The Tenth Senior Technical Managers' Meeting
of the Acid Deposition Monitoring Network in East Asia
26-28 August 2009, Pathumthani, Thailand

Progress report on the preparation of the technical manual on dry deposition flux estimation

Secretariat of the Expert Group
on Dry Deposition Flux Estimation

I. Introduction

1. The Strategy Paper for Future Direction of Dry Deposition Monitoring of EANET (2nd edition) presents the status quo of dry deposition monitoring, a revised list of major chemical species for dry deposition monitoring in EANET and included a step-by-step future strategy on dry deposition monitoring. However, it did not identify a method for estimating dry deposition flux in the EANET region. On the basis of this background, establishment of the Expert Group on Dry Deposition Flux Estimation was approved in 2007 to develop a method for estimating dry deposition fluxes in the EANET region and produce a Technical Manual on Dry Deposition Flux Estimation.

2. The First Meeting of the Expert Group was held at ADORC (Acid Deposition and Oxidant Research Center), Niigata, Japan from 23 to 24 June 2008. The main discussions of the First Meeting are as follows:
   i) Method for estimation of dry deposition flux for EANET
   ii) Preferred monitoring sites for field studies
   iii) Reporting of dry deposition flux
   iv) Future research projects for improvement of estimation method for dry deposition
   v) Validation of the Inferential Method
   vi) Table of Contents of the Technical Manual on Dry Deposition Flux Estimation

   Then, the lead authors for each chapter of the Technical Manual were determined, and the respective authors agreed to prepare the 1st draft of the Technical Manual until the Second Meeting of the Expert Group.

II. Second Meeting of the Expert Group

3. The draft table of contents of the Technical Manual on Dry Deposition Flux Estimation was approved by the Eighth Session of the Scientific Advisory Committee (SAC8) held in October 2008, and then each authors started to prepare the draft Technical Manual. The Second Meeting of the Expert Group was held at Meisei University, Tokyo, Japan from 23

to 24 June 2008. At the 2nd Meeting, the draft contents of each chapter of the manual were reviewed based on the submitted 1st draft by the respective authors. Discussions on the contents of the Technical Manual were summarized as the meeting minutes (Annex). In addition, the outline of the EANET High Priority Research Project (Aerosol Deposition Studies in Forests for Improvement on Estimate Method for Dry Deposition) was introduced by Dr. Pojanie Khummongkol.

III. Major decisions

The Meeting agreed that the future activities of the Expert Group will be according to the Schedule of Activities shown below. The major decisions of the Second Meeting are as follows:

- The draft technical should be revised at least 2 times by the members and NC before September, 2009. Then, the 2nd draft of the Technical Manual should be compiled by the NC so that it could be submitted to the Second Meeting of the Task Force on Monitoring for Dry Deposition and the Ninth Session of the Scientific Advisory Committee (SAC9) in October, 2009.
- The progress of activities of the Expert Group on Dry Deposition Flux Estimation will be informed to the participants of the Tenth Senior Technical Managers' meeting (STM10) and SAC9.
- The Third meeting will be held back to back with the next Workshop of Acid Deposition to be held at Meisei University in February or May, 2010.

IV. Schedule of activities until adoption of the Technical Manual

May – August, 2009	Revise of the 1st draft of the Technical Manual
August 26 – 28, 2009	Report activity of the Expert Group at STM 10 for comments
October, 2009	Report activity of the Expert Group at the Second Meeting of the Task Force on Monitoring for Dry Deposition for comments
October 14-16, 2009	Submission of the draft Technical Manual to SAC9 for comments
February or May, 2010	Third meeting of the Expert Group to finalize the Technical Manual
At SAC10 (autumn 2010)	Submission of the Technical Manual to SAC for adoption

ACID DEPOSITION MONITORING NETWORK IN EAST ASIA (EANET)

