MUNICIPALITY OF LINZ
Environmental and Technical Center

Report Nr. 2/2012

Air Quality Data in 2011

The Comparison of Cities and Regions in Europe

Authors: Judith Kreindl
Wilfried Hager

Environment + Technology

LINZ verändert

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

Inhalt

Contents

Luftgütedaten 2011 Nationaler und europäischer Städtevergleich

Einführung

Die Bekämpfung der Luftverschmutzung ist nach wie vor eines der zentralen Themen, mit denen Umweltämter, Umweltbehörden bzw. sonstige für den Umweltschutz tätige Organisationen beschäftigt sind. In Form von regionalen oder nationalen Luftreinhalteplänen wird versucht, die Luftverschmutzung in den Griff zu bekommen und die Luftqualität sukzessive zu verbessern. In den letzten Jahren ist die Belastung an Feinstaub (PM_{10}) und 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 2011 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 aufgrund des großen Interesses auf immer mehr europäische Städte und Regionen ausgedehnt. Im Jahr 2011 wurden Städte bzw. Regionen aus Deutschland, England, Frankreich, Belgien, Dänemark, Schweden, Italien, Schweiz, Spanien, Polen, Bulgarien, Tschechien, Ungarn, Griechenland, Lettland, Portugal und Kroatien mit einbezogen. Die Städte Luxemburg und Rotterdam lieferten für das Jahr 2011 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 2011 comprised cities and regions of Austria, Germany, cities from England, France, Belgium, Denmark, Sweden, Italy, Switzerland, Spain, Poland, Bulgaria, Czech Republic, Hungary, Greece, Latvia, Portugal and Croatia. No data were sent to us by the city of Luxemburg and Rotterdam in 2011.
Die Städte Bukarest und Debrecen liefern seit 11 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 11 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 sei, da

1. die Zahl der Messstellen sehr verschieden ist (die Anzahl der Messstellen pro Messgebiet ist in der Tabelle auf Seite 19 und den nachfolgenden Grafiken angeführt),
2. die Messstellendichte unterschiedlich ist,
3. die Situierung der Messstellen nicht immer vergleichbar ist (In manchen Städten wurde deswegen bei den Schadstoffkomponenten zwischen verkehrsbelasteten Messstationen und anderen Messstationen unterschieden).

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

1. Die Luftschadstoffmessungen werden im Allgemeinen technisch in der gleichen oder in ähnlicher Weise durchgeführt. Das bedeutet, dass die Luftüberwachung an bestimmten *Punkten* einer Stadt oder einer Region mit Hilfe automatisch registrierender Immissionsmessstationen durchgeführt wird. Die gemessenen Konzentrationen repräsentieren die Belastung eines mehr oder weniger weiten Bereiches um die Messstation. Die *Art der Probenahme* müsste also *vergleichbar* sein.

2. Die Luftgütestationen sollten an Punkten errichtet werden, die einen größeren Bereich um die Messstation abdecken und nicht nur die Schadstoffbelastung an einem bestimmten Punkt widerspiegeln. Ausgenommen sind besondere verkehrsbelastete Probenahmepunkte. Die Messnetzbetreiber wurden eingeladen, diese Messpunkte getrennt anzugeben, um die wirkliche Situation des überwachten Gebietes wiederzugeben. Wie bereits erwähnt, unterscheiden einige Städte zwischen verkehrsbelasteten und nicht vom Verkehr beeinflussten Messstationen.

Critical remarks

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

1. The number of monitoring stations differs very much (the number of monitoring stations of each monitoring network is mentioned in the table on page 19 and the subsequent graphics),
2. the density of distribution of the monitoring stations is different,
3. the location of the monitoring station is not always comparable (for that reason in some cities the network services distinguish between traffic-stressed and non-traffic-influenced monitoring stations).

The authors of the comparative study are thoroughly conscious of these facts. But despite to the raised objections there are also some arguments of continuing the activities:

1. The way of measurement of air pollutants is carried out by the same ore similar technical methods. This means the results of air monitoring activities are obtained by sampling at special sampling *points* in a city or region by means of automatically recording monitoring stations. The registered concentrations represent the stress of a more or less wide area around the monitoring station. Due to this reason the *method of sampling* itself should be *comparable*.

2. The monitoring stations should be located at points representing a wider portion of the monitored area, not only the pollution stress representative for a focal point. Exceptions are special traffic stressed sampling points. The monitoring station network services were invited to separate such monitoring points in order to reproduce the real situation of the monitored area. As already mentioned, some cities distinguish between traffic-stressed and non-traffic-influenced monitoring stations.

3. Schließlich wird eine stärker objektivierende Basis der Auswertungen besonders dann erreicht, wenn längere Zeiträume betrachtet werden und daraus die Trendentwicklung der Schadstoffimmissionen abliest. Nachdem die Stadt Linz internationale und nationale Städtevergleiche schon seit vielen Jahren durchführt, wurde in diesen Bericht für die Jahresmittelwerte auch die mehrjährige *Trendentwicklung* der Schadstoffbelastung seit 1993 für die einzelnen Immissionsgebiete mit aufgenommen. Die Daten von Städten bzw. Regionen, die erst seit kurzem im Städtevergleich integriert sind, wurden dabei auch so weit wie möglich nachgeführt.	3. And finally the evaluations are put to a more objectified basis, if one observes longer term developments and derives from these the trends of the pollutant immission. Since the city of Linz has been carrying out comparisons of the air quality for many years, in this report the *trend developments* for the annual mean value since 1993 for all immission regions have been included. The data of cities or regions which only have been participating the comparison since a couple of years have been updated as far back as possible

Immissionskenngrößen

In der vorliegenden Studie wurden verschiedene Immissionskenngrößen erhoben:

- Jahresmittelwert (Mittel aus allen Stationen einer Stadt/Region)
- Max. Monatsmittelwerte (höchstbelastete Station einer Stadt/Region)
- Max. Tagesmittelwert (höchstbelastete Station einer Stadt/Region)
- Max. 3-Stunden-Mittelwert (höchstbelastete Station einer Stadt/Region)
- Max. Einstunden-Mittelwert (höchstbelastete Station einer Stadt/Region)
- Max. Halbstunden-Mittelwert (höchstbelastete Station einer Stadt/Region)
- Max. 98-Percentil/Jahr (höchstbelastete Station einer Stadt/Region)
- Anzahl der Überschreitungen des PM_{10}-Tagesgrenzwertes an der höchstbelasteten Messstation
- Anzahl der Überschreitungen des NO_2-Grenzwertes für den 1h-Mittelwert an der höchstbelasteten Messstation

Von den einzelnen Messnetzbetreibern wurden die gewünschten Immissionsdaten in sehr unterschiedlicher Vollständigkeit zur Verfügung gestellt. Insbesondere betrifft dies die Perzentil-Auswertungen und manchmal auch die Auswertungen für max. HMW oder max. 3h-MW. Oftmals ist auch nicht das 98-Percentil verfügbar, sondern es werden andere Perzentilgrößen (z. B. 95-Percentil) gebildet. Die meisten Messnetzbetreiber berechnen die Perzentile aus den Halbstunden-Mittelwerten eines Jahres, manchmal werden jedoch auch die Tagesmittelwerte dafür herangezogen.

Wie schon in den letzten Berichten, ist der vorliegende Bericht bei den grafischen Auswertungen kürzer gefasst als in den früheren Jahren. Seit 2006 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 herausgenommen. Aufgenommen wurden hingegen 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. Since 2006 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 2011 aufgetragen.

Nach Analyse der Daten, können folgende Aussagen getroffen werden:

1. Einige Städte und Regionen haben ein dichtes Messstellennetz bezogen auf die Größe des Immissionsgebietes. Beispiele: Berlin, Linz, Wien. Andererseits werden manchmal sehr große Gebiete durch eine geringe Zahl von Messstationen überwacht.
2. Aufgrund dieser Tatsache ist die Vergleichbarkeit einzelner Regionen begrenzt.
3. Die Belastung (Jahresmittelwerte) einzelner Regionen und Städte ist noch immer sehr unterschiedlich.
   Bei einigen Städten kann man erkennen, dass in jenen Situationen, bei denen 1993 relativ hohe Immissionsbelastungen registriert wurden, seitdem oftmals eine deutlich sichtbare Besserung der Immissionssituation eingetreten ist, während in Städten mit niedriger Immissionsbelastung im Vergleich dazu kaum eine Änderung der Luftbelastung eingetreten ist.

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

Pollutants compared

The following air pollutants have been compared:

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

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

Comparison over a period of years

One can get a good impression of the development of the air pollutant stress by studying the graphics. For this the immission stress for the area of each participating city and region from 1993 through 2011 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 den Städten und Regionen die Schwebstaub (TSP)-Messungen abgeschaltet wurden. Diese Messungen wurden durch Feinstaub (PM_{10}-Messungen) abgelöst. TSP-Messungen wurden daher im vorliegenden Vergleich nicht mehr miteinbezogen.

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

   SO_2: Alle Regionen *geringer* belastet

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

   PM_{10}: uneinheitlich, tendenziell *gleich bleibend* oder *geringer belastet*

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

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

   CO: Nahezu alle Regionen *geringer* belastet

   O_3: Belastung tendenziell *gleich bleibend oder leicht erhöht*

4. It can be seen that cities and regions do not monitor TSP any more. These measurements were replaced by monitoring the pollutant PM_{10}. So TSP measurements have not been included in the present report any more.

5. Development of the air pollution stress (annual mean values of SO_2, TSP (only until 2004!), NO, NO_2, CO, O_3) in comparison with 1993 (for PM_{10}: comparison with 2001):

   SO_2: All regions *less* stressed

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

   PM_{10}: non-uniform, trend is constant or *lower* stressed

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

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

   CO: nearly all regions *lower* trend of stress

   O_3: trend is constant or *slightly higher* stressed

Übersicht über die Entwicklung der Schadstoffbelastungen 1993 -2011 [1)]

Beurteilungsbasis: Jahresmittelwerte über alle Stationen einer Region

Overview over the development of the stress of air pollutants from 1993 through 2011 [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 2011	Stress in 1993 [2)]	Trend last 5 years	Stress in 2011	Stress in 1993 [2)]	Trend last 5 years	Stress in 2011	Stress in 1993 [2)]	Trend last 5 years	Stress in 2011	Stress in 1993 [2)]	Trend last 5 years	Stress in 2011
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 2011	Stress in 1993 [3]	Trend last 5 years	Stress in 2011	Stress in 1993 [3]	Trend last 5 years	Stress in 2011	Stress in 1993 [3]	Trend last 5 years	Stress in 2011	Stress in 1993 [3]	Trend last 5 years	Stress in 2011
Athens	2007	↓		2007	↘		2007	↓		2007	↓		2007	↗	
Barcelona	1994	==		1994	↓		1994	↓			==		1994	↗	
Basel		↘			==			==			-	1999		==	
Belfast		↓			==			==			==			==	
Berlin		==			==			==			↓			==	
Birmingham		↘			==			==			-	2010		==	
Bristol		==			==			==			↘			==	
Brussels	1995	↘		1995	==		1995	↘			↘		1995	==	
Budapest	1996	↗		2003	↘		2003	==			==		2003	==	
Chemnitz		-	2007		==			==			-	2007		==	
Copenhagen		==		1994	-	2005	1995	==			==		1994	==	
Debrecen		-	2001	1995	-	2001		-	2001		-	2001		-	2001
Dresden		==			↘			↘			-	2007		==	
Edinburgh		==			==			==			==			↘	
Frankfurt		↘			==			==			==			==	
Gothenburg		==			↗			==			↗			==	
Hamburg		==			==			==			↘			==	
Karlsruhe		↘			==			==			==			==	
Leeds		↘			↗			==			↑			↘	
Leipzig		==			==			==			-	2007		==	
Lisbon	1997	↘		2001	-	2010	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 2011	Stress in 1993 [4)]	Trend last 5 years	Stress in 2011	Stress in 1993 [4)]	Trend last 5 years	Stress in 2011	Stress in 1993 [4)]	Trend last 5 years	Stress in 2011	Stress in 1993 [4)]	Trend last 5 years	Stress in 2011
Luxemburg	1996	-	2010	1996	-	2010	1996	-	2010	1996	-	2010	1996	-	2010
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	-	2010	1995	-	2010	1995	-	2010	2003	-	2010	1995	-	2010
Sofia	1999	↘		2003	-		1999	↘		1999	↓		1999	↗	
Stockholm		==		1994	-	2004	1994	↘		1994	↘			==	
Stuttgart	2007	↘		2008	-		2007	↓		2007	↘		2007	==	
Thessaloniki	2007	↓		2007	==		2007	↓		2007	↑		2007	↗	
Warsaw	1995	↘		2001	==		1995	==		1995	↘		1995	↗	
Wiesbaden		↘			==			==			==			==	
Zagreb		↘		-	-	-	1994	==		2005	-		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 2011 [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 2011 [6]
Gothenburg		==	
Hamburg		==	
Karlsruhe		==	
Leeds		==	
Leipzig		==	
Lisbon		==	
Liverpool		==	
London		↘	
Luxemburg		-	2010
Lyon		==	
Madrid		↓	
Mannheim		==	
Milan		↘	
Munich		==	
Prague	2007	==	
Riga		↓	
Rhine/Ruhr Area		==	
Rotterdam		-	2010
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 2011 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 2011 [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 2011 [9)]

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

	PM_{10} number of days >50 µg/m³										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Linz	62	66	80	46	68	71	41	47	30	45	45
Bludenz	-	-	-	-	13	45	16	13	12	17	14
Dornbirn	-	-	38	21	22	40	18	20	14	21	13
Graz	159	131	131	117	127	113	76	73	57	69	78
Hallein	-	28	49	26	27	50	20	13	20	29	19
Innsbruck	-	50	61	52	55	83	46	28	26	29	46
Klagenfurt	36	58	74	80	82	79	42	33	34	43	46
Region Leoben	26	7	42	29	36	49	36	25	19	20	31
Salzburg	-	34	62	34	39	56	25	34	37	41	31
St. Pölten	-	-	58	79	87	57	23	20	23	38	39
Vienna	-	57	95	54	92	108	48	39	40	87	62
Villach	-	24	35	25	29	45	10	9	17	7	18
Athens	-	-	-	-	-	-	178	163	122	99	101
Barcelona	-	86	-	47	74	100	97	72	94	23	43
Basel	11	22	23	16	15	24	12	6	10	11	8
Belfast	16	7	33	8	5	7	5	7	3	10	10
Berlin	60	91	117	62	74	71	30	24	39	46	54
Birmingham	2	1	5	4	5	9	18	10	7	8	18
Bristol	7	1	9	12	4	6	15	15	7	4	12
Brussels	52	153	163	127	67	56	56	66	66	45	87
Budapest	-	-	-	178	160	162	117	96	71	84	86
Chemnitz	41	20	35	12	59	65	27	19	32	34	39
Copenhagen	-	59	91	-	-	68	60	59	59	18	46
Dresden	53	36	53	27	78	49	27	35	42	40	46
Edinburgh	3	8	2	0	3	2	6	0	3	0	0
Frankfurt	42	44	51	19	48	24	33	22	36	26	42
Gothenburg	1	10	12	2	7	13	3	4	0	0	21
Hamburg	33	43	62	20	45	31	26	18	15	26	46
Karlsruhe	6	33	33	25	22	34	16	10	20	23	18
Leeds	3	3	9	4	15	10	11	8	16	11	26

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

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

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

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

	PM10										
	number of days >50 µg/m³										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Leipzig	109	63	92	49	82	74	40	40	51	49	69
London	28	29	61	107	121	157	124	157	47	22	57
Lisbon	230	222	183	147	180	145	154	82	92	90	113
Liverpool	4	2	1	14	5	8	11	12	6	2	8
Lyon	-	83	124	71	153	-	142	79	39	81	93
Madrid	-	98	-	121	159	181	123	65	35	18	41
Mannheim	25	44	36	41	43	20	26	12	23	24	27
Milan	148	177	137	139	152	149	132	115	106	85	132
Munich	64	75	123	59	107	92	53	60	52	65	48
Prague	-	-	-	-	-	-	132	84	48	71	68
Riga	57	74	105	160	88	244	148	126	46	31	11
Rhine/Ruhr Area	40	48	58	38	21	-	71	68	70	54	62
Rotterdam	98	103	123	54	30	31	26	12	12	12	-
Sofia	-	-	225	178	162	-	195	199	106	134	134
Stockholm	101	113	80	80	80	74	75	77	65	46	58
Stuttgart	-	-	-	-	-	-	110	14	19	40	42
Thessaloniki	-	-	-	-	-	-	152	155	80	96	87
Warsaw	-	-	89	184	162	192	136	133	148	151	129
Wiesbaden	15	35	19	11	18	32	20	8	13	5	25
Zagreb	-	-	-	75	89	134	108	116	61	73	101
Zurich	18	23	38	23	15	39	17	11	11	12	11

Anzahl der Überschreitungen des 1h-Grenzwertes für NO_2 von 200 µg/m³ in den Jahren 2004 bis 2011

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 2011
based on the number of exceedances at the peak stressed monitoring station of a region

	NO_2 number of 1 h mean values >200 µg/m³							
	2004	2005	2006	2007	2008	2009	2010	2011
Linz	0	1	4	4	1	5	3	6
Bludenz	0	0	0	0	0	0	0	0
Dornbirn	-	0	0	0	0	0	0	0
Graz	0	0	4	0	0	0	1	0
Hallein	0	0	1	3	0	0	0	0
Innsbruck	0	0	4	0	0	1	0	0
Klagenfurt	-	1	1	1	0	0	1	1
Region Leoben	0	0	0	0	0	0	0	0
Salzburg	0	0	2	1	2	4	3	0
St. Pölten	0	0	0	0	1	0	0	0
Vienna	8	24	26	11	17	4	7	5
Villach	0	0	0	0	0	0	0	0
Athens	-	-	-	192	56	35	8	1
Barcelona	13	-	18	22	13	9	0	12
Basel	0	0	0	0	0	0	0	0
Belfast	0	4	5	0	3	0	0	0
Berlin	-	-	-	6	0	8	6	3
Birmingham	0	2	0	0	3	0	7	4
Bristol	0	22	13	8	5	11	3	0
Brussels	24	90	2	2	6	1	1	3
Budapest	1	25	19	9	1	0	1	3
Chemnitz	1	0	0	1	0	2	0	2
Copenhagen	-	-	-	-	-	-	-	-
Dresden	0	0	0	0	0	0	0	0
Edinburgh	0	0	0	0	6	0	0	0
Frankfurt	0	10	3	6	2	16	5	8

	NO_2							
	number of 1 h mean values >200 µg/m³							
	2004	2005	2006	2007	2008	2009	2010	2011
Gothenburg	2	0	7	1	1	0	3	8
Hamburg	0	0	26	19	30	29	24	10
Karlsruhe	5	0	0	0	3	3	4	2
Leeds	0	0	0	0	8	0	1	0
Leipzig	1	39	0	0	0	0	0	0
Liverpool	0	458	0	0	0	0	0	0
Lisbon	52	-	80	39	20	69	21	37
London	542	139	686	458	822	486	539	229
Luxemburg	-	267	-	-	-	-	0	-
Lyon	35	0	-	139	66	28	181	150
Madrid	83	-	208	267	119	150	76	103
Mannheim	0	69	0	0	0	0	1	1
Milan	47	1	123	-	241	101	25	132
Munich	11	0	103	69	56	95	192	50
Prague	-	0	-	1	106	98	56	51
Riga	0	0	0	0	0	0	0	0
Rhine/Ruhr Area	0	24	-	0	0	0	1	0
Rotterdam	10	3	2	0	0	0	0	-
Sofia	7	450	-	24	155	95	30	55
Stockholm	0	3	1	3	1	0	3	1
Stuttgart	-	-	-	5	9	22	6	6
Thessaloniki	-	3	-	3	1	0	0	0
Warsaw	0	0	5	17	0	0	1	5
Wiesbaden	0	0	2	3	1	7	1	3
Zagreb	0	0	0	0	0	0	0	0
Zurich	0	0	0	0	0	0	0	0

Anzahl der Messstellen Number of monitoring stations

Country	Monitored Area	SO_2	PM_{10}	$PM_{2,5}$	NO	NO_2	CO	O_3
Austria	Bludenz	-	1	-	1	1	-	1
	Dornbirn	1	1	-	1	1	-	-
	Graz	4	7	2	6	6	3	4
	Hallein	2	1	-	2	2	1	1
	Innsbruck	1	2	1	3	3	1	3
	Klagenfurt	1	2	1	2	2	2	2
	Region Leoben	3	5	-	4	4	1	1
	Linz	5	6	1	7	7	5	3
	Salzburg	2	3	2	3	3	2	2
	St. Pölten	2	2	1	2	2	1	2
	Vienna	7	13	6	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	3	-	5	1	5
Czech Republic	Prague	8	20	5	15	20	4	9
Denmark	Copenhagen	1	3	2	-	3	2	2
France	Lyon	4	5	3	7	7	4	3
Germany	Berlin	2	12	5	16	16	2	7
	Chemnitz	-	2	1	2	2	-	1
	Dresden	1	4	3	4	4	-	3
	Frankfurt	2	4	1	4	4	1	2
	Hamburg	4	10	4	16	16	7	6
	Karlsruhe	1	2	2	2	2	1	1
	Leipzig	1	3	2	3	3	-	1
	Mannheim	2	3	2	3	3	1	2
	Munich	1	4	2	5	5	4	3
	Rhine/Ruhr Area	9	20	10	21	21	-	16
	Stuttgart	1	2	2	2	2	1	2
	Wiesbaden	1	2	1	2	2	1	1
Greece	Athens	5	7	3	14	14	7	13
	Thessaloniki	2	5	-	6	6	4	5
Hungary	Budapest	10	12	1	12	12	12	10
Italy	Milan	1	3	1	8	8	4	3
Latvia	Riga	2	4	2	1	3	1	3
Luxemburg	Luxemburg (2010)	2	1	1	2	2	2	2
The Netherlands	Rotterdam (2010)	7	3	3	3	3	2	3
Poland	Warsaw	4	5	3	4	4	3	4
Portugal	Lisbon	4	5	2		6	6	4
Spain	Barcelona	3	9	6	6	6	3	4
	Madrid	10	12	6	24	24	10	14

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	4	2	1	2	4	2	3
	Stockholm	1	5	4	-	5	2	1
U.K.	Belfast	1	1	1	1	1	1	1
	Birmingham	2	2	2	2	2	-	2
	Bristol	1	1	1	2	2	1	1
	Edinburgh	1	1	1	1	1	1	1
	Leeds	1	2	2	2	2	1	1
	Liverpool	1	1	1	2	2	1	1
	London	6	6	10	15	15	7	9

Immissionsgebiete und Bevölkerung

Immission area and population

Country	Monitored Area	immission area [km²]	population
Austria	Bludenz	3	13 727
	Dornbirn	13	45 978
	Graz	128	265 318
	Hallein	27	20 022
	Innsbruck	105	144 696
	Klagenfurt	120	93 306
	Region Leoben	108	24 645
	Linz	96	189 845
	Salzburg	66	149 385
	St. Pölten	108	52 109
	Vienna	415	1 731 236
	Villach	135	59 004
Belgium	Brussels	161	1 119 088
Bulgaria	Sofia	1 344	1 291 591
Croatia	Zagreb	641	792 875
Czech Republic	Prague	496	1 270 000
Denmark	Copenhagen	88	528 208
France	Lyon	48	445.274
Germany	Berlin	892	3 460 725
	Chemnitz	221	243 248
	Dresden	328	523 058
	Frankfurt	248	691 518
	Hamburg	755	1 796 077
	Karlsruhe	173	297 488
	Leipzig	298	522 883
	Mannheim	145	314 931
	Munich	310	1 378 176
	Rhine/Ruhr Area	5 770	8 213 872
	Stuttgart	207	613 392
	Wiesbaden	204	278 919
Greece	Athens	1 948	3 551 370
	Thessaloniki	129	794 330
Hungary	Budapest	525	1 733 685
Italy	Milan	182	1 324 110
Latvia	Riga	307	659 418
Luxemburg	Luxemburg	51	91 000
The Netherlands	Rotterdam	803	1 200 000
Poland	Warsaw	517	1 708 491
Portugal	Lisbon	85	550 000

Country	Monitored Area	immission area [km²]	population
Spain	Barcelona	101	1 615 448
	Madrid	604	3 237 937
Switzerland	Basel	557	501 285
	Zurich	1 086	1 185 214
Sweden	Gothenburg	72 164	520 374
	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.15 Energie, Wohnbau, Technik (Ref. für Luftreinhaltung) Landhausgasse 7 A-8010 Graz e-mail: *abteilung15@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: *andreas.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*
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 Umweltschutz Roßmarkt 6 A-3100 St. Pölten Austria e-mail: umweltschutz@st-poelten.gv.at Homepage: http://www.noe.gv.at/Umwelt/Luft.html

Austria ***Vienna***	Magistrat der Stadt Wien, Wiener Umweltschutzabteilung, 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: *abt8.post@ktn.gv.at* Homepage: http://www.ktn.gv.at/198194_DE-Oekologie_und_Monitoring-Luftreinhaltung_und_Immissionsschutz
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: fonmon@eea.government.bg Homepage: -
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://www.dmu.dk/en/air/

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***	Senatsverwaltung für Stadtentwicklung und Umwelt Referat Immissionsschutz, , IX C 63 Brückenstraße 6 D-10179 Berlin Germany e-mail: efthalia.nulis@SenStadtUm.Berlin.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.smul.sachsen.de/lfulg
Germany ***Frankfurt, Wiesbaden***	Hessisches Landesamt für Umwelt und Geologie Rheingaustrasse 186 D-65203 Wiesbaden Germany e-mail: baerbel.oehme@hlug.hessen.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.hamburger-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 Umwelt Bürgermeister-Ulrich-Straße 160 D-86179 Augsburg Germany e-mail: *Ulrich.Boellmann@lfu.bayern.de* Homepage: www.lfu.bayern.de

Germany ***Rhine Area, Ruhr Area***	Landesamt für Natur, Umwelt und Verbraucherschutz 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@prv.ypeka.gr* Homepage: www.ypeka.gr
Hungary ***Budapest***	Hungarian Meteorological Service Air Quality Reference Centre 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 Protection and Regional Development of the Republic of Latvia Lativian 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: Andre.snijder@dcmr.nl Homepage: *http://www.dcmr.nl*

Poland ***Warsaw***	WIOS Warszawa ul. Bartycka 110A PL-00-716 Warszawa Poland e-mail: t.klech@wios.warszawa.pl Homepage: *http://www.wios.warszawa.pl*
Portugal ***Lisbon***	Comissão de Coordenação e Desenvolvimento Regional de Lisboa e Vale do Tejo R. Bramcaamp 7 PT-1250-048 Lisboa Portugal e-mail : ambiente@ccdr-lvt.pt 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, 1^{a} planta E-28003 Madrid e-mail: *mpallares@magrama.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

2011

Jahresmittelwert (Gebietsmittel)

Comparison of The Air Quality

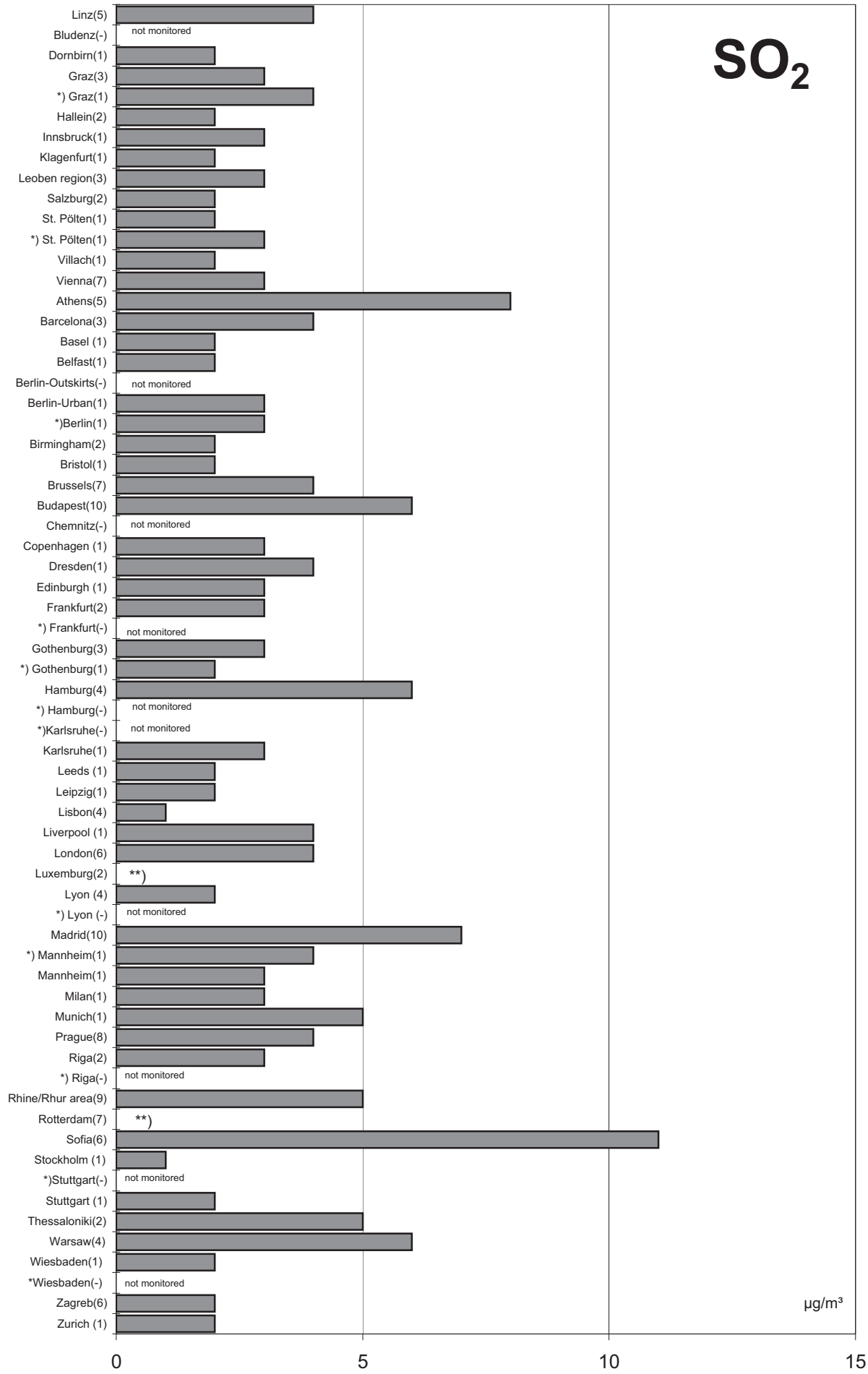
2011

Annual Mean Values

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)



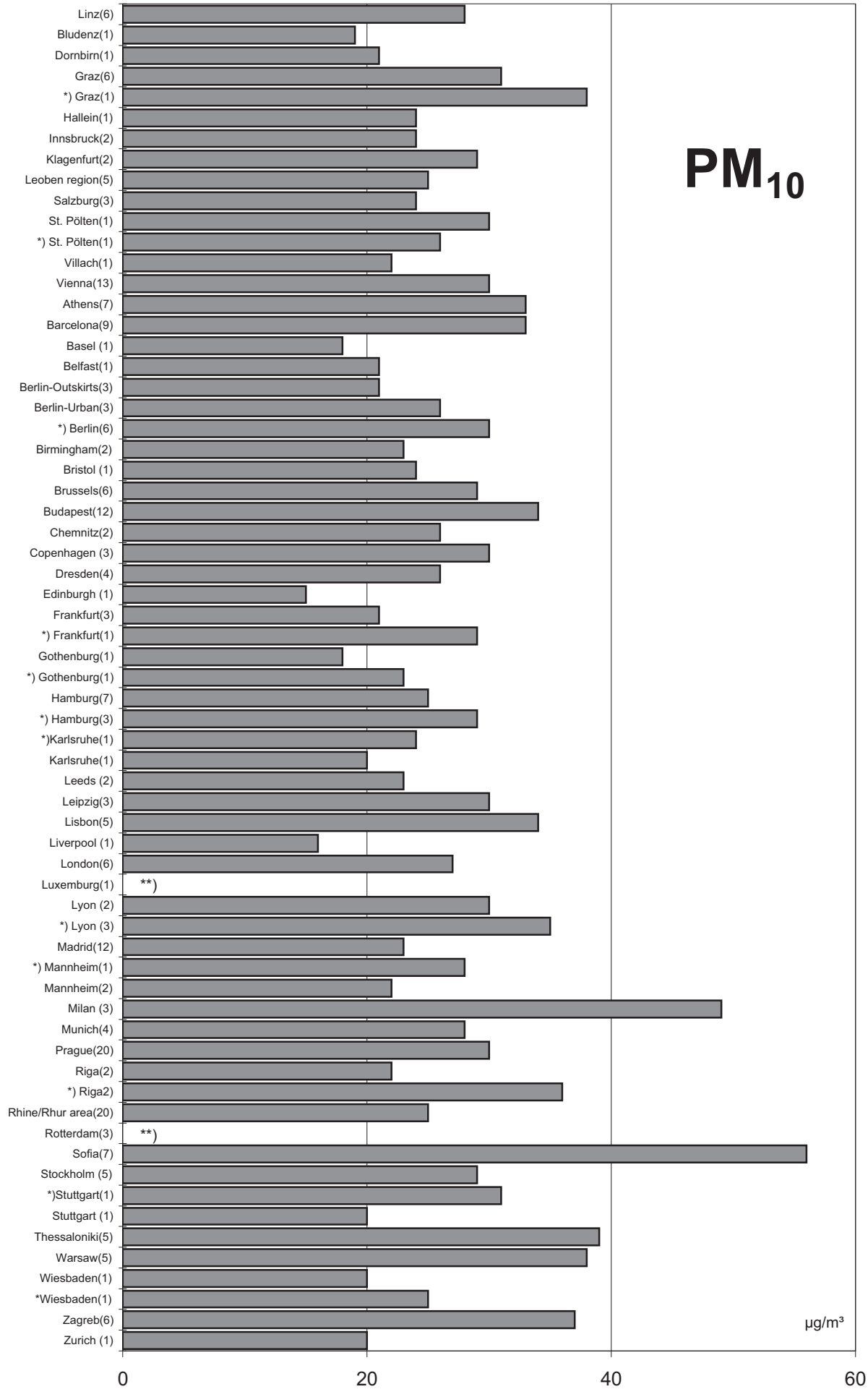
*) traffically influenced monitoring stations

**) no data

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)



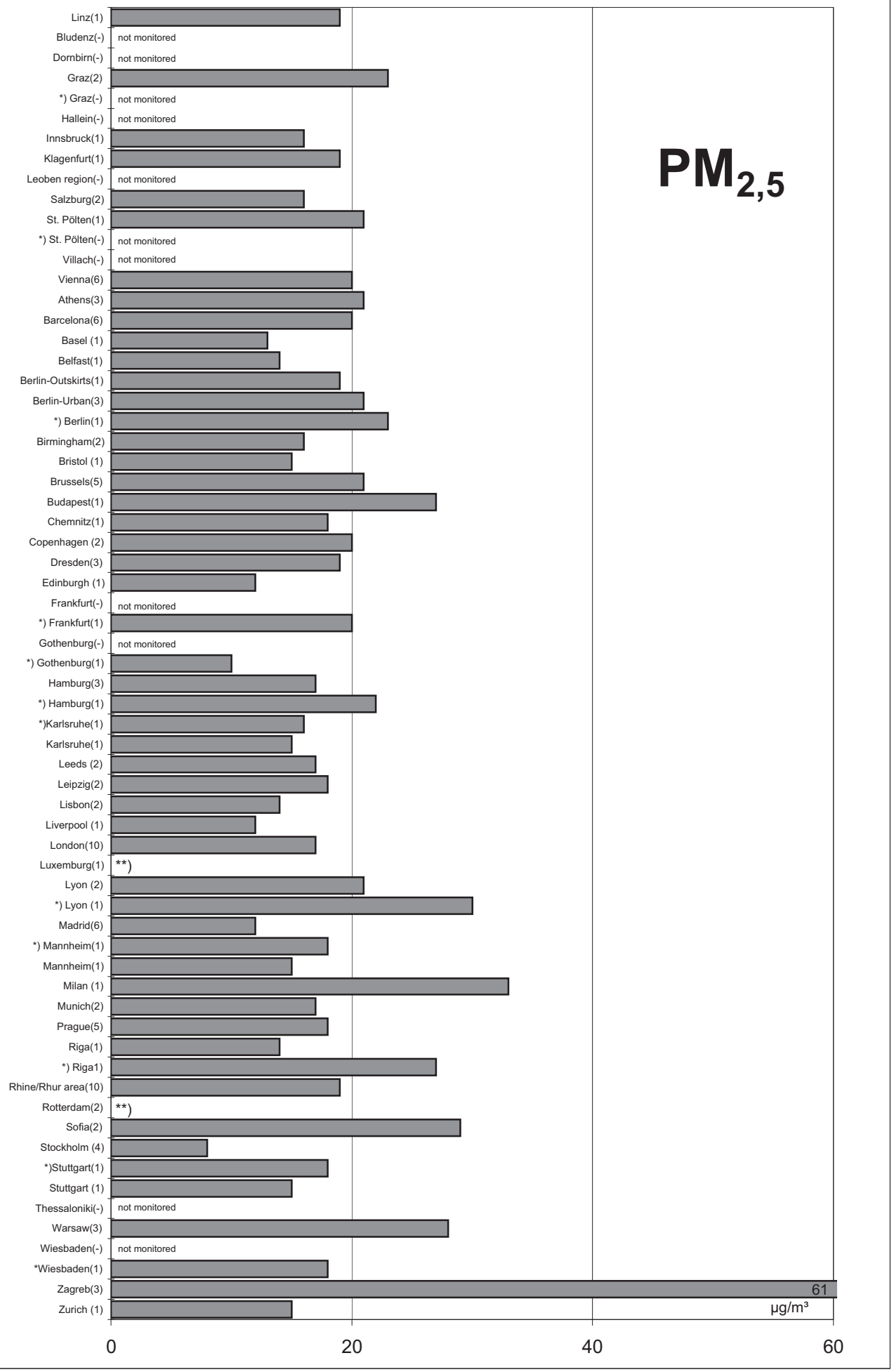
*) traffically influenced monitoring stations

**) no data

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)



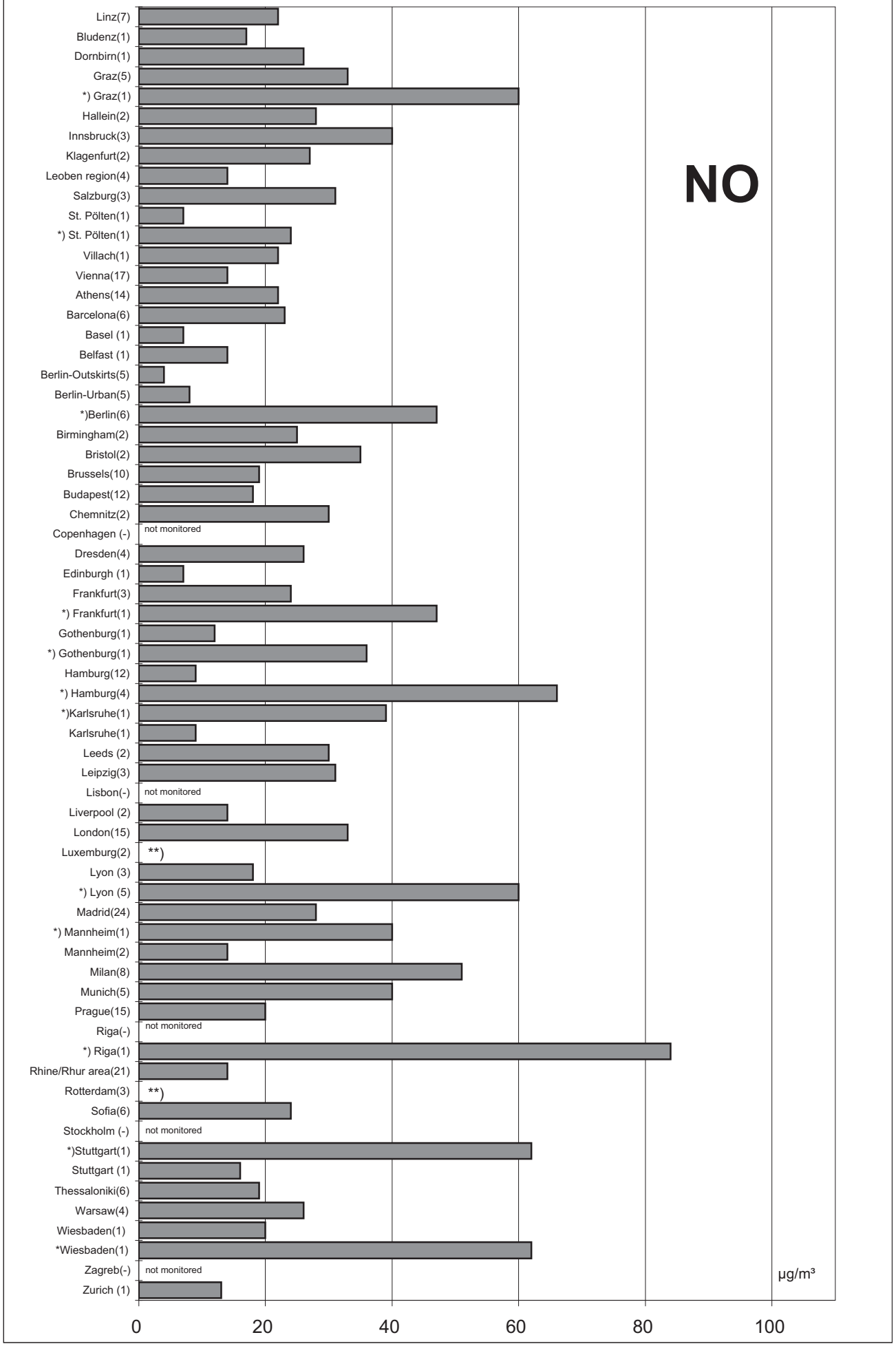
*) traffically influenced monitoring stations

**) no data

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)



