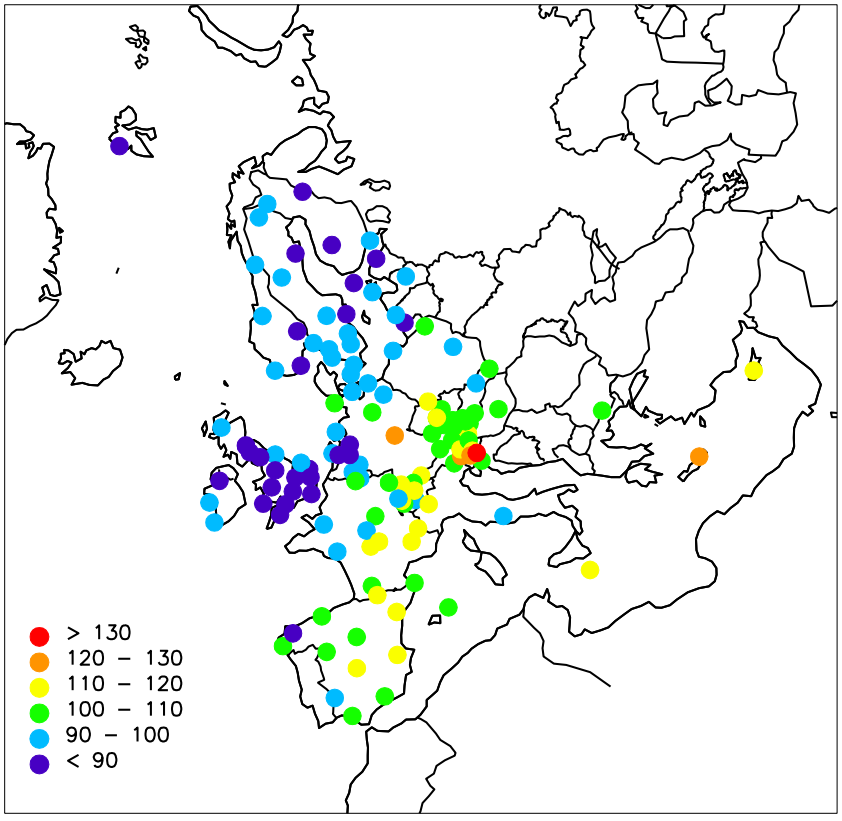
EMEP/CCC-Report 3/2016

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

Ozone measurements 2014

Anne-Gunn Hjellbrekke and Sverre Solberg



95-percentile
April-September, µg/m³

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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 increased the photochemical formation of ozone in the troposphere. 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 widespread. The ongoing monitoring of ozone at rural sites throughout Europe shows that episodes of high concentrations of ground-level ozone occur over most parts of the continent every summer. During these episodes the ozone concentrations can reach values above ambient air quality standards over large regions and lead to adverse effects for human health and vegetation. 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).

The formation of ozone is due to a large number of photochemical reactions taking place in the atmosphere and depends on the temperature, humidity and solar radiation as well as the primary emissions of nitrogen oxides and volatile organic compounds. Together with the non-linear relationships between the primary emissions and the ozone formation, these effects complicates the abatement strategies for ground-level ozone and makes photochemical models crucial in addition to the monitoring data.

The EMEP ozone data from 2014 are presented in this report, which aims to give a short summary of the measurement data. A complete set of data, including raw data, annual statistics and monthly means, can be downloaded from the web at http://ebas.nilu.no and at http://www.nilu.no/projects/ccc

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 defined certain threshold levels for ozone. Within WHO these are called “air quality guidelines”, within EU “target value”, “long-term objective” etc. and within UN-ECE “critical levels”. The values of the various threshold levels vary among these organisations and, additionally, the health based indicators are normally based on concentration (µg/m^3) whereas those related to vegetation are based on mixing ratio (ppb). An overview of various levels relevant for vegetation and human health is given in Table 1 and Table 2, respectively.

Table 1: Limit values for the protection of vegetation.

AOT40 (ppb hours)	Period	Reference	Comment
3000	3 months	CLRTAP (2011)	Critical level for crops and natural vegetation [1)]
5000	1 April - 1 Oct	CLRTAP (2011)	Critical level for forest [1)]
6000	3.5 months	CLRTAP (2011)	Critical level for horticultural crops
9000	1 May – 1 Aug	EU (2008)	EU's target value for vegetation [2,3)]
3000	1 May - 1 Aug	EU (2008)	EU's long-term objective for vegetation [2,3)]

1) ECE's AOT values should be based on the hours with global incoming radiation > 50 W/m^2
2) EU's AOT values should be based on the period 08-20 CET
3) The EU directive uses $\mu g/m^3$ and a factor 2 $\mu g/m^3$ = 1 ppb

Table 2: Limit values for the protection of human health.

Value ($\mu g/m^3$)	Averaging time (hours)	Ref	Description
180	1	EU (2008)	EU's information threshold
240	1	EU (2008)	EU's alert threshold
120	8[1)]	EU (2008)	EU's target value. 8-hour mean value not to be exceeded on more than 25 days per year averaged over 3 years. To be fulfilled by 1.1.2010
120	8[1)]	EU (2008)	EU's long-term objective.
100	8[1)]	WHO (2006)	WHO's air quality guideline (global update 2005)

[1)] The highest 8-hour running mean value for each day calculated such that the 8-hour periods are assigned to the day on which the period ends.

Within UN-ECE scientific evidence has suggested that AOT40-based critical levels for vegetation (Gothenburg Protocol of 1999) should be replaced by stomatal flux-based critical levels. Flux based critical levels have been developed to reflect that the real impacts depend on the amount of the pollutant transported into the leaves, whereas AOT40 are only based on the concentration of ozone in the atmosphere at the top of the plant canopy (Mills et al., 2011). Concentration based critical levels (AOT_X) for estimating the risk of damage to vegetation are, however, still included where climatic data or suitable flux models are not available.

The concentration based critical level is 3000 ppb h (3-months period) for agricultural crops and (semi-)natural vegetation and 5000 ppb h (6-months period) for forest trees. The former critical level for forest was 10 000 ppb h, and the new, lower level is seen as a clear improvement compared to the former level (CLRTAP, 2011). The "Modelling and mapping manual" strongly recommends that the critical levels should be based on the concentrations at the canopy height whereas the measurements normally are taken at 2 m height above ground. When meteorological measurements are not available it is recommended to adjust the measured data to values relevant for the canopy height by applying a given vertical profile depending on the type of vegetation.

Furthermore, the period for calculation of AOT40 should reflect the true growing season and should thus be adapted to the climate of the various regions in Europe, like specified in the Mapping Manual (CLRTAP, 2011). This leads to large

differences in the applied period, from March-May in East Mediterranean to June-August in North Europe, which in turn has major consequences for the calculated AOT values. Since the aim of the present report is to document the general status of the ozone levels and not to provide any effect based calculations, the same 3-months period (May-July) is used for all stations. This also corresponds to the period stated in the EU directive. Moreover, no adjustment of the measured values to take the canopy height into account is done in this report. The measurement data are used directly.

EU has in the ozone directive (2002/3/EC) and the ambient air quality directive (2008/50/EC) defined a number of target values and long-term objectives for the protection of vegetation and human health. The target value, to be met by 1.1.2010, for human health is 120 µg/m^3 (8h mean) which is not to be exceeded on more than 25 days per year averaged over 3 years. For protection of vegetation, AOT40 (May-July) should not exceed 18 000 µg/m^{3}h averaged over five years. In addition information should be given to the population when hourly means exceed 180 µg/m^3 and an alert warning should be issued if hourly means exceed 240 µg/m^3.

EU's long-term objective for the protection of human health defines 120 µg/m^3 as the maximum daily 8-hour mean value to occur within a calendar year. The long-term objective for the protection of vegetation is defined as an AOT40 value of 6000 µg/m^{3}h for the period May-July. Community progress towards attaining the long-term objective using the year 2020 as a benchmark shall be reviewed.

WHO has also defined certain air quality guidelines for the protection of human health and provided a global update of these levels including a new guideline for ground-level ozone in 2005 (WHO, 2006). Additionally, within both WHO, EU and UN-ECE the parameter SOMO35, defined as the sum of maximum 8-hour ozone levels over 35 ppb, is used as an indicator for health effects without any specified threshold level.

New flux-based critical levels for various types of vegetation have been approved for inclusion in LRTAP Convention's modelling and mapping manual (CLRTAP, 2011). The DO_3SE model is used to estimate the stomatal ozone flux as a function of the ozone concentration at the leaf boundary layer, the transfer of ozone across this boundary layer, the stomatal conductance to ozone and the ozone deposition to the leaf cuticle. The accumulated stomatal flux over a specified time interval is estimated by the parameter POD_Y (the Phytotoxic Ozone Dose over a threshold flux of Y nmol m^{-2} PLA s^{-1}|). In this context, Y represents a detoxification threshold, below which it is assumed that any ozone absorbed by the plant will be detoxified. Thus, POD_Y can be described as the "effective dose" or "effective flux". POD_Y is the flux-based analogy to the concentration based AOT_x.

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, 1984; Grennfelt et al., 1988 and 1989).

This report presents surface ozone data measured at rural background EMEP sites during 2014 with emphasis on statistical summaries and geographical distributions. Earlier reports are listed in Annex 5.

Table 3 and Figure 1 show the location of the monitoring stations reporting data from whole or part of 2014. In total 137 stations from 28 different countries reported data. One of these sites (Ispra), is operated by the Commission of the European communities in Italy.

Table 3: List of EMEP ozone monitoring stations in operation 2014.

Code	Station name	Latitude	Longitude	Altitude
AT0002R	Illmitz	47°46'00"N	16°46'00"E	117
AT0005R	Vorhegg	46°40'40"N	12°58'20"E	1020
AT0030R	Pillersdorf bei Retz	48°43'16"N	15°56'32"E	315
AT0032R	Sulzberg	47°31'45"N	09°55'36"E	1020
AT0034G	Sonnblick	47°03'16"N	12°57'30"E	3106
AT0038R	Gerlitzen	46°41'37"N	13°54'54"E	1895
AT0040R	Masenberg	47°20'53"N	15°52'56"E	1170
AT0041R	Haunsberg	47°58'23"N	13°00'58"E	730
AT0042R	Heidenreichstein	48°52'43"N	15°02'48"E	570
AT0043R	Forsthof	48°06'22"N	15°55'10"E	581
AT0045R	Dunkelsteinerwald	48°22'16"N	15°32'48"E	320
AT0046R	Gänserndorf	48°20'05"N	16°43'50"E	161
AT0047R	Stixneusiedl	48°03'03"N	16°40'36"E	240
AT0048R	Zoebelboden	47°50'19"N	14°26'29"E	899
AT0049R	Grebenzen bei St. Lamprecht	47°02'25"N	14°19'48"E	1648
AT0050R	Graz Lustbuehel	47°04'01"N	15°29'37"E	481
BE0001R	Offagne	49°52'40"N	05°12'13"E	430
BE0032R	Eupen	50°37'46"N	06°00'04"E	295
BE0035R	Vezin	50°30'12"N	04°59'22"E	160
BG0053R	Rojen peak	41°41'45"N	24°44'19"E	1750
CH0001G	Jungfraujoch	46°32'51"N	07°59'06"E	3578
CH0002R	Payerne	46°48'47"N	06°56'41"E	489
CH0003R	Tänikon	47°28'47"N	08°54'17"E	539
CH0004R	Chaumont	47°02'59"N	06°58'46"E	1137
CH0005R	Rigi	47°04'03"N	08°27'50"E	1031
CY0002R	Ayia Marina	35°02'21"N	33°03'29"E	532
CZ0001R	Svratouch	49°44'00"N	16°03'00"E	737
CZ0003R	Košetice	49°35'00"N	15°05'00"E	534
CZ0005R	Churanov	49°04'00"N	13°36'00"E	1118
CZ0007R	Kresin u Pacova	49°34'60"N	15°04'60"E	534
DE0001R	Westerland	54°55'32"N	08°18'35"E	12
DE0002R	Waldhof	52°48'08"N	10°45'34"E	74
DE0003R	Schauinsland	47°54'53"N	07°54'31"E	1205
DE0007R	Neuglobsow	53°10'00"N	13°02'00"E	62
DE0008R	Schmücke	50°39'00"N	10°46'00"E	937
DE0009R	Zingst	54°26'00"N	12°44'00"E	1
DK0005R	Keldsnor	54°44'00"N	10°44'00"E	10
DK0010G	Nord, Greenland	81°36'00"N	16°40'12"W	20
DK0012R	Risoe	55°41'37"N	12°05'09"E	3

Table 3, cont.

Code	Station name	Latitude	Longitude	Altitude
EE0009R	Lahemaa	59°30'00"N	25°54'00"E	32
EE0011R	Vilsandi	58°23'00"N	21°49'00"E	6
ES0001R	San Pablo de los Montes	39°32'52"N	04°20'55"W	917
ES0005R	Noya	42°43'41"N	05°55'25"W	683
ES0006R	Mahón	39°52'00"N	04°19'00"E	78
ES0007R	Víznar	37°14'00"N	03°32'00"W	1265
ES0008R	Niembro	43°26'32"N	04°51'01"W	134
ES0009R	Campisábalos	41°16'52"N	03°08'34"W	1360
ES0010R	Cabo de Creus	42°19'10"N	03°19'01"E	23
ES0011R	Barcarrota	38°28'33"N	06°55'22"W	393
ES0012R	Zarra	39°05'10"N	01°06'07"W	885
ES0013R	Penausende	41°17'00"N	05°52'00"W	985
ES0014R	Els Torms	41°24'00"N	00°43'00"E	470
ES0016R	O Saviñao	43°13'52"N	07°41'59"W	506
ES0017R	Doñana	37°01'50"N	06°19'55"W	5
FI0009R	Utö	59°46'45"N	21°22'38"E	7
FI0018R	Virolahti III	60°31'48"N	027°40'03"E	4
FI0022R	Oulanka	66°19'13"N	29°24'06"E	310
FI0037R	Ähtäri II	62°35'00"N	24°11'00"E	180
FI0096G	Pallas (Sammaltunturi)	68°00'00"N	24°09'00"E	340
FR0008R	Donon	48°30'00"N	07°08'00"E	775
FR0009R	Revin	49°54'00"N	04°38'00"E	390
FR0010R	Morvan	47°16'00"N	04°05'00"E	620
FR0013R	Peyrusse Vieille	43°37'00"N	00°11'00"E	200
FR0014R	Montandon	47°18'00"N	06°50'00"E	836
FR0015R	La Tardière	46°39'00"N	00°45'00"W	133
FR0016R	Le Casset	45°00'00"N	06°28'00"E	1750
FR0017R	Montfranc	45°48'00"N	02°04'00"E	810
FR0018R	La Coulonche	48°38'00"N	00°27'00"W	309
FR0019R	Pic du Midi	42°56'12"N	00°08'31"E	2877
FR0023R	Saint-Nazaire-le-Désert	44°34'10"N	005°16'44"E	605
FR0025R	Verneuil	46°48'53"N	002°36'36"E	182
FR0030R	Puy de Dôme	45°46'00"N	02°57'00"E	1465
GB0002R	Eskdalemuir	55°18'47"N	03°12'15"W	243
GB0006R	Lough Navar	54°26'35"N	07°52'12"W	126
GB0013R	Yarner Wood	50°35'47"N	03°42'47"W	119
GB0014R	High Muffles	54°20'04"N	00°48'27"W	267
GB0015R	Strath Vaich Dam	57°44'04"N	04°46'28"W	270
GB0031R	Aston Hill	52°30'14"N	03°01'59"W	370
GB0033R	Bush	55°51'31"N	03°12'18"W	180
GB0035R	Great Dun Fell	54°41'00"N	02°27'00"W	847
GB0036R	Harwell	51°34'23"N	01°19'00"W	137
GB0037R	Ladybower Res.	53°23'56"N	01°45'12"W	420
GB0038R	Lullington Heath	50°47'34"N	00°10'46"E	120
GB0039R	Sibton	52°17'38"N	01°27'47"E	46
GB0043R	Narberth	51°14'00"N	04°42'00"W	160
GB0045R	Wicken Fen	52°17'54"N	00°17'34"W	5
GB0048R	Auchencorth Moss	55°47'32"N	03°14'34"W	260
GB0049R	Weybourne	52°57'02"N	01°07'19"E	16
GB0050R	St. Osyth	51°46'41"N	01°04'56"E	8
GB0053R	Charlton Mackrell	51°03'23"N	02°41'00"W	54
GR0001R	Aliartos	38°22'00"N	23°05'00"E	110
GR0002R	Finokalia	35°19'00"N	25°40'00"E	250
HU0002R	K-puszta	46°58'00"N	19°35'00"E	125
IE0001R	Valentia Observatory	51°56'23"N	10°14'40"W	11
IE0031R	Mace Head	53°10'00"N	09°30'00"W	15
IT0001R	Montelibretti	42°06'00"N	12°38'00"E	48
IT0004R	Ispra	45°48'00"N	08°38'00"E	209
LT0015R	Preila	55°21'00"N	21°04'00"E	5
LV0010R	Rucava	56°09'43"N	21°10'23"E	18
LV0016R	Zoseni	57°08'07"N	25°54'20"E	188
MK0007R	Lazaropole	41°32'10"N	20°41'38"E	1332
MT0001R	Giordan lighthouse	36°04'24"N	14°13'09"E	167
NL0007R	Eibergen	52°05'00"N	06°34'00"E	20
NL0009R	Kollumerwaard	53°20'02"N	06°16'38"E	1
NL0010R	Vredepeel	51°32'28"N	05°51'13"E	28

Table 3, cont.

Code	Station name	Latitude	Longitude	Altitude
NL0091R	De Zilk	52°18'00"N	04°30'00"E	4
NL0644R	Cabauw Wielsekade	51°58'28"N	04°55'25"E	1
NO0002R	Birkenes II	58°23'19"N	08°15'07"E	219
NO0015R	Tustervatn	65°50'00"N	13°55'00"E	439
NO0039R	Kårvatn	62°47'00"N	08°53'00"E	210
NO0042G	Zeppelin mountain (Ny-Ålesund)	78°54'24"N	11°53'18"E	474
NO0043R	Prestebakke	59°00'00"N	11°32'00"E	160
NO0052R	Sandve	59°12'00"N	05°12'00"E	15
NO0056R	Hurdal	60°22'21"N	11°04'41"E	300
PL0002R	Jarczew	51°49'00"N	21°59'00"E	180
PL0003R	Sniezka	50°44'00"N	15°44'00"E	1603
PL0004R	Leba	54°45'00"N	17°32'00"E	2
PL0005R	Diabla Gora	54°09'00"N	22°04'00"E	157
RO0008R	Poiana Stampei	47°19'29"N	25°08'05"E	908
SE0005R	Bredkälen	63°51'00"N	15°20'00"E	404
SE0011R	Vavihill	56°01'00"N	13°09'00"E	175
SE0012R	Aspvreten	58°48'00"N	17°23'00"E	20
SE0013R	Esrange	67°53'00"N	21°04'00"E	475
SE0014R	Råö	57°23'38"N	11°54'50"E	5
SE0018R	Asa	57°09'52"N	014°46'57"E	180
SE0019R	Östad	57°57'09"N	012°24'11"E	65
SE0032R	Norra-Kvill	57°49'00"N	15°34'00"E	261
SE0035R	Vindeln	64°15'00"N	19°46'00"E	225
SE0039R	Grimsö	59°43'41"N	15°28'19"E	132
SI0008R	Iskrba	45°34'00"N	14°52'00"E	520
SI0031R	Zarodnje	46°25'43"N	15°00'12"E	770
SI0032R	Krvavec	46°17'58"N	14°32'19"E	1740
SI0033R	Kovk	46°07'43"N	15°06'50"E	600
SK0002R	Chopok	48°56'00"N	19°35'00"E	2008
SK0004R	Stará Lesná	49°09'00"N	20°17'00"E	808
SK0006R	Starina	49°03'00"N	22°16'00"E	345
SK0007R	Topolniky	47°57'36"N	17°51'38"E	113

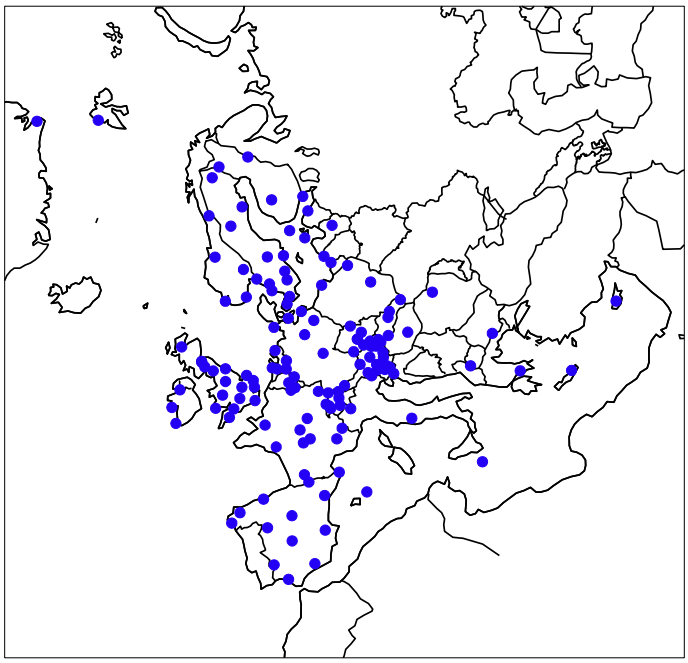

Figure 1: Location of the monitoring stations.

Until 10/09/2008, ozone has been measured at four different heights at Donon. Since 11/09/2008 ozone is measured at one sampling height, 3.5 m, at a new site next to the old deleted tower.

The monitoring stations are selected by the countries. Information about the ozone data quality, calibration and maintenance procedures was in 2000 collected from the participants (Aas et al., 2000). An updated document, "Overview of the routines for calibration and maintenance", is also available under ozone section at http://www.nilu.no/projects/ccc/emepdata.html.

A report on station representativeness has been written for the GEOmon project (Henne et al., 2010). The report can be downloaded at http://geomon.empa.ch/index.php#data.

The UV absorption method is the only measurement method in use in 2014.

All data presented in this report are given in µg/m^3. The conversion factor used to calculate from ppb to µg/m^3 is given in Table 4. Most countries use a conversion factor of 2.0, which corresponds to 20°C and 1013 hPa. Switzerland uses the mean annual conditions at Jungfraujoch (-8°C, 653 mbar). A number of countries report ozone data in ppb, and in this case the data are converted to µg/m^3 by multiplying by 2.0 at the CCC.

Table 4: Conversion factor ppb – µg/m^3.

Country	Conversion factor
Armenia	
Austria	2.0
Belgium	
Bulgaria	
Cyprus	2.0
Czech Republic	2.0
Denmark	2.0
Estonia	2.14
Finland	2.0
France	2.0
Germany	2.0
Greece (Aliartos)	1.96
Greece (Finokalia)	reported in ppb
Hungary	2.0
Ireland (Mace Head)	reported in ppb
Italy (Ispra)	2.0
Italy (Montelibretti)	reported in ppb
Latvia	2.0
Lithuania	2.0
Malta	reported in ppb
Netherlands	2.0
Norway	2.0
Poland	2.0
Romania	unknown
Slovakia	reported in ppb
Slovenia	2.0
Spain	2.0
Sweden	2.0
Switzerland	1.96
United Kingdom	reported in ppb

4. Data completeness

The annual data capture (number of valid measurements in per cent of the total number of measurements) for each station is given in Table 5. The data capture is in general good. 120 stations have a data capture above 90% and 126 above 85%.

Table 5: Data capture in per cent, 2014.

Code	Station	Data capture 2014
AT0002R	Illmitz	95.3
AT0005R	Vorhegg	94.9
AT0030R	Pillersdorf bei Retz	94.5
AT0032R	Sulzberg	95.1
AT0034G	Sonnblick	73.7
AT0038R	Gerlitzen	95.4
AT0040R	Masenberg	94.9
AT0041R	Haunsberg	94.7
AT0042R	Heidenreichstein	95.4
AT0043R	Forsthof	95.2
AT0045R	Dunkelsteinerwald	90.4
AT0046R	Gänserndorf	95.5
AT0047R	Stixneusiedl	95.5
AT0048R	Zoebelboden	91.8
AT0049R	Grebenzen bei St. Lamprecht	95.5
AT0050R	Graz Lustbuehel	94.3
BE0001R	Offagne	93.8
BE0032R	Eupen	94.7
BE0035R	Vezin	91.7
BG0053R	Rojen peak	93.2
CH0001G	Jungfraujoch	95
CH0002R	Payerne	98
CH0003R	Tänikon	99.2
CH0004R	Chaumont	99.3
CH0005R	Rigi	99.3
CY0002R	Ayia Marina	97
CZ0001R	Svratouch	99.6
CZ0003R	Kosetice	94.8
CZ0005R	Churanov	96.7
CZ0007R	Kresin u Pacova	89.6
DE0001R	Westerland	95.5
DE0002R	Waldhof	95.3
DE0003R	Schauinsland	95.3
DE0007R	Neuglobsow	95.1
DE0008R	Schmücke	94.1
DE0009R	Zingst	94.8
DK0005R	Keldsnor	82.6
DK0010G	Villum Research Station, Station Nord	68.3
DK0012R	Risoe	91.4
EE0009R	Lahemaa	99.9
EE0011R	Vilsandi	98.5

Table 5, cont.

Code	Station	Data capture 2014
ES0001R	San Pablo de los Montes	99.2
ES0005R	Noya	99.1
ES0006R	Mahón	97.4
ES0007R	Víznar	97.6
ES0008R	Niembro	96.1
ES0009R	Campisabalos	98.8
ES0010R	Cabo de Creus	97.1
ES0011R	Barcarrota	96.8
ES0012R	Zarra	98.2
ES0013R	Penausende	96.2
ES0014R	Els Torms	98.5
ES0016R	O Saviñao	97.8
ES0017R	Doñana	97.5
FI0009R	Utö	82
FI0018R	Virolahti III	97.1
FI0022R	Oulanka	92
FI0037R	Ähtäri II	99
FI0096G	Pallas (Sammaltunturi)	95
FR0008R	Donon	99.6
FR0009R	Revin	95.5
FR0010R	Morvan	92.8
FR0013R	Peyrusse Vieille	97.2
FR0014R	Montandon	99.5
FR0015R	La Tardière	96.6
FR0016R	Le Casset	95.9
FR0017R	Montfranc	99.1
FR0018R	La Coulonche	98.7
FR0019R	Pic du Midi	91.1
FR0023R	Saint-Nazaire-le-Désert	97.1
FR0025R	Verneuil	99.3
FR0030R	Puy de Dôme	81.3
GB0002R	Eskdalemuir	99.3
GB0006R	Lough Navar	99
GB0013R	Yarner Wood	94.8
GB0014R	High Muffles	92.4
GB0015R	Strath Vaich Dam	87.3
GB0031R	Aston Hill	99.2
GB0033R	Bush	96.3
GB0035R	Great Dun Fell	98.2
GB0036R	Harwell	98.7
GB0037R	Ladybower Res.	97.3
GB0038R	Lullington Heath	98.7
GB0039R	Sibton	99.4
GB0043R	Narberth	98.4
GB0045R	Wicken Fen	77
GB0048R	Auchencorth Moss	98.9
GB0049R	Weybourne	99.9
GB0050R	St. Osyth	98.2
GB0053R	Charlton Mackrell	99.6
GR0001R	Aliartos	27.7
GR0002R	Finokalia	97.7
HU0002R	K-puszta	98.9

Table 5, cont.

Code	Station	Data capture 2014
IE0001R	Valentia Observatory	88.1
IE0031R	Mace Head	99.7
IT0001R	Montelibretti	91.6
IT0004R	Ispra	83
LT0015R	Preila	96.8
LV0010R	Rucava	91.5
LV0016R	Zoseni	98.4
MK0007R	Lazaropole	40.7
MT0001R	Giordan lighthouse	94.7
NL0007R	Eibergen	98.7
NL0009R	Kollumerwaard	97.5
NL0010R	Vredepeel	96.1
NL0091R	De Zilk	96.1
NL0644R	Cabauw Wielsekade	98.6
NO0002R	Birkenes II	85.2
NO0015R	Tustervatn	99.6
NO0039R	Kårvatn	99.5
NO0042G	Zeppelin mountain (Ny-Ålesund)	99.2
NO0043R	Prestebakke	99.4
NO0052R	Sandve	99.2
NO0056R	Hurdal	99.5
PL0002R	Jarczew	99.7
PL0003R	Sniezka	99.6
PL0004R	Leba	99.9
PL0005R	Diabla Gora	95
RO0008R	Poiana Stampei	57
SE0005R	Bredkälen	93.8
SE0011R	Vavihill	99.6
SE0012R	Aspvreten	98.3
SE0013R	Esrange	99.6
SE0014R	Råö	99.1
SE0018R	Asa	86
SE0019R	Östad	99.7
SE0032R	Norra-Kvill	99.4
SE0035R	Vindeln	99.5
SE0039R	Grimsö	97.9
SI0008R	Iskrba	94.7
SI0031R	Zarodnje	93.2
SI0032R	Krvavec	94.3
SI0033R	Kovk	92.4
SK0002R	Chopok	52.4
SK0004R	Stará Lesná	89.2
SK0006R	Starina	99.3
SK0007R	Topolniky	99.8

Missing data in the measurement series may be critical, especially in summer when the highest ozone concentrations occur. 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 data capture

of 85% is required and an adjustment proportional to the number of missing data is applied, i.e. exposure index divided by the fraction of data available. This correction gives 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% is regarded as sufficient for the mapping.

5. Concentration summaries and episodes

The number of ozone exceedances in 2014 was lower than in many previous years, continuing the long-term downward trend observed over the last 25 years (EEA, 2015). During the past decade, the summers of 2003 and 2006 had very large number of exceedances, principally due to very warm weather (EEA, 2011).

The highest one-hour ozone concentration in 2014 was measured at Illmitz in Austria (194 µg/m^3, June 11) (Table 1.1, Annex 1). In total concentrations above 180 µg/m^3 were measured at seven sites (Illmitz, Austria; Rigi, Switzerland, Sibton and St. Osyth, United Kingdom; Ispra, Italy, Vredeped and De Zilk, Netherlands). The lowest maximum concentrations were measured at the Arctic stations Zeppelin mountain in Svalbard (95 µg/m^3) and Villum research station in Greenland (100 µg/m^3).

Exceedances of the information threshold of 180 µg/m^3 were only observed at seven sites, compared to 24 sites in 2013. The unusual warm summers of 2003 and 2006 had 81 and 69 exceedances respectively.

Table 1.2 in Annex 1 shows the 25-, 50-, 75-, 90-, 95-, 98- and 99-percentiles for the period April-September. Graphical distributions of the 99-percentiles and 95-percentiles for stations with data capture higher than 75% are shown in Figure 1.1 and 1.2 in Annex 1. The lowest values are found in Norway, Finland and United Kingdom, where the 99-percentiles are below 110 µg/m^3. The concentrations are higher in Denmark, Sweden and the Baltics, where the 99-percentiles generally ranges from 110-120 µg/m^3, and at its highest in Switzerland and Austria where the 99-percentile values are above 130 µg/m^3.

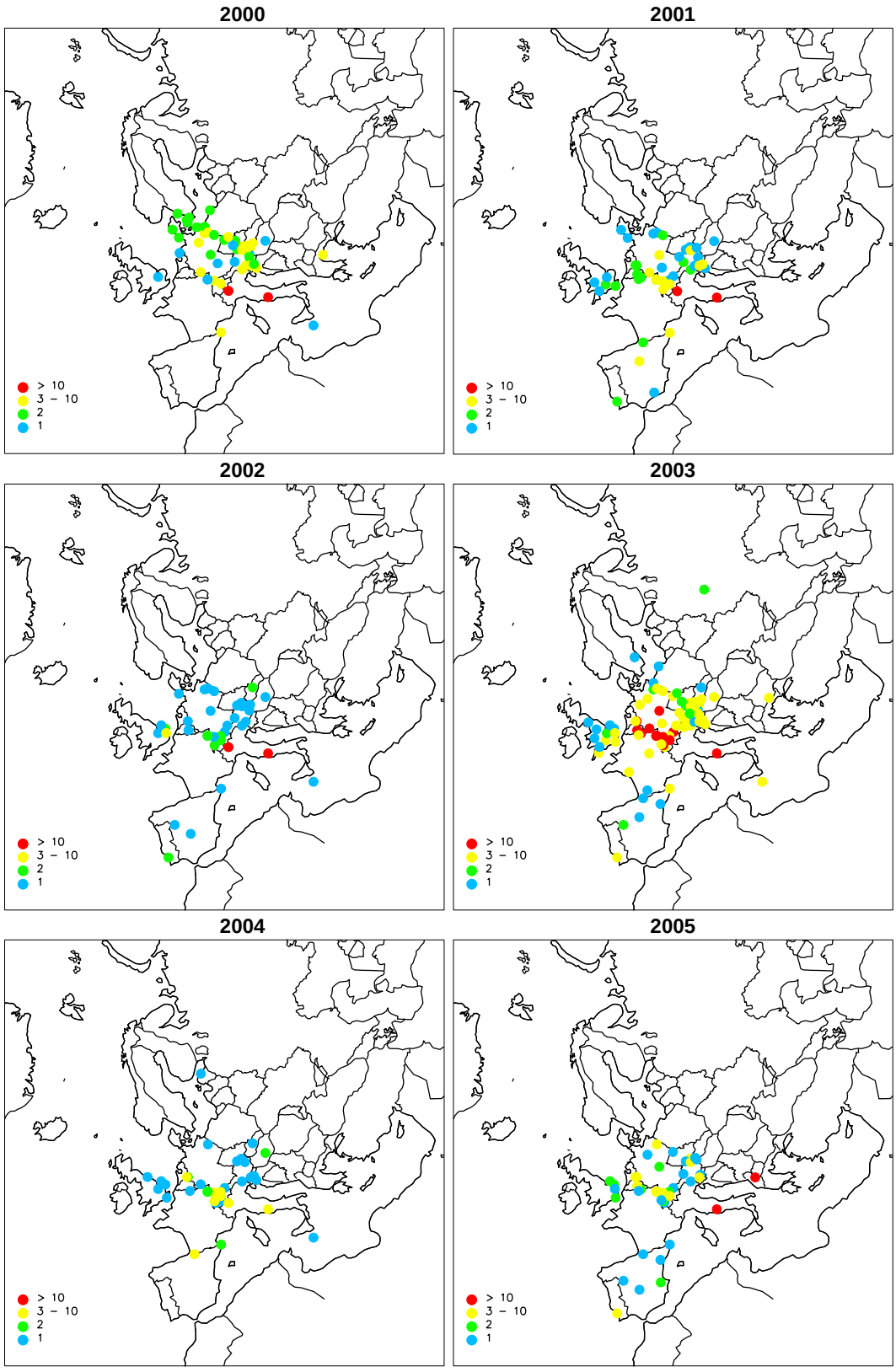

Figure 2: Number of exceedances of the threshold value of 180 µg/m^3 2000-2014. (Unit: number of days.) Stations with zero exceedances are not shown.

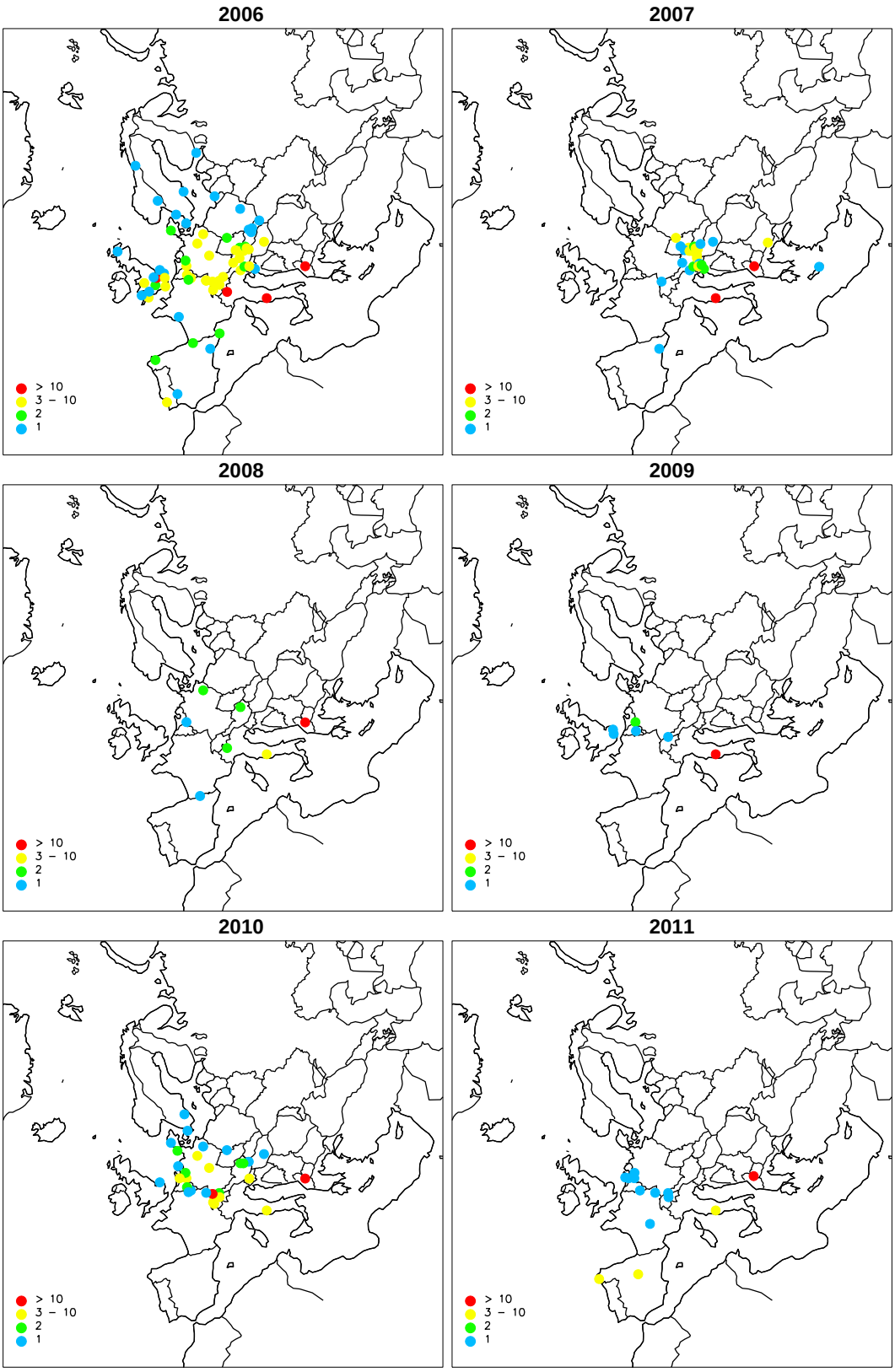

Figure 2, cont.

