

**Workshop on Climate Change and Urban Planning
- presentation of the SUDPLAN tool**

Wuppertal, 11 October 2012

Czech Regional Pilot: Air Quality in Prague

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- 1) Aims of the pilot
- 2) National data used
- 3) Pilot results
- 4) IT integration
- 5) National SUDPLAN application
- 6) Users and follow up

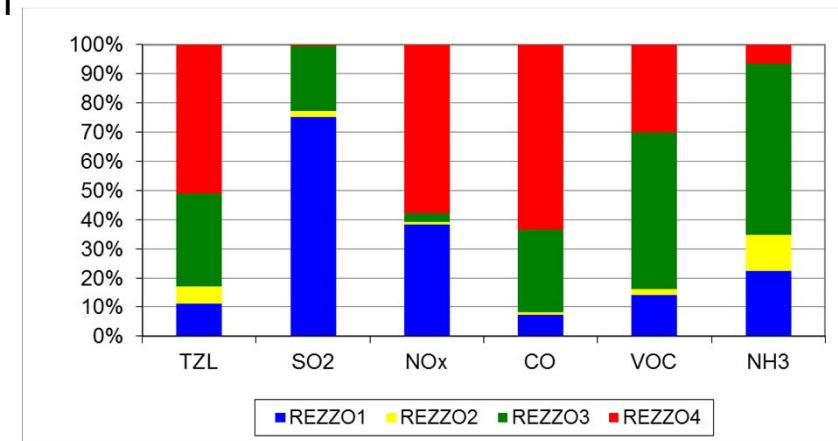
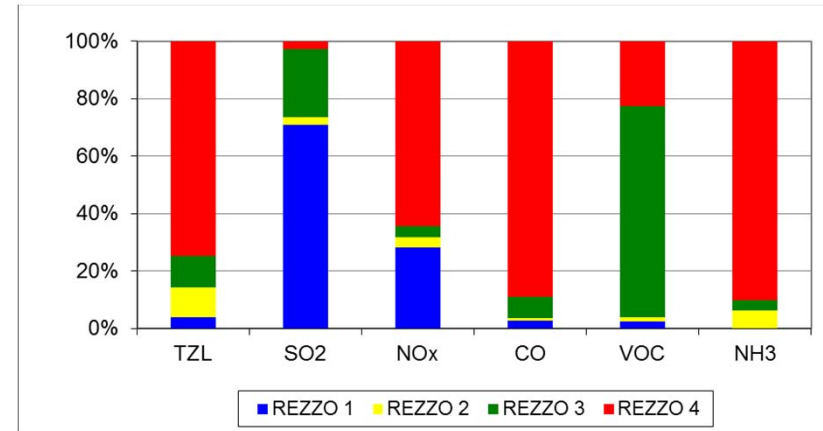


- Test the SUDPLAN tool on national air quality and emission data
- Verify the usability of the tool in the area of Prague and surroundings
- Produce air quality predictions and scenarios
- Ensure publicity and increase accessibility of SUDPLAN tool
- Integrate SUDPLAN tool to information systems of CENIA
- Offer the SUDPLAN tool to potential end-users
- Potential follow up

Contextual information

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- Majority of NO_x emission in the CR are produced from **transportation** (31 %) and **households** and services (20 %). In Prague the **share of transportation is 64 %** on total NO_x emission, outside Prague (Middle Bohemia) NO_x emissions from household heating make up 28 %
- The share of PM₁₀ emissions from transportation in Prague is **75 %**, in Middle Bohemia **51 %** of PM₁₀ emissions are from transportation and 32 % from small point sources.
- 60 % of personnel cars (approx. 2,7 million) are **older than 10 years**, 30 % are older than 15 years. 17 % of the vehicle fleet does not comply with any of EURO standards.



- **Emission data**

- R1-R2 – geo-referenced point sources
- R3 – on the level of municipalities with extended competence
- R4 – transportation data – distributed to grids 0,5x0,5 km according to transportation intensities on roads

- **Air quality data**

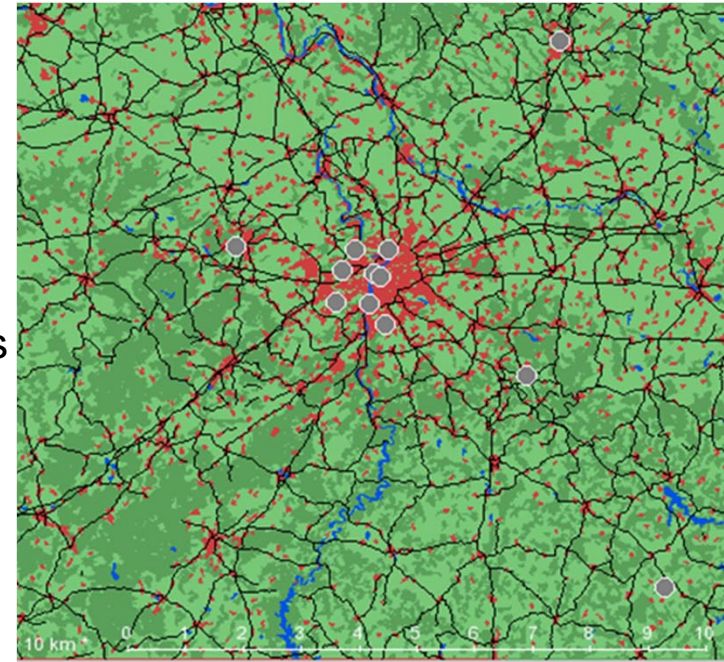
- 12 selected stations, classified as background/rural

- **Transportation data**

- Transportation intensities based on transport census (Technical Administration of Roads, Directorate of Highways – outside Prague)
- Project of Prague city bypass (ring-road)

