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Report of the Inter-laboratory Comparison Project 2020 on Wet Deposition

23rd attempt

(Preliminary Draft)

STM 22 1st September, 2021

Web meeting by WebEx



Network Center for the EANET

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Artificial Rainwater Samples

Samples	No. 201w (high concentration sample*) No. 202w (low concentration sample*) * concentration levels were not displayed on the sample when they were distributed
Quantity	100mL each
Container	polypropylene bottle
Parameters	pH, EC, 3 anions (SO_4^{2-} , NO_3^- , Cl^-), 5 cations (Na^+ , K^+ , Ca^{2+} , Mg^{2+} , NH_4^+)
Note	<ul style="list-style-type: none"> • Samples are distributed as concentrated liquid. • Participating laboratories have to dilute the samples 100 times with deionized water before analysis.

Prepared Values and Flag 3

Unit: EC [mS m^{-1}], Ions [$\mu\text{mol L}^{-1}$]

	pH	EC	SO ₄ ²⁻	NO ₃ ⁻	Cl ⁻	NH ₄ ⁺	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺
No. 201w	4.70	2.76	35.8	29.8	58.1	38.0	48.1	4.0	16.8	7.9
No. 202w	5.30	1.09	18.5	15.8	15.4	16.6	15.4	3.6	10.2	3.6

No Flag : Within $\pm 15\%$ (DQO)

Flag E : Over the DQO more than $\pm 15\%$ and within $\pm 30\%$

Flag X : Over the DQO more than $\pm 30\%$

Compared to [prepared values](#)

ACAP Asia Center for Air Pollution Research Japan Environmental Sanitation Center

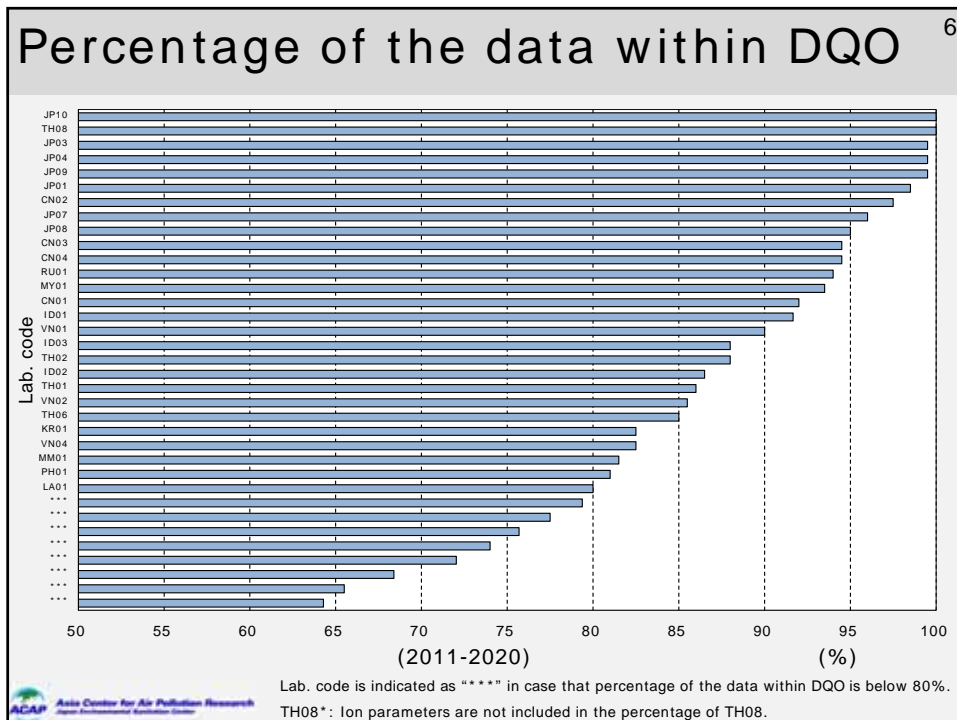
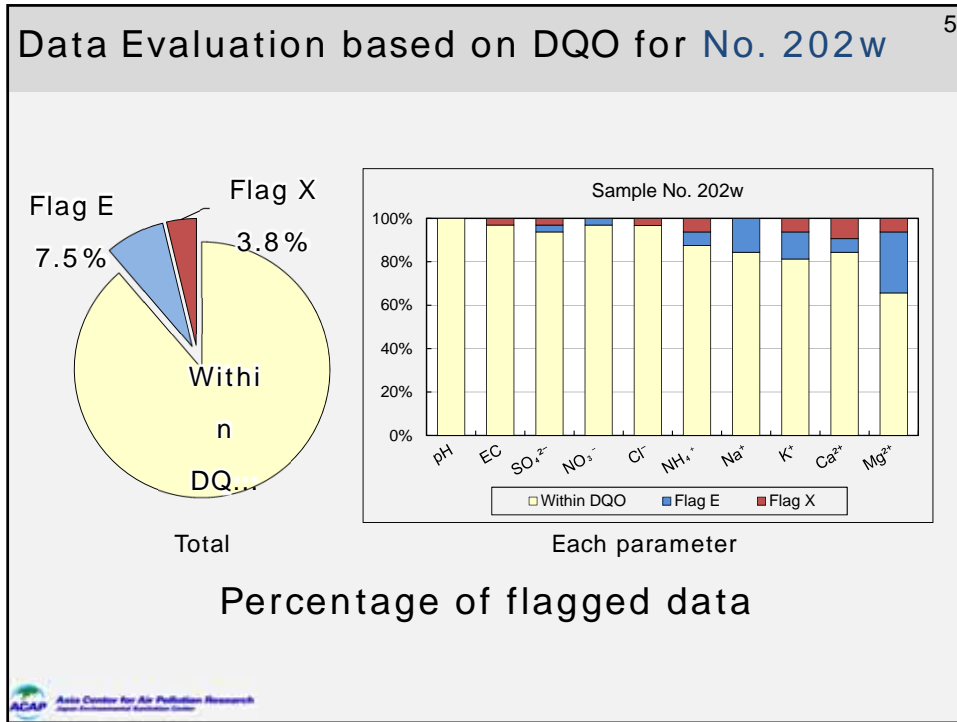
Data Evaluation based on DQO for No. 201w 4

