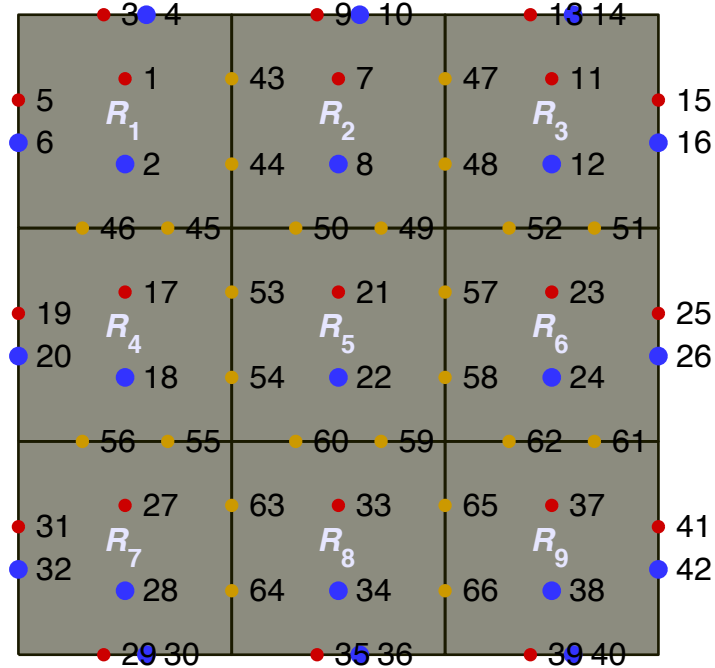
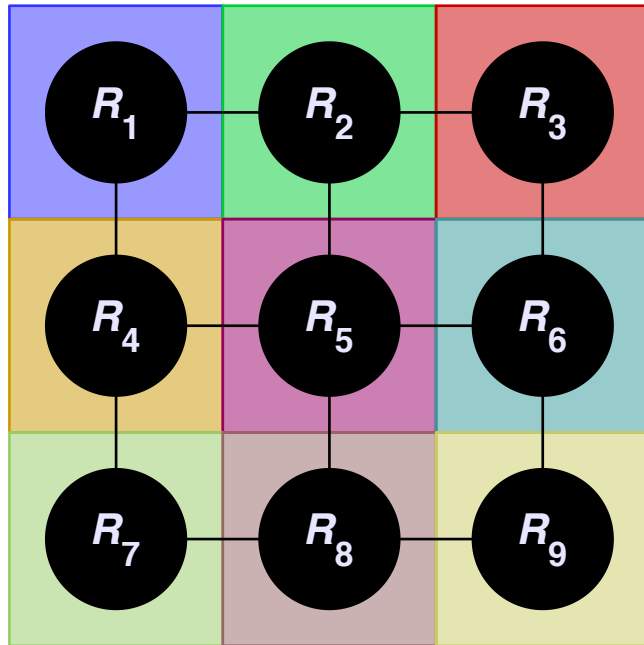


Test of PID control on the 9-reservoir grid network

Guilhem Mariotte

12/06/2020

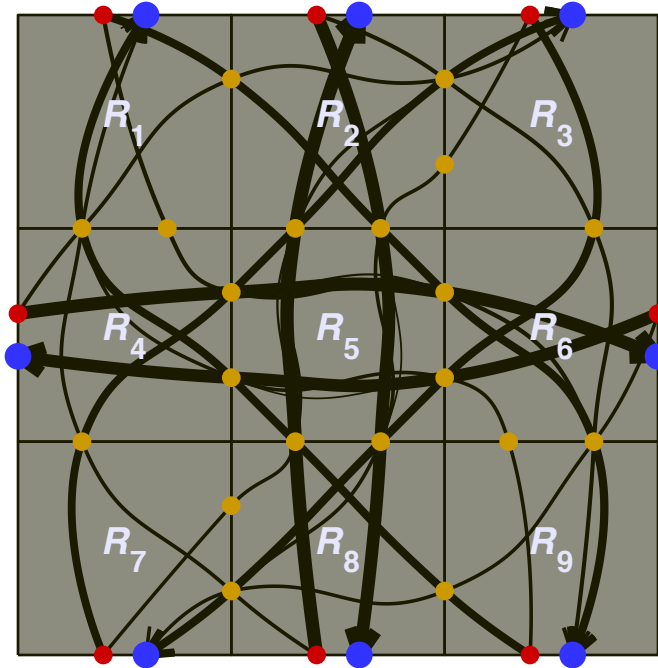
Reservoir network configuration



Reservoirs adjacent by their N-S-E-W faces, no trips in diagonal (like R_1 to R_5)

Two border nodes by reservoir border: one for each flow direction (eg, node 49 = R_2 to R_5 , node 50 = R_5 to R_2)

