Webinar
S2-P3: Health Surveillance Air Quality-HSAQ' Pilot

Health Risk assessment due to air pollution exploiting World Settlement Footprint – Munich Pilot

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Evaluation of the health risk at city level caused by exposure to PM2.5

Presence of pollution species in a certain concentration

Damage extent when exposure to hazard occurs/ sensitivity

Presence of people in polluted areas/ probability of exposure

Risk = Hazard x Vulnerability x Exposure

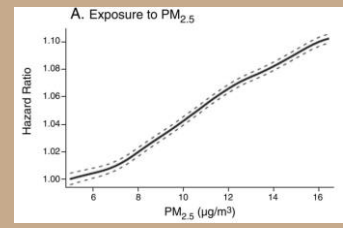
Available products

Pollutants concentration

- Chemical transport models (CAMS, POLYPHEMUS/DLR)
- Satellite data (Sentinel 3,4,5,5p)
- In situ stations

Relative Risk curves for different population groups

- International health authorities (WHO, EMA,..)
- Literature/ epidemiological studies



Population density
Urbanization level
Activities time patterns

- National/international statistical institutes
- World Settlement Footprint (DLR)
- Surveys results
- Transportation data

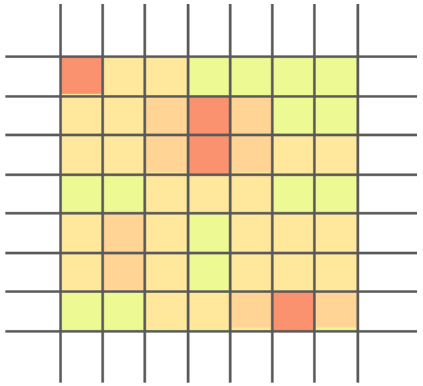
DLR

health

Method

Increased health risk

Increased health risk relative probability map



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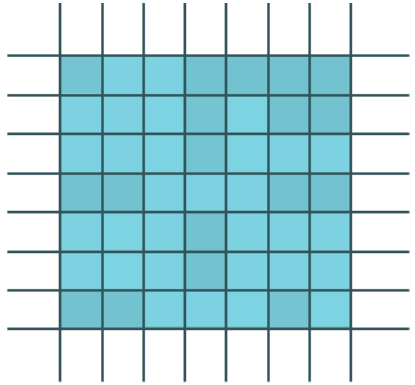
Increased risk due to exposure

