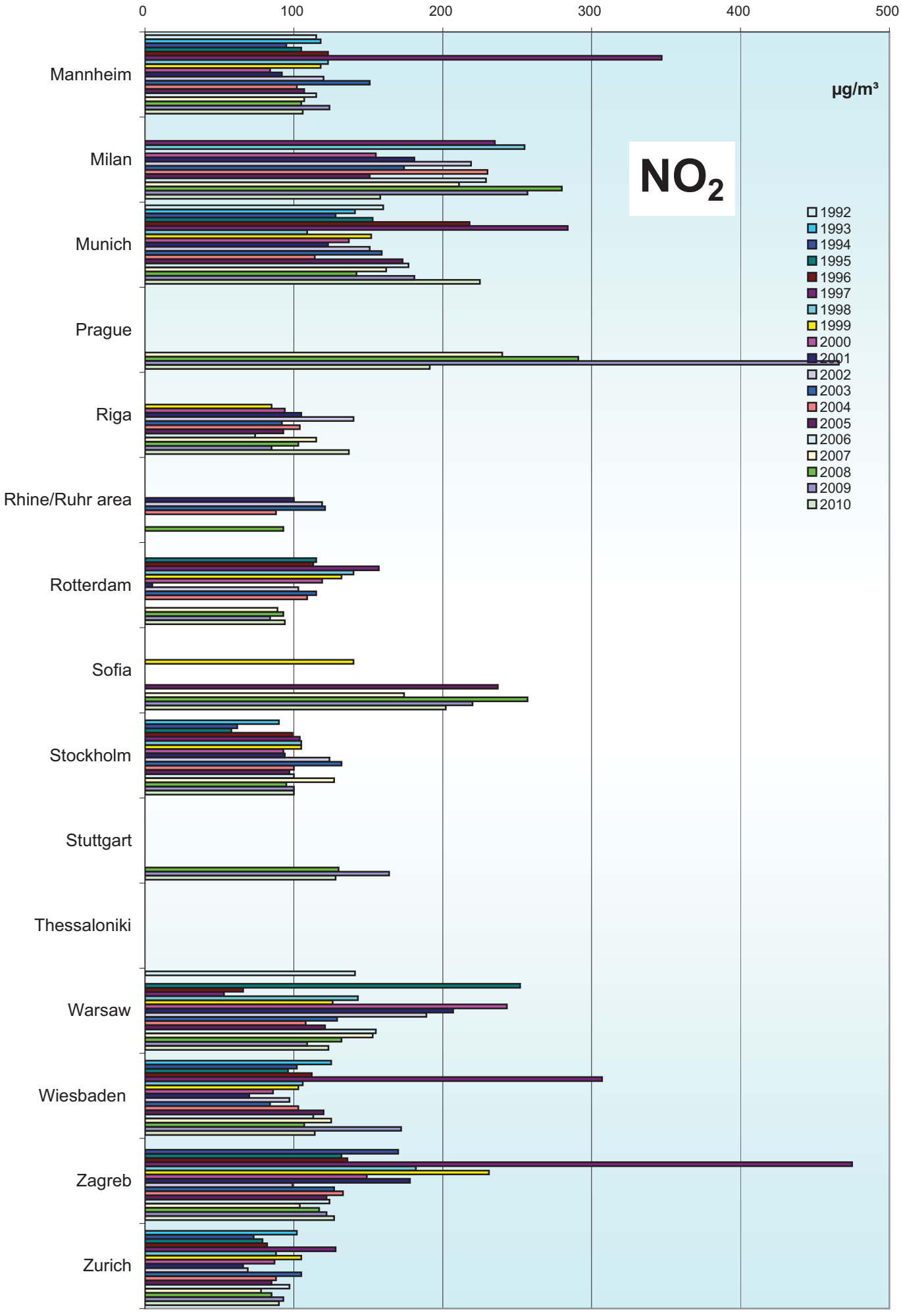
Comparison of The Air Quality 1992 - 2010

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



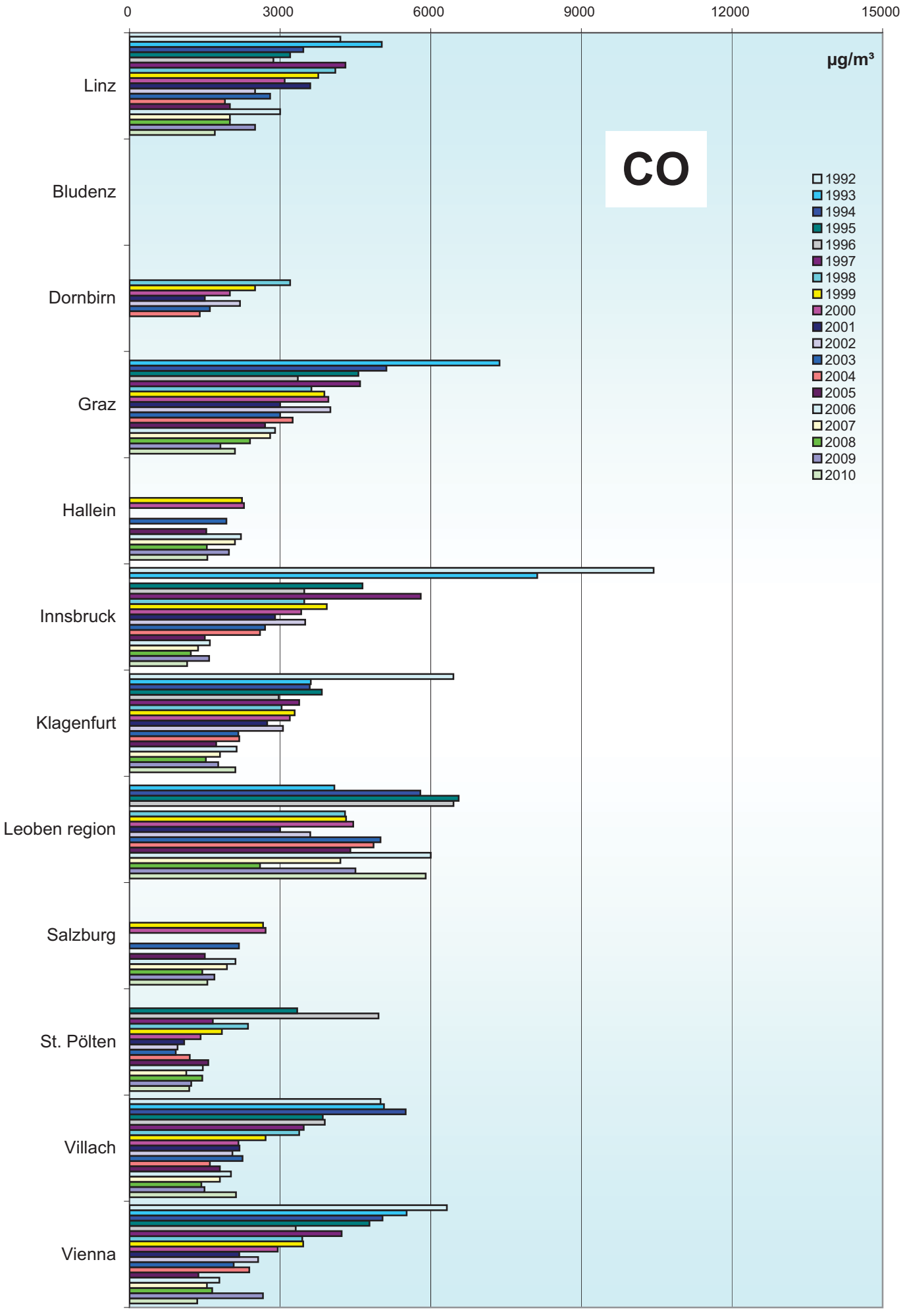
Comparison of The Air Quality 1992 - 2010

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



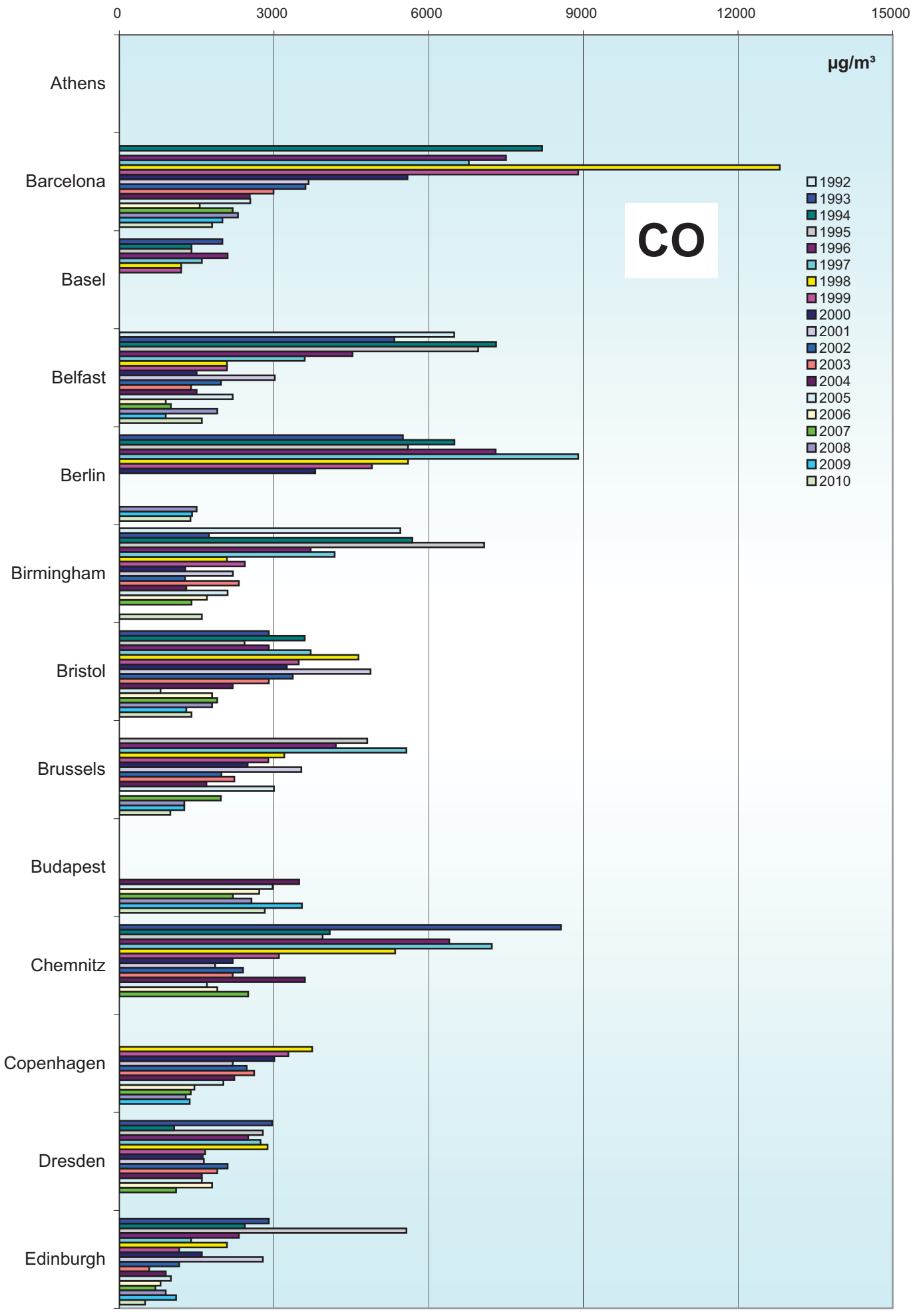
Comparison of The Air Quality 1992 - 2010

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



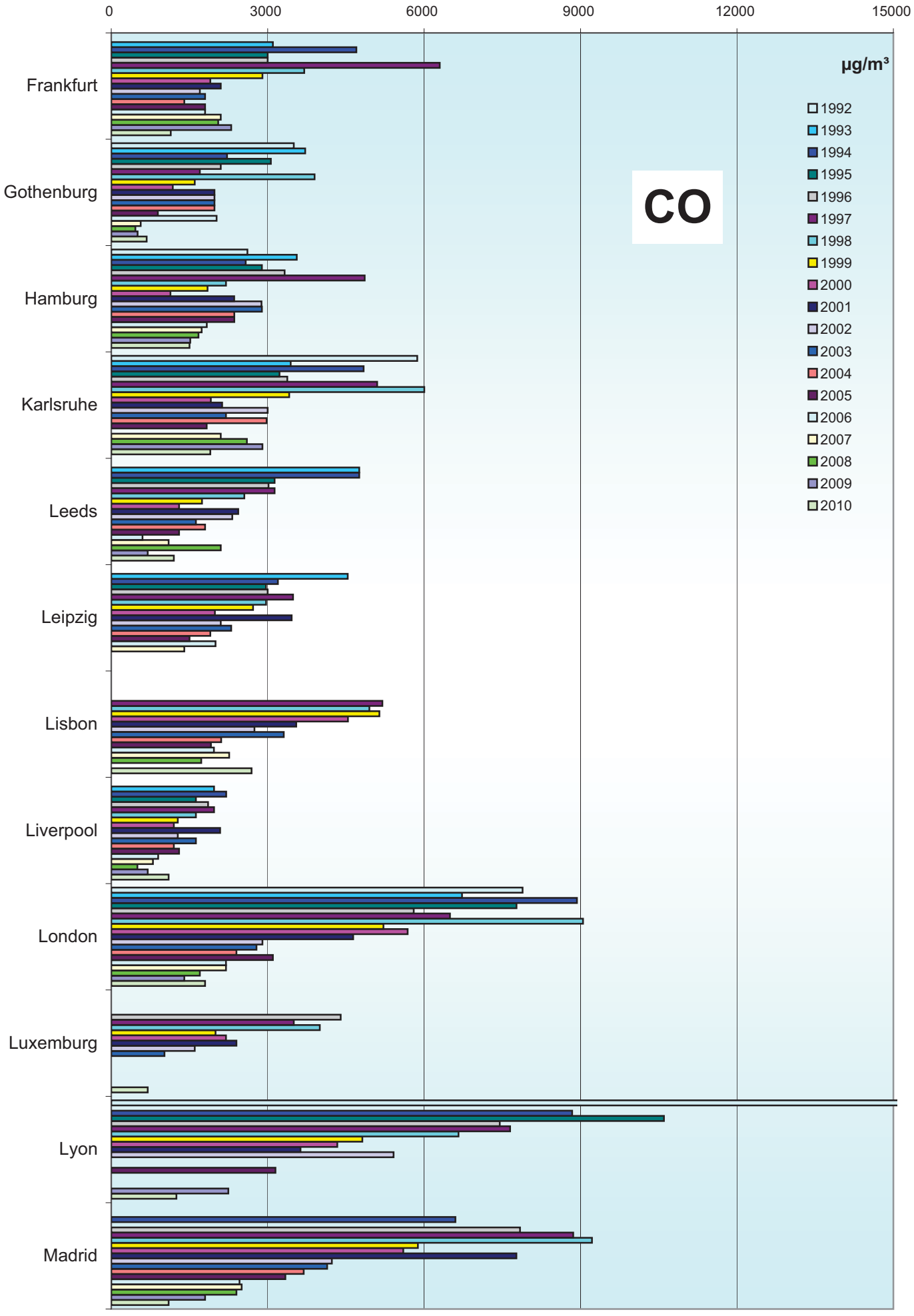
Comparison of The Air Quality 1992 - 2010

