

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

SAC21

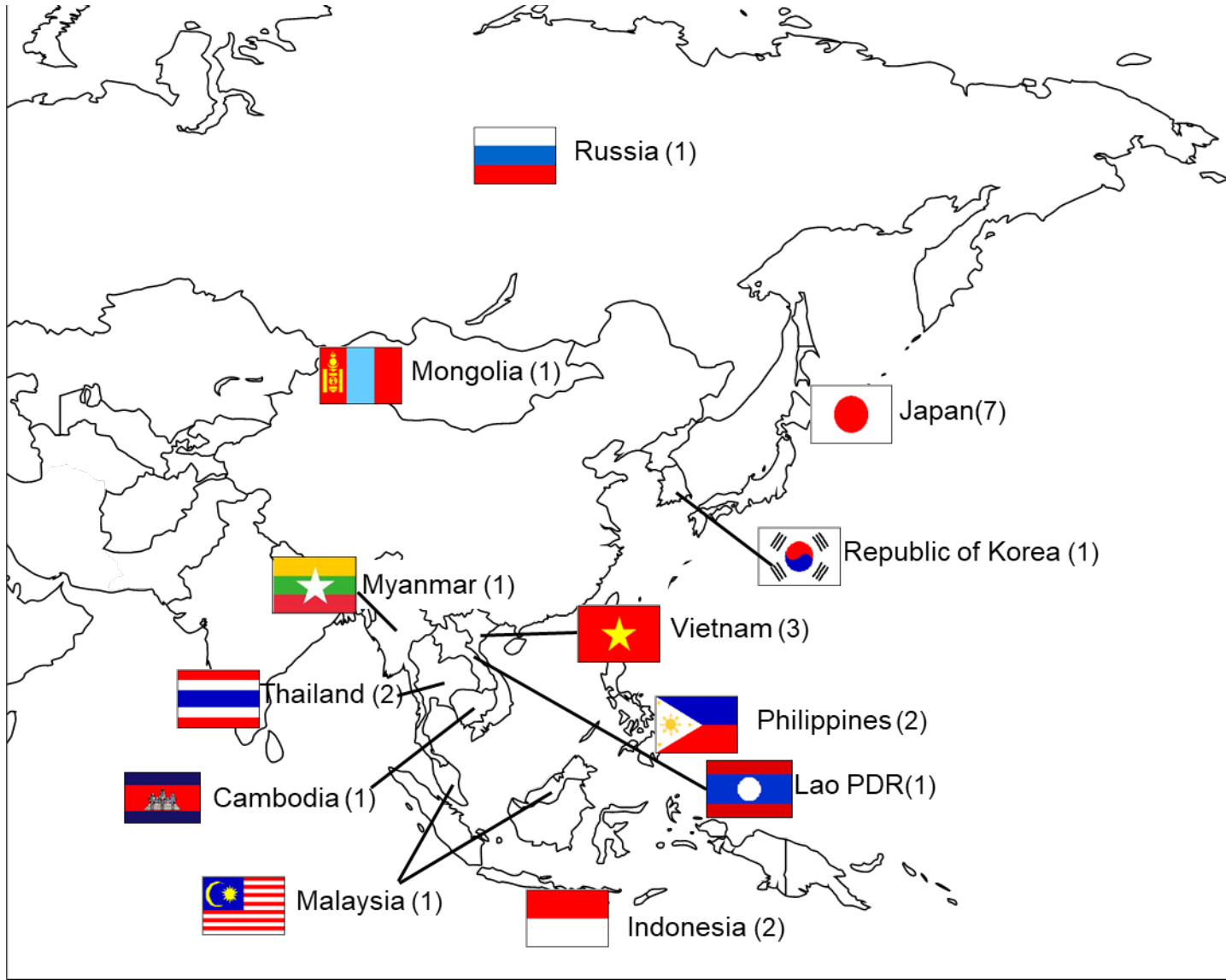
26-28 October, 2021

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 (K₂CO₃) impregnated filter	Polyethylene centrifuge tube	3	Each filter contains a known quantity of sulfate and chloride ions.
No.201d-2	Acid (H₃PO₄) impregnated filter	Polyethylene centrifuge tube	3	Each filter contains a known quantity of ammonium ions.
No.202d-1	Alkali (K₂CO₃) impregnated filter	Polyethylene centrifuge tube	3	Each filter contains a known quantity of sulfate and chloride ions.
No.202d-2	Acid (H₃PO₄) impregnated filter	Polyethylene centrifuge tube	3	Each filter contains a known quantity of ammonium ions.
No.203d-1	Alkali (K₂CO₃) impregnated filter	Polyethylene centrifuge tube	3	Blank
No.203d-2	Acid (H₃PO₄) 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□</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