Mean annual concentration map

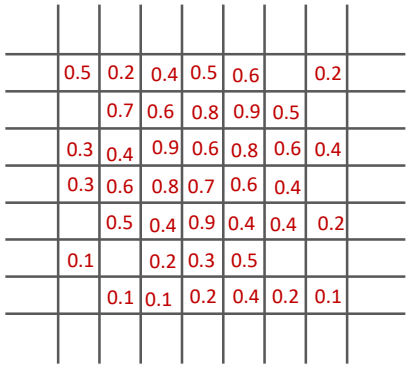


× Relative risk

×

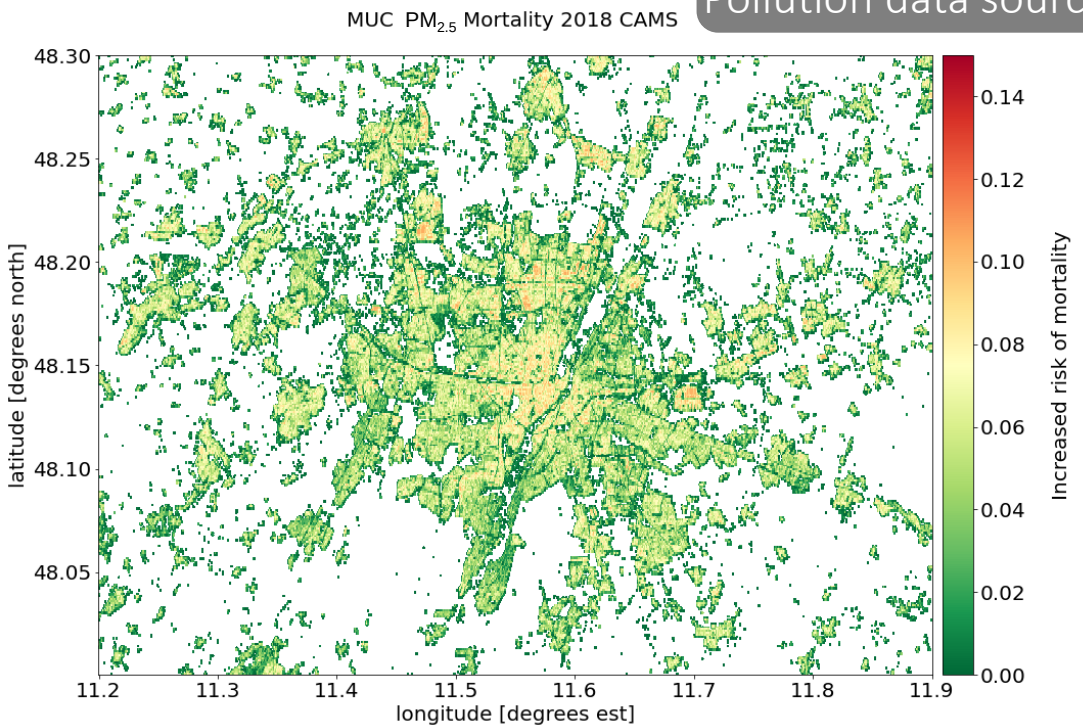
Probability of exposure

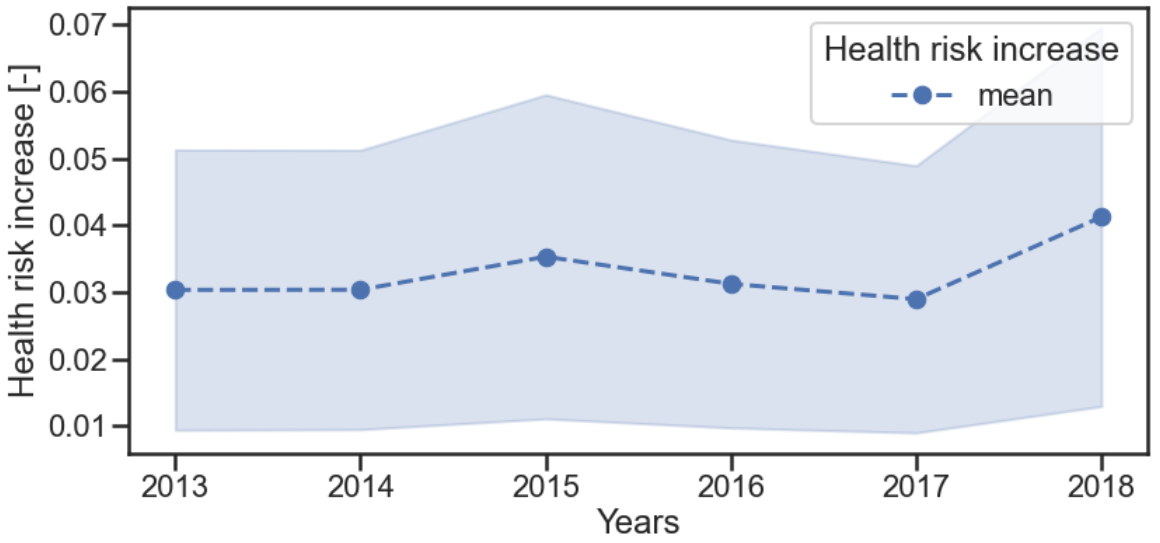
Urbanization level map



Increased health risk of mortality due to all causes caused by exposure to PM2.5

City: **Munich**
Pollution data sources: **CAMS reanalysis**

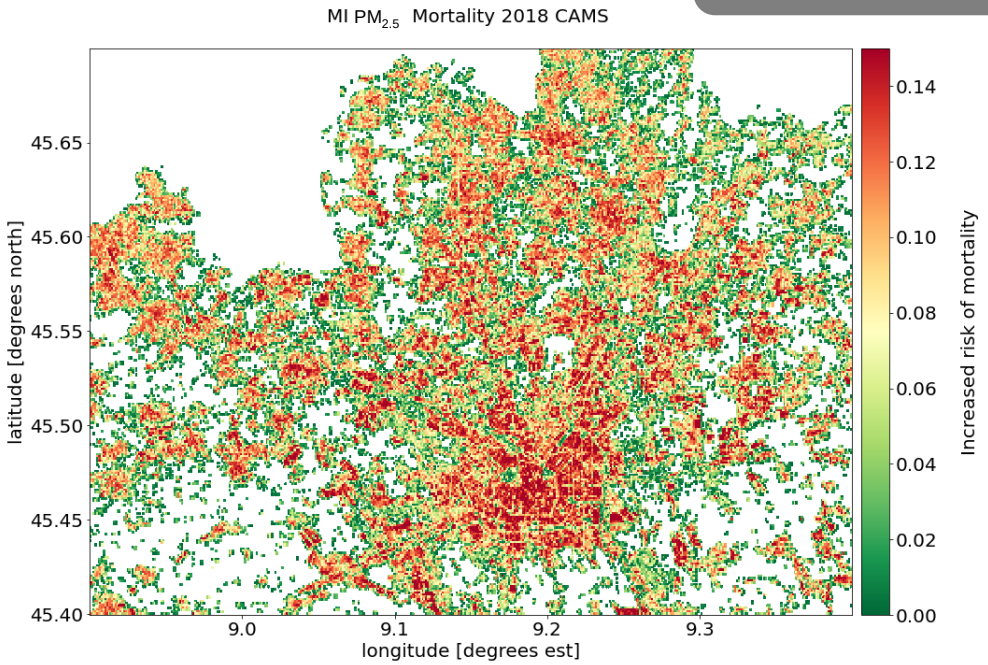


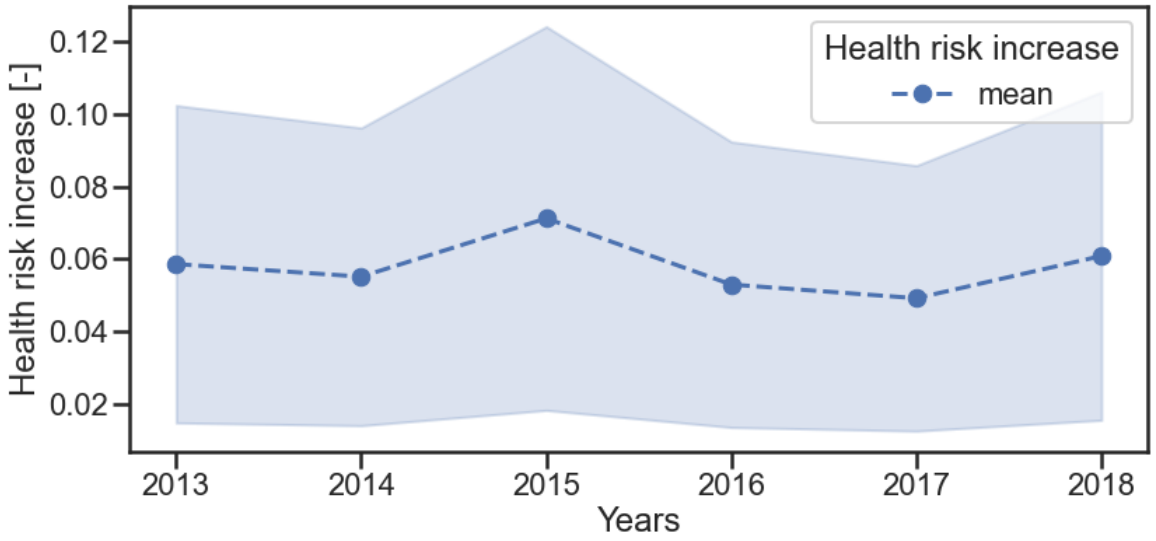


Source: L. Gilardi, A. Metz-Marconcini, M. Marconcini, T. Erbertseder, **"Urban air pollution exposure: an assessment exploiting world settlement footprint and land use data,"** Proc. SPIE 11864, Remote Sensing Technologies