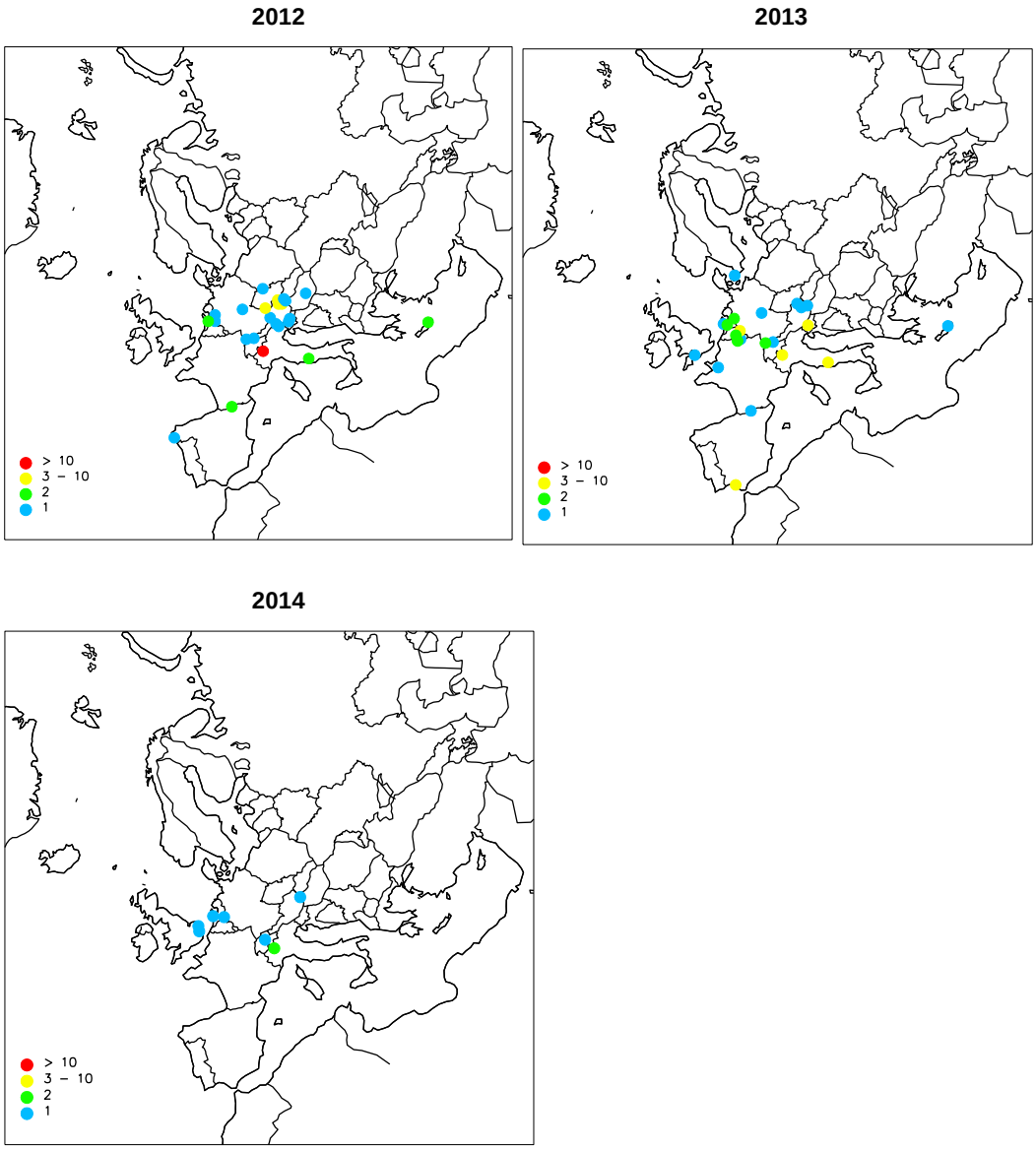

Figure 2, cont.

6. Calculation of AOT40

AOT40 and AOT60 for forest and agricultural crops for 2014 are shown in Table 2.1 and Table 2.2 in Annex 2, and the corresponding geographical distributions of AOT40 and AOT60 are shown in Figure 2.1–2.4. AOT values are calculated using daylight hours only, based on an estimated global radiation above 50 W/m^2 assuming clear skies. The maps of AOT40 show a general increasing gradient from west to east and from north to south. Low values are found in most parts of Northern Europe, while the highest values are found in Central Europe. Three sites in Europe (Austria, Greece and Macedonia) had AOT40 (May-July) values above 15 000 ppbh. The critical level for forest (5 000 ppbh) was exceeded at most sites in Central, Eastern and Southern Europe.

7. Seasonal variation

Monthly mean concentrations and data capture for 2014 are given in Table 3.1 (Annex 3). The concentrations show a clear pattern with maximum values during spring or early summer and minimum in winter. The seasonal variation is the net result of a number of processes such as dry deposition, photochemical loss (titration with NO_x) and formation, and varying influx from the stratosphere as well as varying background ozone concentrations. Plots of the seasonal variations 1990-2014 are given in Figure 3.1 in Annex 3. 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 spring 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 average diurnal variation of surface ozone for summer (April-September) 2014 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 Austria, 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 the diurnal cycle of the mixing height and photochemical generation of ozone during daytime. 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 Spitsbergen shows no diurnal variation. Elevated sites like 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 quality assured and quality controlled data at present. If errors are detected in the future, 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 August 29th, 2016.

All EMEP measurement data can be downloaded online at http://ebas.nilu.no or sent upon request to annehj@nilu.no. Information on EMEP and the measurement network are available at http://www.emep.int and http://www.nilu.no/projects/ccc.

10. References

Aas, W., Hjellbrekke, A.-G., Schaug, J. (2000) Data quality 1998, quality assurance and field comparisons. Kjeller, Norwegian Institute for Air Research (EMEP/CCC-Report 6/2000).

Ashmore, M.R., Wilson, R.B., eds. (1992) Critical levels of air pollutants for Europe. Background papers prepared for UN-ECE workshop on critical levels, Egham, U.K. 23-26 March 1992. London, Department of the Environment.

Bojkov, R.D. (1986) Surface ozone during the second half of the nineteenth century. *J. Clim. Appl. Meteorol., 25*, 343-352.

CLRTAP (2011) Mapping critical levels for vegetation. In: *Manual on methodologies and criteria for modelling and mapping critical loads and levels and air pollution effects, risks and trend, chapter 3*. URL: http://icpvegetation.ceh.ac.uk/manuals/mapping_manual.html.

EEA (2011) Air pollution by ozone across Europe during summer 2010. Copenhagen, European Environment Agency (EEA Technical report No 6/2011). URL: http://www.eea.europa.eu/publications/air-pollution-by-ozone-across.

EEA (2015) Summer 2014 ozone assessment. Copenhagen, European Environment Agency. URL: http://www.eea.europa.eu/themes/air/ozone/air-pollution-by-ozone-across.

Forberg, E., Aarnes, H., Nilsen, S., Semb, A. (1987) Effect of ozone on net photosynthesis in oat (*Avena sativa*) and duckweed (*Lemna gibba*). *Environ. Poll., 47*, 285-291.

Führer, J., Achermann, B., eds. (1994) Critical levels for ozone. A UN-ECE workshop report. Bern, Swiss Federal Station for Agricultural Chemistry.

Grennfelt, P., Hoem, K., Saltbones, J., Schjoldager, J. (1989) Oxidant data collection in OECD-Europe 1985-87 (OXIDATE). Report on ozone, nitrogen dioxide and peroxyacetyl nitrate. October 1986-March 1987, April-September 1987 and October-December 1987. Lillestrøm (NILU OR 63/89).

Grennfelt, P., Saltbones, J., Schjoldager, J. (1988) Oxidant data collection in OECD-Europe 1985-87 (OXIDATE). Report on ozone, nitrogen dioxide and peroxyacetyl nitrate. October 1985 – March 1986 and April – September 1986. Lillestrøm (NILU OR 31/88).

Grennfelt, P., Schjoldager, J. (1984) Photochemical oxidants in the troposphere: a mounting menace. *Ambio, 13*, 61-67.

Henne, S., Brunner, D., Folini, D., Solberg, S., Klausen, J., Buchmann, B. (2010) Report on supersite representativeness and representativeness assessment method. *Atmos. Chem. Phys., 10*, 3561-3581.

Kärenlampi, L., Skärby, L., eds. (1996) Critical levels for ozone in Europe. Testing and finalizing the concepts. UN-ECE Workshop Report. Kuopio, University of Kuopio.

Mills, G., Pleijel, H., Braun, S., Büker, P., Bermejo, V., Calvo, E., Danielsson, H., Emberson, L., González Fernández, I., Grünhage L., Harmens, H., Hayes, F., Karlsson, P.-E., Simpson, D. (2011) New stomatal flux-based critical levels for ozone effects on vegetation. *Atmos. Environ., 45*, 5064-5068. doi:10.1016/j.atmosenv.2011.06.009.

Roemer, M., Boersen, G., Builtjes, P., Esser, P. (1996) The budget of ozone and precursors over Europe calculated with the LOTOS-model. In: *Trends of tropospheric ozone over Europe*. By M. Roemer. Amsterdam, University of Utrecht. pp. 93-116.

Volz, A., Kley, D. (1988) Evaluation of the Montsouris series of ozone measurements made in the nineteenth century. *Nature, 332*, 240-242.

WHO (2006) Air quality guidelines. Global update 2005. Particulate matter, ozone, nitrogen dioxide and sulfur dioxide. Copenhagen, World Health Organization Regional Office for Europe, 2006.

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Closer at home the secretarial work, and far beyond, has been performed by Berit Modalen. Ann Mari Fjæraa, Rita Larsen Våler and Mona Waagsbø have been very helpful with data flow and database maintenance.

12. List of participating institutions

Armenia	Environmental Impact Monitoring Centre
Austria	Umweltbundesamt Provincial Government of Tyrol Provincial Government of Carinthia Environment Institute Vorarlberg Provincial Government Styria Provincial Government Salzburg Provincial Government Lower Austria
Belgium	CELINE – IRCEL
Bulgaria	Executive Environment Agency
Commission of the European Communities	Joint Research Center. Ispra Establishment
Cyprus	Ministry of Labour and Social Insurance
Czech Republic	Czech Hydrometeorological Institute
Denmark	Department of Environmental Science, Aarhus University
Estonia	Estonian Environmental Research Laboratory Ltd.
Finland	Finnish Meteorological Institute (FMI)
France	l' Ecole des Mines de Douai
Germany	Umweltbundesamt
Greece	Environmental Chemical Processes Laboratory, University of Crete Ministry of Environmental Physical Planning and Public Works
Hungary	Meteorological Service, Institute for Atmospheric Physics, Dep. for Air Chemistry
Ireland	Environmental Protection Agency (EPA) Ricardo – AEA
Italy	C.N.R. Istituto Inquinamento Atmosferico
Latvia	Latvian Environment, Geology and Meteorology Agency
Lithuania	Center for Physical Sciences and Technology
Macedonia	Ministry of Environment and Physical Planning
Malta	University of Malta
Netherlands	National Institute for Public Health and Environmental Protection (RIVM)
Norway	Norwegian Institute for Air Research (NILU)
Poland	Institute of Meteorology and Water Management Institute of Environmental Protection
Portugal	Instituto de Meteorologica
Romania	National Environmental Protection Agency
Slovakia	Slovak Hydrometeorological Institute
Slovenia	Slovenian Environment Agency
Spain	Dirección General de Calidad y Evaluacíon Ambiental
Sweden	Swedish Environmental Research Institute (IVL)
Switzerland	Swiss Federal Laboratory of Testing Materials and Research (EMPA)
United Kingdom	Ricardo – AEA

Annex 1

Concentration summaries and episodes, tables and figures

Table 1.1: Number of hours (h) and days (d) exceeding 120, 150, 180 and 200 μg/m³ and maximum concentrations in 2014.

Code	Station	Total		>120		>150		>180		>200		Max concentrations	
		hours	days	hours	days	hours	days	hours	days	hours	days	μg/m³	day(s)
AT0002R	Illmitz	8346	365	164	36	7	2	2	1	0	0	194	2014-06-11
AT0005R	Vorhegg	8311	365	98	25	0	0	0	0	0	0	144	2014-07-19
AT0030R	Pillersdorf bei Retz	8280	365	142	33	10	2	0	0	0	0	172	2014-06-11
AT0032R	Sulzberg	8332	365	152	28	0	0	0	0	0	0	144	2014-07-17
AT0034G	Sonnblick	6455	283	271	34	0	0	0	0	0	0	148	2014-03-11
AT0038R	Gerlitzen	8359	365	446	57	1	1	0	0	0	0	157	2014-06-11
AT0040R	Masenberg	8310	364	249	37	0	0	0	0	0	0	143	2014-05-02
AT0041R	Haunsberg	8298	363	134	21	4	1	0	0	0	0	158	2014-06-11
AT0042R	Heidenreichstein	8359	365	131	29	3	2	0	0	0	0	163	2014-06-10
AT0043R	Forsthof	8343	365	163	32	2	1	0	0	0	0	158	2014-06-08
AT0045R	Dunkelsteinerwald	7917	353	149	31	7	4	0	0	0	0	175	2014-06-10
AT0046R	Gänserndorf	8367	365	163	35	6	2	0	0	0	0	163	2014-06-11
AT0047R	Stixneusiedl	8367	365	134	32	8	2	0	0	0	0	173	2014-06-11
AT0048R	Zoebelboden	8043	354	141	24	8	1	0	0	0	0	162	2014-06-11
AT0049R	Grebenzen bei St. Lamprecht	8369	365	416	50	3	1	0	0	0	0	154	2014-06-12
AT0050R	Graz Lustbuehel	8261	362	87	18	0	0	0	0	0	0	139	2014-05-22
BE0001R	Offagne	8215	354	28	8	0	0	0	0	0	0	139.5	2014-07-18
BE0032R	Eupen	8293	359	77	14	0	0	0	0	0	0	144.5	2014-05-21
BE0035R	Vezin	8036	356	58	17	2	1	0	0	0	0	156.5	2014-07-23
BG0053R	Rojen peak	8166	362	54	19	0	0	0	0	0	0	134.5	2014-08-09
CH0001G	Jungfraujoch	8323	362	4	1	0	0	0	0	0	0	132.4	2014-04-16
CH0002R	Payerne	8587	361	146	34	3	1	0	0	0	0	151.3	2014-06-12
CH0003R	Tänikon	8693	365	152	33	2	1	0	0	0	0	150.7	2014-06-12
CH0004R	Chaumont	8701	365	328	44	8	3	0	0	0	0	161.8	2014-06-11
CH0005R	Rigi	8695	365	285	46	19	6	1	1	0	0	187	2014-06-11
CY0002R	Ayia Marina	8501	365	424	79	0	0	0	0	0	0	143.7	2014-07-04
CZ0001R	Svratouch	8729	365	117	20	0	0	0	0	0	0	143.4	2014-06-11
CZ0003R	Kosetice	8304	355	100	21	0	0	0	0	0	0	140.4	2014-06-11
CZ0005R	Churanov	8475	358	157	25	1	1	0	0	0	0	163.2	2014-07-18
CZ0007R	Kresin u Pacova	7845	330	188	30	6	2	0	0	0	0	158.9	2014-07-18

Table 1.1, cont.

Code	Station	Total		>120		>150		>180		>200		Max concentrations	
		hours	days	hours	days	hours	days	hours	days	hours	days	μg/m^3	day(s)
DE0001R	Westerland	8367	365	80	18	2	1	0	0	0	0	152	2014-07-05
DE0002R	Waldhof	8351	365	154	30	28	7	0	0	0	0	172.8	2014-05-22
DE0003R	Schauinsland	8352	365	374	46	19	5	0	0	0	0	176	2014-07-17
DE0007R	Neuglobsow	8331	365	86	20	5	2	0	0	0	0	165.4	2014-07-04
DE0008R	Schmücke	8240	363	418	41	33	9	0	0	0	0	158.3	2014-06-08
DE0009R	Zingst	8303	363	42	9	4	1	0	0	0	0	152.3	2014-07-04
DK0005R	Keldsnor	7236	336	37	12	0	0	0	0	0	0	148.6	2014-07-04
DK0010G	Villum Research Station, Station Nord	5984	285	0	0	0	0	0	0	0	0	100.1	2014-04-15
DK0012R	Risoe	8010	365	83	14	9	1	0	0	0	0	172.8	2014-07-04
EE0009R	Lahemaa	8747	365	24	7	0	0	0	0	0	0	130	2014-04-22
EE0011R	Vilsandi	8626	363	44	9	0	0	0	0	0	0	130	2014-05-25
ES0001R	San Pablo de los Montes	8687	365	159	23	0	0	0	0	0	0	136.1	2014-07-28
ES0005R	Noya	8685	365	87	17	1	1	0	0	0	0	150.7	2014-03-13
ES0006R	Mahón	8531	364	40	8	0	0	0	0	0	0	136.5	2014-03-15
ES0007R	Víznar	8550	365	41	19	0	0	0	0	0	0	129.4	2014-05-07
ES0008R	Niembro	8418	360	35	10	0	0	0	0	0	0	138.8	2014-05-18
ES0009R	Campisabalos	8654	365	128	29	4	2	0	0	0	0	166.8	2014-07-16
ES0010R	Cabo de Creus	8504	364	35	11	0	0	0	0	0	0	136.3	2014-10-04
ES0011R	Barcarrota	8478	365	16	4	0	0	0	0	0	0	136.2	2014-08-18
ES0012R	Zarra	8605	365	318	62	4	1	0	0	0	0	153.2	2014-05-09
ES0013R	Penausende	8431	359	151	27	0	0	0	0	0	0	144.8	2014-09-10
ES0014R	Els Torms	8627	365	303	58	1	1	0	0	0	0	151.7	2014-06-10
ES0016R	O Saviñao	8566	364	31	7	0	0	0	0	0	0	141.5	2014-09-02
ES0017R	Doñana	8538	361	71	16	0	0	0	0	0	0	141.6	2014-05-06
FI0009R	Utö	7182	301	9	3	0	0	0	0	0	0	127.9	2014-05-22
FI0018R	Virolahti III	8505	359	40	12	3	1	0	0	0	0	178.1	2014-05-19
FI0022R	Oulanka	8063	338	5	1	0	0	0	0	0	0	133.9	2014-05-23
FI0037R	Ähtäri II	8671	365	16	2	0	0	0	0	0	0	138.5	2014-05-23
FI0096G	Pallas (Sammaltunturi)	8323	351	0	0	0	0	0	0	0	0	117.9	2014-08-07

Table 1.1, cont.

Code	Station	Total		>120		>150		>180		>200		Max concentrations	
		hours	days	hours	days	hours	days	hours	days	hours	days	µg/m^3	day(s)
FR0008R	Donon	8727	365	76	20	1	1	0	0	0	0	154	2014-07-19
FR0009R	Revin	8369	353	68	17	0	0	0	0	0	0	143	2014-07-18
FR0010R	Morvan	8127	352	49	9	0	0	0	0	0	0	141	2014-07-18
FR0013R	Peyrusse Vieille	8517	359	41	8	0	0	0	0	0	0	145	2014-06-21
FR0014R	Montandon	8716	365	42	8	0	0	0	0	0	0	150	2014-06-12
FR0015R	La Tardière	8459	358	46	11	0	0	0	0	0	0	149	2014-07-25
FR0016R	Le Casset	8397	355	210	31	0	0	0	0	0	0	145	2014-07-26
FR0017R	Montfranc	8677	364	156	24	0	0	0	0	0	0	140	2014-03-14
FR0018R	La Coulonche	8643	364	64	10	1	1	0	0	0	0	155	2014-07-24
FR0019R	Pic du Midi	7976	337	374	66	11	5	0	0	0	0	162	2014-05-07
FR0023R	Saint-Nazaire-le-Désert	8505	365	184	35	4	2	0	0	0	0	167	2014-07-18
FR0025R	Verneuil	8700	365	39	9	0	0	0	0	0	0	139	2014-06-13
FR0030R	Puy de Dôme	7122	352	251	40	3	1	0	0	0	0	155	2014-06-12
GB0002R	Eskdalemuir	8699	365	3	1	0	0	0	0	0	0	122.5	2014-05-19
GB0006R	Lough Navar	8669	364	0	0	0	0	0	0	0	0	109.1	2014-04-21
GB0013R	Yarner Wood	8307	349	10	3	0	0	0	0	0	0	145.8	2014-07-24
GB0014R	High Muffles	8091	345	14	4	0	0	0	0	0	0	142.2	2014-05-19
GB0015R	Strath Vaich Dam	7648	322	4	2	0	0	0	0	0	0	124.9	2014-04-28
GB0031R	Aston Hill	8686	365	6	2	0	0	0	0	0	0	129.9	2014-07-25
GB0033R	Bush	8440	358	0	0	0	0	0	0	0	0	112.3	2014-05-18
GB0035R	Great Dun Fell	8600	362	3	1	0	0	0	0	0	0	136.6	2014-07-19
GB0036R	Harwell	8645	363	9	2	0	0	0	0	0	0	129.9	2014-05-18
GB0037R	Ladybower Res.	8520	361	1	1	0	0	0	0	0	0	120.6	2014-05-19
GB0038R	Lullington Heath	8647	365	4	1	0	0	0	0	0	0	127.6	2014-05-18
GB0039R	Sibton	8711	365	21	4	8	1	2	1	0	0	193.9	2014-07-18
GB0043R	Narberth	8616	364	1	1	0	0	0	0	0	0	123.7	2014-05-17
GB0045R	Wicken Fen	6742	287	10	1	5	1	0	0	0	0	164.5	2014-07-18
GB0048R	Auchencorth Moss	8668	365	0	0	0	0	0	0	0	0	105.1	2014-05-18
GB0049R	Weybourne	8753	365	36	7	3	2	0	0	0	0	152.1	2014-07-19
GB0050R	St. Osyth	8605	365	21	6	5	1	2	1	0	0	188.2	2014-07-18
GB0053R	Charlton Mackrell	8724	365	4	1	0	0	0	0	0	0	131.1	2014-07-24
GR0001R	Aliartos	2430	105	63	11	11	3	0	0	0	0	156	2014-03-15
GR0002R	Finokalia	8557	363	1099	118	7	4	0	0	0	0	155.6	2014-08-10

Table 1.1, cont.

Code	Station	Total		>120		>150		>180		>200		Max concentrations	
		hours	days	hours	days	hours	days	hours	days	hours	days	μg/m³	day(s)
HU0002R	K-puszta	8667	363	121	28	7	2	0	0	0	0	158	2014-06-12
IE0001R	Valentia Observatory	7715	331	1	1	0	0	0	0	0	0	123	2014-05-17
IE0031R	Mace Head	8738	365	0	0	0	0	0	0	0	0	113.7	2014-05-08
IT0001R	Montelibretti	8024	338	60	21	1	1	0	0	0	0	152.6	2014-07-04
IT0004R	Ispra	7272	314	214	51	33	11	2	2	0	0	185.4	2014-06-12
LT0015R	Preila	8479	359	17	5	1	1	0	0	0	0	151.1	2014-08-04
LV0010R	Rucava	8018	338	73	15	3	2	0	0	0	0	156.9	2014-07-05
LV0016R	Zoseni	8623	362	20	4	3	1	0	0	0	0	154.1	2014-04-21
MK0007R	Lazaropole	3568	157	798	81	69	19	0	0	0	0	172.7	2014-08-27
MT0001R	Giordan lighthouse	8299	351	276	42	6	2	0	0	0	0	159.8	2014-06-10
NL0007R	Eibergen	8646	364	67	13	8	3	0	0	0	0	164.6	2014-07-18
NL0009R	Kollumerwaard	8543	361	45	9	5	1	0	0	0	0	162.5	2014-07-19
NL0010R	Vredepeel	8418	363	62	15	11	2	1	1	0	0	180.2	2014-07-19
NL0091R	De Zilk	8419	358	68	14	17	3	3	1	0	0	190.7	2014-07-18
NL0644R	Cabauw Wielsekade	8637	365	53	14	10	2	0	0	0	0	175.6	2014-07-18
NO0002R	Birkenes II	7467	314	3	1	0	0	0	0	0	0	121.1	2014-04-29
NO0015R	Tustervatn	8723	365	0	0	0	0	0	0	0	0	111.8	2014-05-22
NO0039R	Kårvatn	8720	365	11	3	0	0	0	0	0	0	139.7	2014-07-06
NO0042G	Zeppelin mountain (Ny-Ålesund)	8690	365	0	0	0	0	0	0	0	0	95.4	2014-04-16
NO0043R	Prestebakke	8709	365	25	5	0	0	0	0	0	0	147.2	2014-07-05
NO0052R	Sandve	8688	365	11	4	0	0	0	0	0	0	130.8	2014-08-02
NO0056R	Hurdal	8718	365	15	4	0	0	0	0	0	0	135.2	2014-07-05
PL0002R	Jarczew	8730	365	53	13	0	0	0	0	0	0	146	2014-08-04
PL0003R	Sniezka	8728	365	357	47	0	0	0	0	0	0	150	2014-06-11
PL0004R	Leba	8749	365	91	18	2	1	0	0	0	0	151	2014-08-03
PL0005R	Diabla Gora	8326	349	149	30	8	2	0	0	0	0	168.8	2014-08-04
RO0008R	Poiana Stampei	4991	225	12	6	0	0	0	0	0	0	133.7	2014-03-15

Table 1.1, cont.

Code	Station	Total		>120		>150		>180		>200		Max concentrations	
		hours	days	hours	days	hours	days	hours	days	hours	days	μg/m³	day(s)
SE0005R	Bredkälen	8218	349	3	1	0	0	0	0	0	0	123	2014-04-26
SE0011R	Vavihill	8726	365	75	11	7	1	0	0	0	0	176	2014-07-04
SE0012R	Aspvreten	8615	364	29	7	0	0	0	0	0	0	146	2014-07-05
SE0013R	Esrange	8725	365	0	0	0	0	0	0	0	0	116	2014-08-07
SE0014R	Råö	8684	365	76	11	5	1	0	0	0	0	163	2014-07-04
SE0018R	Asa	7535	333	46	7	0	0	0	0	0	0	139	2014-08-03
SE0019R	Östad	8730	365	35	7	0	0	0	0	0	0	140	2014-07-05
SE0032R	Norra-Kvill	8706	364	83	12	2	1	0	0	0	0	151	2014-08-03
SE0035R	Vindeln	8712	364	13	2	0	0	0	0	0	0	138	2014-05-23
SE0039R	Grimsö	8574	359	63	11	1	1	0	0	0	0	154	2014-07-05
SI0008R	Iskrba	8299	364	168	34	0	0	0	0	0	0	148	2014-07-20
SI0031R	Zarodnje	8163	361	249	37	0	0	0	0	0	0	142	2014-06-10
SI0032R	Krvavec	8261	365	719	80	4	4	0	0	0	0	152	2014-04-30
SI0033R	Kovk	8093	356	815	80	58	13	0	0	0	0	179	2014-06-09
SK0002R	Chopok	4590	203	156	17	0	0	0	0	0	0	139	2014-05-01
SK0004R	Stará Lesná	7814	332	5	2	0	0	0	0	0	0	148	2014-06-10
SK0006R	Starina	8698	365	32	10	2	1	0	0	0	0	154	2014-06-10
SK0007R	Topolniky	8746	365	151	35	3	1	0	0	0	0	154	2014-06-11

Table 1.2: Percentiles of hourly ozone values April–September 2014.

Code	Station	25%	50%	75%	90%	95%	98%	99%	Data capture
AT0002R	Illmitz	54	71	90	108	118	125	135	95.3
AT0005R	Vorhegg	55	75	92	106	114	121	125	94.3
AT0030R	Pillersdorf bei Retz	56	72	89	107	116	124	131	95.4
AT0032R	Sulzberg	69	81	96	110	117	126	130	95.3
AT0034G	Sonnblick	91	100	111	118	125	131.8	135	52.6
AT0038R	Gerlitzen	88	99	111	121	127	133.2	137	95.4
AT0040R	Masenberg	76	87	101	115	121	128	133	94.7
AT0041R	Haunsberg	61	74	89	104	115	124.4	131	94.1
AT0042R	Heidenreichstein	48	67	87	105	115	125	131	95.4
AT0043R	Forsthof	64	79	94	110	118	126	130	95.2
AT0045R	Dunkelsteinerwald	43	62	83	104	115	128	133	92.5
AT0046R	Gänserndorf	50	66	88	107	117	126.1	132	95.5
AT0047R	Stixneusiedl	54	70	89	108	117	125	134	95.6
AT0048R	Zoebelboden	67	79	94	108	117	126	132	94.8
AT0049R	Grebenzen bei St. Lamprecht	83	95	108	120	126	133	136	95.5
AT0050R	Graz Lustbuehel	48	69	87	104	112	120	125	93.4
BE0001R	Offagne	43.5	59	77	92.5	101.5	112	117.2	97.1
BE0032R	Eupen	38	55.5	74	92	105.5	118	126	96.4
BE0035R	Vezin	28.5	51	74.5	93	106	116.4	124.5	91.3
BG0053R	Rojen peak	76.8	85.7	95.9	104.5	110	117.3	121.2	94.4
CH0001G	Jungfraujoch	74	80.9	87.4	93.7	97	101.2	103.8	97.3
CH0002R	Payerne	43.2	65.1	87.9	106.3	115.2	124.8	130.4	99.2
CH0003R	Tänikon	44.5	64.6	84.1	103.1	114.9	126.4	132.9	99.1
CH0004R	Chaumont	76.7	89	103.6	116.5	123.3	130.6	135.2	99.3
CH0005R	Rigi	76	88	102.7	116.2	122.9	131.9	139.3	99.2
CY0002R	Ayia Marina	88.6	99.5	109.9	118.9	123.8	129.5	133	97.7
CZ0001R	Svratouch	61.6	76.8	92.6	106.7	114.3	122.1	126.7	99.9
CZ0003R	Kosetice	46.1	64.3	83	101.5	111.7	120.9	125.5	96.5
CZ0005R	Churanov	66.6	79.4	94.8	109.1	117.1	125	132.1	95.2
CZ0007R	Kresin u Pacova	64.5	80.2	97.1	110.5	120.3	129.6	136.9	79.4
DE0001R	Westerland	70.9	82	92.3	104	111	120	126	95.7
DE0002R	Waldhof	43.8	63	82.9	101.5	114	131	142.4	95.2
DE0003R	Schauinsland	76.9	89.4	105	119	128	138.8	144	95.9
DE0007R	Neuglobsow	42.8	63	81.8	97.6	107.6	120.1	129.1	95.1
DE0008R	Schmücke	66.8	80.6	98.5	120	132.3	141.8	147.5	94
DE0009R	Zingst	59.3	72	84.3	94.9	102.8	112.8	120.3	95.8
DK0005R	Keldsnor	60.7	71.8	82.2	93.7	102.1	110.9	119	90.3
DK0010G	Villum Research Station, Station Nord	44.7	54.1	63	73.6	78.8	86.9	94.8	74.2
DK0012R	Risoe	60.3	72.9	86.2	98.7	107.7	120.8	125.3	91.4
EE0009R	Lahemaa	41	58	76	90	99	110.3	118	99.8
EE0011R	Vilsandi	61	74	86	97	107	115	121	98.1
ES0001R	San Pablo de los Montes	73.8	86.5	101.5	112.8	118.1	123.1	125.7	99.2
ES0005R	Noya	61.1	73.8	89.2	100.7	108.1	115.3	121.9	99.2
ES0006R	Mahón	72.7	82.5	92.6	103.1	109.2	114.3	117.2	97.3
ES0007R	Víznar	69.4	81.6	92.5	103.5	109.1	114.2	118.6	98.4
ES0008R	Niembro	61.9	73.8	86.7	97.6	104.5	111.1	116.9	97.6
ES0009R	Campisabalos	61.8	79.4	94.4	107.9	114.5	123.5	130.3	98.7
ES0010R	Cabo de Creus	63.9	76.2	88.5	100.3	105.5	112.8	116.1	97.4
ES0011R	Barcarrota	44.4	62.9	80.8	95.1	102.3	110.5	115	97.2
ES0012R	Zarra	79.2	91.8	105.2	116.1	122.5	129	132.6	98.7
ES0013R	Penausende	67.1	81.6	94.1	108.3	117.2	125.6	130.7	93.5
ES0014R	Els Torms	72.1	86.8	101.6	115.8	122.9	128.2	132.4	98
ES0016R	O Saviñao	43.5	58.7	73.1	86.1	94.5	105.1	113.8	98.3
ES0017R	Doñana	49.1	68.4	85.5	99.5	108.1	117.8	125.8	97.8
FI0009R	Utö	58.1	69.3	80.4	89.6	98.2	106.1	113.7	64.3
FI0018R	Virolahti III	38.4	60.1	76.4	90.4	99.1	112.6	119.1	97.5
FI0022R	Oulanka	45	56.1	71.4	83	88.2	94.3	99.5	99.6
FI0037R	Ähtäri II	43.3	57.8	72.9	85.4	92	101.7	108.4	98.8
FI0096G	Pallas (Sammaltunturi)	52	63.9	79.7	89.2	93.7	100	103.7	97

Table 1.2, cont.

Code	Station	25%	50%	75%	90%	95%	98%	99%	Data capture
FR0008R	Donon	52	67	84	102	111	119	123	99.5
FR0009R	Revin	54	71	88	102	110	118.9	123	95.7
FR0010R	Morvan	54	71	87	101	109	116	121	91.6
FR0013R	Peyrusse Vieille	57	70	84	98	104	113	120	98.8
FR0014R	Montandon	46	62	79	96	104	113	119.4	99.2
FR0015R	La Tardière	51	67	82	96	104	112	119	93.6
FR0016R	Le Casset	87	96	105	115	121	127	130	93.8
FR0017R	Montfranc	73	84	97	109	114	121	124	98.4
FR0018R	La Coulonche	59	72	85	97	105	116	124	98.1
FR0019R	Pic du Midi	87	98	110	120	125	133	139	88.3
FR0023R	Saint-Nazaire-le-Désert	45	74	94	110	119	129	134	97.7
FR0025R	Verneuil	38	60	79	94	102	114	118	99.2
FR0030R	Puy de Dôme	85	95	107	116	122	131	138	73.6
GB0002R	Eskdalemuir	47.5	60.7	72	83.6	88.7	96.7	103.1	99.3
GB0006R	Lough Navar	29.1	49.5	64.7	78.8	84.8	90.2	94.6	99.6
GB0013R	Yarner Wood	47.7	60.7	74.8	87.5	95.4	102.9	107.1	90.5
GB0014R	High Muffles	52.9	65.9	79.5	91	97.1	105.1	111.6	85.5
GB0015R	Strath Vaich Dam	55.2	66.8	80.4	92.6	98.2	103.4	106.5	99
GB0031R	Aston Hill	56.1	67.2	77.2	85.2	91.3	101.1	109.4	99.1
GB0033R	Bush	48.4	60.3	72.8	83.6	89.7	95.2	99.5	97.5
GB0035R	Great Dun Fell	58.2	66.7	77.3	86.8	93.6	100.4	104.5	99.7
GB0036R	Harwell	45.5	59	73.5	85.4	92.6	102.7	110.1	99.8
GB0037R	Ladybower Res.	32.8	44.5	57.1	68.5	76.4	88.3	95.5	95.3
GB0038R	Lullington Heath	44.3	56.4	69.4	79.4	85.7	96.4	104.4	99
GB0039R	Sibton	43.1	57.5	72.6	84.5	91.8	101.5	111.4	99.2
GB0043R	Narberth	48.3	59.8	73.1	82.6	88.2	94.9	99.1	98.6
GB0045R	Wicken Fen	34	50.8	67.8	79.8	87.2	95.3	102.8	95
GB0048R	Auchencorth Moss	46.8	58	69.8	79.9	85.4	90.7	94.3	98.8
GB0049R	Weybourne	55.3	69	82.1	93.5	100.3	108.5	117.3	99.9
GB0050R	St. Osyth	41.4	57.4	72.8	84.3	91.9	100.8	107	98
GB0053R	Charlton Mackrell	41.6	57.1	72.2	83.3	90.2	100.3	107	99.6
GR0002R	Finokalia 1	2.3	110.6	119.6	128.4	133.8	140.1	144.2	98.6
HU0002R	K-puszta	39	65	88	107	116	122	128	98
IE0001R	Valentia Observatory	55.8	67.7	82.3	92.6	96.9	101.1	103.8	99.2
IE0031R	Mace Head	60.1	69.9	82.1	92.5	97.5	100	101.4	99.6
IT0001R	Montelibretti	22.4	52	80.7	97.1	106.2	116.1	123.4	98.8
IT0004R	Ispra	39.3	64.5	89.9	111.3	122.6	138.5	150.4	75.2
LT0015R	Preila	51.1	63.5	76.7	88.8	96.1	105.8	113	95.8
LV0010R	Rucava	50.8	69.4	84.9	98.5	107.4	119.2	128.5	88
LV0016R	Zoseni	44.7	60.1	74.4	87.7	93.9	101.6	109.3	99
MK0007R	Lazaropole	91.9	114.3	131.8	142.5	149	155.6	158.8	37
MT0001R	Giordan lighthouse	85.5	95.9	106.7	116.1	122.4	129.2	134.4	93.3
NL0007R	Eibergen	26.8	47.5	67.9	88.4	100.1	114.9	129.5	98.3
NL0009R	Kollumerwaard	44.8	61.6	78.3	90.3	97.4	109.6	120.5	99.1
NL0010R	Vredepeel	27.6	48.3	68.2	87.3	100.4	116	127.7	93.2
NL0091R	De Zilk	45.1	65	80.4	94.1	104.4	117	127	94.6
NL0644R	Cabauw Wielsekade	32.4	50.5	68.4	82.8	93.9	107.6	122.6	99.8
NO0002R	Birkenes II	48.2	61.8	77.9	88.2	95.1	102.7	107	71.3
NO0015R	Tustervatn	50.5	64.3	78.6	88.3	92.4	99.8	102.4	99.5
NO0039R	Kårvatn	32.5	54.4	73.5	88.7	94.3	101.3	107.4	99.5
NO0042G	Zeppelin mountain (Ny-Ålesund)	44.9	54.5	64.1	72.9	78	84.8	88.2	99.6
NO0043R	Prestebakke	51.1	64.5	78.8	91.6	100.7	109.4	114.6	99.2
NO0052R	Sandve	58.1	68.9	81.8	91.2	97.2	106	112.1	98.9
NO0056R	Hurdal	43.8	58.3	71.4	83.4	90.8	100.5	108.6	99.3
PL0002R	Jarczew	38	56	76	95	104	115	123	99.8
PL0003R	Sniezka	80	91	105	117	124	130	134	99.6
PL0004R	Leba	57	71	85	97	107	121	129	99.9
PL0005R	Diabla Gora	50.8	69.1	86.7	106.7	115.9	126.5	133.6	98.4

Table 1.2, cont.

Code	Station	25%	50%	75%	90%	95%	98%	99%	Data capture
RO0008R	Poiana Stampei	33.8	64.3	88.5	100.8	105.4	111.1	113.8	44.4
SE0005R	Bredkälen	47	61	77	88	94	104	110	93.9
SE0011R	Vavihill	53	68	82	97	108	118	126	99.4
SE0012R	Aspvreten	41	59	75	90	99	111	118	97.7
SE0013R	Esrange	54	65	82	92	97	103	106	99.3
SE0014R	Råö	61	73	85	97	106	118	131	98.7
SE0018R	Asa	42	60	76	90	101	113.4	123	82.7
SE0019R	Östad	39	62	78	90	100	111	117	99.4
SE0032R	Norra-Kvill	58	69	83	99	110	120	126	99.9
SE0035R	Vindeln	41	59	75	86	92	100	109	99.2
SE0039R	Grimsö	46	62	77	92	104	118	129.9	95.9
SI0008R	Iskrba	21	60	87	105	115	123	127	95.5
SI0031R	Zarodnje	70	84	98	114	121	127	131	94.3
SI0032R	Krvavec	90	101	114	125	131	139.5	143	95
SI0033R	Kovk	78	93	111	128	136	145	153	93.9
SK0002R	Chopok	84	92	105	114.6	126	131	134	49.5
SK0004R	Stará Lesná	41	61	79	93	99	107	111	92.8
SK0006R	Starina	42	63	85	101	109	114	118	99.2
SK0007R	Topolniky	38	61	86	107	116	125	130	99.8

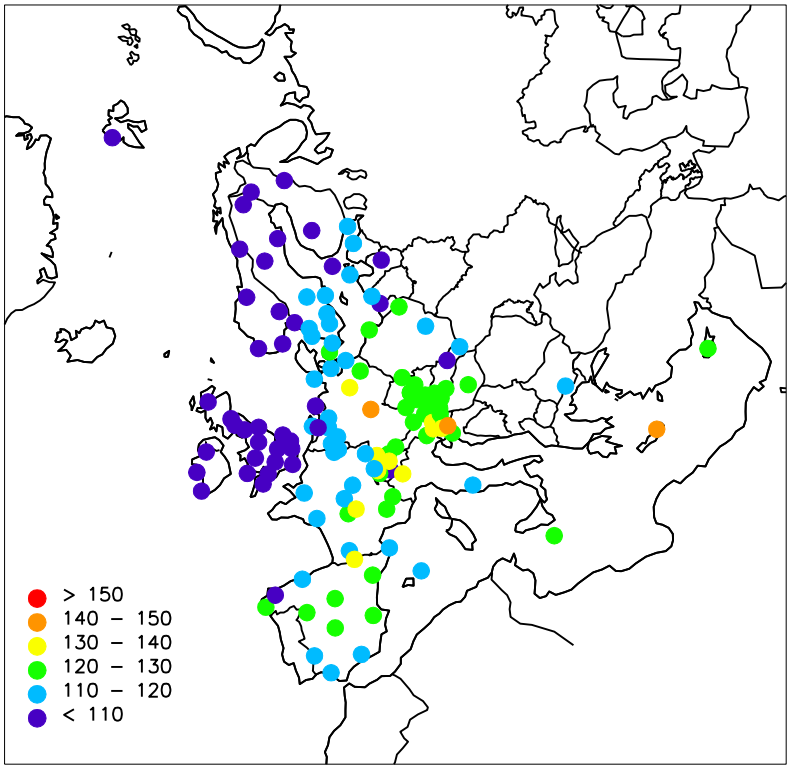


Figure 1.1: Ozone April–September 2014. 99-percentiles (µg/m^3).

