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AIR TRITIA - Air pollution modelling and AQMS

AIR TRITIA | VŠB – TECHNICAL UNIVERSITY OF OSTRAVA | Petr Jančík

EVIDENCE BASED MANAGEMENT

Make appropriate decisions

=

Intimately understand emission – pollution relations

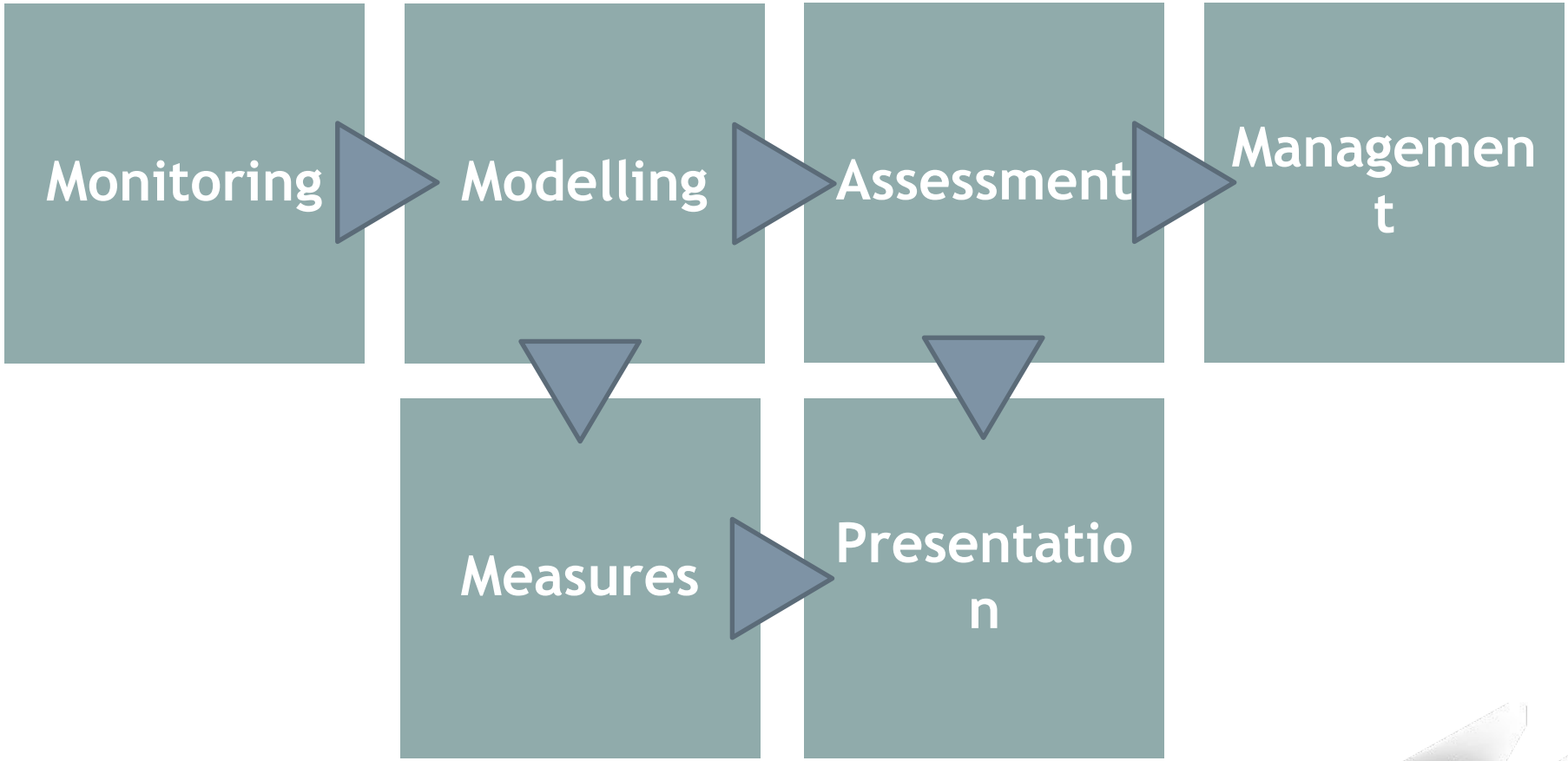
MOTIVATION

The contribution to changing the way of the strategic air quality management in the TRITIA area from individual (local) to joint (integral) management is based on:

