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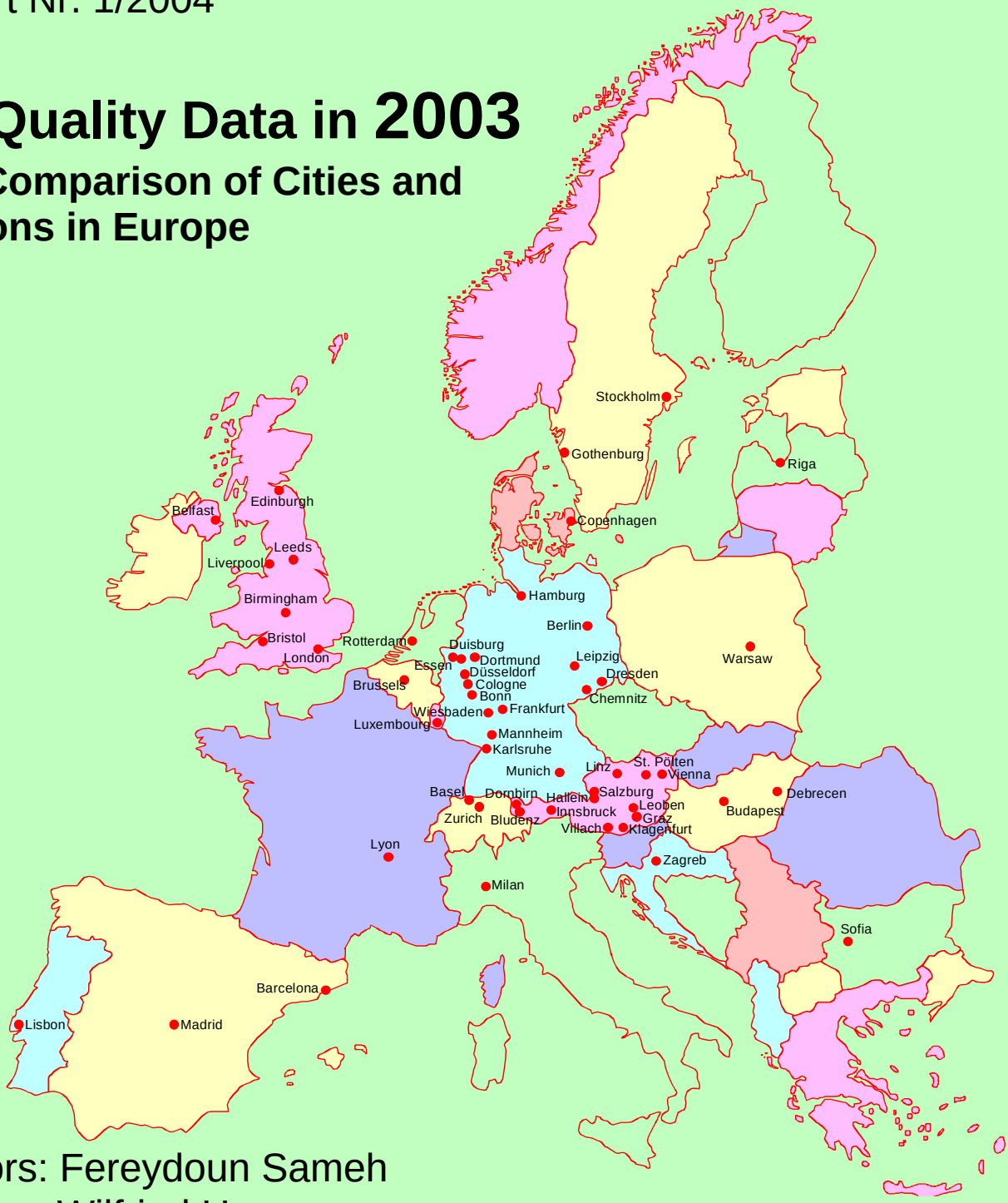
Air Quality Data in 2003

The Comparison of Cities and Regions in Europe



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Environment + Technics

Inhalt

Contents

Luftgütedaten 2003
Nationaler und europäischer Städtevergleich

Einführung

Die Bekämpfung der Luftverschmutzung war in den letzten Jahren und ist auch noch heute eines der zentralen Themen, mit denen Umweltämter, Umweltbehörden bzw. sonstige für den Umweltschutz tätige Organisationen beschäftigt sind. In Form von regionalen oder nationalen Luftreinhalteplänen versucht man, die Luftverschmutzung in den Griff zu bekommen und Luftqualität sukzessive zu verbessern.

Um überhaupt den Erfolg von Sanierungsmaßnahmen nachweisen zu können, ist die Beobachtung der Schadstoffkonzentrationen mit Hilfe von Luftmessnetzen sinnvoll. Mittlerweile sind in den meisten Messgebieten Luftmessnetze seit mehr als 2 Jahrzehnten installiert, sodass bei einer Verfolgung der Luftschadstoffdaten über mehrere Jahre ein Trend zur Verbesserung (oder auch Verschlechterung?) der Luftbelastung herauslesbar sein sollte. Sanierungsmaßnahmen in Betrieben und bei anderen Emittentengruppen müssten sich jedenfalls langfristig in einer verminderten Immissionsbelastung an Luftschadstoffen manifestieren.

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

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The Comparison of Cities and Regions in Europe

Introduction

The fight against air-pollution was one of the major topics to deal with of all organisations concerned with environmental affairs, such as national and local authorities. In the form of regional or national air-cleaning programmes it is tried to get air pollution under control as well as to increase the air quality step by step.

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 air-monitoring areas monitoring station networks have been installed already for more than 2 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 Amt für Natur- und Umweltschutz bereits seit mehreren Jahren durchgeführt, genau genommen seit 1989. Anfänglich wurden nur österreichische Städte miteinander verglichen. In den folgenden Jahren wurde der Städtevergleich auf immer mehr europäische Städte und Regionen wegen des großen Interesses ausgedehnt. Im Jahr 2003 wurden weiters Städte bzw. Regionen aus Deutschland, England, Frankreich, Belgien, Niederlande, Dänemark, Schweden, Italien, Schweiz, Spanien, Portugal, Polen, Bulgarien, Lettland, Luxemburg und Kroatien mit einbezogen.

Die Städte Athen, Thessaloniki, Bukarest und Debrecen haben seit 2 Jahren keine Daten geliefert. Sollten diese noch eintreffen, werden sie in künftigen Städtevergleichen in Form von Zeitreihen mit berücksichtigt werden.

Comparisons of the air quality have been carried out by our organization already for a couple 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 2003 comprised cities and regions of Austria, Germany, cities from England, France, Belgium, Netherlands, Denmark, Sweden, Italy, Switzerland, Spain, Portugal, Poland, Bulgaria, Latvia, Luxemburg and Croatia.

The cities Athens, Thessalonica, Bucharest and Debrecen did not deliver any data during the past 2 years. In the case of delivery to us they will be taken into account for future reports in terms of time series.

Kritische Anmerkungen

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

1. die Zahl der Messstellen sehr verschieden ist (die Anzahl der Messstellen pro Messgebiet ist in der Tabelle auf Seite 14 und den nachfolgenden Grafiken angeführt),
2. die Messstellendichte unterschiedlich ist,
3. die Situierung der Messstellen nicht immer vergleichbar ist (In manchen Städten hat man deswegen bei den Schadstoffkomponenten zwischen verkehrsbelasteten Messstationen und anderen Messstationen unterschieden).

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

Critical remarks

Over and over again there is critically remarked that a comparison of the pollutant stress between monitoring areas is not possible. 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 14 and the subsequent graphics),
2. the density of distribution of the monitoring stations is different,
3. the location of the monitoring station not always is comparable (for that reason in some cities the network services distinguished 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. 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 werden. 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 oben bemerkt, unterscheiden einige Städte zwischen verkehrsbelasteten und nicht vom Verkehr beeinflussten Messstationen.

3. Schließlich wird eine stärker objektivierende Basis der Auswertungen besonders dann erreicht, wenn man längere Zeiträume betrachtet und daraus die Trends der Entwicklung der Schadstoffimmissionen abliest.
   Nachdem die Stadt Linz internationale und nationale Städtevergleiche schon seit einigen Jahren durchführt, wurden 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.

1. The kind of measurement of air pollutants is carried out by the same ore similar technical methods. This means that 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 measured 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 that represent a wider portion of the monitored area, not only the pollution stress representative for a focal point. Exceptions are specially 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 above, some cities distinguish between traffic-stressed and non-traffic-influenced monitoring stations.

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 immissions.
   Since the city of Linz has been carrying out comparisons of the air quality for 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 that only have been participating the comparison since a couple of years, have been updated far as back as possible

Verglichene Immissionskenngrößen

In der vorliegenden Studie wurden verschiedene Immissionskenngrößen miteinander verglichen:

- 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

Von den einzelnen Messnetzbetreibern wurden die gewünschten Immissionsdaten in sehr unterschiedlicher Vollständigkeit zur Verfügung gestellt. Insbesondere betrifft dies die Percentil-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 Percentilgrößen (z. B. 95-Percentil) gebildet. Die meisten Messnetzbetreiber berechnen die Percentile aus den Halbstunden-Mittelwerten eines Jahres, manchmal werden jedoch auch die Tagesmittelwerte dafür herangezogen.

Aus diesem Grund wurde nur die Auswertung „max. 98-Percentil“ in grafischer Form durchgeführt. Im Kapitel „Luftgütekennzahlen“ der einzelnen Vergleichsregionen sind sämtliche dem Amt für Natur- und Umweltschutz übermittelten Perzentilwerte aufgelistet. Die Art der Percentilbildung ist - soweit bekannt - in den Tabellen jeweils vermerkt.

Immission reference values compared

The present study compares various Immission reference values, 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

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.

This was the reason that only „max. 98-percentile“ was graphically evaluated. Within the chapter „Air quality reference numbers“ of each compared region all percentile-values the monitoring network services supported us with are mentioned. If known the kind of formation of percentiles is remarked in the tables.

Verglichene Luftschadstoffe

Folgende Luftschadstoffe wurden miteinander verglichen:
SO_2, Staub (TSP), CO, NO, NO_2, O_3,
Feinstaub (PM_{10})

Mehrjahresvergleich

Ein gutes Bild über die Entwicklung der Luftbelastung geben die Grafiken wieder. Dabei wurden von den am Luftgütevergleich teilnehmenden Städte die Entwicklung der Immissionsbelastung von 1993 bis 2003 aufgetragen.

Wenn man die Daten analysiert, können folgende Aussagen getroffen werden:

1. Einige Städte und Regionen haben ein sehr 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 sichtbare Besserung der Immissionssituation eingetreten ist, während in Städten mit niedriger Immissionsbelastung im Vergleich dazu nahezu keine Änderung der Luftbelastung eingetreten ist.
4. Es zeigt sich, dass in immer mehr Städten und Regionen die Schwebstaub (TSP)-Messungen abgeschaltet werden. TSP wird nur mehr bei weniger als einem Drittel der Teilnehmer am Luftgütevergleich gemessen. Andererseits werden diese Messungen immer mehr durch Feinstaub (PM_{10}-Messungen abgelöst).
5. Entwicklung der Langzeitbelastung (Jahresmittelwerte SO_2, Staub, NO, NO_2, CO, und O_3) gegenüber 1993 (PM_{10}: gegenüber 2001):

Pollutants compared

The following air pollutants have been compared:

SO_2, particulates (TSP), CO, NO, NO_2, O_3,
fine particulates (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 2003 are plotted.

The following statements can be given in analysing the data:

1. Some cities and regions have - according to the area - a very 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. It can be seen that more and more cities and regions do not monitor TSP any more. Less than a third of the participants of the comparison of the air quality are still measuring TSP. On the other hand the percentage of monitoring networks including the pollutant PM_{10} increasing rapidly.
5. Development of the air pollution stress in comparison with 1993 (for PM_{10}: comparison with 2001):

SO_2: Nahezu alle Regionen *geringer* belastet	SO_2: Nearly all regions *less* stressed
Staub: Nahezu alle Regionen *geringer* belastet	TSP: Nearly all regions *less* stressed
PM_{10}: Nahezu alle Regionen *höher* belastet	PM_{10}: Nearly all regions *higher* stressed
NO: uneinheitlich, tendenziell *geringer* belastet oder *gleichbleibend*	NO: non-uniform, tendency of lower stress or staying constant
NO_2: tendenziell *gleichbleibend*	NO_2: trend *constant*
CO: uneinheitlich, tendenziell *gleichbleibend*	CO: non-uniform, trend *constant*
O_3: uneinheitlich	O_3: non-uniform

Übersicht über die Entwicklung der Schadstoffbelastungen 1993 -2003

Beurteilungsbasis: Jahresmittelwerte über alle Stationen einer Region

Overview over the development of the stress of air pollutants from 1993 through 2003

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

Austrian Towns, Cities and Regions

	SO_2			TSP			NO			NO_2			CO			O_3		
	Stress in 1993 [1]	Tendency last 5 years	Stress in 2003	Stress in 1993 [1]	Tendency last 5 years	Stress in 2003	Stress in 1993 [1]	Tendency last 5 years	Stress in 2003	Stress in 1993 [1]	Tendency last 5 years	Stress in 2003	Stress in 1993 [1]	Tendency last 5 years	Stress in 2003	Stress in 1993 [1]	Tendency last 5 years	Stress in 2003
Linz		↘			↗			↗			↗			==			↗	
Bludenz		↘			↗		1994	==			==		-	-	-	1995	↗	
Dornbirn		↘			-	2000	1994	↗			↗		1998	↘		-	-	-
Graz		==			↗		1994	↗			↗			↗			↑	
Hallein		↘			==	2001	-	-			↗			↓			↗	
Innsbruck		↓			↗			↘			==			↓			↗	
Klagenfurt		↓			↘			==			==			↘			↗	
Leoben/Göß/ Donawitz		↘			==			↗			==			↗			↗	
Salzburg		==			↘	2001	-	-			↗			↓			↗	
St. Pölten		↗		1994	↘	2002	**1994**	==		1994	==		1994	↓		1994	↗	
Vienna		↘			↘		**1994**	==			↗			↘			↗	
Villach		↓			↘			==			↗			↓			==	

[1] Or year, when data were primarily available

European Cities and Regions

	SO_2			TSP			NO			NO_2			CO			O_3		
	Stress in 1993 [2]	Tendency last 5 years	Stress in 2003	Stress in 1993 [2]	Tendency last 5 years	Stress in 2003	Stress in 1993 [2]	Tendency last 5 years	Stress in 2003	Stress in 1993 [2]	Tendency last 5 years	Stress in 2003	Stress in 1993 [2]	Tendency last 5 years	Stress in 2003	Stress in 1993 [2]	Tendency last 5 years	Stress in 2003
Barcelona	1994	↓		1995	==	2000	1994	↘		1994	↘		1994	↓		1994	==	
Basel		==			↘	1998		==			↘			↘	1999		↗	
Belfast		↓		-	-	-		==			↘			↓			==	
Berlin		↘			↘	2001		↘			↘			==			==	
Birmingham		↘		-	-	-		==			↘			↘			==	
Bristol		↘		-	-	-		↓			↗			↘			==	
Brussels	1995	↘		-	-	-	1995	↘		1995	↗		1995	↘		1995	==	
Chemnitz		↘			↘	2001	-	↘			==			↗			↗	
Copenhagen		==		1994	↘	2000	1994	↗		1995	↗		1998	==		1994	↓	
Debrecen		-	2001		↘	2000	1995	↘	2001		==	2001		-	2001		-	2001
Dresden		↘			↘	2001		↘			↘			↗			↗	
Edinburgh		↗		-	-	-		==			↗			↘			↗	
Frankfurt		↘			↘	1999		==			==			↘			↗	
Gothenburg	-	==		-	-	-		↗			==			↓			==	
Hamburg		==			==			↗			↗			↗			==	
Karlsruhe		↘			↘	2000		==			==			↗			==	
Leeds		↘		-	-	-		==			↘			==			==	
Leipzig		↘			↘	2001		↗			↗			↑			↗	
Lisbon	1997	↘		-	-	-	-	-	-	1997	↘		-	↘		1997	↑	
Liverpool		↘		-	-	-		↓			↘			↓			↗	
London		↘		-	-	-		↓			↘			↘			==	
Luxemburg	1996	↘		-	-	-	1996	↘		1996	==		1996	↘		1996	==	

[2] Or year, when data were primarily available

	SO_2			TSP			NO			NO_2			CO			O_3		
	Stress in 1993 [3]	Tendency last 5 years	Stress in 2003	Stress in 1993 [3]	Tendency last 5 years	Stress in 2003	Stress in 1993 [3]	Tendency last 5 years	Stress in 2003	Stress in 1993 [3]	Tendency last 5 years	Stress in 2003	Stress in 1993 [3]	Tendency last 5 years	Stress in 2003	Stress in 1993 [3]	Tendency last 5 years	Stress in 2003
Lyon		↓		-	-	-		↘			==		1994	↘		1994	↗	
Madrid	1994	↓		-	-	-	1999	↓		1994	↘		1994	↓		1994	↗	
Mannheim		↓			↘	2000		==			==			==			↗	
Milan	1994	↘		1994	↗		1994	↓		1994	↘		1994	↓		1994	==	
Munich		↘			↘	2000		↘			↗			↘			↗	
Riga	1999	↘		-	-	-	-	-	-	1999	==		-	-	-	1999	↗	
Rhine/Ruhr Area		==			↘	2002		==			==			↘			↗	
Rotterdam	1995	==		1995	↗		1995	↗		1995	==		1995	==		1995	↗	
Sofia	1999	↗		1999	↗		-	-		1999	↗		1999	==		1999	↑	
Stockholm		==		-	-	-	1994	↗		1994	↗		1994	==			==	
Warsaw	1995	↘		-	-	-	-	-		1995	==		1995	==		1995	↗	
Wiesbaden		↘			↘	1999		==			==			↘			==	
Zagreb		↓			==		-	-	-	1994	↗		-	-	-	1999	↗	
Zurich		↘			==	1997		↘			==			==			↗	

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

[3] Or year, when data were primarily available

	PM10		
	Stress in 2001 [3]	Tendency	Stress in 2003
Linz		↗	
Bludenz	-	-	-
Dornbirn	2002	↑	
Graz		==	
Hallein	2002	↗	
Innsbruck		↗	
Klagenfurt	2002	==	
Leoben/Göß/ Donawitz	2003	?	
Salzburg	2002	↗	
St. Pölten	2002	↑	
Vienna	2002	↗	
Villach	2002	==	
Barcelona		↑	
Basel		↗	
Belfast		↗	
Berlin		↗	
Birmingham		↗	
Bristol		↗	
Brussels		↑	
Chemnitz		↗	
Copenhagen		↗	
Debrecen	-	-	-
Dresden		==	
Edinburgh		==	

	PM10		
	Stress in 2001 [3]	Tendency	Stress in 2003
Frankfurt		↗	
Gothenburg		↗	
Hamburg		↗	
Karlsruhe		↗	
Leeds		↗	
Leipzig		↗	
Lisbon		↘	
Liverpool		==	
London		↗	
Luxemburg		↗	
Lyon		↗	
Madrid		↗	
Mannheim		↗	
Milan		↘	
Munich		↗	
Riga		==	
Rhine-/Ruhr Area		↗	
Rotterdam		↗	
Stockholm		↗	
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
- ? no evaluation possible due to available data of max. 2 years

[3] If values of 2001 are not available, values of the year 2002 are compared

Anzahl der Tage mit Überschreitungen des PM_{10}-Tagesmittelwertes von 50 µg/m³ in den Jahren 2001 bis 2003 [4)]

Beurteilungsbasis: Anzahl der Überschreitungen an der höchstbelasteten Station eines Messgebietes

Number of days with exceedences of the PM_{10} daily mean of 50 µg/m³ in 2001 through 2003 [5)]

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

	PM_{10} number of days >50µg/m³		
	2001	2002	2003
Linz	88	79	78
Bludenz	-	-	-
Dornbirn	1[4]	0	38
Graz	65 (159)[6)]	99 (131)[6)]	129 (131)[6)]
Hallein	-	28	49
Innsbruck	-	50	61
Klagenfurt	36	58	74
Leoben/Göß/ Donawitz	26	7 [7)]	42
Salzburg	-	34	62
St. Pölten	-	?	58
Vienna	-	57	95
Villach	11[4]	24	35
Barcelona	-	86	-
Basel	11	22	23
Belfast	16	7	33
Berlin	60	91	117
Birmingham	2	1	5
Bristol	7	1	9
Brussels	52	153	163
Chemnitz	41	20	35
Copenhagen	-	-	-
Debrecen	-	-	-
Dresden	53	36	53
Edinburgh	3	8	2

	PM_{10} number of days > 50 µg/m³		
	2001	2002	2003
Frankfurt	42	44	51
Gothenburg	1	10	12
Hamburg	22 (33) [6)]	33 (43) [6)]	62
Karlsruhe	6	27 (33) [6)]	28 (33) [6)]
Leeds	3	3	9
Leipzig	109	63	92
Liverpool	4	2	1
Lisbon	230	222	183
London	28	29	61
Luxemburg	1	4	17
Lyon	-	83	124
Madrid	-	98	-
Mannheim	25	33 (44) [6)]	28 (36) [6)]
Milan	148	177	137
Munich	64	75	123
Rhine-/Ruhr Area	40	48	58
Riga	57	74	105
Rotterdam	98	103	123
Sofia	-	-	225
Stockholm	101	113	80
Warsaw	-	-	89
Wiesbaden	15	35	19
Zagreb	-	-	-
Zurich	18	23	38

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

[5] For the number of exceedences the correction factors already have been considered. One can refer to the tables at the end of the report.

[6] Peak stressed traffic station

[7] Evaluation only for second half of the year

Anzahl der Messstellen *Number of monitoring stations*

Country	Monitored Area	SO_2	TSP	PM_{10}	NO	NO_2	CO	O_3
Austria	Bludenz	1	1	-	1	1	-	1
	Dornbirn	1	-	1	1	1	1	-
	Graz	4	1	5	6	6	3	4
	Hallein	2	-	1	2	2	1	1
	Innsbruck	1	2	2	2	2	2	2
	Klagenfurt	1	2	1	2	2	2	2
	Leoben/Göß/Donawitz	3	1	1	3	3	1	1
	Linz	7	1	6	7	7	7	3
	Salzburg	3	-	3	3	3	2	2
	St. Pölten	1	-	1	1	1	1	1
	Vienna	12	10	6	17	17	4	5
	Villach	1	1	1	1	1	1	1
Belgium	Brussels	9	-	6	10	10	8	7
Bulgaria	Sofia	9	4	4	4	9	4	3
Croatia	Zagreb	5	5	1	-	5	-	5
Denmark	Copenhagen	1	-	3	3	3	3	2
France	Lyon	8	-	5	9	9	5	3
Germany	Berlin	10	-	13	17	17	13	10
	Chemnitz	1	-	2	2	2	1	1
	Dresden	2	-	3	3	3	1	3
	Frankfurt	5	-	5	5	5	4	5
	Hamburg	13	3	13	16	16	8	6
	Karlsruhe	1	-	3	3	3	3	2
	Leipzig	1	-	3	3	3	1	1
	Mannheim	3	-	4	4	4	4	3
	Munich	4	-	3	5	5	4	3
	Rhine/Ruhr Area	15	-	16	24	24	1	18
	Wiesbaden	1	-	1	1	1	1	1
Italy	Milan	3	1	2	9	9	5	3
Latvia	Riga	3	-	1	-	3	-	3
Luxemburg	Luxemburg	2	-	1	2	2	1	2
Netherlands	Rotterdam	9	5	4	4	4	1	3
Poland	Warsaw	15	1	5	3	14	2	1
Portugal	Lisbon	10	-	8	12	12	11	10

Anzahl der Messstellen ***Number of monitoring stations***

Country	Monitored Area	SO_2	TSP	PM_{10}	NO	NO_2	CO	O_3
Spain	Barcelona	2	-	2	4	4	4	4
	Madrid	27	-	27	27	27	25	26
Switzerland	Basel	1	-	1	1	1	-	1
	Zurich	1	-	1	1	1	1	1
Sweden	Gothenburg	3	-	1	2	3	1	3
	Stockholm	2	-	3	2	2	2	1
U.K.	Belfast	2	-	2	1	1	1	1
	Birmingham	2	-	2	1	1	1	1
	Bristol	1	-	1	1	1	1	1
	Edinburgh	1	-	1	1	1	1	1
	Leeds	1	-	1	1	1	1	1
	Liverpool	1	-	1	1	1	1	1
	London	13	-	11	22	22	15	14

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. Ia (Ref. für Luftgüteüberwachung) Landhausgasse 7 A-8010 Graz e-mail: *fa17c@stmk.gv.at* Homepage: *http://www.umwelt.steiermark.at/*
Austria, ***Innsbruck***	Amt der Tiroler Landesregierung Abt. Waldschutz-Luftgüte Bürgerstrasse 36 A-6020 Innsbruck Austria e-mail: *an.weber@tirol.gv.at* Homepage: http://www.tirol.gv.at/luft
Austria, ***Linz***	Amt der oö. Landesregierung Abt. Umwelt- und Anlagentechnik Goethestraße 86 A-4020 Linz Austria e-mail: elisabeth.danninger@ooe.gv.at Homepage: *http://www.ooe.gv.at/umwelt/*
Austria, **Salzburg**	Amt der Salzburger Landesregierung, Abt. 16 Postfach 527 A-5010 Salzburg e-mail: *alexander.kranabetter@salzburg.gv.at* Homepage: *http://www.salzburg.gv.at/*
Austria, ***St. Pölten***	Magistrat der Landeshauptstadt St. Pölten Abteilung XIII Roßmarkt 6 A-3100 St. Pölten Austria e-mail: *marktamt@st-poelten.gv.at* Homepage: http://www.noe.gv.at/Umwelt/Luft.htm

Austria, ***Vienna***	Magistrat der Stadt Wien, MA 22 Ebendorferstraße 4 A-1082 Wien Austria e-mail: *scg@m22.magwien.gv.at* Homepage: *http://www.wien.at/ma22/luftgue.html*
Austria, ***Klagenfurt, Villach***	Amt der Kärntner Landesregierung Abt. 15 (Umweltschutz und Technik) Flatschacher Straße 70 A-9020 Klagenfurt e-mail: *abt15.Luftimmission@ktn.gv.at* Homepage: http://www.ktn.gv.at
Belgium ***Brussels***	CELINE-IRCEL Avenue des Arts, 10-11 B-1210 – Bruxelles Belgium e-mail: *rasse@irceline.be* Homepage: http://www.irceline.be/
Bulgaria ***Sofia***	Executive Environmental Agency 136 Tzar Boris III 6 Lvd. BG-1618 Sofia Bulgaria e-mail: *Serafimov@nfp-bg.eionet.eu.int* Homepage: http://nfp-bg.eionet.eu.int/
Croatia ***Zagreb***	Institute of Medical Research and Occupational Health Ksaverska cesta 2 HR-10000 Zagreb Croatia e-mail: *vadic@imi.hr* Homepage: -
Denmark ***Copenhagen***	National Environmental Research Institute Atmospheric Environment Frederiksborvej 399 DK-4000 Roskide Denmark e-mail: *kke@dmu.dk* Homepage: http://www2.dmu.dk/AtmosphericEnvironment

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Germany, ***Berlin***	Umweltbundesamt FG II 6.4 Bismarckplatz 1 D-14193 Berlin Germany e-mail: *Angela.weikinn@uba.de* Homepage: *http://www.umweltbundesamt.net* http://www.env-it.de/luftdaten/start.fwd
Germany, ***Chemnitz, Dresden, Leipzig***	Sächsisches Landesamt für Umwelt und Geologie Zur Wetterwarte 11 D-01109 Dresden e-mail: *frank.berger@lfug.smul.sachsen.de* Homepage: *http://www.lfug.de*
Germany, ***Frankfurt, Wiesbaden***	Hessische Landesamt für Umwelt und Geologie Rheingaustrasse 186 D-65203 Wiesbaden Germany e-mail: *w.stec-lazaj@hlug.de* Homepage: *http://www.hlug.de*
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Germany, ***Karlsruhe, Mannheim***	Landesanstalt für Umweltschutz Baden-Württemberg Postfach 210752 D-76157 Karlsruhe Germany e-mail: *ursula.mielicke@lfuka.lfu.bwl.de* Homepage*: http://www.lfu.baden-wuerttemberg.de/*

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Germany, ***Rhine Area, Ruhr Area***	Landesumweltamt Nordrhein-Westfalen Wallneyer Straße 6 D-45133 Essen Germany e-mail: *reinhold.beier@lua.nrw.de* Homepage: *http://www.lua.nrw.de*
Greece ***Athens, Thessalonica***	Hellenic Ministry of Environment, City Planning And Public Works Patission 147 GR-11251 Athens Greece e-mail: - Homepage: -
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Hungary, ***Debrecen***	Debrecen Megyei Jogú Város Polgármesteri Hivatal Városfejlesztési Osztály Piac u. 20 H-4024 Debrecen Hungary e-mail: *koros.csaba@ph.debrecen.hu* Homepage: -
Italy ***Milan***	Agenzia Regionale per la Protezione dell'Ambiente della Lombardia Sede ARPA Milano Città Via Filippo Juvara 22 I-20129 Milano Italy e-mail: mailto:g.tebaldi@arpalombardia.it Homepage: http://www. arpalombardia.it/

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Netherlands ***Rotterdam***	DCMR- Environmental Protection Agency ´s-Gravelandseweg 565, Postbox 843 NL- 3100 AV Schiedam The Netherlands e-mail: *jel@dcmr.nl* Homepage: *http://www.dcmr.nl*
Poland ***Warsaw***	WIOS Warszawa ul. Bartycka 110A PL-00-716 Warszawa Poland e-mail: *warszawa@pios.gov.pl* monitoring@wios.warszawa.pl Homepage: *http://www.wios.warszawa.pl*
Portugal ***Lisbon***	*Direcção Regional do Ambiente – Lisboa* *Rua Antero de Quental, 44* *Lisboa- 1169-171* *Portugal* *e-mail:* *Homepage: http://www.qualar.org/*
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Spain ***Barcelona, Madrid***	Ministerio de Medio Ambiente Plaza de San de la Cruz, s/n E-28071 Madrid Spain e-mail: *mailto:mpallares@mma.es* Homepage: -
Switzerland ***Basel, Zurich***	Bundesamt für Umwelt, Wald und Landschaft Abteilung Luftreinhaltung CH-3003 Bern Switzerland e-mail: *rudolf.weber@buwal.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, Transport and the Regions Zone F 15, 4th Floor Air and Environment Quality Division Ashdown House, 123 Victoria St London SW 1E 6DE U.K. e-mail: *ruth_chapman@detr.gsi.gov.uk* Homepage: *http://www.aeat.co.uk/netcen/airqual*

Luftgütevergleich

2003

Jahresmittelwert (Gebietsmittel)

Comparison of The Air Quality

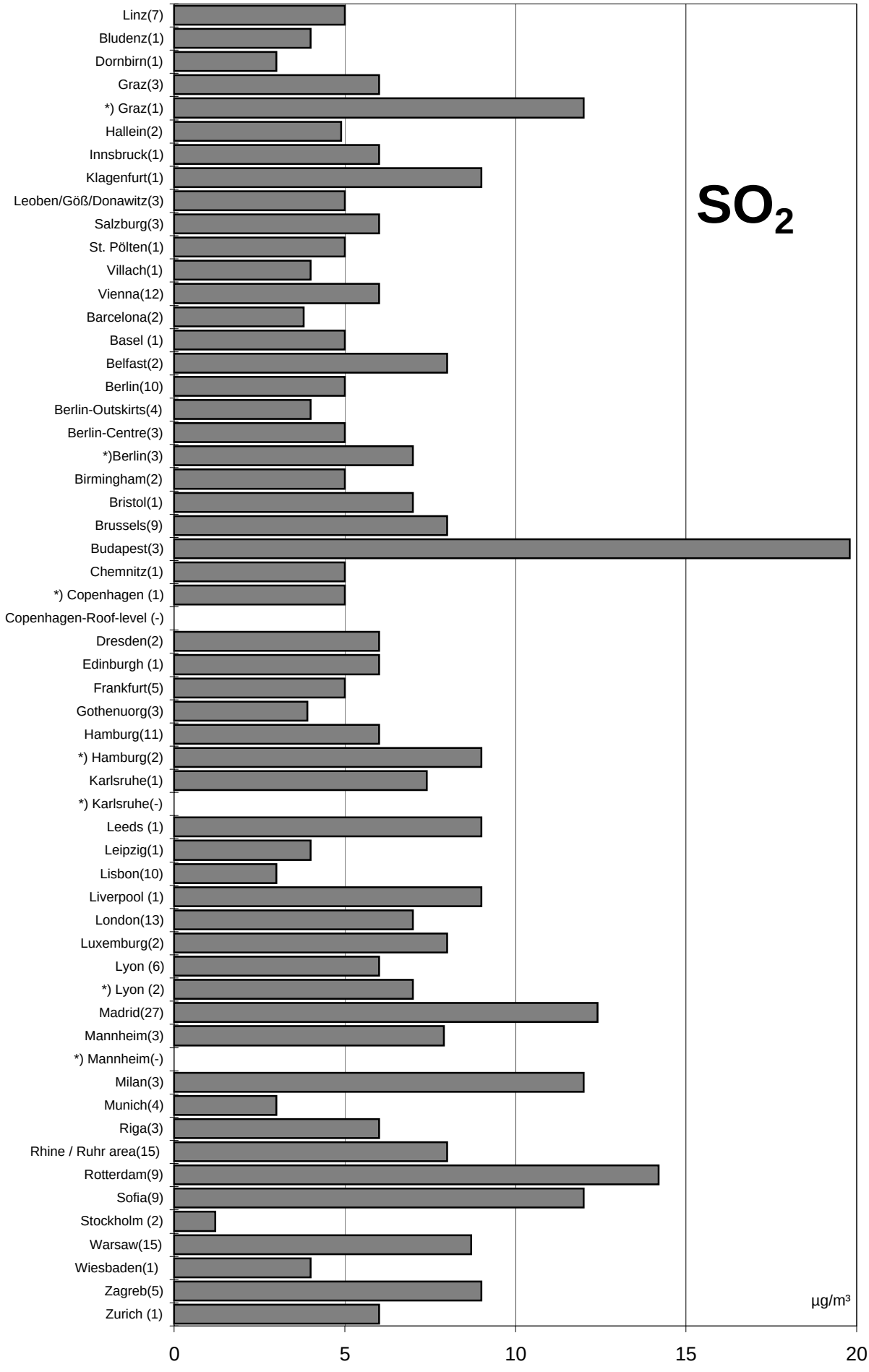
2003

Annual Mean Values

Comparison of The Air Quality in 2003

annual mean values

(in parentheses: number of monitoring stations)



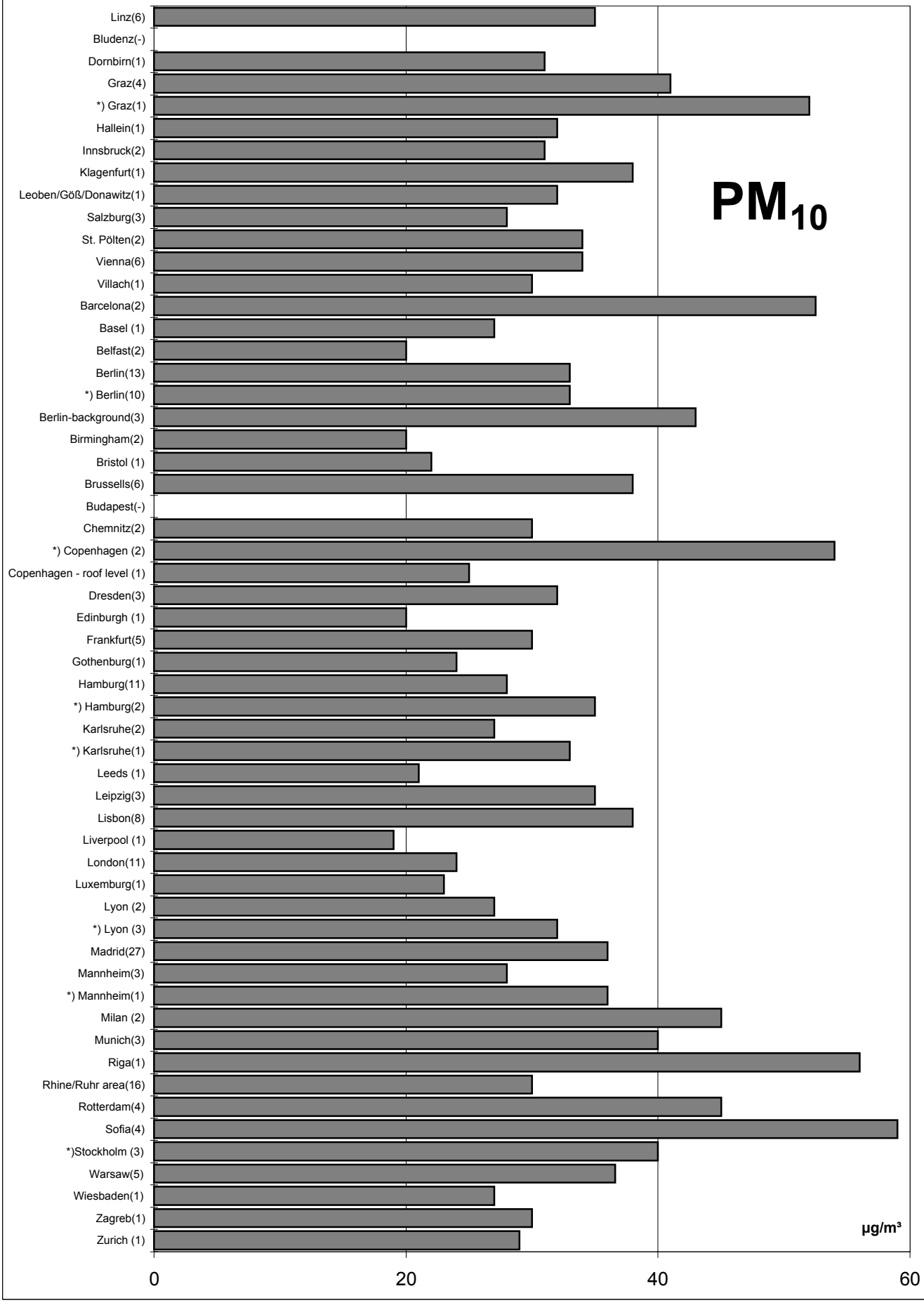
*) traffic-influenced monitoring stations

**) no data

Comparison of The Air Quality in 2003

annual mean values

(in parentheses: number of monitoring stations)

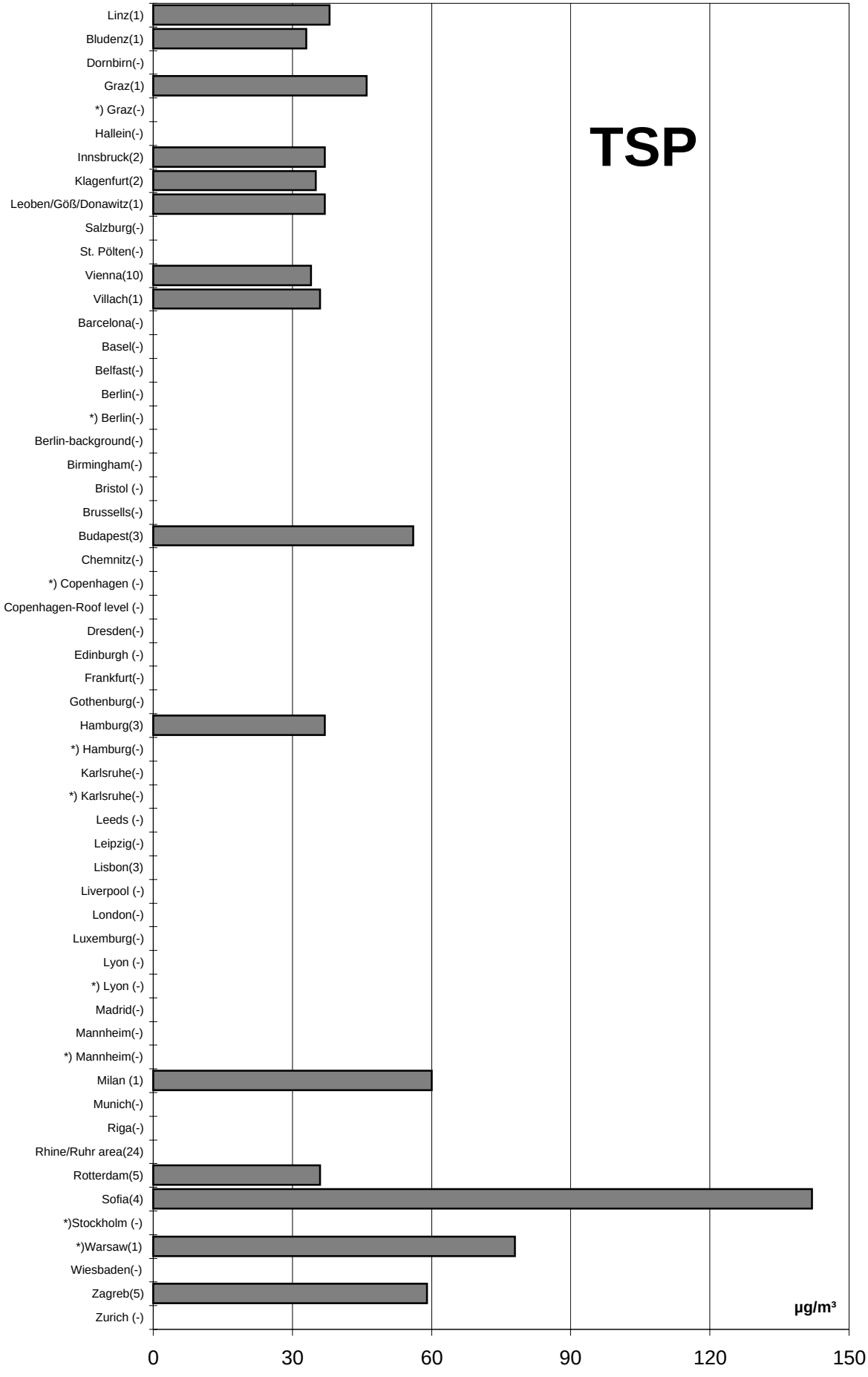


*) traffic-influenced monitoring stations
**) no data

Comparison of The Air Quality in 2003

annual mean values

(in parentheses: number of monitoring stations)



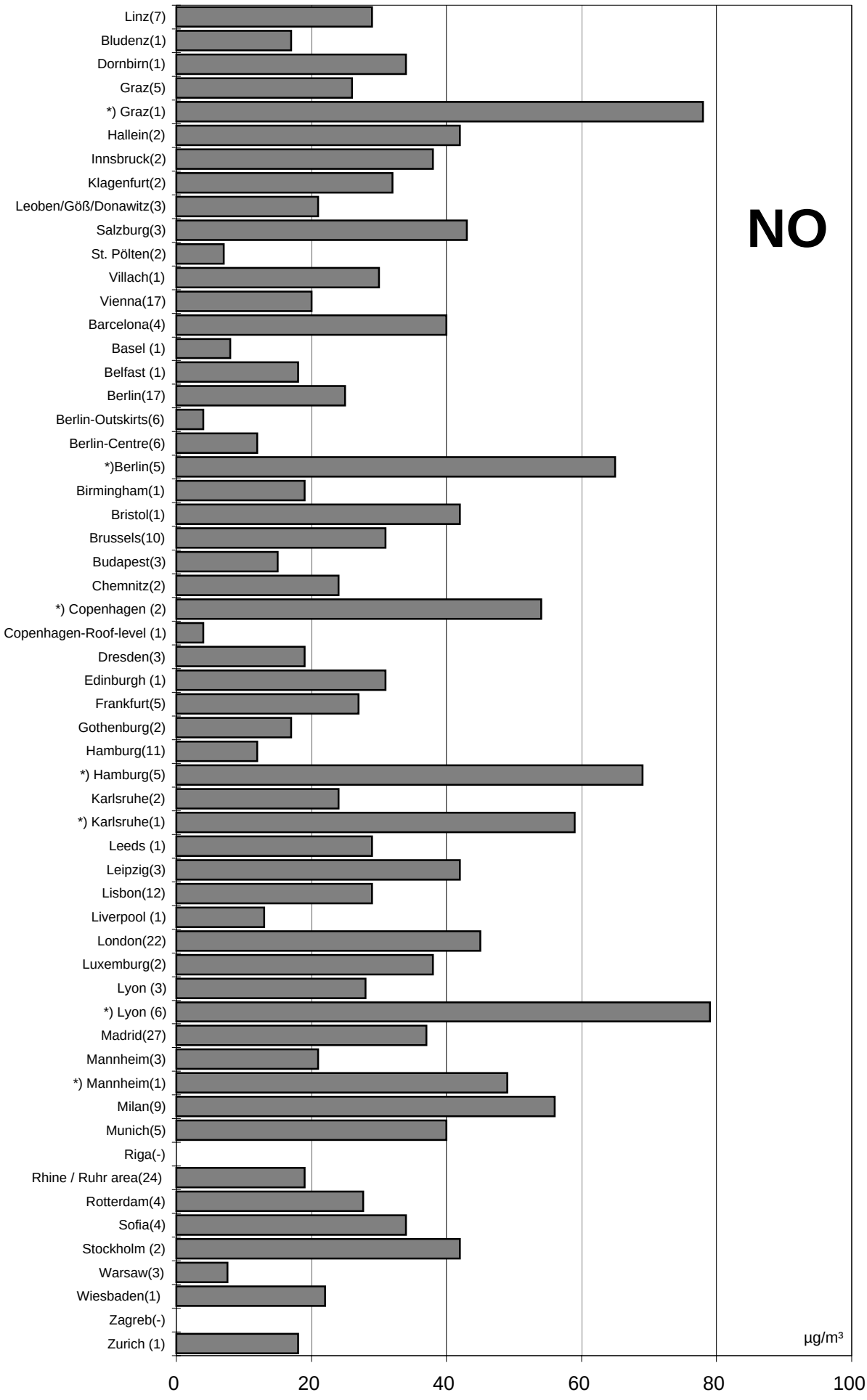
*)traffic-ininfluenced monitoring station

**)no data

Comparison of The Air Quality in 2003

annual mean values

(in parentheses: number of monitoring stations



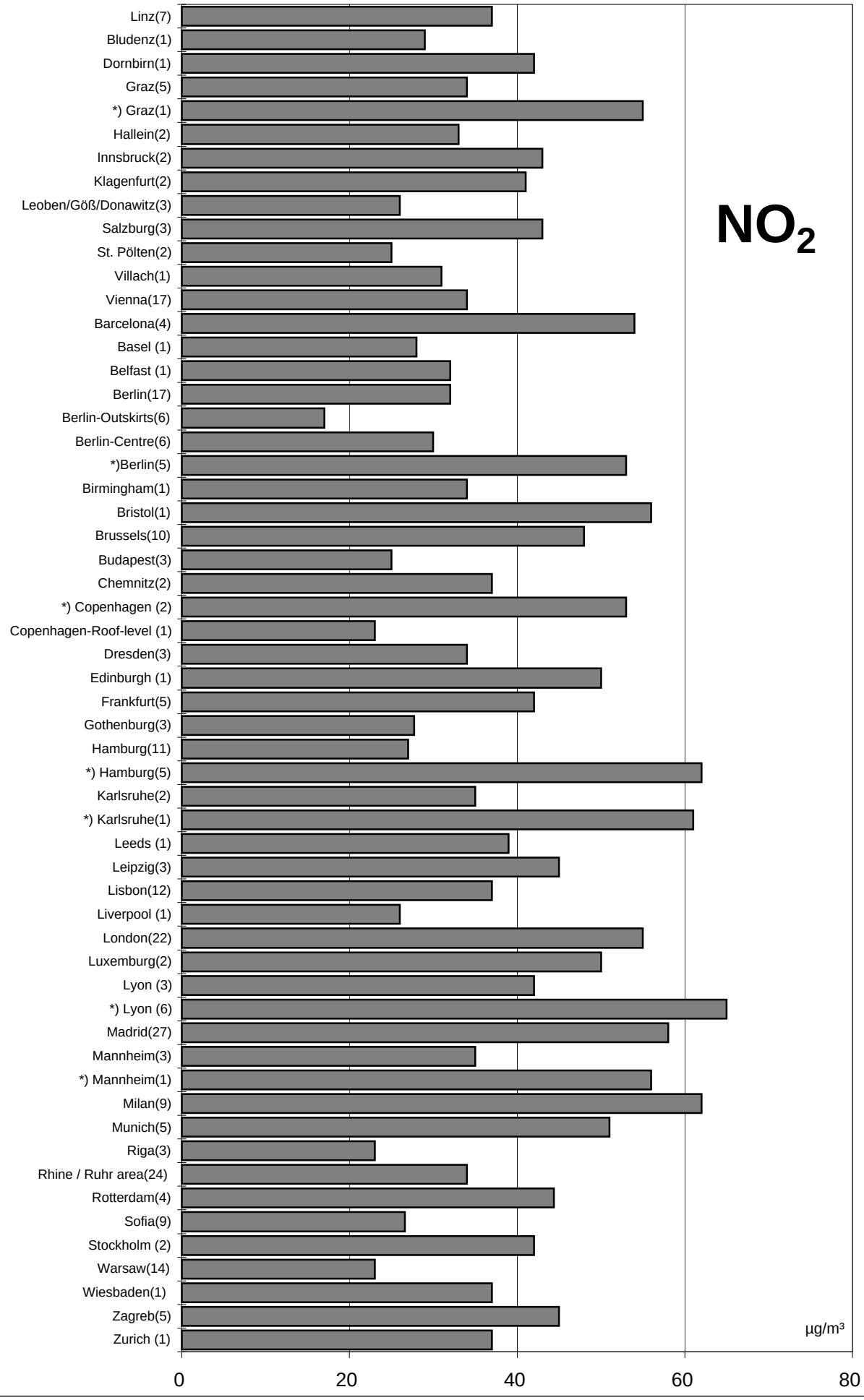
*) traffic-influenced monitoring stations

**) no data

Comparison of The Air Quality in 2003

annual mean values

(in parentheses: number of monitoring stations)

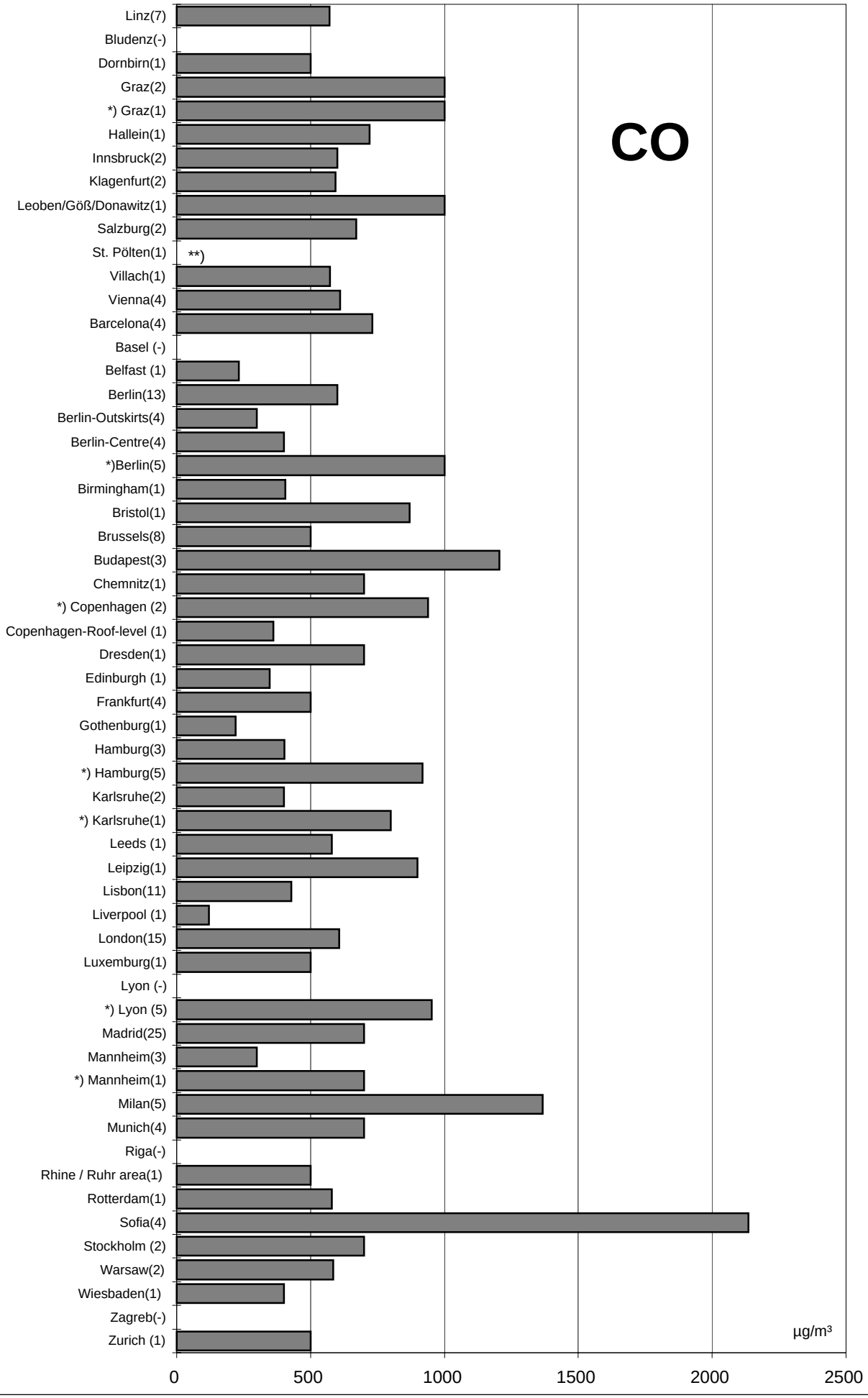


*) traffic-influenced monitoring stations
**) no data

Comparison of The Air Quality in 2003

annual mean values

(in parentheses: number of monitoring stations)



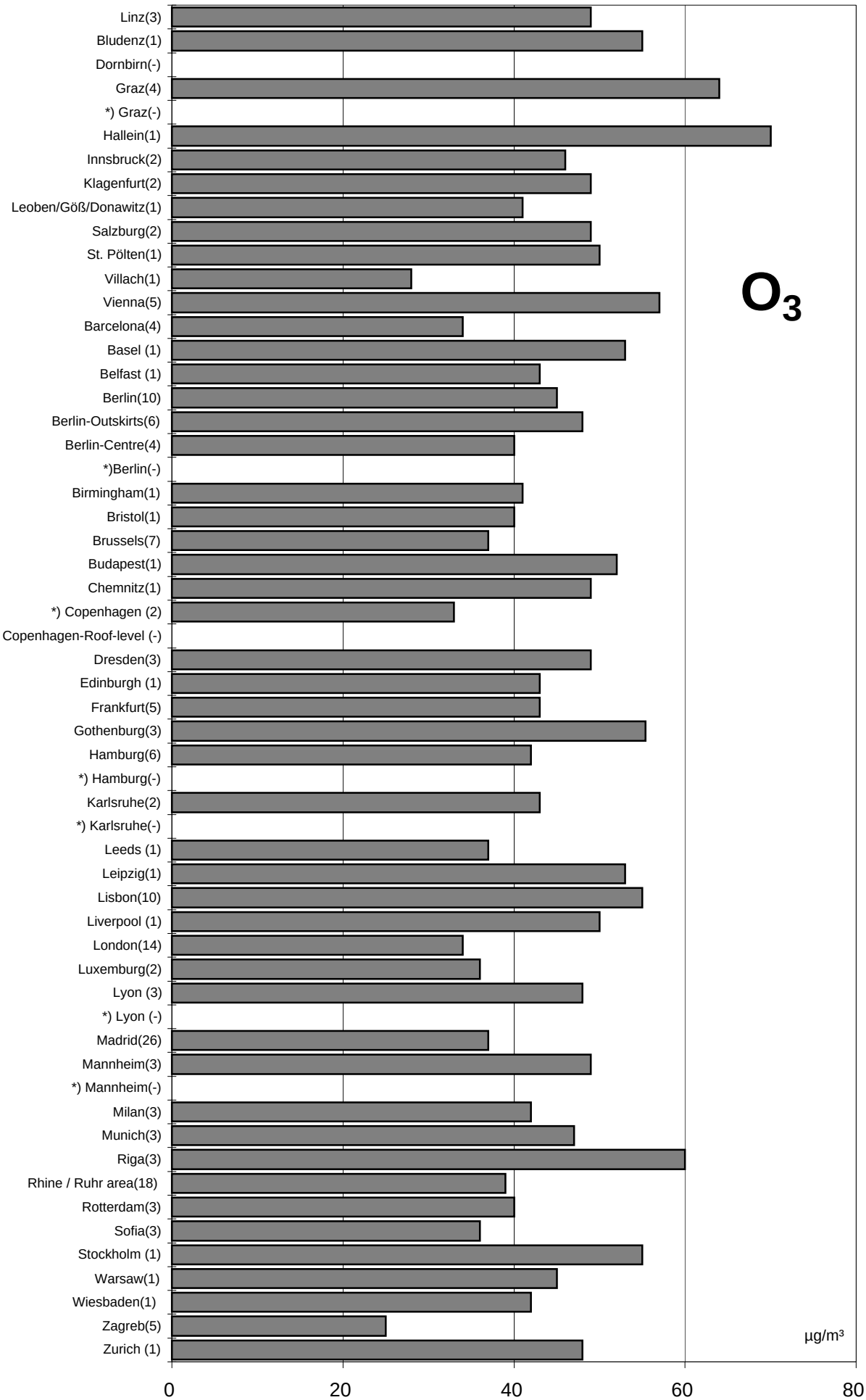
*) traffic-influenced monitoring stations

**) no data

Comparison of The Air Quality in 2003

annual mean values

(in parentheses: number of monitoring stations)



*) traffic-influenced monitoring stations

**) no data

Luftgütevergleich

2003

max. Monatsmittelwert

Comparison of The Air Quality

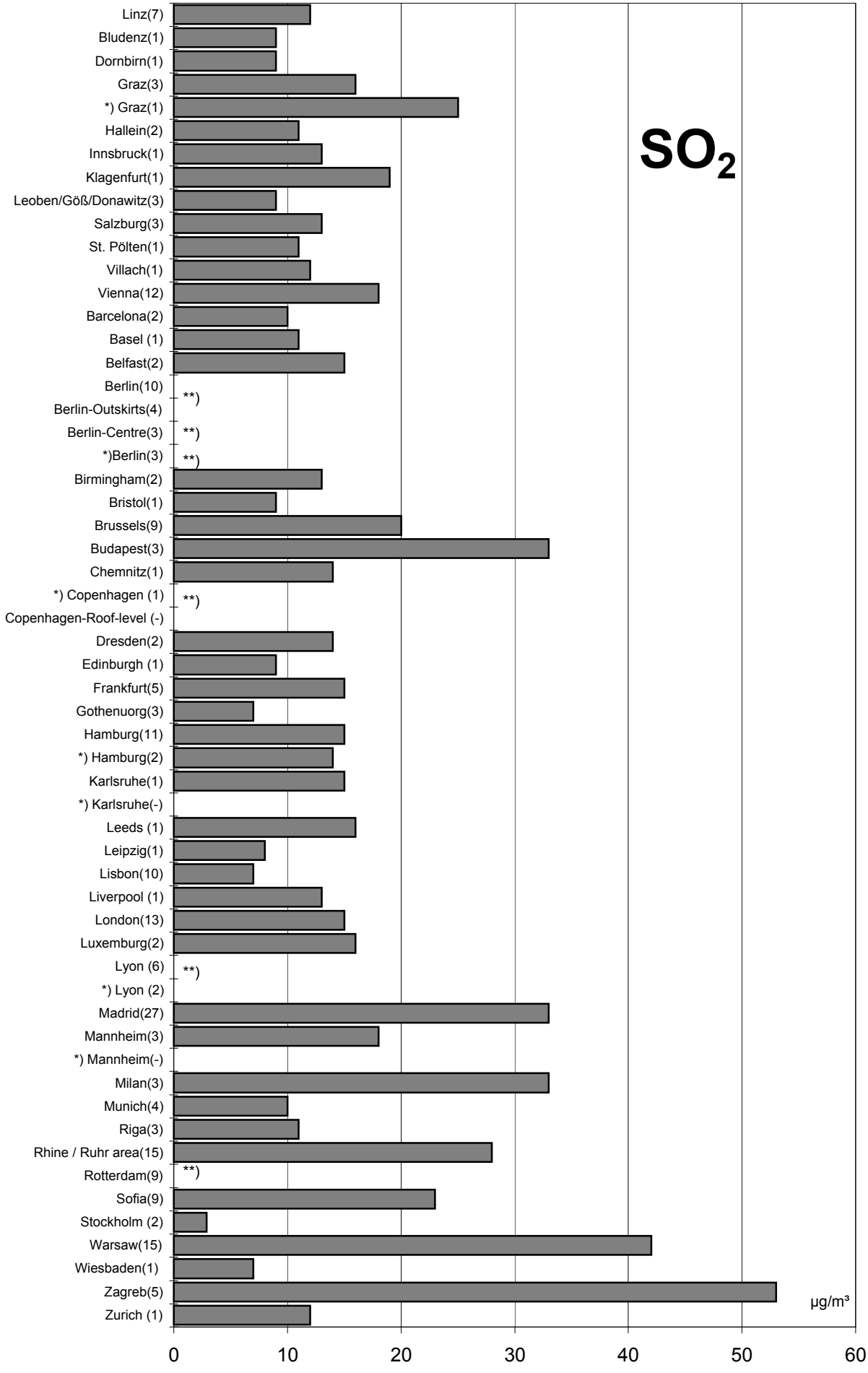
2003

Max. Monthly Mean Values

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)



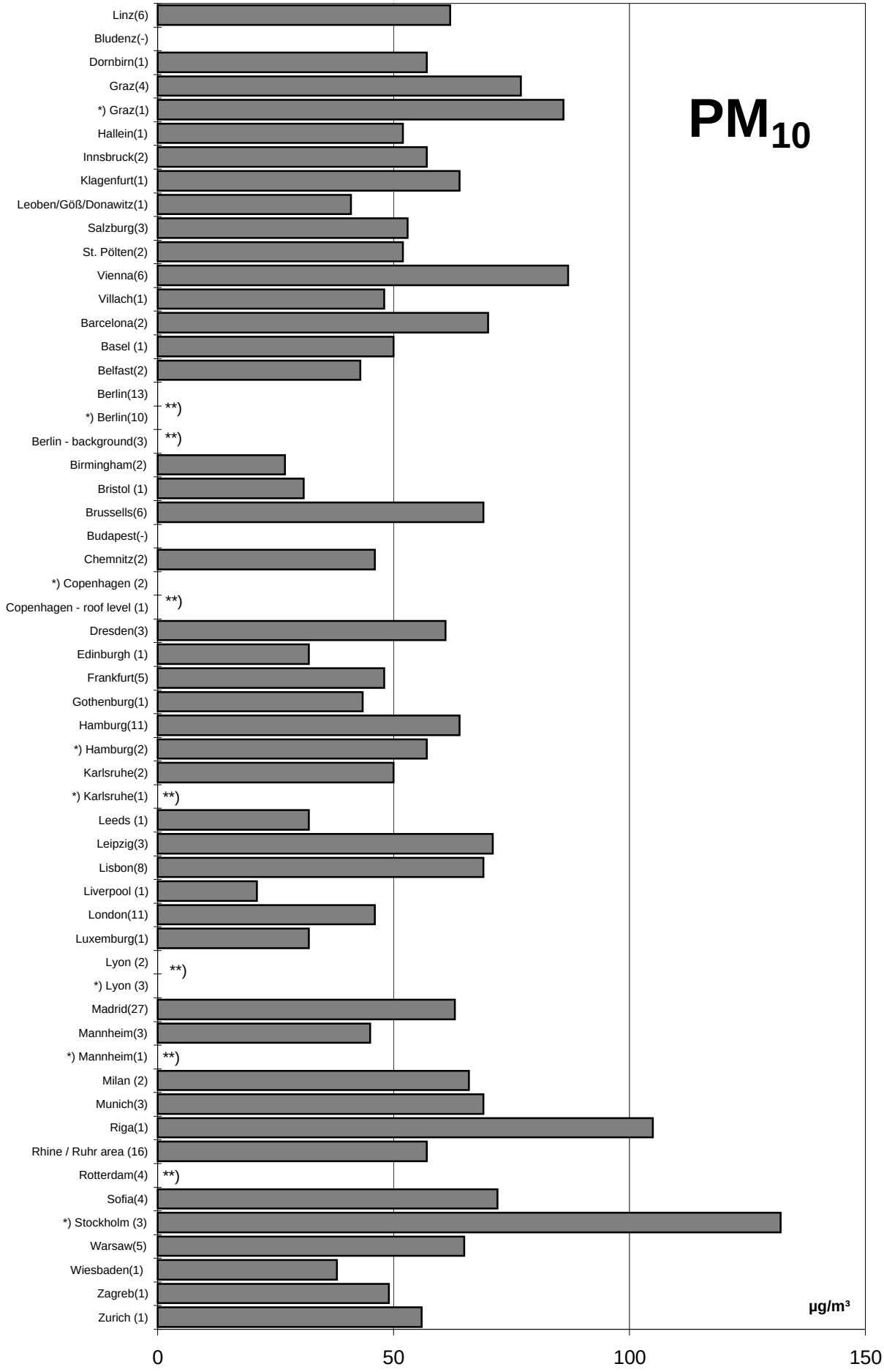
*) traffic-influenced monitoring stations

**) no data

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)

