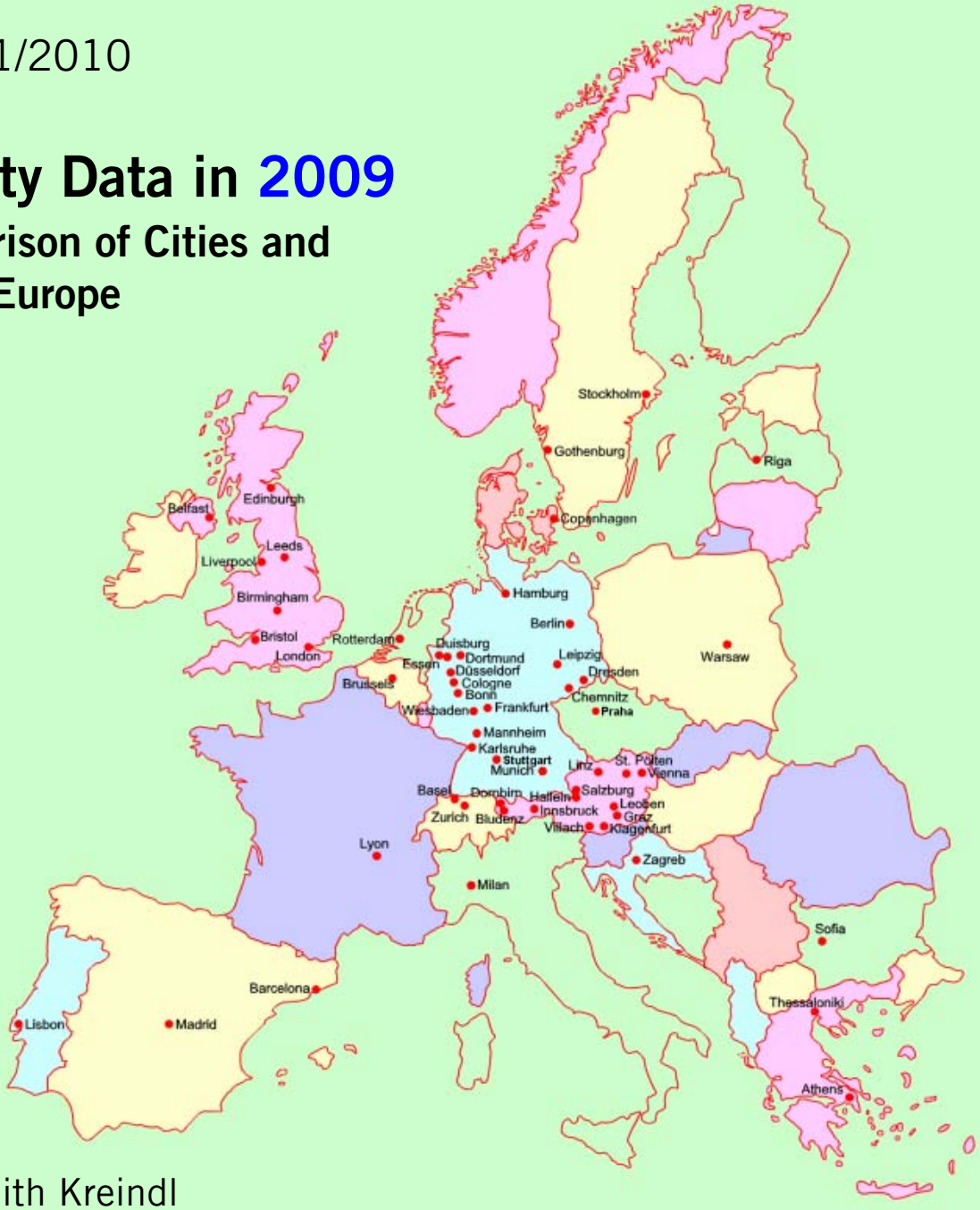
Publisher:
MUNICIPALITY OF LINZ
Dept. „Environmental and Technical Center“
Hauptstrasse 1 – 5
A-4041 Linz
e-mail: utc@mag.linz.at
Tel.: +43 (732) 7070 – 3901
Fax: +43 (732) 7070 – 3902

Report Nr. 1/2010

Air Quality Data in 2009

The Comparison of Cities and Regions in Europe



Authors: Judith Kreindl
Wilfried Hager

Environment + Technics

Linz verändert

Inhalt

Contents

Luftgütedaten 2009 Nationaler und europäischer Städtevergleich

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 versucht man, die Luftverschmutzung in den Griff zu bekommen und 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.

Air Quality Data in 2009 The Comparison of Cities and Regions in Europe

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 auf immer mehr europäische Städte und Regionen wegen des großen Interesses ausgedehnt. Im Jahr 2009 wurden Städte bzw. Regionen aus Deutschland, England, Frankreich, Belgien, Niederlande, Dänemark, Schweden, Italien, Schweiz, Spanien, Polen, Bulgarien, Tschechien, Ungarn, Griechenland, Lettland, Lissabon und Kroatien mit einbezogen. Die Stadt Luxemburg lieferte für das Jahr 2009 keine Daten.	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 2009 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, Lisbon and Croatia. No data were sent to us by the city of Luxemburg.
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 hat man 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 Messstati-

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.

onen. 3. Schließlich wird eine stärker objektivierende Basis der Auswertungen besonders dann erreicht, wenn man längere Zeiträume betrachtet und daraus die Trends der Entwicklung 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 ist 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 2009 aufgetragen.

Wenn man die Daten analysiert, 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 nahezu keine 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 2009 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 leicht 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 *slightly 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 -2009 [1)]

Beurteilungsbasis: Jahresmittelwerte über alle Stationen einer Region

Overview over the development of the stress of air pollutants from 1993 through 2009 [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 2009	Stress in 1993 [2)]	Trend last 5 years	Stress in 2009	Stress in 1993 [2)]	Trend last 5 years	Stress in 2009	Stress in 1993 [2)]	Trend last 5 years	Stress in 2009	Stress in 1993 [2)]	Trend last 5 years	Stress in 2009
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 2009	Stress in 1993 [3]	Trend last 5 years	Stress in 2009	Stress in 1993 [3]	Trend last 5 years	Stress in 2009	Stress in 1993 [3]	Trend last 5 years	Stress in 2009	Stress in 1993 [3]	Trend last 5 years	Stress in 2009
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		↘			↘			↘			==	
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 2009	Stress in 1993 [4]	Trend last 5 years	Stress in 2009	Stress in 1993 [4]	Trend last 5 years	Stress in 2009	Stress in 1993 [4]	Trend last 5 years	Stress in 2009	Stress in 1993 [4]	Trend last 5 years	Stress in 2009
Luxemburg	1996	-	2003	1996	-	2003	1996	-	2003	1996	-	2003	1996	-	2003
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	-	2005	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 2009 [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 2009 [6]
Gothenburg		↘	
Hamburg		↘	
Karlsruhe		↘	
Leeds		==	
Leipzig		↘	
Lisbon		↘	
Liverpool		↘	
London		↘	
Luxemburg		-	2003
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 2009 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 2009 [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 2009 [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
Linz	62	66	80	46	68	71	41	47	30
Bludenz	-	-	-	-	13	45	16	13	12
Dornbirn	-	-	38	21	22	40	18	20	14
Graz	159	131	131	117	127	113	76	73	57
Hallein	-	28	49	26	27	50	20	13	20
Innsbruck	-	50	61	52	55	83	46	28	26
Klagenfurt	36	58	74	80	82	79	42	33	34
Region Leoben	26	7	42	29	36	49	36	25	19
Salzburg	-	34	62	34	39	56	25	34	37
St. Pölten	-	-	58	79	87	57	23	20	23
Vienna	-	57	95	54	92	108	48	39	40
Villach	-	24	35	25	29	45	10	9	17
Athens	-	-	-	-	-	-	178	163	122
Barcelona	-	86	-	47	74	100	97	72	94
Basel	11	22	23	16	15	24	12	6	10
Belfast	16	7	33	8	5	7	5	7	3
Berlin	60	91	117	62	74	71	30	24	39
Birmingham	2	1	5	4	5	9	18	10	7
Bristol	7	1	9	12	4	6	15	15	7
Brussels	52	153	163	127	67	56	56	66	66
Budapest	-	-	-	178	160	162	117	96	71
Chemnitz	41	20	35	12	59	65	27	19	32
Copenhagen	-	59	91	-	-	68	60	59	59
Dresden	53	36	53	27	78	49	27	35	42
Edinburgh	3	8	2	0	3	2	6	0	3
Frankfurt	42	44	51	19	48	24	33	22	36
Gothenburg	1	10	12	2	7	13	3	4	0
Hamburg	33	43	62	20	45	31	26	18	15
Karlsruhe	6	33	33	25	22	34	16	10	20
Leeds	3	3	9	4	15	10	11	8	16

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.

	PM_{10} number of days >50 µg/m³								
	2001	2002	2003	2004	2005	2006	2007	2008	2009
Leipzig	109	63	92	49	82	74	40	40	51
London	28	29	61	107	121	157	124	157	47
Lisbon	230	222	183	147	180	145	154	82	92
Liverpool	4	2	1	14	5	8	11	12	6
Lyon	-	83	124	71	153	-	142	79	39
Madrid	-	98	-	121	159	181	123	65	35
Mannheim	25	44	36	41	43	20	26	12	23
Milan	148	177	137	139	152	149	132	115	106
Munich	64	75	123	59	107	92	53	60	52
Prague	-	-	-	-	-	-	132	84	48
Riga	57	74	105	160	88	244	148	126	46
Rhine/Ruhr Area	40	48	58	38	21	-	71	68	70
Rotterdam	98	103	123	54	30	31	26	12	12
Sofia	-	-	225	178	162	-	195	199	106
Stockholm	101	113	80	80	80	74	75	77	65
Stuttgart	-	-	-	-	-	-	110	14	19
Thessaloniki	-	-	-	-	-	-	152	155	80
Warsaw	-	-	89	184	162	192	136	133	148
Wiesbaden	15	35	19	11	18	32	20	8	13
Zagreb	-	-	-	75	89	134	108	116	61
Zurich	18	23	38	23	15	39	17	11	11

Anzahl der Überschreitungen des 1h-Grenzwertes für NO_2 von 200 µg/m³ in den Jahren 2004 bis 2009

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 2009
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
Linz	0	1	4	4	1	5
Bludenz	0	0	0	0	0	0
Dornbirn	-	0	0	0	0	0
Graz	0	0	4	0	0	0
Hallein	0	0	1	3	0	0
Innsbruck	0	0	4	0	0	1
Klagenfurt	-	1	1	1	0	0
Region Leoben	0	0	0	0	0	0
Salzburg	0	0	2	1	2	4
St. Pölten	0	0	0	0	1	0
Vienna	8	24	26	11	17	4
Villach	0	0	0	0	0	0
Athens	-	-	-	192	56	35
Barcelona	13	-	18	22	13	9
Basel	0	0	0	0	0	0
Belfast	0	4	5	0	3	0
Berlin	-	-	-	6	0	8
Birmingham	0	2	0	0	3	0
Bristol	0	22	13	8	5	11
Brussels	24	90	2	2	6	1
Budapest	1	25	19	9	1	0
Chemnitz	1	0	0	1	0	2
Copenhagen	-	-	-	-	-	-
Dresden	0	0	0	0	0	0
Edinburgh	0	0	0	0	6	0
Frankfurt	0	10	3	6	2	16

	NO_2					
	number of 1 h mean values >200 µg/m³					
	2004	2005	2006	2007	2008	2009
Gothenburg	2	0	7	1	1	0
Hamburg	0	0	26	19	30	29
Karlsruhe	5	0	0	0	3	3
Leeds	0	0	0	0	8	0
Leipzig	1	39	0	0	0	0
Liverpool	0	458	0	0	0	0
Lisbon	52	-	80	39	20	69
London	542	139	686	458	822	486
Luxemburg	-	267	-	-	-	-
Lyon	35	0	-	139	66	28
Madrid	83	-	208	267	119	150
Mannheim	0	69	0	0	0	0
Milan	47	1	123	-	241	101
Munich	11	0	103	69	56	95
Prague	-	0	-	1	106	98
Riga	0	0	0	0	0	0
Rhine/Ruhr Area	0	24	-	0	0	0
Rotterdam	10	3	2	0	0	0
Sofia	7	450	-	24	155	95
Stockholm	0	3	1	3	1	0
Stuttgart	-	-	-	5	9	22
Thessaloniki	-	3	-	3	1	0
Warsaw	0	0	5	17	0	0
Wiesbaden	0	0	2	3	1	7
Zagreb	0	0	0	0	0	0
Zurich	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	4	7	2	6	6	3	4
	Hallein	2	1	-	2	2	1	1
	Innsbruck	1	2	1	2	2	1	2
	Klagenfurt	1	2	1	2	2	2	2
	Region Leoben	3	4	-	3	3	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	10	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	20	4	15	21	12	8
Denmark	Copenhagen	1	3	2	-	3	3	3
France	Lyon	4	3	1	6	6	2	3
Germany	Berlin	2	13	4	15	15	2	7
	Chemnitz	-	3	2	3	3	-	1
	Dresden	1	4	3	4	4	-	3
	Frankfurt	4	6	-	6	6	2	4
	Hamburg	7	12	4	18	18	7	6
	Karlsruhe	1	3	-	3	3	2	2
	Leipzig	1	3	1	3	3	-	1
	Mannheim	2	4	-	4	4	2	3
	Munich	1	5	1	6	6	4	3
	Rhine/Ruhr Area	10	32	5	21	21	-	13
	Stuttgart	1	3	-	3	3	2	3
	Wiesbaden	1	2	1	2	2	1	1
Greece	Athens	3	8	4	15	15	7	13
	Thessaloniki	1	4	-	7	7	4	6
Hungary	Budapest	9	11	1	11	11	11	9
Italy	Milan	1	3	1	8	8	5	3
Latvia	Riga	3	3	2	1	4	1	4
Luxemburg	Luxemburg (2003)	2	1	-	2	2	1	2
The Netherlands	Rotterdam	7	3	2	3	3	2	3
Poland	Warsaw	8	10	5	9	9	4	5
Portugal	Lisbon	5	5	2	7	7	7	4
Spain	Barcelona	5	8	2	5	5	5	4
	Madrid	23	21	5	23	23	21	22

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	3	-	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	13 760
	Dornbirn	13	44 870
	Graz	128	255 354
	Hallein	27	19 566
	Innsbruck	105	140 000
	Klagenfurt	120	93 306
	Region Leoben	108	24 999
	Linz	96	189 355
	Salzburg	66	149 065
	St. Pölten	108	51 500
	Vienna	415	1 698 957
	Villach	135	59 004
Belgium	Brussels	161	1 101 872
Bulgaria	Sofia	1 311	1 234 622
Croatia	Zagreb	641	779 145
Czech Republic	Prague	496	1 250 000
Denmark	Copenhagen	88	528 208
France	Lyon	48	445.274
Germany	Berlin	892	3 442 700
	Chemnitz	221	243 880
	Dresden	328	512 234
	Frankfurt	248	676 197
	Hamburg	755	1 782 639
	Karlsruhe	173	290 663
	Leipzig	298	506 578
	Mannheim	145	312 144
	Munich	310	1 330 440
	Rhine/Ruhr Area	5 770	8 213 872
	Stuttgart	207	601 337
	Wiesbaden	204	275 482
Greece	Athens	1 948	3 551 370
	Thessaloniki	129	794 330
Hungary	Budapest	525	1 712 210
Italy	Milan	182	1 306 561
Latvia	Riga	307	713 016
Luxemburg	Luxemburg	52	90 000
The Netherlands	Rotterdam	803	1 186 434
Poland	Warsaw	517	1 709 800
Portugal	Lisbon	85	499 700

Country	Monitored Area	immission area [km²]	population
Spain	Barcelona	101	1 621 537
	Madrid	604	3 255 944
Switzerland	Basel	557	489 854
	Zurich	1 086	1 132 273
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/*
Austria ***Innsbruck***	Amt der Tiroler Landesregierung Abt. Waldschutz-Luftgüte Bürgerstrasse 36 A-6020 Innsbruck Austria e-mail: *an.weber@tirol.gv.at* Homepage: http://www.tirol.gv.at/luft
Austria ***Linz***	Amt der oö. Landesregierung Abt. Umwelt- und Anlagentechnik Goethestraße 86 A-4020 Linz Austria e-mail: elisabeth.danninger@ooe.gv.at Homepage: *http://www.ooe.gv.at/umwelt/*
Austria **Salzburg, Hallein**	Amt der Salzburger Landesregierung, Umweltschutz Postfach 527 A-5010 Salzburg e-mail: *alexander.kranabetter@salzburg.gv.at* Homepage: *http://www.salzburg.gv.at/*
Austria ***St. Pölten***	Magistrat der Landeshauptstadt St. Pölten Abteilung XIII Roßmarkt 6 A-3100 St. Pölten Austria e-mail: *marktamt@st-poelten.gv.at* Homepage: http://www.noe.gv.at/Umwelt/Luft.html

Austria ***Vienna***	Magistrat der Stadt Wien, MA 22 Dresdner Straße 45 A-1200 Wien Austria e-mail: *roman.augustyn@wien.gv.at* Homepage: *http://www.wien.at/ma22/luftgue.html*
Austria ***Klagenfurt, Villach***	Amt der Kärntner Landesregierung Abt. 15 Umweltschutz und Technik Flatschacher Straße 70 A-9020 Klagenfurt e-mail: *abt15.oekologie@ktn.gv.at* Homepage: http://www.ktn.gv.at
Belgium ***Brussels***	CELINE-IRCEL Avenue des Arts, 10-11 B-1210 – Bruxelles Belgium e-mail: *pvd@ibgebim.be* Homepage: http://www.irceline.be/
Bulgaria ***Sofia***	Executive Environmental Agency 136 Tzar Boris III Blvd. BG-1618 Sofia Bulgaria e-mail: *Rosen@nfp-bg.eionet.eu.int* Homepage: http://nfp-bg.eionet.eu.int/
Croatia ***Zagreb***	Institute of Medical Research and Occupational Health Ksaverska cesta 2 HR-10000 Zagreb Croatia e-mail: *vvadjic@imi.hr* Homepage: -
Czech Republic ***Prague***	Czech Hydrometeorological Institute Na Sabatce 17 14306 Praha 4 Czech Republic e-mail: osta@chmi.cz Homepage: http://www.chmi.cz
Denmark ***Copenhagen***	National Environmental Research Institute Atmospheric Environment Frederiksborvej 399 DK-4000 Copenhagen Denmark Homepage: http://www2.dmu.dk/AtmosphericEnvironment/aq_aar/aovers.htm

France
Lyon

COPARLY
3 Allèe des Sorbiers-Activillage
F-69500 Bron
France
e-mail: demandes@atmo-rhonealpes.org
Homepage: *http://www.atmo-rhonealpes.org*

Germany
Berlin

Referat Immissionsschutz, Senatsverwaltung für
Gesundheit, Umwelt und Verbraucherschutz, III D 23
Brückenstraße 6
D-10179 Berlin
Germany
e-mail: efthalia.nulis@senguv.de
Homepage *http://www.berlin.de/sen/umwelt/luftqualitaet/index.shtml*

Germany
Chemnitz, Dresden,
Leipzig

Sächsisches Landesamt für Umwelt, Landwirtschaft und Geologie
Söbrigener Str. 3a
D-01326 Dresden
e-mail: *Kornelia.Oelke@smul.sachsen.de*
Homepage: *http://www.lfug.de*

Germany
Frankfurt, Wiesbaden

Hessisches Landesamt für Umwelt und Geologie
Rheingaustrasse 186
D-65203 Wiesbaden
Germany
e-mail: wieslawa.stec-lazaj@hlug.de
Homepage: *http://www.hlug.de*

Germany
Hamburg

Freie Hansestadt Hamburg,
Behörde für Soziales, Familie, Gesundheit und Verbraucherschutz,
Institut für Hygiene und Umwelt, Abteilung f. Luftuntersuchungen
Marckmannstraße 129b
D-20539 Hamburg
Germany
e-mail: *dagmar.goemer@hu.hamburg.de*
Homepage: *http://www.hambuger-luft.de*

Germany
Karlsruhe, Mannheim
Stuttgart

Landesanstalt für Umwelt, Messungen und Naturschutz
Baden-Württemberg, LUBW
Großoberfeld 3
D-76135 Karlsruhe
Germany
e-mail: *sabrina.krabbe@lubw.bwl.de*
Homepage*:* http://www.lubw.baden-wuerttemberg.de/

Germany
Munich

Bayerisches Landesamt für Umweltschutz
Bürgermeister-Ulrich-Straße 160
D-86179 Augsburg
Germany
e-mail: *Ulrich.Böllmann@lfu.bayern.de*
Homepage: www.lfu.bayern.de

Germany ***Rhine Area, Ruhr Area***	Landesumweltamt Nordrhein-Westfalen Wallneyer Straße 6 D-45133 Essen Germany Homepage: http://www.lanuv.nrw.de/luft/immissionen/ber_trend/berichte.htm
Greece ***Athens, Thessaloniki***	Hellenic Republic Ministry for the environment Directorate of air and noise pollution control Patission 147 GR-11251 Athens Greece e-mail: *air_quality@dearth.minenv.gr* Homepage: www.ypeka.gr
Hungary ***Budapest***	Hungarian Meteorological Service Observations Department Kitaibel Pál u. 1 H-1024 Budapest Hungary e-mail: puskas.monika@met.hu Homepage: www.met.hu www.kvvm.hu/olm/
Italy ***Milan***	ARPA Lombardia - Agenzia Regionale per la Protezione dell'Ambiente della Lombardia Dipartimento di Milano Via Juvara 22 I-20129 Milano Italy e-mail: m.lazzarini@arpalombardia.it Homepage: http://ita.arpalombardia.it/ITA/qaria/doc_RelazAnnualiProv.asp
Latvia ***Riga***	Ministry of Environmental of the Republic of Latvia Latvian Environment, Geology and Meteorology Centre Air and Climate Division 165 Maskavas str. LV-1019 Riga Latvia e-mail: Tamara.vasiljeva@lvgmc.lv Homepage: http://www.lvgmc.lv
Luxemburg ***Luxemburg***	Administration de l´Environnement, Dèpartement Air/Bruit 16, rue Eugène RUPPERT L-2453 Luxemburg e-mail: *Serge.solagna@aev.etat.lu* Homepage: -
The Netherlands ***Rotterdam***	DCMR- Environmental Protection Agency ´s-Gravelandseweg 565, Postbox 843 NL- 3100 AV Schiedam The Netherlands e-mail: jel@dcmr.nl Homepage: *http://www.dcmr.nl*

Poland ***Warsaw***	WIOS Warszawa ul. Bartycka 110A PL-00-716 Warszawa Poland e-mail: e.trebinska@wios.warszawa.pl or t.klech@wios.warszawa.pl Homepage: *http://www.wios.warszawa.pl*
Portugal ***Lisbon***	Agencia Portuguesa do Ambiente Rua da Murgueira 9/9A *PT-2610-124 Amadora* *Portugal* *Homepage: http://www.qualar.org/*
Sweden ***Gothenburg***	Environmental Department Göteborg Karl Johansgatan 23 S-414 59 Göteborg Sweden e-mail: *maria.holmes@miljo.goteborg.se* Homepage: *http://www.goteborg.se/luften*
Sweden ***Stockholm***	Environment and Health Protection Administration, Slb – analys Box 8136 S-10420 Stockholm Sweden e-mail: *boel@slb.nu* Homepage: *http://www.slb.nu*
Spain ***Barcelona, Madrid***	Ministerio de Medio Ambiente, Medio Rural y Marino c/ Agustin de Betancourt, 25, 1ª planta E-28003 Madrid e-mail: *mpallares@mma.es* Homepage: -
Switzerland ***Basel, Zurich***	Bundesamt für Umwelt, Abteilung Luftreinhaltung und NIS CH-3003 Bern Switzerland e-mail: *rudolf.weber@bafu.admin.ch* Homepage: *http://www.umwelt-schweiz.ch/buwal/de/fachgebiete/fg_luft/luftbelastung/index.html*
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

2009

Jahresmittelwert (Gebietsmittel)

Comparison of The Air Quality

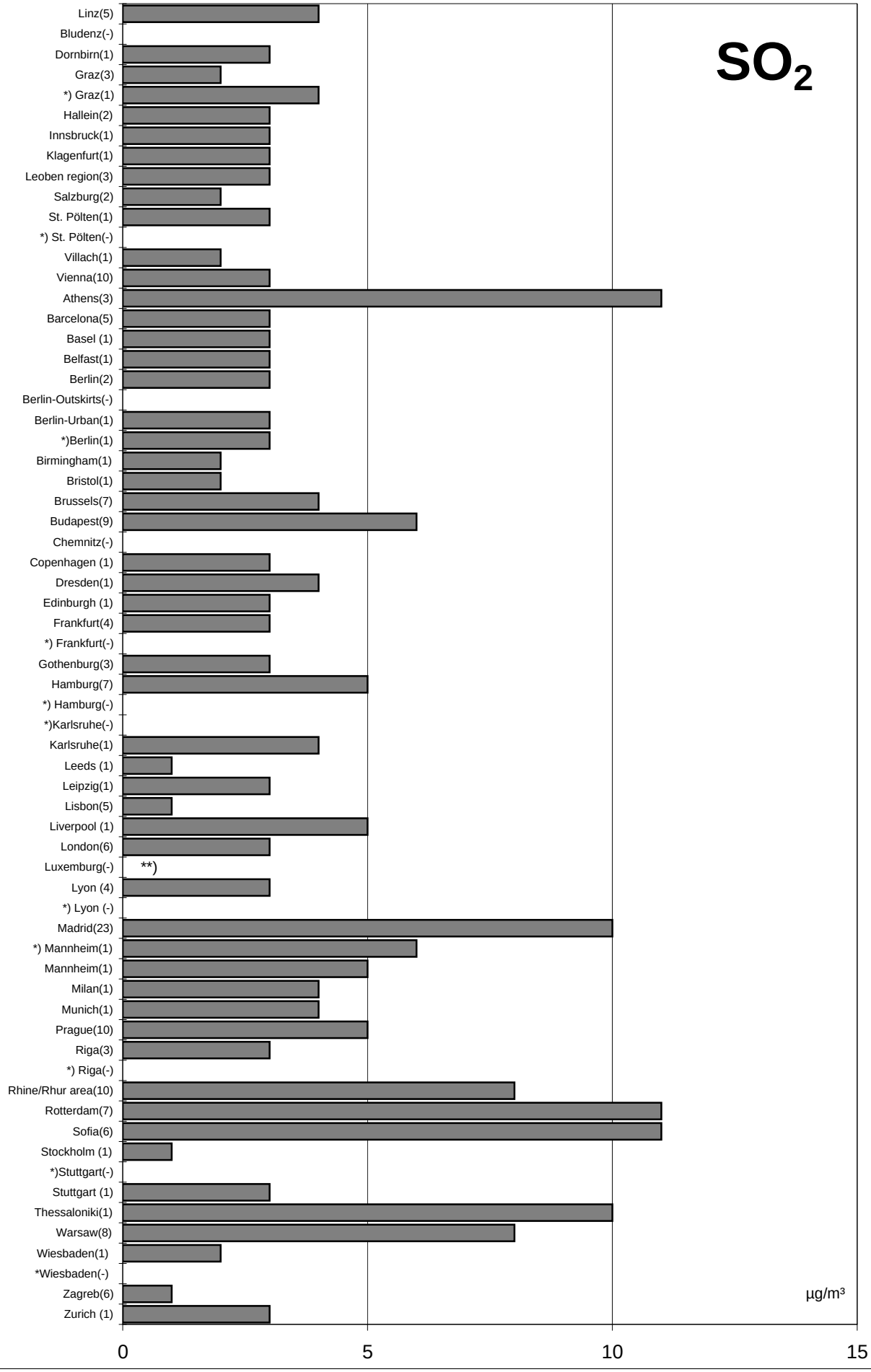
2009

Annual Mean Values

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)



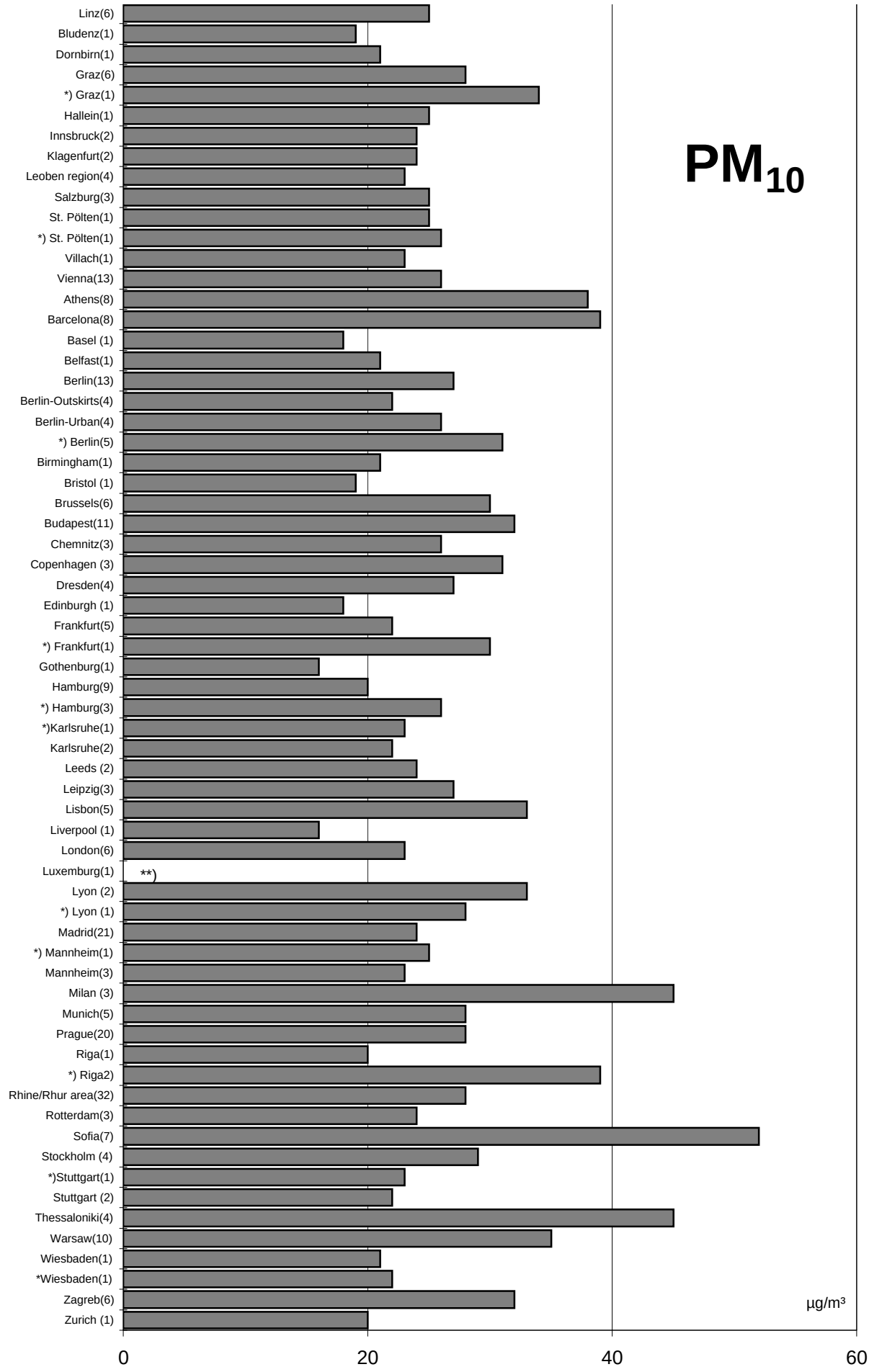
*) traffically influenced monitoring stations

**) no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)



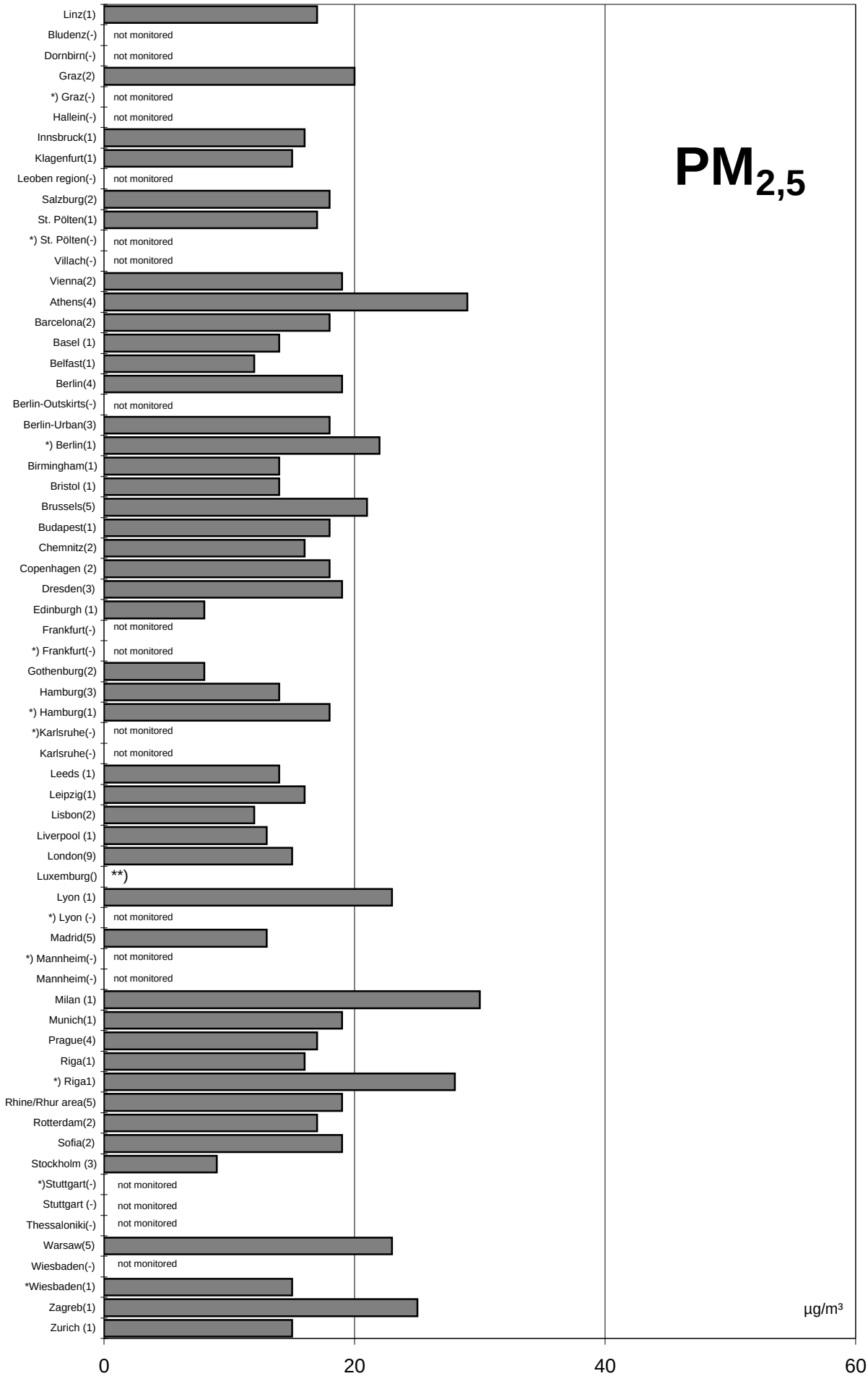
*) traffically influenced monitoring stations

**) no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)



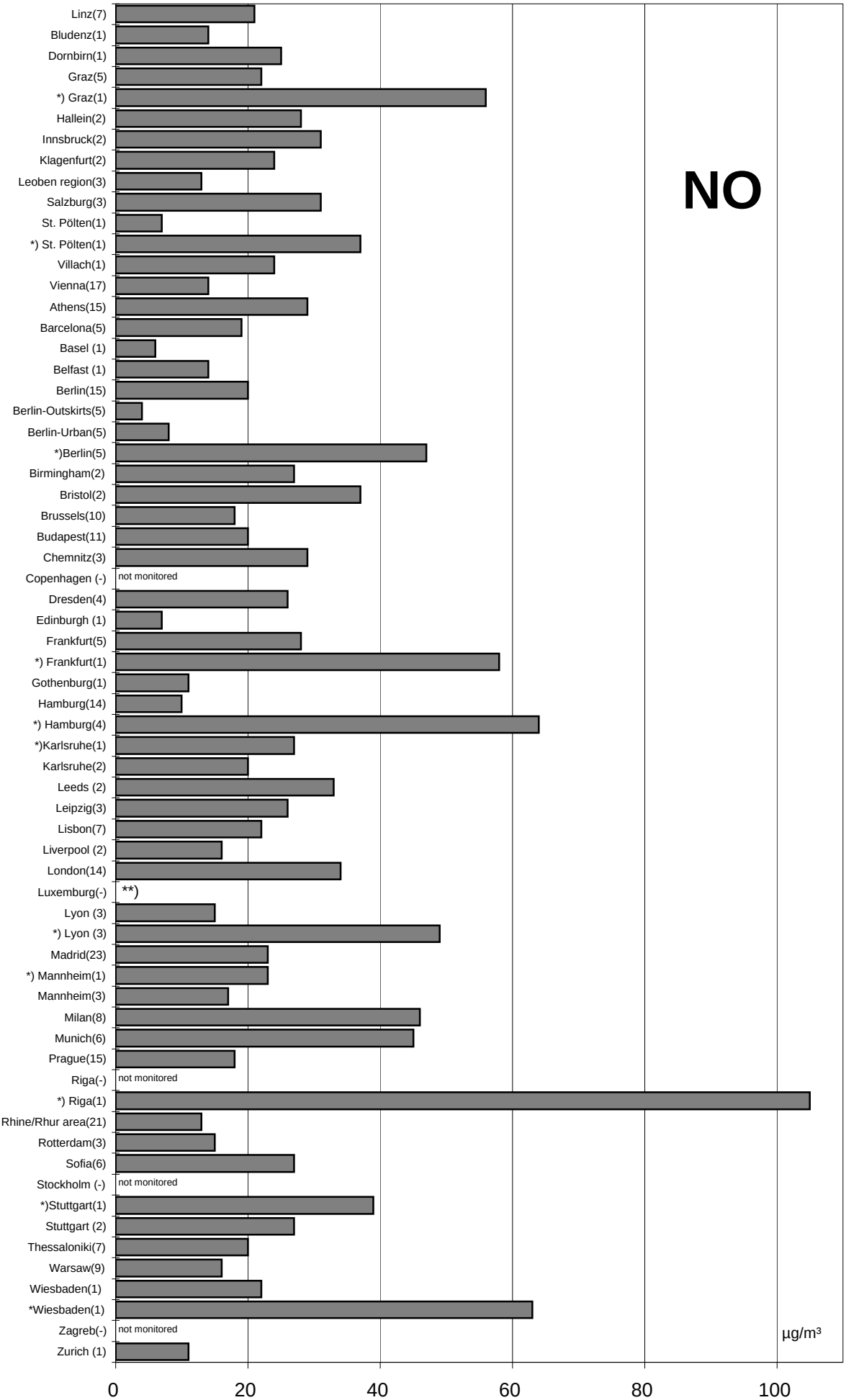
*) traffically influenced monitoring stations

**) no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)



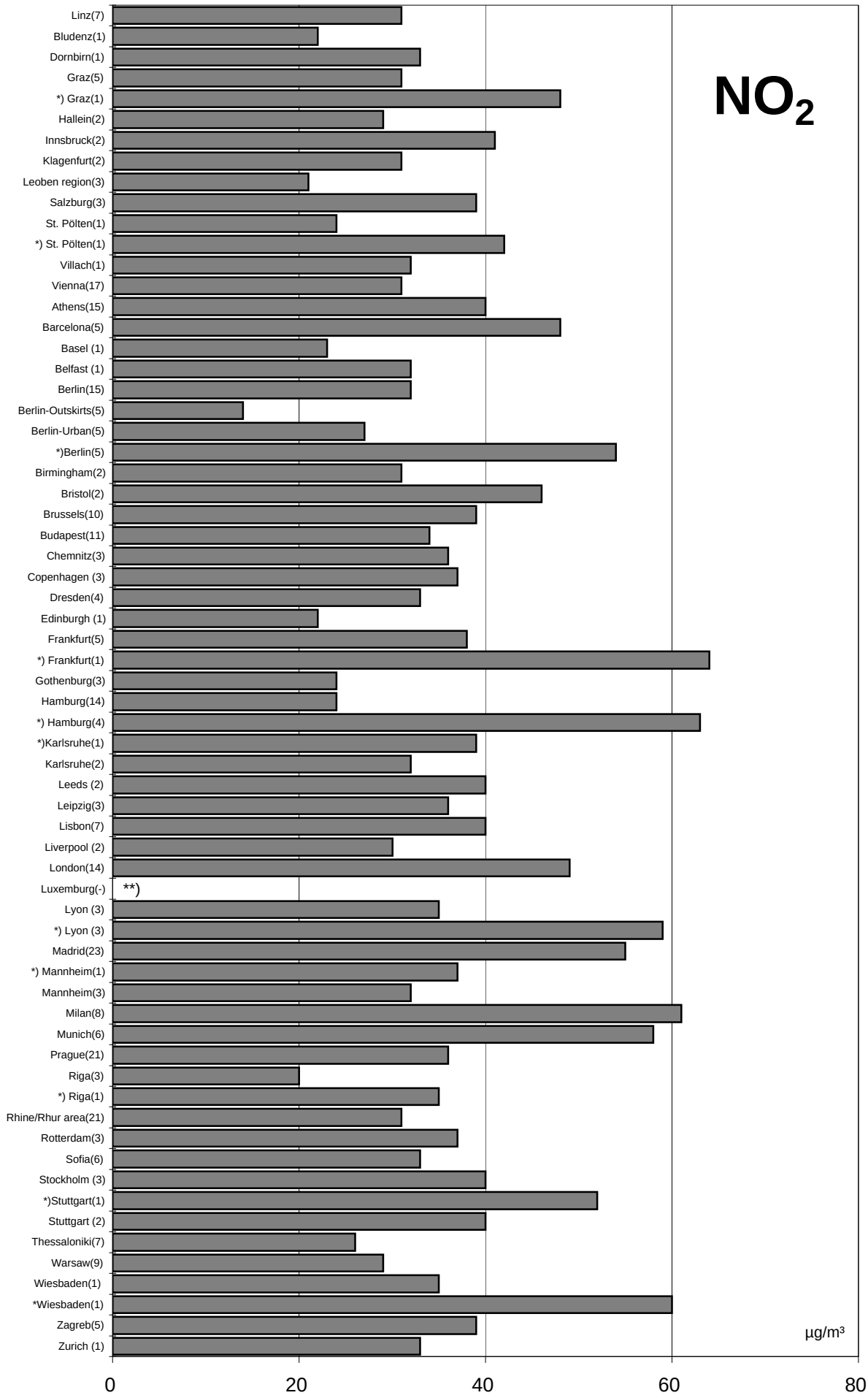
*) traffically influenced monitoring stations

