

An aerial photograph of a city, showing a dense urban area with many buildings, streets, and green spaces. The image is used as a background for the title and authors information.

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

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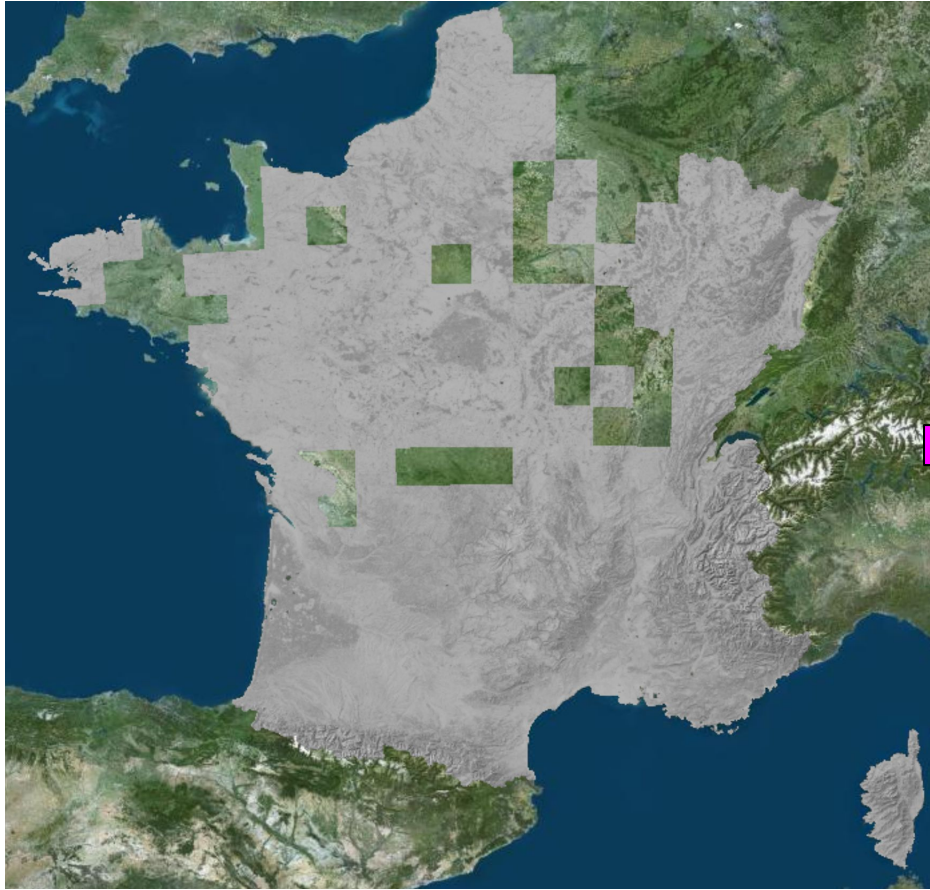


