Simulation of modern Traffic Lights Control Systems using the open source Traffic Simulation SUMO

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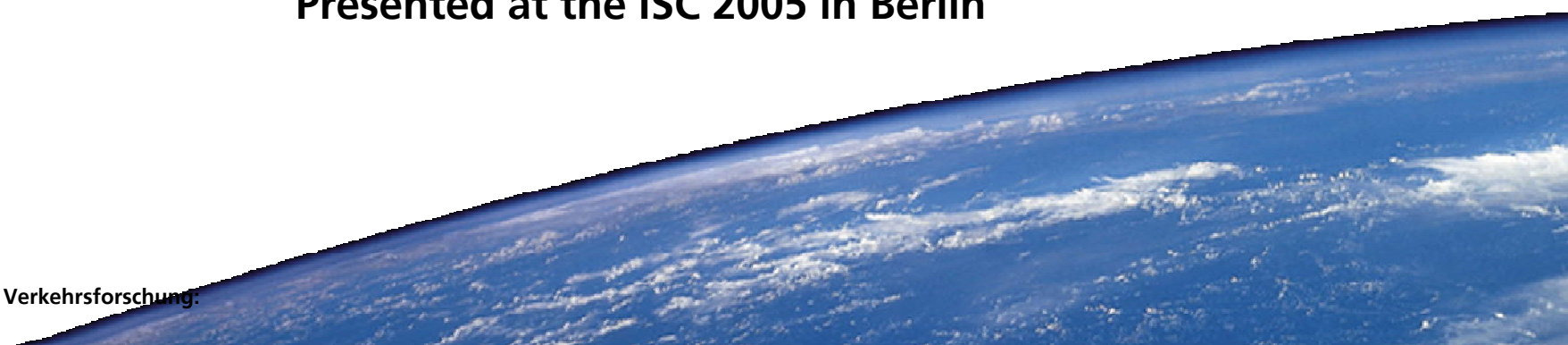
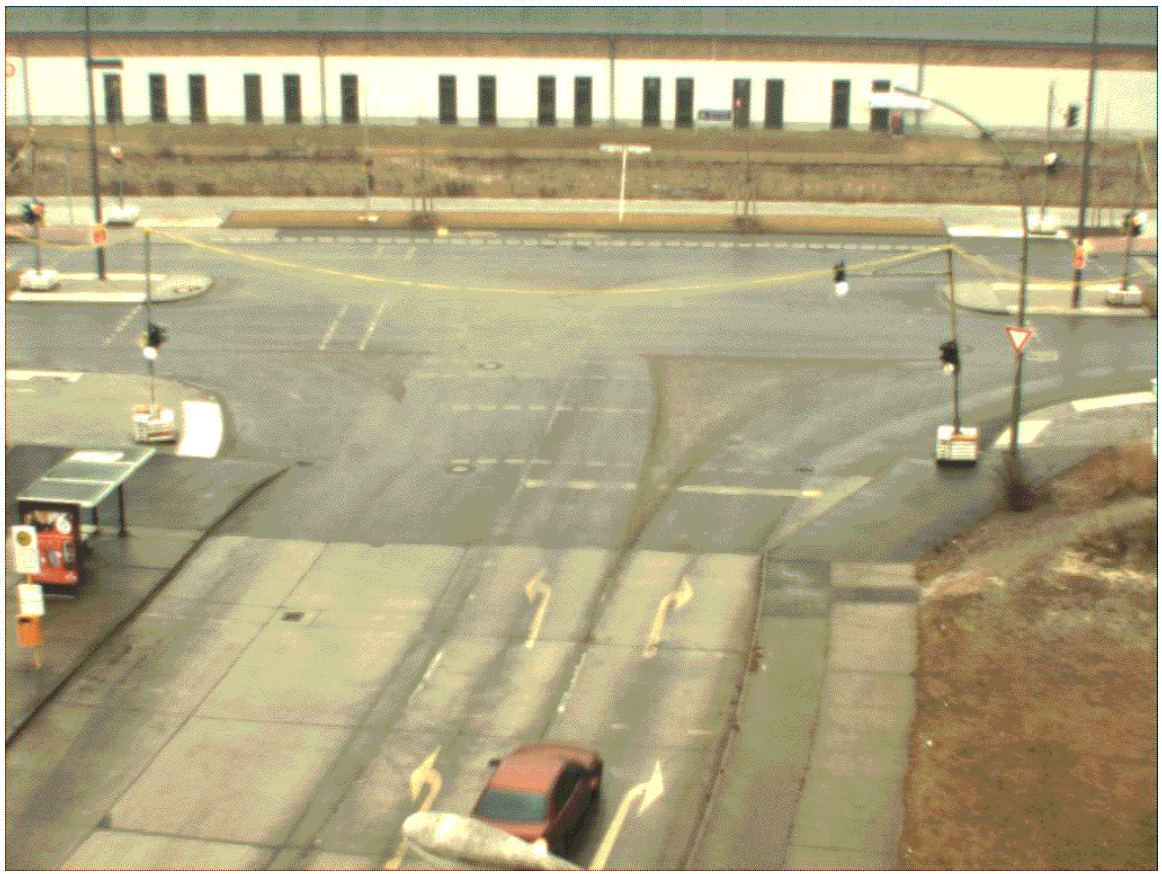