**) no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)



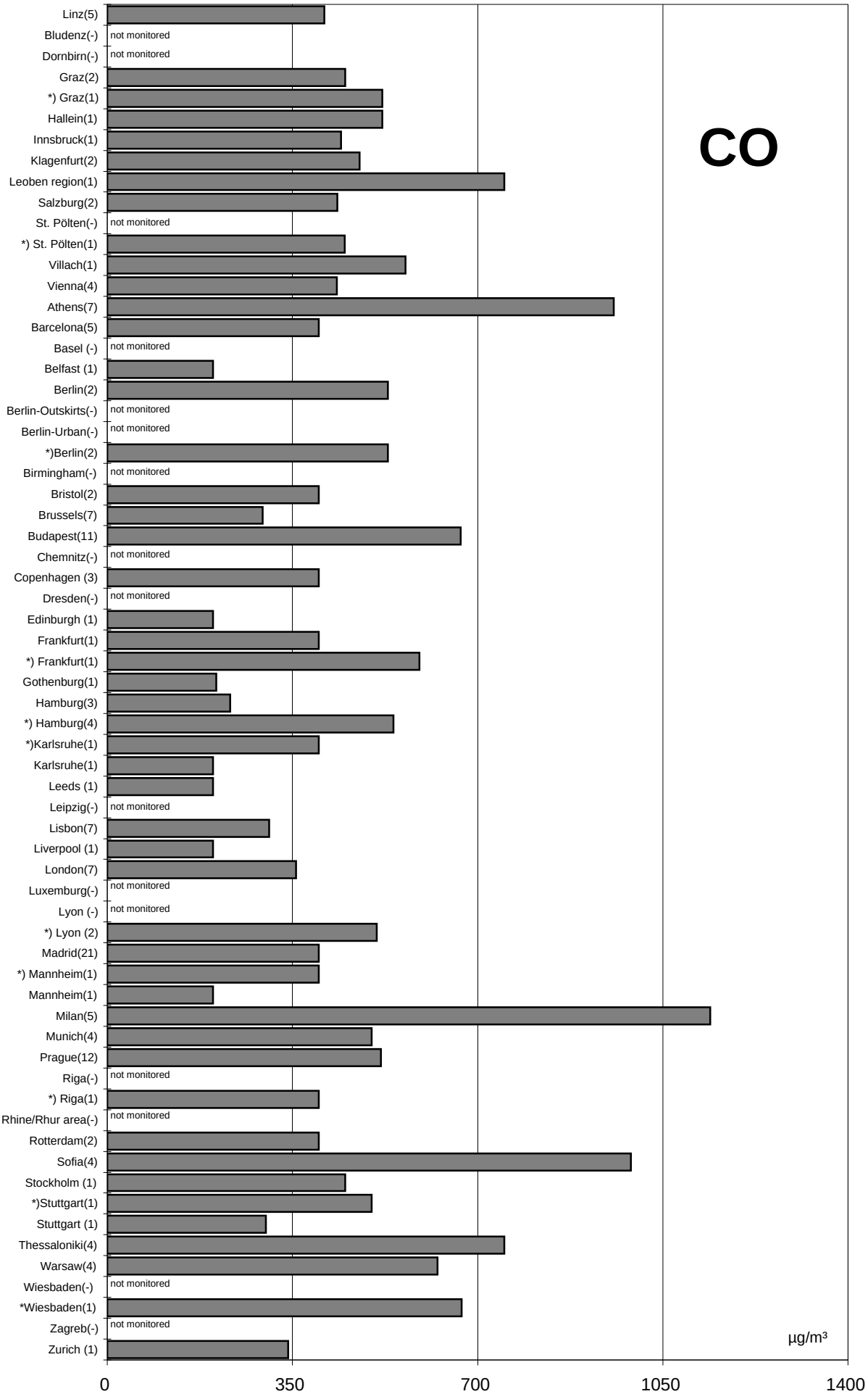
*) traffically influenced monitoring stations

**) no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)



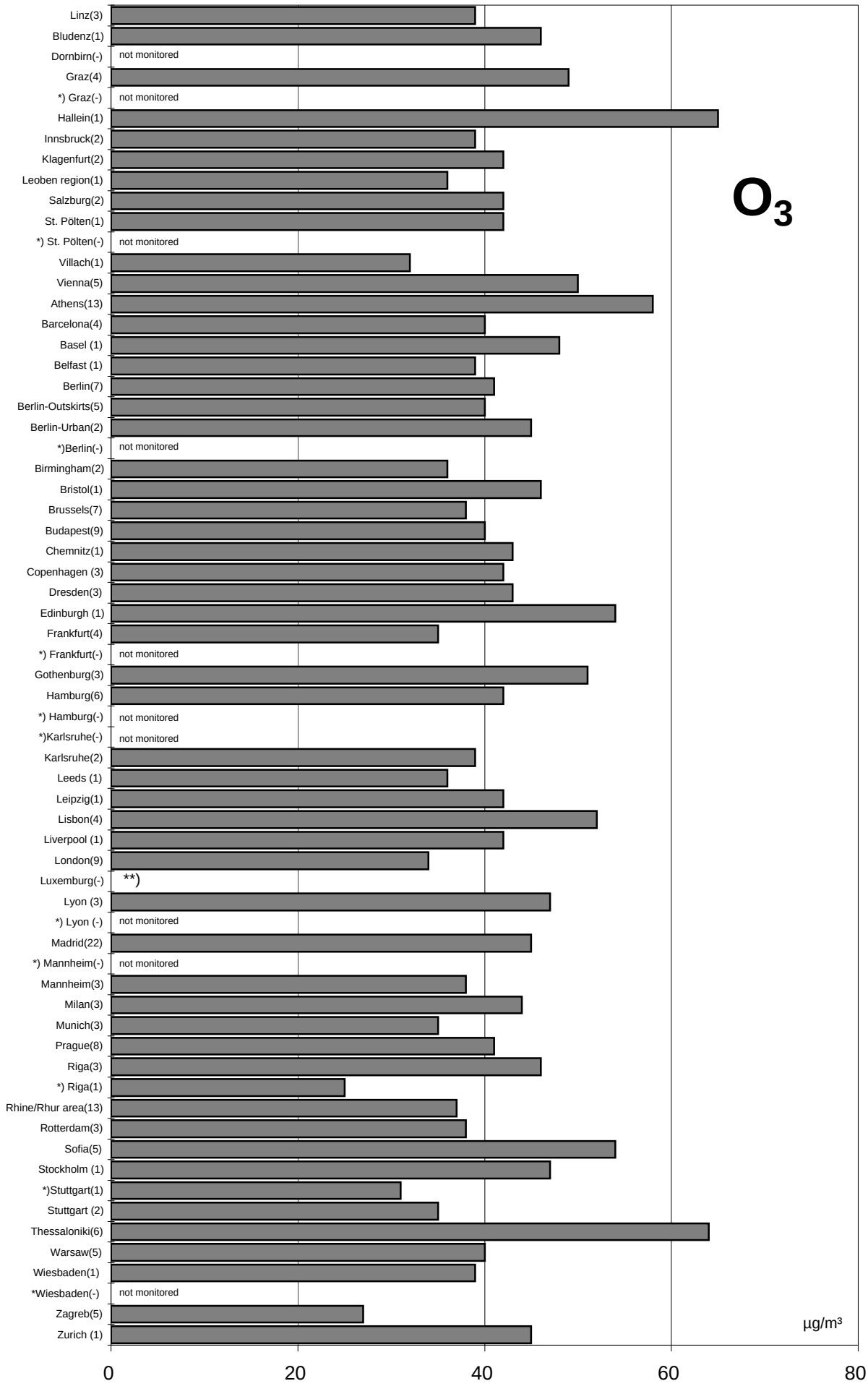
*) traffically influenced monitoring stations

**) no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)



*) traffically influenced monitoring stations

**) no data

Luftgütevergleich

2009

max. Tagesmittelwert

Comparison of The Air Quality

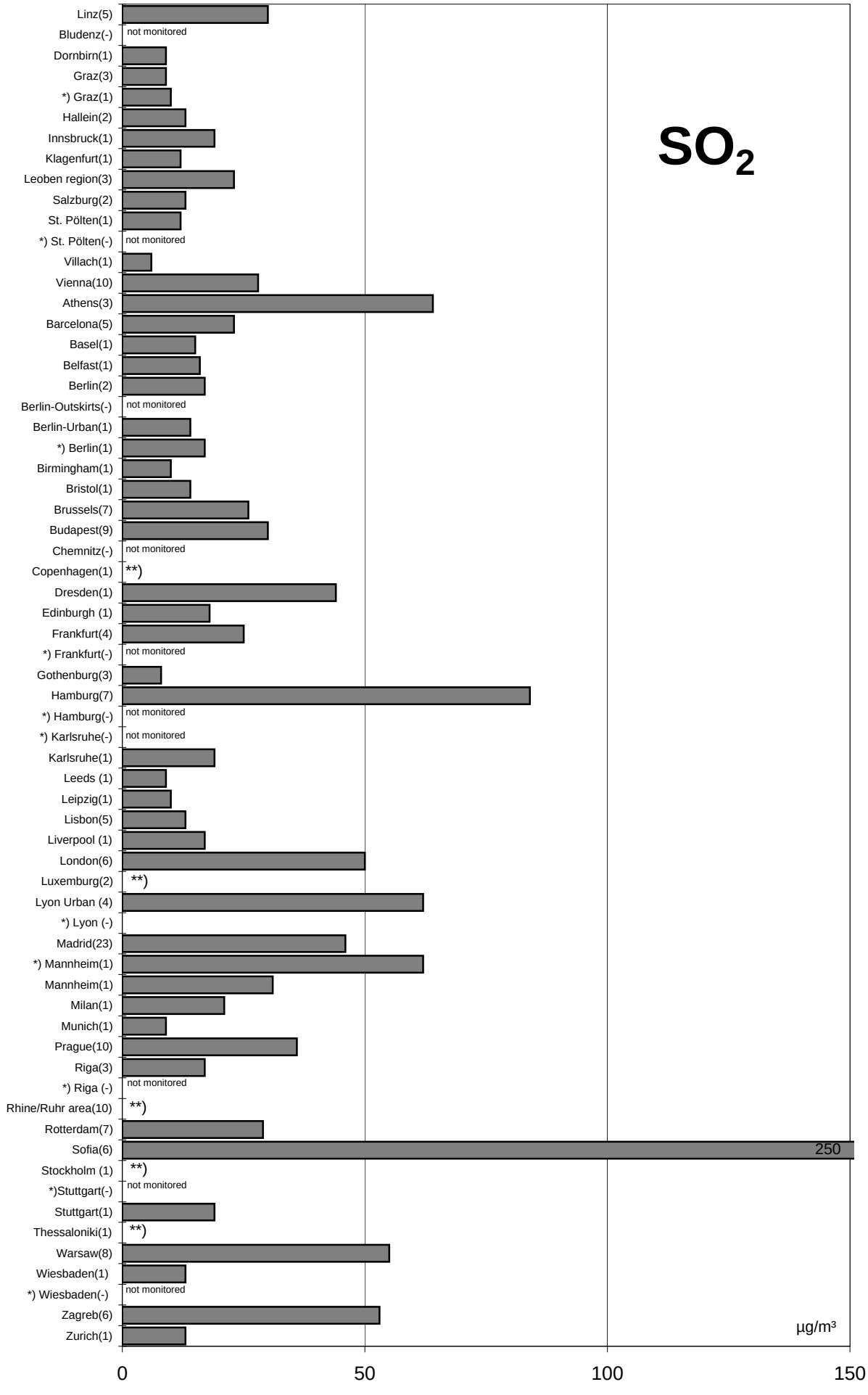
2009

Max. Daily Mean Values

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)

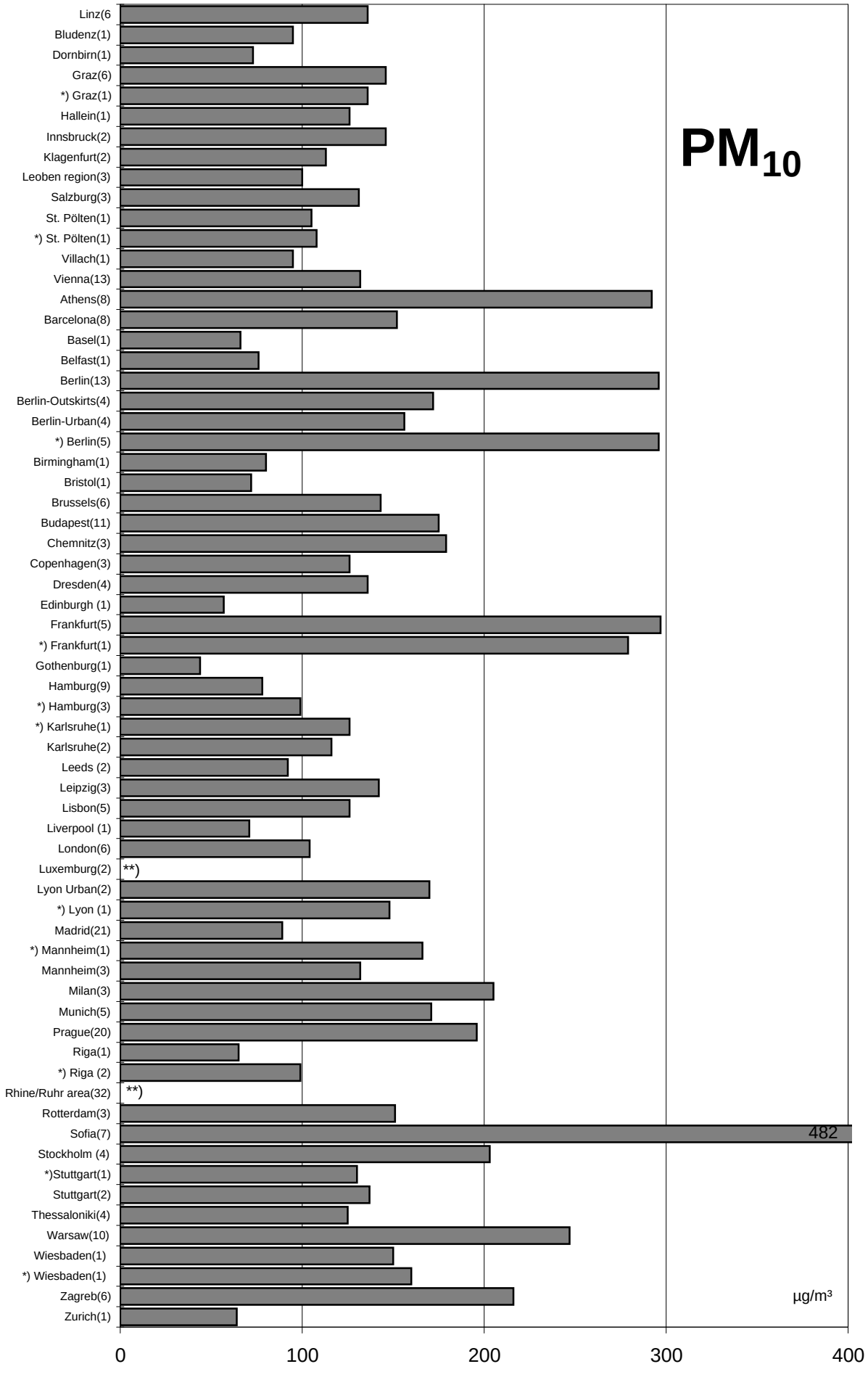


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)

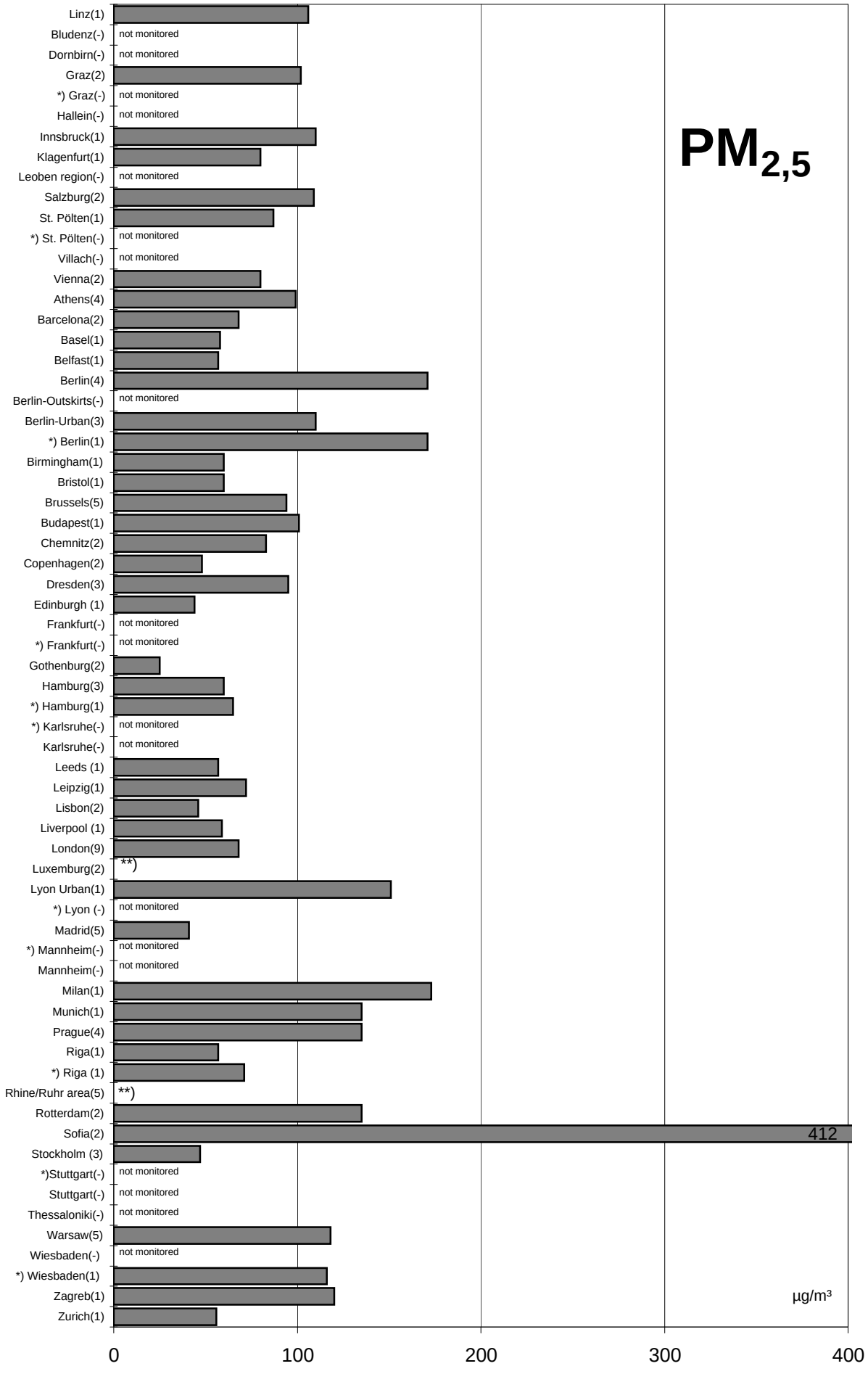


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)

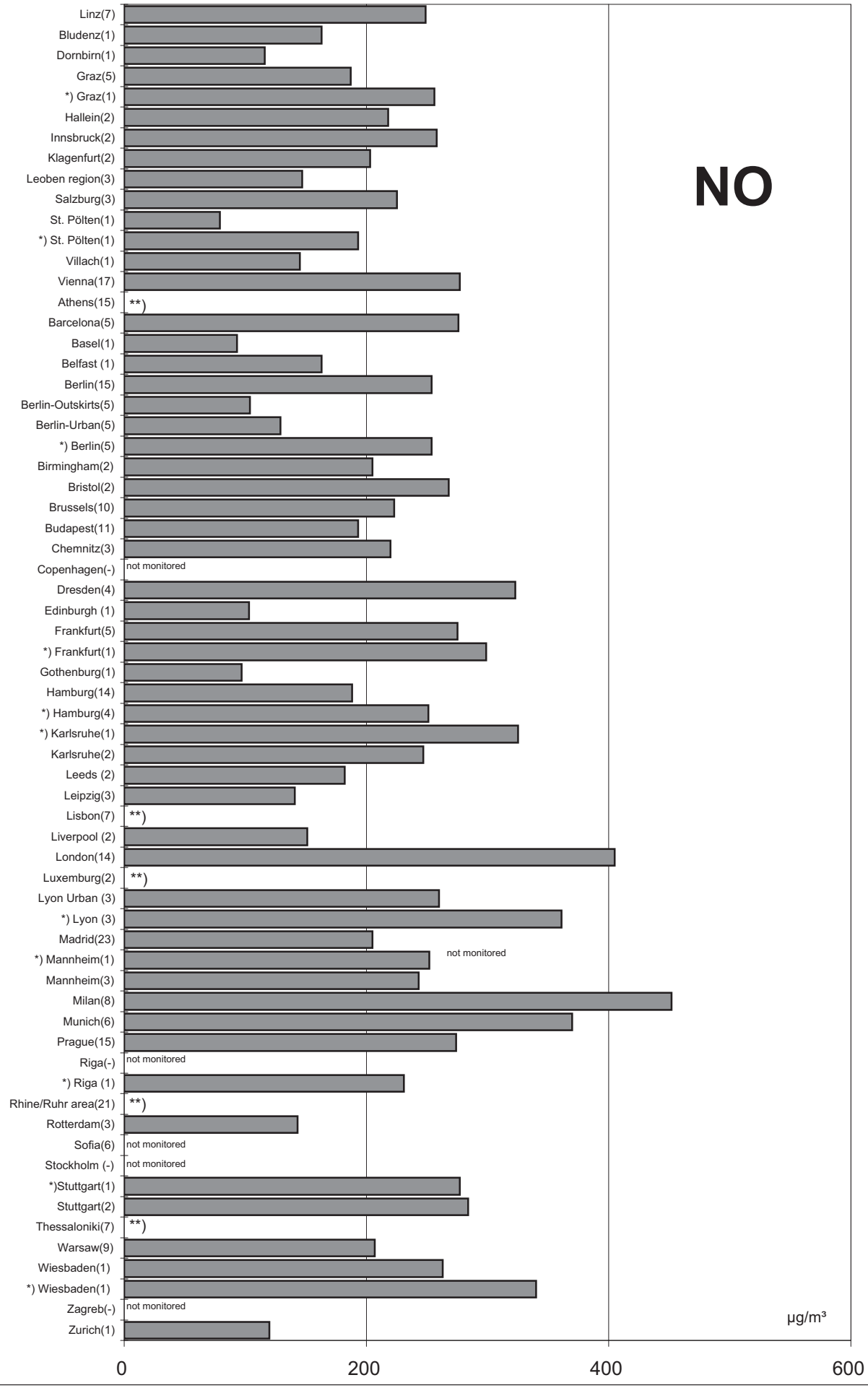


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)

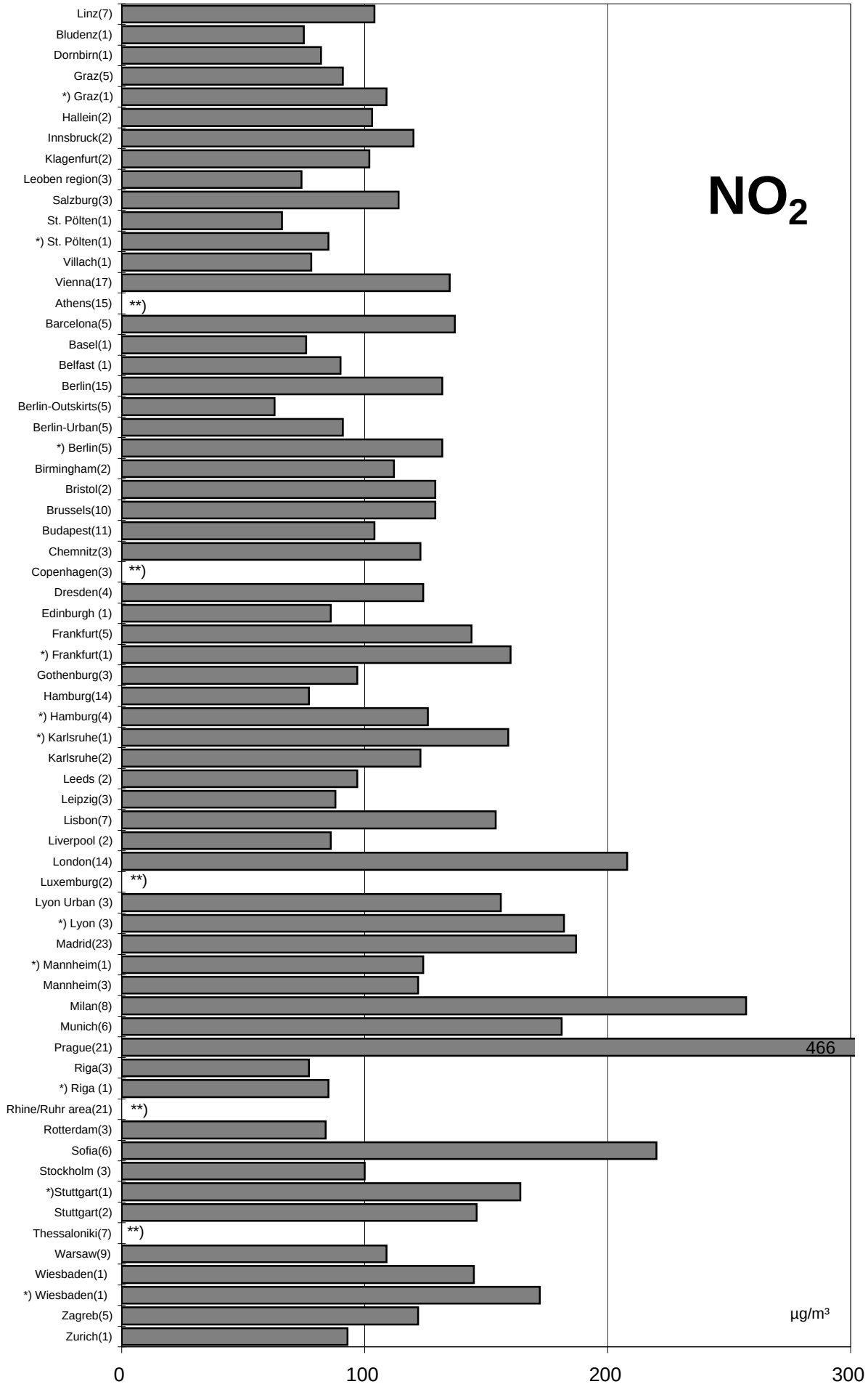


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)

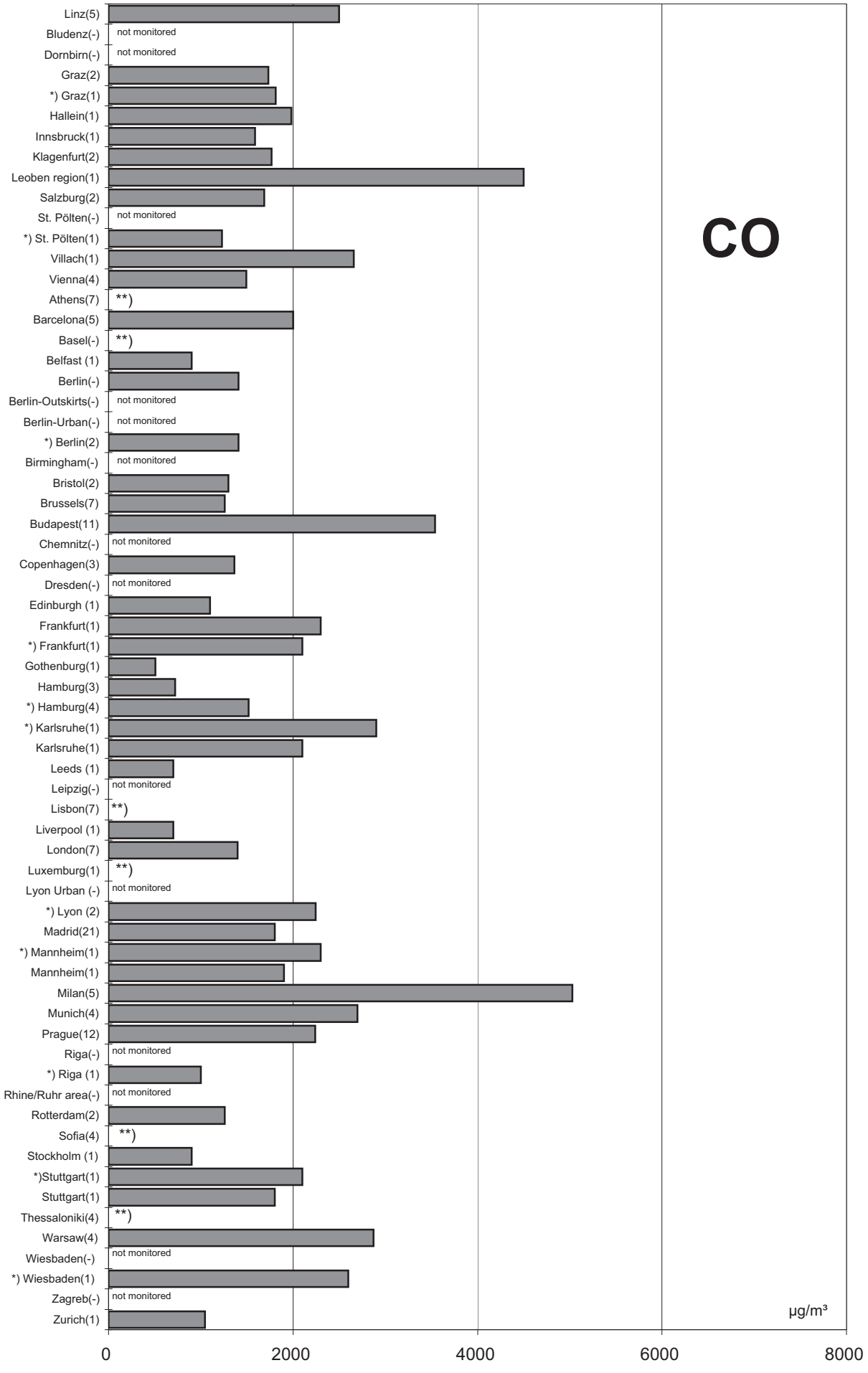


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)

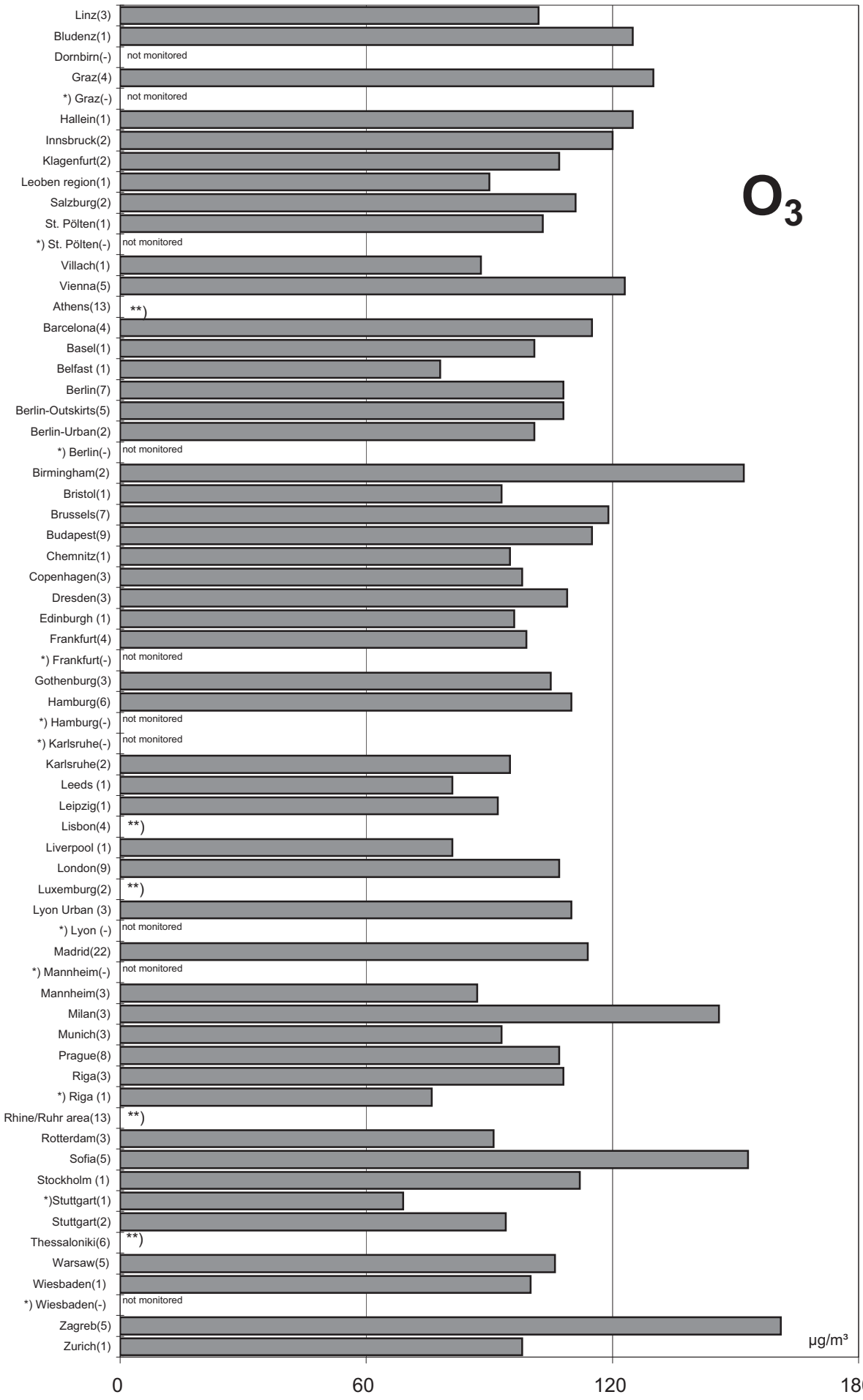


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)



*) traffically influenced monitoring stations
**)no data

Luftgütevergleich

2009

max. 1h-Mittelwerte

Comparison of The Air Quality

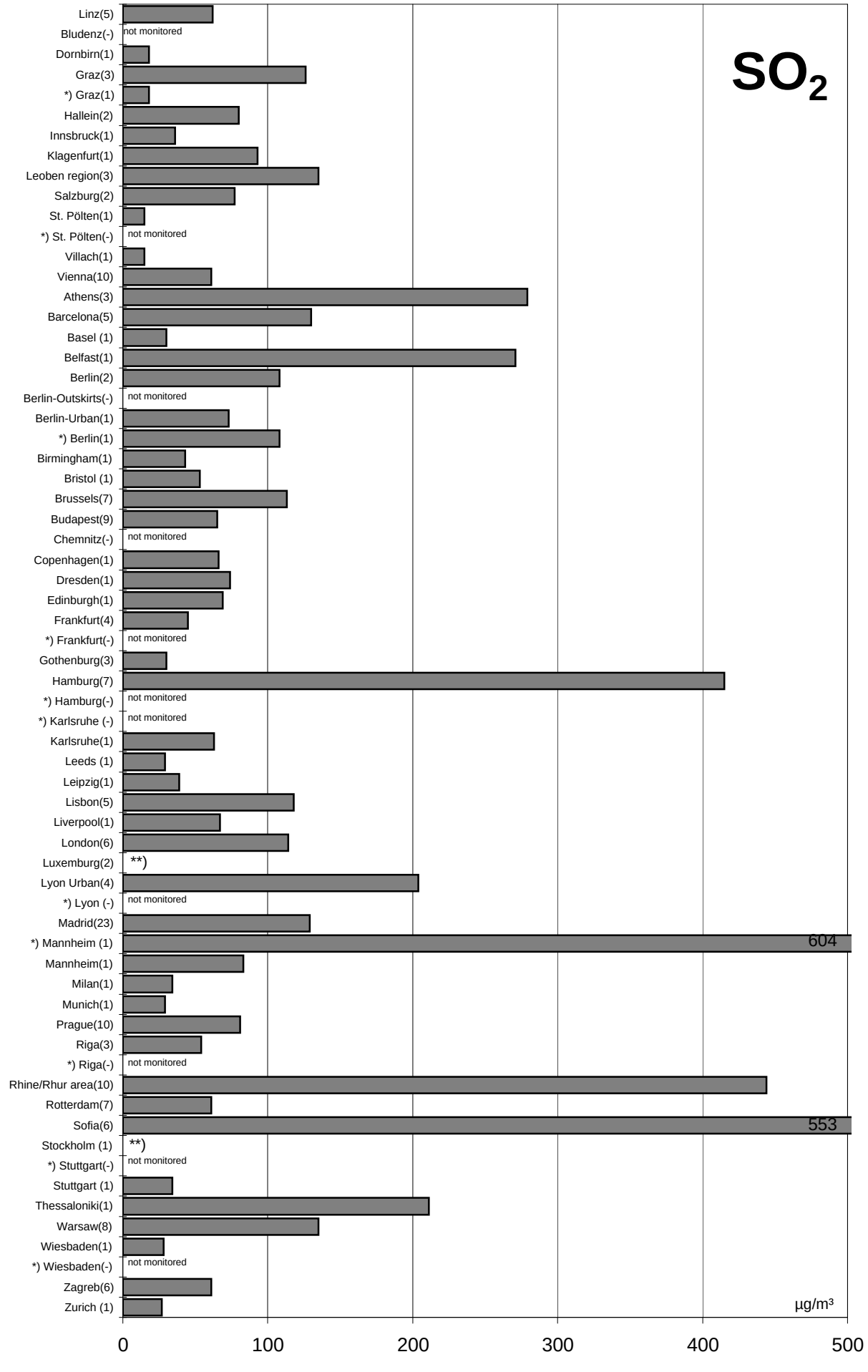
2009

Max. 1h-Mean Values

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)

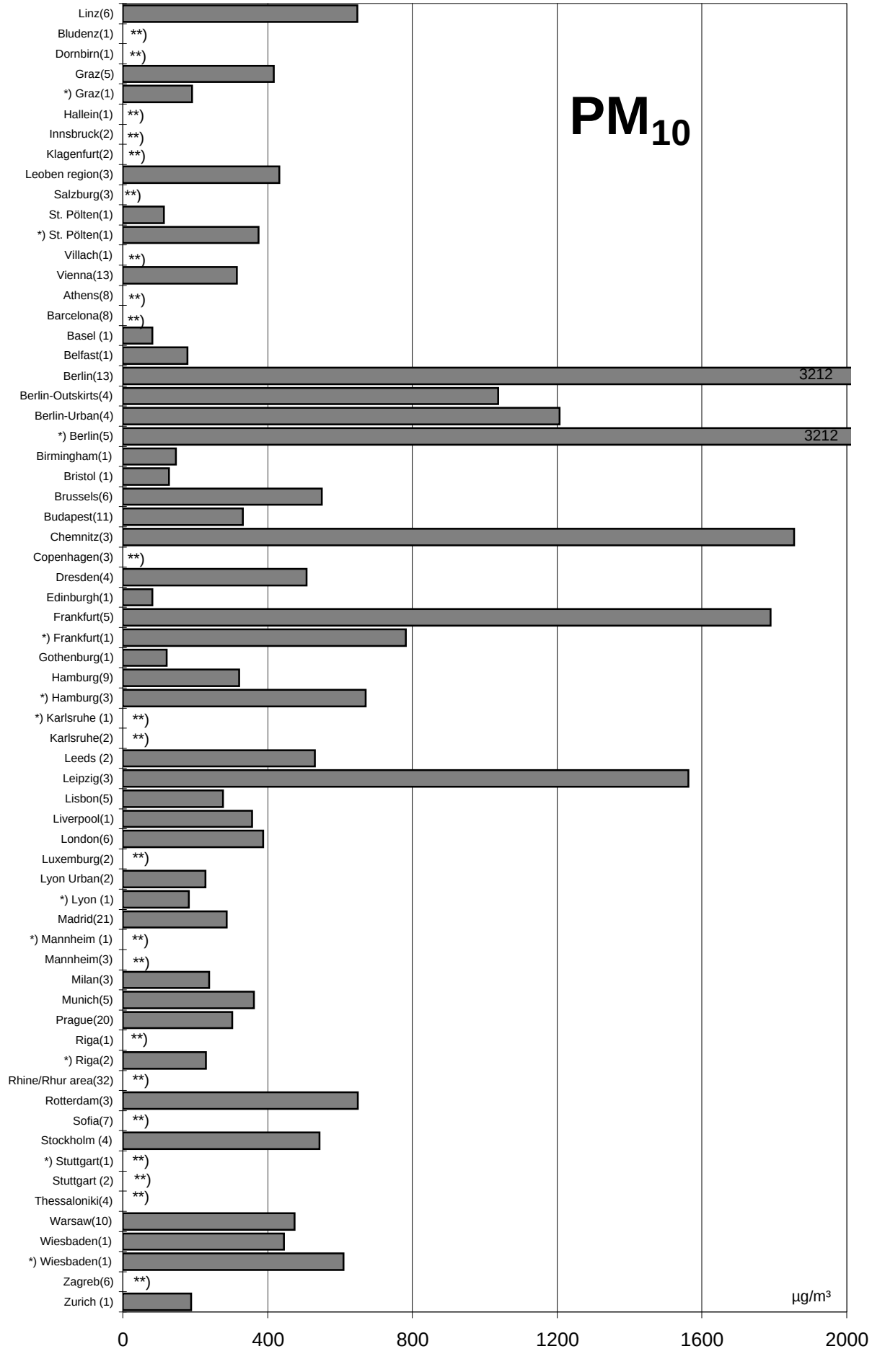


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)

