EMEP/CCC-Report 7/2008

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

The twenty-fifth intercomparison of analytical methods within EMEP

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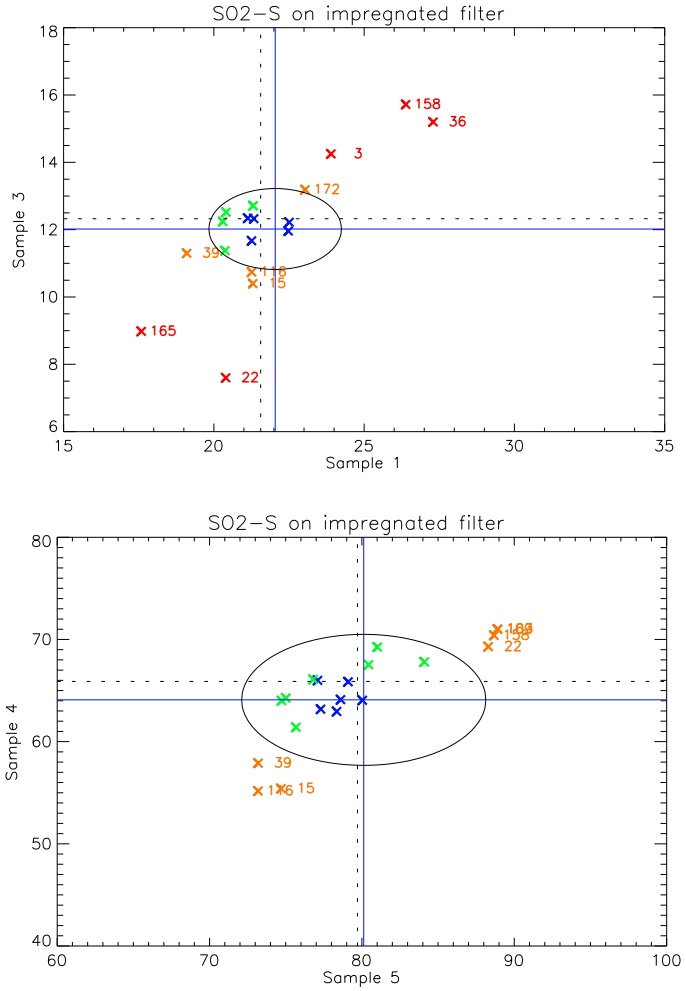

Youden plot of SO_2-S on impregnated filter

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The twenty-fifth intercomparison of analytical methods within EMEP

1. Introduction

40 different laboratories in European countries are performing chemical analysis of air and precipitation samples within EMEP (Co-operative Programme for Monitoring and Evaluation of Long-range Transmission of Air Pollutants in Europe). Since the measurement programme is based on individual national networks, the participating laboratories apply different sampling and analytical methods. Most of the methods used are described in the manual for sampling and chemical analysis (EMEP, 1996).

In order to improve the data comparability and to get a picture of the different laboratories' performance, interlaboratory comparisons are organised by the Chemical Co-ordinating Centre (CCC) at the Norwegian Institute for Air Research (NILU). So far twenty-five intercomparisons have been arranged (Hanssen, 1988, 1990; Hanssen et al., 1983; Hanssen and Ladegård, 1984, 1985, 1987; Hanssen and Skjelmoen, 1992, 1994, 1995, 1996, 1997, 2001; Thrane, 1978, 1980a, 1980b, 1981; Uggerud et al., 2001, 2002, 2003, 2004; Hjellbrekke et al., 2005; Uggerud and Hjellbrekke, 2007).

Since 2000 the laboratory intercomparisons within EMEP have also been open for participation of laboratories from other networks.

This report gives the results of the twenty-fifth interlaboratory test.

2. Organisation of the intercomparison

The samples for the twenty-fifth intercomparison (see Table 2) were prepared and distributed to 89 laboratories in October 2007.

Most of the laboratories had returned their results to the CCC within one month after the deadline given as 15 December 2007. A total of 66 laboratories have returned their results. This includes 32 EMEP-laboratories.

The participating laboratories received the theoretical (expected) values by e-mail 29.01.2008. The laboratories were given the opportunity to compare their results with the expected ones, and give corrected values if obvious mistakes e.g. misprints had occurred. A few corrections were reported. In those cases the corrected value is used in this report. In accordance with the decision of the Steering Body of EMEP, the results are presented in such a way that the different laboratories are identified. Tables 3a and 3b give the names of the participating laboratories together with the numbers used when presenting the results in tables and figures.

Information received on the analytical methods used is given in Tables 4–9.

3. Data handling

The data reported from the participants are presented in Tables 13-28 and Figures 2-17. An overview of all results is presented in Tables 10 and 11.

3.1 Data analysis

The reported values are presented in the tables in decreasing order together with the number of the laboratory. The expected (theoretical) value, the number of results, the arithmetic mean value, the median, the standard deviation and the relative standard deviation in percent are also given. After the first statistical run with all results included, the calculation was repeated with the outliers excluded. The outliers (unused) are defined as the results more than two standard deviations from the mean value in the first run.

The ratio between expected values (theoretical) to reported values, the ratio between measured to calculated conductivity and the ratio between equivalent concentrations of anions to equivalent concentrations cations, are presented in tables.

3.2 Youden plot

The Youden plot is a graphical method to analyse inter-laboratory data where the samples are ordered in pairs with similar concentrations. One plot is made for each pair of samples and gives results for all participating laboratories. The plots visualize both systematic and random errors.

The plot is draw as a scatter plot where each point represents a pair of concentrations for one laboratory. The expected values for the two samples are drawn as solid blue lines. The arithmetic average of the measured values excluding outliers is drawn as dotted lines. The solid lines divide the plot in four quadrants and a 45° reference line going through the intercept of the solid lines may be added.

If errors are due to random factors, the points will be evenly distributed around the mean value and situated in all four quadrants.

If systematic errors dominate, the results will be close to 45° reference line, and be situated in the upper right quadrant (overestimation) or lower left quadrant (underestimation).

Drawing a line from a given point perpendicular on the 45° reference line gives two line segments, one from the point to the intercept on the reference line (a), and one continuing from the intercept to the point representing the expected values (b). The lengths of these line segments are measures of the random and systematic errors respectively.

Ellipses with radii corresponding to the data quality objectives (DQO, Table 1) are added in each plot. The data points are colour coded depending on the magnitude of errors as given in Table 1.

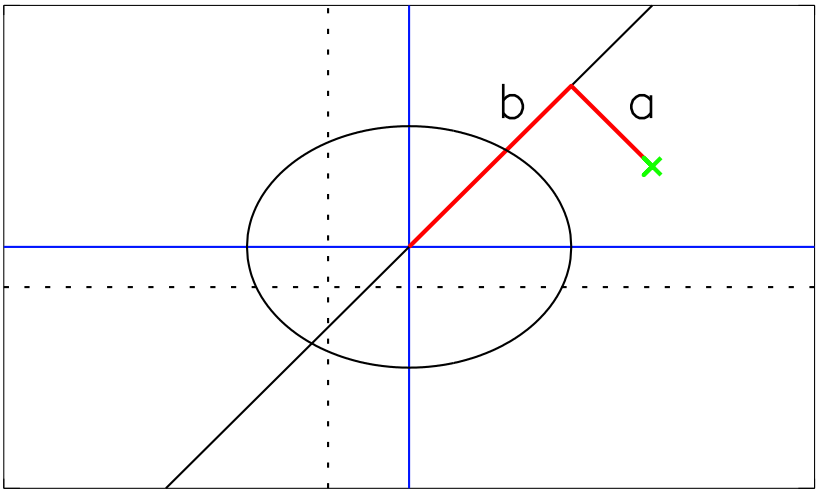


Figure 1: Youden plot showing concentrations for a pair of samples (green), expected values (blue lines), average of measured values (dotted lines) and random and systematic errors (red lines)

In Figures 18–33 the reported data are presented in Youden plots.

Table 1: Youden plot parameters.

Radii	**Components**
10%	SO_2 in abs.sol, NO_2 in abs.sol.
20%	SO_2, HNO_3 and NH_3 in impregnated filter
Radii = DQO	**Components**
10% accuracy or better	SO_4^{2-} -, NO_3^-
15% accuracy or better	NH_4^+, Cl^-, Ca^{2+}, K^+, Mg^{2+}, Na^+ , cond, H+ (from pH)
0.1 units	pH
Criteria	**Colour**
Within 0.5*DQO	Blue
Within DQO	Green
Within 2*DQO	Orange
> 2*DQO	Red

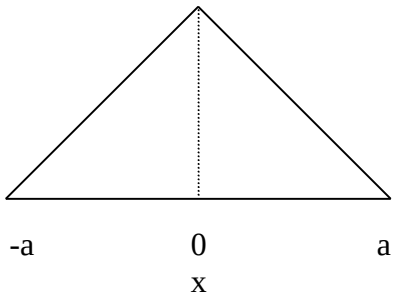
3.3 Estimating random and systematic errors from laboratory comparisons

Table 12 presents relative random and relative systematic errors obtained by the different laboratories in the analysis of each parameter in the precipitation samples. The calculation method and assumptions used are given in Chapter 3.3.1 and Chapter 3.3.2.

3.3.1 Estimating random errors

Systematic errors or bias in the laboratory analyses give a constant shift in the results from the expected ones at a particular concentration level. It is assumed that laboratories taking part in comparisons will obtain results near the expected

ones when this bias is removed, and that the differences between expected and obtained results more often will be close to zero than not. A triangular distribution, based upon this assumption, can be used to quantify the random errors in the laboratory results (Eurachem/CITAC, 2000).



The triangle distribution is symmetric with a baseline 2a. The height in the triangle will be 1/a when the triangle area equals 1. The standard uncertainty is given by

$$u(x) = \frac{a}{\sqrt{6}} \tag{1}$$

and more than 95 % of the data will be within ± 2·u(x). The distance from -a to a (i.e. 2a) is called the range. When applied on the laboratory comparison results, the range equals the distance between the largest and smallest of the four differences between expected and found concentrations. As long as the bias can be assumed to be constant for the samples in the comparison of a specific component, it cannot have an effect on the distance corresponding to 2a. The bias may be dependent upon the concentrations, but can be considered approximate constant for the concentrations used here in the comparison of the main components in precipitation, since the differences between the concentrations are small.

L and T represent the laboratories' and the expected concentrations respectively, and D is the difference. The difference for the lowest concentration is

$$D_1 = L_1 - T_1 \tag{2}$$

and the differences are D_1, D_2, D_3, D_4 in increasing order.

The range is $D_4 - D_1$ and the standard uncertainty for the differences u(D) becomes

$$u(D) = \frac{(D_4 - D_1)}{(2 \cdot \sqrt{6})}. \tag{3}$$

The average expected concentration T for the four samples is given by

$$T = \frac{(T_1 + T_2 + T_3 + T_4)}{4} \tag{4}$$

The relative standard uncertainty, RSD, for 4 samples is given by $\frac{u(D)}{T}$, or

$$RSD = \frac{2 \cdot (D_4 - D_1) \cdot 100}{\sqrt{6} \cdot (T_1 + T_2 + T_3 + T_4)}\%, \quad (5)$$

and 95 per cent of the laboratory results in this comparison are expected to be within ±2 · RSD.

If the data quality objectives (DQO) likewise are looked upon as 95 percentiles, then 95 per cent of the laboratory analytical results should not be more than 10 or 15 per cent from the correct values (10 per cent for S and N containing components and 15 per cent for other components).

Correspondingly, the values 2·RSD should therefore be less than 10 or 15 per cent in order to comply with the DQO.

3.3.2 Estimating systematic errors

An estimation of bias in single measurements requires a long data series, and four samples as we normally have in laboratory comparison, are merely able to give an indication of the bias or a very coarse estimate.

Coarse estimates have been performed here in the cases where the four samples had similar concentrations and where all four laboratory results were either higher or lower than the expected concentrations. The median of the differences D_i, as defined above, was taken as a measure of the bias, B, in these cases.

$$B = \text{median}[D_i] \quad (6)$$

A relative bias, RB, was also calculated based upon the average expected concentration T, as defined in (4).

$$RB = \frac{4 \cdot \text{median}[D_i] \cdot 100}{(T_1 + T_2 + T_3 + T_4)}\% \quad (7)$$

4. Results

4.1 Sulphur dioxide in absorbing solution (A-samples)

Four samples and one blank solution were distributed to the laboratories that use the hydrogen peroxide absorption solution method. The results are given in Table 13, Figure 2. For those laboratories that reported a blank value this has been subtracted from the reported results.

8 laboratories have reported values for SO_2 in absorbing solution. Two laboratories reports systematically results below expected value.

The results are presented in Table 13 and Figure 2.

4.2 Sulphur dioxide and nitric acid on impregnated filter (B-samples)

Five impregnated filter samples (including one blank) for determination of sulphur dioxide were analysed by 20 laboratories. The value reported for the blank filter was subtracted from the other values before the data were used.

The amount of sulphur on the distributed filters corresponds to air concentrations between 0.48-3.20 µg S m^{-3} when 25 m^3 is sampled.

In addition to sulphate, nitrate was added to the same impregnated filters for determination of HNO_3-N. The value reported for the blank filter was subtracted from the other values before using the data.

The amount of nitrogen on the distributed filters corresponds to air concentrations between 0.39 µg N m^{-3}–1.18 µg N m^{-3} when 25 m^3 sampling volume is used.

Both sulphur dioxide and nitric acid results show prevalence of systematic versus random errors. The systematic error is most clearly for the low concentration samples. More outlying results are reported for sulphur dioxide than nitric acid.

The results are presented in Tables 14 and 15 and Figures 3 and 4.

4.3 Nitrogen dioxide in absorbing solution (C-samples)

The four samples distributed were made to represent both absorption solutions and extracts from iodide-impregnated glass filters. The samples contain known amounts of sodium nitrite diluted in water. In order to assure sample stability and to give the laboratories the opportunity to use the matrix they use in their daily routine, the distributed samples were to be diluted 1:10. The results should be reported as the diluted concentrations.

The 10 times diluted samples correspond to air concentrations between 2.34-5.34µg NO_2-N m^{-3}, when 70 ml absorbing solution and 1.4 m^3 are used. If 4 ml extraction solution and 0.7 m^3 sampling volume are used, the samples correspond to air concentrations between 0.27-0.61 µg NO_2-N m^{-3}.

14 laboratories have reported results. Two laboratories (lab 3 and 22) report results that deviates more than 20% form expected value. The rest of the reported results are mostly within 10% of expected value.

The results are presented in Table 16 and Figure 5.

4.4 Ammonia on impregnated filters (J-samples)

Six impregnated filters inclusive two unidentified blank filters were sent to 21 laboratories. 17 laboratories have reported their analytical results. The two blank values reported by each laboratory were averaged and subtracted from the other values reported before the data were used. The results are shown in Table 17 and Figure 6.

The amount of nitrogen on the filters correspond to air concentrations between 0.40-1.20 µg N m^{-3}, if 25 m^3 sampling volume is used.

17 laboratories have reported their results, which generally are in good agreement with expected value. Only one laboratory reports value outside DQO.

4.5 Precipitation (G-samples)

Four precipitation samples were distributed and 2411 single results from 64 laboratories were reported. 118 results were identified as outliers. This is ~5% of the data, which is slightly higher compared to last year's intercomparison.

Results for sulphate and nitrate are mostly in good agreement with expected value and few results outside DQO are reported. Standard deviation when outliers are excluded varies between 4-6%, which is very good.

Results for ammonium, potassium and chloride shows an improvement compared to last year. Fewer results outside DQO are reported.

Poorer results were reported for magnesium and calcium this round when compared to earlier years. However, only three samples were analysed for Ca in this last round. For magnesium the standard deviation varies between 13-19% and there is an increase in reported results between 15-25% away from expected value. The standard deviation for calcium varies between 16-29% and more results outside DQO are reported compared earlier intercomparisons.

The results are presented in Tables18-28 and in Figures 7-28.

5. Summary

A total of 66 laboratories participated in the twenty-fifth intercomparison. 32 of these laboratories are within the EMEP network.

As in earlier intercomparisons, outliers are defined as values that deviates more than two standard deviations from the mean value. Outliers occur for all samples and almost all parameters. Out of a total of 2809 single results, 141 are defined as outliers. This is 5% of the reported data, which is slightly higher compared to last year.

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Appendix 1

Tables

Table 2: Samples distributed for the twenty-second interlaboratory test.

A.	5 synthetic samples for determination of SO_2, consisting of 0.3% H_2O_2 absorbing solution and containing different concentrations of sulphuric acid. One of the samples was an unidentified blank.
B.	5 KOH-impregnated Whatman 40 filters, comprising 1 blank and 4 filters to which different amounts of sulphuric acid and nitrate salt have been added.
C.	4 synthetic samples for determination of NO_2 consisting of sodium nitrite diluted in water.
J.	6 Whatman 40 filters impregnated with 3% oxalic acid, comprising 2 blank and 4 filters to which different amounts of ammonium salt solution have been added.
G.	4 synthetic precipitation samples, containing SO_4^{2-}, NO_3^-, NH_4^+, H^+, Na^+, Mg^{2+} and Cl^-, and Ca^{2+} and K^+.

Table 3a: EMEP laboratories participating in the twenty-second laboratory intercomparison. The numbers in front of the names are used in tables and figures.

Austria	(1)	Umweltbundesamt Zweigstelle Sud, Klagenfurt
Belgia	(2)	Flemish Environment Agency, Antwerpen
Canada	(26)	Meteorological Service of Canada, Toronto
Croatia	(35)	Meteorological and Hydrological Service of Croatia
Czech Republic	(3)	Czech Hydrometeorological Institute, Praha
Denmark	(4)	National Environmental Research Institute. Air Pollution Laboratory
Estonia	(38)	Estonian Environmental Research Centre, Tallinn
Finland	(5)	Finnish Meteorological Institute. Air Quality Department
France	(6)	SGS Multilab, Saint Guenault-Courcouronnes
Georgia	(43)	Centre for Monitoring and Prognostication, Tbilisi
Germany	(7)	IfE Leipzig GmbH, Umweltlabor
Germany	(8)	Umweltbundesamt, Messtelle Schauinsland
Hungary	(10)	Institute for Atmospheric Physics
Iceland	(11)	Idntæknistofnun Islands (Technological Inst. of Iceland)
Ireland	(12)	Met. Eirann, Dublin
Italy	(13)	C.N.R. Istituto Inquinamento Atmosferico
Latvia	(33)	Air Pollution Observation Laboratory
Netherlands	(14)	National Institute of Public Health and Environmental Protection (RIVM)
Norway	(15)	Norwegian Institute for Air Research (NILU)
Macedonia	(40)	Hydrometeorological Institute, Skopje
Moldova	(42)	State Hydrometeorological Service, Chisinau
Poland	(16)	Institute of Meteorology and Water Management, Warsaw
Poland	(39)	Environmental Monitoring Laboratory, Institute of Environmental Protection
Portugal	(17)	Laboratorio Santo Andre
Russian Federation	(22)	Institute of Global Climate and Ecology
Serbia and Montenegro	(24)	Rep. Hydrometeorological Institute of Serbia
Slovakia	(31)	Slovak Hydrometeorological Institute
Slovenia	(36)	Hydrometeorological Institute of Slovenia
Spain	(19)	Centro Nacional de Sanidad Ambiental
Sweden	(20)	Swedish Environmental Research Institute (IVL), Gothenburg
Switzerland	(21)	Swiss Federal Laboratories for Materials Testing (EMPA)
United Kingdom	(23)	AEA Technology, National Environmental Technology Centre
United States of America	(27)	Illinois State Water Survey

Table 3b: Participating laboratories outside the EMEP network.

Germany	(102)	Ökologie-Zentrum Universität München
Germany	(104)	Hessige Landwirtschafliche
Finland	(107)	The Finnish Forest Institute
Germany	(108)	Institut f. Bondenkunde und Standortlehre, Dredsten
Germany	(109)	Bügen-Institute, dep. of Soil Science of Temporal and Boreal Ecosystems
Germany	(110)	Thüringer Landesanstalt für Landwirtschaft (TTL), Jena
Germany	(112)	Niedersächsische Forstliche Versuchsanstalt (NVF)
Germany	(113)	Landesforstanstalt Eberswalde, abt. Waldökologie
Italy	(114)	C.N.R. Istituto Italiano di Idrobiologia
Germany	(115)	Bayerische Landesanstalt f. Wald- und Forstwirtshaft
Switzerland	(116)	Institute for Applied Plant Biology
Germany	(117)	Sächsische Landesanstalt für Forsten, Graupa
Germany	(118)	Forstliche Versuchs-und Forschungsansta
Germany	(120)	Landwirtschaftliche Untersuchungs- und Forschungsanstalt (LUFA)
Germany	(121)	Landeslabor Schleswig-Holstein
Belgium	(124)	Laboratorium voor Bondemkunde, Gent
Germany	(125)	Bayerisches Landesamt für Umweltschutz, Augsburg
Italy	(126)	APPA Laboratorio Biologico Provinciale
Finland	(145)	Tartu Environmental Research, Tartu
Luxembourg	(146)	Cellule de Recherche en Environment et Biotechnologies Public Research Center-Gabriel Lippman
Spain	(150)	Fundación Centro de Estudios ambentials del meditirrain
Belgium	(151)	Laboratoire de l'Unitè des Eaux et Forêst (EFOR), Louvain-la-Neuve
Norway	(152)	Norwegian Forest Research Institute, Ås
Slovenia	(153)	Slovenian Forestry Institute, Ljubljana
United Kingdom	(155)	Environmental Research Branch, Forest Research
Hungary	(157)	Ecological Laboratory of Forest research Institute
Japan	(158)	Acid Deposition and Oxidant Research Center (ADOCRC), Niigata
France	(159)	CARSO, Lyon
Ireland	(160)	Coillite Research Laboratory
Thailand	(163)	Environmental Researching and Training Center (ERTC)
Thailand	(164)	Pollution Control Department (PCD)
Viet Nam	(165)	Institute of Meteorology and Hydrology
Poland	(166)	Forest Research Institute, Laboratory of Forest Habitat Chemistry
Unidet Kingdom	(167)	CEH Edinburgh
France	(172)	Soils Agronomy and Spatiztization unit INRA

Table 4: Analytical methods used at the participating laboratories for the determination of sulphur dioxide in absorbing solution (A).

Method	Laboratory
1. Ion chromatography	6, 15, 17, 21, 36, 159

Table 5: Analytical methods used at the participating laboratories for the determination of sulphur dioxide on impregnated filters (B).

Method	Laboratory
1. Spectrophotometry	16
2. Ion chromatography	3, 4, 5, 8, 11, 15, 20, 22, 31, 33, 36, 109, 116, 158, 164, 165, 172
3. Capillary Ion Analysis	39

Table 6: Analytical methods used at the participating laboratories for determination of nitric acid on impregnated filters (B).

Method	Laboratory
1. Reduction to nitrite	16
2. Ion chromatography	3, 4, 5, 8, 15, 20, 22, 31, 33, 36, 109, 116, 158, 164, 165, 172
3. Capillary Ion Analysis	39

Table 7: Analytical method for determination of ammonia on impregnated filters (J).

Method	Laboratory
1. Spectrophotometry	4, 10, 15, 20, 33, 39, 116, 172
2. FIA	11
3 Ion chromatography	3, 5, 8, 13, 31, 36, 38, 158, 165

Table 8: Analytical method used for NO_2 in absorbing solution (C).

Method	Laboratory
1. Spectrophotometry	3, 8, 12, 15, 16, 20, 22,31, 33, 35, 36, 38, 39
2. Ion chromatography	19

Table 9: Analytical methods used for the determination of chemical constituents in precipitation samples.

