NILU: F 8/2008

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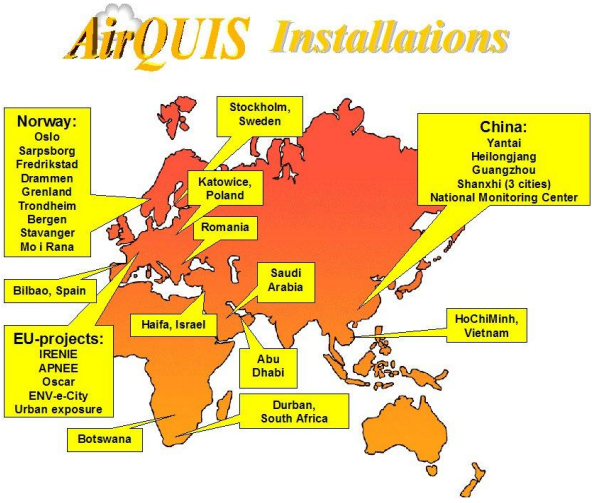
REFERENCE: E-106057
DATE: APRIL 2008

NILU international assignments and the AirQUIS system



Presented at a meeting wit Vaisala OY, Finland Kjeller 9. April 2008

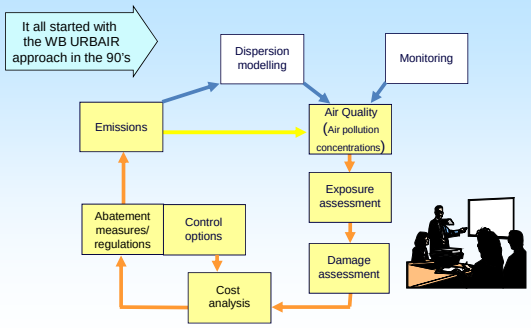
Bjarne Sivertsen

The Air Quality Management System

AirQUIS

Developed by the
Norwegian Institute for Air Research

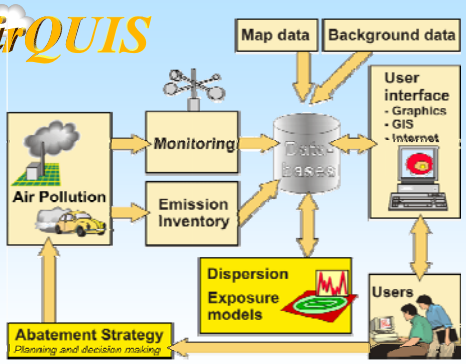
AQ Management model concept



A complete Air Quality Management System

- Monitoring (Air Qual.)
- Meteorological data !
- Data retrieval
- QA/QC
- Databases (GIS based)
- Dispersion Models
- Assessment tools
- Planning tools
- Forecasts (met+AQ)

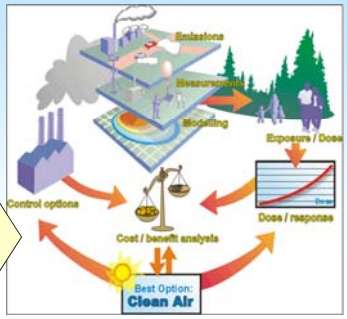
AirQUIS



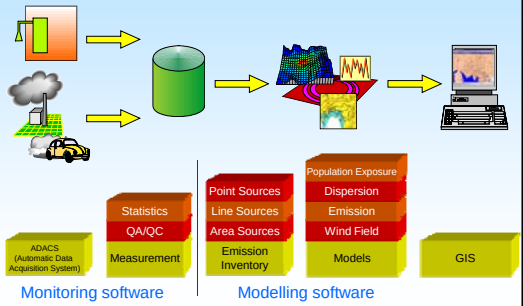
AQMS – main objective:

Identify actions to improve air quality

Identify most cost-effective options



AirQUIS Software system

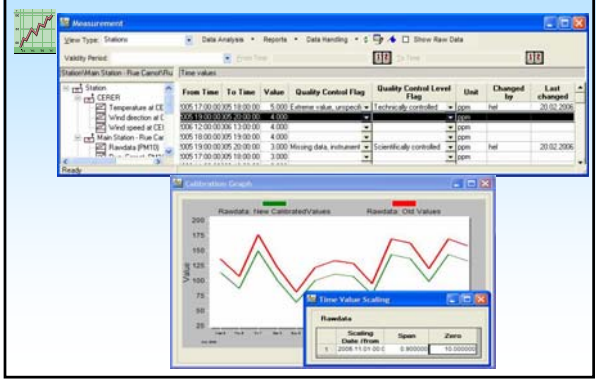


AirQUIS application

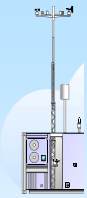
Measurement database

- **Database: Retrieve, organise and store data**
- **Quality control**
- **Data presentation**
- **Graphics and statistics**
- **Data as input for model calculations**

