EMEP/CCC-Report 3/2007

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

Data quality 2005, quality assurance, and field comparisons

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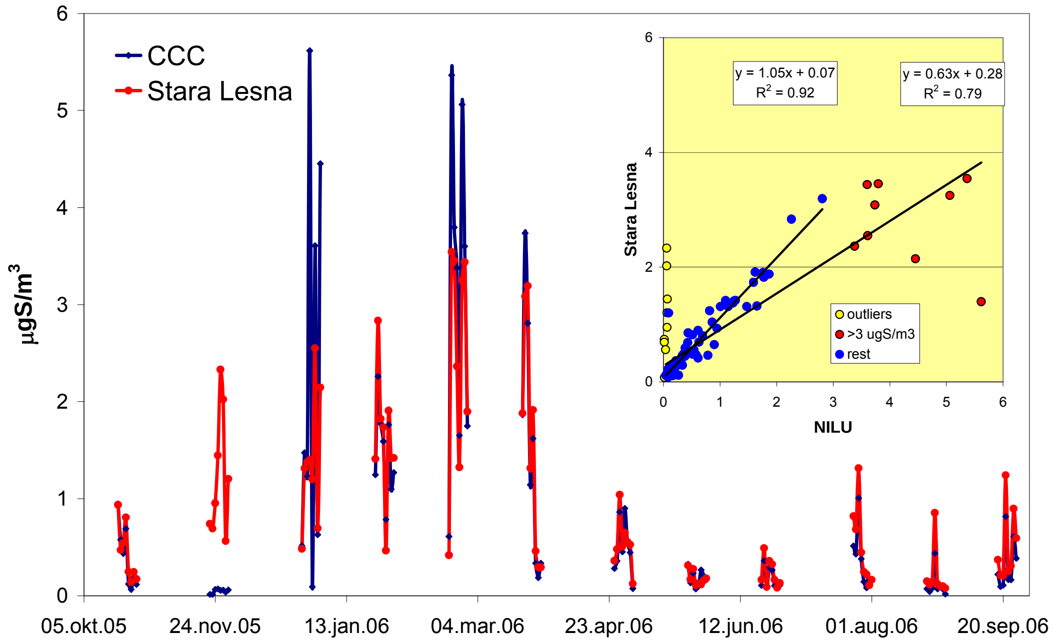

SO_2 collocated measurements in Slovakia

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Contents

Summary

This report is mainly concerned with the quality of the 2005 data and new results from field and laboratory comparisons.

The requirement with respect to data completeness for the main components in precipitation and air, i.e. 90 per cent, is generally met. For heavy metals, VOC and POPs the data capture is lower, especially for air samples mainly due to less sampling frequencies, i.e. once or twice a week.

To obtain a reliable estimate of the concentration level it is generally stated that 75% of the measurements should be above the detection limit. Heavy metals and POP measurements have generally more problems to meet this requirement than the main components, but also for these latter measurements there are labs that need to look into whether their methods are suited for low background concentration levels, e.g. the SO_2 measurements in France are mainly under the detection limit.

The ion balance for many countries was within ± 20 per cent, which indicate valid data when pH is less than 5.5. For higher pH values there is often a systematic difference that is not yet fully understood. However, it should be emphasized that the ion balance does not give an exact assessment of the quality, but some labs (e.g. EE, RU) have very scattered ion balance plot indicating that their QA/QC routines needs to be improved.

Laboratory comparison of the main components in precipitation and air is carried out annually. The main message is that the laboratory performances in general are satisfactory, but that there nevertheless is room for improvements for some components like chloride, calcium, and potassium. Laboratory comparison of heavy metals is also performed annually. The measurements of high concentration samples give no major problem, except in Estonia,, but at many EMEP sites these samples are not very representative. Several countries have problems measuring low concentration samples of Cr, Ni, As and Cd.

Field intercomparison has been carried out in Stara Lesna in Slovakia for main components in air. The results are satisfactory, but some overestimation for NO_2 is observed. The main components in air and precipitation has been assigned a DQ flag based on results in the laboratory and field intercomparison.

Annex 5 contains detection limits and estimates of precision, both for the complete measurement methods applied, and for the chemical method in the laboratories. This Annex is based on the information and data the participants themselves have forwarded to the CCC.

Data quality 2005, quality assurance, and field comparisons

1. Introduction

The aim of quality assurance is to provide data with sufficiently good and known quality, and this series of reports is intended to document the EMEP data quality and the progress made. The present report is relevant for the 2005 data. All data included in the EMEP program is covered by this data quality report, most of the information available on the data quality is, however, on acidifying and eutrophying components.

Much of the information given here are collected from the participating laboratories, this being data on detection limits and precision. CCC organizes annually different types of comparisons, and the EMEP Laboratory inter-comparison and results from field comparisons with reference instrumentation provide important information of the data quality. Information of both these types of comparisons is used in a new flagging system of data quality.

Calculations of ion balances in precipitation samples are important supplementary information to evaluate the data quality; however, the ion balance (IB) check is mainly a control of the analytical procedure, and contamination or other field problems are not detected by this control. In addition, at high pH and/or at low ion strength the IB test is more uncertain. A flagging system has been developed to fully get use of the information from the ion balance test, however the flags are not implemented to the database yet.

2. Measurement programme and data completeness

EMEP's measurement programme in 2005 is given in Table 1. Details on the sampling program and measurement frequency at the different sites are found in the different data reports (Hjellbrekke and Fjæraa, 2007; Fjæraa and Hjellbrekke, 2007; Aas and Breivik, 2007; Solberg, 2007).

Many Parties do not fulfil the measurement program. There is in general a big lack of measurements of particles, VOC, POPs and heavy metals. The monitoring strategy being developed for 2004–2009 (EB.AIR/GE.1/2004/5) aims to improve this situation and a better spatial coverage is expected in the future. In addition few Parties measure all the inorganic species in air. Very few countries report base cations, and several labs that use the filterpack method report sum of nitrogen species in air and aerosols, even though these should be reported separately; however there is an increased tendency for more complete reporting of these species.

According to the Data Quality Objectives (DQO) of EMEP (Annex 1), the data completeness should be at least 90 per cent for main ions and heavy metals. In Annex 2 there is a summary of the data capture for all the EMEP data for 2005.

For the precipitation components most participants broadly met the DQO, but the data completeness for the air components is less satisfactory.

Table 1: EMEP's measurement programme (level 1 and 2) in 2005.

	Components	Measurement period	Measurement frequency
Gas	SO_2, NO_2, NH_3, HNO_3	24 hours	Daily
	O_3	Hourly means stored	Continuously
	Light hydrocarbons C_2-C_7	10-15 mins	Twice weekly
	Ketones and aldehydes (VOC)	8 hours	Twice weekly
	Hg	Hourly/24 hours	Continuously/ Weekly
Particles	SO_4^{2-}, NH_4^+, NO_3^-, Ca^{2+}, Mg^{2+}, Na^+, K^+, Cl^-	24 hours	Daily
	Cd, Pb (first priority), Cu, Zn, As, Cr, Ni (second priority)	Weekly/24 hours	Weekly
	PM_{10} mass	24 hours	Daily
Gas + particles	HNO_3(g)+NO_3^-(p), NH_3(g)+NH_4^-(p)	24 hours	Daily
	POPs (PAH, PCB, HCB, chlordane, lindane, α-HCH, DDT/DDE)	Daily/weekly	Once weekly
Precipitation	Amount, SO_4^{2-}, NO_3^-, Cl^-, pH, NH_4^+, Na^+, Mg^{2+}, Ca^{2+}, K^+, conductivity	24 hours/weekly	Daily/weekly
	Hg, Cd, Pb (first priority), Cu, Zn, As, Cr, Ni (second priority)	Weekly	Weekly
	POPs (PAH, PCB, HCB, chlordane, lindane, α-HCH, DDT/DDE)	Weekly	Weekly

For heavy metals, VOC and POPs the data capture is lower than for the main components, especially for air samples. The reason is that several countries analyse e.g. one or two air samples weekly. This will give poor data completeness, but the seasonal distribution is anyhow satisfactory, and the annual average will probably give a reasonable estimate even though there are no measurements on the majority of the days.

Even though percentage of measurements above detection limit is not defined in the DQO it is important that most of the data is measurable, otherwise the uncertainty in the average will become quite high. The exact level of what is acceptable depend somewhat on the concentration level and the component in question. In Annex 3 it is given a summary of the number of samples below the detection limit for main components and heavy metals. Limits of 75%, 50% and 25% are given. Heavy metal and POP (not shown) measurements have more problems than the main components.

3. Ion balances

The ion balance is a good test on consistency and errors in the analytical results, but will not necessarily reveal a contamination of the sample. This will depend on whether or not the contamination occurred before the analysis started. The ion balance will also fail to discover errors related to the precipitation sampling.

The ion balances for all precipitation samples from 2005 are presented in Annex 4, as a function of pH. Ion balances for samples with pH < 5 were, for many countries, better than 15–20%, indicating fairly good accuracy in the determination of the individual ions. Some results give very scattered plot of the ion balance, i.e. in CZ, EE, RU and BY. This may indicate that the quality assurance routines need to be improved. For BY, analysis of K is not included, but this will probably not change the results significantly.

At some sites there were many samples with pH > 5. This is particularly the case in Mediterranean countries due to alkaline dust as clearly seen from the Portuguese and Spanish results, as well as at other continental sites and in the far north of Europe. It is an experience made that ion balances become markedly poorer with increasing pH above 5–6. Some countries seem to have systematic deficit of anions, i.e. in contrast to the large spread in the ion balances seen in the Mediterranean. This is seen at many sites, e.g. in Croatia, Italy and Norway. In other countries, e.g. in Denmark and Ireland, the systematic anion deficit does not occur.

The reason for the poor ion balances at pH values above 5–6 is not yet fully understood. One contributing factor is certainly due to unmeasured ion species present in the sample, i.e. organic acids and bicarbonate. Biological degradation of some precipitation components may also contribute. The systematic deficit of anions at pH above 5–6 is a general problem, which also occurs in other networks in other parts of the world. The current situation with the very poor ion balances for samples with pH above 5 is highly unsatisfactory since we will only have limited information about the consistency of these results. Countries having weakly acidic samples as a larger fraction of their precipitation could supplement their current pH measurements with titration for determining weak acid concentrations, preferably as described in the Manual (EMEP/CCC, 1996). This is hardly done at any sites today.

4. Accuracy, detection limits and precision

A request for quality assurance data for the main components was made earlier this year: measurement and laboratory lower detection limit and precision results from control samples, and detection limits and precision for monitors. The information collected on detection limits and precision is given in Annex 5.

There are various ways of defining the measurement and laboratory precision and detection limit. The methods for calculating these data are defined in the EMEP Manual (EMEP/CCC, 1996). To quantify the precision in the measurements, parallel sampling is necessary and the precision should be given as M.MAD and CoV, relative standard deviation (RSD) is also an informative parameter. M.MAD expresses the spread of the data and equals the standard deviation if the population has a normal distribution. CoV expresses the relative spread of the data, and, similar to the M.MAD, approaches the relative standard deviation for a normal distributed population. Both parameters are non-parametric statistics, which make them particularly useful for measurements with spikes in the data. The definitions of M.MAD and CoV are (Sirois and Vet, 1994):

$$M.MAD = \frac{1}{0.6754}\, median\left(\left|e_i - median\left(e_i\right)\right|\right)$$

where e_i is the error in the two measurements

$$CoV\ \frac{M.MAD}{median\left(\overline{C}\right)} * 100\%$$

where $\overline{C}$ is the average of the two corresponding results. If a reference method is used to evaluate the national/local measurements, the median of the reference measurements is used.

The detection limit is calculated using three times the standard deviation of the field blanks and given in the same unit as the measurement data. By using split samples and laboratory blank samples, laboratory precisions and detection limits can be assessed in a similar way.

5. Field intercomparison at Stara Lesna

5.1 Introduction

Laboratory comparisons and field studies are organized in order to quantify systematic differences and errors and, as far as possible, to assess the measurement accuracies. Field comparisons have been carried out, and so far completed in several countries. Updated information on this is found on the EMEP web pages, http://www.nilu.no/projects/ccc/qa/index.htm. Results from the field intercomparison in Slovakia is presented in this report.

The comparisons are carried out at an EMEP site using a set of reference instruments that corresponds to the specifications in the EMEP Manual. An inherent advantage of the reference methods is that the samples are stable and may be mailed from one country to another without any deterioration or change of concentrations. In order to make the comparison valid for a representative period, it was decided to distribute the comparison measurements over a whole year and for the air components about 100 measurements were considered necessary. The reference sampler is usually sampled one week every month. The measurements are assigned a QA flag in accordance to the definitions described in Annex 6.

5.2 Reference instrumentation

The EMEP manual recommends a filterpack method with an aerosol filter for collection of sulphate, and subsequent absorption of sulphur dioxide on a cellulose filter impregnated with KOH. This filterpack is also suitable for determining the sum of nitrate aerosol and gaseous nitric acid. Evaporation of ammonium nitrate collected on the aerosol filter during the sampling period will lead to nitric acid that is collected on the impregnated filter. The quantity of nitrate accumulated on the impregnated filter will therefore usually represent an overestimate of the airborne gaseous nitric acid. For nitrogen dioxide, the recommended sampling method is conversion to nitrite, using sodium iodide as reducing agent, which is added to a glass sinter frit in a glass bulb. The methods are described in more detail in the EMEP Manual for Sampling and Chemical Analysis (EMEP, 1996 – revised 2001).

5.3 Results

The Slovak Hydrometeorological Institute (SHMI) is responsible for the EMEP measurements in Slovakia. At Stara Lesna they use the reference methods for measuring the main ions and gases in air, using a three stage filterpack. First aerosol filter is a Whatman 40 cellulose filter, and the two next are KOH and oxalic acid impregnated Whatman 40 filters. The flow is 27-28 m^3/day. The local measurements are, however, sampling inside, while the filterpack for the reference is placed outside in ambient air.

For NO_2 a modified Salzman method, using absorbing solution of NaOH and gajacol and a flow rate of 0.5–0.6 m^3/day. The analytical measurements of NO_2 were done spectrophotometric. SO_2 and HNO_3 is analysed with IC while NO_3^- and SO_4^{2-} with capillary electrophoresis.

The results from this comparison are found in Figure 1–Figure 5 and Table 2.

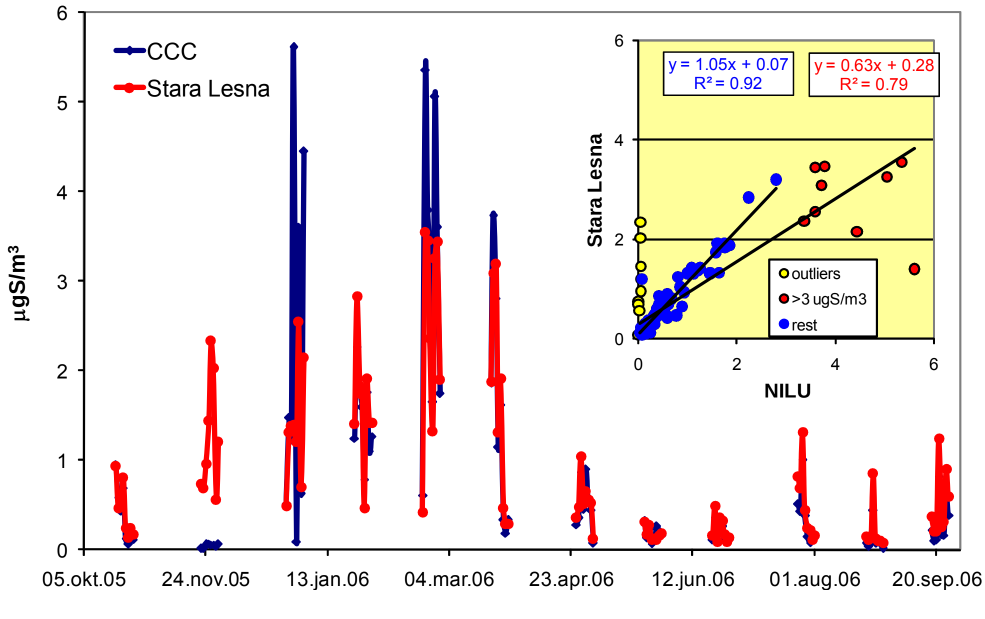

Figure 1: Comparison of the co-located measurements of SO_2 at Stara Lesna.

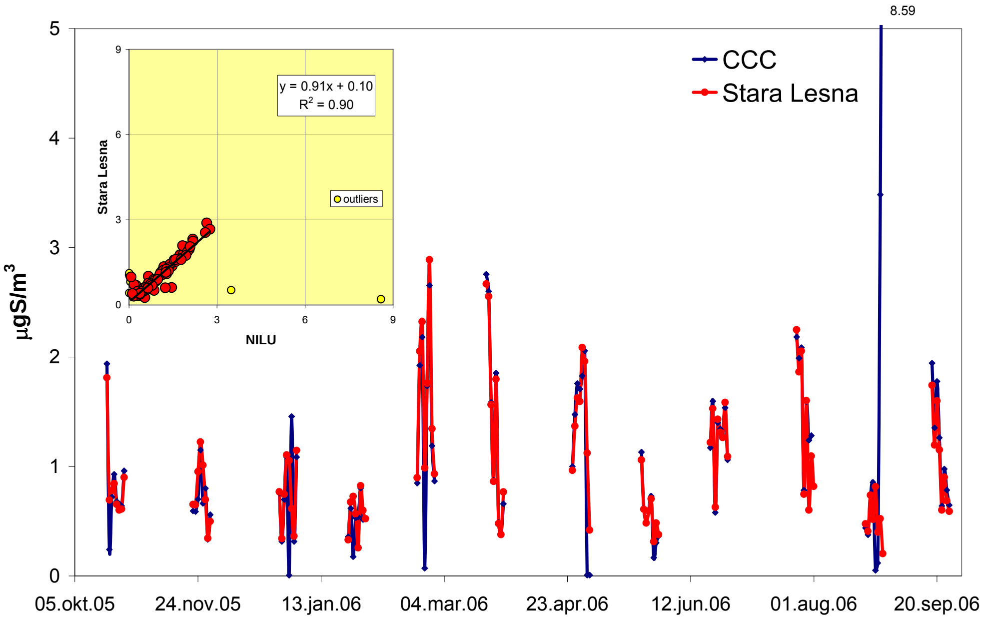

Figure 2: Comparison of the co-located measurements of SO_4^{2-} at Stara Lesna Outliers (yellow dots in xy plot) are not included to estimate the slope.

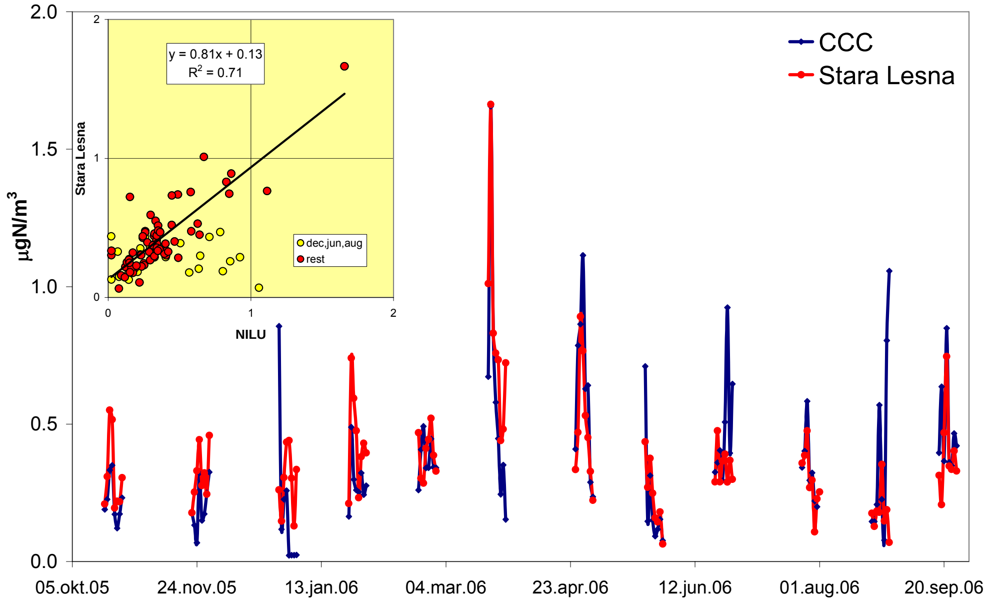

Figure 3: Comparison of the co-located measurements of sum(HNO_3 + NO_3^-) at Preila. Outliers (yellow dots in xy plot) are not included to estimate the slope.

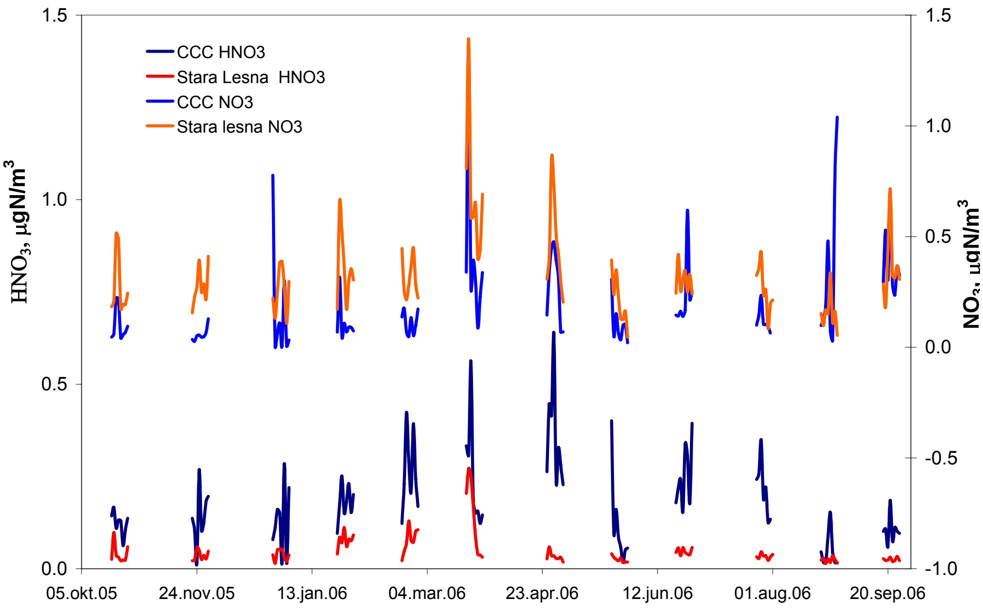

Figure 4: *Comparison of the co-located measurements of HNO_3 and NO_3^- at Preila.*

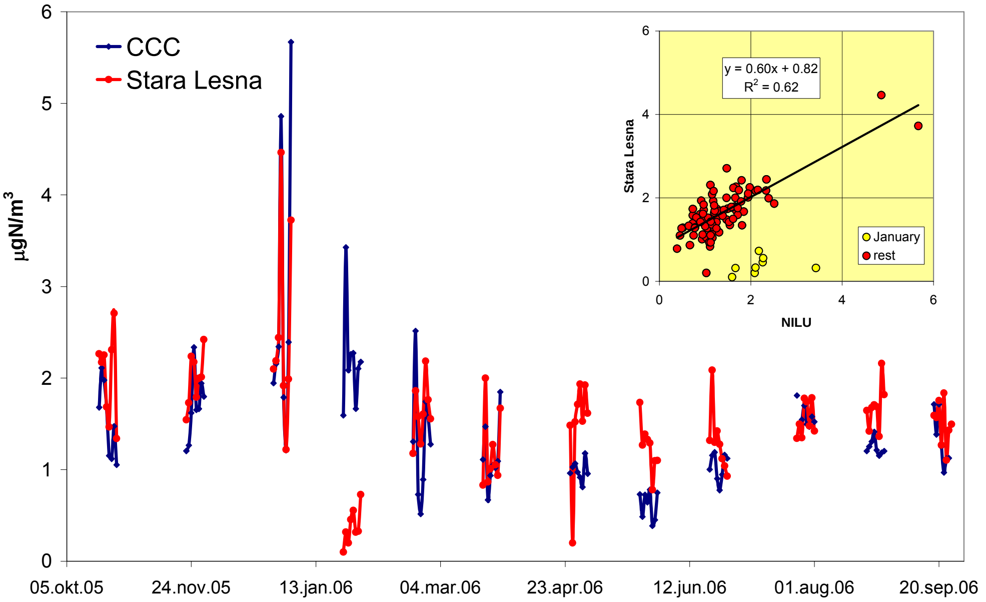

Figure 5: *Comparison of the co-located NO_2 measurements at Preila. Outliers (yellow dots in xy plot) are not included to estimate the slope.*

Table 2: Summary of results of co-located measurements at Stara Lesna, in μg/m³.

	SO_2	SO_2 < 3 μgS/m³	SO_4	Sum NO_3	NO_2
Mean NILU:	0.95	0.56	1.03	0.35	1.39
Mean SK:	0.88	0.65	1.04	0.41	1.65
Median NILU:	0.39	0.34	0.83	0.32	1.2
Median SK:	0.48	0.43	0.83	0.35	1.59
Num pairs:	85	76	88	69	87
Average diff:	0.07	-0.1	0	-0.06	-0.26
Median diff:	-0.06	-0.07	0.01	-0.05	-0.27
M.MAD:	0.10	0.10	0.09	0.10	0.39
CoV:	27 %	28 %	11 %	32 %	32 %
Slope	0.63	1.05	0.91	0.81	0.60
QA flag	50	00	10	10	52
QA category	B	A	B	B	B

The results from this comparison satisfactory for all the components. For SO_2 it seems to be a problem for concentrations higher than 3-4 μgS/m³. The reason might be that the SHMI measurement use 2 m inlet tubes while the reference sampler has the filters outside in direct ambient air. Some SO_2 might be deposited on the way. For sum of nitrate the results are rather scattered. Data for three month are not included in the statistical calculations. The reason is that NILU's laboratory has in the past had problems with NH_4NO_3 contamination of the filters from the manufacture. These problems seems to be resolved but to ensure that this is not the cause of the difference between the two laboratories, suspicious month are deleted. When looking at the individual concentrations of NO_3^- and HNO_3 the partition is very different in the two laboratories. The gas/particle ratio for SHMI is much lower than for NILU, Figure 4. This may indicate that NH_4NO_3 evaporation from the aerosol filters are higher for the SHMI measurements, may be due to different storage and sampling procedures. The Slovakian sampler is collecting inside in often warmer condition than the reference sampler. For NO_2, the spread is relatively high. The absorbing solution method has shown to give rather uncertain results, especially for low concentrations (Aas et al., 2007).

6. New reference methods to be included in the EMEP manual

As a consequence of the increased number of parameters being measured in EMEP, among others due to the EMEP Monitoring strategy, it is necessary to include guidelines and reference to more advanced measurements than EMEP traditionally has been dealing with, i.e. level 3 measurement

Within the EU project EUSAAR (European Supersites for Atmospheric Aerosol Research) reference methodology for advance aerosol measurements are being developed. In close cooperation with EMEP a draft protocol for the EC/OC measurements is developed and made available at the EMEP Manual web page, http://www.nilu.no/projects/ccc/manual/index.html. EUSAAR has also developed some recommendations for measurements of number size distribution of fine aerosol particle in the range 10-500 nm using DMPS/SMPS. These recommendation will soon also be included in the manual. This is also true for optical measurements. For optical parameters (aerosol scattering coefficients, aerosol absorption coefficients and aerosol optical depth) EUSAAR is also developing standard procedures for routine measurements, these will also be included when finalised.

The UK Centre for Ecology and Hydrology (CEH) and the EU project NitroEurope has developed a manual for low cost denuder measurements. These recommendations are also made available at the EMEP Manual homepage.

7. Results from laboratory comparisons

7.1 Main components

The twenty-third intercomparison (Uggerud and Hjellbrekke, 2007a) of main components in air and precipitation is relevant for the data reported for 2004. The results of the systematic and random errors are shown in Table 3 and Table 4, respectively. The details on how these calculations are done are presented in Aas et al. (2003). Some labs submit data to EMEP but do not participate in the laboratory intercalibration, these latter are marked in grey in Table 3.

The results are mostly good. Except for a few labs, i.e. PT, RU, EE and PL05 that have difficulties with some of the elements. This is not necessarily the general performance for the laboratory an outlier may cause the problems, one should look at the performance for several years if one needs a general picture. However, large deviations are signs of QA/QC problems in the lab, and the lab routines need to be checked extra carefully. Another point is than some of the results are not representative for the data reported. I.e., Spain makes it quite poor for SO_2, but the data reported to EMEP is by monitors and therefore not affected by the performance in the lab.

Table 3: Random errors (2RSD%) in the 23rd laboratory intercomparison for precipitation and air.

