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Luftgütedaten 2000 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 1 bis 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 aufgrund unterschiedlichen meteorologischen Einflüssen die Immissionsbelastungen außerordentlich stark schwanken können. Beispielsweise wird ein Monat mit vornehmlich regnerischer Witterung und viel Wind wesentlich geringere Immissionskonzentrationen aufweisen als ein Monat, in dem häufig Inversionswetterlagen vorherrschen.

Air Quality Data in 2000 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 1 to 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 emittents 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.

<p>Luftgütevergleiche werden durch das Amt für Natur- und Umweltschutz bereits seit mehreren Jahren durchgeführt, genaugenommen 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 2000 wurden weitere Städte bzw. Regionen aus Österreich und Deutschland, England, Frankreich, Belgien, Niederlande, Dänemark, Schweden, Italien, Schweiz, Spanien, Portugal, Polen, Griechenland, Bulgarien, Rumänien, Lettland, Ungarn und Kroatien mit einbezogen. Leider wurden uns bis zum heutigen Tag keine Daten aus Bukarest und Budapest zur Verfügung gestellt.</p>	<p>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 2000 comprised cities and regions of Austria, Germany, Cities from Great Britain, France, Belgium, The Netherlands, Denmark, Sweden, Italy, Switzerland, Spain, Portugal, Poland, Greece, Bulgaria, Romania, Latvia, Hungary and Croatia. Unfortunately up to the present day no data of Bucarest and Budapest were placed to our disposal.</p>
<p><u>Kritische Anmerkungen</u></p> <p>Als Kritikpunkt wird immer wieder angemerkt, daß ein Vergleich der Immissionsbelastung aus fachlichen Gründen nicht möglich ist, da</p> <ol style="list-style-type: none"> 1. die Zahl der Messstellen sehr verschieden ist (die Anzahl der Messstellen pro Messgebiet ist in der Tabelle auf Seite 7 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). <p>Den Autoren sind diese Tatsachen durchaus bewusst. Trotz der erhobenen Einwände gibt es einige Argumente für die Fortführung der Städtevergleiche:</p>	<p><u>Critical remarks</u></p> <p>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:</p> <ol style="list-style-type: none"> 1. The number of monitoring stations differs very much (the number of monitoring stations of each monitoring network is mentioned on page 7 and the following tables), 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). <p>1. The authors of the comparative study is thoroughly conscious of these facts. But despite to the raised objections there are also some arguments of continuing the activities:</p>

<p>1. Die Luftschadstoffmessungen werden im allgemeinen in der gleichen Weise durchgeführt. Das bedeutet, daß die Luftüberwachung an bestimmten <i>Punkten</i> 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 <i>Art der Probenahme</i> müsste also <i>vergleichbar</i> sein.</p> <p>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.</p> <p>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 <i>Trendentwicklung</i> 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.</p>	<p>1. The kind of measurement of air pollutants is carried out by the same way. This means that the results of air monitoring activities are obtained by sampling at special sampling <i>points</i> in a city or region by means of automatically registering monitoring stations. The measured concentrations represent the stress of a more or less wide area around the monitoring station. Due to this reason the <i>method of sampling</i> itself should be <i>comparable</i>.</p> <p>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.</p> <p>1. 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 <i>trend developments</i> 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.</p>
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<u>Immissionskenngrößen</u>	<u>Immission reference values</u>
<p>In der vorliegenden Studie wurden verschiedene Immissionskenngrößen miteinander verglichen:</p> <ul style="list-style-type: none"> • 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-Perzentil/Jahr (höchstbelastete Station einer Stadt/Region) <p>Von den einzelnen Messnetzbetreibern wurden die gewünschten Immissionsdaten in sehr unterschiedlicher Vollständigkeit zur Verfügung gestellt. Insbesondere betrifft dies die Perzentil-Auswertungen und manchmal auch die Auswertungen für max. HMW oder max. 3h-MW. Oftmals ist auch nicht das 98-Perzentil verfügbar, sondern es werden andere Perzentilgrößen (z. B. 95-Perzentil) gebildet. Die meisten Messnetzbetreiber berechnen die Perzentile aus den Halbstunden-Mittelwerten eines Jahres, manchmal werden jedoch auch die Tagesmittelwerte dafür herangezogen.</p> <p>Aus diesem Grund wurde nur die Auswertung „max. 98-Perzentil“ in grafischer Form durchgeführt. Im Kapitel „Luftgütekennzahlen“ der einzelnen Vergleichsregionen sind sämtliche dem Amt für Natur- und Umweltschutz übermittelten Perzentilwerte aufgelistet. Die Art der Perzentilbildung ist - soweit bekannt - in den Tabellen jeweils vermerkt.</p>	<p>The present study compares various Immission reference values, such as:</p> <ul style="list-style-type: none"> • 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) <p>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.</p> <p>This was the reason that only „max. 98-percentile“ was graphically evaluated. Within the chapter „Air quality reference numbers“ of each compared region on 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.</p>

<u>Mehrijahresvergleich</u>	<u>Comparison over a period of years</u>
<p>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 2000 aufgetragen.</p>	<p>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 2000 are plotted.</p>
<p>Wenn man die Daten analysiert, können folgende Aussagen getroffen werden:</p>	<p>The following statements can be given in analyzing the data:</p>
<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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 1992 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.
<ol style="list-style-type: none"> 4. Entwicklung der Langzeitbelastung (Jahresmittelwerte) gegenüber 1993: 	<ol style="list-style-type: none"> 4. Development of the air pollution stress in comparison with 1993:
<p>SO₂: Nahezu alle Regionen <i>geringer</i> belastet</p>	<p>SO₂: Nearly all regions <i>less</i> stressed</p>
<p>Staub: Nahezu alle Regionen <i>geringer</i> belastet</p>	<p>particulates: Nearly all regions <i>less</i> stressed</p>
<p>NO: Nahezu alle Regionen <i>höher</i> belastet</p>	<p>NO: Nearly all regions <i>higher</i> stressed</p>
<p>NO₂: tendenziell <i>gleichbleibend</i></p>	<p>NO₂: trend <i>constant</i></p>
<p>CO: uneinheitlich, tendenziell <i>gleichbleibend</i></p>	<p>CO: nonuniform, trend <i>constant</i></p>
<p>O₃: uneinheitlich</p>	<p>O₃: nonuniform</p>

Übersicht über die Entwicklung der Schadstoffbelastungen 1993 - 2000

Overview over the development of the stress of air pollutants from 1993 through 2000

Beurteilungsbasis: Jahresmittelwerte über alle Stationen einer Region/ based on mean of all annual mean values of a region

Austrian cities

	SO ₂			Particulates			NO			NO ₂			CO			O ₃		
	Stress in 1993	Tendency last 3 years	Stress in 2000	Stress in 1993	Tendency last 3 years	Stress in 2000	Stress in 1993	Tendency last 3 years	Stress in 2000	Stress in 1993	Tendency last 3 years	Stress in 2000	Stress in 1993	Tendency last 3 years	Stress in 2000	Stress in 1993	Tendency last 3 years	Stress in 2000
Linz	■	==	■	■	↘	■	■	↗	■	■	==	■	■	↘	■	■	↗	■
Bludenz	■	↓	■	■	↘	■	■	==	■	■	↘	■	-	-	-	■	↗	■
Dornbirn	■	↘	■	■	↘	■	-	↘	■	■	↗	■	-	↘	■	-	↑	-
Graz	■	↘	■	■	==	■	-	↗	■	■	==	■	-	==	■	■	↗	■
Hallein	■	↓	■	■	↘	■	-	-	■	■	==	■	■	↓	■	■	==	■
Innsbruck	■	↘	■	■	==	■	■	==	■	■	==	■	■	↘	■	■	==	■
Klagenfurt	■	↘	■	■	↘	■	■	==	■	■	==	■	■	==	■	■	↗	■
Leoben/Göß/Dona-witz	■	↓	■	■	↘	■	■	==	■	-	==	■	■	==	■	■	↗	■
Salzburg	■	↘	■	■	==	■	-	-	■	■	==	■	■	↓	■	■	↘	■
St. Pölten	■	↗	■	-	==	■	■	==	■	■	↘	■	-	↓	■	-	↗	■
Vienna	■	↓	■	■	↘	■	■	==	■	■	↘	■	■	==	■	■	==	■
Villach	■	↓	■	■	↘	■	■	==	■	■	↘	■	■	↘	■	■	==	■

European Cities

	SO ₂			Particulates			NO			NO ₂			CO			O ₃		
	Stress in 1993	Tendency last 3 years	Stress in 2000	Stress in 1993	Tendency last 3 years	Stress in 2000	Stress in 1993	Tendency last 3 years	Stress in 2000	Stress in 1993	Tendency last 3 years	Stress in 2000	Stress in 1993	Tendency last 3 years	Stress in 2000	Stress in 1993	Tendency last 3 years	Stress in 2000
Barcelona	Yellow	↓	Blue	White	==	Red	White	↘	Red	Yellow	==	Red	White	↘	Yellow	-	↗	Yellow
Basel	Blue	↘	Blue	Yellow	↘	Blue	Blue	↘	Blue	Yellow	↘	Yellow	Blue	↘	White	White	==	Yellow
Belfast	Red	↓	Yellow	White	↘	Blue	Yellow	↘	Blue	Yellow	↘	Yellow	Blue	↘	Blue	Yellow	==	Yellow
Berlin	Yellow	↓	Blue	White	↓	Blue	Blue	↘	Yellow	Yellow	↘	Yellow	Blue	↘	Blue	Yellow	==	Yellow
Birmingham	Yellow	↓	Blue	Yellow	↘	Blue	Blue	↓	Blue	Yellow	↘	Yellow	Blue	↘	Blue	Blue	==	Yellow
Bristol	Yellow	↘	Blue	White	==	Blue	White	==	Red	Yellow	==	Red	Blue	↘	Blue	Yellow	==	Yellow
Brussels	Yellow	↓	Blue	White	↘	Blue	White	↓	Yellow	Yellow	==	Red	White	==	Blue	White	↗	Yellow
Budapest	Red		White	White		White	White		White	White		White	White		White	White		White
Chemnitz	Red	↓↓	Blue	Yellow	↘	Yellow	Blue	==	Yellow	Yellow	↘	Yellow	Blue	↓	Blue	Yellow	==	Yellow
Copenhagen	Blue	↘	Blue	White	==	Blue	White	↘	Yellow	Yellow	==	Yellow	Blue	↘	White	White		White
Debrecen	Red	↓	Blue	Red	↓	Red	White	↘	Blue	White	↘	Blue	Blue	↘	-	Yellow	↗	Yellow
Dresden	Red	↓↓	Blue	Red	↘	Yellow	Blue	==	Yellow	Yellow	==	Yellow	Blue	↓	Blue	Yellow	↘	Yellow
Edinburgh	Yellow	==	Blue	White	==	Blue	Yellow	==	Yellow	Yellow	==	Red	White	==	Blue	Blue	==	Blue
Frankfurt	Yellow	↓	Blue	Yellow	↘	Blue	Yellow	==	Yellow	Red	↘	Red	Blue	↘	Blue	Yellow	==	Yellow
Goteborg	White	↘	Blue	White	==	Blue	Blue	↘	Blue	White	==	Yellow	Blue	↓	Blue	White	==	Yellow
Hamburg	Yellow	↓	Blue	Yellow	↘	Yellow	Blue	↓	Blue	Yellow	↓	Yellow	Blue	↓	Blue	Yellow	==	Yellow
Karlsruhe	Blue	↘	Blue	White	==	Blue	Yellow	==	Red	Yellow	==	Red	White	↘	Blue	Yellow	↗	Yellow
Leeds	Yellow	↓	Blue	White	↘	Blue	Yellow	↘	Yellow	White	↓	Yellow	Blue	↘	Blue	Blue	↗	Yellow
Leipzig	Red	↓↓	Blue	White	↘	Yellow	Blue	↘	Yellow	Yellow	==	Yellow	Blue	↓	Blue	Yellow	==	Yellow
Liverpool	Red	↓↓	Blue	Yellow	↘	Blue	Yellow	↘	Yellow	Yellow	↘	Yellow	Blue	==	Blue	Blue	↗	Yellow
London	Red	↓	Blue	Yellow	==	Blue	Blue	↘	Red	Red	==	Red	Yellow	==	Blue	Blue	==	Blue
Luxemburg	White	↘	Blue	White	==	Blue	White	==	Red	White	==	Red	White	↘	Blue	White	↗	Yellow

	SO ₂			Particulates			NO			NO ₂			CO			O ₃		
	Stress in 1993	Tendency last 3 years	Stress in 2000	Stress in 1993	Tendency last 3 years	Stress in 2000	Stress in 1993	Tendency last 3 years	Stress in 2000	Stress in 1993	Tendency last 3 years	Stress in 2000	Stress in 1993	Tendency last 3 years	Stress in 2000	Stress in 1993	Tendency last 3 years	Stress in 2000
Lyon-Agglomeration		↓	Highly stressed		==	Highly stressed		↗	Highly stressed		↗	Highly stressed		↘	Medium stressed		==	Medium stressed
Madrid	Highly stressed	==	Medium stressed		==	Medium stressed				Highly stressed	==	Highly stressed		↓	Medium stressed		==	Highly stressed
Mannheim	Medium stressed	==	Highly stressed	Medium stressed	==	Highly stressed		==	Medium stressed	Medium stressed	==	Medium stressed	Highly stressed	↘	Highly stressed		==	Medium stressed
Milan	Medium stressed	↘	Highly stressed		↗	Medium stressed	Highly stressed	↘	Highly stressed	Highly stressed	↘	Highly stressed	Highly stressed	↓	Medium stressed		==	Medium stressed
Munich	Highly stressed	↘	Highly stressed	Medium stressed	↓	Highly stressed	Highly stressed	↘	Highly stressed	Highly stressed	==	Highly stressed	Medium stressed	↓	Highly stressed		↘	Medium stressed
Rhine-Area south	Medium stressed	↓	Highly stressed		↘	Medium stressed	Medium stressed	↘	Highly stressed	Medium stressed	↘	Medium stressed	Highly stressed	↓	Medium stressed		==	Medium stressed
Rhine Area Centre	Medium stressed	↘	Highly stressed	Medium stressed	↘	Medium stressed	Medium stressed	↘	Highly stressed	Medium stressed	↘	Medium stressed	Highly stressed	↓	Highly stressed		==	Highly stressed
Rotterdam		==	Highly stressed		↘	Medium stressed		↘	Highly stressed	Medium stressed	↘	Medium stressed					==	Medium stressed
Ruhr-Area West	Medium stressed	↘	Highly stressed	Medium stressed	==	Medium stressed	Highly stressed	==	Highly stressed	Medium stressed	↘	Medium stressed	Highly stressed	↘	Highly stressed		==	Medium stressed
Ruhr-Area Centre	Medium stressed	↘	Highly stressed	Medium stressed	==	Medium stressed	Highly stressed	↘	Highly stressed	Medium stressed	↘	Medium stressed	Highly stressed	↓	Highly stressed		==	Medium stressed
Ruhr-Area East	Medium stressed	↓	Highly stressed	Medium stressed	==	Medium stressed	Highly stressed	==	Highly stressed	Medium stressed	↘	Medium stressed	Highly stressed	↓	Highly stressed	Highly stressed	==	Medium stressed
Stockholm	Highly stressed	↘	Highly stressed			Medium stressed		↘	Medium stressed		↘	Medium stressed	Highly stressed	↘	Highly stressed	Medium stressed	==	Medium stressed
Warszawa		↓	Highly stressed	Medium stressed	↘	Medium stressed					==	Medium stressed		==	Highly stressed		==	Medium stressed
Wiesbaden	Medium stressed	↓	Highly stressed	Medium stressed	↘	Medium stressed	Medium stressed	==	Medium stressed	Medium stressed	==	Medium stressed	Highly stressed	↘	Highly stressed		==	Medium stressed
Zagreb		==	Medium stressed		==	Medium stressed				Medium stressed	==	Medium stressed					↗	Highly stressed
Zurich - town centre	Highly stressed	↓	Highly stressed	Medium stressed	==	Highly stressed	Highly stressed	↘	Highly stressed	Medium stressed	↘	Medium stressed	Highly stressed	↘	Highly stressed	Medium stressed	↘	Medium stressed

Legend:



slightly stressed



No data



slight stress decrease



==keeping constant



Medium stressed



strong stress decrease



↗ slight stress increase



Highly stressed



very strong stress decrease



↑ strong stress increase

Anzahl der Messstellen

Number of monitoring stations

Country	Monitored Area	SO ₂	particulates	NO	NO ₂	CO	O ₃
Austria	Bludenz-Town-Hall	1	1	1	1	-	1
	Dornbirn-Stadtstraße	1	1	1	1	1	-
	Graz	6	6	6	6	4	4
	Hallein	3	1	-	1	1	1
	Innsbruck	2	2	2	2	2	2
	Klagenfurt	2	2	2	2	2	2
	Leoben/Göß/Donawitz	3	3	3	3	2	1
	Linz	10	10	10	10	10	4
	Salzburg	3	3	-	3	2	2
	St. Pölten	1	1	1	1	1	1
	Vienna	17	17	17	17	5	5
Villach	1	1	1	1	1	1	
Belgium	Brussels	8	5	8	8	5	5
Bulgaria	Sofia	9	7	4	9	4	4
Croatia	Zagreb	9	4	1	6	-	4
Denmark	Copenhagen	1	1	2	2	2	1
France	Lyon-Agglomeration	11	6	11	11	5	5
Germany	Berlin	19	12	21	21	18	10
	Chemnitz	2	2	2	2	2	2
	Dresden	2	2	2	2	2	2
	Frankfurt	5	5	5	5	4	5
	Hamburg	11	5	11	11	3	6
	Karlsruhe	3	3	3	3	3	3
	Leipzig	3	3	3	3	3	3
	Mannheim	3	3	3	3	3	3
	Munich	8	7	8	8	8	3
	Rhine Area Centre (Region Düsseldorf)	4	4	4	4	3	2
	Rhine Area South (Region Cologne, Bonn)	8	8	8	8	5	7
	Ruhr Area East (Region Dortmund)	9	9	9	9	7	4
	Ruhr Area Centre (Region Essen, Bochum)	8	8	8	8	5	5
Ruhr Area West (Region Duisburg, Oberhausen)	8	8	8	8	6	5	
Wiesbaden	1	1	1	1	1	1	
Greece	Athens	8	-	8	8	9	8
	Thessaloniki	3	2	-	3	3	3

Anzahl der Messstellen

Number of monitoring stations

Country	Monitored Area	SO ₂	particulates	NO	NO ₂	CO	O ₃
Hungary	Budapest	8	8	8	8	8	2
	Debrecen	10	2	1	10	-	1
Italy	Milan	5	1	9	9	5	3
Latvia	Riga	4	1	-	4	-	4
Luxemburg	Luxemburg	2	1	2	2	1	2
Netherlands	Rotterdam	8	5	3	3	-	3
Poland	Warszawa	17	4	-	16	2	2
Portugal	Lisbon	5	3	-	8	8	2
Romania	Bukarest	5	5	-	5	-	-
Spain	Barcelona	2	5	5	5	5	5
	Madrid	25	24	25	25	25	25
Switzerland	Basel-Outskirts	1	1	1	1	0	1
	Zurich-Centre	1	1	1	1	1	1
Sweden	Göteborg	3	1	2	3	1	3
	Stockholm	1	2	5	6	4	1
U.K.	Belfast	2	2	1	1	1	1
	Birmingham	2	2	2	2	2	2
	Bristol	1	1	2	2	2	1
	Edinburgh	1	1	1	1	1	1
	Leeds	1	1	1	1	1	1
	Liverpool	1	1	1	1	1	1
	London	11	11	22	22	16	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: ui@vlr.gv.at
homepage: -

*Austria,
Graz, Leoben, Donawitz*

Amt der Steiermärkischen Landesregierung
Fachabt. Ia (Ref. f. Luftgüteüberwachung)
Landhausgasse 7
A-8010 Graz
e-mail: post@fa1a.stmk.gv.at
homepage: <http://www.stmk.gv.at/luis>

Austria, Innsbruck

Amt der Tiroler Landesregierung
Landesforstdirektion
Abt. Waldschutz-Luftgüte
Bürgerstrasse 36
A-6020 Innsbruck
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e-mail: an.weber@tirol.gv.at
homepage: -

Austria, Linz

Amt der öö. Landesregierung
UA Luftreinhaltung und Energietechnik
Goethestraße 86
A-4020 Linz
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e-mail: elisabeth.danninger@ooe.gv.at
homepage: www.ooe.gv.at

*Austria,
Salzburg, Hallein*

Amt der Salzburger Landesregierung, Abt. 16
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A-5010 Salzburg
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Abteilung XIII
Roßmarkt 6
A-3100 St. Pölten
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e-mail: marktamt@st-poelten.gv.at
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Austria, Vienna Magistrat der Stadt Wien, MA 22
Ebendorferstraße 4
A-1082 Wien
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e-mail: post@m22.magwien.gv.at
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Austria, Klagenfurt, Villach Amt der Kärntner Landesregierung
Abt. 15 (Umweltschutz und Technik)
Flatschacher Straße 70
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Frederiksborgvej 399
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homepage: <http://www.dmu.dk/Atmospheric>

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Marckmannstraße 129b
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Latvia Ministry of Environmental Protection and Regional Development
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Zone F 15, 4th Floor

Air and Environment Quality Division

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U.K.

e-mail: ruth_chapman@detr.gsi.gov.uk

homepage: <http://www.aeat.co.uk/netcen/airqual>

Luftgütevergleich

2000

Jahresmittelwert (Gebietsmittel)

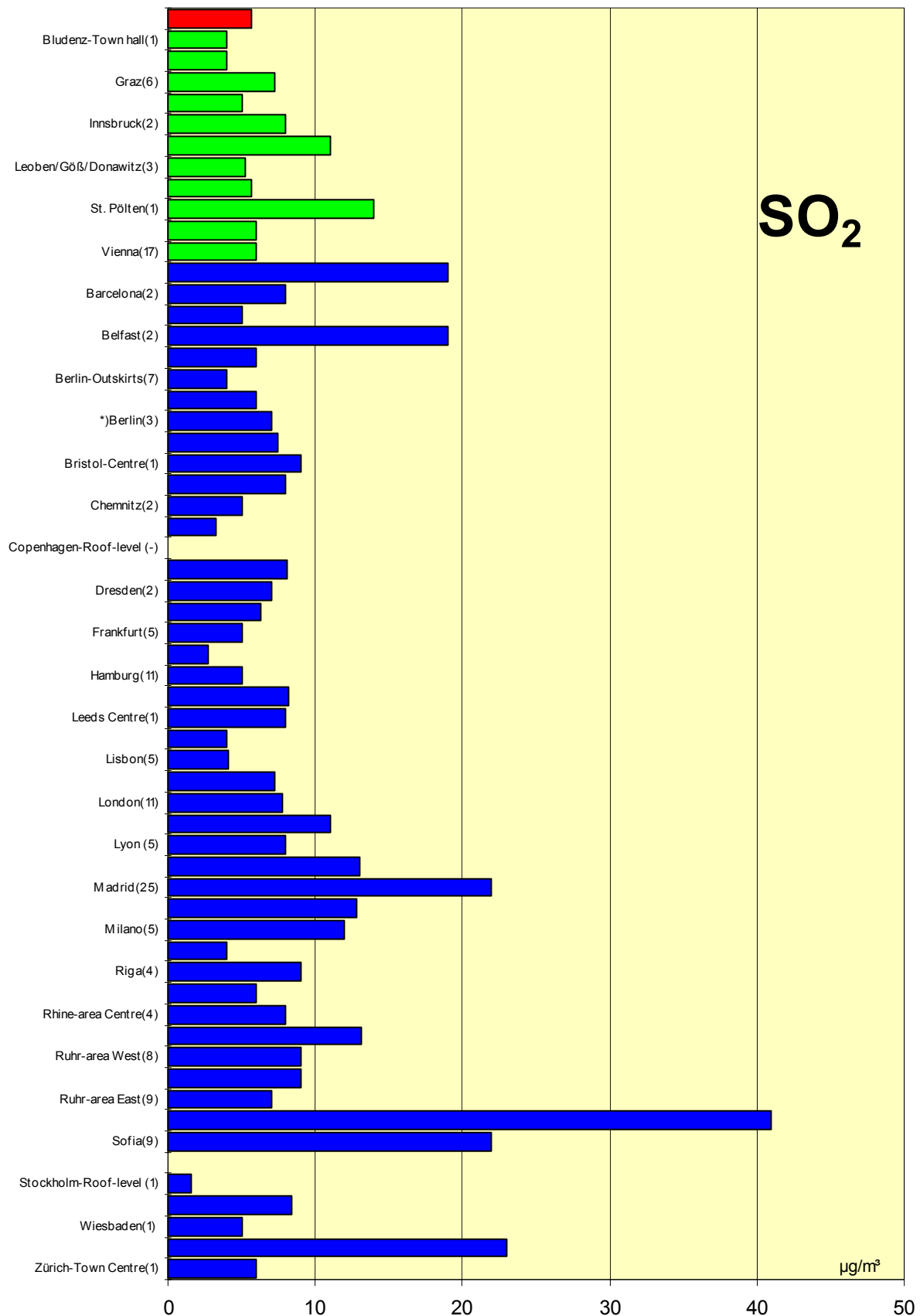
Comparison of The Air Quality

2000

Annual Mean Values

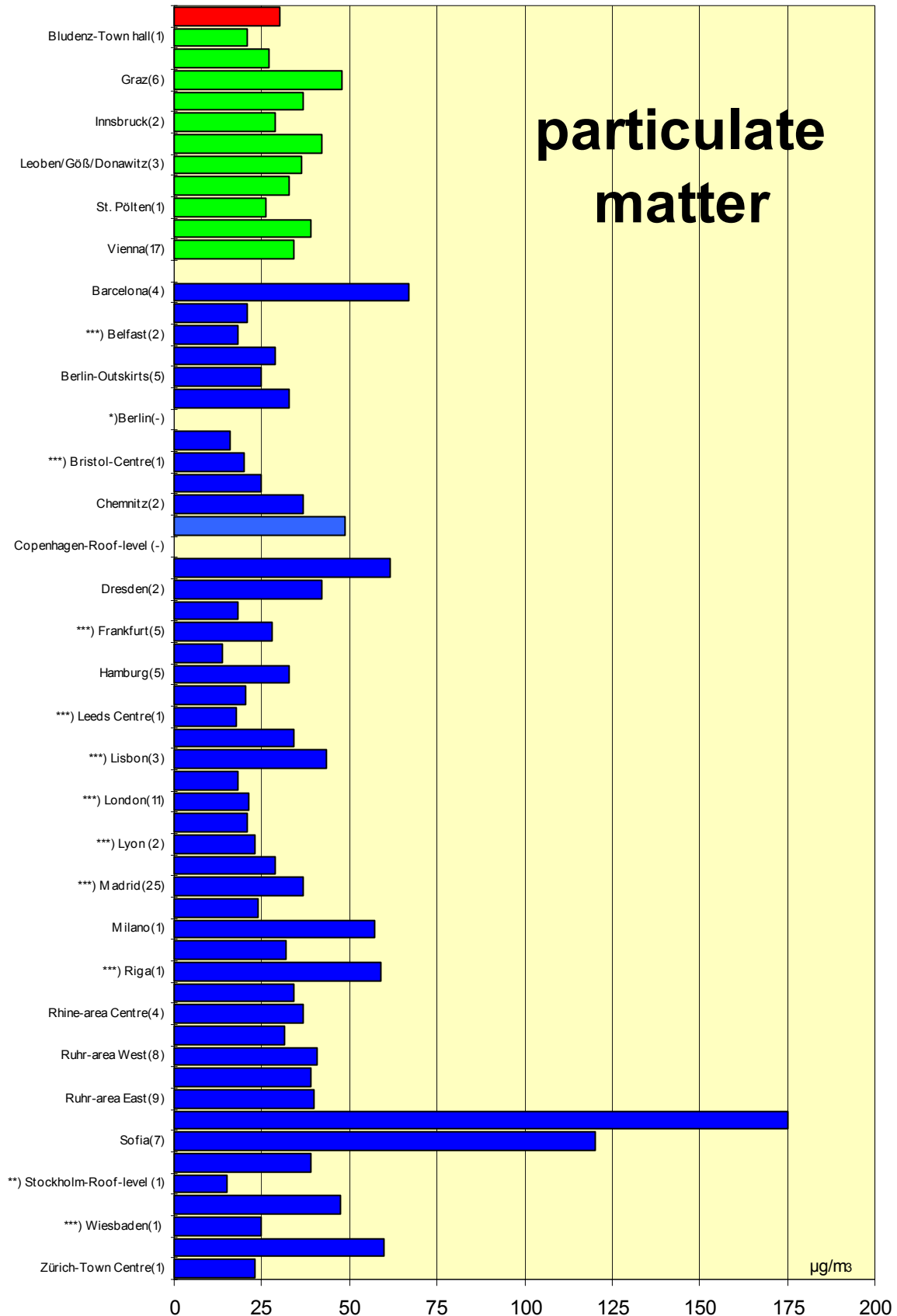
Comparison of The Air Quality 2000 annual mean values

(in parentheses: number of monitoring stations)



Comparison of The Air Quality 2000 annual mean values

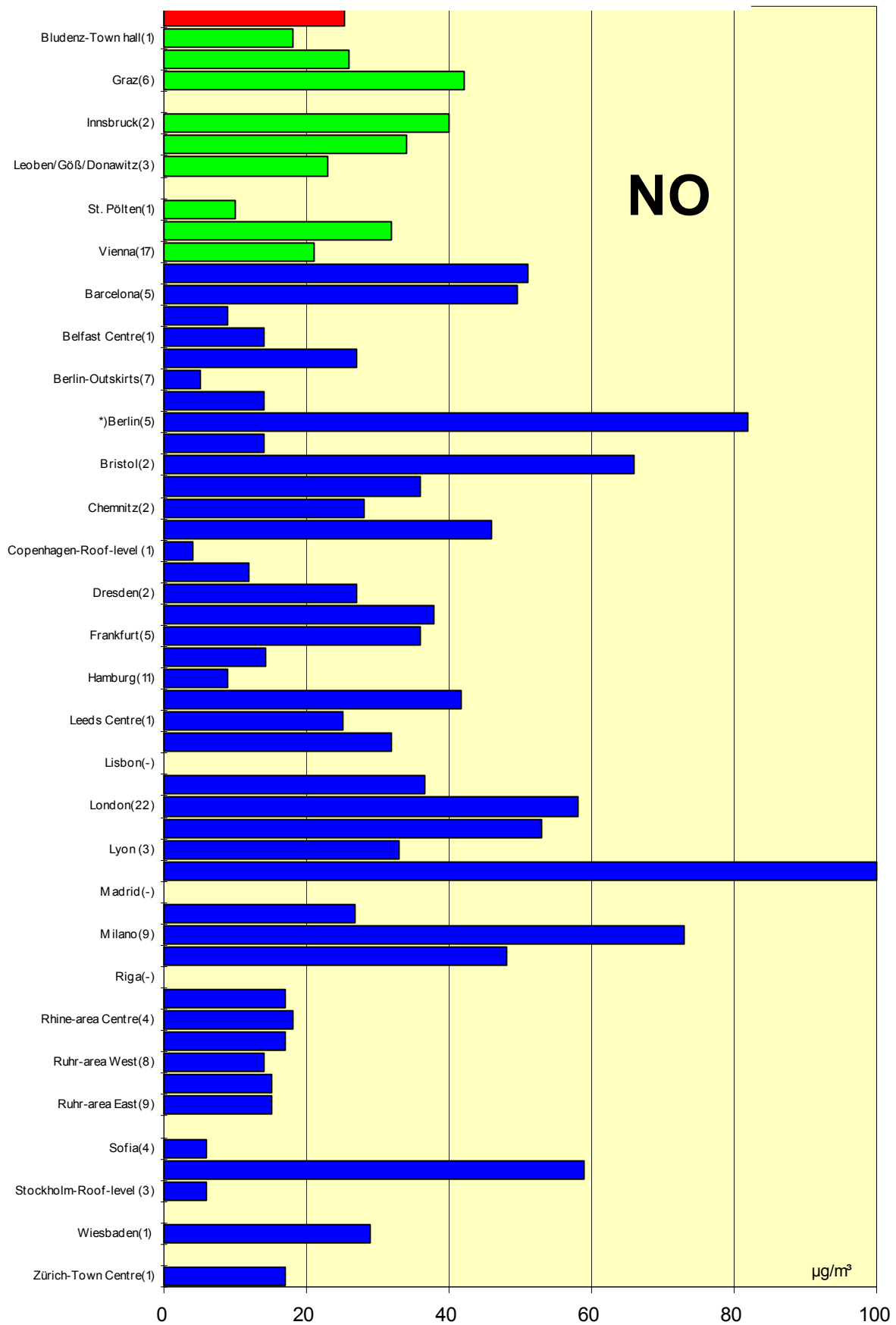
(in parentheses: number of monitoring stations)



Comparison of The Air Quality 2000

annual mean values

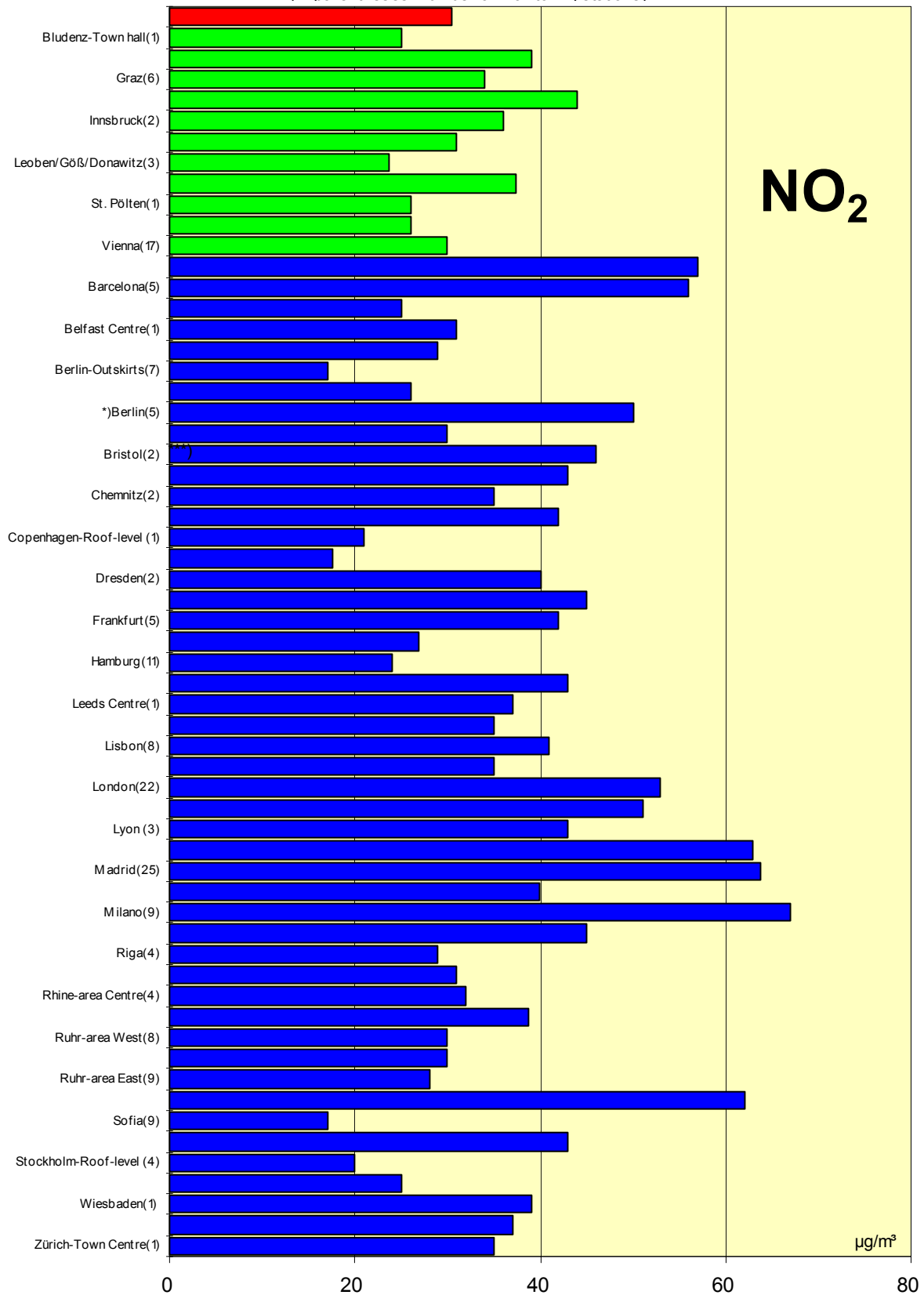
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Comparison of The Air Quality 2000

