Department of Science, Technology and Environment (DOSTE) Ho Chi Minh City

NORAD
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NORWEGIAN AGENCY FOR DEVELOPMENT COOPERATION

Ho Chi Minh City Environmental Improvement Project
Air Quality Monitoring Component

AirQUIS Workshop no. 1
Workshop at Norwegian Institute for Air Research (NILU)
31 March – 11 April 2003

NILU

Norwegian Institute for Air Research

HEIA

**Ho Chi Minh City
Environmental Improvement Project
Air Quality Monitoring Component**

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AirQUIS Workshop no. 1
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Herdis Laupsa and Mona Johnsrud

Table of contents

1   Introduction

From 31 March to 11 April 2003 a workshop for Department of Science, Technology and Environment (DOSTE) in Ho Chi Minh City was held at NILU. A summary of the workshop is given below and the workshop program (Appendix A) and the participants list (Appendix B) are enclosed to this document.

The aim of the AirQUIS training was to give the participants an introduction on how to use the $AirQUIS_{2003}$ application. This was done by demonstration and explanation of the system in addition to active hands-on training by the participants.

2   Monday 31 March. Introduction and demonstration of AirQUIS 2003

The first day an introduction of the training program and demonstration of AirQUIS$_{2003}$ was held. This was to give the participants an overview and introduction to the AirQUIS$_{2003}$ system.

2.1   Introduction

- Presentation of the training program and aim of the training

2.2   Demonstration of AirQUIS

- Description of AirQUIS (Power point presentation)
- Demonstration of Geographical Information System (GIS)
- Demonstration of Measurement Module
- Demonstration of Emission Inventory Module
- Demonstration of Models Module
- Demonstration of Geographical Module
- Data import and data export
- The data set type and data type
- AirQUIS ADMIN Module

3 Tuesday 1 April. Main Module, Geographical Information System (GIS) and Admin Module

3.1 AirQUIS MAIN module

Main module is the superstructure of the software. A demonstration and hands-on training was given of the AirQUIS user interface and functionality tools.

3.2 Geographical Information System (GIS)

The Geographical Information System (GIS) is one of the main features in the system. The GIS functionality of the AirQUIS system is designed to offer several possibilities for understanding the problems of air pollution. The aim of the training was to give an overview of the possibilities of the GIS and how to use the AirQUIS GIS. The training was divided into two parts. The first part was to give an introduction and demonstration of the GIS by showing how to use the GIS functionalities. The second part was that the participants did hands-on training. The following tasks were demonstrated and trained on:

Introduction to GIS

- Concept of the Geographical Information System (GIS)
- AirQUIS themes and Shape themes
- Presentation of data by using Geographical Information System (GIS)
- Searching the database through Geographical Information System (GIS)
- Entering and editing data through Geographical Information System (GIS)
- Maps and Geographical Information System (GIS)
- Regions and region levels Geographical Information System (GIS)

Hands-on training GIS

- How to display a map
- How to use the GIS to place a theme on a geographical position

- How to use the GIS to correct/update geographical position of the data
- How to use GIS functionality to search and find properties of GIS themes
- How to display and present dataset on map and how to export maps.
- How to edit and update data by using the map.
- How to build the regions by shape files

3.3   AirQUIS ADMIN module

Only a short introduction to the admin module was demonstrated due to not completed implementation. Further training will be held during the installation in November 2003.

The following subjects were demonstrated and explained:

- Concept of the ADMIN module
- Project manager
- Change language
- Logging

During the training in November there must be focused on administration of ORACLE, database backup (import and export of database dumps) and the AirQUIS Admin module.

4   Thursday 3 April and Friday 4 April. Measurement module and automatic data import

Data from 9 monitoring stations in Ho Chi Minh City will be imported into the measurement module in AirQUIS. The features of the measurement module will be used to present and analyse the monitoring data. Another important task of the training was therefore the measurement module. The participants built a small measurement database with measurement data from a couple of stations in Ho Chi Minh City. In addition thorough training on how to use the application for analysing and presenting data was held.