OIS - optical information systems



OIS:

OIS - optical information systems

Automatic detection of vehicles within a list of images…

OIS - optical information systems

And their tracking…

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Results (among other): vehicle trajectories for all vehicles that have passed the junction

Simulation Tasks & Methods

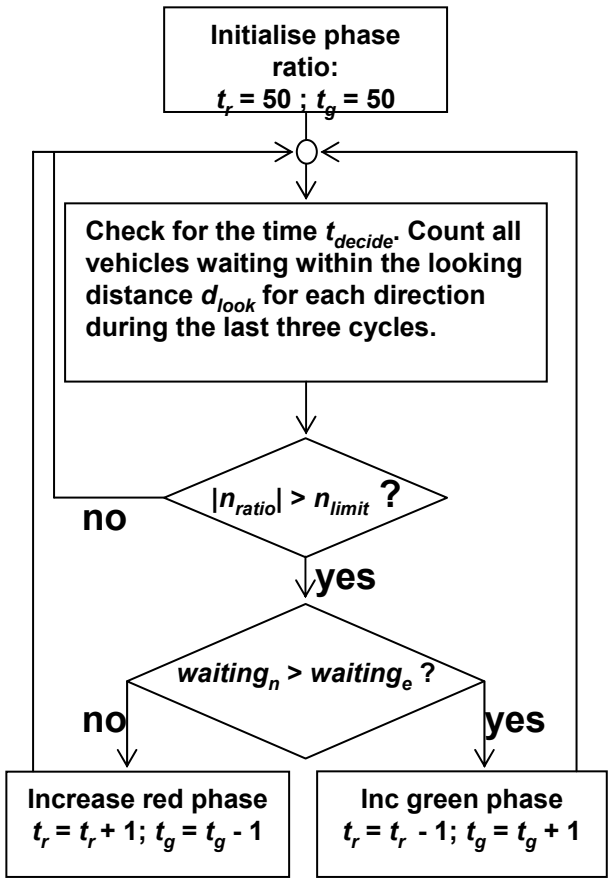
Task:

- Show capabilities to improve traffic flow by
  - comparing throughput against a normal tls
  - comparing jam lengths against a normal tls
  - Visualisation (running both - enhanced and normal - network versions synchronized)

Method:

- Simulate the area of interest (area the original OIS was tested within) with two different TLS-logics
  - Real-world logic
  - Agentbased TLS which uses values as those generated by OIS
- Compare the results

The „agentbased“ TLS-logic



t_r , t_g : red, green phase proportion

$r_{ph} = t_r / t_g$

$t_{cycle} = t_r + t_g$: cycle time

d_{look} : looking distance

t_{decide} : decision time interval

$n_{ratio} = (waiting_n - waiting_e) / waiting_n$

n : northbound

e : eastbound

n_{limit} : decision threshold

Network Preparation 1

Steps for generating a net that allows comparison and visual comparing:

1. **The area of interest was extracted from a NavTech-database**
2. **The area was duplicated and shifted to the right to gain a second network for comparison**
3. **The original TLS-plans were inserted into both networks**
4. **One network version was equipped with the new tls-logics**

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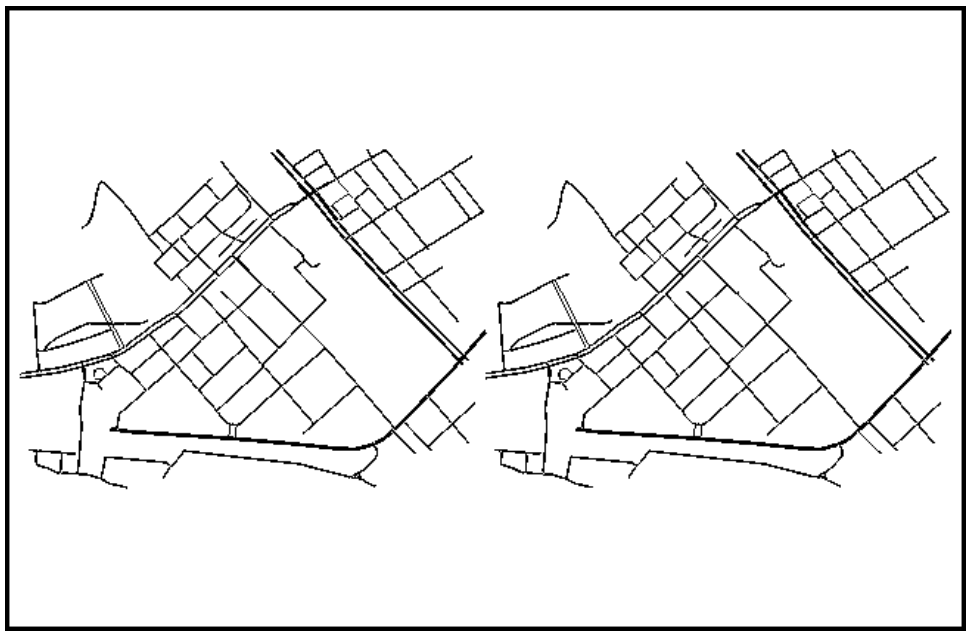

