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Ozone measurements 1998

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EMEP Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe

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1. Introduction

Ozone is a natural constituent of the atmosphere and plays a vital role in many atmospheric processes. However, man made emissions of volatile organic compounds and nitrogen oxides have influenced the production of tropospheric ozone. The problem of photochemical oxidant formation has received increased attention during the last decades. Until the end of the 1960s the problem was basically believed to be one of the big cities and their immediate surroundings. In the 1970s, however, it was found that the problem of photochemical oxidant formation is much more wide-spread. Episodes of high concentrations of ozone occur over most part of Europe every summer (Cox et al., 1975; Guicherit and van Dop, 1977; Schjoldager et al., 1981; Grennfelt and Schjoldager, 1984). During these episodes the ozone concentrations can reach values above ambient air quality standards over large regions.

Historical records of ozone measurements in Europe and North America indicate that in the last part of the nineteenth century the values were only about half of the average surface ozone concentrations measured in the same regions during the last 10-15 years (Bojkov, 1986; Volz and Kley, 1988). Measurements over the last decades in Europe support a linear increase in ozone by 1-3% per year (Feister and Warmbt, 1987; Attmannspacher, Hartmannsgruber and Lang, 1984; Hov et al., 1986) although there are sites where the concentrations are decreasing. Ozone episodes are therefore superimposed on a background level which is slowly increasing. This change is probably controlled by changes in the emission of nitrogen oxides (NO_x) and volatile organic compounds (VOC) (Isaksen and Hov, 1987).

2. Critical levels

Ozone concentrations vary widely from region to region, with the time of year, and with time of day. Typically, high concentrations of ozone are observed in periods with anticyclonic conditions. Such episodes may lead to adverse environmental effects such as impact on human health, agricultural crops, forests and materials. National authorities and international organisations have therefore formulated critical levels for ozone.

The critical levels defined by ECE for protection of vegetation are 150 $\mu g/m^3$ for hourly mean, 60 $\mu g/m^3$ for eight-hour mean and 50 $\mu g/m^3$ for seven-hour mean (9 a.m.–4 p.m.) averaged over the growing season (April–September). According to the EU ozone directive, the threshold values for protection of vegetation are 200 $\mu g/m^3$ for hourly mean and 65 $\mu g/m^3$ for daily mean, while the threshold value for health protection is 110 $\mu g/m^3$ for eight-hour mean. In addition information should be given to the population when hourly means exceed 180 $\mu g/m^3$ and a warning should be issued if hourly means exceed 360 $\mu g/m^3$.

The critical level formulated by WHO for protection of health is 120 µg/m^3 for eight-hour mean.

In defining the harmful effects of ozone exposure to plants, attention must be given to the physiological response to ozone. Ozone is generally taken up through the stomata, and reacts with a number of enzymes and antioxidants. Several studies have shown that plants respond by reduced carbon dioxide uptake, and other symptoms of damage to the respiration system, for ozone exposure above a certain threshold (e.g. Forberg et al., 1987). This concentration threshold varies between plant species, cultivars, and phenological development.

Previously recommended critical levels for ozone based on seven-hour mean concentrations in the growing season do not take into account the existence of such a threshold, and have been criticised because the effects on vegetation of a generally high concentration level of ozone may be less harmful than the exposure to short-term and episodic high concentrations, which may cause permanent damage to the cell tissue.

Within the framework of the UN-ECE Convention on long-range transboundary air pollution, workshops held at Egham, UK (Ashmore and Wilson, 1992) and at Bern, Switzerland (Führer and Achermann, 1994) have recommended that critical levels for ozone exposure should be based on the accumulated exposure in ppb hours over a concentration threshold during the growing season (AOT). The Egham workshop was not able to decide conclusively on the threshold concentration or the accumulated dose corresponding to the critical loads, but the Bern workshop made specific recommendations to use a threshold of 40 ppb. The critical levels were revised at a UN-ECE workshop in Kuopio, Finland (Kärenlampi and Skärby, 1996) with minor changes to the Bern recommendations and are defined as:

- Critical level for agricultural crops: The AOT40 for crops is calculated as an accumulated ozone exposure above a threshold of 40 ppb for a period of three months during daylight hours, defined as those hours the mean global radiation is 50 W/m^2 or greater. The AOT40 value for comparison with the critical level should be calculated as the highest running three months sum during the period when crops are grown. If a fixed period is required for modelling assessment the period May to July should be used. Data from open-top chamber experiments indicate that an AOT40 of 3000 ppbh corresponds to a 5% yield loss for wheat. This value is only applicable when soil moisture is not limiting because of sufficient precipitation or irrigation.

  Short term critical level for crops: The critical levels are defined as:
  - 500 ppbh over five days for high (water) vapour pressure deficit conditions
  - 200 ppbh over five days for low (water) vapour pressure deficit conditions.

  As for the long term critical level, the short term critical levels refer to daylight hours only and should not be applied when soil moisture is limiting.

- For natural vegetation, since the sensitivity of the most sensitive species is considered to be similar to that of the most sensitive crops, the same long term critical level as for agricultural crops is used.

- Critical level for forests: AOT40 of 10 000 ppbh, calculated for daylight hours only, defined as for crops, during a six months period from April to September.

Although these critical loads are based on relatively strong experimental evidence, changes in the formulations may be expected when more information is available on the response of different plants to ozone exposure. The vegetation periods above are defined as being typical of climatic conditions in northern Europe whereas other vegetation periods may be more appropriate for other areas, such as southern Europe and northern Scandinavia.

The critical levels are considered to be suitable for exceedance mapping and integrated assessment modelling, but should not be used for economic assessment of crop or biomass losses. For these purposes, it is needed to take into account different species and modifying factors such as (water) vapour pressure deficit, soil moisture content, nutritional status, altitude, other pollutants etc.

3. Measurement network

Surface ozone measurements have been a part of the EMEP extended (voluntary) measurement activities since the third phase (1 January 1984–31 December 1986). Due to the lack of funds, the systematic collection and checking of data within EMEP, did not start until 1 January 1987. The measurement of ozone data within the EMEP region was a continuation of the OECD's oxidant data collection programme OXIDATE. Ozone data from the OXIDATE project have been reported in three reports (Grennfelt and Schjoldager, 1987; Grennfelt et al., 1988 and 1989).

This is the tenth EMEP report of ozone measurements and presents surface ozone data from 1998. The report only includes statistical summaries of the data. Earlier reports present ozone data from 1985 (Feister and Pedersen, 1989), 1986 (Feister et al., 1990), 1988 (Pedersen, 1992), 1989 (Pedersen and Kvalvågnes, 1993), 1990–1992 (Hjellbrekke, 1995), 1993-1994 (Hjellbrekke, 1996), 1995 (Hjellbrekke, 1997), 1996 (Hjellbrekke, 1998) and 1997 (Hjellbrekke, 1999).

Table 1 and Figure 1 show the location of the monitoring stations reporting data from whole or part of 1998. In total 97 stations in 22 different countries reported data. EMEP also receive data from one site operated by the Commission of the European Communities in Italy. There are no reported data from Belgium from the period covered by this report, although the country has submitted ozone data in the past.

Table 1: List of EMEP ozone monitoring stations in operation 1998.

Code	Station	Country	Latitude	Longitude	Altitude (m)
AT02	Illmitz	Austria	47 46 00 N	16 46 00 E	117
AT04	St.Koloman	Austria	47 39 00 N	13 12 00 E	851
AT05	Vorhegg	Austria	46 40 40 N	12 58 20 E	1020
CH02	Payerne	Switzerland	46 49 00 N	06 57 00 E	500
CH03	Taenikon	Switzerland	47 29 00 N	08 54 00 E	540
CH04	Chaumont	Switzerland	47 03 00 N	06 59 00 E	1130
CH05	Rigi	Switzerland	47 04 00 N	08 28 00 E	1028
CZ01	Svratouch	Czech Republic	49 44 00 N	16 02 00 E	737
CZ03	Kosetice	Czech Republic	49 35 00 N	15 05 00 E	633
DE01	Westerland	Germany	54 55 32 N	08 18 35 E	12
DE02	Waldhof	Germany	52 48 08 N	10 45 34 E	73
DE03	Schauinsland	Germany	47 54 53 N	07 54 31 E	1205
DE04	Deuselbach	Germany	49 45 53 N	07 03 07 E	480
DE05	Brotjacklriegel	Germany	48 49 10 N	13 13 09 E	1016
DE07	Neuglobsow	Germany	53 09 00 N	13 02 00 E	62
DE08	Schmücke	Germany	50 39 00 N	10 46 00 E	937
DE09	Zingst	Germany	54 26 00 N	12 44 00 E	1
DE11	Hohenwestedt	Germany	54 06 00 N	09 40 00 E	75
DE12	Bassum	Germany	52 51 00 N	08 43 00 E	52
DE14	Meinerzhagen	Germany	51 07 00 N	07 38 00 E	510
DE17	Ansbach	Germany	49 18 00 N	10 34 00 E	481
DE26	Ueckermünde	Germany	53 45 00 N	14 04 00 E	1
DE31	Wiesenburg	Germany	52 07 00 N	12 28 00 E	107
DE35	Lückendorf	Germany	50 50 00 N	14 46 00 E	490
DE38	Murnauer Moos	Germany	47 39 05 N	11 12 12 E	622
DK31	Ulborg	Denmark	56 17 00 N	08 26 00 E	10
DK32	Frederiksborg	Denmark	55 58 00 N	12 20 00 E	10
EE09	Lahemaa	Estonia	59 30 00 N	25 54 00 E	32
EE11	Vilsandi	Estonia	58 23 00 N	21 49 00 E	6
ES01	San Pablo	Spain	39 32 55 N	04 21 07 W	917
ES03	Tortosa	Spain	40 49 14 N	00 29 29 E	50
ES04	Logroño	Spain	42 27 28 N	02 30 11 W	445
ES05	Noia	Spain	42 43 45 N	08 55 27 W	685
ES07	Viznar	Spain	37 14 17 N	03 32 00 W	1265
FI09	Utö	Finland	59 47 00 N	21 23 00 E	7
FI17	Virolahti	Finland	60 31 00 N	27 41 00 E	8
FI22	Oulanka	Finland	66 19 00 N	29 25 00 E	310
FI37	Ähtäri II	Finland	62 35 00 N	24 11 00 E	180
FR08	Donon	France	48 30 00 N	07 08 00 E	775
FR09	Revin	France	49 54 00 N	04 38 00 E	390
FR11	Bonnevaux	France	46 49 00 N	06 11 00 E	836
FR13	Peyrusse Vieille	France			
FR14	Montandon	France			
GB02	Eskdalemuir	United Kingdom	55 19 00 N	03 12 00 W	269
GB06	Lough Navar	United Kingdom	54 27 00 N	07 54 00 W	130
GB13	Yarner Wood	United Kingdom	50 36 00 N	03 42 00 W	119
GB14	High Muffles	United Kingdom	54 20 00 N	00 48 00 W	267
GB15	Strath Vaich	United Kingdom	57 44 00 N	04 47 00 W	270
GB31	Aston Hill	United Kingdom	52 30 00 N	03 20 00 W	370
GB32	Bottesford	United Kingdom	52 56 00 N	00 49 00 W	32
GB33	Bush	United Kingdom	55 52 00 N	03 12 00 W	180
GB34	Glazebury	United Kingdom	53 28 00 N	02 28 00 W	21
GB35	Great Dun Fell	United Kingdom	54 41 00 N	02 27 00 W	847

Table 1, cont.

Code	Station	Country	Latitude	Longitude	Altitude (m)
GB36	Harwell	United Kingdom	51 34 00 N	01 19 00 W	137
GB37	Ladybower	United Kingdom	53 20 00 N	01 45 00 W	420
GB38	Lullington Heath	United Kingdom	50 47 00 N	00 11 00 E	120
GB39	Sibton	United Kingdom	52 18 00 N	01 28 00 E	46
GB43	Narberth	United Kingdom	51 46 53 N	04 41 34 W	160
GB44	Somerton	United Kingdom	51 13 52 N	03 02 53 W	55
GB45	Wicken Fell	United Kingdom	52 17 54 N	00 17 34 W	5
HU02	K-puszta	Hungary	46 58 00 N	19 35 00 E	125
IE31	Mace Head	Ireland	53 10 00 N	09 30 00 W	15
IT01	Montelibretti	Italy	42 06 00 N	12 38 00 E	48
IT04	Ispra	Italy	45 48 00 N	08 38 00 E	209
LT15	Preila	Lithuania	55 21 00 N	21 04 00 E	5
LV10	Rucava	Latvia	56 13 00 N	21 13 00 E	18
NL09	Kollumerwaard	Netherlands	53 20 00 N	06 17 00 E	1
NL10	Vreedepeel	Netherlands	51 32 28 N	05 51 13 E	28
NO01	Birkenes	Norway	58 23 00 N	08 15 00 E	190
NO15	Tustervatn	Norway	65 50 00 N	13 55 00 E	439
NO39	Kårvatn	Norway	62 47 00 N	08 53 00 E	210
NO41	Osen	Norway	61 15 00 N	11 47 00 E	440
NO42	Zeppelinfjellet	Norway	78 54 00 N	11 53 00 E	474
NO43	Prestebakke	Norway	59 00 00 N	10 36 00 E	160
NO45	Jeløya	Norway	59 26 00 N	10 36 00 E	3
NO48	Voss	Norway	60 36 00 N	06 32 00 E	500
NO52	Sandve	Norway	59 12 00 N	05 12 00 E	15
NO55	Karasjok	Norway	69 28 00 N	25 13 00 E	333
NO56	Hurdal	Norway	60 22 00 N	11 04 00 E	300
PL02	Jarczew	Poland	51 19 00 N	21 59 00 E	180
PL03	Sniezka	Poland	50 44 00 N	15 44 00 E	1604
PL04	Leba	Poland	54 45 00 N	17 32 00 E	2
PL05	Diabla Gora	Poland	54 09 00 N	22 04 00 E	157
PT04	Monte Velho	Portugal	38 05 00 N	08 48 00 W	43
SE02	Rörvik	Sweden	57 25 00 N	11 56 00 E	10
SE11	Vavihill	Sweden	56 01 00 N	13 09 00 E	175
SE12	Aspvreten	Sweden	58 48 00 N	17 23 00 E	20
SE13	Esrange	Sweden	67 53 00 N	21 04 00 E	475
SE32	Norra Kvill	Sweden	57 49 00 N	15 34 00 E	261
SE35	Vindeln	Sweden	64 15 00 N	19 46 00 E	225
SI08	Iskrba	Slovenia	45 34 00 N	14 52 00 E	520
SI31	Zavodnje	Slovenia	46 25 43 N	15 00 12 E	770
SI32	Krvavec	Slovenia	46 17 58 N	14 32 19 E	1740
SI33	Kovk	Slovenia	46 07 43 N	15 06 50 E	600
SK02	Chopok	Slovakia	48 56 00 N	19 35 00 E	2008
SK04	Stará-Lesná	Slovakia	49 09 00 N	20 17 00 E	808
SK06	Starina	Slovakia	49 03 00 N	22 16 00 E	345

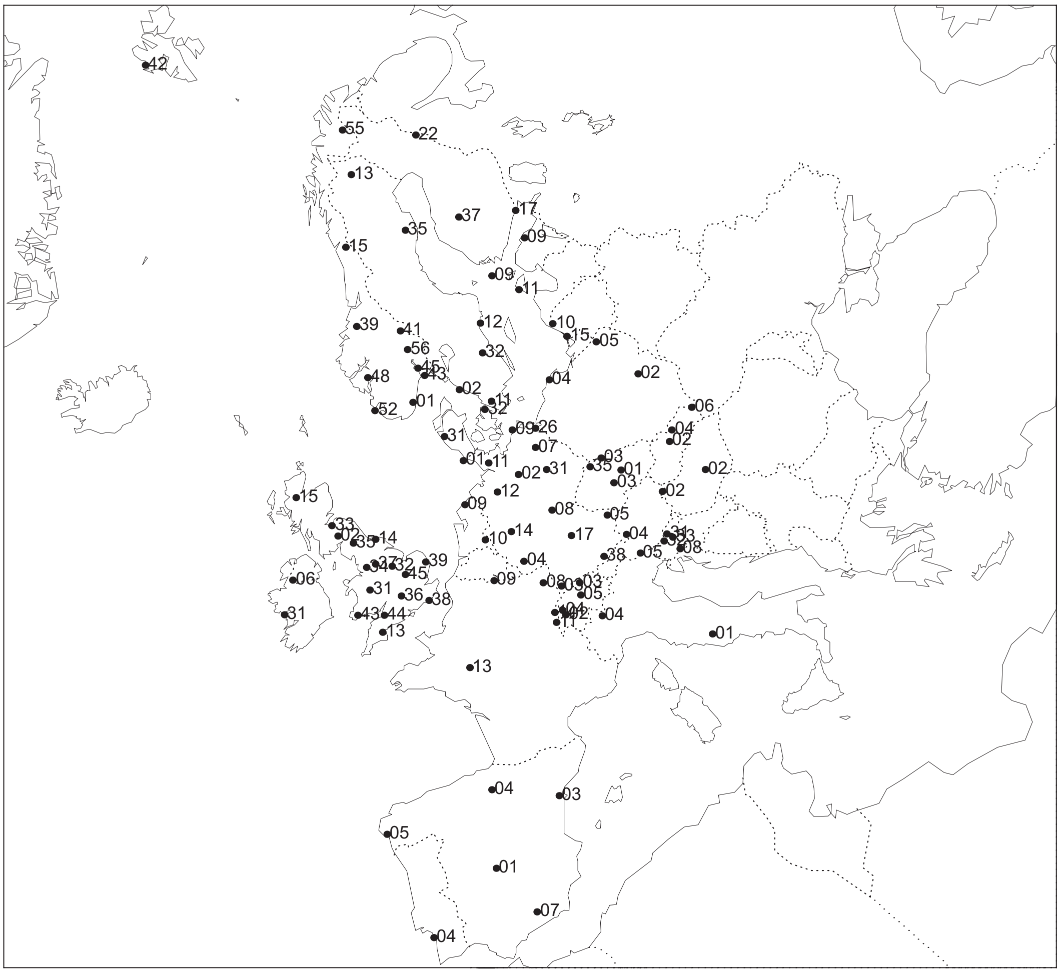

Figure 1: Location of the monitoring stations.

At Donon (FR08) the measurements are taken at four different heights above the ground:

FR08A: 8.6 m, ground level
FR08B: 17.6 m, half height of the trees
FR08C: 31.2 m, canopy of the trees
FR08D: 45.2 m, approximately 15 m above the trees

The measurements at Bonnevaux were stopped in March 1998 and replaced by a new site in the same region, Montandon (FR14). Two German sites was closed down during the summer of 1998: Meinerzhagen and Hohenwestedt. No data have been reported from Russia or Greece for 1998.

The ozone sites are situated mainly in central, western and northern Europe and the network density is insufficient in the eastern and Mediterranean parts of Europe.

The monitoring stations have been selected by the countries and only a small number of them are regular EMEP sites. No general intercalibration has been performed, nor has there been a general evaluation of the representativeness of the sites. However, information about the ozone data quality, calibration and maintenance procedures have during 2000 been collected from the participants (Aas et al., 2000).

The UV-absorption method was the only measurement method in use in 1998.

All data presented in this report are given in $\mu g/m^3$. The conversion factor used to calculate from ppb to $\mu g/m^3$ is given in Table 2. Most countries use a conversion factor of 2.0, which corresponds to 20°C and 1013 mbar. Switzerland uses the mean annual conditions at the stations (9°C and 950 mbar at Payerne, Tänikon, Rigi, Chaumont and Sion). A number of countries report ozone data in ppb, and in this case the data are converted to $\mu g/m^3$ by multiplying by 2.0 at the CCC.

Table 2: Conversion factor ppb - $\mu g/m^3$.

Country	Conversion factor
Austria	2.0
Czech Republic	2.0
Denmark	2.0
Estonia	2.14
Finland	2.0
France	2.0
Germany	2.0
Great Britain	reported in ppb
Ireland (Mace Head)	reported in ppb
Italy (Ispra)	2.0
Italy (Montelibretti)	reported in ppb
Lithuania	2.0
Netherlands	2.0
Norway	2.0
Poland	2.0
Slovakia	reported in ppb
Slovenia	2.0
Spain	2.0
Sweden	2.0
Switzerland	1.96

4. Data completeness

The data capture for each station is given in Table 3. The capture was in general good, and in 1998 as many as 75 stations had a capture above 90%. Not taking into account sites where the measurements started or ended during 1998, no sites had a capture lower than 50%.

Table 3: Data capture in per cent, 1998.

Code	Station	Data capture 1998
AT02	Illmitz	92.9
AT04	Koloman	94.3
AT05	Vorhegg	89.2
CH02	Payerne	99.1
CH03	Taenikon	98.8
CH04	Chaumont	98.7
CH05	Rigi	99.5
CZ01	Svratouch	94.7
CZ03	Kosetice	98.8
DE01	Westerland	87.3
DE02	Waldhof	95.9
DE03	Schauinsland	87.8
DE04	Deuselbach	94.1
DE05	Brotjacklriegel	96.6
DE07	Neuglobsow	96.2
DE08	Schmücke	96.7
DE09	Zingst	99.3
DE11	Hohenwestedt	46.4
DE12	Bassum	91.2
DE14	Meinerzhagen	55.2
DE17	Ansbach	95.4
DE26	Ueckermünde	93.6
DE31	Wiesenburg	91.0
DE35	Lückendorf	91.0
DE38	Murnauer Moos	97.8
DK31	Ulborg	97.2
DK32	Frederiksborg	93.3
EE09	Lahemaa	58.6
EE11	Vilsandi	96.3
ES01	San Pablo	95.3
ES03	Tortosa	93.5
ES04	Logroño	92.2
ES05	Noia	72.3
ES07	Viznar	90.2
FI09	Uto	98.3
FI17	Virolahti	96.7
FI22	Oulanka	95.7
FI37	Ahtari II	95.1
FR09	Revin	93.7
FR11	Bonnevaux	20.5
FR13	Peyrusse Vieille	88.0
FR14	Montandon	74.0
FR08A	Donon	94.9
FR08B	Donon	94.9
FR08C	Donon	95.0
FR08D	Donon	95.0
GB02	Eskdalemuir	96.3
GB06	Lough Navar	94.6
GB13	Yarner Wood	86.4
GB14	High Muffles	98.0
GB15	Strath Vaich	87.2
GB31	Aston Hill	94.1

Table 3, cont.

Code	Station	Data capture 1998
GB32	Bottesford	97.4
GB33	Bush	98.2
GB34	Glazebury	91.6
GB35	Great Dun Fell	93.4
GB36	Harwell	95.5
GB37	Ladybower	94.6
GB38	Lullington Heath	87.3
GB39	Sibton	96.5
GB43	Narberth	89.5
GB44	Somerton	95.4
GB45	Wicken Fen	95.0
HU02	K-puszta	97.8
IE31	Mace Head	97.0
IT01	Montelibretti	93.8
IT04	Ispra	100.0
LT15	Preila	96.4
LV10	Rucava	91.9
NL09	Kollumerwaard	99.6
NL10	Vredepeel	92.4
NO01	Birkenes	99.3
NO15	Tustervatn	99.8
NO39	Kaarvatn	99.4
NO41	Osen	99.9
NO42	Zeppelinfjellet	99.3
NO43	Prestebakke	99.9
NO45	Jeloya	99.9
NO48	Voss	97.0
NO52	Sandve	93.9
NO55	Karasjok	98.5
NO56	Hurdal	99.4
PL02	Jarczew	96.8
PL03	Sniezka	72.5
PL04	Leba	98.4
PL05	Diabla Gora	96.2
PT04	Monte Velho	76.1
SE02	Rorvik	98.9
SE11	Vavihill	98.8
SE12	Aspvreten	97.4
SE13	Esrange	99.5
SE32	Norra Kvill	99.8
SE35	Vindeln	99.7
SI08	Iskrba	90.1
SI31	Zavodnje	88.8
SI32	Krvavec	89.7
SI33	Kovk	87.8
SK02	Chopok	52.2
SK04	Stara-Lesna	66.3
SK06	Starina	67.9

Missing data in the measurement series may be critical, especially in summer when the highest ozone concentrations are found. In particular calculations of AOT40 values may be strongly affected by missing data, and a correction is necessary in order to obtain comparable calculations. In the mapping of AOT40, a 85% data capture has been required and an adjustment proportional to the number of missing data has been applied, i.e. exposure index divided by the fraction of data available. This correction will give a good approximation when the missing data are randomly scattered throughout the dataset, but a better correction is needed for larger gaps in the dataset. Calculations of percentiles are less sensitive to missing data, and a data capture of 75% has been regarded as sufficient for the mapping. Highly elevated sites (above 1000 m.a.s.l.) have not been included in the mapping of neither percentiles nor AOT40 values due to influence of air from the free troposphere.

5. Concentration summaries and episodes

Table 1.1 in Annex 1 shows the extreme concentrations for 1998. The number of hours and days the ozone concentrations exceed 120, 150, 200 and 240 µg/m^3 and the maxima are given. The highest hourly mean values were found at Ispra (309 µg/m^3, 24 June), Montelibretti (291 µg/m^3, 13 May) and K-puszta (255 µg/m^3, 4 August). The lowest maximum values were observed at Zeppelin-fjellet (101 µg/m^3, 15 July) and Karasjok (116 µg/m^3, 24 April).

The one hour critical level for ozone formulated by the ECE for protection of vegetation, 150 µg/m^3, was in 1998 exceeded at 63 sites. In the central parts of Europe the exceedances were considerable, and at Ispra this limit was exceeded 59 days during 1998.

Table 1.2 shows the 25-, 50-, 75-, 90-, 95-, 98- and 99-percentiles for the period April–October. The kriged estimates of the 99-percentile are shown in Figure 1.1. The lowest values are found in northern Ireland, Scotland, and at Spitzbergen, where the 99-percentile is below 110 µg/m^3. Low concentrations are also measured in Scandinavia. The concentrations are higher in central and eastern Europe, with maxima in Hungary and Switzerland/Italy where the 99-percentile reaches above 170 µg/m^3. The concentration levels on the Iberian peninsula are inconsistent, possibly due to local influence and topographical differences. A higher station density is needed for mapping purposes.

