

## D3.3 Modeling platforms implementation

- Modeling tools for AQ planning, including health assessment (D4.1) and for disaster management (D4.2)
- Emphasis is given to bridging state-of-the-art regional atmospheric models with city-scale models for high resolution AQ simulations in cities
- The Copernicus Atmosphere Monitoring Service (CAMS) provides continuous data and information on atmospheric composition and short-term air quality forecast on a European scale
- Common interfaces will be developed for the utilization of CAMS products in the city scale models or as components in integrated city solutions.
- Existing model platforms for disaster management, e.g. floods and forest fires, will be advanced by the incorporation of crowdsourcing methods

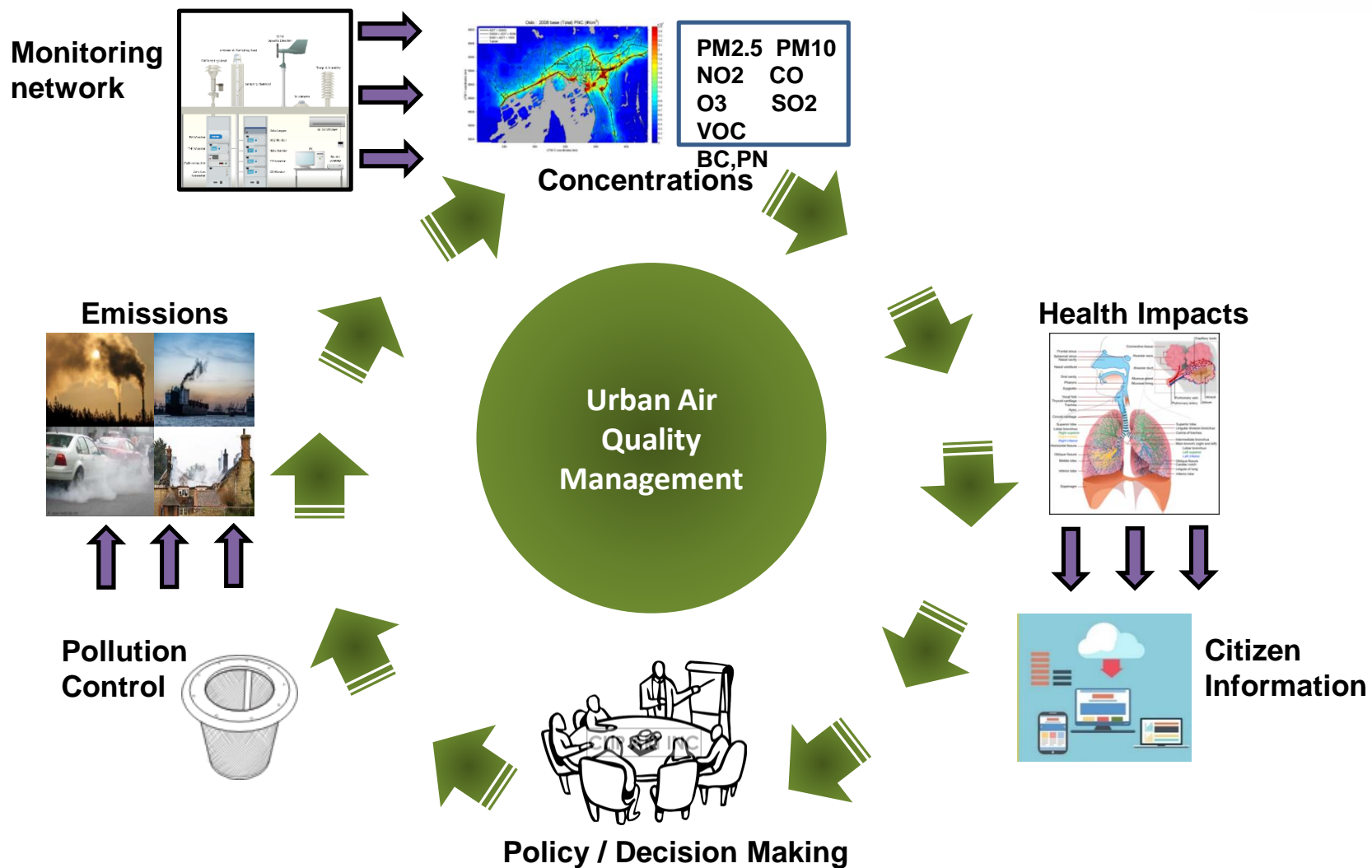


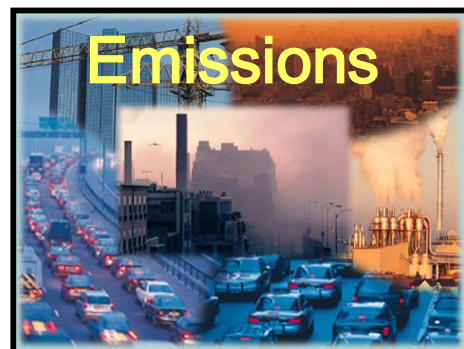
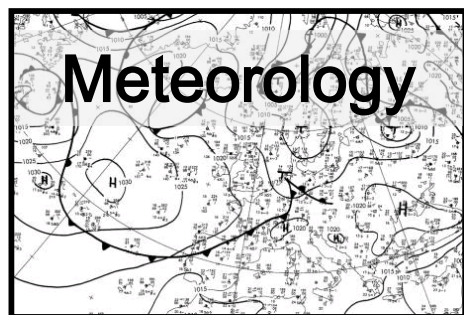