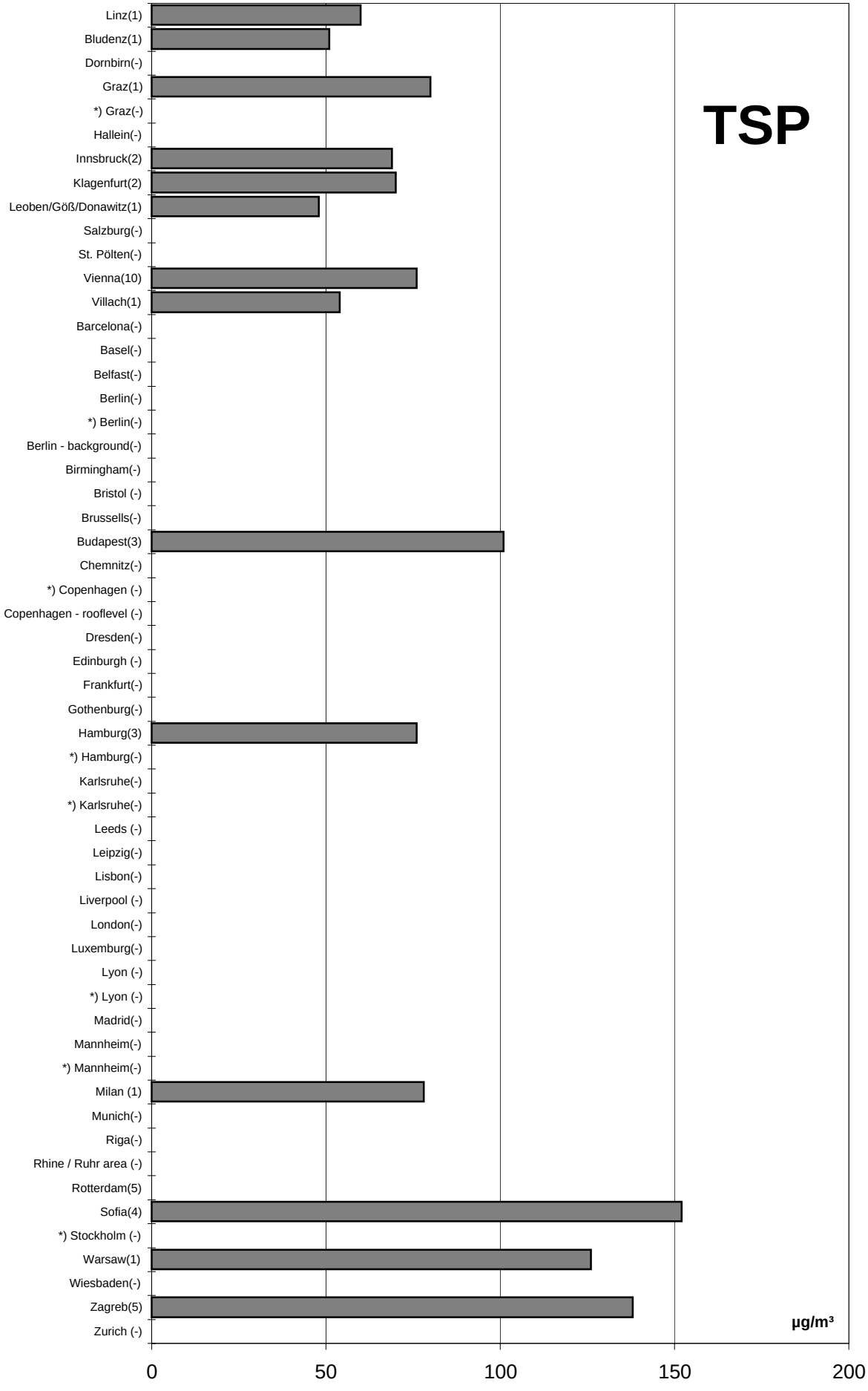


*) traffic-influenced monitoring stations
**) no data

Comparison of The Air Quality 2003

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

(in parentheses: number of monitoring stations)



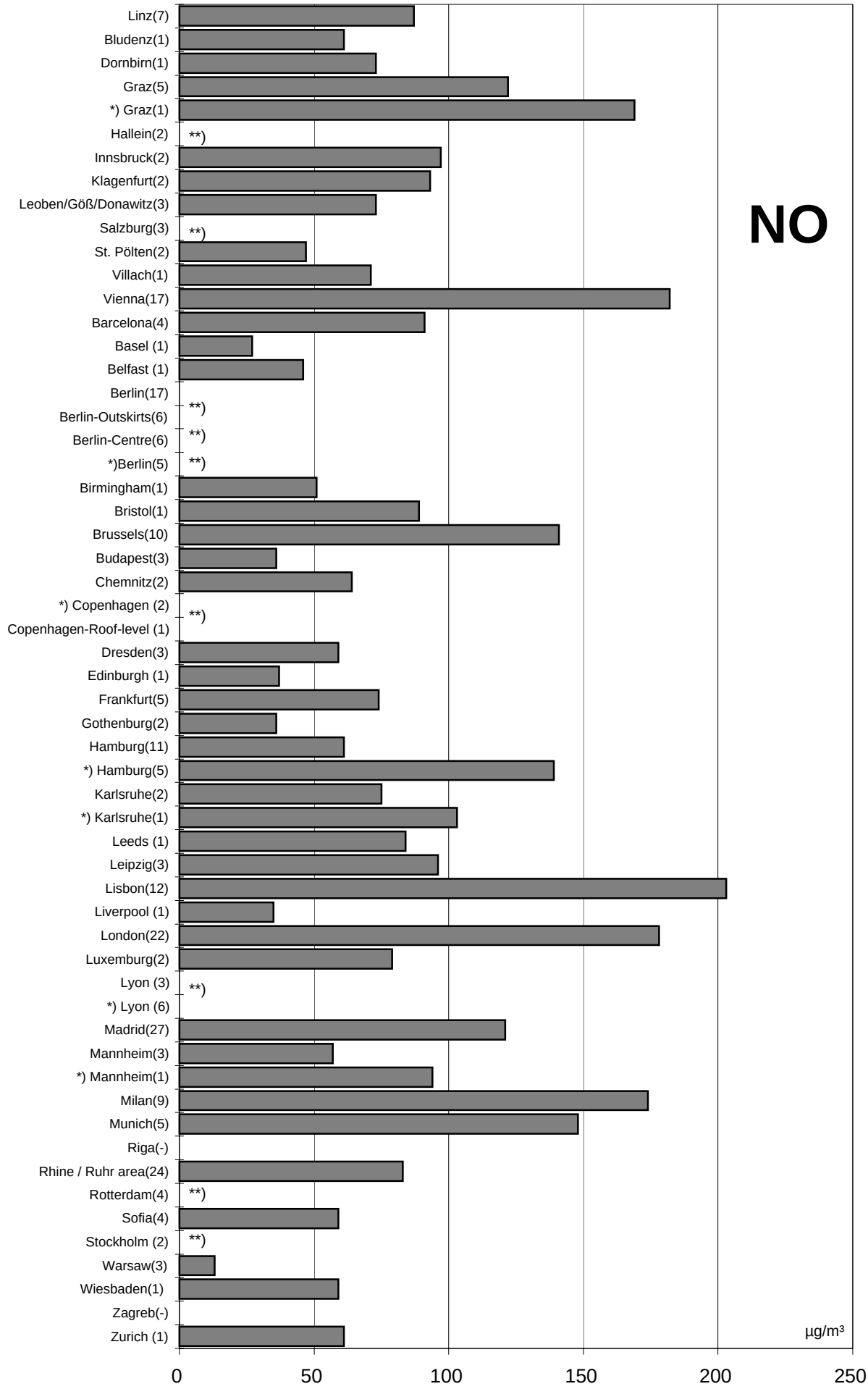
*)traffic-ininfluenced monitoring station

**)no data

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)

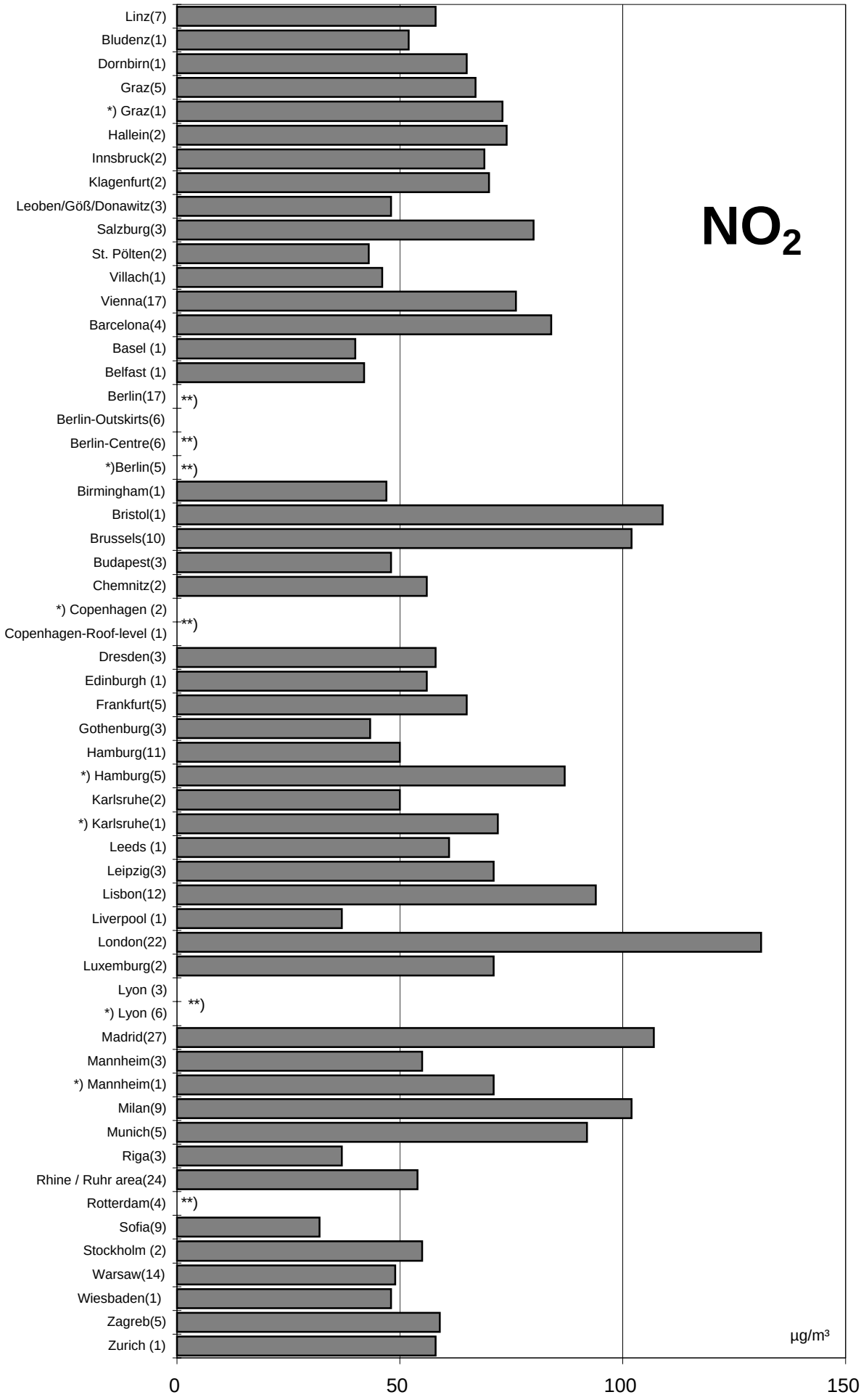


*) traffic-influenced monitoring stations
**) no data

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)

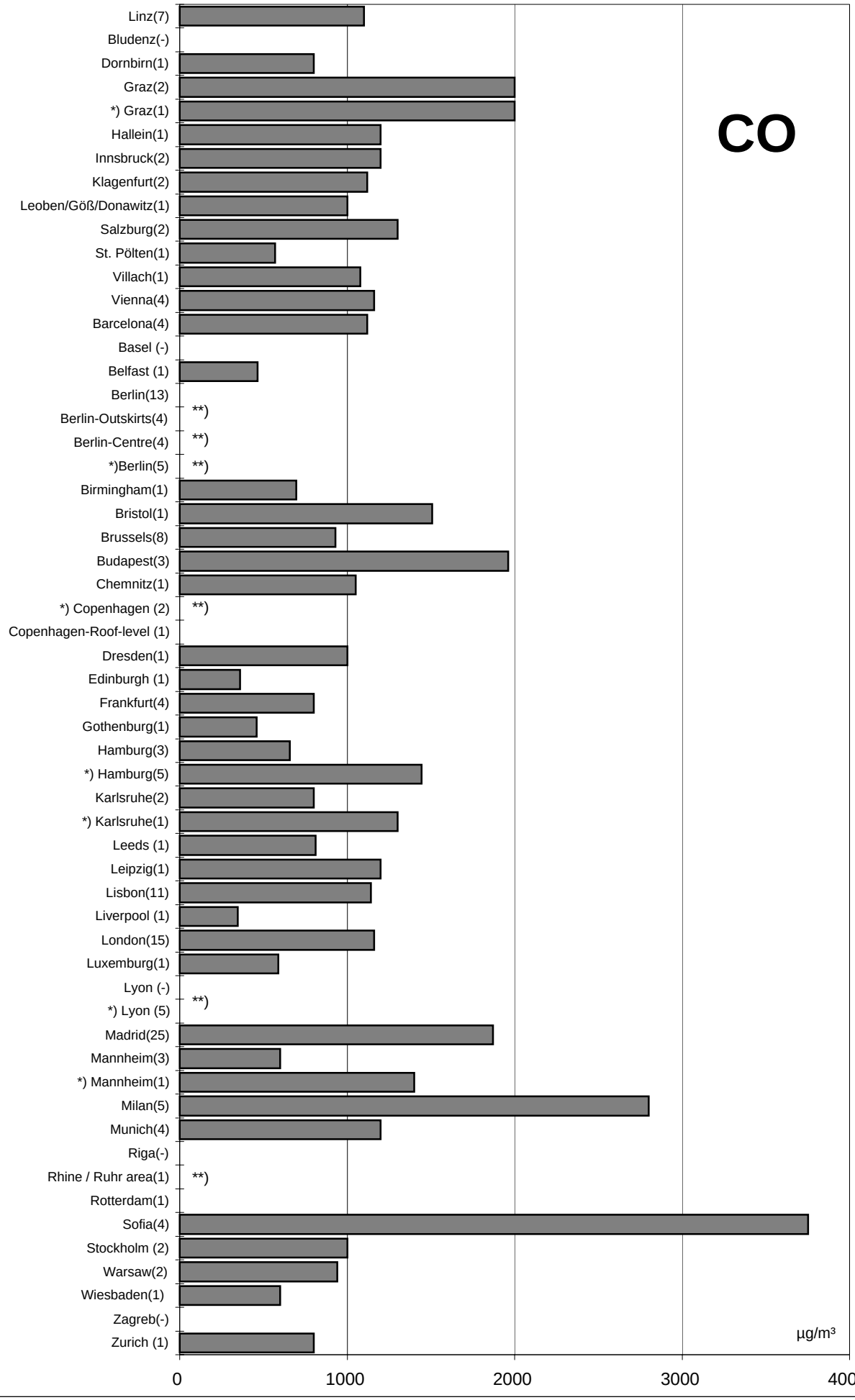


*) traffic-influenced monitoring stations
**) no data

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)



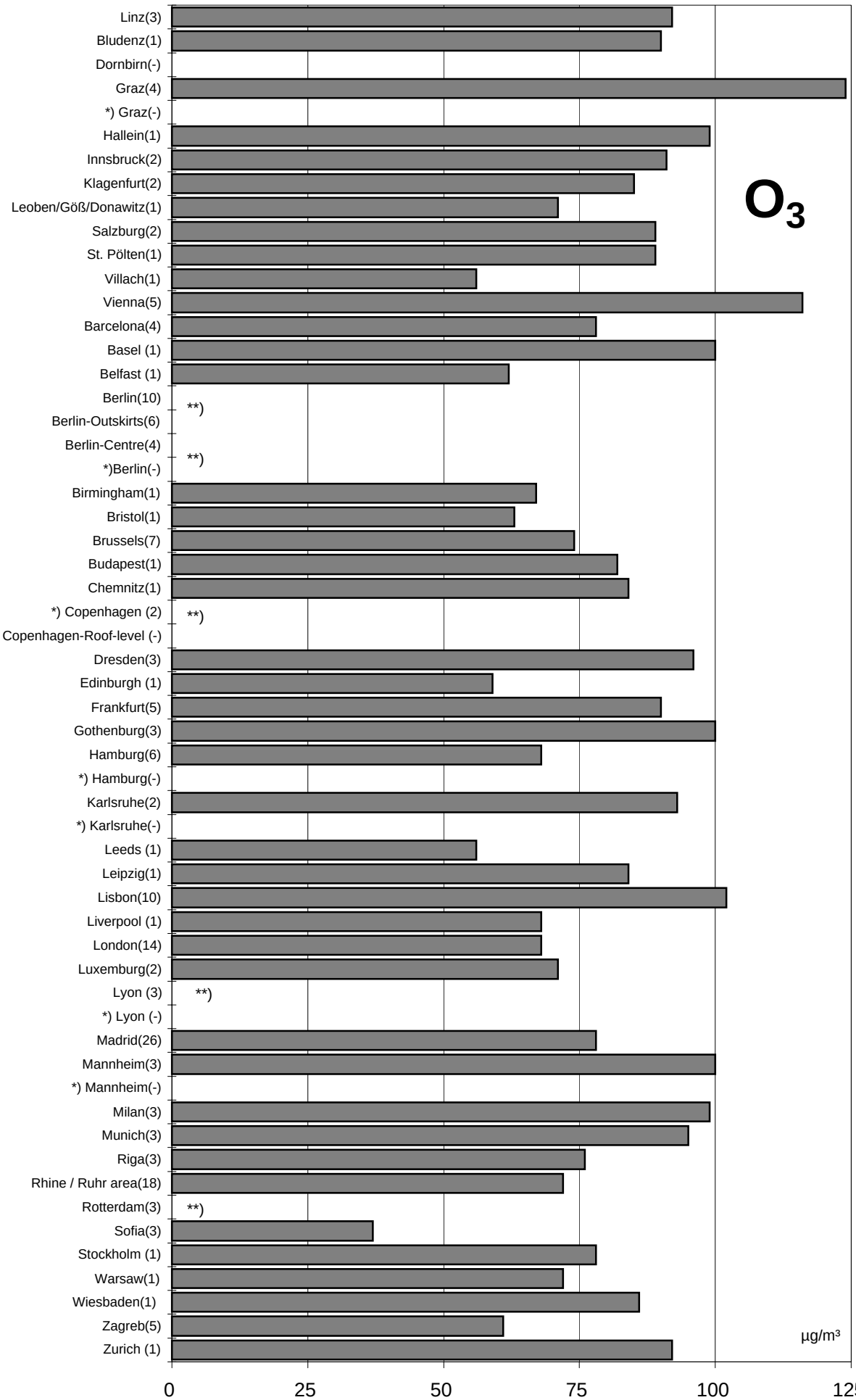
*) traffic-influenced monitoring stations

**) no data

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)



*) traffic-influenced monitoring stations

**) no data

MAGISTRAT LINZ - Amt für Natur- und Umweltschutz

S:\anu\Abteilung\MT\Immission\Städtevergleich\2003\Tabellen, Grafiken\LGV[Max. MMW .xls]O3-sw

Luftgütevergleich

2003

max. Tagesmittelwert

Comparison of The Air Quality

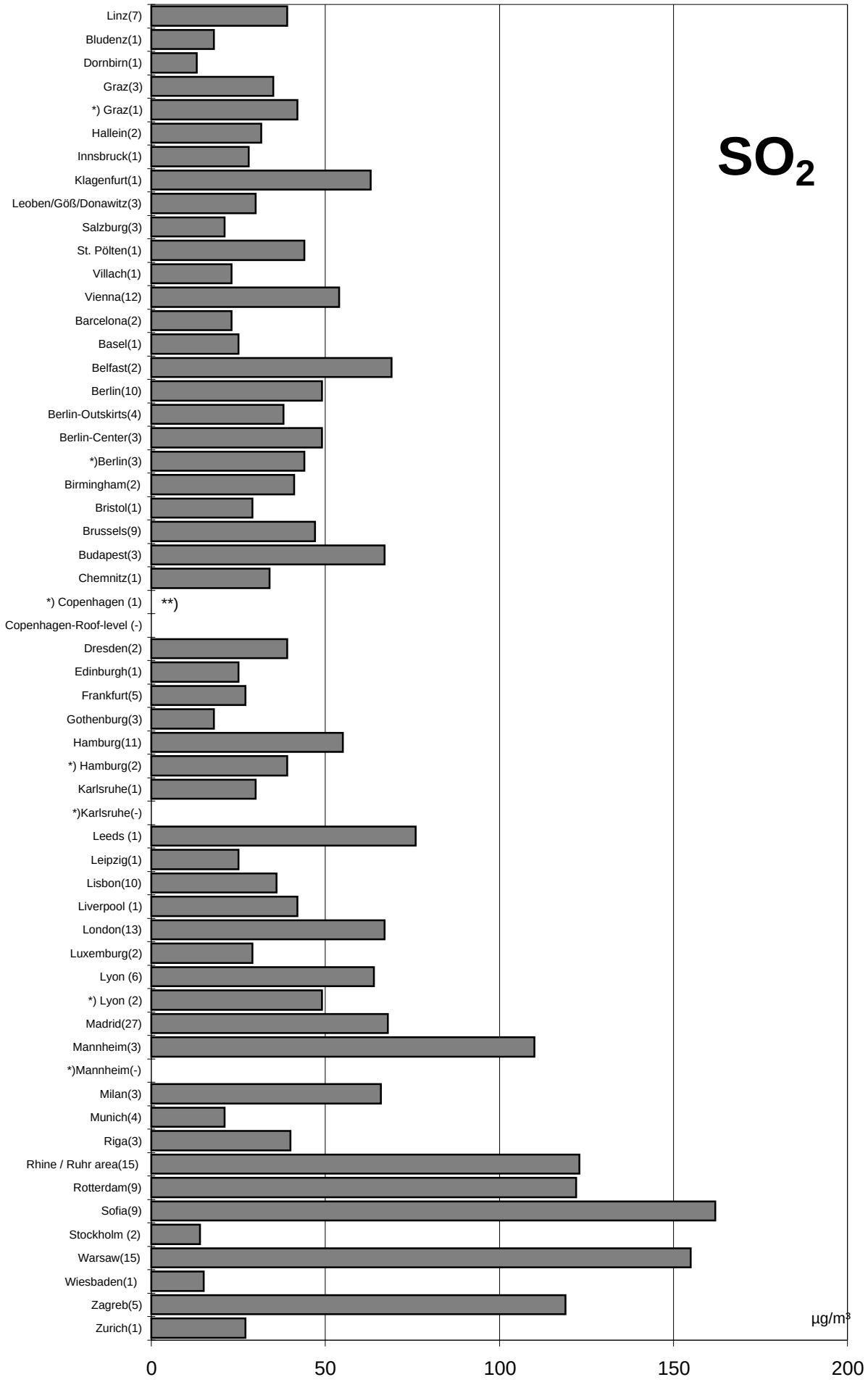
2003

Max. Daily Mean Values

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)



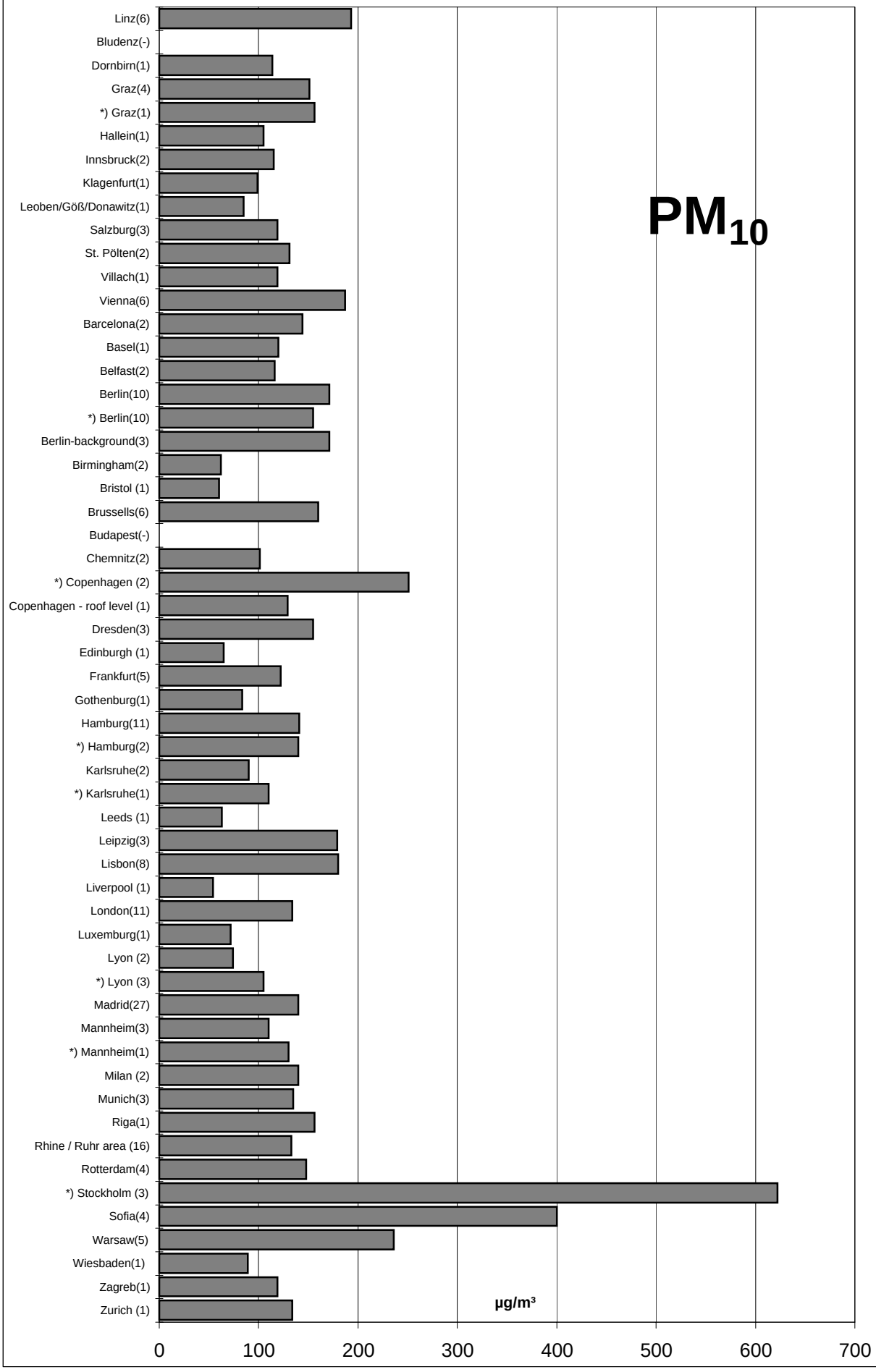
*) traffic-influenced monitoring stations

**)no data

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)

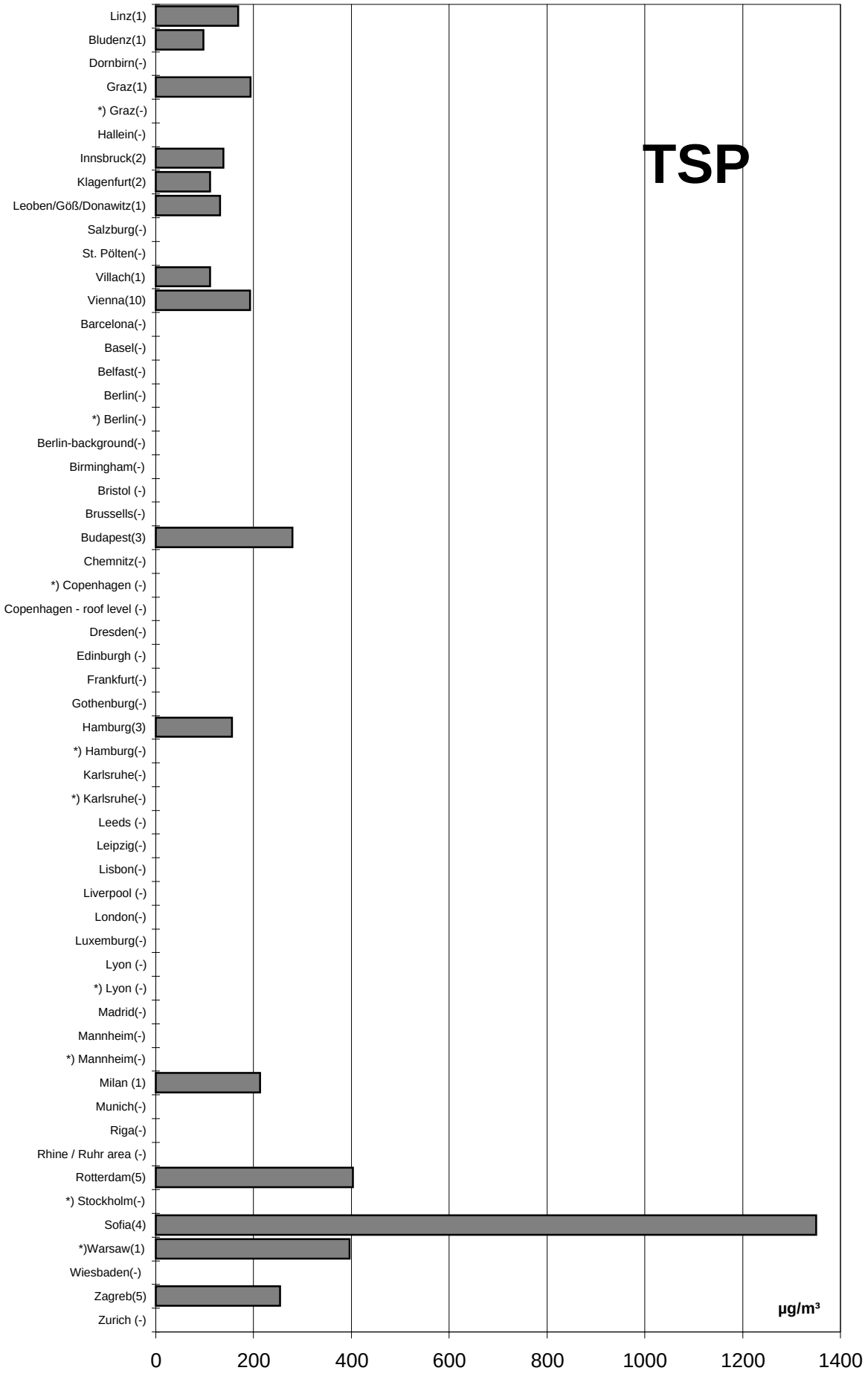


*) traffic-influenced monitoring stations
**) no data

Comparison of The Air Quality 2003

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

(in parentheses: number of monitoring stations)



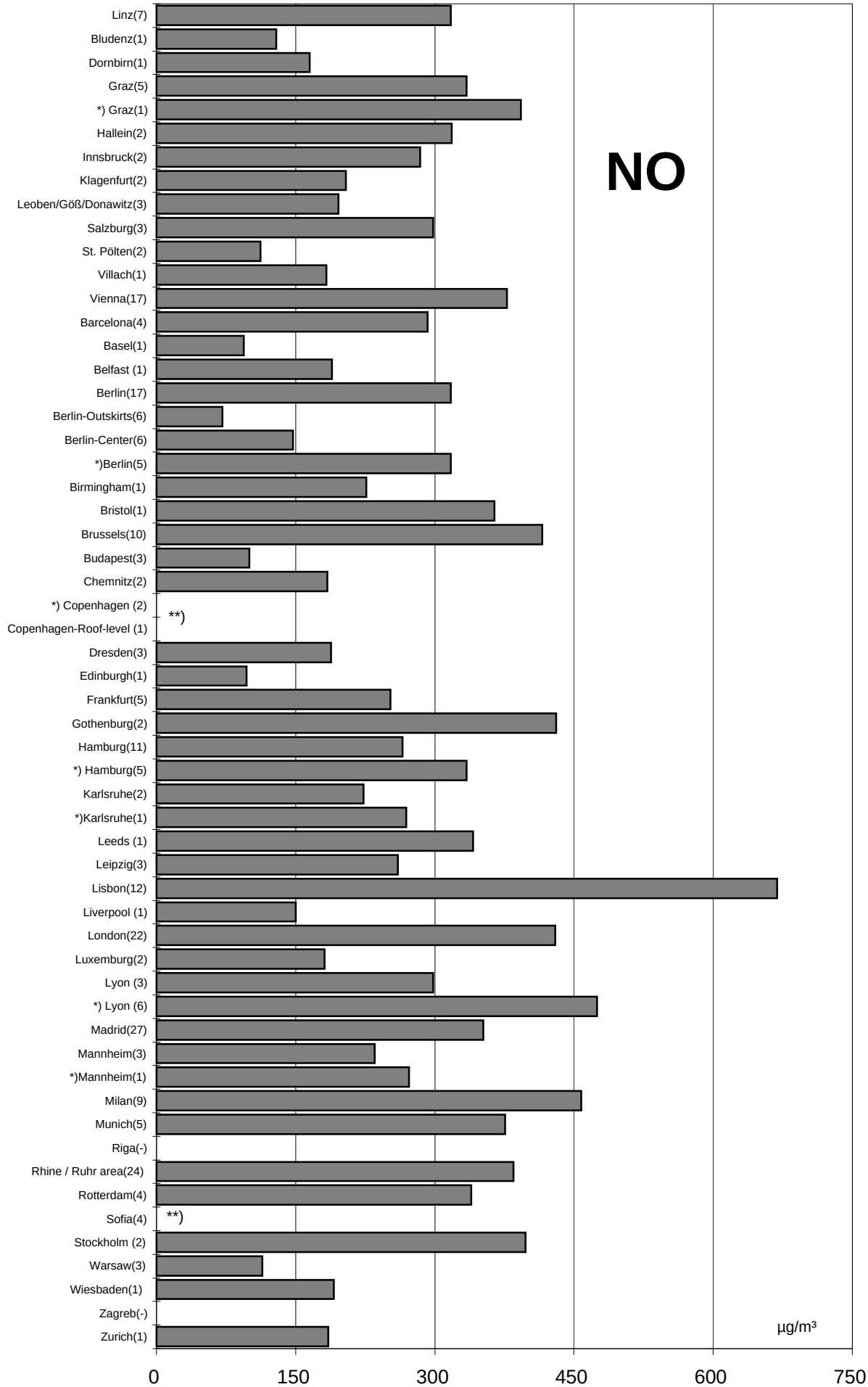
*)traffic-ininfluenced monitoring station

**)no data

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)



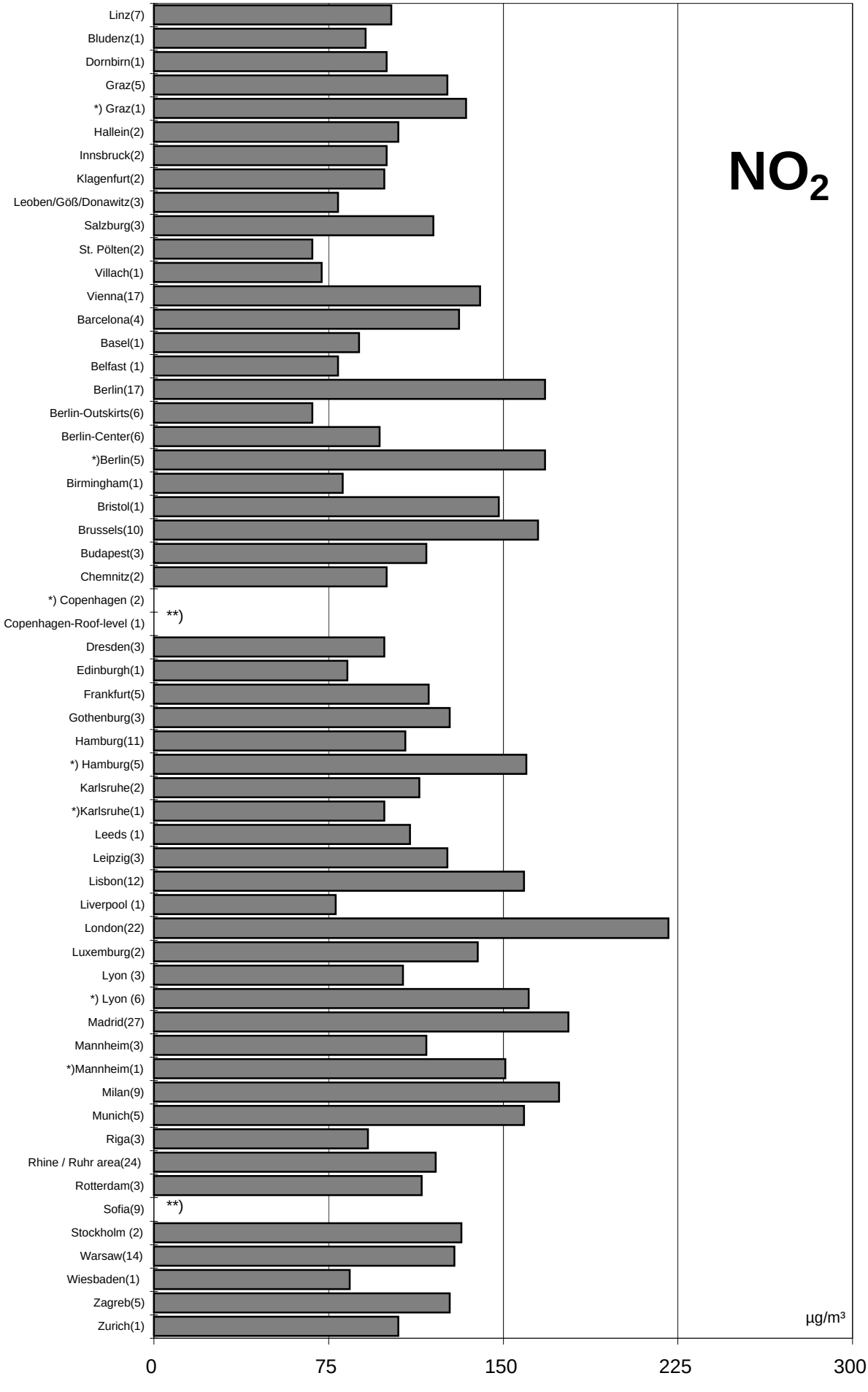
*) traffic-influenced monitoring stations

**)no data

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)

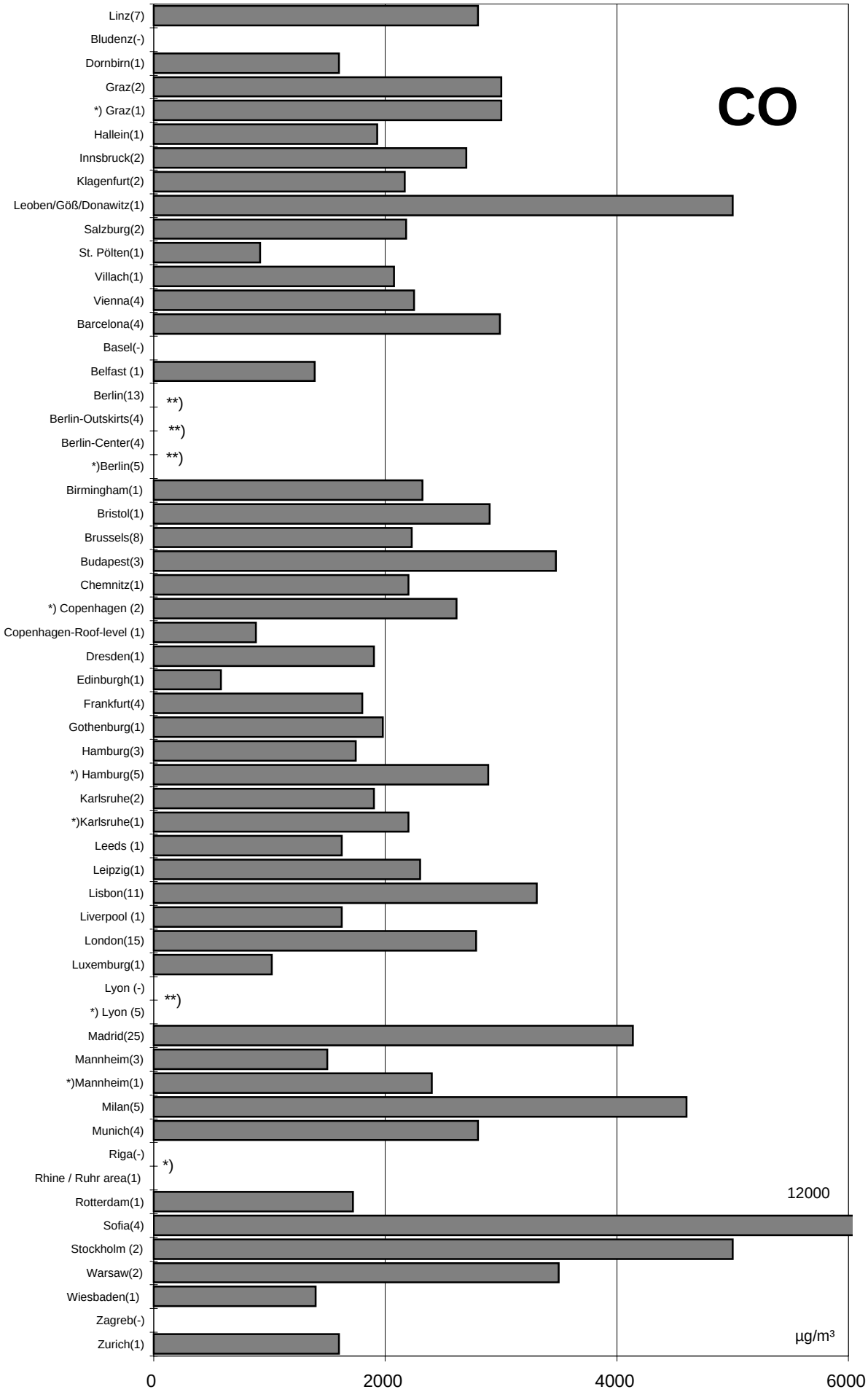


*) traffic-influenced monitoring stations
**)no data

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)



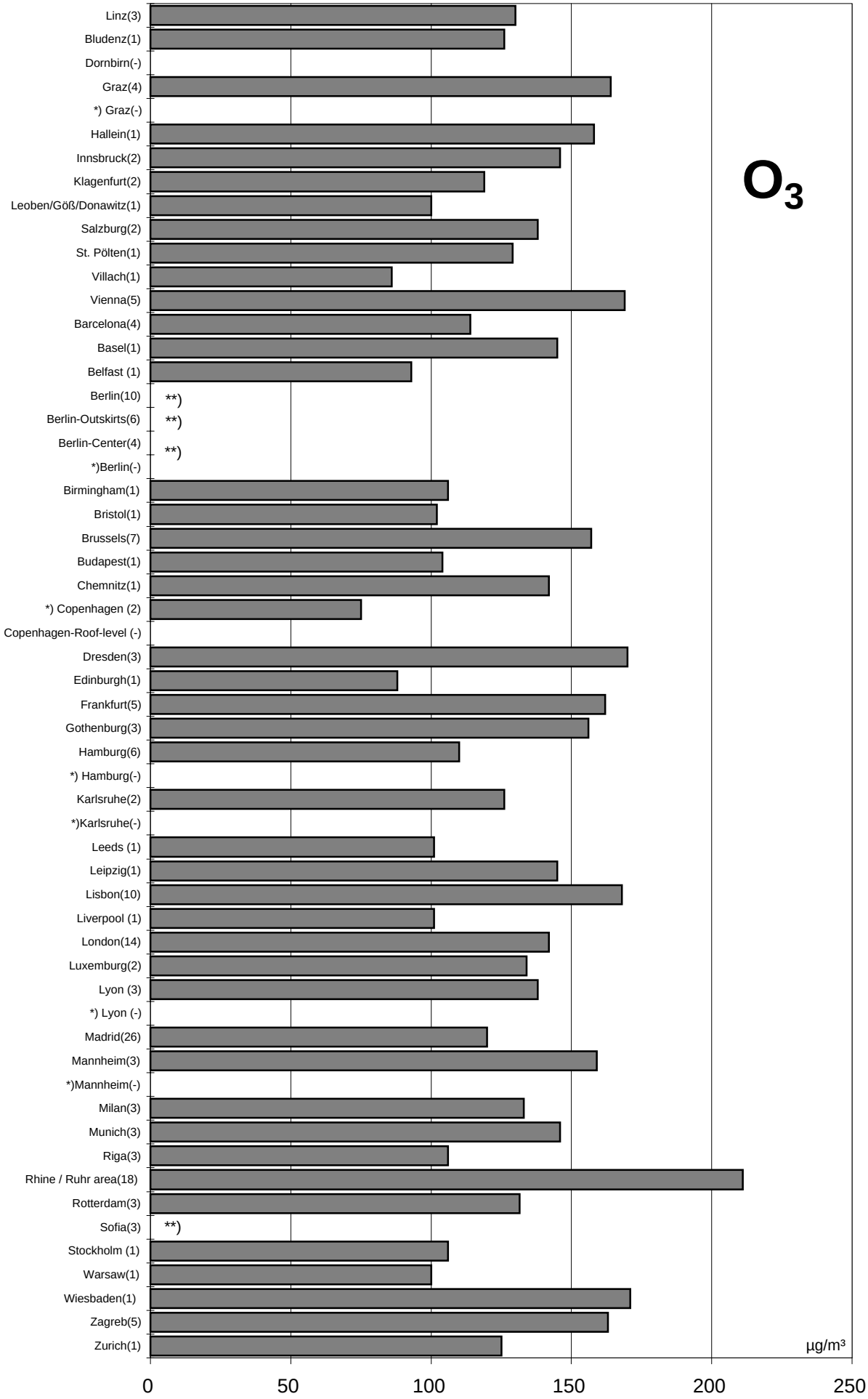
*) traffic-influenced monitoring stations

**)no data

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)



*) traffic-influenced monitoring stations
**)no data

Luftgütevergleich

2003

max. 3h-Mittelwert

Comparison of The Air Quality

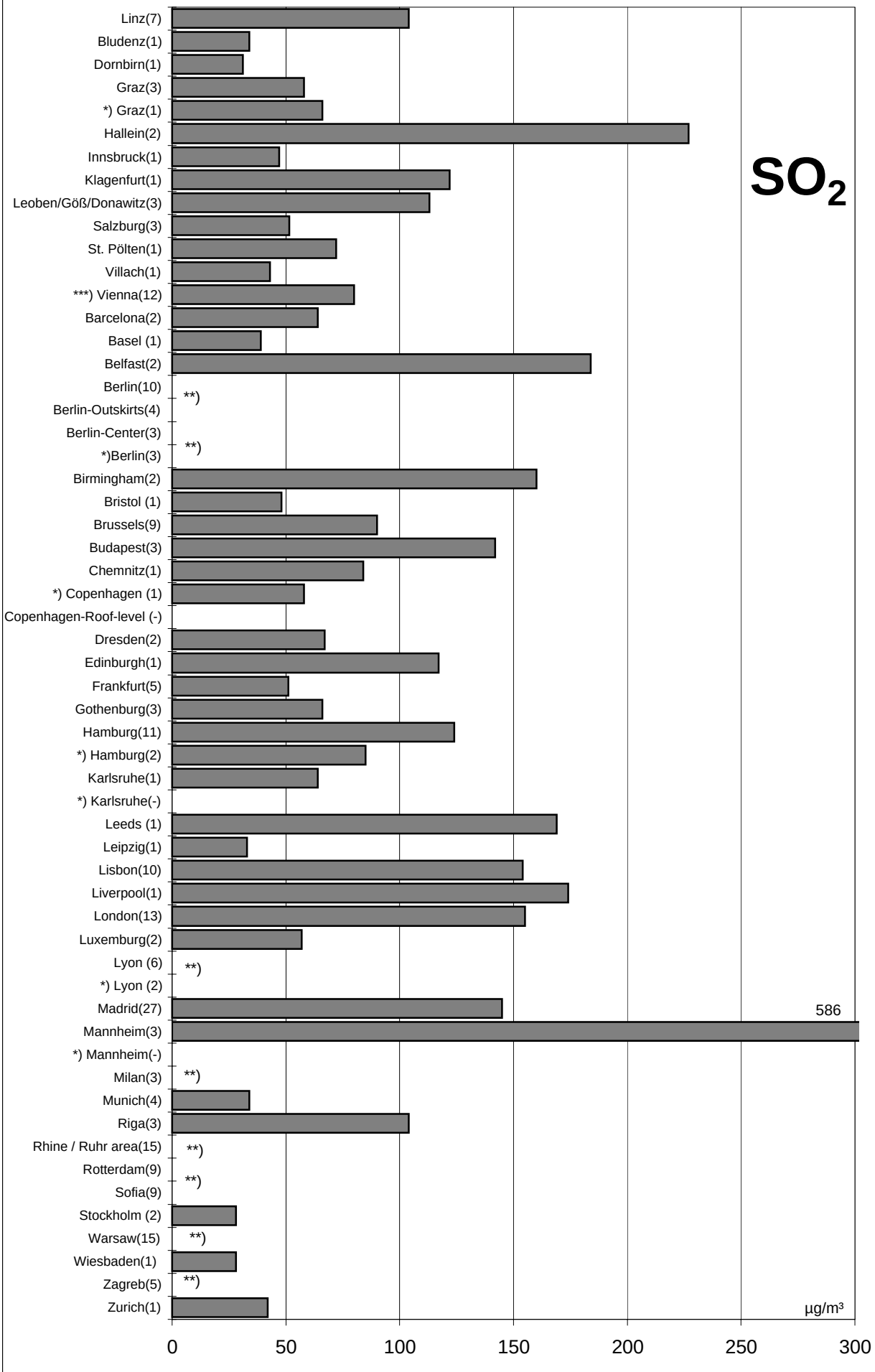
2003

Max. 3h- Mean Values

Comparison of The Air Quality in 2003

max. 3h mean values (max. stressed monitoring station)

(in parentheses: number of monitoring stations)

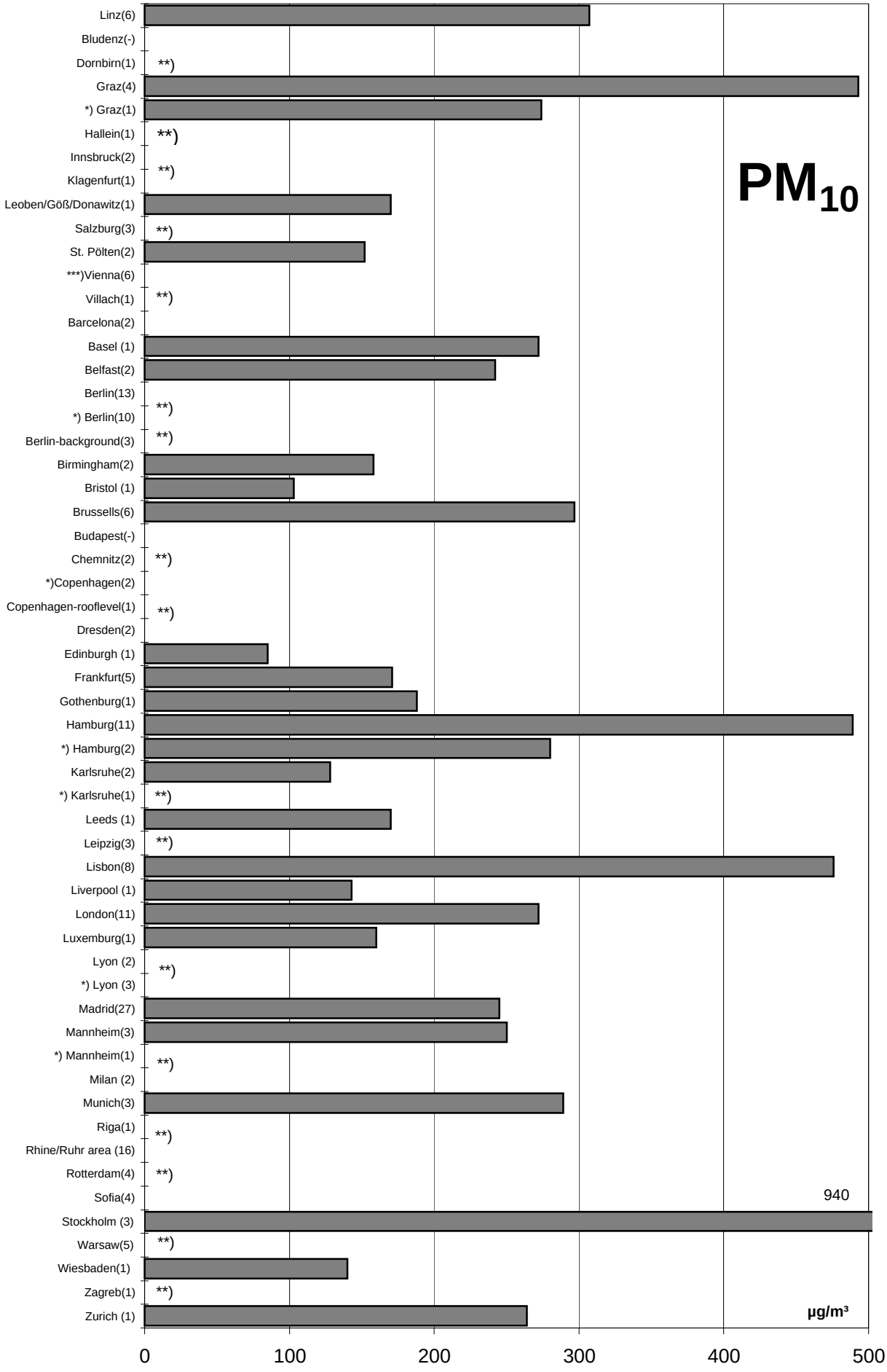


*) traffic-influenced monitoring stations
**) no data
***)max. 99,9 Percentile

Comparison of The Air Quality in 2003

max. 3h mean values (max. stressed monitoring station)

(in parentheses: number of monitoring stations)

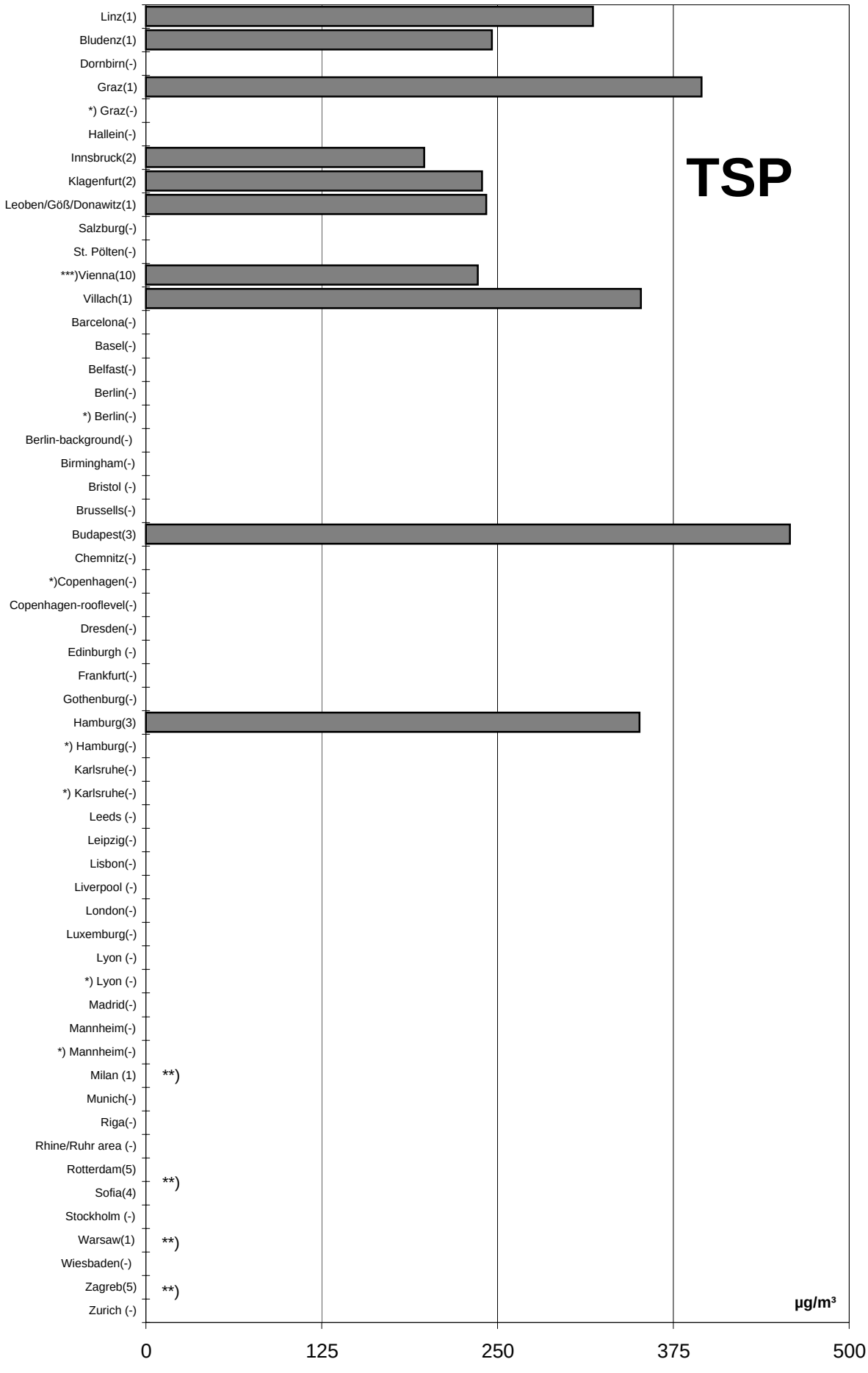


*) traffic-influenced monitoring stations
**) no data
***)max. 99,9 Percentile

Comparison of The Air Quality 2003

max. 3h mean values (max. stressed monitoring station)

(in parentheses: number of monitoring stations)

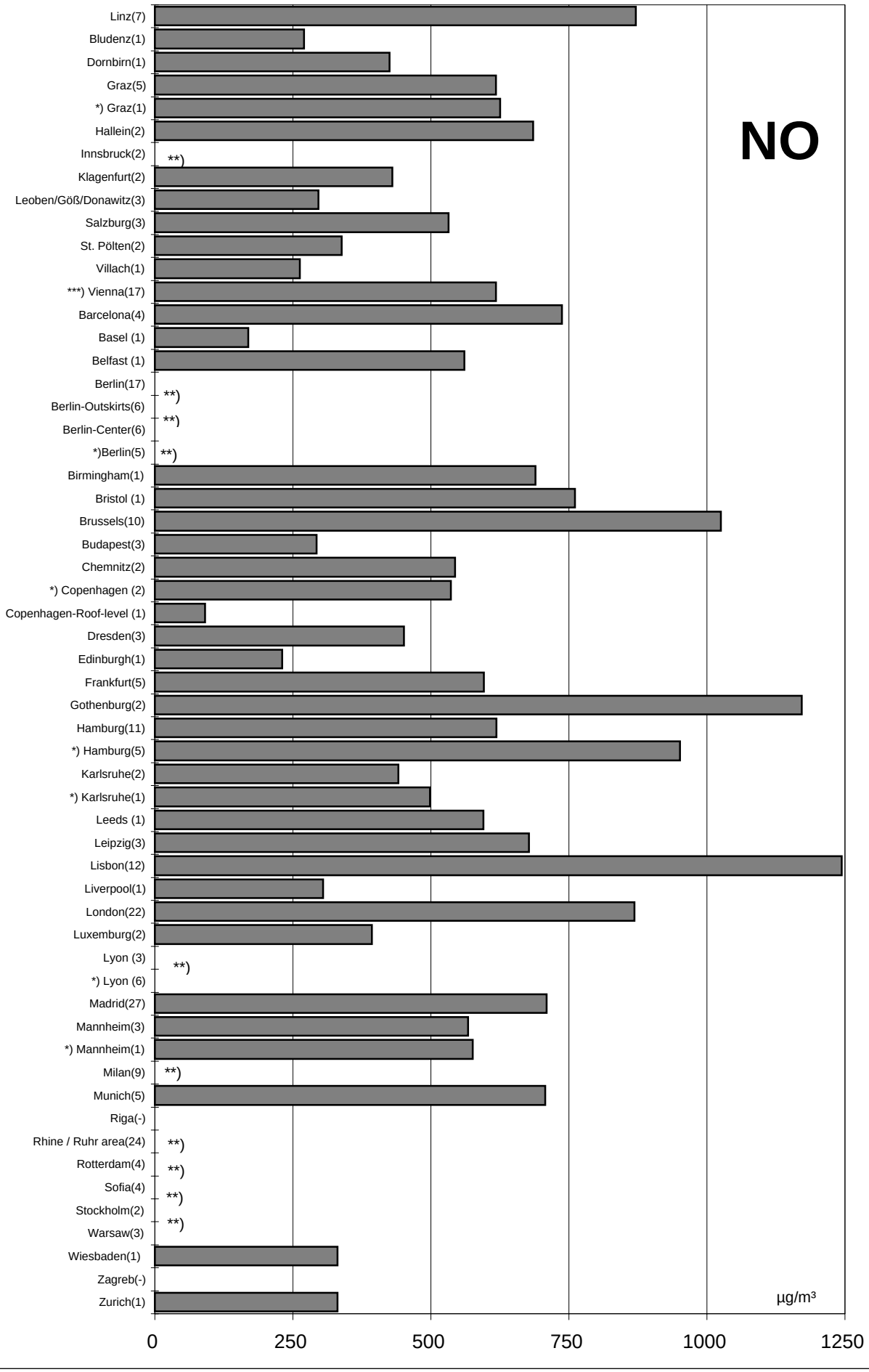


*) traffic-influenced monitoring stations
**) no data
***)max. 99,9 Percentile

Comparison of The Air Quality in 2003

max. 3h mean values (max. stressed monitoring station)

(in parentheses: number of monitoring stations)



*) traffic-influenced monitoring stations

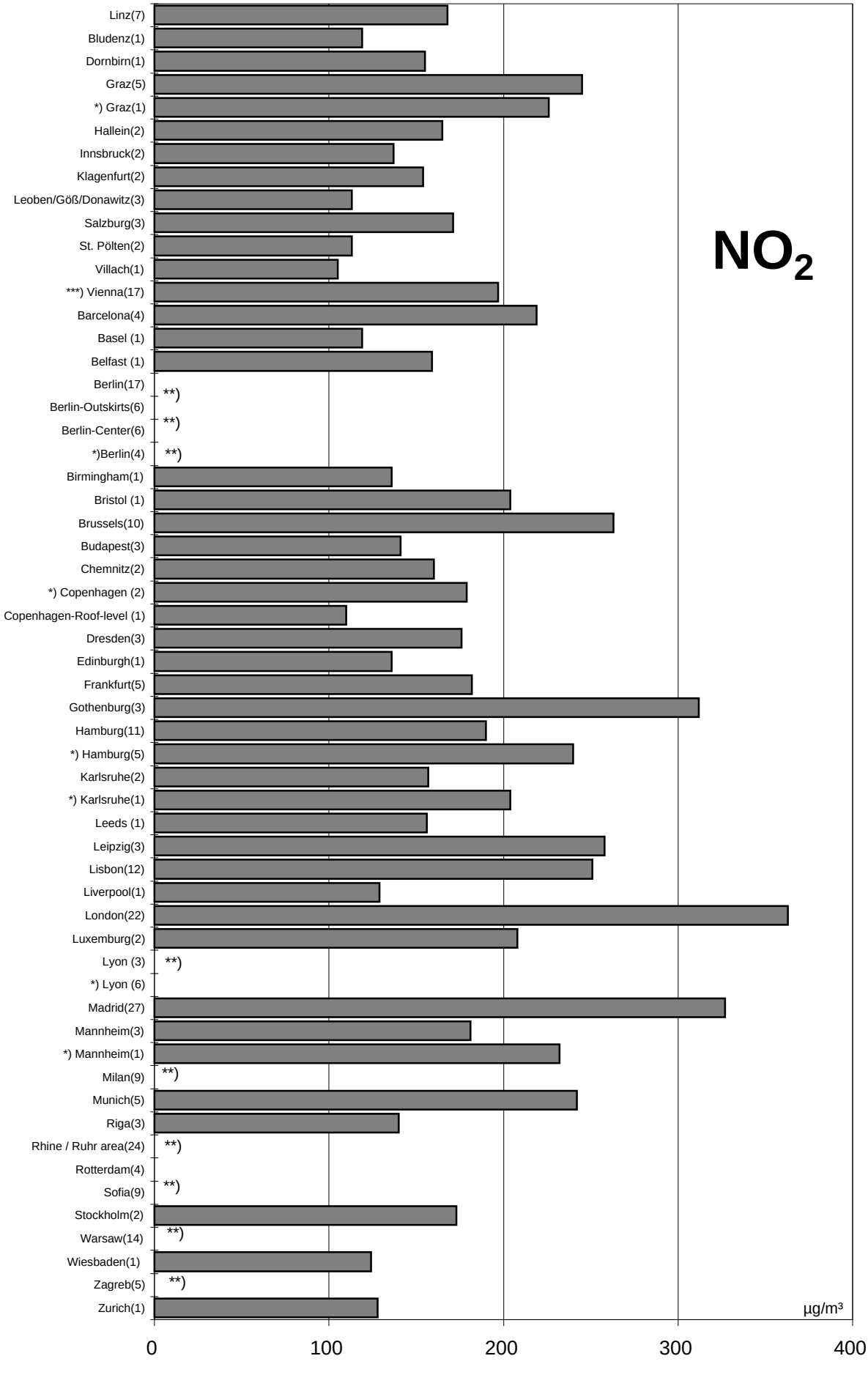
**)no data

***)max. 99,9-Percentile

Comparison of The Air Quality in 2003

max. 3h mean values (max. stressed monitoring station)

(in parentheses: number of monitoring stations)

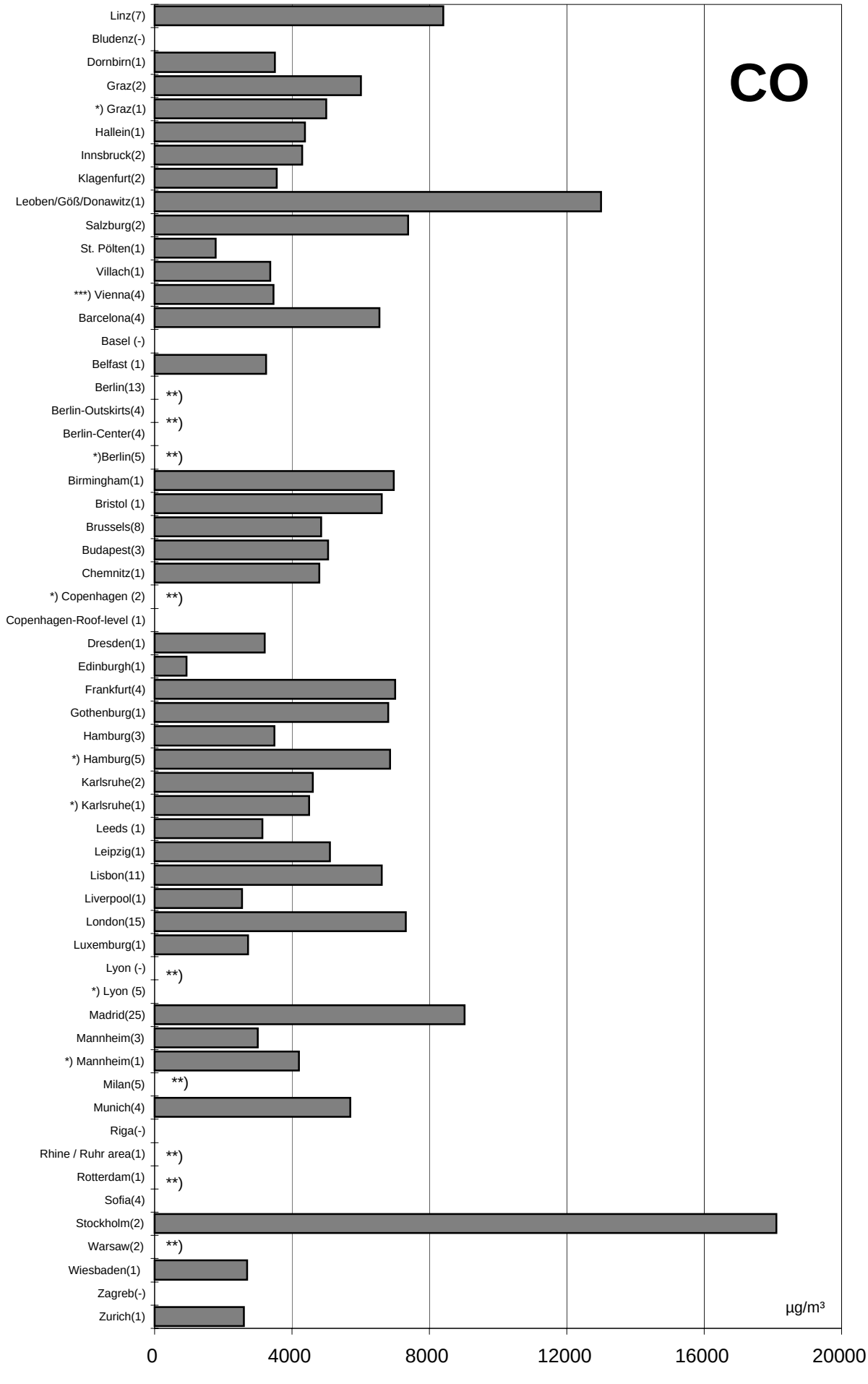


*) traffic-influenced monitoring stations
**)no data
***)max. 99,9-Percentile

Comparison of The Air Quality in 2003

max. 3h mean values (max. stressed monitoring station)