- **Population**

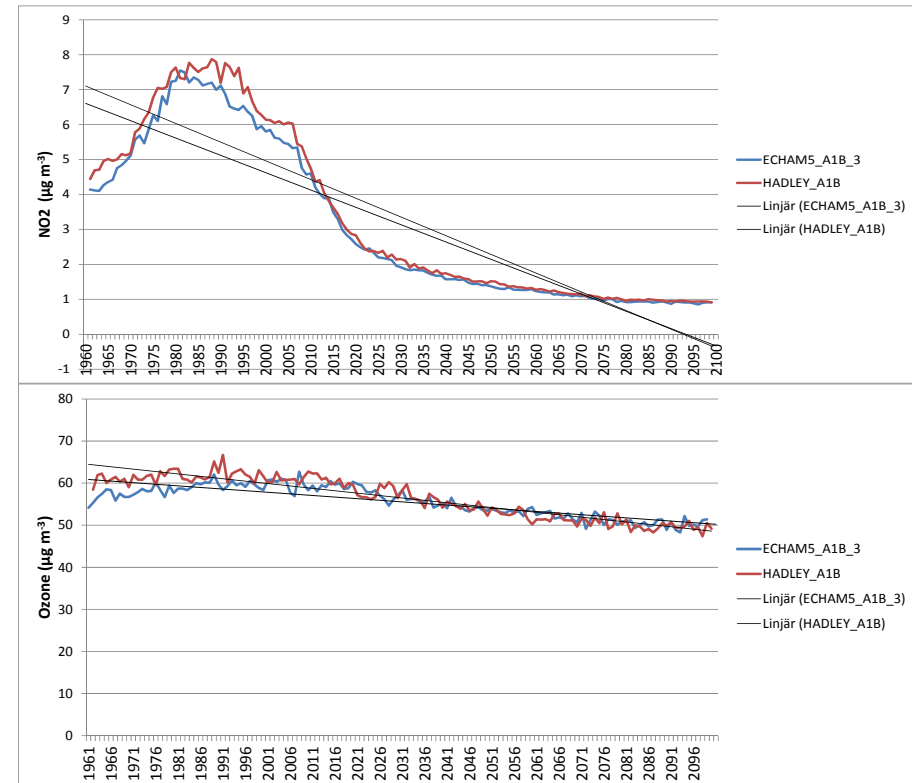
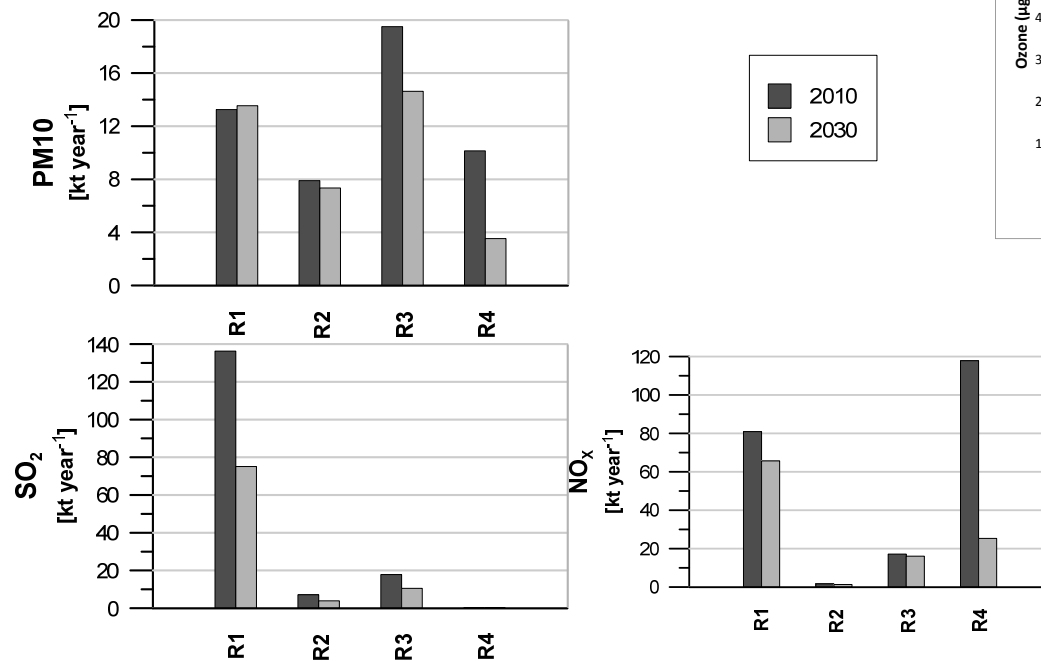
- Number of inhabitants of the settlements around Prague (Czech Statistical Office)



Emission scenarios used

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GCM model ECHAM used with 1A1B emission scenario (RCP 4.5 emission scenario)



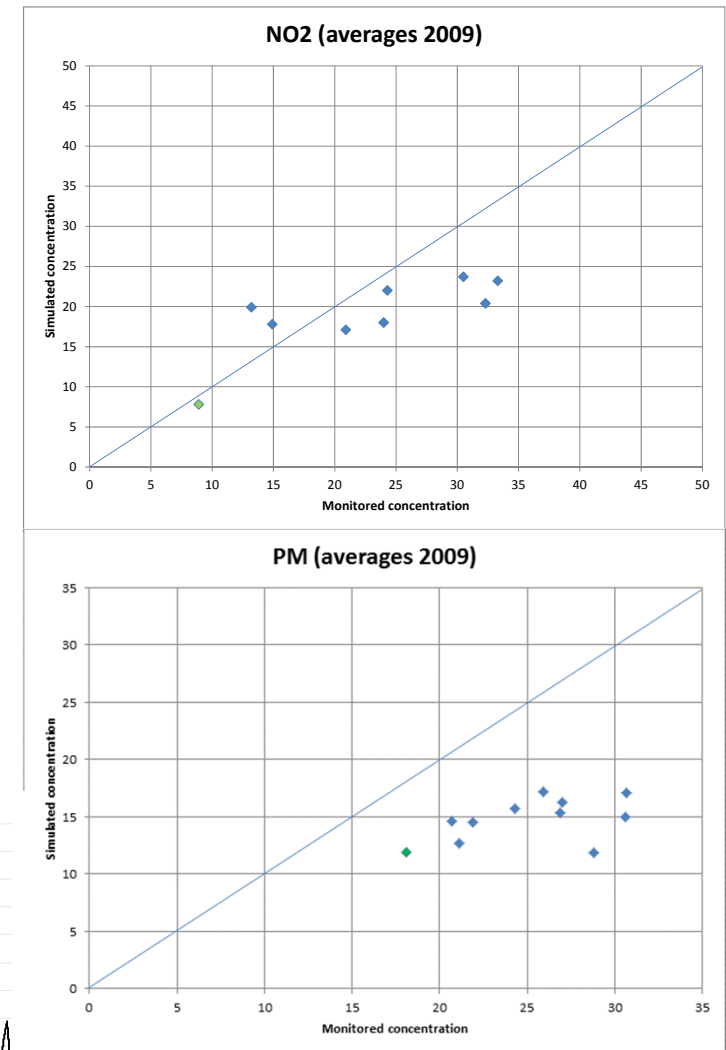
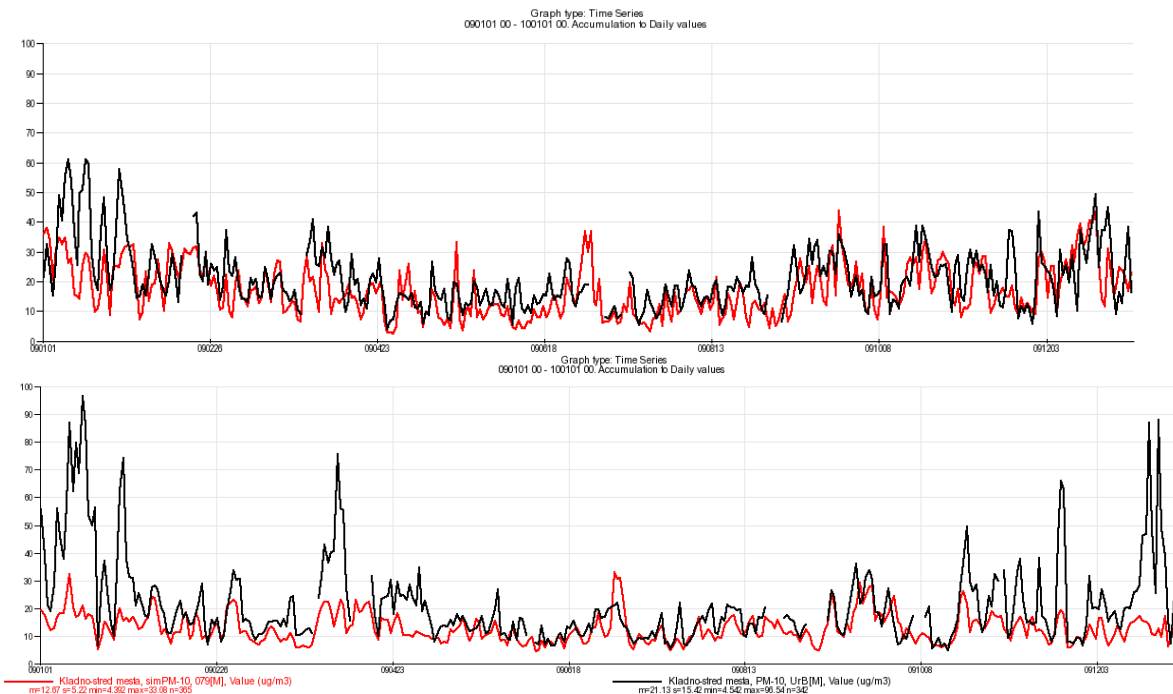
Downscaling inputs

- Emission database 2010
- GAINS projections 2010-2030 including decomposition to SNAP categories of sources and R1-4 categories
- Boundary conditions from GCM models

