



vito

vision on technology

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PROMOTE: AURORA for Prague

F. Lefebvre, K. De Ridder, J. Maes, K. Van de Vel, J. Vliegen

VITO – Flemish Institute for Technological Research, Mol, Belgium (filip.lefebvre@vito.be)

M. Kazmuková

URM – City Development Authority of Prague, Czech Republic

J. Macoun

Czech Hydrometeorological Institute, Prague, Czech Republic

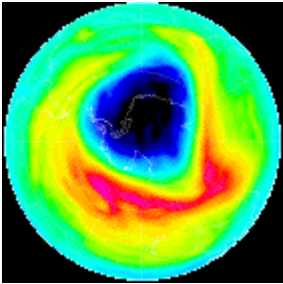
PROMOTE background

GMES: Global Monitoring for Environment and Security

- » 1 of the ESA contributions is the GMES Service Element (GSE) Programme, target is
 - » operationalization of information services
 - » to respond directly to the needs of users
- » PROMOTE: 2004 – 2009
 - » the GSE project dealing with the atmosphere
 - » consortium of ~ 30 partners involved in service provision
 - » most services operational and freely available

PROMOTE portfolio

5 themes based on user requirements and maturity of satellite and ground-based observations



Ozone



UV



Air Quality



**Climate Study
Support**



**Aviation
Support**

www.gse-promote.org

air quality services

- » Products
 - » **Global and European Air Quality records**
 - » **European-scale Air Quality** analyses and forecasts (daily)
 - » **Local/urban-scale Air Quality forecasts and assessments**
 - » **Desert dust awareness** (regional)
 - » **Pollen** (regional → European)
 - » **Satellite-based ground-level PM** (regional and European)
- » User applications
 - » Monitoring of levels and changes in atmospheric pollutants
 - » Assessments & monitoring of European and national air quality
 - » Scenario assessments
 - » Minimization of health impacts to European citizens

Table 2.3. Comparison of air quality monitoring and dispersion modelling as tools for assessing air quality

Task	Relevance to:	
	Monitoring	Modelling
Assessing true concentrations	High	Low ^a
Alert systems	High	Low
Assessing variability in time	High	High
Assessing variability in space	Low ^b	High
Assessing concentrations in future	Low	High
Source apportionment	Low	High

^a Modelled results should always be compared with some measured values to assure that the model is reliable and the input data correct.

^b Increasing the number of monitors or samples can improve the spatial resolution and coverage of the monitoring network.

Monitoring ambient air quality for health impact assessment.
 WHO regional publications, European series, no. 85, 1999.

AURORA

- » 3-D urban/regional chemistry-transport model
- » spatial resolution ~ 1-10 km
- » processes:
 - » advection, turbulent diffusion
 - » gas phase and secondary particle chemistry
 - » dry & wet deposition
- » requires specification 3-D meteorological fields
- » emissions from local source or using the EMAP tool
- » employs detailed terrain information: CORINE land cover, USGS DEM, satellite NDVI & SST, ...
- » “nesting” within European-scale core service model output (EURAD, CHIMERE, ...)
- » typical output consists of hourly 1-km gridded concentrations of O₃, NO₂, PM₁₀, PM_{2.5}, ... for a full year