	Precipitation										Air and aerosols		
	SO_4^{2}	NO_3	NH_4	pH	Mg	Na	Cl	Ca	K	Cond	SO_2	HNO_3	NH_3
1 AT	0.6	0.2	1.4	0.3	3.1	1.3	4.2	2.8	1.6	0.9			
21 CH	0.7	0.6	1.0	0.0	1.2	0.4	1.1	0.7	2.9	0.3	1.0		
24 CS	0.4	0.7	1.0	0.1	2.8	1.4	2.1	2.2	1.3	0.5			
3 CZ	0.9	0.3	10.5	0.5	1.2	2.3	1.3	3.2	1.3	1.2	8.1	3.3	
7 DE	0.6	0.5	1.1	0.1	0.8	1.2	0.9	0.7	1.0	3.0			
8 DE Leipz	0.1	0.3	0.7	0.0	0.8	0.4	0.8	0.5	0.3	1.4	5.1	2.1	8.3
4 DK	0.3	0.3	1.2	0.0	1.2	5.1	3.2	3.0	2.1	1.8	1.8	3.8	
38 EE	1.2	1.4	32.7	1.3	2.0	2.7	4.1	6.7	0.8	3.1	7.2		
19 ES	6.3	7.0	4.1	0.3	0.4	1.8	12.0	1.0	0.7	0.9	22.5		3.8
5 FI	0.9	1.7	2.6	0.3	2.8	11.2	9.6	2.3	2.8	0.8	5.0	2.1	4.8
6 FR	0.4	0.9	1.0	0.2	3.5	1.6	2.1	3.5	1.3	1.9	1.3		
23 GB	0.9	0.9	1.9	0.3	18.5	15.2	1.8	6.2	10.3	4.0	1.5		
10 HU	2.7	2.9	1.2	0.3	0.8	2.1	18.2	2.2	8.5	2.1			18.4
35 HR	1.2	2.0	0.8	0.2	9.8	3.7	1.3	8.8	8.3	1.1			
12 IE	0.5	1.1	2.6	0.2	2.0	1.3	1.8	2.0	2.1	0.4			
11 IS	2.0	6.0	11.4	0.3	2.4	0.7	12.5	1.5	5.2	1.6	8.0	5.9	4.8
13 IT	1.0	0.7	3.8	0.5	2.4	3.2	3.3	1.8	2.8	2.1			8.2
30 IT	0.5	3.4	11.4	1.0	1.2	0.3	3.6	1.7	9.5	1.2			
32 LT	3.2	0.6	3.0	0.1		2.1	3.1	45.1	1.6	1.0	2.8	2.8	14.6
33 LV	2.3	2.4	1.2	0.2	1.6	0.2	6.8	1.8	0.7	0.6	4.4	12.4	6.3
40 MK		9.9	89.2	1.3	31.3	1.1		183.1	7.1	16.6			
14 NL	0.5	3.5	0.5	0.3	3.9	2.0	5.6	1.8	7.0	1.2			
15 NO	0.5	0.7	1.2	0.2	3.5	1.4	1.1	1.5	0.5	1.4	8.1	5.5	5.7
16 PL	0.9	0.7	3.4	0.2	2.0	2.7	1.6	3.7	4.1	1.0	1.8	1.0	
39 PL05	1.5	2.4	0.8	0.4	0.4	0.5	2.5	0.8	0.8	1.3	8.6	1.8	6.2
17 PT	11.2	2.5	4.9	0.9	5.1	4.1	22.3	3.5	5.4	1.9	4.6		
22 RU	3.9	6.7	1.8	0.2	9.1	10.5	31.0	24.1	7.8	0.9	13.7	3.8	
20 SE	0.1	0.2	2.9	0.2	2.4	0.5	1.4	2.8	0.7	1.4	4.0	2.6	4.6
36 SI	0.6	2.1	2.2	0.2	2.0	1.3	7.0	1.3	0.3	1.3	4.5	2.1	3.0
31 SK	4.5	1.3	38.4	0.2	10.2	5.4	3.9	13.5	17.3	0.5	2.5	1.9	10.0
34 TR	0.7	2.6	11.8	0.3	4.7	2.0	2.9	4.5	3.6	6.6	3.0	1.6	26.5

1-2 DQO   > 2 DQO

Table 4: Systematic errors (RB%) in the 23rd laboratory intercomparison for precipitation and air.

	Precipitation										Air and aerosols		
	SO_4^{2-}-S	NO_3-N	NH_4-N	pH	Mg	Na	Cl	Ca	K	Cond	SO_2-S	NO_3	NH_3
1 AT	1	0	-1	-2	-9	-3	-11	-3	-5	-2			
21 CH	2	1	2	1	3	1	-1	4	7	0	-9		
24 CS	0	-2	-1	0	-2	-6	3	0	0	-1			
3 CZ	3	-1	20	0	6	-2	-2	14	-3	1	-12	-6	
7 DE	5	-1	-3	-1	0	-1	-2	0	-3	-5	2	4	4
8 DE	1	0	-2	2	1	-1	-3	4	-3	-5			
4 DK	0	0	1	1	-11	8	-3	-1	-10	-3	-5	-3	
38 EE	-1	-1	-107	-8	-17	-9	1	-28	-8	-11	-13		
19 ES	-7	1	8	3	1	2	-36	-2	2	2	-20		9
5 FI	3	4	1	1	4	4	8	6	4	3	4	10	-7
6 FR	-1	0	-1	0	-9	4	-2	7	-4	-3	-8		
10 HU	-1	11	-1	1	2	-6	-11	5	2	0			-24
35 CR	4	3	-2	2	51	-1	0	22	-1	-5			
12 IE	-1	-1	3	0	4	-5	-2	0	-4	1			
11 IS	-1	13	24	1	-3	1	7	-8	-8	-4	-10	25	6
13 IT	4	-1	3	-1	-4	-2	-3	2	0	-3			14
30 IT	-7	-12	-35	3	0	2	0	-2	-37	0			
32 LT	4	0	7	1		0	-2	40	0	-1	2	-3	5
33 LV	-1	-6	5	0	2	1	-7	2	0	-1	7	-15	3
40 MK		1	-7	-4	-4	1		100	-4	-22			
14 NL	2	14	-5	2	-4	6	-21	-1	4	3			
15 NO	3	2	11	2	11	2	-2	2	2	1	0	-6	-11
16 PL	0	-1	-1	1	2	5	-1	12	13	-4	4	2	
39 PL05	3	2	1	0	0	2	4	2	0	-4	9	6	-13
17 PT	-4	-1	-1	-6	17	-42	-72	-12	-34	0	-11		
22 RU	-2	-3	-30	2	-6	-7	-28	0	-5	-6	0	-8	
20 SE	-1	0	4	1	-11	-2	-5	-11	-3	-1	-4	-3	-4
36 SI	-1	8	1	1	-6	3	21	-2	-6	-2	3	8	-2
31 SK	-3	-4	39	1	-16	7	-4	-30	19	2	6	3	4
34 TY	2	-2	3	1	0	4	-2	2	-10	-8	-7	-16	-10
23 UK	1	0	4	-2	-24	29	-32	-9	-18	-6	-3		

systematic bias; more than +- 20 % bias; between 10 and 20 % or between -10 and -20 % bias

7.2 Heavy metals

The data quality objectives (DQO) in EMEP states that the accuracy in the laboratory should be better than 15% and 25% for high and low concentrations of heavy metals, respectively (Annex 1). One important measure to check the data quality is the laboratory ring test. There is a marked improvement in the laboratory performance for both lead and cadmium since the beginning of the laboratory comparison in 1995. The intercomparison completed last year is relevant for the 2005 data (Uggerud and Hjellbrekke, 2007b). In Table 5, there is a summary of the results from this laboratory intercomparison. Sweden and Iceland were not participating because these measurements were analyzed in Norway. The measurements of high concentration samples are generally quite OK, however, at many EMEP sites these high concentrations are not very representative. France has too high detection limit, but strangely this is not reflected in Annex 3, so may be there is a reporting problem in the intercomparison exercise. Estonia has large errors. Denmark and Great Britain also have large errors. In addition, there are some countries reporting measurements data without participation in the laboratory intercomparison: Belgium, Ireland, Portugal, and Spain. Data from these countries are of unknown quality; and it is therefore strongly recommended that they take part in the annual laboratory intercomparison.

Table 5: Average per cent error (absolute) in low and high concentration samples, results from heavy metal laboratory intercomparison in 2005.

	As		Cd		Cr		Cu		Pb		Ni		Zn	
	low	high	low	high	low	high	low	high	low	high	low	high	low	high
DK	33	11	0	6	8	5			25	3	47	2		
FI	2	2	1	2	22	9	5	6	6	1	15	8	4	7
FR	<DL	0	<DL	<DL	<DL	<DL	<DL	<DL	<DL	12	<DL	<DL	<DL	12
DE	2	2	4	2	2	2	2	3	3	5	5	5	9	1
HU			54	15					203	6				
NL	10	1	0	4	40	8	0	1	7	2	13	1	15	2
NO	0	2	4	1	0	8	5	0	2	2	5	9	10	3
PL05				6		1	8	7			21	6	3	3
GB	8	8	29	7	47	5	9	4	7	9	10	11	16	16
SK		6	0	2	2	4	3	4	4	3		3		2
LT	0	3	6	4	0	5	18	2	4	2	6	3	6	3
LV	11	0	0	3	13	0	15	13	6	1	7	2	11	3
SI	5	5	23	1	115	3	8	4	2	5	8	1	2	11
EE	<DL	33	<DL	6	<DL	22	23	12	31	36	163	28	29	4

1/2 - 1 DQO   1 - 2 DQO   > 2 DQO

8. QA flags for 2005

The data quality (DQ) flag is divided in two two-digit numbers, the leftmost two digits describing the performance in field comparisons and the two rightmost being based on the laboratory comparisons, the definitions are found in Annex 6. The two-digit flags are furthermore defined by letting the first digit represent an estimate of the systematic error and the second digit the random error. Most of the SO_2 and NO_2 in air and SO_4 in aerosols data have been given a four-digit DQ flag. The rest of the air data have not been assigned any flag due to few field- and laboratory comparisons for these components. For precipitation data there has been very few field comparisons and therefore only two flags representing the performance in the laboratory comparisons are given. Details on how these flags are defined are found in Aas et al. (2003).

It should be noted that the field comparisons have been far less both in number and in length with respect to different meteorological situations than desirable, and that the DQ flag cannot be expected to give a precise estimate of the quality. The flags will give a data user a quick overview of the expected errors in a data set and hopefully also give the user reasonable estimates of systematic deviations from a reference and of random errors in the data.

One may also group the different flags in a simpler classification, i.e. A, B, and C or as shown in Table A6.1 and Table A6.2 in three colour codes. The data series flagged with any of the red flags (C) will be classified as invalid data. The rest of the data are classified as valid data although those marked with a green colour (A) is considered by CCC as the most accurate data in the EMEP database. The data user may create other criteria or quality groups depending on the use of the data.

Several countries have never participated in field comparisons, and some countries have changed their measurement method since they took part. The comparisons carried out so far are therefore far from sufficient to express the comparability of all measurements. There are probably many comparisons performed outside EMEP, and if this information is made available, further updates of the flags will be done.

The results obtained in one comparison are used to flag data for all the years this method has been in use at the site. A poor performance in a field comparison can therefore influence the flagging for many years of data. If the data quality is determined to a large extent by the sampling method then this seems to be an acceptable approach. If on the other hand the sampling is fairly simple and the laboratory work determines most of the overall measurement quality, then the performance in the annual laboratory comparisons will more important than the results from a field comparison. Details on the flags for SO_2 and SO_4 in air and CCC's recommendations on whether the field or laboratory flag should be prioritised is shown in Annex 5 in Aas et al. (2004).

In Table 6 and Table 7 the flags relevant for 2005 are listed. The field flags are based on last results in the latest field intercomparison that the country has participated in, while the laboratory flag is based on the results in the 23rd laboratory intercomparison (Uggerud et al., 2007). For SO_4 in air, only field flags are shown since this component is taken out from the laboratory intercomparison. SO_4 in precipitation should be representative for the laboratory performance also for SO_4 on filters. It was some problems with the reference sampler for NO_2 in the laboratory intercomparison, so results from this is therefore not included.

As seen there are very few measurements that should be considered invalid (marked in red); however, the B category is rather big for especially SO_2 and NO_2 measurements. It is up to the data user to select which data to be used based on the quality flags depending on the accuracy needed.

Table 6: QA flag and category for main components in precipitation.

Code	SO_4		NO_3		NH_4		pH		Mg		Na		Cl		K		Ca		Cond	
AT	00	A	00	A	00	A	00	A	20	A	00	A	40	B	00	A	00	A	00	A
CH	00	A	00	A	00	A	00	A	00	A	20	A	00	A	20	A	1	A	00	A
CS	00	A	00	A	00	A	00	A	00	A	00	A	00	A	00	A	10	A	00	A
CZ	00	A	00	A	50	B	00	A	10	A	00	A	00	A	00	A	30	B	00	A
DE003	00	A	00	A	00	A	00	A	00	A	00	A	00	A	00	A	00	A	00	A
DE	00	A	00	A	00	A	00	A	00	A	00	A	00	A	00	A	00	A	00	A
DK	00	A	00	A	00	A	00	A	40	B	10	A	00	A	40	B	00	A	00	A
EE	00	A	00	A	82	C	20	A	00	A	00	A	00	A	00	A	00	A	00	A
ES	20	A	00	A	10	A	00	A	00	A	00	A	60	B	00	A	40	B	00	A
FI	00	A	00	A	00	A	00	A	00	A	00	A	10	A	00	A	10	A	00	A
FR	00	A	00	A	00	A	00	A	20	A	00	A	00	A	00	A	10	A	00	A
GB	00	A	00	A	00	A	00	A	61	B	20	A	60	B	00	A	00	A	20	A
HU	00	A	30	B	00	A	00	A	00	A	20	A	41	B	00	A	00	A	00	A
HR	00	A	10	A	00	A	00	A	20	A	00	A	00	A	20	A	00	A	00	A
IE	00	A	00	A	00	A	00	A	00	A	20	A	00	A	00	A	00	A	00	A
IS	00	A	30	B	50	B	00	A	00	A	00	A	10	A	20	A	20	A	00	A
IT	00	A	00	A	00	A	00	A	00	A	00	A	00	A	00	A	00	A	00	A
IT	20	A	00	A	60	B	00	A	00	A	10	A	00	A	31	B	60	B	00	A
LT	00	A	20	A	10	A	00	A	00	A	00	A	00	A	00	A	00	A	00	A
LV	00	A	00	A	10	A	00	A	00	A	00	A	20	A	40	B	00	A	20	A
NL	00	A	30	B	00	A	00	A	00	A	10	A	60	B	00	A	00	A	00	A
NO	00	A	00	A	30	B	00	A	30	B	00	A	00	A	00	A	00	A	00	A
PL	00	A	00	A	00	A	00	A	00	A	10	A	00	A	30	B	30	B	00	A
PL05	00	A	00	A	00	A	00	A	2	B	00	A	00	A	00	A	73	C	61	B
PT	00	A	00	A	00	A	00	A	30	B	80	C	81	C	60	B	40	B	00	A
RU	00	A	00	A	60	B	00	A	20	A	51	B	62	B	40	B	20	A	20	A
SE	00	A	00	A	00	A	00	A	40	B	00	A	00	A	10	A	00	A	00	A
SI	00	A	00	A	00	A	00	A	40	B	20	A	50	B	20	A	60	B	40	B
SK	00	A	00	A	52	B	00	A	40	B	00	A	00	A	00	A	52	B	00	A
TR	00	A	00	A	00	A	00	A	70	C	00	A	00	A	00	A	50	B	00	A

Table 7: QA flag and category for main components in air.

	SO_2			NO_2		SO_4		sNO_3			sNH_4		
	qa flagg	field	lab	qa flagg	field	qa flagg	field	qa flagg	field	lab	qa flagg	field	lab
AT	22--	B		-	-	-	-		-			-	
CH	3220	B	A	33--	B	-	-		-			-	
CS	-	-		53--	B	-	-		-			-	
CZ	1240	B	B	-	-	-	-	--20	-	A		-	
DE	0100	A	A	-	-	00--	A	--00	-	A	--00	-	A
DK	0000	A	A	-	-	00--	A	--00	-	A		-	
EE	1240	B	B	62--	B	-	-		-			-	
ES	32--	B	B	30--	B	00--	A		-		--10	-	A
FI	1000	A	A	-	-	00--	A	--10	-	A	--20	-	A
FR	2020	B	A	-	-	20--	B						
GB	1000	B	A	53--	B	00--	A		-			-	
HU	-	-		13--	B	-	-		-		--61	-	B
IS			A					--50		B	--10		A
IE	00--	A		50--	B	-	-		-			-	
IT											--30		B
LT	1000	B	A	32--	B	10--	B	1000	B	A	--10		A
LV	5010	B	A	02--	B	22--	B	2241	B	B	0200	A	A
NL	11--	B		03--	-	00--	A		-			-	
NO	0020	A	A	00--	A	00--	A	--20	-	A	--40	-	B
PL	0000	A	A	43--	B	01--	A	--00	-	A		-	
PL05	2010	B	A	52--	B	32--	B	--10	-	A	--40	-	B
PT	--40		B										
RU	--01		A					--20		A	--00		A
SE	0000	A	A	10--	B	00--	A	--00	-	A	--00	-	A
SI	0000	A	A	-	-	20--	B	--10	-	A	--00	-	A
SK	5010	B	A	53--	B	10--	B	1000	B	A		-	
TR	0010	A	A	-	-	-	-	--40	-	B	--21	-	B

9. Audits

Audit is not being done regularly from CCC, but will be done when needed. It is recommended regular audits at all EMEP sites, at least as an internal control every year, but also with visitors from e.g. neighbouring countries. Forms to be used for auditing main components in air and precipitation, and ozone can be downloaded from EMEP's homepage, http://www.nilu.no/projects/ccc/qa/index.htm. It is recommended that all the external auditing is reported to CCC.

10. References

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11. List of participating institutions and the national quality assurance managers (NQAM)

Country	**Institute**	**NQAM**
Austria	Umweltbundesamt	Christian Schuetz
Croatia	Meteorological and Hydrological Service of Croatia	Sonja Vidic
The Czech Republic	Czech Hydrometerological Institute	Nadezda Melichova
Denmark	National Environmental Research Institute	Lone Grundahl
Estonia	Estonian Environmental Research Lab. Ltd	Toivo Truuts
Finland	Finnish Meteorological Institute	Veijo Pohjola
France	l'Ecole des Mines de Douai Laboratories Wolff	Patrice Coddeville
Germany	Umweltbundesamt	Markus Wallasch
Greece	Ministry of Environment Physical Planning and Public works Environmental Chemical Processes Laboratory, University of Crete	Vasiliki Smirnioudi GR02: Nikos Mihalopoulos
Hungary	Hungarian Meteorological Service, Institute for Atmospheric Physics	Laszlo Haszpra
Island	The Icelandic Meteorological office	Johanna Thorlacius
Ireland	Environmental Protection Agency	Concannon Colman
Italy	CNR Instituto Inquinamento Atmosferico	Cinzia Perrino
EU at Ispra, IT04	Joint Research Center (JRC)	Jean-Philippe Putaud
Latvia	Latvian Hydrometeorological Institute	Iraida Lyulko
Lithuania	Institute of Physics	Dalia Sopauskiene and Vidmantas Ulevicius (HM and POP)
The Netherlands	National Institute for public Helath and Environmental Protection (RIVM)	Arien Stolk
Norway	Norwegian Institute for Air Research (NILU)	Jan Erik Hanssen
Poland	Institute of Meteorology and Water Management and Institute of Environmental Protection	Barbara Obminska and for PL05: Anna Degorska
Portugal	Instituto de Meteorologia	Amelia Lopes
Russia	Institute of Global Climate and Ecology	Alexey Ryaboshapko
Serbia	Republic Hydrometeorological Service of Serbia	Liljana Novakovic
Slovenia	Environment Agency - Slovenia	Brigita Jesenovec
Slovak Republic	Slovak Hydrometeorological Institute	Marta Mitosinkova
Spain	Subdirección General de Calidad Ambiental	Alberto González Ortiz
Sweden	Swedish Environmental Research Institute (IVL)	Karin Sjöberg
Switzerland	Swiss Federal Laboratory of testing Materials and Research (EMPA)	Robert Gehrig/ Claudia Zellweger
Turkey	The Ministry of Health of the Republic of Turkey	Lütfü Kýlýçla
United Kingdom	AEA Technology	Keith Vincent

Annex 1

Data quality objectives

DQO for the acidifying and eutrophying compounds

- 10% accuracy or better for oxidised sulphur and oxidised nitrogen in single analysis in the laboratory,

- 15 % accuracy or better for other components in the laboratory,

- 0.1 units for pH,

- 15–25% uncertainty for the combined sampling and chemical analysis (components to be specified later),

- 90 % data completeness of the daily values.

- The targets, with respect to accuracy in the laboratory, for the very lowest concentrations of the main components in precipitation follow the WMO GAW (1992) recommendations for regional stations:

	Accuracy	
SO_4^{2-}	0.032 mg S/l	(1 µmol/l)
NO_3^-	0.014 mg N/l	(1 µmol/l)
NH_4^+	0.028 mg N/l	(2 µmol/l)
Cl^-	0.107 mg Cl/l	(3 µmol/l)
Ca^{2+}	0.012 mg Ca/l	(0.3 µmol/l)
K^+	0.012 mg K/l	(0.3 µmol/l)
Mg^{2+}	0.007 mg Mg/l	(0.3 µmol/l)
Na^+	0.007 mg Na/l	(0.3 µmol/l)

The targets for the wet analysis of components extracted from air filters are the same as for precipitation. For SO_2 the limit above for sulphate is valid for the medium volume method with impregnated filter. For NO_2 determined as NO_2^- in solution the accuracy for the lowest concentrations is 0.01 mg N/l.

The aim for data completeness is valid for the current definition used by the CCC. This definition will, however, be harmonised with the WMO GAW definition and modified.

DQO for heavy metals

- 90% completeness
- 30% accuracy in annual average
- Accuracy in laboratory (c= concentration):

Pb:	15%	if c > 1 µg Pb/l
	25%	if c < 1 µg Pb/l
Cd:	15%	if c > 0.5 µg Cd/l
	25%	if c < 0.5 µg Cd/l
Cr:	15%	if c > 1 µg Cr/l
	25%	if c < 1 µg Cr/l
Ni:	15%	if c > 1 µg Ni/l
	25%	if c < 1 µg Ni/l
Cu:	15%	if c > 2 µg Cu/l
	25%	if c < 2 µg Cu/l
Zn:	15%	if c > 10 µg Zn/l
	25%	if c < 10 µg Zn/l
As:	15%	if c > 1 µg As/l
	25%	if c < 1 µg As/l
Hg:	15%	if c > 0.01 µg Hg/l
	25%	if c < 0.01 µg Hg/l

Annex 2

Data capture

Table A2.1: Data capture for main components in precipitation in 2005, in per cent.

Code	mm	pH	SO_4	XSO_4	NH_4	NO_3	Na	Mg	Cl	Ca	K	cond
AT0002R	100	100	100	96	100	100	96	96	95	100	96	100
AT0005R	100	100	100	100	100	100	99	100	99	100	100	100
AT0048R	100	100	100	100	100	100	100	100	98	100	100	100
BY0004R	100	89	91	73	91	75	61	61	52	61	-	78
CH0002R	100	99	97	97	97	97	97	97	97	97	95	99
CH0004R	100	100	100	100	100	100	100	100	100	100	95	100
CH0005R	97	100	99	99	99	99	99	99	99	99	99	100
CS0005R	100	100	100	100	99	100	99	100	100	99	100	100
CZ0001R	100	100	99	99	100	99	100	100	99	100	100	100
CZ0003R	100	86	86	86	80	86	84	84	86	84	84	86
DE0001R	100	98	98	98	96	98	96	96	98	96	96	98
DE0002R	100	96	100	100	99	100	99	99	100	95	99	99
DE0003R	100	100	100	100	99	100	99	99	100	99	99	100
DE0004R	100	99	99	99	98	99	98	98	99	98	98	99
DE0005R	99	100	100	100	100	100	100	100	100	100	100	100
DE0007R	100	100	100	100	99	100	99	99	100	99	99	100
DE0008R	100	99	99	99	98	99	98	98	99	98	98	99
DE0009R	92	100	100	100	97	100	97	97	100	97	97	100
DK0005R	100	93	100	100	100	100	100	93	93	100	100	100
DK0008R	100	90	90	90	90	90	90	90	90	90	90	90
DK0022R	100	100	100	100	100	100	100	100	100	100	93	98
EE0009R	100	100	91	91	89	91	82	82	91	82	82	100
EE0011R	99	100	95	95	-	95	100	100	95	100	100	100
ES0007R	100	83	81	81	81	81	77	77	81	77	77	83
ES0008R	100	92	92	92	92	92	91	91	92	91	91	89
ES0009R	100	87	87	87	87	87	85	85	87	85	85	87
ES0011R	100	97	97	97	97	97	95	95	97	95	95	97
ES0012R	100	94	93	93	92	93	87	87	93	87	87	93
ES0013R	100	87	86	86	84	86	84	84	86	84	84	87
ES0014R	100	90	90	90	90	90	89	89	90	89	89	90
ES0015R	100	89	87	87	83	87	81	81	87	81	81	89
ES0016R	100	93	91	91	91	91	90	90	91	90	90	93
FI0004R	100	100	100	100	100	100	100	100	100	100	100	100
FI0009R	100	98	98	98	98	98	98	98	98	98	98	98
FI0017R	100	100	100	100	100	100	100	100	100	100	100	100
FI0022R	100	100	100	100	100	100	100	100	100	100	100	100
FR0008R	100	99	99	99	99	99	99	99	99	99	99	99
FR0009R	100	88	88	88	88	88	88	88	88	88	88	88
FR0010R	100	97	97	97	97	97	97	97	97	97	97	97
FR0012R	100	99	99	99	99	99	99	99	99	99	99	99
FR0013R	100	91	91	91	91	91	91	91	91	91	91	91
FR0014R	100	99	99	99	99	99	99	99	99	99	99	99
FR0015R	100	97	97	97	97	97	97	97	97	97	97	97
FR0016R	100	97	97	97	97	97	97	97	97	97	97	97
FR0017R	100	94	94	94	94	94	94	94	94	94	94	94
GB0002R	100	98	100	100	98	100	100	100	100	100	98	100
HR0002R	45	99	99	99	95	99	96	98	96	98	98	99
HR0004R	43	100	100	100	98	100	100	100	100	100	100	100
HU0002R	97	100	100	100	100	100	99	100	100	100	100	100
IE0001R	100	99	99	99	99	99	99	99	99	99	99	99
IS0002R	100	100	100	100	-	-	100	-	-	-	-	-
IS0090R	100	100	99	99	99	99	99	99	99	99	99	100
IS0091R	100	99	100	100	100	100	100	100	100	100	100	100
IT0001R	15	100	100	100	100	100	100	100	100	100	100	100
IT0004R	100	98	100	100	99	100	99	99	100	99	99	98
LT0015R	100	100	100	100	100	100	100	-	100	99	100	100

Table A2.1, cont.

Code	mm	pH	SO_4	XSO_4	NH_4	NO_3	Na	Mg	Cl	Ca	K	cond
LV0010R	100	98	93	93	97	93	97	97	93	-	96	98
LV0016R	100	96	84	84	95	84	90	89	84	88	88	96
NL0009R	98	91	91	91	88	91	85	85	91	85	85	84
NO0001R	100	98	99	99	99	99	99	99	99	99	99	99
NO0008R	16	100	84	84	84	84	84	84	84	84	84	100
NO0015R	100	90	94	94	90	94	92	92	94	92	90	92
NO0039R	100	99	100	100	100	100	100	100	100	100	100	99
NO0055R	100	91	98	98	98	98	98	98	98	98	97	93
PL0002R	100	100	98	98	98	98	98	98	98	98	98	98
PL0003R	100	100	100	100	100	100	100	100	100	100	100	100
PL0004R	100	97	97	97	97	97	97	97	97	97	97	97
PL0005R	100	100	100	99	100	99	99	99	100	99	99	81
PT0001R	100	49	49	49	49	49	49	49	49	49	49	49
PT0003R	100	73	73	73	73	73	73	73	73	72	73	73
PT0004R	100	95	95	95	95	95	95	95	95	95	95	95
RU0013R	100	98	99	99	100	99	100	100	99	100	100	100
RU0016R	100	99	100	100	100	100	100	100	100	100	100	100
RU0020R	100	100	100	100	100	100	100	100	100	100	100	100
SE0005R	102	99	99	99	99	99	99	99	99	99	99	99
SE0011R	100	100	100	100	100	100	100	100	100	100	100	100
SE0014R	100	100	100	100	99	100	99	99	100	99	99	98
SI0008R	100	91	93	93	93	93	90	93	93	93	93	91
SK0002R	100	69	90	90	88	90	88	88	90	88	88	69
SK0004R	100	82	95	95	94	95	94	94	95	94	94	82
SK0005R	100	92	96	96	94	96	95	95	96	95	95	92
SK0006R	100	80	90	90	90	91	89	90	91	90	90	80
SK0007R	100	98	100	100	99	100	99	99	100	97	99	98
TR0001R	100	98	93	93	93	93	81	82	93	84	82	98

Table A2.2: Data capture for main components in air in 2005, in per cent.