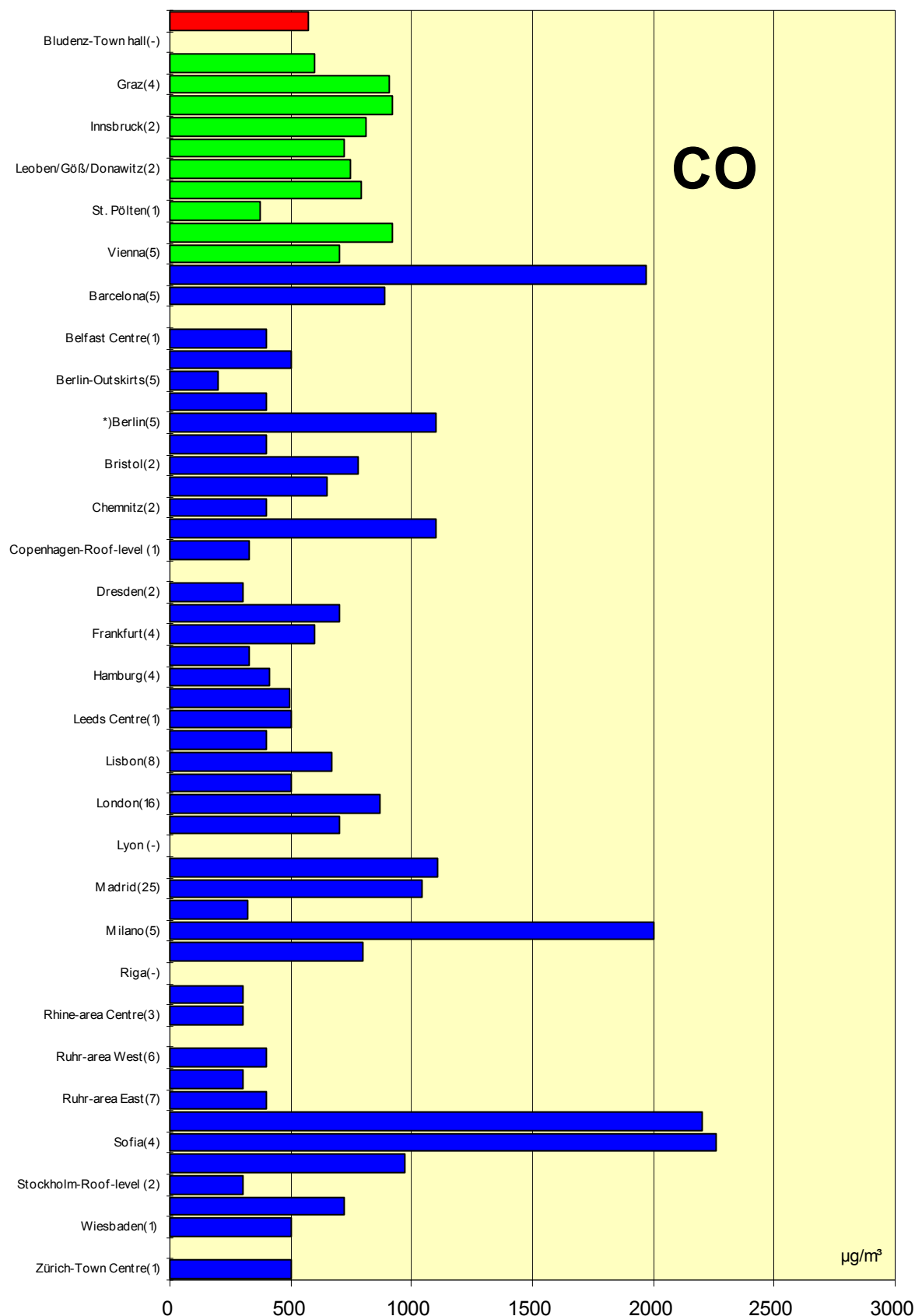
annual mean values

(in parentheses: number of monitoring stations)



Comparison of The Air Quality 2000 annual mean values

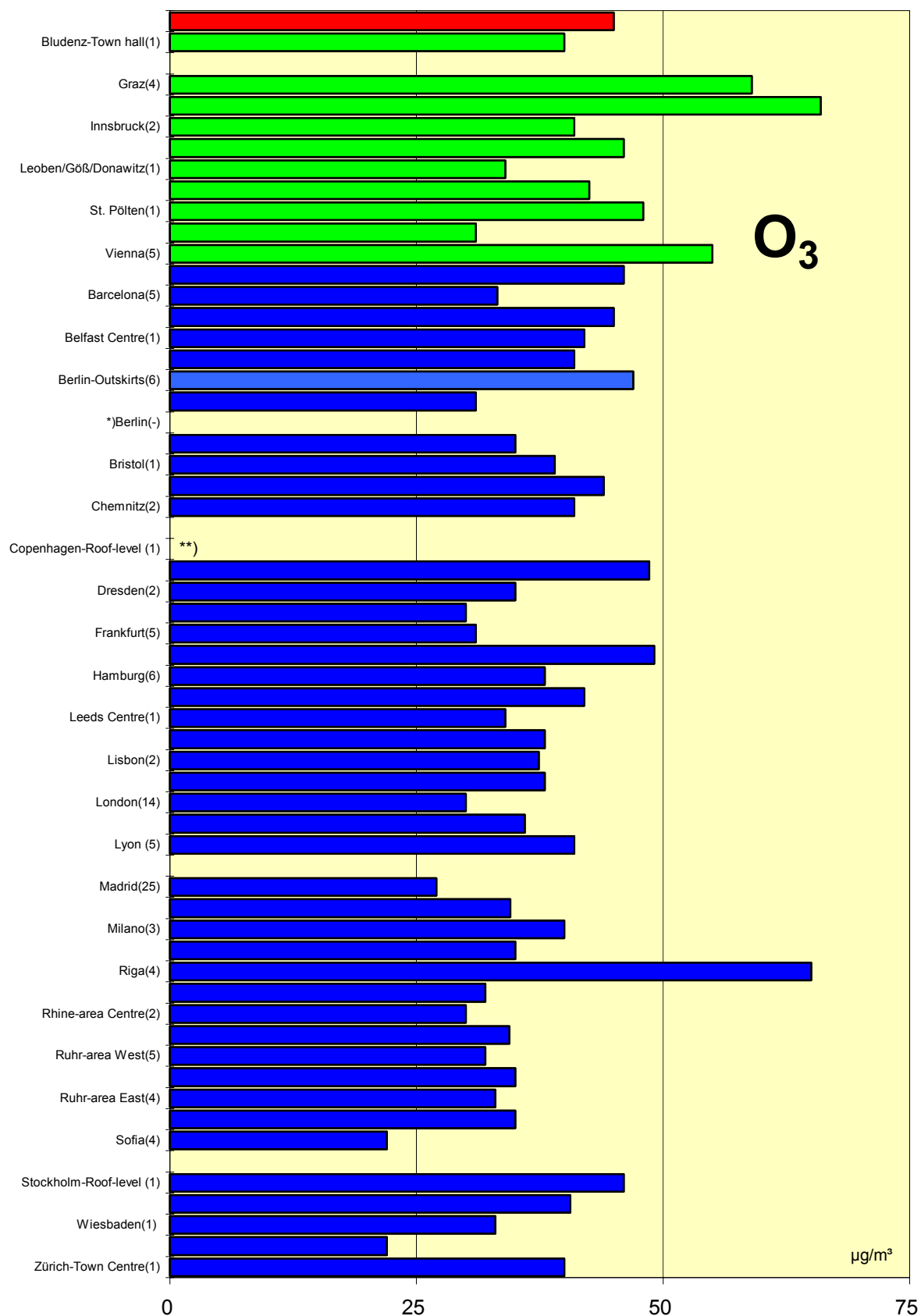
(in parentheses: number of monitoring stations)



Comparison of The Air Quality 2000

annual mean values

(in parentheses: number of monitoring stations)



Luftgütevergleich

2000

max. Monatsmittelwert

Comparison of The Air Quality

2000

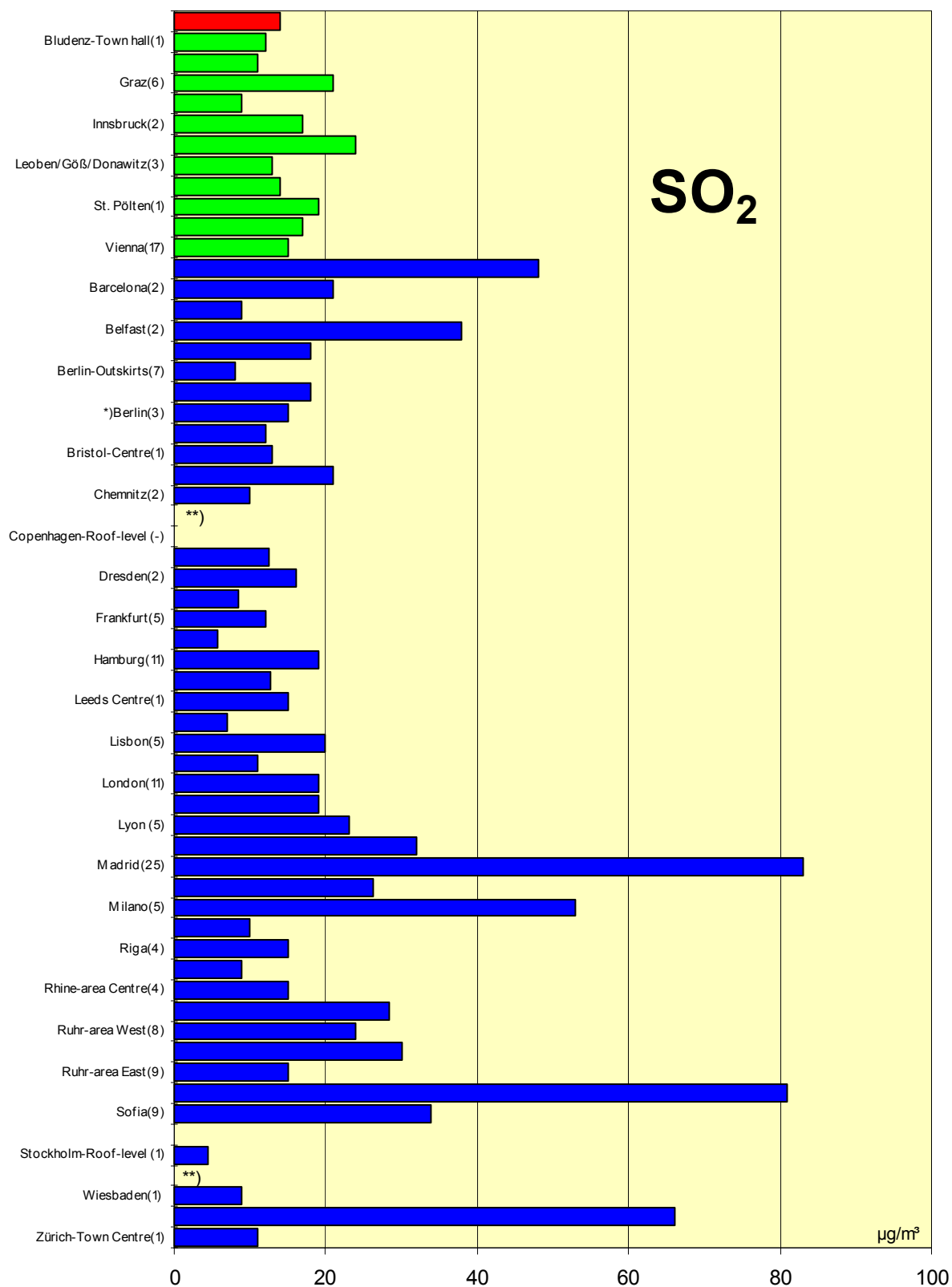
Max. Monthly Mean Values

Comparison of The Air Quality 2000

max. monthly mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

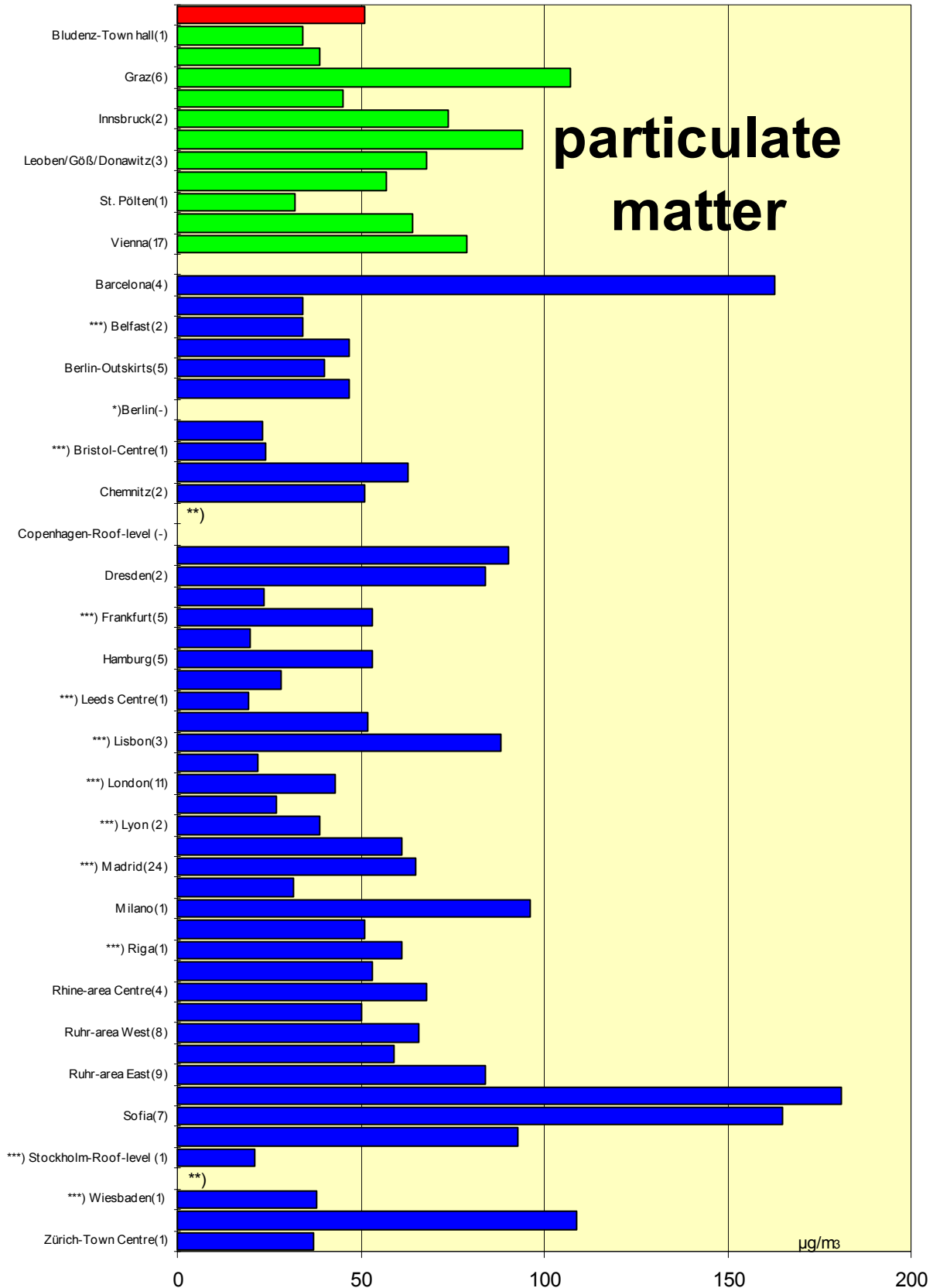


Comparison of The Air Quality 2000

max. monthly mean values

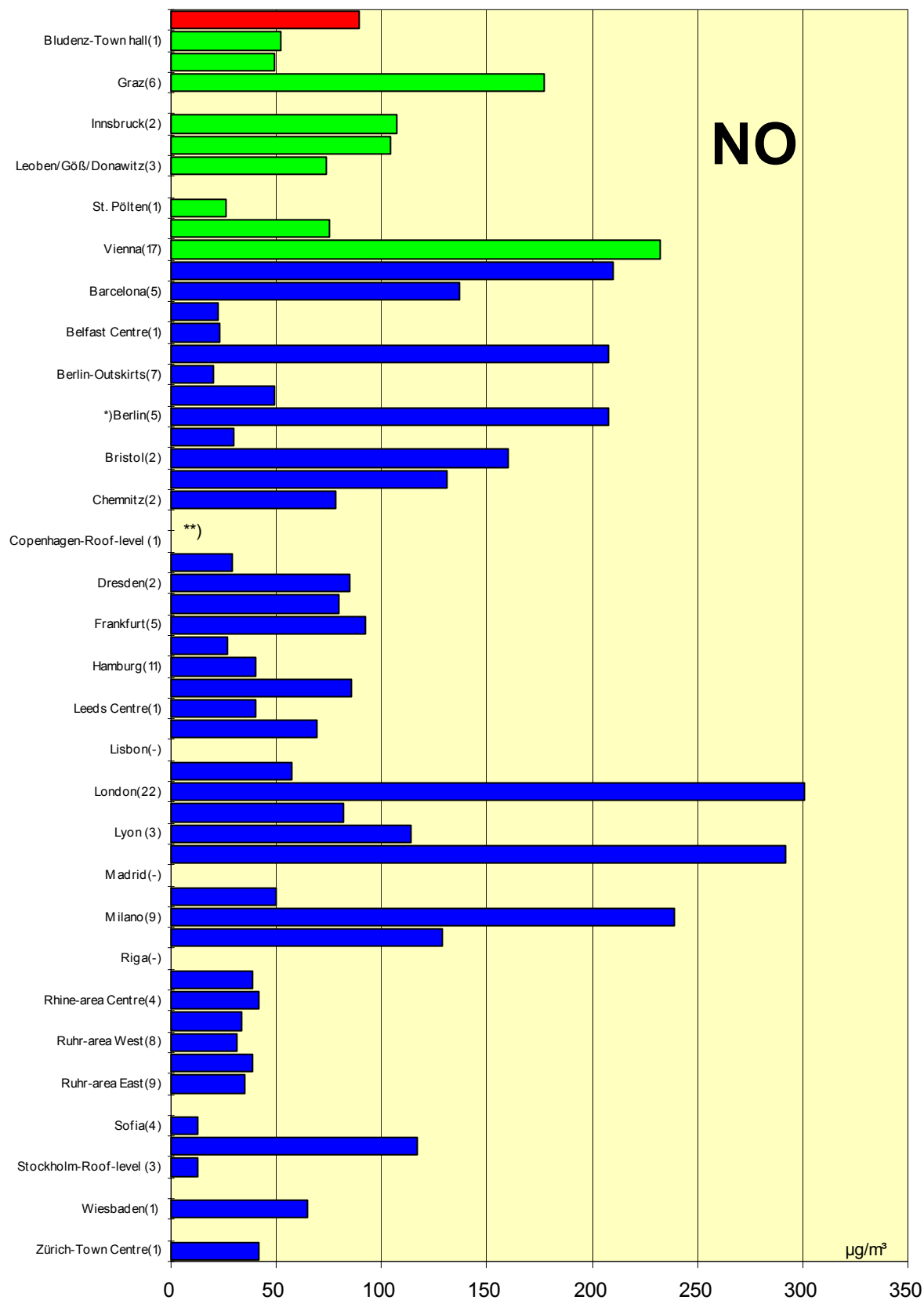
(max. stressed monitoring station)

(in parentheses: number of monitoring stations)



Comparison of The Air Quality 2000

max. monthly mean values
 (max. stressed monitoring station)
 (in parentheses: number of monitoring stations)

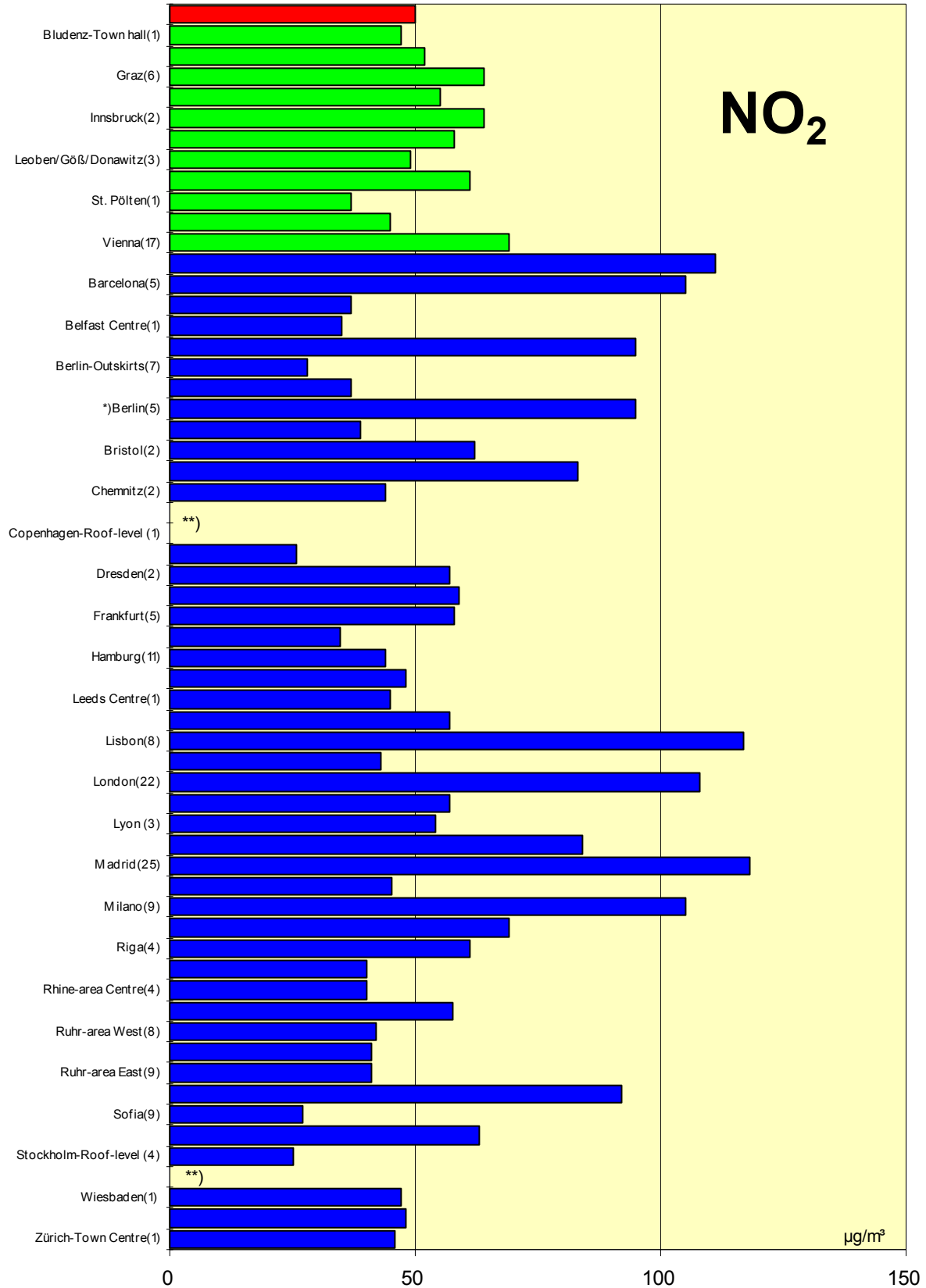


Comparison of The Air Quality 2000

max. monthly mean values

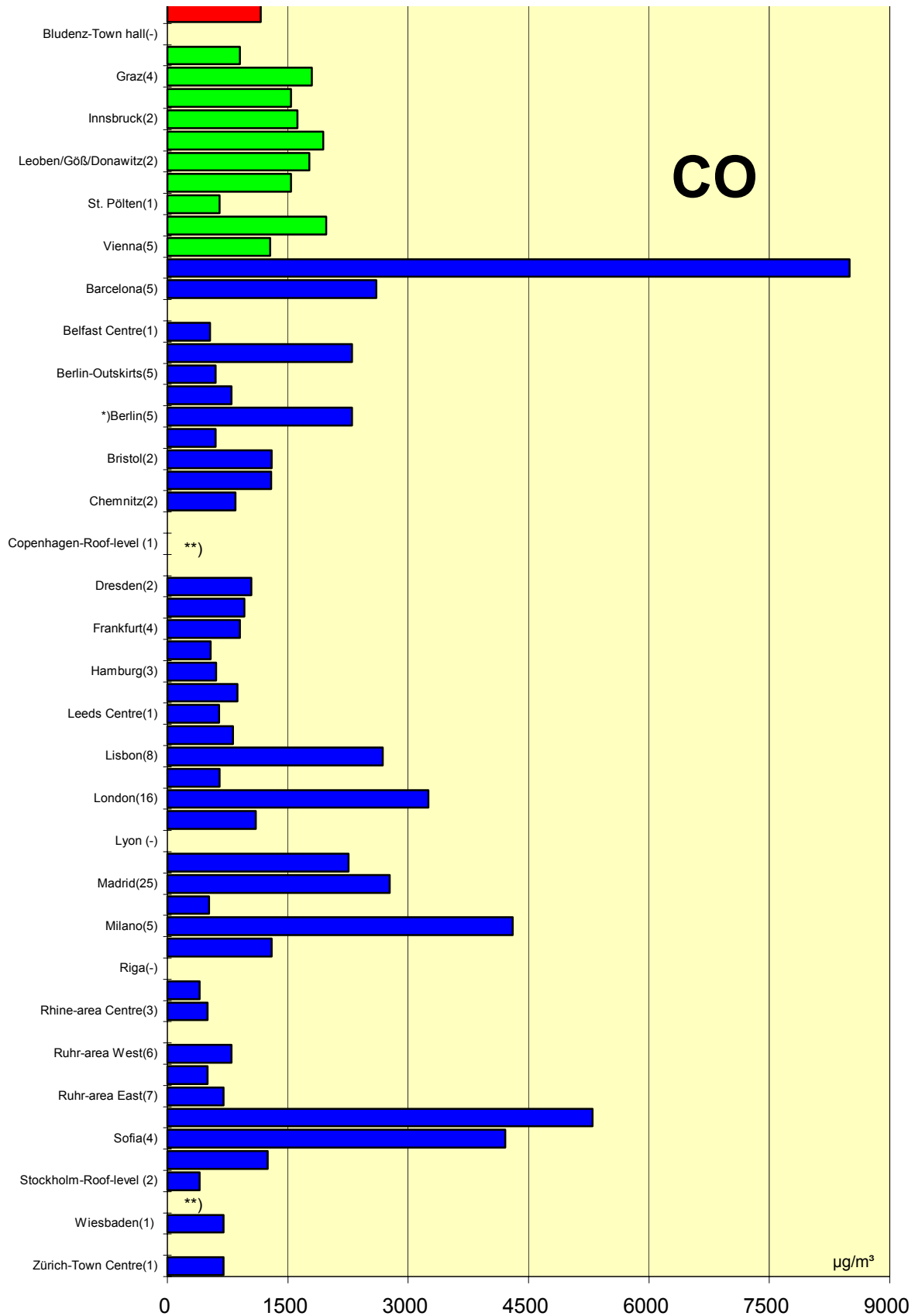
(max. stressed monitoring station)

(in parentheses: number of monitoring stations)



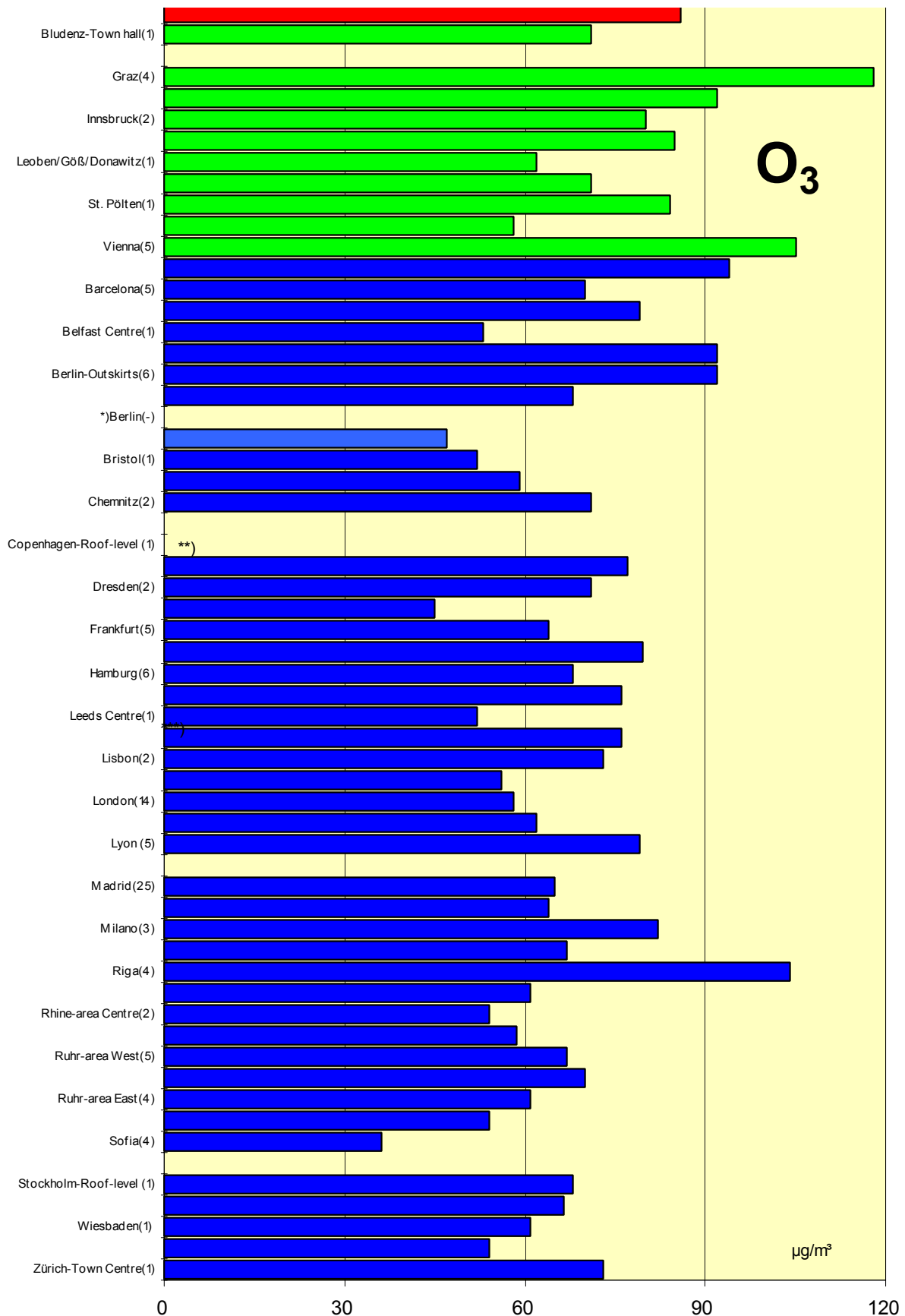
Comparison of The Air Quality 2000

max. monthly mean values
(max. stressed monitoring station)
(in parentheses: number of monitoring stations)



Comparison of The Air Quality 2000

max. monthly mean values (max. stressed monitoring station)
(in parentheses: number of monitoring stations)



Luftgütevergleich

2000

max. Tagesmittelwert

Comparison of The Air Quality

2000

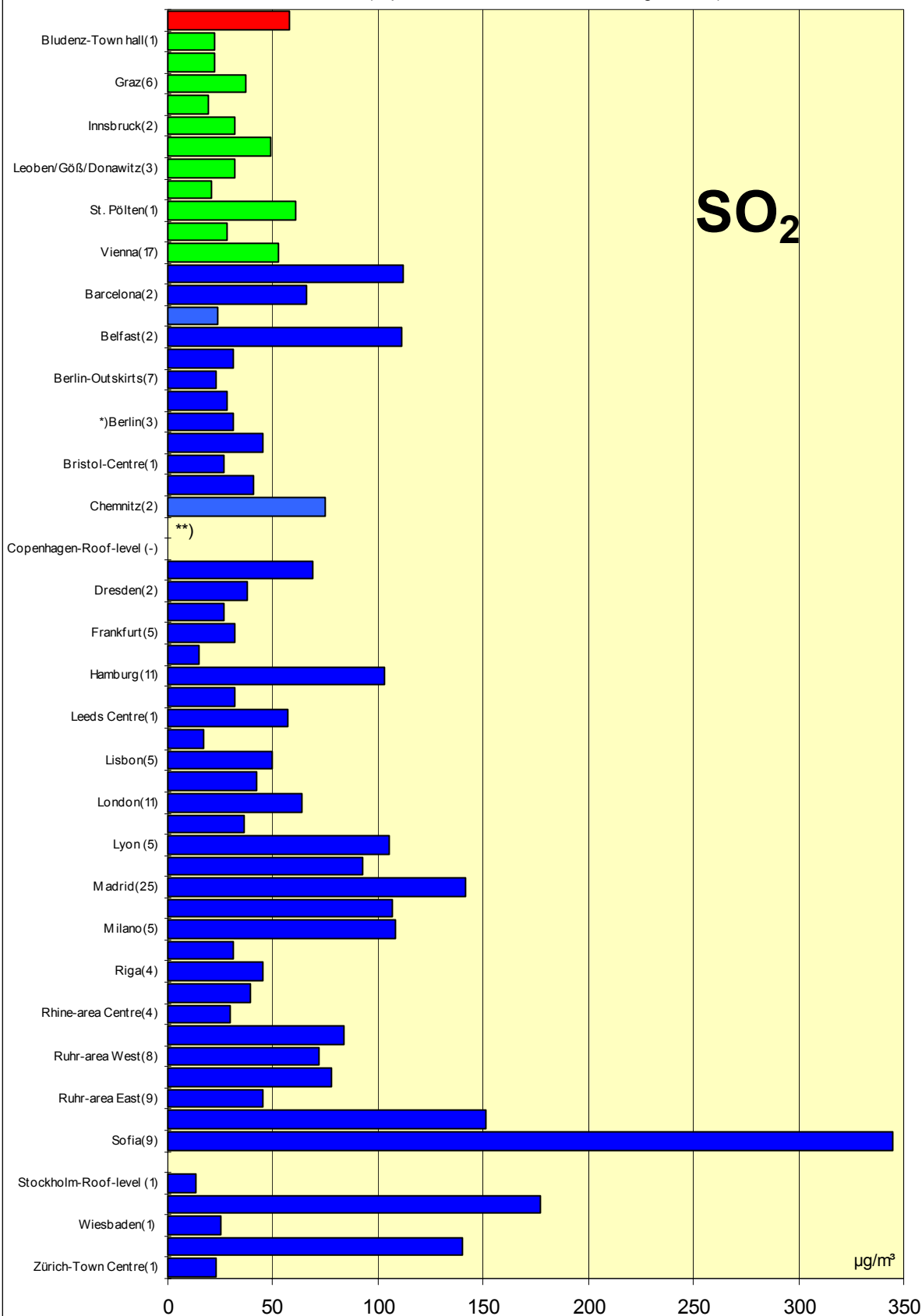
Max. Daily Mean Values

Comparison of The Air Quality in 2000

max. daily mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

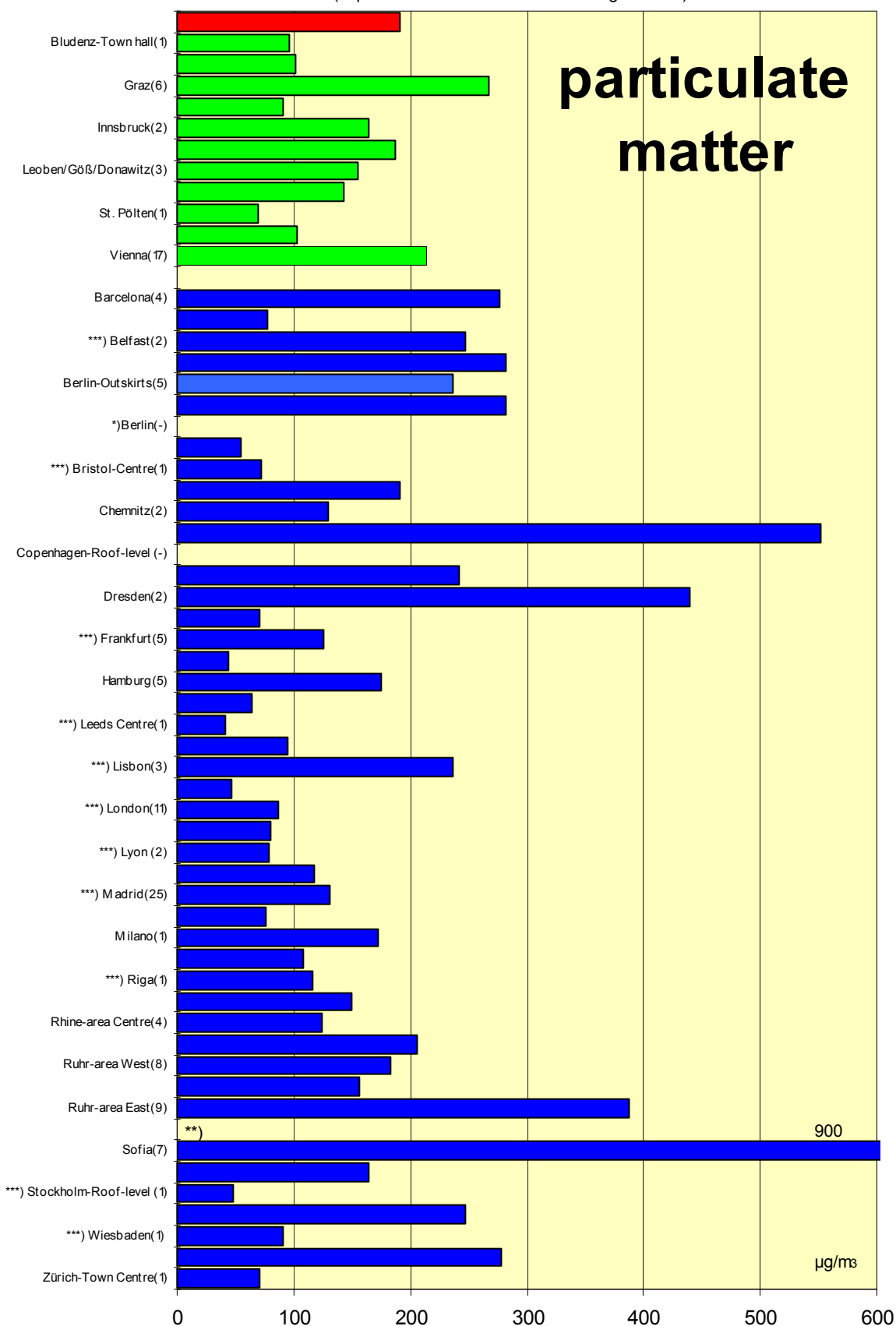


Comparison of The Air Quality in 2000

max. daily mean values

(max. stressed monitoring station)

