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Noise-Footprint of Personal Mobility Demand

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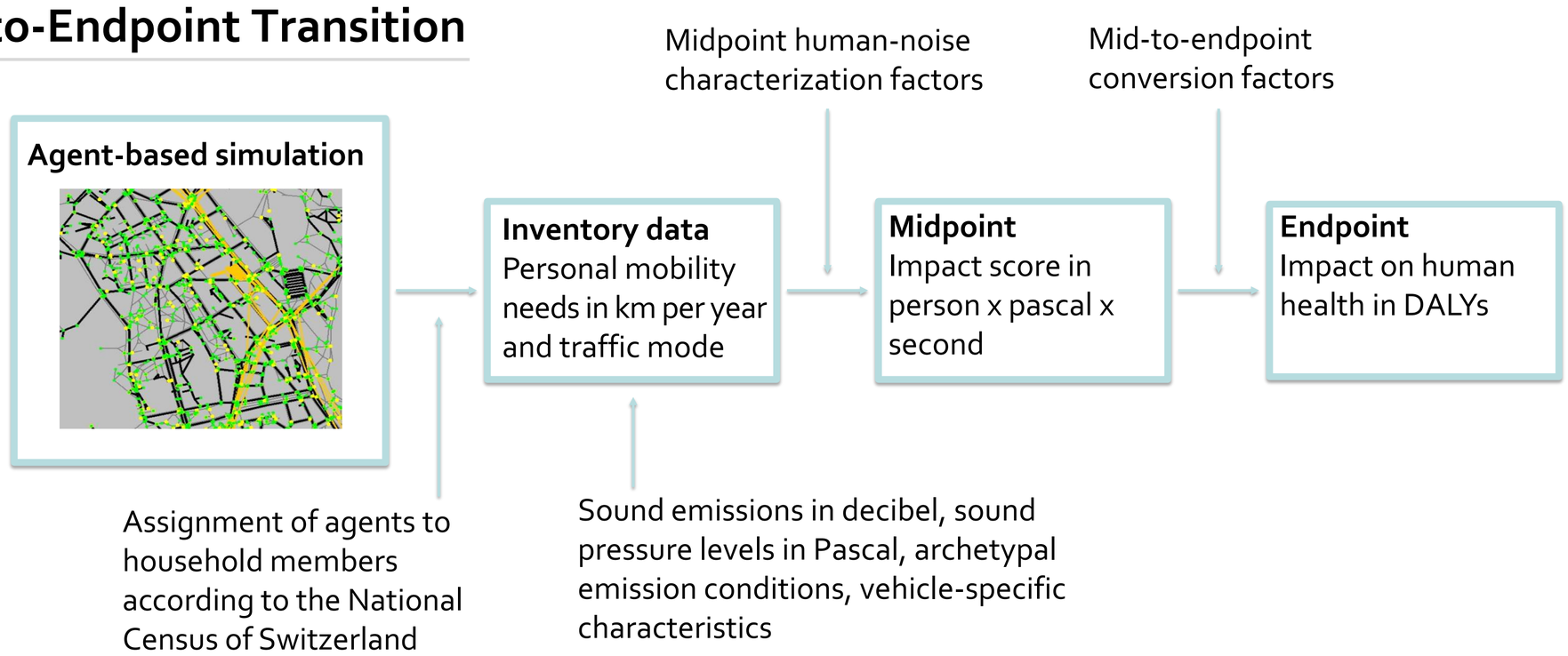
Background

A large part of the world population is exposed to noise levels that are unhealthy. Yet, noise is often neglected when impact assessment studies are conducted and when policy interventions are required. In this study, we provide a way to calculate the noise-footprint of citizens directly determined by their use of private and public transport. We extended a noise characterization model [1] developed in the context of life cycle assessment from midpoint to endpoint and we connected it with an agent-based model that tracks the use of private and public transport by agents. The results after characterization provide a consumption-based noise-footprint [2]. The application of our approach to Switzerland assessed thus the total noise that is caused by the private mobility demand of the Swiss inhabitants.