Context

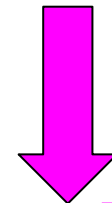
LiDARHD

Aerial Image

high quality
less frequent

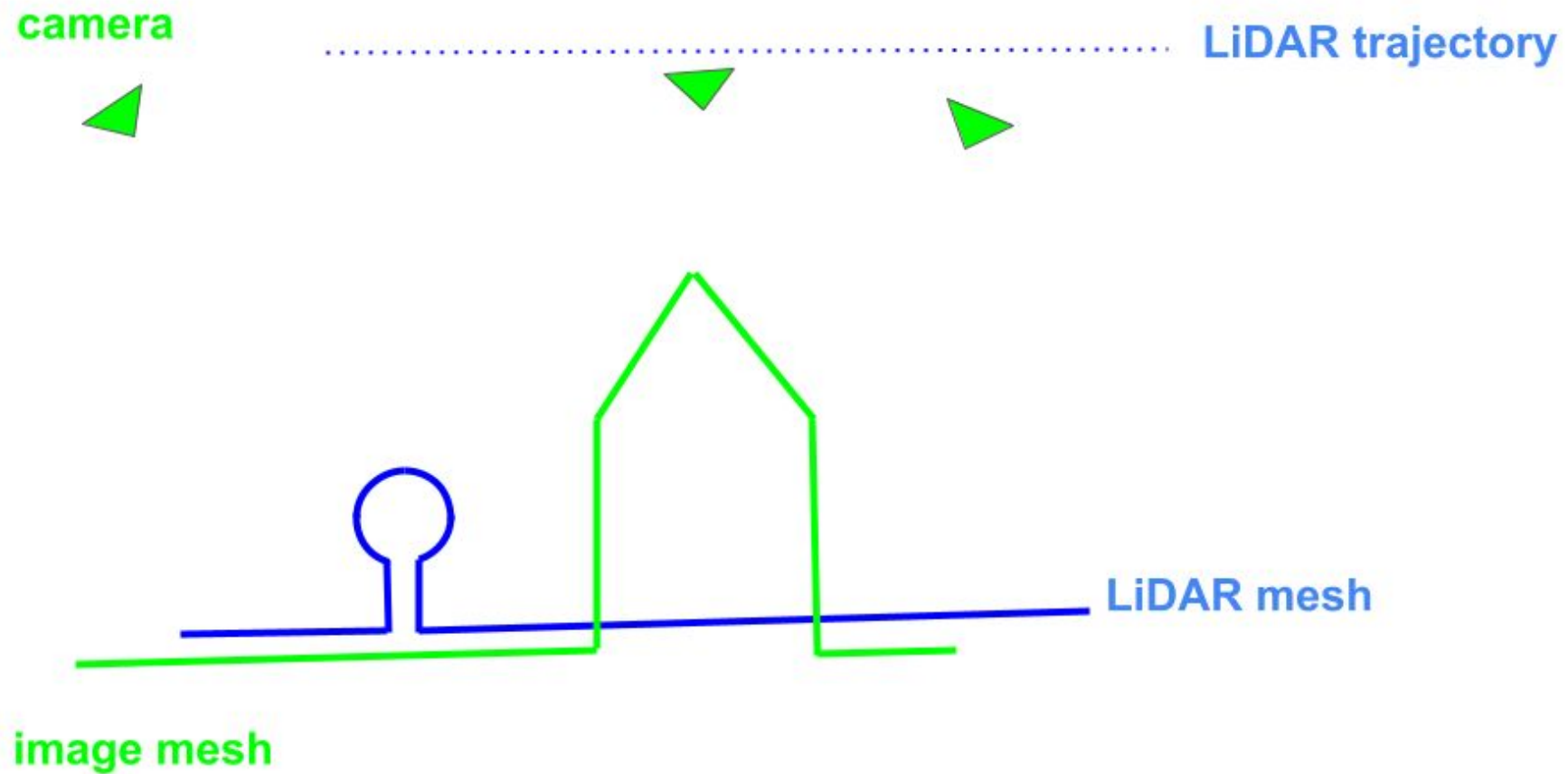


less accurate
more frequent

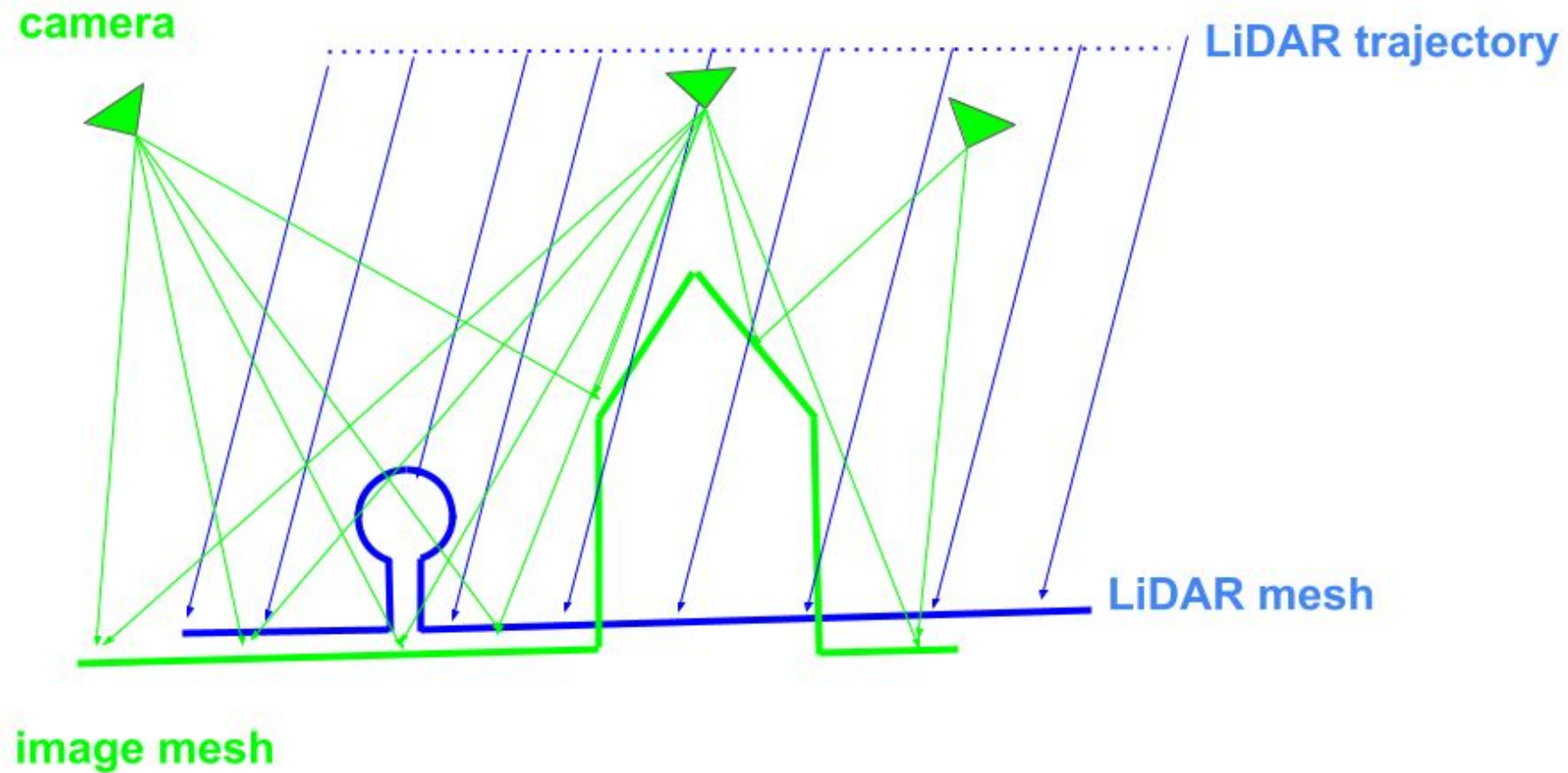


3D mesh update

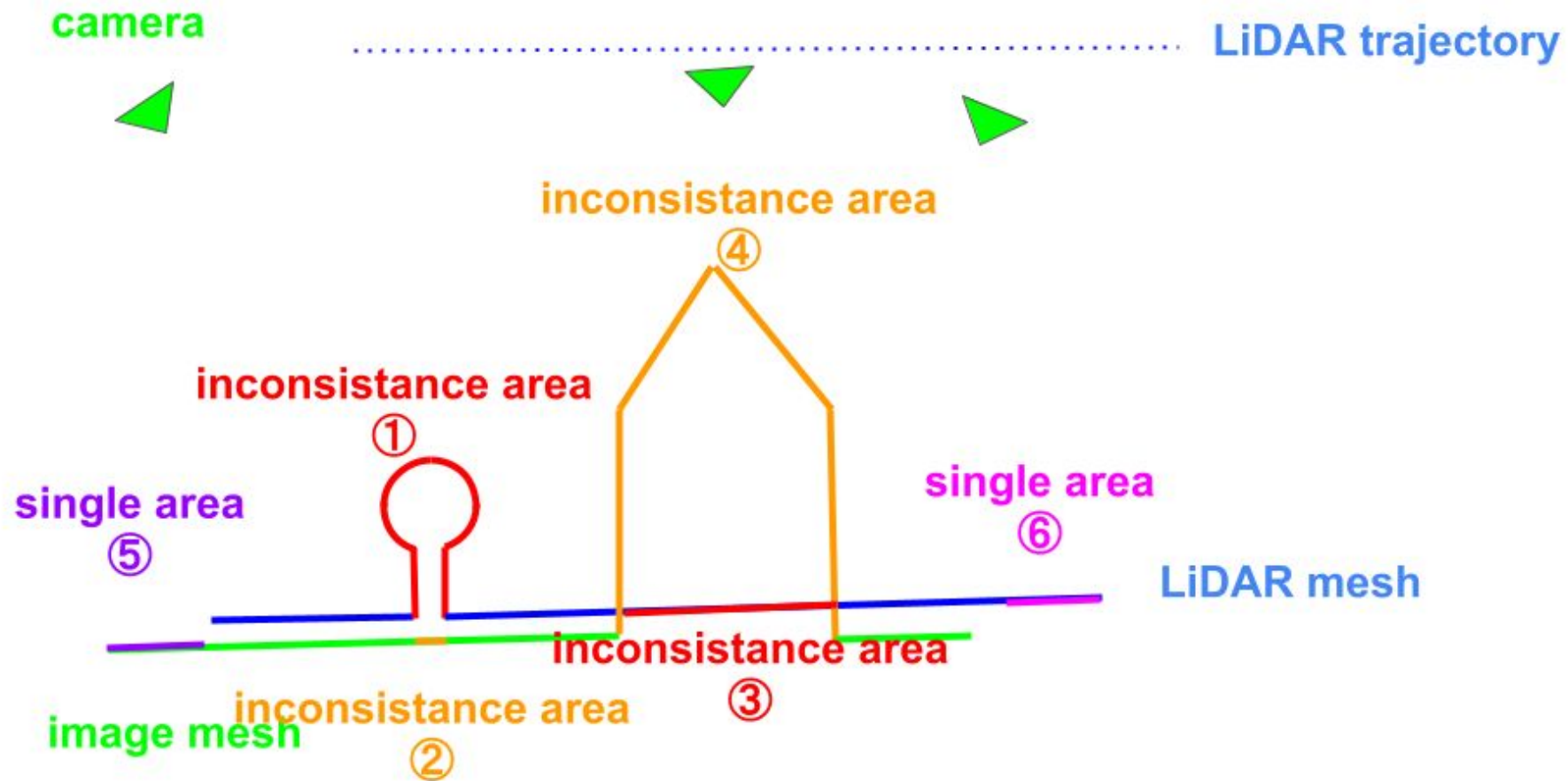
3D change detection: inputs



3D change detection: ray tracing based change detection