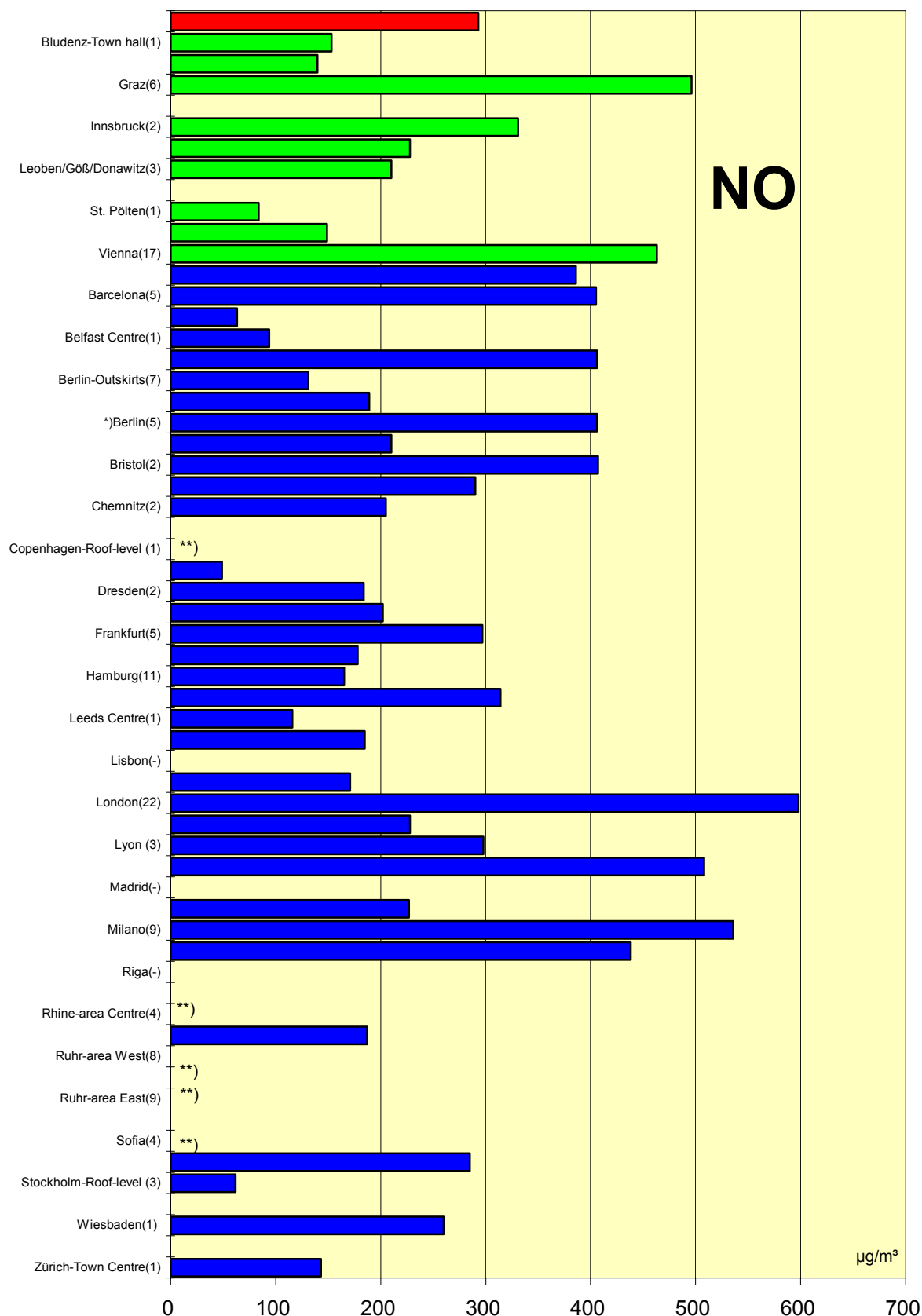
(in parentheses: number of monitoring stations)



Comparison of The Air Quality in 2000

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

(in parentheses: number of monitoring stations)

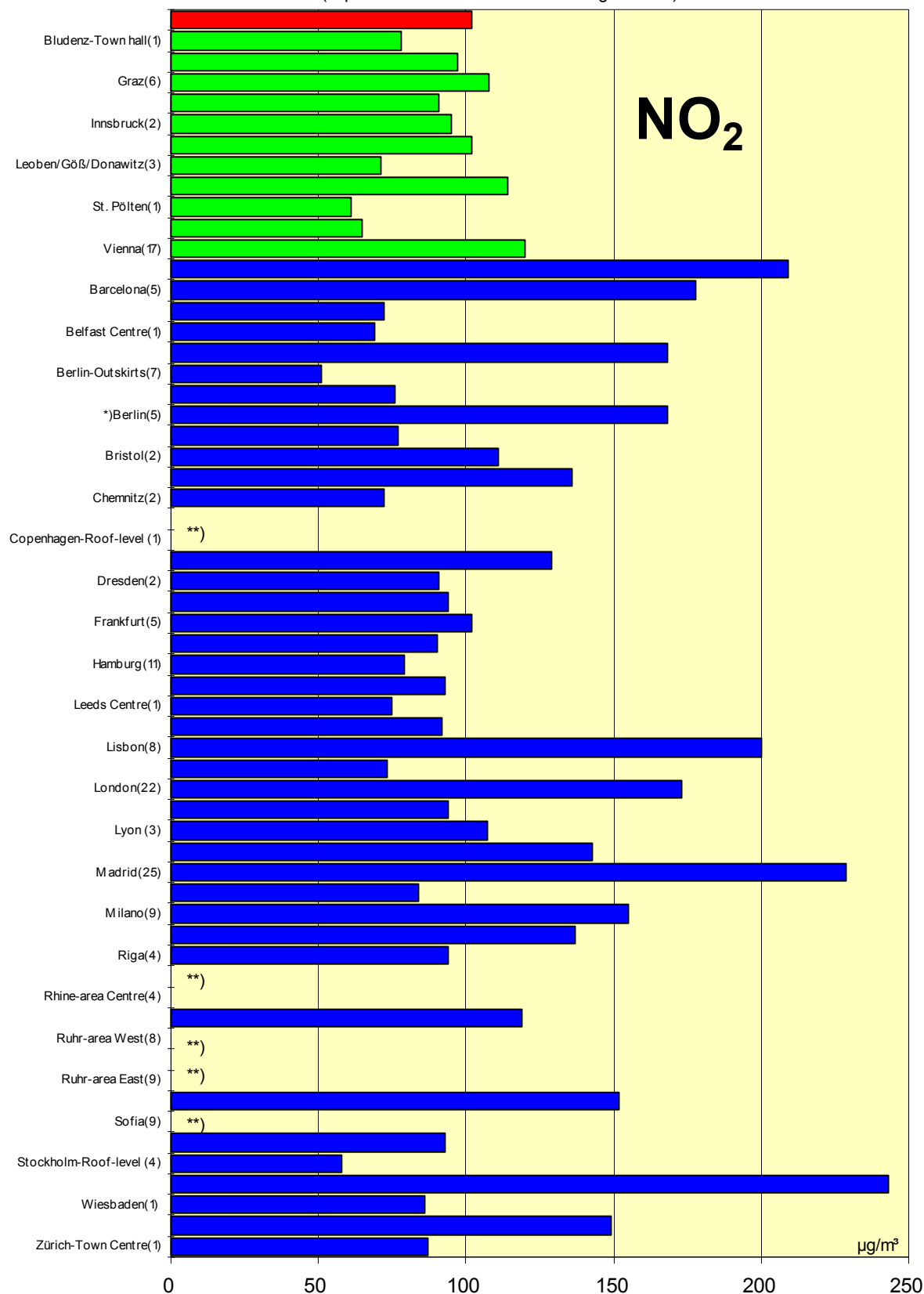


Comparison of The Air Quality in 2000

max. daily mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

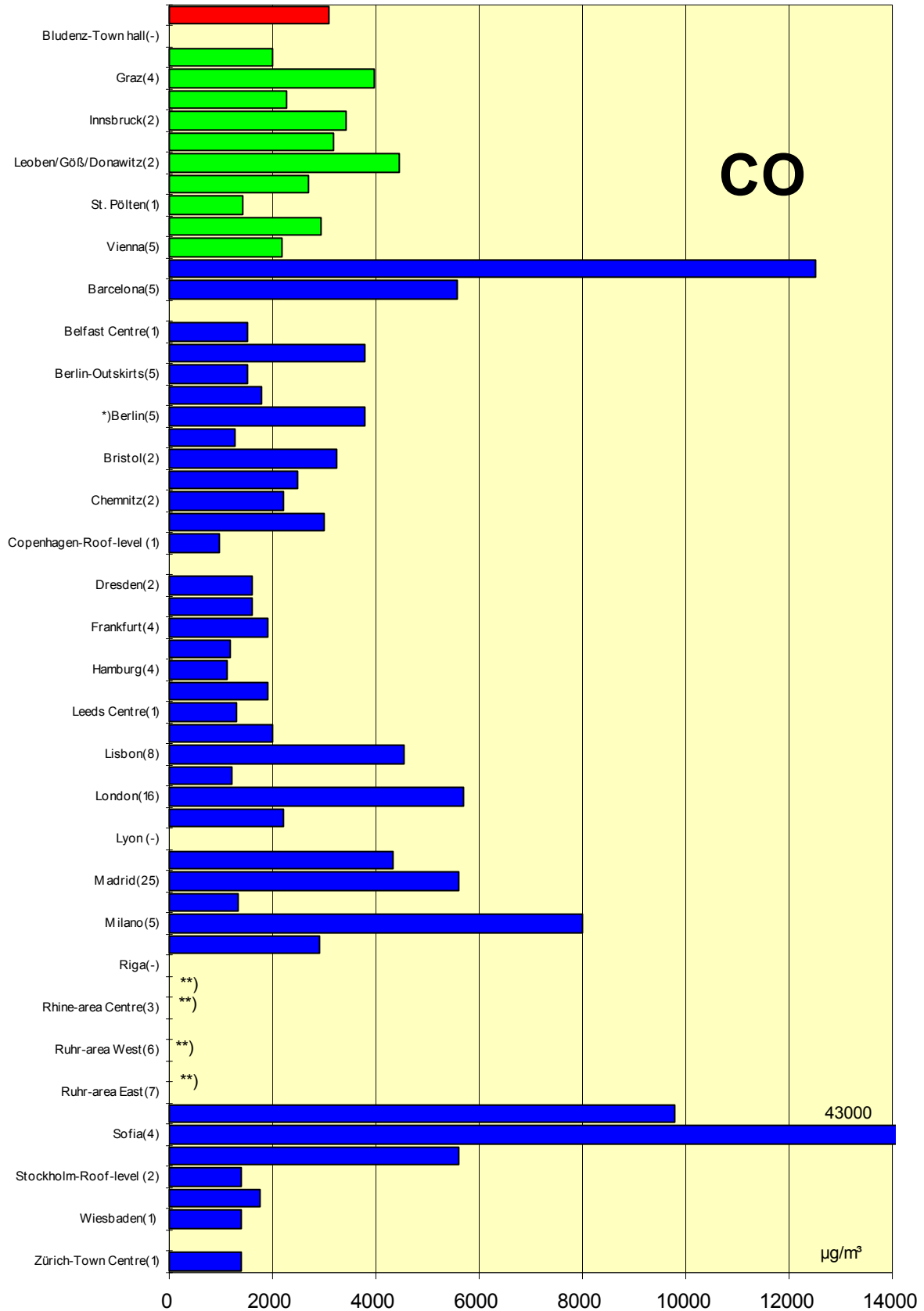


Comparison of The Air Quality in 2000

max. daily mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

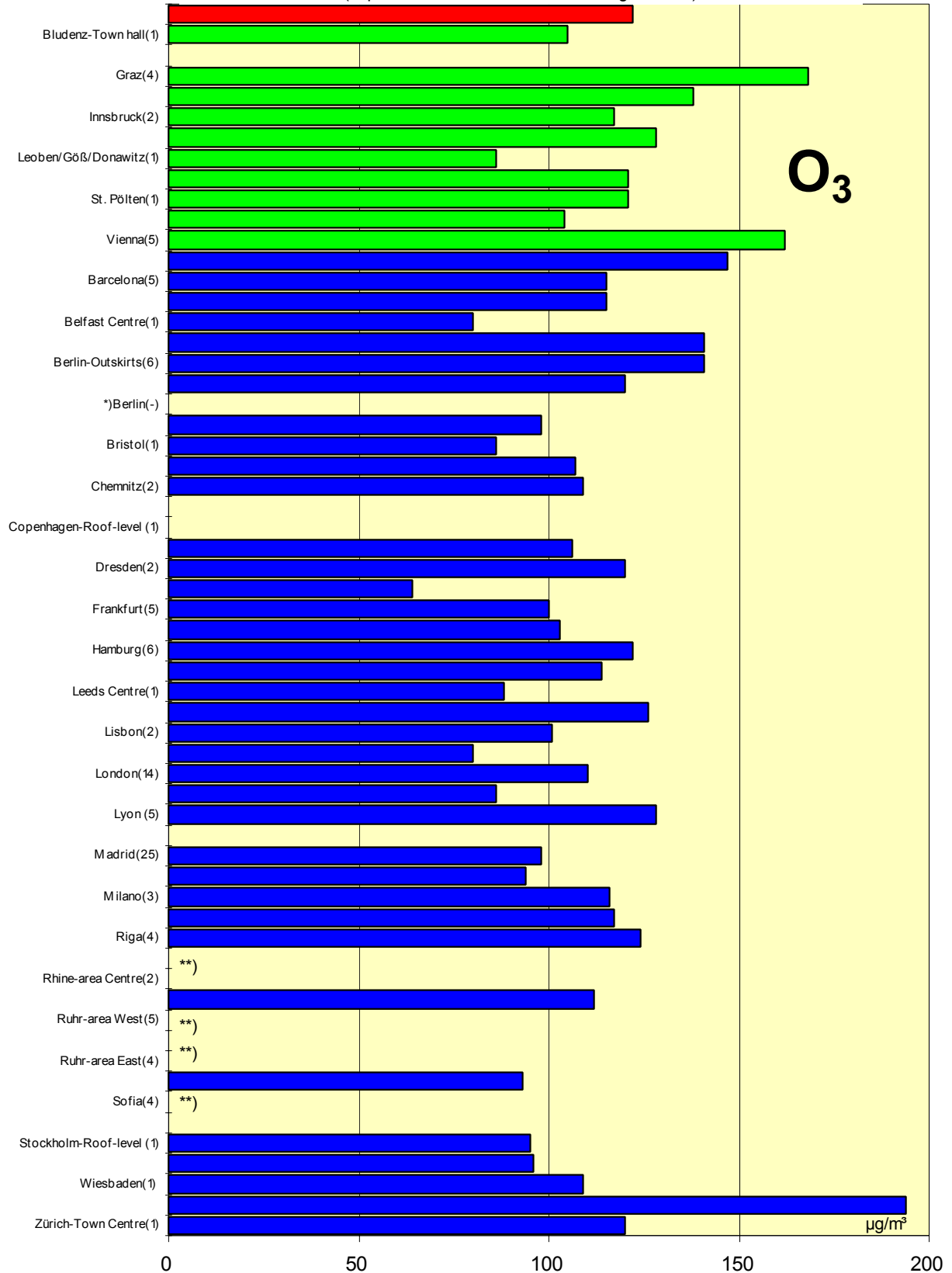


Comparison of The Air Quality in 2000

max. daily mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)



Luftgütevergleich

2000

max. 3h-Mittelwerte

Comparison of The Air Quality

2000

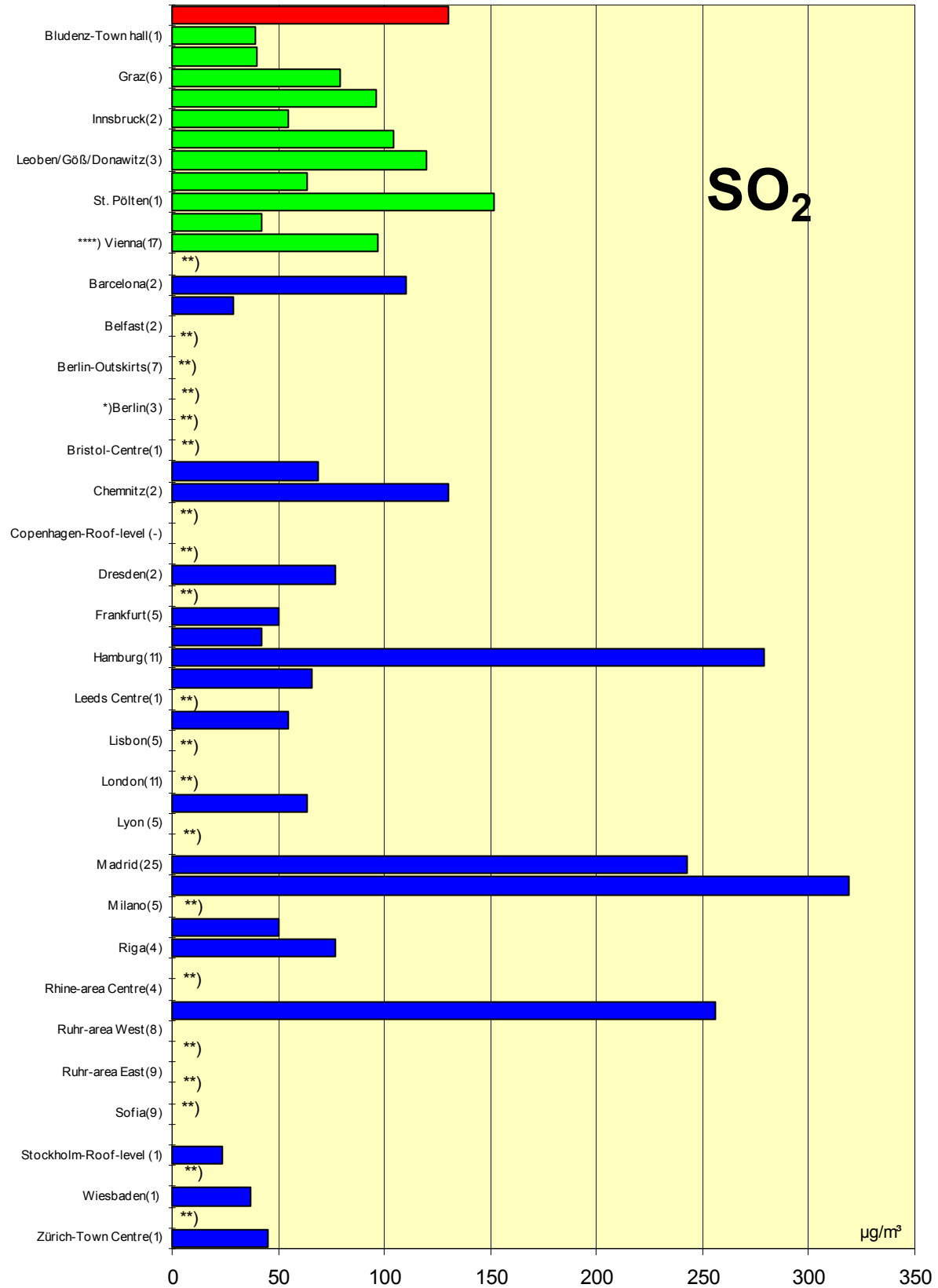
Max. 3h- Mean Values

Comparison of The Air Quality in 2000

max. 3h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

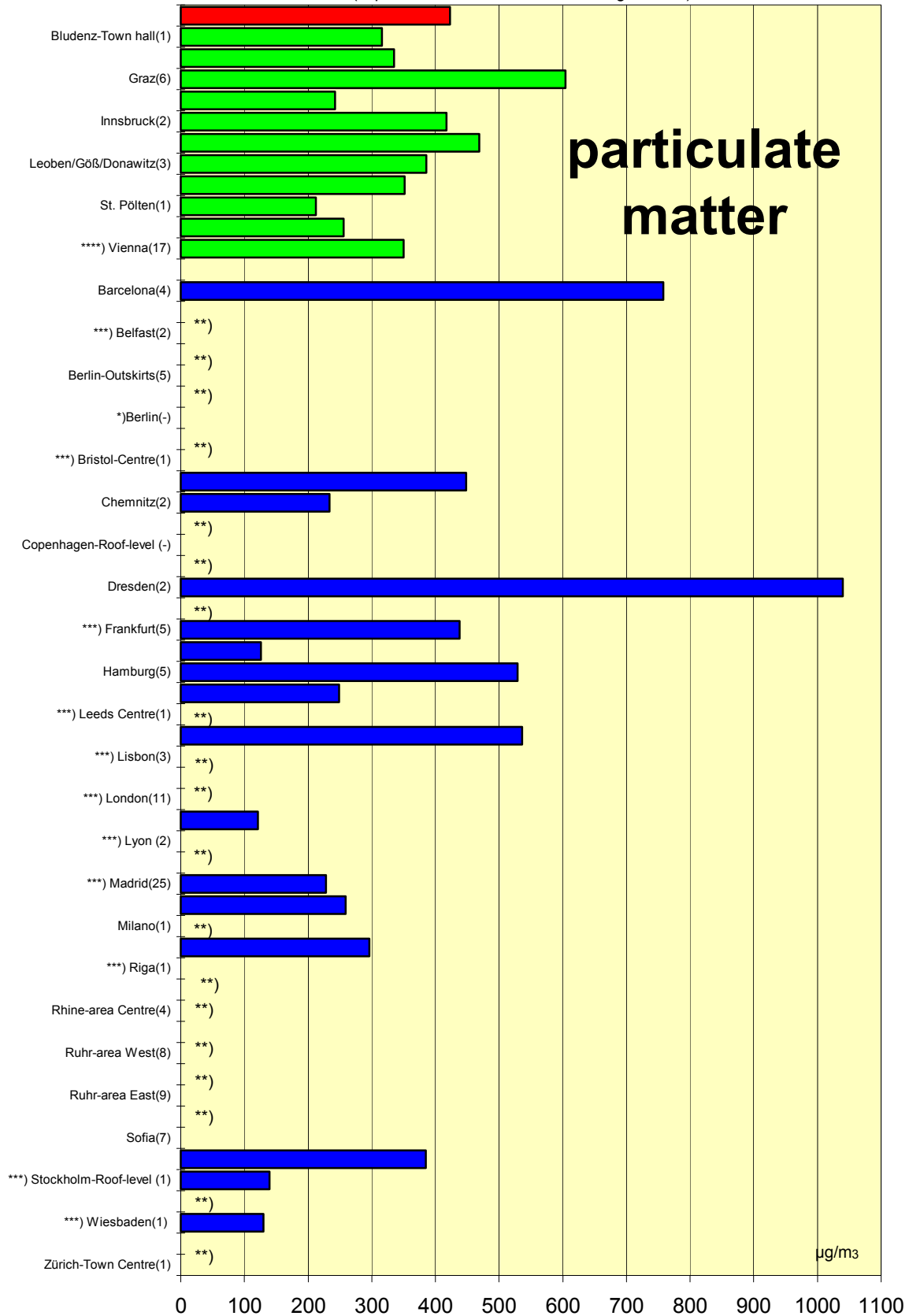


Comparison of The Air Quality in 2000

max. 3h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

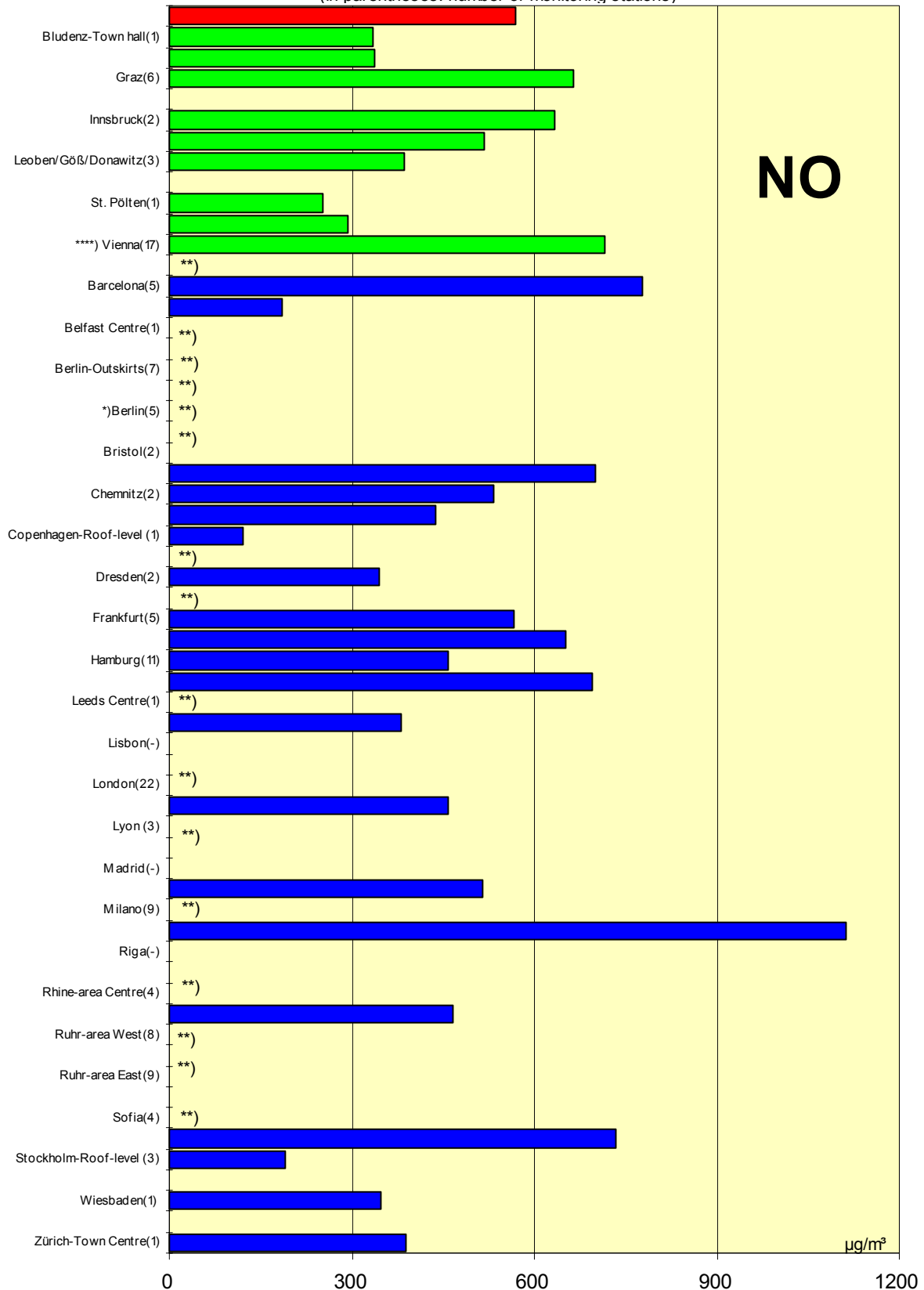


Comparison of The Air Quality in 2000

max. 3h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)



NO

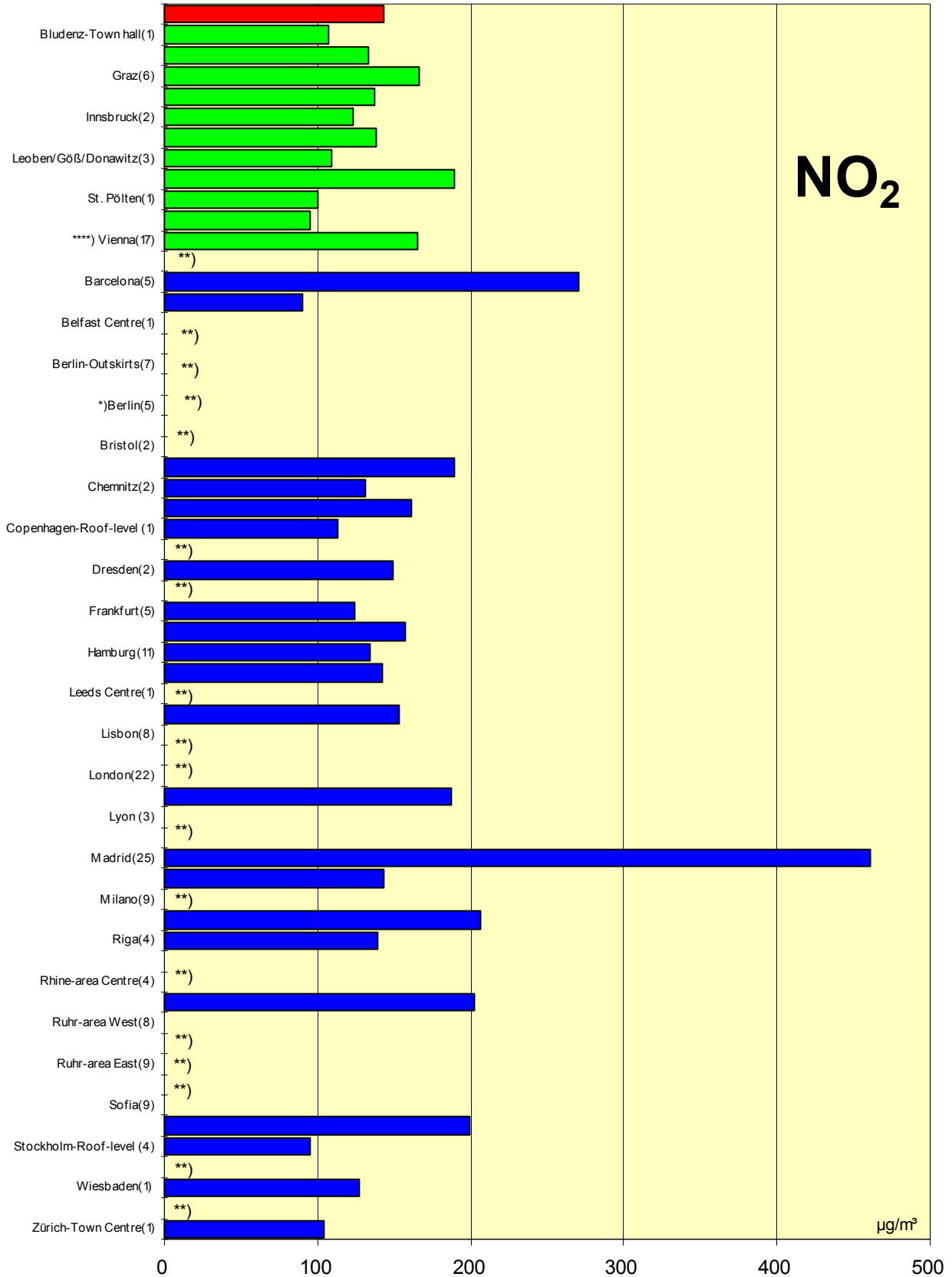
µg/m³

Comparison of The Air Quality in 2000

max. 3h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

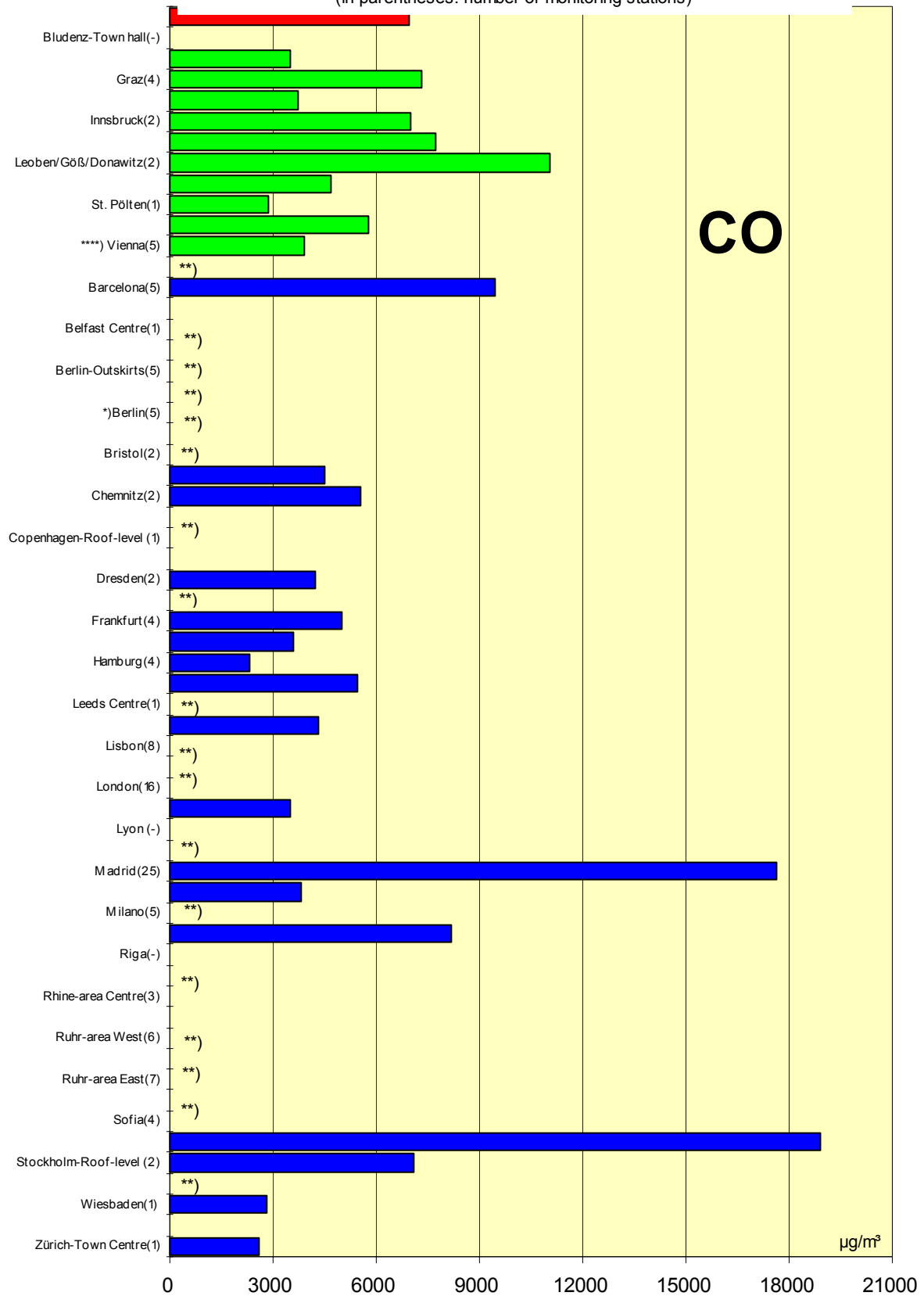


Comparison of The Air Quality in 2000

max. 3h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

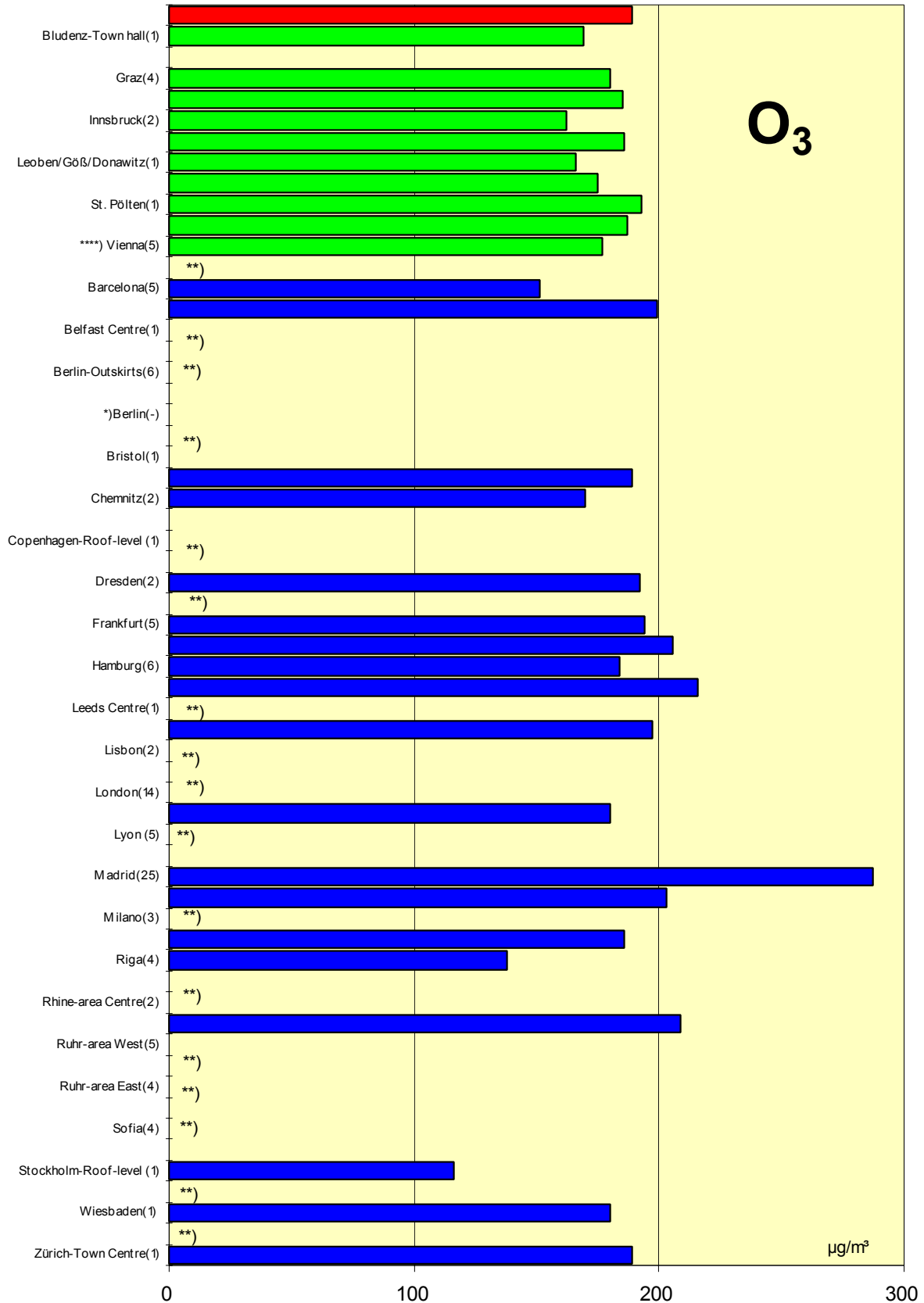


Comparison of The Air Quality in 2000

max. 3h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)