6. Calculation of AOT40

According to the workshop on critical levels for ozone in Europe, held in Kuopio, 1996, the AOT40 values for forest and agricultural crops is accumulated during daylight hours only, defined as hours with mean global radiation exceeding 50 W/m^2. Since the CCC has no access to measurements of global radiation, an algorithm estimating the radiation has been used in the calculations of AOT40. The algorithm calculates the zenith angle given time, latitude and longitude, and uses results from a radiation model (Dahlback, 1991) to estimate the visible fraction (400-700 nm) of global radiation assuming a clear sky. Comparison with measurements shows that the model gives good estimates of the solar radiation with an inaccuracy in the magnitude of a few per cent. The total global radiation is approximately 40% higher than the visible fraction, but this will have only small influence on the calculation of AOT40 except for stations far north, since the global radiation increases above 50 W/m^2 only a short time after sunrise.

AOT40 and AOT60 for forests and agricultural crops for 1998 are shown in Tables 2.1 and 2.2 in Annex 2, and the corresponding kriged estimates of AOT40 in Figures 2.1 and 2.2. The maps of AOT40 show a general increasing gradient from west to east. The lowest values are found in northern Scandinavia and in the northern parts of Ireland and the United Kingdom, while the highest values are found in Switzerland, Italy, Hungary and Slovenia. High values are also seen in Spain.

The maps show that the exceedances of the critical levels are considerable. The critical level for forests (10 000 ppbh) is exceeded in larger parts of central and Eastern Europe. Several stations in central Europe had AOT40 values above 20 000 ppbh. The critical level for agricultural crops, 3000 ppbh, was in 1998 exceeded at most stations except in Scandinavia, Ireland, United Kingdom and the Baltic states.

To give an indication of the exceedances of short-time AOT40, the number of days contained in at least one five-day period where the AOT40 exceeds the critical level of 500 ppbh in 1998 is shown in Table 2.3. The exceedances were numerous, especially in central and southern Europe, reaching 232 days at Viznar and 182 days at K-puszta during 1998. Most of the exceedances occurred in the period April-August.

7. Seasonal variation

Monthly mean concentrations for 1998 are given in Table 3.1 in Annex 3 and monthly data capture in Table 3.2. The concentrations show a clear pattern with maximum values during spring or early summer and a minimum in winter. The seasonal variations is controlled by a number of factors such as variation of average temperature and insolation rates during the year, frequency of nocturnal inversions and the concentrations of OH radicals and NO_x.

Plots of the seasonal variations 1990–1998 are given in Figure 3.1.

The seasonal variation of ozone shows characteristics which seem to be bound by the geographical location of the station (Roemer et al., 1996). In central and Alpine Europe the variation is characterised by a broad summer maximum with high monthly means from May to August. A springtime maximum in April and May followed by a gradual decline to a minimum in November-December is found for sites in England, the Netherlands and the southern parts of Scandinavia and Finland. A springtime maximum followed by a minimum in the summer is generally found in Ireland, Scotland and the northern parts of Scandinavia and Finland.

8. Diurnal variation

In addition to the seasonal variation, ozone concentrations show a variation on a shorter time scale. The diurnal variation is a well-known phenomenon described by several authors, e.g. Garland and Derwent, 1979; Calbally and Roy, 1980. The shape of the curve can give information on sources, transport and chemical formation and destruction effects at the various sites.

The average diurnal variation of surface ozone for summer (April–September) 1998 is shown in Annex 4. In general the lowest concentrations are found in early morning and the highest in the afternoon.

The most pronounced diurnal variation is found at the rural sites in central Europe e.g. sites in Switzerland, most of the German sites and Ispra in Italy. Typical for those sites is a more marked peak in the diurnal cycle with a characteristic maximum around mid-afternoon. The pronounced diurnal peak during the summer months is due to photochemical generation of ozone during daytime as a result of higher temperature and insolation during this time of the day. However, during the night, more stable atmospheric conditions and nocturnal inversions prevent the vertical mixing and the transport of ozone from the free troposphere into the boundary layer.

A weaker diurnal variation is observed at the coastal and island stations and at the remote sites in Norway and Sweden. Mace Head, situated on the west coast of Ireland, has roughly the same average concentrations as the rural sites in central Europe but almost no diurnal variation due to remoteness from source areas and prevailing westerly winds. Zeppelinfjellet at Spitzbergen is seldom influenced by anthropogenic activity, and shows no diurnal variation.

Elevated sites like Schauinsland, Chaumont and Krvavec show a weaker diurnal cycle and the average concentration level is also high, due to influence of air from the free troposphere.

9. Update

The data compiled in this report represent the best data available at present. If errors are detected, the data will be corrected in the database. It is important that users make certain they have access to the most recent version of the data. For the data presented here, the latest alteration was 18 July, 2000.

Complete data sets are available upon request to the CCC (e-mail: anne-gunn.hjellbrekke@nilu.no). Information about the EMEP network and measurement data is also available on the web at http://www.emep.int and http://www.nilu.no/projects/ccc/index.html.

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Annex 1

Concentration summaries and episodes, tables and figures

Table 1.1: Number of hours (h) and days (d) exceeding 120, 150, 200 and 240 µg/m³ and maximum concentrations in 1998.

Code	Station	Total		>120		>150		>200		>240		Max concentration	
		hours	days	hours	days	hours	days	hours	days	hours	days	µg/m³	date
AT02	Illmitz	8141	360	337	61	50	13	1	1	0	0	222	17. 8.98
AT04	Koloman	8263	362	653	65	92	14	0	0	0	0	179	12. 5.98
AT05	Vorhegg	7815	346	349	64	39	11	1	1	0	0	202	23. 7.98
CH02	Payerne	8678	365	404	62	96	19	0	0	0	0	198	13. 5.98
CH03	Taenikon	8653	363	420	70	113	26	0	0	0	0	196	12. 8.98
CH04	Chaumont	8650	365	885	73	264	27	3	1	0	0	207	13. 5.98
CH05	Rigi	8720	365	838	80	220	30	2	1	0	0	212	13. 5.98
CZ01	Svratouch	8298	348	494	55	35	5	0	0	0	0	186	18. 8.98
CZ03	Kosetice	8659	363	378	53	34	6	0	0	0	0	182	12. 8.98
DE01	Westerland	7647	328	93	19	4	2	0	0	0	0	175	21. 6.98
DE02	Waldhof	8399	359	150	23	45	10	1	1	0	0	219	11. 8.98
DE03	Schauinsland	7688	341	655	67	214	24	1	1	0	0	204	7. 8.98
DE04	Deuselbach	8246	365	449	51	127	14	2	1	0	0	208	10. 8.98
DE05	Brotjacklriegel	8458	362	758	73	123	17	0	0	0	0	199	12. 8.98
DE07	Neuglobsow	8430	365	111	24	12	5	0	0	0	0	164	21. 7.98
DE08	Schmücke	8472	365	556	59	160	19	3	1	0	0	218	12. 8.98
DE09	Zingst	8698	365	31	9	1	1	0	0	0	0	151	21. 7.98
DE11	Hohenwestedt	4066	172	28	6	0	0	0	0	0	0	148	10. 5.98
DE12	Bassum	7985	350	91	14	26	6	2	1	0	0	207	11. 8.98
DE14	Meinerzhagen	4838	211	96	14	17	5	0	0	0	0	164	12. 5.98
DE17	Ansbach	8360	365	109	21	9	3	0	0	0	0	175	12. 8.98
DE26	Ueckermünde	8195	361	82	15	5	1	1	1	0	0	203	21. 7.98
DE31	Wiesenburg	7968	347	203	29	42	9	0	0	0	0	184	20. 7.98
DE35	Lückendorf	7970	351	348	44	57	10	2	2	0	0	213	12. 8.98
DE38	Murnauer Moos	8568	362	323	51	69	13	0	0	0	0	194	12. 5.98
DK31	Ulborg	8505	358	41	8	1	1	0	0	0	0	155	21. 7.98
DK32	Frederiksborg	8170	343	34	7	2	1	0	0	0	0	153	10. 5.98

Table 1.1, cont.

Code	Station	Total		>120		>150		>200		>240		Max concentration	
		hours	days	hours	days	hours	days	hours	days	hours	days	µg/m^3	date
EE09	Lahemaa	5129	218	13	3	0	0	0	0	0	0	135	2. 5.98
EE11	Vilsandi	8436	364	106	14	2	1	0	0	0	0	155	26. 4.98
ES01	San Pablo	8350	363	423	70	1	1	0	0	0	0	151	5. 8.98
ES03	Tortosa	8188	352	23	8	0	0	0	0	0	0	137	22. 5.98
ES04	Logroño	8080	348	323	59	58	14	0	0	0	0	176	29. 6.98
ES05	Noia	6333	274	264	24	70	9	0	0	0	0	176	19. 6.98
ES07	Viznar	7898	339	1506	166	223	59	0	0	0	0	189	11. 7.98
FI09	Uto	8614	361	63	15	0	0	0	0	0	0	144	10. 6.98
FI17	Virolahti	8467	360	61	12	4	3	0	0	0	0	159	30. 4.98
FI22	Oulanka	8380	352	60	7	0	0	0	0	0	0	139	25. 4.98
FI37	AhtariIl	8333	365	66	8	18	2	0	0	0	0	169	30. 4.98
FR08A	Donon	8314	355	732	61	232	24	2	2	0	0	210	9. 8.98
FR08B	Donon	8316	355	788	65	257	25	4	2	0	0	215	9. 8.98
FR08C	Donon	8319	355	807	66	264	27	4	3	0	0	214	12. 8.98
FR08D	Donon	8319	355	826	66	275	27	10	5	0	0	212	9. 8.98
FR09	Revin	8211	345	173	22	44	7	0	0	0	0	177	11. 8.98
FR11	Bonnevaux	1798	76	2	2	0	0	0	0	0	0	128	13. 2.98
FR13	Peyrusse Vieille	7706	334	130	23	10	3	0	0	0	0	162	10. 8.98
FR14	Montandon	6482	274	196	29	18	5	0	0	0	0	170	13. 5.98
GB02	Eskdalemuir	8435	357	23	5	0	0	0	0	0	0	148	14. 5.98
GB06	Lough Navar	8284	351	3	1	0	0	0	0	0	0	132	20. 5.98
GB13	Yarner Wood	7569	327	78	9	24	6	0	0	0	0	170	19. 5.98
GB14	High Muffles	8578	362	40	9	0	0	0	0	0	0	144	13. 5.98
GB15	Strath Vaich	7641	335	9	3	0	0	0	0	0	0	144	13. 5.98
GB31	Aston Hill	8239	350	29	5	0	0	0	0	0	0	142	20. 6.98
GB32	Bottesford	8529	359	13	6	0	0	0	0	0	0	140	10. 8.98

Table 1.1, cont.

Code	Station	Total		>120		>150		>200		>240		Max concentration	
		hours	days	hours	days	hours	days	hours	days	hours	days	µg/m^3	date
GB33	Bush	8602	363	3	1	0	0	0	0	0	0	138	20. 6.98
GB34	Glazebury	8017	345	15	5	0	0	0	0	0	0	150	18. 5.98
GB35	Great Dun Fell	8183	348	21	3	1	1	0	0	0	0	158	13. 5.98
GB36	Harwell	8369	358	41	8	0	0	0	0	0	0	150	18. 5.98
GB37	Ladybower	8282	355	17	5	0	0	0	0	0	0	144	19. 5.98
GB38	Lullington Heath	7650	335	86	18	24	4	0	0	0	0	196	13. 5.98
GB39	Sibton	8448	359	28	7	2	1	0	0	0	0	162	11. 8.98
GB43	Narberth	7837	351	9	5	1	1	0	0	0	0	152	30. 8.98
GB44	Somerton	8355	354	95	14	18	7	0	0	0	0	182	20. 5.98
GB45	Wicken Fen	8312	356	24	7	8	2	0	0	0	0	192	10. 8.98
HU02	K-puszta	8567	360	1163	148	290	49	7	2	1	1	255	4. 8.98
IE31	Mace Head	8501	363	31	6	4	1	0	0	0	0	164	20. 5.98
IT01	Montelibretti	8114	352	510	114	170	57	25	21	4	4	291	13. 5.98
IT04	Ispra	8760	366	635	114	270	59	33	12	7	2	309	24. 7.98
LT15	Preila	8448	356	36	10	0	0	0	0	0	0	139	29. 4.98
LV10	Rucava	8047	343	58	12	0	0	0	0	0	0	144	11. 5.98
NL09	Kollumerwaard	8721	366	28	6	2	2	0	0	0	0	159	21. 6.98
NL10	Vredepeel	7623	353	47	13	18	4	4	1	0	0	206	11. 8.98
NO01	Birkenes	8695	365	17	7	0	0	0	0	0	0	130	27. 4.98
NO15	Tustervatn	8745	365	45	7	0	0	0	0	0	0	128	23. 4.98
NO39	Kaarvatn	8708	365	36	7	0	0	0	0	0	0	134	23. 4.98
NO41	Osen	8747	365	5	2	0	0	0	0	0	0	126	17. 5.98
NO42	Zeppelinfjellet	8687	364	0	0	0	0	0	0	0	0	101	15. 7.98
NO43	Prestebakke	8752	365	3	2	0	0	0	0	0	0	128	21. 7.98
NO45	Jeloya	8750	365	1	1	0	0	0	0	0	0	128	21. 7.98

Table 1.1, cont.

Code	Station	Total		>120		>150		>200		>240		Max concentration	
		hours	days	hours	days	hours	days	hours	days	hours	days	µg/m^3	date
NO48	Voss	8494	357	24	4	0	0	0	0	0	0	132	31. 5.98
NO52	Sandve	8228	349	4	2	0	0	0	0	0	0	128	22. 6.98
NO55	Karasjok	8630	364	0	0	0	0	0	0	0	0	116	24. 4.98
NO56	Hurdal	8710	365	4	4	0	0	0	0	0	0	130	21. 7.98
PL02	Jarczew	8484	361	164	27	4	2	0	0	0	0	158	22. 7.98
PL03	Sniezka	6348	272	530	62	46	9	0	0	0	0	192	11. 8.98
PL04	Leba	8623	364	152	22	13	7	0	0	0	0	187	11. 5.98
PL05	Diabla Gora	8431	364	147	25	9	3	0	0	0	0	159	6. 6.98
PT04	Monte Velho	6662	284	1	1	0	0	0	0	0	0	149	14. 2.98
SE02	Rorvik	8664	363	16	5	1	1	0	0	0	0	151	21. 7.98
SE11	Vavihill	8657	364	41	7	5	1	0	0	0	0	155	10. 5.98
SE12	Aspvreten	8535	360	29	6	0	0	0	0	0	0	138	10. 5.98
SE13	Esrange	8716	365	26	3	0	0	0	0	0	0	128	24. 4.98
SE32	Norra Kvill	8743	365	30	4	0	0	0	0	0	0	145	10. 5.98
SE35	Vindeln	8735	365	30	6	0	0	0	0	0	0	139	30. 4.98
SI08	Iskrba	7890	361	504	77	38	11	0	0	0	0	183	13. 8.98
SI31	Zavodnje	7781	358	483	71	29	7	0	0	0	0	164	13. 5.98
SI32	Krvavec	7857	356	1525	124	163	36	0	0	0	0	187	31. 7.98
SI33	Kovk	7692	356	81	16	19	5	0	0	0	0	168	18. 7.98
SK02	Chopok	4575	207	255	27	48	6	0	0	0	0	189	13. 8.98
SK04	Stara-Lesna	5807	254	1	1	0	0	0	0	0	0	121	30. 3.98
SK06	Starina	5947	259	11	5	0	0	0	0	0	0	136	19. 8.98

Table 1.2: Percentiles of hourly ozone values April–September 1998.

Code	Station	25%	50%	75%	90%	95%	98%	99%	Data capture
AT02	Illmitz	56.0	75.0	96.0	117.0	130.0	144.0	155.0	90.6
AT04	Koloman	78.0	96.0	111.0	127.4	140.0	151.0	161.0	93.3
AT05	Vorhegg	67.0	84.0	100.0	116.0	126.0	139.0	146.0	92.0
CH02	Payerne	49.0	72.0	94.0	117.0	133.0	151.2	162.0	98.9
CH03	Taenikon	53.0	72.0	94.0	119.0	136.0	155.0	168.4	99.4
CH04	Chaumont	81.0	96.0	113.0	138.0	155.0	169.0	180.0	99.5
CH05	Rigi	80.0	96.0	113.0	136.0	150.0	164.0	174.0	99.4
CZ01	Svratouch	68.0	84.0	102.0	123.0	132.0	141.0	148.0	89.7
CZ03	Kosetice	60.0	77.0	96.0	116.3	128.0	141.0	147.3	99.4
DE01	Westerland	66.0	78.0	89.0	100.0	110.0	122.0	130.3	92.7
DE02	Waldhof	38.0	56.0	75.0	96.0	112.0	135.0	152.9	93.5
DE03	Schauinsland	80.0	95.0	111.0	133.0	153.0	166.0	174.0	89.7
DE04	Deuselbach	63.0	79.0	97.0	122.0	139.0	164.0	175.8	93.7
DE05	Brotjacklriegel	78.0	94.0	113.0	132.0	143.0	157.0	165.0	94.9
DE07	Neuglobsow	41.0	61.0	82.0	100.0	111.0	124.0	140.0	95.4
DE08	Schmücke	69.0	86.0	104.0	127.0	145.0	163.0	171.0	95.7
DE09	Zingst	52.0	65.0	79.0	92.0	101.0	110.0	117.0	99.0
DE11	Hohenwestedt	50.0	65.0	80.0	96.0	105.0	116.1	124.0	45.4
DE12	Bassum	35.0	50.0	68.0	87.0	104.0	125.0	143.0	86.8
DE14	Meinerzhagen	43.0	59.0	76.0	97.0	112.0	129.0	145.0	63.7
DE17	Ansbach	36.0	53.0	73.0	90.0	104.0	126.0	138.0	95.7
DE26	Ueckermünde	51.0	67.0	82.0	96.0	107.1	121.0	130.6	91.9
DE31	Wiesenburg	44.0	63.0	84.0	108.0	122.0	142.0	151.2	86.1
DE35	Lückendorf	60.0	75.0	95.0	117.0	131.0	145.0	158.0	86.5
DE38	Murnauer Moos	41.0	71.0	96.0	114.0	126.0	145.0	157.0	99.9
DK31	Ulborg	56.5	68.1	79.1	90.2	99.2	109.4	119.2	99.4
DK32	Frederiksborg	42.3	58.4	72.8	85.9	93.4	104.8	115.3	97.7
EE09	Lahemaa	37.0	53.0	67.0	80.0	88.0	102.0	112.0	56.3
EE11	Vilsandi	65.0	78.0	89.2	101.0	111.0	124.0	136.0	94.4
ES01	San Pablo	85.0	96.0	111.0	120.0	128.0	137.0	140.0	94.5
ES03	Tortosa	51.0	70.0	85.0	96.0	103.0	112.0	117.0	90.4
ES04	Logroño	62.0	80.0	99.0	116.0	129.4	148.0	154.0	90.9
ES05	Noia	83.0	90.0	99.0	120.0	138.0	153.0	159.9	59.5
ES07	Viznar	97.0	113.0	124.0	141.0	151.0	160.0	166.0	98.2
FI09	Uto	68.0	78.0	89.0	100.0	109.0	118.0	122.2	99.7
FI17	Virolahti	44.0	63.0	80.0	94.0	102.0	112.0	121.5	96.9
FI22	Oulanka	50.0	63.0	81.0	96.0	103.7	118.0	124.0	91.7
FI37	Ahtari II	47.0	62.0	79.0	96.0	107.0	117.0	123.4	92.5
FR08A	Donon	72.0	87.0	107.0	136.0	153.0	171.0	181.0	94.2
FR08B	Donon	74.0	89.0	109.0	138.0	155.0	173.0	181.6	94.3
FR08C	Donon	75.0	90.0	110.0	139.0	156.0	174.0	182.0	94.3
FR08D	Donon	76.0	91.0	112.0	139.0	156.0	174.0	184.0	94.3
FR09	Revin	49.0	63.0	81.0	102.0	117.0	137.0	152.0	91.0
FR13	Peyrusse Vieille	58.0	75.0	90.0	105.0	116.0	129.0	137.0	76.6
FR14	Montandon	59.0	73.0	88.0	105.0	118.0	133.0	144.0	98.9
GB02	Eskdalemuir	46.0	58.0	70.0	82.0	90.0	100.0	108.0	95.7
GB06	Lough Navar	34.0	48.0	60.0	74.0	80.0	86.0	92.0	98.1
GB13	Yarner Wood	52.0	64.0	78.0	92.0	100.0	121.0	138.0	88.2
GB14	High Muffles	50.0	64.0	78.0	92.0	98.0	108.0	120.0	99.7
GB15	Strath Vaich	60.0	70.0	80.0	90.0	96.0	102.0	106.0	90.1
GB31	Aston Hill	54.0	64.0	76.0	88.0	94.0	108.0	116.0	90.9
GB32	Bottesford	34.0	50.0	66.0	78.0	84.0	94.0	106.0	98.4

Table 1.2, cont.

Code	Station	25%	50%	75%	90%	95%	98%	99%	Data capture
GB33	Bush	46.0	56.0	68.0	78.0	86.0	94.0	96.9	99.2
GB34	Glazebury	22.0	44.0	60.0	74.0	84.0	93.8	106.0	99.2
GB35	Great Dun Fell	36.0	44.0	56.0	64.0	70.0	83.8	104.0	98.0
GB36	Harwell	40.0	54.0	70.0	84.0	92.0	106.0	120.0	95.9
GB37	Ladybower	46.0	58.0	70.0	82.0	90.0	102.0	112.0	99.1
GB38	Lullington Heath	50.0	64.0	80.0	94.0	106.0	124.0	138.0	83.9
GB39	Sibton	40.0	58.0	74.0	88.0	96.0	110.0	116.0	96.3
GB43	Narberth	52.0	62.0	72.0	82.0	90.0	102.0	109.7	93.7
GB44	Somerton	46.0	62.0	76.0	92.0	102.0	124.0	142.0	99.5
GB45	Wicken Fen	30.0	48.0	66.0	80.0	90.0	104.0	114.0	97.4
HU02	K-puszta	68.0	91.0	120.0	143.0	157.0	168.0	175.0	96.6
IE31	Mace Head	62.0	72.0	82.0	96.0	100.0	104.0	111.2	96.5
IT01	Montelibretti	22.0	55.0	93.0	124.0	143.0	172.4	189.7	96.3
IT04	Ispra	25.0	58.0	93.0	133.0	155.0	176.2	195.1	100.0
LT15	Preila	58.0	72.0	81.0	92.0	100.0	113.0	120.0	93.6
LV10	Rucava	42.0	59.0	73.0	85.4	96.0	115.0	123.0	97.6
NL09	Kollumerwaard	38.0	56.0	71.0	83.7	91.0	102.5	110.0	99.6
NL10	Vredepeel	22.0	41.0	60.0	79.0	90.0	110.4	123.0	89.5
NO01	Birkenes	44.0	60.0	74.0	88.0	96.0	106.0	114.0	99.5
NO15	Tustervatn	54.0	66.0	82.0	99.0	106.0	115.3	121.0	99.8
NO39	Kaarvatn	37.0	59.0	78.0	97.0	107.0	115.0	120.0	99.8
NO41	Osen	41.0	58.0	76.0	89.0	96.0	106.0	111.0	100.0
NO42	Zeppelinfjellet	51.0	63.0	70.0	78.0	82.0	88.0	90.0	100.0
NO43	Prestebakke	40.0	52.0	68.0	82.0	88.0	96.0	102.0	99.9
NO45	Jeloya	48.0	60.0	74.0	86.0	92.0	98.0	102.0	99.9
NO48	Voss	42.0	59.0	78.0	94.0	104.0	112.0	116.0	94.1
NO52	Sandve	56.0	66.0	78.0	88.0	94.0	102.0	108.0	95.9
NO55	Karasjok	50.0	60.0	72.0	88.0	94.0	102.0	106.0	97.5
NO56	Hurdal	42.0	56.0	72.0	86.0	94.0	104.0	110.0	99.7
PL02	Jarczew	43.0	61.0	82.0	103.0	115.0	128.0	136.0	97.3
PL03	Sniezka	76.0	92.0	107.0	123.0	132.0	141.0	151.3	99.5
PL04	Leba	60.8	76.0	90.0	104.0	115.2	131.3	144.0	98.7
PL05	Diabla Gora	46.0	65.0	83.0	99.0	112.0	125.0	137.0	95.9
PT04	Monte Velho	16.0	26.0	37.0	47.0	51.0	59.0	64.1	96.7
SE02	Rorvik	52.0	68.0	79.0	90.0	97.0	104.0	111.0	99.6
SE11	Vavihill	49.0	62.0	76.0	89.0	98.0	111.9	120.0	98.0
SE12	Aspvreten	43.0	61.0	77.0	89.0	96.0	107.0	116.0	99.4
SE13	Esrange	46.0	58.0	73.0	94.0	103.0	113.0	117.0	99.8
SE32	Norra Kvill	47.0	60.0	75.0	89.0	96.0	107.0	114.2	99.7
SE35	Vindeln	39.0	55.0	72.0	90.0	99.0	113.0	119.0	99.7
SI08	Iskrba	27.0	74.0	104.0	123.0	132.0	143.0	150.0	89.3
SI31	Zavodnje	71.0	89.0	107.0	122.0	130.0	141.0	146.0	86.5
SI32	Krvavec	99.0	113.0	128.0	141.0	148.0	157.0	162.0	86.6
SI33	Kovk	59.0	73.0	88.0	101.0	109.0	121.0	134.0	88.8
SK02	Chopok	69.0	83.0	102.0	121.0	132.0	147.0	162.0	56.6
SK04	Stara-Lesna	26.0	46.0	62.0	77.0	83.0	92.0	98.2	36.0
SK06	Starina	34.0	52.0	69.0	84.0	93.0	108.6	117.0	40.3

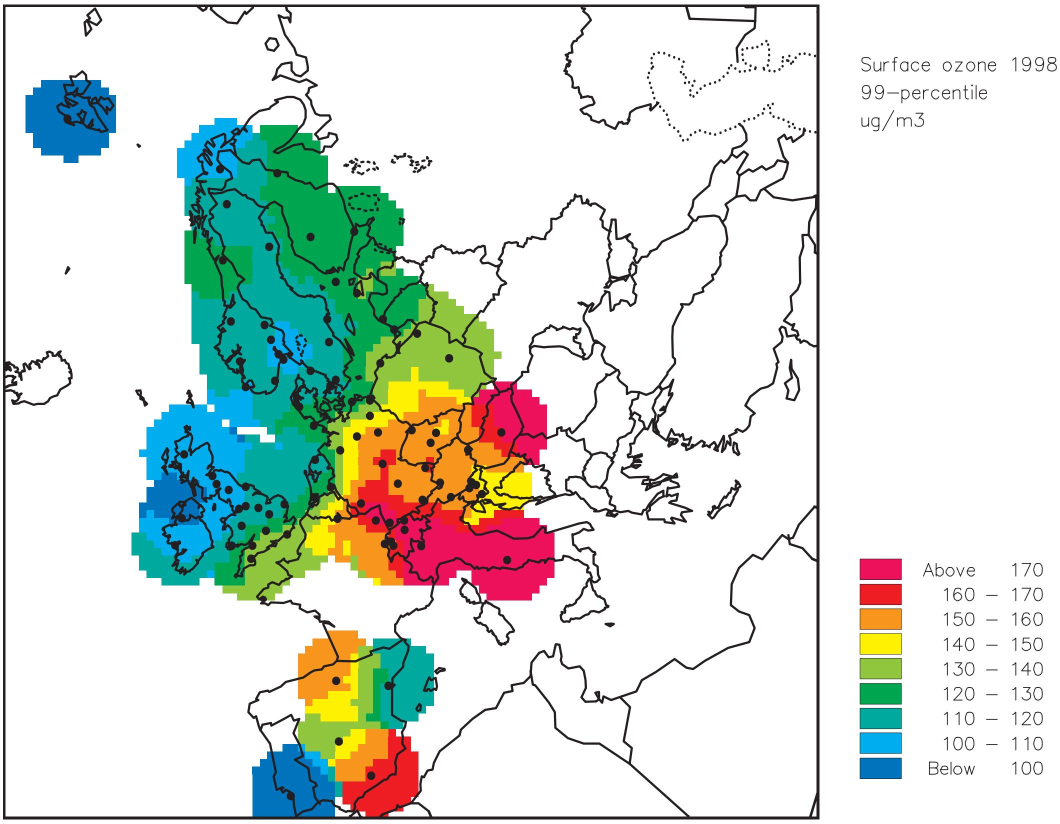


Figure 1.1: Ozone April–September 1998. 99-percentiles (µg/m³).