Code	SO_2	NO_2	SO_4	XSO_4	SNO_3	NO_3	HNO_3	SNH_4	NH_4	NH_3	Na	Mg	Cl	Ca	K
AT0002R	99	100	99	99	-	99	99	-	99	99	99	99	-	99	99
AT0004R	95	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AT0005R	94	96	-	-	-	-	-	-	-	-	-	-	-	-	-
AT0048R	94	98	-	-	-	-	-	-	-	-	-	-	-	-	-
BE0001R	-	79	-	-	-	-	-	-	-	-	-	-	-	-	-
BE0032R	-	89	-	-	-	-	-	-	-	-	-	-	-	-	-
BE0035R	-	35	-	-	-	-	-	-	-	-	-	-	-	-	-
CH0001G	99	82	99	-	-	-	-	-	-	-	-	-	-	-	-
CH0002R	100	100	96	-	100	-	-	100	-	-	-	-	-	-	-
CH0003R	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-
CH0004R	100	100	-	-	-	-	-	-	-	-	-	-	-	-	-
CH0005R	100	83	100	-	100	-	-	100	-	-	-	-	-	-	-
CS0005R	69	33	-	-	-	-	-	-	-	-	-	-	-	-	-
CZ0001R	93	99	93	-	93	-	-	90	-	-	-	-	-	-	-
CZ0003R	98	99	98	-	98	-	-	99	-	-	-	-	-	-	-
DE0001R	95	98	98	98	90	98	90	94	98	94	95	99	-	83	98
DE0002R	53	77	58	57	58	58	58	57	58	58	57	57	-	58	58
DE0003R	88	90	98	98	94	98	94	98	98	98	90	98	-	85	98
DE0007R	90	96	96	96	94	96	94	94	96	95	97	97	-	89	98
DE0008R	100	97	-	-	-	-	-	-	-	-	-	-	-	-	-
DE0009R	94	100	98	98	94	98	94	98	98	98	95	98	-	95	98
DK0003R	97	-	96	96	96	-	-	-	96	97	97	-	-	-	-
DK0005R	55	93	55	54	55	-	-	-	55	54	54	-	-	-	-
DK0008R	99	80	99	99	99	-	-	-	99	99	99	-	-	-	-
DK0031R	95	-	96	95	95	-	-	-	96	-	95	-	-	-	-
EE0009R	97	98	-	-	-	-	-	-	-	-	-	-	-	-	-
EE0011R	95	95	-	-	-	-	-	-	-	-	-	-	-	-	-
ES0007R	97	96	95	-	98	95	-	98	-	-	-	-	-	-	-
ES0008R	98	98	92	-	95	92	-	99	-	100	-	-	-	-	-
ES0009R	95	95	92	-	98	92	-	99	14	97	97	97	14	97	97
ES0010R	98	98	95	-	97	95	-	97	-	-	-	-	-	-	-
ES0011R	97	95	96	-	100	96	-	100	-	-	-	-	-	-	-
ES0012R	95	93	98	-	98	98	-	99	-	-	-	-	-	-	-
ES0013R	99	99	93	-	98	93	-	99	-	-	-	-	-	-	-
ES0014R	98	97	94	-	99	94	-	97	-	-	-	-	-	-	-
ES0015R	96	94	95	-	97	95	-	98	-	-	-	-	-	-	-
ES0016R	98	97	90	-	95	90	-	97	-	-	-	-	-	-	-
FI0009R	94	70	97	-	97	-	-	96	-	-	-	-	-	-	-
FI0017R	96	93	99	-	99	-	-	96	-	-	-	-	-	-	-
FI0022R	96	98	100	-	100	-	-	94	-	-	-	-	-	-	-
FI0037R	96	99	100	-	100	-	-	98	-	-	-	-	-	-	-
FR0001R	90	-	90	-	-	-	-	-	-	-	-	-	-	-	-
FR0008R	99	-	99	-	-	-	-	-	-	-	-	-	-	-	-
FR0009R	94	-	90	-	-	-	-	-	-	-	-	-	-	-	-
FR0010R	98	-	98	-	-	-	-	-	-	-	-	-	-	-	-
FR0012R	100	-	100	-	-	-	-	-	-	-	-	-	-	-	-
FR0013R	97	-	97	-	-	-	-	-	-	-	-	-	-	-	-
FR0014R	88	-	89	-	-	-	-	-	-	-	-	-	-	-	-
FR0015R	100	-	99	-	-	-	-	-	-	-	-	-	-	-	-
FR0016R	93	-	93	-	-	-	-	-	-	-	-	-	-	-	-
FR0017R	98	-	98	-	-	-	-	-	-	-	-	-	-	-	-
GB0002R	100	-	97	-	-	-	-	-	-	-	-	-	-	-	-
GB0006R	100	-	96	-	-	100	100	-	100	100	-	-	-	-	-
GB0007R	-	-	92	-	-	-	-	-	-	-	-	-	-	-	-
GB0013R	92	-	75	-	-	100	100	-	100	100	-	-	-	-	-
GB0014R	-	88	60	-	-	100	100	-	100	100	-	-	-	-	-
GB0015R	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GB0016R	-	-	-	-	-	100	100	-	100	100	-	-	-	-	-

Table A1.2, cont.

Code	SO_2	NO_2	SO_4	XSO_4	SNO_3	NO_3	HNO_3	SNH_4	NH_4	NH_3	Na	Mg	Cl	Ca	K
GR0001R	-	83	-	-	-	-	-	-	-	-	-	-	-	-	-
HU0002R	98	84	98	-	-	98	98	-	98	98	-	-	-	-	-
IE0001R	100	100	100	100	100	-	-	100	-	-	100	100	-	100	100
IS0002R	-	-	97	-	-	-	-	-	-	-	-	-	-	-	-
IS0091R	-	-	100	100	-	100	-	-	-	-	-	-	100	-	-
IT0001R	96	90	96	-	-	94	96	-	96	96	-	-	-	-	-
IT0004R	91	98	88	-	-	88	-	-	88	-	-	-	-	-	-
LT0015R	100	100	100	-	100	-	-	100	-	-	-	-	-	-	-
LV0010R	98	99	99	-	99	98	-	99	-	-	91	91	-	-	91
LV0016R	100	100	100	-	100	99	-	100	100	-	-	-	-	-	-
NL0009R	99	94	97	-	-	97	-	-	97	-	-	-	-	46	-
NL0010R	100	96	95	-	-	95	-	-	95	80	-	-	-	-	-
NO0001R	99	100	99	99	96	96	96	96	-	96	99	99	98	99	99
NO0015R	99	96	99	99	86	86	95	85	86	94	99	99	99	99	99
NO0039R	100	100	99	99	84	84	95	84	84	94	100	100	98	100	100
NO0042G	96	-	98	98	96	98	96	97	97	97	98	98	98	98	98
NO0055R	100	100	100	100	96	96	96	88	96	-	100	100	98	100	100
PL0002R	97	97	98	-	97	97	-	98	98	-	-	-	-	-	-
PL0003R	100	100	100	-	100	100	-	100	100	-	-	-	-	-	-
PL0004R	100	99	100	-	100	100	-	100	100	-	-	-	-	-	-
PL0005R	93	100	93	-	93	-	-	93	-	-	-	-	-	-	-
RU0001R	82	-	82	-	-	82	-	-	82	-	-	-	-	-	-
RU0016R	57	-	57	-	-	57	-	-	57	-	-	-	-	-	-
SE0005R	100	100	100	-	100	-	-	100	-	-	-	-	-	-	-
SE0008R	100	100	100	-	-	-	-	-	-	-	-	-	-	-	-
SE0011R	93	95	93	-	93	-	-	93	-	-	-	-	-	-	-
SE0014R	96	99	96	-	96	-	-	96	-	-	-	-	-	-	-
SI0008R	98	84	98	98	98	-	-	98	-	-	98	98	27	98	54
SK0002R	100	100	95	-	-	95	100	-	-	-	-	-	-	-	-
SK0005R	98	100	99	-	-	99	100	-	-	-	-	-	-	-	-
SK0006R	99	100	100	-	-	100	100	-	-	-	-	-	-	-	-
SK0007R	99	99	99	-	-	99	99	-	-	-	-	-	-	-	-
TR0001R	91	93	92	-	93	93	91	88	90	91	-	-	-	-	-

Table A2.3: Data capture for particulate matter in air in 2005, in per cent.

Code	PM_{10}	$PM_{2.5}$	PM_1	SPM
AT0002R	99	98	99	-
AT0005R	95	-	-	-
AT0048R	97	96	-	-
CH0001G	-	-	-	90
CH0002R	99	99	-	-
CH0003R	100	-	-	-
CH0004R	96	98	99	-
CH0005R	98	-	-	-
CY0002R	95	-	-	-
CZ0001R	36	-	-	-
CZ0003R	49	50	-	-
DE0001R	97	-	-	-
DE0002R	100	99	97	-
DE0003R	98	98	-	-
DE0007R	99	-	-	-
DE0008R	100	-	-	-
DE0009R	94	-	-	-
DK0005R	61	-	-	-
ES0007R	94	90	-	-
ES0008R	92	91	-	-
ES0009R	92	-	-	-
ES0010R	94	93	-	-
ES0011R	96	95	-	-
ES0012R	98	96	-	-
ES0013R	93	96	-	-
ES0014R	93	92	-	-
ES0015R	93	93	-	-
ES0016R	89	79	-	-
IT0001R	91	-	-	-
IT0004R	88	96	-	-
LT0015R	-	-	-	100
NO0001R	92	94	-	-
PL0005R	99	-	-	-
SE0005R	-	-	-	100
SE0008R	-	-	-	100
SE0011R	82	82	-	95
SE0012R	99	91	-	-
SE0014R	-	-	-	99
SE0035R	98	-	-	-
SI0008R	97	96	-	-
SK0002R	-	-	-	82
SK0005R	82	-	-	-
SK0006R	85	-	-	-
SK0007R	-	-	-	79

Table A2.4: Data capture for heavy metals in precipitation in 2005, in per cent.

Code	Pb	Cd	Zn	Hg	Ni	As	Cu	Co	Cr	Mn	V	Fe	mm
BE0014R	100	100	100	99	100	100	100	-	100	-	-	-	82
CZ0001R	100	100	-	-	96	-	-	-	-	100	-	-	100
CZ0003R	100	100	-	-	93	-	-	-	-	100	-	-	100
DE0001R	97	97	97	99	97	97	96	97	97	97	97	97	100
DE0002R	98	98	98	100	98	98	98	98	98	98	98	98	100
DE0003R	100	100	100	-	100	100	-	100	100	100	100	100	100
DE0007R	98	98	98	98	98	98	98	98	98	98	98	98	100
DE0008R	100	100	100	-	100	100	100	100	100	100	100	100	100
DE0009R	100	100	100	99	100	100	100	100	100	100	100	100	92
DK0008R	100	100	94	-	100	100	100	-	100	-	-	-	100
DK0020R	100	100	100	-	100	100	100	-	100	-	-	-	91
DK0022R	100	100	100	-	100	100	100	-	100	-	-	-	100
DK0031R	100	100	100	-	100	100	100	-	100	-	-	-	100
EE0009R	100	100	100	-	-	100	100	-	-	-	-	-	100
EE0011R	100	100	100	-	-	14	100	-	-	-	-	-	100
ES0008R	100	100	100	-	100	100	100	-	100	-	-	-	100
ES0009R	100	100	100	-	100	100	100	-	100	-	-	-	96
FI0008R	100	100	100	-	100	100	100	100	100	100	100	100	100
FI0017R	100	100	100	-	100	100	100	100	100	100	100	100	100
FI0022R	100	100	100	-	100	100	100	100	100	100	100	100	100
FI0036R	100	95	100	-	100	100	100	100	100	100	100	100	100
FI0053R	100	100	100	-	100	100	100	100	100	100	100	100	100
FI0092R	100	100	100	-	100	100	100	100	100	100	100	100	100
FI0093R	100	100	100	-	100	100	100	100	100	100	100	100	100
FI0096G	-	-	-	100	-	-	-	-	-	-	-	-	73
FR0090R	100	100	100	-	100	100	100	-	100	-	-	-	100
GB0006R	55	55	55	-	55	55	-	-	62	-	-	-	100
GB0013R	94	94	94	91	94	94	94	-	94	-	-	-	99
GB0017R	100	100	100	95	100	100	100	-	100	-	-	-	100
GB0091R	94	94	94	100	94	94	-	-	94	-	-	-	91
HU0002R	91	91	-	-	-	-	-	-	-	-	-	-	97
IE0001R	100	100	100	100	100	100	100	-	100	100	100	-	100
IS0090R	100	100	100	-	100	100	100	-	100	100	100	100	100
IS0091R	100	100	100	-	100	100	100	-	100	100	100	100	100
LT0015R	100	100	100	-	-	-	100	-	-	-	-	-	100
LV0010R	100	100	100	-	98	100	100	-	-	100	-	-	101
LV0016R	99	98	99	-	96	99	97	-	-	98	-	-	100
NL0009R	100	100	100	-	100	100	100	-	100	-	-	-	85
NL0091R	100	100	100	100	100	100	100	-	100	-	-	-	92
NO0001R	99	99	99	100	99	99	99	99	99	-	99	-	100
NO0039R	100	100	94	-	-	-	-	-	-	-	-	-	100
NO0047R	100	100	100	-	100	100	100	100	100	-	-	-	98
NO0055R	99	99	99	-	-	-	-	-	-	-	-	-	100
NO0056R	100	100	100	-	-	-	-	-	-	-	-	-	100
PL0004R	100	100	76	-	100	-	100	-	100	-	-	-	100
PL0005R	98	98	98	93	100	98	98	-	98	-	-	-	100
PT0003R	73	73	73	-	73	-	73	-	-	73	-	-	100
PT0004R	95	95	95	-	95	-	95	-	-	95	-	-	100
PT0010R	1	1	1	-	1	-	1	-	-	1	-	-	99
SE0014R	-	-	-	100	-	-	-	-	-	-	-	-	97
SE0051R	99	99	99	-	99	99	99	-	99	99	99	-	100
SE0097R	100	100	100	-	100	100	100	-	100	100	100	-	100
SK0002R	98	100	88	-	100	100	100	-	100	-	-	-	100
SK0004R	100	100	96	-	100	100	100	-	100	-	-	-	100
SK0005R	100	100	94	-	100	100	100	-	100	-	-	-	100
SK0006R	100	100	89	-	100	100	93	-	100	-	-	-	100
SK0007R	99	100	97	-	94	100	100	-	100	-	-	-	100

Table A2.5: Data capture for heavy metals in air in 2005, in per cent.

Code	Pb	Cd	Zn	Hg	Ni	As	Cu	Co	Cr	Mn	V	Fe
AT0002R	99	99	-	-	-	-	-	-	-	-	-	-
AT0005R	87	87	-	-	-	-	-	-	-	-	-	-
AT0048R	92	92	-	-	-	-	-	-	-	-	-	-
BE0014R	84	84	84	-	84	-	84	-	-	-	-	-
CZ0001R	36	36	-	-	36	36	36	-	-	36	-	-
CZ0003R	49	50	-	-	50	50	49	-	-	50	-	-
DE0001R	94	94	94	-	-	94	94	94	-	92	92	94
DE0002R	98	98	-	99	98	98	98	98	-	98	98	98
DE0003R	92	92	-	-	92	92	90	92	-	92	92	92
DE0007R	100	100	-	82	100	100	100	100	-	100	100	100
DE0008R	100	100	-	-	100	100	-	100	-	100	100	100
DE0009R	100	100	100	98	-	100	-	100	-	100	100	100
DK0003R	97	-	97	-	97	97	97	-	97	97	-	96
DK0005R	57	-	58	-	57	57	57	-	57	57	-	57
DK0008R	99	-	99	-	99	99	99	-	98	98	-	99
DK0011G	44	-	44	27	44	44	44	-	44	44	-	44
DK0031R	97	-	98	-	97	97	97	-	97	97	-	97
ES0008R	12	12	-	48	-	-	12	-	-	-	-	-
ES0010R	-	-	-	78	-	-	-	-	-	-	-	-
FI0036R	100	100	100	-	100	100	100	99	100	100	100	100
FI0096G	-	-	-	24	-	-	-	-	-	-	-	-
GB0013R	84	86	84	172	92	86	86	-	84	-	-	-
GB0017R	64	64	64	19	64	64	64	-	98	-	-	-
GB0091R	89	86	89	-	100	89	89	-	89	-	-	-
HU0002R	44	44	-	-	-	-	-	-	-	-	-	-
IE0031R	-	-	-	58	-	-	-	-	-	-	-	-
IS0091R	100	100	100	100	100	100	100	-	100	100	100	100
LT0015R	99	99	99	-	-	-	99	-	-	-	-	-
LV0010R	98	98	98	-	98	100	100	-	-	96	-	-
LV0016R	98	100	100	-	96	98	100	-	-	96	-	-
NL0009R	48	48	48	-	48	48	-	-	-	-	-	-
NO0001R	92	93	93	58	93	93	93	93	93	-	93	-
NO0042G	27	27	27	86	27	27	27	27	27	27	27	-
NO0090R	-	-	-	31	-	-	-	-	-	-	-	-
PL0005R	100	100	100	14	100	100	100	-	100	-	-	-
SE0014R	100	100	-	26	100	100	-	-	-	-	-	-
SI0008R	15	15	-	-	15	13	-	-	-	-	-	-
SK0002R	80	80	82	-	80	80	80	-	79	79	-	-
SK0004R	73	75	73	-	75	75	75	-	75	75	-	-
SK0005R	82	82	82	-	82	82	82	-	81	79	-	-
SK0006R	82	85	85	-	83	85	85	-	83	82	-	-
SK0007R	78	78	78	-	78	78	78	-	78	78	-	-

Table A2.6: Data capture for ozone in 2005, in per cent.

Code	O_3	Code	O_3	Code	O_3	Code	O_3	Code	O_3
AT0002R	91	CZ0001R	100	ES0014R	97	GB0034R	98	NO0055R	100
AT0005R	89	CZ0003R	99	ES0015R	95	GB0035R	99	NO0056R	100
AT0030R	95	DE0001R	96	ES0016R	97	GB0036R	98	NO0489R	100
AT0032R	95	DE0002R	95	FI0009R	97	GB0037R	96	PL0002R	99
AT0033R	94	DE0003R	94	FI0017R	98	GB0038R	98	PL0003R	95
AT0034G	94	DE0007R	92	FI0022R	98	GB0039R	91	PL0004R	100
AT0037R	96	DE0008R	84	FI0037R	93	GB0043R	60	PL0005R	97
AT0038R	96	DE0009R	96	FR0008R	95	GB0044R	95	PT0004R	41
AT0040R	95	DE0026R	77	FR0008R	96	GB0045R	90	SE0005R	99
AT0041R	95	DE0035R	71	FR0008R	98	GR0001R	99	SE0011R	97
AT0042R	94	DE0039R	77	FR0008R	98	GR0002R	66	SE0012R	97
AT0043R	96	DE0045R	74	FR0009R	89	HU0002R	82	SE0013R	100
AT0044R	89	DE0047R	73	FR0010R	87	IE0001R	99	SE0014R	99
AT0045R	95	DK0005R	92	FR0012R	93	IE0031R	99	SE0032R	94
AT0046R	96	DK0011G	24	FR0013R	98	IT0001R	97	SE0035R	100
AT0047R	95	DK0025G	91	FR0014R	90	IT0004R	95	SE0039R	99
BE0001R	89	DK0031R	95	FR0015R	98	LT0015R	95	SI0008R	94
BE0011R	100	DK0041R	96	FR0016R	95	LV0010R	89	SI0031R	95
BE0013R	100	EE0009R	97	FR0017R	98	MT0001R	87	SI0032R	97
BE0032R	90	EE0011R	94	GB0002R	96	NL0009R	93	SI0033R	91
BE0035R	89	ES0007R	96	GB0006R	98	NL0010R	99	SK0002R	97
BG0053R	98	ES0008R	98	GB0013R	96	NO0001R	99	SK0004R	100
CH0002R	95	ES0009R	95	GB0014R	93	NO0015R	99	SK0005R	95
CH0003R	95	ES0010R	98	GB0015R	93	NO0039R	100	SK0006R	95
CH0004R	95	ES0011R	97	GB0031R	99	NO0042G	99	SK0007R	96
CH0005R	95	ES0012R	95	GB0032R	99	NO0043R	100		
CY0002R	93	ES0013R	98	GB0033R	98	NO0052R	99		

Table A2.7: The number of samples of hydrocarbons (HC) and carbonyls (Carb) in 2005.

Station	Number of samples	
	Hydrocarbons	Carbonyls
Birkenes	-	101
Pallas	96	-
Utö	98	102
Waldhof	103	-
Schauinsland	91	-
Neuglobsow	102	-
Schmücke	96	-
Zingst	101	-
Hohenpeissenberg[1)]	342	-
Košetice	103	101
Starina	93	-
Rigi[1)]	226	-
Donon	91	50
Peyrusse Vieille	59	50
La Tardière	95	52
Campisábalos	-	100

[1)] Refer to days with monitoring data

Table A2.8: Data capture for POPs in 2005, in per cent.

	precip	precip + dry dep	air	sampling frequency
BE0014R	98			
CZ0003R	100		14	1 day a week
DE0001R	100			
DE0009R	100			
ES0008R			3	24-31/10 and 26-31/12
FI0096R		23	23	1 week a month
GB0014R			100	biweekly sampling, 3 monthly analysis
IS0091R	100		100	biweekly
LV0010R			100	monthly
LV0016R			100	monthly
NL0091R	100			
NO0042G			29	2 days a week
NO0001R	100		14	1 day a week
SE0012R		36	21	1 week a month
SE0014R		100	96	biweekly

Annex 3

Below detection limit

Table A3.1: Number of samples below the detection limit for main components in precipitation in 2005, in per cent.

Code	pH	SO_4	XSO_4	NH_4	NO_3	Na	Mg	Cl	Ca	K	cond
AT0002R	0	0	0	0	0	0	0	0	0	0	0
AT0005R	0	0	0	0	0	0	0	0	0	0	0
AT0048R	0	0	0	0	0	0	0	0	0	0	0
BY0004R	0	0	0	0	0	0	0	0	0		0
CH0002R	0	0	0	0	0	16	0	0	14	12	0
CH0004R	0	0	0	0	0	7	0	0	20	9	0
CH0005R	0	0	0	0	0	16	0	0	19	10	0
CS0005R	0	0	0	0	0	0	0	0	0	0	0
CZ0001R	0	0	0	0	0	0	0	0	4	0	0
CZ0003R	0	0	0	0	0	0	0	0	8	5	0
DE0001R	0	0	0	3	0	0	0	0	0	0	0
DE0002R	0	0	0	0	0	0	6	0	2	42	0
DE0003R	0	0	0	0	0	17	47	13	6	68	0
DE0004R	0	0	0	0	0	7	16	2	2	56	0
DE0005R	0	0	0	0	0	23	50	8	21	67	0
DE0007R	0	0	0	0	0	2	19	0	0	40	0
DE0008R	0	0	0	0	0	10	29	4	10	52	0
DE0009R	0	0	0	0	0	0	0	0	0	18	0
DK0005R	0	0	0	0	0	0	0	0	0	0	0
DK0008R	0	0	0	0	0	0	0	0	0	0	0
DK0022R	0	0	0	0	0	0	0	0	0	0	0
EE0009R	0	3		13	8	2	11	1	4	27	0
EE0011R	0	0	0		0	0	0	0	0	4	0
ES0007R	0	0	0	19	0	0	0	12	0	0	0
ES0008R	0	0	0	1	0	0	0	0	0	0	0
ES0009R	0	2	2	13	0	4	0	21	0	2	7
ES0011R	0	0	0	16	6	0	0	2	0	0	0
ES0012R	0	0	0	2	0	0	0	5	0	0	0
ES0013R	0	0	0	32	15	5	0	36	0	9	11
ES0014R	0	0	0	6	0	0	0	0	0	0	0
ES0015R	0	0	0	0	3	0	0	10	0	0	0
ES0016R	0	0	0	5	7	0	1	2	0	1	2
FI0004R	0	0	0	0	0	0	0	0	0	0	0
FI0009R	0	0	0	0	0	0	0	0	0	0	0
FI0017R	0	0	0	0	0	0	0	0	0	0	0
FI0022R	0	0	0	0	0	0	4	0	0	0	0
FR0008R	0	0	0	0	0	4	41	4	0	32	0
FR0009R	0	0	0	0	0	0	15	0	1	18	0
FR0010R	0	0	0	3	0	1	29	1	1	9	0
FR0012R	0	0	0	6	0	1	19	4	2	40	0
FR0013R	0	0	0	3	0	0	14	0	0	21	0
FR0014R	0	0	0	1	0	7	37	8	1	45	0
FR0015R	0	0	0	0	0	0	9	0	1	16	0
FR0016R	0	1	1	11	2	16	36	11	0	34	0
FR0017R	0	0	0	2	0	2	25	3	0	41	0
GB0002R	0	0	0	4	2	1	7	2	12	2	22
HR0002R	0	0	0	0	0	0	0	0	0	0	0
HR0004R	0	0	0	0	0	0	0	0	0	0	0
HU0002R	0	0	0	16	0	0	11	0	0	3	0
IE0001R	0	0	0	24	3	0	7	0	4	6	0
IS0002R	0	2	2			1					
IS0090R	0	0	0	0	2	0	0	0	0	2	0
IS0091R	0	0	0	13	35	0	0	0	0	0	0
IT0001R	0	0	0	0	0	0	0	0	0	0	0
IT0004R	0	0	0	0	0	0	0	0	0	0	0
LT0015R	0	0	0	0	0	0		0	0	0	0

Table A3.1, cont.

Code	pH	SO_4	XSO_4	NH_4	NO_3	Na	Mg	Cl	Ca	K	cond
LV0010R	0	0	0	0	0	0	3	0		1	0
LV0016R	0	0	0	0	0	0	1	19	0	1	0
NL0009R	0	0	0	0	0	0	0	0	0	0	0
NO0001R	0	1	1	2	5	0	6	0	6	6	0
NO0008R	0	0	0	0	0	0	0	0	0	0	0
NO0015R	0	3	3	0	3	0	7	0	3	1	0
NO0039R	0	2	2	1	15	0	10	1	3	2	0
NO0055R	0	1	1	0	1	0	18	0	5	0	0
PL0002R	0	0	0	0	0	0	0	0	0	0	0
PL0003R	0	0	0	0	0	0	0	0	0	0	0
PL0004R	0	0	0	0	0	0	0	0	0	0	0
PL0005R	0	0	0	2	0	0	0	4	0	0	0
PT0001R	0	7	7	29	29	29	43	0	0	50	0
PT0003R	0	0	0	15	6	0	0	0	4	35	0
PT0004R	0	0	0	45	35	0	0	0	0	35	0
RU0013R	0	0	0	0	0	0	0	0	0	0	0
RU0016R	0	0	0	0	0	0	0	0	0	0	0
RU0020R	0	0	0	0	0	0	0	0	0	0	0
SE0005R	0	0	0	6	0	55	35	12	45	65	0
SE0011R	0	0	0	0	0	5	0	0	5	70	0
SE0014R	0	0	0	0	0	2	2	0	5	32	0
SI0008R	0	0	0	1	0	3	14	0	8	33	0
SK0002R	0	0	0	0	4	11	30	0	2	14	0
SK0004R	0	0	0	0	1	8	20	3	4	16	0
SK0005R	0	0	0	0	0	0	0	0	0	0	0
SK0006R	0	0	0	1	0	2	6	0	0	2	0
SK0007R	0	0	0	0	0	3	0	0	0	0	0
TR0001R	0	0	0	0	0	0	0	0	0	0	0

between25 and 50% below the detection limit
between 50 and 75% below the detection limit
more than 75% below the detection limit

Table A3.2: Number of samples below the detection limit for main components in air in 2005, in per cent.

Code	SO_2	NO_2	SO_4	XSO_4	SNO_3	NO_3	HNO_3	SNH_4	NH_4	NH_3	Na	Mg	Cl	Ca	K
AT0002R	0	0	0	0		0	0		0.28	0.28	0.28	16.3		0.55	0.55
AT0004R	0														
AT0005R	0	0													
AT0048R	0	0													
BE0001R		0													
BE0032R		0													
BE0035R		0													
CH0001G	2	0	17												
CH0002R	0	0	0		0			0							
CH0003R		0													
CH0004R	0	0													
CH0005R	0	0	0		0			0							
CS0005R	0	0													
CZ0001R	0	19	0		0			0							
CZ0003R	0	19	0		0			0							
DE0001R	0	0	0	0	11	0	0	8	1	0	0	2		2	0
DE0002R	1	0	0	0	4	0	0	1	1	0	1	11		2	0
DE0003R	1	0	0	0	13	0	0	24	1	3	4	13		6	12
DE0007R	1	0	0	0	3	0	0	7	1	0	2	7		2	1
DE0008R	5	0													
DE0009R	0	0	0	0	4	0	0	9	2	0	0	4		2	1
DK0003R	1		0	0	0				0	2	0				
DK0005R	2	8	0	0	0				0	12	0				
DK0008R	1	0	0	0	0				0	36	0				
DK0031R	2		0	0	0				0		0				
EE0009R	0	0													
EE0011R	0	0													
ES0007R	0	0	0		0	0		0							
ES0008R	0	0	0		0	0		2		8					
ES0009R	0	0	0		0	0		1	10	4	28	2	0	0	5
ES0010R	0	0	0		1	0		0							
ES0011R	0	0	0		1	0		2							
ES0012R	0	0	0		0	0		0							
ES0013R	0	0	0		9	0		2							
ES0014R	0	0	0		2	0		0							
ES0015R	0	0	0		3	0		0							
ES0016R	0	0	0		3	0		1							
FI0009R	0	0	0		0			1							
FI0017R	0	0	0		0			0							
FI0022R	0	0	0		0			0							
FI0037R	2	0	0		0			0							
FR0001R	25		0												
FR0008R	45		0												
FR0009R	38		0												
FR0010R	54		0												
FR0012R	45		0												
FR0013R	33		0												
FR0014R	68		0												
FR0015R	35		0												
FR0016R	82		1												
FR0017R	55		0												
GB0002R	0		0												
GB0006R	0		0			0	0		0	0					
GB0007R			0												
GB0013R	0		0			0	0		0	0					
GB0014R		0	0			0	0		0	0					

Table A3.2, cont.