3D change detection



Lidar vs Lidar 3D change detection



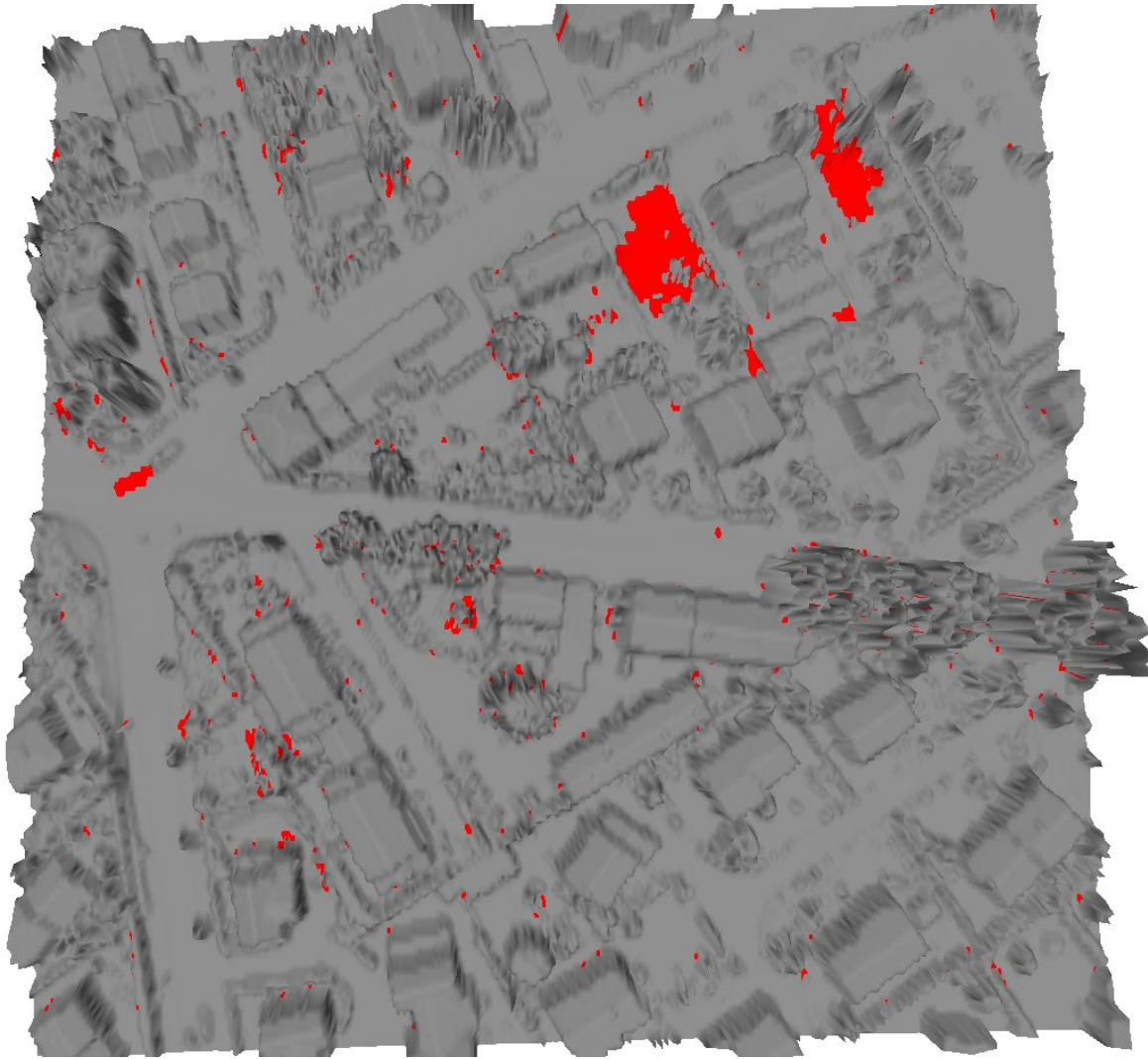
*Lyon **2015** LiDAR sensor mesh*



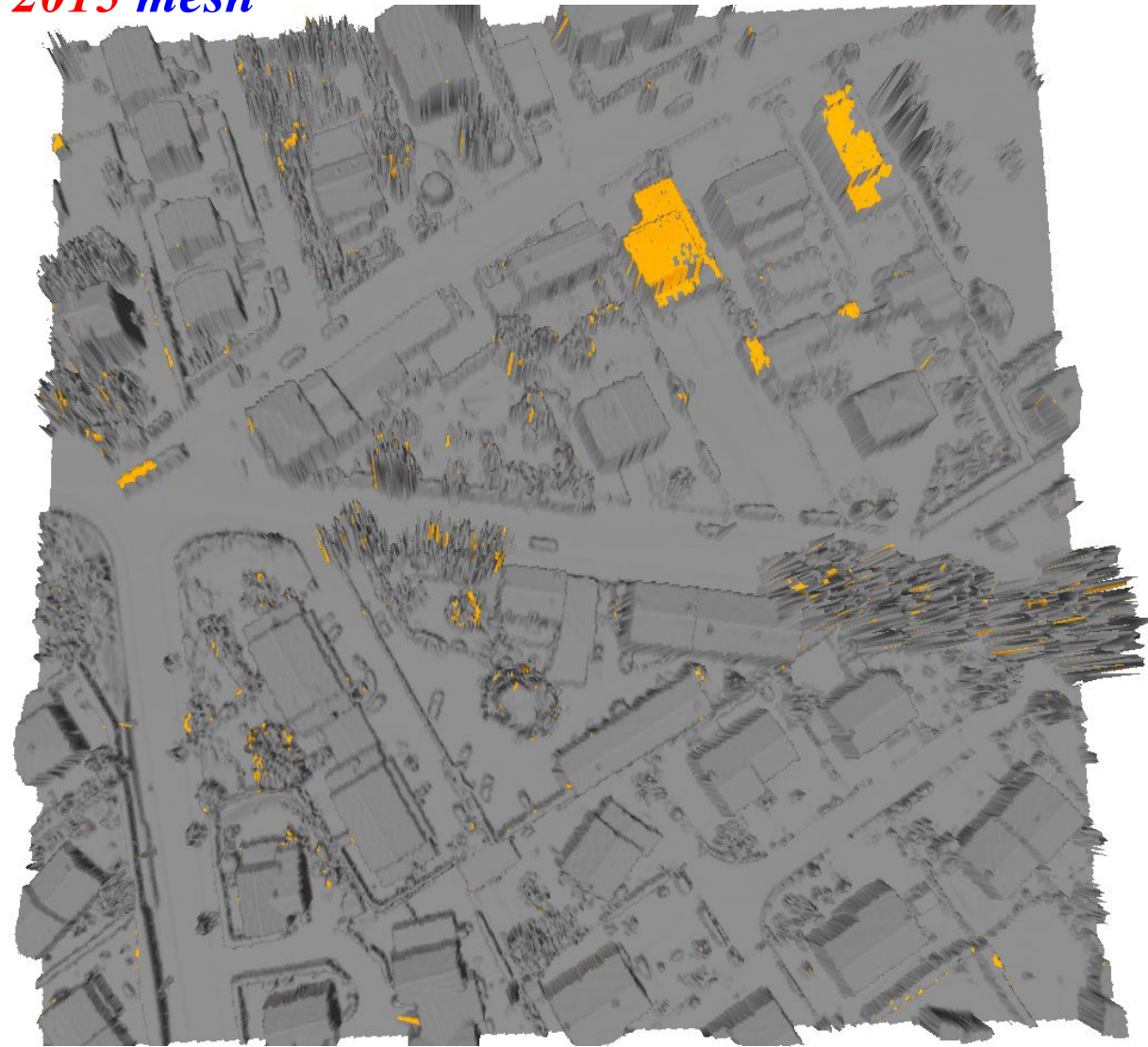
*Lyon **2021** LiDAR sensor mesh*

Lidar vs Lidar 3D change detection

Ray tracing on 2015 mesh



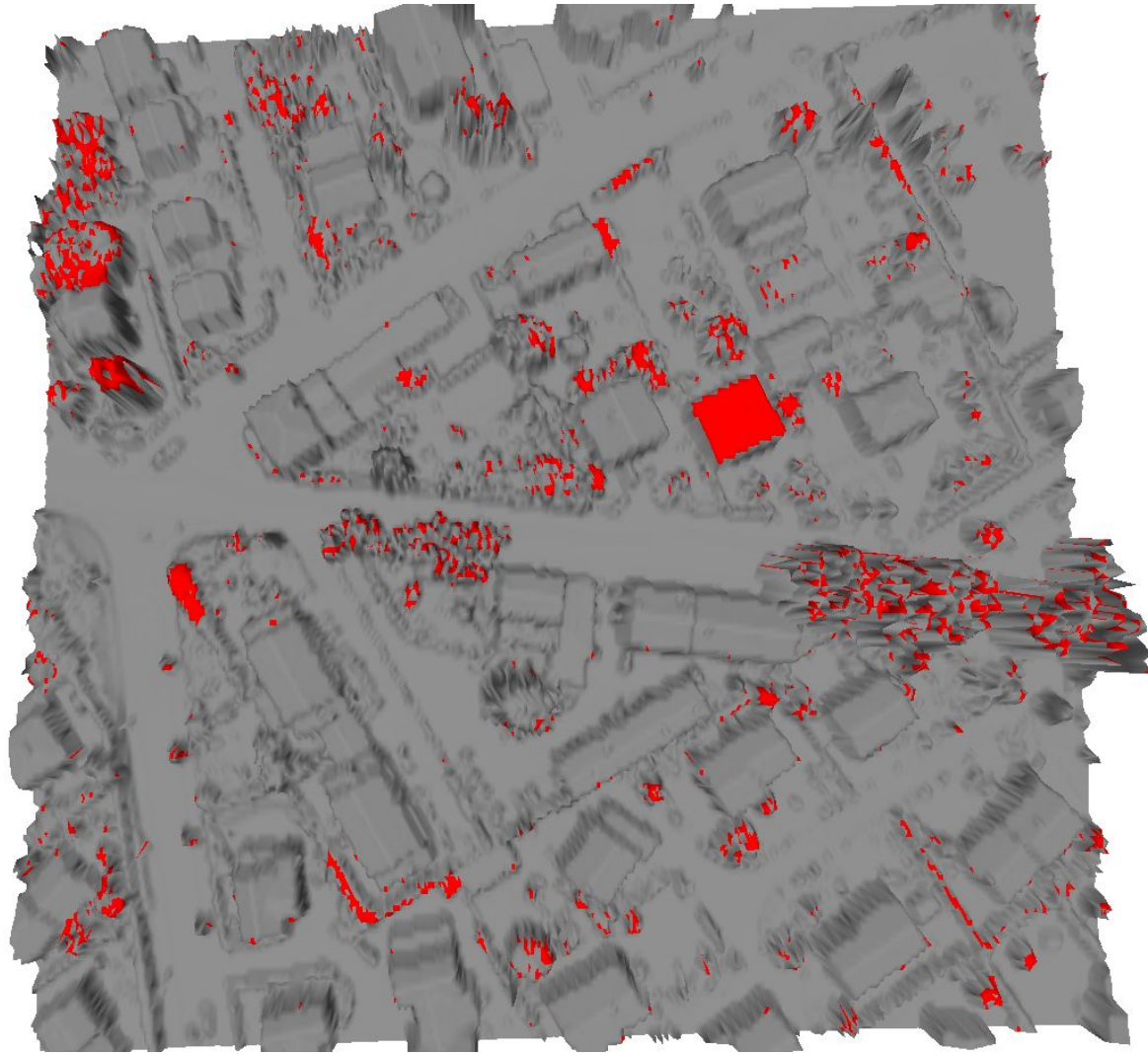
Lyon 2015 LiDAR sensor mesh