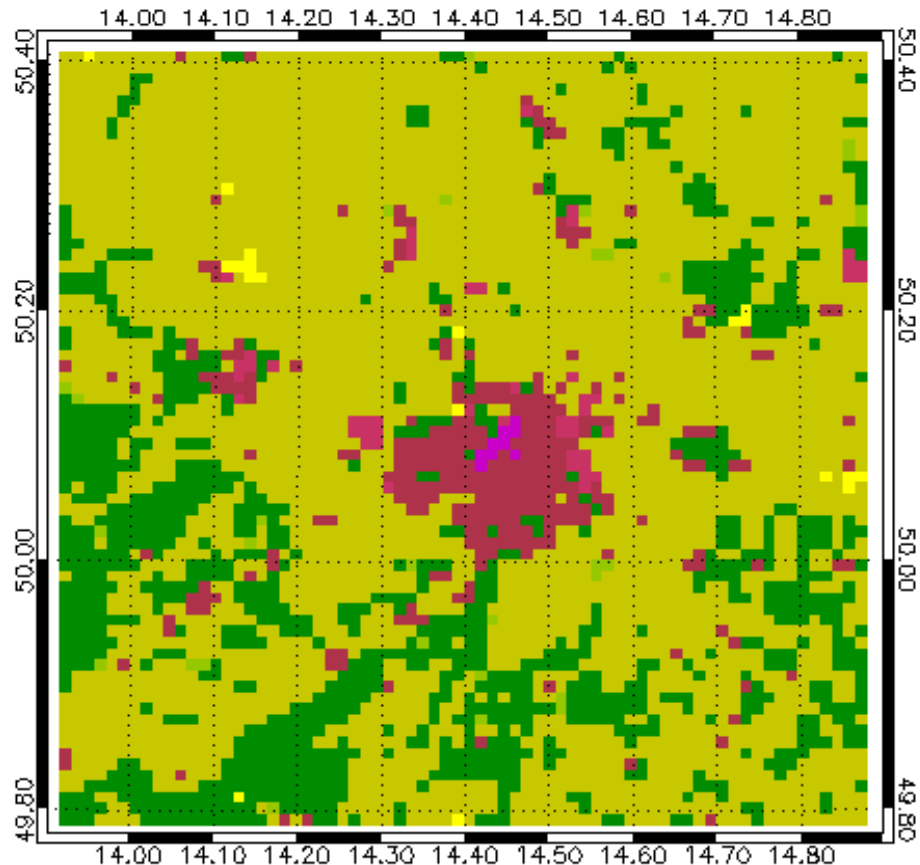
AURORA in PROMOTE

- » air quality **forecasts** for
 - » Belgium
 - » Belgian cities (Antwerp, Ghent, Brussels, Liège, Charleroi)
- » air quality **assessments** for European cities and urban agglomerations (incl. CITE-Air index calculation)
 - » Antwerp-Brussels-Ghent
 - » Rotterdam
 - » **Prague**
- » air quality **scenario** studies
 - » Antwerp-Rotterdam area

