



Image LiDAR based change detection and updating for urban 3D reconstruction

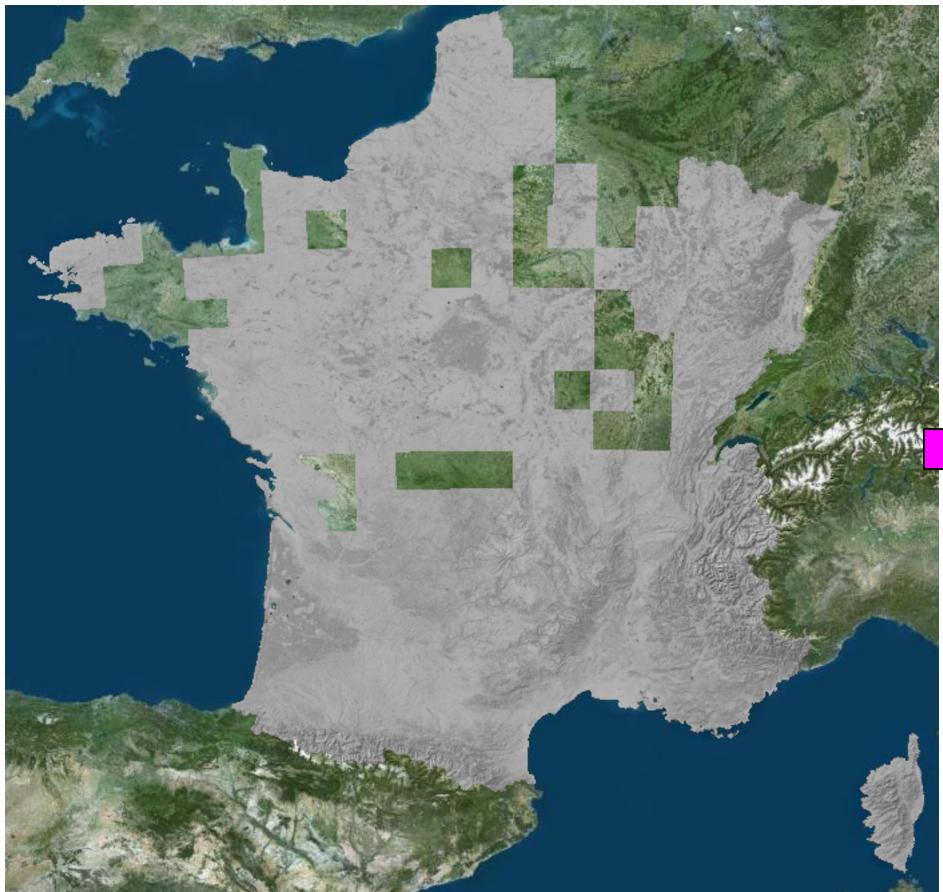
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Context