Code	SO_2	NO_2	SO_4	XSO_4	SNO_3	NO_3	HNO_3	SNH_4	NH_4	NH_3	Na	Mg	Cl	Ca	K
GB0015R	0														
GB0016R						0	0		0	0					
GR0001R		0													
HU0002R	0	0	0			0	1		1	2					
IE0001R	2	1	8	8	0			0			3	23		12	28
IS0002R			1												
IS0091R			0	0		0							0		
IT0001R	0	0	0			0	0			0					
IT0004R	0	0	0			0			0						
LT0015R	0	0	0		0			0							
LV0010R	1	1	5		0	2		0			0	9			36
LV0016R	0	5	1		0	0		0	2						
NL0009R	0	0	0			0			0					0	
NL0010R	0	0	0			0			0	0					
NO0001R	2	2	1	1	0	3	38	0		0	2	23	24	25	14
NO0015R	2	11	4	4	0	15	61	0	14	0	7	42	33	29	32
NO0039R	4	0	3	3	0	14	48	0	19	0	7	49	42	39	32
NO0042G	8		4	4	0	19	70	0	16	0	2	34	22	28	42
NO0055R	1	7	3	3	0	11	60	0	15		1	45	30	37	23
PL0002R	2	0	1		0	0		0	0						
PL0003R	0	0	7		0	0		0	2						
PL0004R	7	0	1		0	1		0	1						
PL0005R	0	0	0		0			0							
RU0001R	0		0			0			0						
RU0016R	0		0			0			0						
SE0005R	63	74	1		5			23							
SE0008R	1	2	0												
SE0011R	2	0	1		1			1							
SE0014R	3	0	1		1			1							
SI0008R	1	0	0	0	0			0			11	20	41	7	4
SK0002R	0	15	0			36	6								
SK0005R	0	1	0			0	0								
SK0006R	0	1	0			0	0								
SK0007R	0	0	0			0	0								
TR0001R	10	7	2		0	4	57	0	2	6					

between25 and 50% below the detection limit
between 50 and 75% below the detection limit
more than 75% below the detection limit

Table A3.3: Number of samples below the detection limit for heavy metals in precipitation in 2005, in per cent.

Code	Pb	Cd	Zn	Hg	Ni	As	Cu	Co	Cr	Mn	V	Fe
BE0014R	10	41	59	0	41	105	7		88			
CZ0001R	13	0			37					4		
CZ0003R	13	4			26					0		
DE0001R	0	0	0	0	0	0	0	0	0	0	0	0
DE0002R	0	0	0	0	0	0	0	0	0	0	0	0
DE0003R	0	0	0		0	0		0	0	0	0	0
DE0007R	0	0	0	0	0	0	0	0	0	0	0	0
DE0008R	0	0	0		0	0	0	0	0	0	0	0
DE0009R	0	0	0	0	0	0	0	0	0	0	0	0
DK0008R	0	0	0		0	0	0		0			
DK0020R	0	0	0		0	0	0		0			
DK0022R	0	0	0		0	0	0		0			
DK0031R	0	0	0		0	0	0		0			
EE0009R	75	33	83			8	0					
EE0011R	83	33	58			50	0					
ES0008R	26	67	0		5	17	0		0			
ES0009R	41	81	0		37	78	0		0			
FI0008R	0	0	0		0	0	0	0	25	0	0	8
FI0017R	0	0	0		0	0	0	0	0	0	0	0
FI0022R	0	0	0		0	0	0	0	8	0	0	0
FI0036R	0	0	0		0	0	0	0	17	0	0	0
FI0053R	0	0	0		0	0	0	0	8	0	0	0
FI0092R	0	0	0		0	0	0	0	17	0	0	0
FI0093R	0	0	0		0	0	0	0	17	0	0	0
FI0096G				0								
FR0090R	0	0	0		0	0	0		0			
GB0006R	0	0	0		0	0			0			
GB0013R	0	0	0	0	0	0	0		0			
GB0017R	0	0	0	0	0	0	0		0			
GB0091R	0	0	0	0	0	0			0			
HU0002R	0	11										
IE0001R	83	92	0	100	92	100	8		100	17	83	
IS0090R	0	47	0		0	6	0		2	0	0	0
IS0091R	0	30	0		6	2	0		0	0	0	0
LT0015R	0	0	0				0					
LV0010R	2	21	20		39	88	5			66		
LV0016R	14	43	42		63	88	10			69		
NL0009R	0	8	8		46	23	0		85			
NL0091R	0	20	13	0	47	80	0		93			
NO0001R	0	79	0	0	58	18	26	86	74		2	
NO0039R	35	98	21									
NO0047R	0	46	2		0	2	0	15	72			
NO0055R	2	98	2									
NO0056R	4	60	0									
PL0004R	0	0	0		0		0		0			
PL0005R	0	0	0	2	0	0	0		0			
PT0003R	94	100	0		100		40			69		
PT0004R	100	100	0		100		85			70		
PT0010R	100	100	0		0		0			0		
SE0014R				0								
SE0051R	0	0	0		0	20	0		40	0	0	NaN
SE0097R	0	17	0		0	8	0		17	0	0	NaN
SK0002R	0	0	0		0	0	0		0			
SK0004R	0	0	0		0	0	0		0			
SK0005R	0	0	0		0	0	0		0			
SK0006R	0	0	0		0	0	0		0			
SK0007R	0	0	0		0	0	0		0			

between25 and 50% below the detection limit
between 50 and 75% below the detection limit
more than 75% below the detection limit

Table A3.4: Number of samples below the detection limit for heavy metals in air in 2005, in per cent.

Code	Pb	Cd	Zn	Hg	Ni	As	Cu	Co	Cr	Mn	V	Fe
AT0002R	5	2										
AT0005R	13	49										
AT0048R	25	61										
BE0014R	0	0	0		0		0					
CA0420G				0								
CZ0001R	0	0			15	1	0			0		
CZ0003R	0	0			11	0	4			0		
DE0001R	0	0	0			0	0	0		0	0	0
DE0002R	0	0			0	0	0	0		0	0	0
DE0003R	0	0			0	0	0	0		0	0	0
DE0007R	0	0			0	0	0	0		0	0	0
DE0008R	0	0			0	0		0		0	0	0
DE0009R	0	0	0			0		0		0	0	0
DK0003R	1		0		7	5	4		47	4		0
DK0005R	7		4		1	10	5		40	2		0
DK0008R	1		3		4	9	7		55	5		1
DK0011G	58		83	0	63	50	67		67	54		29
DK0031R	5		7		6	13	15		52	10		1
ES0008R	20	9	0	0	0	0	0		0			
ES0009R	0	0	0		0	0	0		0			
ES0010R				0								
FI0036R	0	0	0		0	0	0	4	2	0	0	0
FI0096G				0								
GB0013R	0	0	0	0	0	0	0		0			
GB0017R	0	0	0	0	0	0	0		0			
GB0091R	0	2	0		2	0	0		0			
HU0002R	1	1										
IE0031R				0								
IS0091R	0	0	0	0	0	0	0		0	0	0	0
LT0015R	0	0	0				0					
LV0010R	2	8	2		0	4	2			2		
LV0016R	0	2	0		2	2	0			0		
NL0009R	0	30	43		37	28						
NO0001R	22	19	7	0	18	24	26	36	88		15	
NO0042G	6	40	43	0	56	36	22	60	84	26	16	
NO0090R				0								
PL0005R	0	0	0	0	0	0	0		0			
RU0002R				0								
SE0014R	0	0		0	0	0						
SI0008R	79	76			61	72						
SK0002R	0	2	6		8	6	4		8	0		
SK0004R	0	0	0		4	0	0		0	0		
SK0005R	0	0	0		0	0	0		0	0		
SK0006R	0	0	0		0	0	0		0	0		
SK0007R	0	0	0		0	0	0		0	0		

between25 and 50% below the detection limit
between 50 and 75% below the detection limit
more than 75% below the detection limit

Table A3.5: number of samples below the detection limit for particulate matter in 2005, in per cent.

Code	PM_{10}	$PM_{2.5}$	PM_1	SPM
AT0002R	0	0	0	
AT0005R	0			
AT0048R	0	0		
CH0001G				30
CH0002R	0	0		
CH0003R	0			
CH0004R	0	0	0	
CH0005R	0			
CY0002R	0			
CZ0001R	0			
CZ0003R	1	1		
DE0001R	0			
DE0002R	0	0	0	
DE0003R	1	0		
DE0007R	0			
DE0008R	0			
DE0009R	0			
DK0005R	0			
ES0007R	0	0		
ES0008R	0	0		
ES0009R	0	0		
ES0010R	0	0		
ES0011R	0	0		
ES0012R	0	0		
ES0013R	0	0		
ES0014R	0	0		
ES0015R	0	0		
ES0016R	0	0		
IT0001R	0			
IT0004R	0	0		
LT0015R				0
NO0001R	1	0		
PL0005R	0			
SE0005R				92
SE0008R				61
SE0011R	0	0		53
SE0012R	0	0		
SE0014R				68
SE0035R	10			
SI0008R	0	0		
SK0002R				0
SK0005R	0			
SK0006R	0			
SK0007R				0

between25 and 50% below the detection limit
between 50 and 75% below the detection limit
more than 75% below the detection limit

Table A3.6: Number of samples below the detection limit for POPs in air in 2005, in per cent.

Code	Component	% BDL	Code	Component	% BDL	Code	Component	% BDL	Code	Component	% BDL
CZ0003R	PCB_101	0	GB0014R	PCB_101	0	NO0042G	PCB_105	2	NO0042G	fluoranthene	0
CZ0003R	PCB_118	38	GB0014R	PCB_118	0	NO0042G	PCB_114	100	NO0042G	fluorene	0
CZ0003R	PCB_138	0	GB0014R	PCB_138	0	NO0042G	PCB_118	0	NO0042G	gamma_HCH	0
CZ0003R	PCB_153	2	GB0014R	PCB_153	50	NO0042G	PCB_122	98	NO0042G	inden_123cd_pyrene	43
CZ0003R	PCB_180	10	GB0014R	PCB_180	25	NO0042G	PCB_123	98	NO0042G	naphtalene	0
CZ0003R	PCB_28	2	GB0014R	PCB_28	0	NO0042G	PCB_128	23	NO0042G	op_DDD	35
CZ0003R	PCB_52	0	GB0014R	PCB_52	0	NO0042G	PCB_138	0	NO0042G	op_DDE	0
CZ0003R	alpha_HCH	4	GB0014R	anthracene	0	NO0042G	PCB_141	4	NO0042G	op_DDT	0
CZ0003R	benzo_a_pyrene	8	GB0014R	benz_a_anthracene	0	NO0042G	PCB_149	0	NO0042G	perylene	53
CZ0003R	fluoranthene	0	GB0014R	benzo_a_pyrene	0	NO0042G	PCB_153	0	NO0042G	phenanthrene	0
CZ0003R	fluorene	0	GB0014R	benzo_ghi_perylene	0	NO0042G	PCB_156	85	NO0042G	pp_DDD	10
CZ0003R	gamma_HCH	0	GB0014R	chrysene	0	NO0042G	PCB_157	100	NO0042G	pp_DDE	0
CZ0003R	phenanthrene	0	GB0014R	fluoranthene	0	NO0042G	PCB_167	98	NO0042G	pp_DDT	0
CZ0003R	pp_DDD	23	GB0014R	inden_123cd_pyrene	0	NO0042G	PCB_170	60	NO0042G	pyrene	0
CZ0003R	pp_DDE	0	GB0014R	phenanthrene	0	NO0042G	PCB_18	0	NO0042G	retene	0
CZ0003R	pp_DDT	2	GB0014R	pyrene	0	NO0042G	PCB_180	0	NO0042G	sum_DDT	0
CZ0003R	pyrene	0	IS0091R	HCB	0	NO0042G	PCB_183	0	NO0042G	sum_PCB	0
ES0008R	acenaphtylene	100	IS0091R	PCB_101	4	NO0042G	PCB_187	0	NO0042G	sum_heptachlor_PCB	0
ES0008R	anthracene	0	IS0091R	PCB_105	100	NO0042G	PCB_189	100	NO0042G	sum_hexachlor_PCB	0
ES0008R	benz_a_anthracene	100	IS0091R	PCB_118	92	NO0042G	PCB_194	83	NO0042G	sum_pentachlor_PCB	0
ES0008R	benzo_a_pyrene	0	IS0091R	PCB_138	92	NO0042G	PCB_206	98	NO0042G	sum_tetrachlor_PCB	0
ES0008R	benzo_b_fluoranthene	0	IS0091R	PCB_153	79	NO0042G	PCB_209	94	NO0042G	sum_trichlor_PCB	0
ES0008R	benzo_ghi_perylene	0	IS0091R	PCB_156	100	NO0042G	PCB_28	0	NO0042G	trans_CD	0
ES0008R	benzo_k_fluoranthene	0	IS0091R	PCB_180	83	NO0042G	PCB_31	0	NO0042G	trans_NO	0
ES0008R	chrysene	0	IS0091R	PCB_28	0	NO0042G	PCB_33	0	SE0012R	PCB_101	0
ES0008R	dibenzo_ah_anthracene	0	IS0091R	PCB_31	0	NO0042G	PCB_37	0	SE0012R	PCB_118	0
ES0008R	fluoranthene	0	IS0091R	PCB_52	4	NO0042G	PCB_47	0	SE0012R	PCB_138	0
ES0008R	fluorene	100	IS0091R	alpha_HCH	0	NO0042G	PCB_52	0	SE0012R	PCB_153	0
ES0008R	inden_123cd_pyrene	0	IS0091R	beta_HCH	100	NO0042G	PCB_66	0	SE0012R	PCB_180	0
ES0008R	naphtalene	100	IS0091R	cis_CD	79	NO0042G	PCB_74	0	SE0012R	PCB_28	0
ES0008R	phenanthrene	0	IS0091R	dieldrin	88	NO0042G	PCB_99	0	SE0012R	PCB_52	0
ES0008R	pyrene	0	IS0091R	gamma_HCH	0	NO0042G	acenaphthene	0	SE0012R	anthracene	8
FI0096G	benzo_k_fluoranthene	0	IS0091R	op_DDT	100	NO0042G	acenaphthylene	15	SE0012R	benz_a_anthracene	0
FI0096R	PCB_101	0	IS0091R	pp_DDD	100	NO0042G	alpha_HCH	0	SE0012R	benzo_a_pyrene	0
FI0096R	PCB_118	0	IS0091R	pp_DDE	75	NO0042G	anthanthrene	94	SE0012R	benzo_ghi_perylene	8
FI0096R	PCB_138	0	IS0091R	pp_DDT	100	NO0042G	anthracene	2	SE0012R	fluoranthene	0
FI0096R	PCB_153	0	IS0091R	trans_CD	92	NO0042G	benz_a_anthracene	47	SE0012R	inden_123cd_pyrene	0
FI0096R	PCB_180	17	IS0091R	trans_NO	96	NO0042G	benzo_a_fluoranthene	72	SE0012R	phenanthrene	0
FI0096R	PCB_28	0	NO0001R	HCB	0	NO0042G	benzo_a_fluorene	55	SE0012R	pp_DDE	0
FI0096R	PCB_52	0	NO0001R	PCB_101	0	NO0042G	benzo_a_pyrene	60	SE0012R	pyrene	0
FI0096R	alpha_HCH	0	NO0001R	PCB_118	0	NO0042G	benzo_b_fluorene	23	SE0014R	PCB_101	0
FI0096R	anthracene	0	NO0001R	PCB_138	0	NO0042G	benzo_bjk_fluoranthenes	4	SE0014R	PCB_118	0
FI0096R	benz_a_anthracene	0	NO0001R	PCB_153	0	NO0042G	benzo_e_pyrene	25	SE0014R	PCB_138	0
FI0096R	benzo_a_pyrene	0	NO0001R	PCB_180	2	NO0042G	benzo_ghi_fluoranthene	11	SE0014R	PCB_153	0
FI0096R	benzo_b_fluoranthene	0	NO0001R	PCB_28	0	NO0042G	benzo_ghi_perylene	19	SE0014R	PCB_180	0
FI0096R	benzo_ghi_perylene	0	NO0001R	PCB_52	0	NO0042G	biphenyl	0	SE0014R	PCB_28	0
FI0096R	chrysene_triphenylene	0	NO0001R	alpha_HCH	0	NO0042G	chrysene_triphenylene	4	SE0014R	PCB_52	0
FI0096R	fluoranthene	0	NO0001R	gamma_HCH	0	NO0042G	cis_CD	0	SE0014R	alpha_HCH	0
FI0096R	gamma_HCH	0	NO0042G	HCB	0	NO0042G	cis_NO	15	SE0014R	anthracene	0
FI0096R	inden_123cd_pyrene	0	NO0042G	N1methylnaphtalene	0	NO0042G	coronene	57	SE0014R	benz_a_anthracene	0
FI0096R	phenanthrene	0	NO0042G	N1methylphenanthrene	0	NO0042G	cyclopenta_cd_pyrene	74	SE0014R	benzo_a_pyrene	0
FI0096R	pp_DDD	25	NO0042G	N2methylanthracene	96	NO0042G	dibenzo_ac_ah_anthracenes	55	SE0014R	benzo_b_fluoranthene	0
FI0096R	pp_DDE	0	NO0042G	N2methylnaphtalene	0	NO0042G	dibenzo_ae_pyrene	85	SE0014R	benzo_ghi_perylene	0
FI0096R	pp_DDT	0	NO0042G	N2methylphenanthrene	0	NO0042G	dibenzo_ah_pyrene	100	SE0014R	benzo_k_fluoranthene	0
FI0096R	pyrene	0	NO0042G	N3methylphenanthrene	0	NO0042G	dibenzo_ai_pyrene	96	SE0014R	chrysene_triphenylene	0
LV0010R	benzo_a_pyrene	0	NO0042G	N9methylphenanthrene	0	NO0042G	dibenzofuran	0	SE0014R	fluoranthene	0
LV0016R	benzo_a_pyrene	25	NO0042G	PCB_101	0	NO0042G	dibenzothiophene	2	SE0014R	gamma_HCH	0
									SE0014R	inden_123cd_pyrene	0
									SE0014R	phenanthrene	0
									SE0014R	pp_DDD	0
									SE0014R	pp_DDE	0
									SE0014R	pp_DDT	0
									SE0014R	pyrene	0

- between25 and 50% below the detection limit
- between 50 and 75% below the detection limit
- more than 75% below the detection limit

Table A3.7: Number of samples below the detection limit for POPs in precipitation in 2005, in per cent.

Code	Comp	% BDL	Code	Comp	% BDL	Code	Comp	% BDL	Code	Comp	% BDL
BE0014R	alpha_HCH	100	DE0001R	benz_a_anthracene	0	DE0009R	inden_123cd_pyrene	0	IS0091R	dieldrin	8
BE0014R	dieldrin	100	DE0001R	benzo_a_pyrene	0	DE0009R	op_DDD	0	IS0091R	gamma_HCH	4
BE0014R	endrin	100	DE0001R	benzo_bjk_fluoranthenes	0	DE0009R	op_DDE	0	IS0091R	op_DDT	96
BE0014R	gamma_HCH	38	DE0001R	benzo_ghi_perylene	0	DE0009R	op_DDT	0	IS0091R	pp_DDD	88
BE0014R	heptachlor	100	DE0001R	dibenzo_ah_anthracene	0	DE0009R	phenanthrene	0	IS0091R	pp_DDE	96
BE0014R	pp_DDD	100	DE0001R	dieldrin	0	DE0009R	pp_DDD	0	IS0091R	pp_DDT	63
BE0014R	pp_DDE	100	DE0001R	endrin	0	DE0009R	pp_DDE	0	IS0091R	trans_CD	71
BE0014R	pp_DDT	100	DE0001R	fluoranthene	0	DE0009R	pp_DDT	0	IS0091R	trans_NO	42
CZ0003R	PCB_101	84	DE0001R	gamma_HCH	0	DE0009R	pyrene	0	NL0091R	gamma_HCH	83
CZ0003R	PCB_118	100	DE0001R	heptachlor	0	FI0096R	PCB_101	0	NO0001R	HCB	0
CZ0003R	PCB_138	89	DE0001R	inden_123cd_pyrene	0	FI0096R	PCB_118	0	NO0001R	PCB_101	2
CZ0003R	PCB_153	79	DE0001R	op_DDD	0	FI0096R	PCB_138	0	NO0001R	PCB_118	4
CZ0003R	PCB_180	87	DE0001R	op_DDE	0	FI0096R	PCB_153	0	NO0001R	PCB_138	2
CZ0003R	PCB_28	87	DE0001R	op_DDT	0	FI0096R	PCB_180	0	NO0001R	PCB_153	0
CZ0003R	PCB_52	96	DE0001R	phenanthrene	0	FI0096R	PCB_28	100	NO0001R	PCB_180	5
CZ0003R	acenaphthene	0	DE0001R	pp_DDD	0	FI0096R	PCB_52	0	NO0001R	PCB_28	2
CZ0003R	acenaphthylene	0	DE0001R	pp_DDE	0	FI0096R	alpha_HCH	0	NO0001R	PCB_52	2
CZ0003R	benzo_a_anthracene	1	DE0001R	pp_DDT	0	FI0096R	anthracene	0	NO0001R	alpha_HCH	0
CZ0003R	benzo_a_pyrene	5	DE0001R	pyrene	0	FI0096R	benzo_a_pyrene	0	NO0001R	gamma_HCH	0
CZ0003R	benzo_b_fluoranthene	0	DE0009R	HCB	0	FI0096R	benzo_ghi_perylene	17	SE0012R	PCB_101	0
CZ0003R	benzo_k_fluoranthene	0	DE0009R	PCB_101	0	FI0096R	fluoranthene	0	SE0012R	PCB_118	0
CZ0003R	chrysene	0	DE0009R	PCB_118	0	FI0096R	gamma_HCH	0	SE0012R	PCB_138	22
CZ0003R	dibenzo_ah_anthracene	24	DE0009R	PCB_138	0	FI0096R	inden_123cd_pyrene	25	SE0012R	PCB_153	22
CZ0003R	gamma_HCH	17	DE0009R	PCB_153	0	FI0096R	phenanthrene	0	SE0012R	PCB_180	22
CZ0003R	phenanthrene	0	DE0009R	PCB_180	0	FI0096R	pyrene	0	SE0012R	PCB_28	0
CZ0003R	pp_DDD	76	DE0009R	PCB_28	0	IS0091R	HCB	17	SE0012R	PCB_52	0
CZ0003R	pp_DDE	52	DE0009R	PCB_52	0	IS0091R	PCB_101	67	SE0012R	anthracene	10
CZ0003R	pp_DDT	76	DE0009R	alpha_HCH	0	IS0091R	PCB_105	88	SE0012R	benzo_a_pyrene	10
CZ0003R	pyrene	0	DE0009R	anthracene	0	IS0091R	PCB_118	63	SE0012R	benzo_ghi_perylene	10
DE0001R	HCB	0	DE0009R	benz_a_anthracene	0	IS0091R	PCB_138	46	SE0012R	fluoranthene	0
DE0001R	PCB_101	0	DE0009R	benzo_a_pyrene	0	IS0091R	PCB_153	42	SE0012R	inden_123cd_pyrene	10
DE0001R	PCB_118	0	DE0009R	benzo_bjk_fluoranthenes	0	IS0091R	PCB_156	92	SE0012R	phenanthrene	0
DE0001R	PCB_138	0	DE0009R	benzo_ghi_perylene	0	IS0091R	PCB_180	67	SE0012R	pyrene	0
DE0001R	PCB_153	0	DE0009R	dibenzo_ah_anthracene	0	IS0091R	PCB_28	79	SE0014R	PCB_101	0
DE0001R	PCB_180	0	DE0009R	dieldrin	0	IS0091R	PCB_31	79	SE0014R	PCB_118	0
DE0001R	PCB_28	0	DE0009R	endrin	0	IS0091R	PCB_52	54	SE0014R	PCB_138	0
DE0001R	PCB_52	0	DE0009R	fluoranthene	0	IS0091R	alpha_HCH	0	SE0014R	PCB_153	0
DE0001R	alpha_HCH	0	DE0009R	gamma_HCH	0	IS0091R	beta_HCH	96	SE0014R	PCB_180	0
DE0001R	anthracene	0	DE0009R	heptachlor	0	IS0091R	cis_CD	46	SE0014R	PCB_28	100
									SE0014R	PCB_52	8
									SE0014R	alpha_HCH	0
									SE0014R	anthracene	0
									SE0014R	benzo_a_pyrene	0
									SE0014R	benzo_ghi_perylene	0
									SE0014R	fluoranthene	0
									SE0014R	gamma_HCH	0
									SE0014R	inden_123cd_pyrene	0
									SE0014R	phenanthrene	0
									SE0014R	pyrene	0

The Swedish and Finnish data are precipitation + dry deposition, the rest is precipitation only.

between25 and 50% below the detection limit

between 50 and 75% below the detection limit

more than 75% below the detection limit

Table A3.8: Number of samples below the detection limit for VOC in 2005, in per cent.

