

The Twenty-second Senior Technical Managers' Meeting
of the Acid Deposition Monitoring Network in East Asia
1 and 2 September 2021, Online Platform

MINUTES OF THE MEETING

I. Introduction

1. The Twenty-second Senior Technical Managers' Meeting (STM22) on the Acid Deposition Monitoring Network in East Asia (EANET) was held online on 1 and 2 September 2021. The Meeting was organized by the Network Center (NC) for the EANET in collaboration with the Secretariat for the EANET.
2. Senior technical officials involved in the EANET monitoring activities from Cambodia, China, Indonesia, Japan, Lao PDR, Malaysia, Mongolia, Myanmar, Philippines, Republic of Korea, Russia, Thailand and Viet Nam 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 Item 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 during the serious situation of COVID-19, to exchange information on the current status of the EANET monitoring activities. It was included to consider the draft Data Report 2020 and the results of the Inter-laboratory Comparison Project 2020, and to discuss the National Monitoring Plans (NMPs). He mentioned that according to the adoption of the scope expansion of the EANET in IG22, the contents of ANNEX of the EANET Instrument will have been finalized at IG23. He asked all participants for fruitful discussion in line with the Work Program and Budget of the EANET in 2021.
5. Mr. Tomi Haryadi, Coordinator, Secretariat for the EANET delivered the Welcome Remarks. He expressed his high appreciation to the Network Center and STM22 meeting participants. He mentioned the inputs from the STM22 Meeting are very critical, and the UNEP welcomes EANET activities and congratulates for your hard effort, continuously support, contribution of air quality and organized meeting.

III. Election of the Officers (Agenda Item 2)

6. At each of the previous STM meetings, two Co-chairpersons have been elected from participating countries. However, STM22 was held as the virtual meeting and the meeting time was significantly

shorter than those of previous meetings. In order to proceed with the meeting smoothly, Dr. Tsuyoshi Ohizumi, the QA/QC Manager of the EANET, Head of Data Management Department served as moderators on behalf of the Chairperson.

IV. Adoption of the Agenda (Agenda Item 3)

7. The Agenda was adopted as proposed (EANET/STM 22/3/1).

V. Progress of EANET activity (Agenda Item 4)

8. The NC presented the progress of EANET activity 2020 (EANET/STM 22/4), which including the Scope Expansion of the EANET and Project Fund and Project Activities. The meeting was invited to discuss and provide comments, as appropriate.
9. The NC indicated two topics: 1) Scope expansion of EANET, 2) Project fund and Project Activities, and explain the reason that is very crucial in the near future to proceed EANET future activities. The NC briefly explained about the background around 2019, the establishment of two working groups in 2020, and the status that the WG has still under discussion and they are expected to reach a consensus and to approve scope expansion, and project guideline. In order to make clear these issues; WG has to define the term: Air Pollution/Atmospheric Related Substances, and WG has to scope expansion substances and activities. The NC mentioned that before IG23, the additional WG meeting will be held.
10. Major discussion on this agenda included the following:
 - No discussion was made on this agenda.

VI. Overview of the Preliminary Draft Data Report 2020 (Agenda Item 5)

11. The NC presented the Preliminary Draft Data Report 2020 (EANET/STM 22/5), which contains wet deposition, dry deposition (air concentration), soil and vegetation, inland aquatic environment and catchment-scale monitoring including a summary of the monitoring data in 2020 and related information submitted by the participating countries. The meeting was invited to discuss and provide comments, as appropriate.
12. Major discussions on this agenda included the following:
 - (Wet deposition)
 - i. The NC requested to submit the data from Cambodia, Lao PDR, Philippines, Republic of Korea. It was informed that Mae Hia and Sakaerat in Thailand were closed, regarding the number of the monitoring site in 2020.