Consolidation of the background data

- Assessment of the current state of air quality
- Provision of the reliable information on the origin of pollution
- Suggestion of common strategies to address the air quality problem in the TRITIA area

AIR POLLUTION MODELLING



ADMOSS

Analytical Disperssion Modelling Supercomputer System (ADMoSS)

ADMOSS

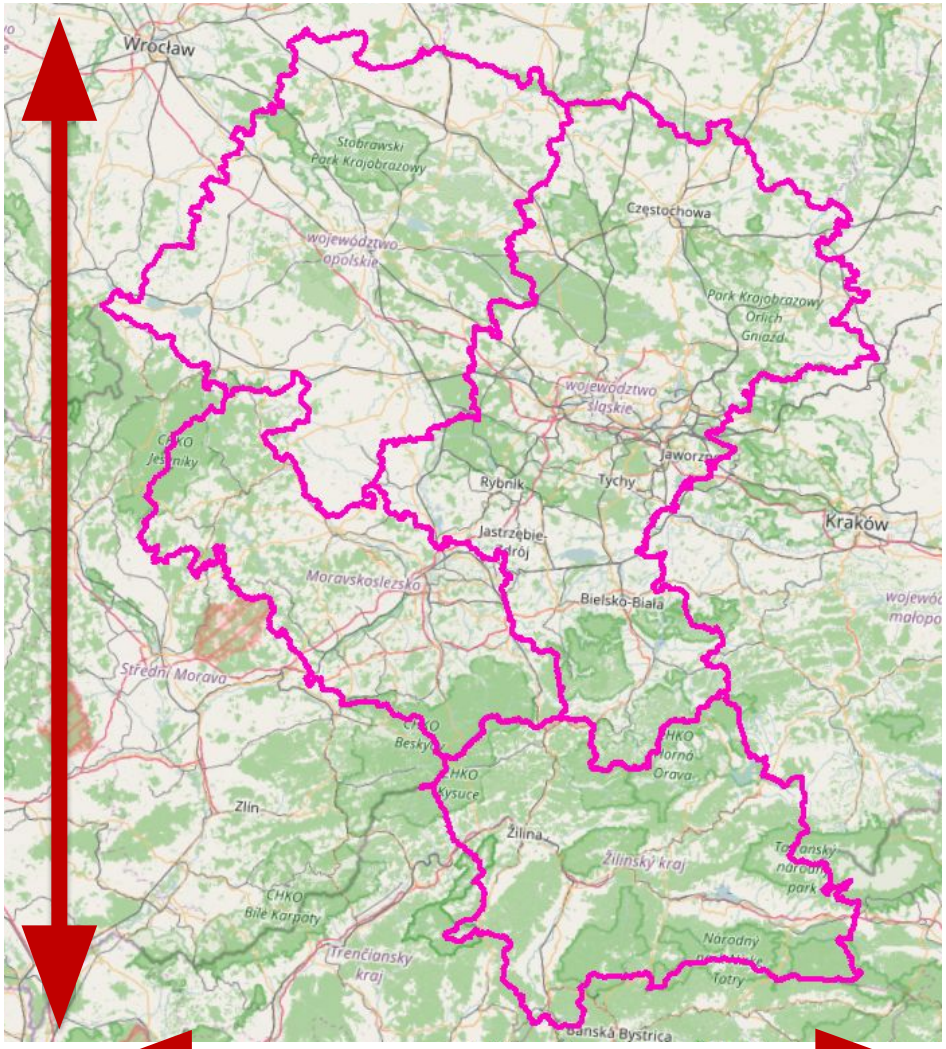
Air pollution modelling within the AIR TRITIA project was performed using the ADMoSS:

- ✓ Assesment of air quality in large areas with a large number of sources of air pollution
- ✓ Great detail and accuracy of modeling
- ✓ High computational power (IT4Innovation, Cesnet)
- ✓ High automation of the computational process

Modelling makes possible to compare the effects of both sources of pollution with local impact (transport, local heating, cold and low industrial sources) and sources with long distance impact (high chimneys of powerful industrial sources).