(in parentheses: number of monitoring stations)



*) traffic-influenced monitoring stations

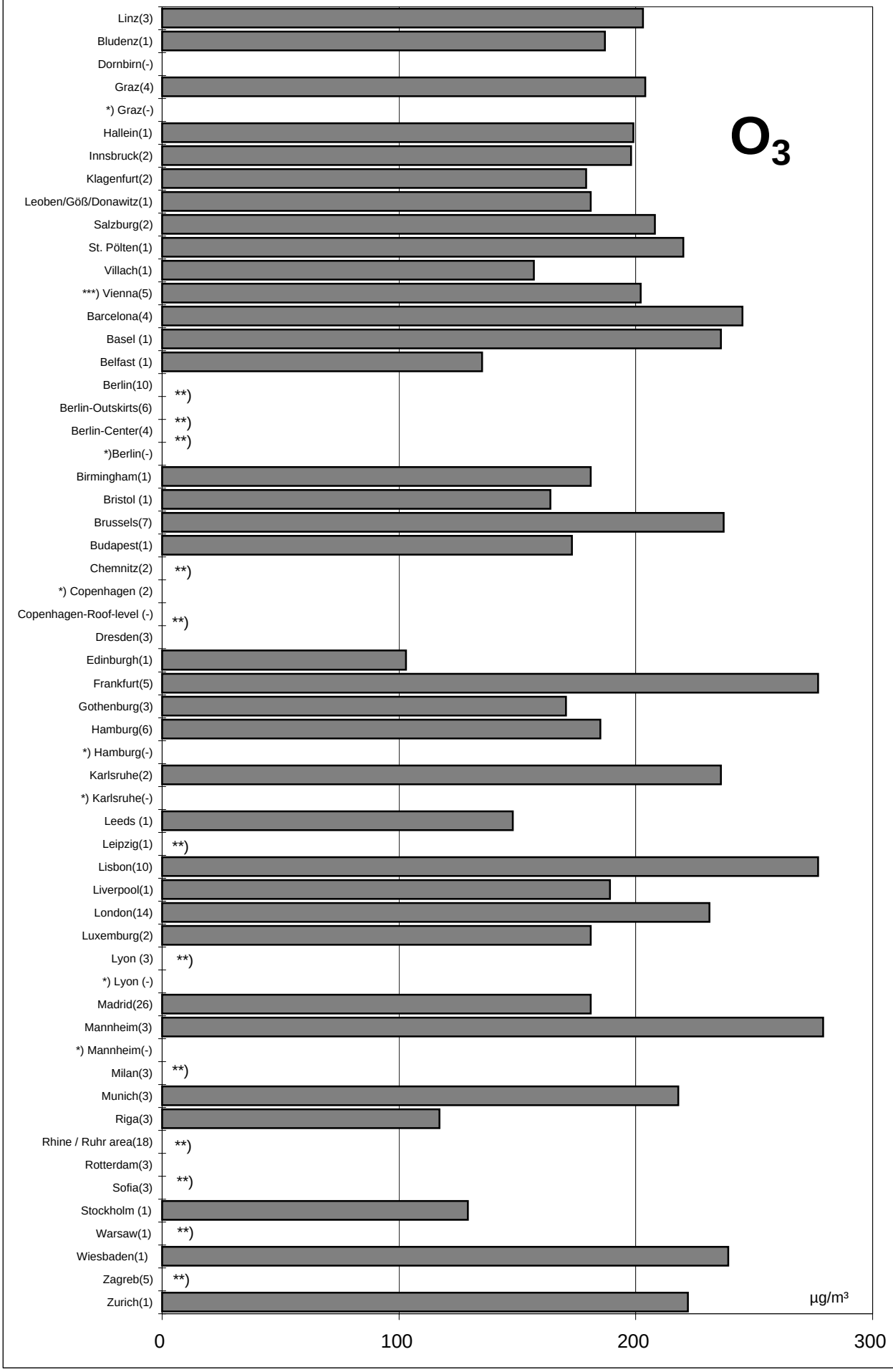
**)no data

***)max. 99,9-Percentile

Comparison of The Air Quality in 2003

max. 3h mean values (max. stressed monitoring station)

(in parentheses: number of monitoring stations)



*) traffic-influenced monitoring stations
**)no data
***)max. 99,9-Percentile

Luftgütevergleich

2003

max. 1h-Mittelwert

Comparison of The Air Quality

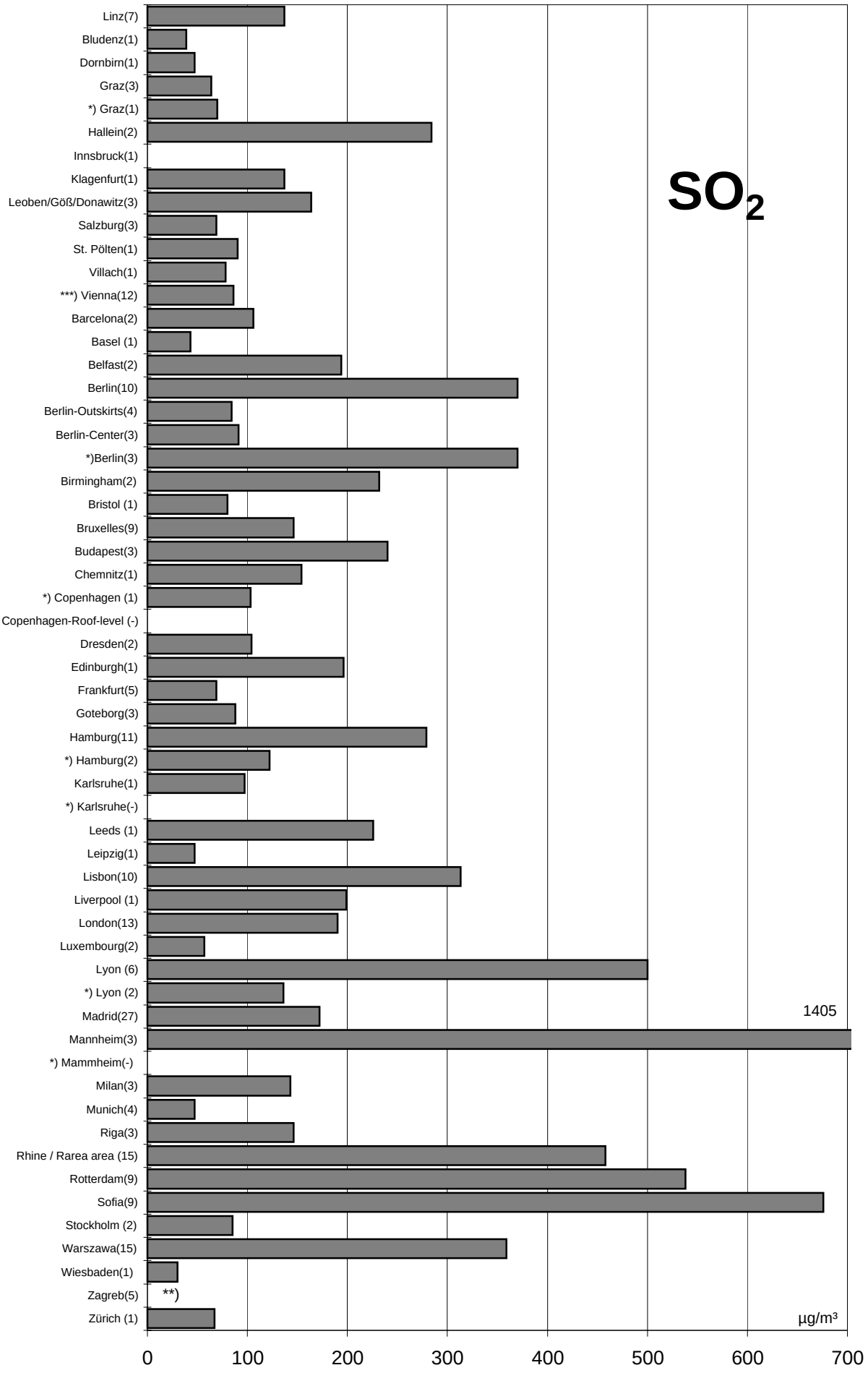
2003

Max. 1h- Mean Values

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)

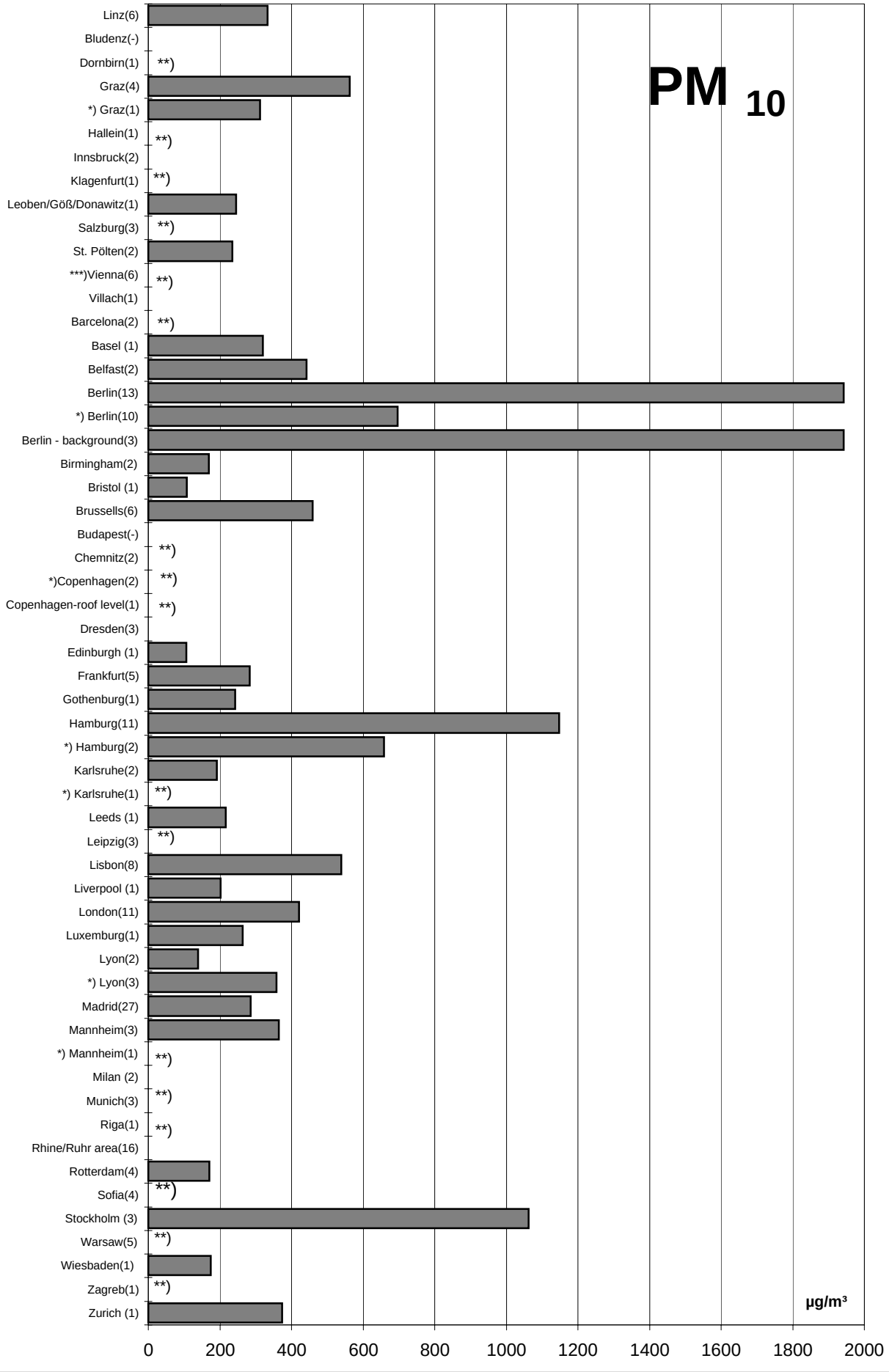


*) traffic-influenced monitoring stations
**)no data
***)max. 99,9-Percentile

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)

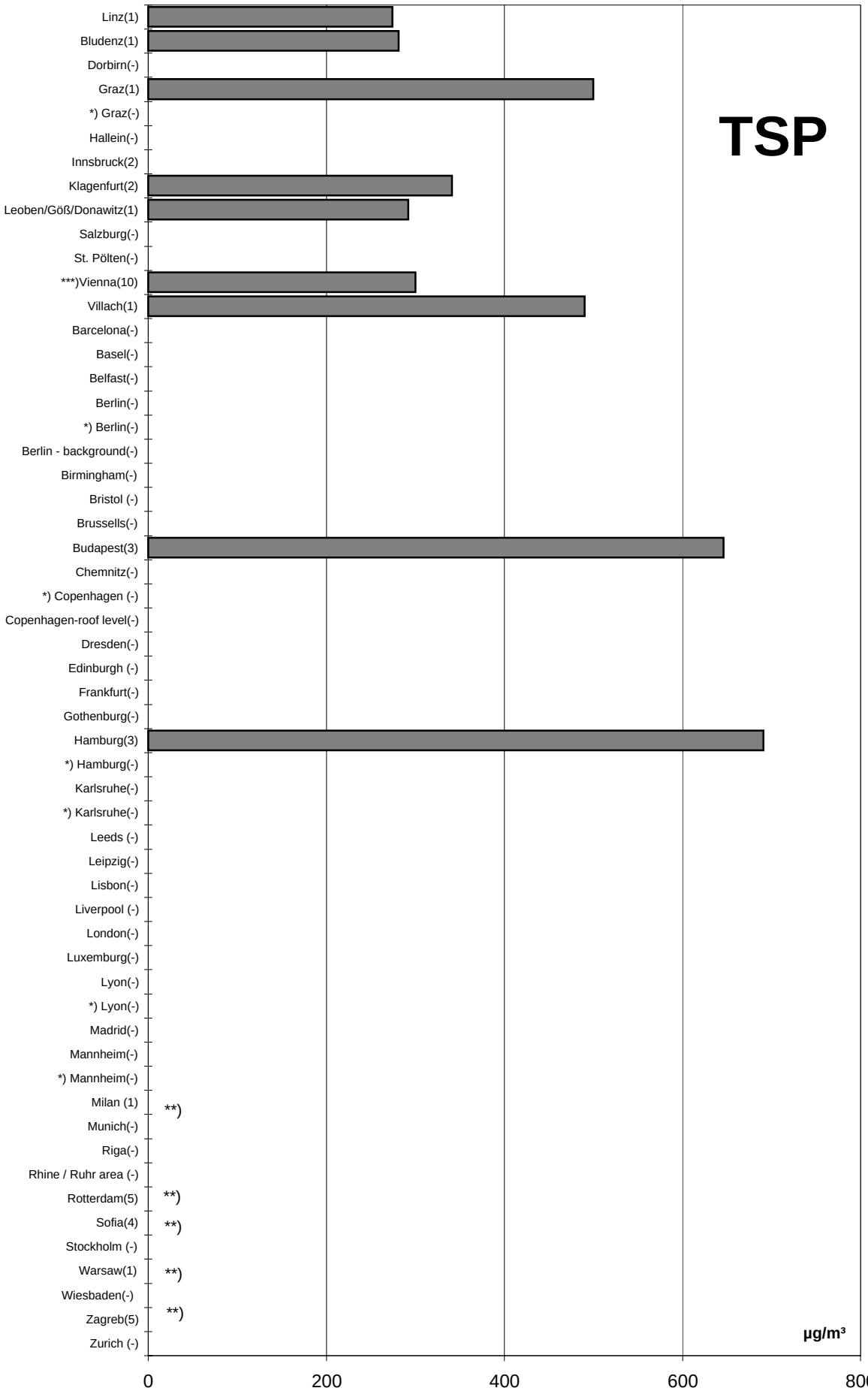


*)traffic-ininfluenced monitoring station
**)no data
***) max. 99,9 Percentile

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)

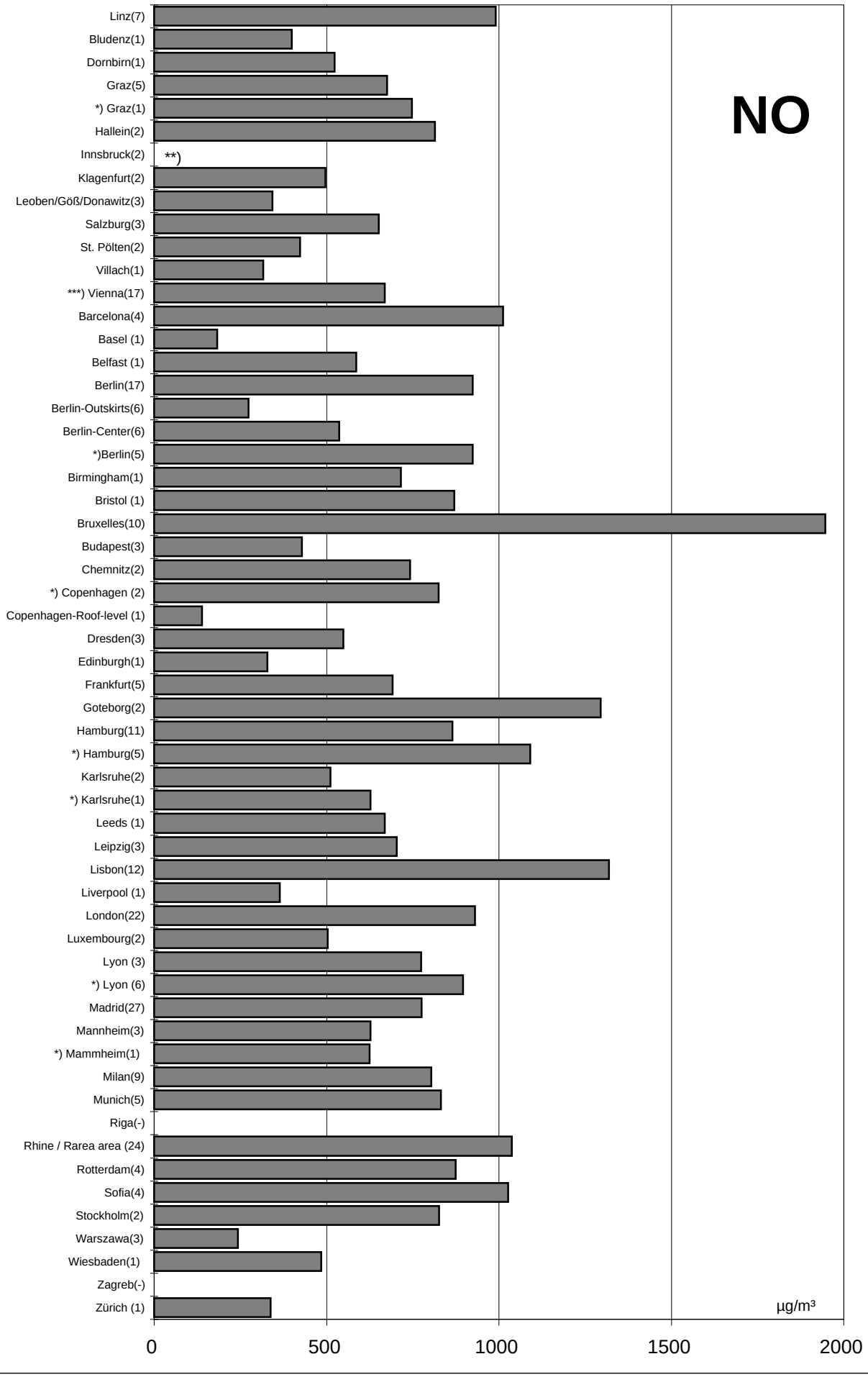


*)traffic-ininfluenced monitoring station
**)no data
***) max. 99,9 Percentile

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)

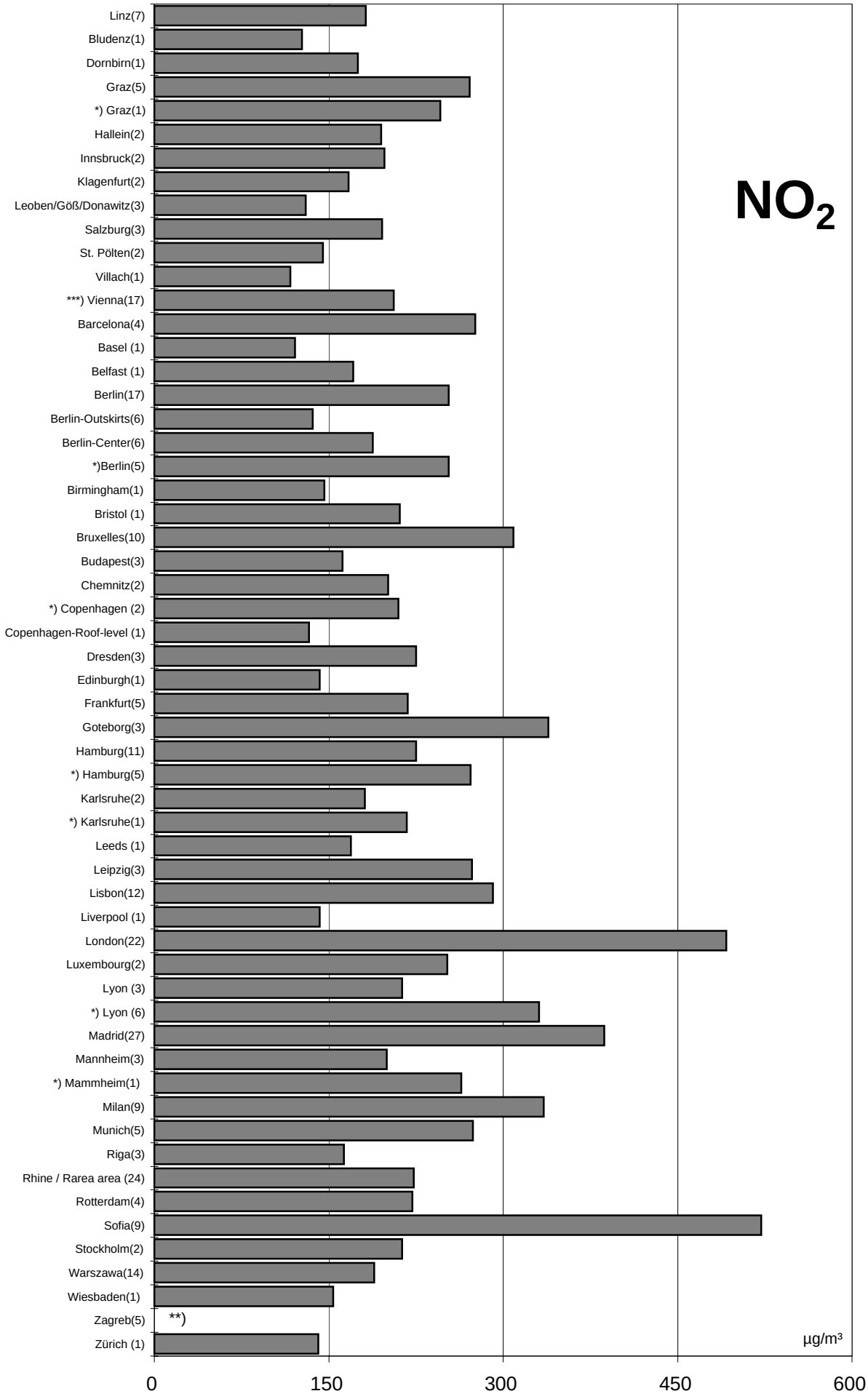


*) traffic-influenced monitoring stations
**)no data
***)max. 99,9-Percentile

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)

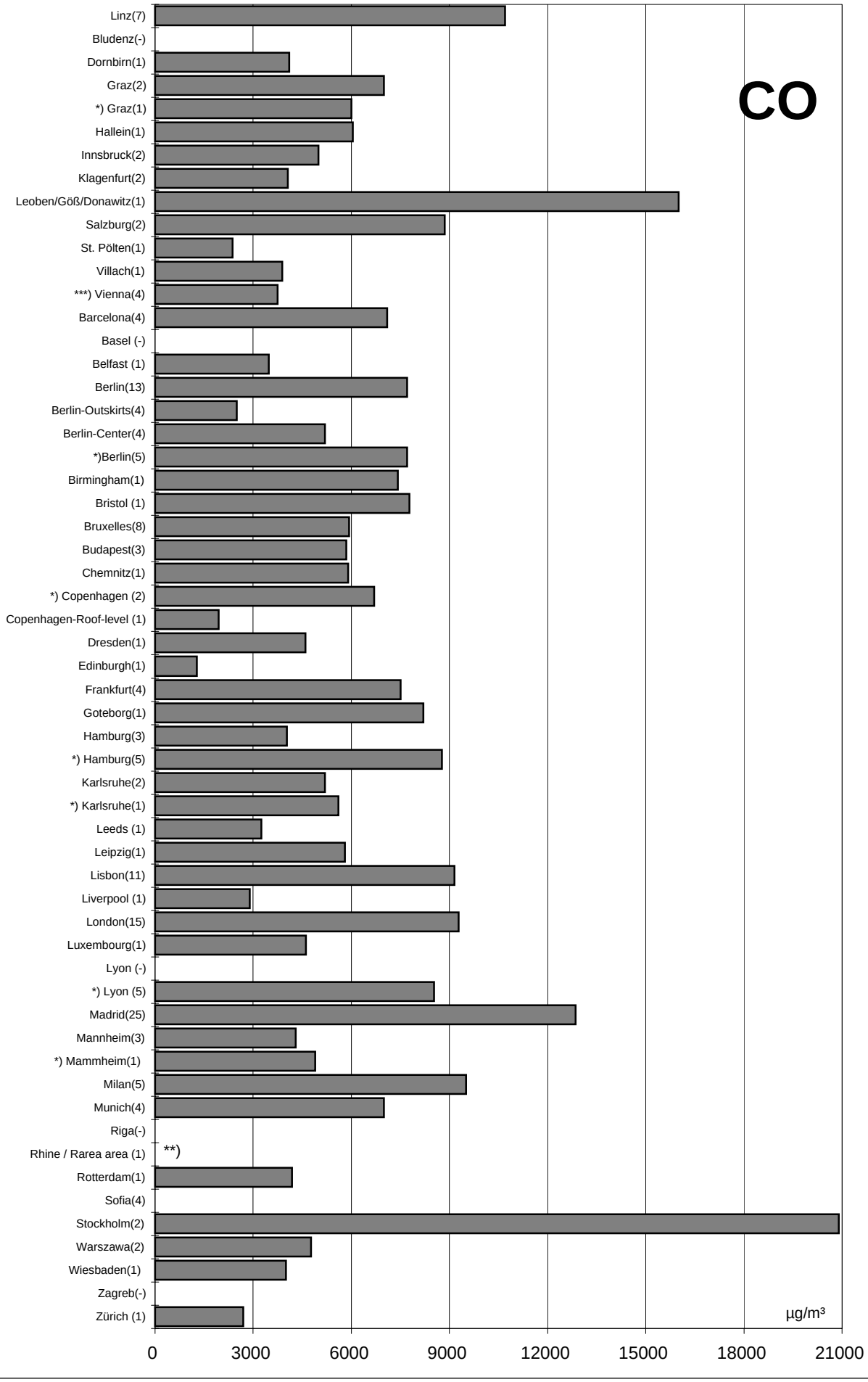


*) traffic-influenced monitoring stations
**)no data
***)max. 99,9-Percentile

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)

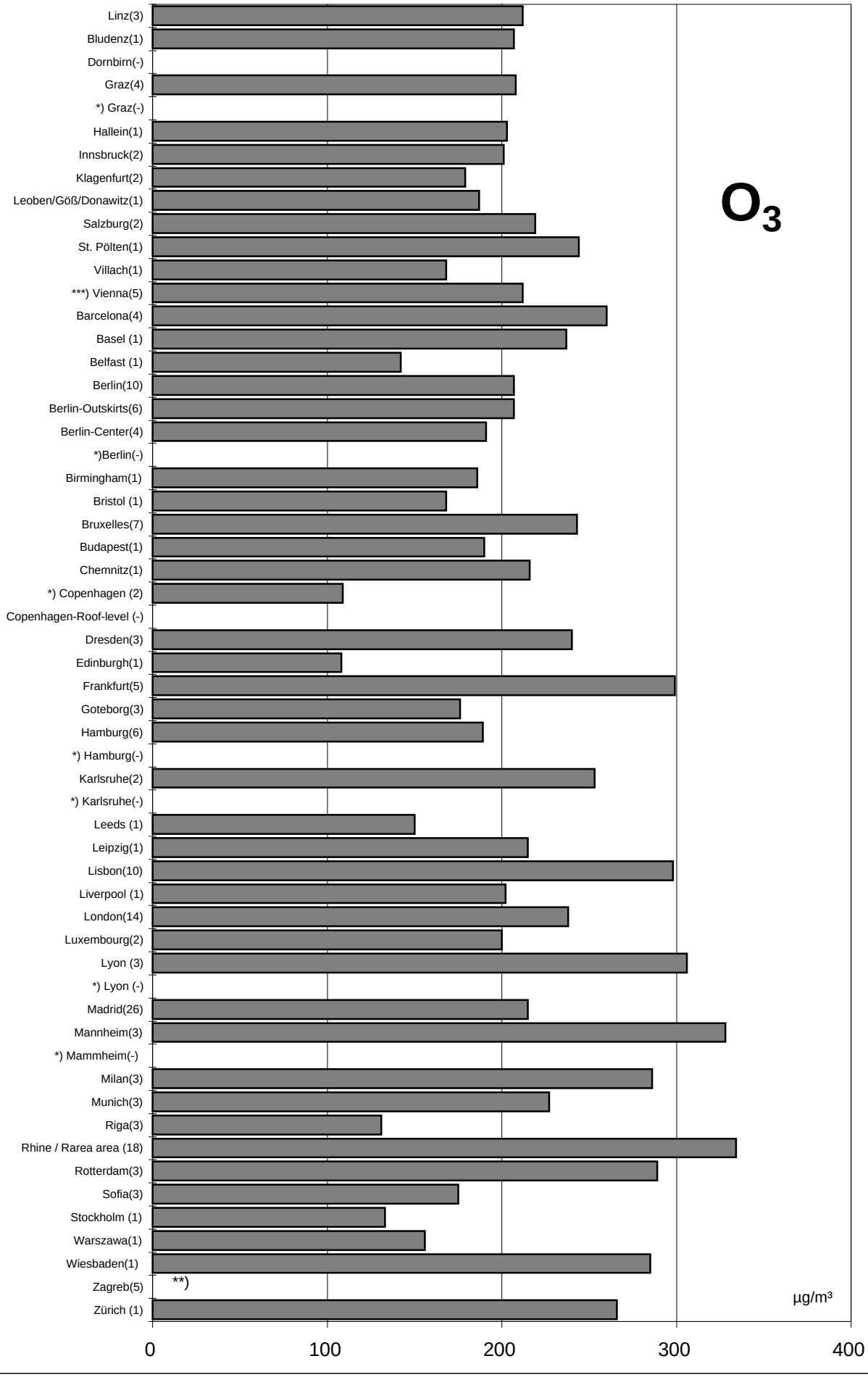


*) traffic-influenced monitoring stations
**)no data
***)max. 99,9-Percentile

Comparison of The Air Quality in 2003

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

(in parentheses: number of monitoring stations)



*) traffic-influenced monitoring stations
**)no data
***)max. 99,9-Percentile

Luftgütevergleich

2003

max. Halbstunden-Mittelwert

Comparison of The Air Quality

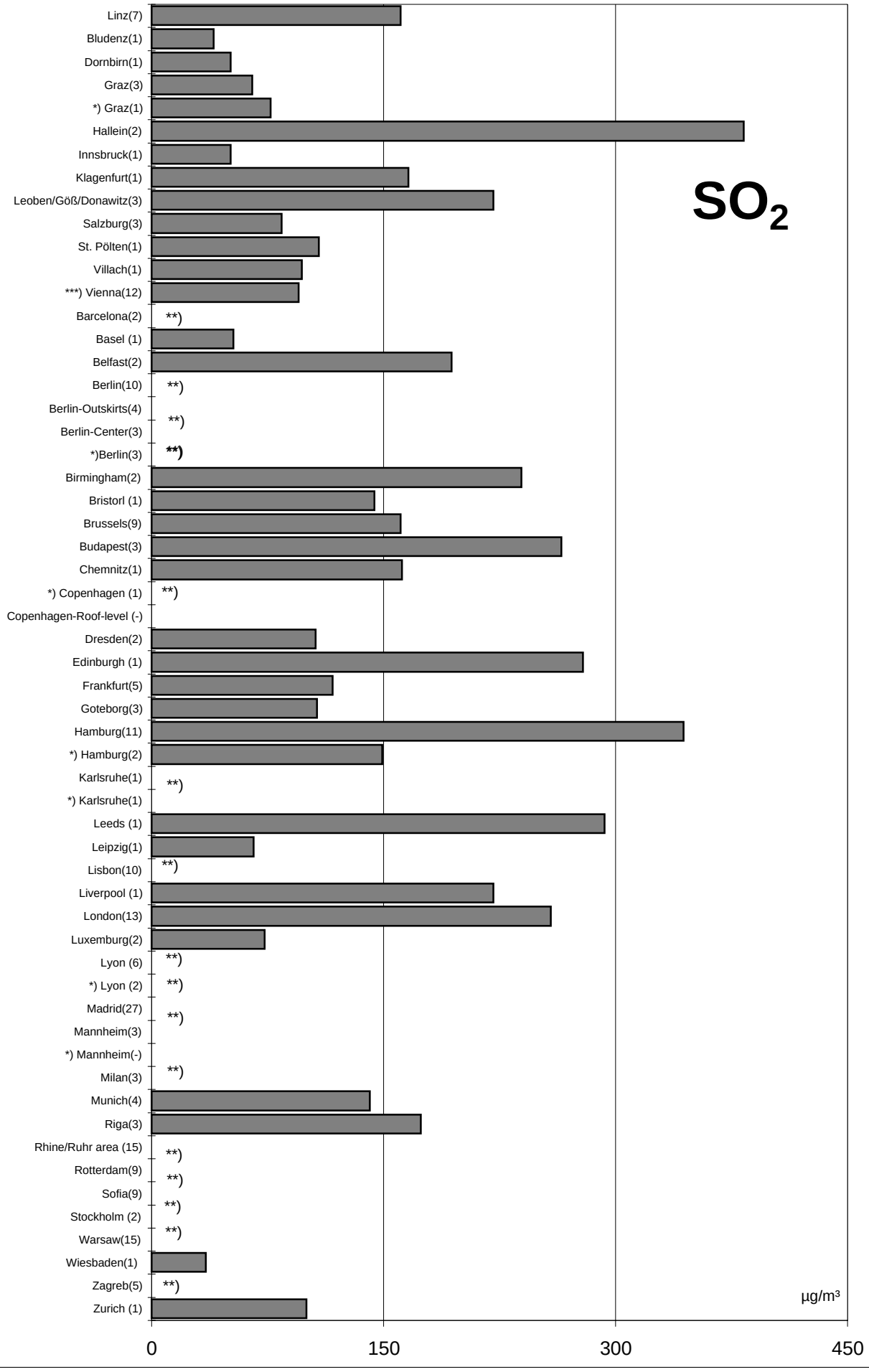
2003

Max. 1/2h- Mean Values

Comparison of The Air Quality in 2003

max. 1/2-h mean values (max. stressed monitoring station)

(in parentheses: number of monitoring stations)

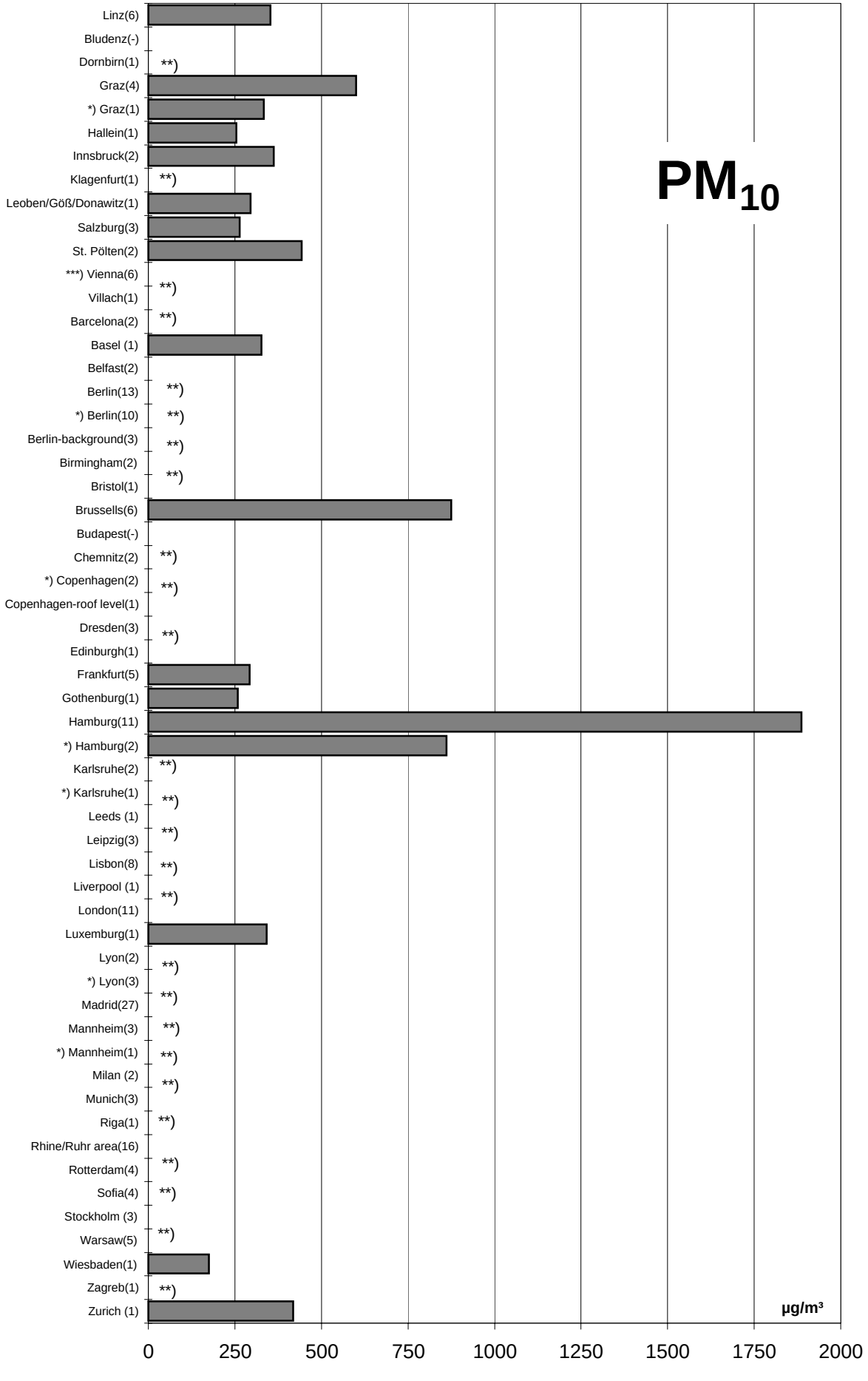


*) traffic-influenced monitoring stations
**)no data
***)max. 99,9-Percentile

Comparison of The Air Quality 2003

max. 1/2-h mean values (max. stressed monitoring station)

(in parentheses: number of monitoring stations)

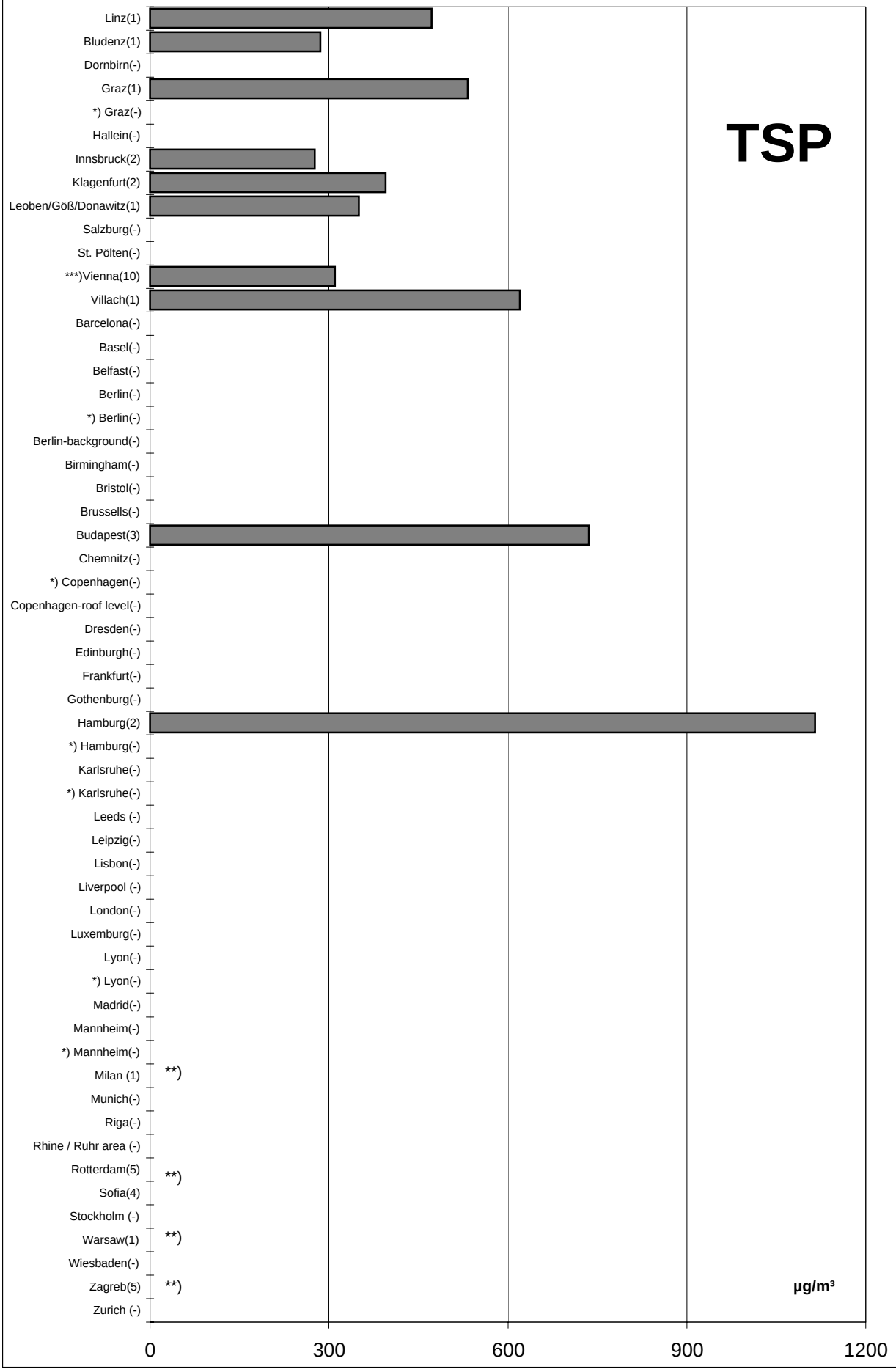


*) traffic-influenced monitoring stations
**)no data
***)max. 99,9-Percentile

Comparison of The Air Quality in 2003

max. 1/2-h mean values (max. stressed monitoring station)

(in parentheses: number of monitoring stations)

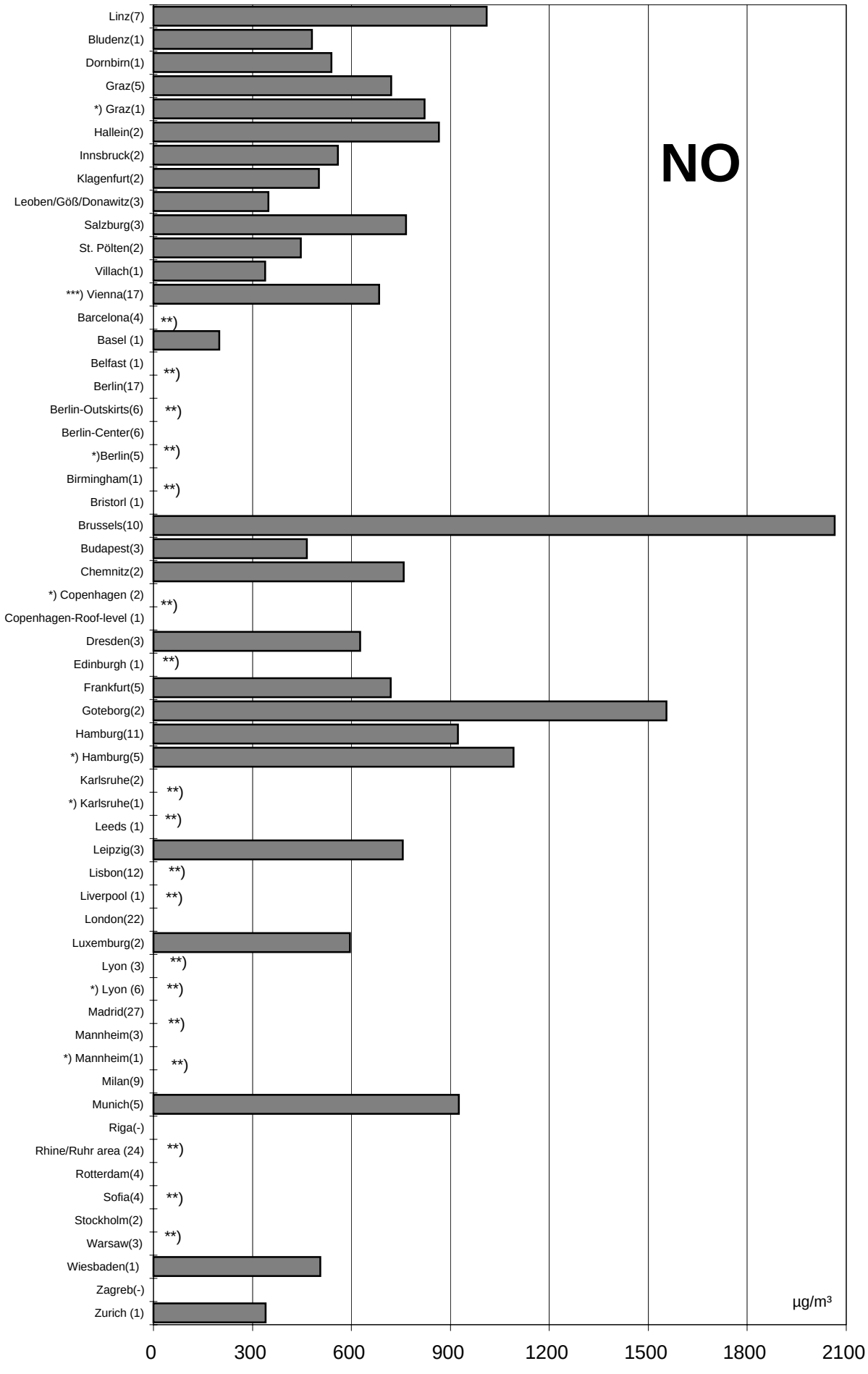


*) traffic-influenced monitoring stations
**)no data
***)max. 99,9-Percentile

Comparison of The Air Quality in 2003

max. 1/2-h mean values (max. stressed monitoring station)

(in parentheses: number of monitoring stations)

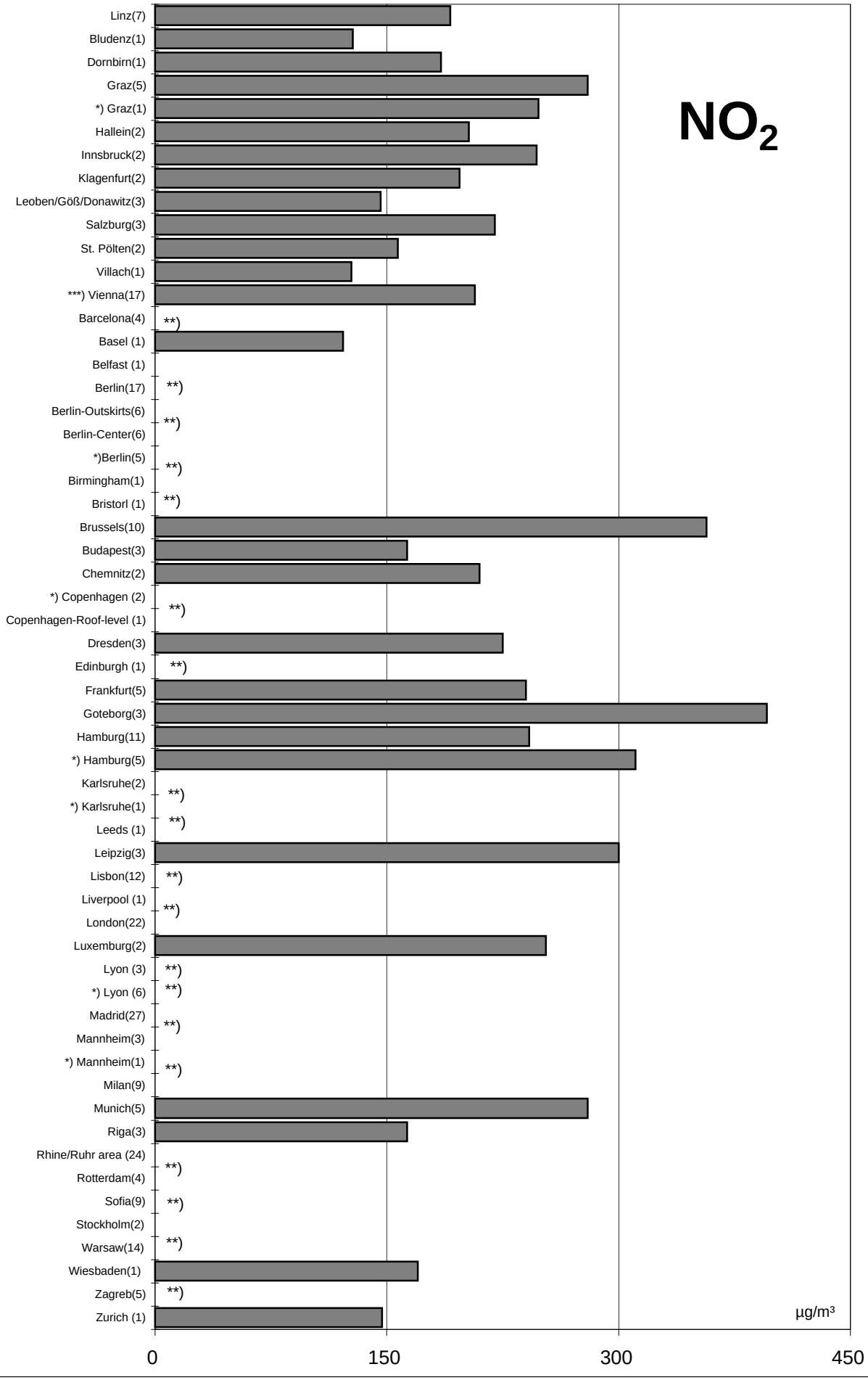


*) traffic-influenced monitoring stations
**)no data
***)max. 99,9-Percentile

Comparison of The Air Quality in 2003

max. 1/2-h mean values (max. stressed monitoring station)

(in parentheses: number of monitoring stations)

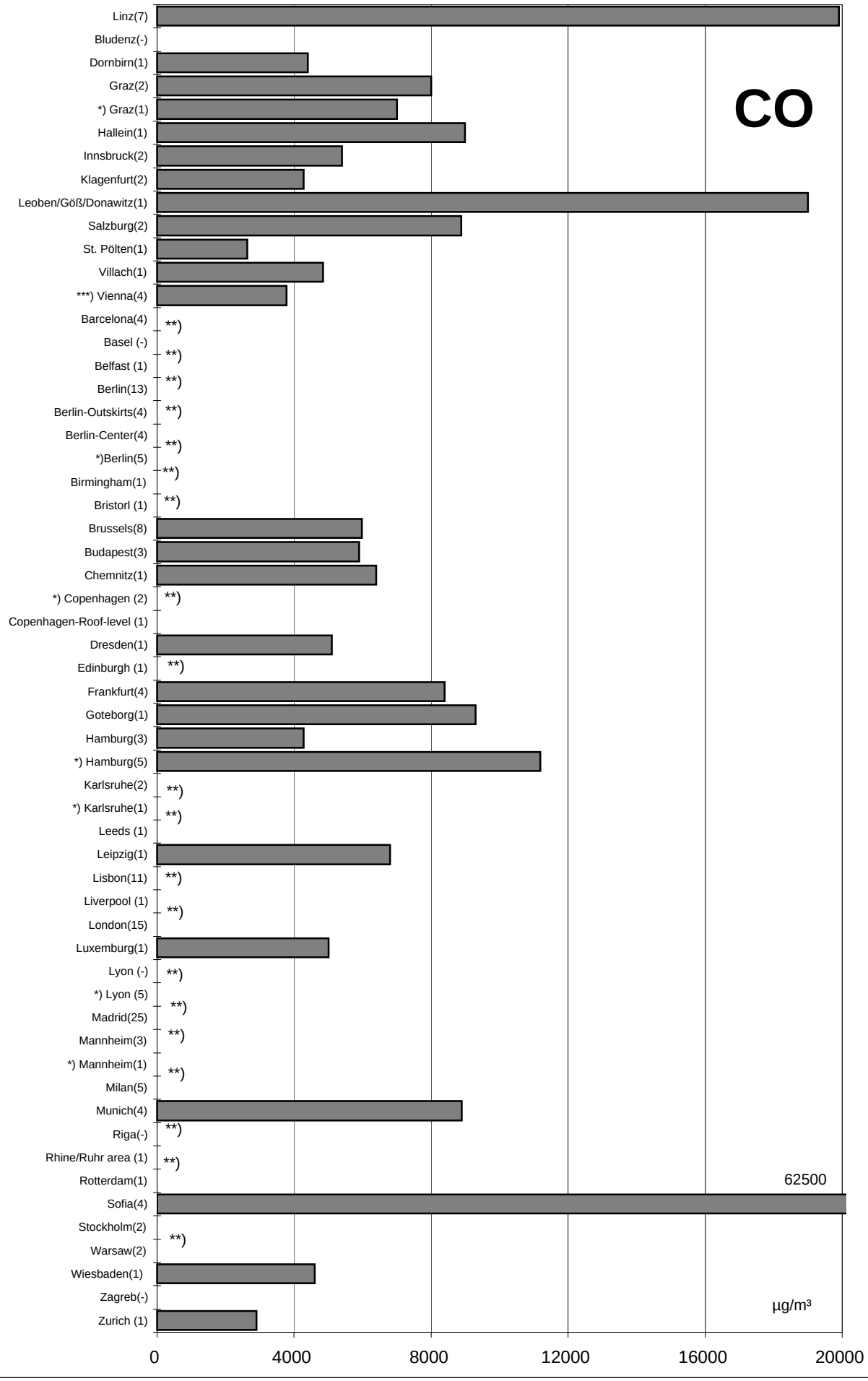


*) traffic-influenced monitoring stations
**)no data
***)max. 99,9-Percentile

Comparison of The Air Quality in 2003

max. 1/2-h mean values (max. stressed monitoring station)

(in parentheses: number of monitoring stations)

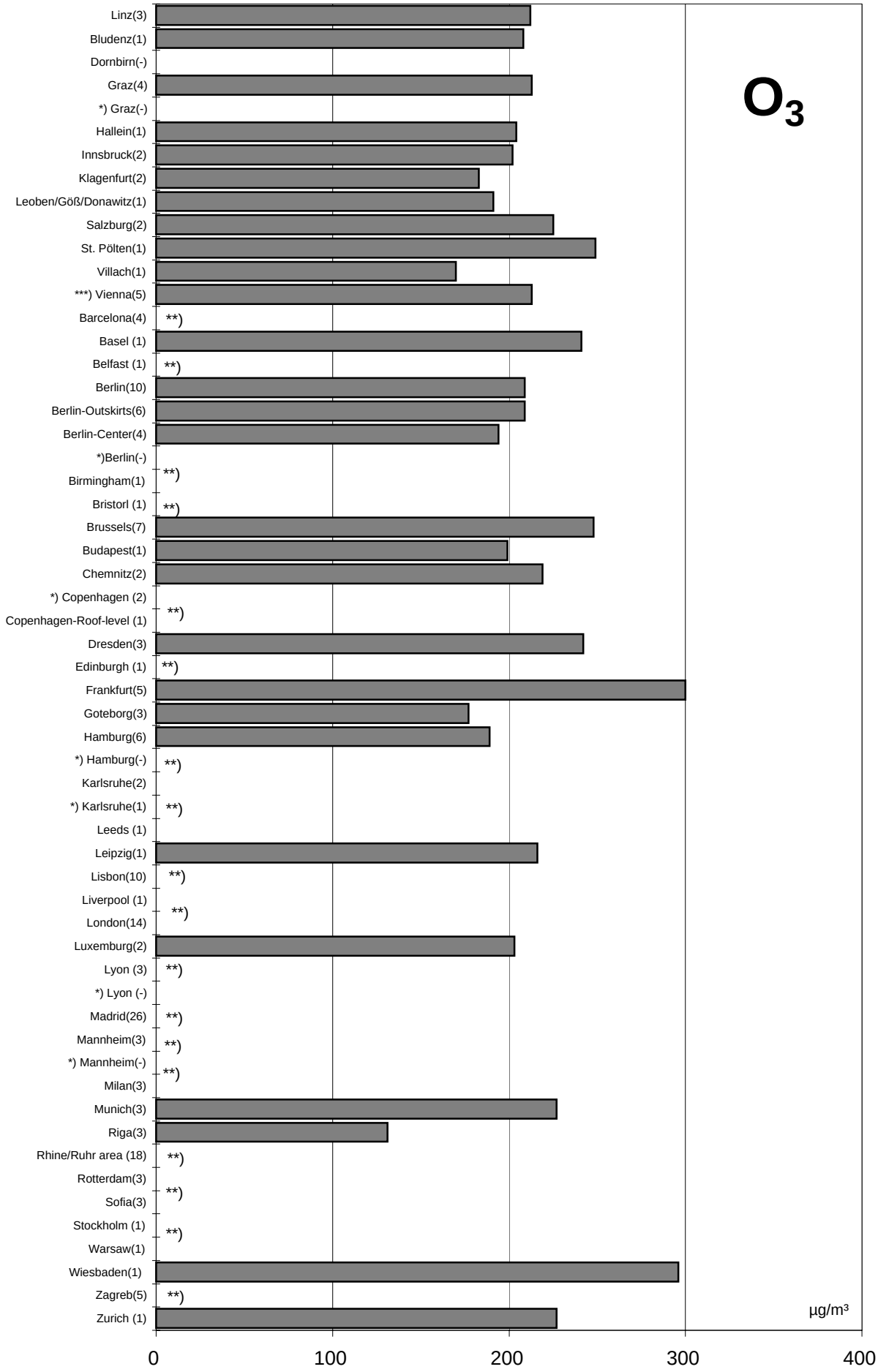


*) traffic-influenced monitoring stations
**)no data
***)max. 99,9-Percentile

Comparison of The Air Quality in 2003

max. 1/2-h mean values (max. stressed monitoring station)

(in parentheses: number of monitoring stations)



*) traffic-influenced monitoring stations
**)no data
***)max. 99,9-Percentile

Luftgütevergleich

2003

max. 98-Percentil/Jahr

Comparison of The Air Quality

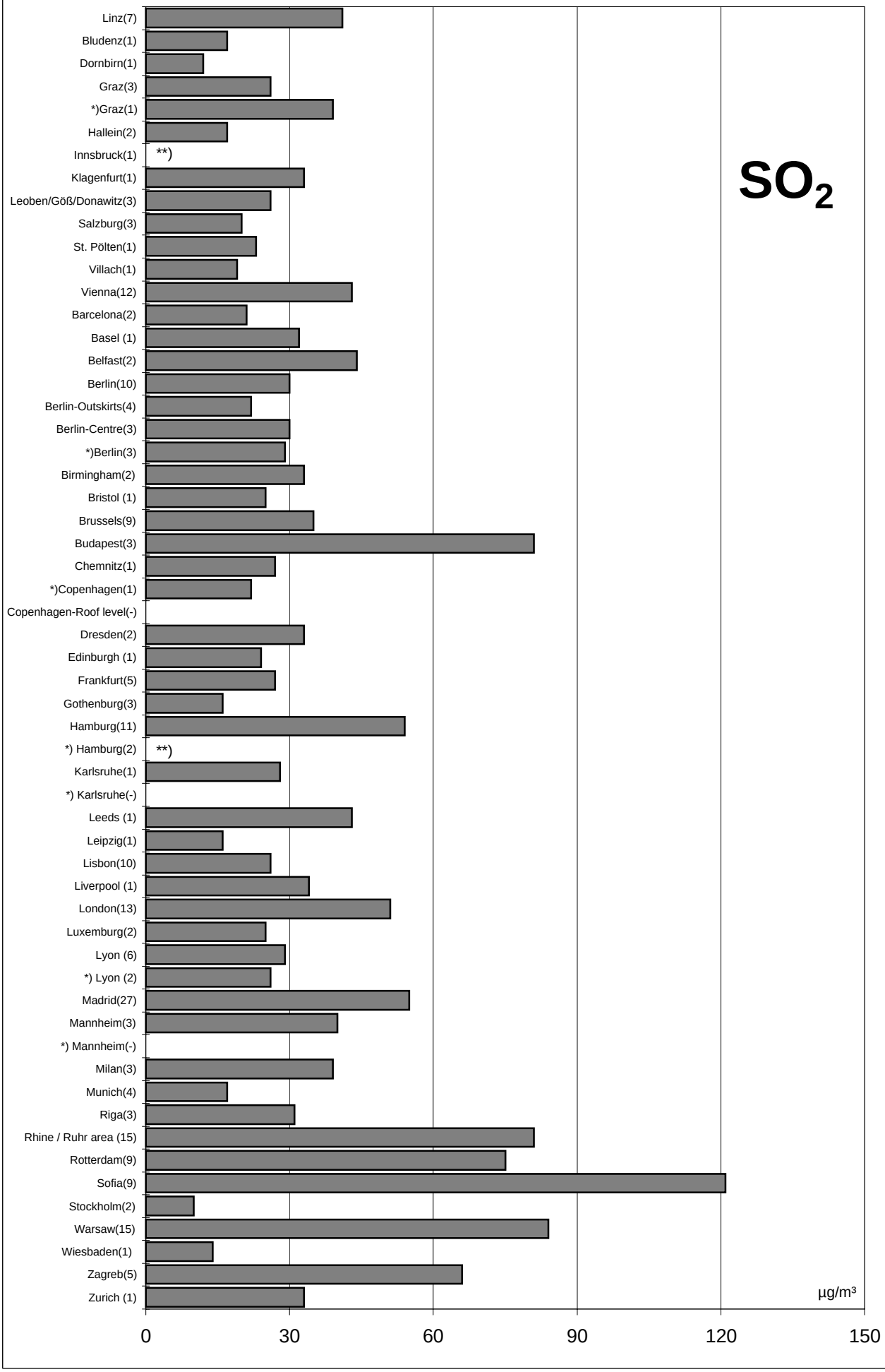
2003

Max. 98- Percentile per Year

Comparison of The Air Quality in 2003

max. 98-Percentile (max. stressed monitoring station)

(in parentheses: number of monitoring stations)

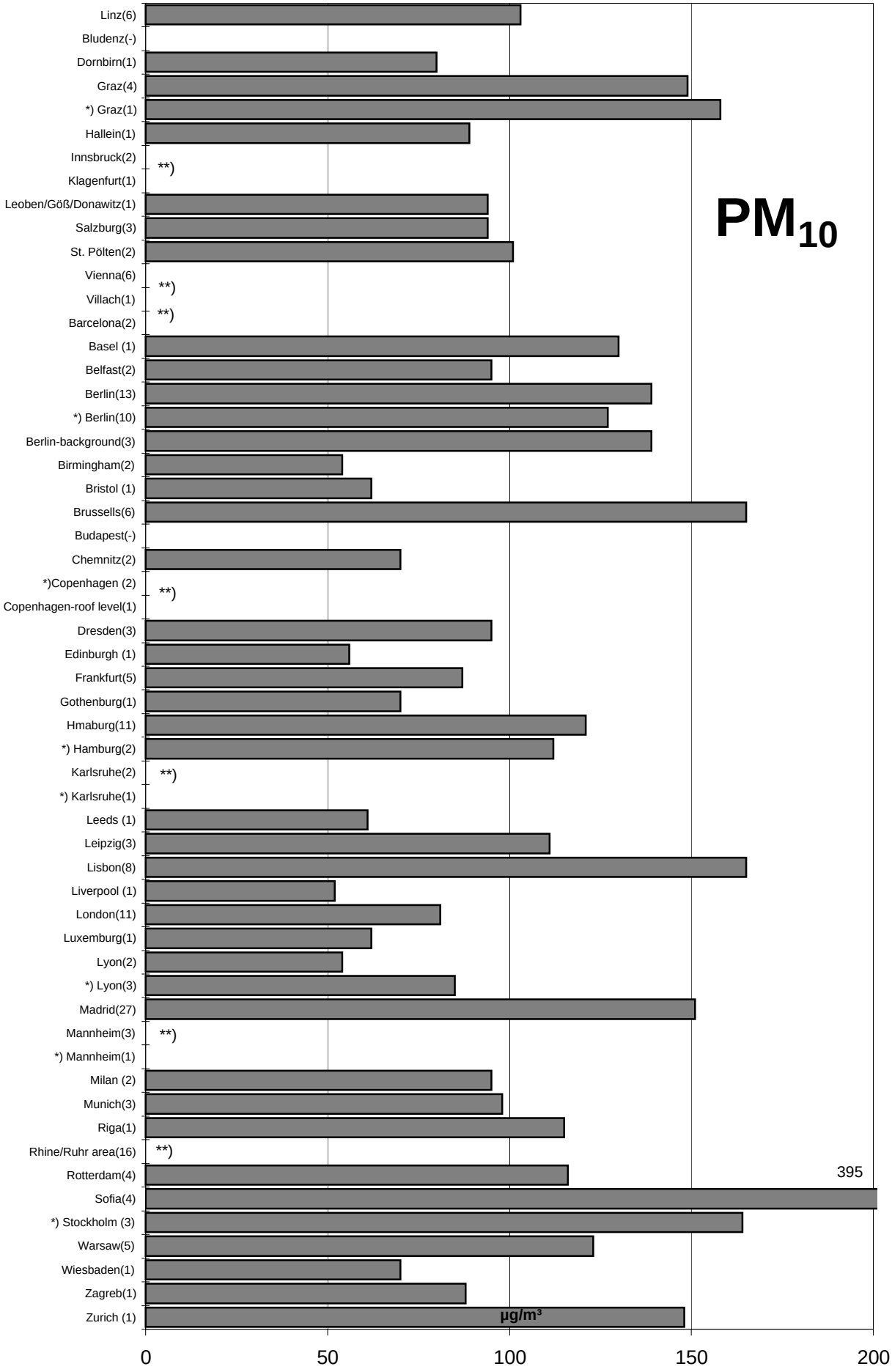


*) traffic-influenced monitoring stations
**)no data

Comparison of The Air Quality in 2003

max. 98-Percentile (max. stressed monitoring station)