Va/Vp : (Average (Va)- Prepared (Vp)) / Prepared (Vp) × 100 (%)

The Data Quality Objectives (DQOs)

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

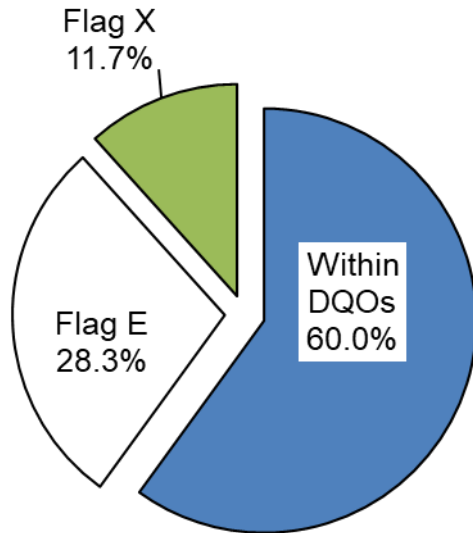
Flag E : **15% < | Deviation | ≤ 30%**

Flag X : **30% < | Deviation |**

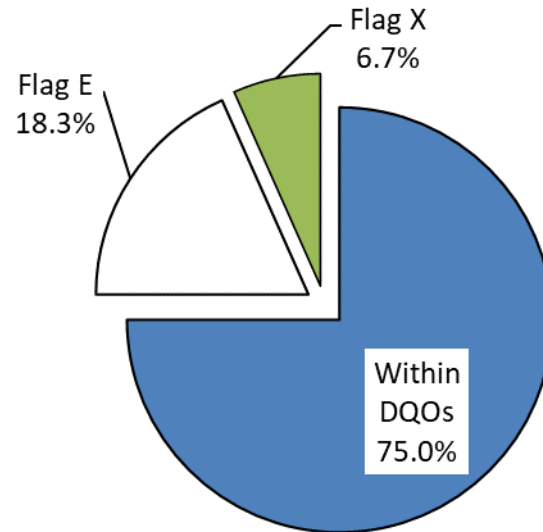
Percentage of flagged data for Sample No.201d and No.202d