- ii. It was informed that Malaysia has just submitted the updated data before STM22. NC confirmed that the updated data would be included in the draft Data Report 2020.
- iii. The NC asked the participant from Thailand about the situation on the closed two sites, namely Mae Hia site in Chiang Mai and Sakaerat site in Nakhon Ratchasima. It was clarified that these sites would not be restarted due to stopping financial supports for local universities in charge of the monitoring activities there. Although wet deposition monitoring and the filter pack monitoring were stopped in these sites, the automatic data are still available and have submitted to the NC.
- iv. It was confirmed that there is the possibility to submit the monitoring data of the domestic site in Thailand instead of the closed sites. It was informed that in Thailand, acid deposition monitoring is currently conducted only in the EANET sites, because other domestic monitoring sites have already closed because of the financial situation.
- v. Deviations of the 2020 data compared to the previous 5-year average data were presented for the respective sites in the maps. In the case of Lijiang site in China, the shown deviation was compared to only one year data in 2019. Also, for some sites, the average values were calculated just for four-year or three-year data depending on the data availability. It was clarified that the maps would be shown in the presentation only for the EANET meetings.
- vi. It was clarified that the arrow degree would be shown as $+90^\circ$ or -90° even if the deviations were larger than 90% or smaller than 90% compared to the previous data, respectively.

(Dry deposition)

- i. The NC requested Cambodia to submit Filter-pack (FP) results, Lao PDR, Philippines, Republic of Korea to submit the automatic monitors and FP data, and Myanmar to submit Mandalay the automatic monitoring data. The monitoring data of Malaysia and Russia had just submitted to the NC before STM22, but they haven't reflected by the meeting due to limited time. NC confirmed that the updated data would be included in the draft Data Report 2020.
- ii. It was informed that the FP monitoring had been started in Niigata-maki and Tsushima sites in Japan since April, 2020 and the FP monitoring stopped at Mae Hia and Sakaerat in Thailand for their financial issues in 2020.
- iii. It was pointed out that PM_{10} and $PM_{2.5}$ concentration in Kanchanaburi was quite higher than the previous years. It might be because that the $PM_{2.5}$ monitoring had been conducted only in March to April when the biomass burning were frequently occurred surrounding Kanchanaburi.
- iv. Data fluctuations were obvious for some sites, such as high concentrations in Mae Hia site or Hanoi site for the NO_3^- concentration. It was clarified that NC has asked the countries about possible causes for such high concentrations, but no clear cause has been found to remove the data as outliers. Therefore, the data could not be deleted and still included in the previous data reports.
- v. The NC have been asking the countries to check the monitoring data, especially for extreme

high or low concentration data. It was suggested that the data be compared with the previous-year data and be checked whether the seasonal trend was normal or not. It was also suggested that the ion balance between anions and cations be checked using the latest data format for the FP method. In case the latest format has not been used in a laboratory, contacting to the NC is recommended. The NC informed that the revised technical manual would include descriptions on QA/QC and how to screen outliers.

(Soil and Vegetation)

- i. In 2020, China (Jinyunshan, Jiwozi, and Xiaoping) and Japan (Happo and Ijira) submitted monitoring data.
- ii. It was informed that there were many mistakes in the name of plant described in Latin scientific name in the previous Data Reports. The NC made corrigenda list and included in the Data Report 2020.
- iii. In soil chemical properties in Dabagou site, Soil pH, Ex-BC and base saturation were continuously declining. It was clarified that the pH decline could be explained by changes of ion balances. The NC was requested to consider causes of the phenomena.
- iv. It was clarified that the graph for tree decline symptoms showed cumulative percentages for six observational items and 600% was the full scale. It was pointed out that additional explanations would be informative to avoid misunderstanding.

(Inland aquatic environment)

- i. The NC requested Cambodia, Indonesia, Lao PDR, Malaysia, and Philippines to submit the data.
- ii. No comment was given in this item.

(Catchment-scale)

- i. It was informed that the catchment scale monitoring in La Mesa Watershed had been started since 2020. The NC requested to submit the data from La Mesa Watershed.
- ii. No comment was given in this item.

13. STM22 was held earlier than usual. For the countries which have not submitted the monitoring data 2020 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.

14. The draft Data Report 2020 will be submitted to the Scientific Advisory Committee for adoption at its Twenty-first Session (SAC21).

VII. Evaluation for the Results of the Inter-laboratory Comparison (ILC) Projects 2020 (Agenda Item 6)

15. The NC presented the preliminary draft Report on the Inter-laboratory Comparison Projects in 2020 for wet deposition, dry deposition (filter pack method), soil and inland aquatic environment (EANET/STM 22/6). 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, it was notified that the participating countries which have not submitted the 2020 ILC data were requested to submit the data as soon as possible, so as to complete the ILC Project Report 2020 for adoption at the SAC21. The meeting was invited to discuss and provide comments.