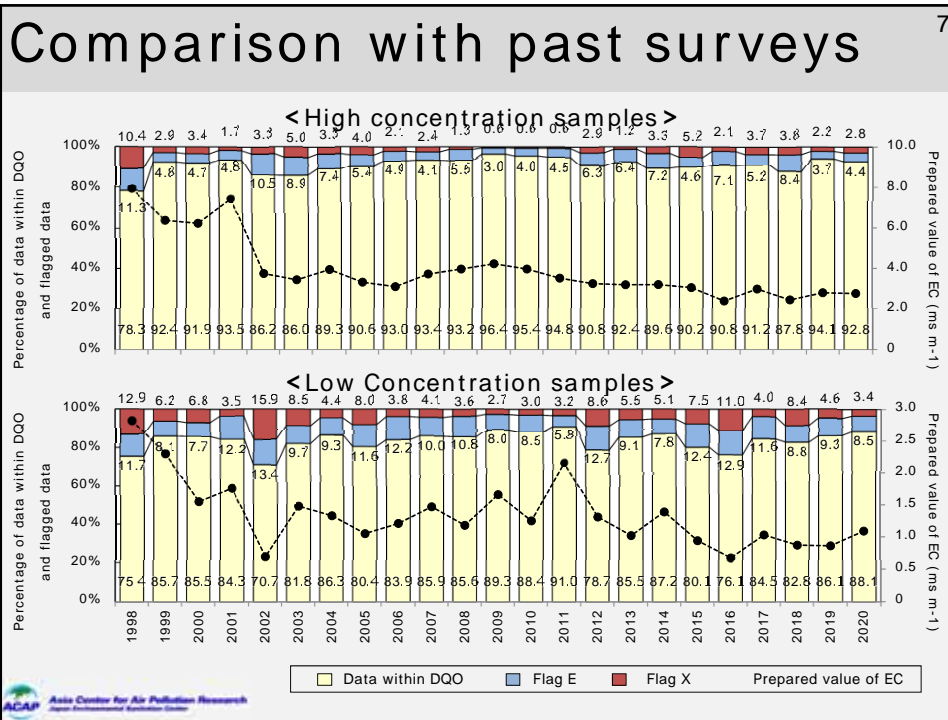
Total

Each parameter

Percentage of flagged data

ACAP Asia Center for Air Pollution Research Japan Environmental Sanitation Center





Re-analysis 8

- NC asked participant laboratories to re-analyze artificial rainwater samples and submit the results.
- NC will analyze condition of laboratory, chromatograms and calibration curves etc. and will provide technical guidance.

ACAAP Asia Center for Air Pollution Research Japan Environmental Sanitation Center

Schedule of Next Survey (ILC 2021) ⁹

21 Jul 1st NC sent [the questionnaire](#) about required number of samples to National QA/QC Manager and requested to submit it by the end of July. [Cambodia, Lao P.D.R., Russia](#), have not submitted yet (mid-Aug).

Oct Mid NC will ship the samples .



Participating Lab:
Analysis and submission

22 Feb 28th **Deadline of submission (To NC)**

The National Centers or National QA/QC Managers are strongly requested to submit their analytical results **no later than the deadline.**

Thank you for
your attention.

Report of the 16th Inter-laboratory Comparison Project 2020 on Dry Deposition (Filter Pack Method) Preliminary Draft

STM22

Web meeting on September 1-2, 2021

Network Center for the EANET



Participating Laboratories

The Network Center shipped the sample filters to 23 laboratories in 12 countries. Participating laboratories and their codes are listed in Table 1.1.



Outline of filter samples

Name	Details	Container	Number of filters	Note
No.201d-1	Alkali (K ₂ CO ₃) impregnated filter	Polyethylene centrifuge tube	3	Each filter contains a known quantity of sulfate and chloride ions.
No.201d-2	Acid (H ₃ PO ₄) impregnated filter	Polyethylene centrifuge tube	3	Each Filter contains a known quantity of ammonium ions.
No.202d-1	Alkali (K ₂ CO ₃) impregnated filter	Polyethylene centrifuge tube	3	Each filter contains a known quantity of sulfate and chloride ions.
No.202d-2	Acid (H ₃ PO ₄) impregnated filter	Polyethylene centrifuge tube	3	Each Filter contains a known quantity of ammonium ions.
No.203d-1	Alkali (K ₂ CO ₃) impregnated filter	Polyethylene centrifuge tube	3	Blank
No.203d-2	Acid (H ₃ PO ₄) impregnated filter	Polyethylene centrifuge tube	3	Blank

Summary of the analytical results

Table 3.3

Analyte	Prepared (Vp)	Average (Va)	Va/Vp [%]	S.D.	N	Min.	Max.
<u>Sample No. 201d</u>							
SO ₄ ²⁻ [µg]	8.25	8.16	-1.1	3.55	20	1.97	16.6
Cl ⁻ [µg]	3.42	2.98	-12.9	0.52	20	1.54	4.09
NH ₄ ⁺ [µg]	8.82	9.33	5.7	1.08	20	7.11	11.3
<u>Sample No. 202 d</u>							
SO ₄ ²⁻ [µg]	57.3	50.8	-11.3	6.84	20	36.9	65.1
Cl ⁻ [µg]	11.1	9.87	-11.1	1.70	20	5.29	12.9
NH ₄ ⁺ [µg]	55.1	53.5	-2.8	3.55	19	42.7	58.0

Prepared* : Prepared Values

$\Delta V/Vp^*$: (Average (Va)- Prepared (Vp)) / Prepared (Vp) × 100 (%)

The Data Quality Objectives (DQOs)

$$\text{Deviation (\%)} = (\text{Determined value} - \text{Prepared value}) / \text{Prepared value} \times 100 (\%)$$

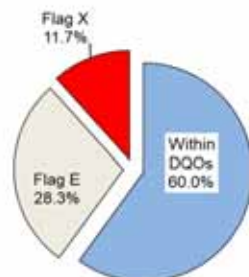
Flag E : $15\% < |\text{Deviation}| \leq 30\%$

Flag X : $30\% < |\text{Deviation}|$

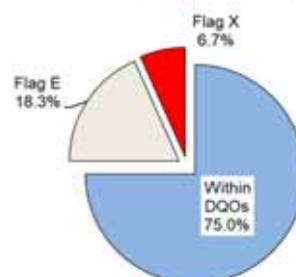
Percentage of flagged data for Sample No.201d and No.202d

Figures 3.1, 3.2

Sample No.201d (n =60)
(small Quant.)



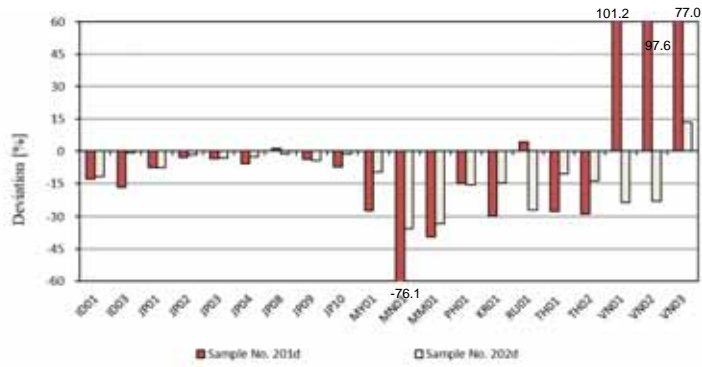
Sample No.202d (n = 60)
(Large Quant.)



Flag E; $15\% < |\text{Deviation}| \leq 30\%$
Flag X; $30\% < |\text{Deviation}|$

Deviation for SO₄²⁻ (by laboratory)

Figure 3.3

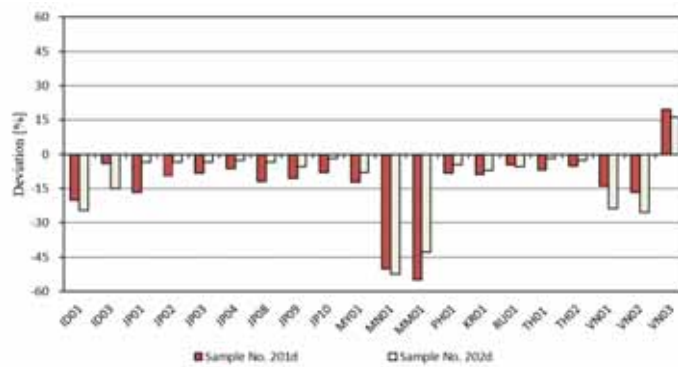


Deviation (%) = (Determined value – Prepared value)/ Prepared value x 100 (%)

All laboratories used Ion Chromatography for the analysis of SO₄²⁻.

