The Twenty-fourth Senior Technical Managers' Meeting
of the Acid Deposition Monitoring Network in East Asia
29 and 30 August 2023, in Niigata, Japan

MINUTES OF THE MEETING

I. Introduction

1. The Twenty-fourth Senior Technical Managers' Meeting (STM24) on the Acid Deposition Monitoring Network in East Asia (EANET) was held at Asia Center for Air Pollution Research (ACAP) in Niigata on 29 and 30 September 2023. The Meeting was organized by the Network Center (NC) for the EANET in collaboration with the Secretariat for the EANET.

2. Senior technical officials, who were involved in the EANET monitoring activities from Cambodia, China, Indonesia, Japan, Lao PDR, Malaysia, Mongolia, Myanmar, Philippines, Republic of Korea, Russia, Thailand, and Vietnam, participated in the Meeting. The Secretariat of the EANET and the representatives of the NC attended the Meeting. The List of Participants is attached as Annex.

II. The opening of the Meeting (Agenda 1)

3. The meeting was opened by the NC.

4. Dr. Shiro Hatakeyama, Director General, Asia Center for Air Pollution Research (ACAP), delivered the Opening Remarks. He expressed the objectives of this annual meeting to exchange information on the current status of the EANET monitoring activities, including the draft Data Report 2022, the results of the Inter-laboratory Comparison Project 2022, and the National Monitoring Plans (NMPs). He also mentioned the scope expansion of the EANET and the implementation of the EANET Project would hopefully contribute to get more fruitful results of monitoring in each country.

5. Mr. Bert Fabian, Coordinator, Secretariat for the EANET, delivered the Welcome Remarks. He welcomed to all participants for the twenty-third Senior Technical Managers meeting on behalf of the United Nations Environment Programme and the Secretariat for the EANET. He also appreciated your efforts, hard work, and strong ambition to support the EANET and to improve the Region's problems on acid deposition and air pollution. He believes that the participating countries and the EANET can play a more leading role in managing air pollution issues in the Region.

III. Election of the Officers (Agenda 2)

6. Two Co-chairpersons have been elected from the participating countries. The NC proposed Dr. Le Ngoc Cau, Vietnam, and Mr. Pichaid Atipakya, Thailand as co-chairpersons of first and second day, respectively.

IV. Adoption of the Agenda (Agenda 3)

7. The Agenda was adopted as proposed (EANET/STM 24/3/1).

V. Progress of EANET activity (Agenda 4)

8. The NC presented the progress of the EANET activity since STM22 (EANET/STM 24/4), which includes the decision on scope expansion of the EANET, the mechanism of Project Fund and Project Activity, and draft project plans in 2023. The meeting was invited to discuss and provide comments, as appropriate.

9. Major discussions on this agenda included the following:
   - There is no comment or suggestion.

VI. Overview of the Preliminary Draft Data Report 2022 (Agenda 5)

10. The NC presented the Preliminary Draft Data Report 2022 (EANET/STM 24/5), which contains wet deposition, dry deposition (air concentration), soil and vegetation, inland aquatic environment and catchment-scale monitoring based on monitoring data submitted by the participating countries. The meeting was invited to discuss and provide comments, as appropriate.

11. Major discussions on this agenda included the following:
    (Wet deposition)
    i. The NC informed that Tanah Rata, Malaysia had been once abolished, but revived as the EANET monitoring site.
    ii. The NC requested participant countries to submit the rest of their data no later than the end of September.
    iii. The NC recommended re-checking data to analysts whether there is something wrong when the deviation showing as the arrows is huge.
    iv. No comment was given in this item.

    (Dry deposition)
    i. The NC explained that the report hasn't been finalized yet, still expected some results from some countries. Additionally, the NC received newly $PM_{2.5}$ and Ozone data from 3 sites in China, and continuous hourly data from Khanchanaburi site in Thailand instead of 2-week intensive monitoring 3 times a year, and appreciated their efforts.
    ii. As one of the issues, the NC shared a comment from a verification member for Data Report 2021; if the participating countries submit only one digit, its final monthly or annual significant digit should be only one digit for disclosure of Data Report. Some countries submitted their data with ppm or mg/m3, thus the NC asked to submit data with more digits

or at least two digits.

