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Air quality assessment at the street level: sensitivity analysis of a road traffic-emissions-CTM model chain for the Paris region

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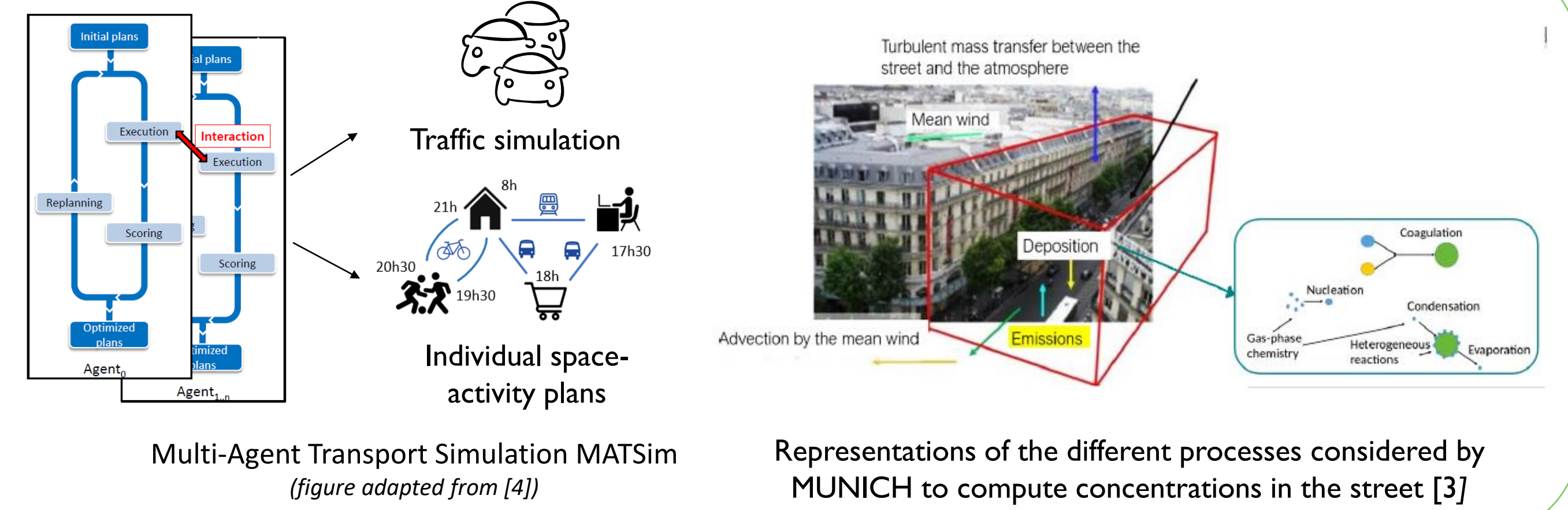
INTRODUCTION

- Public policies aiming to **improve air quality** focus mainly on vehicle fleet regulation & low emission zones
- Need to assess the **effect of public transport policies** on urban air quality and personal exposure
- Development of **modeling chain** from road traffic to chemical transport models (CTM) in recent years [1] [2]
- Uncertainties and model **sensitivity** to hypotheses remain little studied