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



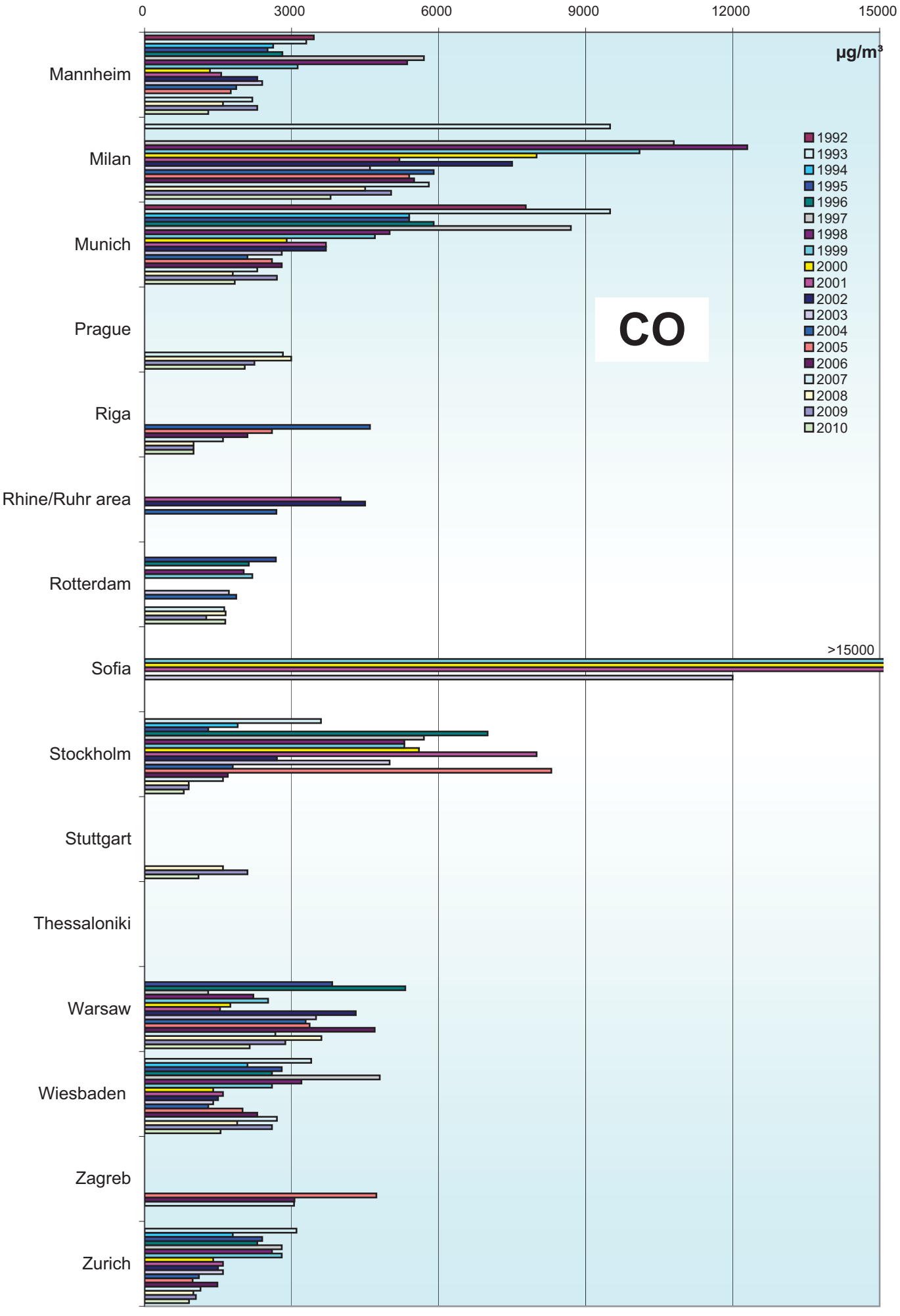
Comparison of The Air Quality 1992 - 2010

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



Comparison of The Air Quality 1992 - 2010

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



Jahresvergleich

1993 - 2010

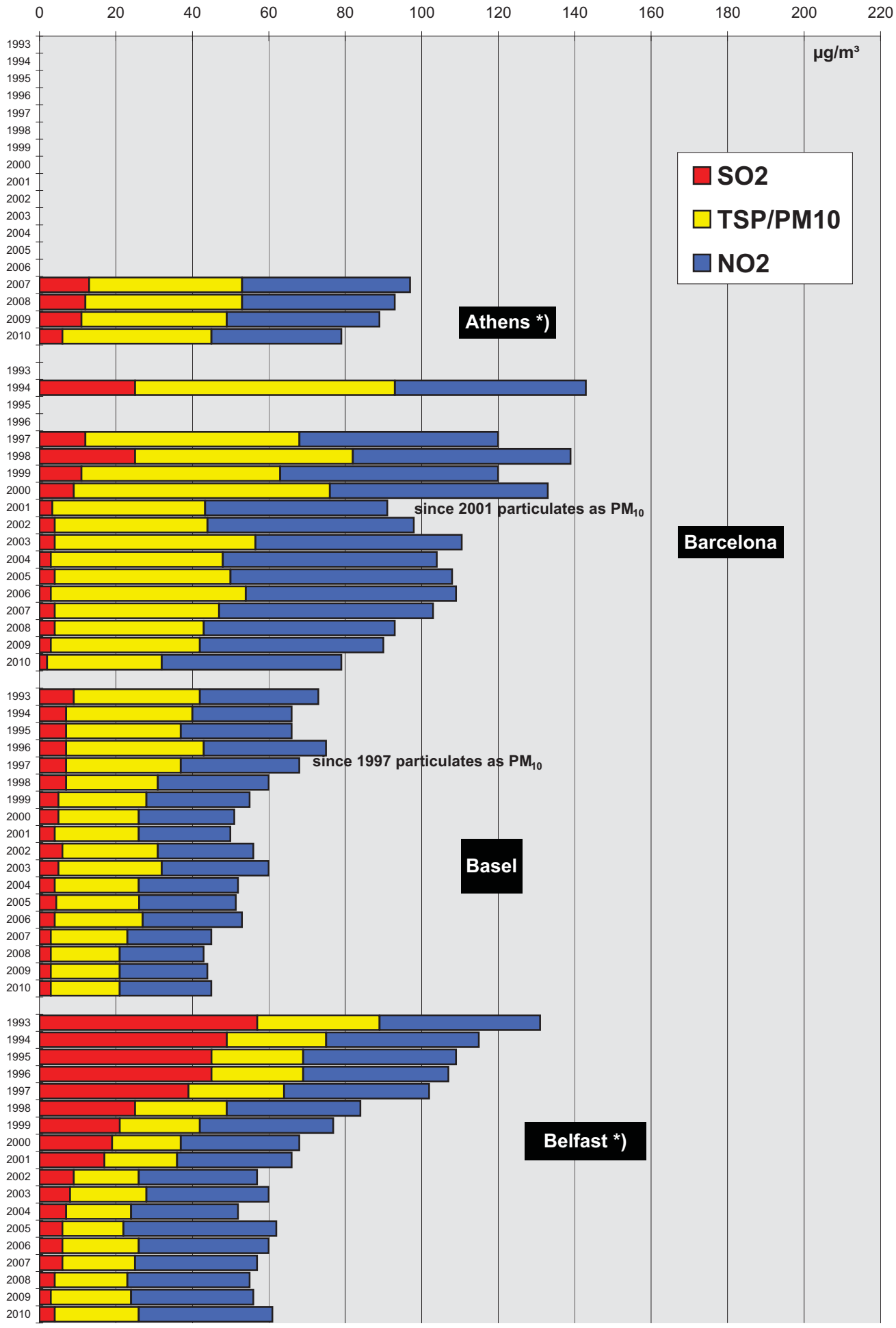
Jahresmittelwerte, Σ SO_2, TSP/PM10, NO_2

Comparison Of The Air Quality

1993 - 2010

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

Comparison Of The Air Quality 1993-2010
Development of the annual mean values, Σ SO_2, TSP/PM_{10}, NO_2
(mean of all monitoring stations)

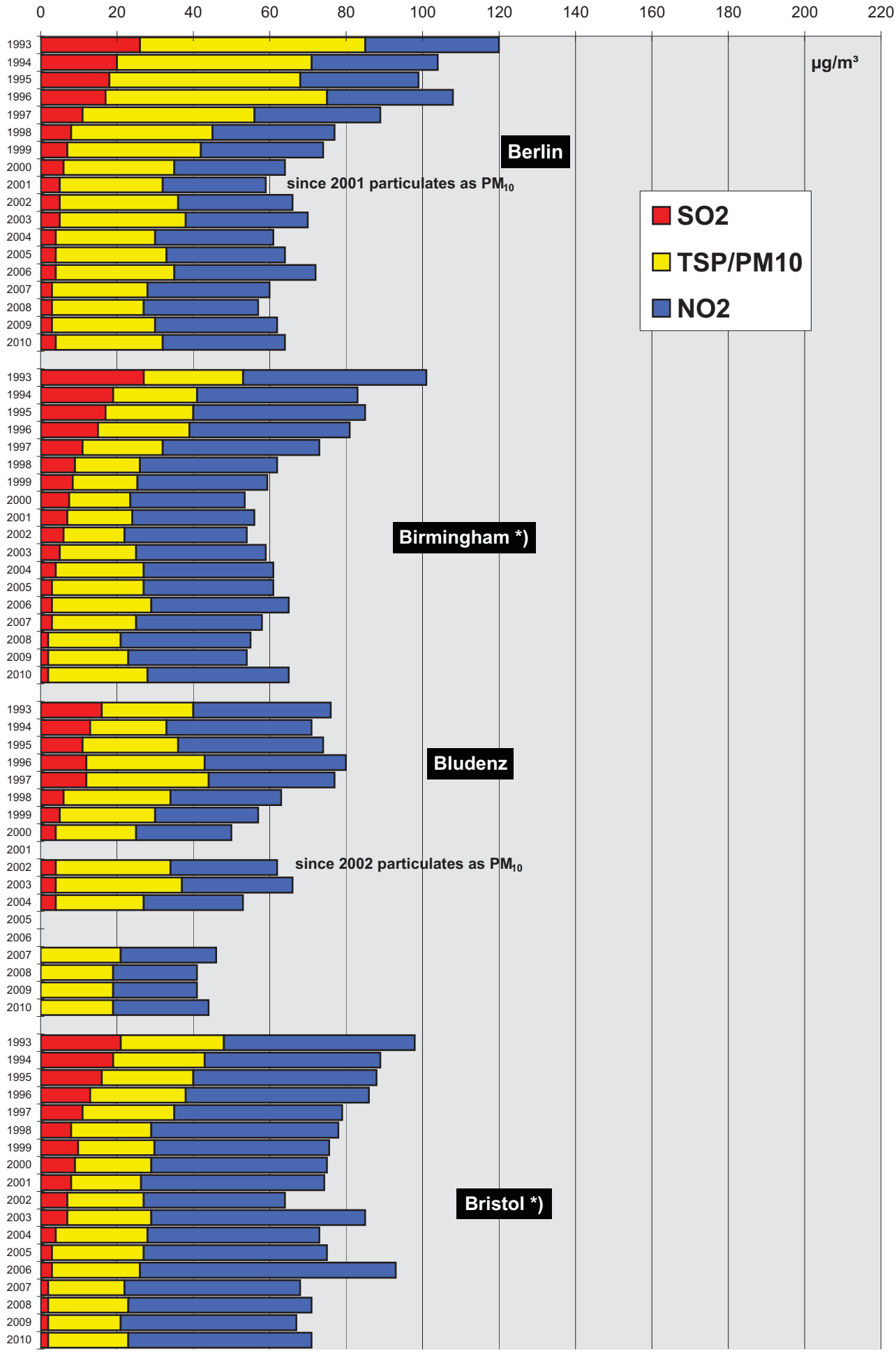


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2010

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

(mean of all monitoring stations)

