

# European Network on New Sensing Technologies for Air Pollution Control and Environmental Sustainability - *EuNetAir*

COST Action TD1105

**3<sup>rd</sup> International Workshop *EuNetAir* on**

***New Trends and Challenges for Air Quality Control***

**University of Latvia - Faculty of Geography and Earth Sciences**

**Riga, Latvia, 26 - 27 March 2015**

## **AIR QUALITY CONTROL IN HUNGARY: RECENT CHANGES**



**Krisztina Labancz**

(MC Member, WG3, SIG4 Member) / [labancz.k@met.hu](mailto:labancz.k@met.hu)  
**Hungarian Meteorological Service / Hungary**



# Our scientific context and objectives in the Action

## Scientific context / challenges

- official background monitoring in Hungary
- chemical weather forecast (Budapest) and regulatory dispersion modeling for Hungary
- air quality legislation

## Brief reminder of MoU objectives

- Contribution to the **SIG4** objectives
  - Expert comments for the revision of the Air Quality Directive
- Contribution to the **Gender Balance Committee** objectives
- Contribution to the **WG3.1 and 3.2** objectives
  - Environmental measurements at laboratory and in field air quality stations
  - Air quality modeling and chemical weather forecasting



# Air quality legislation in Hungary - examples

All air quality directives are adapted to the Hungarian legislation, e.g.:

- 306/2010 governmental decree on the protection of air quality
- 4/2011 decree of the Ministry of Rural Development on the limit values of air concentrations and emitted values
- 69/2008 decree of the Local Authority of Budapest on the smog alarm
- 96/2009 decree of the Parliament on the National Environmental Protection Program 2009-2014

# Different tools in the air quality control

- **Air quality monitoring**
  - Accurate, continuous in time, but point-wise in space
  - Measuring strategy attempts to improve spatial coverage: station sites should represent larger areas
  - expensive
- **Air quality modelling**
  - less accurate, but provide spatial distributions of pollutant concentrations
  - different spatial scales required different approximations
  - cheaper
- **combination the advantages of the two different tools**
  - **Provide more complete assessment of the air quality situation**

# Air pollution monitoring

- **What is the aim of this activity?**
  - focus on air quality and environment
  - focus on air quality and human health
- **In the background**
  - identify the impacts of air pollution on ecosystems, human health, materials and climate change
  - detect the long-range transport of air pollutants
- **In the urban areas**
  - follow the concentration levels of toxic pollutants in the urban atmosphere
  - monitor air pollutants relevant to human health (protect the health of human beings)

# International regulations of the background monitoring activity

- **EMEP**
  - Monitoring strategy: 2010-2019
  - main objectives: *identify the impacts of air pollution on ecosystems, human health, materials and climate change*
  - laboratory intercomparison (air/aerosol and precipitation samples)
  - national data providers
- **WMO - Global Atmosphere Watch (GAW)**
  - Strategic plan: 2008-2015
  - main objectives: *detection of long-term man-made trends in the concentration of greenhouse gases and aerosols related to climate change*
  - WMO/GAW recommendation for
    - precipitation network (GAW Report No 158 and GAW report No 172)
    - aerosol network (GAW report No. 153)
  - laboratory intercomparison (precipitation samples)
  - national data providers