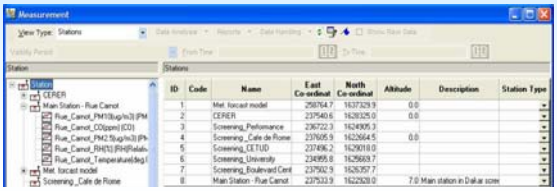
Measurement data – quality control



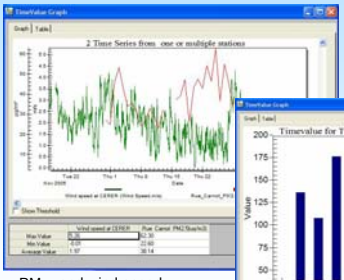
Measurement database



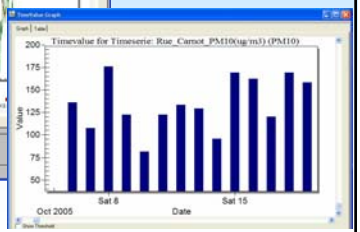
- Stations
- Components
- Time series



Measurements – time series

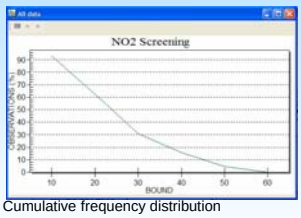


$PM_{2.5}$ and wind speed

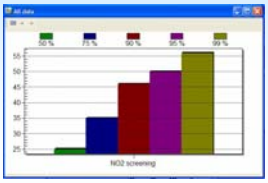


Daily values of PM_{10}

Measurement - statistics

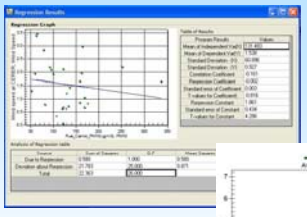


Cumulative frequency distribution

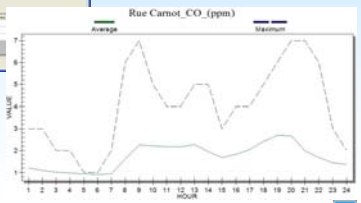


Percentiles

Measurement - statistics



Regression: PM_{10} v.s wind speed



Diurnal variation CO

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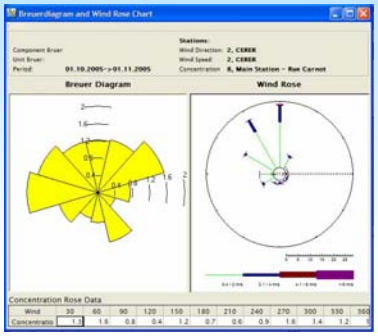
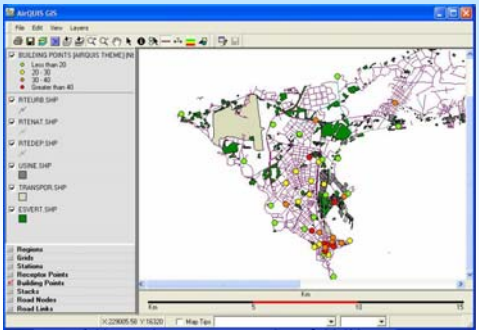
Measurements - air quality statistics



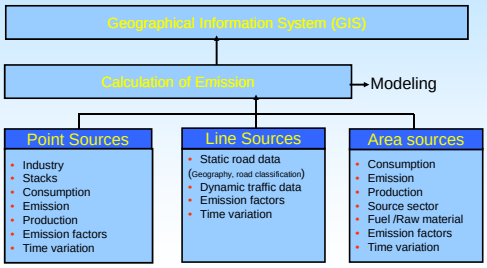
Measurement data presentations



The emission inventory

The atmospheric emissions inventory is a compilation of all sources of air pollution within an area