Validation and calibration

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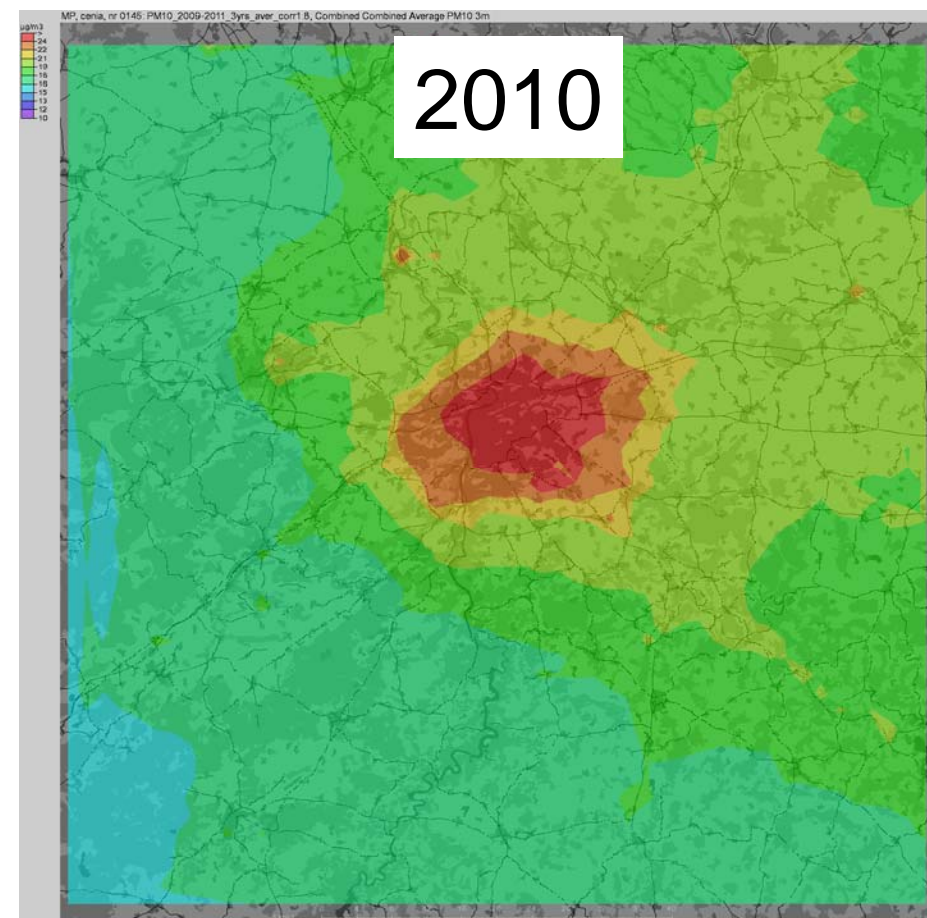
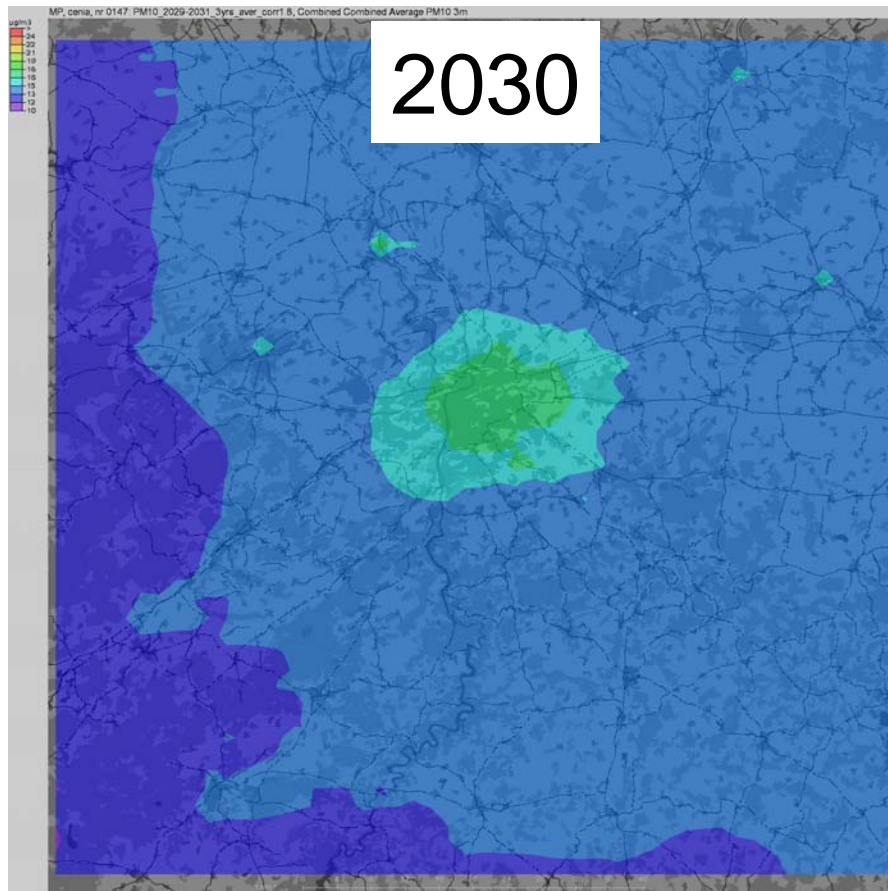
- Annual concentrations of O_3 and NO_2 reproduced well, PM_{10} concentrations underestimated
- Daily peaks underestimated
- Variability of simulated and monitored data similar for all pollutants apart from PM_{10}
- Worst performance of the model for PM_{10} concentrations



