

**Report of the Inter-laboratory  
Comparison Project 2025  
on Inland Aquatic Environment  
-26<sup>th</sup> Attempt-  
(Draft)**

**ACAP  
Network Center for EANET**

# Laboratories participating in the Inter-comparison project 2025 of the EANET

| Lab. ID        | pH     | EC<br>mS m <sup>-1</sup> | Alkalinity<br>meq L <sup>-1</sup> | SO <sub>4</sub> <sup>2-</sup><br>mg L <sup>-1</sup> | NO <sub>3</sub> <sup>-</sup><br>mg L <sup>-1</sup> | Cl <sup>-</sup><br>mg L <sup>-1</sup> | Na <sup>+</sup><br>mg L <sup>-1</sup> | K <sup>+</sup><br>mg L <sup>-1</sup> | Ca <sup>2+</sup><br>mg L <sup>-1</sup> | Mg <sup>2+</sup><br>mg L <sup>-1</sup> | NH <sub>4</sub> <sup>+</sup><br>mg L <sup>-1</sup> | R1<br>% | R2<br>% |
|----------------|--------|--------------------------|-----------------------------------|-----------------------------------------------------|----------------------------------------------------|---------------------------------------|---------------------------------------|--------------------------------------|----------------------------------------|----------------------------------------|----------------------------------------------------|---------|---------|
| CN01           | 7.08   | 3.87                     | 0.134                             | 4.52                                                | 0.63                                               | 2.98                                  | 3.98                                  | 0.52                                 | 1.53                                   | 0.52                                   | 0.28                                               | -0.21   | -0.56   |
| CN02           | 6.98   | 3.81                     | 0.133                             | 4.46                                                | 0.65                                               | 2.94                                  | 3.91                                  | 0.53                                 | 1.50                                   | 0.54                                   | 0.30                                               | 0.04    | 0.00    |
| CN03           | 7.08   | 3.87                     | 0.131                             | 4.36                                                | 0.70                                               | 2.91                                  | 4.01                                  | 0.53                                 | 1.54                                   | 0.52                                   | 0.28                                               | 1.31    | -0.97   |
| CN04           | 6.90   | 3.72                     | 0.133                             | 4.55                                                | 0.68                                               | 2.97                                  | 3.91                                  | 0.53                                 | 1.60                                   | 0.54                                   | 0.28                                               | 0.26    | 1.76    |
| ID01           | 6.92   | 4.04                     | 0.105 E                           | 4.52                                                | 0.67                                               | 2.86                                  | 3.72                                  | 0.53                                 | 1.33                                   | 0.45                                   | 0.40 E                                             | 1.81    | -5.98   |
| JP03           | 7.12   | 3.67                     | 0.130                             | 4.96                                                | 0.70                                               | 3.33                                  | 3.80                                  | 0.53                                 | 1.46                                   | 0.50                                   | 0.24 E                                             | -5.04   | 2.76    |
| JP04           | 7.12   | 3.69                     | 0.136                             | 4.56                                                | 0.64                                               | 3.01                                  | 3.89                                  | 0.52                                 | 1.60                                   | 0.53                                   | 0.30                                               | -0.56   | 2.32    |
| LA01           |        |                          |                                   |                                                     |                                                    |                                       |                                       |                                      |                                        |                                        |                                                    |         |         |
| MY01           | 7.10   | 3.77                     | 0.137                             | 4.53                                                | 0.61                                               | 3.03                                  | 3.92                                  | 0.47                                 | 1.54                                   | 0.53                                   | 0.31                                               | -0.90   | 1.02    |
| MN01           | 6.94   | 3.39                     | 0.133                             | 4.95                                                | 0.73                                               | 3.22                                  | 3.86                                  | 0.50                                 | 1.74                                   | 0.53                                   | 0.26 E                                             | -2.01   | 8.09    |
| PH01           | 6.73   | 3.79                     | 0.131                             | 4.55                                                | 0.62                                               | 2.97                                  | 3.98                                  | 0.54                                 | 1.90 E                                 | 0.49                                   | 0.28                                               | 2.81    | 1.73    |
| PH02           | 6.97   | 4.67 E                   | 0.153 E                           | 4.38                                                | 0.71                                               | 2.89                                  | 3.78                                  | 0.49                                 | 1.83 E                                 | 0.64 E                                 | 0.33                                               | 0.24    | -7.83   |
| RU01           | 7.07   | 3.80                     | 0.099 E                           | 4.82                                                | 0.58                                               | 2.69                                  | 3.46                                  | 0.55                                 | 1.56                                   | 0.52                                   | 0.30                                               | 2.97    | -3.29   |
| RU02           | 7.11   | 3.91                     | 0.127                             | 3.97                                                | 0.61                                               | 3.91 E                                | 4.05                                  | 0.40 E                               | 1.63                                   | 0.53                                   | 0.35                                               | 0.15    | 0.62    |
| TH01           | 7.18   | 3.53                     | 0.136                             |                                                     |                                                    |                                       |                                       |                                      |                                        |                                        |                                                    | ( - )   | ( - )   |
| TH02           | 6.10 E | 3.66                     | 0.130                             | 4.59                                                | 0.62                                               | 3.00                                  | 4.38                                  | 0.49                                 | 1.39                                   | 0.48                                   | 0.31                                               | 1.50    | 3.05    |
| VN01           | 6.85   | 3.67                     | 0.125                             | 4.60                                                | 0.72                                               | 3.19                                  | 3.80                                  | 0.50                                 | 1.50                                   | 0.54                                   | 0.32                                               | -1.19   | 2.22    |
| VN02           | 6.95   | 3.68                     | 0.125                             | 4.63                                                | 0.63                                               | 3.15                                  | 3.81                                  | 0.52                                 | 1.48                                   | 0.52                                   | 0.32                                               | -1.10   | 1.66    |
| VN03           | 6.83   | 3.72                     | 0.128                             | 4.56                                                | 0.60                                               | 3.42                                  | 3.85                                  | 0.51                                 | 1.45                                   | 0.51                                   | 0.34                                               | -2.37   | 1.95    |
| VN04           | 6.70   | 3.64                     | 0.126                             | 4.37                                                | 0.99 X                                             | 3.24                                  | 3.79                                  | 0.49                                 | 1.51                                   | 0.55                                   | 0.33                                               | -1.29   | 2.79    |
| VN05           | 6.88   | 3.70                     | 0.123                             | 4.68                                                | 0.62                                               | 3.07                                  | 3.84                                  | 0.51                                 | 1.54                                   | 0.55                                   | 0.32                                               | 0.46    | 1.74    |
| Expected value | 7.20   | 3.86                     | 0.132                             | 4.57                                                | 0.65                                               | 3.04                                  | 3.91                                  | 0.52                                 | 1.55                                   | 0.53                                   | 0.32                                               | -       | -       |

