GraphTinker: Outlier Rejection and Inlier Injection for Pose Graph SLAM (Supplementary Results)

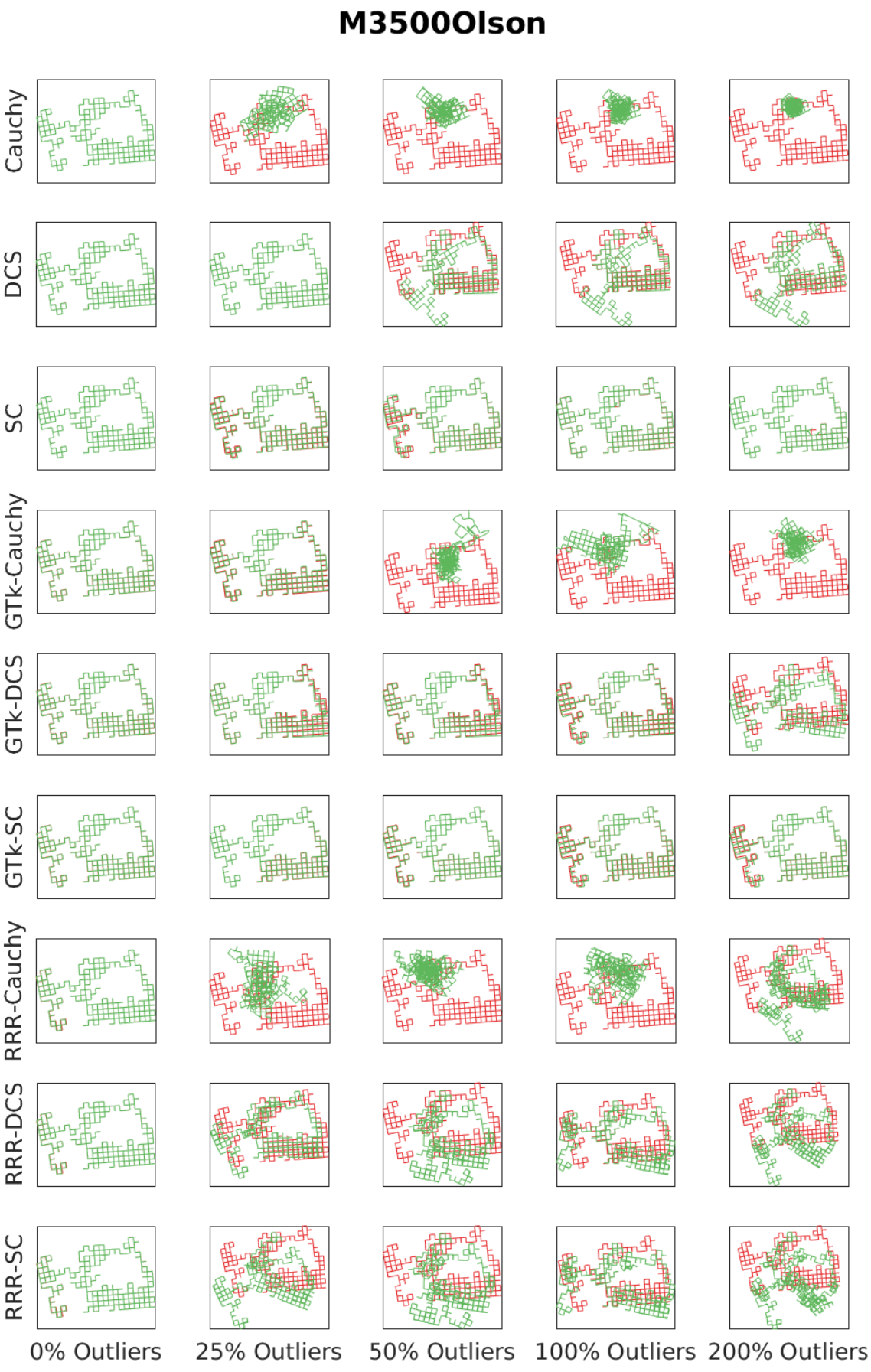
Linhai Xie, Sen Wang, Andrew Markham and Niki Trigoni *

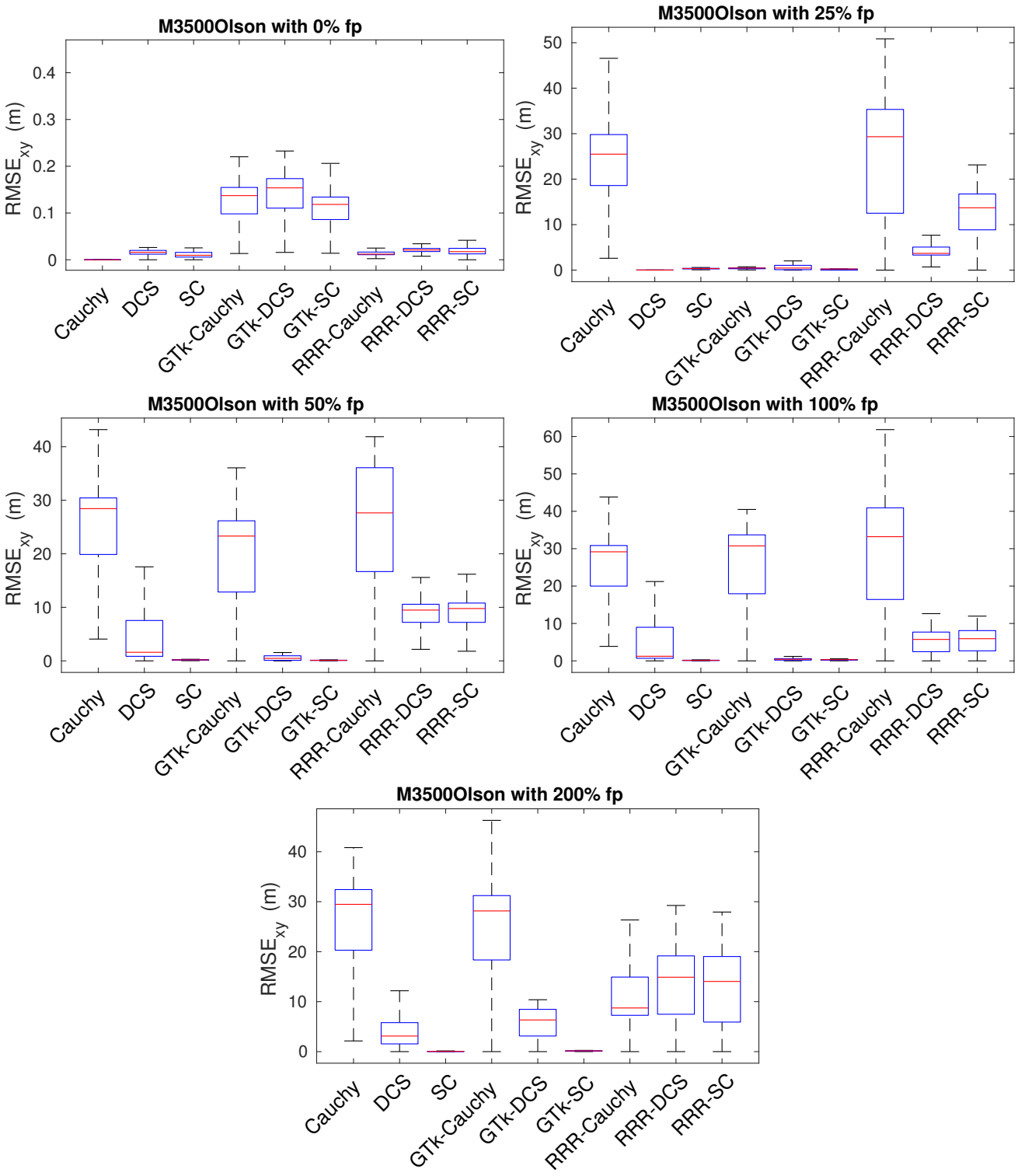
February 26, 2017

In this document, we give extra experimental results on the eight public datasets we used (M3500Olson, MIT-Killian-Court, city10000, Intel, ringCity, Bicocca, Bovisa04, Bovisa06) for the paper 'GraphTinker: Outlier Rejection and Inlier Injection for Pose Graph SLAM' submitted to IROS 2017.