AQ Projection: PM₁₀ annual concentrations

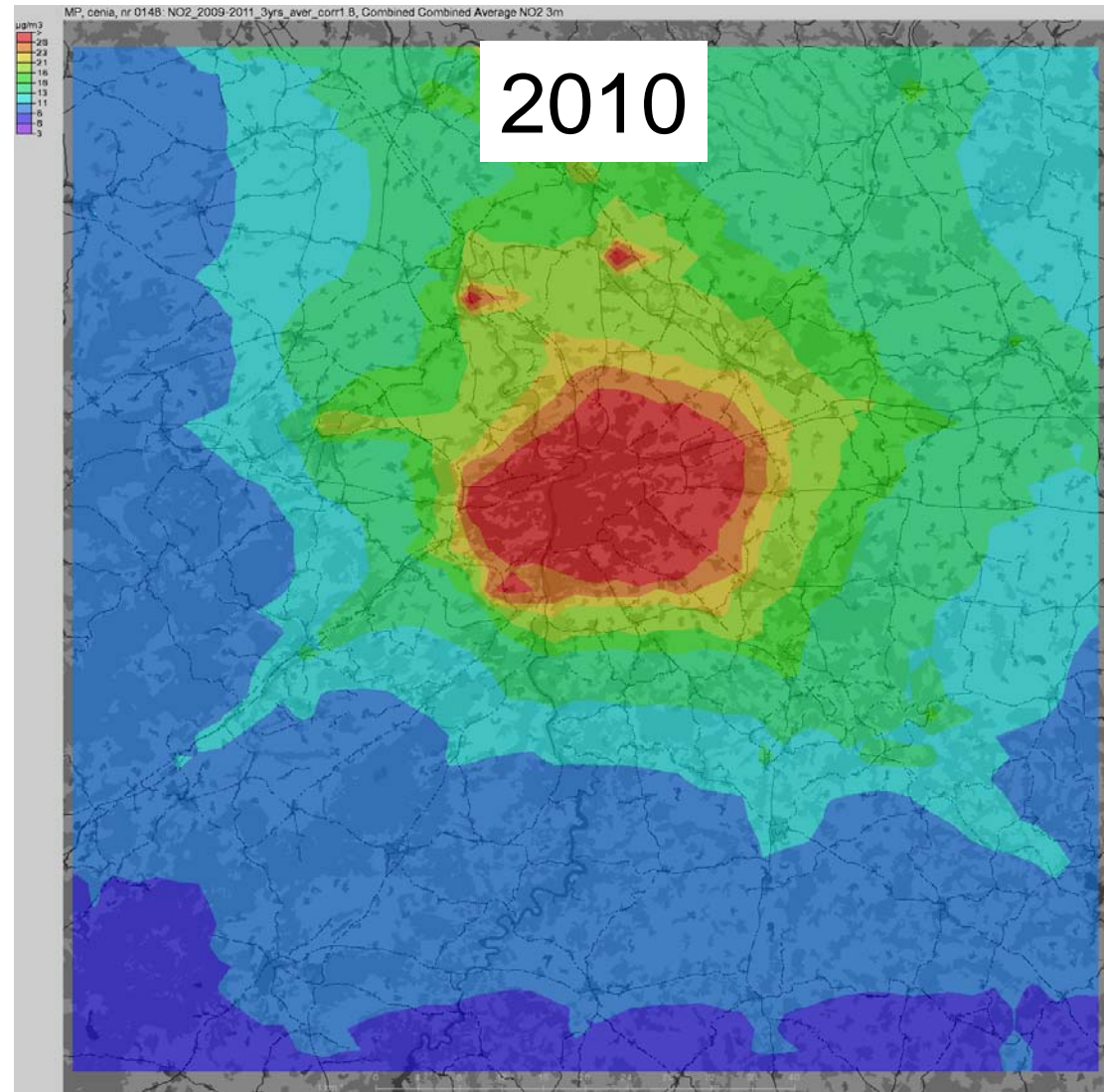
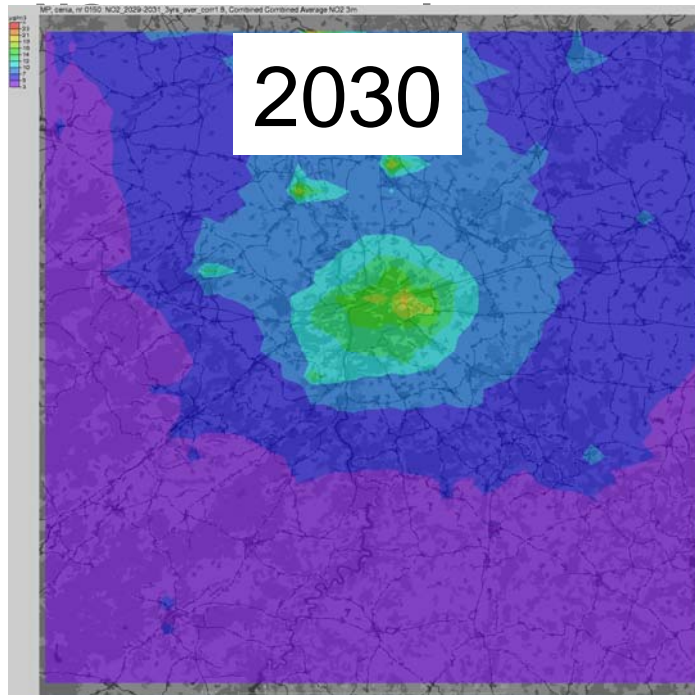
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- Decrease of concentrations, most significant in Prague's suburb
- The share of mobile and diffuse sources on PM₁₀ air pollution will decrease



AQ Projection: NO2 annual concentrations

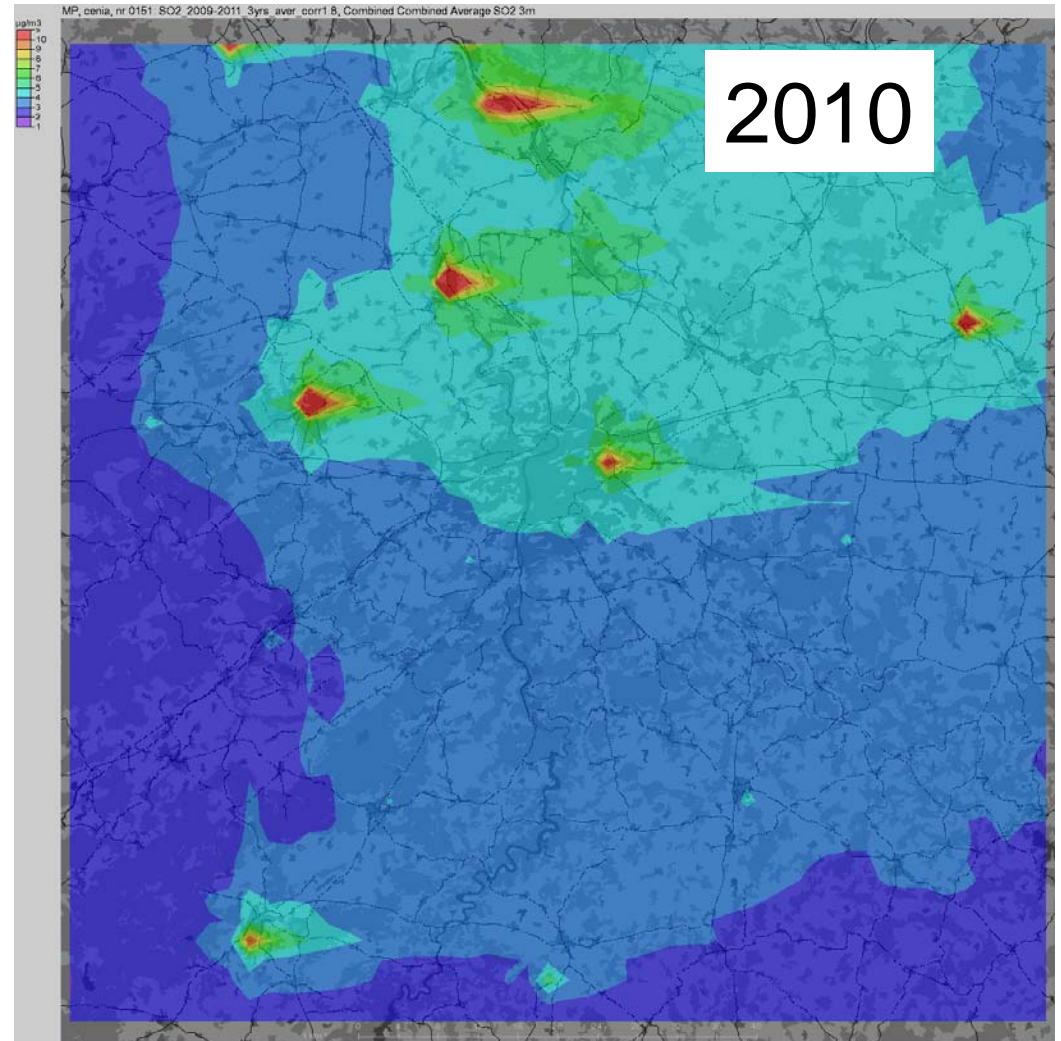
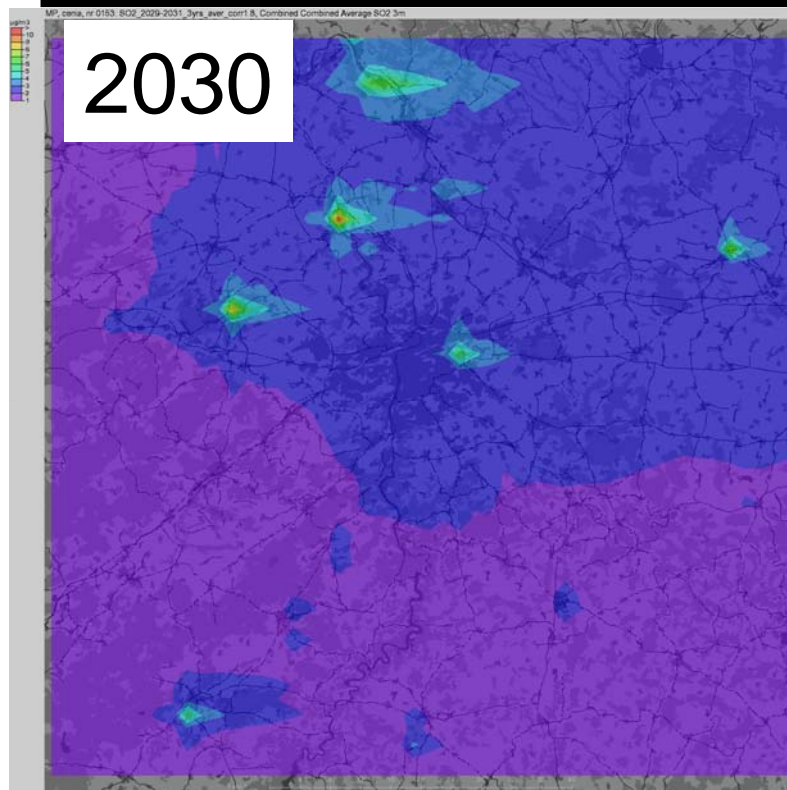
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- Concentration fields follow the distribution of emissions from large point sources and mobile sources
- The highest improvement in the city center because of lower emissions and transportation measures