Flag E: 15% < |Deviation| ≤ 30%

Flag X: 30% < |Deviation|

I: Poor ion balance (R1)

C: Rich Conductivity agreement (R2)

blank: not analyzed

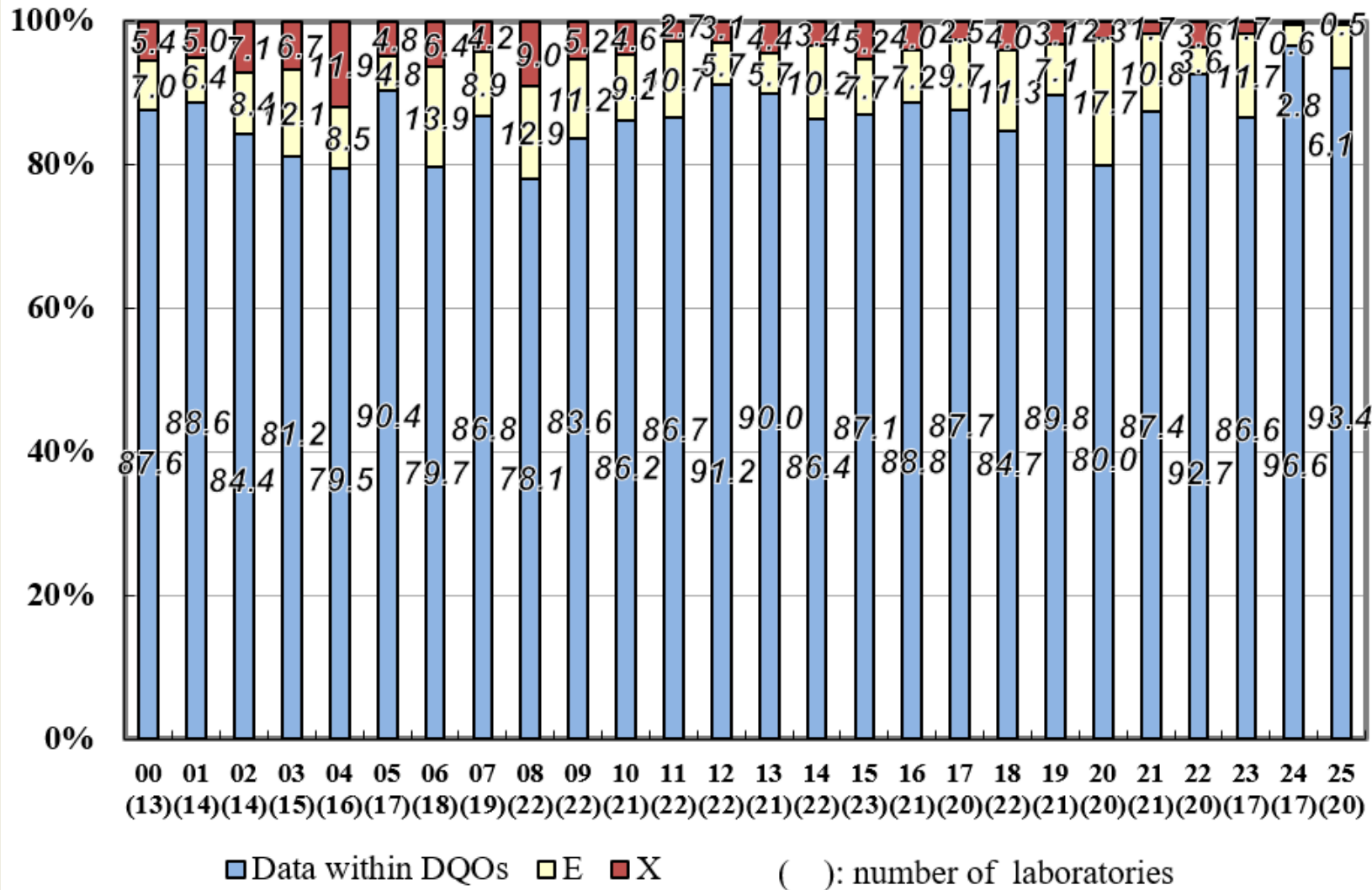
- **21** laboratories participated in this project,  
and **20** laboratories submitted their analytical data