(in parentheses: number of monitoring stations)

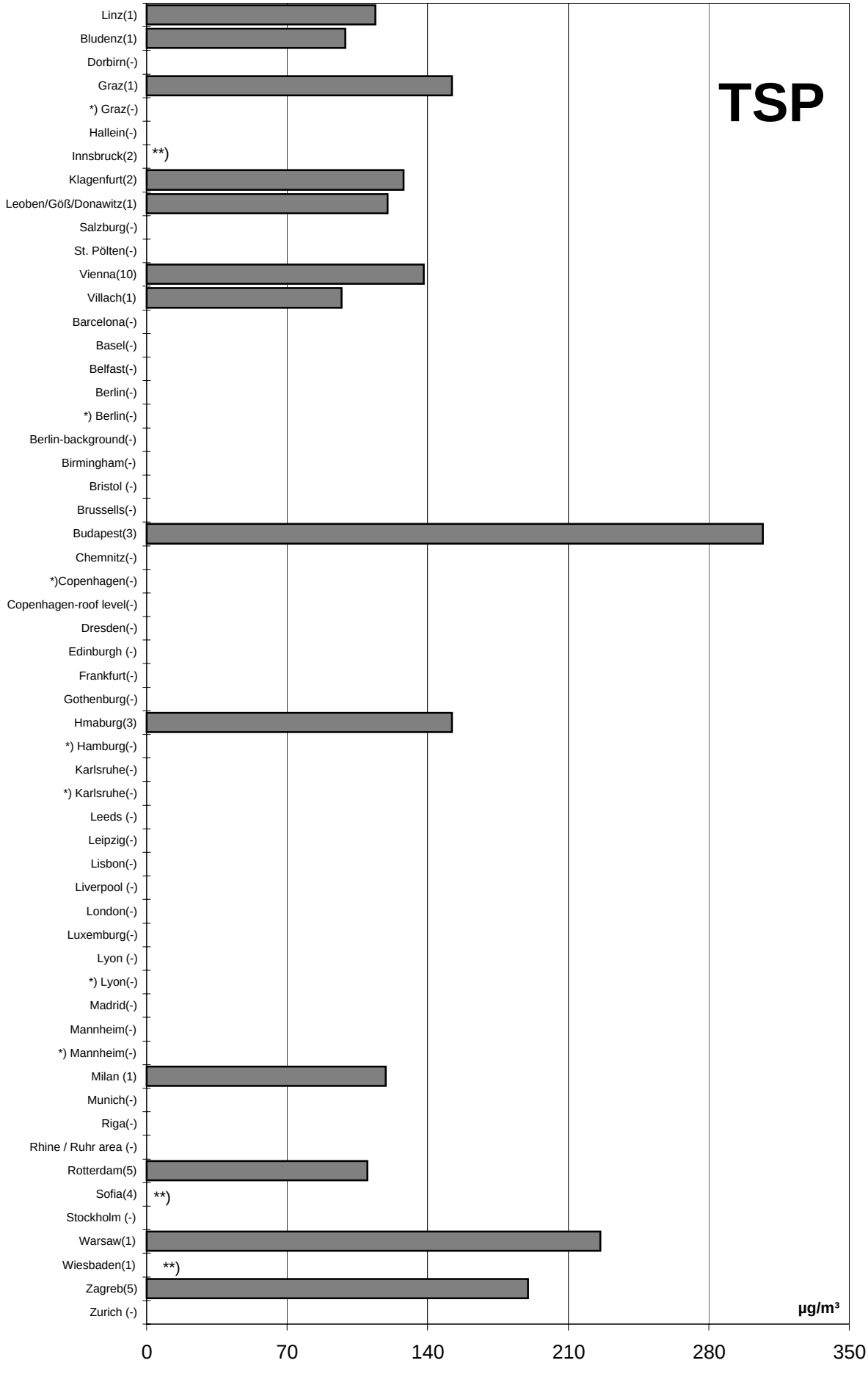


*) traffic-influenced monitoring stations
**)no data

Comparison of The Air Quality 2003

max. 98-Percentile (max. stressed monitoring station)

(in parentheses: number of monitoring stations)

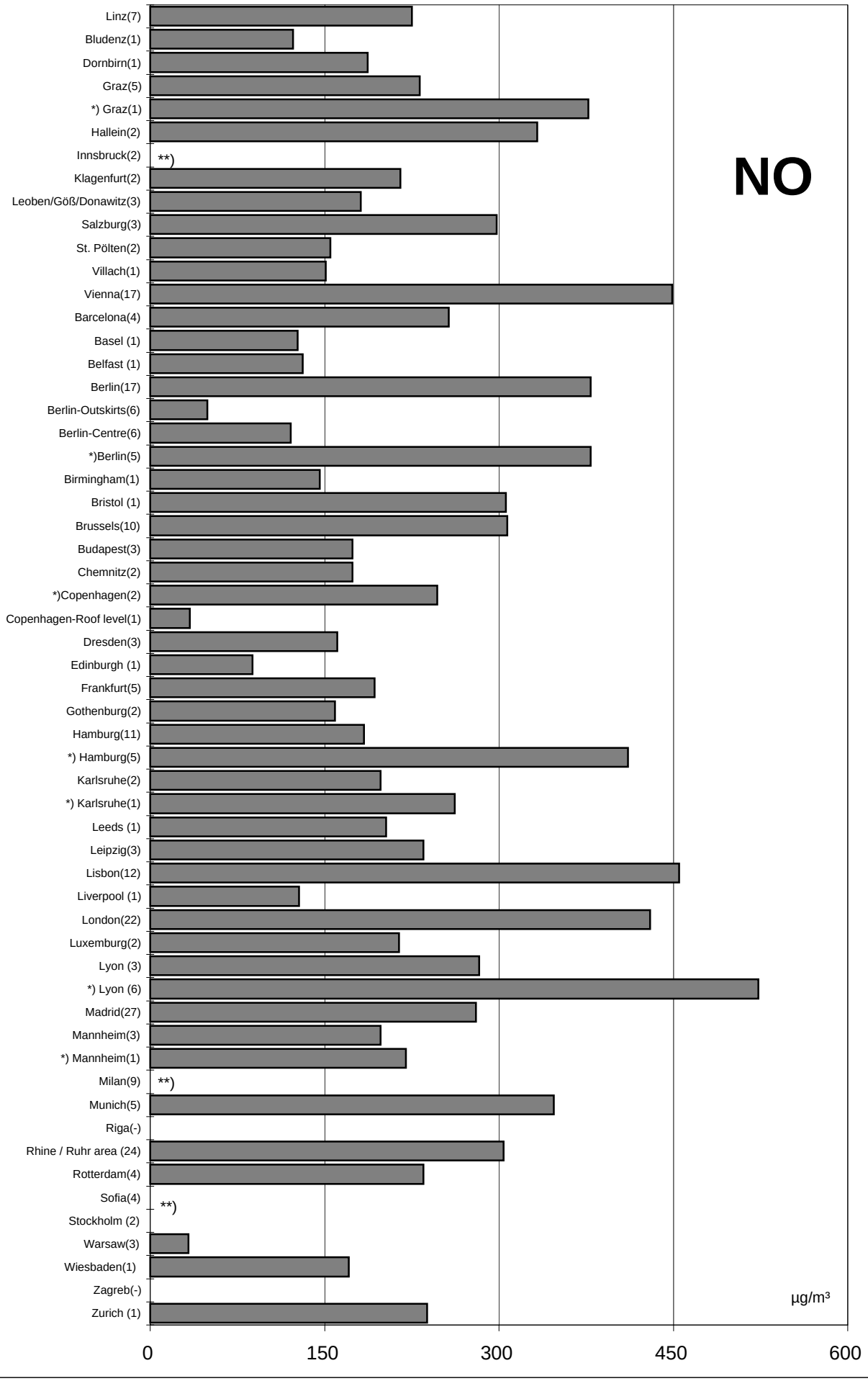


*) traffic-influenced monitoring stations
**)no data

Comparison of The Air Quality in 2003

max. 98-Percentile (max. stressed monitoring station)

(in parentheses: number of monitoring stations)

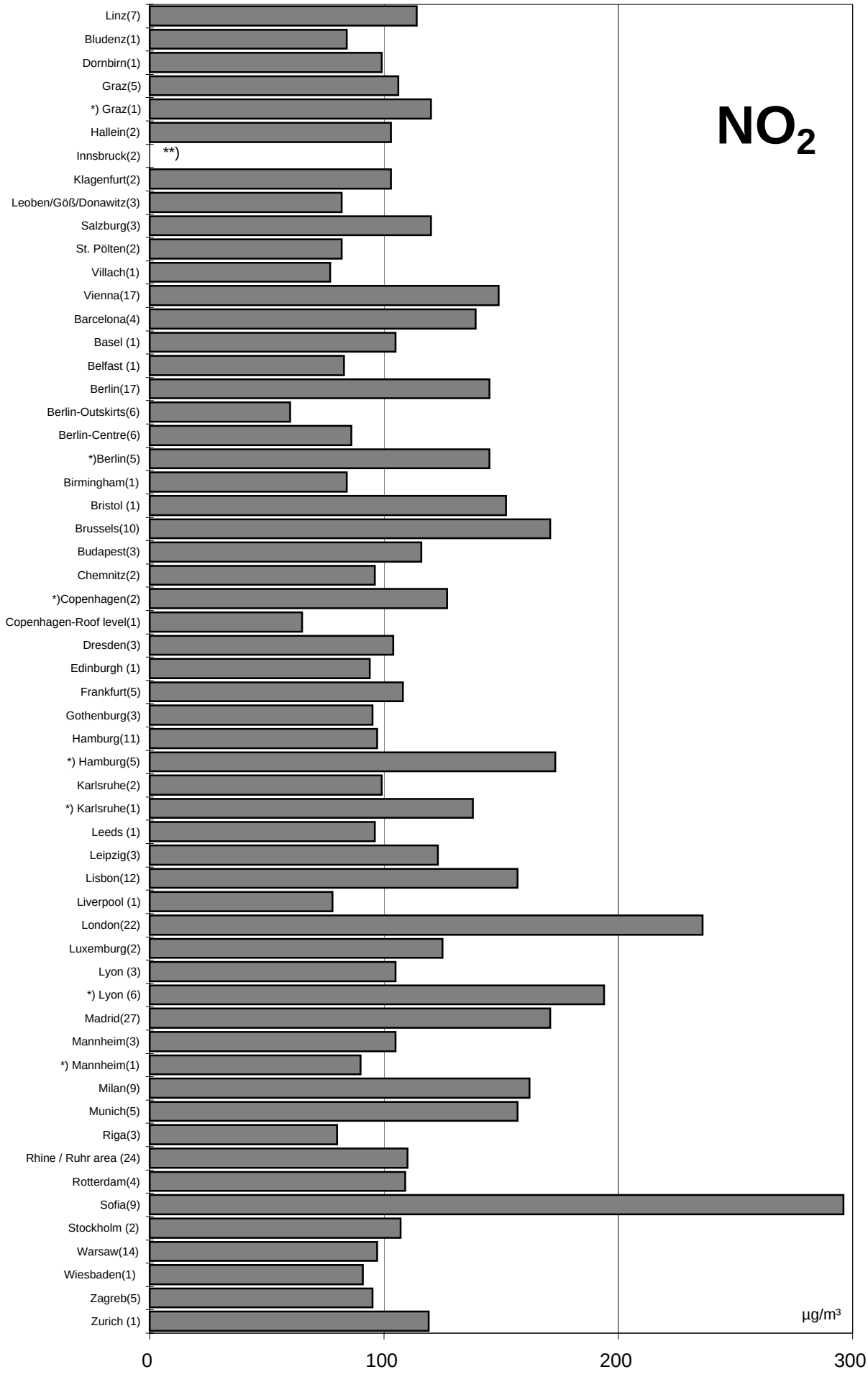


*) traffic-influenced monitoring stations
**)no data

Comparison of The Air Quality in 2003

max. 98-Percentile (max. stressed monitoring station)

(in parentheses: number of monitoring stations)



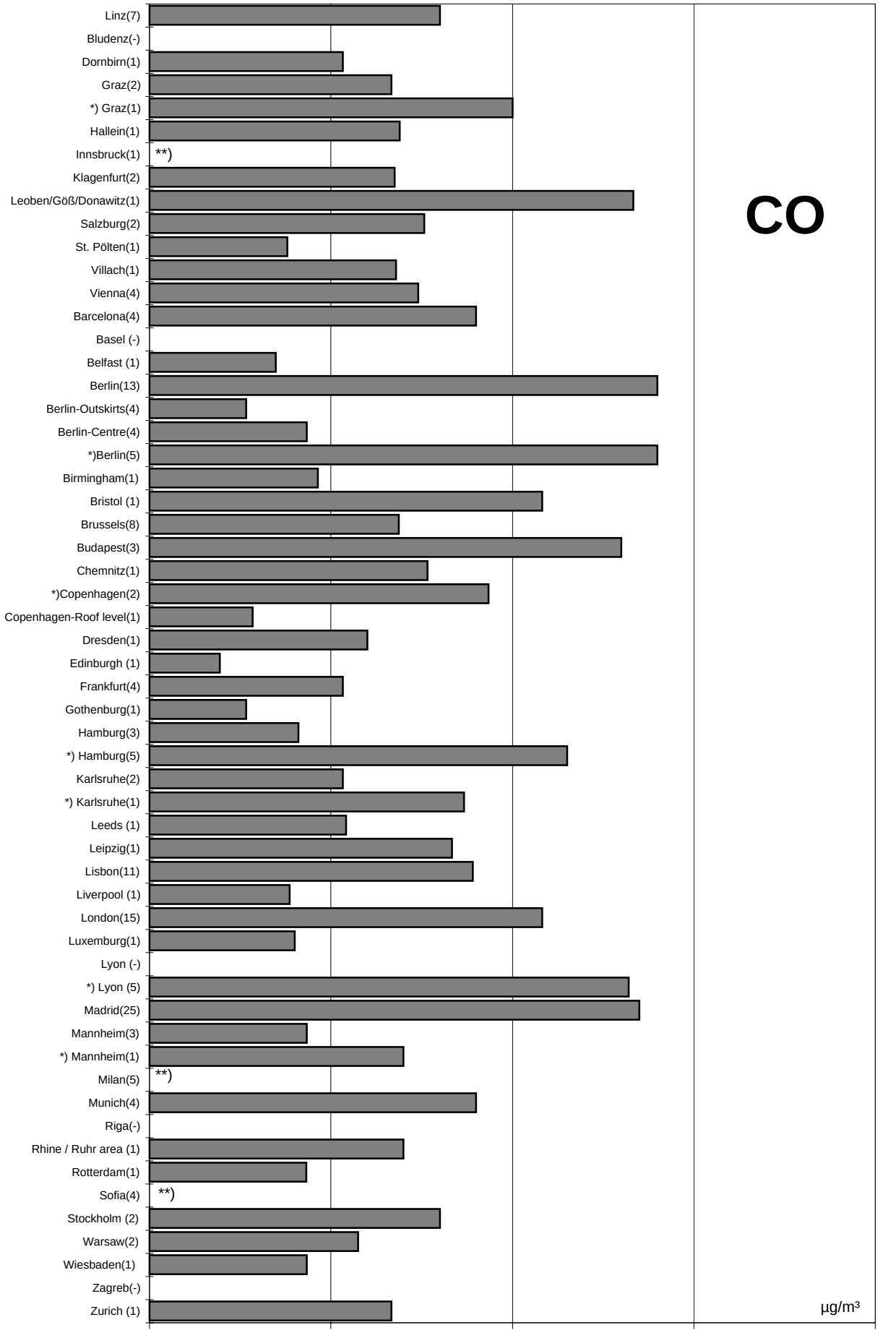
*) traffic-influenced monitoring stations

**)no data

Comparison of The Air Quality in 2003

max. 98-Percentile (max. stressed monitoring station)

(in parentheses: number of monitoring stations



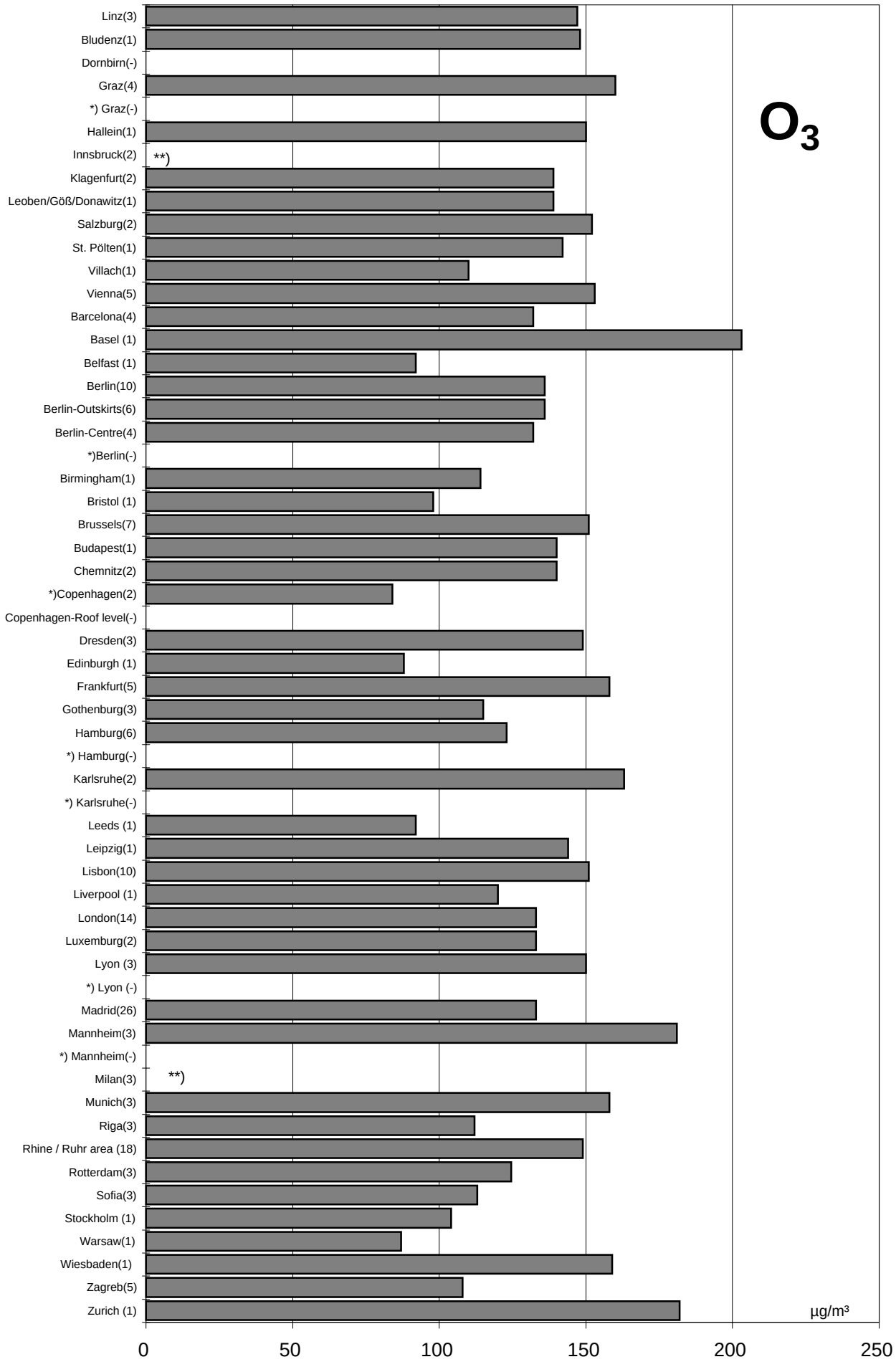
*) traffic-influenced monitoring stations

**)no data

Comparison of The Air Quality in 2003

max. 98-Percentile (max. stressed monitoring station)

(in parentheses: number of monitoring stations)



*) traffic-influenced monitoring stations
**)no data

Jahresvergleich

1992-2003

Jahresmittelwert

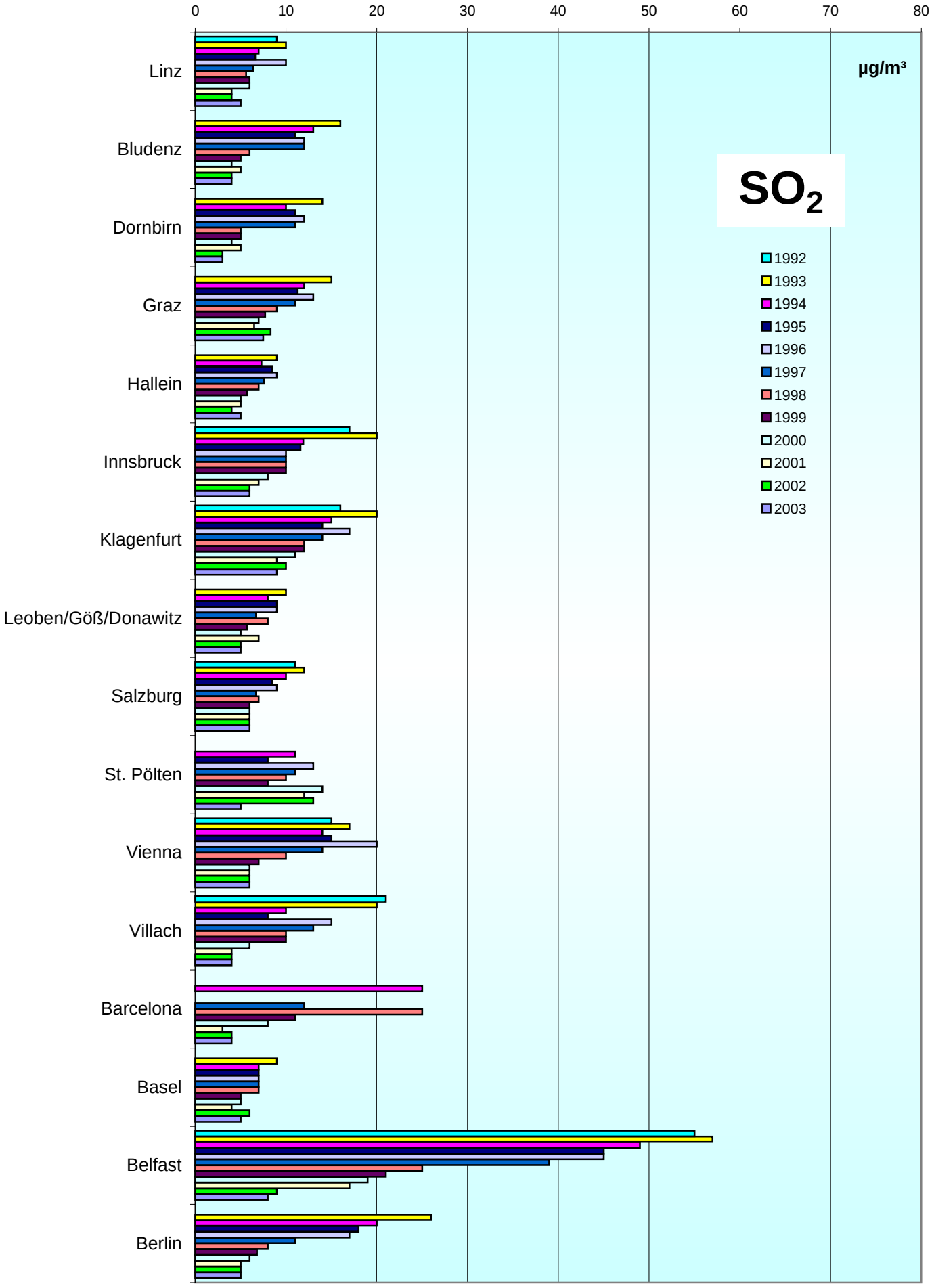
Comparison of The Air Quality Over The Years

1992-2003

Annual Mean Values

Comparison of The Air Quality 1992 - 2003

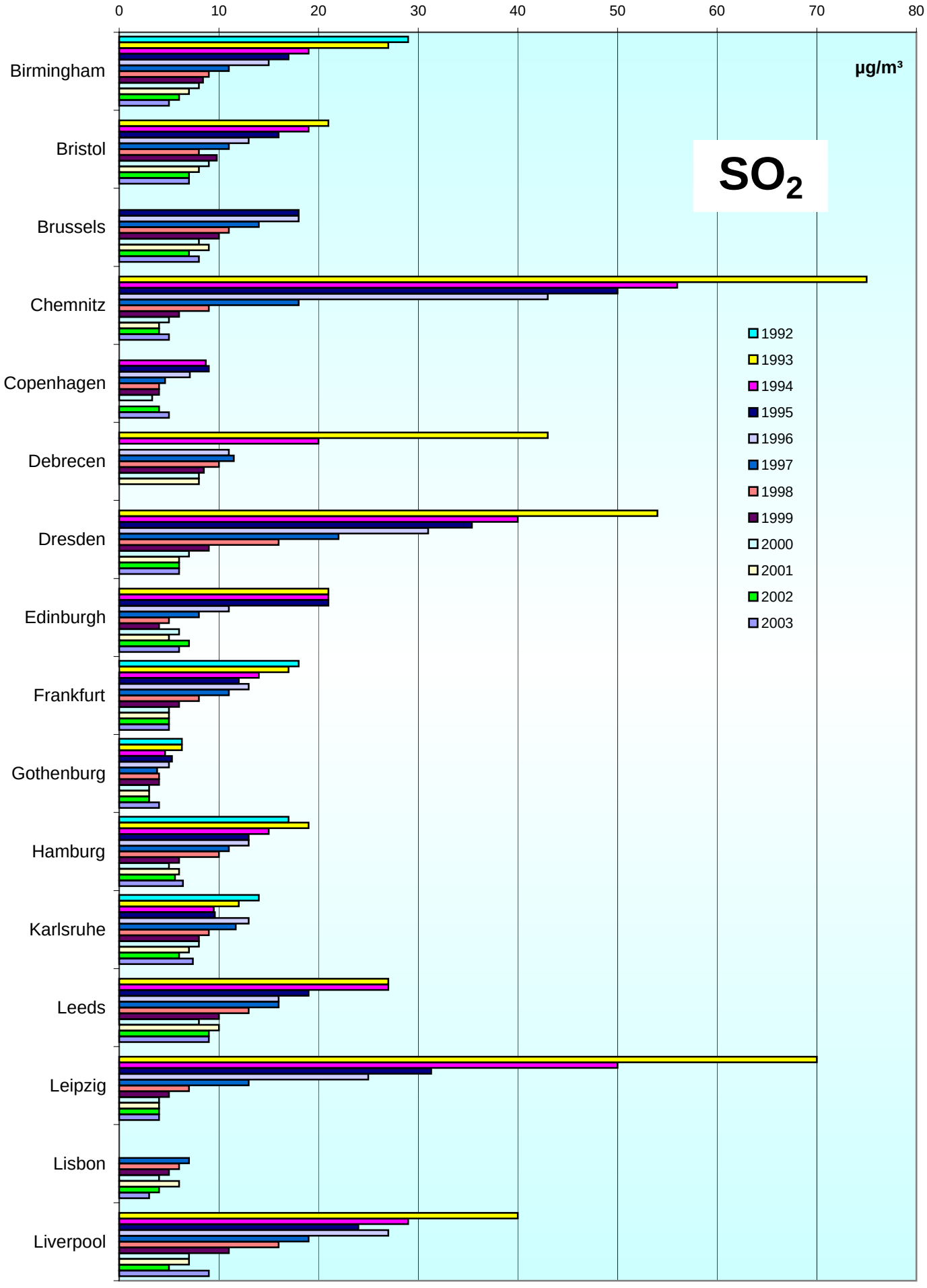
Annual mean values
(mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2003

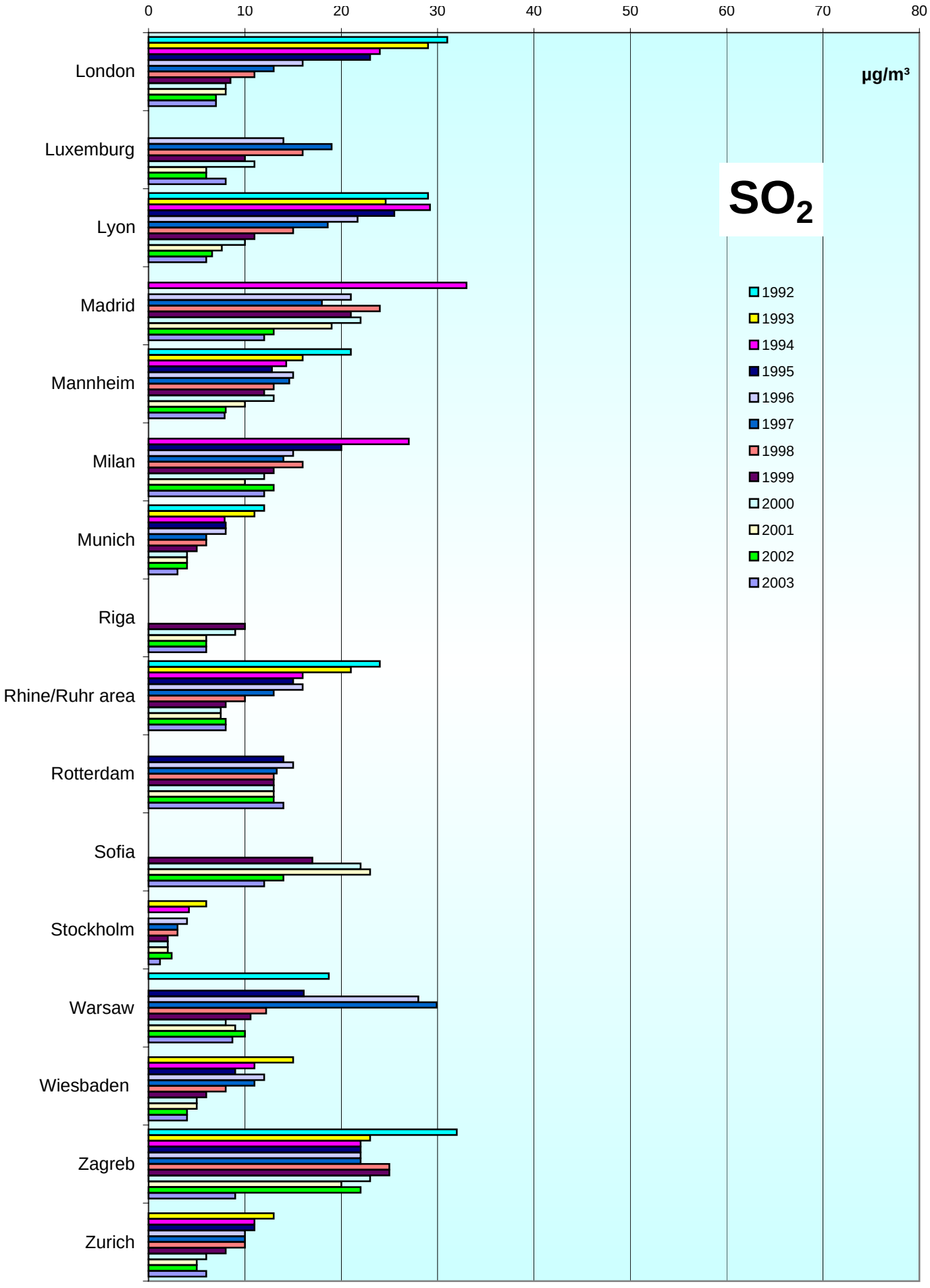
Annual mean values

(mean of all monitoring stations)



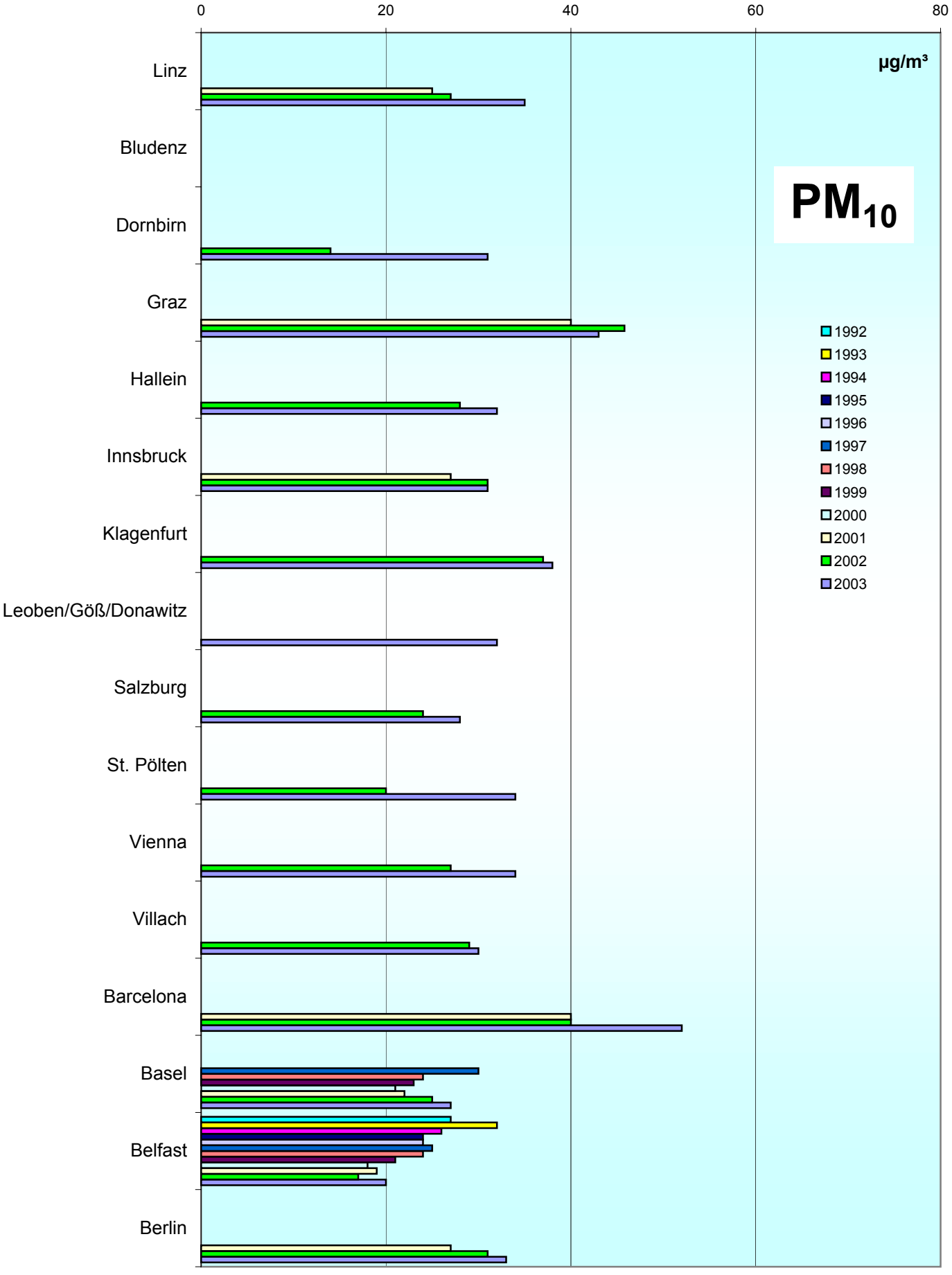
Comparison of The Air Quality 1992 - 2003

Annual mean values
(mean of all monitoring stations)



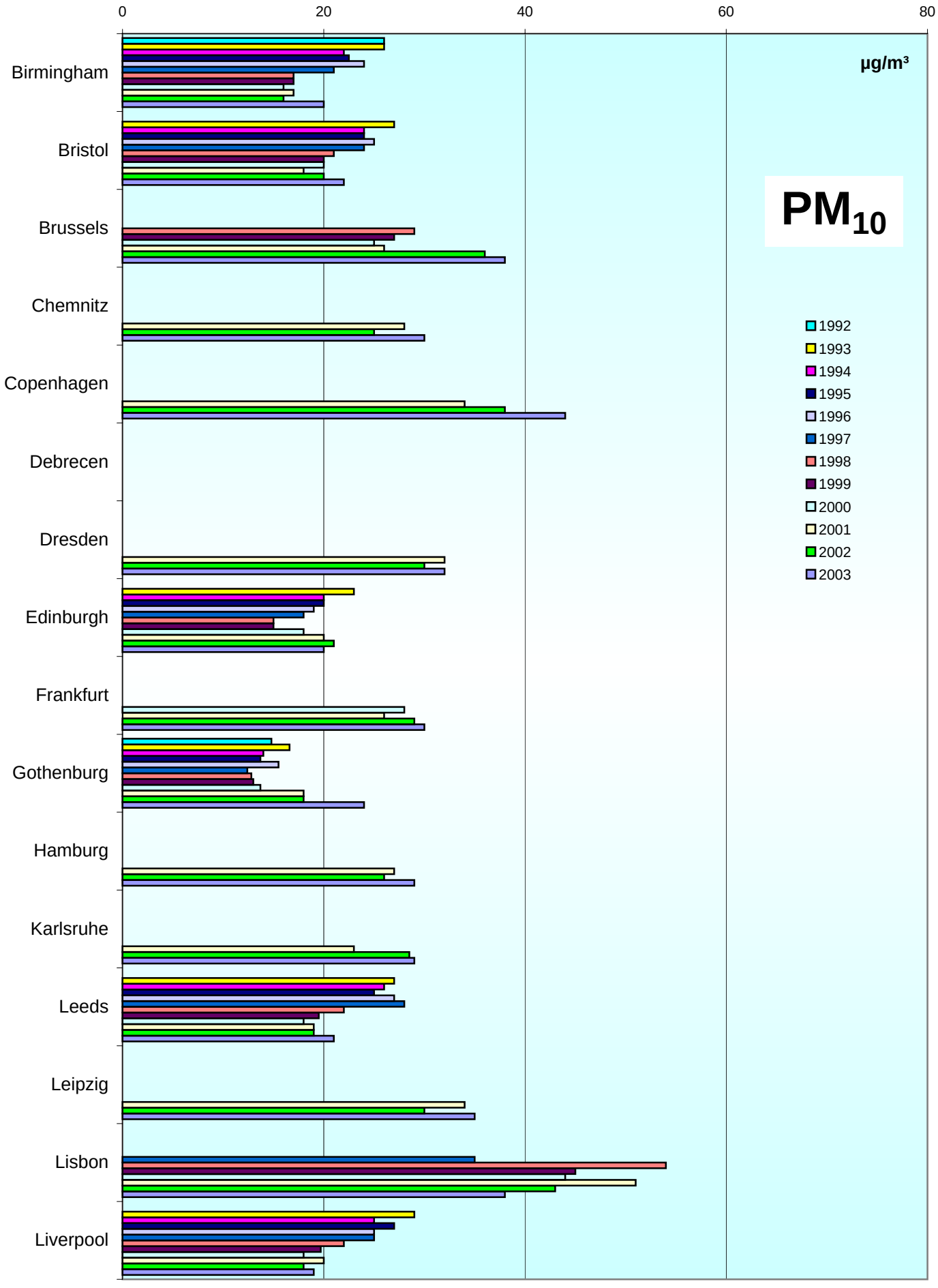
Comparison of The Air Quality 1992 - 2003

Annual mean values
(mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2003

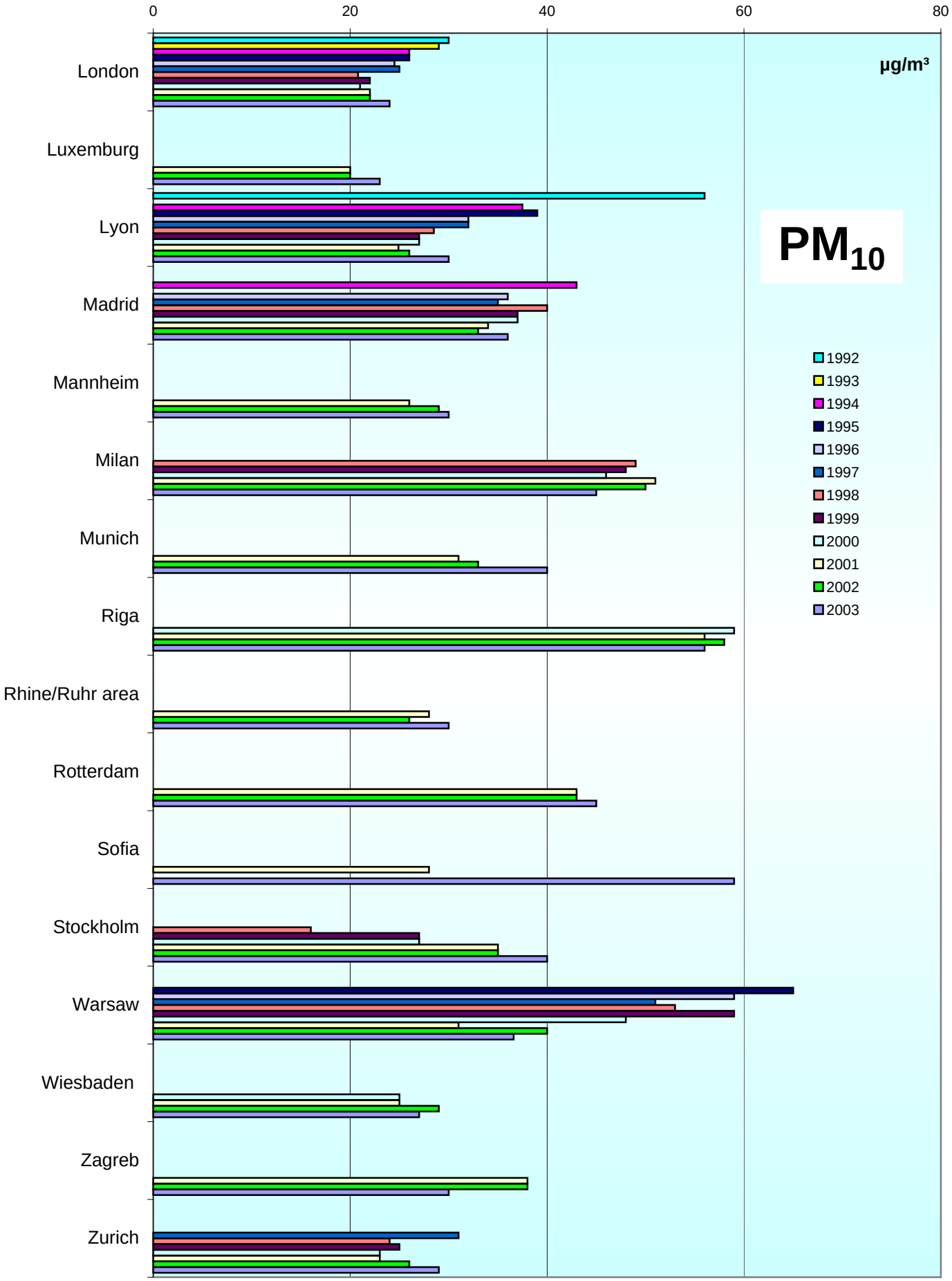
Annual mean values
(mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2003

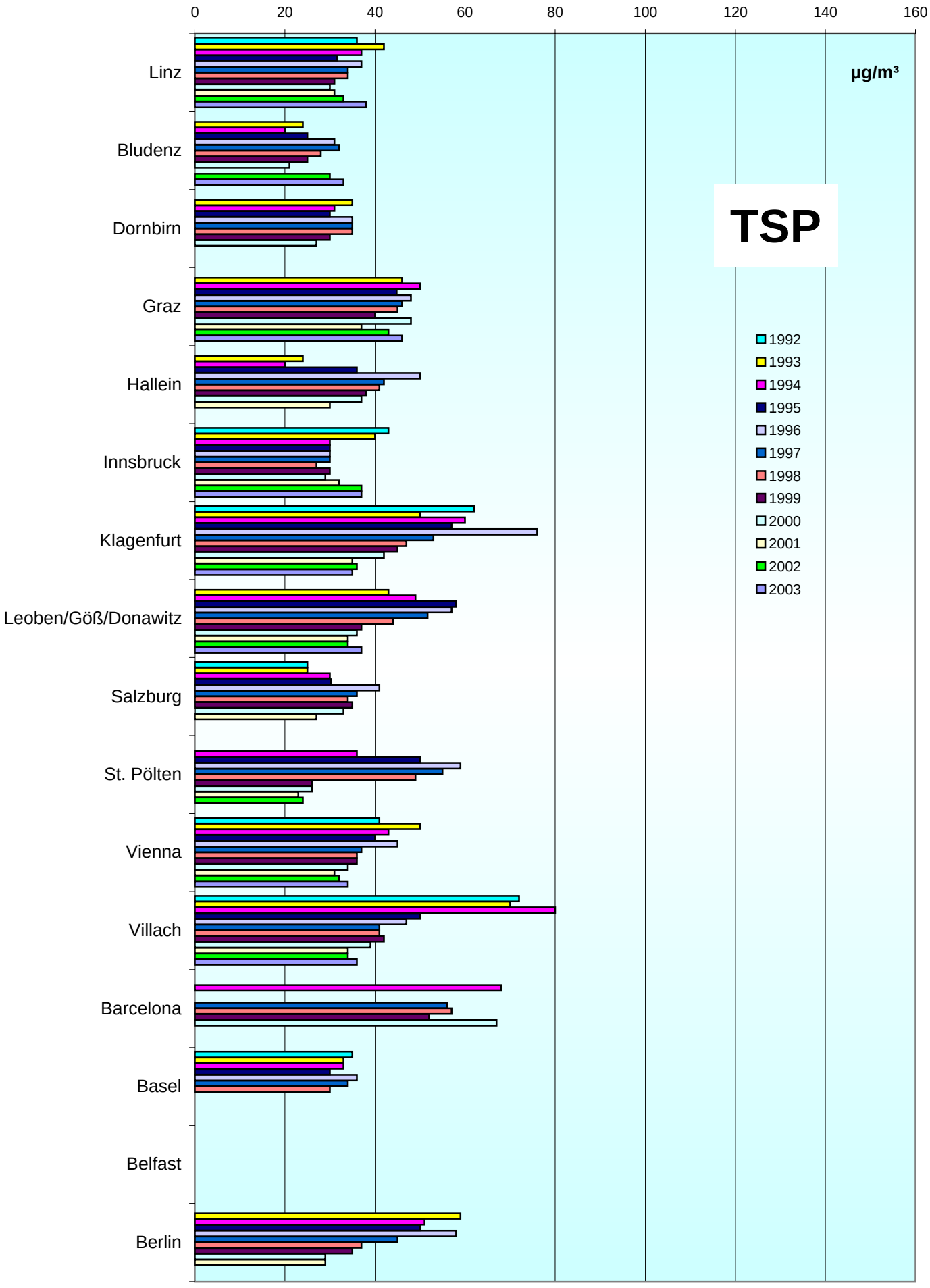
Annual mean values

(mean of all monitoring stations)



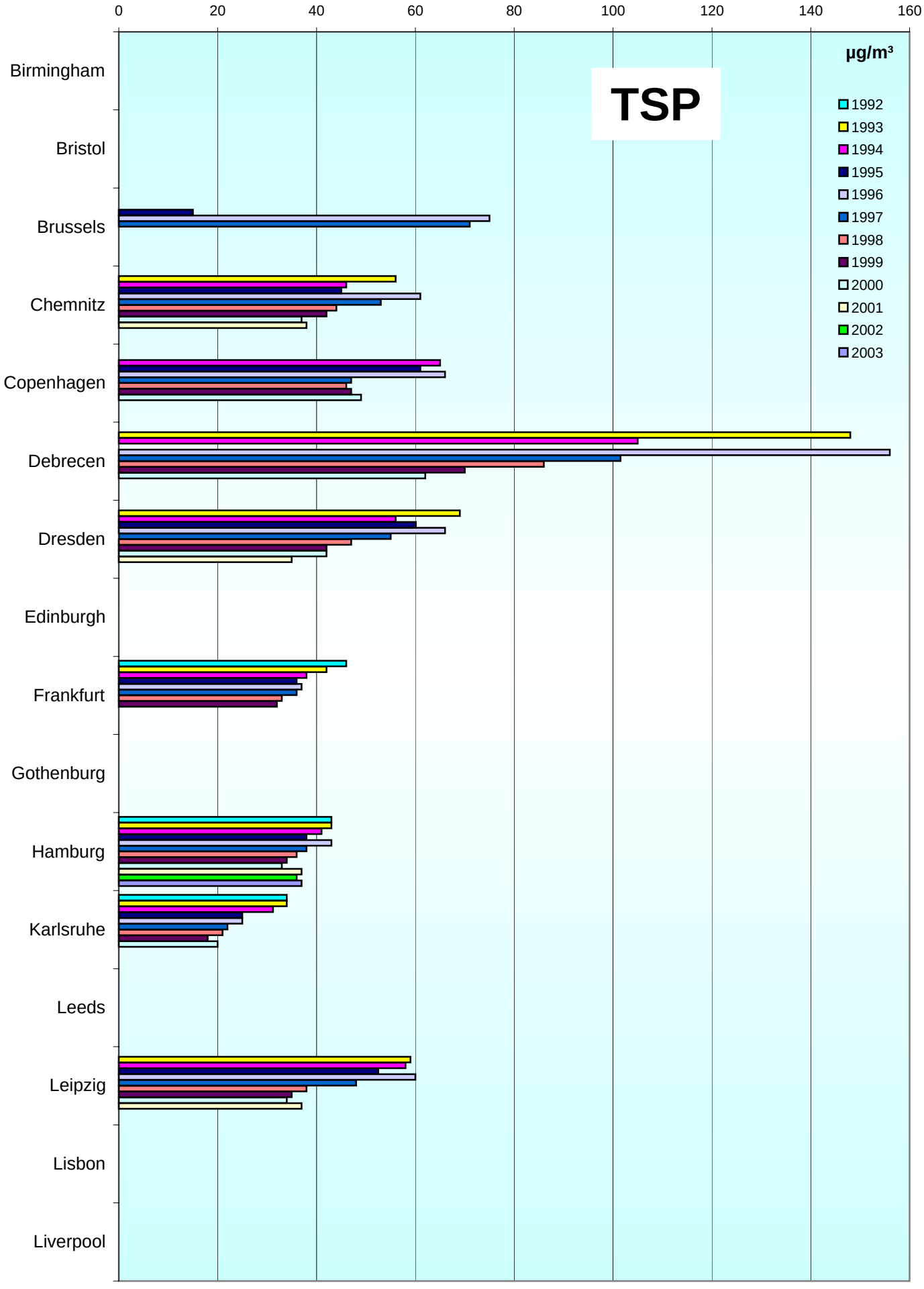
Comparison of The Air Quality 1992 - 2003

Annual mean values
(mean of all monitoring stations)



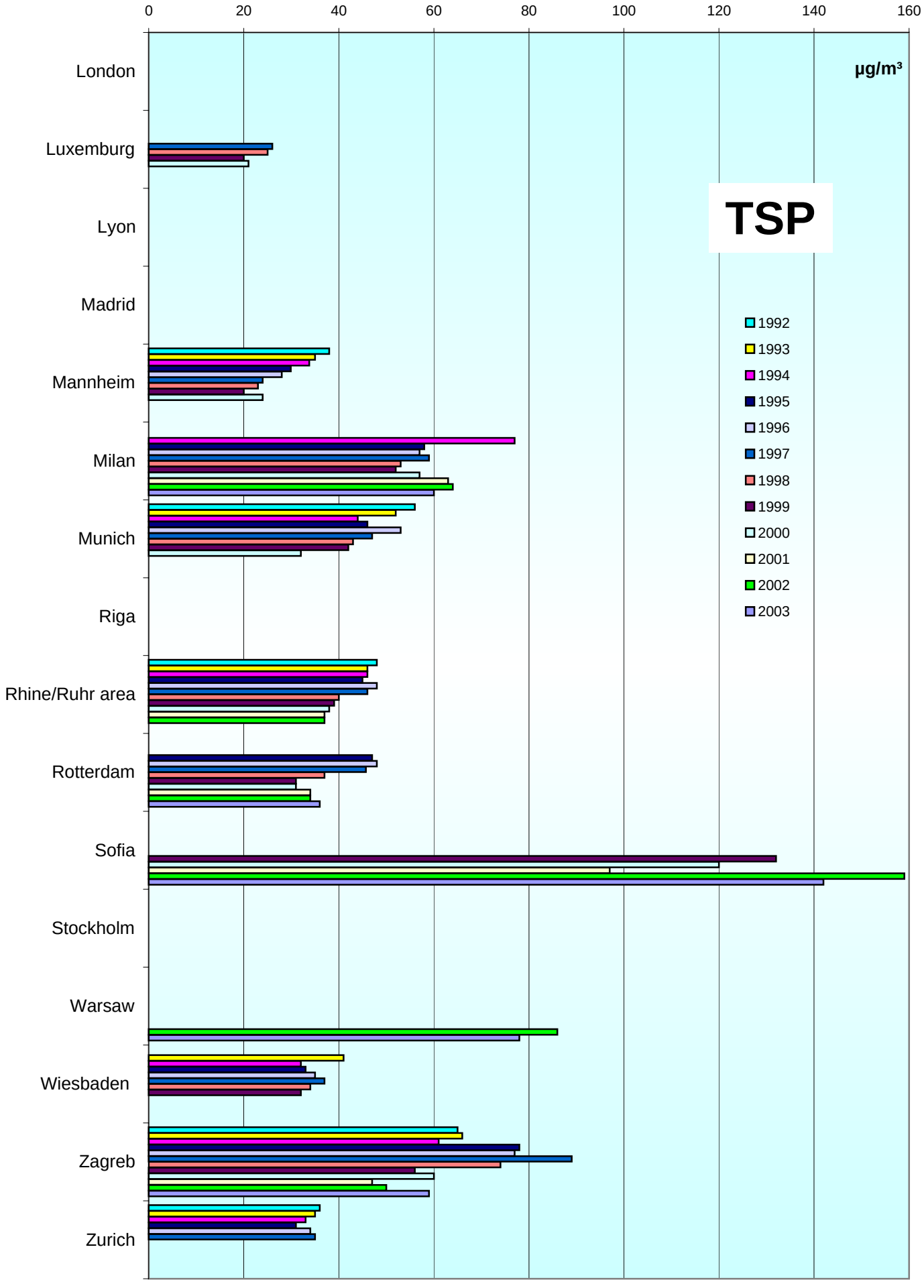
Comparison of The Air Quality 1992 - 2003

Annual mean values
(mean of all monitoring stations)



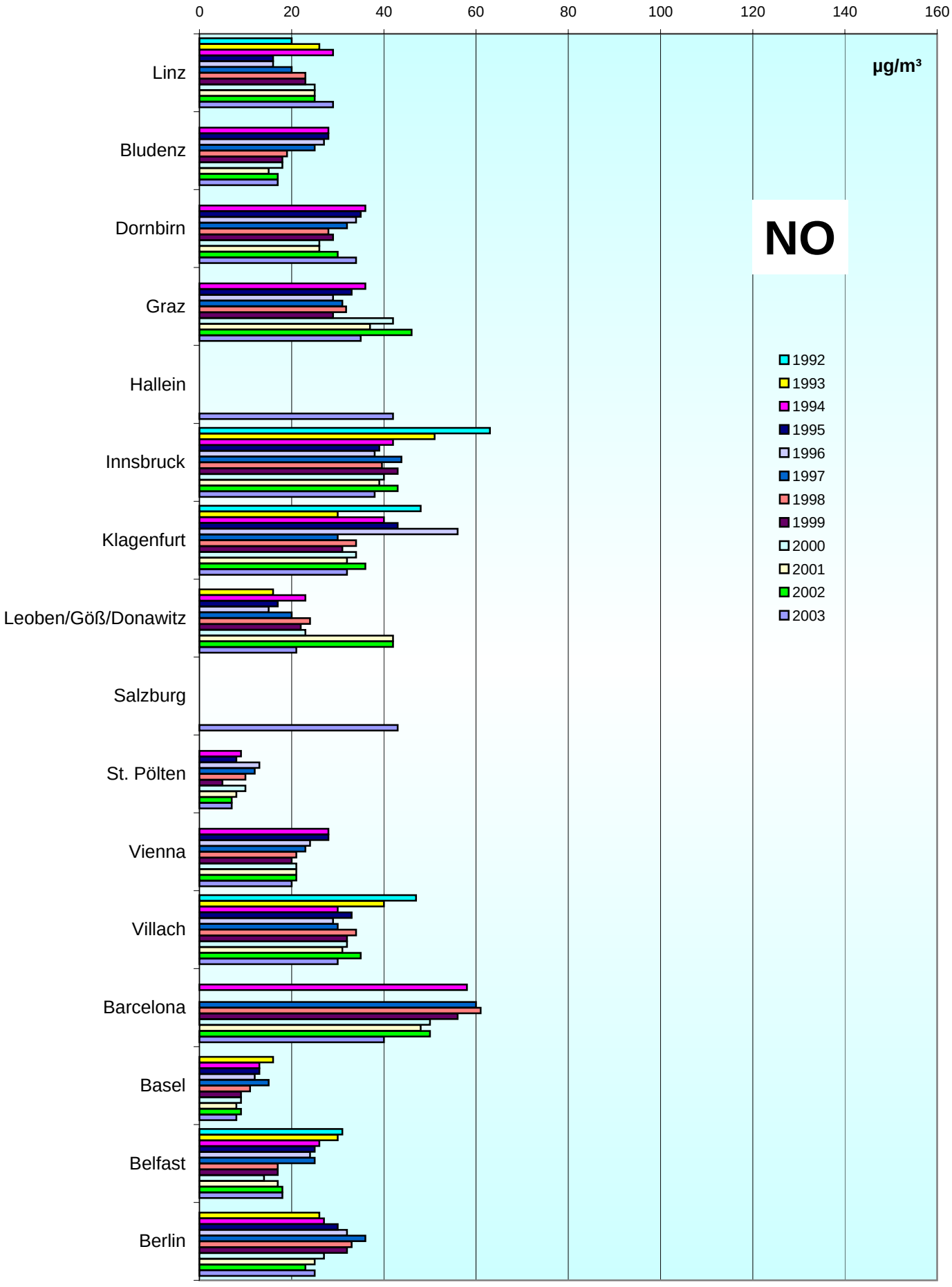
Comparison of The Air Quality 1992 - 2003

Annual mean values
(mean of all monitoring stations)



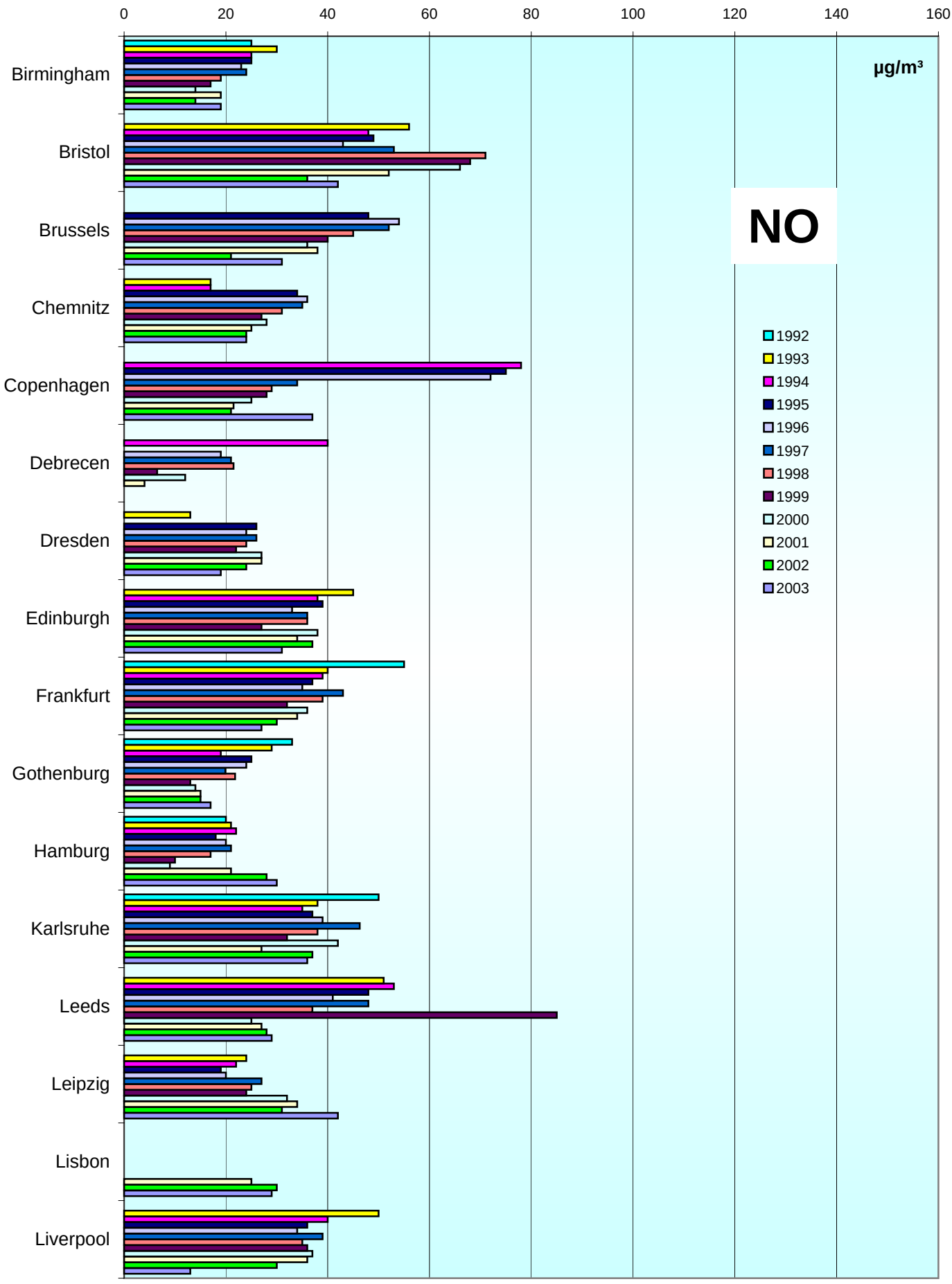
Comparison of The Air Quality 1992 - 2003

Annual mean values
(mean of all monitoring stations)



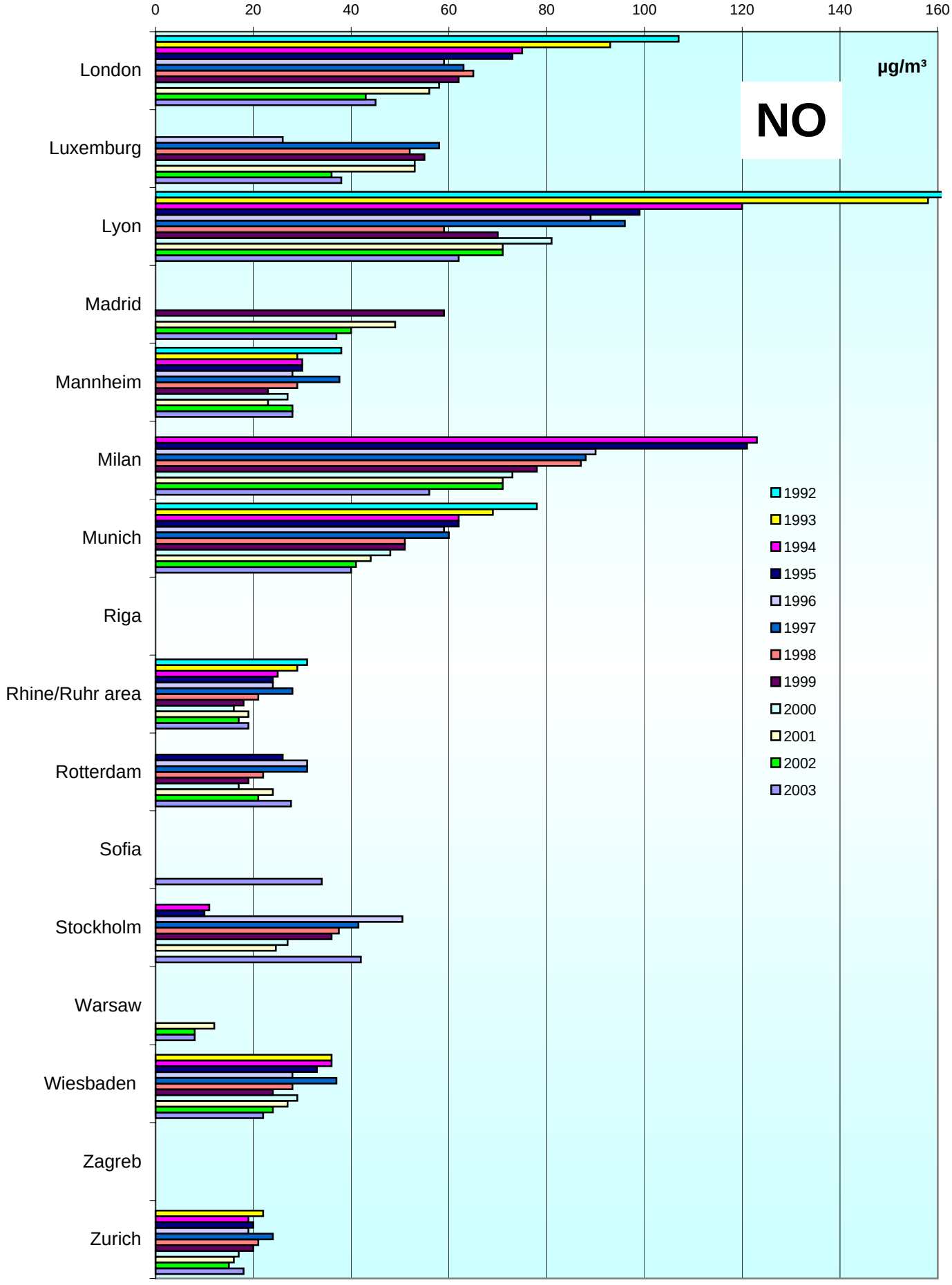
Comparison of The Air Quality 1992 - 2003