LiDARHD

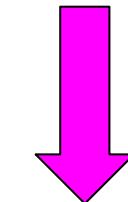


high quality
less frequent

Aerial Image

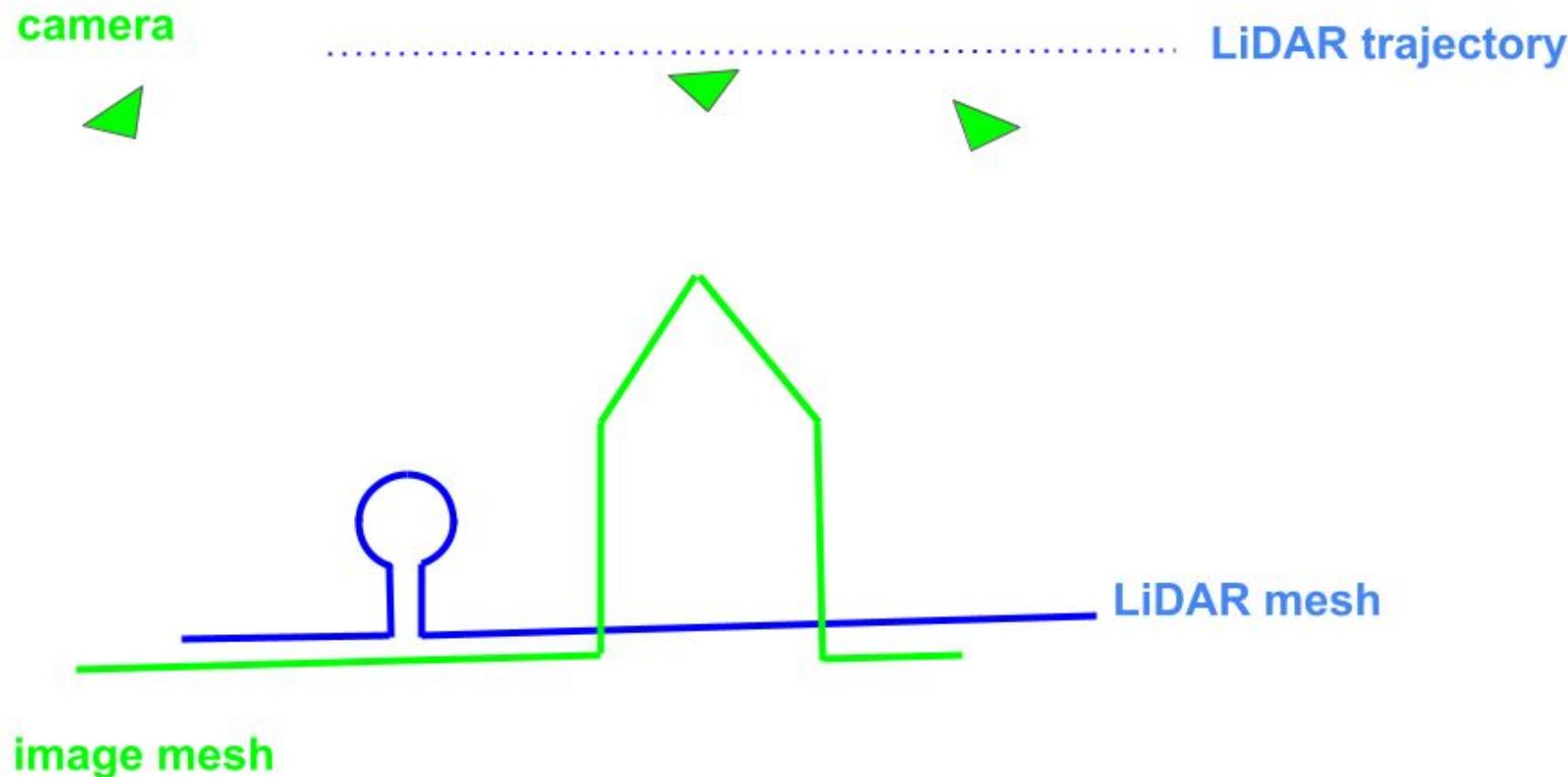


less accurate
more frequent

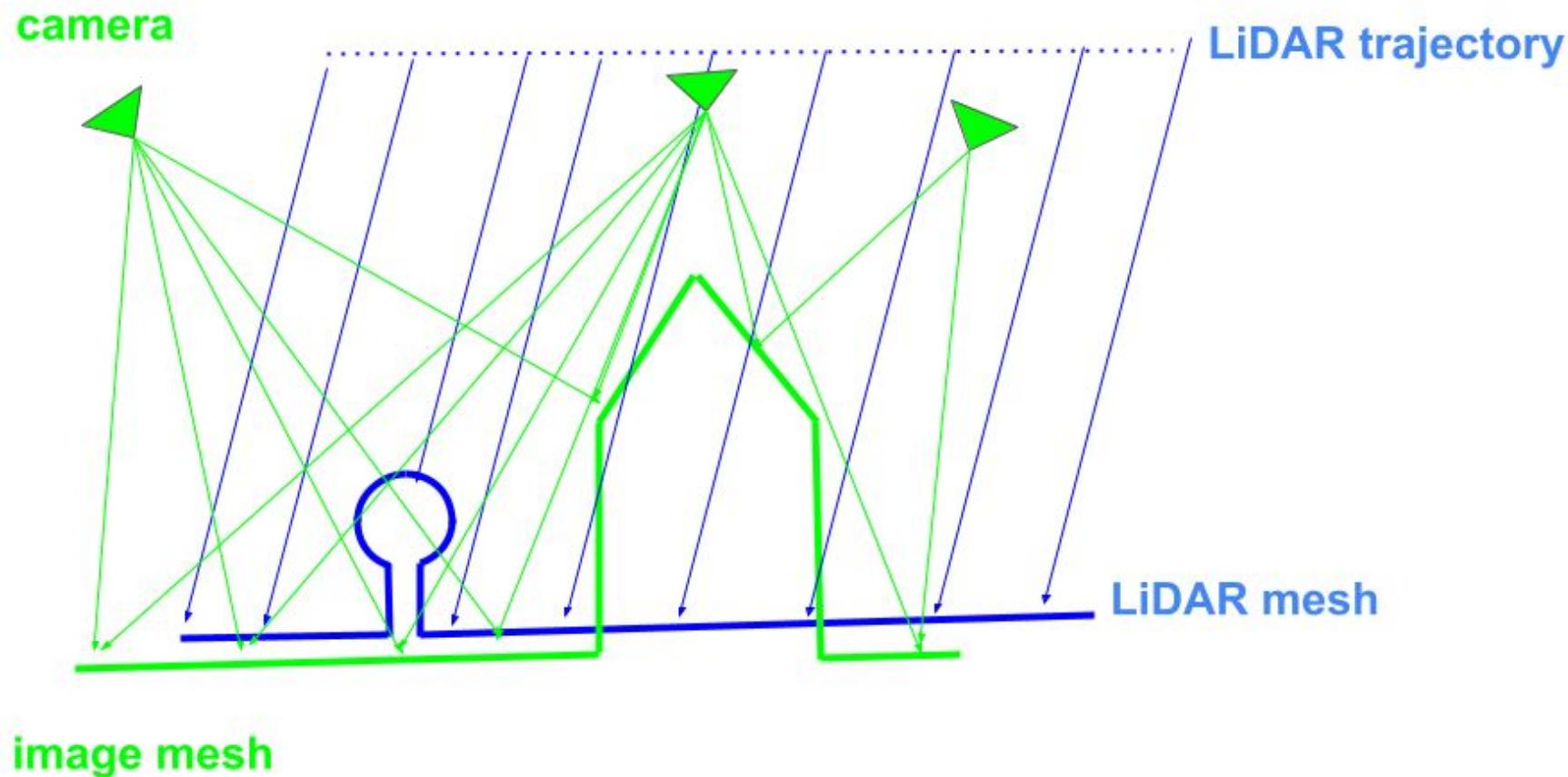


3D mesh update

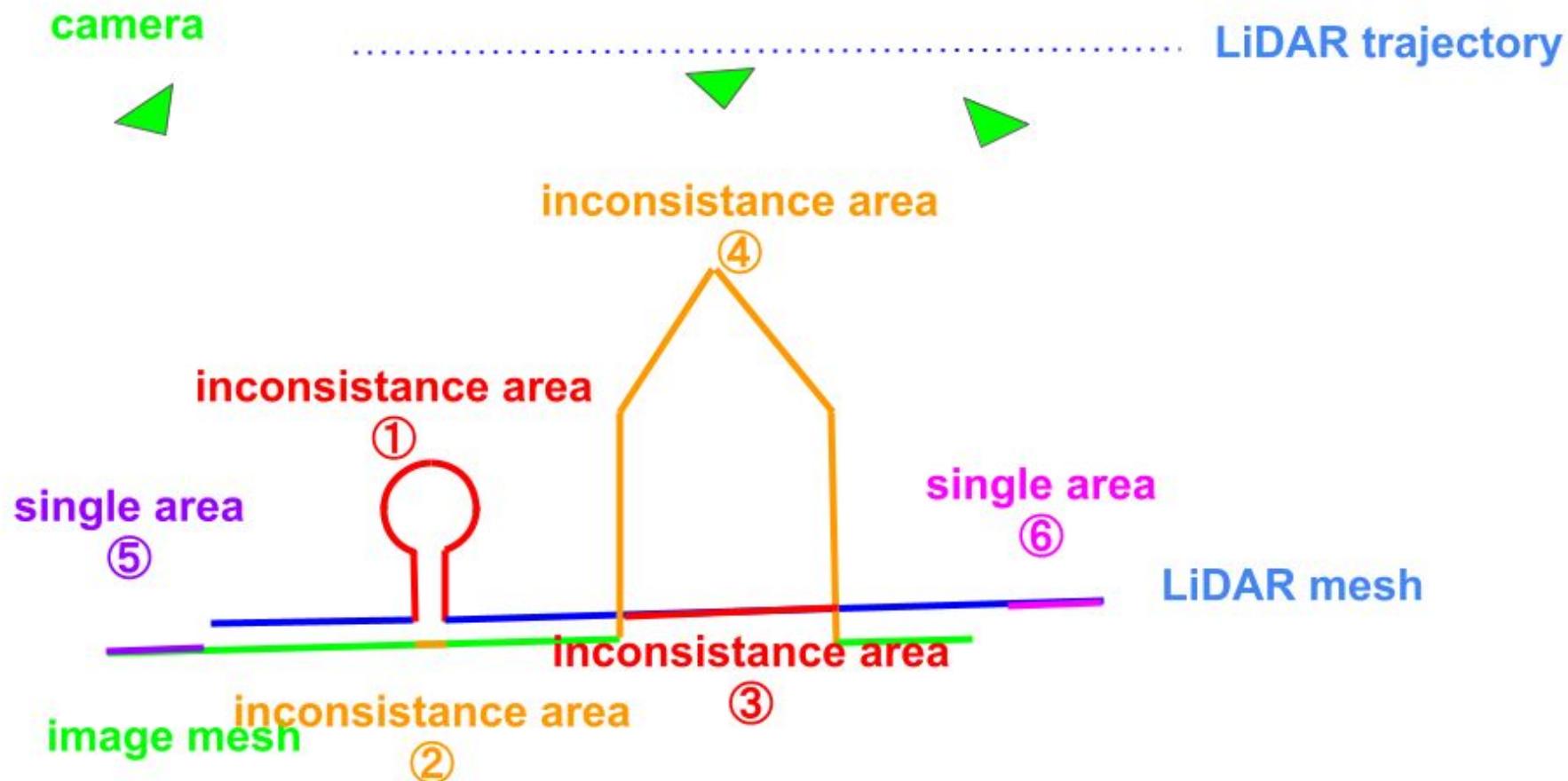