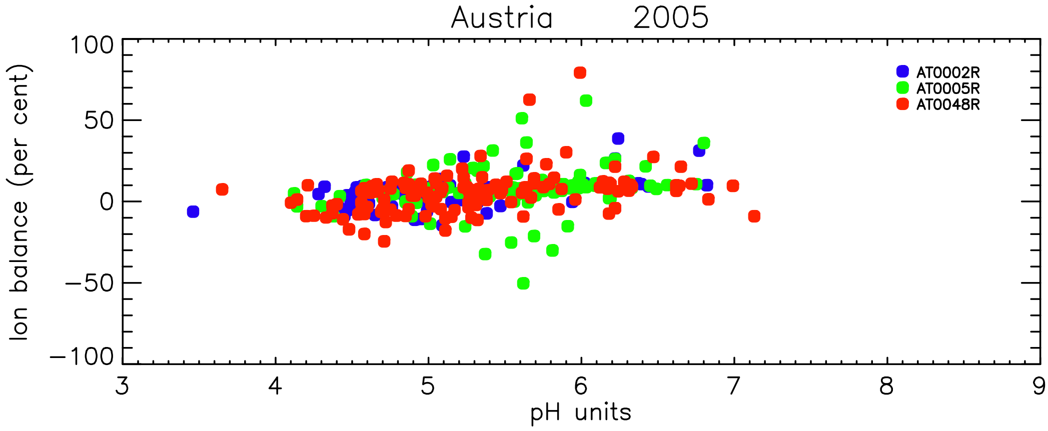
Site	Comp	% BDL	Site	Comp	% BDL	Site	Comp	% BDL	Site	Comp	% BDL
CH0005R	benzene	0	DE0007R	ethane	0	FI0009R	N2butanone	8	FR0013R	benzenecarbaldehyde	50
CH0005R	butadiene	0	DE0007R	ethene	0	FI0009R	N2methylpentane	11	FR0013R	but_1_ene	6
CH0005R	butane	0	DE0007R	heptane	0	FI0009R	N2methylpropenal	97	FR0013R	butanales	12
CH0005R	ethane	0	DE0007R	isopentane	0	FI0009R	N2oxopropanal	28	FR0013R	butane	0
CH0005R	ethene	0	DE0007R	mpxylene	0	FI0009R	N2propenal	81	FR0013R	cyclohexane	47
CH0005R	ethylbenzene	0	DE0007R	oxylene	0	FI0009R	N3buten2one	100	FR0013R	ethanal	0
CH0005R	ethyne	0	DE0007R	pentane	0	FI0009R	N3methylpentane	26	FR0013R	ethane	0
CH0005R	hexane	0	DE0007R	pentenes	0	FI0009R	benzene	0	FR0013R	ethanedial	34
CH0005R	isobutane	0	DE0007R	propane	0	FI0009R	benzenecarbaldehyde	93	FR0013R	ethene	0
CH0005R	isoprene	0	DE0007R	propene	0	FI0009R	but_1_ene	17	FR0013R	ethylbenzene	30
CH0005R	mpxylene	0	DE0007R	toluene	0	FI0009R	butadiene	100	FR0013R	ethyne	0
CH0005R	oxylene	0	DE0007R	trans_2_butene	0	FI0009R	butanales	55	FR0013R	heptane	16
CH0005R	pentane	0	DE0008R	N2methylpentane	0	FI0009R	butane	0	FR0013R	hexanal	18
CH0005R	propane	0	DE0008R	N3methylpentane	0	FI0009R	cis_2_butene	93	FR0013R	hexane	0
CH0005R	propene	0	DE0008R	benzene	0	FI0009R	cis_2_pentene	96	FR0013R	isobutane	0
CH0005R	toluene	0	DE0008R	but_1_ene	0	FI0009R	cyclohexane	0	FR0013R	isoheptane	76
CZ0003R	2+3metylheptan	0	DE0008R	butadiene	0	FI0009R	ethanal	0	FR0013R	isooctane	57
CZ0003R	N2butanone	6	DE0008R	butane	0	FI0009R	ethane	0	FR0013R	isopentane	0
CZ0003R	N2methylpropenal	96	DE0008R	cis_2_butene	0	FI0009R	ethanedial	31	FR0013R	isoprene	6
CZ0003R	N2oxopropanal	25	DE0008R	cis_2_pentene	0	FI0009R	ethene	0	FR0013R	methanal	0
CZ0003R	N2propenal	51	DE0008R	ethane	0	FI0009R	ethyne	0	FR0013R	mpxylene	5
CZ0003R	N3buten2one	100	DE0008R	ethene	0	FI0009R	heptane	0	FR0013R	neohexane	7
CZ0003R	benzene	0	DE0008R	heptane	0	FI0009R	hexanal	35	FR0013R	neopentane	100
CZ0003R	benzenecarbaldehyde	83	DE0008R	isopentane	0	FI0009R	hexane	10	FR0013R	octane	3
CZ0003R	butanales	42	DE0008R	mpxylene	0	FI0009R	isobutane	0	FR0013R	oxylene	40
CZ0003R	butane	0	DE0008R	oxylene	0	FI0009R	isopentane	0	FR0013R	pentane	0
CZ0003R	butenes	0	DE0008R	pentane	0	FI0009R	isoprene	NaN	FR0013R	propanal	12
CZ0003R	cyclohexane	0	DE0008R	pentenes	0	FI0009R	methanal	0	FR0013R	propane	0
CZ0003R	ethanal	0	DE0008R	propane	0	FI0009R	pentanal	62	FR0013R	propanone	0
CZ0003R	ethane	0	DE0008R	propene	0	FI0009R	pentane	0	FR0013R	propene	2
CZ0003R	ethanedial	14	DE0008R	toluene	0	FI0009R	propanal	14	FR0013R	toluene	0
CZ0003R	ethene	0	DE0008R	trans_2_butene	0	FI0009R	propane	0	FR0013R	trans_2_butene	94
CZ0003R	ethylbenzene	2	DE0009R	N2methylpentane	0	FI0009R	propanone	0	FR0015R	N2butanone	0
CZ0003R	ethyne	0	DE0009R	N3methylpentane	0	FI0009R	propene	0	FR0015R	N2methylpentane	3
CZ0003R	heptane	0	DE0009R	benzene	0	FI0009R	trans_2_butene	42	FR0015R	N2methylpropenal	44
CZ0003R	hexanal	25	DE0009R	but_1_ene	0	FI0009R	trans_2_pentene	96	FR0015R	N2oxopropanal	54
CZ0003R	hexane	1	DE0009R	butadiene	0	FI0096G	N2methylpentane	30	FR0015R	N2propenal	98
CZ0003R	isobutane	0	DE0009R	butane	0	FI0096G	N3methylpentane	44	FR0015R	N3methylpentane	9
CZ0003R	isoheptane	0	DE0009R	cis_2_butene	0	FI0096G	benzene	0	FR0015R	benzene	0
CZ0003R	isohexane	0	DE0009R	cis_2_pentene	0	FI0096G	but_1_ene	26	FR0015R	benzenecarbaldehyde	8
CZ0003R	isooctane	0	DE0009R	ethane	0	FI0096G	butadiene	91	FR0015R	but_1_ene	1
CZ0003R	isopentane	0	DE0009R	ethene	0	FI0096G	butane	0	FR0015R	butanales	4
CZ0003R	isoprene	29	DE0009R	heptane	0	FI0096G	cis_2_butene	95	FR0015R	butane	0
CZ0003R	methanal	0	DE0009R	isopentane	0	FI0096G	cis_2_pentene	96	FR0015R	cyclohexane	33
CZ0003R	mpxylene	2	DE0009R	mpxylene	0	FI0096G	cyclohexane	0	FR0015R	ethanal	0
CZ0003R	octane	0	DE0009R	oxylene	0	FI0096G	ethane	0	FR0015R	ethane	0
CZ0003R	oxylene	0	DE0009R	pentane	0	FI0096G	ethene	0	FR0015R	ethanedial	38
CZ0003R	pentanal	52	DE0009R	pentenes	0	FI0096G	ethyne	0	FR0015R	ethene	0
CZ0003R	pentane	0	DE0009R	propane	0	FI0096G	heptane	8	FR0015R	ethylbenzene	2
CZ0003R	pentenes	1	DE0009R	propene	0	FI0096G	hexane	21	FR0015R	ethyne	0
CZ0003R	propanal	7	DE0009R	toluene	0	FI0096G	isobutane	0	FR0015R	heptane	41
CZ0003R	propane	0	DE0009R	trans_2_butene	0	FI0096G	isopentane	0	FR0015R	hexanal	15
CZ0003R	propanone	0	DE0043G	benzene	0	FI0096G	isoprene	42	FR0015R	hexane	5
CZ0003R	propene	0	DE0043G	but_1_ene	0	FI0096G	pentane	0	FR0015R	isobutane	3
CZ0003R	toluene	0	DE0043G	butadiene	0	FI0096G	propane	0	FR0015R	isoheptane	61
DE0002R	N2methylpentane	0	DE0043G	butane	0	FI0096G	propene	0	FR0015R	isooctane	37
DE0002R	N3methylpentane	0	DE0043G	cis_2_butene	0	FI0096G	trans_2_butene	55	FR0015R	isopentane	0
DE0002R	benzene	0	DE0043G	cis_2_pentene	0	FI0096G	trans_2_pentene	98	FR0015R	isoprene	22
DE0002R	but_1_ene	0	DE0043G	ethane	0	FR0008R	N2butanone	0	FR0015R	methanal	0
DE0002R	butadiene	0	DE0043G	ethene	0	FR0008R	N2methylpentane	6	FR0015R	mpxylene	0
DE0002R	butane	0	DE0043G	ethylbenzene	0	FR0008R	N2methylpropenal	42	FR0015R	neohexane	5
DE0002R	cis_2_butene	0	DE0043G	ethyne	0	FR0008R	N2oxopropanal	64	FR0015R	neopentane	100
DE0002R	cis_2_pentene	0	DE0043G	heptane	0	FR0008R	N2propenal	98	FR0015R	octane	4
DE0002R	ethane	0	DE0043G	hexane	0	FR0008R	N3methylpentane	1	FR0015R	oxylene	0
DE0002R	ethene	0	DE0043G	isobutane	0	FR0008R	benzene	0	FR0015R	pentane	0
DE0002R	heptane	0	DE0043G	isopentane	0	FR0008R	benzenecarbaldehyde	42	FR0015R	propanal	2
DE0002R	isopentane	0	DE0043G	isoprene	0	FR0008R	but_1_ene	1	FR0015R	propane	0
DE0002R	mpxylene	0	DE0043G	mpxylene	0	FR0008R	butanales	10	FR0015R	propanone	0
DE0002R	oxylene	0	DE0043G	oxylene	0	FR0008R	butane	0	FR0015R	propene	1
DE0002R	pentane	0	DE0043G	pentane	0	FR0008R	cyclohexane	3	FR0015R	toluene	0
DE0002R	pentenes	0	DE0043G	propane	0	FR0008R	ethanal	0	FR0015R	trans_2_butene	78
DE0002R	propane	0	DE0043G	propene	0	FR0008R	ethane	0	NO0001R	N2butanone	13
DE0002R	propene	0	DE0043G	toluene	0	FR0008R	ethanedial	51	NO0001R	N2methylpropenal	91
DE0002R	toluene	0	DE0043G	trans_2_butene	0	FR0008R	ethene	0	NO0001R	N2oxopropanal	52
DE0002R	trans_2_butene	0	DE0043G	trans_2_pentene	0	FR0008R	ethylbenzene	16	NO0001R	N2propenal	83
DE0002R	voc_complete	0	ES0009R	1_pentene	96	FR0008R	ethyne	0	NO0001R	N3buten2one	99
DE0003R	N2methylpentane	0	ES0009R	N2butanone	23	FR0008R	heptane	39	NO0001R	benzenecarbaldehyde	92
DE0003R	N3methylpentane	0	ES0009R	N2methylpropenal	22	FR0008R	hexanal	28	NO0001R	butanales	67
DE0003R	benzene	0	ES0009R	N2propenal	16	FR0008R	hexane	0	NO0001R	ethanal	0
DE0003R	but_1_ene	0	ES0009R	benzene	60	FR0008R	isobutane	0	NO0001R	ethanedial	45
DE0003R	butadiene	0	ES0009R	benzenecarbaldehyde	12	FR0008R	isoheptane	48	NO0001R	hexanal	51
DE0003R	butane	0	ES0009R	but_1_ene	54	FR0008R	isooctane	21	NO0001R	methanal	0
DE0003R	cis_2_butene	0	ES0009R	butadiene	41	FR0008R	isopentane	0	NO0001R	pentanal	71
DE0003R	cis_2_pentene	0	ES0009R	butanales	17	FR0008R	isoprene	9	NO0001R	propanal	19
DE0003R	ethane	0	ES0009R	butane	32	FR0008R	methanal	0	NO0001R	propanone	0
DE0003R	ethene	0	ES0009R	cis_2_butene	76	FR0008R	mpxylene	1	NO0931R	benzene	0
DE0003R	heptane	0	ES0009R	cis_2_pentene	78	FR0008R	neohexane	6	SK0006R	benzene	0
DE0003R	isopentane	0	ES0009R	ethanal	0	FR0008R	neopentane	100	SK0006R	butane	0
DE0003R	mpxylene	0	ES0009R	ethane	34	FR0008R	octane	16	SK0006R	butenes	0
DE0003R	oxylene	0	ES0009R	ethene	60	FR0008R	oxylene	12	SK0006R	ethane	0
DE0003R	pentane	0	ES0009R	ethyne	50	FR0008R	pentane	0	SK0006R	ethene	0
DE0003R	pentenes	0	ES0009R	heptane	37	FR0008R	propanal	24	SK0006R	ethyne	0
DE0003R	propane	0	ES0009R	hexanal	3	FR0008R	propane	0	SK0006R	hexane	0
DE0003R	propene	0	ES0009R	hexane	30	FR0008R	propanone	0	SK0006R	isobutane	0
DE0003R	toluene	0	ES0009R	isobutane	39	FR0008R	propene	0	SK0006R	isopentane	0
DE0003R	trans_2_butene	0	ES0009R	isoprene	66	FR0008R	toluene	0	SK0006R	isoprene	25
DE0007R	N2methylpentane	0	ES0009R	methanal	0	FR0008R	trans_2_butene	78	SK0006R	oxylene	0
DE0007R	N3methylpentane	0	ES0009R	pentanal	24	FR0013R	N2butanone	4	SK0006R	pentane	0
DE0007R	benzene	0	ES0009R	pentane	72	FR0013R	N2methylpentane	5	SK0006R	pentenes	0
DE0007R	but_1_ene	0	ES0009R	propane	1	FR0013R	N2methylpropenal	47	SK0006R	propane	0
DE0007R	butadiene	0	ES0009R	propene	50	FR0013R	N2oxopropanal	68	SK0006R	propene	0
DE0007R	butane	0	ES0009R	toluene	55	FR0013R	N2propenal	98	SK0006R	toluene	0
DE0007R	cis_2_butene	0	ES0009R	trans_2_butene	100	FR0013R	N3methylpentane	18			
DE0007R	cis_2_pentene	0	ES0009R	trans_2_pentene	98	FR0013R	benzene	0			

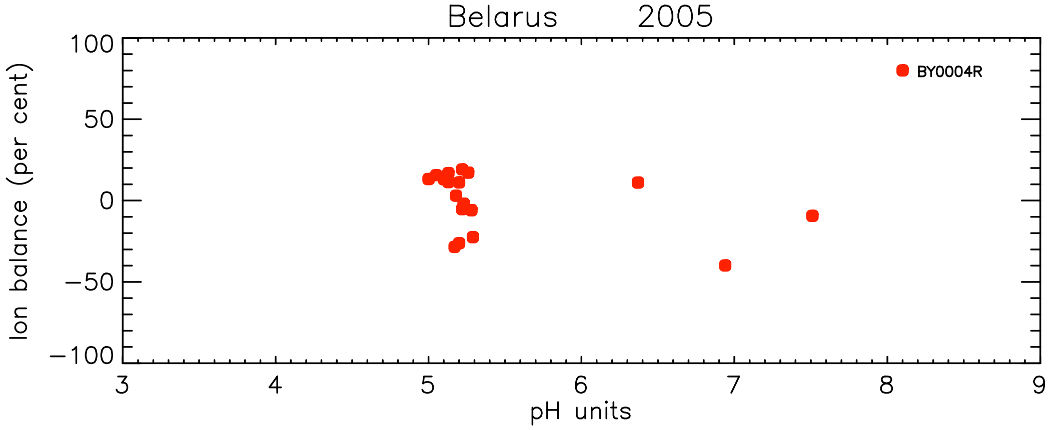
between25 and 50% below the detection limit
between 50 and 75% below the detection limit
more than 75% below the detection limit

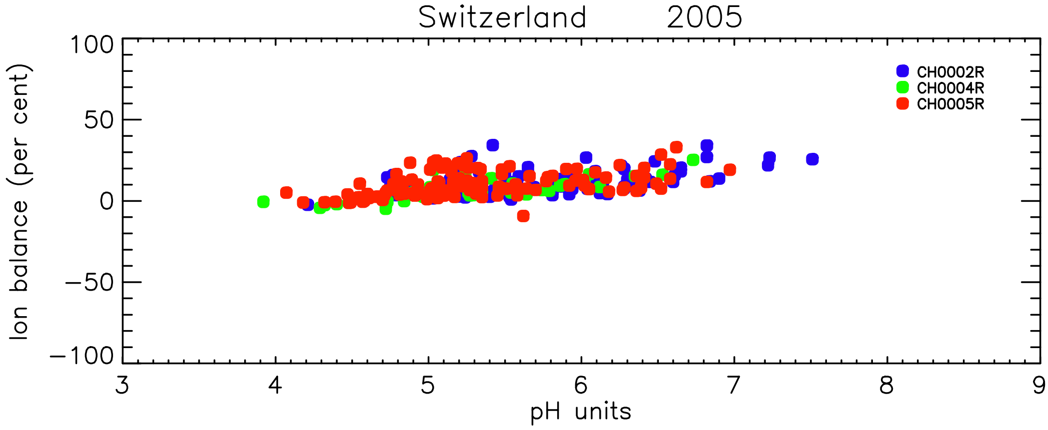
Annex 4

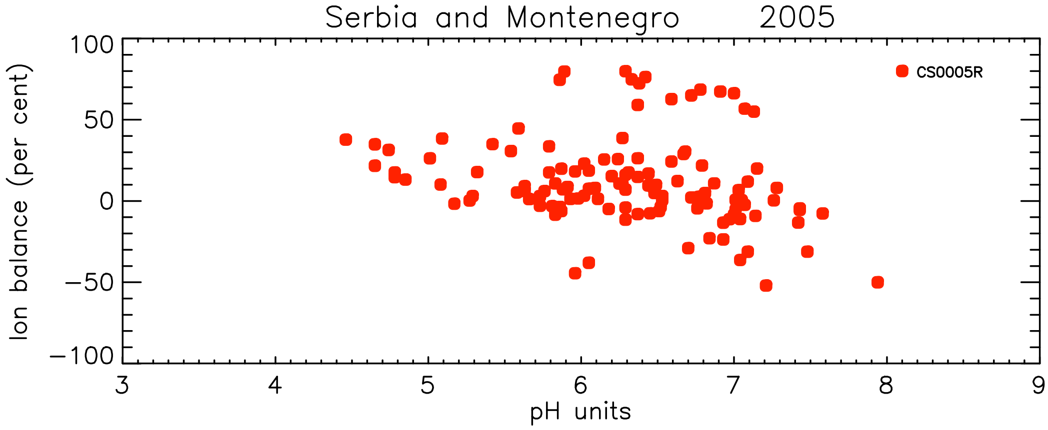
Ion balances in precipitation samples 2005

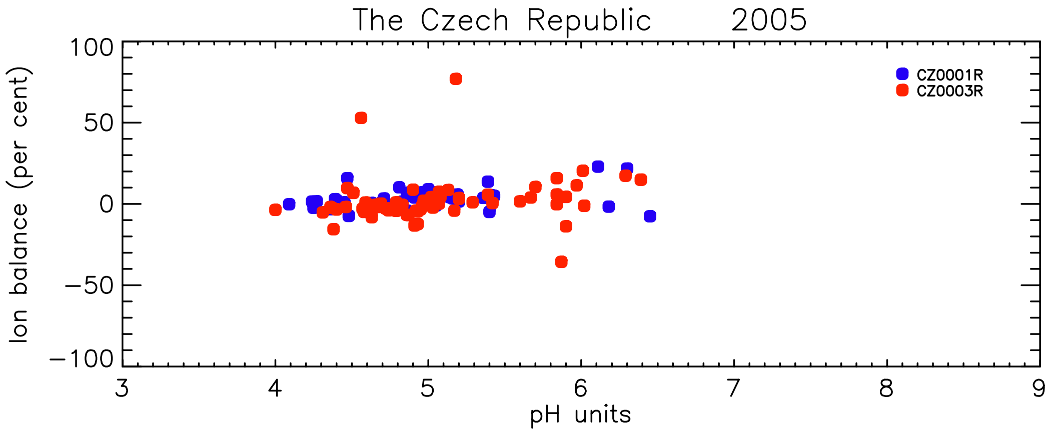
Units: Ion balance (per cent)

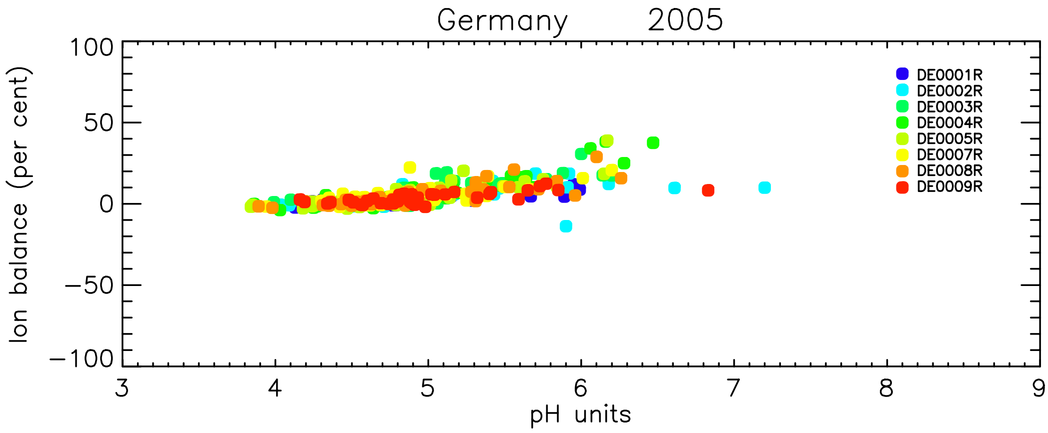

Austria 2005
AT0002R
AT0005R
AT0048R
Ion balance (per cent)
pH units

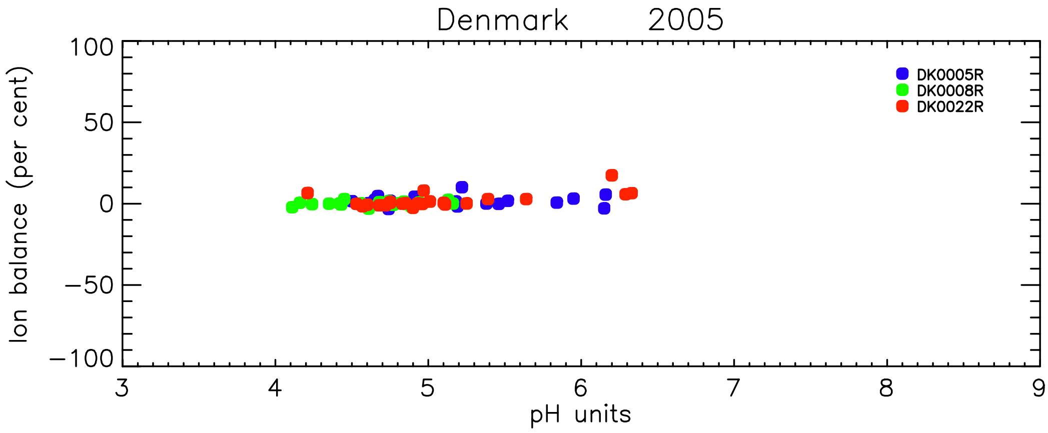

Belarus 2005
BY0004R
Ion balance (per cent)
pH units

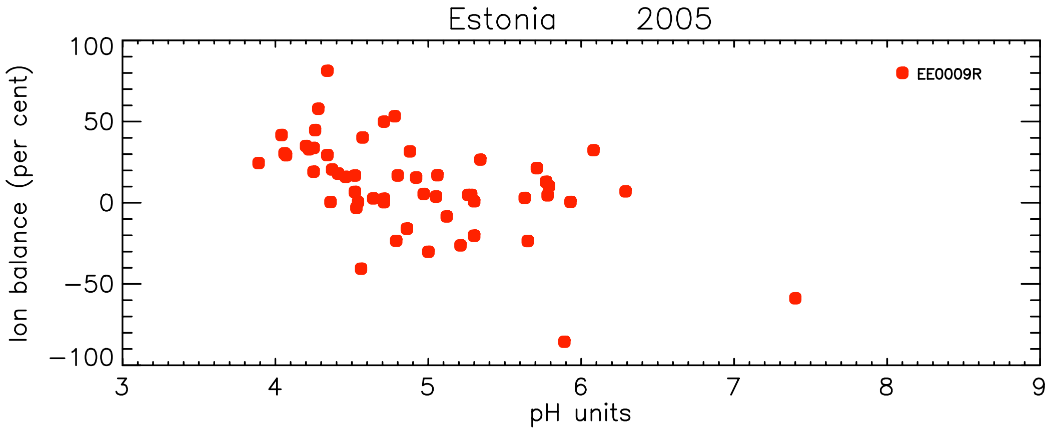

Switzerland 2005
CH0002R
CH0004R
CH0005R
Ion balance (per cent)
pH units

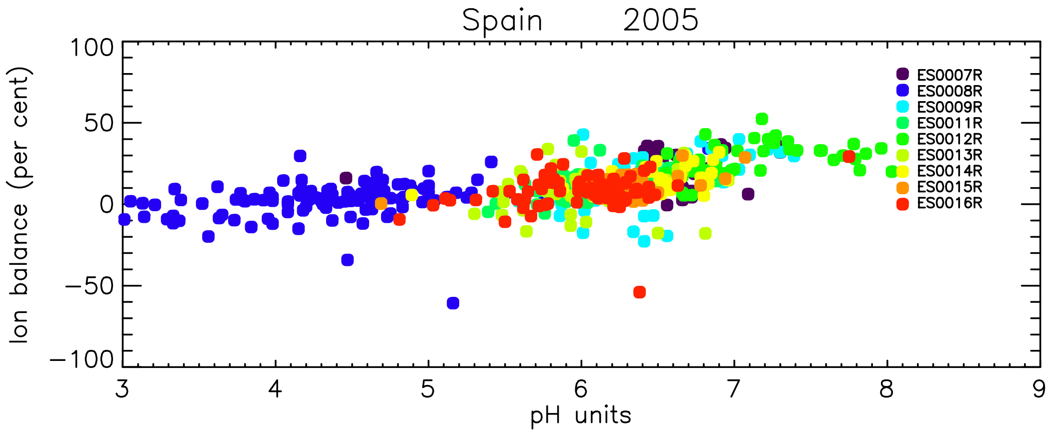

Serbia and Montenegro 2005
CS0005R
Ion balance (per cent)
pH units

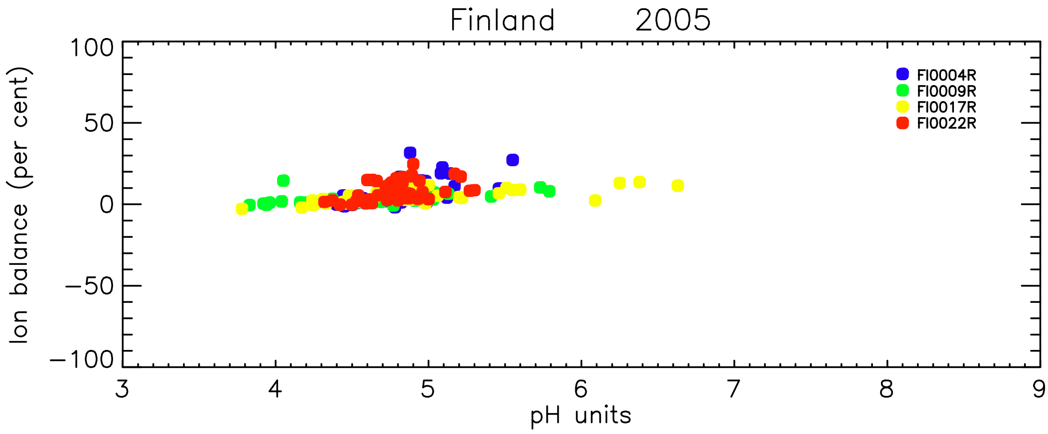

The Czech Republic 2005
Ion balance (per cent)
pH units
CZ0001R
CZ0003R
100
50
0
−50
−100
3
4
5
6
7
8
9

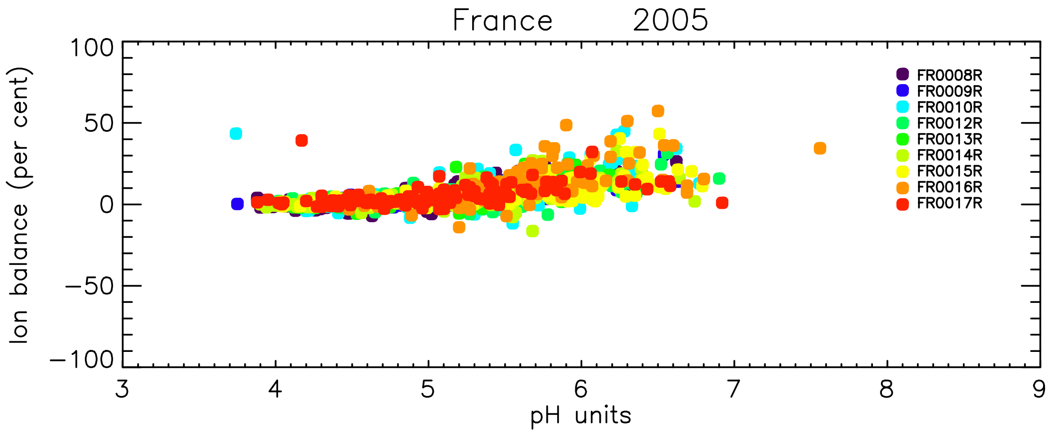

Germany 2005
Ion balance (per cent)
pH units
DE0001R
DE0002R
DE0003R
DE0004R
DE0005R
DE0007R
DE0008R
DE0009R
100
50
0
−50
−100
3
4
5
6
7
8
9

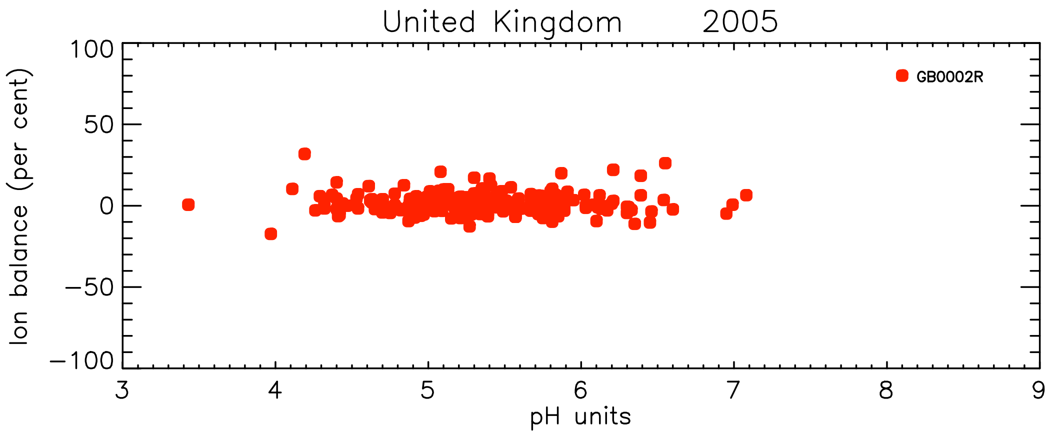

Denmark 2005
Ion balance (per cent)
pH units
DK0005R
DK0008R
DK0022R
100
50
0
−50
−100
3
4
5
6
7
8
9