4.1   Introduction to the measurement module

- General on database structure
- Preparation of input data
- Data Import (lookups, stations, time series, time values)
- Data retrieval and filters
- Graphs and statistics
- Use of flags in graphs and statistical calculations
- Meteorology calculations
- Automatic reports (see Appendix C)

Hands-on training – Measurement module

- Import lookup data
- Define stations and time series
- Import time values
- Presentation of time series (display and edit graphs, show threshold values, export graph)
- Calculation of statistical values
- Calculate wind rose, stability matrix and concentration load in a meteorological matrix
- Change flag interpretation in graphs and statistics

5 Monday 7 April. Introduction to the emission inventories module including emission inventory templates and data collection

The Department of Science, Technology and Environment has not yet started to collect emission inventory data for Ho Chi Minh City. Another main task of the training was therefore to go through the data emission inventory collection. This was done by detailed explanation of the concept of the emission inventory module and the emission inventory data collection templates.

The training program for 7 April focused on understanding the emission inventory module and the emission inventory data collection templates.

5.1 Introduction to the AirQUIS emission inventory database

An introduction and demonstration of the emission inventory module was held. Following main features were presented:

- **Emission inventory Lookups**
  - Source sectors
  - Fuel/Raw material/Product
  - Time variation

- **Point sources emission**
  - Industries
  - Stacks
  - Cleaning devices
  - Processes
  - Process data (Emission/Consumption/Production data)
  - Emission factors

- **Line source emission**
  - Static data
  - Dynamic traffic data
  - Lookups
  - Emission factors and dependencies

The traffic emission factors were briefly presented since this is a quite complex task and DOSTE will need more detailed information and help from NILU preparing this data.

Area emission sources

- Special lookups
- Regionally or gridded distributed consumption and emission data

Hands-on training - Emission inventory module

Hands-on training was carried out on the following tasks:

- Navigation in the Emission Inventory Module
- Lookup data
- Point source module
- Line source module
- Area source module
- Summary of Emission Inventory Module

5.2   Emission inventory templates and data collection

All the emission inventory import files (excel-files) were presented and explained. The connection between the import files and the emission inventory module was explained in detailed and information about required and not required data was given. Following tasks were presented:

- General lookup data
- Emission Inventory lookups
- Emission Inventory point sources
- Emission Inventory line sources
- Emission Inventory area sources

6 Tuesday 8 April. How to build an Emission Inventory Database

6.1 Introduction to how to build an Emission Inventory Database

The aim of the training "How to build an emission inventory database" was to let the participants get familiar with the structure of the emission inventory data, use of the emission inventory templates and how to import the data. In addition some advice about backup, how to structure the databases etc were given. The following tasks were presented:

- Concept of building a database
- Database structure
- Emission Inventory Import templates
- Order of importing data
- Backup (database dumps)
- Backup of import data
- Decisions to take before building a database
- Quality control of the emission inventory database

Hands-on training, emission inventory module

The participants built a complete emission inventory database of Oslo. The data was prepared on templates in advance.

7 Wednesday 9 April. Introduction to Geographical Data and to the AirQUIS models

7.1 Introduction to Geographical data

A demonstration and a presentation of the concept of the geographical data was given. The following tasks were presented:

- Grid
- Topography
- Population data
- Receptor point
- Building points

Hands-on training, Geographical data

The participants imported all geographical data for Oslo. The import files were prepared in advance.

7.2 Introduction to AirQUIS Models

A presentation and demonstration of the concept of the AirQUIS models was held. A short presentation of the different models was given and the concept of how to define, run and store model results was demonstrated. The following tasks were presented:

- **Meteorology model**
  - Meteorology composition
  - Mathew calculations
  - Mathew results

- **Emission model**
  - Emission composition
  - Emission calculations
  - Emission results

- **Dispersion model**
  - EPISODE -industry accident model
  - EPISODE- model
  - EPISODE- results

- **Exposure model**
  - Exposure model
  - Exposure results

The exposure model was only briefly discussed since this functionality is
not completely implemented yet.

Hands-on training models

The participants defined and ran the wind field model, the emission model
and the dispersion model for some emission sources in Oslo.