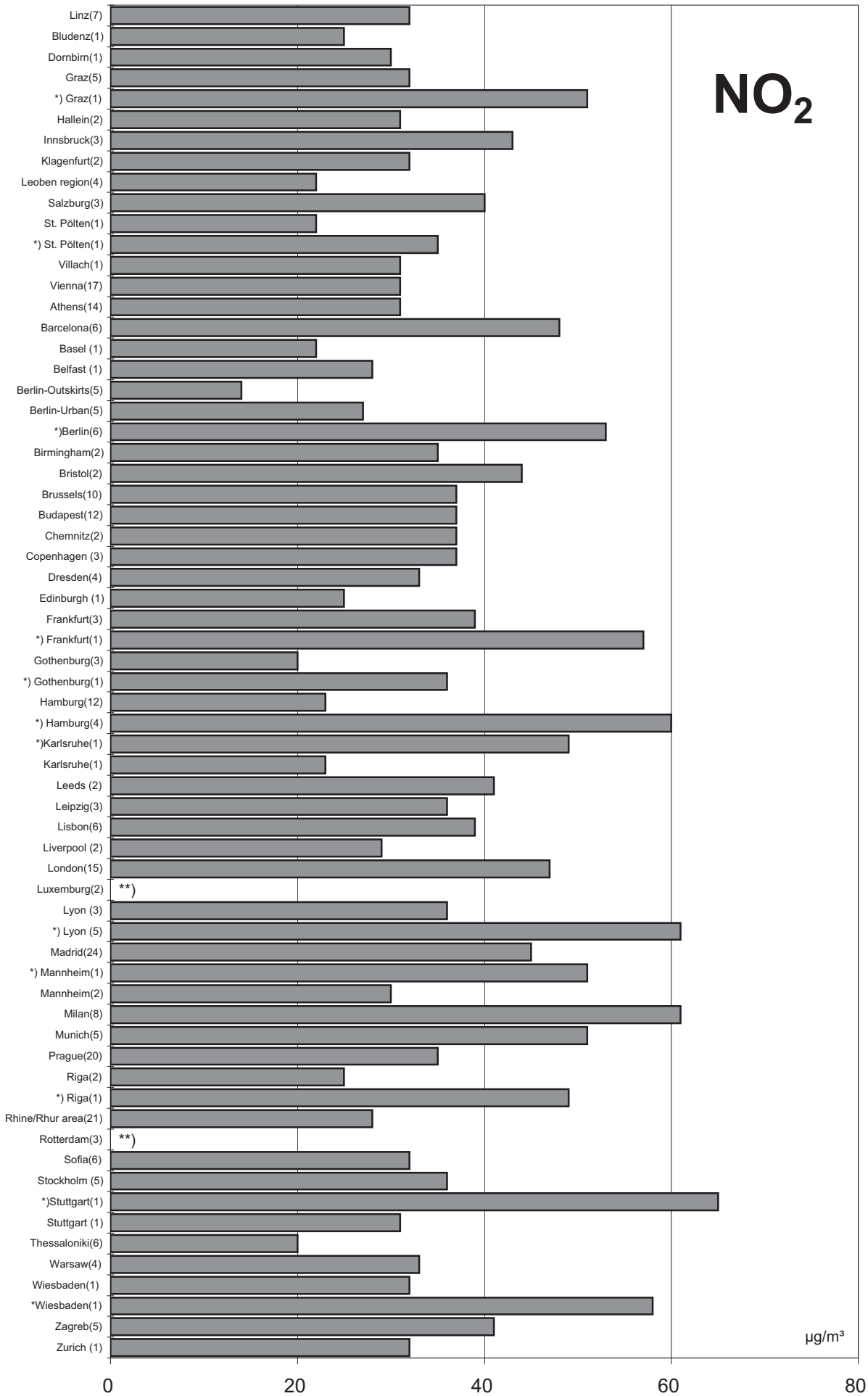
*) traffically influenced monitoring stations

**) no data

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)



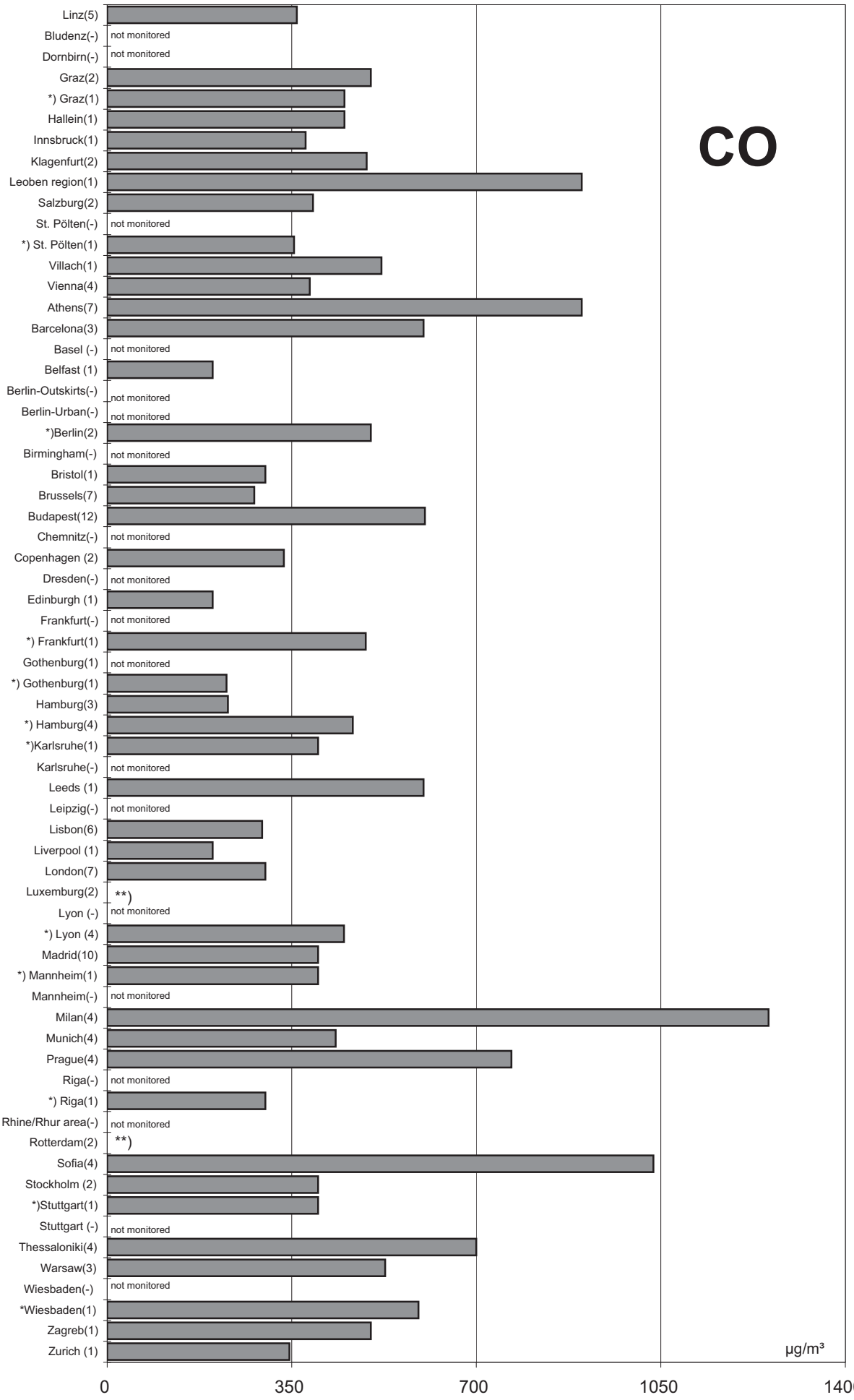
*) traffically influenced monitoring stations

**) no data

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)



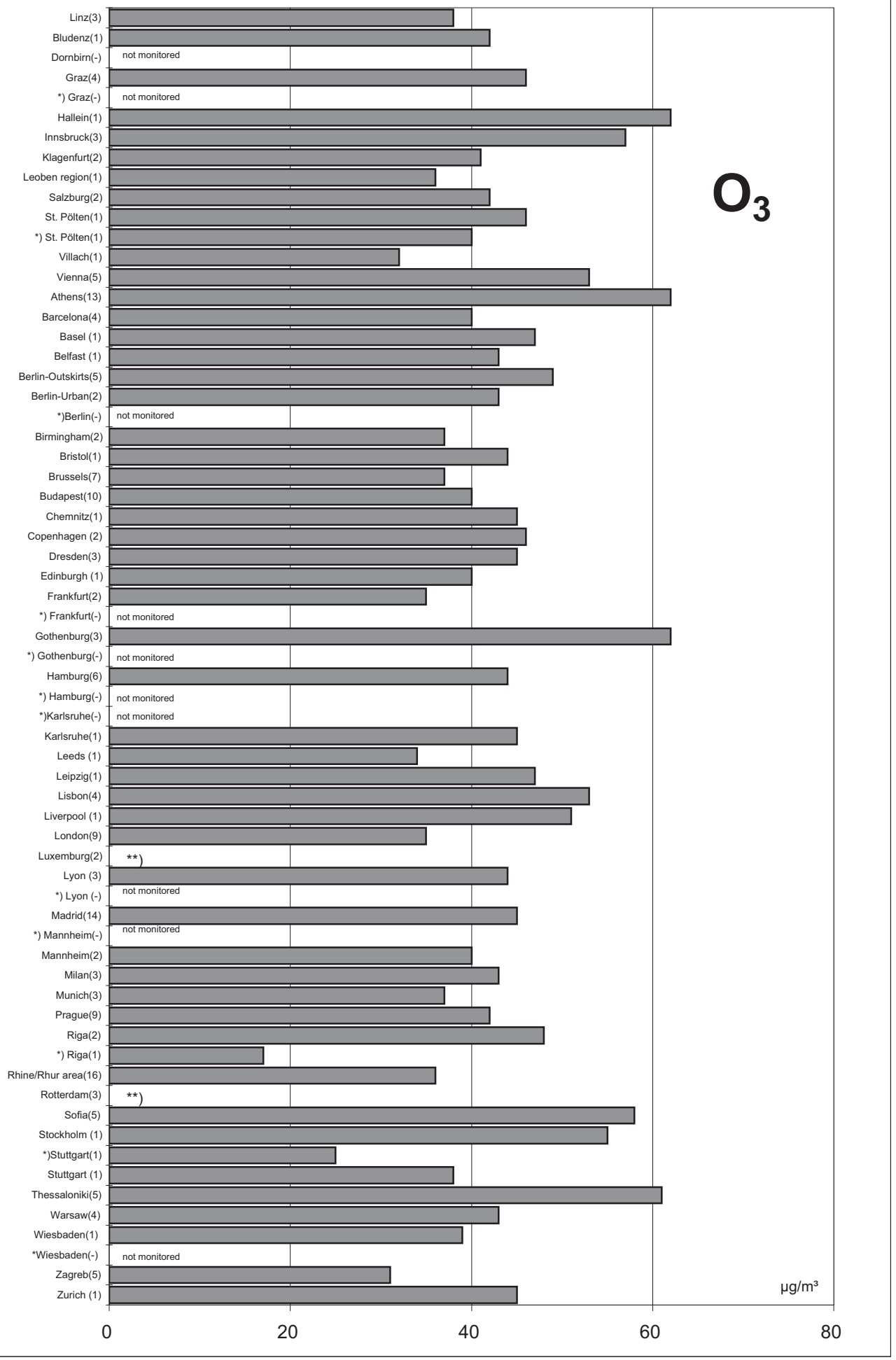
*) traffically influenced monitoring stations

**) no data

Comparison of The Air Quality in 2011

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

2011

max. Tagesmittelwert

Comparison of The Air Quality

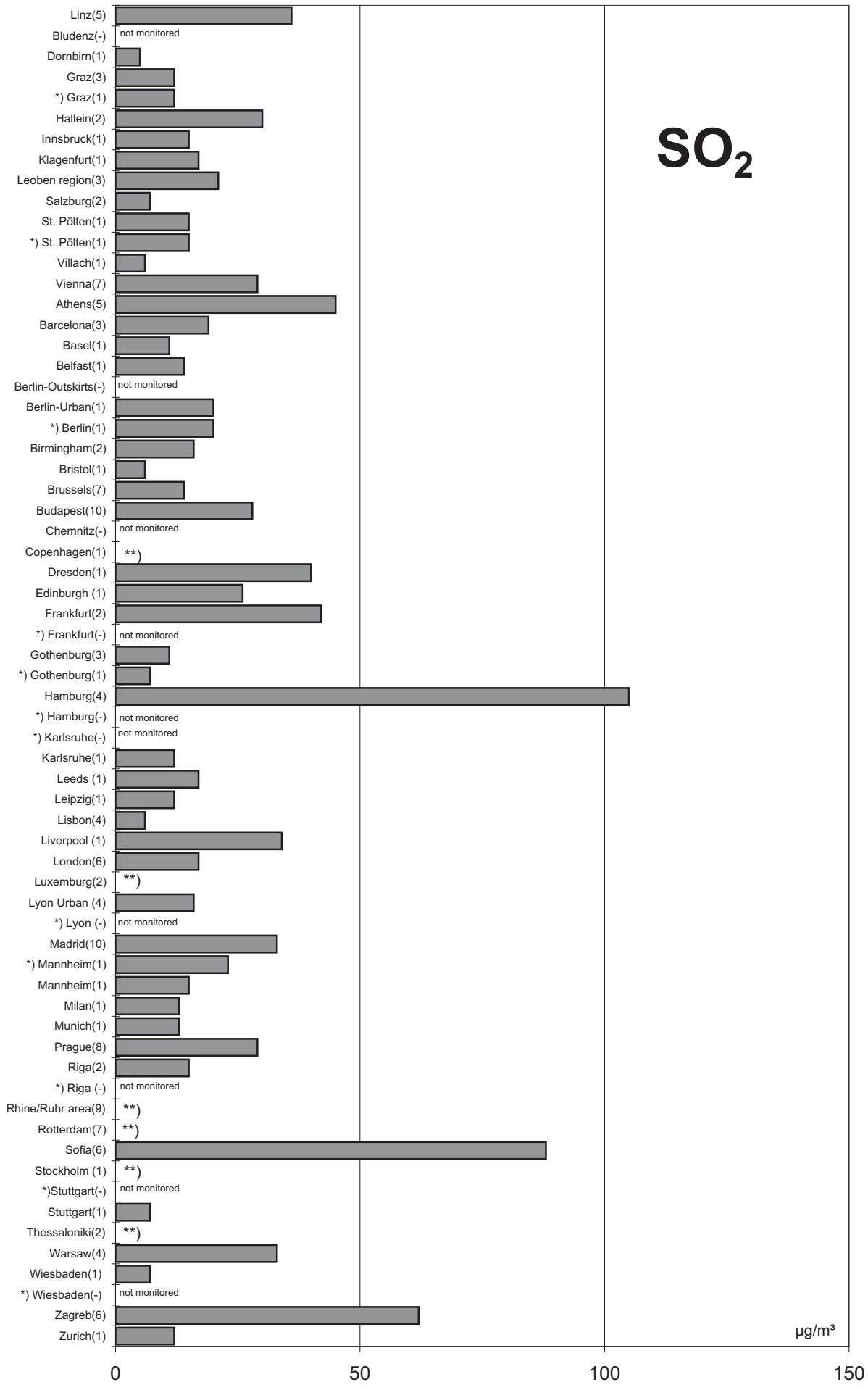
2011

Max. Daily Mean Values

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)

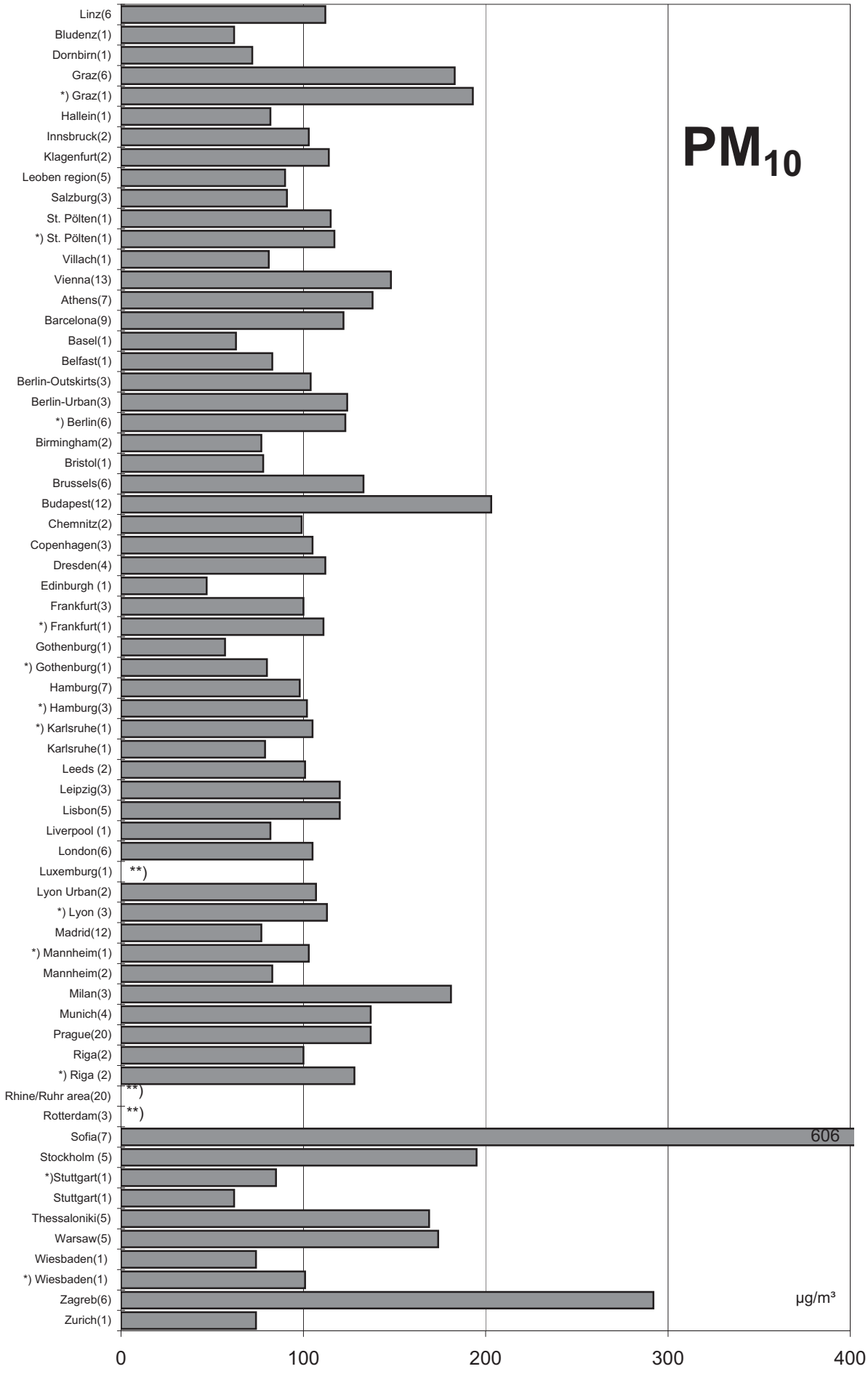


*) traffically influenced monitoring stations
**) no data

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)



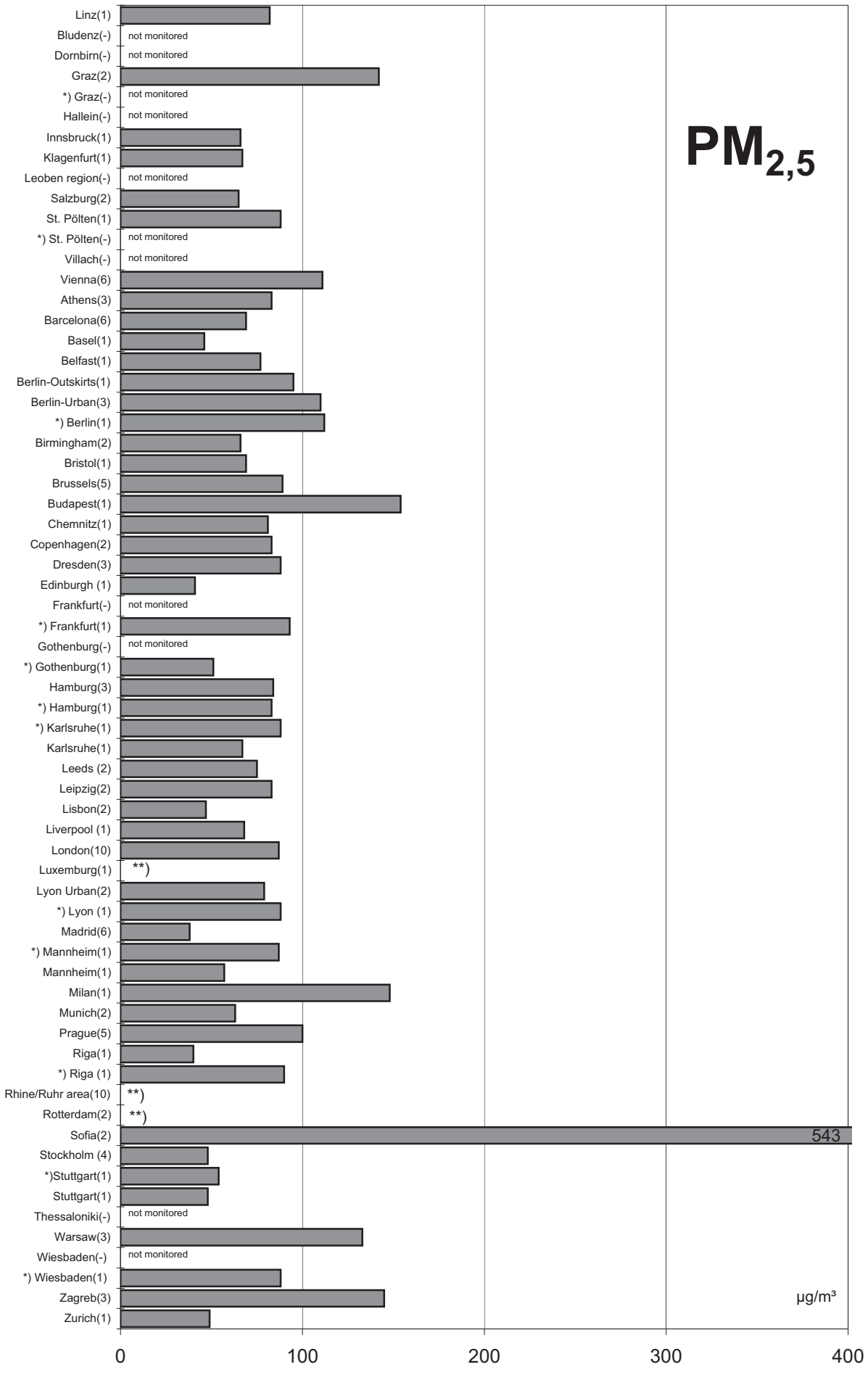
*) traffically influenced monitoring stations

**) no data

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)

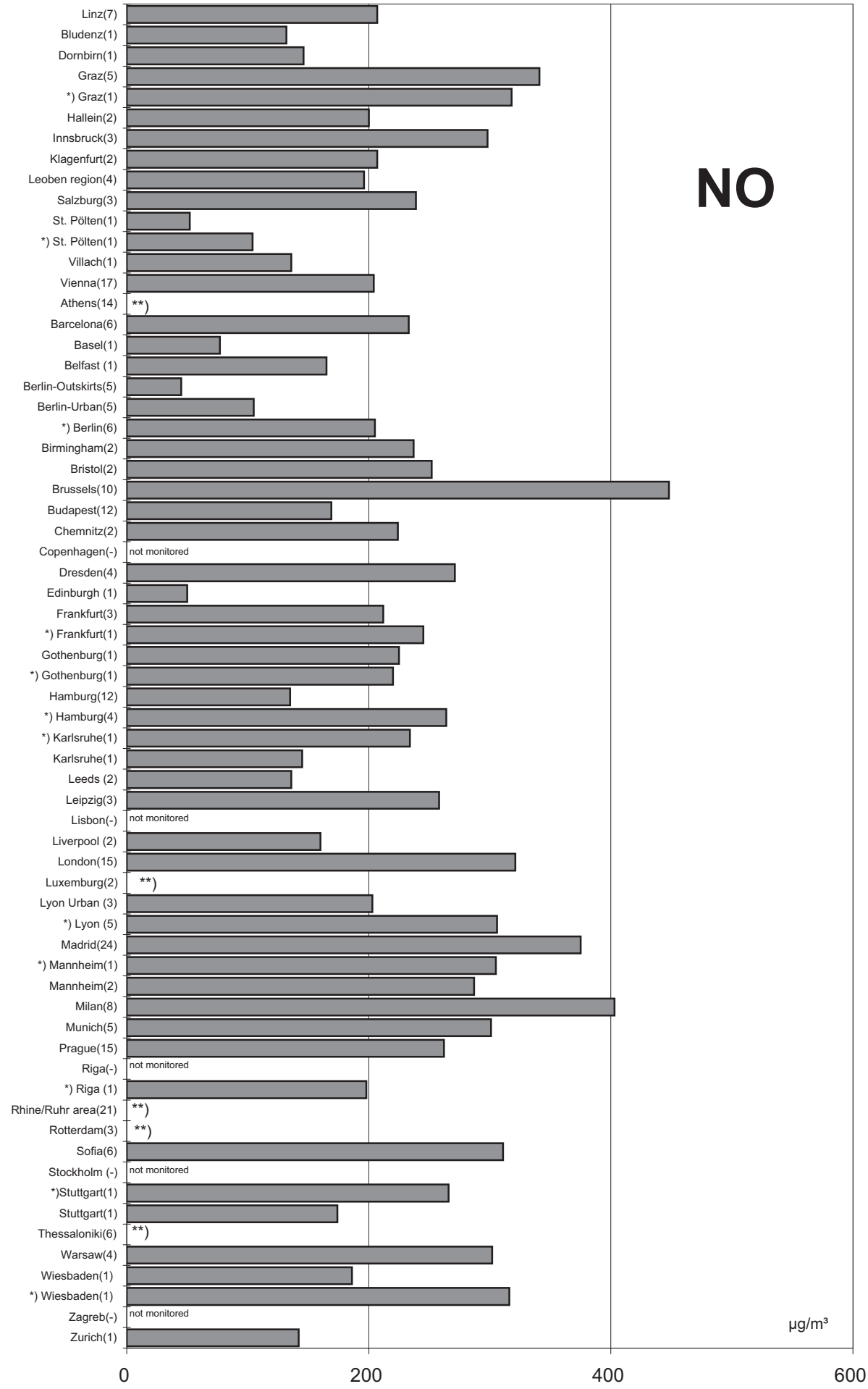


*) traffically influenced monitoring stations
**) no data

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)

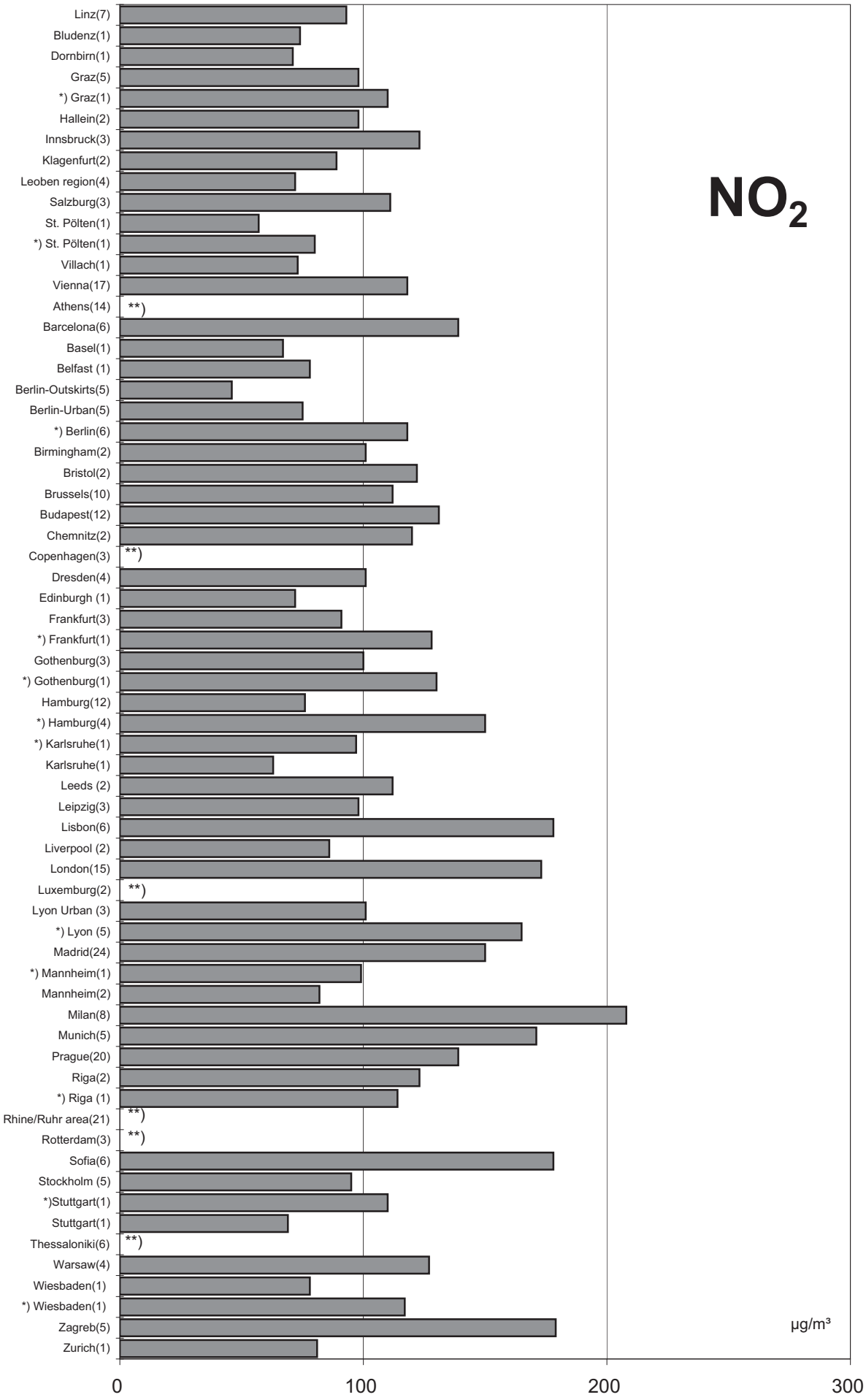


*) traffically influenced monitoring stations
**) no data

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)

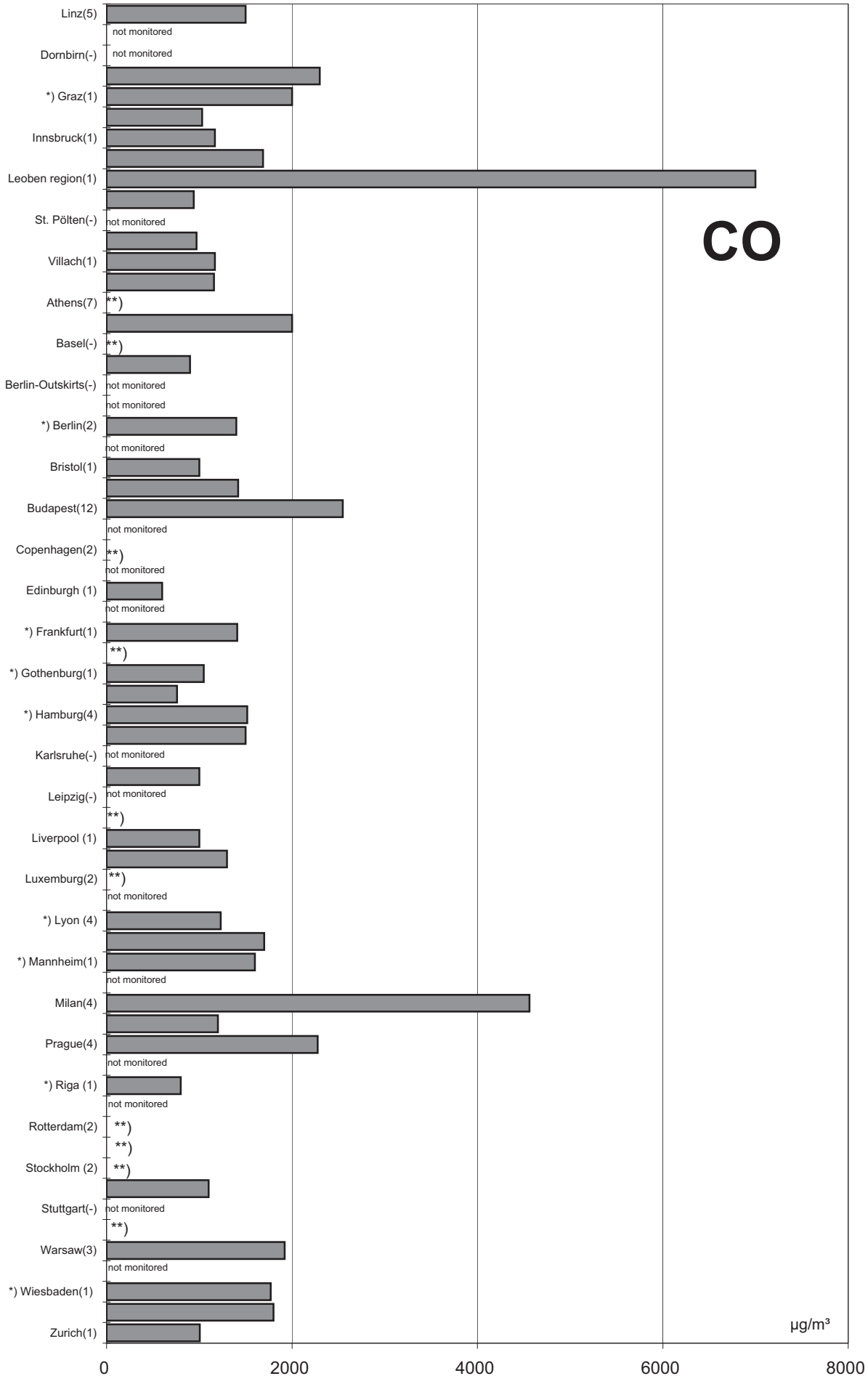


*) traffically influenced monitoring stations
**) no data

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)

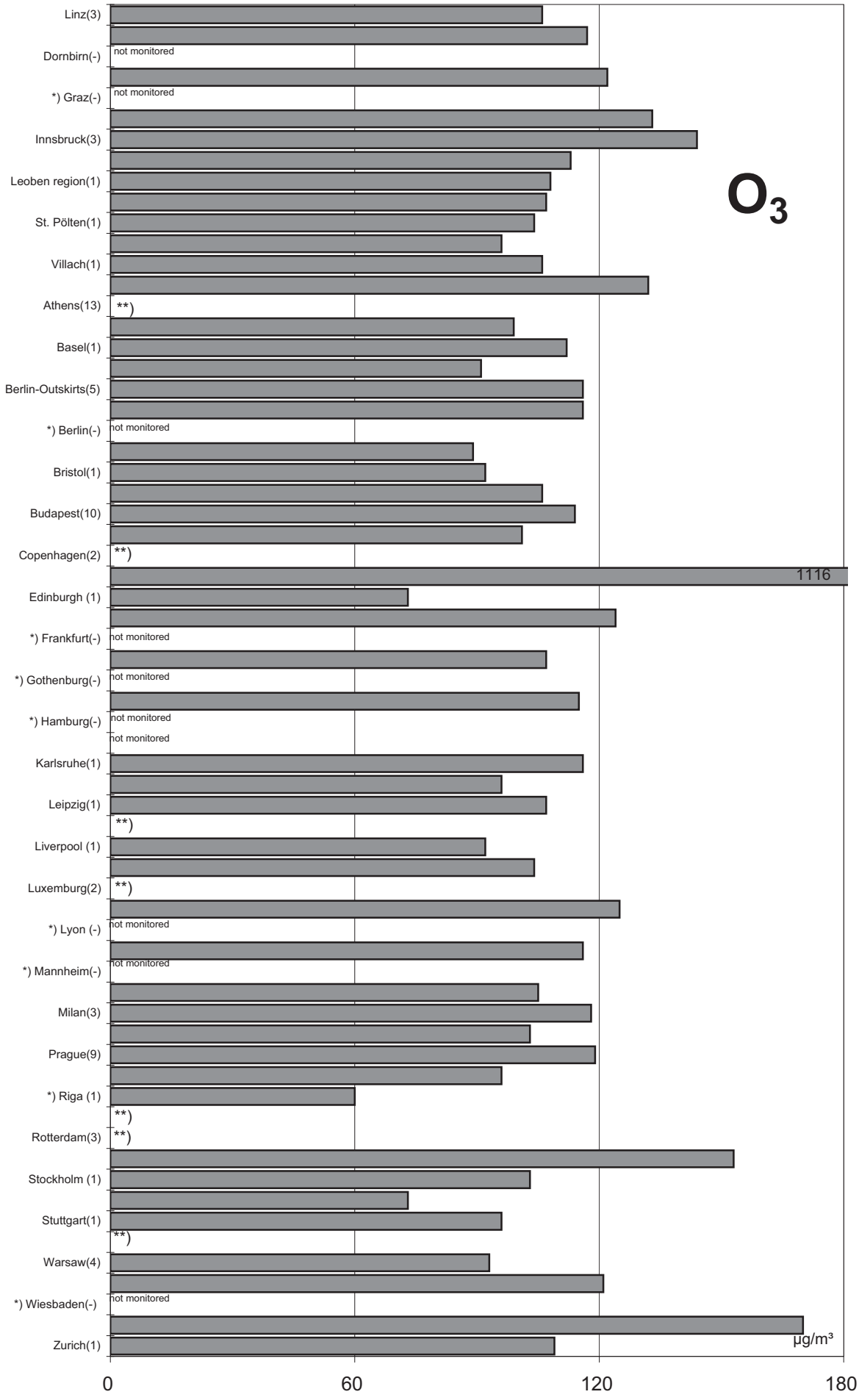


*) traffically influenced monitoring stations
**) no data

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)



*) traffically influenced monitoring stations
**) no data

Luftgütevergleich

2011

max. 1h-Mittelwerte

Comparison of The Air Quality

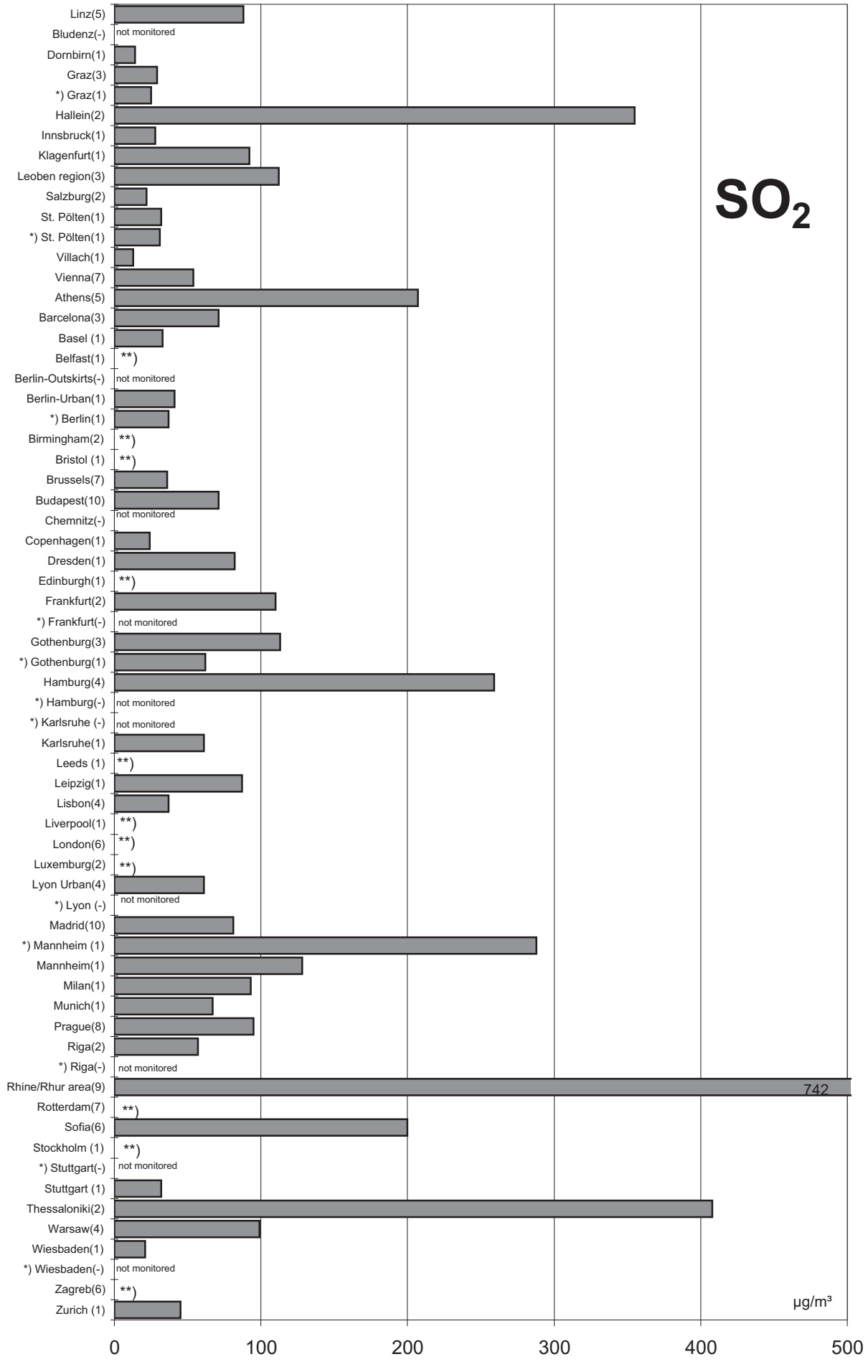
2011

Max. 1h-Mean Values

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)

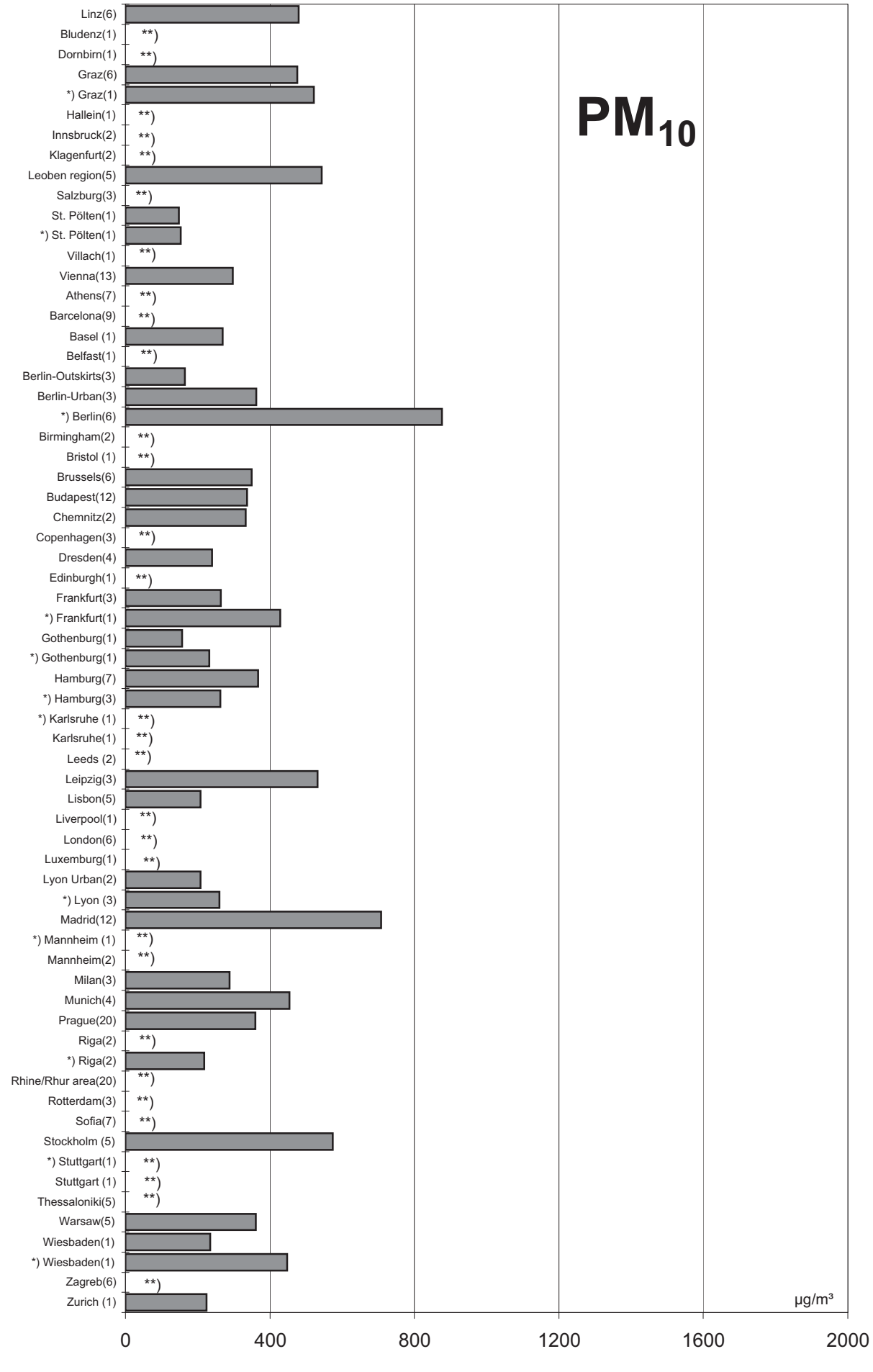


*) traffically influenced monitoring stations
**) no data

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)