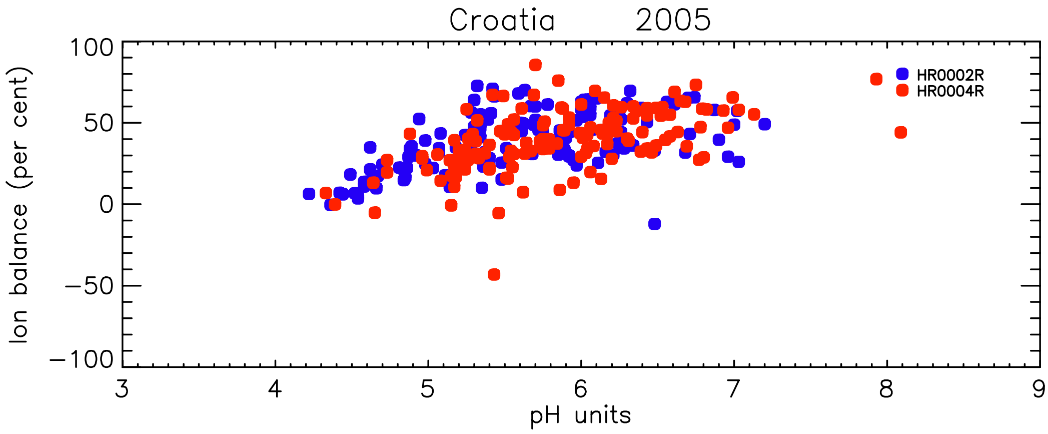

Estonia 2005
Ion balance (per cent)
pH units
EE0009R
100
50
0
−50
−100
3
4
5
6
7
8
9

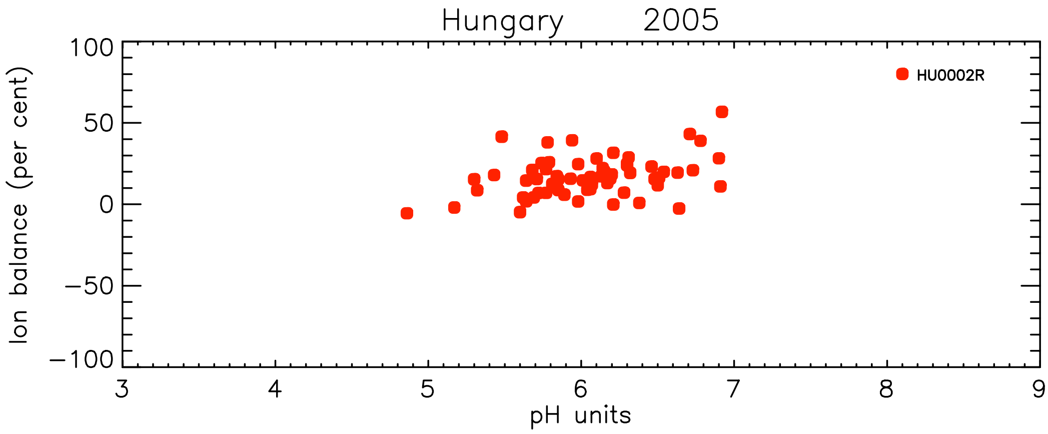

Spain 2005
Ion balance (per cent)
pH units
ES0007R
ES0008R
ES0009R
ES0011R
ES0012R
ES0013R
ES0014R
ES0015R
ES0016R

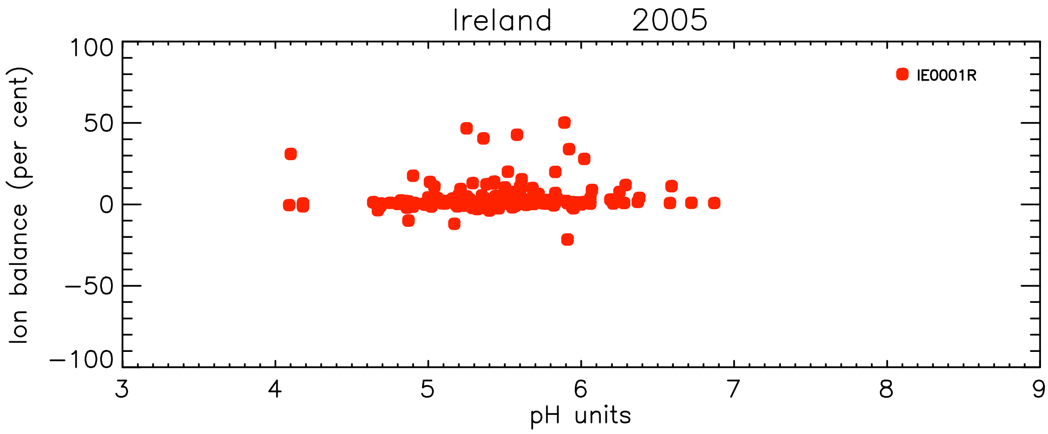

Finland 2005
Ion balance (per cent)
pH units
FI0004R
FI0009R
FI0017R
FI0022R

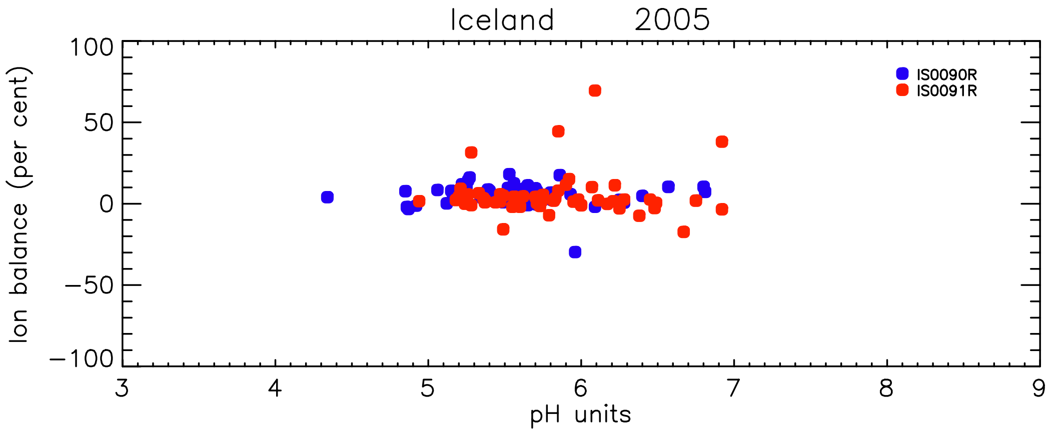

France 2005
Ion balance (per cent)
pH units
FR0008R
FR0009R
FR0010R
FR0012R
FR0013R
FR0014R
FR0015R
FR0016R
FR0017R

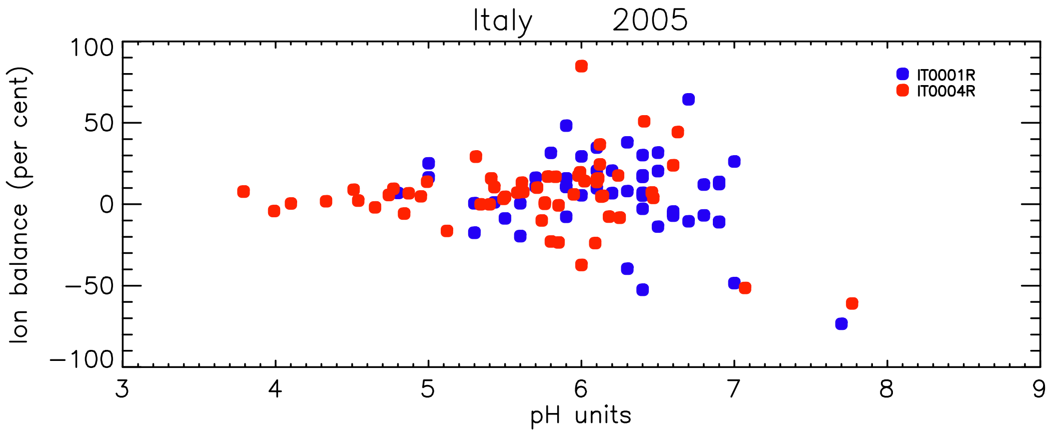

United Kingdom 2005
Ion balance (per cent)
pH units
GB0002R

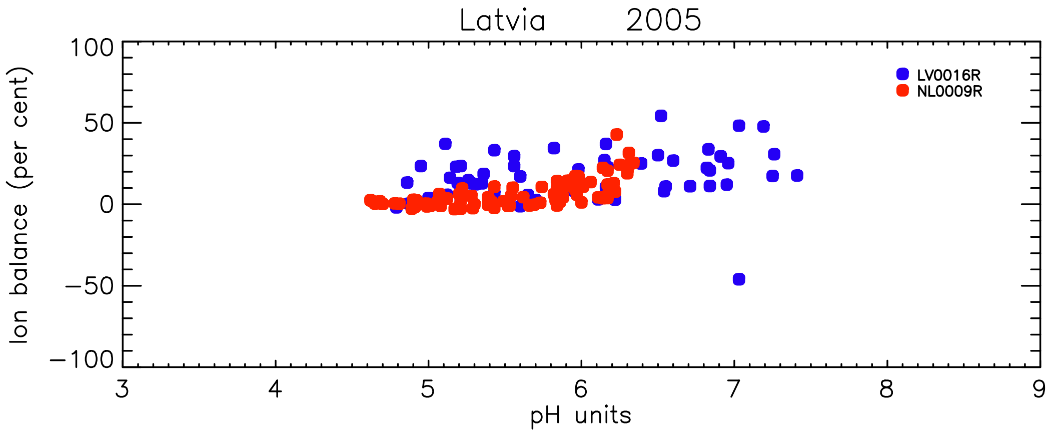

Croatia 2005
Ion balance (per cent)
pH units
HR0002R
HR0004R
100
50
0
−50
−100
3
4
5
6
7
8
9

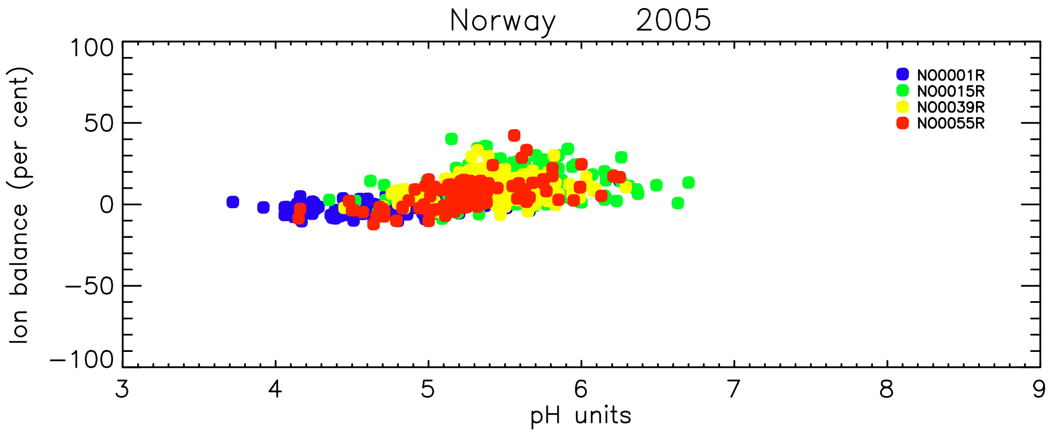

Hungary 2005
Ion balance (per cent)
pH units
HU0002R
100
50
0
−50
−100
3
4
5
6
7
8
9

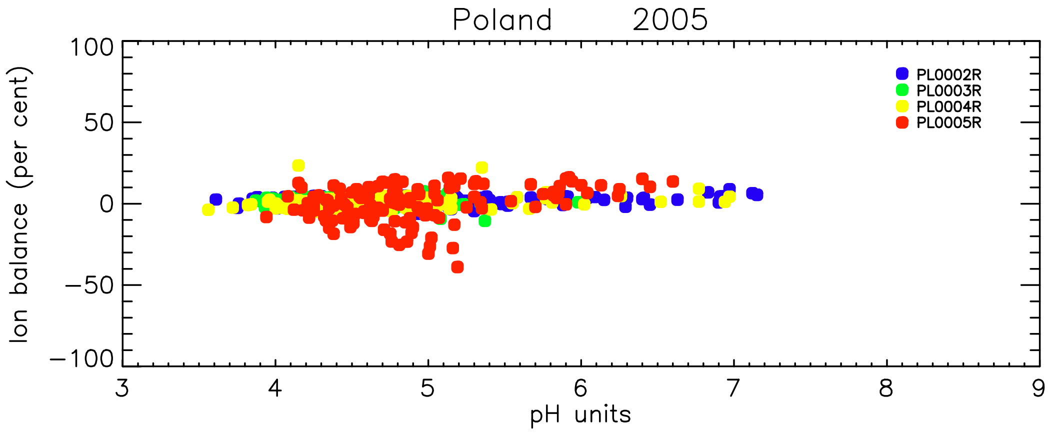

Ireland 2005
Ion balance (per cent)
pH units
IE0001R
100
50
0
−50
−100
3
4
5
6
7
8
9

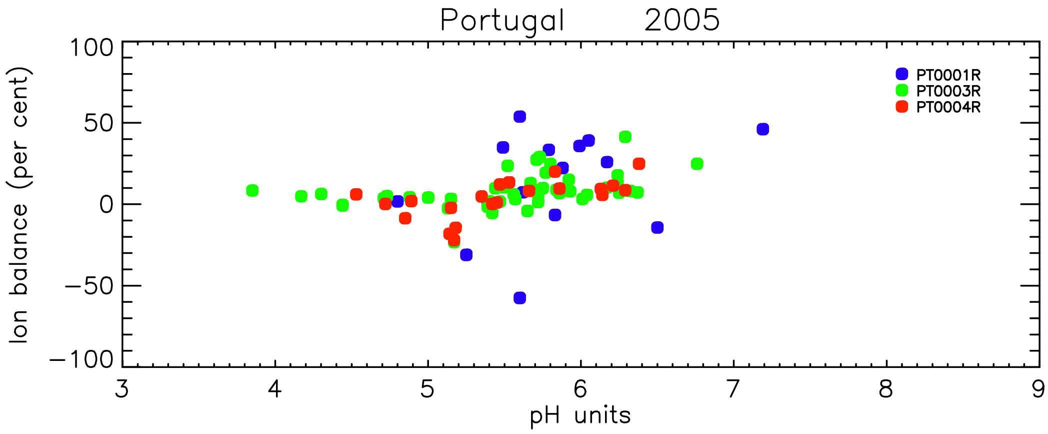

Iceland 2005
Ion balance (per cent)
pH units
IS0090R
IS0091R
100
50
0
−50
−100
3
4
5
6
7
8
9

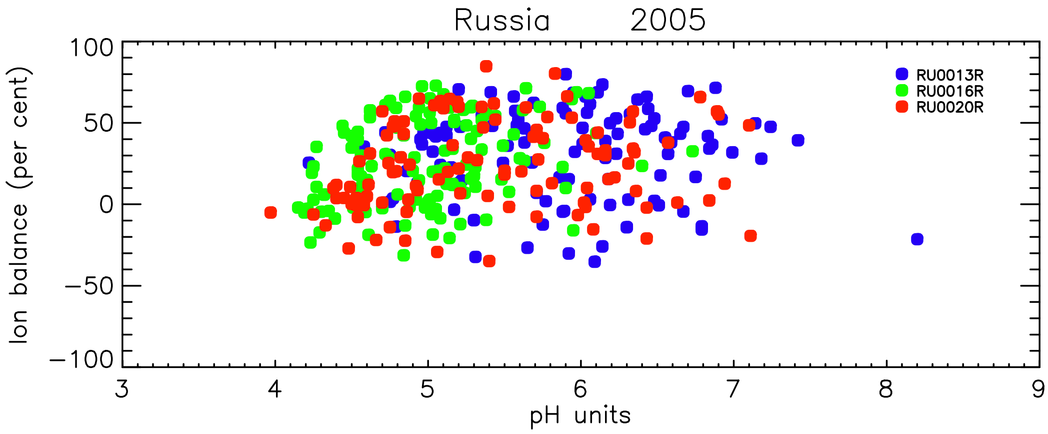

Italy 2005
Ion balance (per cent)
pH units
IT0001R
IT0004R
100
50
0
−50
−100
3
4
5
6
7
8
9

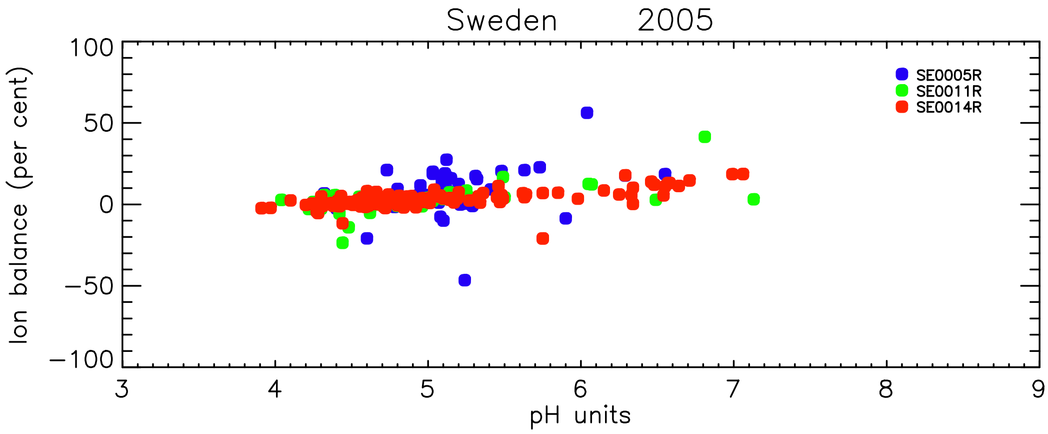

Latvia 2005
Ion balance (per cent)
pH units
LV0016R
NL0009R
100
50
0
−50
−100
3
4
5
6
7
8
9

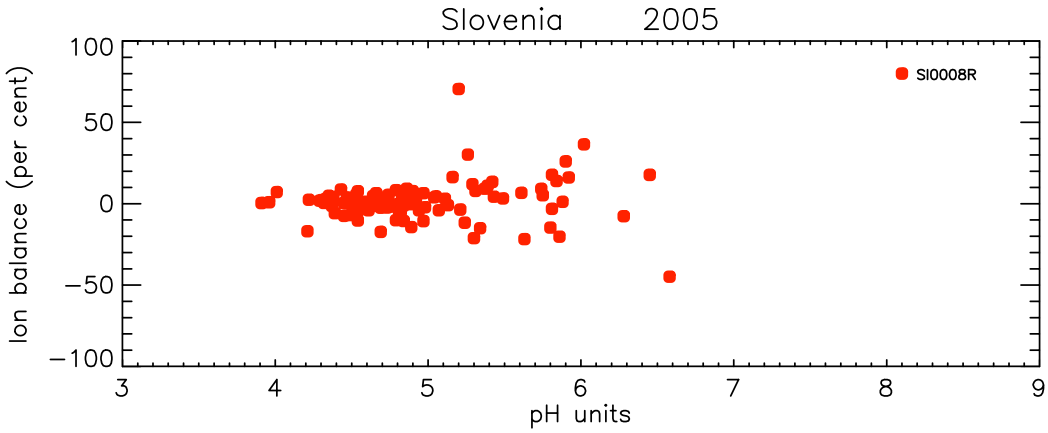

Norway 2005
Ion balance (per cent)
pH units
NO0001R
NO0015R
NO0039R
NO0055R
100
50
0
−50
−100
3
4
5
6
7
8
9

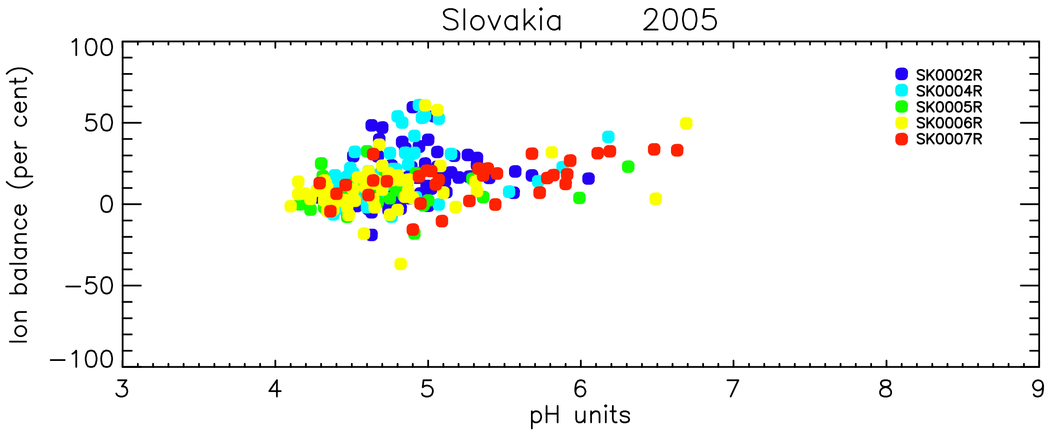

Poland 2005
Ion balance (per cent)
pH units
PL0002R
PL0003R
PL0004R
PL0005R
100
50
0
−50
−100
3
4
5
6
7
8
9

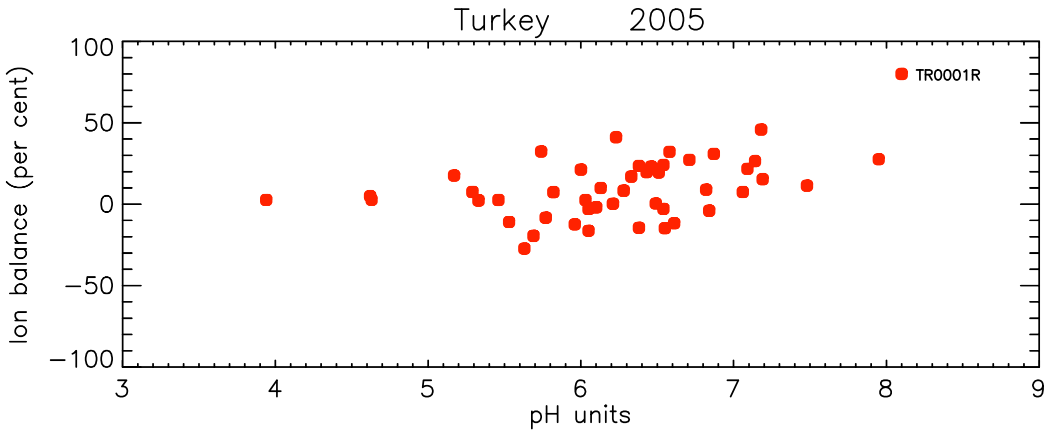

Portugal 2005
Ion balance (per cent)
pH units
PT0001R
PT0003R
PT0004R


Russia 2005
Ion balance (per cent)
pH units
RU0013R
RU0016R
RU0020R


Sweden 2005
Ion balance (per cent)
pH units
SE0005R
SE0011R
SE0014R


Slovenia 2005
Ion balance (per cent)
pH units
SI0008R


Slovakia 2005
Ion balance (per cent)
pH units
SK0002R
SK0004R
SK0005R
SK0006R
SK0007R


Turkey 2005
Ion balance (per cent)
pH units
TR0001R

Annex 5

Detection limits and precision

Table A5.1: Detection limits and precision of ozone.

Country	Precision	Detection limit	Instrument
Austria* AT02,04 AT05	1 ppb	0.4 ppb 0.5 ppb	Horiba APOA 350E Horiba APOA 360
Belgium	0.5%	1 ppb 0.5%	APi Model 400E
Czech Republic	RSD: 10%	2 µg/m^3	Thermo Electron Series 49
Denmark		1 ppb	API Model 400 and 400A
Estonia*		2 µg/m^3	Thermo Environmental Instruments TEI 49 C
Finland* FI04 FI09 FI17 FI22	2 µg/m^3	2 µg/m^3	TEI 49 C Dasibi 1008 PC, from 09.10.2003 Horiba APOA 360 TEI 49 C Dasibi 1008 PC
France* FR08,09,10, 12,13,14,15,16	2 µg/m^3	2 µg/m^3	Environnement SA, O341M
Germany*		2.0 µg/m^3	
Greece	1 ppb	0.5 ppb	Horiba APOA 360
Hungary			Thermo Environmental Instrument, Model 49
Ireland (IE01)	0.5% of readings above 50 ppb	0.6 ppb	API Model 400
Italy (IT01)	2 µg/m^3	1 µg/m^3	API Model 400
Italy, EU* (IT04)	2 ppb	2 ppb	Thermo Environmental Instrument, Model 49
Latvia	1%	1 ppb	O341M Ozone Analyzer
Netherlands*	1%	4 µg/m^3	Thermo Environmental Instruments TEI 49 W
Norway	2 µg/m^3	2 µg/m^3	API Model 400
Poland PL05	2 µg or 1%, whichever is greater RSD 1.8%	2 µg/m^3 1 ppb	Monitor Labs Inc. ML-9810 Monitor Labs Inc. ML-9810
Portugal PT04	1 ppb	1 ppb	Dasibi Environmental corp. 1008 PC
Russia*	2 µg/m^3	2 µg/m^3	Dasibi Environmental corp., DAS 1008 PC
Slovakia	2 µg/m^3	2 µg/m^3	TEI M49 ; API M400 ; Horiba APOA 360
Slovenia, SI08,32 SI31,33	1 ppb RSD: 0.5%	1 ppb 1 µg/m^3	Thermo Environmental Model 49 C API Model 400A
Spain	2% 2 µg/m^3	1 ppb 2 µg/m^3	MCV, S.A. Model 48 AUV MCV, S.A. Model 0341 M
Sweden, SE11,12,14 SE32 SE05,13,35,39	uncertainty (95% conf. int.): 5%	1 ppb 1 ppb 1 ppb	Monitor Labs, ML 9810 (ML 9810 B at SE 12) Thermo Environmental Instrument, Model 49C Monitor Labs, ML 8810
Switzerland, CH02,03,04,05	uncertainty (95% conf. int.): 3%	2 µg/m^3	Thermo Environmental Instruments TEI 49C
UK*, all sites except: GB32 GB43 GB44	2 ppb		Monitor Labs, ML 8810 TECO, TE49 Ambirack API Model 400

*Data from AT, DE, EE, FI, FR, IT, NL, RU and UK are taken from earlier years

Table A5.2: Detection limits and precision of sulphur dioxide.

Country	Measurements		Laboratory	
	Precision	Detection limit; µg S/m^3	Precision	Detection limit
Austria* [1]	0.7 ppb	0.1 ppb		
Belgium	1%	1 ppb		
Czech Republic	CoV: 12.62% M.MAD : 0.194 µg SO_2/m^3	0.024	RSD : 3% uncertainty: 5.6%	0.024 mg S/l
Denmark	M.MAD: 0.02 µgS/m^3; CoV: 5.0%	0.01	M.MAD: 0.01 µg S/m^3; CoV: 1.2%	0.01 µg S/m^3
Estonia*		0.48		
Finland*		0.04	M.MAD: 0.003 µg S/m^3 CoV: 1.0%	0.01 µg S/m^3
France* Abs. sol.			at 0.01<c<0.1 mg S/l: RSD = 8-12% at 0.1<c<0.5 mg S/l: RSD = 1-3%	0.1 mg S/L
France* Filterpack	M.MAD 0.19 CoV: 5.4%	0.01		0.02 mg S/l
Germany*	M.MAD: < 0.02			0.01 µg/m^3
Hungary	M.MAD: 0.250, CoV: 37.56	0.48	M.MAD: 0.041, CoV: 3.92	0.32 µg S/m^3
Iceland		0.01	RSD: 4% at 1 mg S/l	0.02 mg S/l
Ireland				0.05 µgS/m^3
Italy (IT01)	RSD: 7.0% at 2.0 µg S/m^3	0.1		0.002 mg S/l
Italy, EU* (IT04) [2]	0.5 ppb	1 ppb		
Latvia		0.05	RSD: 1.5%	0.014 mg S/l
Lithuania*	0.021	0.021 µg S/m^3	at c<0.7 µg S/m^3: 2.4% RSD; at c>0.7 µgS/m3: 0.5-1.0 % RSD	0.017 mg S/l
Netherlands* [4]	1%	1.5		
Norway	M.MAD 0.04; CoV: 12%	0.03		0.01 µg S/m3
Poland	M.MAD = 0.13; CoV= 11.2%	0.2		0.04 mg S/l
Poland PL05		0.1	RSD: 0.73%	0.09 mg S/l
Serbia and Montenegro				2.50 µg S/m^3
Slovakia			CoV: 9.36%	0.2 µg S/filter
Slovenia		0.081	RSD: 3.8% (at 0.334 mg S/l)	0.041 mg S/l
Spain	1% or 0.2 ppb	0.08 ppb		
Sweden	uncertainty (95% conf. int): 13%	0.02	uncertainty (95% conf. int.): 5%	0.01 µg S/m^3
Switzerland CH01	RSD: 4%	0.02		
Switzerland [3]CH02, CH04, CH05	uncertainty (95% conf. int.): 9%	0.3		
Turkey		0.0705	M.MAD: 0.011; CoV: 2.03%	0.0436 mg S/l
UK*				0.01 mg S/l

[1] AT, Monitor, (TEI 43BS to 15th December, after that TEI 43 C trace level)
[2] IT04. Monitor Environment SA, AF 21M
[3] CH02, CH04, CH05: TEI 43C TL
[4] NL: TEI 43W

*Data from AT, DE, EE, FI, FR, IT, LT, NL and UK are taken from earlier years

Table A5.3: Detection limits and precision of nitrogen dioxide.