Deviation for Cl⁻ (by laboratory)

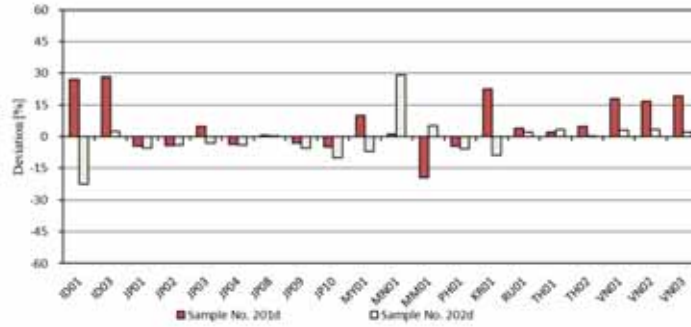
Figure 3.4



All laboratories used Ion Chromatography for the analysis of Cl⁻.

Deviation for NH₄⁺ (by Laboratory)

Figure 3.5

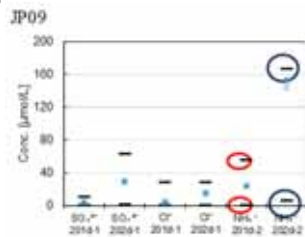


All laboratories used Ion Chromatography for the analysis of NH₄⁺

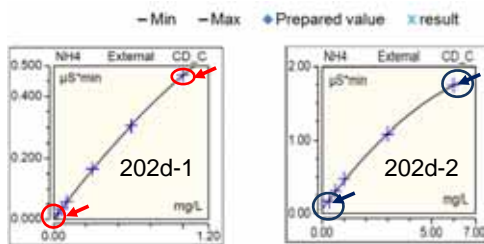
Calibration standard solution

Figure 3.7

Example : ACAP JP09



ACAP sets up 10 standard solutions for NH₄⁺, and chooses proper solutions for 201d-2 and 202d-2 separately.

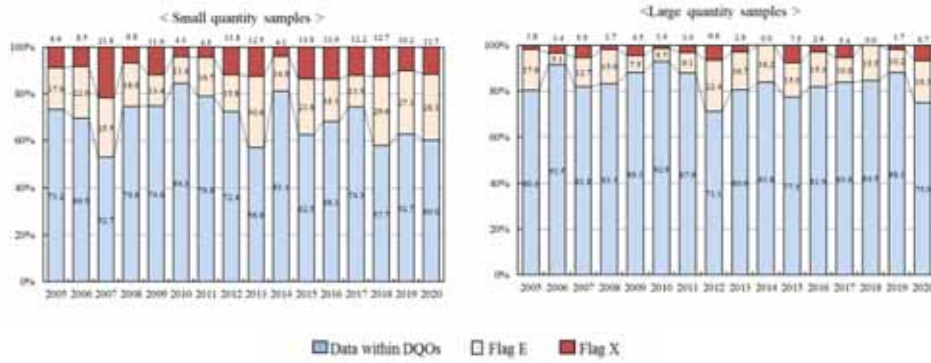


Quadratic curve is each drawn.

Standard solution	NH ₄ ⁺ (µmol L ⁻¹)	201d-2	202d-2
Std0 (Pure water)	0.00	✓	✓
Std1	1.66	✓	
Std2	3.33	✓	
Std3	5.54	✓	✓
Std4	16.63	✓	✓
Std5	33.26	✓	✓
Std6	55.44	✓	✓
Std7	166.31		✓
Std8	332.62		
Std9	554.36		
Std10			

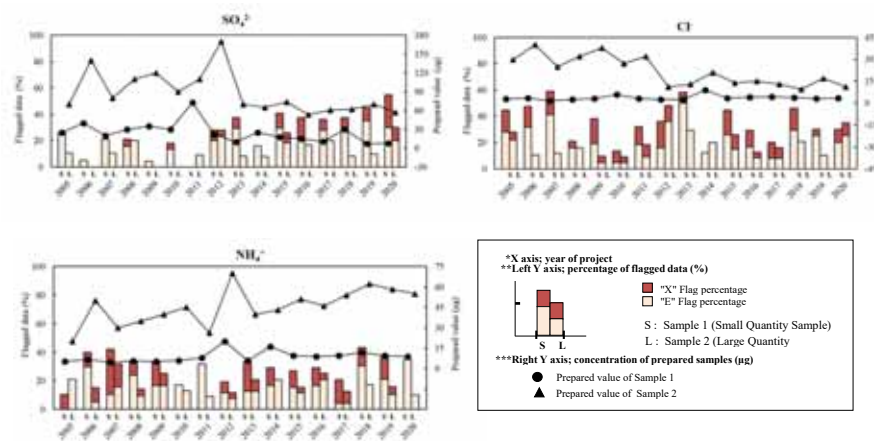
Comparison with past studies

Figure 3.31



Flagged data of each year

Figure 3.32



Thank you for your attention!

Report of the Inter-laboratory Comparison Project 2020 (Draft)

Chapter 4: 22nd Inter-laboratory Comparison Project on Soil

Network Center for EANET

1

Description of Soil Samples

- Sample No.201s: Cambisols
- Sample No.202s: Cambisols
- The soil No.201s and No.202s were collected under Japanese cedar plantations in Niigata Prefecture, Japan.
- Fourteen laboratories of 7 countries participated in the 22nd project.

2

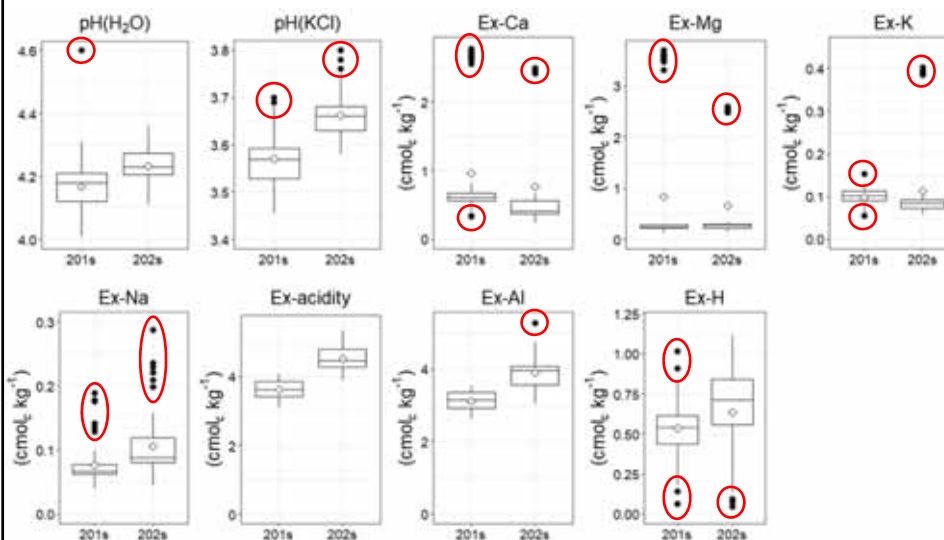
Analyzed Soil Chemical Properties

Parameters	Unit	No. 201s and No. 202s
a) Moisture Content	wt %	M
b) pH (H ₂ O)	-	M
c) pH (KCl)	-	M
d) Exchangeable Ca	cmol _c kg ⁻¹	M
e) Exchangeable Mg	cmol _c kg ⁻¹	M
f) Exchangeable K	cmol _c kg ⁻¹	M
g) Exchangeable Na	cmol _c kg ⁻¹	M
h) Exchangeable Acidity	cmol _c kg ⁻¹	M
i) Exchangeable Al	cmol _c kg ⁻¹	M
j) Exchangeable H	cmol _c kg ⁻¹	M

M: Mandatory items

3

Data variation among 14 Laboratories



Outstanding outliers were found in almost all items.