Prague – simulation configuration

domain
70 x 70 km²,
1 km resolution

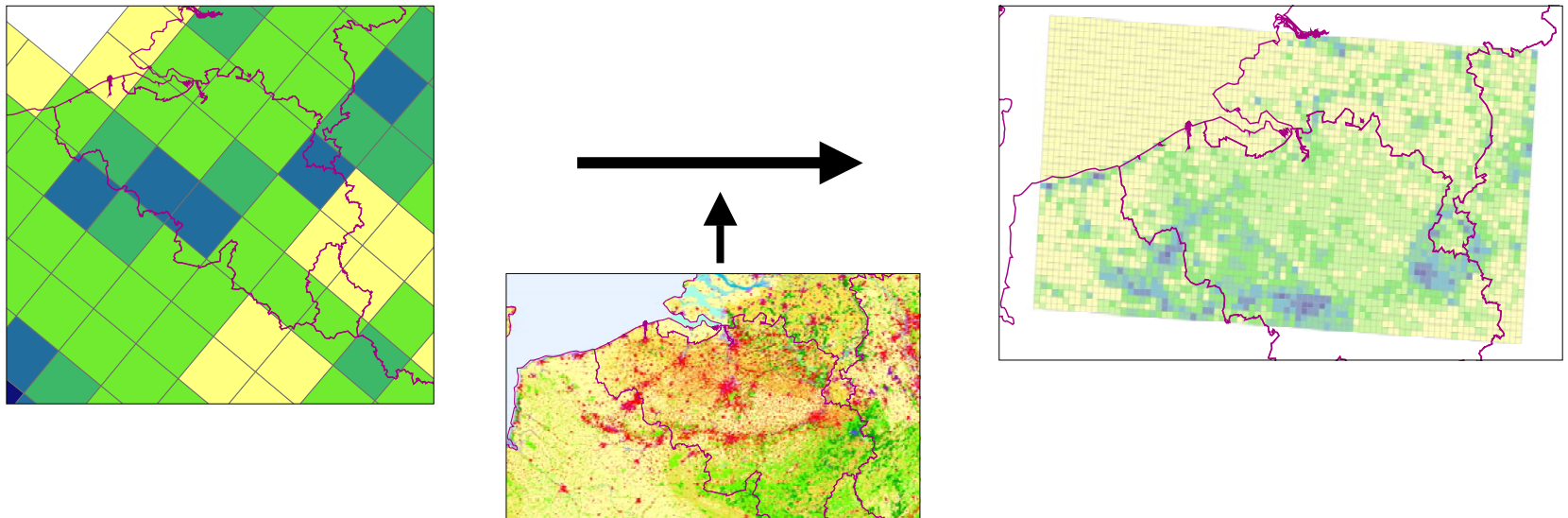
period
year 2005



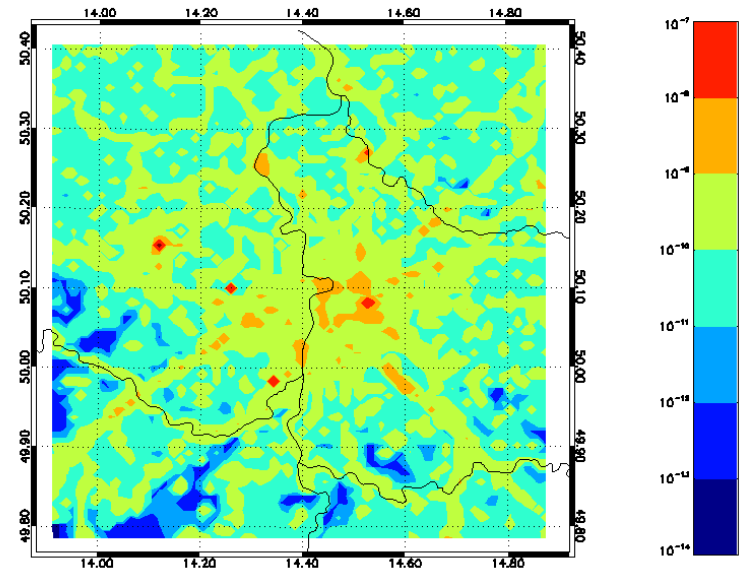
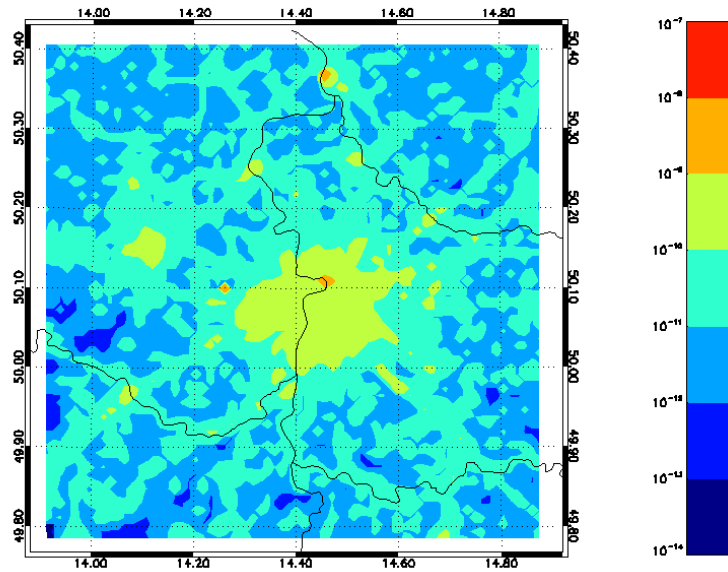
land use type