Annex 2

AOT40 and AOT60, figures and tables

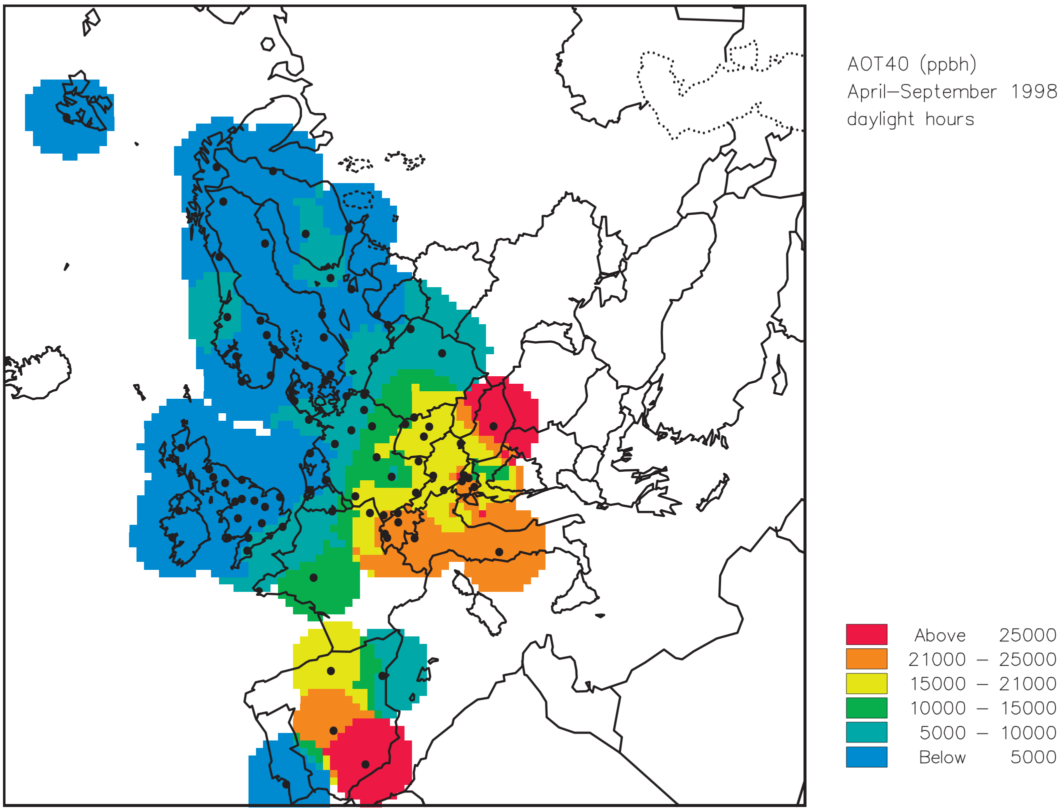


Figure 2.1: AOT40 (ppbh) April–September 1998 (daylight hours).

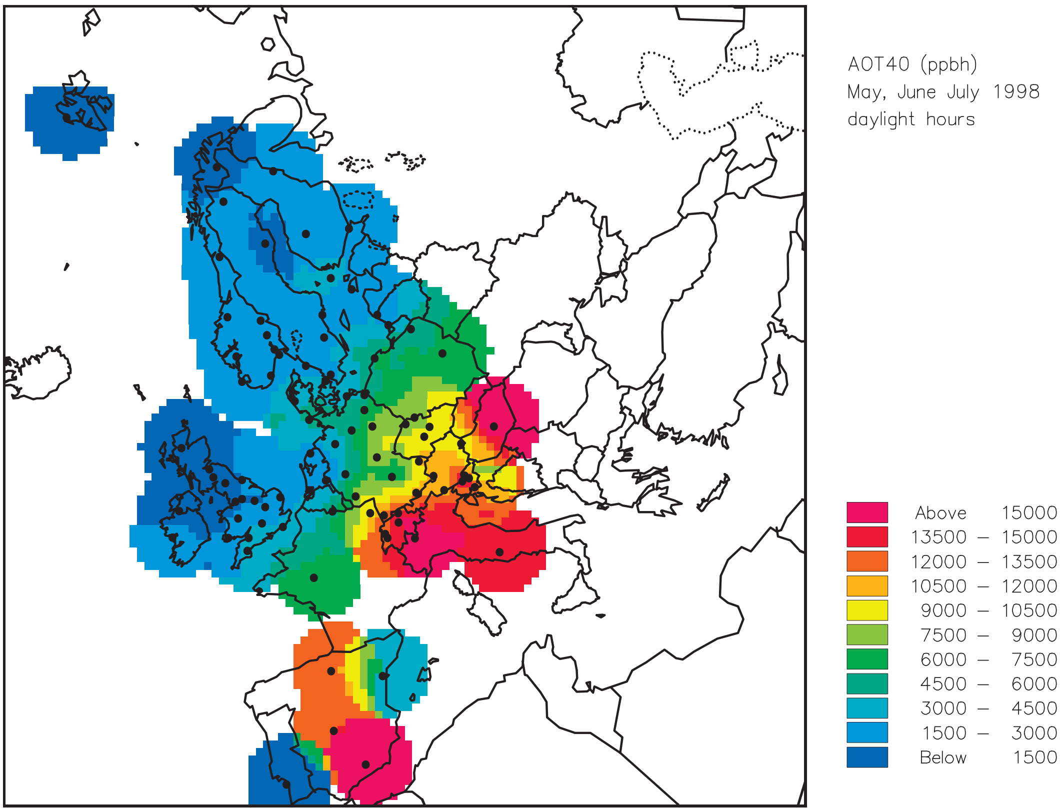


Figure 2.2: AOT40 (ppbh) May, June and July 1998 (daylight hours).

Table 2.1: AOT40 and AOT60 April–September 1998 (daylight hours).

Code	Station	AOT40	AOT40 corrected	AOT60	AOT60 corrected	Data capture
AT02	Illmitz	15136	17040	2413	2717	88.8
AT04	Koloman	17094	18778	1964	2157	91
AT05	Vorhegg	13144	14960	1080	1229	87.9
CH02	Payerne	20193	20588	4191	4272	98.1
CH03	Taenikon	21363	21650	4973	5040	98.7
CH04	Chaumont	24610	24904	5388	5452	98.8
CH05	Rigi	25452	25705	5978	6037	99
CZ01	Svratouch	15586	17349	1948	2169	89.8
CZ03	Kosetice	15968	16124	2102	2123	99
DE01	Westerland	7182	7904	244	268	90.9
DE02	Waldhof	7822	8358	1448	1548	93.6
DE03	Schauinsland	19747	22081	3933	4398	89.4
DE04	Deuselbach	15974	17175	3664	3939	93
DE05	Brotjacklriegel	19971	20969	3068	3221	95.2
DE07	Neuglobsow	9020	9496	806	849	95
DE08	Schm'cke	16432	17185	2888	3020	95.6
DE09	Zingst	4672	4718	134	135	99
DE11	Hohenwestedt	2941	6263	124	263	47
DE12	Bassum	5237	6121	1009	1179	85.6
DE14	Meinerzhagen	4233	6354	606	909	66.6
DE17	Ansbach	6236	6546	818	858	95.3
DE26	Ueckerm'nde	6442	7002	518	562	92
DE31	Wiesenburg	9705	11341	1442	1685	85.6
DE35	L'ckendorf	12470	14629	2108	2473	85.2
DE38	Murnauer Moos	17600	17626	2556	2559	99.9
DK31	Ulborg	4510	4537	171	172	99.4
DK32	Frederiksborg	2834	2902	162	165	97.6
EE09	Lahemaa	539	1000	8	15	53.9
EE11	Vilsandi	3581	3769	111	117	95
ES01	San Pablo	20234	21469	1064	1128	94.2
ES03	Tortosa	7272	7968	60	65	91.3
ES04	Logro±o	18724	20694	2322	2566	90.5
ES05	Noia	9620	16181	1067	1795	59.4
ES07	Viznar	38738	39934	8822	9094	97
FI09	Uto	6024	6059	47	47	99.4
FI17	Virolahti	4204	4407	196	205	95.4
FI22	Oulanka	4098	4564	126	140	89.8
FI37	Ahtari II	4796	5342	330	368	89.8
FR08A	Donon	16888	17855	3630	3838	94.6
FR08B	Donon	18994	20059	4320	4563	94.7
FR08C	Donon	19382	20459	4424	4670	94.7
FR08D	Donon	19884	20977	4556	4807	94.8
FR09	Revin	7911	8643	1132	1237	91.5
FR13	Peyrusse Vieille	7901	10907	617	852	72.4
FR14	Montandon	11046	11239	1330	1353	98.3
GB02	Eskdalemuir	2394	2514	94	99	95.2
GB06	Lough Navar	587	600	14	14	97.8
GB13	Yarner Wood	5144	5878	731	835	87.5
GB14	High Muffles	3908	3931	185	186	99.4
GB15	Strath Vaich	3324	3706	63	70	89.7
GB31	Aston Hill	2771	3038	81	89	91.2
GB32	Bottesford	1720	1755	57	58	98

Table 2.1, cont.

Code	Station	AOT40	AOT40 corrected	AOT60	AOT60 corrected	Data capture
GB33	Bush	1336	1344	16	16	99.4
GB34	Glazebury	1589	1608	93	94	98.8
GB35	Great Dun Fell	529	538	26	26	98.4
GB36	Harwell	3247	3393	250	261	95.7
GB37	Ladybower	2324	2356	93	94	98.7
GB38	Lullington Heath	5010	5945	664	788	84.3
GB39	Sibton	3551	3688	192	199	96.3
GB43	Narberth	1937	2099	20	22	92.3
GB44	Somerton	6025	6084	833	841	99
GB45	Wicken Fen	2719	2811	264	273	96.7
HU02	K-puszta	33136	34408	9462	9826	96.3
IE31	Mace Head	3993	4159	139	145	96
IT01	Montelibretti	1216	1262	213	221	96.3
IT04	Ispra	24630	24630	8690	8690	100
LT15	Preila	2934	3147	52	55	93.2
LV10	Rucava	3204	3293	174	178	97.3
NL09	Kollumerwaard	2716	2739	208	209	99.2
NL10	Vredepeel	3002	3376	590	663	88.9
NO01	Birkenes	3756	3776	35	35	99.5
NO15	Tustervatn	4748	4764	33	33	99.7
NO39	Kaarvatn	5608	5632	74	74	99.6
NO41	Osen	3844	3844	6	6	100
NO42	Zeppelinfjellet	163	163	0	0	99.9
NO43	Prestebakke	1804	1808	5	5	99.8
NO45	Jeloya	2195	2199	0	0	99.8
NO48	Voss	4504	4817	72	76	93.5
NO52	Sandve	2612	2720	6	6	96
NO55	Karasjok	1767	1792	0	0	98.6
NO56	Hurdal	2856	2866	2	2	99.7
PL02	Jarczew	8934	9353	784	821	95.5
PL03	Sniezka	15165	15231	873	877	99.6
PL04	Leba	9390	9631	920	944	97.5
PL05	Diabla Gora	7378	7611	610	630	96.9
PT04	Monte Velho	31	32	0	0	96.9
SE02	Rorvik	3910	3936	86	87	99.3
SE11	Vavihill	3908	3989	198	202	98
SE12	Aspvreten	3520	3541	45	45	99.4
SE13	Esrange	3430	3438	28	29	99.8
SE32	Norra Kvill	3213	3230	155	156	99.5
SE35	Vindeln	3711	3718	94	95	99.8
SI08	Iskrba	19923	21342	2447	2621	93.3
SI31	Zavodnje	15314	17427	1308	1488	87.9
SI32	Krvavec	29852	33405	4432	4960	89.4
SI33	Kovk	6510	6805	321	336	95.7
SK02	Chopok	6778	12312	758	1378	55.1
SK04	Stara-Lesna	364	1014	0	0	36
SK06	Starina	1454	3727	32	83	39

Table 2.2: AOT40 and AOT60 May–July 1997 (daylight hours).

Code	Station	AOT40	AOT40 corrected	AOT60	AOT60 corrected	Data capture
AT02	Illmitz	7449	9013	901	1090	82.7
AT04	Koloman	10099	11239	1076	1198	89.9
AT05	Vorhegg	8920	10498	886	1043	85
CH02	Payerne	12128	12374	2200	2245	98
CH03	Taenikon	13444	13580	2838	2866	99
CH04	Chaumont	14375	14573	2922	2963	98.6
CH05	Rigi	15521	15621	3475	3497	99.4
CZ01	Svratouch	9622	9690	905	911	99.3
CZ03	Kosetice	8763	8794	928	932	99.6
DE01	Westerland	5497	6322	228	263	87
DE02	Waldhof	5374	5691	730	774	94.4
DE03	Schauinsland	11388	13303	2225	2599	85.6
DE04	Deuselbach	9069	9806	1908	2064	92.5
DE05	Brotjacklriegel	11048	11838	1438	1541	93.3
DE07	Neuglobsow	6652	6949	682	712	95.7
DE08	Schmücke	9817	10306	1734	1820	95.3
DE09	Zingst	3662	3672	126	126	99.7
DE11	Hohenwestedt	2405	4144	115	198	58
DE12	Bassum	2960	3769	384	488	78.5
DE14	Meinerzhagen	3971	4159	598	626	95.5
DE17	Ansbach	3350	3503	503	526	95.6
DE26	Ueckermünde	4432	4608	418	435	96.2
DE31	Wiesenburg	7359	8458	1308	1504	87
DE35	Lückendorf	6472	8282	899	1150	78.1
DE38	Murnauer Moos	10986	10986	1556	1556	100
DK31	Ulborg	3451	3464	155	155	99.6
DK32	Frederiksborg	2297	2297	140	140	100
EE09	Lahemaa	537	1145	8	17	46.9
EE11	Vilsandi	1885	2009	14	14	93.8
ES01	San Pablo	12064	13013	755	814	92.7
ES03	Tortosa	4179	4412	56	60	94.7
ES04	Logroño	12666	13078	1810	1868	96.8
ES05	Noia	7558	10955	1066	1546	69
ES07	Viznar	23056	23607	5988	6132	97.7
FI09	Uto	3865	3905	28	28	99
FI17	Virolahti	2532	2612	85	88	96.9
FI22	Oulanka	1719	2068	0	0	83.1
FI37	Ahtari II	1599	1848	6	6	86.5
FR08A	Donon	9810	10056	1978	2027	97.6
FR08B	Donon	11060	11326	2372	2429	97.6
FR08C	Donon	11263	11513	2423	2477	97.8
FR08D	Donon	11500	11756	2500	2555	97.8
FR09	Revin	5240	5260	837	840	99.6
FR13	Peyrusse Vieille	3069	6010	93	182	51.1
FR14	Montandon	6358	6440	734	743	98.7
GB02	Eskdalemuir	1626	1777	94	103	91.5
GB06	Lough Navar	434	451	14	15	96.3
GB13	Yarner Wood	3148	3883	678	836	81.1
GB14	High Muffles	2359	2377	169	170	99.2
GB15	Strath Vaich	1088	1310	43	52	83.1
GB31	Aston Hill	1849	1963	81	86	94.2

Table 2.2, cont.

Code	Station	AOT40	AOT40 corrected	AOT60	AOT60 corrected	Data capture
GB32	Bottesford	1071	1085	17	17	98.7
GB33	Bush	691	695	16	16	99.4
GB34	Glazebury	1191	1203	87	88	99
GB35	Great Dun Fell	528	532	26	26	99.3
GB36	Harwell	2165	2233	206	213	96.9
GB37	Ladybower	1629	1655	93	94	98.4
GB38	Lullington Heath	3495	3672	461	484	95.2
GB39	Sibton	2291	2410	82	86	95
GB43	Narberth	1092	1191	17	19	91.7
GB44	Somerton	3874	3905	688	694	99.2
GB45	Wicken Fen	1498	1580	33	35	94.8
HU02	K-puszta	17944	19053	4930	5235	94.2
IE31	Mace Head	1973	2042	139	144	96.6
IT01	Montelibretti	880	909	124	128	96.8
IT04	Ispra	17511	17511	7013	7013	100
LT15	Preila	2008	2283	20	23	88
LV10	Rucava	1960	2005	88	90	97.7
NL09	Kollumerwaard	1811	1832	120	121	98.8
NL10	Vredepeel	1490	1814	166	202	82.2
NO01	Birkenes	2900	2902	30	30	99.9
NO15	Tustervatn	1926	1930	0	1	99.8
NO39	Kaarvatn	2503	2520	6	6	99.3
NO41	Osen	2472	2472	6	6	100
NO42	Zeppelinfjellet	115	115	0	0	99.9
NO43	Prestebakke	1362	1362	0	0	100
NO45	Jeloya	1800	1803	0	0	99.8
NO48	Voss	2502	2817	72	80	88.8
NO52	Sandve	1562	1566	6	6	99.7
NO55	Karasjok	747	749	0	0	99.8
NO56	Hurdal	2154	2158	2	2	99.8
PL02	Jarczew	6185	6376	583	601	97
PL03	Sniezka	8602	8610	365	365	99.9
PL04	Leba	6823	6870	622	626	99.3
PL05	Diabla Gora	5449	5659	545	566	96.3
PT04	Monte Velho	0	0	0	0	95.2
SE02	Rorvik	3147	3172	56	56	99.2
SE11	Vavihill	2650	2750	145	150	96.4
SE12	Aspvreten	2433	2458	6	6	99
SE13	Esrange	1756	1761	9	9	99.7
SE32	Norra Kvill	2256	2264	74	75	99.7
SE35	Vindeln	1212	1216	0	0	99.7
SI08	Iskrba	11092	12243	1352	1492	90.6
SI31	Zavodnje	9120	10995	776	936	82.9
SI32	Krvavec	18097	20348	2917	3280	88.9
SI33	Kovk	5202	5417	311	324	96
SK02	Chopok	1604	3924	26	65	40.9
SK04	Stara-Lesna	66	325	0	0	20.5
SK06	Starina	154	662	0	0	23.3

Table 2.3: Number of days in 1998 contained in at least one five-day period with short-time AOT40 exceeding the critical level of 500 ppbh.

Code	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
AT02	Illmitz	0	0	3	25	28	10	13	23	0	0	0	0	102
AT04	Koloman	0	0	8	30	31	24	9	18	0	0	0	0	120
AT05	Vorhegg	0	0	7	13	24	15	26	13	0	0	0	0	98
CH02	Payerne	0	0	7	3	28	15	23	25	4	0	0	0	105
CH03	Taenikon	0	0	6	12	29	27	21	21	0	0	0	0	116
CH04	Chaumont	0	0	8	16	31	24	23	25	4	0	0	0	131
CH05	Rigi	0	0	8	17	31	26	25	21	0	0	0	0	128
CZ01	Svratouch	0	0	9	10	30	19	13	21	0	0	0	0	102
CZ03	Kosetice	0	0	9	15	29	11	12	20	0	0	0	0	96
DE01	Westerland	0	0	0	0	11	6	0	0	0	0	0	0	17
DE02	Waldhof	0	0	0	0	16	7	9	11	0	0	0	0	43
DE03	Schauinsland	0	0	8	12	19	23	21	21	0	0	0	0	104
DE04	Deuselbach	0	0	5	7	20	17	14	20	0	0	0	0	83
DE05	Brotjacklriegel	0	0	4	22	29	25	15	22	0	0	0	0	117
DE07	Neuglobsow	0	0	0	0	25	10	10	5	0	0	0	0	50
DE08	Schmücke	0	0	0	8	26	17	13	20	0	0	0	0	84
DE09	Zingst	0	0	0	0	11	5	6	0	0	0	0	0	22
DE11	Hohenwestedt	0	0	0	0	14	0	0	0	0	0	0	0	14
DE12	Bassum	0	0	0	0	13	0	0	11	0	0	0	0	24
DE14	Meinerzhagen	0	0	0	0	11	0	7	0	0	0	0	0	18
DE17	Ansbach	0	0	0	0	13	0	0	16	0	0	0	0	29
DE26	Ueckermünde	0	0	0	0	14	2	9	0	0	0	0	0	25
DE31	Wiesenburg	0	0	0	0	18	10	13	9	0	0	0	0	50
DE35	Lückendorf	0	0	0	8	22	2	13	22	0	0	0	0	67
DE38	Murnauer Moos	0	0	7	25	29	24	9	19	0	0	0	0	113
DK31	Ulborg	0	0	0	0	6	0	0	0	0	0	0	0	6
DK32	Frederiksborg	0	0	0	0	0	0	0	0	0	0	0	0	0
EE09	Lahemaa	0	0	0	0	0	0	0	0	0	0	0	0	0
EE11	Vilsandi	0	0	0	7	4	0	0	0	0	0	0	0	11
ES01	San Pablo	0	0	16	11	25	18	31	31	1	0	0	0	133
ES03	Tortosa	0	0	5	10	20	0	0	0	0	0	0	0	35
ES04	Logroño	0	0	13	6	28	25	29	18	2	0	0	0	121
ES05	Noia	0	0	0	0	22	12	7	0	0	0	0	0	41
ES07	Viznar	0	4	31	29	31	30	31	31	26	19	0	0	232
FI09	Uto	0	0	0	7	3	8	0	0	0	0	0	0	18
FI17	Virolahti	0	0	0	6	4	0	0	0	0	0	0	0	10
FI22	Oulanka	0	0	0	15	6	0	0	0	0	0	0	0	21
FI37	Ahtari II	0	0	0	24	11	0	0	0	0	0	0	0	35
FR08A	Donon	0	0	6	8	21	19	11	20	0	0	0	0	85
FR08B	Donon	0	0	7	9	26	21	12	21	0	0	0	0	96
FR08C	Donon	0	0	7	9	26	22	12	21	0	0	0	0	97
FR08D	Donon	0	0	7	11	28	22	13	22	0	0	0	0	103
FR09	Revin	0	0	0	0	18	0	0	15	0	0	0	0	33
FR11	Bonnevaux	0	0	0	0	0	0	0	0	0	0	0	0	0
FR13	Peyrusse Vieill	0	0	5	0	7	0	8	19	1	0	0	0	40
FR14	Montandon	0	0	0	0	21	5	9	18	0	0	0	0	53
GB02	Eskdalemuir	0	0	0	0	9	0	0	0	0	0	0	0	9
GB06	Lough Navar	0	0	0	0	0	0	0	0	0	0	0	0	0
GB13	Yarner Wood	0	0	0	0	14	2	0	0	0	0	0	0	16
GB14	High Muffles	0	0	0	0	11	0	0	0	0	0	0	0	11
GB15	Strath Vaich	0	0	0	7	0	0	0	0	0	0	0	0	7
GB31	Aston Hill	0	0	0	0	9	0	0	0	0	0	0	0	9
GB32	Bottesford	0	0	0	0	5	0	0	0	0	0	0	0	5
GB33	Bush	0	0	0	0	0	0	0	0	0	0	0	0	0
GB34	Glazebury	0	0	0	0	8	0	0	0	0	0	0	0	8
GB35	Great Dun Fell	0	0	0	0	0	0	0	0	0	0	0	0	0
GB36	Harwell	0	0	0	0	9	0	0	0	0	0	0	0	9

Table 2.3, cont.