iii. The NC asked to submit NO data if the NO_2 monitor at the site classified as Rural or Remote enable to measure NO. According to the technical manual, NO data are also one of the first priority species as well as NO_2.

iv. The NC received 8-hour ozone average data from 3 sites in China, asked them if the calculation method was followed on air quality standard of EPA or another guideline such as one instructed by MOEJ. Then, the NC asked China to provide the hourly value, and if not, as an alternative plan, a table for 8-hour ozone data should be prepared with a note in Table 4.10.3 of Data Report 2022.

v. One question for Mongolia was that why SO_2 concentrations in 2010 and 2021 were so high, and Mongolia replied that no specific reasons were known, but it probably came from coal combustion around gel and urban areas.

vi. The Chair suggested that the NC should disclose all dry formats to all participating countries to have their figures done more carefully. The NC agreed to his thought, and eventually mentioned a new format should be necessary with unit conversion.

(Soil and Vegetation)

i. Observation of the tree decline was conducted in China and Japan in 2022.

ii. No pronounced changes have been observed in vegetation condition.

iii. No comment was given in this item.

(Inland aquatic environment)

i. The NC informed that Philippines and Russia have just submitted the data before STM 24.

ii. The NC requested Cambodia, Indonesia, Lao PDR, and Malaysia to submit data.

iii. In Xiaoping Dam, high concentrations of NO_3^- were observed in 2022, while the concentration had been decreased recently. The data will be checked again in the national center (the revised data will be submitted after the meeting according to personal communications in the venue).

iv. Decreasing trends of SO_4^{2-} and NO_3^- have been observed in many sites, suggesting recovery from acidification. It was pointed out that the monitoring be continued to confirm the recovery trends.

v. The pH in Futagoike (Meike) Lake was significantly lower than that in Futagoike (Oike) Lake, even though these lakes are located in the same area. It was informed that two lakes were not connected and conditions of soil and geology were different. It was suggested that the rainwater was not enough neutralized and flowed into the Meike Lake.

vi. Concentrations of SO_4^{2-} in the sites in Russia are relatively high. It was informed that a catchment budget analysis suggested a relationship with wet deposition, climate, and internal sulfur sources in the case of Komarovka River, while the reason in Pereemnaya River has not been identified.

(Catchment-scale)

i. The catchment-scale monitoring has been conducted in Lake Ijira, Japan and La Mesa Watershed, Philippines.
ii. The pH in La Mesa Watershed was tended to increase. It was pointed out that the data obtained there would be of concerns to the general public, because the La Mesa Watershed is located in Metro Manila. It was suggested that the monitoring be continued to accumulate the data and discuss possible causes of the trend, such as recovery from acidification and progress of alkalinization.
iii. It was suggested that the data and their trends be carefully checked in communication with the participating countries, because the monitoring has been conducted as national activities. The results should be presented some more attractively.

12. The countries which have not submitted their monitoring data 2022 or which have the necessity of data modifications, were requested that the data be submitted to the Data Management Department as early as possible.

13. The draft Data Report 2022 will be submitted to the Scientific Advisory Committee for adoption at its Twenty-third Session (SAC23).

VII. Evaluation for the Results of the Inter-laboratory Comparison (ILC) Projects 2022 (Agenda 6)

14. The NC presented the preliminary draft Report on the Inter-laboratory Comparison Projects in 2022 for wet deposition, dry deposition (filter pack method), soil and inland aquatic environment (EANET/STM 24/6). The participating countries were requested to submit the results of the Inter-laboratory Comparison (ILC) Projects by the deadline, the end of February every year. Also, the participating countries which have not submitted the 2022 ILC data were requested to submit the data as soon as possible, so as to complete the ILC Project Report 2022 for adoption at SAC23. The meeting was invited to discuss and provide comments.

