

The Seventh Session of the Scientific Advisory Committee
on Acid Deposition Monitoring Network in East Asia
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Consideration of Research Activities for Further Development of EANET

Network Center for EANET

I. Introduction

1. Promotion and implementation of research activities on acid deposition and related scientific issues are one of the major activities of EANET to be conducted by the Network Center (NC) and the participating countries, according to the “Tentative Design of the Acid Deposition Monitoring Network in East Asia (EANET) (EANET/IG 2/5/3)”. NC elaborated directions of research activities several times (EANET/SAC 2/9/3; EANET/SAC 3/9/2; EANET/SAC 4/12/2; EANET/SAC 5/11/2; EANET/SAC 6/12/3) based on discussions in previous SAC meetings, and research needs on the existing activities as well as activities in new directions have been clarified. Some important related issues were also pointed out to support discussion how to promote research activities by SAC and NC.
2. To strengthen the existing activities including monitoring on acid deposition and ecological effects, the following research needs were clarified:
 - Prospective investigation how to extend the monitoring network
 - Estimation of dry deposition fluxes by the direct measurement method as well as the indirect measurement method (inferential method)
 - Long-term evaluation of O₃ and its precursors
 - Assessment of atmospheric depositions and biogeochemical flow/budget in forested catchments
 - Development of monitoring procedures to detect sensitivity and capacity of soil to acid deposition
 - Assessment of O₃ impacts on trees and crops
3. As activities in new directions, necessity of emission inventories, necessity of modeling works and extension of the EANET scope to impacts on human health were also discussed. Moreover, the following important related issues were also pointed out:
 - Cooperation with other regional activities for inter-regional and global pollution issues
 - Establishment of ad hoc groups: Group for data analysis and Group for research coordination
 - Procurement of research funding
4. “Strategy on EANET Development (2006-2010) (EANET/IG 8/7/1 rev)”, which was adopted by the Intergovernmental Meeting at its 8th Session (IG8), discussed the whole activities of EANET based on the tentative design above. In the Strategy, “Promotion of research activities related to acid deposition problems” was included as one of important major categories, and the following two activities were

proposed for this purpose:

- Consideration on general directions of research activities by SAC: (No. 19)
- Promotion of inter-comparison studies and validation of existing models on acid deposition in East Asia (No. 20)

Several research topics were also clarified for promotion of existing monitoring activities in the Strategy.

5. Research needs discussed in the previous SAC meeting mostly covered the research topics in the Strategy. SAC may have an important role as a scientific body of EANET to implement the activities in the Strategy. In this document, based on the “Strategy on EANET Development (2006-2010)”, research activities and related issues will be considered for further development of EANET. Moreover, new functions in SAC will be discussed for promotion of the research activities and related issues.

II. Current situation of research activities in EANET

6. NC has implemented several research activities in cooperation with organizations relevant to EANET in the participating countries or independently. All the following ongoing research activities are related to the research needs above directly or indirectly. Outcomes of the following research activities will contribute to implementation of the activities in the Strategy on EANET Development.

a. Joint research project with Republic of Korea on aerosol monitoring methodology

In the discussion at SAC4 for the improvement of dry deposition monitoring methodologies, it was suggested that a study on PM10, PM2.5 and their components in special sites should be considered. In line with the suggestion, the project on aerosol monitoring was planned as a joint research between National Institute of Environmental Research (NIER), Ministry of the Environment, Republic of Korea and NC. Preliminary research was implemented in October 2005 and the workshop to be discussed the results was held in February 2006 in Republic of Korea. In order to evaluate aerosol sampling methodology and behavior of fine particles in Japan and Republic of Korea, intensive monitoring was performing at both of Korean site and Japanese site on 12-27 October 2006 and 16-31 May 2007. Several methods for aerosol monitoring including PM2.5 (PM10) collection are implementing simultaneously in both sites. The results of the intensive monitoring have been analyzed and discussed in small workshops held at NIER on a day during NC technical mission every year since 2005.