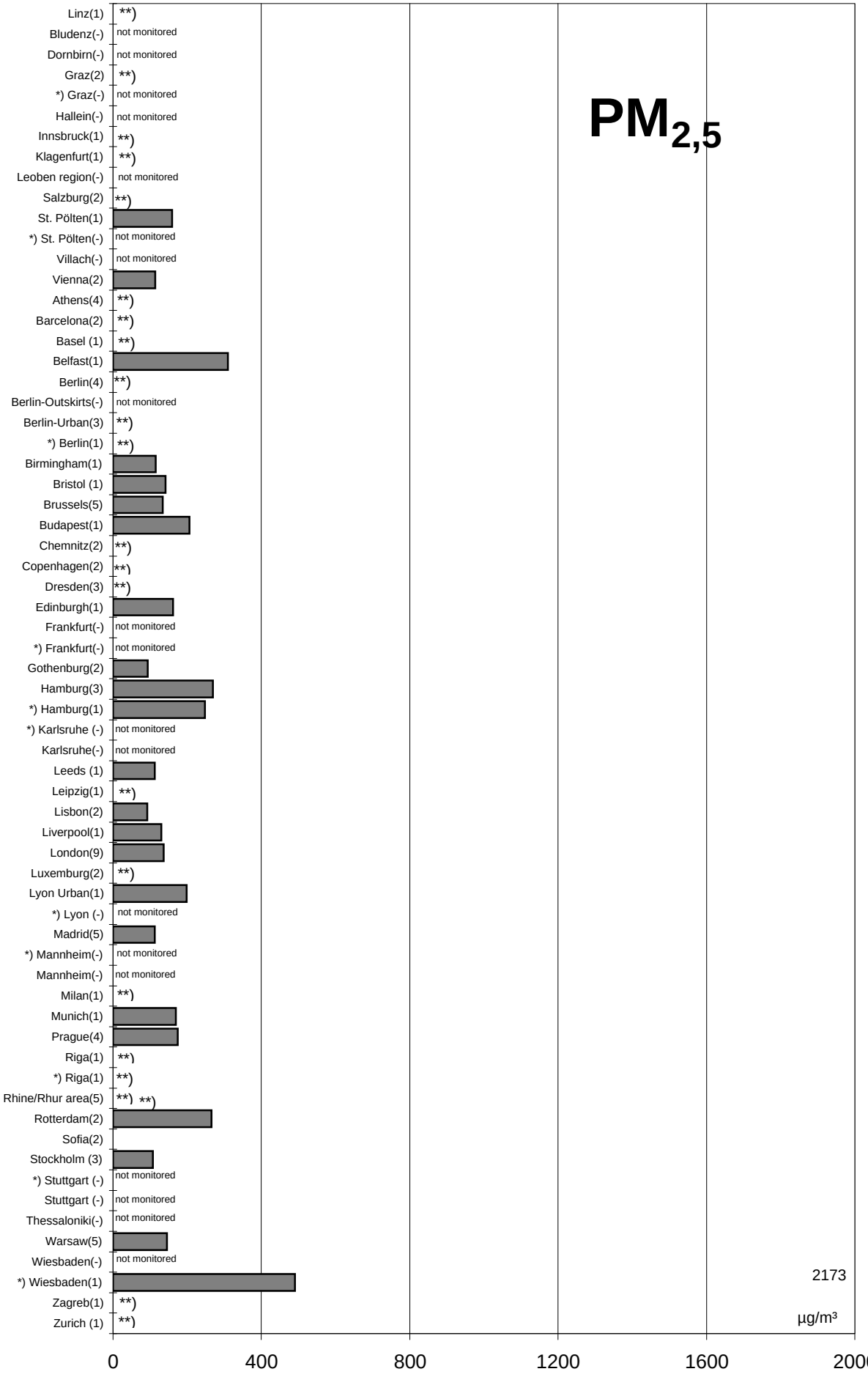


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)

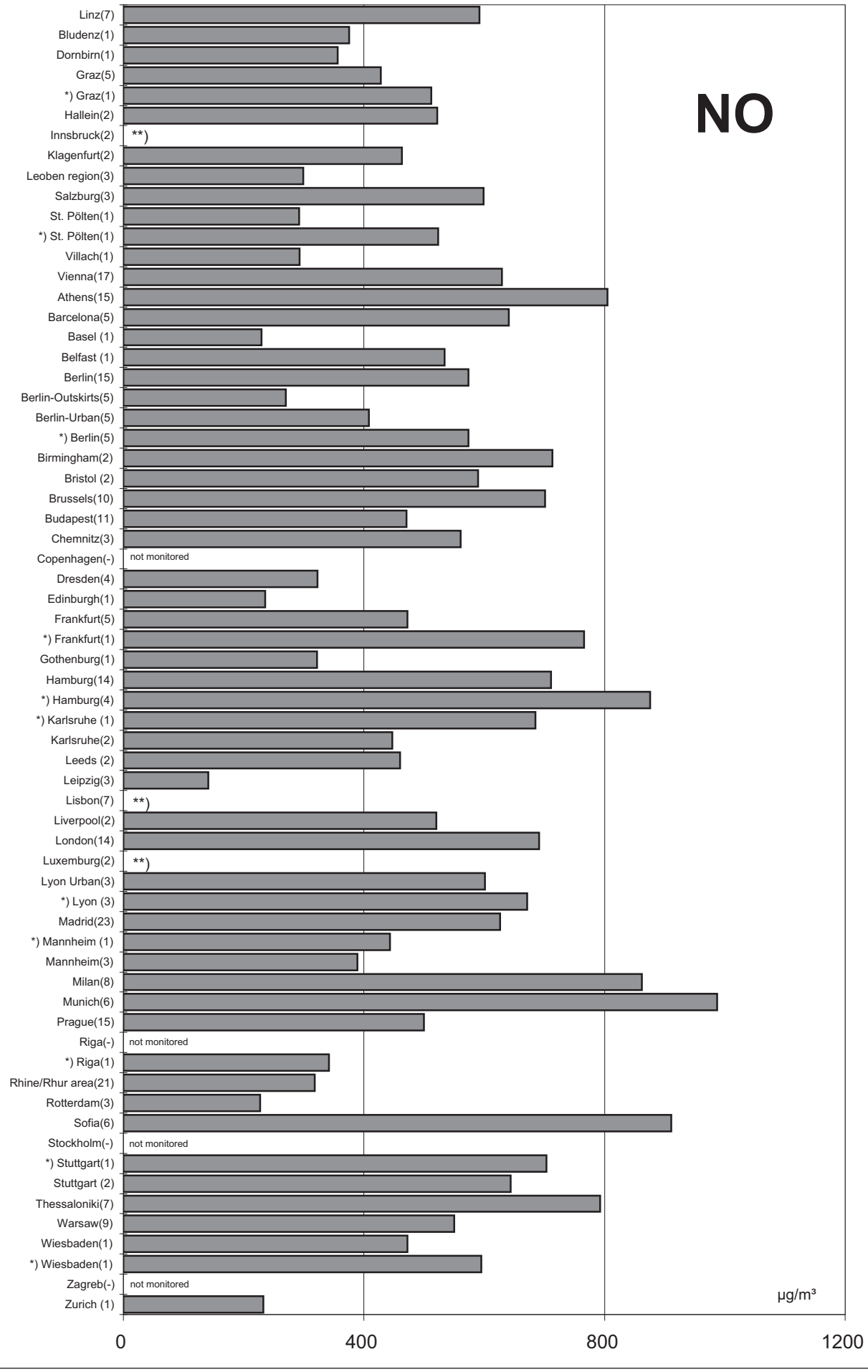


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)

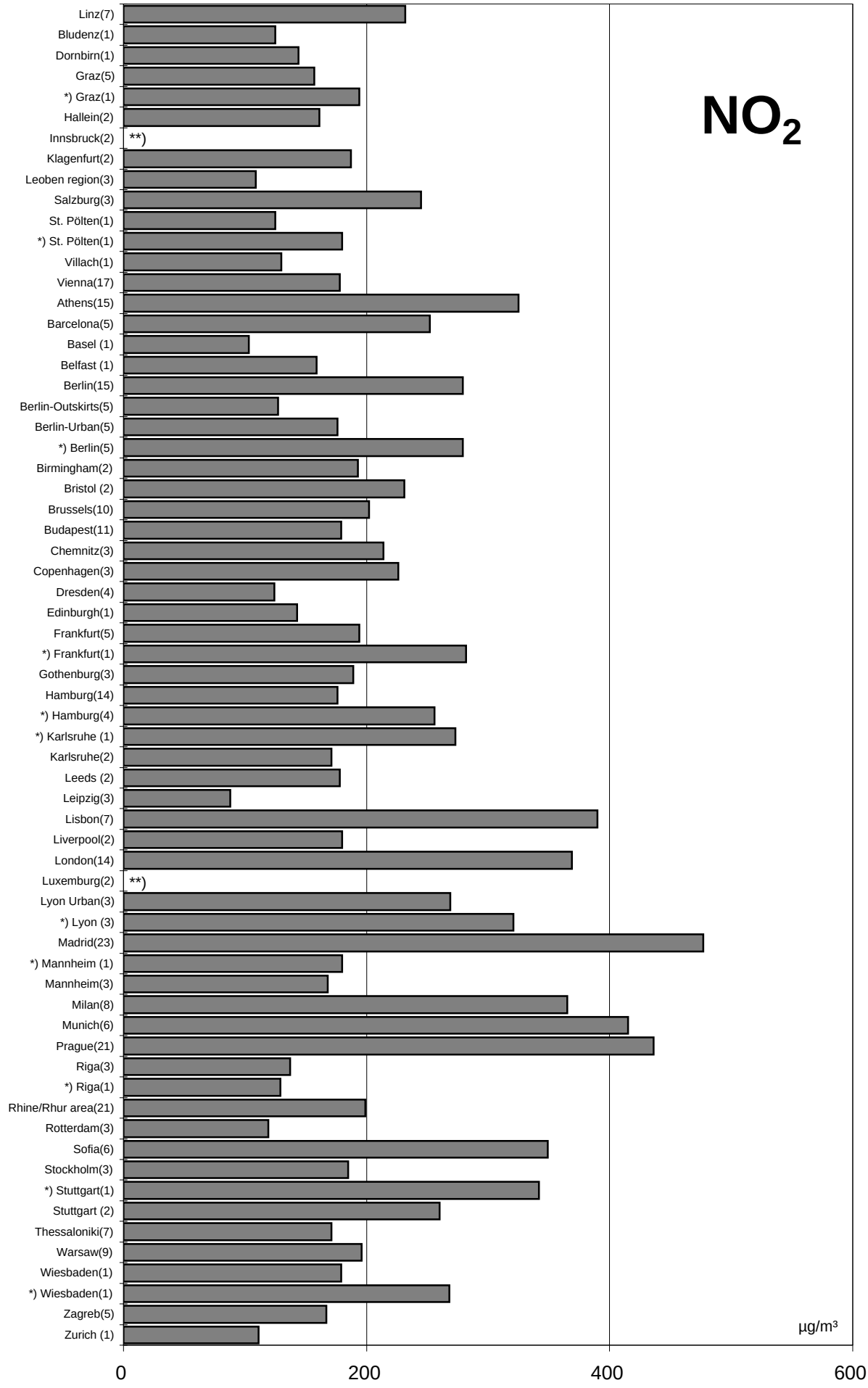


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)

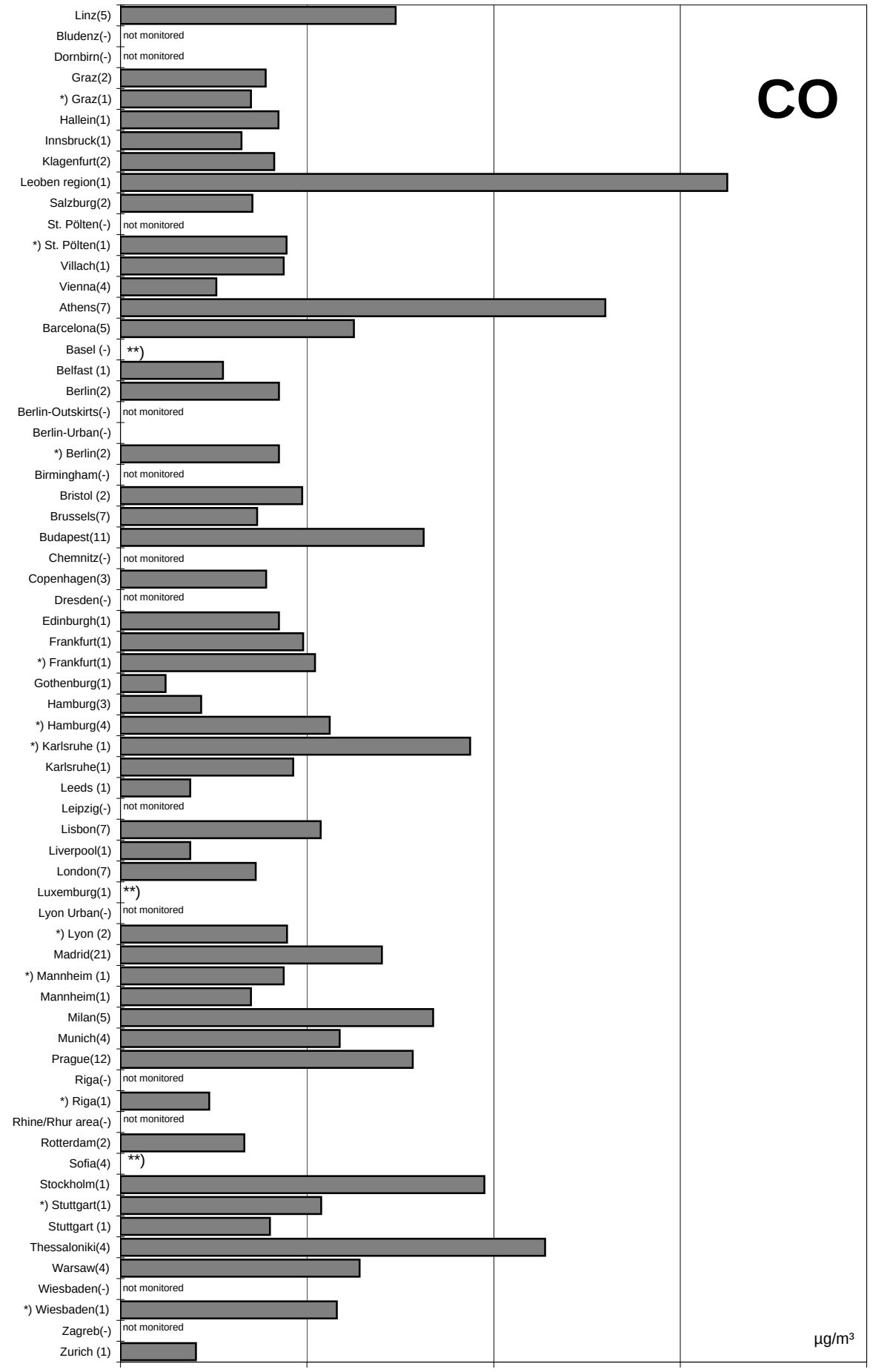


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)

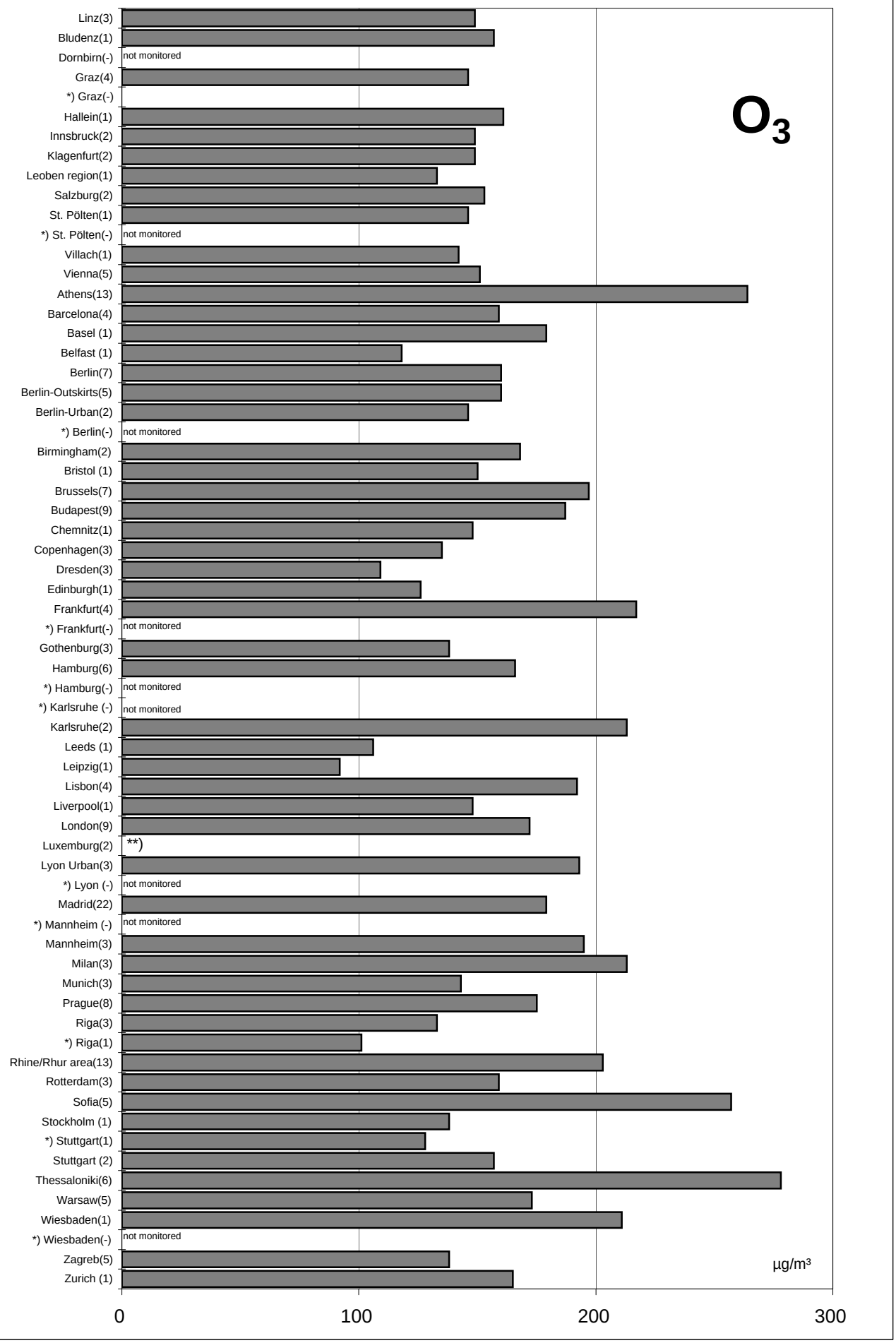


*) traffically influenced monitoring stations
**)no data

Comparison of The Air Quality in 2009

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

(in parentheses: number of monitoring stations)



*) traffically influenced monitoring stations

**)no data

Jahresvergleich

1992 - 2009

Jahresmittelwerte

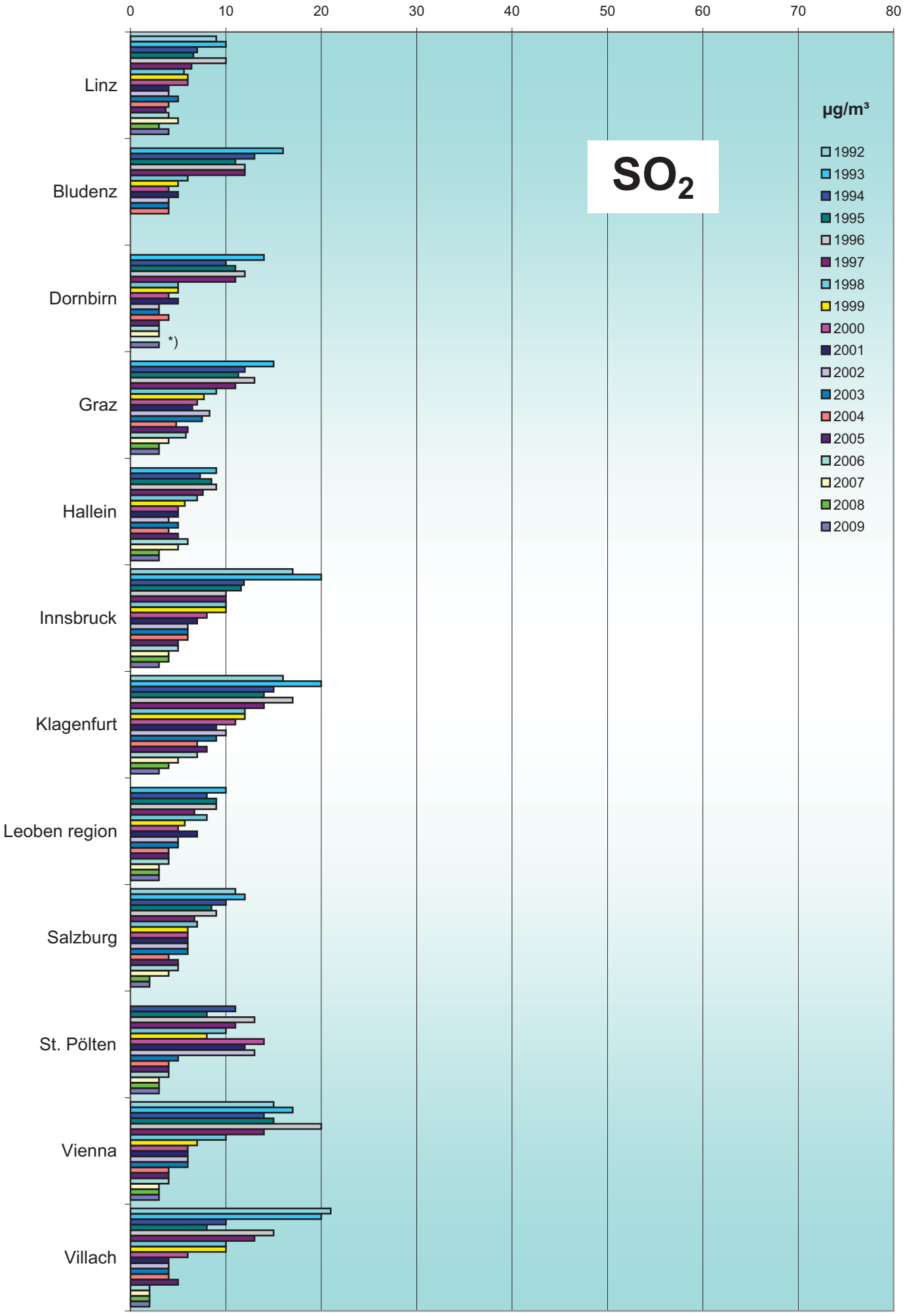
Comparison of The Air Quality Over The Years

1992 - 2009

Annual Mean Values

Comparison of The Air Quality 1992 - 2009

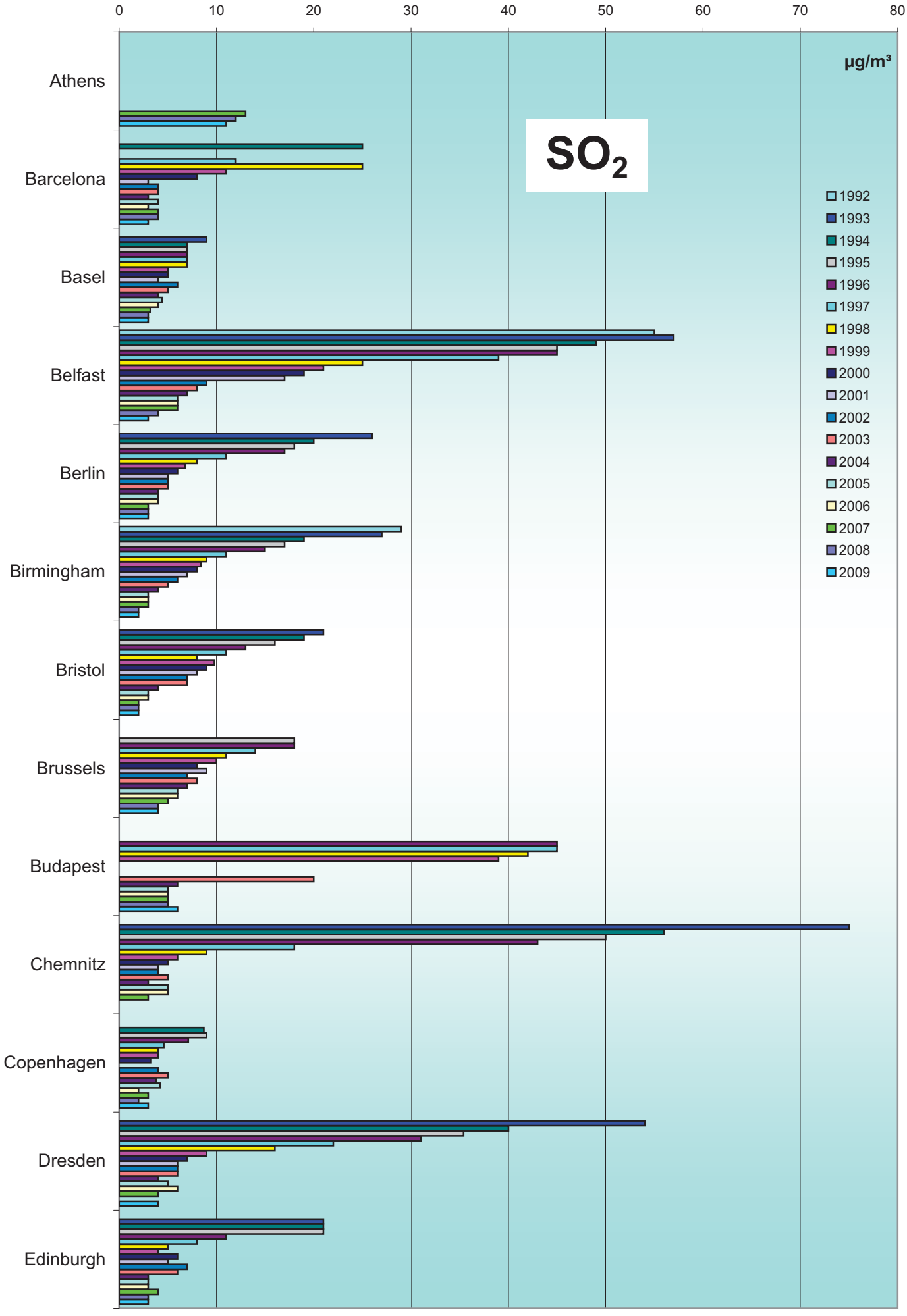
Annual mean values (mean of all monitoring stations)



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

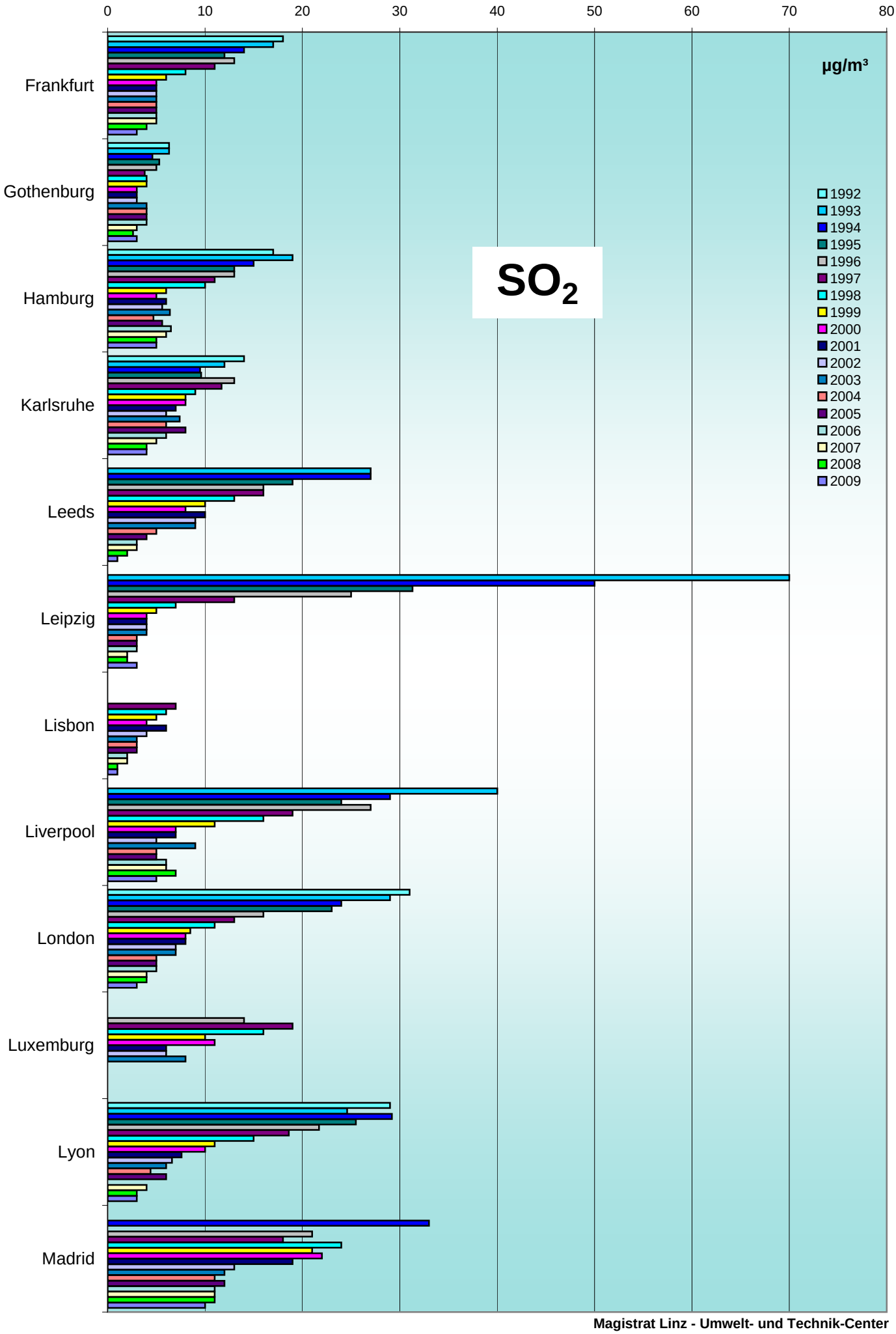
Comparison of The Air Quality 1992 - 2009

Annual mean values (mean of all monitoring stations)



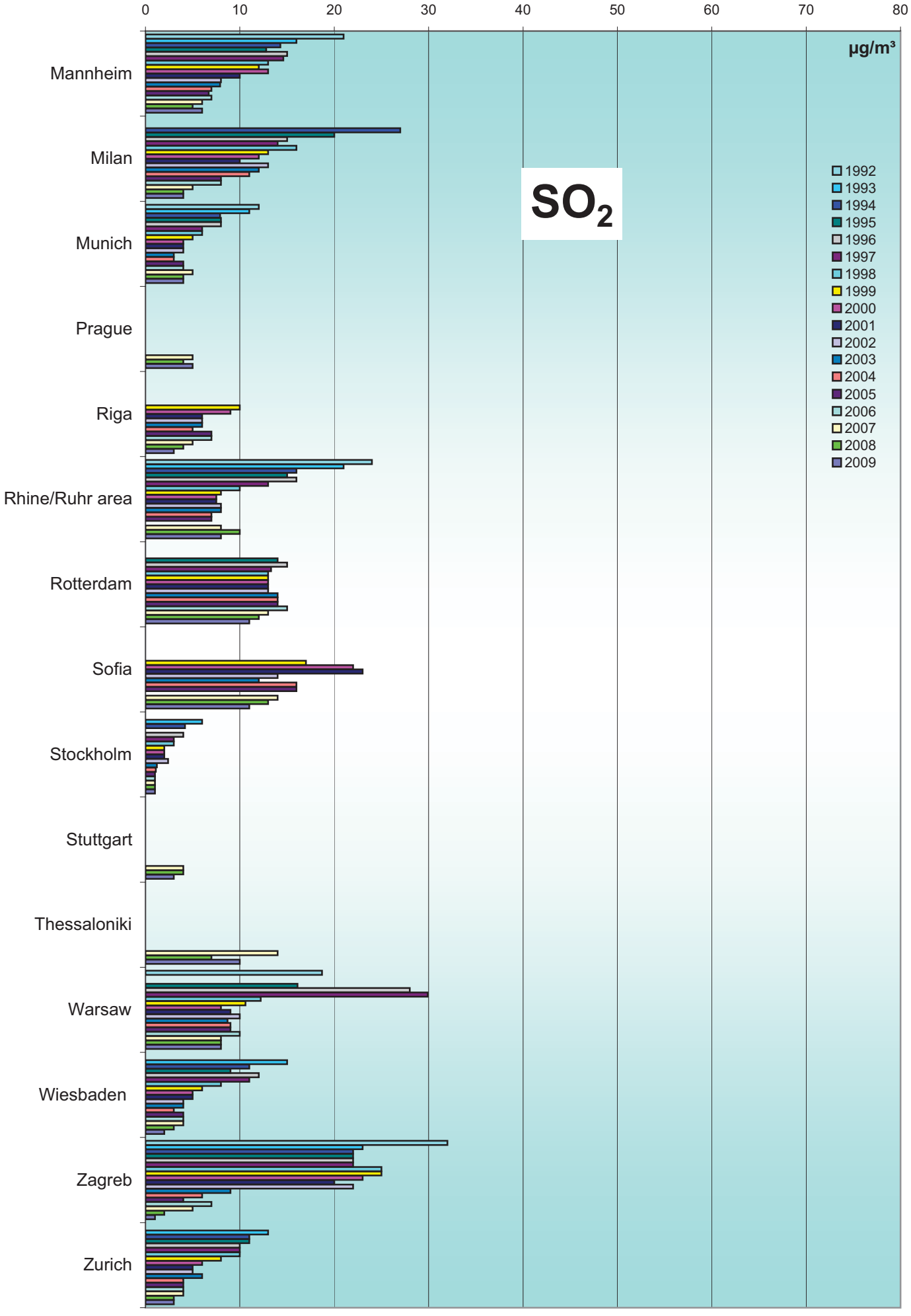
Comparison of The Air Quality 1992 - 2009

Annual mean values (mean of all monitoring stations)



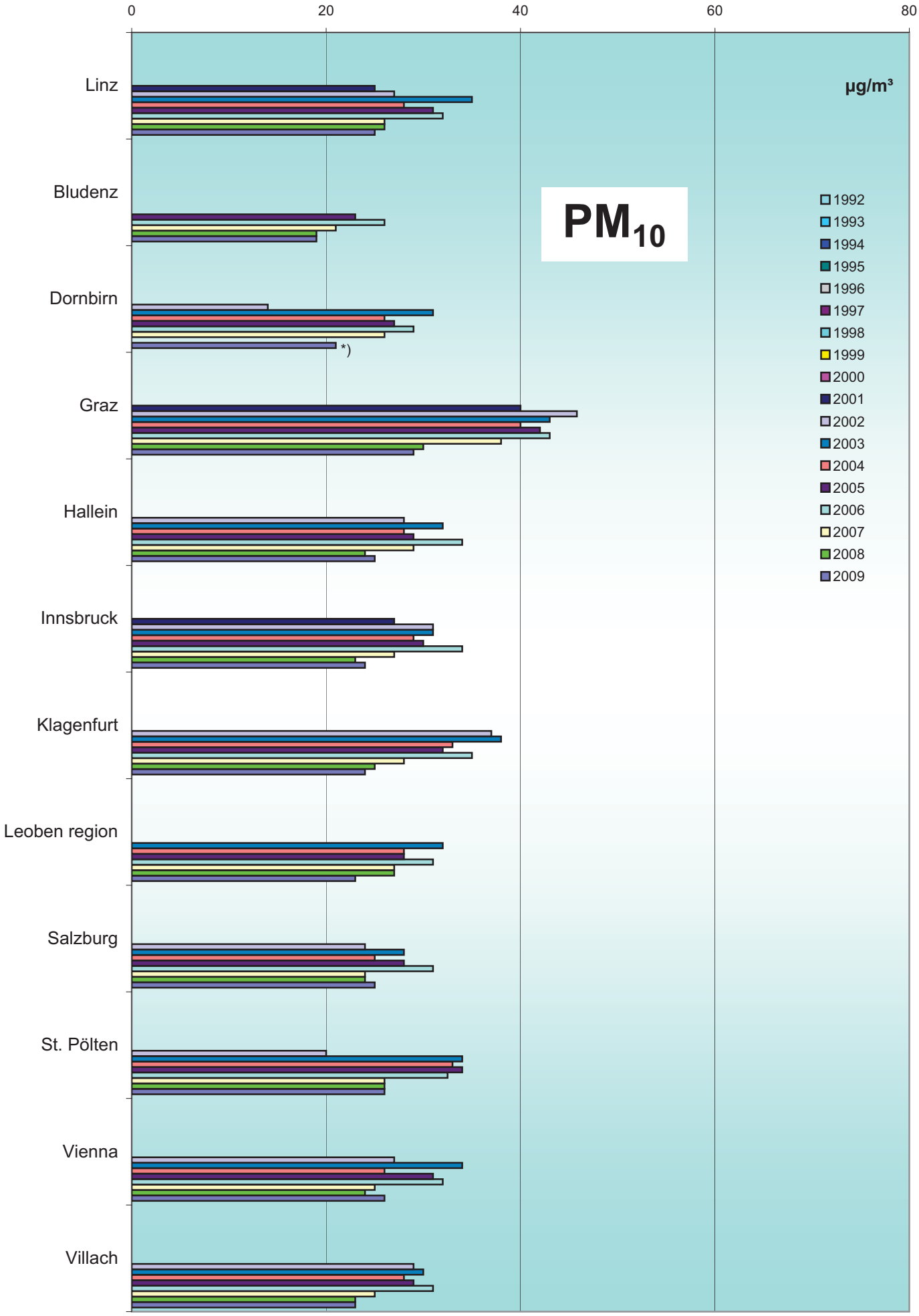
Comparison of The Air Quality 1992 - 2009

Annual mean values (mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2009

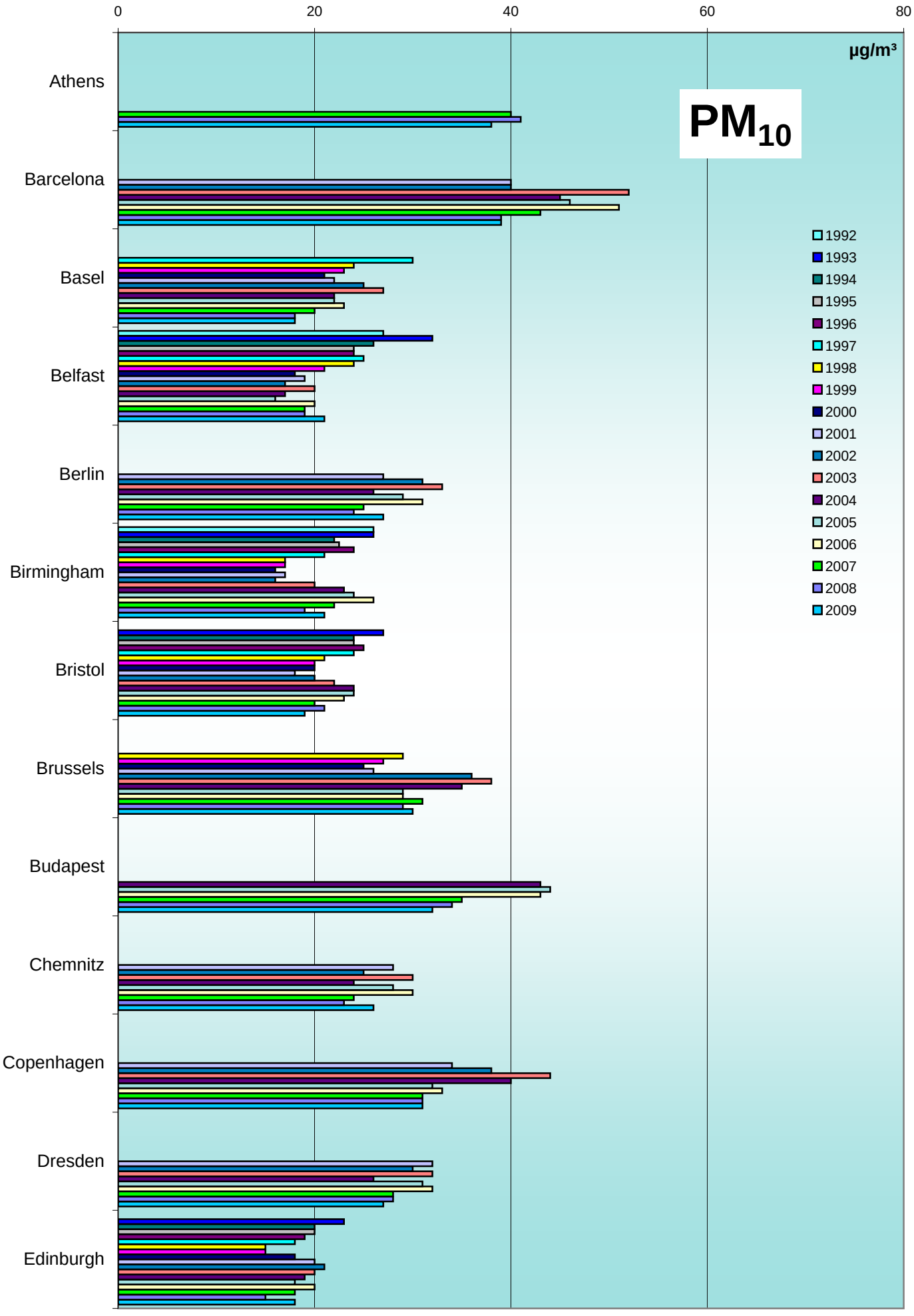
Annual mean values (mean of all monitoring stations)



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

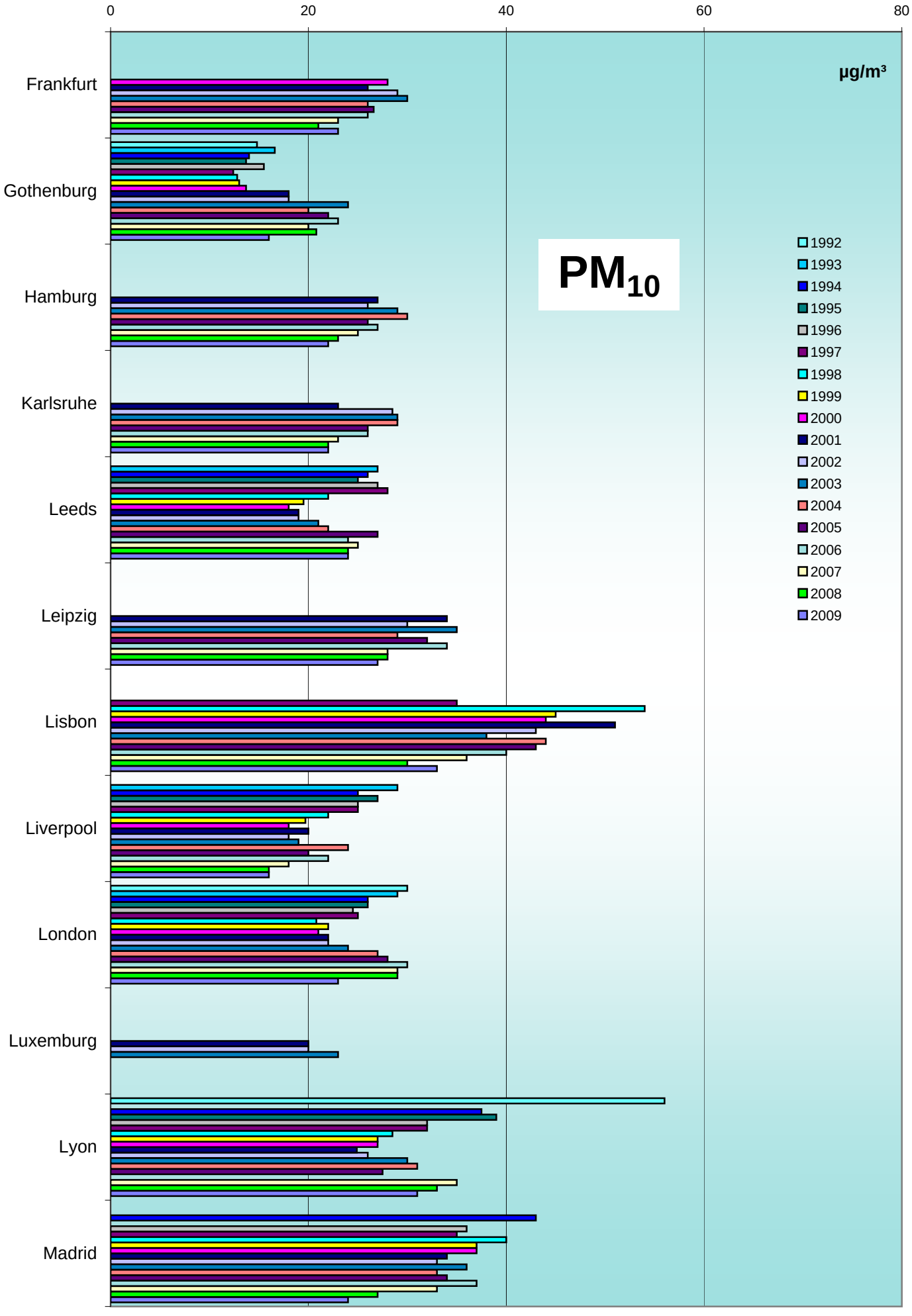
Comparison of The Air Quality 1992 - 2009