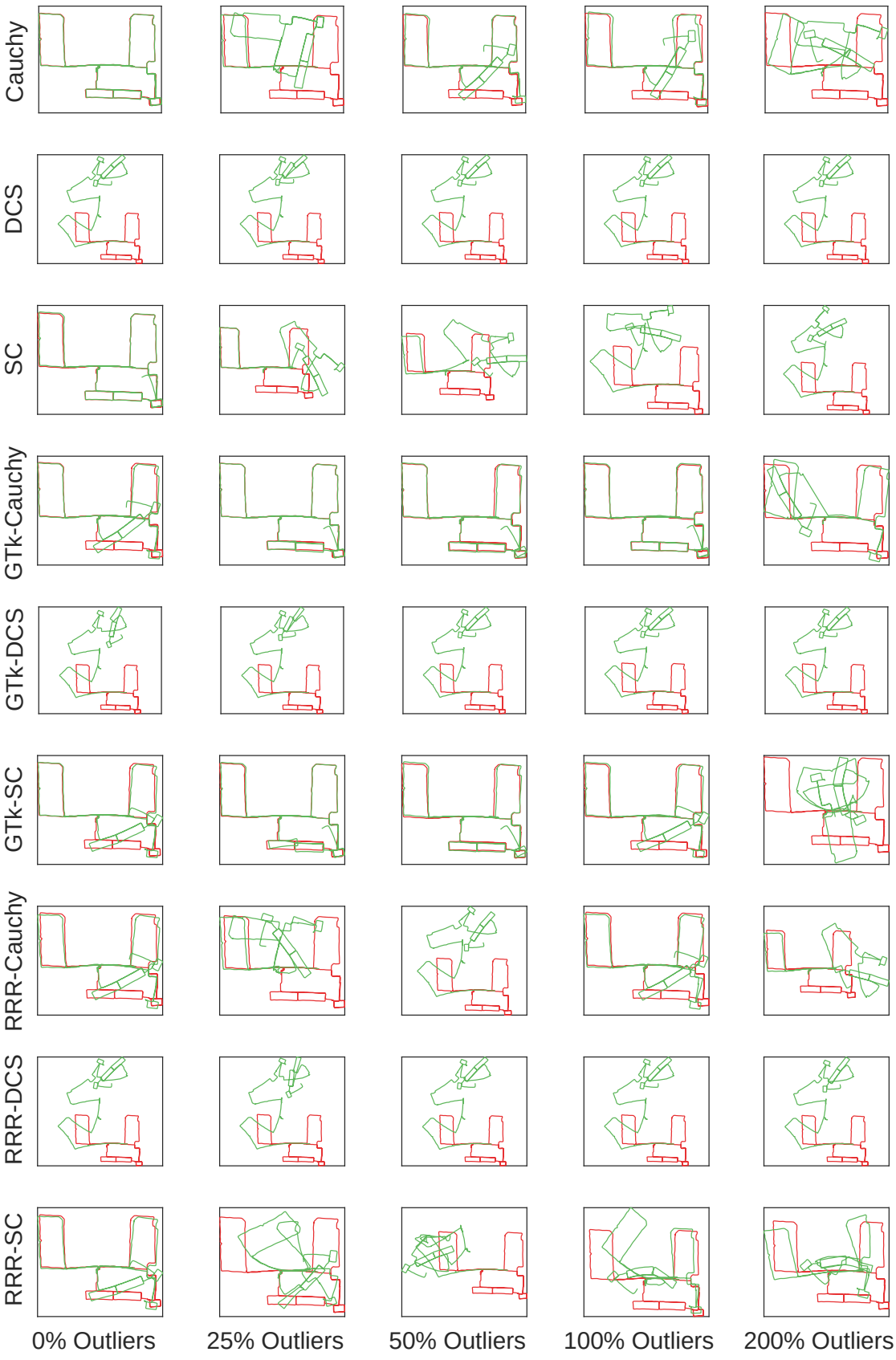
We generate various numbers of outliers on each dataset and compare the robustness and errors among nine different combinations of two middle layers (proposed GTk and RRR) and three robust back-end systems (Cauchy, Dynamic Covariance Scaling (DCS) and Switchable Constraint (SC)) to evaluate the effectiveness of the proposed GTk algorithm. There are 360 pose graph results in total.

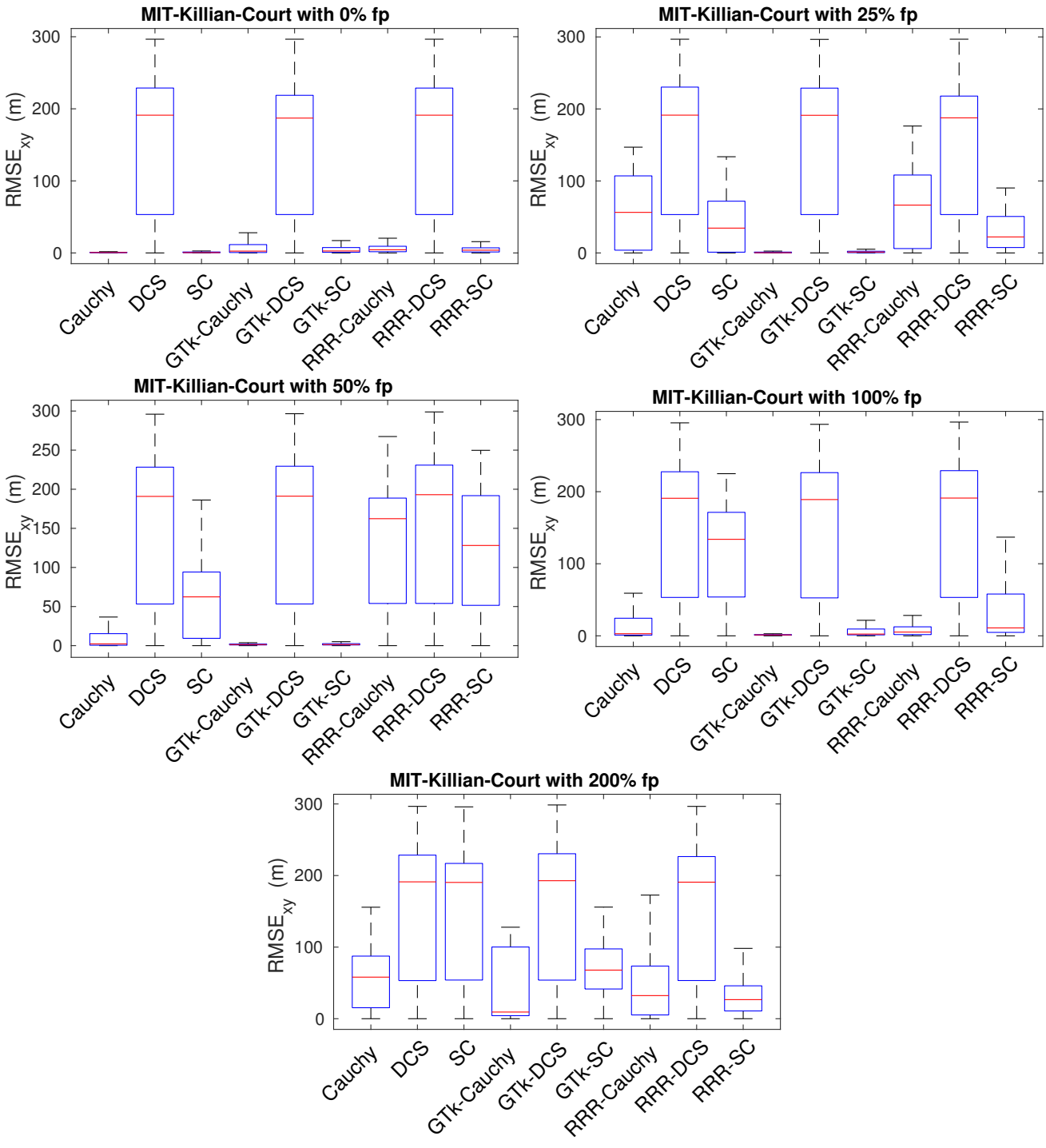
*The authors are with Department of Computer Science, University of Oxford, Oxford OX1 3QD, United Kingdom {firstname.lastname} @cs.ox.ac.uk