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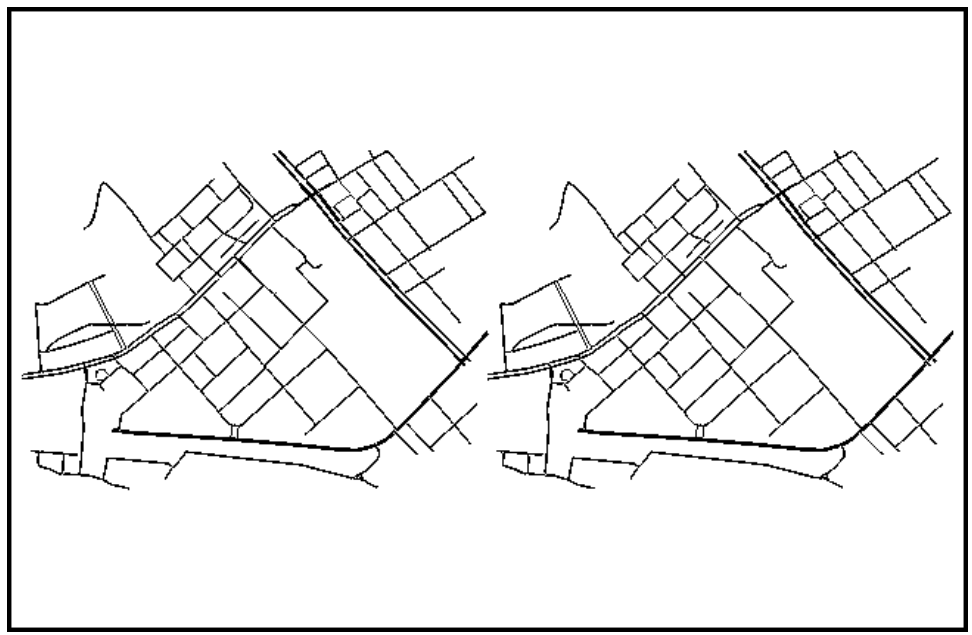