Annual mean values
(mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2003

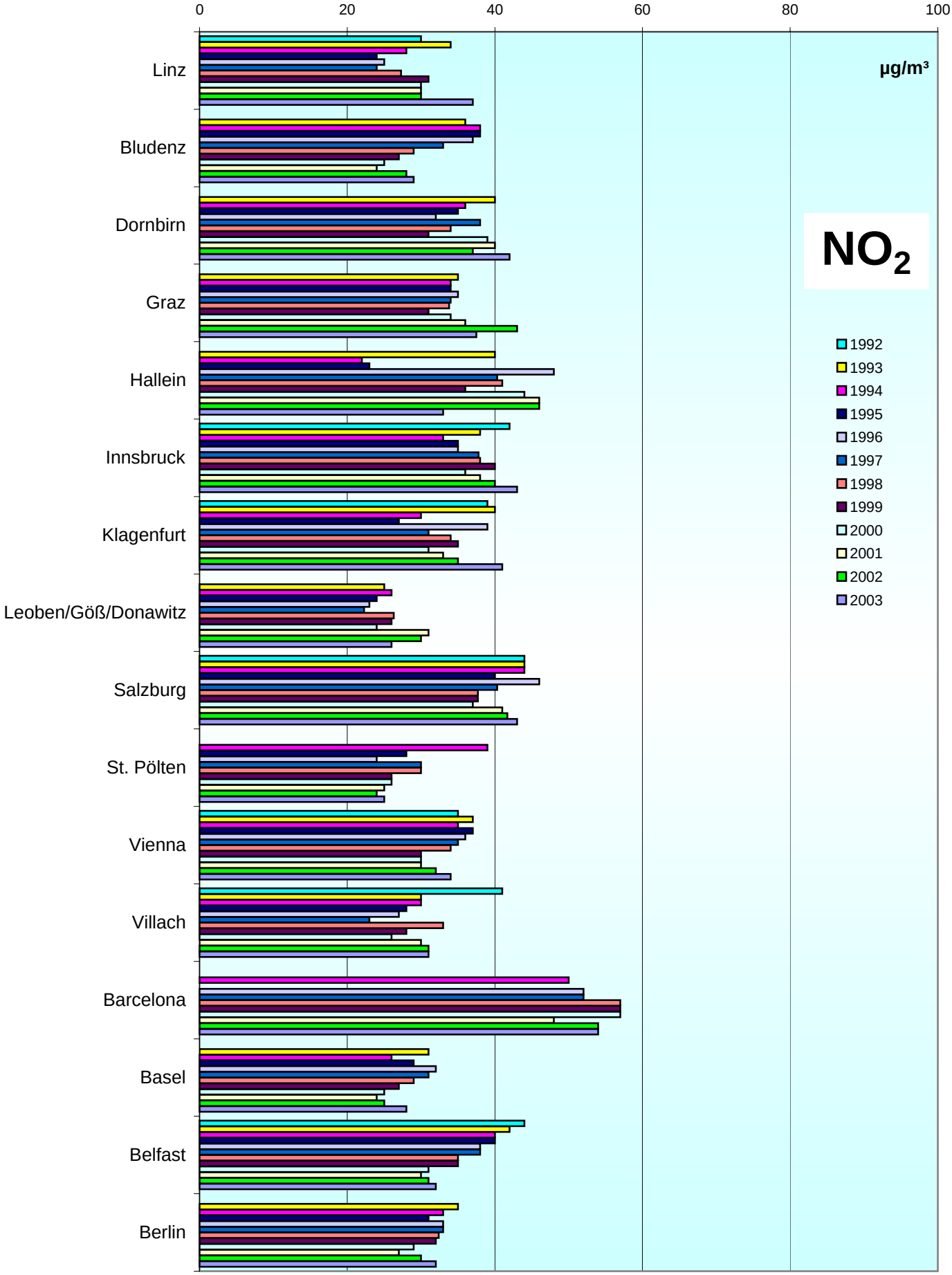
Annual mean values
(mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2003

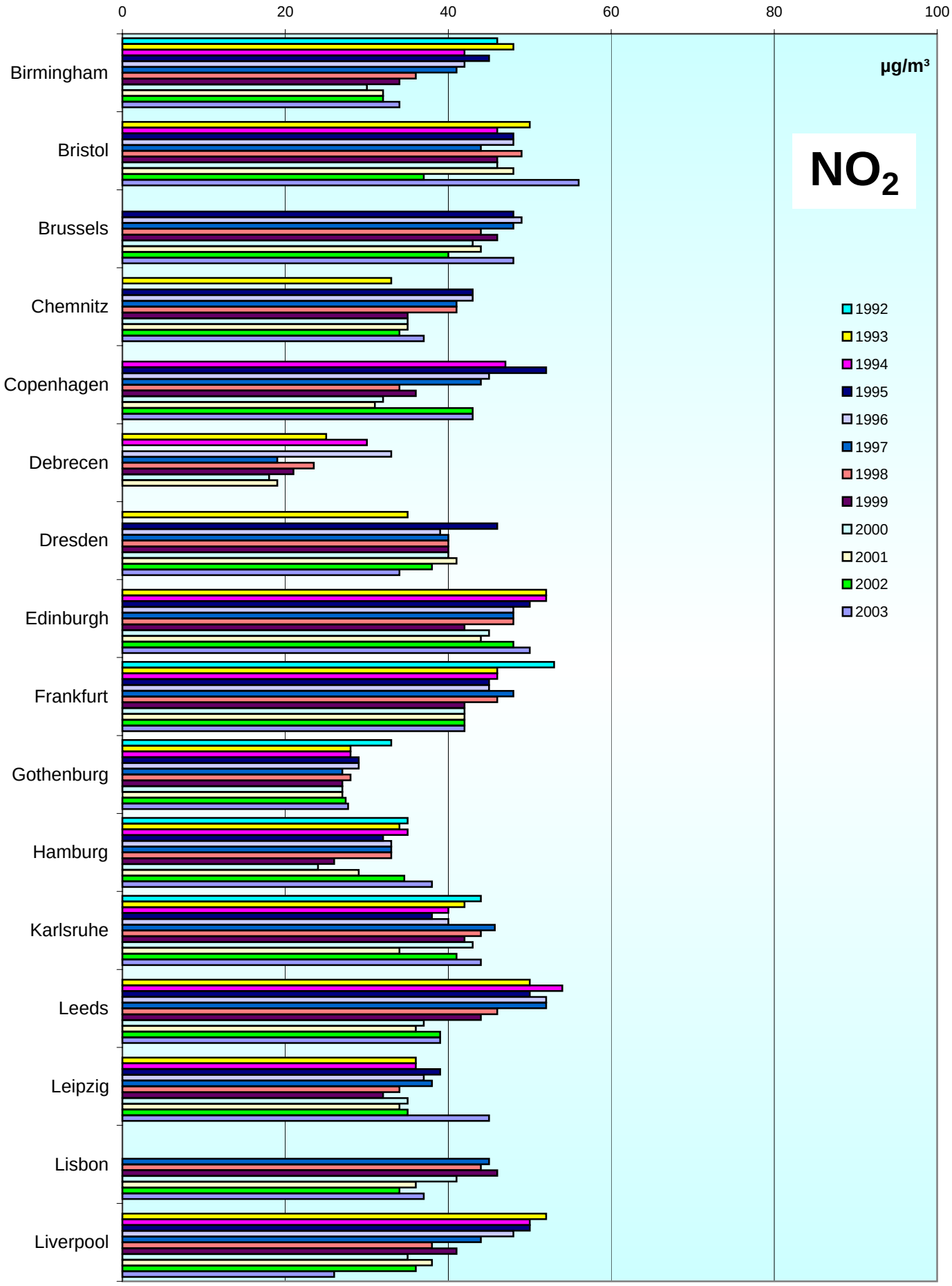
Annual mean values
(mean of all monitoring stations)

92



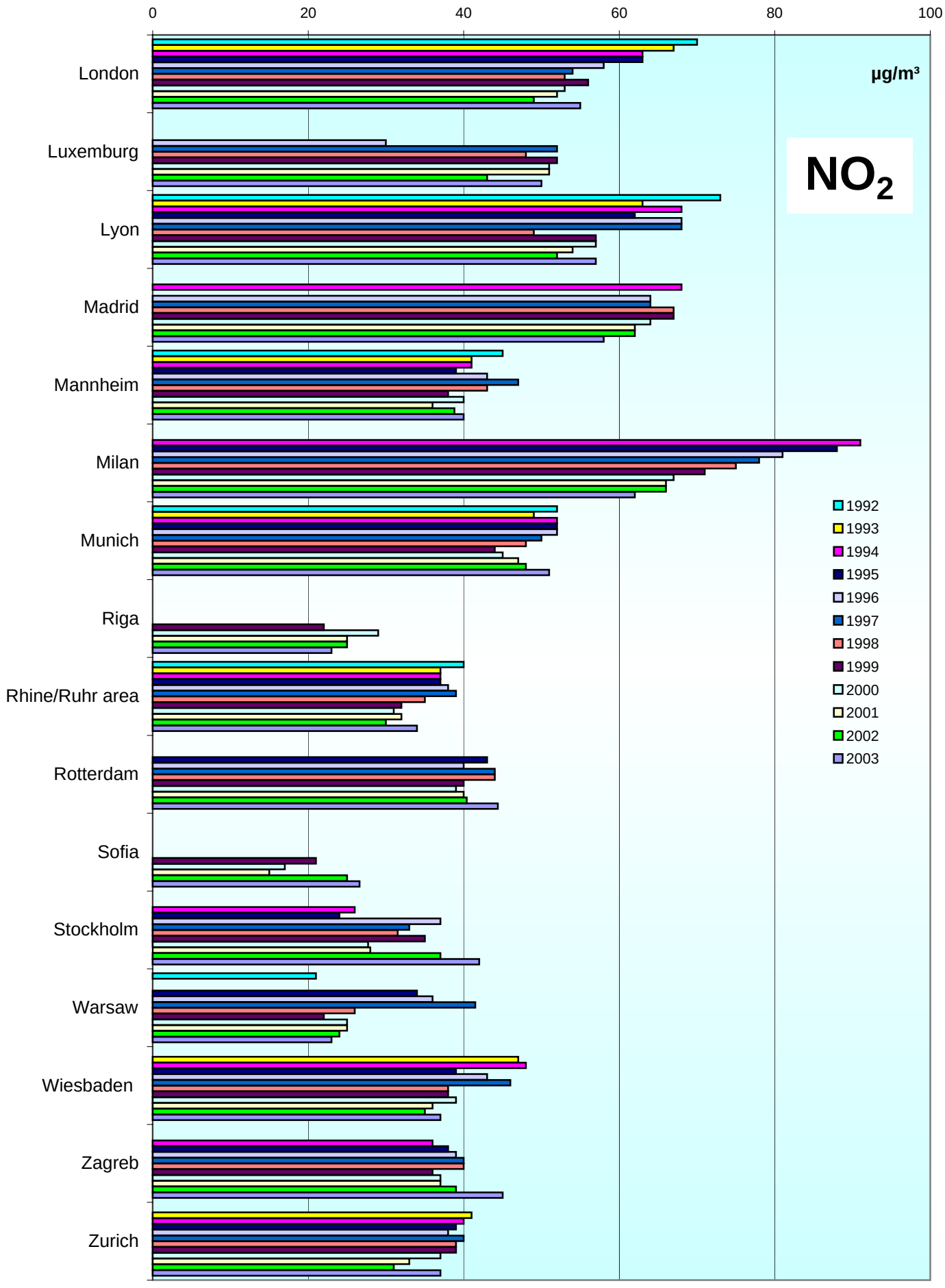
Comparison of The Air Quality 1992 - 2003

Annual mean values
(mean of all monitoring stations)



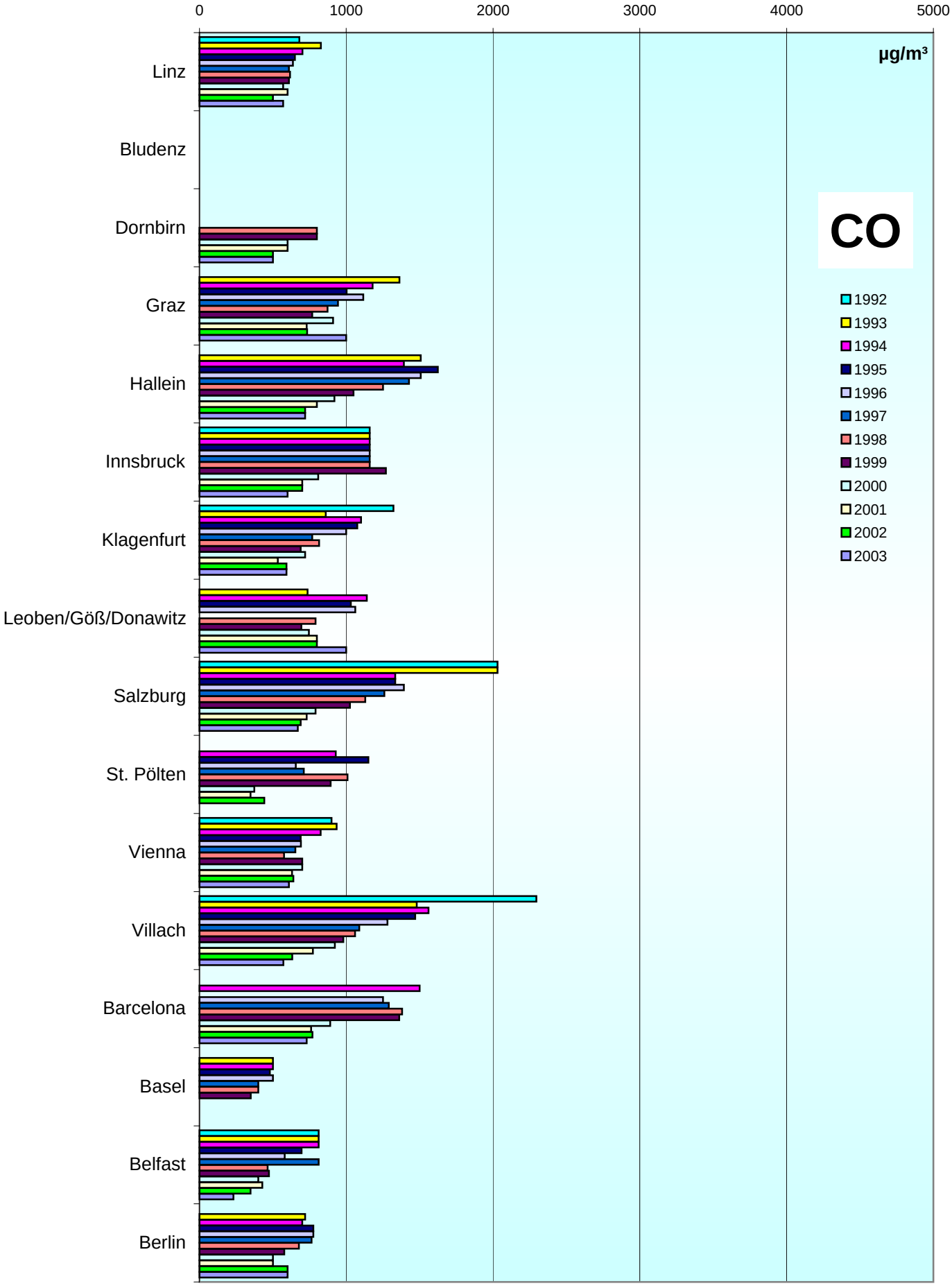
Comparison of The Air Quality 1992 - 2003

Annual mean values
(mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2003

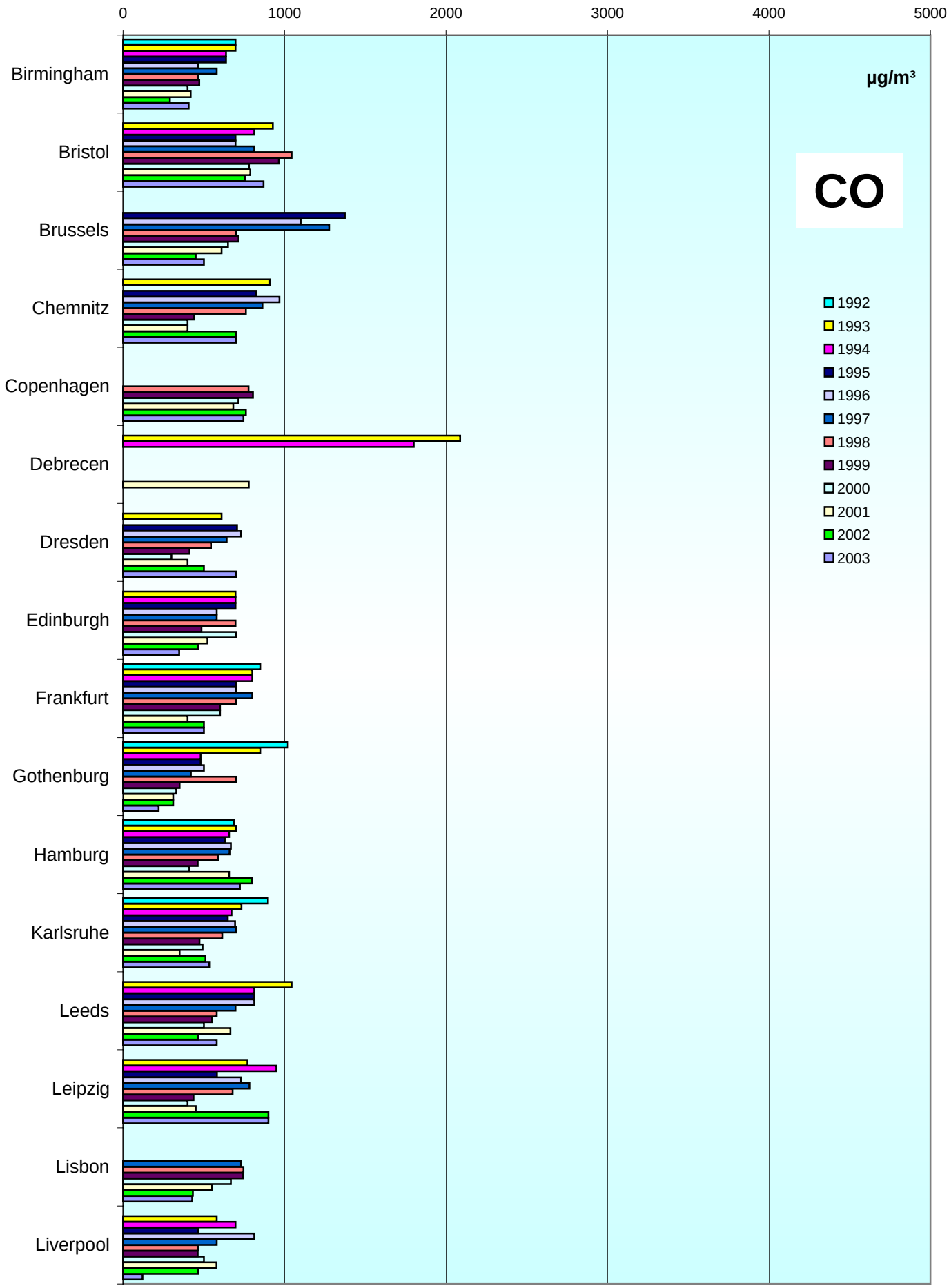
Annual mean values
(mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2003

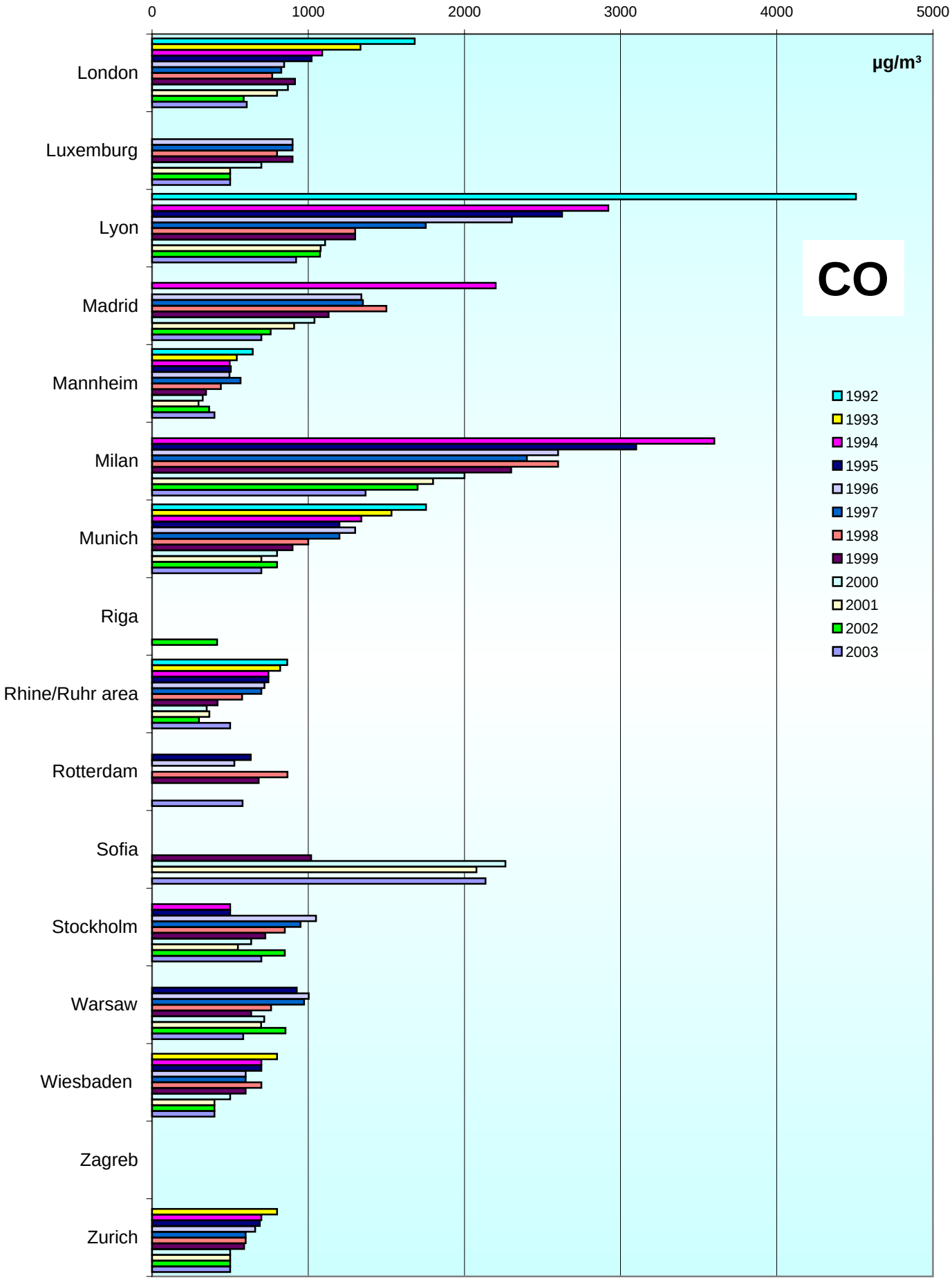
Annual mean values

(mean of all monitoring stations)



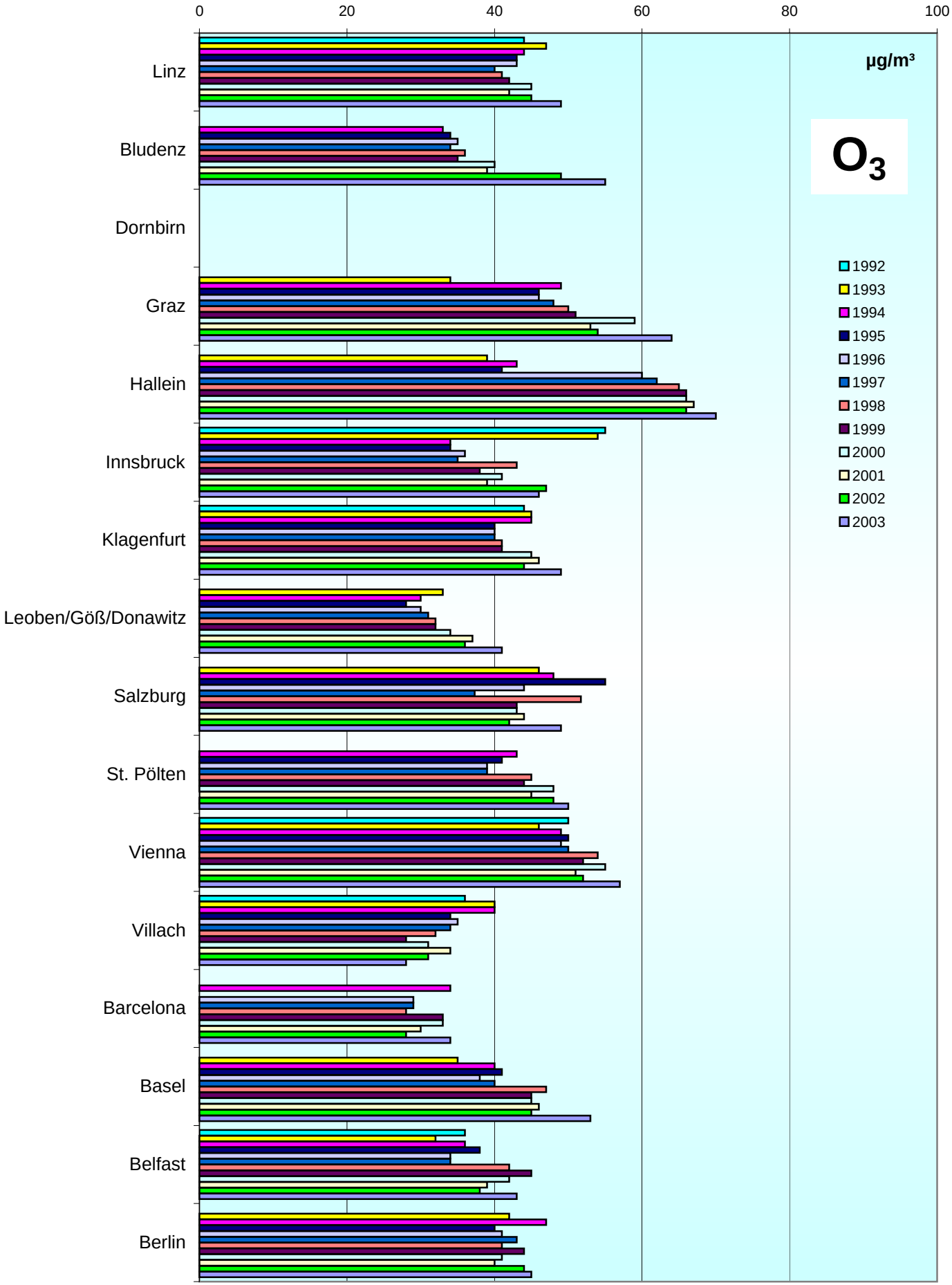
Comparison of The Air Quality 1992 - 2003

Annual mean values
(mean of all monitoring stations)



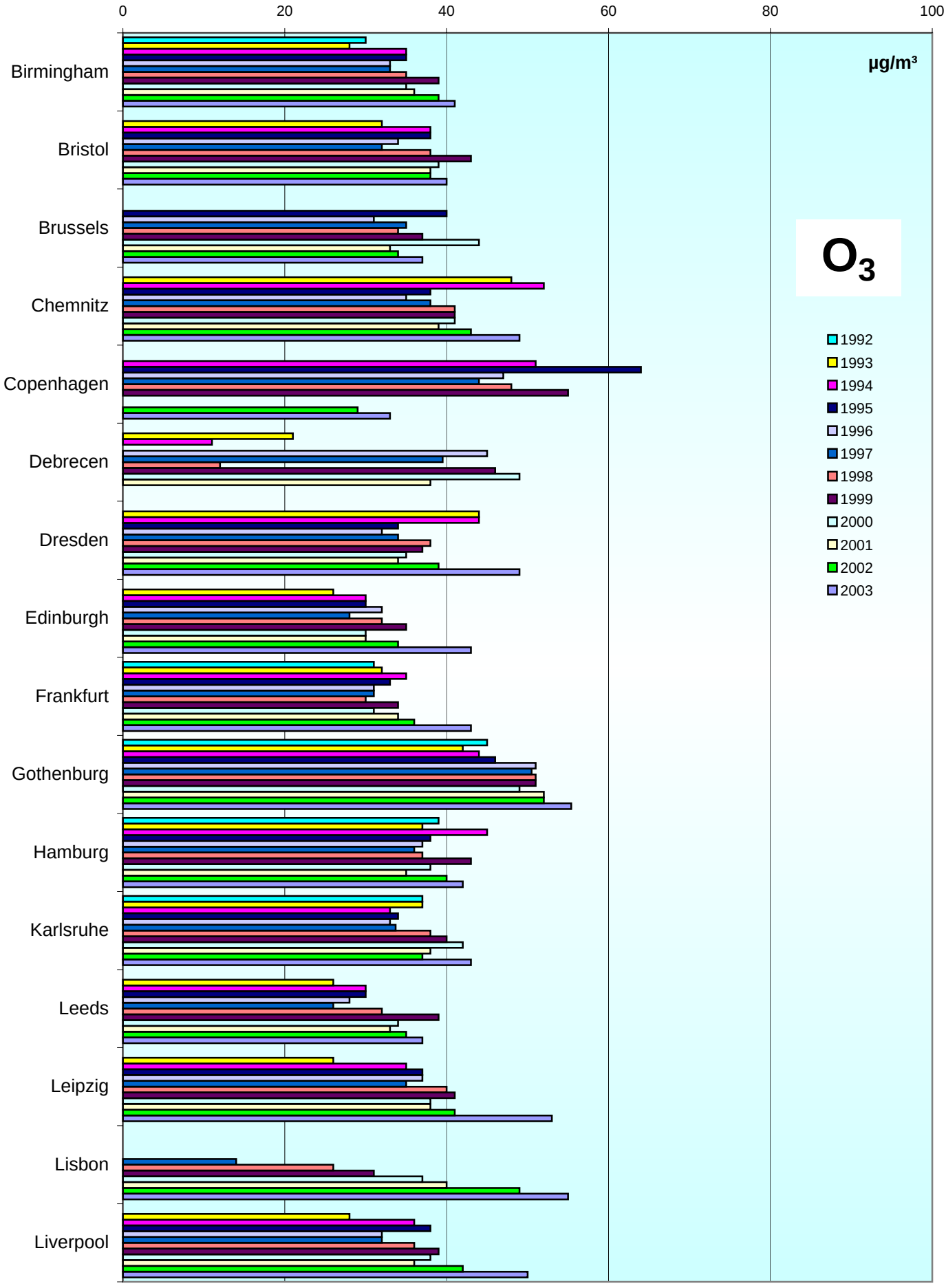
Comparison of The Air Quality 1992 - 2003

Annual mean values
(mean of all monitoring stations)



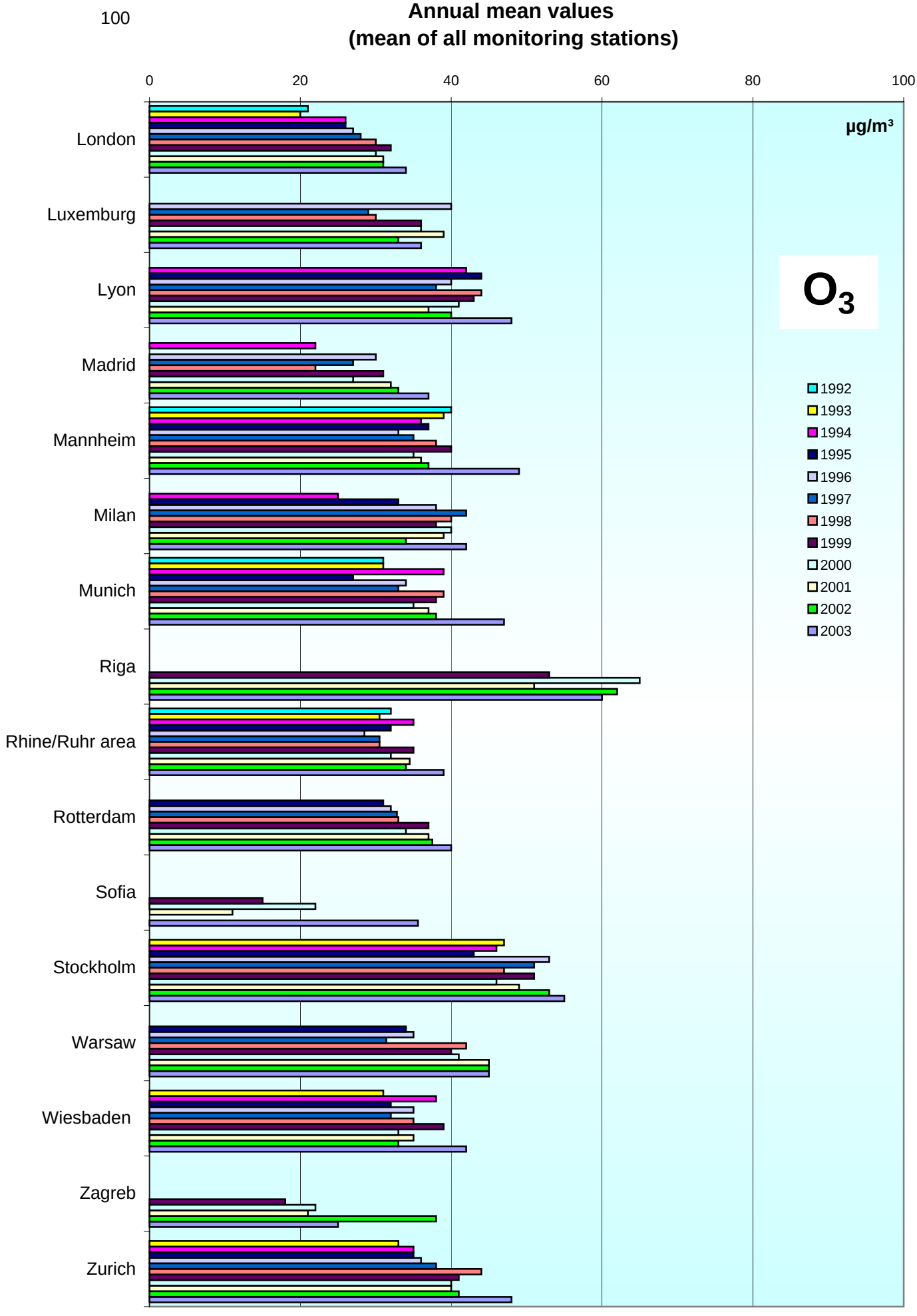
Comparison of The Air Quality 1992 - 2003

Annual mean values
(mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2003

Annual mean values
(mean of all monitoring stations)



Jahresvergleich

1992-2003

max. Tagesmittelwert

Comparison of The Air Quality Over The Years

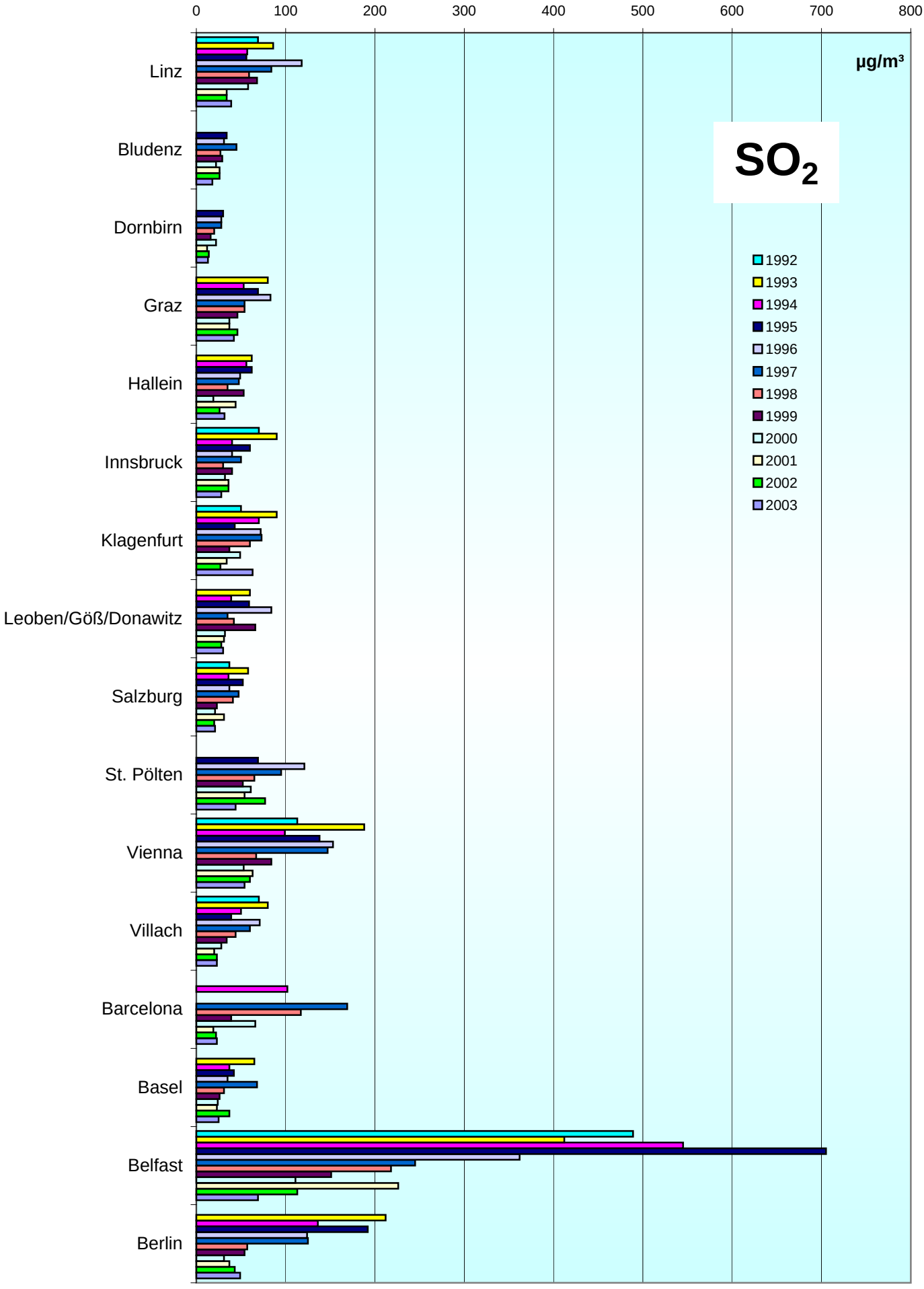
1992-2003

Max. Daily Mean Values

Comparison of The Air Quality 1992 - 2003

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

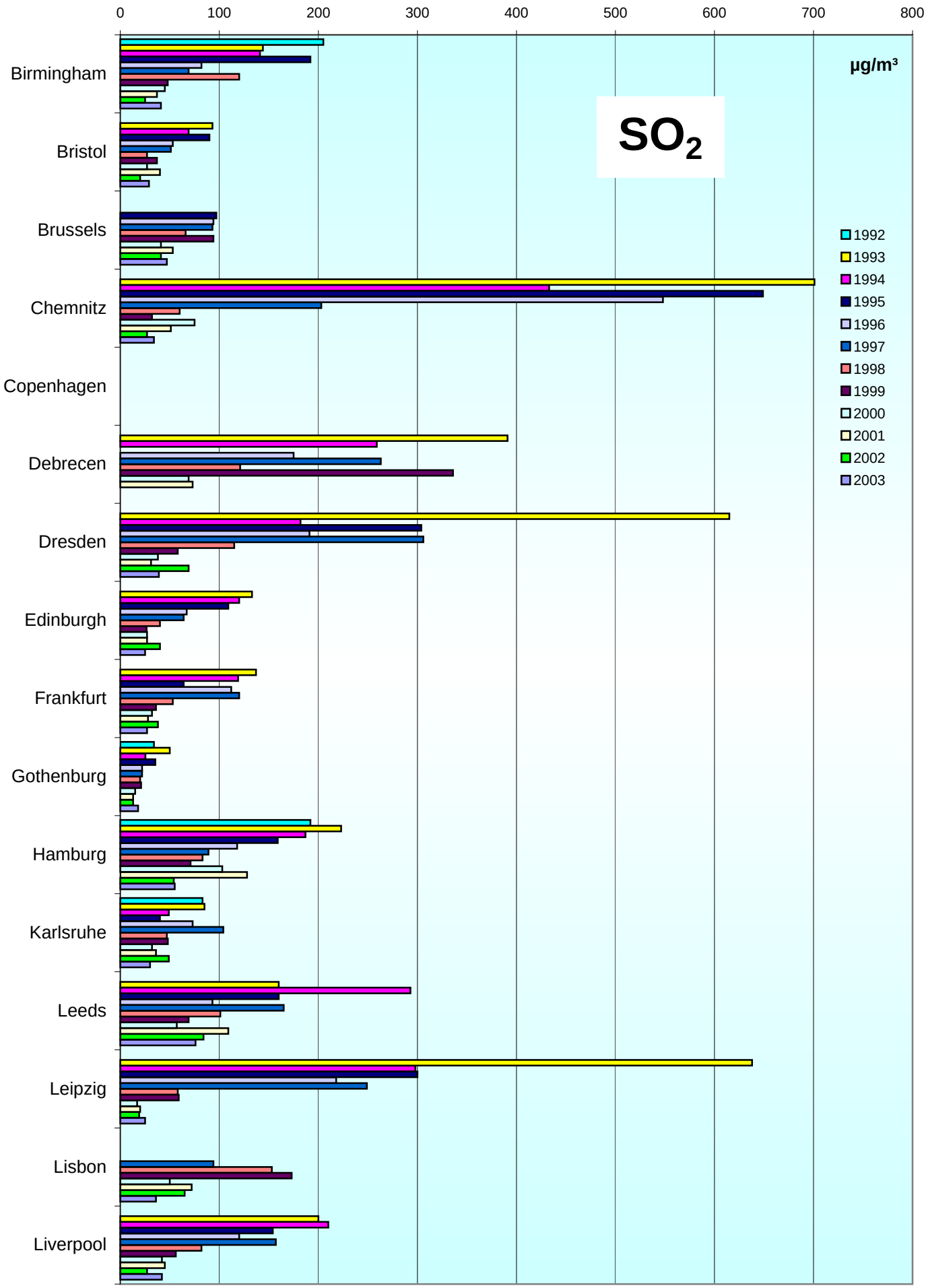
102



Comparison of The Air Quality 1992 - 2003

max. daily mean values

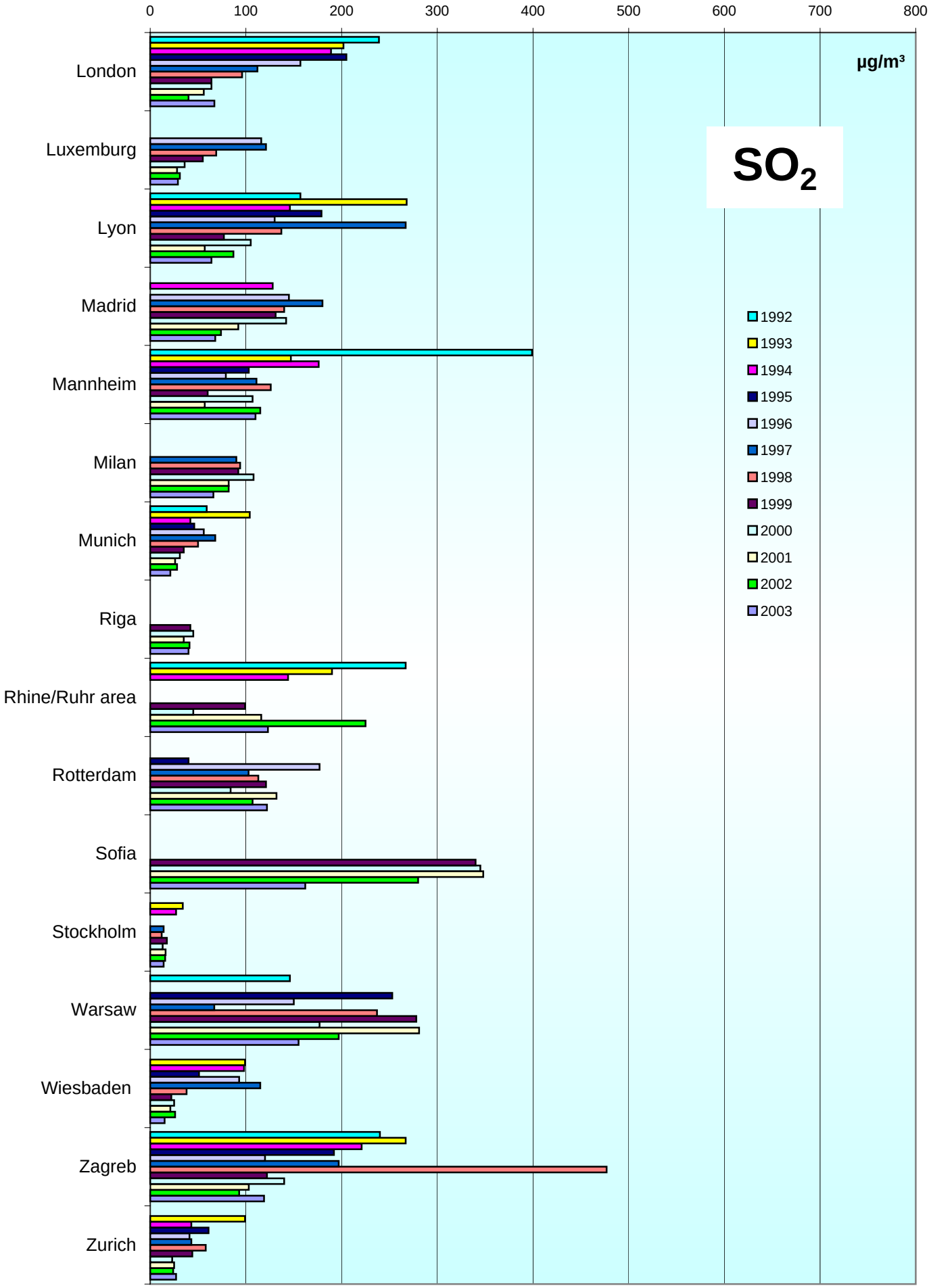
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

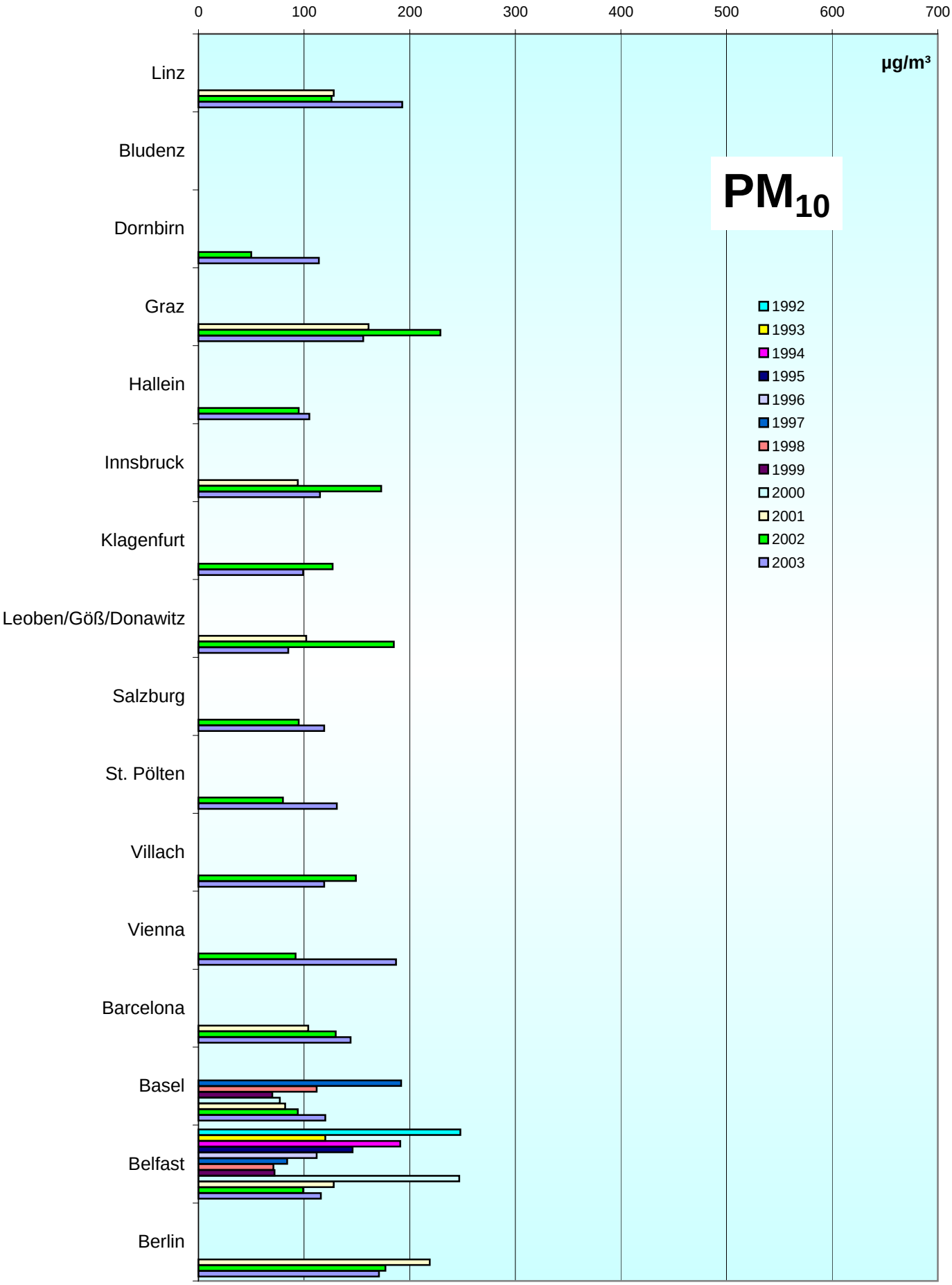
max. daily mean values
(peak-stressed monitoring station)

104



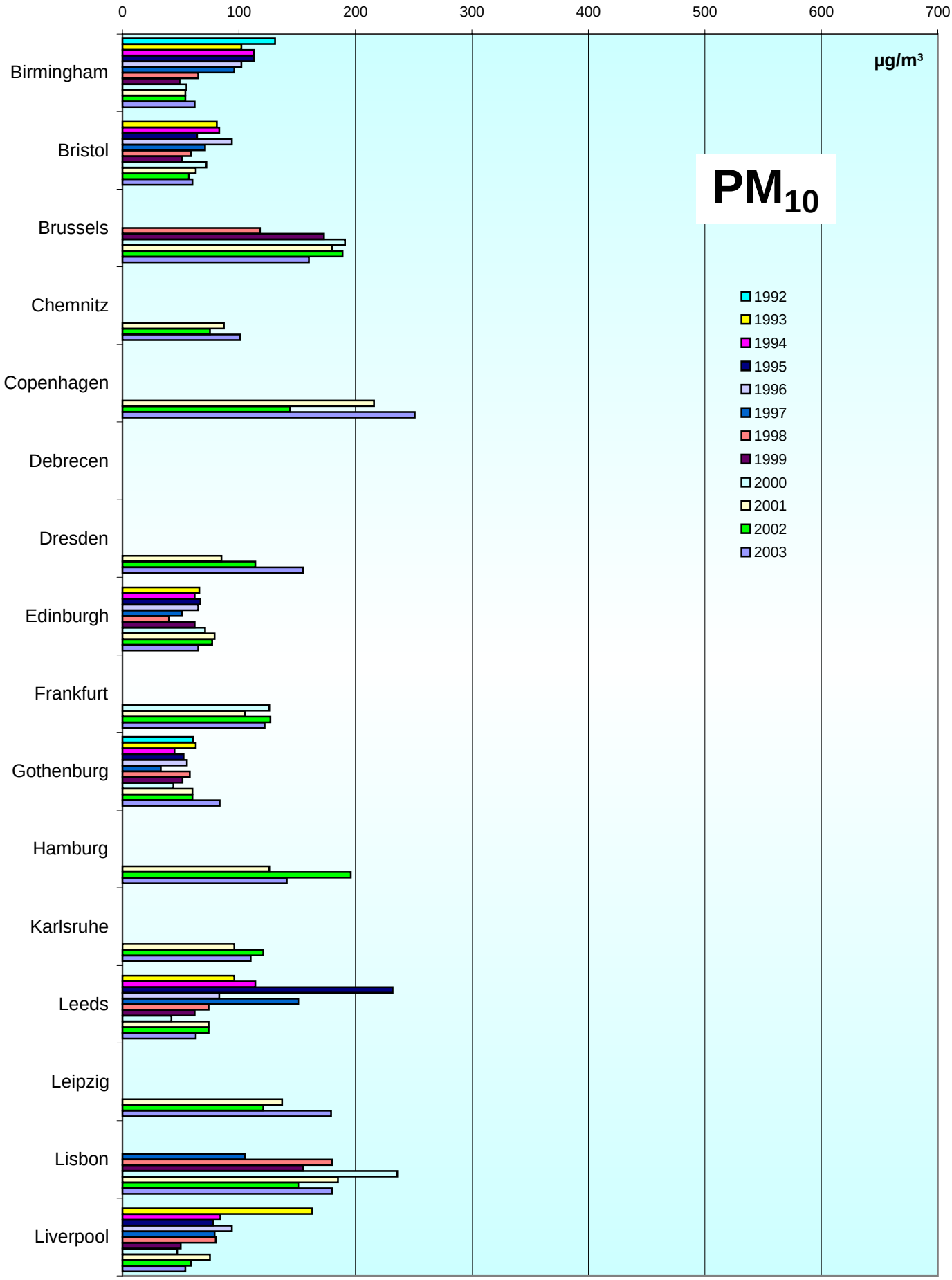
Comparison of The Air Quality 1992 - 2003

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



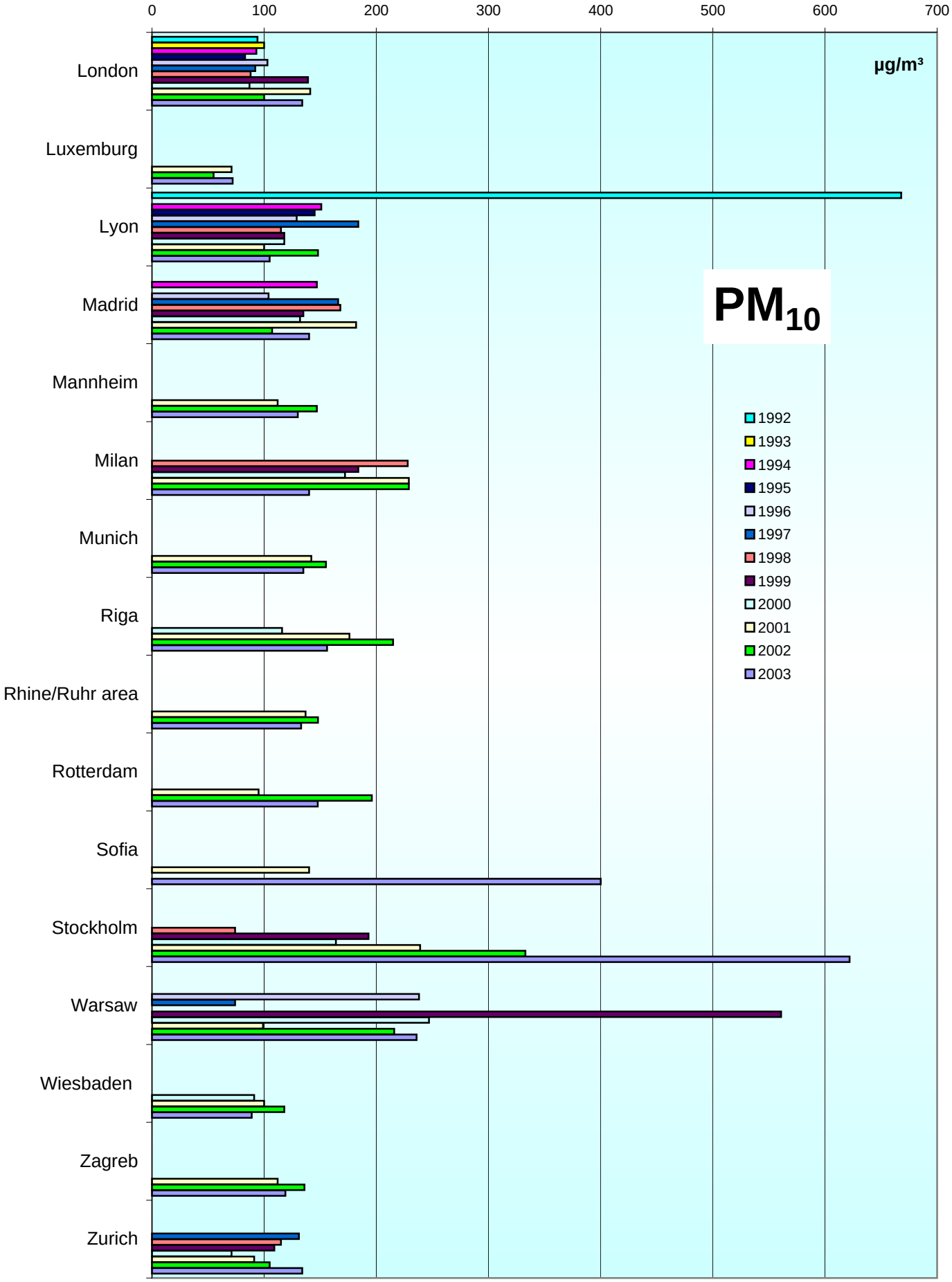
Comparison of The Air Quality 1992 - 2003

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



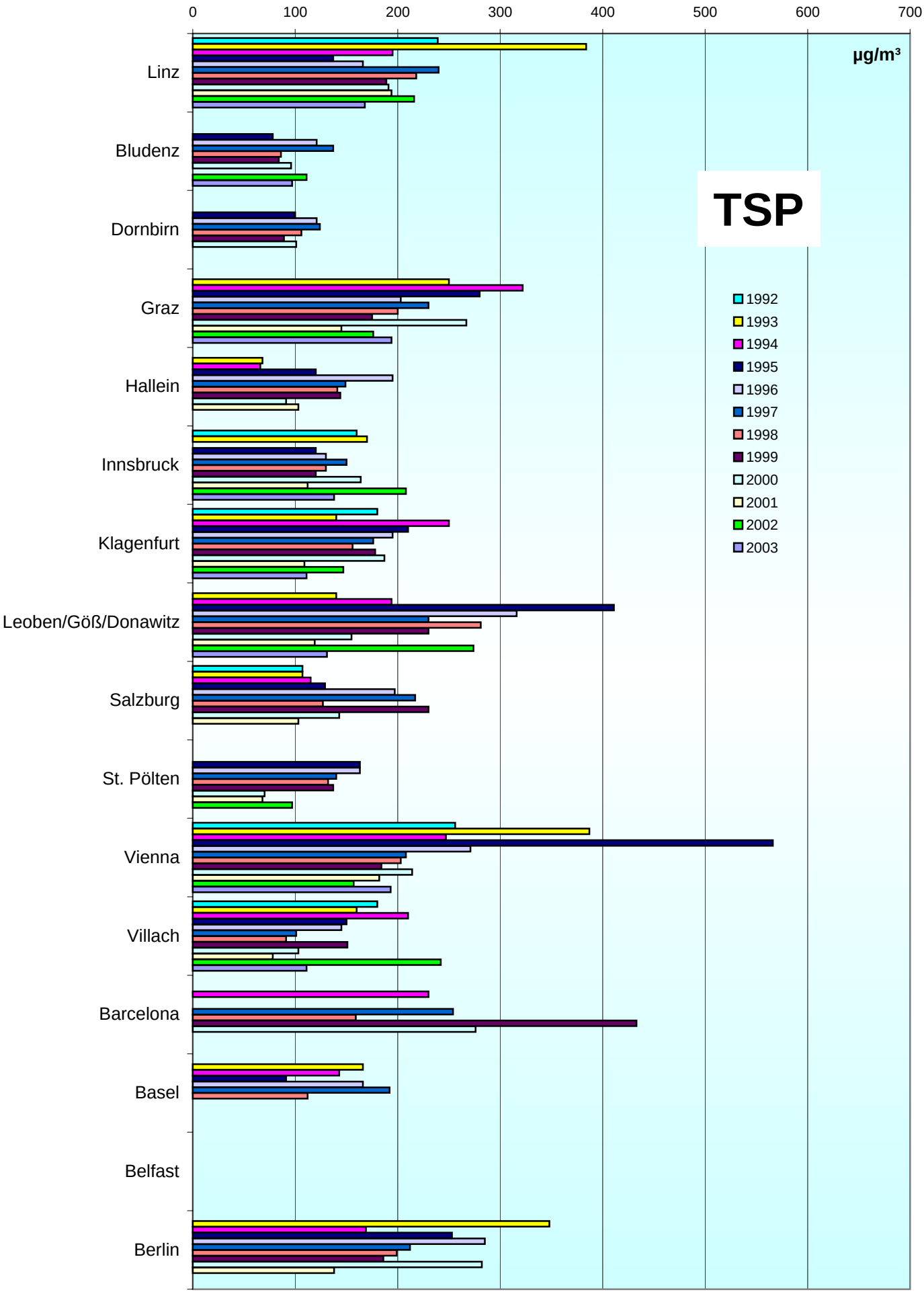
Comparison of The Air Quality 1992 - 2003

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



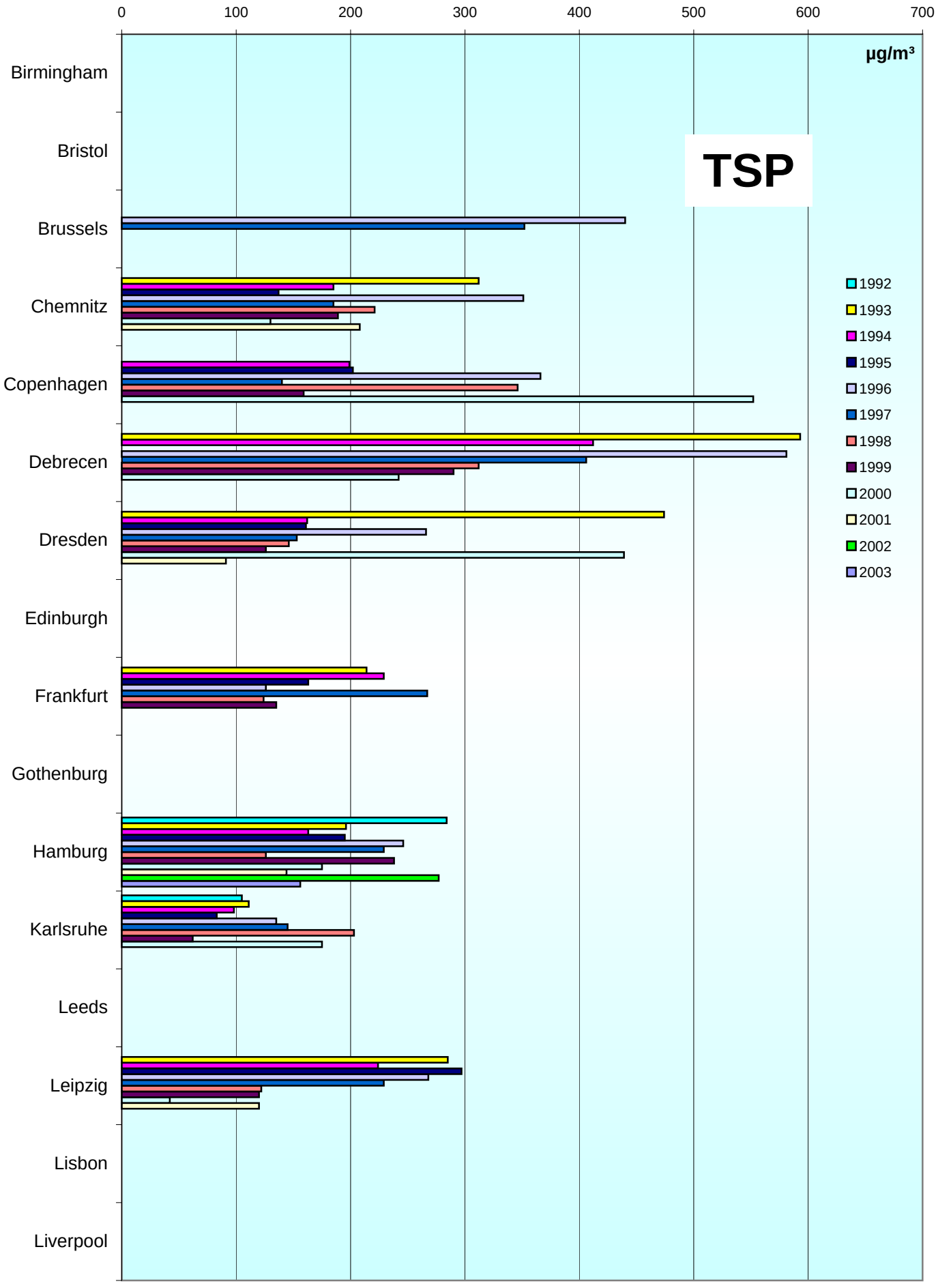
Comparison of The Air Quality 1992 - 2003

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



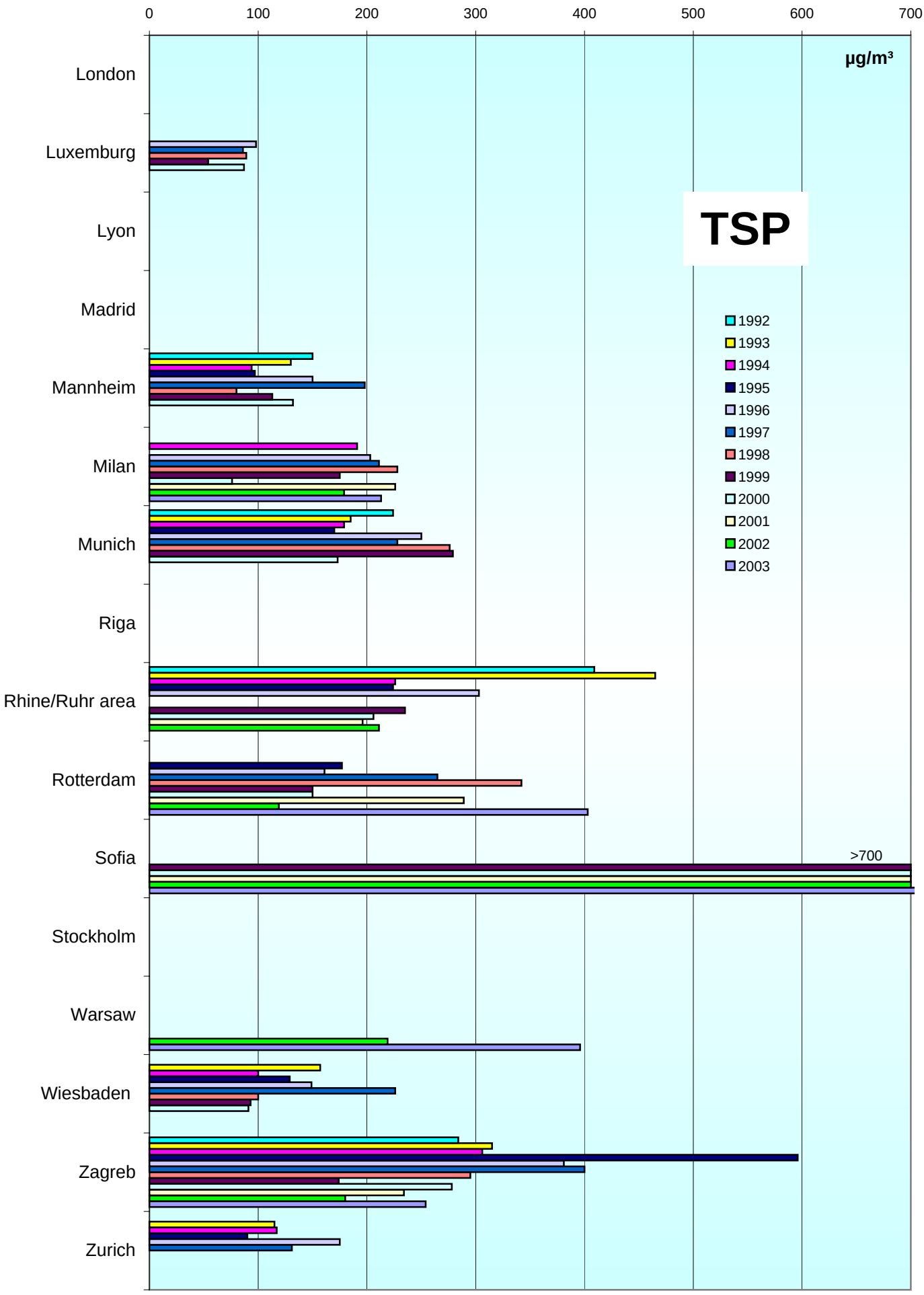
Comparison of The Air Quality 1992 - 2003