3D change detection: inputs



3D change detection: ray tracing based change detection



3D change detection



Lidar vs Lidar 3D change detection



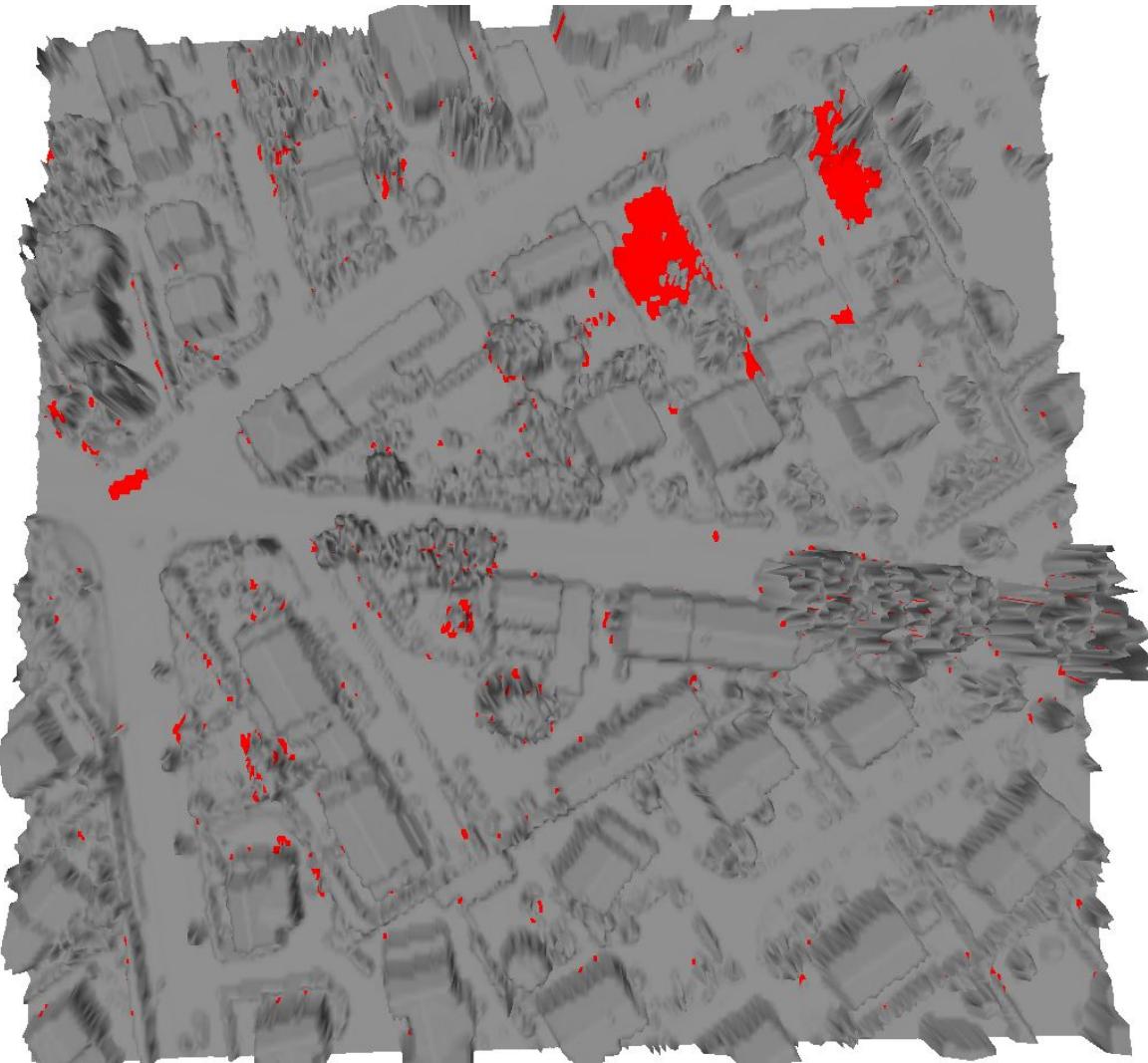
Lyon 2015 LiDAR sensor mesh



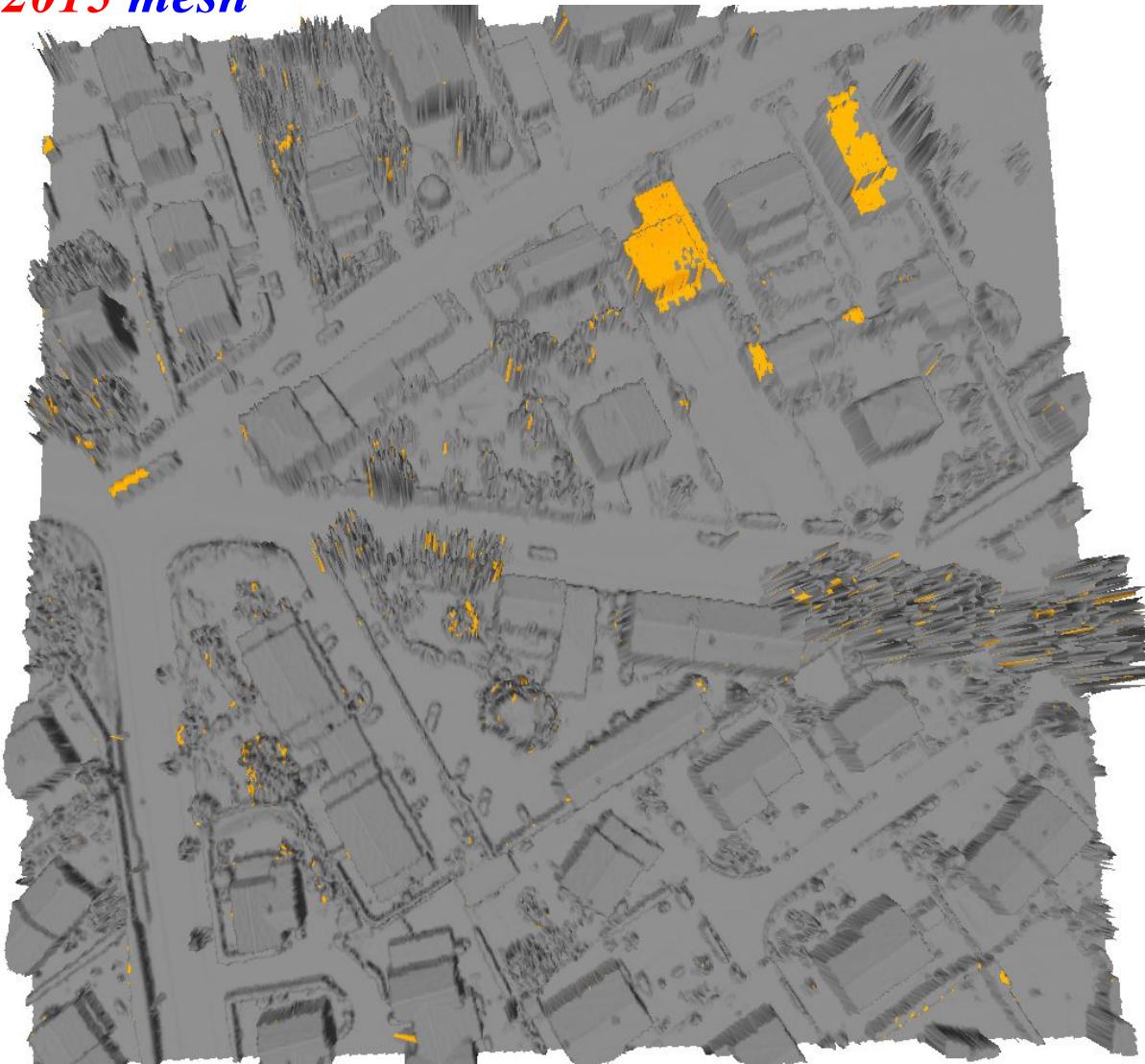
Lyon 2021 LiDAR sensor mesh