emissions generated with e-MAP tool

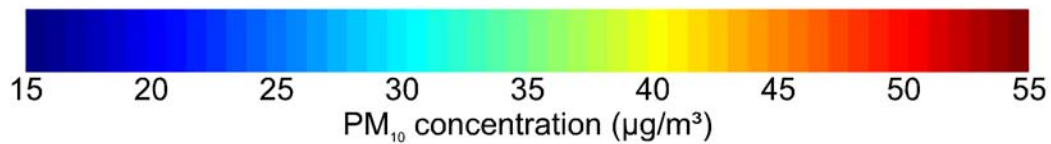
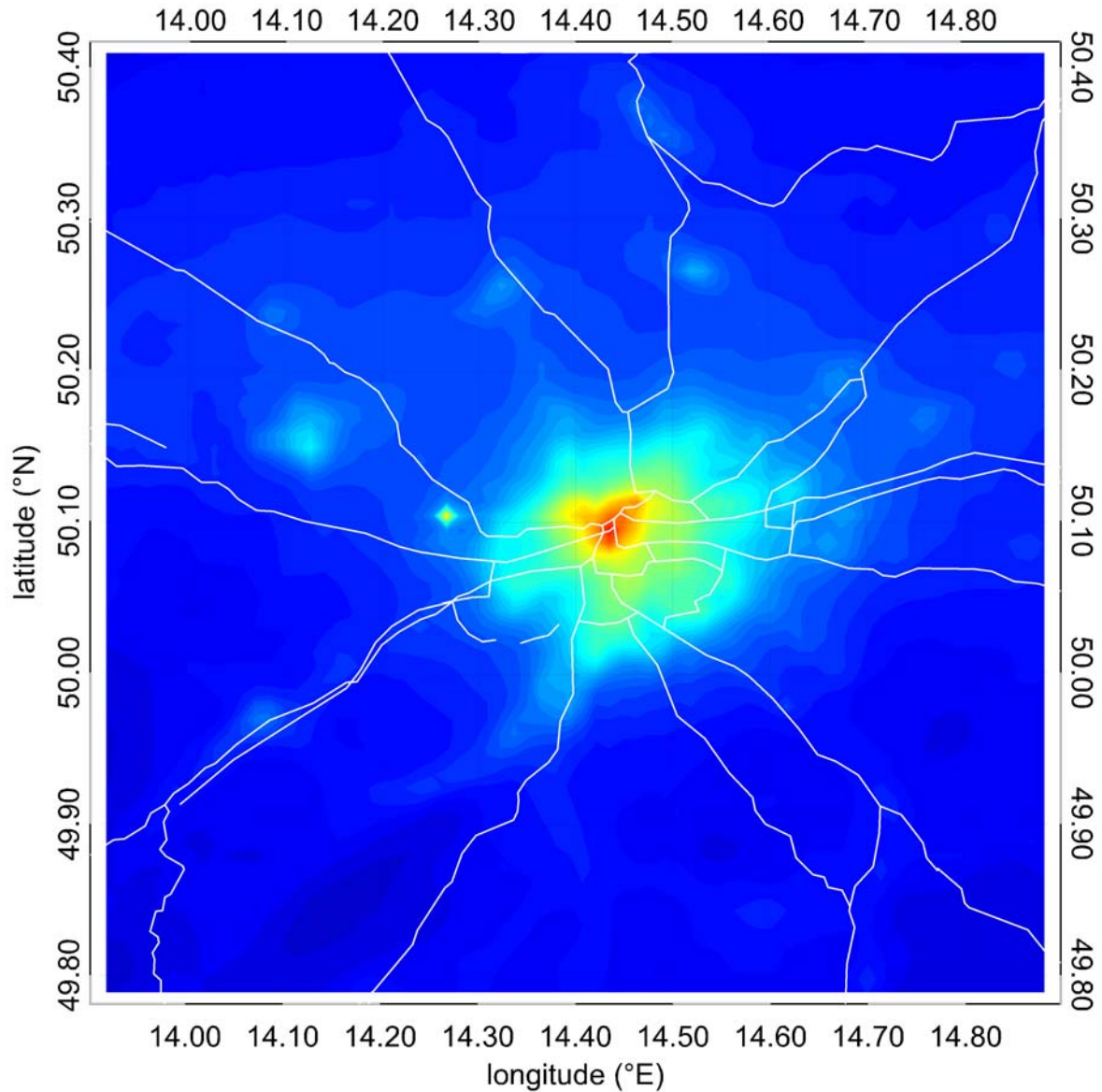
- » interpolates coarse (EMEP) emissions to a finer model grid
- » employs proxy data (land cover, population density, ...)