Lab no.	Network	SO_4^{2-}	NH_4^+	NO_3^-	Na^+	Mg^{2+}	Cl^-	Ca^{2+}	K^+
1	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
2	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
3	EMEP	Ion chromatography	Spectrophotometry	Ion chromatography	Flame-AAS	Flame-AAS	Ion chromatography	Flame-AAS	Flame-AAS
4	EMEP	Ion chromatography	Spectrophotometry	Ion chromatography	Flame-AES	Flame-AAS	Ion chromatography	Flame-AAS	Flame-AES
5	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
6	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
7	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
8	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
10	EMEP	Ion chromatography	Spectrophotometry	Ion chromatography	Flame-AAS	Flame-AAS	Ion chromatography	Flame-AAS	Flame-AAS
11	EMEP	ICP-AES	FIA	FIA	ICP-AES	ICP-AES	FIA	ICP-AES	ICP-AES
13	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
14	EMEP	Ion chromatography	Spectrophotometry	Ion chromatography	ICP-MS	ICP-MS	Ion chromatography	ICP-MS	K methods
15	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
16	EMEP	Ion chromatography	Spectrophotometry	Ion chromatography	Flame-AAS	Flame-AAS	Ion chromatography	Flame-AAS	Flame-AAS
17	EMEP	Ion chromatography	Spectrophotometry, Indophenol	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
19	EMEP	Ion chromatography	Spectrophotometry	Ion chromatography	Flame-AAS	Flame-AAS	Ion chromatography	Flame-AAS	Flame-AAS
20	EMEP	Ion chromatography	Spectrophotometry	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
21	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
22	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
24	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
26	EMEP	Ion chromatography	Spectrophotometry	Ion chromatography	Flame-AAS	Flame-AAS	Ion chromatography	Ca methods	Flame-AAS
27	EMEP	Ion chromatography	flow injection colorimetry	Ion chromatography	ICP-AES	ICP-AES	Ion chromatography	ICP-AES	ICP-AES
31	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
33	EMEP	Ion chromatography	Spectrophotometry	Ion chromatography	ICP-AES	ICP-AES	Ion chromatography	ICP-AES	ICP-AES
35	EMEP								
36	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
38	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
39 station	EMEP								
40	EMEP		Spectrophotometry	Spectrophotometry			Spectrophotometry		
43	EMEP	Ion chromatography	photocolorimeter	Ion chromatography	Na methods	titrimetric	Ion chromatography	titrimetric	K methods
102	EMEP	Spectrophotometry	Spectrophotometry	Spectrophotometry	Flame-AES	Flame-AAS	Spectrophotometry	Flame-AAS	Flame-AES
102	EMEP	Spectrophotometry	Spectrophotometry	Spectrophotometry	Flame-AES	Flame-AAS	Spectrophotometry	Flame-AAS	Flame-AES
104	ICP-Forest	Ion chromatography	Spectrophotometry, CFA	Spectrophotometry with CFA	ICP-AES	ICP-AES	Ion chromatography	ICP-AES	ICP-AES
107	ICP-Forest	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
108	EMEP	ICP-AES	Spectrophotometry	Spectrophotometry	ICP-AES	ICP-AES	Potensiometric method	ICP-AES	ICP-AES
109		ICP-AES	Spectrophotometry	Spectrophotometry	ICP-AES	ICP-AES	Potensiometric method	ICP-AES	ICP-AES
110	EMEP	Ion chromatography	Spectrophotometry	Ion chromatography	ICP-AES	ICP-AES	Ion chromatography	ICP-AES	ICP-AES
112	ICP-Forest	ICP-AES	Spectrophotometry	Spectrophotometry	ICP-AES	ICP-AES	Ion chromatography	ICP-AES	ICP-AES
113		Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	ICP-AES	Ion chromatography	Ion chromatography	ICP-AES
114	ICP-Forest	Ion chromatography	Spectrophotometry	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
115	ICP-Forest	Ion chromatography	Ion chromatography	Ion chromatography	ICP-AES	ICP-AES	Ion chromatography	ICP-AES	Ion chromatography

Table 9, cont.

Lab no.	Network	SO_4^{2-}	NH_4^+	NO_3^-	Na^+	Mg^{2+}	Cl^-	Ca^{2+}	K^+
116	Other	Ion chromatography	Spectrophotometry	Ion chromatography	Flame-AES	Flame-AAS	Ion chromatography	Flame-AAS	Flame-AES
117	ICP-Forest	ICP-AES	Spectrophotometry	Spectrophotometry	ICP-AES	ICP-AES	Spectrophotometry	ICP-AES	ICP-AES
118	EMEP	Ion chromatography	Spectrophotometry	Ion chromatography	ICP-AES	ICP-AES	Ion chromatography	ICP-AES	ICP-AES
120	ICP-Forest	ICP-AES	Spectrophotometry	Spectrophotometry	ICP-AES	ICP-AES	Spectrophotometry	ICP-AES	ICP-AES
121		Spectrophotometry	Spectrophotometry	Spectrophotometry	ICP-AES	ICP-AES	Spectrophotometry	ICP-AES	ICP-AES
124	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Flame-AAS	Flame-AAS	Ion chromatography	Flame-AAS	Flame-AAS
125	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
126	ICP-Forest	Ion chromatography	Spectrophotometry	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
145	EMEP	Ion chromatography	Spectrophotometry	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
146	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
150		Ion chromatography	Spectrophotometry	Ion chromatography	ICP-AES	ICP-AES	Ion chromatography	ICP-AES	ICP-AES
151	ICP-Forest	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	ICP-AES	Ion chromatography	ICP-AES	Ion chromatography
152	ICP-Forest	Ion chromatography	Spectrophotometry	Ion chromatography	ICP-AES	ICP-AES	Ion chromatography	ICP-AES	ICP-AES
153	ICP-Forest	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
155	EMEP	Ion chromatography	Spectrophotometry, CFA	Ion chromatography with suppressor	ICP-AES,with USN	ICP-AES,with USN	Ion chromatography	ICP-AES,with USN	ICP-AES,with USN
157	EMEP	Ion chromatography	Spectrophotometry	Ion chromatography	Flame-AAS	Flame-AAS	Ion chromatography	Flame-AAS	Flame-AAS
158	EANET	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
163	EANET	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
164	EMEP	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
165	EANET	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Flame-AAS	Ion chromatography	Flame-AAS	Ion chromatography
166	ICP-Forest	Ion chromatography	Ion chromatography	Ion chromatography	ICP-AES	ICP-AES	Ion chromatography	ICP-AES	ICP-AES
167	EMEP	Ion chromatography	Spectrophotometry,AMFIA	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography
172		Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography	Ion chromatography

Table 10: Reported results for precipitation samples expressed as % deviation from expected value.

Precipitation

Lab no	SO_4^{2-} % deviation form expected value				NH_4^+ % deviation form expected value				NO_3^- % deviation form expected value				Na^+ % deviation form expected value				Mg^{2+} % deviation form expected value				Cl^- % deviation form expected value				Ca^{2+} % deviation form expected value				K^+ % deviation form expected value				pH pH-units from expected value				Cond % deviation form expected value				H^+ % deviation form expected value			
	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4
1	3	4	2	2	4	7	2	-2	1	2	2	1	2	-1	1	-4	-3	-7	-6	-4	1	-7	8	-7	-15	-11	-7	1	-1	-1	2	0.14	0.05	0.05	0.09	-13	-5	1	-1				
2	2	4	5	4	4	5	4	2	3	4	4	3	-10	-8	-4	-7	6	15	12	11	-1	14	11	6	14	5	5	13	12	19	26	-0.59	0.04	-0.5	-0.14	-3	-1	6	2				
3	2	2	2	1	11	15	8	5	-1	-1	0	-2	8	6	3	-3	1	1	-1	1	11	-1	0	-2	1	-1	-1	-3	-1	-1	12	0.02	0.006	0.005	0.03	2	1	11	4				
4	0	0	0	0	-6	-3	-1	-2	0	0	1	-1	-5	-4	-6	-8	-13	-19	-20	-17	-4	-5	-4	-9	-4	-3	-4	2	3	3	8	0.03	0.02	0.03	0.02	0	-1	4	3				
5	2	2	2	-1	-1	1	0	-2	1	1	1	-2	6	2	2	-3	1	4	1	1	15	5	0	-3	-1	2	2	6	5	-1	-1	0.02	0.02	0.02	0.02	5	5	9	8				
6	-1	-1	-2	-2	4	5	3	0	-2	-1	-1	-3	8	6	3	0	170	13	12	10	-25	-23	-15	-15	-1	2	-4	-13	-18	-25	-24	0.04	0.01	0.01	-0.46								
7	13	18	23	21	3	5	0	1	-1	0	-1	-2	1	0	0	-4	3	0	2	4	3	1	3	-2	1	5	4	-2	-1	-1	2	-0.05	-0.09	-0.12	-0.11	-5	0	-3	0				
8	5	4	3	3	-19	-19	-18	-14	2	3	4	1	-9	-4	-3	-8	-6	-3	-6	842	3	2	0	-2	16	8	4	-12	-11	-8	-11	0.05	0.04	0.04	0.04	-2	-3	2	0				
10	-6	-7	-9	-7	-4	-6	-5	-5	-6	-6	-3	-2	-6	-7	-11	-13	8	12	5	6	21	16	-11	-8	21	13	8	12	16	7	6	0.07	0.05	0.06	0.05	1	1	3	3				
11	-3	-2	-3	-2	-19	-21	-16	-14	3	3	4	1	-8	-2	-1	-4	2	1	-1	0	9	12	-2	-5	-2	-2	-2	14	-32	-38	-65	0.03	-0.01	0	0	3	2	6	5				
13	47	46	42	48	10	4	5	0	4	4	7	3	-3	4	6	-1	-3	-9	-7	-6	-8	6	-7	-11	-14	-9	-6	-3	2	7	9	0	0	0	-0.01	15	23	45	24				
14	-3	-3	-1	-2	11	10	4	-1	1	1	1	0	-2	1	-2	-7	-3	-3	-2	-2	-25	-12	-22	-24	-1	1	1	-3	0	-4	1	0.09	0.08	0.13	0.15	5	3	11	9	16	15	31	14
15	3	4	4	3	13	12	8	3	0	-1	1	-3	3	5	2	-1	3	4	-4	-3	-4	-1	0	-5	-2	1	3	2	3	3	-2	0.05	0.03	0.05	0.05	0	0	6	5				
16	0	0	-1	-2	-4	-1	-6	-3	-1	0	1	-3	3	1	-4	-5	-19	6	0	2	4	9	0	-5	8	1	5	-10	-1	-4	3	0	0	0.01	-0.03	-5	-4	-2	-2				
17	-14	-13	-13	-13	4	10	7	8	-8	-5	-7	-6	-24	-28	-27	-31	-5	-19	-24	-21	76	122	67	50	569	-21	-29	5	37	-2	<0,077	-0.29	-0.33	-0.34	-0.38	-6	-37	1	0				
19	-10	-9	-7	-8	14	16	16	7	-11	-9	-8	-9	29	17	9	7	2	0	0	0	<0,31	<0,31	<0,31	-2	8	7	5	16	12	27	25	0.133	0.114	0.176	0.162	3	3	4	4				
20	1	0	0	-1	3	2	7	7	-1	0	0	-2	-1	3	9	3	18	24	24	22	73	-1	-3	-8	8	27	6	-30	-25	-29	-46	0.06	0.01	0.01	0.01	1	1	7	4				
21	2	2	1	1	1	3	0	-2	1	2	2	0	-5	-5	-5	-8	2	-4	-2	0	-2	-4	-3	-6	0	3	0	1	1	-1	-3	0.05	0.03	0.04	0.04	1	1	4	4				
22	-4	-4	-5	-5	65	63	54	37	-3	-3	-2	-2	20	5	6	-6	17	19	19	15	-58	-54	-26	-29	-39	-25	-23	6	-2	14	8	0	0	0.05	0.03	-14	-13	-12	-13				
23	-10	-9	-9	-10	-3	15	5	4	0	1	1	-1	-11	-4	-2	-4	-1	9	-1	2	-6	-7	-4	-6	-1	-9	-2	-8	-17	-1	3	0	0	0	0	-20	-15	-13	-14				
24	-4	-4	-2	-7	31	27	37	43	-7	-12	-7	-10	3	9	13	19	10	4	20	17	48	17	22	4	5	12	15	7	18	10	37	-0.01	0.05	0.06	0.03	-1	0	5	0				
26	-1	-1	0	-1	-1	-1	0	0	4	5	2	-2	1	2	-1	-5	-1	1	-1	-1	1	3	0	-2	12	3	4	-1	-1	1	0	0.07	0.06	0.07	0.1								
27	2	3	3	3	1	2	3	2	2	1	3	1	15	1	2	-2	3	1	0	3	38	-1	1	-2	2	2	0	1	0	-1	2	0.05	0.03	0.04	0.03	-1	-2	2	2				
31	-3	-2	-4	-3	43	40	28	13	-6	-4	-3	-4	-1	0	-1	-5	-5	3	-7	2	-5	-9	-7	-11	-7	-10	-2	-1	1	9	24	0.05	0.05	0.05	0.05	2	4	7	7				
33	-2	-4	0	-1	-6	-10	-5	-5	-7	-8	-5	-6	-3	-4	6	-6	14	7	22	17	-4	-7	-4	-5	7	19	10	1	-5	26	27	0.09	0.04	0.04	0.03	-6	-5	4	-1				
35	0	0	0	-1					-1	-1	1	-1									-7	-5	-2	-4								0.08	0.06	0.13	0.12					-16	-14	-26	-25
36	0	0	1	0	-10	-9	-7	-6	3	3	3	1	-6	-5	-4	-8	-8	-9	-7	-9	-4	-5	7	6	-4	-3	-5	-8	-9	-15	-15	0	0	0.03	0.03	-10	-9	-7	-7				
38	3	3	1	3	-6	-10	0	1	-3	-5	-5	-3	-25	-19	-12	-14	-16	-25	-28	-22	-4	-14	-15	-24	-8	-5	-5	-27	-26	-26	-31	0.18	0.15	0.17	0.11	-7	-2	-1	1				
39 station																																0.01	-0.01	0	0	-18	-8	-3	-6				
40					39	54	28	22	24	352	267	202									85	23	11	7								-0.25	-0.36	-0.36	-0.34	-12	-20	-21	-32				
42	-2	2	-1	-1	104	101	58	53	11	12	8	9	44	39	36	34	39	39	46	62	8	0	10	-13	62	69	60	41	36	49	69												
43	1	0	1	3	59	57	23	3	-2	3	-1	-2	-6	-27	-60	-70	60	197	253	43	4	-1	-2	0	244	169	65	-15	-41	-26	-2												
102	2	2	1	-3	29	49	13	7	36	33	23	1	19	-8	-10	-19	13	6	23	17	<0,19	<0,19	9	5	<0,16	<0,16	-14	<0,17	<0,17	<0,17	<0,17	-0.068	-0.084	-0.042	-0.047	1	1	7	4				
104	-2	-2	-3	-2	-6	4	8	3	0	-1	-2	-5	-15	-11	-10	-11	-3	-10	-4	-3	19	17	4	4	-28	-16	-14	-21	-12	-26	<0,1	0.15	0.03	0.06	0.02	3	0	53	-4	-28	-9	-14	-6
107	23	28	20	21	-33	-42	-15	-16	-5	-5	-1	-2	15	8	6	4	26	37	39	31	28	3	0	-4	75	96	80	8	3	-1	1	0.05	0.04	0.04	0.05	-4	-3	-5	-3				
108	-1	-3	-4	-3	-6	4	0	3	-7	-1	1	-4	-1	-5	-7	-9	-6	-18	-16	-13	-44	8	17	78	67	51	28	-7	-9	-19	-12	0.22	0.14	0.11	0.07	-11	-8	-5	-4				
109	-14	-11	-12	-10	25	<0,15	8	1	0	2	1	-3	-6	-3	-7	-5	10	19	20	36	<0,25	<0,25	<0,25	<0,25	31	40	147	2	3	25	37												
110	3	4	3	-2	0	-3	0	-2	-10	-1	-5	-5	-6	5	-7	-9	-10	-24	-20	-15	<0.30	<0.30	<0.30	-9	-8	-11	-5	2	3	-12	<0,11	0.11	0.13	0.15	0.1	-5	-4	-1	-1				
112	-8	-7	-3	-1	0	12	0	-5	10	9	8	2	3	1	2	-3	3	4	-4	-3	2	1	3	-3	-2	1	3	19	18	32	37	0.08	0.06	0.08	0.08	-5	-4	0	-2				
113	-7	-7	-11	-9	-18	-17	-8	-4	-3	-1	-3	-4	-12	-12	-12	-13	-14	-49	-42	-35	4	5	-15	-2	56	22	39	-25	-14	-11	<0,1	0.06	0.05	0.09	0.06	-16	-9	-6	-7				
114	0	1	0	-1	-3	1	0	-3	0	-1	-1	-2	-6	-3	2	-7	23	4	8	7	-4	-1	-4	-5	-35	-22	-22	-10	-7	-4	-12	0.02	-0.01	-0.02	-0.01	-4	1	9	4				
115	10	12	15	13	-6	-1	-3	-5	1	0	3	3	-11	-4	-12	-7	-21	-21	-34	-30	104	85	41	22	-29	-31	-37	-20	-23	-32	7	0.03	0.01	0.02	0.02	15	16	19	13				
116	0	-2	-4	-2	2	4	8	7	-4	-5	-4	-4	7	-3	-4	-7	-3	-25	-19	-14	21	28	-18	59	-95	-76	-51	4	2	4	3	0.08	0.02	0.02	-0.04	0	0	7	7				
117	-6	-5	-7	-6	-3	-1	-2	-2	-5	-4	-4	-6	25	25	19	11	-3	0	-2	-2	<0.1	<0.1	-45	-37	4	5	-1	3	11	10	20	0.14	0.06	0.09	-0.2	-3	-13	-5	33	-27	-14	-19	57
118	5	-4	0	-2	-3	-2	-1	-1	3	-1	-5	-6	-11	-7	-12	-14	-6	-4	-8	-7	-41	-32	-30	-27	-8	-11	-14	-15	-12	-12	-12	-0.01	-0.01	-0.01	-0.01	-6	-7	-5	-4	3	1	2	1
120	-8	-7	-9	-9	-38	-48	-46	-28	-7	-5	1	-1	-4	-4	-10	-13	-7	-7	-10	-8	19	23	-4	-2	-1	-7	-7	2	-7	-4	8	0.03	0.01	0.01	0.01								

Table 10, cont.

Precipitation																																						
Lab no	SO_4^{2-} % deviation from expected value				NH_4^+ % deviation from expected value				NO_3^- % deviation from expected value				Na^+ % deviation from expected value				Mg^{2+} % deviation from expected value				Cl^- % deviation from expected value				Ca^{2+} % deviation from expected value				K^+ % deviation from expected value				pH pH-units from expected value				Cond % deviation from expected value				H^+ % deviation from expected value			
	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4	G1	G2	G3	G4
121	-12	-13	-17	-11	-11	-10	-5	-5	7	6	6	4	15	21	15	11	-35	-22	-42	-44	<0.1	<0.1	-1	-24	-16	-30	-15		-3	-37	<0,1	46	0.1	0.04	0.04	0.08	-8	-4	11	5				
124	-2	-4	-3	-3	-25	-25	4	3	-3	-1	-10	-17	-6	-3	5	2	3	4	8	7	-11	-32	-30	-30	-2	-11	-9		-4	-2	10	<0,13	0.02	0.01	-0.01	0.01	1	1	4	4				
125	-1	-1	-2	-2	5	8	11	13	-6	-5	-6	-6	0	2	4	-2	12	36	30	23	11	1	-4	-5	39	66	15		0	-1	1	10												
126	-2																																										
145	-33	-29	-14	-15	10	14	19	6	-29	-21	-12	-13	7	7	-5	1	4	<0,1	28	<0,1	-11	-20	-16	-16	<0.2	25	13		<0,1	3	-3	<0,1												
146	1	1	2	1	-3	-6	-3	-3	0	1	1	-1	0	0	0	-4	-14	-19	-27	-22	1	-1	-1	-4	4	8	1		3	-24	4	10	-0.11	-0.12	-0.15	-0.13	-1	-1	2	1	-2	-5	-3	0
150	1	2	2	2	33	39	20	9	-2	-1	-1	0	-2	-2	-2	-5	-3	-4	-6	-5	10	16	-1	-2	-14	-14	-12		-10	-9	-1	8	0.1	0.22	0.22	0.12	-1	-2	-15	0				
151	1	2	4	3	-32	-33	-24	-19	0	3	3	2	5	4	0	-3	-2	-1	-4	-2	-7	-4	-2	-4	1	-1	-1		8	10	13	36	-0.23	-0.212	-0.197	-0.22	-3	-2	0	1				
152	1	0	0	2	0	-3	12	9	-7	-8	-7	-5	-5	-3	0	-3	-7	-10	-8	-7	48	23	-26	-9	5	6	3		2	0	-2	-6	0.04	0.04	0.02	0.03	-15	-16	-4	-7				
153	-5	-4	-4	-4	6	-3	0	-5	-7	-8	-7	-6	-6	5	5	-1	10	139	-4	-3	-4	-14	-11	-18	5	23	3		-15	-7	-12	-31	0.08	0.07	0.09	0.14	-4	-2	3	-1				
155	1	1	0	-1	-41	-10	0	-6	0	2	-2	0	2	2	5	-1	3	0	2	2	-11	-14	-10	-14	-3	4	-1		0	3	2	1	0.04	0.02	0.01	0.01	0	-1	3	3				
157	-1	4	8	5	75	94	45	49	0	5	3	-1	60	37	-66	19	16	19	20	26	300	215	115	83	31	34	44		2	8	-12	-12	-0.1	-0.2	-0.1	-0.2	42	7	5	4				
158	-2	-1	-2	-2	0	2	2	-1	-3	-3	-3	-4	0	-1	0	-3	0	-3	-5	1	21	10	1	-5	2	2	2		-3	-3	-5	-8	0.03	0.03	0.02	0.02	-8	-7	-4	-5	-6	-7	-5	-5
160					-8	-7	-3	-1	0	-2	0	-1	-1	5	-1	-1	-3	-5	-28	-3					-2	-11	-1		13	13	10	18												
163	3	4	4	3	6	-18	4	1	0	2	3	1	3	5	2	-3					-11	-7	-7	-9	76	34	32		2	-2	3	-2	0.06	0.07	0.04	0.06	-2	-4	2	1				
164	-5	-4	-6	-5	13	12	12	6	-3	-5	-2	-1	3	1	2	-1	-3	-10	-4	-3	-11	-14	-7	-9	-2	-5	-1		7	-7	-4	-12	0.12	0.04	0.03	0.04	-4	-4	-15	-2	-24	-11	-8	-10
165	11	12	42	-13	-6	-7	-23	-35	2	3	-10	-27	-5	-4	-15	-22	-6	1	-12	-24	51	37	20	13	105	82	39		-25	-15	8	33	0.1	0.16	0.01	0.05	-7	-12	1	-1	-20	-32	-3	-12
166	-2	-2	1	-1	-13	-3	0	-5	-5	-6	-3	-6	-6	-7	-4	-9	-1	-10	-11	-8	-10	-12	-4	-11	-15	-16	-5		-27	-12	-26	18	0.15	0.11	0.13	0.12	-3	-1	0	0				
167	2	-1	-3	-3	-4	-1	-3	-5	-1	-1	-3	-5	-12	-8	-8	-10	-3	-9	-2	13	-24	-25	-14	-14	-11	-14	-17		-15	-21	-10	-1												
172	6	4	4	6	8	4	5	2	-1	-1	0	0	-12	-13	-13	-19	-21	-27	-27	-26	-10	-6	-9	-2	-12	-4	-16		-1	-13	-1	-23	-0.42	-0.4	-0.45	-0.4	0	1	6	5				

SO_4^{2-} and NO_3^- between ± 10 and 20%
SO_4^{2-} and NO_3^- more than + 20%

NH_4^+, NO_3^-, Cl^-, Na^+, Mg^{2+}, Ca^{2+}, K^+ and cond: between ± 15-25%
NH_4^+, NO_3^-, Cl^-, Na^+, Mg^{2+}, Ca^{2+}, K^+ and cond: between ± 15-25%

pH: between ± 0,1-0,2 pH-units
pH: more than ± 0,2 pH- units

Table 11: Reported results for filter samples expressed as % deviation from expected value.