Lidar vs Lidar 3D change detection

Ray tracing on 2015 mesh



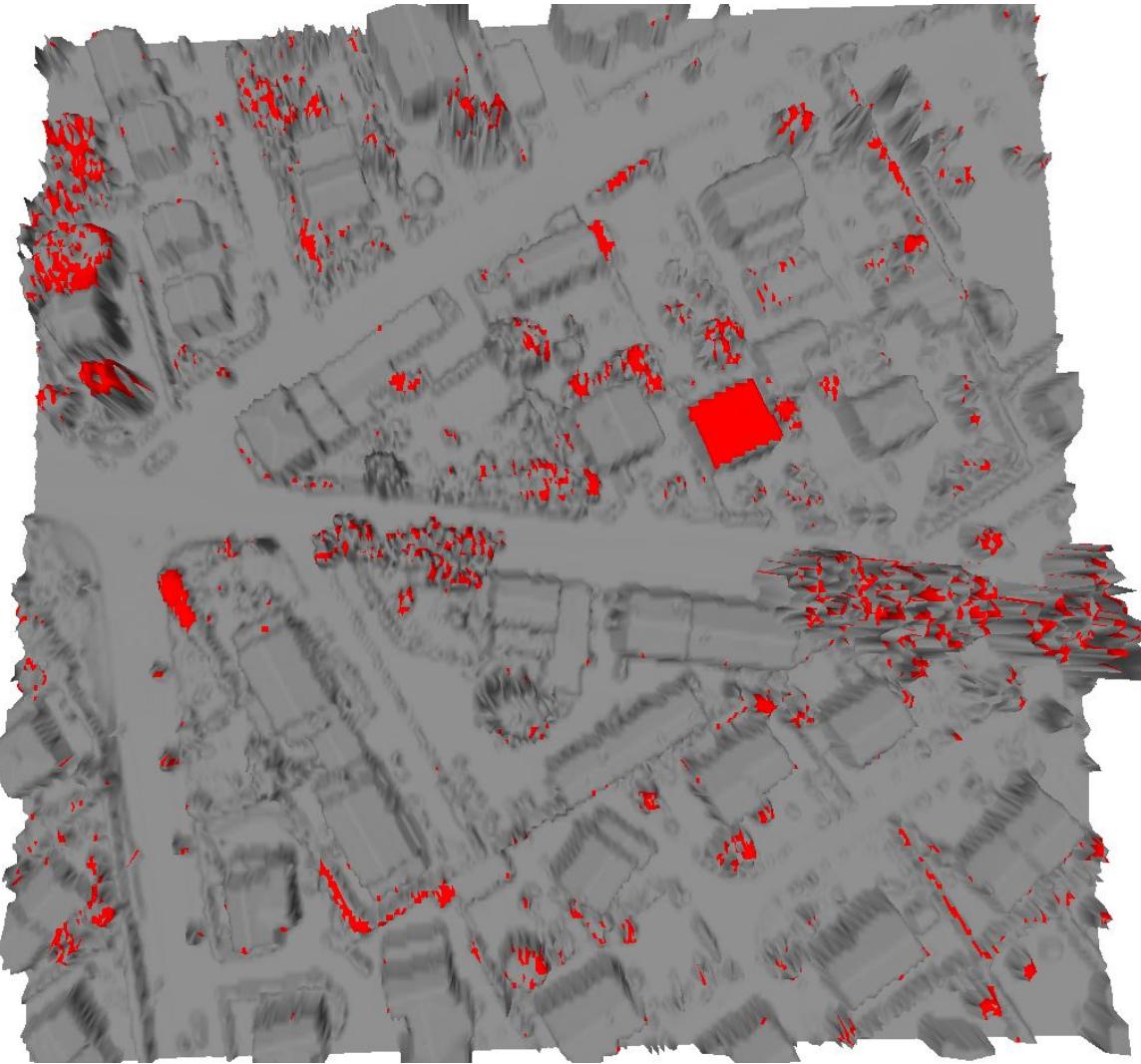
Lyon 2015 LiDAR sensor mesh



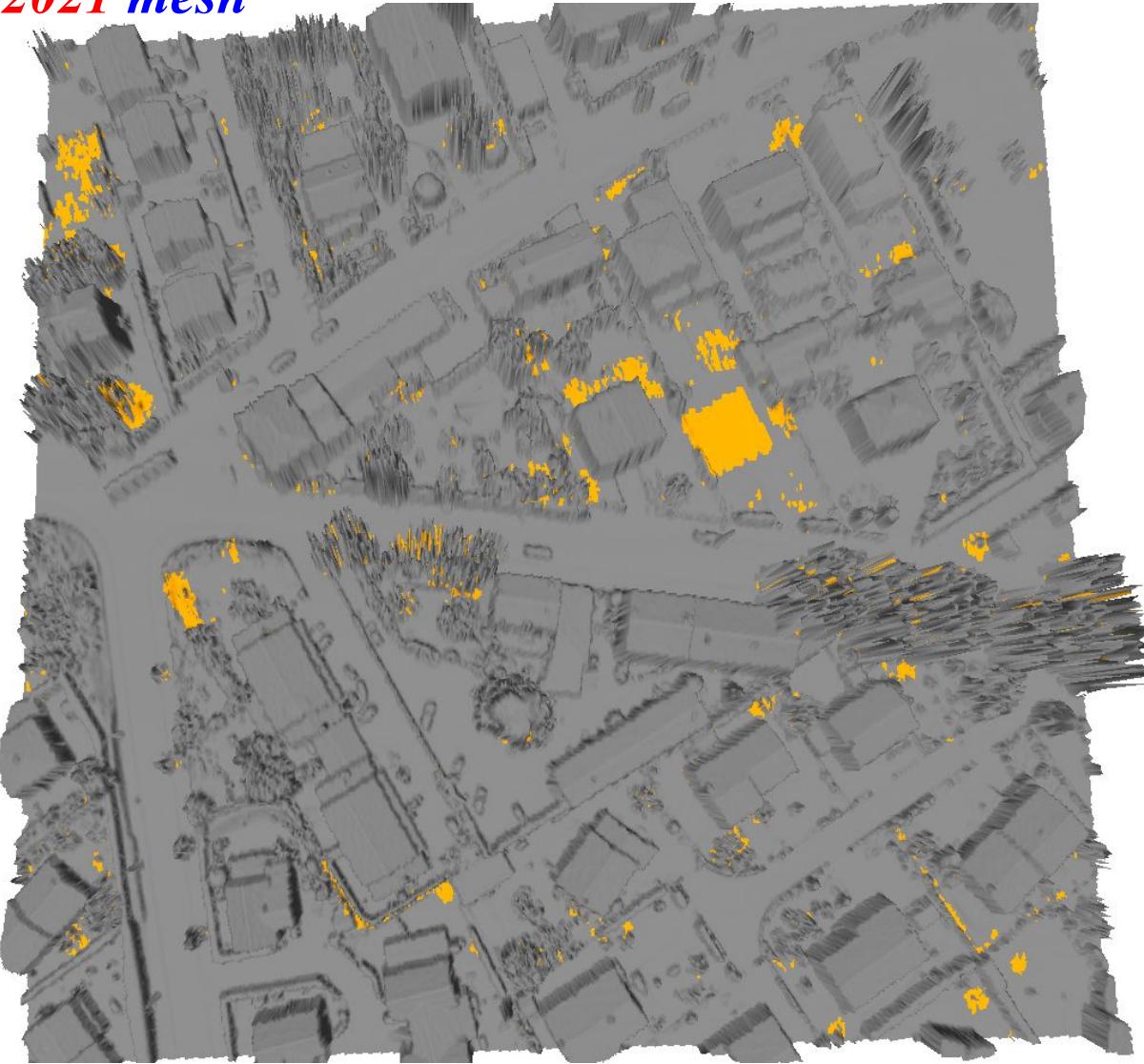
Lyon 2021 LiDAR sensor mesh

Lidar vs Lidar 3D change detection

Ray tracing on 2021 mesh