RESEARCH QUESTIONS

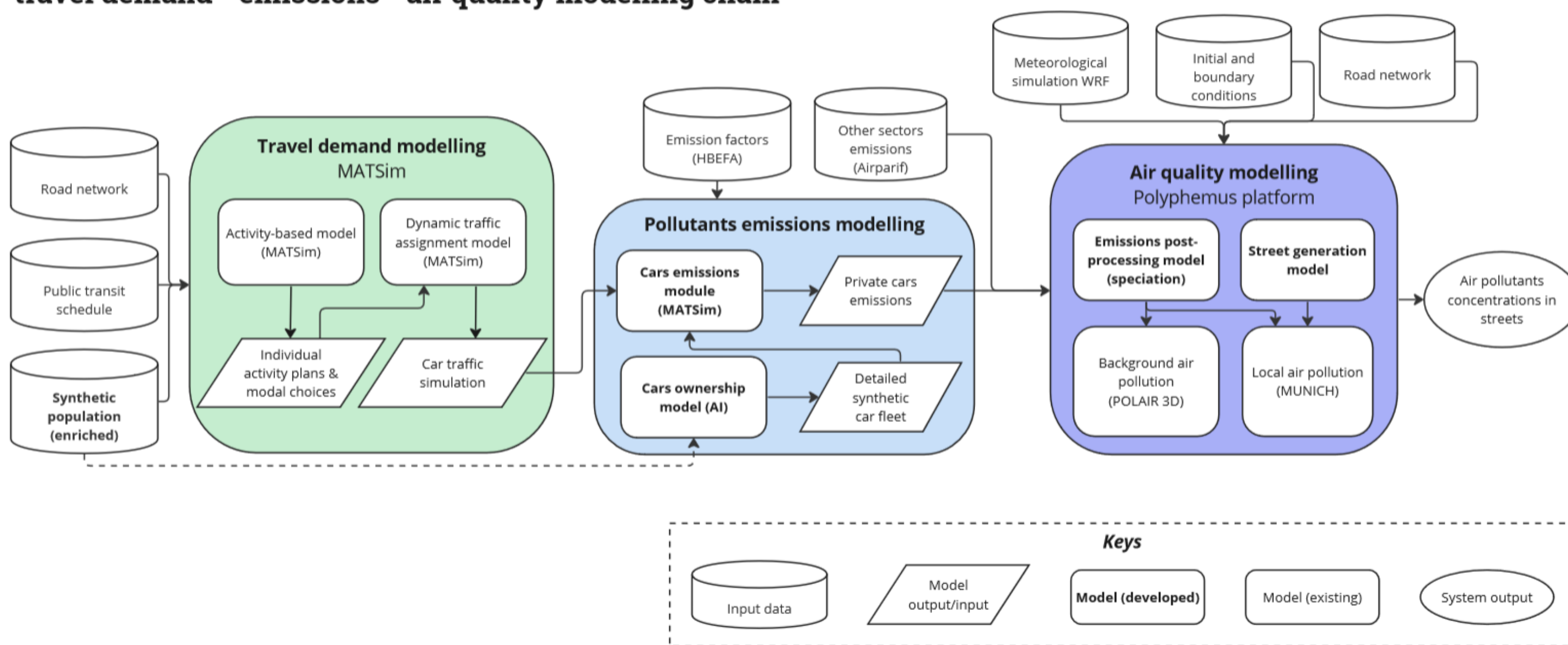
- 1) How to integrate high resolution traffic emissions into an air quality model based on street canyons?
- 2) How sensible to modeling hypotheses is the modeling chain?