AREA OF INTEREST

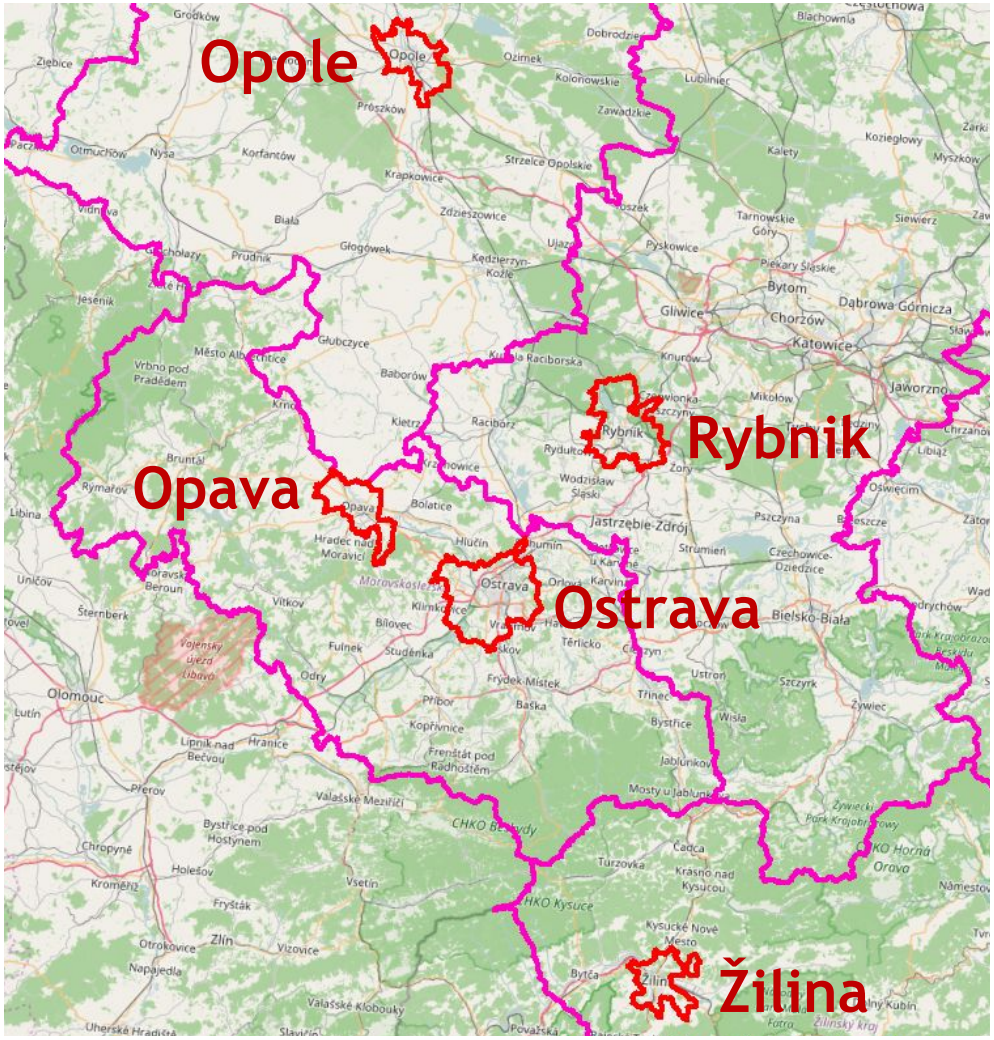
220 km



280 km

34 000 km^2
(similar to Taiwan)
7 550 000 inhabitants
(more, then Slovakia, Bohemia)