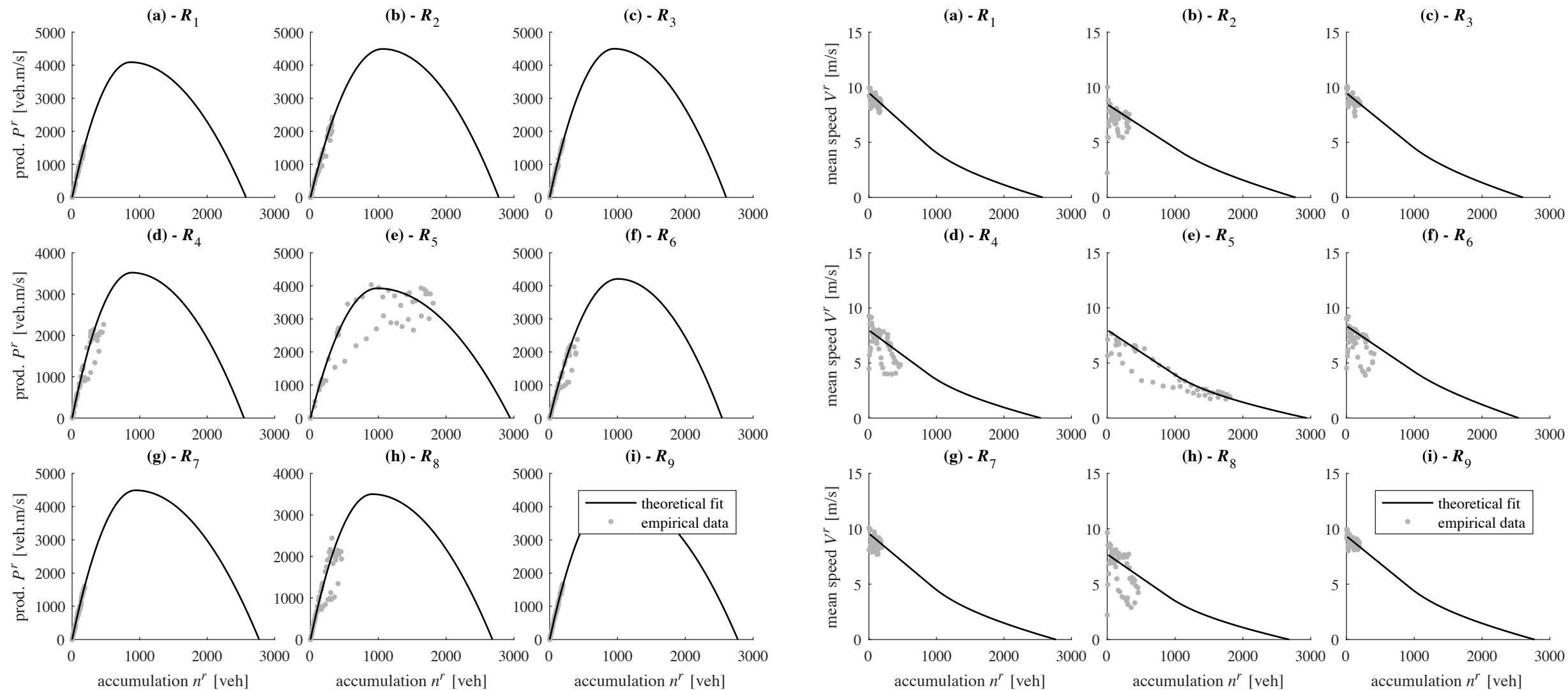
Demand scenario (reference scenario)