4

Data verification by Cochran and Grubbs tests – 201s

No. 201s

Country	Lab.	Repeat analysis	pH(H ₂ O)	pH(KCl)	Ex-Ca	Ex-Mg	Ex-K	Ex-Na	Ex-acidity	Ex-Al	Ex-H
China	CN01	1st	4.2	3.5	0.36	0.14	0.07	0.04	3.22	2.97	0.20
		2nd	4.1	3.5	0.39	0.15	0.07	0.04	3.22	3.00	0.17
	CN02	1st	4.2	3.6	0.66	0.25	0.11	0.07	3.66	2.89	0.77
		2nd	4.2	3.5	0.67	0.25	0.11	0.07	3.60	2.75	0.84
	CN03	1st	4.2	3.6	0.61	0.21	0.12	0.10	3.37	2.94	0.43
		2nd	4.2	3.6	0.62	0.21	0.12	0.09	3.36	2.91	0.45
	CN04	1st	4.2	3.6	0.65	0.24	0.11	0.07	3.56	2.81	0.75
		2nd	4.2	3.6	0.62	0.23	0.11	0.07	3.46	2.75	0.72
Indonesia	ID01	1st	4.2 c	3.5	0.60	0.27	0.13	0.08	3.93	3.38	0.54
		2nd	4.0 c	3.5	0.61	0.26	0.14	0.08	3.96	3.46	0.50
	ID04	1st	4.3	3.6	0.74	0.28	0.07 c	0.15 c	3.74 c	3.39	0.35
		2nd	4.3	3.6	0.72	0.28	0.10 c	0.17 c	3.34 c	3.19	0.15
Japan	JP13	1st	4.2	3.6	0.55	0.23	0.10	0.06	3.43	2.90	0.53
		2nd	4.2	3.6	0.57	0.22	0.09	0.06	3.58	3.01	0.56
Mongolia	MN01	1st	4.3	3.7	NA	NA	NA	NA	3.49	3.28	0.41
		2nd	4.3	3.7	NA	NA	NA	NA	3.49	3.28	0.41
Philippines	PH01	1st	4.1	3.5 c	0.55	0.25	0.10	0.06	3.76	3.19	0.63
		2nd	4.2	3.6 c	0.61	0.26	0.10	0.06	3.59	3.20	0.83
Russia	RU01	1st	4.1	3.5	0.49	0.17	0.10	0.07	3.82	3.35	0.48
		2nd	4.1	3.5	0.49	0.17	0.09	0.06	3.82	3.37	0.48
Vietnam	VN01	1st	4.1	3.6	2.71 g	3.59 g	0.07	0.07	3.74	3.22	0.61
		2nd	4.1	3.6	2.73 g	3.61 g	0.07	0.07	3.83	3.15	0.61
	VN02	1st	4.2	3.6	NA	NA	NA	NA	4.02	3.38	0.61
		2nd	4.2	3.6	NA	NA	NA	NA	3.99	3.38	0.61
	VN04	1st	4.1	3.5	2.68 g	3.43 c	NA	NA	3.14	2.63	0.51
		2nd	4.1	3.5	2.59 g	3.54 c	NA	NA	3.14	2.63	0.51
	VN05	1st	4.0	3.7	NA	NA	NA	NA	4.01	3.35	0.68
		2nd	4.0	3.7	NA	NA	NA	NA	3.99	3.41	0.61

The outliers were determined by Cochran and Grubbs tests, and were indicated by "c" and "g" signs, respectively.

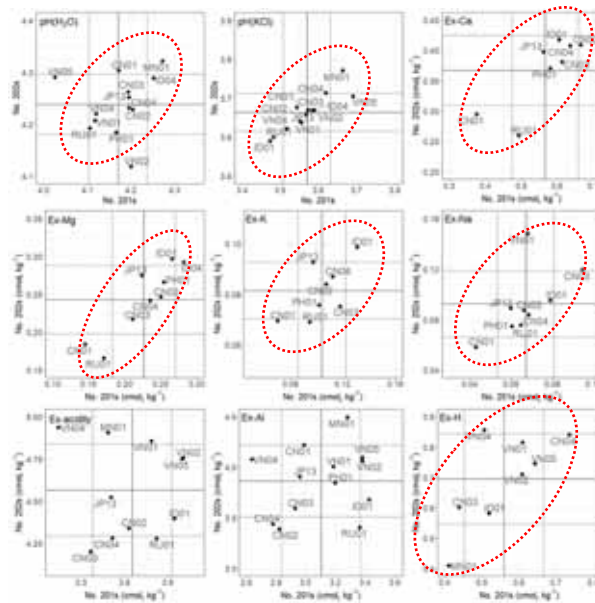
Data verification by Cochran and Grubbs tests – 202s

No. 202s

Country	Lab.	Repeat analysis	pH(H ₂ O)	pH(KCl)	Ex-Ca	Ex-Mg	Ex-K	Ex-Na	Ex-acidity	Ex-Al	Ex-H
China	CN01	1st	4.3	3.7	0.29	0.18	0.07	0.06	4.22 c	4.10	0.08 g
		2nd	4.3	3.7	0.30	0.18	0.06	0.05	4.47 c	4.35	0.08 g
	CN02	1st	4.2	3.6	0.41	0.25	0.08	0.09	4.29	3.37	0.91 c
		2nd	4.2	3.6	0.41	0.24	0.08	0.09	4.39	3.41	0.98 c
	CN03	1st	4.3	3.7	0.38	0.22	0.08	0.12	4.17	3.57	0.60
		2nd	4.3	3.7	0.38	0.22	0.07	0.12	4.23	3.62	0.60
	CN04	1st	4.3	3.7	0.42	0.25	0.09	0.08	4.28	3.44	0.84
		2nd	4.3	3.7	0.40	0.24	0.09	0.08	4.28	3.44	0.85
Indonesia	ID01	1st	4.2	3.6	0.42	0.30	0.10	0.10	4.38	3.80	0.58
		2nd	4.2	3.6	0.42	0.30	0.10	0.09	4.41	3.56	0.58
	ID04	1st	4.3	3.7	0.60 g	0.30	0.07	0.24 c	5.05 c	4.89 c	0.15 g
		2nd	4.3	3.7	0.60 g	0.29	0.08	0.22 c	3.99 c	3.83 c	0.16 g
Japan	JP13	1st	4.2	3.7	0.39	0.28	0.09	0.09	4.48	3.88	0.61 c
		2nd	4.2	3.7	0.41	0.27	0.09	0.09	4.56	3.93	0.63 c
Mongolia	MN01	1st	4.3	3.8	NA	NA	NA	NA	4.91	4.50	0.41
		2nd	4.3	3.8	NA	NA	NA	NA	4.91	4.50	0.41
Philippines	PH01	1st	4.2	3.6	0.34	0.25	0.07	0.07	4.28 c	3.96	0.56 c
		2nd	4.1	3.7	0.40	0.28	0.08	0.08	4.09 c	3.74	0.72 c
Russia	RU01	1st	4.2	3.6	0.27	0.17	0.07	0.08	4.26	3.45	0.83 c
		2nd	4.2	3.6	0.24	0.16	0.07	0.07	4.30	3.36	0.94 c
Vietnam	VN01	1st	4.2	3.6	2.43 g	2.54 g	0.39 g	0.14	4.86	4.01	0.82
		2nd	4.2	3.6	2.41 g	2.50 g	0.40 g	0.15	4.86	4.01	0.82
	VN02	1st	4.1	3.7	NA	NA	NA	NA	4.76	4.10	0.71
		2nd	4.1	3.7	NA	NA	NA	NA	4.76	4.03	0.71
	VN04	1st	4.2	3.6	2.44 g	2.57 c	NA	NA	4.94	4.08	0.86
		2nd	4.2	3.6	2.47 g	2.49 c	NA	NA	4.94	4.08	0.86
	VN05	1st	4.3	3.7	NA	NA	NA	NA	4.78	4.13	0.75
		2nd	4.3	3.7	NA	NA	NA	NA	4.72	4.06	0.75