Code	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
GB37	Ladybower	0	0	0	0	10	0	0	0	0	0	0	0	10
GB38	Lullington Heat	0	0	0	0	19	2	0	8	0	0	0	0	29
GB39	Sibton	0	0	0	0	7	0	0	0	0	0	0	0	7
GB43	Narberth	0	0	0	0	5	0	0	0	0	0	0	0	5
GB44	Somerton	0	0	0	0	18	2	0	0	0	0	0	0	20
GB45	Wicken Fen	0	0	0	0	7	0	0	8	0	0	0	0	15
HU02	K-puszta	0	6	17	30	31	30	29	31	8	0	0	0	182
IE31	Mace Head	0	0	0	5	7	0	0	0	0	0	0	0	12
IT01	Montelibretti	0	0	7	13	25	26	31	29	13	0	0	0	144
IT04	Ispra	0	0	7	17	24	18	31	30	1	0	0	0	128
LT15	Preila	0	0	0	6	2	0	0	0	0	0	0	0	8
LV10	Rucava	0	0	0	8	3	0	0	0	0	0	0	0	11
NL09	Kollumerwaard	0	0	0	0	0	0	0	0	0	0	0	0	0
NL10	Vredepeel	0	0	0	0	0	0	0	9	0	0	0	0	9
NO01	Birkenes	0	0	0	0	16	0	0	0	0	0	0	0	16
NO15	Tustervatn	0	0	0	17	8	0	0	0	0	0	0	0	25
NO39	Kaarvatn	0	0	0	22	17	0	0	0	0	0	0	0	39
NO41	Osen	0	0	0	5	9	0	0	0	0	0	0	0	14
NO42	Zeppelinfjellet	0	0	0	0	0	0	0	0	0	0	0	0	0
NO43	Prestebakke	0	0	0	0	0	0	0	0	0	0	0	0	0
NO45	Jeloya	0	0	0	0	0	0	0	0	0	0	0	0	0
NO48	Voss	0	0	0	7	16	3	0	0	0	0	0	0	26
NO52	Sandve	0	0	0	0	7	0	0	0	0	0	0	0	7
NO55	Karasjok	0	0	0	7	0	0	0	0	0	0	0	0	7
NO56	Hurdal	0	0	0	0	8	0	0	0	0	0	0	0	8
PL02	Jarczew	0	0	0	8	17	10	10	0	0	0	0	0	45
PL03	Sniezka	0	0	0	22	23	14	15	14	0	0	0	0	88
PL04	Leba	0	0	0	8	29	14	7	0	0	0	0	0	58
PL05	Diabla Gora	0	0	9	10	17	10	5	0	0	0	0	0	51
PT04	Monte Velho	0	0	0	0	0	0	0	0	0	0	0	0	0
SE02	Rorvik	0	0	0	0	7	0	0	0	0	0	0	0	7
SE11	Vavihill	0	0	0	3	9	0	0	0	0	0	0	0	12
SE12	Aspvreten	0	0	0	5	3	0	0	0	0	0	0	0	8
SE13	Esrange	0	0	0	11	15	0	0	0	0	0	0	0	26
SE32	Norra Kvill	0	0	0	5	9	0	0	0	0	0	0	0	14
SE35	Vindeln	0	0	0	17	4	0	0	0	0	0	0	0	21
SI08	Iskrba	0	0	8	29	23	23	31	26	4	0	0	0	144
SI31	Zavodnje	0	0	6	25	24	16	12	15	0	0	0	0	98
SI32	Krvavec	0	7	9	30	31	30	29	26	6	0	0	0	168
SI33	Kovk	0	0	0	0	0	13	12	0	0	0	0	0	25
SK02	Chopok	0	0	0	7	1	0	13	23	0	0	0	0	44
SK04	Stara-Lesna	0	0	0	0	0	0	0	0	0	0	0	0	0
SK06	Starina	0	0	0	0	0	0	0	7	0	0	0	0	7

Annex 3

Seasonal variation

Table 3.1: Monthly mean concentrations 1998 ($\mu g/m^3$).

Code	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AT02	Illmitz	34.1	55.3	68.9	85.6	85.7	80.2	69.4	83.8	58.7	41.8	29.5	35.0
AT04	Koloman	63.1	76.2	86.3	104.8	110.2	99.6	88.2	98.2	72.0	60.2	61.0	70.2
AT05	Vorhegg	52.6	74.4	84.5	88.9	95.0	87.1	93.2	79.5	63.8	61.0	50.5	64.1
CH02	Payerne	32.9	33.1	57.7	71.5	84.4	71.4	72.8	81.6	53.0	42.3	30.6	24.0
CH03	Taenikon	37.3	34.6	58.5	73.4	87.5	79.4	76.3	81.2	50.6	45.6	35.5	34.5
CH04	Chaumont	66.3	84.1	87.1	95.4	117.0	97.8	93.5	113.2	81.9	65.9	65.3	70.3
CH05	Rigi	61.4	78.6	80.6	97.6	113.0	101.2	94.2	106.4	77.8	65.3	66.8	70.8
CZ01	Svratouch	52.1	70.0	81.2	-	97.4	89.4	80.5	93.8	68.7	51.4	49.3	51.3
CZ03	Kosetice	47.9	65.5	74.8	85.2	90.6	80.4	74.4	87.3	59.6	46.1	44.2	49.7
DE01	Westerland	49.0	56.0	-	71.5	88.2	87.8	80.8	77.2	61.1	65.4	37.8	47.3
DE02	Waldhof	37.6	39.3	55.9	56.0	74.3	60.2	56.6	64.0	39.6	44.5	21.4	33.6
DE03	Schauinsland	-	86.7	85.3	97.1	118.3	99.9	89.0	108.4	80.9	65.9	65.8	72.5
DE04	Deuselbach	54.1	62.2	70.6	81.7	95.3	84.9	74.3	94.4	67.8	49.3	40.1	48.3
DE05	Brotjacklriegel	59.5	68.2	77.1	95.0	106.7	100.0	88.7	108.9	80.8	58.7	54.0	58.3
DE07	Neuglobsow	37.9	41.6	64.0	60.3	78.1	66.3	62.5	62.3	41.9	43.6	28.1	33.5
DE08	Schmücke	54.5	59.1	74.9	87.1	104.5	91.7	79.8	98.5	73.5	49.5	42.0	50.2
DE09	Zingst	42.9	46.0	66.8	66.5	79.2	72.9	64.4	58.9	53.9	50.3	35.3	34.9
DE11	Hohenwestedt	37.3	39.9	60.6	58.6	73.9	63.3	-	-	-	-	-	-
DE12	Bassum	34.9	34.1	53.4	52.6	68.8	51.0	54.4	57.2	38.3	38.6	21.4	32.8
DE14	Meinerzhagen	41.3	40.8	53.5	57.2	73.9	62.4	53.2	-	-	-	-	-
DE17	Ansbach	28.8	31.8	49.8	57.7	66.4	52.2	50.4	64.6	40.0	31.2	25.2	26.8
DE26	Ueckermünde	43.2	47.7	65.2	71.1	80.0	72.5	64.0	59.8	53.6	52.1	34.0	41.5
DE31	Wiesenburg	33.5	39.5	52.8	63.0	88.1	71.4	67.0	69.7	46.5	38.3	22.8	31.0
DE35	Lückendorf	36.8	55.1	71.7	83.0	90.6	78.7	75.4	89.2	58.0	41.5	35.3	40.5
DE38	Murnauer Moos	33.1	38.3	64.3	79.1	79.6	74.9	68.7	65.2	46.8	40.4	37.9	49.2

Table 3.1, cont.

Code	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DK31	Ulborg	48.9	60.8	71.2	67.1	80.8	75.2	65.9	64.4	56.2	61.4	34.6	46.2
DK32	Frederiksborg	34.3	41.4	62.6	59.9	73.5	61.7	53.6	52.6	43.2	48.1	32.8	29.8
EE09	Lahemaa	51.2	-	-	-	65.8	-	-	43.1	43.1	46.2	42.6	49.9
EE11	Vilsandi	52.4	67.8	83.4	82.8	83.0	68.4	81.6	73.0	74.9	70.5	56.9	64.0
ES01	San Pablo	68.0	78.6	97.3	91.6	98.5	95.5	108.4	105.4	80.6	79.1	59.0	59.0
ES03	Tortosa	42.2	44.7	64.9	76.8	78.0	65.5	62.6	60.4	59.7	55.0	47.2	32.1
ES04	Logroño	53.0	53.1	75.6	79.0	97.3	83.2	82.4	86.5	59.1	49.7	42.2	40.1
ES05	Noia	66.0	77.2	82.9	87.2	102.7	91.8	-	-	-	92.0	88.5	87.7
ES07	Viznar	-	91.5	110.2	101.4	109.4	111.8	127.0	119.2	99.4	96.2	77.5	86.5
FI09	Uto	55.6	70.1	81.2	87.7	82.7	79.2	79.1	68.9	72.4	67.1	60.7	65.7
FI17	Virolahti	47.4	59.2	70.5	79.8	68.6	64.1	61.2	46.8	48.7	50.5	46.7	50.4
FI22	Oulanka	56.6	74.5	80.5	90.6	88.9	61.5	59.5	51.4	53.0	49.2	51.6	64.7
FI37	Ahtari II	50.6	69.3	81.7	91.5	72.7	63.1	58.6	44.3	52.2	52.0	45.2	49.1
FR08A	Donon	57.1	71.7	75.2	89.0	108.2	92.3	81.5	108.8	75.0	57.0	55.0	57.5
FR08B	Donon	57.7	72.7	76.9	90.5	109.8	94.9	84.0	111.5	76.4	58.1	55.9	58.3
FR08C	Donon	58.0	73.3	77.6	91.3	110.6	96.0	85.1	112.8	76.9	58.8	56.9	59.1
FR08D	Donon	58.2	73.9	77.7	92.3	111.6	96.8	85.8	113.7	77.8	59.1	57.8	59.5
FR09	Revin	44.5	53.7	59.2	-	84.4	66.4	57.2	69.7	56.0	39.4	32.6	27.4
FR11	Bonnevaux	54.1	61.3	71.2	-	-	-	-	-	-	-	-	-
FR13	Peyrusse Vieille	54.6	64.7	75.8	81.5	85.5	-	61.8	78.9	68.9	55.4	43.5	39.9
FR14	Montandon	-	-	-	80.7	88.2	68.7	70.4	79.6	60.7	46.9	49.2	53.5
GB02	Eskdalemuir	48.1	61.4	61.6	67.1	70.4	57.3	49.2	45.5	52.3	55.6	42.6	50.2
GB06	Lough Navar	42.4	59.1	52.5	57.5	60.1	44.3	42.1	40.7	38.0	45.5	40.7	43.4
GB13	Yarner Wood	56.4	62.1	70.1	80.4	87.8	67.2	52.8	57.3	60.1	58.6	-	56.1
GB14	High Muffles	42.6	54.8	56.3	76.7	81.7	59.8	52.7	54.0	58.1	56.8	38.4	41.9

Table 3.1, cont.

Code	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
GB15	Strath Vaich	65.7	78.3	80.4	85.3	81.3	68.2	62.1	64.2	66.4	70.6	66.8	72.1
GB31	Aston Hill	53.0	69.4	72.9	76.2	75.7	63.9	54.5	58.1	57.4	49.3	53.6	58.6
GB32	Bottesford	44.5	41.7	44.5	59.6	54.9	48.6	46.7	46.9	40.6	47.7	28.0	37.3
GB33	Bush	51.3	66.1	65.3	68.5	64.4	59.0	48.8	48.3	47.8	56.4	48.9	58.2
GB34	Glazebury	30.6	36.9	48.8	53.1	54.3	41.4	38.2	33.9	31.8	39.0	21.8	25.5
GB35	Great Dun Fell	39.7	53.2	44.6	55.8	62.4	45.6	36.0	36.2	44.8	45.3	37.5	40.7
GB36	Harwell	43.1	53.5	55.4	66.6	64.9	58.1	46.0	51.9	46.1	50.8	38.4	46.4
GB37	Ladybower	44.9	61.1	58.8	70.3	71.6	59.0	50.0	49.4	51.0	54.2	39.1	45.5
GB38	Lullington Heath	48.5	48.3	57.7	68.9	82.1	64.2	54.8	60.8	-	54.6	44.2	47.9
GB39	Sibton	44.4	36.4	51.4	63.2	71.8	54.0	48.8	57.2	49.5	49.1	33.2	37.8
GB43	Narberth	60.3	68.9	71.2	74.5	67.9	59.5	51.5	58.9	61.3	62.6	69.2	73.2
GB44	Somerton	48.5	52.6	62.8	72.6	76.5	64.8	48.3	56.1	55.3	54.5	49.1	50.5
GB45	Wicken Fen	36.8	33.9	44.2	57.1	61.3	46.9	40.9	46.5	40.1	42.1	23.2	29.7
HU02	K-puszta	52.0	79.4	94.0	100.0	97.7	97.3	95.5	104.3	71.6	49.4	38.0	47.6
IE31	Mace Head	65.7	82.6	85.7	89.4	81.6	68.8	62.7	64.2	69.4	73.3	75.3	76.7
IT01	Montelibretti	22.3	36.3	55.4	58.3	58.8	58.8	70.3	72.1	51.8	32.0	25.4	17.5
IT04	Ispra	14.5	26.8	55.4	67.4	74.0	69.9	76.5	62.3	36.4	29.6	17.8	12.7
LT15	Preila	45.0	61.7	69.7	67.7	77.2	70.4	72.8	67.5	60.3	55.5	40.8	42.3
LV10	Rucava	38.4	55.9	67.3	65.5	67.1	60.0	60.7	51.2	46.6	52.0	36.2	-
NL09	Kollumerwaard	39.0	35.8	56.0	59.2	68.6	57.2	52.8	54.3	38.3	44.4	25.0	32.4
NL10	Vredepeel	32.8	23.5	37.2	42.9	54.6	47.5	42.5	43.9	30.5	27.4	15.7	20.7
NO01	Birkenes	46.7	65.5	70.9	72.1	73.4	61.9	55.5	47.6	44.6	57.0	41.3	52.4
NO15	Tustervatn	66.7	83.3	86.3	95.8	84.1	65.3	56.0	52.6	54.5	59.9	61.1	73.2
NO39	Kaarvatn	66.5	81.8	85.8	90.2	70.3	55.7	47.1	45.9	39.8	40.6	56.6	65.2

Table 3.1, cont.

Code	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
NO41	Osen	43.5	58.4	71.5	77.0	75.4	57.6	49.5	44.0	40.5	42.0	40.2	51.8
NO42	Zeppelinfjellet	69.9	80.1	51.7	54.0	36.8	59.5	63.2	66.2	69.6	73.6	76.2	71.4
NO43	Prestebakke	40.4	54.9	65.5	65.9	68.6	53.8	50.0	42.2	41.5	43.5	30.0	45.8
NO45	Jeloya	37.6	55.0	69.9	66.1	74.4	62.3	57.6	54.6	48.7	52.2	31.8	44.4
NO48	Voss	56.8	68.1	77.4	83.6	84.5	61.5	48.8	48.4	45.3	52.1	56.4	65.5
NO52	Sandve	51.6	68.1	70.3	75.2	75.0	67.4	60.6	60.1	54.4	62.9	48.8	61.7
NO55	Karasjok	55.6	71.7	76.5	81.4	70.7	58.9	54.7	51.4	54.3	53.0	58.3	67.1
NO56	Hurdal	44.6	58.9	72.4	71.7	77.7	56.2	50.5	45.3	41.2	42.6	31.2	42.8
PL02	Jarczew	37.4	52.1	72.7	66.4	77.2	68.0	63.6	59.1	48.5	45.6	40.6	34.2
PL03	Sniezka	-	-	-	104.3	100.5	90.0	92.9	91.3	77.0	64.3	51.6	60.1
PL04	Leba	49.4	58.5	77.5	79.2	90.5	83.8	73.9	66.4	61.8	62.9	49.9	50.2
PL05	Diabla Gora	40.6	48.2	76.4	68.8	79.0	67.2	67.0	56.3	49.7	51.9	44.5	57.4
PT04	Monte Velho	29.1	34.1	40.0	37.9	35.0	24.5	21.8	23.9	18.2	-	-	-
SE02	Rorvik	41.3	56.2	70.4	65.5	73.2	70.8	67.8	60.1	51.5	57.5	35.5	43.7
SE11	Vavihill	38.0	46.4	65.8	69.4	75.8	68.4	56.8	55.8	53.1	50.9	38.0	37.6
SE12	Aspvreten	41.7	57.3	69.0	72.3	72.8	60.8	55.7	48.5	48.8	47.8	40.7	49.2
SE13	Esrange	52.9	68.1	74.1	84.3	81.3	58.7	52.4	45.4	49.2	48.6	55.5	64.4
SE32	Norra Kvill	45.6	59.3	71.5	74.1	79.3	63.8	56.7	48.4	48.0	49.5	36.5	47.1
SE35	Vindeln	50.6	64.2	71.0	85.4	71.0	54.0	48.6	38.8	37.0	36.2	38.6	51.9
SI08	Iskrba	45.9	53.0	70.8	87.8	73.6	65.7	68.8	65.8	50.5	45.4	38.9	31.5
SI31	Zavodnje	50.5	76.6	83.0	99.5	104.9	91.4	86.9	87.7	62.7	47.8	41.3	37.9
SI32	Krvavec	80.4	98.0	97.9	117.8	120.1	113.4	124.1	115.2	91.9	88.4	76.5	81.9
SI33	Kovk	41.9	58.3	60.2	70.3	77.2	79.9	87.4	71.0	54.0	44.6	41.0	47.1
SK02	Chopok	-	-	-	-	-	64.8	95.7	110.6	76.2	72.3	68.2	69.2
SK04	Stara-Lesna	38.6	50.7	68.8	-	-	-	41.7	48.5	45.7	35.7	34.2	39.8
SK06	Starina	45.8	55.5	70.5	-	-	-	50.4	59.4	48.5	44.5	44.7	52.3

Table 3.2: Monthly data capture 1998 (µg/m³).

Code	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AT02	Illmitz	95.4	95.7	94.9	95.3	95.2	75.3	87.1	95.2	95.3	94.9	95.3	95.8
AT04	Koloman	95.6	95.7	94.9	95.4	96.0	95.3	82.0	95.3	95.8	95.6	95.4	95.3
AT05	Vorhegg	95.3	95.5	67.7	95.6	94.9	76.5	94.4	94.8	95.6	94.9	70.1	95.3
CH02	Payerne	99.5	99.6	98.1	99.0	98.7	99.4	98.9	99.1	98.1	99.6	99.4	99.5
CH03	Taenikon	99.7	92.3	97.4	99.2	99.6	99.2	99.7	99.7	98.9	100.0	99.7	99.3
CH04	Chaumont	90.2	99.7	99.6	99.3	99.5	99.0	99.5	99.9	99.6	99.7	99.7	99.5
CH05	Rigi	99.9	99.7	99.5	99.3	99.7	99.4	99.9	99.9	98.1	99.7	99.9	99.6
CZ01	Svratouch	100.0	99.7	100.0	40.4	99.7	99.2	98.8	99.9	99.0	99.7	99.7	99.7
CZ03	Kosetice	96.8	100.0	99.9	99.6	99.1	100.0	100.0	98.0	100.0	93.1	100.0	100.0
DE01	Westerland	97.8	98.2	4.3	96.5	73.0	97.8	93.0	98.3	97.9	96.8	98.2	98.1
DE02	Waldhof	97.8	96.0	98.7	79.3	84.4	99.6	97.8	99.9	99.9	97.7	99.4	99.9
DE03	Schauinsland	37.4	96.4	96.0	95.8	71.4	91.0	91.9	92.5	95.8	96.1	95.6	95.0
DE04	Deuselbach	99.1	99.9	98.1	99.7	96.6	90.3	91.8	91.9	91.9	91.9	86.8	91.8
DE05	Brotjacklriegel	100.0	99.6	99.7	100.0	92.1	94.0	91.9	94.6	97.2	97.8	94.0	97.8
DE07	Neuglobsow	99.5	99.3	99.7	94.4	95.7	95.6	95.4	95.7	95.7	94.6	93.5	95.8
DE08	Schmücke	100.0	100.0	99.6	95.8	95.0	95.8	95.6	95.8	95.8	95.4	95.7	96.1
DE09	Zingst	99.1	99.7	99.7	95.6	99.5	99.9	99.7	99.5	99.9	100.0	99.2	99.9
DE11	Hohenwestedt	89.1	99.7	99.5	100.0	100.0	73.5	-	-	-	-	-	-
DE12	Bassum	95.7	95.7	95.7	96.0	82.7	88.1	65.3	95.3	93.9	96.0	94.3	96.0
DE14	Meinerzhagen	95.8	95.7	91.8	96.0	95.2	95.3	96.0	-	-	-	-	-
DE17	Ansbach	96.0	95.1	95.6	95.6	95.8	95.8	95.4	95.8	96.0	95.7	93.5	94.9
DE26	Ueckermünde	95.7	96.0	94.8	95.4	95.3	95.7	95.7	74.2	95.6	94.9	94.2	95.7
DE31	Wiesenburg	95.8	95.8	95.7	96.5	70.2	96.0	96.1	63.6	95.4	95.8	95.7	96.0
DE35	Lückendorf	95.2	95.8	95.8	95.6	94.5	55.4	82.9	95.7	94.7	95.4	95.7	94.8
DE38	Murnauer Moos	96.1	96.1	96.1	99.7	100.0	100.0	100.0	100.0	99.6	99.6	86.2	99.9

Table 3.2, cont.

Code	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DK31	Ulborg	75.3	98.8	98.9	99.2	99.5	100.0	99.5	98.7	99.6	98.7	99.4	99.2
DK32	Frederiksborg	100.0	53.6	85.8	100.0	100.0	100.0	100.0	86.7	100.0	100.0	89.9	100.0
EE09	Lahemaa	72.0	0.0	0.0	0.0	100.0	23.3	19.4	94.6	98.9	89.2	100.0	99.1
EE11	Vilsandi	98.1	98.1	98.4	98.1	96.0	91.7	92.1	91.0	97.9	99.5	95.3	99.7
ES01	San Pablo	98.1	90.9	97.3	98.8	95.0	94.9	87.5	95.2	96.0	96.0	96.9	97.0
ES03	Tortosa	98.0	96.1	91.7	99.7	97.4	99.2	85.8	66.1	94.7	97.6	99.2	97.0
ES04	Logroño	98.5	94.9	98.0	99.0	98.9	98.3	95.0	55.6	99.3	97.4	97.9	74.9
ES05	Noia	76.5	76.3	64.8	99.7	96.4	98.9	16.8	10.9	36.0	98.8	97.5	96.8
ES07	Viznar	31.7	95.5	93.7	97.6	98.5	99.0	98.4	97.6	97.8	76.9	99.2	97.6
FI09	Uto	100.0	100.0	83.3	100.0	100.0	98.3	100.0	100.0	100.0	98.7	100.0	100.0
FI17	Virolahti	85.6	98.2	99.6	99.3	97.4	99.2	97.0	91.4	96.9	100.0	95.4	100.0
FI22	Oulanka	99.6	99.1	100.0	100.0	58.6	93.5	100.0	100.0	98.6	100.0	100.0	99.2
FI37	Ahtari II	93.8	95.8	100.0	99.4	98.1	85.6	83.3	90.9	98.1	98.7	97.9	100.0
FR08A	Donon	99.7	99.9	99.9	80.3	99.3	94.9	100.0	96.5	93.8	95.2	86.2	93.0
FR08B	Donon	99.9	99.7	99.9	80.3	100.0	94.9	99.7	96.6	93.6	95.0	86.1	93.1
FR08C	Donon	99.7	99.7	99.6	80.0	99.9	95.0	100.0	96.8	93.8	95.4	86.2	93.1
FR08D	Donon	99.9	99.7	99.7	80.3	99.6	95.1	100.0	96.5	93.6	95.4	86.1	93.3
FR09	Revin	100.0	99.6	80.2	48.6	99.5	100.0	100.0	97.4	99.9	100.0	100.0	99.3
FR11	Bonnevaux	98.7	99.9	52.8	-	-	-	-	-	-	-	-	-
FR13	Peyrusse Vieille	99.9	97.6	99.6	99.6	61.8	13.5	88.3	95.8	99.9	99.9	99.7	99.7
FR14	Montandon	-	-	-	98.8	98.5	99.7	99.3	99.1	97.8	92.6	98.5	99.7
GB02	Eskdalemuir	90.9	99.7	96.4	99.9	99.3	97.4	78.2	99.9	100.0	96.5	99.4	98.7
GB06	Lough Navar	91.7	99.7	72.3	99.9	90.1	99.9	99.6	99.7	99.7	95.8	98.2	89.5
GB13	Yarner Wood	87.8	98.1	99.5	89.2	64.1	91.0	89.7	97.2	98.6	94.2	30.7	96.9
GB14	High Muffles	91.8	100.0	96.5	99.9	99.3	99.9	99.6	99.9	99.9	99.3	99.4	91.4
GB15	Strath Vaich	90.1	83.0	60.1	93.9	56.7	93.8	98.7	98.8	99.2	90.3	89.0	93.7

Table 3.2, cont.