AREA OF INTEREST



Opole	120 000 inhabitants	97 km^2
Rybnik	140 000 inhabitants	148 km^2
Opava	61 000 inhabitants	90 km^2
Ostrava	316 000 inhabitants	214 km^2
Žilina	85 000 inhabitants	80 km^2

MODELLING VIA ADMOSS

Input data preparation

- Air pollution sources
- Meteorological data
- Digital model of terrain
- Air pollution monitoring data
- Receptor network generation

Modelling

- Division of the calculation into subtasks
- Parallel calculation of subtasks
- Joining subtasks
- Correction of results using air pollution monitoring
- Interpolation of results

Analyses of results

Export of outputs

MODELLING WITHIN THE AIR TRITIA PROJECT

Model:

- SYMOS‘97 (Czech reference methodology)

Pollution Sources:

- Industrial sources – REZZO (CZ), NEIS (SK), KOBiZE (PL) + EPA, CHMI emission factors
- Road transport – Transport model (UNIZA) + MEFA 13 emission factors
- Domestic boilers – Consenzus and surveys + ERC VSB emission factors

Pollution:

- PM_{10}, $PM_{2.5}$, NO2, benzo[a]pyrene

Period:

- Real data - 2006, 2010 and 2015
- Future scenarios - 2020, 2025, 2030, 2035 and 2040

FUTURE SCENARIOS

YEAR	Industrial Sources	Domestic Boilers	Road Transport
2020	Extrapolation according to the development of emissions	Replacement of the boilers in the CR (real situation)	EF 2020, road construction finished
2025	Estimation supposing the gradual implementation of BAT	Replacement 80% CZ, 50% PL, 33% SK	EF 2025, road construction finished
2030	BAT implemented	Replacement 100% CZ, 100% PL, 66% SK	EF 2030, road construction finished
2035	BAT implemented; -20% emission	Replacement 100% CZ, 100% PL, 100% SK	EF 2035, road construction finished
2040	BAT implemented; -40% emission	Replacement 100% CZ, 100% PL, 100% SK	EF 2040, road construction finished