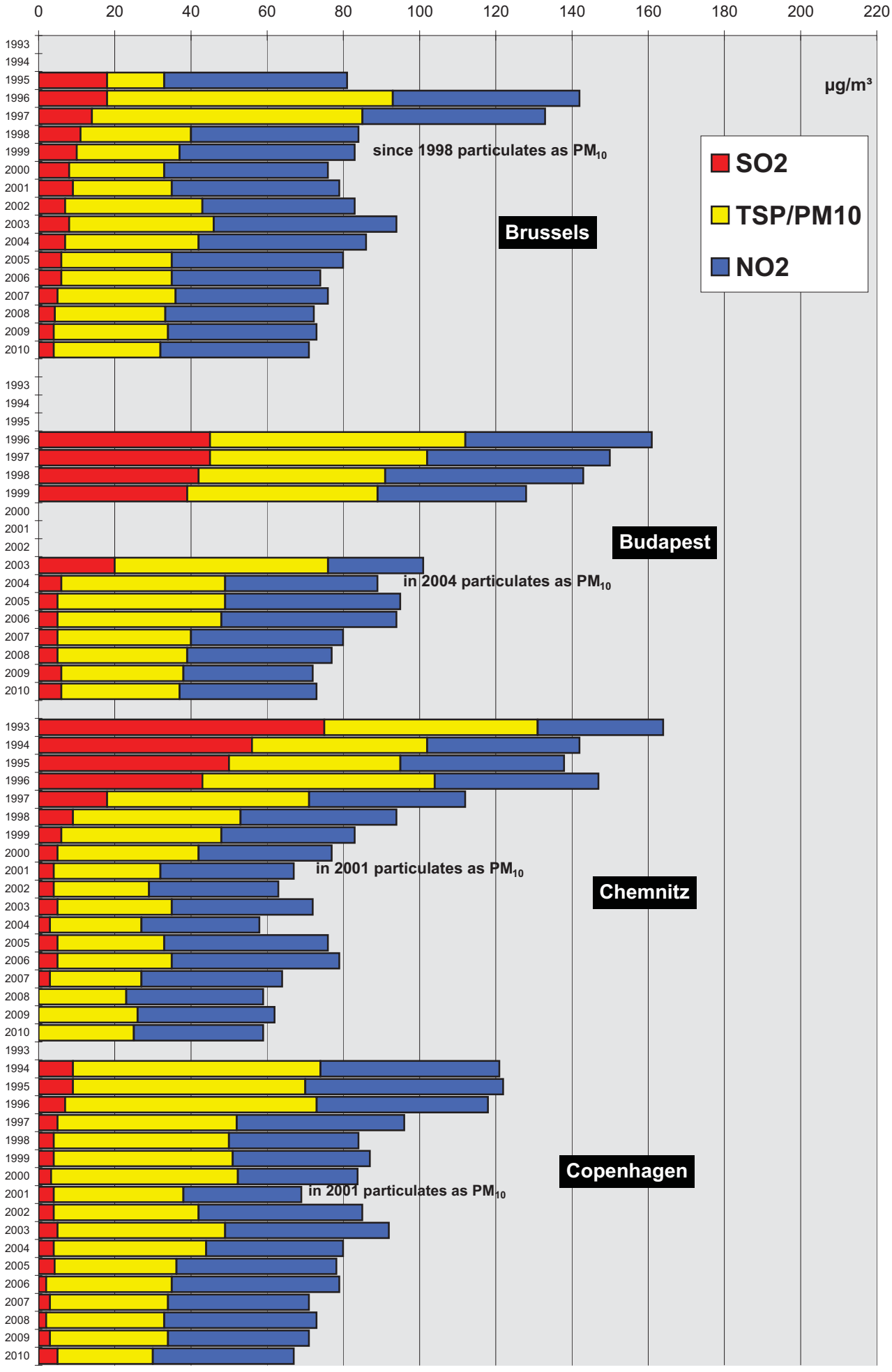


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2010

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

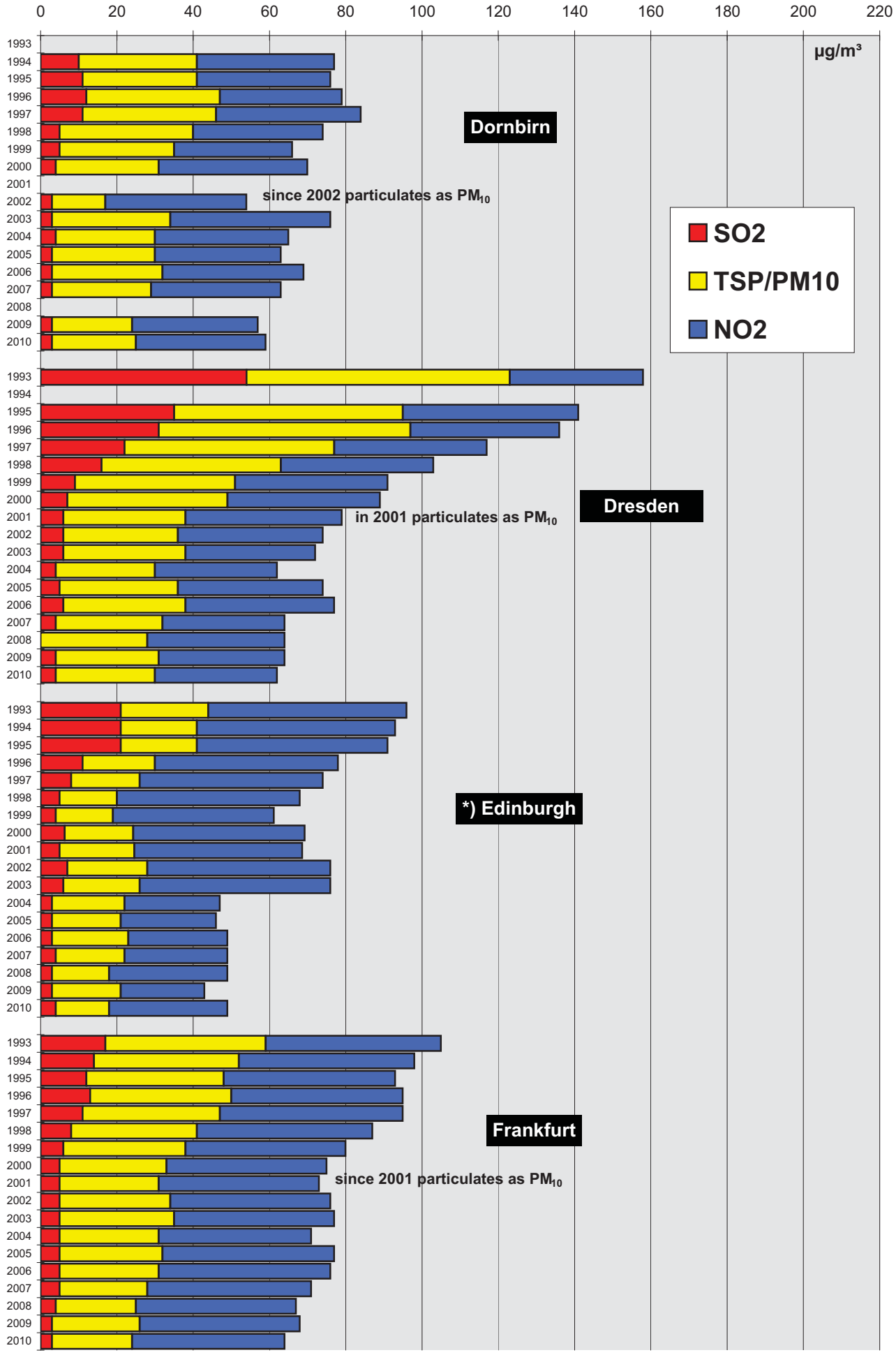
(mean of all monitoring stations)



Comparison Of The Air Quality 1993-2010

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

(mean of all monitoring stations)

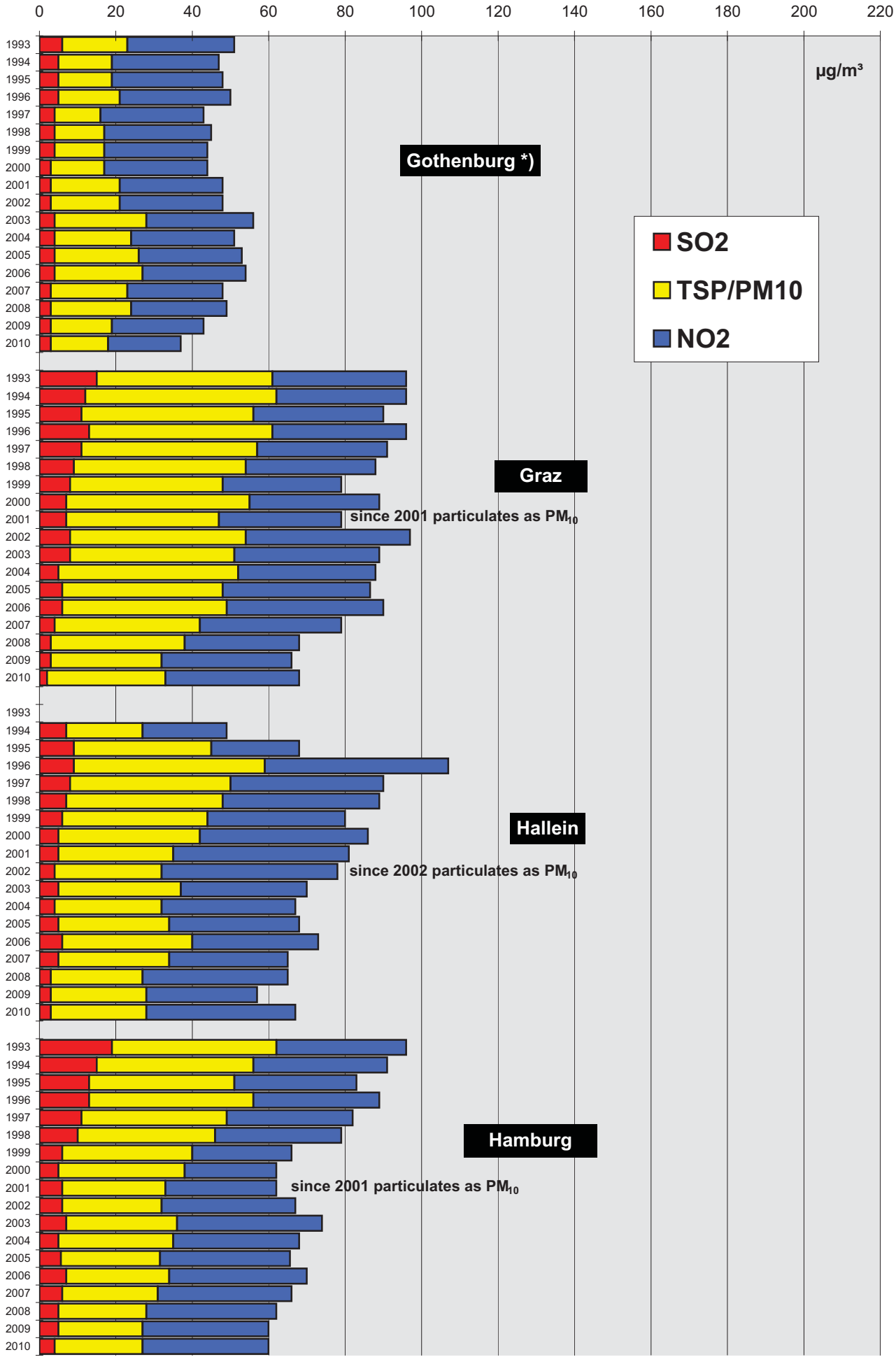


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2010

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

(mean of all monitoring stations)

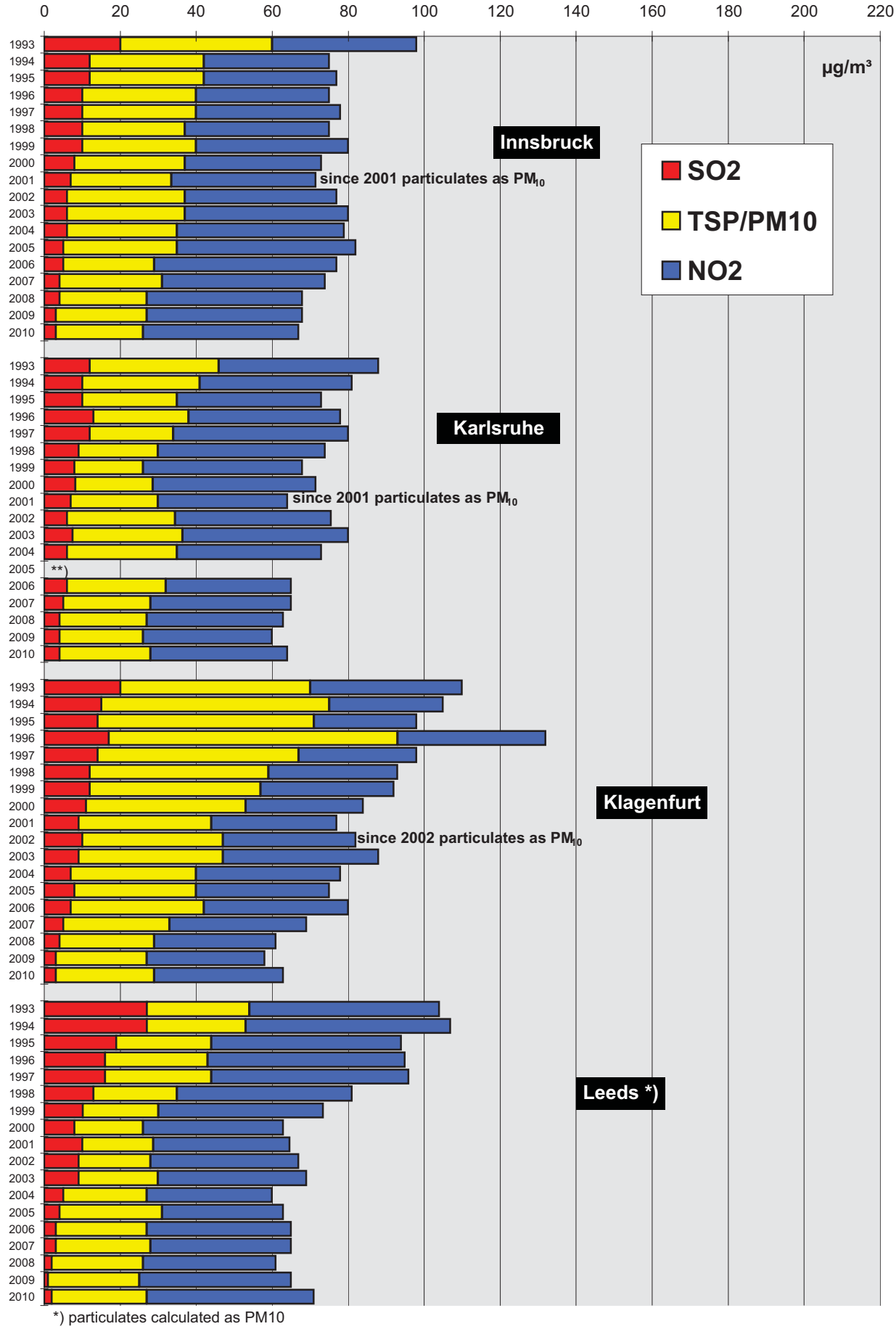


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2010

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

(mean of all monitoring stations)