16. Major discussion on this agenda included the following:

(Wet deposition)

- i. The NC requested Cambodia, Lao PDR, and Russia to answer the necessary number of the samplers for ILC 2021.
- ii. It was pointed out that the flagged data percentage was higher in the high concentration sample than the low concentration sample. It was clarified that percentages were not so different from those in the previous projects, approx. 30 – 35 %.
- iii. It was clarified that the re-analyzed data could not be treated as the official data, the setting values will be disclosed for the participating laboratories.

(Dry deposition)

- i. It was recommended that the ILC participating countries should review the results of ILC2020 and recheck the whole analysis procedures such as the extraction, calculation, reporting before starting analyzing the sample of the ILC2021.
- ii. In some laboratories, the data on SO_4^{2-} for the high-concentration sample showed large outlier although those for low-concentration sample showed satisfied the Data Quality Objectives (DQOs). It was suggested that the data be compared to the previous data whether contaminations occurred or not.
- iii. The participating laboratories were suggested to contact the NC, in case the sample quality would be doubted.

(Soil)

- i. It was recommended that analyst recheck the error of the calibration and the data handling such as copy and paste to prevent the extremely-large variation of Ex-base cations shown in ILC 2020.
- ii. It was recommended to reconsider the condition of the standard solution, extraction solution, dilution ratio, and calculation for reducing the outliers.
- iii. The NC requested China and Russia to check the analysis date of pH (H_2O).
- iv. No comment was given in this item.

(Inland Aquatic Environment)

- i. The large flagged percentage was found for NH_4^+ . It was suggested that possible factors be checked to identify actual causes. It was pointed out that the trends on flagged data percentages were slightly different between the projects on wet deposition and inland aquatic environment.
- ii. It was clarified that the data evaluation in the report was conducted by comparing with the setting (designed) values of the inter-laboratory sample. It was informed that another inter-laboratory comparison program adopted the consensus values (robust averages) based on the data submitted from participating laboratories. It was also suggested that homogeneity or stability of the inter-laboratory samples be considered carefully.

VIII. Consideration of the National Monitoring Plans (NMPs), Current Monitoring Activities for the EANET and Overall Air Concentration Monitoring Status of the Participating Countries (Agenda Item7)

17. At each of the previous STM meetings, the representatives of the participating countries made presentations on their NMPs and current EANET activities, including monitoring capacities, technical problems, future plan and so on, for improvement of the activities of the EANET. It was requested that the NMPs will be submitted to the NC as early as possible, if it is necessary for modifications (EANET/STM 22/7).
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
 - The wet deposition monitoring in Siem Reap and the inland aquatic monitoring in Kirirom Sras Srong were stopped because of the limitation of the budget.
 - The lid of the rain sampler was disordered. The next annual budget plan may include purchase of the sensor for the sampler. It was clarified that samples collected manually have been stored in a refrigerator but have not analyzed due to problems of the ion chromatography. Cambodia recently purchased a new IC, and an engineer in Thailand was supposed to visit Cambodia for training and calibration. However, due to the COVID 19, the training was postponed. Their training and calibration schedule haven't been decided yet.
 - It was suggested that the sampler in Siem Reap be moved to Phnom Penh.
 - ii. China
 - It was informed that the monitoring had been started at Wuzhishan and Lijiang since 2019.
 - There were 10 sites for the wet deposition monitoring, 6 site for the dry deposition monitoring,

6 sites for the inland aquatic monitoring, and 4 sites for the soil and vegetation monitoring.

- It was informed that the annual technical conference was held in China on December 4, 2020, and the annual monitoring data was published.
- It was informed that the soil and vegetation monitoring will be started in 2021, the domestic meeting will be held in October 2021 for the technical staffs to give the training about the analysis of wet and dry deposition samples.
- It was clarified that the recent published Technical Manual for Air Concentration Monitoring in Chinese language version will be used for not only EANET relevant people but also other users involved in air concentration monitoring.
- It was mentioned that Technical Manual for Wet Deposition Monitoring in Chinese language version will be published 2021. It was clarified that the users of the technical manuals will be expected the staffs in the domestic monitoring sites.
- It was pointed out that the declining trend of pH at Zhuxiandong and Hongwen sites for recent 4 years should carefully be checked.

iii. Indonesia

- Currently, the inland aquatic environment monitoring and the soil and vegetation monitoring are stopped because the local organizations in charge has financial restrictions, and re-starting schedule in the near future has not planned at this moment.