SECOND MEETING OF THE EXPERT GROUP ON DRY DEPOSITION FLUX ESTIMATION OF THE TASK FORCE ON DRY DEPOSITION MONITORING SCIENTIFIC ADVISORY COMMITTEE (SAC) OF EANET

(Tokyo, 19 February 2009)

PROVISIONAL AGENDA

09:00-09:15

1. Opening and Introductory remarks
   Chairperson

09:15-10:30

2. Review of the 1st draft of Chapters 1 and 2

Chapter 1	Introduction	Dr. Pojanie
Chapter 2.1	Air Quality Measurements	Dr. Hong
Chapter 2.2	Meteorological Measurements	Dr. Takahashi
Chapter 2.3	Land Use Information	Dr. Ueda

10:30-10:45 Coffee Break

10:45-12:00

Review of the 1st draft of Chapter 3

Chapter 3	Methodology for dry deposition flux estimation in EANET	Dr. Matsuda

12:00-13:00 Lunch

13:00-15:00

Review of the 1st draft of Chapters 4 and 5

Chapter 4	Data reporting	Dr. Ueda (NC)
Chapter 5	Evaluation of dry deposition flux determined by the Inferential Method	Dr. Hayashi

15:00-15:15 Coffee Break

15:15-16:00

Review of the 1st draft of Chapters 6, 7 and 8

Chapter 6	Direct measurement for determining dry deposition flux	Dr. Pojanie
Chapter 7	Use of remotely sensed information	Dr. Ueda
Chapter 8	Future direction of dry deposition flux estimation	Dr. Matsuda

16:00-17:00

3. Discussion on High Priority Research Project (Aerosol deposition studies in forests for improvement of estimation method for dry deposition) — Dr. Pojanie

17:00-17:30

4. Future schedule — Discussion

17:30 Closing

MEETING MINUTES

I. Agenda

The Meeting followed the issues as listed in the Provisional Agenda.

II. Opening and introductory remark

Dr. Pojanie Khummongkol, the chairperson of the Expert Group, made introductory remark to the members of the Expert Group on Dry Deposition Flux Estimation (EGDDFE). The secretariat informed that Dr. Hong sent his apologies that he could not attend the meeting. The list of participants is attached as Annex 1.

III. Review of the 1st draft of the Technical Manual on Dry Deposition Flux Estimation (see Annex 2)

Chapter 1 Introduction (written by Dr. Pojanie)
Chapter 1 will consist of three parts (Background, Objectives of dry deposition flux estimation and Outline of the manual for dry deposition flux estimation). This chapter will be prepared by Dr. Pojanie after the drafts of other chapters are completed.

Chapter 2 Fundamental items for dry deposition flux estimation
Chapter 2.1 Air Quality Measurements (written by Dr. Hong)
Dr. Hong has submitted the draft, and the members discussed the contents of Chapter 2.1. Major comments are shown as follows:

i) The title of Chapter 2.1.2.1 should be changed as “Major chemical species for flux estimation”;
ii) Species to be estimated for dry deposition flux should be reconsidered. PM10 and PM2.5 are not necessary for dry deposition flux estimation;
iii) As for the manual method of monitoring PM and atmospheric concentrations of ions, “High-volume sampler” is not adopted as the EANET monitoring method. Therefore, the method should be removed from Table 1;
iv) The brackets for “Passive sampler” should be removed from Table 1.

Chapter 2.2 Meteorological measurements (written by Dr. Takahashi)
Dr. Takahashi explained the outline of Chapter 2.2, and the members discussed the contents. It was pointed out that general conditions should be included at the first part followed by specific conditions. Major comments are shown as follows:

Chapter 2.2.1 Siting of meteorological instruments

i) The recommended area “20km x 20km” for meteorological instruments should be checked according to the EANET monitoring guideline.