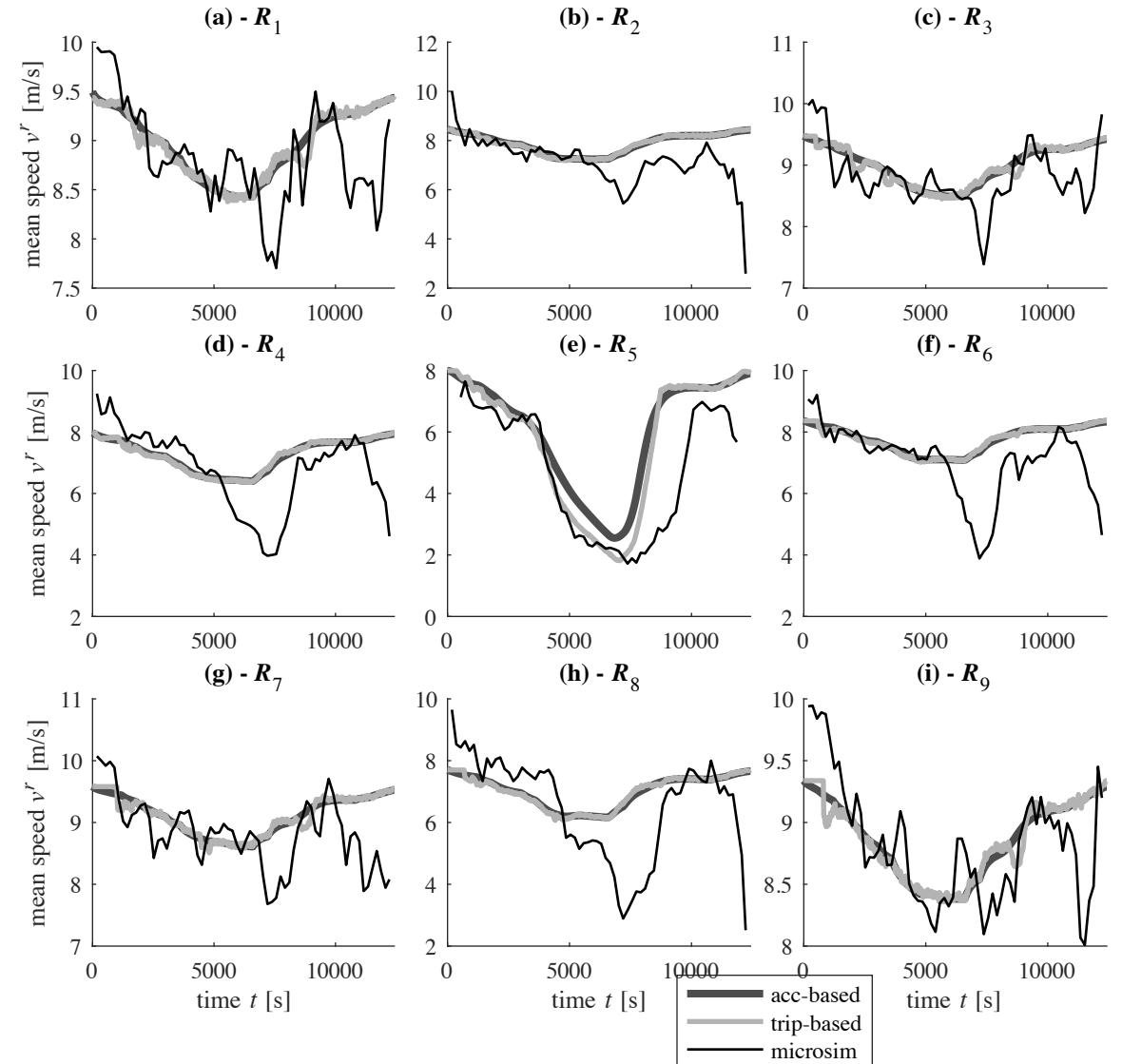
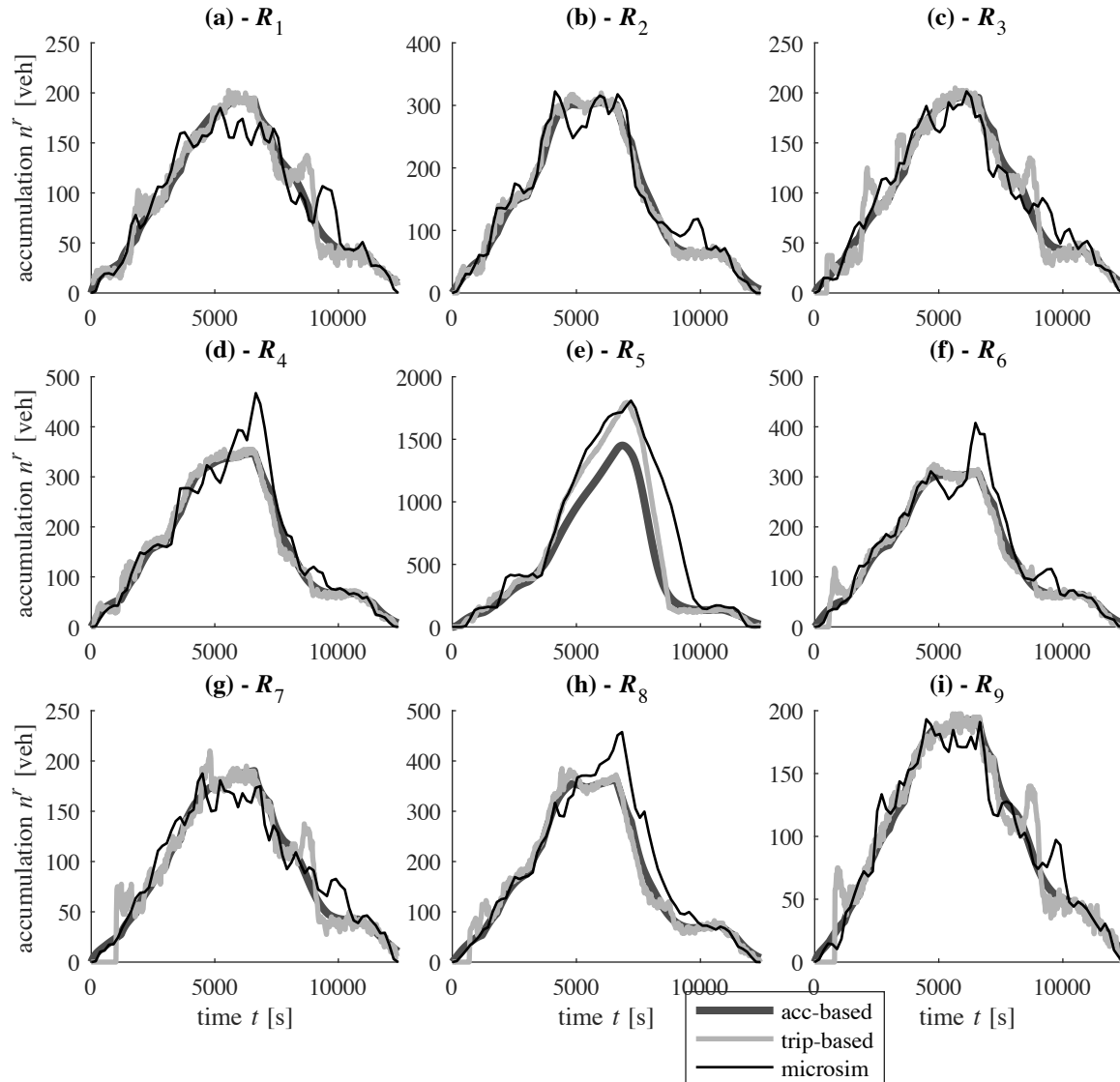
Internal origin and destination nodes are not used, only external entry and exit nodes