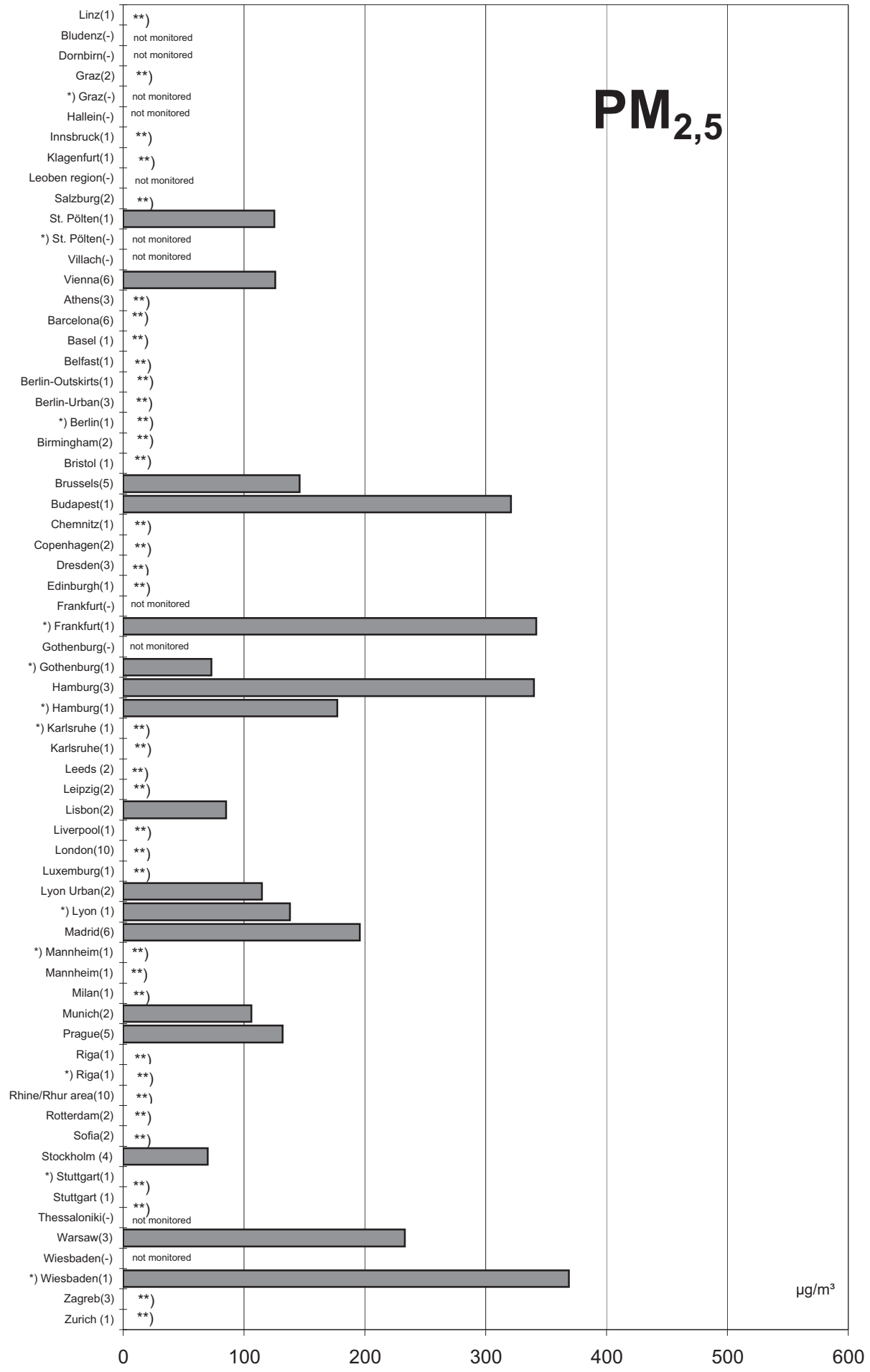


*) traffically influenced monitoring stations
**) no data

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)

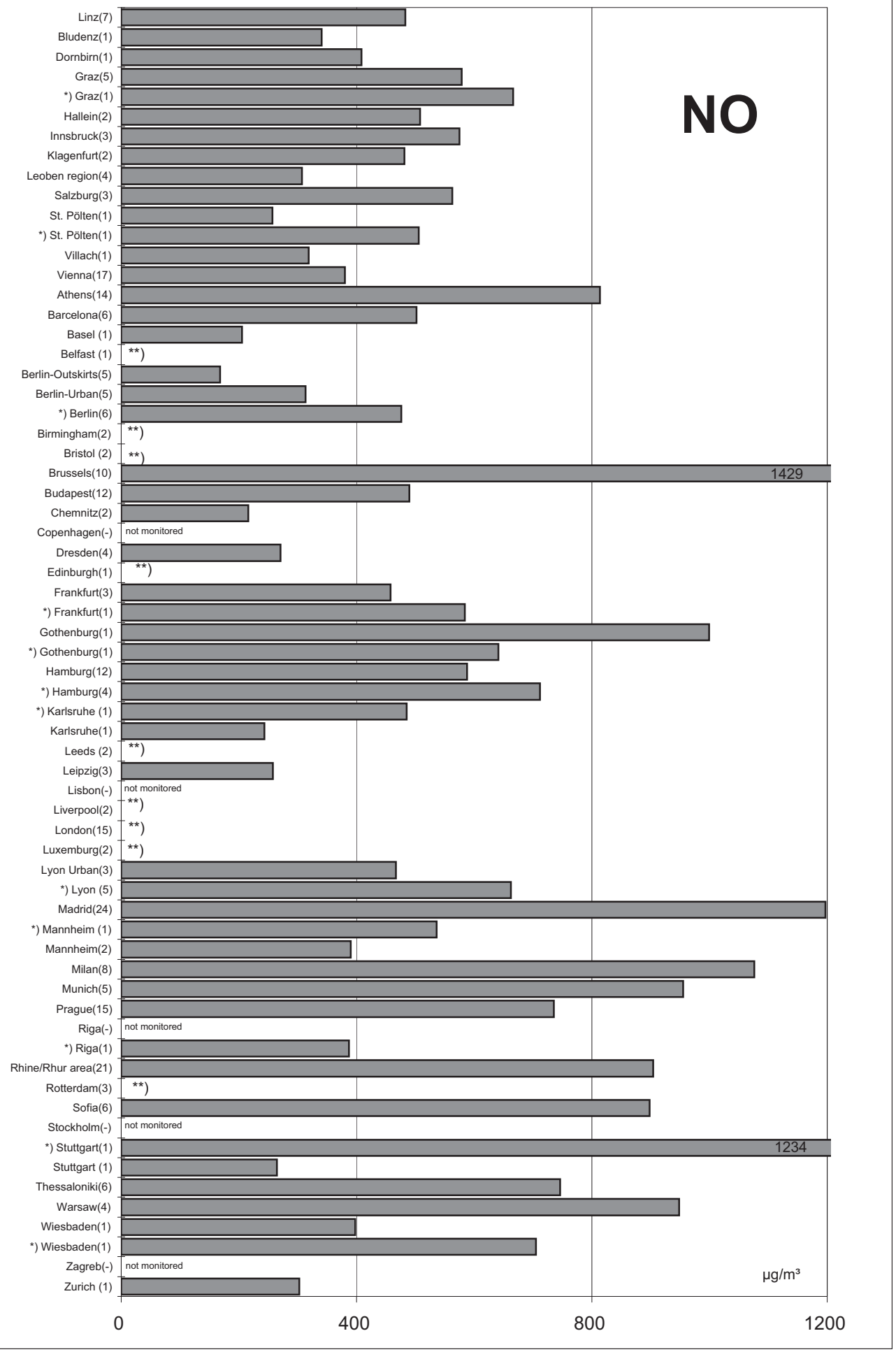


*) traffically influenced monitoring stations
**) no data

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)

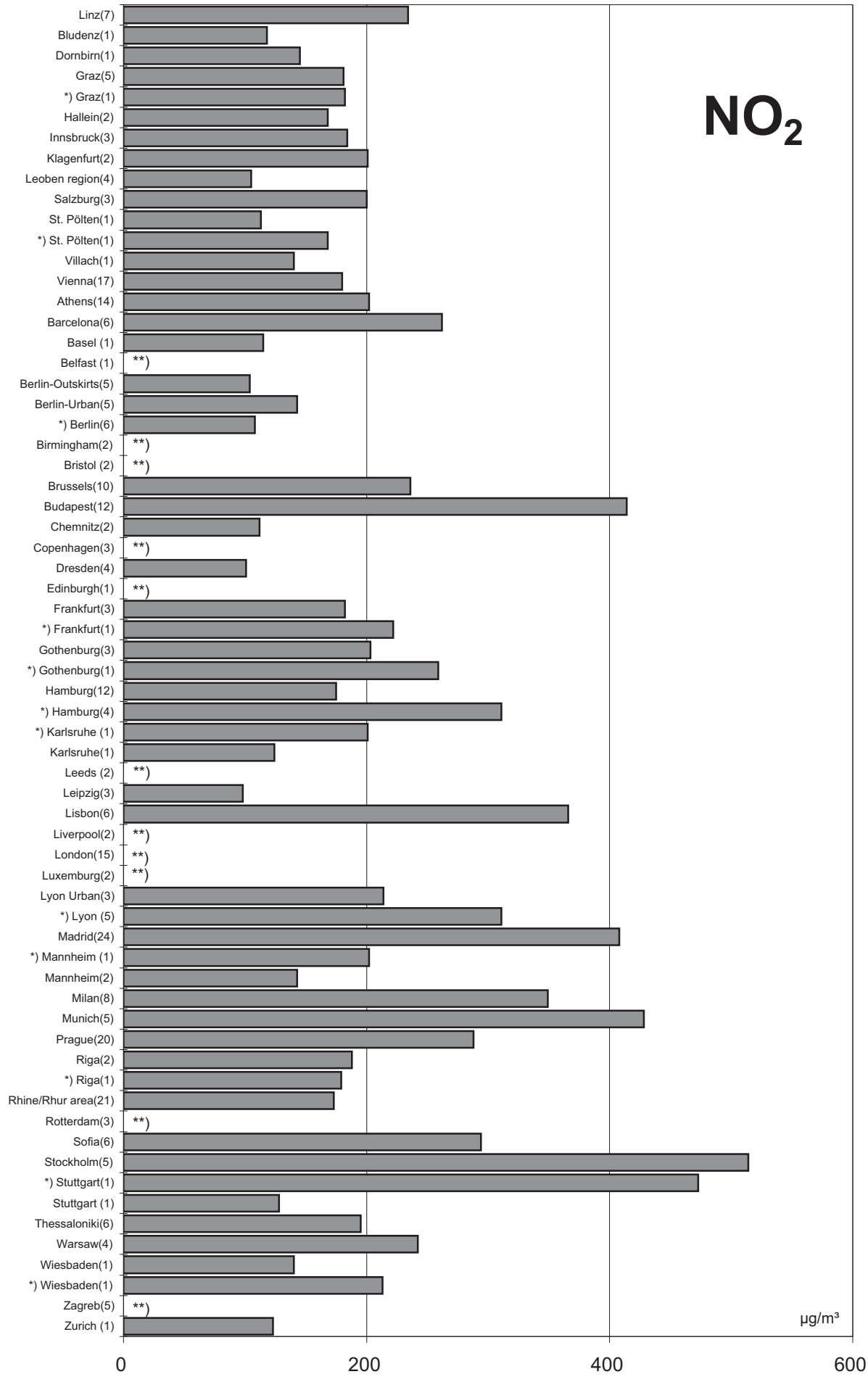


*) traffically influenced monitoring stations
**) no data

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)

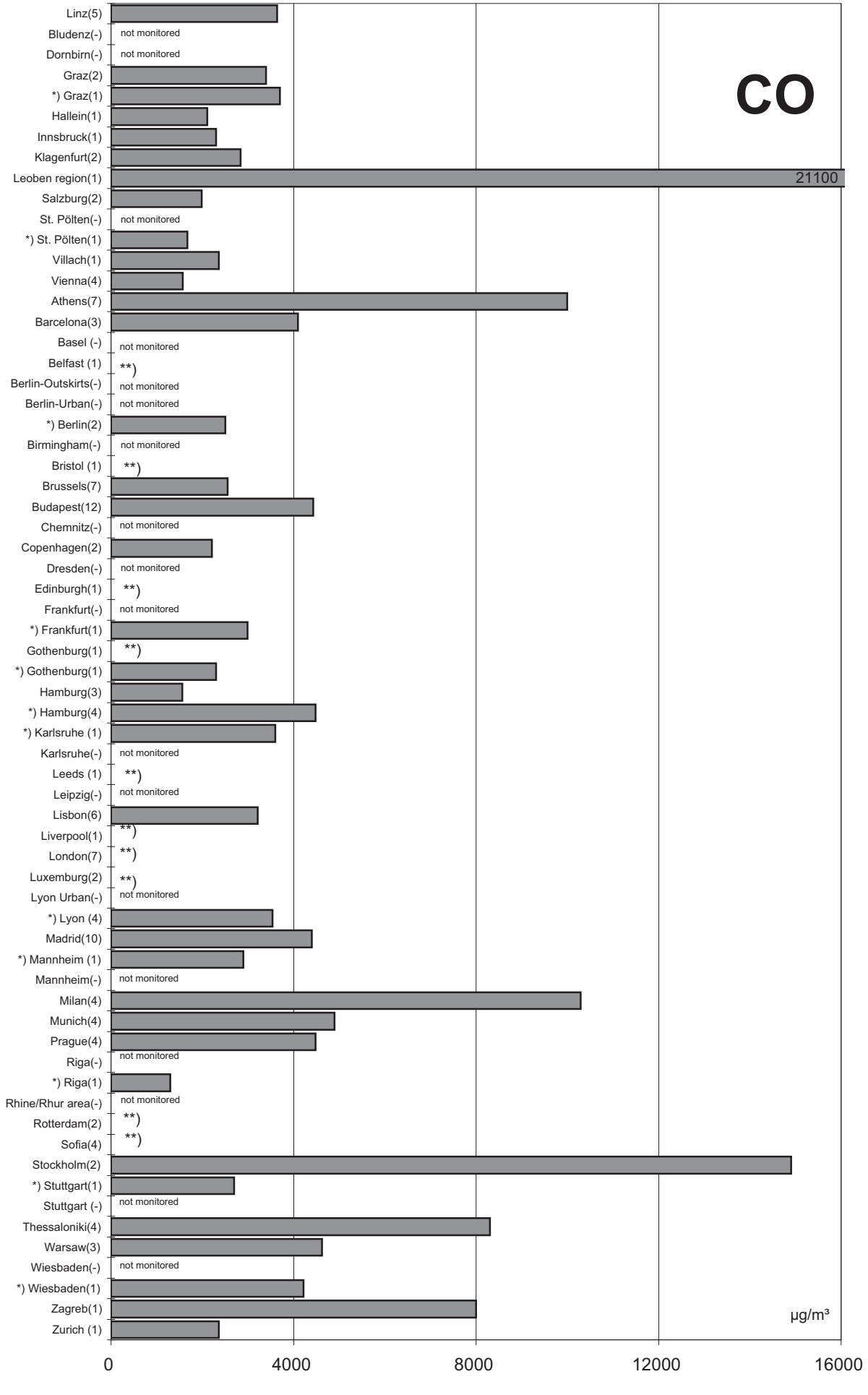


*) traffically influenced monitoring stations
**) no data

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)

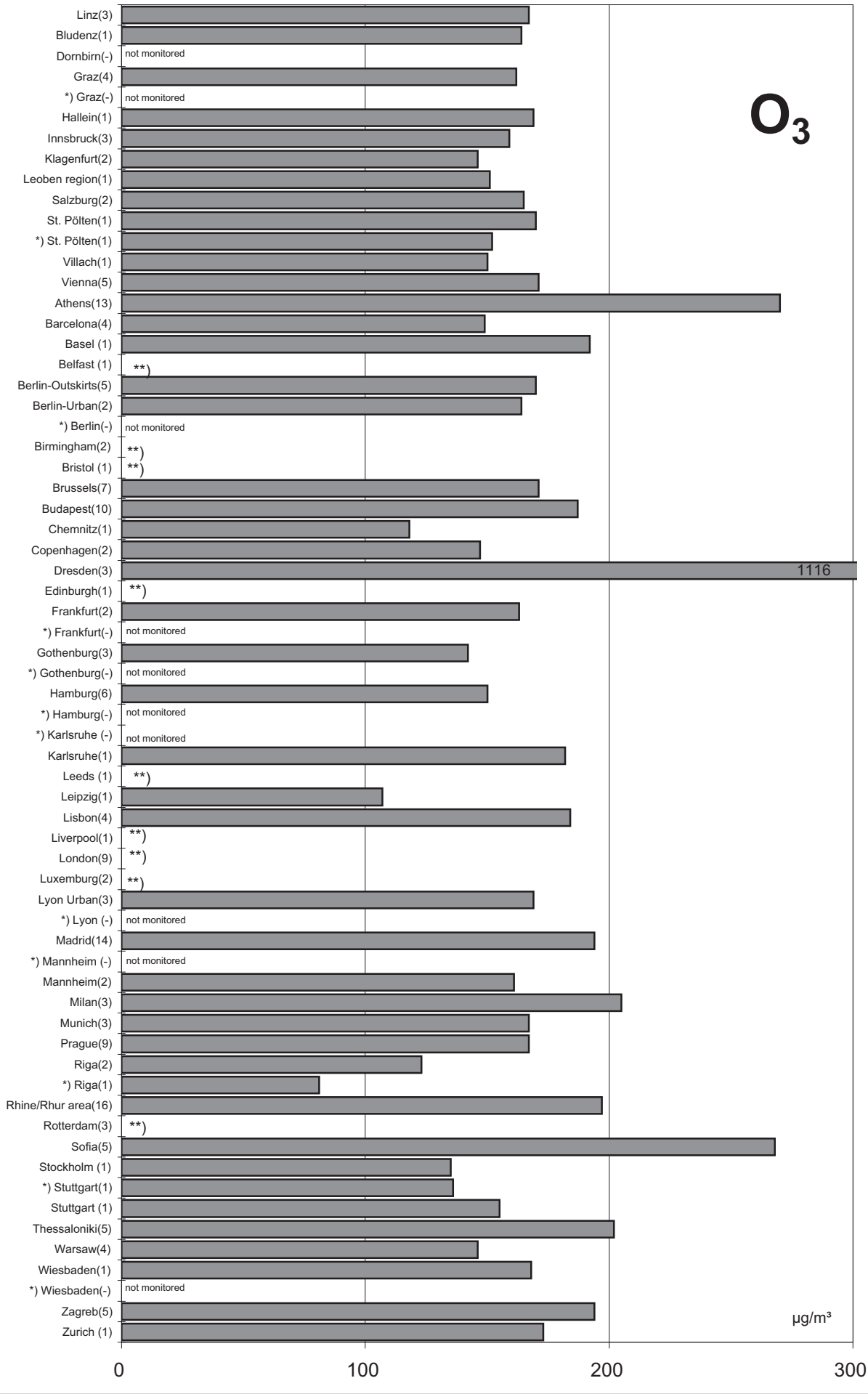


*) traffically influenced monitoring stations
**) no data

Comparison of The Air Quality in 2011

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

(in parentheses: number of monitoring stations)



*) traffically influenced monitoring stations
**) no data

Jahresvergleich

1992 - 2011

Jahresmittelwerte

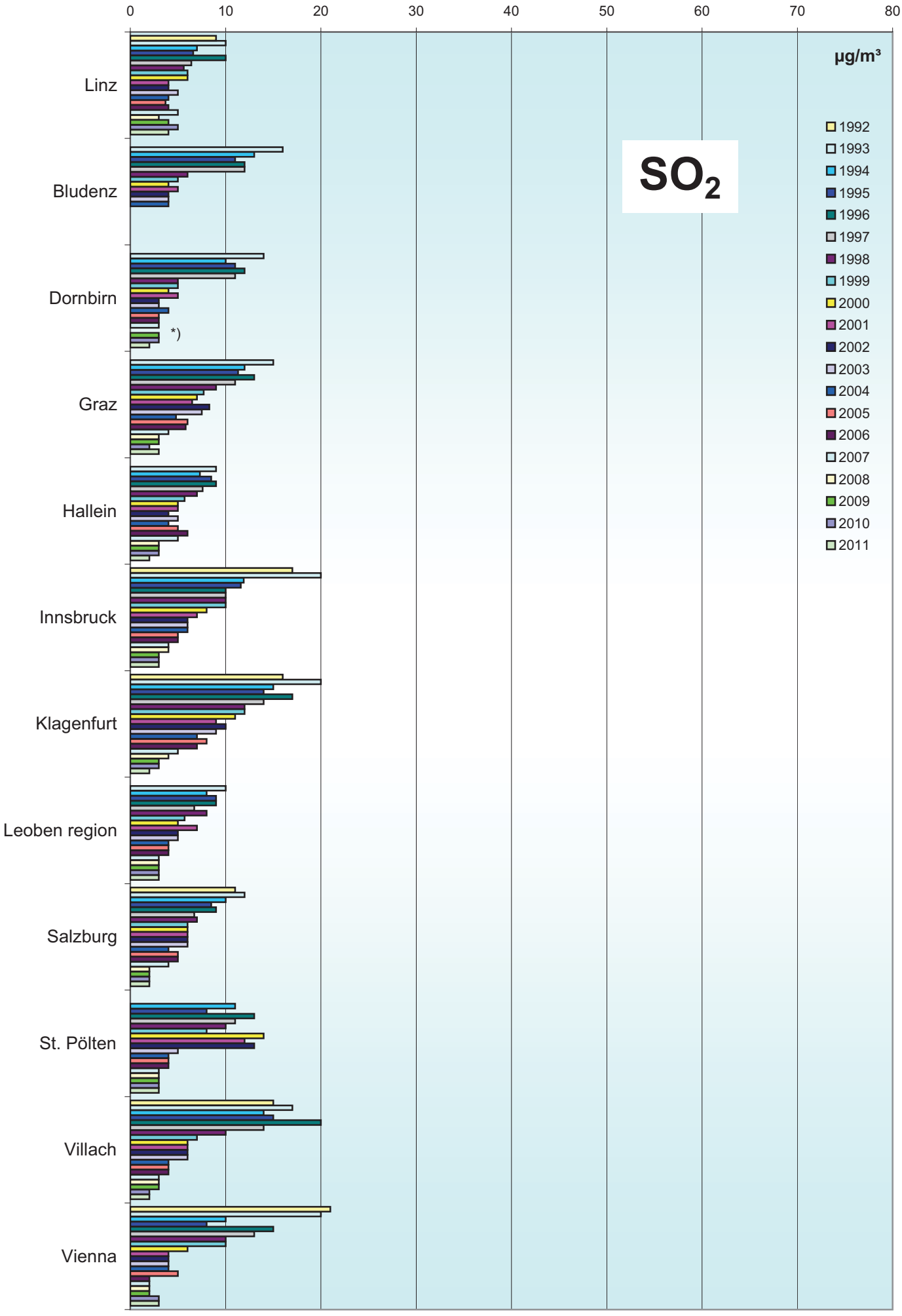
Comparison of The Air Quality Over The Years

1992 - 2011

Annual Mean Values

Comparison of The Air Quality 1992 - 2011

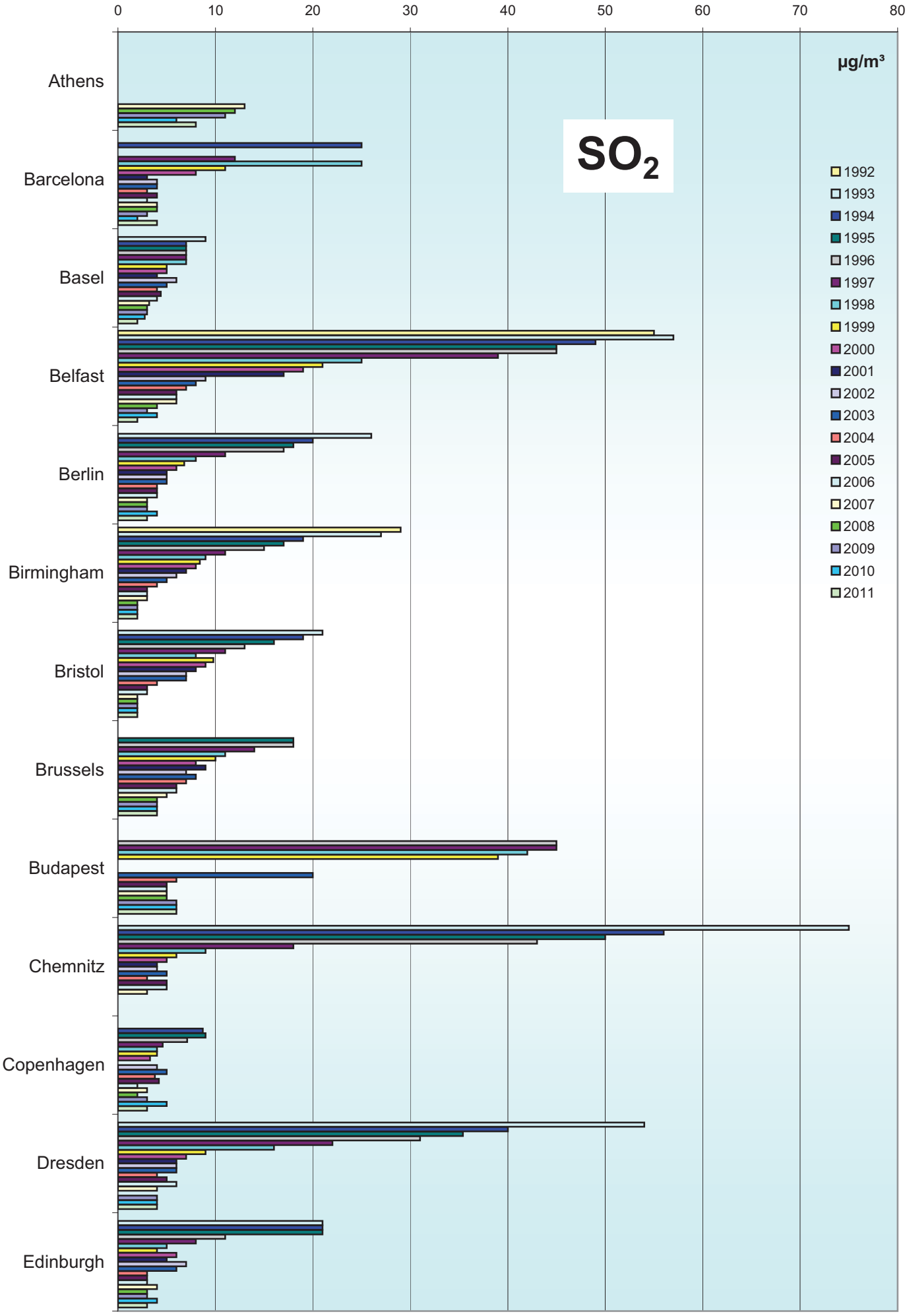
Annual mean values (mean of all monitoring stations)



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

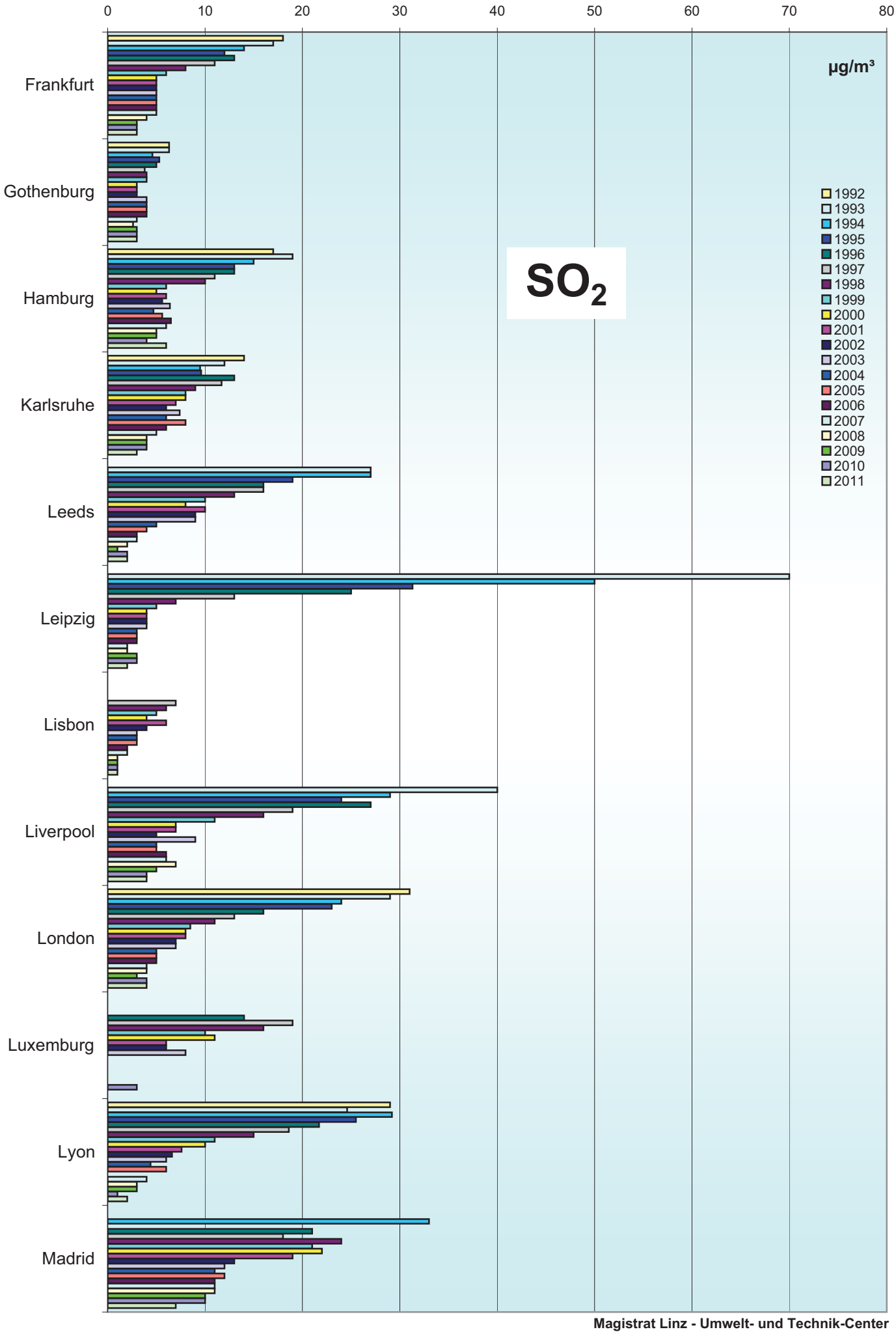
Comparison of The Air Quality 1992 - 2011

Annual mean values (mean of all monitoring stations)



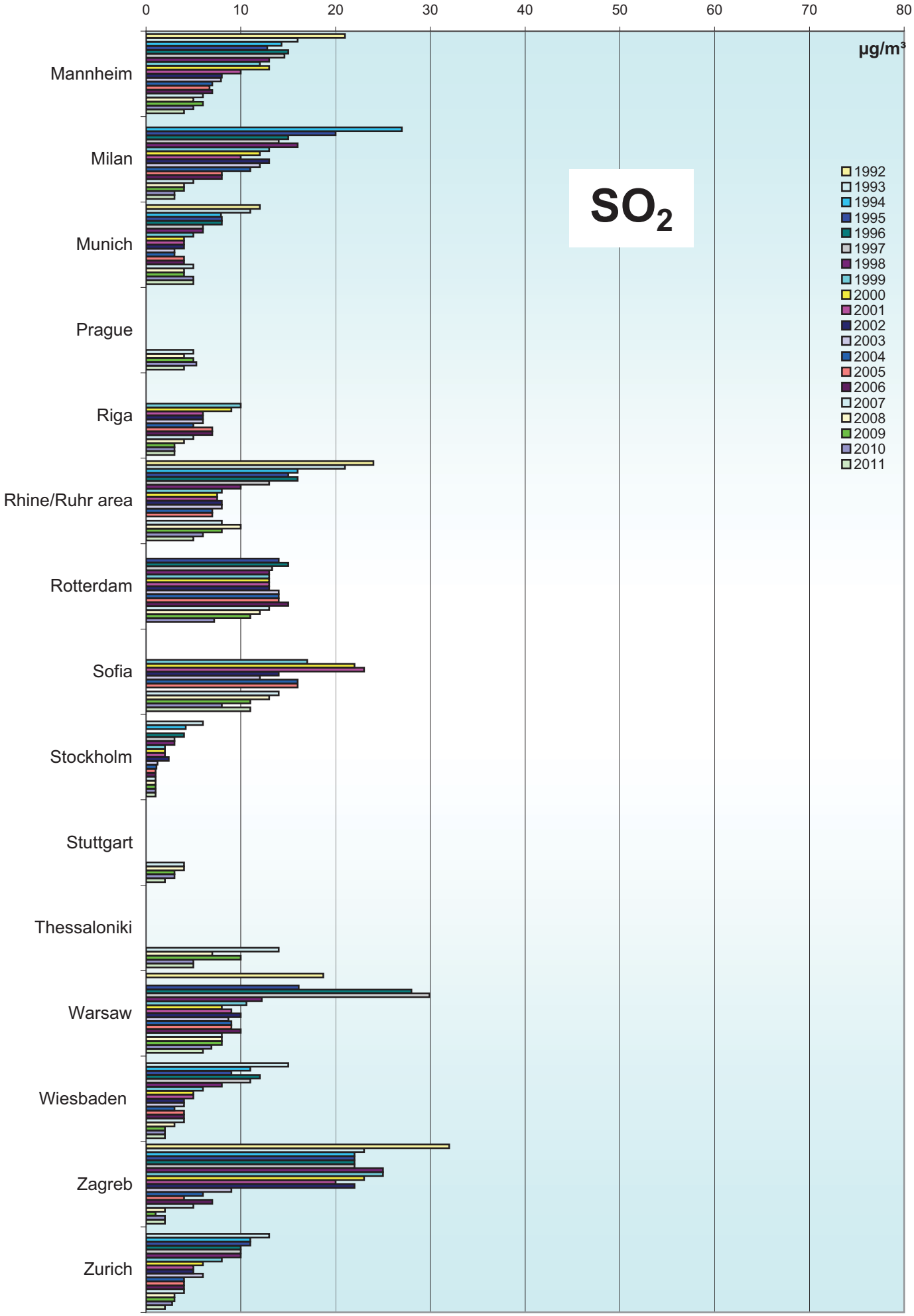
Comparison of The Air Quality 1992 - 2011

Annual mean values (mean of all monitoring stations)



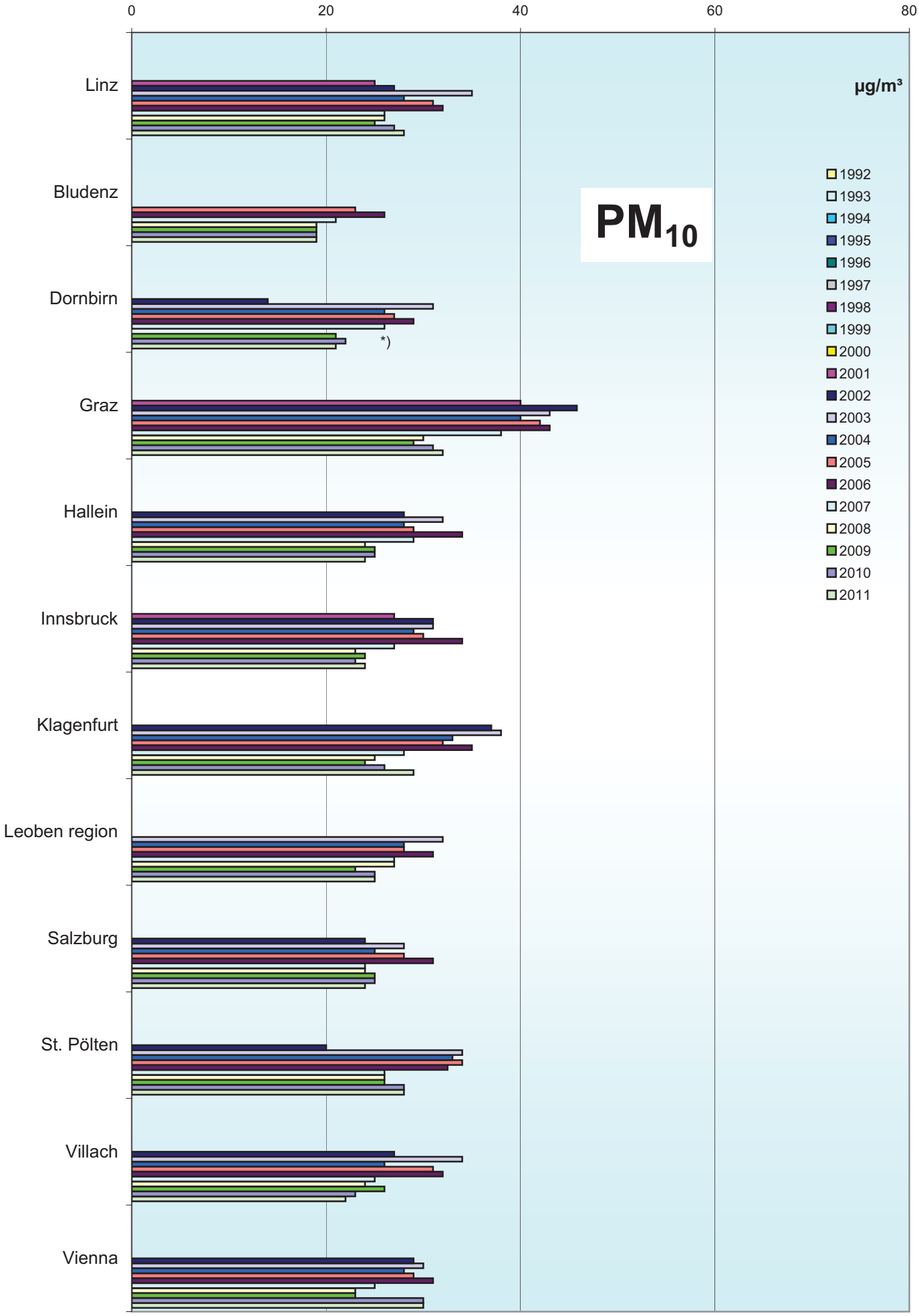
Comparison of The Air Quality 1992 - 2011

Annual mean values (mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2011

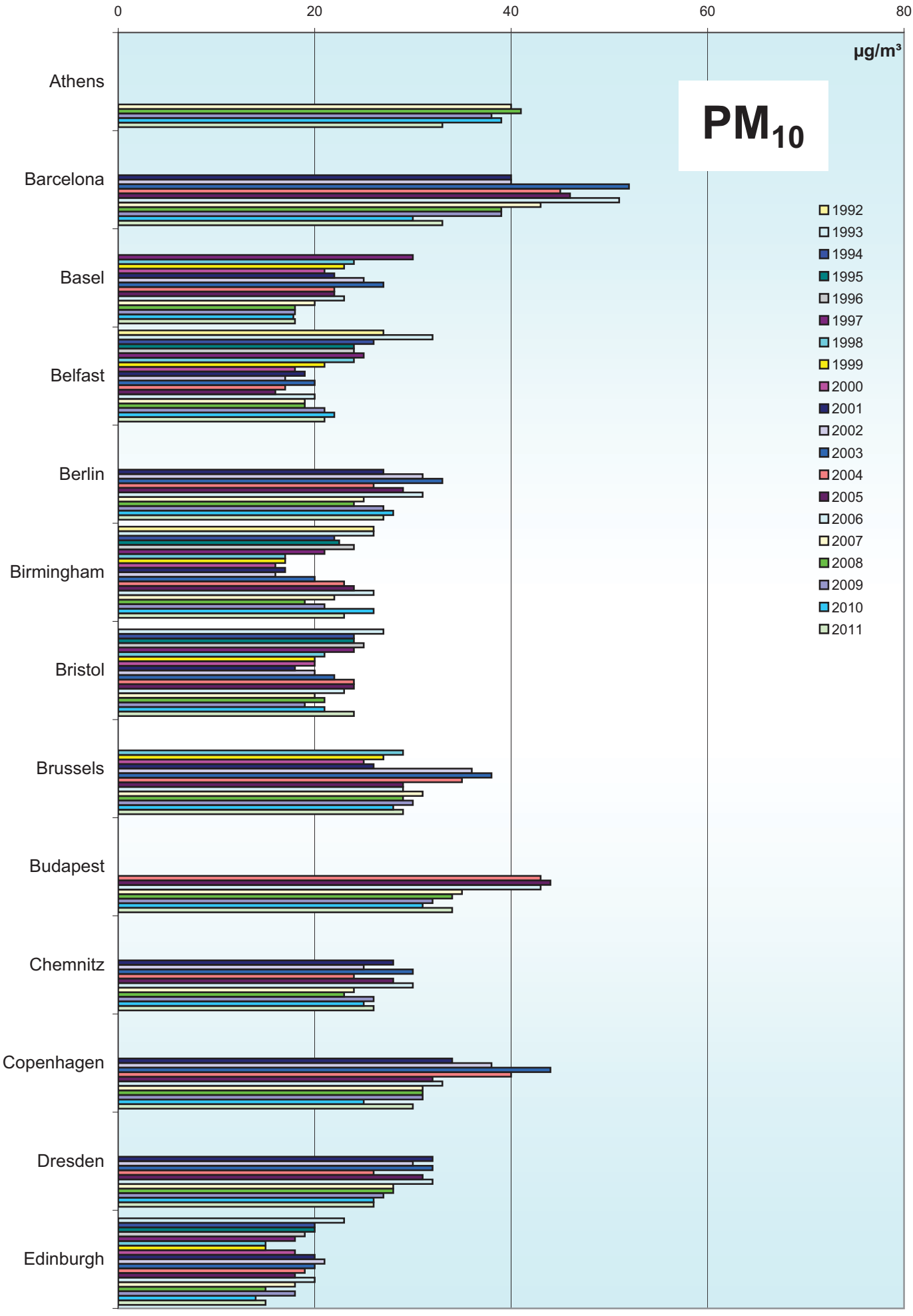
Annual mean values (mean of all monitoring stations)