Inventory and Mid-to-Endpoint Transition

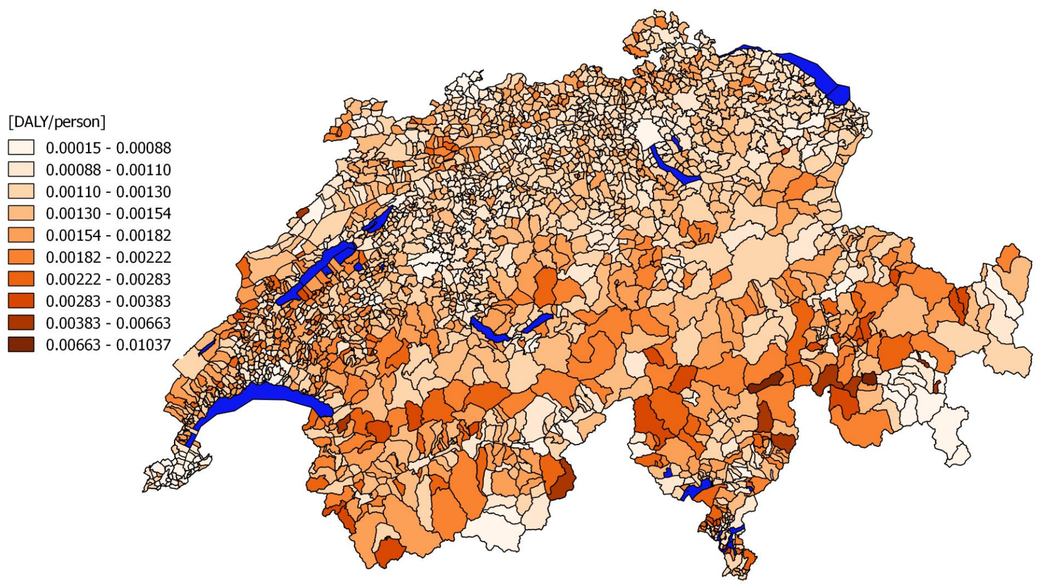
We used the MATSim model [3], a framework that implements large-scale agent-based transport simulations. We applied the implementation of MATSim for Switzerland [4] to feed the inventory of our noise assessment.



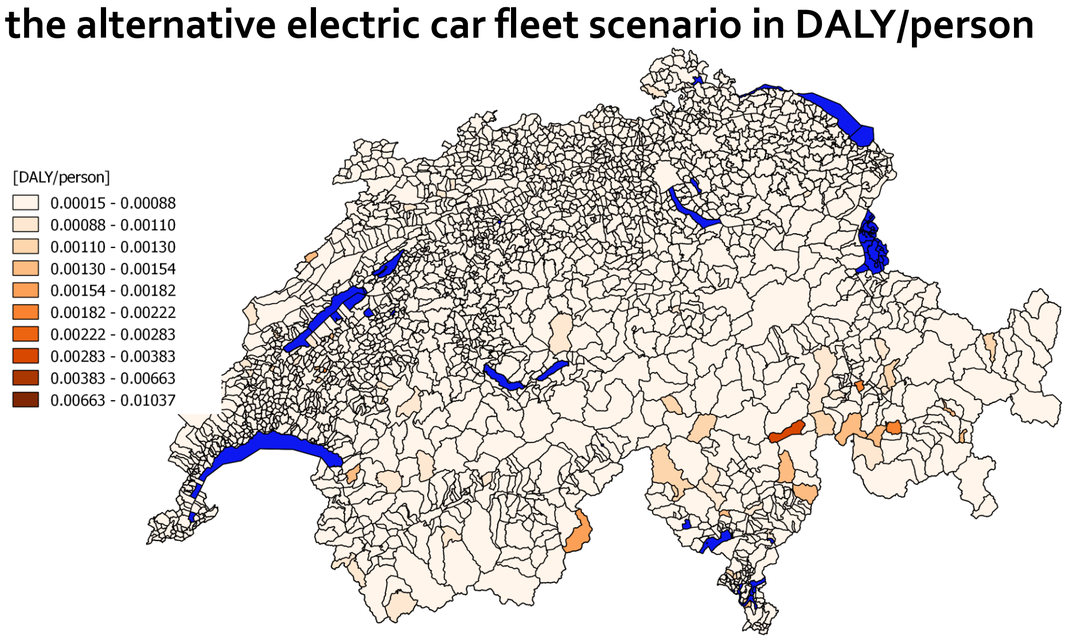
Results

Results were calculated for the whole of Switzerland. Alternative scenarios were created. We show here the results of the per-capita noise-footprint aggregated at municipal level considering the current fleet, and the scenario of the entire Swiss fleet turned from conventional cars to electrical cars.

Per-capita noise-footprint aggregated at municipal level for current fleet in DALY/person



Per-capita noise-footprint aggregated at municipal level for the alternative electric car fleet scenario in DALY/person



Conclusions

The noise-footprint method allows accounting for noise impacts on humans using an LCA impact assessment model and quantifying impacts on humans using a DALY scale. The transition of the existing characterization model from midpoint to endpoint allows for the comparison of the impacts determined by sound-emitting sources with other impacts in a full life cycle. Further harnessing the output data provided by agent-based models such as MATSim would allow to better calibrating characterization models and to closely track temporal and spatial dynamics that are, otherwise, typically lost in LCA studies.

References

[1] Cucurachi S et al. 2012. Towards a general framework for including noise impacts in LCA. The International Journal of Life Cycle Assessment
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Remarks

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