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



Comparison of The Air Quality 1992 - 2003

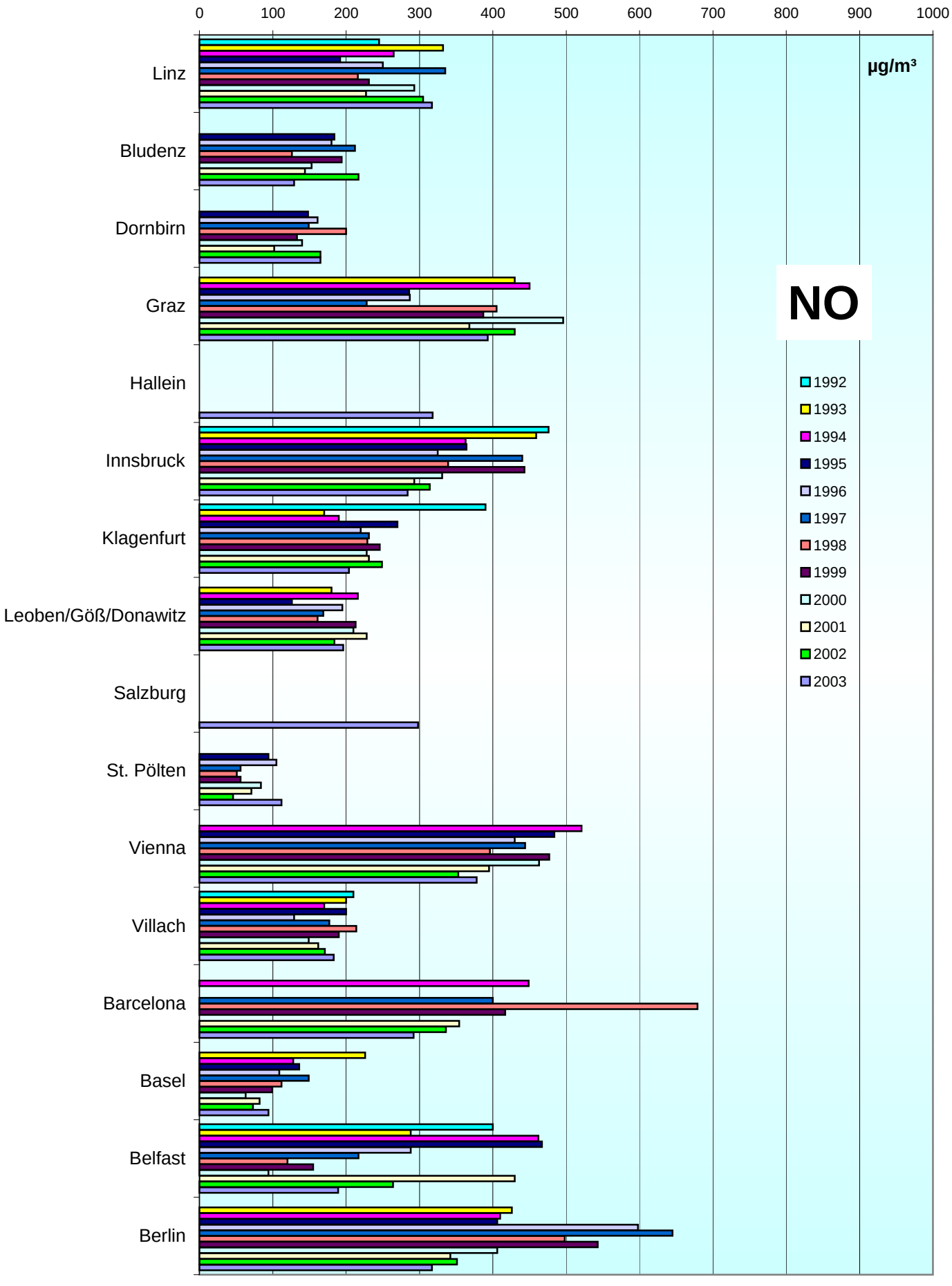
max. daily mean values
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

max. daily mean values

(peak-stressed monitoring station)

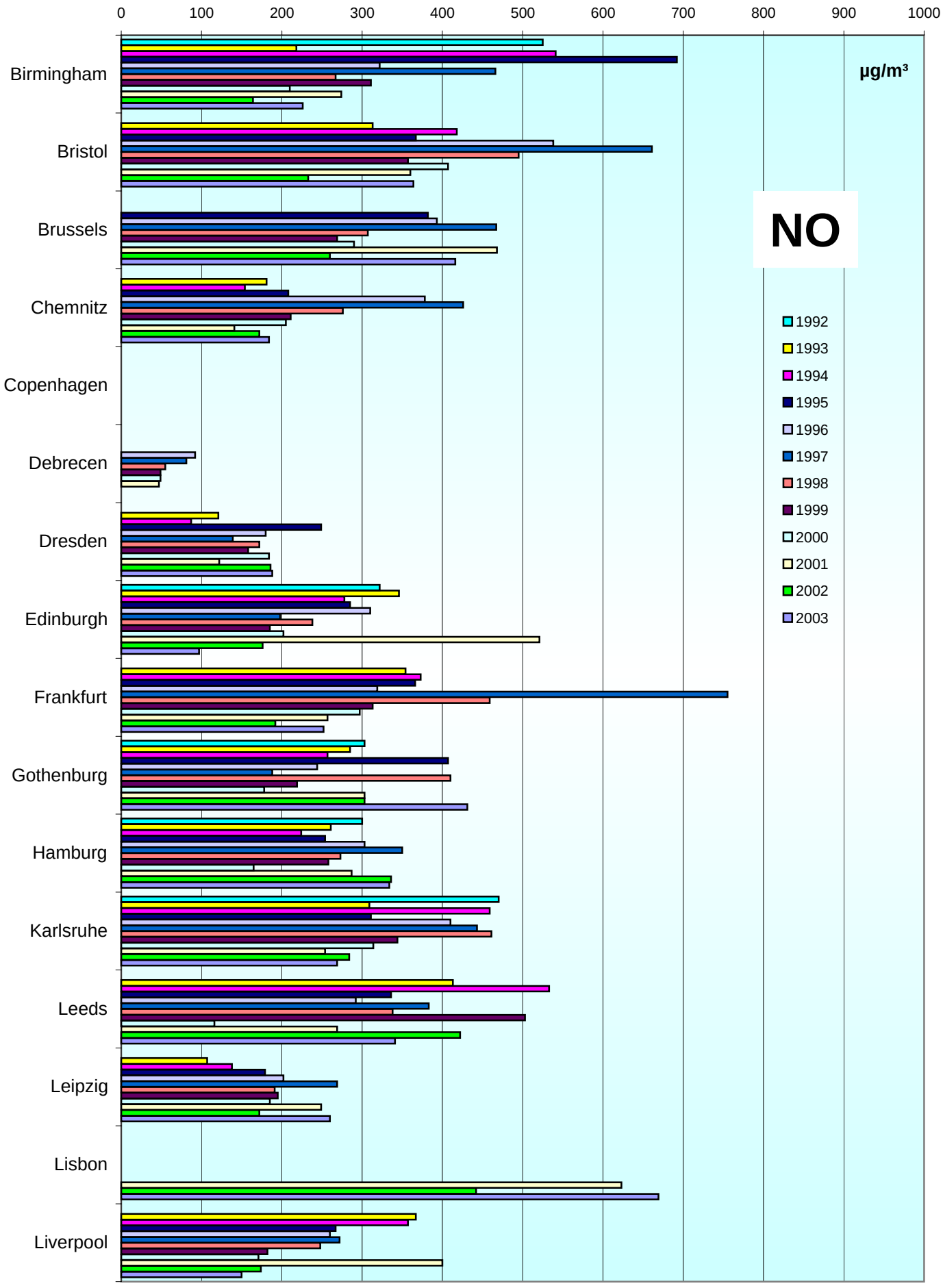


Comparison of The Air Quality 1992 - 2003

112

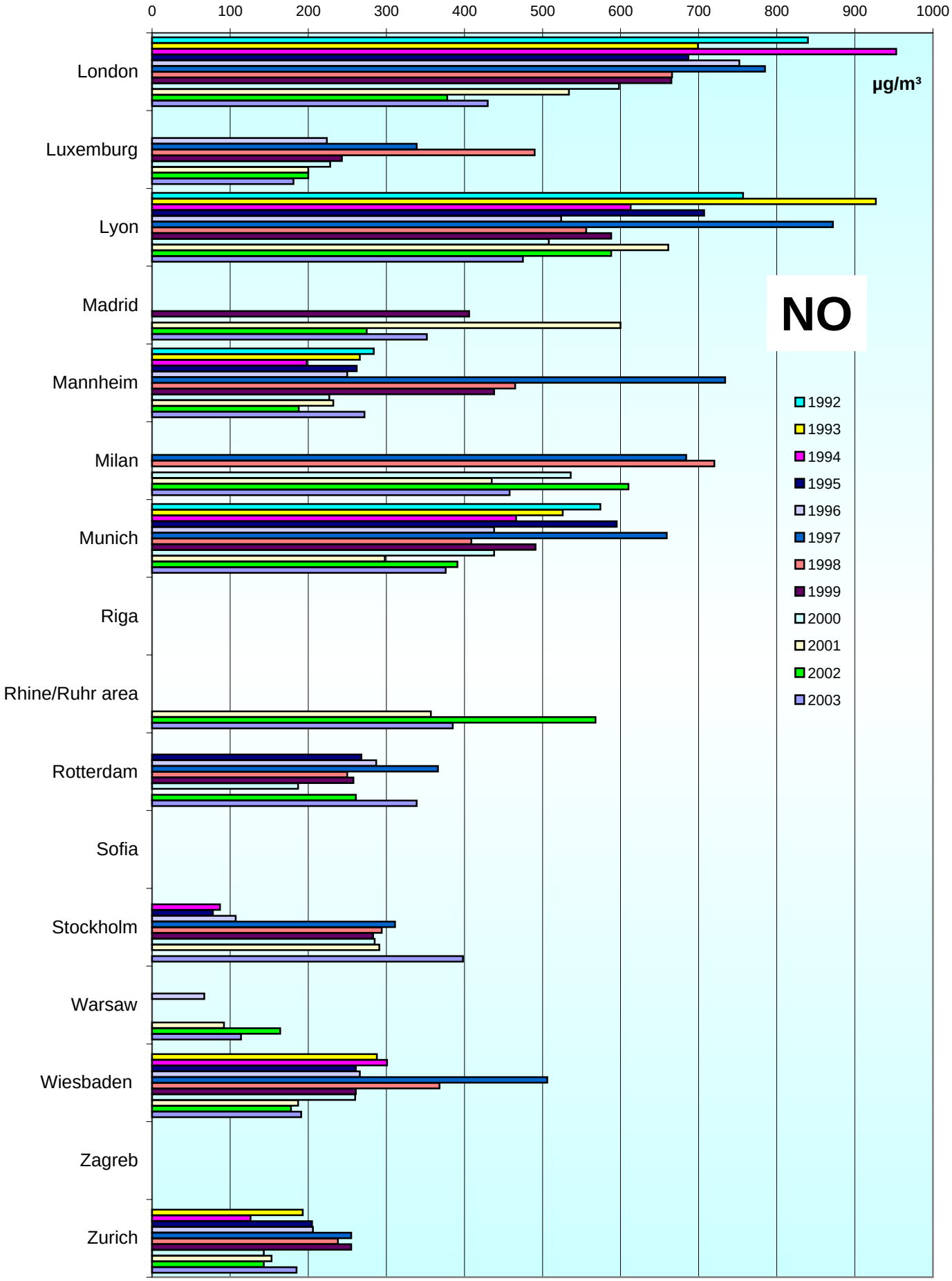
max. daily mean values

(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

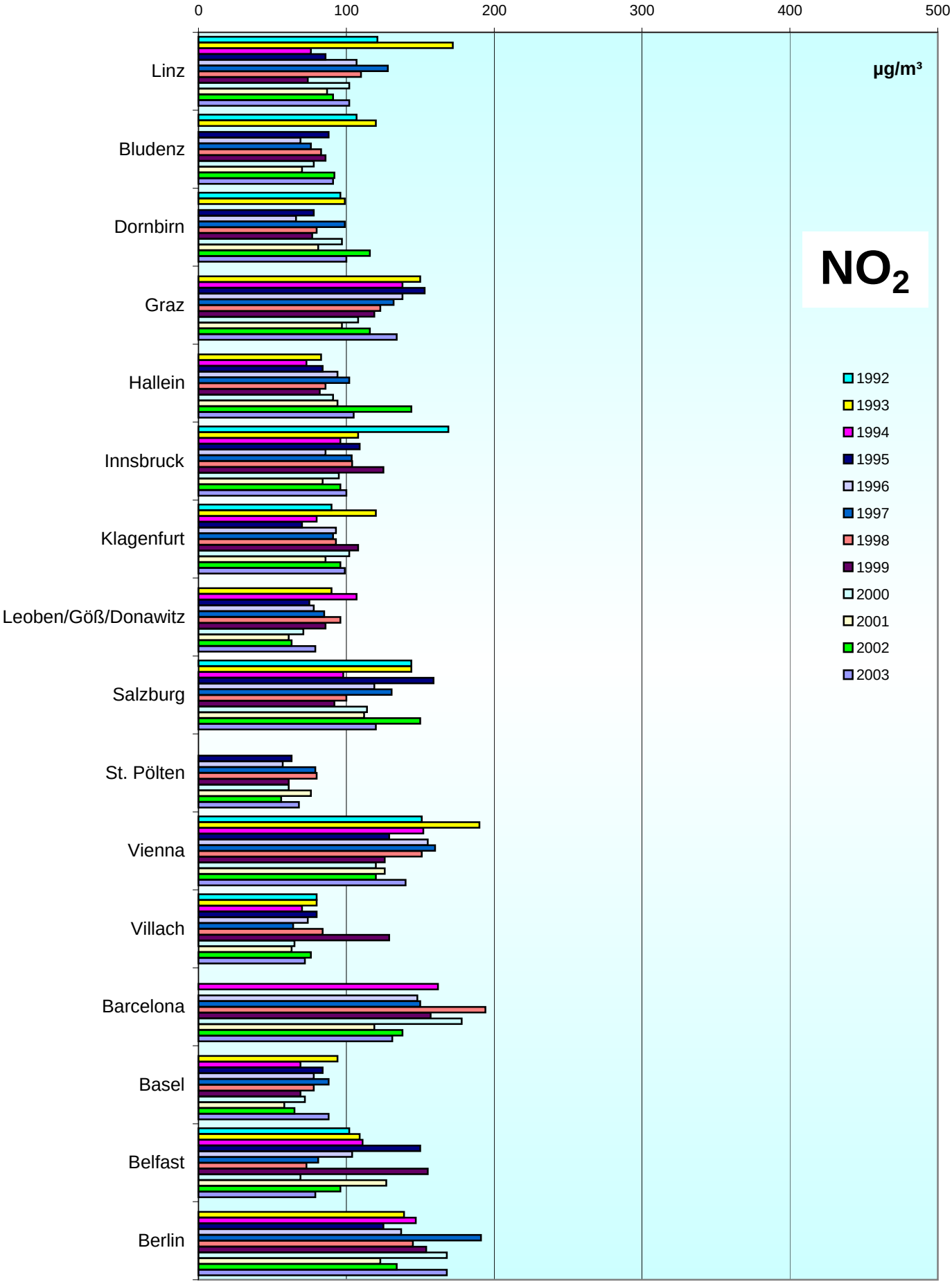
max. daily mean values
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

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

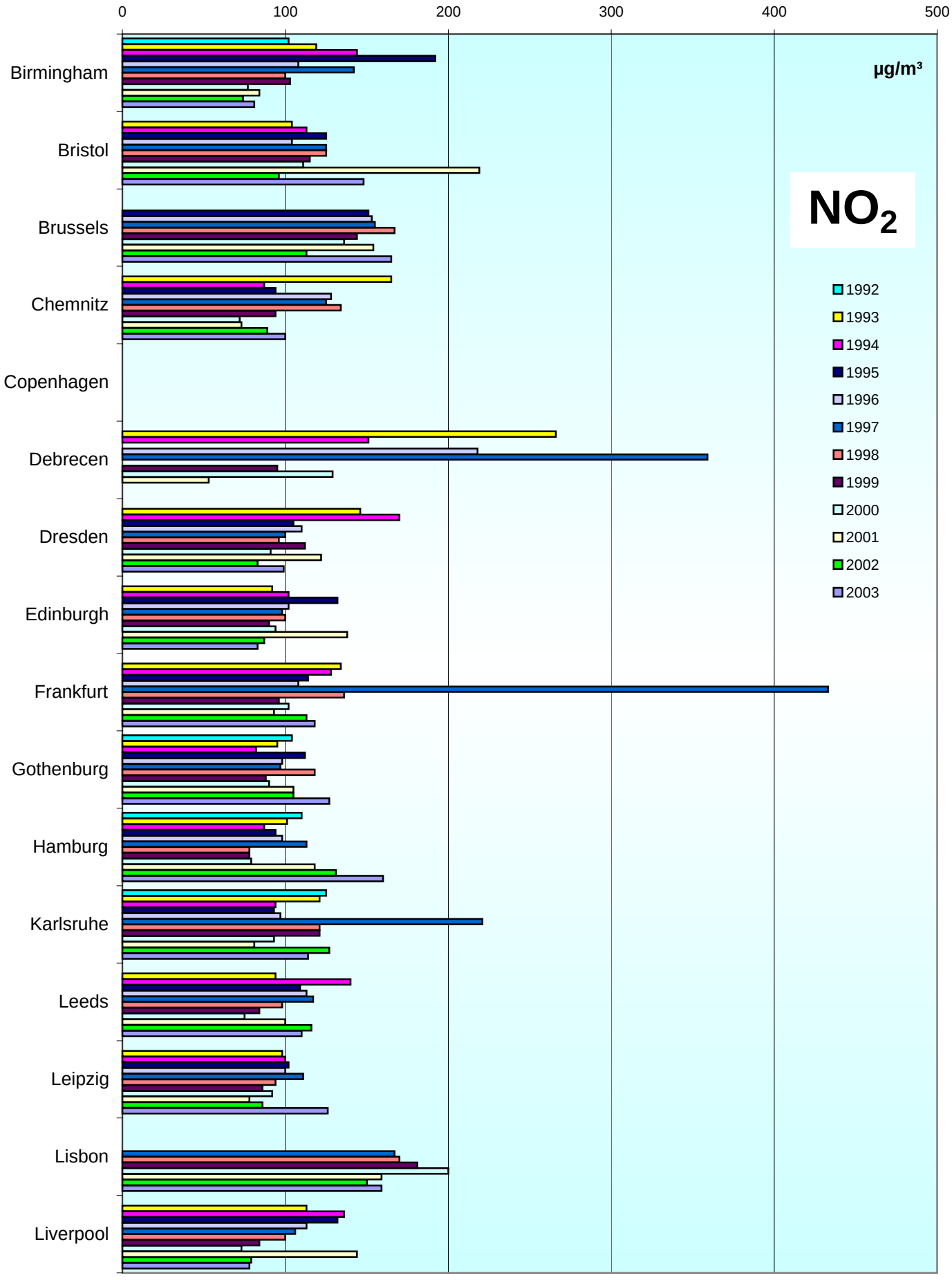
114



Comparison of The Air Quality 1992 - 2003

max. daily mean values

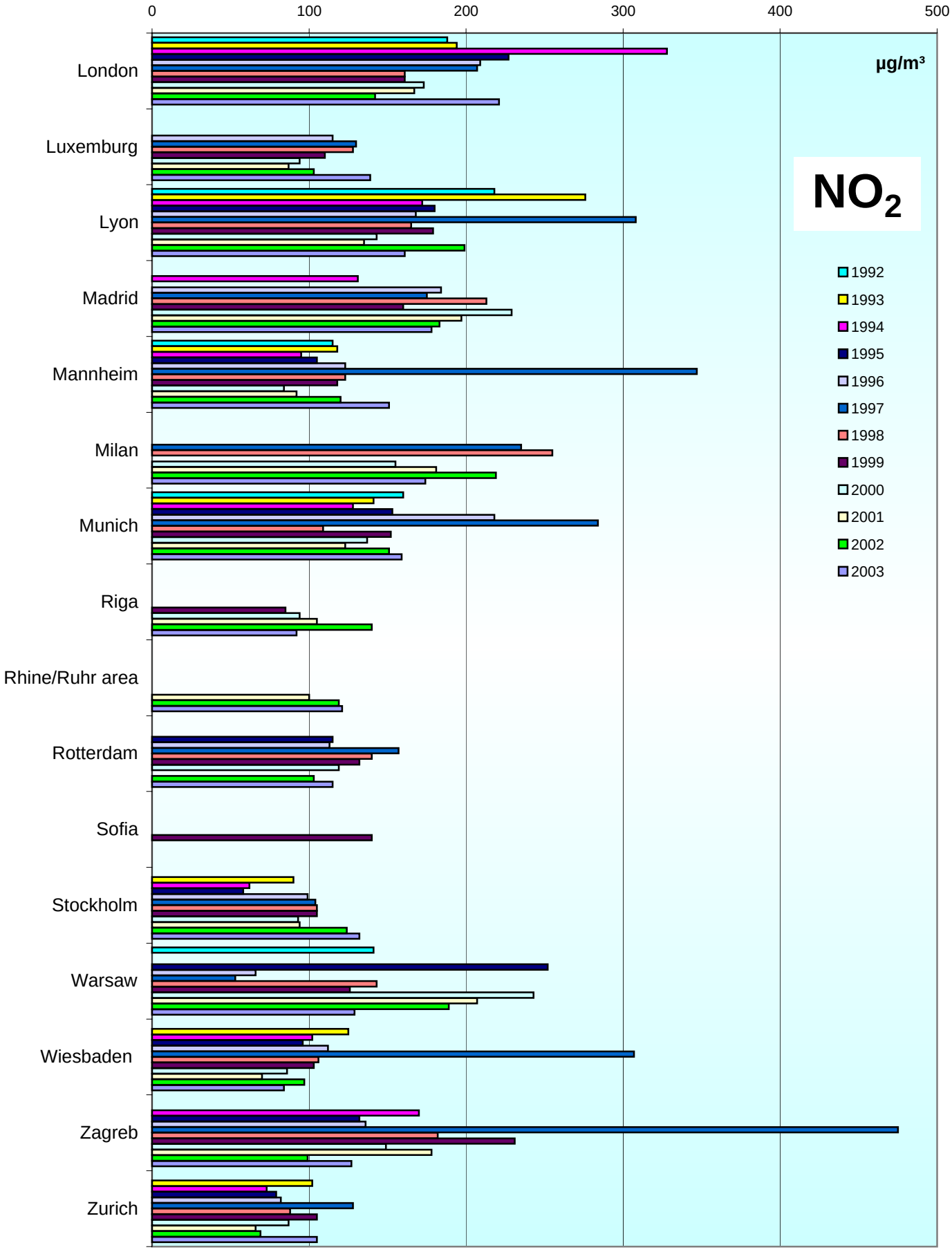
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

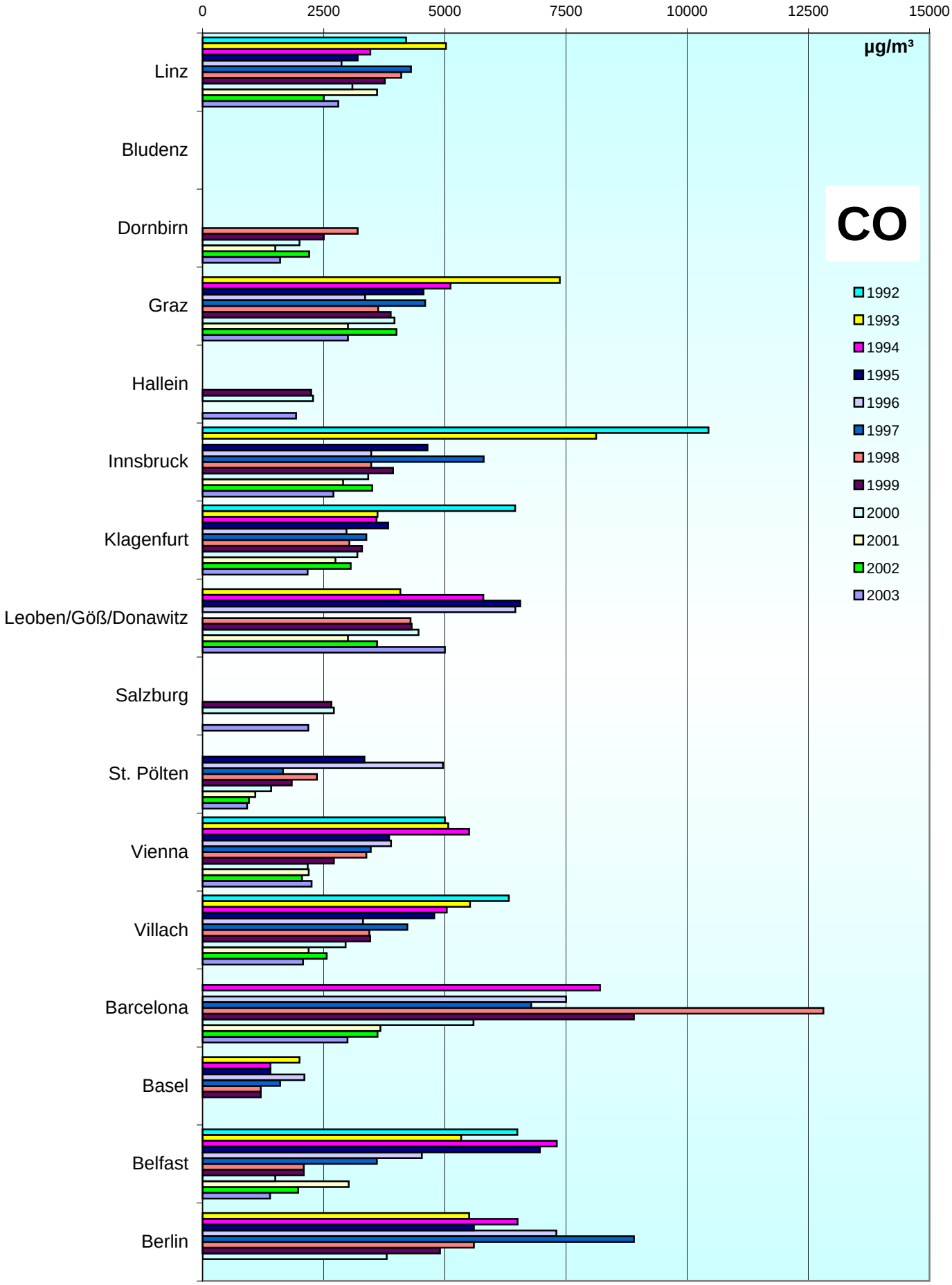
max. daily mean values

(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

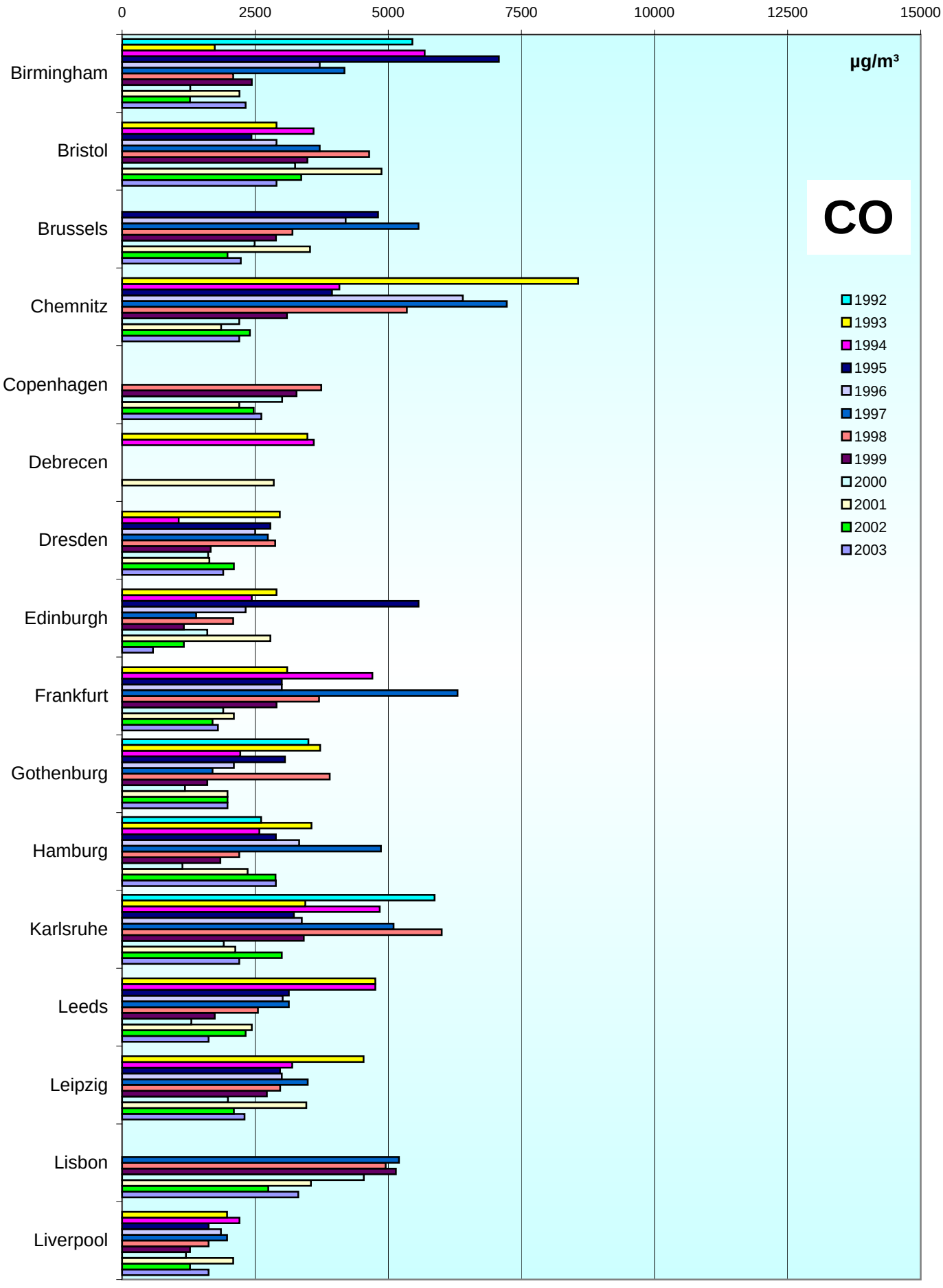
max. daily mean values
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

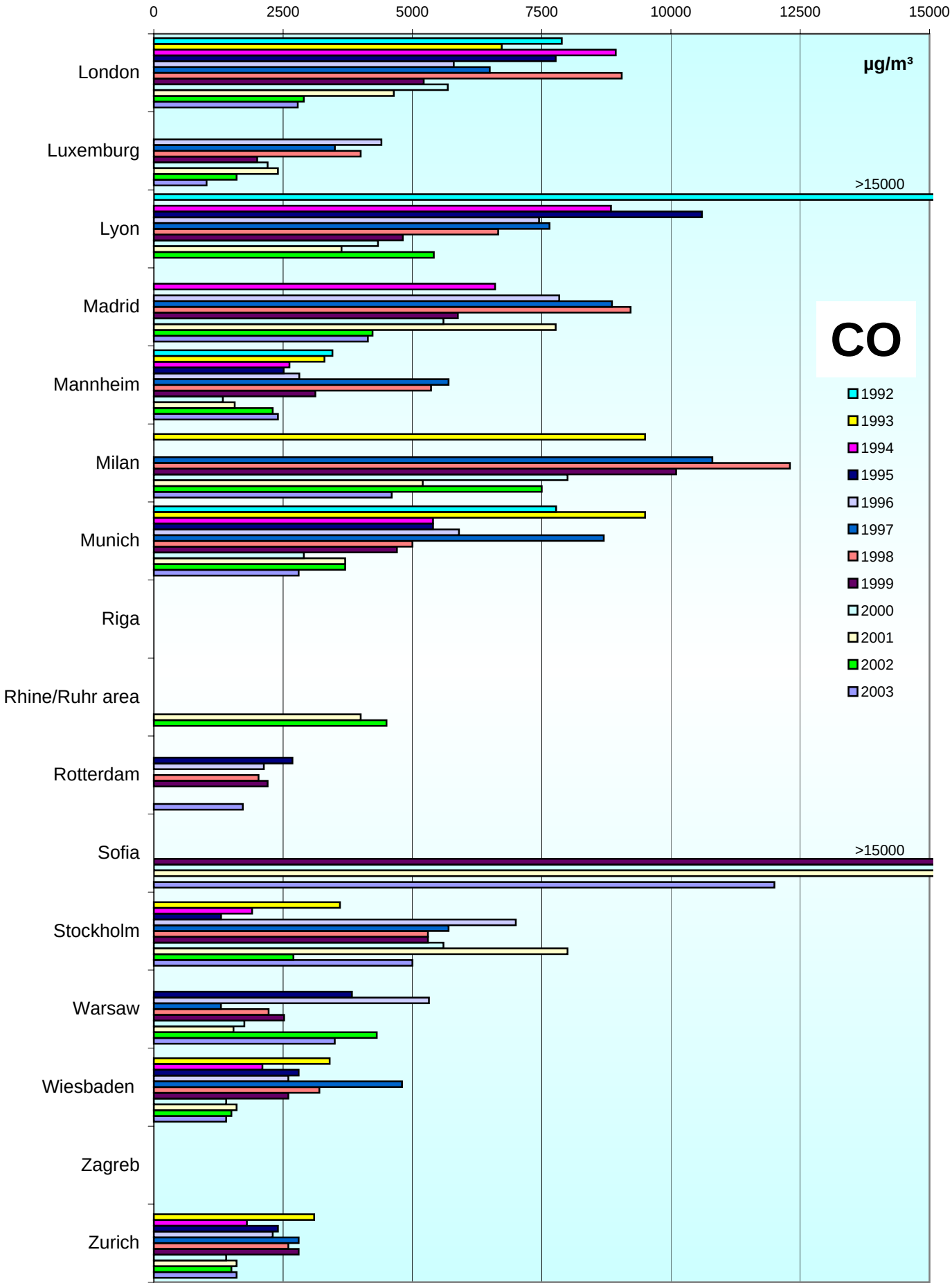
118

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



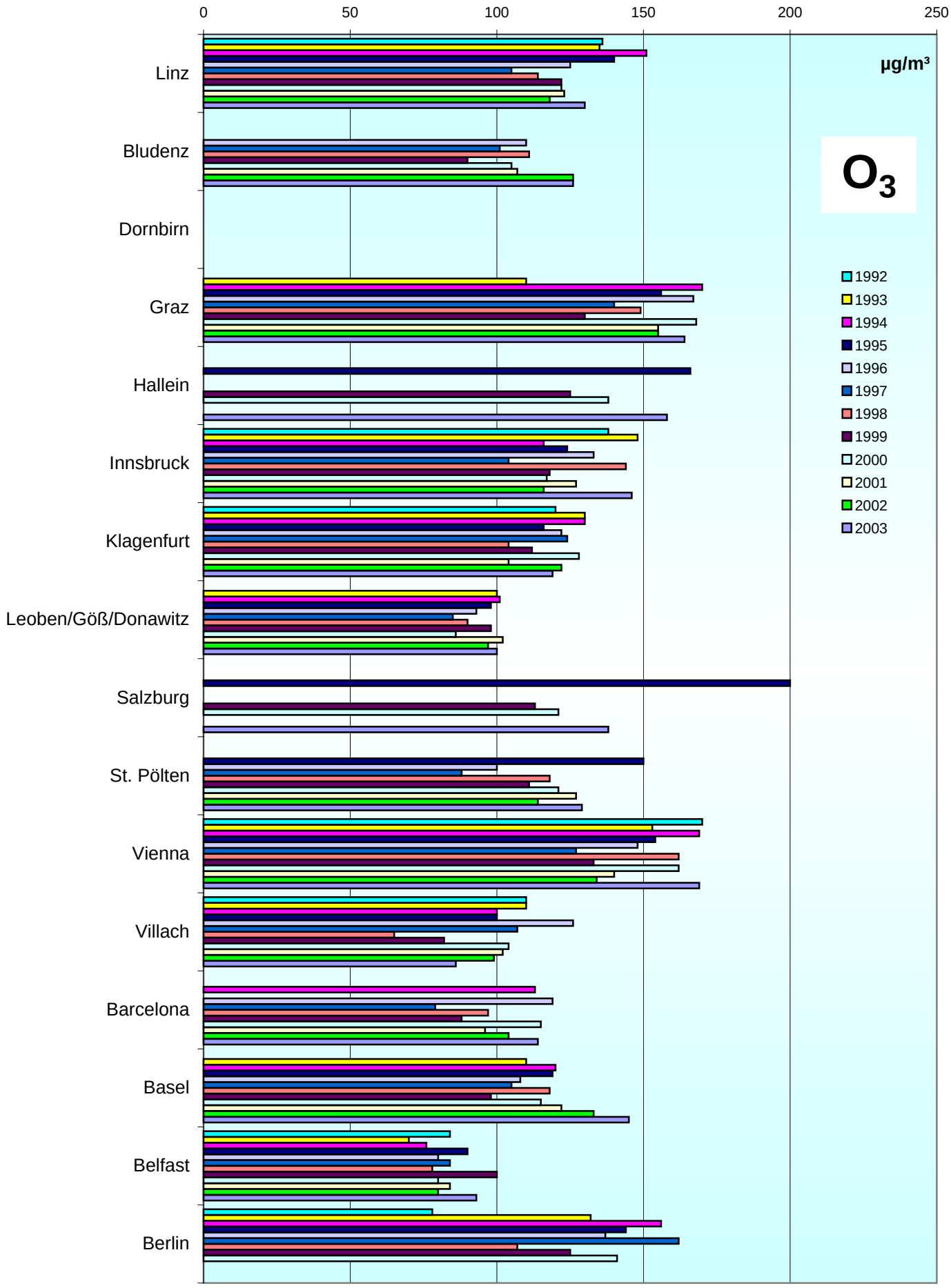
Comparison of The Air Quality 1992 - 2003

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



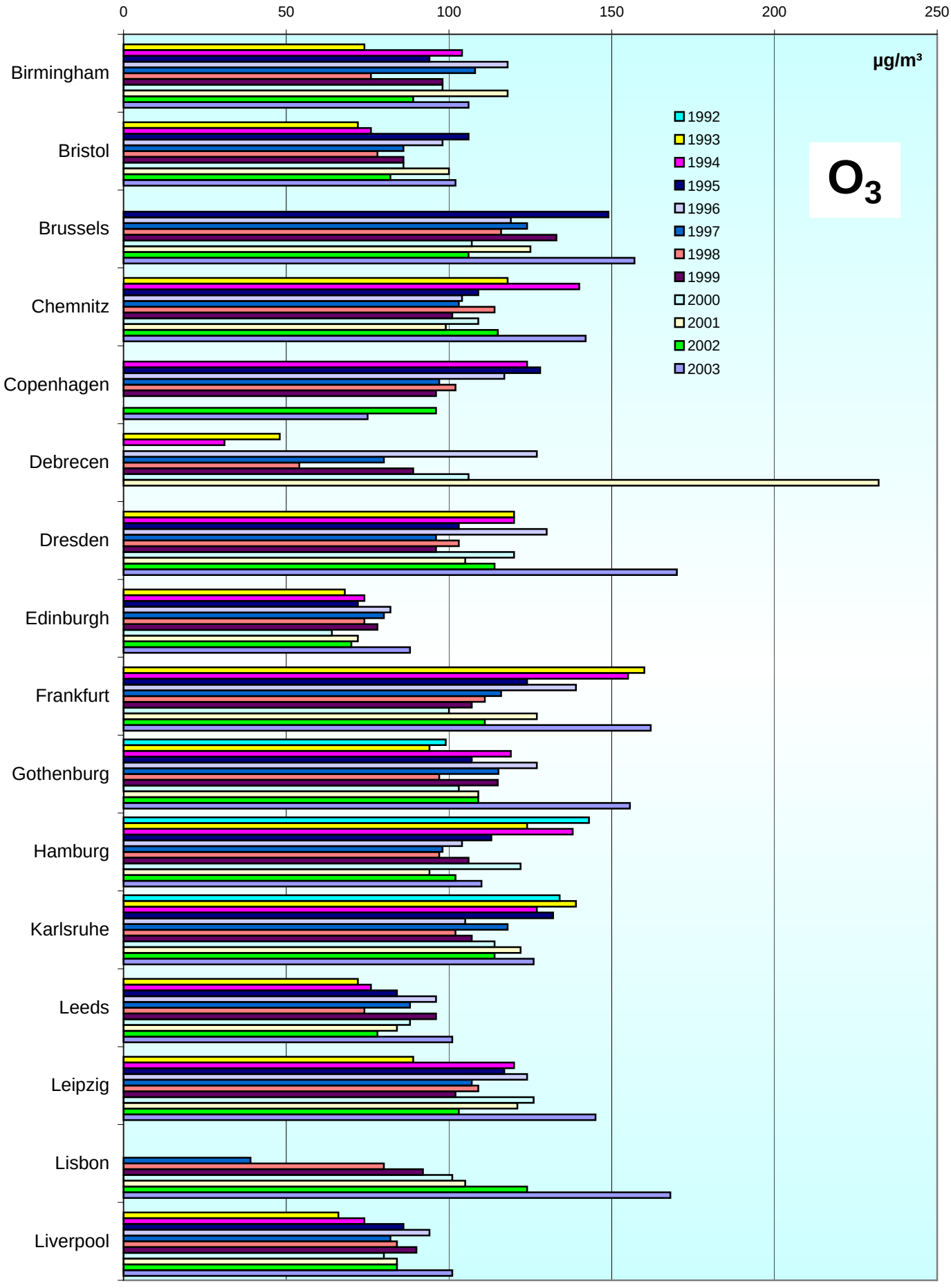
Comparison of The Air Quality 1992 - 2003

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



Comparison of The Air Quality 1992 - 2003

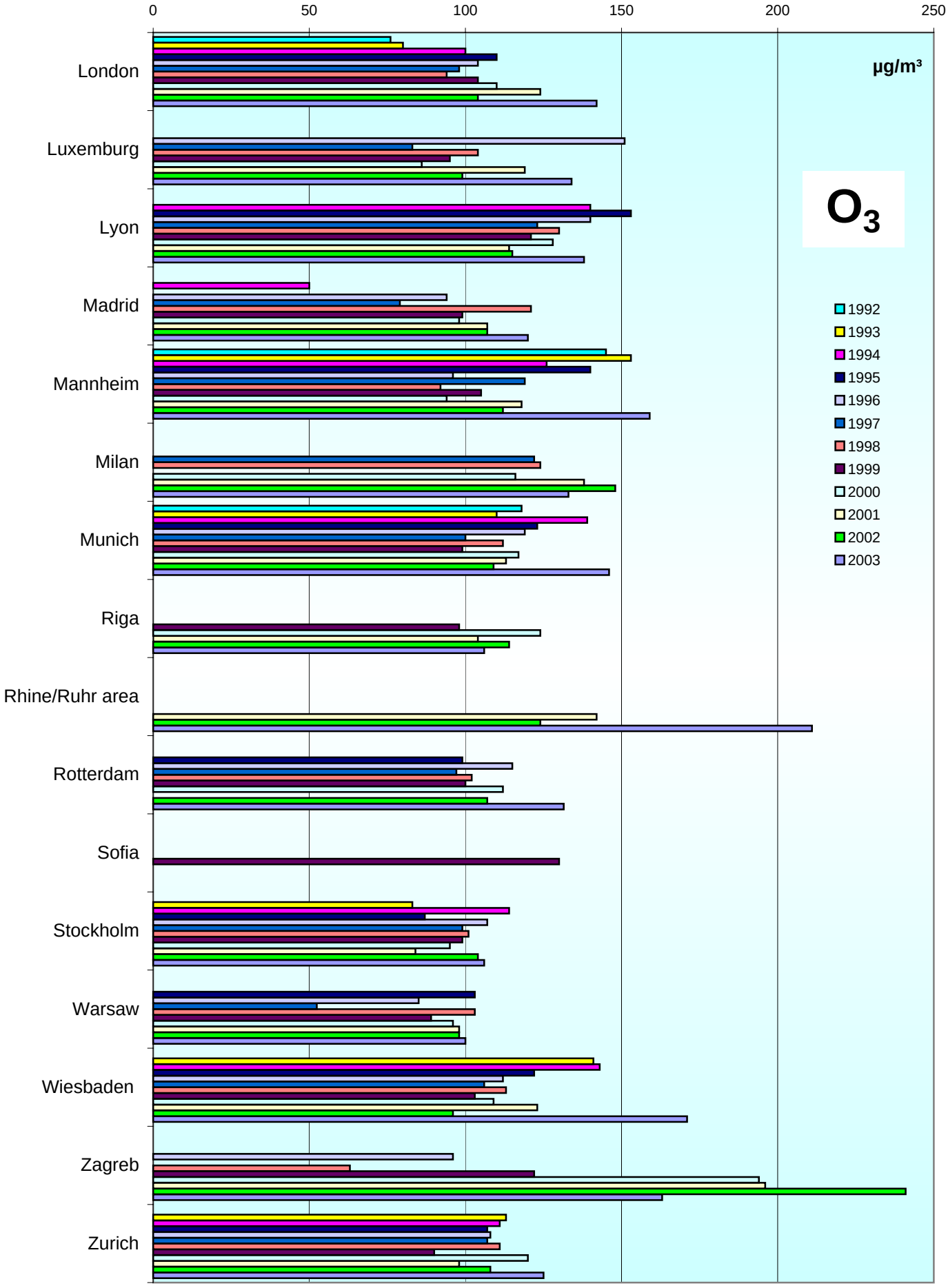
max. daily mean values
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

122

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



Jahresvergleich

1992-2003

max. 98-Percentile

Comparison of The Air Quality Over The Years

1992-2003

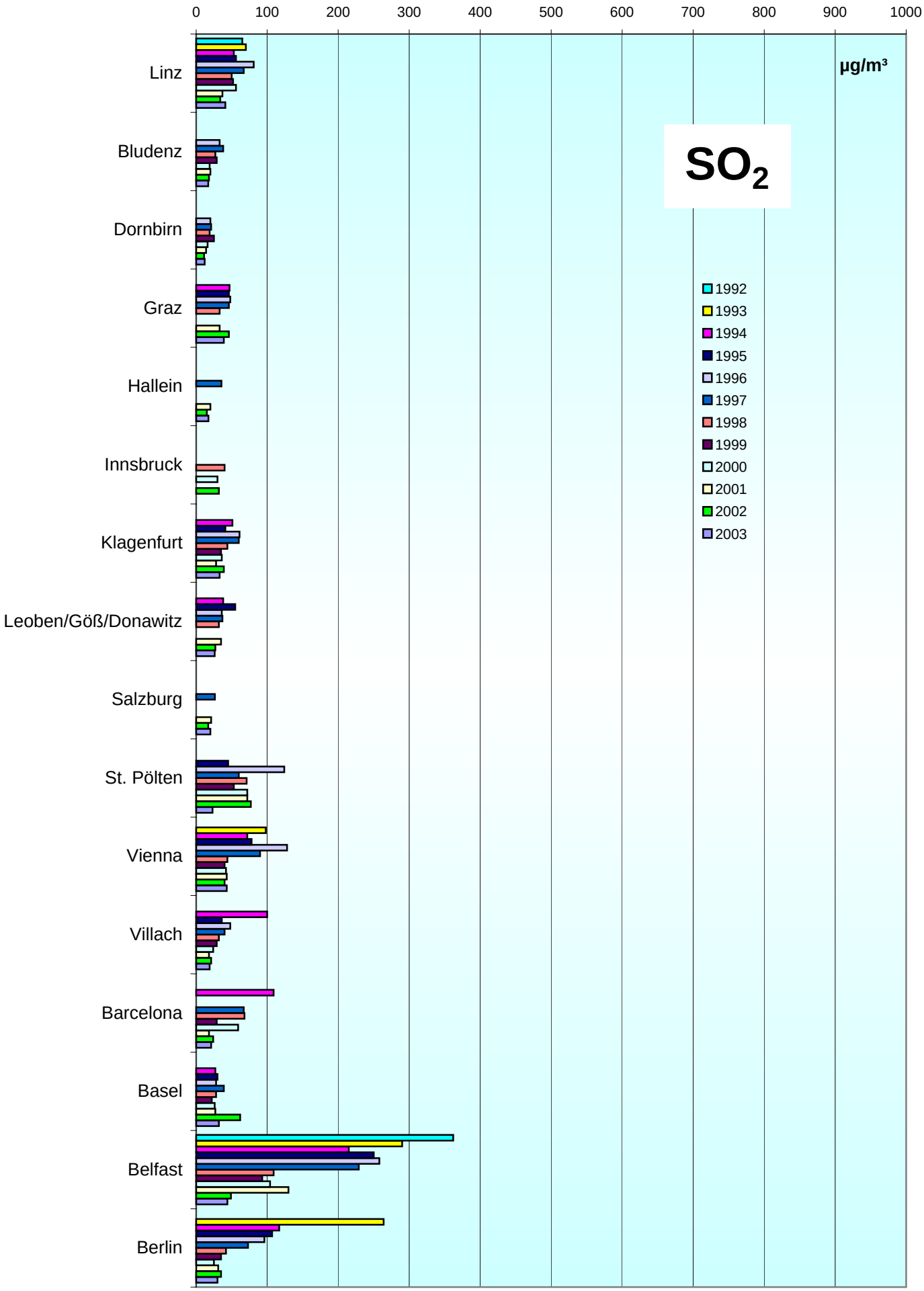
Max. 98-Percentiles

Comparison of The Air Quality 1992 - 2003

max. 98 percentile

(peak-stressed monitoring station)

124



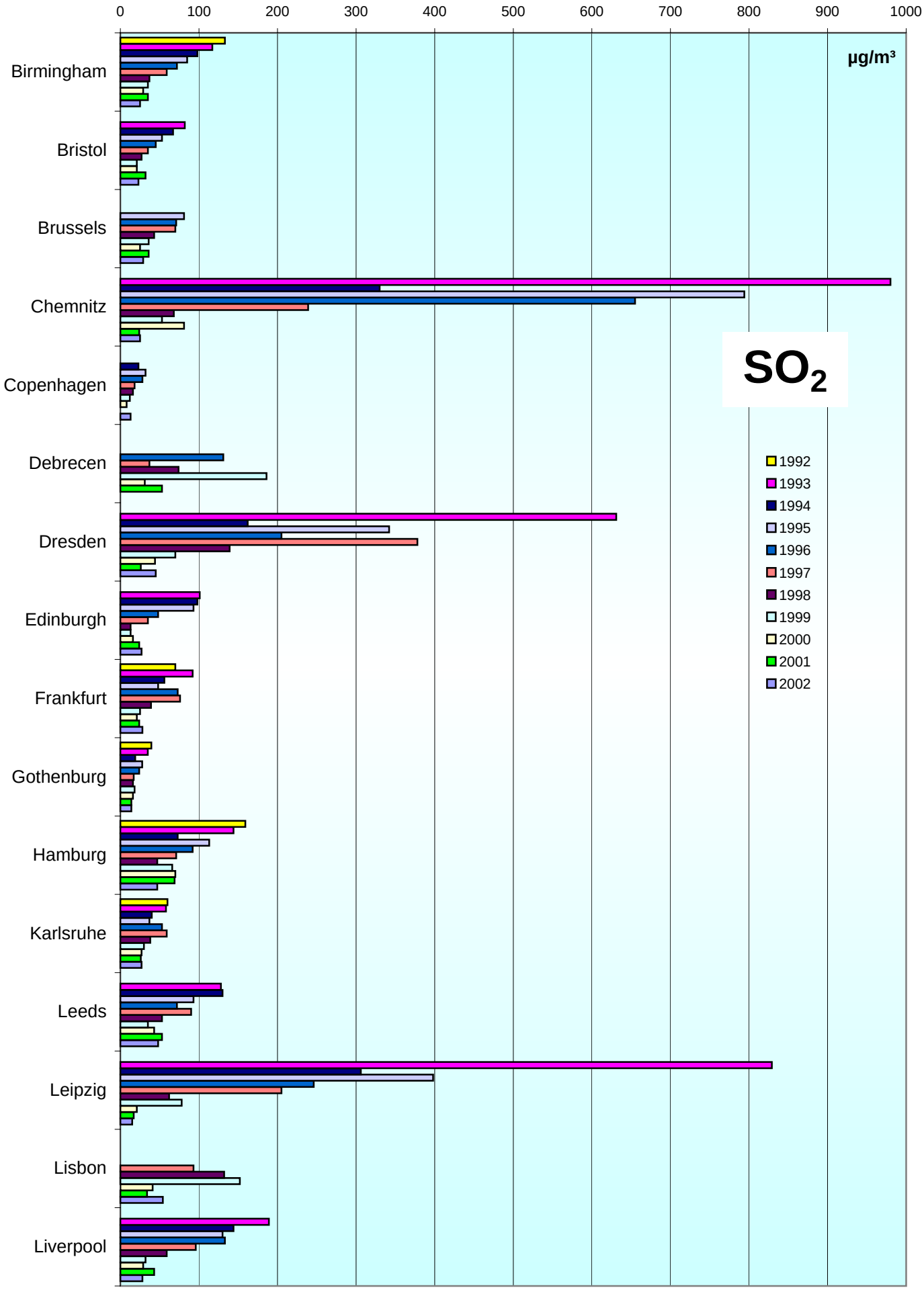
MAGISTRAT LINZ - Amt für Natur- und Umweltschutz

S:\anu\Abteilung\MU\Immission\Städtevergleich\2003\Tabellen, Grafiken\Entwicklung 1992....\[Entwicklung SO2.xls]max. 98%-Linz bis Berlin

Comparison of The Air Quality 1992 - 2003

max. 98 percentile

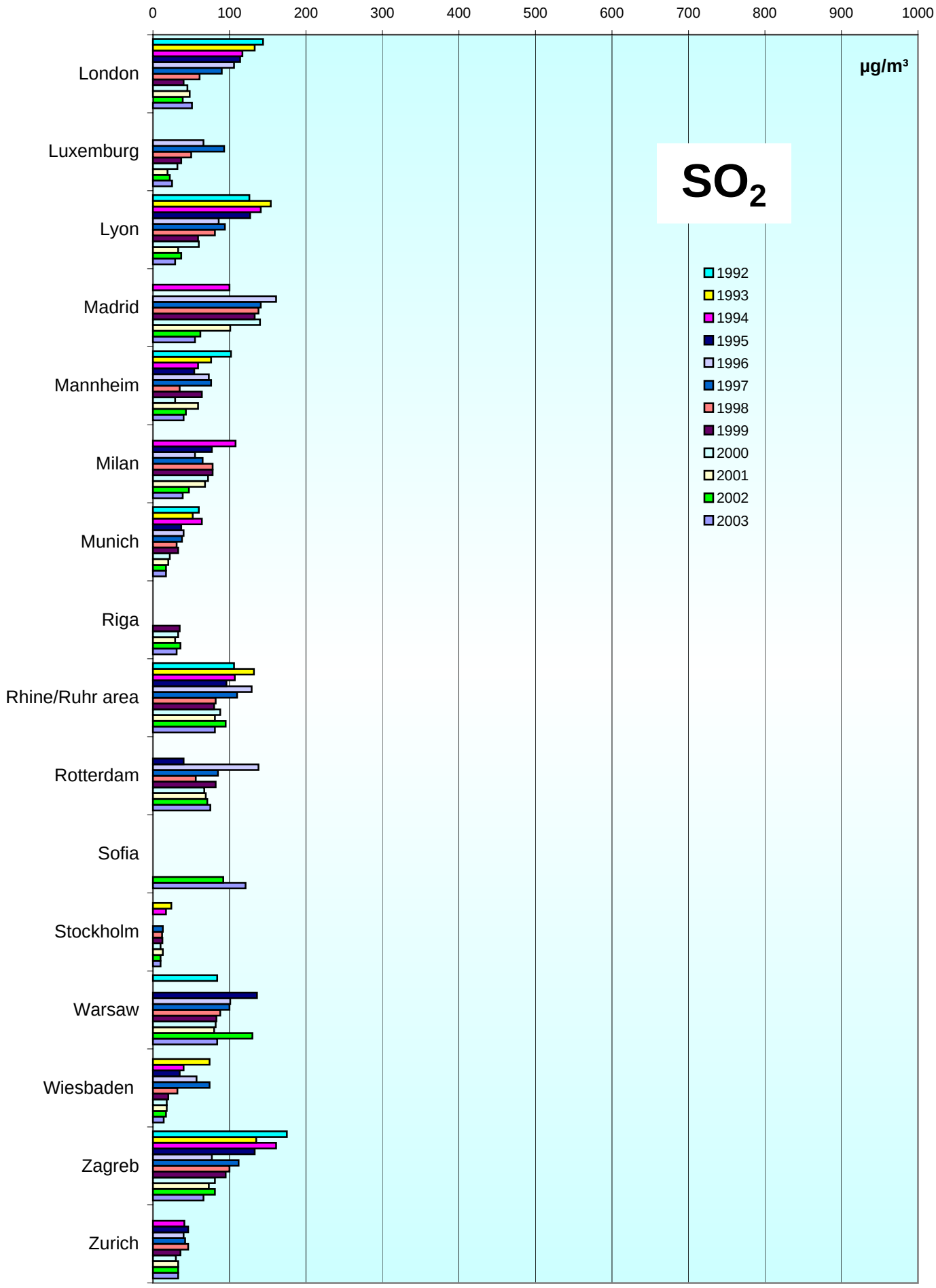
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

max. 98 percentile

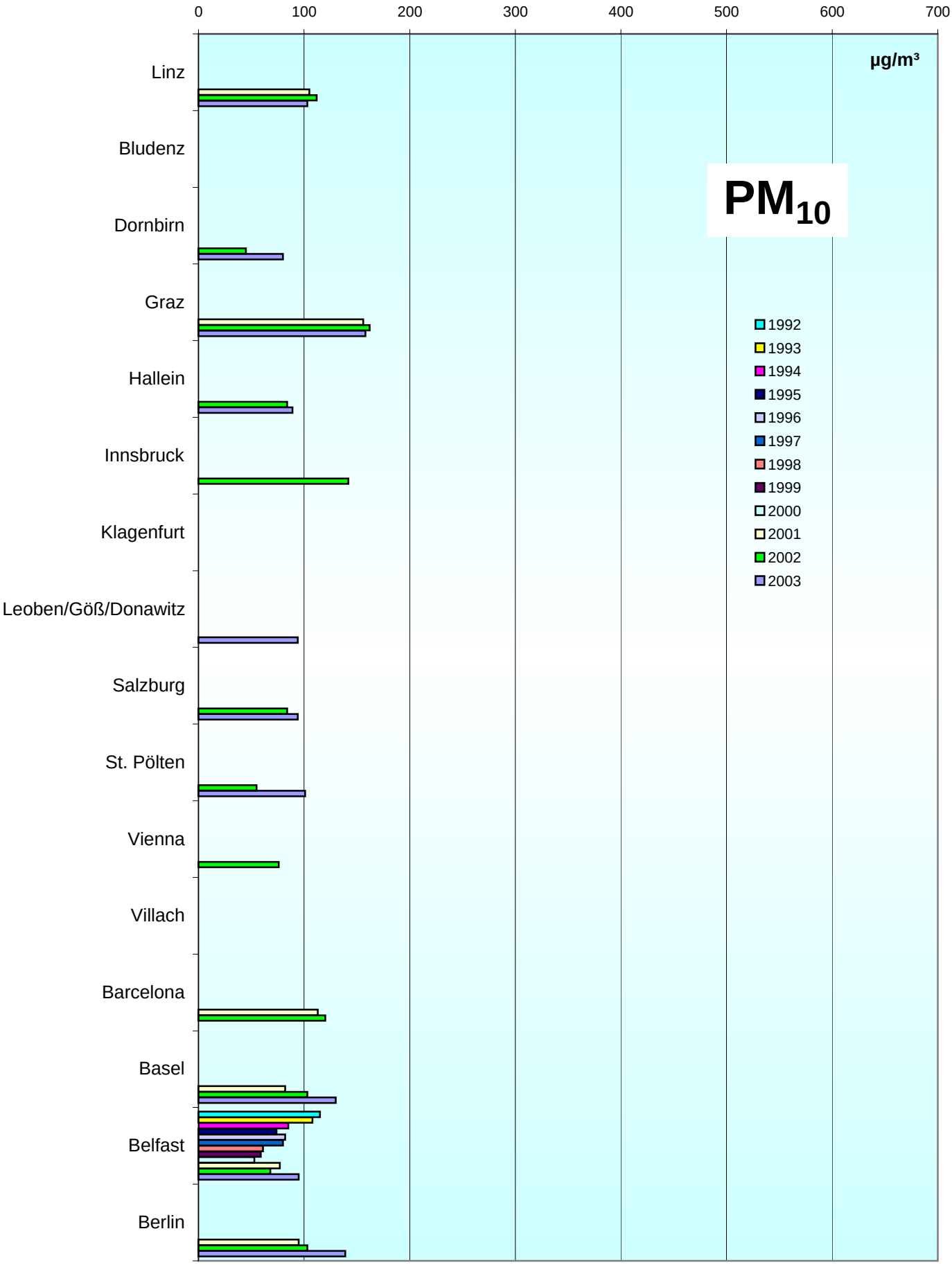
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2002