# 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

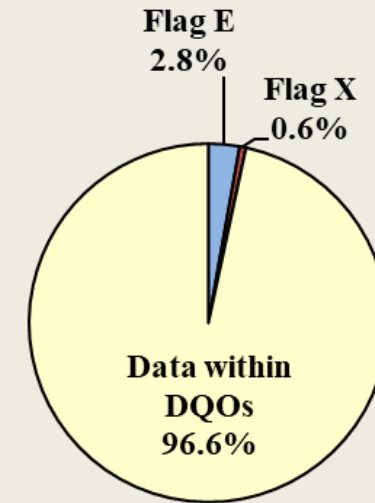
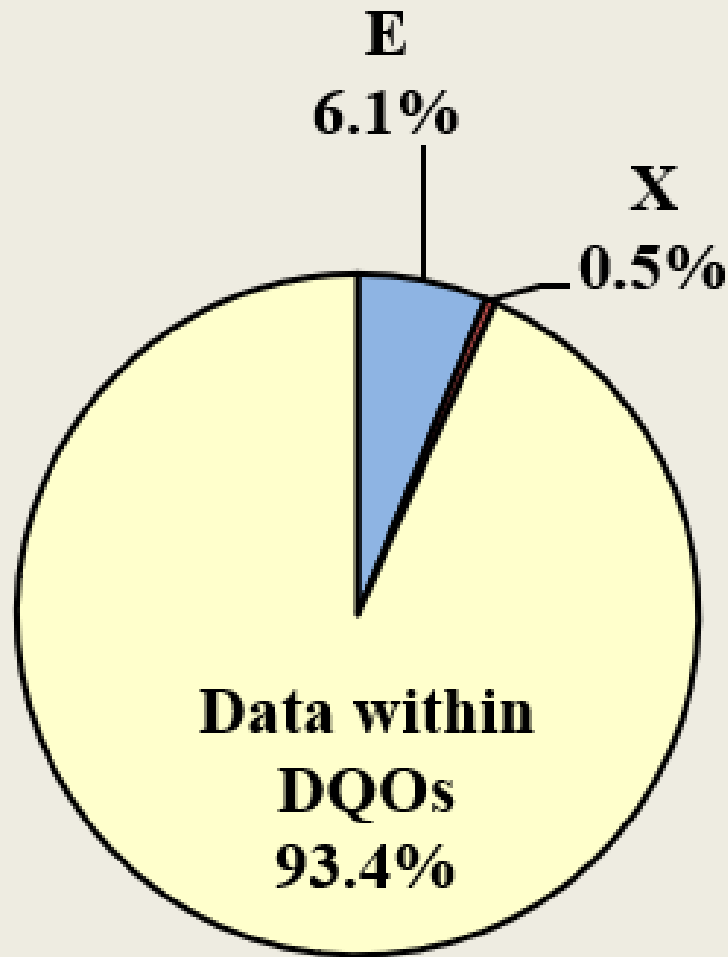
# Comparison of the 1<sup>st</sup>-26<sup>th</sup> surveys



See Fig. 5.16

- The percentage of data that satisfied the DQOs **decreased** in 2025 compared to 2024.

# Percentage of flagged/non-flagged data (Total)



Reference: last attempt

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

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

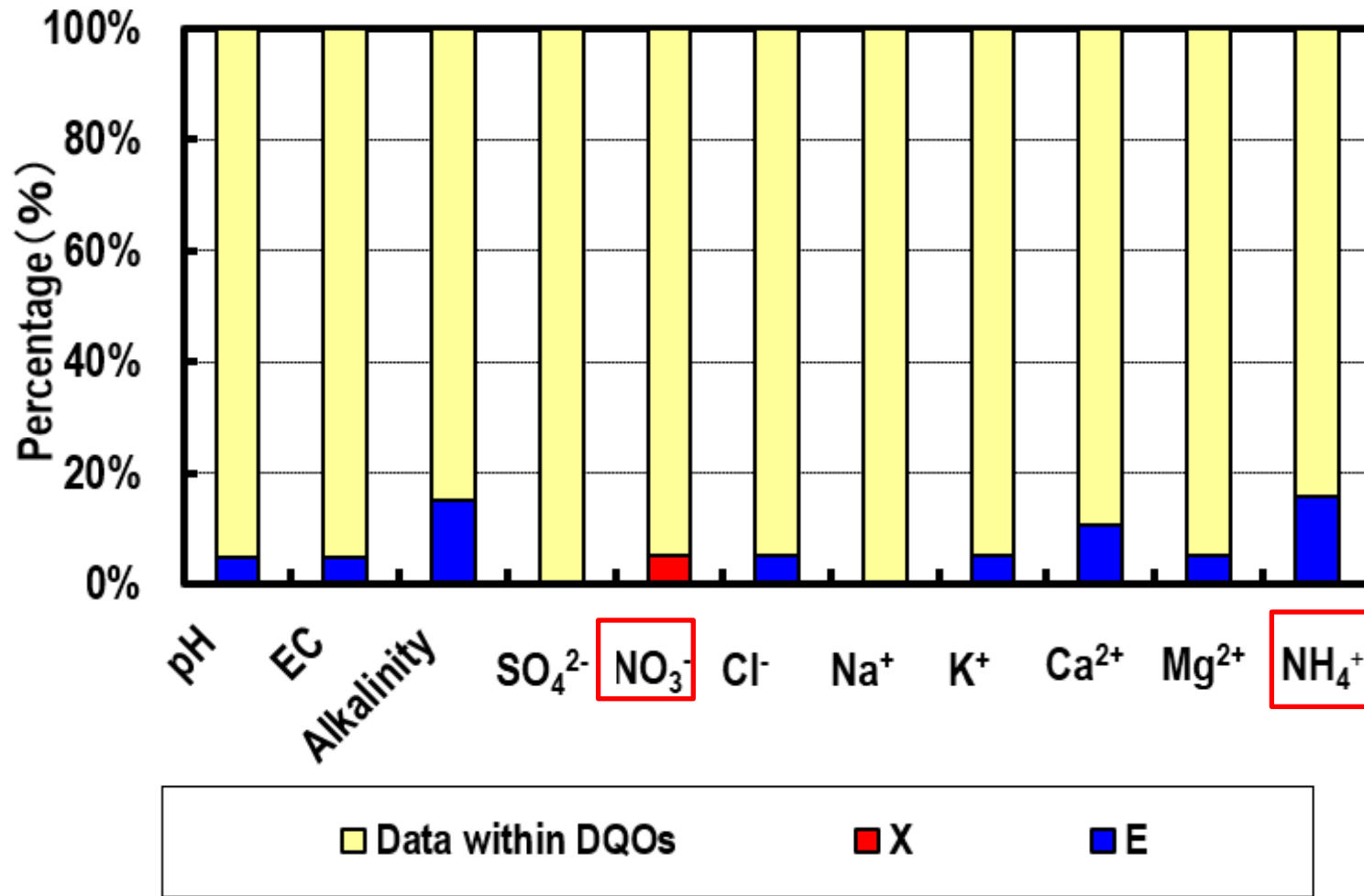
**Flag X** : Over the DQO more than  $\pm 30\%$