example: PM10 and NOx emissions



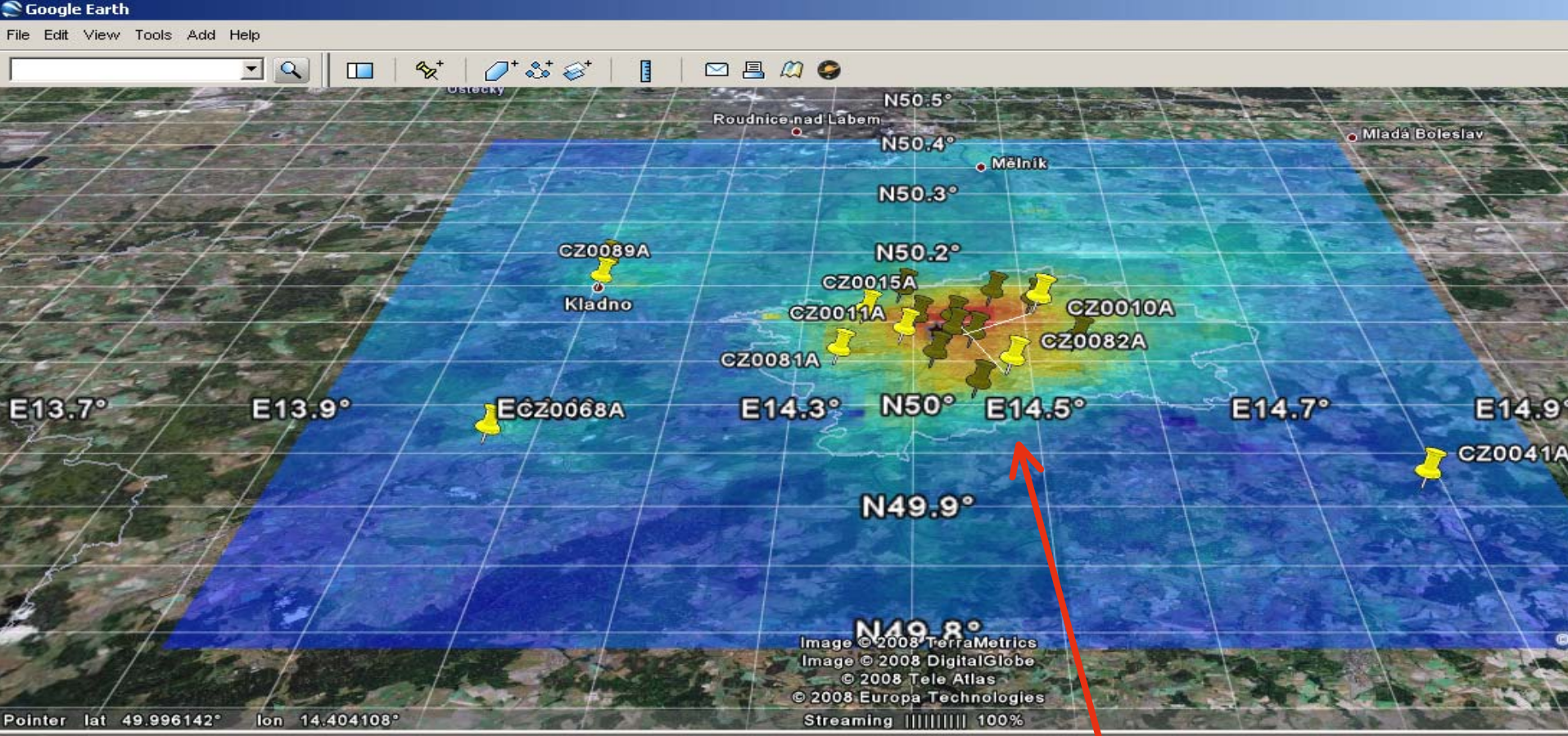
ANNUAL MEAN PM₁₀ CONCENTRATION FOR PRAGUE (2005)