b. Joint research project with Russia on evaluation of East Siberian atmospheric environment

NC has implemented the joint research project Phase III with the Limnological Institute, Russian Academy of Science, Siberian Branch (RAS/SB) in cooperation with National Institute for Environmental Studies, Japan. Annual acid deposition as well as heavy metals (mercury and lead) and lead isotope ratio in rain and snow have been determined at four sites in East Siberia and Primorsky Region in Russia. The monitoring data are expected to be important for evaluation of long-range

transportation of air pollutants from Europe and industrial regions of Russia to East Asia. The methodologies on data analysis used in the project are expected to be useful for evaluation of EANET monitoring data.

c. Joint research project with Thailand on dry deposition (gas concentration) monitoring

Following the termination of the Joint Research on dry deposition flux (Phase I) from January 2000 to December 2005, NC and PCD agreed to establish Phase II of the Joint Research Project focusing on QA/QC of gas concentration monitoring method in tropical region in August 2005. The difference of gas concentrations among some different types of monitoring methods (automatic monitor, filter-pack method, and passive sampling method) in Bangkok EANET site will be evaluated through the joint research between both organizations in cooperation with Asian Center for Environmental Research, Meisei University, Japan. The observation was started in December 2006.

d. Joint research project with Thailand on catchment analysis

NC started the joint research project on catchment analysis in Thailand in 2005 with Royal Forest Department (RFD) and Environmental Research and Training Center (ERTC) in cooperation with Kyoto University (Japan) as a part of the Global Environment Research Fund (C-052: Project Leader, Dr. Junko Shindo, NIAES), the Ministry of the Environment of Japan. Monitoring on input (deposition) and output (stream water) fluxes in/from a small catchment area, and analyses on other biogeochemical aspects have been carried out continuously, and nutrient dynamics related to acid deposition in the area would be discussed. The project will be informative for the future catchment monitoring as one of activities in line with the Strategy Paper for Future Direction of Soil and Vegetation Monitoring of EANET.

e. Other research activities (Independent and multilateral research activities)

Catchment analysis is one of the issues described in the Strategy Paper for Future Direction of Soil and Vegetation Monitoring of EANET. For obtaining basic data on this issue, research activities are implemented in a small catchment area in Shibata City, Niigata Prefecture, Japan. The data will be informative for development of guidelines or manual on catchment monitoring as well as implementation of the joint research project on catchment analysis with Thailand.

In order to investigate the differences among the long-range transport models developed for East Asian region, NC has been collaborating with the Model Inter-Comparison Study in Asia (MICS-Asia) Phase II. The overview of the collaboration activities with MICS-Asia are summarized in the other document, "Consideration on collaboration with other initiatives on emission inventories and numerical modeling (EANET/SAC 7/9/4)".

7. In order to promote evaluation of the monitoring data effectively and studies on relevant research topics, and encourage young researchers in the EANET participating countries to join the research

activities, NC has carried out the research fellowship program in 2005 and 2006 in cooperation with the Secretariat. Two researchers were invited in each year, and the fellowship researches were carried out for approximately two months in late autumn in both years.

In 2005, two researchers of China and Philippines were invited to NC. The researcher from China studied the theme entitled “Assessment of ozone variability in East Asia during recent years”. The variability of ozone concentration observed at sixteen sites in East Asia during recent years (from 2000 to 2004) was analyzed by using EANET monitoring data. The researcher from the Philippines studied the theme entitled “Determination of unanalyzed components in rainwater”. In order to obtain good quality data on wet deposition monitoring, unanalyzed components on routine analysis, such as HCO_3^- , F^- , Br^- , NO_2^- , PO_4^{3-} , H_2PO_4^- , HCOO^- and CH_3COO^- were determined in addition to the ten major parameters in rainwater samples collected at EANET wet deposition monitoring sites in the Philippines.