Annual mean values (mean of all monitoring stations)



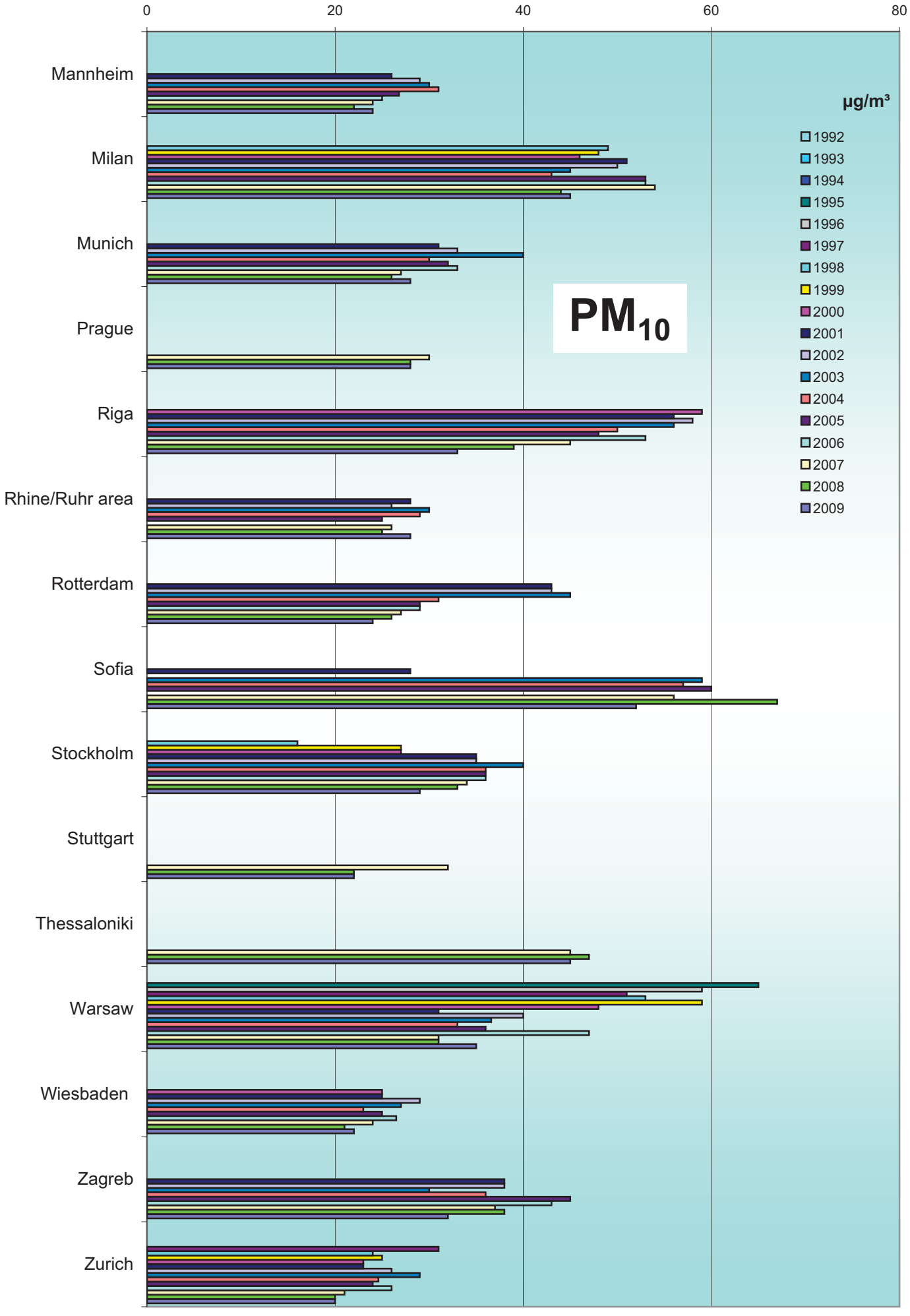
Comparison of The Air Quality 1992 - 2009

Annual mean values (mean of all monitoring stations)



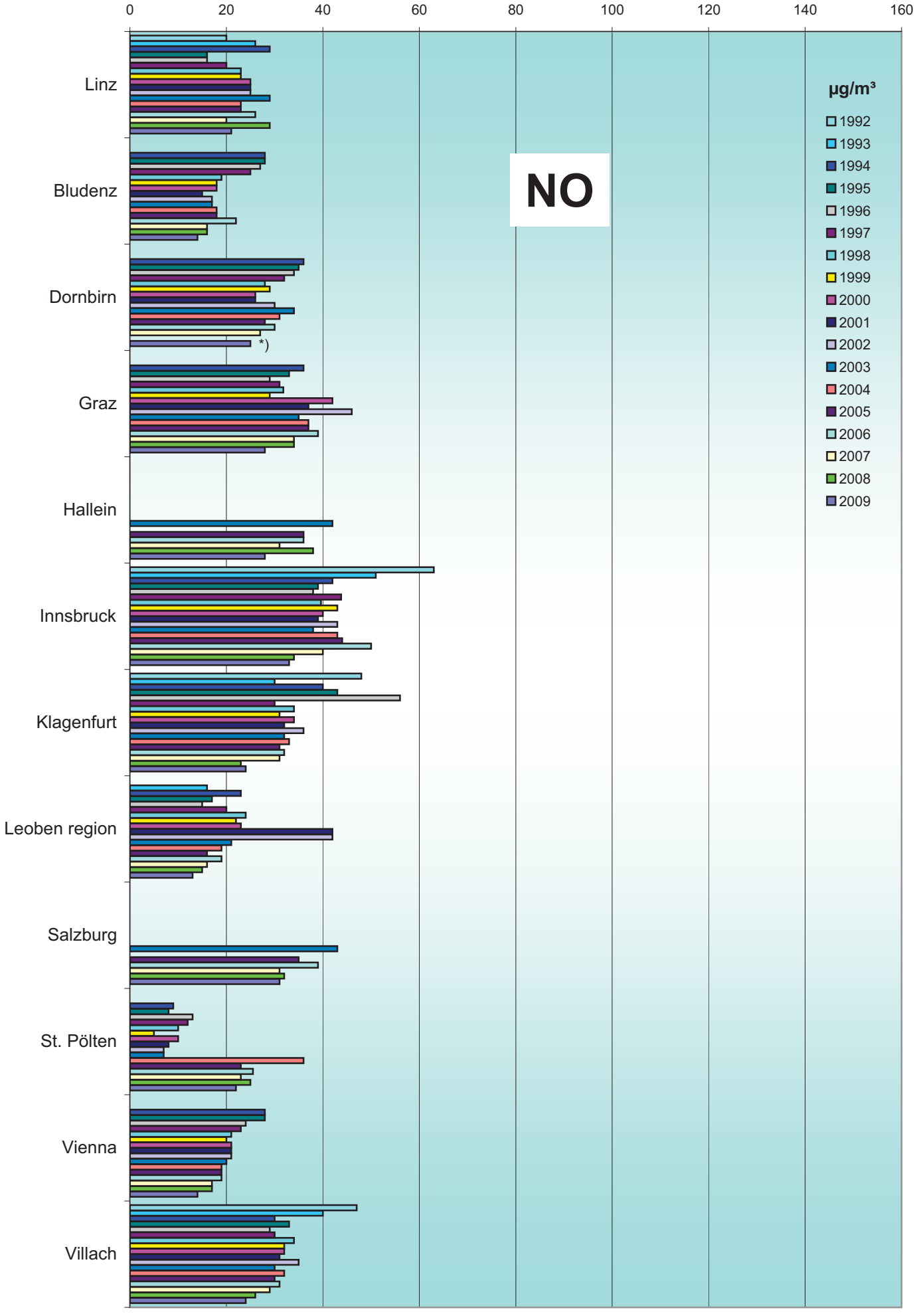
Comparison of The Air Quality 1992 - 2009

Annual mean values (mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2009

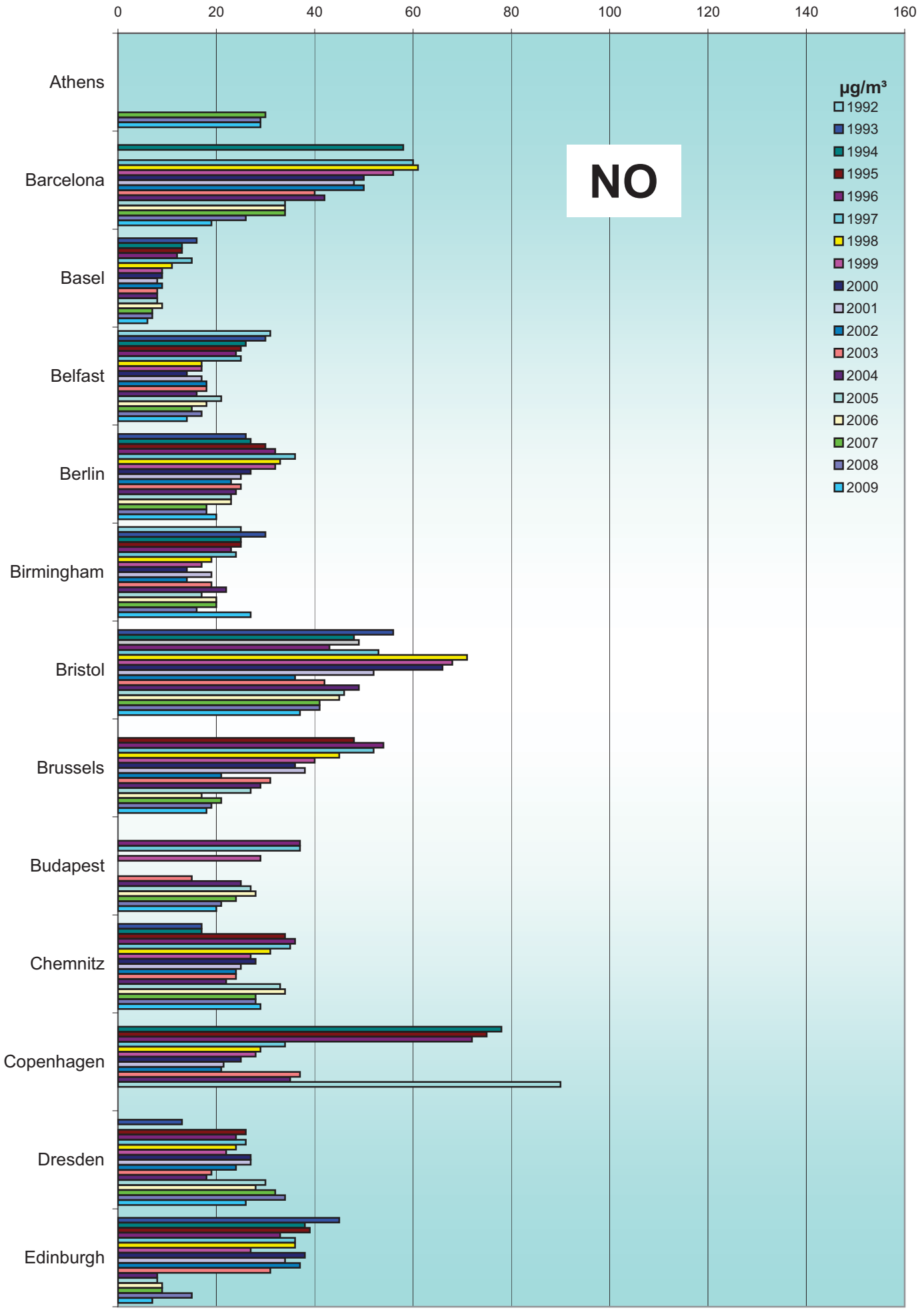
Annual mean values (mean of all monitoring stations)



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

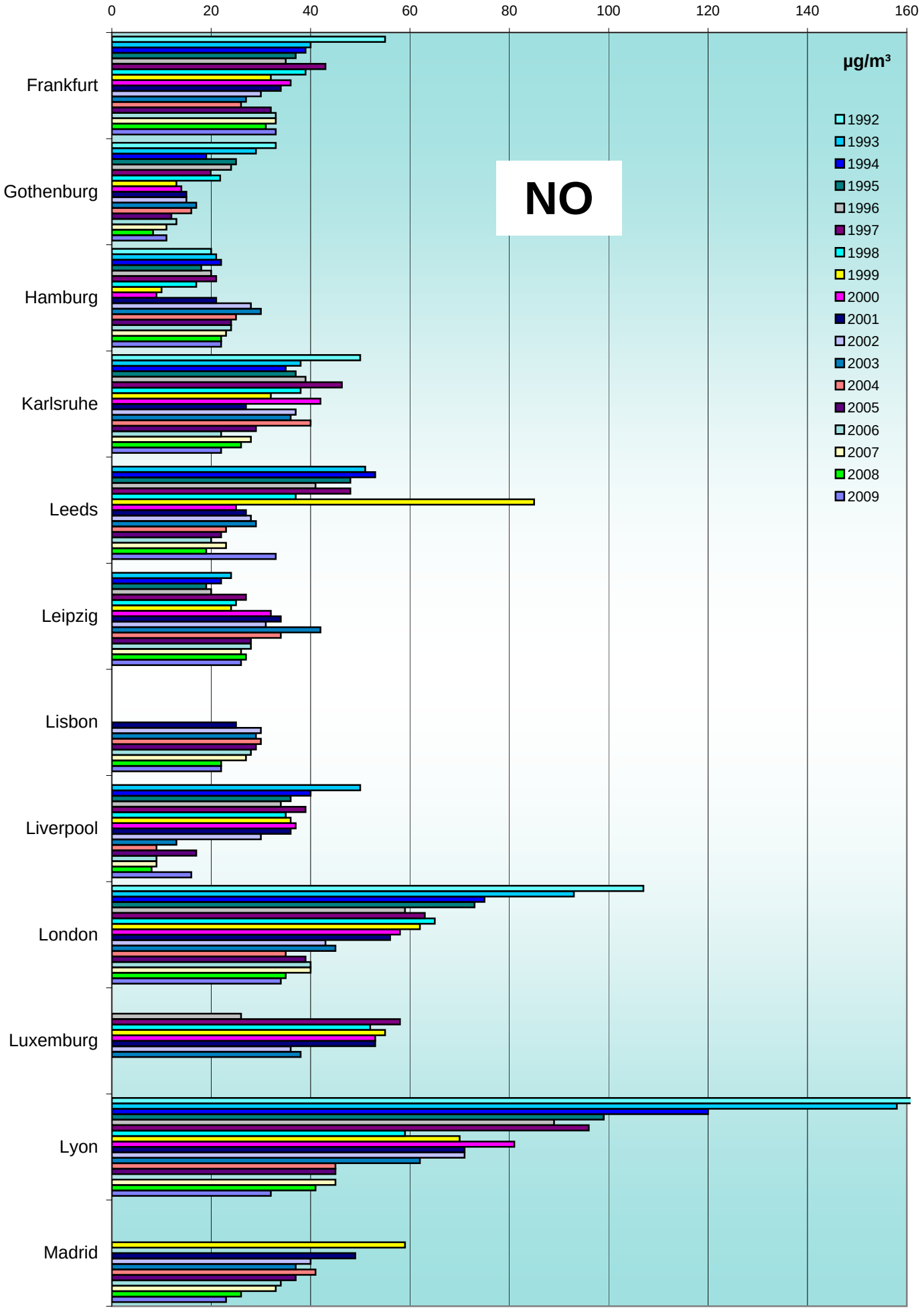
Comparison of The Air Quality 1992 - 2009

Annual mean values (mean of all monitoring stations)



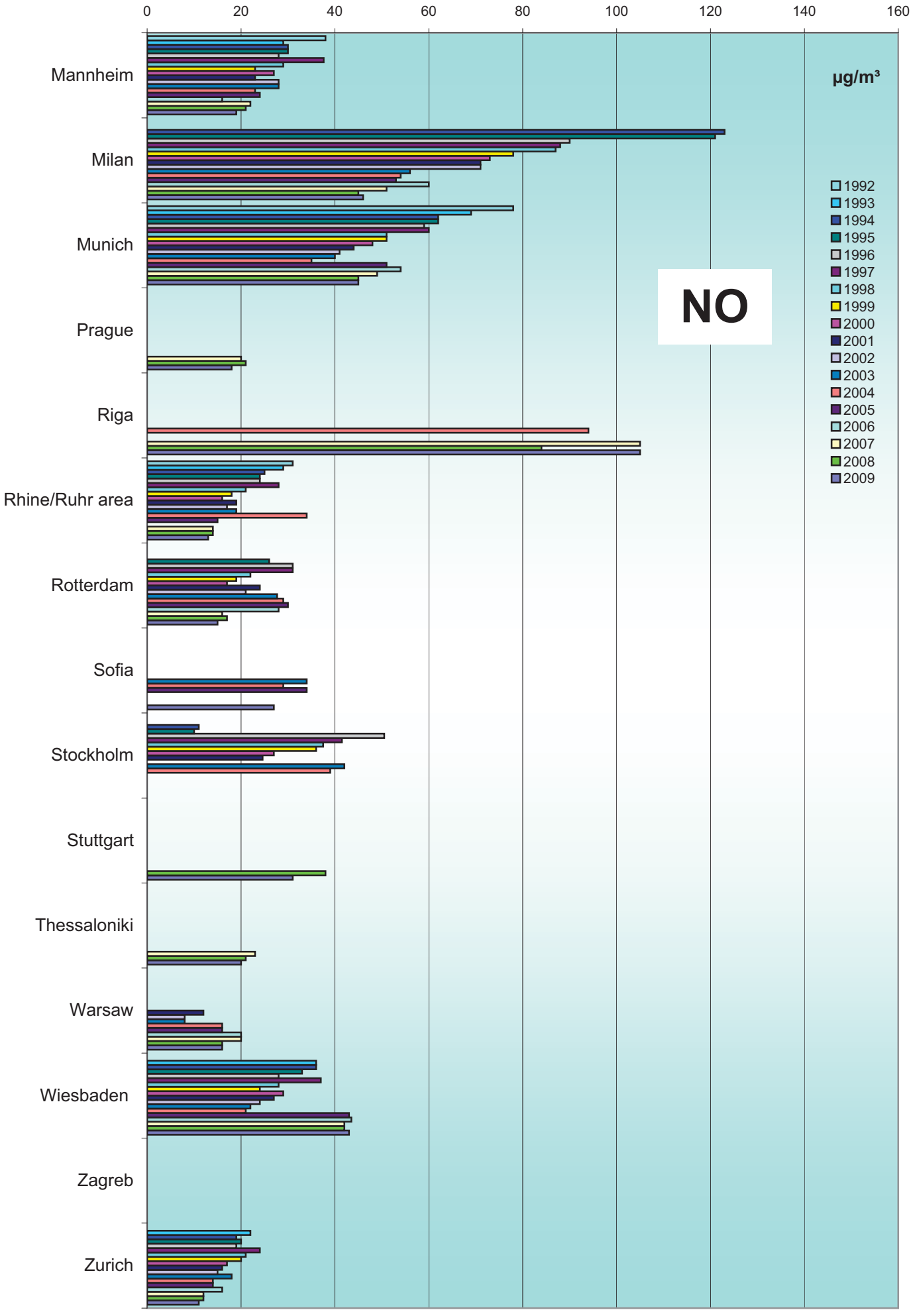
Comparison of The Air Quality 1992 - 2009

Annual mean values (mean of all monitoring stations)



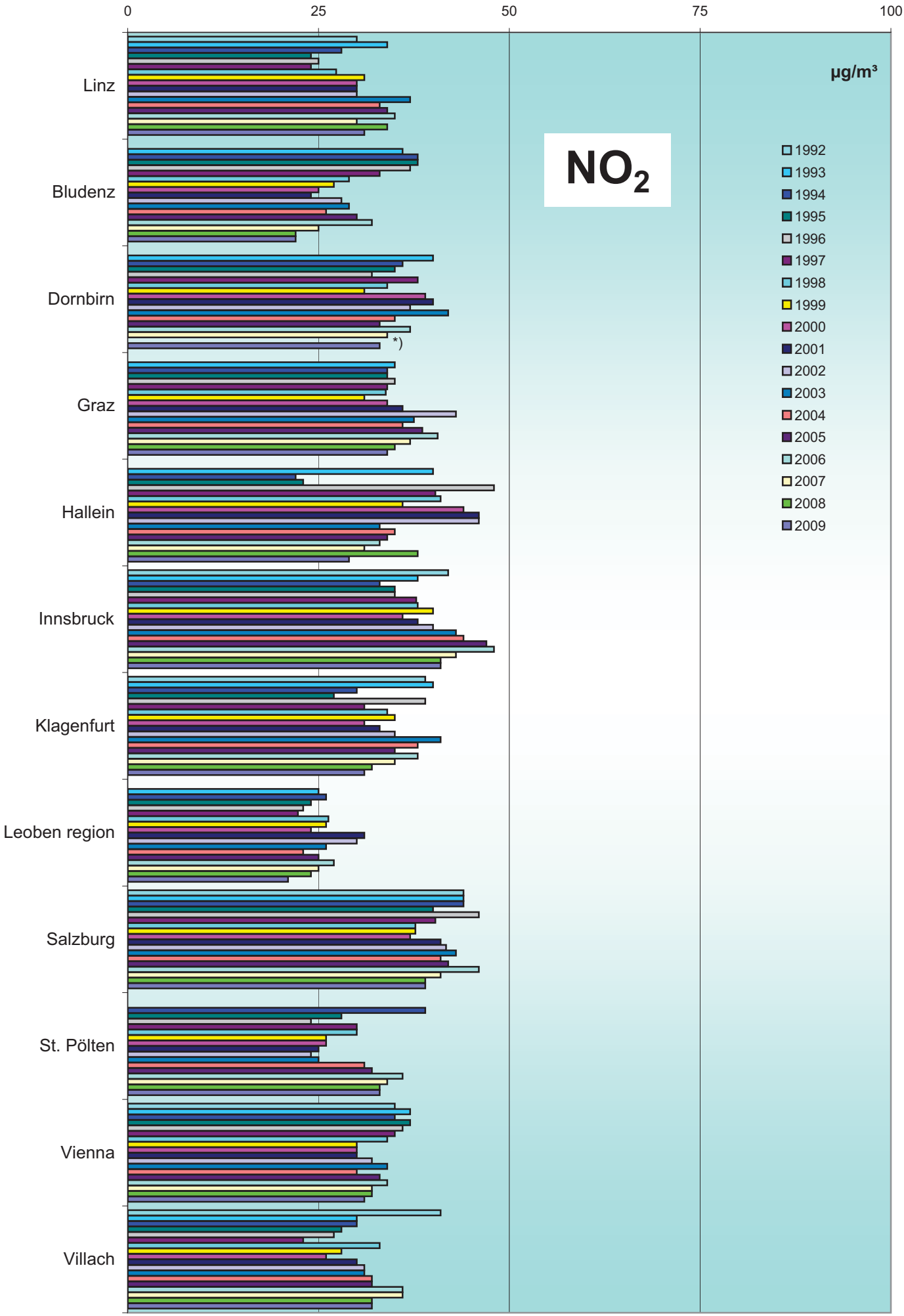
Comparison of The Air Quality 1992 - 2009

Annual mean values (mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2009

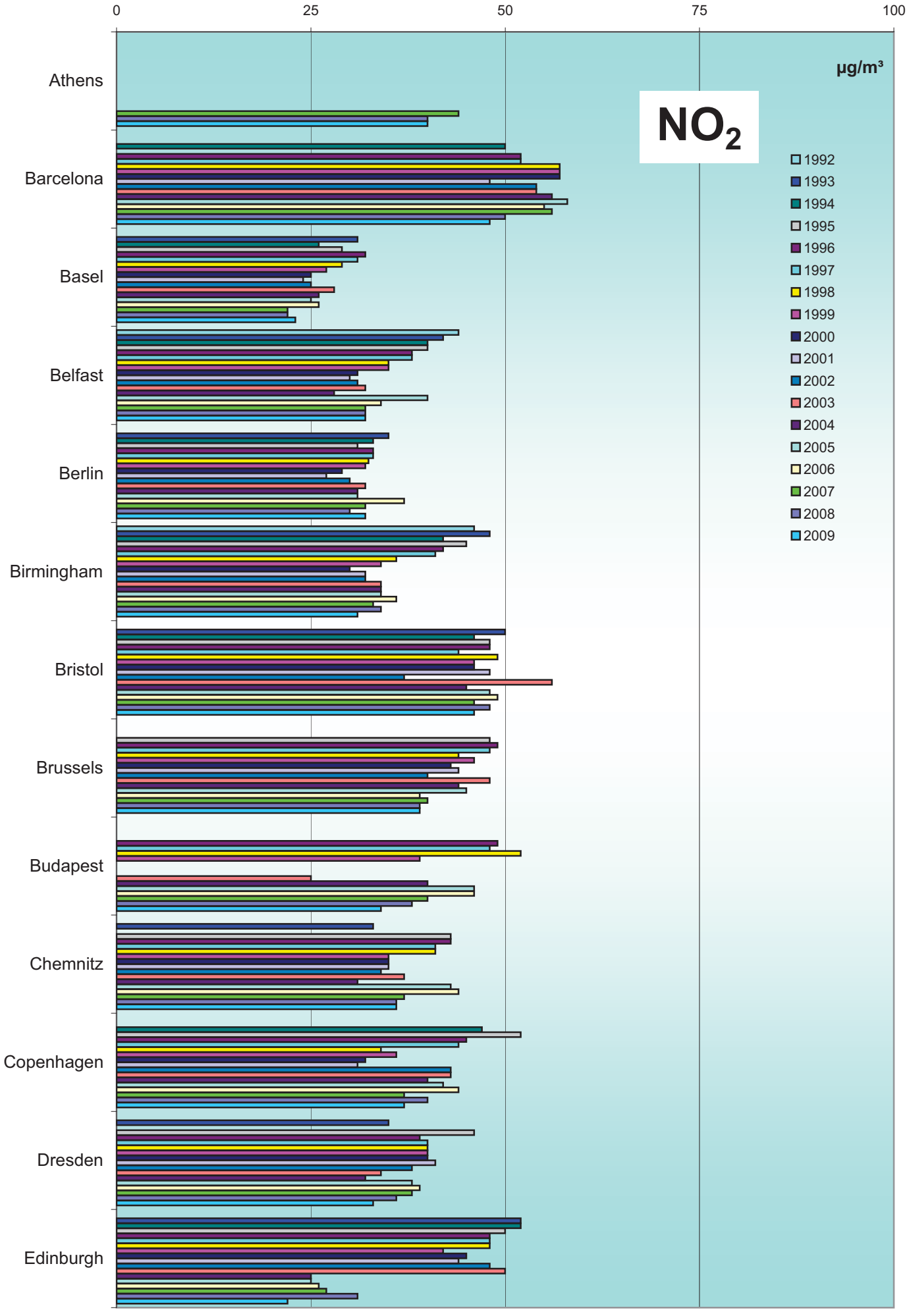
Annual mean values (mean of all monitoring stations)



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

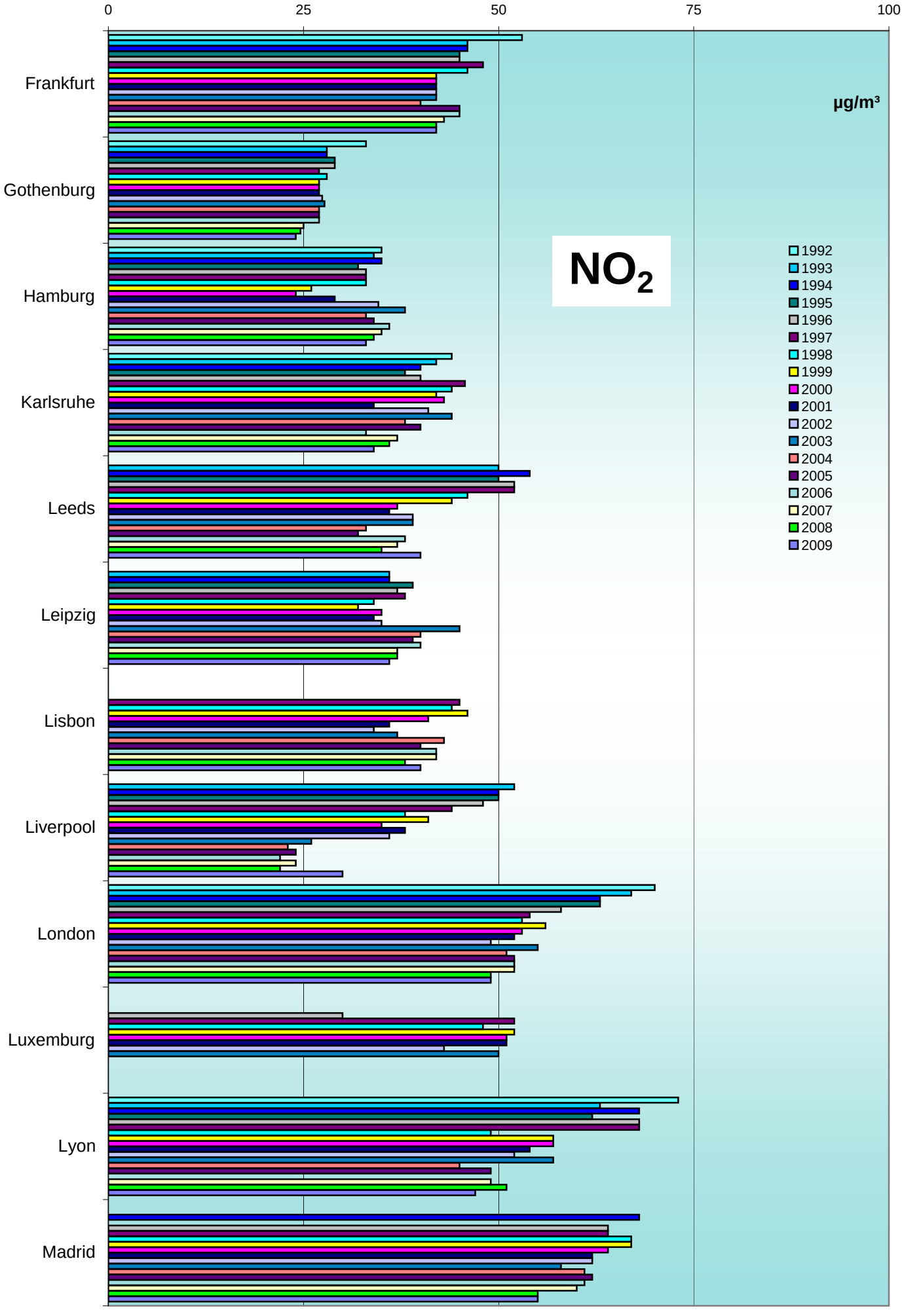
Comparison of The Air Quality 1992 - 2009

Annual mean values (mean of all monitoring stations)



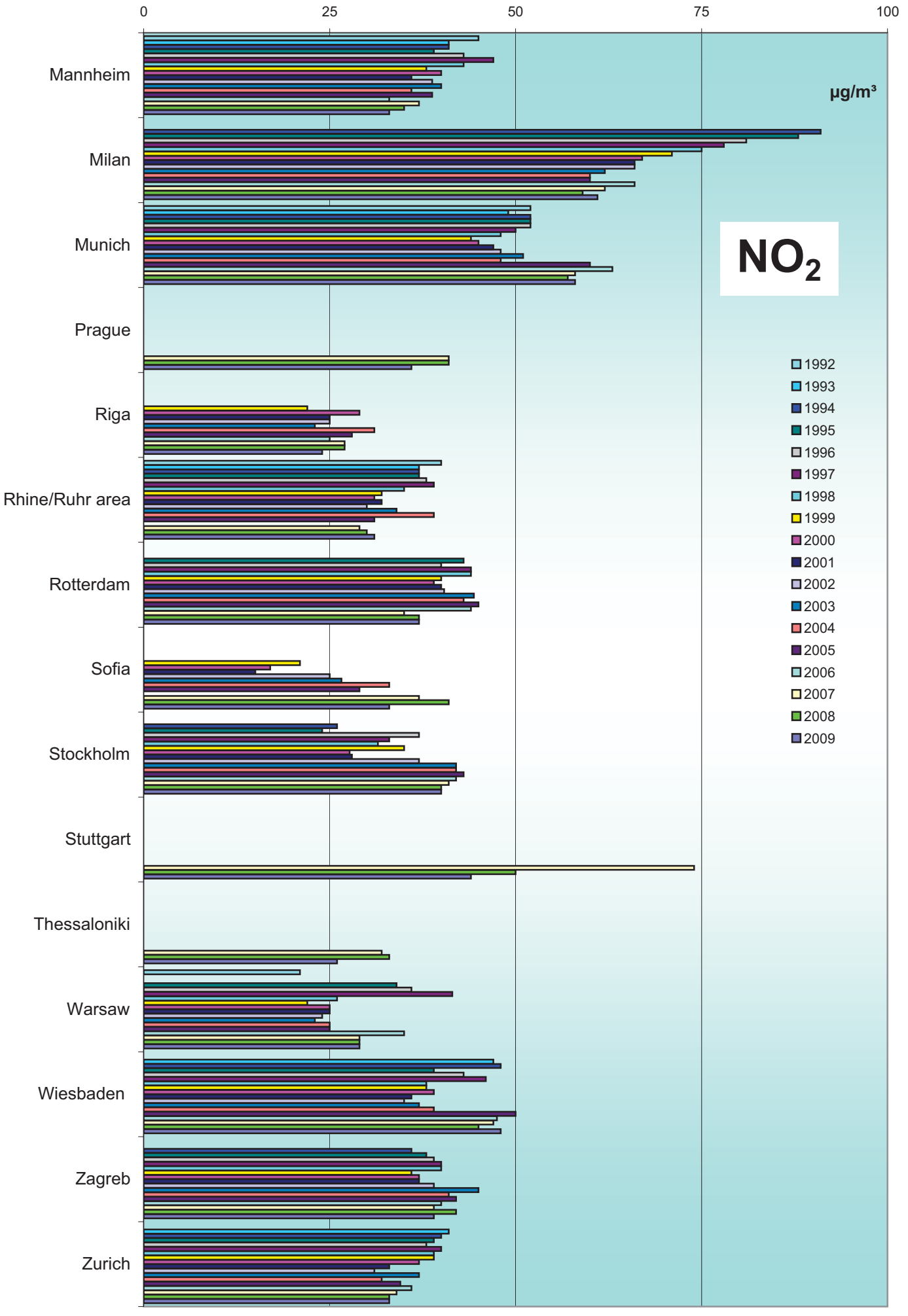
Comparison of The Air Quality 1992 - 2009

Annual mean values (mean of all monitoring stations)



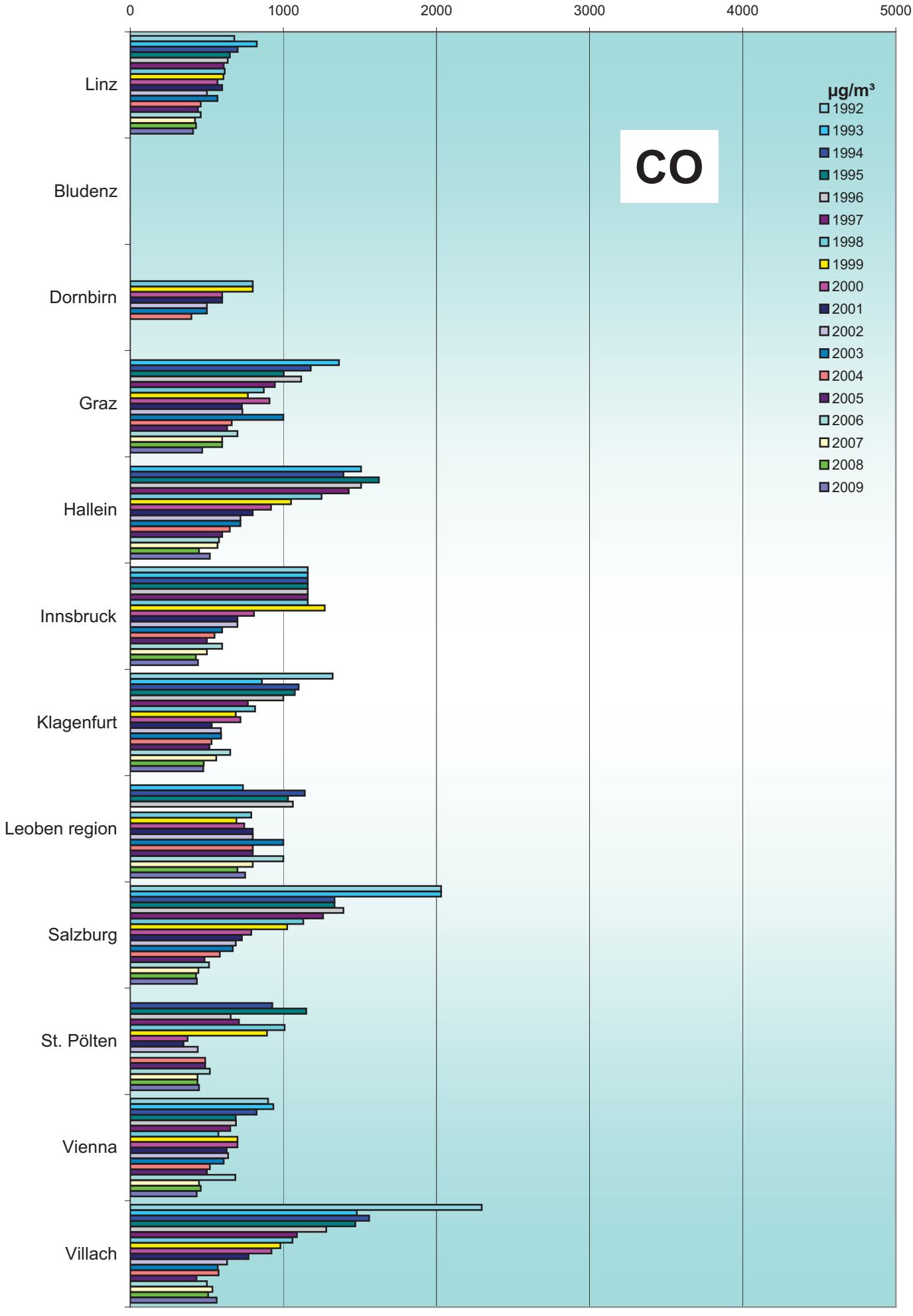
Comparison of The Air Quality 1992 - 2009

Annual mean values (mean of all monitoring stations)



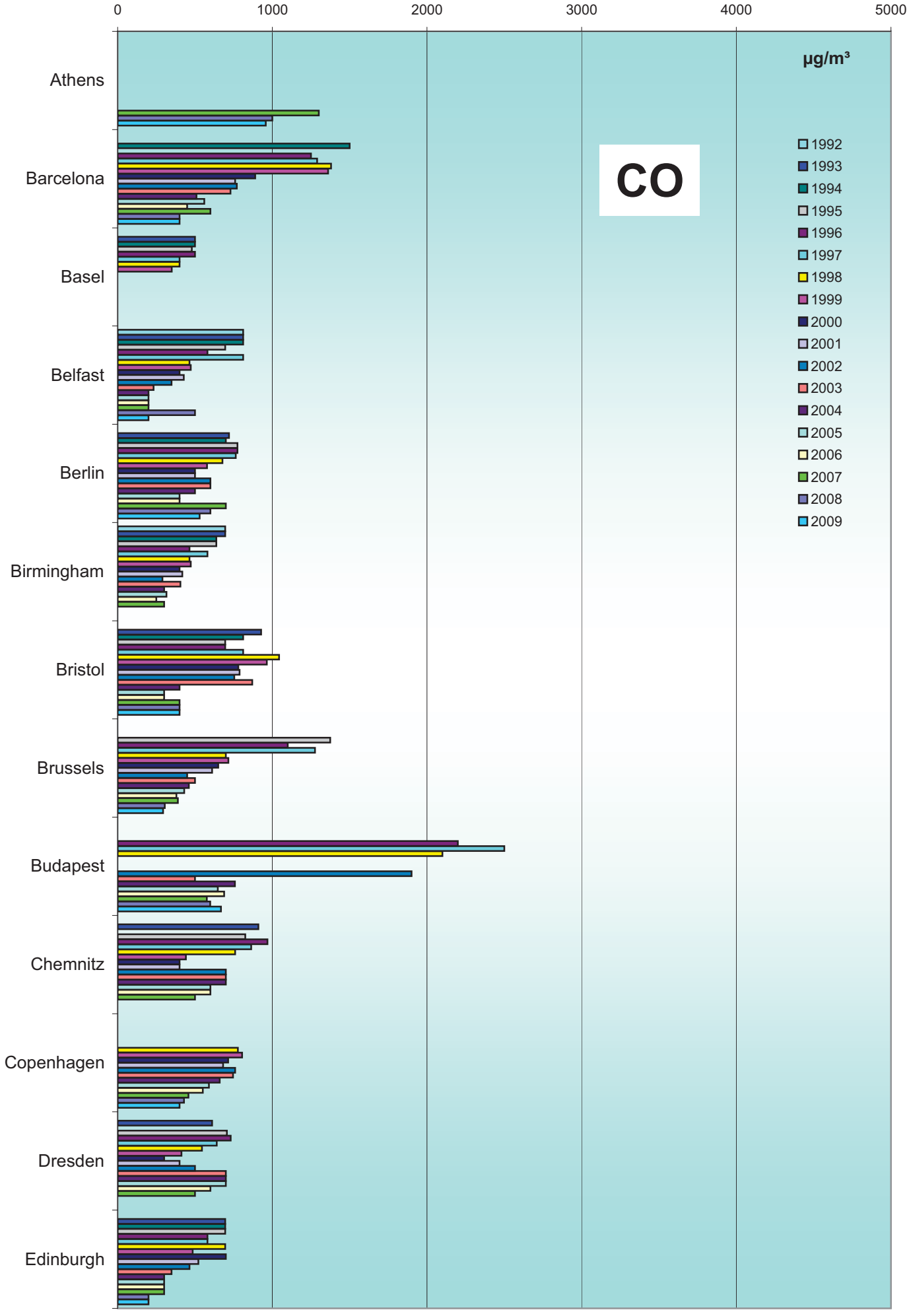
Comparison of The Air Quality 1992 - 2009