	Air and aerosols																	
	Absorbing solution				Impregnated filter				Impregnated filter				Absorbing solution				Impregnated filter			
	SO_2-S % deviation form expected value				SO_2-S % deviation form expected value				HNO_3-N % deviation form expected value				NO_2-N % deviation form expected value				NH_3-N % deviation form expected value			
	A1	A2	A4	A5	B2	B3	B4	B5	B1	B3	B4	B5	C1	C2	C3	C4	J1	J2	J4	J6
3					8	19	0	-7	-2	-9	-6	-7	-25	-36	-21	-15	-2	0	-5	3
4					2	0	3	-1	2	-1	1	0					-13	-7	-8	-6
5					2	2	8	1	4	-1	2	0					-7	-6	-6	-5
6	0	3	2	3																
8					10		3	-4	13		-2	-4	-6	-7	-13	-15	1	4	4	3
10																	-19	-19	-16	-24
11					-7	4	3	-4												
12													1	9	2	1				
13																	2	14	-5	5
15	-7	-3	-3	-5	-3	-13	-14	-7	-4	-9	-15	-9	-9	-15	-4	-7	-5	1	-2	0
16					-4	3	-2	-2	2	-5	-3	-3	-3	-4	-6	-6				
17	-16	-13	-13	-14																
19	-33	-23	-28	-21									1	0	0	2				
20					-8	2	-1	-4	-6	-8	-9	-10	-5	-4	-4	-3	-8	-6	-4	-9
21	5	4	6	3																
22					-7	-37	8	10	-11	-17	-17	-17	-18	26	-35	-35				
23	7	3	7	14																
31					-8	-5	-4	-6	-2	-6	-3	-1	1	4	0	3	-3	-2	-9	2
33					-3	3	0	0	3	2	-3	123	9	4	5	6	20	0	1	-6
35													-1	-4	0	1				
36	2	2	2	-54	24	26	6	5	2	-3	-4	-3	-5	-2	-3	-1	-4	-8	-6	-7
38													4	6	0	3	4	4	1	10
39					-13	-6	-10	-9	-5	-6	-6	-9	-1	2	3	2	-8	-7	-10	-6
109					-3	6	11	11	8	9	11	11								
116					-4	-11	-14	-9	1	-18	-17	-17					1	1	-2	0
158					20	31	10	11	6	6	5	6					-7	-6	-5	3
159	-2	-3	-2	3																
163					-3	6	11	11	8	9	11	11								
164					-4	-3	0	-2	2	1	0	-1								
165					-20	-25	5	0	13	9	4	4					-6	-6	-3	-4
172					5	10	0	-6	-7	-1	1	-1					8	5	1	9

Results between 10 and 20% or between -10 and -20% from expected value

more than ± 20% from expected value

Table 12: Relative random and systematic errors obtained by the different laboratories in the analysis of each parameter in the precipitation samples.

Lab. no.	SO_4^{2-}		NO^{3-}		NH_4^+		Mg^{2+}		H^+ calc	
	Random error %	Systematic error %	Random error %	Systematic error %	Random error %	Systematic error %	Random error %	Systematic error %	Random error %	Systematic error %
1	1	3	0	1	3	2	0	-5	12	-14
2	1	4	1	3	1	3	1	10	163	84
3	0	1	1	-1	0	8	1	1	2	-4
4	0	0	1	0	1	-2	3	-17	2	-5
5	1	2	2	1	2	-1	1	1	2	-4
6	0	-1	1	-1	2	3	102	10	4	-3
7	2	18	1	-1	1	1	2	3	4	22
8	2	4	1	2	5	-16	351	-3	4	-9
10	1	-7	0	-4	2	-4	4	7	5	-11
11	1	-2	1	2	4	-15	2	0	4	0
13	10	49	1	4	3	4	0	-6	1	0
14	1	-3	1	1	3	5	1	-2	3	-22
15	1	3	2	-1	1	8	3	0	3	-9
16	1	0	2	-1	2	-4	13	1	3	0
17	3	-14	2	-7	4	7	6	-16	26	118
19	3	-8	3	-8	3	11	1	0	6	-27
20	1	0	1	0	4	4	5	21	6	-3
21	1	2	1	1	2	0	2	-1	4	-8
22	1	-5	1	-2	10	51	6	15	3	-3
23	2	-10	1	1	4	6	3	0	3	-5
24	2	-5	4	-8	23	30	6	16	7	-7
26	1	-1	3	3	0	0	1	-1	4	-16
27	0	3	1	1	1	2	2	2	4	-7
31	1	-3	1	-4	3	26	4	-2	3	-11
33	2	-2	2	-6	1	-5	6	17	8	-9
35	0	0	1	-1					2	-18
36	0	0	1	2	2	-7	2	-7	2	-2
38	1	3	1	-4	3	-2	3	-23	11	-29
39									2	0
40			112	269	4	31			32	98
42	2	-1	2	9	15	20	15	48		
43	1	1	2	-1	8	60	66	110		
102	2	1	11	24	7	17	6	18	8	16
104	0	-2	3	-2	5	4	2	-4	14	-9
107	7	24	1	-3	4	-24	6	31	4	-10
108	1	-3	2	-3	4	1	1	-12	17	-25
109	4	-11	2	0			10	16		
110	3	3	3	-6	1	-1	1	-15	7	-24
112	4	-5	2	7	6	0	3	0	5	-15
113	0	-8	2	-3	2	-9	6	-33	3	-13
114	1	0	1	-1	2	-1	13	7	4	2
115	1	12	2	2	3	-4	8	-29	2	-4
116	1	-2	1	-4	4	5	5	-15	12	-5
117	1	-6	2	-4	1	-2	2	-2	33	-14
118	4	-1	5	-3	1	-2	2	-7	1	2
120	1	-8	2	-3	9	-38	2	-8	3	-3
121	2	-13	1	6	1	-7	16	-39	9	-12
124	1	-3	10	-6	9	-5	2	6	3	-3
125	0	-1	2	-5	7	8	3	24		
126	4	1	6	3	2	0	7	-32	3	3
145	12	-24	4	-18	5	9				
146	0	1	1	0	2	-3	4	-22	5	33
150	1	2	1	-1	3	22	1	-5	13	-26
151	1	3	1	3	5	-24	1	-2	23	64
152	1	1	1	-6	7	6	2	-7	4	-8
153	1	-4	2	-7	5	-1	38	6	4	-20
155	1	0	2	0	12	-8	2	2	4	-4
157	3	4	2	2	13	54	6	21	13	30
158	0	-2	1	-3	1	1	2	-1	3	-6
160			1	-1	14	20	8	-11		
163	1	3	1	1	6	3	11	19	6	-13
164	1	-5	1	-2	2	9	2	-4	11	-9
165	17	13	17	-4	22	-14	10	-9	16	-18
166	1	-2	2	-4	3	-5	3	-7	9	-24
167	2	-2	3	-2	3	-3	8	-3		
172	2	5	0	0	1	4	6	-24	42	152

Table 12, cont.

Lab. no.	Na+		Cl-		K+		Cond.	
	Random error %	Systematic error %	Random error %	Systematic error %	Random error %	Systematic error %	Random error %	Systematic error %
1	3	0	8	-2	1	0	7	-4
2	2	-6	5	10	1	16	3	0
3	4	4	4	0	5	-2	3	3
4	3	-5	4	-4	1	3	1	1
5	3	2	5	2	3	3	1	6
6	3	1	3	-18	4	-19	3	-3
7	3	0	3	1	2	-2	3	-1
8	4	-5	2	1	3	-10	2	-1
10	6	-9	11	0	7	10	1	2
11	2	-3	7	1	24	-37	1	4
13	3	0	9	-6	4	4	6	24
14	4	-2	11	-21	2	-2	2	7
15	2	2	3	-2	2	2	2	2
16	4	-2	6	1	5	-3	2	-3
17	12	-26	18	77	47	2	18	-4
19	4	12			3	18	0	3
20	4	3	23	-2	4	-32	2	3
21	4	-4	3	-3	1	0	1	2
22	9	5	5	-37	6	6	3	-13
23	2	-4	2	-5	10	-5	6	-15
24	10	11	10	20	7	16	2	0
26	3	0	2	0	1	0		
27	5	1	10	1	1	0	2	0
31	3	-1	5	-8	7	5	1	5
33	6	-3	2	-5	12	9	4	-3
35	5	-1	1	-4	6	-11		
36	3	-4	5	3	2	-11	3	-9
38	2	-16	13	-14	6	-27	4	-2
39							8	-7
40			17	15			6	-19
42	8	35	12	2	2	46		
43	40	-44	2	0	22	-20		
102	16	-8					1	2
104	3	-10	3	8			17	2
107	2	6	9	1	4	2	0	-4
108	5	-6	58	13	4	-10	4	-7
109	2	-6			9	13		
110	7	-6					2	-3
112	3	1	3	1	3	24	2	-3
113	4	-11	9	-1			6	-9
114	5	-3	3	-3	3	-8	5	2
115	4	-9	12	55	14	-26	3	16
116	6	-3	44	16	1	4	2	3
117	2	18			4	11	19	-4
118	6	-10	7	-30	4	-13	2	-6
120	6	-7	9	4	6	-1		
121	3	16					7	0
124	4	0	15	-29			1	2
125	3	0	6	-2	3	0		
126	4	-13	10	-14	6	-24	1	8
145	4	3	7	-17				
146	2	0	3	-1	16	4	1	0
150	3	-2	6	3	7	-6	5	-2
151	3	2	1	-4	6	12	2	-1
152	2	-3	25	2	2	-1	6	-12
153	4	1	10	-12	5	-14	3	-2
155	3	1	6	-11	2	1	1	1
157	46	28	24	147	8	-3	19	6
158	2	0	8	4	1	-5	3	-6
160	2	-1			3	13		
163	3	2	3	-8	2	0	3	-1
164	1	1	2	-9	7	-6	4	-5
165	12	-10	5	25	21	-6	6	-4
166	4	-5	4	-7	17	-19	2	-1
167	3	-8	3	-17	11	-13		
172	8	-12	3	-5	7	-8	2	3

Table 13: Analytical results for sulphur dioxide in absorbing solution.

SO2-S in absorbing solution
Sample no.: A1
Theoretical value: 2.000
Unit: ug S/ml

Run 1:

Number of laboratories:	8
Arithmetic mean value:	1.894
Median:	1.985
Standard deviation	0.265
Rel. st. deviation (%)	13.987

Run 2:

Number of laboratories:	7
Arithmetic mean value:	1.972
Median:	2.010
Standard deviation	0.156
Rel. st. deviation (%)	7.930

Results in decreasing order:

23	2.131	159	1.960	
21	2.108	15	1.870	
36	2.048	17	1.680	
6	2.010	19	1.345	(*)

SO2-S in absorbing solution
Sample no.: A2
Theoretical value: 1.200
Unit: ug S/ml

Run 1:

Number of laboratories:	8
Arithmetic mean value:	1.156
Median:	1.196
Standard deviation	0.111
Rel. st. deviation (%)	9.608

Run 2:

Number of laboratories:	7
Arithmetic mean value:	1.188
Median:	1.223
Standard deviation	0.068
Rel. st. deviation (%)	5.704

Results in decreasing order:

21	1.243	15	1.170	
23	1.231	159	1.170	
6	1.230	17	1.050	
36	1.223	19	0.929	(*)

SO2-S in absorbing solution
Sample no.: A4
Theoretical value: 1.800
Unit: ug S/ml

Run 1:

Number of laboratories:	8
Arithmetic mean value:	1.734
Median:	1.795
Standard deviation	0.210
Rel. st. deviation (%)	12.107

Run 2:

Number of laboratories:	7
Arithmetic mean value:	1.796
Median:	1.830
Standard deviation	0.123
Rel. st. deviation (%)	6.874

Results in decreasing order:

23	1.925	159	1.760	
21	1.909	15	1.750	
36	1.838	17	1.560	
6	1.830	19	1.298	(*)

SO2-S in absorbing solution
Sample no.: A5
Theoretical value: 4.000
Unit: ug S/ml

Run 1:

Number of laboratories:	8
Arithmetic mean value:	3.646
Median:	3.955
Standard deviation	0.855
Rel. st. deviation (%)	23.445

Run 2:

Number of laboratories:	7
Arithmetic mean value:	3.904
Median:	4.120
Standard deviation	0.479
Rel. st. deviation (%)	12.261

Results in decreasing order:

23	4.551	15	3.790	
6	4.140	17	3.440	
159	4.140	19	3.149	
21	4.120	36	1.837	(*)

Table 14: Analytical results for sulphur dioxide on impregnated filter.

SO2-S on impregnated filter
Sample no.: 1
Theoretical value: 22.040
Unit:

Run 1:

Number of laboratories:	20
Arithmetic mean value:	21.845
Median:	21.305
Standard deviation	2.284
Rel. st. deviation (%)	10.456

Run 2:

Number of laboratories:	19
Arithmetic mean value:	21.558
Median:	21.300
Standard deviation	1.941
Rel. st. deviation (%)	9.003

Results in decreasing order:

36	27.300 (*)	15	21.300	
158	26.390	116	21.260	
8	24.200	164	21.260	
3	23.901	16	21.130	
172	23.040	11	20.410	
5	22.510	22	20.400	
4	22.480	31	20.375	
33	21.333	20	20.300	
163	21.310	39	19.100	
109	21.310	165	17.590	

SO2-S on impregnated filter
Sample no.: 3
Theoretical value: 12.020
Unit:

Run 1:

Number of laboratories:	19
Arithmetic mean value:	12.077
Median:	12.240
Standard deviation	1.910
Rel. st. deviation (%)	15.816

Run 2:

Number of laboratories:	18
Arithmetic mean value:	12.325
Median:	12.283
Standard deviation	1.618
Rel. st. deviation (%)	13.129

Results in decreasing order:

158	15.720	5	12.220	
36	15.200	4	11.960	
3	14.251	164	11.670	
172	13.190	31	11.379	
163	12.710	39	11.300	
109	12.710	116	10.740	
11	12.520	15	10.400	
16	12.340	165	8.980	
33	12.326	22	7.600	(*)
20	12.240			

SO2-S on impregnated filter
Sample no.: 4
Theoretical value: 64.090
Unit:

Run 1:

Number of laboratories:	20
Arithmetic mean value:	64.835
Median:	65.065
Standard deviation	4.688
Rel. st. deviation (%)	7.230

Run 2:

Number of laboratories:	18
Arithmetic mean value:	65.896
Median:	65.930
Standard deviation	3.555
Rel. st. deviation (%)	5.394

Results in decreasing order:

109	71.010	172	64.270	
163	71.010	164	64.110	
158	70.400	33	64.050	
22	69.300	3	64.011	
5	69.260	20	63.180	
36	67.800	16	62.950	
165	67.530	31	61.405	
11	66.090	39	57.900	
8	66.000	15	55.400	(*)
4	65.860	116	55.170	(*)

SO2-S on impregnated filter
Sample no.: 5
Theoretical value: 80.120
Unit:

Run 1:

Number of laboratories:	20
Arithmetic mean value:	79.710
Median:	78.480
Standard deviation	5.344
Rel. st. deviation (%)	6.704

Run 2:

Number of laboratories:	20
Arithmetic mean value:	79.710
Median:	78.480
Standard deviation	5.344
Rel. st. deviation (%)	6.704

Results in decreasing order:

163	88.910	16	78.350
109	88.910	20	77.300
158	88.680	8	77.100
22	88.300	11	76.810
36	84.100	31	75.681
5	81.020	172	75.020
165	80.440	3	74.731
33	80.038	15	74.700
4	79.100	39	73.200
164	78.610	116	73.190

Table 15: Analytical results for nitric acid on impregnated filter.

HNO3-N on impregnated filter
Sample no.: 1
Theoretical value: 9.820
Unit:

Run 1:

Number of laboratories:	19
Arithmetic mean value:	9.956
Median:	10.000
Standard deviation	0.645
Rel. st. deviation (%)	6.481

Run 2:

Number of laboratories:	19
Arithmetic mean value:	9.956
Median:	10.000
Standard deviation	0.645
Rel. st. deviation (%)	6.481

Results in decreasing order:

8	11.100	164	9.970
165	11.090	116	9.920
163	10.620	31	9.631
109	10.620	3	9.622
158	10.440	15	9.400
5	10.220	39	9.300
33	10.081	20	9.260
16	10.030	172	9.140
4	10.020	22	8.700
36	10.000		

HNO3-N on impregnated filter
Sample no.: 3
Theoretical value: 18.000
Unit:

Run 1:

Number of laboratories:	18
Arithmetic mean value:	17.500
Median:	17.645
Standard deviation	1.453
Rel. st. deviation (%)	8.305

Run 2:

Number of laboratories:	18
Arithmetic mean value:	17.500
Median:	17.645
Standard deviation	1.453
Rel. st. deviation (%)	8.305

Results in decreasing order:

163	19.620	36	17.500
109	19.620	16	17.030
165	19.550	31	16.986
158	19.040	39	16.900
33	18.328	20	16.560
164	18.120	3	16.340
172	17.890	15	16.300
5	17.800	22	14.900
4	17.790	116	14.730

HNO3-N on impregnated filter
Sample no.: 4
Theoretical value: 29.450
Unit:

Run 1:

Number of laboratories:	19
Arithmetic mean value:	28.656
Median:	28.702
Standard deviation	2.340
Rel. st. deviation (%)	8.167

Run 2:

Number of laboratories:	19
Arithmetic mean value:	28.656
Median:	28.702
Standard deviation	2.340
Rel. st. deviation (%)	8.167

Results in decreasing order:

163	32.620	33	28.572
109	32.620	16	28.550
158	30.830	36	28.300
165	30.520	3	27.770
5	29.970	39	27.600
172	29.650	20	26.940
4	29.640	15	25.000
164	29.560	116	24.520
8	28.800	22	24.300
31	28.702		

HNO3-N on impregnated filter
Sample no.: 5
Theoretical value: 24.540
Unit:

Run 1:

Number of laboratories:	19
Arithmetic mean value:	25.481
Median:	24.260
Standard deviation	7.316
Rel. st. deviation (%)	28.711

Run 2:

Number of laboratories:	18
Arithmetic mean value:	23.860
Median:	24.080
Standard deviation	1.953
Rel. st. deviation (%)	8.186

Results in decreasing order:

33	54.657 (*)	36	23.900
109	27.220	16	23.830
163	27.220	8	23.500
158	25.910	3	22.940
165	25.440	39	22.300
5	24.660	15	22.300
4	24.520	20	22.180
31	24.398	116	20.320
164	24.280	22	20.300
172	24.260		

Table 16: Analytical results for nitrogen dioxide in absorbing solution.

NO2-N in absorbing solution
Sample no.: 1
Theoretical value: 0.077
Unit:

Run 1:

Number of laboratories:	14
Arithmetic mean value:	0.074
Median:	0.075
Standard deviation	0.007
Rel. st. deviation (%)	9.124

Run 2:

Number of laboratories:	13
Arithmetic mean value:	0.075
Median:	0.076
Standard deviation	0.005
Rel. st. deviation (%)	6.867

Results in decreasing order:

33	0.084	16	0.075	
38	0.080	20	0.073	
12	0.078	36	0.073	
19	0.078	8	0.072	
31	0.078	15	0.070	
35	0.076	22	0.063	
39	0.076	3	0.058	(*)

NO2-N in absorbing solution
Sample no.: 2
Theoretical value: 0.047
Unit:

Run 1:

Number of laboratories:	14
Arithmetic mean value:	0.046
Median:	0.046
Standard deviation	0.006
Rel. st. deviation (%)	13.849

Run 2:

Number of laboratories:	13
Arithmetic mean value:	0.047
Median:	0.047
Standard deviation	0.005
Rel. st. deviation (%)	9.590

Results in decreasing order:

22	0.059	36	0.046	
12	0.051	16	0.045	
38	0.050	35	0.045	
33	0.049	20	0.045	
31	0.049	8	0.043	
39	0.048	15	0.040	
19	0.047	3	0.030	(*)

NO2-N in absorbing solution
Sample no.: 3
Theoretical value: 0.100
Unit:

Run 1:

Number of laboratories:	14
Arithmetic mean value:	0.095
Median:	0.099
Standard deviation	0.011
Rel. st. deviation (%)	11.467

Run 2:

Number of laboratories:	13
Arithmetic mean value:	0.097
Median:	0.100
Standard deviation	0.007
Rel. st. deviation (%)	7.213

Results in decreasing order:

33	0.105	36	0.097	
39	0.103	15	0.096	
12	0.102	20	0.096	
35	0.100	16	0.094	
38	0.100	8	0.087	
19	0.100	3	0.079	
31	0.100	22	0.065	(*)

NO2-N in absorbing solution
Sample no.: 4
Theoretical value: 0.107
Unit:

Run 1:

Number of laboratories:	14
Arithmetic mean value:	0.102
Median:	0.107
Standard deviation	0.011
Rel. st. deviation (%)	11.244

Run 2:

Number of laboratories:	13
Arithmetic mean value:	0.105
Median:	0.108
Standard deviation	0.007
Rel. st. deviation (%)	6.775

Results in decreasing order:

33	0.113	36	0.106	
38	0.110	20	0.104	
31	0.110	16	0.101	
39	0.109	15	0.100	
19	0.109	3	0.091	
12	0.108	8	0.091	
35	0.108	22	0.070	(*)

Table 17: Analytical results for ammonia on impregnated filter. The reported results are corrected for an average blank value (J3 and J5).

NH3-N on impregnated filter ug N/filter

Sample no.: J1
Theoretical value: 16.040
Unit:

Run 1:

Number of laboratories:	17
Arithmetic mean value:	15.616
Median:	15.400
Standard deviation	1.365
Rel. st. deviation (%)	8.738

Run 2:

Number of laboratories:	16
Arithmetic mean value:	15.394
Median:	15.290
Standard deviation	1.045
Rel. st. deviation (%)	6.786

Results in decreasing order:

33	19.170 (*)	15	15.180
172	17.250	165	15.130
38	16.745	158	14.980
13	16.300	5	14.960
116	16.275	39	14.795
8	16.200	20	14.770
3	15.660	4	14.015
31	15.611	10	13.025
36	15.400		

NH3-N on impregnated filter ug N/filter

Sample no.: J2
Theoretical value: 20.050
Unit:

Run 1:

Number of laboratories:	17
Arithmetic mean value:	19.595
Median:	19.641
Standard deviation	1.445
Rel. st. deviation (%)	7.373

Run 2:

Number of laboratories:	15
Arithmetic mean value:	19.598
Median:	19.641
Standard deviation	0.894
Rel. st. deviation (%)	4.562

Results in decreasing order:

13	22.900 (*)	158	18.890
172	21.050	20	18.870
38	20.845	165	18.860
8	20.800	5	18.750
15	20.220	4	18.725
116	20.165	39	18.695
3	20.000	36	18.500
33	19.965	10	16.236 (*)
31	19.641		

NH3-N on impregnated filter ug N/filter

Sample no.: J4
Theoretical value: 30.080
Unit:

Run 1:

Number of laboratories:	17
Arithmetic mean value:	28.767
Median:	28.680
Standard deviation	1.449
Rel. st. deviation (%)	5.038

Run 2:

Number of laboratories:	16
Arithmetic mean value:	28.983
Median:	28.705
Standard deviation	1.184
Rel. st. deviation (%)	4.086

Results in decreasing order:

8	31.200	158	28.590
172	30.450	13	28.500
38	30.445	5	28.250
33	30.420	36	28.200
15	29.440	4	27.785
116	29.425	31	27.481
165	29.130	39	26.995
20	28.730	10	25.326 (*)
3	28.680		

NH3-N on impregnated filter ug N/filter

Sample no.: J6
Theoretical value: 10.030
Unit:

Run 1:

Number of laboratories:	17
Arithmetic mean value:	9.843
Median:	9.990
Standard deviation	0.812
Rel. st. deviation (%)	8.245

Run 2:

Number of laboratories:	16
Arithmetic mean value:	9.983
Median:	10.032
Standard deviation	0.591
Rel. st. deviation (%)	5.923

Results in decreasing order:

38	11.045	165	9.670
172	10.950	5	9.540
13	10.500	33	9.450
3	10.370	4	9.435
158	10.350	39	9.395
8	10.300	36	9.300
31	10.241	20	9.110
116	10.075	10	7.611 (*)
15	9.990		

Table 18: Analytical results for sulphate in precipitations samples.