AQ Projection: SO₂ annual concentrations

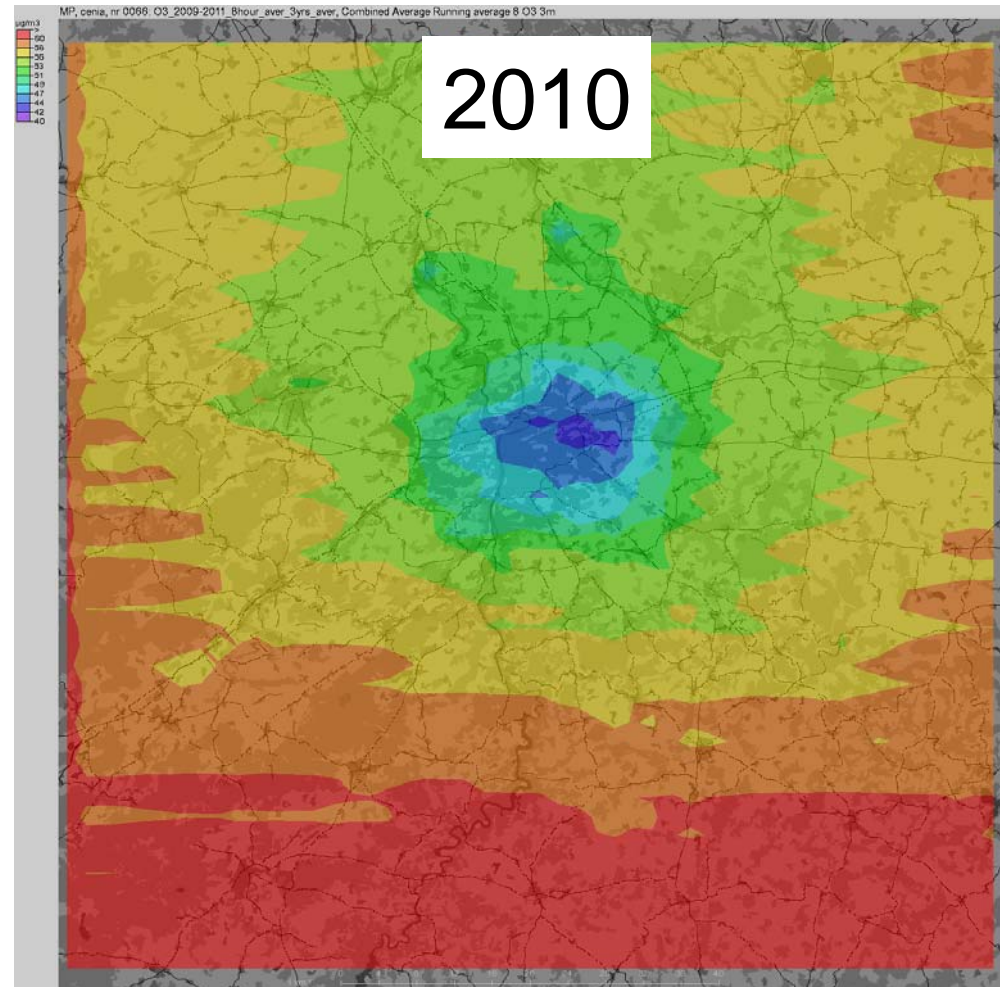
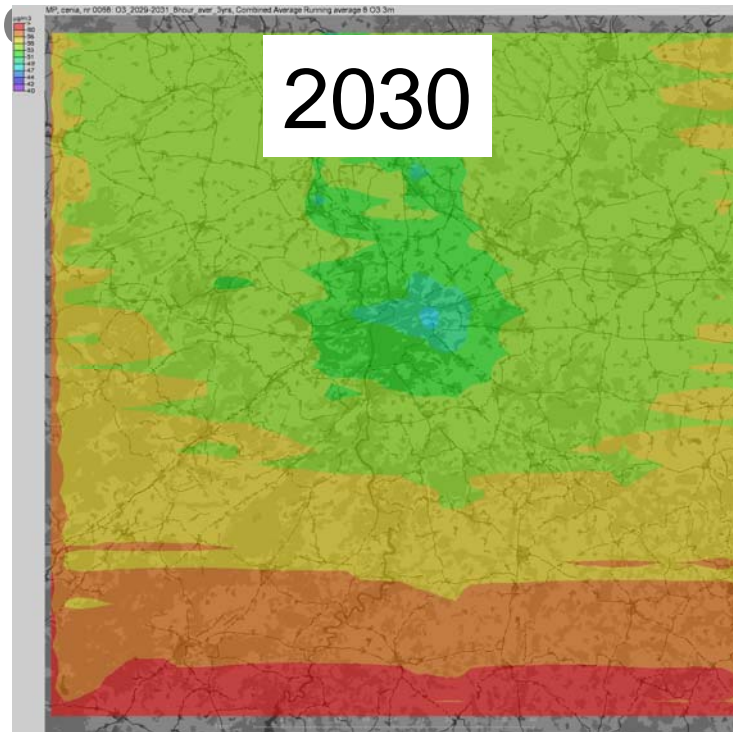
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- SO₂ emission produced almost only in large point sources
- SO₂ air pollution is very low recently and will further decrease in future