MODELS



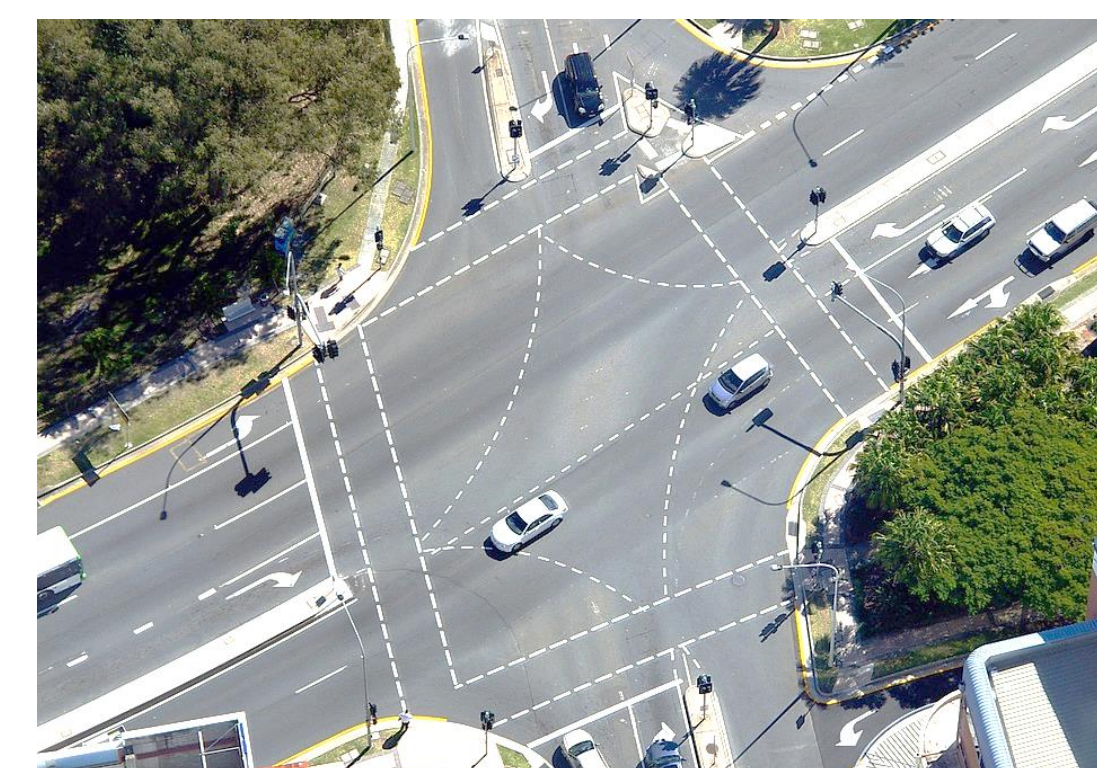
METHODOLOGY

The integrated modelling framework for air quality assessment: travel demand - emissions - air quality modelling chain



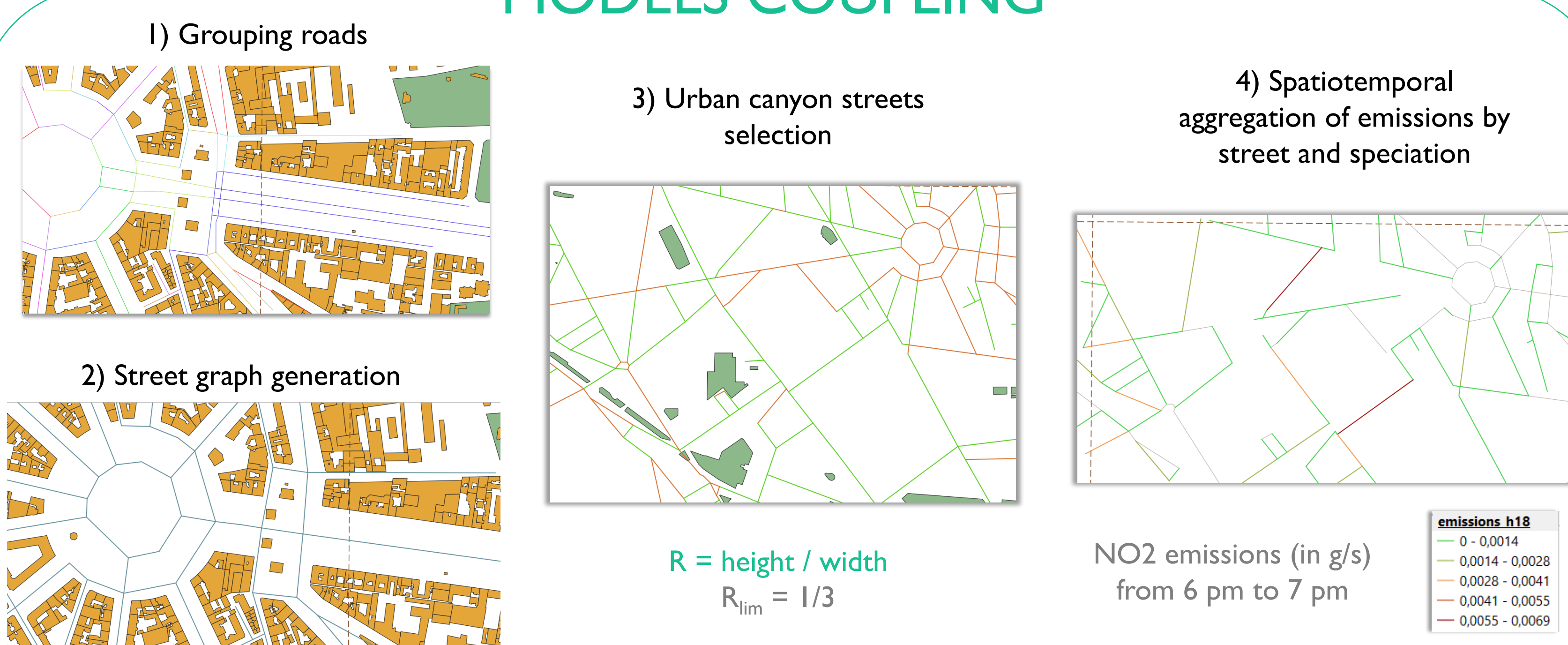
Modeling challenges

- 1 Urban modeling: based on roads vs. streets
- 2 Computational cost due to level of details required
- 3 Pollutants speciation (e.g. from PM emissions to emissions by size class and species)