Luftgütevergleich

2000

max. 1h-Mittelwerte

Comparison of The Air Quality

2000

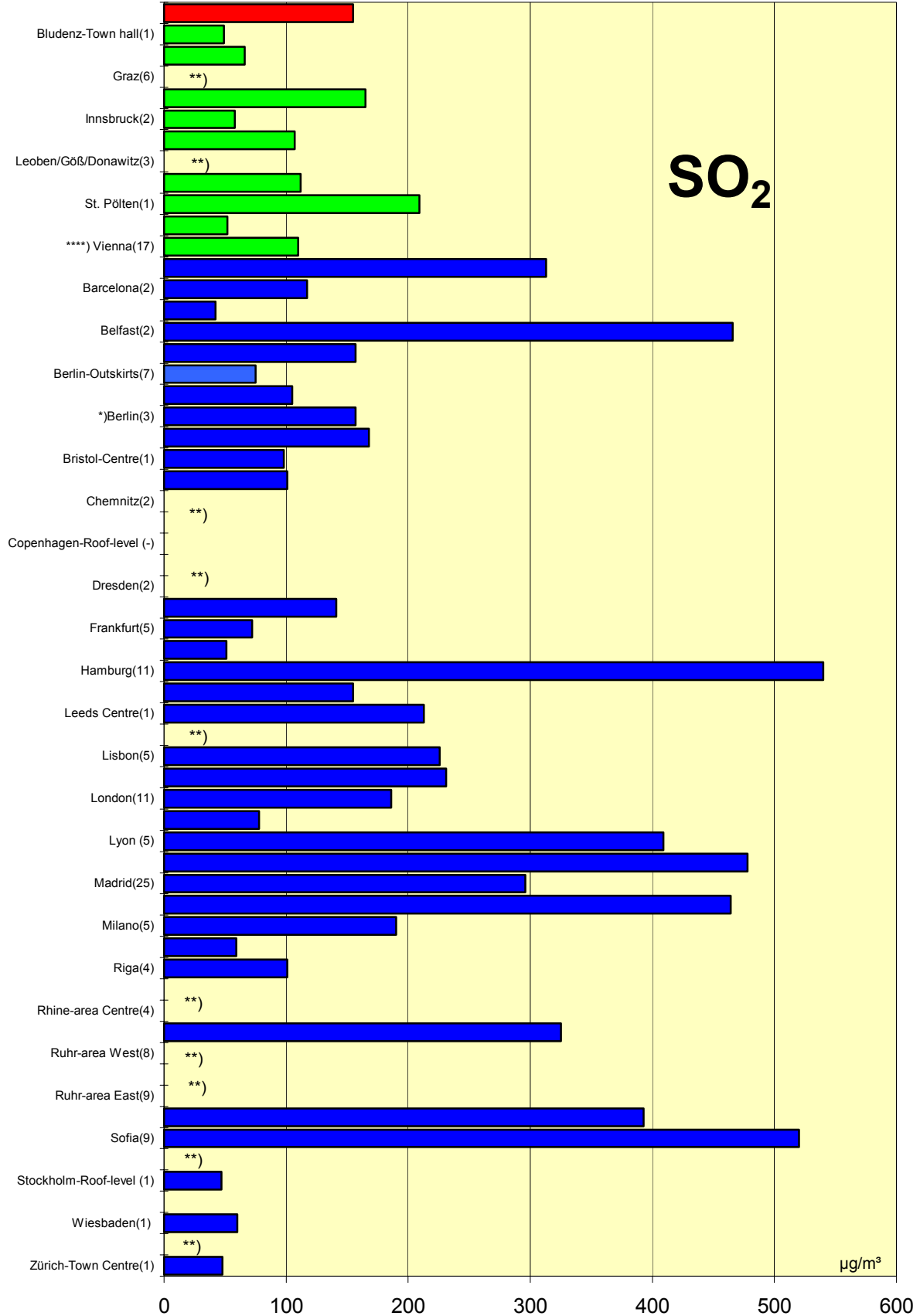
Max. 1h-Mean Values

Comparison of The Air Quality in 2000

max. 1h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

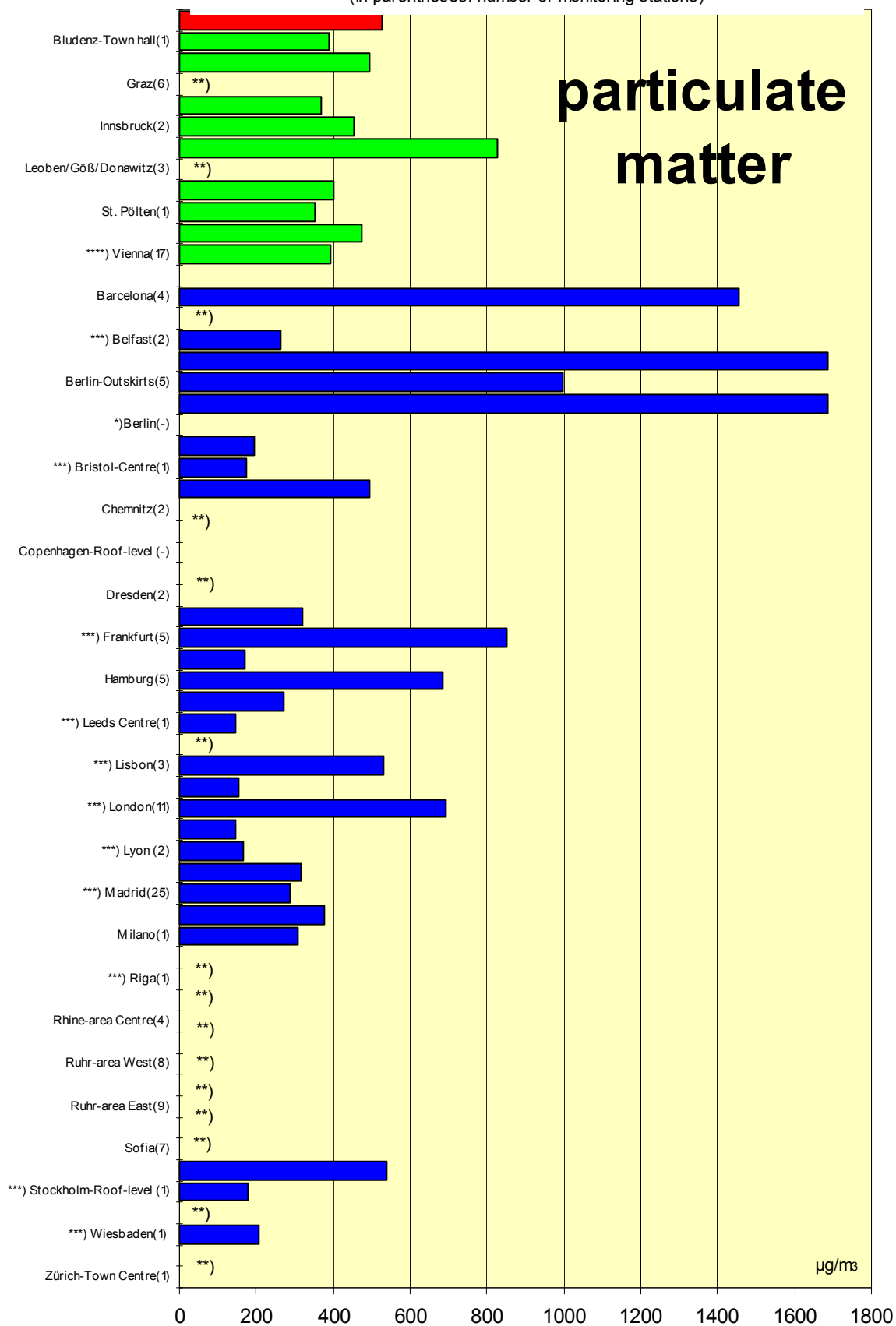


Comparison of The Air Quality in 2000

max. 1h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

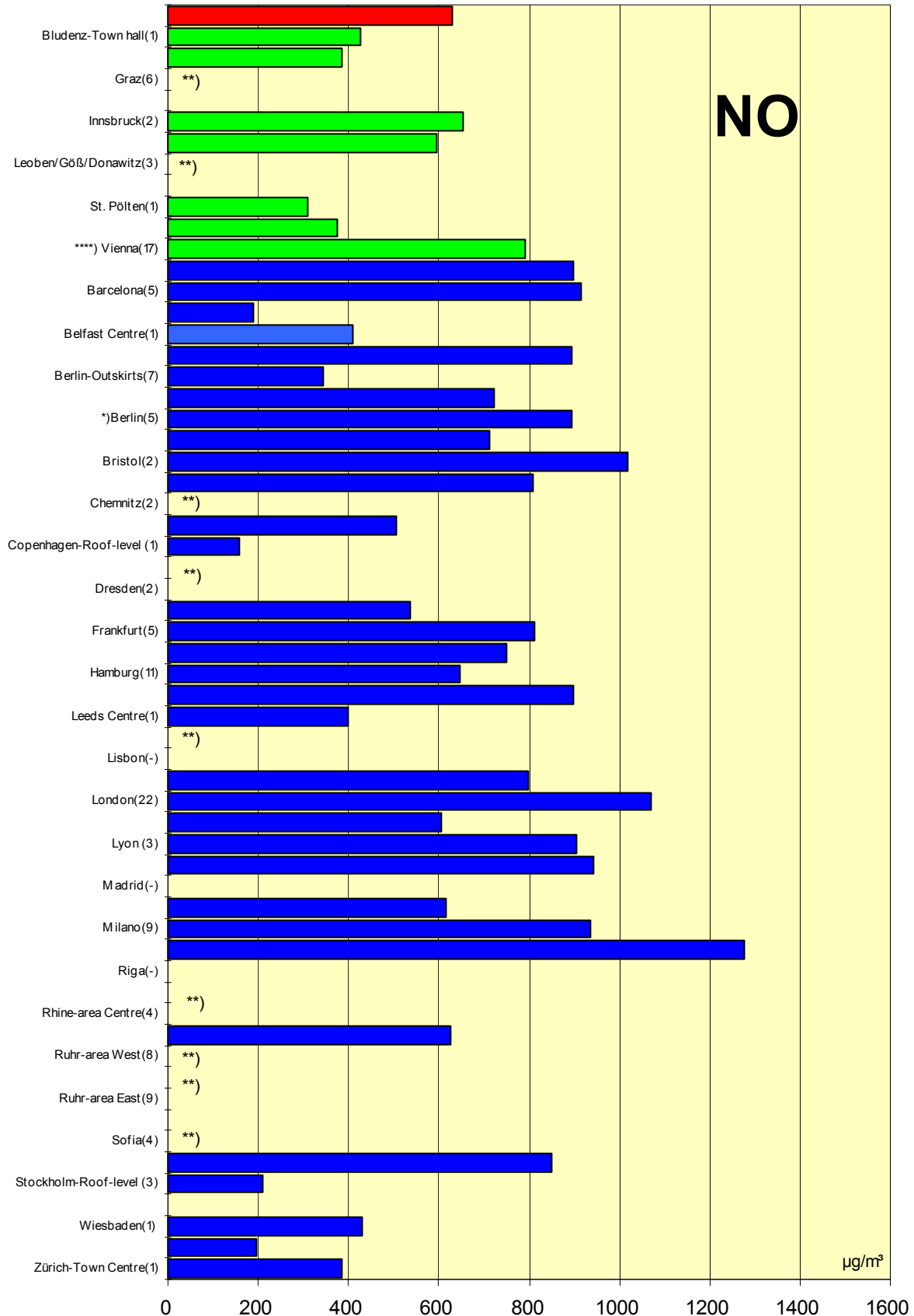


Comparison of The Air Quality in 2000

max. 1h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

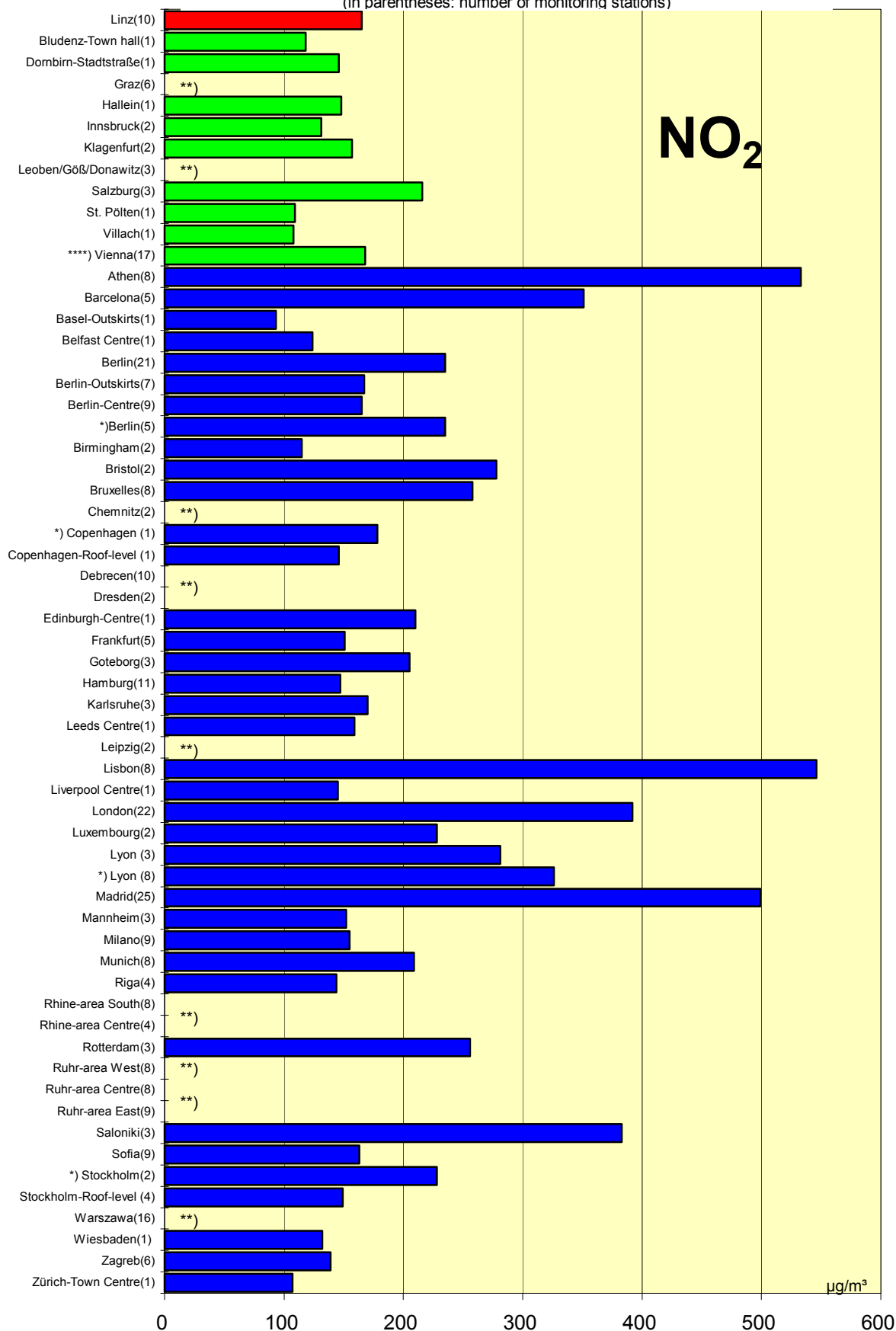


Comparison of The Air Quality in 2000

max. 1h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

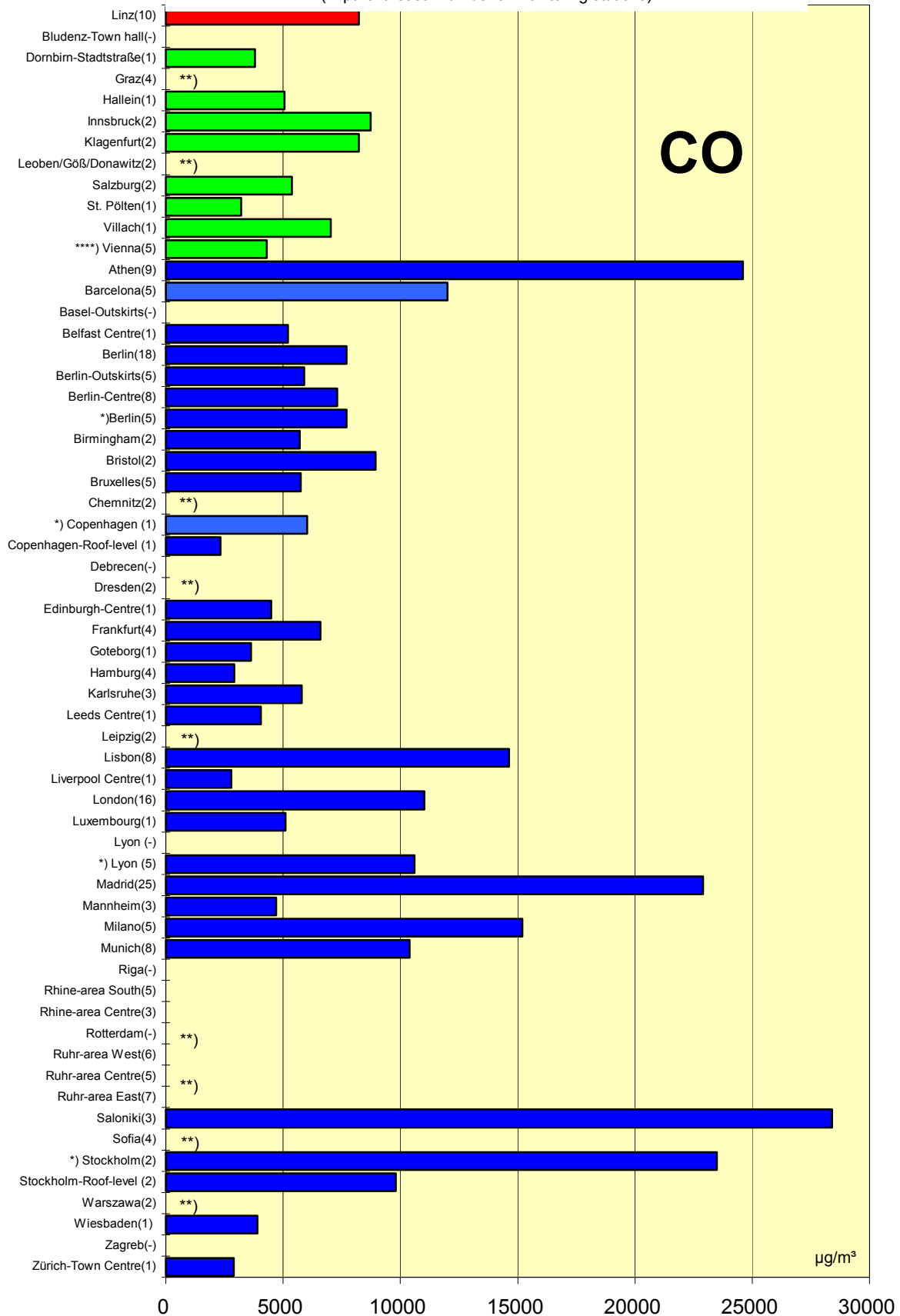


Comparison of The Air Quality in 2000

max. 1h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

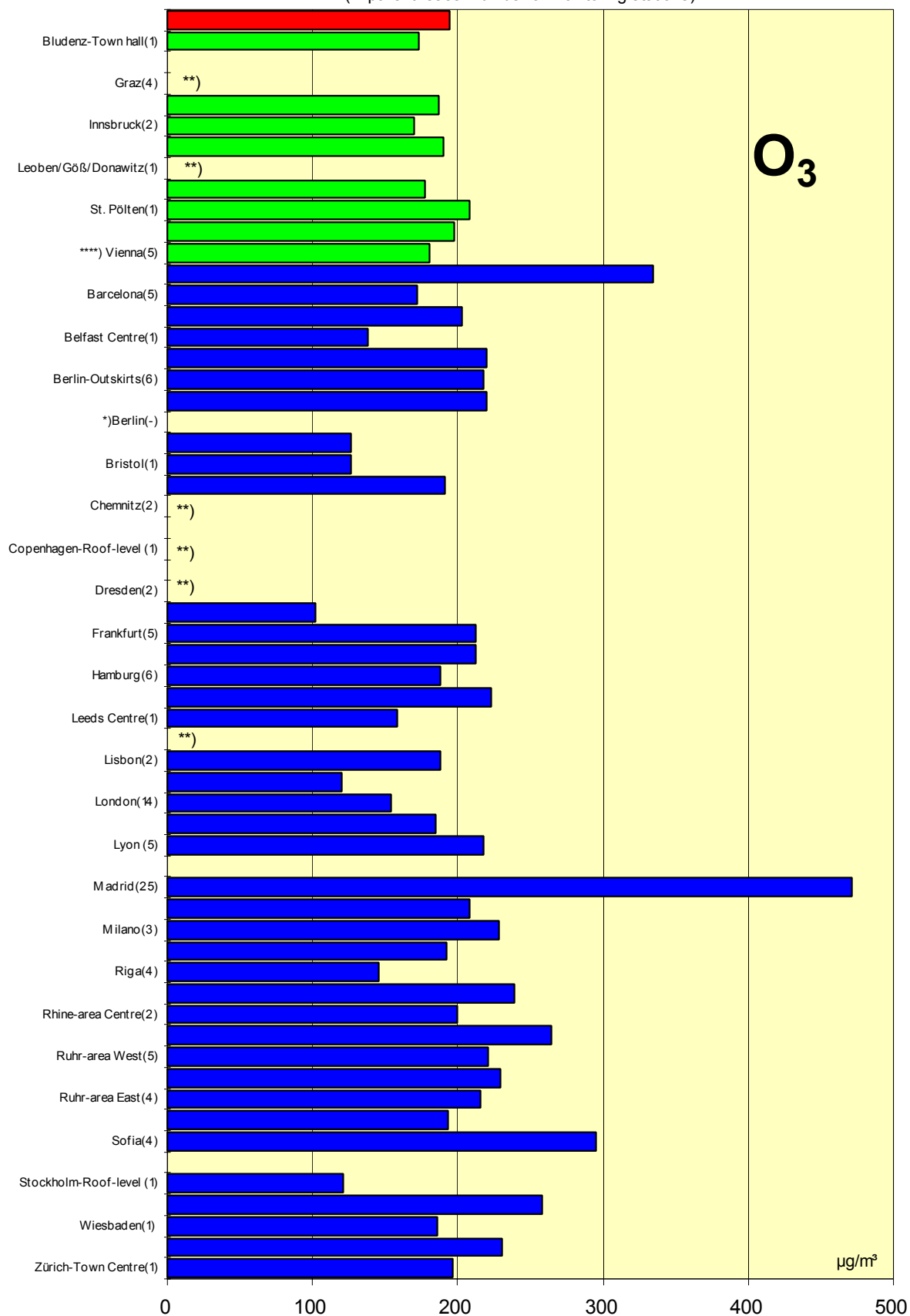


Comparison of The Air Quality in 2000

max. 1h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)