and Applications in Urban Environments VI, 1186406 (23 September 2021); https://doi.org/10.1117/12.2600414

Increased health risk of mortality due to all causes caused by exposure to PM2.5

City: **Milan**
Pollution data sources: **CAMS reanalysis**





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Achievements

- New tool to improve the heath risk assessment in cities
  - Exploiting urbanization level
  - Land use
  - Demographical data

➢ Relies on methods and tools approved by main health authorities

➢ Easily scalable and customizable

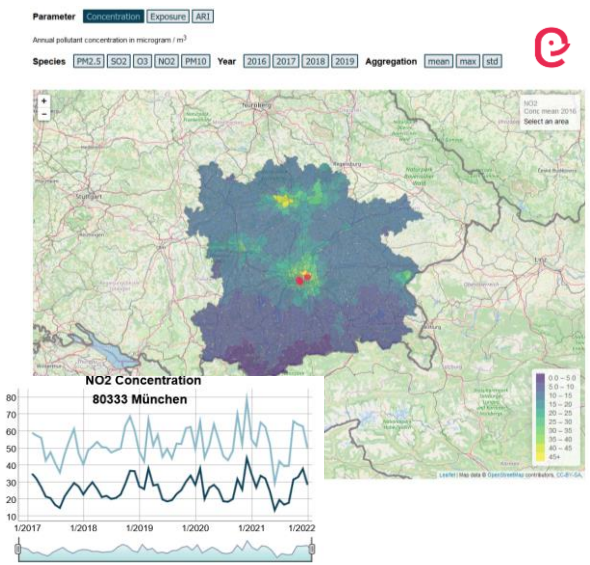
➢ Allows for an immediate overview of the health risk in different urban contexts