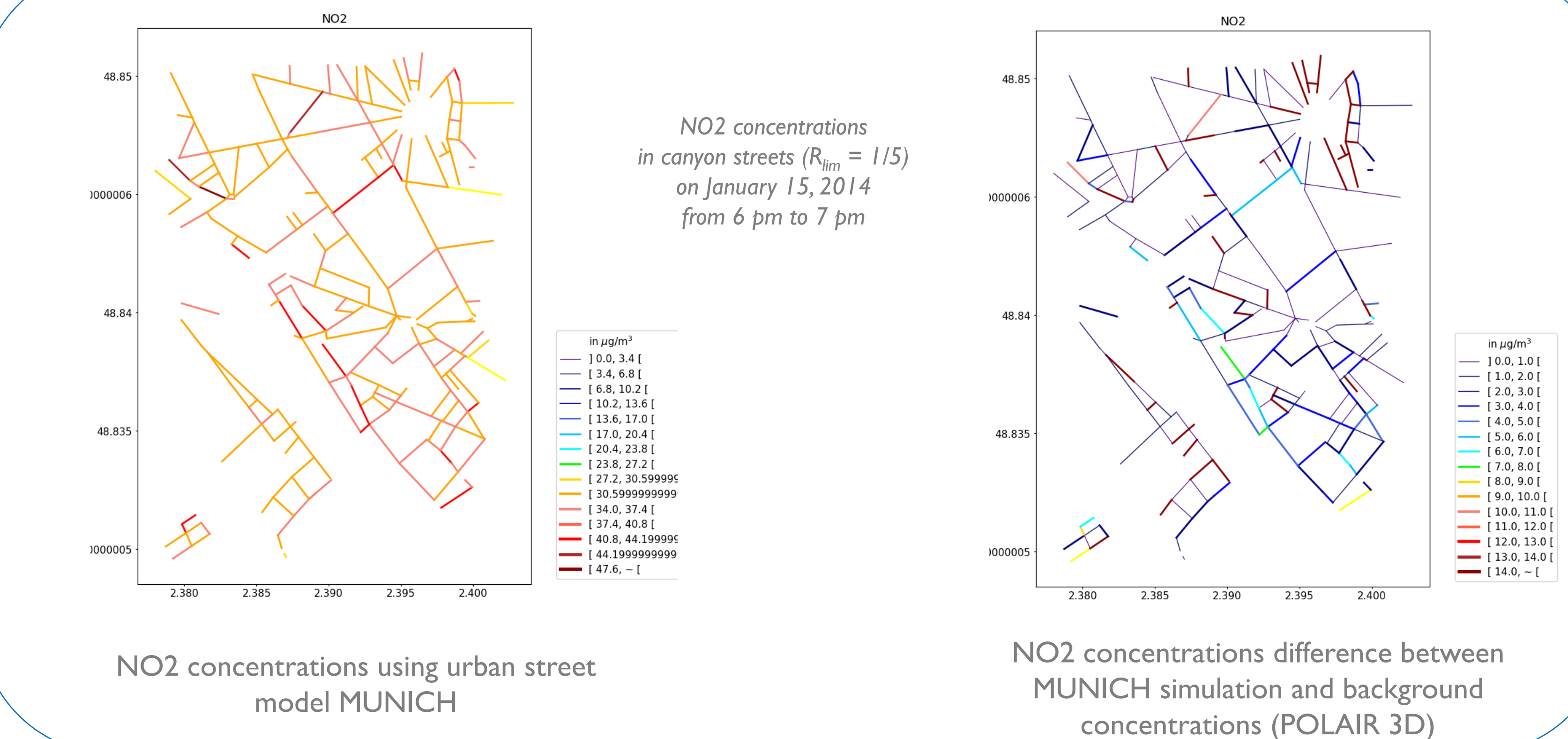


- In **transportation models**, **traffic lines and junctions** are used as a basis for urban modeling
- Chemical transport models** rely on a **built environment** model based on streets and intersections

MODELS COUPLING



SENSITIVITY ANALYSIS



CONCLUSIONS

Development of an **open-source** air quality modeling platform based on multi-agent transportation model MATSim, CTM and urban street-network model.

Calculation costs: ~1 week simulation for the street network model

Sensitivity analysis show the contribution of street-level resolution for both road traffic emissions and air quality modeling.

Perspectives :

- Development of an **exposure model**
- Complementary sensitivity tests including cars emissions, temporal resolution...

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