Annual mean values (mean of all monitoring stations)



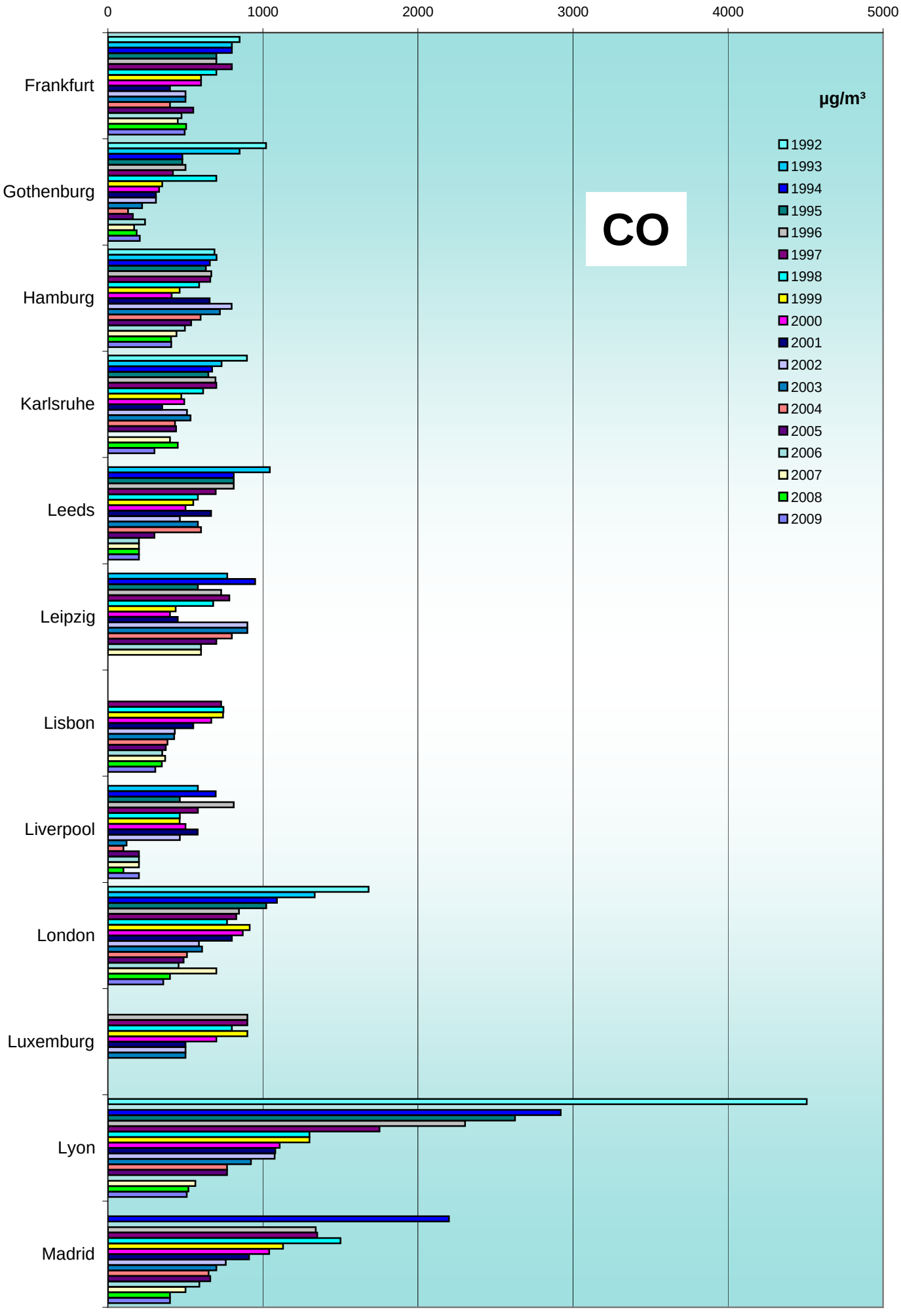
Comparison of The Air Quality 1992 - 2009

Annual mean values (mean of all monitoring stations)



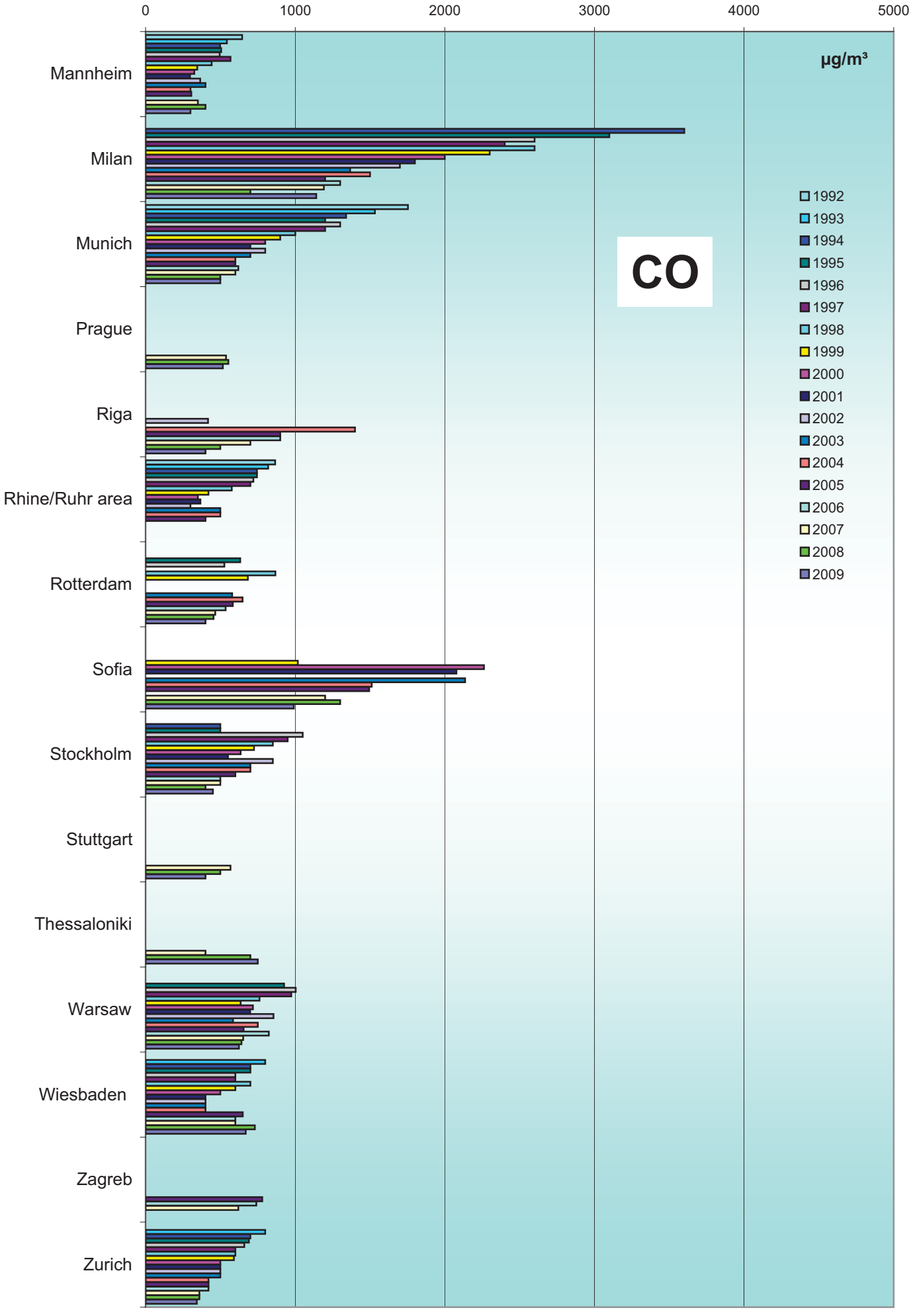
Comparison of The Air Quality 1992 - 2009

Annual mean values (mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2009

Annual mean values (mean of all monitoring stations)



Jahresvergleich

1992 - 2009

max. Tagesmittelwerte

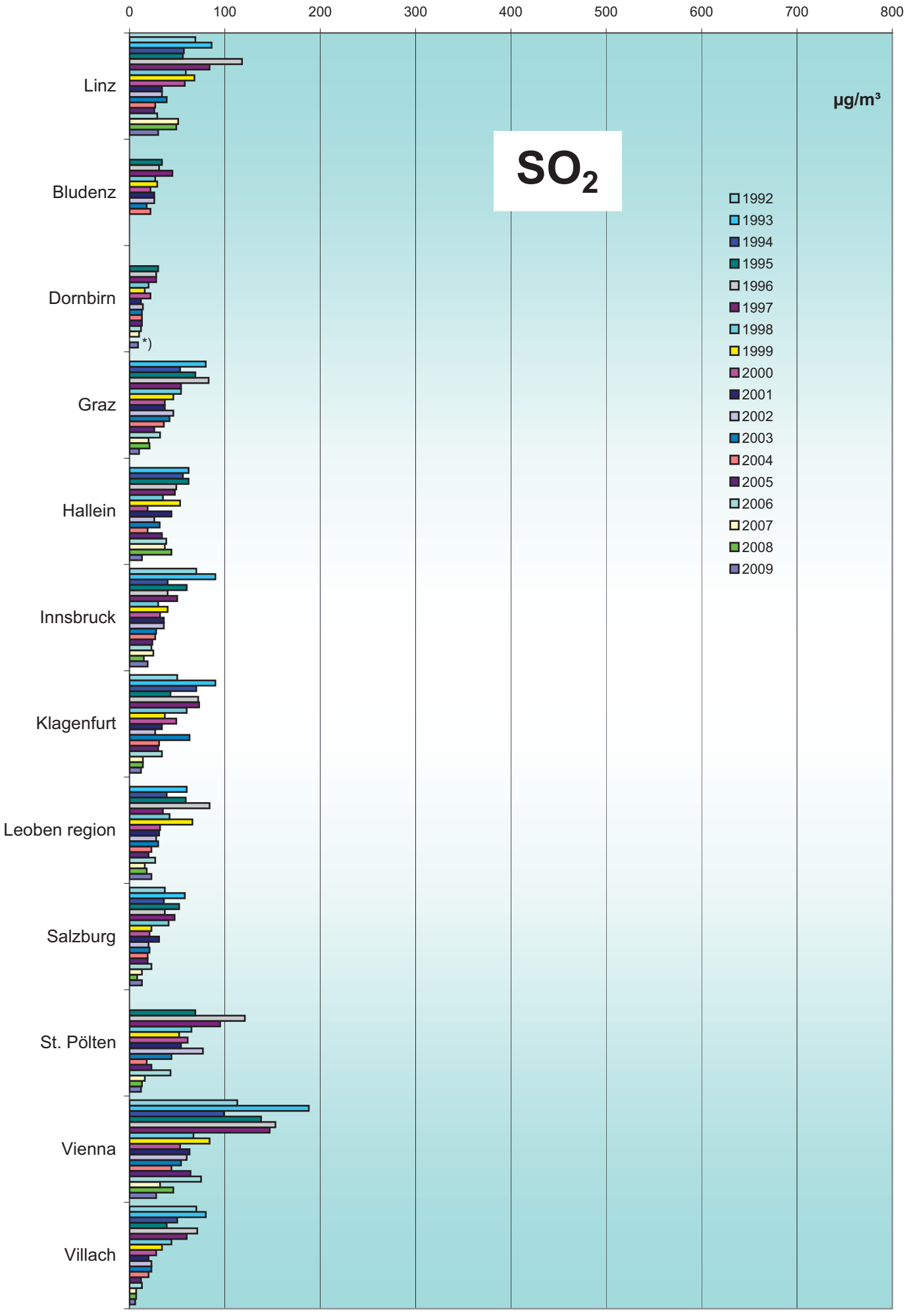
Comparison of The Air Quality Over The Years

1992 - 2009

Max. Daily Mean Values

Comparison of The Air Quality 1992 - 2009

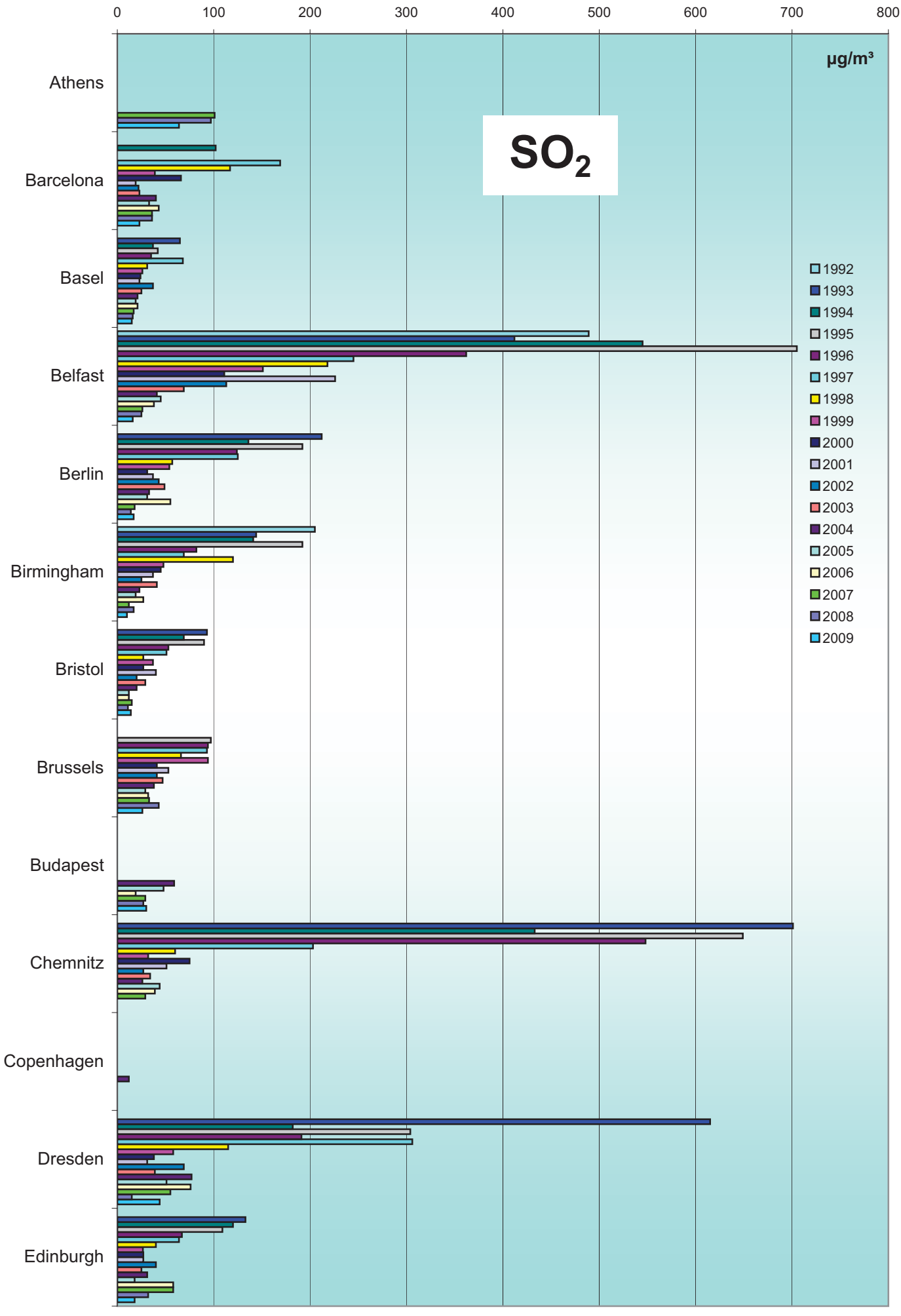
max. daily mean values (peak-stressed monitoring station)



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

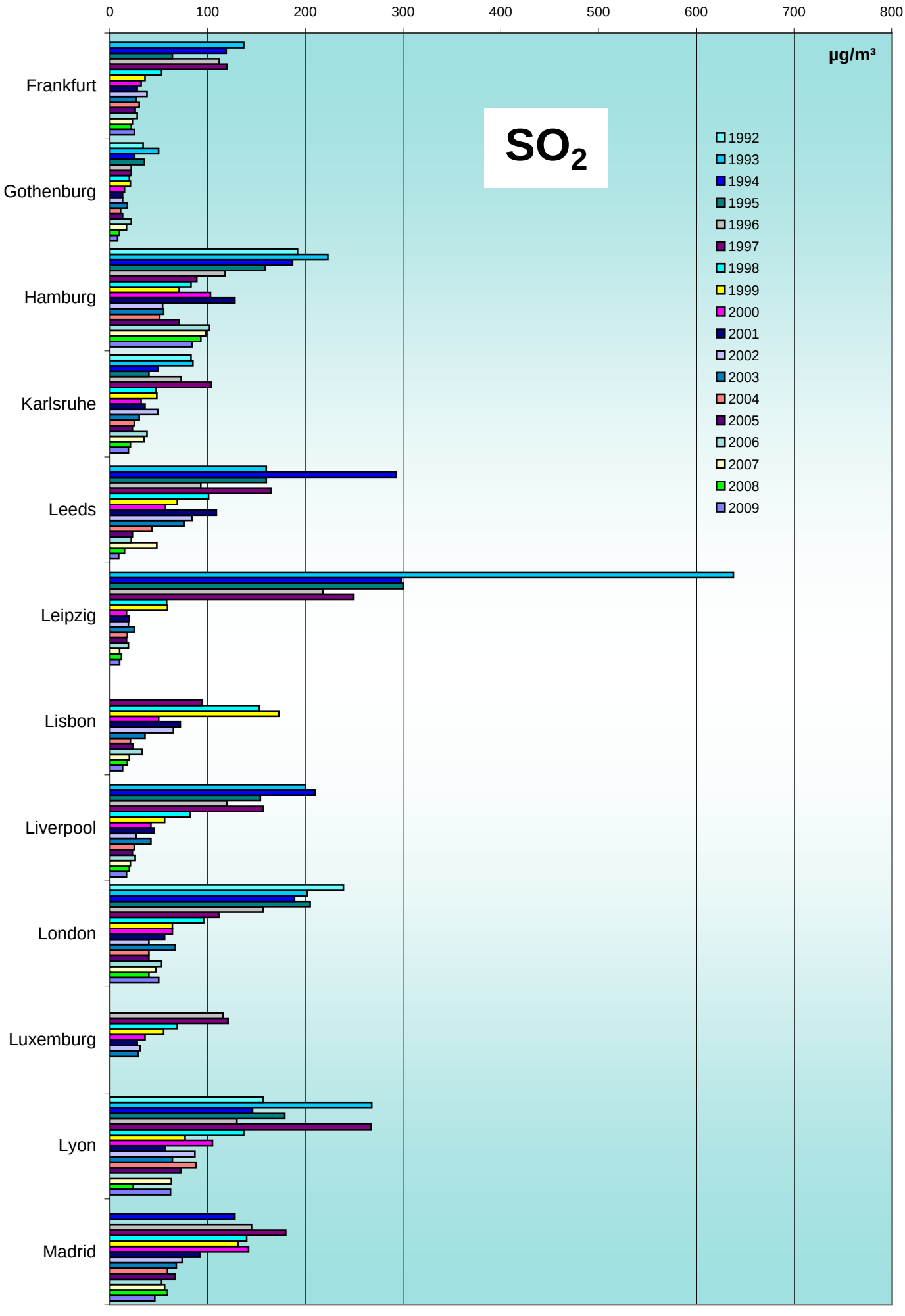
Comparison of The Air Quality 1992 - 2009

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



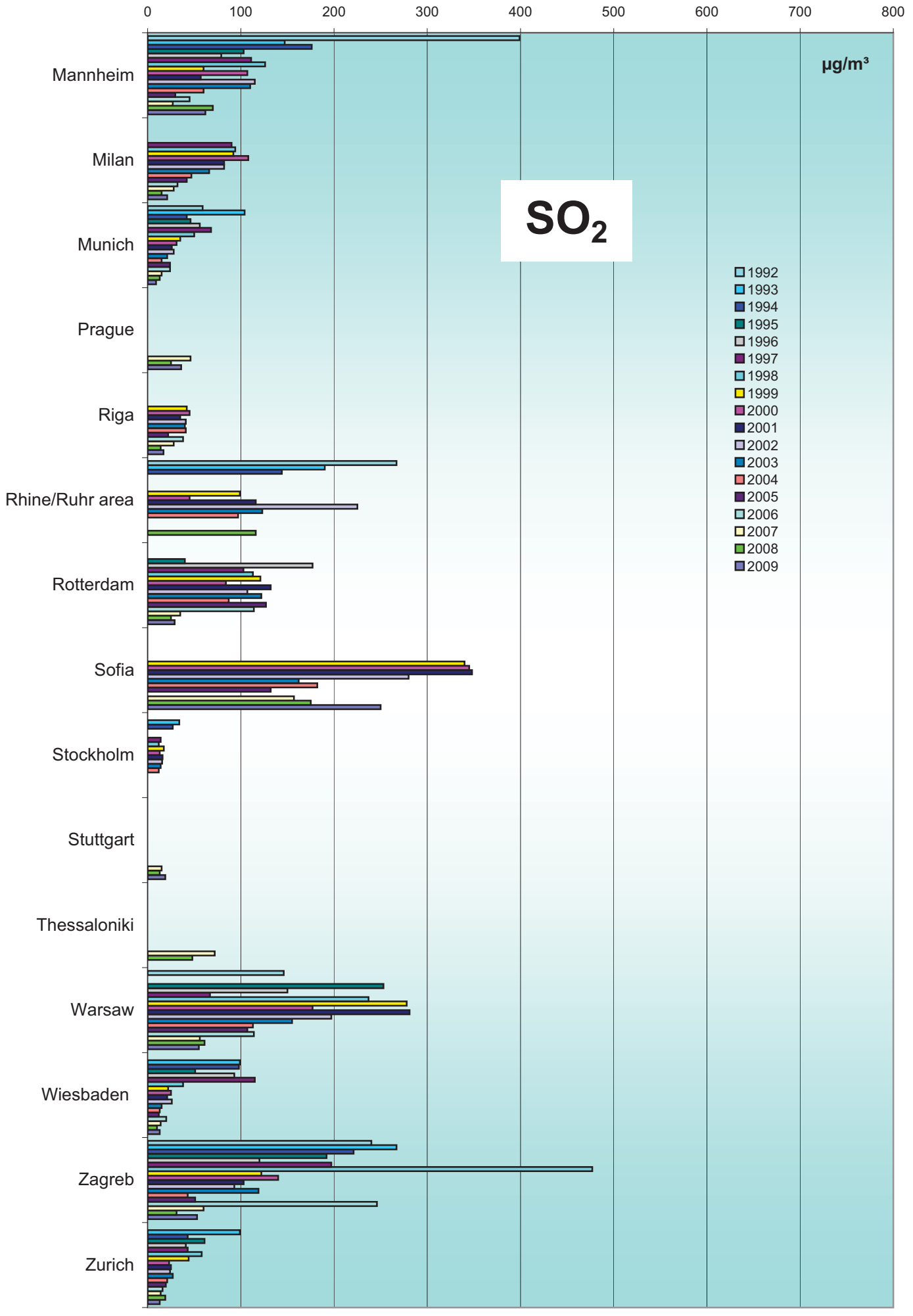
Comparison of The Air Quality 1992 - 2009

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



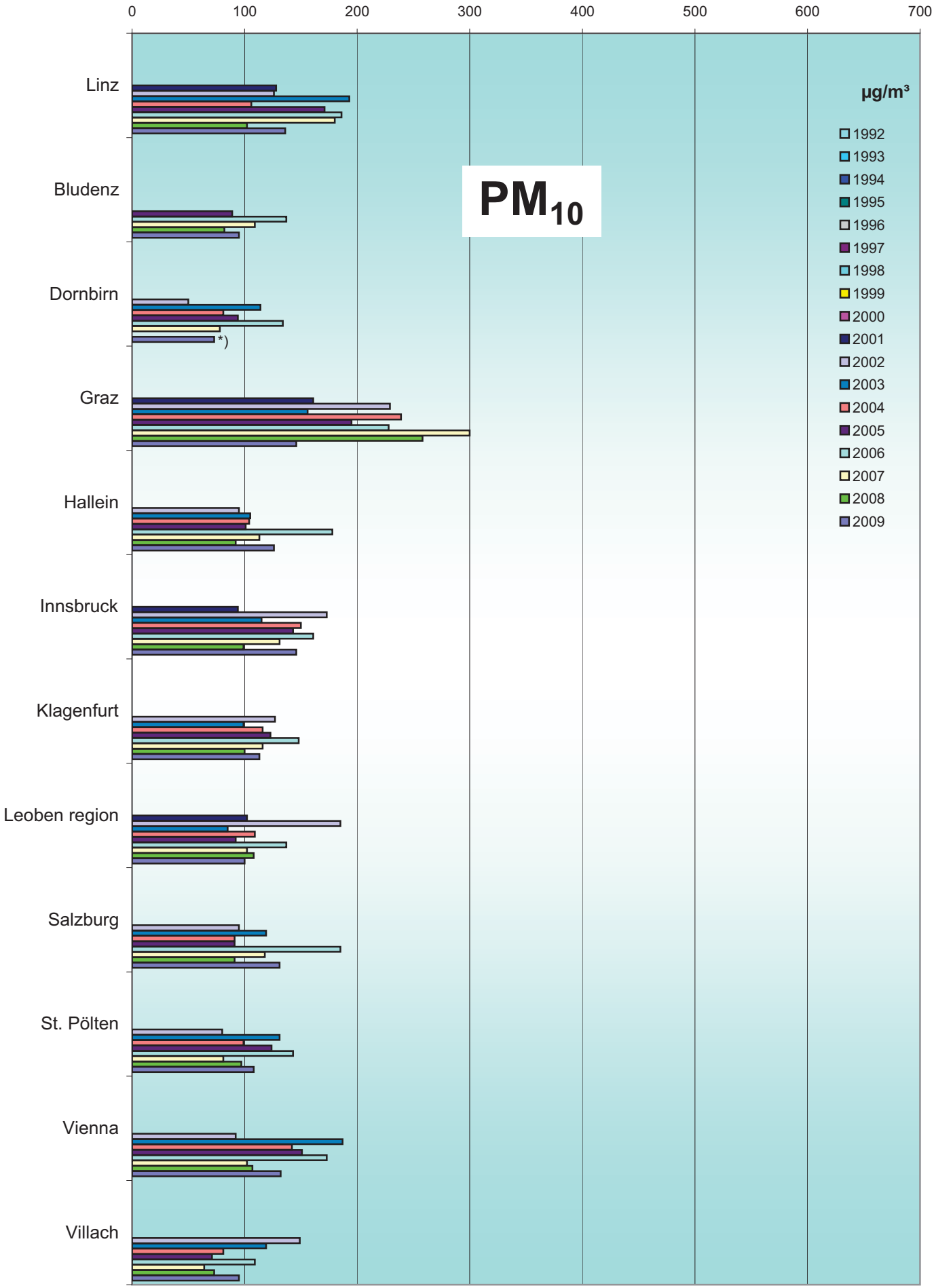
Comparison of The Air Quality 1992 - 2009

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



Comparison of The Air Quality 1992 - 2009

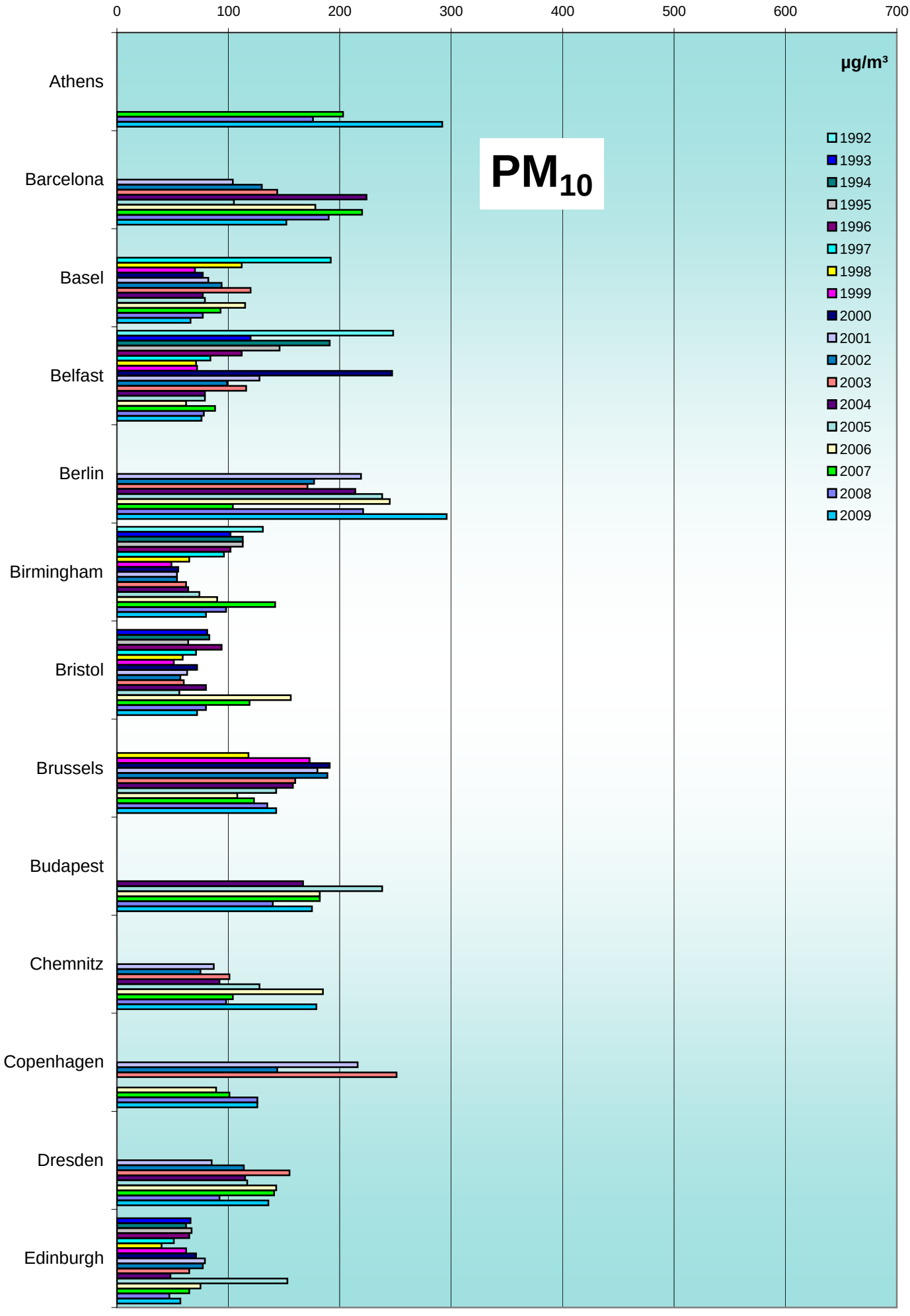
max. daily mean values (peak-stressed monitoring station)



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

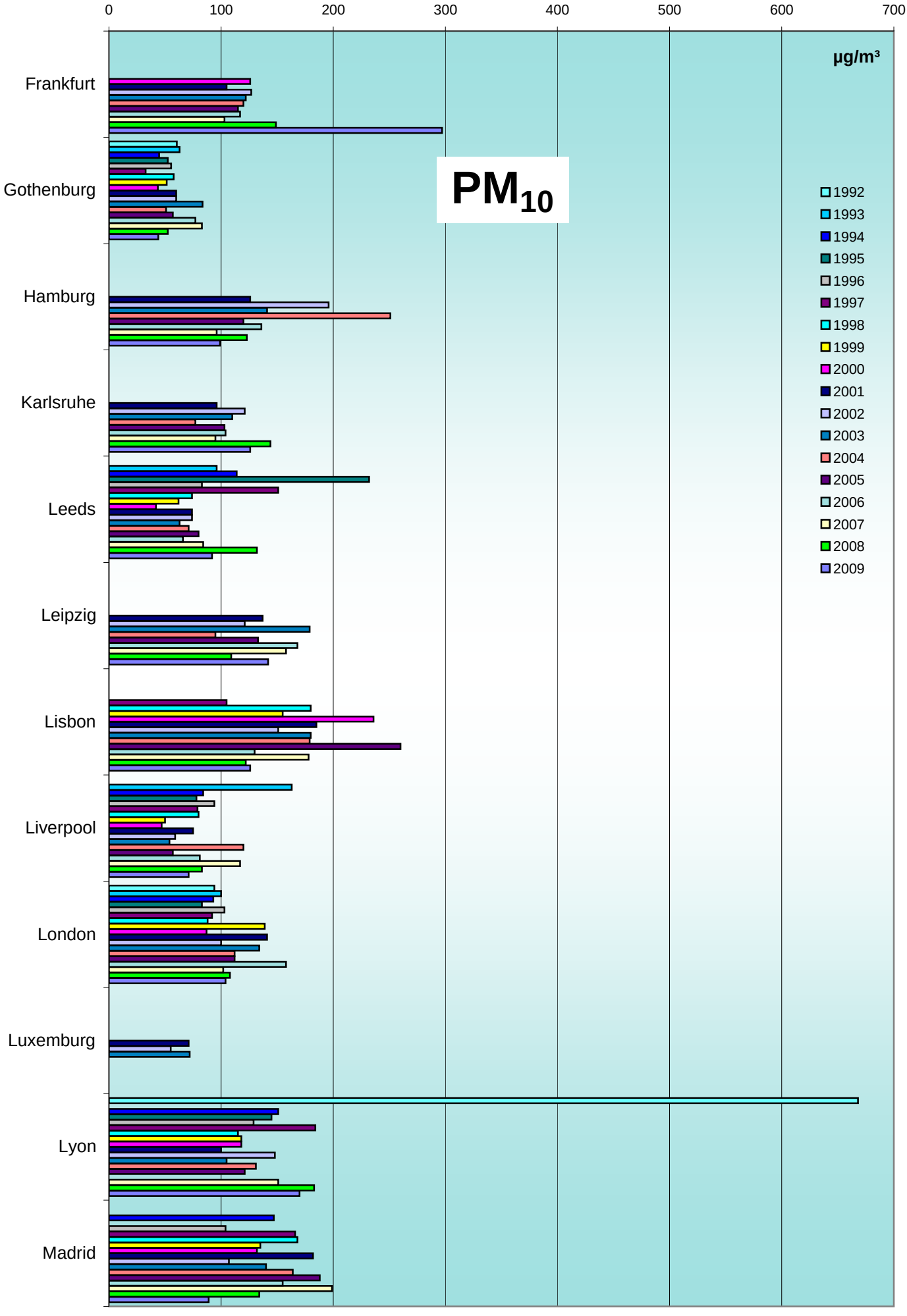
Comparison of The Air Quality 1992 - 2009

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



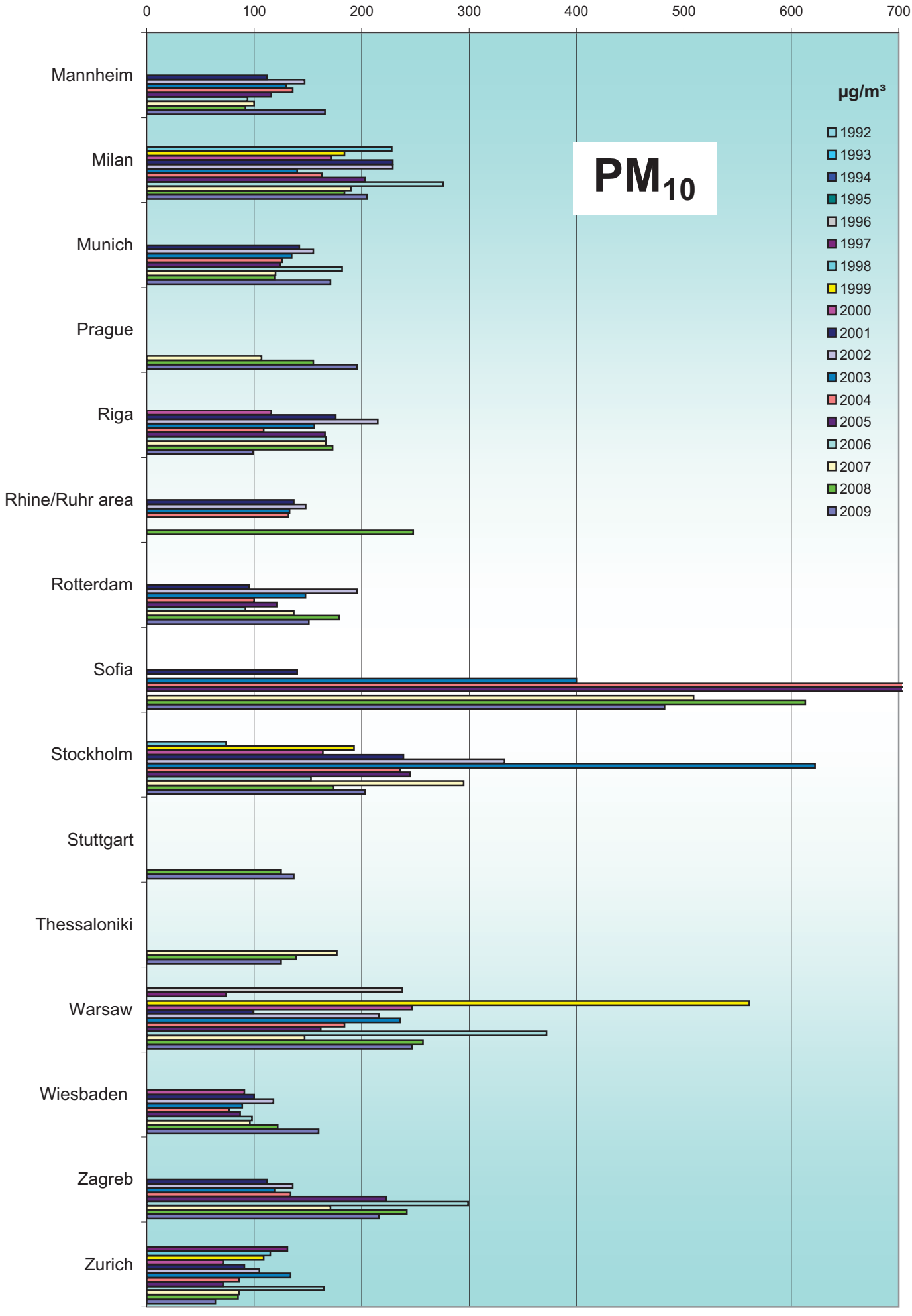
Comparison of The Air Quality 1992 - 2009

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



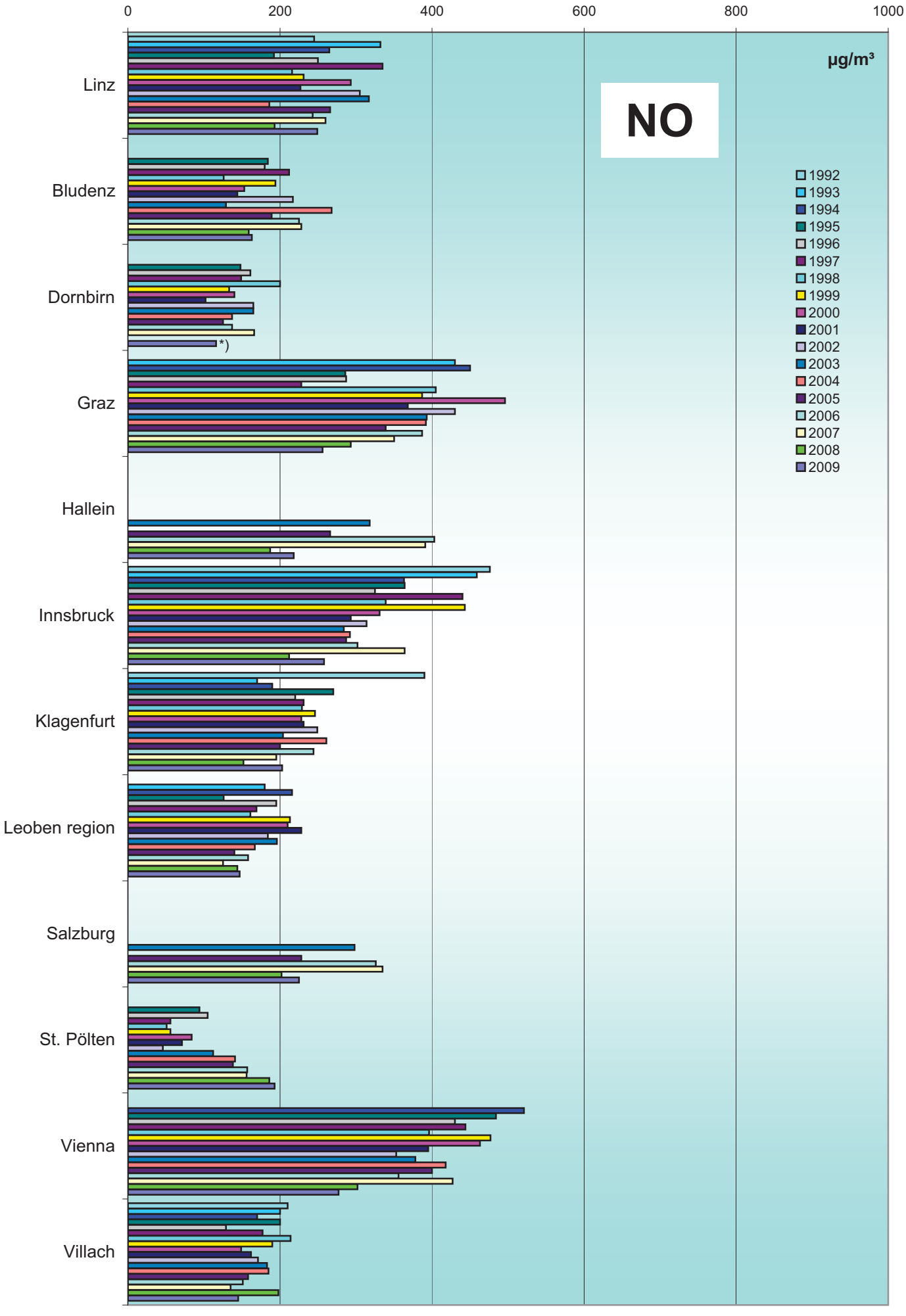
Comparison of The Air Quality 1992 - 2009