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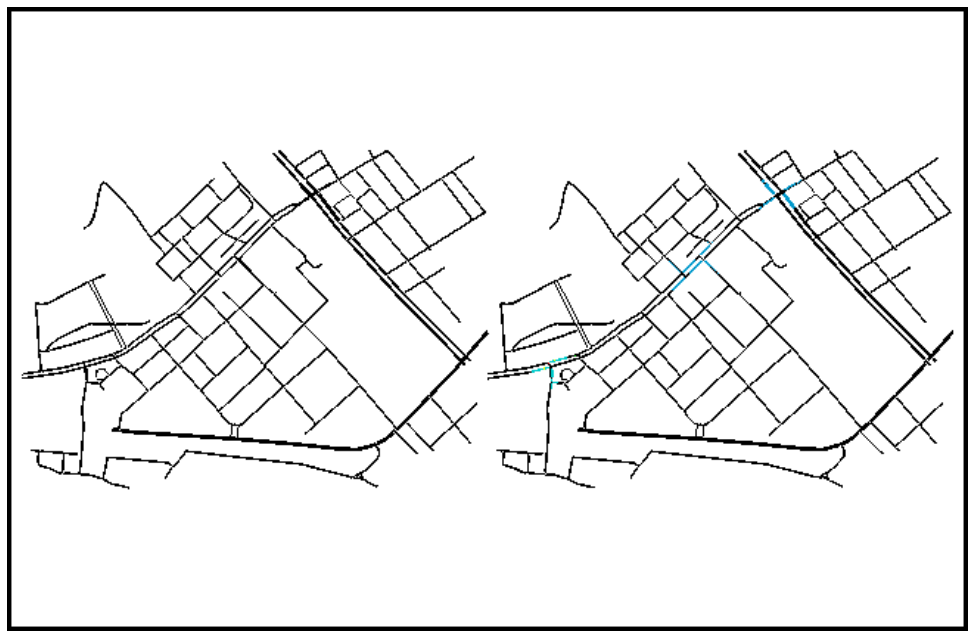
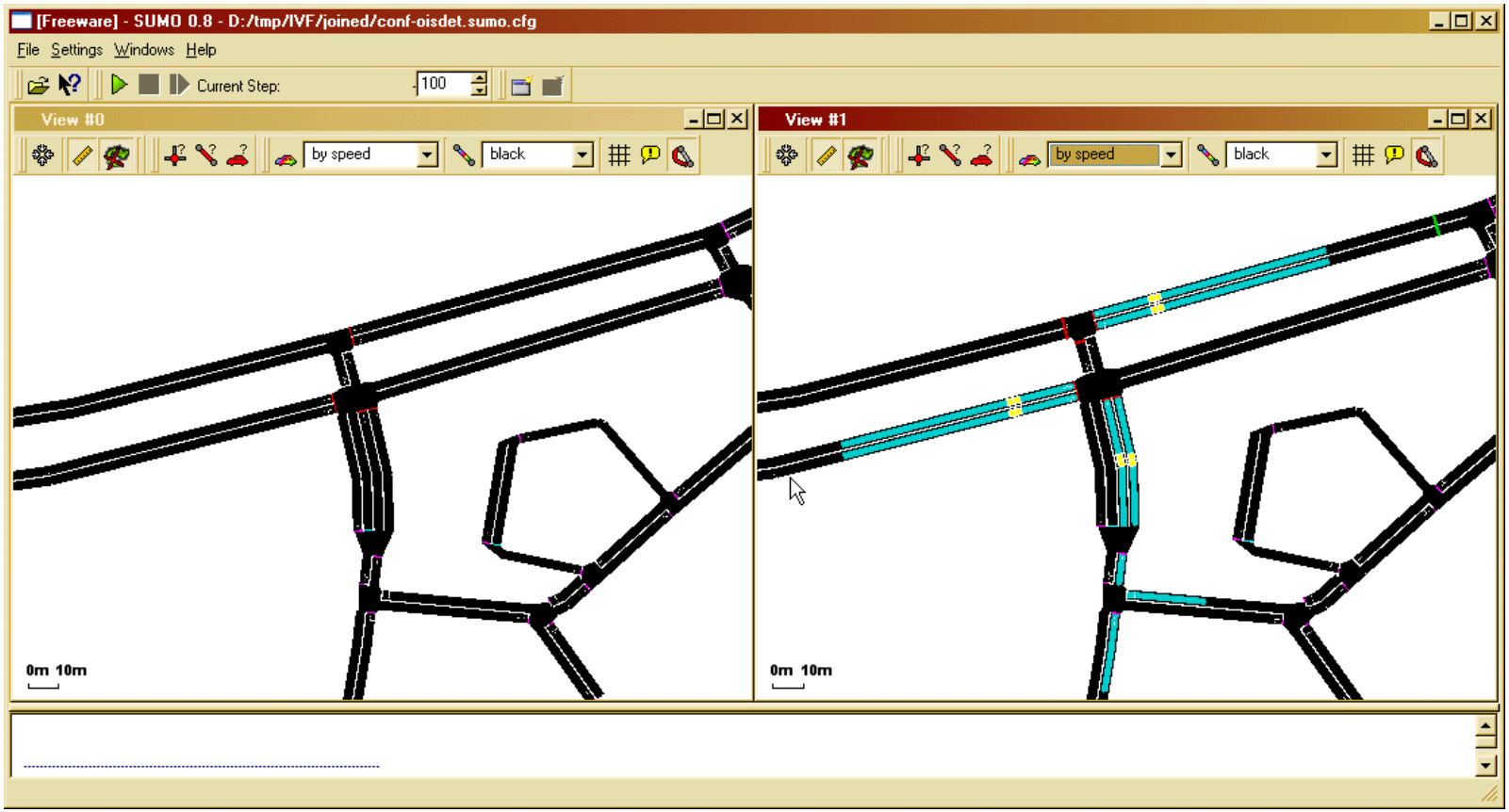