→ Compared to prepared values

See Fig. 5.1

- 93.4% of the results were within the DQOs.

# Percentage of flagged/non-flagged data (Each parameter)



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

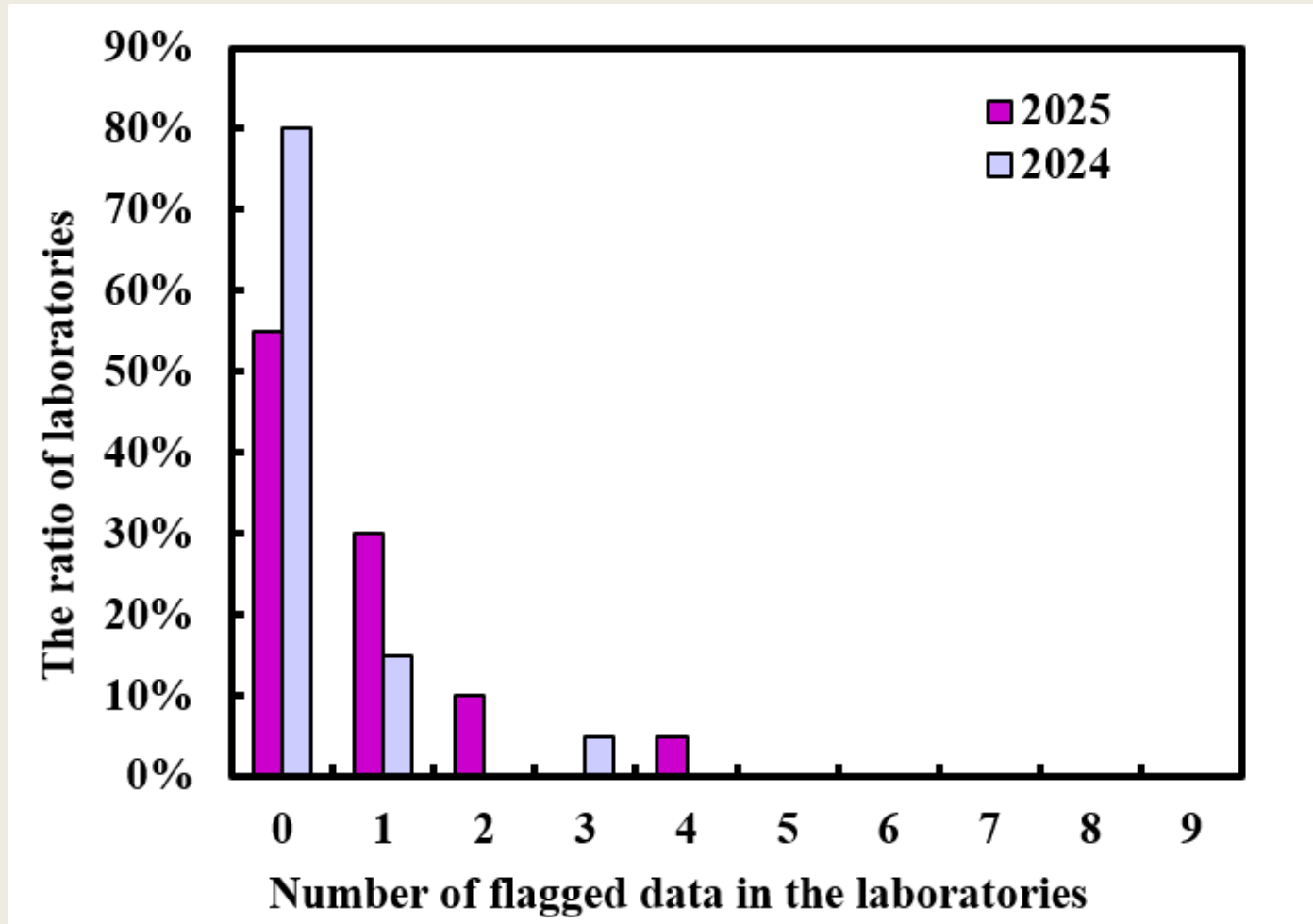
**Flag E** : Over the DQO more than  $\pm 15\%$  and within  $\pm 30\%$

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

→ Compared to prepared values

- **NH<sub>4</sub><sup>+</sup>** showed the highest number of flagged data, accounting for 15.8% of the total.
- The result assigned **Flag X** was for **NO<sub>3</sub><sup>-</sup>**.