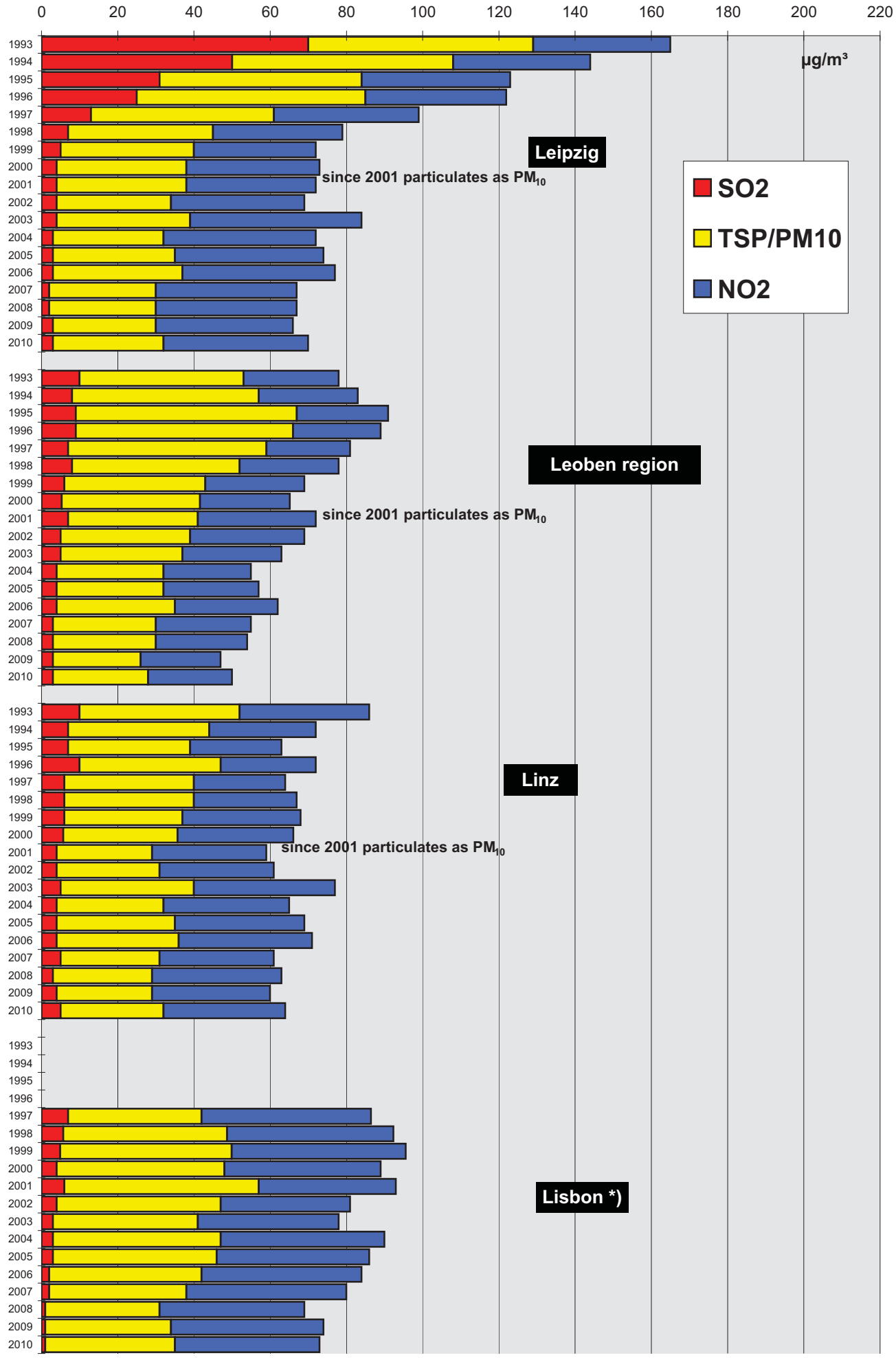
*) particulates calculated as PM10

**) No data

Comparison Of The Air Quality 1993-2010

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

(mean of all monitoring stations)

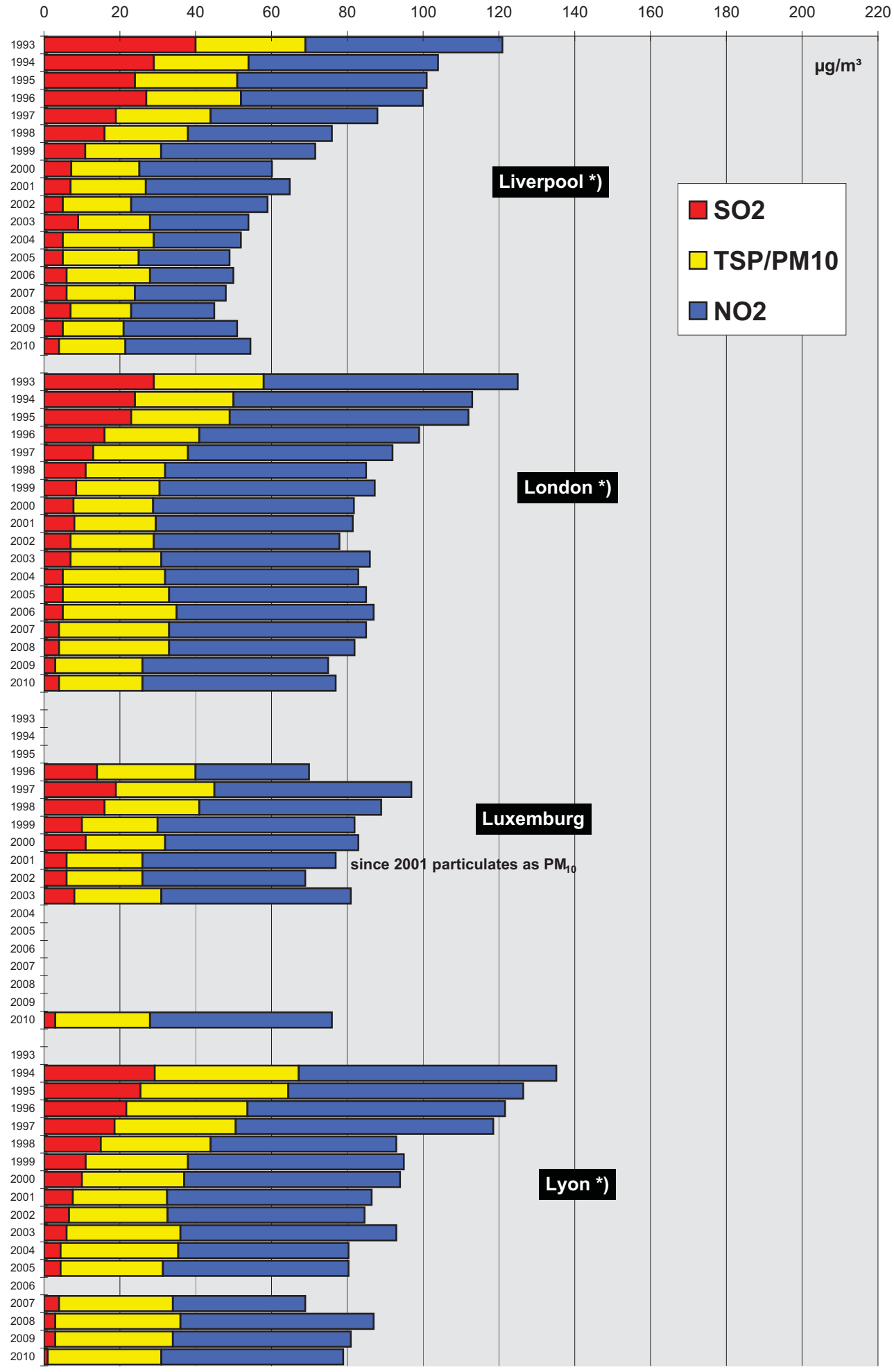


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2010

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

(mean of all monitoring stations)