8 Thursday 10 April. Application of the total AirQUIS system and Summarizing the Emission Inventory data collection

8.1 Application of the total AirQUIS system

Hands-on training - Use of the total AirQUIS system

The participants did hands-on training of the emission inventory module and the AirQUIS models.

8.2 Summarizing the emission inventory data collection

All the templates were explained once more and the participants discussed and asked questions on how to collect the emission data. A summary of the discussion is given below:

- **Lookup data**
  - **Fuels/Product/Raw Material**

    Probably there is no default list for Fuels/Product/Raw Material for Vietnam or Ho Chi Minh City. They prefer to use some official default list for Europe (Corinair) or USA (USEPA).

    NILU has to prepare this list and sent it to DOSTE as soon as possible.

    They expect to use both fuel consumption and raw material consumption. Products will not be used.

  - **Source sectors**
    There is no default list for Source sectors for Vietnam or Ho Chi Minh City. They prefer to use some official default list for Europe (Corinair) or USA (USEPA).

NILU found a couple of Internet addresses for this list as well as a document describing these lists.

– http://reports.eea.eu.int/92-9167-033-2/en/TopRep12-96-Annex-1c.pdf

– http://reports.eea.eu.int/92-9167-033-2/en/TopRep12-96-Annex-1b.pdf

– ESTIMATING AND REPORTING EMISSION DATA. DRAFT GUIDELINES FOR EB.AIR/GE.1/2001/6 27 June 2001

NILU has to decide which list to use and send it to DOSTE as soon as possible.

o **Time variations**
The participant discussed the availability of time variation for different sources. As a first suggestion they will try to get time variations for the following sources:

- Traffic:
Traffic is one of the main sources to pollution in Ho Chi Minh City. DOSTE will try to get at least one time variation used for all vehicle types and all road classes.

- Power plants:
DOSTE expects to get one time variation for this main source and use the same time variation for all power plants.

- Other industry (point sources)
The production time depends on the demand of the product, so time variation might be very difficult to get and will probably be very uncertain. DOSTE will therefore probably not use any time variation for other point sources than power plants.

- Area sources.
DOSTE does not expect to get any time variation for area sources.

o **Components**
DOSTE will run the models for other components than the predefined components in the AirQUIS system.

NILU has to make procedures for how to add new components for model runs.

- **Industry data**
  NILU gave some examples on how to make unique ID's for industry data.

  DOSTE will need help to find emission factors for different industries since this type of information is probably not available. Some of the required parameters for the stacks may be difficult to collect. NILU must therefore give help and advice to get the most important physical parameters and help to estimate missing information if necessary.

  NILU has to give some advice or help to get emission factors for different industries and fuel types. In addition NILU has to help DOSTE in estimating missing information if necessary

- **Traffic data**
  - **Vehicle classes**
    The participants discussed the vehicle class list and the following suggestion of vehicle list was given:

ID	Road Vehicle Class (RVC) Name
1	Light duty vehicles
2	Heavy duty vehicles
3	Buses
4	Motorbikes

    DOSTE need information on how to distinguish between light and heavy vehicles.

    NILU has to give some advice on how to distinguish between vehicle types.

  - **Road classes**
    The participants discussed the Road class list and the following suggestion of Road class list was given:

ID	Road Class Name
1	Major road / transit road
2	City centre street
3	Residential area street
4	Industrial area street
5	Local road

o **Road node definition**
The road links are already well described by the shape files. It is probably possible to create road nodes from the existing shape files.

NILU must give help and advise on how to use Arcview to prepare the road link network from shape files.

o **Static data**
It is probably possible to create road links from the existing shape files.

NILU must give some advise on how to use Arcview to prepare the road link network from shape files.

o **Dynamic data**
No comments

o **Road link vehicle distribution**
No comments

o **Traffic emission factors**
The traffic emission factors were only briefly presented. No detailed description was given during the workshop.

DOSTE need help to prepare the Traffic emission factors for Ho Chi Minh City.

o **Area Source Definition**
The group discussed which type of sources are the most important area sources. Some suggestions were given:
   − Open air burning
   − Farming
   − Gasoline stations
   − Home cooking

The area sources will probably be region-based sources.

The area sources are probably the less important sources and might therefore have lowest priority.