No internal trips, only trips crossing the whole network. 32 macro routes in total (succession of nodes)

MFD fit from Symuvia outputs

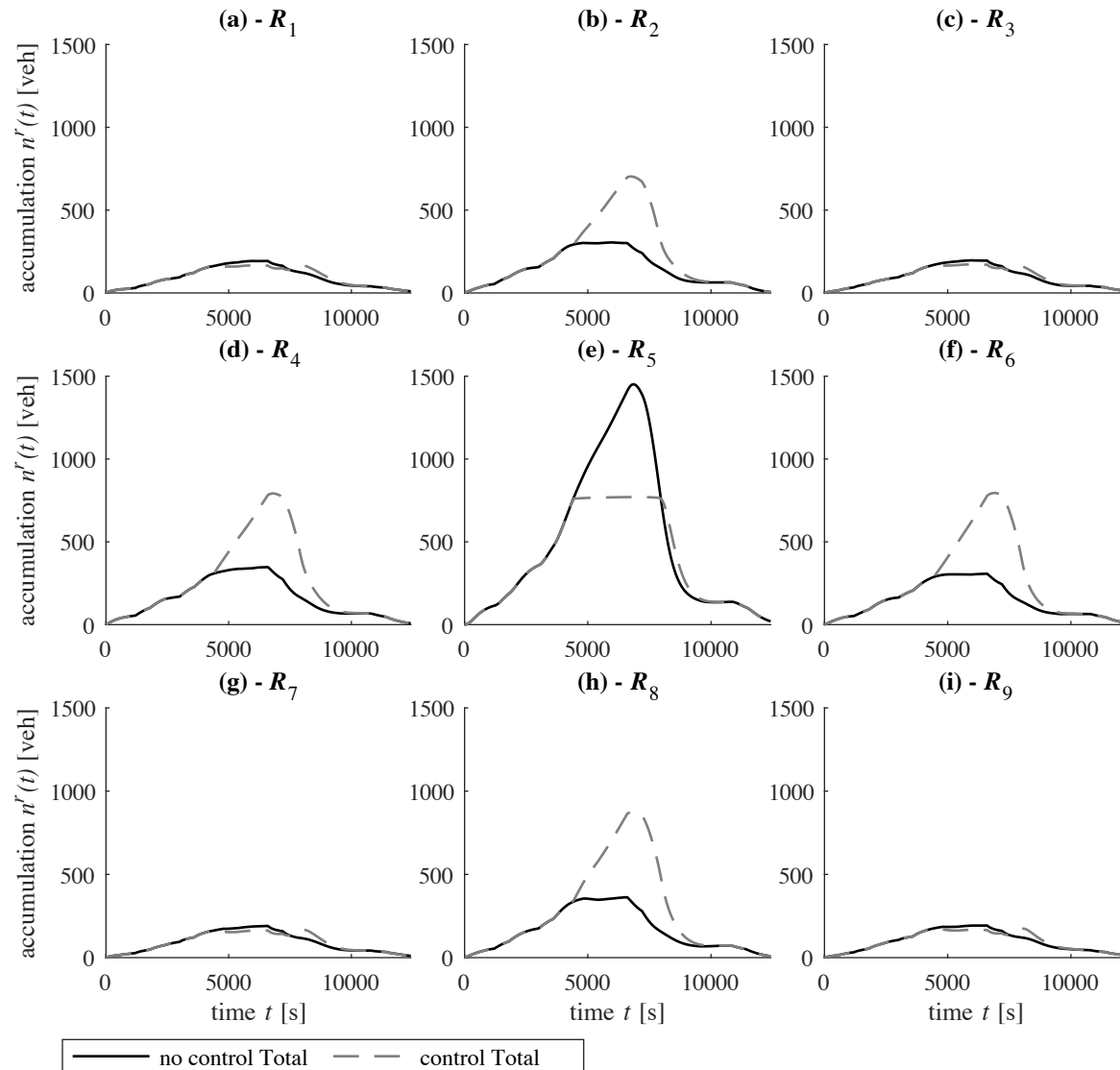


Comparison with Symuvia outputs



- Good match for accumulation evolution, less accurate for mean speed evolution
- Two models can be used for the MFD simulation: accumulation-based or trip-based. Although slightly better results are obtained with the trip-based one, only the accumulation-based model will be used then as it is much faster to compute (a few seconds vs a few minutes for the trip-based)