Figures 3.1, 3.2

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



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

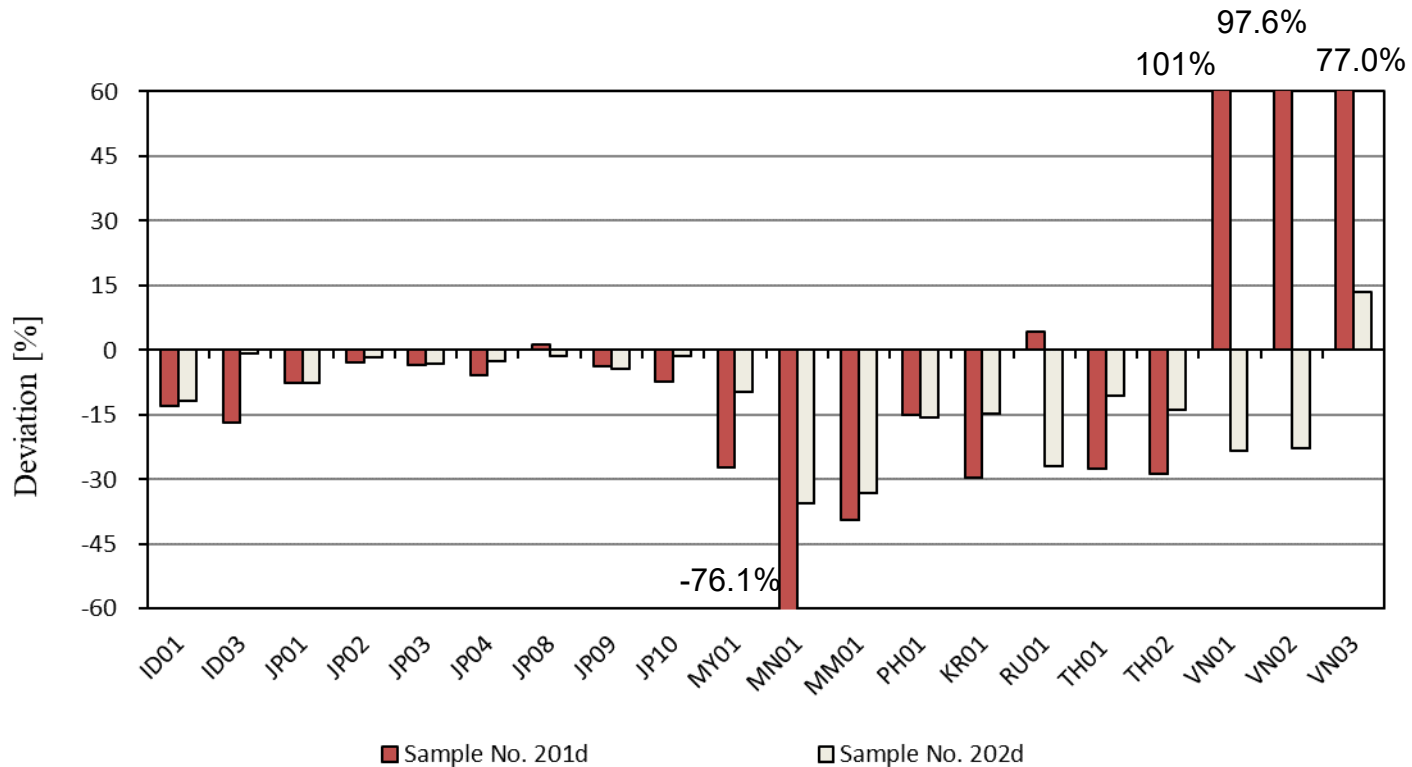


**Flag E; $15 \% < | \text{Deviation} | \leq 30 \%$
Flag X; $30 \% < | \text{Deviation} |$**



Deviation for SO₄²⁻ (by laboratory)

Figure 3.3



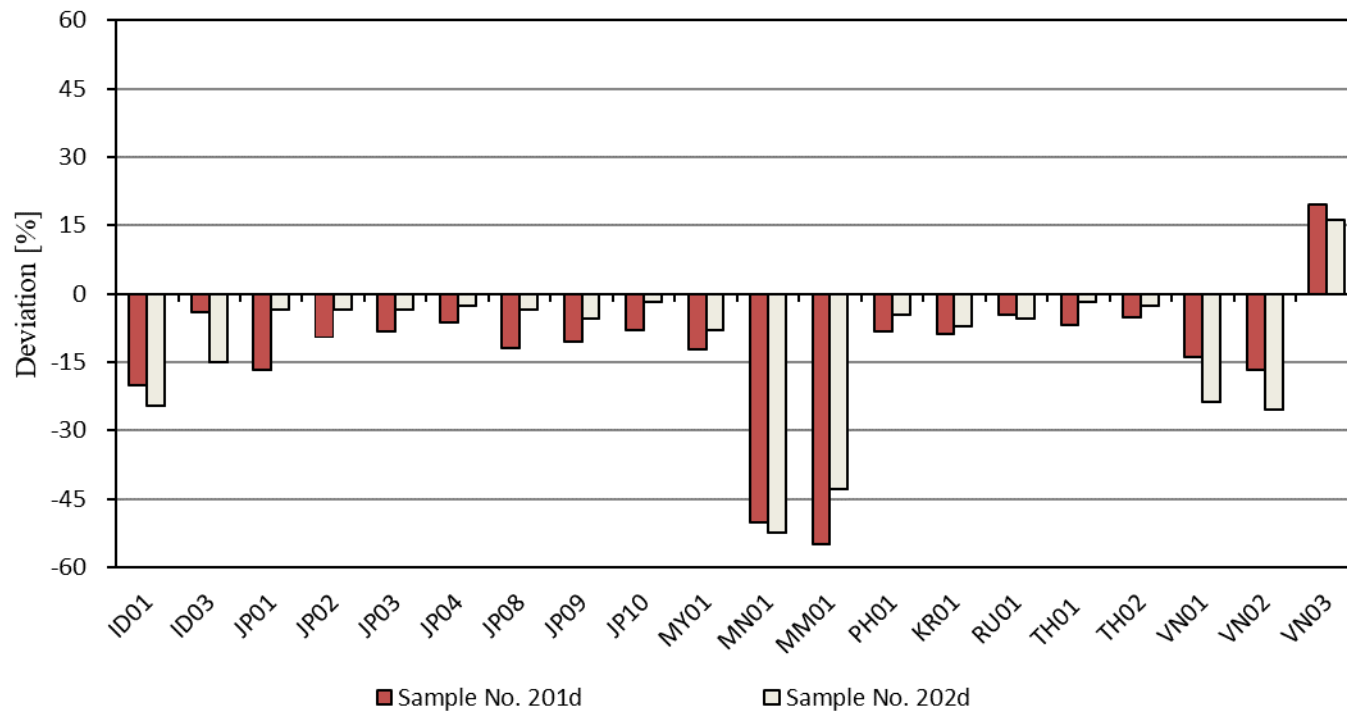
$$\text{Deviation (\%)} = (\text{Determined value} - \text{Prepared value}) / \text{Prepared value} \times 100 (\%)$$