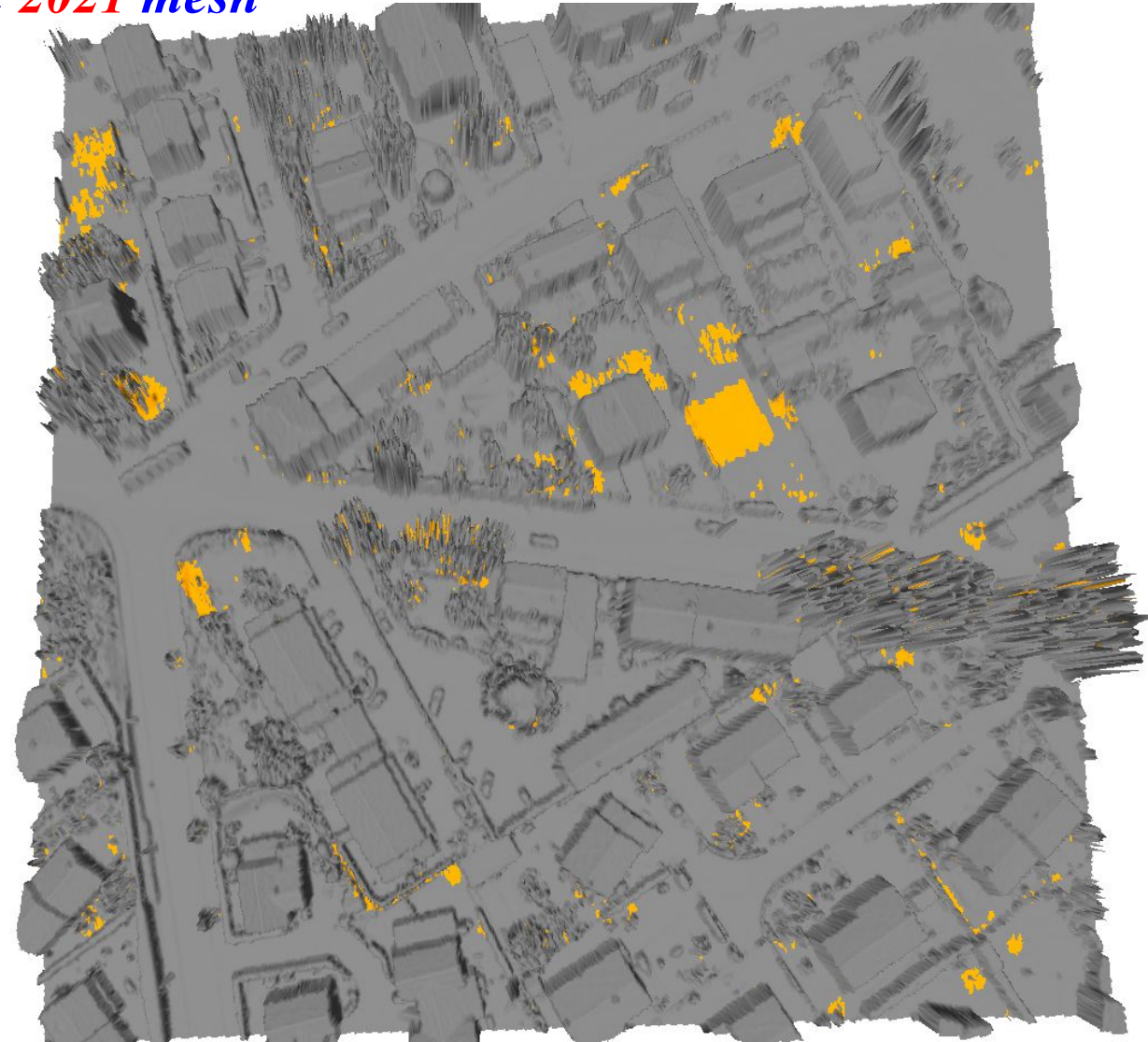
Lyon 2021 LiDAR sensor mesh

Lidar vs Lidar 3D change detection

Ray tracing on 2021 mesh

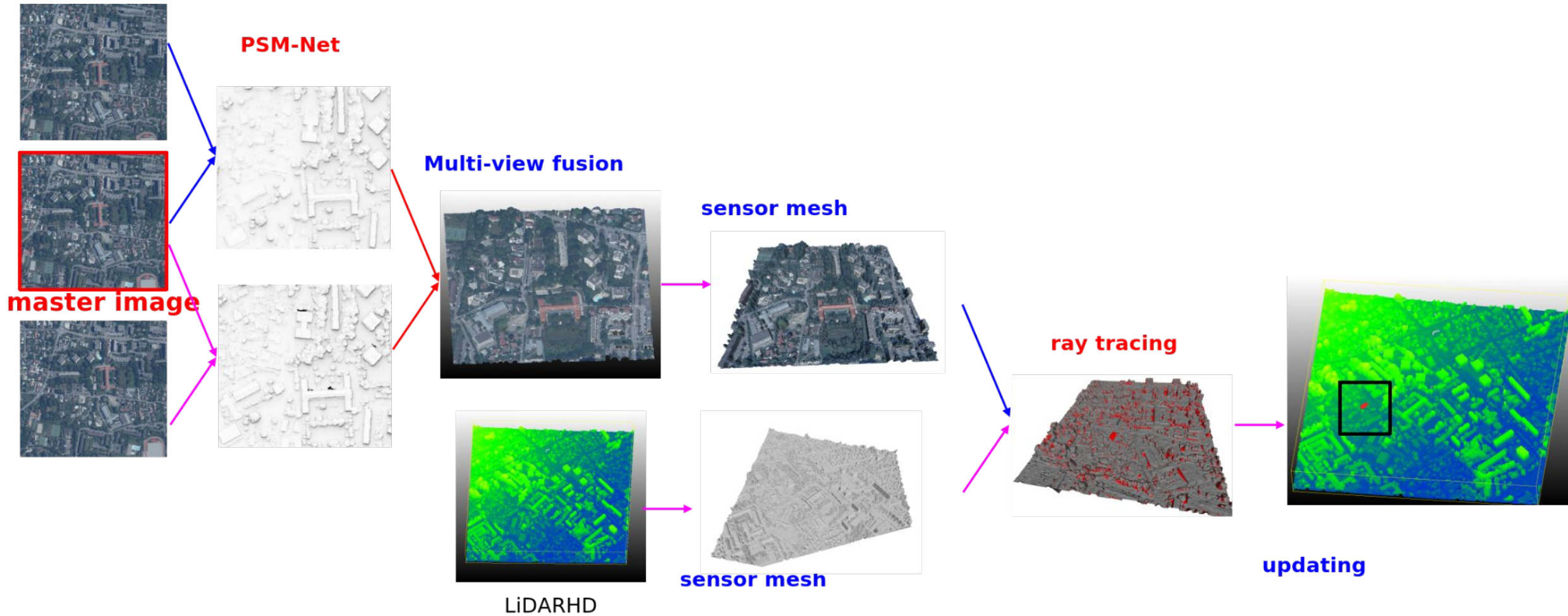


Lyon 2015 LiDAR sensor mesh



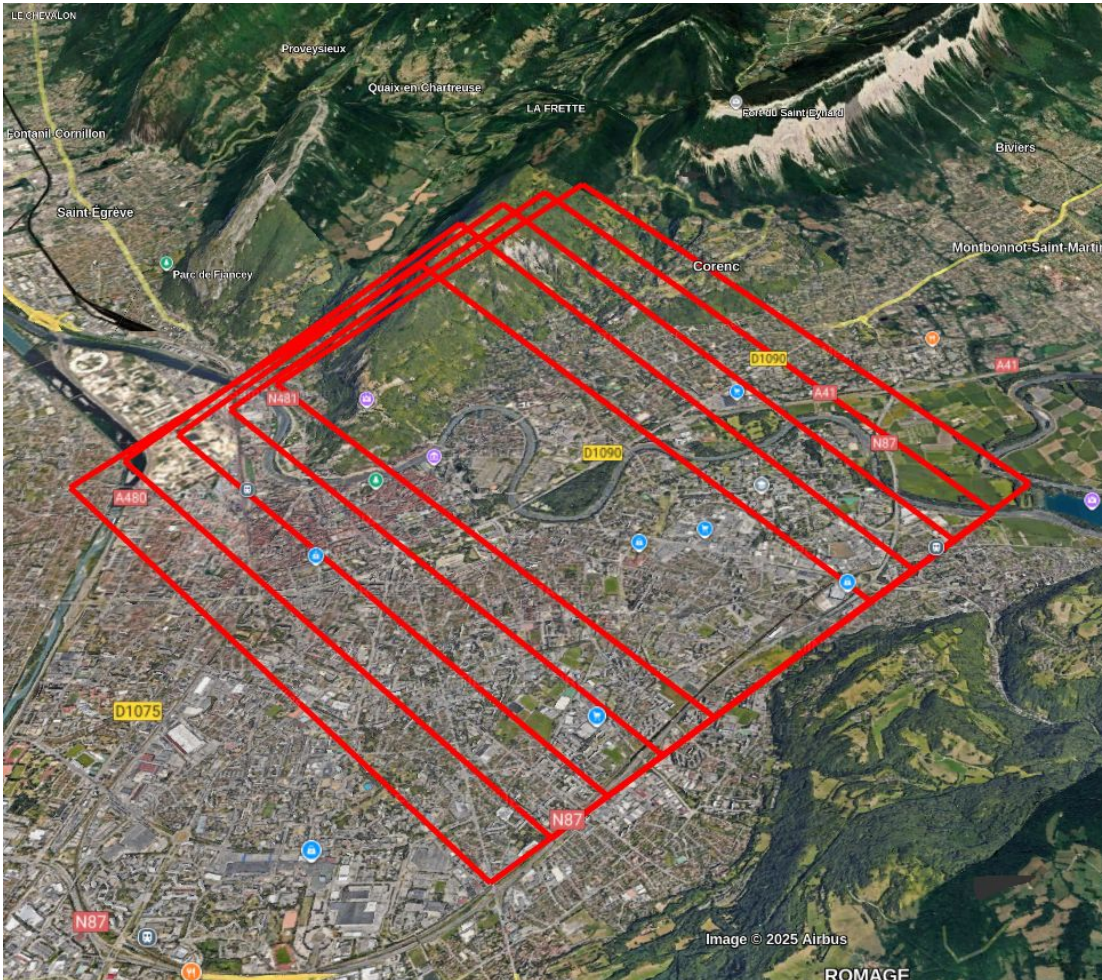
Lyon 2021 LiDAR sensor mesh

Image vs Lidar 3D change detection



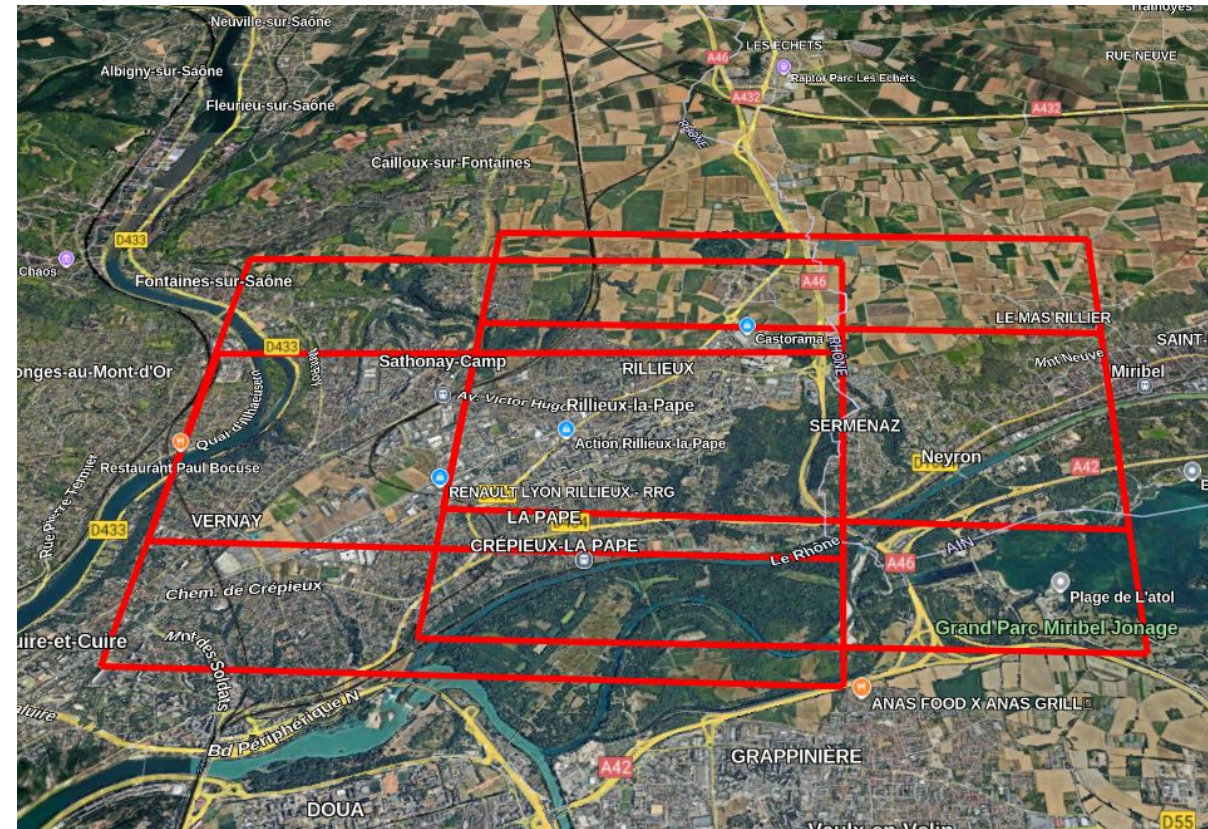