PID control for the 4 nodes to enter R5



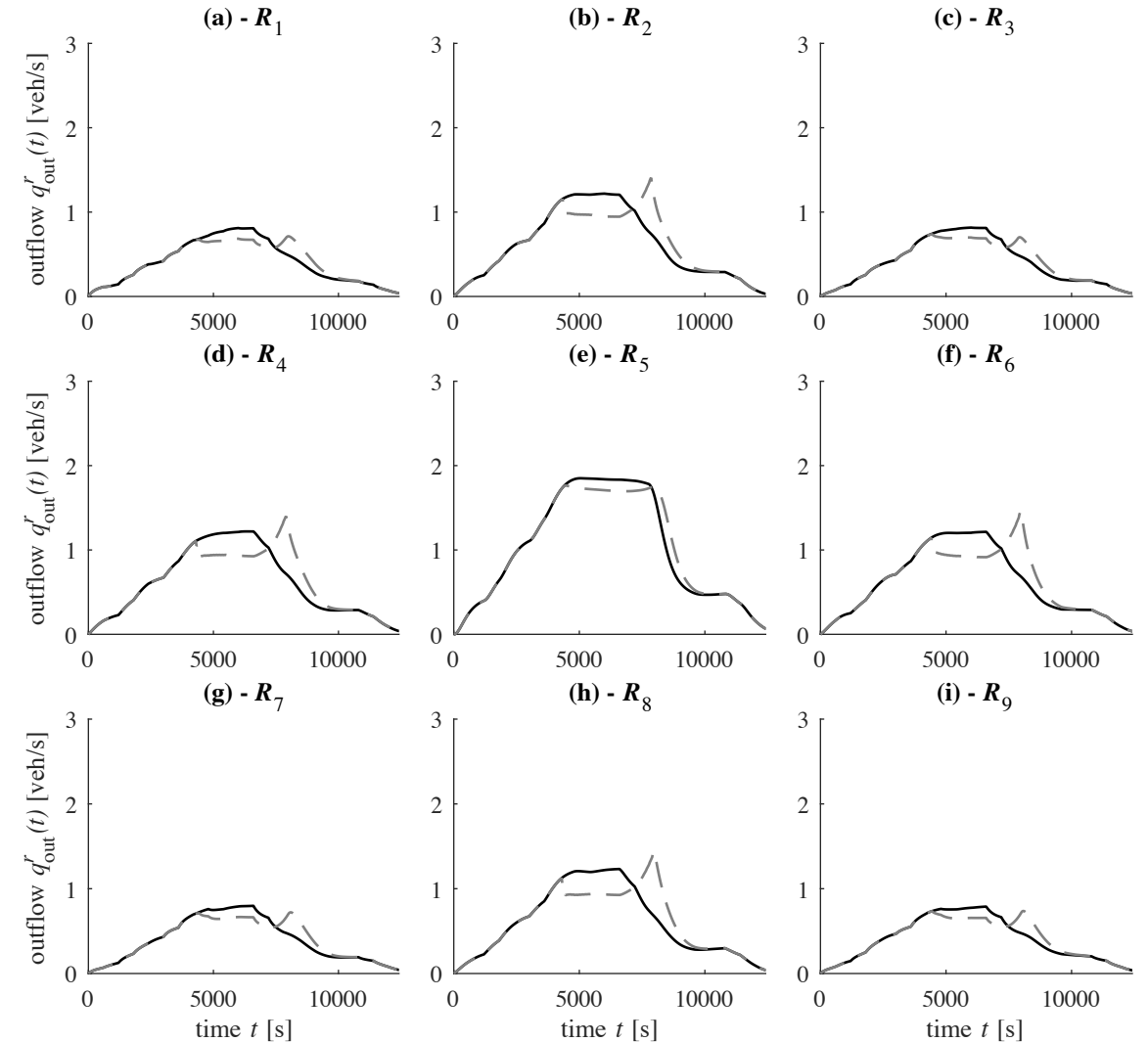