Code	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
GB31	Aston Hill	90.5	95.4	99.1	97.2	99.1	97.5	89.7	99.5	61.8	99.7	99.4	99.3
GB32	Bottesford	82.0	99.6	98.7	99.9	98.7	99.6	99.7	98.8	93.5	99.7	99.0	99.7
GB33	Bush	91.8	99.7	95.3	96.5	99.6	99.9	99.3	99.9	99.9	99.7	98.8	98.3
GB34	Glazebury	91.1	75.3	66.5	99.6	97.8	99.3	99.7	99.9	98.6	98.3	86.7	85.2
GB35	Great Dun Fell	84.7	95.2	94.1	99.7	99.5	99.9	99.6	99.9	89.4	91.9	73.6	93.4
GB36	Harwell	91.5	98.8	87.9	83.6	99.7	99.7	92.6	99.7	99.7	95.7	98.8	98.9
GB37	Ladybower	87.5	67.7	93.3	99.7	96.6	99.6	99.7	99.5	99.3	99.7	98.8	91.3
GB38	Lullington Heath	70.8	95.7	92.5	81.4	99.2	96.0	96.9	92.5	36.0	93.7	93.5	99.3
GB39	Sibton	91.5	99.9	96.9	99.6	99.7	99.6	86.4	99.9	92.5	96.0	96.9	99.6
GB43	Narberth	58.7	99.3	96.2	86.9	98.5	90.1	89.5	99.5	97.6	91.1	85.3	81.7
GB44	Somerton	59.0	98.8	96.0	99.3	99.6	99.7	99.5	99.7	99.4	96.1	99.0	99.5
GB45	Wicken Fen	91.3	99.3	93.1	99.7	97.6	91.4	98.1	99.5	98.2	91.5	98.5	82.4
HU02	K-puszta	100.0	100.0	100.0	100.0	98.3	98.2	84.9	99.9	98.6	98.8	99.3	96.0
IE31	Mace Head	99.7	92.3	96.5	100.0	92.2	98.1	99.9	91.1	98.2	99.9	99.6	96.9
IT01	Montelibretti	100.0	74.1	100.0	100.0	100.0	89.3	99.3	98.8	90.1	97.0	86.1	89.1
IT04	Ispra	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.1
LT15	Preila	96.1	100.0	100.0	99.7	83.3	82.1	96.8	100.0	100.0	100.0	100.0	99.5
LV10	Rucava	98.4	97.6	99.7	99.6	96.0	97.5	97.7	98.7	96.1	94.5	99.2	28.8
NL09	Kollumerwaard	99.9	99.9	99.2	100.0	99.9	98.2	100.0	99.9	99.4	98.7	100.0	99.9
NL10	Vredepeel	93.8	87.6	97.3	97.2	69.1	90.4	86.3	98.3	96.2	99.1	93.2	99.7
NO01	Birkenes	100.0	100.0	99.9	100.0	100.0	100.0	99.9	96.9	100.0	95.6	99.0	100.0
NO15	Tustervatn	99.6	99.4	100.0	99.3	99.9	99.9	100.0	100.0	100.0	100.0	100.0	99.9
NO39	Kaarvatn	100.0	99.6	99.2	100.0	100.0	99.6	99.3	99.9	100.0	99.6	99.2	96.6
NO41	Osen	99.9	100.0	98.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.6	100.0
NO42	Zeppelinfjellet	99.5	99.4	93.5	100.0	100.0	99.7	100.0	100.0	100.0	99.9	99.6	99.9

Table 3.2, cont.

Code	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
NO43	Prestebakke	100.0	100.0	100.0	99.7	100.0	100.0	100.0	100.0	99.6	100.0	100.0	99.6
NO45	Jeloya	100.0	99.6	100.0	100.0	99.7	100.0	100.0	99.7	100.0	100.0	99.6	100.0
NO48	Voss	100.0	100.0	99.6	100.0	66.0	99.6	100.0	99.6	100.0	100.0	99.4	100.0
NO52	Sandve	100.0	100.0	99.3	100.0	100.0	99.6	100.0	75.9	100.0	88.0	64.6	99.9
NO55	Karasjok	97.3	100.0	100.0	93.9	96.6	99.4	99.7	99.1	96.2	100.0	99.9	100.0
NO56	Hurdal	99.3	100.0	100.0	99.6	100.0	99.7	99.7	99.2	100.0	96.0	99.7	100.0
PL02	Jarczew	99.9	100.0	81.2	99.9	99.3	97.1	98.1	94.6	95.0	97.7	99.7	100.1
PL03	Sniezka	0.0	0.0	0.0	99.9	100.0	99.9	100.0	97.2	100.0	100.0	88.5	80.4
PL04	Leba	99.9	100.0	97.6	93.3	98.9	100.0	100.0	100.0	99.9	92.1	99.6	100.1
PL05	Diabla Gora	99.2	97.9	89.4	99.2	98.4	89.7	97.3	99.1	91.7	98.4	95.4	99.2
PT04	Monte Velho	100.0	100.0	100.0	98.3	91.1	96.7	96.6	100.0	97.4	34.4	0.0	0.0
SE02	Rorvik	99.2	90.6	99.6	100.0	99.2	99.3	100.0	99.7	99.4	99.1	100.0	100.0
SE11	Vavihill	99.2	100.0	100.0	100.0	99.3	94.6	94.0	100.0	100.0	99.5	100.0	99.5
SE12	Aspvreten	90.1	99.3	97.6	100.0	97.4	99.9	99.5	99.9	100.0	100.0	86.7	99.1
SE13	Esrange	96.6	100.0	100.0	100.0	99.5	99.7	100.0	100.0	99.7	98.5	100.0	100.0
SE32	Norra Kvill	99.5	100.0	100.0	100.0	99.5	99.9	100.0	99.7	99.2	100.0	100.0	100.0
SE35	Vindeln	99.5	100.0	100.0	100.0	98.7	99.7	100.0	100.0	100.0	99.5	100.0	99.3
SI08	Iskrba	89.4	75.9	94.6	91.4	78.5	86.8	91.9	95.0	92.2	93.4	95.7	94.8
SI31	Zavodnje	93.1	91.5	93.4	91.0	87.6	70.3	86.8	92.3	90.7	85.1	90.1	93.7
SI32	Krvavec	93.4	89.9	94.5	88.6	93.7	91.4	73.8	86.4	86.1	88.8	95.1	94.6
SI33	Kovk	89.8	76.9	77.8	89.9	89.2	93.3	83.5	88.7	88.5	89.9	91.9	93.5
SK02	Chopok	0.0	0.0	0.0	46.8	12.2	57.9	58.3	81.9	83.2	85.6	99.9	98.4
SK04	Stara-Lesna	98.7	100.0	100.0	0.0	0.0	0.0	58.9	78.2	77.9	90.2	92.9	98.9
SK06	Starina	96.4	99.7	100.0	0.0	0.0	0.0	69.4	87.6	83.5	82.1	98.2	98.0

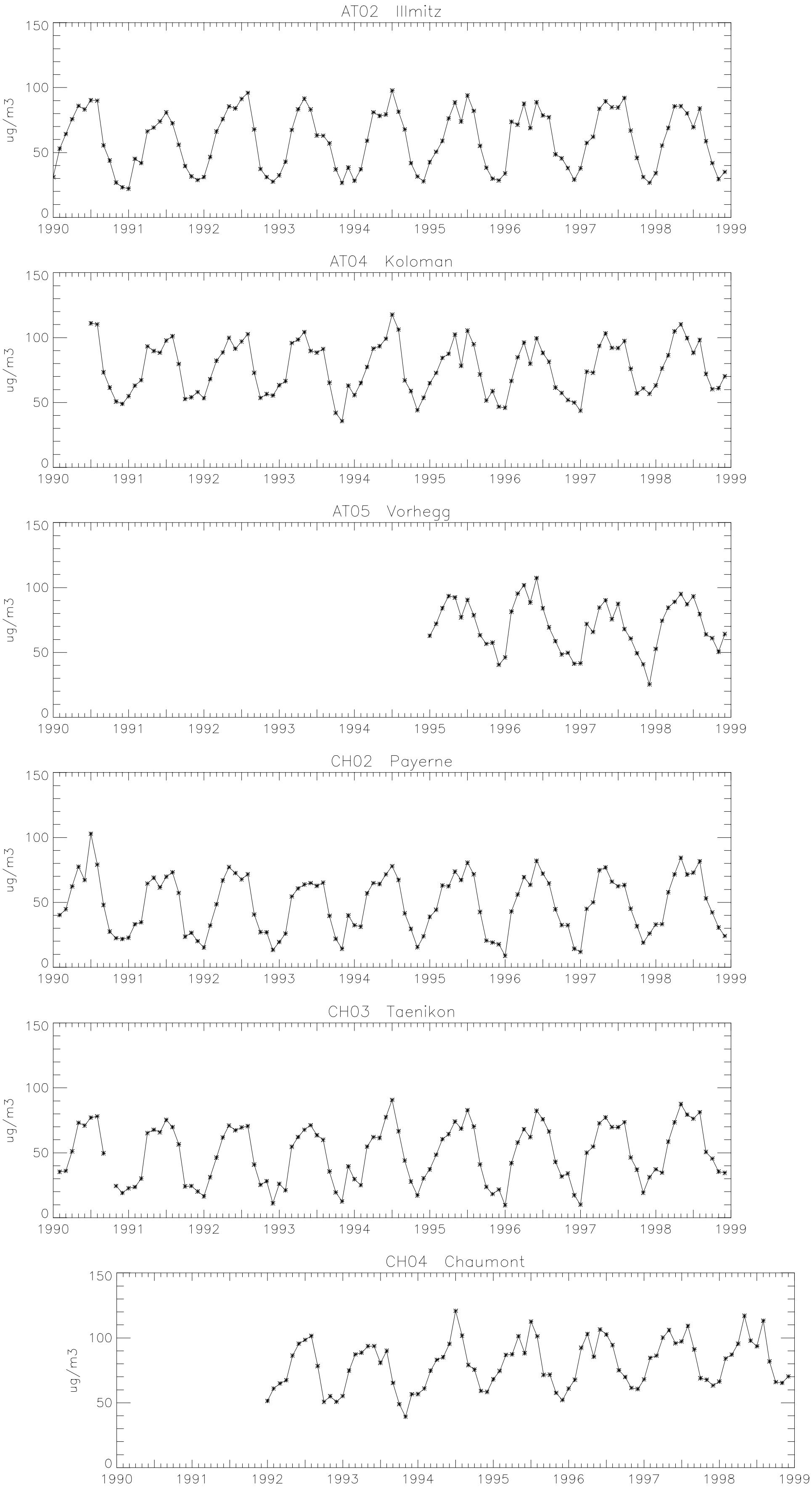


Figure 3.1: Seasonal variation, 1990–1998.

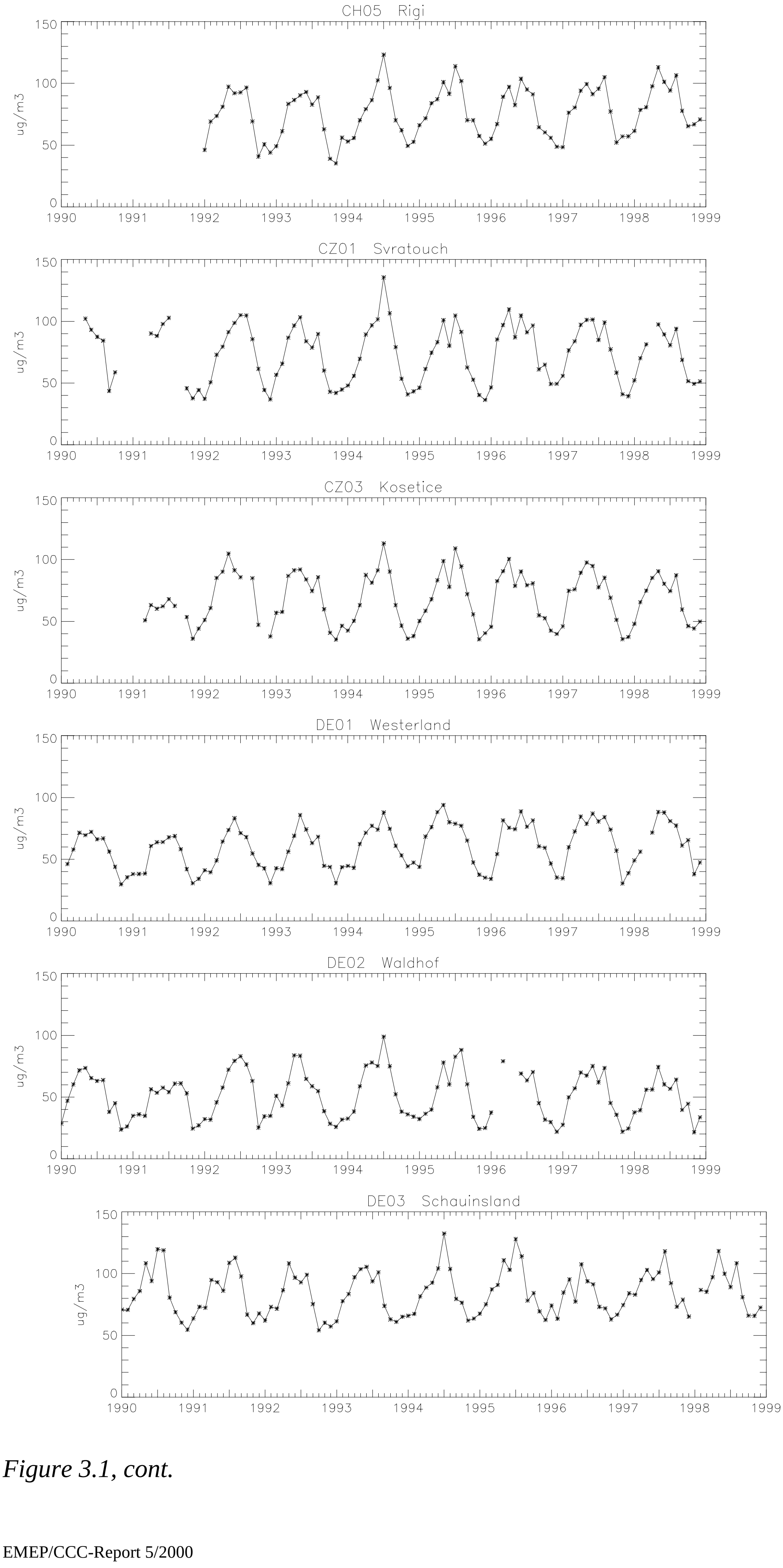


Figure 3.1, cont.

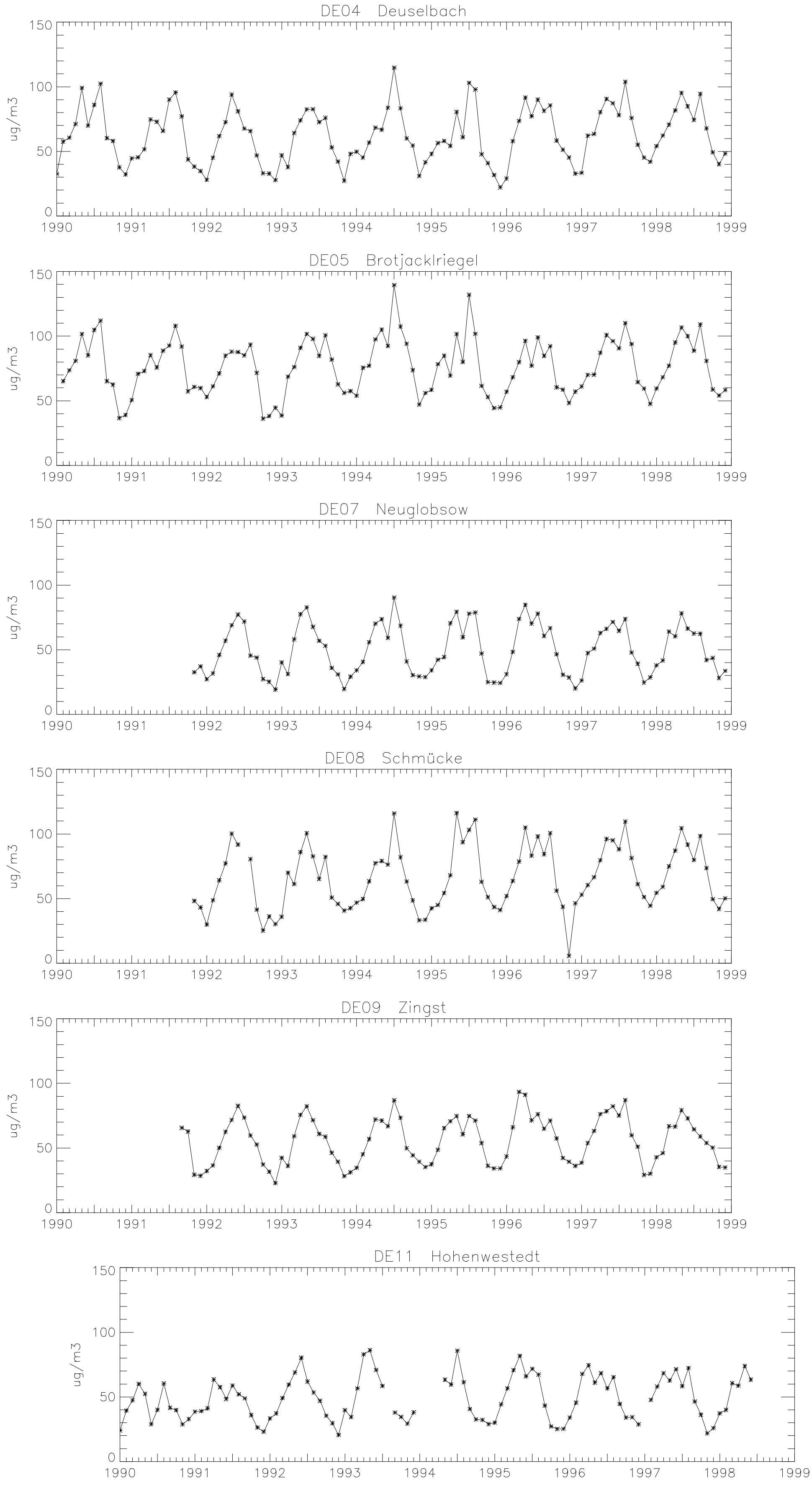


Figure 3.1, cont.

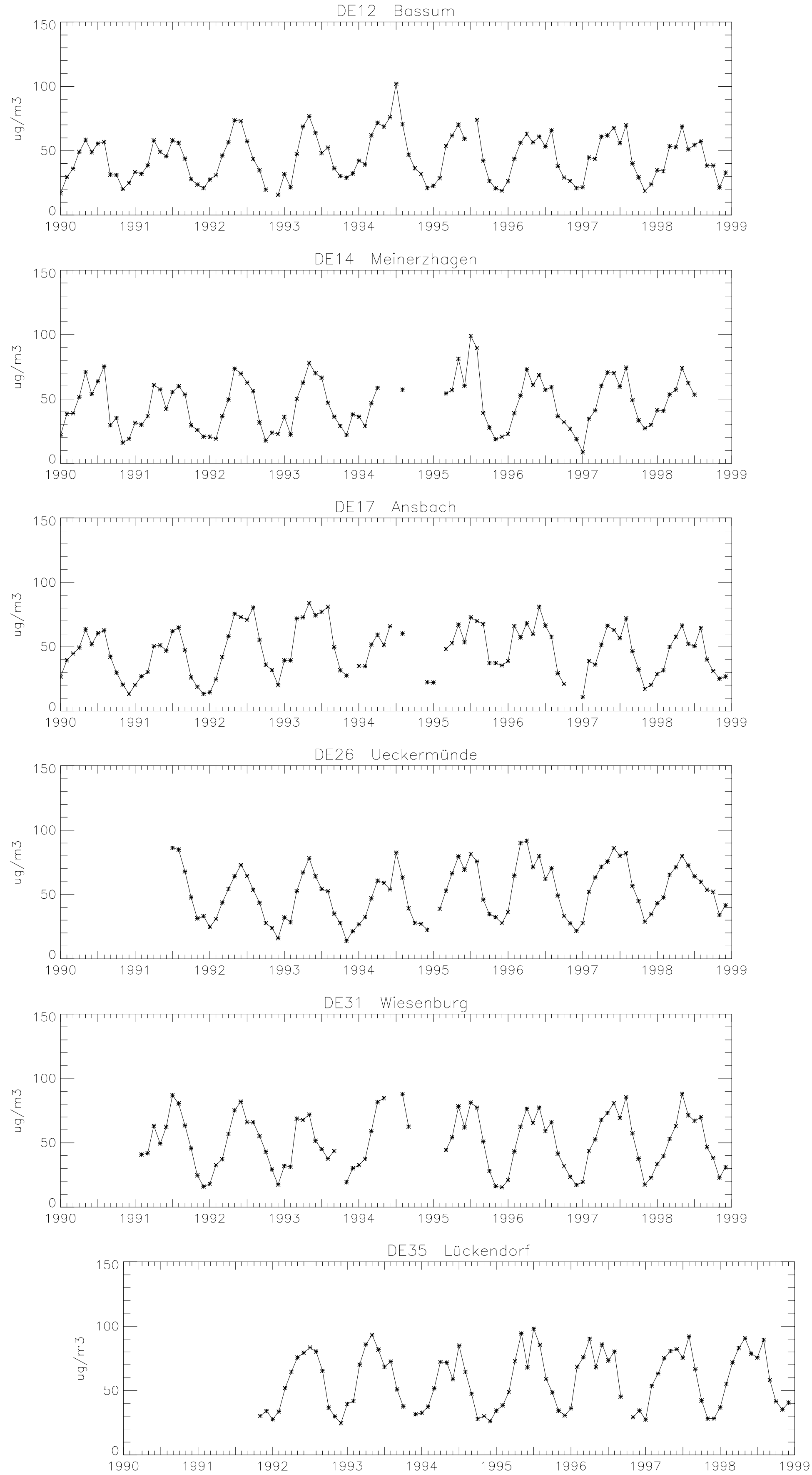


Figure 3.1, cont.

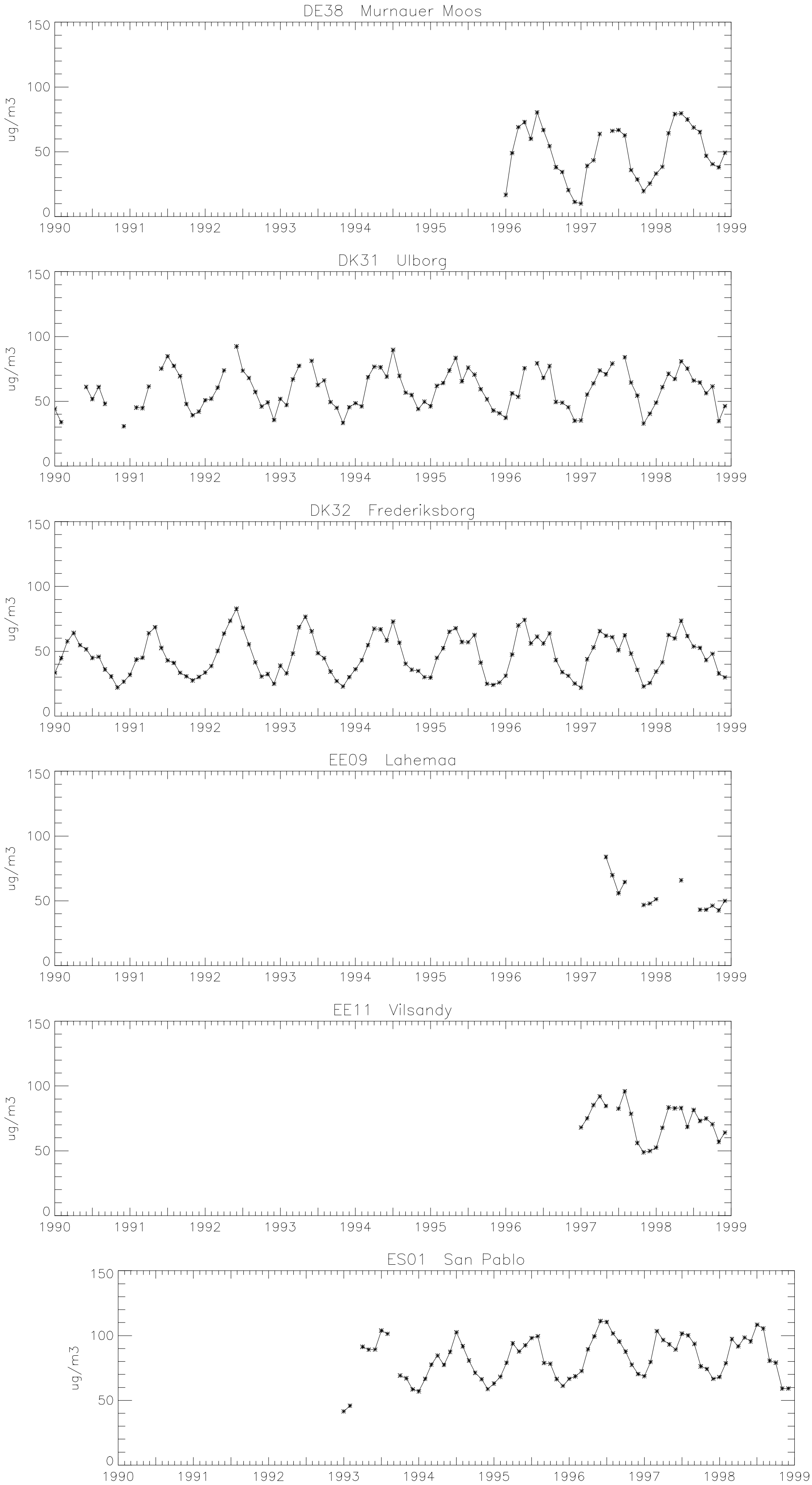


Figure 3.1, cont.