Dataset

LiDARHD in 2021
Image in 2024



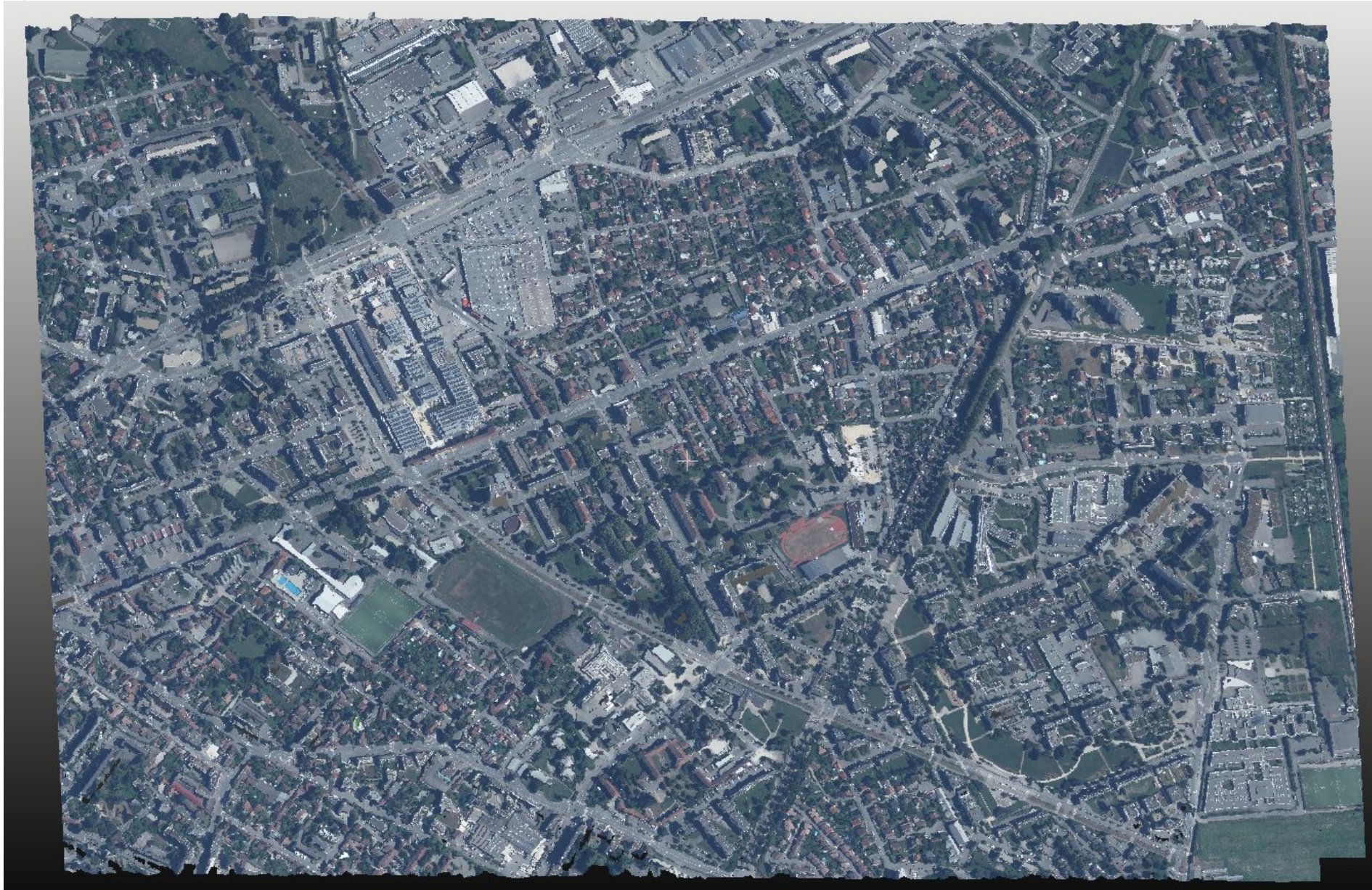
Grenoble dataset

LiDARHD in 2021
Image in 2023



Lyon dataset

Photogrammetric point cloud



Photogrammetric sensor mesh



An example

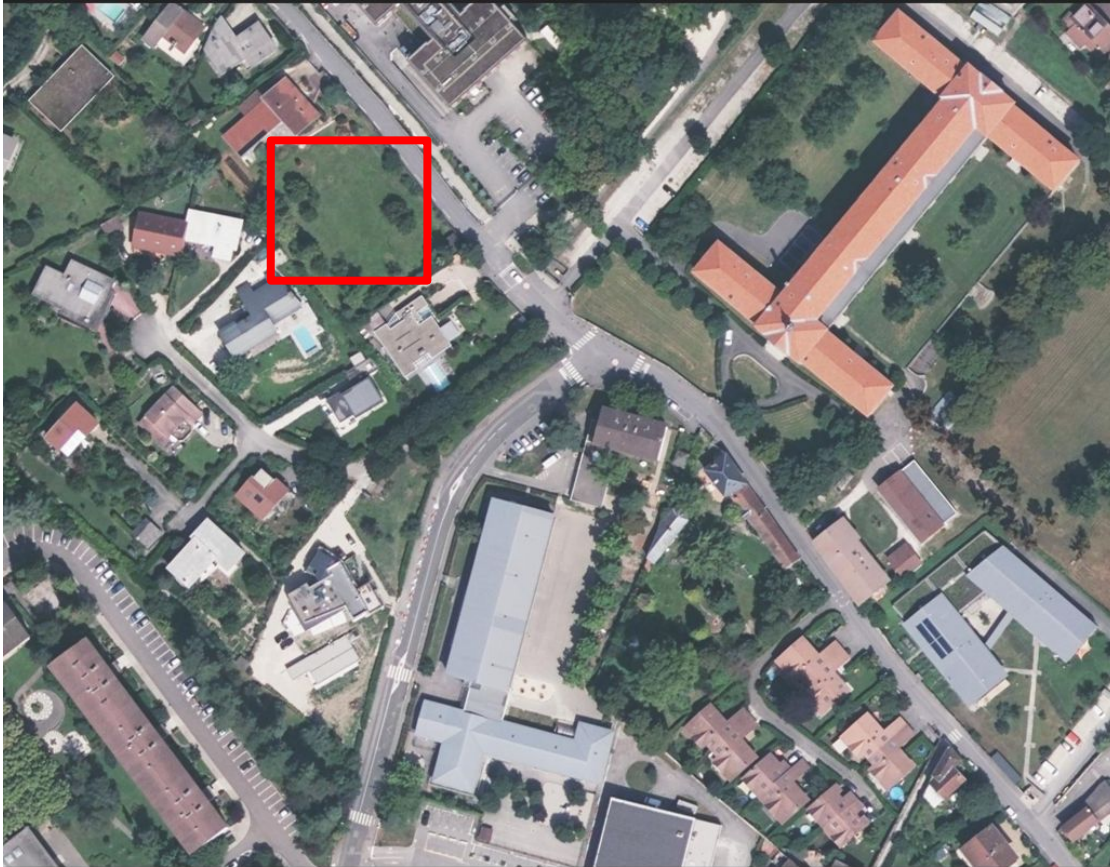


Image 2021

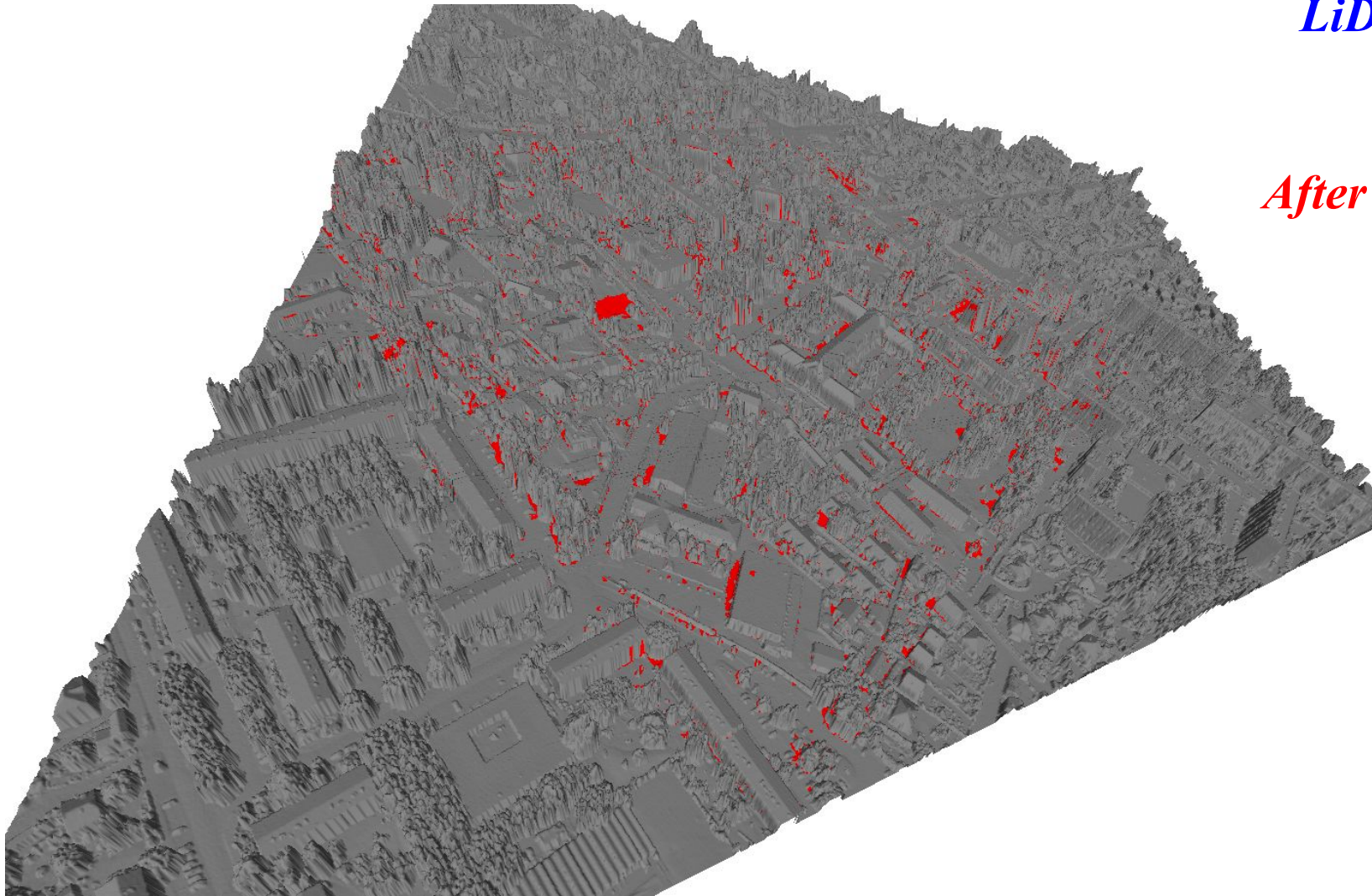


Image 2024

Result

