

Agent-based human space-time activity modeling for air pollution exposure assessment

Conventional air pollution exposure assessment methods assess air pollution exposure as air pollutant concentrations at front door locations. This approach ignores human activity patterns and consequently may lead to over- or under-estimation of air pollution exposure. Assessing air pollution exposure considering activity patterns of individual persons remains to be a challenge as the detailed working location information and detailed activity pattern of the residents are commonly unknown when large numbers of individuals need to be considered. This study aims at integrating mixed-effect and machine learning models in ABM (agent-based modelling) methods to predict human activity patterns for exposure assessment. The methodology will be tested and evaluated for Switzerland using national travel survey data. This study is closely related to our ongoing *Mobi-Air* project with Swiss TPH.

Tasks:

- 1) Regression modeling of travel survey data, finding relationships between e.g. travel mode and travel distances, ethnics.
- 2) ABM modeling of human space-time activity. Comparing the model results for different population groups.
- 3) Linking to temporal air pollution maps for exposure assessment.

Keywords: regression analysis, agent-based modeling, space-time activity, exposure assessment, air pollution, environmental health

Reading material

Meng Lu, Oliver Schmitz, Ilonca Vaartjes, Derek Karssenber, Activity-based air pollution exposure assessment: Differences between homemakers and cycling commuters, *Health & Place*, Volume 60, 2019, 102233, ISSN 1353-8292, <https://doi.org/10.1016/j.healthplace.2019.102233>