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



Comparison of The Air Quality 1992 - 2009

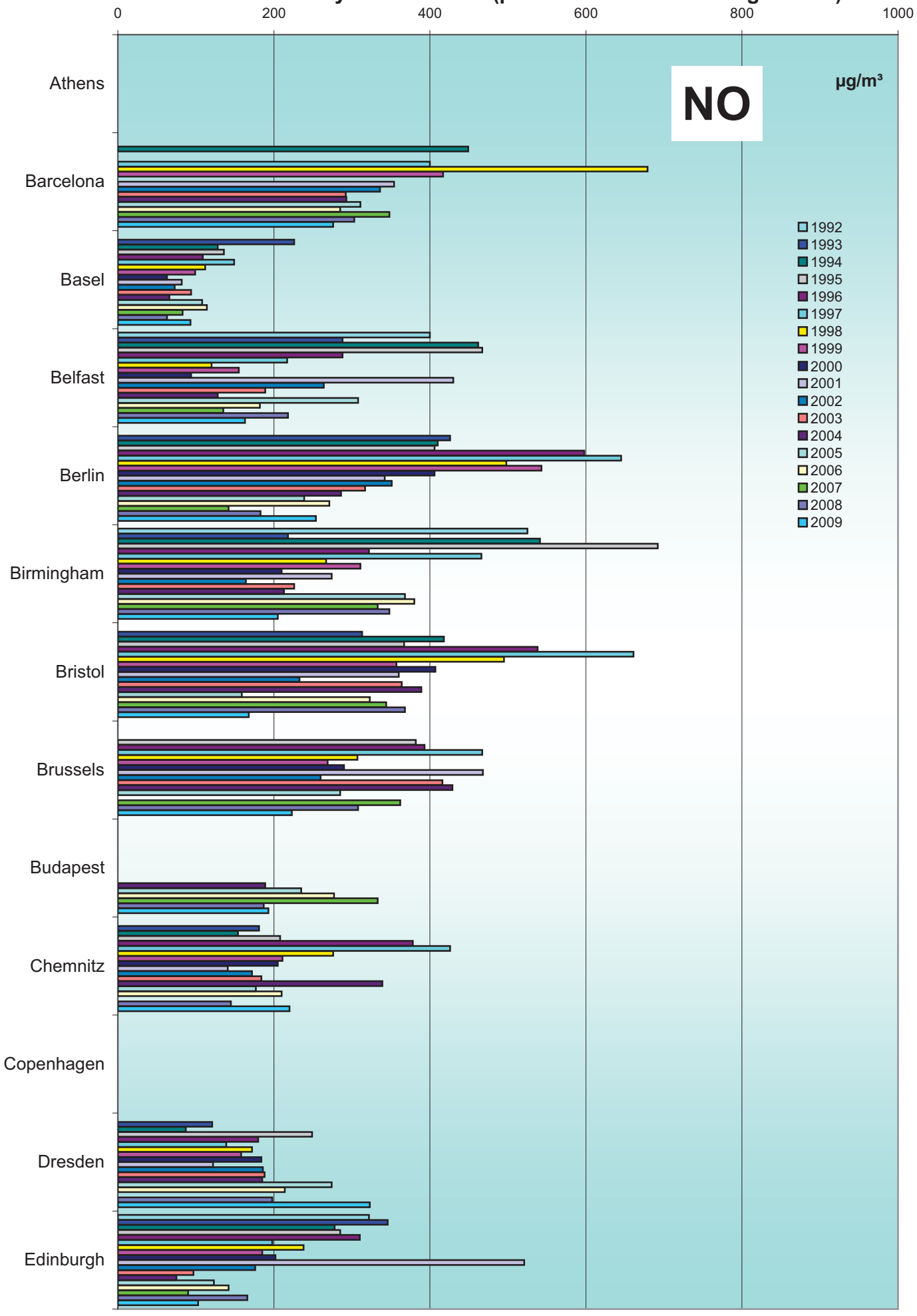
max. daily mean values (peak-stressed monitoring station)



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

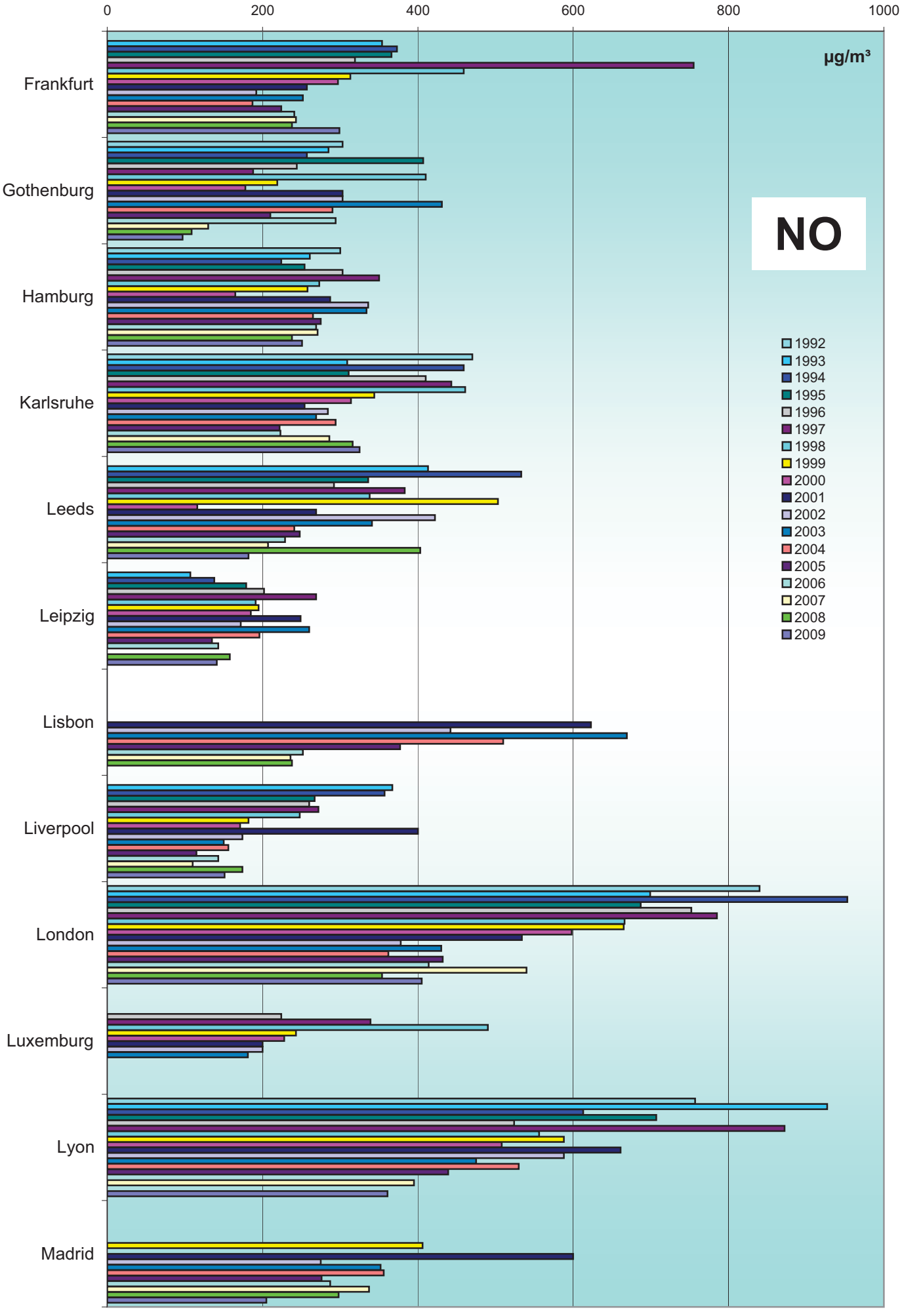
Comparison of The Air Quality 1992 - 2009

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



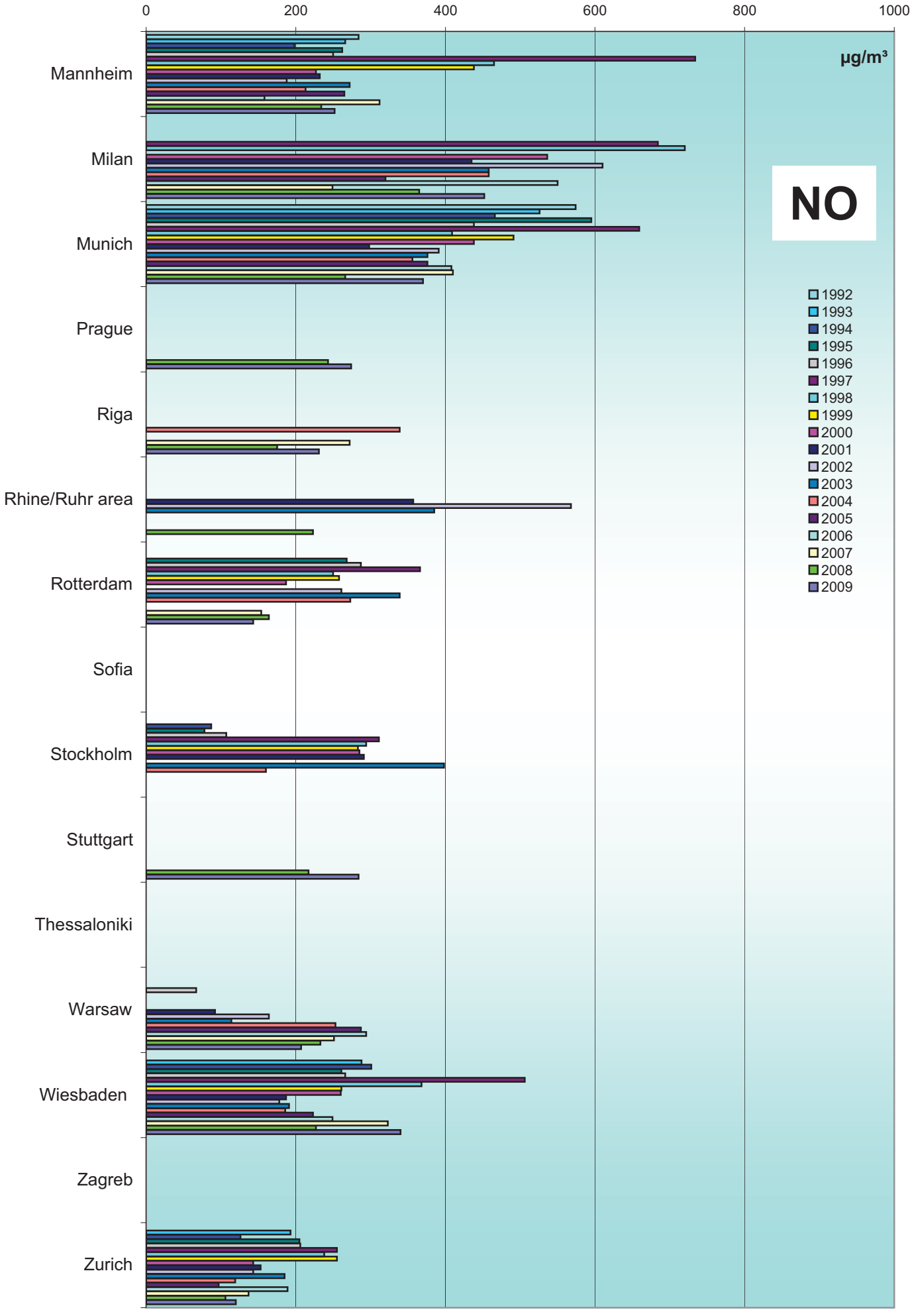
Comparison of The Air Quality 1992 - 2009

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



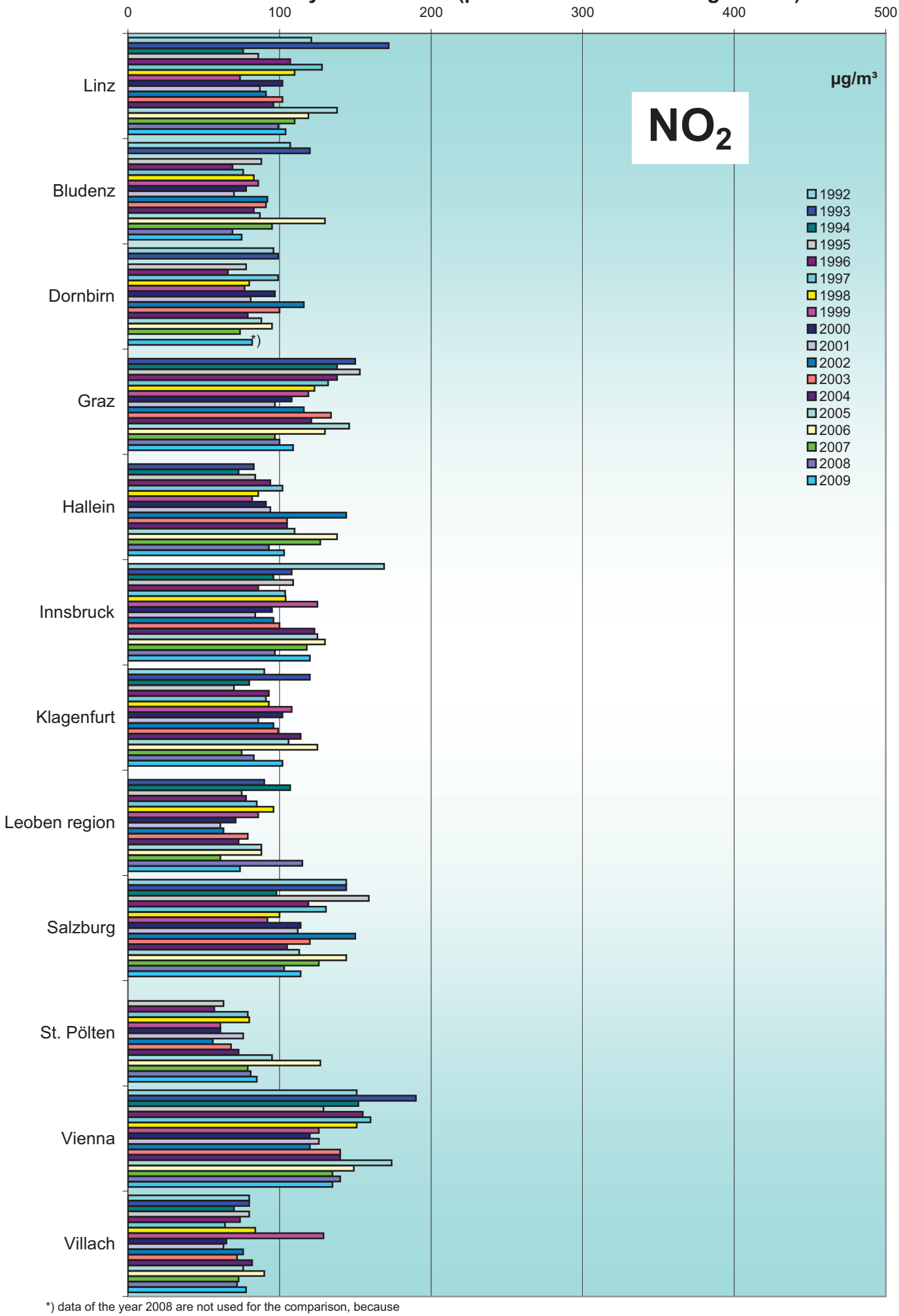
Comparison of The Air Quality 1992 - 2009

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



Comparison of The Air Quality 1992 - 2009

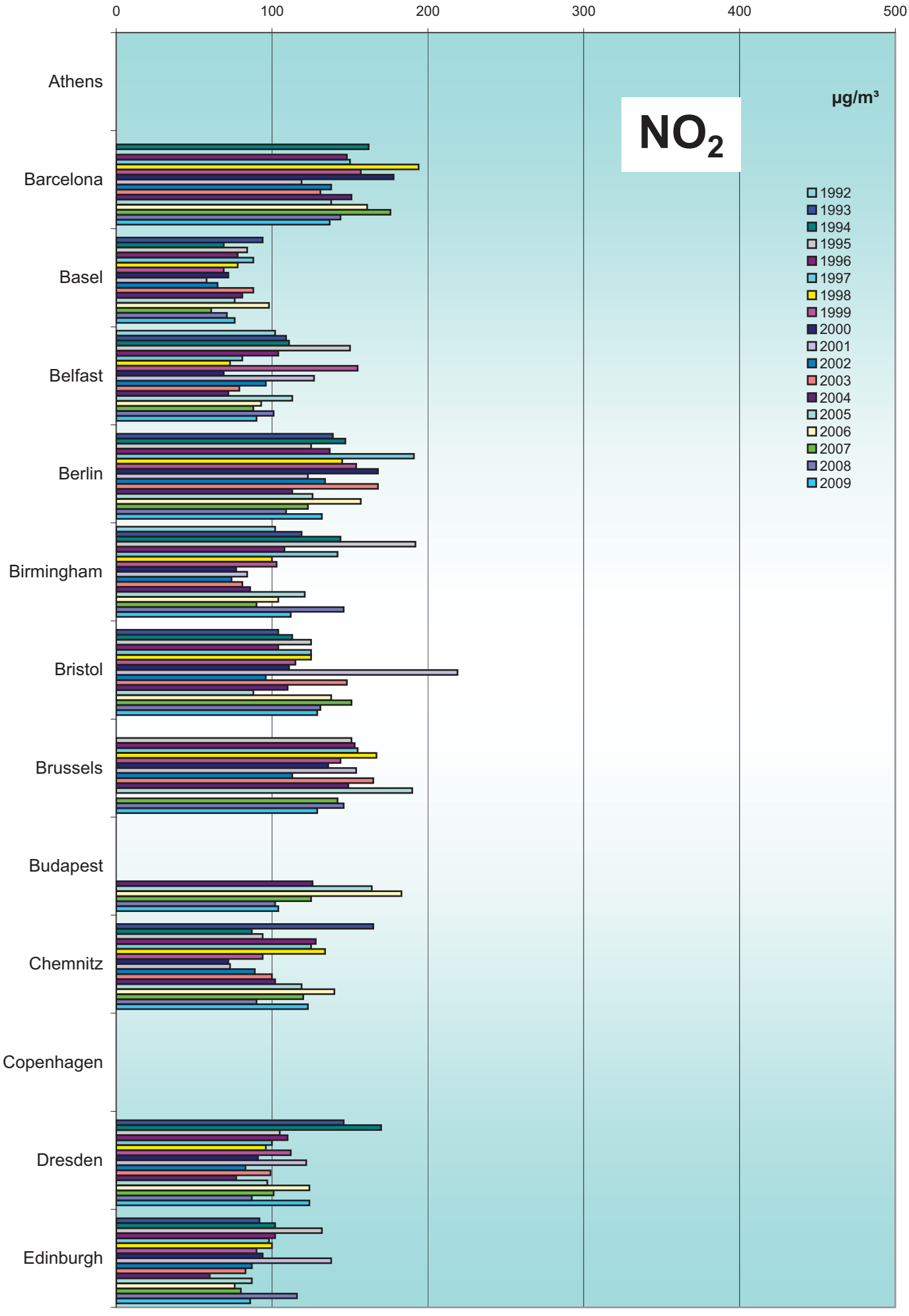
max. daily mean values (peak-stressed monitoring station)



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

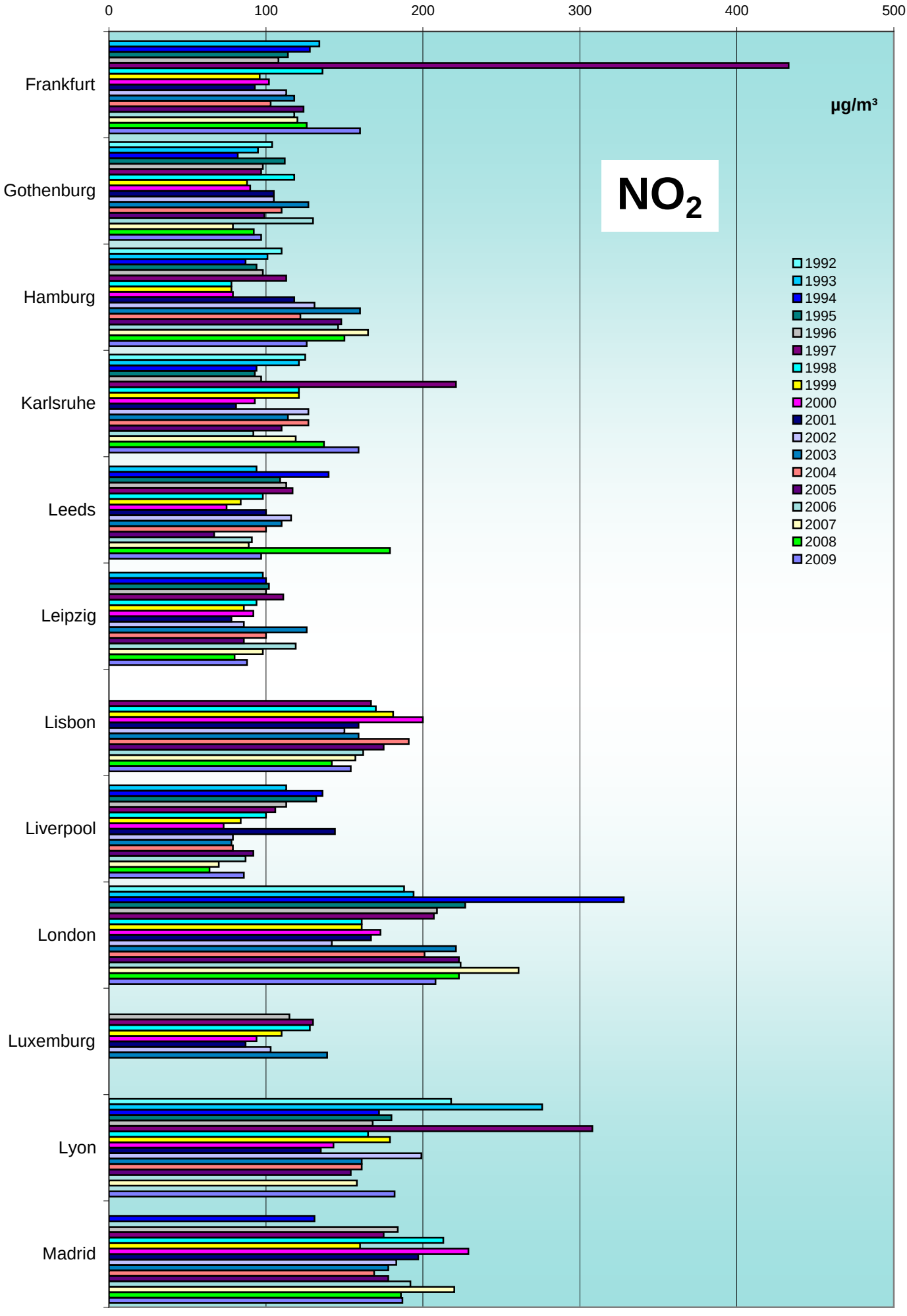
Comparison of The Air Quality 1992 - 2009

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



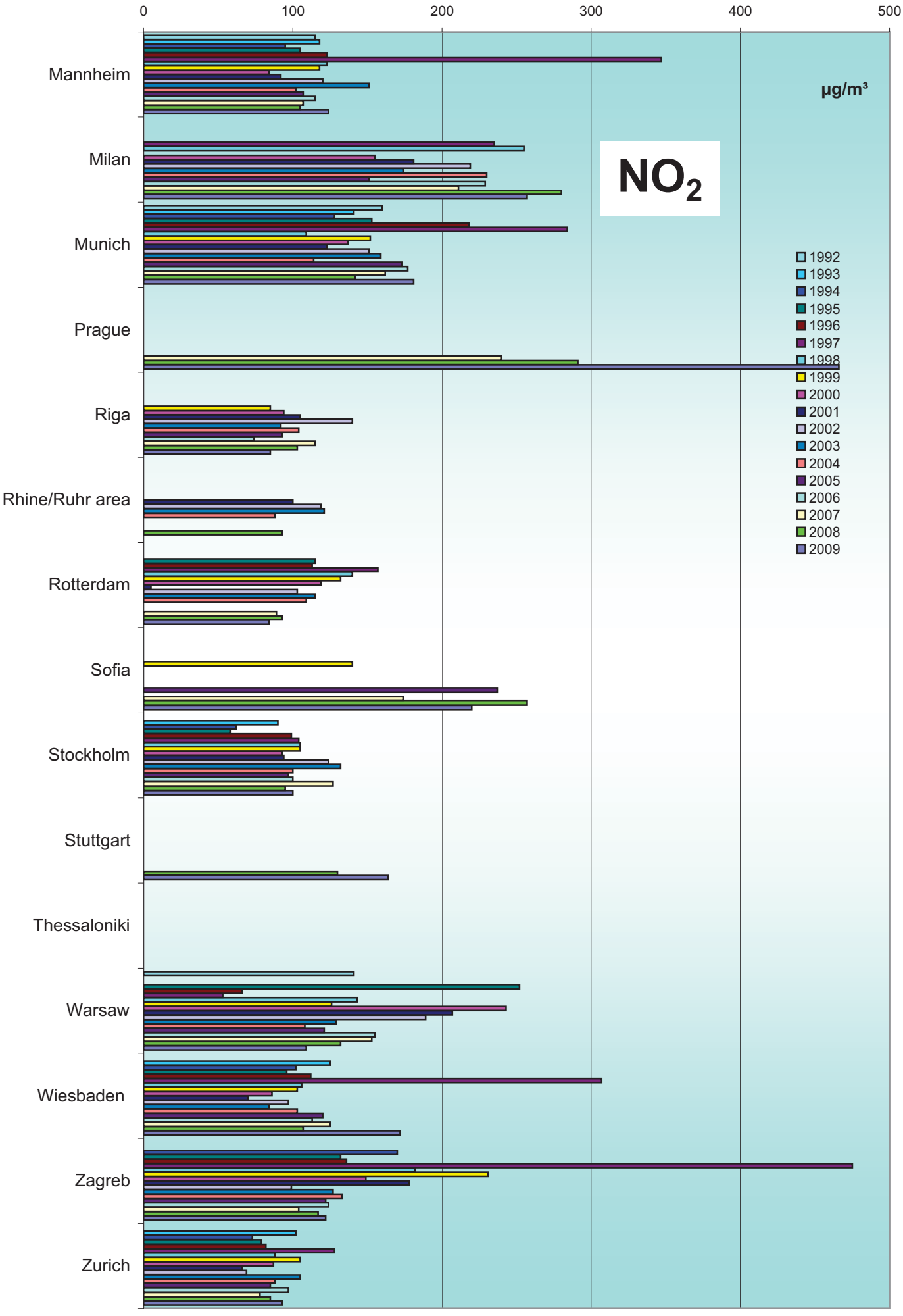
Comparison of The Air Quality 1992 - 2009

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



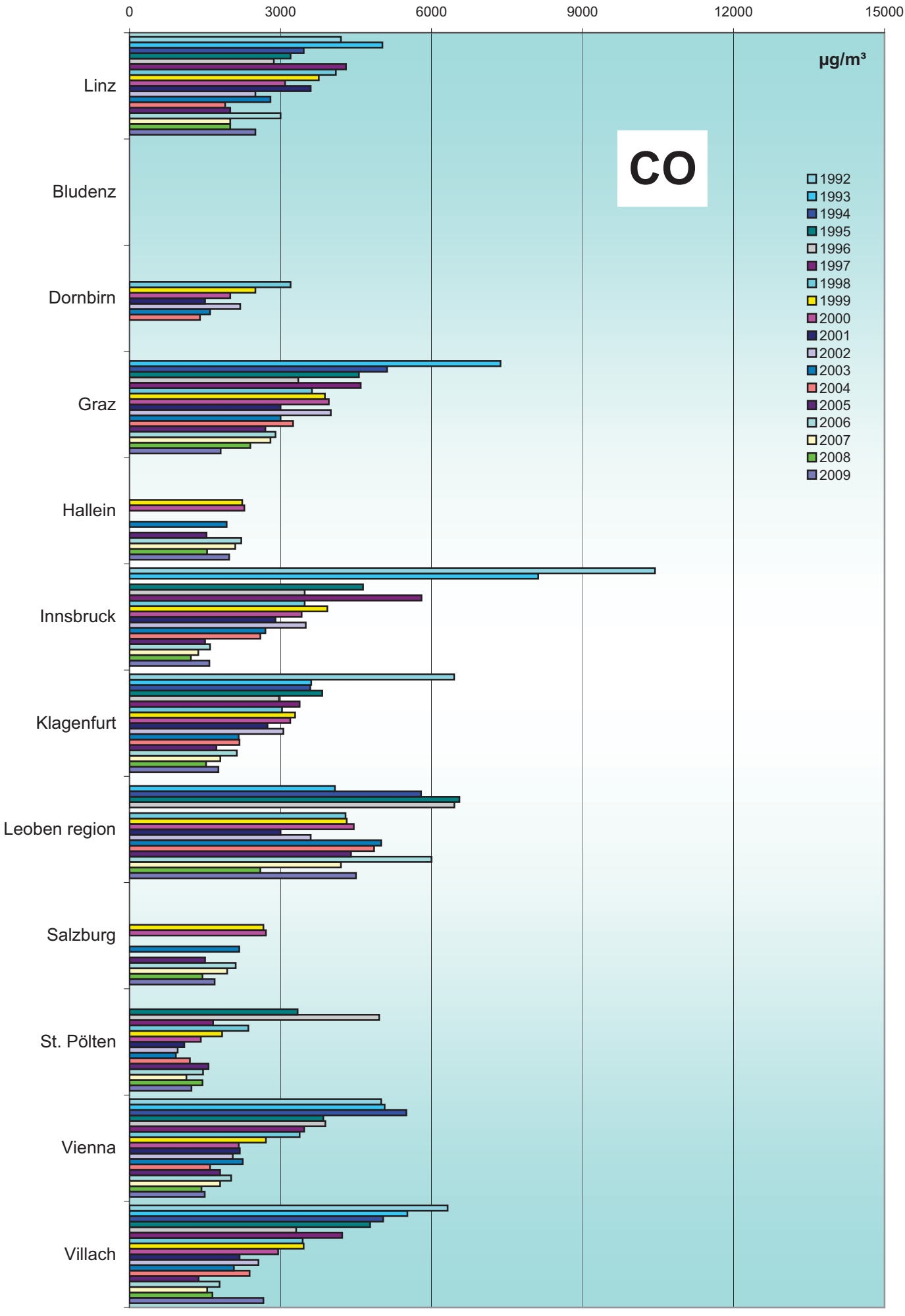
Comparison of The Air Quality 1992 - 2009

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



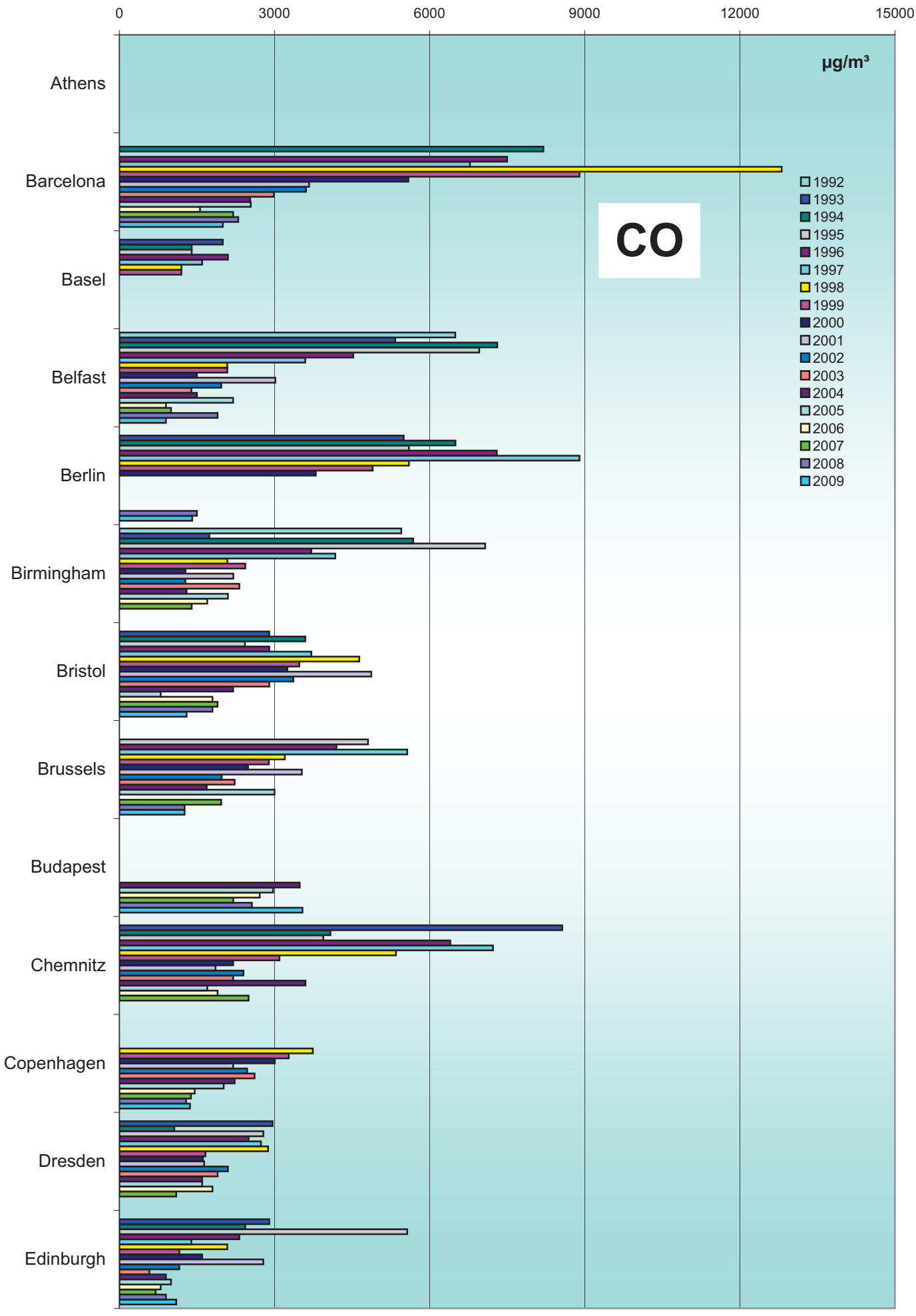
Comparison of The Air Quality 1992 - 2009

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



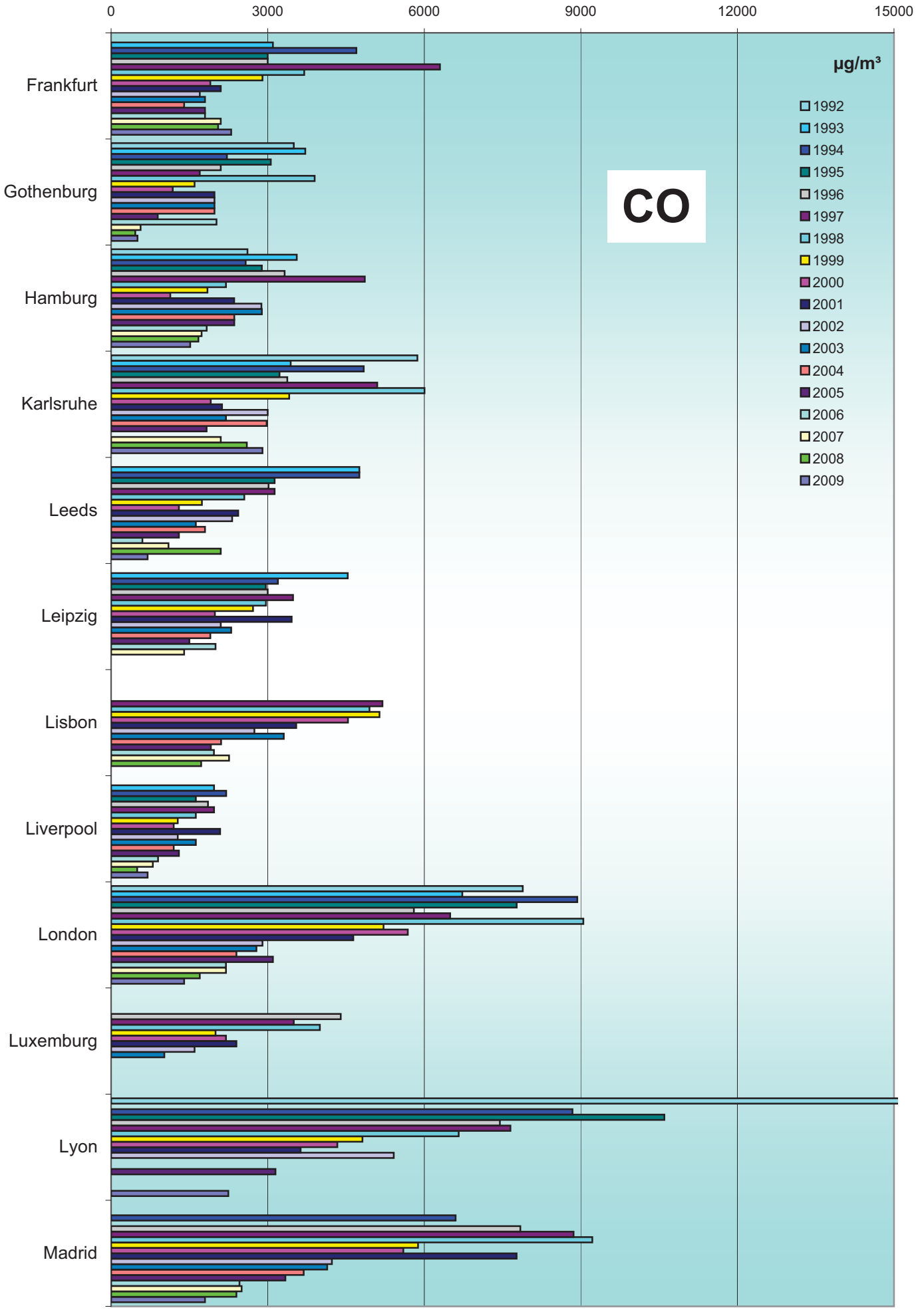
Comparison of The Air Quality 1992 - 2009

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



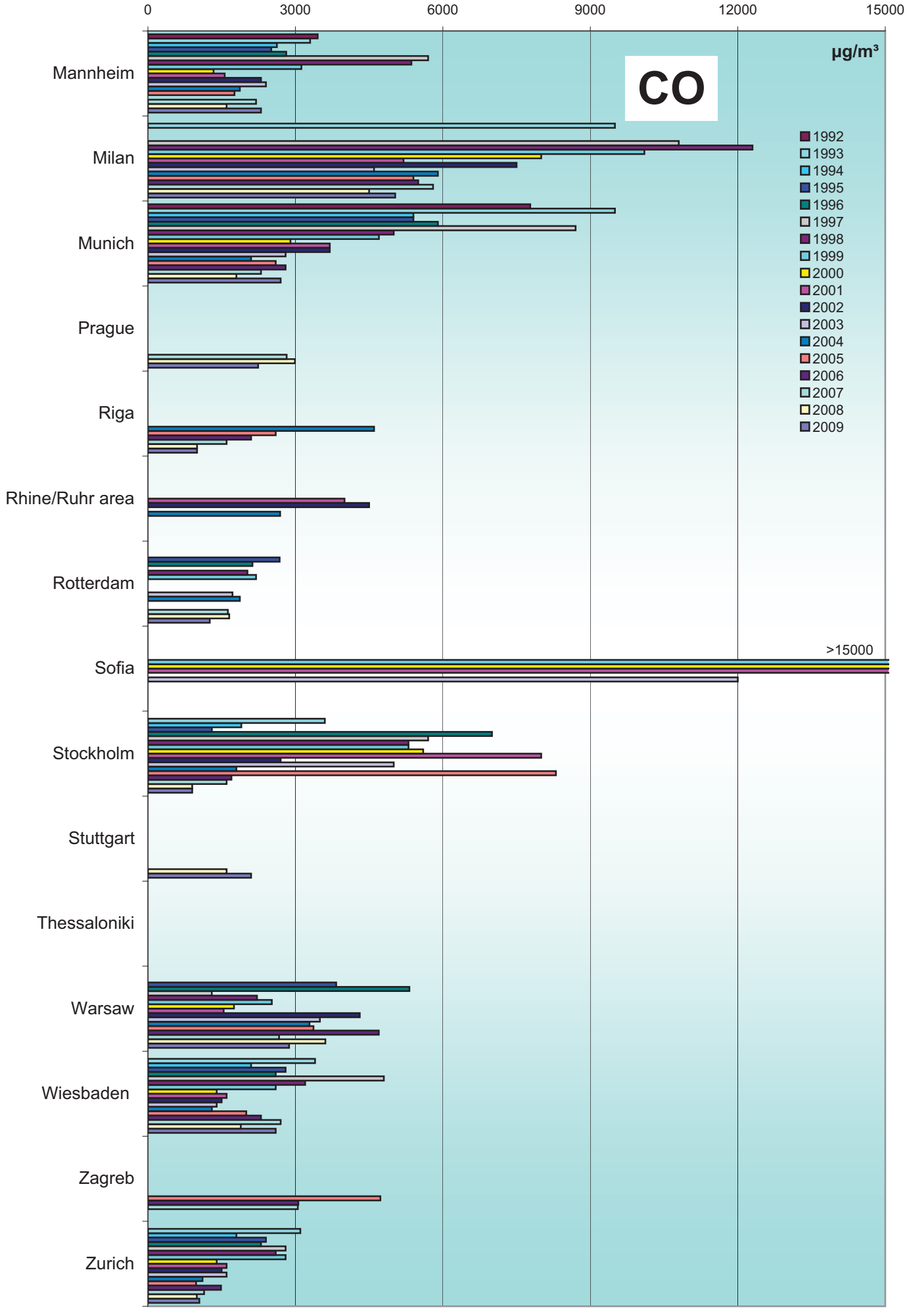
Comparison of The Air Quality 1992 - 2009