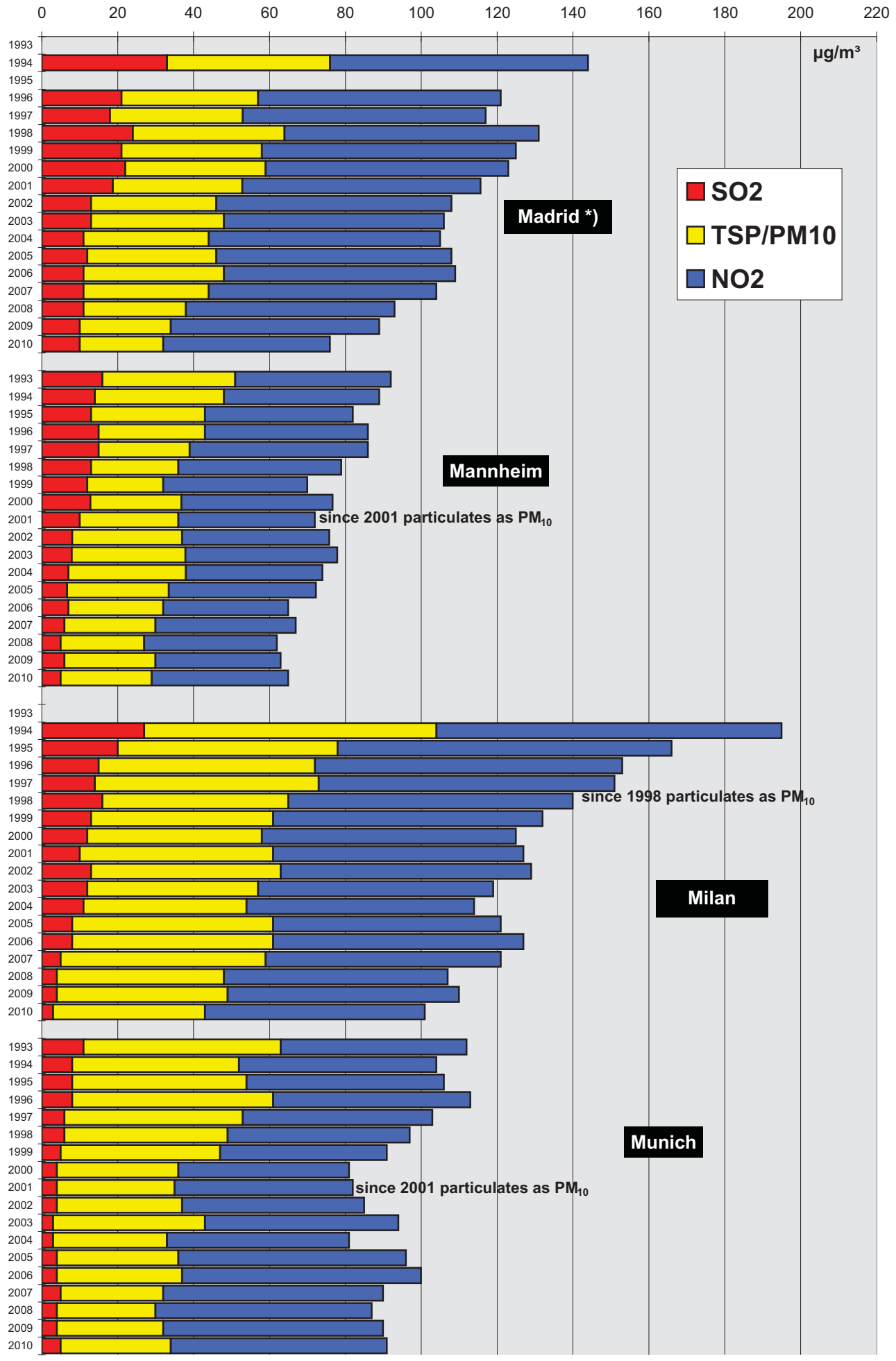


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2010

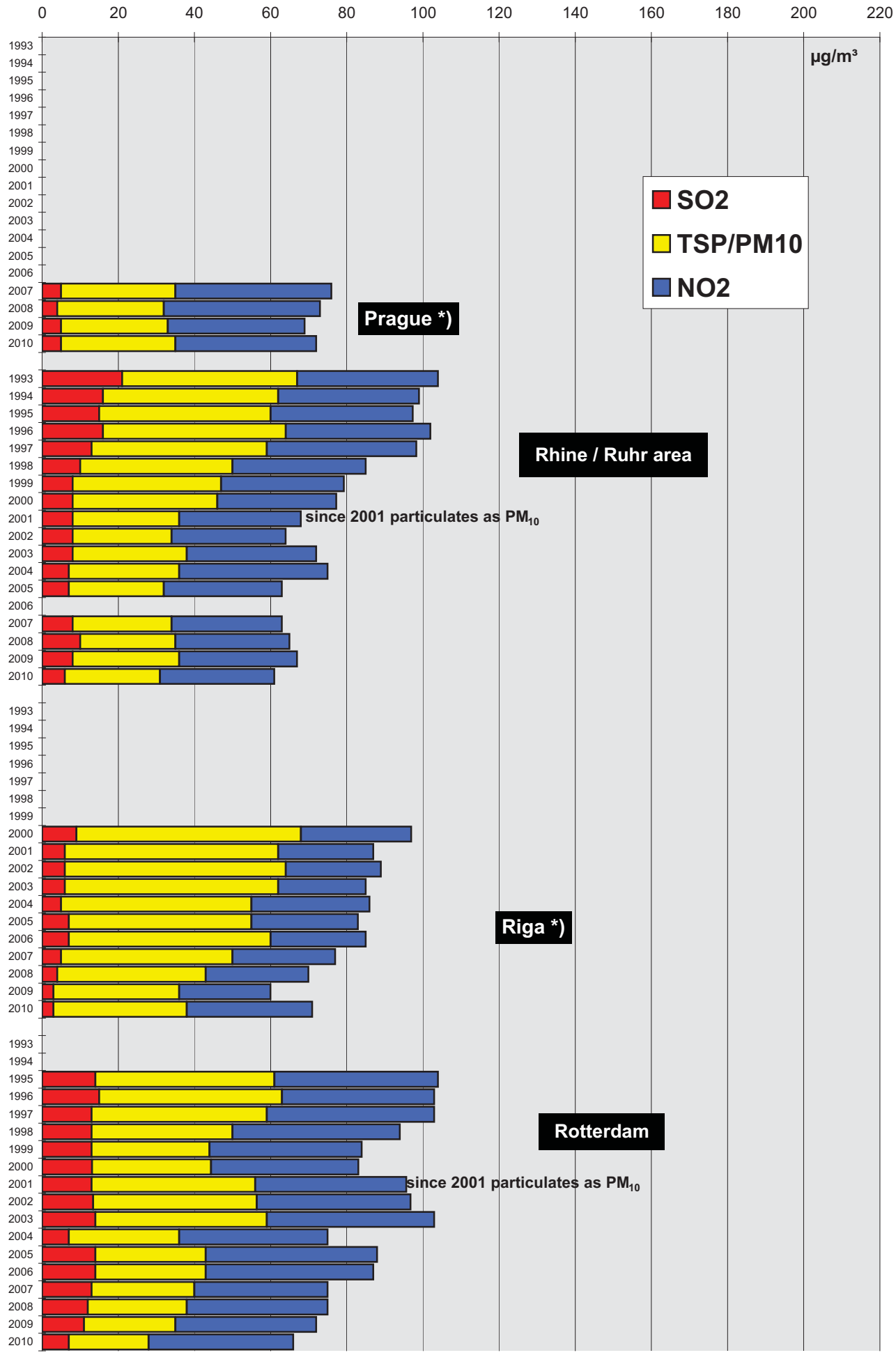
Development of the annual mean values, Σ SO_2, TSP/PM_{10}, NO_2

(mean of all monitoring stations)



*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2010
Development of the annual mean values, Σ SO_2, TSP/PM_{10}, NO_2
(mean of all monitoring stations)



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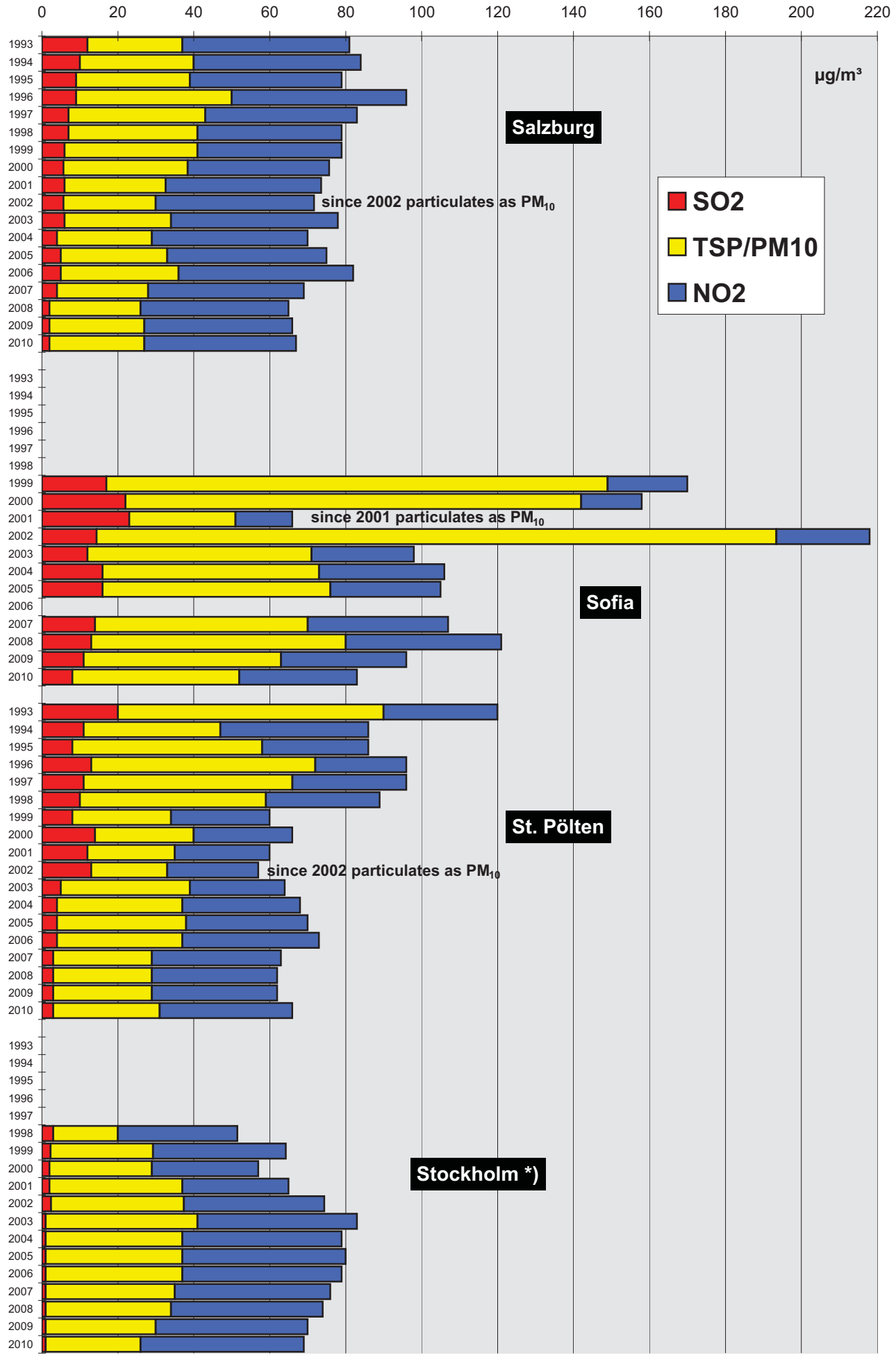
Comparison Of The Air Quality 1993-2010

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

(mean of all monitoring stations)

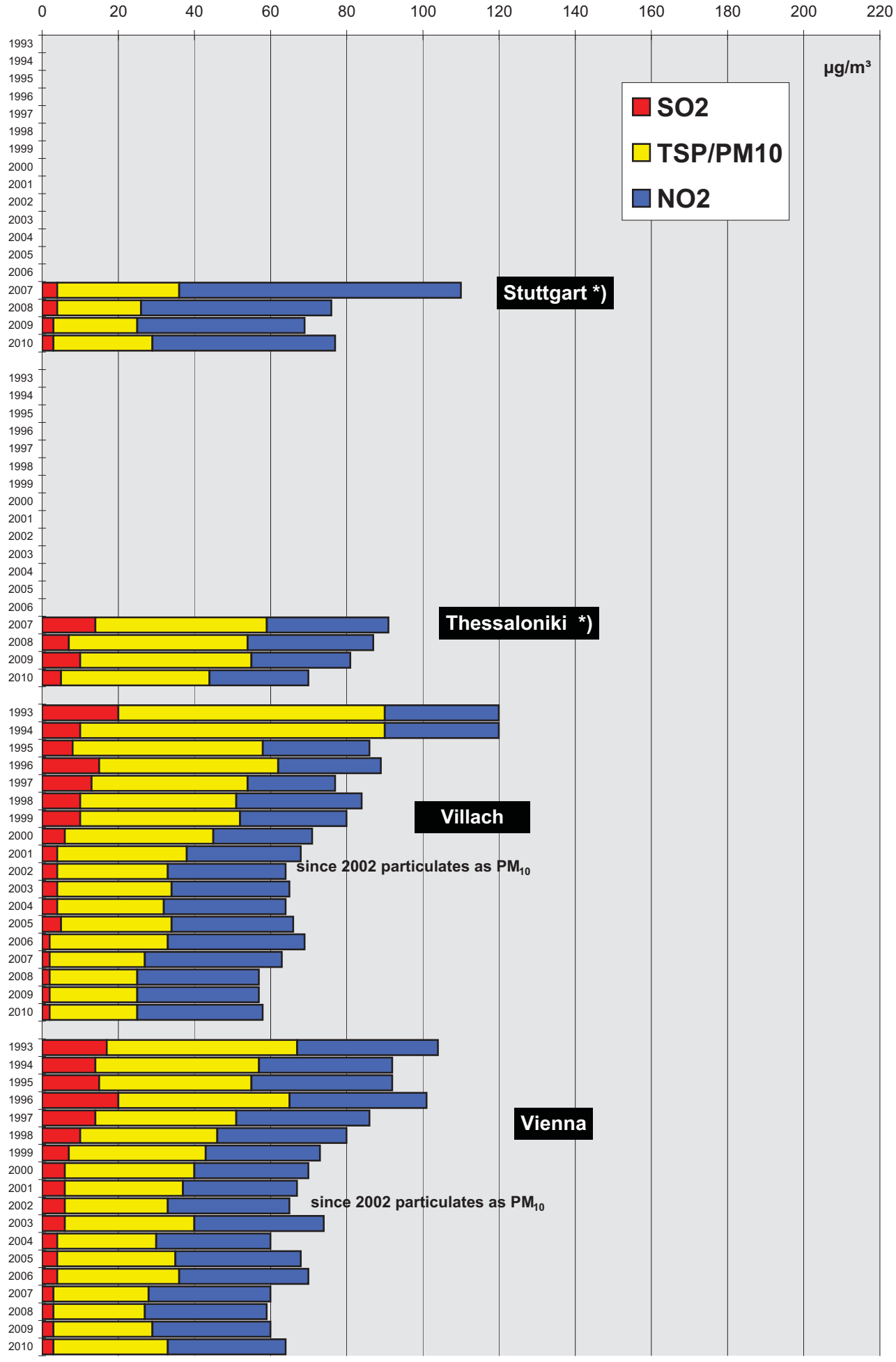


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2010

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

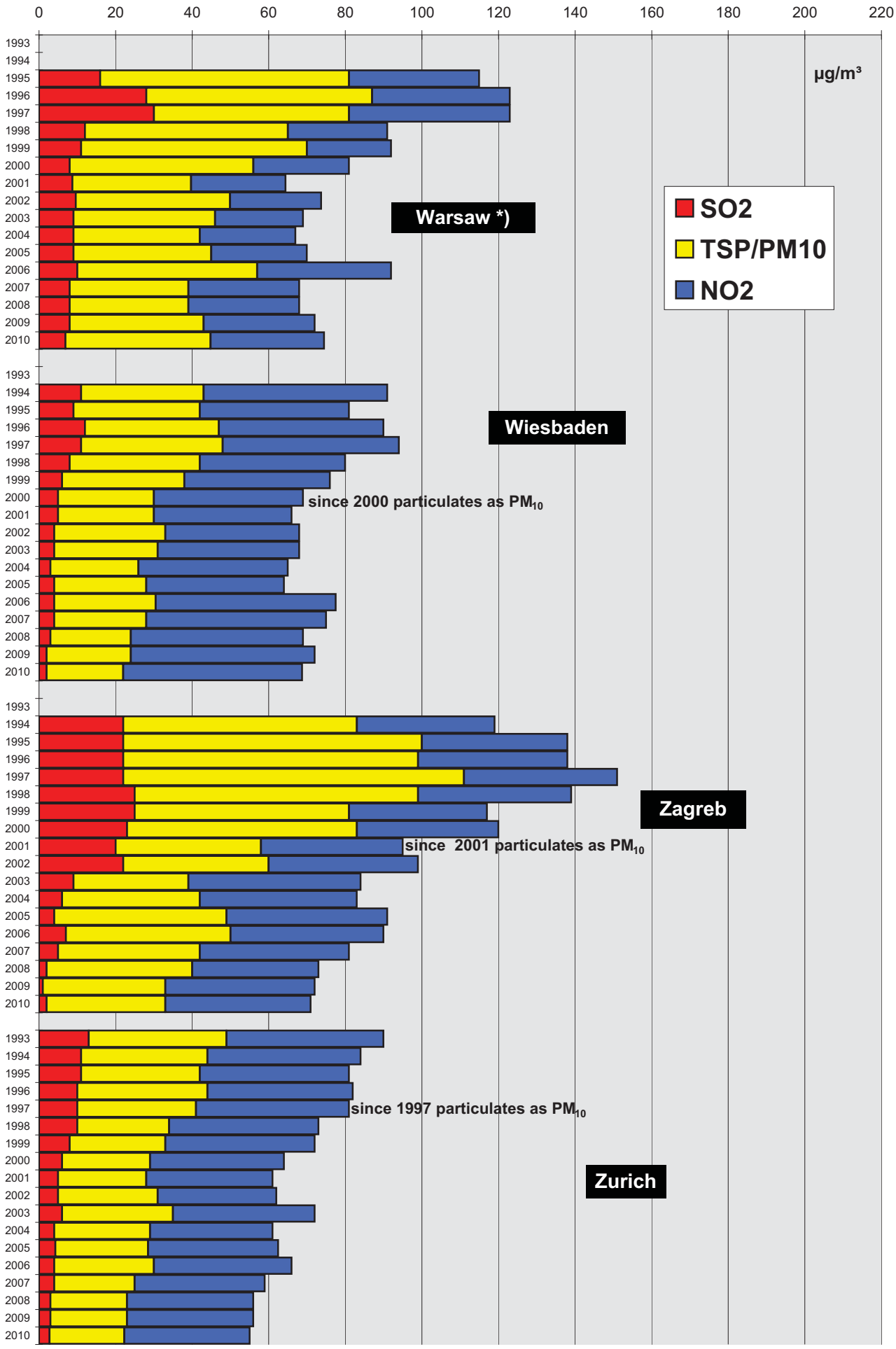
(mean of all monitoring stations)