AQ Projection: ozone annual concentrations

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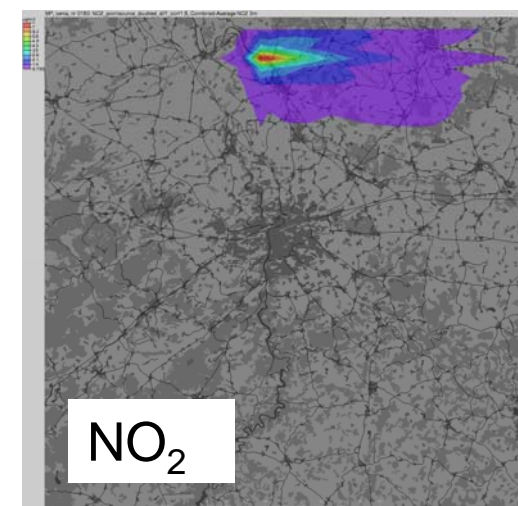
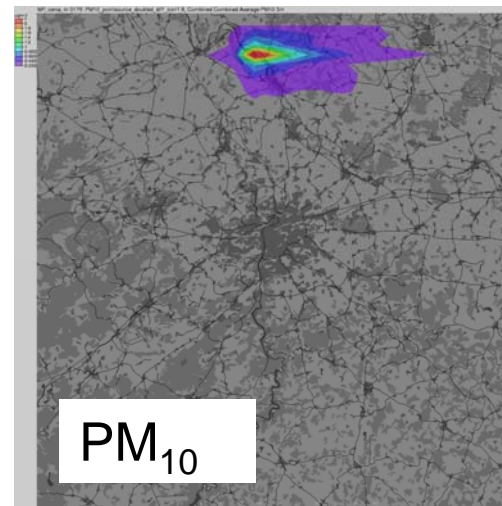
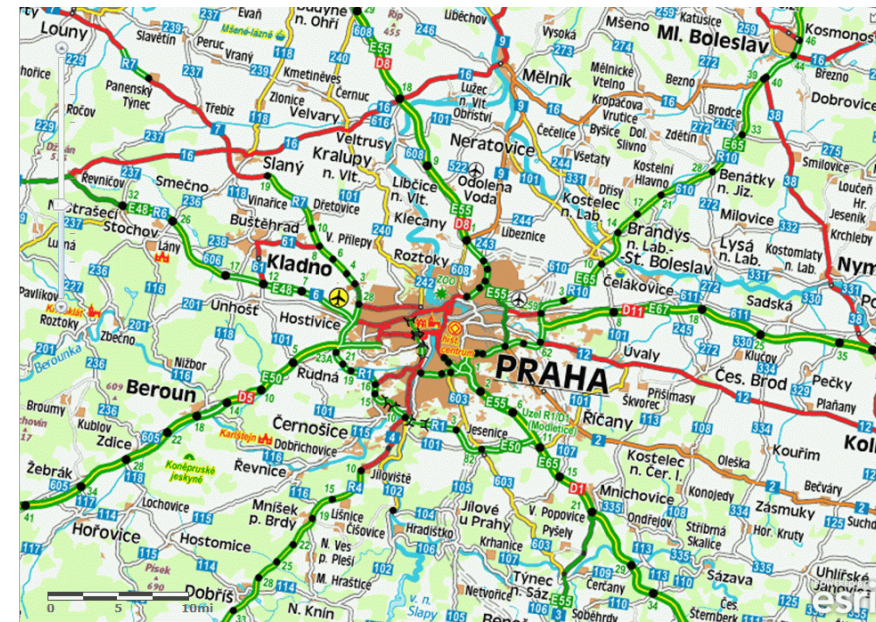
- Tropospheric ozone concentrations are higher beyond the city and in hilly areas, due to atmospheric photochemistry and higher insolation in mountains
- Towards the year 2030 ozone concentrations in the city centre will increase whereas in the surroundings remain stable or decrease a bit

Aim of scenario

- Assess the impact of changes in emissions from large coal power plant located north of Prague on air quality

Results

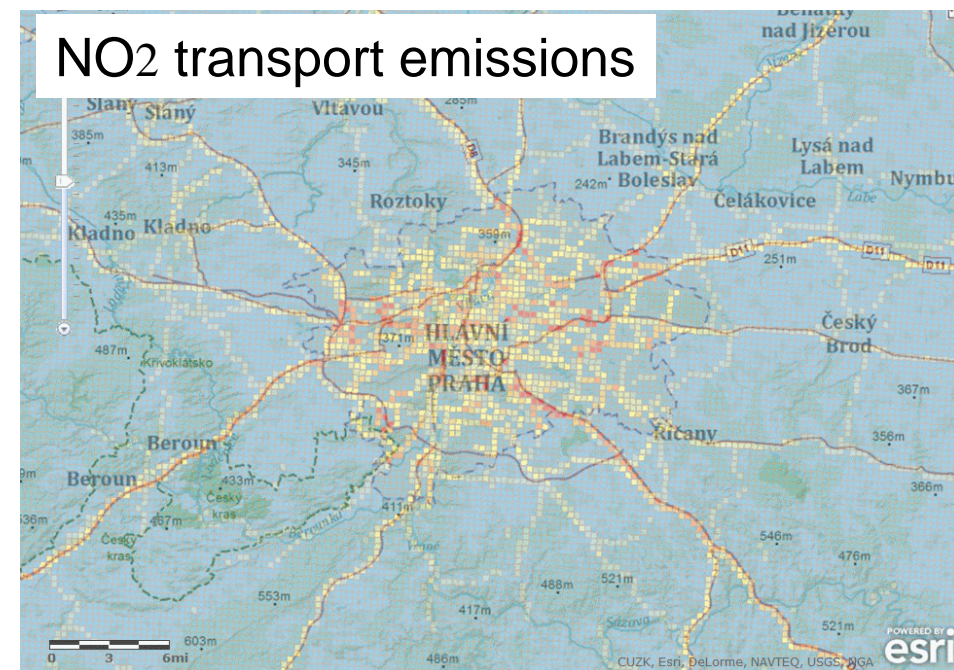
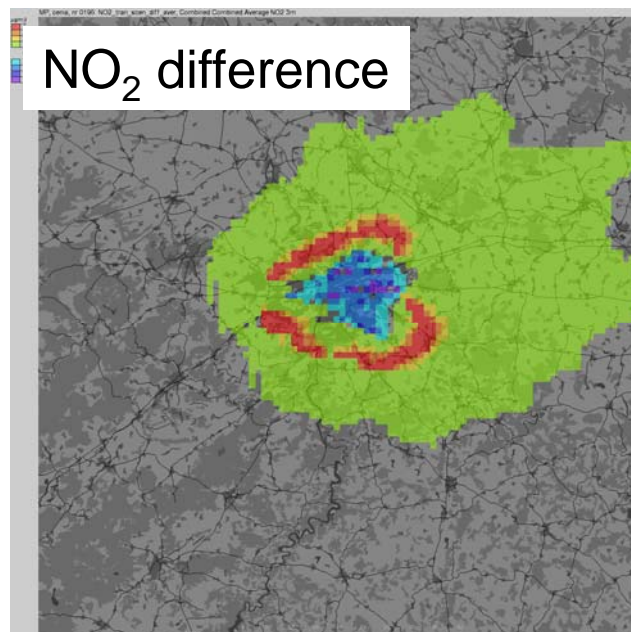
- Model clearly shows increase/decrease of concentrations which confirms the high role of large sources on air quality
- the impact of air quality is noticeable not only close to the source but at the distances up to 50 km in the direction of prevailing wind