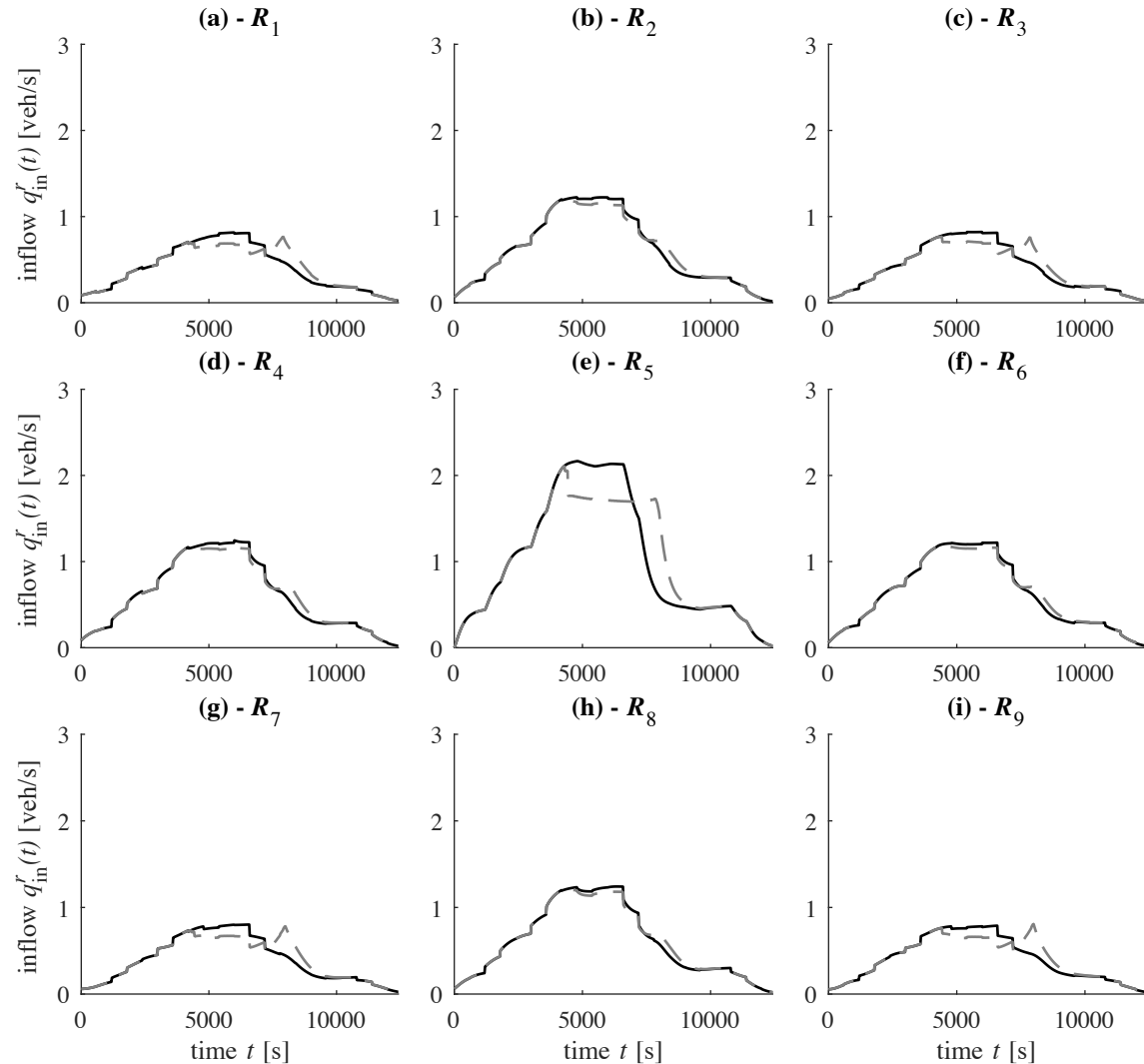
Setpoint = 1000 veh (critical accumulation of R5)