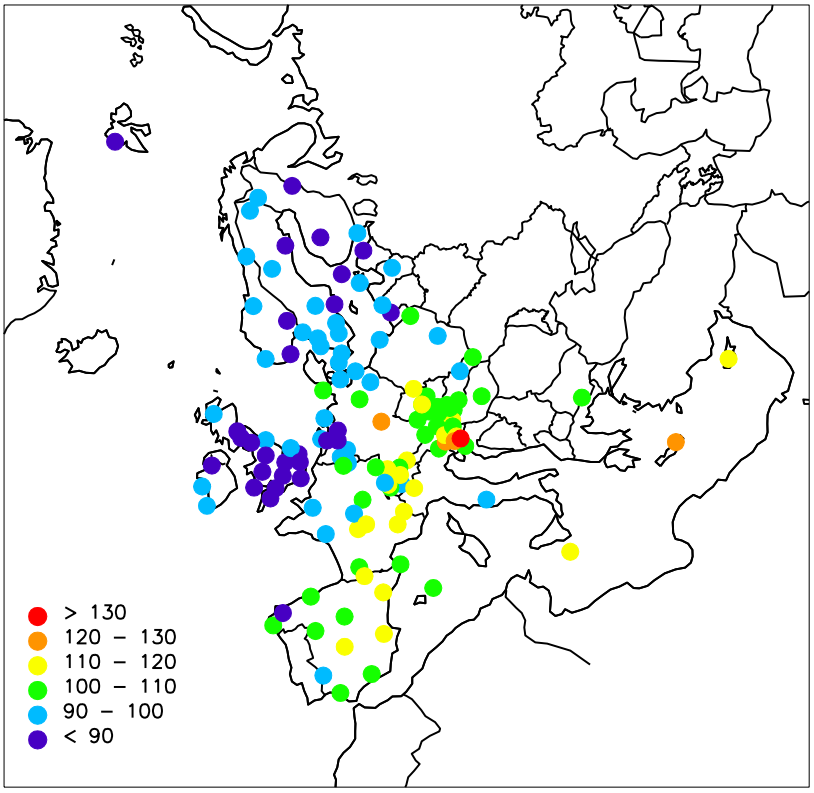


Figure 1.2: Ozone April–September 2014. 95-percentiles (μg/m^3).

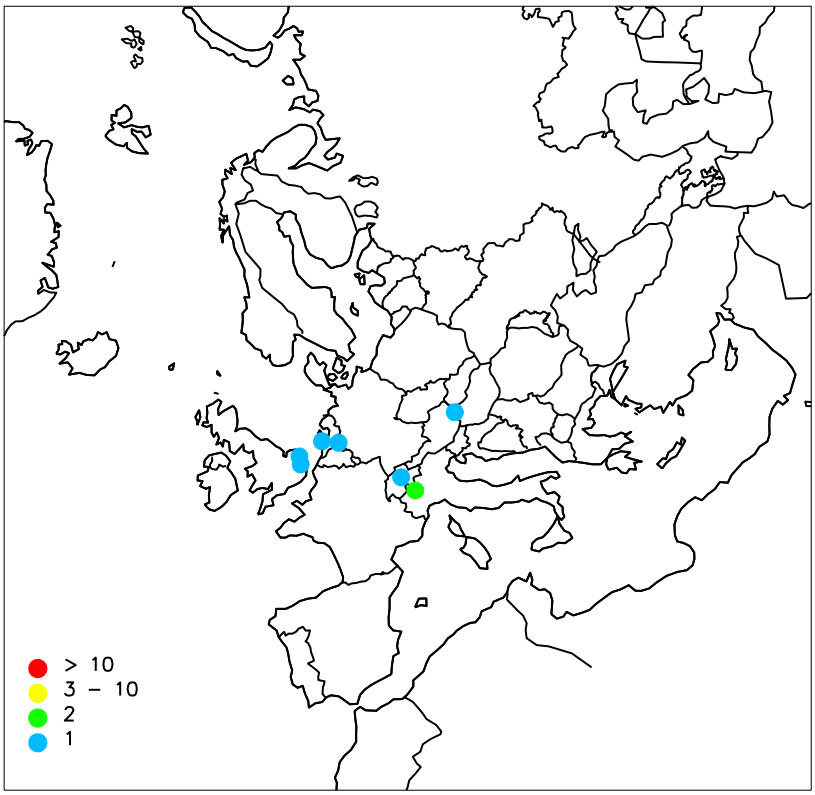


Figure 1.3: Number of exceedances of the threshold value of 180 μg/m^3. (Unit: number of days). Stations with zero exceedances are not shown.

Annex 2

AOT40 and AOT60, figures and tables

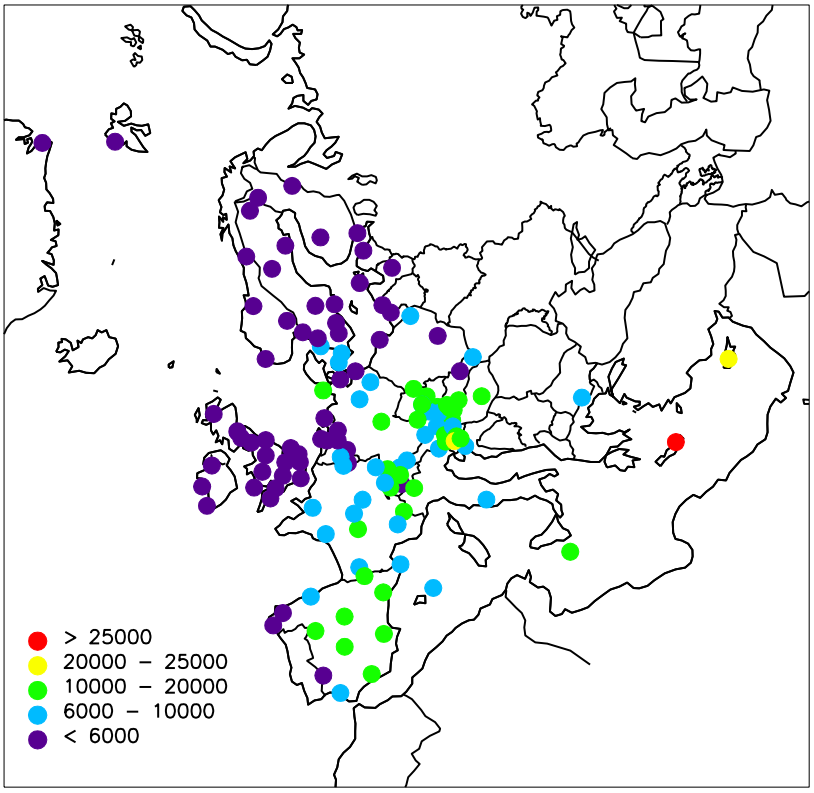


Figure 2.1: AOT40 (ppbh) April–September 2014 (daylight hours).

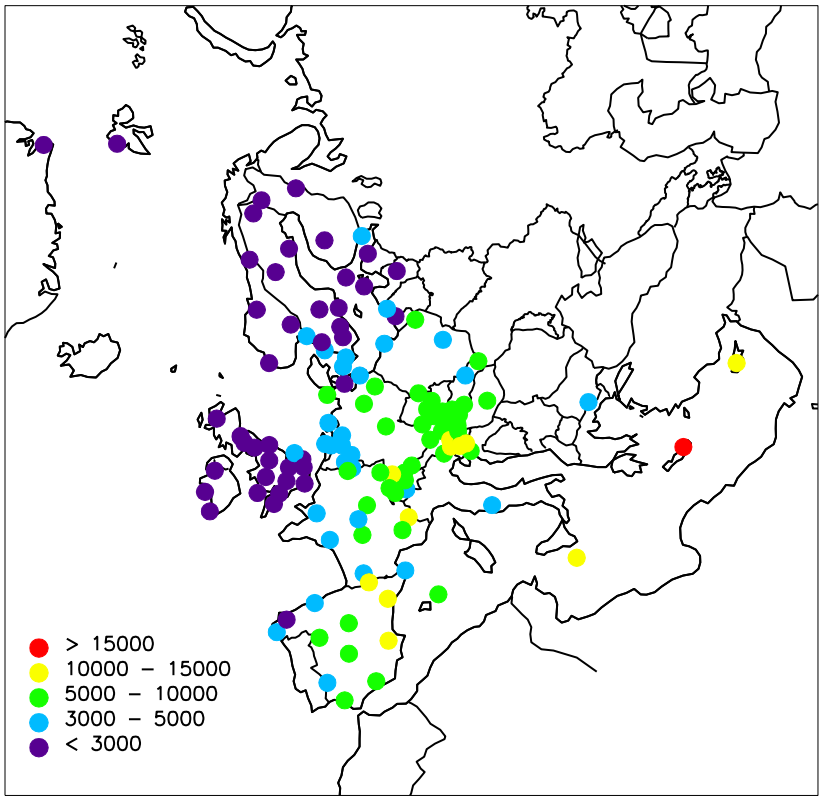


Figure 2.2: AOT40 (ppbh) May, June and July 2014 (daylight hours).

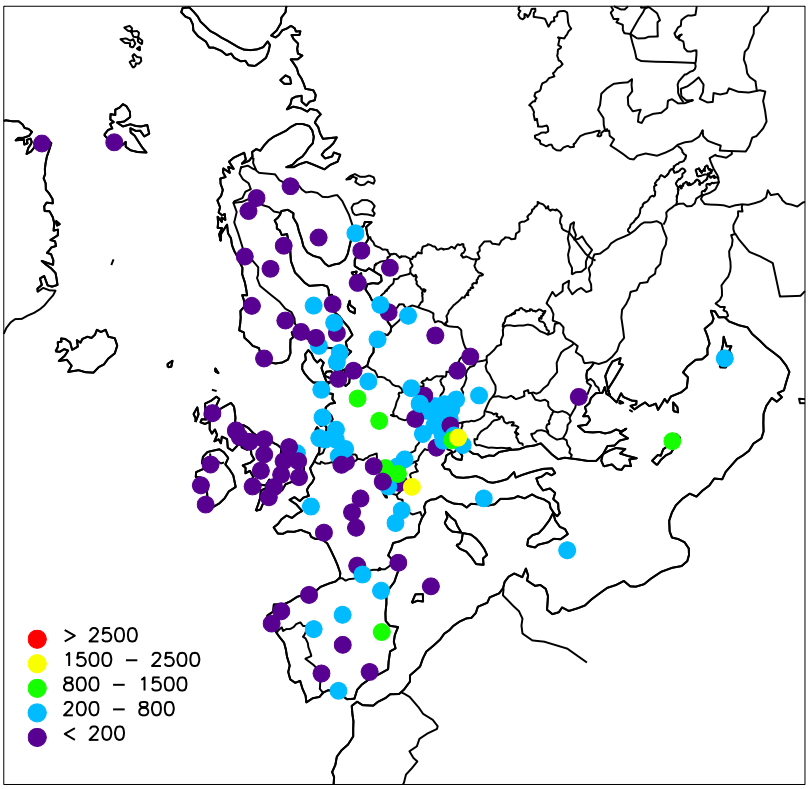


Figure 2.3: AOT60 (ppbh) April-September 2014 (daylight hours).

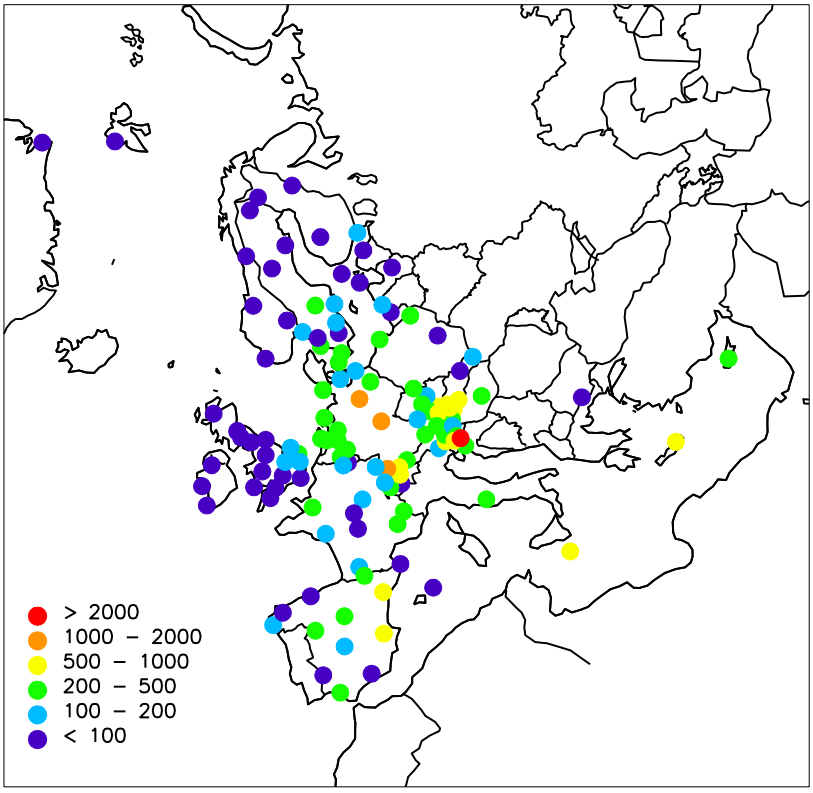


Figure 2.4: AOT60 (ppbh) May, June and July 2014 (daylight hours).

Table 2.1: AOT40 and AOT60 April–September 2014 (daylight hours).

Code	Station	AOT40	AOT40 corrected	AOT60	AOT60 corrected	Data capture
AT0002R	Illmitz	11410.5	12123.7	771.5	819.7	94.1
AT0005R	Vorhegg	9204.5	9968.7	122	132.1	92.3
AT0030R	Pillersdorf bei Retz	10412	11048.7	623	661.1	94.2
AT0032R	Sulzberg	9724	9810.9	314	316.8	99.1
AT0034G	Sonnblick	10664	21234.4	279.5	556.5	50.2
AT0038R	Gerlitzen	18915	19844.3	630.5	661.5	95.3
AT0040R	Masenberg	12008.5	12705.8	351.5	371.9	94.5
AT0041R	Haunsberg	8018.5	8592.1	423.5	453.8	93.3
AT0042R	Heidenreichstein	9908.5	10386.1	464	486.4	95.4
AT0043R	Forsthof	10098.5	10646	498	525	94.9
AT0045R	Dunkelsteinerwald	9225.5	10038.1	712.5	775.3	91.9
AT0046R	Gänserndorf	11087	11628.9	663.5	695.9	95.3
AT0047R	Stixneusiedl	10613.5	11115.3	680.5	712.7	95.5
AT0048R	Zoebelboden	8262	8813.9	305	325.4	93.7
AT0049R	Grebenzen bei St. Lamprecht	16017.5	16802.4	468	490.9	95.3
AT0050R	Graz Lustbuehel	6640	7166	155	167.3	92.7
BE0001R	Offagne	5481.5	5668.7	85.2	88.2	96.7
BE0032R	Eupen	5451	5628.5	275	284	96.8
BE0035R	Vezin	6228.5	6895.6	243.2	269.3	90.3
BG0053R	Rojen peak	8428.7	8620.3	12.3	12.6	97.8
CH0001G	Jungfraujoch	4445.2	4589.5	15	15.5	96.9
CH0002R	Payerne	10714.3	10885.6	504.6	512.6	98.4
CH0003R	Tänikon	9843.6	10036	684.6	698	98.1
CH0004R	Chaumont	13051.6	13253.8	492.7	500.3	98.5
CH0005R	Rigi	13543.8	13781	959.3	976.1	98.3
CY0002R	Ayia Marina	22458.6	23242.8	628.6	650.5	96.6
CZ0001R	Svratouch	10351.3	10381.5	171.9	172.4	99.7
CZ0003R	Kosetice	8717.1	8986.6	272.5	280.9	97
CZ0005R	Churanov	10736.8	11260.9	196.6	206.2	95.3
CZ0007R	Kresin u Pacova	11179.4	14279.8	711.5	908.9	78.3
DE0001R	Westerland	10113.7	10584.1	354	370.5	95.6
DE0002R	Waldhof	9951.1	10485.8	1208.2	1273.1	94.9
DE0003R	Schauinsland	14027.6	14654.4	1194.5	1247.9	95.7
DE0007R	Neuglobsow	7736.7	8223.8	466.4	495.8	94.1
DE0008R	Schmücke	12104.1	12897.9	1394.5	1486	93.8
DE0009R	Zingst	5971.4	6238.9	173.2	181	95.7
DK0005R	Keldsnor	4065.3	4228.8	110.5	114.9	96.1
DK0010G	Villum Research Station, Station Nord	200.3	257.7	0	0	77.7
DK0012R	Risoe	7000.2	7230.3	294.3	303.9	96.8
EE0009R	Lahemaa	2908	2917.9	26.5	26.6	99.7
EE0011R	Vilsandi	4421.5	4550.5	36	37.1	97.2
ES0001R	San Pablo de los Montes	13110.8	13322	147.6	150	98.4
ES0005R	Noya	5921.3	6022	136.1	138.4	98.3
ES0006R	Mahón	9085.4	9382.1	28.3	29.2	96.8
ES0007R	Víznar	10512.3	10803.2	44.8	46.1	97.3
ES0008R	Niembro	6380.8	6636.1	56.4	58.7	96.2
ES0009R	Campisabalos	13948.5	14288.9	515.9	528.5	97.6
ES0010R	Cabo de Creus	6362.1	6634.3	49.6	51.7	95.9
ES0011R	Barcarrota	5759	5935.1	47.4	48.8	97
ES0012R	Zarra	19601	20013.1	816.6	833.8	97.9
ES0013R	Penausende	10762.3	11622.4	344.8	372.4	92.6
ES0014R	Els Torms	16767.9	17290.6	632.2	651.9	97
ES0016R	O Saviñao	3459.5	3553.9	109.7	112.7	97.3
ES0017R	Doñana	8030.9	8247.5	211	216.7	97.4
FI0009R	Utö	2428.6	3542.1	18.2	26.5	68.6
FI0018R	Virolahti III	4897.6	4996.5	201.5	205.6	98
FI0022R	Oulanka	1686	1697.4	17	17.1	99.3
FI0037R	Ähtäri II	2656.2	2705	71.6	72.9	98.2
FI0096G	Pallas (Sammaltunturi)	2132.3	2205.1	0	0	96.7

Table 2.1, cont.

Code	Station	AOT40	AOT40 corrected	AOT60	AOT60 corrected	Data capture
FR0008R	Donon	6966	7038.8	143.5	145	99
FR0009R	Revin	8047.5	8464	193.5	203.5	95.1
FR0010R	Morvan	7972	8609.4	101	109.1	92.6
FR0013R	Peyrusse Vieille	6487	6581	146	148.1	98.6
FR0014R	Montandon	6062	6125.3	134	135.4	99
FR0015R	La Tardière	6820.5	7343.2	186.5	200.8	92.9
FR0016R	Le Casset	18871	20160.1	350.5	374.4	93.6
FR0017R	Montfranc	11580	11782	104	105.8	98.3
FR0018R	La Coulonche	6913.5	7088.6	255	261.5	97.5
FR0019R	Pic du Midi	14980	17028.5	380.5	432.5	88
FR0023R	Saint-Nazaire-le-Désert	9880.5	10013.6	336.5	341	98.7
FR0025R	Verneuil	6306	6324.6	95	95.3	99.7
FR0030R	Puy de Dôme	10243	16333.9	287	457.7	62.7
GB0002R	Eskdalemuir	1936.8	1953.8	2.3	2.3	99.1
GB0006R	Lough Navar	1095.4	1103	0	0	99.3
GB0013R	Yarner Wood	3237.2	3541.2	41.2	45.1	91.4
GB0014R	High Muffles	3433.6	4081.8	46.5	55.2	84.1
GB0015R	Strath Vaich Dam	3801.7	3846.4	3.2	3.2	98.8
GB0031R	Aston Hill	2302.1	2328	16.6	16.8	98.9
GB0033R	Bush	1674.8	1687.8	0	0	99.2
GB0035R	Great Dun Fell	1864.3	1873.3	0	0	99.5
GB0036R	Harwell	3341.8	3354.7	25.4	25.5	99.6
GB0037R	Ladybower Res.	786.3	835.8	0.3	0.3	94.1
GB0038R	Lullington Heath	1392.7	1412.5	11.7	11.9	98.6
GB0039R	Sibton	3271.9	3302.2	241.1	243.3	99.1
GB0043R	Narberth	1741.7	1771.3	1.8	1.9	98.3
GB0045R	Wicken Fen	1951.5	2050.3	115.1	120.9	95.2
GB0048R	Auchencorth Moss	1060.3	1079.5	0	0	98.2
GB0049R	Weybourne	5136.2	5146.2	167.3	167.6	99.8
GB0050R	St. Osyth	2972.5	3050.5	182	186.8	97.4
GB0053R	Charlton Mackrell	2538.2	2553	10.9	10.9	99.4
GR0002R	Finokalia	29028.6	29395.3	1373.2	1390.5	98.8
HU0002R	K-puszta	11069	11252.1	417	423.9	98.4
IE0001R	Valentia Observatory	3087.7	3115	1.5	1.5	99.1
IE0031R	Mace Head	3292.8	3299.2	0	0	99.8
IT0001R	Montelibretti	7315.1	7436.9	232.8	236.6	98.4
IT0004R	Ispra	11317.1	14969.2	1558.6	2061.6	75.6
LT0015R	Preila	2741.3	2868.1	22.7	23.7	95.6
LV0010R	Rucava	5455.8	6036.3	252.4	279.3	90.4
LV0016R	Zoseni	1973.4	1995.5	63.7	64.4	98.9
MK0007R	Lazaropole	13789.6	39060.9	2894.2	8198.1	35.3
MT0001R	Giordan lighthouse	19112	20456.3	686.5	734.8	93.4
NL0007R	Eibergen	4631.5	4712.8	490.6	499.2	98.3
NL0009R	Kollumerwaard	4636.3	4684.5	260.8	263.6	99
NL0010R	Vredepeel	4474.7	4719	464.4	489.7	94.8
NL0091R	De Zilk	5521.1	5800.2	490	514.8	95.2
NL0644R	Cabauw Wielsekade	3615.1	3629.3	403.5	405.1	99.6
NO0002R	Birkenes II	2219.6	3202	0.7	1.1	69.3
NO0015R	Tustervatn	2462.8	2479.4	0	0	99.3
NO0039R	Kårvatn	3247.6	3270.9	3.2	3.3	99.3
NO0042G	Zeppelin mountain (Ny-Ålesund)	196.6	197.8	0	0	99.4
NO0043R	Prestebakke	4933.9	4999.1	152.5	154.6	98.7
NO0052R	Sandve	4526.3	4597.3	21.6	21.9	98.5
NO0056R	Hurdal	2383.6	2404.5	46.4	46.8	99.1
PL0002R	Jarczew	5214	5229.5	184	184.5	99.7
PL0003R	Sniezka	13838.5	13925.9	390	392.5	99.4
PL0004R	Leba	5719	5719	324.5	324.5	100
PL0005R	Diabla Gora	9780.9	9957.7	698.4	711	98.2
RO0008R	Poiana Stampei	2997.5	6783.6	4.4	10	44.2
SE0005R	Bredkälen	2752.5	2951.3	2.5	2.7	93.3
SE0011R	Vavihill	6442.5	6498.8	277	279.4	99.1
SE0012R	Aspvreten	4607.5	4691.1	139.5	142	98.2

Table 2.1, cont.

Code	Station	AOT40	AOT40 corrected	AOT60	AOT60 corrected	Data capture
SE0013R	Esrange	3127.5	3157.7	0	0	99
SE0014R	Råö	6749	6838.1	292	295.9	98.7
SE0018R	Asa	4073.5	4884.4	145	173.9	83.4
SE0019R	Östad	4818.5	4851.3	94.5	95.1	99.3
SE0032R	Norra-Kvill	5919.5	5930.9	290	290.6	99.8
SE0035R	Vindeln	2619	2644.2	62	62.6	99
SE0039R	Grimsö	5402	5661.2	287.5	301.3	95.4
SI0008R	Iskrba	9895	10393.1	333	349.8	95.2
SI0031R	Zarodnje	11726	11982.7	452	461.9	97.9
SI0032R	Krvavec	20712	21763	1046.5	1099.6	95.2
SI0033R	Kovk	19414.5	20935.4	2338.5	2521.7	92.7
SK0002R	Chopok	6973	14291.5	260	532.9	48.8
SK0004R	Stará Lesná	4667.5	4992.3	21.5	23	93.5
SK0006R	Starina	9052.5	9106.3	152.5	153.4	99.4
SK0007R	Topolniky	12688.5	12713.3	594	595.2	99.8

Table 2.2: AOT40 and AOT60 May–July 2014 (daylight hours).

Code	Station	AOT40	AOT40 corrected	AOT60	AOT60 corrected	Data capture
AT0002R	Illmitz	8364.5	8886.8	662.5	703.9	94.1
AT0005R	Vorhegg	6800	7284.3	111.5	119.4	93.4
AT0030R	Pillersdorf bei Retz	7761.5	8165.4	598	629.1	95.1
AT0032R	Sulzberg	7362	7443.4	279.5	282.6	98.9
AT0034G	Sonnblick	3978	15614.7	217.5	853.7	25.5
AT0038R	Gerlitzen	13125.5	13730.5	590.5	617.7	95.6
AT0040R	Masenberg	8532	9091.1	316	336.7	93.9
AT0041R	Haunsberg	6554	7101.8	423.5	458.9	92.3
AT0042R	Heidenreichstein	7253.5	7588.7	433.5	453.5	95.6
AT0043R	Forsthof	7471	7891.1	472	498.5	94.7
AT0045R	Dunkelsteinerwald	7103.5	7696.6	665	720.5	92.3
AT0046R	Gänserndorf	8358.5	8786.9	606	637.1	95.1
AT0047R	Stixneusiedl	7898.5	8280.9	573.5	601.3	95.4
AT0048R	Zoebelboden	6634	7190.6	304	329.5	92.3
AT0049R	Grebenzen bei St. Lamprecht	11255	11870.8	426	449.3	94.8
AT0050R	Graz Lustbuehel	5029	5527.5	128.5	141.2	91
BE0001R	Offagne	4274.2	4422.5	85.2	88.2	96.6
BE0032R	Eupen	4509.8	4661.8	275	284.3	96.7
BE0035R	Vezin	4736.8	5564	241.5	283.7	85.1
BG0053R	Rojen peak	4732.4	4898.4	7.9	8.2	96.6
CH0001G	Jungfraujoch	3106.6	3202.3	0	0	97
CH0002R	Payerne	7767.6	7881.9	492.2	499.4	98.6
CH0003R	Tänikon	7759.6	7874	662	671.8	98.5
CH0004R	Chaumont	9632.4	9792.1	471.3	479.1	98.4
CH0005R	Rigi	9958.4	10114.5	909.9	924.2	98.5
CY0002R	Ayia Marina	12525.2	12734.8	375.8	382.1	98.4
CZ0001R	Svratouch	7471.4	7484.5	158.8	159.1	99.8
CZ0003R	Kosetice	6682.1	6888.2	247.8	255.4	97
CZ0005R	Churanov	7968.4	8003.9	181.9	182.7	99.6
CZ0007R	Kresin u Pacova	6718.4	10734.3	628.9	1004.8	62.6
DE0001R	Westerland	6672.6	7009	300.5	315.7	95.2
DE0002R	Waldhof	7101.7	7514.4	1139.4	1205.6	94.5
DE0003R	Schauinsland	10579.7	10998.1	1164	1210	96.2
DE0007R	Neuglobsow	5292.5	5610.7	392.2	415.8	94.3
DE0008R	Schmücke	8929.2	9445.8	1357	1435.5	94.5
DE0009R	Zingst	3420.7	3579.3	144.6	151.3	95.6
DK0005R	Keldsnor	2477.3	2583.6	105.2	109.7	95.9
DK0010G	Villum Research Station, Station Nor	d 95.5	122.4	0	0	78
DK0012R	Risoe	4241	4437.1	265.8	278.1	95.6
EE0009R	Lahemaa	1405.5	1412.8	14.5	14.6	99.5
EE0011R	Vilsandi	2632.5	2755.2	35.5	37.2	95.5

Table 2.2, cont.

Code	Station	AOT40	AOT40 corrected	AOT60	AOT60 corrected	Data capture
ES0001R	San Pablo de los Montes	9490	9623.1	147.6	149.7	98.6
ES0005R	Noya	4063.5	4142.4	133.5	136.1	98.1
ES0006R	Mahón	6375.8	6576.6	28.3	29.2	96.9
ES0007R	Víznar	7363.1	7589.6	40.6	41.8	97
ES0008R	Niembro	3905.7	4108.7	56.4	59.3	95.1
ES0009R	Campisabalos	9848.6	10120.1	498.4	512.1	97.3
ES0010R	Cabo de Creus	4416.4	4538.4	49.6	51	97.3
ES0011R	Barcarrota	3058.9	3144.9	0	0	97.3
ES0012R	Zarra	13128.6	13358.7	707.3	719.7	98.3
ES0013R	Penausende	6980.9	7273.2	315.8	329	96
ES0014R	Els Torms	11316.1	11722.7	603.7	625.4	96.5
ES0016R	O Saviñao	2463.3	2532.1	74.8	76.9	97.3
ES0017R	Doñana	6030	6102.7	210	212.5	98.8
FI0009R	Utö	1778.5	1865.3	15	15.7	95.3
FI0018R	Virolahti III	3004.9	3023	153	154	99.4
FI0022R	Oulanka	924.7	933.8	17	17.2	99
FI0037R	Ähtäri II	1677.4	1712.7	71.6	73.1	97.9
FI0096G	Pallas (Sammaltunturi)	740.6	747.2	0	0	99.1
FR0008R	Donon	5650.5	5702.1	143.5	144.8	99.1
FR0009R	Revin	5829	6369.9	191	208.7	91.5
FR0010R	Morvan	5959.5	6014.3	101	101.9	99.1
FR0013R	Peyrusse Vieille	4429	4546.1	144	147.8	97.4
FR0014R	Montandon	5066	5140.5	134	136	98.6
FR0015R	La Tardière	4249.5	4682.9	186.5	205.5	90.7
FR0016R	Le Casset	11871.5	12169.1	338	346.5	97.6
FR0017R	Montfranc	7364	7584.2	88.5	91.1	97.1
FR0018R	La Coulonche	4953.5	5061	255	260.5	97.9
FR0019R	Pic du Midi	11130.5	11298.5	377.5	383.2	98.5
FR0023R	Saint-Nazaire-le-Désert	6796.5	6877.7	324.5	328.4	98.8
FR0025R	Verneuil	4482	4494.2	95	95.3	99.7
FR0030R	Puy de Dôme	6111.5	10393.4	284.5	483.8	58.8
GB0002R	Eskdalemuir	1149	1164.1	2.3	2.3	98.7
GB0006R	Lough Navar	324.7	325	0	0	99.9
GB0013R	Yarner Wood	2090.8	2092.7	41.2	41.2	99.9
GB0014R	High Muffles	2035.9	2646.6	43.3	56.3	76.9
GB0015R	Strath Vaich Dam	1640.5	1640.5	0	0	100
GB0031R	Aston Hill	1461.5	1462.8	16.6	16.7	99.9
GB0033R	Bush	994.3	994.3	0	0	100
GB0035R	Great Dun Fell	1226.6	1228.8	0	0	99.8
GB0036R	Harwell	2599.5	2608.6	25.4	25.5	99.7
GB0037R	Ladybower Res.	707.5	781.6	0.3	0.3	90.5
GB0038R	Lullington Heath	1159.1	1173.5	11.7	11.9	98.8
GB0039R	Sibton	2506.1	2536.9	241.1	244.1	98.8
GB0043R	Narberth	960.6	966.8	1.8	1.9	99.4
GB0045R	Wicken Fen	1595.2	1651.1	115.1	119.2	96.6
GB0048R	Auchencorth Moss	703.7	712.3	0	0	98.8
GB0049R	Weybourne	3542.6	3548.8	166.2	166.5	99.8
GB0050R	St. Osyth	2432	2506.2	182	187.6	97
GB0053R	Charlton Mackrell	1704.3	1704.3	10.9	10.9	100
GR0002R	Finokalia	15963.4	16143.8	730.3	738.6	98.9
HU0002R	K-puszta	7701	7701	406.5	406.5	100
IE0001R	Valentia Observatory	975.6	975.6	1.5	1.5	100
IE0031R	Mace Head	1238.7	1243.1	0	0	99.6
IT0001R	Montelibretti	4800.8	4859.5	215.9	218.6	98.8
IT0004R	Ispra	7361.5	10650.5	1331.9	1926.9	69.1
LT0015R	Preila	1906.9	2047	3.5	3.7	93.2
LV0010R	Rucava	3188.3	3245.2	125.4	127.7	98.2
LV0016R	Zoseni	623.5	626.2	0	0	99.6
MK0007R	Lazaropole	2694.7	21153.6	585	4592.6	12.7
MT0001R	Giordan lighthouse	11044.4	12255.5	610.4	677.3	90.1

Table 2.2, cont.

Code	Station	AOT40	AOT40 corrected	AOT60	AOT60 corrected	Data capture
NL0007R	Eibergen	3714.5	3731.4	459.1	461.2	99.5
NL0009R	Kollumerwaard	3587.6	3639.7	229.2	232.6	98.6
NL0010R	Vredepeel	3664.4	3784.3	439.9	454.3	96.8
NL0091R	De Zilk	4456.6	4678.6	487.2	511.5	95.3
NL0644R	Cabauw Wielsekade	3081.8	3095.5	363.9	365.5	99.6
NO0002R	Birkenes II	713.5	1066.7	0	0	66.9
NO0015R	Tustervatn	912.2	916.7	0	0	99.5
NO0039R	Kårvatn	1540	1545.1	3.2	3.3	99.7
NO0042G	Zeppelin mountain (Ny-Ålesund)	63.8	64.3	0	0	99.3
NO0043R	Prestebakke	3117.4	3172	152.5	155.2	98.3
NO0052R	Sandve	2762.2	2803.2	8.9	9	98.5
NO0056R	Hurdal	1438.7	1456.1	46.4	47	98.8
PL0002R	Jarczew	3153.5	3170.7	57	57.3	99.5
PL0003R	Sniezka	8999.5	9015.3	350.5	351.1	99.8
PL0004R	Leba	3598.5	3598.5	240	240	100
PL0005R	Diabla Gora	5022.3	5191.6	224.2	231.7	96.7
RO0008R	Poiana Stampei	1877.1	3867.1	4.4	9.1	48.5
SE0005R	Bredkälen	1100.5	1233	0	0	89.3
SE0011R	Vavihill	3422.5	3458.3	232.5	234.9	99
SE0012R	Aspvreten	2950	2977.9	128.5	129.7	99.1
SE0013R	Esrange	1101.5	1115	0	0	98.8
SE0014R	Råö	4268	4346.8	270	275	98.2
SE0018R	Asa	2387	2799.2	83.5	97.9	85.3
SE0019R	Östad	2761	2789.8	93	94	99
SE0032R	Norra-Kvill	2834	2843.7	157.5	158	99.7
SE0035R	Vindeln	1192.5	1194.5	62	62.1	99.8
SE0039R	Grimsö	2893.5	3139.3	226.5	245.7	92.2
SI0008R	Iskrba	6807.5	7130.1	263.5	276	95.5
SI0031R	Zarodnje	8916.5	9112.6	411.5	420.6	97.8
SI0032R	Krvavec	14169	14864.1	917.5	962.5	95.3
SI0033R	Kovk	13768	14581	2021	2140.3	94.4
SK0002R	Chopok	2036	11097.2	157	855.7	18.3
SK0004R	Stará Lesná	3191.5	3362.2	21.5	22.6	94.9
SK0006R	Starina	5274.5	5332.5	145.5	147.1	98.9
SK0007R	Topolniky	8649	8656.7	543	543.5	99.9

Annex 3

Seasonal variation

Table 3.1: Monthly mean concentrations 2014 ($\mu g/m^3$).

Code	Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AT0002R	Illmitz	monthly mean	32.6	50.3	66.4	71.8	77.2	83.2	81.4	68.6	53.6	37.5	30.4	31.3
AT0002R	Illmitz	data capture	95.7	95.2	95.4	95.3	95.2	95.1	95.6	95.2	95.3	94.6	95.4	95.3
AT0005R	Vorhegg	monthly mean	52	61.5	87.9	80.6	88.7	87.2	71.5	62.6	53	56.2	42	50
AT0005R	Vorhegg	data capture	95.6	95.2	95.6	94.6	94.6	94.3	95.3	95.4	91.7	95.3	95.4	95.4
AT0030R	Pillersdorf bei Retz	monthly mean	28.1	51.5	68.9	74	74.2	85.9	82.6	66.5	56.5	38.7	28.1	36.3
AT0030R	Pillersdorf bei Retz	data capture	78.8	95.8	95.8	95.3	96.8	94.7	95.2	95	95.3	94.9	98.9	98.1
AT0032R	Sulzberg	monthly mean	66.7	74.8	84	84.8	84	97.2	87.8	74.8	68.5	61.8	52.9	52.2
AT0032R	Sulzberg	data capture	95.6	94.8	95.8	95	95.6	94.4	95.2	95.8	95.8	94.2	94.6	94.5
AT0034G	Sonnblick	monthly mean	83.9	90.4	101.7	107.3	-	-	109.4	95.3	96.9	89.6	82.8	82.9
AT0034G	Sonnblick	data capture	95.6	96.1	96.2	47.9	0	0	78.9	96	92.4	94.6	95.7	91.1
AT0038R	Gerlitzen	monthly mean	73.6	83.3	95.6	101.6	105.5	109	104.4	92.3	85.8	81.2	74.2	74
AT0038R	Gerlitzen	data capture	95.8	94	95.7	95.8	95.7	95.8	95.7	93.5	95.7	95.6	95.7	95.8
AT0040R	Masenberg	monthly mean	54.4	71.6	89.9	93.4	93.2	98.7	93.1	80	73.7	58.8	43.2	58.2
AT0040R	Masenberg	data capture	95.6	94.9	95.7	95.3	90.9	95.7	95.6	95.7	95	95.3	95.7	93.1
AT0041R	Haunsberg	monthly mean	47.4	56.3	68	71.8	79.4	91.7	82.3	71.5	58	47	25.9	37.8
AT0041R	Haunsberg	data capture	95.4	95.1	95.4	95.8	95.7	95.4	86.2	95.7	95.7	94.9	95.7	95.8
AT0042R	Heidenreichstein	monthly mean	32.1	52.6	64	68.3	72.9	78.2	74	56	51.9	41.5	30.4	40.9
AT0042R	Heidenreichstein	data capture	95.2	95.5	95.2	94.7	95.7	95.4	95.6	95.6	95.6	95.4	95.7	95.6
AT0043R	Forsthof	monthly mean	34	59.7	76.1	79.9	82.5	91.8	86.1	73.6	59.8	45.7	32.4	41.6
AT0043R	Forsthof	data capture	95.2	95.4	94.9	95.4	95.7	94.6	95.2	95.6	95	95.7	95	95.3
AT0045R	Dunkelsteinerwald	monthly mean	23	43.3	64.3	66	69.9	78.5	70.1	58.5	39.6	31.9	21.6	33.9
AT0045R	Dunkelsteinerwald	data capture	90.9	94.8	76.5	95.7	94.9	88.3	95.6	86.4	94.3	86.3	85.8	95.6
AT0046R	Gänserndorf	monthly mean	28.1	44.9	59	63.9	72.4	81.9	79.2	63.6	50.2	33.8	28.9	33.3
AT0046R	Gänserndorf	data capture	95.3	95.7	95.7	95.6	95.3	95.1	95.6	95.7	95.7	95.6	95.4	95.6
AT0047R	Stixneusiedl	monthly mean	31.1	49.6	63.6	67.7	76.3	83.1	80.8	68	52.6	38.2	31	36.5
AT0047R	Stixneusiedl	data capture	95.4	95.4	95.6	95.7	95.7	95.3	95.6	95.7	95.6	95	95.7	95.6
AT0048R	Zoebelboden	monthly mean	58.3	68.4	81.4	83.4	87.1	96.1	85.9	69.3	59.9	51.6	42.3	52.9
AT0048R	Zoebelboden	data capture	95.3	93.9	92.6	95	94.5	94.6	94.5	95.2	95.3	95.3	66.7	88.7
AT0049R	Grebenzen bei St. Lamprecht	monthly mean	74.4	85.5	97.2	102.1	102	106.1	99.4	85.6	78.7	75.7	68.9	69.8
AT0049R	Grebenzen bei St. Lamprecht	data capture	95.6	95.7	95.6	95.7	95.3	95.1	95.4	95.8	95.6	95.2	95.8	95.7
AT0050R	Graz Lustbuehel	monthly mean	21.8	41.5	73.9	70.5	77	81.2	70.8	59.6	48.3	41	26.4	25.1
AT0050R	Graz Lustbuehel	data capture	95.7	95.5	95.6	95.6	95.4	83.8	94.5	95.7	95.4	95.7	92.9	95.7

Table 3.1, cont.