LiDAR mesh

After ray tracing



Result

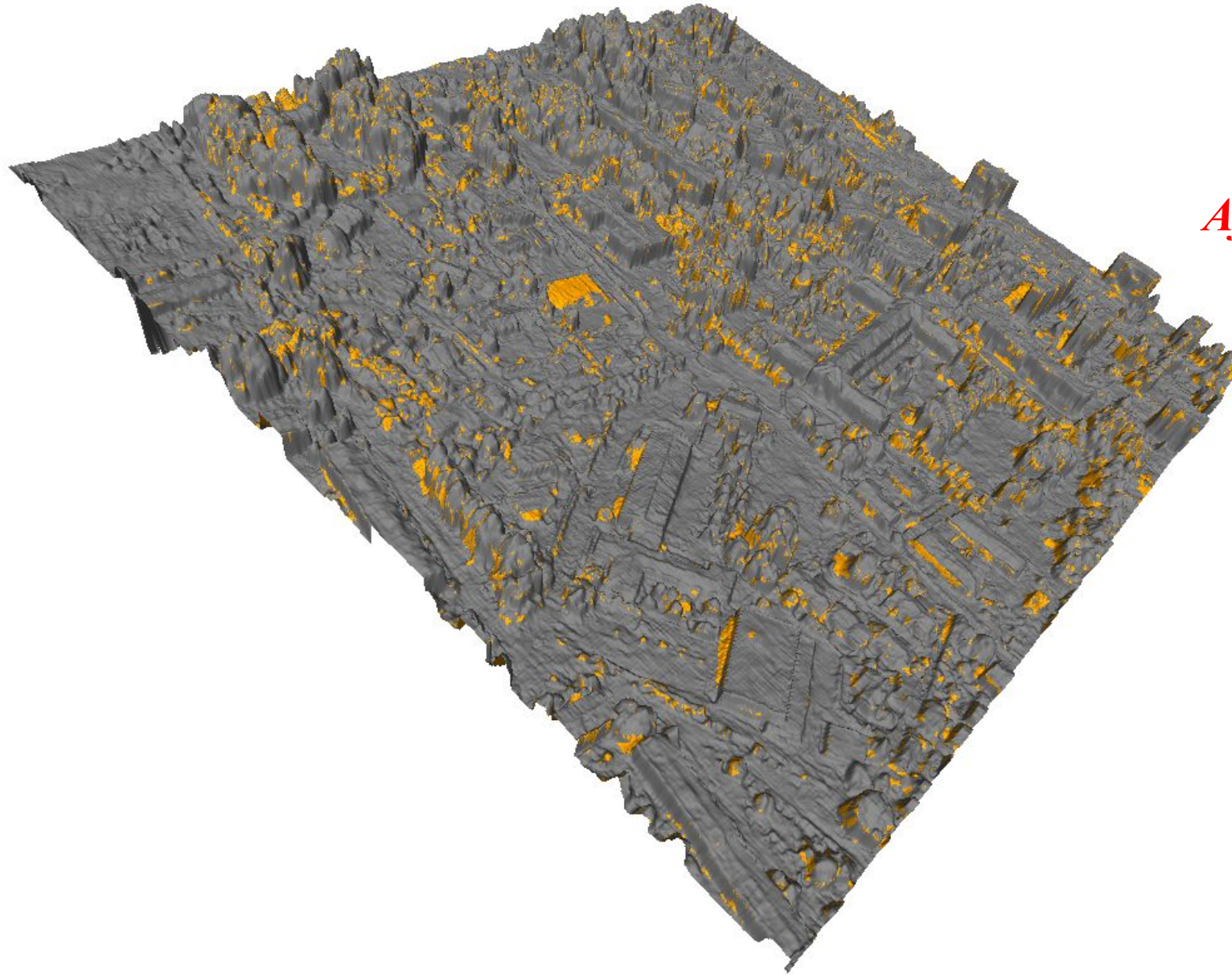


Image mesh

After ray tracing

Result

LiDAR mesh

*Change area
after
removing noise*



Result

Image mesh

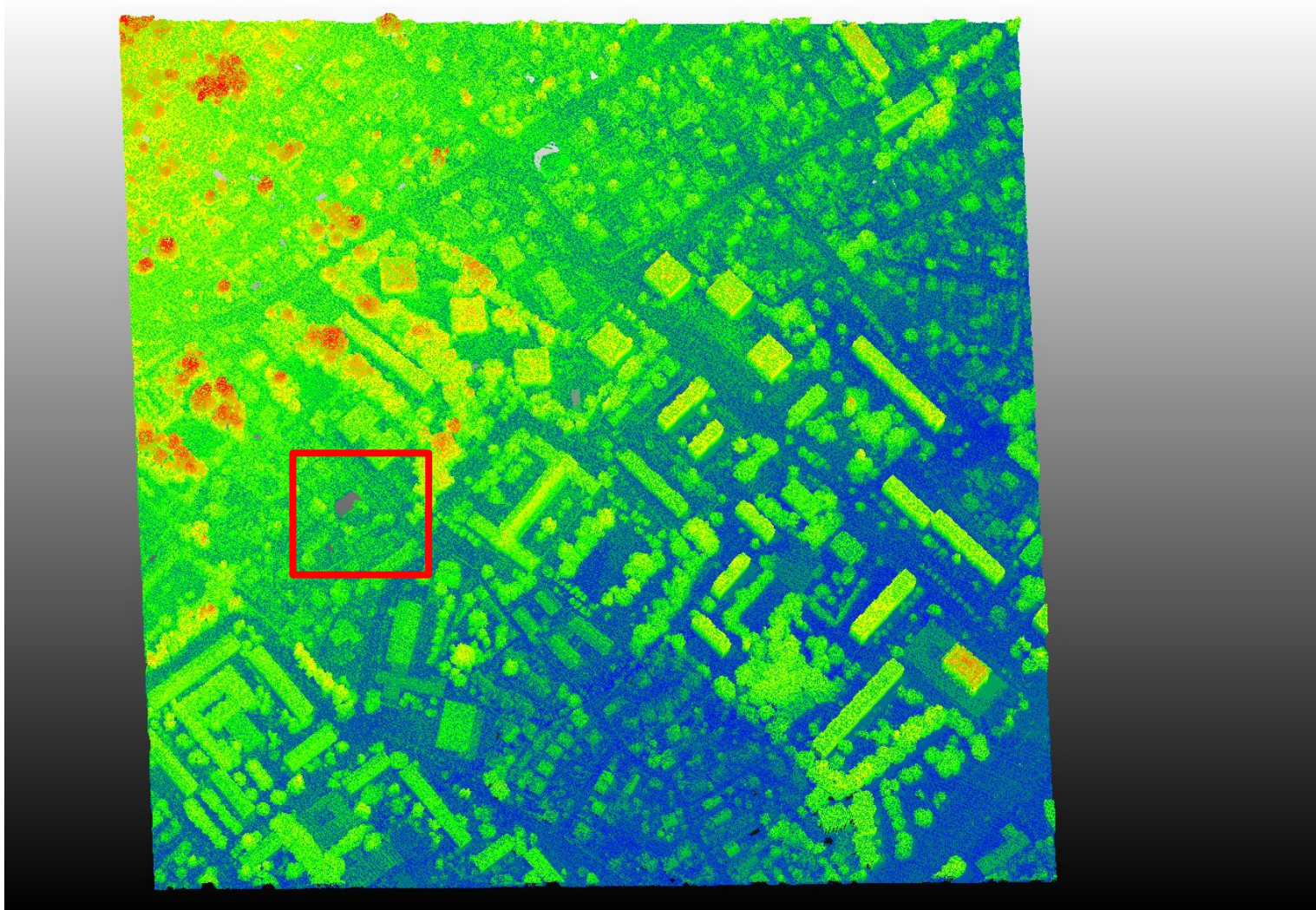
*Change area
after
removing noise*



Result

LiDARHD

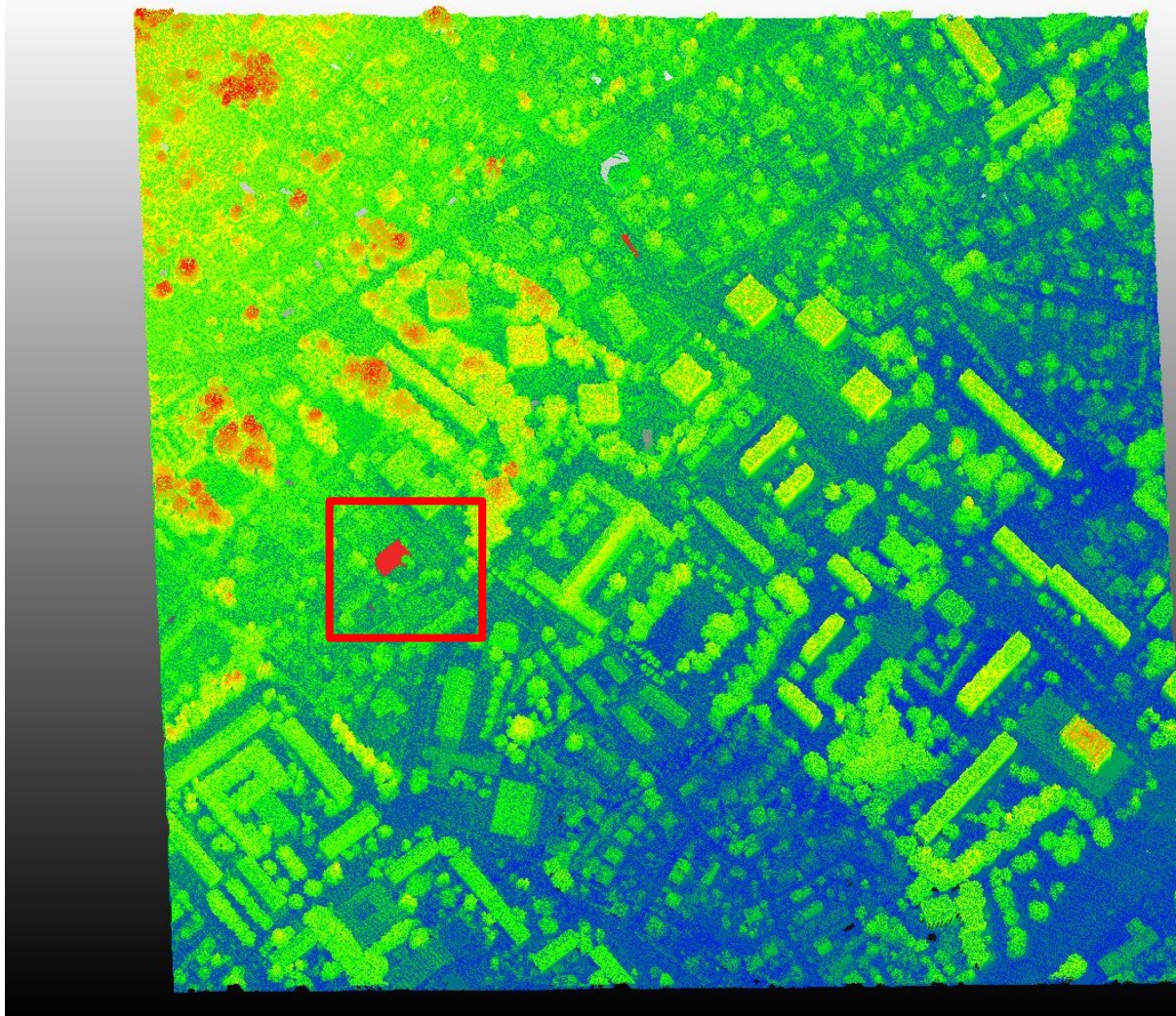
remove changes