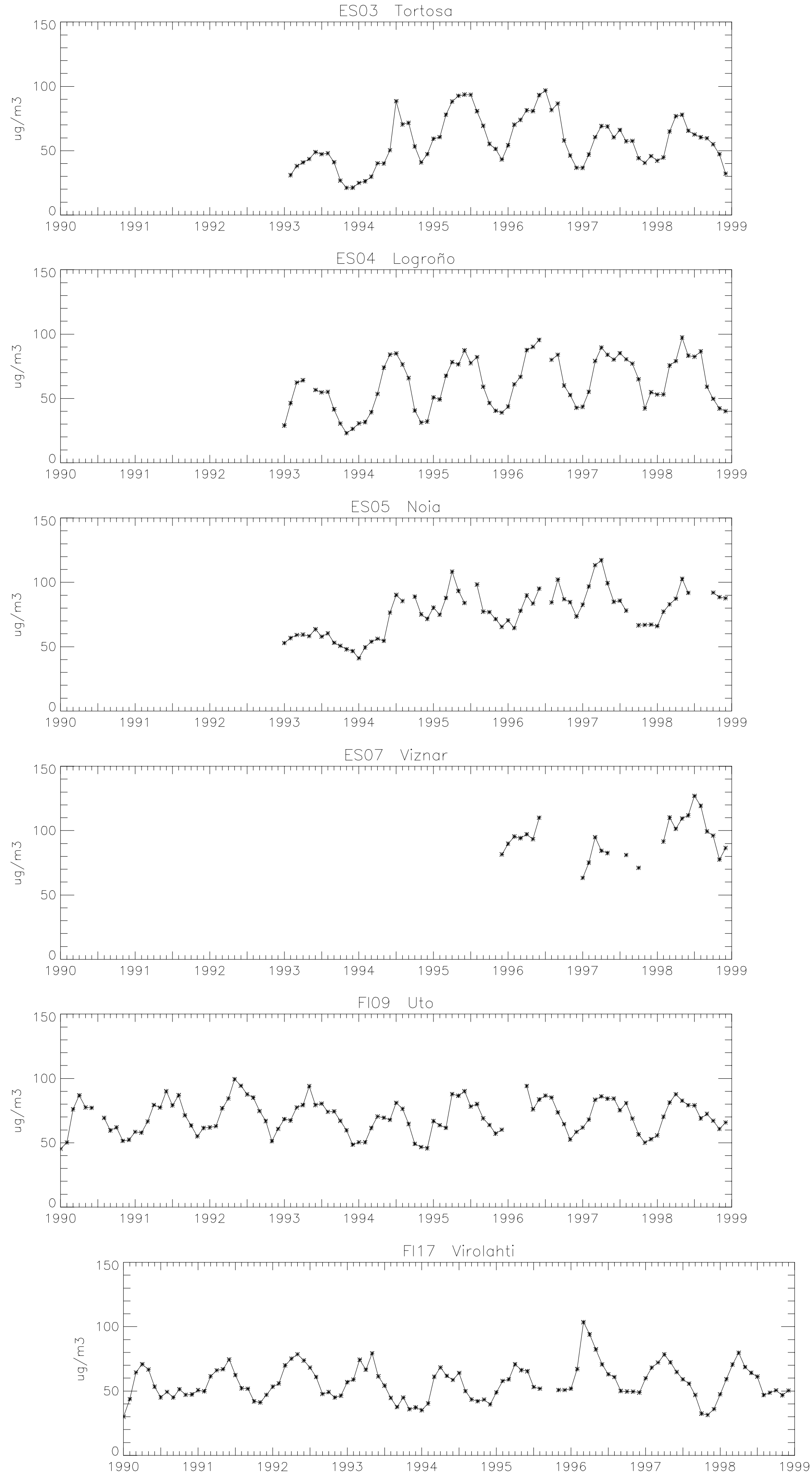


Figure 3.1, cont.

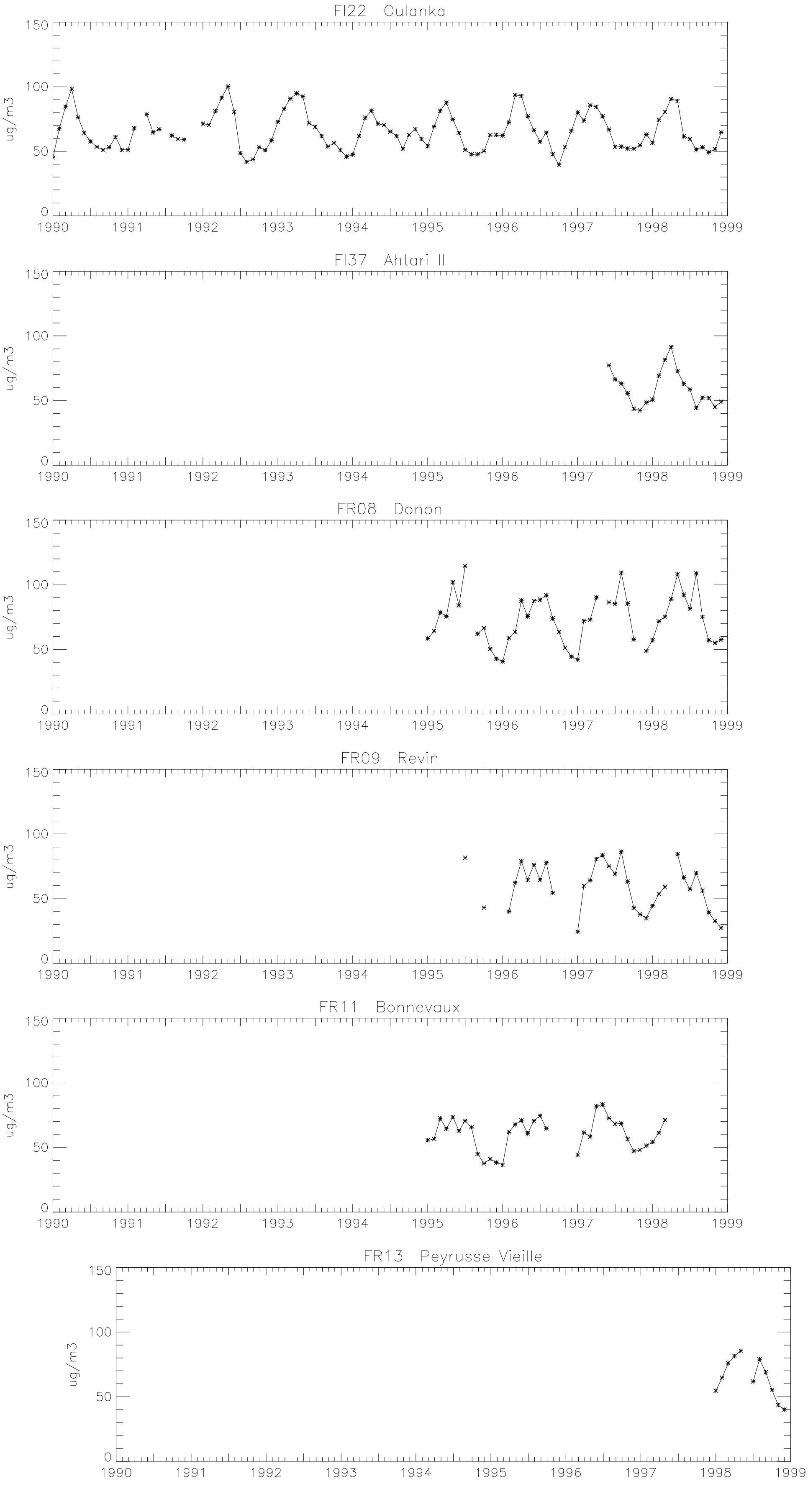


Figure 3.1, cont.

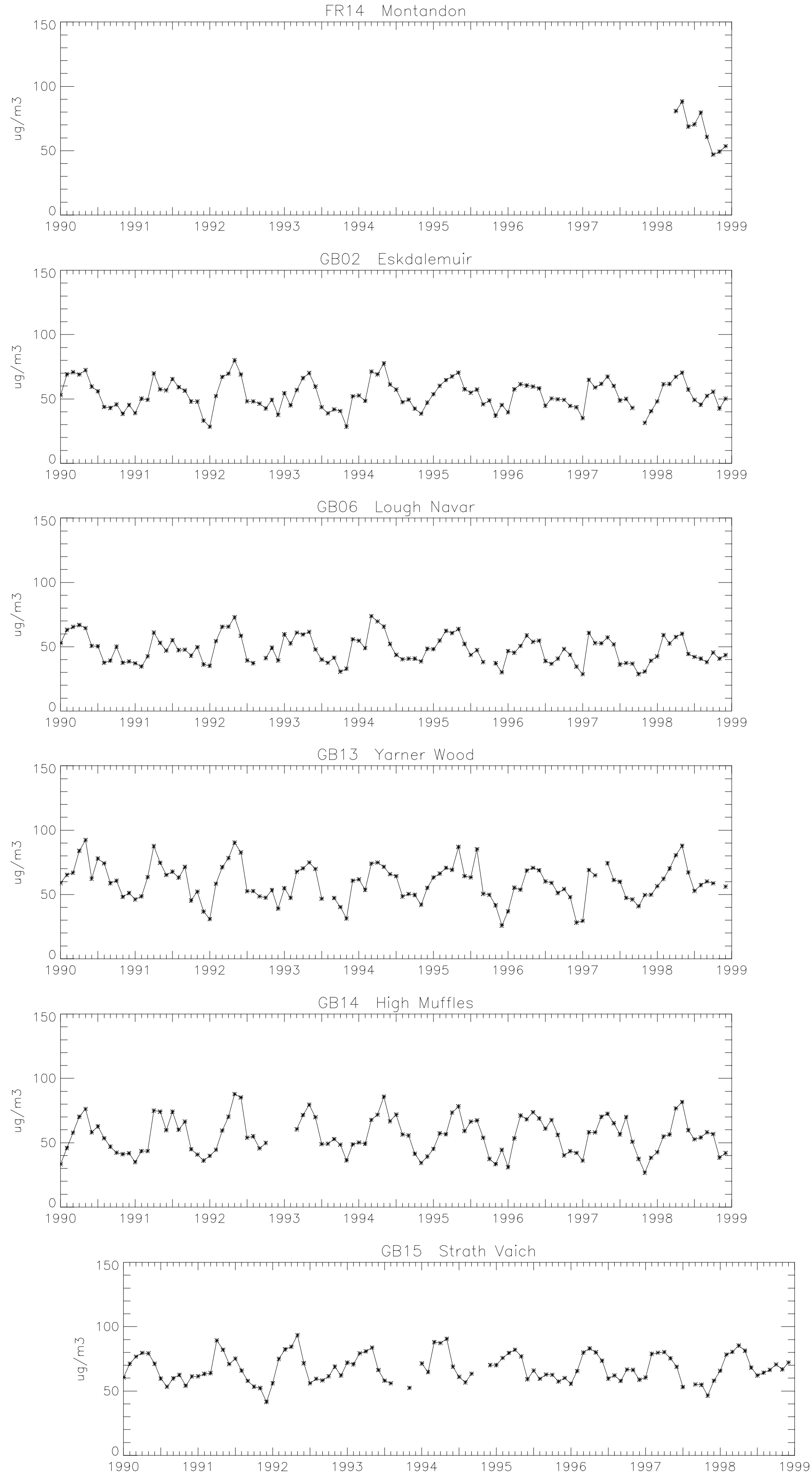


Figure 3.1, cont.

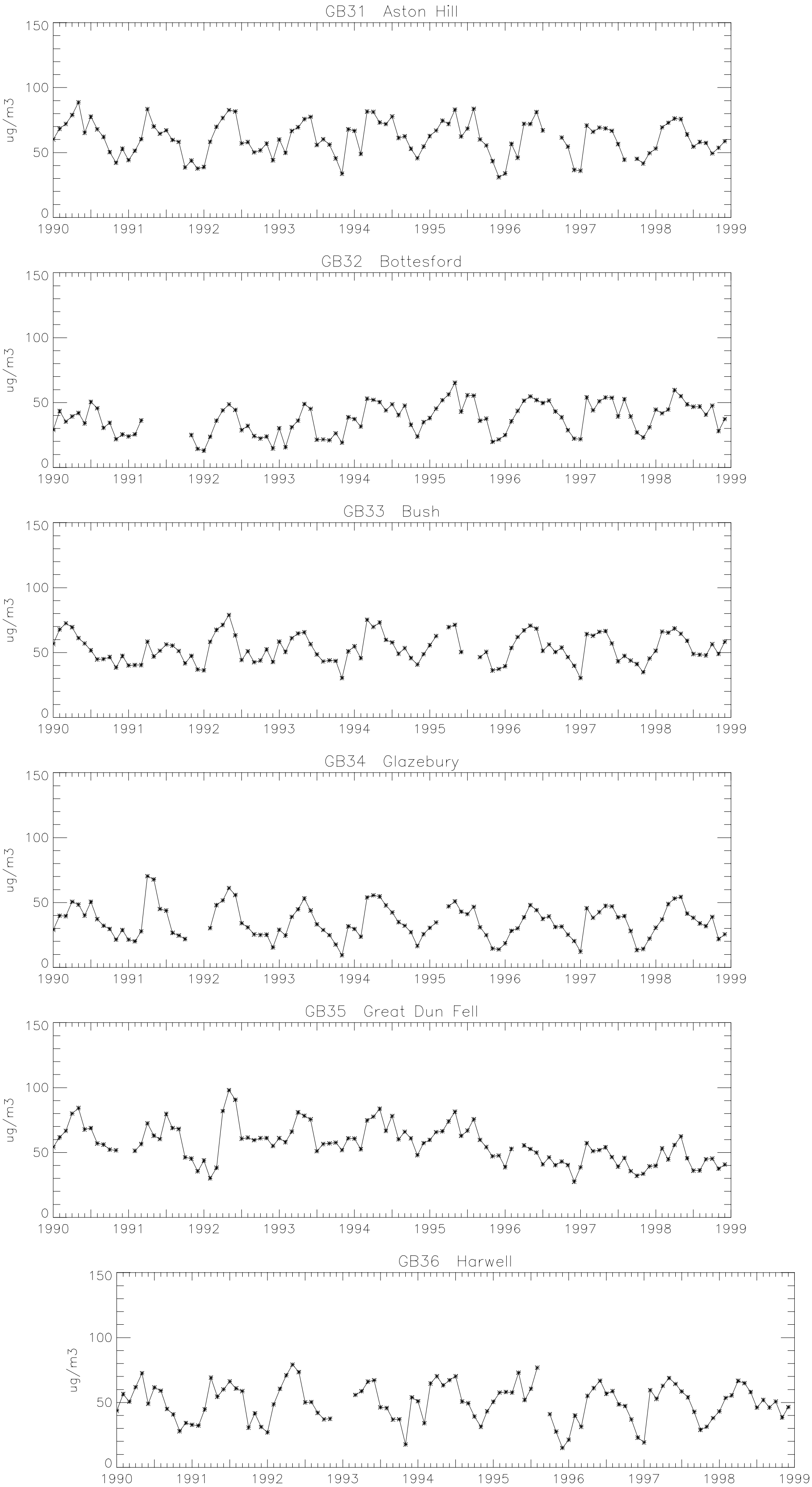


Figure 3.1, cont.

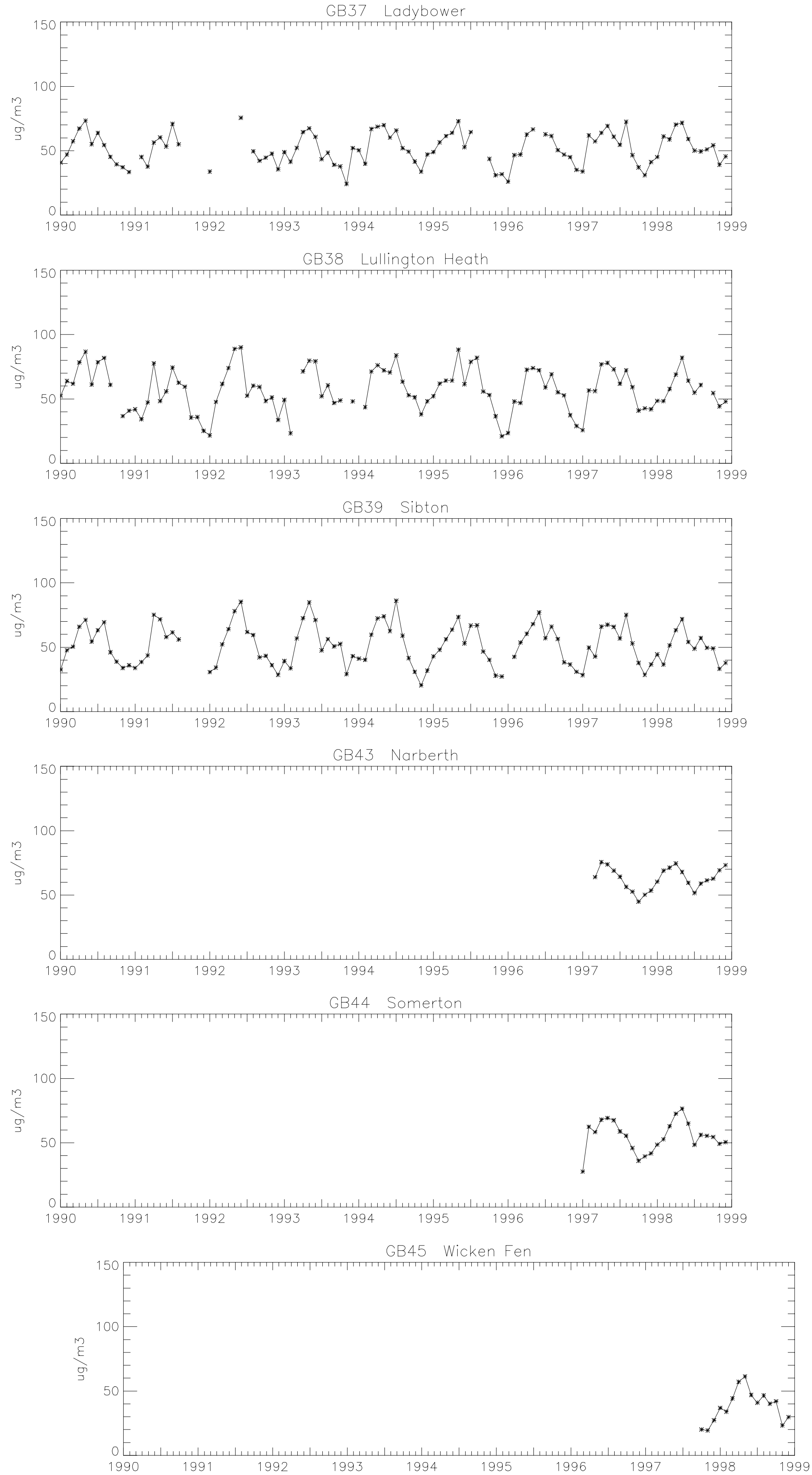


Figure 3.1, cont.

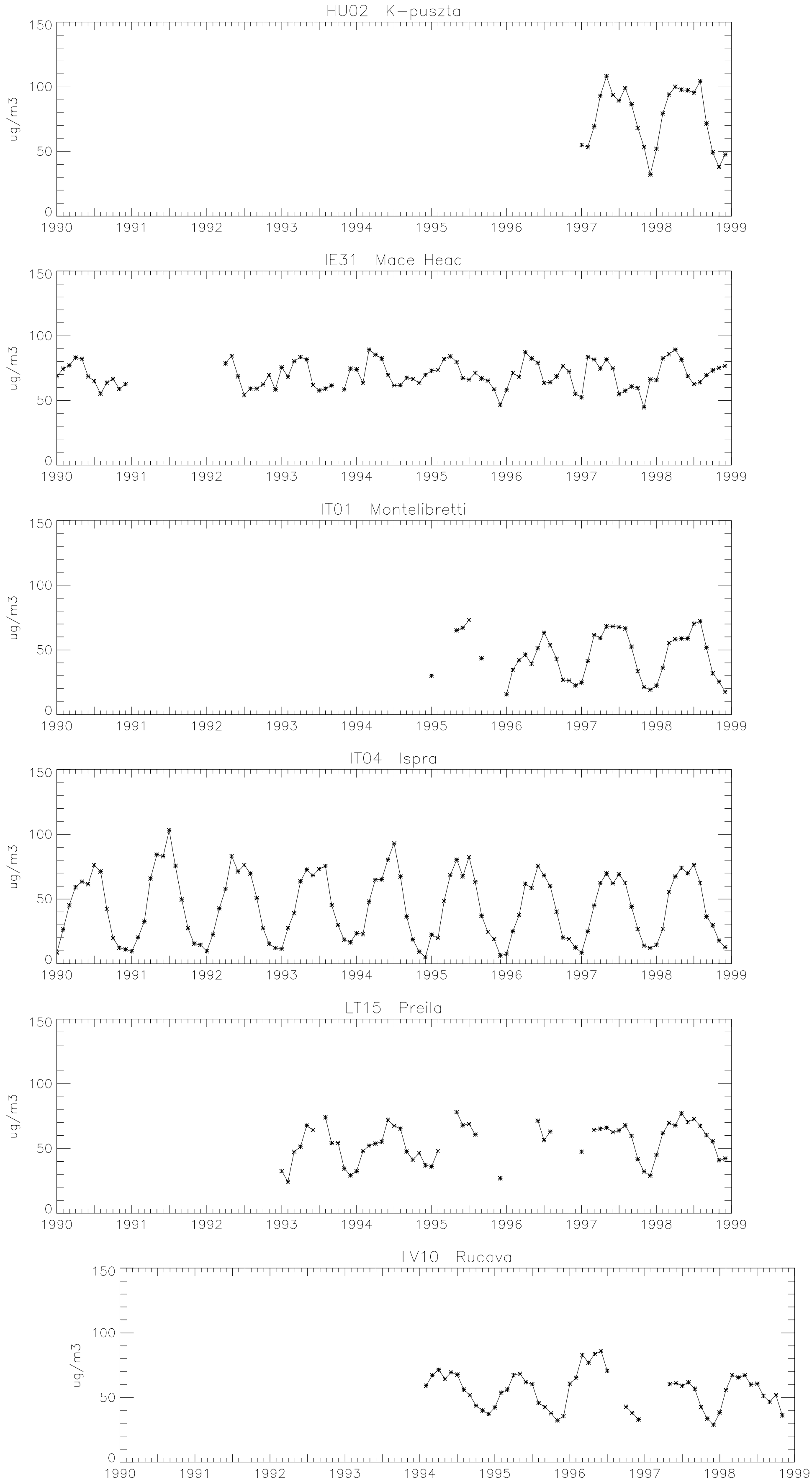


Figure 3.1, cont.

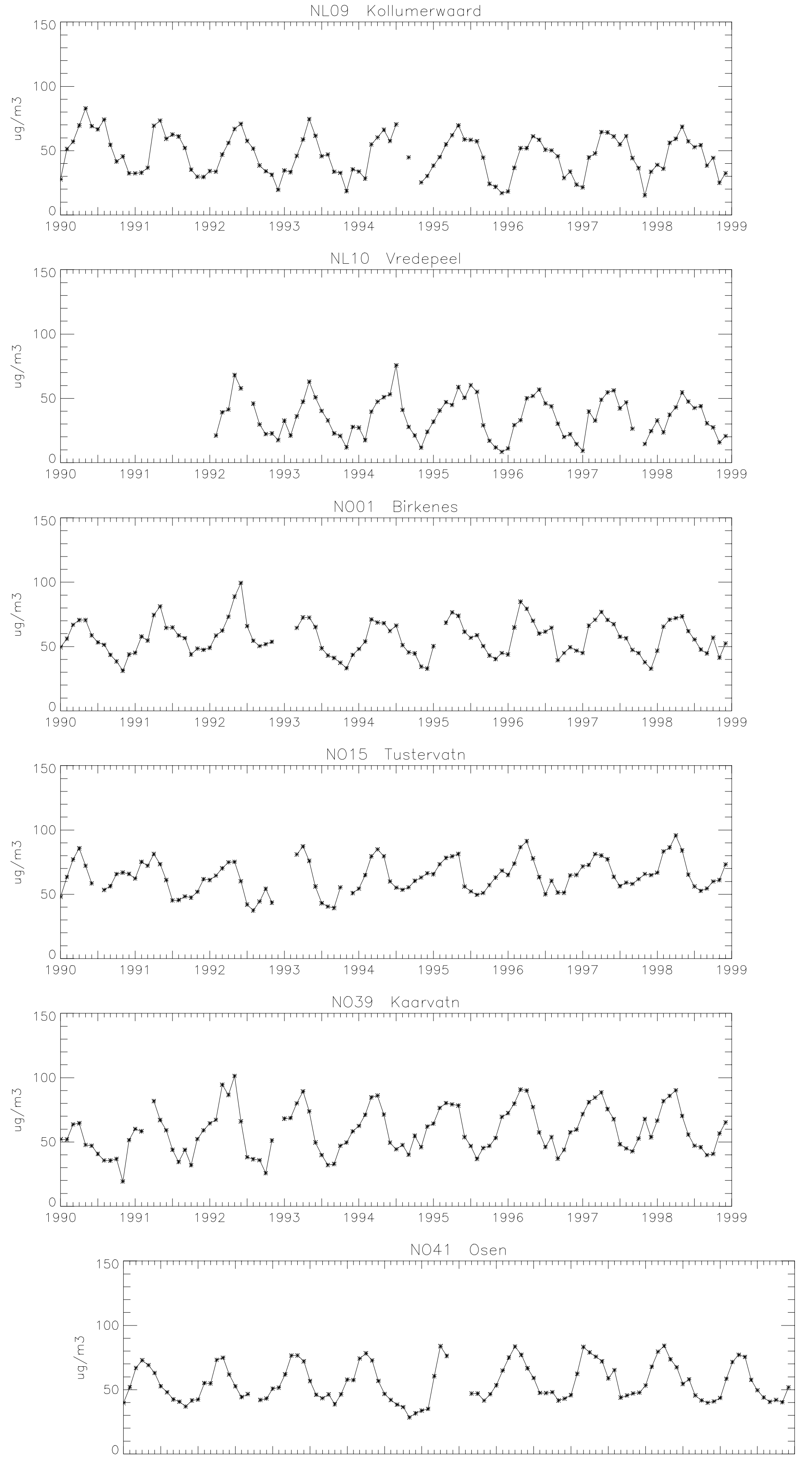


Figure 3.1, cont.

