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Estimation of urban air quality with respect to the EC directives on NO_2 and PM_{10}

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October 12-17, 2002

Estimation of urban air quality with respect to the EC directives on NO_2 and PM_{10}

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Overview

- Brief description of AirQUIS
- Model evaluation
- Exposure Estimates with recpect to the EC directive
- Estimation of Source Contributors
- Concluding remarks

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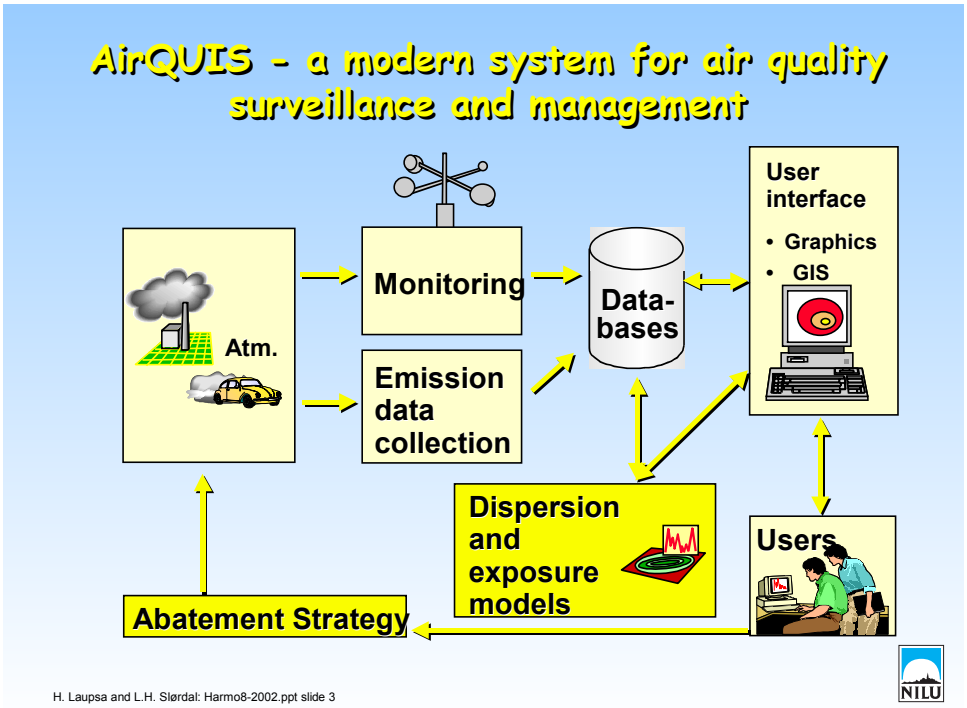
AirQUIS - a modern system for air quality surveillance and management
Atm.
Monitoring
Emission data collection
Data-bases
User interface
• Graphics
• GIS
Dispersion and exposure models
Users
Abatement Strategy
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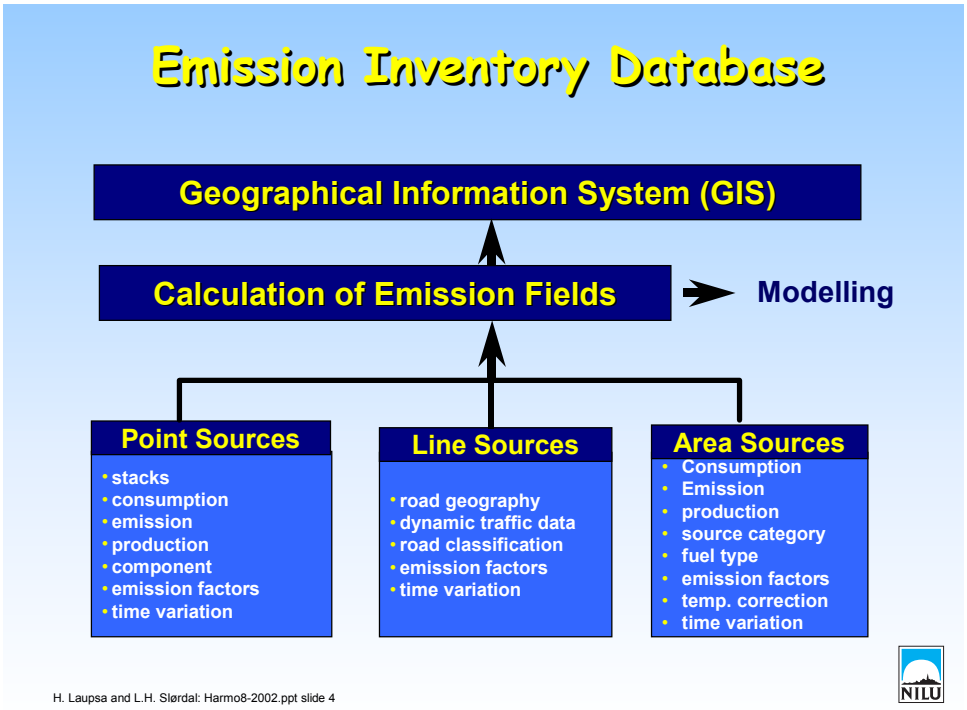
Emission Inventory Database
Geographical Information System (GIS)
Calculation of Emission Fields
Modelling
Point Sources
• stacks
• consumption
• emission
• production
• component
• emission factors
• time variation
Line Sources
• road geography
• dynamic traffic data
• road classification
• emission factors
• time variation
Area Sources
• Consumption
• Emission
• production
• source category
• fuel type
• emission factors
• temp. correction
• time variation
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Models in AirQUIS