Air quality scenarios – transportation

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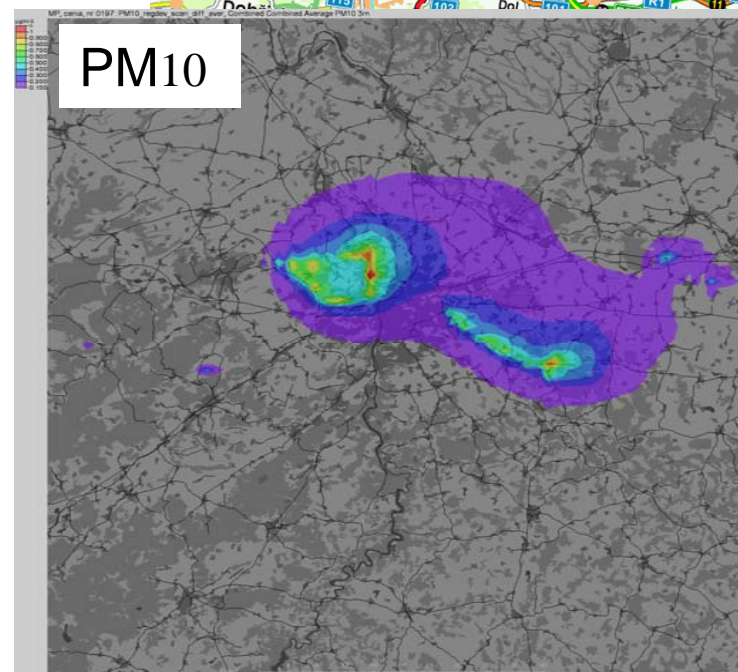
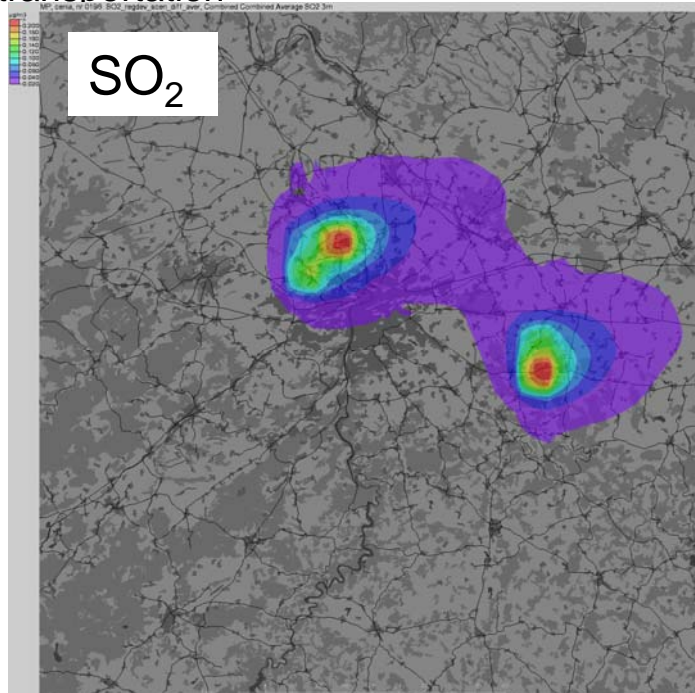
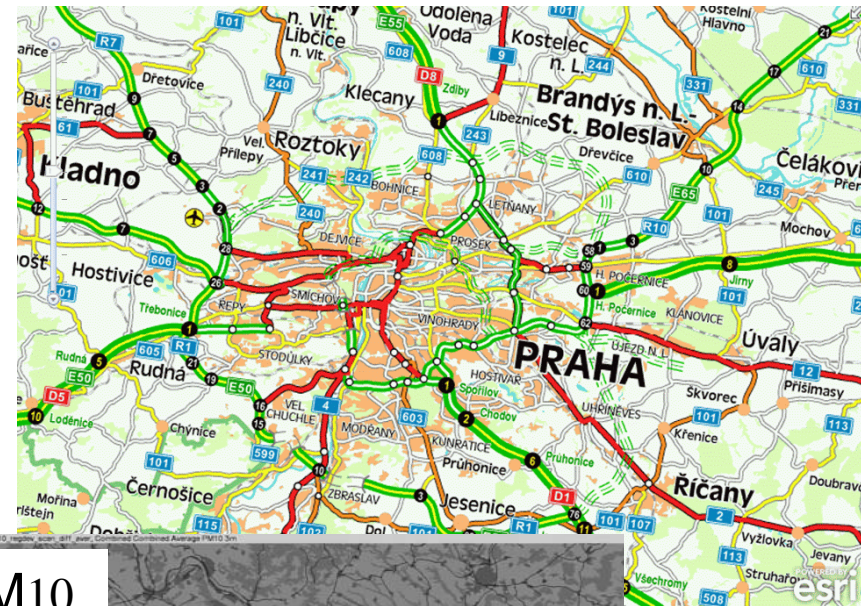
- We tried to find out what would happen with air quality in Prague and surroundings if the Prague ring-road had been completed in 2010. In fact, its completion is envisaged after 2015.
- Especially NO₂ concentrations will decrease in the city centre due to the limitation of transit traffic. On the other hand, some increases must be expected outside Prague and especially close to the highway communication.



Air quality scenarios – regional development

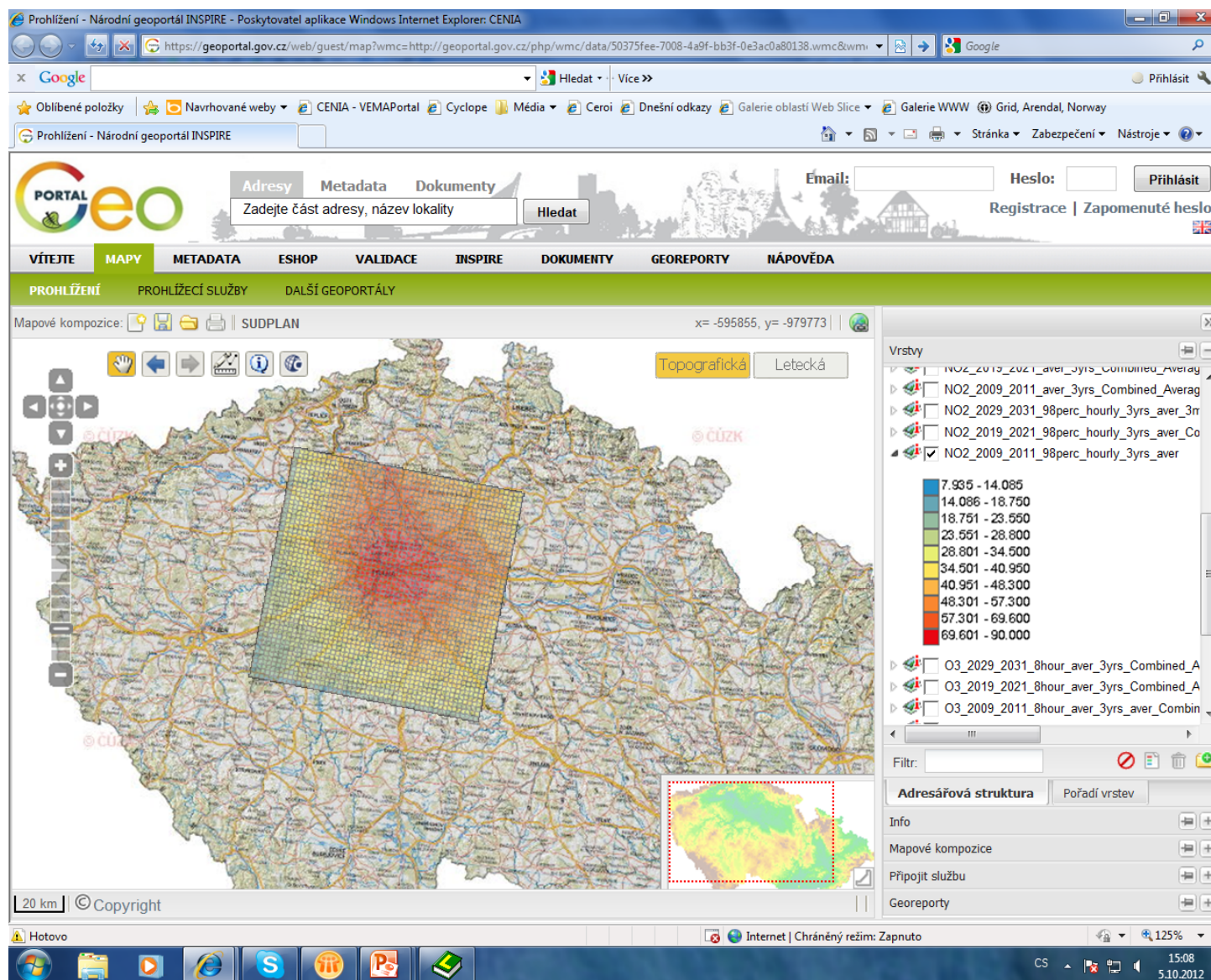
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- The scenario is looking into the impact of suburbanization on air quality
- Scenario assumes two development parts of Prague in the south east and north west, where in each case about 10 thousand new inhabitants will move in
- In both cases air quality changes will be caused by household heating (local emissions) and by transportation