# Activities in T3.3

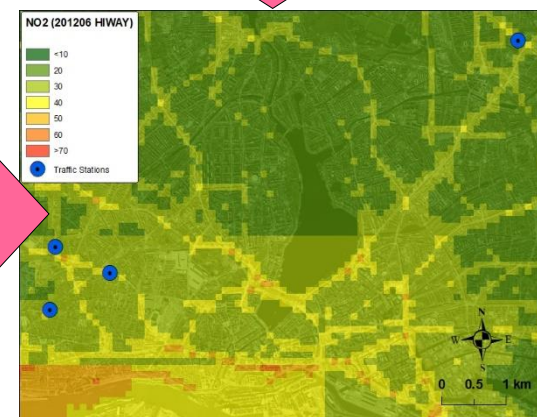
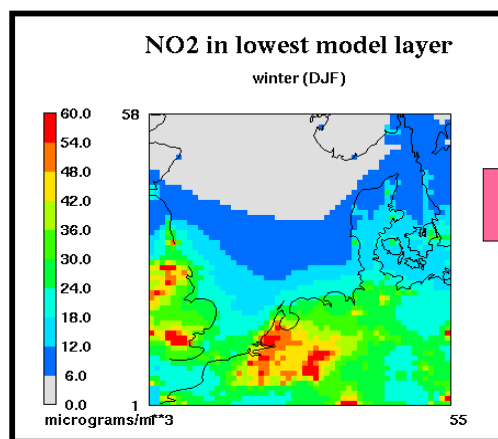
- Closing the gap between regional and urban AQ models.
- Two regional scale AQ models (@ NOA, HZG) and two city scale AQ models (@ HZG, SU). CAMS regional ensemble products (AoA).
- Development of high resolution emission inventories based on e.g. real time monitoring (HZG, SU, UHEL).
- Development of FMI-ENFUSER (UHEL) which uses the sensor network from Helsinki and various GIS datasets.
- Develop prototype model for AQ forecasting (NOA, HZG, SU) in coordination with T4.1
- NOA provides the FloodHub service for flood management and the FireHub service for forest fire control under the BEYOND Centre of Excellence for EO-based monitoring of Natural Disasters (<http://beyond-eocenter.eu/>)
- Report D3.3 delivered Jan. 7<sup>th</sup>, 2019