Chapter 2.2.2 Meteorological Parameters necessary for dry deposition flux estimation

i) All listed parameters are important to calculate dry deposition velocity. Minimum parameters for calculation are Wind speed, Wind direction, Temperature, Relative humidity, Solar radiation and Precipitation amount;
ii) Atmospheric stability can be determined by three different schemes using one of three parameters (Standard deviation of wind direction, Net radiation and Cloud cover);
iii) All participating countries may not be able to select parameters to determine atmospheric stability. The Expert Group should select the minimum meteorological parameters to be described in Chapter 2.2.2 and 2.2.3 for determining atmospheric stability;
iv) Dr. Hayashi suggested that standard deviation of wind direction is better than cloud cover to determine atmospheric stability;
v) Dr. Ueda also suggested that using an ultrasonic anemometer is better than standard deviation of wind direction. However, it is difficult as not all participating countries can afford to install the instrument;
vi) A description of how to choose each category of stability classes should be added in the appendix.

Chapter 2.2.3 Instrumentation

i) The typical instruments for measuring meteorological parameters are summarized in Table 2.1;
ii) The investigated height of meteorological parameters is dependent on canopy height at the selected site. Temperature, Relative humidity, Solar radiation and Net radiation should be monitored at 1.5-2.0m height because these parameters are necessary to calculate Surface resistance (Rc). Dr. Takahashi will add the classification of measurement height depending on canopy height.

Chapter 2.2.4 Monitoring period

i) All meteorological parameters should be measured continuously throughout a year;
ii) Dr. Hayashi and Dr. Takahashi suggested that parameters for atmospheric stability should be monitored at 1 or 10 minute intervals.

Chapter 2.3 Land use information (written by Dr. Ueda)

Dr. Ueda explained the outline of Chapter 2.3, and the members discussed the contents. Major comments are shown as follows:

i) Dr. Ueda will describe the contents with reference to the PSU/NCAR mesoscale model (MM5) document. He suggested that all participating countries can download land use dataset (1km x 1km) from the Web site;
ii) Dr. Ueda will suggest the categories of land use that could be used as source data (Soil type, Forest fraction, Soil temperature, Land waters mask, Vegetation type etc.). He will add the description of how to install land use data and a select type in Chapter 2.3;
iii) “Surface wetness” can be estimated as water content (%) which is included in MM5 model.

Chapter 3 Methodology for dry deposition flux estimation in EANET (written by Dr. Matsuda)

Dr. Matsuda explained the outline of Chapter 3. He asked all members to discuss how to estimate atmospheric stability. Major comments are shown as follows:

i) Ms. Leong asked how to estimate Deposition velocity (Vd) at an urban site. Dr. Matsuda suggested that Vd at an urban site should be omitted because calculation of Rc at an urban site has large uncertainty. He suggested that constant Vd should be used at an urban site. Dr. Matsuda mentioned that the “Strategy Paper for Future Direction of Dry Deposition Monitoring of EANET” (2nd Edition) specified that Vd should be estimated at a suitable site (not all sites);
ii) All the parameters described in Chapter 3.2 should be clearly explained;
iii) Ms. Leong suggested that the description of a urban site is necessary in Chapter 2;
iv) Ms. Leong requested to add a new section at the beginning of Chapter 3.2 in order to explain why EANET has adopted the Inferential Method;
v) The parameter of "L" in the formula (2) will be explained in Chapter 3.3;
vi) The parameter of "T” in the formula (8) should be explained in Chapter 5 by Dr. Hayashi;
vii) It was proposed to modify the formulae (13) and (14);
viii) Dr. Pojanie requested that the formula numbers should be formatted in all chapters;
ix) Dr. Matsuda will modify Chapter 3 with support of NC in order to make it more understandable for staffs in participating countries;
x) Dr. Takahashi asked how to determine a seasonal category of tropical area. The description of a seasonal category should be added in the Technical Manual;
xi) Dr. Ueda suggested friction velocity (u*) should be determined by satellite data rather than the formula (3), because estimation of u* has two order difference compared with the satellite observation data;
xii) Dr. Ueda suggested all countries could calculate typical Vd by themselves. Ms. Leong commented that NC should recalculate Vd after receiving data to verify the initial calculations;
xiii) Selection of a suitable site to estimate flux using the Inferential Method should be described as well in the Strategy Paper (2nd edition).