In 2006, two researchers of Mongolia and Russia were invited to NC. The researcher from Mongolia studied the theme entitled “Determination of unanalyzed components in rain water”. Unanalyzed components in rainwater samples collected in Mongolia were determined. The researcher from Russia studied the theme entitled “Application of scientific climatological approach and statistical methods for optimization of EANET network”. In order to determine the areas for disposition “optimal” EANET network’s station, the precipitation chemistry (nss-SO_4^{2-} , NO_3^- , NH_4^+ , nss-Ca^{2+} , H^+) data obtained for 2000-2005 were calculated by using the statistical method.

III. New planned activities to support the Strategy objectives

8. In addition to the ongoing research activities above, new catchment study in tropical rain forests in cooperation with the OP3 Project in Malaysia is now planned. The OP3 Project (Oxidant and Particle Photochemical Processes above a South-East Asian tropical rain forest) is a three-year scientific research project conducted by eight groups from UK universities, Malaysian institutions (including the Malaysian Meteorological Department) and a combined group from USA. The project will be based in the Danum Valley in Sabah, Malaysia which is also one of the EANET monitoring sites. A BAe 146 research aircraft will be deployed for 3 weeks in Malaysia during the intensive measurement periods: 31 March-4 May 2008 and 23 June-27 July 2008. The overall goal of the project is to lead to a better understanding of the interactions that exist between natural forests and the Earth’s climate system.

ADORC discussed the possibility of collaboration with scientists of Lancaster University, who were leading the sub-project, “Forest fluxes and atmospheric chemistry” in the Project. Based on preliminary discussions with the UK researchers and Malaysian colleagues, several scientists of ADORC will start the activity on “Atmospheric deposition impacts on soil and stream hydrochemistry” under this sub-project. Experience in Thailand can be utilized for this work. ADORC’s involvement in the other

sub-projects which focuses on regional air quality and climate change may be considered. ADORC is now trying to obtain research grants for this new activity. The outputs will be informative for future activities of EANET, especially for the catchment-scale monitoring/modeling, which is one of activities proposed in the Strategy, and also the regional ozone issue.

9. New directions, such as “necessity of emission inventories”, “necessity of modeling works” and “extension of the EANET scope to impacts on human health” are closely related to activities described in the Strategy on EANET Development.

10. As for “necessity of emission inventories” and “necessity of modeling works”, the following activities in the Strategy may be closely related:

- Discussion on promotion of modeling activities and emission inventories (No. 23)
- Promotion of capacity building for model application (No. 24)

Implementation of these activities are discussed in other documents, “Consideration on promotion of emission inventories (EANET/SAC 7/9/1)” and “Consideration on collaboration with other initiatives on emission inventories and numerical modeling (EANET/SAC 7/9/4)”. Especially for modeling works, the latter document discusses also the activity No.20 as mentioned above.

11. As for “extension of the EANET scope to impacts on human health”, the following activity in the Strategy may be related:

- Investigation on environmental/human effects of priority substances and their monitoring requirements such as monitoring equipment, sampling and analytical methods (Activity No.26)

Discussion on implementation of the activity will be started in another document, “Consideration on establishment of the framework for reviewing substances to be monitored including other air pollutants and monitoring parameters (EANET/SAC 7/9/2)”, which is to support the activity No.25 in the Strategy.

IV. Issues for promotion of research activities

12. To promote research activities in EANET effectively, it is necessary to consider directions on further development of EANET as well as needs of the participating countries taking into account activities proposed in the Strategy on EANET Development. NC tried to promote research activities according to previous discussions in SAC meetings as well as recommendations in the technical documents of EANET, such as the “Strategy Paper on Future Direction of Dry Deposition Monitoring in EANET” and the “Strategy Paper on Future Direction of Soil and Vegetation Monitoring in EANET.” The discussions and recommendations have already been mostly reflected to the Strategy. Therefore, it can be considered that the current ongoing research activities are carried out in line with the Strategy.