The outliers were determined by Cochran and Grubbs tests, and were indicated by "c" and "g" signs, respectively.

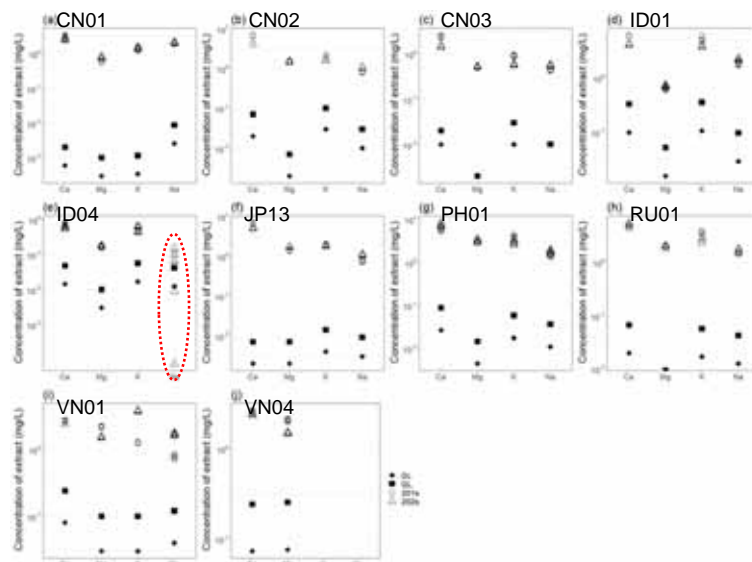
Relationship of measurement between 201s and 202s



Linear correlations suggest systematic errors.

7

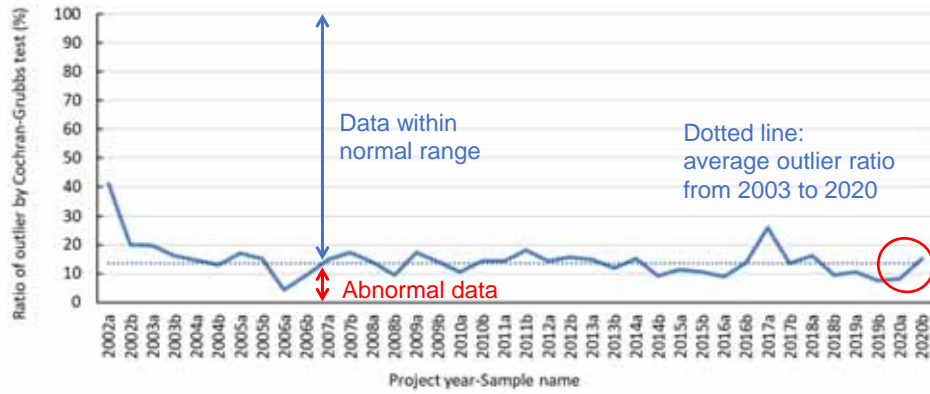
Relationships between DL, QL and Ex-base cations in soil



Measured concentrations were much higher than DL and QL by one digit except for ID04.

8

Ratio of outliers from 2002 to 2020



Ratio of outliers* was slightly increased compared to 2019 and almost same as the average from 2003 to 2020.

$$\text{*Ratio of outliers} = \frac{\{(N \text{ of entire dataset}) - (N \text{ of verified dataset})\}}{(N \text{ of entire dataset})}$$

Please review date of analysis

Table 4.8 Date of analysis

Lab.	Repeat	pH		Ex-Ca and Mg				Ex-K and Na			Ex-acidity, Al and H						
		Start Date	Finish Date	AD	ID	Start Date	Finish Date	AD	ID	Start Date	Finish Date	AD	ID				
CN01	1st	2021/3/15	2021/3/15	1	0	2021/5/10	2021/5/11	2	0	2021/5/10	2021/5/11	2	0	2021/4/17	2021/4/17	1	0
	2nd	2021/3/15	2021/3/15	1		2021/5/10	2021/5/11	2		2021/5/10	2021/5/11	2		2021/4/17	2021/4/17	1	
CN02	1st	2021/1/28	2021/1/28	1	1	2021/1/27	2021/1/28	2	1	2021/1/27	2021/1/28	2	1	2021/2/23	2021/2/24	2	1
	2nd	2021/1/29	2021/1/29	1		2021/1/28	2021/1/29	2		2021/1/28	2021/1/29	2		2021/2/24	2021/2/25	2	
CN03 *1	1st	2021/1/25	2021/1/26	2	###	2021/1/25	2021/1/26	2	8	2021/1/25	2021/1/26	2	8	2021/1/26	2021/1/27	2	8
	2nd	2021/1/28	#VALUE!	###		2021/2/2	2021/2/3	2		2021/2/2	2021/2/3	2		2021/2/3	2021/2/4	2	
CN04	1st	2020/11/2	2020/11/2	1	3	2020/12/15	2020/12/16	2	4	2020/12/15	2020/12/16	2	4	2021/1/13	2021/1/14	2	5
	2nd	2020/11/5	2020/11/5	1		2020/12/18	2020/12/20	3		2020/12/18	2020/12/20	3		2021/1/18	2021/1/19	2	
ID01	1st	2020/12/7	2020/12/7	1	7	2020/12/14	2020/12/15	2	7	2020/12/14	2020/12/15	2	7	2020/12/9	2020/12/10	2	7
	2nd	2020/12/14	2020/12/14	1		2020/12/21	2020/12/22	2		2020/12/21	2020/12/22	2		2020/12/16	2020/12/17	2	
ID04	1st	2020/11/4	2020/11/4	1	7	2020/11/4	2020/11/5	2	7	2020/11/4	2020/11/5	2	7	2020/11/4	2020/11/4	1	7
	2nd	2020/11/11	2020/11/11	1		2020/11/11	2020/11/12	2		2020/11/11	2020/11/12	2		2020/11/11	2020/11/11	1	
JP13	1st	2020/10/29	2020/10/29	1	7	2021/1/14	2021/1/15	2	0	2021/1/14	2021/1/15	2	0	2021/1/13	2021/1/14	2	0
	2nd	2020/11/5	2020/11/5	1		2021/1/14	2021/1/15	2		2021/1/14	2021/1/15	2		2021/1/13	2021/1/14	2	
MN01	1st	2020/12/21	2020/12/21	1	1				NA				NA	2020/12/27	2020/12/27	1	0
	2nd	2020/12/22	2020/12/22	1										2020/12/27	2020/12/27	1	
PH01	1st	2021/2/8	2021/2/8	1	8	2021/2/8	2021/2/11	4	7	2021/2/8	2021/2/11	4	7	2021/2/15	2021/2/15	1	8
	2nd	2021/2/16	2021/2/16	1		2021/2/16	2021/2/18	3		2021/2/16	2021/2/18	3		2021/2/22	2021/2/23	2	
RU01 *1	1st	2021/1/26	2021/1/26	1	-358	2021/1/27	2021/1/28	2	7	2021/1/27	2021/1/28	2	7	2021/1/28	2021/1/28	1	7
	2nd	2021/2/3	2020/2/3	-365		2021/2/3	2021/2/4	2		2021/2/3	2021/2/4	2		2021/2/4	2021/2/4	1	
VN01	1st	2020/12/14	2020/12/14	1	2	2020/12/14	2020/12/15	2	2	2020/12/14	2020/12/15	2	2	2020/12/14	2020/12/15	2	2
	2nd	2020/12/16	2020/12/16	1		2020/12/16	2020/12/17	2		2020/12/16	2020/12/17	2		2020/12/16	2020/12/17	2	
VN02	1st	2020/12/26	2020/12/27	2	0				NA				NA	2020/12/27	2020/12/28	2	0
	2nd	2020/12/26	2020/12/27	2										2020/12/27	2020/12/28	2	
VN04	1st	2020/12/7	2020/12/7	1	0	2020/12/14	2020/12/17	4	0				NA	2020/12/7	2020/12/7	1	0
	2nd	2020/12/7	2020/12/7	1		2020/12/14	2020/12/17	4						2020/12/7	2020/12/7	1	
VN05	1st	2020/12/27	2020/12/28	2	0				NA				NA	2020/12/27	2020/12/28	2	0
	2nd	2020/12/27	2020/12/28	2										2020/12/27	2020/12/28	2	