Sulphate in precipitation
Sample no.: 1
Theoretical value: 1.166
Unit:

Run 1:
Number of laboratories: 63
Arithmetic mean value: 1.162
Median: 1.162
Standard deviation 0.110
Rel. st. deviation (%) 9.441

Run 2:
Number of laboratories: 60
Arithmetic mean value: 1.155
Median: 1.162
Standard deviation 0.061
Rel. st. deviation (%) 5.281

Results in decreasing order:

13	1.710 (*)	4	1.162	
107	1.440 (*)	108	1.160	
7	1.313	125	1.153	
165	1.289	6	1.152	
115	1.280	157	1.150	
172	1.240	26	1.150	
8	1.230	158	1.148	
118	1.220	166	1.144	
110	1.200	104	1.140	
163	1.200	124	1.140	
15	1.200	33	1.140	
38	1.200	126	1.140	
1	1.200	42	1.139	
27	1.195	14	1.130	
167	1.188	31	1.128	
5	1.187	11	1.128	
21	1.186	24	1.120	
2	1.185	22	1.119	
102	1.184	164	1.110	
3	1.184	153	1.110	
150	1.183	10	1.098	
20	1.182	117	1.097	
152	1.180	113	1.082	
43	1.180	112	1.070	
155	1.175	120	1.070	
146	1.173	23	1.054	
151	1.172	19	1.048	
36	1.170	121	1.030	
114	1.170	109	1.000	
16	1.167	17	1.000	
35	1.166	145	0.780 (*)	
116	1.162			

Sulphate in precipitation
Sample no.: 2
Theoretical value: 1.120
Unit:

Run 1:
Number of laboratories: 63
Arithmetic mean value: 1.120
Median: 1.117
Standard deviation 0.106
Rel. st. deviation (%) 9.457

Run 2:
Number of laboratories: 60
Arithmetic mean value: 1.112
Median: 1.115
Standard deviation 0.061
Rel. st. deviation (%) 5.454

Results in decreasing order:

13	1.640 (*)	6	1.114	
107	1.430 (*)	126	1.110	
7	1.320	167	1.109	
165	1.251	26	1.108	
115	1.250	125	1.106	
110	1.170	158	1.105	
172	1.170	11	1.102	
2	1.165	104	1.100	
8	1.160	116	1.097	
163	1.160	31	1.094	
15	1.160	166	1.093	
1	1.160	14	1.090	
157	1.160	108	1.085	
27	1.150	153	1.080	
38	1.150	33	1.080	
102	1.147	124	1.080	
21	1.146	118	1.080	
150	1.144	22	1.074	
151	1.142	164	1.070	
5	1.142	24	1.070	
3	1.141	117	1.059	
42	1.138	113	1.045	
146	1.135	10	1.045	
114	1.130	112	1.040	
155	1.128	120	1.040	
43	1.125	19	1.024	
36	1.124	23	1.019	
20	1.122	109	1.000	
4	1.122	121	0.970	
152	1.120	17	0.970	
35	1.119	145	0.790 (*)	
16	1.117			

Sulphate in precipitation
Sample no.: 3
Theoretical value: 0.712
Unit:

Run 1:
Number of laboratories: 63
Arithmetic mean value: 0.716
Median: 0.710
Standard deviation 0.072
Rel. st. deviation (%) 10.051

Run 2:
Number of laboratories: 60
Arithmetic mean value: 0.704
Median: 0.710
Standard deviation 0.044
Rel. st. deviation (%) 6.256

Results in decreasing order:

13	1.010 (*)	152	0.710
165	1.009 (*)	118	0.710
7	0.878 (*)	35	0.709
107	0.854	16	0.707
115	0.820	42	0.705
126	0.770	14	0.703
157	0.770	158	0.700
2	0.750	24	0.700
163	0.740	6	0.699
15	0.740	125	0.698
172	0.740	167	0.692
151	0.739	104	0.690
8	0.734	124	0.690
27	0.732	112	0.690
110	0.730	11	0.690
146	0.725	116	0.686
3	0.723	108	0.685
1	0.723	31	0.684
150	0.723	153	0.680
5	0.723	22	0.677
36	0.721	164	0.670
21	0.720	117	0.665
38	0.720	19	0.662
102	0.717	120	0.650
166	0.717	10	0.645
43	0.717	23	0.645
26	0.713	113	0.633
155	0.711	109	0.630
20	0.711	17	0.623
4	0.711	145	0.610
114	0.710	121	0.590
33	0.710		

Sulphate in precipitation
Sample no.: 4
Theoretical value: 0.886
Unit:

Run 1:
Number of laboratories: 63
Arithmetic mean value: 0.882
Median: 0.874
Standard deviation 0.079
Rel. st. deviation (%) 8.915

Run 2:
Number of laboratories: 60
Arithmetic mean value: 0.869
Median: 0.872
Standard deviation 0.045
Rel. st. deviation (%) 5.150

Results in decreasing order:

13	1.310 (*)	5	0.873
7	1.074 (*)	16	0.871
107	1.070 (*)	6	0.871
115	1.000	118	0.870
172	0.940	104	0.870
157	0.930	110	0.870
2	0.920	11	0.869
151	0.917	158	0.868
8	0.916	116	0.866
27	0.911	125	0.864
43	0.910	14	0.864
38	0.910	102	0.862
126	0.910	167	0.861
163	0.910	108	0.860
15	0.910	124	0.860
150	0.908	31	0.857
1	0.906	153	0.850
152	0.900	22	0.844
21	0.897	164	0.840
146	0.896	117	0.832
3	0.896	10	0.824
36	0.887	24	0.820
4	0.883	19	0.819
155	0.881	120	0.810
112	0.880	113	0.803
33	0.880	109	0.800
35	0.880	23	0.799
114	0.880	121	0.790
20	0.879	165	0.773
42	0.875	17	0.770
166	0.874	145	0.750
26	0.874		

Table 19: Analytical results for nitrate in precipitations samples.

Nitrate in precipitation
Sample no.: 1
Theoretical value: 0.300
Unit:

Run 1:
Number of laboratories: 65
Arithmetic mean value: 0.298
Median: 0.298
Standard deviation 0.023
Rel. st. deviation (%) 7.812

Run 2:
Number of laboratories: 62
Arithmetic mean value: 0.296
Median: 0.298
Standard deviation 0.013
Rel. st. deviation (%) 4.345

Results in decreasing order:

102	0.407	(*)	20	0.298
40	0.371	(*)	167	0.298
42	0.332		3	0.297
112	0.330		16	0.296
121	0.321		172	0.296
126	0.320		35	0.296
26	0.313		6	0.295
13	0.313		43	0.294
118	0.310		150	0.293
11	0.308		113	0.292
36	0.308		22	0.291
2	0.308		164	0.290
8	0.307		158	0.290
27	0.305		124	0.290
165	0.305		38	0.290
1	0.304		116	0.288
21	0.303		166	0.285
115	0.302		107	0.285
5	0.302		117	0.284
14	0.302		31	0.283
114	0.301		125	0.283
23	0.301		10	0.283
109	0.300		108	0.280
163	0.300		120	0.280
155	0.300		24	0.280
15	0.300		33	0.280
157	0.300		153	0.280
104	0.300		152	0.280
4	0.300		17	0.277
160	0.300		110	0.270
146	0.299		19	0.267
151	0.299		145	0.213 (*)
7	0.298			

Nitrate in precipitation
Sample no.: 2
Theoretical value: 0.294
Unit:

Run 1:
Number of laboratories: 65
Arithmetic mean value: 0.309
Median: 0.292
Standard deviation 0.130
Rel. st. deviation (%) 42.087

Run 2:
Number of laboratories: 64
Arithmetic mean value: 0.293
Median: 0.291
Standard deviation 0.020
Rel. st. deviation (%) 6.674

Results in decreasing order:

40	1.329	(*)	113	0.291
102	0.391		150	0.291
42	0.330		167	0.291
126	0.320		35	0.290
112	0.320		110	0.290
121	0.313		3	0.290
157	0.310		118	0.290
26	0.308		124	0.290
13	0.306		15	0.290
2	0.305		6	0.290
8	0.304		104	0.290
151	0.304		108	0.290
43	0.303		160	0.289
36	0.303		22	0.285
165	0.302		158	0.285
11	0.302		31	0.282
155	0.300		117	0.281
21	0.300		38	0.280
163	0.300		107	0.280
109	0.300		116	0.280
1	0.299		120	0.280
14	0.298		164	0.280
27	0.298		17	0.280
23	0.297		125	0.278
146	0.296		10	0.277
5	0.296		166	0.276
4	0.295		153	0.270
16	0.294		33	0.270
7	0.294		152	0.270
115	0.294		19	0.267
20	0.294		24	0.260
114	0.292		145	0.231
172	0.292			

Nitrate in precipitation
Sample no.: 3
Theoretical value: 0.398
Unit:

Run 1:
Number of laboratories: 65
Arithmetic mean value: 0.412
Median: 0.397
Standard deviation 0.134
Rel. st. deviation (%) 32.395

Run 2:
Number of laboratories: 64
Arithmetic mean value: 0.396
Median: 0.397
Standard deviation 0.020
Rel. st. deviation (%) 5.128

Results in decreasing order:

40	1.460	(*)	172	0.397
102	0.489		150	0.396
112	0.430		6	0.396
42	0.428		114	0.396
13	0.424		7	0.394
121	0.423		43	0.394
8	0.414		107	0.393
11	0.412		22	0.392
2	0.412		164	0.390
163	0.410		104	0.390
157	0.410		155	0.389
36	0.410		166	0.388
151	0.409		158	0.388
27	0.409		31	0.387
115	0.408		10	0.385
21	0.406		167	0.385
26	0.406		113	0.385
1	0.405		116	0.383
16	0.403		117	0.381
23	0.403		118	0.380
146	0.403		33	0.380
4	0.402		110	0.380
35	0.402		38	0.380
5	0.402		125	0.375
14	0.401		152	0.370
15	0.400		153	0.370
120	0.400		24	0.370
126	0.400		17	0.370
109	0.400		19	0.366
108	0.400		124	0.360
160	0.399		165	0.358
3	0.397		145	0.350
20	0.397			

Nitrate in precipitation
Sample no.: 4
Theoretical value: 0.566
Unit:

Run 1:
Number of laboratories: 65
Arithmetic mean value: 0.568
Median: 0.553
Standard deviation 0.147
Rel. st. deviation (%) 25.791

Run 2:
Number of laboratories: 64
Arithmetic mean value: 0.550
Median: 0.553
Standard deviation 0.028
Rel. st. deviation (%) 5.165

Results in decreasing order:

40	1.710	(*)	26	0.553
42	0.618		3	0.552
121	0.589		10	0.552
2	0.585		22	0.552
115	0.582		20	0.552
13	0.581		6	0.551
112	0.580		16	0.551
151	0.578		38	0.550
8	0.574		109	0.550
11	0.572		15	0.550
27	0.572		108	0.545
163	0.570		113	0.544
36	0.569		158	0.543
1	0.569		116	0.543
102	0.569		31	0.541
150	0.568		104	0.540
155	0.567		167	0.540
172	0.566		152	0.540
21	0.565		110	0.540
14	0.564		166	0.534
23	0.563		117	0.533
157	0.560		17	0.533
120	0.560		125	0.530
164	0.560		153	0.530
35	0.559		33	0.530
146	0.559		118	0.530
160	0.559		126	0.530
4	0.558		19	0.514
107	0.556		24	0.510
43	0.556		145	0.492
7	0.556		124	0.470
114	0.553		165	0.414
5	0.553			

Table 20: Analytical results for ammonium in precipitations sample.

Ammonium in precipitation
Sample no.: 1
Theoretical value: 0.160
Unit:

Run 1:
Number of laboratories: 64
Arithmetic mean value: 0.167
Median: 0.160
Standard deviation 0.038
Rel. st. deviation (%) 22.886

Run 2:
Number of laboratories: 61
Arithmetic mean value: 0.160
Median: 0.160
Standard deviation 0.026
Rel. st. deviation (%) 16.383

Results in decreasing order:

43	0.326	(*)	152	0.160
157	0.280	(*)	110	0.160
22	0.264	(*)	112	0.160
31	0.229		26	0.159
40	0.223		5	0.158
150	0.213		23	0.156
24	0.210		146	0.156
102	0.206		117	0.156
109	0.200		114	0.155
42	0.194		118	0.155
19	0.183		167	0.154
164	0.180		10	0.153
15	0.180		16	0.153
3	0.178		4	0.151
14	0.177		115	0.151
145	0.176		165	0.150
13	0.176		33	0.150
172	0.172		38	0.150
153	0.170		104	0.150
163	0.170		108	0.150
125	0.168		160	0.148
17	0.167		36	0.144
2	0.167		121	0.143
1	0.166		166	0.140
6	0.166		113	0.132
7	0.164		11	0.130
20	0.164		8	0.129
116	0.163		124	0.120
21	0.162		151	0.109
27	0.161		107	0.108
126	0.160		120	0.100
158	0.160		155	0.094

Ammonium in precipitation
Sample no.: 2
Theoretical value: 0.134
Unit:

Run 1:
Number of laboratories: 63
Arithmetic mean value: 0.141
Median: 0.137
Standard deviation 0.034
Rel. st. deviation (%) 24.203

Run 2:
Number of laboratories: 59
Arithmetic mean value: 0.137
Median: 0.136
Standard deviation 0.023
Rel. st. deviation (%) 16.533

Results in decreasing order:

43	0.270	(*)	5	0.136
157	0.260	(*)	114	0.135
22	0.218	(*)	167	0.133
40	0.206		26	0.133
102	0.199		16	0.133
31	0.187		126	0.132
150	0.186		117	0.132
24	0.170		115	0.132
42	0.159		118	0.131
19	0.156		4	0.130
23	0.154		166	0.130
3	0.154		153	0.130
145	0.153		152	0.130
112	0.150		110	0.130
15	0.150		10	0.126
164	0.150		146	0.126
17	0.147		165	0.125
14	0.147		160	0.125
125	0.145		36	0.122
1	0.143		121	0.121
7	0.141		155	0.120
6	0.141		33	0.120
2	0.141		38	0.120
104	0.140		113	0.111
172	0.140		163	0.110
108	0.140		8	0.108
116	0.139		11	0.106
13	0.139		124	0.100
21	0.138		151	0.090
27	0.137		107	0.078
20	0.137		120	0.070 (*)
158	0.137			

Ammonium in precipitation
Sample no.: 3
Theoretical value: 0.241
Unit:

Run 1:
Number of laboratories: 64
Arithmetic mean value: 0.251
Median: 0.243
Standard deviation 0.040
Rel. st. deviation (%) 15.792

Run 2:
Number of laboratories: 60
Arithmetic mean value: 0.248
Median: 0.241
Standard deviation 0.027
Rel. st. deviation (%) 10.906

Results in decreasing order:

43	0.380	(*)	7	0.242
22	0.371	(*)	110	0.240
157	0.350	(*)	114	0.240
24	0.330		153	0.240
40	0.309		166	0.240
31	0.308		38	0.240
42	0.299		21	0.240
150	0.288		26	0.240
145	0.286		5	0.240
19	0.279		112	0.240
102	0.273		108	0.240
164	0.270		126	0.240
152	0.270		155	0.240
125	0.267		4	0.239
116	0.261		118	0.239
104	0.260		117	0.236
3	0.260		146	0.234
15	0.260		160	0.234
109	0.260		167	0.233
17	0.259		115	0.233
20	0.257		10	0.230
23	0.254		33	0.230
172	0.253		121	0.229
13	0.252		16	0.227
2	0.251		36	0.225
14	0.251		113	0.221
163	0.250		107	0.204
124	0.250		11	0.203
6	0.249		8	0.197
27	0.248		165	0.186
158	0.246		151	0.183
1	0.245		120	0.130 (*)

Ammonium in precipitation
Sample no.: 4
Theoretical value: 0.377
Unit:

Run 1:
Number of laboratories: 64
Arithmetic mean value: 0.385
Median: 0.377
Standard deviation 0.052
Rel. st. deviation (%) 13.511

Run 2:
Number of laboratories: 58
Arithmetic mean value: 0.379
Median: 0.376
Standard deviation 0.030
Rel. st. deviation (%) 7.856

Results in decreasing order:

157	0.560	(*)	26	0.376
24	0.540	(*)	6	0.376
22	0.517	(*)	160	0.375
43	0.500	(*)	14	0.375
42	0.485		158	0.374
40	0.461		118	0.372
31	0.427		117	0.371
125	0.426		1	0.371
150	0.411		110	0.370
152	0.410		4	0.370
17	0.408		21	0.369
102	0.404		5	0.369
19	0.404		16	0.367
116	0.403		114	0.365
20	0.402		146	0.364
164	0.400		113	0.361
145	0.400		33	0.360
3	0.395		153	0.360
23	0.393		112	0.360
124	0.390		166	0.360
15	0.390		167	0.358
108	0.390		10	0.358
104	0.390		115	0.357
126	0.386		121	0.357
2	0.383		155	0.356
172	0.383		36	0.353
27	0.383		11	0.326
109	0.380		8	0.325
163	0.380		107	0.317
38	0.380		151	0.305
7	0.379		120	0.270 (*)
13	0.378		165	0.246 (*)

Table 21: Analytical results for pH in precipitations samples.

pH in precipitation
Sample no.: G1
Theoretical value: 4.220
Unit: pH-units

Run 1:
Number of laboratories: 59
Arithmetic mean value: 4.238
Median: 4.260
Standard deviation 0.135
Rel. st. deviation (%) 3.187

Run 2:
Number of laboratories: 56
Arithmetic mean value: 4.262
Median: 4.270
Standard deviation 0.082
Rel. st. deviation (%) 1.920

Results in decreasing order:

108	4.440	6	4.260	
38	4.400	152	4.260	
104	4.370	23	4.260	
166	4.370	4	4.250	
117	4.360	120	4.250	
1	4.360	158	4.250	
19	4.353	115	4.250	
164	4.340	11	4.250	
110	4.330	114	4.240	
121	4.320	124	4.240	
165	4.320	3	4.240	
150	4.320	5	4.240	
33	4.310	126	4.230	
14	4.310	39	4.230	
35	4.300	22	4.220	
153	4.300	36	4.220	
112	4.300	16	4.220	
116	4.300	13	4.220	
26	4.290	118	4.210	
10	4.290	24	4.210	
20	4.280	7	4.170	
113	4.280	102	4.152	
163	4.280	157	4.150	
107	4.270	146	4.110	
8	4.270	151	3.990	
15	4.270	40	3.970	
31	4.270	17	3.930	(*)
27	4.270	172	3.800	(*)
21	4.270	2	3.630	(*)
155	4.260			

pH in precipitation
Sample no.: G2
Theoretical value: 4.250
Unit: pH-units

Run 1:
Number of laboratories: 59
Arithmetic mean value: 4.259
Median: 4.280
Standard deviation 0.111
Rel. st. deviation (%) 2.599

Run 2:
Number of laboratories: 56
Arithmetic mean value: 4.279
Median: 4.280
Standard deviation 0.070
Rel. st. deviation (%) 1.639

Results in decreasing order:

150	4.470	158	4.280	
165	4.410	116	4.270	
38	4.400	155	4.270	
108	4.390	5	4.270	
110	4.380	4	4.270	
19	4.364	23	4.270	
166	4.360	20	4.260	
14	4.330	6	4.260	
153	4.320	120	4.260	
163	4.320	115	4.260	
35	4.310	124	4.260	
117	4.310	3	4.256	
112	4.310	36	4.250	
26	4.310	22	4.250	
1	4.300	16	4.250	
10	4.300	13	4.250	
113	4.300	11	4.240	
24	4.300	39	4.240	
31	4.300	126	4.240	
8	4.290	118	4.240	
121	4.290	114	4.240	
33	4.290	102	4.166	
107	4.290	7	4.160	
164	4.290	146	4.130	
2	4.290	157	4.100	
152	4.290	151	4.038	
104	4.280	17	3.920	(*)
21	4.280	40	3.890	(*)
27	4.280	172	3.850	(*)
15	4.280			

pH in precipitation
Sample no.: G3
Theoretical value: 4.540
Unit: pH-units

Run 1:
Number of laboratories: 59
Arithmetic mean value: 4.544
Median: 4.570
Standard deviation 0.135
Rel. st. deviation (%) 2.968

Run 2:
Number of laboratories: 55
Arithmetic mean value: 4.574
Median: 4.570
Standard deviation 0.074
Rel. st. deviation (%) 1.611

Results in decreasing order:

150	4.760	23	4.570	
19	4.716	158	4.560	
38	4.710	116	4.560	
110	4.690	115	4.560	
14	4.670	152	4.560	
35	4.670	5	4.560	
166	4.670	6	4.550	
108	4.650	155	4.550	
153	4.630	165	4.550	
113	4.630	16	4.550	
117	4.630	20	4.550	
112	4.620	120	4.550	
26	4.610	3	4.545	
104	4.600	39	4.540	
24	4.600	11	4.540	
10	4.600	13	4.540	
22	4.590	118	4.530	
1	4.590	124	4.530	
15	4.590	114	4.520	
31	4.590	126	4.510	
33	4.580	102	4.498	
107	4.580	157	4.430	
27	4.580	7	4.420	
121	4.580	146	4.390	
21	4.580	151	4.343	
8	4.580	17	4.200	(*)
163	4.580	40	4.180	(*)
164	4.570	172	4.090	(*)
36	4.570	2	4.040	(*)
4	4.570			

pH in precipitation
Sample no.: G4
Theoretical value: 4.460
Unit: pH-units

Run 1:
Number of laboratories: 59
Arithmetic mean value: 4.461
Median: 4.490
Standard deviation 0.117
Rel. st. deviation (%) 2.623

Run 2:
Number of laboratories: 56
Arithmetic mean value: 4.481
Median: 4.490
Standard deviation 0.080
Rel. st. deviation (%) 1.780

Results in decreasing order:

19	4.622	104	4.480	
14	4.610	115	4.480	
153	4.600	23	4.480	
150	4.580	5	4.480	
166	4.580	4	4.480	
35	4.580	158	4.480	
38	4.570	20	4.470	
26	4.560	120	4.470	
110	4.560	124	4.470	
1	4.550	155	4.470	
112	4.540	6	4.470	
121	4.540	39	4.460	
108	4.530	11	4.460	
163	4.520	114	4.450	
113	4.520	13	4.450	
165	4.510	118	4.450	
107	4.510	126	4.440	
31	4.510	16	4.430	
15	4.510	116	4.420	
10	4.510	102	4.413	
8	4.500	7	4.350	
164	4.500	146	4.330	
21	4.500	2	4.320	
33	4.490	157	4.290	
27	4.490	117	4.260	
152	4.490	151	4.240	
22	4.490	40	4.120	(*)
24	4.490	17	4.080	(*)
36	4.490	172	4.060	(*)
3	4.490			

Table 22: Analytical results for strong acid calculated from pH.