Country	Measurements		Laboratory	
	Precision	Detection limit, µg N/m³	Precision	Detection limit
Austria* [1]	1 ppb	0.5 ppb		
Belgium[5] (BE01) (BE02)	1 ppb	1ppb		
Czech Republic	RSD: 12%	0.23	RSD: 3.4%	0.06 mg NO_2/l
Denmark		0.07	M.MAD: 0.01 µg N/m³; CoV: 3.45%	0.07 µg N/m³
Estonia*		0.07		
Finland* [6]	0.3 µg N/m³	0.3		
France*		0.7 ppb		
Hungary		0.23		
Ireland				0.1 µg N/m³
Italy (IT01)	0.6 µg N/m³	0.3		
Italy, EU* (IT04)[2]	0.5 ppb	0.5 ppb		
Latvia		0.10	RSD: 2.8%	0.005 mg N/l
Lithuania*		0.08	RSD 3.75-6.9% at c<2.0 µg N/m³	0.03 mg N/l
Netherlands* [4]	1%	0.3		
Norway	M.MAD: 0.13; CoV: 5%	0.03	RSD: 7.0% at c=0.03 mgN/l RSD: 4.6% at c=0.17 mgN/l RSD: 4.2% at c=0.08 mgN/l	0.0045 mg N/l
Poland		0.2	RSD: 1.0% at 0.304 mgN/l RSD: 5.9 % at 0.015 mgN/l	0.008 mg N/l
PL05	M.MAD: 0.37; CoV: 24.5%	0.02	RSD: 3.17%	0.02 mg N/l
Serbia and Montenegro				0.3 µg N/m³
Slovakia			CoV: 3.73%	0.01 mg N/l
Slovenia		0.07		0.01 mg N/l
Spain	0.05 ppb	0.03 ppb		
Sweden	uncertainty (95% conf.int.): 6%	0.3		0.02 mg N/l
Switzerland[3] CH04, CH05	uncertainty (95% conf. int.): 10%	0.06		
CH02, CH03	uncertainty (95% conf. int.): 7%	0.3		
CH01	uncertainty (95% conf. int.): 10%	0.02		
Turkey	M.MAD: 0.0803; CoV: 9.13%	0.1120	M.MAD: 0.1184; CoV: 16.87%	0.0146 mg N/l
UK*	3.5 ppb			

[1]AT: Monitor, HORIBA APNA 360
[2]IT04: Monitor, Thermo Environment 42C
[3]CH04 and CH05: Monitor Labs 9841A; CH02 and CH03: APNA 360; CH01: Eco Physics CLD 770AL ppt + PLC 760
[4] NL: TEI 43W
[5] BE: TEI 42C
[6] FI: Monitor, Thermo Environment 42TCL

*Data from AT, EE, FI, FR, IT, LT, NL and UK are taken from earlier years

Table A5.4: Detection limits and precision of sulphate in air.

Country	Measurements		Laboratory	
	Precision	Detection limit, µg S/m³	Precision	Detection limit
Austria*		0.05 µg/m³	RSD: 2.3%	0.0028 µg/m³
Czech Republic	M.MAD: 0.225 µg/m³, CoV: 8.6%	0.021	RSD: 3% uncertainty: 6.4%	0.021 mg S/l
Denmark	M.MAD: 0.05 µg S/m³ CoV: 6.5%	0.03	M.MAD: 0.01 µg S/m³, CoV: 1.36%	0.02 µg S/m³
Estonia*		0.53		
Finland*		0.04	M.MAD: 0.02 µg S/m³; CoV: 1.26%	0.01 µg S/m³
France* Prefil. air			at 0.01<c<0.1 mg S/l: RSD = 8-12% at 0.1<c<0.5 mg S/l: RSD = 1-3%	0.2 µg S/filter
France* Filterpack	M.MAD 0.058 CoV: 6.1%	0.01		0.02 mg S/l
Germany*	M.MAD < 0.02 µg/m³			0.01 µg/m³
Hungary	M.MAD: 0.107 CoV: 5.62	0.12	M.MAD: 0.019, CoV: 3.14	0.16 µg S/m³
Iceland		0.01	RSD: 4% at 1 mg S/l	0.05 mg S/l
Ireland				0.02 µg/m³
Italy (IT01)	RSD: 1.3% at 1 µg S/m³	0.01		0.002 mg S/l
Italy, EU* (IT04)		0.009 ppm	CoV: 1.3%	0.004 mg S/l
Latvia		0.04	RSD: 2.4%	0.02 mg S/l
Lithuania*		0.024	RSD: 7.2% at c<1.0 µgS/m³ RSD: 1.0% at c>1.0 µgS/m³	0.024 mg S/l
Netherlands*			SD: 0.3 µg/m³	1.2 µg/m³
Norway	M.MAD 0.009 µg S/m³ at c<2.4 µg S/m³	0.01		
Poland		0.18		0.04 mg S/l
Poland PL05	M.MAD: 0.08; CoV=10.4%	0.1	RSD: 4%	0.09 mg S/l
Russia*	RU16: M.MAD 0.02; CoV=2.15%		CoV: 1.75 µg/m³	0.02 mg/l
Slovakia			CoV: 6.15%	0.33 µg S/filter
Slovenia		0.049	RSD: 3.8% (at 0.334 mg S/l)	0.041 ml S/l
Spain (in PM_{10})				0.02 µg S/m³
Sweden	uncertainty (95% conf. int.): 13%	0.005 µg SO_4-S/m³		0.005 mg S/l
Switzerland	RSD: 10%	0.04		
Turkey		0.0398	M.MAD: 0.0102; CoV: 2.20%	0.0396 mg S/l
UK*			RSD: 2%	0.01 mg S/l

*Data from AT, DE, EE, FI, FR, IT, LT, NL, RU and UK are taken from earlier years

Table A5.5: Detection limits and precision of nitrate and nitric acid in air.

Country	Measurements		Laboratory	
	Precision	**Detection limit, µg N/m^3**	**Precision**	**Detection limit**
Austria*		HNO_3: 0.020 µg/m^3 NO_3: 0.011 µg/m^3	HNO_3: RSD: 1.7%	HNO_3: 0.0006 µg/m^3 NO_3: 0.0009 µg/m^3
Czech Republic	aNO_3: M.MAD: 0.252 µg/m^3, CoV: 7.49%	HNO_3: 0.015 µg N/m^3 NO_3^{*}: 0.005 µg N/m^3	RSD: 2% uncertainty: 4.4%	HNO_3: 0.015 mg N/l NO_3^{*}: 0.005 mg N/l
Denmark	M.MAD: 0.04 µg N/m^3, CoV: 7,3%	0.04	NO_3; M.MAD: 0,01 µg N/m^3, CoV: 1.0%	NO_3: 0.01 µg N/m^3
Finland*		0.02	M.MAD: 0.001 µg N/m^3 CoV: HNO_3 = 5.0% and NO_3 = 0.9%	0.005 µg N/m^3
Germany*	< 0.02 µg/m^3 M.MAD			0.01 µg/m^3
Hungary	HNO_3: M.MAD: 0.024 µg/m^3, CoV: 9.38 NO_3: M.MAD: 0.132 µg/m^3, CoV: 13.44	HNO_3: 0.07; NO_3: 0.06	HNO_3: M.MAD: 0.013, CoV: 6.24% NO_3: M.MAD:0.008, CoV: 3.31%	HNO_3: 0.08; NO_3: 0.11
Ireland				0.02 ng N/m^3
Italy (IT01)	HNO_3: RSD: 6.2% at 0.25 µg N/m^3 NO_3: RSD: 1.5% at 1 µg N/m^3	HNO_3: 0.01 NO_3: 0.01		0.002 mg N/l
Italy, EU* (IT04)		0.024	CoV: 1.2%	0.011 mg N/l
Latvia		HNO_3, NO_3: 0.01	RSD: HNO_3 1.2%, NO_3 2.9%	HNO_3: 0.006 mg N/l NO_3: 0.015 mg N/l
Lithuania*		0.014	RSD 0.5-1.2% at c=0.3-1.0 µg N/m^3	0.013 mg N/l
Norway	M.MAD 0.012 at <1.6 µg N/m^3	0.02		
Poland		0.02		0.01 mg N/l
PL05	M.MAD: 0.11; CoV: 16.9%	0.2	RSD: 2%	0.05 mg N/l
Russia*	NO_3: M.MAD 0.01			0.01 mg/l
Slovakia			HNO_3: CoV 6.93%; NO_3: CoV 4.66%	HNO_3: 0.14 µg N/filter; NO_3: 0.4 µg N/filter
Slovenia		NO_3^-: 0.039 HNO_3: 0.009	RSD: 2.6% (at 0.113 mg N/l)	0.009 mg N/l
Spain [1]				0.01 µg N/m^3
Sweden	uncertainty (95% conf. int.): 12%	NO_3-N: 0.005; HNO_3-N: 0.002		NO_3-N: 0.005; HNO_3-N: 0.002 mg N/l
Switzerland	RSD: 8%	0.04		
Turkey		NO_3: 0.0390 HNO_3: 0.0748	NO_3: M.MAD: 0.0062; CoV: 4.03% HNO_3: M.MAD: 0.0062; CoV: 18.49%	NO_3: 0.0423 mg N/l HNO_3: 0.0528 mg N/l

[1] From 05.09.2005

*Data from AT, DE, FI, IT, LT and RU are taken from earlier years

Table A5.6: Detection limits and precision of ammonia and ammonium in air.

Country	Measurements		Laboratory	
	Precision	Detection limit, µg N/m^3	Precision	Detection limit
Austria*		NH_3: 0.10 µg/m^3 NH_4: 0.013 µg/m^3	NH_4: M.MAD: 0.03 µg N/m^3, CoV: 4.1% NH_3: M.MAD: 0.01 µg N/m^3, CoV: 1.4%	NH_4^+: 0.01 µg N/m^3 NH_3: 0.01 µg N/m^3
Czech Republic	sNH_4: M.MAD: 0.315 µg/m^3 CoV: 12.10% uncertainty: sNH4: 0.16-0.7 µg/m^3: 17% 0.7-4.0 µg/m^3: 11%	NH_4: 0.04 µg/m^3 NH_3^*: 0.05 µg/m^3	NH_4: 0.16-0.7 mg/l: 11% 0.7-4.0 mg/l: 3.2% NH_3: 0.16-0.7 mg/l: 9% 0.7-4.0 mg/l: 3%	NH_4^+: 0.01 µg N/m^3 NH_3: 0.05 mg N/l
Denmark	M.MAD: 0.13 µg N/m^3 CoV: 6.6%	0.05	NH_4: M.MAD: 0.01 µg N/m^3; CoV: 1.2% NH_3: M.MAD: 0.01 µg N/m^3; CoV: 0.8%	NH_4^+: 0.02 µg N/m^3 NH_3: 0.01 µg N/m^3
Finland*		0.04	M.MAD: 0.004 µg N/m^3; CoV: 1.5%	0.01 µg/m^3
France*	M.MAD 0.385 µg N/m^3 CoV: 14.5%	0.1		0.02 mg N/l
Germany*	M.MAD < 0.02 µg/m^3			0.01 µg/m^3
Hungary	NH_3: M.MAD: 0.346, CoV: 18.57 NH_4: M.MAD: 0.273, CoV: 13.07	NH_3: 0.34 NH_4: 0.03	NH_3: M.MAD: 0.010, CoV: 0.59 NH_4: M.MAD: 0.005, CoV: 0.59	NH_3: 0.23 µg N/m^3 NH_4: 0.05 µg N/m^3
Ireland				0.08 µg N/m^3
Italy (IT01)	NH_3: RSD: 3.9% at 1 µg N/m^3 NH_4: RSD: 4.2% at 2 µg N/m^3	0.1		0.001 mg N/l
Italy, EU* (IT04)		0.17	CoV: 2.4%	0.074 mg N/l
Latvia		NH_3: 0.09 NH_4: 0.09	RSD: NH_4: 4%; NH_3: 2%	NH_4; 0.03 mg N/l NH_3: 0.02 mg N/l
Lithuania*		0.027	RSD: 4.0% at c<1.0 µg N/m^3 RSD 0.6-1.8% at c>1.0 µg N/m^3	0.04 mg N/l
Netherlands*	NH_3: RSD: <2%	NH_3: 0.1	NH_4, SD: 0.05 µg/m^3	NH_4: 0.2 µg/m^3
Norway		0.05-0.1		
Poland		0.06		0.03 mg N/l
PL05	M.MAD: 0.24; CoV: 20.8%	0.03	RSD: 1.64%	0.01 mg N/l
Russia*	NH_4: RU01: M.MAD 0.05; CoV=5.37% NH_4: RU16: M.MAD 0.03; CoV=5.13% NH_4: RU18: M.MAD 0.01; CoV=0.84%		NH_4: M.MAD: 0.01 µg/m^3 CoV: 3.39 µg/m^3	NH_4: 0.02 mg/l
Slovenia		NH_4^+: 0.05 NH_3: 0.07	RSD: 3.9% (at 0.298 mg N/L)	0.019 mg N/l
Spain [1]		0.03	2.68 %	0.01 µg N/m^3
Sweden	uncertainty (95% conf. int.): 13%	NH_3-N: 0.03; NH_4-N: 0.02		0.02 mg N/l
Switzerland	RSD: 7%	0.2		
Turkey		NH_4: 0.0935 µg N/m^3 NH_3: 0.0717 µg N/m^3	NH_4: M.MAD: 0.0142; CoV: 3.79% NH_3: M.MAD: 0.0224; CoV: 6.42%	NH_4: 0.0339 mg N/l NH_3: 0.0438 mg N/l

[1] From 05.09.2005

*Data from AT, DE, FI, FR, IT, LT, NL and RU are taken from earlier years

Table A5.7: Detection limits and precision of calcium in air.

Country	Measurements		Laboratory	
	Precision	Detection limit, µg N/m^3	Precision	Detection limit
Norway				
Spain				0.02*

* From 05.09.2005

Table A5.8: Detection limits and precision of chloride in air.

Country	Measurements		Laboratory	
	Precision	Detection limit, µg N/m^3	Precision	Detection limit
Norway				
Spain				0.07*

* From 05.09.2005

Table A5.9: Detection limits and precision of magnesium in air.

Country	Measurements		Laboratory	
	Precision	Detection limit, µg N/m^3	Precision	Detection limit
Norway				0.001*

* From 05.09.2005

Table A5.10: Detection limits and precision of potassium in air.

Country	Measurements		Laboratory	
	Precision	Detection limit, µg N/m^3	Precision	Detection limit
Norway				
Spain				0.01*

* From 05.09.2005

Table A5.11: Detection limits and precision of sodium in air.

Country	Measurements		Laboratory	
	Precision	Detection limit, µg N/m^3	Precision	Detection limit
Denmark		0.07 µg/m^3	M.MAD: 0.02 µg/m^3 CoV: 2.1%	0.02 µg/m^3
Norway				
Spain				0.04*

* From 05.09.2005

Table A5.12: Detection limits and precision of sulphate in precipitation.

Country	Measurements		Laboratory	
	Precision	**Detection limit, mg S/l**	**Precision**	**Detection limit, mg S/l**
Austria*		0.012	RSD: 0.92%	0.002
Belarus*				0.100
Belgium		0.02		
Czech Republic	CoV: 5.5% M.MAD: 0.153 mg/l	0.013	Uncertainty: SO_4^{2}: 5%	0.013
Denmark			M.MAD: 0.01 mg S/l; CoV: 1.9%	0.04
Estonia*		0.347		0.221
Finland*			M.MAD: 0.006 mg S/l; CoV: 2.0%	0.02
France*			at c<0.2 mg S/l: RSD = 5-10% at 0.2<c<0.5 mg S/l: RSD = 3-5% at 0.5<c<5 mg S/l: RSD = 1-3%	0.02
Germany*				0.01
Hungary	CoV: 2.03% M.MAD: 0.063 mg/l		M.MAD=0.019; CoV=1.25%	ca. 0.03*
Iceland		0.1	RSD: 4% at 1 mg S/l	0.05
Ireland				0.02
Italy (IT01)	RSD: 1.1% at 1 mg S/l	0.01	RSD: 0.8% at 0.5 mg S/l RSD: 1.6% at 0.05 mg S/l	0.002
Italy, EU* (IT04)			CoV: 1.3%	0.004
Latvia		0.08	CoV: 3.9%	0.012
Lithuania*			RSD: 3.4% at c<0.5 mg S/l RSD: 1.0% at c>0.5 mg S/l	0.02
Netherlands*			SD: 0.2	0.07
Norway	M.MAD: 0.03, CoV: 7%		SD: 0.041 at c=2.23 mgS/l SD: 0.019 at c=0.85 mgS/l	0.01
Poland			RSD: 1% at 6.7 mg S/l RSD: 1.8% at 0.67 mg S/l RSD: 2% at 0.33 mgS/l	0.03
PL05	M.MAD: 0.03; CoV: 2.7%	0.1	M.MAD: 0.01; CoV: 2.0%	0.09
Portugal			0.75%	0.04
Russia*	RU01: M.MAD: 0.02; CoV: 4.6% RU16: M.MAD: 0.02; CoV: 0.05% RU18: M.MAD: 0.01; CoV: 0.75%		CoV: 0.78%	0.02
Serbia and Montenegro				0.15
Slovakia			CoV: 3.18%	0.017
Slovenia		0.08	RSD: 3.8% (at 0.334 mg S/l)	0.041
Spain			CoV: 1.4 %	0.07
Sweden	uncertainty (95% conf. int.): 5% (0.004-1 mg/l) uncertainty (95% conf. int.): 1% (1-28 mg/l)	0.005		0.005
Switzerland	M.MAD: 0.01 mg S/l			0.01
Turkey			M.MAD: 0.017; CoV: 1.54%	0.036
UK*			1%	0.01

*Data from AT, BY, DE, EE, FI, FR, IT, LT, NL, RU and UK are taken from earlier years

Table A5.13: Detection limits and precision of nitrate in precipitation.

Country	Measurements		Laboratory	
	Precision	**Detection limit mg N/l**	**Precision**	**Detection limit mg N/l**
Austria*		0.013	RSD: 0.7%	0.001
Belarus*				0.100
Belgium		0.014		
Czech Republic	CoV: 5.4% M.MAD: 0.155 mg/l	0.009	NO_3^-: uncertainty: 7%	0.009
Denmark			M.MAD: 0.01 mg N/l; CoV: 1.6%	0.01
Estonia*		0.302		0.167
Finland*			M.MAD: 0.003 mg N/l; CoV: 1.5%	0.01
France*			at c<0.2 mg N/l: RSD = 5-10% at 0.2<c<0.5 mg N/l: RSD = 3-5% at 0.5<c<5 mg N/l: RSD = 1-3%	0.02
Germany*				0.01
Hungary	CoV: 5.81% M.MAD: 0.147 mg/l		M.MAD=0.003; CoV=0.25%	ca. 0.03*
Iceland		0.1	RSD: 7% at 1 mg N/l	0.01
Ireland				0.01
Italy (IT01)	RSD: 1.4% at 1 mg N/l	0.01	RSD: 0.7% at 0.5 mg N/l RSD: 1.5% at 0.05 mg N/l	0.002
Italy, EU* (IT04)			CoV: 1.2%	0.011
Latvia		0.05	CoV: 1.9%	0.0052
Lithuania*			RSD: 5.1% at c<0.5 mg N/l RSD: 1.8% at c>0.5 mg N/l	0.013
Netherlands*			SD: 0.01	0.06
Norway	M.MAD: 0.03, CoV: 8%		SD: 0.023 at c=0.86 mg N/ml SD: 0.016 at c=0.39 mg N/ml	0.01
Poland			RSD: 1.7% at 4.5 mg N/l RSD: 1.9% at 0.45 mg N/l RSD: 2.0% at 0.23 mg N/l	0.015
PL05	M.MAD: 0.02; CoV: 4.3%	0.09	M.MAD: 0.02; CoV: 5.9%	0.09
Portugal			0.25%	0.02
Russia*	RU16: M.MAD: 0.01			0.01
Serbia and Montenegro				0.1
Slovakia			CoV: 3.73%	0.01
Slovenia		0.04	RSD: 2.6% (at 0.113 mg N/l)	0.009
Spain			CoV: 1.2%	0.08
Sweden	uncertainty (95% conf. int.): 5% (0.006-1 mg/l) uncertainty (95% conf. int.): 1% (1-6 mg/l)	0.006		0.006
Switzerland	M.MAD: 0.01 mg N/l			0.01
Turkey			M.MAD: 0.007; CoV: 1.53%	0.034
UK*			1%	0.01

*Data from AT, BY, DE, EE, FI, FR, IT, LT, NL, RU and UK are taken from earlier years

Table A5.14: Detection limits and precision of ammonium in precipitation.

Country	Measurements		Laboratory	
	Precision	Detection limit, mg N/l	Precision	Detection limit, mg N/l
Austria*		0.02	RSD 2.98%	0.007
Belarus*				0.050
Belgium		0.016		
Czech Republic	CoV: 11.4% M.MAD: 0.169 mg/l	0.014	uncertainty: N: ≤0.09 mg/l: ≥42% 0.09 mg/l: 42% 0.8 mg/l: 5% 3.0 mg/l: 1%	0.014
Denmark			M.MAD: 0.01 mg N/l; CoV: 1.66%	0.02
Estonia*		0.064		0.077
Finland*			M.MAD: 0.001 mg N/l; CoV: 0.5%	0.002
France*			at c<0.2 mg N/l: RSD = 5-10% at 0.2<c<0.5 mg N/l: RSD = 3-5% at 0.5<c<5 mg N/l: RSD = 1-3%	0.03
Germany*				0.01
Hungary	CoV: 7.66% M.MAD: 0.062 mg/l		M.MAD=0.002; CoV=0.61%	ca. 0.04*
Ireland				0.04
Italy (IT01)	RSD: 0.8% at 0.5 mg N/l	0.005	RSD: 0.5% at 0.5 mg N/l RSD: 1.8% at 0.05 mg N/l	0.001
Italy, EU* (IT04)			CoV: 2.4%	0.014
Latvia		0.07	CoV: 3.7%	0.015
Lithuania*			RSD: 3.3% at c<1.0 mg N/l RSD: 1.0% at c>1.0 mg N/l	0.04
Netherlands*			SD: 0.01	0.03
Norway	M.MAD: 0.06, CoV: 20%		SD: 0.016 at c=0.64 mg/l SD: 0.013 at c=0.32 mgN/l	0.01
Poland			RSD: 2.7% at 1 mg/l RSD: 4.6% at 0.1 mg/l	0.03
PL05	M.MAD: 0.04; CoV: 10.9%	0.01	M.MAD: 0.01; CoV: 1.2%	0.01
Portugal			0.79%	0.03
Russia*	RU18: M.MAD: 0.01; CoV: 0.85%		CoV: 2.24%; M.MAD: 0.02	0.02
Serbia and Montenegro				0.05
Slovakia			CoV: 2.87%	0.01
Slovenia		0.04	RSD: 3.9% (at 0.298 mg N/l)	0.019
Spain			CoV: 2.7%	0.08
Sweden	uncertainty (95% conf. int.): 5% (0.01-1 mg/l) uncertainty (95% conf. int.): 2% (1-10 mg/l)	0.02		0.02
Switzerland	M.MAD: 0.02 mg N/l			0.01
Turkey			M.MAD: 0.017; CoV: 3.81%	0.034
UK*			1%	0.01

*Data from AT, BY, DE, EE, FI, FR, IT, LT, NL, RU and UK are taken from earlier years

Table A5.15: Detection limits and precision of calcium in precipitation.

	Measurements		Laboratory	
Country	Precision	Detection limit, mg/l	Precision	Detection limit, mg/l
Austria*		0.34	RSD: 2.02%	0.003
Belarus*				0.001
Belgium		0.020		
Czech Republic	CoV: 13.5% M.MAD: 0.107 mg/l	0.033	RSD:5.0% uncertainty: 11%	0.033
Denmark			M.MAD: 0.01 mg/l; CoV: 3.1%	0.03
Estonia*		0.407		0.382
Finland*			M.MAD: 0.001 mg/l; CoV: 2.2%	0.005
France*			at c<0.2 mg/l: RSD = 10-20% at 0.2<c<0.5 mg/l: RSD = 5-10% at 0.5<c<5 mg/l: RSD = 1-5%	0.02
Germany*				0.01
Hungary	CoV: 6.62% M.MAD: 0.068 mg/l		M.MAD: 0.008; CoV: 3.83%	ca. 0.01*
Iceland		0.1	RSD: 1-3% at 1<c<6 mg Ca/l	0.02
Ireland				0.05
Italy (IT01)	RSD: 1.8% at 1 mg Ca/l	0.01	RSD: 1.2% at 0.5 mg Ca/l RSD: 3.6% at 0.05 mg Ca/l	0.002
Italy, EU* (IT04)			CoV: 16%	0.014
Latvia		0.06	CoV: 4.5%	0.02
Lithuania*			RSD: 5.5% at c<0.2 mg Ca/l RSD: 1.5% at c>0.2 mg Ca/l	0.02
Netherlands*			SD: 0.01	0.06
Norway	M.MAD: 0.03; CoV: 59%		SD: 0.010 at c=0.27 mg/l SD: 0.006 at c=0.15 mg/l	0.01
Poland			RSD: 0.9% at 2 mg/l RSD: 1.8% at 0.8 mg/l RSD: 2.1% at 0.4 mg/l	0.03
PL05	M.MAD: 0.03; CoV: 8%	0.001	M.MAD: 0.003; CoV: 1.8%	0.001
Portugal			1.31%	0.06
Russia*	RU01: M.MAD: 0.04; CoV: 13.5% RU13: M.MAD: 0.04; CoV: 5.2% RU16: M.MAD: 0.02; CoV: 1.18% RU18: M.MAD: 0.05; CoV: 7.01%		CoV: 5.88%; M.MAD: 0.03	0.04
Serbia and Montenegro				0.05
Slovakia			CoV: 2.29%	0.03
Slovenia		0.14	RSD: 3.8% (at 0.300 mg/l)	0.033
Spain			CoV: 7.4%	0.04
Sweden	uncertainty (95% conf. int.): 31%	0.05		0.05
Switzerland	M.MAD: 0.02 mg/l			0.05
Turkey			M.MAD: 0.007; CoV: 0.60%	0.04
UK*			1%	0.02

*Data from AT, BY, DE, EE, FI, FR, IT, LT, NL, RU and UK are taken from earlier years

Table A5.16: Detection limits and precision of potassium in precipitation.

Country	Measurements		Laboratory	
	Precision	**Detection limit, mg/l**	**Precision**	**Detection limit, mg/l**
Austria*		0.014	RSD: 2.85%	0.005
Belarus*				0.050
Belgium		0.010		
Czech Republic	CoV: 10.4% M.MAD: 0.015 mg/l	0.007	RSD: 6% uncertainty: 12%	0.007
Denmark			M.MAD: 0.01 mg/l; CoV: 4.0%	0.03
Estonia*		0.095		0.1
Finland*			M.MAD: 0.002 mg/l; CoV: 3.5%	0.006
France*			at c<0.2 mg/l: RSD = 10-20% at 0.2<c<0.5 mg/l: RSD = 5-10% at 0.5<c<5 mg/l: RSD = 1-5%	0.02
Germany*				0.01
Hungary	CoV: 5.24% M.MAD: 0.010 mg/l		M.MAD: 0.002; CoV: 2.22%	ca. 0.01*
Iceland		0.1	RSD: 5-10% at 1<c<6 mg K/l	0.4
Ireland				0.05
Italy (IT01)	RSD: 1.4% at 1 mg K/l	0.01	RSD: 1.5% at 0.5 mg K/l RSD: 3.0% at 0.05 mg K/l	0.03
Italy, EU* (IT04)			CoV: 3.7%	0.005
Latvia		0.07	CoV: 2.3%	0.03
Lithuania*			RSD: 8.1% at c<0.5 mg K/l	0.02
Netherlands*			SD: 0.01	0.04
Norway	M.MAD: 0.03; CoV: 59%		SD: 0.027; c=0.61 mg/l SD: 0.015; c=0.20 mg/l	0.01
Poland			RSD: 1.0% at 0.5 mg/l RSD: 2.9% at 0.1 mg/l RSD: 2.4% at 0.05 mg/l	0.02
PL05	M.MAD: 0.026; CoV: 22.5%	0.003	M.MAD: 0.004; CoV: 6.7%	0.002
Portugal			1.69%	0.077
Russia*	RU01: M.MAD: 0.01; CoV: 2.41% RU13: M.MAD: 0.03; CoV: 4.15% RU16: M.MAD: 0.04; CoV: 5.01% RU18: M.MAD: 0.04; CoV: 5.1%		CoV: 5.20%; M.MAD: 0.02	0.03
Serbia and Montenegro				0.02
Slovakia			CoV: 2.80%	0.03
Slovenia		0.04	RSD: 6.2% (at 0.100 mg/l)	0.018
Spain			CoV: 18%	0.05
Sweden	uncertainty (95% conf. int.): 10% (0.08-1 mg/l) 6% (1-15 mg/l)	0.08		0.08
Switzerland	M.MAD: 0.01 mg/l			0.01
Turkey			M.MAD: 0.006; CoV: 2.4%	0.015
UK*			1%	0.02

*Data from AT, BY, DE, EE, FI, FR, IT, LT, NL, RU and UK are taken from earlier years

Table A5.17: Detection limits and precision of chloride in precipitation.