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



Comparison of The Air Quality 1992 - 2009

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



Jahresvergleich

1993 - 2009

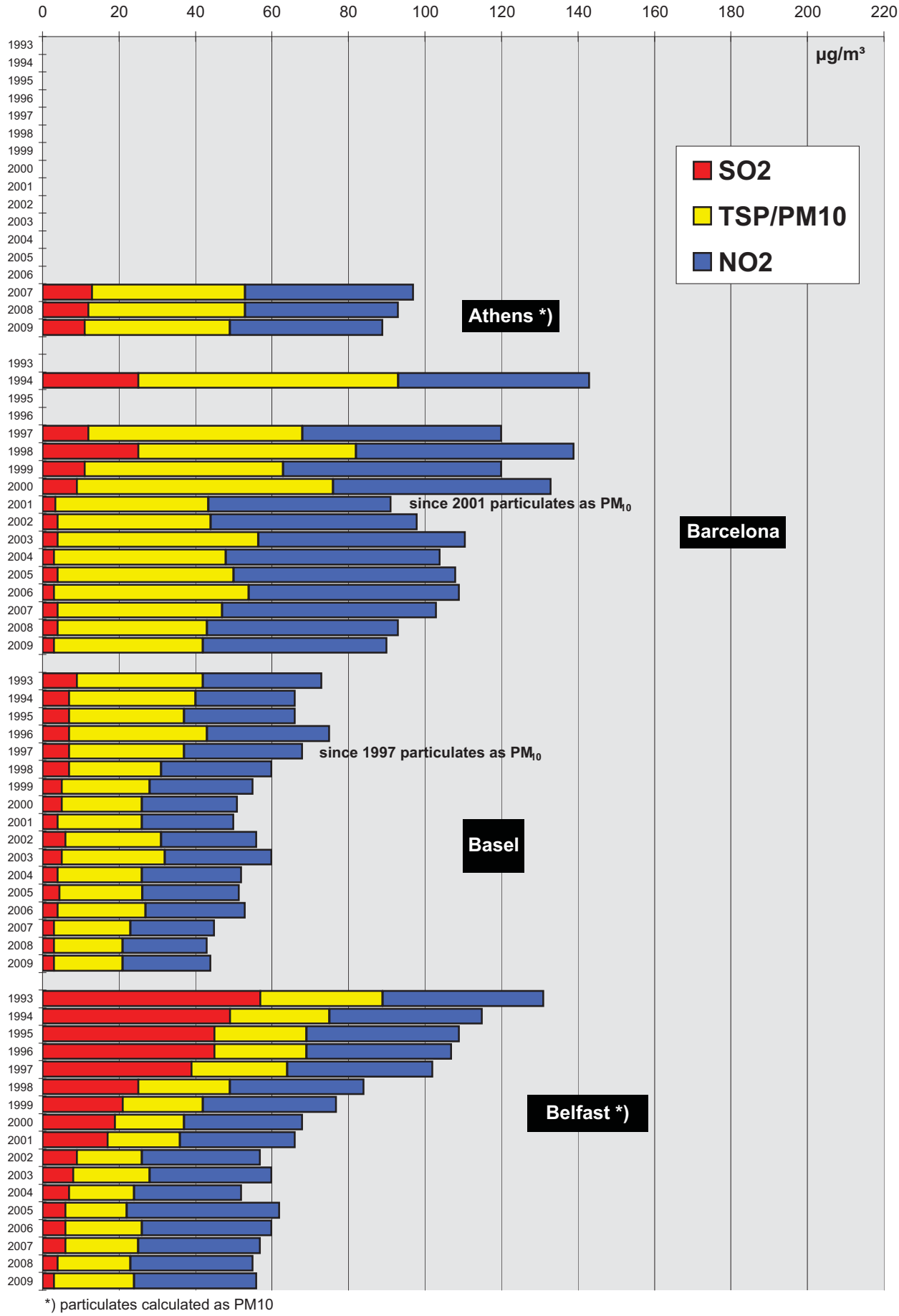
Jahresmittelwerte, Σ SO_2, TSP/PM10, NO_2

Comparison Of The Air Quality

1993 - 2009

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

Comparison Of The Air Quality 1993-2009
Development of the annual mean values, Σ SO_2, TSP/PM_{10}, NO_2
(mean of all monitoring stations)

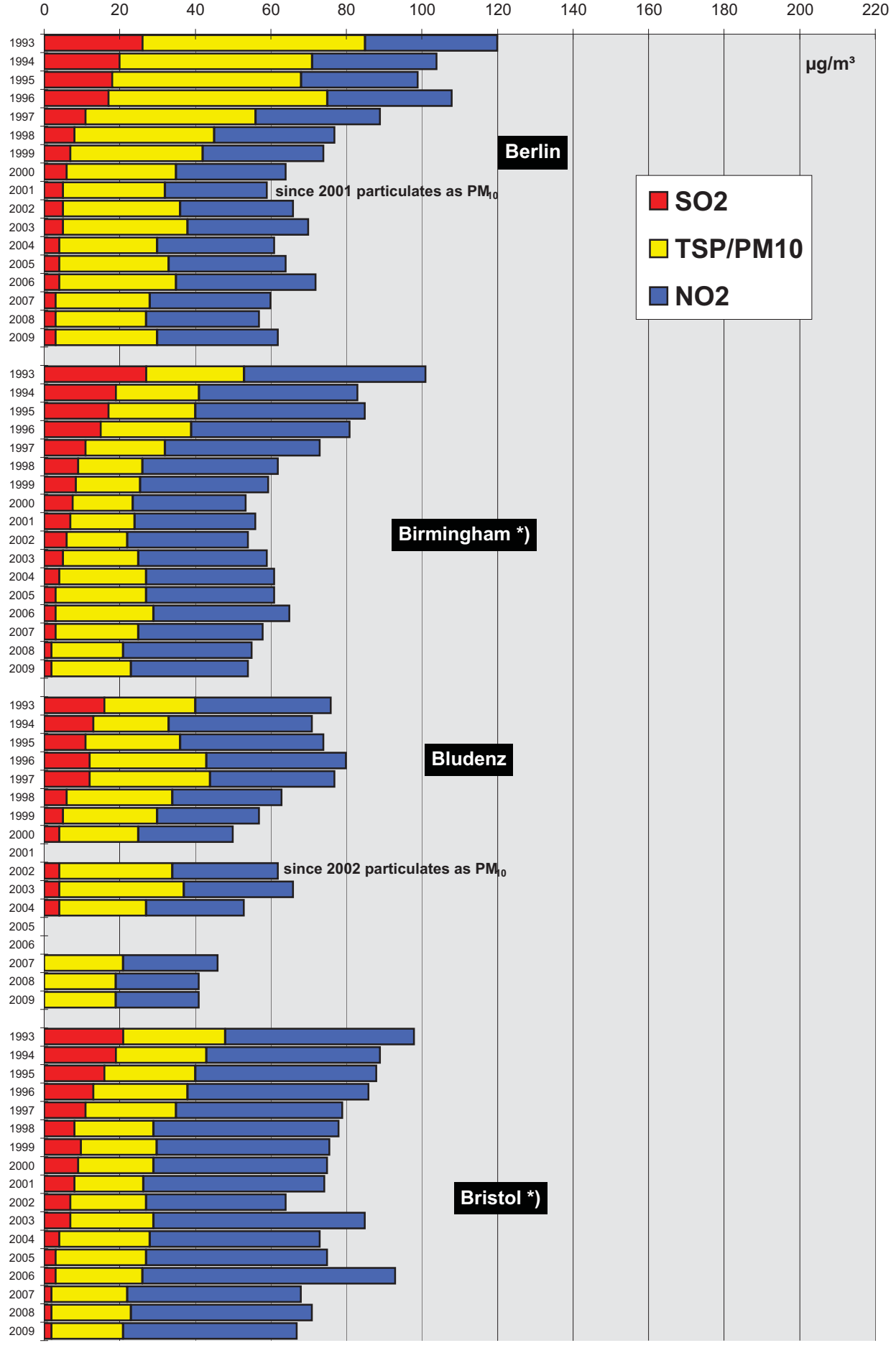


*) particulates calculated as PM10

Comparison Of The Air Quality 1993-2009

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

(mean of all monitoring stations)

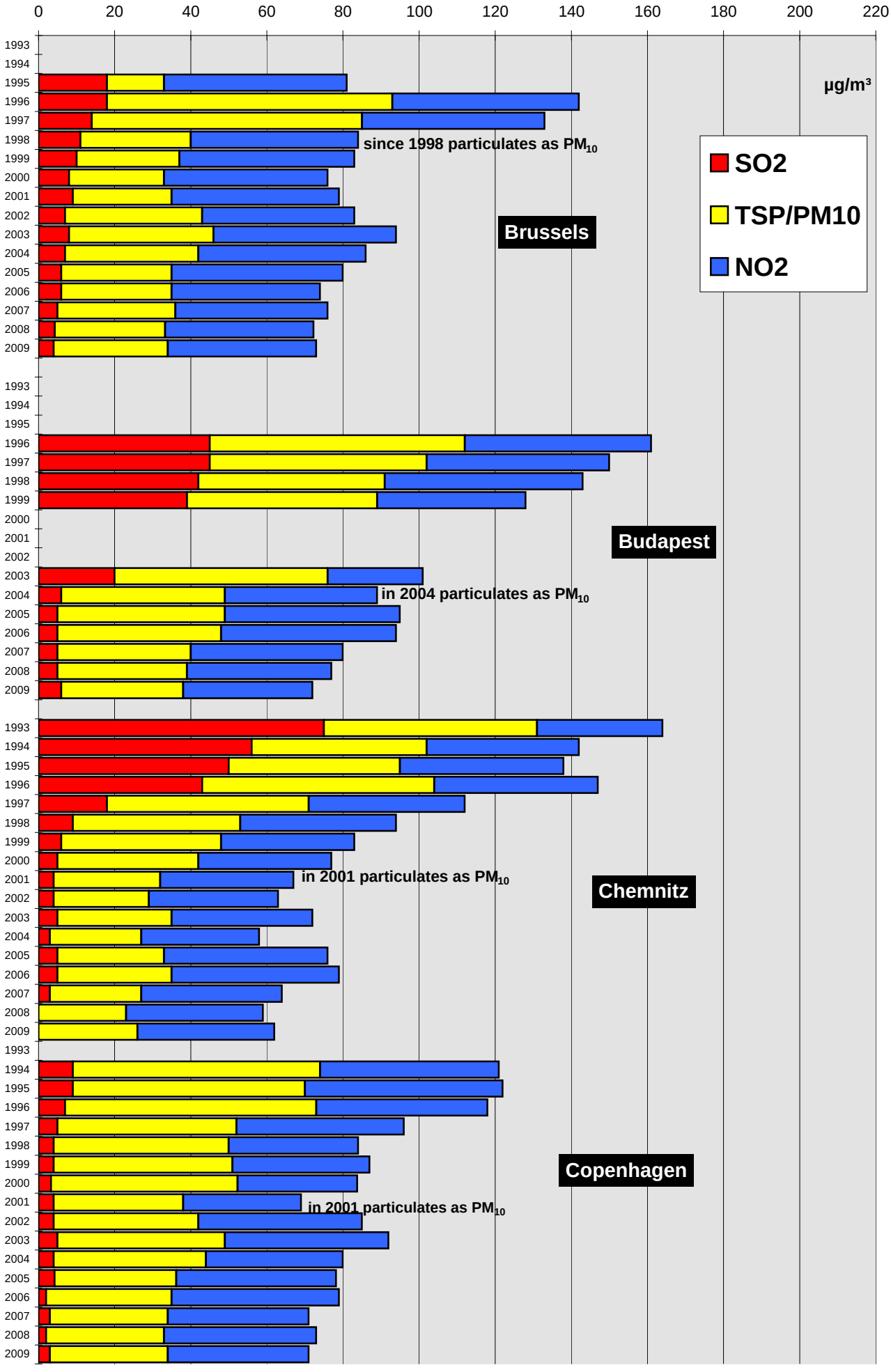


*) particulates calculated as PM10

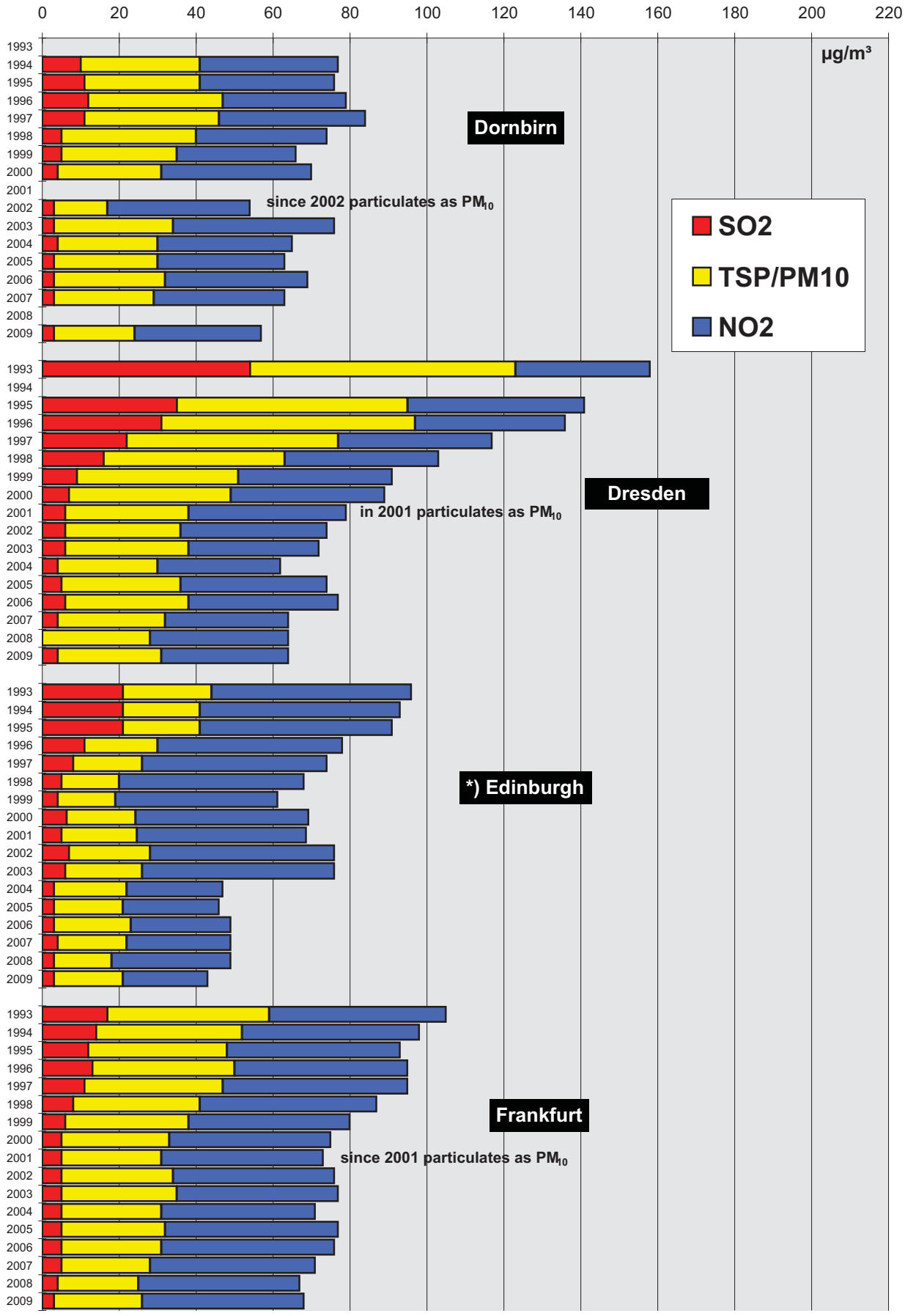
Comparison Of The Air Quality 1993-2009

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

(mean of all monitoring stations)



Comparison Of The Air Quality 1993-2009
Development of the annual mean values, Σ SO_2, TSP/PM_{10}, NO_2
(mean of all monitoring stations)

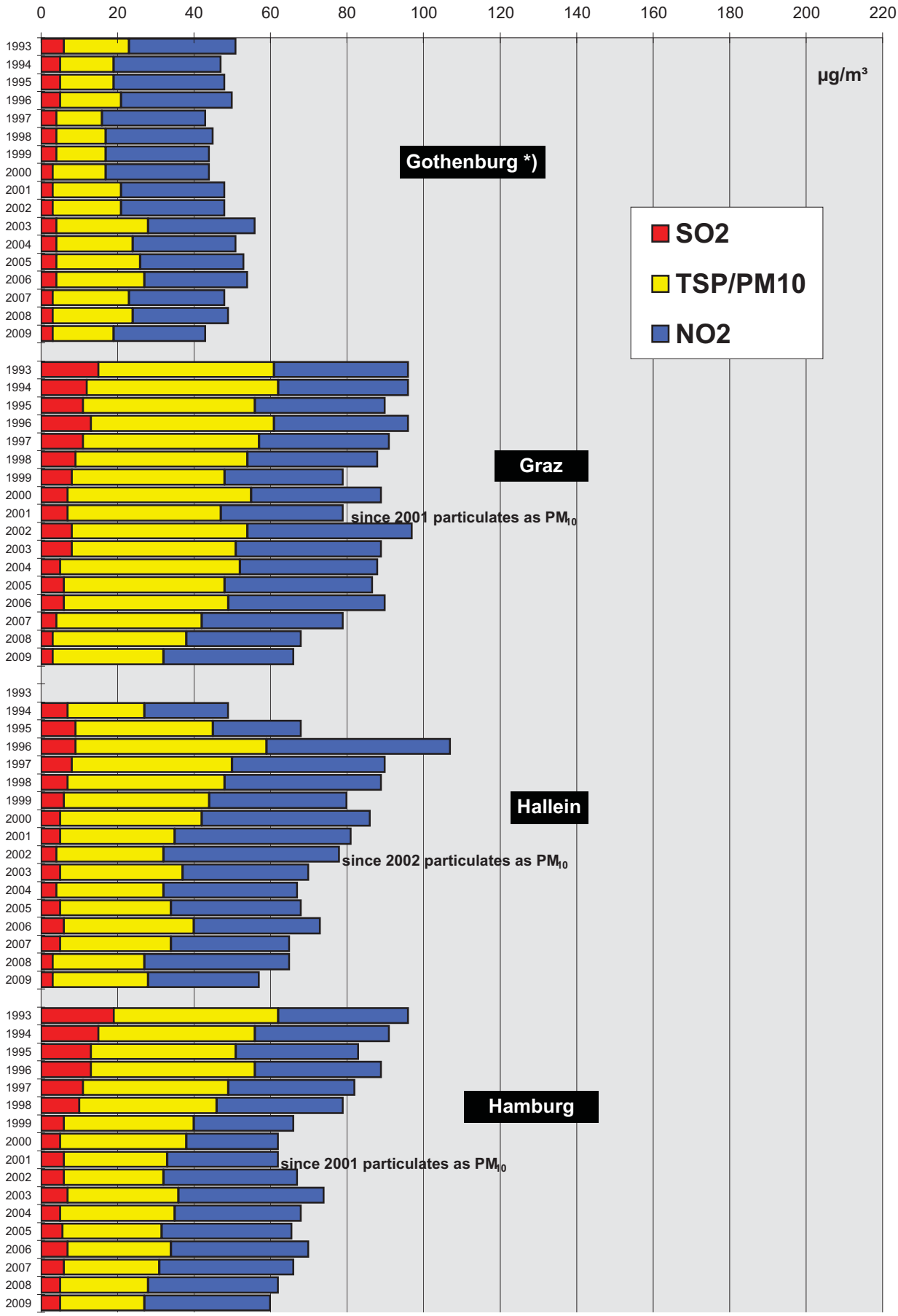


*) particulates calculated as PM10

Comparison Of The Air Quality 1993-2009

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

(mean of all monitoring stations)

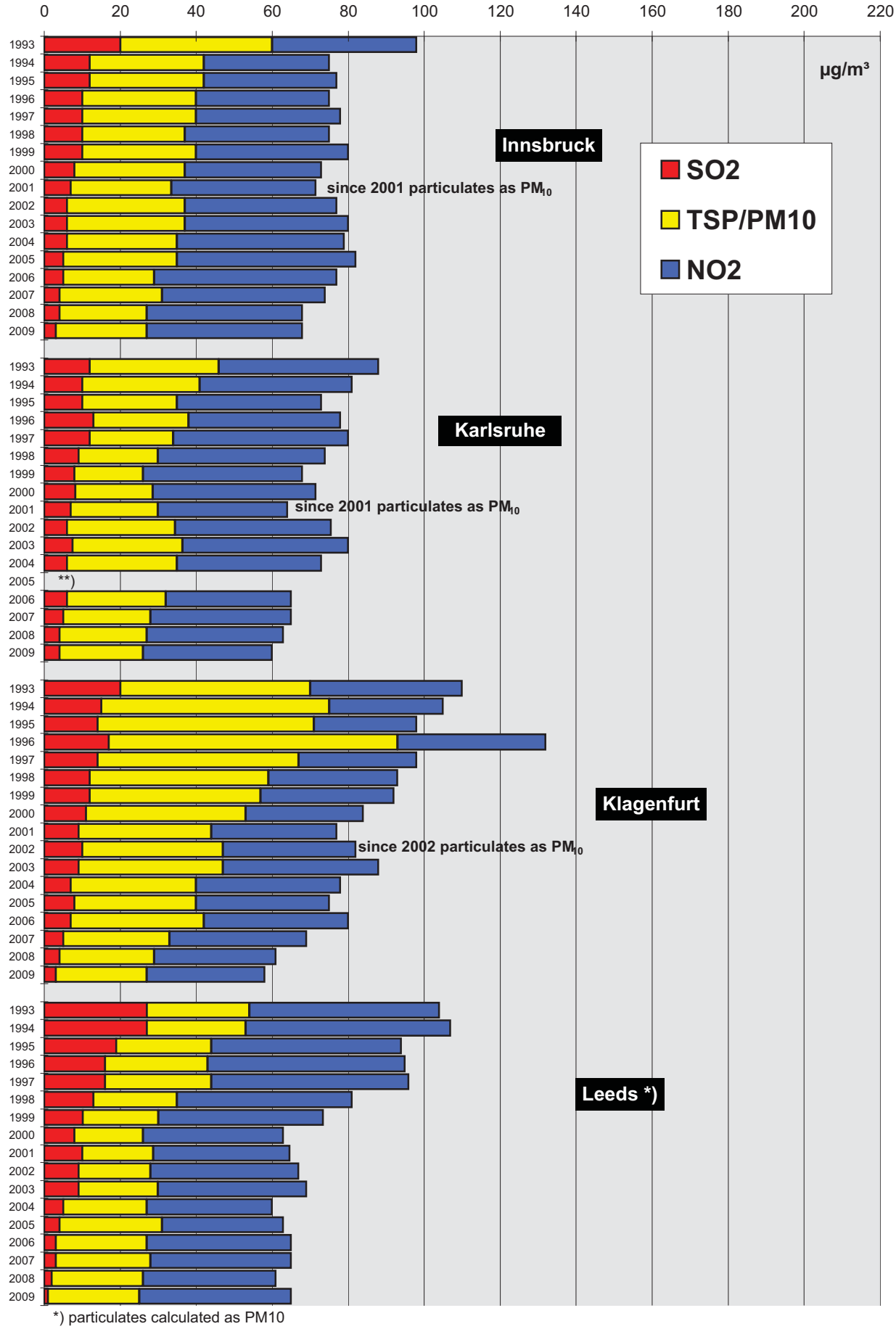


*) particulates calculated as PM10

Comparison Of The Air Quality 1993-2009

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

(mean of all monitoring stations)



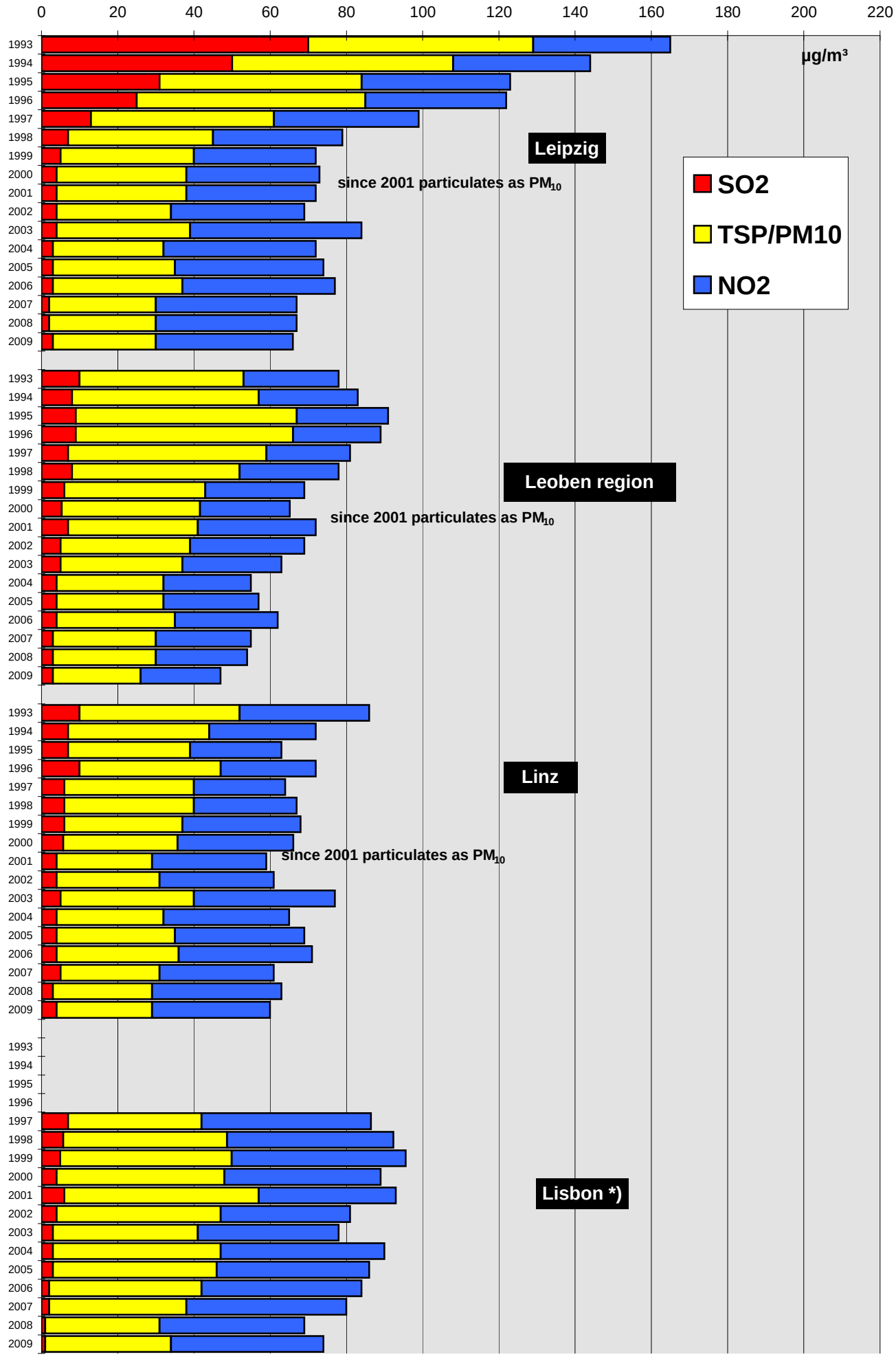
*) particulates calculated as PM10

**) No data

Comparison Of The Air Quality 1993-2009

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

(mean of all monitoring stations)

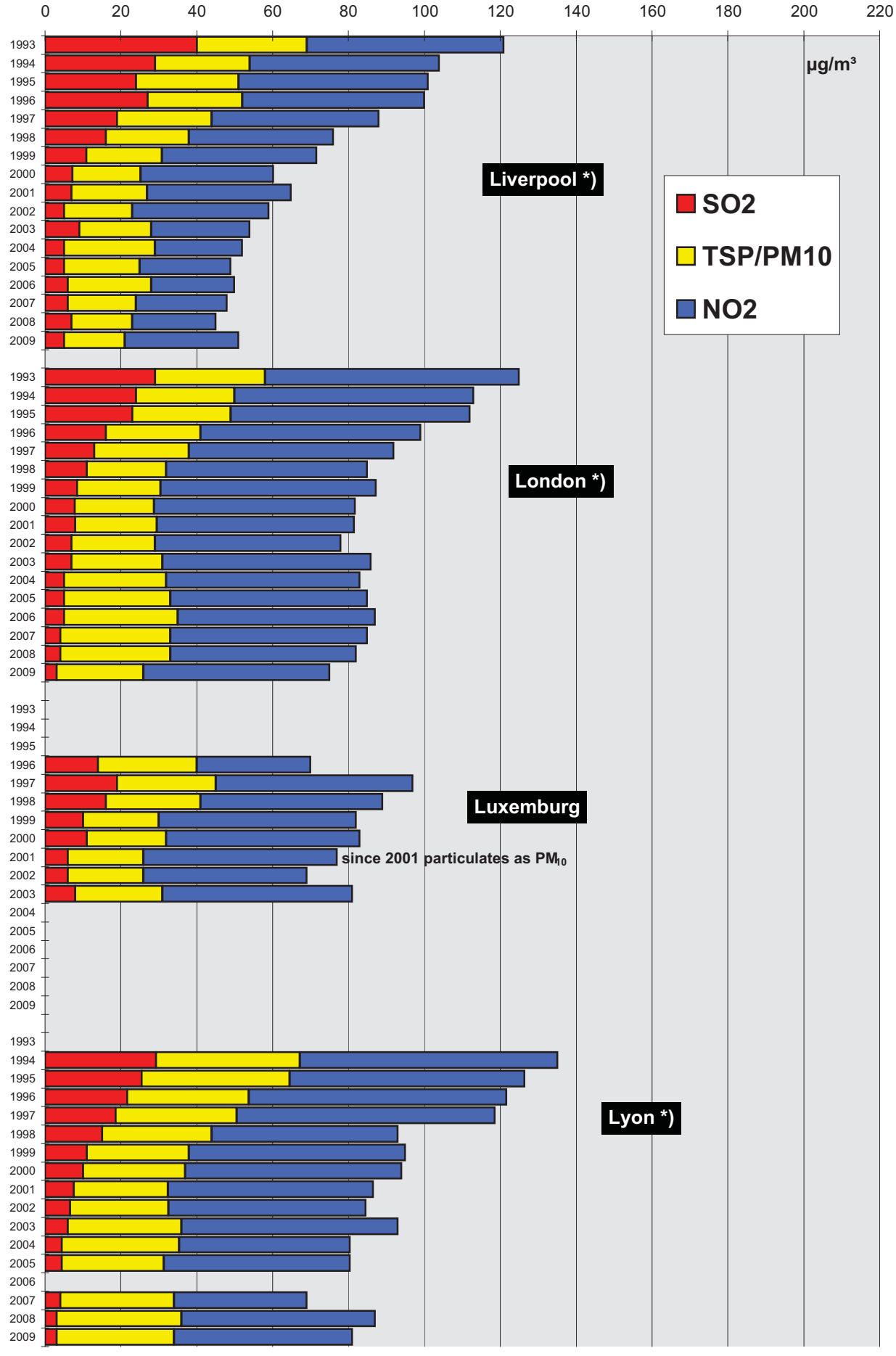


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2009

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

(mean of all monitoring stations)

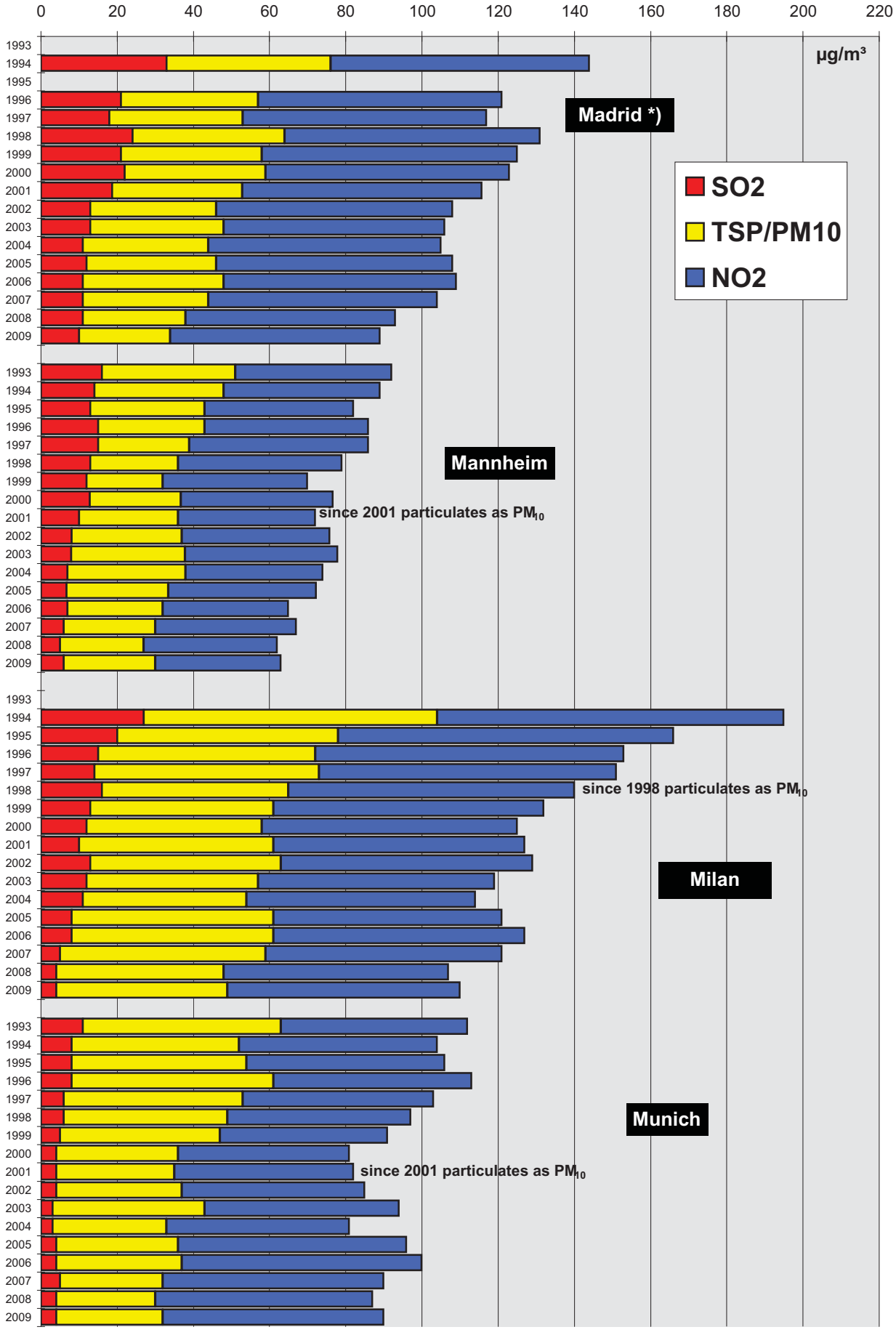


*) particulates calculated as PM10

Comparison Of The Air Quality 1993-2009

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

(mean of all monitoring stations)

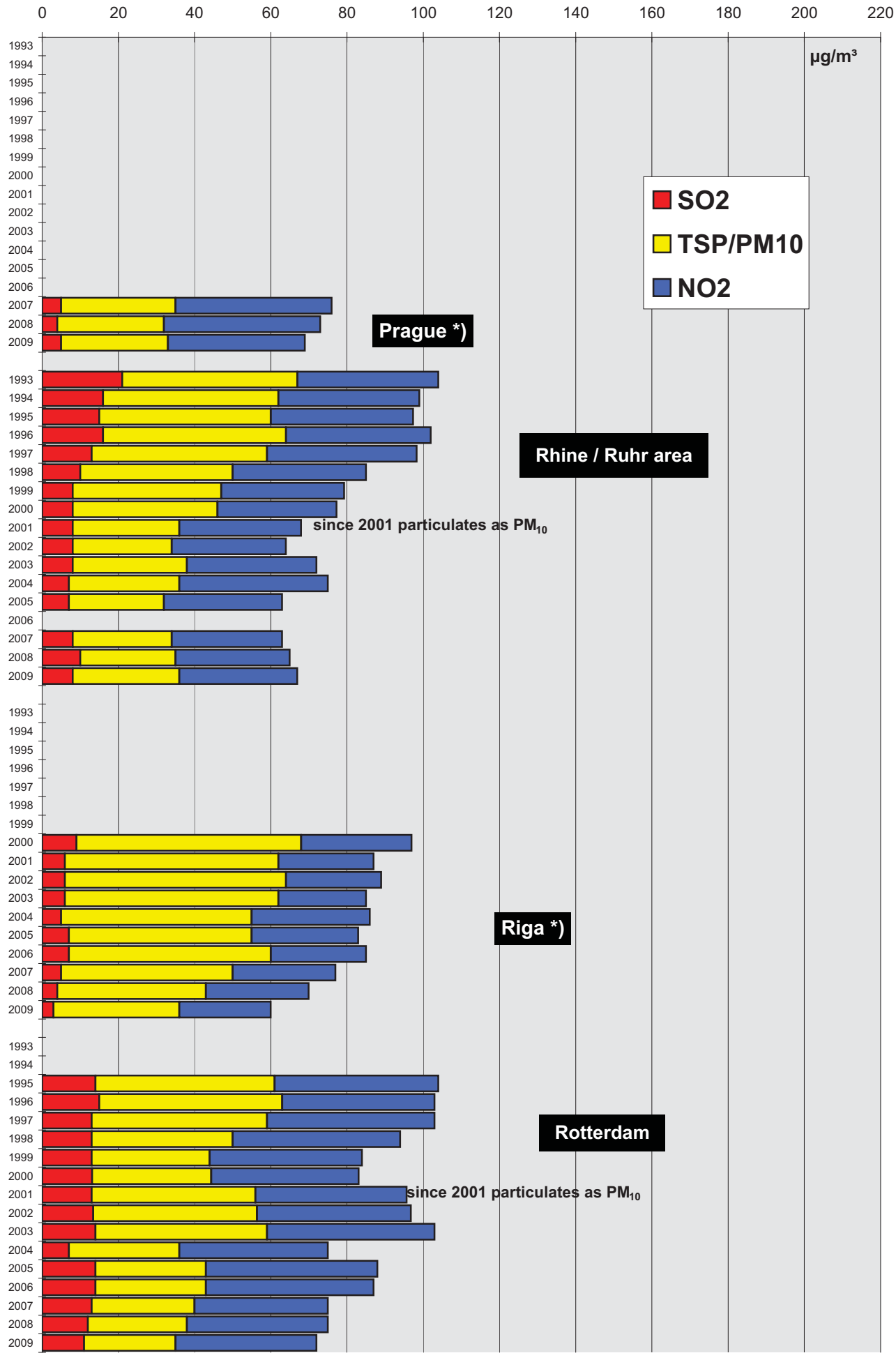


*) particulates calculated as PM10

Comparison Of The Air Quality 1993-2009

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

(mean of all monitoring stations)

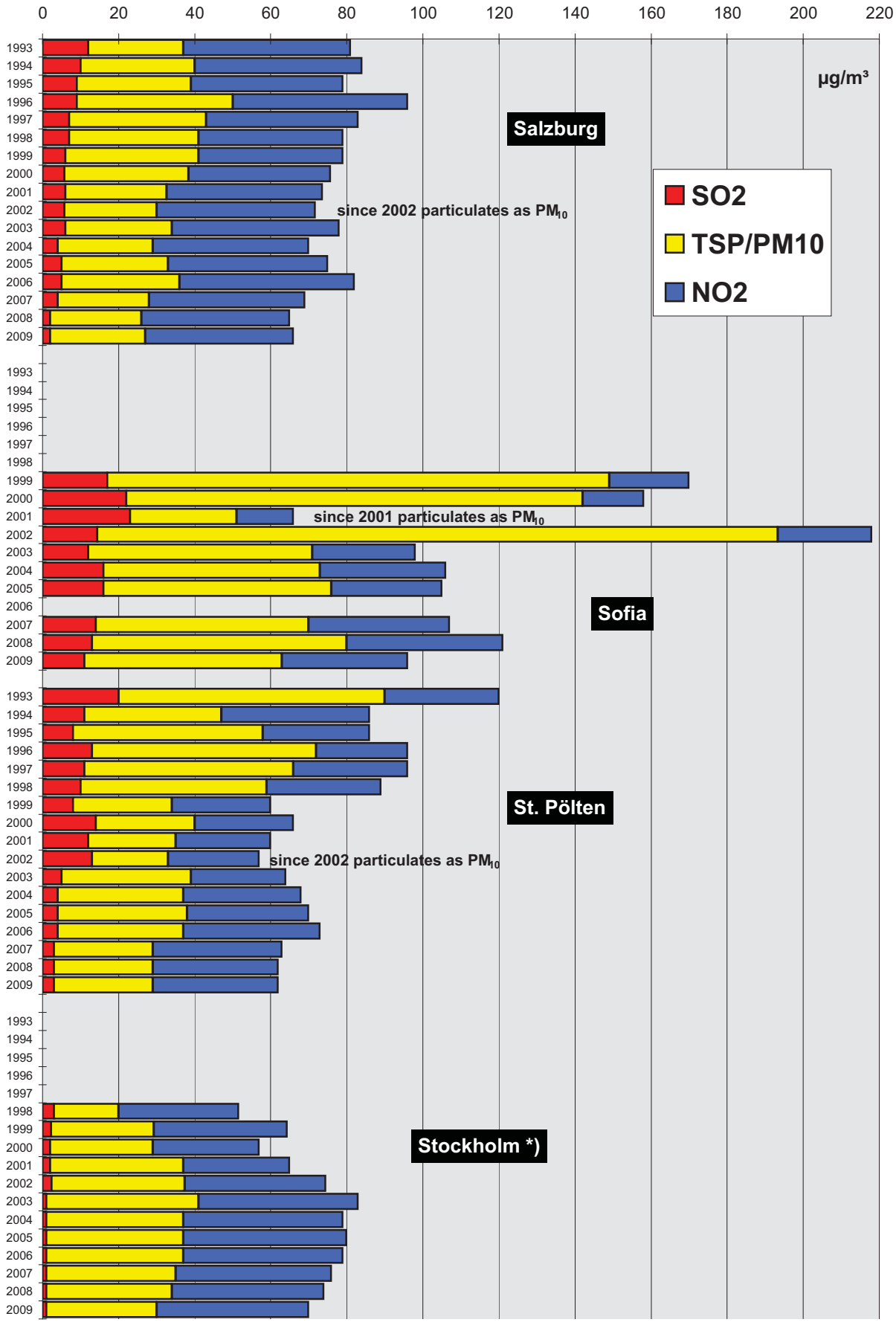


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2009

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

(mean of all monitoring stations)