M3500Olson
Cauchy
DCS
SC
GTk-Cauchy
GTk-DCS
GTk-SC
RRR-Cauchy
RRR-DCS
RRR-SC
0% Outliers
25% Outliers
50% Outliers
100% Outliers
200% Outliers

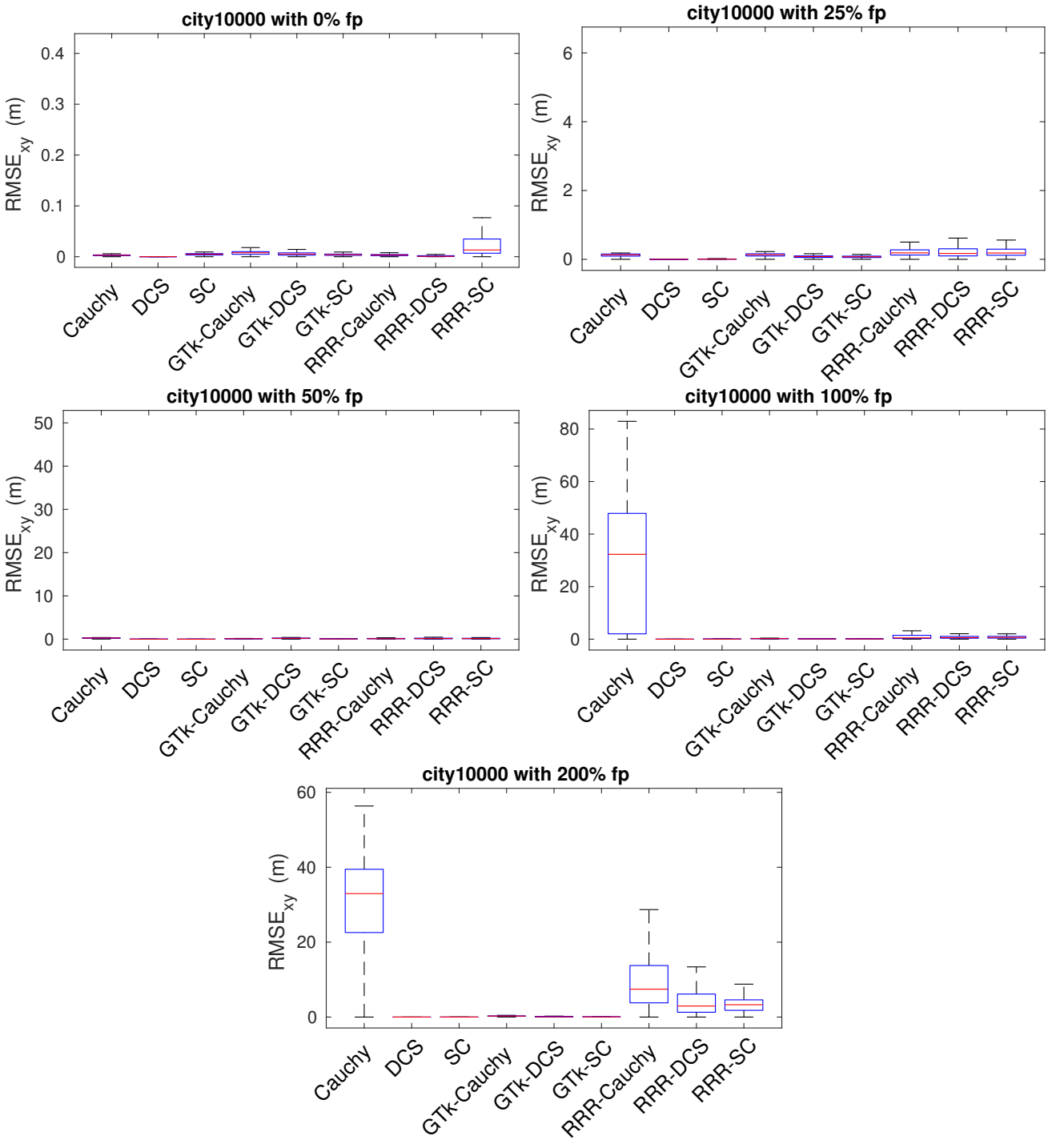

M3500Olson with 0% fp
M3500Olson with 25% fp
M3500Olson with 50% fp
M3500Olson with 100% fp
M3500Olson with 200% fp
RMSE_xy (m)
Cauchy
DCS
SC
GTk-Cauchy
GTk-DCS
GTk-SC
RRR-Cauchy
RRR-DCS
RRR-SC