# European regulations of urban monitoring activity

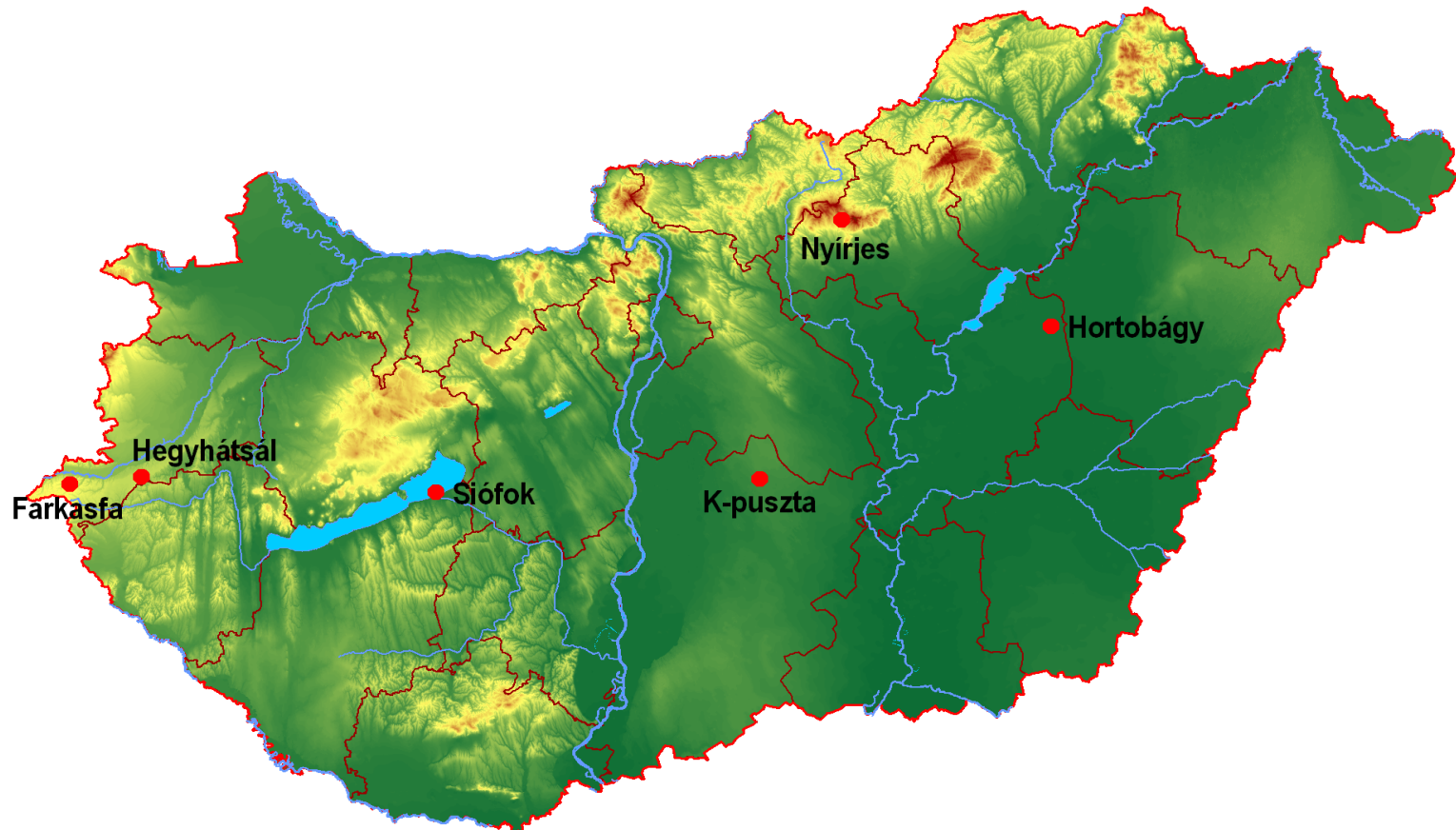
- Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive (2008/50/EC)
  - will be updated soon
- European Environment Agency (EEA)
- European Environment Information and Observation Network (Eionet)
- Aquila – Network of National Air Quality Reference Laboratories
  - provide expert judgment
  - promote the harmonization of air quality measurements
  - method development and validation
  - participate in standardization activities

# Harmonization of measurements

- **Inspiration:**
  - Monitoring activity is expensive
  - Do not measure the same components parallel
- **Expectation:**
  - harmonization of urban and background measurements as far as possible
- **Question:**
  - the aim of the monitoring programs are different (how can we harmonize)
  - Different concentration levels of the same pollutants in different conditions
  - Different type of pollutants are in the focus



# Background Air Pollution Monitoring Network of Hungary



# Monitoring program of K-pusztá

- Trace gases:

- $\text{SO}_2$ ,  $\text{NO}_2$ ,  $\text{O}_3$ ,  $\text{NH}_3$ ,  $\text{HNO}_3$

- Aerosols:

- sulfate, nitrate, ammonium, sodium, potassium,
- calcium, magnesium, heavy metals ,  $\text{PM}_{10}$ ,  $\text{PM}_{2.5}$

- Inorganic compounds in precipitation:

- pH, conductivity, sulfate, nitrate, ammonium, chloride, sodium magnesium, calcium, potassium, heavy metals

- K-pusztá is our reference station, member of the EMEP and WMO/GAW network.

- The monitoring program of this station is the widest.