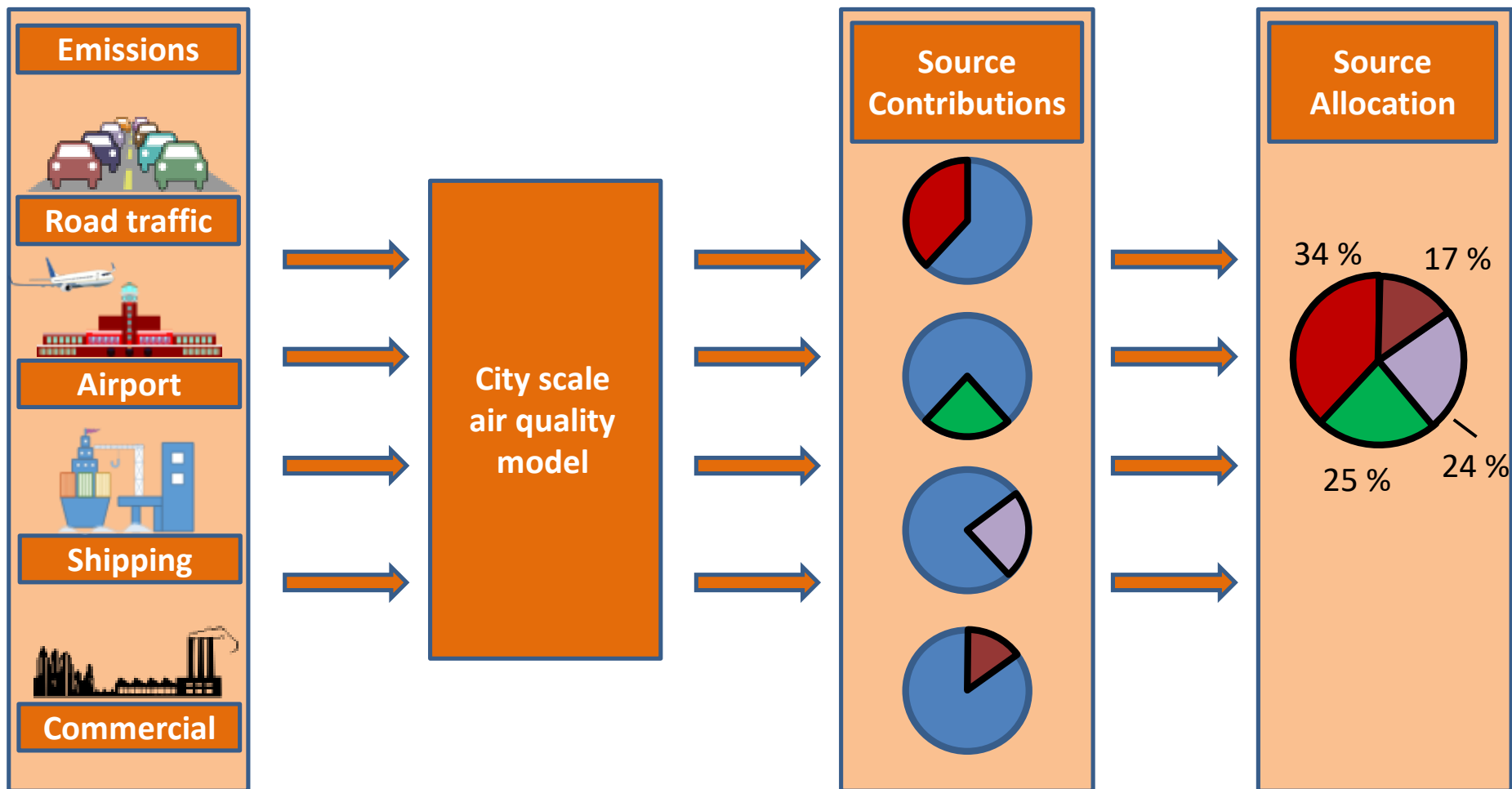


## CTM: Regional / Urban

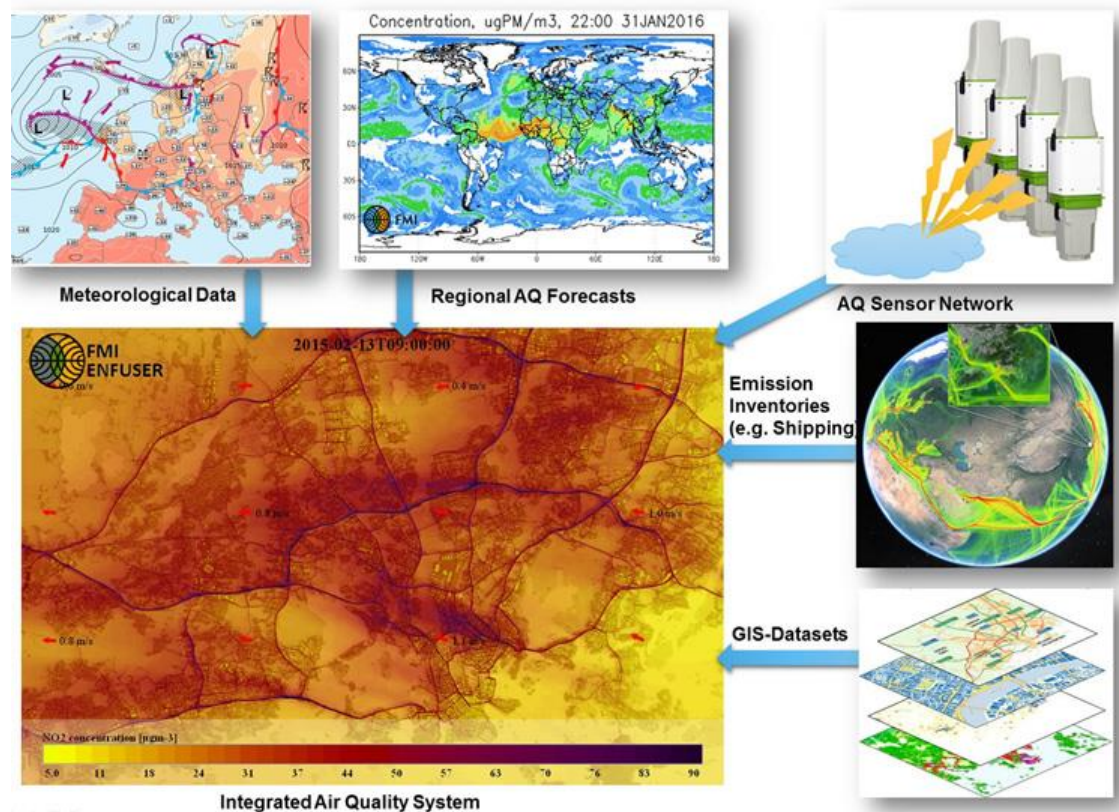
Gas phase chemistry  
Aerosol chemistry  
Cloud chemistry  
Transport