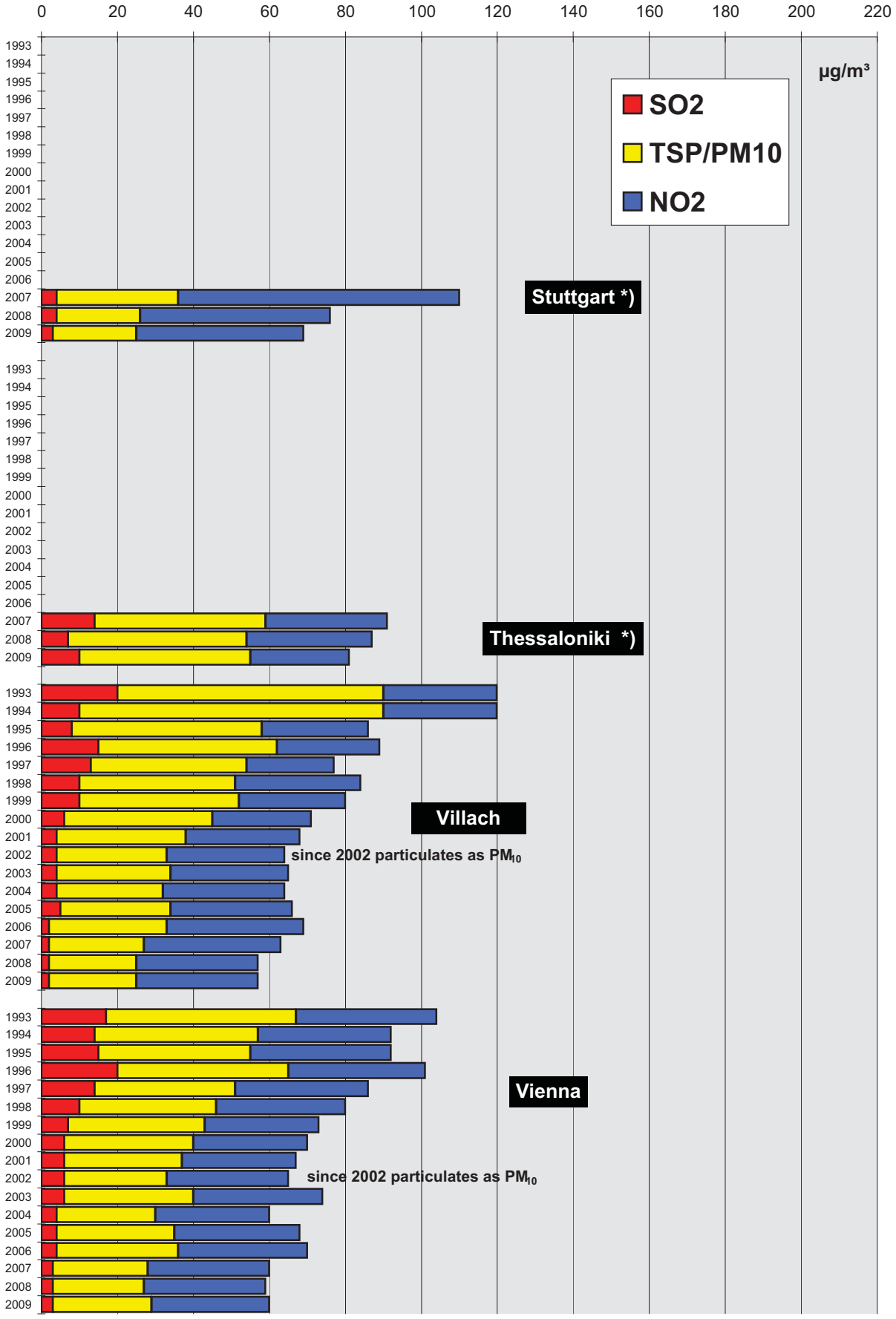


*) particulates calculated as PM1(

Comparison Of The Air Quality 1993-2009

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

(mean of all monitoring stations)

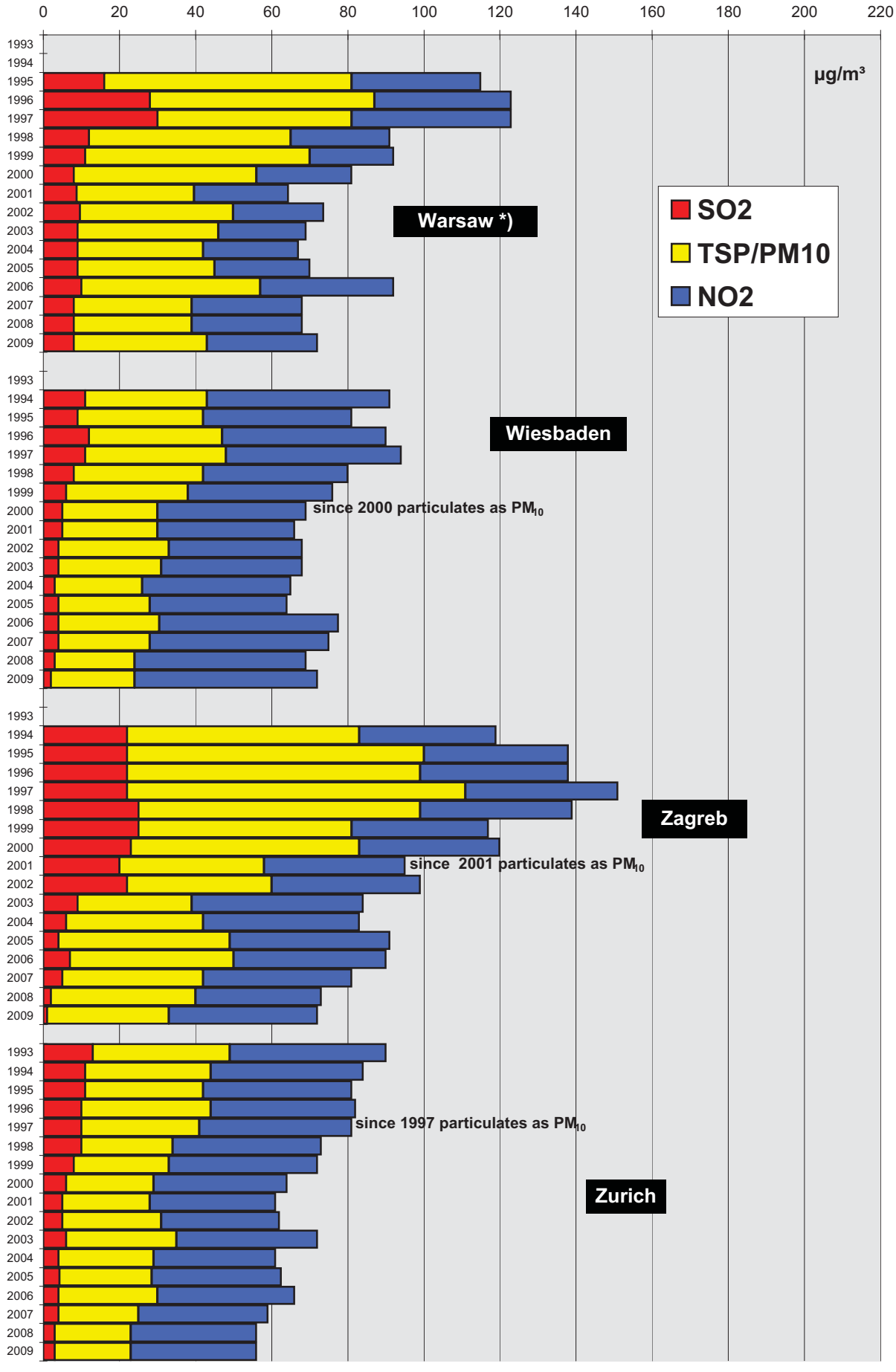


*) particulates calculated as PM1(

Comparison Of The Air Quality 1993-2009

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

(mean of all monitoring stations)



*) particulates calculated as PM1(

Luftgütekennzahlen 2009

der einzelnen

Vergleichsregionen

Immission Reference Values 2009

Of All Compared Regions

Comparison of The Air Quality in 2009

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	3	11	25	64	-	279	-	61
PM_{10}	8	38	66	292	-	-	-	118
$PM_{2,5}$	4	29	38	99	-	-	-	53
NO	15	29	214	-	-	805	-	391
NO_2	15	40	103	-	-	325	-	166
CO	7	957	2400	-	-	10400	-	4700
O_3	13	58	120	-	-	264	-	147

PM_{10}:	Monitoring method(s) used:	β-attenuation
	Correction factor for this method according to EU-directive 1999/30/EC):	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	122
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	35

[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 2009

Barcelona

immission area: 101 km^2 population: 1 621 537

	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	3	5	23	42	130	-	19
PM_{10}	8	39	69	152	-	-	-	97
$PM_{2,5}$	2	18	30	68	-	-	-	48
NO	5	19	61	276	284	641	-	165
NO_2	5	48	74	137	161	252	-	136
CO	5	400	800	2000	2900	5000	-	1700
O_3	4	40	69	115	120	159	-	110

PM_{10}:	Monitoring method(s) used:	Gravimetry
	Correction factor for this method according to EU-directive 1999/30/EC):	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	**94** (ID_BARCELONA, ES1396A, 8019042) P90.4=77
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	**9** (IJ-BARCELONA (GRACIA-SANT GERVASI), ES1480A,8019044) P99.8=182

Comments:

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

* Static average (not moving average)

** Maximum 98 percentile of 1-hour values, except PM_{10} and $PM_{2,5}$ 24-hour 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 2009

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	6	15	20	30	53	15
PM_{10}	1	18	38	66	81	82	82	71
$PM_{2,5}$	1	14	32	58	-	-	-	-
NO	1	6	19	93	146	230	235	90
NO_2	1	23	42	76	93	103	105	81
CO	-	-	-	-	-	-	-	-
O_3	1	48	71	101	176	179	181	148

PM_{10}:	Monitoring method(s) used:	β-Meter-measurements, calibrated with gravimetrical measurements every 4 days
	Correction factor for this method according to EU-directive 1999/30/EC):	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	10
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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	3	5	16	122	271	-	13
PM_{10}	1	21	26	76	109	179	-	57
$PM_{2,5}$	1	12	17	57	222	310	-	41
NO	1	14	27	163	353	534	-	103
NO_2	1	32	42	90	133	159	-	86
CO	1	200	300	900	1700	2200	-	600
O_3	1	39	57	78	111	118	-	80

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	Correction factor for this method according to EU-directive 1999/30/EC):	
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	3
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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 2009

Berlin (traffic station)

immission area: 892 km^2 population: 3 442 700

	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	3	6	17	46	108	146	12
PM_{10}	5	31	47/54*	108/296*	222/3094*	232/3212*	433/3679*	81/82*
$PM_{2,5}$	1	21/22*	35/40*	71/171*	-	-	-	54
NO	5	47	100	254	525	574	691	244
NO_2	5	54	79	132	210	279	434	126
CO	2	530	840	1410	3300	3400	4000	1460
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	β-absorption
	Correction factor for this method according to EU-directive 1999/30/EC):	1.21 / 1.26
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	39
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	8

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	3	6	14	37	73	109	14
PM_{10}	4	26	39/42*	82/156*	122/639*	138/1206*	144/1358*	68/70*
$PM_{2,5}$	3	18	33/36*	64/110*	-	-	-	51
NO	5	8	26	129	350	408	502	65
NO_2	5	27	45	91	168	176	196	77
CO	-	-	-	-	-	-	-	
O_3	2	45	73	101	140	146	148	110

PM_{10}:	Monitoring method(s) used:	β-absorption
	Correction factor for this method according to EU-directive 1999/30/EC):	1.21 / 1.26
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	20
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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 2009

Berlin (outskirt station) immission area: 892 km^2 population: 3 442 700

	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	22	35/35*	79/172*	104/273*	131/1037*	141/1111*	59/60*
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	5	4	13	104	225	270	464	36
NO_2	5	14	30	63	98	127	218	50
CO	-	-	-	-	-	-	-	-
O_3	5	40	82	108	152	160	162	121

PM_{10}:	Monitoring method(s) used:	β-absorption
	Correction factor for this method according to EU-directive 1999/30/EC):	1.21 / 1.26
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	12
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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 2009

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	3	10	31	43	-	8
PM_{10}	1	21	29	80	117	147	-	58
$PM_{2,5}$	1	14	20	60	82	115	-	47
NO	2	27	55	205	608	713	-	203
NO_2	2	31	62	112	170	193	-	111
CO	-	-	-	-	-	-	-	-
O_3	2	36	61	152	161	168	-	90

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	Correction factor for this method according to EU-directive 1999/30/EC):	
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	7
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

Bludenz

immission area: 3 km^2 population: 13 760

	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	45	95	-	-	-	54
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	14	55	163	354	375	383	119
NO_2	1	22	46	75	119	125	131	71
CO	-	-	-	-	-	-	-	-
O_3	1	46	76	125	154	157	159	120

PM_{10}:	Monitoring method(s) used:	gravimetrically
	Correction factor for this method according to EU-directive 1999/30/EC):	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	12
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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 2009

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	14	43	53		8
PM_{10}	1	19	26	72	109	127		56
$PM_{2,5}$	1	14	21	60	108	142		49
NO	2	37	93	268	525	590		260
NO_2	2	46	84	129	228	231		141
CO	2	400	600	1300	3400	3900		1300
O_3	1	46	67	93	145	150		98

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	Correction factor for this method according to EU-directive 1999/30/EC):	
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	7
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	11

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	9	26	-	113	125	13 (daily)
PM_{10}	6	30	61	143	-	550	651	88 (daily)
$PM_{2,5}$	5	21	42	94	-	134	135	64 (daily)
NO	10	18	81	223	-	701	764	225 (1 h)
NO_2	10	39	66	129	-	202	207	112 (1 h)
CO	7	294	547	1260	-	2930	4830	880 (1 h)
O_3	7	38	72	119	-	197	200	117 (1 h)

PM_{10}:	Monitoring method(s) used:	TEOM-FDMS (both for PM_{10} and$PM_{2,5}$)
	Correction factor for this method according to EU-directive 1999/30/EC):	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	66
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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 2009

Budapest

immission area: 525 km^2 population: 1 712 210

	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	6	14	30	47	65	-	21
PM_{10}	11	32	64	175	260	331	-	84
$PM_{2,5}$	1	18	37	101	139	206	-	53
NO	11	20	64	193	403	471	-	167
NO_2	11	34	60	104	162	179	-	109
CO	11	668	1874	3542	5710	6497	-	2859
O_3	9	40	83	115	175	187	-	137

PM_{10}:	Monitoring method(s) used:	β-absorption
	Correction factor for this method according to EU-directive 1999/30/EC):	1.1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	71
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

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 2009

Chemnitz

immission area: 221 km^2 population: 243 880

	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	26	51	179	634	1855	2904	87
$PM_{2,5}$	2	16	50	83	-	-	-	-
NO	3	29	78	220	220	561	662	209
NO_2	3	36	58	123	123	214	238	111
CO	0	-	-	-	-	-	-	-
O_3	1	43	65	95	95	148	149	112

PM_{10}:	Monitoring method(s) used:	gravimetrically (High-Volume-Sampler, micro balance)
	Correction factor for this method according to EU-directive 1999/30/EC):	depending on station and method*
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	32
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	2

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

station	PM_{10}-HVS	PM_{10}-TEOM
Chemnitz-Leipziger Straße	1,10	1,20 + Funktion (Temperatur, Feuchte)
Chemnitz-Mitte	1,05	1,10
Chemnitz-Nord	1,10	1,14

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 2009

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	3			61	66		10
PM_{10}	3	31		126				73*
$PM_{2,5}$	2	18		48				41*
NO								
NO_2	3	37			185	226		111
CO	3	400		1366		3127		1350
O_3	3	42		98		135		102

PM_{10}:	Monitoring method(s) used:	Gravimetically , TEOM
	Correction factor for this method according to EU-directive 1999/30/EC):	1 / 1.3
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	59
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	n.a.

Comments: * Max. 95-Percentile

Dornbirn

immission area: 13 km^2 population: 44 870

	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	9	13	18	29	9
PM_{10}	1	21	40	73	-	-	-	68
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	25	51	116	263	356	369	133
NO_2	1	33	52	82	120	144	153	88
CO	-	-	-	-	-	-	-	-
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	Gravimetrically
	Correction factor for this method according to EU-directive 1999/30/EC):	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	14
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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 2009

Dresden

immission area: 328 km^2 population: 512 234

	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	13	44	72	74	75	25
PM_{10}	4	27	56	136	350	508	876	87
$PM_{2,5}$	3	19	45	95	-	-	-	-
NO	4	26	101	323	323	323	648	253
NO_2	4	33	65	124	124	124	230	122
CO	-	-	-	-	-	-	-	-
O_3	3	43	76	109	109	109	151	115

PM_{10}:	Monitoring method(s) used:	Gravimetrically (High-Volume-Sampler, micro balance)
	Correction factor for this method according to EU-directive 1999/30/EC):	depending on station and method*
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	42
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

Comments:

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

station	PM_{10}-HVS	PM_{10}-TEOM
Dresden-Bergstr.	1,10	1,20 + Funktion (Temperatur, Feuchte)
Dresden-Nord.	1,10	1,14
Dresden-Winckelmannstr.	1,05	1,00
Dresden-Wahnsdorf	1,05	1,00

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 2009

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	3	5	18	49	69	-	13
PM_{10}	1	18	22	57	77	82	-	47
$PM_{2,5}$	1	8	13	44	95	162	-	31
NO	1	7	12	103	210	236	-	63
NO_2	1	22	34	86	134	143	-	80
CO	1	200	400	1100	3300	3400	-	700
O_3	1	54	70	96	117	126	-	94

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	Correction factor for this method according to EU-directive 1999/30/EC):	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	3
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

Frankfurt (urban stations)

immission area: 248 km^2 population: 676 197

	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	12	25	39	45	62	18
PM_{10}	5	22	64	297	1075	1789	1814	88
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	5	28	100	275	408	472	540	208
NO_2	5	38	76	144	184	194	213	104
CO	1	400	920	2300	3250	3920	4560	1550
O_3	4	35	63	99	193	217	219	129

PM_{10}:	Monitoring method(s) used:	ß-absorption
	Correction factor for this method according to EU-directive 1999/30/EC):	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	19
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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 2009

Frankfurt (traffic station)

immission area: 248 km^2 population: 676 197

	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	30	69	279	760	782	861	101
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	58	132	299	521	766	805	267
NO_2	1	64	93	160	220	282	308	153
CO	1	590	1140	2100	2910	4170	4590	1870
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	ß-absorption
	Correction factor for this method according to EU-directive 1999/30/EC):	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	36
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	16

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	3	8	27	30	53	9
PM_{10}	1	16	25	44	83	121	177	46
$PM_{2,5}$	2	8	11	25	76	94	-	22
NO	1	11	21	97	282	322	365	71
NO_2	3	24	38	97	145	189	298	84
CO	1	206	316	506	828	965	1494	470
O_3	3	51	75	105	137	138	156	101

PM_{10}:	Monitoring method(s) used:	TEOM
	Correction factor for this method according to EU-directive 1999/30/EC):	+19% +1.15
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	0
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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 2009

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, 3] [µg/m³]	max. 1h mean value [2, 4] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	3	2	5	9	53	126	142	8
PM_{10} cont.	5	31	68	138	215	417	496	120
PM_{10} g.	2	28	63	146	-	-	-	-
$PM_{2,5}$	2	20	49	102	-	-	-	-
NO	5	22	89	187	362	428	441	201
NO_2	5	31	54	91	152	157	165	90
CO	2	450	940	1730	2930	3110	3150	1770
O_3	4	49	108	130	146	146	148	131

PM_{10}:	Monitoring method(s) used:	Continuous / Gravimetric*
	Correction factor for this method according to EU-directive 1999/30/EC):	1.3
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	57 / 45*
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

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

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

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

Comparison of The Air Quality in 2009

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, 3] [µg/m³]	max. 1h mean value [2, 4] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	4	7	10	16	18	19	12
PM_{10} cont.	1	32	64	134	180	191	211	106
PM_{10} g.	1	34	69	136	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	56	124	256	416	512	599	263
NO_2	1	48	59	109	171	194	198	106
CO	1	520	990	1810	2630	2800	2990	1750
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	continuous, gravimetric*
	Correction factor for this method according to EU-directive 1999/30/EC):	1.3
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	43 / 51*
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

Comments:

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

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

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

Comparison of The Air Quality in 2009

Hallein

immission area: 27 km^2 population: 19 566

	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	4	13	54	80	151	7
PM_{10}	1	25	61	126	-	-	-	77
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	2	28	105	218	412	522	679	227
NO_2	2	29	69	103	154	161	205	108
CO	1	520	1080	1980	3090	3390	3600	1600
O_3	1	65	97	125	158	161	165	128

PM_{10}:	Monitoring method(s) used:	Gravimetrically
	Correction factor for this method according to EU-directive 1999/30/EC):	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	20
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

Comments:
The ozone measurement station in Hallein stands about 200 meters above the valley floor. On this account the values are not directly comparable with urban ozone stations.

Comparison of The Air Quality in 2009

Hamburg (area monitoring stations)

immission area: 755 km^2 population: 1 782 639

	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	5	15	84	223	415	641	57
PM_{10}	9	20	35	78	199	321	341	62
$PM_{2,5}$	3	14	27	60	170	269	277	46
NO	14	10	40	188	552	711	736	134
NO_2	14	24	44	77	148	176	185	83
CO	3	232	390	724	1343	1728	2431	603
O_3	6	42	67	110	159	166	170	107

PM_{10}:	Monitoring method(s) used:	TEOM (7 stations), β-absorption (2 stations)
	Correction factor for this method according to EU-directive 1999/30/EC):	TEOM: 1; Beta: 1.20, 1.32
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	10
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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	26	39	99	388	671	939	69
$PM_{2,5}$	1	18	26	65	212	248	254	47
NO	4	64	104	251	672	876	926	330
NO_2	4	63	80	126	219	256	267	162
CO	4	541	825	1516	3921	4484	4814	1793
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	Teom (3 stations) ß-Adsorption (1 station)
	Correction factor for this method according to EU-directive 1999/30/EC):	TEOM: 1; Beta: 1.26
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction	15
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	29

[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 2009

Innsbruck

immission area: 105 km^2 population: 140 000

	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	3	8	19	33	36	37	12
PM_{10}	2	24	60	146	-	-	-	75
$PM_{2,5}$	1	16	37	110	-	-	-	44
NO	2	31	82	258	-	-	658	195
NO_2	2	41	71	120	186	-	210	102
CO	1	442	1001	1587	2329	2596	2653	1251
O_3	2	39	87	120	147	149	149	123

PM_{10}:	Monitoring method(s) used:	Gravimetric (Digitel HVS)
	Correction factor for this method according to EU-directive 1999/30/EC):	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	26
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	1

Karlsruhe (urban station)

immission area: 173 km^2 population: 290 663*

	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 [2,3] [µg/m³]
SO_2	1	4	9	19	36	63	69	-
PM_{10}	2	22	49	116	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	2	20	75	247	151	447	464	-
NO_2	2	32	61	123	153	171	181	-
CO	1	200	600	2100	3100	3700	3800	-
O_3	2	39	70	95	193	213	219	-

PM_{10}:	Monitoring method(s) used:	gravimetrically
	Correction factor for this method according to EU-directive 1999/30/EC):	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	17
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

Comment: * 3. Quarter 2009; source: Statistisches Bundesamt

[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 2009

Karlsruhe (traffic station)

immission area: 173 km^2 population: 290 663*

	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 [2,3] [µg/m³]
SO_2	-	-	-	-	-	-	-	-
PM_{10}	1	23	52	126	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	27	93	325	149	685	796	-
NO_2	1	39	76	159	202	273	300	-
CO	1	400	1000	2900	4200	7500	9100	-
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	gravimetrically
	Correction factor for this method according to EU-directive 1999/30/EC):	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	20
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	3

Comments: * 3. Quarter 2009; source: Statistisches Bundesamt

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	12	59	93	99	10
PM_{10}	2	24	60	113	-	-	-	-
$PM_{2,5}$	1	15	36	80	-	-	-	-
NO	2	24	75	203	433	463	490	182
NO_2	2	31	54	102	175	187	191	93
CO	2	477	918	1766	3004	3300	3331	1495
O_3	2	42	78	107	148	149	150	126

PM_{10}:	Monitoring method(s) used:	Gravimetrically (Digitel HVS)
	Correction factor for this method according to EU-directive 1999/30/EC):	(x-1,76)/0,94
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	34
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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 2009

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	1	2	9	26	29	-	8
PM_{10}	2	24	34	92	339	530	-	72
$PM_{2,5}$	1	14	21	57	97	113	-	48
NO	2	33	74	182	395	460	-	186
NO_2	2	40	60	97	149	178	-	109
CO	1	200	400	700	1400	1500	-	600
O_3	1	36	55	81	106	106	-	80

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	Correction factor for this method according to EU-directive 1999/30/EC):	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	16
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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 2009

Leipzig

immission area: 298 km^2 population: 506 578

	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	3	10	24	39	41	10
PM_{10}	3	27	54	142	763	1562	1694	82
$PM_{2,5}$	1	16	32	72	-	-	-	-
NO	3	26	60	141	141	141	486	140
NO_2	3	36	59	88	88	88	173	99
CO	-	-	-	-	-	-	-	-
O_3	1	42	65	92	92	92	168	112

PM_{10}:	Monitoring method(s) used:	Gravimetrically (High-Volume-Sampler, micro balance)
	Correction factor for this method according to EU-directive 1999/30/EC):	*
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	51
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

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

station	PM_{10}-HVS	PM_{10}-TEOM
Leipzig-Lützner Str.	1,10	1,20 + Funktion (Temperatur, Feuchte)
Leipzig-Mitte	1,10	1,14
Leipzig-West	1,05	1,00

The measurement of CO in “Leipzig Mitte” is stopped on 1.1.2009

[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 2009

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	7	23	71	135	173	22
PM_{10} cont.	3	26	44	100	286	432	517	76
PM_{10} g.	1	21	37	83	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	3	13	46	147	258	299	319	102
NO_2	3	21	44	74	99	109	109	67
CO	1	750	1170	4500	11790	13010	15690	3330
O_3	1	36	57	90	132	133	139	112

PM_{10}:	Monitoring method(s) used:	continuous, gravimetric*
	Correction factor for this method according to EU-directive 1999/30/EC):	1.3
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	19 / 10*
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

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

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

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

Comparison of The Air Quality in 2009

Linz

immission area: 96 km^2 population: 189 355

	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	4	13	30	52	62	75	33
PM_{10}	6	25	57	136	287	648	738	94
$PM_{2,5}$	1	17	43	106	-	-	-	-
NO	7	21	102	249	480	592	640	210
NO_2	7	31	52	104	180	232	266	122
CO	5	410	1400	2500	5000	5900	7500	1760
O_3	3	39	74	102	144	149	150	120

PM_{10}:	Monitoring method(s) used:	Continuously and gravimetrically
	Correction factor for this method according to EU-directive 1999/30/EC):	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	30
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	5

Lisbon

immission area: 85 km^2 population: 499 700

	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	5	1	-	13	-	118	-	7
PM_{10}	5	33	-	126	-	277	-	-
$PM_{2,5}$	2	12	-	46	-	92	-	37
NO	7	22	-	-	-	-	-	-
NO_2	7	40	-	154	-	390	-	177
CO	7	306	-	-	-	4296	-	-
O_3	4	52	-	-	-	192	-	-

PM_{10}:	Monitoring method(s) used:	no information
	Correction factor for this method according to EU-directive 1999/30/EC):	No information
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	92
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	69

[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 2009

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	5	8	17	39	67		19
PM_{10}	1	16	26	71	246	357		55
$PM_{2,5}$	1	13	29	59	111	130		46
NO	2	16	42	151	456	520		124
NO_2	2	30	51	86	177	180		90
CO	1	200	200	700	1400	1500		500
O_3	1	42	60	81	141	148		82

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	Correction factor for this method according to EU-directive 1999/30/EC):	
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	6
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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	3	9	50	105	114	-	21
PM_{10}	6	23	52	104	267	388		86
$PM_{2,5}$	9	15	24	68	108	136		49
NO	14	34	179	405	655	691		399
NO_2	14	49	128	208	355	369		227
CO	7	357	800	1400	2400	2900		1600
O_3	9	34	67	107	171	172		100

PM_{10}:	Monitoring method(s) used:	GRAV EQ, TEOM (FDMS)
	Correction factor for this method according to EU-directive 1999/30/EC):	
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	47
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	486

[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 2009

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	3	-	62	-	204	-	16
PM_{10}	2	33	-	170	-	228	-	95
$PM_{2,5}$	1	23	-	151	-	198	-	79
NO	3	15	-	260	-	601	-	148
NO_2	3	35	-	156	-	269	-	106
CO	0	-	-	-	-	-	-	-
O_3	3	47	-	110	-	193	-	120

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	0	-	-	-	-	-	-	-
PM_{10}	1	28	-	148	-	183	-	87
$PM_{2,5}$	0	-	-	-	-	-	-	-
NO	3	49	-	361	-	671	-	262
NO_2	3	59	-	182	-	321	-	140
CO	2	509	-	2246	-	3575	-	1508
O_3	0	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	TEOM with Filter Dynamics Measurement System
	Correction factor for this method according to EU-directive 1999/30/EC):	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	39
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	28

[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 2009

Madrid

immission area: 604 km^2 population: 3 255 944

	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	23	10	26	46	83	129	-	51
PM_{10}	21	24	42	89	206	287	-	105
$PM_{2,5}$	5	13	18	41	80	112	-	46
NO	23	23	81	205	355	626	-	215
NO_2	23	55	109	187	325	477	-	198
CO	21	400	800	1800	3700	5600	-	1700
O_3	22	45	86	114	128	179	-	141

PM_{10}:	Monitoring method(s) used:	Oscillating microbalance
	Correction factor for this method according to EU-directive 1999/30/EC):	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	**35** (LUCA DE TENA,ES0119A,28079009) P90.4=51
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	**150** (MARAÑON, ES0116A, 28079006) P99.8=337

Comments:
Area and population of the municipalities of Madrid (not metropolitan areas)
* Static average (not moving average)
** Maximum 98 percentile of 1-hour 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 2009

Mannheim (urban station)

immission area: 145 km^2 population: 312 144*

	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	12	31	50	83	145	-
PM_{10}	3	23	53	132	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	3	17	68	243	337	389	411	-
NO_2	3	32	58	122	157	168	174	-
CO	1	200	700	1900	2600	2800	3000	-
O_3	3	38	64	87	171	195	198	-

PM_{10}:	Monitoring method(s) used:	Gravimetrically
	Correction factor for this method according to EU-directive 1999/30/EC):	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	20
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

Mannheim (traffic station)

immission area: 145 km^2 population: 312 144*

	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	6	12	62	209	604	1197	-
PM_{10}	1	25	57	166	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	23	94	252	349	443	468	-
NO_2	1	37	67	124	165	180	190	-
CO	1	400	1100	2300	3100	3500	3900	-
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	Gravimetrically
	Correction factor for this method according to EU-directive 1999/30/EC):	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	23
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

Comments: * 3. Quarter 2009; source: Statistisches Bundesamt
** 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 2009

Milan

immission area: 182 km^2 population: 1 306 561

	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	-	21	-	34	-	17
PM_{10}	3	45	-	205	-	239	-	126
$PM_{2,5}$	1	30	-	173	-	-	-	95
NO	8	46	-	452	-	862	-	275
NO_2	8	61	-	257	-	365	-	151
CO	5	1140	-	5030	-	6700	-	3110
O_3	3	44	-	146	-	213	-	149

PM_{10}:	Monitoring method(s) used:	Beta attenuation
	Correction factor for this method according to EU-directive 1999/30/EC):	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	106
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	101

Munich

immission area: 310 km^2 population: 1 330 440

	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	5	9	15	29	37	9
PM_{10}	5	28	66	171	345	362	412	88
$PM_{2,5}$	1	19	52	135	168	170	172	64
NO	6	45	173	370	839	987	1039	385
NO_2	6	58	109	181	367	415	436	187
CO	4	500	1000	2700	4100	4700	5600	1700
O_3	3	35	63	93	140	143	144	112

PM_{10}:	Monitoring method(s) used:	β-absorption
	Correction factor for this method according to EU-directive 1999/30/EC):	1,25
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	52
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	95

Comment: PM_{10}: The values from 01.01.2009 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 2009

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	18	36	-	81	-	24
PM_{10}	20	28	64	196	-	302	-	90
$PM_{2,5}$	4	17	46	135	-	175	-	65
NO	15	18	106	274	-	500	-	172
NO_2	21	36	112	466	-	436	-	130
CO	12	517	1379	2242	-	6268	-	1762
O_3	8	41	79	107	-	175	-	95

PM_{10}:	Monitoring method(s) used:	6 x Gravimetry, 14 x radiometry
	Correction factor for this method according to EU-directive 1999/30/EC):	Correction factor for measured data from the database = 1. Correction factor built in the PM_{10} analyzer (beta absorption) is set to the value 1.3.
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	48
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	98

Comments:
Number of monitoring stations = number of stations which have valid annual mean.
Number of used stations for other calculated values are > 10 – 21 – 6 – 15 – 22 – 13 – 8.
Max 1h values – automatic stations are used only.
Other values - automatic and manual stations 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 2009

Riga (traffic station)

immission area: 307 km^2 population: 713 016

	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	39	60	99	162	229	252	104
$PM_{2,5}$	1	28	39	71	-	-	-	58
NO	1	105	130	231	324	342	356	232
NO_2	1	35	55	85	122	129	135	89
CO	1	400	600	1000	1600	1900	2000	1100
O_3	1	25	50	76	99	101	117	73

PM_{10}:	Monitoring method(s) used:	beta absorption
	Correction factor for this method according to EU-directive 1999/30/EC):	1.0
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	46
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

Comments:
98-percentiles: SO_2, NO_2, PM_{10}, CO, Ozone: 98%-value of the hour's means
98-percentiles: $PM_{2,5}$: 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 2009

Riga (urban station)

immission area: 307 km^2 population: 713 016

	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	7	17	43	54	58	15
PM_{10}	1	20	34	65	-	-	-	53
$PM_{2,5}$	1	16	20	57	-	-	-	48
NO	-	-	-	-	-	-	-	-
NO_2	3	20	34	77	121	137	139	82
CO	-	-	-	-	-	-	-	-
O_3	3	46	73	108	129	133	139	96

PM_{10}:	Monitoring method(s) used:	beta absorption
	Correction factor for this method according to EU-directive 1999/30/EC):	1.0
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	-
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

Comment:
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 2009

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	8				444		31
PM_{10}	32	28						
$PM_{2,5}$	5	19						
NO	21	13				318		117
NO_2	21	31				199		76
CO	-							
O_3	13	37				203		119

PM_{10}:	Monitoring method(s) used:	1) Beta-absorption 2) Oscillating micro balance 3) Gravimetric
	Correction factor for this method according to EU-directive 1999/30/EC):	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 2009 (measured values **including** correction factor):	70
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

Comments: Traffic stations are not included in the calculation

Rotterdam

immission area: 803 km^2 population: 1 186 434

	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	11	14	29	-	61	-	28
PM_{10}	3	24	35	151	-	649	-	62
$PM_{2,5}$	2	17	29	135	-	265	-	54
NO	3	15	39	143	-	227	-	104
NO_2	3	37	47	84	-	119	-	86
CO	2	400	601	1259	-	2657	-	1043
O_3	3	38	63	91	-	159	-	99

PM_{10}:	Monitoring method(s) used:	TEOM (SES)
	Correction factor for this method according to EU-directive 1999/30/EC):	1.3
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	12
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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 2009

Salzburg

immission area: 66 km^2 population: 149 065

	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	6	13	48	77	96	9
PM_{10}	3	25	65	131	-	-	774	95
$PM_{2,5}$	2	18	53	109	-	-	-	82
NO	3	31	114	225	457	599	643	242
NO_2	3	39	79	114	209	245	257	133
CO	2	435	980	1690	2320	2830	4180	1490
O_3	2	42	78	111	149	153	154	117

PM_{10}:	Monitoring method(s) used:	Gravimetrically, beta-emitter
	Correction factor for this method according to EU-directive 1999/30/EC):	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	**37** (9 caused by local construction site)
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	4

Sofia

immission area: 1 311 km^2 population: 1 234 622

	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	11	51	250	-	553	-	64
PM_{10}	7	52	160	482	-	-	-	316
$PM_{2,5}$	2	19	73	412	-	-	-	-
NO	6	27	173	-	-	911	-	-
NO_2	6	33	87	220	-	349	-	167
CO	4	990	2850	-	-	-	-	-
O_3	5	54	123	153	-	257	-	148

PM_{10}:	Monitoring method(s) used:	EN 12341
	Correction factor for this method according to EU-directive 1999/30/EC):	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	160
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	95

Comments:
4 stations – urban; 1 station – transport; 1 station – rural/background;1 station – industrial (only measuring PM_{10})

[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 2009

St. Pölten: immission area: 108 km^2 population: 51 500

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	4	12	15	15	15	14
PM_{10}	1	25	52	105	111	114	115	109
$PM_{2,5}$	1	17	40	87	93	159	172	88
NO	1	7	22	79	198	292	309	131
NO_2	1	24	34	66	92	125	126	73
CO	-	-	-	-	-	-	-	-
O_3	1	42	67	103	141	146	148	133

PM_{10}:	Monitoring method(s) used:	oscillating micro balance
	Correction factor for this method according to EU-directive 1999/30/EC):	1.3
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	17
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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	26	53	108	118	375	415	111
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	37	67	193	436	523	533	265
NO_2	1	42	50	85	146	180	205	109
CO	1	449	720	1230	1860	3560	6680	1520
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	oscillating micro balance
	Correction factor for this method according to EU-directive 1999/30/EC):	1.3
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	23
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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 2009

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	2	-	-	-	-	-
PM_{10}	4	29	82	203	-	543	-	-
$PM_{2,5}$	3	9	14	47	-	107	-	-
NO	-	-	-	-	-	-	-	-
NO_2	3	40	55	100	-	185	-	111/83
CO	1	450	600	900	-	7800	-	-
O_3	1	47	71	112	-	138	-	-

PM_{10}:	Monitoring method(s) used:	TEOM
	Correction factor for this method according to EU-directive 1999/30/EC):	*1.19 + 1.15
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	65
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

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: 601 337*

	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	1	3	11	19	24	34	39	-
PM_{10}	2	22	47	137	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	2	27	88	284	177	644	671	-
NO_2	2	40	71	146	242	260	261	-
CO	1	300	700	1800	2700	3200	3500	-
O_3	2	35	65	94	145	157	159	-

PM_{10}:	Monitoring method(s) used:	gravimetrically
	Correction factor for this method according to EU-directive 1999/30/EC):	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	19
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	9

Comment: * 3. Quarter 2009; source: Statistisches Bundesamt

[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 2009

Stuttgart (traffic station)

immission area: 207 km^2 population: 601 337

	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	-	-	-	-	-	-	-	-
PM_{10}	1	23	48	130	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	39	110	277	177	703	730	-
NO_2	1	52	91	164	273	342	398	-
CO	1	500	1100	2100	3600	4300	4500	-
O_3	1	31	-	69	-	128	131	-

PM_{10}:	Monitoring method(s) used:	gravimetrically
	Correction factor for this method according to EU-directive 1999/30/EC):	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	19
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	22

Comment: * 3. Quarter 2009; source: Statistisches Bundesamt

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	1	10	-	-	-	211	-	32
PM_{10}	4	45	-	125	-	-	-	98
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	7	20	-	-	-	793	-	397
NO_2	7	26	-	-	-	171	-	101
CO	4	750	-	-	-	9100	-	4000
O_3	6	64	-	-	-	278	-	197

PM_{10}:	Monitoring method(s) used:	β-attenuation
	Correction factor for this method according to EU-directive 1999/30/EC):	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	80
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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 2009

Vienna

immission area: 415 km^2 population: 1 698 957

	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	10	3	8	28	50	61	64	20
PM_{10}	13	26	62	132	279	315	335	104
$PM_{2,5}$	2	19	43	80	114	114	114	76
NO	17	14	98	277	558	629	669	212
NO_2	17	31	76	135	175	178	184	134
CO	4	434	780	1494	1813	2056	2122	1136
O_3	5	50	96	123	148	151	152	128

PM_{10}:	Monitoring method(s) used:	8 Stations gravimetric and continuous, 5 Stations continuous (including correction factor)
	Correction factor for this method according to EU-directive 1999/30/EC):	depending on station and quarter
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	40
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	4

Comments:
PM_{10} and $PM_{2,5}$: The used station factors for the continuous measurement k * x + d depending on station and quarter: In the year 2009 is the band width of the gradient in the interval k [0.93 … 1.62] and the axis intercept is in the interval d [-3.18 … 4.47]; The station factors in Vienna vary seasonally very strong.

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.

[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 2009

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	6	11	15	15	6
PM_{10}	1	23	47	95	-	-	-	-
$PM_{2,5}$	0	-	-	-	-	-	-	-
NO	1	24	55	145	256	293	343	133
NO_2	1	32	50	78	116	130	133	77
CO	1	564	1174	2659	3343	3495	3648	1821
O_3	1	32	59	88	140	142	142	111

PM_{10}:	Monitoring method(s) used:	Gravimetrically (Digitel HVS)
	Correction factor for this method according to EU-directive 1999/30/EC):	(x-1,76)/0,94
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	17
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

Warsaw

immission area: 517 km^2 population: 1 709 800

	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	8	8	22	55	-	135	-	33
PM_{10}	10	35	69	247	-	475	-	123
$PM_{2,5}$	5	23	44	118	-	145	-	71
NO	9	16	80	207	-	550	-	159
NO_2	9	29	52	109	-	196	-	88
CO	4	624	1312	2872	-	5124	-	1842
O_3	5	40	68	106	-	173	-	82

[1]

PM_{10}:	Monitoring method(s) used:	automatic TEOM + FDMS, manual gravimetric method
	Correction factor for this method according to EU-directive 1999/30/EC):	automatic TEOM+FDMS – factor 1.0
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	148 traffic station TEOM-FDMS automatic
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	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 2009

Wiesbaden (urban stations)

immission area: 204 km^2 population: 275 482

	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	6	13	18	28	33	10
PM_{10}	1	21	54	150	333	445	461	84
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	22	73	263	341	472	512	177
NO_2	1	35	64	145	159	179	182	96
CO	-	-	-	-	-	-	-	-
O_3	1	39	62	100	200	211	216	124

[1]

PM_{10}:	Monitoring method(s) used:	ß-absorption
	Correction factor for this method according to EU-directive 1999/30/EC):	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2005 (measured values **including** correction factor):	13
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)

immission area: 204 km^2 population: 275 482

	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	52	160	547	610	828	80
$PM_{2,5}$	1	15	42	116	387	490	569	63
NO	1	63	118	340	465	595	636	272
NO_2	1	60	83	172	216	268	283	132
CO	1	670	1170	2600	3570	4640	6330	2110
O_3	-	-	-	-	-	-	-	-

[1]

PM_{10}:	Monitoring method(s) used:	ß-absorption
	Correction factor for this method according to EU-directive 1999/30/EC):	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2005 (measured values **including** correction factor):	12
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2005:	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 2009

Zagreb

immission area: 641 km^2 population: 779 145

	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	1	13	53		61		15
PM_{10}	6	32	71	216				114
$PM_{2,5}$	1	25	49	120				73
NO								
NO_2	5	39	59	122		167		90
CO								
O_3	5	27	86	161		138		109

[1]

PM_{10}:	Monitoring method(s) used:	gravimetric
	Correction factor for this method according to EU-directive 1999/30/EC):	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	61
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

Zurich

immission area: 1 086 km^2 population: 1 132 273

	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	23	27	27	17
PM_{10}	1	20	38	64	149	189	204	71
$PM_{2,5}$	1	15	32	56	-	-	-	-
NO	1	11	27	120	186	233	260	136
NO_2	1	33	50	93	104	111	114	95
CO	1	342	529	1047	1390	1617	2095	1160
O_3	1	45	73	98	164	165	168	142

PM_{10}:	Monitoring method(s) used:	β-meter-measurement, calibrated with gravimetrical measurements every 4 days
	Correction factor for this method according to EU-directive 1999/30/EC):	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2009 (measured values **including** correction factor):	11
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2009:	0

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

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