Comparison Of The Air Quality 1993-2010

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

(mean of all monitoring stations)



*) particulates calculated as PM_{10}

Luftgütekennzahlen 2010

der einzelnen

Vergleichsregionen

Immission Reference Values 2010

Of All Compared Regions

Comparison of The Air Quality in 2010

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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	6	6	16	39	-	173	-	39
PM_{10}	7	39	87	421	-	-	-	108
$PM_{2,5}$	3	20	34	111	-	-	-	42
NO	14	25	164	-	-	753	-	342
NO_2	14	34	105	-	-	222	-	150
CO	7	900	2400	-	-	11000	-	4400
O_3	13	58	114	-	-	245	-	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 2010 (measured values **including** equivalent factor):	99
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	8

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

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

Comparison of The Air Quality in 2010

Barcelona

immission area: 101 km^2 population: 1 619 337

	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. 3h mean value [2] [µg/m³]**	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]***
SO_2	5	2	7	19	57	71	-	17
PM_{10}*	8	30	48	74	-	-	-	63
$PM_{2,5}$*	4	17	28	59	-	-	-	39
NO	5	18	62	211	374	470	-	147
NO_2	5	47	78	117	173	182	-	130
CO	5	400	700	1800	2900	3700	-	1500
O_3	4	45	75	108	157	177	-	117

PM_{10}:	Monitoring method(s) used:	Gravimetry
	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 2010 (measured values **including** equivalent factor):	23 ****
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0 *****

Comments:

* Gravimetric method
** Static average (not moving average)
*** Maximum 98 percentile of hourly values, except PM_{10} and $PM_{2.5}$, daily values
**** Station: ID_BARCELONA
***** Station: IJ-BARCELONA (GRACIA-SANT GERVASI)

Area and population of the municipalities of Barcelona (not metropolitan areas)
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

Comparison of The Air Quality in 2010

Basel

immission area: 557 km^2 population: 489 854

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	3	5	12	24	27	30	17
PM_{10}	1	18	30	66	90	92	92	73
$PM_{2,5}$	1	14	26	60	-	-	-	-
NO	1	6	18	75	160	183	196	83
NO_2	1	24	40	77	92	100	100	81
CO	-	-	-	-	-	-	-	-
O_3	1	49	84	140	203	209	210	183

PM_{10}:	Monitoring method(s) used:	β-Meter-measurements, calibrated with gravimetrical measurements every 4 days
	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 2010 (measured values **including** equivalent factor):	11
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Belfast

immission area: 115 km^2 population: 277 000

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	4	9	35	-	-	-	15
PM_{10}	1	22	38	117	-	-	-	60
$PM_{2,5}$	1	14	31	111	-	-	-	46
NO	1	21	60	207	-	-	-	111
NO_2	1	35	54	112	-	-	-	80
CO	1	200	500	1600	-	-	-	800
O_3	1	38	52	81	-	-	-	69

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	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 2010 (measured values **including** equivalent factor):	10
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

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

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

Comparison of The Air Quality in 2010

Berlin (traffic station)

immission area: 892 km^2 population: 3 460 700

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	4	10	36	47	58	71	22
PM_{10}	6	33	60	140	467	199/995*	244/1134*	99
$PM_{2,5}$	1	24	53	171	-	-	-	109
NO	6	43	62	153	295	379	442	167
NO_2	6	53	60	105	161	194	237	117
CO	2	500	740	1380	2280	2400	5000	1300
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	β-absorption
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.2
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	56
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	6

Berlin (urban 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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	4	11	32	46	56	63	22
PM_{10}	4	27	54	127	332	171/708*	179/829*	92
$PM_{2,5}$	4	22	48	111	-	-	-	112
NO	5	7	13	62	210	228	272	48
NO_2	5	27	37	74	136	146	154	71
CO	-	-	-	-	-	-	-	-
O_3	2	45	54	126	194	198	203	121

PM_{10}:	Monitoring method(s) used:	β-absorption
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.2
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	39
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Comments: PM_{10}*: mean or max. values from the New Years Eve Day
$PM_{2,5}$*: mean or max. values (from daily values) from the New Years Eve Day

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

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

Comparison of The Air Quality in 2010

Berlin (outskirt station)

immission area: 892 km^2 population: 3 460 700

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	-	-	-	-	-	-	-	-
PM_{10}	4	23	45	118	161	162/268*	193/327*	86
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	6	4	7	46	121	123	147	23
NO_2	6	15	23	59	85	90	92	49
CO	-	-	-	-	-	-	-	-
O_3	5	50	45	127	195	197	199	127

PM_{10}:	Monitoring method(s) used:	β-absorption
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.2
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	28
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Comments: PM_{10}*: mean or max. values from the New Years Eve Day
$PM_{2,5}$*: mean or max. values (from daily values) from the New Years Eve Day

Birmingham

immission area: 268 km^2 population: 1 010 200

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	2	4	9	-	-	-	6
PM_{10}	1	26	31	56	-	-	-	51
$PM_{2,5}$	1	18	24	49	-	-	-	41
NO	2	36	94	309	-	-	-	163
NO_2	2	37	69	119	-	-	-	89
CO	-	-	-	-	-	-	-	-
O_3	2	33	56	90	-	-	-	75

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	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 2010 (measured values **including** equivalent factor):	8
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	7

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

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

Comparison of The Air Quality in 2010

Bludenz

immission area: 3 km^2 population: 13 775

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	-	-	-	-	-	-	-	-
PM_{10}	1	19	41	76	-	-	-	58
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	13	39	121	232	303	308	104
NO_2	1	25	49	89	115	127	131	79
CO	-	-	-	-	-	-	-	-
O_3	1	45	78	127	166	172	172	128

PM_{10}:	Monitoring method(s) used:	gravimetrically
	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 2010 (measured values **including** equivalent factor):	17
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Comment: Max 3h-mean value is calculated from six ½h-mean values (moving average)

Bristol

immission area: 110 km^2 population: 416 516

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	2	3	9	-	-	-	6
PM_{10}	1	21	29	116	-	-	-	49
$PM_{2,5}$	1	14	24	100	-	-	-	39
NO	2	44	112	268	-	-	-	189
NO_2	2	48	87	129	-	-	-	108
CO	2	500	600	1400	-	-	-	1000
O_3	1	40	60	79	-	-	-	71

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	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 2010 (measured values **including** equivalent factor):	4
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	3

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

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

Comparison of The Air Quality in 2010

Brussels

immission area: 161 km^2 population: 1 101 872

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per day, hour [µg/m³]
SO_2	7	4	8	16	-	37	42	11 (daily)
PM_{10}	6	28	42	126	-	373	453	75 (daily)
$PM_{2,5}$	5	20	36	94	-	160	198	61.1 (daily)
NO	10	17	55	224	-	860	997	196 (1 Hr)
NO_2	10	39	62	106	-	215	229	107 (1 Hr)
CO	7	310	610	990	-	2920	3170	840 (1 Hr)
O_3	7	35	67	127	-	196	198	117 (1Hr)

PM_{10}:	Monitoring method(s) used:	TEOM-FDMS (both for PM_{10} and $PM_{2,5}$)
	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 2010 (measured values **including** equivalent factor):	45
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	1

Budapest

immission area: 525 km^2 population: 1 712 556

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	10	6	13	31	57	59	-	22
PM_{10}	12	31	56	123	198	326	-	82
$PM_{2,5}$	1	23	36	95	140	141	-	77
NO	12	18	59	293	499	621	-	170
NO_2	12	36	68	132	176	282	-	112
CO	12	618	1443	2822	4506	4808	-	1965
O_3	10	38	76	105	177	185	-	120

PM_{10}:	Monitoring method(s) used:	β-absorption
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	84
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	1

Comments: SO_2, NO, NO_2, CO, O_3: Max. 98 percentile per year is calculated from 1 hour mean values.
PM_{10}: Max. 98 percentile per year is calculated from daily 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

Comparison of The Air Quality in 2010

Chemnitz

immission area: 221 km^2 population: 243 089

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	0	-	-	-	-	-	-	-
PM_{10}	3	25	49	167	278	388	288	87
$PM_{2,5}$	2	20	37	124	-	-	-	-
NO	3	25	68	181	181	181	181	190
NO_2	3	34	56	95	95	95	95	105
CO	0	-	-	-	-	-	-	-
O_3	1	47	80	121	121	121	121	127

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:	depending on station and method*
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	34
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

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

station	PM_{10}-HVS	PM_{10}-TEOM
Chemnitz-Leipziger Straße	1,10	1,20 + f (temperature, humidity)
Chemnitz-Mitte	1,05	1,10 + f (temperature, humidity)
Chemnitz-Nord	1,10	1,14 + f (temperature, humidity)

The measurement of SO_2 and CO stopped on 1.1.2008

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

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

Comparison of The Air Quality in 2010

Copenhagen

immission area: 88 km^2 population: 528 208

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	5	-	-	-	39	-	16
PM_{10}	3	25	-	89	-	-	-	-
$PM_{2,5}$	3	16	-	72	-	-	-	-
NO	-	-	-	-	-	-	-	-
NO_2	3	37	-	-	-	-	-	129
CO	3	429	-	-	-	3194	-	1242
O_3	3	43	-	-	-	173	-	-

PM_{10}:	Monitoring method(s) used:	Gravimetically , TEOM
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1 / 1.3
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	18
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	n.a.

Dornbirn

immission area: 13 km^2 population: 45 261

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	3	5	8	17	21	18	8
PM_{10}	1	22	42	94	-	-	-	63
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	25	52	139	324	368	388	127
NO_2	1	34	52	88	141	162	179	89
CO	-	-	-	-	-	-	-	-
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	gravimetrically
	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 2010 (measured values **including** equivalent factor):	21
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Comment: Max 3h-mean value is calculated from six ½h-mean values (moving average)

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

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

Comparison of The Air Quality in 2010

Dresden

immission area: 328 km^2 population: 517 052

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	4	9	35	71	72	81	22
PM_{10}	4	26	51	187	279	373	378	99
$PM_{2,5}$	3	19	39	138	-	-	-	-
NO	4	25	87	278	278	278	771	250
NO_2	4	32	59	103	103	103	264	122
CO	-	-	-	-	-	-	-	-
O_3	3	47	89	127	127	127	193	132

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:	depending on station and method*
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	40
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Comments:

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

station	PM_{10}-HVS	PM_{10}-TEOM
Dresden-Bergstr.	1,10	1,20 + f (temperature, humidity)
Dresden-Nord.	1,10	1,14 + f (temperature, humidity)
Dresden-Winckelmannstr.	1,05	1,00 + f (temperature, humidity)
Dresden-Wahnsdorf	1,05	1,00 + f (temperature, humidity)

The measurement of CO (station Dresden-Nord) and SO_2 (station Radebeul-Wahsdorf) stopped on 1.1.2008

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

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

Comparison of The Air Quality in 2010

Edinburgh (St. Leonhards)

immission area: 262 km^2 population: 463 510

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	4	11	48	-	-	-	18
PM_{10}	1	14	20	47	-	-	-	35
$PM_{2,5}$	1	10	15	30	-	-	-	27
NO	1	10	35	105	-	-	-	51
NO_2	1	31	62	88	-	-	-	76
CO	1	200	400	500	-	-	-	700
O_3	1	33	45	83	-	-	-	66

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	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 2010 (measured values **including** equivalent factor):	0
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Frankfurt (urban stations)

immission area: 248 km^2 population: 688 249

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	4	3	5	18	44	73	130	13
PM_{10}	5	19	34	87	194	378	549	63
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	5	20	53	149	337	350	436	134
NO_2	5	37	62	92	129	145	150	97
CO	1	350	520	1070	2040	2820	3110	920
O_3	4	34	66	116	198	202	209	120

PM_{10}:	Monitoring method(s) used:	ß-absorption
	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 2010 (measured values **including** equivalent factor):	10
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

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

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

Comparison of The Air Quality in 2010

Frankfurt (traffic station)

immission area: 248 km^2 population: 688 249

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	-	-	-	-	-	-	-	-
PM_{10}	1	29	44	99	140	346	544	76
$PM_{2,5}$	1	21	37	91	176	442	656	61
NO	1	46	71	179	303	382	459	187
NO_2	1	56	67	103	225	300	319	123
CO	1	510	720	1140	2420	3300	4440	1320
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	ß-absorption
	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 2010 (measured values **including** equivalent factor):	26
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	5

Gothenburg

immission area: 198 km^2 population: 501 429

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile year [µg/m³]
SO_2	3	3	4	10	11	29	36	9
PM_{10}	1	15	22	49	100	139	214	46
$PM_{2,5}$	2	7	10	27	48	59		22
NO	1	18	30	186	564	675	741	143
NO_2	3	19	53	106	143	260	278	95
CO	1	247	397	678	828	1255	1328	593
O_3	3	52	74	112	129	147	167	101

PM_{10}:	Monitoring method(s) used:	TEOM
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	+19% + 1.15
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	0
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	3

Comment: There was some exceedences of the NO_2 limit at the beginning of 2010 due to a spell of very cold weather with strong inversions.