Chapter 4 Data reporting (written by NC)

The secretariat explained the outline of Chapter 4, which was prepared referring to the “Technical Document on Wet deposition Monitoring”. Major comments are shown as follows:

i) With support of Dr. Matsuda, NC will make a Microsoft Excel calculation file which all participating countries could calculate Vd and dry deposition flux automatically. NC will recalculate Vd after submission of data from participating countries;
ii) Dr. Ueda asked that which time resolution of meteorological data should be submitted. Dr. Matsuda and Dr. Hayashi suggested that hourly data should be submitted because the meteorological parameters changed in short period. After calculating hourly Vd, it was better to average weekly or biweekly according to the atmospheric concentration data of using Filter-pack method;
iii) The descriptions of "Site information" and "Vegetation" should be merged to the same item;
iv) The explanation of Chapter 4.4.3 should be just referred by the “Technical Document for Filter Pack Method in East Asia”;

v) For the Leaf Area Index (LAI), it should be measured at each site by some instruments, because satellite data of LAI deal regional scale. The measurement method of LAI should be discussed in future;
vi) Ms. Leong suggested that information of LAI, Land use, Site vegetation etc. should be specified in Chapter 2;
vii) Chapter 4.4.4 “Calculated results for dry deposition velocity and flux” should be included in Chapter 3, because it was not “Data reporting”;
viii) The order of Chapter 3 and 4 should be interchanged;
ix) “The Technical documents for Wet and Dry Deposition Monitoring” should be cited as references in this Technical manual;
x) NC will revise the Chapter 4.1.1 (2) “Measurement and calculated results”. The description of “Vegetation and LAI by the satellite data” should be removed;
xi) NC can calculate Vd, but all countries should submit the necessary data reporting of Vd;
xii) It should be mentioned in the text that certain information already described in other EANET Technical Manuals will not reported in this manual and where such information can be found should be clearly informed.

Chapter 5 Evaluation of dry deposition flux determined by the Inferential Method (written by Dr. Hayashi)

Dr. Hayashi explained the outline of Chapter 5. The chapter consists of 2 sections depending on the species; (1) Gaseous species and (2) Particle matter. Major comments are shown as follows:

i) At the end of Chapter 5.1.1, Dr. Hayashi described that dry deposition flux of nitrous acid (HONO) should be evaluated in future because it is a precursor of HNO_3;
ii) After Chapter 5.1.2, 3 major uncertainties of the Inferential Method are explained in Chapter 5.1.3 and 5.1.4;
iii) Dr. Hayashi suggested that nitrogen dry deposition will be underestimated by using the Inferential Method;
iv) Regarding Chapter 5.1.3, determination of Rc in East Asia region should be improved by micrometeorological measurements;
v) Regarding Chapter 5.1.4, averaging of dry deposition flux is usually underestimated;
vi) Dr. Hayashi is considering Chapter 5 should cover the best methodology or quality control of dry deposition flux;
vii) Dr. Matsuda suggested that the Strategy Paper (2nd Edition) mentioned the approach for inferring Vd value;
viii) The description of future direction (including HONO in monitoring) should be moved from Chapter 5 to Chapter 8.

Chapter 6 Direct measurement for determining dry deposition flux (written by Dr. Pojanie)

Dr. Pojanie explained the direct measurement of dry deposition flux in Chapter 6. Major comments are shown as follows:

i) Dr. Hayashi will support to make the Chapter 6 complete;
ii) Dr. Pojanie will provide more information of the direct measurement in Chapter 6;
iii) The table of advantages and disadvantages for each method will provide useful information.