Strong acid calculated from pH
Sample no.: G1
Theoretical value: 60.000
Unit: µeg/l

Run 1:

Number of laboratories:	59
Arithmetic mean value:	61.517
Median:	54.954
Standard deviation	30.078
Rel. st. deviation (%)	48.894

Run 2:

Number of laboratories:	57
Arithmetic mean value:	56.782
Median:	53.703
Standard deviation	14.573
Rel. st. deviation (%)	25.665

Results in decreasing order:

2	234.423 (*)	8	53.703
167	158.489 (*)	15	53.703
17	117.490	21	53.703
39	107.152	31	53.703
150	102.329	27	53.703
145	77.625	104	53.703
155	70.795	158	52.481
43	70.469	112	52.481
7	67.608	20	52.481
117	61.660	10	51.286
24	61.660	26	51.286
36	60.256	110	50.119
13	60.256	152	50.119
16	60.256	115	50.119
22	60.256	35	50.119
125	58.884	33	48.978
172	58.884	14	48.978
121	57.544	146	47.863
5	57.544	120	47.863
3	57.544	164	47.863
113	57.544	109	46.774
11	56.234	163	45.709
118	56.234	19	44.361
114	56.234	1	43.652
157	56.234	116	43.652
4	56.234	102	42.658
151	54.954	165	42.658
153	54.954	38	39.811
6	54.954	107	36.308
23	54.954		

Strong acid calculated from pH
Sample no.: G2
Theoretical value: 57.000
Unit: µeg/l

Run 1:

Number of laboratories:	59
Arithmetic mean value:	57.231
Median:	52.481
Standard deviation	19.353
Rel. st. deviation (%)	33.815

Run 2:

Number of laboratories:	56
Arithmetic mean value:	53.328
Median:	52.481
Standard deviation	9.260
Rel. st. deviation (%)	17.364

Results in decreasing order:

167	141.254 (*)	102	52.481
39	128.825 (*)	157	52.481
17	120.226 (*)	21	52.481
150	91.622	8	51.286
155	79.433	151	51.286
145	74.131	104	51.286
7	69.183	120	51.286
43	68.234	163	51.286
11	57.544	33	51.286
117	57.544	2	51.286
113	57.544	31	50.119
125	57.544	1	50.119
172	57.544	24	50.119
13	56.234	112	50.119
22	56.234	10	50.119
36	56.234	26	48.978
16	56.234	35	48.978
3	55.463	116	48.978
114	54.954	110	48.978
6	54.954	158	47.863
118	54.954	152	47.863
20	54.954	14	46.774
121	54.954	165	43.652
5	53.703	19	43.251
115	53.703	109	41.687
23	53.703	107	40.738
153	53.703	38	39.811
4	53.703	164	38.905
27	52.481	146	33.884
15	52.481		

Strong acid calculated from pH
Sample no.: G3
Theoretical value: 29.000
Unit: µeg/l

Run 1:

Number of laboratories:	59
Arithmetic mean value:	30.315
Median:	26.915
Standard deviation	13.472
Rel. st. deviation (%)	44.441

Run 2:

Number of laboratories:	55
Arithmetic mean value:	27.035
Median:	26.915
Standard deviation	4.863
Rel. st. deviation (%)	17.988

Results in decreasing order:

2	91.201 (*)	23	26.915
167	81.283 (*)	4	26.915
39	66.069 (*)	120	26.303
17	63.096 (*)	21	26.303
150	45.394	158	26.303
145	40.738	27	26.303
7	38.019	8	26.303
155	37.154	33	26.303
43	31.769	104	26.303
125	30.903	15	25.704
113	30.200	22	25.704
121	29.512	31	25.704
117	29.512	1	25.704
13	28.840	24	25.119
172	28.840	10	25.119
11	28.840	102	25.119
3	28.510	26	24.547
164	28.184	110	23.988
6	28.184	152	23.442
20	28.184	112	23.442
16	28.184	116	23.442
118	28.184	107	22.387
153	28.184	35	21.380
114	27.542	14	21.380
5	27.542	165	21.380
115	27.542	109	20.417
151	27.542	38	19.498
157	27.542	19	19.231
36	26.915	146	17.378
163	26.915		

Strong acid calculated from pH
Sample no.: G4
Theoretical value: 35.000
Unit: µeg/l

Run 1:

Number of laboratories:	59
Arithmetic mean value:	36.091
Median:	32.359
Standard deviation	12.704
Rel. st. deviation (%)	35.199

Run 2:

Number of laboratories:	56
Arithmetic mean value:	33.629
Median:	32.359
Standard deviation	6.903
Rel. st. deviation (%)	20.527

Results in decreasing order:

167	87.096 (*)	36	32.359
17	83.176 (*)	151	32.359
39	75.858 (*)	3	32.359
150	57.544	33	32.359
116	54.954	22	32.359
155	51.286	24	32.359
2	47.863	8	31.623
145	46.774	21	31.623
7	44.668	163	31.623
43	38.637	104	30.903
115	38.019	15	30.903
16	37.154	164	30.903
125	36.308	31	30.903
117	35.481	10	30.903
113	35.481	158	30.200
13	35.481	112	30.200
172	34.674	107	29.512
11	34.674	110	28.840
118	33.884	120	28.840
153	33.884	1	28.184
6	33.884	109	27.542
121	33.884	26	27.542
20	33.884	38	26.915
23	33.113	146	26.303
4	33.113	165	26.303
114	33.113	35	26.303
102	33.113	152	25.119
157	33.113	14	24.547
5	33.113	19	23.878
27	32.359		

Table 23: Analytical results for chloride in precipitations samples.

Chloride in precipitation
Sample no.: G1
Theoretical value: 0.135
Unit: µg/ml

Run 1:
Number of laboratories: 58
Arithmetic mean value: 0.151
Median: 0.136
Standard deviation 0.065
Rel. st. deviation (%) 43.399

Run 2:
Number of laboratories: 57
Arithmetic mean value: 0.144
Median: 0.136
Standard deviation 0.040
Rel. st. deviation (%) 27.777

Results in decreasing order:

157	0.540 (*)	1	0.136	
19	< 0.31			
110	< 0.3			
115	0.275	2	0.134	
40	0.250	21	0.132	
109	< 0.25			
17	0.237	114	0.130	
20	0.234	15	0.130	
165	0.204	38	0.130	
24	0.200	153	0.130	
152	0.200			
102	< 0.19	36	0.130	
27	0.186	4	0.130	
107	0.173	33	0.130	
10	0.164	31	0.128	
158	0.163	23	0.127	
116	0.163	35	0.126	
104	0.160	151	0.125	
120	0.160	13	0.124	
5	0.155	172	0.121	
125	0.150	166	0.121	
3	0.150	164	0.120	
150	0.149	155	0.120	
11	0.147	126	0.120	
42	0.146	163	0.120	
16	0.141	124	0.120	
43	0.140	145	0.120	
113	0.140	167	0.103	
8	0.139	6	0.101	
7	0.139	14	0.101	
112	0.138	118	0.080	
26	0.137	108	0.075	
146	0.136	22	0.057	

Chloride in precipitation
Sample no.: G2
Theoretical value: 0.162
Unit: µg/ml

Run 1:
Number of laboratories: 58
Arithmetic mean value: 0.172
Median: 0.161
Standard deviation 0.061
Rel. st. deviation (%) 35.337

Run 2:
Number of laboratories: 55
Arithmetic mean value: 0.160
Median: 0.160
Standard deviation 0.026
Rel. st. deviation (%) 16.167

Results in decreasing order:

157	0.510 (*)	114	0.160	
17	0.360 (*)	43	0.160	
19	< 0.31			
115	0.300 (*)	20	0.160	
110	< 0.3			
109	< 0.25			
165	0.222	146	0.160	
116	0.207	15	0.160	
152	0.200	21	0.155	
120	0.200	151	0.155	
40	0.200	35	0.154	
102	< 0.19			
24	0.190	4	0.154	
104	0.190	36	0.154	
10	0.188	172	0.152	
150	0.188	1	0.151	
2	0.185	33	0.150	
11	0.181	163	0.150	
158	0.179	23	0.150	
16	0.177	31	0.148	
108	0.175	14	0.143	
13	0.172	166	0.143	
5	0.170	38	0.140	
113	0.170	164	0.140	
107	0.167	155	0.140	
26	0.167	126	0.140	
8	0.165	153	0.140	
125	0.164	145	0.129	
7	0.163	6	0.124	
112	0.163	167	0.122	
42	0.162	118	0.110	
3	0.161	124	0.110	
27	0.161	22	0.074	

Chloride in precipitation
Sample no.: G3
Theoretical value: 0.270
Unit: µg/ml

Run 1:
Number of laboratories: 61
Arithmetic mean value: 0.268
Median: 0.264
Standard deviation 0.059
Rel. st. deviation (%) 22.197

Run 2:
Number of laboratories: 58
Arithmetic mean value: 0.261
Median: 0.263
Standard deviation 0.033
Rel. st. deviation (%) 12.815

Results in decreasing order:

157	0.580 (*)	21	0.262	
17	0.450 (*)	20	0.261	
115	0.380	33	0.260	
24	0.330	125	0.260	
165	0.323	114	0.260	
108	0.315	23	0.260	
19	< 0.31			
40	0.300	120	0.260	
110	< 0.3			
2	0.299	166	0.259	
42	0.296	4	0.258	
102	0.294	13	0.252	
1	0.291	163	0.250	
36	0.288	31	0.250	
104	0.280	164	0.250	
		109	< 0.25	
112	0.277	172	0.245	
7	0.277	155	0.242	
27	0.274	153	0.240	
158	0.272	10	0.239	
8	0.271	167	0.233	
26	0.270	113	0.230	
3	0.270	126	0.230	
107	0.270	38	0.230	
15	0.270	6	0.229	
5	0.270	145	0.226	
16	0.269	116	0.222	
150	0.268	14	0.211	
146	0.266	22	0.201	
121	0.266	152	0.200	
43	0.265	118	0.190	
151	0.265	124	0.190	
35	0.264	117	0.147 (*)	
11	0.264			

Chloride in precipitation
Sample no.: G4
Theoretical value: 0.328
Unit: µg/ml

Run 1:
Number of laboratories: 63
Arithmetic mean value: 0.320
Median: 0.312
Standard deviation 0.070
Rel. st. deviation (%) 21.839

Run 2:
Number of laboratories: 59
Arithmetic mean value: 0.304
Median: 0.310
Standard deviation 0.034
Rel. st. deviation (%) 11.270

Results in decreasing order:

157	0.600 (*)	11	0.311	
108	0.585 (*)	33	0.310	
116	0.522 (*)	114	0.310	
17	0.493 (*)	15	0.310	
115	0.400	23	0.307	
165	0.371	21	0.307	
40	0.350	1	0.304	
36	0.349	20	0.303	
2	0.349	10	0.301	
102	0.343	110	0.300	
24	0.340	4	0.300	
104	0.340	152	0.300	
43	0.328	163	0.300	
172	0.322	164	0.300	
27	0.322	166	0.293	
8	0.322	31	0.293	
3	0.321	13	0.291	
150	0.321	42	0.287	
26	0.321	167	0.281	
120	0.320	155	0.281	
113	0.320	6	0.280	
7	0.320	145	0.277	
19	0.320	153	0.270	
5	0.318	126	0.260	
112	0.318	38	0.250	
107	0.316	14	0.250	
		109	< 0.25	
151	0.316	121	0.248	
35	0.315	118	0.240	
146	0.314	22	0.232	
158	0.312	124	0.230	
16	0.312	117	0.207	
125	0.312			

Table 24: Analytical results for sodium in precipitations samples.

Sodium in precipitation
Sample no.: G1
Theoretical value: 0.213
Unit: µg/ml

Run 1:

Number of laboratories:	64
Arithmetic mean value:	0.213
Median:	0.208
Standard deviation	0.030
Rel. st. deviation (%)	13.835

Run 2:

Number of laboratories:	61
Arithmetic mean value:	0.209
Median:	0.207
Standard deviation	0.021
Rel. st. deviation (%)	9.836

Results in decreasing order:

157	0.340	(*)	150	0.208
42	0.306	(*)	6	0.207
19	0.275	(*)	13	0.207
117	0.267		33	0.206
22	0.256		120	0.205
102	0.254		4	0.203
121	0.245		21	0.203
27	0.245		152	0.202
107	0.244		165	0.202
3	0.229		10	0.201
145	0.228		166	0.200
116	0.227		153	0.200
5	0.226		124	0.200
151	0.223		109	0.200
163	0.220		114	0.200
112	0.220		110	0.200
16	0.220		43	0.200
15	0.220		36	0.200
24	0.220		35	0.199
164	0.220		11	0.197
155	0.218		8	0.193
1	0.217		2	0.192
7	0.216		118	0.190
26	0.215		115	0.190
158	0.214		23	0.189
146	0.212		167	0.187
125	0.212		172	0.187
108	0.210		113	0.187
20	0.210		104	0.180
31	0.210		126	0.170
160	0.210		17	0.161
14	0.209		38	0.160

Sodium in precipitation
Sample no.: G2
Theoretical value: 0.248
Unit: µg/ml

Run 1:

Number of laboratories:	64
Arithmetic mean value:	0.248
Median:	0.245
Standard deviation	0.028
Rel. st. deviation (%)	11.213

Run 2:

Number of laboratories:	59
Arithmetic mean value:	0.246
Median:	0.245
Standard deviation	0.017
Rel. st. deviation (%)	6.981

Results in decreasing order:

42	0.344	(*)	35	0.245
157	0.340	(*)	1	0.245
117	0.311	(*)	150	0.244
121	0.299		11	0.242
19	0.290		152	0.241
24	0.270		116	0.241
107	0.268		124	0.240
145	0.265		114	0.240
3	0.264		109	0.240
6	0.262		23	0.239
153	0.260		115	0.238
110	0.260		120	0.238
163	0.260		33	0.238
22	0.260		165	0.238
15	0.260		8	0.237
160	0.260		4	0.237
151	0.258		21	0.236
13	0.257		108	0.235
20	0.256		36	0.235
5	0.254		10	0.231
26	0.253		118	0.230
155	0.252		166	0.230
125	0.252		102	0.229
14	0.251		2	0.228
27	0.251		167	0.227
164	0.250		104	0.220
112	0.250		113	0.218
16	0.250		172	0.216
7	0.249		126	0.210
146	0.249		38	0.200
31	0.247		43	0.180 (*)
158	0.246		17	0.178 (*)

Sodium in precipitation
Sample no.: G3
Theoretical value: 0.354
Unit: µg/ml

Run 1:

Number of laboratories:	64
Arithmetic mean value:	0.343
Median:	0.350
Standard deviation	0.050
Rel. st. deviation (%)	14.681

Run 2:

Number of laboratories:	61
Arithmetic mean value:	0.348
Median:	0.350
Standard deviation	0.028
Rel. st. deviation (%)	8.170

Results in decreasing order:

42	0.481	(*)	31	0.350
117	0.422		11	0.349
121	0.406		150	0.348
24	0.400		23	0.348
19	0.386		14	0.346
20	0.385		8	0.342
22	0.377		116	0.341
35	0.376		36	0.340
33	0.376		166	0.340
107	0.375		16	0.340
13	0.375		2	0.339
124	0.370		145	0.338
155	0.370		21	0.338
153	0.370		4	0.334
125	0.367		110	0.330
6	0.364		108	0.330
3	0.364		109	0.330
5	0.361		167	0.326
164	0.360		104	0.320
27	0.360		102	0.320
15	0.360		120	0.318
114	0.360		10	0.316
163	0.360		113	0.312
112	0.360		115	0.312
1	0.357		118	0.310
158	0.355		38	0.310
146	0.355		172	0.308
151	0.355		165	0.300
152	0.355		126	0.290
7	0.353		17	0.258
26	0.351		43	0.140 (*)
160	0.350		157	0.120 (*)

Sodium in precipitation
Sample no.: G4
Theoretical value: 0.463
Unit: µg/ml

Run 1:

Number of laboratories:	64
Arithmetic mean value:	0.439
Median:	0.443
Standard deviation	0.058
Rel. st. deviation (%)	13.104

Run 2:

Number of laboratories:	61
Arithmetic mean value:	0.443
Median:	0.444
Standard deviation	0.035
Rel. st. deviation (%)	7.788

Results in decreasing order:

42	0.619	(*)	31	0.441
24	0.550		26	0.441
157	0.550		16	0.441
121	0.513		109	0.440
117	0.512		150	0.439
19	0.496		22	0.436
107	0.481		33	0.436
20	0.476		14	0.432
124	0.470		116	0.431
145	0.468		114	0.430
6	0.461		2	0.430
15	0.460		126	0.430
164	0.460		115	0.429
153	0.460		36	0.428
160	0.460		4	0.427
35	0.459		8	0.424
155	0.458		21	0.424
13	0.457		110	0.420
125	0.452		166	0.420
27	0.452		108	0.420
151	0.451		167	0.419
5	0.451		104	0.410
3	0.451		120	0.405
112	0.450		10	0.404
163	0.450		113	0.402
152	0.449		118	0.400
158	0.447		38	0.400
23	0.446		172	0.376
1	0.446		102	0.375
146	0.446		165	0.362
11	0.445		17	0.319 (*)
7	0.444		43	0.140 (*)

Table 25: Analytical results for magnesium in precipitations samples.

Magnesium in precipitation
Sample no.: G1
Theoretical value: 0.155
Unit: µg/ml

Run 1:
Number of laboratories: 63
Arithmetic mean value: 0.161
Median: 0.154
Standard deviation 0.040
Rel. st. deviation (%) 25.014

Run 2:
Number of laboratories: 61
Arithmetic mean value: 0.155
Median: 0.153
Standard deviation 0.020
Rel. st. deviation (%) 12.945

Results in decreasing order:

6	0.418 (*)	166	0.153
43	0.248 (*)	151	0.152
42	0.215	117	0.151
163	0.200	14	0.151
107	0.195	116	0.150
114	0.190	1	0.150
20	0.183	150	0.150
22	0.182	13	0.150
157	0.180	164	0.150
33	0.176	167	0.150
102	0.175	104	0.150
125	0.173	160	0.150
24	0.170	31	0.147
109	0.170	17	0.147
153	0.170	165	0.146
10	0.168	8	0.146
2	0.164	118	0.146
145	0.161	108	0.145
7	0.160	152	0.144
27	0.160	120	0.144
112	0.160	36	0.143
15	0.160	110	0.140
124	0.160	4	0.135
155	0.159	113	0.134
21	0.158	146	0.133
11	0.158	38	0.130
19	0.158	16	0.126
5	0.157	115	0.122
3	0.156	172	0.122
158	0.155	126	0.110
23	0.154	121	0.101
26	0.154		

Magnesium in precipitation
Sample no.: G2
Theoretical value: 0.067
Unit: µg/ml

Run 1:
Number of laboratories: 62
Arithmetic mean value: 0.069
Median: 0.067
Standard deviation 0.024
Rel. st. deviation (%) 33.971

Run 2:
Number of laboratories: 60
Arithmetic mean value: 0.066
Median: 0.067
Standard deviation 0.012
Rel. st. deviation (%) 17.842

Results in decreasing order:

43	0.199 (*)	117	0.067
153	0.160 (*)	7	0.067
145 <	0.1		
42	0.093	151	0.066
107	0.092	14	0.065
125	0.091	158	0.065
163	0.088	8	0.065
20	0.083	150	0.064
22	0.080	118	0.064
109	0.080	21	0.064
157	0.080	120	0.062
2	0.077	1	0.062
6	0.076	167	0.061
10	0.075	36	0.061
23	0.073	13	0.061
33	0.072	166	0.060
16	0.071	104	0.060
102	0.071	152	0.060
5	0.070	164	0.060
112	0.070	108	0.055
114	0.070	4	0.054
124	0.070	17	0.054
24	0.070	146	0.054
15	0.070	115	0.053
31	0.069	121	0.052
26	0.068	110	0.051
11	0.068	116	0.050
165	0.068	38	0.050
3	0.068	160	0.050
27	0.068	172	0.049
155	0.067	126	0.040
19	0.067	113	0.034

Magnesium in precipitation
Sample no.: G3
Theoretical value: 0.083
Unit: µg/ml

Run 1:
Number of laboratories: 63
Arithmetic mean value: 0.085
Median: 0.081
Standard deviation 0.031
Rel. st. deviation (%) 36.391

Run 2:
Number of laboratories: 62
Arithmetic mean value: 0.081
Median: 0.081
Standard deviation 0.015
Rel. st. deviation (%) 19.068

Results in decreasing order:

43	0.293 (*)	164	0.080
42	0.121	104	0.080
107	0.115	151	0.080
125	0.108	153	0.080
145	0.106	15	0.080
20	0.103	112	0.080
102	0.102	158	0.079
33	0.101	1	0.078
109	0.100	8	0.078
163	0.100	150	0.078
24	0.100	13	0.077
157	0.100	31	0.077
22	0.099	36	0.077
6	0.094	152	0.076
2	0.093	118	0.076
124	0.090	120	0.075
114	0.090	166	0.074
10	0.087	165	0.073
7	0.085	108	0.070
155	0.085	116	0.067
5	0.084	110	0.066
27	0.083	4	0.066
19	0.083	17	0.063
16	0.083	172	0.061
11	0.082	146	0.061
3	0.082	160	0.060
23	0.082	38	0.060
26	0.082	115	0.055
21	0.081	126	0.050
167	0.081	121	0.048
14	0.081	113	0.048
117	0.081		

Magnesium in precipitation
Sample no.: G4
Theoretical value: 0.103
Unit: µg/ml

Run 1:
Number of laboratories: 62
Arithmetic mean value: 0.117
Median: 0.102
Standard deviation 0.112
Rel. st. deviation (%) 95.460

Run 2:
Number of laboratories: 61
Arithmetic mean value: 0.103
Median: 0.102
Standard deviation 0.019
Rel. st. deviation (%) 18.529

Results in decreasing order:

8	0.970 (*)	26	0.102
42	0.167	117	0.101
43	0.147	14	0.101
109	0.140	151	0.101
107	0.135	104	0.100
157	0.130	153	0.100
125	0.127	112	0.100
20	0.126	160	0.100
102	0.121	164	0.100
163	0.120	15	0.100
		145 <	0.1
33	0.120	1	0.099
24	0.120	150	0.098
22	0.118	13	0.097
167	0.116	118	0.096
2	0.114	152	0.096
6	0.113	166	0.095
124	0.110	120	0.095
114	0.110	36	0.094
10	0.109	108	0.090
7	0.107	116	0.089
27	0.106	110	0.088
155	0.105	4	0.085
16	0.105	17	0.081
31	0.105	146	0.080
23	0.105	38	0.080
3	0.104	165	0.078
158	0.104	172	0.076
5	0.104	115	0.072
11	0.103	126	0.070
19	0.103	113	0.067
21	0.103	121	0.058

Table 26: Analytical results for calcium in precipitations samples.