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MODEL RESULTS AND EVALUATION !

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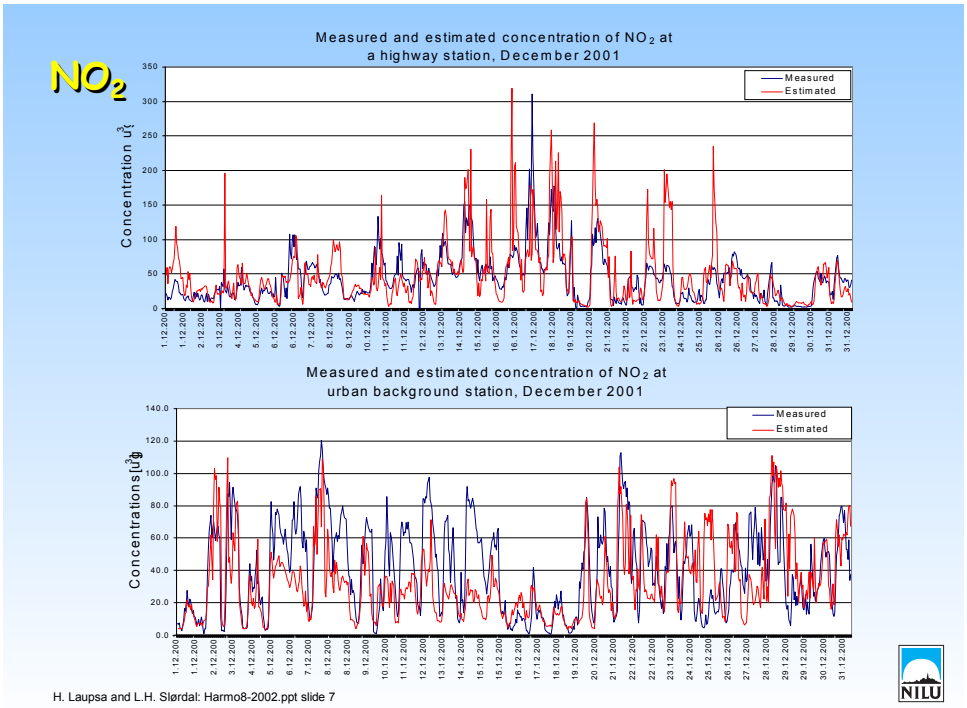