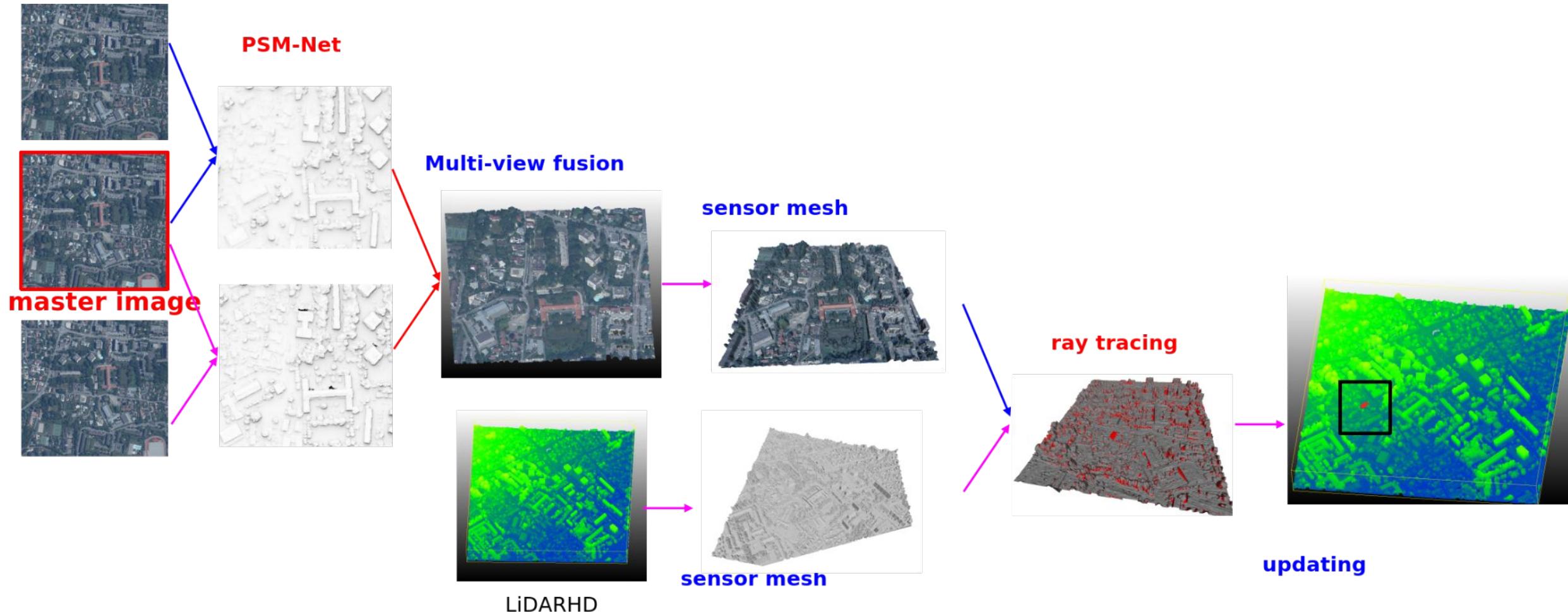


Lyon 2015 LiDAR sensor mesh



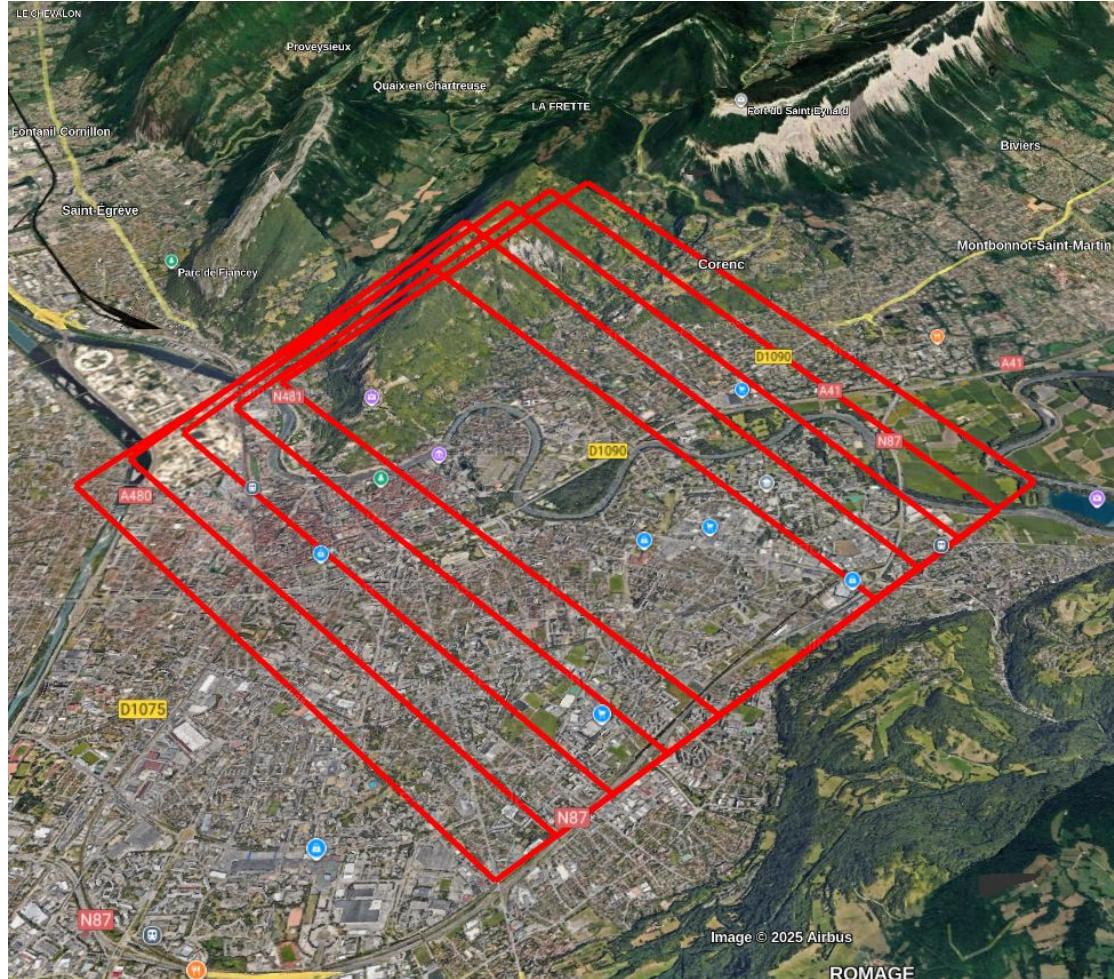
Lyon 2021 LiDAR sensor mesh

Image vs Lidar 3D change detection



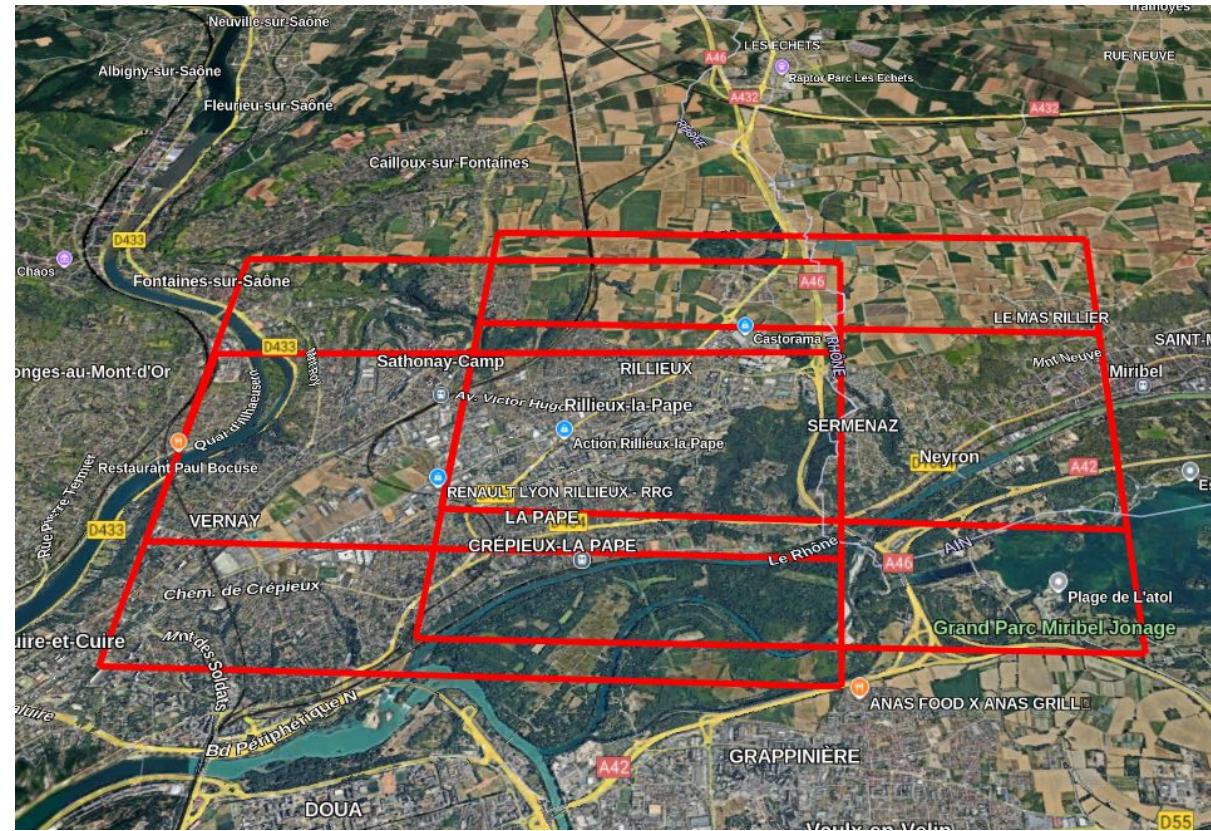
Dataset

*LiDARHD in 2021
Image in 2024*



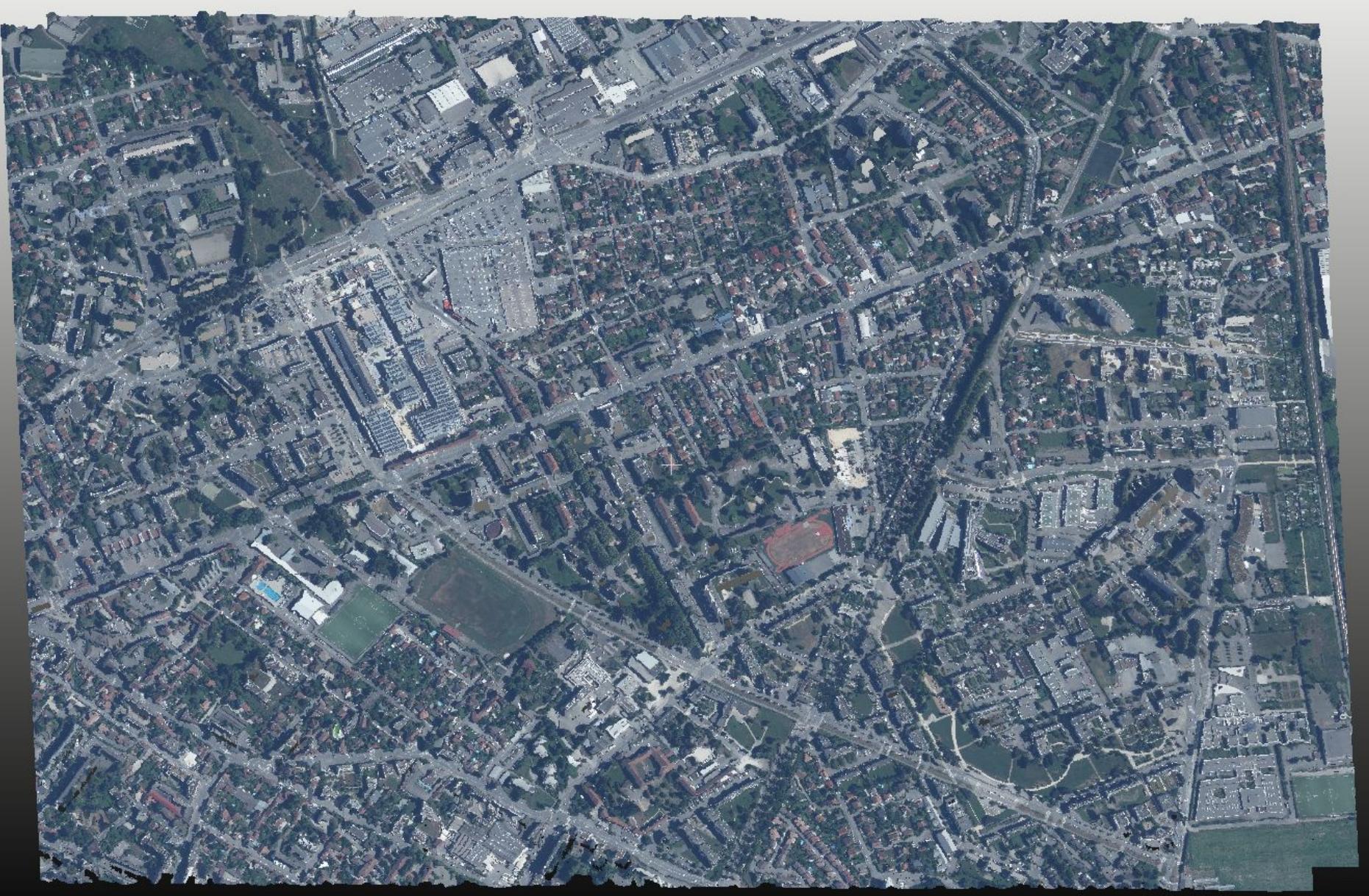