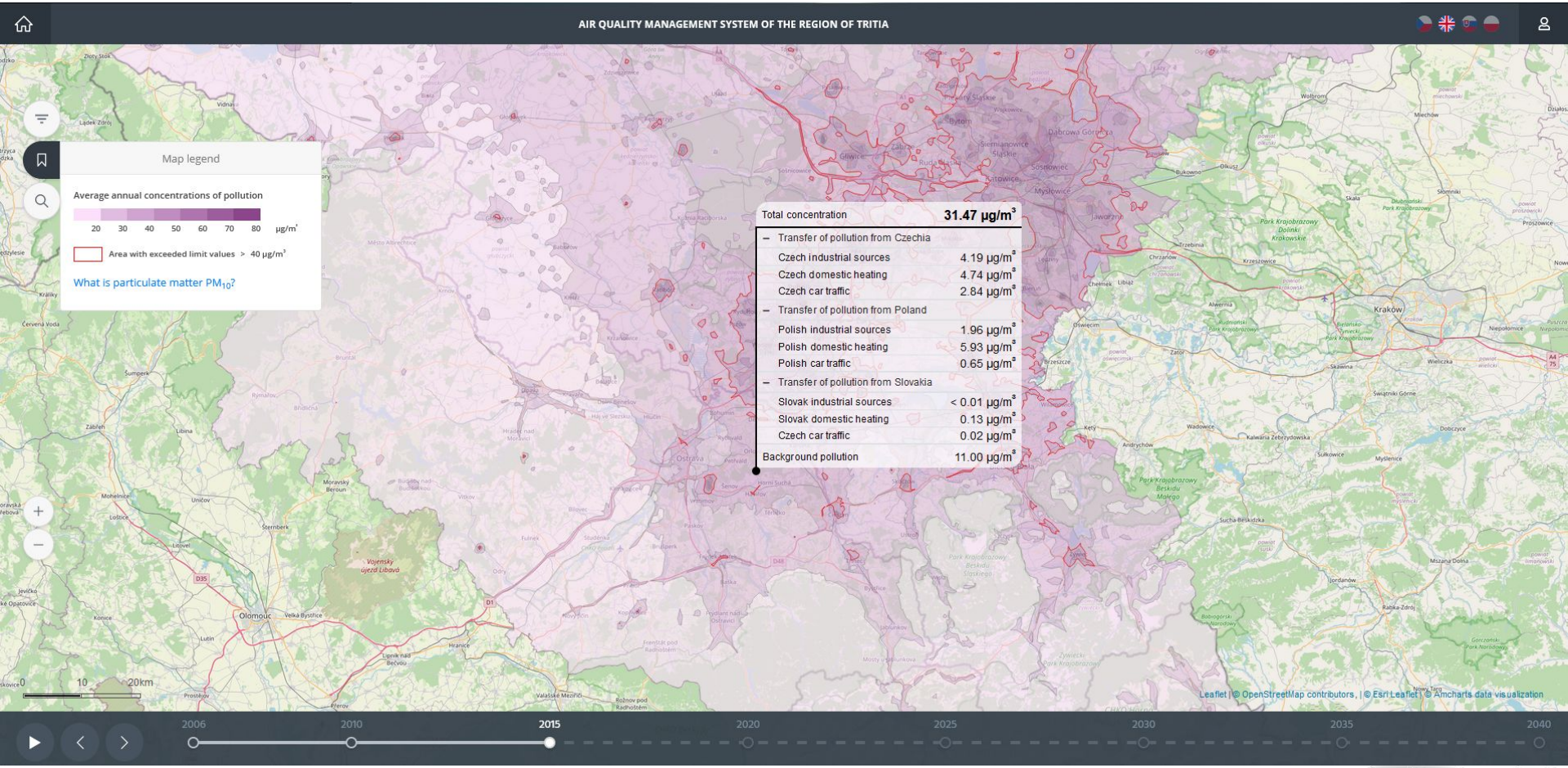
AQMS

- One of the project goals = **create a tool to support air quality management** in accordance with evidence based policy - **AIR QUALITY MANAGEMENT SYSTEM (AQMS)**
  - Supports long-term strategic decision making
  - Based on scientific knowledge
  - User-friendly environment of an interactive map
- Transparency - provide information on air quality and planned measures for the general public.

INTERFACE & DATA

- USER INTERFACE:
  - AQMS works at: https://aqms.vsb.cz/
  - The login interface is accessible from each city / TRITIA sub-website.
- PRESENTED DATA:
  - The public client displays the air pollution modelling results (PM_{10}, $PM_{2.5}$, NO_2, benzo[a]pyrene from the past (2006, 2010 and 2015) and future = suggested scenarios (2020, 2025, 2030, 2035 and 2040.
  - The client for municipalities (login access) comprises in addition data for whole FUA, emission data, data on domestic boilers.
  - According to the needs the client can be extended to more datasets.

AQMS



▫https://aqms.vsb.cz/ ▫ TRITIA

AQMS CONCLUSION

- AQMS was **implemented in 5 cities** and respective FUAs (Opava, Ostrava, Opole, Rybnik and Žilina) and the **TRITIA region** (Moravian-Silesian Region, Opole and Silesian Voivodeship and Žilina Region)
- AQMS is **based on the Unified database, validated by experts** in all three countries and thus should provide a credible basis for decision-making processes
- The public access to the system makes the **decision-making process transparent** to the population in the area concerned

- **AQMS is designed to be**
  - **Loaded with updated / new data**
  - **Implemented in** other cities / regions

CONTACT

Petr Jančík
VŠB – Technical University of Ostrava
AIR TRITIA

www.interreg-central.eu/air-tritia

petr.jancik@@vsb.cz

+420 603 511 547

twitter.com/AirTritia