Code	Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
BE0001R	Offagne	monthly mean	43.9	52.8	54.7	65.5	65	67	66.7	49.7	48	38	28.7	36.5
BE0001R	Offagne	data capture	97.3	97.5	84.5	96.8	97	96.4	97	97.7	97.8	84.3	97.8	82
BE0032R	Eupen	monthly mean	46.4	58.9	52.1	58	63.4	62.4	63.1	51.8	41.5	39.1	30.5	34.5
BE0032R	Eupen	data capture	97.4	97.6	84.3	95.3	97.8	94.2	95.8	97.8	97.6	83.6	97.6	97.3
BE0035R	Vezin	monthly mean	43.7	53.1	45.6	53.7	62.2	61.9	59.1	43.8	38.3	35.8	24.3	30.9
BE0035R	Vezin	data capture	97	82.9	97.4	97.6	82.5	77.8	97.4	95.3	97.1	80.6	96.9	97.3
BG0053R	Rojen peak	monthly mean	63.9	67.7	75.3	78.8	83	88.7	91.4	93.8	83.4	75	70.8	66.8
BG0053R	Rojen peak	data capture	90.3	91.2	95.2	95	93.5	95.3	91.9	95	95.7	84.8	95.6	95.2
CH0001G	Jungfraujoch	monthly mean	61.8	65.5	74.5	81.2	83.5	84.6	82.1	76.8	76.4	68.2	60.3	64.2
CH0001G	Jungfraujoch	data capture	97	90.5	96.5	97.2	97.6	97.6	96.5	97.4	97.4	96.8	81.5	93.4
CH0002R	Payerne	monthly mean	32	47.1	57.8	65.5	73.8	81.5	66.2	58.5	50.4	32	16.8	30.4
CH0002R	Payerne	data capture	85.1	99.3	99.3	98.9	99.3	99.3	99.2	99.5	99.3	98.8	99.3	99.3
CH0003R	Tänikon	monthly mean	31.7	45.4	54.1	62.2	72.9	81.9	69.8	59.8	42.1	30.8	14.8	34.6
CH0003R	Tänikon	data capture	99.2	99.6	99.1	99.2	99.1	99.3	99.5	98.9	98.8	99.6	99.2	99.6
CH0004R	Chaumont	monthly mean	66.4	76	87.7	91.7	91.9	107.9	90	78.2	82.2	67.2	61	57
CH0004R	Chaumont	data capture	99.2	99.7	99.5	99.4	99.5	99.3	98.7	99.5	99.3	99.2	99.6	99.2
CH0005R	Rigi	monthly mean	67.4	76.4	86.3	89.9	92	105.3	92.2	80.9	76.8	64.6	57.9	51.6
CH0005R	Rigi	data capture	99.3	99.3	99.6	98.9	99.2	99.4	99.1	99.5	99.2	99.1	99.4	99.2
CY0002R	Ayia Marina	monthly mean	77.9	89.5	95.1	101.5	98.8	100.9	101.5	100.6	89.5	87.8	84.2	77.1
CY0002R	Ayia Marina	data capture	99.9	99.6	97.2	100	98.8	98.9	99.7	93.8	95.3	86.3	98.6	96.9
CZ0001R	Svratouch	monthly mean	35.7	55.5	76.2	80.6	77.4	83.2	88.9	71.2	62.5	48	38.6	43.3
CZ0001R	Svratouch	data capture	99.5	99.7	98.1	99.6	100	100	99.7	100	99.9	99.6	99.7	100
CZ0003R	Kosetice	monthly mean	38	59.2	70.9	72.4	73.5	74.7	73.8	52	45.7	41.2	31.1	45.5
CZ0003R	Kosetice	data capture	98.8	96.7	96.8	100	97.8	97.1	94.4	93	97.1	99.1	74	92.6
CZ0005R	Churanov	monthly mean	59.7	68.1	79	80.3	79.4	89.3	90.7	75.1	68.6	60.7	49.4	55.4
CZ0005R	Churanov	data capture	100	99.9	100	98.3	98.8	99.7	99.1	75.5	100	100	99.7	90.6
CZ0007R	Kresin u Pacova	monthly mean	42.4	63.9	78.1	85.5	68	82.9	94.5	78.7	66.7	51.2	37.3	47.1
CZ0007R	Kresin u Pacova	data capture	100	100	98.4	92.9	33.5	50.4	100	100	100	100	100	100

Table 3.1, cont.

Code	Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DE0001R	Westerland	monthly mean	47	47.1	63.8	79.2	87.8	81.3	86.1	82.5	69.5	50.4	34.6	61.9
DE0001R	Westerland	data capture	96	95.5	95.6	96.1	95.8	95.4	96	96	95.1	94.2	95.8	94.6
DE0002R	Waldhof	monthly mean	35.7	45.7	51.7	67.5	71.9	64.7	72.8	55.5	49.6	29.7	22.6	38.7
DE0002R	Waldhof	data capture	96	95.5	95.7	94.6	96.1	95.3	94.1	96	95.4	96	95.6	93.8
DE0003R	Schauinsland	monthly mean	68	67.5	69.8	85.2	88.7	105.9	100.8	84.1	85.3	75.7	68.9	57.5
DE0003R	Schauinsland	data capture	93	92.4	95.7	96	96	95.8	96	95.6	96	95.8	96	95.7
DE0007R	Neuglobsow	monthly mean	34.3	34.5	52.6	68.4	70.5	62.5	69.3	51.9	51	24.4	19.9	37.9
DE0007R	Neuglobsow	data capture	95.8	94.6	95.3	96	95.3	95.1	95	94.4	94.7	94.8	95	95.2
DE0008R	Schmücke	monthly mean	44.6	62.4	76.5	86.8	85.6	88.5	95.8	78.2	67.3	54.9	42.7	46.7
DE0008R	Schmücke	data capture	95	95.4	95.2	95.6	95.4	95.6	94.8	95.3	87.1	95.6	90.6	93.3
DE0009R	Zingst	monthly mean	42.1	41.3	56.7	74.8	73.8	67.2	77.6	68.7	68.1	38.2	28.2	47
DE0009R	Zingst	data capture	95.8	86.2	93.5	95.1	95.8	96	96	96.1	95.7	95.6	96.1	94.8
DK0005R	Keldsnor	monthly mean	24.2	39.6	54.3	74.5	70.7	67.6	80.4	69.4	67.9	43.4	33.2	52.6
DK0005R	Keldsnor	data capture	39.9	81.5	87.9	91.7	90.7	91.4	91.5	91.3	85.1	91.1	71	78.2
DK0010G	Villum Research Station, Station Nord	monthly mean	67.9	63.4	65	70.8	52.6	54.9	44.4	48.3	59.1	50.5	63.2	69.3
DK0010G	Villum Research Station, Station Nord	data capture	91.7	91.5	90.7	49.7	78.8	69.7	77.2	91.1	78.1	65.7	12.5	23.3
DK0012R	Risoe	monthly mean	50	41.6	61.2	76.7	78	69.7	81.9	74.3	58.7	42.3	34.3	52.8
DK0012R	Risoe	data capture	91.5	91.4	91.4	91.7	91	91.7	91.5	91.5	91	91.4	91.7	91.5
EE0009R	Lahemaa	monthly mean	45.7	53.9	65.6	76.3	62.3	50.3	54.4	56.9	44	41.5	29.7	49.4
EE0009R	Lahemaa	data capture	99.6	100	99.9	100	99.7	100	99.5	99.9	100	99.7	100	100
EE0011R	Vilsandi	monthly mean	52.5	52.7	67.9	82.8	79.2	66	76.3	77.5	61.6	47.2	35.3	56.8
EE0011R	Vilsandi	data capture	99.9	100	99.1	99.2	99.1	90.8	99.6	99.7	100	99.7	97.6	96.9
ES0001R	San Pablo de los Montes	monthly mean	66.4	69.3	84.8	81	93	90.6	96.1	87.3	74.3	67.7	63.1	60.7
ES0001R	San Pablo de los Montes	data capture	99.3	98.7	99.3	99	99.5	98.6	99.5	99.3	99	99.2	99	99.5
ES0005R	Noya	monthly mean	79.9	82	93.4	84.7	83.6	79.3	69	61.4	69.5	73.4	71	69.5
ES0005R	Noya	data capture	99.1	98.7	99.5	99.3	98.5	99.2	99.5	99.3	99.3	99.3	98.8	99.3
ES0006R	Mahón	monthly mean	65.1	67.6	88.4	84	88.7	89.9	79.1	76.4	76.9	59.8	52.4	45
ES0006R	Mahón	data capture	98.8	99	99.1	94.7	97.7	96.1	98.3	98.3	98.6	98.4	90.7	98.9
ES0007R	Víznar	monthly mean	70.2	71	86.8	80.6	89.4	83.2	84.9	81.7	65.6	64.6	57.4	57.4
ES0007R	Víznar	data capture	95	99.3	99.5	99	98.9	96.5	98.1	98.7	99	95.6	92.2	99.5
ES0008R	Niembro	monthly mean	68.2	75.9	82.5	81.9	80.2	79.9	66	63.9	76.5	62	58.7	61.2
ES0008R	Niembro	data capture	93	97.2	99.1	98.8	98.1	94	97.2	98.8	98.6	99.3	80.6	98.3
ES0009R	Campisabalos	monthly mean	67.3	73.8	79.5	78.7	85.7	86.3	81.2	70.3	63.2	50.9	59.4	55.5
ES0009R	Campisabalos	data capture	99.3	98.7	98.7	98.9	98.8	98.9	98	98.7	99	99.1	98.8	98.8
ES0010R	Cabo de Creus	monthly mean	56.8	71.2	82.1	86.4	79	87.2	71.2	65	70.6	69.2	58.4	44.6
ES0010R	Cabo de Creus	data capture	98.8	98.8	98	96.1	98.1	99	98.9	98.7	93.5	99.1	92.6	93.3

Table 3.1, cont.

Code	Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
ES0011R	Barcarrota	monthly mean	57.4	45.5	54.1	45.3	67.2	59.7	59.7	74	68.3	64.3	44.6	47.3
ES0011R	Barcarrota	data capture	96	95.5	94.2	97.6	96.2	98.5	97.4	98.5	95	98.8	93.9	99.5
ES0012R	Zarra	monthly mean	69.7	71	90.4	84.1	101.4	103.2	91.9	89.2	80.9	75.5	66.7	61.9
ES0012R	Zarra	data capture	98.7	98.2	94.1	98.6	98.9	98.3	98.8	98.5	98.8	99.1	97.9	98.9
ES0013R	Penausende	monthly mean	68	73.2	82.7	76.7	84.1	85.7	82.2	81.7	79.5	65.9	59.1	52.6
ES0013R	Penausende	data capture	99.1	99.3	98.8	96.8	99.2	98.2	92.2	84.1	90.4	99.2	98.9	99.1
ES0014R	Els Torms	monthly mean	56.3	67.7	85	84.2	94.2	101.1	87.5	80.2	76	60.9	55	49
ES0014R	Els Torms	data capture	98.9	99	98.8	96.2	99.1	96.4	99.2	98.9	98.3	98.9	98.6	99.3
ES0016R	O Saviñao	monthly mean	62.1	70.5	69.1	65.8	66	62.7	57.2	49.3	51.5	46	50	56.1
ES0016R	O Saviñao	data capture	98.8	98.1	97.8	99	98.7	96.9	98.7	99.3	97.4	98.9	99	90.9
ES0017R	Doñana	monthly mean	50.8	56.7	67.4	65.8	81.3	70.4	68.1	65.6	48.2	49.5	52.2	36.7
ES0017R	Doñana	data capture	99.6	99.6	99.6	89.6	99.2	99.6	99.3	99.3	99.6	89	95.7	99.6
FI0009R	Utö	monthly mean	56.7	55.1	69.2	77.3	69.3	61	71.1	-	55.4	55.1	47.7	61.7
FI0009R	Utö	data capture	100	98.5	100	99.7	98.9	100	86	0	1.5	99.9	100	100
FI0018R	Virolahti III	monthly mean	42.8	47.4	63.8	69.7	62.7	52.3	57.6	58.6	42.9	41.2	35.3	48.1
FI0018R	Virolahti III	data capture	99.2	100	89	99.7	99.3	100	99.7	99.9	86.2	96	96.1	100
FI0022R	Oulanka	monthly mean	59.5	54.6	75.8	77.3	66	52.6	52.3	51.7	48.1	49.3	52.7	57.4
FI0022R	Oulanka	data capture	10.9	100	100	99.7	99.1	100	99.2	100	99.7	98.9	99.3	99.5
FI0037R	Ähtäri II	monthly mean	45	51.2	67.9	77.3	66.8	49.8	54.9	53.7	43.6	42.2	44.3	52
FI0037R	Ähtäri II	data capture	99.2	99.6	99.7	99.6	99.3	99.4	96.8	97.8	100	99.3	100	97.2
FI0096G	Pallas (Sammaltunturi)	monthly mean	64	59	79.8	86	72.3	58.7	57.3	60.7	57	55.3	63.6	66.1
FI0096G	Pallas (Sammaltunturi)	data capture	78.2	84.4	100	99.9	99.9	99.4	98.1	86.3	98.9	96.5	99.7	98.4
FR0008R	Donon	monthly mean	54.8	66.4	68.4	71.2	74.8	84.3	72.6	57.3	54.7	49.2	35.1	42.4
FR0008R	Donon	data capture	99.7	99.9	99.6	99.3	99.9	99.4	99.3	99.9	99.3	99.7	99.7	99.7
FR0009R	Revin	monthly mean	50.8	61.6	70.8	77.1	76.7	77.5	82.3	57.1	60.7	43.7	34.8	43.1
FR0009R	Revin	data capture	98.3	99.4	97.6	99.7	100	99.6	76.3	99.3	99.4	78.6	99.7	99.3
FR0010R	Morvan	monthly mean	64.5	72.3	74.7	72.8	76.9	82.2	66.4	51.7	61.4	52.6	54	48.3
FR0010R	Morvan	data capture	98.5	94.3	98.4	98.5	98.3	98.2	98	69	87.8	98.1	98.6	76.2
FR0013R	Peyrusse Vieille	monthly mean	59.7	69.7	83.2	74.8	71.5	80.2	67.3	57.5	74.5	59.2	56.5	53.3
FR0013R	Peyrusse Vieille	data capture	100	99.7	99.5	99.7	99.6	96.9	97.6	99.9	99	97.4	77.4	99.7
FR0014R	Montandon	monthly mean	50.6	59.9	60.2	62.4	66.2	82.3	65.1	53.5	50	44.4	32.4	42.2
FR0014R	Montandon	data capture	99.7	99.4	100	99.7	99.7	96.7	99.7	100	99.6	99.7	100	99.6
FR0015R	La Tardière	monthly mean	50.8	66.1	68.6	71.7	70.5	73	63.1	51.6	70.7	50.8	43.6	43.7
FR0015R	La Tardière	data capture	100	99.7	99.6	88.9	79.7	97.4	96.6	99.7	99.4	99.9	99.3	98.8

Table 3.1, cont.

Code	Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
FR0016R	Le Casset	monthly mean	75.8	80.1	98	98.6	96.6	105.3	96.7	88.2	88.3	74.2	69.1	76.8
FR0016R	Le Casset	data capture	99.7	100	95.3	100	100	93.6	100	69.8	100	98.9	93.5	100
FR0017R	Montfranc	monthly mean	71.2	79.2	97.1	92.8	88.7	93.4	82.1	71.2	81.8	71.6	69.2	59.3
FR0017R	Montfranc	data capture	99.7	99.3	100	99.9	97	99.9	94.4	99.9	99.7	99.6	99.4	100
FR0018R	La Coulonche	monthly mean	63.3	71.6	76.7	78.4	80.6	75.5	71.1	59.6	70.6	53.7	47.5	56.3
FR0018R	La Coulonche	data capture	99.7	99.1	98.7	99.2	96.1	99.4	99.7	99.1	95	99.5	99.7	98.8
FR0019R	Pic du Midi	monthly mean	82.5	88.8	98.2	95.1	106.2	106.8	96.3	92	94.2	77.7	79.6	84.3
FR0019R	Pic du Midi	data capture	98.5	98.4	67.5	31	98.8	99.4	99.6	99.7	99.9	99.9	99.9	99.7
FR0023R	Saint-Nazaire-le-Désert	monthly mean	49.8	59.7	68.3	75.1	76.3	84.5	69.1	57	57.6	45.1	43.8	42
FR0023R	Saint-Nazaire-le-Désert	data capture	93	98.1	97.6	98.3	98.1	97.8	98.3	98.3	95.4	97.2	94.9	98.3
FR0025R	Verneuil	monthly mean	52.7	65.7	62	60.5	64.2	66.8	60.4	49.1	49.6	37.9	34	40.8
FR0025R	Verneuil	data capture	99.5	99	99.3	99.4	99.2	99.3	99.2	99.3	99	99.2	99.9	99.5
FR0030R	Puy de Dôme	monthly mean	75.9	84.1	98.5	98.9	94.2	107	95.1	80.6	95.5	82	77.3	71.1
FR0030R	Puy de Dôme	data capture	98.4	93.9	94.9	91.7	85.2	78.8	45.6	66.9	74.3	71.8	78.6	96.8
GB0002R	Eskdalemuir	monthly mean	59.2	65.3	64.1	70.6	72.3	54.1	50.9	55.2	51.3	53.8	42.9	57.2
GB0002R	Eskdalemuir	data capture	99.7	96	100	99.6	99.9	100	96.5	100	100	99.7	100	100
GB0006R	Lough Navar	monthly mean	51.7	60.9	58.5	64.6	58.4	44	37.5	41.8	34.3	45.1	38.2	56.6
GB0006R	Lough Navar	data capture	100	91.8	99.1	98.6	100	100	99.6	99.6	100	99.7	98.8	99.7
GB0013R	Yarner Wood	monthly mean	62.6	71.5	67.6	71	68.8	58	56	53.7	56.1	55.9	55.1	71
GB0013R	Yarner Wood	data capture	99.9	95.7	100	99.7	100	100	99.9	81.3	61.7	99.6	100	99.7
GB0014R	High Muffles	monthly mean	49.2	58.3	65.9	74.6	79.4	61.2	59.7	55.4	65.5	62	55.4	70.3
GB0014R	High Muffles	data capture	99.7	95.7	99.9	99.7	87	99.9	46.8	94.5	86.4	99.7	100	100
GB0015R	Strath Vaich Dam	monthly mean	67.2	76.3	83.5	88	78.8	60.4	57.2	63.2	60.8	66.2	55	76.2
GB0015R	Strath Vaich Dam	data capture	27.3	100	98.4	94.7	100	100	100	98.9	100	99.9	100	31.2
GB0031R	Aston Hill	monthly mean	66	73.3	70.8	71.2	71.3	59.4	65.6	69.7	63.1	58.7	45.5	63.9
GB0031R	Aston Hill	data capture	100	95.5	99.3	99.9	100	99.9	99.7	96	99.3	100	100	100
GB0033R	Bush	monthly mean	58.1	63.6	70.7	74.4	71.8	53.9	54.7	55.2	50.3	50.1	39.4	63.7
GB0033R	Bush	data capture	100	95.8	100	96.1	96.2	96.4	100	96.1	100	76.9	98.8	100
GB0035R	Great Dun Fell	monthly mean	60.7	66.1	68.9	74.8	77.6	61.8	64.5	62	67.5	60.8	53.7	67.1
GB0035R	Great Dun Fell	data capture	82.4	99.3	100	99.6	100	99.9	99.7	100	99.3	99.6	99.6	99.1
GB0036R	Harwell	monthly mean	56.3	66.6	57.6	60.6	68.2	56.7	61.3	56	52.3	50.4	32.6	53.6
GB0036R	Harwell	data capture	99.3	92.9	99.9	100	99.7	99.7	100	99.6	99.9	93.1	100	99.7
GB0037R	Ladybower Res.	monthly mean	45.5	46.3	41.5	48.9	53.7	38.2	48.1	44.6	38.7	35.3	21.3	33.9
GB0037R	Ladybower Res.	data capture	96.5	99.6	100	99.9	100	86.9	86.8	98.3	99.7	99.6	100	100
GB0038R	Lullington Heath	monthly mean	55.6	65.8	56.9	57.4	65.1	57.7	55.8	52.8	53.7	49.9	37.7	45.4
GB0038R	Lullington Heath	data capture	100	95.7	100	99.7	98.9	100	99.2	99.6	96.5	99.7	97.8	97

Table 3.1, cont.

Code	Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
GB0039R	Sibton	monthly mean	49.9	60.1	54.5	59.3	67.2	58	61.2	55.6	50.3	46.1	33.6	45.2
GB0039R	Sibton	data capture	100	99.6	100	99.9	95.7	100	100	99.7	99.7	98.8	100	100
GB0043R	Narberth	monthly mean	67.3	76	70.1	73.7	69.5	57	46.2	53.6	59.6	59.9	48.2	64
GB0043R	Narberth	data capture	99.3	96	99.9	100	100	100	99.1	92.7	100	97	99.9	96.4
GB0045R	Wicken Fen	monthly mean	44.9	56.1	46.9	52.3	59.5	48.8	54.1	46.9	43.1	-	-	44
GB0045R	Wicken Fen	data capture	100	94.9	96.9	99.9	90.3	100	99.7	96.1	84	0	0	62.6
GB0048R	Auchencorth Moss	monthly mean	58.4	64	65.4	71	69.2	52.7	52.8	52.9	50.7	53.7	42.3	58.6
GB0048R	Auchencorth Moss	data capture	100	95.2	99.5	99.3	99.3	99	99.6	95.8	100	99.6	99.7	100
GB0049R	Weybourne	monthly mean	52.6	61.2	61.8	71.2	77.7	66.9	72.4	60.3	65.2	50.6	39.6	52
GB0049R	Weybourne	data capture	100	99.9	100	99.7	100	100	99.7	100	100	99.7	100	100
GB0050R	St. Osyth	monthly mean	52.4	63.8	52.4	57.9	67.5	56.7	61.4	55.8	42.2	46.1	34.6	42.4
GB0050R	St. Osyth	data capture	99.2	95.5	98.4	98.2	98.1	98.9	95.8	99.5	97.5	99.5	98.9	99.1
GB0053R	Charlton Mackrell	monthly mean	62	73	61.9	64	65.3	52.8	54.8	52.6	51	50.5	39.6	52.9
GB0053R	Charlton Mackrell	data capture	100	97.8	100	99.3	99.7	99.9	100	99.6	98.9	99.7	100	100
GR0001R	Aliartos	monthly mean	36.3	38.5	54.9	-	-	-	-	-	-	-	58.3	50.2
GR0001R	Aliartos	data capture	91.4	100	99.6	0	0	0	0	0	0	0	38.2	8.3
GR0002R	Finokalia	monthly mean	84.5	86.6	101.9	107.8	111.2	111.7	112.4	118.8	103.2	92.8	83.4	84.2
GR0002R	Finokalia	data capture	98.4	85.9	99.1	99.6	97.4	97.5	99.5	99.1	98.6	96.2	100	100
HU0002R	K-puszta	monthly mean	32.7	45	65.5	65.9	64.4	71.8	68.9	61.2	48.7	35.3	23.7	30.3
HU0002R	K-puszta	data capture	100	100	100	90	100	100	99.3	98.8	100	100	99	100
IE0001R	Valentia Observatory	monthly mean	81.3	77.6	78.7	88.6	77	60.9	53.8	62.8	65.8	68	66.5	76.4
IE0001R	Valentia Observatory	data capture	36	47.8	75.4	95.4	100	100	100	100	99.7	100	100	100
IE0031R	Mace Head	monthly mean	81	82.8	83.9	87.5	81.6	63.1	58.2	66.9	67.5	71.7	66	81.1
IE0031R	Mace Head	data capture	100	100	99.9	100	100	97.8	100	100	100	100	99.3	100
IT0001R	Montelibretti	monthly mean	25.9	35.1	50.5	51.8	54.4	59.5	52.5	55	43.2	32.1	31.2	20.1
IT0001R	Montelibretti	data capture	100	100	98.7	95.3	99.5	99.7	99.1	100	99	98.5	8.3	99.9
IT0004R	Ispra	monthly mean	18.2	29.8	56.9	68.2	80.9	78.8	67	62.7	47.5	24.4	22.3	11.4
IT0004R	Ispra	data capture	91.7	69.9	84.8	100	40.5	65.4	98.3	52.2	96.2	99.9	100	97
LT0015R	Preila	monthly mean	41.4	40.4	51.7	53.2	67.1	63	68.6	74.2	55.6	39.9	28.7	41.3
LT0015R	Preila	data capture	99.3	98.4	99.2	100	96.5	90.1	92.1	96.1	100	91.7	100	98.4

Table 3.1, cont.

Code	Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
LV0010R	Rucava	monthly mean	50.2	56.3	67.9	76.6	69.6	60.8	70.6	68	41.6	43.3	34.1	55.6
LV0010R	Rucava	data capture	97.4	99.3	99.7	99.7	98.9	98.9	99.1	99.9	30.4	75	99.9	99.7
LV0016R	Zoseni	monthly mean	49.7	57.3	74.6	79.2	64.5	55.2	51.5	57.9	43.9	46.8	41.8	58.6
LV0016R	Zoseni	data capture	99.6	99.9	99.9	100	99.7	100	99.6	100	94.4	91.9	96.2	100
MK0007R	Lazaropole	monthly mean	-	-	-	-	-	-	110.8	120.7	97.2	93.5	93.7	92.8
MK0007R	Lazaropole	data capture	0	0	0	0	0	0	38.2	97.8	85.1	82	95.1	87.1
MT0001R	Giordan lighthouse	monthly mean	79.3	82.3	94.2	99.5	98.5	109.3	92.9	87.3	89.8	82.2	75.8	78.5
MT0001R	Giordan lighthouse	data capture	99.7	99.6	80.4	89.7	72.8	99.7	99.2	98.9	99.6	99.3	99.7	98.9
NL0007R	Eibergen	monthly mean	28.8	41.1	46.5	51.8	56.9	54.5	58.3	41.9	31.5	21.9	14.5	28.6
NL0007R	Eibergen	data capture	99.5	99.1	96.2	100	100	99.3	100	92.6	98.2	100	100	99.6
NL0009R	Kollumerwaard	monthly mean	34	45.4	51.1	54.9	69.7	64.6	70.1	58.6	52.1	35.9	19.3	43.8
NL0009R	Kollumerwaard	data capture	99.1	99.6	98.1	99.7	99.6	96	100	99.7	99.6	82.5	99	97.7
NL0010R	Vredepeel	monthly mean	33.1	45.1	40.5	48.3	56.8	55.5	59.1	44.3	33.5	28.9	15.3	33.2
NL0010R	Vredepeel	data capture	99.5	98.8	100	78.3	92.1	93.2	96.1	99.5	100	99.9	99.7	96
NL0091R	De Zilk	monthly mean	35.2	43.3	46.4	55.9	66.7	62.5	76.6	59.6	52.1	35.6	19	48.4
NL0091R	De Zilk	data capture	100	99.9	99.3	98.2	97.6	85.7	99.6	87.2	99	88.2	99.7	99.2
NL0644R	Cabauw Wielsekade	monthly mean	35.1	44.9	41.5	47.4	57.8	54.9	62.8	45.9	36.8	25.8	12.7	30.8
NL0644R	Cabauw Wielsekade	data capture	96.5	96.9	93.4	100	99.9	100	99.3	100	99.6	100	98.2	99.3
NO0002R	Birkenes II	monthly mean	60.3	58.2	71.5	76.9	66.6	54.3	35	53.1	52.4	52.7	49	61.5
NO0002R	Birkenes II	data capture	99.7	98.7	99.3	99.7	99.3	99.6	1.6	30.6	99.7	99.2	99.7	98.8
NO0015R	Tustervatn	monthly mean	68.3	67	83.3	86.5	75.2	58.8	55.6	52.7	52	55.5	60.2	70.4
NO0015R	Tustervatn	data capture	99.7	100	98.7	99.2	99.7	99.7	99.7	99.5	99.4	99.9	99.9	99.6
NO0039R	Kårvatn	monthly mean	67.2	69.9	71.6	73.9	63.6	55.2	49.7	43	31.6	47.3	49.5	57
NO0039R	Kårvatn	data capture	99.1	100	100	99.4	100	99	99.6	99.7	98.9	99.6	99.6	99.6
NO0042G	Zeppelin mountain (Ny-Ålesund)	monthly mean	77	70.6	71.7	58	47.9	55.9	46.5	51.7	61	67.5	73.7	66.4
NO0042G	Zeppelin mountain (Ny-Ålesund)	data capture	96.4	100	98.4	99.6	99.5	99.4	99.6	99.7	99.7	98.8	99.9	99.6
NO0043R	Prestebakke	monthly mean	58.8	54	65.2	73.2	70.5	63.6	70.8	59.2	51.4	48.7	45.1	54.5
NO0043R	Prestebakke	data capture	99.7	100	98.9	99.7	99.2	99.4	98.4	98.5	99.9	99.7	99.9	99.7
NO0052R	Sandve	monthly mean	62.8	63.7	69.7	79.2	75.4	65.5	69	66.2	56.9	59.3	53.4	67.4
NO0052R	Sandve	data capture	99.7	100	99.1	99.7	99.5	97.4	99.3	99.6	98.1	98.8	99.6	99.5
NO0056R	Hurdal	monthly mean	51.8	49.3	65.4	68.7	65.2	59.9	60.4	49.9	41.9	41.9	40.6	40.2
NO0056R	Hurdal	data capture	99.9	99.9	99.9	99.6	99.2	99.9	98.8	98.7	99.9	99.3	99.9	99.6

Table 3.1, cont.

Code	Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PL0002R	Jarczew	monthly mean	39.6	47	50.9	58.6	61.9	54.8	64.8	58.1	49.3	36.3	27.1	31.3
PL0002R	Jarczew	data capture	100	99.6	97.6	100	99.5	100	99.5	100	100	100	99.9	100
PL0003R	Sniezka	monthly mean	68.2	74.8	89.3	96.1	92	91.5	101.4	87.5	83.8	75.2	65.4	60.4
PL0003R	Sniezka	data capture	99.6	99.9	99.6	99.4	99.7	99.7	99.7	99.7	99.2	99.7	99.6	99.7
PL0004R	Leba	monthly mean	49.2	49.2	64.4	74.8	75.8	67.2	76.8	72.2	60.6	40.6	27.2	48.7
PL0004R	Leba	data capture	100	100	100	100	100	99.6	100	100	100	99.2	99.7	100
PL0005R	Diabla Gora	monthly mean	45	57.2	61.1	72.3	72.2	56.8	78	73.1	64.5	41.6	32	48.4
PL0005R	Diabla Gora	data capture	100	100	100	100	90.3	100	100	100	100	100	100	51.3
RO0008R	Poiana Stampei	monthly mean	54.6	49.4	71.1	71.7	70.6	61.6	59.1	-	47.8	37.9	25	40.2
RO0008R	Poiana Stampei	data capture	54.2	43.5	63.4	56.5	46.4	79.6	20.6	0	65.7	89.8	97.9	67.2
SE0005R	Bredkälen	monthly mean	63.5	56	79.8	85.4	67.6	57.8	66.4	50.6	43.5	44.3	48.7	63.1
SE0005R	Bredkälen	data capture	99.5	60.6	100	100	80.6	98.5	87.6	98.1	99.3	99.5	99.9	99.7
SE0011R	Vavihill	monthly mean	55.8	45.4	65.9	81.3	73	59.8	74.7	65.1	56.9	44.1	39.4	51.9
SE0011R	Vavihill	data capture	99.6	100	99.7	100	99.5	100	98.1	99.7	99.2	99.9	99.9	99.9
SE0012R	Aspvreten	monthly mean	53.9	43.6	58.7	65.7	62.9	53.9	65.9	54.6	43.4	41.4	39.7	44.5
SE0012R	Aspvreten	data capture	98	96	100	92.9	100	100	95.6	97.7	100	100	100	99.7
SE0013R	Esrange	monthly mean	65.2	59.7	84	89.5	73.6	61.5	60.7	60.1	58.1	55.8	64.4	67.4
SE0013R	Esrange	data capture	99.7	100	100	99.7	99.1	99.9	97.4	100	99.6	99.9	100	100
SE0014R	Råö	monthly mean	59.2	49.5	63.9	75.6	78.1	70	77.4	75.8	60.5	51.8	43.1	61.3
SE0014R	Råö	data capture	99.6	100	100	100	98.1	98.6	98.3	98.4	99.2	99.9	97.6	100
SE0018R	Asa	monthly mean	57.4	47.2	55	67	63.2	55.4	63.8	56.2	44.2	43.4	41.5	52.3
SE0018R	Asa	data capture	99.5	97.6	59.7	61.4	73.3	98.9	80.2	93.8	88.3	81.7	99	100
SE0019R	Östad	monthly mean	58.3	48.2	59.9	68.5	64	56.4	61.6	55	44.4	42.9	37.3	51.4
SE0019R	Östad	data capture	99.7	100	100	100	99.6	98.9	98.1	100	99.7	99.9	100	100
SE0032R	Norra-Kvill	monthly mean	60.8	52.5	72.5	83.4	75	62.7	76.8	69.2	63.2	48.8	45.4	55.8
SE0032R	Norra-Kvill	data capture	94.5	99.7	99.7	100	99.6	100	99.7	99.9	100	99.6	100	100
SE0035R	Vindeln	monthly mean	56.7	52.4	73.9	80.6	65.7	54.5	54.8	47.2	39.3	42.2	44.1	55
SE0035R	Vindeln	data capture	99.6	98.8	100	100	99.7	100	99.9	96.6	99	99.7	100	100
SE0039R	Grimsö	monthly mean	59.8	53.5	70.1	73.5	68.6	59.8	69.3	56.4	41.4	40.9	40.4	47.5
SE0039R	Grimsö	data capture	99.6	100	100	100	99.1	98.9	78.1	100	99.4	99.9	100	100

Table 3.1, cont.