iv. Japan

- FP monitoring at Niigata-maki site and Tsushima site started in April, 2020. Only Tokyo site is classified into urban site, but monitor only wet and FP monitoring.
- As a part of QA/QC activities, real time data are disclosed on the Ministry of the Environment, Japan (MOEJ) web site, called “SORAMAMEKUN” or Atmospheric Environmental Regional Observation System (AEROS). The site shows real time data of spatial distribution, temporal distribution, and data table of air concentrations. It can be updated hourly, and the data can be downloaded anytime.
- No comment was given in the presentation.

v. Lao PDR

- It was informed that the wet deposition and inland aquatic monitoring were conducted in 2020. The dry deposition monitoring had been stopped due to the problem on the instrument. The monitoring for PM_{2.5} concentration was conducted at 5 sites including 1 site of the EANET.
- It was confirmed that they are planning to dispatch their staff for the individual training course in 2021.
- The data of automatic monitor are disclosed in the Natural Resources and Environment Research Institute (NRERI), and the facebook page of NRERI has been established to disseminate the activity to the general public.

vi. Malaysia

- It was informed that there were 4 sites for the wet deposition monitoring, 3 sites for the dry deposition monitoring, and 2 sites for each inland aquatic monitoring and soil and vegetation. It was mentioned that the dry deposition monitoring would be started in 4 new sites during 2021-2025. It was informed that the inland aquatic monitoring site was relocated from Tembaling river to Baru river, and would be relocated from Semenyih Dam Selangor to Kuala Tahan.
- It was clarified that the data on organic acids have already included in the 2020 wet deposition data submitted to the NC.
- It was clarified that the actual sampling location for inland aquatic environment monitoring in Kuala Tahan area has not been decided. Based on the preliminary survey results, the sampling point is expected to be decided soon. The NC may give some advices on selecting the sampling point, if necessary.
- The inland aquatic environment monitoring in Danum Valley area was successfully restarted at the new location in Baru River in July 2020. Formerly, the NC conducted research activities in the Baru River catchment in cooperation with MET Malaysia. The existing data for nearly four years could be shared for reference. Moreover, it was suggested that the flow rate data collected at the weir in Baru River could be utilized to estimate material fluxes with the stream and the relationship with atmospheric deposition.

vii. Mongolia

- It was informed that there were 2 sites for the wet deposition monitoring, 3 sites for the dry deposition monitoring, and 1 site for the inland aquatic monitoring. It was pointed out that the Ulaanbaatar site had relocated since June 15, 2020, due to the construction work.
- The gaseous NH_3 concentration at the Ulaanbaatar site was much higher than at the Terej site in which effects of livestock might be large. It was clarified that main emission sources at the Ulaanbaatar included automobiles and coal combustion in ger houses, while the number of livestock was limited in the city.
- It was clarified that automatic monitoring data have already submitted to the NC, while the data on the FP monitoring were presented at the meeting.

viii. Myanmar

- The presentation was skipped because the internet had not been connected correctly.

ix. Philippines

- It was informed that the wet deposition monitoring was stopped because the wet-only sampler in Los Banos had been broken. The new one would be installed in the near future.
- As on-going activities, they have been planning to publish some guidelines, Ambient Air Monitoring Station Siting Criteria Guidelines, Ambient Air Monitoring Station Siting Criteria Guidelines, Guidelines for Hazardous Air Pollutants (HAZAP) PAH, VOCs,

metals and black carbon, and a Manual of Air Pollution Source Installation (APSI).

- It was clarified that F⁻ has not been detected in wet deposition samples in 2020, trials on analysis of additional chemical species have already been started.

x. Republic of Korea

- There are 3 EANET monitoring sites (Ganghwa , Imsil , Jeju) and 42 domestic acid deposition monitoring sites, some of which are monitoring atmospheric mercury.
- Results of wet deposition and gaseous concentrations in 2020 and annual pH distribution from 2012 to 2020 were presented.
- No comment was given in this presentation.

xi. Russia

- It was informed that the dry deposition monitoring was not conducted because of the lack of the consumables such as the filters.
- In 2020, the NC tried to provide chemical reagents and laboratory consumables for monitoring activities. However, because of difficulty on the custom clearance, their consumables were returned to Japan. It was pointed out that the NC and the national center of Russia should discuss how to solve this problem. The virtual technical mission in 2021 will be a good chance to discuss this issue with the NC.