Network Preparation II

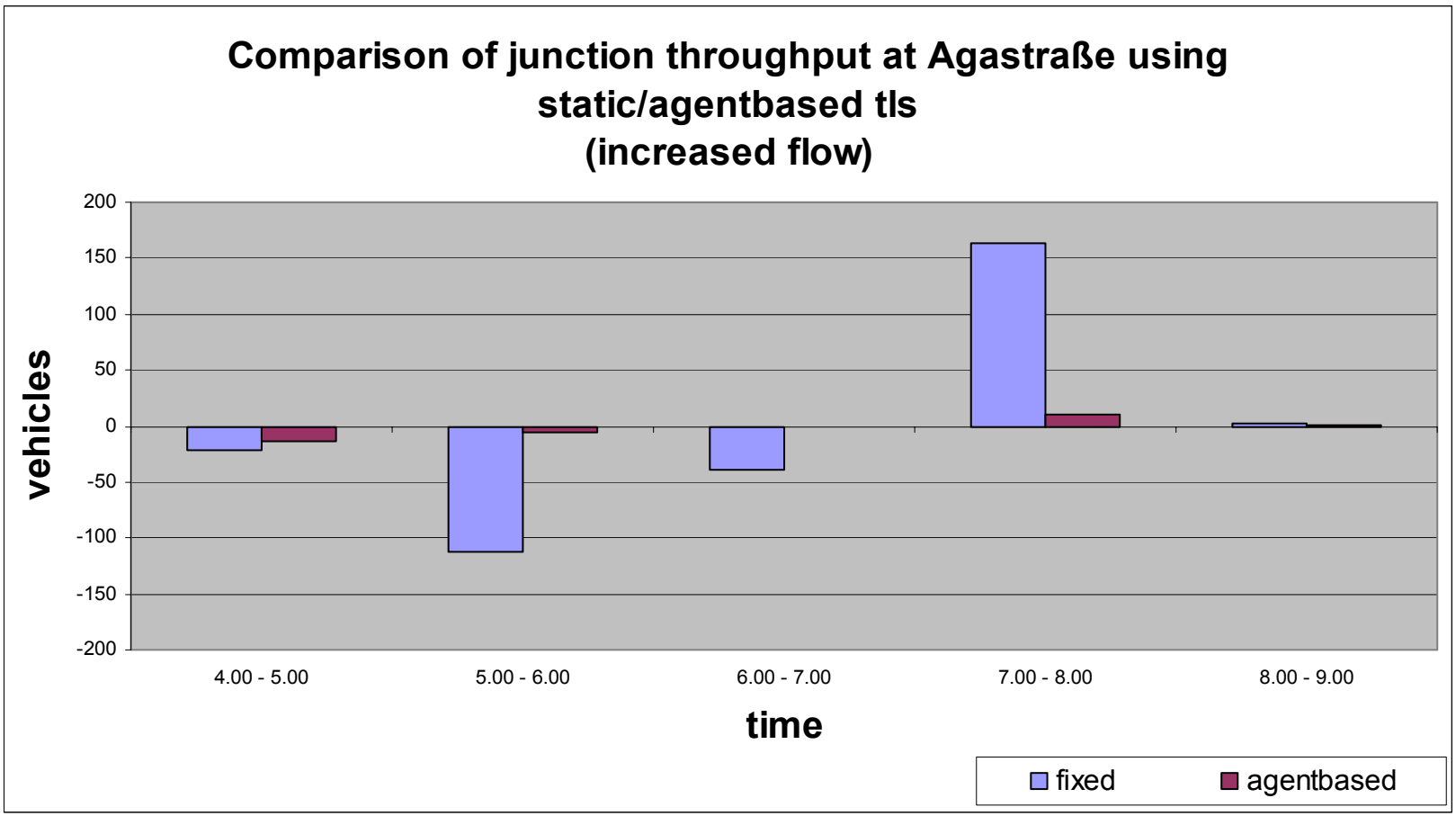


Close-up comparison between a normal (left) and OIS-equipped (right) junction (here: Wegedornstraße)