Code	Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SI0008R	Iskrba	monthly mean	41.6	52.2	63.6	63.2	62.3	62.9	55.8	52.7	43.3	46.8	35.9	39.3
SI0008R	Iskrba	data capture	95.8	83.6	95.8	95.7	95.8	94.3	96	95.4	95.7	95.8	95.8	96
SI0031R	Zarodnje	monthly mean	42.3	70	85	86.6	92.7	96.9	88.4	74.4	66.1	58.5	40	43.1
SI0031R	Zarodnje	data capture	95.2	75.6	94.6	95.4	93.5	94.9	94.9	95.3	91.7	95.2	94.9	95.6
SI0032R	Krvavec	monthly mean	76.9	79.6	104.5	107.5	109.8	110.6	105.1	91.7	85	80.2	77	77.1
SI0032R	Krvavec	data capture	95.6	96	92.5	93.3	95.4	95.6	95.7	94.6	95.6	94.5	91.9	91.1
SI0033R	Kovk	monthly mean	51.7	69.5	97.1	93.3	101.8	109.1	96.1	91	73.4	73	46.7	43.6
SI0033R	Kovk	data capture	94.2	93.2	95.6	95.8	90.9	95	95.8	90.5	95.8	96	96	70.4
SK0002R	Chopok	monthly mean	76.4	84.2	94.6	104.6	108.1	93.8	91.8	85.4	89.1	-	75.8	67
SK0002R	Chopok	data capture	50.5	99.7	66.4	89	22.7	18.6	8.9	89.1	69.4	0	22.4	96.2
SK0004R	Stará Lesná	monthly mean	56.3	69.9	67.2	71	69.1	65	62.3	51.2	48.7	44.5	44	46.4
SK0004R	Stará Lesná	data capture	99.2	99.1	17.3	73.6	98.1	84.4	100	99.9	100	99.9	100	99.9
SK0006R	Starina	monthly mean	45.8	55.9	65.8	68.6	68.7	70.5	63.5	63.3	52.1	40.8	39.9	36.5
SK0006R	Starina	data capture	97.4	100	100	99.9	96.9	99.9	99.6	99.7	99.4	99.5	99.9	99.5
SK0007R	Topolniky	monthly mean	34.4	52.5	66.6	56.2	49.3	80.3	75	63	51.7	32	25.6	28.9
SK0007R	Topolniky	data capture	100	100	100	99.9	99.6	100	100	99.9	99.4	100	99.6	99.7

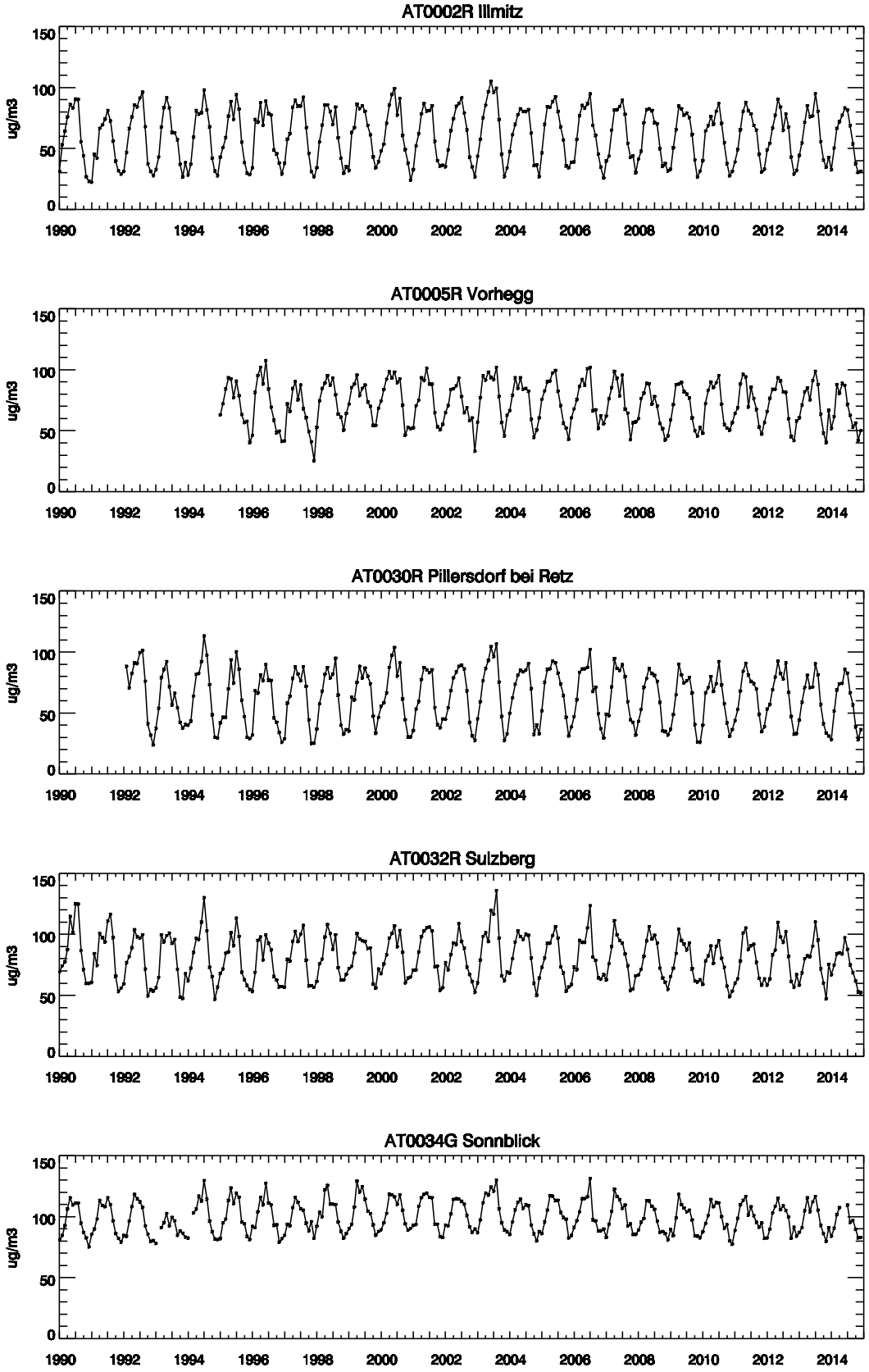
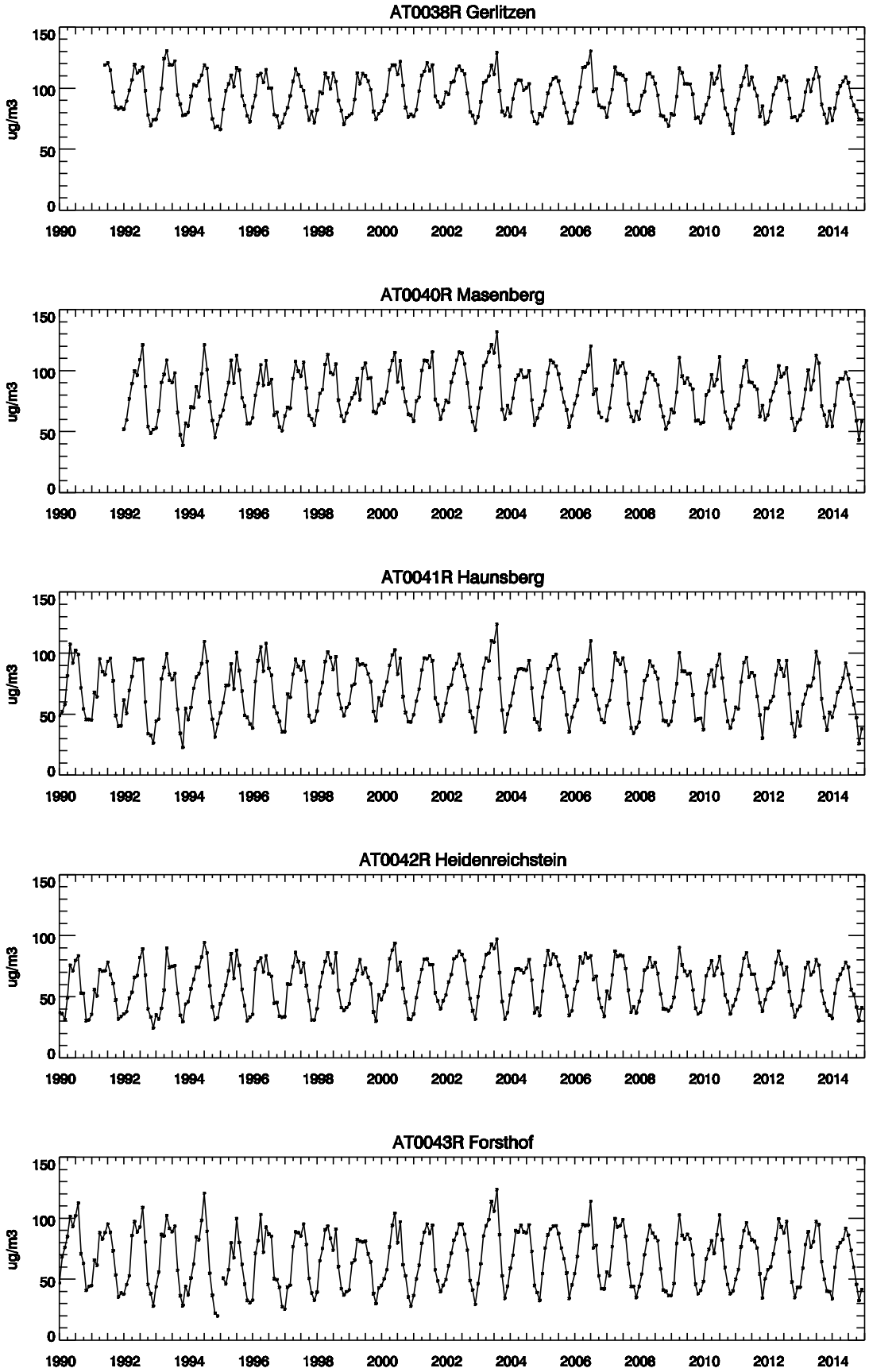


Figure 3.1: Seasonal variation, 1990–2014.



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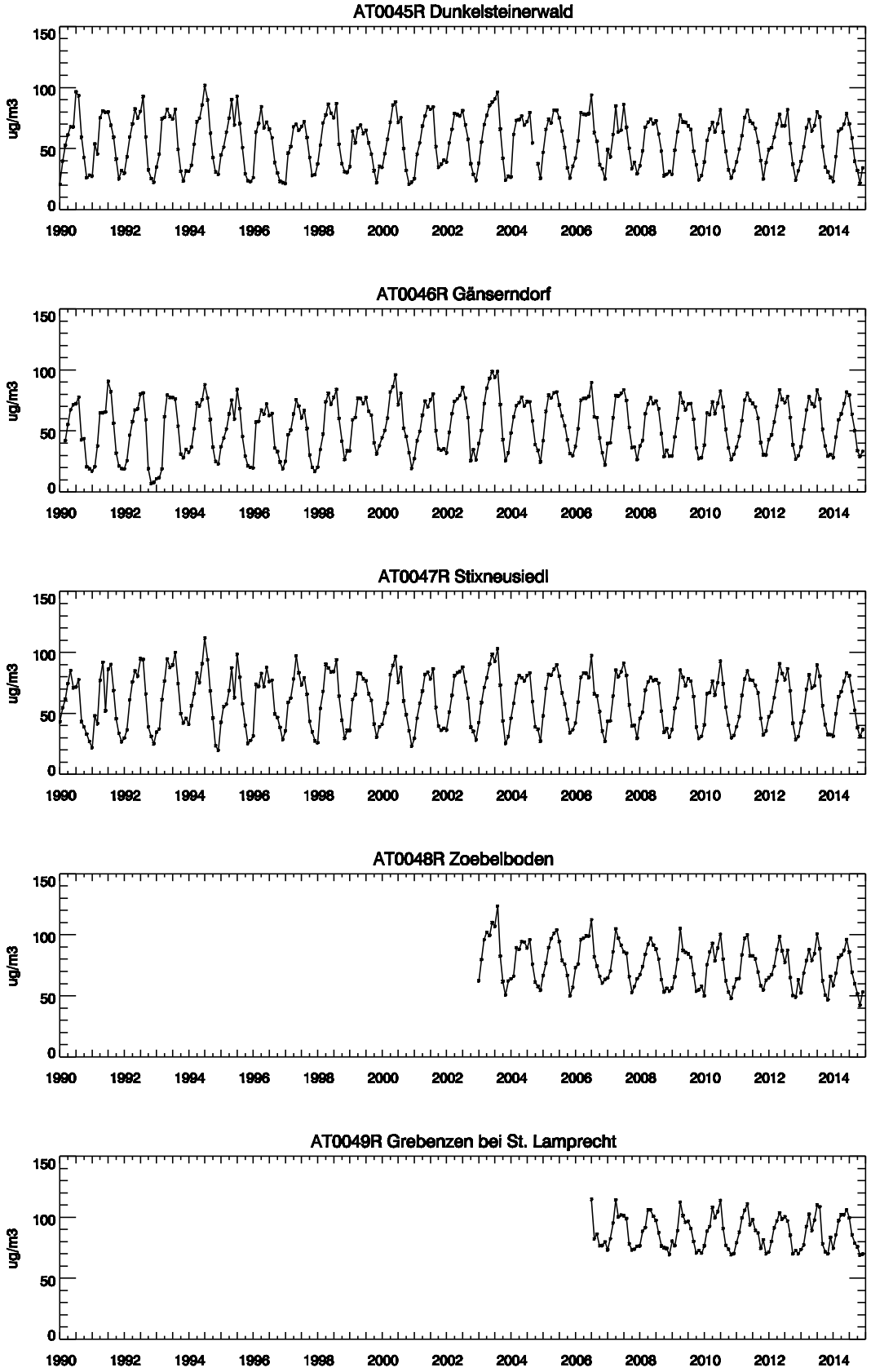

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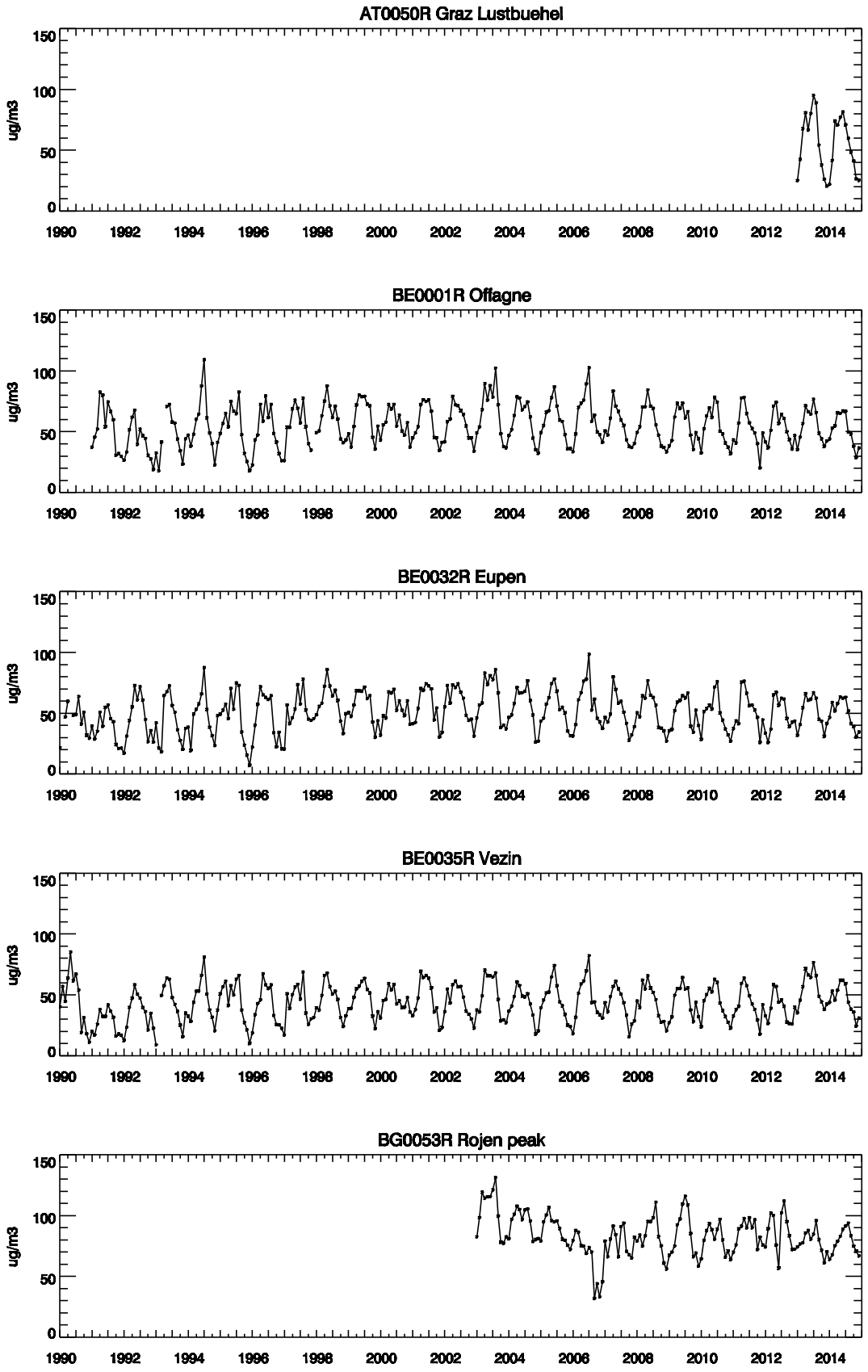

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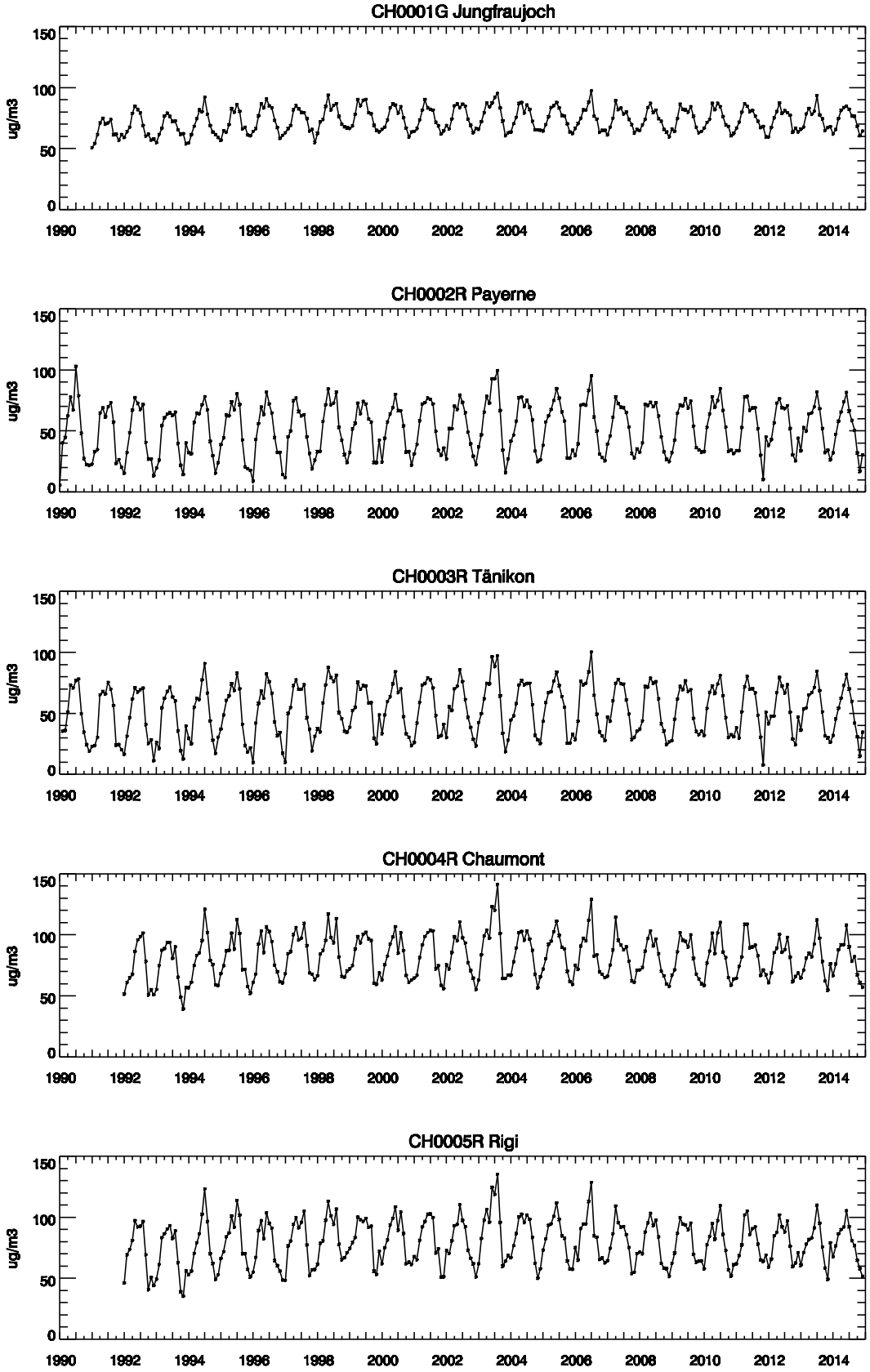

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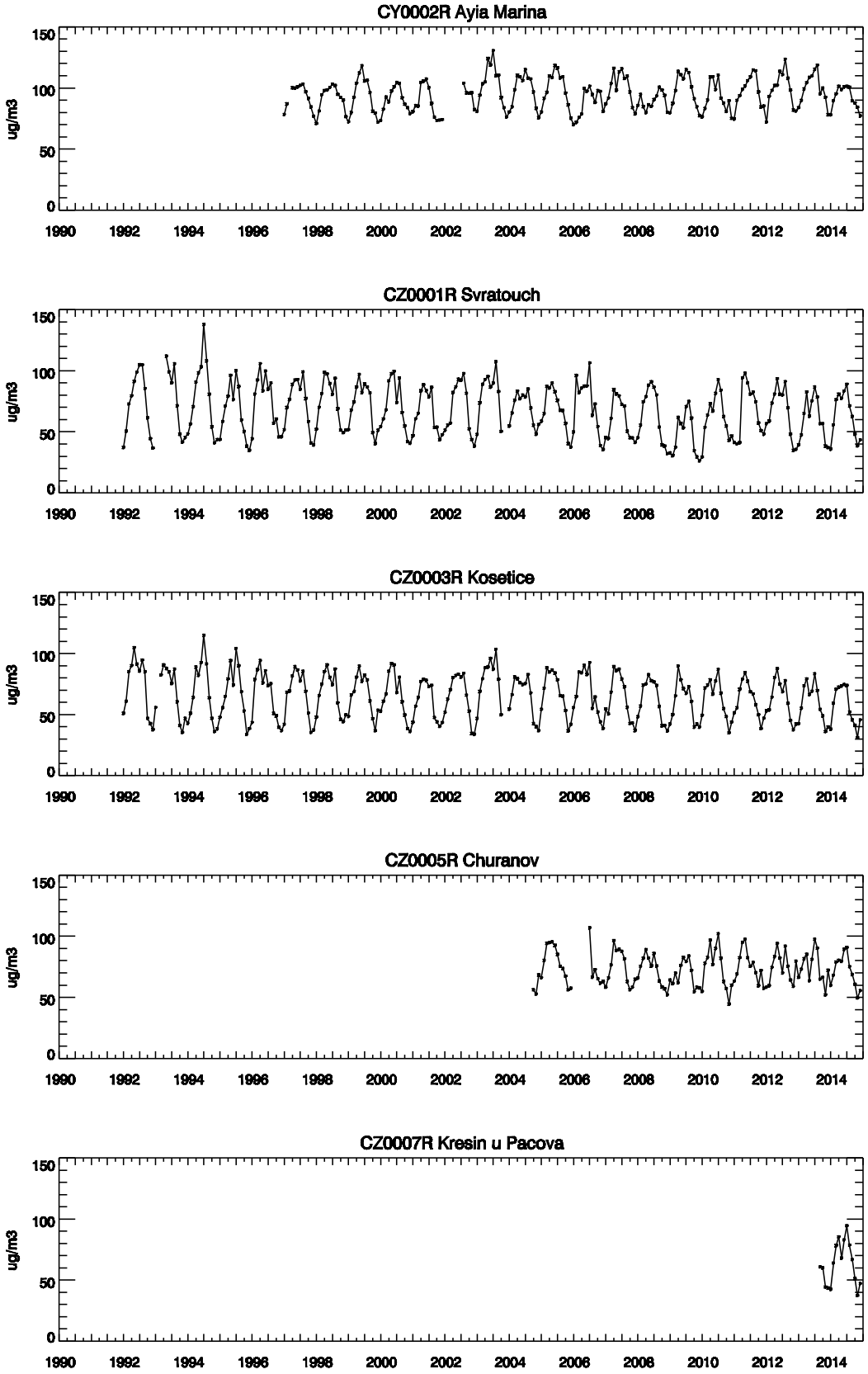
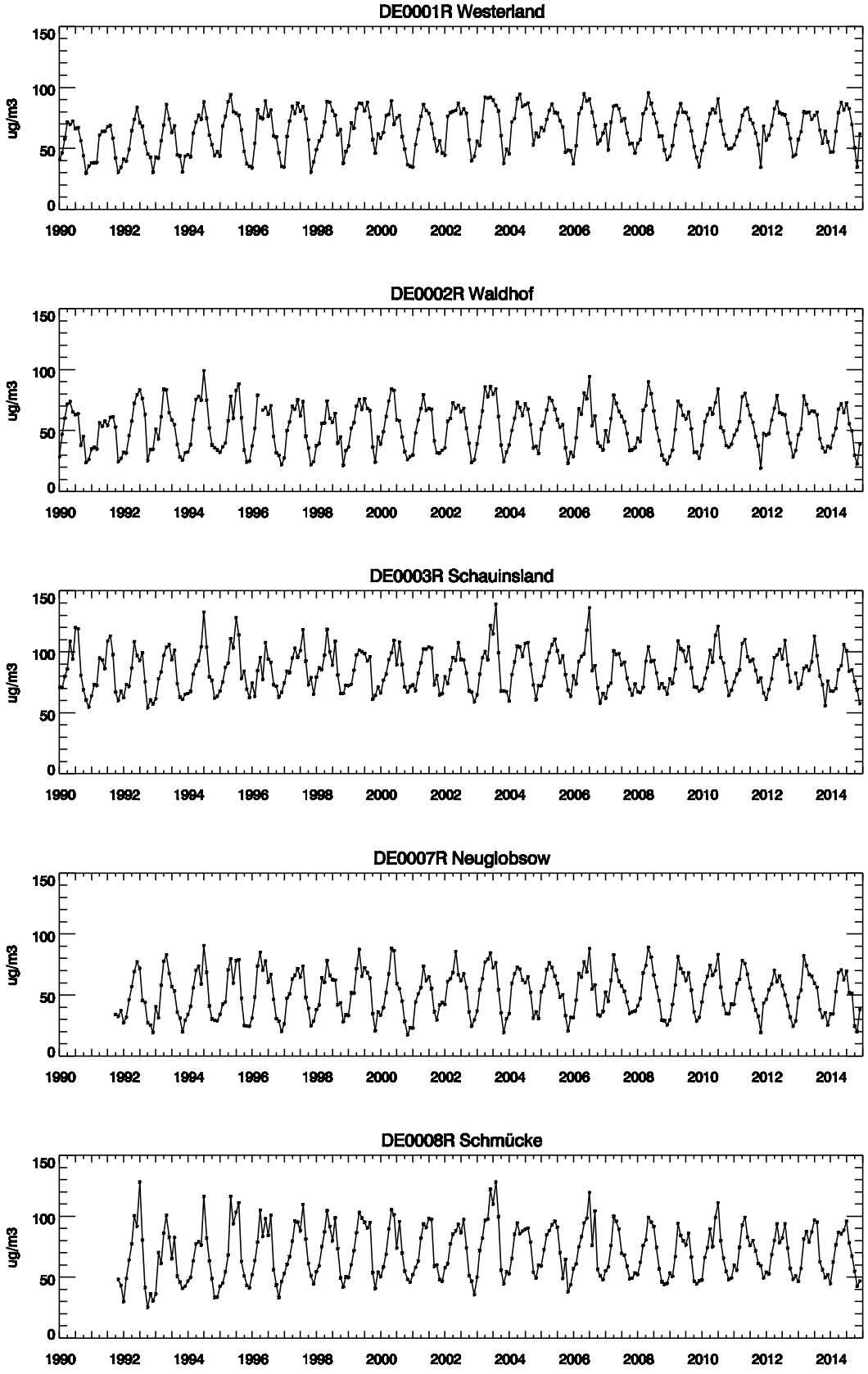


Figure 3.1, cont.



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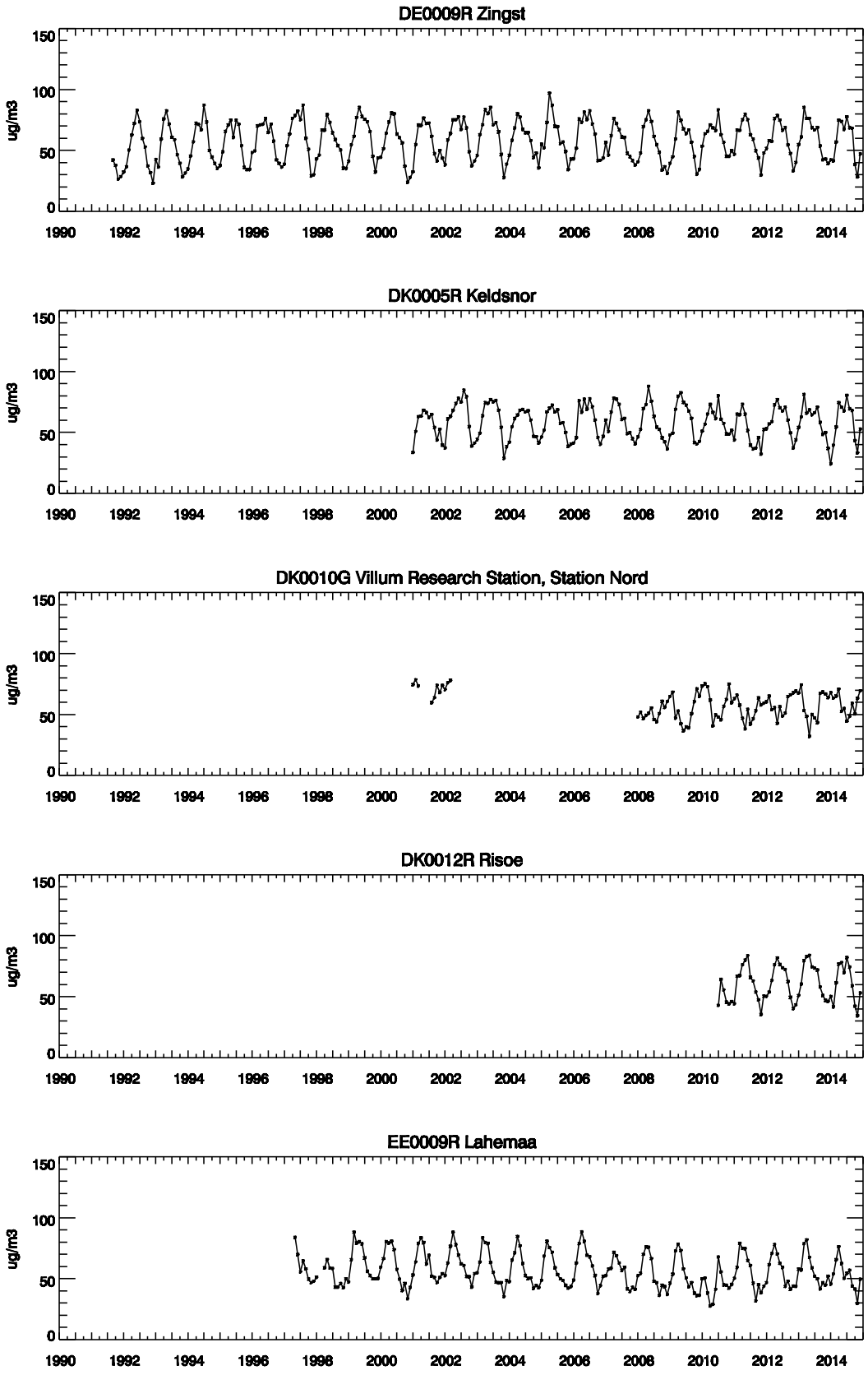
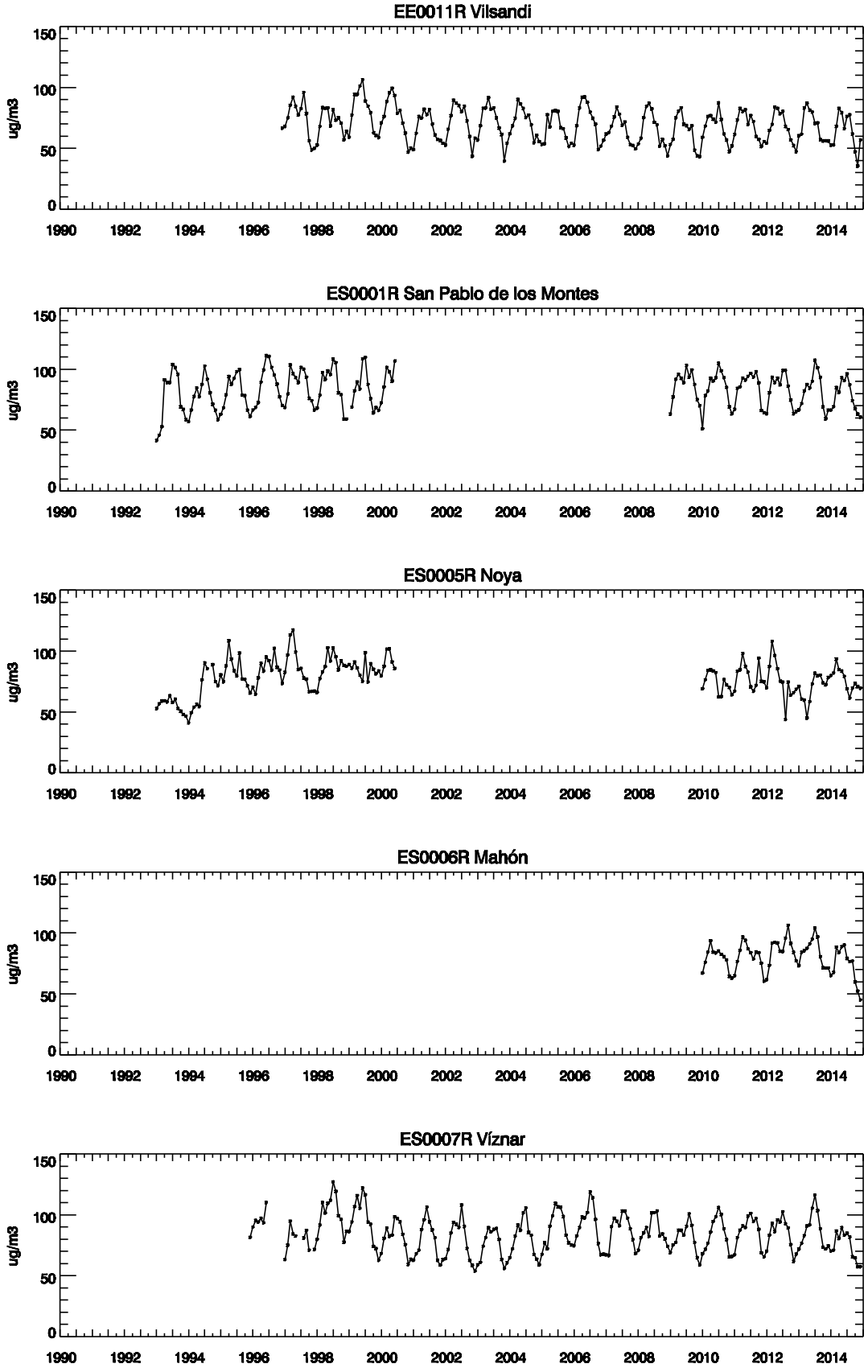


Figure 3.1, cont.



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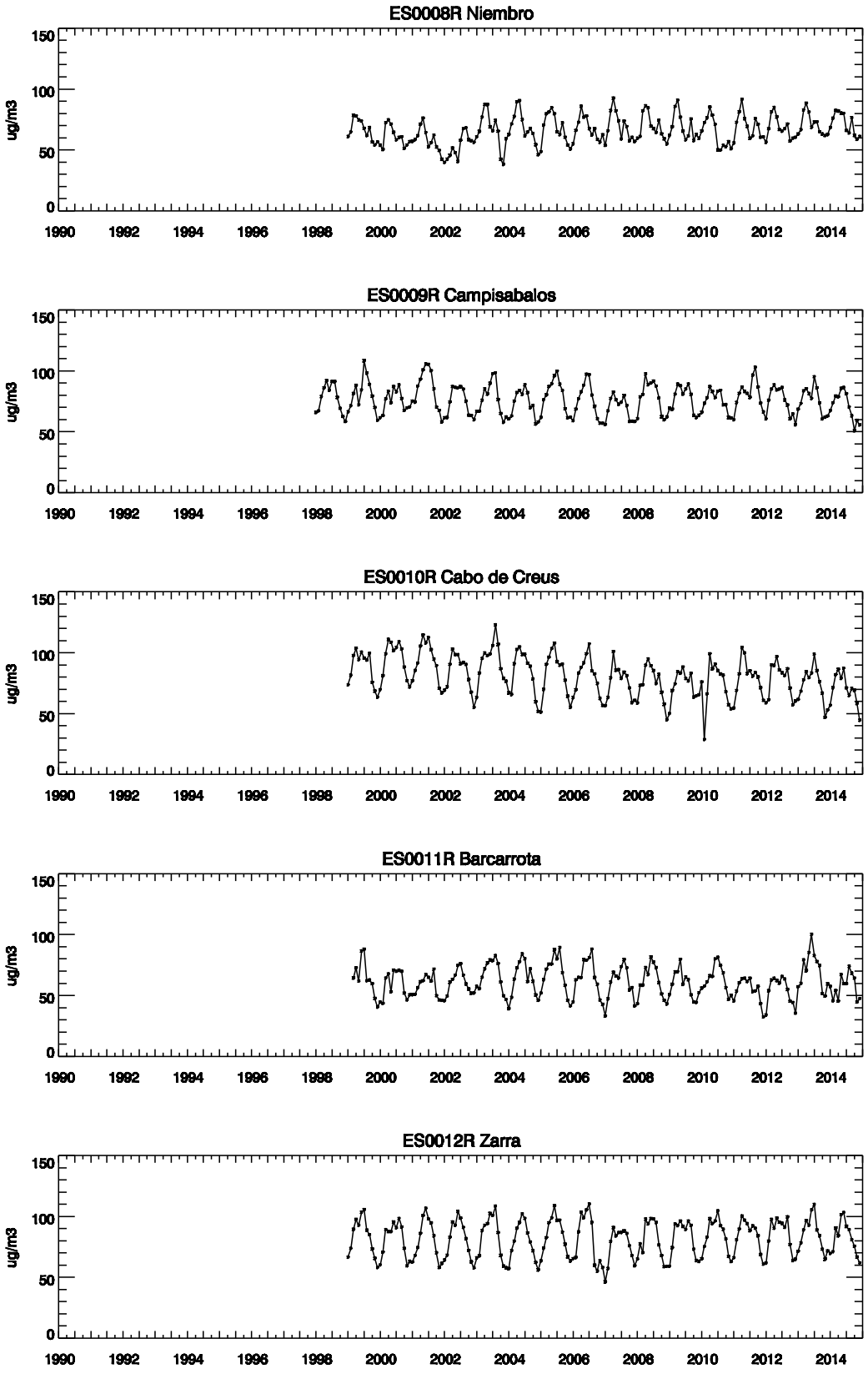

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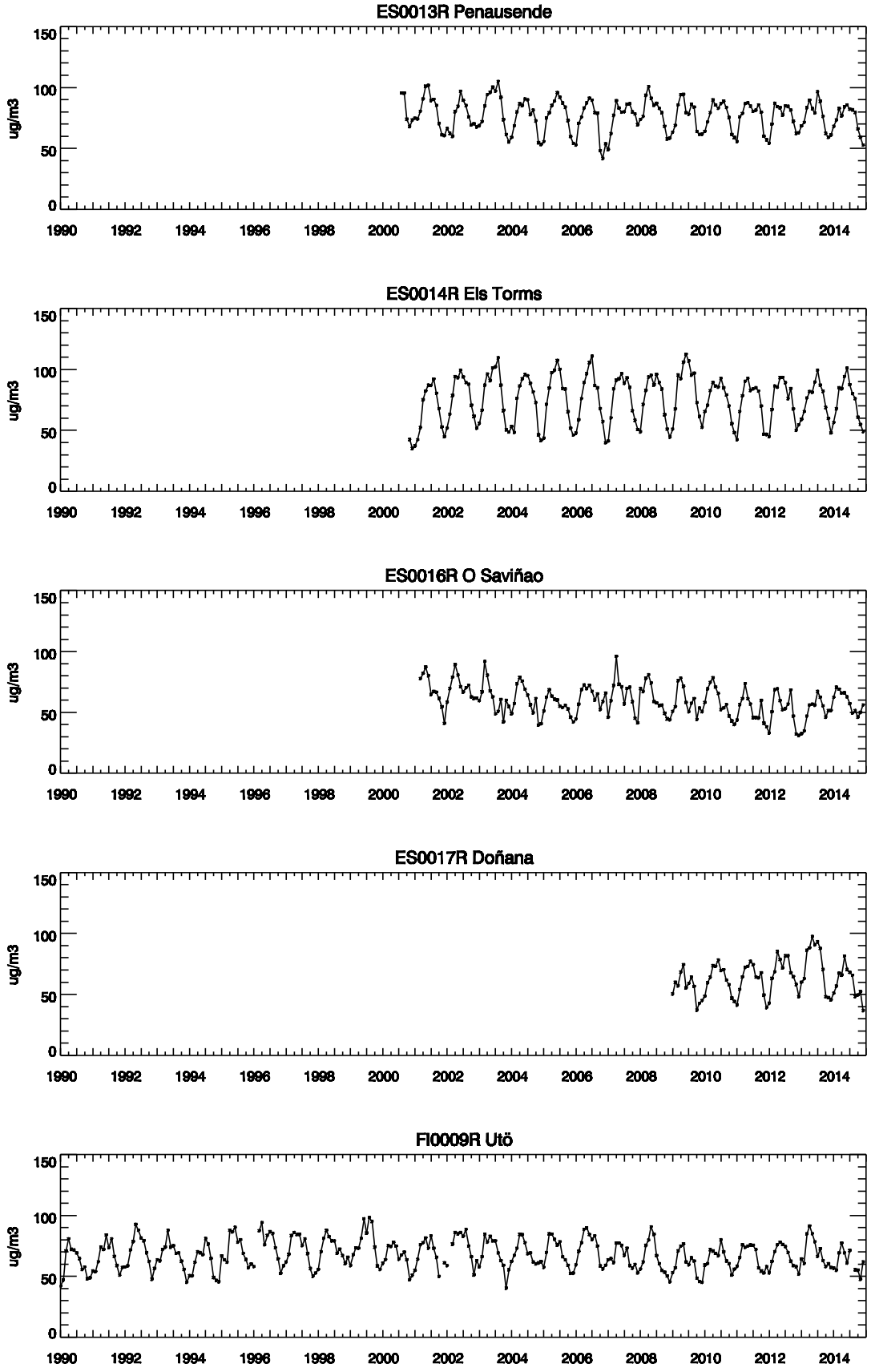