Result

LiDARHD

*update changes with
image mesh patch*



Contribution :

A 3D pipeline for updating LiDAR point clouds using images

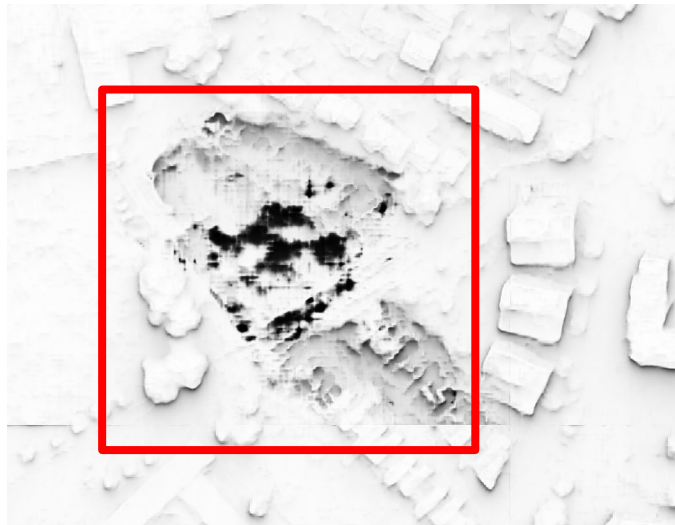
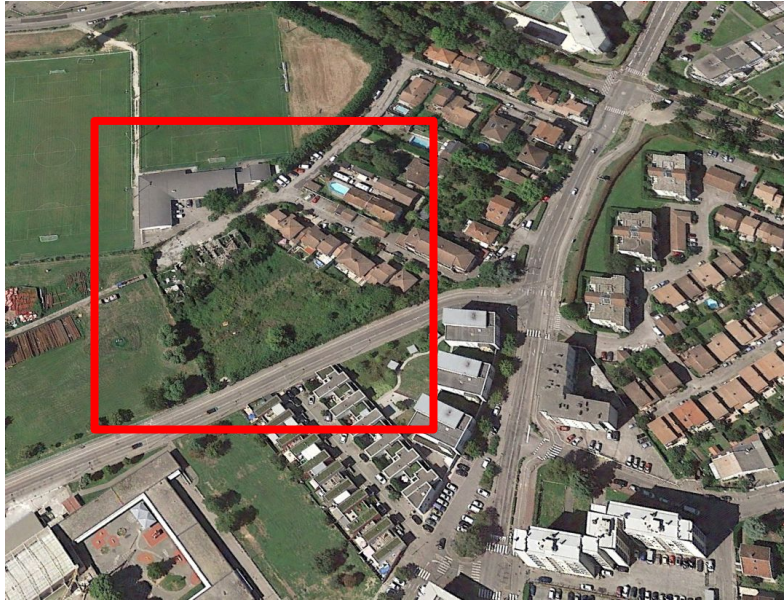
A 3D change detection approach based on sensor mesh representation

Limitation :

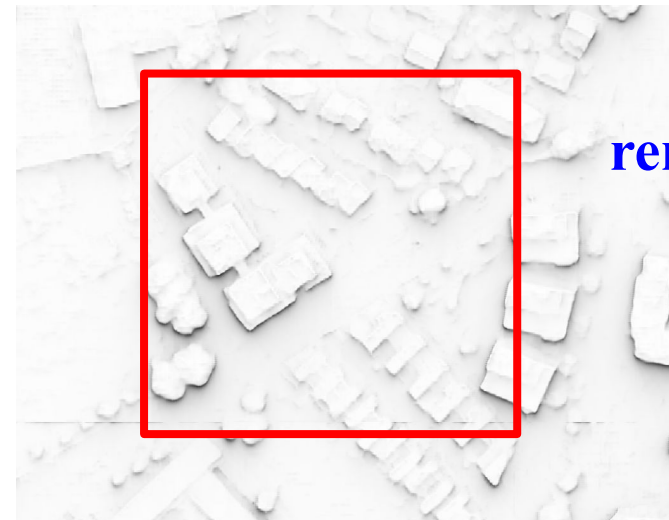