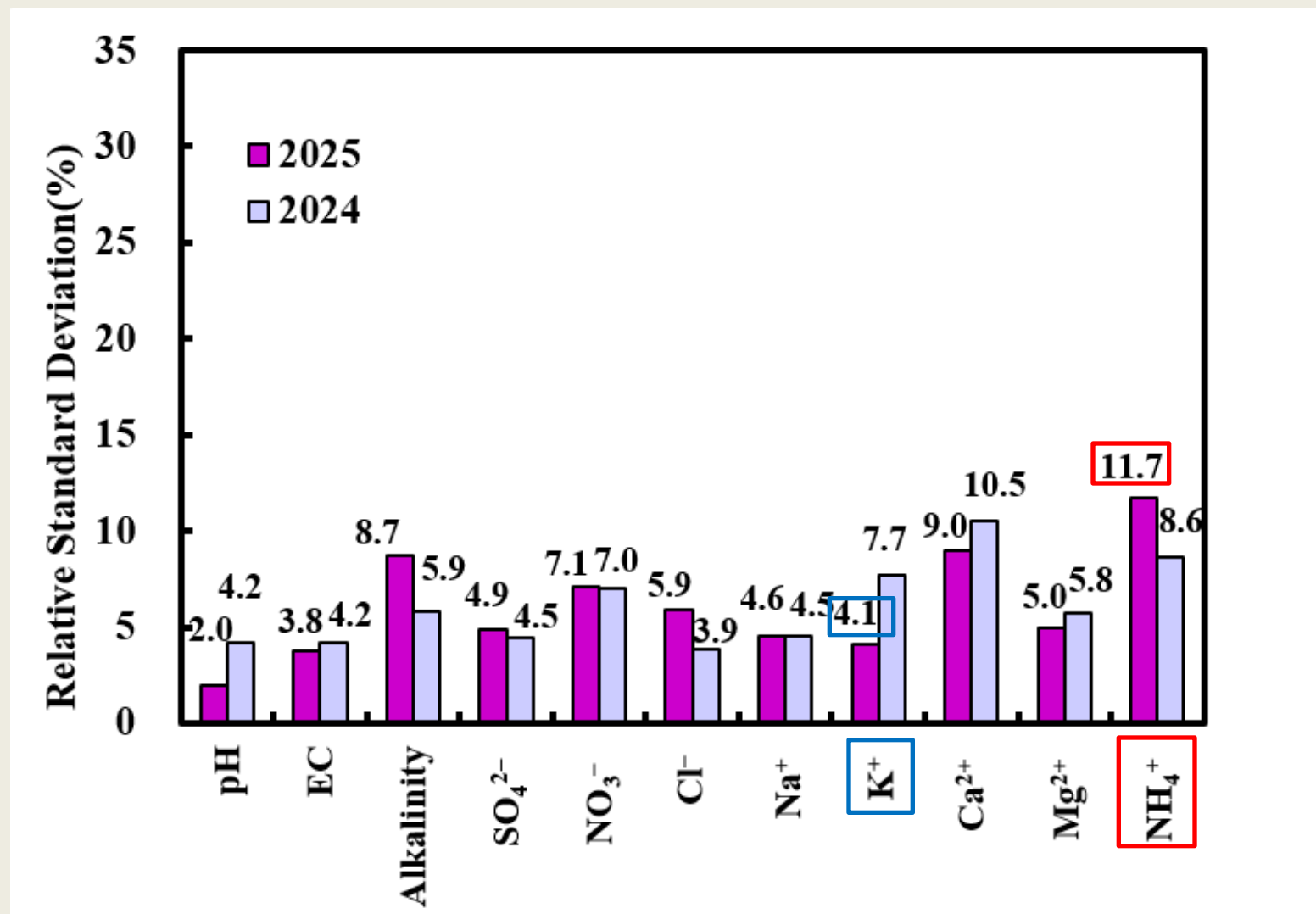
# Number of flagged data in the laboratories



See Fig. 5.2

- 11 laboratories had no flagged data, which was equivalent to 55% of the laboratories.
- 6 laboratories (30%) had one flagged data.
- 1 laboratory, four flagged values were observed as the maximum number.

# Relative standard deviation of each constituent



See Fig. 5.14

- $\text{NH}_4^+$  was increased in this attempt.
- $\text{K}^+$  was particularly lower than the last attempt.

# Number of Staff

| Lab.ID | Total | pH  | EC  | Alkalinity | SO <sub>4</sub> <sup>2-</sup> | NO <sub>3</sub> <sup>-</sup> | Cl <sup>-</sup> | Na <sup>+</sup> | K <sup>+</sup> | Ca <sup>2+</sup> | Mg <sup>2+</sup> | NH <sub>4</sub> <sup>+</sup> |
|--------|-------|-----|-----|------------|-------------------------------|------------------------------|-----------------|-----------------|----------------|------------------|------------------|------------------------------|
| CN01   | 7     | A,B | A,B | C,D        | E,F                           | E,F                          | E,F             | E,G             | E,G            | E,G              | E,G              | E,G                          |
| CN02   | 2     | A   | A   | A          | B                             | B                            | B               | B               | B              | B                | B                | B                            |
| 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   | 1     | A   | A   | A          | A                             | A                            | A               | A               | A              | A                | A                | A                            |
| JP03   | 3     | A   | A   | B          | C                             | C                            | C               | C               | C              | C                | C                | C                            |
| JP04   | 1     | A   | A   | A          | A                             | A                            | A               | A               | A              | A                | A                | A                            |
| MY01   | 3     | A   | A   | A          | B                             | B                            | B               | C               | C              | C                | C                | C                            |
| MN01   | 2     | A   | A   | A          | B                             | B                            | B               | B               | B              | B                | B                | B                            |
| PH01   | 1     | A   | A   | A          | A                             | A                            | A               | A               | A              | A                | A                | A                            |
| PH02   | 2     | A   | A   | B          | B                             | B                            | B               | B               | B              | B                | B                | 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          |                               |                              |                 |                 |                |                  |                  |                              |
| 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   | 3     | A   | A   | B          | C                             | C                            | C               | C               | C              | C                | C                | C                            |

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.