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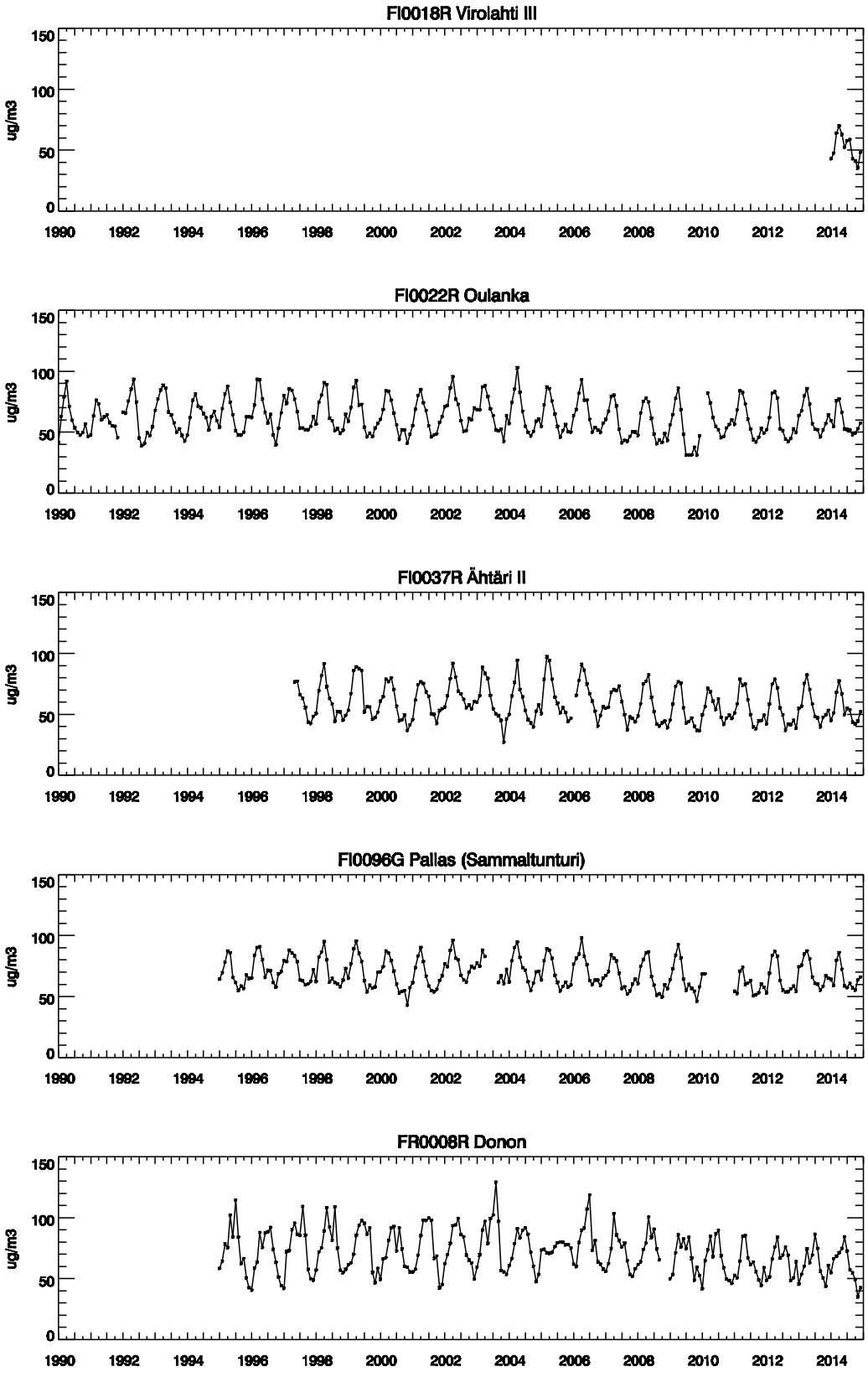

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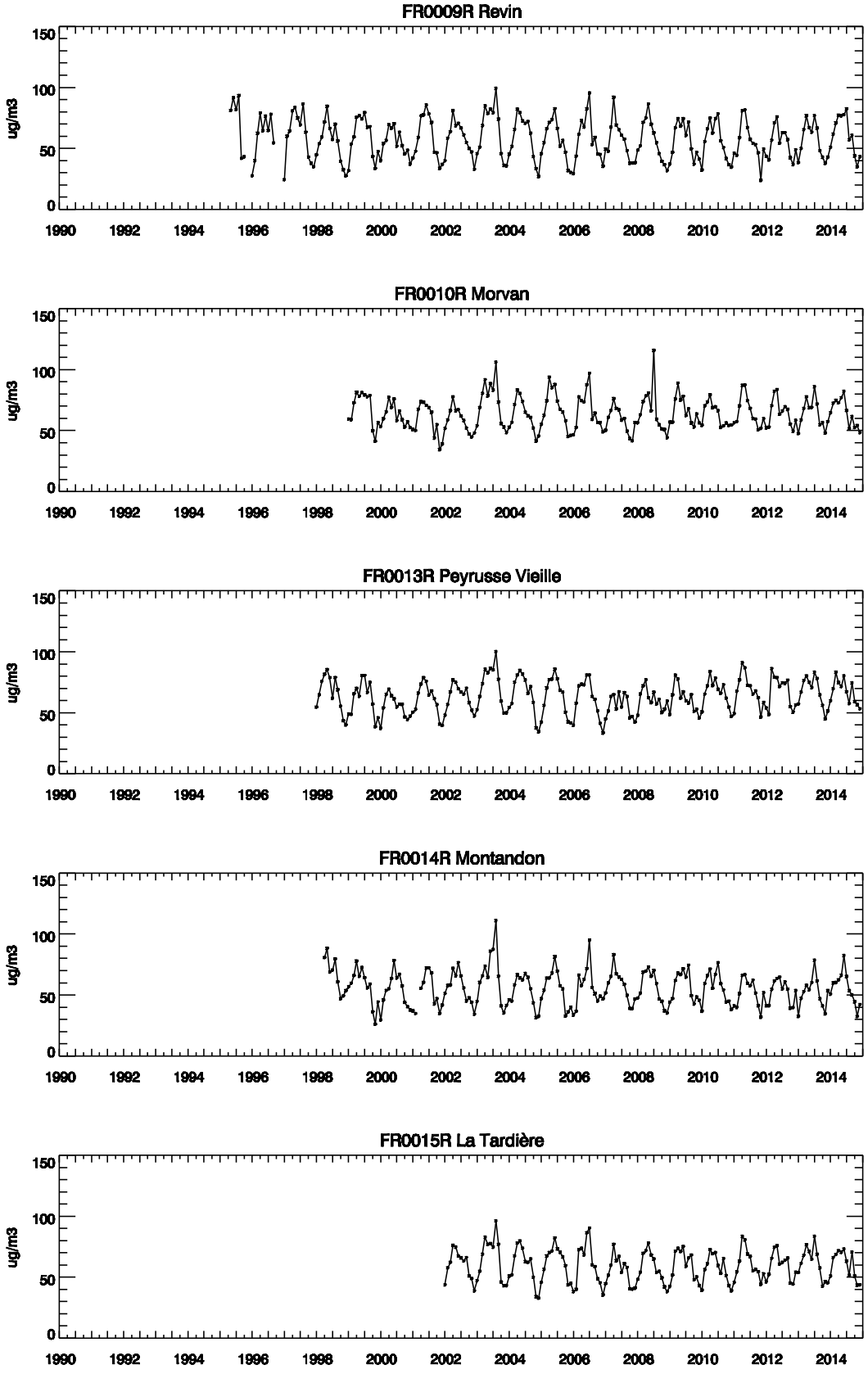

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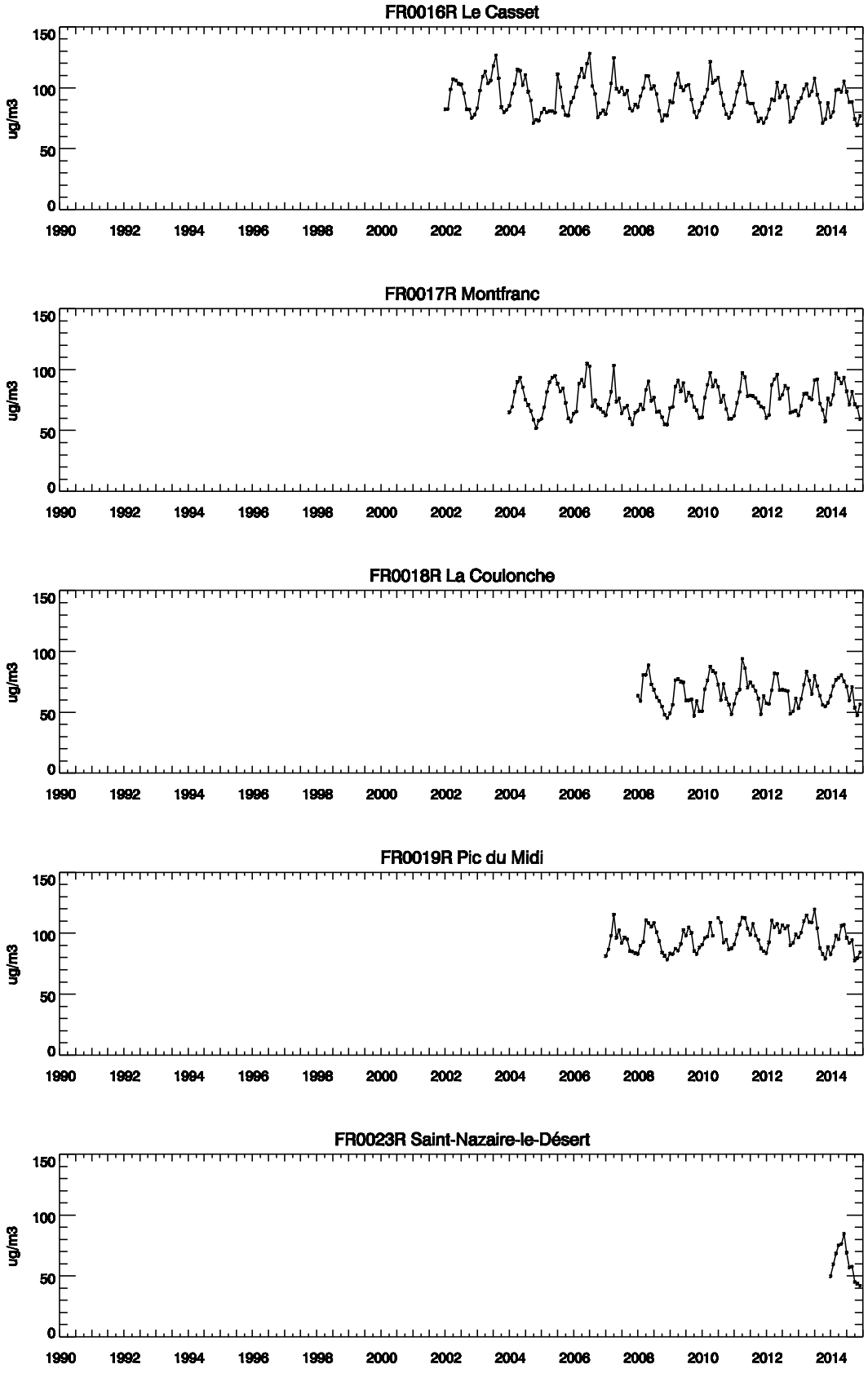

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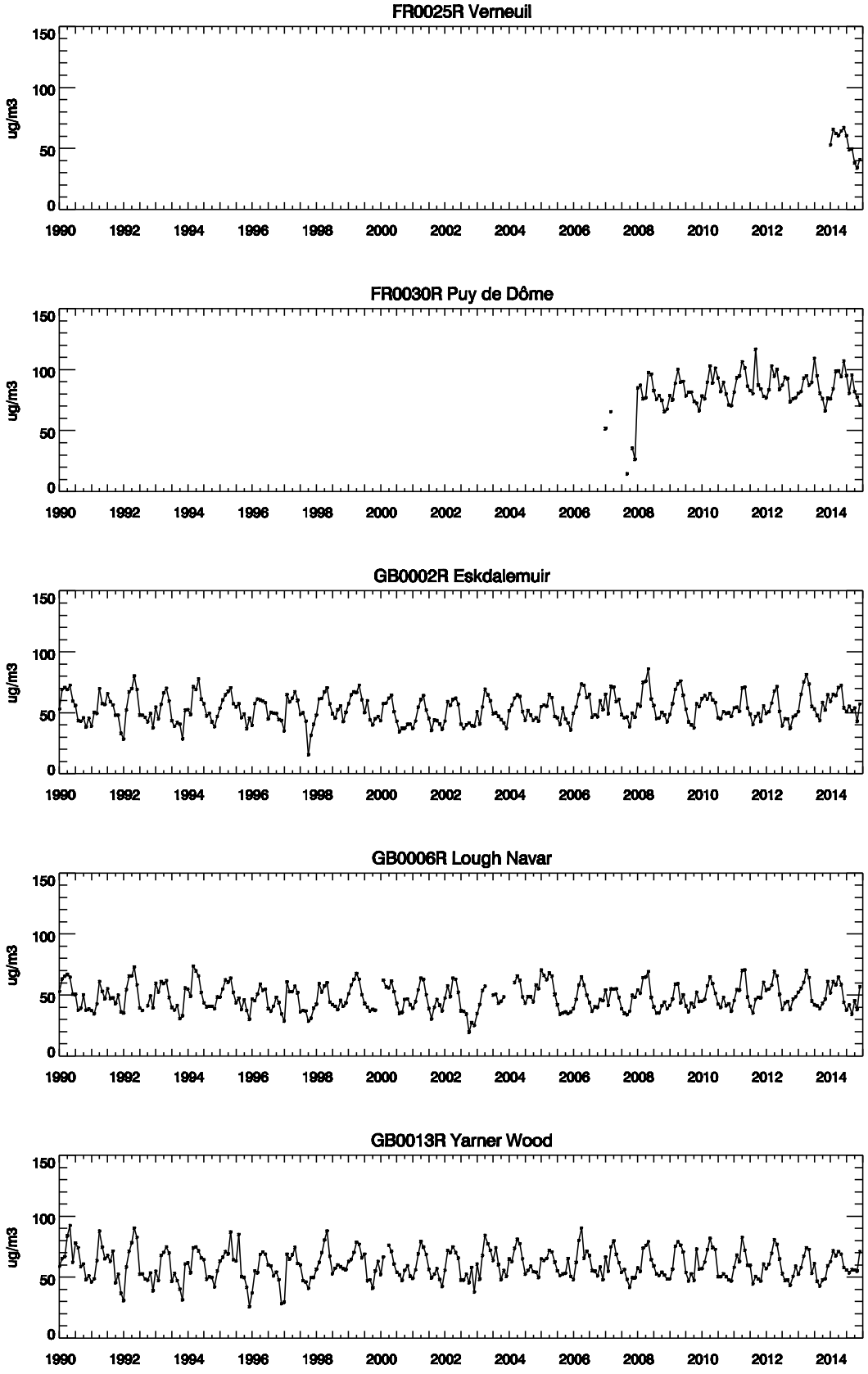

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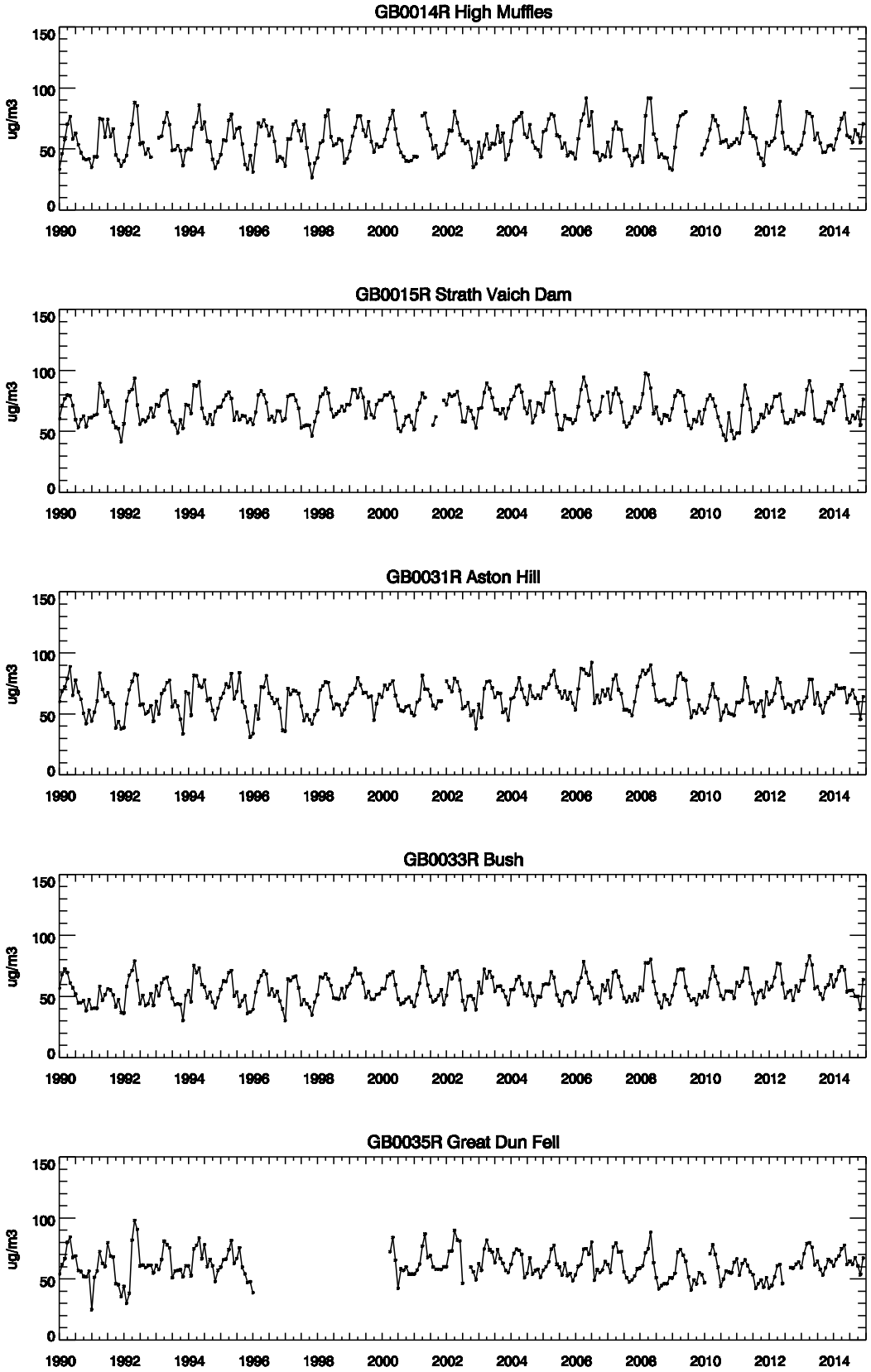

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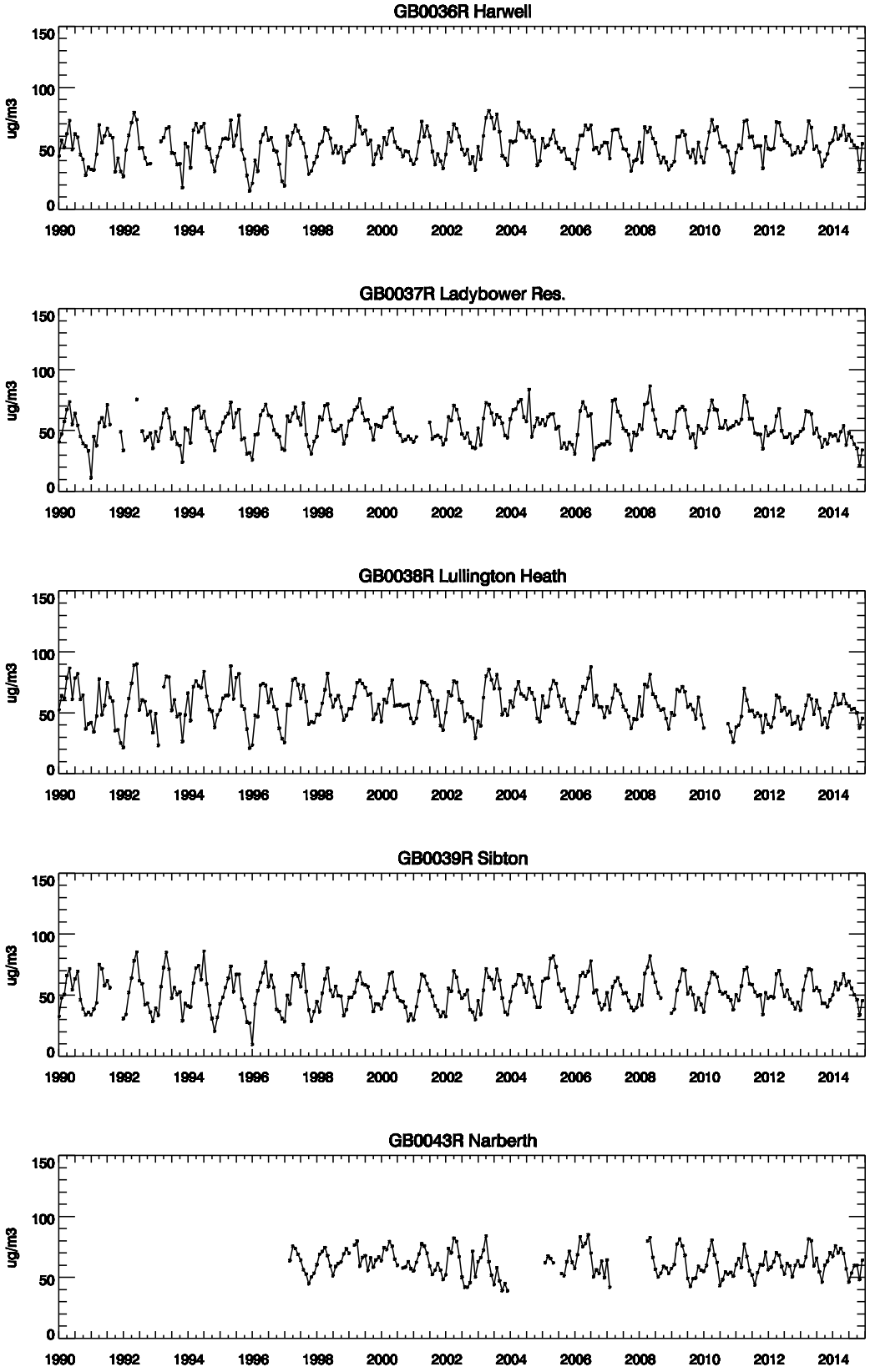

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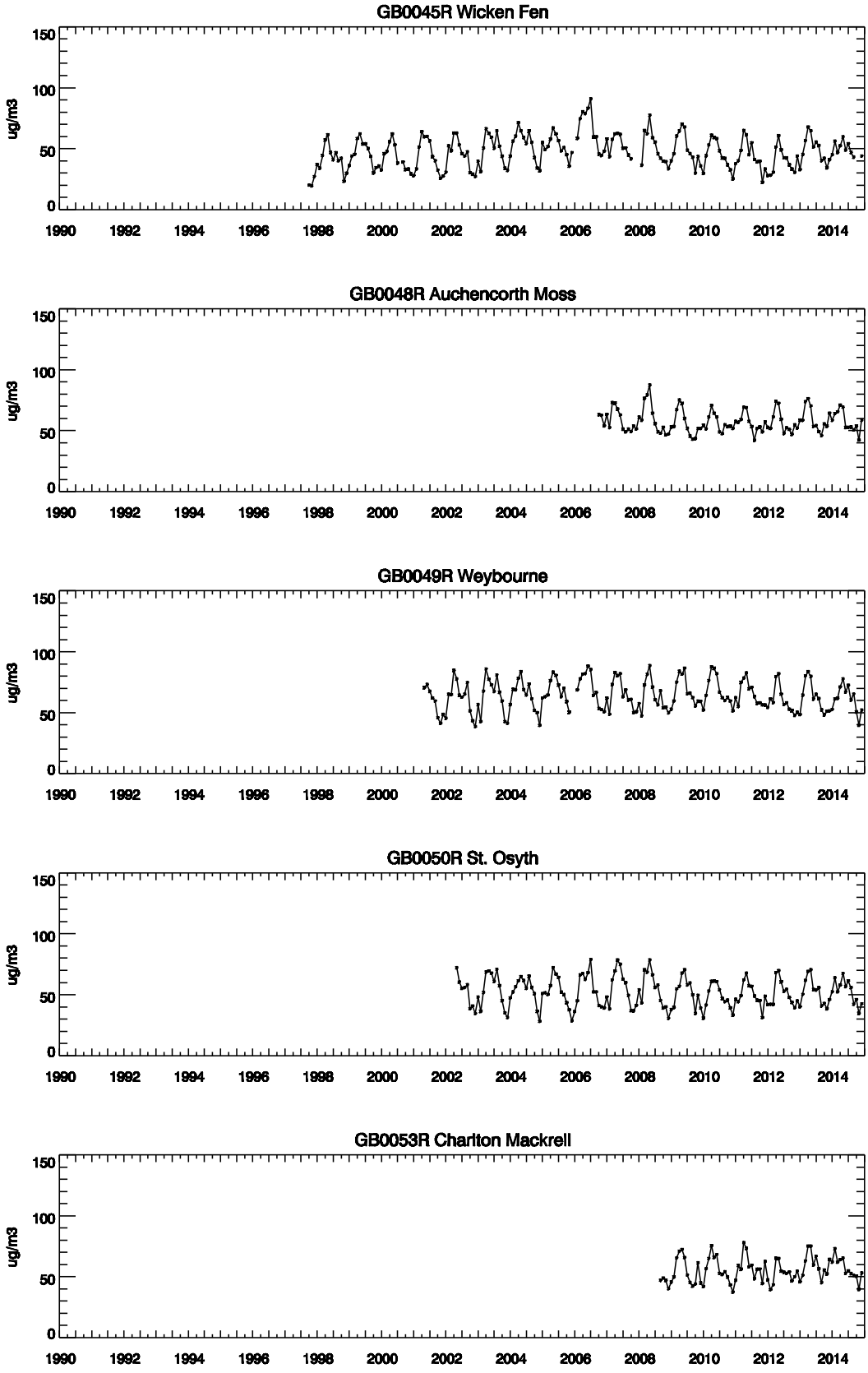

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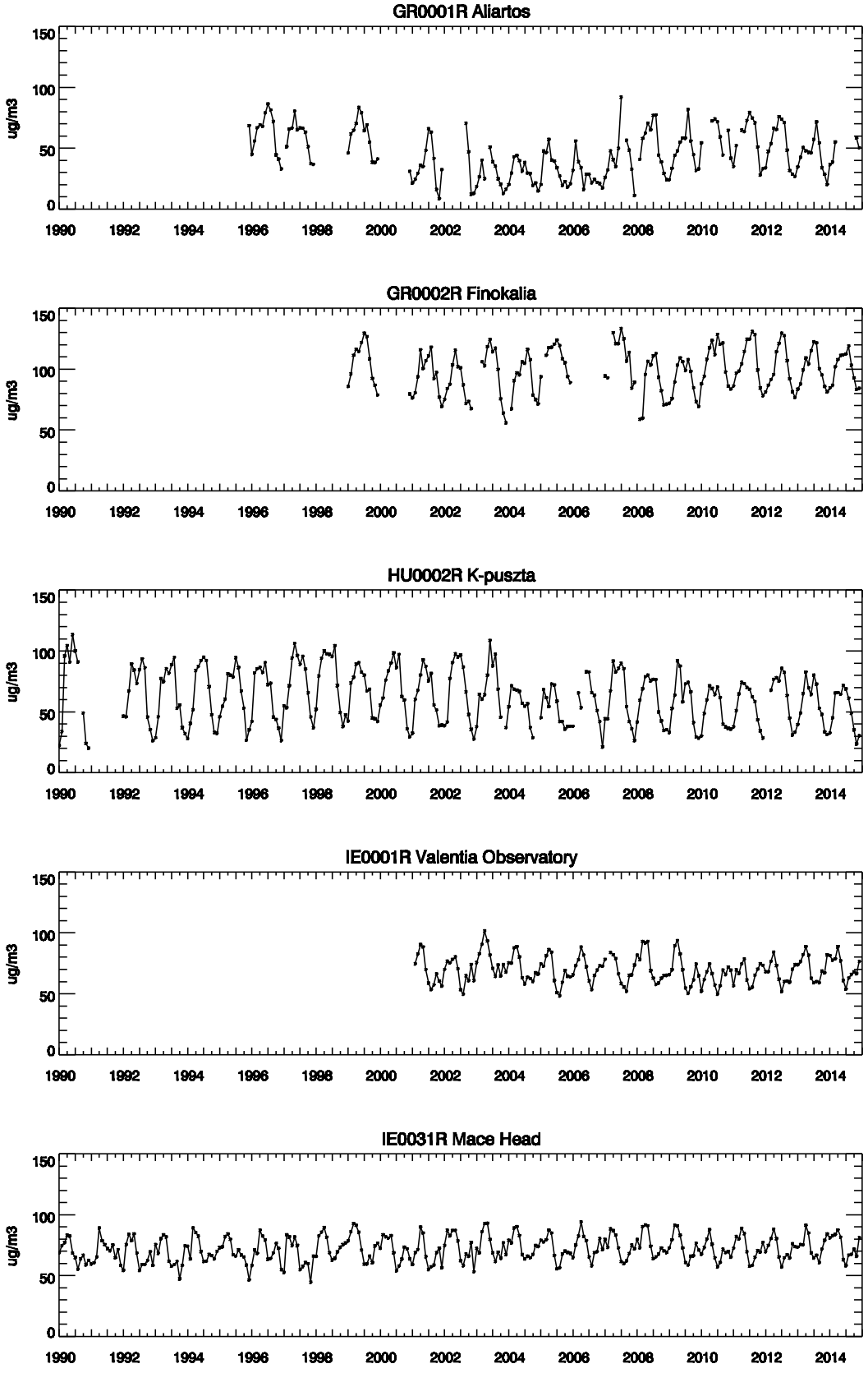

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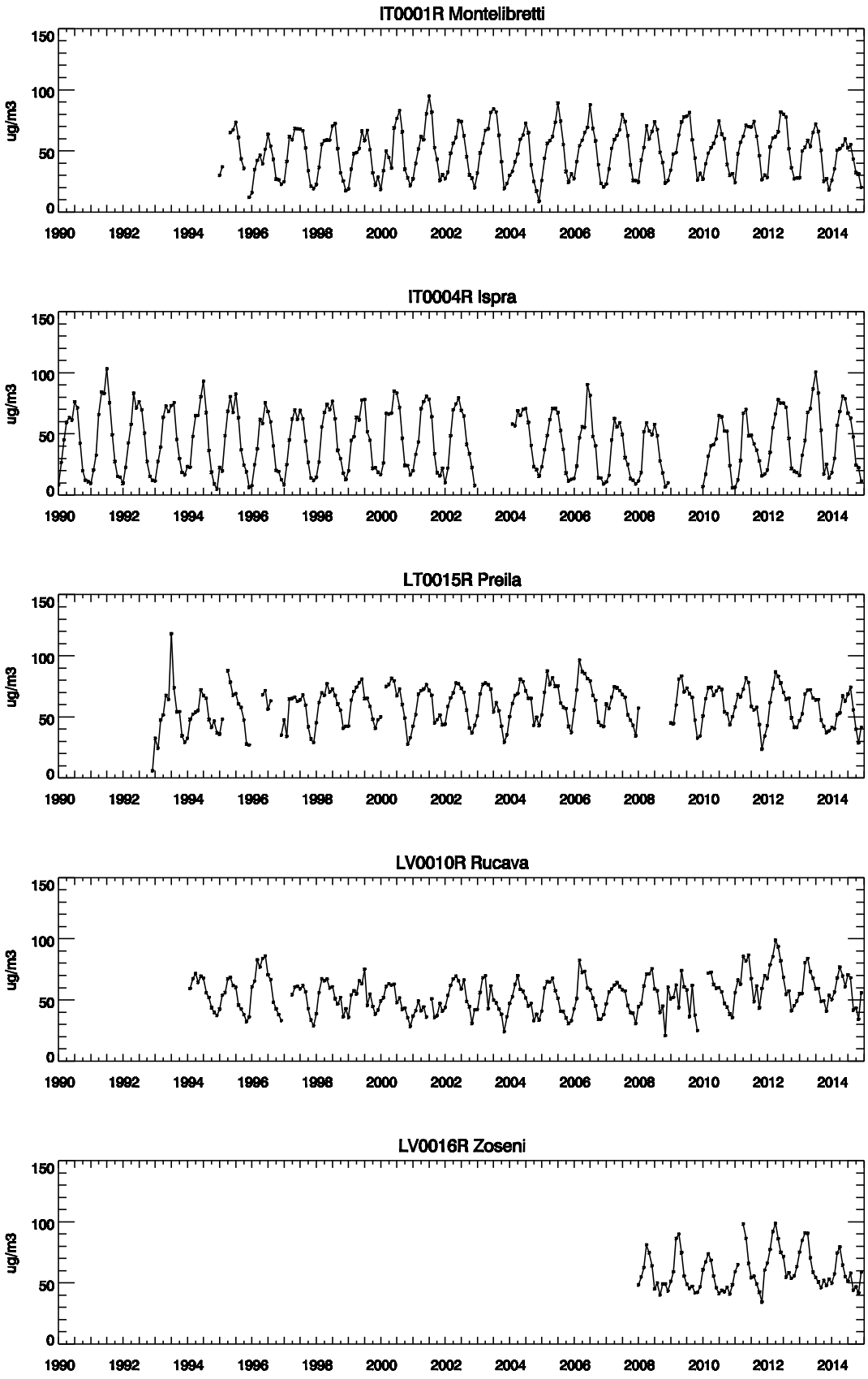

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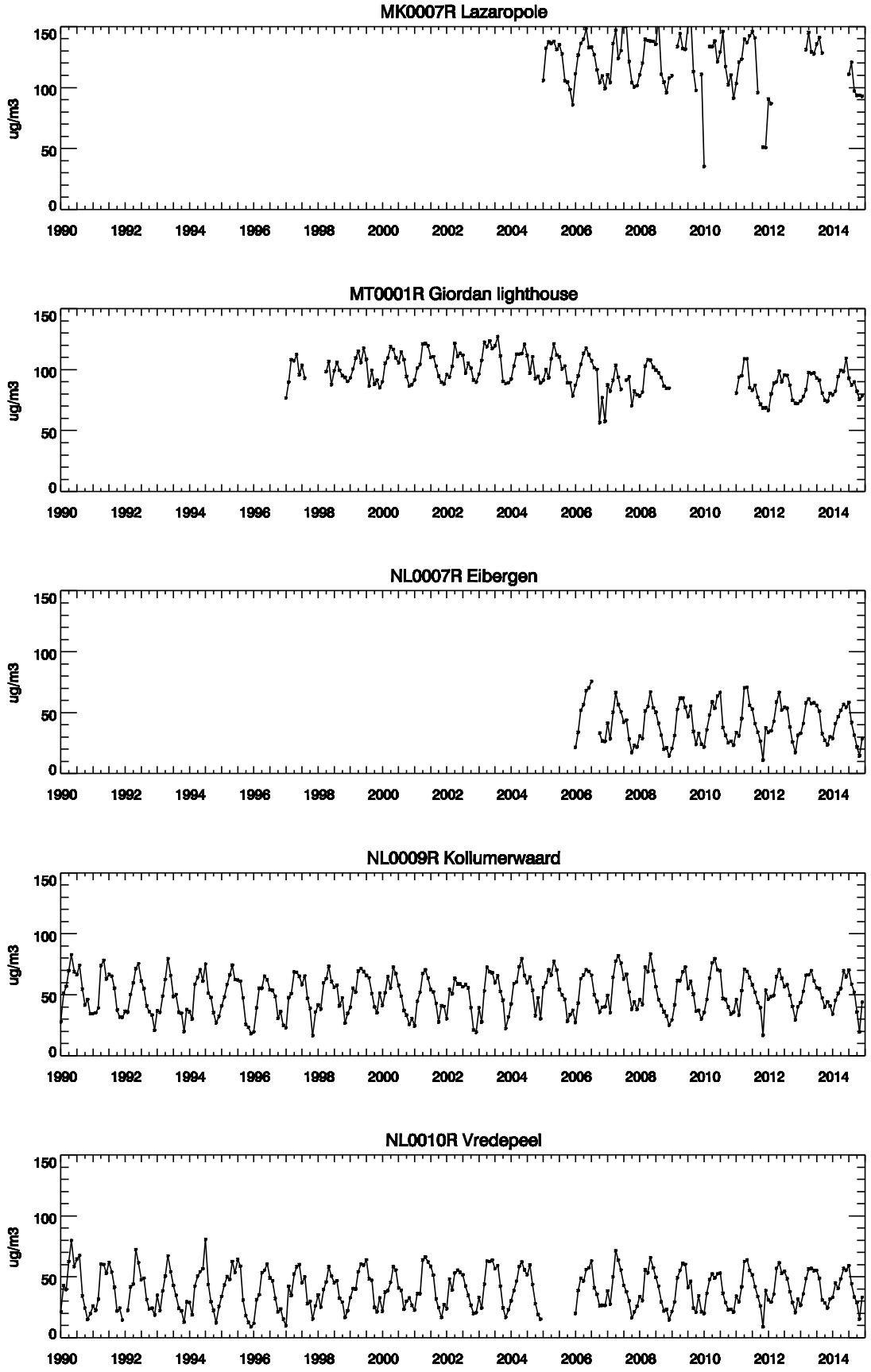

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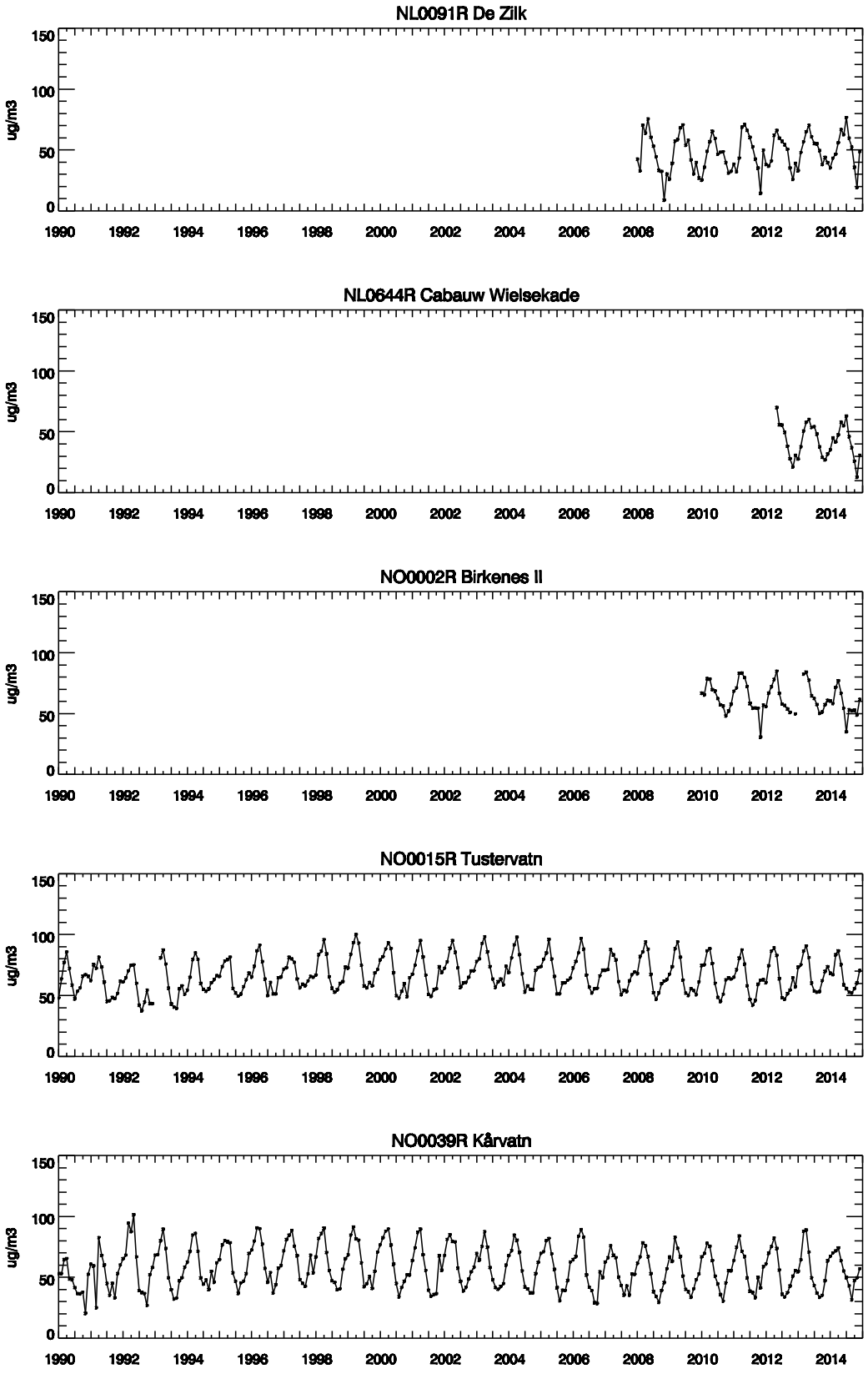

