Development of a Healthy Urban Route Planner for cyclists and pedestrians in Amsterdam
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Background
Cities are typically several degrees warmer than the countryside, especially during hot summer days. The frequency of hot spells are foreseen to increase by climate change (Molenaar et al 2016). Contrasting urban morphology provides a temperature variation between neighborhoods. At the same time, citizens are subject to spatiotemporally varying air pollution concentration due to intense motorised traffic.

Objective
This study develops a route planner for pedestrians, runners and cyclists for finding the most healthy route between their departure and destination (minimum urban heat and air polluton concentrations)

Methods
The Weather Research and Forecasting model at a novel 100 m spatial resolution is used for forecasting weather and air quality in Amsterdam. (Ronda et al, 2017) WRF is fed with high resolution land use data and pollution emissions from the TNO-MACC database and traffic counts (Fig.1). The route planner uses OpenStreetMap data, the open source pgrouting, enabling geospatial routing. The model computes (using pgrouting in PostGIS, with network data stored in the database in PostgreSQL) at that moment the best route. The most healthy route is calculated according to the Dijkstra (1959) algorithm, where the air pollution and temperature are taken as the cost variable to minimize.

Results

Validation

Conclusion
• High resolution forecasting of urban weather and air quality provides essential data for healthy route planners for urban commuters and an opportunity for minimizing individual exposure.

References
Dekker, I, 2014: NOx concentrations and exposure in Amsterdam and over Europe: First assessment based on joint high-resolution WRF modelling and observations. MSc thesis, Wageningen University, Wageningen, Netherlands. Online available via http://edepot.wur.nl/332393

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