See Table 5.13

- In many laboratories, 2 or 3 persons analyzed the sample, and they usually shared the work.

# Years of Experience

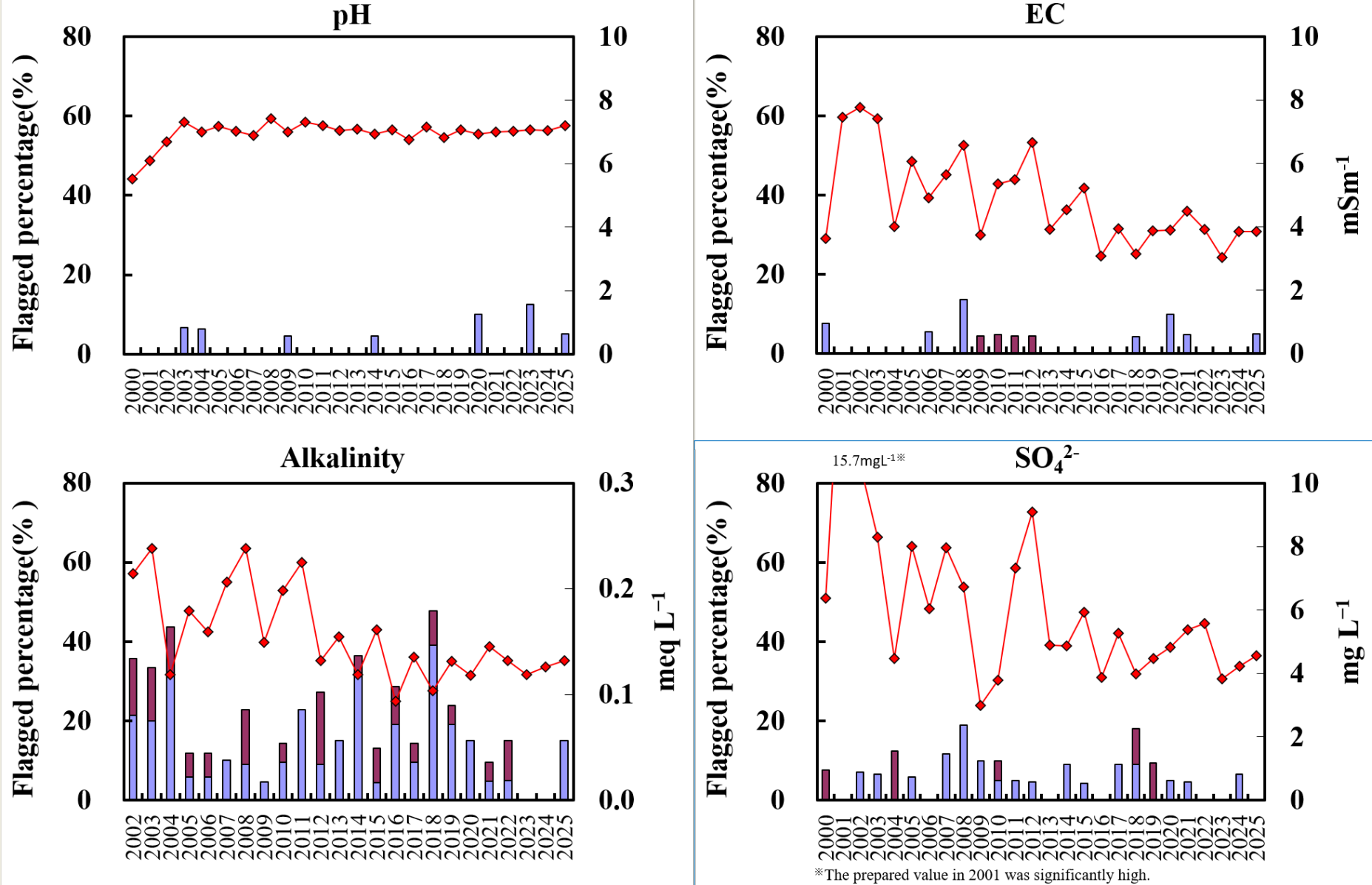
| Lab.ID | pH   | EC   | Alkalinity | SO <sub>4</sub> <sup>2-</sup> | NO <sub>3</sub> <sup>-</sup> | Cl <sup>-</sup> | Na <sup>+</sup> | K <sup>+</sup> | Ca <sup>2+</sup> | Unit : year      |                              |
|--------|------|------|------------|-------------------------------|------------------------------|-----------------|-----------------|----------------|------------------|------------------|------------------------------|
|        |      |      |            |                               |                              |                 |                 |                |                  | Mg <sup>2+</sup> | NH <sub>4</sub> <sup>+</sup> |
| CN01   | 7,15 | 7,15 | 1,13       | 7,13                          | 7,13                         | 7,13            | 7,16            | 7,16           | 7,16             | 7,16             | 7,16                         |
| CN02   | 7    | 7    | 7          | 11                            | 11                           | 11              | 11              | 11             | 11               | 11               | 11                           |
| CN03   | 13   | 13   | 13         | 27                            | 27                           | 27              | 27              | 27             | 27               | 27               | 27                           |
| CN04   | 19   | 19   | 19         | 19                            | 19                           | 19              | 19              | 19             | 19               | 19               | 19                           |
| ID01   | 3    | 3    | 3          | 3                             | 3                            | 3               | 3               | 3              | 3                | 3                | 3                            |
| JP03   | 6    | 6    | 24         | 22                            | 22                           | 22              | 22              | 22             | 22               | 22               | 22                           |
| JP04   | 13   | 13   | 13         | 13                            | 13                           | 13              | 13              | 13             | 13               | 13               | 13                           |
| MY01   | 1    | 1    | 1          | 12                            | 12                           | 12              | 12              | 12             | 12               | 12               | 12                           |
| MN01   | 3    | 3    | 3          | 27                            | 27                           | 27              | 27              | 27             | 27               | 27               | 27                           |
| PH01   | 6    | 6    | 6          | 5                             | 5                            | 6               | 6               | 6              | 6                | 6                | 6                            |
| PH02   | 0.8  | 0.8  | 6          | 6                             | 6                            | 6               | 6               | 6              | 6                | 6                | 6                            |
| RU01   | 32   | 32   | 32         | 30                            | 30                           | 30              | 40              | 40             | 40               | 40               | 33                           |
| RU02   | 3    | 10   | 50         | 1                             | 1                            | 50              | 1               | 1              | 1                | 1                | 45                           |
| TH01   | 26   | 26   | 26         | 26                            | 26                           | 26              | 26              | 26             | 26               | 26               | 26                           |
| TH02   | 19   | 19   | 19         |                               |                              |                 |                 |                |                  |                  |                              |
| VN01   | 9    | 9    | 9          | 12                            | 12                           | 12              | 12              | 12             | 12               | 12               | 12                           |
| VN02   | 19   | 19   | 21         | 21                            | 21                           | 21              | 21              | 21             | 21               | 21               | 21                           |
| VN03   | 11   | 11   | 14         | 14                            | 11                           | 11              | 14              | 14             | 14               | 14               | 11                           |
| VN04   | 13   | 13   | 21         | 22                            | 22                           | 22              | 22              | 22             | 22               | 22               | 22                           |
| VN05   | 16   | 16   | 16         | 21                            | 21                           | 21              | 21              | 21             | 21               | 21               | 21                           |