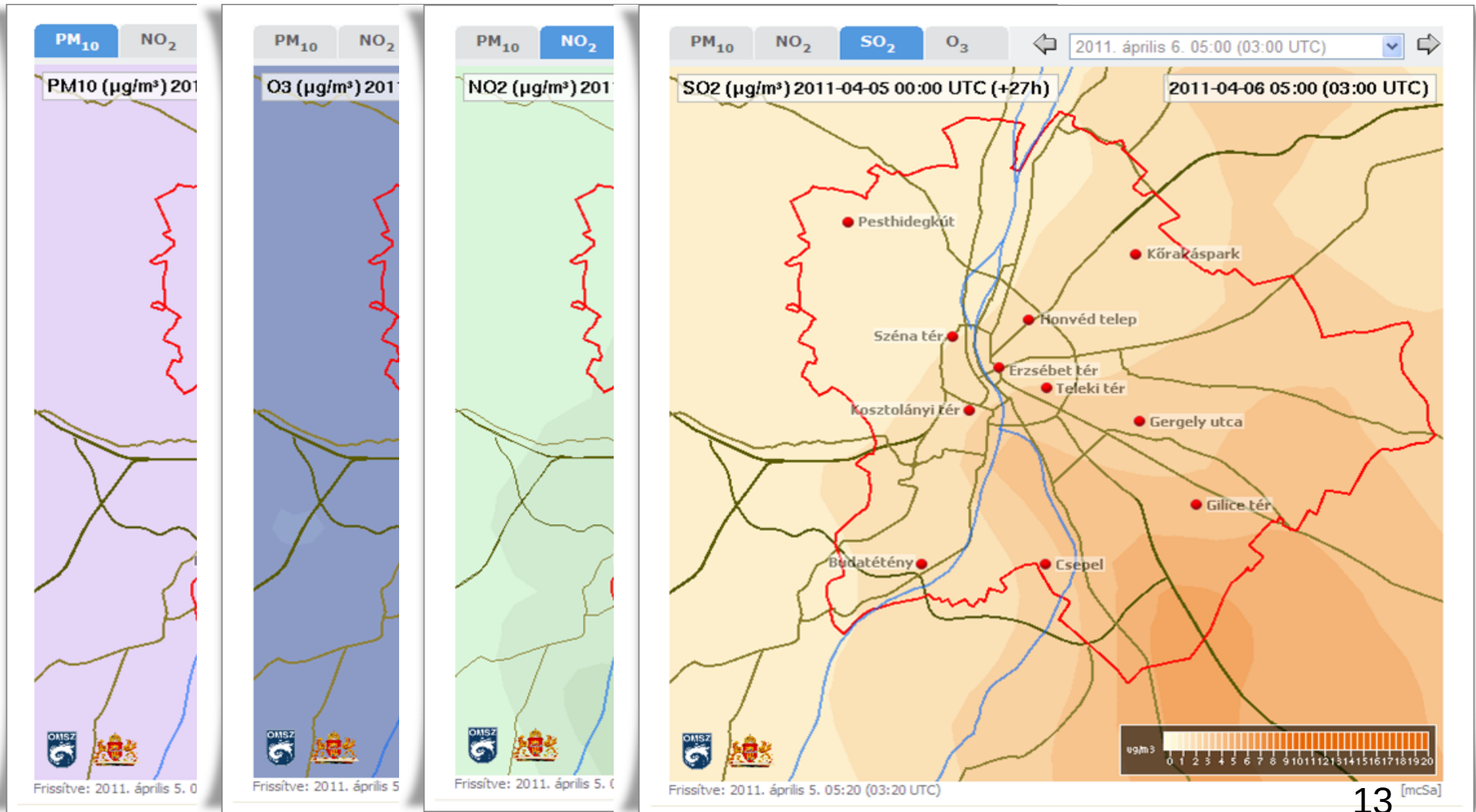
# Air Quality Modelling at the Hungarian Meteorological Service

- **Long-range transport model:**
  - EMEP
- **Regulatory models:**
  - AERMOD (+ EDMS)
- **Lagrangian particle dispersion model (Decision support in case of accidents):**
  - FLEXTRA and FLEXPART
- **Chemical weather forecast:**
  - CHIMERE + WRF or. AROME