Sudplan results on INSPIRE Geoportal

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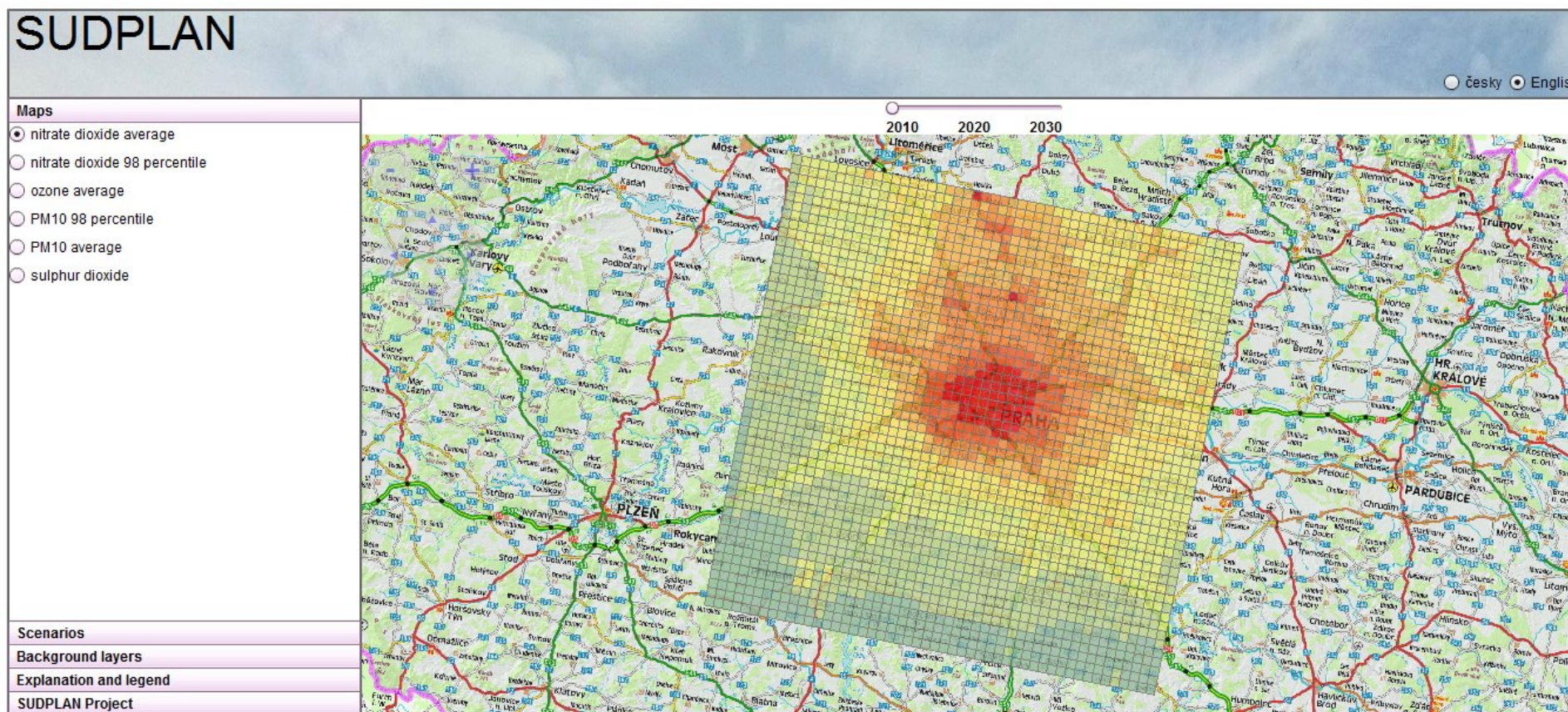


<http://geoportal.gov.cz/web/guest/map?wmc=http://geoportal.gov.cz/php/wmc/data/50375fee-7008-4a9f-bb3f-0e3ac0a80138.wmc&wmaction=overwrite>

Sudplan application

SUDPLAN

<http://elwing.cenia.cz/flex/SUDPLAN.html>



Sudplan application – switching of layers

SUDPLAN


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☐ český ☒ English

Maps

Scenarios

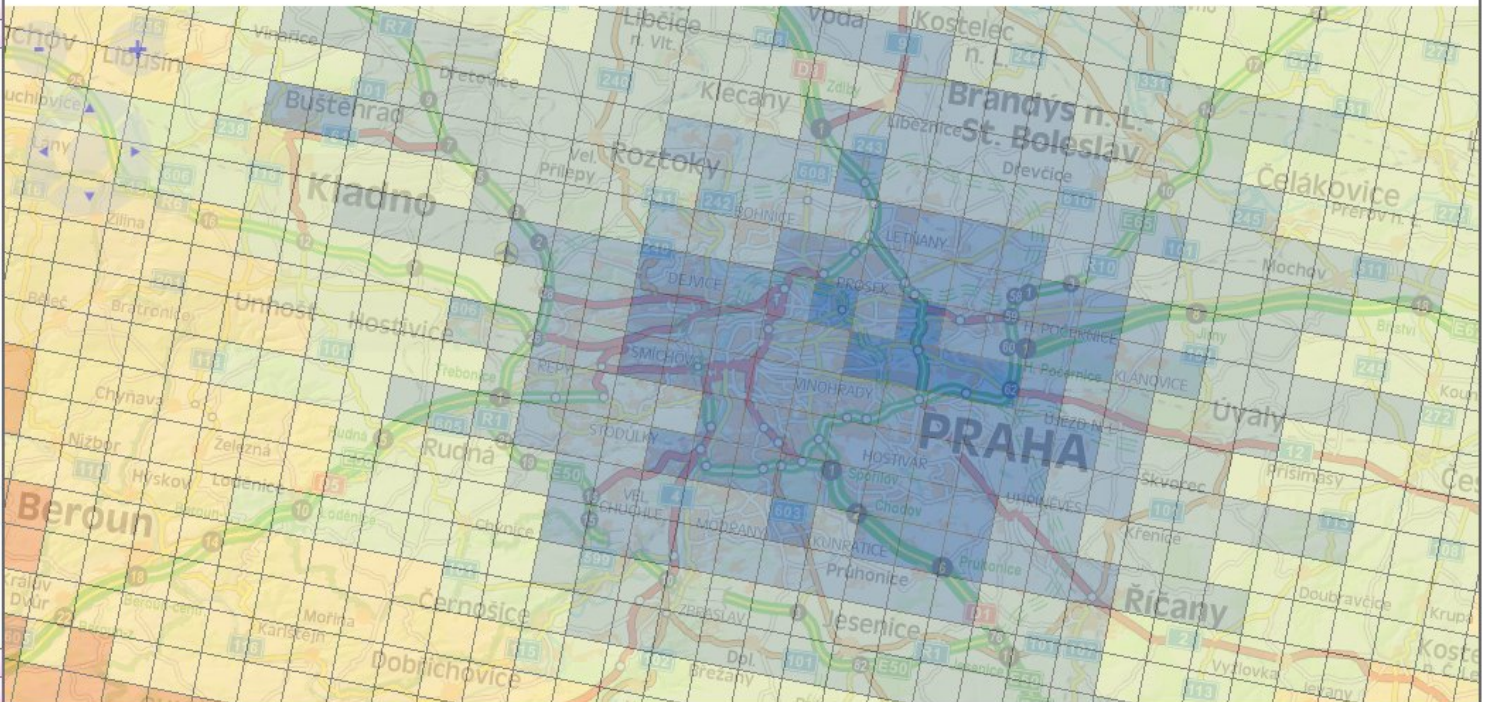
Background layers

☒  road map

☒  shaded relief

Explanation and legend

SUDPLAN Project



- Municipality of Prague + Institute for Regional Development
- Czech Hydrometeorological Institute
- Ministry of the Environment
- Local stakeholders involved in spatial planning and transportation infrastructure development
- Consultants (environmental impact assessment)

Thank you for your attention

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