- **Geographical Data**
  - o **Regions and region levels for the Geographical Information System**

    Before the workshop DOSTE sent both shape file for regions as well as shape files for map layout. Following shape files have been sent:

    - Districts
    - Main roads
    - Minor roads
    - Rivers
    - Streams

    The shapes for regions have to be reorganised before the files can be used in AirQUIS. The group discussed the region levels and how to prepare the region shape file for AirQUIS. The following suggestions were given:

    Regions will be divided into the following Region levels:

1	City
2	District
3	Special areas
4	Ward

In addition one shape covering the whole area and a shape file containing the districts must be created. The shape files for wards (lowest level) are the shape files sent to NILU as district shapes. In the shape files the coding between the different levels must also be defined. A suggestion is given below:

Region Identification Number	Region Name	Region Level	Parent Region Identification Number	Shape Key
701	City	1		701
70129	Binh Thanh	2	701	70129
70139	Binh Chanh	2	701	70139
7013907	Da Phuoc	3	70139	7013907
7013915	Binh Chanh	3	70139	7013915
7013923	Vinh Loc A	3	70139	7013923
7013927	Pham Van Hai	3	70139	7013927
7013929	Le Minh Xuan	3	70139	7013929
7013925	Vinh Loc B	3	70139	7013925

The shape files will be prepared by DOSTE and sent to NILU as soon as possible but not later then 1st of July.

o **Grid**
The model area is not defined yet. The downtown of HCMC is approximately 20*30 km.

NILU has to decide if they should use 1 km or 500 m grid cells and the height of the modelling area (number and size of the vertical layers).

o **Topography**
It has to be decided if topography data should be used for model calculations.

If topography should be used, DOSTE need help to create gridded topography values from height curves by using Arcview.

One has to decide if it's necessary and possible to use more stations as input.

o **Receptor point**
Receptor points are defined by DOSTE

o **Building points**
Building points will not be used

o **Population data (building or field data).**
Population in buildings will not be used. DOSTE expect to get data on regions.

NILU has to implement a conversion routine from regions to grid.

9 Friday 11 April. Summary of AirQUIS training and application

The last day a short summary of the application was given before lunch.
After lunch a short summary of the workshop was held.

- Software
  NILU installed the newest AirQUIS version on the laptop. In addition
  some empty projects and one complete Oslo project is stored on the
  computer.

- User documentation
  NILU will finish a first version of the user documentation within June.
  This will be sent by e-mail to DOSTE.

- The following tasks were not trained in detail during the workshop due
  to incomplete implementation.
    - o Admin module/Oracle
    - o Import and export of dumps
    - o Traffic emission factors
    - o Exposure model

- Data collection and preparing the import templates for AirQUIS
    - o Final version of import templates will be sent from NILU as
      soon as possible.
    - o DOSTE contacts NILU by mail or telephone if there are any
      questions regarding data collection or AirQUIS.

- Import data to emission inventory module
  Please, see workshop report on Thursday 10 April for detailed
  information.

Appendix A

Time schedule for
AirQUIS training

Time schedule for AirQUIS training

Date		Topic	Responsible
Monday 31 Mar 2003	AM	Introduction to NILU Presentation of workshop program Guiding to NILU	B. Sivertsen/ T.N. Thanh
	PM	Introduction to AirQUIS (DEMO) • Navigation through the system	H. Laupsa
Tuesday 1 April	AM	AirQUIS - Geographical Information System (GIS)	H. Laupsa
	PM	AirQUIS hands-on training • GIS	H. Laupsa
Wednesday 2 April	AM	Introduction to Air quality models Abatement strategy planning	B. Sivertsen/T. Bøhler S. Larssen
	PM	QA/QC in measurements PM$_{10}$ measurements	L. Marsteen R. Dreiem
Thursday 3 April	AM	AirQUIS - Measurement module	M. Johnsrud
	PM	AirQUIS -Automatic data import	T.N. Thanh
		AirQUIS - Statistics and reporting	M. Johnsrud
		AirQUIS hands-on training • Measurement module	M. Johnsrud
Friday 4 April	AM	AirQUIS hands-on training (cont.) • Measurement module	M. Johnsrud
	PM	Demonstration of Internet applications at NILU - Discussions	G. Endregard/B. Sivertsen/T.N. Thanh
Sat - Sun		Sightseeing	TNT/BS
Monday 7 April	AM	AirQUIS - Introduction to emission inventories module	H. Laupsa
	PM	AirQUIS hands-on training Emission inventories	
Tuesday 8 April	AM	AirQUIS – Emission inventory templates and data collection	H. Laupsa (R. Ødegård)
		Mr Khoa visit to SFT	
	PM	AirQUIS – Emission inventory- build a database	B. Sivertsen H. Laupsa (R. Ødegård)