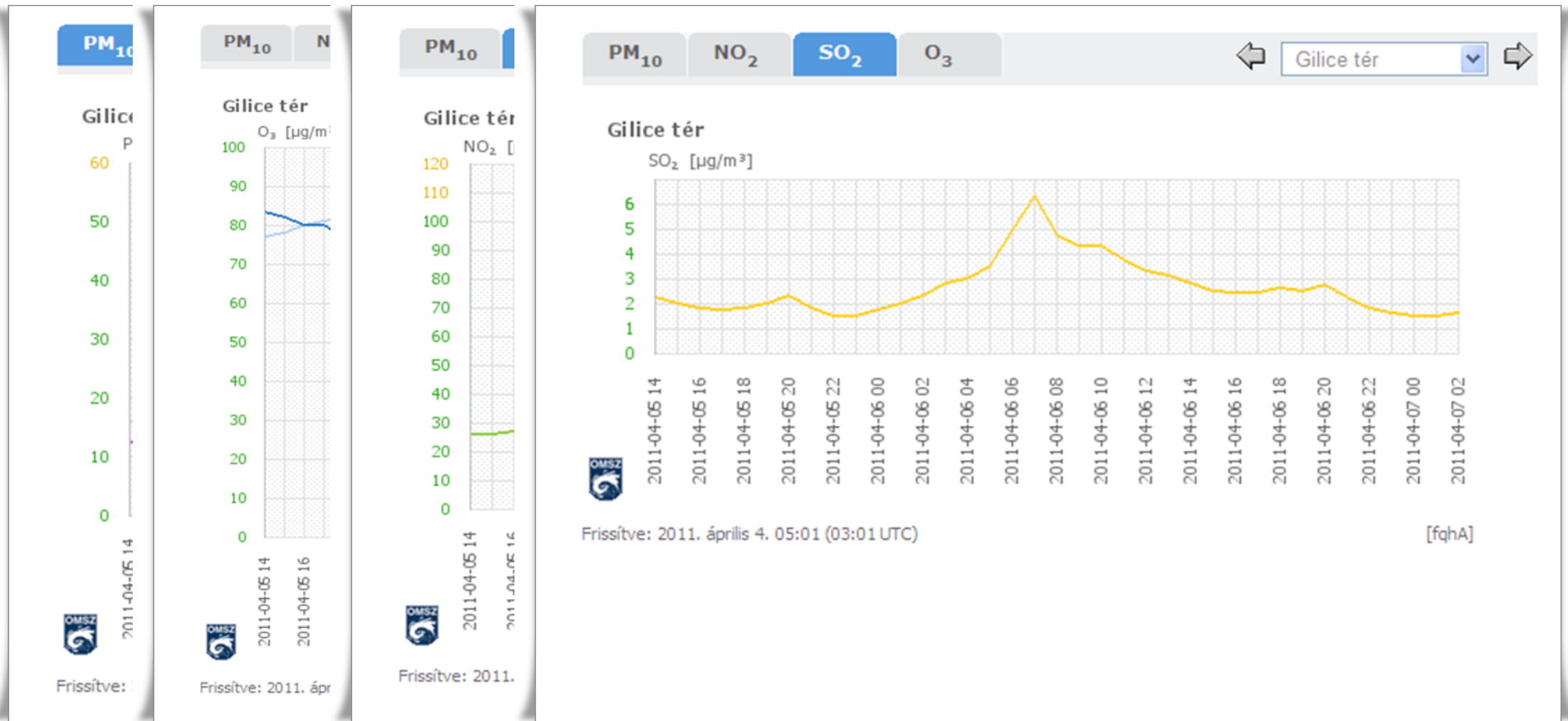
# An example - chemical weather forecast for Budapest


- **A WEB based chemical weather forecasting and information system for Budapest**
- **Chemical transport model – CHIMERE**
- **Emission data**
  - Point sources - power plants
  - Area sources ( 3 km x 3 km)
    - domestic heating
    - industrial processes
    - traffic - 2004 official traffic count data
- **Meteorological data**
  - WRF (AROME) numerical weather prediction models
- **Visualization – HAWK (Hungarian Advanced Workstation)**
  - visualization system developed and used by HMS

# Chemical weather forecast for Budapest - maps



# Chemical weather forecast for Budapest - diagrams





## Conclusion: Suggestions for the air quality directives

- harmonisation of the pollution concentration and emission regulations
  - useful measures for the effect of emission reduction arrangements
  - measures or “limit values” for the effect of long-range transport
  - supporting the source identification studies
- support of the emission reduction arrangements instead of fines for limit value exceedances
- revision of the “unfeasible” limit values (e.g. PM<sub>10</sub>, PM<sub>2.5</sub>)
- careful definition (or dedicated financial support) of expensive new measures (VOC, POPs, etc.)
- support of the modelling activity
- standardization of low-cost equipments and measuring methods



Thank you for your attention!