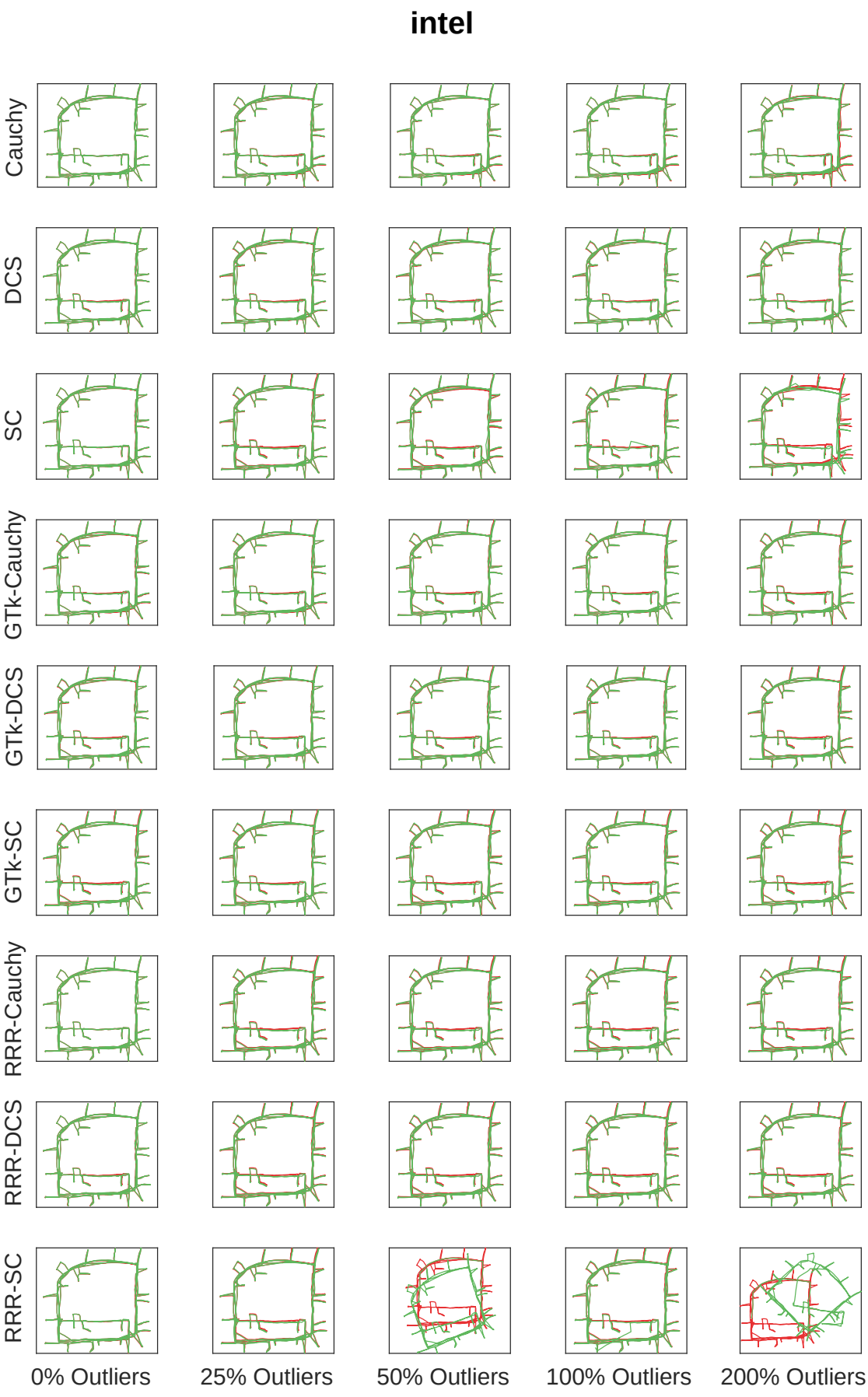
MIT-Killian-Court

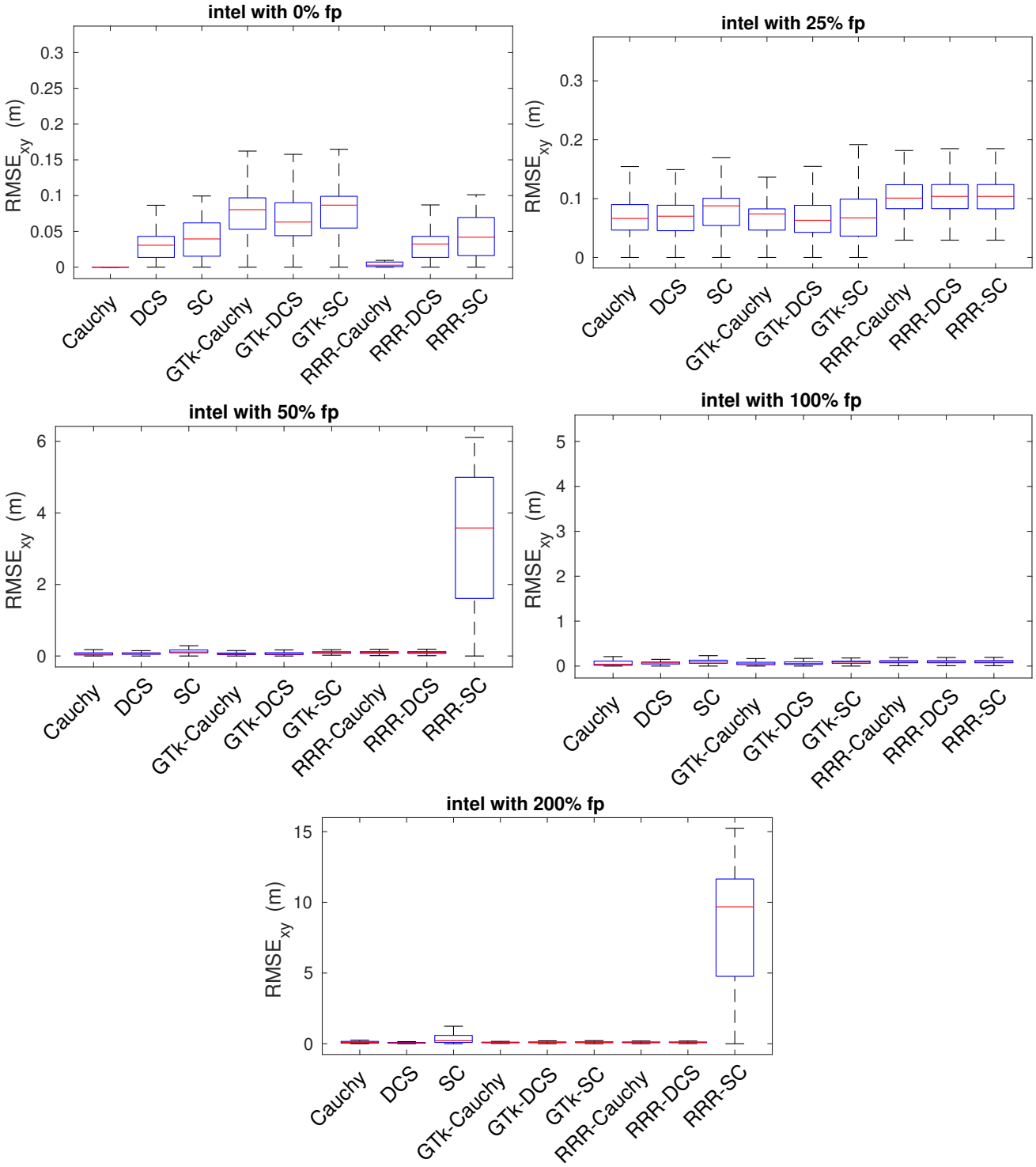


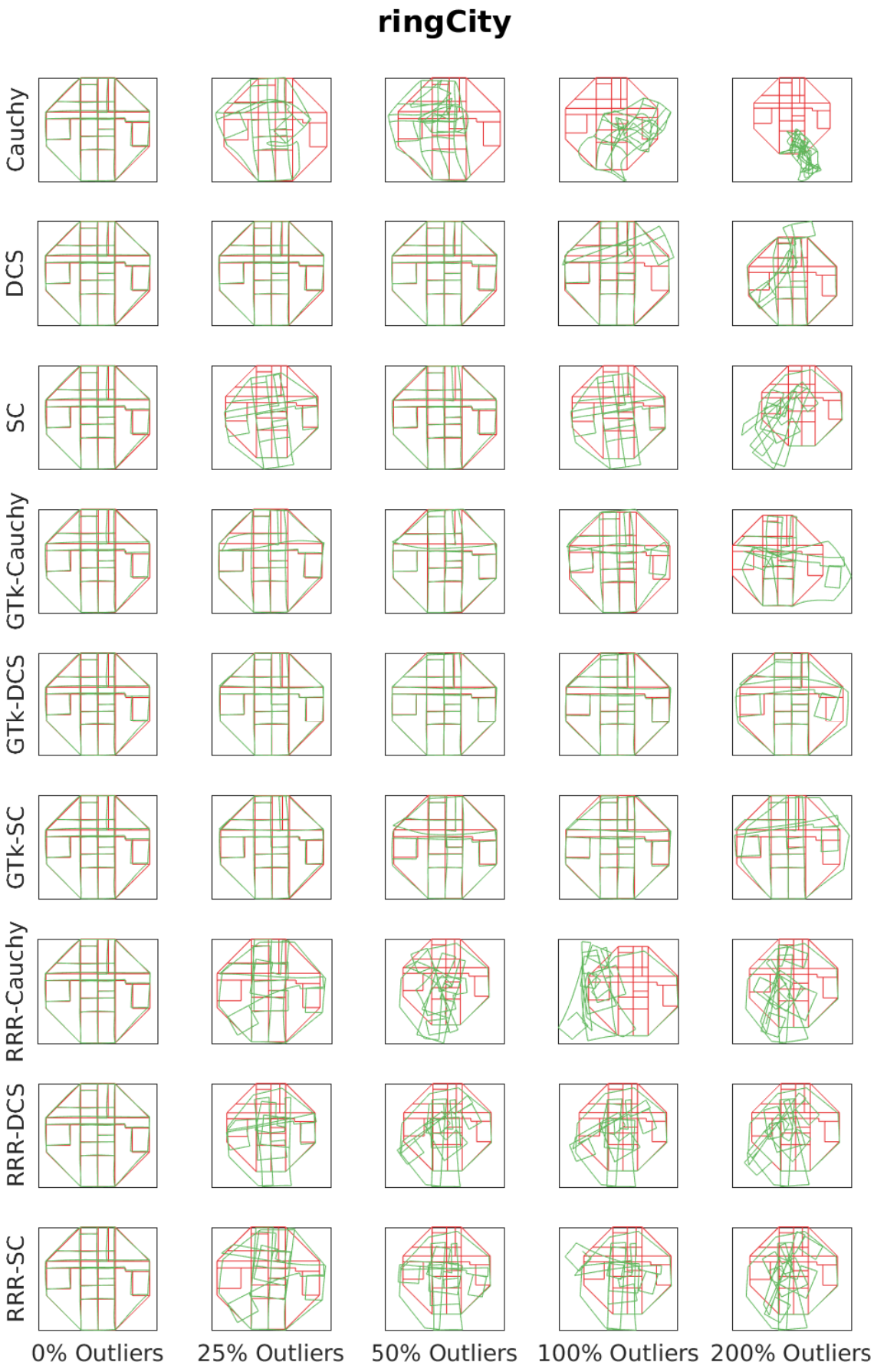

MIT-Killian-Court with 0% fp
MIT-Killian-Court with 25% fp
MIT-Killian-Court with 50% fp
MIT-Killian-Court with 100% fp
MIT-Killian-Court with 200% fp
RMSE_xy (m)
Cauchy
DCS
SC
GTk-Cauchy
GTk-DCS
GTk-SC
RRR-Cauchy
RRR-DCS
RRR-SC