Calcium in precipitation
Sample no.: G1
Theoretical value: -999.000
Unit:

Run 1:

Run 2:

Results in decreasing order:

Calcium in precipitation
Sample no.: G2
Theoretical value: 0.153
Unit: µg/ml

Run 1:
Number of laboratories: 62
Arithmetic mean value: 0.180
Median: 0.152
Standard deviation 0.127
Rel. st. deviation (%) 70.358

Run 2:
Number of laboratories: 60
Arithmetic mean value: 0.160
Median: 0.152
Standard deviation 0.046
Rel. st. deviation (%) 28.496

Results in decreasing order:

17	1.023 (*)	6	0.152
43	0.526 (*)	14	0.152
165	0.314	120	0.152
163	0.270	23	0.152
107	0.267	5	0.152
108	0.255	112	0.150
42	0.248	15	0.150
113	0.238	164	0.150
125	0.212	11	0.150
157	0.200	124	0.150
109	0.200	160	0.150
10	0.185	155	0.148
8	0.178	36	0.147
2	0.174	4	0.147
26	0.171	31	0.142
16	0.166	38	0.140
20	0.166	110	0.140
19	0.166	126	0.140
33	0.163	118	0.140
24	0.160	167	0.136
152	0.160	172	0.135
153	0.160	13	0.131
102 <	0.16		
146	0.159	150	0.131
117	0.159	166	0.130
35	0.157	1	0.130
158	0.156	121	0.129
27	0.156	104	0.110
3	0.155	115	0.109
7	0.154	114	0.100
151	0.154	22	0.094
21	0.153	116	0.008

Calcium in precipitation
Sample no.: G3
Theoretical value: 0.179
Unit: µg/ml

Run 1:
Number of laboratories: 63
Arithmetic mean value: 0.192
Median: 0.181
Standard deviation 0.061
Rel. st. deviation (%) 31.610

Run 2:
Number of laboratories: 59
Arithmetic mean value: 0.185
Median: 0.180
Standard deviation 0.036
Rel. st. deviation (%) 19.663

Results in decreasing order:

43	0.481 (*)	15	0.180	
107	0.350 (*)	112	0.180	
165	0.326 (*)	16	0.180	
42	0.303	151	0.177	
125	0.297	3	0.177	
108	0.270	11	0.176	
109	0.250	36	0.173	
163	0.240	4	0.173	
157	0.240	172	0.171	
20	0.227	164	0.170	
145	0.223	38	0.170	
153	0.220	120	0.166	
113	0.219	23	0.163	
33	0.213	13	0.162	
10	0.203	31	0.161	
24	0.200	110	0.160	
8	0.194	126	0.160	
146	0.193	118	0.160	
19	0.192	124	0.160	
152	0.190	160	0.160	
		102 <	0.160	
2	0.188	1	0.159	
7	0.188	150	0.154	
117	0.188	167	0.154	
155	0.186	104	0.150	
26	0.185	166	0.150	
21	0.185	17	0.142	
158	0.182	114	0.140	
5	0.182	22	0.134	
6	0.182	121	0.125	
27	0.182	115	0.123	
35	0.181	116	0.043	(*)
14	0.181			

Calcium in precipitation
Sample no.: G4
Theoretical value: 0.243
Unit: µg/ml

Run 1:
Number of laboratories: 64
Arithmetic mean value: 0.255
Median: 0.241
Standard deviation 0.068
Rel. st. deviation (%) 26.838

Run 2:
Number of laboratories: 60
Arithmetic mean value: 0.246
Median: 0.241
Standard deviation 0.041
Rel. st. deviation (%) 16.497

Results in decreasing order:

109	0.600 (*)	3	0.241	
107	0.438 (*)	117	0.241	
43	0.401 (*)	151	0.240	
42	0.389	164	0.240	
157	0.350	155	0.240	
165	0.338	160	0.240	
113	0.337	11	0.239	
163	0.320	23	0.237	
108	0.310	31	0.237	
24	0.280	35	0.236	
125	0.280	6	0.233	
145	0.275	4	0.233	
33	0.267	36	0.231	
10	0.263	38	0.230	
126	0.260	110	0.230	
20	0.257	166	0.230	
2	0.256	13	0.228	
16	0.254	120	0.227	
19	0.254	1	0.226	
7	0.253	124	0.220	
26	0.252	150	0.213	
8	0.252	104	0.210	
152	0.250	118	0.210	
112	0.250	102	0.208	
153	0.250	121	0.206	
15	0.250	172	0.205	
5	0.248	167	0.201	
158	0.247	114	0.190	
146	0.246	22	0.188	
14	0.245	17	0.172	
27	0.243	115	0.152	
21	0.242	116	0.118	(*)

Table 27: Analytical results for potassium in precipitations samples

Potassium in precipitation
Sample no.: G1
Theoretical value: 0.177
Unit: µg/ml

Run 1:
Number of laboratories: 62
Arithmetic mean value: 0.172
Median: 0.176
Standard deviation 0.022
Rel. st. deviation (%) 12.943

Run 2:
Number of laboratories: 60
Arithmetic mean value: 0.172
Median: 0.176
Standard deviation 0.019
Rel. st. deviation (%) 11.262

Results in decreasing order:

42	0.249	(*)	172	0.176
112	0.210		26	0.176
19	0.206		31	0.175
11	0.201		7	0.173
160	0.200		158	0.172
2	0.200		14	0.172
10	0.199		13	0.172
151	0.192		121	0.171
107	0.191		3	0.171
164	0.190		124	0.170
			102 <	0.17
24	0.190		108	0.165
22	0.188		23	0.163
5	0.187		36	0.163
17	0.186		16	0.160
116	0.184		114	0.160
117	0.183		150	0.159
146	0.182		8	0.156
109	0.180		35	0.155
157	0.180		6	0.154
110	0.180		118	0.150
120	0.180		43	0.150
152	0.180		167	0.150
15	0.180		153	0.150
4	0.180		115	0.141
163	0.180		104	0.140
27	0.178		126	0.140
1	0.178		113	0.133
21	0.178		165	0.132
33	0.178		166	0.130
125	0.177		38	0.130
155	0.177		20	0.124 (*)

Potassium in precipitation
Sample no.:G2
Theoretical value: 0.204
Unit: µg/ml

Run 1:
Number of laboratories: 63
Arithmetic mean value: 0.196
Median: 0.201
Standard deviation 0.030
Rel. st. deviation (%) 15.252

Run 2:
Number of laboratories: 59
Arithmetic mean value: 0.196
Median: 0.201
Standard deviation 0.023
Rel. st. deviation (%) 11.918

Results in decreasing order:

17	0.280	(*)	22	0.200
42	0.277	(*)	124	0.200
112	0.240		163	0.200
24	0.240		158	0.197
10	0.237		33	0.194
160	0.230		120	0.190
2	0.228		114	0.190
19	0.228		164	0.190
117	0.227		153	0.190
151	0.224		36	0.186
157	0.220		108	0.185
5	0.214		150	0.185
155	0.210		8	0.181
107	0.210		104	0.180
145	0.210		166	0.180
109	0.210		118	0.180
4	0.210		172	0.178
110	0.210		113	0.175
15	0.210		165	0.173
116	0.209		35	0.173
13	0.208		23	0.170
			102 <	0.17
31	0.207		6	0.167
21	0.206		167	0.161
14	0.204		126	0.160
152	0.203		115	0.157
27	0.203		146	0.155
1	0.202		20	0.152
125	0.202		38	0.150
16	0.202		11	0.139
26	0.201		121	0.129 (*)
3	0.201		43	0.120 (*)
7	0.201			

Potassium in precipitation
Sample no.: G3
Theoretical value: 0.136
Unit: µg/ml

Run 1:
Number of laboratories: 62
Arithmetic mean value: 0.133
Median: 0.134
Standard deviation 0.022
Rel. st. deviation (%) 16.327

Run 2:
Number of laboratories: 59
Arithmetic mean value: 0.132
Median: 0.134
Standard deviation 0.018
Rel. st. deviation (%) 13.908

Results in decreasing order:

42	0.202	(*)	23	0.134
112	0.180	(*)	1	0.134
19	0.173		27	0.134
33	0.171		17	0.133
109	0.170		152	0.133
102 <	0.17			
2	0.162		145	0.132
22	0.155		14	0.131
151	0.154		16	0.130
124	0.150		114	0.130
24	0.150		120	0.130
160	0.150		164	0.130
117	0.149		158	0.129
31	0.148		35	0.127
165	0.147		8	0.125
13	0.146		167	0.122
10	0.145		113	0.121
146	0.142		153	0.120
116	0.142		157	0.120
15	0.140		118	0.120
163	0.140		110	0.120
4	0.140		36	0.116
155	0.139		108	0.110
26	0.137		6	0.102
125	0.137		38	0.100
107	0.135		104	0.100
5	0.135		43	0.100
150	0.135		126	0.100
172	0.134		166	0.100
7	0.134		20	0.097
3	0.134		115	0.093
21	0.134		11	0.085 (*)

Potassium in precipitation
Sample no.: G4
Theoretical value: 0.102
Unit: µg/ml

Run 1:
Number of laboratories: 57
Arithmetic mean value: 0.105
Median: 0.104
Standard deviation 0.023
Rel. st. deviation (%) 21.722

Run 2:
Number of laboratories: 54
Arithmetic mean value: 0.106
Median: 0.104
Standard deviation 0.018
Rel. st. deviation (%) 17.089

Results in decreasing order:

42	0.172	(*)	27	0.104
102 <	0.17			
121	0.149		107	0.103
112	0.140		14	0.103
109	0.140		155	0.103
24	0.140		26	0.102
151	0.139		5	0.101
165	0.136		167	0.101
33	0.130		163	0.100
2	0.129		15	0.100
19	0.128		43	0.100
			104 <	0.1
			113 <	0.1
			121 <	0.1
			145 <	0.1
31	0.126		21	0.099
117	0.122		152	0.096
160	0.120		158	0.094
166	0.120		35	0.091
3	0.114		8	0.091
146	0.112		118	0.090
125	0.112		157	0.090
13	0.111		164	0.090
4	0.110		114	0.090
150	0.110		108	0.090
120	0.110		36	0.087
22	0.110		126	0.080
110 <	0.11			
115	0.109		172	0.079
10	0.108		6	0.078
			17 <	0.077
116	0.105		153	0.070
23	0.105		38	0.070
16	0.105		20	0.055 (*)
7	0.104		11	0.036 (*)
1	0.104			

Table 28: Analytical results for conductivity in precipitations samples..

Conductivity in precipitation
Sample no.: G1
Theoretical value: 31.000
Unit: µS/cm

Run 1:

Number of laboratories:	56
Arithmetic mean value:	30.295
Median:	30.150
Standard deviation	2.806
Rel. st. deviation (%)	9.263

Run 2:

Number of laboratories:	55
Arithmetic mean value:	30.045
Median:	30.100
Standard deviation	2.116
Rel. st. deviation (%)	7.044

Results in decreasing order:

157	44.000 (*)	2	30.100	
13	35.800	166	30.100	
115	35.650	117	30.000	
14	32.700	153	29.910	
5	32.600	107	29.900	
126	32.400	164	29.800	
104	32.000	114	29.800	
11	32.000	112	29.500	
19	31.800	6	29.500	
31	31.700	7	29.400	
3	31.500	110	29.400	
20	31.400	16	29.300	
102	31.400	33	29.200	
10	31.400	118	29.000	
124	31.400	17	29.000	
21	31.380	165	28.900	
155	31.150	38	28.700	
15	31.100	121	28.600	
116	31.100	158	28.600	
172	31.000	36	27.990	
4	30.900	108	27.500	
24	30.800	40	27.330	
150	30.800	1	26.900	
146	30.800	22	26.800	
27	30.600	152	26.500	
8	30.400	113	26.100	
163	30.300	39	25.490	
151	30.200	23	24.900	

Conductivity in precipitation
Sample no.: G2
Theoretical value: 30.000
Unit: µS/cm

Run 1:

Number of laboratories:	56
Arithmetic mean value:	29.180
Median:	29.400
Standard deviation	2.502
Rel. st. deviation (%)	8.575

Run 2:

Number of laboratories:	52
Arithmetic mean value:	29.218
Median:	29.400
Standard deviation	1.549
Rel. st. deviation (%)	5.303

Results in decreasing order:

13	36.950 (*)	27	29.400	
115	34.750 (*)	150	29.400	
157	32.000	151	29.350	
126	31.900	153	29.350	
5	31.400	8	29.200	
31	31.230	107	29.000	
14	31.000	16	28.900	
19	30.900	6	28.900	
11	30.700	121	28.900	
172	30.400	110	28.900	
102	30.400	112	28.800	
20	30.360	164	28.800	
3	30.300	163	28.700	
124	30.300	33	28.600	
114	30.300	1	28.400	
21	30.280	118	28.000	
10	30.200	158	28.000	
116	30.140	39	27.700	
15	30.100	108	27.500	
24	30.000	36	27.200	
7	30.000	113	27.200	
104	30.000	165	26.400	
2	29.800	22	26.200	
4	29.800	117	26.000	
155	29.750	23	25.600	
166	29.600	152	25.100	
146	29.600	40	24.000 (*)	
38	29.400	17	19.000 (*)	

Conductivity in precipitation
Sample no.: G3
Theoretical value: 19.000
Unit: µS/cm

Run 1:

Number of laboratories:	56
Arithmetic mean value:	19.529
Median:	19.400
Standard deviation	2.199
Rel. st. deviation (%)	11.259

Run 2:

Number of laboratories:	53
Arithmetic mean value:	19.284
Median:	19.400
Standard deviation	1.302
Rel. st. deviation (%)	6.753

Results in decreasing order:

104	29.000 (*)	8	19.400	
13	27.550 (*)	27	19.400	
115	22.700	146	19.350	
14	21.100	6	19.300	
3	21.030	17	19.250	
121	21.000	1	19.200	
126	21.000	165	19.100	
5	20.700	166	19.080	
114	20.700	151	19.050	
20	20.410	112	18.970	
31	20.400	110	18.800	
102	20.300	38	18.800	
116	20.260	16	18.600	
172	20.200	7	18.500	
11	20.200	39	18.420	
15	20.100	152	18.200	
2	20.100	158	18.200	
157	20.000	107	18.100	
24	20.000	108	18.100	
21	19.820	118	18.000	
33	19.800	117	18.000	
124	19.800	113	17.800	
19	19.800	36	17.700	
4	19.700	22	16.800	
155	19.620	23	16.500	
10	19.600	164	16.100	
153	19.530	150	16.060	
163	19.400	40	15.000 (*)	

Conductivity in precipitation
Sample no.: G4
Theoretical value: 24.000
Unit: µS/cm

Run 1:

Number of laboratories:	56
Arithmetic mean value:	24.245
Median:	24.200
Standard deviation	2.056
Rel. st. deviation (%)	8.481

Run 2:

Number of laboratories:	53
Arithmetic mean value:	24.144
Median:	24.200
Standard deviation	1.232
Rel. st. deviation (%)	5.102

Results in decreasing order:

117	32.000 (*)	146	24.200	
13	29.750 (*)	166	24.100	
115	27.100	24	24.100	
14	26.100	8	24.000	
126	26.100	150	24.000	
5	25.800	17	24.000	
116	25.640	7	23.900	
31	25.630	165	23.800	
11	25.300	33	23.800	
121	25.100	6	23.800	
15	25.100	1	23.700	
172	25.100	110	23.700	
19	25.000	153	23.700	
157	25.000	112	23.570	
3	24.990	16	23.500	
20	24.950	164	23.500	
21	24.940	107	23.200	
114	24.900	108	23.100	
102	24.900	118	23.000	
124	24.900	104	23.000	
10	24.800	158	22.700	
4	24.700	39	22.520	
155	24.660	113	22.300	
27	24.400	152	22.300	
2	24.400	36	22.290	
151	24.350	22	20.900	
38	24.300	23	20.600	
163	24.200	40	16.330 (*)	

Appendix 2

Figures

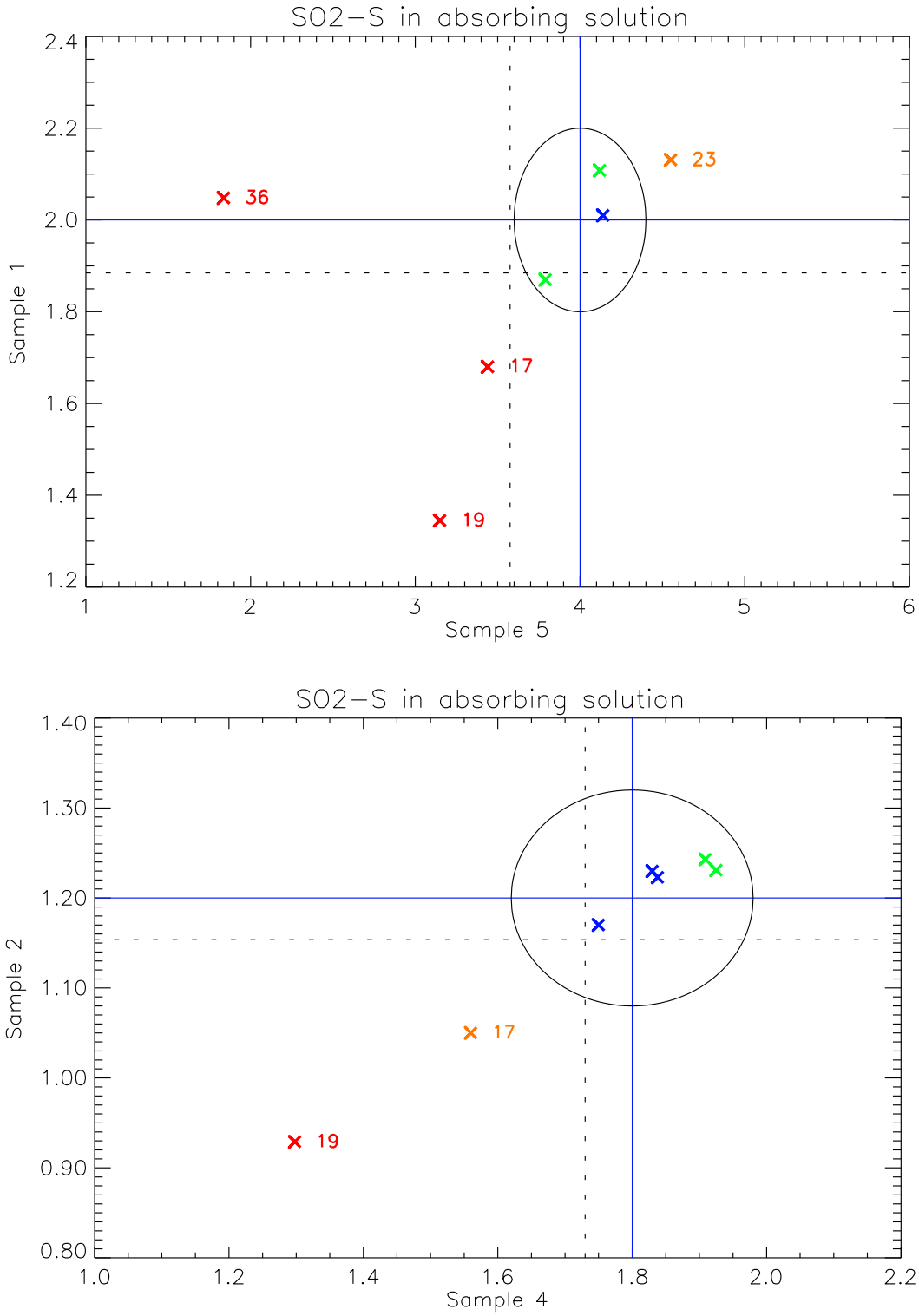

Figure 2: Youden plot of SO_2-S in absorbing solution.

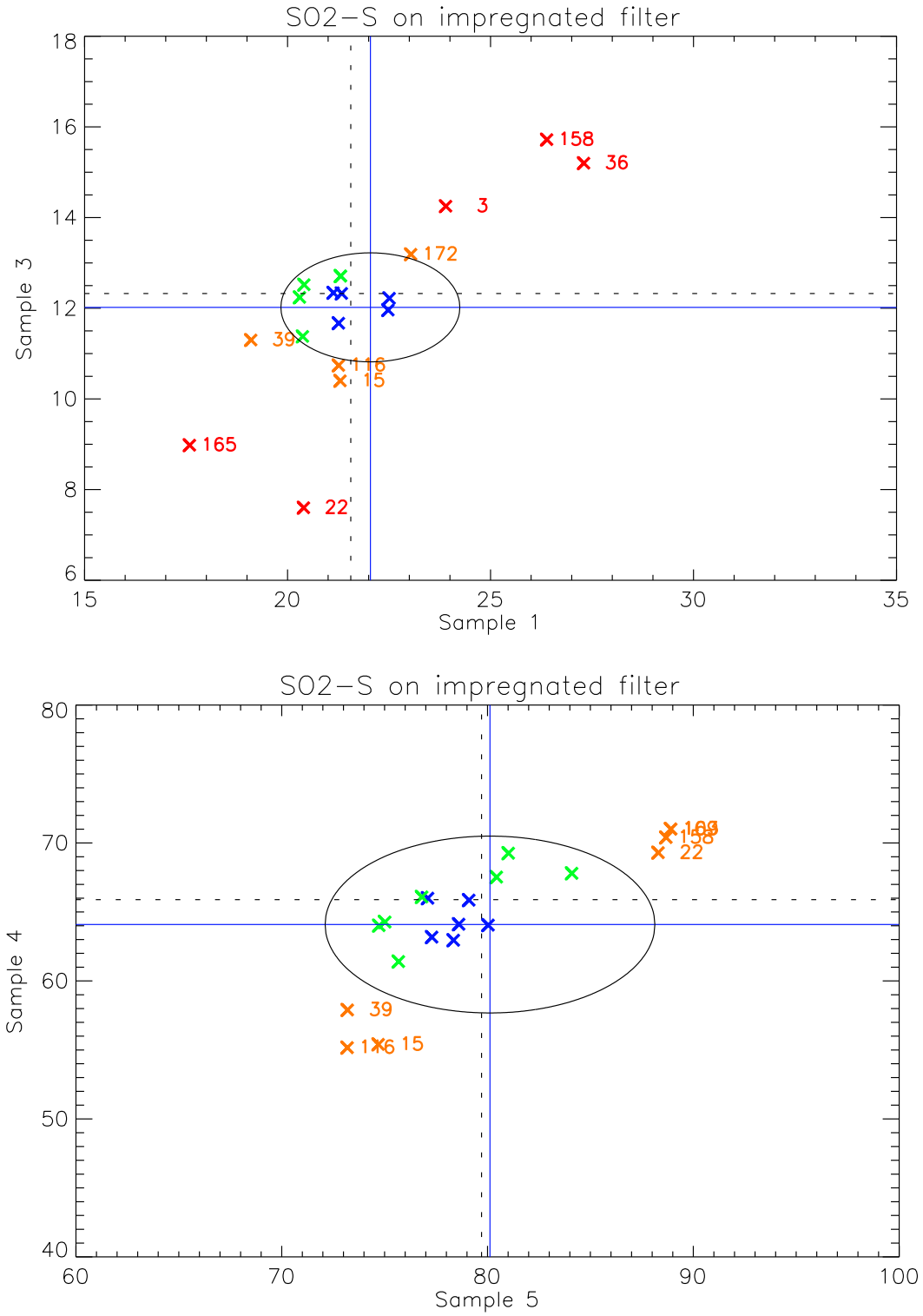

Figure 3: Youden plot of SO_2-S on impregnated filter.

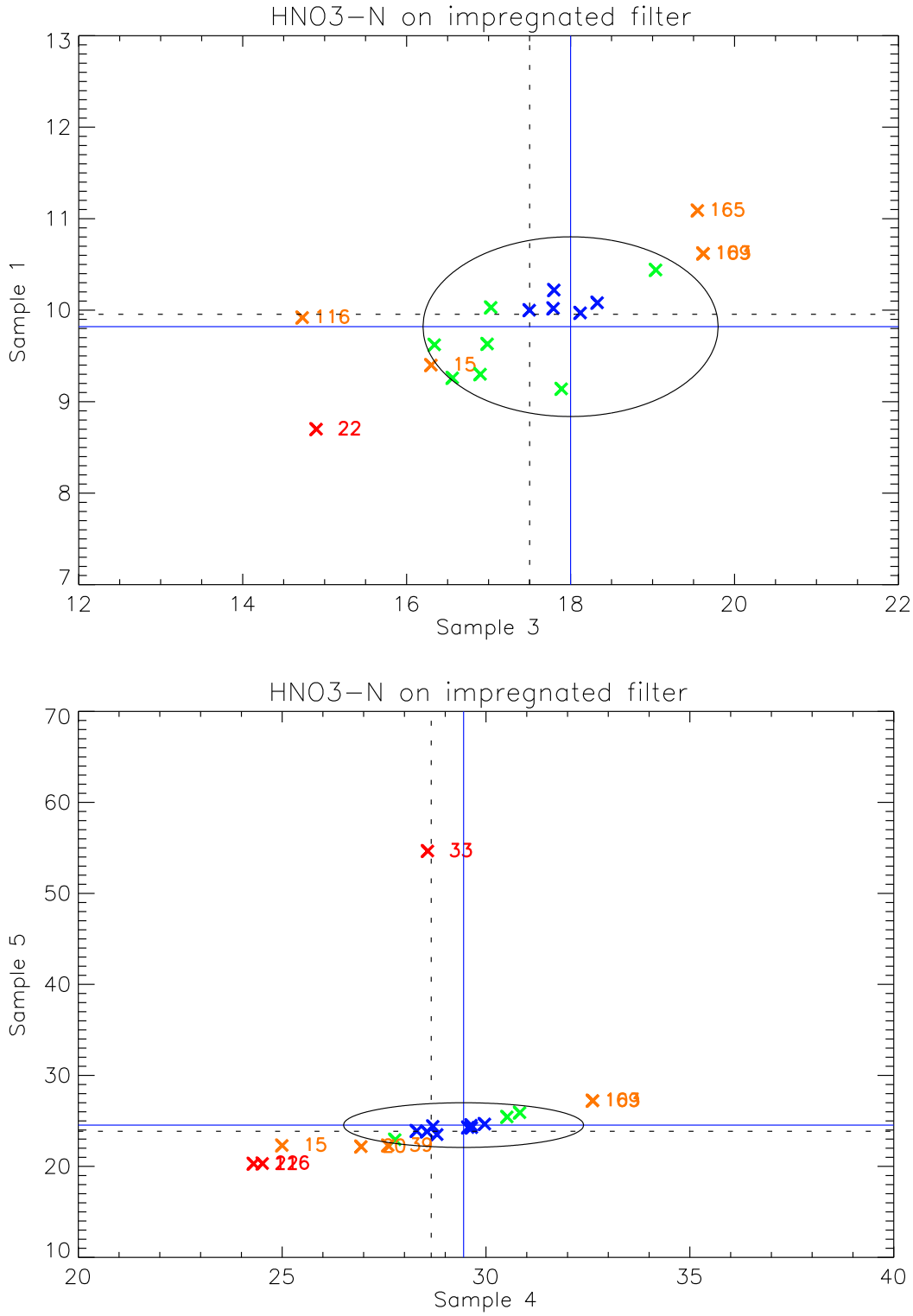

Figure 4: Youden plot of HNO_3-N on impregnated filter.

