



Uncertainty in exposure to air pollution

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To assess exposure to air pollution for a person or for a group of people, one needs to know where the person or group is as a function of time, and what the air pollution is at these times and locations. In this study we used the Albatross activity-based model to assess the whereabouts of people and the uncertainties in this, and a probabilistic air quality system based on TAPM/EPISODE to assess air quality probabilistically. The outcomes of the two models were combined to assess exposure to air pollution, and the errors in it. We used the area around Rotterdam (Netherlands) as a case study.

As the outcomes of both models come as Monte Carlo realizations, it was relatively easy to cancel one of the sources of uncertainty (movement of persons, air pollution) in order to identify their respective contributions, and also to compare evaluations for individuals with averages for a population of persons. As the output is probabilistic, and in addition spatially and temporally varying, the visual analysis of the complete results poses some challenges. This case study was one of the test cases in the UncertWeb project, which has built concepts and tools to realize the uncertainty-enabled model web. Some of the tools and protocols will be shown and evaluated in this presentation.

For the uncertainty of exposure, the uncertainty of air quality was more important than the uncertainty of peoples locations. This difference was stronger for PM10 than for NO₂.

The workflow was implemented as generic Web services in UncertWeb that also allow for other inputs than the simulated activity schedules and air quality with other resolution. However, due to this flexibility, the Web services require standardized formats and the overlay algorithm is not optimized for the specific use case resulting in a data and processing overhead. Hence, we implemented the full analysis in parallel in R, for this specific case as the model web solution had difficulties with massive data.