**NO2 Hamburg inner city**

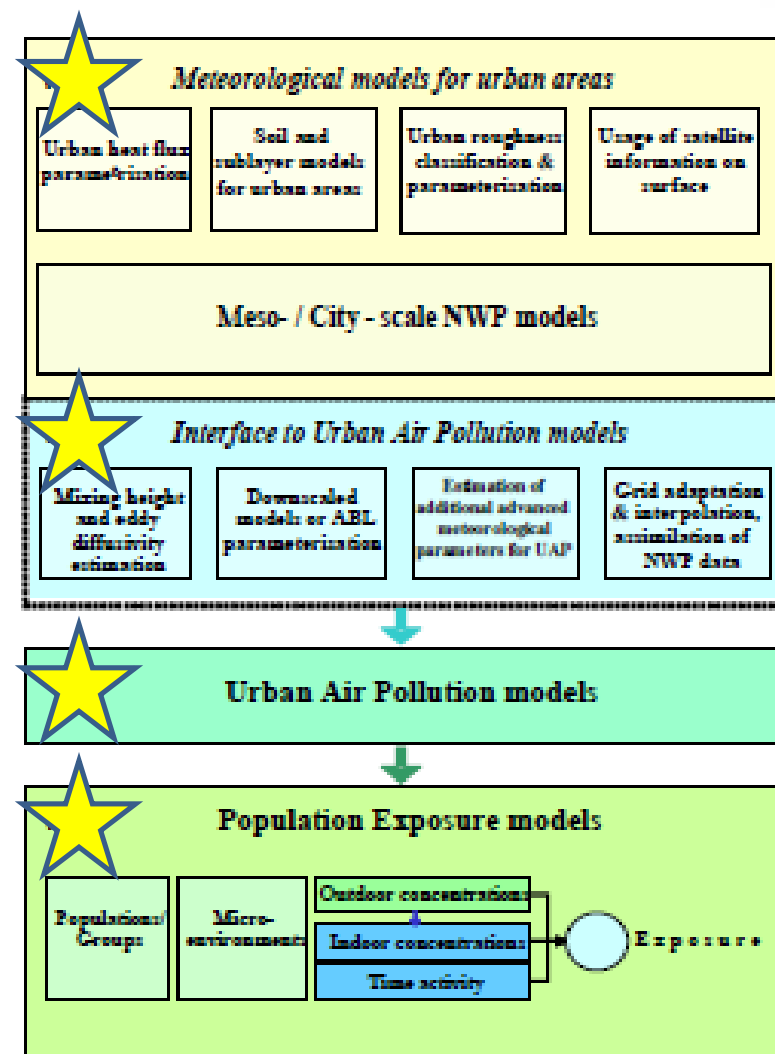






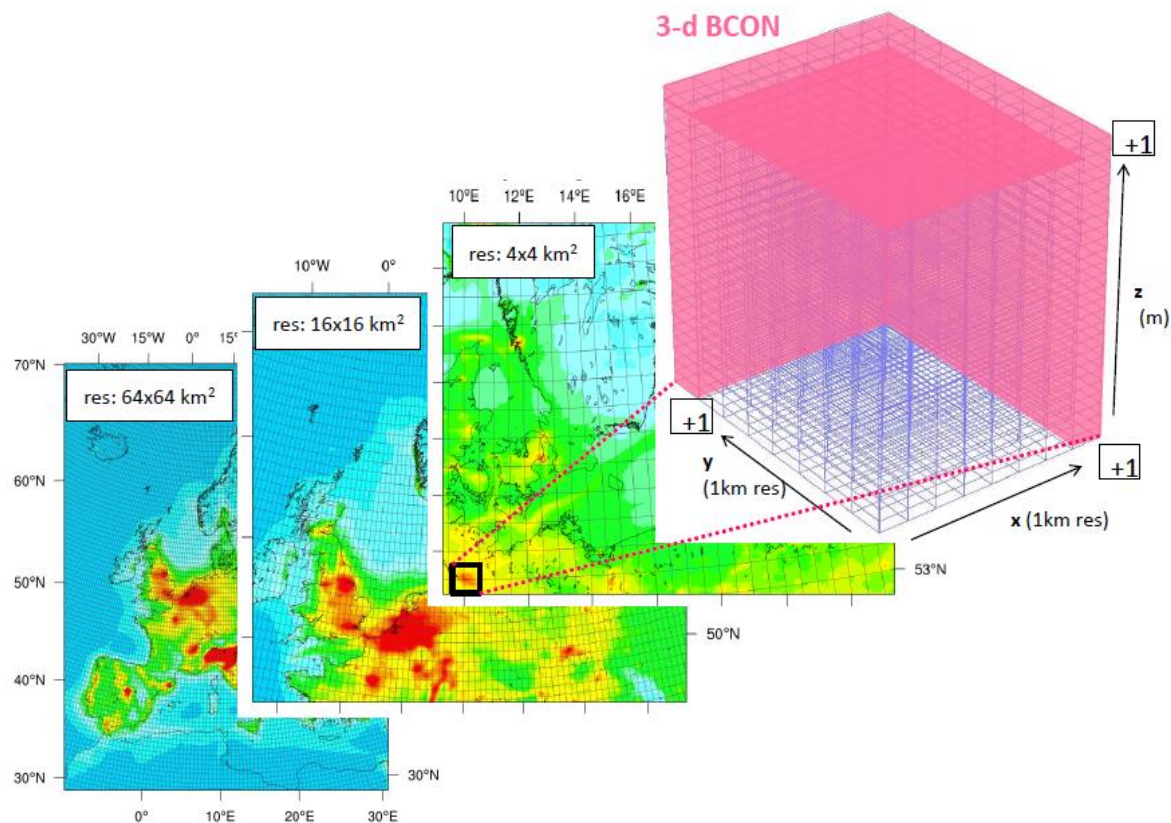
The core components of FMI-ENFUSER modelling system, which utilizes latest sensor observations, meteorological data and regional air quality forecast in the production of high resolution output for the current and future air quality in urban locations. GIS-datasets and emission inventories together with archived concentration time series are used for the calibration of the model.