➢ Possible global coverage

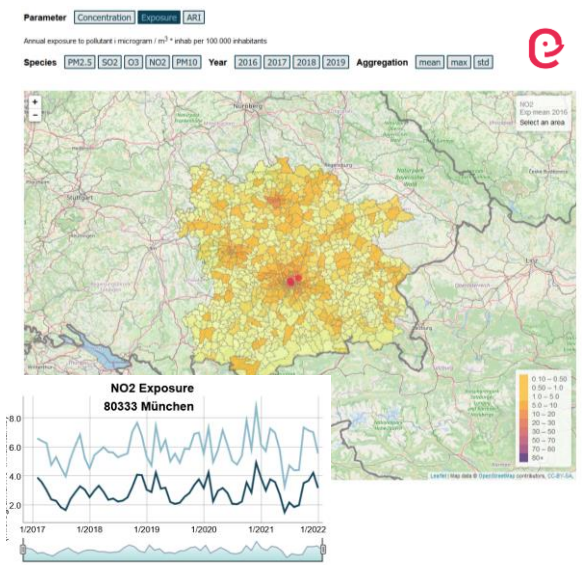
Future work

1. Inclusion of daily commuters contribution to the people count
    - ➢ Allocation in most appropriate areas of the cities
2. Inclusion of industrial and commercial areas in the risk assessment
    - ➢ Validation of meaningful transportation and activity time pattern
3. Stratification of risk for vulnerability classes
4. Validation with real health data in collaboration with health insurance companies
5. Multi-hazard risk evaluation
    - ➢ Among WHO and HERA main objectives

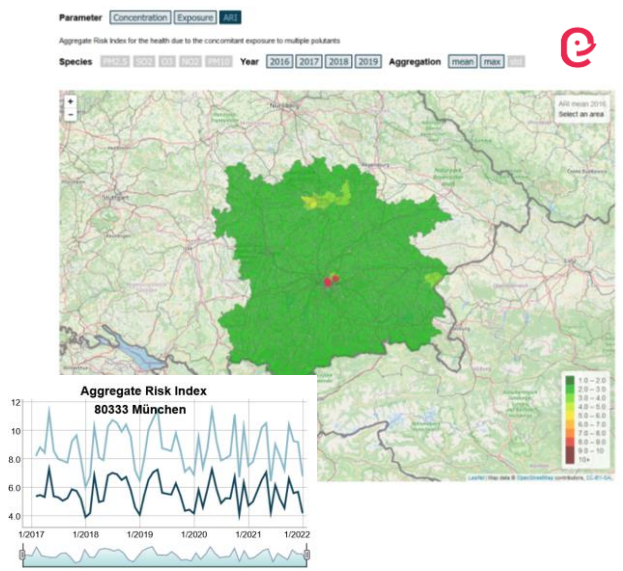
Pollutant concentrations



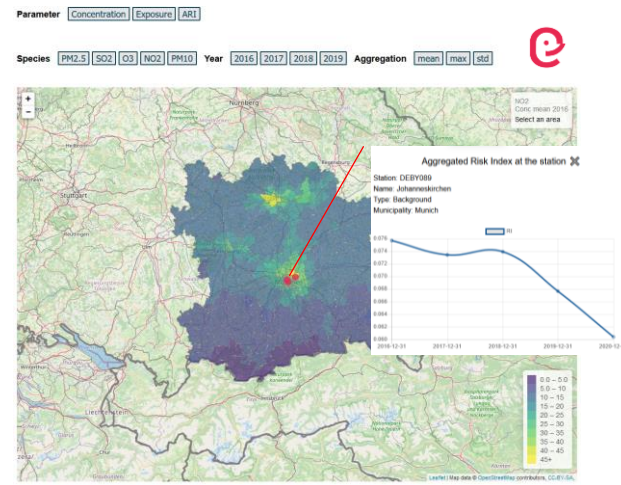
Population weighted exposure



Aggregate Risk Index



Aggregate Risk Index at stations



- Spatial domain: Munich Metropolitan Area (ZIP code areas & station locations)
- Temporal resolution: yearly (zipcodes) and monthly/daily (timeseries)
- Co-Design: Process embedded in Alpine Data Analysis Center (AlpEnDAC) at Virtual Alpine Observatory (VAO)
- Case Access: https://www.alpendac.eu/eshape