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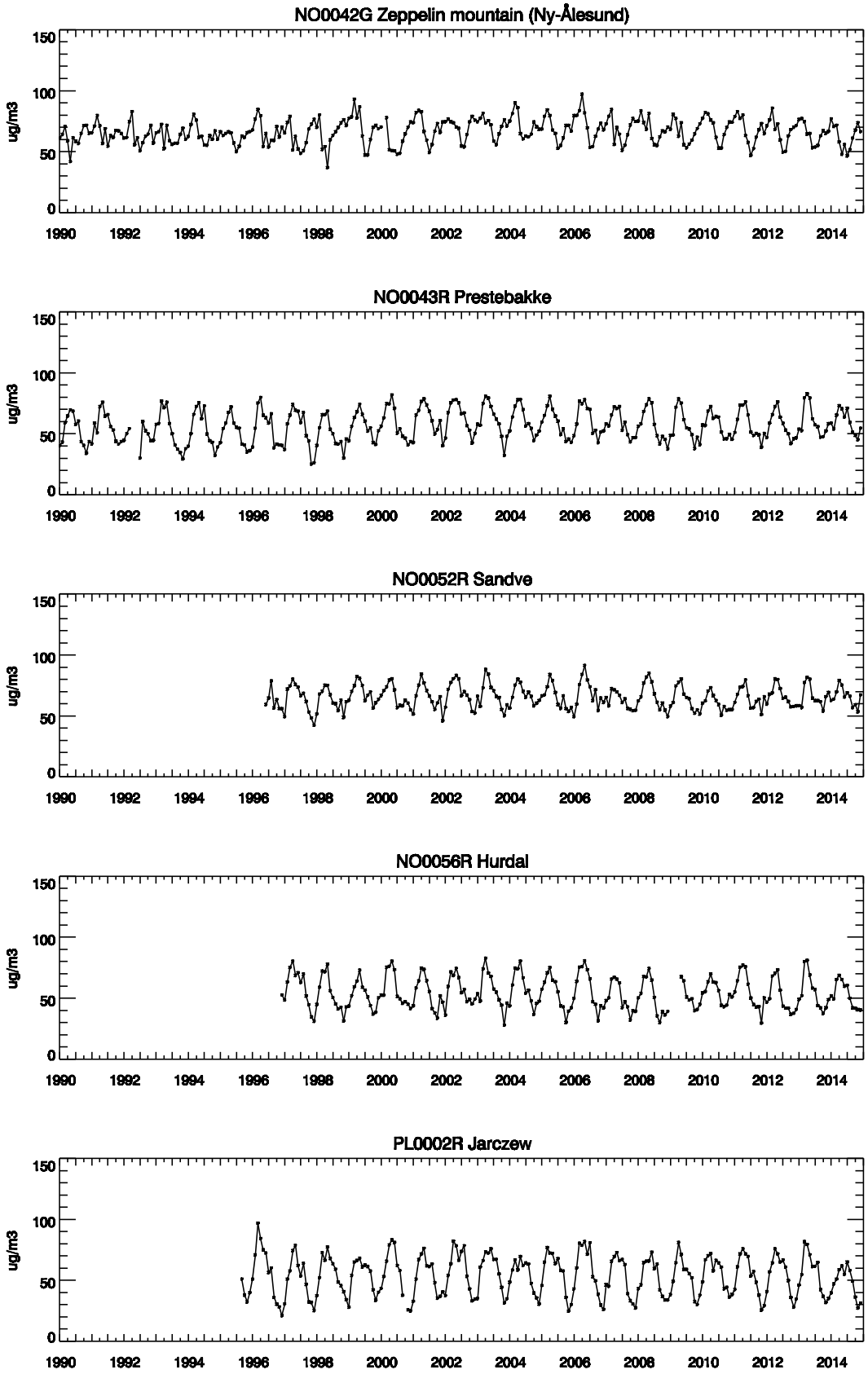

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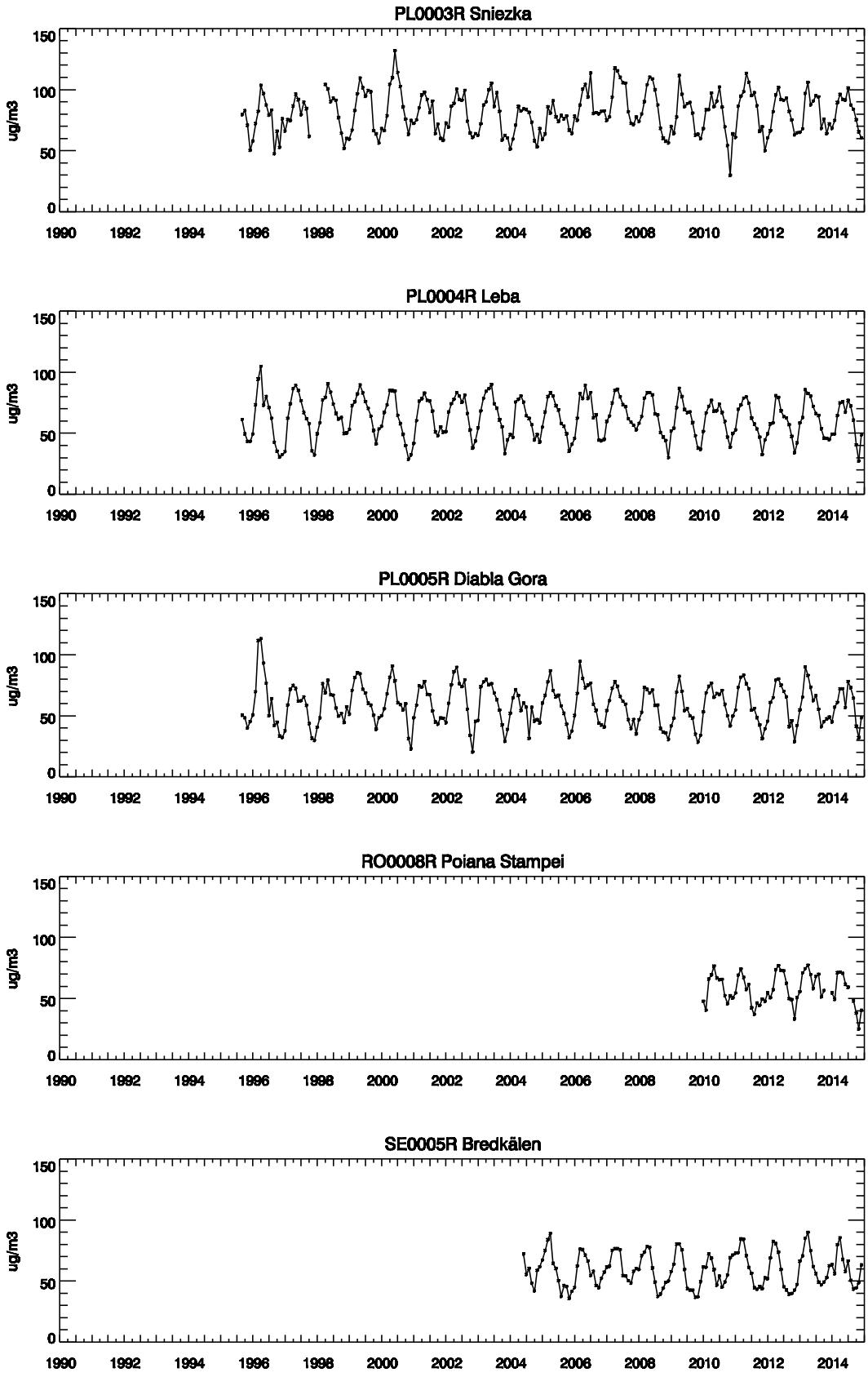

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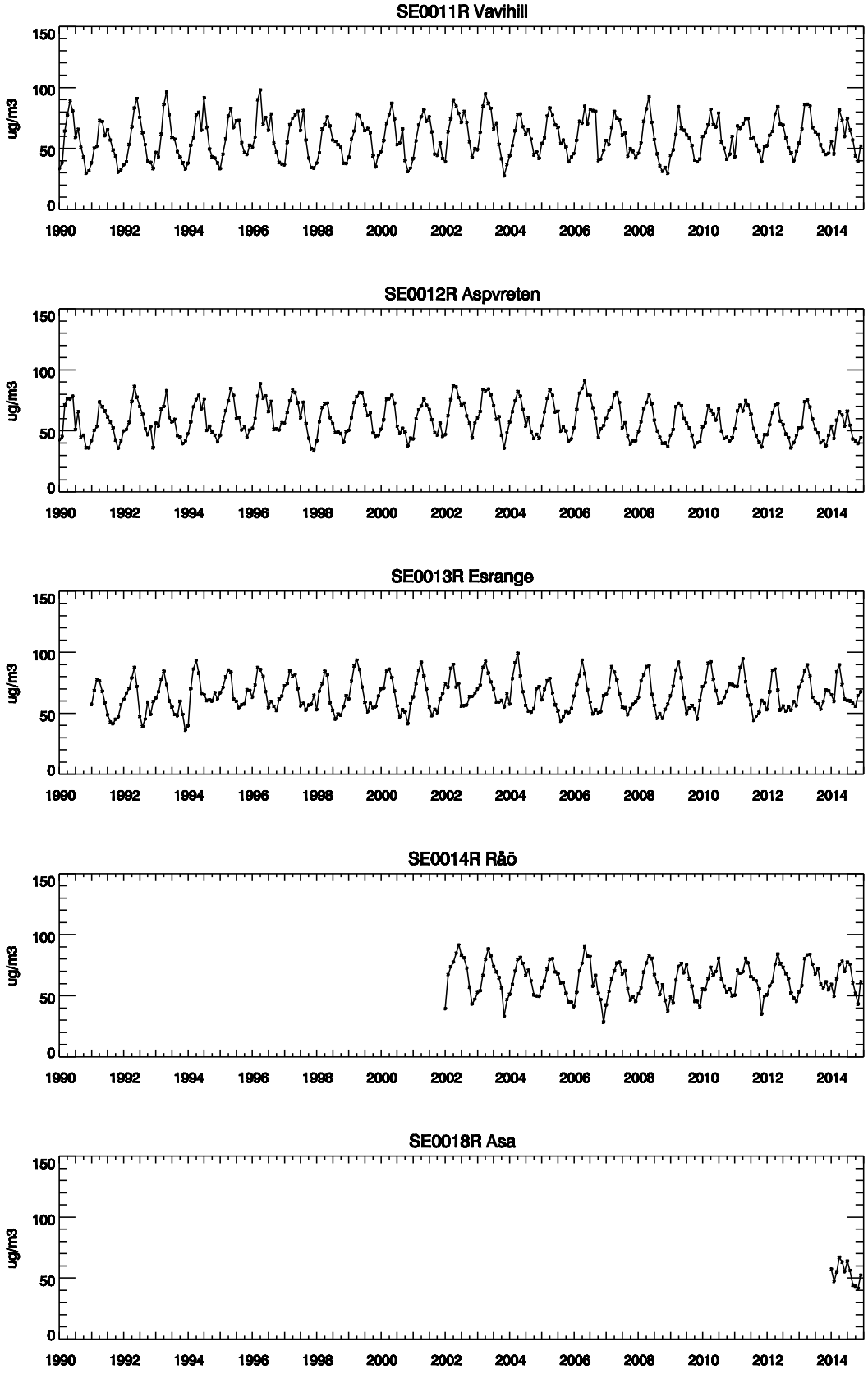

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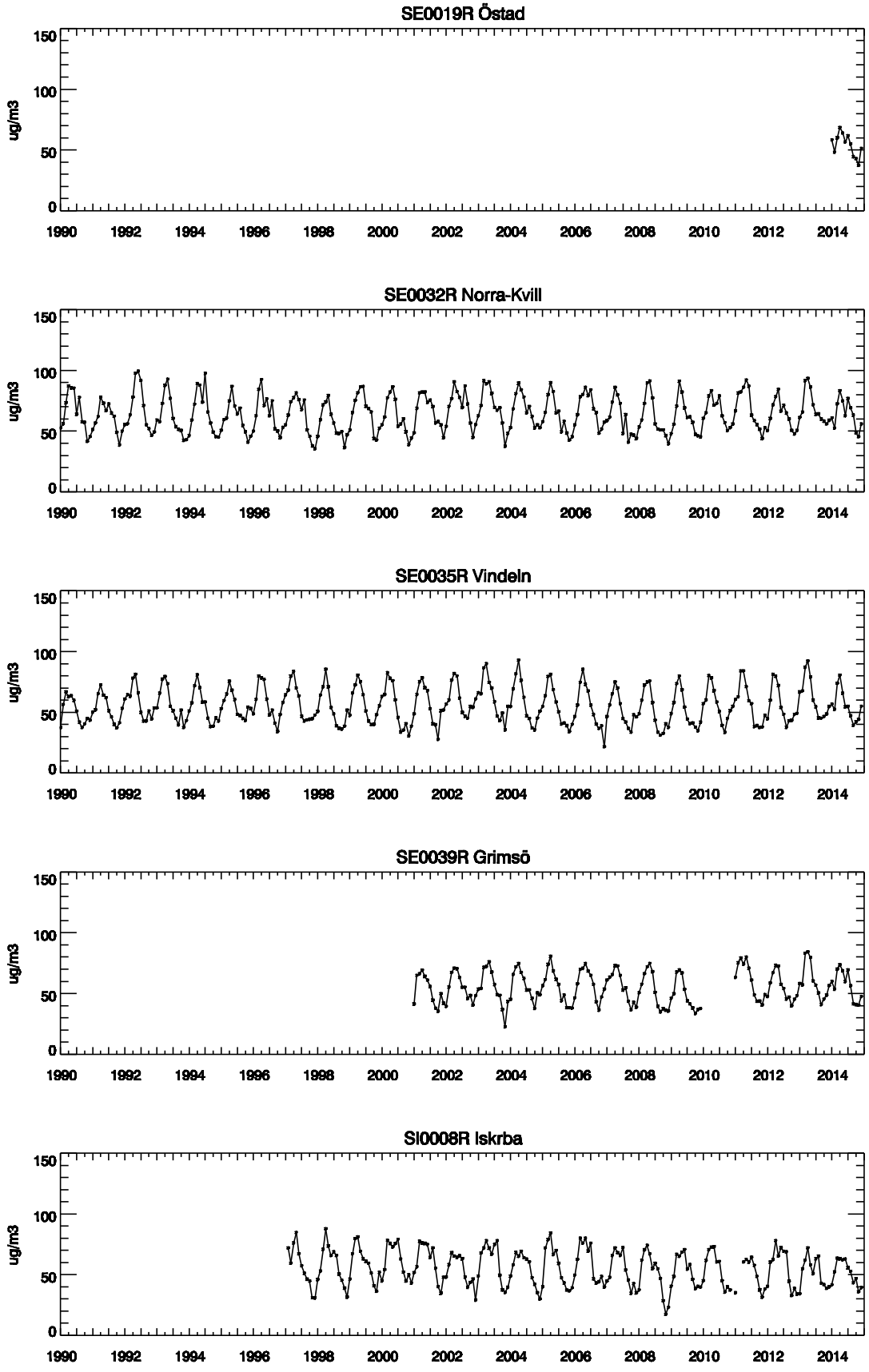

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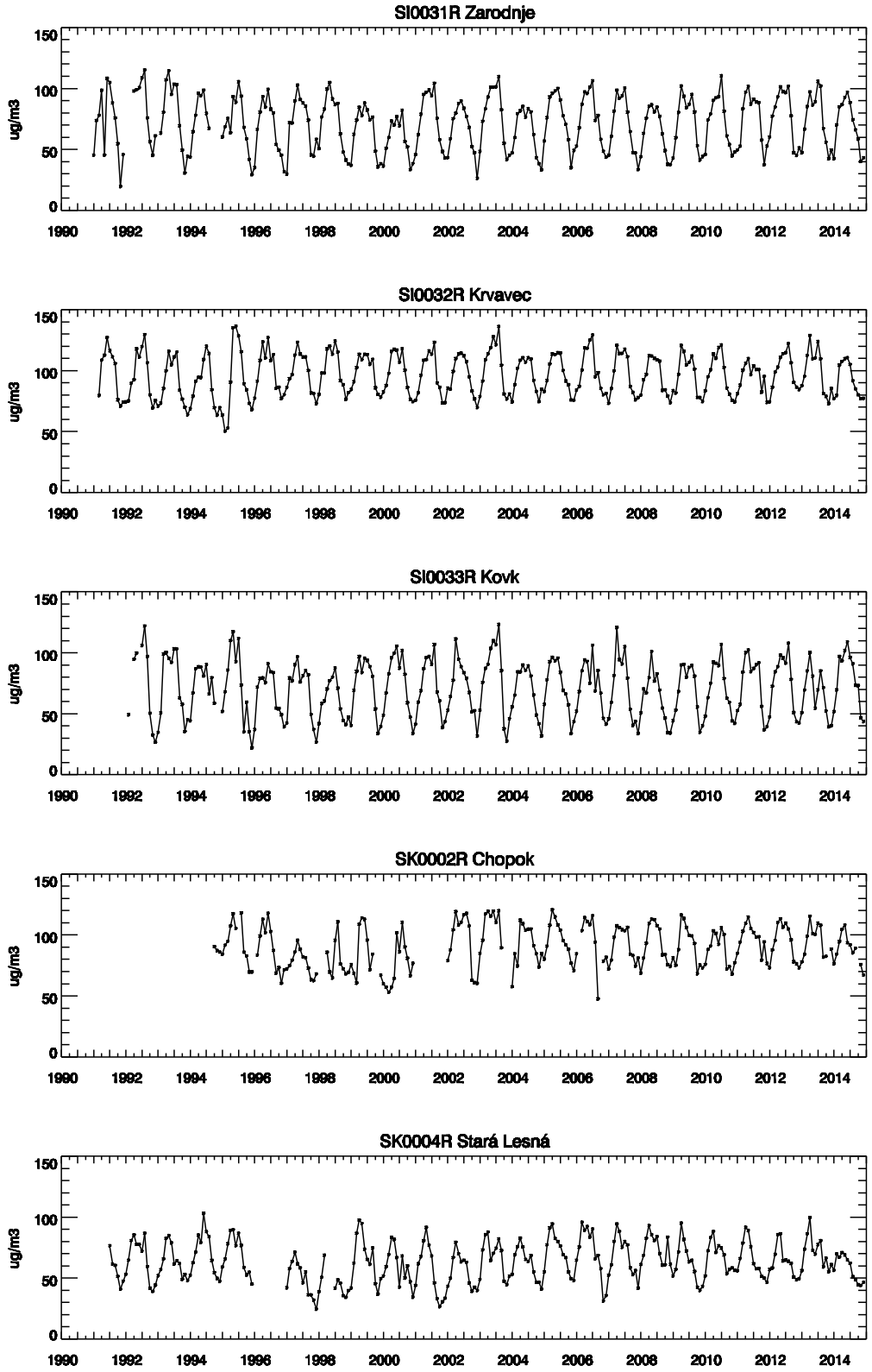

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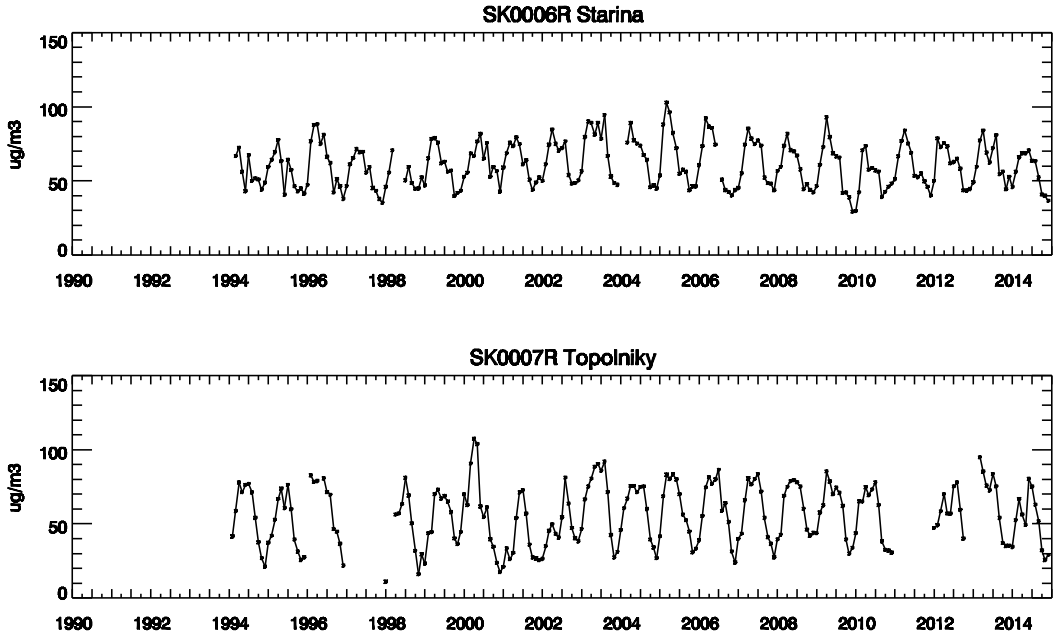


Figure 3.1, cont.

Annex 4

Diurnal variation, April–September 2014

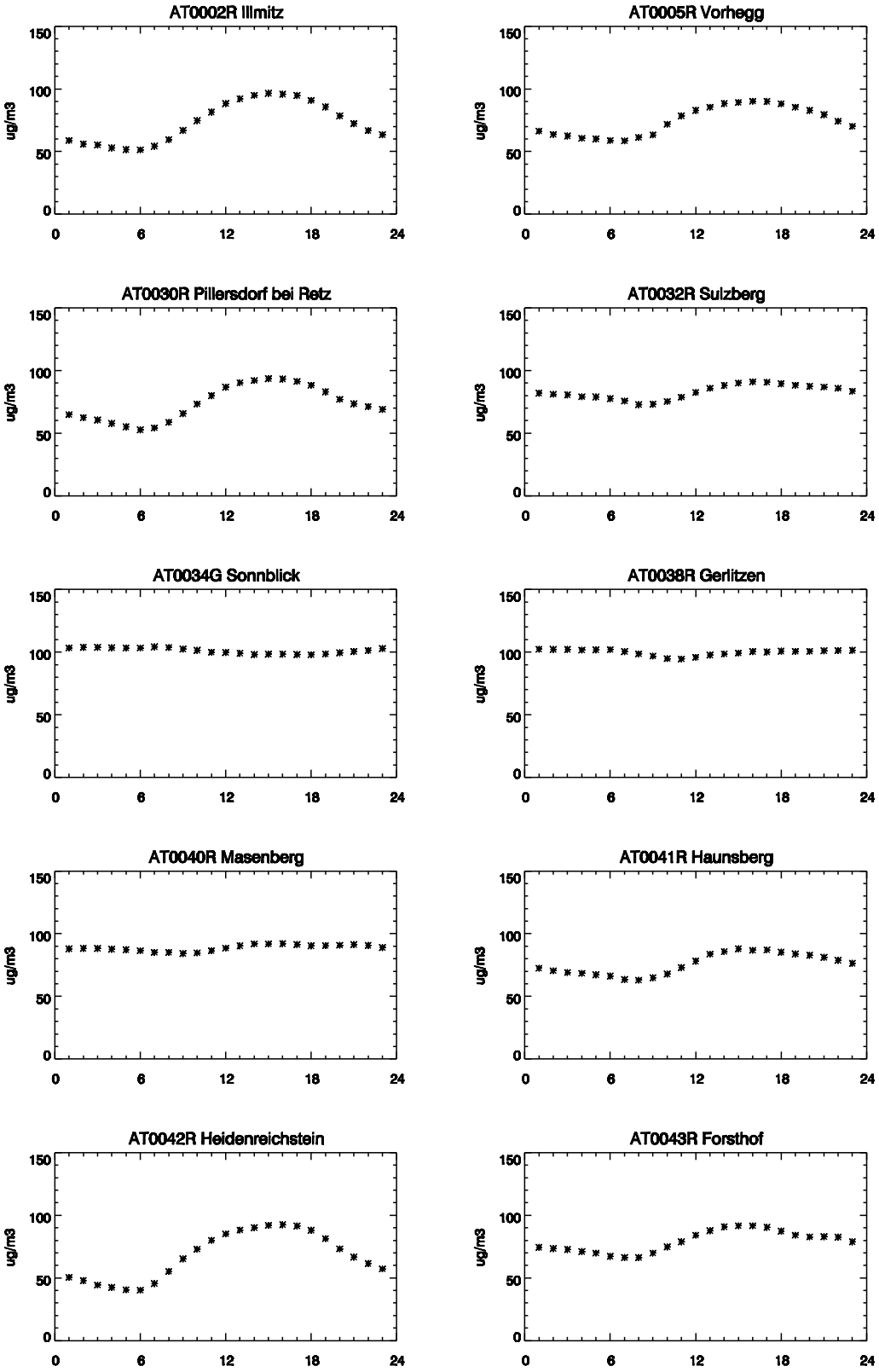


Figure 4.1: Diurnal variation, April–September 2014.

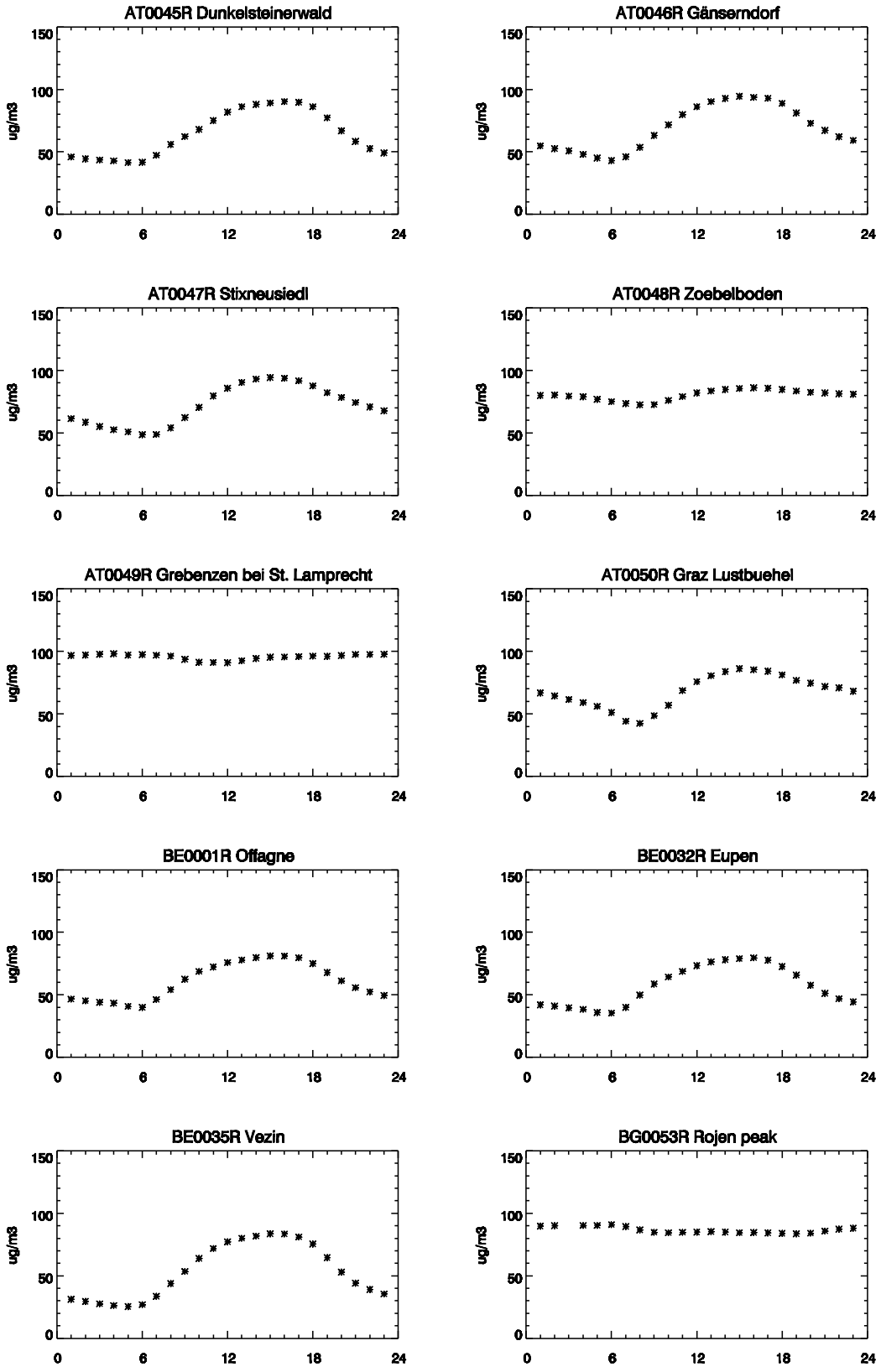
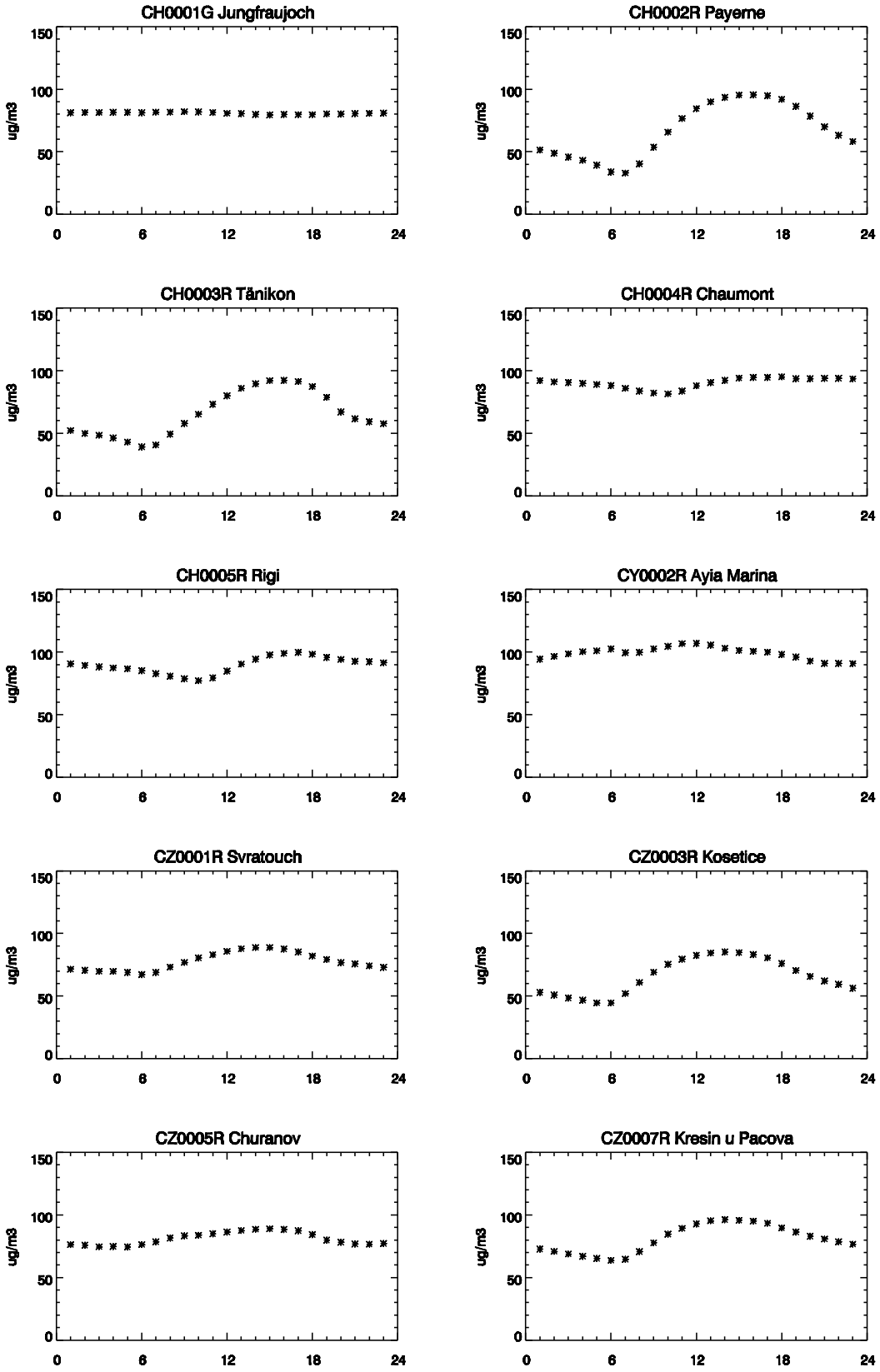


Figure 4.1, cont.



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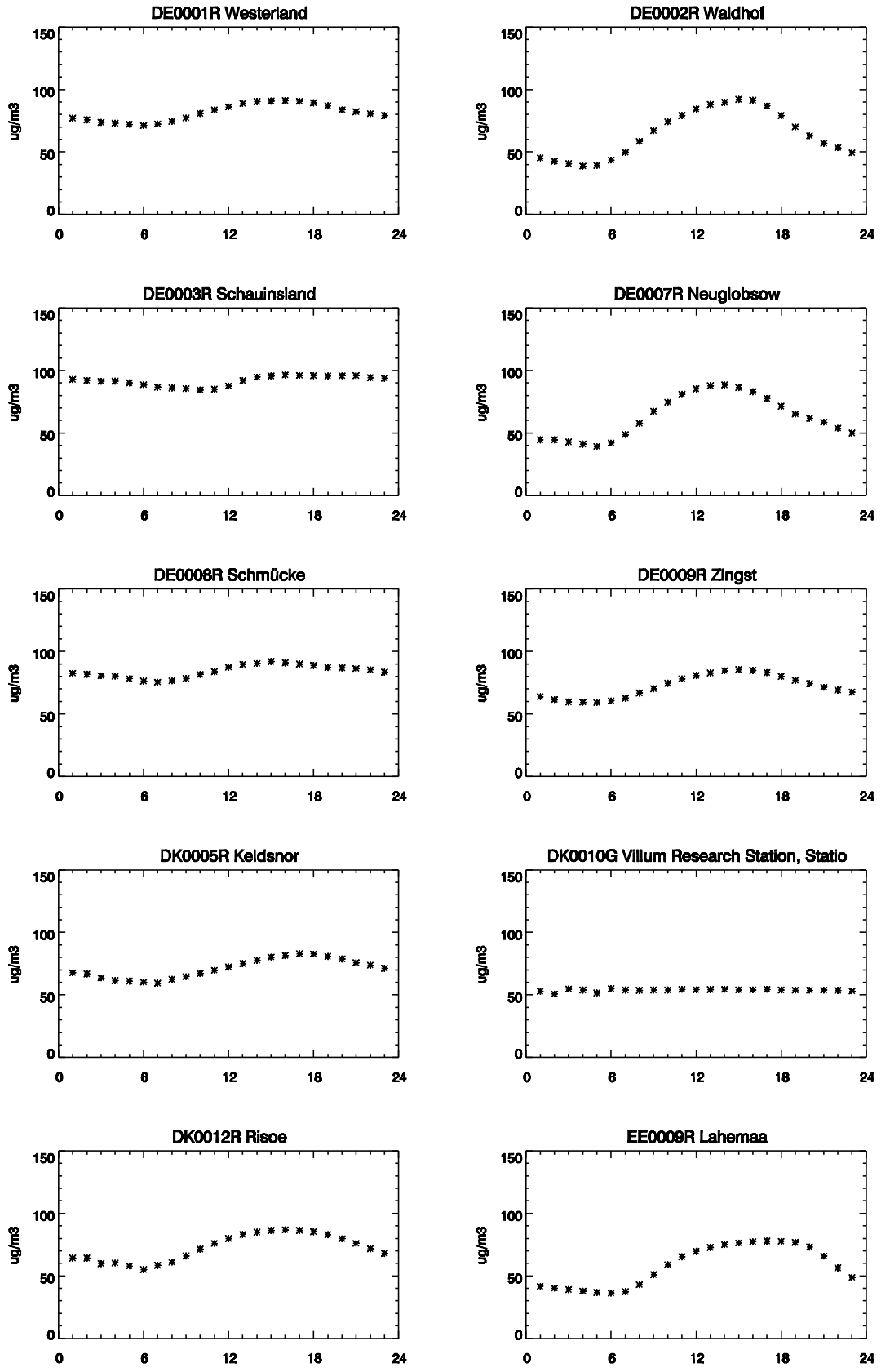

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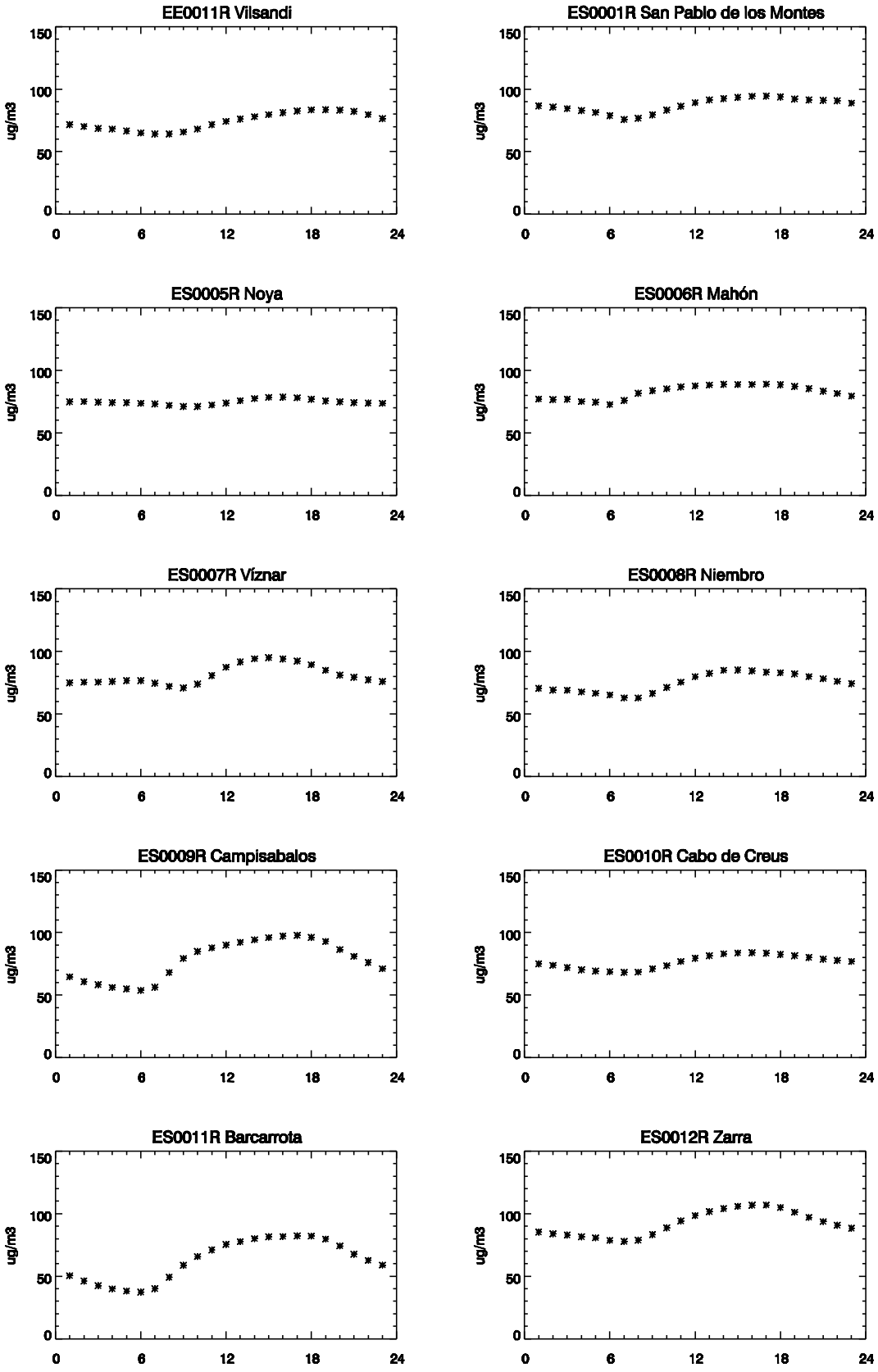