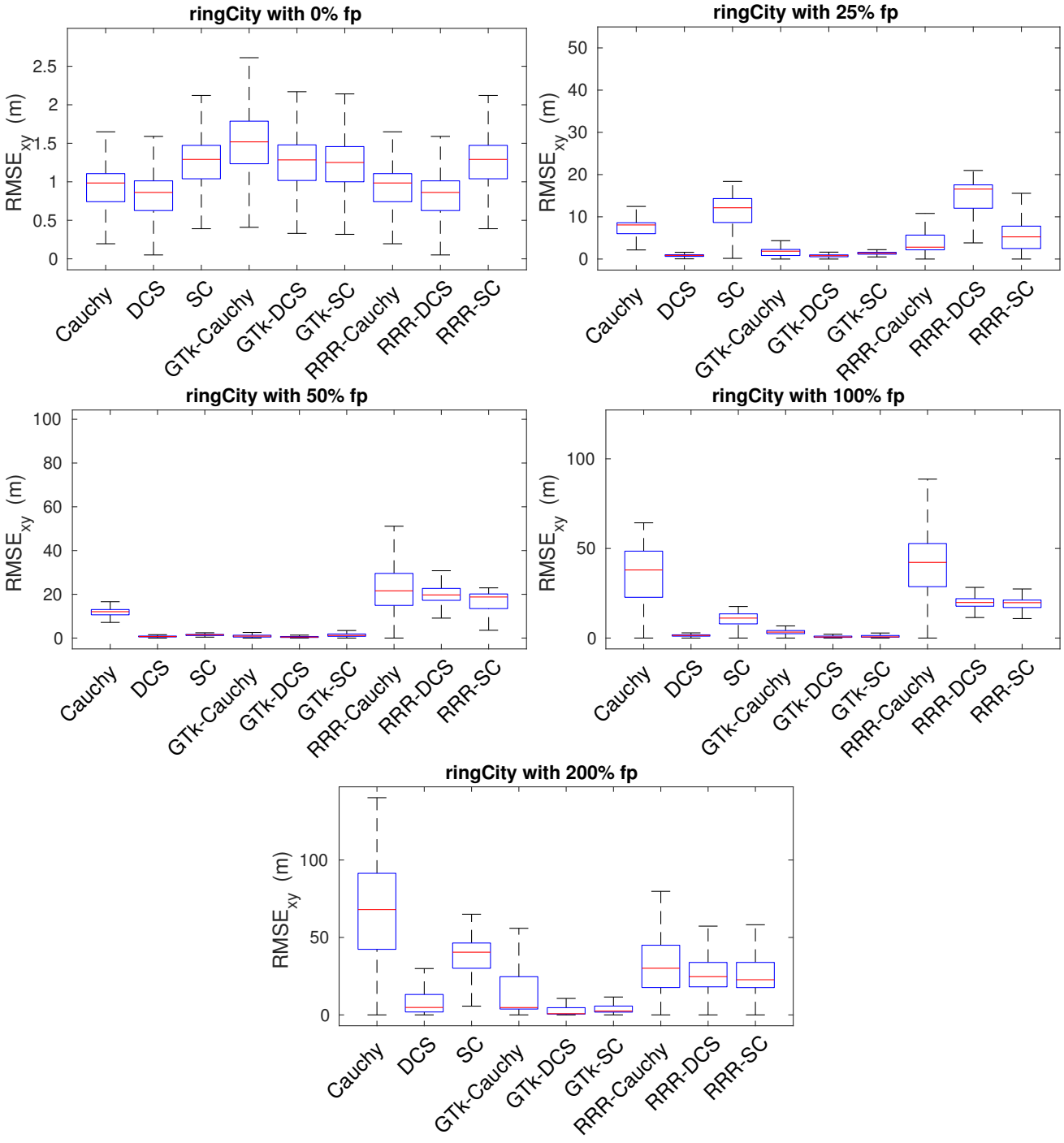

city10000
Cauchy
DCS
SC
GTk-Cauchy
GTk-DCS
GTk-SC
RRR-Cauchy
RRR-DCS
RRR-SC
0% Outliers
25% Outliers
50% Outliers
100% Outliers
200% Outliers