Grenoble dataset

*LiDARHD in 2021
Image in 2023*

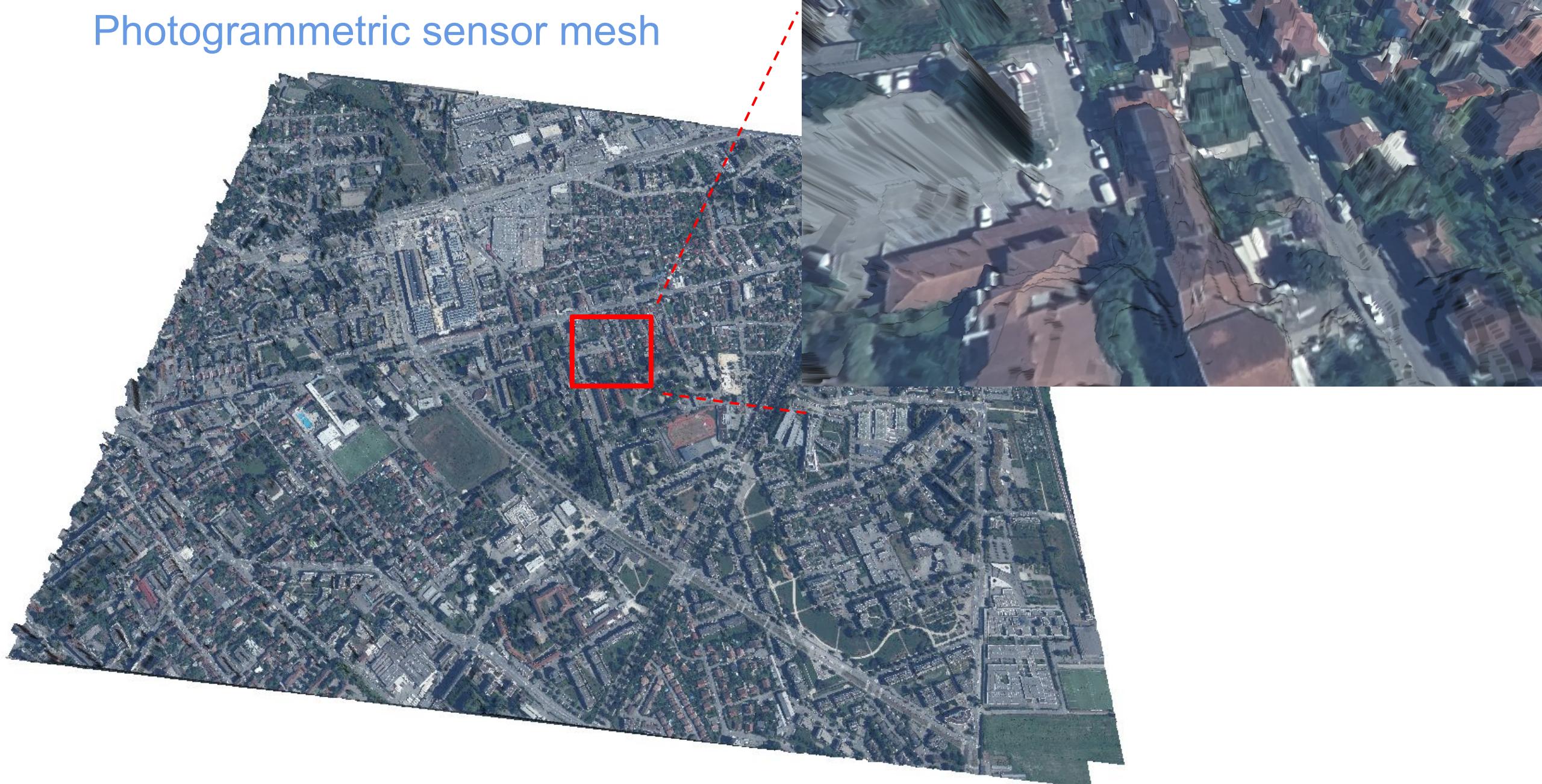


Lyon dataset

Photogrammetric point cloud



Photogrammetric sensor mesh



An example

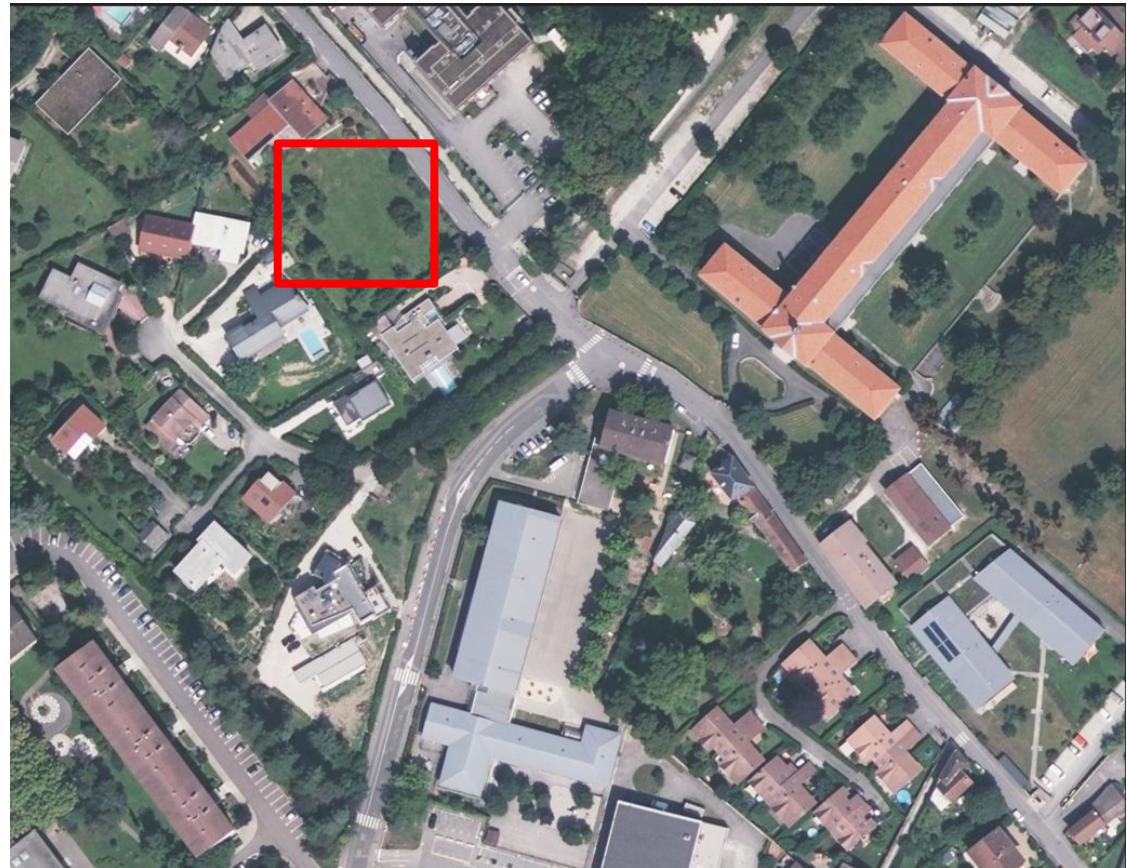
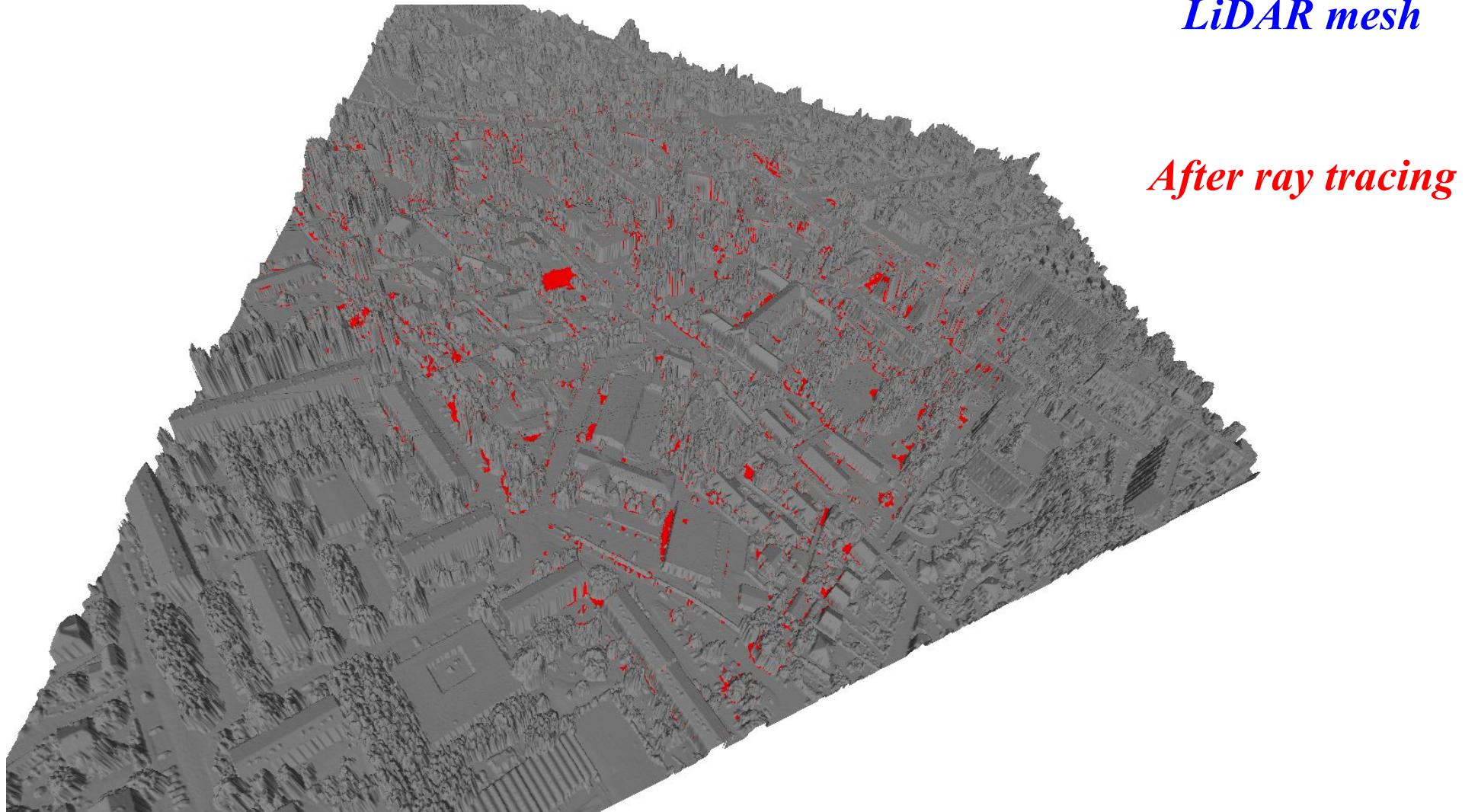