Chapter 7 Use of remotely sensed information (written by NC)

The secretariat explained the outline of Chapter 7, which focuses on the use of remotely sensed information. Major comments are shown as follows:

i) The secretariat mentioned land use/land cover information can be obtained by dataset of AVHRR and MODIS that are available via Internet;
ii) Dr. Katata mentioned land use information using AVHRR is not sure to be useful for the modeling with this Expert Group;
iii) Dr. Ueda explained the outline of the satellite information of LAI and NDVI;
iv) Name of Chapter 7.1 should be revised as “Use of remote sensing”;
v) Name of Chapter 7.2 should also be revised as “How to calculate NDVI”;
vi) Name of Chapter 7.3 should also be revised as “How to calculate LAI from the data of NDVI”.

Chapter 8 Future direction of dry deposition flux estimation (written by Dr. Matsuda)
It was mentioned that the information on “Modeling” and “nitrous acid (HONO)” will be added in Chapter 8. This chapter will be prepared by Dr. Matsuda after the drafts of other chapters are completed.

Based on the discussion at the meeting, the secretariat revised the 1st draft of Technical Manual and attached as Annex 2.

IV. Discussion on High Priority Research Project

Dr. Pojanie introduced the High Priority Research Project (Aerosol Deposition Studies in Forests for Improvement on Estimate Method for Dry Deposition) that will be implemented at a site in Ratchaburi, Thailand from 2009 to 2010. (see Annex 3) Major comments are shown as follows:

i) The activity should be reported to the Task Force on Monitoring for Dry Deposition;
ii) The activity is important for EANET but difficult to carry out all items of the proposed project;
iii) Dr. Matsuda will start his new project at the Sakaerat site in Thailand, and both projects will be conducted by using the Eddy Accumulation method;
iv) Dr. Ueda suggested that the project could also measure the size distribution of particulate matter using an Andersen sampler or other instruments.

IV. Next Steps and Schedule

The Meeting agreed that the future activities of the Expert Group will be according to the Schedule of Activities. (see Annex 4) Major comments are shown as follows:

i) Next meeting will be held back to back with the next Workshop of Acid Deposition to be held at Meisei University in February or May, 2010;
ii) The second draft of the Technical Manual should be compiled by the NC at the beginning of September so that it could be submitted to the 2nd meeting of Task Force on Monitoring for Dry Deposition (scheduled in 15-16 September, 2009). It was decided that the second draft of the Technical Manual should first be submitted to the Chair of the Task Force;
iii) The progress of activities of the EGDDFE will be informed to the participants of STM10 (scheduled in 26 -28 August 2009, in a participating country);
iv) The draft Technical Manual should be revised 2 times by the members and NC before September, 2009. The deadline of first round is the end of May and the second round is early July. NC will distribute the draft Technical Manual and a reminder by e-mail.

The secretariat will circulate the minutes of the meeting and the revised 1st draft of Technical Manual to all members by the end of March, 2009.

(Minutes of the 2nd meeting of EGDDFE Annex 1)

**SECOND MEETING OF THE
EXPERT GROUP ON DRY DEPOSITION FLUX ESTIMATION**

(Tokyo, 19 February 2009)

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**SECOND MEETING OF THE
EXPERT GROUP ON DRY DEPOSITION FLUX ESTIMATION**

(Tokyo, 19 February 2009)

Technical Manual
on
Dry Deposition Flux Estimation

First Draft (Revised)

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**SECOND MEETING OF THE
EXPERT GROUP ON DRY DEPOSITION FLUX ESTIMATION**

(Tokyo, 19 February 2009)

Aerosol Deposition Studies in Forests for Improvement of Estimation Method for Dry Deposition

prepared by

Dr. Pojanie Khummongkol
Project Leader

King Mongkut University of Technology Thonburi

Aerosol Deposition Studies in Forests for Improvement of Estimation Method for Dry Deposition

Objectives

A direct measurement method is applied to determine the aerosol deposition flux and velocity over the forest canopy in the tropical region.