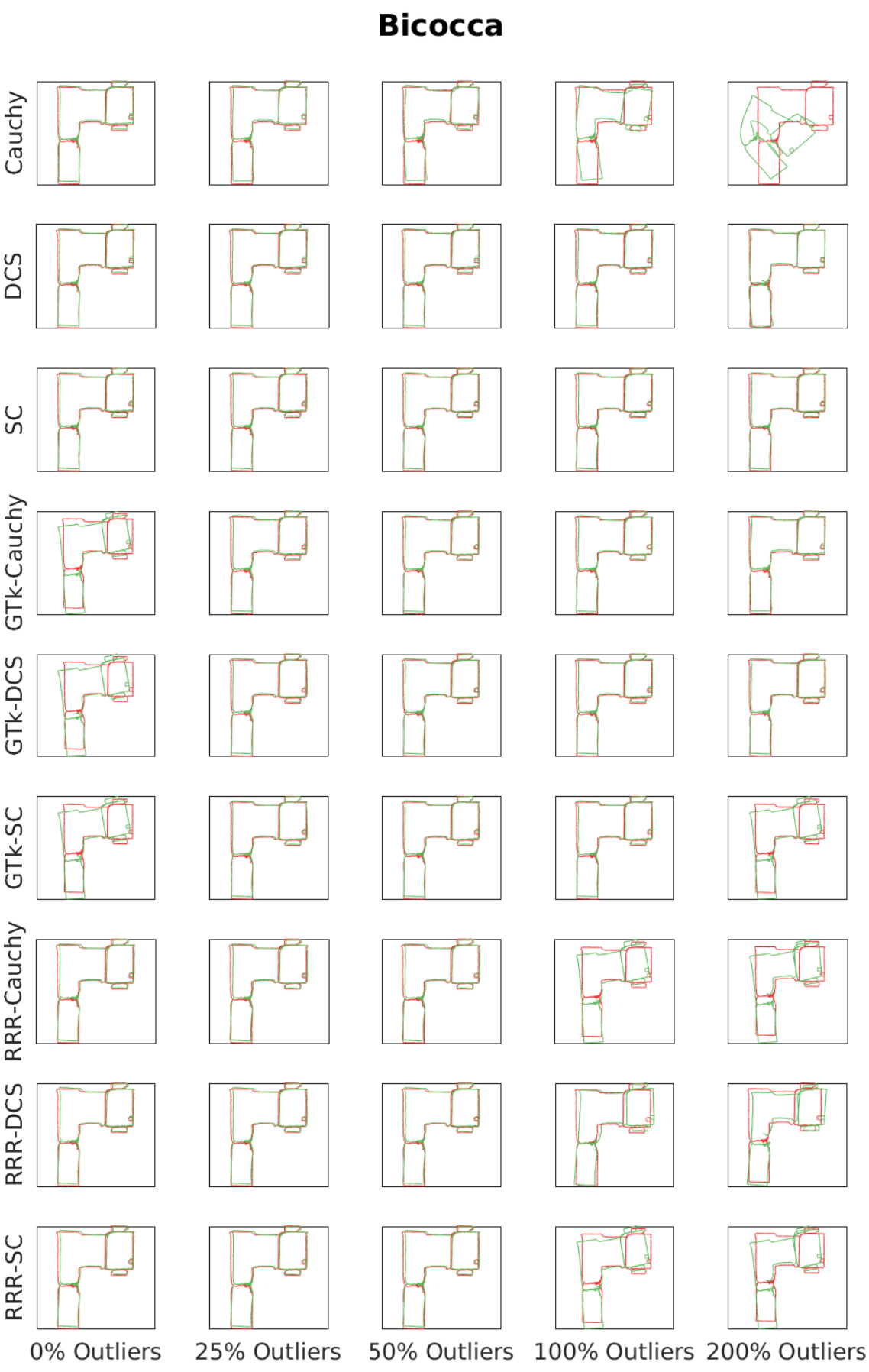

city10000 with 0% fp
city10000 with 25% fp
city10000 with 50% fp
city10000 with 100% fp
city10000 with 200% fp
RMSE_xy (m)
Cauchy
DCS
SC
GTk-Cauchy
GTk-DCS
GTk-SC
RRR-Cauchy
RRR-DCS
RRR-SC

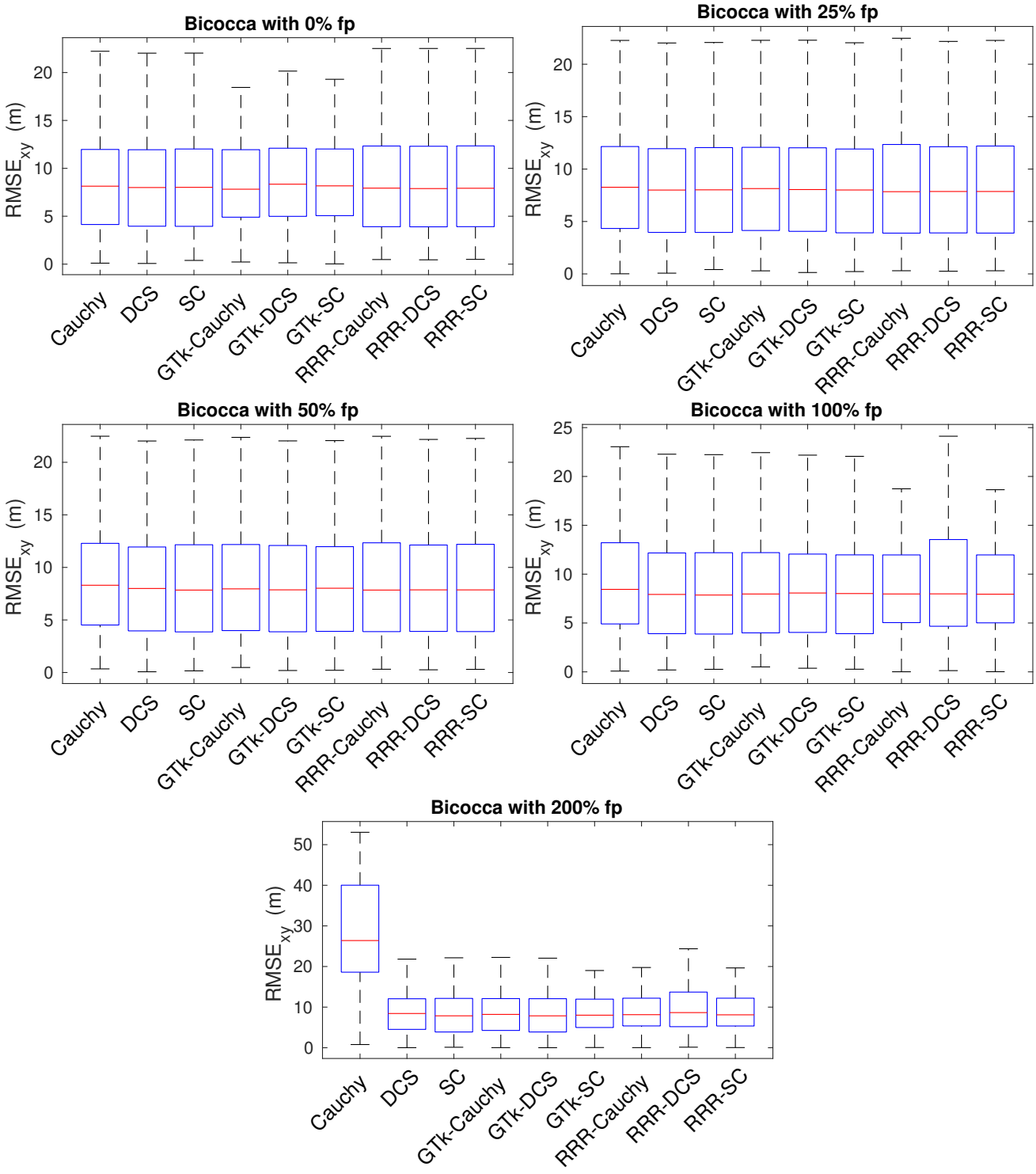

intel
Cauchy
DCS
SC
GTk-Cauchy
GTk-DCS
GTk-SC
RRR-Cauchy
RRR-DCS
RRR-SC
0% Outliers
25% Outliers
50% Outliers
100% Outliers
200% Outliers