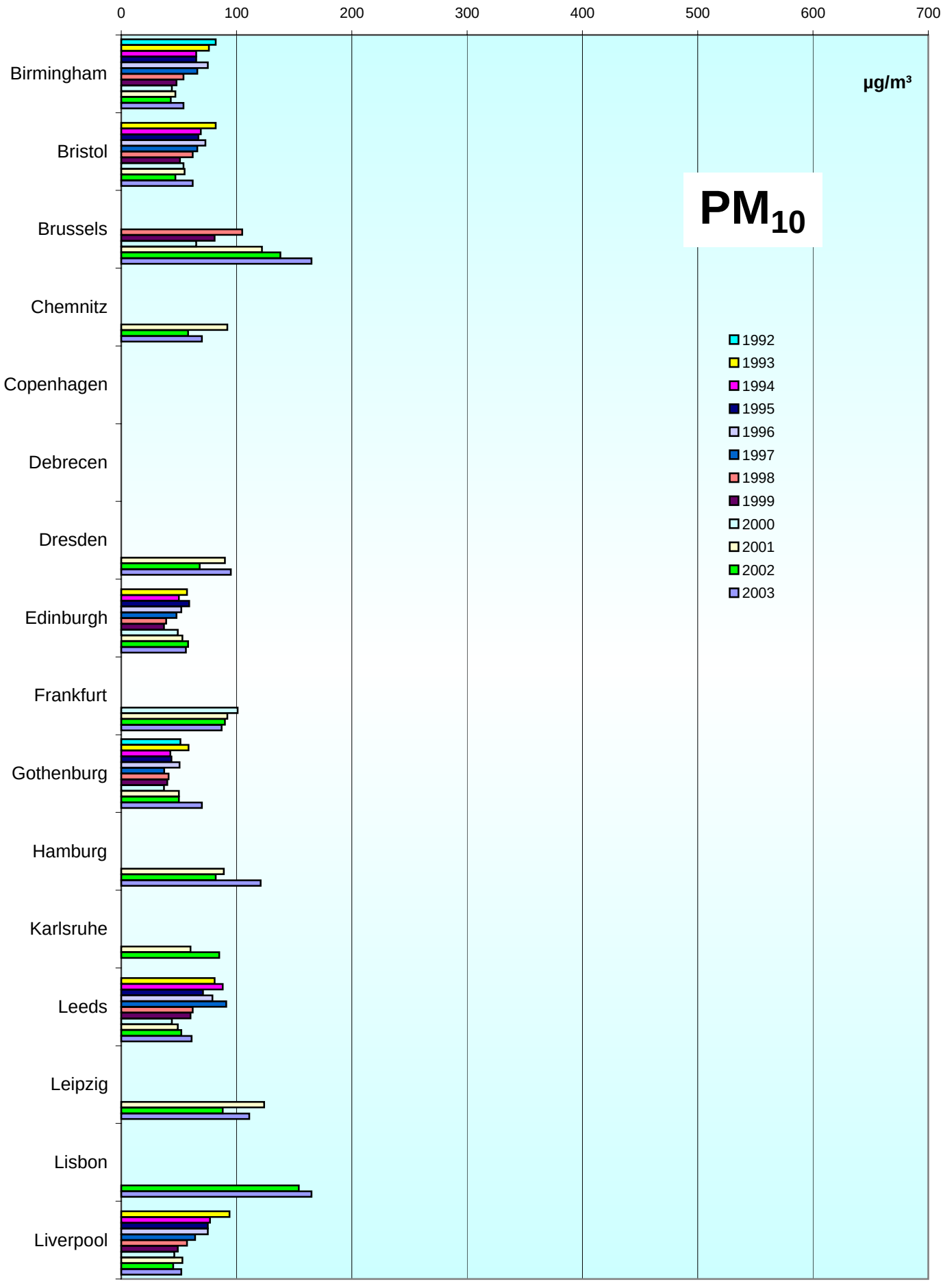
max. 98 percentile

(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

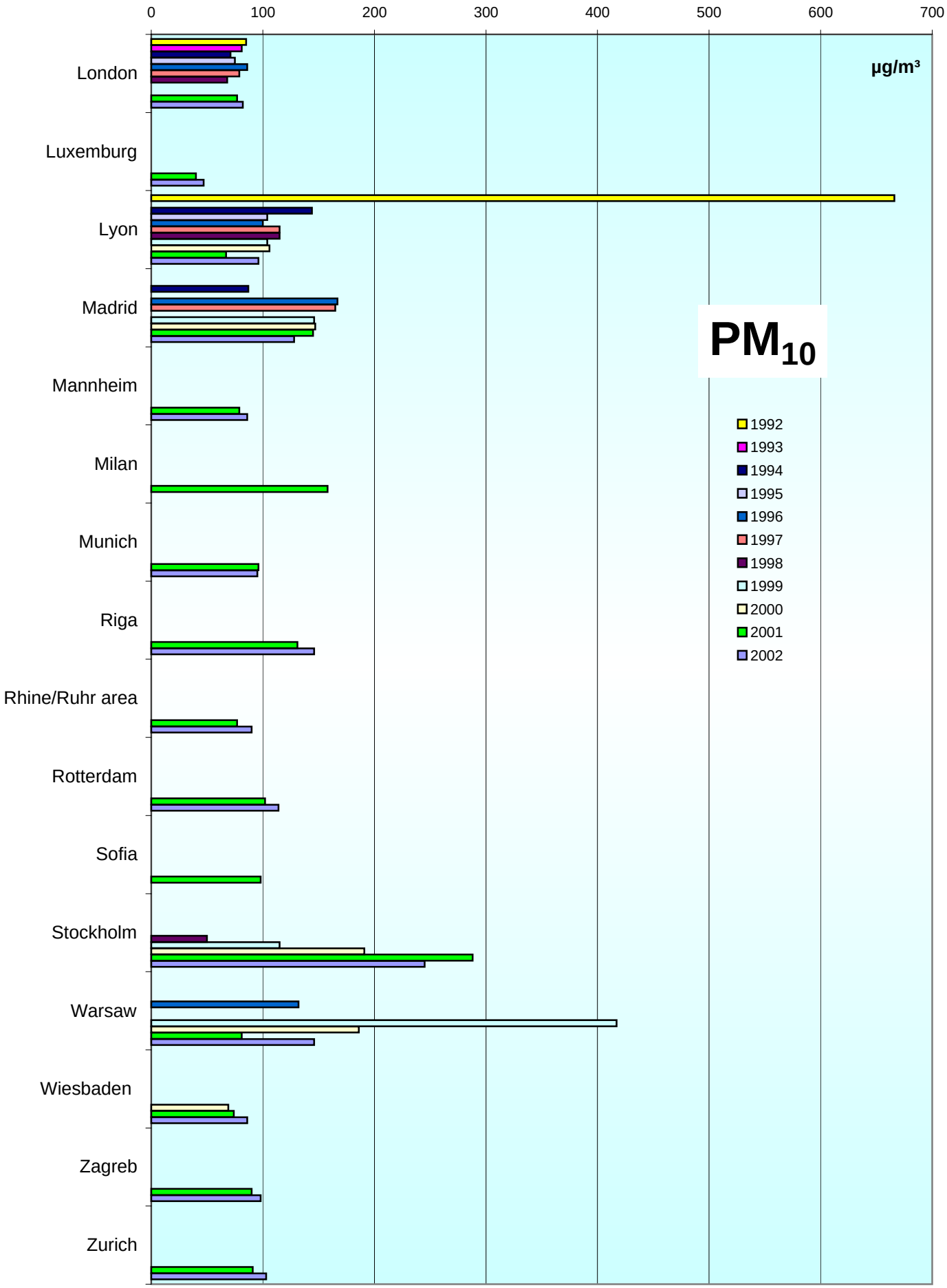
max. 98 percentile
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

max. 98 percentile

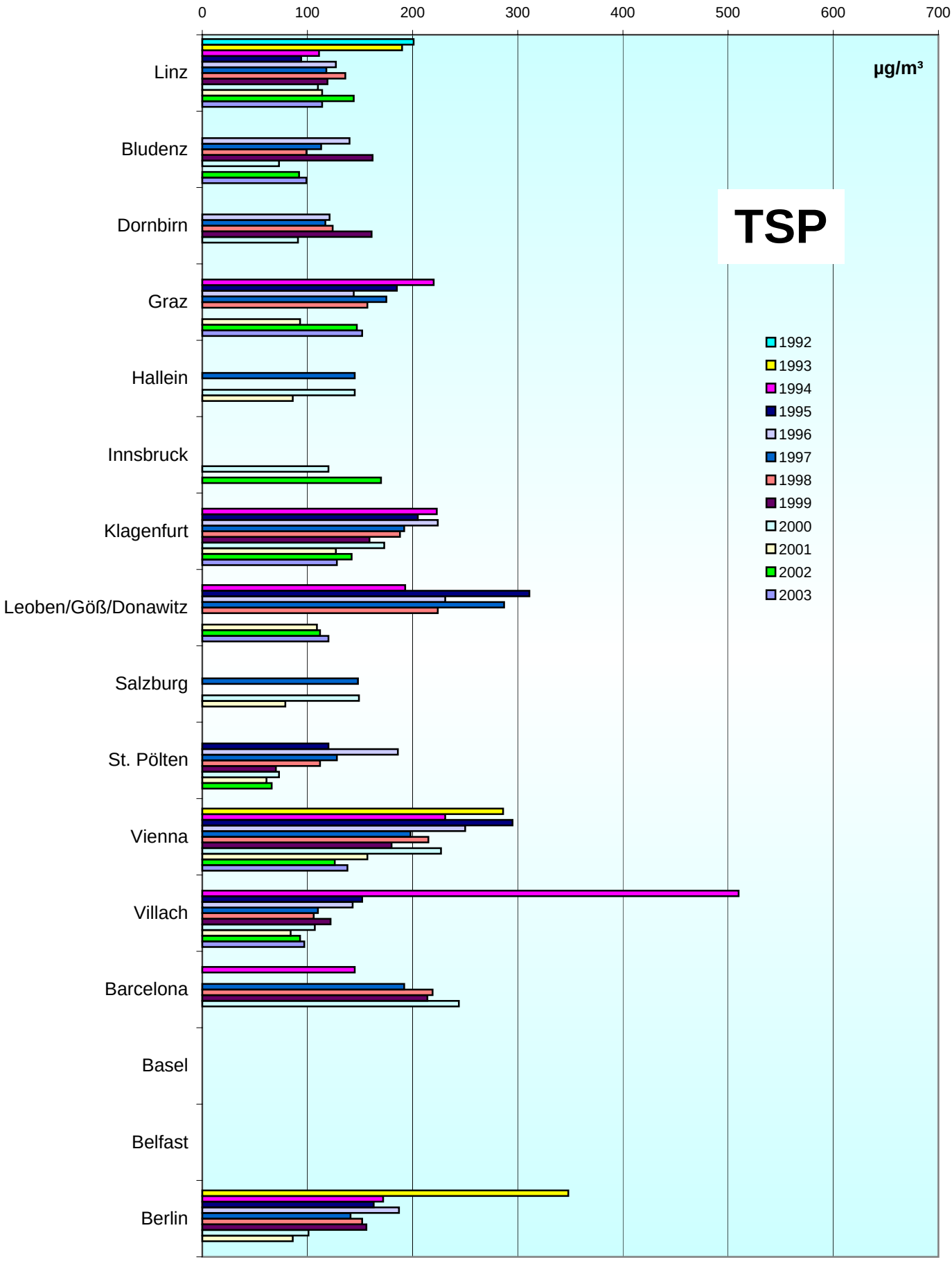
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

max. 98 percentile

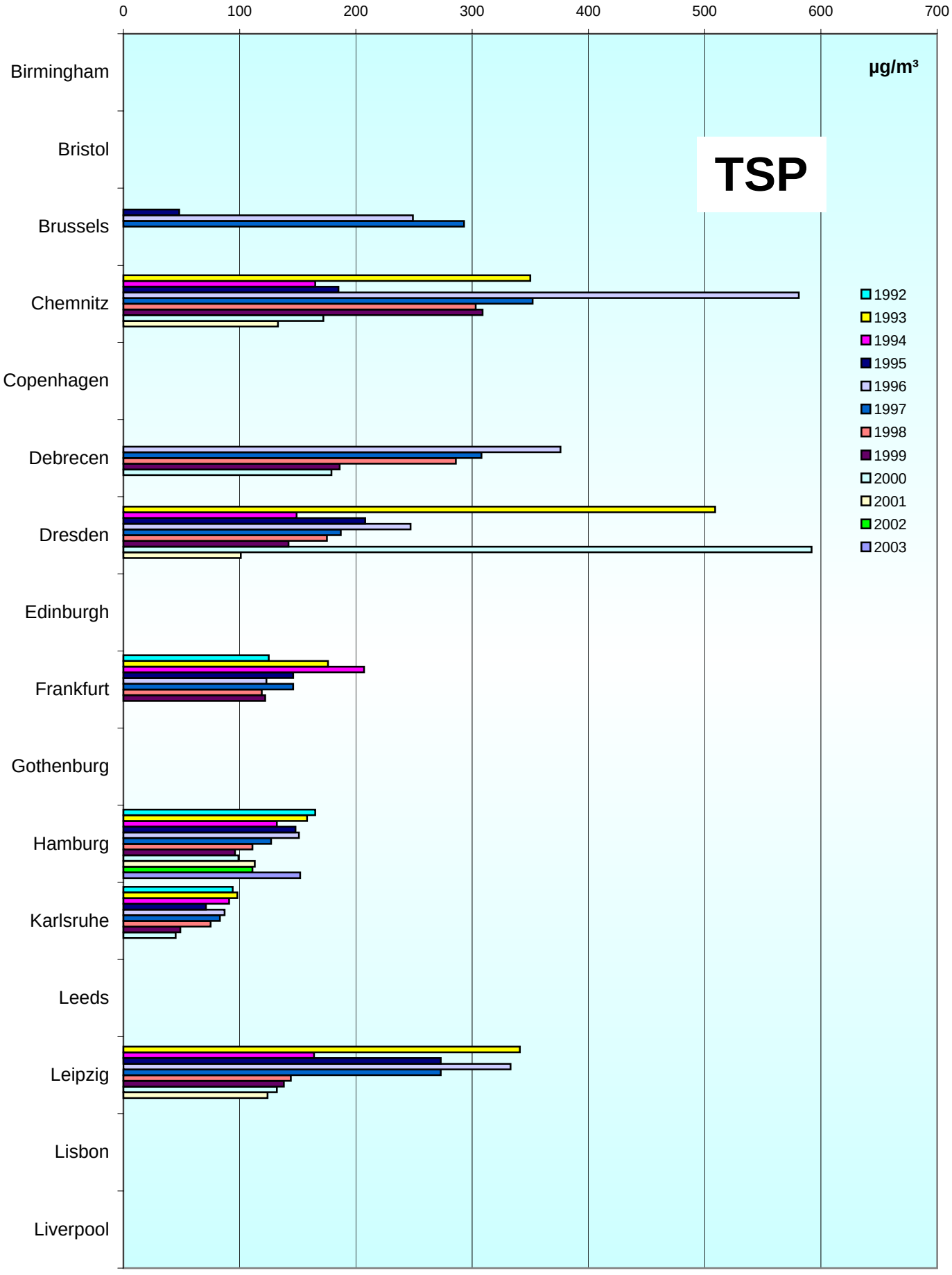
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

max. 98 percentile

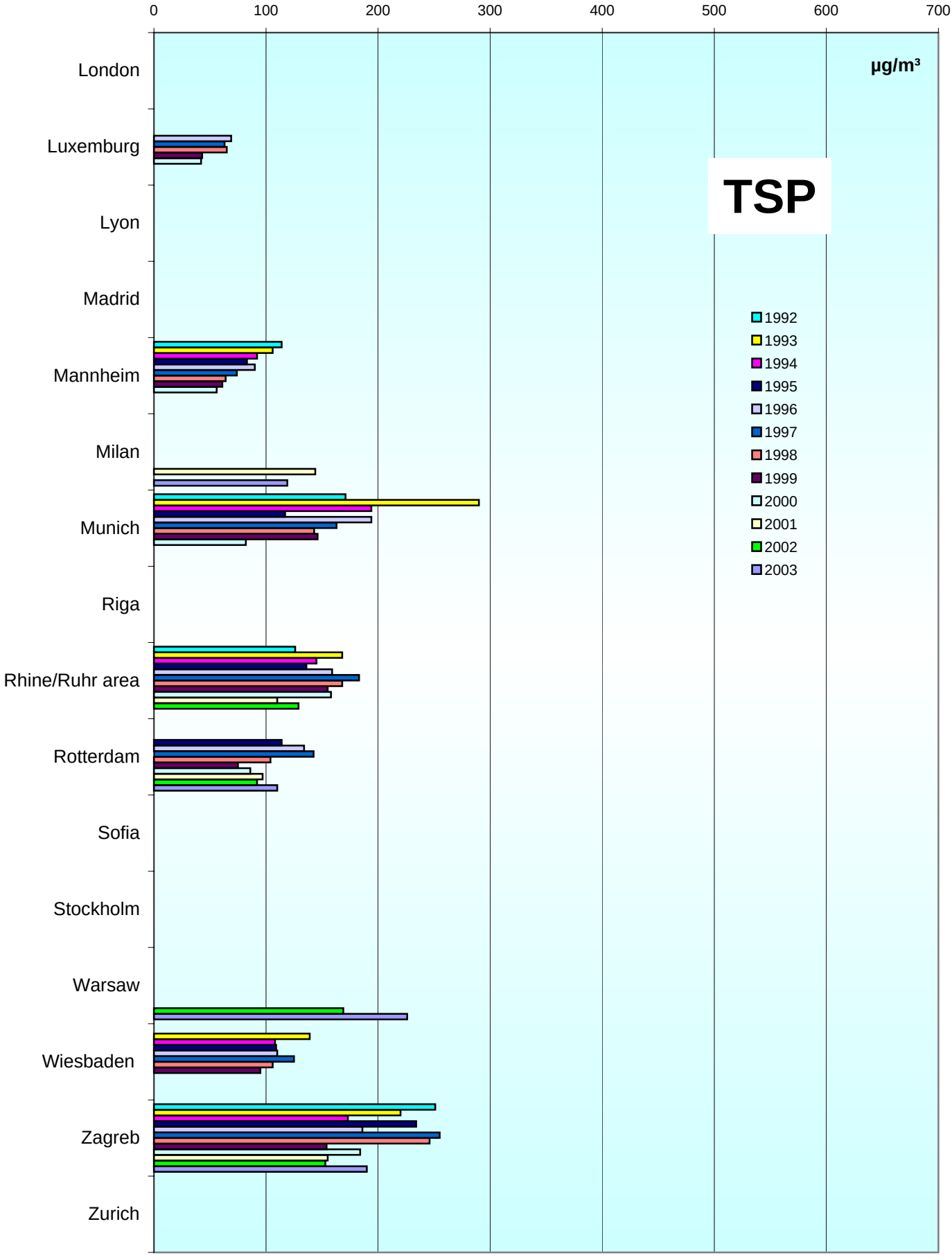
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

max. 98 percentile

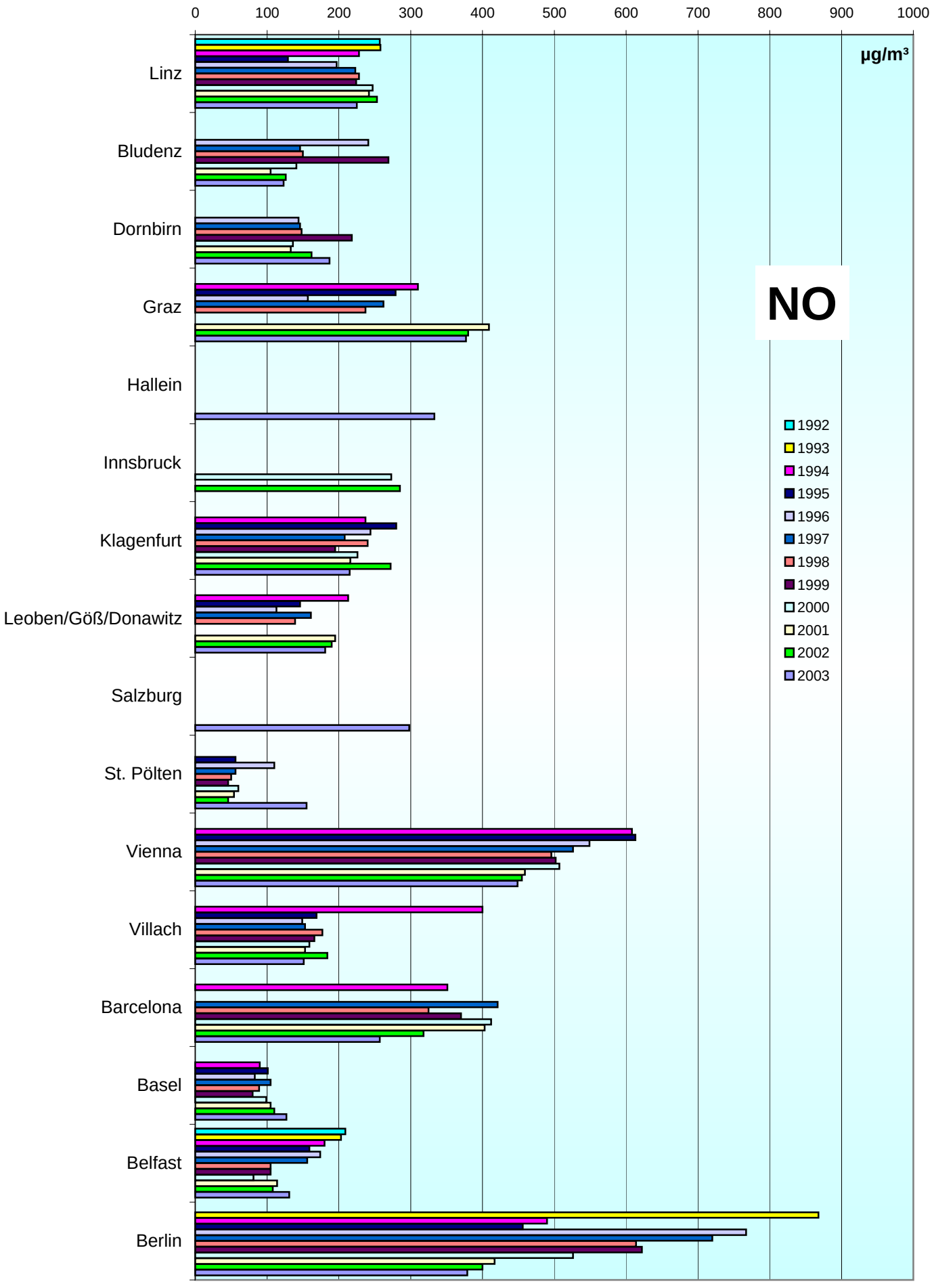
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

max. 98 percentile

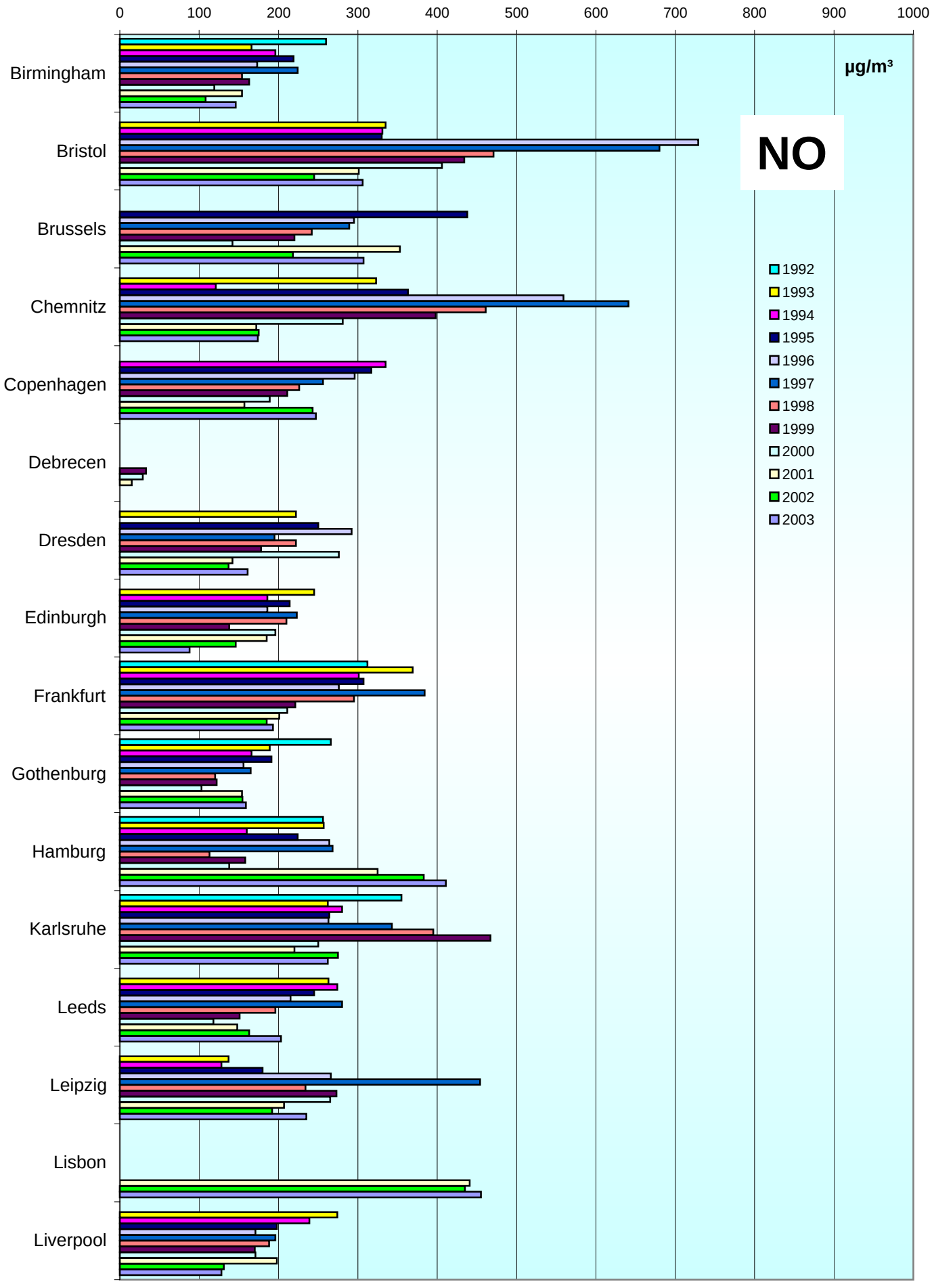
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

max. 98 percentile

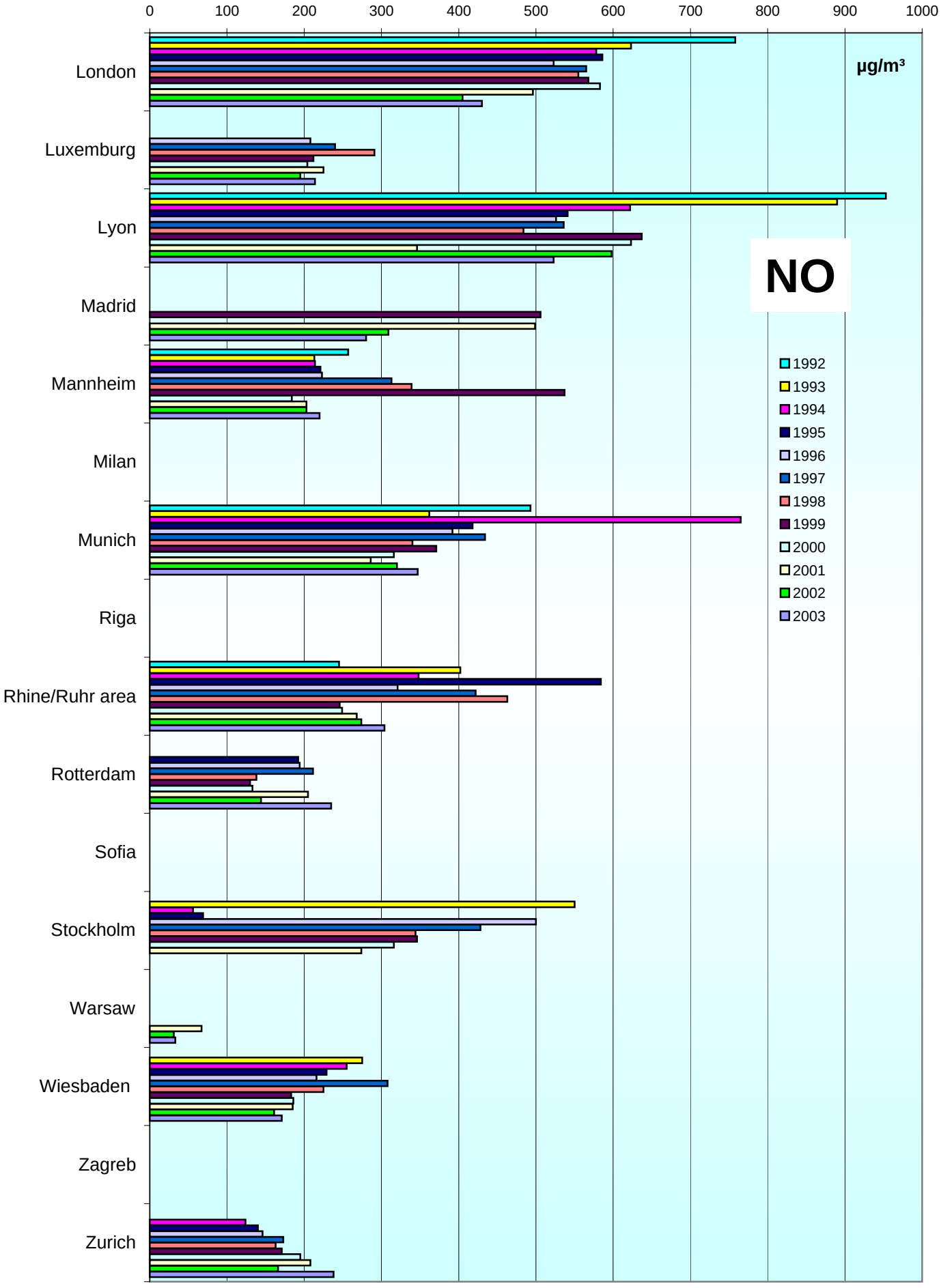
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

max. 98 percentile

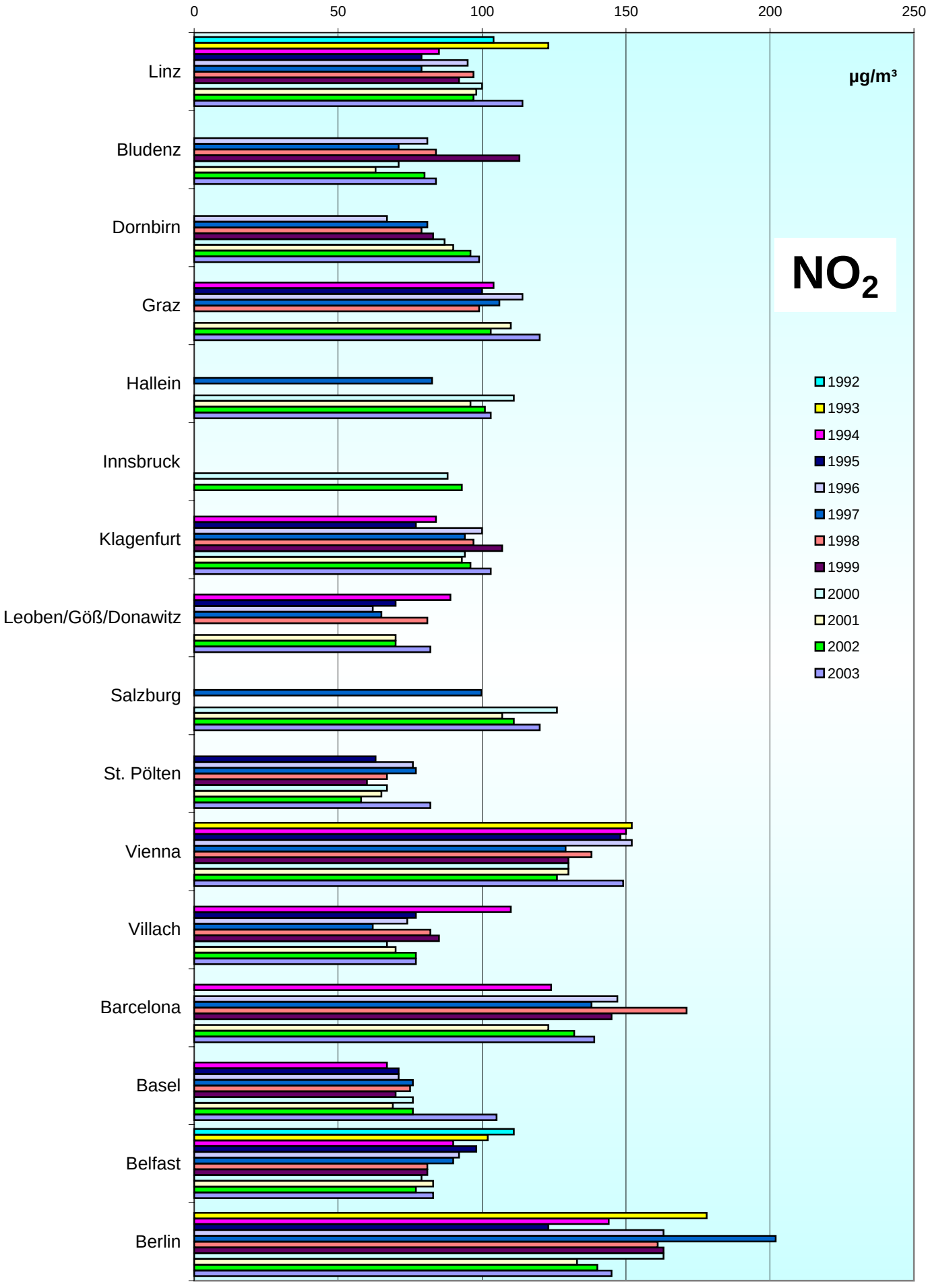
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

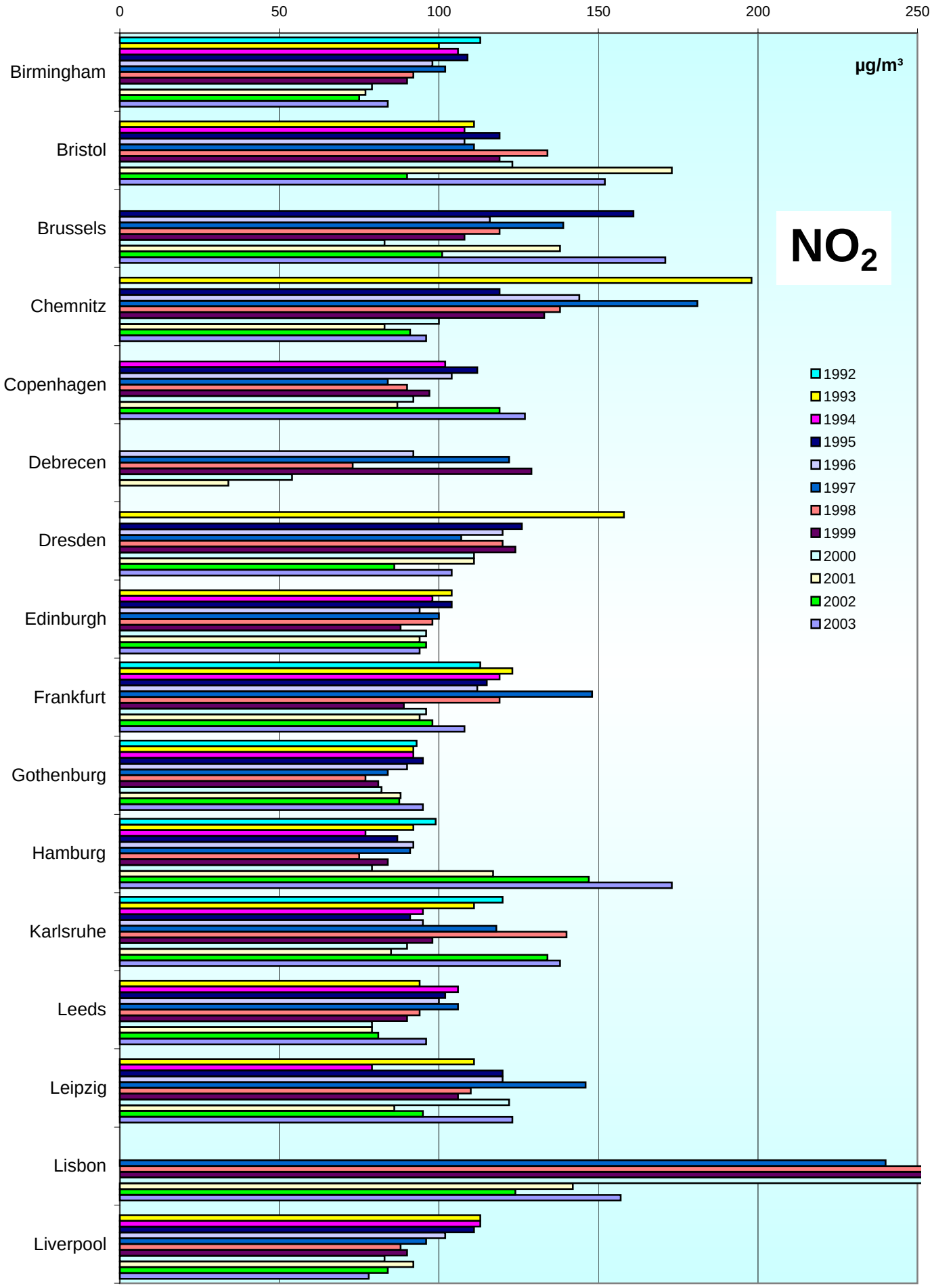
max. 98 percentile

(peak-stressed monitoring station)



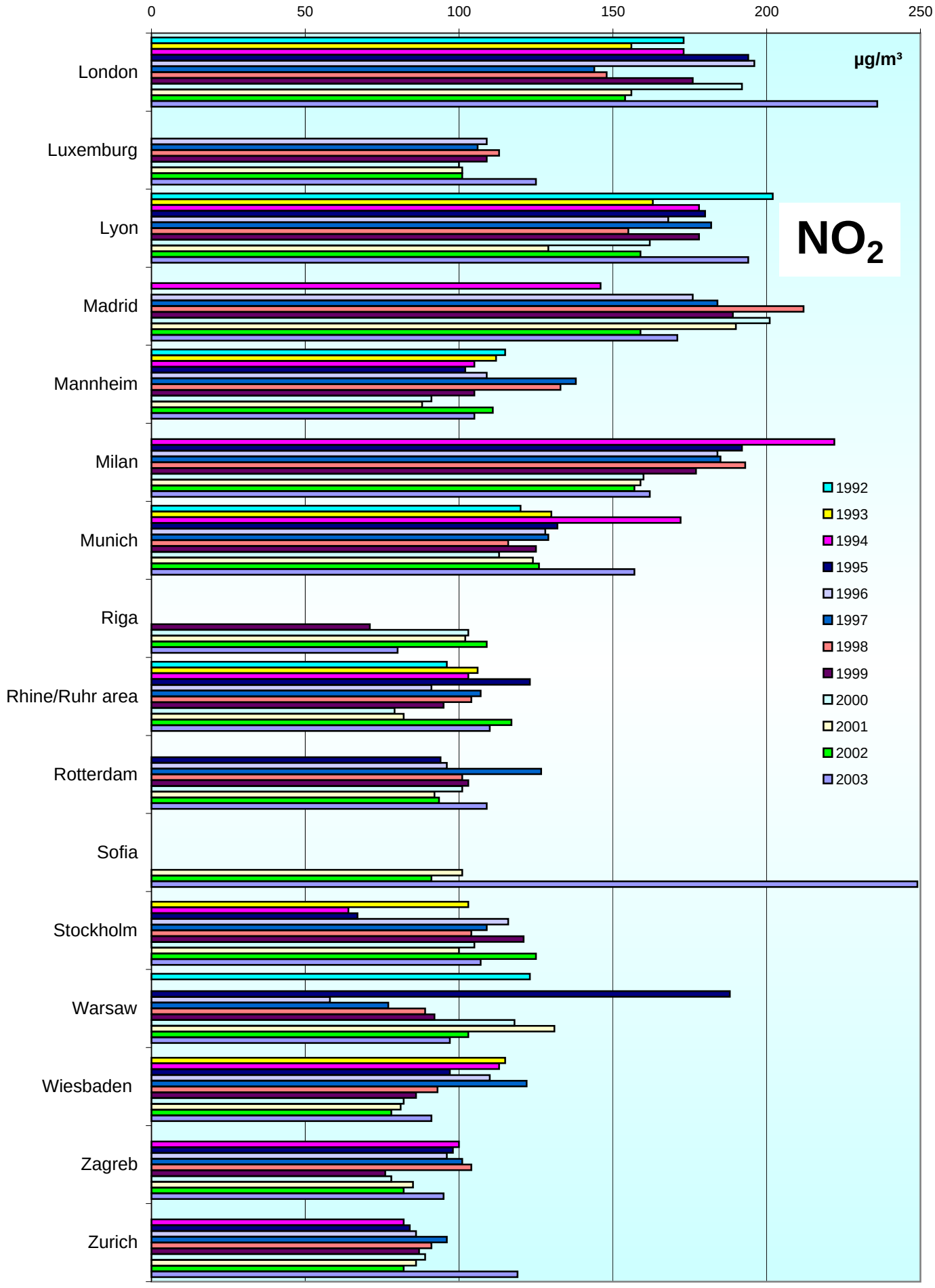
Comparison of The Air Quality 1992 - 2003

max. 98 percentile
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

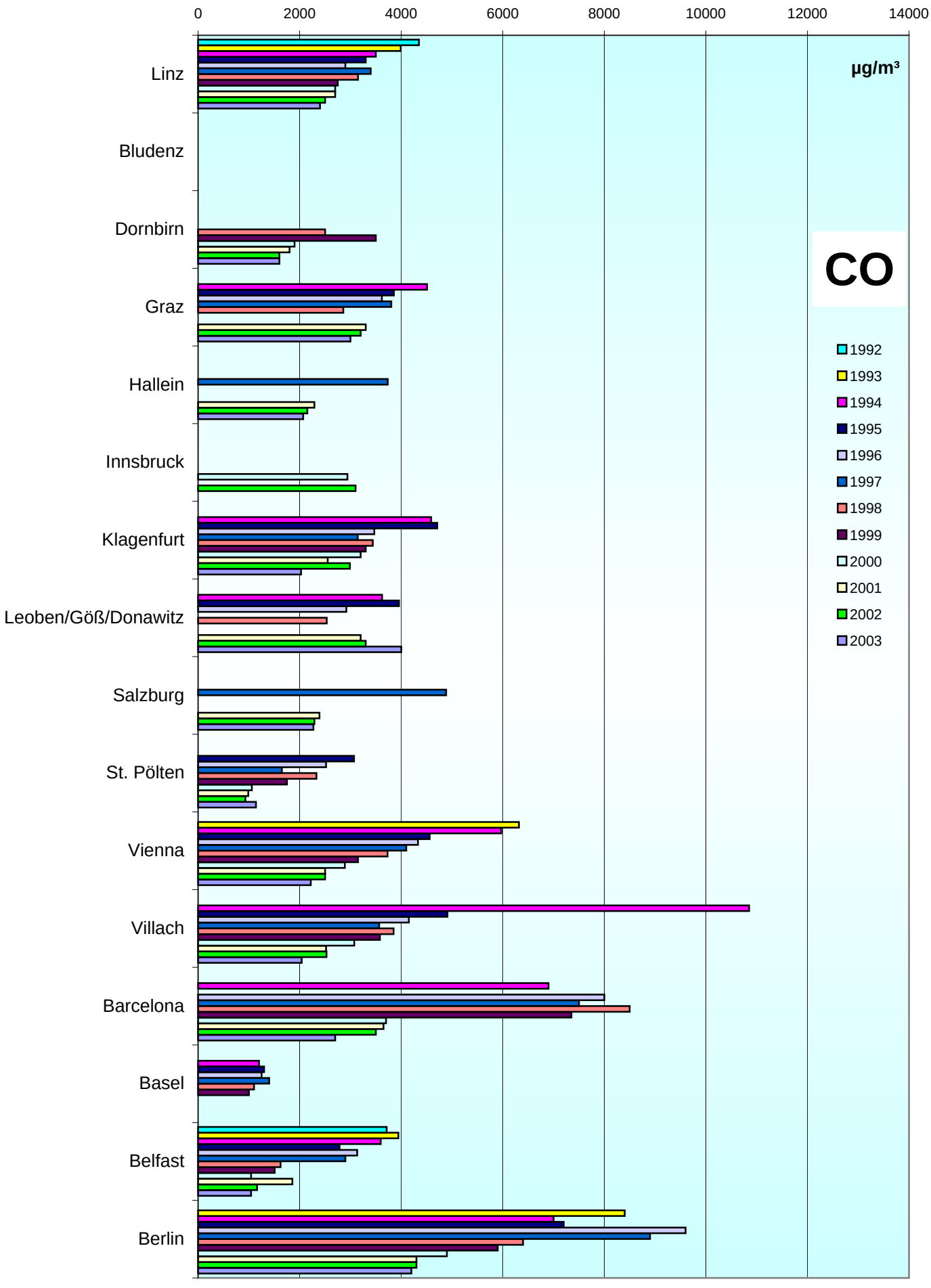
max. 98 percentile
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

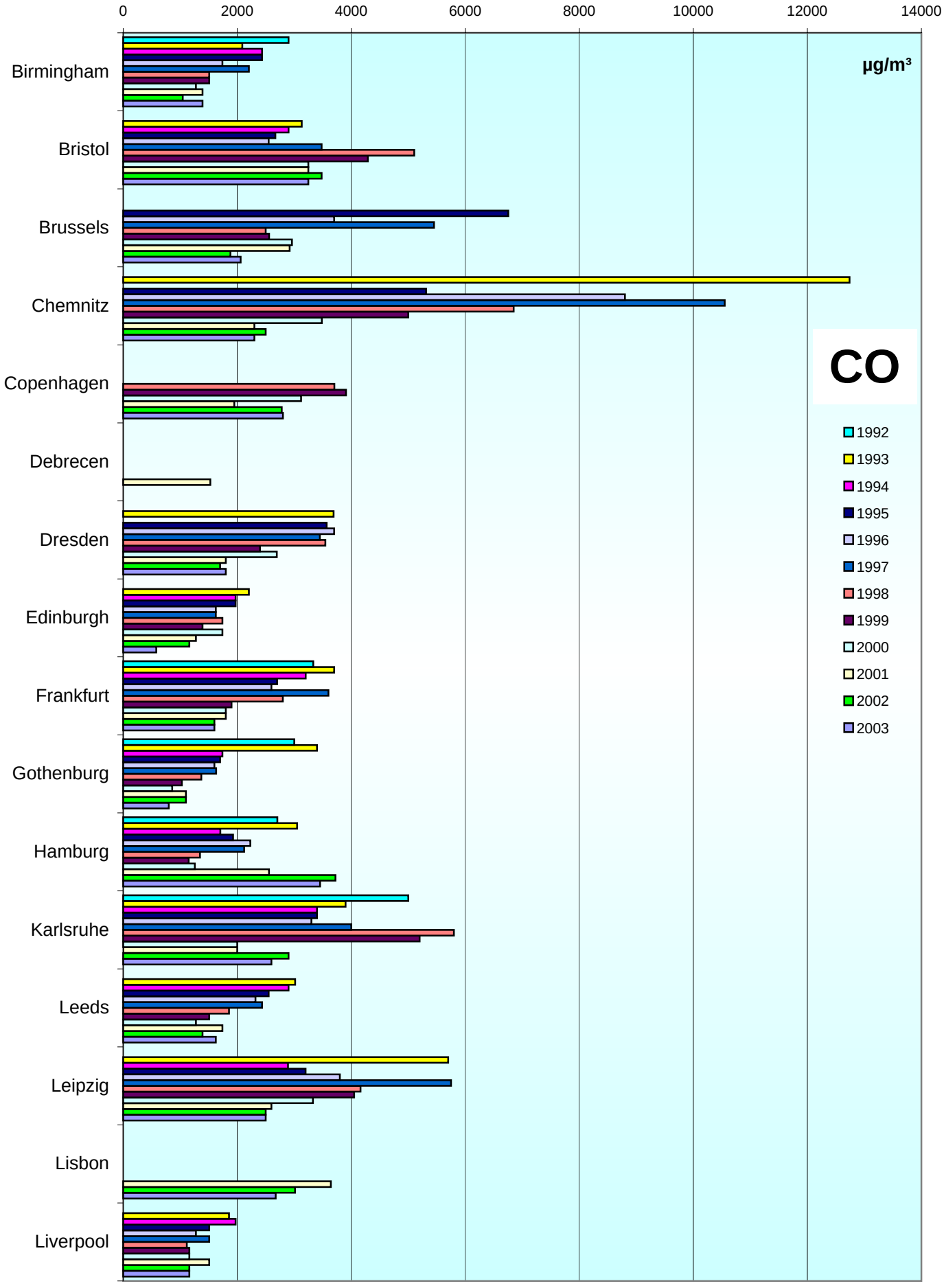
max. 98 percentile

(peak-stressed monitoring station)



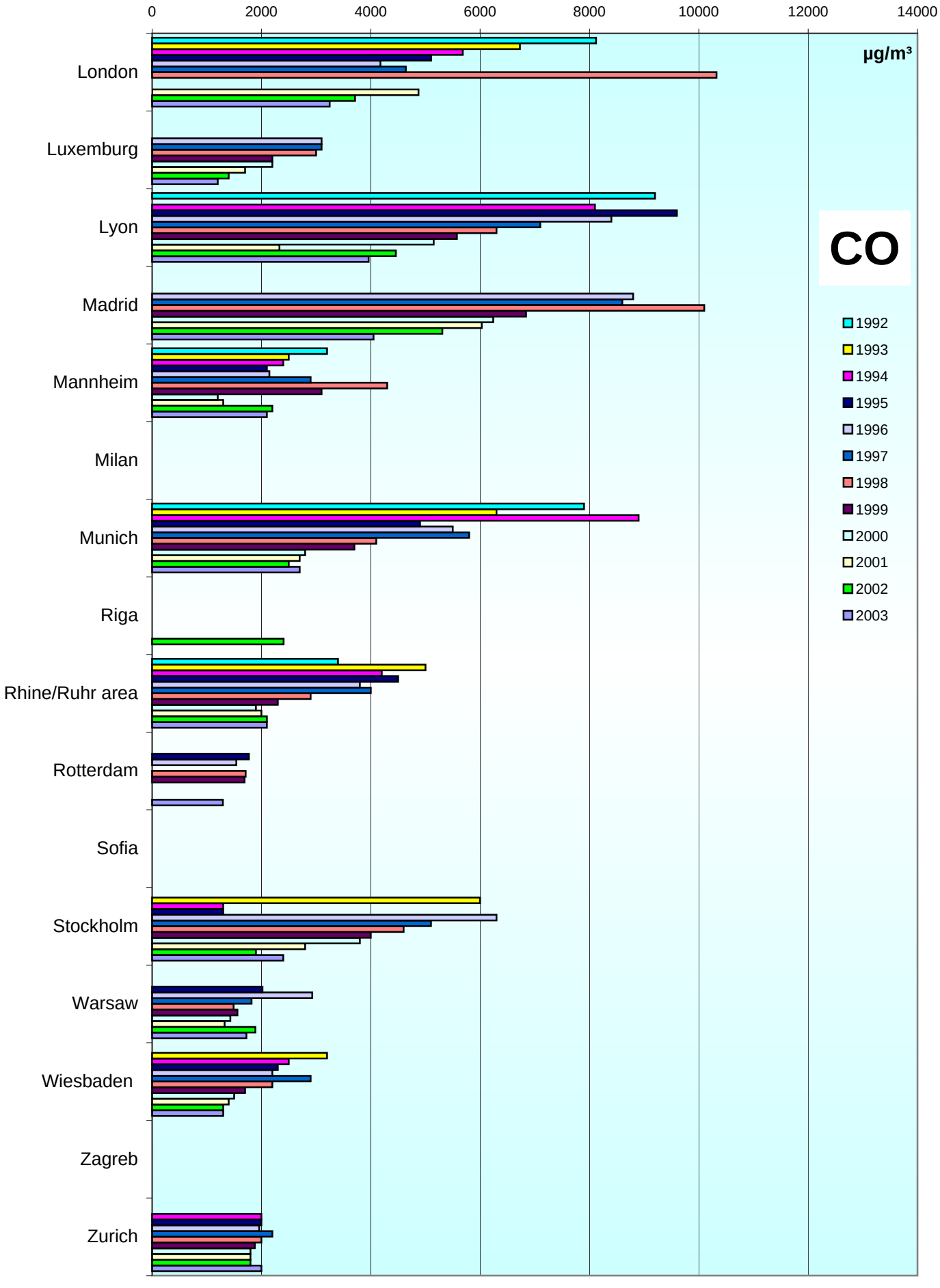
Comparison of The Air Quality 1992 - 2003

max. 98 percentile
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

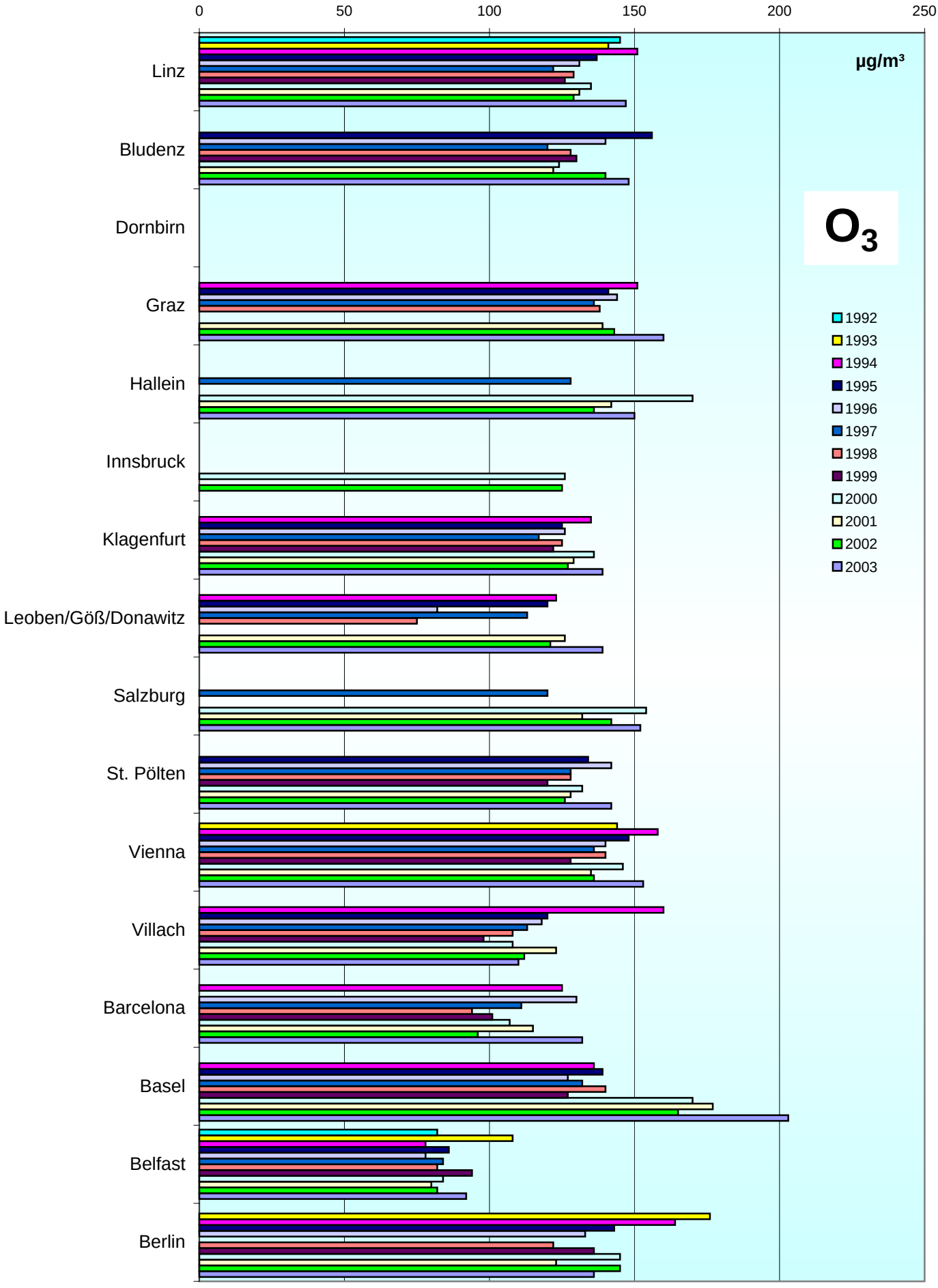
max. 98 percentile
(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

max. 98 percentile
(peak-stressed monitoring station)

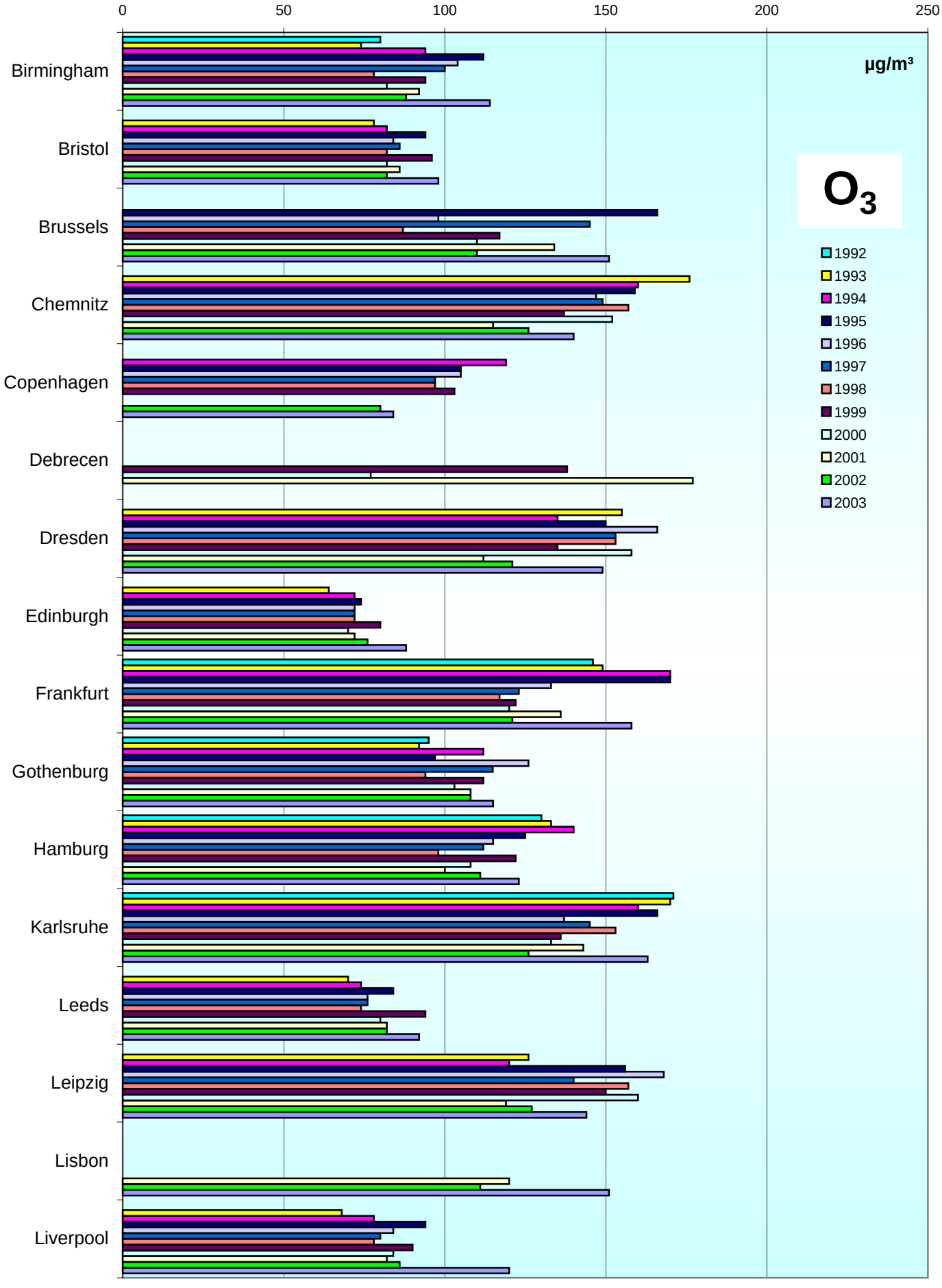
142



Comparison of The Air Quality 1992 - 2003

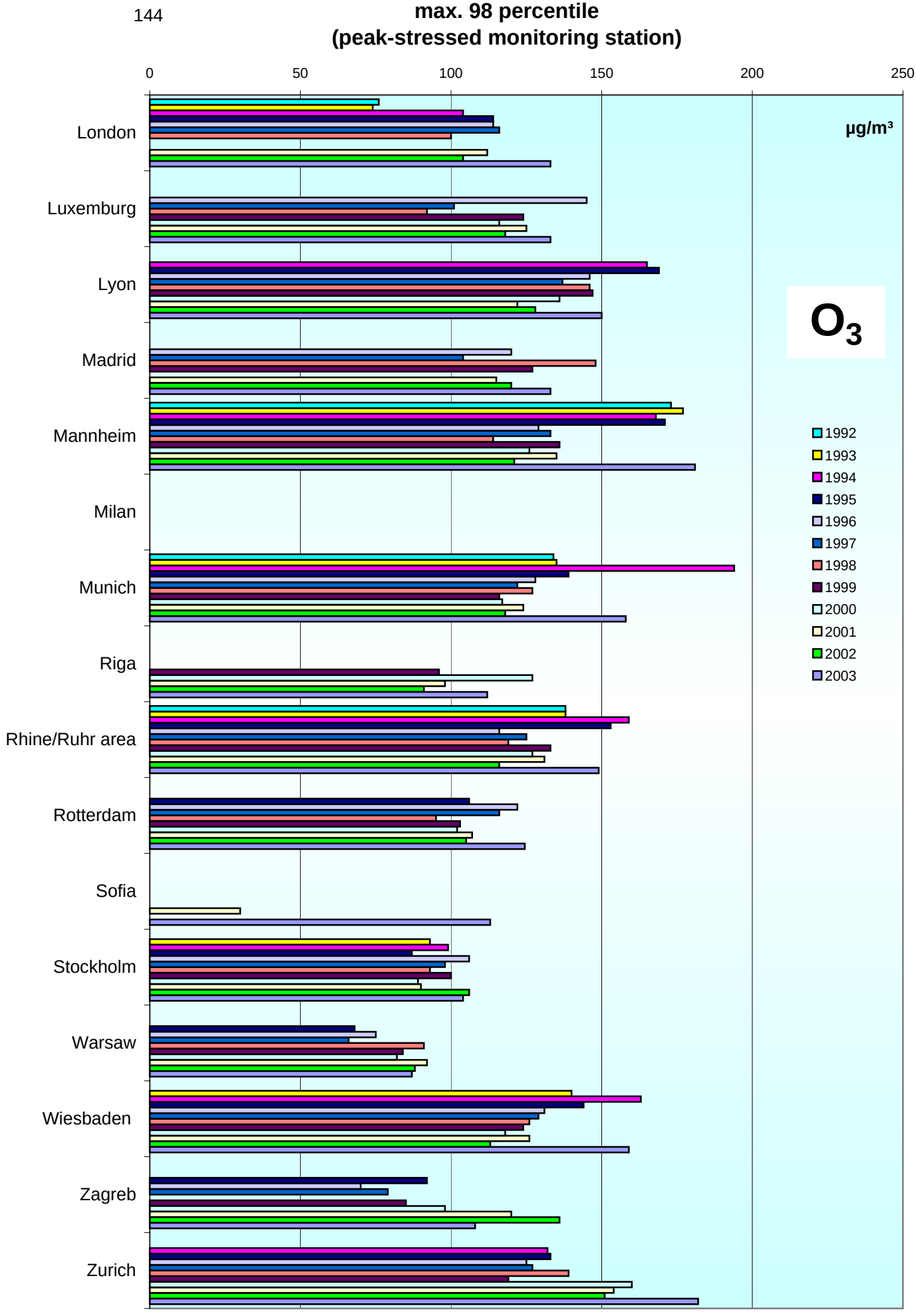
max. 98 percentile

(peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2003

max. 98 percentile
(peak-stressed monitoring station)



MAGISTRAT LINZ - Amt für Natur- und Umweltschutz

S:\anu\Abteilung\MU\Immission\Städtevergleich\2003\Tabellen, Grafiken\Entwicklung 1992....\[Entwicklung O3.xls]max. 98%-London bis Zürich

Jahresvergleich

1993 - 2003

Jahresmittelwerte, Σ SO_2, TSP/PM10, NO_2

Comparison Of The Air Quality

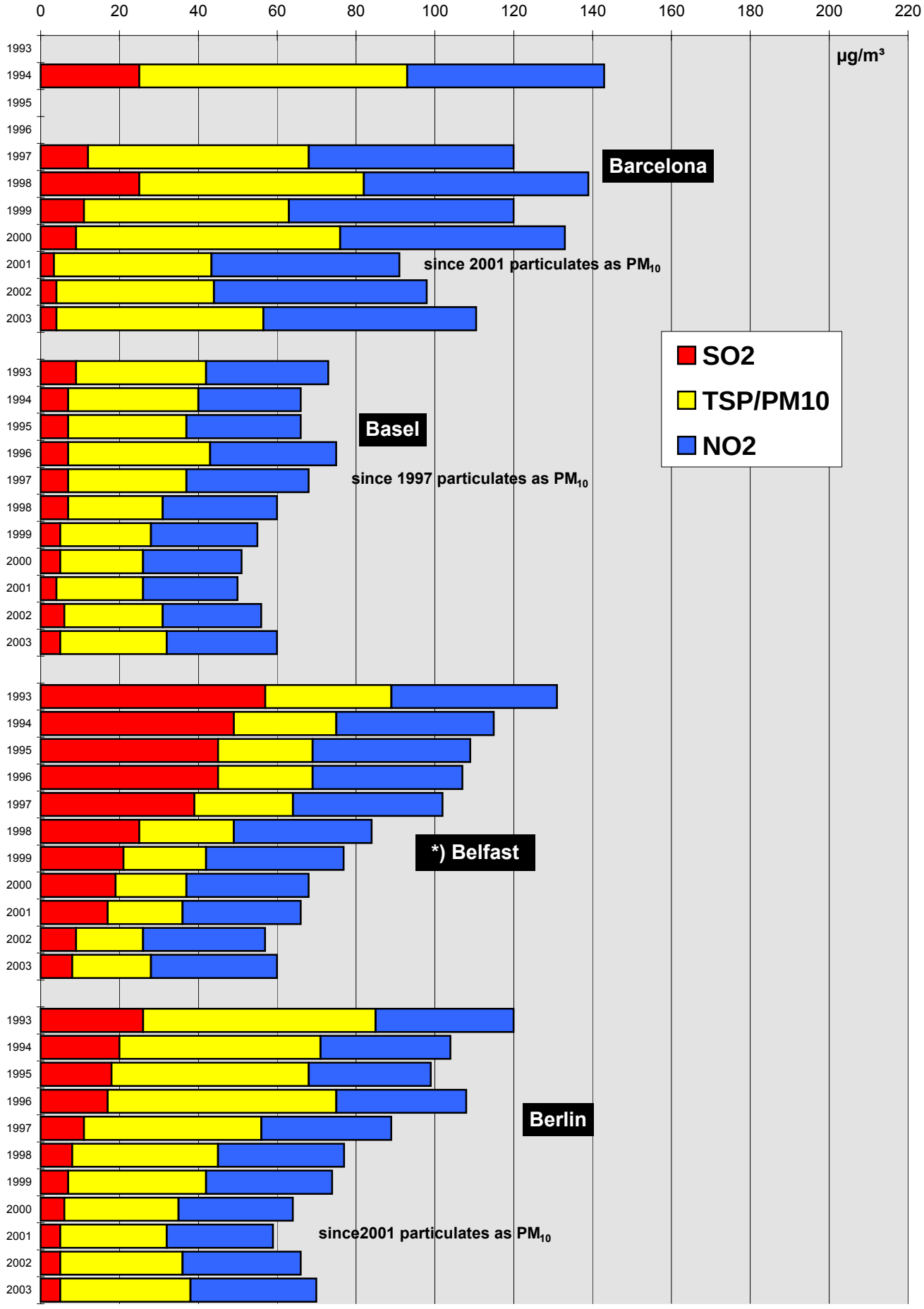
1993 - 2003

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

Comparison Of The Air Quality 1993-2003

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

(mean of all monitoring stations)

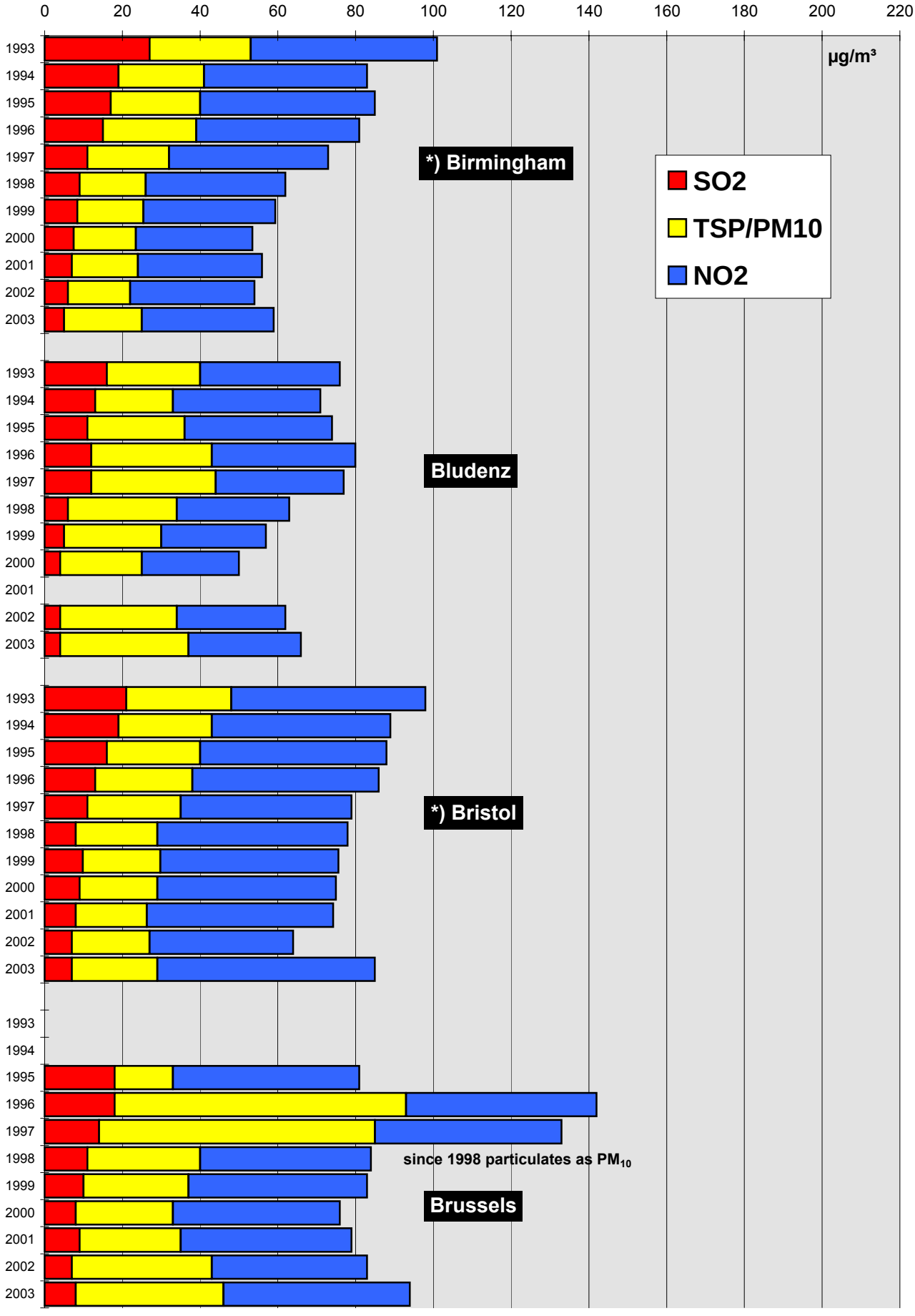


*) particulates calculated as PM 10

Comparison Of The Air Quality 1993-2003

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

(mean of all monitoring stations)