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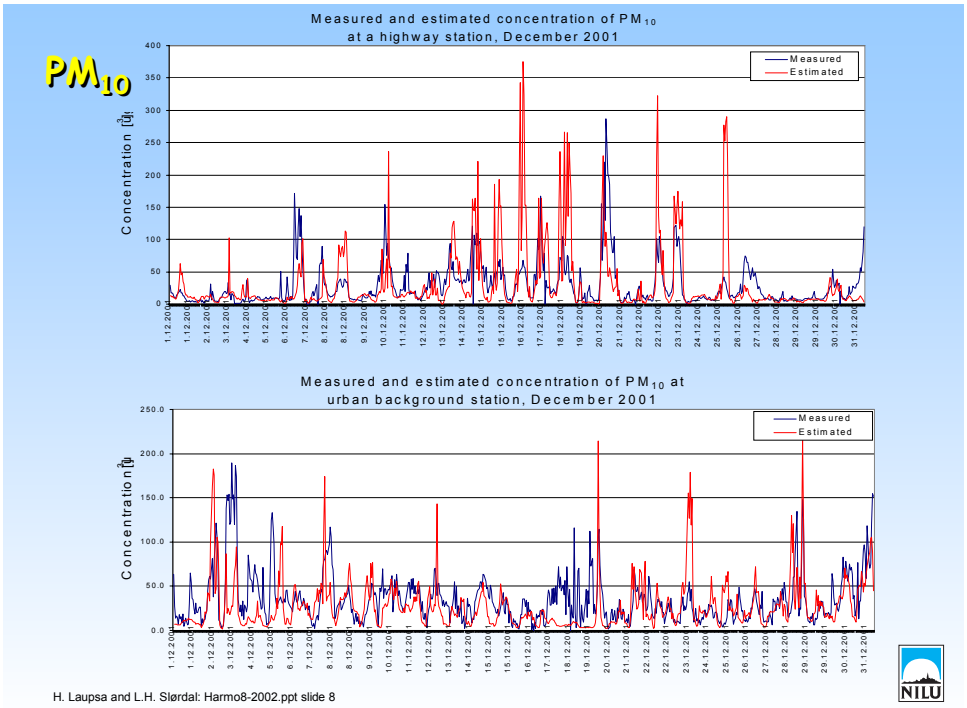

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Statistics of NO_2 and PM_{10}
Jan.-April and Oct.-Des.2001

OSLO		NO_2 (Urban street station)		NO_2 (Highway station)		PM_{10} (Urban street station)		PM_{10} (Highway station)	
		Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.
Mean value	($\mu g/m^3$)	40.0	44,5	46.9	61.3	26.9	21.9	33.3	28.2
Standard deviation	($\mu g/m^3$)	24.4	28.1	31.3	47.0	23.1	29.5	37.6	40.7
Maximum value (hourly)	($\mu g/m^3$)	184.7	145.3	311,1	319,0	227.8	350.5	310.4	375.4
Correlation coefficient		0.62		0.68		0.39		0.51	
Root Mean Square Error	($\mu g/m^3$)	17.5		25.2		17.03		21.1	
Slope of linear regression line		0.72		1,02		0.50		0.55	
Intercept of regression line	($\mu g/m^3$)	15.8		13.2		8.57		9.56	

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The EC Directives
1999/30/EC

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Number of inhabitants exceeding the limit values

	Total number of inhabitants: 507 467	
PM_{10}	Number of exceedances above the limit level:	215 455
NO_2	Number of exceedances above the limit level:	370

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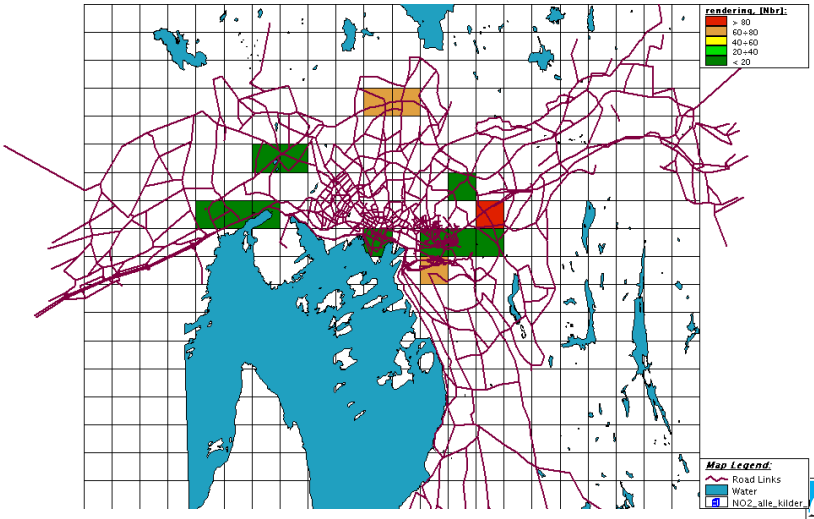
Number of people exposed beyond the limit value of NO_2