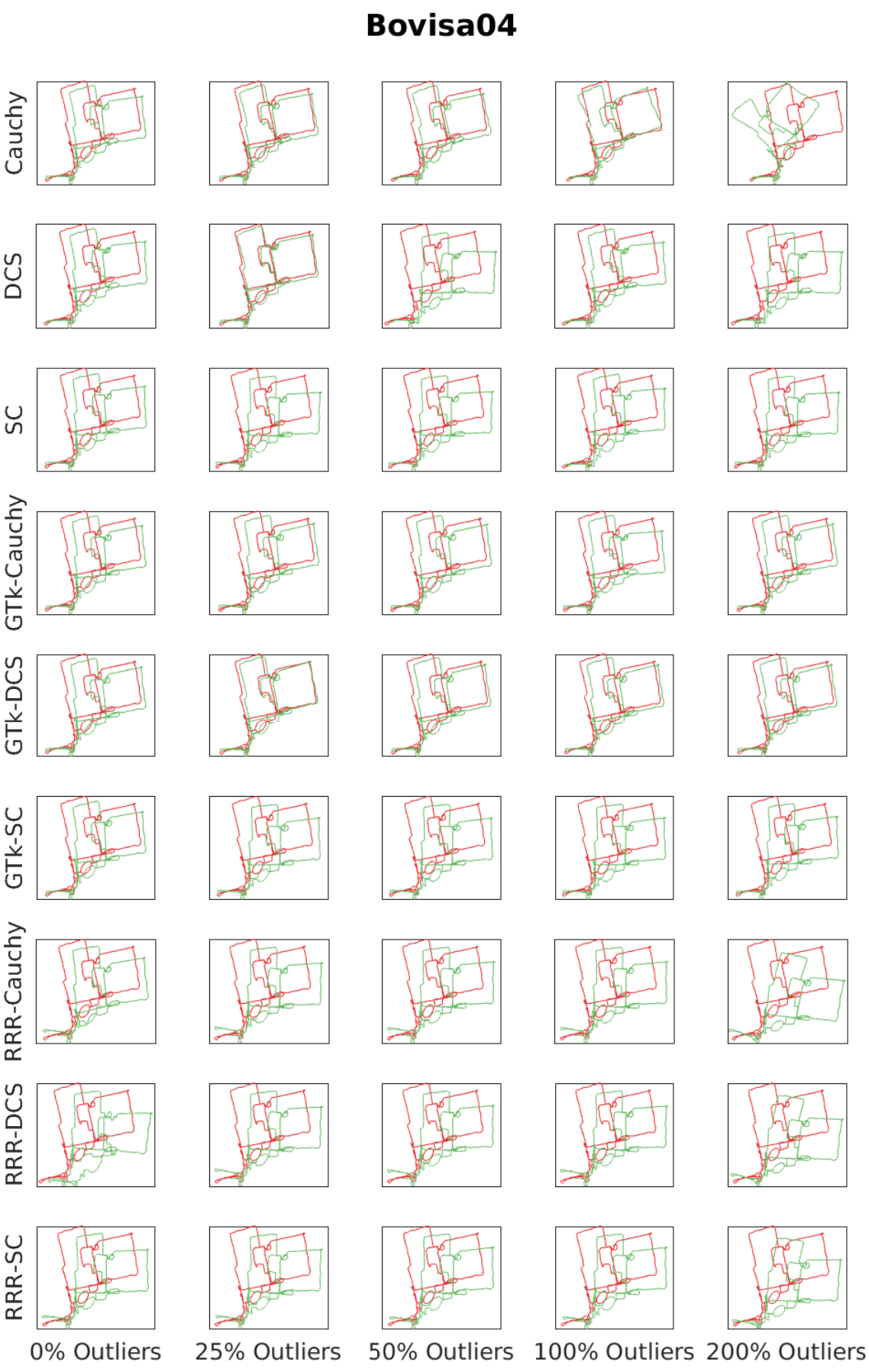

intel with 0% fp
intel with 25% fp
intel with 50% fp
intel with 100% fp
intel with 200% fp
RMSE_xy (m)
Cauchy
DCS
SC
GTk-Cauchy
GTk-DCS
GTk-SC
RRR-Cauchy
RRR-DCS
RRR-SC

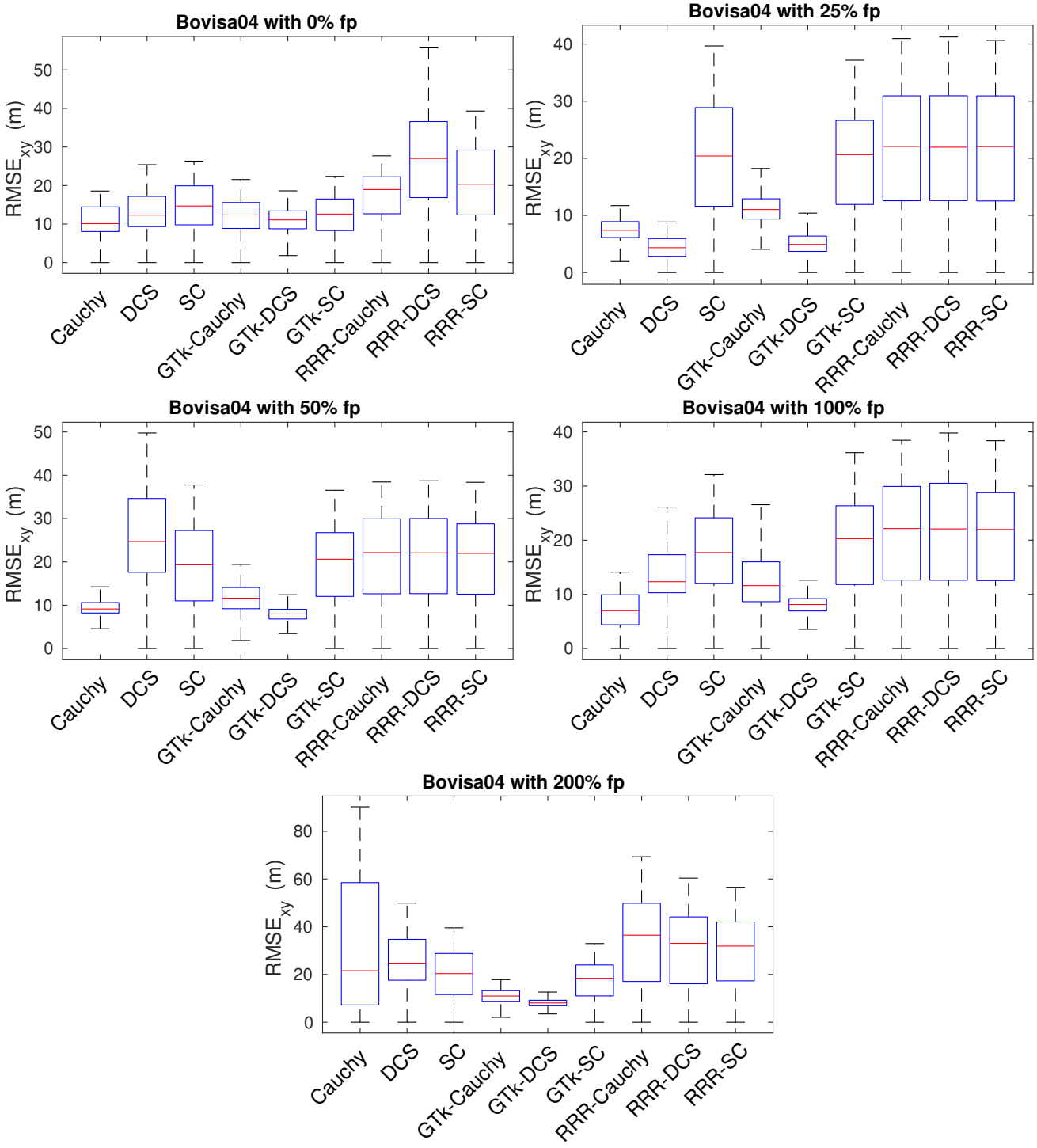

ringCity
Cauchy
DCS
SC
GTk-Cauchy
GTk-DCS
GTk-SC
RRR-Cauchy
RRR-DCS
RRR-SC
0% Outliers
25% Outliers
50% Outliers
100% Outliers
200% Outliers