Image 2021



Image 2024

Result



Result

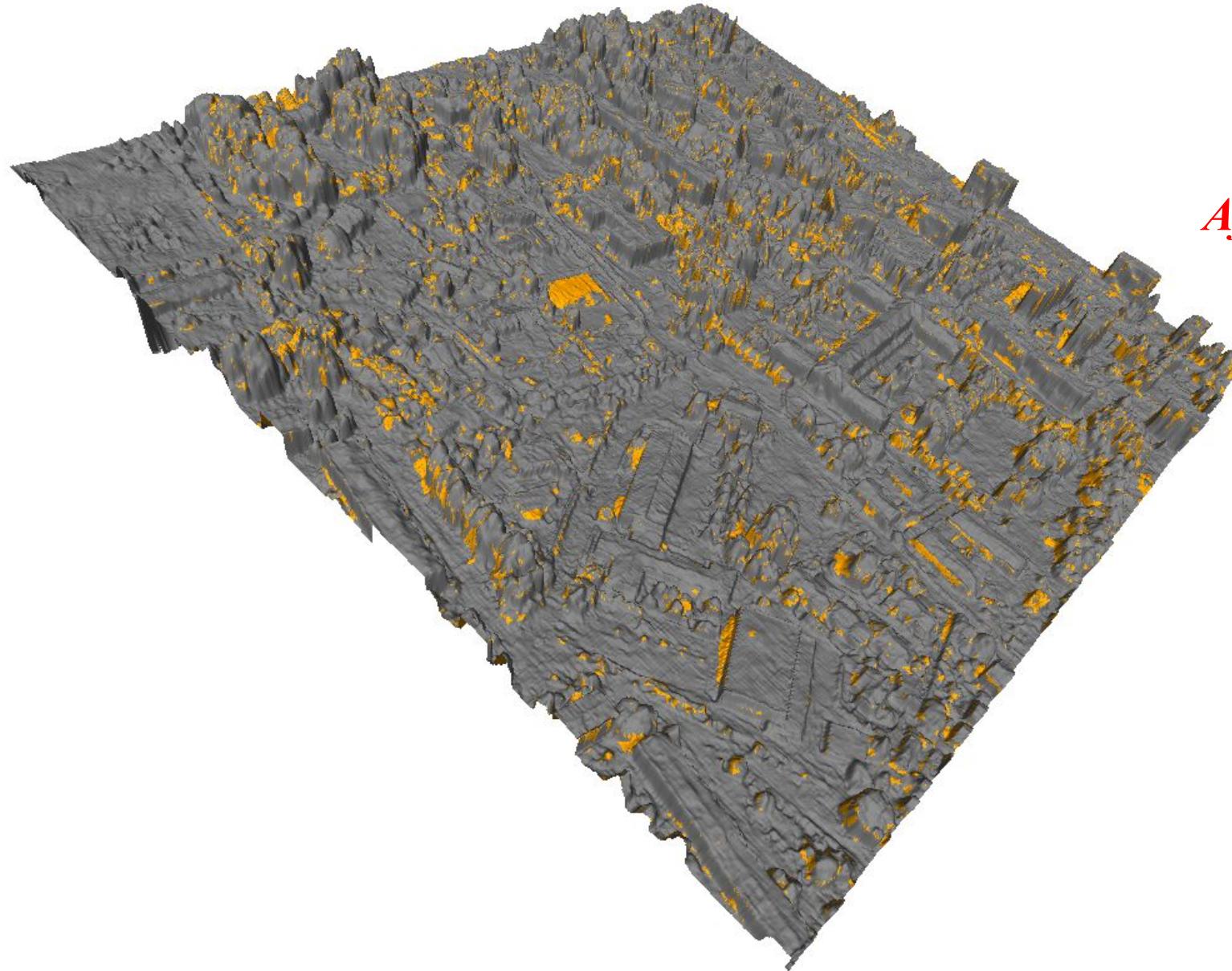


Image mesh

After ray tracing

Result



LiDAR mesh

*Change area
after
removing noise*

Result



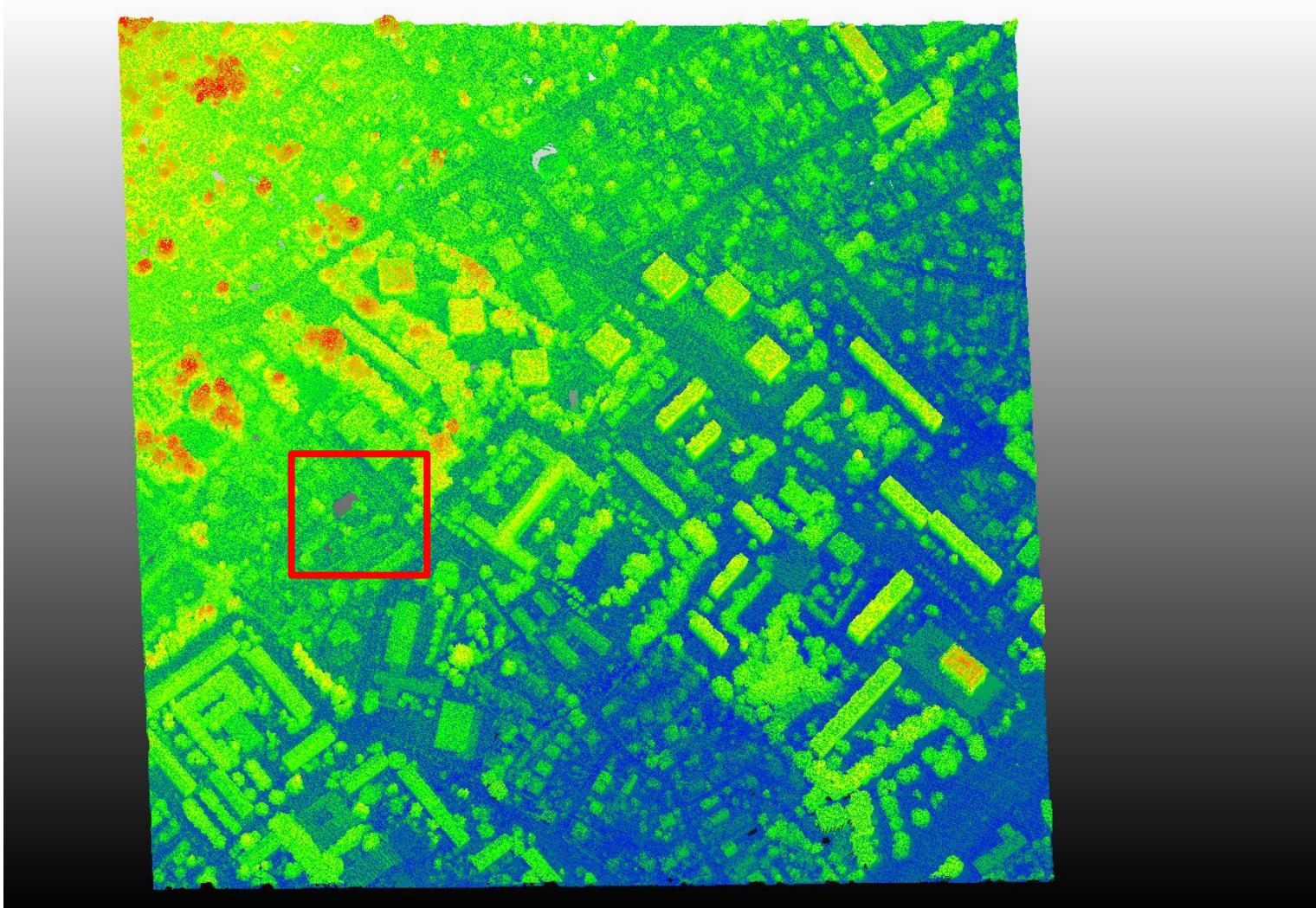
Image mesh

*Change area
after
removing noise*

Result

LiDARHD

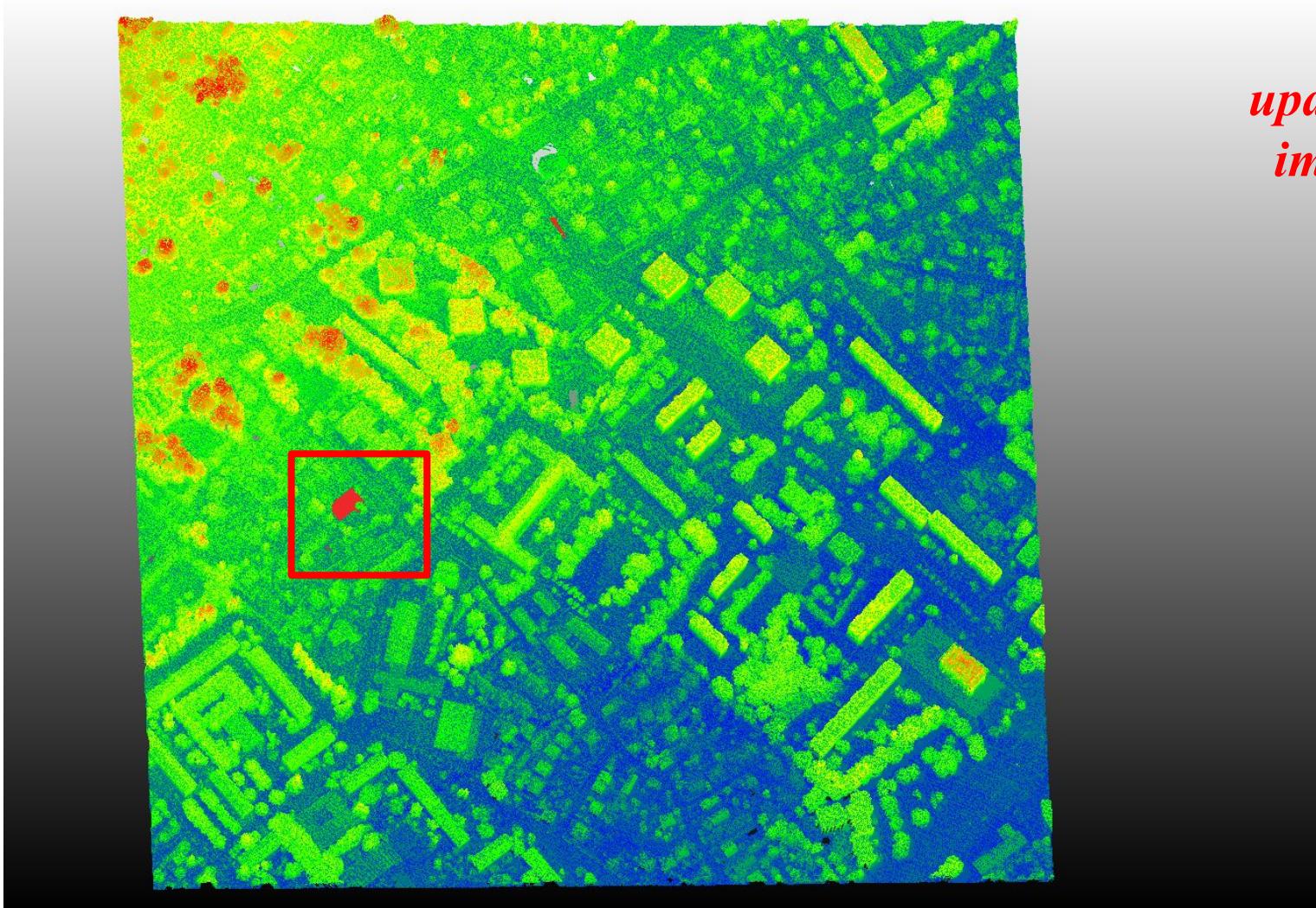
remove changes



Result

LiDARHD

*update changes with
image mesh patch*



Conclusion and perspectives

Contribution :

A 3D pipeline for updating LiDAR point clouds using images

A 3D change detection approach based on sensor mesh representation