$K_p = 0.008$

$K_i = 0$

$K_d = 0$

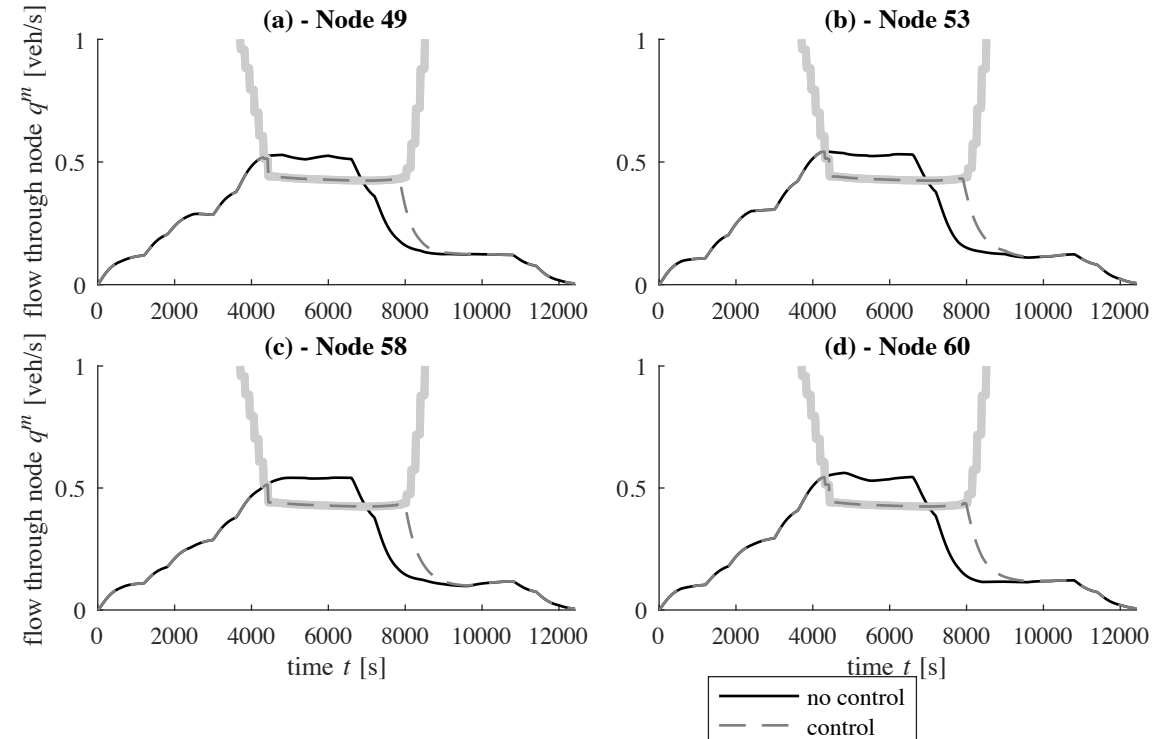
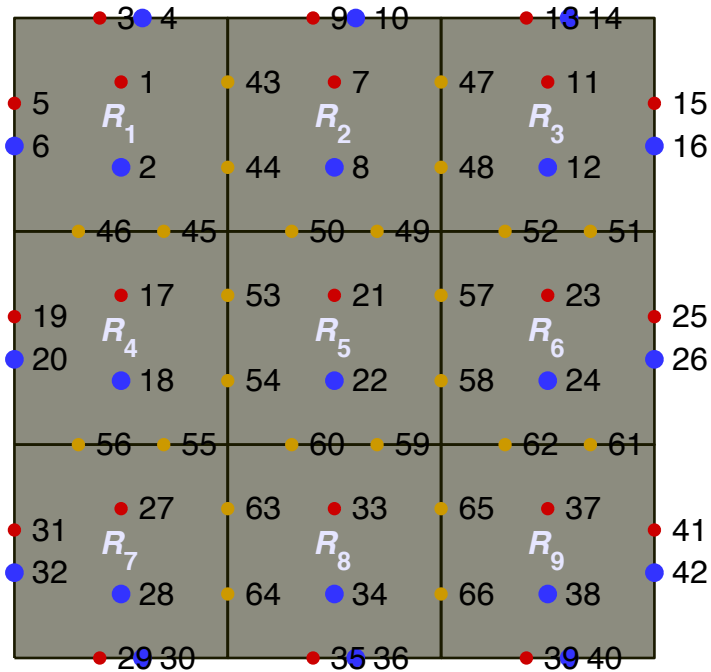
PID control for the 4 nodes to enter R5