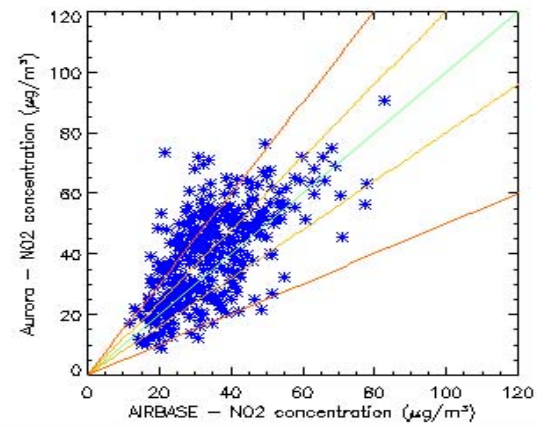
try yourself!

- » requires Google Earth

http://promote.vito.be/demo/demotool/promote_demo.kmz



AirBase stations

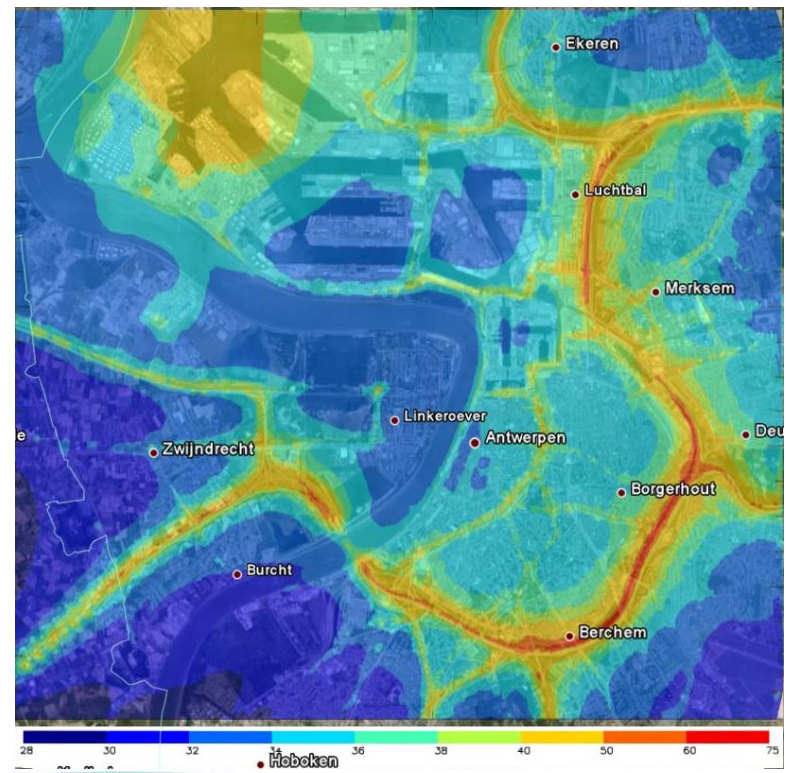


NO2 for AIRBASE CZ0010A
Daily mean for 2005

Number of validation values :	360
Number of model values :	365
+ - 20% :	40.0000
+ - 50% :	77.8082
RMSE :	12.9002
BIAS :	5.36047

follow-up: PASODOBLE (EU-FP7)

- » follow-up of the 'downstream' (local) aspects of PROMOTE
- » will run approx. 2010 - 2012
- » For Prague:
 - » air quality assessments
 - » air quality forecasts



More information

- » <http://www.gse-promote.org/>
- » Dr. Koen De Ridder
Boeretang 200
B-2400 Mol
Belgium
Email: koen.deridder@vito.be
Tel: +32.14.33.59.68