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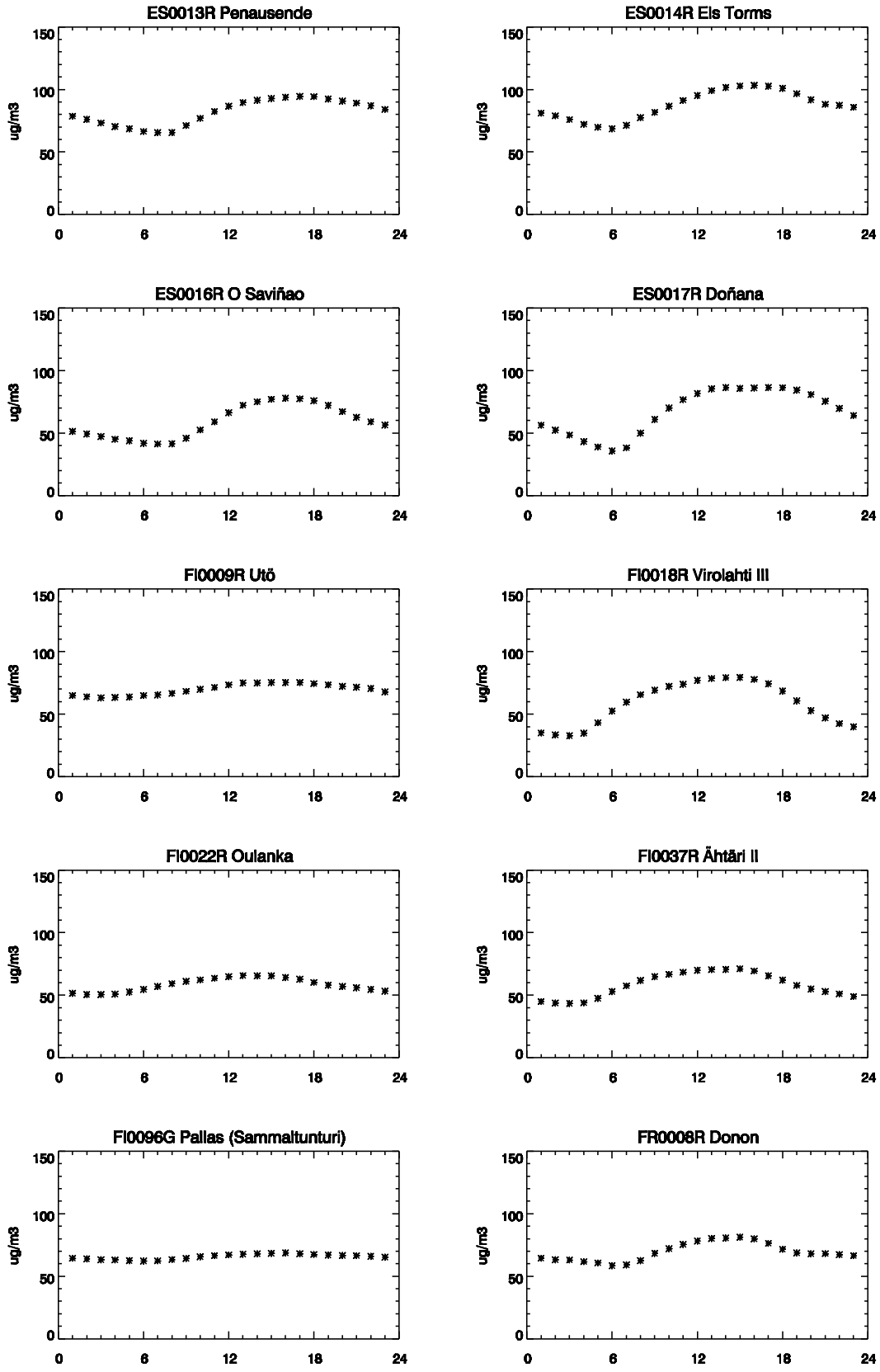

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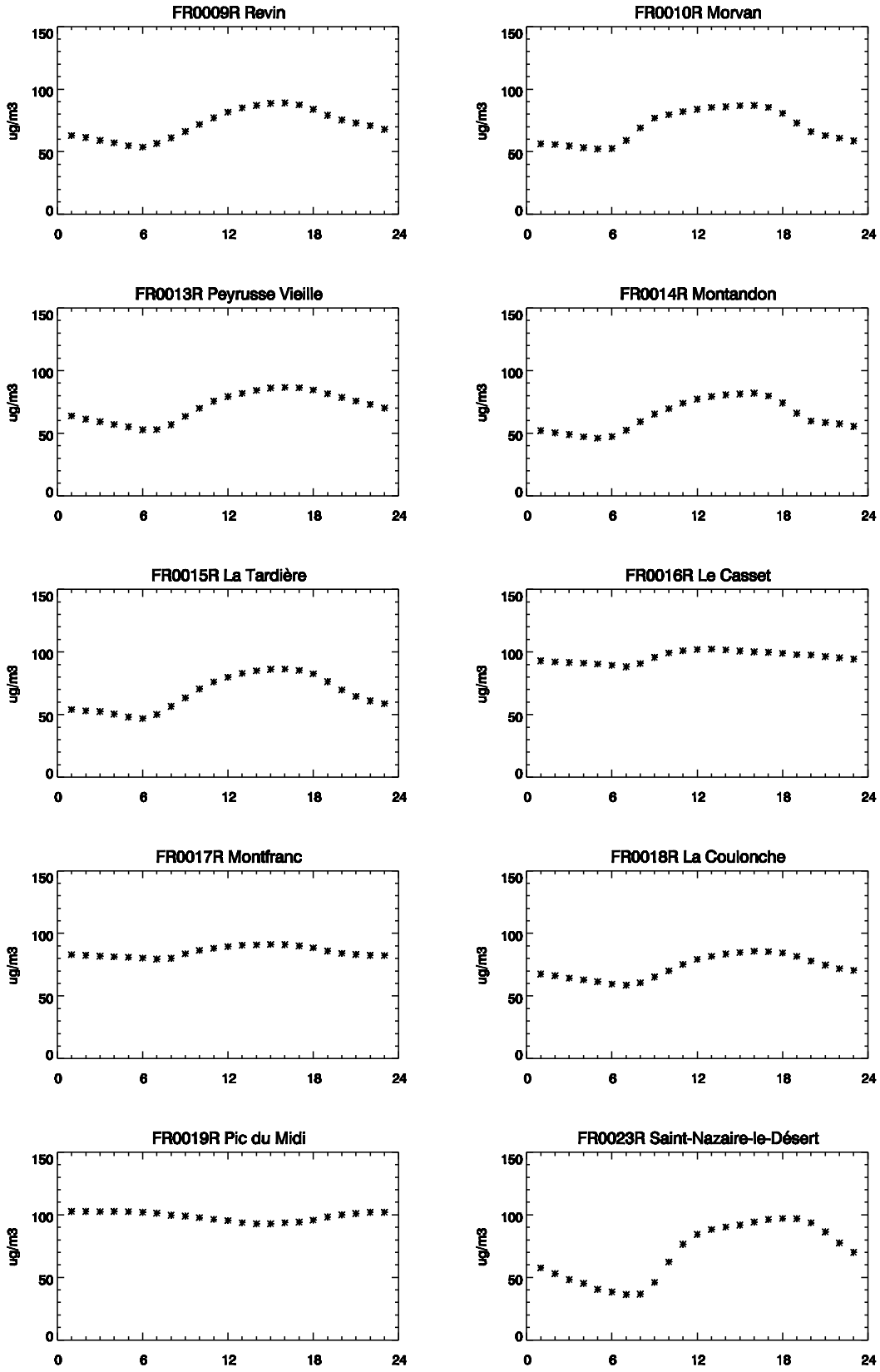

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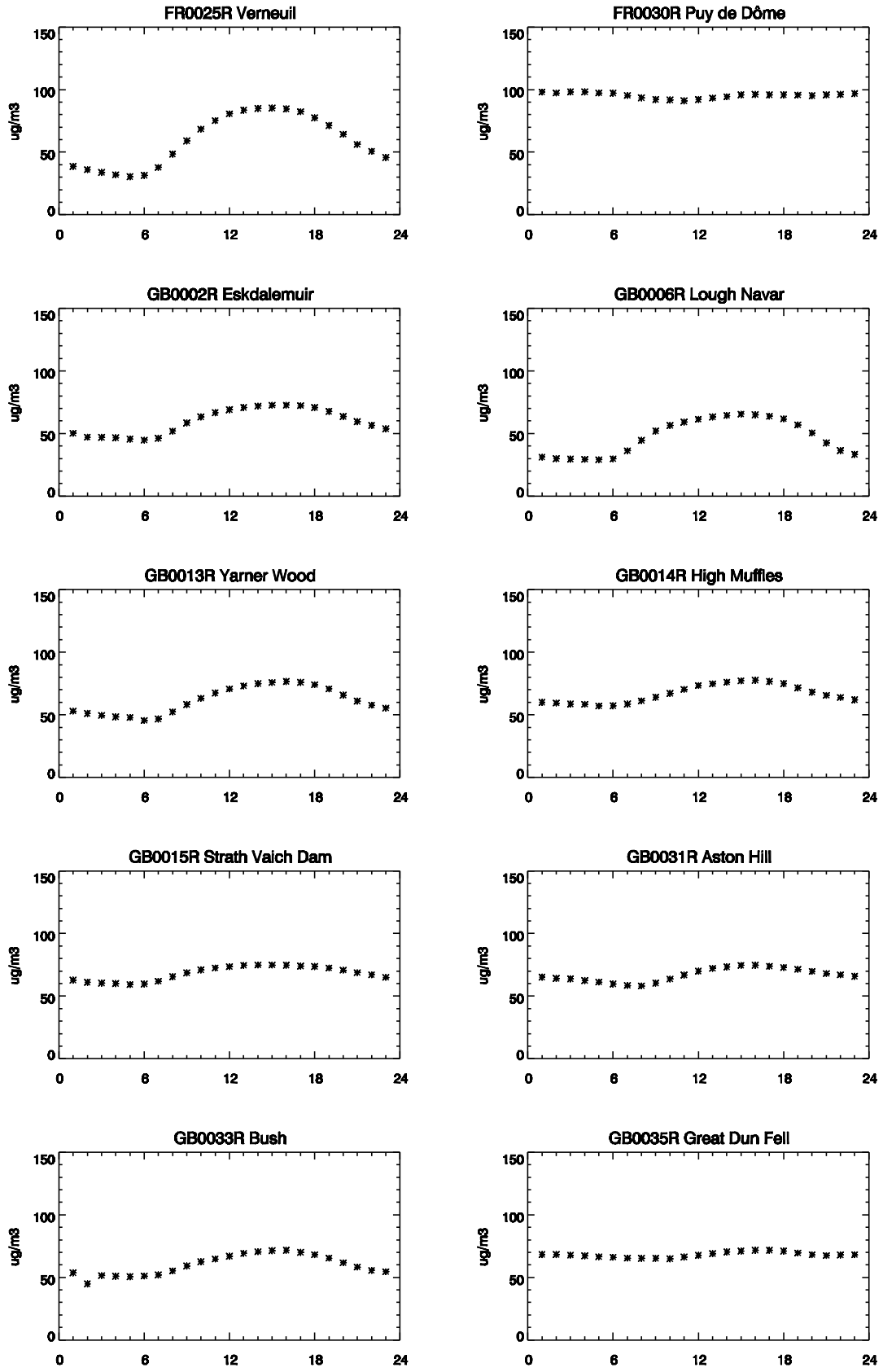

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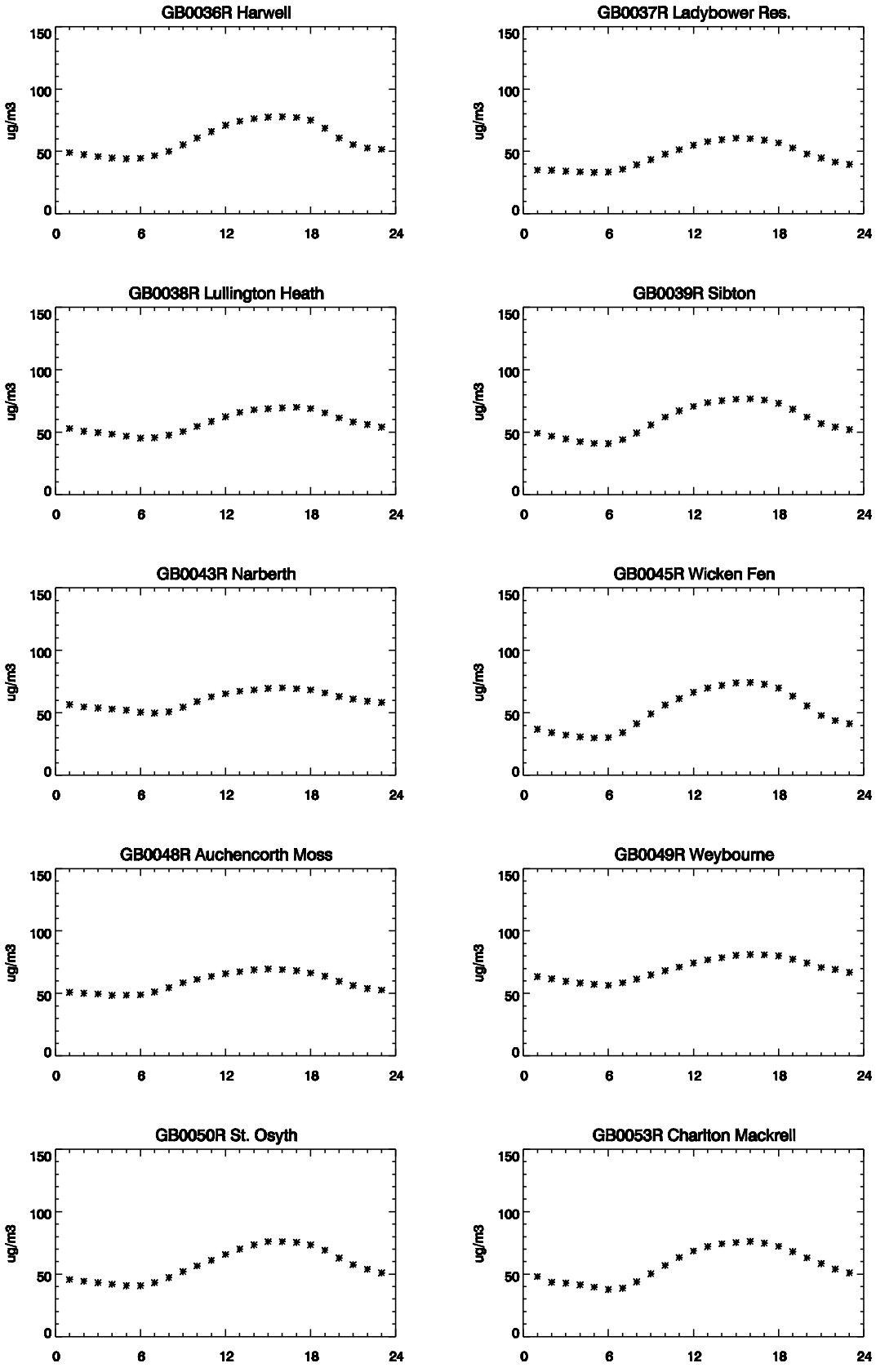

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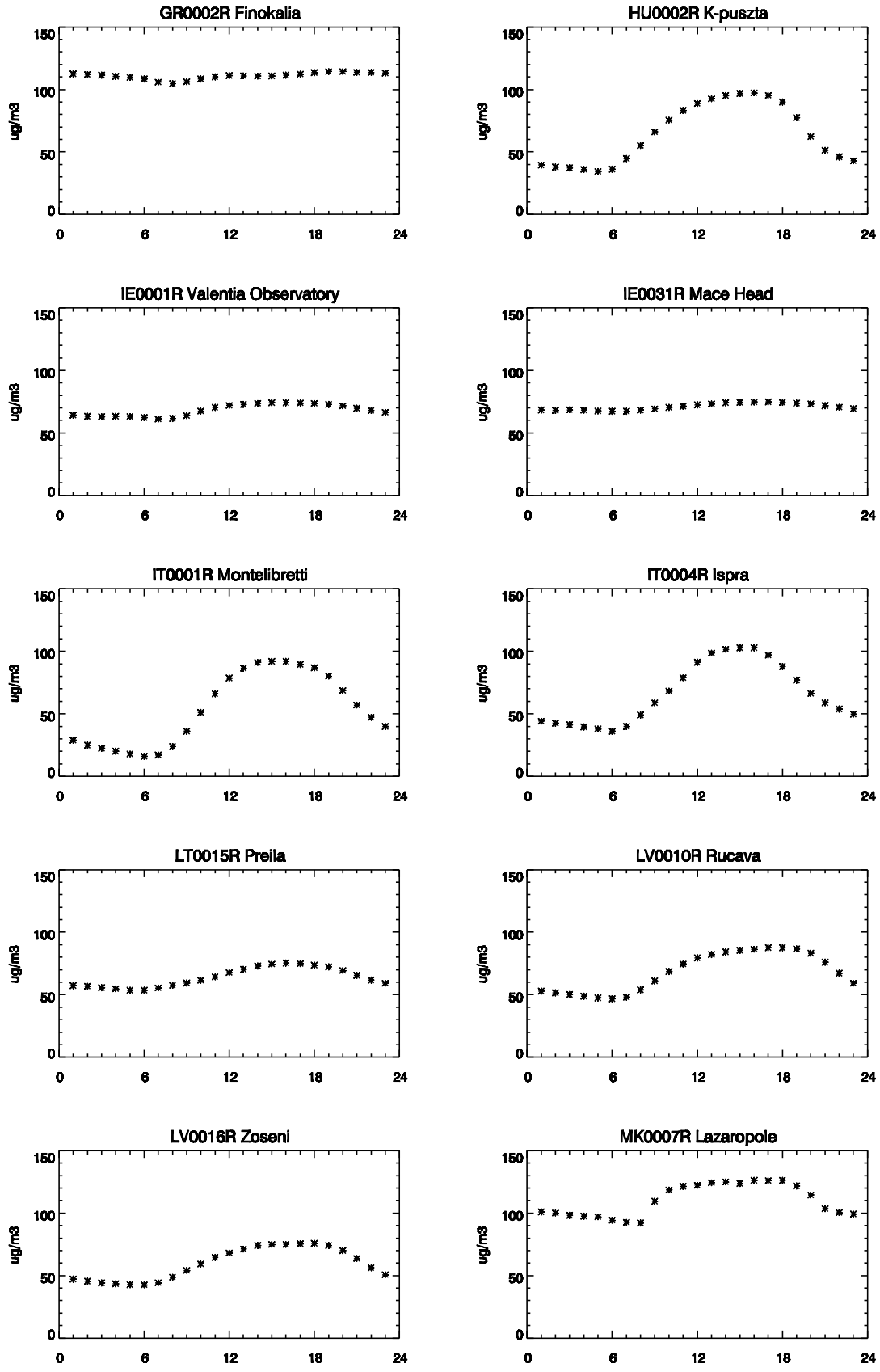

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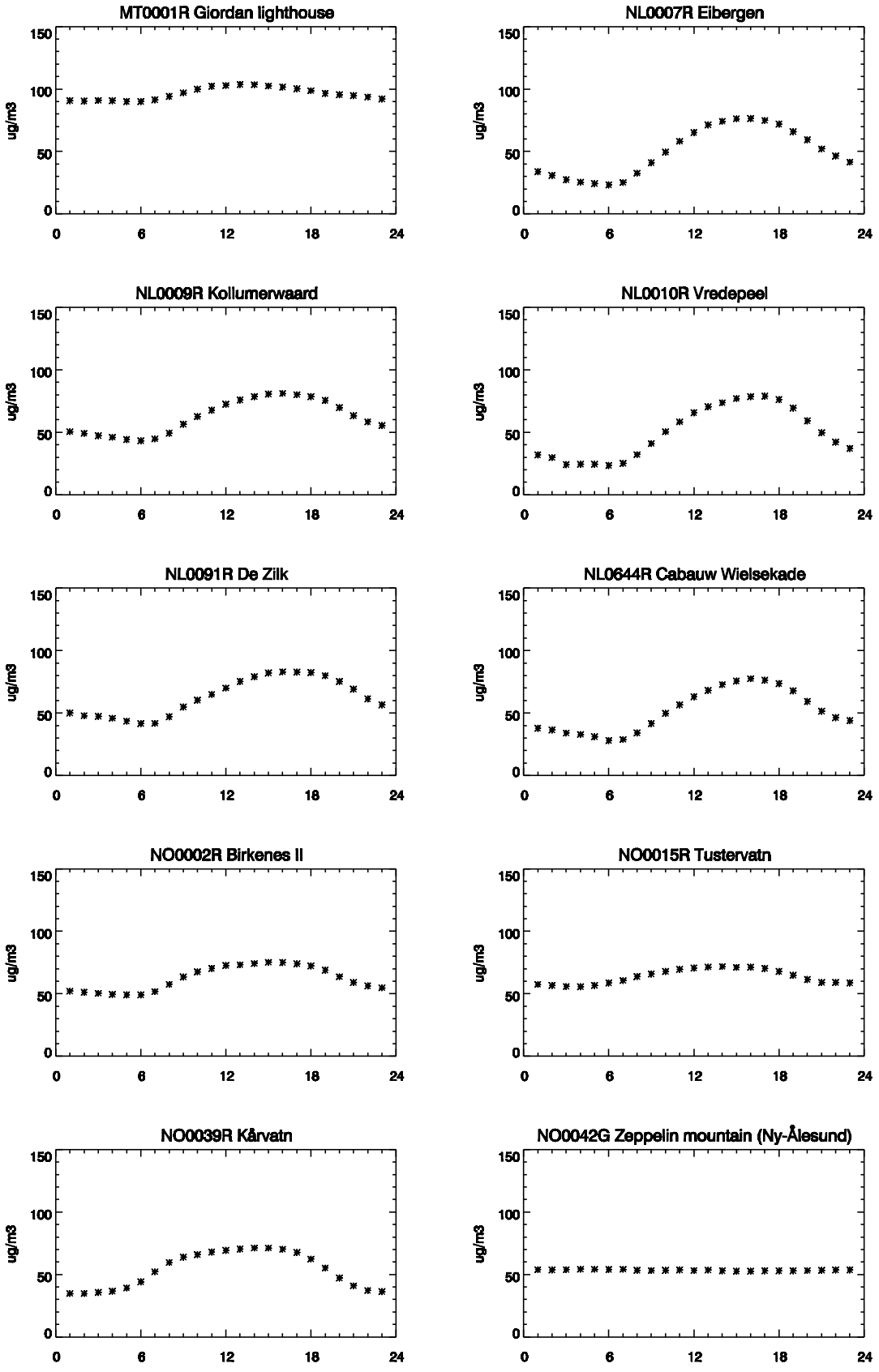

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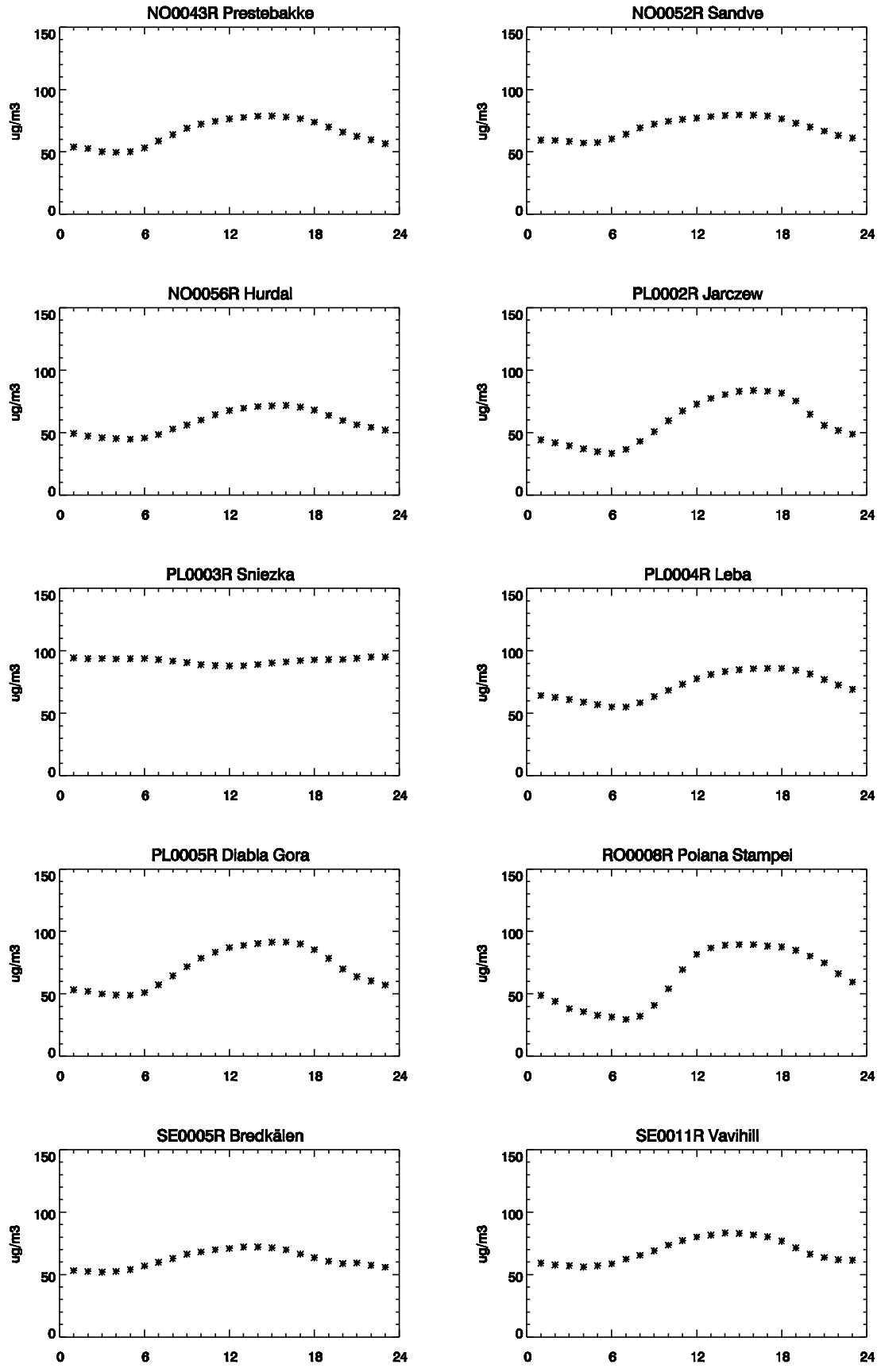

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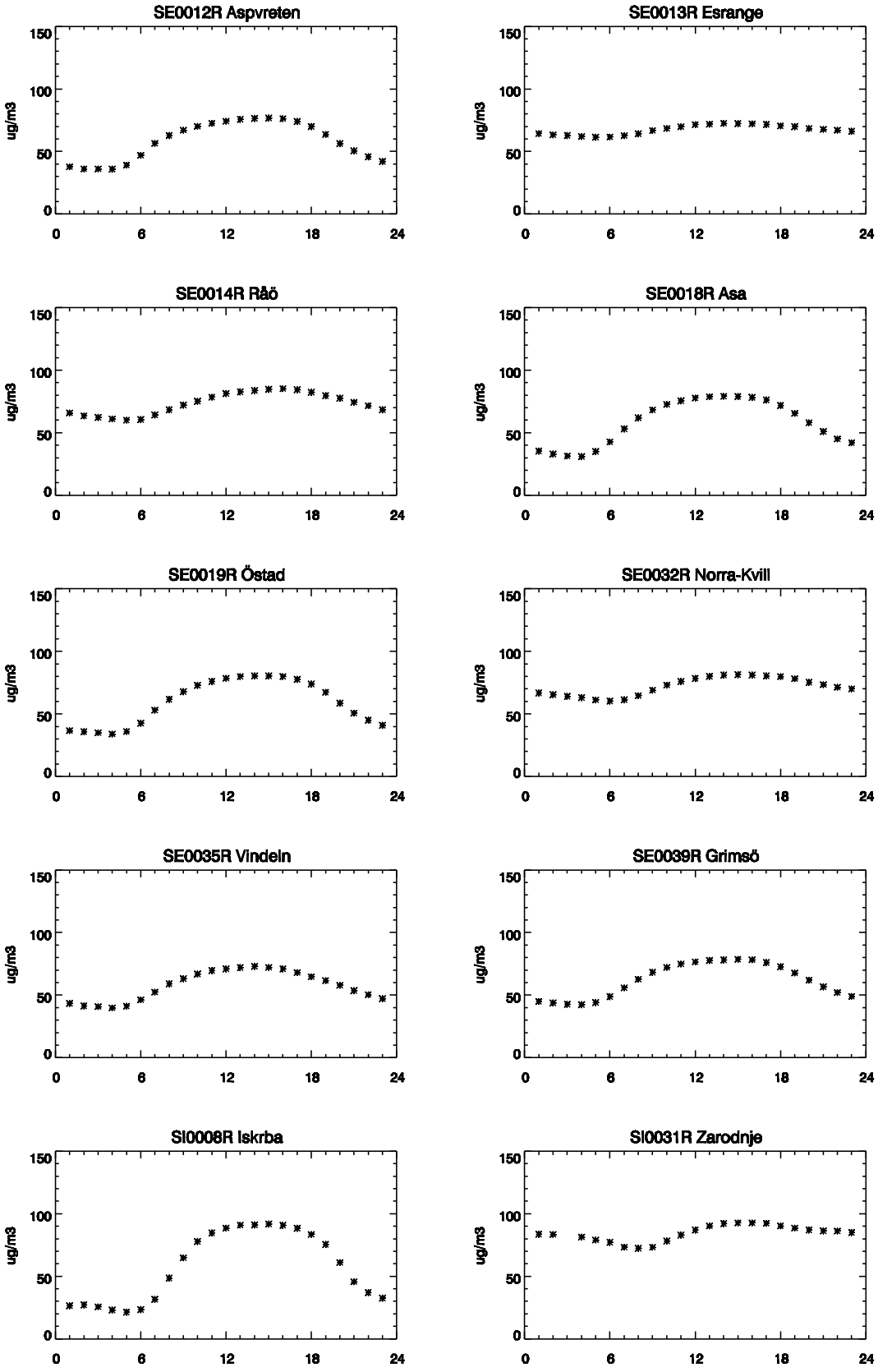

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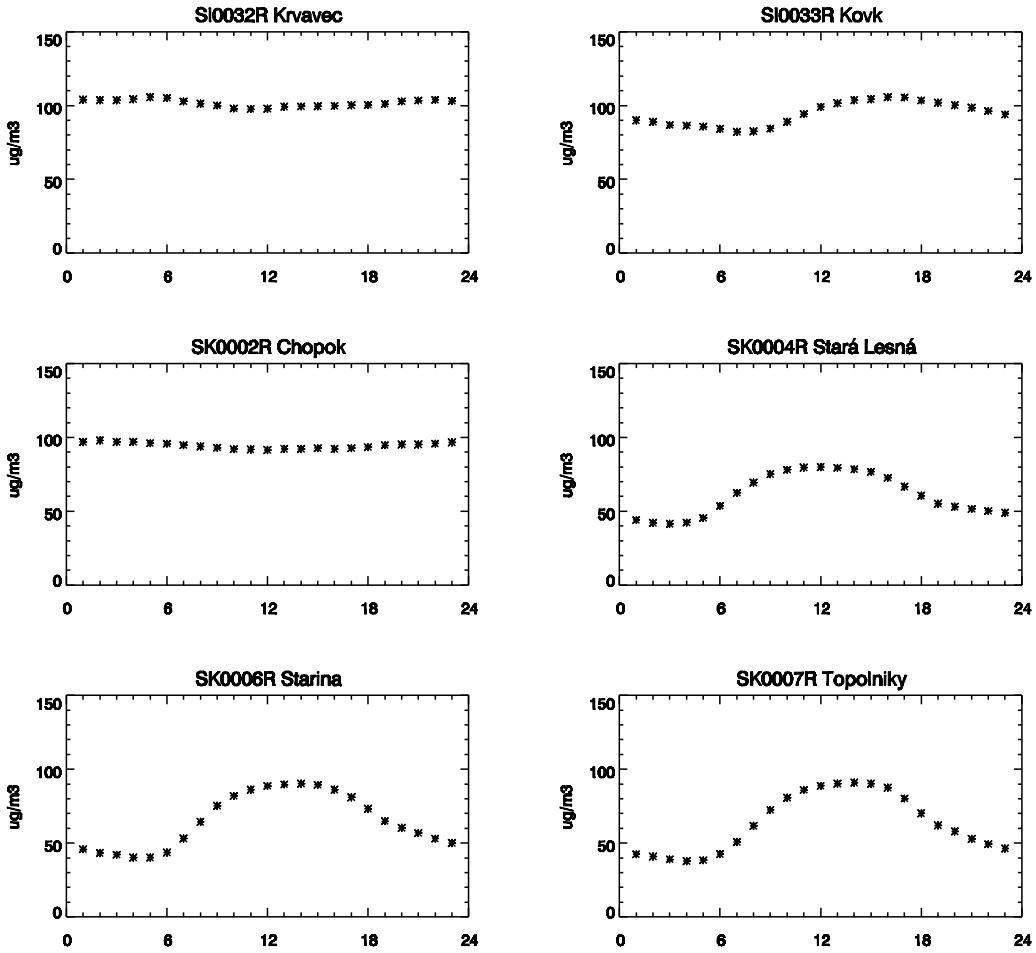

Figure 4.1, cont.

Annex 5

List of data reports

Ozone measurements in the ECE region January 1985–December 1985. Report no. 1.
EMEP/CCC-Report 3/89 by U. Feister and U. Pedersen.
Potsdam/Lillestrøm, Meteorological Service of the GDR/Norwegian Institute for Air Research, 1989.

Ozone measurements January 1986–December 1986. Report no. 2.
EMEP/CCC-Report 8/90 by U. Feister, U. Pedersen, E. Schulz and S. Hechler.
Lillestrøm, Norwegian Institute for Air Research, 1990.

Ozone data report 1988.
EMEP/CCC-Report 1/92 by U. Pedersen.
Lillestrøm, Norwegian Institute for Air Research, 1992.

Ozone data report 1989.
EMEP/CCC-Report 2/93 by U. Pedersen and I.M. Kvalvågnes.
Lillestrøm, Norwegian Institute for Air Research, 1993.

Ozone measurements 1990–1992.
EMEP/CCC-Report 4/95 by A.-G. Hjellbrekke.
Kjeller, Norwegian Institute for Air Research, 1995.

Ozone measurements 1993–1994.
EMEP/CCC-Report 1/96 by A.-G. Hjellbrekke.
Kjeller, Norwegian Institute for Air Research, 1996.

Ozone measurements 1995.
EMEP/CCC-Report 3/97 by A.-G. Hjellbrekke.
Kjeller, Norwegian Institute for Air Research, 1997.

Ozone measurements 1996.
EMEP/CCC-Report 3/98 by A.-G. Hjellbrekke.
Kjeller, Norwegian Institute for Air Research, 1998.

Ozone measurements 1997.
EMEP/CCC-Report 2/99 by A.-G. Hjellbrekke.
Kjeller, Norwegian Institute for Air Research, 1999.

Ozone measurements 1998.
EMEP/CCC-Report 5/2000 by A.-G. Hjellbrekke.
Kjeller, Norwegian Institute for Air Research, 2000.

Ozone measurements 1999.
EMEP/CCC-Report 1/2001 by A.-G. Hjellbrekke and S. Solberg.
Kjeller, Norwegian Institute for Air Research, 2001.

Ozone measurements 2000.
EMEP/CCC-Report 5/2002 by A.-G. Hjellbrekke and S. Solberg.
Kjeller, Norwegian Institute for Air Research, 2002.

Ozone measurements 2001.
EMEP/CCC-Report 4/2003 by A.-G. Hjellbrekke and S. Solberg.
Kjeller, Norwegian Institute for Air Research, 2003.

Ozone measurements 2002.
EMEP/CCC-Report 2/2004 by A.-G. Hjellbrekke and S. Solberg.
Kjeller, Norwegian Institute for Air Research, 2004.

Ozone measurements 2003.
EMEP/CCC-Report 4/2005 by A.-G. Hjellbrekke and S. Solberg.
Kjeller, Norwegian Institute for Air Research, 2005.

Ozone measurements 2004.
EMEP/CCC-Report 2/2006 by A.M. Fjæraa.
Kjeller, Norwegian Institute for Air Research, 2006.

Ozone measurements 2005.
EMEP/CCC-Report 2/2007 by A.M. Fjæraa and A.-G. Hjellbrekke.
Kjeller, Norwegian Institute for Air Research, 2007.

Ozone measurements 2006.
EMEP/CCC-Report 2/2008 by A.M. Fjæraa and A.-G. Hjellbrekke.
Kjeller, Norwegian Institute for Air Research, 2008.

Ozone measurements 2007.
EMEP/CCC-Report 2/2009 by A.M. Fjæraa and A.-G. Hjellbrekke.
Kjeller, Norwegian Institute for Air Research, 2009.

Ozone measurements 2008.
EMEP/CCC-Report 2/2010 by A.M. Fjæraa and A.-G. Hjellbrekke.
Kjeller, Norwegian Institute for Air Research, 2010.

Ozone measurements 2009.
EMEP/CCC-Report 2/2011 by A.-G. Hjellbrekke, S. Solberg and A.M. Fjæraa.
Kjeller, Norwegian Institute for Air Research, 2011.

Ozone measurements 2010.
EMEP/CCC-Report 2/2012 by A.-G. Hjellbrekke, S. Solberg and A.M. Fjæraa.
Kjeller, Norwegian Institute for Air Research, 2012.

Ozone measurements 2011.
EMEP/CCC-Report 3/2013 by A.-G. Hjellbrekke, S. Solberg and A.M. Fjæraa.
Kjeller, Norwegian Institute for Air Research, 2013.

Ozone measurements 2012.
EMEP/CCC-Report 2/2014 by A.-G. Hjellbrekke and S. Solberg.
Kjeller, Norwegian Institute for Air Research, 2014.

Ozone measurements 2013.
EMEP/CCC-Report 2/2015 by A.-G. Hjellbrekke and S. Solberg.
Kjeller, Norwegian Institute for Air Research, 2015.

Ozone measurements 2014.
EMEP/CCC-Report 3/2016 by A.-G. Hjellbrekke and S. Solberg.
Kjeller, Norwegian Institute for Air Research, 2016.