Background Information

The process of dry deposition has been studied over decades in an attempt to estimate quantitatively the removal rate of atmospheric aerosols. Although many different turbulent and chemical mechanisms that can contribute to the processes of deposition have been discussed extensively in the literature over the years, our knowledge remains incomplete. Progress has essentially been limited to bulk estimates of the dry deposition flux. This has been mainly due to the complies interdependence of many different variables that can control the exchange process of atmospheric condensates to surfaces that are complex both at the microscale in terms of morphology and at the terrain scale. Although there have been many models that seek to explain the deposition process to complex surfaces by taking into account variables such as particle size, composition, surface morphology, meteorology, and turbulence, their predictions vary widely. The studies, although providing valuable insights into exchange processes, are not fully representative of atmospheric surface layer turbulent exchange processes, specifically the influence of atmospheric stability. The relative humidity on particle equilibrium size as a function of dry particle size and composition may also cause sizing artifacts in sample collected. This deliquescence effects on the deposition fluxes should receive attention. Buzorius et al. [1998] has suggested that the errors induced in deposition velocity may be large, causing an underestimate in deposition velocity under warm humid conditions.

The scientific information on the aerosol deposition flux in the tropical region where climatology is humid, are non existent while substantial data for the northern hemisphere are available in publications. As indicated in the objective of this project, the outcome of this study will supplement the EANET countries in the tropical regions to be able to estimate the dry aerosol depositions. Hence, the total depositions which include both the wet and dry depositions can be determined.

Scope of Activities

1. Direct measurement of aerosol deposition flux and velocity will be conducted in the forest in Thailand,
2. Principal aerosols to be study consist of SO_4^- and NO_3^-,
3. Seasonal effects on the deposition velocity will be determined,
4. Seasonal differences in the tropical region will be compared with the available inferential model applied for the sub-temperate region.

Budget Plan

The total cost of the project is 30,000.00 USD. They include,

1. Personnel cost	9,000	USD
2. Travel cost	4,200	

3. Equipment	4,150
4. Consumables	12,150
5. Communications	500
Total	30,000

Each item category is described below.

1. Personnel cost (9,000 USD)

The project will hire two full time persons. One person will respond to collect samples at the site and transport the samples to KMUTT laboratory (1 person x 300 USD/month x 12 month) = 3,600 USD. Another person is assigned to perform the laboratory chemical analyses (1 person x 450 USD/month x 12 month = 5,400 USD).

2. Travel cost (4,200 USD)

The transport cost covers the fuel and a rented car to deliver freshly prepared samplers to the Ratchaburi site and to bring the collected samples back to the KMUTT laboratory (approximately 200 km distance) every 3 days. The total cost is approximately 120 trips x 35 USD/trip = 4,200 USD

3. Equipment cost (4,150 USD)

Since the budget granted by EANET is not sufficient to cover for the overall equipment requirement, the project will mainly be supplemented by the KMUTT equipment. The KMUTT will provide a tower (10 m height) for installing the measuring equipments at the site, 10 filter packs and 3 impactors (PM 2.5) to collect aerosols, radiometer, soil heat flux meter, 3-D anemometer. The list below is the equipment employed under the EANET budget:

3.1 Data logger (1 unit)	1,350	USD
3.2 Volumetric flow meter (2 units)	1,500	
3.3 Relative humidity meter (1unit)	300	
3.4 PC to download data (1 unit)	1,000	

4. Consumables (12,150 USD)

The consumables include the following item:

4.1	chemicals	3,000	USD
4.2	filter materials	1,500	USD
4.3	Carrier gases	1,000	USD
4.4	IC anion column	3,550	USD
4.5	IC cation column	1,180	USD
4.5	miscellaneous	2,350	USD

5. Communications (500 USD)

The communication costs include the paper work, printing, mail, etc.