AD, days for analysis; ID; interval between the repeat analyses; +, not reported; NA, not analyzed.

Date of analysis for CN03 was reported as 2021/2/29, and for RU01, it was reported as 2020/2/3.

Summary

- In 22nd Inter-laboratory Comparison Project on soil, 14 laboratories from 7 countries have participated.
- Outliers were detected for almost all measurement items.
- There were both random and systematic errors for factors of variabilities in measurements.
- Ex-base cations were measured with enough spare capacity.
- Ratio of outliers appeared at usual range.

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Recommendation

- Extremely-large variations in Ex-base cations might be produced by error of the calculation or the data handling (e.g. copy and paste). Analyst needs to recheck the both reporting procedures before submitting the data.
- Reducing the outliers will be considered firstly, especially in exchangeable base and acid cations. The condition of standard solution, extraction solution (potassium chloride and ammonium acetate), dilution rate and calculation will be checked.
- Easy mistakes should be avoided by careful reporting process. NC will provide revised reporting format keeping from mistakes. So please use new format every year.

12

**Report of the Inter-laboratory
Comparison Project 2020
on Inland Aquatic Environment
-21st Attempt-**

**ACAP
Network Center for EANET**

1

**Laboratories participating in the Inter-
comparison project 2020 of the EANET**

Lab. ID	pH	EC mS m ⁻¹	Alkalinity meq L ⁻¹	SO ₄ ²⁻ mg L ⁻¹	NO ₃ ⁻ mg L ⁻¹	Cl ⁻ mg L ⁻¹	Na ⁺ mg L ⁻¹	K ⁺ mg L ⁻¹	Ca ²⁺ mg L ⁻¹	Mg ²⁺ mg L ⁻¹	NH ₄ ⁺ mg L ⁻¹
KH01											
CN01	7.05	3.73	0.132	4.97	0.47	3.36	3.21	0.66	1.70	0.80	0.23 E
CN02	6.99	3.81	0.112	4.78	0.48	3.30	3.17	0.62	1.66	0.81	0.24 E
CN03	7.02	3.86	0.125	4.78	0.47	3.30	3.16	0.64	1.66	0.84	0.25 E
CN04	6.89	3.84	0.125	4.88	0.47	3.45	3.18	0.61	1.70	0.83	0.24 E
ID01	6.81	3.64	0.147 E	4.60	0.41 E	3.15	3.00	0.62	1.62	0.73	0.24 E
ID05	7.09	3.50	0.130	4.69	0.47	3.26	2.94	0.44 X	1.45	0.79	0.22 E
JP03	7.06	3.70	0.133	4.78	0.50	3.22	3.17	0.65	1.77	0.83	0.26
JP04	7.09	3.78	0.128	4.77	0.49	3.27	3.02	0.65	1.64	0.80	0.24 E
LA01											
MY01	6.91	3.72	0.115	4.82	0.46	3.27	3.12	0.61	1.70	0.79	0.24 E
MN01	5.53 E	3.63	0.111	5.48	0.52	3.48	3.34	0.57	1.83	0.77	0.40 X
PH01	7.09	4.56 E	0.122	5.12	0.53	3.36	3.16	0.71	1.59	0.78	0.23 E
PH02											
RU01	7.01	3.79	0.099 E	4.67	0.60 E	3.28	3.01	0.60	1.51	0.73	0.24 E
RU02	6.83	4.52 E	0.095 E	4.08 E	0.58 E	3.93 E	3.45	0.70	1.49	0.75	0.26
TH01	6.99	3.54	0.124	4.52	0.43	3.13	3.17	0.62	1.70	0.77	0.25 E
TH02	6.43	3.53	0.133	4.84	0.46	3.28	3.09	0.61	1.16 X	0.59 E	0.25 E
VN01	6.61	3.82	0.116	4.63	0.47	3.26	3.22	0.48 E	1.37 E	0.65 E	0.36 E
VN02	6.57	3.99	0.115	4.65	0.48	3.30	3.15	0.50 E	1.42 E	0.64 E	0.34
VN03	6.55	3.62	0.120	4.73	0.48	2.84	3.15	0.46 E	1.35 E	0.61 E	0.34
VN04	6.88	3.66	0.120	4.61	0.48	3.16	3.34	0.46 E	1.06 X	0.69	0.48 X
VN05	5.85 E	3.53	0.117	4.58	0.45	3.12	3.18	0.48 E	1.37 E	0.58 E	0.33
Expected value	6.94	3.89	0.118	4.83	0.50	3.34	3.14	0.65	1.68	0.80	0.30
Flag E: 15% < Deviation		30%									
Flag X: 30% < Deviation											

**23 laboratories participated in this project, and
20 laboratories submitted their analytical data**

2

Outline of artificial inland water sample

Name	Amount of the sample	Container	Number of samples	Note
Artificial inland water sample	Approximately 1 liter	Poly-ethylene bottle 1 liter	One bottle	To analyze directly