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

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

Comparison of The Air Quality in 2010

Graz (urban stations)

immission area: 128 km^2 population: 255 354

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	2	2	4	14	37	97	166	7
PM_{10} cont.	5	30	69	170	390	455	485	107**
PM_{10} g.	2	30	65	135	-	-	-	-
$PM_{2,5}$	2	22	51	105	-	-	-	-
NO	5	21	81	277	576	625	628	220
NO_2	5	31	62	116	171	176	184	101
CO	2	450	900	2000	3100	3500	3700	1800
O_3	3	38	91	115	158	161	163	122

PM_{10}:	Monitoring method(s) used:	continuous / gravimetrically*
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.3
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	68 / 66*
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Comments:

Max 3h-mean value = moving average, Max 1h-mean value = static average

* PM_{10}: gravimetric monitoring method

** Max. 98-Percentile per year is calculated from daily 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

Comparison of The Air Quality in 2010

Graz (traffically influenced Don Bosco)

immission area: 128 km^2 population: 255 354

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	4	7	15	27	63	113	11
PM_{10} cont.	1	39	70	148	395	460	478	111**
PM_{10} g.	1	37	67	127	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	55	111	293	660	817	824	272
NO_2	1	51	80	138	192	215	217	123
CO	1	500	1000	2100	2900	3100	3400	1700
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	continuous, gravimetrically*
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.3
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	74 / 69*
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	1

Comments:

Max 3h-mean value = moving average, Max 1h-mean value = static average

* PM_{10}: gravimetric monitoring method

** Max. 98-Percentile per year is calculated from daily 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

Comparison of The Air Quality in 2010

Hallein

immission area: 27 km^2 population: 19 864

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	2	3	5	21	141	196	239	9
PM_{10}	2	25	46	99	-	-	-	72,3
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	3	36	88	187	447	561	606	225
NO_2	3	39	69	111	167	188	194	115
CO	2	445	840	1550	2480	3090	3230	1320
O_3	1	63	97	141	181	184	185	139

PM_{10}:	Monitoring method(s) used:	Digitel and SHARP
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	SHARP: 0.9872
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	29
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

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

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

Comparison of The Air Quality in 2010

Hamburg (area monitoring stations)

immission area: 755 km^2 population: 1 783 975

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	7	4	14	74	162	232	284	50
PM_{10}	8	21	42	87	256	343	364	70
$PM_{2,5}$	3	16	33	73	220	295	307	58
NO	13	9	33	175	454	573	964	118
NO_2	13	24	44	105	161	196	198	84
CO	3	241	441	899	2277	2413	2484	637
O_3	6	46	82	145	219	232	233	120

PM_{10}:	Monitoring method(s) used:	TEOM (6 stations), β-absorption (2 stations)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	TEOM: 1; Beta: 1.20 / 1.12
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	18
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	-	-	-	-	-	-	-	-
PM_{10}	3	27	47	98	337	540	780	79
$PM_{2,5}$	2	20	43	91	321	396	416	71
NO	4	66	107	290	550	678	731	307
NO_2	4	63	83	150	252	263	272	151
CO	4	494	766	1501	3263	4776	8846	1562
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	TEOM (2 stations) ß-Adsorption (1 station)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	TEOM: 1; Beta: 1.26
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent	26
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	24

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

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

Comparison of The Air Quality in 2010

Innsbruck

immission area: 105 km^2 population: 120 147

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	3	7	11	16	17	18	9
PM_{10}	2	23	55	92	-	-	-	65
$PM_{2,5}$	1	16	35	69	-	-	-	46
NO	3	28	71	180	-	-	495	159
NO_2	3	41	69	100	152	-	189	102
CO	1	400	808	1147	1664	1924	2343	1052
O_3	2	41	77	132	169	170	171	128

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 2010 (measured values **including** equivalent factor):	29
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Karlsruhe (urban station)

immission area: 173 km^2 population: 294 761*

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	4	7	16	-	101	-	-
PM_{10}	2	23	41	84	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	2	16	49	182	-	408	-	-
NO_2	2	31	47	89	-	172	-	-
CO	1	200	347	900	-	2000	-	-
O_3	2	41	80	131	-	209	-	-

PM_{10}:	Monitoring method(s) used:	gravimetrically
	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 2010 (measured values **including** equivalent factor):	23
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Comment: * 4. Quarter 2010; source: Statistisches Landesamt Baden-Württemberg

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

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

Comparison of The Air Quality in 2010

Karlsruhe (traffic station)

immission area: 173 km^2 population: 294 761*

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	-	-	-	-	-	-	-	-
PM_{10}	1	25	45	86	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	30	61	208	-	493	-	-
NO_2	1	45	60	119	-	253	-	-
CO	1	400	746	1900	-	4000	-	-
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	gravimetrically
	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 2010 (measured values **including** equivalent factor):	22
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	4

Comments: * 4. Quarter 2010; source: Statistisches Landesamt Baden-Württemberg

Klagenfurt

immission area: 120 km^2 population: 93 306

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	3	5	10	39	80	81	11
PM_{10}	2	26	51	99	-	-	-	-
$PM_{2,5}$	1	18	35	69	-	-	-	-
NO	2	25	102	254	541	623	652	197
NO_2	2	34	69	116	189	204	210	105
CO	2	522	1033	2109	3232	3505	3607	1582
O_3	2	45	89	131	154	159	160	130

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 2010 (measured values **including** equivalent factor):	43
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	1

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

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

Comparison of The Air Quality in 2010

Leeds

immission area: 552 km^2 population: 761 100

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	2	4	13	-	-	-	8
PM_{10}	2	25	36	79	-	-	-	57
$PM_{2,5}$	1	17	29	68	-	-	-	42
NO	2	39	97	234	-	-	-	170
NO_2	2	44	70	108	-	-	-	92
CO	1	400	700	1200	-	-	-	1000
O_3	1	33	51	79	-	-	-	67

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	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 2010 (measured values **including** equivalent factor):	11
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	1

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

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

Comparison of The Air Quality in 2010

Leipzig

immission area: 298 km^2 population: 518 862

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	3	7	24	34	36	51	14
PM_{10}	3	29	58	163	286	669	749	110
$PM_{2,5}$	2	19	43	121	-	-	-	-
NO	3	29	70	153	153	377	419	169
NO_2	3	38	60	102	102	162	174	102
CO	-	-	-	-	-	-	-	-
O_3	1	48	83	134	134	206	206	118

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:	depending on station*
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	49
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Comments:

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

station	PM_{10}-HVS	PM_{10}-TEOM
Leipzig-Lützner Str.	1.10	1.20 + f (temperature, humidity)
Leipzig-Mitte	1.10	1.14+ f (temperature, humidity)
Leipzig-West	1.05	1.00+ f (temperature, humidity)

The measurement of CO in “Leipzig Mitte” is stopped on 1.1.2008

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

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

Comparison of The Air Quality in 2010

Leoben (Leoben, Donawitz, Göß)

immission area: 108 km^2 population: 24 999

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	3	3	8	22	96	108	125	21
PM_{10} cont.	4	25	40	110	359	501	612	80
PM_{10} g.	1	23	35	82	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	4	12	53	203	296	320	354	110
NO_2	4	22	45	78	107	139	179	72
CO	1	800	1700	5900	14700	18500	19800	3800
O_3	1	39	67	100	149	158	158	119

PM_{10}:	Monitoring method(s) used:	continuous, gravimetrically*
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.3
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	20 / 16*
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	-

Comments:

Max 3h-mean value = moving average, Max 1h-mean value = static average

* PM_{10}: gravimetrically monitoring method

** Max. 98-Percentile per year is calculated from daily 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

Comparison of The Air Quality in 2010

Linz

immission area: 96 km^2 population: 189 680

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	5	5	15	41	97	111	139	48
PM_{10}	6	27	50	125	339	472	617	85
$PM_{2,5}$	1	21	38	91	-	-	-	-
NO	7	19	76	218	433	545	545	189
NO_2	7	32	60	104	237	340	348	122
CO	5	410	800	1700	5000	6100	7100	2016
O_3	3	40	68	104	179	183	186	122

PM_{10}:	Monitoring method(s) used:	Continuously and gravimetrically
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1 / 1.15 /1.2
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	45
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	3

Lisbon

immission area: 85 km^2 population: 550 000

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	5	1	6	15	-	43	-	10
PM_{10}	5	34	54	131	-	268	-	76
$PM_{2,5}$	2	13	18	61	-	81	-	33
NO	7	20	79	199	-	755	-	216
NO_2	7	38	73	145	-	288	-	154
CO	7	293	620	2691	-	3944	-	1568
O_3	4	56	82	109	-	197	-	114

PM_{10}:	Monitoring method(s) used:	Beta-absorption, TEOM
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.18 (traffic stations) / 1.11 (background stations)
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	90
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	21

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

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

Comparison of The Air Quality in 2010

Liverpool

immission area: 112 km^2 population: 441 100

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	4	6	30	-	-	-	14
PM_{10}	1	18	24	73	-	-	-	46
$PM_{2,5}$	1	12	19	58	-	-	-	34
NO	2	20	64	186	-	-	-	97
NO_2	2	33	58	95	-	-	-	78
CO	1	300	500	1100	-	-	-	600
O_3	1	43	63	89	-	-	-	80

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 2010 (measured values **including** equivalent factor):	2
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

London

immission area: 1 572 km^2 population: 7 556 900

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	6	4	9	29	-	-	-	15
PM_{10}	6	22	40	70	-	-	-	55
$PM_{2,5}$	9	16	28	82	-	-	-	52
NO	14	36	114	389	-	-	-	291
NO_2	14	51	117	213	-	-	-	173
CO	7	386	700	1800	-	-	-	1200
O_3	9	32	65	99	-	-	-	85

PM_{10}:	Monitoring method(s) used:	GRAV EQ, TEOM (FDMS)
	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 2010 (measured values **including** equivalent factor):	22
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	539

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

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

Comparison of The Air Quality in 2010

Luxemburg

immission area: 51 km^2 population: 91 000

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	2	3	16	11	-	28	31	10
PM_{10}	1	25	35	70	-	-	-	63
$PM_{2,5}$	1	16	30	58	-	-	-	45
NO	2	36	64	98	-	396	448	222
NO_2	2	48	55	86	-	158	164	126
CO	2	900	500	700	-	4000	3500	800
O_3	2	31	52	91	-	145	147	117

PM_{10}:	Monitoring method(s) used:	REFERENZVERFAHREN (auf Filter)
	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 2010 (measured values **including** equivalent factor):	15
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Comments:

PM_{10} and $PM_{2,5}$ values are calculated from 24h-values. PM_{10} and $PM_{2,5}$ were measured with the gravimetric filter method, this method deliver only 24h-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

Comparison of The Air Quality in 2010

Lyon (Urban site)

immission area: 47,9 km^2 population: 445 274

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	4	1	-	16	-	81	-	10
PM_{10}	2	28	-	90	-	475	-	74
$PM_{2,5}$	2	23	-	74	-	105	-	60
NO	3	13	-	187	-	399	-	129
NO_2	3	34	-	103	-	205	-	98
CO	0	-	-	-	-	-	-	-
O_3	3	46	-	126	-	229	-	129

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	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 2010 (measured values **including** equivalent factor):	21
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	1

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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	-	-	-	-	-	-	-	-
PM_{10}	3	32	-	108	-	377	-	110
$PM_{2,5}$	1	27	-	84	-	111	-	72
NO	5	55	-	330	-	1140	-	336
NO_2	5	57	-	157	-	284	-	202
CO	4	398	-	1250	-	2921	-	1347
O_3	0	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	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 2010 (measured values **including** equivalent factor):	81*
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	181*

Comment: * station near a highway

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

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

Comparison of The Air Quality in 2010

Madrid

immission area: 604 km^2 population: 3 269 861

	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. 3h mean value [2] [µg/m³]*	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year** [µg/m³]
SO_2	9	10	19	40	87	96	-	44
PM_{10}	11	22	39	140	198	225	-	93
$PM_{2,5}$	5	12	19	72	99	110	-	46
NO	22	16	61	163	546	678	-	178
NO_2	22	44	85	138	356	435	-	174
CO	10	400	600	1100	3400	4200	-	1200
O_3	13	49	85	117	183	193	-	136

PM_{10}:	Monitoring method(s) used:	Oscillating microbalance
	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 2010 (measured values **including** equivalent factor):	18 ***
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	76 ****

Comments:

Area and population of the municipalities of Madrid (not metropolitan areas)
Minimum data capture of 75%

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

* Static average (not moving average)
** Maximum 98 percentile of 1-hour values
*** Station: Escuelas Aguirre
**** Station: Fernandez Ladreda-Oporto

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

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

Comparison of The Air Quality in 2010

Mannheim (urban station)

immission area: 145 km^2 population: 313 174*

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	4	8	20	-	47	-	-
PM_{10}	3	23	39	92	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	3	12	34	142	-	399	-	-
NO_2	3	31	47	79	-	131	-	-
CO	1	200	355	700	-	1800	-	-
O_3	3	42	72	118	-	207	-	-

PM_{10}:	Monitoring method(s) used:	Gravimetrically
	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 2010 (measured values **including** equivalent factor):	21
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Mannheim (traffic station)

immission area: 145 km^2 population: 313 174*

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2**	1	5	-	23	-	46	-	-
PM_{10}	1	28	45	98	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	37	63	231	-	493	-	-
NO_2	1	50	57	106	-	276	-	-
CO	1	500	819	1300	-	2400	-	-
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	Gravimetrically
	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 2010 (measured values **including** equivalent factor):	24
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	1

Comments: * 4. Quarter 2010; source: Statistisches Landesamt Baden-Württemberg
** SO_2 emitter is near the measurement station MA-Nord

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

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

Comparison of The Air Quality in 2010

Milan

immission area: 182 km^2 population: 1 307 495

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	3	-	13	-	47	-	9
PM_{10}	3	40	-	140	-	179	-	109
$PM_{2,5}$	1	25	-	104	-	n.a.	-	79
NO	8	41	-	382	-	918	-	314
NO_2	8	58	-	158	-	250	-	151
CO	5	1265	-	3795	-	11776	-	3419
O_3	3	41	-	140	-	213	-	158

PM_{10}:	Monitoring method(s) used:	Beta 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 2010 (measured values **including** equivalent factor):	85
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	25

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

Comparison of The Air Quality in 2010

Munich immission area: 310 km^2 population: 1 364 000

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	5	7	11	13	28	52	10
PM_{10}	5	29	54	121	246	350	538	77
$PM_{2,5}$	2	18	34	76	120	121	122	57
NO	6	42	140	396	640	762	852	375
NO_2	6	57	113	225	349	413	455	205
CO	4	463	750	1840	3060	3770	5110	1440
O_3	3	39	75	120	180	186	186	126

PM_{10}:	Monitoring method(s) used:	β-absorption / Oscillating micro balance / nephtelometer + β-absorption
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.25 / 1.0
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	65
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	192

Comments:

PM_{10} / $PM_{2,5}$: The values from 01.01.2010 are not in the analysis, because fireworks in the New Year's Eve cause very high single data. These values are included by the number of limit violations.