Luftgütevergleich

2000

max. Halbstunden-Mittelwerte

Comparison of The Air Quality

2000

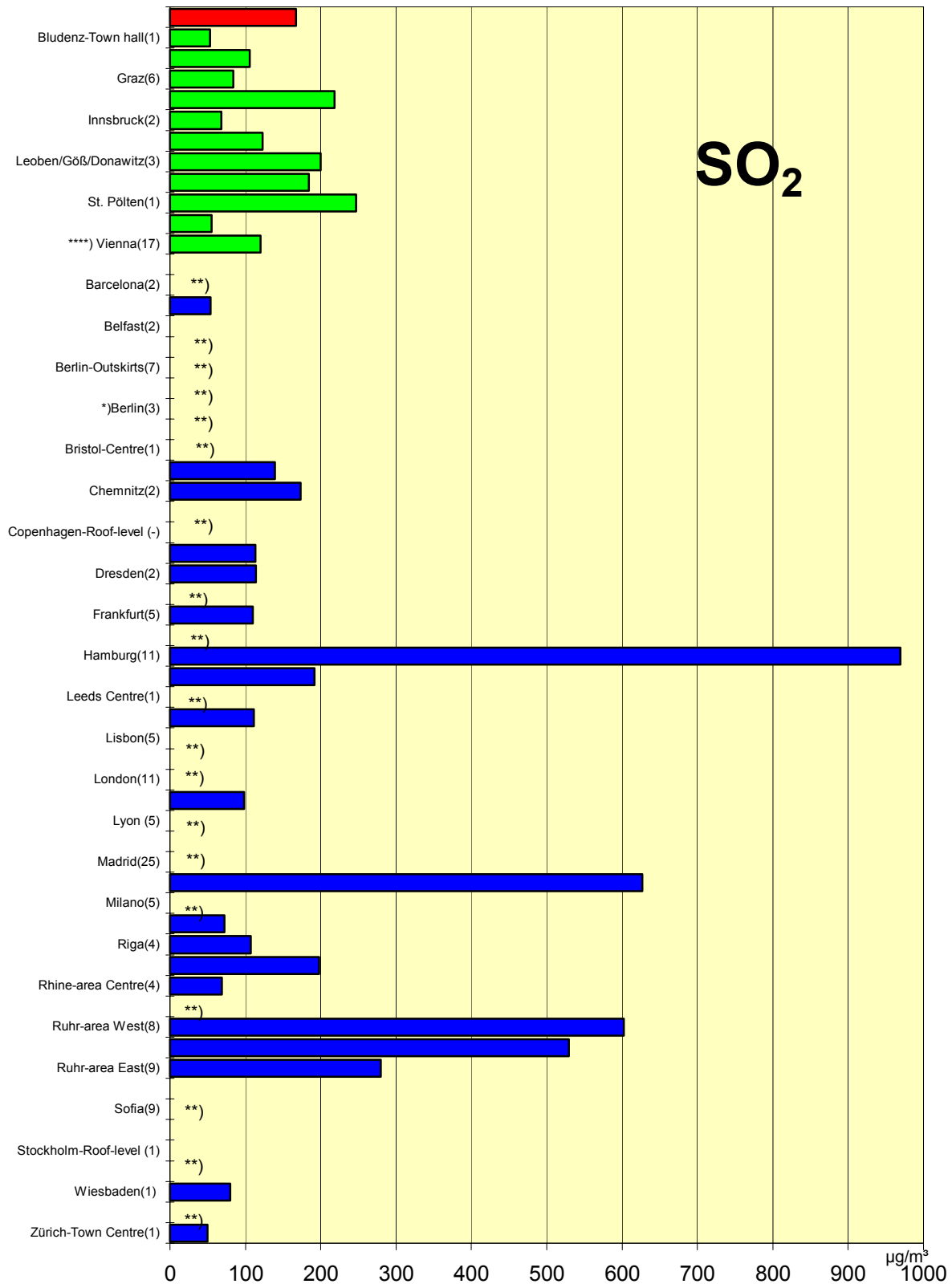
Max. 1/2h-Mean Values

Comparison of The Air Quality in 2000

max. 1/2-h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

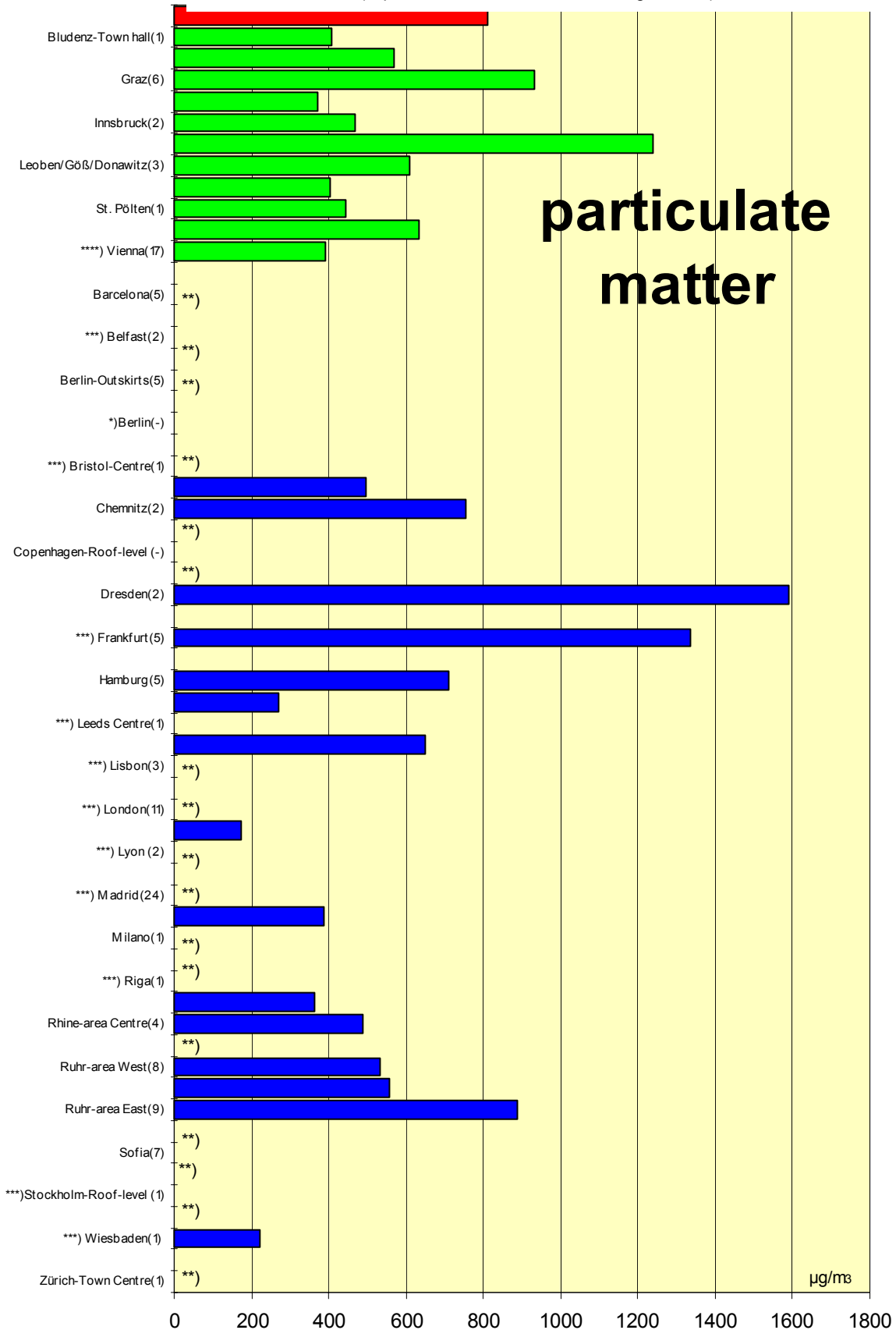


Comparison of The Air Quality in 2000

max. 1/2-h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

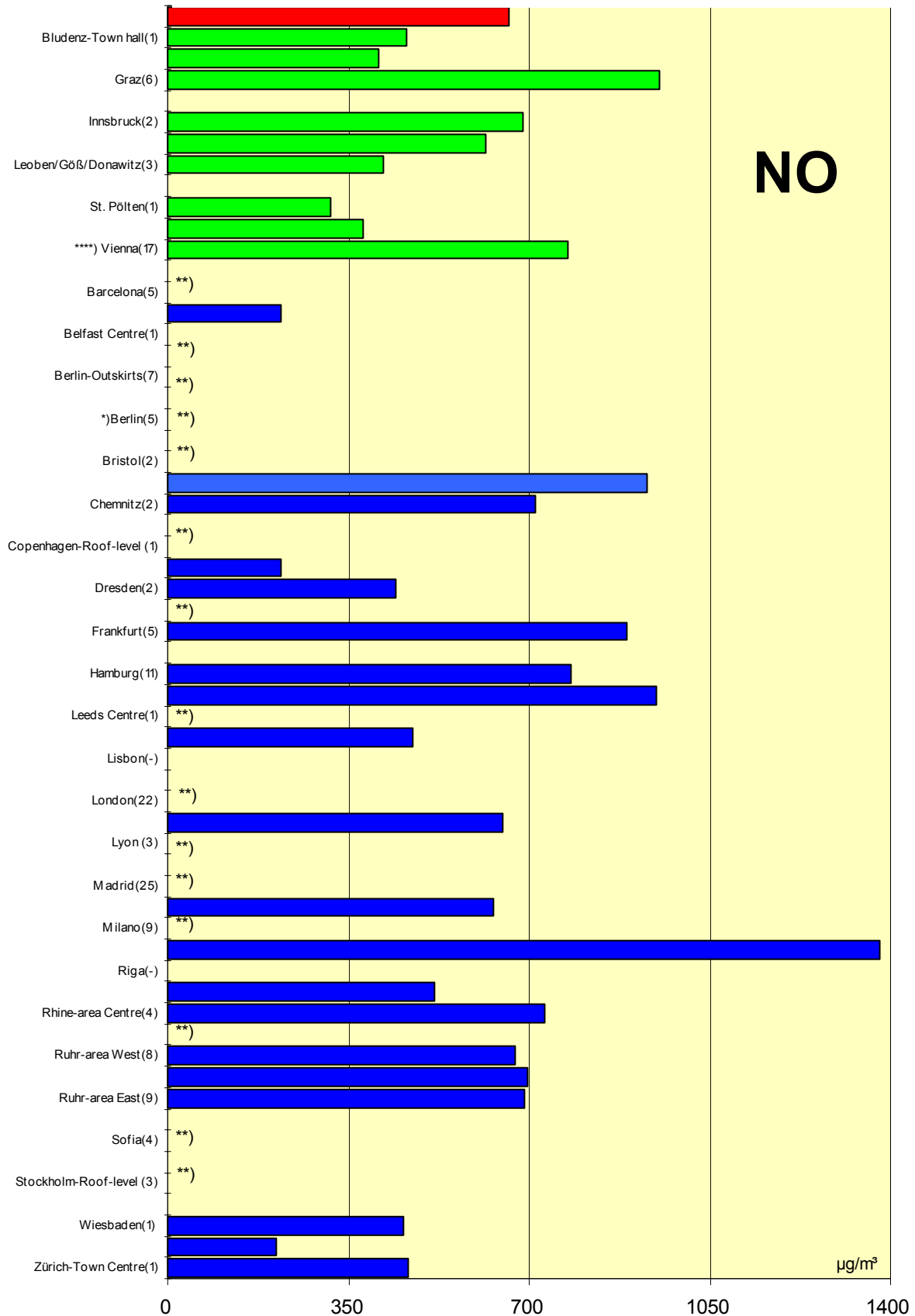


Comparison of The Air Quality in 2000

max. 1/2-h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

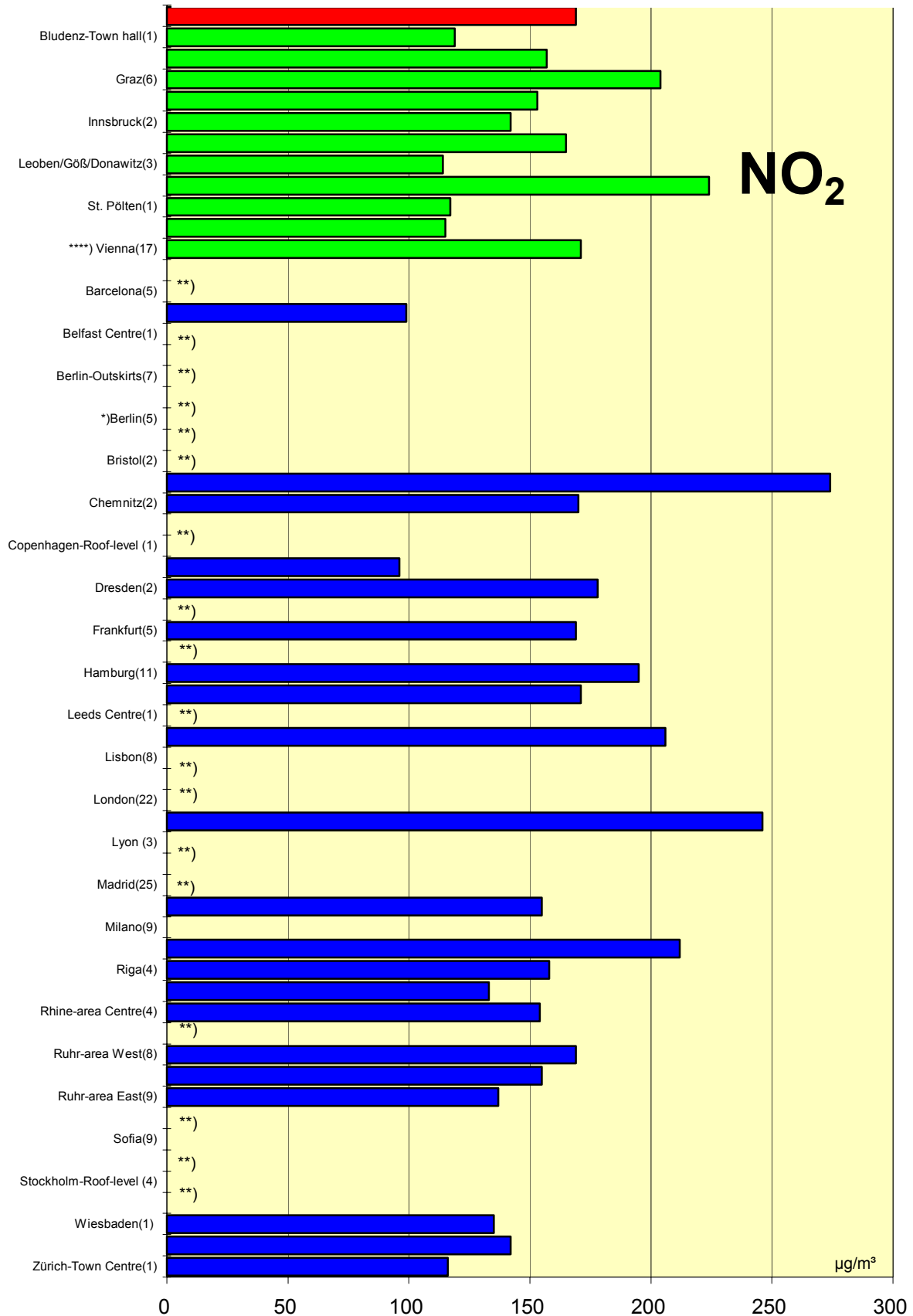


Comparison of The Air Quality in 2000

max. 1/2-h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

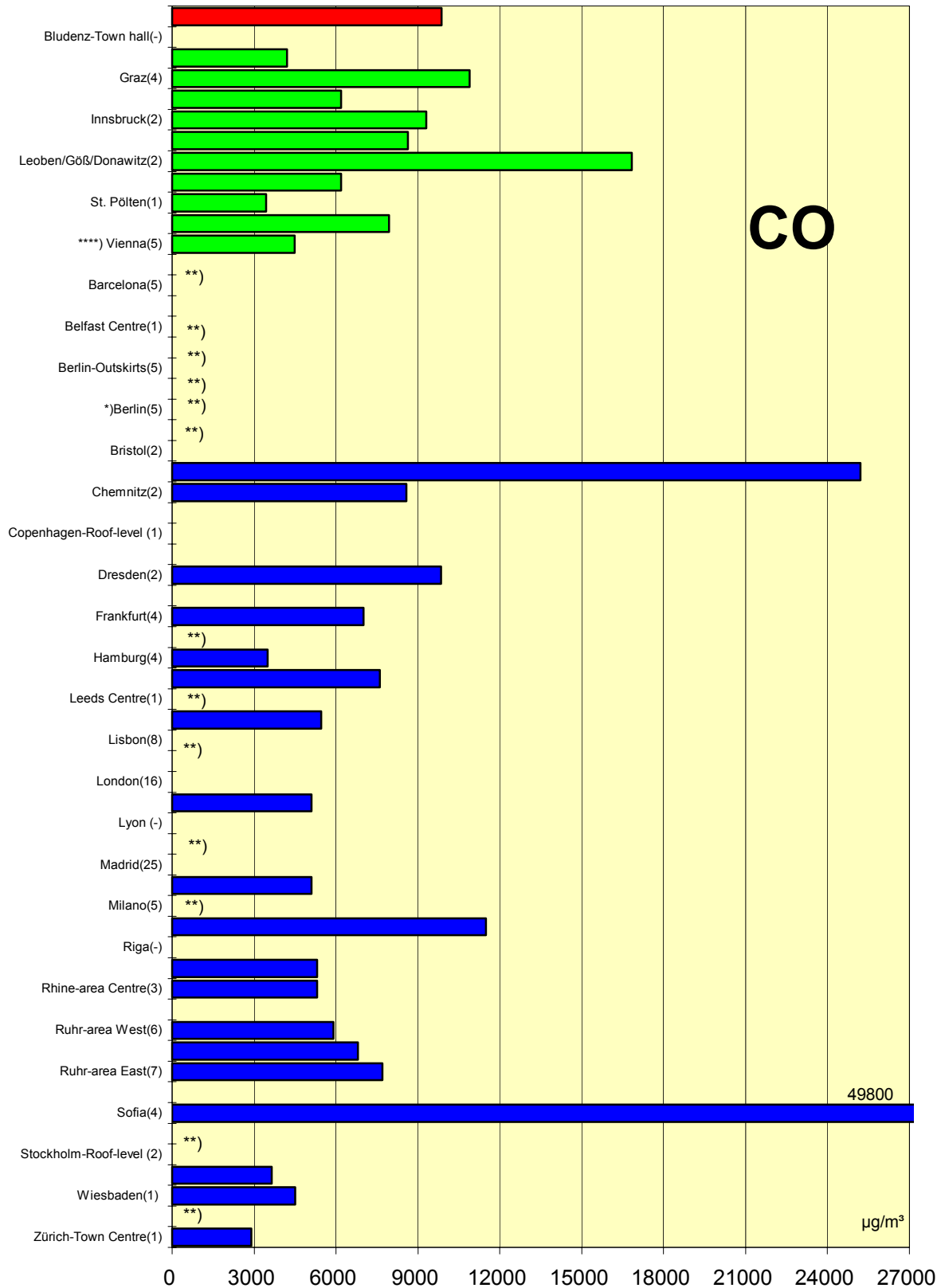


Comparison of The Air Quality in 2000

max. 1/2-h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

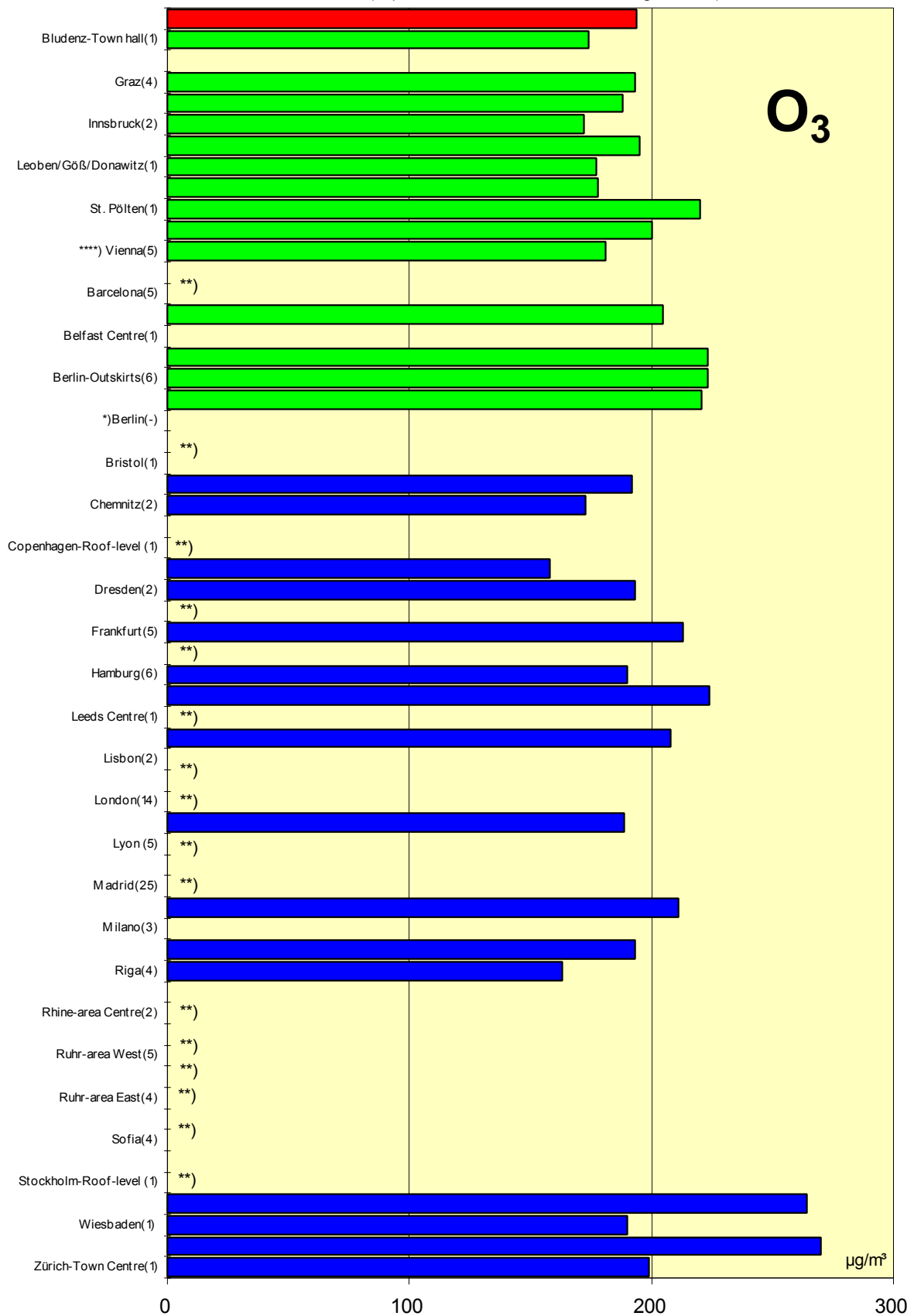


Comparison of The Air Quality in 2000

max. 1/2-h mean values

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)



Luftgütevergleich

2000

max. 98-Percentil/Jahr

Comparison of The Air Quality

2000

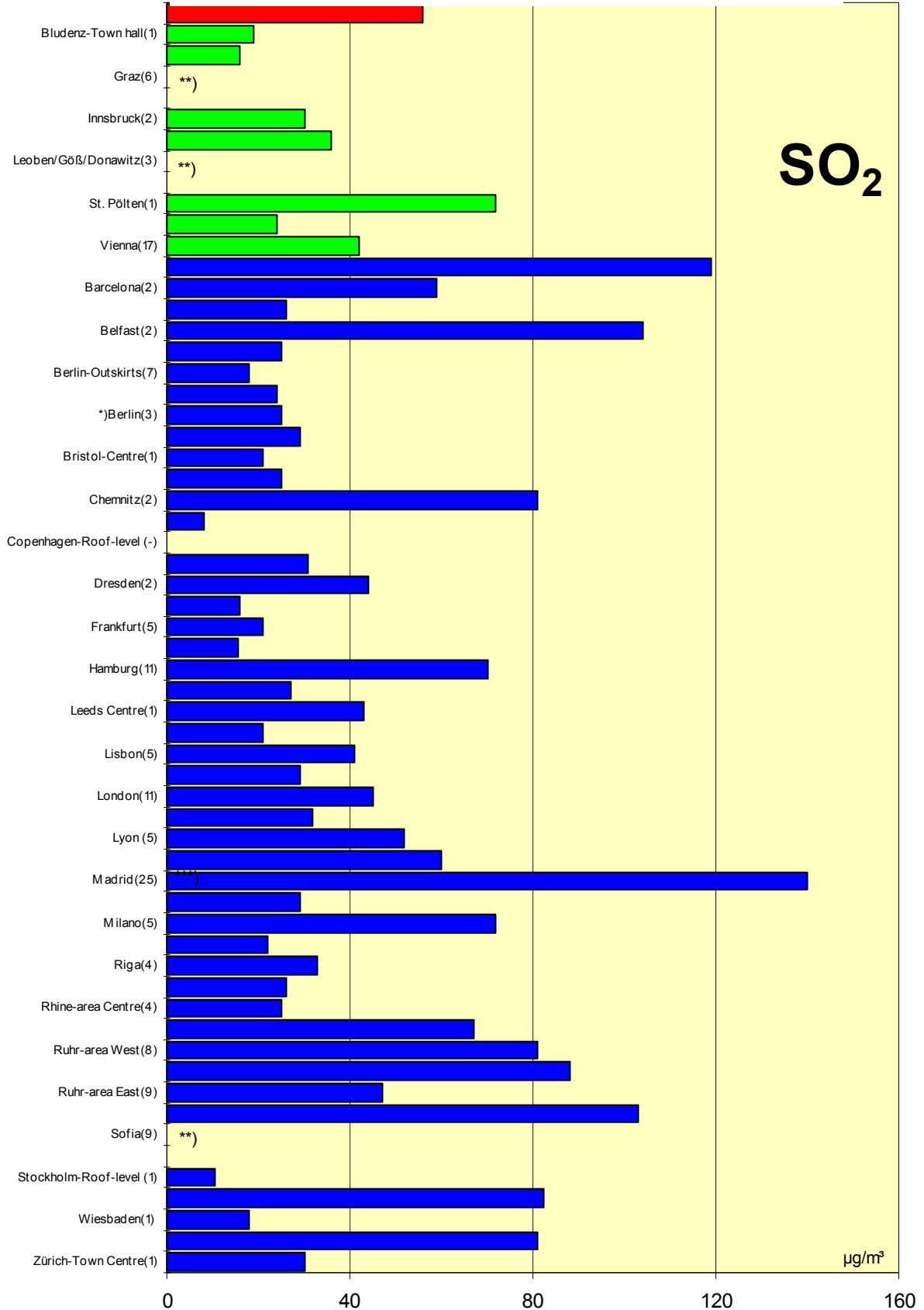
Max. 98-Percentile per Year

Comparison of The Air Quality in 2000

max. 98-Percentile

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

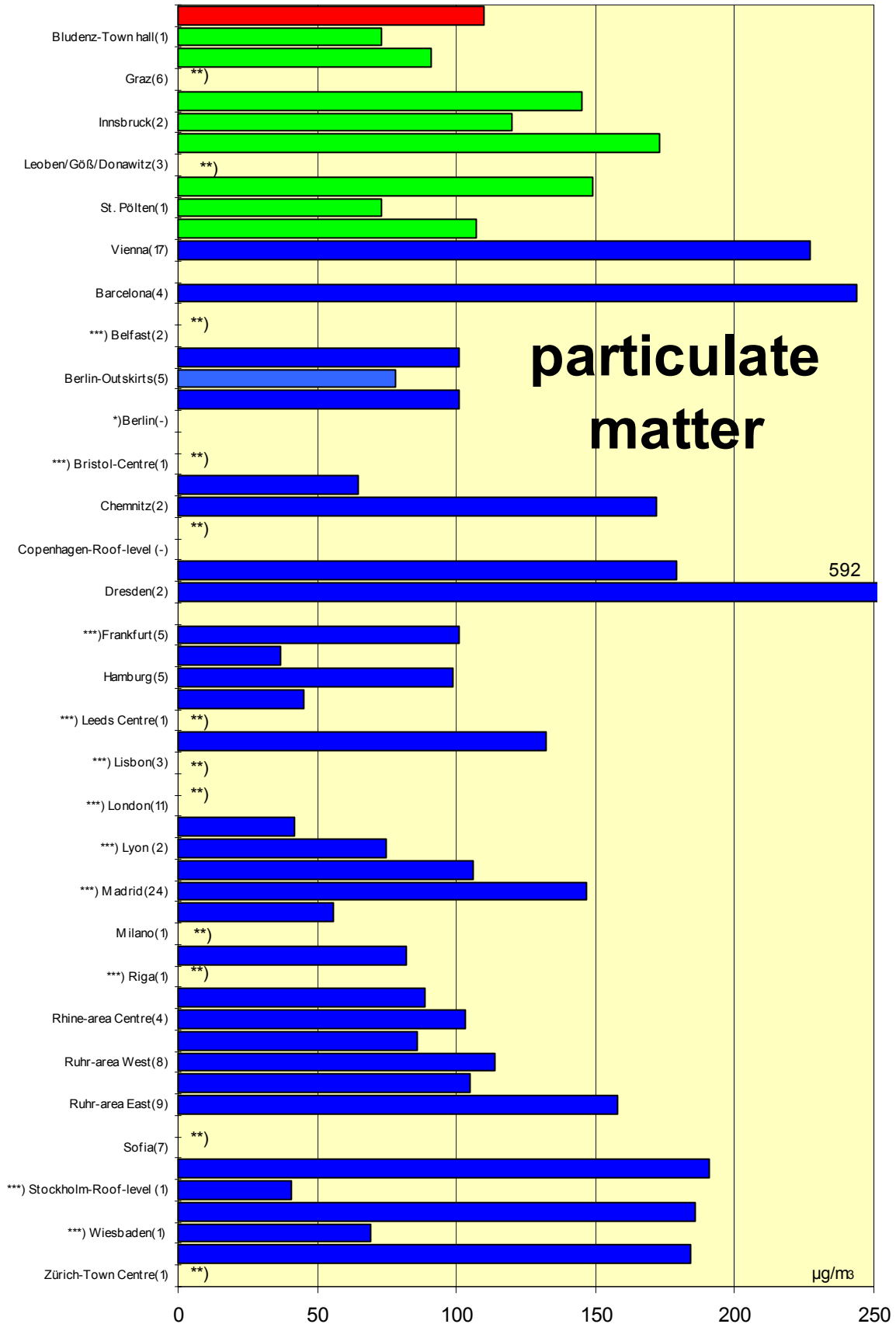


Comparison of The Air Quality in 2000

max. 98-Percentile

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

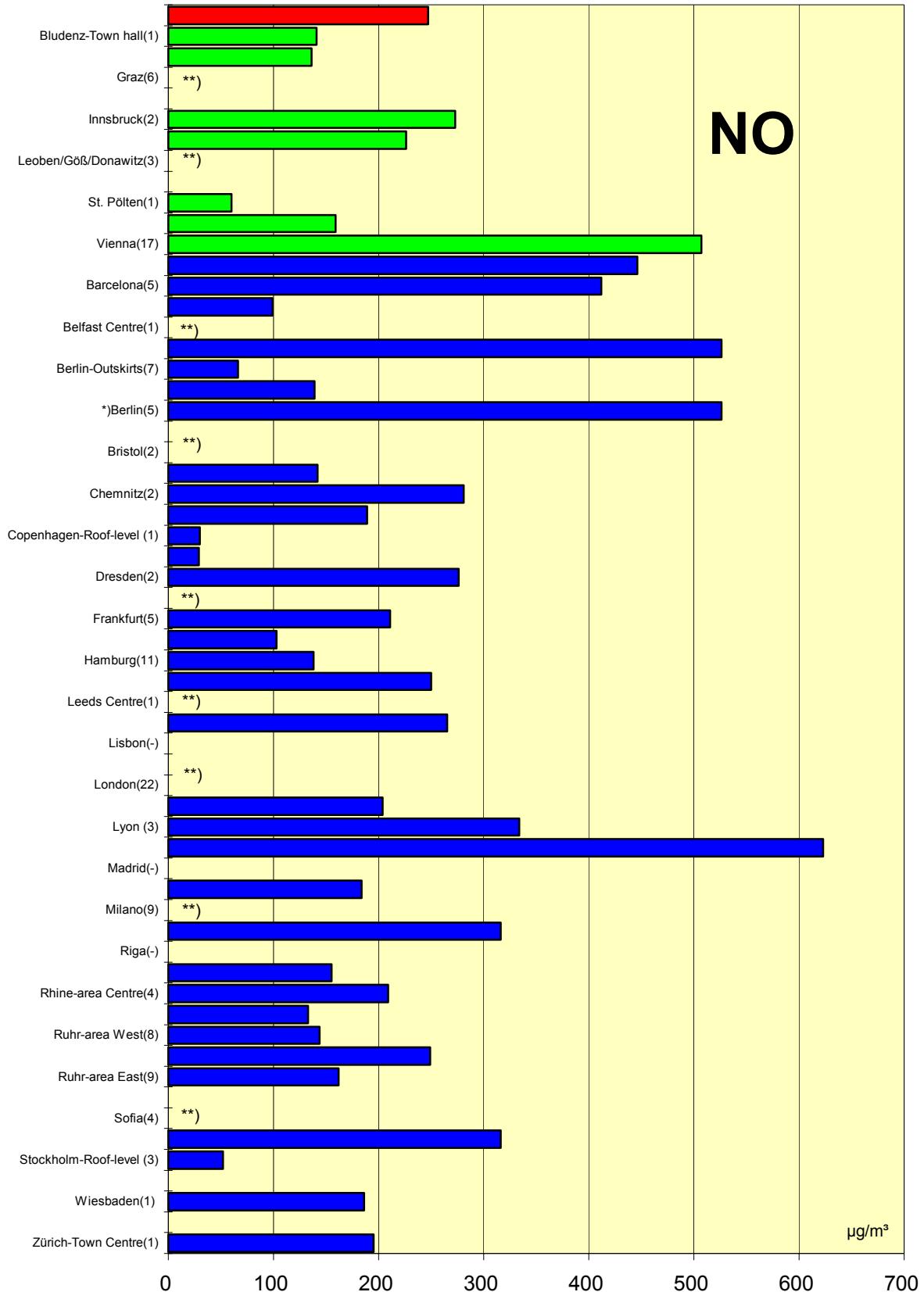


Comparison of The Air Quality in 2000

max. 98-Percentile

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

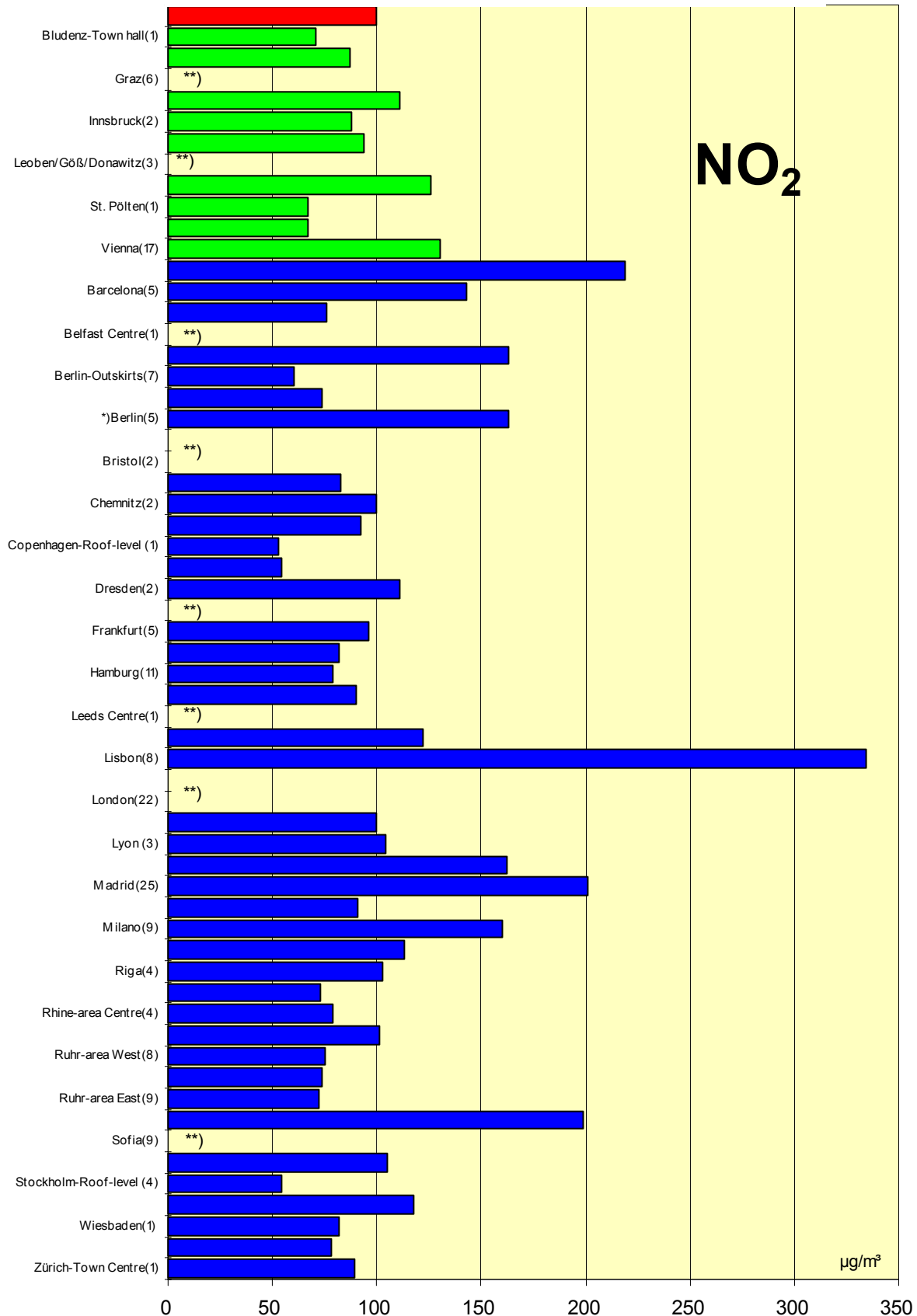


Comparison of The Air Quality in 2000

max. 98-Percentile

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

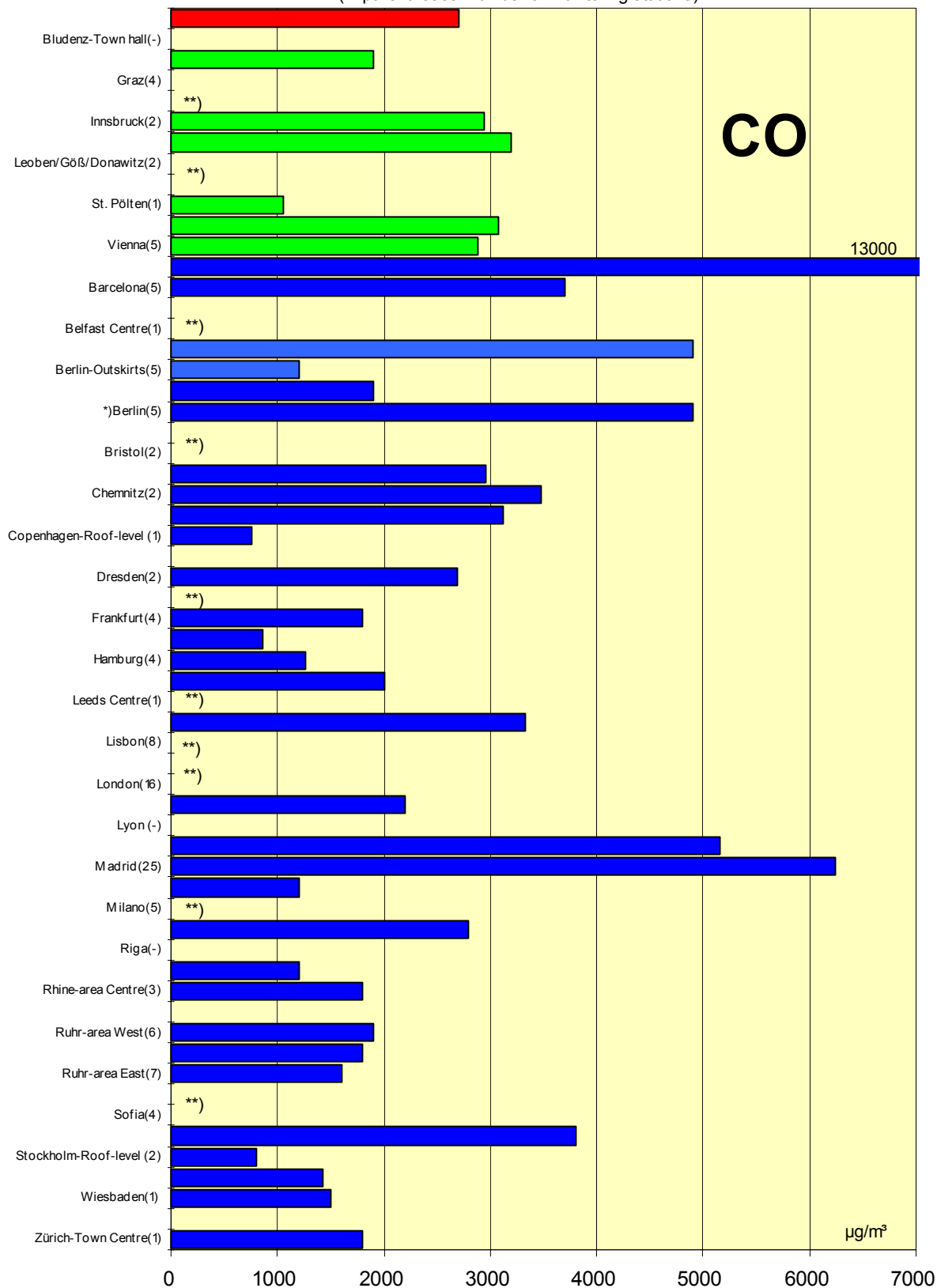


Comparison of The Air Quality in 2000

max. 98-Percentile

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)

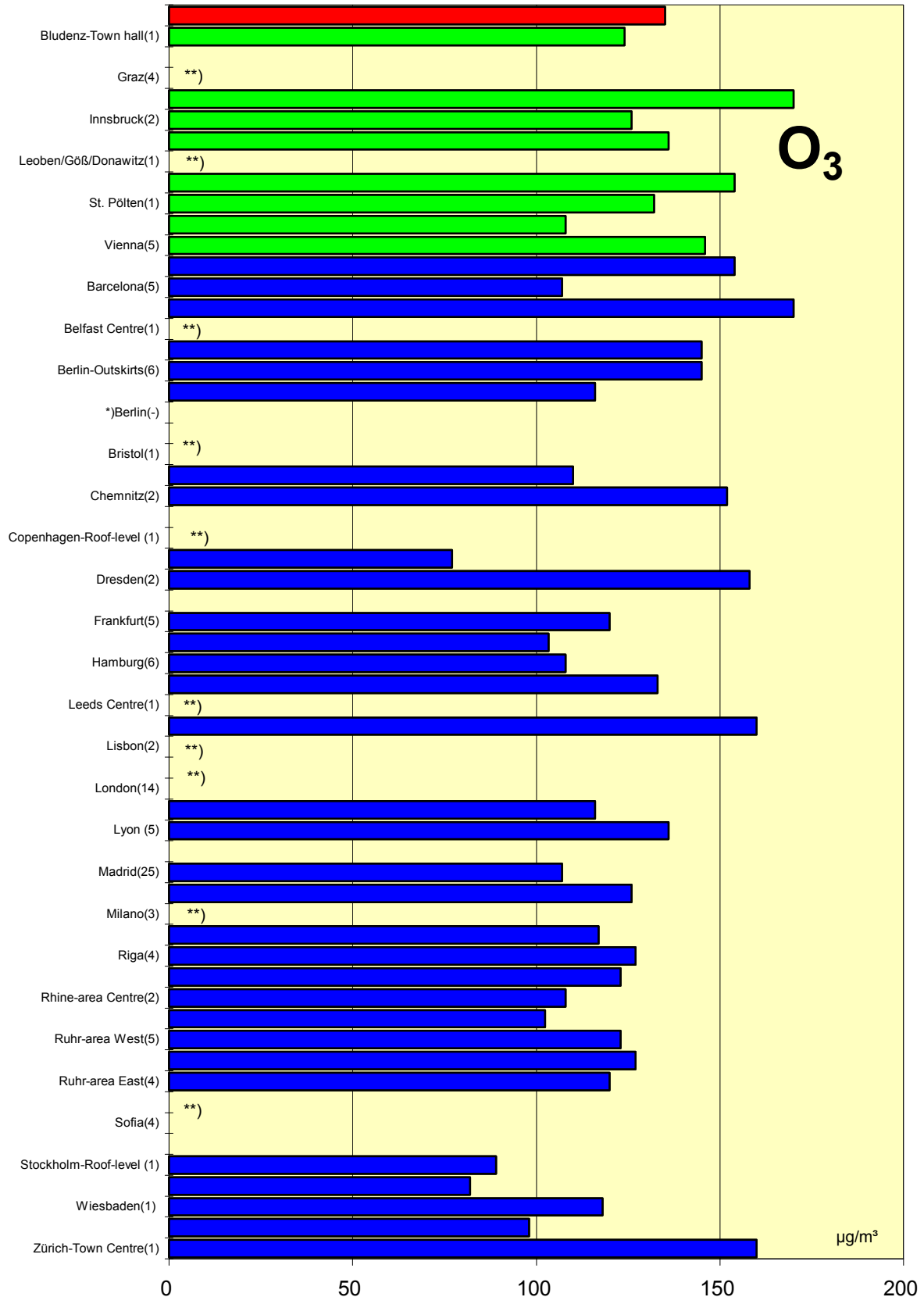


Comparison of The Air Quality in 2000

max. 98-Percentile

(max. stressed monitoring station)

(in parentheses: number of monitoring stations)



Jahresvergleich

1993 - 2000

Jahresmittelwerte

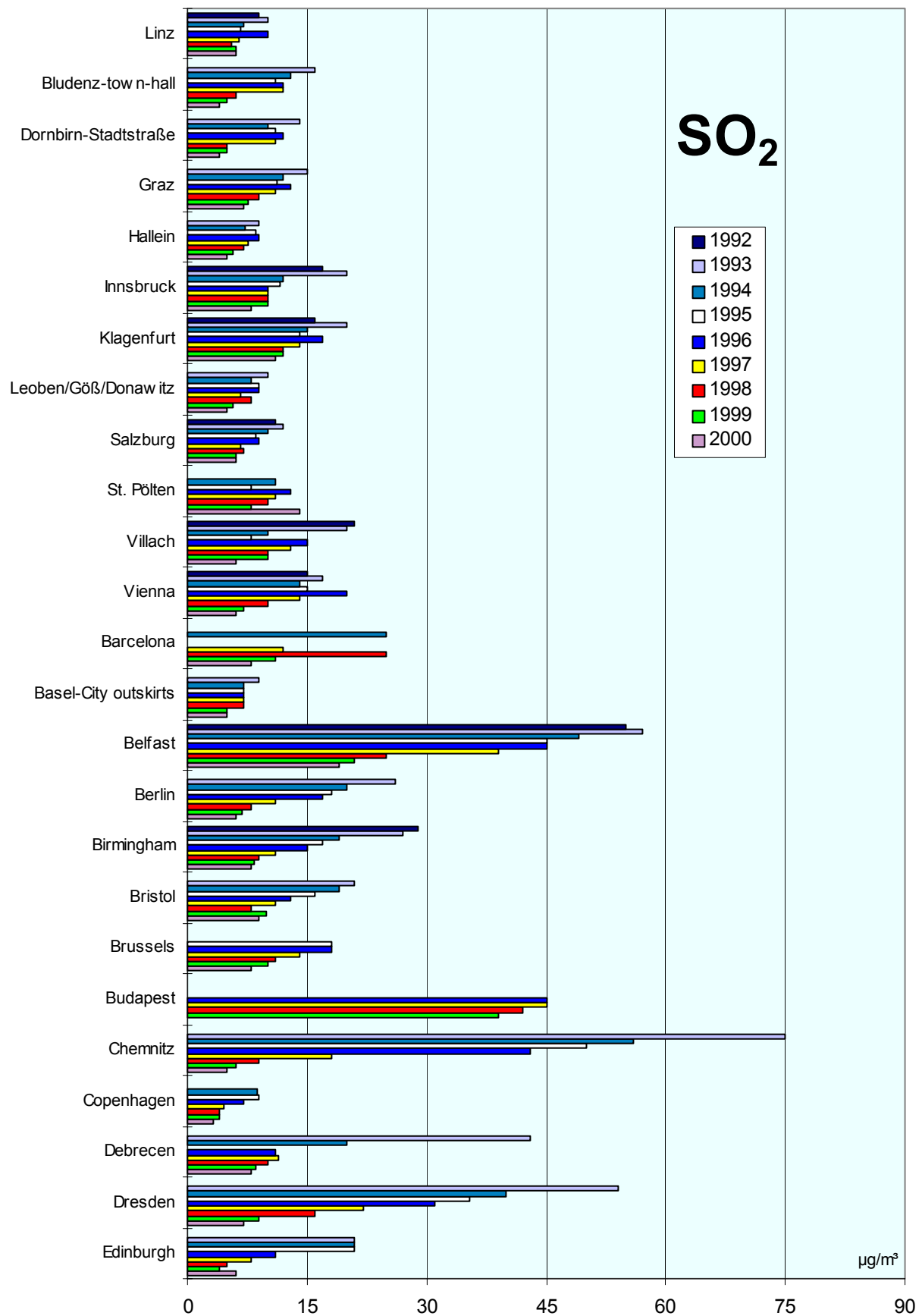
Comparison of The Air Quality Over The Years