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

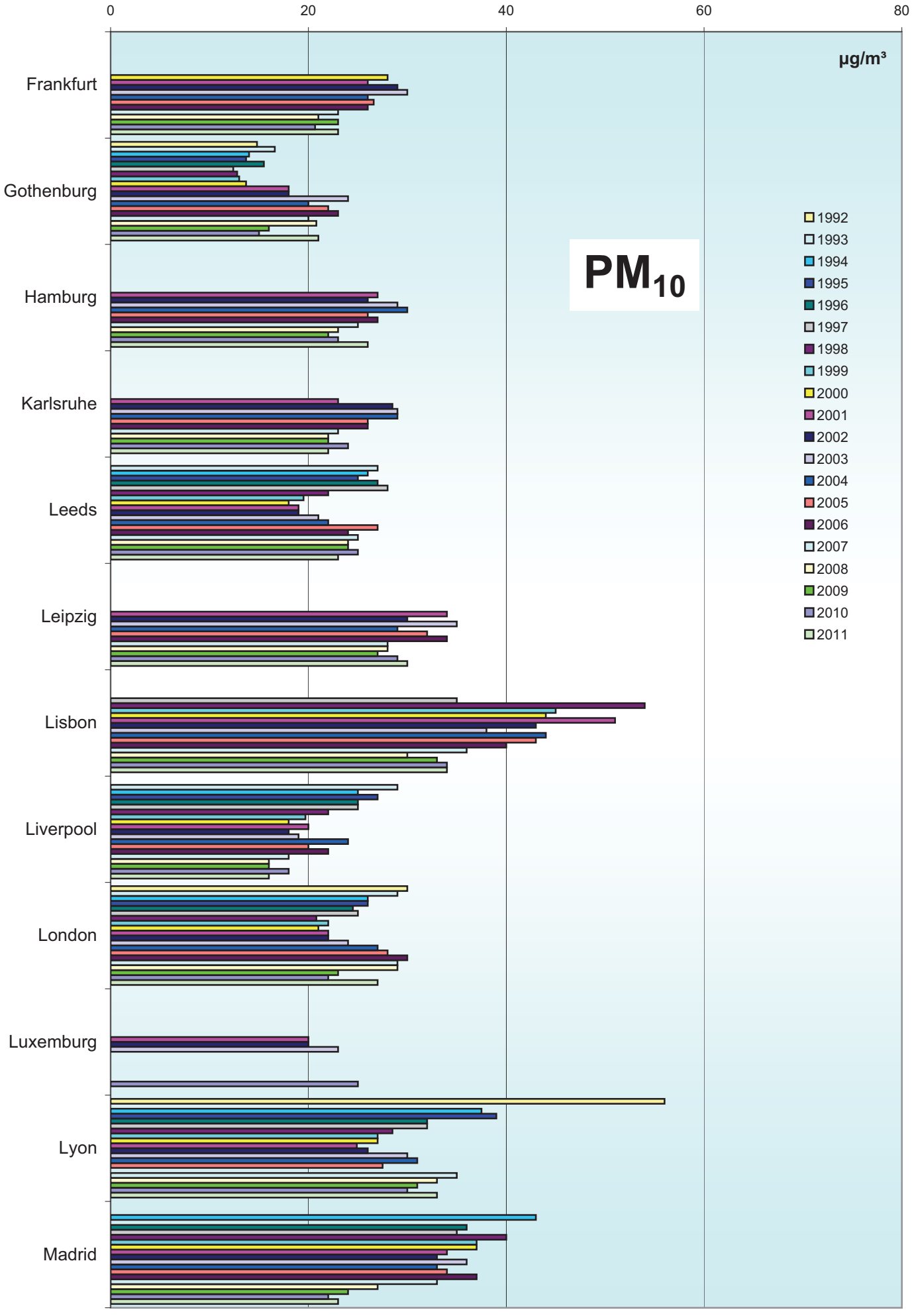
Comparison of The Air Quality 1992 - 2011

Annual mean values (mean of all monitoring stations)



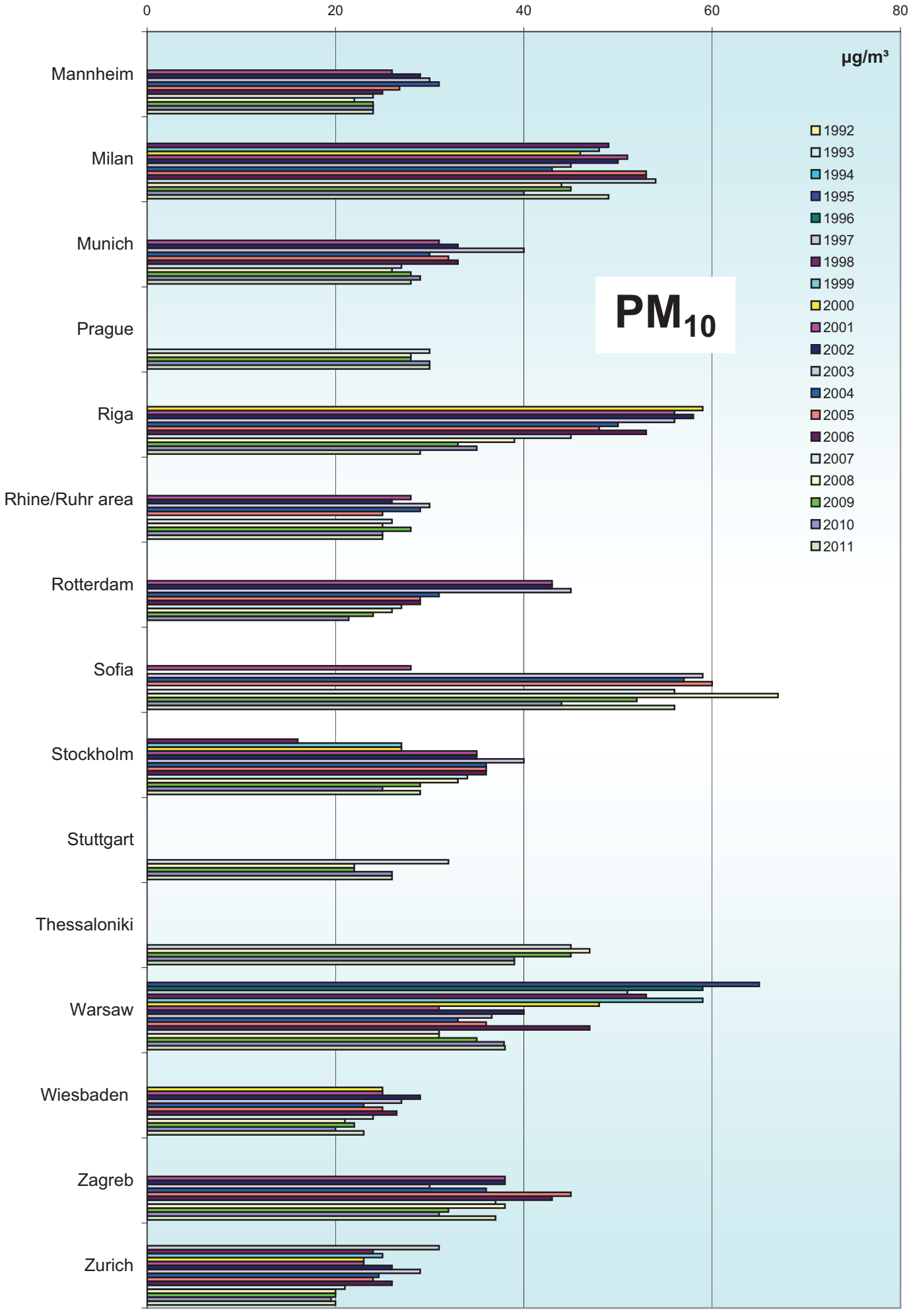
Comparison of The Air Quality 1992 - 2011

Annual mean values (mean of all monitoring stations)



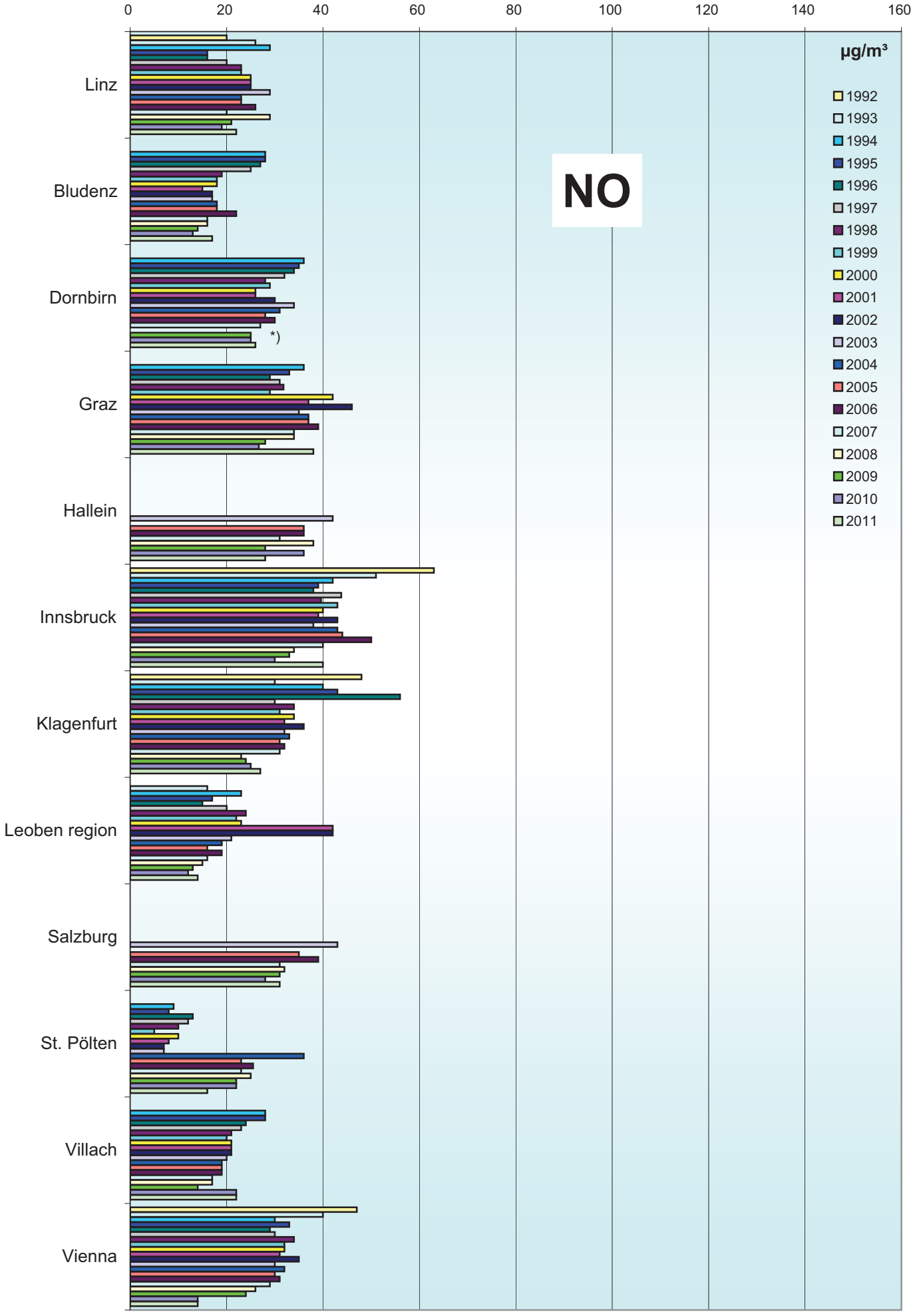
Comparison of The Air Quality 1992 - 2011

Annual mean values (mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2011

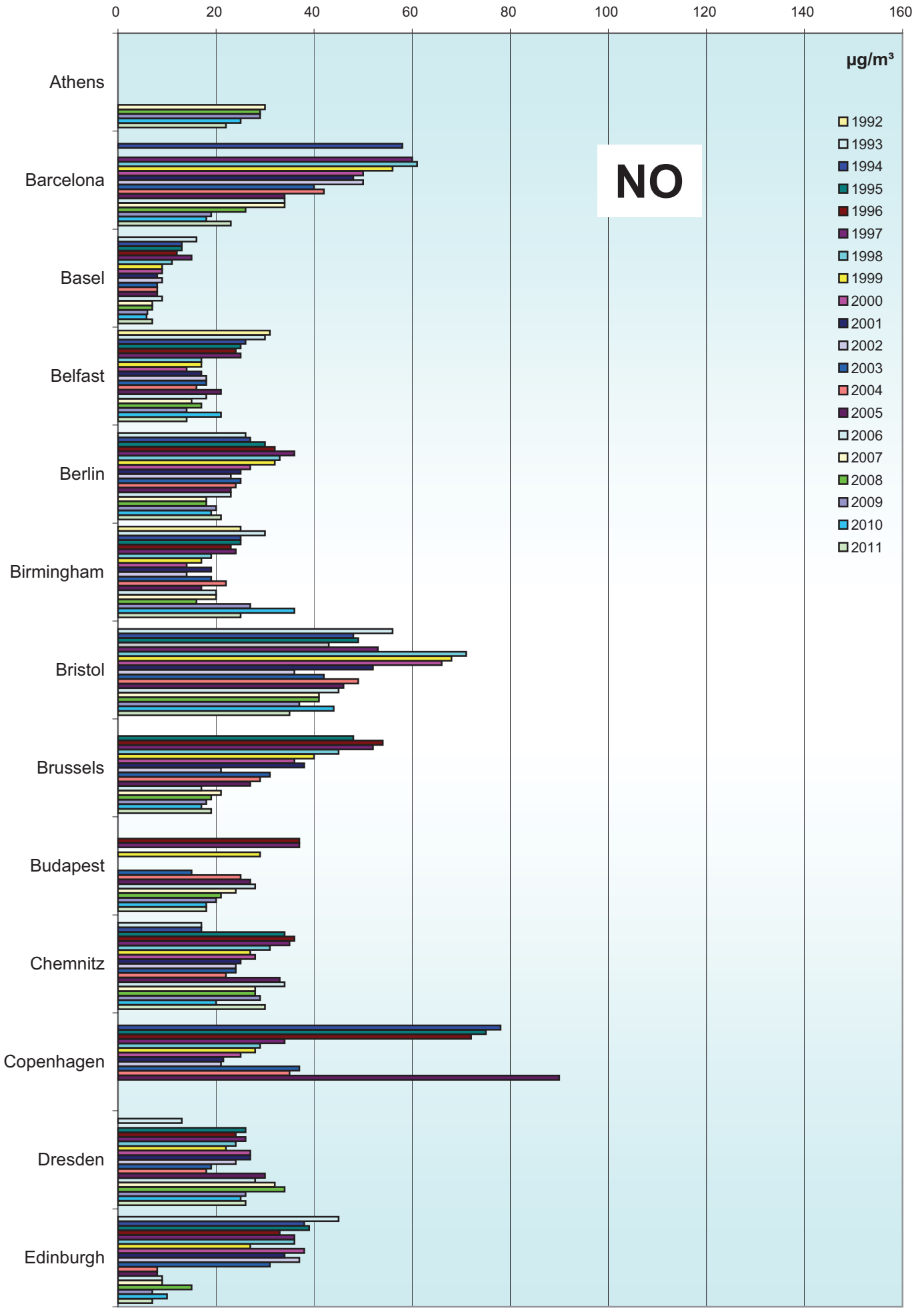
Annual mean values (mean of all monitoring stations)



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

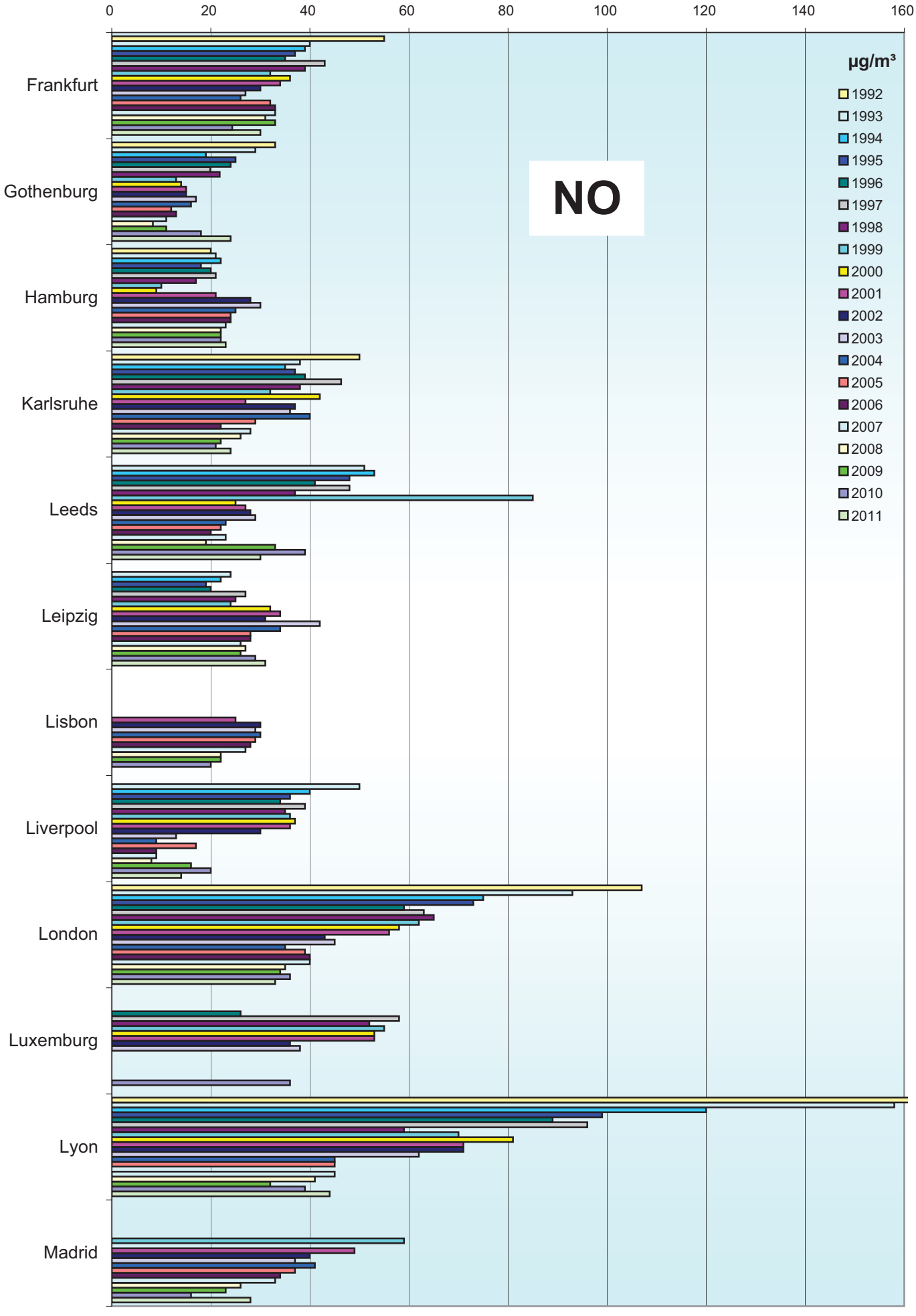
Comparison of The Air Quality 1992 - 2011

Annual mean values (mean of all monitoring stations)



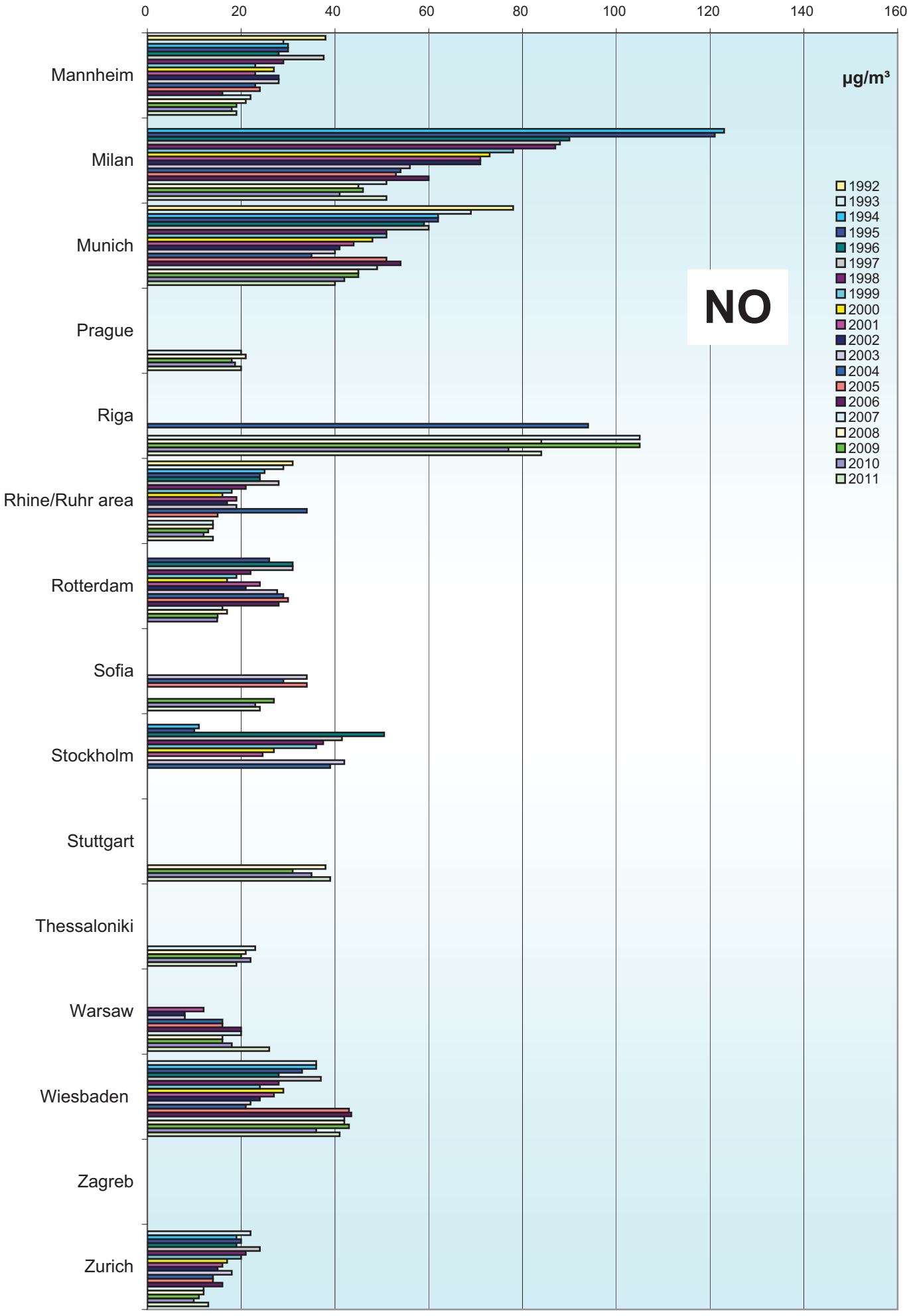
Comparison of The Air Quality 1992 - 2011

Annual mean values (mean of all monitoring stations)



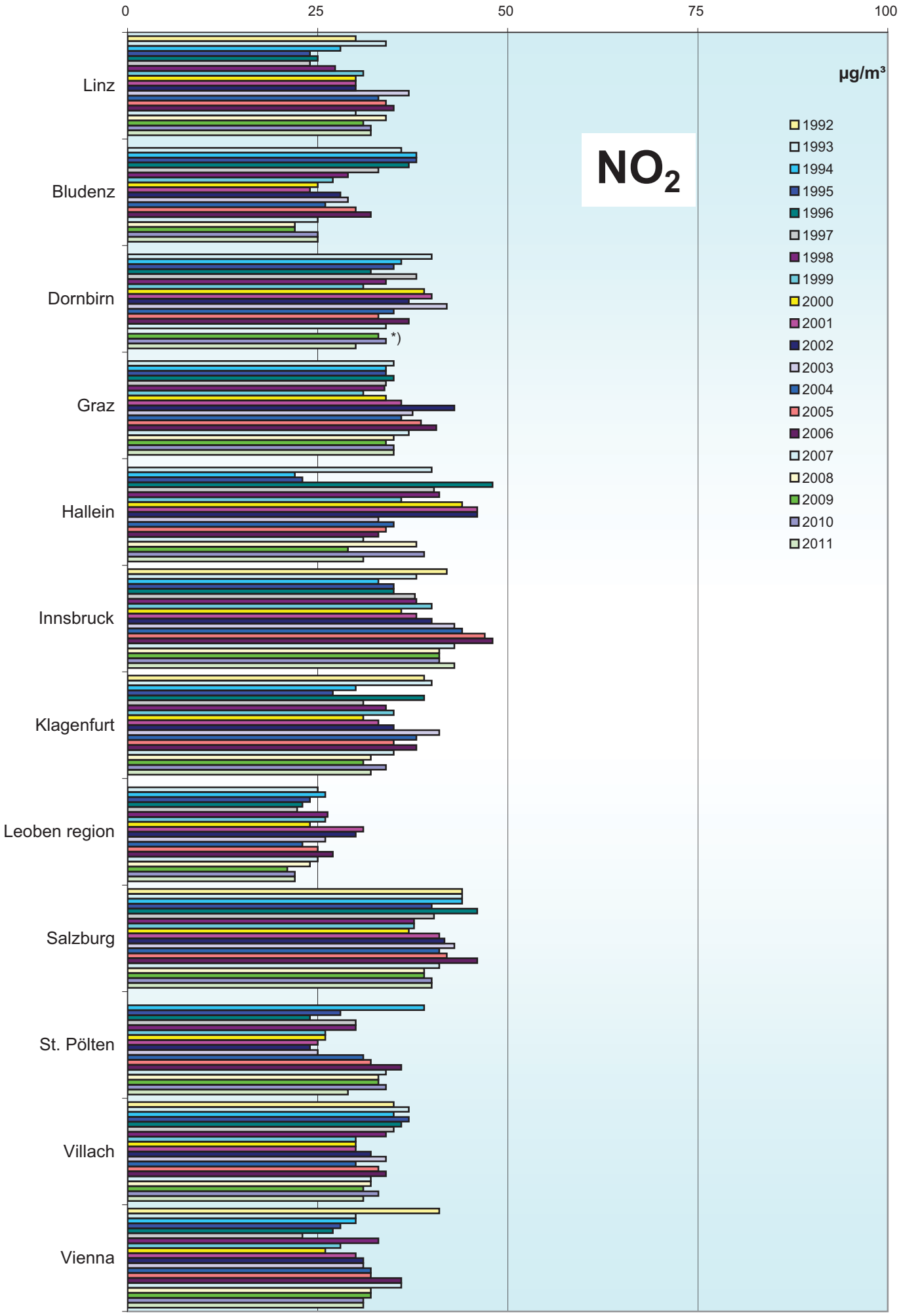
Comparison of The Air Quality 1992 - 2011

Annual mean values (mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2011

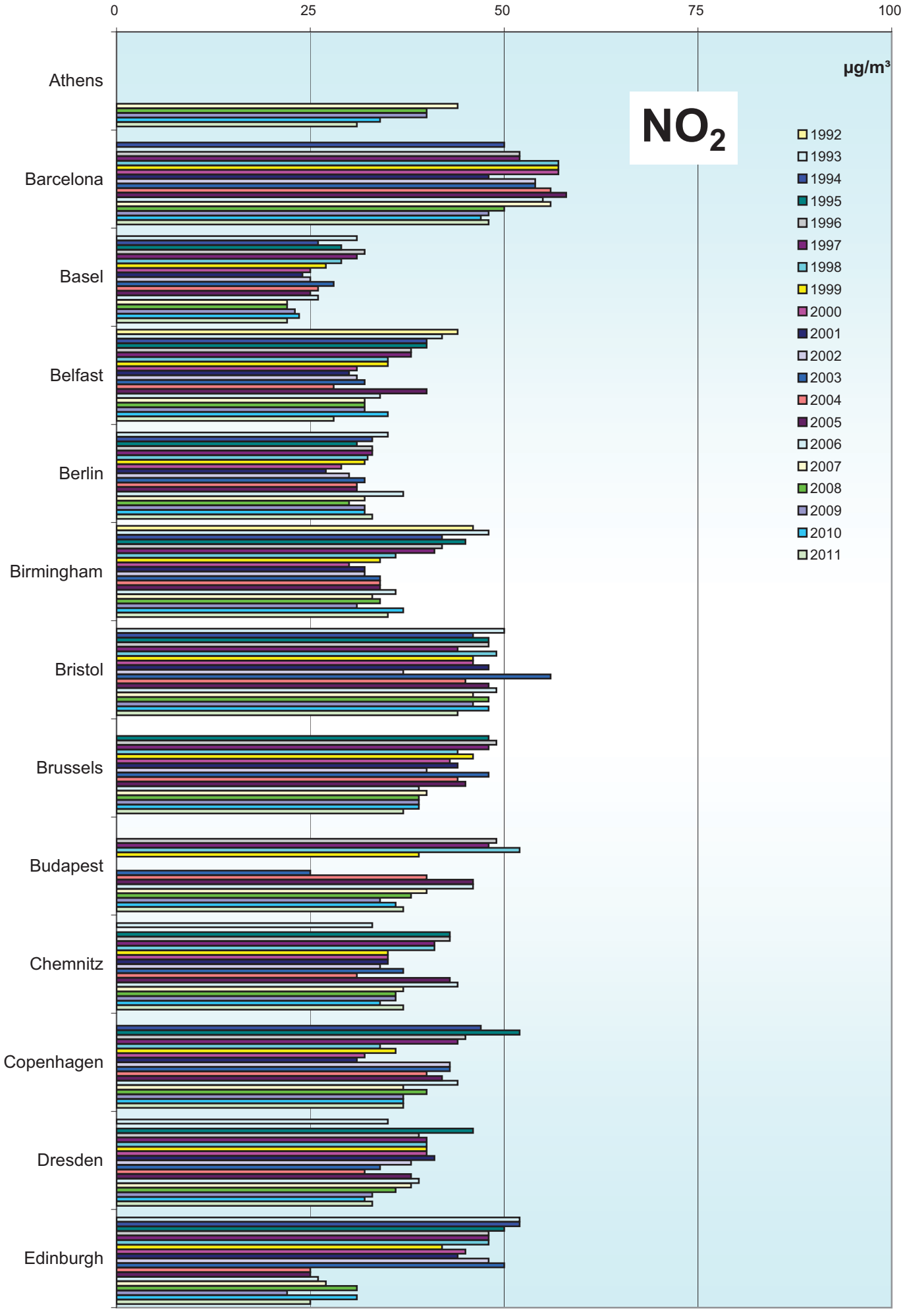
Annual mean values (mean of all monitoring stations)



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

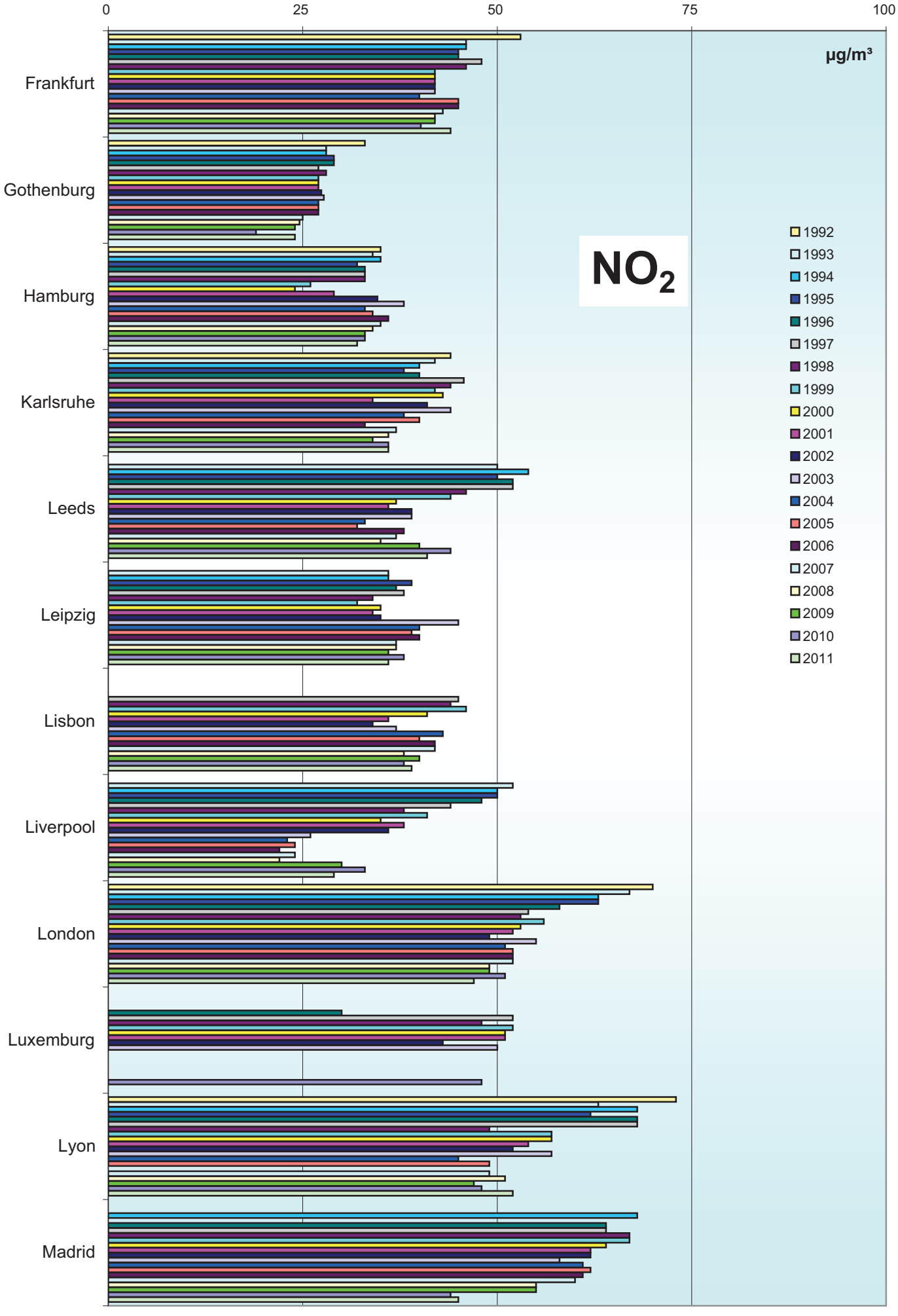
Comparison of The Air Quality 1992 - 2011

Annual mean values (mean of all monitoring stations)



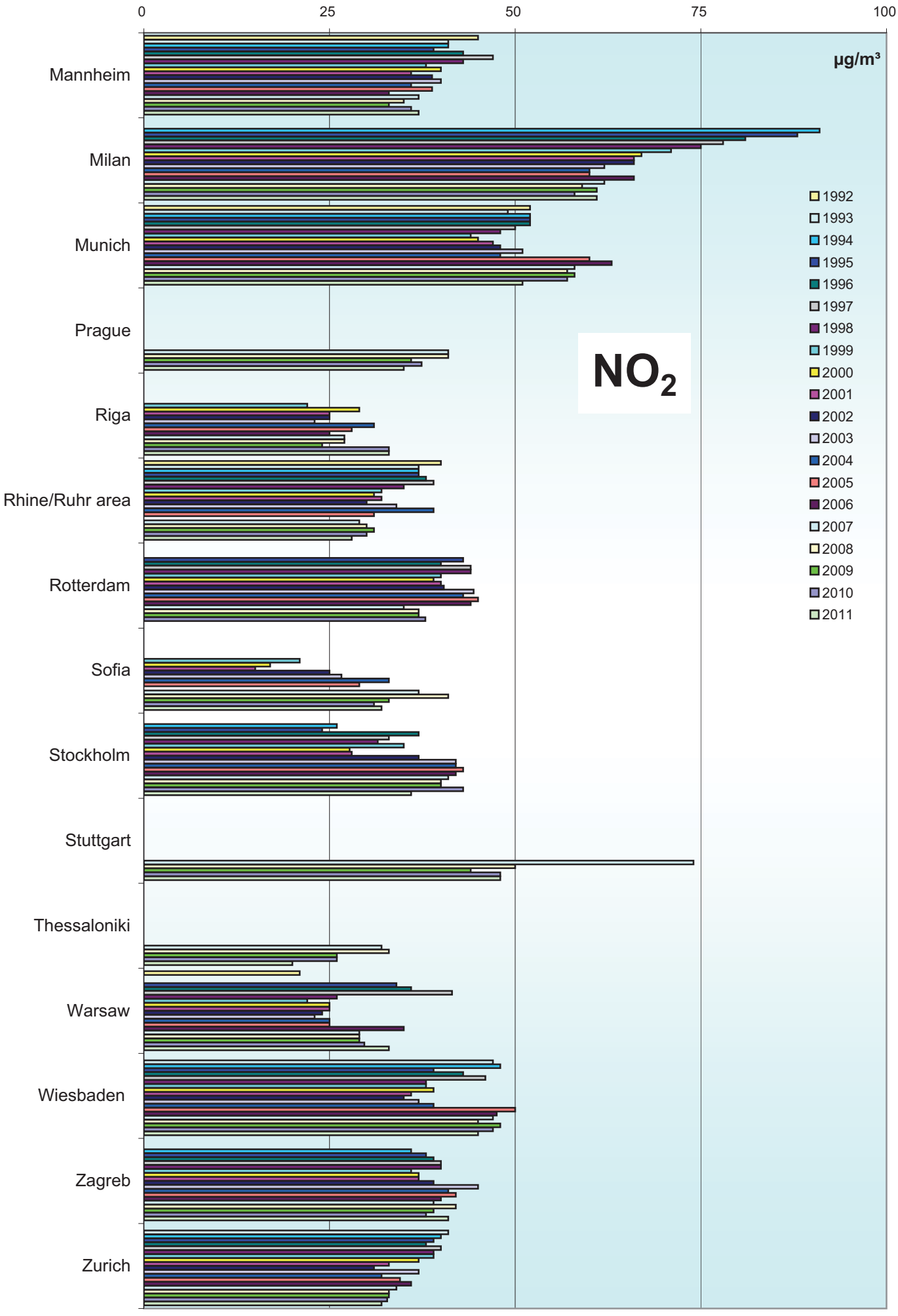
Comparison of The Air Quality 1992 - 2011

Annual mean values (mean of all monitoring stations)



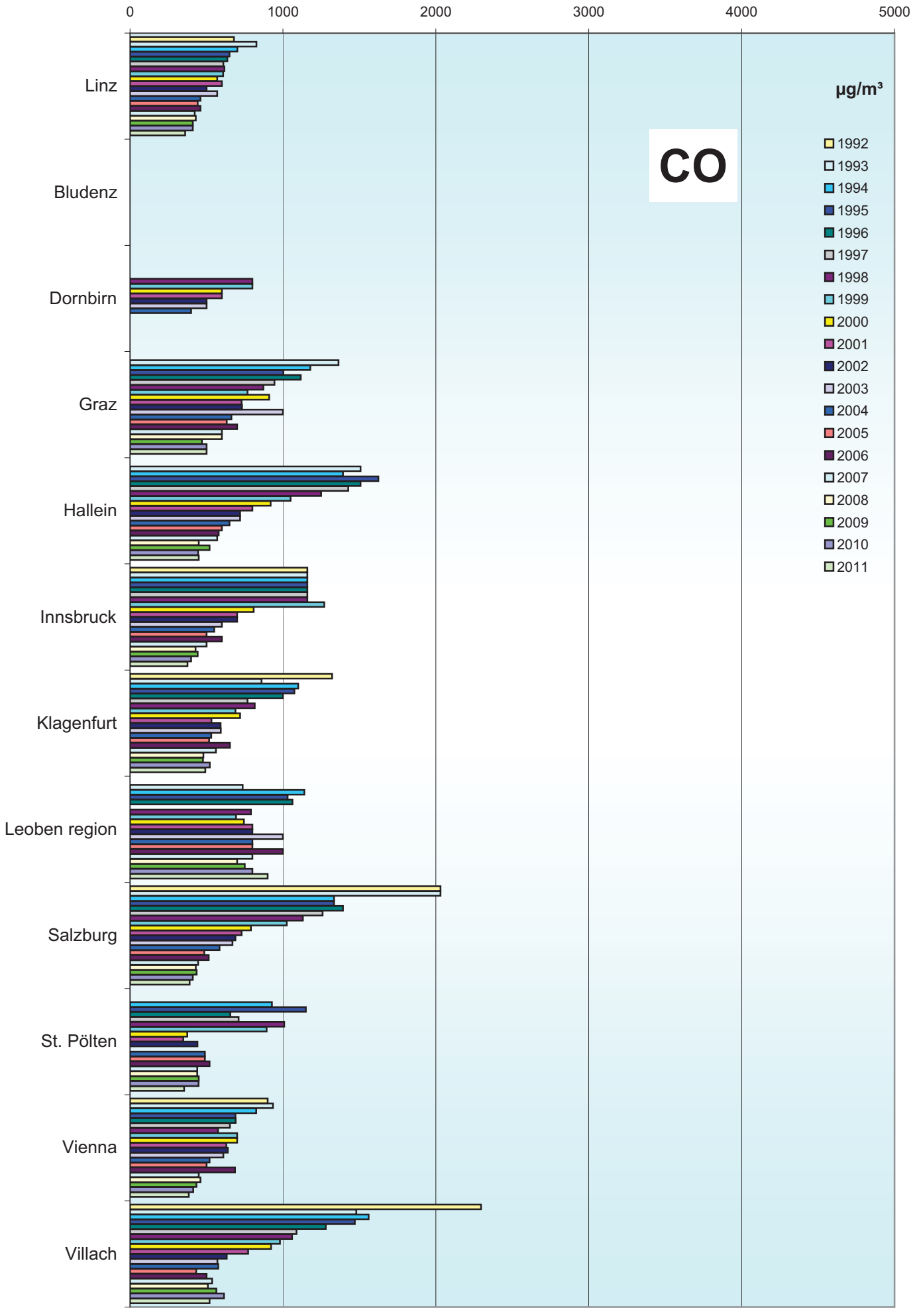
Comparison of The Air Quality 1992 - 2011

Annual mean values (mean of all monitoring stations)