15. Major discussion on this agenda included the following:

(Wet deposition)

v. The NC requested that the participating countries re-analyze the flagged items and submit the analytical results of the artificial rainwaters. The technical guidance, in turn, will be provided from the NC.
vi. The NC requested Cambodia, China, Mongolia, Republic of Korea, and Thailand to answer the questionnaires including the number of necessary samples for the ILC 2023. Based on the request from the participating counties, the NC will ship the samples in the middle of October.
vii. It was pointed out that the annual trend of the ratio of the data within DQO had been possibly changed: regarding lower concentration sample (No.222w), potassium ion was the most

flagged item while analyses of calcium and magnesium ions were a little improved. The NC suggested this might be due to the lowest prepared value of potassium ion ever since the beginning of the ILC projects.

viii. The NC underlined the importance of "Individual Training" for participant countries, giving the example of the Philippines: The ILC project results in 2021/2022 drastically changed in PH01(EMB-CO) and one Filipino participant in "Individual Training" held in 2022, Mr. Sammy made use of the experience there. Mr. Sammy agreed with the idea and would give it his best shot to improve more for both PH01 and PH02(EMB-CAR) in ILC 2023.

(Dry deposition)

i. The NC distributed ILC 2022 samples to 23 laboratories and received their results from 19 laboratories. In the results, Mongolia submitted anion results only due to some malfunction issues for cation analysis.
ii. The NC plans to ship ILC-2023 samples to laboratories around the second week of October, and always encourages them to analyze before December 31.
iii. The NC suggested one thing that the participating laboratories can request one more set of the ILC-2023 dry samples to improve their analytical skill before shipping or they can request another set due to the date, Feb. 28, if they have troubles or issues.
iv. Receiving a question if it could be possible to send a remaining set of ILC2022 Dry samples to Thailand (or to any laboratories of which their results were exceeded DQO), the NC answered that all 2022 samples were already provided to other laboratories.
v. The NC explained that using a shaker at the extraction process should be better than using an ultrasonic bath. Following this explanation, a request from Philippines was to find out the number of labs which used an ultrasonic bath. (At a later date, the NC sent the list regarding the extraction methods to Philippines.)
vi. One comment from Thailand was if the prepared values change every year, it would be difficult to compare whether laboratory skills had improved or not. The NC responded that the prepared values would be set up based on actual wet deposition results which were submitted a few years ago, thus ask all participants to understand that the prepared values change by year as such.

(Soil)

i. In 24th ILC Project on soil, 7 laboratories from 4 countries participated.
ii. There were both random and systematic errors for factors of variabilities in measurements.
iii. Ratio of outliers was higher than usual.
iv. Since there are no setting values for the soil, it is necessary to increase the number of participating laboratories to effectively conduct the ILC comparison project. The NC indicated that they would make every effort to address this matter.
v. No comment was given in this item.

(Inland Aquatic Environment)

i. 23 laboratories participated in this project, and 19 laboratories submitted their analytical data.
ii. The NC pointed out that the flagged data percentage of all the reported data was lower than the last attempt.
iii. The NC recommended that analysts pay more attention to NH_4^+ analysis such as the possibility of contamination in the laboratory, the calibration curve by using the appropriate concentrations of the standard solutions, and the separation of NH_4^+ and Na^+ in ion chromatography.
iv. Relative standard variations (RSD) in NO_3^- and Ca^{2+} became lower in the project 2022 than in the project 2021, while those of alkalinity and NH_4^+ became larger. No clear reason was identified for the result.
v. The chair's comment was who should "pay more attention to the NH_4^+ analysis," shown in the summary. The NC responded that the summary should be general.

16. For the countries which have not submitted the ILC 2022 to the NC or have the necessity of data modifications, it was requested that the data be submitted to the Data Management Department of the NC as early as possible.

VIII. Consideration of the National Monitoring Plans (NMPs), Current Monitoring Activities for the EANET Monitoring and Overall Air Concentration Monitoring Status of the Participating Countries (Agenda 7)

17. Each representative of the participating countries made presentations on their NMPs and the current EANET activities, including monitoring capacities, technical problems, future plan and so on, for improvement of the EANET activities. The NC requested for the participating countries to submit the NMPs as early as possible. (EANET/STM 24/7).

18. The meeting was invited to review the above issues and to discuss with their experiences and knowledge to solve the problems for their future innovation.

19. Major discussion on this agenda included the following:

i. Cambodia
- It was pointed out that the NC could assist technically to identify and solve the problem. For this purpose, the interview for each country has been conducted.
- It was informed that necessary arrangements to fix some of the problems would be discussed internally soon.

ii. China
- PM2.5 monitoring and O_3 monitoring started at 3 sites, Jinyunshan, Hongwen, and Haibin park from November 2022, however the NC received daily data, in particular, ozon data were 8-

hour average data which have not been discussed yet at the EANET. The NC requested China to submit hourly ozone data.