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



Deviation for Cl⁻ (by laboratory)

Figure 3.4

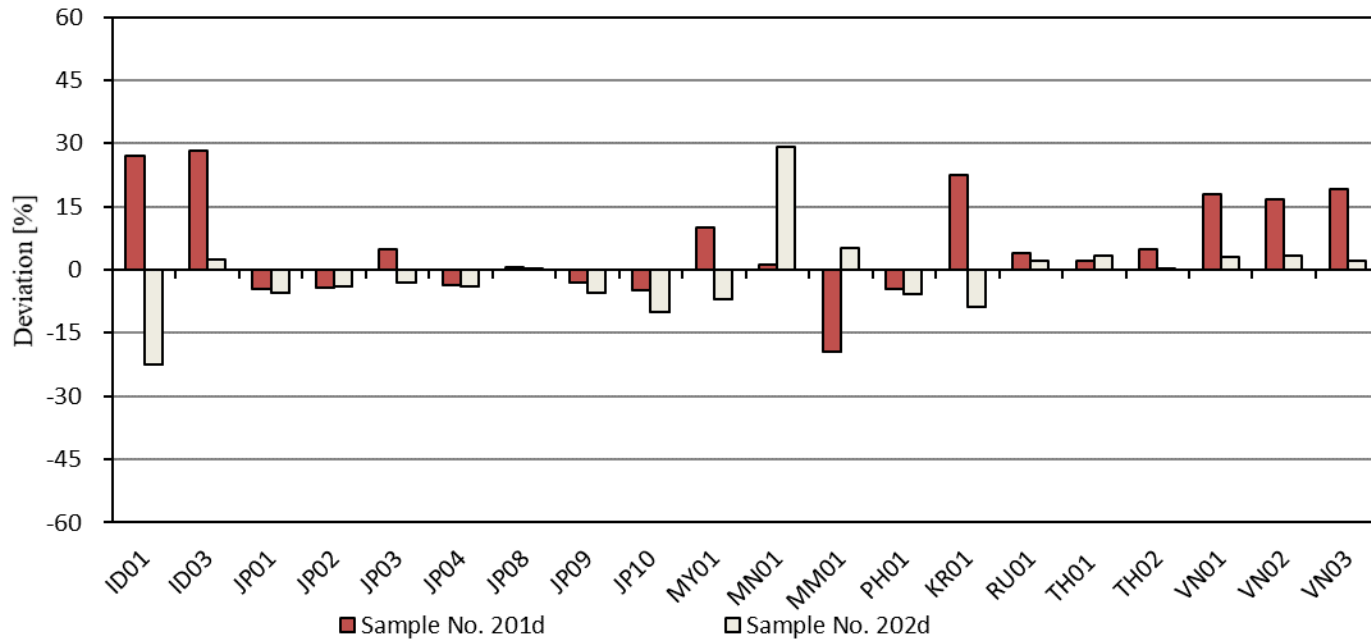


All laboratories used Ion Chromatography for the analysis of Cl⁻.



Deviation for NH₄⁺ (by Laboratory)