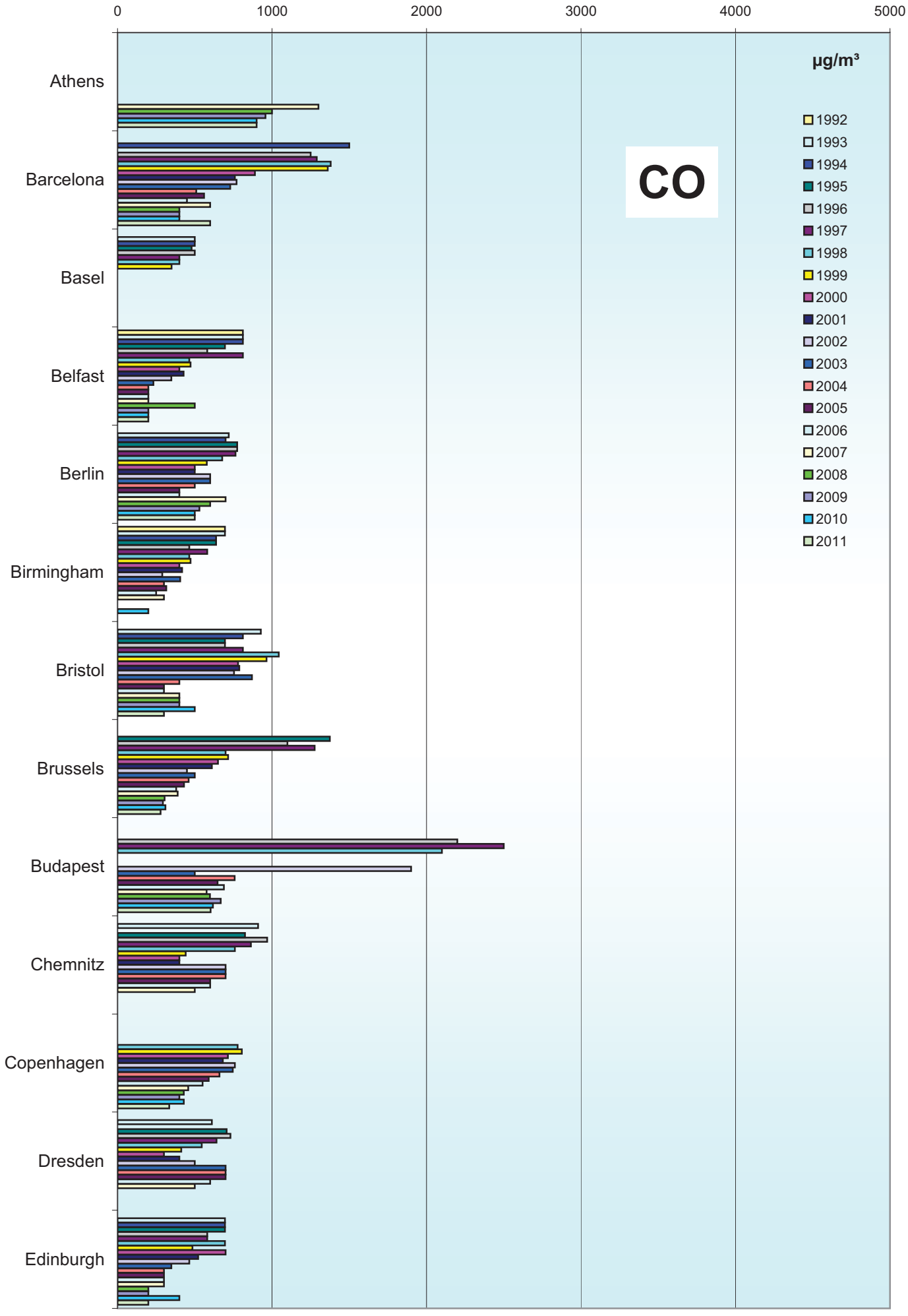
Comparison of The Air Quality 1992 - 2011

Annual mean values (mean of all monitoring stations)



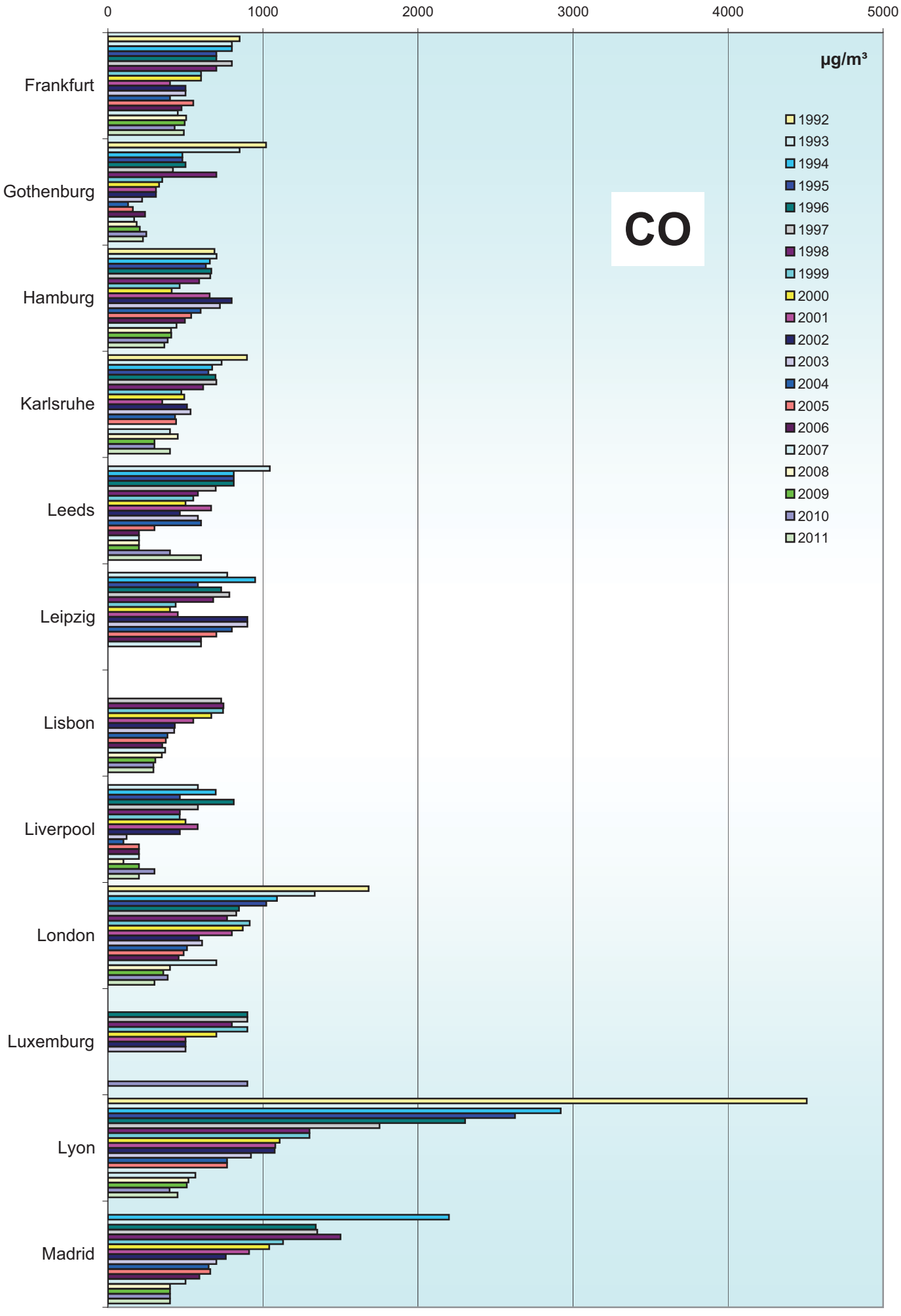
Comparison of The Air Quality 1992 - 2011

Annual mean values (mean of all monitoring stations)



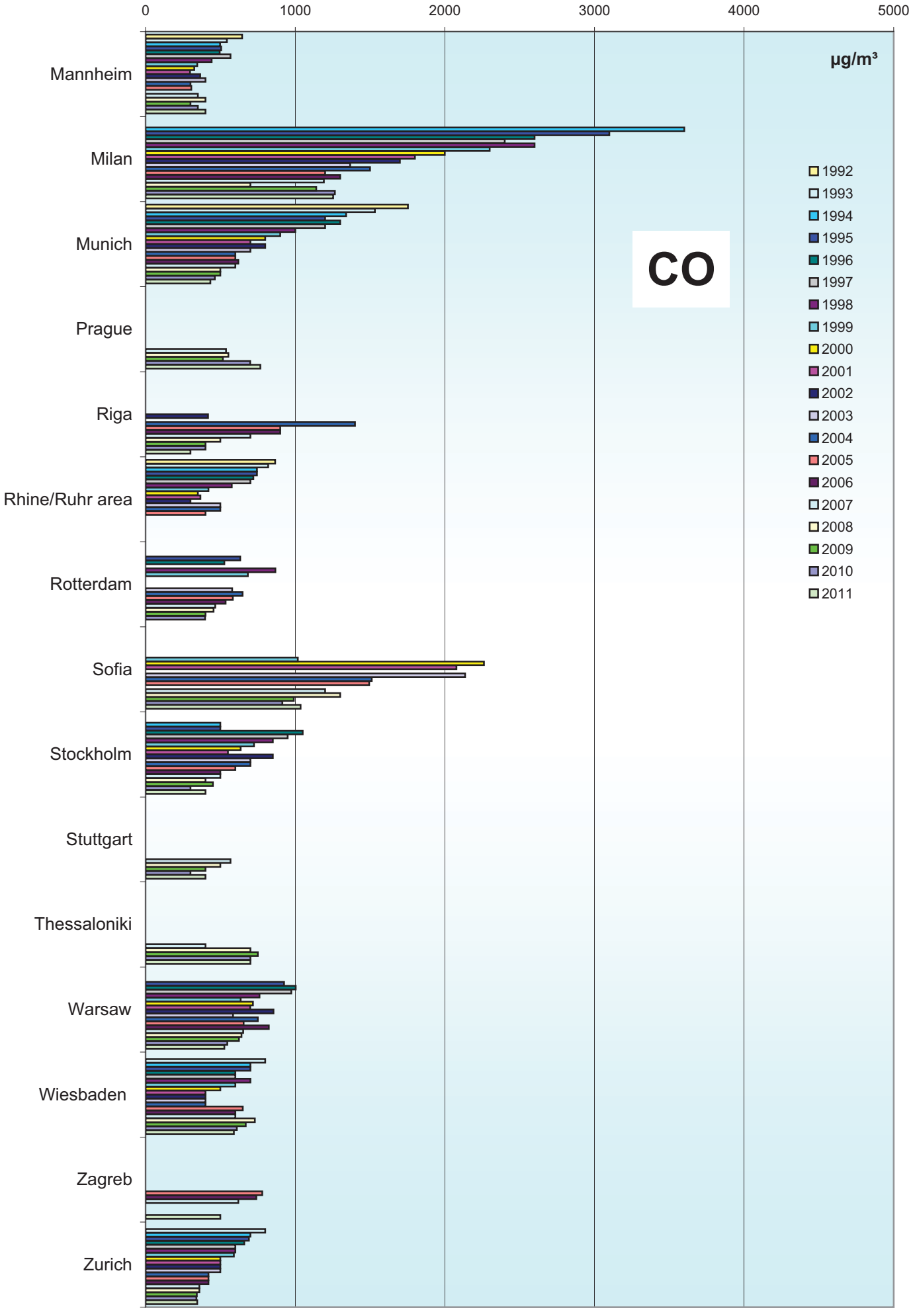
Comparison of The Air Quality 1992 - 2011

Annual mean values (mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2011

Annual mean values (mean of all monitoring stations)



Jahresvergleich

1992 - 2011

max. Tagesmittelwerte

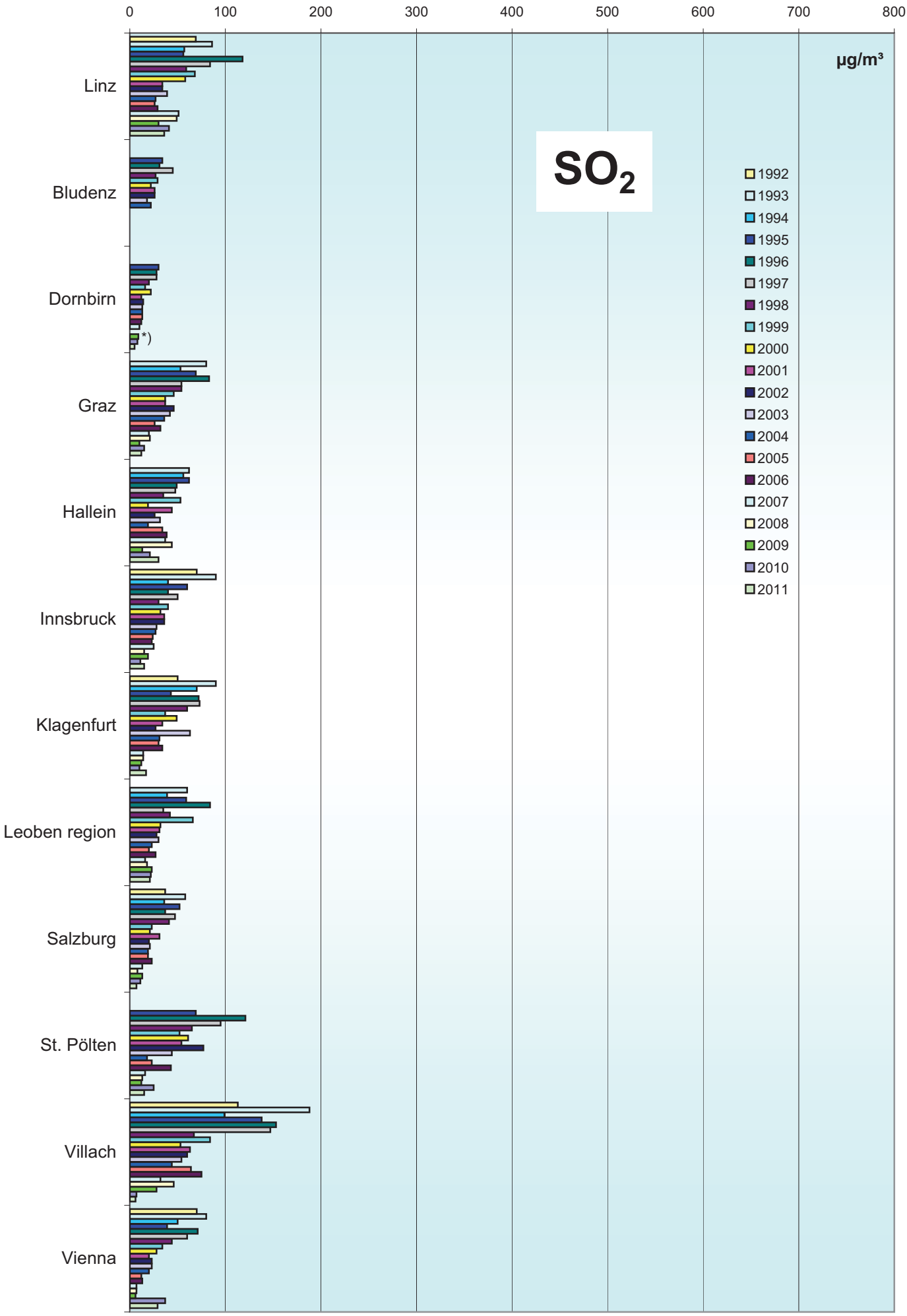
Comparison of The Air Quality Over The Years

1992 - 2011

Max. Daily Mean Values

Comparison of The Air Quality 1992 - 2011

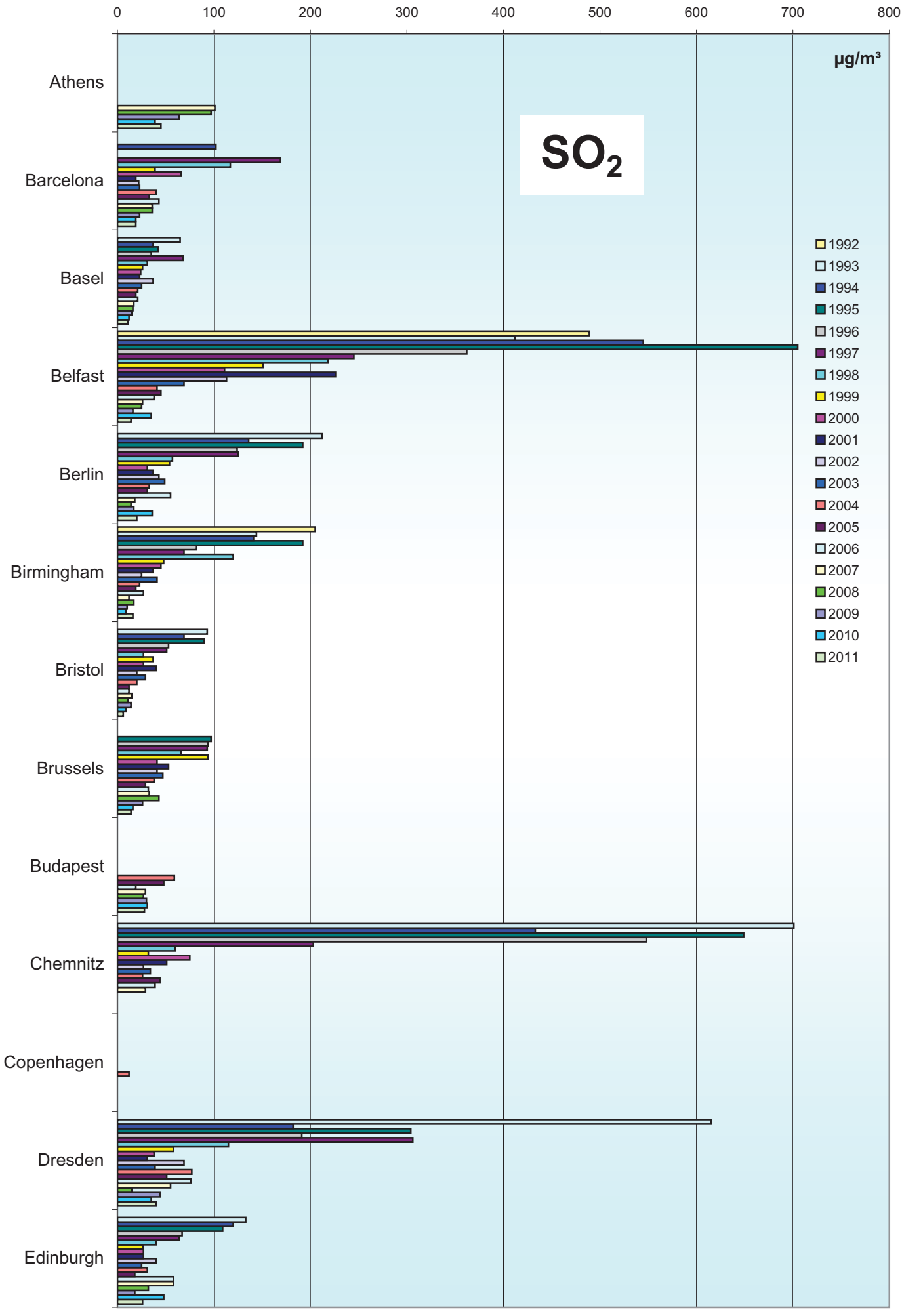
max. daily mean values (peak-stressed monitoring station)



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

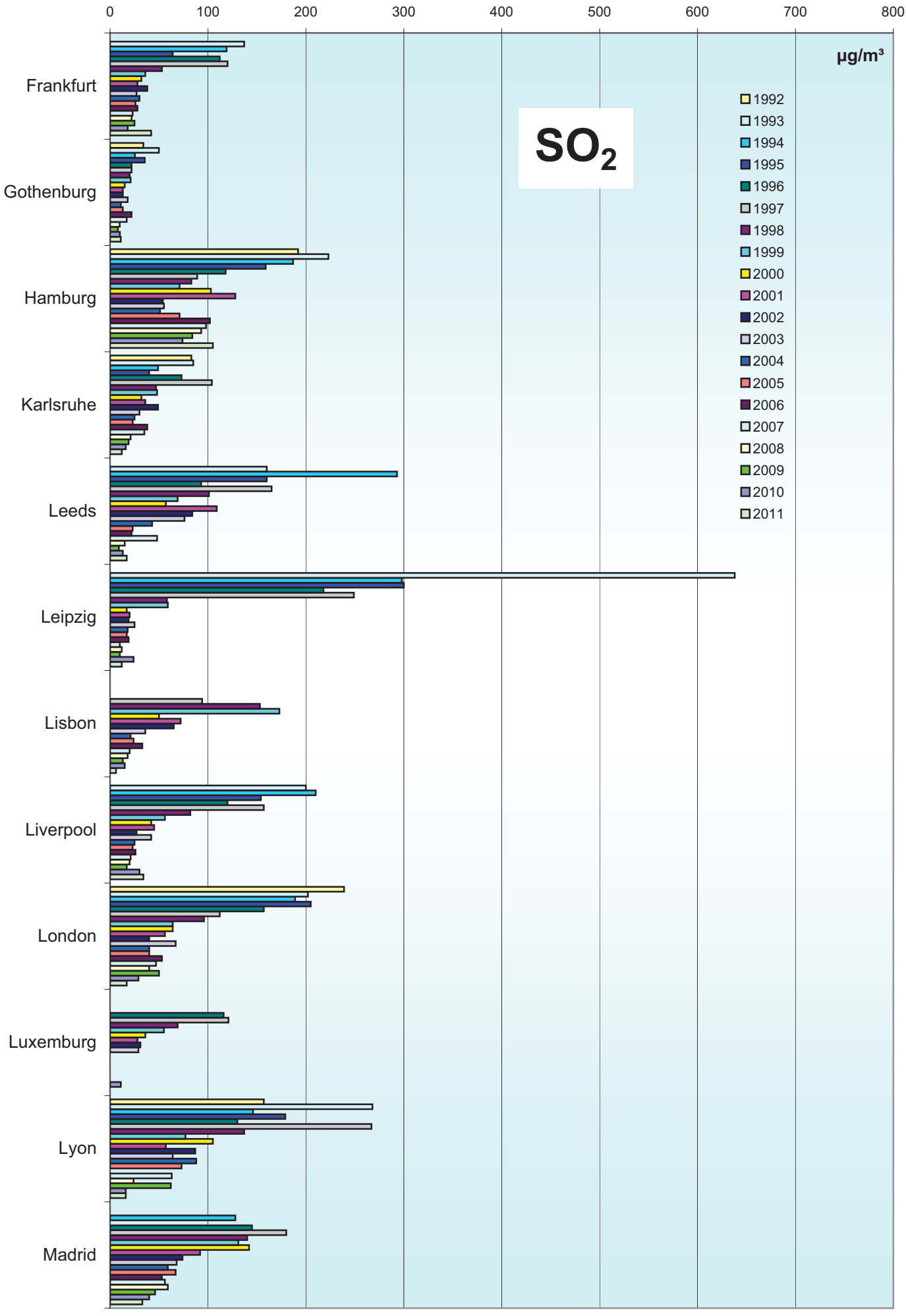
Comparison of The Air Quality 1992 - 2011

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



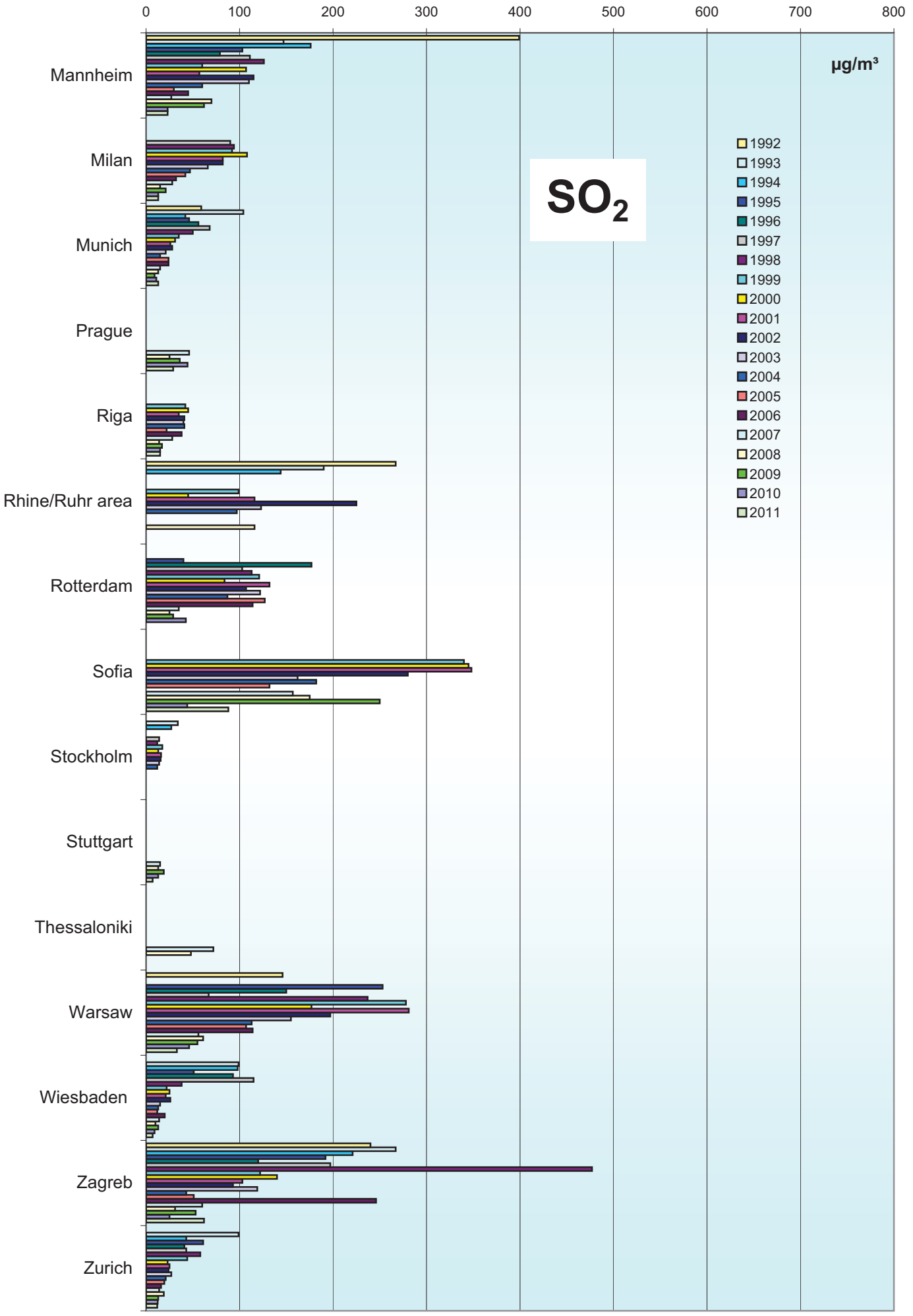
Comparison of The Air Quality 1992 - 2011

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



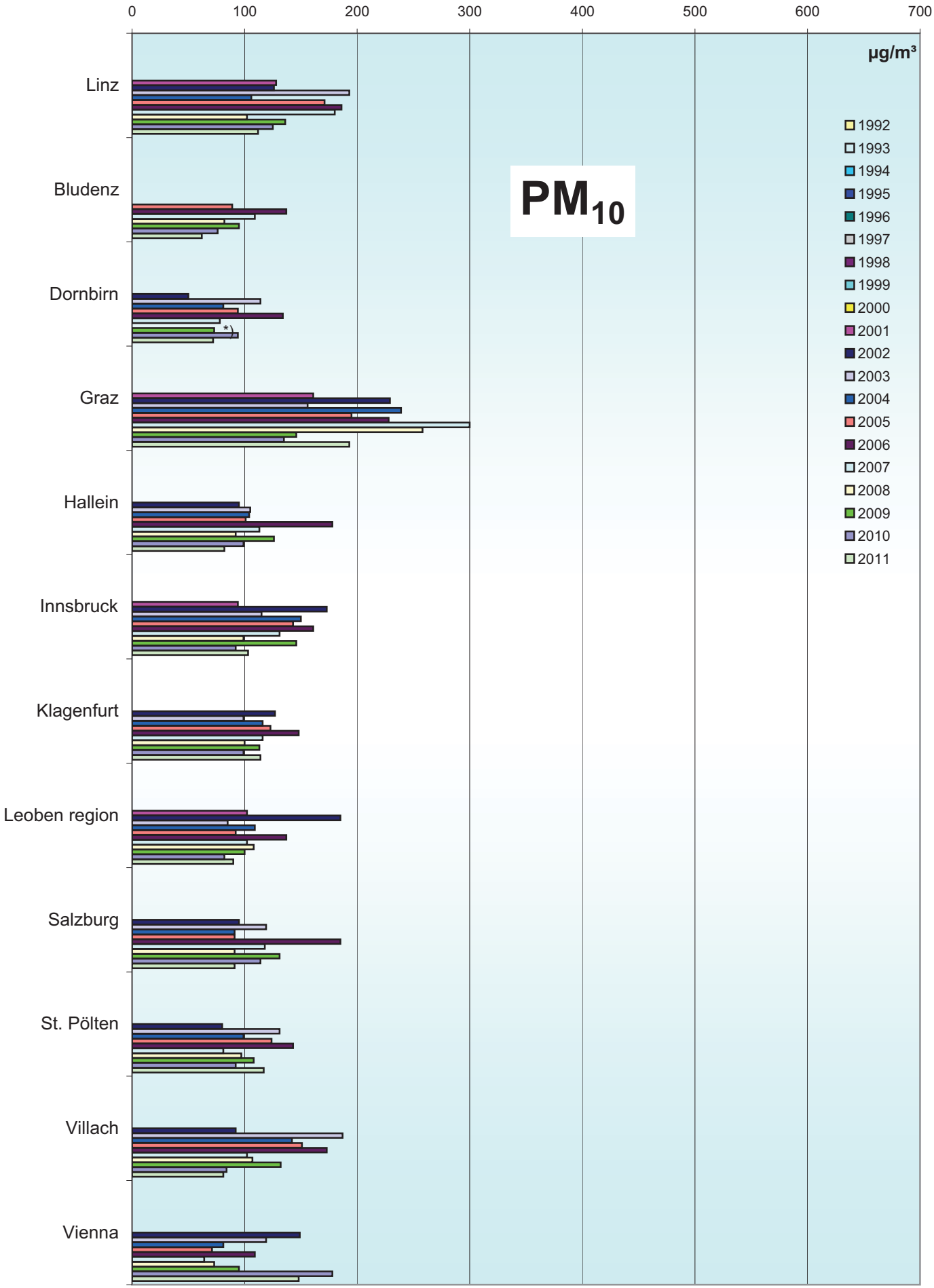
Comparison of The Air Quality 1992 - 2011

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



Comparison of The Air Quality 1992 - 2011

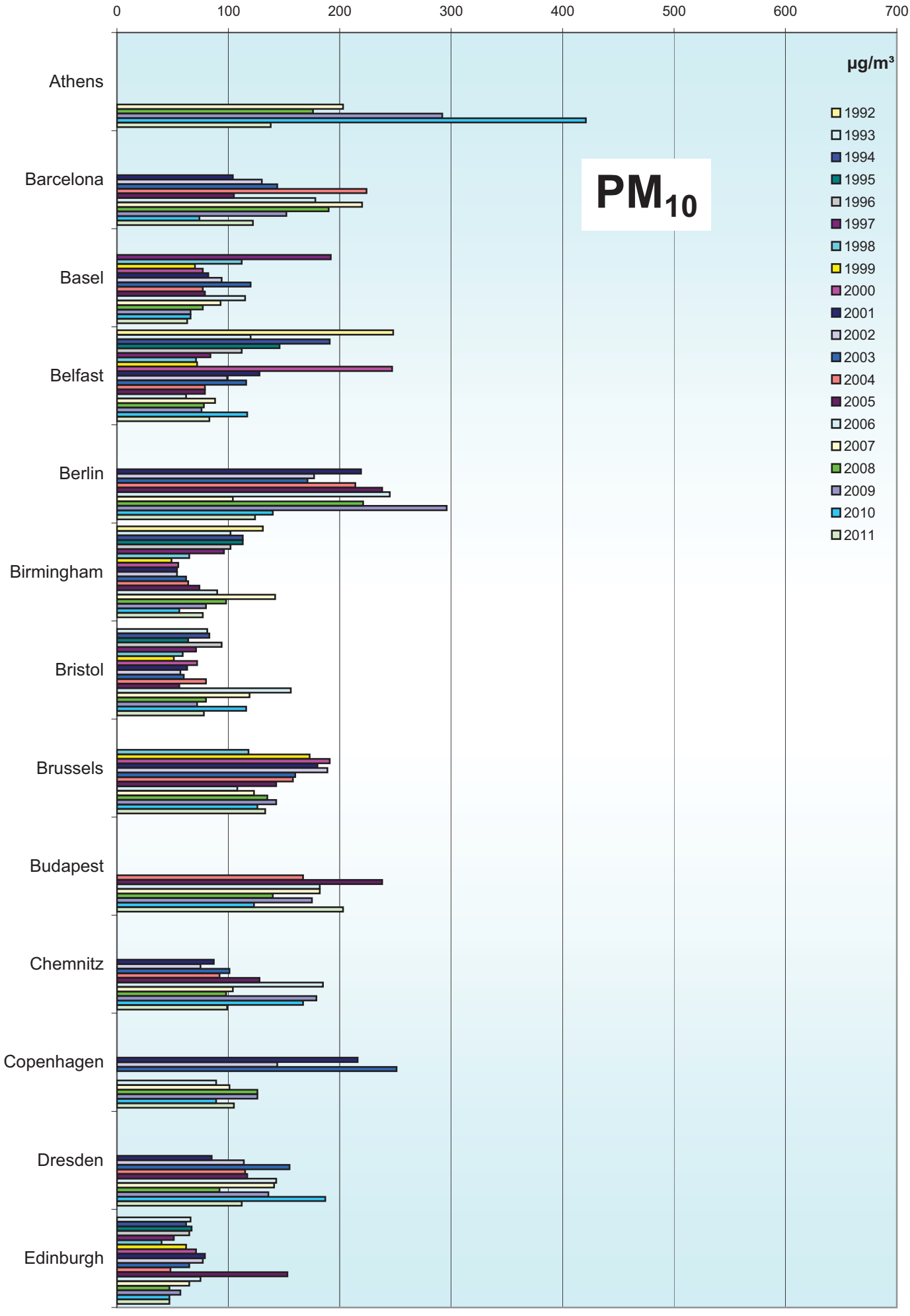
max. daily mean values (peak-stressed monitoring station)



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

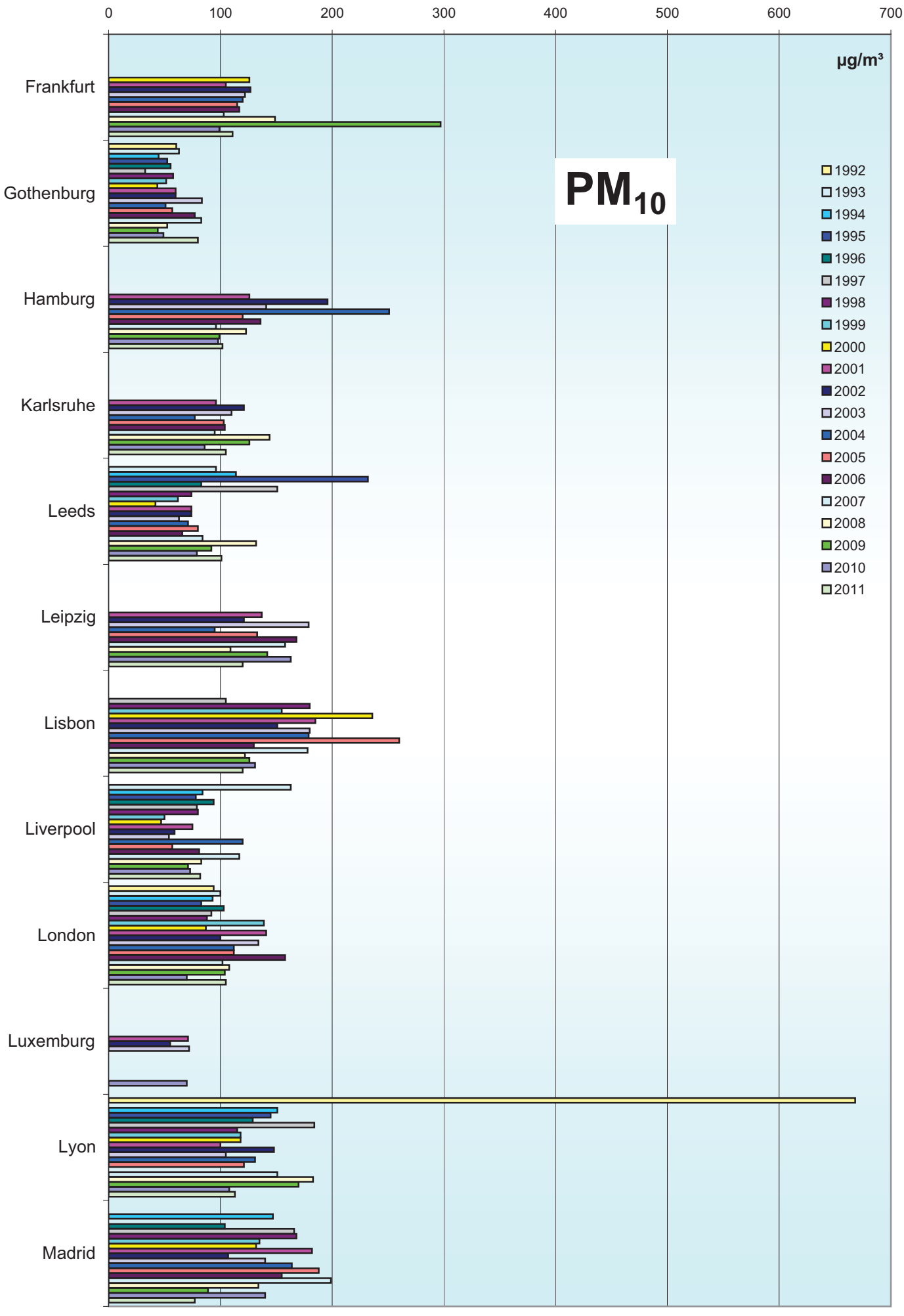
Comparison of The Air Quality 1992 - 2011

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



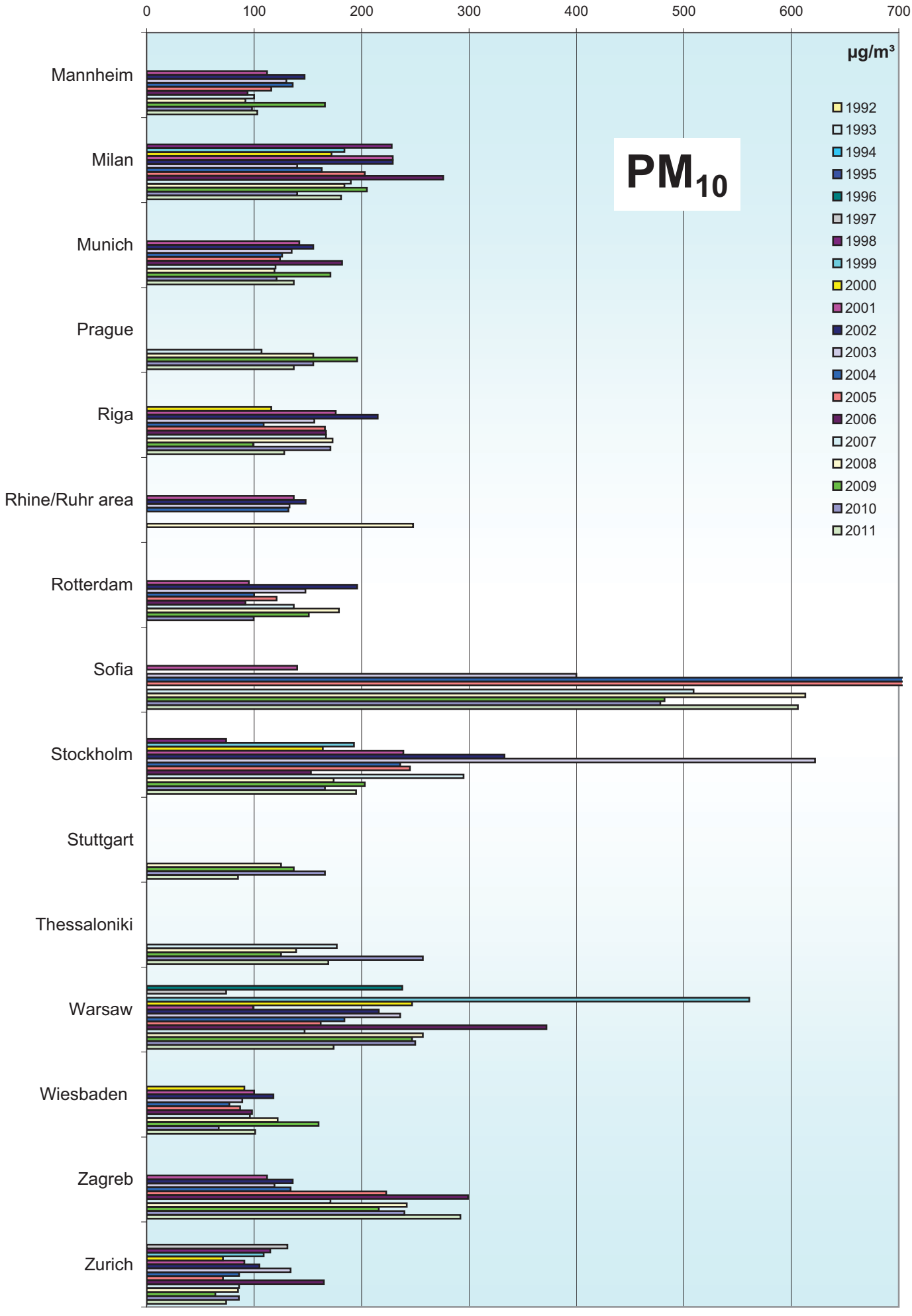
Comparison of The Air Quality 1992 - 2011

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



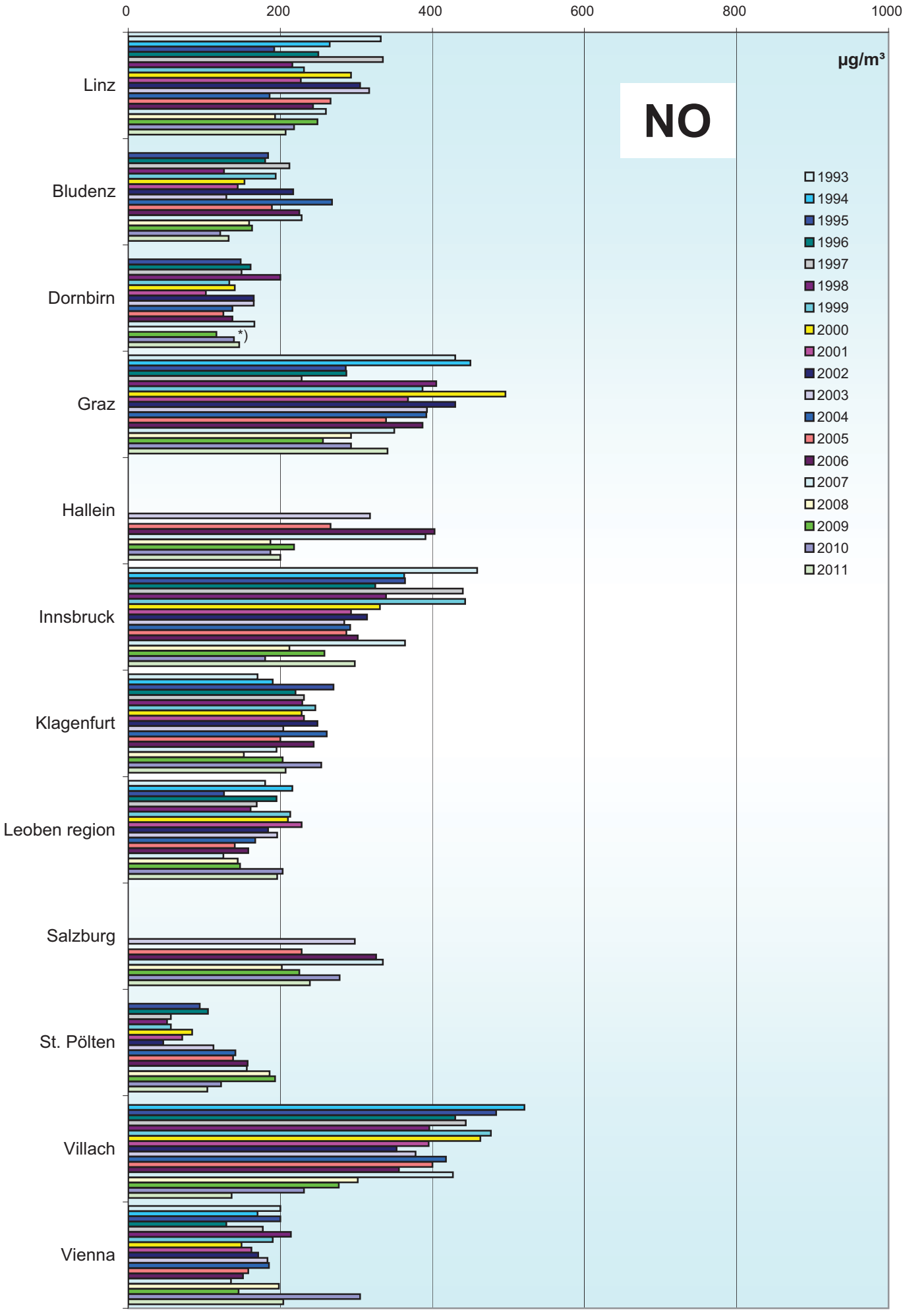
Comparison of The Air Quality 1992 - 2011