The emission inventory database



Emission inventory templates

Stack data											
Stack ID	Stack name	X Co-ordinate	Y Co-ordinate	Stack height (m)	Stack Diameter (m)	Gas Temperature (C)	Gas Velocity (m/s)	Gas Flow Rate (m^3/s)	Building Height	Building Width	Industrial Plant Name
30100501	Pipe 301005-1	600669	6645282	10	0.5	130	16.27	3.19	5	10	Industry nr 301005
30100601	Pipe 301006-1	598856	6646044	20	0.5	178	10	2.00	5	10	Industry nr 301006
30101201	Pipe 301012-1	604096	6646518	46	0.9	250	20	6.67	18	28	Industry nr 301012
30101301	Pipe 301013-1	600071	6644966	14	0.4	190	12.6	10.00	6	10	Industry nr 301005
30101502	Pipe 301015-2	598835	6644487	40	3	225	5	35.34	18	40	Industry nr 301006
30101901	Pipe 301019-1	604474	6649890	30	0.8	110	20	10.00	12	18	Industry nr 301012

A number of Excel based templates for collecting of input data

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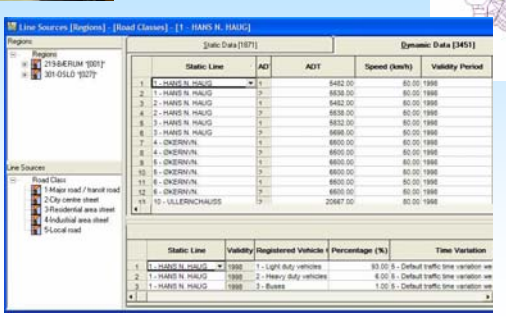
Traffic data



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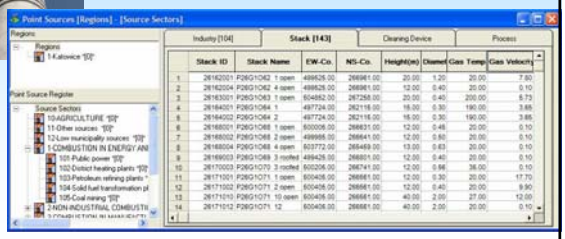
Industrial data



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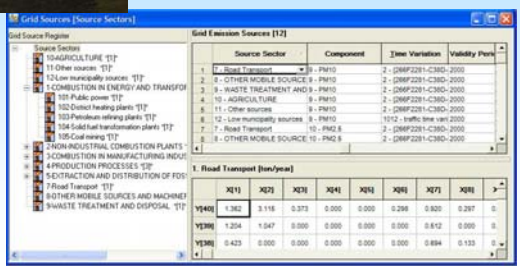
Area source data



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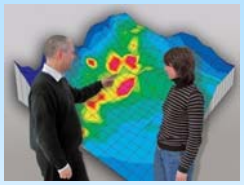

AirQUIS models

- Emission model
- Wind field model (MATHEW)
- Dispersion model (EPISODE)
- Exposure model

AirQUIS modelling

Spatial distribution of pollutant concentrations

Source contribution quantification

Effects of suggested measures

Exposure Estimates

Forecasting

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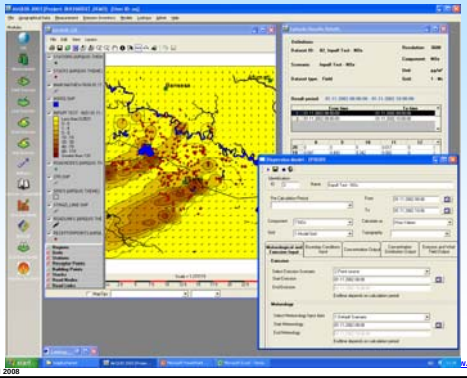
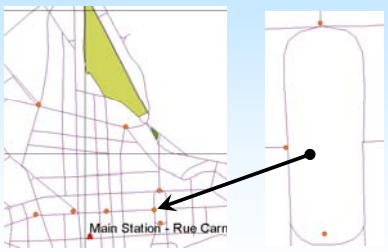
GIS applications

- Visualize information
  - e.g. sources, measurement stations
- Show relationships
  - sources/stations/concentration distribution
- Create and update data
- Present results
  - Reports/internet