Date		Topic	Responsible
Wednesday 9 April	AM	AirQUIS – Introduction to admin module, general lookups and geographical data AirQUIS – introduction to AQ - models • Wind field • Emission • Dispersion • Exposure	H. Laupsa (R. Ødegård)
	PM	AirQUIS hands-on training • Run AirQUIS models	
Thursday 10 April	AM	AirQUIS hands-on training • Run AirQUIS models- cont.	H. Laupsa
	PM	AirQUIS – Emission inventory templates and data collection • Summary and discussion	H. Laupsa
Friday 11 April	AM	AirQUIS- Summarise use of applications Questions and answers	H. Laupsa
	PM	Prepare the data collection system for DOSTE Assure proper understanding Summarising the training - closing	T.N. Thanh/H. Laupsa/ R. Ødegård B. Sivertsen

Appendix B

List of participants

List of participants

No.	Name
1	Le Van Khoa, DOSTE
2	Vo Thanh Dam; DOSTE
3	Tran Thanh, DOSTE

Appendix C

Dataflow

Dataflow

Automatic dataflow

EnviMan - Automatic Data Export

- 1 ASCII-file updated daily containing up to 1 month of measurement data
- 1 h resolution of measurement data in fixed columns with no quality flag
- 8 air quality components (NO, NO2, SO2, O3, CO, PM10 (old), PM10 (new), PM2.5)
- 7 meteorological components (Wind Direction, Wind Speed, Temperature1, Temperature2, Relative Humidity, Pressure, Radiation)

Automatic dataflow

AirQUIS - Automatic Data Import

- Predefined time schedule for reading exported ASCII-files in predefined directory on the AirQUIS server
- The user can preconfigure the verification of no measurement, missing data, above, below, QC-flag, scaling and unit convertion for each component
- Automatic storage into the AirQUIS database after verification
- Time series connected to the components must be predefined in AirQUIS
- QC-flags must be predefined in AirQUIS

The Nguyen Thanh: HEIA11042003.PPT
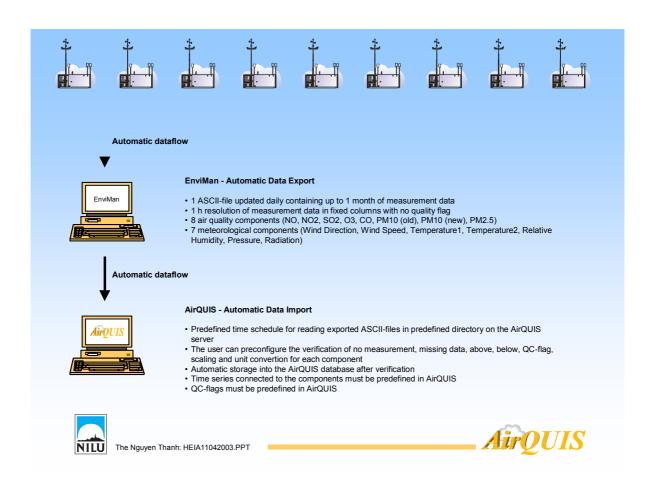
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ABSTRACT
The Ho Chi Minh City Environmental Improvement Project, Air Quality Monitoring Component (HEIA) is being supported by NORAD and is being undertaken by NILU.

From 31 March to 11 April 2003 a workshop for Department of Science, Technology and Environment (DOSTE) in Ho Chi Minh City was held at NILU. A summary of the workshop is given in the report.

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KEYWORDS		
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ABSTRACT (in Norwegian)

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