1993 - 2000

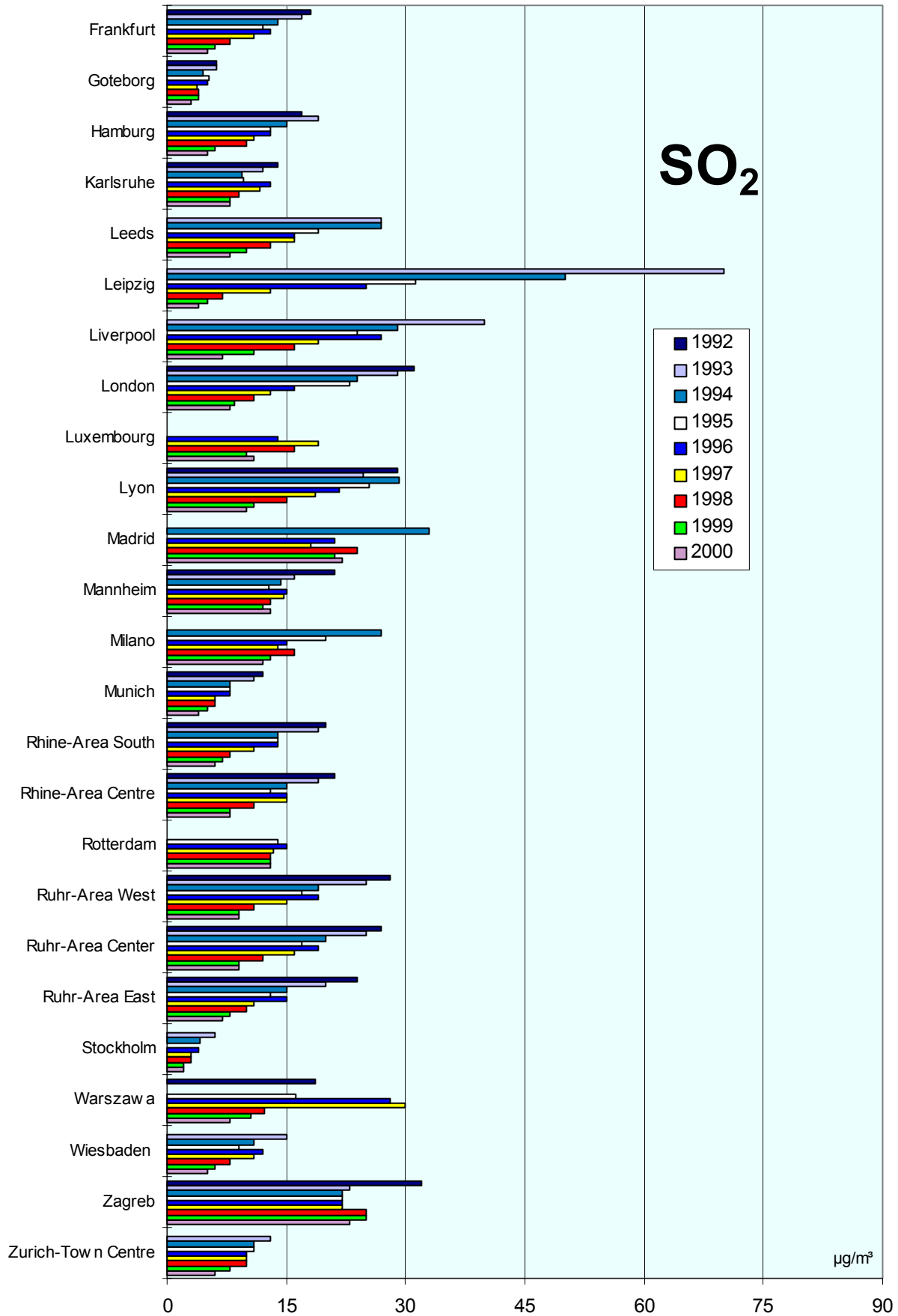
Annual Mean Values

Comparison of The Air Quality 1992 - 2000

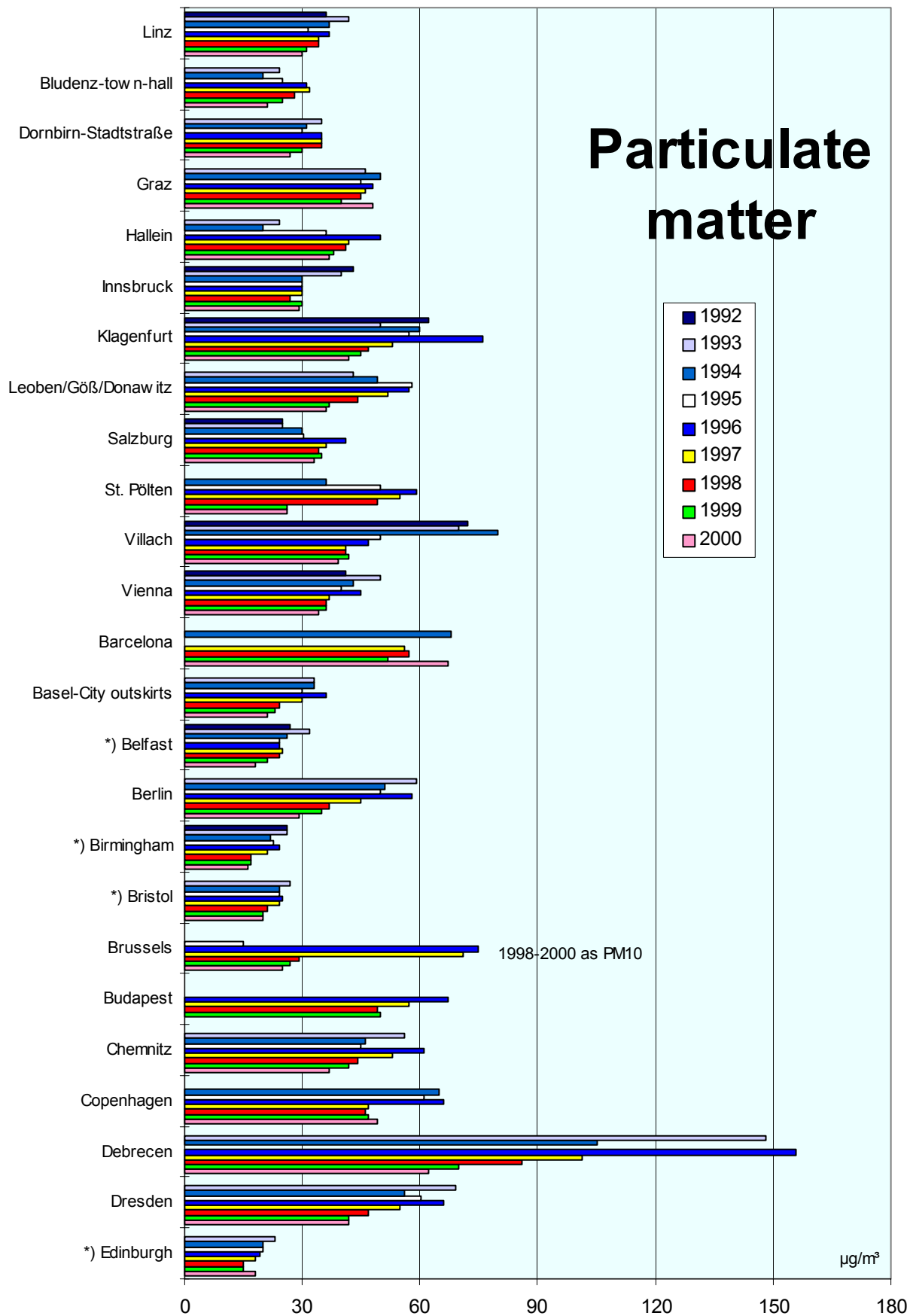
Annual mean values (mean of all monitoring stations)



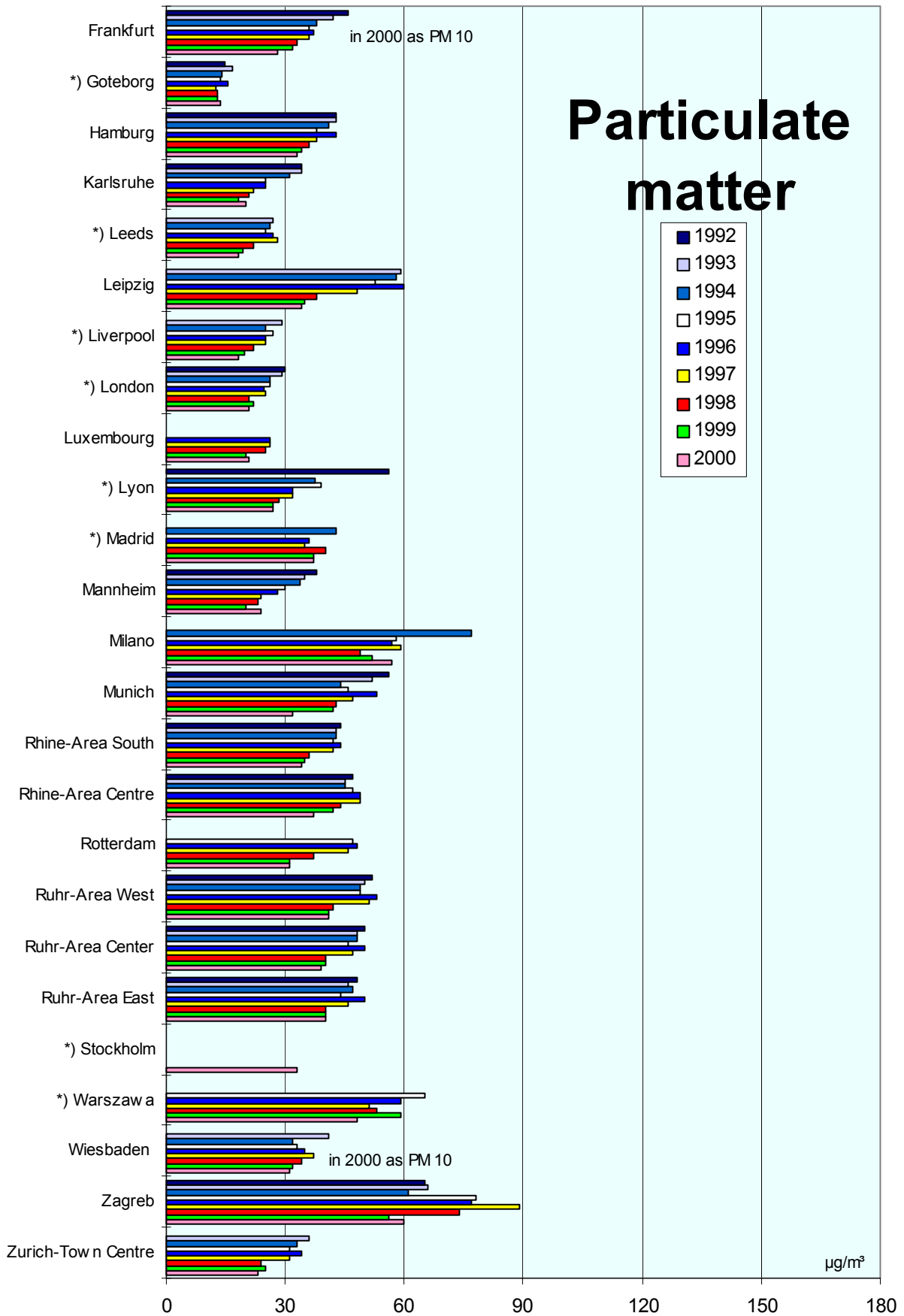
Comparison of The Air Quality 1992 - 2000 Annual mean values (mean of all monitoring stations)



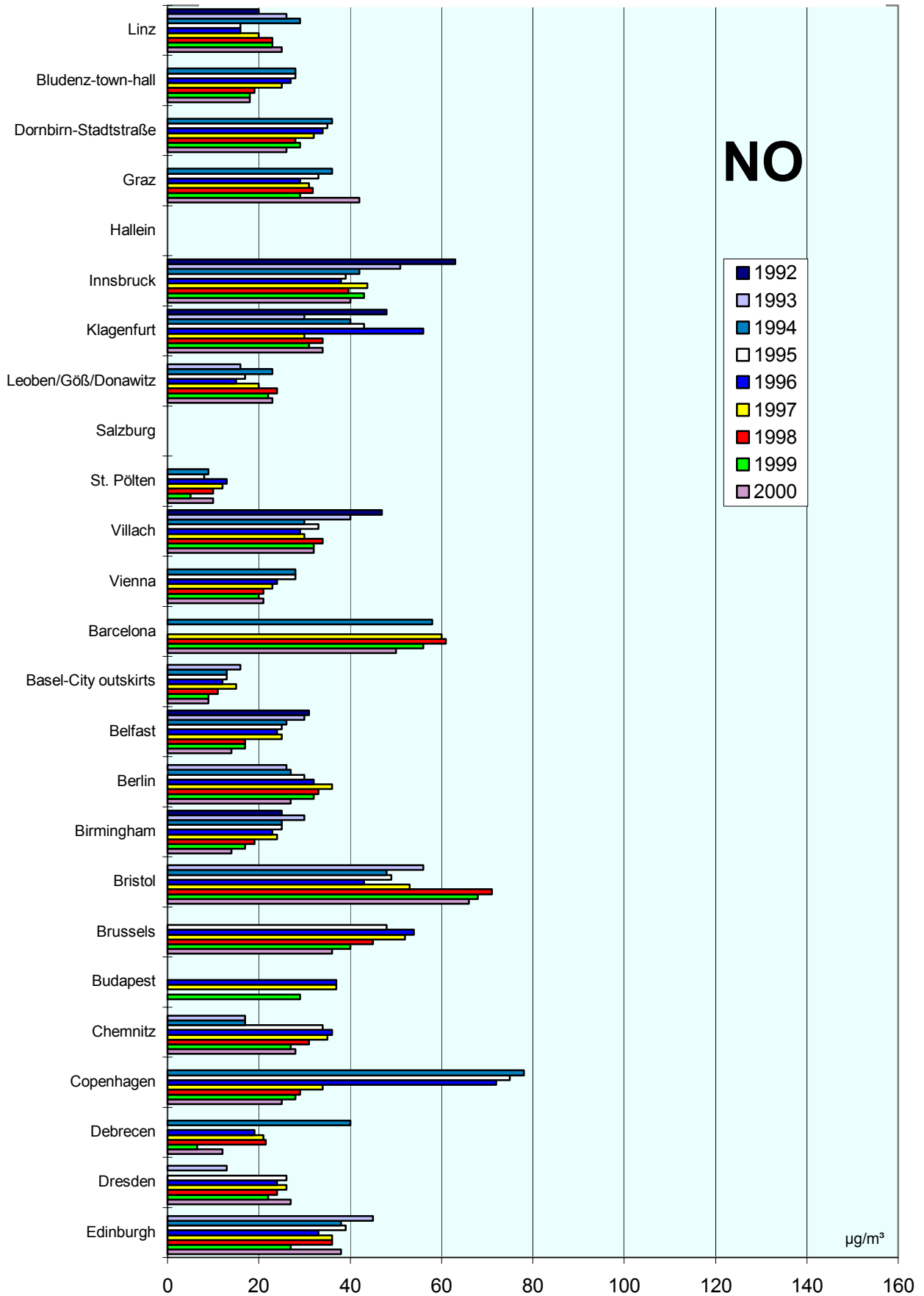
Comparison of The Air Quality 1992 - 2000 Annual mean values (mean of all monitoring stations)



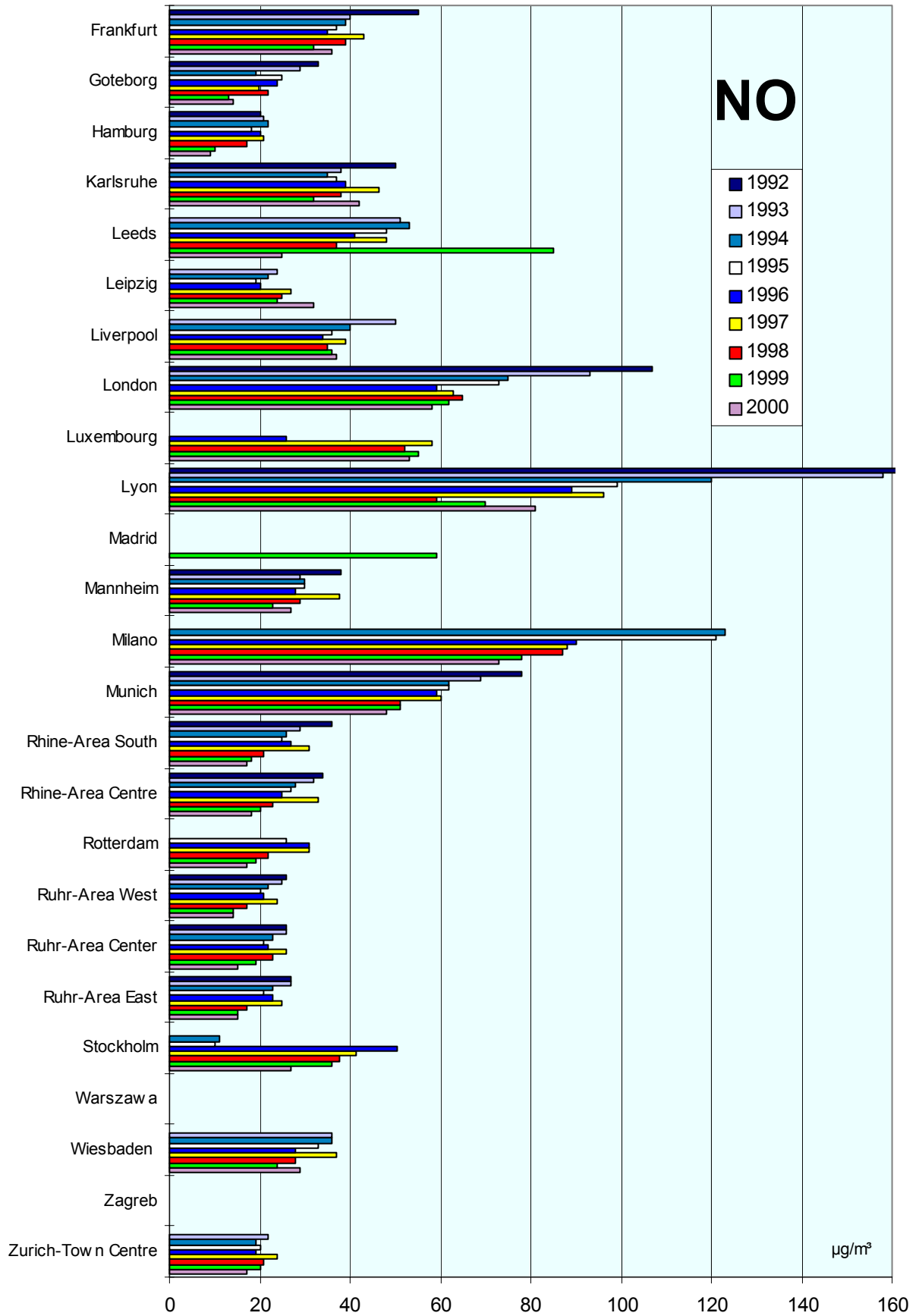
Comparison of The Air Quality 1992 - 2000 Annual mean values (mean of all monitoring stations)



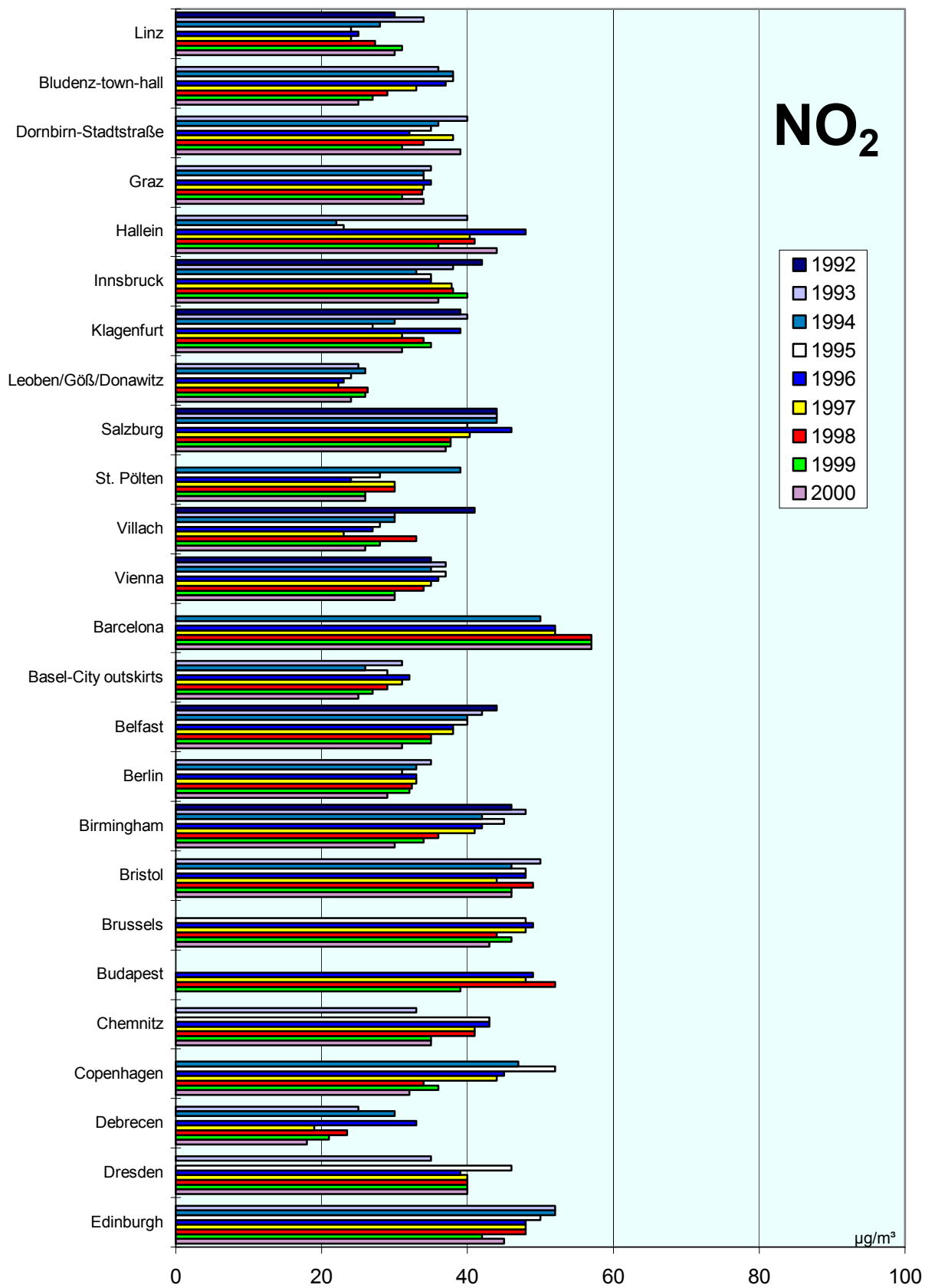
Comparison of The Air Quality 1992 - 2000 Annual mean values (mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2000 Annual mean values (mean of all monitoring stations)

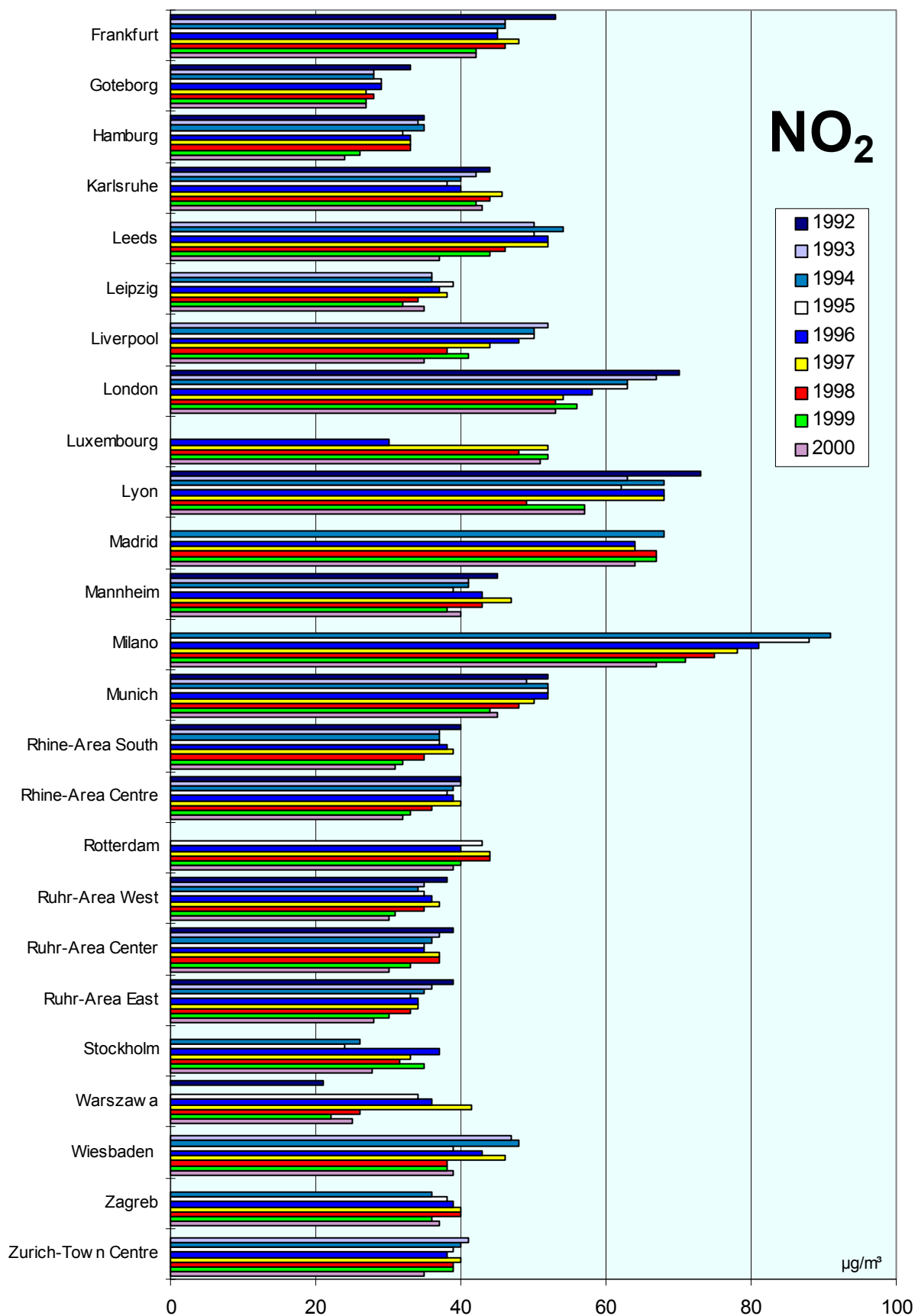


Comparison of The Air Quality 1992 - 2000 Annual mean values (mean of all monitoring stations)

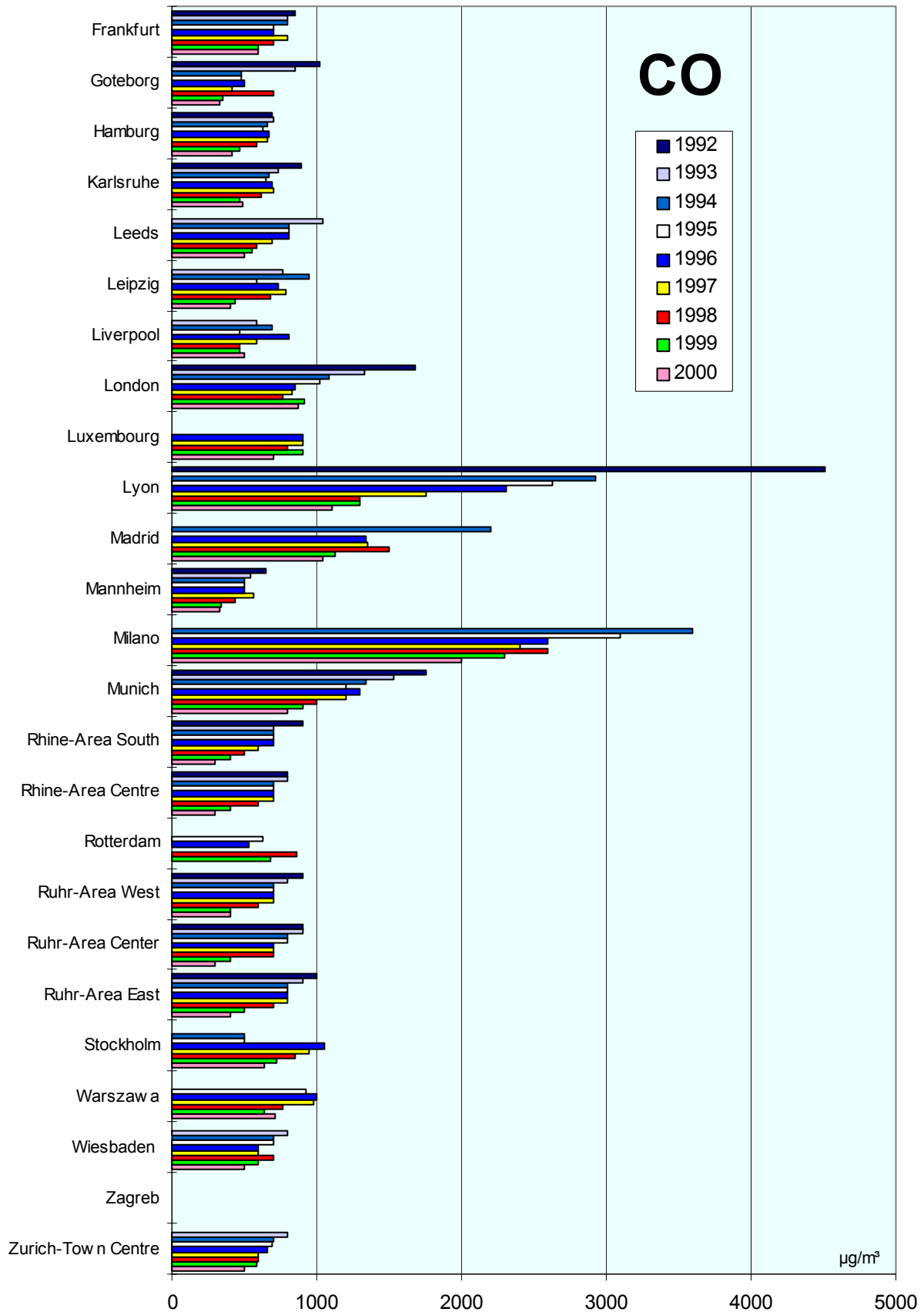


Comparison of The Air Quality 1992 - 2000

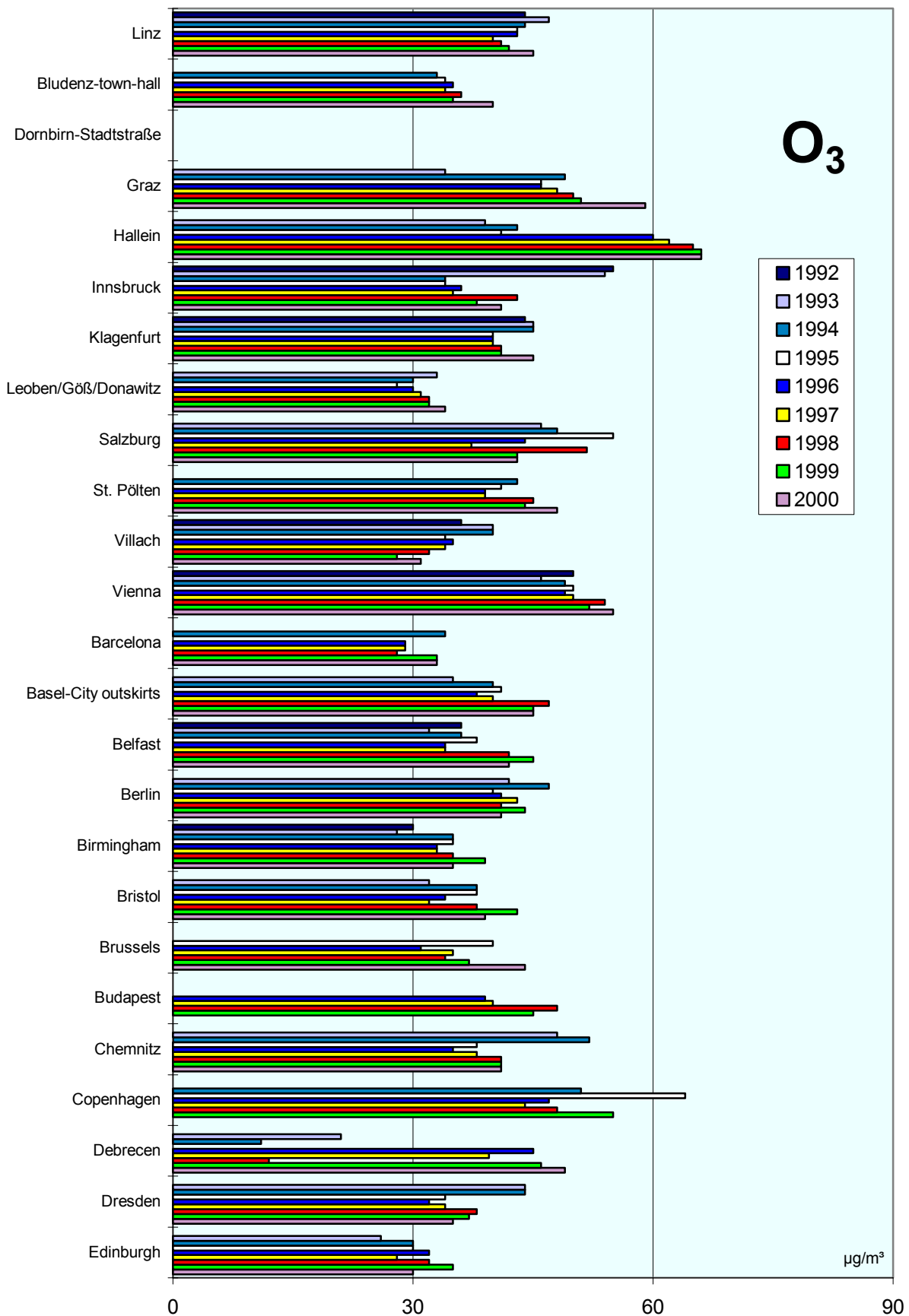
Annual mean values (mean of all monitoring stations)



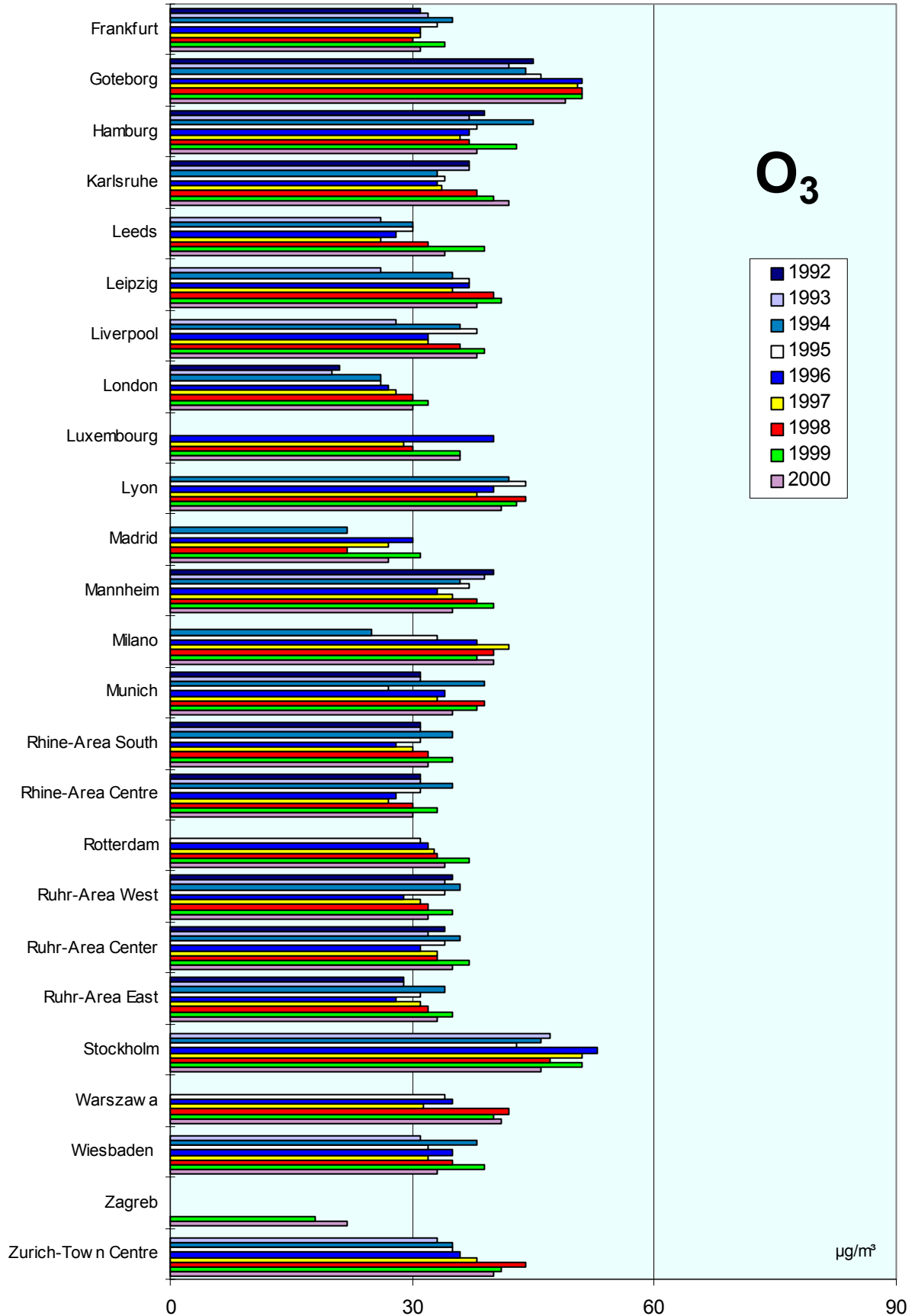
Comparison of The Air Quality 1992 - 2000 Annual mean values (mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2000 Annual mean values (mean of all monitoring stations)



Comparison of The Air Quality 1992 - 2000 Annual mean values (mean of all monitoring stations)