- It was suggested that the definition of NOx data be clarified. It was informed that NOx was measured in Jinyunshan site.
- The inter-lab result in one of the laboratories included many flagged data. The NC suggested that the knowledge obtained from the individual training in September be shared with the laboratory staff to improve the analytical precision.
- The NC requested that the site information should be reconfirmed as there were some discrepancies in the descriptions of the NMP, site information, and monitoring data submitted by the QA/QC managers.

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iii. Indonesia

- It was reported that technical problem occurred on the filter pack sampling in Jakarta and Serpong.
- It was reported that EMC temporarily halted the acid deposition monitoring in Serpong due to trouble on ion chromatography.

iv. Japan

- The location and number of the EANET monitoring stations was not changed in 2023.
- The data validation procedure, the MOEJ and the EANET Website as the real time data disclosure system, and site audit were introduced as a part of QA/QC activities.
- The current monitoring results of wet and dry deposition, soil and vegetation, inland, and catchment were introduced.
- The national center of Japan suggested that the decreasing trends of the data on wet deposition and dry deposition in many Japanese sits reflected emission trends in the region. It was also suggested that the trends of stream water chemistry in the Lake Ijira catchment could partly be explained with the emission trends.

v. Lao PDR

- It was informed that the daily report for the local community has been issued.

vi. Malaysia

- The sampling of inland water in the Danum Valley area has been restarted in the new site, Baru River, which was relocated from the previous sampling point, Tembaling River.
- The NC conducted a catchment research project and obtained the stream water data in the Baru River in the 2010s. The existing past data would be informative for the monitoring activities. It was also suggested to check if the sampling point is the same as the previous point.
- The renewed information of monitoring sites was introduced. The Forest sites stopped monitoring in 2023 and will resume monitoring in 2024. The name of national focal point is changed.

- The monitoring parameters and interval was introduced. The monitoring measurement is not changed from before. Baru River site is established since 2021. There are two power plant within 50km for Tanah Rata site. The IAE monitoring in Kuala Tahan site will resume since middle of 2023.
- Malaysia requests the individual training for QA/QC activities for new national manager.
- For the Kuala Tahan site, what is the critical reason to start the sampling there. If there is any problem to start the sampling there please inform the NC.

vii. Mongolia

- Information of monitoring sites, monitoring methods, organization chart, and monitoring results were introduced. Due to malfunction with their IC (Dionex ICS-1600), Mongolia was unable to submit their anion results in 2021, but since the IC was repaired in 2022, their anion results for 2021 are submitted soon. Likewise, their 2022 monitoring results should be expected to send to the NC soon.
- One comment from the NC was why the maximum Na+ concentration of 2021 at Terelj site was higher than that of Ulaanbaatar site. Moreover, compared with the Cl- concentration (its counterion) of 2021 at Terelj site was not so high, so double check if the results may have been abnormal should be needed. Mongolia took note of the comment and will continue to pay attention to the quality of the analysis work.

viii. Myanmar

- Information of Kaba Aya site. Urban site, heavy traffic. Monitoring parameters.
- It was reported that the power failure often happened for the of filter pack sampling. There were minus results of dry sample was observed.
- The challenge for the future monitoring was the lack of budget to purchase the consumables for PM2.5 monitoring. Low-cost sensor is considered as the plan to expand the monitoring system.
- Myanmar would like to purchase the UPS and pump from ACAP and bring back by trainees.

ix. Philippines

- A lot of agricultural activities were observed near the Mt. Sto Tomas Station (remote site). NC agree to change the catalog of site to rural site. Measuring method is different. The eruption of volcano in 2021 results in the high data of SO_4^{2-} compared to other ions. The wet deposition monitoring at urban site resume since 2019. Showing the long-term trend. It needs to figure out the reason why the pH is very high in the lake.
- The recommended to estimate the dry deposition flux in the catchment area, since there are already air concentration data. In dry season, the dry deposition may dominate.
- Only filterpack method is shown in the national monitoring plan for dry deposition, but there are two sites including automatic methods. The automatic method is also needed to show in the NMP.