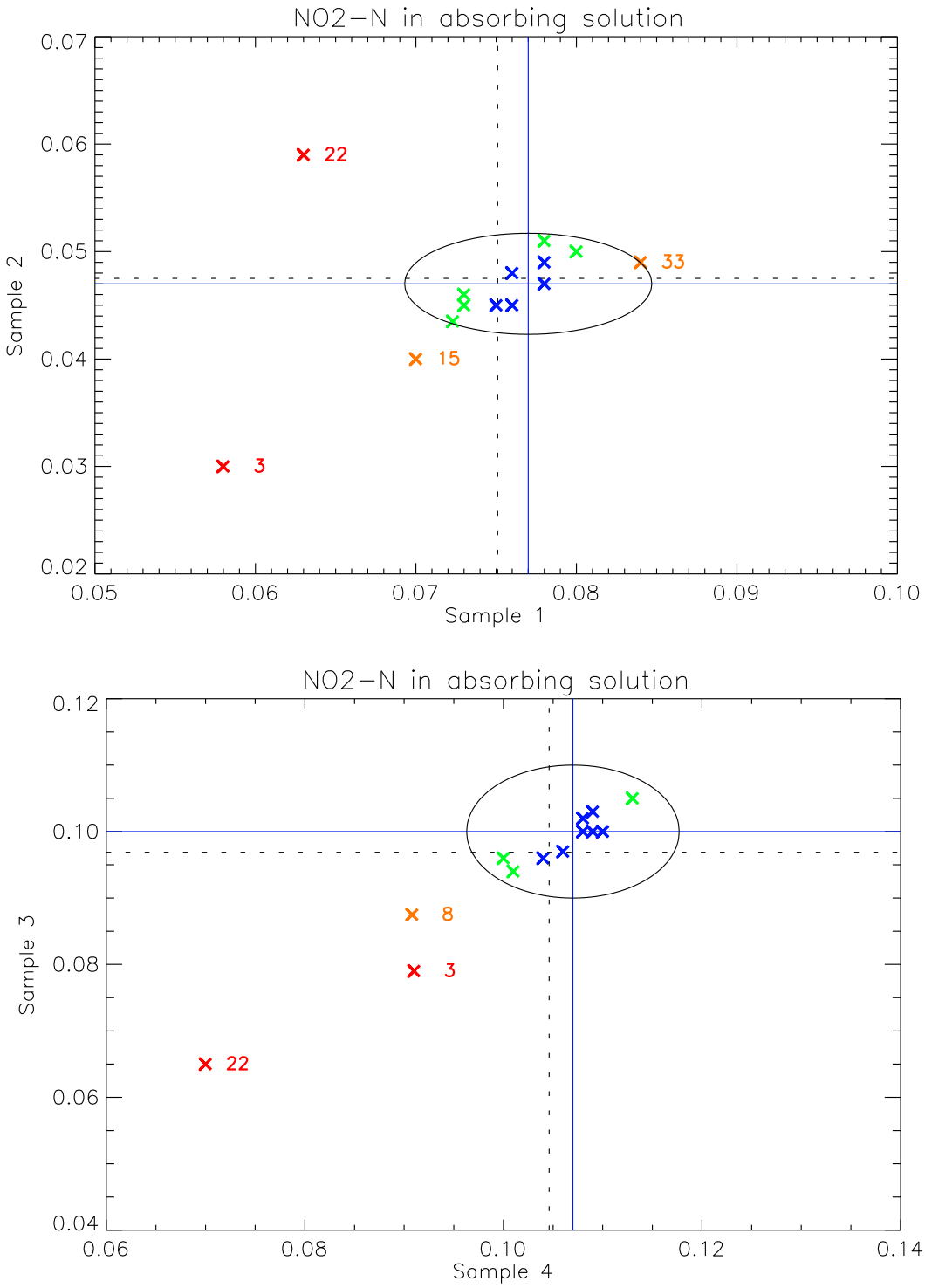

Figure 5: Youden plot of NO_2-N in absorbing solution.

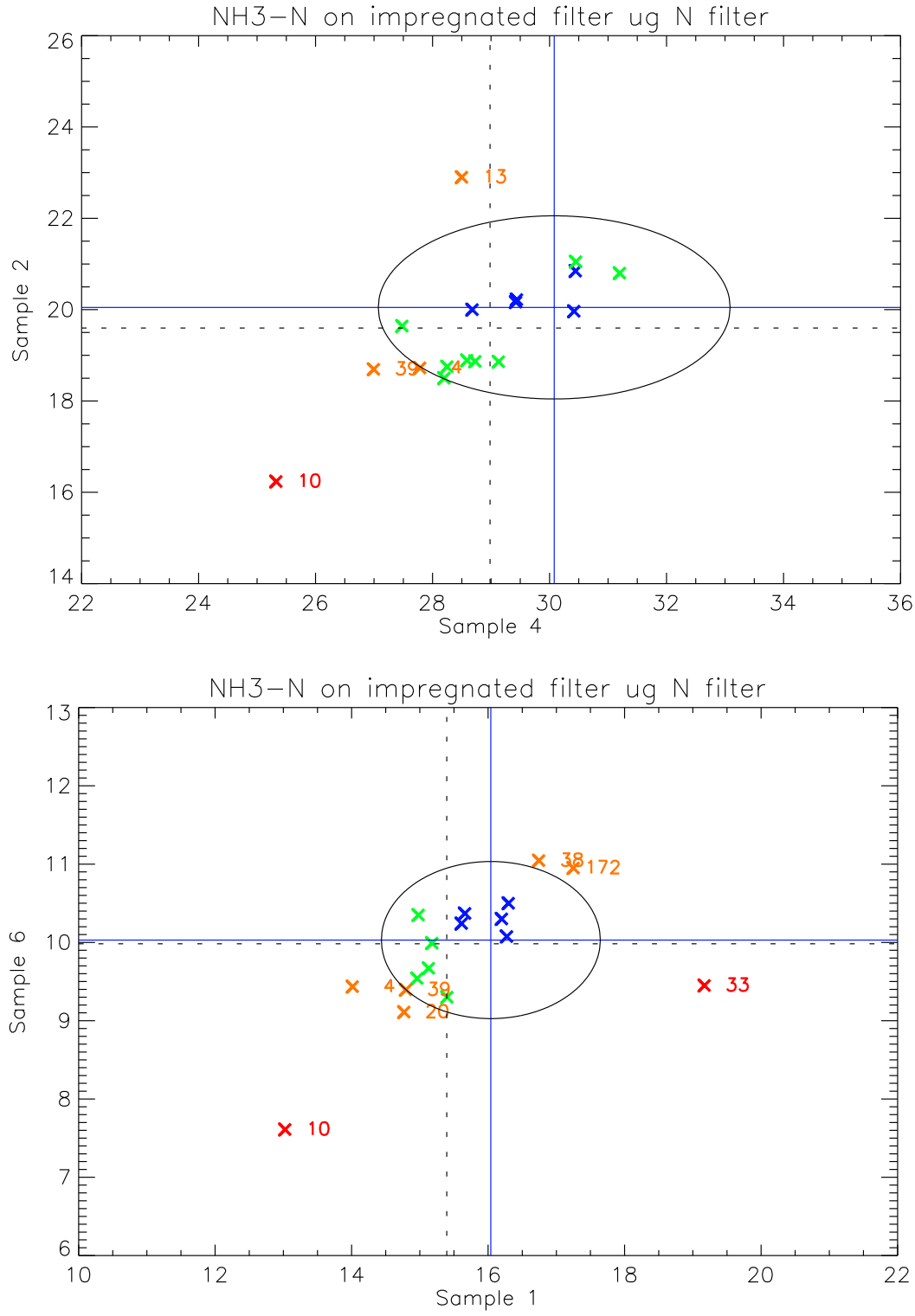

Figure 6: Youden plot of NH_3-N on impregnated filter.

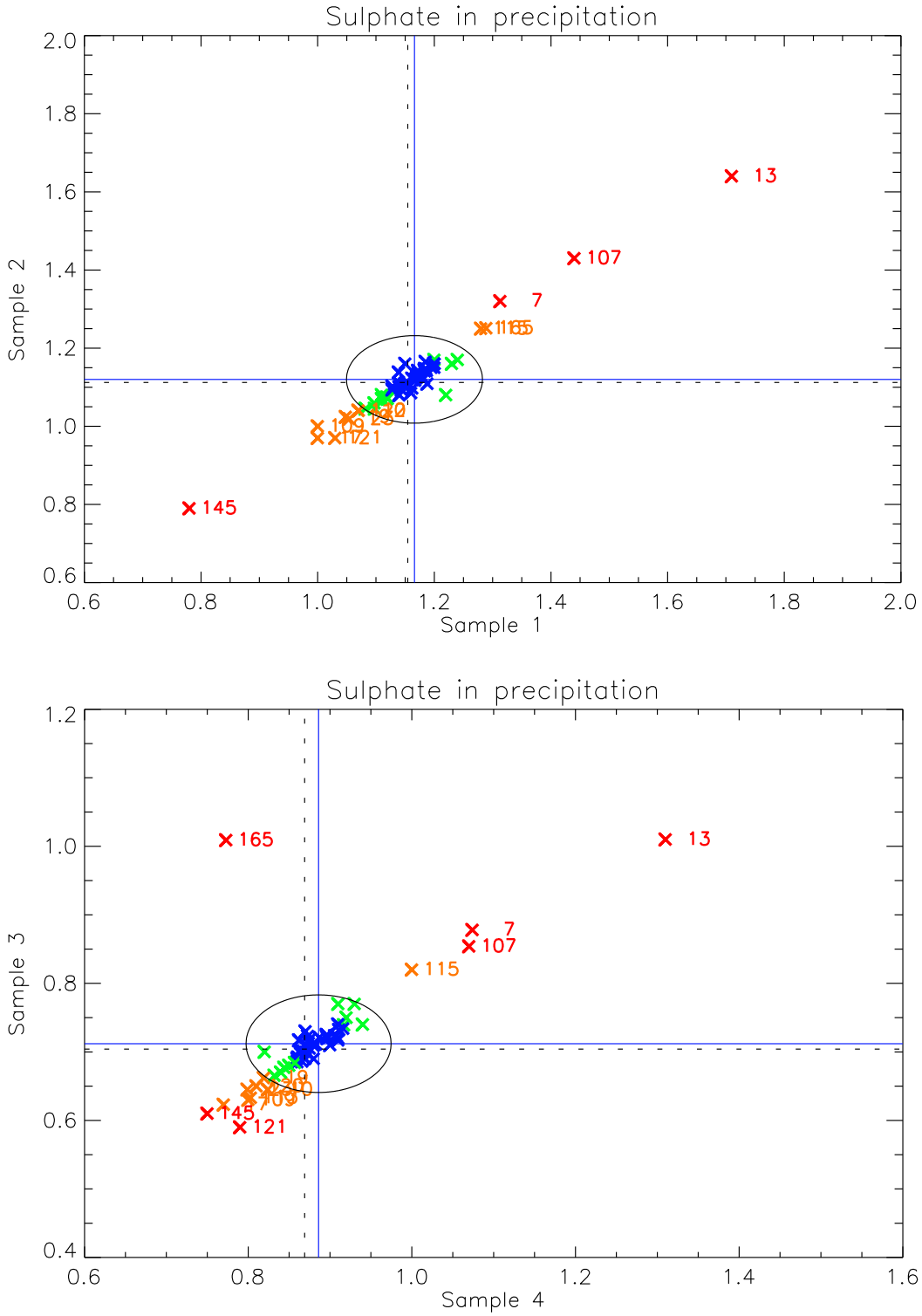

Figure 7: Youden plot of SO_4-S in precipitation.

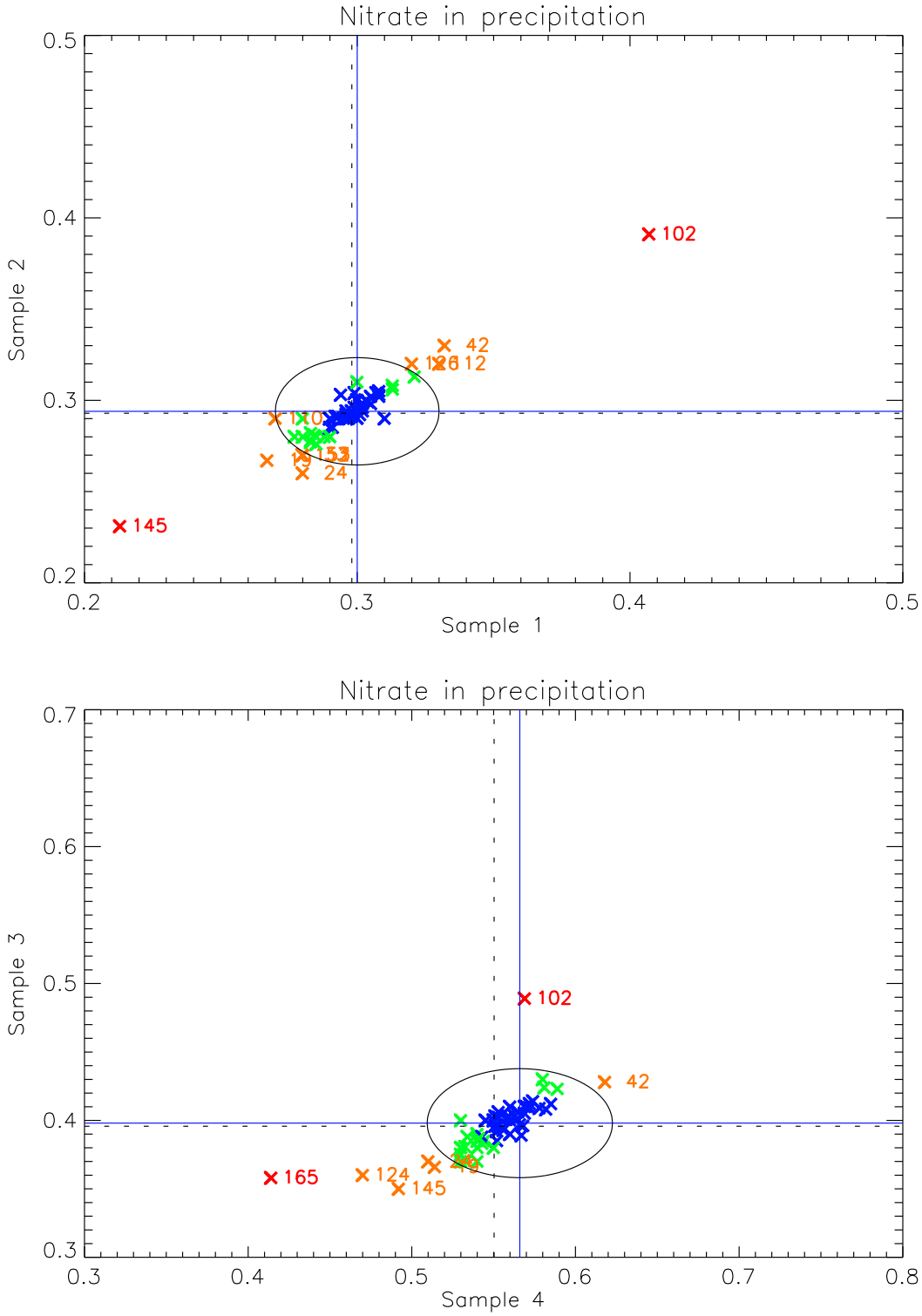

Figure 8: Youden plot of NO_3-N in precipitation.

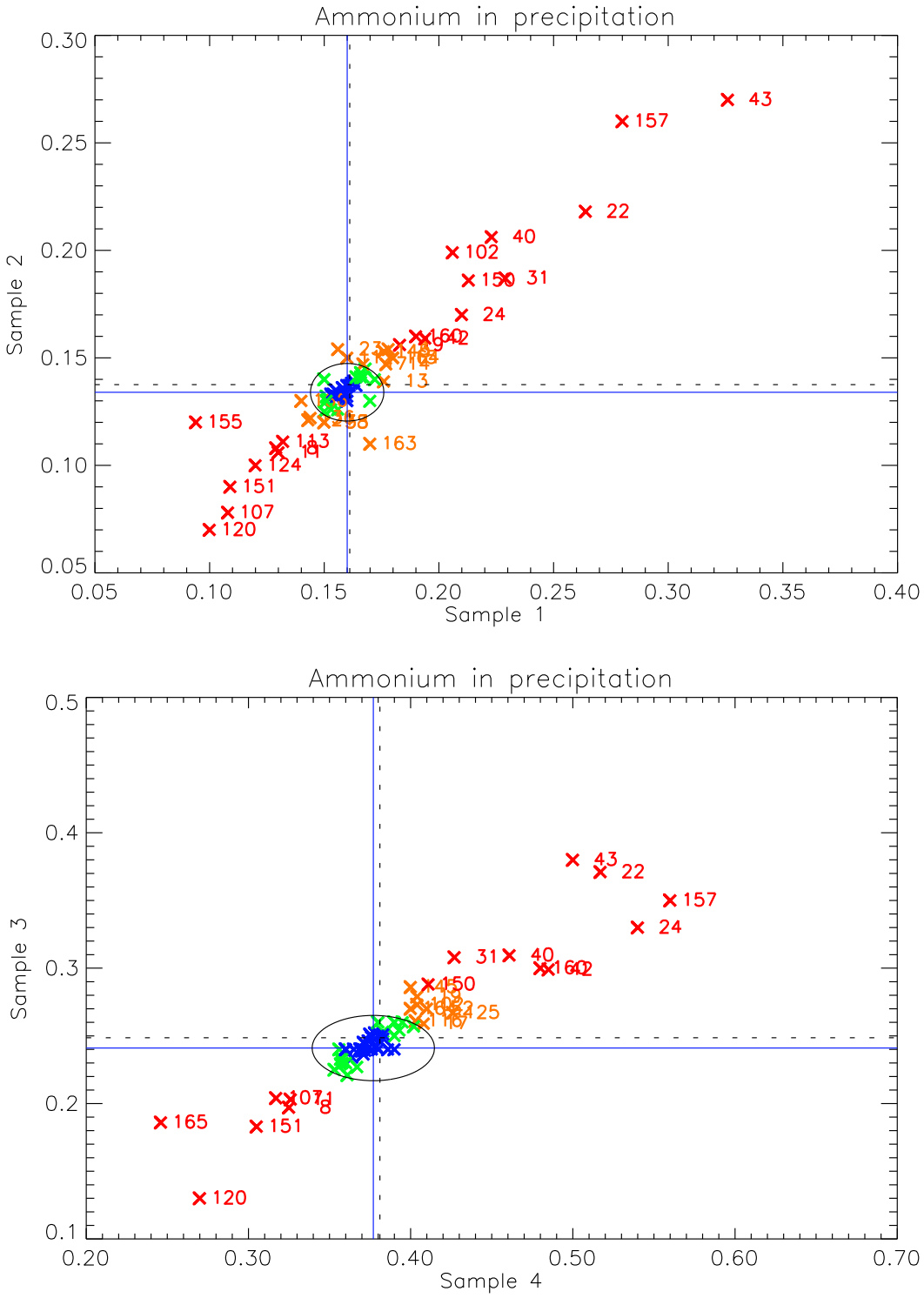

Figure 9: Youden plot of NH_4-N in precipitation.

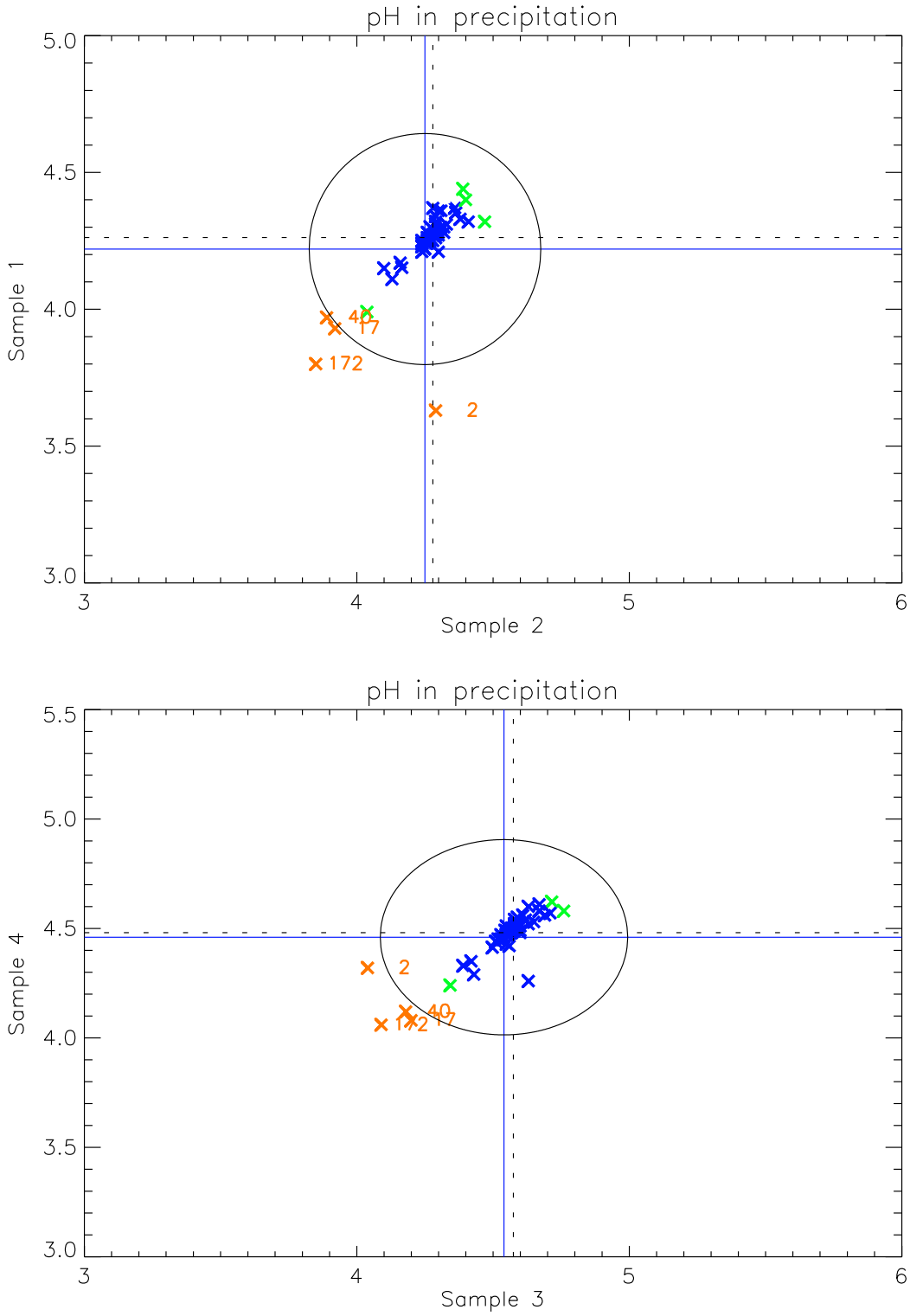

Figure 10: Youden plot of pH in precipitation.