Jahresvergleich

1993 - 2000

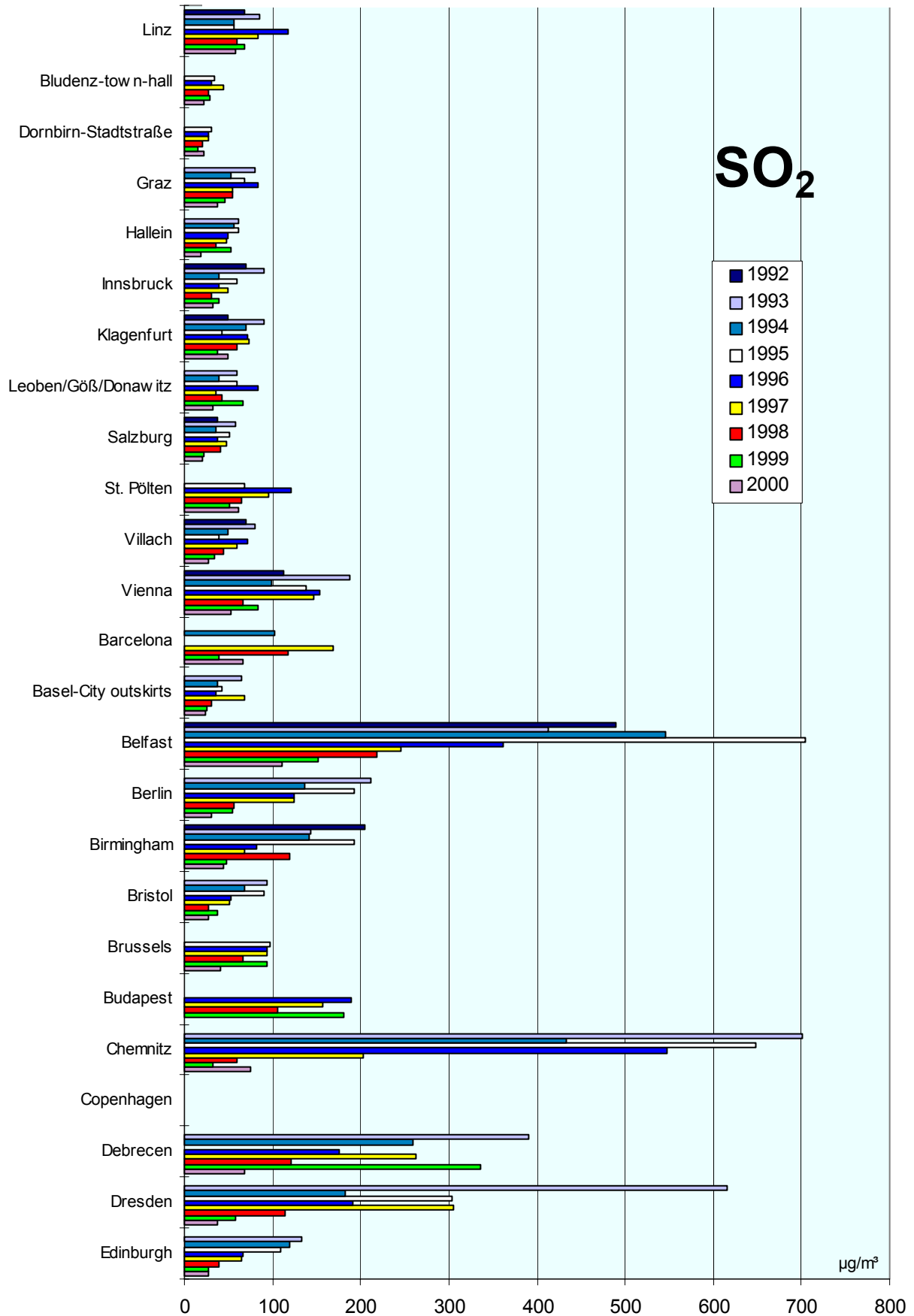
max. Tagesmittelwerte

Comparison of The Air Quality Over The Years

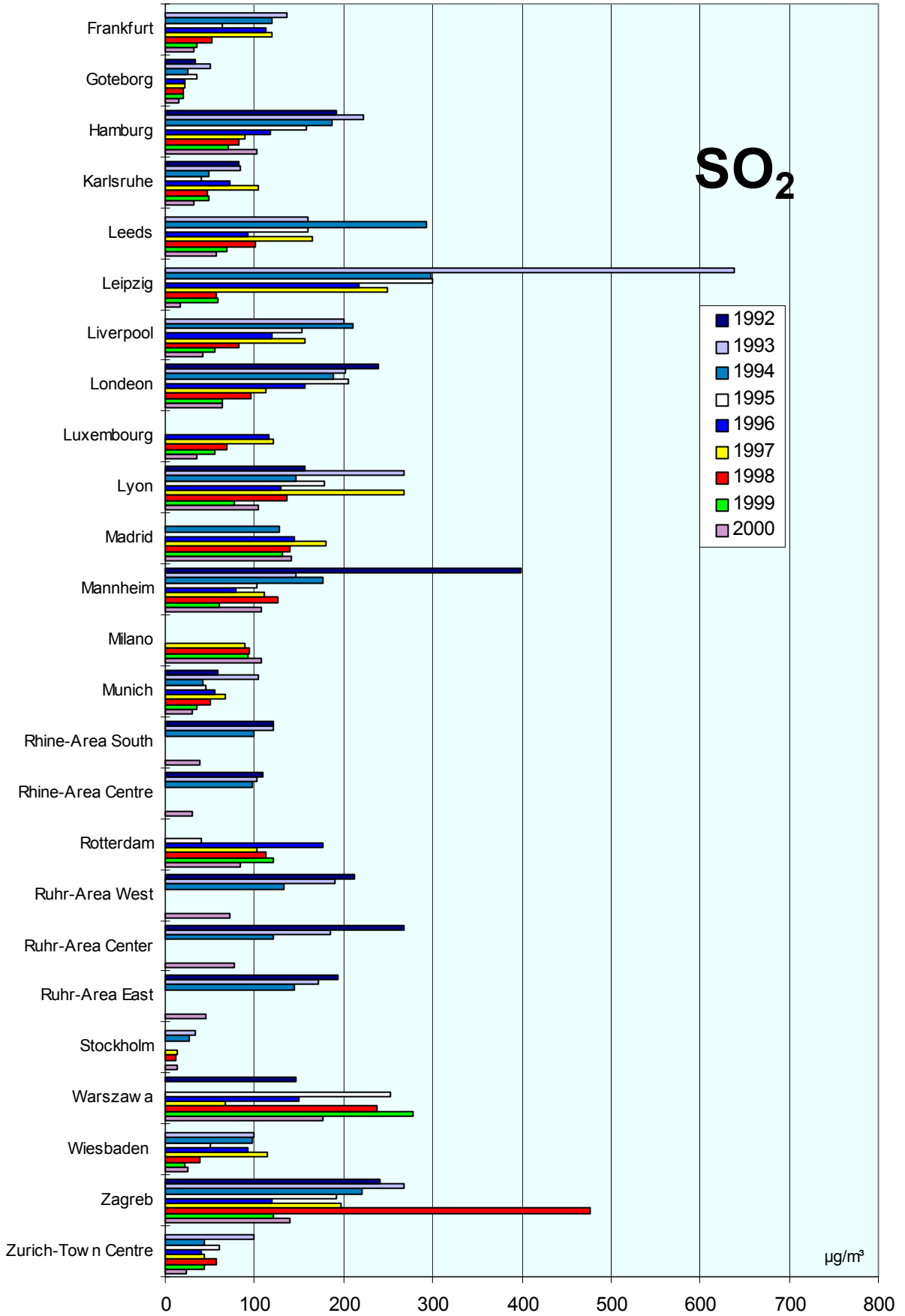
1993 - 2000

Max. Daily Mean Values

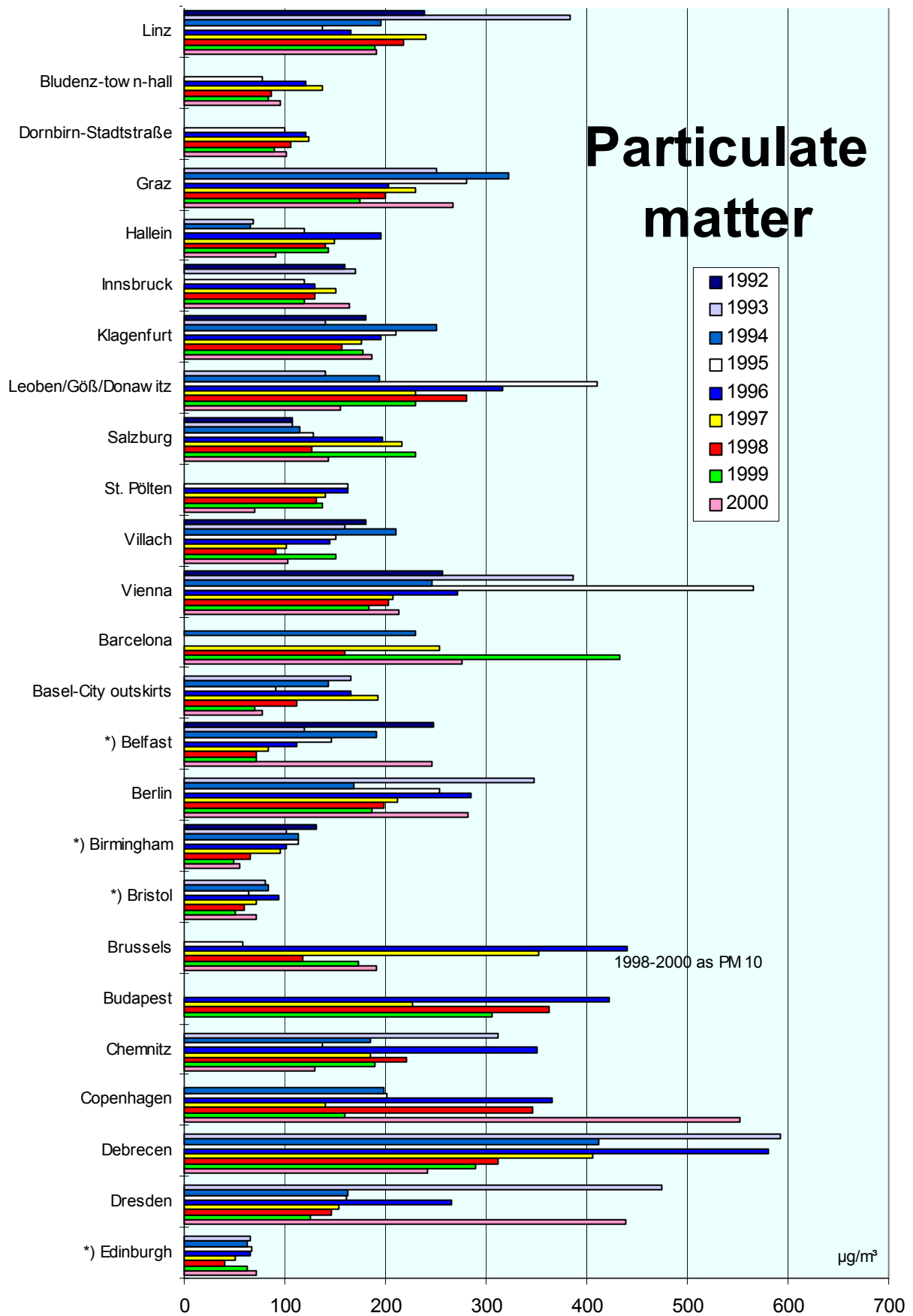
Comparison of The Air Quality 1992 - 2000 Max. daily mean values (peak stressed monitoring) station)



Comparison of The Air Quality 1992 - 2000 Max. daily mean values (peak stressed monitoring station)

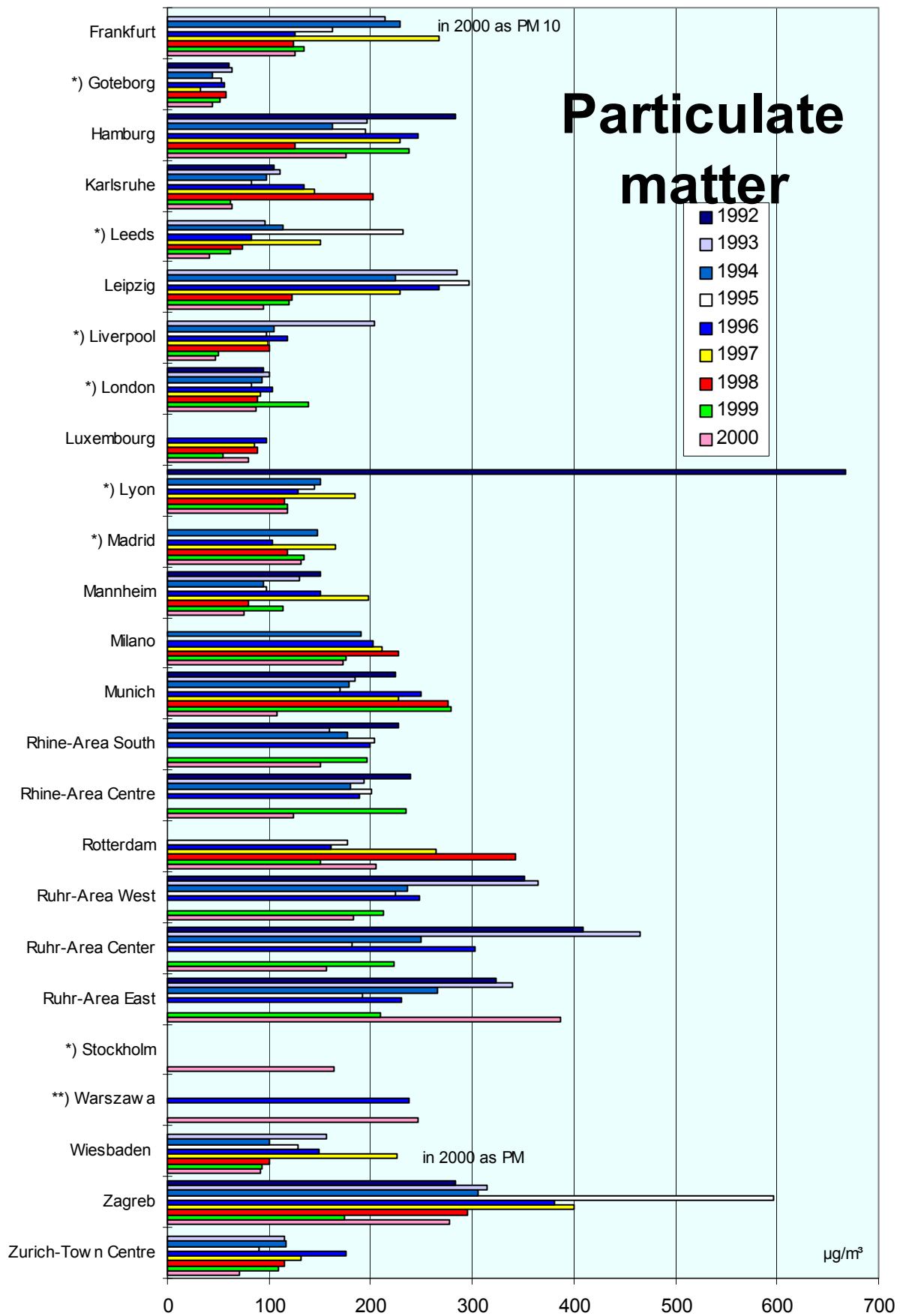


Comparison of The Air Quality 1992 - 2000 Max. daily mean values (peak stressed monitoring station)

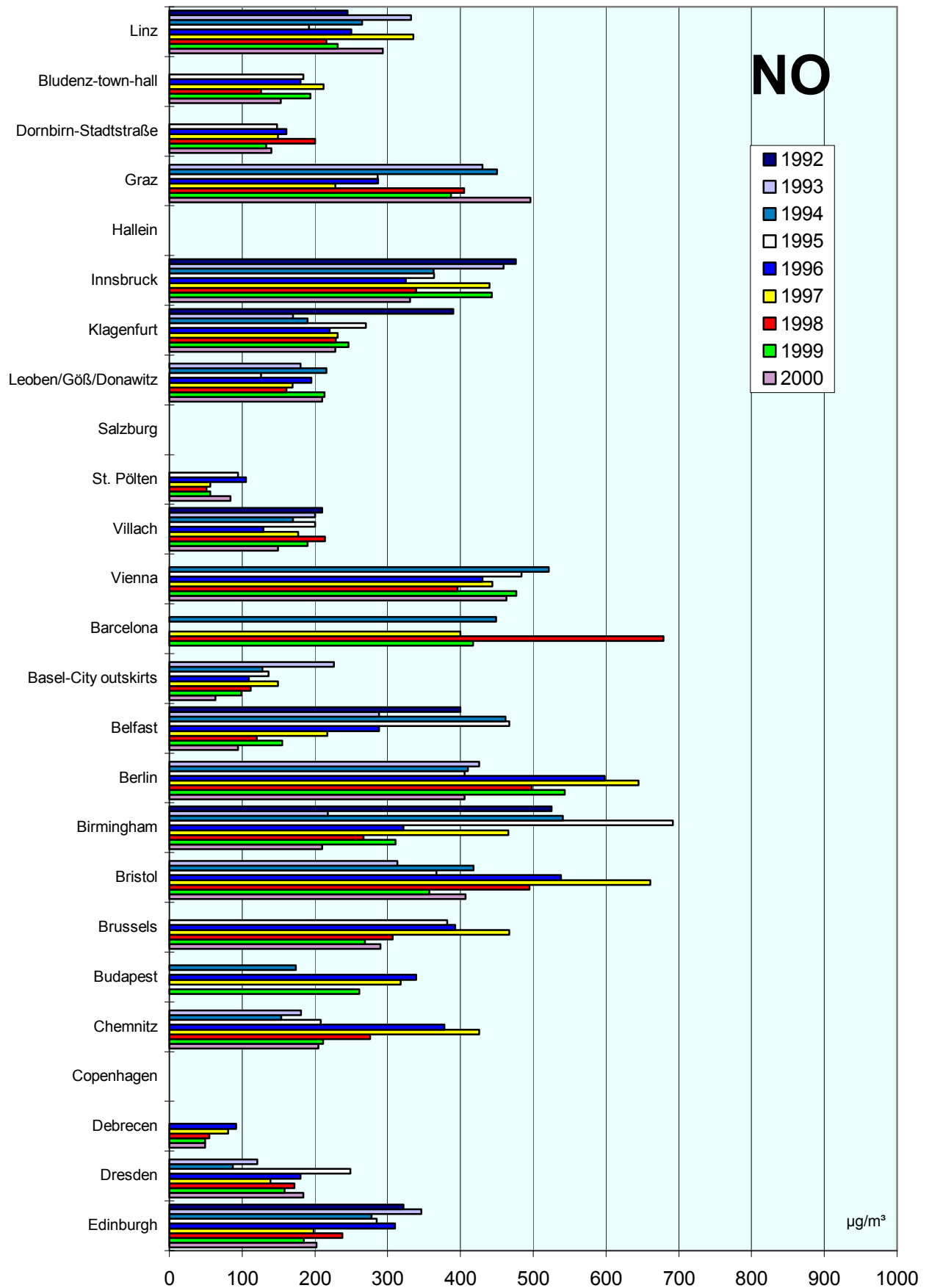


Comparison of The Air Quality 1992 - 2000

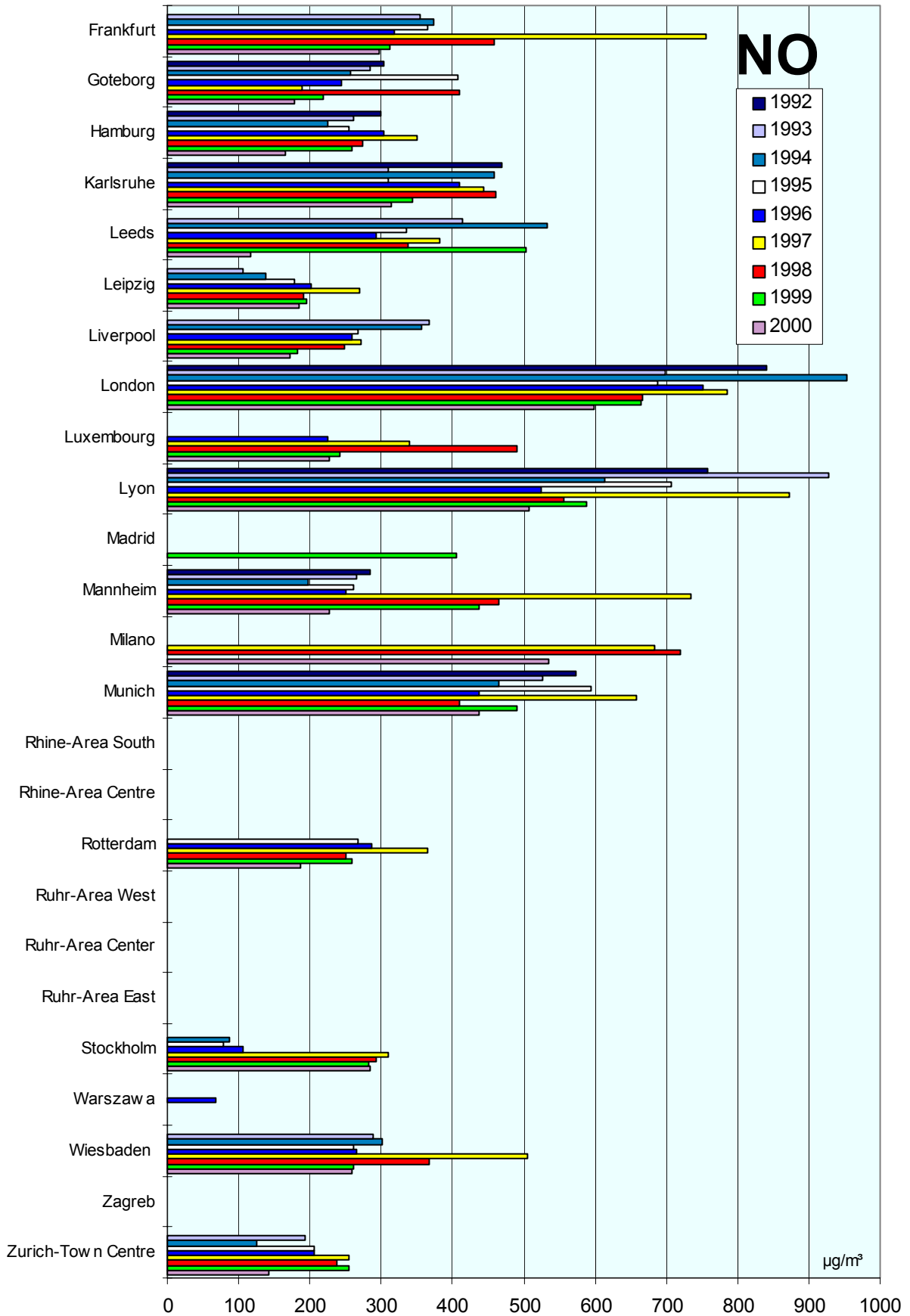
Max. daily mean values (peak stressed monitoring station)



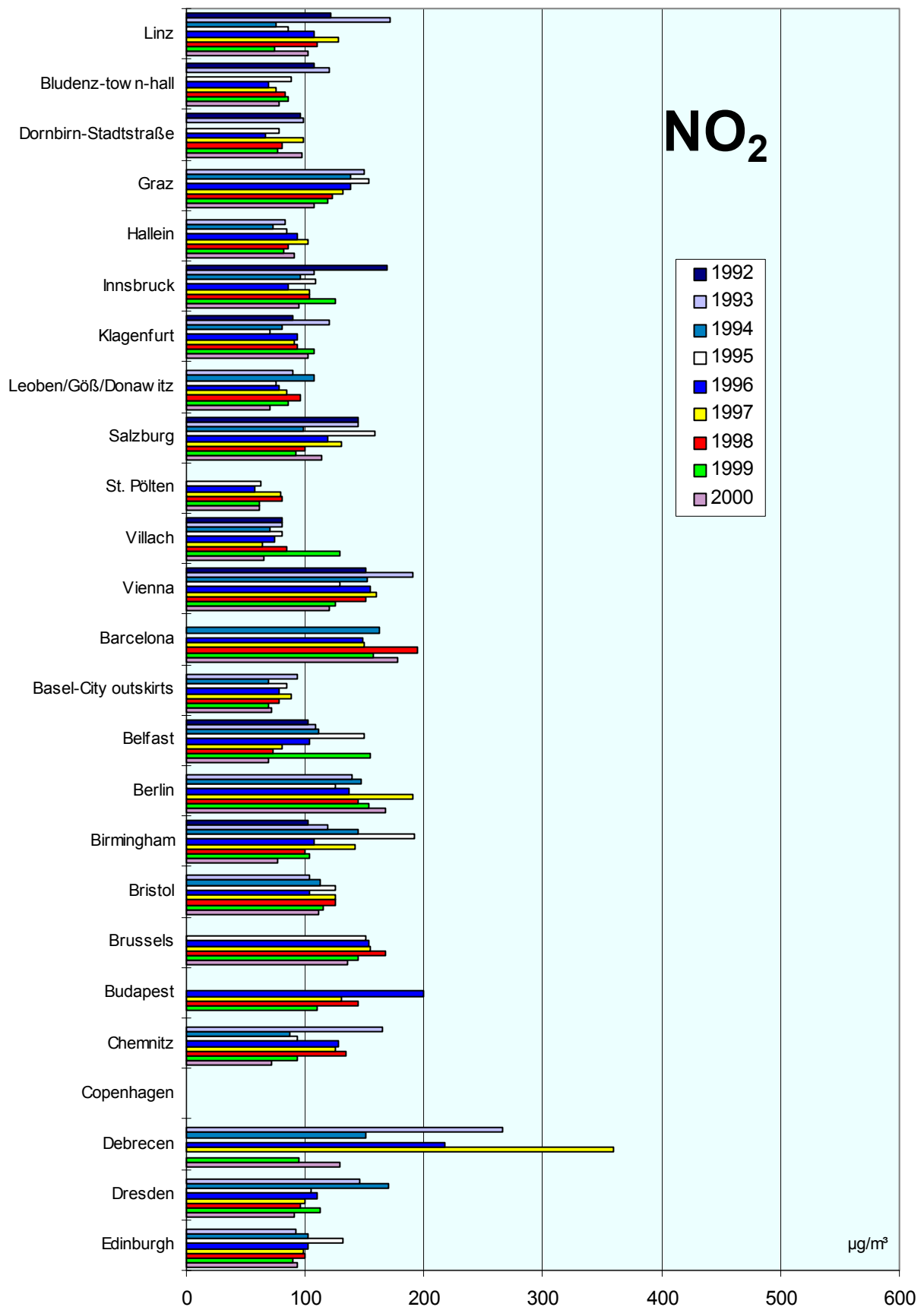
Comparison of The Air Quality 1992 - 2000 Max. daily mean values (peak-stressed monitoring station)



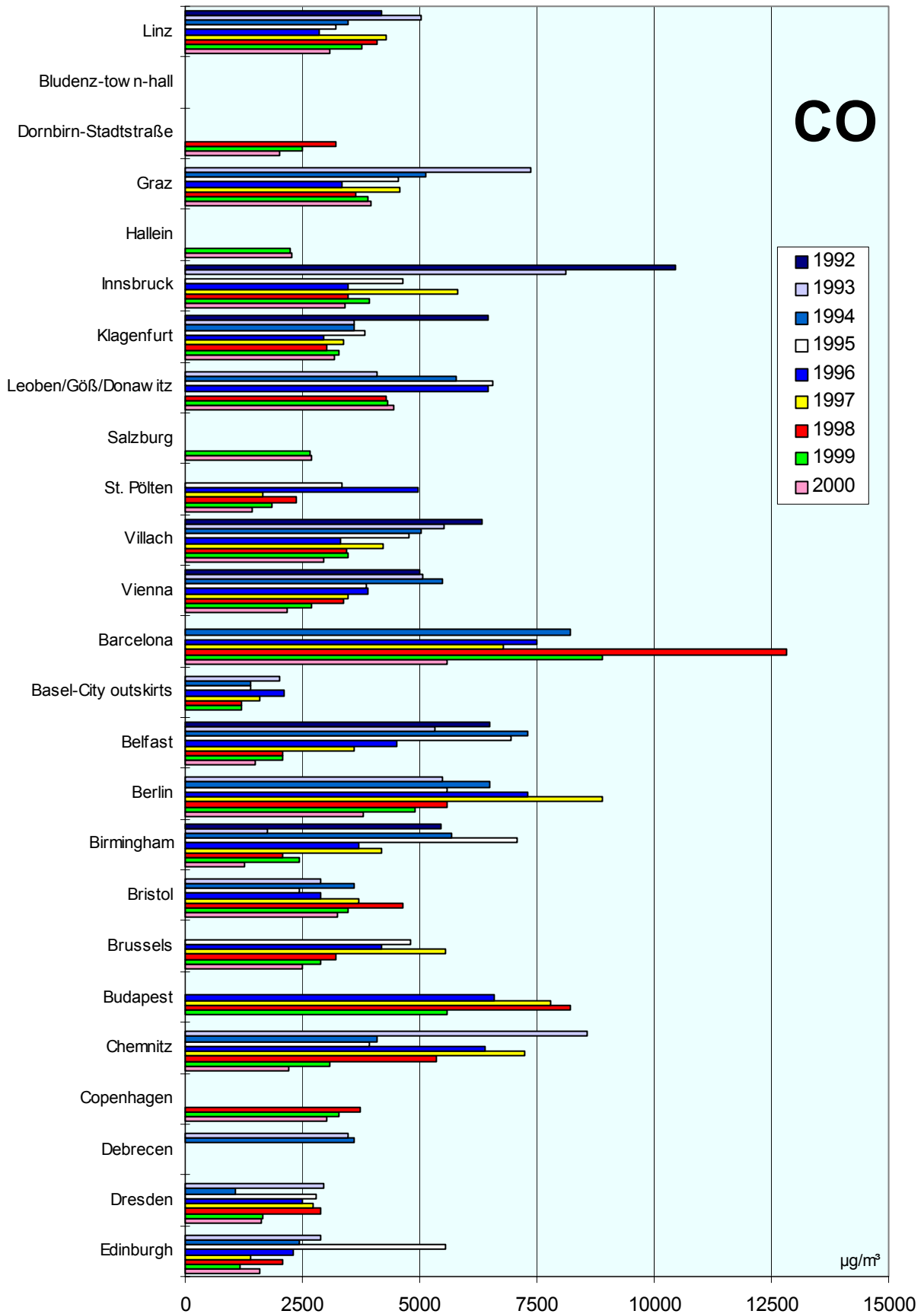
Comparison of The Air Quality 1992 - 2000 Max. daily mean values (peak stressed monitoring station)



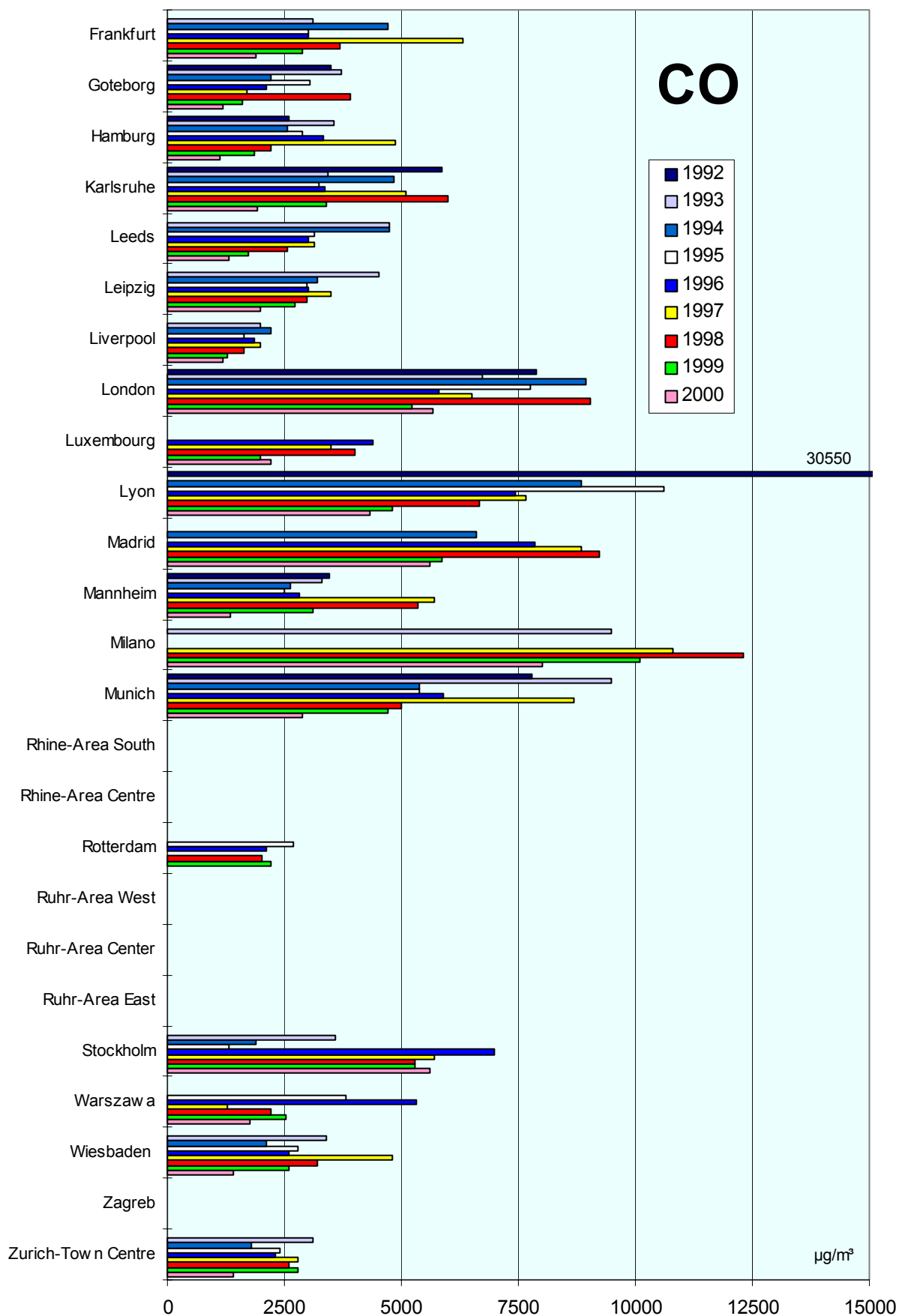
Comparison of The Air Quality 1992 - 2000 Max. daily mean values (peak stressed monitoring)



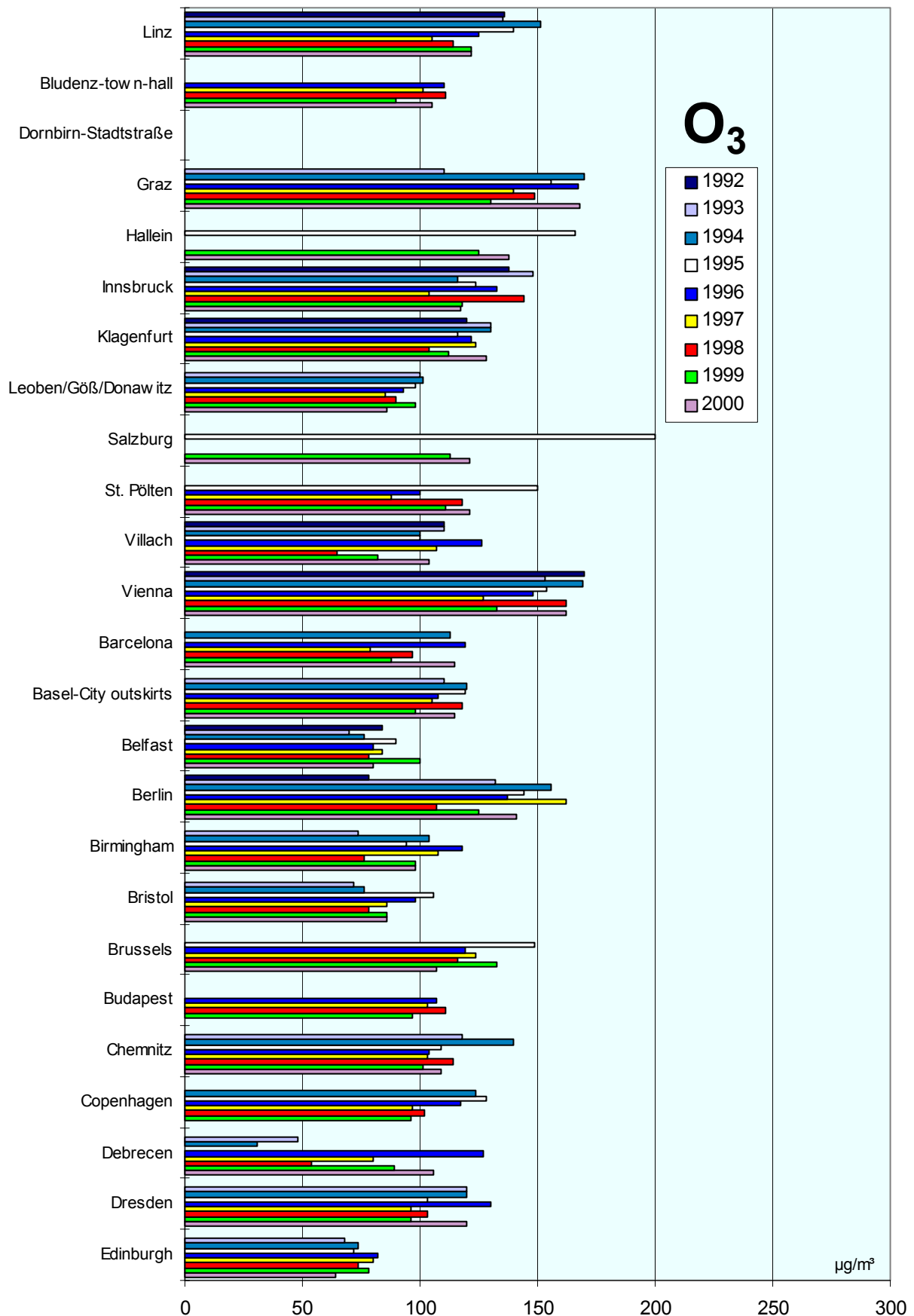
Comparison of The Air Quality 1992 - 2000 Max. daily mean values (peak-stressed monitoring station)