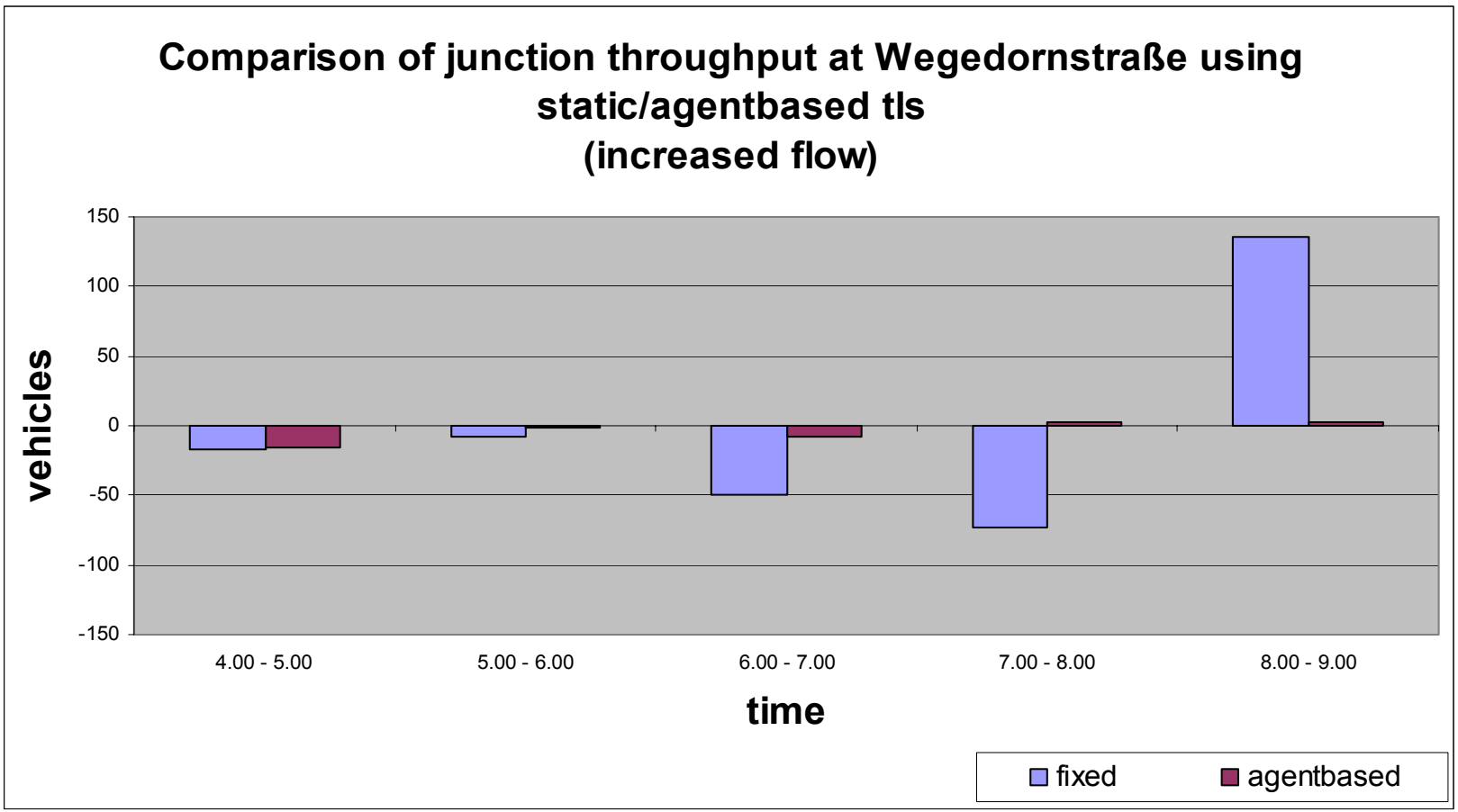
Routes Preparation

- For the area of interest following values were counted:
  - flows over junctions
  - turning percentages
- A special tool for routes generation using these values was implemented.
- For the junctions of interest, the simulated and the original flows were compared in order to calibrate the simulation.

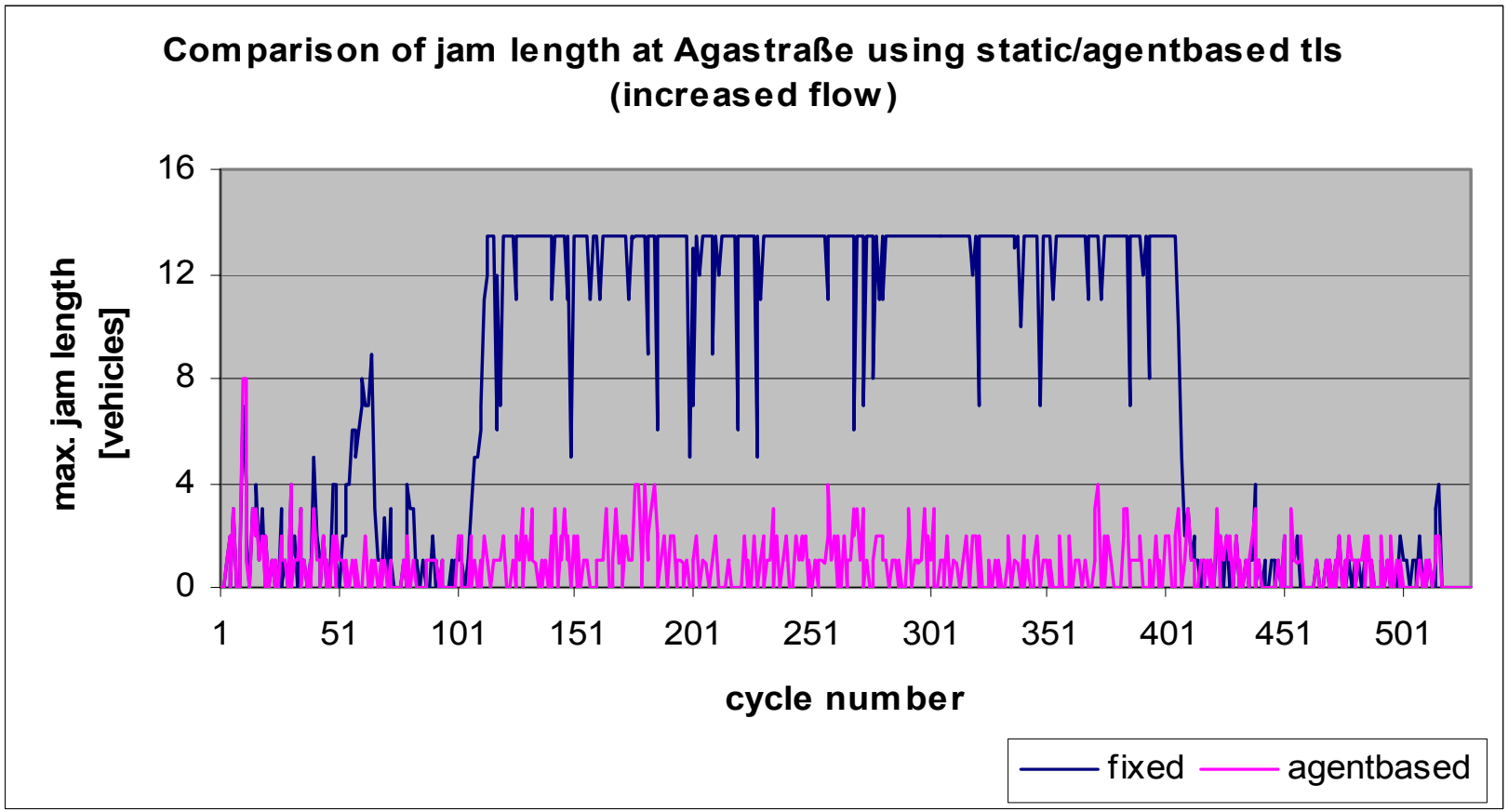
Results – Throughput Comparison Agastraße