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



Comparison of The Air Quality 1992 - 2011

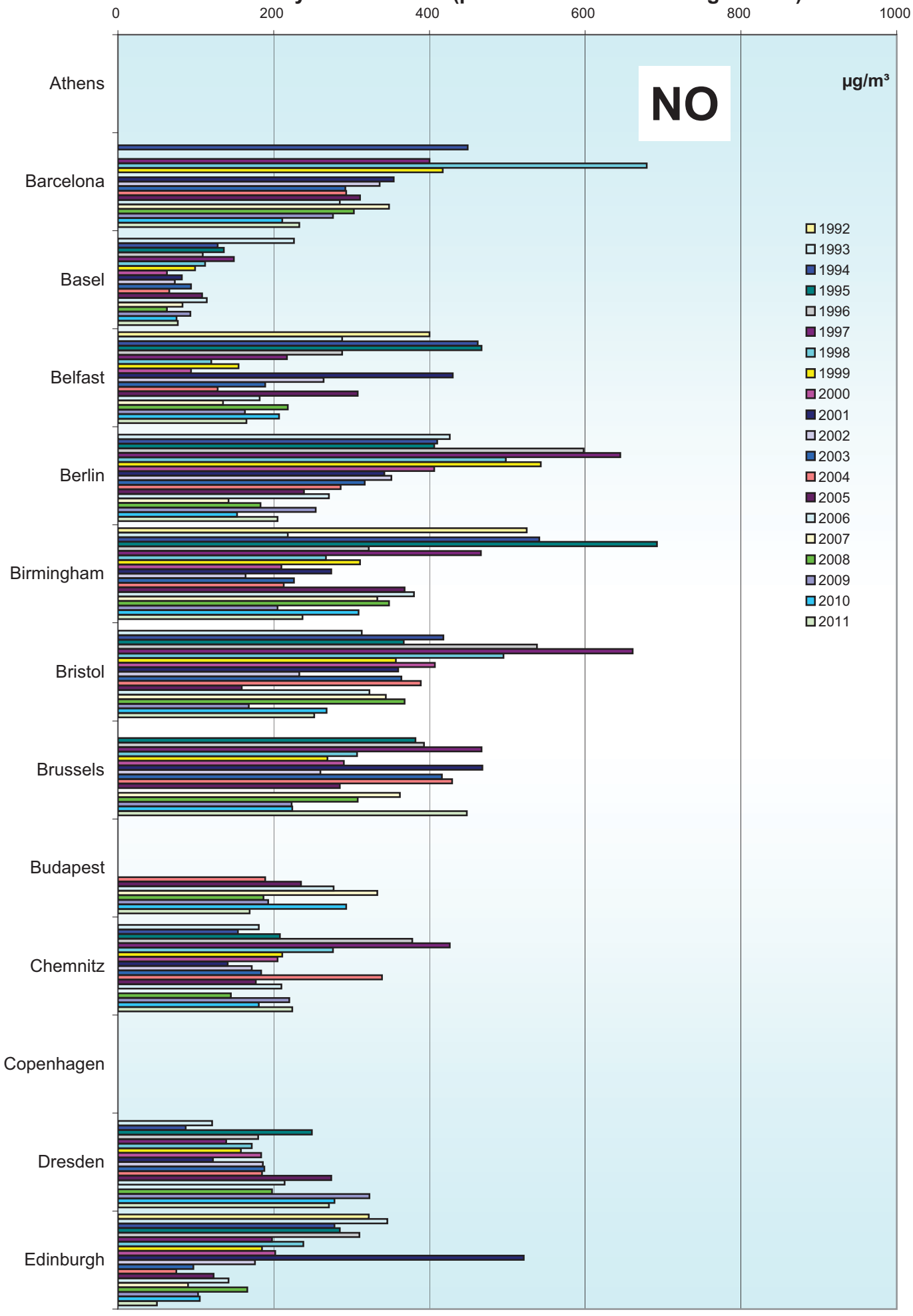
max. daily mean values (peak-stressed monitoring station)



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

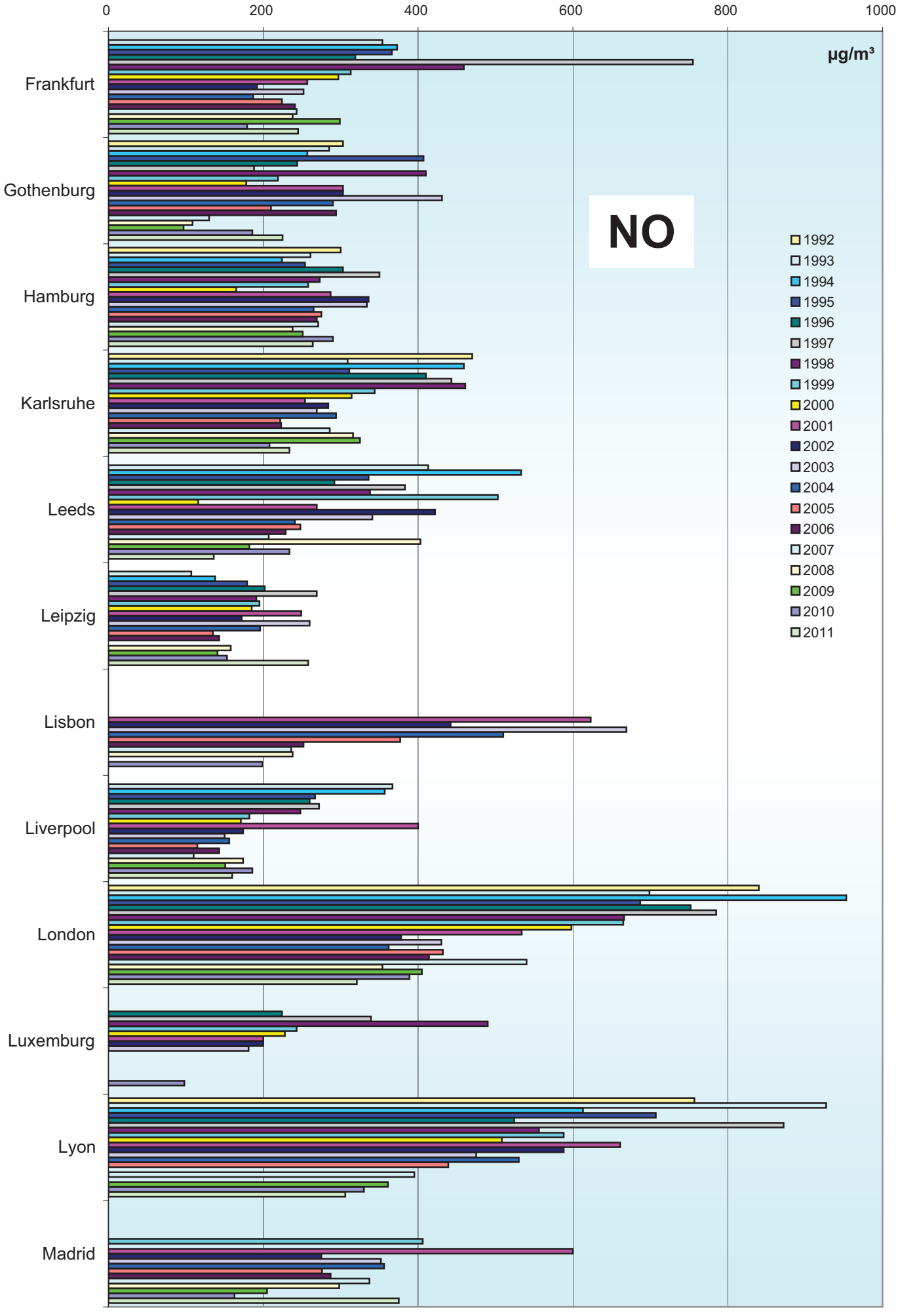
Comparison of The Air Quality 1992 - 2011

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



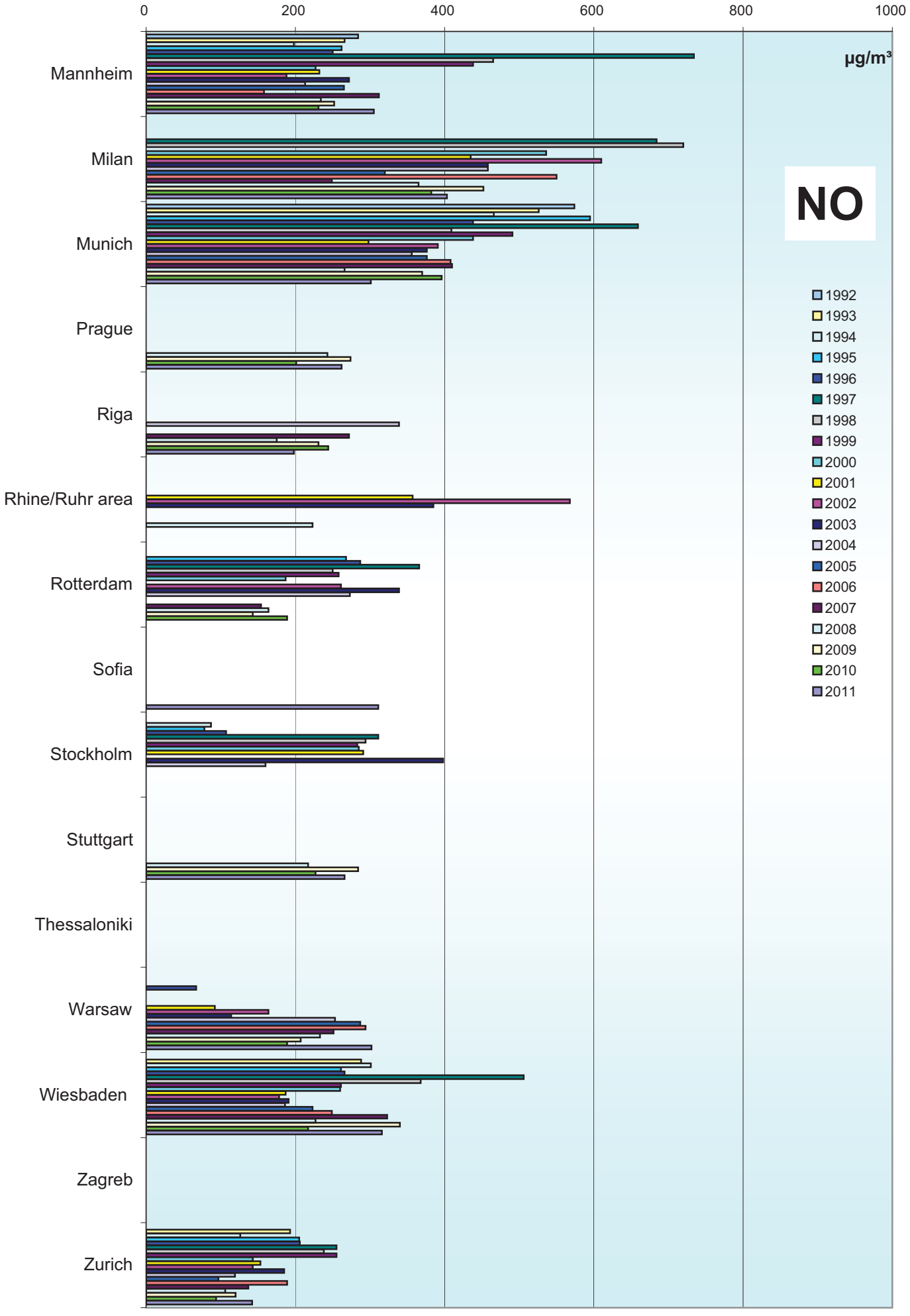
Comparison of The Air Quality 1992 - 2011

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



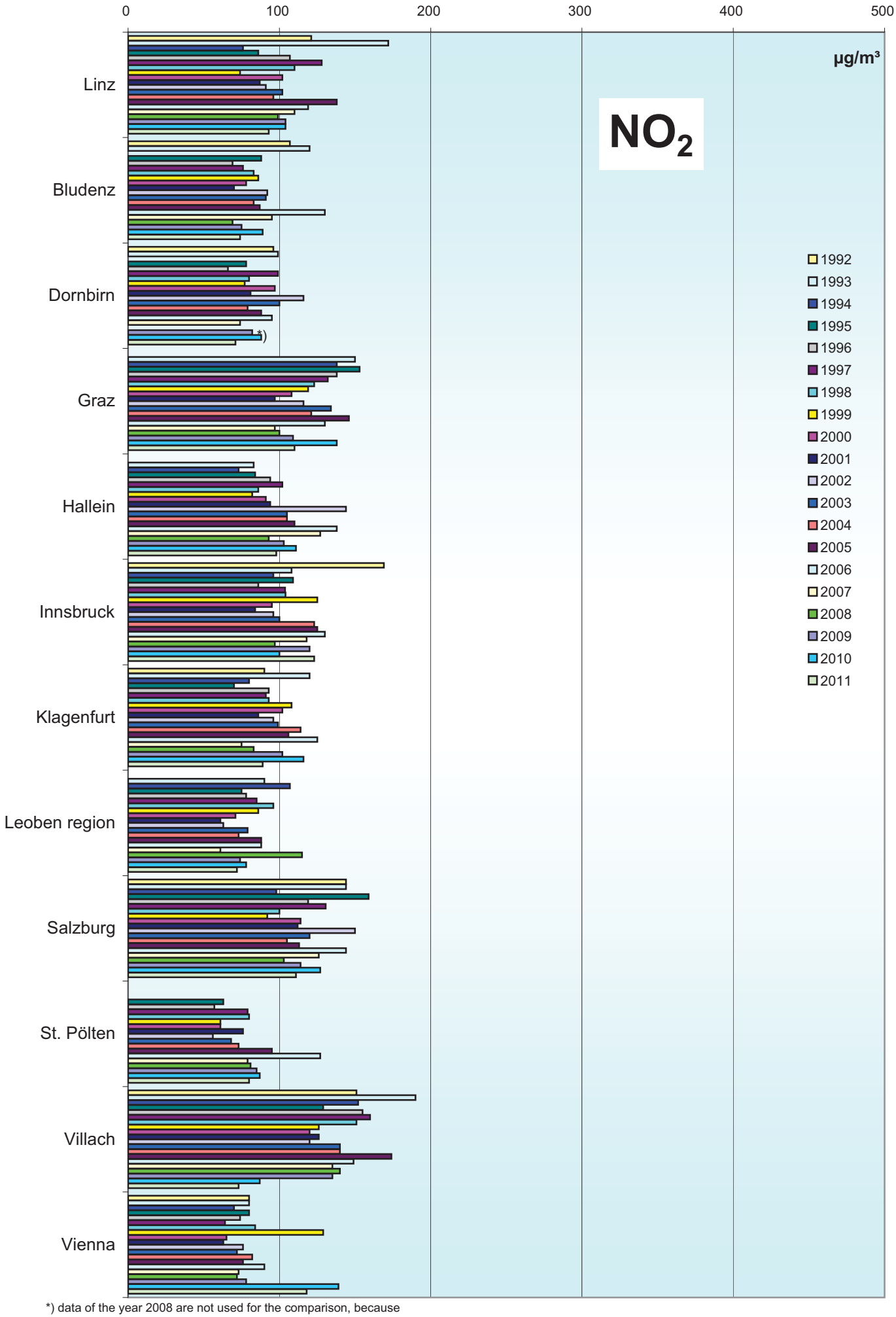
Comparison of The Air Quality 1992 - 2011

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



Comparison of The Air Quality 1992 - 2011

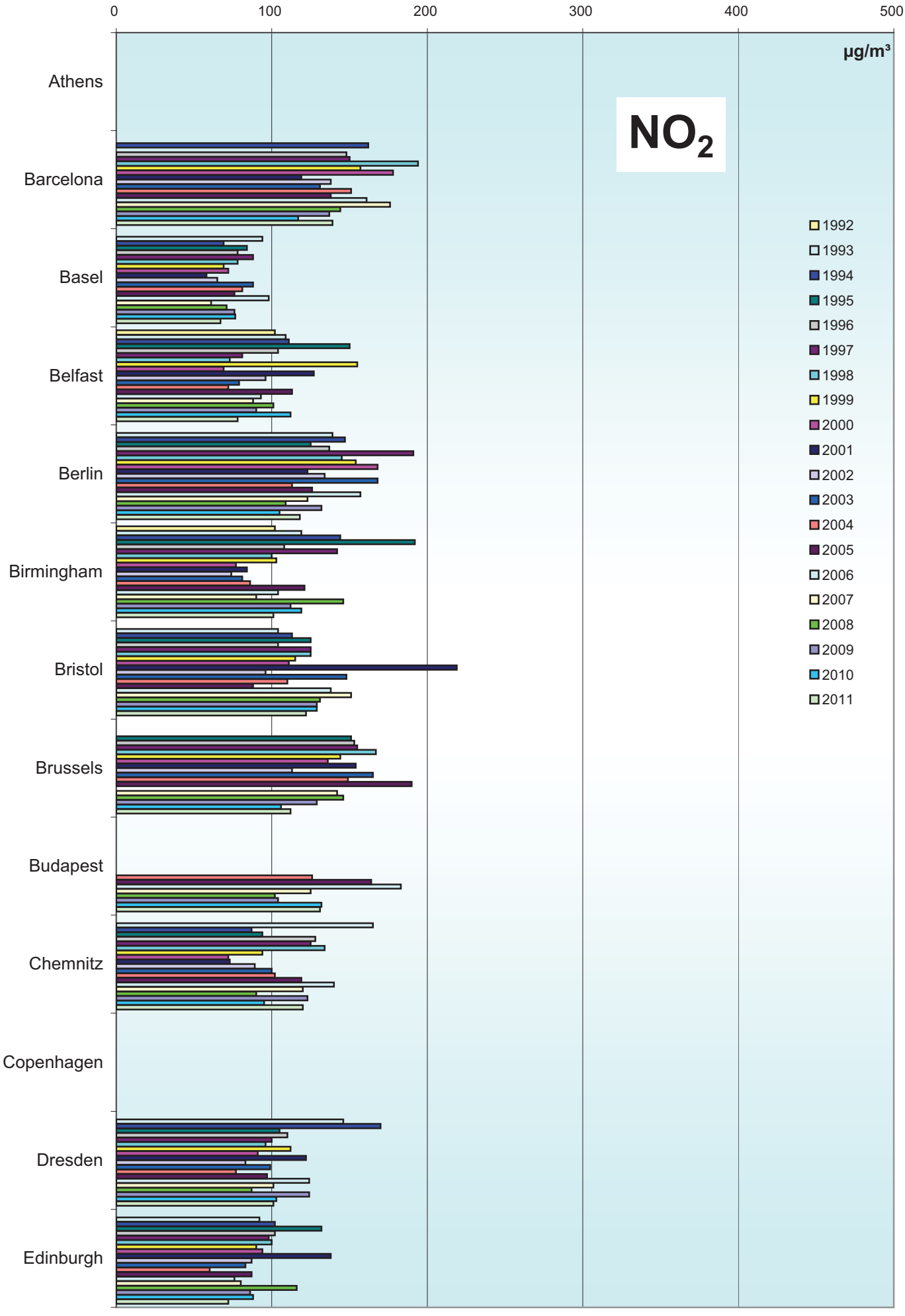
max. daily mean values (peak-stressed monitoring station)



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

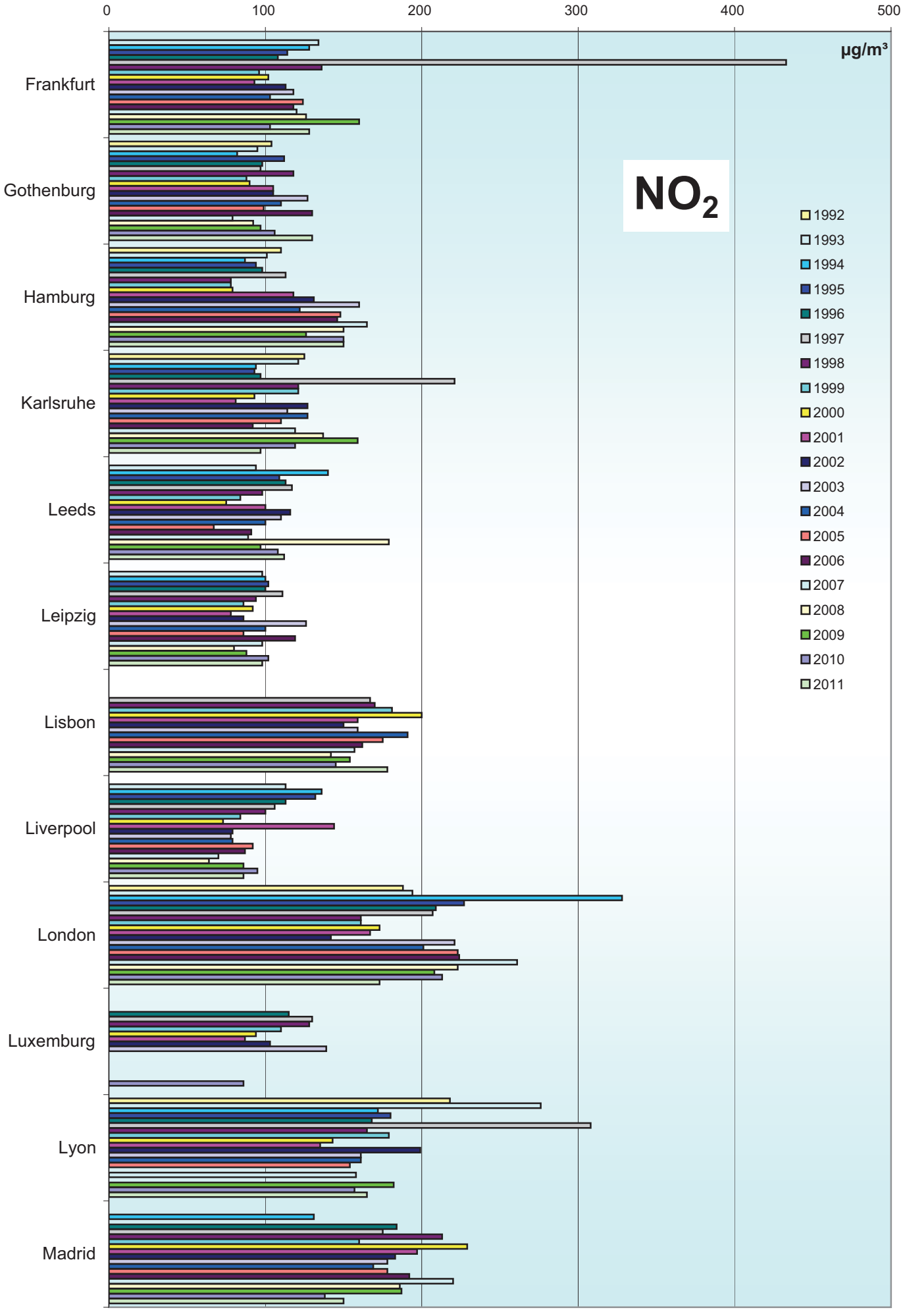
Comparison of The Air Quality 1992 - 2011

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



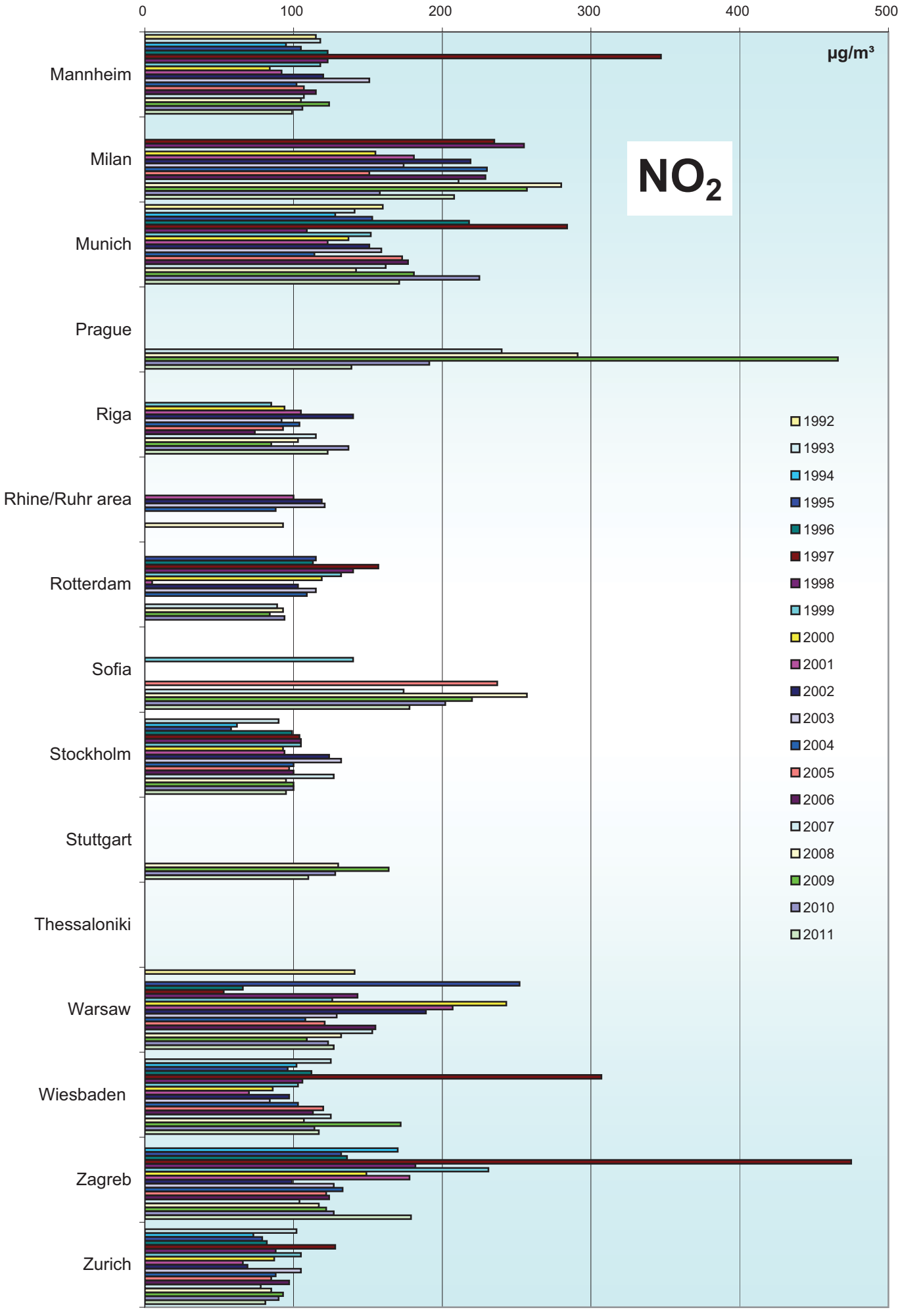
Comparison of The Air Quality 1992 - 2011

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



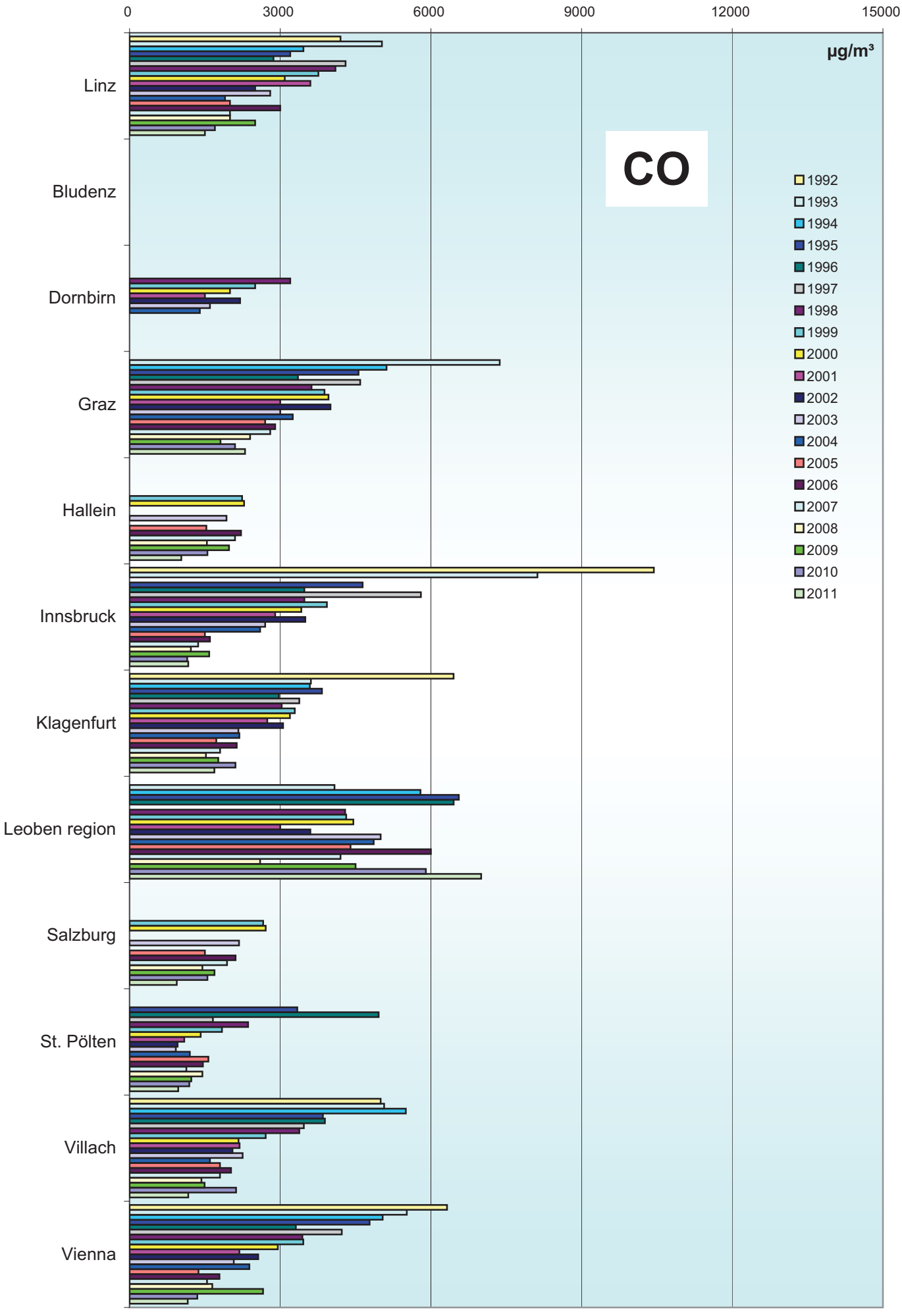
Comparison of The Air Quality 1992 - 2011

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



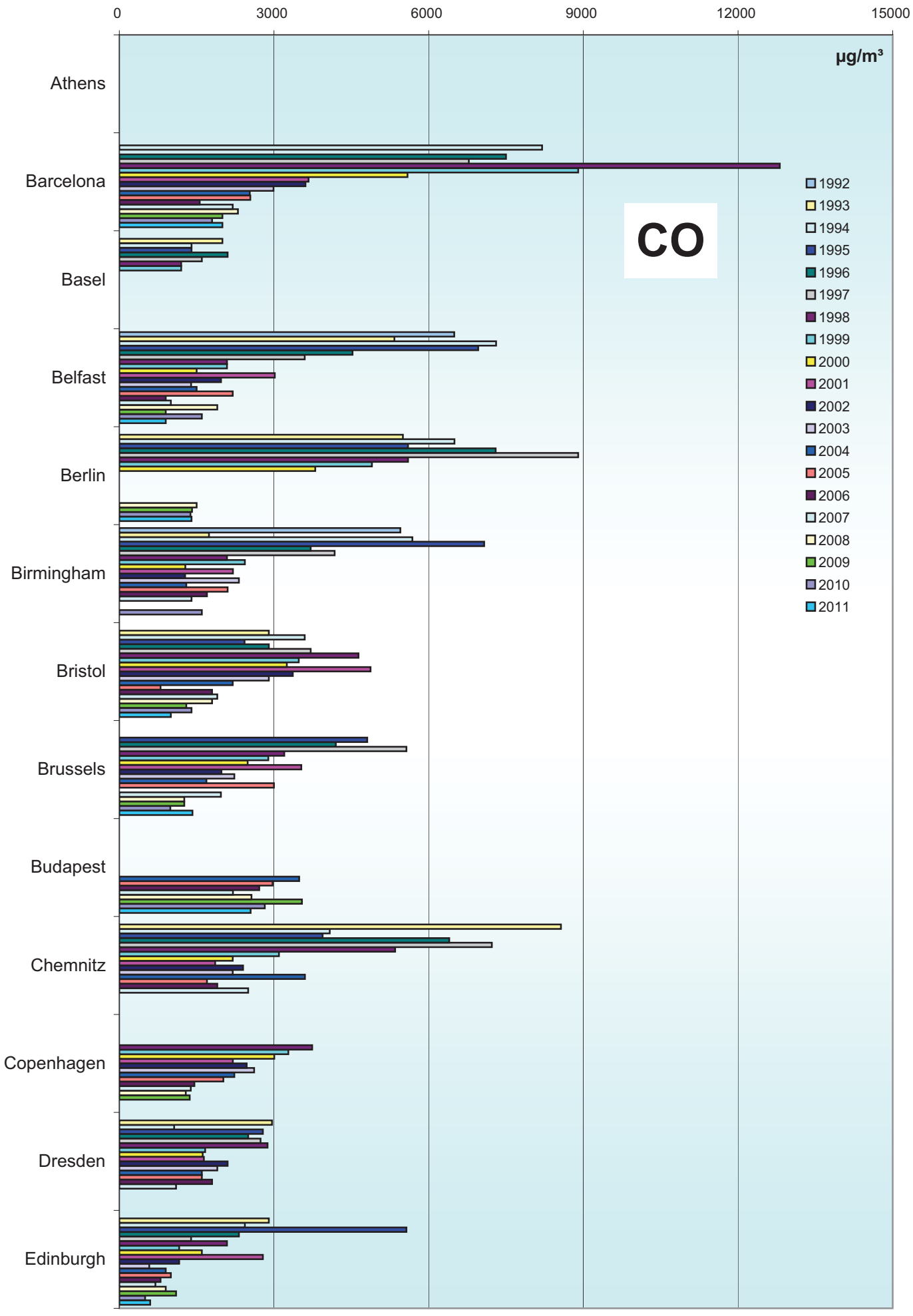
Comparison of The Air Quality 1992 - 2011

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



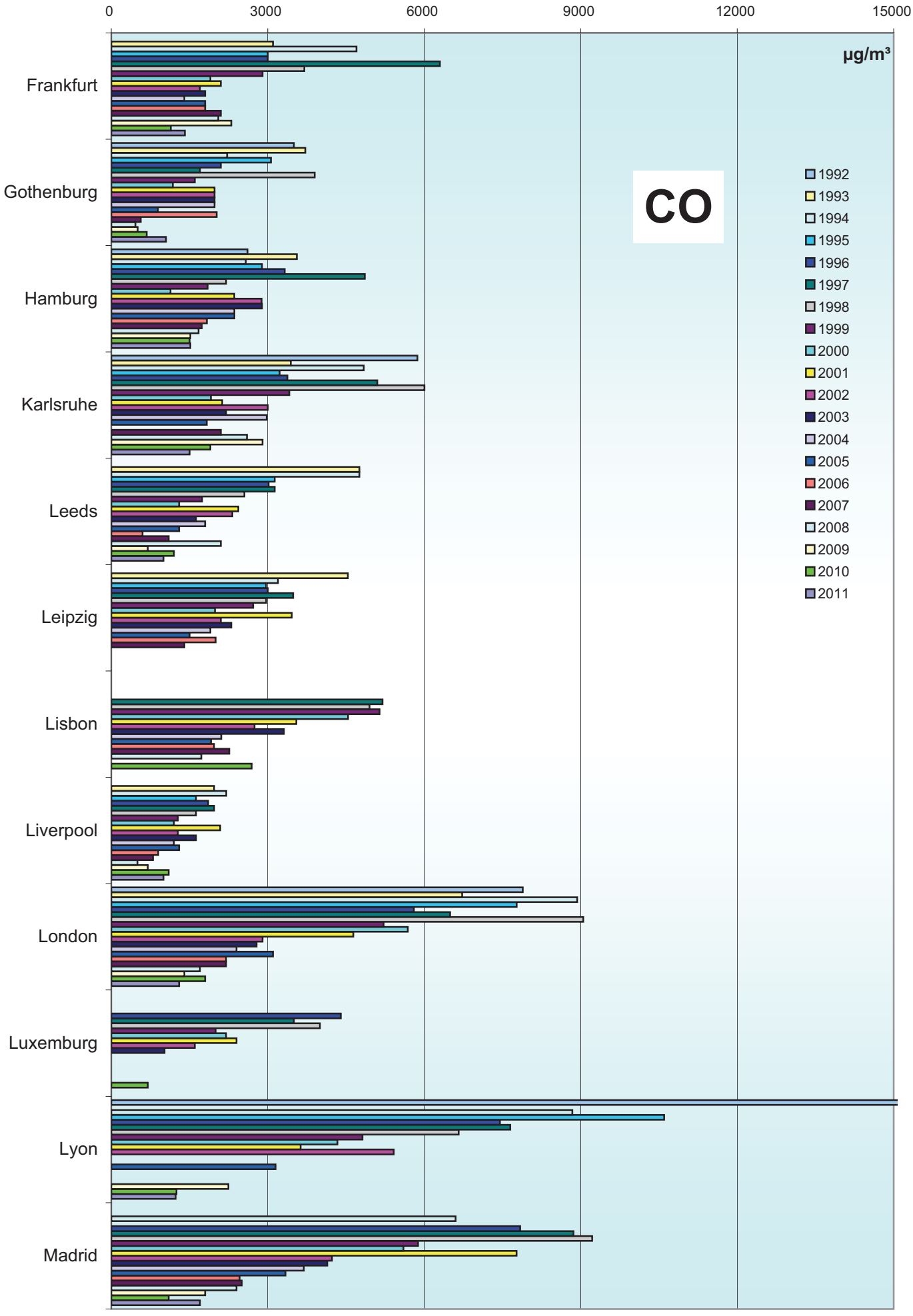
Comparison of The Air Quality 1992 - 2011

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



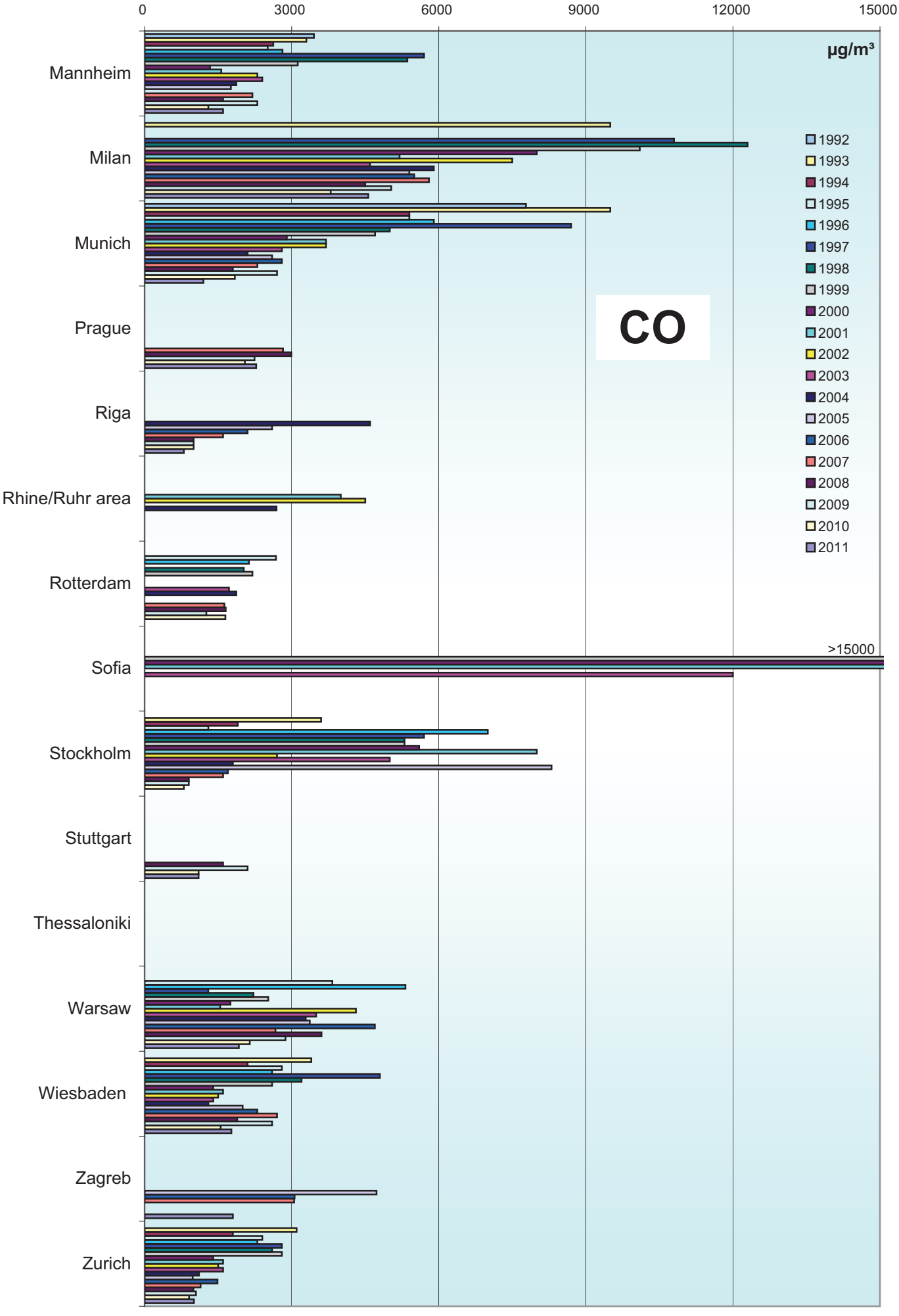
Comparison of The Air Quality 1992 - 2011