Limitation :

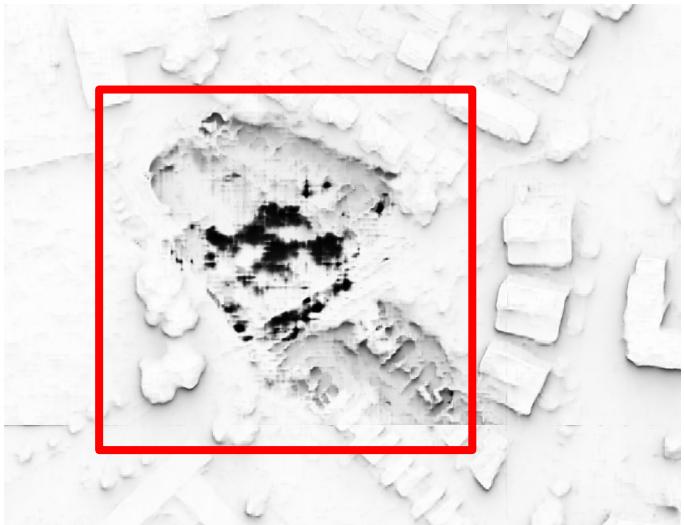
Depends on dense matching result

Only geometry based

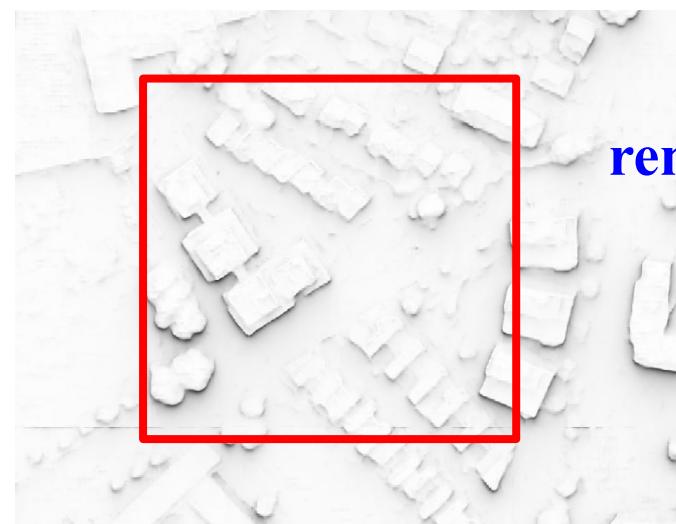
Conclusion and perspectives



training with
noise label



removing noise label



Conclusion and perspectives

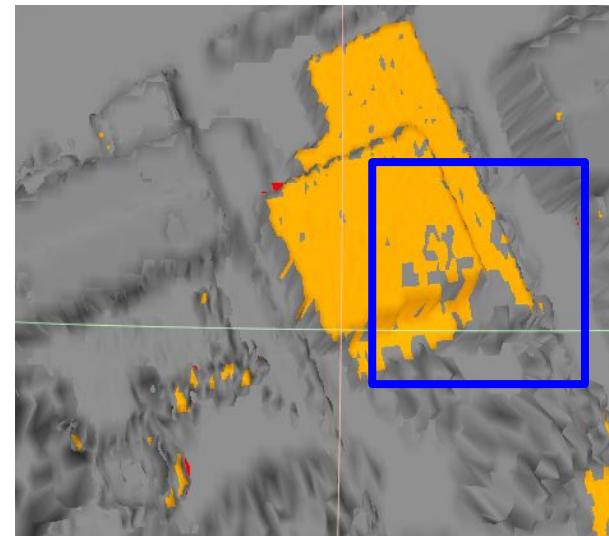
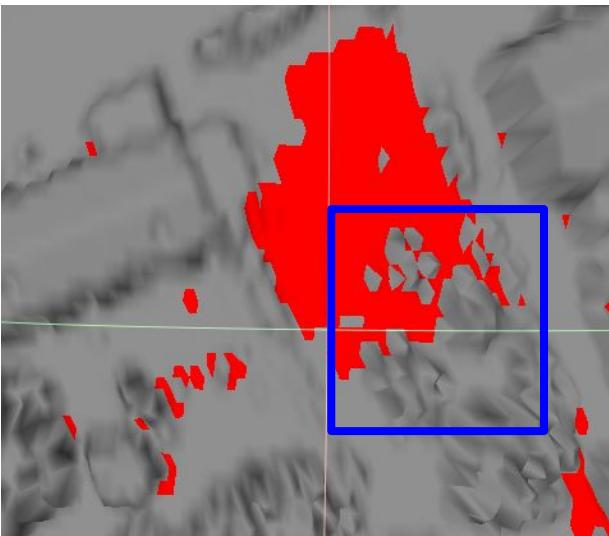
Old image



new image



partial detection



Conclusion and perspectives

Perspectives :

Use semantic information

Deep learning based 3D change detection



Merci pour votre attention !

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