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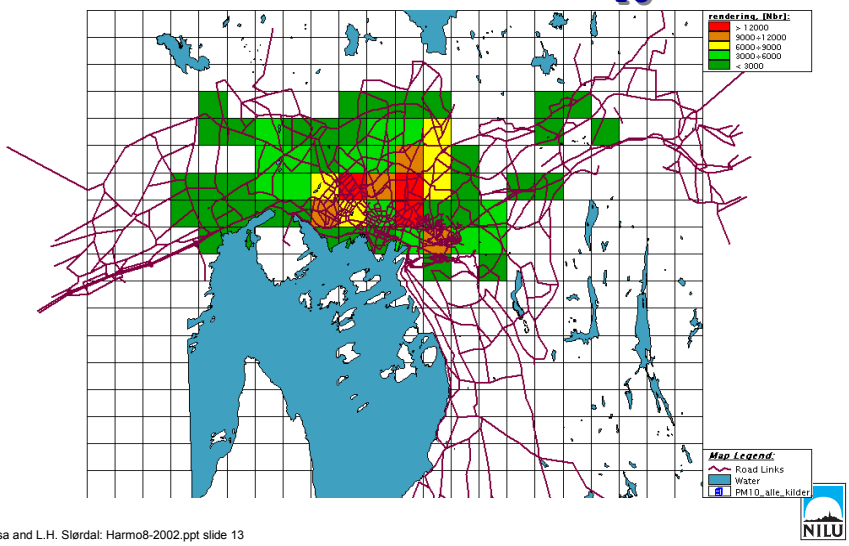
Number of people exposed beyond the limit value of PM_{10}



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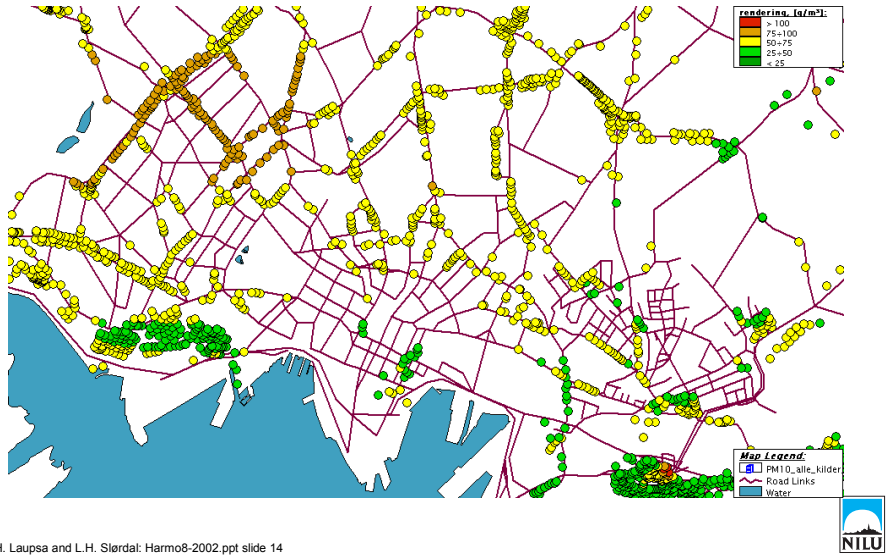
Calculated PM_{10}-concentrations

8. highest daily building point value ($\mu g/m^3$)



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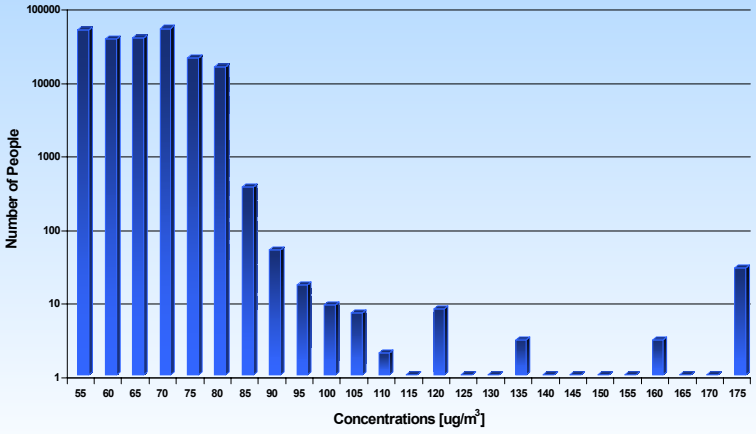
Degree of exceedance above the PM_{10} limit value