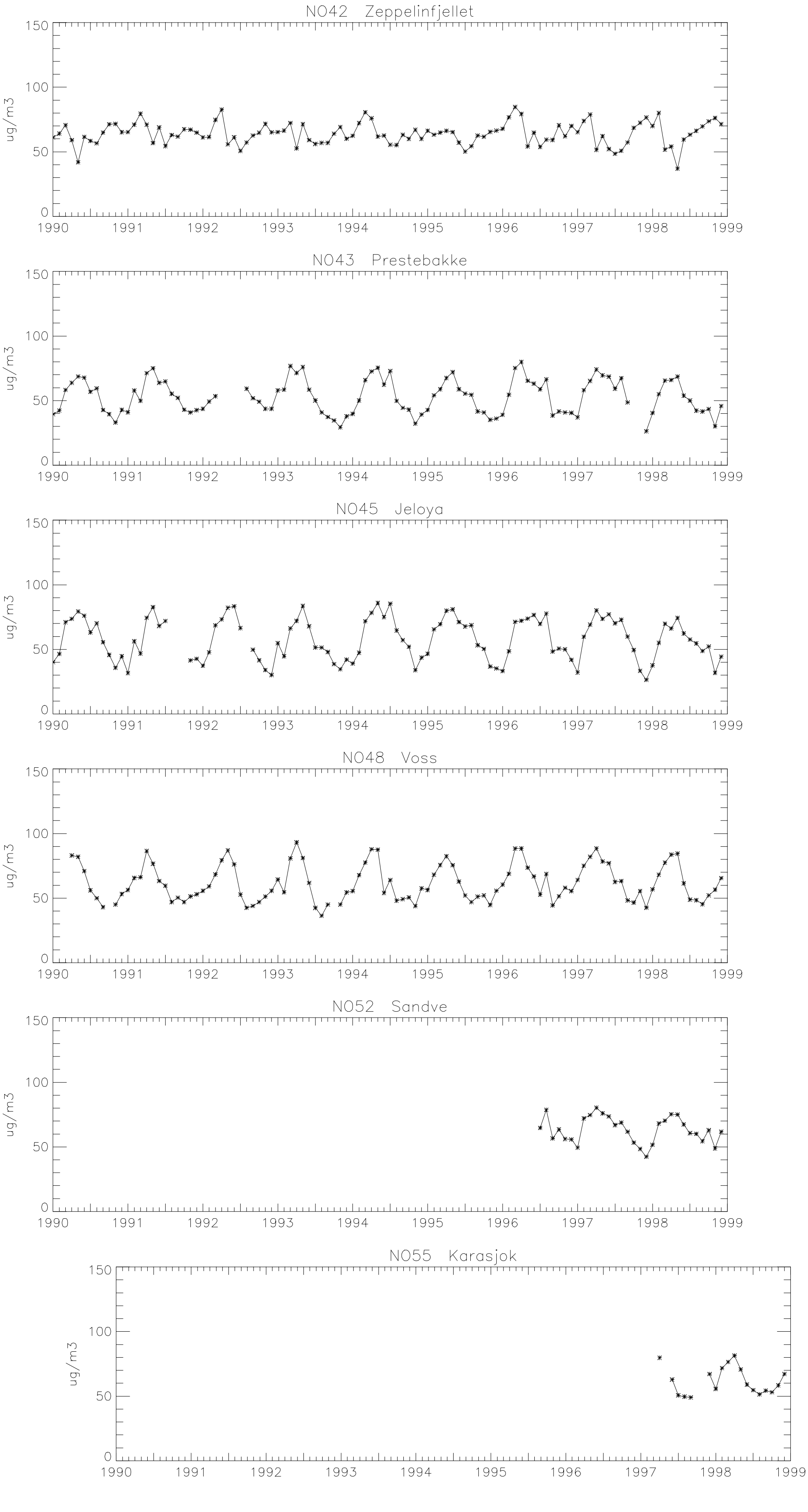


Figure 3.1, cont.

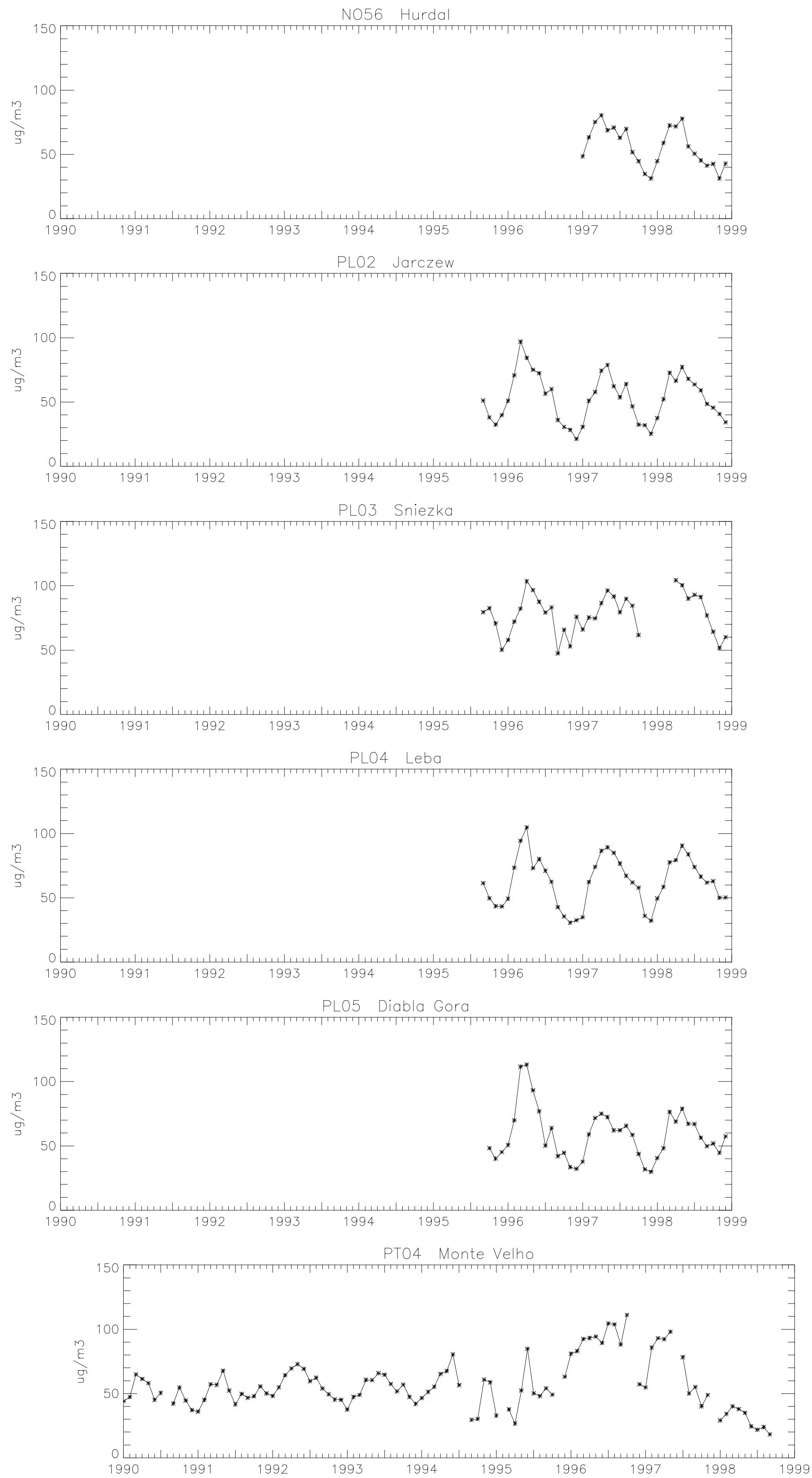


Figure 3.1, cont.

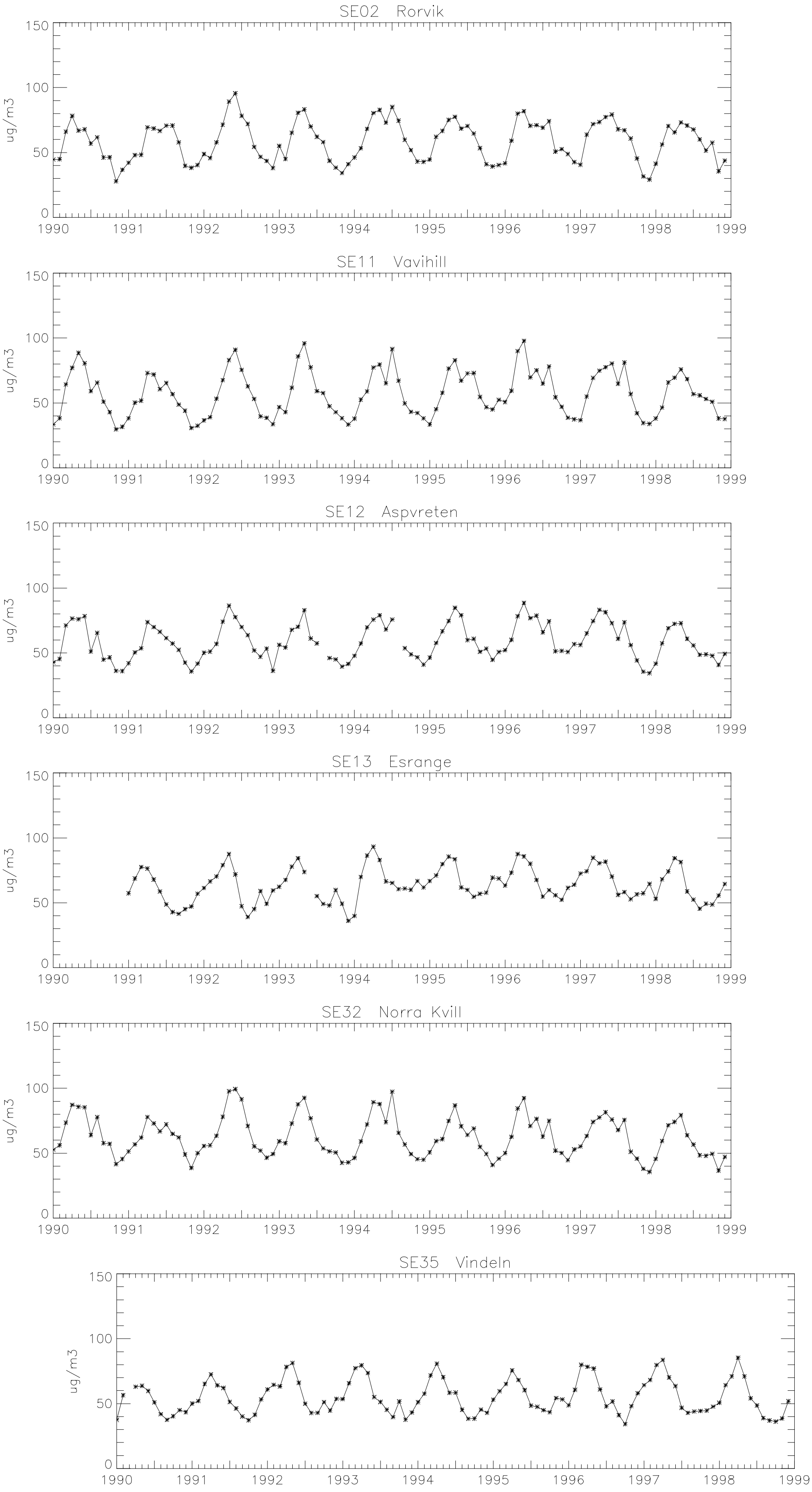


Figure 3.1, cont.

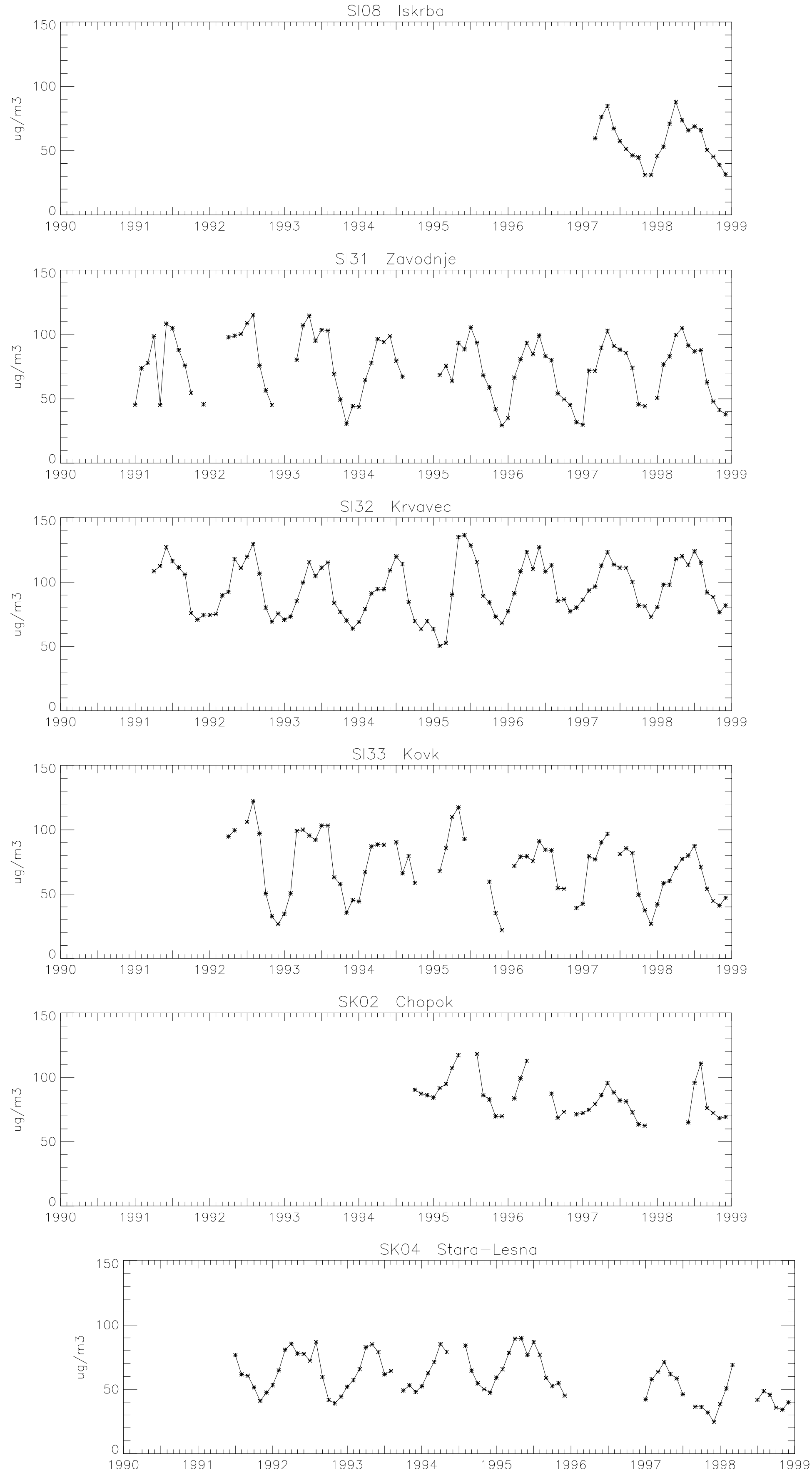


Figure 3.1, cont.

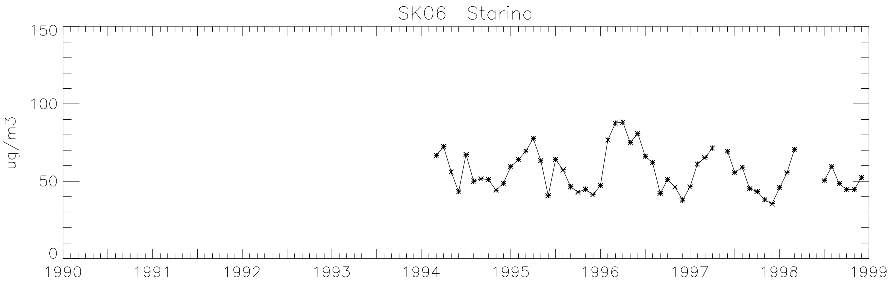


Figure 3.1, cont.

Annex 4

Diurnal variation, April–September 1998

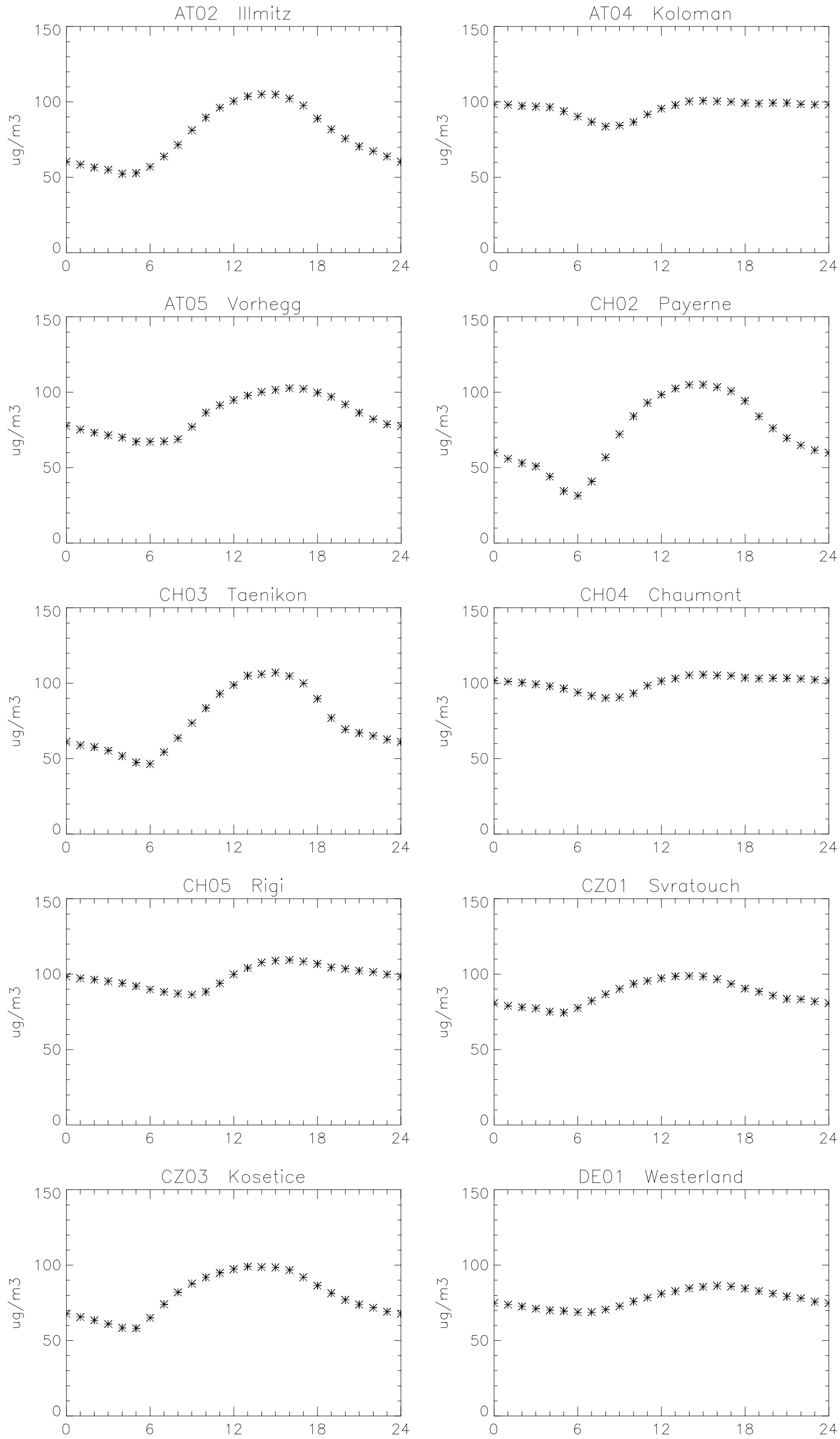


Figure 4.1: Diurnal variation, April–September 1998.

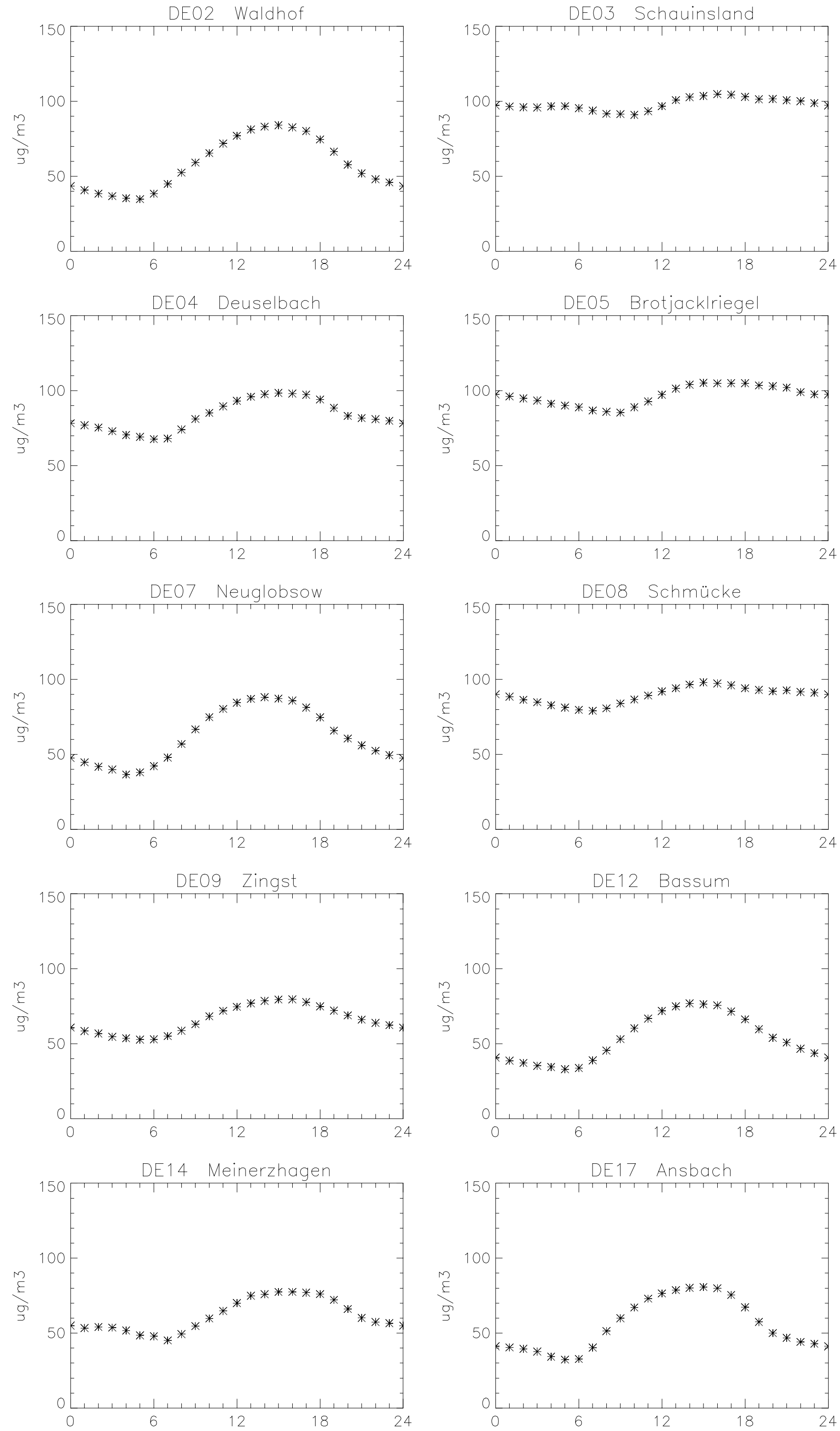


Figure 4.1, cont.