— no control Total - - control Total

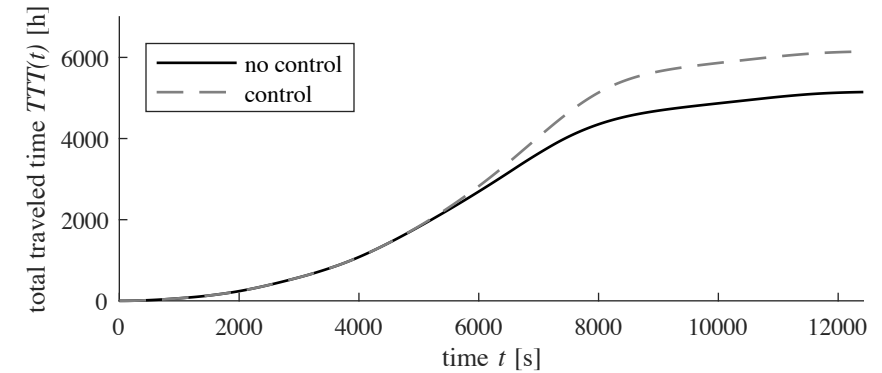
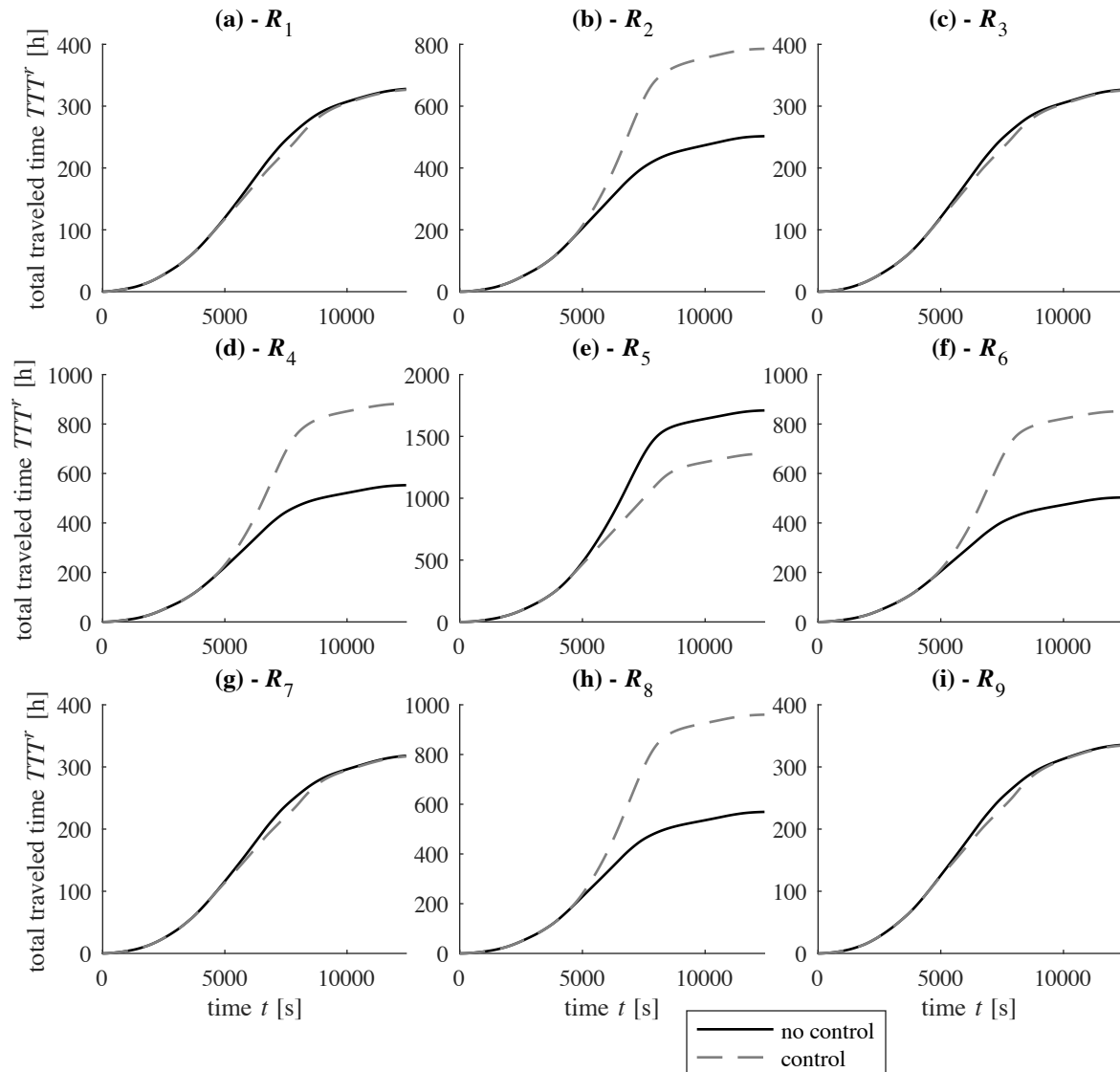
— no control Total - - control Total

PID control for the 4 nodes to enter R5



The node max flow given by the controller is shown in light gray

PID control for the 4 nodes to enter R5



Improve the traffic conditions in R5, but worsen the conditions in R2, R4, R6 and R8. For the whole network, worse conditions.