13. The interest of transboundary air pollutions has been increasing in global scale. It is important to have a

common understanding among regions and inter-regional cooperation programs should be created to treat pollution issues in global scale. EANET has been taking initiative for the evaluation of acid deposition in East Asian region, and it is necessary to conduct data analysis for regional and national environment assessments to contribute to cooperation activities with other programs, such as EMEP, CASTNET, WMO, Regional Forum on Environment and Health, TF HTAP, etc. Therefore NC will establish a special data-assessment group to conduct data analysis and coordination with the other programs to support these activities.

14. However, the current activities may not be able to cover all the relevant research activities proposed in the Strategy. Moreover, needs of the participating countries cannot be enough considered since the manpower and budget of NC are very limited. On the other hand, the EANET community may have many human resources for various scientific fields. Researchers in the EANET community are encouraged to promote research activities by their funds taking further development of EANET into account, while the EANET budget will be used only for research activities mentioned in the Strategy.
15. As mentioned above, NC may need support of researchers in the EANET community to promote research activities in EANET effectively. Moreover, discussions on research project proposals may need more transparency, and all the participating countries should have some possibility of joining research projects. Some projects which will involve all the participating countries may be considered. Such projects may need input of idea from the participating countries and their strong commitment to participate in the projects and support works.

V. Establishment of new functions

16. For coordination of the above works effectively, new functions must be necessary in EANET. The Strategy on EANET Development proposed also “Consideration on general directions of research activities by SAC”. In the last session of SAC, it was suggested that “Ad hoc Group for research coordination” would be formed. However, research directions should be considered with wide and long-term vision. Therefore, more concrete functions than “Ad hoc Group” may be necessary. Consequently, it can be proposed that **Task Force on Research Coordination should be newly formed under SAC** with the following functions:
 - i) To coordinate all EANET research activities and their results
 - ii) To decide on new directions of research in EANET in 2006-2010 and beyond
 - iii) To assist NC in the review of new research applications/requests from participating countries, from the scientific aspect
17. Task Force on Research Coordination should make efforts together with NC to promote both on-going researches and new short-term studies and to procure national or international research funds for their support. Not only proposals on research directions but also recommendations how to obtain the

financial support for research from funding agencies are expected for their activities.

18. In addition to coordination of new research activities, analysis of the monitoring data obtained in EANET is also an important scientific work with research aspects. In the last session of SAC, it was suggested that “Ad hoc Group for data analysis” would be formed. Results of the data analysis should be compiled as the “Periodic Report”. According to the Strategy on EANET Development, preparation of the next Periodic Report is one of major categories. The following activities were proposed:

- Preparation of periodic assessment reports on the state of acid deposition (No.17)
- Studies for support to the assessment on the state of acid deposition by means of trend analysis, assessment indicators, numerical modeling and so on (No. 18)

19. The first actions for preparation of the next Periodic Report should be started soon. However, it may be too early to form the Drafting Committee. The first Periodic Report has just finished, and therefore, problems encountered and tools/software acquired in the last drafting process should be reviewed for the next work. Preliminary data analysis may also be necessary before starting drafting process. Moreover, NC should update members in charge of this work. Therefore, before forming a concrete Drafting Committee, more flexible function may be appropriate at this stage. Consequently, it can be proposed that **Ad hoc Expert Group on Preparation of the Second Periodic Report on State of Acid Deposition in East Asia should be formed under SAC** with the following function:

- To coordinate all activities relating to the preparation of the next Periodic Report prior to the formation of the Drafting Committee

The Ad hoc Group will be dissolved when the Drafting Committee is established by SAC. The participating countries may nominate the same members to be in the Drafting Committee.

20. For the proposed Task Force and Ad hoc Expert Group, the selection of the Heads of these sub-bodies should be considered among the SAC members with request on special status for coordination of their work (with support of NC) and responsibility to present the results for SAC meetings. The communication and coordination with respective international activities could be also done on the scope of addressed research and activities.