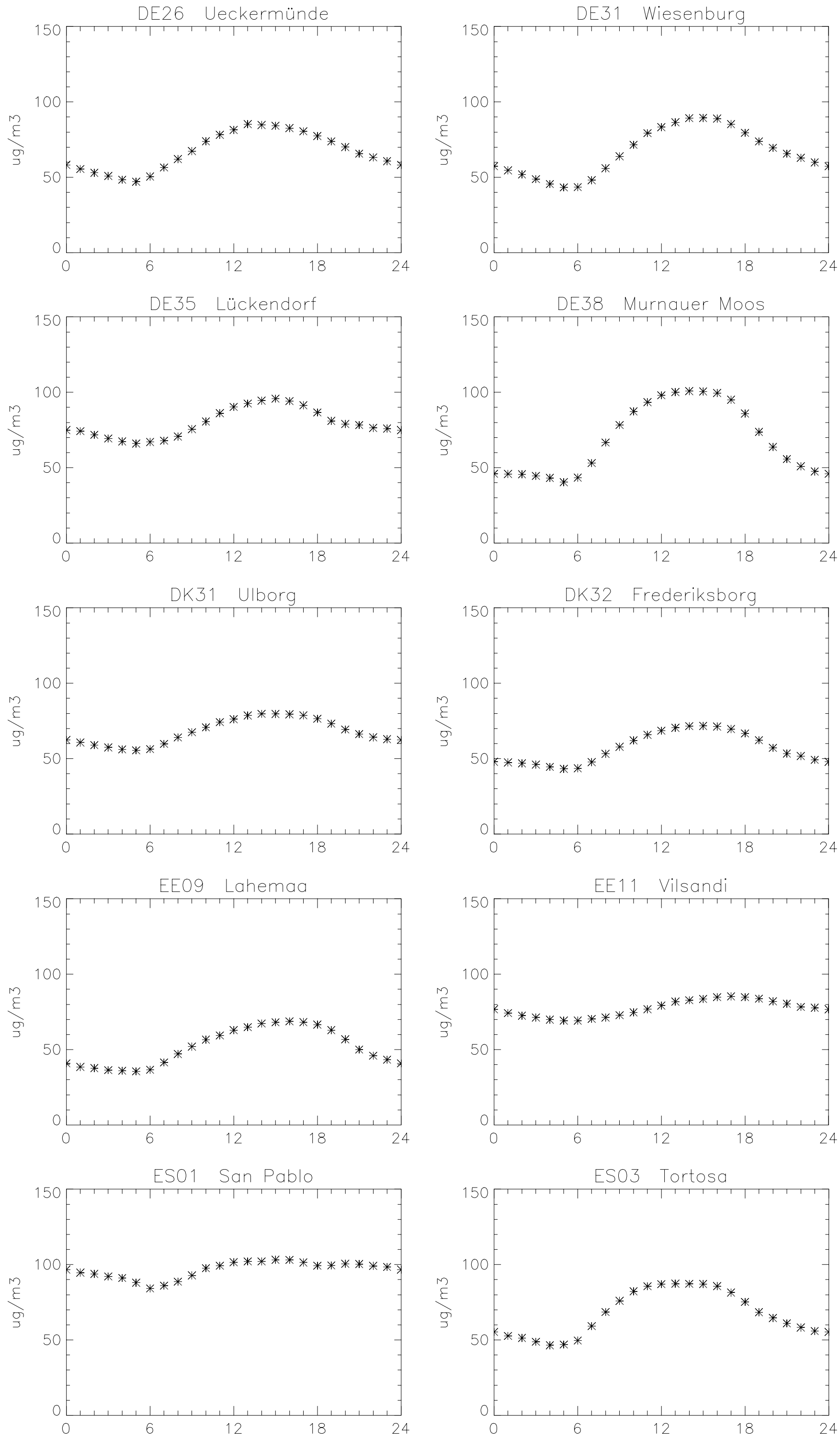
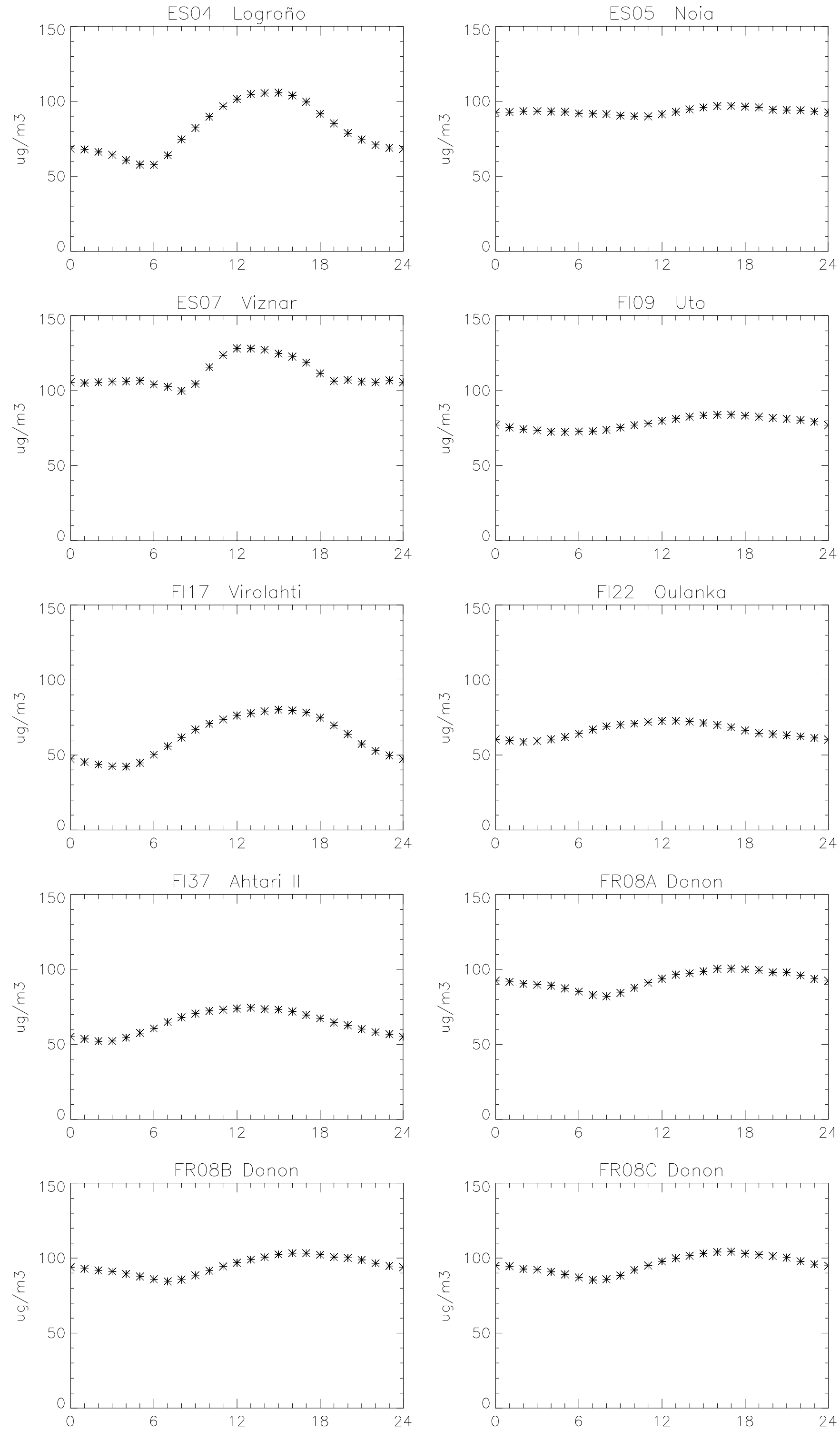


Figure 4.1, cont.



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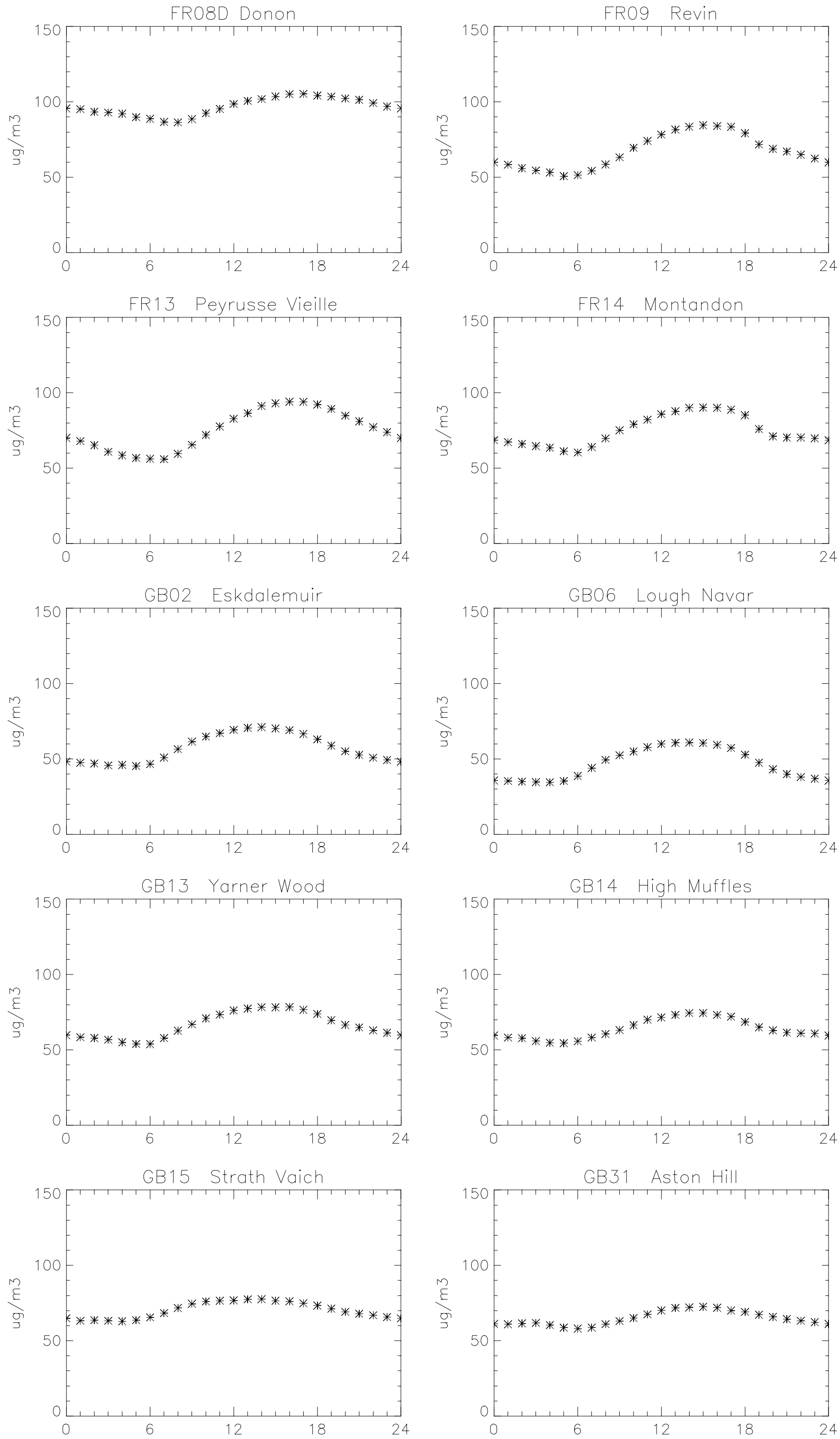

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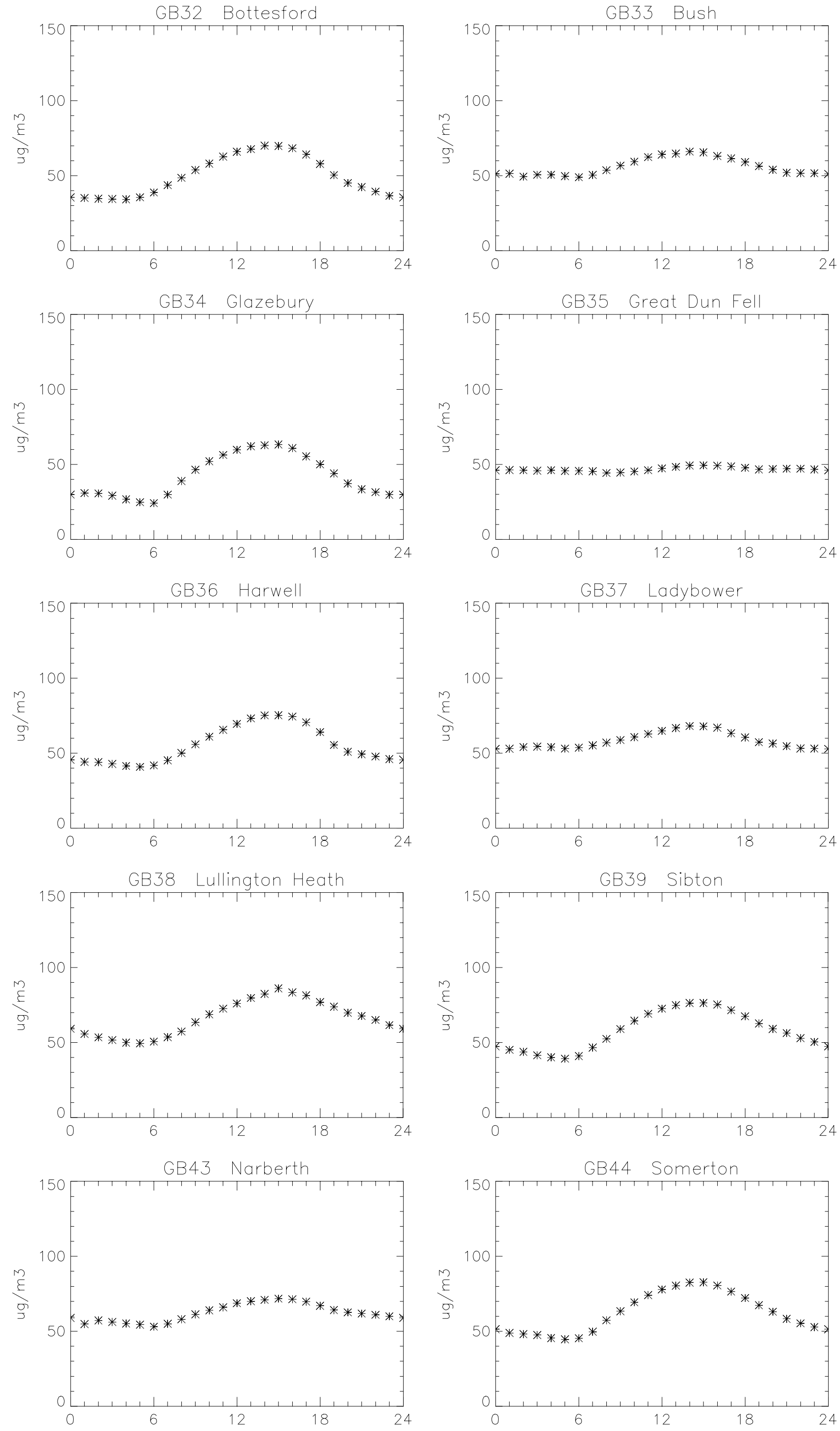

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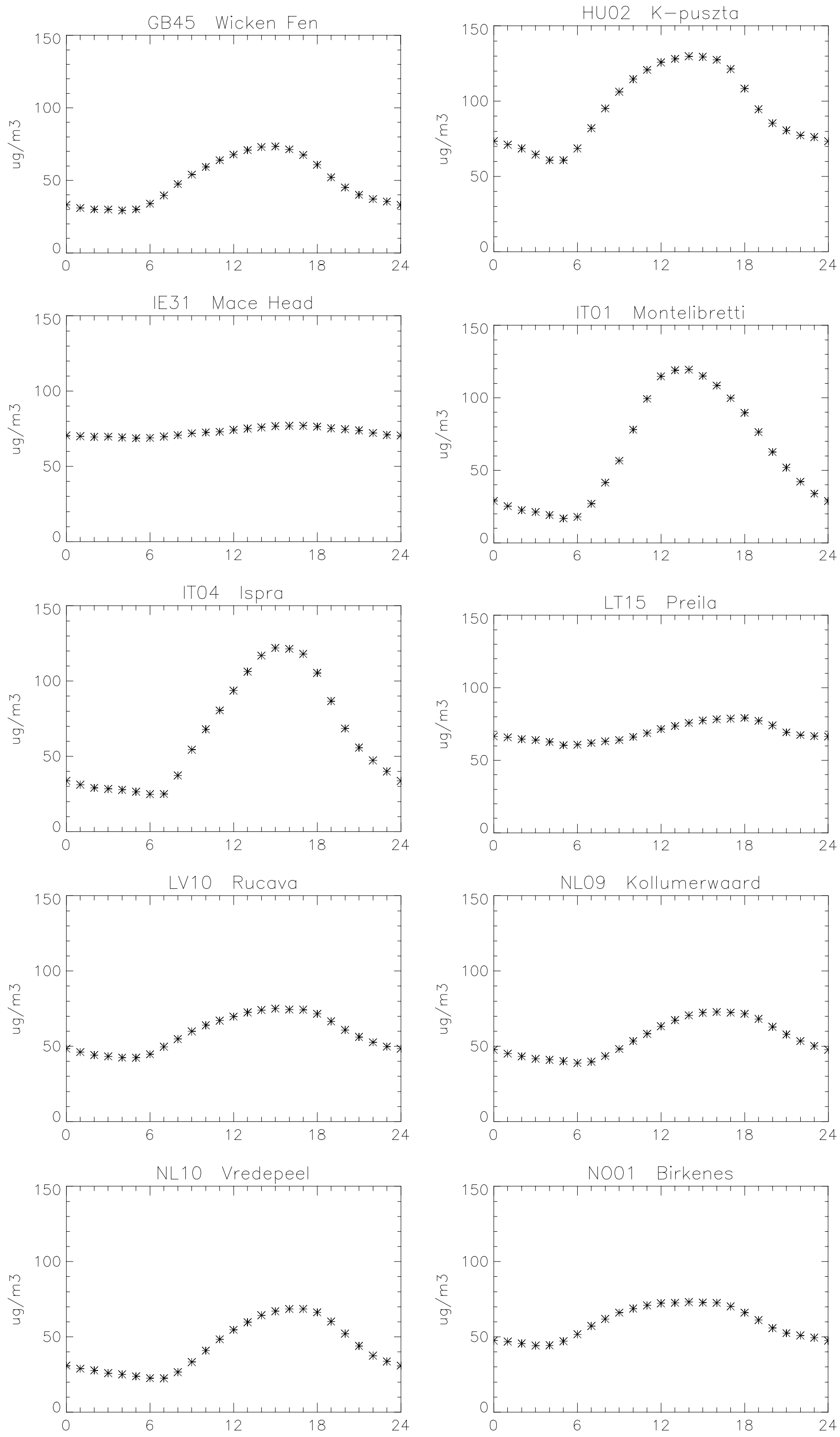

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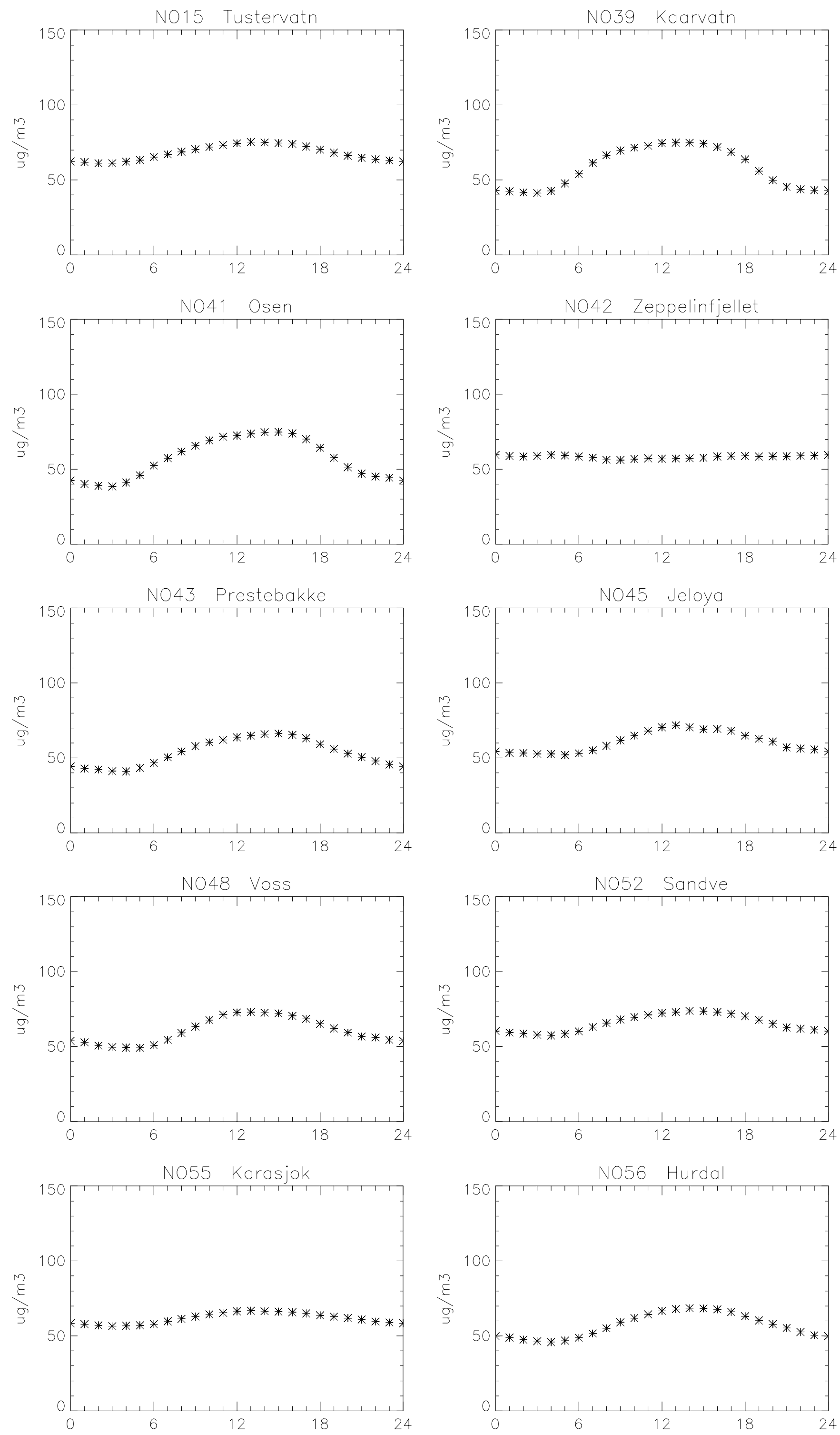

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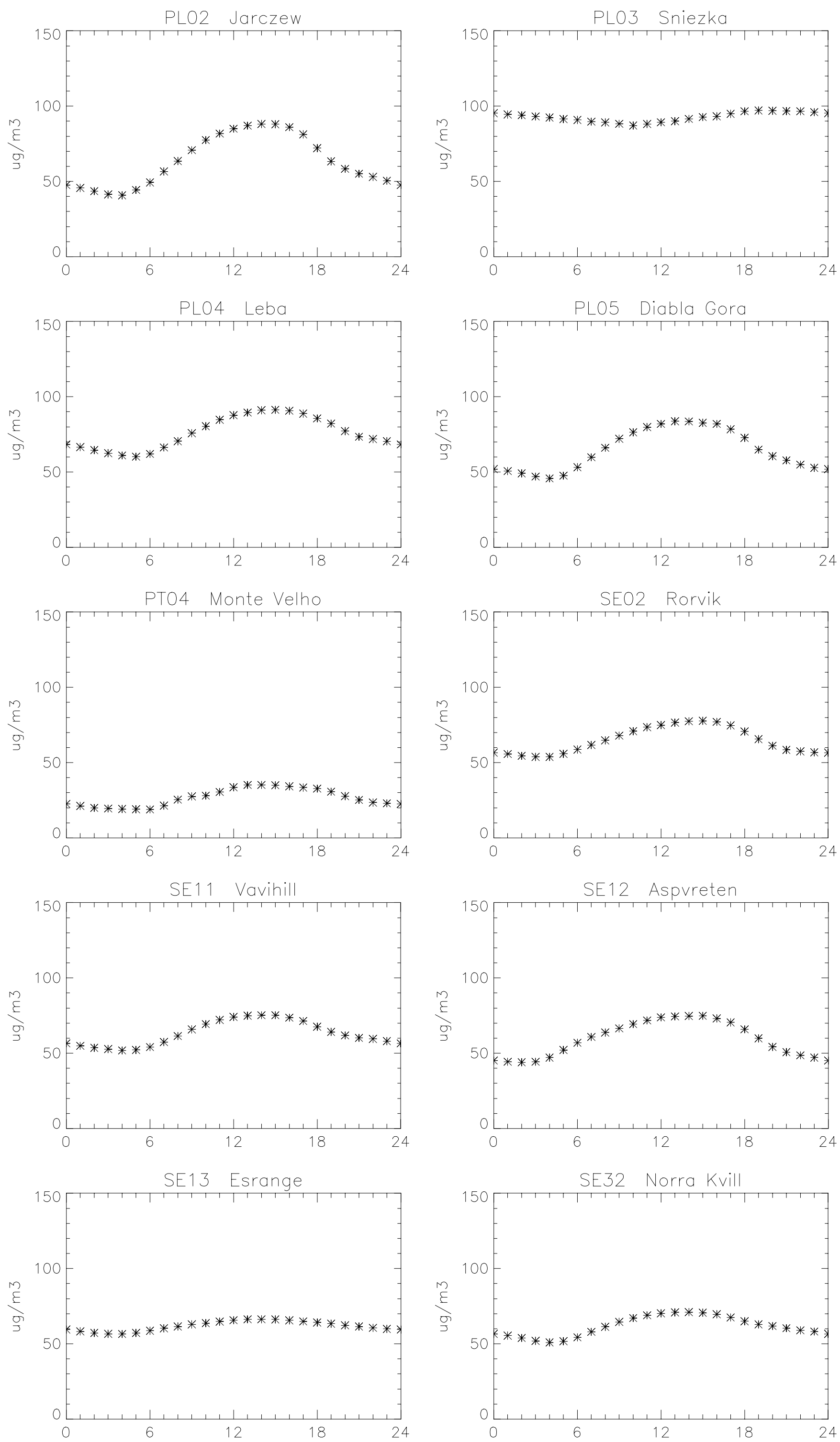

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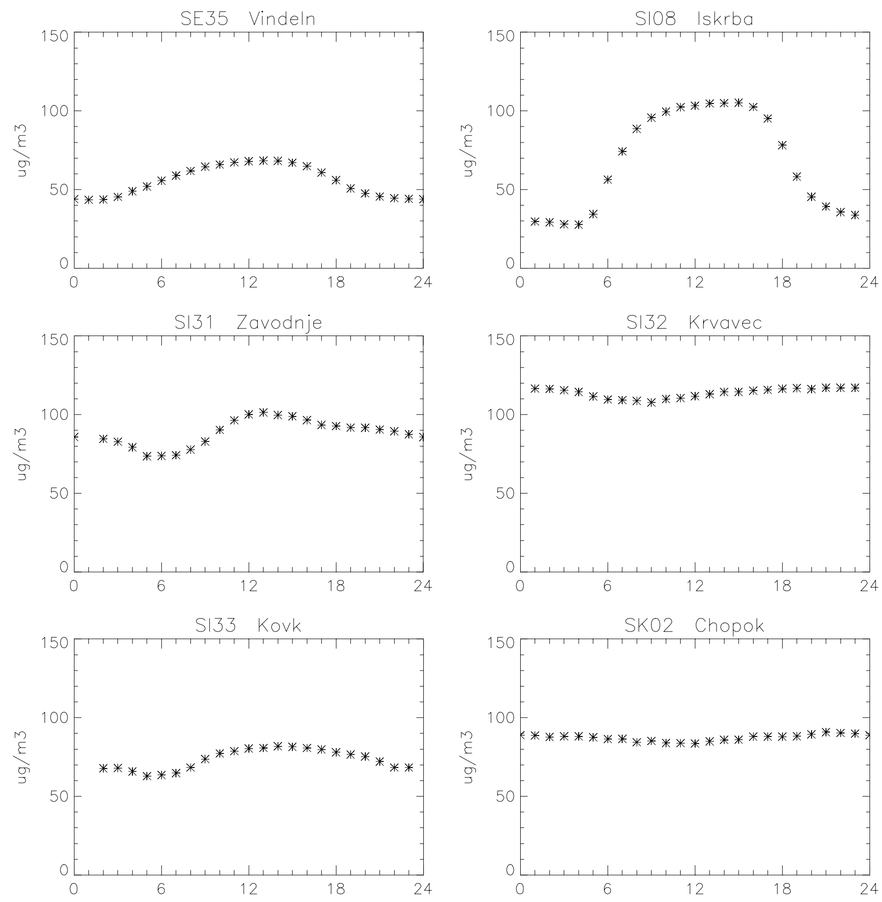

Figure 4.1, cont.