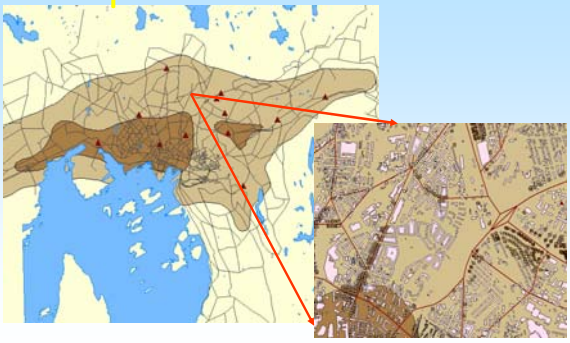
Dispersion Models



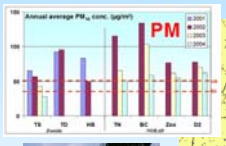
Vizualisation of data

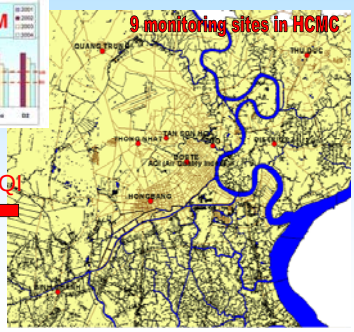


GIS presentations

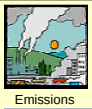


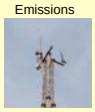
AQM in Ho Chi Minh City





Model development

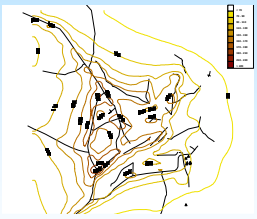

Emissions


Meteorology


Air Quality

118 roads
125 stacks
(70 plants and ind.)
+ all areas

model test evaluation



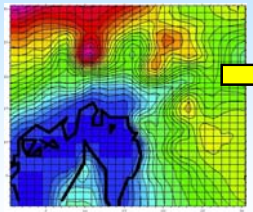
Operational dispersion model

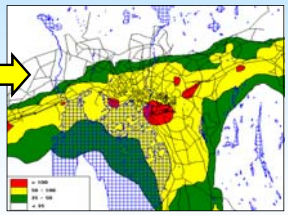
Air Quality Forecast

1. HIRLAM 50 (Atlantic ocean north of 20 deg)
2. HIRLAM 10 (North Western Europe)
3. MM5 (regional scale 3 km res.)
(inner city, local 1 km res.)

48 h prognoses - 1,25 hours at CRAY T3E

"Better city air" -





Important parameters:
- Topographical and surface features
- net radiation - surface temperatures
- clouds and snow cover
Uses NOAA Satellite data

NO_2 (µg/m3) 24h forward

DNMI

Model applications

- Environment impact assessment
- Surveillance and management
- A.Q. forecasting and early warning
- Optimal abatement strategies
- A.Q. information systems

Web solutions AQ data information

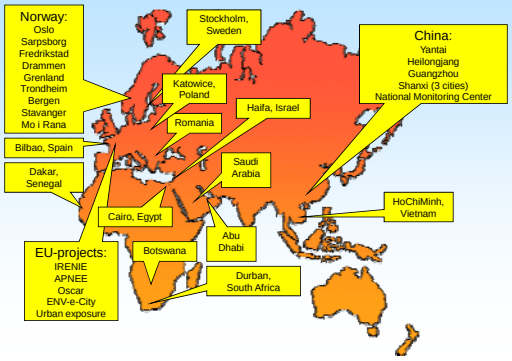
Public pages

Admin pages

AirOnline

www.luftkvalitet.info

AirQUIS Installations



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E-mail: nilu@nilu.no

The Norwegian Institute for Air Research

International assignments

Coordination

- *EMEP-CCC*
- *WMO-GAW*
- *NDSC*
- *AMAP*
- *HELCOM*
- *OSPARCOM*
- *EUROTRAC*
- *CEC – EEA, DG ENV*
- *CEC – DG RES*

Some NILU clients:

- UN ECE, Europe
- European Environmental Agency
- European Commission
- World Bank
- World Meteorological Organisation
- World Health Organization (WHO)
- UNEP
- The European Bank for Reconstruction and Development

Development projects:

- NORAD
- DANIDA
- Guangzhou Science and Technology Commission (China)
- Egypt Environmental Affairs Agency
- ERWDA, Abu Dhabi, UAE
- Department of Mines, Botswana
- DOSTE, HCMC Vietnam
- SEC, Saudi Arabia

NILU as international data centre

NADIR

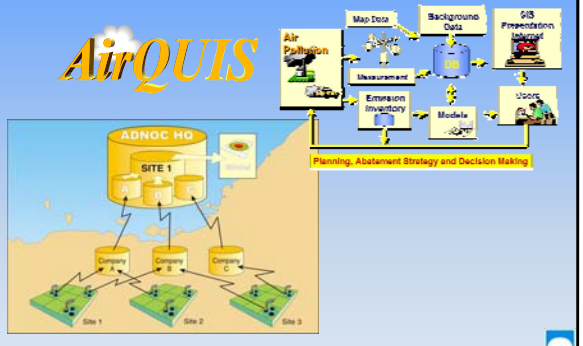
- EMEP-database
- OSPARCOM-database
- The World Data Centre for Surface Ozone
- HELCOM database
- European Emission database on POPs
- AMAP-database
- Third European Stratospheric Experiment on Ozone -database