Figure 3.5



All laboratories used Ion Chromatography for the analysis of NH₄⁺



Calibration standard solution

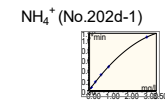
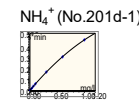
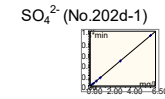
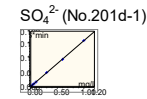
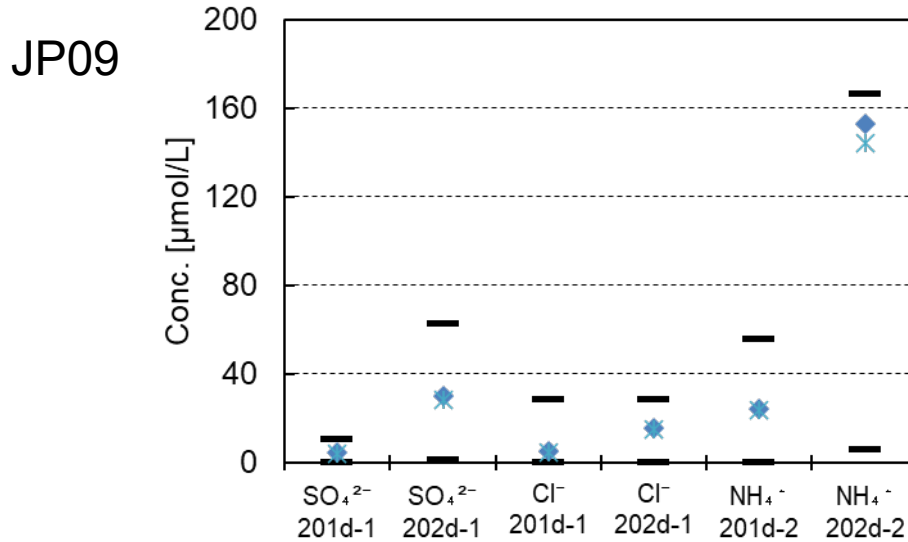


Figure 3.7 Range of the calibration standard solution in each laboratory.

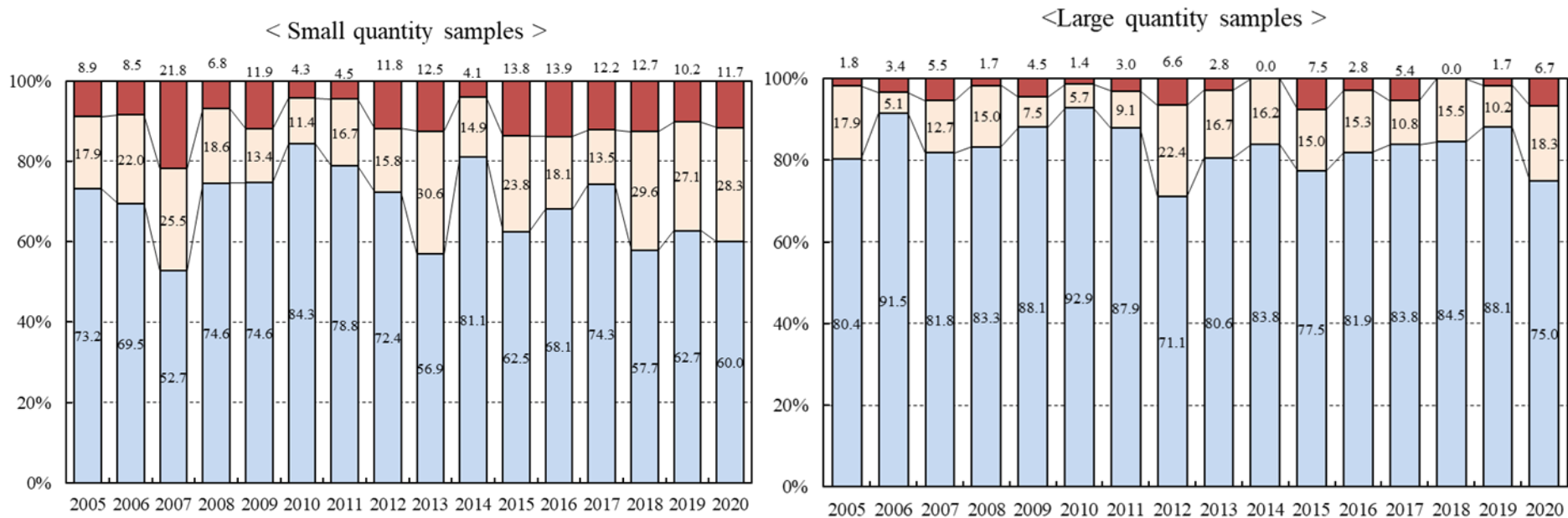
Standard solution	SO ₄ ²⁻ (µmol L ⁻¹)	201d-1	202d-1
Std0 (Pure water)	0.00	✓	✓
Std1	0.31	✓	
Std2	0.62	✓	
Std3	1.04	✓	✓
Std4	3.12	✓	✓
Std5	6.25	✓	✓
Std6	10.41	✓	✓
Std7	31.23		✓
Std8	62.46		✓
Std9	104.10		
Std10			