x. Republic of Korea

- The monitoring site is the same as before. Wet deposition is low in summer and high in winter. The correlation-ship among all the ions are good.
- No comment was given in this item.

xi. Russia

- Mondy site still keeps in the EANET site. The relocation of monitoring sites are still under consideration.
- Dry deposition annual trend was shown according to geophysical year from Oct to the following Oct.

xii. Thailand

- The number of stations for air quality monitoring network has been increasing year by year. It was suggested that the data in the stations be submitted to the EANET.
- It was suggested that renaming of the existing monitoring sites be clarified in the National Monitoring Plan. The NC request to increase the number of ENAET sites, such as Chiangmai and other province. Last year some more sites data have been submitted. The site name of Bangkok sites will be changed (PCD Bangkok and TMD Bangkok sites). The name of Bangkok site in the national monitoring plan needs to be revised

xiii. Vietnam

- The wet only sampler in Ho Chi Minh City is installed under the steel frame.
- It was suggested that the sampler be installed in open area.
- It was clarified that soil and vegetation monitoring would be conducted in Cuc Phuong after official approval of the National Monitoring Plan. Two sites, Cave of Heaven and Thang Ranh, which were surveyed in 1999, have already been closed long time ago.
- The results of PM2.5 by LCS was introduced.
- Next year dispatch the new staff will be dispatched for capacity building training.
- The maintenance of old equipment is challenging.

xiv. Summary of the National Monitoring Plans in the Participating Countries

- The NC presented the summary of the National Monitoring Plans and confirmed the current status of the monitoring activities in the respective countries.
- The NC informed that the excel file showing the site information would be checked with the respective countries and then submitted to the Secretariat to be disclosed in the EANET website.
- The EANET activity should be conducted according to the NMP. The NMP should be submitted every year, even no change. NC confirm the revision of NMP country by country.

There are only passive samples for Jakarta and Kototabang sites in Indonesia. There is no soil and vegetation in Tereji site in Mongolia. The national monitoring plan needs to be revised. The location of sites in Malaysia needs to be revised in the map of the ENAENT sites. The NC explained that Zhushandong site as an inland aquatic water site, the sample was taken from a stream after 2003.

IX. Other issues (Agenda 8)

20. The NC presented Hybrid Air Quality Monitoring Network (HAQMN) using low-cost sensors (LCS) that is implemented under the EANET Project. The major points on this topic are shown as follows.

- Because there is considerable uncertainty and instability of LCS data, QA/QC by comparing reference air quality monitor is important.
- Currently LCS cannot be used for regulatory purpose, but it could be used to clarify the state of air pollution in specific study area and monitor air pollutants surrounding the specific emission sources.
- Correlations of PM2.5 concentrations between the reference monitor and LCSs were good, but the slope for each LCS was deviated from 1.0. The correlation needs to be confirmed on site, because the correlation slope will be different city by city.
- It was mentioned that the Secretariat also will join the LCS training to be held on September 6 and 7 and recommend the PCs to use the LCS. How to make used of LCS as an alternative method of regular air quality monitor is important for the future direction. The technical guideline of LCS is very important to show how to use the LCS effectively. LCS can be installed widely to obtain the spatial distributions of air pollutants and determination of polluted areas.

21. The NC presented the results of the questionnaire survey for the individual trainees.
    - NC explained the results of survey on the individual training program before. All the former precipitants think the EANET individual training program should continue in the future. No comment was given in this item.

X. Closing of the Meeting (Agenda 9)

22. On behalf of the NC, Dr. Meng Fan, Deputy Director General, ACAP, delivered the Closing Remarks. He expressed for his great appreciation to the participating countries and all EANET colleagues for their continuous efforts and contribution to improve the EANET data quality, although maintaining a high level of monitoring data quality is challenging under the limitation of technology and instrument. He appreciated that the important technical issues of monitoring and

QA/QC had been highlighted and discussed among more than 50 experts and participants from the participating countries. The results of STM 24 will be considered further on SAC23 and provided as an essential background document to SAC23 and IG24. He expected that the EANET activities of monitoring, research projects and capacities building will be expanded and strengthened through the expansion of the scope of the EANET.

23. The Meeting was officially closed.

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