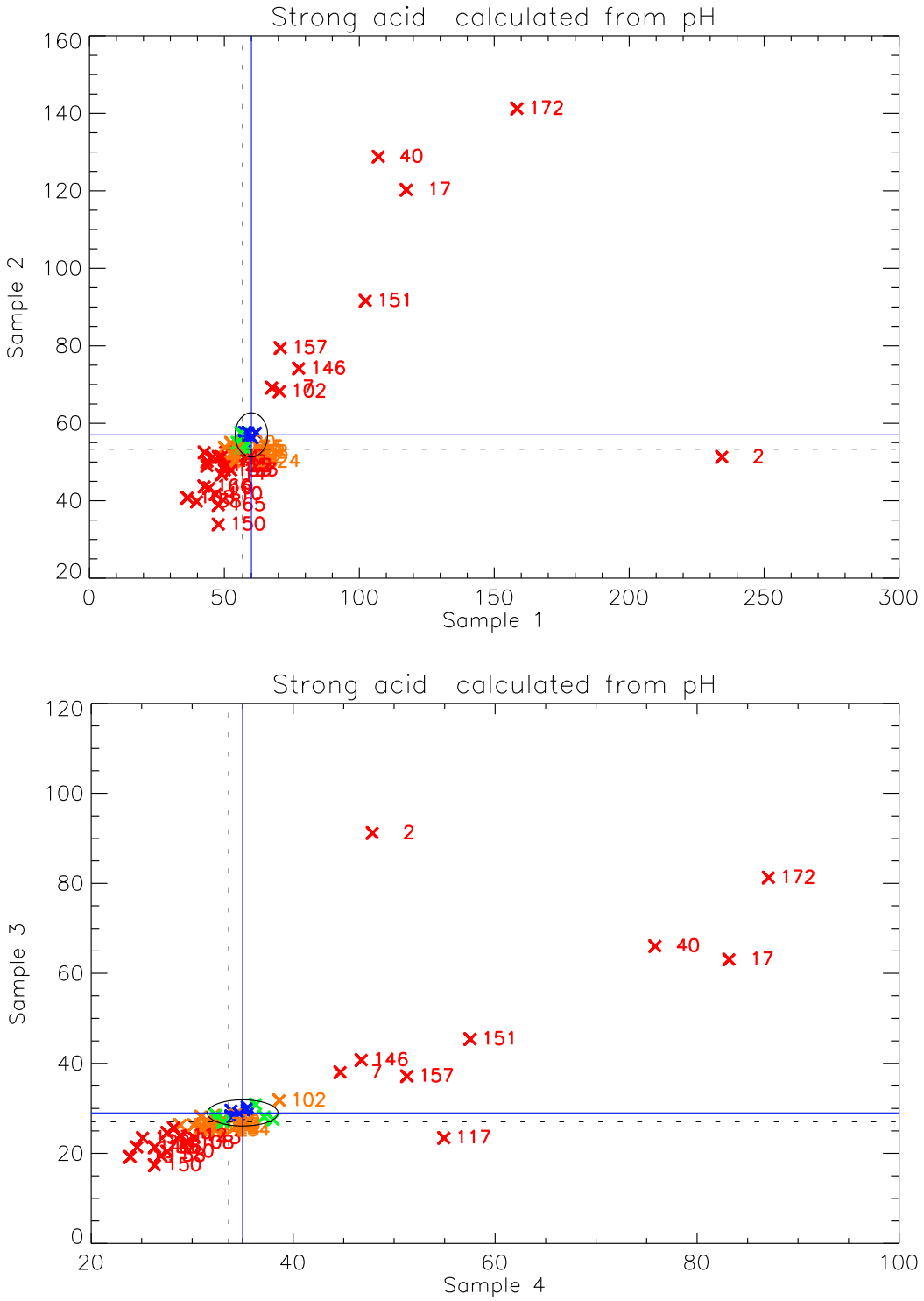

Figure 11: Youden plot of strong acid in precipitation.

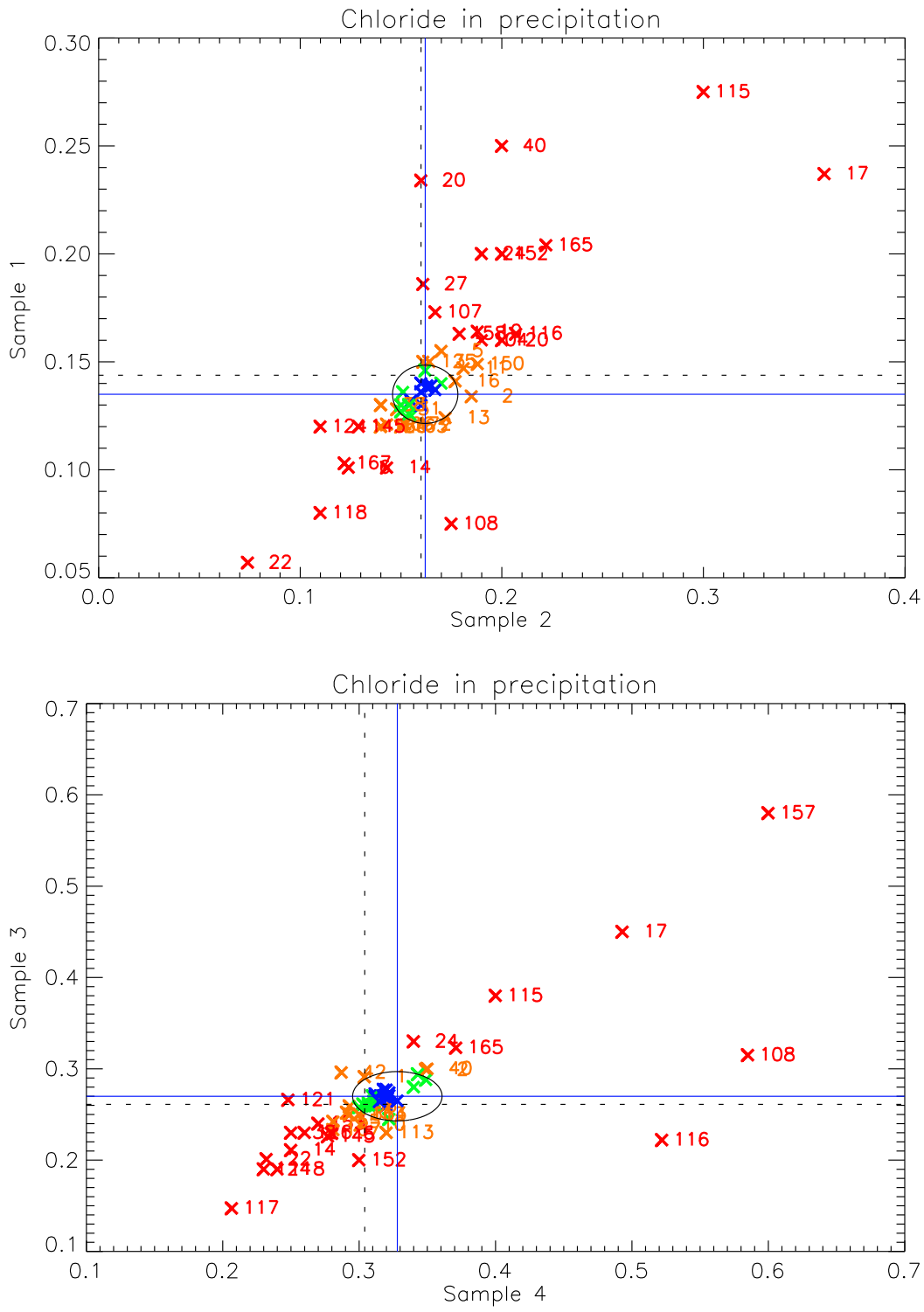

Figure 12: Youden plot of Cl in precipitation.

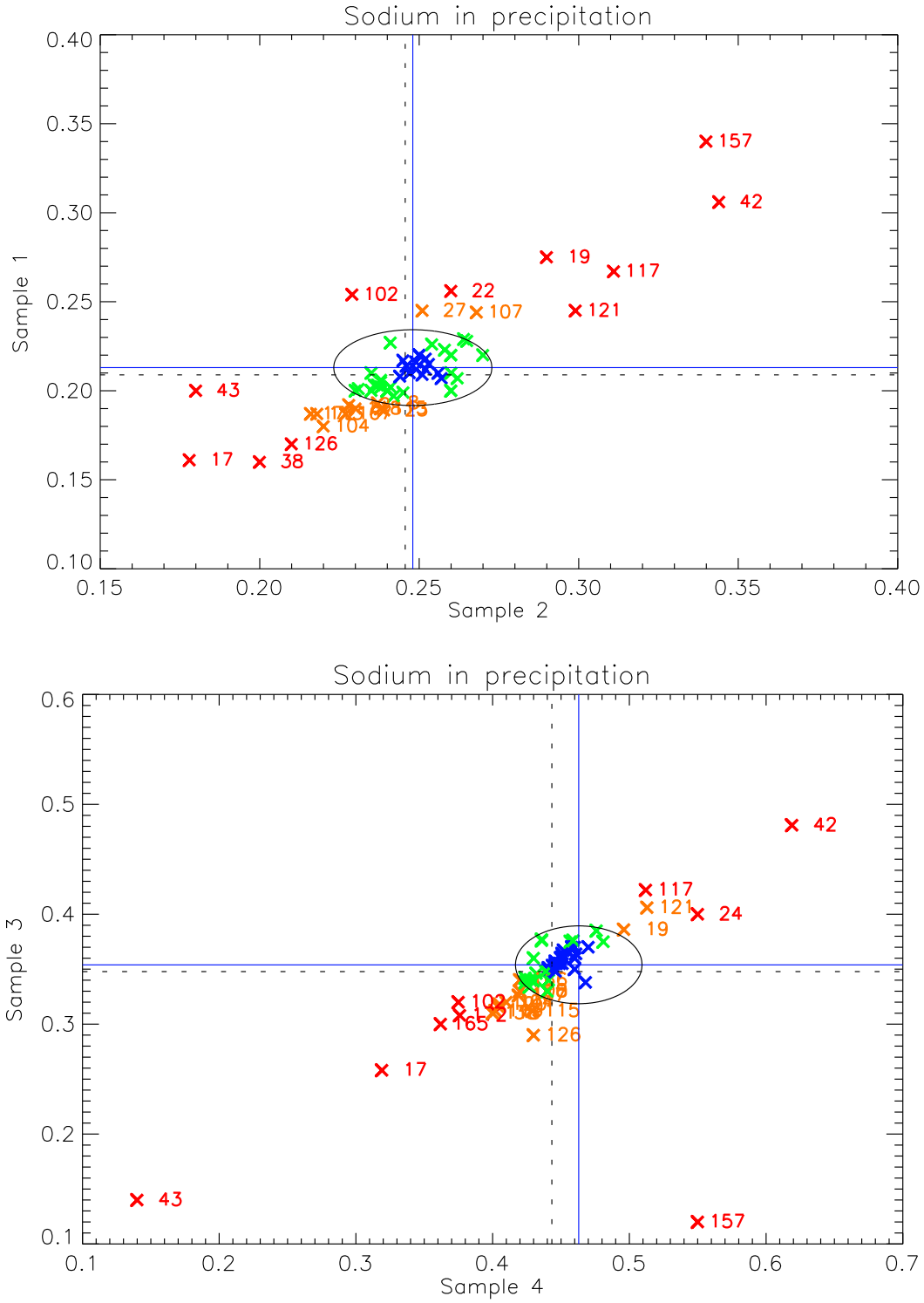

Figure 13: Youden plot of Na in precipitation.

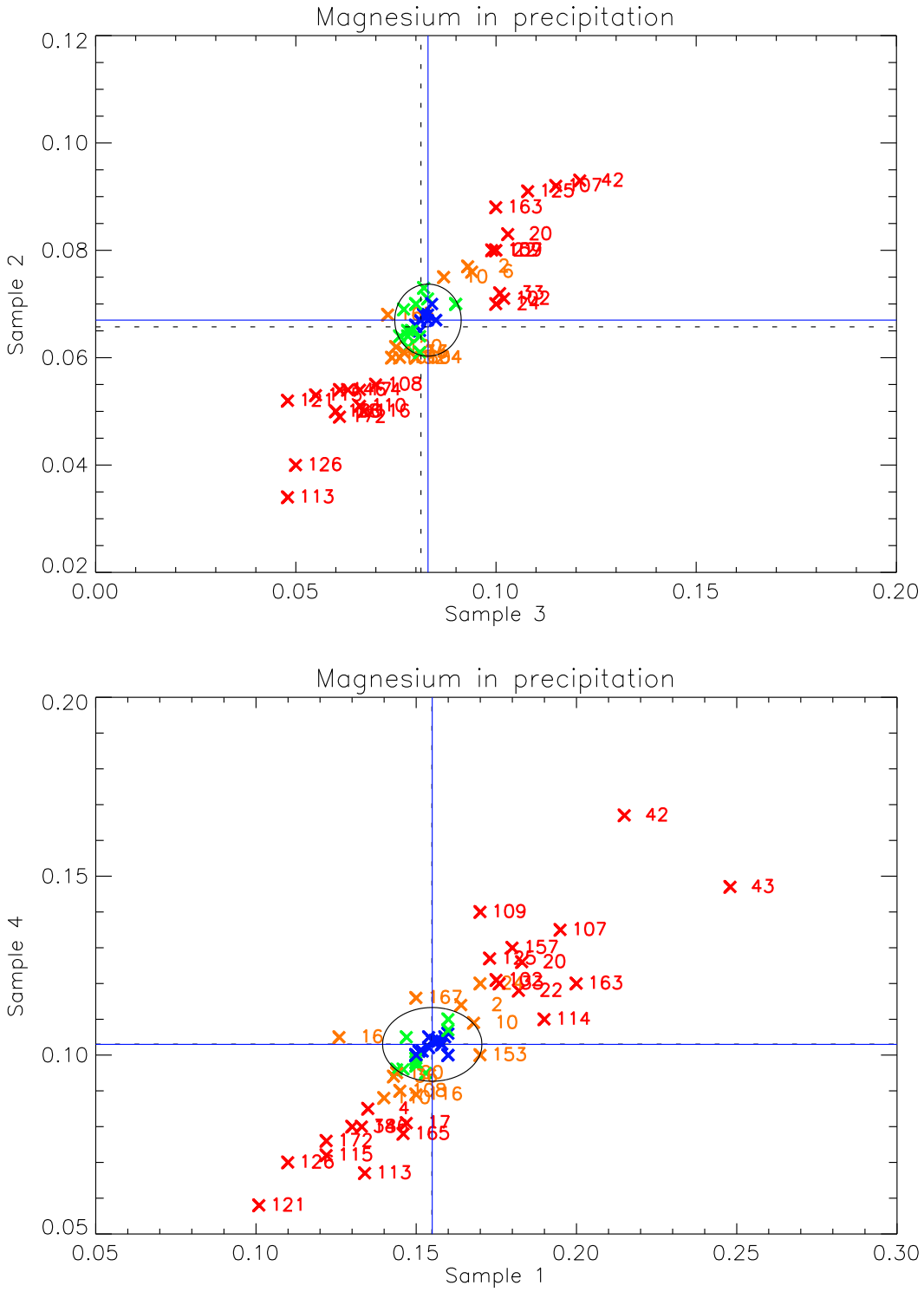

Figure 14: Youden plot of Mg in precipitation.

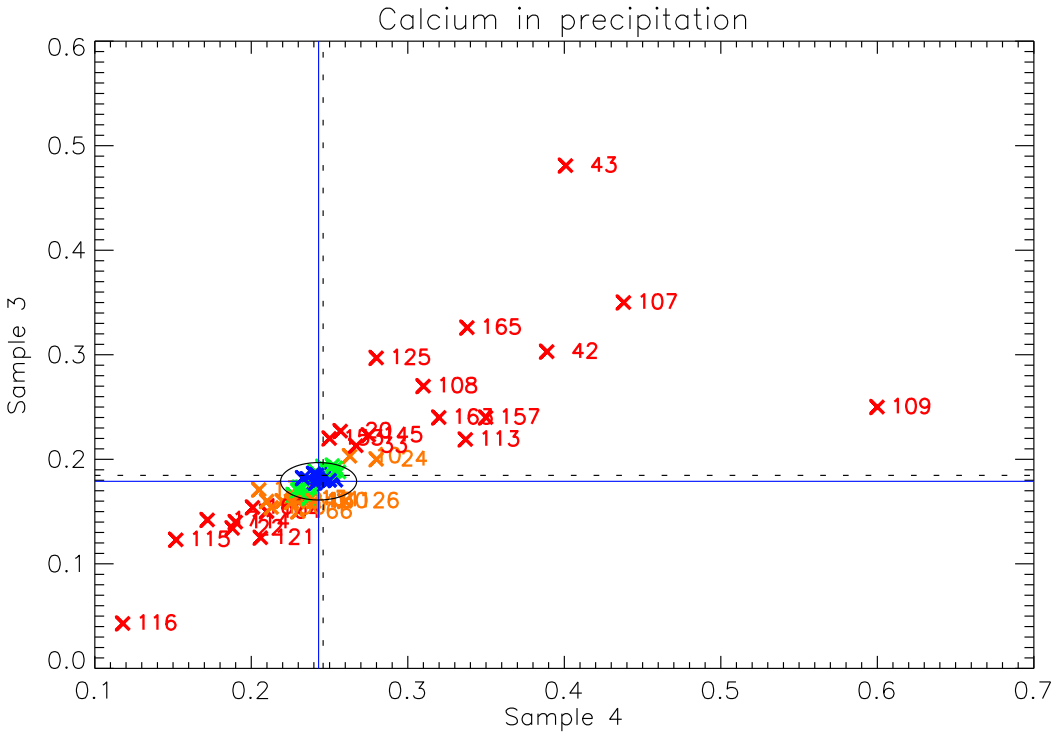

Figure 15: Youden plot of Ca in precipitation.

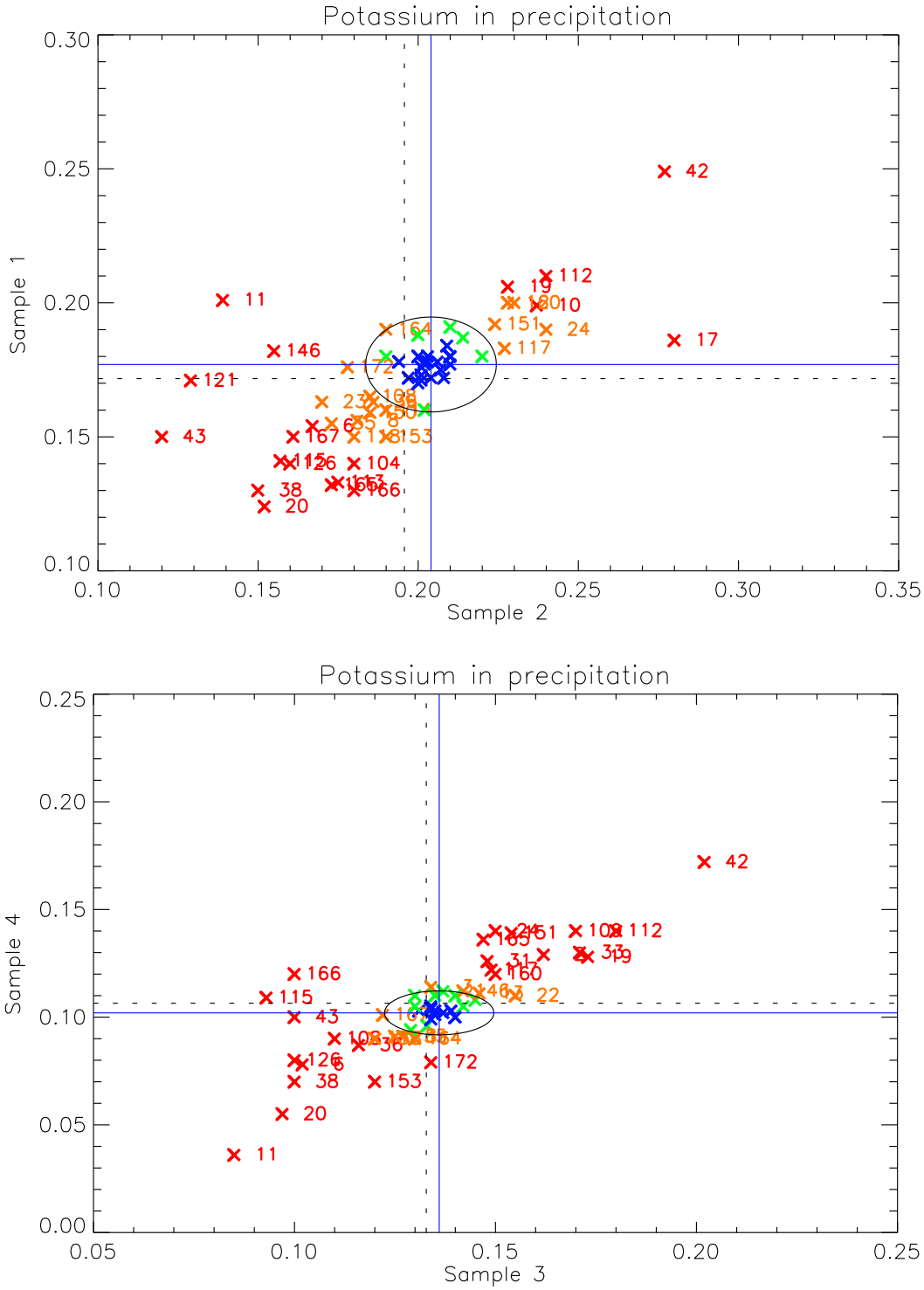

Figure 16: Youden plot of K in precipitation.

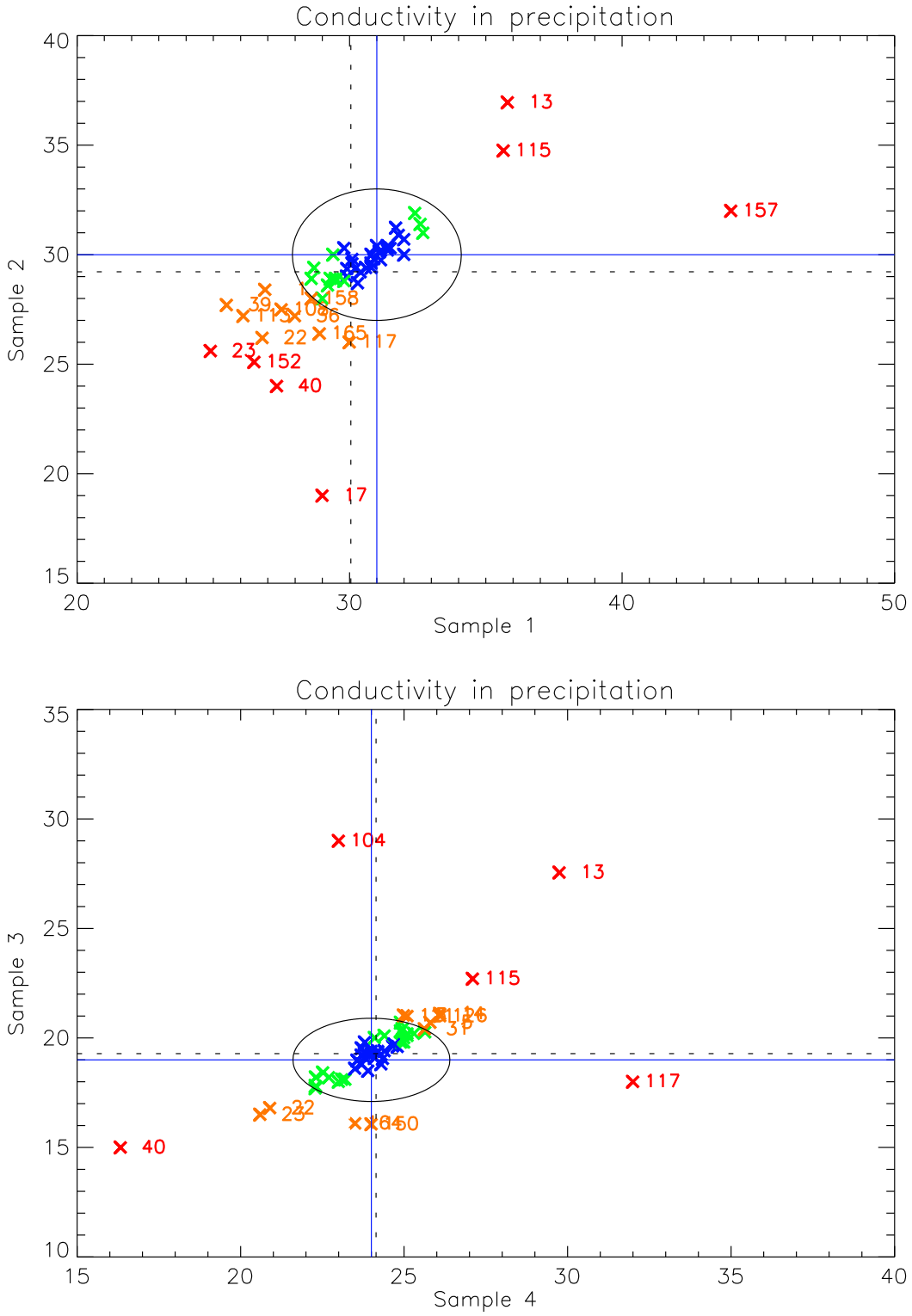

Figure 17: Youden plot of conductivity in precipitation.