Local scale :

Air Quality monitoring and EIA

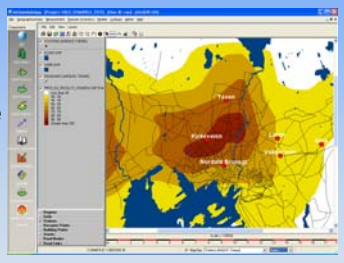
- ✓Design monitoring programmes
- ✓Undertake measurements
- ✓Siting studies
- ✓Background studies
- ✓Model estimate consequences
- ✓Optimise mitigation plans
- ✓Urban AQ assessments
- ✓Air Quality forecasts
- ✓Dissemination of information

Integrated solution using AirQUIS



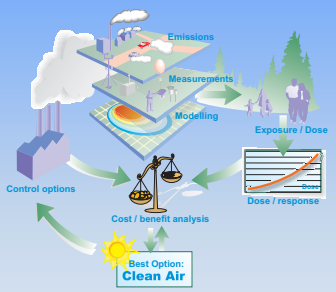
A complete AQMS

- Monitoring
- Data retrieval
- QA/QC
- The GIS database
- Models
- Input data
- EIA
- Forecasts



Optimal Abatement Strategy plan

Identify actions to improve air quality



most cost-effective options

Monitoring of:

Air Quality and Meteorology

For different clients and for basic science

Ambient and in-doors

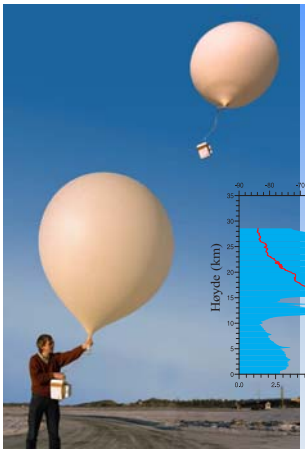
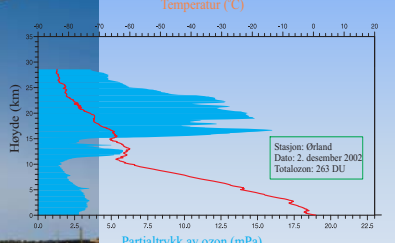





Global and Arctic research

Ny Ålesund station

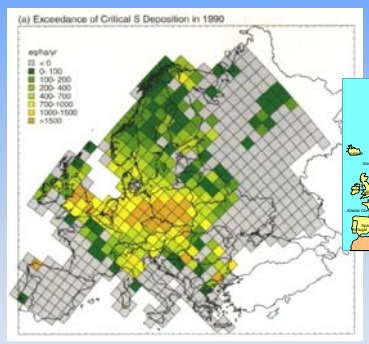

Ozone profiles

International assignments

UN-ECE Convention on Long-Range Transboundary Air Pollution

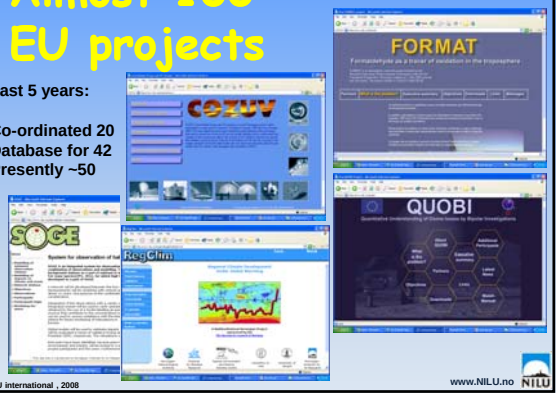
EMEP



Almost 100 EU projects

Last 5 years:

Co-ordinated 20
Database for 42
Presently ~50



NILU provides Internet solutions

On-line information for your mobile telephone

With AirQUIS as a GIS-based database on-line data can be accessed directly:

- **Grenland (APNEE)**
- **Cities in Norway**
- **Industrial impact, Svanvik**
- **Local communities**
- **Haifa , Israel**
- **Romania**
- **AbuDhabi**
- **Durban (RSA)**

Norwegian Institute for Air Research

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