See Table 5.1

3

Concentration range and Parameters

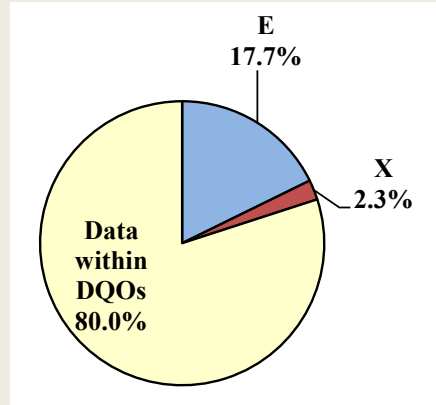
Parameter	Range	Parameter	Range
pH	5.0 – 8.0	Na ⁺	1 – 10 mg L ⁻¹
EC	1.5 – 15 mS m ⁻¹	K ⁺	0.2 – 2 mg L ⁻¹
Alkalinity	0.05 – 0.5 meq L ⁻¹	Ca ²⁺	0.5 – 5 mg L ⁻¹
SO ₄ ²⁻	2 – 20 mg L ⁻¹	Mg ²⁺	0.2 – 2 mg L ⁻¹
NO ₃ ⁻	0.5 – 5 mg L ⁻¹	NH ₄ ⁺	0.05 – 0.5 mg L ⁻¹
Cl ⁻	1 – 10 mg L ⁻¹		

See Table 5.3

4

Percentage of flagged data

- 39 analytical data out of 220 (17.7%) exceeded the DQOs within a factor of 2 and flagged by "E".
- 5 analytical data out of 220 (2.3%) exceeded the DQOs more than a factor of 2 and flagged by "X".

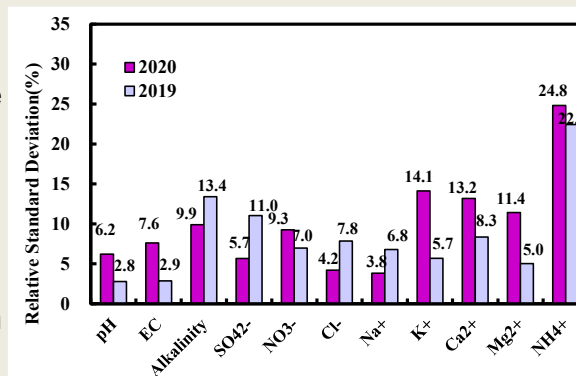


See Fig. 5.1

- Flagged by E: 15 – 30%
- Flagged by X: > 30%

Relative standard deviation of each constituent

- The relative standard deviation (RSD) of alkalinity and NH_4^+ were larger than that of the other parameters.
- RSDs of K^+ , Ca^{2+} and Mg^{2+} increased were increased remarkably in this attempt.



See Fig. 5.14

Number of Staff

- One person analyzed the sample in 7 laboratories.
- In many laboratories, 2 or 3 persons analyzed the sample, and usually they shared the works according to the methods such as pH, EC and ionic items.

Lab.ID	Total	pH	EC	Alkalinity	SO ₄ ²⁻	NO ₃ ⁻	Cl ⁻	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	NH ₄ ⁺
CN01	1	A	A	A	A	A	A	A	A	A	A	A
CN02	3	A	A	B	C	C	C	C	C	C	C	C
CN03	2	A	A	A	B	B	B	B	B	B	B	B
CN04	1	A	A	A	A	A	A	A	A	A	A	A
ID01	2	A	A	B	B	B	B	B	B	B	B	B
ID05	4	A	A	B	C	C	C	D	D	D	D	D
JP03	2	A	A	B	B	B	B	B	B	B	B	B
JP04	1	A	A	A	A	A	A	A	A	A	A	A
MY01	3	A	A	B	C	C	C	B	B	B	B	B
MN01	2	A	A	A	B	B	B	B	B	B	B	B
PH01	3	A	A	A	B	B	B	C	C	C	C	B
RU01	3	A	A	A	B	B	B	C	C	C	C	A
RU02	7	A	B	C	D	E	C	F	F	F	F	G
TH01	1	A	A	A	A	A	A	A	A	A	A	A
TH02	1	A	A	A	A	A	A	A	A	A	A	A
VN01	2	A	A	A	B	B	B	B	B	B	B	B
VN02	3	A	A	B	C	C	C	C	C	C	C	C
VN03	2	A	A	B	B	A	A	B	B	B	B	A
VN04	3	A	A	B	C	C	C	C	C	C	C	C
VN05	2	A	A	A	B	B	B	B	B	B	B	B

The letters of A,B,C,...mean individuals of staff in each laboratory who are in charge of measurement.
 Reverse mesh: "E" or "X" in sample flagged Data.
 blank: not analyzed

See Table 5.13

Years of Experience

- The “years of experience of the staff” seems to be not directly related to the data quality.

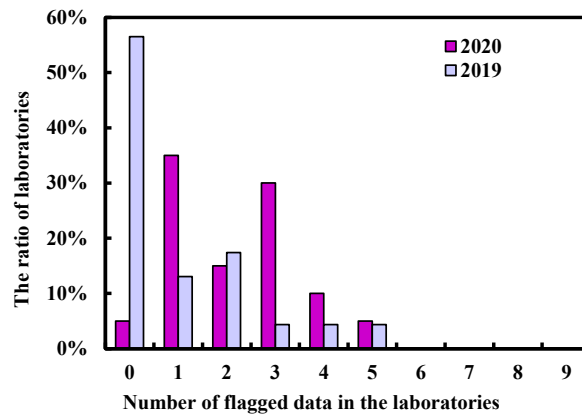
Lab.ID	pH	EC	Alkalinity	SO ₄ ²⁻	NO ₃ ⁻	Cl ⁻	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	Unit : year	
CN01	4	4	4	4	4	4	4	4	4	4	4	4
CN02	11	11	3	15	15	15	15	15	15	15	15	15
CN03	3	3	3	10	10	10	10	10	10	10	10	10
CN04	14	14	14	14	14	14	14	14	14	14	14	14
ID01	22	22	1	1	1	1	1	1	1	1	1	1
ID05	7	7	8	5	5	5	3	3	3	3	3	3
JP03	0.5	0.5	6	6	6	6	6	6	6	6	6	6
JP04	10	10	10	10	10	10	10	10	10	10	10	10
MY01	7	7	8	7	7	7	8	8	8	8	8	8
MN01	19	19	19	22	22	22	22	22	22	22	22	22
PH01	2	2	2	1	1	1	7	7	7	7	7	1
RU01	27	27	27	25	25	25	35	35	35	35	35	27
RU02	13	7	6	34	2	6	26	26	26	26	41	
TH01	14	14	14	14	14	14	14	14	14	14	14	14
TH02	22	22	22	22	22	22	22	22	22	22	22	22
VN01	4	4	4	7	7	7	7	7	7	7	7	7
VN02	14	14	16	16	16	16	16	16	16	16	16	16
VN03	6	6	9	9	6	6	9	9	9	9	6	6
VN04	15	15	17	17	17	17	17	17	17	17	17	17
VN05	2	2	2	16	16	16	16	16	16	16	16	16

Data were Flagged by “E” or “X” in sample
 1 year means experienced with one year or less.
 blank: not analyzed

See Table 5.14

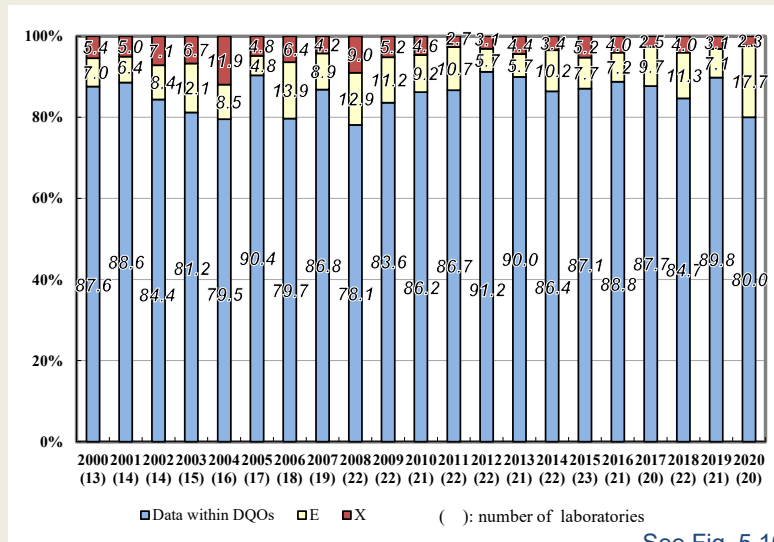
Number of flagged data

- 1 laboratories had no flagged data, which was equivalent to 5% of the laboratories.
- 7 laboratories (35%) had one flagged data.
- In one laboratory, 5 flagged data were observed as the maximum number.