- Meteorological models with urban canopy
- Mesoscale CTM use BCON from CAMS
- City-scale CTM use BCON from Mesoscale inner nest
- Tools for visualization, information of the public, exposure calculation
- Evaluation with satellite data, CO data, ...



Modified after Baklanov et al., ACP, 2007

SMURBS PM2 Meeting, 3-6 June, 2019, Kiev

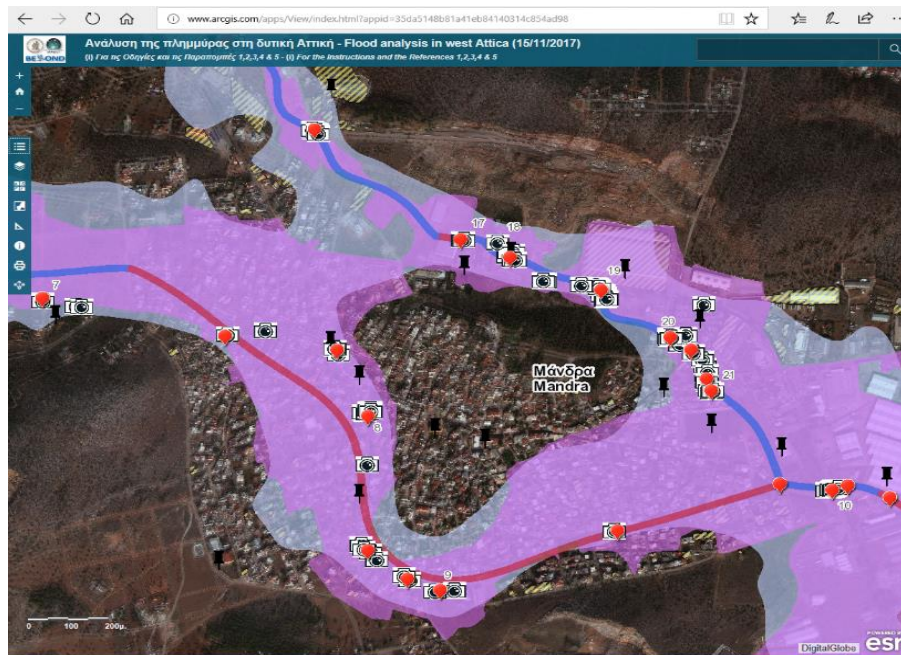


Nested model chain of the CMAQ – CityChem system to bridge between regional and urban scale. The 3-D boundary conditions of the city domain are filled with concentrations from the regional air quality model CMAQ.