Standard solution	Cl ⁻ (µmol L ⁻¹)	201d-1	202d-1
Std0 (Pure water)	0.00	✓	✓
Std1	0.85	✓	✓
Std2	1.69	✓	✓
Std3	2.82	✓	✓
Std4	8.46	✓	✓
Std5	16.92	✓	✓
Std6	28.21	✓	✓
Std7	84.62		
Std8	169.25		
Std9	282.08		
Std10			

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 3.8

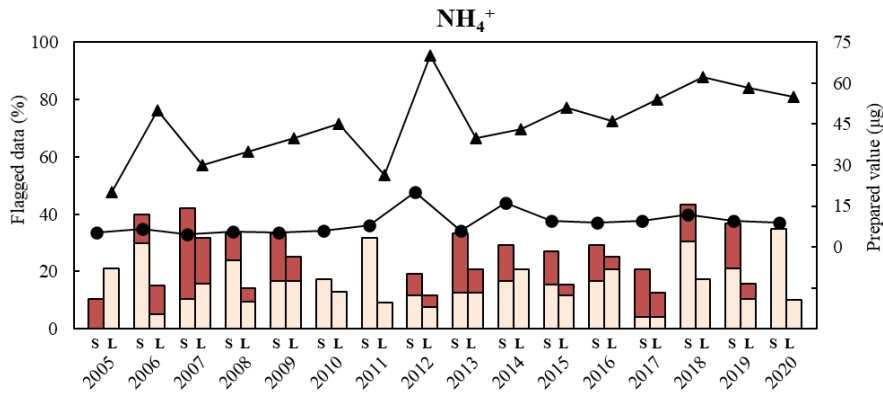
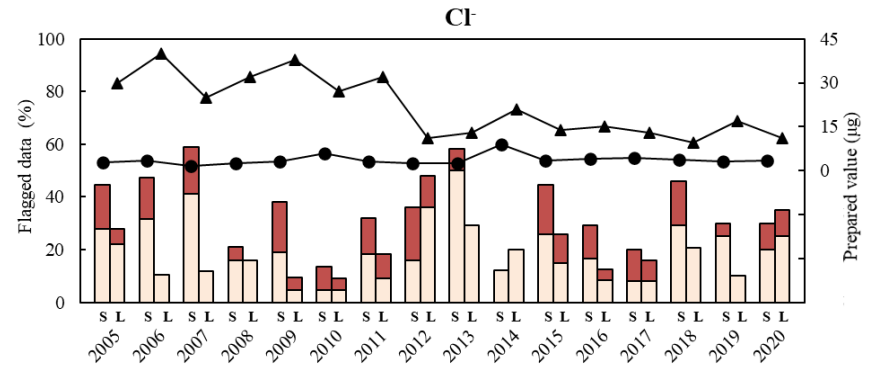
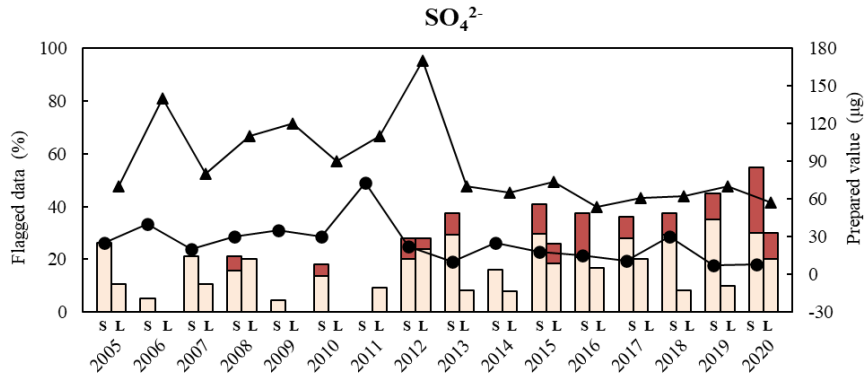


■ Data within DQOs
 ■ Flag E
 ■ Flag X



Flagged data of each year

Figure 3.9



***X axis; year of project**
****Left Y axis; percentage of flagged data (%)**

Legend:

- Red box: "X" Flag percentage
- White box: "E" Flag percentage
- S: Sample 1 (Small Quantity Sample)
- L: Sample 2 (Large Quantity)

*****Right Y axis; concentration of prepared samples (µg)**

- Black circle: Prepared value of Sample 1
- Black triangle: Prepared value of Sample 2



Thank you for your attention!