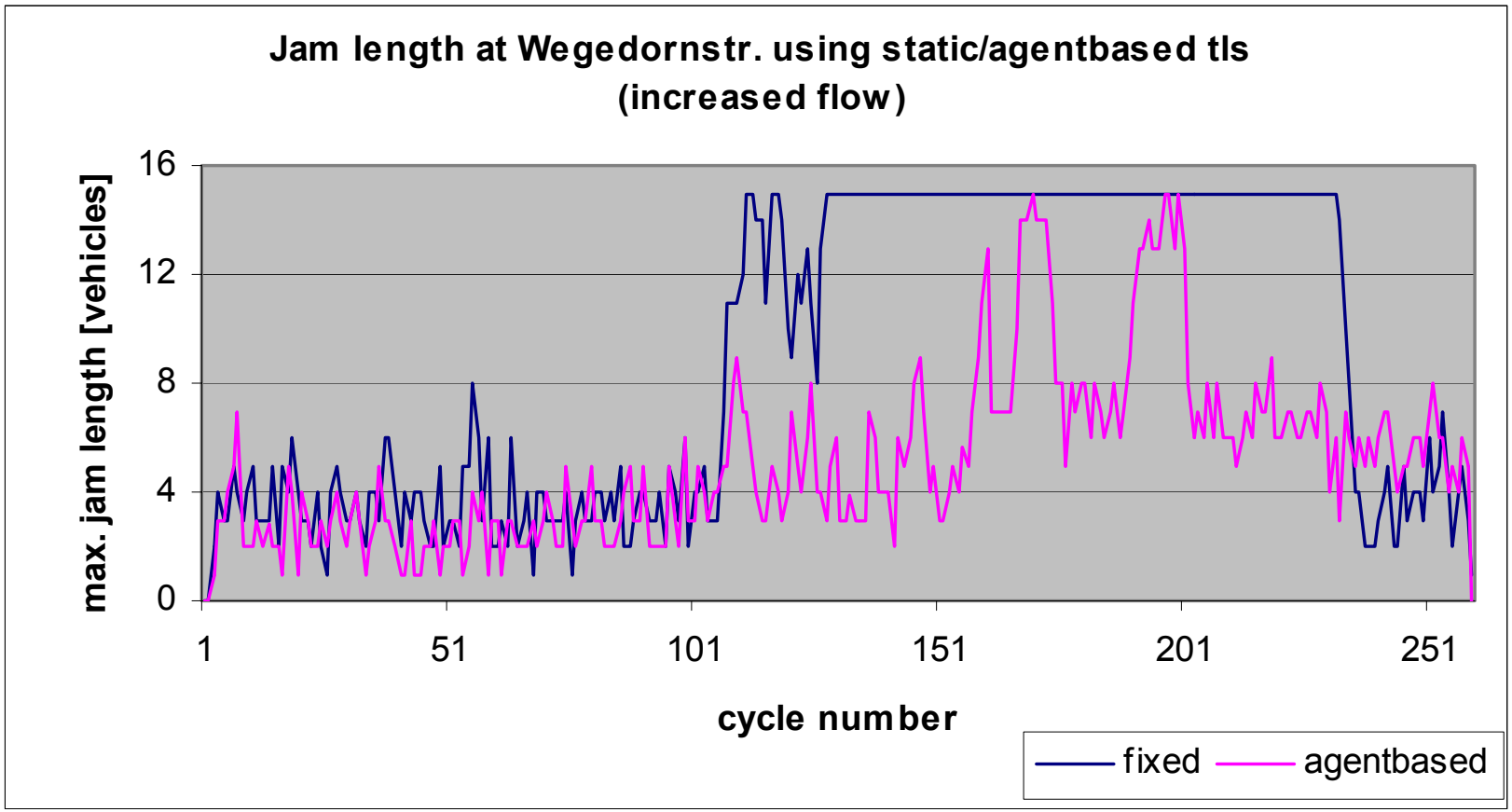
Results – Throughput Comparison Wegedornstr.