Country	Measurements		Laboratory	
	Precision	**Detection limit, mg/l**	**Precision**	**Detection limit, mg/l**
Austria*		0.034	RSD: 2.65%	0.009
Belarus*				0.050
Belgium		0.030		
Czech Republic	CoV: 14.5% M.MAD: 0.072 mg/l	0.018	Uncertainty: 6%	0.018
Denmark			M.MAD: 0.09 mg/l; CoV: 2.5%	0.05
Estonia*		0.463		0.155
Finland*			M.MAD: 0.003 mg/l; CoV: 1.4%	0.01
France*			at c<0.2 mg/l: RSD = 10-20% at 0.2<c<0.5 mg/l: RSD = 5-10% at 0.5<c<5 mg/l: RSD = 1-5%	0.05
Germany*				0.01
Hungary	CoV: 11.51% M.MAD: 0.052 mg/l		M.MAD: 0.032; CoV: 13.17%	ca. 0.1*
Iceland		0.1	RSD: 4% at 1 mg Cl/l	0.1
Ireland				0.05
Italy (IT01)	RSD: 0.7% at 0.5 mg Cl/l	0.005	RSD: 0.6% at 0.5 mg Cl/l RSD: 1.1% at 0.05 mg Cl/l	0.001
Italy, EU* (IT04)			CoV: 2.1%	0.009
Latvia		0.08	CoV: 4.4%	0.07
Lithuania*			RSD: 4.7% at c<0.5 mg Cl/l RSD: 2.3% at c>0.5 mg Cl/l	0.01
Netherlands*			SD: 0.04	0.18
Norway	M.MAD: 0.16, CoV: 22%		SD: 0.028 at c=1.16 mg/l SD: 0.02 at c=0.46 mg/l	0.01
Poland			RSD: 1.9% at 10 mg/l RSD: 2% at 1 mg/l RSD: 2.6% at 0.5 mg/l	0.02
PL05	M.MAD: 0.12; CoV: 24.5%	0.06	M.MAD: 0.02; CoV: 5.6%	0.06
Portugal			0.53%	0.03
Russia*	RU01: M.MAD: 030; CoV: 2.70% RU13: M.MAD: 0.04; CoV: 2.15% RU16: M.MAD: 0.05; CoV: 3.12% RU18: M.MAD: 0.04; CoV: 4.10%			0.03
Serbia and Montenegro				0.05
Slovakia			CoV: 3.75%	0.04
Slovenia		0.20	RSD: 4.3% (at 0.500 mg/l)	0.07
Spain			CoV: 4.9%	0.31
Sweden	uncertainty (95% conf. int.): 8% (0.05-1 mg/l) uncertainty (95% conf. int.): 3% (1-32 mg/l)	0.05		0.05
Switzerland	M.MAD: 0.02 mg/l			0.02
Turkey			M.MAD: 0.069; CoV: 7.9%	0.043
UK*			1%	0.02

*Data from AT, BY, DE, EE, FI, FR, IT, LT, NL, RU and UK are taken from earlier years

Table A5.18: Detection limits and precision of magnesium in precipitation.

Country	Measurements		Laboratory	
	Precision	**Detection limit, mg/l**	**Precision**	**Detection limit, mg/l**
Austria*		0.023	RSD: 1.34%	0.002
Belarus*				0.001
Belgium		0.010		
Czech Republic	CoV: 10.6% M.MAD: 0.015 mg/l	0.001	RSD: 3% uncertainty: 7%	0.001
Denmark			M.MAD: 0.02 mg/l; CoV: 6.8%	0.02
Estonia*		0.077		0.089
Finland*			M.MAD: 0.001 mg/l; CoV: 2.1%	0.003
France*			at c<0.2 mg/l: RSD = 10-20% at 0.2<c<0.5 mg/l: RSD = 5-10% at 0.5<c<5 mg/l: RSD = 1-5%	0.02
Germany*				0.01
Hungary	CoV: 3.47% M.MAD: 0.010 mg/l		M.MAD: 0.004; CoV: 6.85%	ca. 0.01*
Iceland		0.1	RSD: 1-3% at 1<c<6 mg Mg/l	0.005
Ireland				0.05
Italy (IT01)	RSD: 1.1% at 0.5 mg Mg/l	0.005	RSD: 0.8% at 0.5 mg Mg/l RSD: 3.2% at 0.05 mg Mg/l	0.001
Italy, EU* (IT04)			CoV: 2.2%	0.002
Latvia		0.05	CoV: 4.1%	0.020
Netherlands*			SD: 0.01	0.02
Norway	M.MAD: 0.01, CoV: 30%		SD: 0.012 at c=0.31 mg/l SD: 0.007; c=0.19 mg/l	0.01
Poland			RSD: 1.0% at 0.25mg/l RSD: 1.0% at 0.1 mg/l RSD: 2.4% at 0.025 mg/l	0.007
PL05	M.MAD: 0.004; CoV: 13.4%	0.001	M.MAD: 0.001; CoV: 2.9%	0.0001
Portugal			0.60%	0.03
Russia*	RU01: M.MAD: 0.01 RU13: CoV: 1.84% RU18: M.MAD: 0.03; CoV: 0.64%		CoV: 8.17%; M.MAD: 0.09	0.001
Serbia and Montenegro				0.005
Slovakia			CoV: 2.01%	0.01
Slovenia		0.03	RSD: 4.4% (at 0.100 mg/l)	0.013
Spain			CoV: 7.2%	0.02
Sweden	uncertainty (95% conf. int.): 18%	0.03		0.03
Switzerland	M.MAD: 0.01 mg/l			0.003
Turkey			M.MAD: 0.002; CoV: 1.03%	0.005
UK*			1%	0.01

*Data from AT, BY, DE, EE, FI, FR, IT, NL, RU and UK are taken from earlier years

Table A5.19: Detection limits and precision of sodium in precipitation.

Country	Measurements		Laboratory	
	Precision	Detection limit, mg/l	Precision	Detection limit, mg/l
Austria*		0.030	RSD: 1.8%	0.003
Belarus*				0.050
Belgium		0.050		
Czech Republic	CoV: 15.5% M.MAD: 0.019 mg/l	0.004	RSD: 3% uncertainty: 6%	0.004
Denmark		DK03: 0.09 µg/m³ DK05: 0.14 µg/m³ DK08: 0.09 µg/m³	M.MAD: 0.10 mg/l; CoV: 2.5%	0.04
Estonia*		0.095		0.1
Finland*			M.MAD: 0.001 mg/l; CoV: 0.9%	0.002
France*			at c<0.2 mg/l: RSD = 10-20% at 0.2<c<0.5 mg/l: RSD = 5-10% at 0.5<c<5 mg/l: RSD = 1-5%	0.02
Germany*				0.01
Hungary	CoV: 10.65% M.MAD: 0.073 mg/l		M.MAD: 0.010 mg/l; CoV: 4.71%	ca. 0.01*
Iceland		0.1	RSD: 1-3% at 1<c<6 mg Na/l	0.01
Ireland				0.05
Italy (IT01)	RSD: 0.9% at 0.5 mg Na/l	0.005	RSD: 1.3% at 0.5 mg Na/l RSD: 2.0% at 0.05 mg Na/l	0.001
Italy, EU* (IT04)			CoV: 2.1%	0.011
Latvia		0.04	CoV: 3.6%	0.03
Lithuania*			RSD: 2.4-5.7%	0.02
Netherlands*			SD: 0.01	0.05
Norway	M.MAD: 0.09, CoV: 22%		SD: 0.025 at c=0.75 mg/l SD: 0.011 at c=0.30 mg/l	0.01
Poland			RSD: 0.8% at 1 mg/l RSD: 1.4% at 0.4 mg/l RSD: 2.3% at 0.2 mg/l	0.02
PL05	M.MAD: 0.023; CoV: 14.6%	0.002	M.MAD: 0.004; CoV: 4.6%	0.0005
Portugal			0.54%	0.025
Russia*	RU01: M.MAD: 0.02; CoV: 3.71% RU13: M.MAD: 0.03; CoV: 2.10% RU16: M.MAD: 0.02; CoV: 0.75% RU18: M.MAD: 0.03; CoV: 3.12%		CoV: 0.45%	0.01
Serbia and Montenegro				0.02
Slovakia			CoV: 2.11%	0.04
Slovenia		0.097	RSD: 3.9% (at 0.200 mg/l)	0.024
Spain			CoV: 14%	0.1
Sweden	uncertainty (95% conf. int.): 9%	0.12		0.12
Switzerland	M.MAD: 0.02 mg/l			0.02
Turkey			M.MAD: 0.013; CoV: 1.79%	0.064
UK*			1%	0.01

*Data from AT, BY, DE, EE, FI, FR, IT, LT, NL, RU and UK are taken from earlier years

Table A5.20: Detection limits and precision of arsenic in precipitation.

Country	Measurements		Laboratory	
	Precision	Detection limit, µg/l	Precision	Detection limit, µg/l
Belgium		0.25		0.50
Estonia		0.2		
Finland			M.MAD: 0.008 µg/l; CoV: 10.5%	0.006
Germany				0.004
Iceland				0.1
Latvia			CoV: 5.5%	1.2
Lithuania			SD: 0.02	0.05
Netherlands			SD: 0.02	0.06
Norway				0.05
Poland PL05			7.5%	0.05
Slovakia			CoV: 2.06%	0.04
Spain				1.50
Sweden*				0.1
UK				0.04 mg/l

* NILU is analysing our samplers

Table A5.21: Detection limits and precision of cadmium in precipitation.

Country	Measurements		Laboratory	
	Precision	Detection limit, µg/l	Precision	Detection limit, µg/l
Belgium		0.025		0.050
Czech Republic	CoV: 2.32% M.MAD: 0.021 µg/l	0.01	RSD: 7% uncertainty: 14%	0.01
Estonia		0.01		
Finland			M.MAD: 0.002 µg/l CoV: 3.0%	0.002
Germany				0.003
Iceland				0.005
Latvia			CoV: 5.7%	0.04
Lithuania			SD: 0.002	0.006
Netherlands			SD: 0.002	0.01
Norway				0.002
Poland PL05			8.2%	0.001
Slovakia			CoV: 3.18%	0.03
Spain				0.15
Sweden*				0.1
UK				0.04 mg/l

* NILU is analysing our samplers

Table A5.22: Detection limits and precision of chromium in precipitation.

Country	Measurements		Laboratory	
	Precision	Detection limit, µg/l	Precision	Detection limit, µg/l
Belgium		0.25		0.50
Finland			M.MAD: 0.04 µg/l; CoV: 21.8%	0.02
Germany				0.01
Iceland				0.2
Lithuania			SD: 0.05	0.2
Netherlands			SD: 0.08	0.3
Norway				0.1
Poland PL05				0.02
Slovakia			CoV: 2.26%	0.04
Spain				1.15
Sweden*				0.5
UK				0.008 mg/l

* NILU is analysing our samplers

Table A5.23: Detection limits and precision of copper in precipitation.

Country	Measurements		Laboratory	
	Precision	Detection limit, µg/l	Precision	Detection limit, µg/l
Belgium		0.50		1.00
Estonia		26		
Finland			M.MAD: 0.057 µg/l; CoV: 4.7%	0.05
Germany				0.01
Iceland				0.1
Latvia			CoV: 4.6%	0.4
Lithuania			SD: 0.1	0.3
Netherlands			SD: 0.05	0.2
Norway				0.5
Poland PL05				0.01
Slovakia			CoV: 2.81%	0.2
Spain				0.42
Sweden*				0.5
UK				0.003 mg/l

* NILU is analysing our samplers

Table A5.24: Detection limits and precision of iron in precipitation.

Country	Measurements		Laboratory	
	Precision	Detection limit, µg/l	Precision	Detection limit, µg/l
Belgium		7.5		15
Czech Republic	CoV: 1.02%, M.MAD : 0.012mg/l	6	RSD: 7% uncertainty: 15%	6
Finland			M.MAD: 3.21 µg/l CoV: 9.6%	1.5
Germany				0.5
Netherlands			SD: 3	13

Table A5.25: Detection limits and precision of manganese in precipitation.

Country	Measurements		Laboratory	
	Precision	**Detection limit, µg/l**	**Precision**	**Detection limit, µg/l**
Belgium		0.375		0.75
Czech Republic	CoV: 10.75% M.MAD: 0.839 µg/l	0.4	RSD: 6% uncertainty: 12%	0.4
Finland			M.MAD: 0.073 µg/l CoV: 3.4%	0.005
Latvia			CoV: 8.8%	10
Slovakia			3.5%	0.05
Sweden*				0.5

* NILU is analysing our samplers

Table A5.26: Detection limits and precision of nickel in precipitation.

Country	Measurements		Laboratory	
	Precision	**Detection limit, µg/l**	**Precision**	**Detection limit, µg/l**
Belgium		0.25		0.50
Czech Republic	CoV: 9.12% M.MAD: 0.210 µg/l	0.6	RSD: 8% uncertainty: 16%	0.6
Finland			M.MAD: 0.04 µg/l CoV: 15.5%	0.02
Germany				0.2
Iceland				0.2
Latvia			CoV: 6.0%	0.9
Lithuania			SD: 0.1	0.3
Netherlands			SD: 0.05	0.06
Norway				0.1
Poland PL05				0.03
Slovakia			CoV: 1.75%	0.1
Spain				3.57
Sweden*				0.5
UK				0.009 mg/l

* NILU is analysing our samplers

Table A5.27: Detection limits and precision of lead in precipitation.

Country	Measurements		Laboratory	
	Precision	**Detection limit, µg/l**	**Precision**	**Detection limit, µg/l**
Belgium		0.25		0.50
Czech Republic	CoV: 10.73% M.MAD: 0.325 µg/l	0.5	RSD: 8% uncertainty: 15%	0.5
Estonia		0.6		
Finland			M.MAD: 0.049 µg/l CoV: 3.7%	0.03
Germany				0.002
Iceland				0.01
Latvia			CoV: 4.0%	0.4
Lithuania			SD: 0.03	0.09
Netherlands			SD: 0.02	0.06
Norway				0.01
Poland PL05				0.03
Slovakia			CoV: 2.5%	0.2
Spain				2.07
Sweden*				0.1
UK				0.002 mg/l

* NILU is analysing our samplers

Table A5.28: Detection limits and precision of zinc precipitation.

Country	Measurements		Laboratory	
	Precision	Detection limit, µg/l	Precision	Detection limit, µg/l
Belgium		5		10
Czech Republic	CoV: 8.92% M.MAD: 0.002 mg/l	3	RSD: 6% uncertainty: 11%	3
Finland			M.MAD: 0.183 µg/l CoV: 3.1%	0.03
Germany				0.2
Iceland				0.1
Latvia			CoV: 6.0%	10
Lithuania			SD: 0.3	1.0
Netherlands			SD: 0.5	1.9
Norway				0.1
Poland PL05	M.MAD: 2.0 µg Zn/l; CoV: 24%	0.2	M.MAD: 0.2; CoV 2%	0.05
Slovakia			CoV: 7.35%	1.7
Spain				0.16
Sweden*				0.5
UK				0.1 mg/l

* NILU is analysing our samplers

Table A5.29: Detection limits and precision of vanadin (V) precipitation.

Country	Measurements		Laboratory	
	Precision	Detection limit, ng/m^3	Precision	Detection limit
Sweden*				0.5

* NILU is analysing our samplers

Table A5.30: Detection limits and precision of cobalt (Co) precipitation.

Country	Measurements		Laboratory	
	Precision	Detection limit, ng/m^3	Precision	Detection limit
Sweden*				0.1

* NILU is analysing our samplers

Table A5.31: Detection limits and precision of arsenic in air.

Country	Measurements		Laboratory	
	Precision	Detection limit, ng/m^3	Precision	Detection limit
Belgium		0.20		0.35 ng/m^3
Czech Republic	CoV: 8.56% M.MAD: 0.052 ng/m^3	0.02	RSD: 10% uncertainty: 20%	0.107 µg/l
Germany				0.004 µg/l
Iceland		0.0004		
Latvia		0.04	CoV: 3.0%	1.7 µg/l
Lithuania			SD: 0.3	1 ng/m^3
Netherlands			0.04	0.2 ng/m^3
Norway, NO42				0.04 ng/m^3
Poland PL05		0.1		0.08 µg/filter
Slovakia			CoV: 1.49%	4.7 ng/filter
Slovenia				0.05 µg/filter
Spain*				0.1
Sweden**				0.03 ng/ml

* From 05.09.2005 (only ES09)
** NILU is analysing our samplers

Table A5.32: Detection limits and precision of cadmium in air.

Country	Measurements		Laboratory	
	Precision	Detection limit, ng/m³	Precision	Detection limit
Belgium		0.02		0.04 ng/m³
Czech Republic	CoV: 15.1% M.MAD: 0.021 ng/m³	0.005	RSD: 5% uncertainty: 20%	0.022 µg/l
Germany				0.003 µg/l
Iceland		0.0002		
Lativia		0.01	CoV: 2.0%	0.30 µg/l
Lithuania			SD: 0.01	0.03 ng/m³
Netherlands			0.01	0.04 ng/m³
Norway, NO42				0.004 ng/m³
Poland PL05		0.1		0.1 µg/filter
Slovakia			CoV: 1.95%	1.0 ng/filter
Slovenia				0.025 ng/m³
Spain*				0.02 ng/m³
Sweden**				0.025 µg/filter

* From 05.09.2005 (only ES09)
** NILU is analysing our samplers

Table A5.33: Detection limits and precision of chromium in air.

Country	Measurements		Laboratory	
	Precision	Detection limit, ng/m³	Precision	Detection limit
Belgium		0.4		0.7 ng/m³
Iceland		0.02		
Norway				1 ng/m³
Poland PL05		1		0.75 µg/filter
Slovakia			CoV: 2.61%	8 ng/filter
Spain*				1.55

* From 05.09.2005 (only ES09)

Table A5.34: Detection limits and precision of copper in air.

Country	Measurements		Laboratory	
	Precision	Detection limit, ng/m³	Precision	Detection limit
Belgium		0.6		1.1 ng/m³
Czech Republic	uncertainty: 26%	0.04	uncertainty: 10%	0.195 µg/l
Germany				0.01 µg/l
Iceland		0.0004		
Latvia		0.23	CoV: 1.5%	4.0 µg/l
Lithuania			SD: 0.01	0.5 ng/m³
Norway				0.2 ng/m³
Poland PL05		1		0.80 µg/filter
Slovakia			CoV: 1.90%	4 ng/filter
Spain*				0.18 ng/m³

* From 05.09.2005 (only ES09)

Table A5.35: Detection limits and precision of manganese in air.

Country	Measurements		Laboratory	
	Precision	Detection limit, ng/m^3	Precision	Detection limit
Belgium		0.4		0.7 ng/m^3
Czech Republic	uncertainty: 14%	0.015	uncertainty: 20%	0.076 µg/l
Germany				0.002 µg/l
Iceland		0.0008		
Latvia		0.22	CoV: 2.0%	11.0 µg/l
Norway				0.01 ng/m^3
Slovakia				1.3 ng/filter

Table A5.36: Detection limits and precision of nickel in air.

Country	Measurements		Laboratory	
	Precision	Detection limit, ng/m^3	Precision	Detection limit
Belgium		0.5		10 ng/m^3
Czech Republic	uncertainty: 23%	0.01	uncertainty: 46%	0.481 µg/l
Germany				0.01 µg/l
Iceland		0.0001		
Latvia		0.14	CoV: 4.0%	5.3 µg/l
Lithuania			SD: 0.2	0.8 ng/m^3
Norway				0.09 ng/m^3
Poland PL05		1		0.72 µg/filter
Slovakia			CoV: 2.01%	10 ng/filter
Slovenia				0.1 µg/filter
Spain*				0.83
Sweden**				0.24 ng/ml

* From 05.09.2005 (only ES09)
** NILU is analysing our samplers

Table A5.37: Detection limits and precision of lead in air.

Country	Measurements		Laboratory	
	Precision	Detection limit, ng/m^3	Precision	Detection limit
Belgium		1.0		1.9 ng/m^3
Czech Republic	CoV: 9.01% M.MAD: 0.734 ng/m^3	0.01	RSD: 3% uncertainty: 6%	0.05 µg/l
Germany				0.002 µg/l
Iceland		0.00004		
Latvia		0.09	CoV: 2.0%	2.0 µg/l
Lithuania			SD: 0.1	0.5 ng/m^3
Netherlands			0.06	0.2 ng/m^3
Norway				0.1 ng/m^3
Poland PL05		0.4		0.28 µg/filter
Slovakia			CoV: 2.34%	3 ng/filter
Slovenia				1.0 µg/filter
Spain*				0.19 ng/m^3
Sweden**				0.017 ng/ml

* From 05.09.2005 (only ES09)
* NILU is analysing our samplers

Table A5.38: Detection limits and precision of zinc in air.

Country	Measurements		Laboratory	
	Precision	Detection limit, ng/m^3	Precision	Detection limit
Belgium		1.0		2.8 ng/m^3
Iceland		0.0004		
Latvia		0.53	CoV: 3.5%	20 μg/l
Lithuania			SD: 0.6	2 ng/m^3
Netherlands			3.6	15 ng/m^3
Norway				0.2 ng/m^3
Poland PL05				
Slovakia			CoV: 2.22%	70 ng/filter
Spain*				5.28

* From 05.09.2005 (only ES09)

Table A5.39: Detection limits and precision of measurements of particulate matter.

Country	Precision	Detection limit
Belgium		5 $\mu g/m^3$
Germany (PM_{10})		1 $\mu g/m^3$
Italy IT01 (PM_{10})	2.00%	2 $\mu g/m^3$
Lithuania ($PM_{2.5}$)	1 $\mu g/m^3$	3 $\mu g/m^3$
Netherlands		10 $\mu g/m^3$
Norway (PM_{10})	RSD: 5%	0.2 $\mu g/m^3$
Poland PL05 (PM_{10})		1 $\mu g/m^3$
Slovakia (TSP)	CoV: 1.80%	0.06 mg/filter
Slovenia (PM_{10} and $PM_{2.5}$)		1 $\mu g/m^3$
Spain (PM_{10} and $PM_{2.5}$)	2.00%	1 $\mu g/m^3$
Sweden (PM_{10}, hr mean)	2.2 $\mu g/m^3$	3 $\mu g/m^3$
Switzerland ($PM_{10}/PM_{2.5}/PM_1$)	Uncertainty (95% conf. int.): 13%	3 $\mu g/m^3$
UK	4 $\mu g\ m^{-3}$	

Table A5.40: Detection limits and precision of volatile organic carbons, VOC.

Compound	Laboratory detection limit. [ppb]						
	Czech Republic	France	Germany	Finland	Spain	Slovak Republic	UK
VOC (general)		0.01	0.01		0.01	0.01	0.01
Ethane	0.055			0.006			
Ethene	0.020			0.008			
Ethyne	0.041			0.020			
Propane	0.008			0.007			
Propene	0.011			0.010			
Propyne	0.003			0.013			
N-butane	0.003			0.007			
2-methyl propane (i-butane)	0.005			0.008			
2-methyl propene (i-butene)	0.006			0.008			
1-butene	0.009			0.008			
Trans-2-butene	0.004			0.009			
Cis-2-butene	0.008			0.007			
1,3-butadiene	0.009			0.009			
N-pentane	0.003			0.007			
2-methyl butane (i-pentane)	0.008			0.007			
1-pentene							
Trans-2-pentene	0.012			0.011			
Cis-2-pentene	0.009			0.010			
2-methyl pentane	0.003			0.008			
3-methyl pentane	0.012			0.006			
Isoprene	0.006			0.010			
N-hexane	0.011			0.006			
Hexene							
Cyclohexane	0.003			0.006			
N-heptane	0.023			0.005			
Benzene	0.012			0.004			
Methyl benzene (toluene)	0.021						
Ethyl benzene	0.019						
1,3-dimethyl benzene (m-xylene)	0.058						
1,2-dimethyl benzene (o-xylene)	0.013						
1,3,5-trimethyl benzene	0.013						
1,2,4-trimethyl benzene	0.007						
2 and 3-methyl pentane (combined areas)	5.8						
OC in general					0.05 ng/l		
		in ug/m^3					
methanal		0.03					
ethanal		0.025					
propanone		0.03					
propenal		0.03					
propanal		0.03					
MVK		0.025					
butanal+isobutanal		0.04					
benzaldéhyde		0.03					
pentanal+tolualdehyde		0.04					
hexanal		0.03					
glyoxal		0.025					
methylglyoxal		0.03					
methylpropenal		0.025					
ethylmethylketone		0.03					

Table A5.41: Detection limits and precision of persistent organic pollutants (POP).

Compound	Laboratory detection limit, pg/m^3						
	Czech Republic	Norway	UK	Iceland	Latvia	Sweden	
						pg/m^3	ng/m^{2}day
PCB 28	1	0.7		1.0 – 8.0		0.05	0.03
PCB 31	1	0.5		0.7 – 7.6			
PCB 52	1	0.2		0.2 – 2.2		0.05	0.03
PCB 101	1	0.06		0.2 – 0.3		0.05	0.03
PCB 105	1	0.01		0.2 – 0.3			
PCB 118	1	0.05		0.3		0.05	0.03
PCB 138	1	0.05		0.2 – 0.3		0.03	0.02
PCB 153	1	0.05		0.2 – 0.3		0.03	0.02
PCB 153	1	0.05		0.2 – 0.3			
PCB 180	1	0.02		0.2 – 0.3		0.03	0.02
alfa-HCH	1	0.1		0.2 – 0.5		0.03	0.02
beta-HCH	1			0.3 – 0.7		0.03	0.02
gamma-HCH	1	0.3		0.3 – 0.5		0.03	0.02
delta-HCH	1						
HCB	1	0.05		0.2 – 1.0			
p,p'-DDE	1	0.05		0.3		0.03	0.02
p,p'-DDD	1	0.05		0.3		0.03	0.02
p,p'-DDT	1	0.05		0.3 – 1.0		0.03	0.02
Hexachlorbenzene	1	0.05					
Pentachlorbenzene	1						
tr-chlordane		0.06		0.2			
cis-chlordane		0.08		0.2			
gamma-chlordane						0.03	0.02
alpha-chlordane						0.03	0.02
tr-nonachlor		0.04		0.2		0.03	0.02
cis-nonachlor		0.02					
Dieldrin				0.3			
Toxaphene				0.2 – 0.3			
PBDE 47						0.03	0.02
PBDE 100						0.03	0.02
PBDE 99						0.03	0.02
PAH (general)		1					
Naphtalene	5						
Acenaphthylene	5						
Acenaphthene	5						
Fluorene	5						
Phenanthrene	5					0.5	0.3
Anthracene	5					0.1	0.1
Fluoranthene	5					2	0.5
Pyrene	5					2	0.5
Benz[a]antracene	5					1	0.5
Chrysene	5					0.5	0.3
Benzo[b]fluorantene	5					1	0.5
Benzo[k]fluorantene	5					0.5	0.1
Benzo[a]pyrene	5		< 10		< 50	1	0.3
Indeno[123cd]pyrene	5					8	0.4
Dibenz[ah]anthracene	5					1	0.6
Benzo[ghi]perylene	5					3	2

Annex 6

Classification of the QA flags

Table A6.1: Criteria used for classification of data quality based on field comparison results.

	M.MAD / CoV	≤ 0.25 µg S/m³	[0, 25 %]	≤ 0.50 µg S or N/m³	< 25%, 50 %]	> 0.50 µg S or N/m³ and < 50%, → >
Regression slope (a) Ref = a*Lab	[1.50, → >	80	81	82	83	84
	[1.30, 1.50]	60	61	62	63	64
	[1.20, 1.30]	40	41	42	43	44
	[1.10, 1.20]	20	21	22	23	24
	[0.90, 1.10]	00	01	02	03	04
	[0.80, 0.90]	10	11	12	13	14
	[0.70, 0.80]	30	31	32	33	34
	[0.50, 0.70]	50	51	52	53	54
	< ←, 0.50]	70	71	72	73	84

Table A6.2: Criteria used for classification of data quality based on laboratory comparison results.

	2RSD %	<0, 1*DQO]	<1*DQO - 2*DQO]	<2*DQO - 4*DQO]	<4*DQO, → >
RB %	< ←, -40 >	80	81	82	83
	[-40, -20 >	60	61	62	63
	[-20, -10 >	40	41	42	43
	[-10, - 5 >	20	21	22	23
	[-5, +5]	00	01	02	03
	< 5, 10]	10	11	12	13
	< 10, 20]	30	31	32	33
	< 20, 40]	50	51	52	53
	< 40, -→ >	70	71	72	73