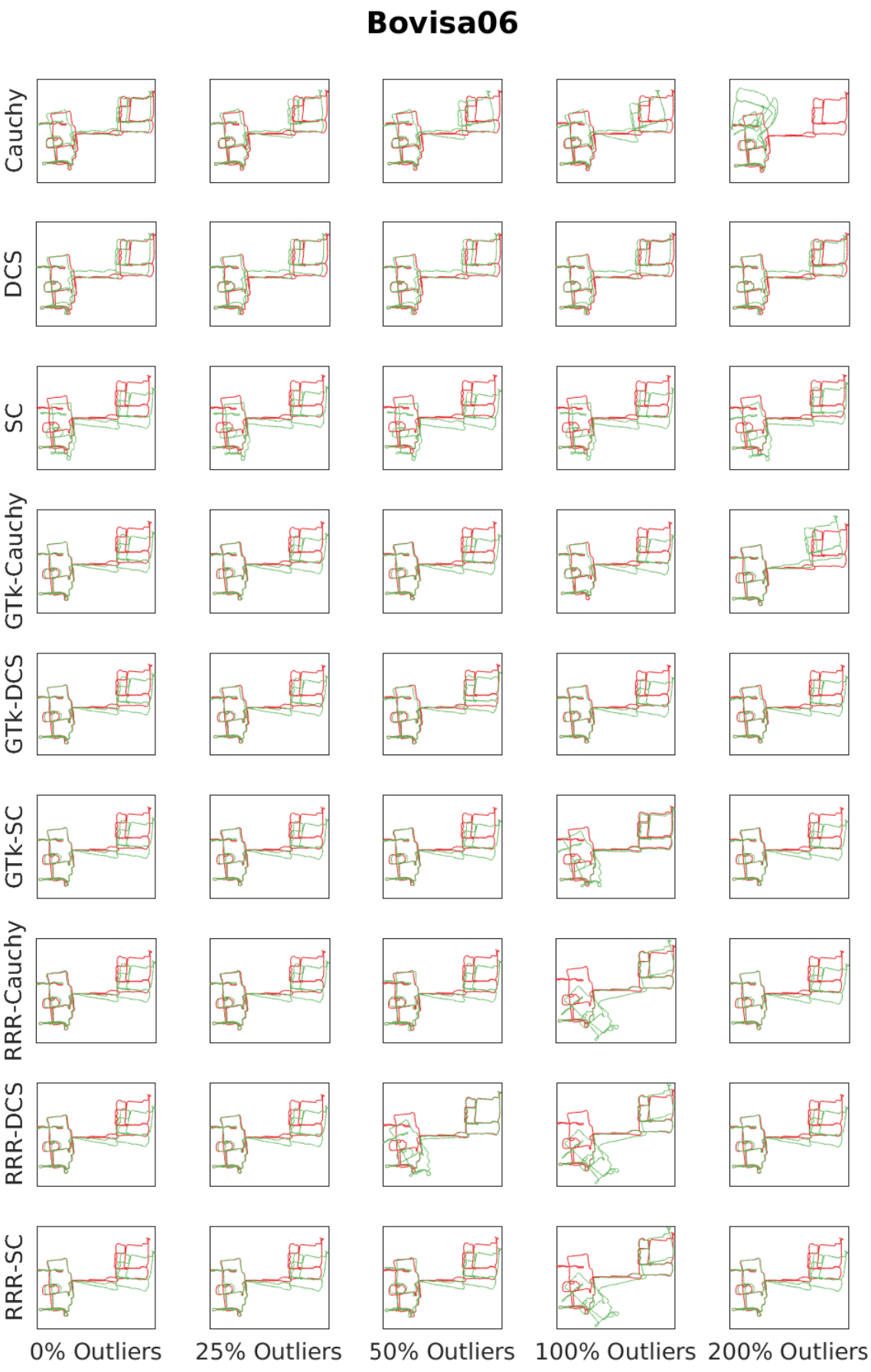

ringCity with 0% fp
ringCity with 25% fp
ringCity with 50% fp
ringCity with 100% fp
ringCity with 200% fp
RMSE_xy (m)
Cauchy
DCS
SC
GTk-Cauchy
GTk-DCS
GTk-SC
RRR-Cauchy
RRR-DCS
RRR-SC

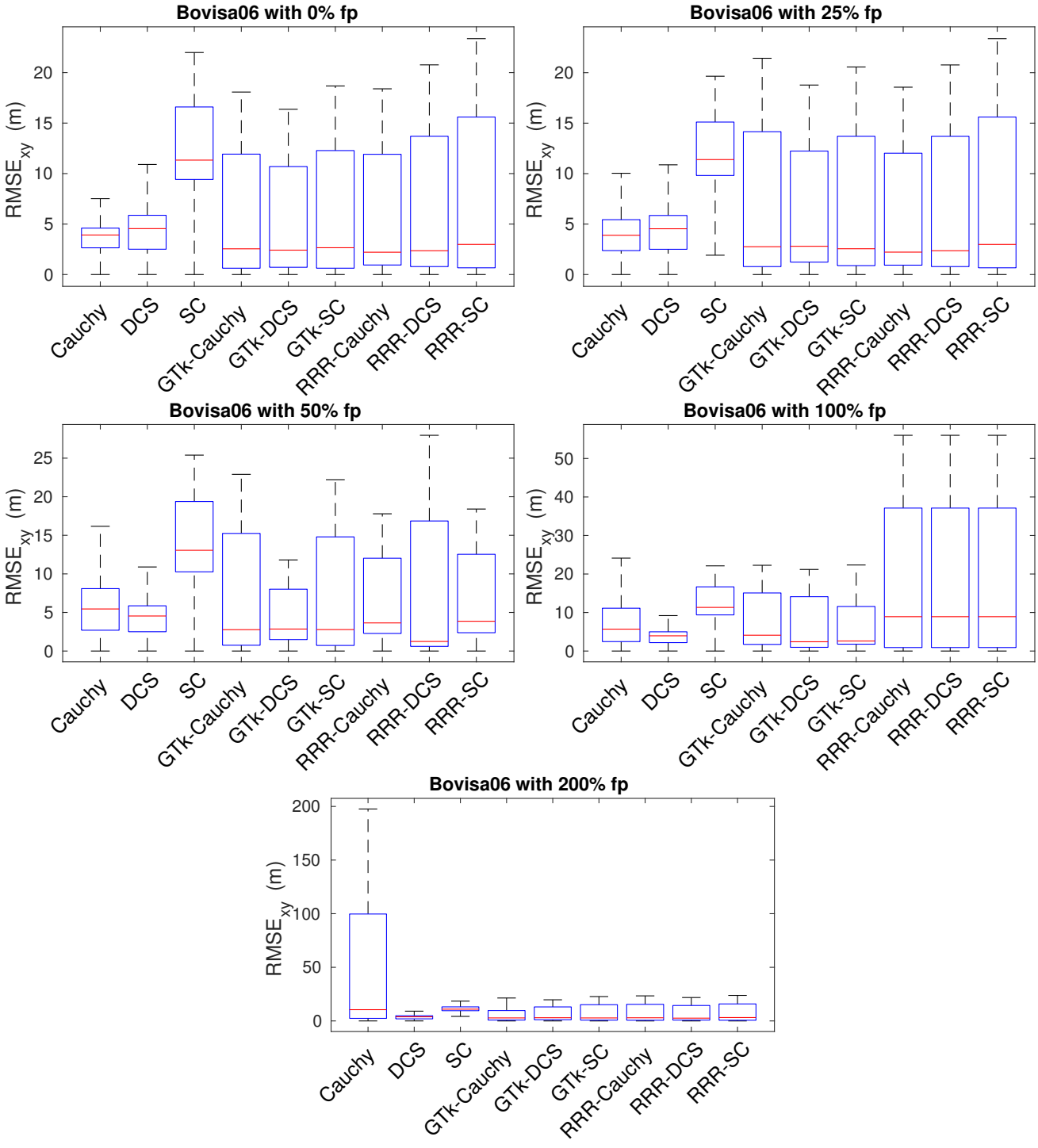

Bicocca
Cauchy
DCS
SC
GTk-Cauchy
GTk-DCS
GTk-SC
RRR-Cauchy
RRR-DCS
RRR-SC
0% Outliers
25% Outliers
50% Outliers
100% Outliers
200% Outliers


Bicocca with 0% fp
Bicocca with 25% fp
Bicocca with 50% fp
Bicocca with 100% fp
Bicocca with 200% fp
RMSE$_{xy}$ (m)
Cauchy
DCS
SC
GTk-Cauchy
GTk-DCS
GTk-SC
RRR-Cauchy
RRR-DCS
RRR-SC


Bovisa04
Cauchy
DCS
SC
GTk-Cauchy
GTk-DCS
GTk-SC
RRR-Cauchy
RRR-DCS
RRR-SC
0% Outliers
25% Outliers
50% Outliers
100% Outliers
200% Outliers


Bovisa04 with 0% fp
Bovisa04 with 25% fp
Bovisa04 with 50% fp
Bovisa04 with 100% fp
Bovisa04 with 200% fp
RMSE$_{xy}$ (m)
Cauchy
DCS
SC
GTk-Cauchy
GTk-DCS
GTk-SC
RRR-Cauchy
RRR-DCS
RRR-SC


Bovisa06
Cauchy
DCS
SC
GTk-Cauchy
GTk-DCS
GTk-SC
RRR-Cauchy
RRR-DCS
RRR-SC
0% Outliers
25% Outliers
50% Outliers
100% Outliers
200% Outliers


Bovisa06 with 0% fp
Bovisa06 with 25% fp
Bovisa06 with 50% fp
Bovisa06 with 100% fp
Bovisa06 with 200% fp
RMSE$_{xy}$ (m)
Cauchy
DCS
SC
GTk-Cauchy
GTk-DCS
GTk-SC
RRR-Cauchy
RRR-DCS
RRR-SC