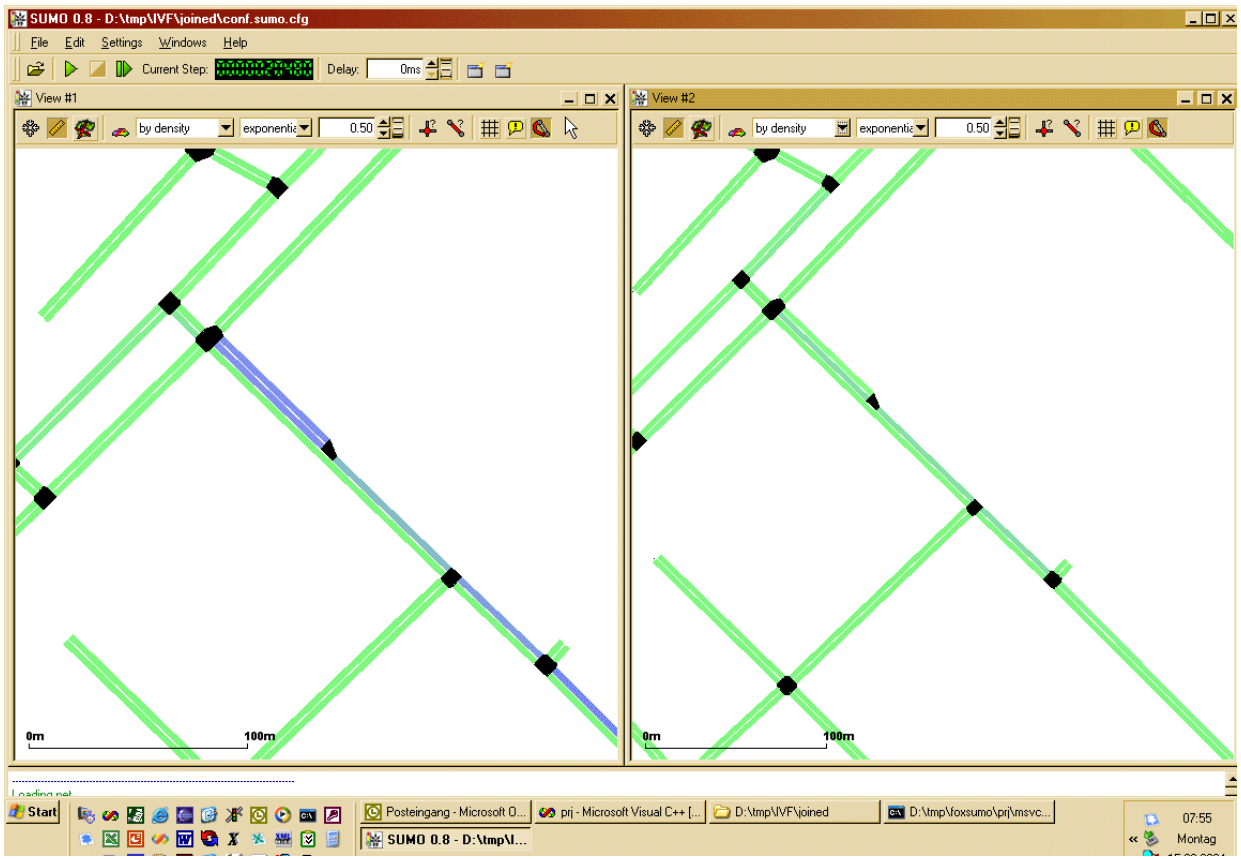
Results – Jam Comparison Agastraße



Results – Jam Comparison Wegedornstraße



Visual Comparison



A non-microscopic view at the simulation showing densities for Agastraße comparing normal (left) and OIS-equipped (right) tls

Summary

On agentbased-TLS:

- Show a clear benefit if one of a junction's inflows is increased dramatically
- Show no benefit if flows are low or same for all directions
- Do not regard problems on following junctions

On SUMO:

- Applicable for real-world problems
- Easy to extend

SUMO Project Details

Participants:

- Institute of Traffic Research / DLR
- Zentrum für angewandte Informatik, Köln

current version:	**Version 0.8.2.4**
free download:	**http://sumo.sourceforge.net**
contact:	**Daniel.Krajzewicz@dlr.de**