Depends on dense matching result

Only geometry based

Conclusion and perspectives



training with
noise label



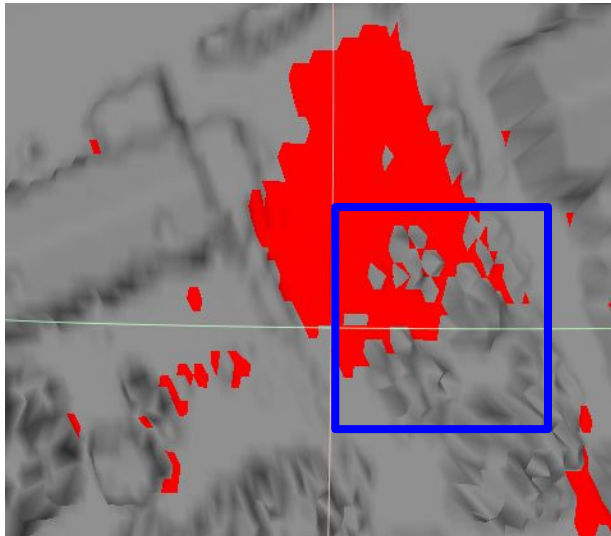
removing noise label

Conclusion and perspectives

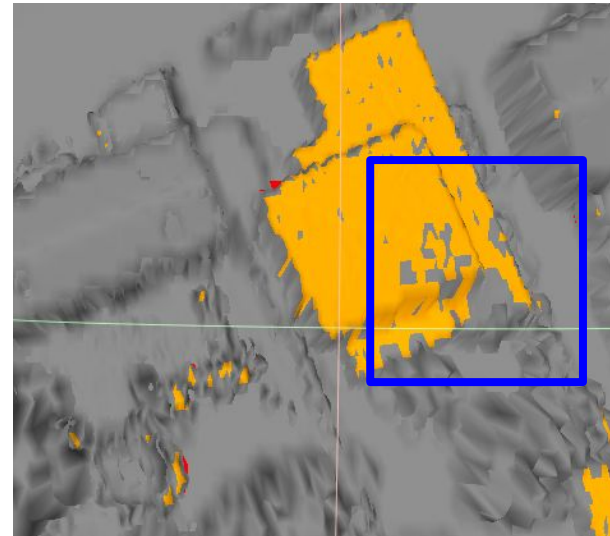
Old image



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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