Timeframe/Schedule

The project composes of Phase I, II, III and IV, starting from the 3rd quarter of 2008 until the 2nd quarter of 2010. The activities for each phase can be described as follow:

Phase I (3rd quarter 2008 to 1st quarter 2009)

The work involved in Phase I are

- the site selection,
- personnel identification,
- purchase of instruments and
- preparation of the site.

The site will be a forest type of deciduous trees, located in Ratchaburi province (approximately 200 km from Bangkok). For this initialized phase I, a field staff and a lab technician will be recruited. The measuring instruments will be prepared and installed on the existing tower at the site. By the end of the 1st quarter of 2009, several trial runs will be carried out in order to check for the stability and accuracy of the installed instrument.

Phase II (2nd quarter to 4th quarter 2009)

The activities involved during phase II are:

- measurements at the site
- analysis of samples
- collection of other necessary data and information

The air samples will be collected continuously 24 hours on every Monday, Wednesday and Friday in each month throughout the year. Once the sample is collected, it will be kept in ice box and brought back to KMUTT laboratory immediately. Other parameters such as the wind speed, humidity, solar radiation, soil heat flux, etc. will be measured online at the site. The information on the topography of the site and the precipitations will be included in the report.

Phase III (3rd quarter to 4th quarter 2009)

By the end of Phase II, more than 50% of the data are expected to be collected and compiled. Phase III will be carried out in terms of data analyses and evaluation of the results. Progress on the work done will be presented and discussed at the 2nd Meeting of the Task Force on Monitoring for Dry Deposition (TF/MDD).

Phase IV (1st quarter to 2nd quarter 2010)

By the end of Phase III, data collection and analyses are expected to be completed. In the 1st quarter of Phase IV, a progress report, followed by the draft report of the project, will be prepared and submitted to the TF/MDD members for comments. The 2nd progress report will be carried out during the 2nd quarter of 2010 and circulated to the TF/MDD members for comments. The final report will be submitted to SAC10 by the end of the 2nd quarter of 2010.

The timeframe/schedule of the project is tabulated in Table 1

Table 1 Time frame/schedule of the project.

	Activities	2008		2009				2010		Responsible persons/agencies
		3rd Q	4th Q	1st Q	2nd Q	3rd Q	4th Q	1st Q	2nd Q	
Phase I: Planning										
1	Identification of site		x							Project leader
2	Identification of personnel		x							Project leader
3	Purchase of instrumentation			x						Project leader, NC
4	Preparation of site			x						Project team
Phase II: Measurement										
1	Measurements at site				x	x	x			Project team
2	Analysis of samples					x	x			Analytical laboratory
3	Collection of other necessary data and information				x	x	x			Project team
Phase III: Assessment										
1	Compilation of results					x	x			
2	Evaluation of results						x			
3	Discussion at 2nd Meeting of TF/MDD					x				
Phase IV: Report preparation										
1	Preparation of 1st progress report					x				Project leader
2	Preparation of draft report of the project						x			Project leader
3	Circulation of draft report to TF/MDD members for comments							x		NC
4	Circulation of draft report to SAC members for comments								x	NC
5	Preparation of 2nd progress report						x			Project leader
6	Submission of final report to SAC 10								x	EG chair

Responsible Person/Agency

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Output

1. Values of aerosol deposition flux and velocity in the tropical region
2. Improvement of the estimation method using the outcome of this study to relate with the inferential method for the velocity estimation

Reference

Buzorius, G., U. Rannik. J. Makela, P.M. Keronen, T. Vesala, and M Kulmala, Vertical aerosol fluxes measured by the eddy covariance technique using a condensational particle counter. J. Aerosol Sci., 29, 157-171, 1998.

(Minutes of the 2nd meeting of EGDDFE Annex 4)

SECOND MEETING OF THE EXPERT GROUP ON DRY DEPOSITION FLUX ESTIMATION

(Tokyo, 19 February 2009)

Future Plan of Activity (updated)