xii. Thailand

- It was informed that 2 sites were closed in 2020 because of the financial limitation. It was informed that the inland aquatic monitoring was not conducted due to the lockdown and protection policy of the COVID-19.
- Rain samples are collected on daily basis, and the collection bucket is replaced manually. It was informed that a new collector of Ogasawara Company with a refrigerator was purchased 2-3 years ago. Sometimes weekly or 10-day sampling is conducted due to COVID-19 locked down. Such irregular sampling interval should be noted.
- The annual variations of precipitation pH at the PCD site show the pH values over 8.0, although such high values were unusual at other EANET sites. It was suggested that soil-origin components, such as Ca²⁺ might have related with those samples. It was informed that the wet only sampler was located on the cement floor of the rooftop, 20F. The effect of contamination should be checked.

xiii. Vietnam

- The rainwater pH has been increasing at the Da Nang site, while decreasing at the Hanoi site. It was clarified that Da Nang is located in the middle part of Vietnam and developed since 2014/2015 including construction of buildings, while the Hanoi site was relocated recently. The situation appeared to influence the trends.
- It was also explained that the northern part and southern part of the countries had four seasons

and two seasons, respectively, and the difference of seasonality influenced rainwater pH.

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

- The NC explained the background, objective and procedures for preparing and reviewing the NMP by the participating countries every year, and deadline of the submission which is usually the end of June, every year. It was requested that all participating countries implement their EANET monitoring activities in accordance with their own NMP.
- It was informed that two sites in China and two sites in Indonesia were nominated as the wet deposition monitoring sites in 2019 and 2020, two sites in Japan were closed due to difficulty of continuous sample collection, and two sites in Japan were newly nominated in 2019. As for Malaysia, instead of Semenyih Dam and Tembaling River, two Inland Aquatic Environment Monitoring sites, Baru Valley and Kuala Tahan, were nominated in 2020.

IX. Progress on the Revision of the Technical Manuals for Dry Deposition Flux Estimation and Air Concentration Monitoring (Agenda 8)

20. The NC presented the results of the 2nd meeting of the Expert Group on Revision of the Technical Manuals for Dry Deposition Flux Estimation and Air Concentration Monitoring (EANET/STM22/8). Following the updated strategy paper, it was started that the technical manuals for the dry deposition flux estimation and air concentration manuals should be revised and updated. It was informed that the two EG meetings had been hold and discussed about the contents in 2019 and 2020. It was informed that the two more meeting will have been held by finalizing the technical manuals in 2022.

21. Major discussion on this agenda included the following:

- Different authorities from the EANET relevant agencies may have the land use information. It was suggested that the disclosed data from USGS, Google Earth, or Google Map could be utilized for this purpose.
- It was recommended that the calculation sheet of deposition velocity (Vd) using the excel macro file be more user friendly to be used easily by technical staffs in the countries and capacity building programs, such as an on-line training course, be planned to share how to use the calculation sheet.
- Currently, hourly data on meteorological parameters have been submitted only from Japan. The current calculation sheet does not function with missing of some hourly data. This is a big barrier to calculate Vd and dry deposition fluxes in other countries. It was pointed out that simplification of the calculation should be taken into consideration. The NC informed that the Expert Group has selected three important parameters, wind speed, relative humidity, and temperature, for Vd calculation.
- The NC welcomes feedback from Senior Technical Mangers and local staff for elaboration of the revised technical manuals.

X. Other issues (Agenda 9)

22. No comments or information were given in this item.

XI. Closing of the Meeting (Agenda Item 10)

On behalf of the NC, Dr. Erdenebat Eldev-Ochir, Deputy Director General, ACAP, delivered the Closing Remarks. He expressed for his great appreciation about the improvement of the data quality due to efforts of the participating countries. Monitoring data are the most important basis for the understanding of our current acid deposition. The 4th Periodic Report on the State of Acid deposition in East Asia, which provides important scientific knowledge of the state of acid deposition, will be issued this year based on EANET monitoring data 2000-2019. Despite the COVID-19, the EANET has been continuously strengthening the capacity of the participating countries through online training, research fellowship, public awareness workshops, joint research, etc.

23 The Meeting was officially closed