- MU: The World Health Organisation (WHO) tool AirQ+ for health assessment (new 2018 version) is a software developed by WHO Regional Office for Europe. Its purpose is to estimate impact of air pollution on health of given population (WHO Regional Office, 2018). This tool can be used to assess health effect of long-term and short-term exposure to ambient air pollution and is designed to work with following pollutants: PM2.5, PM10, NO2 and O3. Best data if from observations, but modelling data can also be used.
- SU: will provide nowcasts and prognoses of health risks associated with air pollution (PM10, NOx and O3) and birch pollen exposure in the Stockholm region. The health risks are calculated based on relative risks for acute hospital admissions for asthma. The relative risks are taken from an epidemiological study in Stockholm (Olstrup et al., 2018), and both a total health index calculated as the sum of the risks associated with each pollutant and pollen, as well as the individual absolute concentrations will be provided



NOA seeks to enhance its flood modelling with the incorporation of crowdsourcing. Currently, NOA provides the FloodHub service of the BEYOND Centre of Excellence for EO-based monitoring of Natural Disasters (<http://beyond-eocenter.eu/>).



Simulation of the maximum flood extent (blue) and flood extent mapping using satellite remote sensing (purple) for the flood in the urban and peri-urban area of Mandra, Attica, Greece on 15/11/2017 (NOA / BEYOND / FloodHub service).

The category 'Modelling' collects the description and characteristics of the main databases used and generated into the related tasks to the current deliverable. In the first version of the DMP, this category is composed by 21 different data collections, basically referred to next thematic areas:

- Land use/cover regional and local databases at different scales;
- Real time monitoring of affected areas and impacts of disasters: fires, floods, landslides, etc.;
- Health statistics data and health risk index based on air quality modelling

# Gaps in D3.3

Overall the Modeling Platforms are in a good position. Existing model platforms will be further developed within SMURBS and automated in the entire modelling chain to achieve a pre-operational mode for the solutions.

- Need for local emissions with high resolution. Some organizations have detailed urban emissions for their cities (SU, HZG). Need for developing proxy-based top-down emission conversion tools.
- FMI-ENFUSER (UHEL) uses sensor network data and does not need emissions.
- Limited interaction with city authorities. The few reported examples include
  - Accidental release, region of Attica (NOA)
  - Rapid response protocols (fire, chemical hazards), region of Attica (NOA)
  - Urban planning (UHEL)
- A common public data platform or hub on AQ data is missing. Some organizations have open ftp service:
  - Health risk index for Stockholm (SU)
  - Land cover classification for Helsinki (UHEL)
  - Deformation maps for Bucharest (ROSA)

# Update of D3.3

- Satellites may also provide information about the regional background pollution. ROSA plans to use in-situ data and Sentinel data to retrieve atmospheric products, e.g. Sentinel3 or 5p for retrieving aerosol concentrations.
- EPISODE-CityChem (HZG) has already been deployed in demonstration activities for the city of Hamburg. Possibilities for operational AQ forecast are investigated for Hamburg (HZG) and a new setup for Athens is ongoing (NOA) entailing the development of a common emission processing system.
- Specialized AQ measurements from a ACTRIS urban supersite in Athens are available. The utilization of the urban supersite data will generate tailored indicators on top of the provided CAMS information (NOA).
- There is a need to have interfaces in SMURBS to use CAMS products in city scale models. Validation of the CAMS global and regional forecast and reanalysis datasets (AoA; D4.5) and CAMS emission datasets for Europe.
- Report D3.3 update due in Sept. 2019; suggest to postpone by two months