  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

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

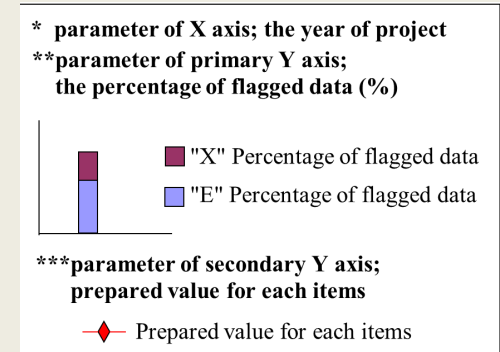
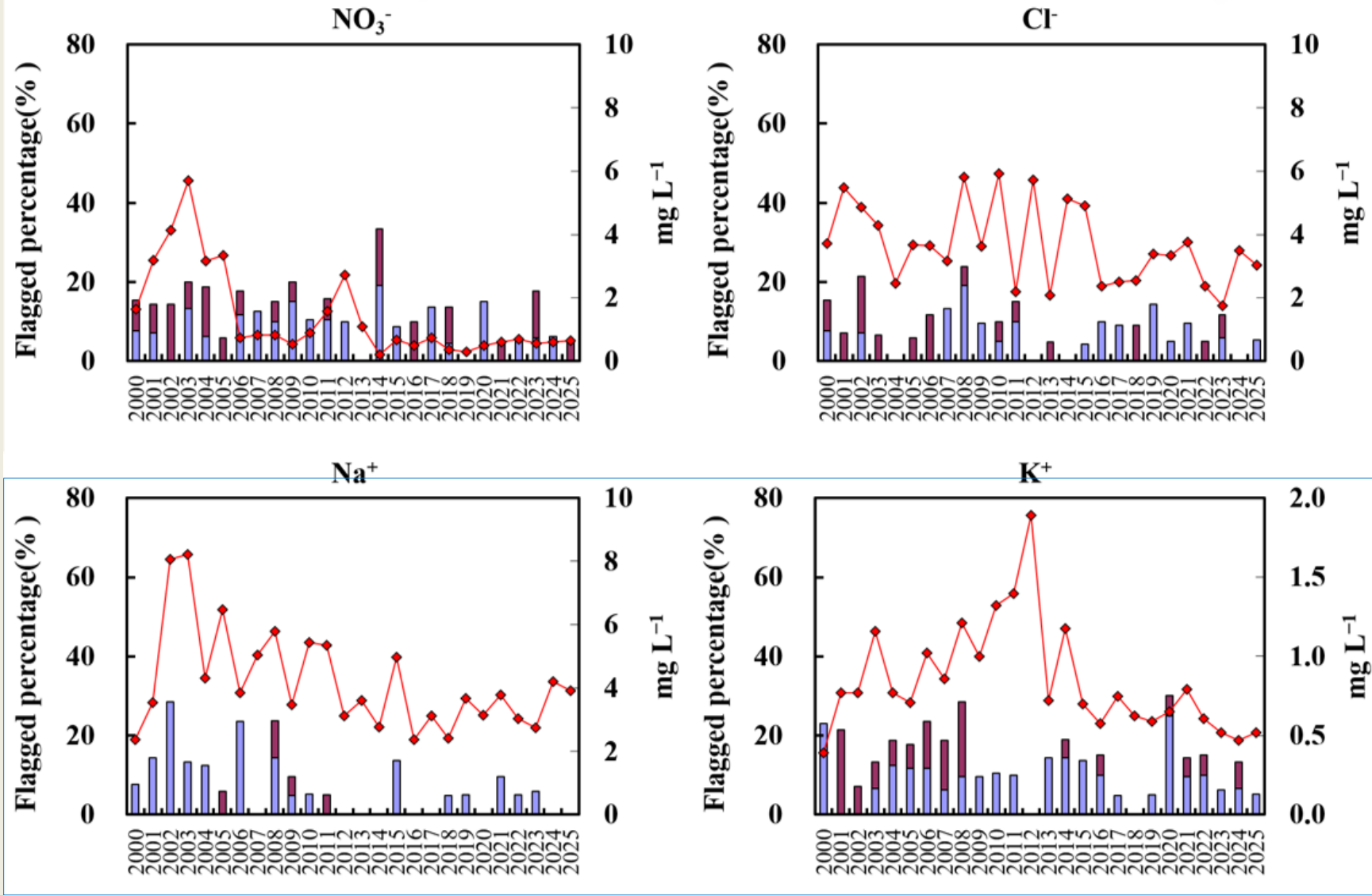
# Values/concentrations for each parameter (1)



- There was no flagged data in  $\text{SO}_4^{2-}$  in this attempt.