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



Comparison of The Air Quality 1992 - 2011

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



Jahresvergleich

1993 - 2011

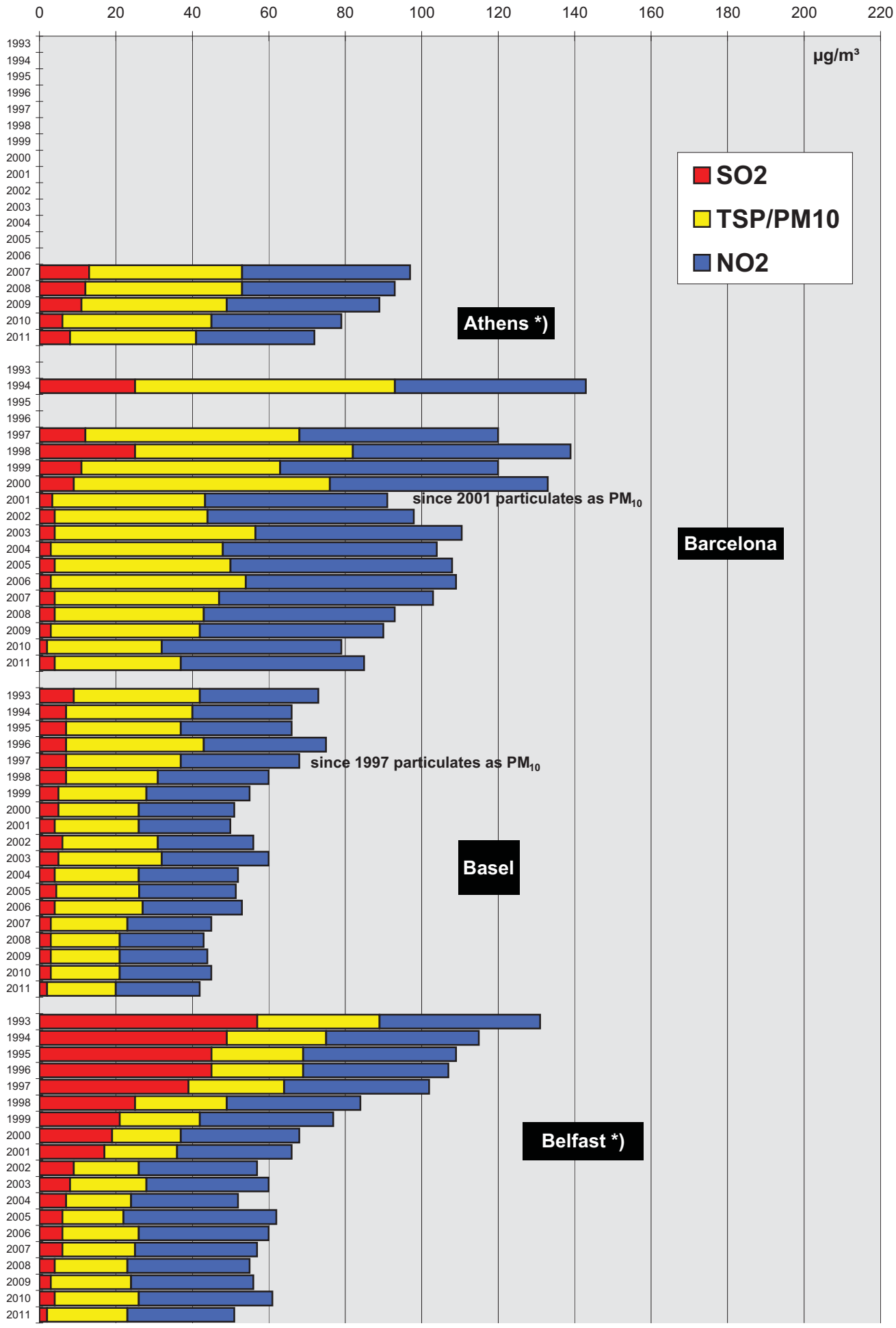
Jahresmittelwerte, Σ SO_2, TSP/PM10, NO_2

Comparison Of The Air Quality

1993 - 2011

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

Comparison Of The Air Quality 1993-2011
Development of the annual mean values, Σ SO_2, TSP/PM_{10}, NO_2
(mean of all monitoring stations)

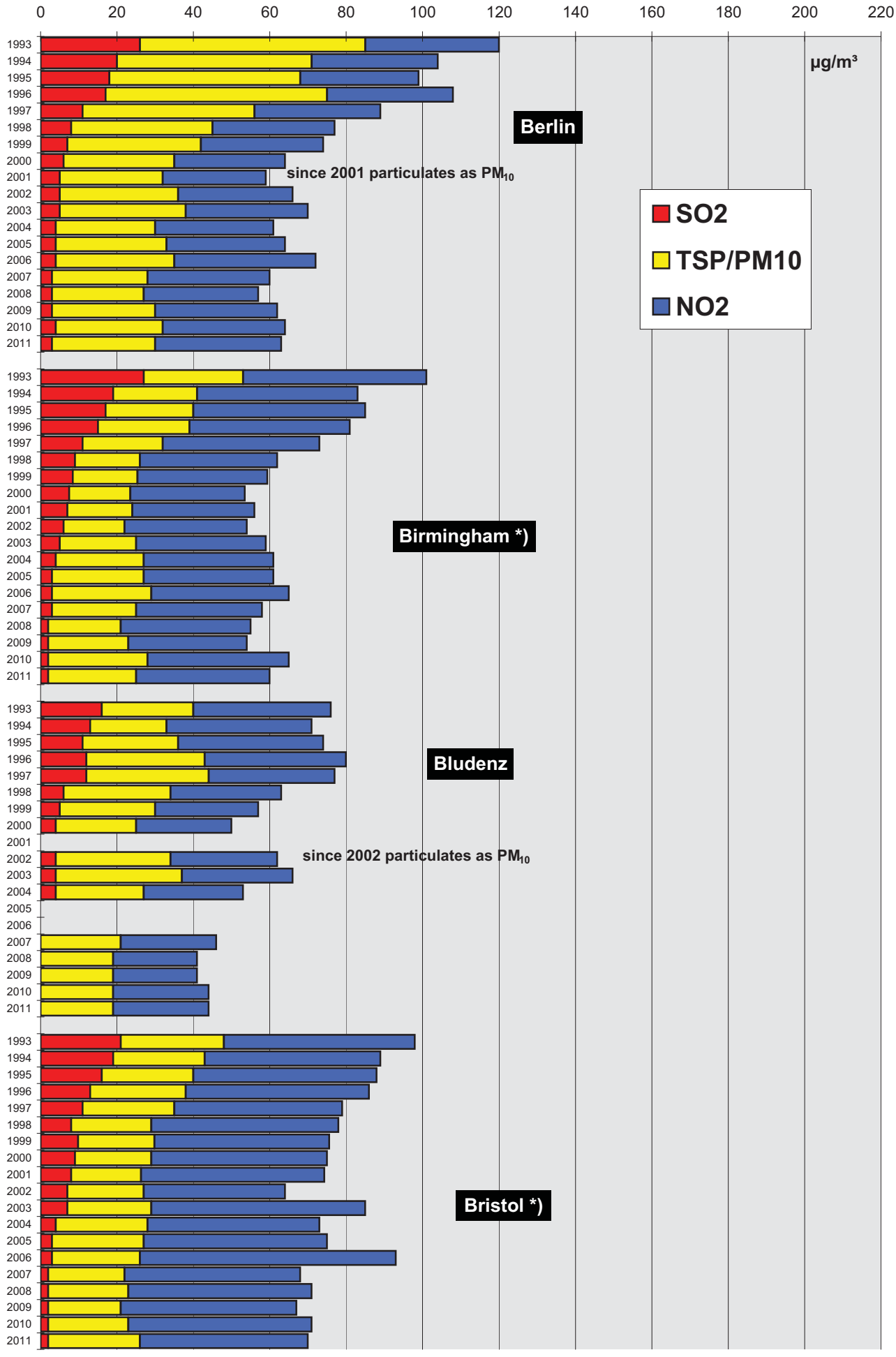


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2011

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

(mean of all monitoring stations)

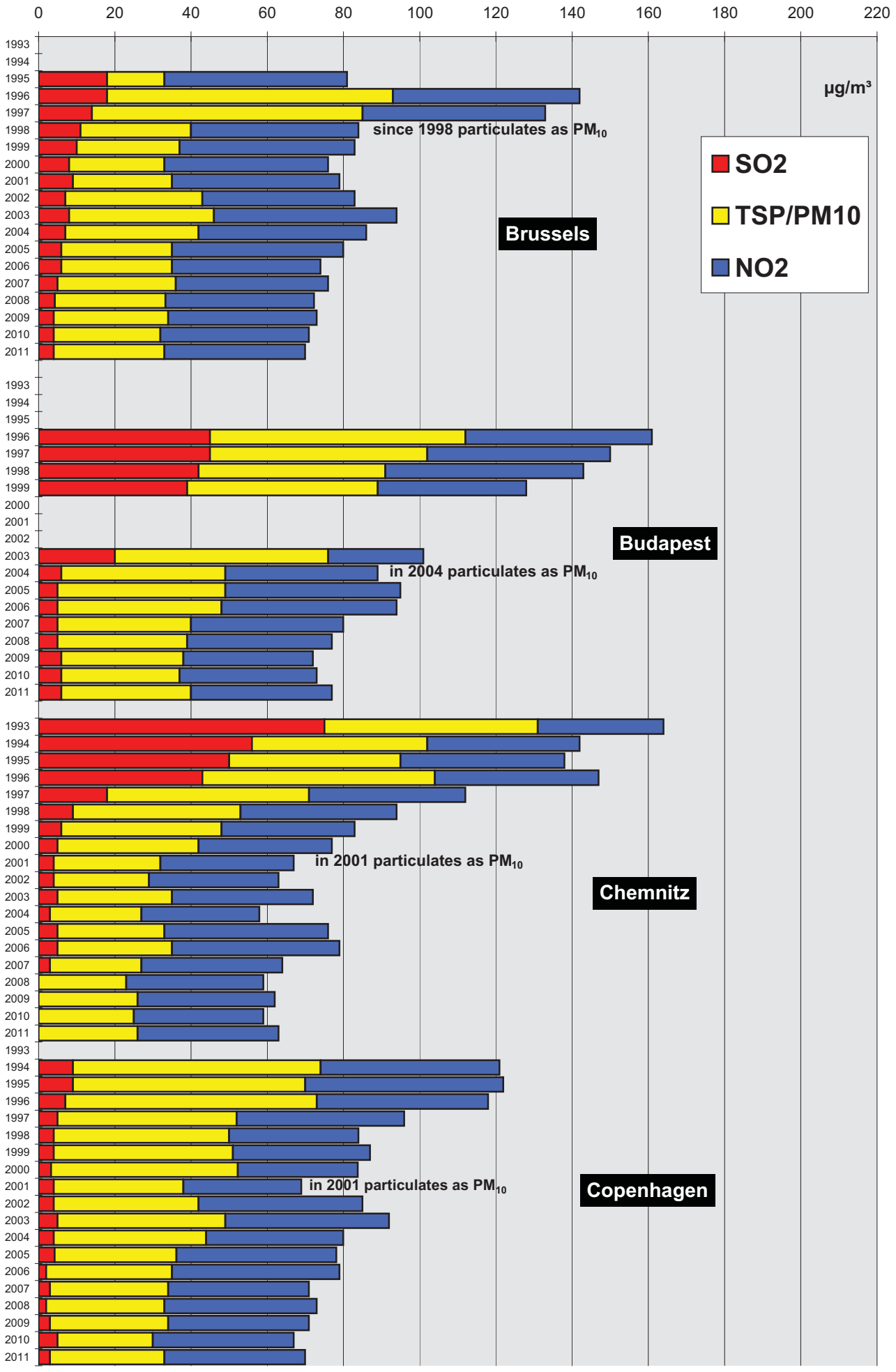


*) particulates calculated as PM_{10}

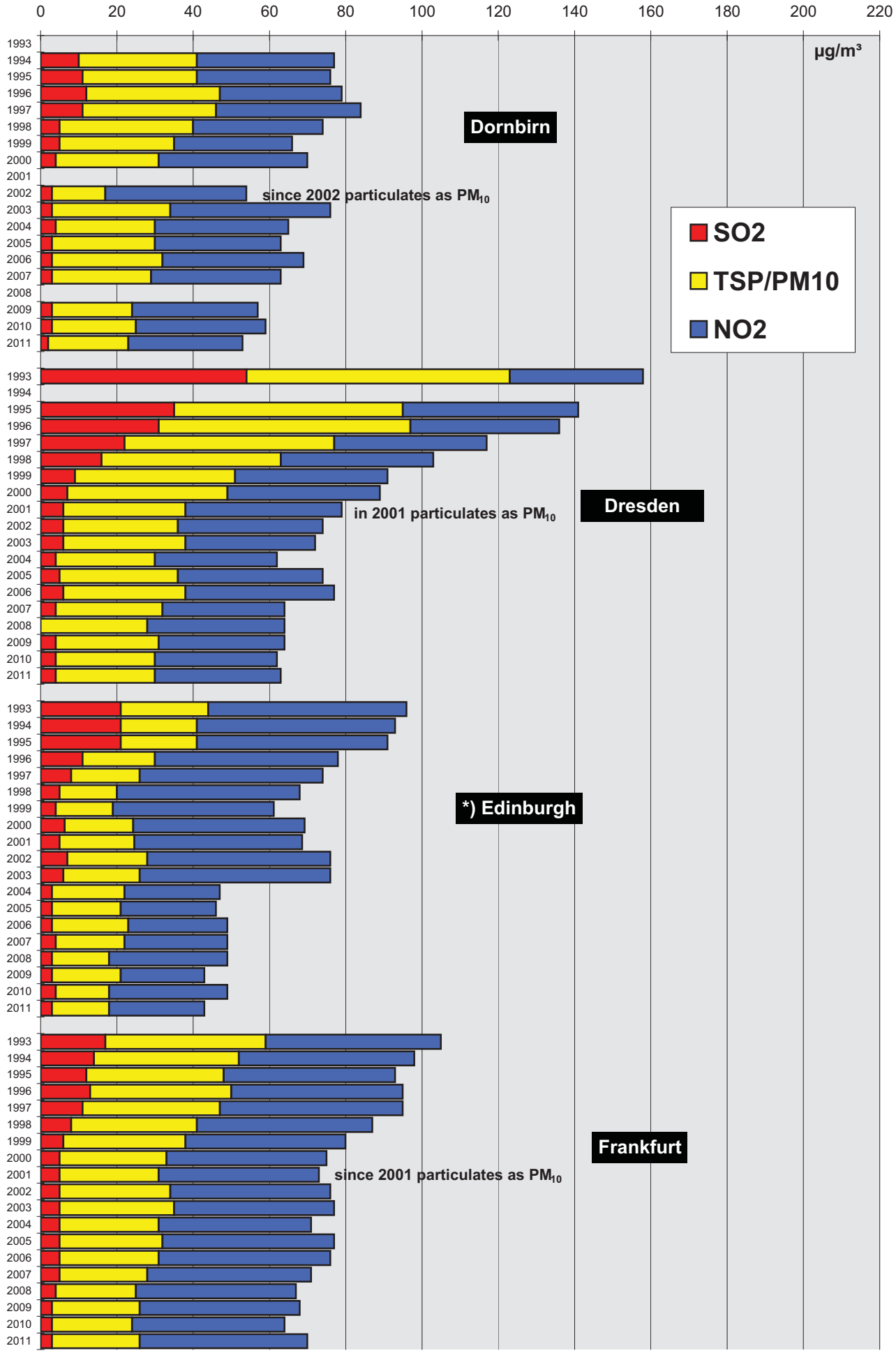
Comparison Of The Air Quality 1993-2011

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

(mean of all monitoring stations)



Comparison Of The Air Quality 1993-2011
Development of the annual mean values, Σ SO_2, TSP/PM_{10}, NO_2
(mean of all monitoring stations)

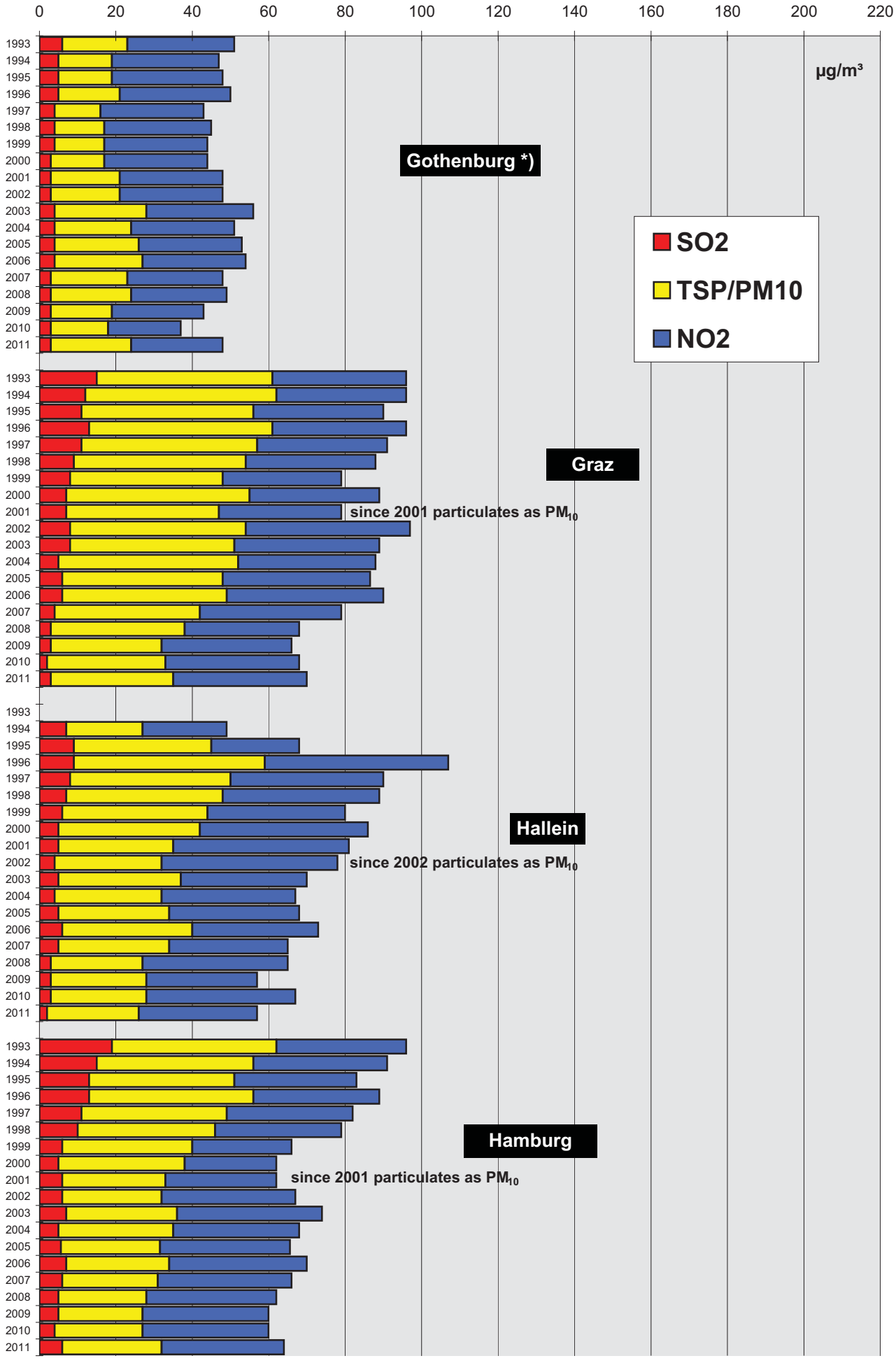


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2011

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

(mean of all monitoring stations)

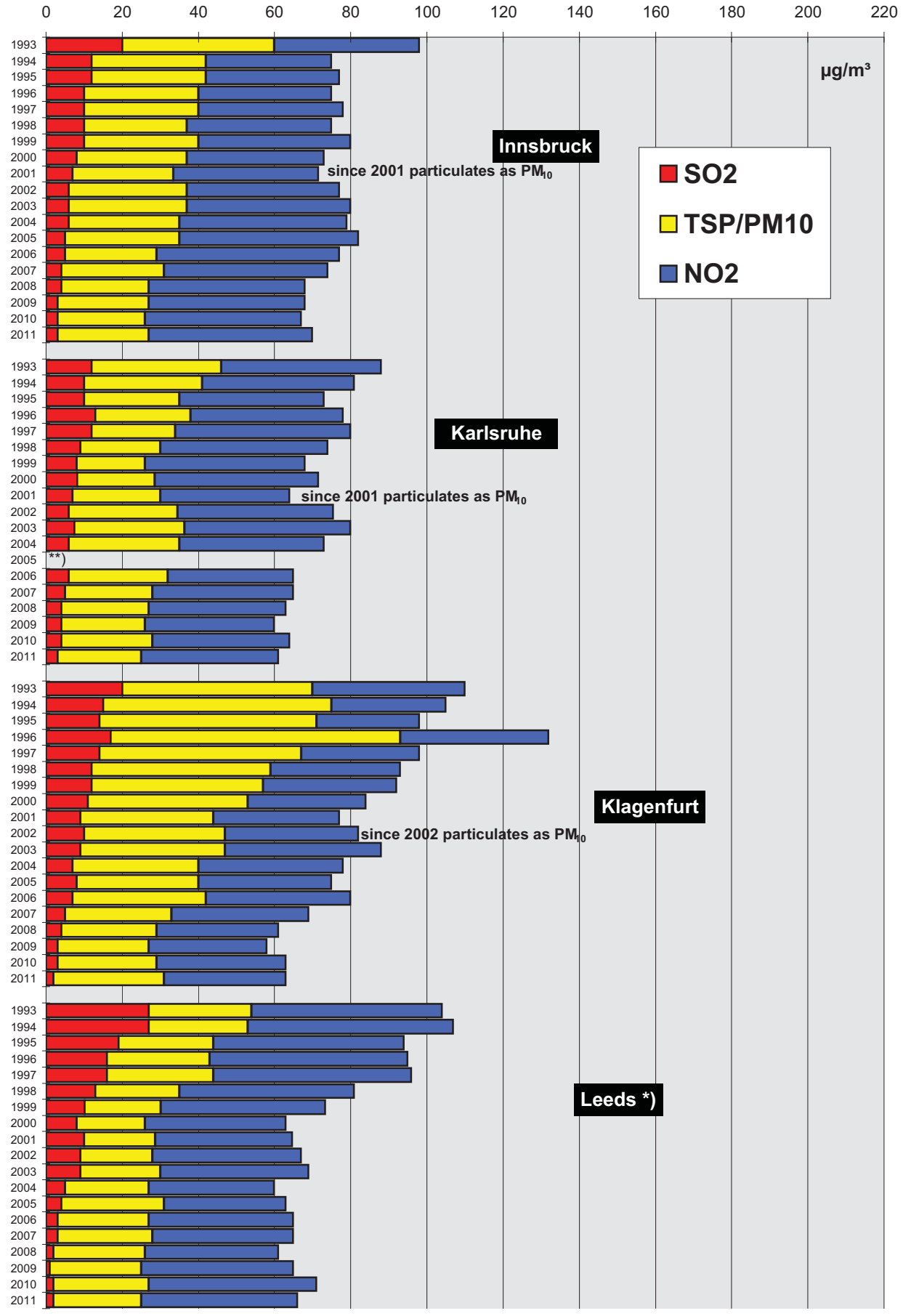


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2011

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

(mean of all monitoring stations)



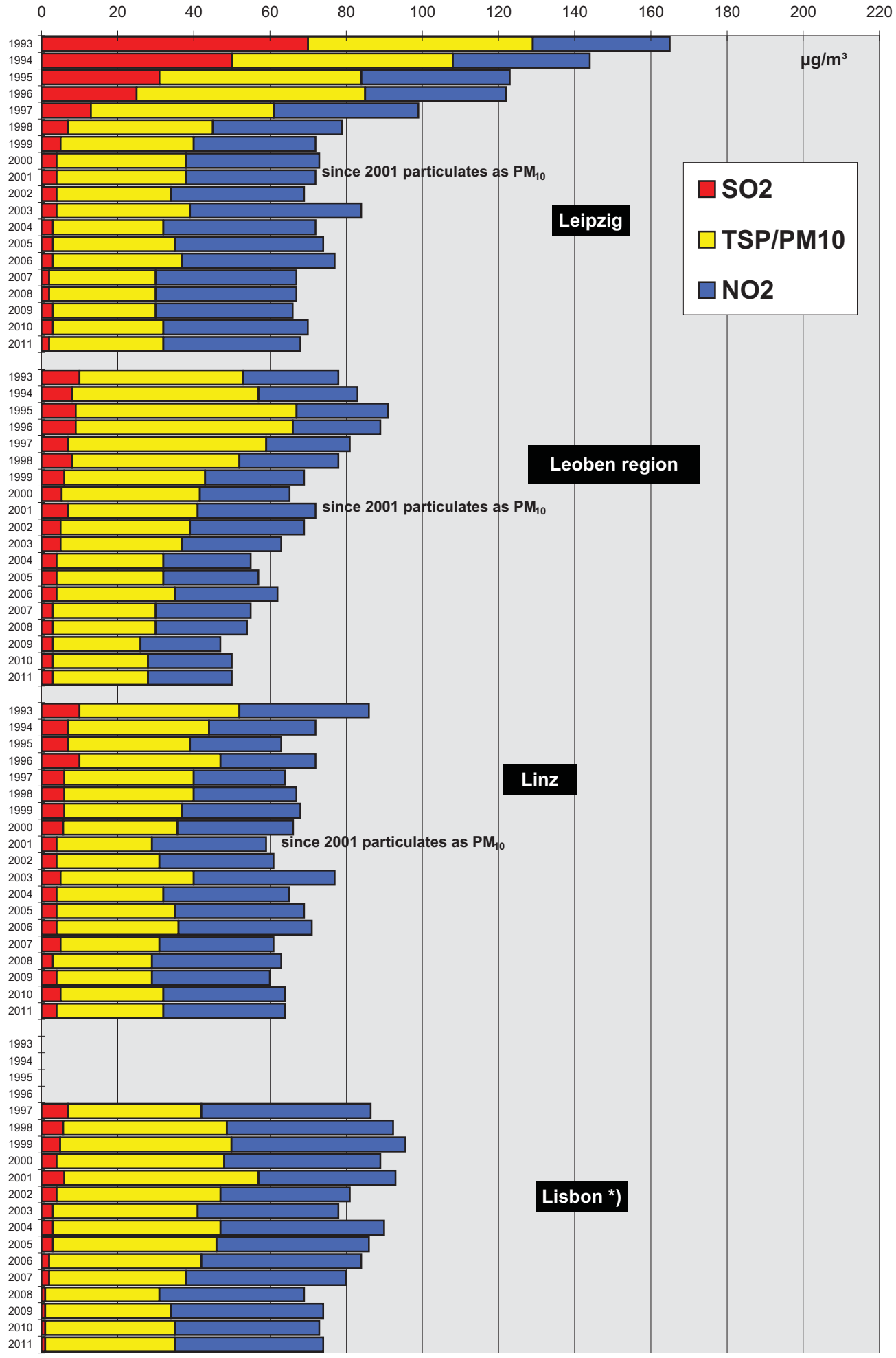
*) particulates calculated as PM10

**) No data

Comparison Of The Air Quality 1993-2011

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

(mean of all monitoring stations)

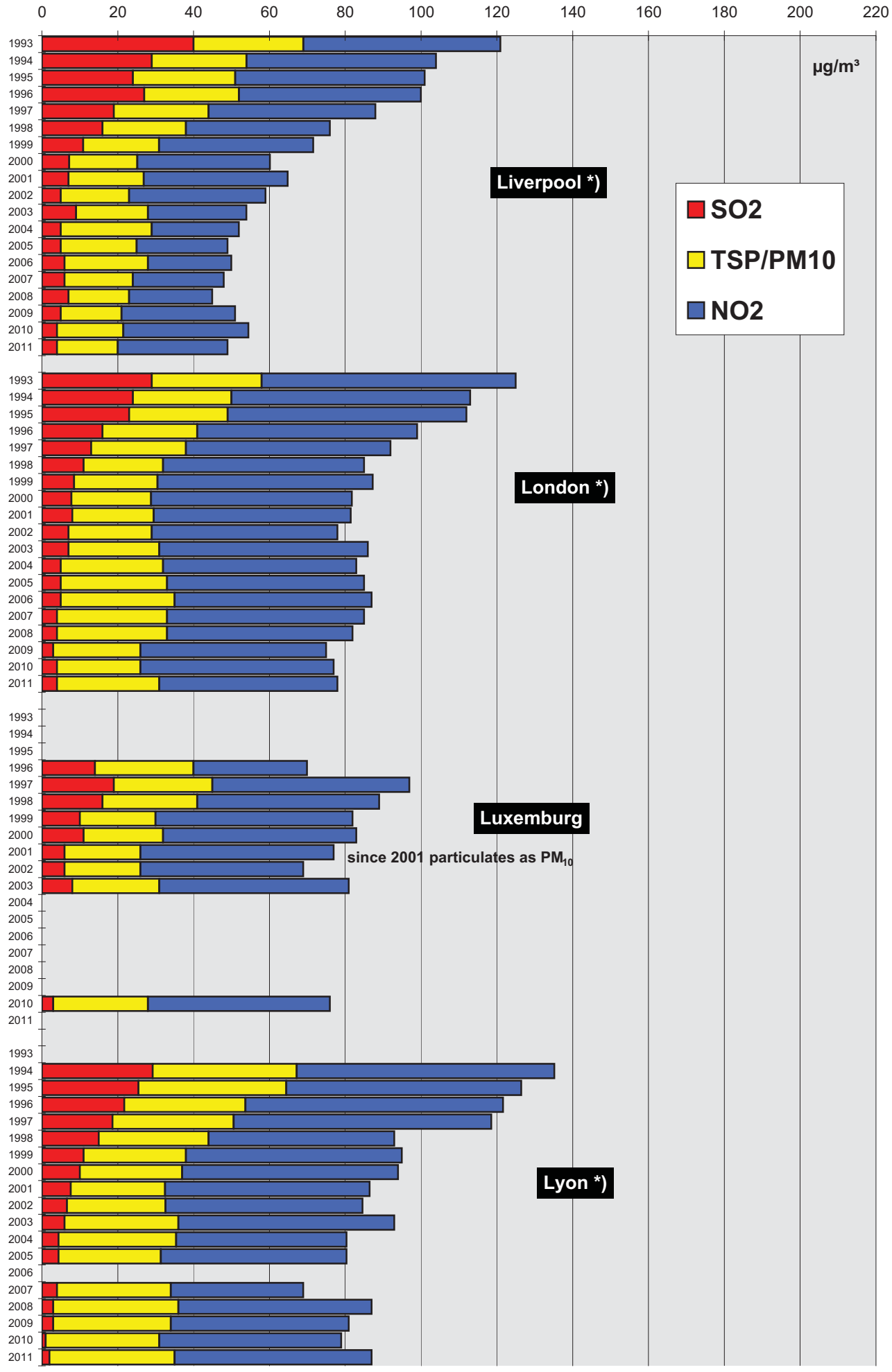


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2011

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

(mean of all monitoring stations)

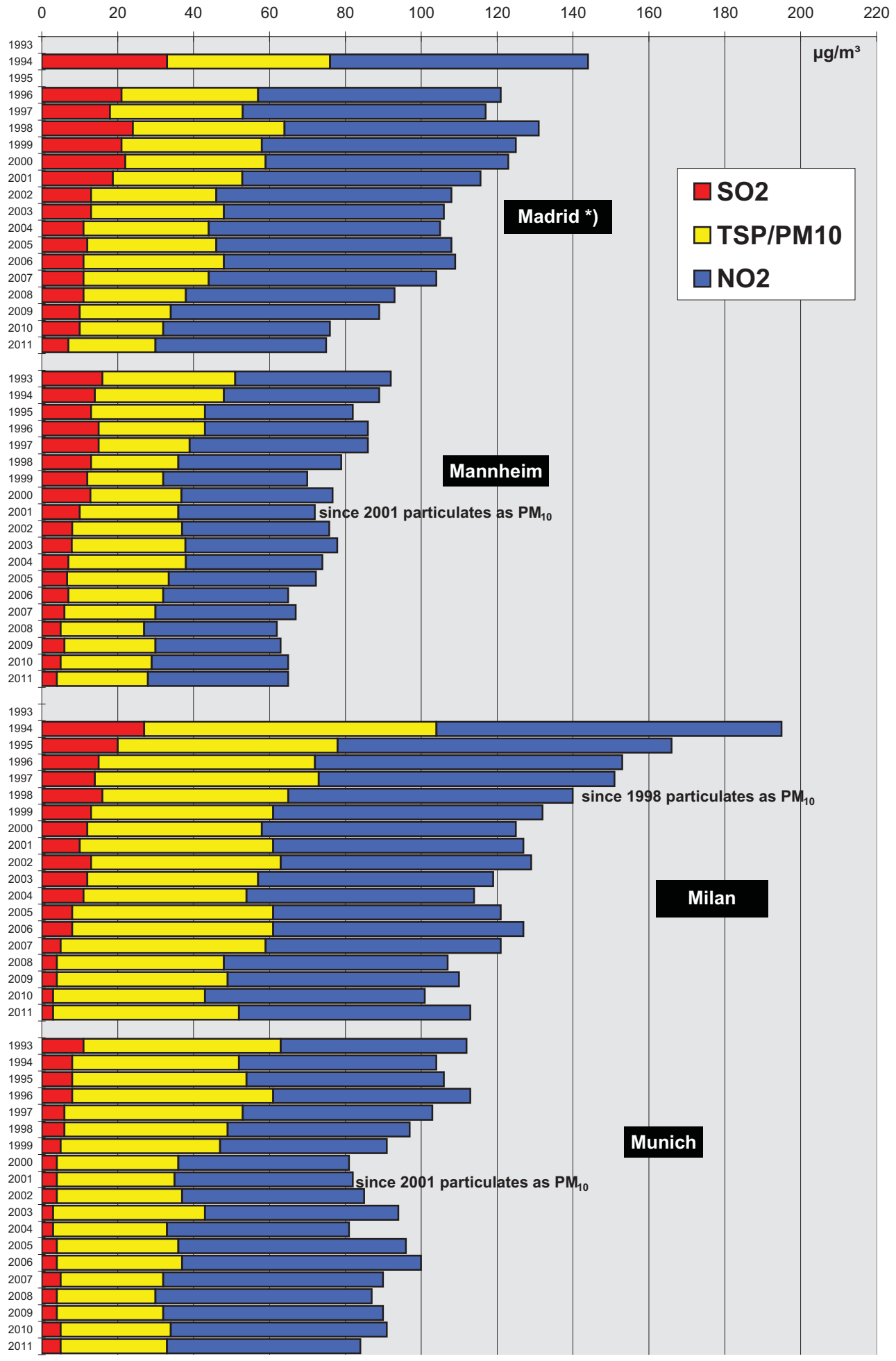


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2011

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

(mean of all monitoring stations)

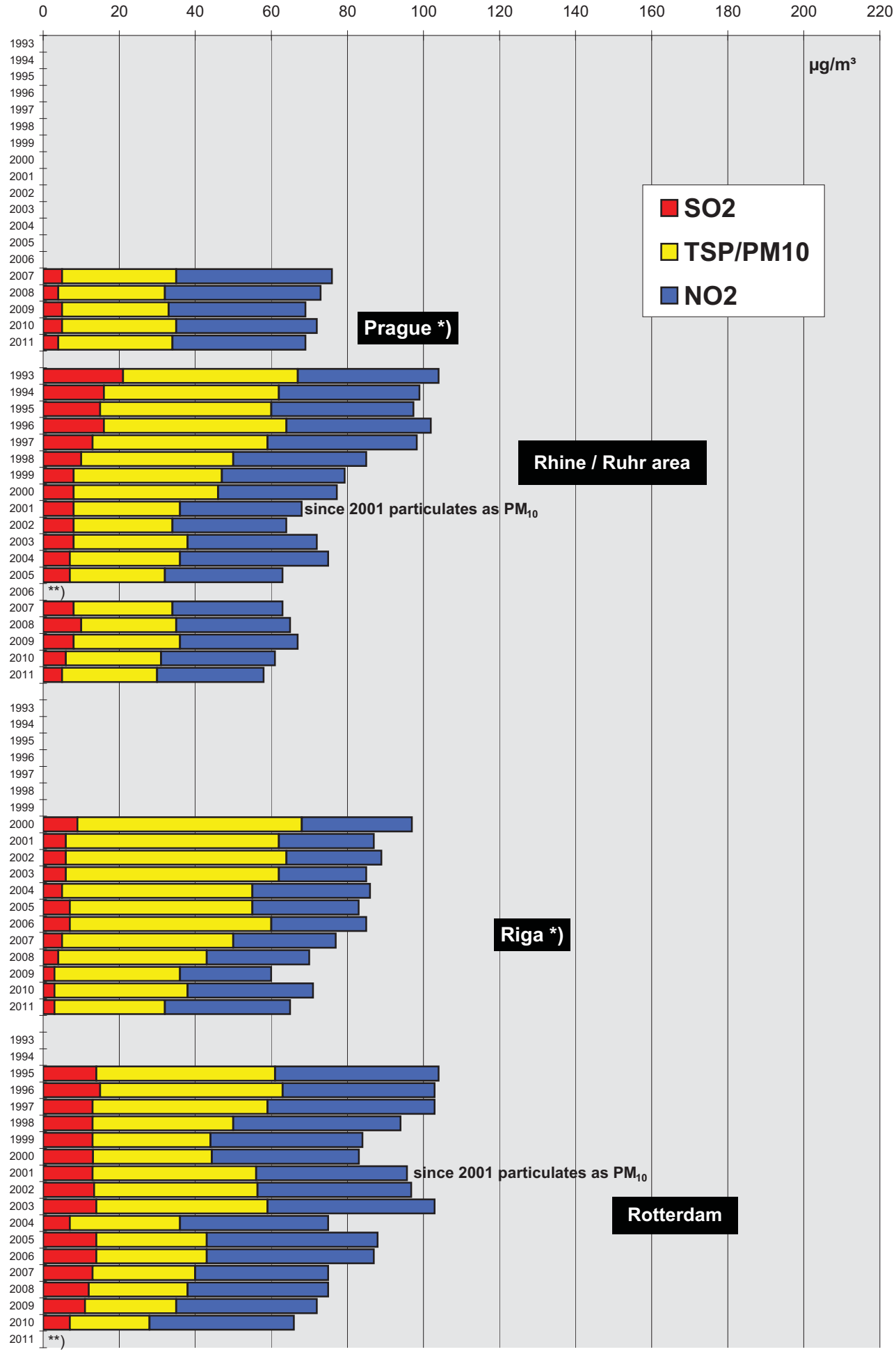


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2011

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

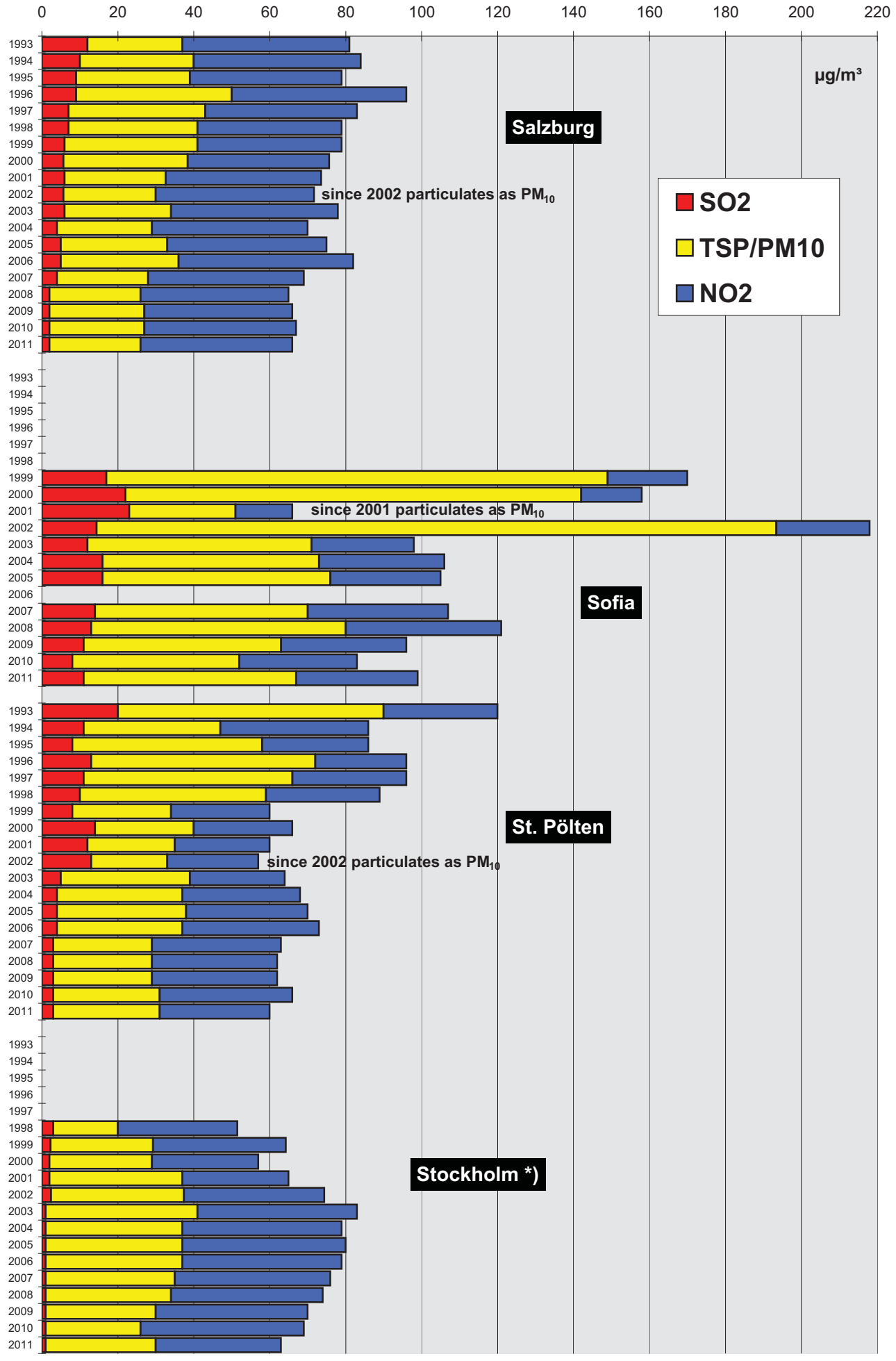
(mean of all monitoring stations)



*) particulates calculated as PM_{10}

**) No data

Comparison Of The Air Quality 1993-2011
Development of the annual mean values, Σ SO_2, TSP/PM_{10}, NO_2
(mean of all monitoring stations)