See Table 5.9 and Fig. 5.2

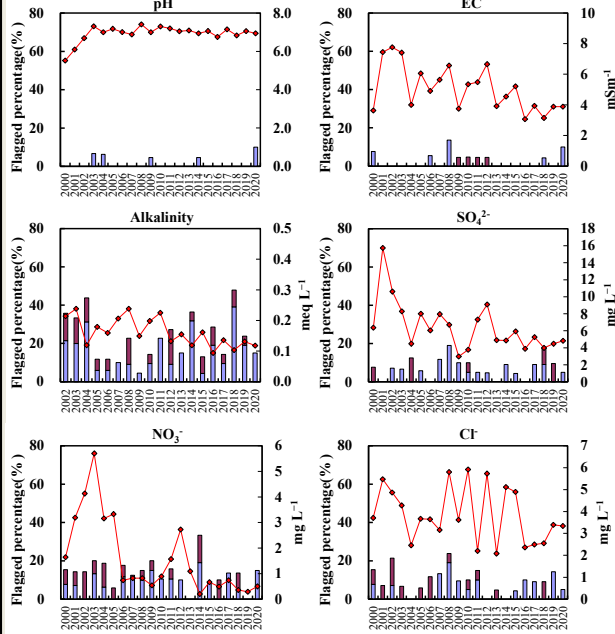
Comparison of the 1st-21st surveys



See Fig. 5.16

- The percentage of data satisfied the DQOs increased in 2019, but declined in 2020.

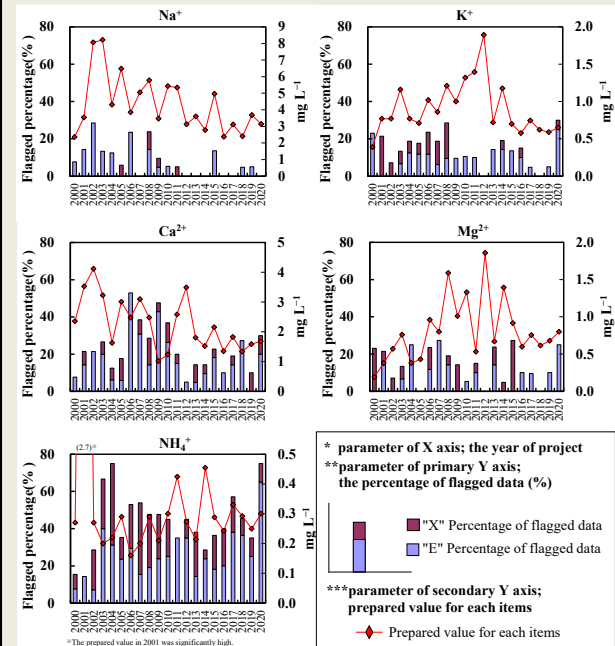
Values/concentrations for each parameter (1)



- The flagged percentages of Alkalinity was decreased.

See Fig. 5.17

Values/concentrations for each parameter (2)



- There was no flagged data in Na⁺ this attempt.
- The flagged percentages of NH₄⁺ was increased, mostly due to the increase in data flagged by E.

See Fig. 5.17

Summary

- Flagged data by “E” and “X” were 20.0% of all the reported data. These were slightly higher the last attempt.
- Flagged data of alkalinity decreased from the last attempt.
- Flagged data of pH, EC, NO_3^- , K^+ , Ca^{2+} , Mg^{2+} and NH_4^+ increased from the last attempt.
- The number of flagged data of NH_4^+ is highest.
- It is necessary to pay more attention to the NH_4^+ analysis:
 - Possibility of contamination of NH_4^+ in the laboratory
 - Calibration curve by using appropriate concentrations of the standard solutions
 - Separation of NH_4^+ and Na^+ chromatograms in the case of IC.
 - Concentration of eluent solution
 - Condition of columns

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Comparison with ILC on Wet Deposition sample(No.202w) in NH_4^+

Prepared values

sample	pH	EC mS m ⁻¹	SO_4^{2-} mg L ⁻¹	NO_3^- mg L ⁻¹	Cl^- mg L ⁻¹	NH_4^+ mg L ⁻¹	Na^+ mg L ⁻¹	K^+ mg L ⁻¹	Ca^{2+} mg L ⁻¹	Mg^{2+} mg L ⁻¹
201i	6.94	3.89	4.83	0.50	3.34	0.30	3.14	0.65	1.68	0.80
202w	5.30	1.09	1.78	0.98	0.55	0.30	0.35	0.14	0.41	0.09

• The prepared values of ammonium ions were the same.

The number of flagged data

	NH_4^+	
	201i	202w
Data within DQO	5	28
Flag E	13	2
Flag X	5	2
Flagged data %	75.0	12.5

• 201i is 6 times more than 202w.

Comparison of the analytical methods

Method	NH_4^+	
	201i	202w
Ion Chromatography	16(13)	28(3)
Spectrophotometry	4(2)	4(1)

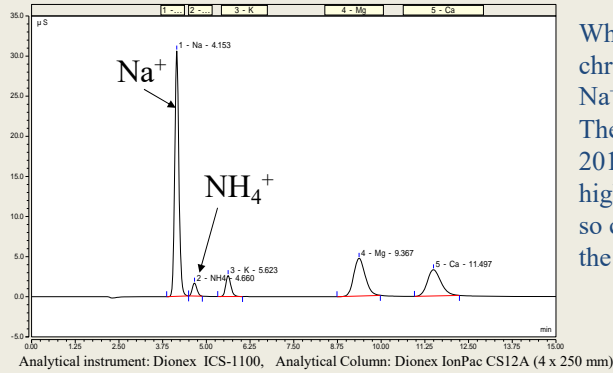
() : Number of data, which flagged by E or X.

• Analysis methods are almost the same.

14

Comparison with ILC on Wet Deposition sample(No.202w) in NH_4^+

Influence of Na^+



When analyzed by ion chromatography, the peak of Na^+ is close to the peak of NH_4^+ . The Na^+ concentration in 201i(3.14) is nearly 10 times higher than that in 202w(0.35), so care must be taken to separate the peaks.

It was not clear why the number of NH_4^+ flagged data in 201i was higher than that in 202w, even though the NH_4^+ concentrations in both 201i and 202w were the same and the analytical methods were the same. However, due to the high Na^+ concentration in 201i, care should be taken in peak separation when analyzing by ion chromatography.