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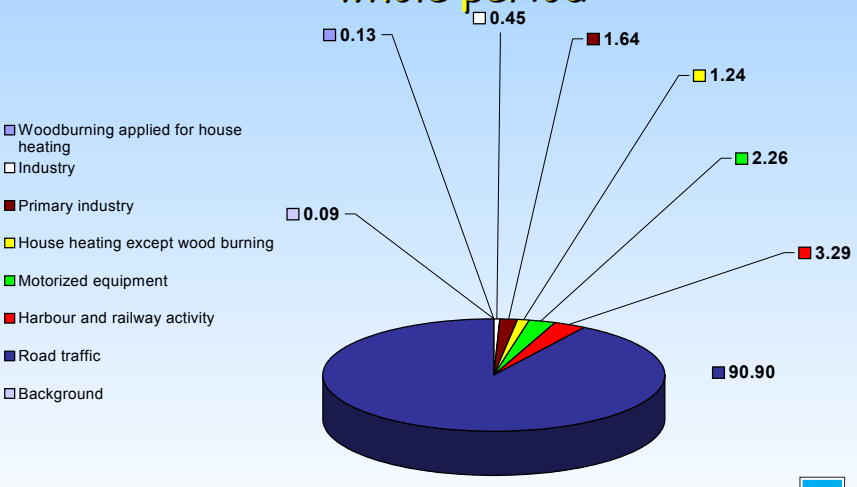
Source contributors to exceedances of NO_2 for an example grid square, whole period



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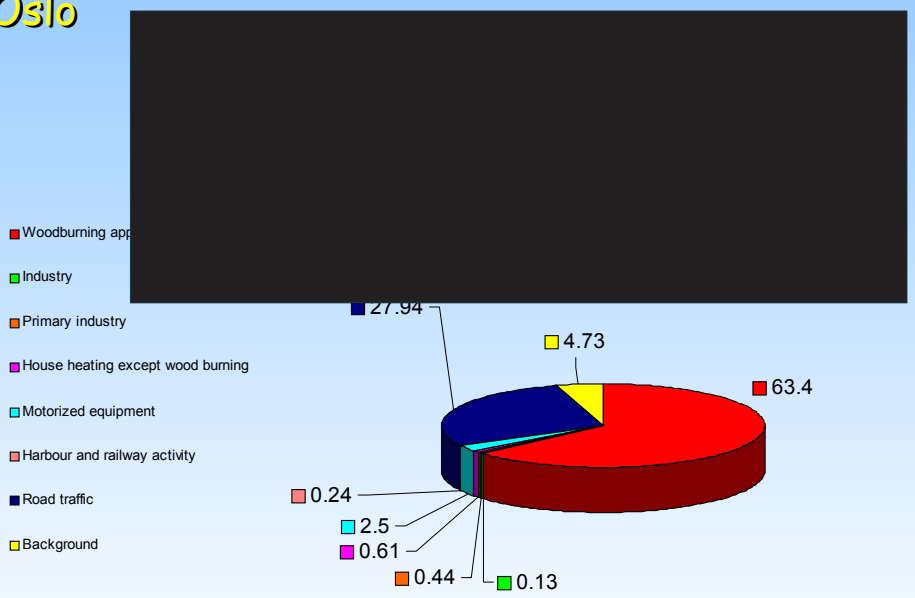

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Concluding remarks

- Observed PM_{10} and NO_2 levels are reproduced quite well with the model system
- The AirQUIS system is a valuable tool for
  - relating exposure levels to existing air quality standards
  - estimating blame matrixes for a set of predefined source categories

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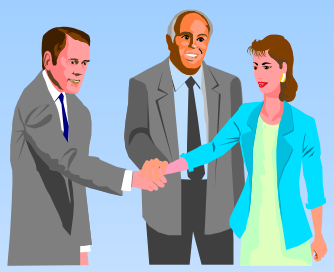
Further work

H. L

Acknowledgements



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  - Colleges at NILU

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