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

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

Comparison of The Air Quality in 2010

Prague

immission area: 496 km^2 population: 1 250 000

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	10	5.3	16.8	44.3	-	116.9	-	26.0
PM_{10}	21	30.4	58.0	155.3	-	493.0	-	94.0
$PM_{2,5}$	5	19.3	36.0	87.4	-	167.0	-	64.0
NO	15	18.7	88.1	201.0	-	521.5	-	160.3
NO_2	20	37.4	104.3	191.3	-	281.6	-	133.2
CO	5	699.0	1384.4	2044.5	-	3809.2	-	1741.7
O_3	9	41.9	84.1	125.7	-	186.9	-	105.8

PM_{10}:	Monitoring method(s) used:	7 x Gravimetry, 14 x radiometry
	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 2010 (measured values **including** equivalent factor):	71
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	56

Comments:

- Number of monitoring stations = number of stations which have valid annual mean
- Number of used stations for non annual mean values there are:
  SO_2 = 10, PM_{10} = 21, $PM_{2,5}$ = 5, NO = 15, NO_2 = 21, CO = 5, O_3 = 9
- Max 1h values – automatic measurement there are used only
- Other values - automatic and manual measurement there are used together

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

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

Comparison of The Air Quality in 2010

Riga (traffic station)

immission area: 307 km^2 population: 703 260

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	-	-	-	-	-	-	-	-
PM_{10}	2	40	57	171	274	302	327	118
$PM_{2,5}$	1	28	42	62	-	-	-	57
NO	1	77	115	244	475	513	518	235
NO_2	1	42	56	87	118	120	135	106
CO	1	400	500	1000	2100	2200	2500	900
O_3	1	24	42	69	111	120	123	69

PM_{10}:	Monitoring method(s) used:	beta absorption
	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 2010 (measured values **including** equivalent factor):	31
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Riga (urban station)

immission area: 307 km^2 population: 703 260

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	2	3	6	15	32	33	34	9
PM_{10}	1	25	38	120	-	-	-	59
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	-	-	-	-	-	-	-	-
NO_2	2	28	59	137	200	223	232	100
CO	-	-	-	-	-	-	-	-
O_3	2	49	65	90	132	143	145	90

PM_{10}:	Monitoring method(s) used:	beta absorption
	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 2010 (measured values **including** equivalent factor):	0
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Comments: *98-percentiles:* SO_2, NO_2, CO, Ozone: 98%-value of the hour's means
98-percentiles: PM_{10} , $PM_{2,5}$: 98%-value of the daily means

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

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

Comparison of The Air Quality in 2010

Rhine / Ruhr area

immission area: 5 770 km^2 population: 8 213 872

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	10	6	-	-	-	399	-	68
PM_{10}	21	25	-	-	-	-	-	-
$PM_{2,5}$	9	19	-	-	-	-	-	-
NO	21	12	-	-	-	684	-	130
NO_2	21	30	-	-	-	203	-	93
CO	-	-	-	-	-	-	-	-
O_3	18	37	-	-	-	247	-	127

PM_{10}:	Monitoring method(s) used:	1) Beta-absorption 2) Oscillating micro balance 3) Gravimetric
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1) 1.24 2)1.27 3) 1.00
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	54
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	1

Comment: Traffic stations are not included in the calculation

Rotterdam

immission area: 803 km^2 population: 1.2 million.

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	7	7	12	43	-	152	-	34
PM_{10}	3	21	33	100	-	631	-	68
$PM_{2,5}$	3	17	31	98	-	130	-	51
NO	3	15	37	189	-	494	-	102
NO_2	3	38	53	94	-	175	-	95
CO	2	397	625	1648	-	4134	-	1232
O_3	3	37	57	95	-	187	-	93

PM_{10}:	Monitoring method(s) used:	TEOM (SES) and BAM
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.3 (TEOM) 1 (BAM)
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	12
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

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

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

Comparison of The Air Quality in 2010

Salzburg

immission area: 66 km^2 population: 148 078

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	2	2	3	11	44	54	69	6
PM_{10}	3	25	57	114				79
$PM_{2,5}$	2	18	38	100				60
NO	3	28	89	278	575	653	691	222
NO_2	3	40	80	127	217	232	278	131
CO	2	410	690	1550	2640	2820	4060	1170
O_3	2	43	75	115	164	167	168	127

PM_{10}:	Monitoring method(s) used:	Digitel; SHARP
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	SHARP: 0.9872
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	**41** (4 caused by winter services)
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	3

Sofia

immission area: 1 344 km^2 population: 1 291 591

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	6	8	19	44	-	143	-	36
PM_{10}	7	44	133	478	-	-	-	209
$PM_{2,5}$	2	20	105	350	-	-	-	-
NO	6	23	143	-	-	917	-	-
NO_2	6	31	68	202	-	366	-	125
CO	4	914	3140	-	-	-	-	-
O_3	5	57	120	153	-	247	-	144

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:	β-absorption: (X-1.89)/0.83
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	134
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	30

Comments:
4 stations – urban; 1 station – transport; 1 station – rural/background; 1 station – industrial

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

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

Comparison of The Air Quality in 2010

St. Pölten: immission area: 108 km^2 population: 52 109

St. Pölten, urban station (Eybnerstrasse)

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	3	8	25	33	34	34	14
PM_{10}	1	28	47	91	115	121	125	77
$PM_{2,5}$	1	19	36	78	110	112	112	59
NO	1	7	15	48	177	233	259	49
NO_2	1	23	37	64	115	144	148	66
CO	-		-	-	-	-	-	-
O_3	1	46	78	111	190	203	207	124

PM_{10}:	Monitoring method(s) used:	oscillating micro balance
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.3
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	38
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

St. Pölten, traffically influenced (Europaplatz)

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	-	-	-	-	-	-	-	-
PM_{10}	1	27	46	92	114	118	139	75
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	36	51	122	380	447	503	164
NO_2	1	44	61	87	140	192	193	102
CO	1	448	700	1190	1760	2170	2510	1100
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	oscillating micro balance
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.3
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	34
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

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

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

Comparison of The Air Quality in 2010

Stockholm

immission area (inner city): 48 km^2 population (inner city): 308 920
area (Stockholm): 220 km^2 population (Stockholm): 832 641

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per hour/daily [µg/m³]
SO_2	1	1	3	-	-	-	-	-
PM_{10}	4	25	68	166	-	405	-	-
$PM_{2,5}$	2	9	15	39	-	94	-	-
NO	-	-	-	-	-	-	-	-
NO_2	3	43	65	100	-	301	-	116/88
CO	1	300	500	800	-	5500	-	-
O_3	1	49	65	97	-	142	-	-

PM_{10}:	Monitoring method(s) used:	TEOM
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.19 + 1.15
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	46
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	3

Comments: all stations are situated in the innercity 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 (urban station)

immission area: 207 km^2 population: 606 508*

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	3	6	13	-	22	-	-
PM_{10}	2	22	39	86	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	2	23	67	190	-	427	-	-
NO_2	2	36	57	115	-	154	-	-
CO	1	200	480	1100	-	1900	-	-
O_3	2	37	69	128	-	187	-	-

PM_{10}:	Monitoring method(s) used:	gravimetrically
	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 2010 (measured values **including** equivalent factor):	20
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Comment: * 4. Quarter 2010; source: Statistisches Landesamt Baden-Württemberg

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

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

Comparison of The Air Quality in 2010

Stuttgart (traffic station)

immission area: 207 km^2 population: 606 508*

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	-	-	-	-	-	-	-	-
PM_{10}	1	33	49	102	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	60	97	227	-	625	-	-
NO_2	1	71	88	128	-	257	-	-
CO	1	400	900	1100	-	3400	-	-
O_3	1	27	51	101	-	178	-	-

PM_{10}:	Monitoring method(s) used:	gravimetrically
	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 2010 (measured values **including** equivalent factor):	40
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	6

Comment: * 4. Quarter 2010; source: Statistisches Landesamt Baden-Württemberg

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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per hour [µg/m³]
SO_2	2	5	-	-	-	87	-	19
PM_{10}	3	39	-	257	-		-	85
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	6	22	-	-	-	739	-	349
NO_2	6	26	-	-	-	131	-	87
CO	4	700	-	-	-	19900	-	3300
O_3	5	56	-	-	-	197	-	151

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 2010 (measured values **including** equivalent factor):	96
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

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

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

Comparison of The Air Quality in 2010

Vienna

immission area: 415 km^2 population: 1 719 730

	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 3h-mean value [2] [µg/m³]	max. 99,9 Percentile 1h-mean value [2] [µg/m³]	max. 99,9 Percentile 1/2h-mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	9	3	11	37	51	55	57	24
PM_{10}	13	30	58	178	267	321	330	120
$PM_{2,5}$	2	22	43	104	214	188	188	82
NO	17	14	95	305	445	478	507	230
NO_2	17	31	72	139	194	197	203	140
CO	4	414	695	1349	1924	1965	2018	1118
O_3	5	51	97	142	169	173	173	133

PM_{10}:	Monitoring method(s) used:	8 Stations gravimetric and continuous, 5 Stations continuous (including equivalent factor)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	y = (y_raw + 1,43)/0,85
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	87 (Belgradplatz) 71 (Rinnböckstr.)
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	7 (Hietzinger Kai)

Comments:

- 99.9-Percentile values (HMW, MW1 and MW3) of PM_{10} and $PM_{2,5}$ are from continues measure (including station factor). This is also for station with continues and gravimetric measurements, because the gravimetric method deliver only TMW.
- All other particulates values (JMW, max. MMW and max. TMW) are preferable from gravimetric monitoring.
- A Road works near (200 m) the measurement station “Belgradplatz” had an influence on the particulate matter values from this station.
- The very high single data of $PM_{2,5}$ were caused by fireworks in the New Year’s Eve.
- PM_{10}: station equivalent faktor (instrument: FH62 I/R): $y_{equivalent} = (y_{raw} + 1,43) / 0,85$
- $PM_{2,5}$: station equivalent faktor (instrument: FH62 I/R): $y_{equivalent} = y_{raw} / 0,824$

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

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

Comparison of The Air Quality in 2010

Villach

immission area: 135 km^2 population: 59 004

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	2	4	7	11	12	12	6
PM_{10}	1	23	36	84	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	22	63	231	299	345	361	121
NO_2	1	33	56	87	127	144	157	85
CO	1	614	1008	2120	2728	2931	3171	1534
O_3	1	34	66	105	142	148	149	117

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 2010 (measured values **including** equivalent factor):	7
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Warsaw

immission area: 517 km^2 population: 1 714 400

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per day [µg/m³]
SO_2	6	7	18	46	86	103	-	26
PM_{10}	6	38	73	250	362	366	-	117
$PM_{2,5}$	4	30	55	133	204	215	-	92
NO	7	18	75	189	534	624	-	159
NO_2	7	30	76	123	192	207	-	111
CO	3	564	1021	2146	3826	4196	-	1564
O_3	4	42	67	100	163	171	-	93

[1]

PM_{10}:	Monitoring method(s) used:	automatic TEOM + FDMS, manual gravimetric method
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.0 (automatic TEOM+FDMS)
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2010 (measured values **including** equivalent factor):	151
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	1

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

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

Comparison of The Air Quality in 2010

Wiesbaden: immission area: 204 km^2 population: 273 477

Wiesbaden (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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	2	3	9	20	33	37	8
PM_{10}	1	18	24	56	127	223	360	50
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	14	32	136	244	325	346	105
NO_2	1	35	47	79	107	133	150	84
CO	-	-	-	-	-	-	-	-
O_3	1	37	68	115	190	196	203	120

[1]

PM_{10}:	Monitoring method(s) used:	ß-absorption
	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):	1
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2005:	0

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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	-	-	-	-	-	-	-	-
PM_{10}	1	22	28	67	157	308	499	57
$PM_{2,5}$	1	16	24	58	136	256	411	46
NO	1	57	85	217	430	489	523	212
NO_2	1	59	72	114	164	214	227	125
CO	1	610	840	1550	2870	3520	4100	1620
O_3	-	-	-	-	-	-	-	-

[1]

PM_{10}:	Monitoring method(s) used:	ß-absorption
	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):	5
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2005:	1

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

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

Comparison of The Air Quality in 2010

Zagreb

immission area: 641 km^2 population: 792 875

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	6	2	7	25	-	97	-	12
PM_{10}	6	31	70	240	-	-	-	118
$PM_{2,5}$	1	24	48	157	-	-	-	83
NO	-	-	-	-	-	-	-	-
NO_2	5	38	62	127	-	184	-	90
CO	-	-	-	-	-	-	-	-
O_3	5	25	53	135	-	234	-	87

[1]

PM_{10}:	Monitoring method(s) used:	gravimetrically
	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 2010 (measured values **including** equivalent factor):	73
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

Zurich

immission area: 1 086 km^2 population: 1 154 359

	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. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	3	6	12	19	23	29	15
PM_{10}	1	20	32	86	201	225	252	90
$PM_{2,5}$	1	15	28	73	-	-	-	-
NO	1	10	24	94	170	196	217	119
NO_2	1	33	47	90	116	122	123	102
CO	1	339	470	908	1285	1372	1976	1089
O_3	1	46	80	114	190	201	204	174

PM_{10}:	Monitoring method(s) used:	β-meter-measurement, calibrated with gravimetrical measurements every 4 days
	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 2010 (measured values **including** equivalent factor):	12
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2010:	0

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

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