See Fig. 5.17

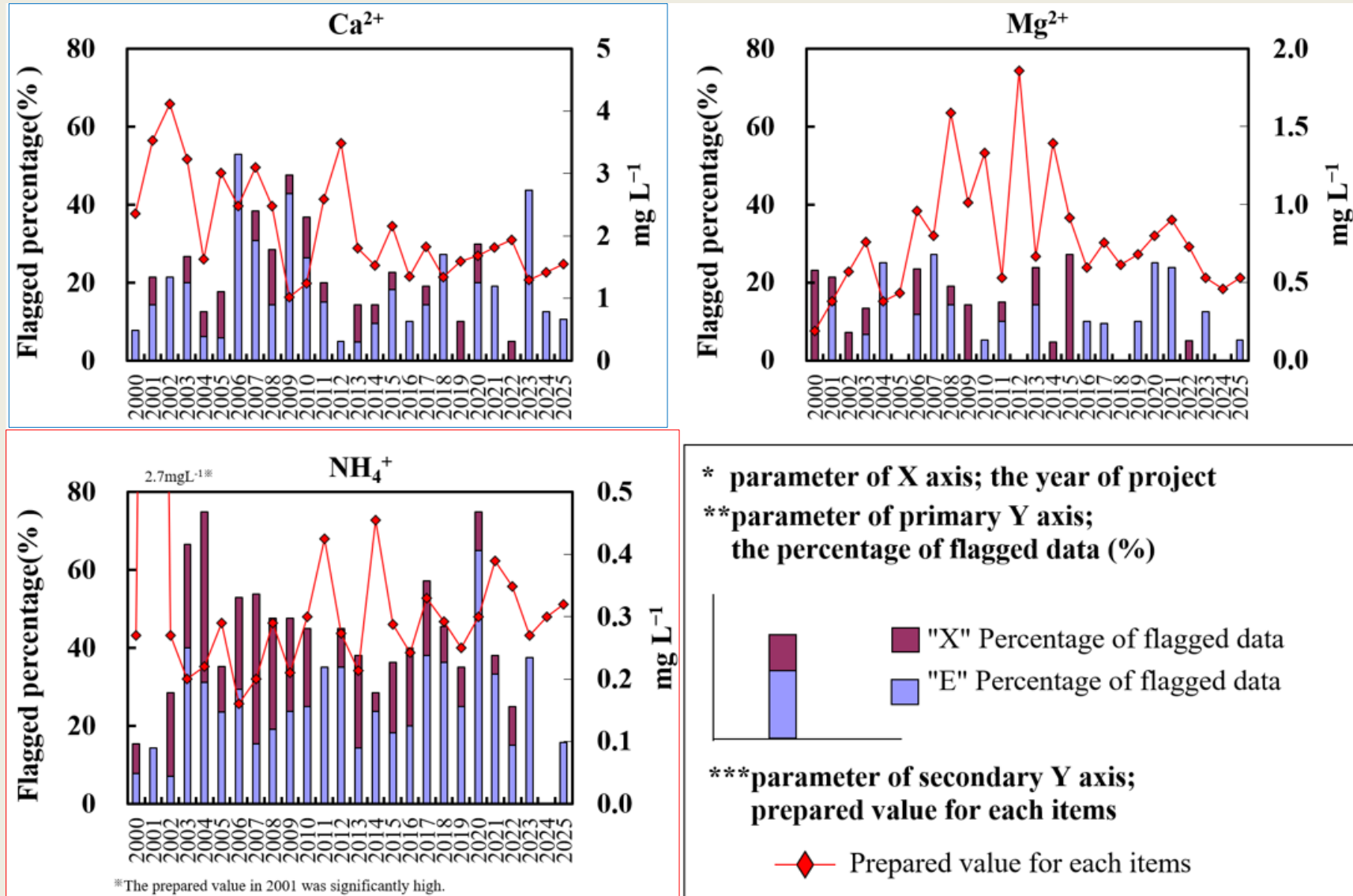
# Values/concentrations for each parameter (2)



See Fig. 5.17

- There was **no flagged data in Na<sup>+</sup>** in this attempt.
- The analysis of **K<sup>+</sup>** was **improved**.

# Values/concentrations for each parameter (3)



See Fig. 5.17

- The analysis of  $\text{Ca}^{2+}$  was improved.
- Flagged percentages of  $\text{NH}_4^+$  became higher than the last attempt.

# Summary

- 20 laboratories participated in this survey.
- 93.4% of the results were within the DQOs.
- 11 laboratories had no flagged data.
- No flags were observed for  $\text{SO}_4^{2-}$  and  $\text{Na}^+$ .
- Flag X was observed for  $\text{NO}_3^-$  in one laboratory.
- $\text{NH}_4^+$  showed the highest percentage of flagged data.
- $\text{NH}_4^+$  consistently showed the highest percentage of flagged data and requires attention in inland water analysis.