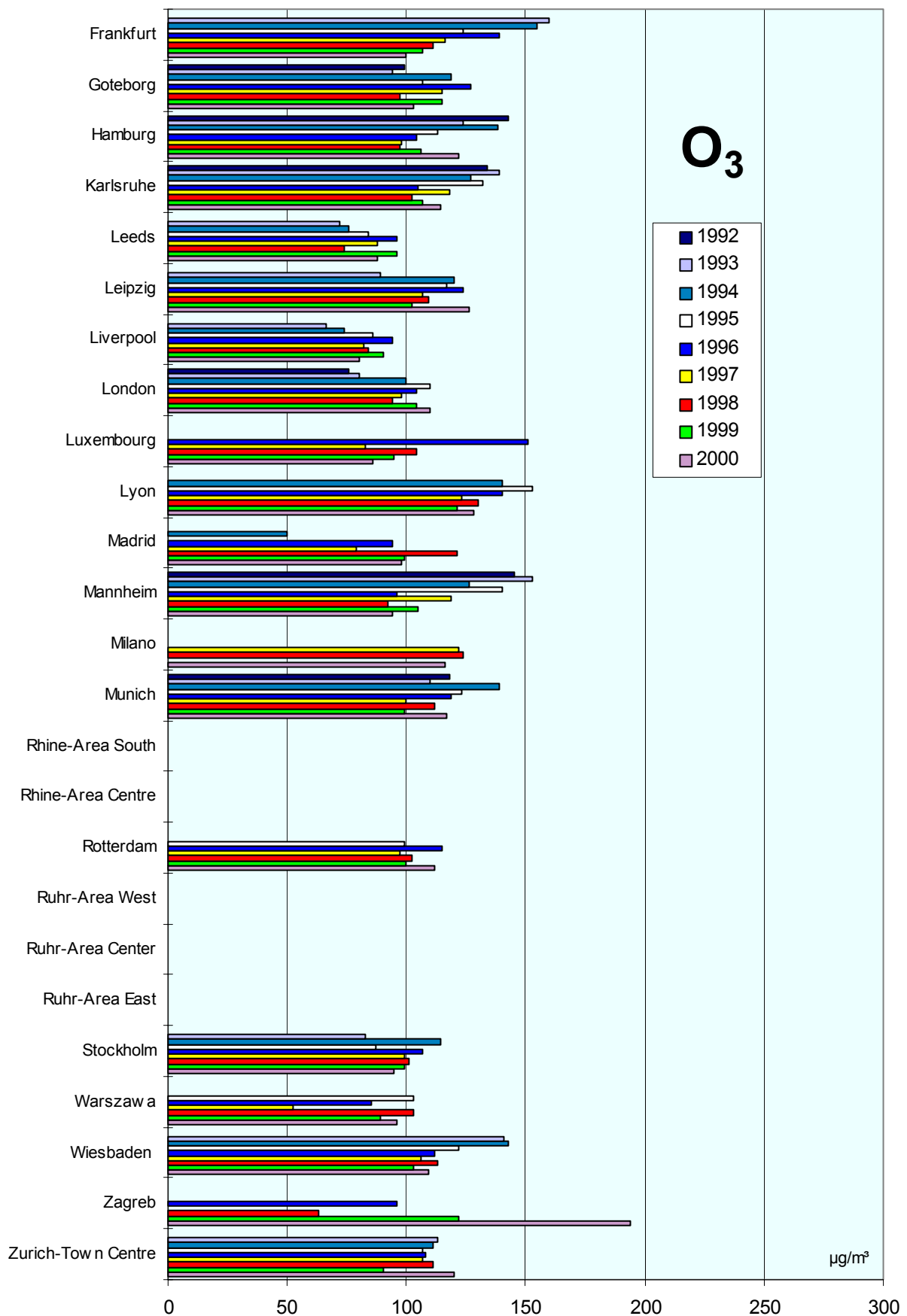
Comparison of The Air Quality 1992 - 2000 Max. daily mean values (peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2000 Max. daily mean values (peak stressed monitoring)



Comparison of The Air Quality 1992 - 2000 Max. daily mean values (peak stressed monitoring station)



Jahresvergleich

1993 - 2000

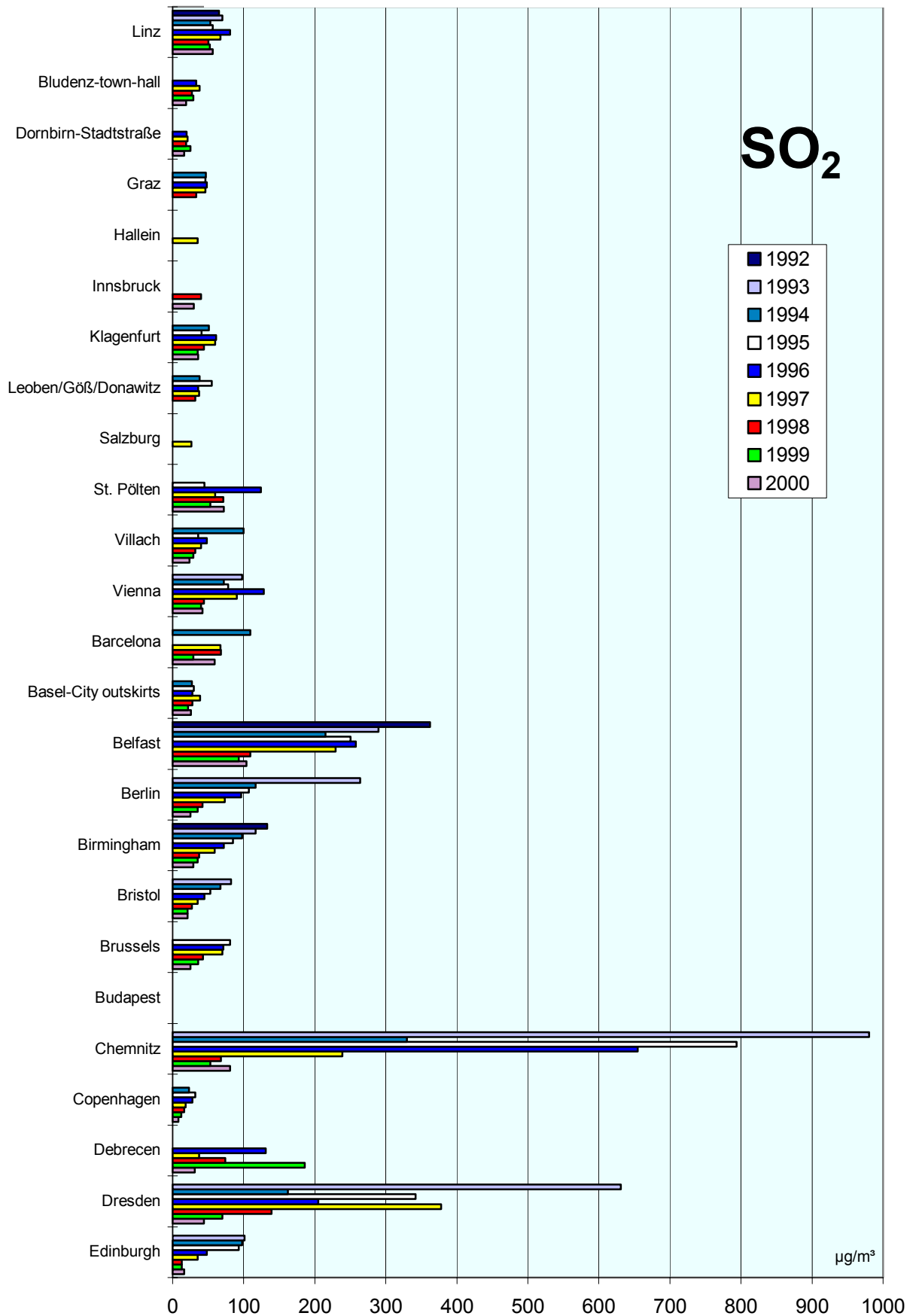
max. 98-Percentile

Comparison of The Air Quality Over The Years

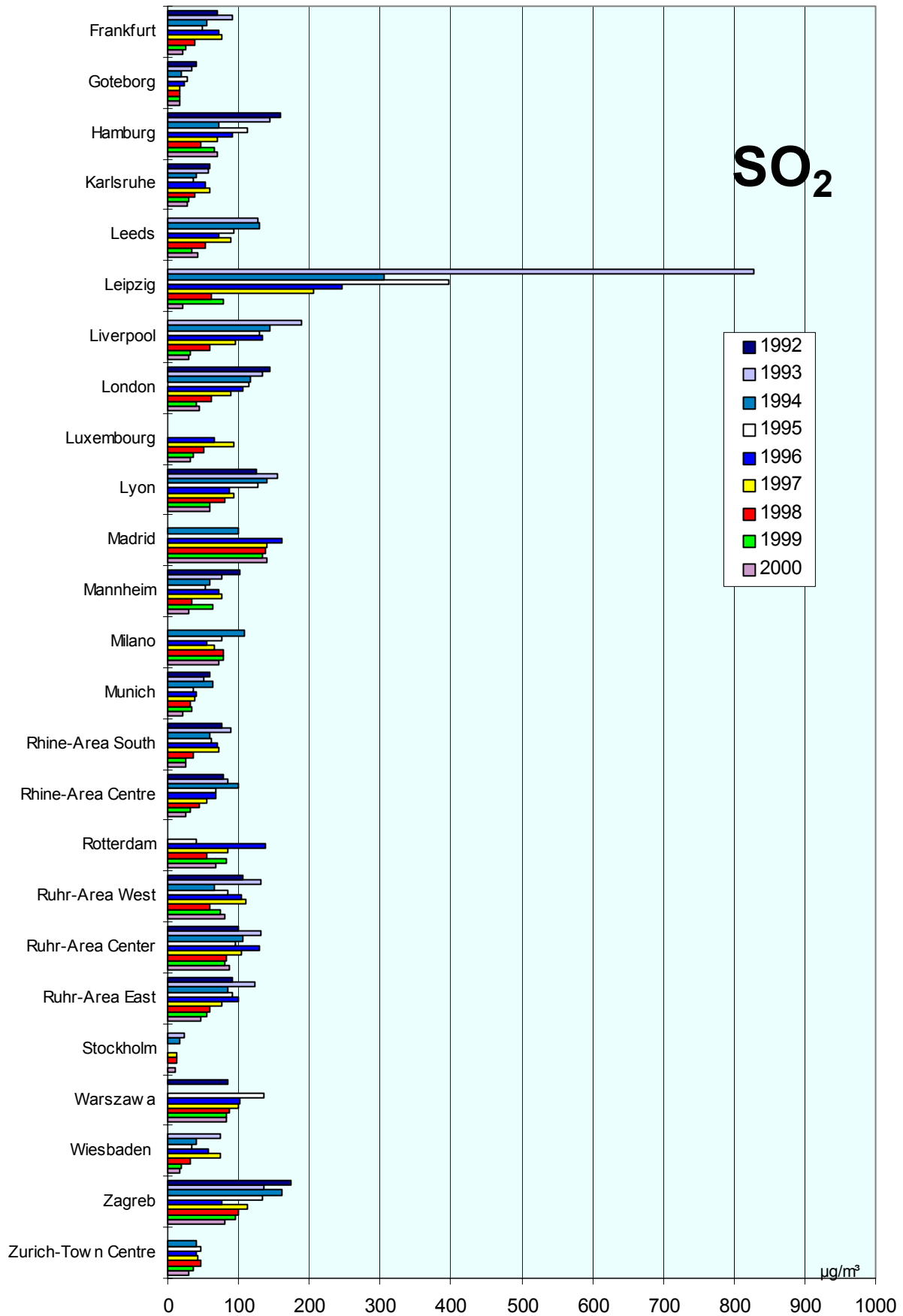
1993 - 2000

Max. 98-Percentiles

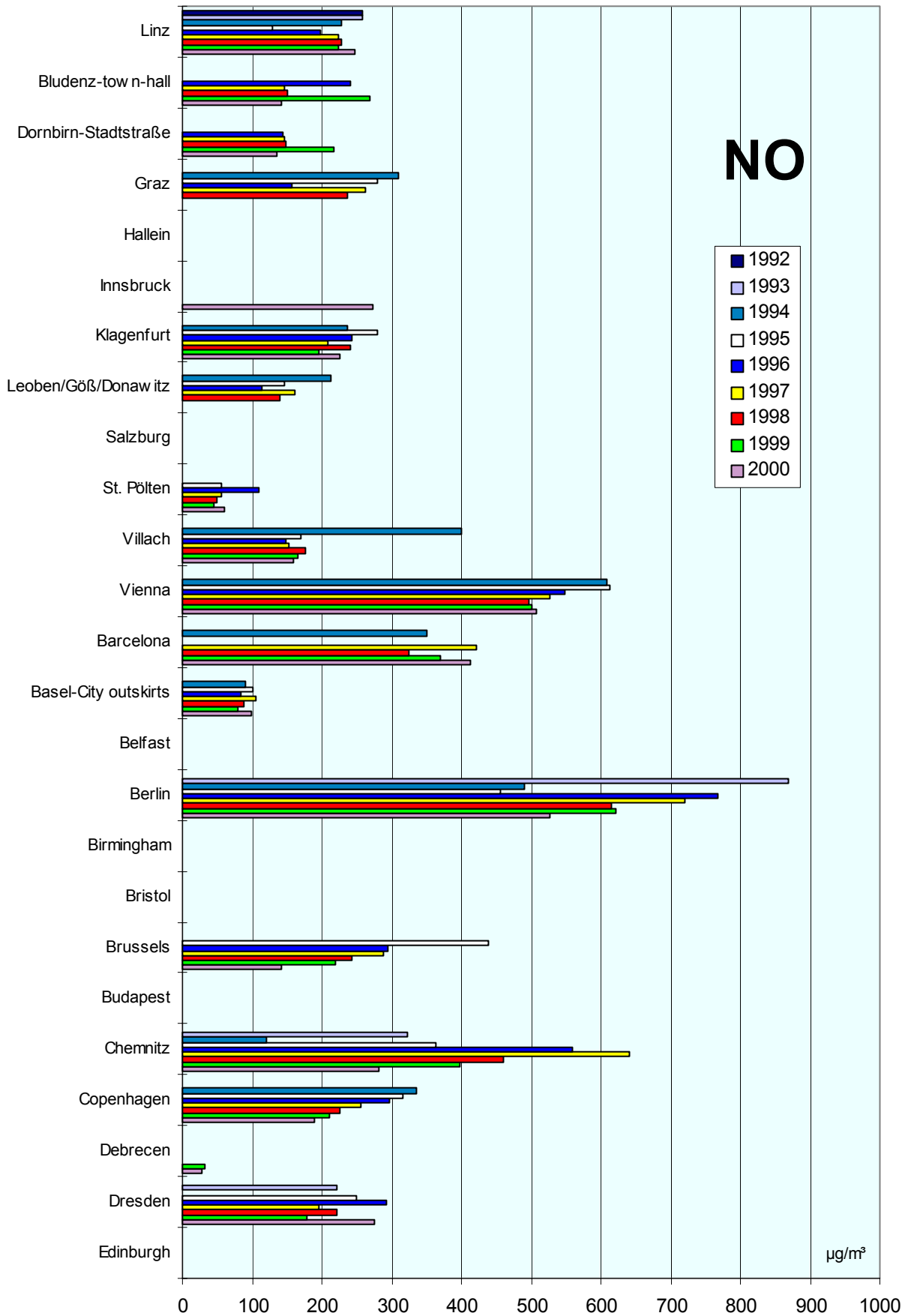
Comparison of The Air Quality 1992 - 2000 Max. 98-Percentile (peak stressed monitoring station)



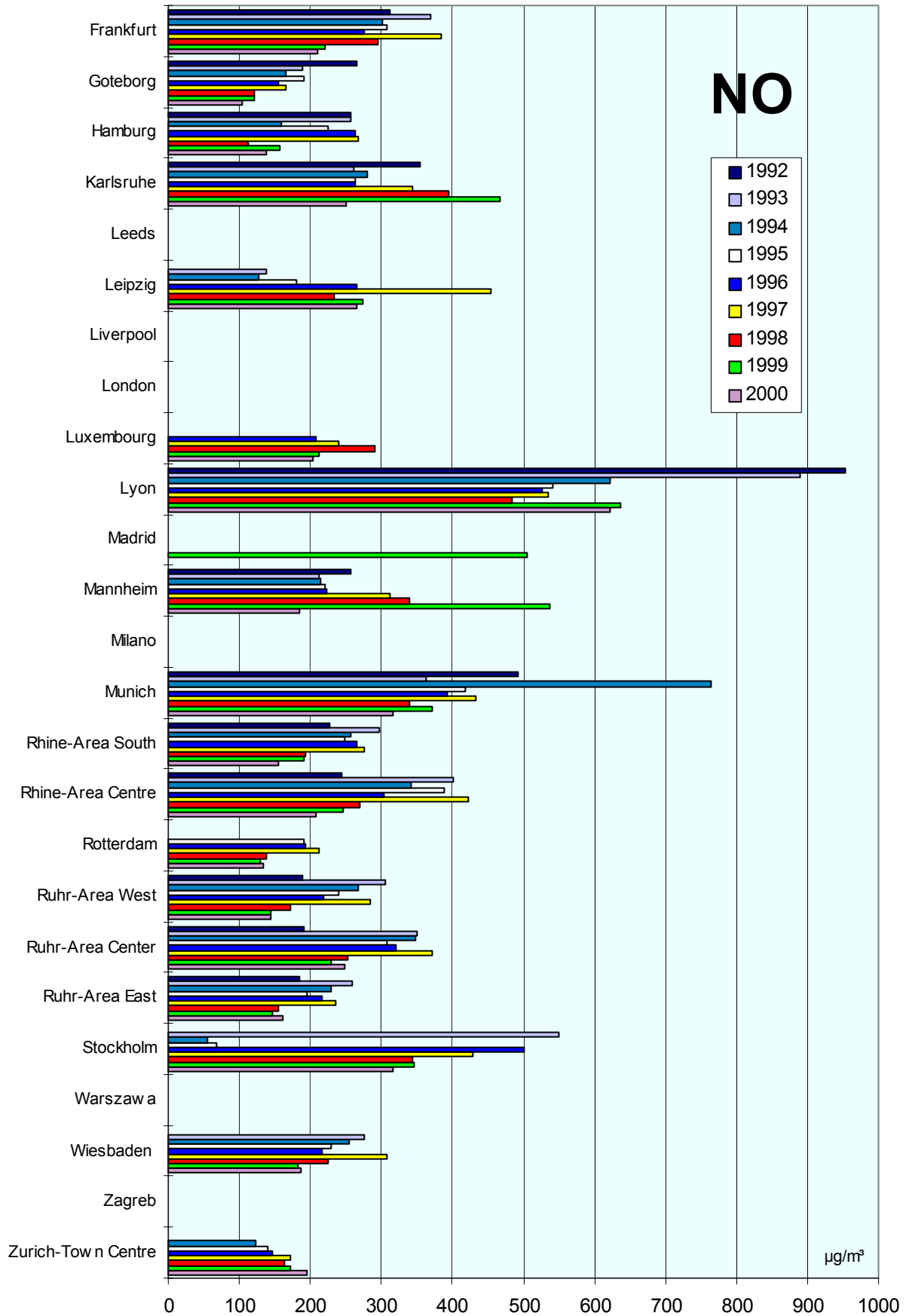
Comparison of The Air Quality 1992 - 2000 Max. 98-Percentile (peak stressed monitoring station)



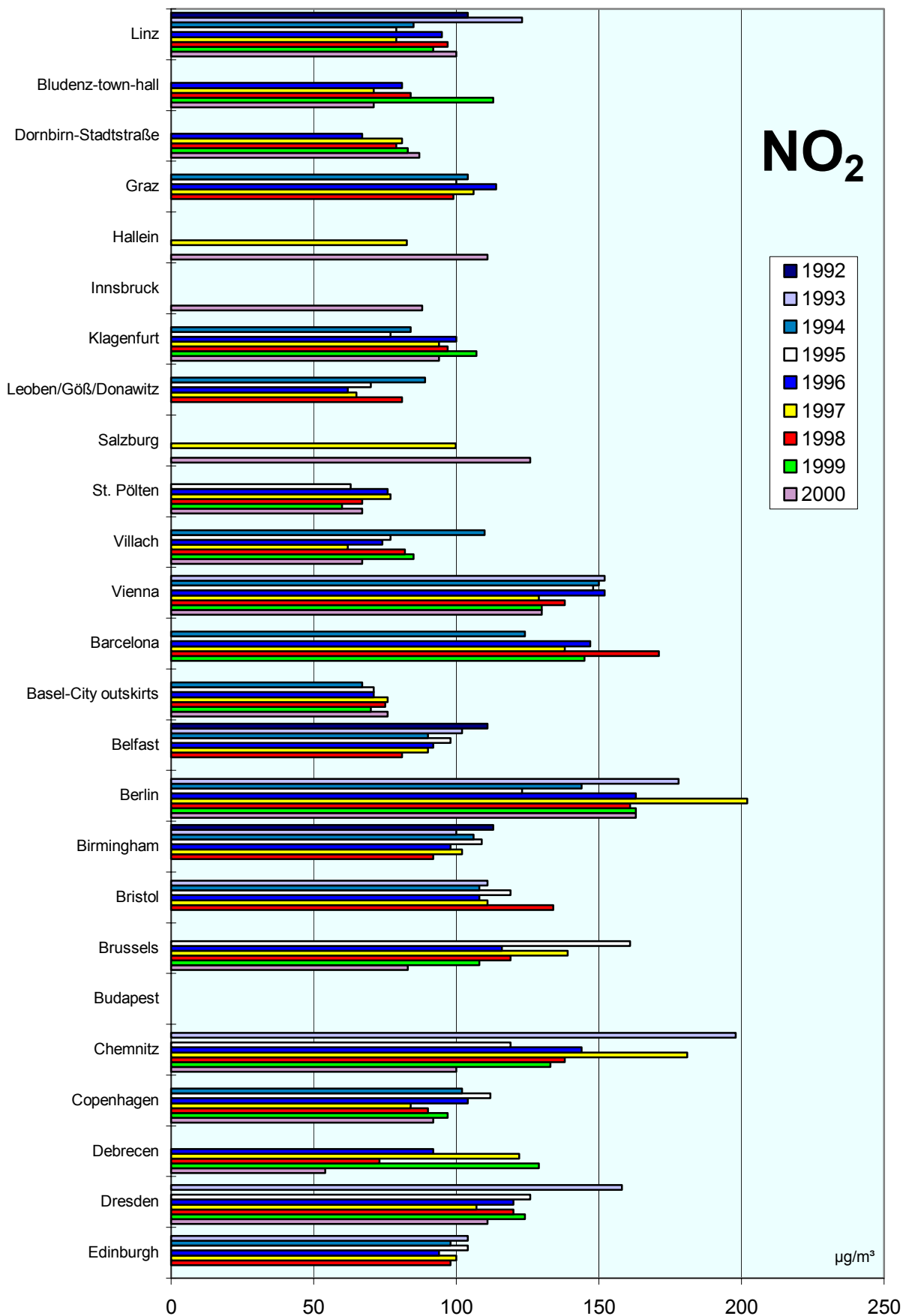
Comparison of The Air Quality 1992 - 2000 Max. 98-Percentile (peak-stressed monitoring station)



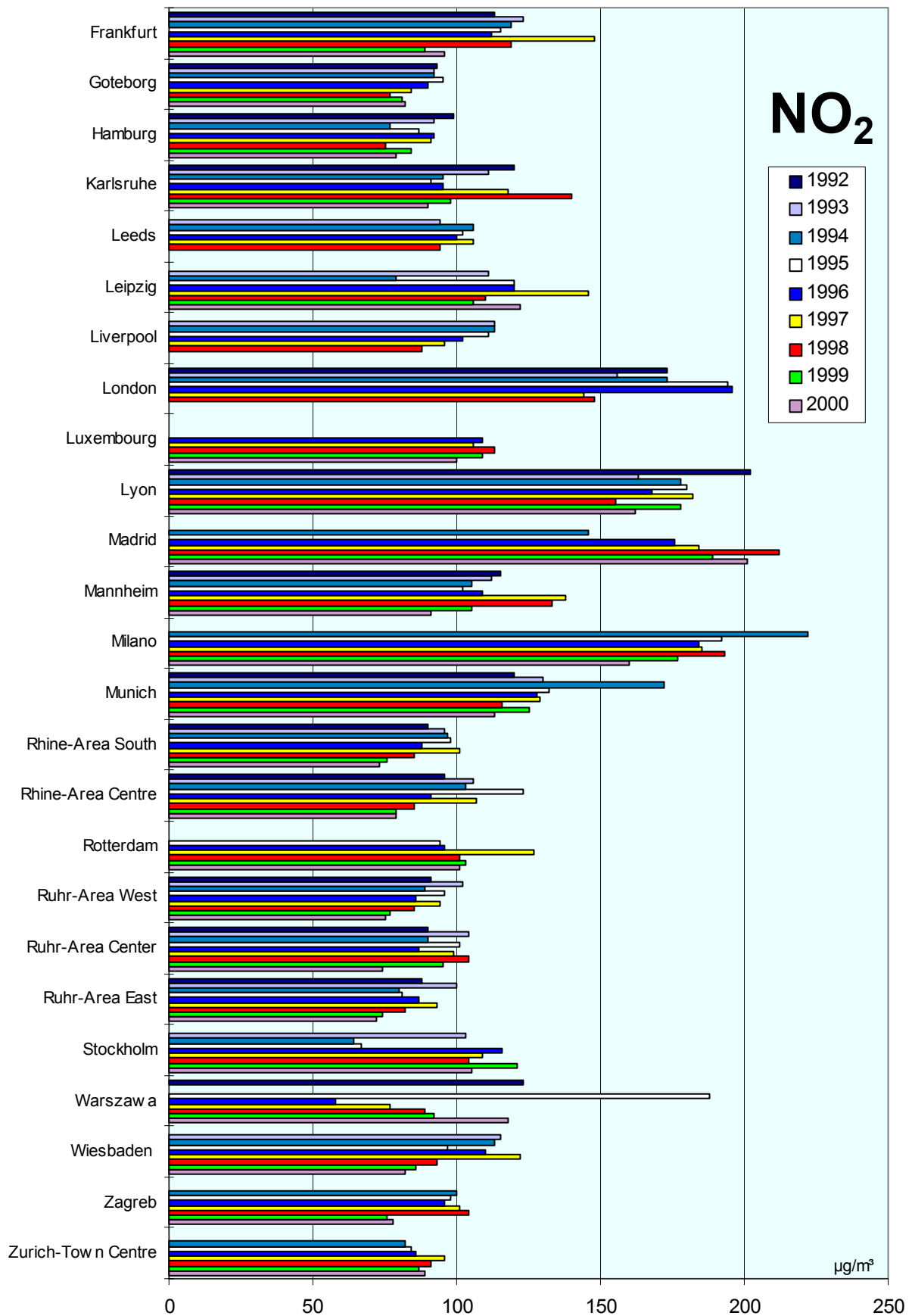
Comparison of The Air Quality 1992 - 2000 Max. 98-Percentile (peak stressed monitoring station)



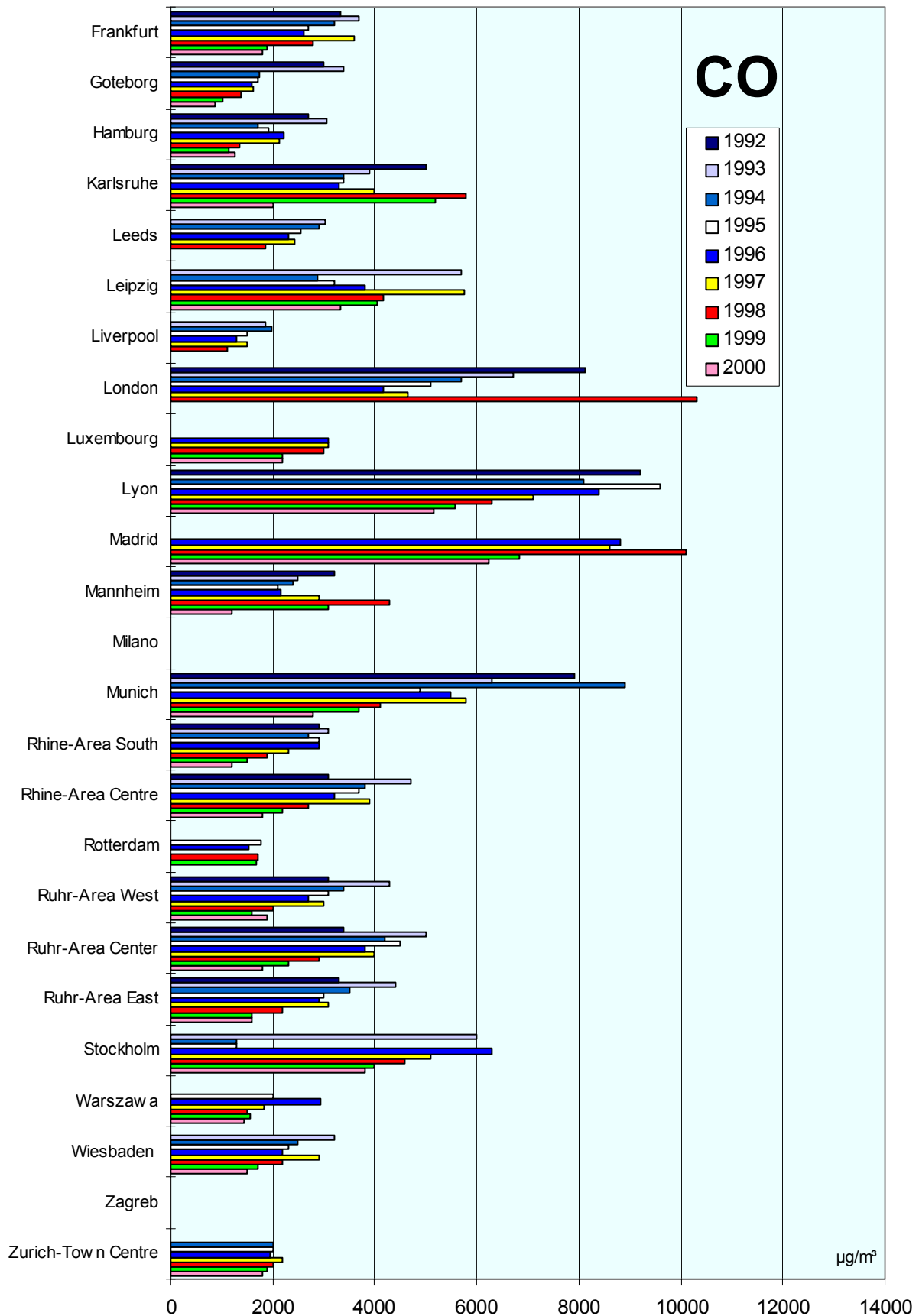
Comparison of The Air Quality 1992 - 2000 Max. 98-Percentile (peak stressed monitoring station)



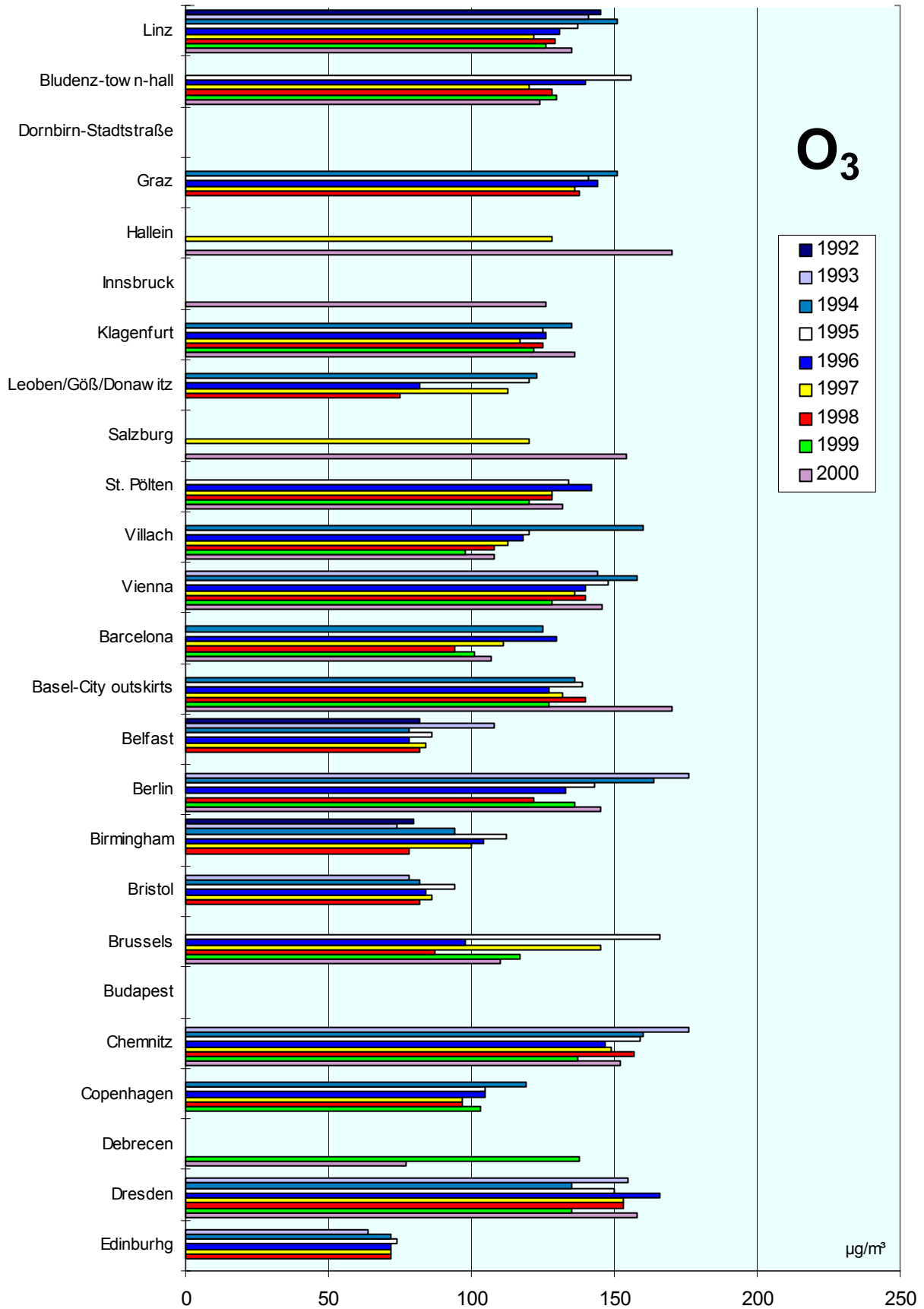
Comparison of The Air Quality 1992 - 2000 Max. 98-Percentile (peak stressed monitoring station)



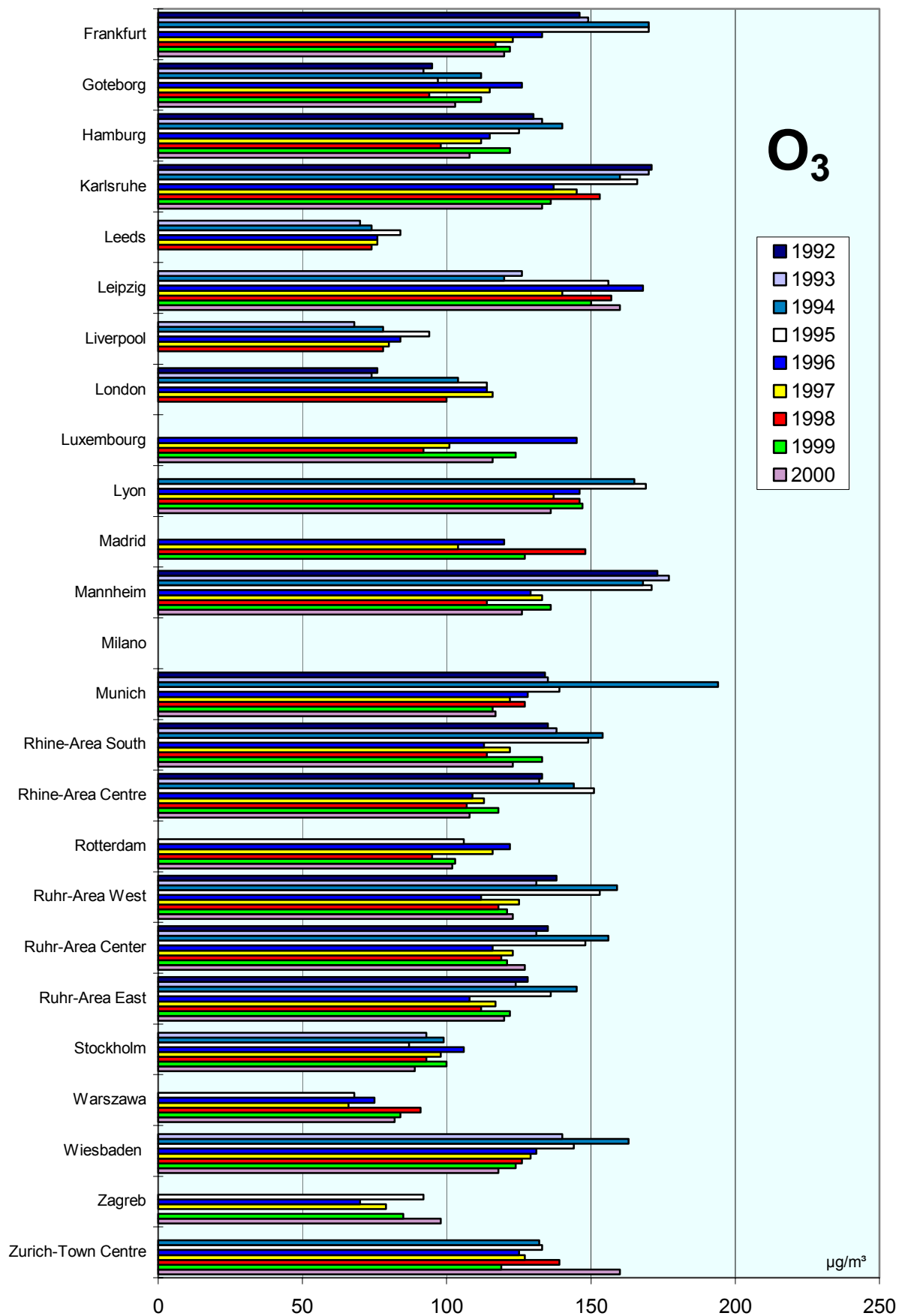
Comparison of The Air Quality 1992 - 2000 Max. 98-Percentile (peak-stressed monitoring station)



Comparison of The Air Quality 1992 - 2000 Max. 98-Percentile (peak stressed monitoring station)



Comparison of The Air Quality 1992 - 2000 Max. 98-Percentile (peak stresses monitoring station)



Jahresvergleich

1993 - 2000

Summe der Jahresmittelwerte SO₂, Staub, NO₂

Comparison of The Air Quality Over The Years

1993 - 2000

Sum of Annual Mean Values for SO₂, TSP ans NO₂