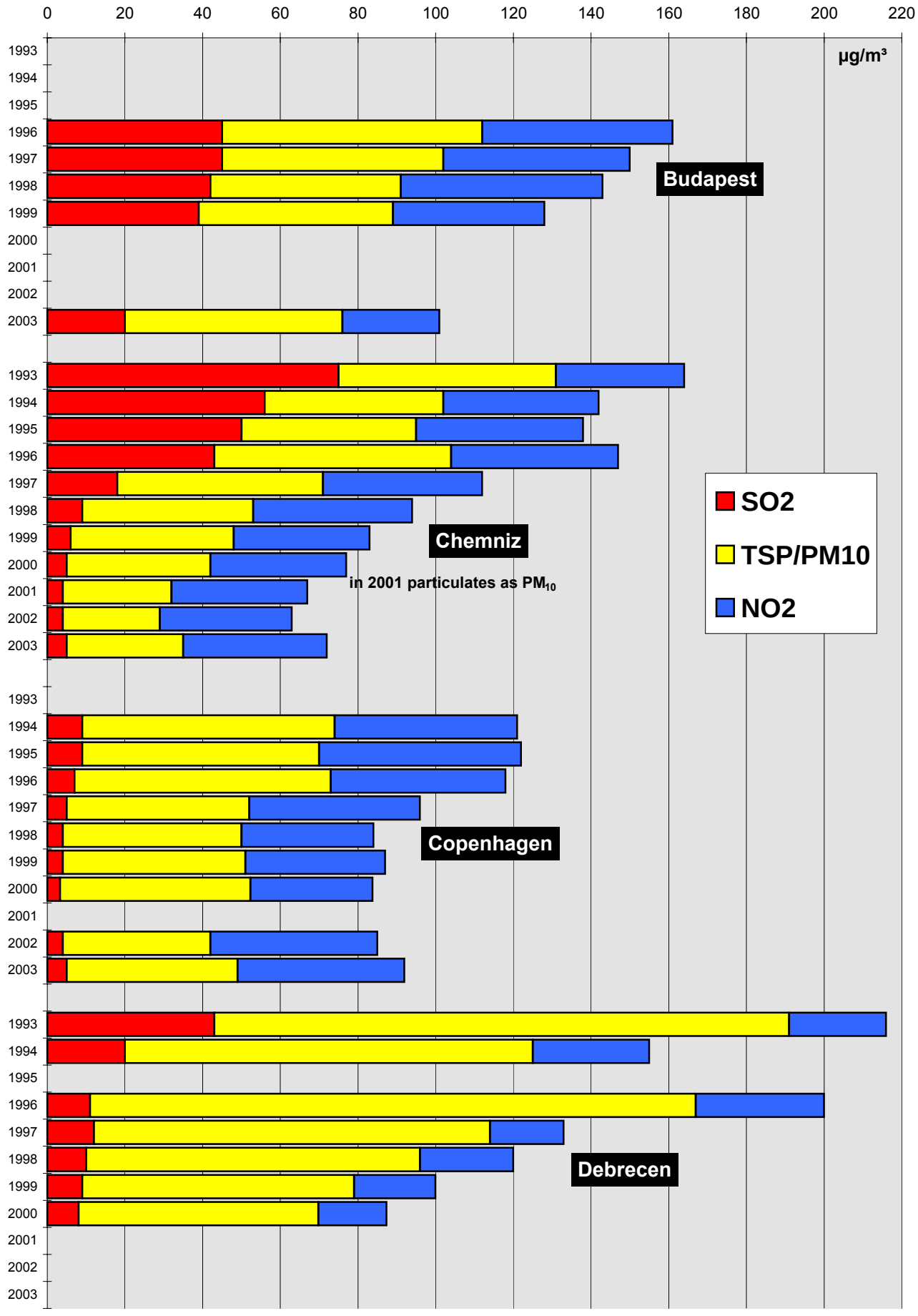


*) particulates calculated as PM 10

Comparison Of The Air Quality 1993-2003

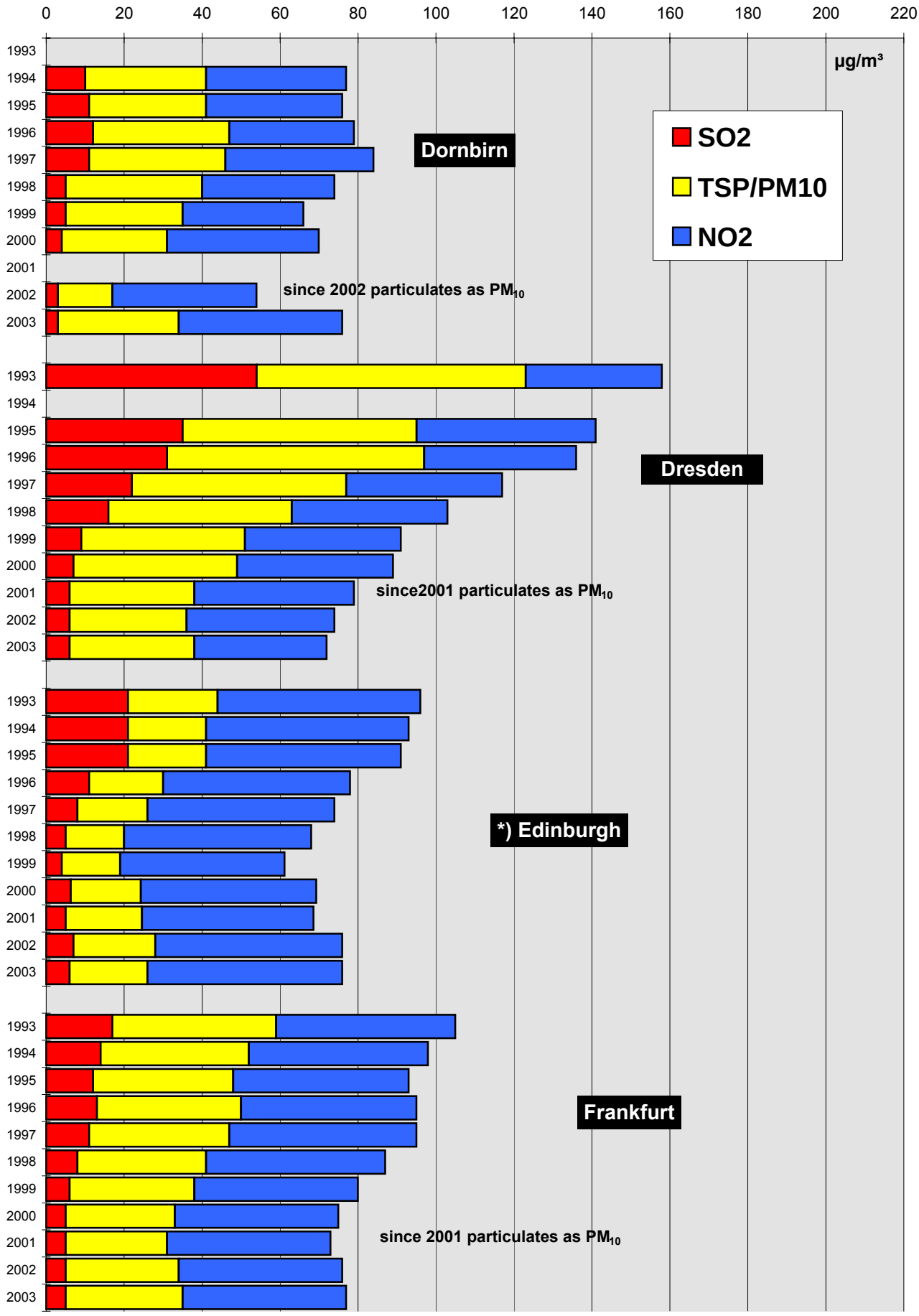
Development of the annual mean values, Σ SO_2, TSP/PM_{10}, NO_2

(mean of all monitoring stations)



*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2003
Development of the annual mean values, Σ SO_2, TSP/PM_{10}, NO_2
(mean of all monitoring stations)

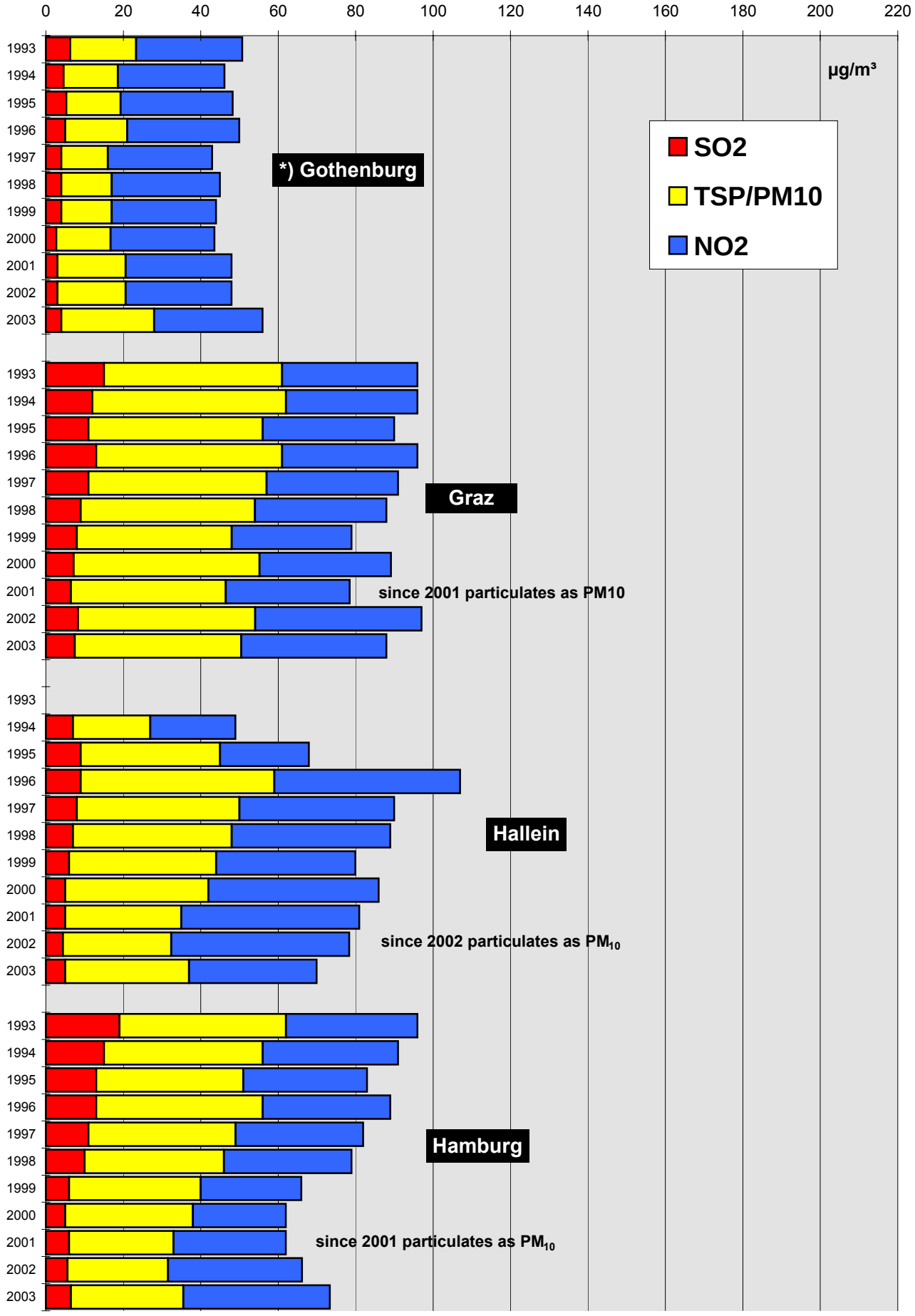


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2003

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

(mean of all monitoring stations)

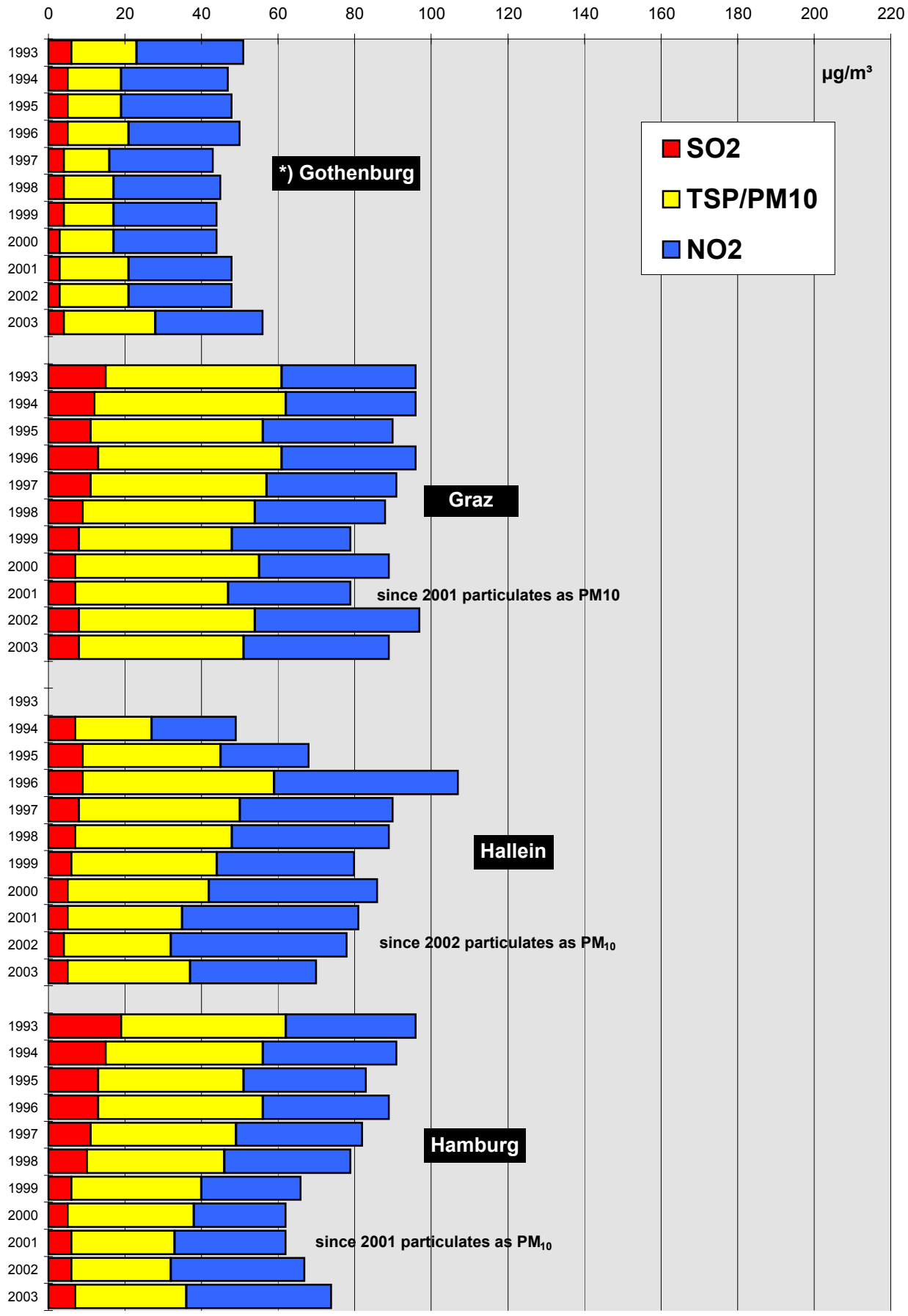


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2003

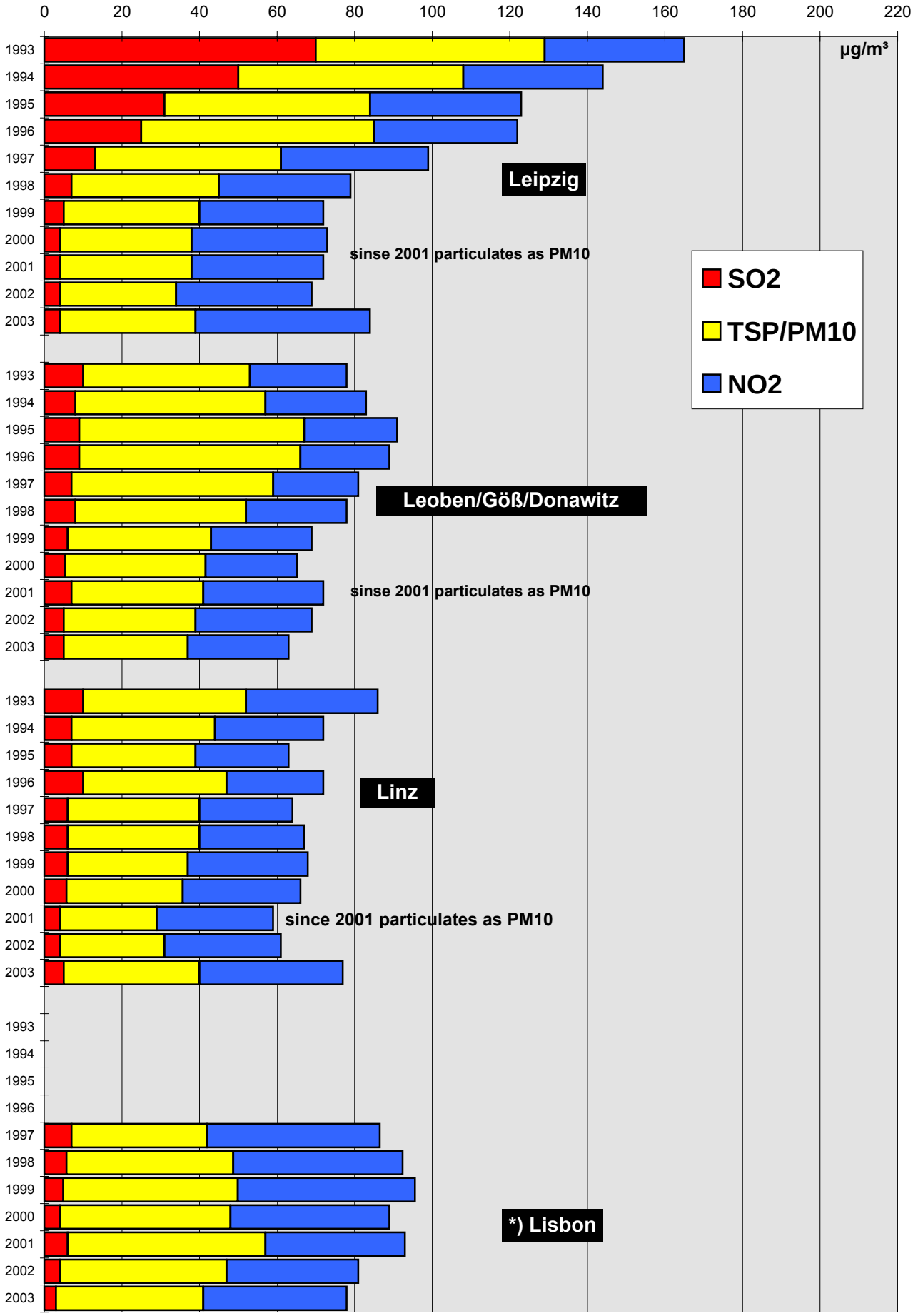
Development of the annual mean values, Σ SO_2, TSP/PM_{10}, NO_2

(mean of all monitoring stations)



*) particulates calculated as PM10

Comparison Of The Air Quality 1993-2003
Development of the annual mean values, Σ SO_2, TSP/PM_{10}, NO_2
(mean of all monitoring stations)

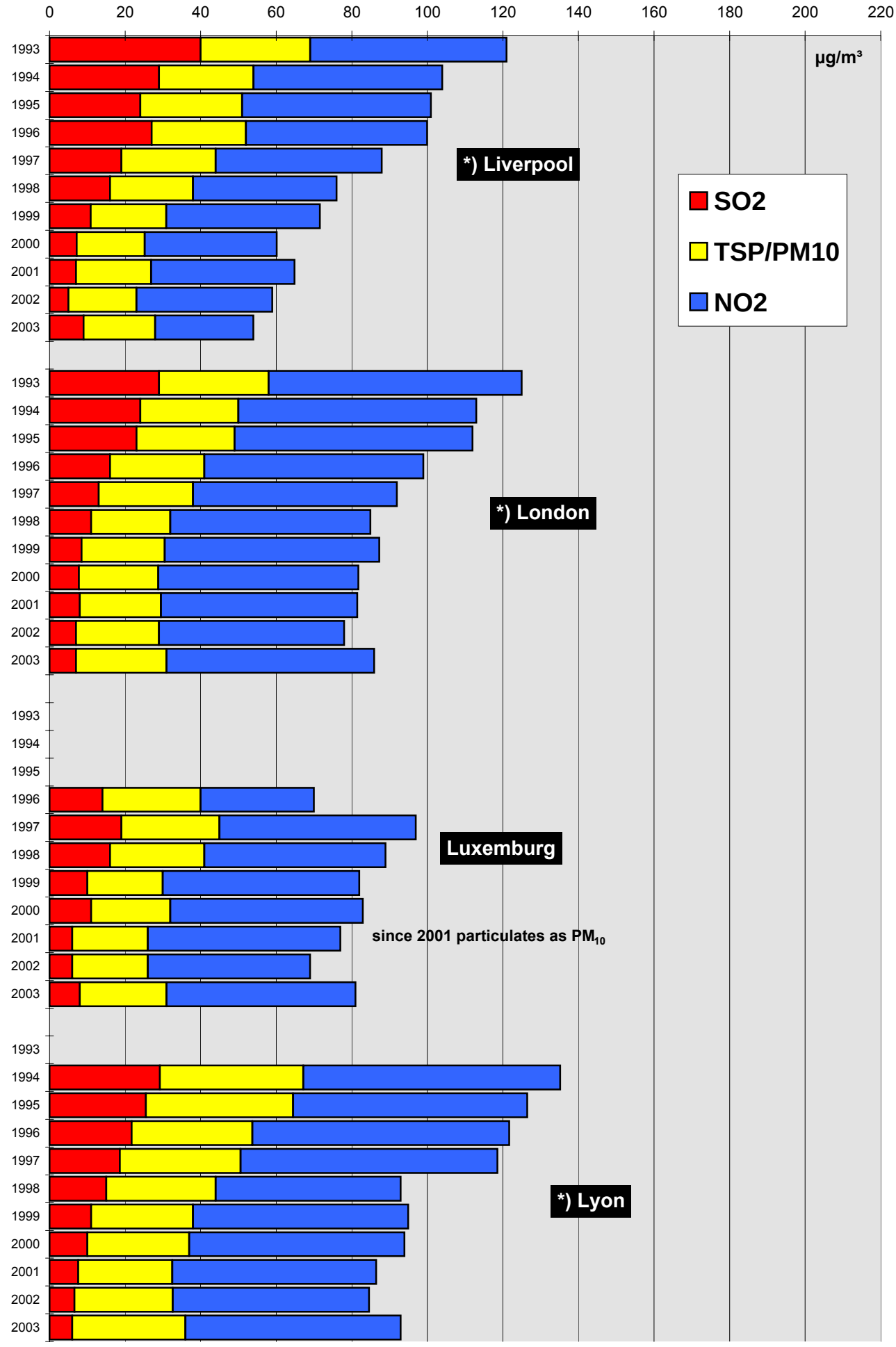


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2003

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

(mean of all monitoring stations)

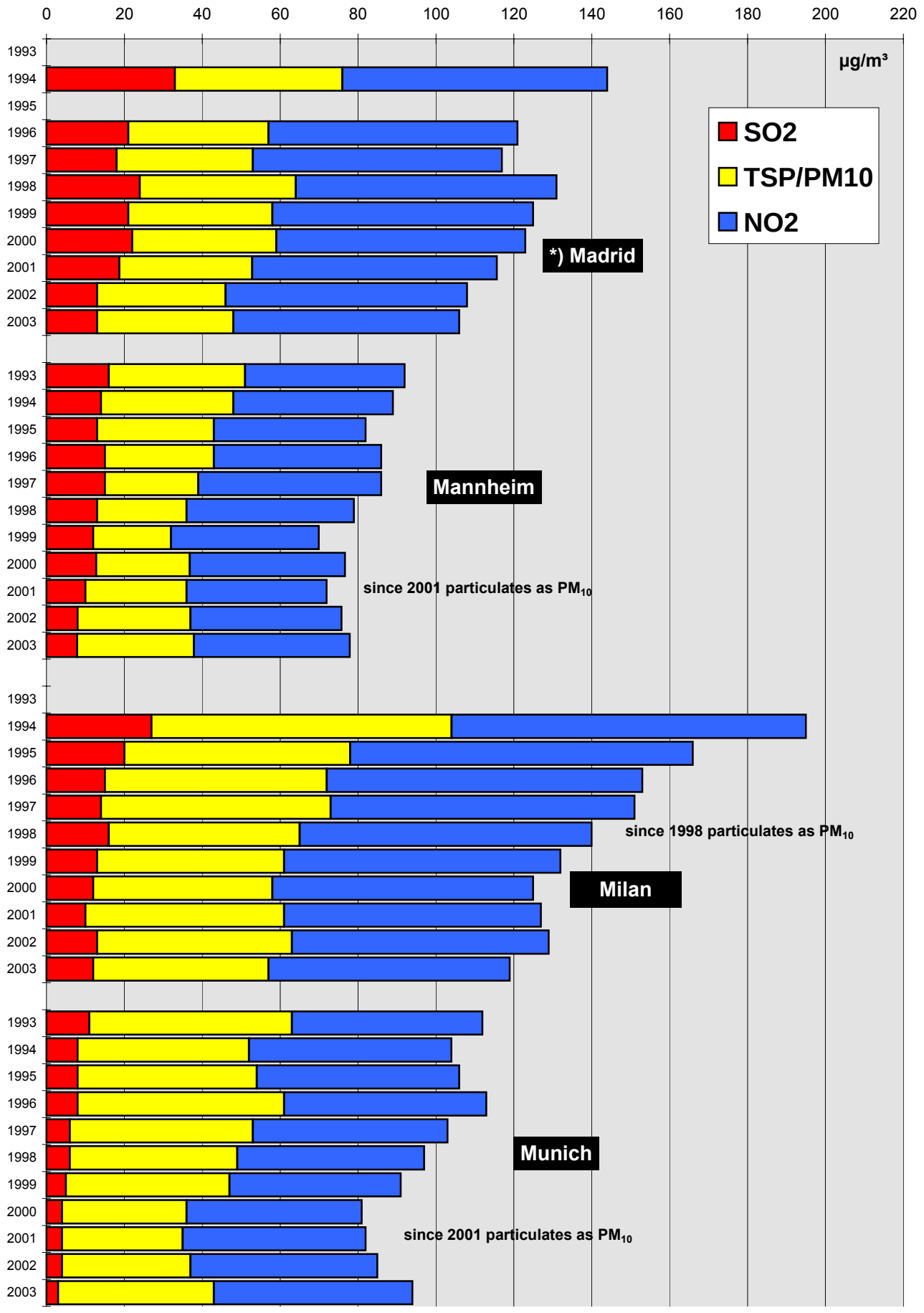


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2003

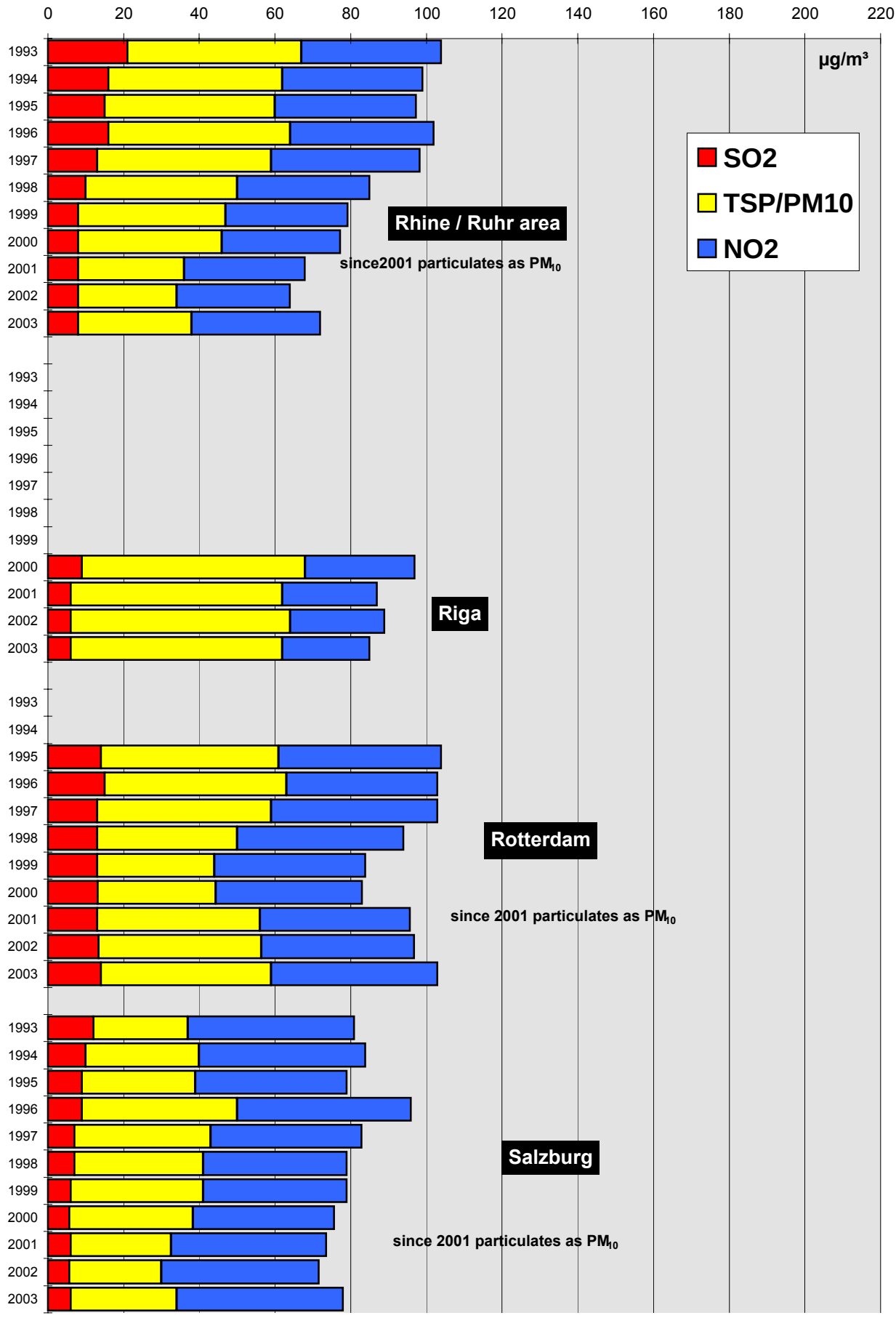
Development of the annual mean values, Σ SO_2, TSP/PM_{10}, NO_2

(mean of all monitoring stations)



*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2003
Development of the annual mean values, Σ SO_2, TSP/PM_{10}, NO_2
(mean of all monitoring stations)

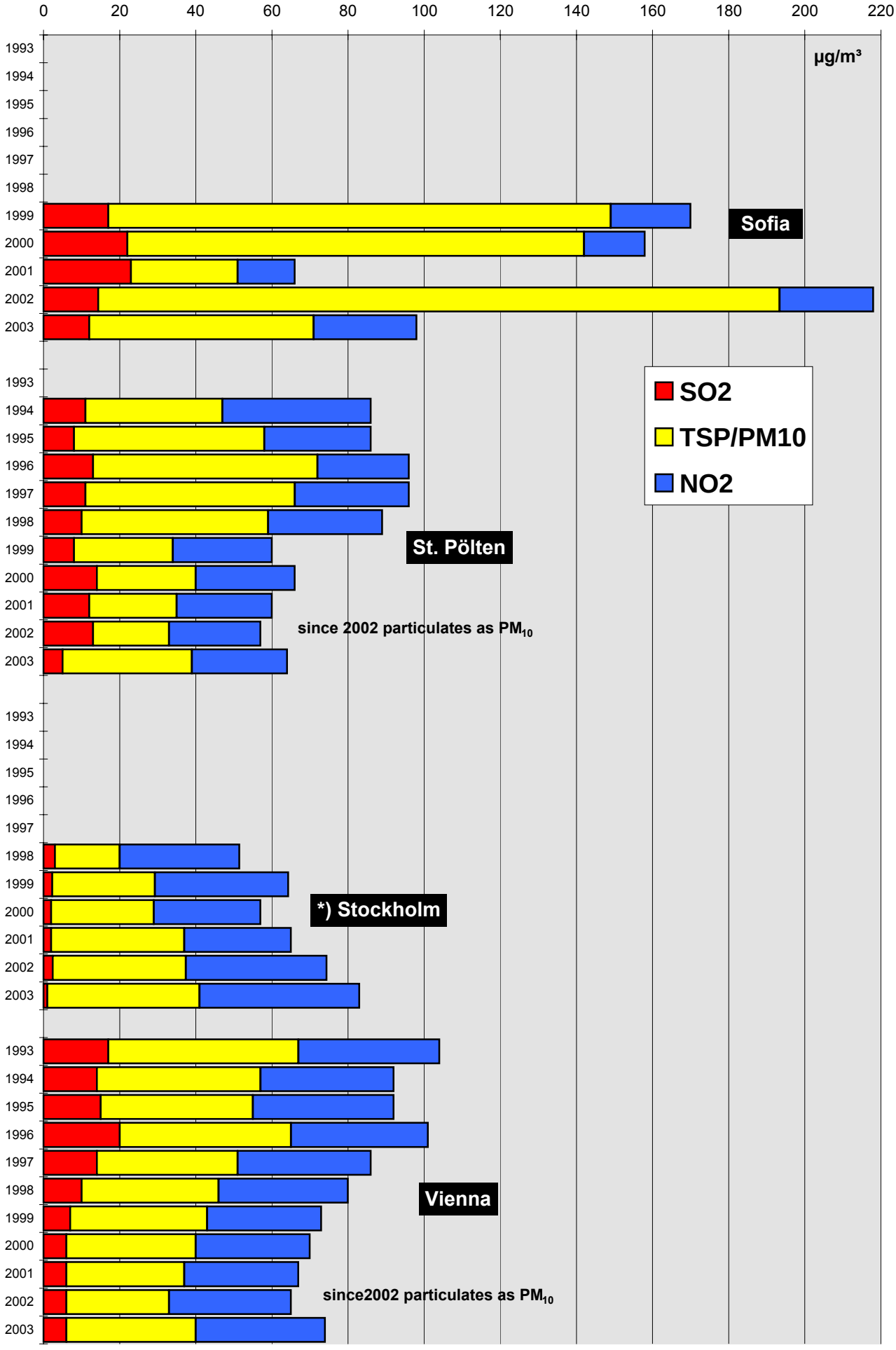


*) particulates calculated as PM10

Comparison Of The Air Quality 1993-2003

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

(mean of all monitoring stations)

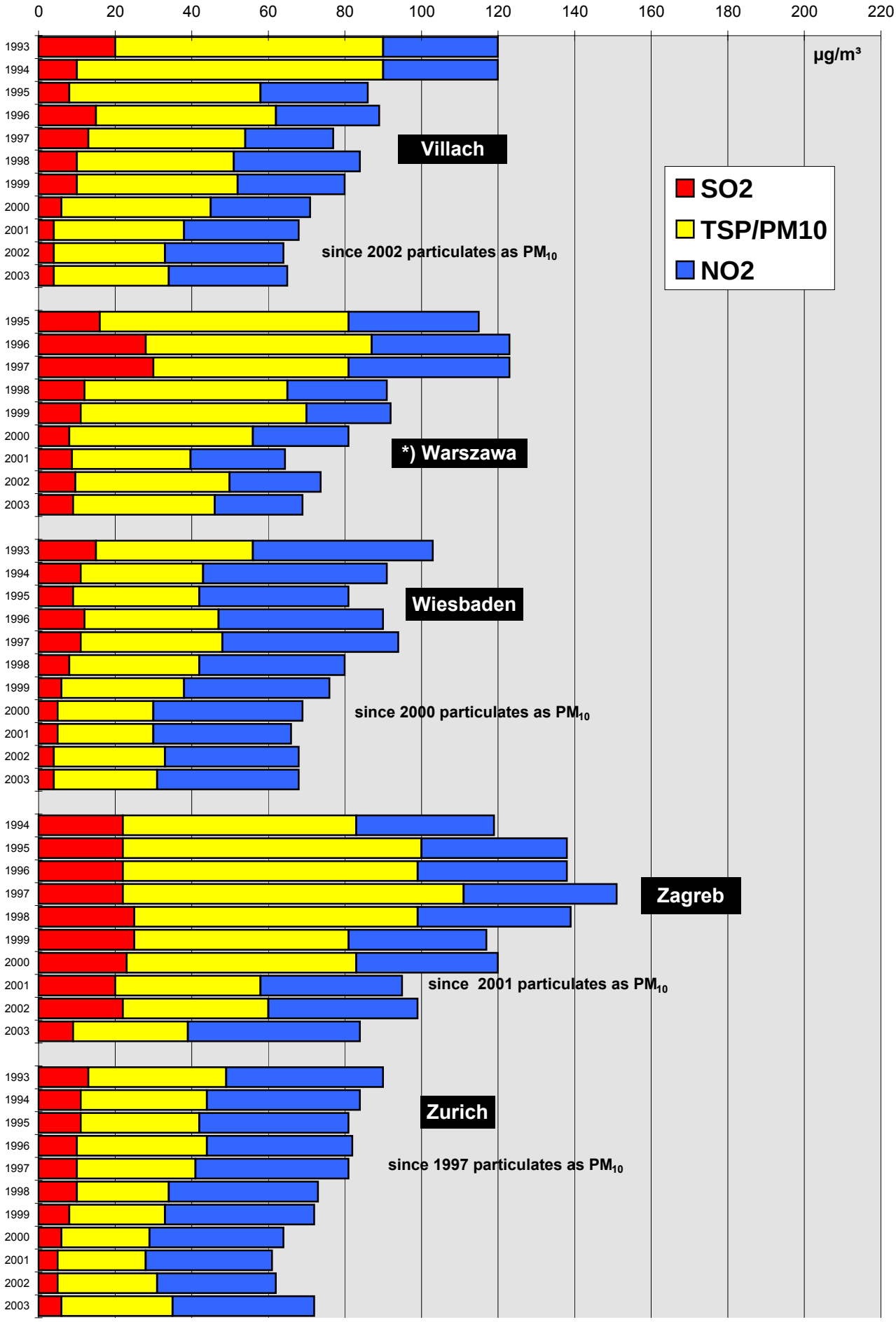


*) particulates calculated as PM_{10}

Comparison Of The Air Quality 1993-2003

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 2003

der einzelnen

Vergleichsregionen

Immission Reference Values 2003

Of All Compared Regions

Reference Numbers for The Air Quality 2003

Barcelona

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. **) 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max.***) 98-Percentile per year (2) (µg/m³)
SO_2	2	3,8	9,7	23	64	106	-	20,5
***) PM_{10}**	2	52,5	70	144	-	-	-	-
NO	4	40	91	292	737	1012	-	257
NO_2	4	54	84	131	219	276	-	139
CO	4	730	1120	2990	6550	7100	-	2700
O_3	4	33,7	78	113	245	260	-	132
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**-**

COMMENTS:

*) Gravimetric method only
**) Static average (not moving average)
***) Maximum 98 percentile of 1-hour values

Basel

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	1	5	11	25	39	43	53	32
PM_{10}	1	27	50	120	272	320	327	130
NO	1	8	27	94	169	183	199	127
NO_2	1	28	40	88	119	121	122	105
CO	0	-	-	-	-	-	-	-
O_3	1	53	100	145	236	237	241	203
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			***)**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**23**

*) Monitoring with β-Meter, calibration with gravimetric measurement every 4th day

(1) arithmetic mean of all monitoring stations of an immission-area
(2) highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for The Air Quality 2003

Belfast

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	2	8	15	69	184	194	194	44
PM_{10}	2	20	43	116	242	442	-	95
NO	1	18	46	189	561	586	-	131
NO_2	1	32	42	79	159	171	-	83
CO	1	232	464	1392	3248	3480	-	1044
O_3	1	43	62	93	135	142	-	92
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**33**

Birmingham

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	2	5	13	41	160	232	239	33
PM_{10}	2	20	27	62	158	169	-	54
NO	1	19	51	226	689	715	-	146
NO_2	1	34	47	81	136	146	-	84
CO	1	406	696	2320	6960	7424	-	1392
O_3	1	41	67	106	181	186	-	114
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**5**

[1] arithmetic mean of all monitoring stations of an immission-area

[2] highest monitored value of an immission-area

Reference Numbers for Air Quality
2003

Berlin

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 8-h- mean (2) (µg/m³)	Max. 1 h- mean (2) (µg/m³)	Max. 1/2 h- mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	10/4/3/3	5/4/5/7	-	49/38/49/44	-	370/84/91/370	-	20/22/30/29
Station types	a/b/c/d	a/b/c/d	-	a/b/c/d	-	a/b/c/d	-	a/b/c/d
PM_{10}		33/30/43	-	171/155/171	-	1942/697/1942	-	139/127/139
Station types	a/d/e	a/d/e	-	a/d/e	-	a/d/e	-	a/d/e
NO	17/6/6/5	25/4/12/65	-	317/71/147/317	-	924/274/537/924	-	379/49/121/379
NO_2	17/6/6/5	32/17/30/53	-	168/68/97/168	-	253/136/188/253	-	145/60/86/145
Station types	a/b/c/d	a/b/c/d	-	a/b/c/d	-	a/b/c/d	-	a/b/c/d
CO	13/4/4/5	600/300/400/1000	-	-	5100/1500/2200/5100	7700/2500/5200/7700	-	4200/800/1300/4200
Station types	a/b/c/d	a/b/c/d	-	-	a/b/c/d	a/b/c/d	-	a/b/c/d
O_3		45/40/48	-	-	188/173/188	207/191/207	209/194/209	136/132/136
Station types	a/c/b	a/c/b	-	a/c/b	-	a/c/b	-	a/c/b
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values including correction factor)			**117**

Comments:

SO_2, NO, NO_2, CO, O_3 [3]: 98-Percentile of 1h mean values

PM_{10}: 98-perc. of daily mean value

O_3 [4]: 98-percentile of max. daily 8h-mean value

max. monthly mean and max. 3h-mean is not calculated

For CO und Ozone the max. 8-h-means are determined

max. daily means are not calculated for CO and Ozone

max. 1/2h-means are only calculated for Ozone

a) all monitoring stations

b) Berlin-Outskirts (i.e. monitoring station located in a region located within an industrial area which is situated in the outskirts)
At this station the highest values for NO_2 und NO are monitored)

c) Berlin-Centre

d) traffic influenced stations

e) background stations

(1) arithmetic mean of all monitoring stations of an immission-area

(2) highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality 2003

Bludenz

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	1	4	9	18	34	39	40	17
TSP	1	33	51	97	246	281	286	99
PM_{10}	-	-	-	-	-	-	-	-
NO	1	17	61	129	270	399	480	123
NO_2	1	29	52	91	119	127	128	84
CO	-	-	-	-	-	-	-	-
O_3	1	55	90	126	187	207	208	148
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**-**

Bristol

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	1	7	9	29	48	80	144	25
PM_{10}	1	22	31	60	103	108	-	62
NO	1	42	89	364	761	871	-	306
NO_2	1	56	109	148	204	211	-	152
CO	1	870	1508	2900	6612	7772	-	3248
O_3	1	40	63	102	164	168	-	98
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**9**

[1] arithmetic mean of all monitoring stations of an immission-area

[2] highest monitored value of an immission-area

Reference Numbers for Air Quality

2003

Brussels

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	9	8	20	47	90	146	161	35
PM_{10}	6	38	69	160	297	459	875	165
NO	10	31	141	416	1025	1947	2065	307
NO_2	10	48	102	165	263	309	357	171
CO	8	500	930	2230	4850	5930	5980	2060
O_3	7	37	74	157	237	243	248	151
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			***)**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values including correction factor)			**163**

*) Correction factor for PM_{10} : 1.37 for FAG and 1.47 for TEOM monitors

Budapest

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	3	20	33	67	142	240	265	81
TSP	3	56	101	279	458	646	735	307
PM_{10}	-	-	-	-	-	-	-	-
NO	3	15	36	100	293	429	465	174
NO_2	3	25	48	117	141	162	163	116
CO	3	1205	1962	3473	5050	5850	5900	3900
O_3	1	52	82	104	173	190	199	140
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**-**

Comments: Sorry for the delay of our answer, we couldn`t earn data earlier because of the maintenace Budapest`s monitoring system.
For the same reason the data of the enclosed schedule are earned from just three standard monitoring stations which are far from the city centre, so these data cant`t be compared to the previous year`s.
Hopefully next year we will be able to provide the complete data sheet abaut Budapest`s air quality for your study.

(1) arithmetic mean of all monitoring stations of an immission-area

(2) highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality
2003

Chemnitz

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO2	1	5	14	34	84	154	162	27
PM10	2	30	46	101	*)	*)	*)	70
NO	2	24	64	184	544	742	759	174
NO2	2	37	56	100	160	201	210	96
CO	1	700	1050	2200	4800	5900	6400	2300
O3	1	49	84	142	**)	216	219	140
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**"1,00"** ***)	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**35**

*) Daily mean is smallest time unit

**) Not calculated

***) Factor is 1.00 due to gravimetrical monitoring

(1) arithmetic mean of all monitoring stations of an immission-area

(2) highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality 2003

Copenhagen (monitoring station at roof-level)

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	-	-	-	-	-	-	-	-
PM_{10}	1	24	-	129	-	-	-	-
NO	1	4	-	-	91	139	-	34
NO_2	1	23	-	-	110	133	-	65
CO	1	361	-	884	-	1949	-	851
O_3	-	-	-	-	-	-	-	-
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**-**

Copenhagen (monitoring station at street-level)

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	1	5	-	-	58	103	-	22
PM_{10}	2	54	-	251	-	-	-	196
NO	2	54	-	-	536	825	-	247
NO_2	2	53	-	-	179	210	-	127
CO	2	939	-	2615	-	6701	-	2802
O_3	2	33	-	75	-	109	-	84
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**-**

[1] arithmetic mean of all monitoring stations of an immission-area

[2] highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality

2003

Dornbirn

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	1	3	9	13	31	47	51	12
PM_{10}	1	31	57	114	-	-	-	*) 80
NO	1	34	73	165	425	524	540	187
NO_2	1	42	65	100	155	175	185	99
CO	1	500	800	1600	3500	4100	4400	1600
O_3	-	-	-	-	-	-	-	-
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**1,00**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**38**

*) 98th percentile of the average 24 hour concentration levels

Dresden

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	2	6	14	39	67	104	106	33
PM_{10}	3	32	61	155	*)	*)	*)	95
NO	3	19	59	188	451	549	626	161
NO_2	3	34	58	99	176	225	225	104
CO	1	700	1000	1900	3200	4600	5100	1800
O_3	3	49	96	170	**)	240	242	149
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**"1,00" ***)**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**53**

*) Daily mean is smallest time unit

**) Not calculated

***) Factor is 1,00 due to gravimetrical monitoring

[1] arithmetic mean of all monitoring stations of an immission-area

[2] highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality
2003

Edinburgh

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	1	6	9	25	117	196	279	24
PM_{10}	1	20	32	65	85	106	-	56
NO	1	31	37	97	231	329	-	88
NO_2	1	50	56	83	136	142	-	94
CO	1	348	360	580	928	1276	-	580
O_3	1	43	59	88	103	108	.	88
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**2**

Frankfurt

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	5	5	15	27	51	69	117	27
PM_{10}	5	30	48	122	171	283	292	87
NO	5	27	74	252	596	691	719	193
NO_2	5	42	65	118	182	218	240	108
CO	4	500	800	1800	7000	7500	8400	1600
O_3	5	43	90	162	277	299	300	158
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**51**

(1) arithmetic mean of all monitoring stations of an immission-area

(2) highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality
2003

Gothenburg

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	3	3,9	7	18	66	88	107	15,7
PM_{10}	1	24	44	83	188	242	253	70
NO	2	17	36	431	1172	1295	1556	159
NO_2	3	27,7	43	127	312	339	396	94,8
CO	1	220	460	1980	6800	8200	9300	800
O_3	3	55,4	100	156	171	176	177	115
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**1,20**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**12**

Graz

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	3	6	16	35	58	64	65	26
TSP	1	46	80	194	395	500	533	152
PM_{10}	4	41	77	151	493	563	600	149
NO	5	26	122	334	618	675	721	232
NO_2	5	34	67	126	245	271	280	106
CO	2	1000	2000	3000	6000	7000	8000	2000
O_3	4	64	125	164	204	208	213	160
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**1,30**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**129**

Comments: The monitoring station "Graz Süd" only worked until April 23rd and was moved to a couple of 100 m to the south, region "Herrgottwiesgasse/Tiergartenweg". Both locations are comparable.

[1] arithmetic mean of all monitoring stations of an immission-area

[2] highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality
2003

Graz (traffic station)

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	1	12	25	42	66	70	77	39
TSP	-	-	-	-	-	-	-	-
PM_{10}	1	52	86	156	274	312	334	158
NO	1	78	169	393	625	747	822	377
NO_2	1	55	73	134	226	246	248	120
CO	1	1000	2000	3000	5000	6000	7000	3000
O_3	-	-	-	-	-	-	-	-
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**1,30**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**131**

Hallein

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	2	4,9	-	32	227	284	383	17
PM_{10}	1	32	-	105	-	-	-	89
NO	2	42	-	318	685	814	865	333
NO_2	2	33	-	105	165	195	203	103
CO	1	720	-	1930	4380	6040	8990	2070
O_3	1	70	-	158	199	203	204	150
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**49**

[1] arithmetic mean of all monitoring stations of an immission-are
[2] highest monitored value of an immission-are

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality
2003

Hamburg

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	11/2*	6/9*	15/14*	55/39*	124/85*	279/122*	344/149*	54
TSP	3	37	76	156	351	691	1115	152
PM_{10}	11/2*	28/35*	64//57*	141/140*	489/280*	1148/658*	1887/861*	121/112*
NO	11/5*	12/69*	61/139*	265/334*	619/951*	865/1091*	923/1091*	184/411*
NO_2	11/5*	27/62*	50/87*	108/160*	190/240*	225/272*	242/311*	97/173*
CO	3/5*	402/918*	658/1444*	1746/2889*	3494/6858*	4024/8768*	4278/11189*	1231//3454*
O_3	6	42	68	110	185	189	189	123
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**1,30**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**62**

* traffic-influenced monitoring stations

Innsbruck

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	1	6	13	28	47	-	51	
TSP	2	37	69	138	198	-	276	
PM_{10}	2	31	57	115	-	-	362	
NO	2	38	97	284	-	-	559	
NO_2	2	43	69	100	137	198	247	
CO	2	600	1200	2700	4300	5000	5400	
O_3	2	46	91	146	198	201	202	
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**1,30**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**61**

(1) arithmetic mean of all monitoring stations of an immission-area

(2) highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality
2003

Karlsruhe

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	1	7,4	15	30	64	97	-	28
PM_{10}	2	27	50 *)	90	128 *)	192 *)	-	-
NO	2	24	75	223	441	512	-	198
NO_2	2	35	50	114	157	181	-	99
CO	2	400	800	1900	4600	5200	-	1600
O_3	2	43	93	126	236	253	-	163
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**28**

Karlsruhe (traffic station)

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	-	-	-	-	-	-	-	-
PM_{10}	1	33	.-	110	-	-	-	-
NO	1	59	103	269	498	628	-	262
NO_2	1	61	72	99	204	217	-	138
CO	1	800	1300	2200	4500	5600	-	2600
O_3	1	-	-	-	-	-	-	-
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**33**

PM_{10} is only monitored gravimetrically at traffic influenced stations (daily mean). All other stations are monitored gravimetrically with ß-absorption. The correction factor is determined dependent on time and place. It is already included in the ß-values.

*) : Values from ß-absorption

(1) arithmetic mean of all monitoring stations of an immission-area

(2) highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality
2003

Klagenfurt

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	1	9	19	63	122	137	166	33
TSP	2	35	70	111	239	341	395	128
PM_{10}	1	38	64	99	*)	*)	*)	*)
NO	2	32	93	204	430	497	502	215
NO_2	2	41	70	99	154	167	197	103
CO	2	593	1120	2168	3562	4060	4279	2028
O_3	2	49	85	119	179	179	183	139
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**1,00**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**74**

*) PM_{10}-values are monitored gravimetrically by means of high volume sampler, so smallest time unit is daily mean value

Leeds

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	1	9	19	76	169	226	293	43
PM_{10}	1	21	32	63	170	216	-	61
NO	1	29	84	341	595	669	-	203
NO_2	1	39	61	110	156	169	-	96
CO	1	580	812	1624	3132	3248	-	1624
O_3	1	37	56	101	148	150	-	92
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**9**

[1] arithmetic mean of all monitoring stations of an immission-area

[2] highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality
2003

Leipzig

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO2	1	4	8	25	33	47	66	16
PM10	3	35	71	179	*)	*)	*)	111
NO	3	42	96	260	678	704	756	235
NO2	3	45	71	126	258	273	300	123
CO	1	900	1200	2300	5100	5800	6800	2500
O_3	1	53	84	145	**)	215	216	144
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**1,00 ***)**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**92**

*) Daily mean is smallest time unit

**) Not calculated

***) Factor is 1,00 due to gravimetrical monitoring

Leoben/Göß/Donawitz

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h- **) mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	3	5	9	30	113	164	221	26
TSP	1	37	48	131	242	292	350	120
PM_{10}	1	32	41	85	170	245	295	94
NO	3	21	73	196	296	343	348	181
NO_2	3	26	48	79	113	130	146	82
CO	1	1000	1000	5000	13000	16000	19000	4000
O_3	1	41	71	100	181	187	191	139
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**42**

(1) arithmetic mean of all monitoring stations of an immission-area

(2) highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality 2003

Linz

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	7	5	12	39	104	137	161	41
TSP	1	38	60	168	318	309	472	114
PM_{10}	6	35	62	193	307	333	353	103
NO	7	29	87	317	871	990	1010	225
NO_2	7	37	58	102	168	182	191	114
CO	7	570	1100	2800	8400	10700	19900	2400
O_3	3	49	92	130	203	212	212	147
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**1,15 - 1,20**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**78**

Lisbon

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	10	3	7	36	154	313	-	26
PM_{10}	8	38	69	180	476	539	-	165
NO	12	29	203	669	1244	1319	-	455
NO_2	12	37	94	159	251	291	-	157
CO	11	428	1142	3309	6609	9154	-	2674
O_3	10	55	102	168	277	298	-	151
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**183**

[1] arithmetic mean of all monitoring stations of an immission-area

[2] highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality
2003

Liverpool

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	1	9	13	42	174	199	221	34
PM_{10}	1	19	21	54	143	202	-	52
NO	1	13	35	150	305	364	-	128
NO_2	1	26	37	78	129	142	-	78
CO	1	116	348	1624	2552	2900	-	1160
O_3	1	50	68	101	189	202	-	120
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**1**

London

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	13	7	15	67	155	190	258	51
PM_{10}	11	24	46	134	272	421	-	81
NO	22	45	178	430	869	931	-	430
NO_2	22	55	131	221	363	492	-	236
CO	15	607	1160	2784	7308	9280	-	3248
O_3	14	34	68	142	231	238	-	133
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**61**

[1] arithmetic mean of all monitoring stations of an immission-area
[2] highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality
2003

Luxemburg

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	2	8	16	29	57	57	73	25 (1/2h value)
PM_{10}	1	23 *)	32 *)	72 *)	160 *)	264 *)	342 *)	62 *)(daily value)
NO	2	38	79	181	393	504	595	214 (1/2h value)
NO_2	2	50	71	139	208	252	253	125 (1/2h value)
CO	1	500	590	1020	2720	4610	5000	1200 (1/2h value)
O_3	2	36	71	134	181	200	203	133
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**1,20**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**17**

COMMENTS: All results related to 20°C and 1013 hPa; PM_{10} related to 25°C und 1013 hPa.

*) Values for PM_{10} are not finally validated

Lyon (urban site)

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	6	6	-	64	-	500	-	29
PM_{10}	2	27	-	74	-	139	-	54
NO	3	28	-	298	-	774	-	283
NO_2	3	42	-	107	-	213	-	105
CO	-	-	-	-	-	-	-	-
O_3	3	48	-	138	-	306	-	150
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**124**

(1) arithmetic mean of all monitoring stations of an immission-area

(2) highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality
2003

Lyon (traffic site)

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	2	7	-	49	-	136	-	26
PM_{10}	3	32	-	105	-	358	-	85
NO	6	79	-	475	-	896	-	523
NO_2	6	65	-	161	-	331	-	194
CO	5	923	-	-	-	8523	-	3961
O_3	-	-	-	-	-	-	-	-
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**-**

Madrid

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max.**) 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max.***) 98-Percentile per year (2) (µg/m³)
SO_2	27	12	33	68	145	172	-	55
***) PM_{10}**	27	36	63	140	245	286	-	151
NO	27	37	121	352	710	776	-	280
NO_2	27	58	107	177	327	387	-	171
CO	25	700	1870	4140	9030	12860	-	4050
O_3	26	37	78	120	181	215	-	133
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**-**

*) PM_{10} without correction factor

**) Static average (not moving average)

***) max. 98 percentile of 1-h-values.

(1) arithmetic mean of all monitoring stations of an immission-area

(2) highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality 2003

Mannheim (traffic station)

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	-	-	-	-	-	-	-	-
PM_{10}	1	36	-	130	-	-	-	-
NO	1	49	94	272	576	625	-	220
NO_2	1	56	71	151	232	246	-	90
CO	1	700	1400	2400	4200	4900	-	2100
O_3	-	-	-	-	-	-	-	-
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**36**

Mannheim

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	3	7,9	18	110	586	1405	-	40
PM_{10}	3	28	45 *)	110	250 *)	365 *)	-	-
NO	3	21	57	235	567	627	-	198
NO_2	3	35	55	117	181	200	-	105
CO	3	300	600	1500	3000	4300	-	1300
O_3	3	49	100	159	279	328	-	181
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**28**

PM_{10} is only monitored gravimetrically at traffic influenced stations (daily mean). All other stations are monitored gravimetrically with ß-absorption. The correction factor is determined dependent on time and place. It is already included in the ß-values.

*) : values from ß-absorption

(1) arithmetic mean of all monitoring stations of an immission-area

(2) highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality
2003

Milan

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 2-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 95-Percentile per year (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	3	12	33	66	-	143	34*	39**
TSP	1	60	87	213	328	-	99*	119**
PM_{10}	2	45	66	140	193	-	86*	95**
$PM_{2,5}$	1	31	44	121	166	-	60*	69**
NO	9	56	174	458	-	804	-	-
NO_2	9	62	102	174	-	335	-	162***
CO	5	1367	2800	4600	-	9500	-	-
O_3	3	42	99	133	-	286	-	-
Benzene	2	4,9	7,0	15,2	-	25,2	-	-
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			gravimetr. **1,00** TEOM **1,00**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			gravimetr. **137** TEOM **113**

Comments:

* 95th percentile of the average 24 hour concentration levels (01/04/03-31/03/04)

** 98th percentile of the average 24 hour concentration levels (01/04/03-31/03/04)

*** 98th percentile of the average 1 hour concentration levels (01/01/03-31/12/03)

(1) arithmetic mean of all monitoring stations of an immission-area

(2) highest monitored value of an immission-area

(1) arithmetic mean of all monitoring stations of an immission-area

(2) highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality 2003

Munich

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	4	3	10	21	34	47	141	17
PM_{10}	3	40	69	135	289	-	-	98
NO	5	40	148	376	707	832	926	347
NO_2	5	51	92	159	242	274	280	157
CO	4	700	1200	2800	5700	7000	8900	2700
O_3	3	47	95	146	218	227	227	158
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**1,25**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**123**

Riga

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	3	6	11	40	104	146	174	31
PM_{10}	1	56	105	156	-	-	-	115
NO	-	-	-	-	-	-	-	-
NO_2	3	23	37	92	140	163	163	80
CO	-	-	-	-	-	-	-	-
O_3	3	60	76	106	117	131	131	112
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**105**

Comments: Daily PM_{10} measurements in Riga with SM200 ADAM (Atmospheric Dust Automatic Monitor).
The equipment employs the beta radiation analysis method.

(1) arithmetic mean of all monitoring stations of an immission-area
(2) highest monitored value of an immission-are

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality
2003

Rhine / Ruhr area

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	15	8	28	123	-	458	-	81
PM_{10}	16	30	57	133	-	-	-	-
NO	24	19	83	385	-	1038	-	304
NO_2	24	34	54	131	-	223	-	110
CO	1	500	-	-	-	-	-	2100
O_3	18	39	72	211	-	334	-	149
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			see comments	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**58**

Comments:
relation for gaseous substances: 20 °C
without traffic stressed monitoring stations and special monitorings
Factors for PM_{10} measurements:
1) for FH-62 Monitor: 1,11
2) for TEOM Monitor: 1,28

[1] arithmetic mean of all monitoring stations of an immission-area
[2] highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality
2003

Rotterdam

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	9	14	-	122	-	539	-	75
TSP	5	36	-	403	-	-	-	110
PM_{10}	4	45	-	148	-	170	-	116
NO	4	28	-	339	-	875	-	235
NO_2	4	44	-	115	-	222	-	109
CO	1	579	-	1720	-	4188	-	1295
O_3	3	40	-	132	-	289	-	124
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**1,90** *)	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**123**

*) TEOM monitor

[1] arithmetic mean of all monitoring stations of an immission-area

[2] highest monitored value of an immission-area

Comments:
We have added a roadside site. This implies that our area average has gone up for most species.
Nice weather also contributed to higher concentrations
TSP is monitored in an industrial environment and PM_{10} in the city. Concentrations cannot be compared.

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality
2003

Salzburg

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	3	6	-	21	52	69	84	20
PM_{10}	3	28	-	119	-	-	-	94
NO	3	43	-	298	532	651	765	298
NO_2	3	43	-	120	171	196	220	120
CO	2	670	-	2180	7380	8860	8880	2270
O_3	2	49	-	138	208	219	225	152
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**1,05**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**62**

Sofia

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	9	12	23	162	-	676	-	121
TSP	4	143	152	1350	-	-	-	-
PM_{10}	4	59	72	400	-	-	-	395
NO	4	34	58	-	-	1028	-	-
NO_2	9	27	32	-	-	522	-	296
CO	4	2135	3752	12000	-	-	62500	-
O_3	3	36	37	-	-	175	-	113
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**225**

[1] arithmetic mean of all monitoring stations of an immission-are
[2] highest monitored value of an immission-are

Reference Numbers for Air Quality 2003

Stockholm

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	2	1,2	2,9	-	-		-	-
PM_{10}	3	40	132	622	-	1062	-	-
NO	2	42	-	398	-	826	-	-
NO_2	2	42	55	132	-	213	-	-
CO	2	700	1000	5000		21000	-	-
O_3	1	55	78	106	-	133	-	-
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**1,20**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**80**

Comments:

SO_2=passive sampler, roof level city centre +urban area

O_3=roof level city centre

PM_{10}, NO, NO_2, CO = street level city centre

St. Pölten

	# of monitoring stations	annual mean [1] (µg/m³)	Max. monthly mean [2] (µg/m³)	Max. daily mean [2] (µg/m³)	Max. 3-h-mean [2] (µg/m³)	Max. 1 h-mean [2] (µg/m³)	Max. 1/2 h-mean [2] (µg/m³)	Max. 98-Percentile per year [2] (µg/m³)
SO_2	1	5	11	44	72	90	108	23
PM_{10}	2	34	52	131	152	235	443	101
NO	2	7	47	112	338	423	446	155
NO_2	2	25	43	68	113	145	157	82
CO	1	-	570	920	1780	2370	2630	1140
O_3	1	50	89	129	220	244	249	142
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**1,30**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**58**

[1] arithmetic mean of all monitoring stations of an immission-area

[2] highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality 2003

Vienna

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max.99,9-Percentil 3-h-mean (2) (µg/m³)	Max.99,9-Percentil 1 h-mean (2) (µg/m³)	Max.99,9-Percentil 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	12	6	18	54	80	86	95	43
TSP	10	34	76	193	236	300	310	138
PM_{10}	6	34	87	187	-	-	-	-
NO	17	20	182	378	618	669	684	449
NO_2	17	34	76	140	197	206	207	149
CO	4	610	1160	2250	3460	3740	3785	2220
O_3	5	57	116	169	202	212	213	153
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**1,00**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**95**

PM10: No short term values mentioned, only gravimetric measuring technique use
The short term percentiles have been calculated glidingly by means of half hours´ step

Villach

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	1	4	12	23	43	78	97	19
TSP	1	36	54	111	352	490	620	97
PM_{10}	1	30	48	119	*)	*)	*)	*)
NO	1	30	71	183	263	317	339	151
NO_2	1	31	46	72	105	117	127	77
CO	1	572	1079	2074	3366	3885	4840	2039
O_3	1	28	56	86	157	168	170	110
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**1,00**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**35**

*) PM_{10} values have been monitored gravimetrically by means of high volume sampler, so only daily mean values are available

(1) arithmetic mean of all monitoring stations of an immission-are
(2) highest monitored value of an immission-are

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality
2003

Warsaw

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	15	9	42	155	-	359	-	84
TSP *)	1	78	127	396	-	-	-	226
PM_{10}	5	37	65	236	-	-	-	123
NO	3	8	13	114	-	243	-	33
NO_2	14	23	49	129	-	189	-	97
CO	2	584	941	3499	-	4774	-	1724
O_3	1	45	72	100	-	156	-	87
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**89**

*) Traffic Station

Wiesbaden

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	1	4	7	15	28	30	35	14
PM_{10}	1	27	38	89	140	174	175	70
NO	1	22	59	191	331	485	505	171
NO_2	1	37	48	84	124	154	170	91
CO	1	400	600	1400	2700	4000	4600	1300
O_3	1	42	86	171	239	285	296	159
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**19**

(1) arithmetic mean of all monitoring stations of an immission-area

(2) highest monitored value of an immission-area

MAGISTRAT LINZ
Amt für Natur- und Umweltschutz

Reference Numbers for Air Quality 2003

Zagreb

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	5	9	53	119	-	-	-	66
TSP	5	59	138	254	-	-	-	190
PM_{10}	1	30	49	119	-	-	-	88
NO	0	-	-	-	-	-	-	-
NO_2	5	45	59	127	-	-	-	95
CO	0	-	-	-	-	-	-	-
O_3	5	25	61	163	-	-	-	108
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			**-**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**-**

Zurich

	# of monitoring stations	annual mean (1) (µg/m³)	Max. monthly mean (2) (µg/m³)	Max. daily mean (2) (µg/m³)	Max. 3-h-mean (2) (µg/m³)	Max. 1 h-mean (2) (µg/m³)	Max. 1/2 h-mean (2) (µg/m³)	Max. 98-Percentile per year (2) (µg/m³)
SO_2	1	6	12	27	42	67	100	33
PM_{10}	1	29	56	134	264	374	418	148
NO	1	18	61	185	331	338	340	238
NO_2	1	37	58	105	128	141	147	119
CO	1	500	800	1600	2600	2700	2900	2000
O_3	1	48	92	125	222	226	227	182
PM_{10}:	correction factor for the monitoring method used according to EU-directive 1999/30/EC			***)**	Number of limit violations of daily mean standard of 50 µg/m³ at the highest stressed station in 2003 (measured values **including** correction factor)			**38**

*) Monitoring with β-Meter, calibration with gravimetric measurement every 4th day

(1) arithmetic mean of all monitoring stations of an immission-area

(2) highest monitored value of an immission-area

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