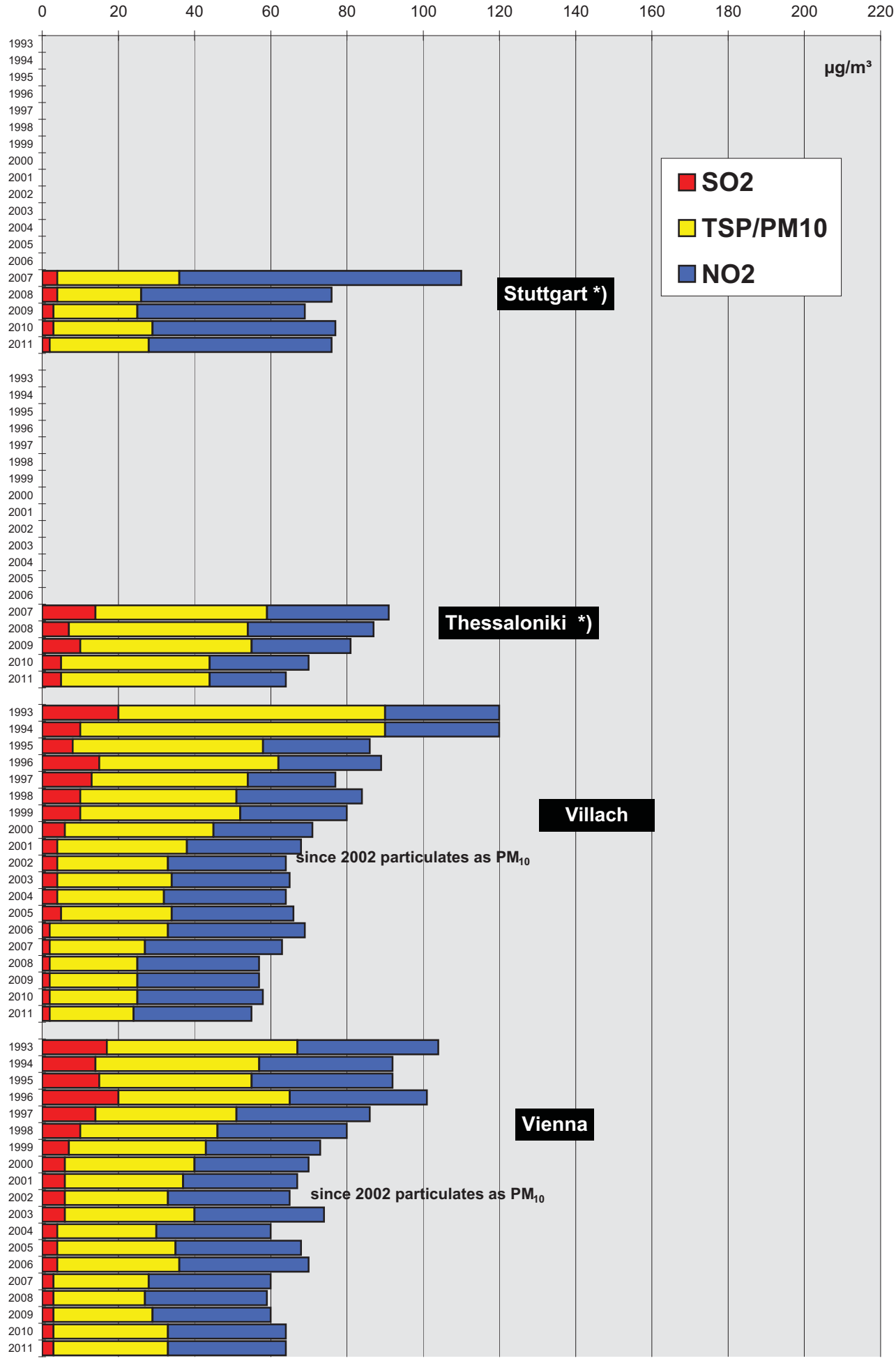


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2011

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

(mean of all monitoring stations)

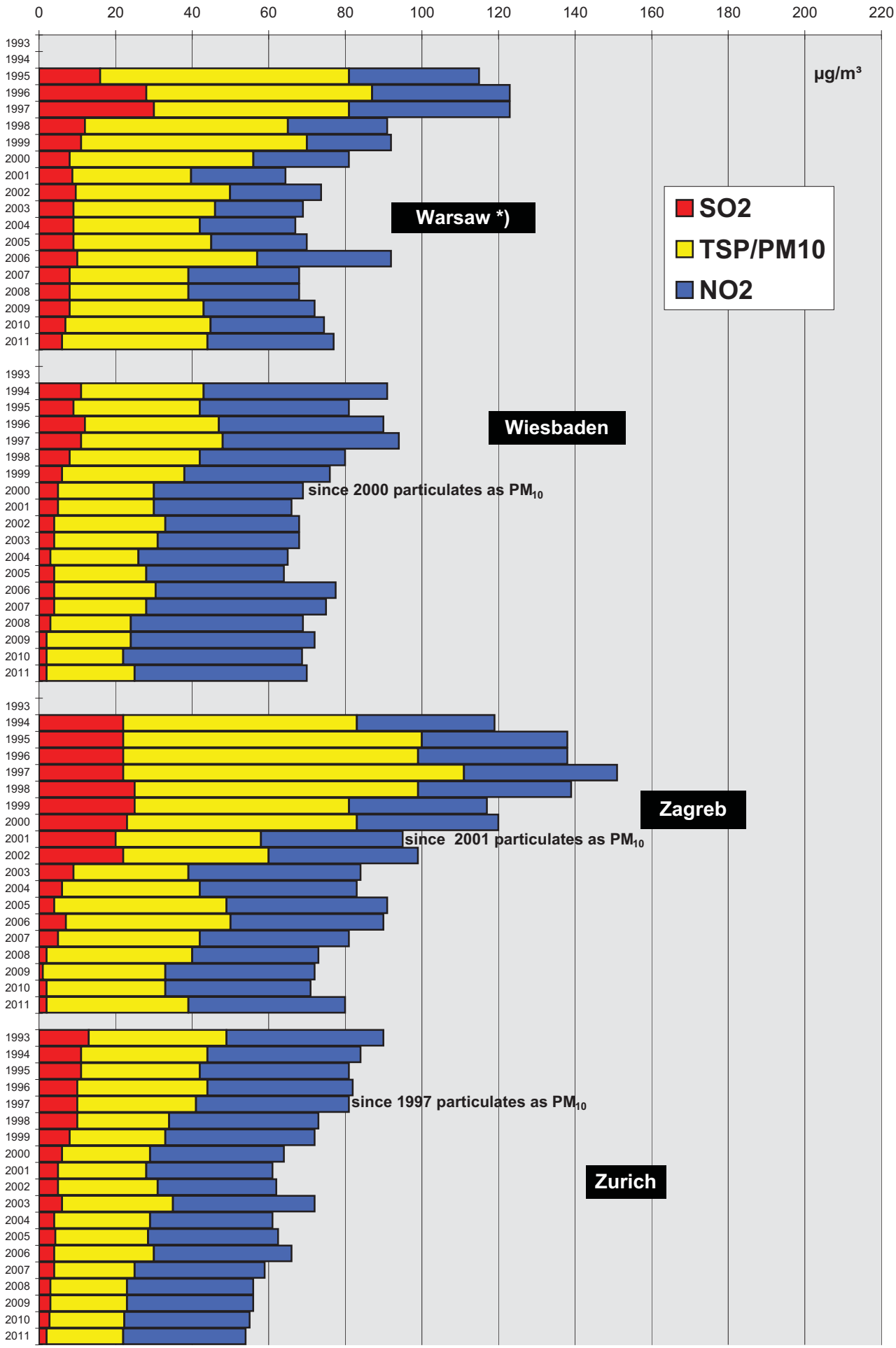


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2011

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

(mean of all monitoring stations)



*) particulates calculated as PM_{10}

Luftgütekennzahlen 2011

der einzelnen

Vergleichsregionen

Immission Reference Values 2011

Of All Compared Regions

Comparison of The Air Quality in 2011

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	5	8	21	45	-	207	-	43
PM_{10}	7	33	57	138	-	-	-	95
$PM_{2,5}$	3	21	36	83	-	-	-	60
NO	14	22	148	-	-	814	-	347
NO_2	14	31	83	-	-	202	-	140
CO	7	900	2600	-	-	10000	-	4800
O_3	13	62	115	-	-	270	-	140

PM_{10}:	Monitoring method(s) used:	β-attenuation
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	101
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	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 2011

Barcelona

immission area: 101 km^2 population: 1 615 448

	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	4	9	19	45	71	-	20
PM_{10}*	9	33	55	122	-	-	-	71
$PM_{2,5}$*	6	20	30	69	-	-	-	44
NO	6	23	68	233	463	502	-	232
NO_2	6	48	84	139	215	262	-	137
CO	3	600	900	2000	3500	4100	-	2000
O_3	4	40	63	99	132	149	-	108

PM_{10}:	Monitoring method(s) used:	Gravimetry
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	43 (35 exceedences after subtraction of natural contribution) ****
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	12 *****

Comments:

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

Area and population of the municipalities of Barcelona (not metropolitan areas)
Minimum data capture of 75%, except for gravimetric PM_{10} and $PM_{2.5}$ with a minimum data capture of 45%

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

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

Comparison of The Air Quality in 2011

Basel

immission area: 557 km^2 population: 501 285

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 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	11	24	33	37	18
PM_{10}	1	18	35	63	187	269	270	65
$PM_{2,5}$	1	13	30	46	-	-	-	-
NO	1	7	27	77	155	205	323	92
NO_2	1	22	40	67	102	115	122	80
CO	-	-	-	-	-	-	-	-
O_3	1	47	81	112	178	192	198	153

PM_{10}:	Monitoring method(s) used:	β-Meter-measurements, calibrated with gravimetrical measurements every 4 days
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	8
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	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	2	4	14	-	-	-	8
PM_{10}	1	21	39	83	-	-	-	73
$PM_{2,5}$	1	14	22	77	-	-	-	52
NO	1	14	33	165	-	-	-	69
NO_2	1	28	42	78	-	-	-	66
CO	1	200	300	900	-	-	-	400
O_3	1	43	62	91	-	-	-	77

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	10
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	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 2011

Berlin (traffic station)

immission area: 892 km^2 population: 3 460 725

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	3	7	20	-	37	-	15
PM_{10}	6	30	54	123	-	876	-	89
$PM_{2,5}$	1	23	47	112	-		-	75
NO	6	47	76	205	-	476	-	176
NO_2	6	53	67	118	-	108	-	119
CO	2	500	750	1400	-	2500	-	1300
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	β-absorption
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.15
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	54
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	3

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	7	20	-	41	-	15
PM_{10}	3	26	51	124	-	362	-	80
$PM_{2,5}$	3	21	46	110	-		-	69
NO	5	8	19	105	-	313	-	65
NO_2	5	27	38	75	-	143	-	75
CO	-	-	-	-	-	-	-	-
O_3	2	43	69	116	-	164	-	117

PM_{10}:	Monitoring method(s) used:	β-absorption
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.15
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	34
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

Comment for Berlin:
$PM_{2,5}$: mean or max. values from daily values (gravimetric measurment)

[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 2011

Berlin (outskirt station)

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

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	-	-	-	-	-	-	-	-
PM_{10}	3	21	34	104	-	164	-	72
$PM_{2,5}$	1	19	41	95	-	-	-	65
NO	5	4	10	45	-	168	-	28
NO_2	5	14	23	46	-	104	-	45
CO	-	-	-	-	-	-	-	-
O_3	5	49	76	116	-	170	-	123

PM_{10}:	Monitoring method(s) used:	β-absorption
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.15
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	27
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

Comment for Berlin: $PM_{2,5}$: mean or max. values from daily values (gravimetric measurment)

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	2	2	3	16	-	-	-	6
PM_{10}	2	23	39	77	-	-	-	69
$PM_{2,5}$	2	16	29	66	-	-	-	56
NO	2	25	61	237	-	-	-	133
NO_2	2	35	60	101	-	-	-	88
CO	-	-	-	-	-	-	-	-
O_3	2	37	60	89	-	-	-	76

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	18
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	4

[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 2011

Bludenz

immission area: 3 km^2 population: 13 727

	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	35	62	-	-	-	54
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	17	62	132	337	341	344	137
NO_2	1	25	47	74	113	118	120	77
CO	-	-	-	-	-	-	-	-
O_3	1	42	77	117	162	164	166	123

PM_{10}:	Monitoring method(s) used:	gravimetrically
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	14
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

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	6	-	-	-	5
PM_{10}	1	24	38	78	-	-	-	61
$PM_{2,5}$	1	15	30	69	-	-	-	48
NO	2	35	87	252	-	-	-	142
NO_2	2	44	78	122	-	-	-	109
CO	1	300	400	1000	-	-	-	600
O_3	1	44	63	92	-	-	-	76

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	12
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	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 2011

Brussels

immission area: 161 km^2 population: 1 119 088 (01.2011)

	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	7	14	-	36	39	10 (daily)
PM_{10}	6	29	69	133	-	350	417	105 (daily)
$PM_{2,5}$	5	21	44	89	-	146	150	71 (daily)
NO	10	19	111	448	-	1429	1452	238 (1Hr)
NO_2	10	37	58	112	-	236	245	110 (1Hr)
CO	7	279	565	1420	-	2560	4780	820 (1Hr)
O_3	7	37	67	106	-	171	171	114 (1Hr)

PM_{10}:	Monitoring method(s) used:	TEOM-FDMS (both for PM_{10} and $PM_{2,5}$)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	87
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	3

Budapest

immission area: 525 km^2 population: 1 733 685

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	10	6	14	28	51	71	-	22
PM_{10}	12	34	91	203	300	337	-	113
$PM_{2,5}$	1	27	70	154	270	321	-	96
NO	12	18	63	169	403	490	-	176
NO_2	12	37	74	131	219	414	-	126
CO	12	603	1317	2547	4061	4432	-	2151
O_3	10	40	77	114	179	187	-	128

PM_{10}:	Monitoring method(s) used:	β-absorption
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	86
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	3

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 2011

Chemnitz

immission area: 221 km^2 population: 243 248

	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}	2	26	50	99	165	333	352	90
$PM_{2,5}$	1	18	33	81	-	-	-	-
NO	2	30	92	224	216	216	551	216
NO_2	2	37	63	120	112	112	235	112
CO	0	-	-	-	-	-	-	-
O_3	1	45	72	101	118	118	156	118

PM_{10}:	Monitoring method(s) used:	gravimetrically (High-Volume-Sampler, micro balance)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	depending on station and method*
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	39
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	2

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

station	PM_{10}-HVS	PM_{10}-TEOM
Chemnitz-Leipziger Straße	1.10	1.20 + f (temperature, humidity)
Chemnitz-Mitte	1.05	1.10 + f (temperature, humidity)

The measurement of SO_2 on station “Chemnitz-Mitte” stopped on 1.1.2008.
The measurement of all components on station “Chemnitz-Nord” stopped on 1.1.2011.

[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 2011

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	-	-	-	24	-	10
PM_{10}	3	30	-	105	-	-	-	-
$PM_{2,5}$	2	20	-	83	-	-	-	-
NO	-	-	-	-	-	-	-	-
NO_2	3	37	-	-	-	-	-	126
CO	2	335	-	-	-	2214	-	979
O_3	2	46	-	-	-	147	-	-

PM_{10}:	Monitoring method(s) used:	Gravimetically , TEOM
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1 / 1.3
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	46
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	n.a.

Dornbirn

immission area: 13 km^2 population: 45 978

	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	5	11	14	16	5
PM_{10}	1	21	41	72	-	-	-	55
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	26	61	146	345	408	457	135
NO_2	1	30	45	71	122	145	151	81
CO	-	-	-	-	-	-	-	-
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	gravimetrically
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	13
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

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

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

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

Comparison of The Air Quality in 2011

Dresden

immission area: 328 km^2 population: 523 058

	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	14	40	70	82	84	24
PM_{10}	4	26	56	112	165	240	367	100
$PM_{2,5}$	3	19	41	88	-	-	-	-
NO	4	26	77	271	271	271	672	264
NO_2	4	33	57	101	101	101	215	121
CO	-	-	-	-	-	-	-	-
O_3	3	45	83	1116	1116	1116	168	120

PM_{10}:	Monitoring method(s) used:	Gravimetrically (High-Volume-Sampler, micro balance)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	depending on station and method*
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	46
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

Comments:

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

station	PM_{10}-HVS	PM_{10}-TEOM
Dresden-Bergstr.	1.10	1.20 + f (temperature, humidity)
Dresden-Nord.	1.10	1.14 + f (temperature, humidity)
Dresden-Winckelmannstr.	1.00	1.00 + f (temperature, humidity)
Dresden-Wahnsdorf	1.05	1.00 + f (temperature, humidity)

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

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

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

Comparison of The Air Quality in 2011

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	26	-	-	-	9
PM_{10}	1	15	20	47	-	-	-	32
$PM_{2,5}$	1	12	15	41	-	-	-	29
NO	1	7	14	50	-	-	-	28
NO_2	1	25	45	72	-	-	-	56
CO	1	200	200	600	-	-	-	400
O_3	1	40	53	73	-	-	-	67

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	0
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	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 2011

Frankfurt (urban stations)

immission area: 248 km² population: 691 518

	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	7	42	77	110	136	22
PM_{10}	3	21	40	100	227	264	322	71
$PM_{2,5}$	0	-	-	-	-	-	-	-
NO	3	24	84	212	328	458	469	152
NO_2	3	39	61	91	147	182	187	98
CO	0	-	-	-	-	-	-	-
O_3	2	35	68	124	158	163	166	119

PM_{10}:	Monitoring method(s) used:	ß-absorption
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	20
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

Comments: Till 2010 in the analysis there were two mearusment stations more from the region. In 2011 the stations are adapted to the immission area and the population of Frankfurt. For the comparison there are only stations used which are located on the area of Frankfurt.

Frankfurt (traffic station)

immission area: 248 km² population: 691 518

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	-	-	-	-	-	-	-	-
PM_{10}	1	29	47	111	222	429	578	81
$PM_{2,5}$	1	20	37	93	177	342	503	62
NO	1	47	112	245	441	584	608	203
NO_2	1	57	66	128	208	222	271	129
CO	1	490	790	1410	2390	2990	3500	1340
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	ß-absorption
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	42
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	8

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

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

Comparison of The Air Quality in 2011

Gothenburg (traffic station)

immission area: 72 164* km^2 population: 520 374

	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	1	2	5	7	26	62	-	6
PM_{10}	1	23	42	80	184	232	400	78
$PM_{2,5}$	1	10	16	51	55	73	109	32
NO	1	36	72	220	577	641	706	119
NO_2	1	36	60	130	237	259	301	101
CO	1	226	363	1049	2056	2304	2652	763
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	TEOM
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	+19% + 1.15
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	21
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	8

Gothenburg (background)

immission area: 72 164* km^2 population: 520 374

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile year [µg/m³]
SO_2	3	3	4	11	25	113	119	9
PM_{10}	1	18	26	57	136	157	272	53
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	12	42	225	951	999	-	99
NO_2	3	20	39	100	155	203	216	80
CO**	1	-	-	-	-	-	-	-
O_3	3	62	74	107	131	142	168	103

PM_{10}:	Monitoring method(s) used:	TEOM
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	+19% + 1.15
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	4
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	1

Comments:

* According to the Gothenburg annual book of statistics the area of Gothenburg is 72 164 square kilometres. This is divided into land area (45 023 km^2) and aquatic area (27 141 km^2) excluding territorial sea.

** Background measurements of CO were inadequate during 2011. Data coverage was only 69 procent. Therefore results are not included in the summary table.

[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 2011

Graz (urban stations)

immission area: 128 km^2 population: 265 318

	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	2	4	12	19	29	53	9
PM_{10} cont.	4	30	71	178	407	476	497	103**
PM_{10} g.	2	31	65	183	-	-	-	-
$PM_{2,5}$	2	23	48	142	-	-	-	-
NO	5	33	93	341	528	579	597	245
NO_2	5	32	56	98	145	181	194	96
CO	2	500	1100	2300	3100	3400	5200	1800
O_3	4	46	91	122	160	162	166	124

PM_{10}:	Monitoring method(s) used:	continuous / gravimetrically*
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.3 / 1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	64 / 64*
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

Comments:

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

* PM_{10}: gravimetric monitoring method

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

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

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

Comparison of The Air Quality in 2011

Graz (traffically influenced Don Bosco)

immission area: 128 km^2 population: 265 318

	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	12	23	25	27	11
PM_{10} cont.	1	40	75	193	369	522	549	105**
PM_{10} g.	1	38	71	136	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	60	125	318	762	666	986	309
NO_2	1	51	66	110	182	182	223	112
CO	1	450	1100	2000	3400	3700	3800	2000
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	continuous, gravimetrically*
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	73 / 78*
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

Comments:

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

* PM_{10}: gravimetric monitoring method

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

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

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

Comparison of The Air Quality in 2011

Hallein

immission area: 27 km^2 population: 20 022

	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	30	248	355	409	8
PM_{10}	1	24	43	82	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	2	28	99	200	427	508	569	-
NO_2	2	31	66	98	157	168	183	107
CO	1	450	650	1030	1800	2110	2810	1150
O_3	1	62	91	133	167	169	171	127

PM_{10}:	Monitoring method(s) used:	Digitel
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	---
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	19 (3 caused by winter services)
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

Comments:
PM_{10} – exeedances of limit values:
The „Winterstreuverordnung (BGBl. II Nr.131/2012)“ regulates the deduction of PM_{10} - exeedances of limit values caused by winter services like road salt and grit. In 2011 there are deducted three days on station “Halleiner B159”.

[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 2011

Hamburg (area monitoring stations)

immission area: 755 km^2 population: 1 796 077

	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	6	20	105	179	259	332	65
PM_{10}	7	25	52	98	320	367	399	89
$PM_{2,5}$	3	17	35	84	280	340	367	67
NO	12	9	40	135	355	588	883	124
NO_2	12	23	44	76	119	175	335	85
CO	3	229	407	760	1462	1563	1848	643
O_3	6	44	71	115	146	150	150	111

PM_{10}:	Monitoring method(s) used:	TEOM (6 stations), β-absorption (2 stations)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	TEOM: 1; Beta: 1.20 / 1.12
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	40
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	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	29	57	102	226	263	336	91
$PM_{2,5}$	1	22	41	83	109	177	194	72
NO	4	66	117	264	616	712	875	310
NO_2	4	60	92	150	259	311	315	167
CO	4	466	825	1516	3921	4484	4814	1793
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	TEOM (3 stations) ß-Adsorption (1 station)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	TEOM: 1; Beta: 1.26
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent	46
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	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 2011

Innsbruck

immission area: 105 km^2 population: 144 696

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	3	7	15	25	28	29	12
PM_{10}	2	24	56	103	-	-	-	76
$PM_{2,5}$	1	16	31	66	-	-	-	42
NO	3	40	124	298	549	575	585	274
NO_2	3	43	74	123	177	184	197	114
CO	1	376	791	1169	2029	2306	2424	1180
O_3	3	57	111	144	157	159	160	140

PM_{10}:	Monitoring method(s) used:	gravimetrically (Digitel HVS)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	46
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

Karlsruhe (urban station)

immission area: 173 km^2 population: 297 488*

	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	-	12	-	61	-	-
PM_{10}	1	20	36	79	-	-	-	-
$PM_{2,5}$	1	15	31	67	-	-	-	-
NO	1	9	-	145	-	243	-	-
NO_2	1	23	-	63	-	124	-	-
CO	-	-	-	-	-	-	-	-
O_3	1	45	-	116	-	182	-	-

PM_{10}:	Monitoring method(s) used:	gravimetrically
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	14
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

Comment: * 2011; source: Statistisches Landesamt Baden-Württemberg

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

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

Comparison of The Air Quality in 2011

Karlsruhe (traffic station)

immission area: 173 km^2 population: 297 488*

	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	24	42	105	-	-	-	-
$PM_{2,5}$	1	16	30	88	-	-	-	-
NO	1	39	-	234	-	485	-	-
NO_2	1	49	-	97	-	201	-	-
CO	1	400	-	1500	-	3600	-	-
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	gravimetrically
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	18
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	2

Comments: * 2011; source: Statistisches Landesamt Baden-Württemberg

Klagenfurt

immission area: 120 km^2 population: 93 306

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	2	6	17	59	92	114	16
PM_{10}	2	29	59	114	-	-	-	-
$PM_{2,5}$	1	19	39	67	-	-	-	-
NO	2	27	33	207	383	481	496	189
NO_2	2	32	60	89	169	201	336)*	98
CO	2	492	1001	1688	2671	2841	2964	1513
O_3	2	41	83	113	145	146	149	112

PM_{10}:	Monitoring method(s) used:	Gravimetrically (Digitel HVS)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	--
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	46
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	1

Comments: *) The high value (1-HMW>200µg/m³) is caused by road works near the measurement station.

[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 2011

Leeds

immission area: 552 km^2 population: 761 100

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	2	3	17	-	-	-	8
PM_{10}	2	23	42	101	-	-	-	64
$PM_{2,5}$	2	17	30	75	-	-	-	51
NO	2	30	68	136	-	-	-	113
NO_2	2	41	62	112	-	-	-	85
CO	1	600	800	1000	-	-	-	1000
O_3	1	34	60	96	-	-	-	78

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	26
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	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 2011

Leipzig

immission area: 298 km^2 population: 522 883

	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	12	38	87	91	9
PM_{10}	3	30	58	120	230	532	663	111
$PM_{2,5}$	2	18	37	83	-	-	-	-
NO	3	31	111	258	258	258	573	201
NO_2	3	36	59	98	98	98	178	100
CO	-	-	-	-	-	-	-	-
O_3	1	47	72	107	107	107	155	117

PM_{10}:	Monitoring method(s) used:	Gravimetrically (High-Volume-Sampler, micro balance)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	depending on station*
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	69
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

Comments:

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

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

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

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

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

Comparison of The Air Quality in 2011

Leoben (Leoben, Donawitz, Göß)

immission area: 108 km^2 population: 24 645

	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	5	21	94	112	141	23
PM_{10} cont.	4	26	44	90	246	543	690	67**
PM_{10} g.	1	23	35	79	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	4	14	50	196	287	307	317	108
NO_2	4	22	45	72	99	105	128	74
CO	1	900	1600	7000	20600	21100	35,3	4500
O_3	1	36	67	108	147	151	152	119

PM_{10}:	Monitoring method(s) used:	continuous, gravimetrically*
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.3
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	31 / 13*
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

Comments:

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

* PM_{10}: gravimetrically monitoring method

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

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

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

Comparison of The Air Quality in 2011

Linz

immission area: 96 km^2 population: 189 845

	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	11	36	85	88	121	40
PM_{10}	6	28	52	112	237	480	523	100
$PM_{2,5}$	1	19	38	-	-	-	-	-
NO	7	22	65	207	407	483	504	209
NO_2	7	32	59	93	194	234	264	128
CO	5	360	800	1500	3000	3635	5600	1690
O_3	3	38	72	106	154	167	170	124

PM_{10}:	Monitoring method(s) used:	Continuously and gravimetrically
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1 / 1.15 /1.2
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	45
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	6

Lisbon

immission area: 85 km^2 population: 550 000

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	4	1	-	6	-	37	-	-
PM_{10}	5	34	-	120	-	208	-	-
$PM_{2,5}$	2	14	-	47	-	85	-	41
NO	-	-	-	-	-	-	-	-
NO_2	6	39	-	178	-	366	-	-
CO	6	294	-	-	-	3219	-	-
O_3	4	53	-	-	-	184	-	-

PM_{10}:	Monitoring method(s) used:	Beta-absorption, TEOM
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.18 (traffic stations) / 1.11 (background stations)
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	113
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	37

[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 2011

Liverpool

immission area: 112 km^2 population: 441 100

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	4	5	34	-	-	-	12
PM_{10}	1	16	33	82	-	-	-	51
$PM_{2,5}$	1	12	26	68	-	-	-	42
NO	2	14	42	160	-	-	-	62
NO_2	2	29	56	86	-	-	-	72
CO	1	200	300	1000	-	-	-	500
O_3	1	51	73	92	-	-	-	84

PM_{10}:	Monitoring method(s) used:	TEOM (FDMS)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	8
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

London

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

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	6	4	10	17	-	-	-	15
PM_{10}	6	27	52	105	-	-	-	79
$PM_{2,5}$	10	17	38	87	-	-	-	58
NO	15	33	178	321	-	-	-	286
NO_2	15	47	110	173	-	-	-	151
CO	7	300	800	1300	-	-	-	1100
O_3	9	35	74	104	-	-	-	94

PM_{10}:	Monitoring method(s) used:	GRAV EQ, TEOM (FDMS)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	57
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	229

[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 2011

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	2	-	16	-	61	-	12
PM_{10}	2	30	-	107	-	208	-	76
$PM_{2,5}$	2	21	-	79	-	115	-	60
NO	3	18	-	203	-	467	-	174
NO_2	3	36	-	101	-	214	-	105
CO	-	-	-	-	-		-	-
O_3	3	44	-	125	-	169	-	122

PM_{10}:	Monitoring method(s) used:	TEOM
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	FDMS
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	51
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	2

Lyon (traffic site)

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	-	-	-	-	-	-	-	-
PM_{10}	3	35	-	113	-	260	-	92
$PM_{2,5}$	1	30	-	88	-	138	-	69
NO	5	60	-	306	-	662	-	345
NO_2	5	61	-	165	-	311	-	199
CO	4	449	-	1232	-	3543	-	1322
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	TEOM
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	FDMS
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	93
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	150

Comment: * station near a highway

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

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

Comparison of The Air Quality in 2011

Madrid

immission area: 604 km^2 population: 3 237 937

	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	7	17	33	59	81	-	36
PM_{10}	12	23	42	77	279	708	-	95
$PM_{2,5}$	6	12	17	38	79	196	-	42
NO	24	28	122	375	869	1197	-	359
NO_2	24	45	83	150	316	408	-	177
CO	10	400	800	1700	3900	4400	-	1700
O_3	14	45	82	116	175	194	-	132

PM_{10}:	Monitoring method(s) used:	Oscillating microbalance
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	41 ***
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	103 ***

Comments:

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

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

* Static average (not moving average)
** Maximum 98 percentile of 1-hour values
*** Station: Escuelas Aguirre; 28 exceedences after subtraction of natural contribution/ P90.4=51
**** Station: Fernandez Ladreda-Oporto

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

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

Comparison of The Air Quality in 2011

Mannheim (urban station)

immission area: 145 km^2 population: 314 931*

	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	-	15	-	128	-	-
PM_{10}	2	22	41	83	-	-	-	-
$PM_{2,5}$	1	15	29	57	-	-	-	-
NO	2	14	-	287	-	390	-	-
NO_2	2	30	-	82	-	143	-	-
CO	-	-	-	-	-	-	-	-
O_3	2	40	-	105	-	161	-	-

PM_{10}:	Monitoring method(s) used:	Gravimetrically
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	20
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

Mannheim (traffic station)

immission area: 145 km^2 population: 314 931*

	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	-	23	-	288	-	-
PM_{10}	1	28	44	103	-	-	-	-
$PM_{2,5}$	1	18	30	87	-	-	-	-
NO	1	40	-	305	-	536	-	-
NO_2	1	51	-	99	-	202	-	-
CO	1	400	-	1600	-	2900	-	-
O_3	-	-	-	-	-	-	-	-

PM_{10}:	Monitoring method(s) used:	Gravimetrically
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	27
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	1

Comments: * 2011: source: Statistisches Landesamt Baden-Württemberg
** SO_2 emitter is near the measurement station MA-Nord

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

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

Comparison of The Air Quality in 2011

Milan

immission area: 182 km^2 population: 1 324 110

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year* [µg/m³]
SO_2	1	3	-	13	-	93	-	9
PM_{10}	3	49	-	181	-	288	-	138
$PM_{2,5}$	1	33	-	148	-	-.	-	100
NO	8	51	-	403	-	1076	-	293
NO_2	8	61	-	208	-	349	-	153
CO	4	1254	-	4562	-	10292	-	3482
O_3	3	43	-	118	-	205	-	136

PM_{10}:	Monitoring method(s) used:	Beta attenuation
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	132
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	132

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

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

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

Comparison of The Air Quality in 2011

Munich immission area: 310 km^2 population: 1 378 176

	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	13	20	67	124	10
PM_{10}	4	28	63	137	306	454	560	104
$PM_{2,5}$	2	17	31	63	80	106	107	52
NO	5	40	96	301	689	955	1009	343
NO_2	5	51	125	171	327	428	455	178
CO	4	433	700	1200	3700	4900	7400	1400
O_3	3	37	67	103	151	167	168	117

PM_{10}:	Monitoring method(s) used:	β-absorption / Oscillating micro balance / nephtelometer + β-absorption
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.25 / 1.0
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	48
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	50

Comments:

PM_{10} / $PM_{2,5}$: The values from 01.01.2011 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 2011

Prague

immission area: 496 km^2 population: 1 270 000

	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 from daily mean per year [µg/m³]
SO_2	8	4	10	29	–	95	–	17
PM_{10}	20	30	65	137	–	360	–	103
$PM_{2,5}$	5	18	45	100	–	132	–	82
NO	15	20	126	262	–	735	–	160
NO_2	20	35	93	139	–	288	–	125
CO	4	767	1339	2277	–	4480	–	1654
O_3	9	42	76	119	–	167	–	99

PM_{10}:	Monitoring method(s) used:	6 x Gravimetry, 14 x radiometry
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	68
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	51

Comments:

The last column is calculated from daily averages.
This means - Max. 98-Percentile from daily means per station per year.

[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 2011

Riga (traffic station)

immission area: 307 km^2 population: 659 418

	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	36	55	128	171	218	247	93
$PM_{2,5}$	1	27	44	90	-	-	-	77
NO	1	84	118	198	348	387	410	258
NO_2	1	49	58	114	152	179	193	109
CO	1	300	400	800	1200	1300	1500	700
O_3	1	17	31	60	76	81	84	55

PM_{10}:	Monitoring method(s) used:	beta absorption
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	11
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	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

Riga (urban station)

immission area: 307 km^2 population: 659 418

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	2	3	6	15	34	57	82	9
PM_{10}	2	22	31	100	-	-	-	58
$PM_{2,5}$	1	14	16	40	-	-	-	32
NO	-	-	-	-	-	-	-	-
NO_2	2	25	40	123	167	188	205	93
CO	-	-	-	-	-	-	-	-
O_3	2	48	71	96	117	123	146	97

PM_{10}:	Monitoring method(s) used:	beta absorption
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	0
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

Comments: *98-percentiles:* SO_2, NO_2, CO, Ozone: 98%-value of the hour's means
98-percentiles: PM_{10}: 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 2011

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	9	5	-	-	-	742	-	32
PM_{10}	20	25	-	-	-	-	-	-
$PM_{2,5}$	10	19	-	-	-	-	-	-
NO	21	14	-	-	-	904	-	121
NO_2	21	28	-	-	-	173	-	71
CO	-	-	-	-	-	-	-	-
O_3	16	36	-	-	-	197	-	114

PM_{10}:	Monitoring method(s) used:	1) Beta-absorption 2) Oscillating micro balance 3) Gravimetric
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1) 1.24 2)1.27 3) 1.00
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	62
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

Comment: Traffic stations are not included in the calculation

[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 2011

Salzburg

immission area: 66 km^2 population: 149 385

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	2	2	4	7	16	22	32	6
PM_{10}	3	24	48	91	-	-	-	-
$PM_{2,5}$	2	16	29	65	-	-	-	-
NO	3	31	110	239	433	563	626	-
NO_2	3	40	73	111	195	200	243	131
CO	2	390	680	940	1900	1990	3680	1150
O_3	2	42	75	107	160	165	166	121

PM_{10}:	Monitoring method(s) used:	Digitel and SHARP
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	---
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	31 (10 caused by winter services)
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

Comments: PM_{10} – exeedances of limit values
The „Winterstreuverordnung (BGBl. II Nr.131/2012)“ regulates the deduction of PM_{10} - exeedances of limit values caused by winter services like road salt and grit. In 2011 there are deducted ten days on station “Rudolfsplatz”.

Sofia

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

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	6	11	27	88	-	200	-	56
PM_{10}	7	56	211	606	-	-	-	384
$PM_{2,5}$	2	29	166	543	-	-	-	-
NO	6	24	126	311	-	898	-	346
NO_2	6	32	83	178	-	294	-	157
CO	4	1036	3435	-	-	-	-	-
O_3	5	58	123	153	-	268	-	149

PM_{10}:	Monitoring method(s) used:	β-absorption (6 stations), gravimetric (1 station)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	134
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	55

[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 2011

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

St. Pölten, 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	2	4	15	23	32	33	9
PM_{10}	1	30	53	115	138	148	151	84
$PM_{2,5}$	1	21	41	88	119	125	132	72
NO	1	7	12	52	153	257	279	49
NO_2	1	22	31	57	96	113	115	61
CO	-	-	-	-	-	-	-	-
O_3	1	46	72	104	164	170	174	122

PM_{10}:	Monitoring method(s) used:	oscillating micro balance
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.3
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	39
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

St. Pölten, traffically influenced

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 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	15	22	31	33	10
PM_{10}	1	26	46	117	141	153	157	83
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	24	36	104	369	506	655	127
NO_2	1	35	48	80	135	168	208	88
CO	1	354	540	970	1430	1670	1820	1110
O_3	1	40	63	96	148	152	152	112

PM_{10}:	Monitoring method(s) used:	oscillating micro balance
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.3
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	27
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	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 2011

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}	5	29	68	195	-	574	-	-
$PM_{2,5}$	4	8	13	48		70	-	-
NO	-	-	-	-	-	-	-	-
NO_2	5	36	44	95	-	514	-	107/68
CO	2	400	400	-	-	14900	-	-
O_3	1	55	75	103	-	135	-	-

PM_{10}:	Monitoring method(s) used:	TEOM
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.19 + 1.15
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	58
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	1

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: 613 392*

	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	-	7	-	32	-	-
PM_{10}	1	20	34	62	-	-	-	-
$PM_{2,5}$	1	15	26	48	-	-	-	-
NO	1	16	-	174	-	265	-	-
NO_2	1	31	-	69	-	128	-	-
CO	-	-	-	-	-	-	-	-
O_3	1	38	-	96	-	155	-	-

PM_{10}:	Monitoring method(s) used:	gravimetrically
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	11
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

Comment: * 2011; source: Statistisches Landesamt Baden-Württemberg

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

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

Comparison of The Air Quality in 2011

Stuttgart (traffic station)

immission area: 207 km^2 population: 613 392*

	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	31	54	85	-	-	-	-
$PM_{2,5}$	1	18	32	54	-	-	-	-
NO	1	62	-	266	-	1234	-	-
NO_2	1	65	-	110	-	473**	-	-
CO	1	400	-	1100	-	2700	-	-
O_3	1	25	-	73	-	136	-	-

PM_{10}:	Monitoring method(s) used:	gravimetrically
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	42
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	6

Comments:

* 2011; source: Statistisches Landesamt Baden-Württemberg

** The max. 1h-mean value of NO_2 is measured by the station „Stuttgart Arnulf-Klett Platz“. The value 473 µg/m³ is over the alert thresholds. But there was no exceedance because you have to measure 400 µg/m³ over three consecutive hours at locations representative of air quality over at least 100 km² or an entire zone or agglomerativon, whichever is the smaller.

Thessaloniki

immission area: 129 km^2 population: 794 330

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per hour [µg/m³]
SO_2	2	5	-	-	-	408	-	36
PM_{10}	5	39	-	169	-	-	-	107
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	6	19	-	-	-	746	-	289
NO_2	6	20	-	-	-	195	-	88
CO	4	700	-	-	-	8300	-	3500
O_3	5	61	-	-	-	202	-	175

PM_{10}:	Monitoring method(s) used:	β-attenuation
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	87
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	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 2011

Vienna

immission area: 415 km^2 population: 1 731 236

	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	7	3	8	29	45	54	61	19
PM_{10}	13	30	65	148	239	297	326	123
$PM_{2,5}$	6	20	50	111	124	126	127	81
NO	17	14	102	204	352	380	397	233
NO_2	17	31	73	118	172	180	184	135
CO	4	384	703	1158	1517	1569	1692	1053
O_3	5	53	97	132	165	171	173	133

PM_{10}:	Monitoring method(s) used:	5 Stations gravimetric and continuous, 8 Stations only continuous (including equivalent factor)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	y = (y_raw + 1.43)/0.85
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	62 (Rinnböckstr.)
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	5 (Hietzinger Kai)

Comments:

- 99.9-Percentile values (HMW, MW1 and MW3) of PM_{10} and $PM_{2,5}$ are from continues measure (including station factor). This is also for station with continues and gravimetric measurements, because the gravimetric method deliver only TMW.
- All other particulates values (JMW, max. MMW and max. TMW) are preferable from gravimetric monitoring.
- PM_{10}: station equivalent faktor (instrument: FH62 I/R): $y_{equivalent} = (y_{raw} + 1.43) / 0.85$
- $PM_{2,5}$: station equivalent faktor (instrument: FH62 I/R): $y_{equivalent} = y_{raw} / 0.824$
- $PM_{2,5}$ is measure on all six stations with gravimetric measurements. In 2011 on two from this stations are measure continues measurements additionally.

[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 2011

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	12	13	13	6
PM_{10}	1	22	44	81	-	-	-	-
$PM_{2,5}$	-	-	-	-	-	-	-	-
NO	1	22	55	136	257	319	364	119
NO_2	1	31	47	73	126	140	144	78
CO	1	520	775	1169	2091	2359	2451	1298
O_3	1	32	61	106	133	150	152	110

PM_{10}:	Monitoring method(s) used:	Gravimetrically (Digitel HVS)
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	--
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	18
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

Warsaw

immission area: 517 km^2 population: 1 708 491

	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	4	6	17	33	68	99	-	22
PM_{10}	5	38	69	174	322	361	-	110
$PM_{2,5}$	3	28	55	133	201	233	-	89
NO	4	26	86	302	657	948	-	162
NO_2	4	33	73	127	224	242	-	101
CO	3	527	961	1922	4364	4623	-	1428
O_3	4	43	68	93	142	146	-	84

[1]

PM_{10}:	Monitoring method(s) used:	automatic TEOM + FDMS, manual gravimetric method
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1.0 (automatic TEOM+FDMS)
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	**129** 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 2011:	**5** traffic station

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

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

Comparison of The Air Quality in 2011

Wiesbaden: immission area: 204 km^2 population: 278 919

Wiesbaden (urban stations)

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	1	2	3	7	14	21	29	7
PM_{10}	1	20	34	74	171	235	363	60
$PM_{2,5}$	0	-	-	-	-	-	-	-
NO	1	20	70	186	348	398	419	143
NO_2	1	32	44	78	111	140	164	81
CO	0	-	-	-	-	-	-	-
O_3	1	39	72	121	162	168	169	127

[1]

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

Wiesbaden (traffic station)

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	0	-	-	-	-	-	-	-
PM_{10}	1	25	43	101	297	448	492	71
$PM_{2,5}$	1	18	33	88	252	369	397	57
NO	1	62	137	316	565	705	741	268
NO_2	1	58	71	117	186	213	250	128
CO	1	590	970	1770	3290	4220	5370	1750
O_3	0	-	-	-	-	-	-	-

[1]

PM_{10}:	Monitoring method(s) used:	ß-absorption
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	-
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2005 (measured values **including** equivalent factor):	25
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2005:	3

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

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

Comparison of The Air Quality in 2011

Zagreb

immission area: 641 km^2 population: 792 875

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 3h mean value [2] [µg/m³]	max. 1h mean value [2] [µg/m³]	max. ½ h mean value [2] [µg/m³]	Max. 98-Percentile per year [µg/m³]
SO_2	6	2	8	62	-	-	-	21
PM_{10}	6	37	72	292	-	-	-	121
$PM_{2,5}$	3	27	61	145	-	-	-	93
NO	-	-	-	-	-	-	-	-
NO_2	5	41	76	179	-	-	-	127
CO	1	500	600	1800	-	8000	-	1700
O_3	5	31	77	170	-	194	-	118

[1]

PM_{10}:	Monitoring method(s) used:	gravimetrically
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	101
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	-

Zurich

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

	Number of monitoring stations	Annual mean value [1] [µg/m³]	max. monthly mean value [2] [µg/m³]	max. daily mean value [2] [µg/m³]	max. 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	5	12	18	45	89	15
PM_{10}	1	20	38	74	121	224	280	77
$PM_{2,5}$	1	15	29	49	-	-	-	-
NO	1	13	48	142	205	303	344	165
NO_2	1	32	54	81	110	123	126	95
CO	1	346	584	1006	1490	2361	2866	1152
O_3	1	45	79	109	171	173	174	154

PM_{10}:	Monitoring method(s) used:	β-meter-measurement, calibrated with gravimetrical measurements every 4 days
	Equivalent factor for monitoring method(s) according to EU-directive 2008/50/EG:	1
	Number of limit violations of the daily mean standard of 50 µg/m³ at the highest stressed station in 2011 (measured values **including** equivalent factor):	11
NO_2	Number of limit violations of the 1h mean standard of 200 µg/m³ at the highest stressed station in 2011:	0

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

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