

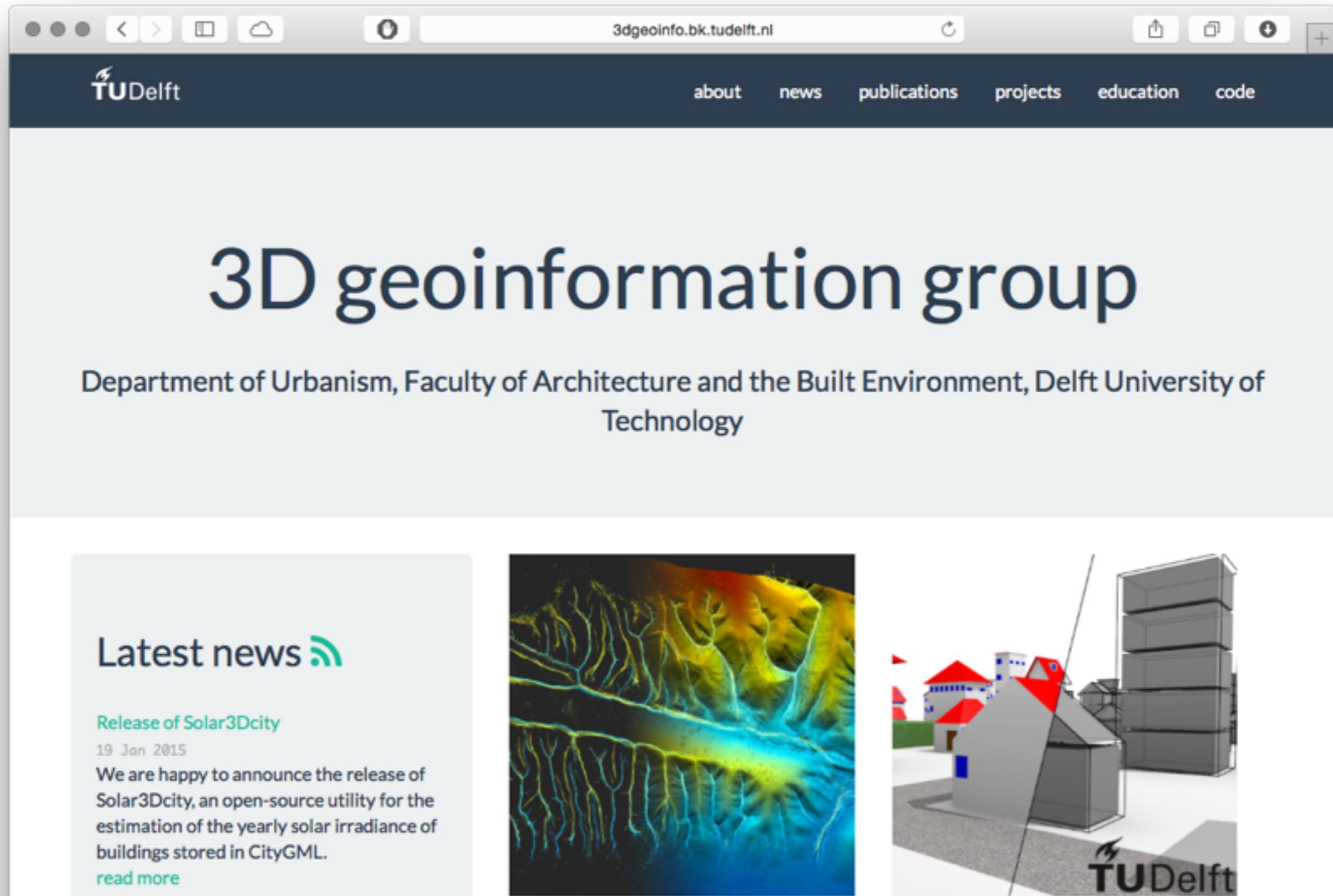
Het 3D skelet van een puntenwolk

AHN/NCG studiemiddag

Amersfoort, 28 januari 2015

Ravi Peters

3dgeoinfo.bk.tudelft.nl



The image shows a screenshot of a web browser displaying the homepage of the 3D geoinformation group at TU Delft. The browser's address bar shows the URL '3dgeoinfo.bk.tudelft.nl'. The website has a dark blue header with the TU Delft logo on the left and navigation links for 'about', 'news', 'publications', 'projects', 'education', and 'code' on the right. The main content area features a large heading '3D geoinformation group' and a subtitle 'Department of Urbanism, Faculty of Architecture and the Built Environment, Delft University of Technology'. Below this, there is a 'Latest news' section with a green RSS icon, a news item titled 'Release of Solar3Dcity' dated '19 Jan 2015', and a 'read more' link. To the right of the text are two images: a 3D topographic map with a color gradient from blue to red, and a 3D architectural rendering of a building complex with a red roof and a tall grey structure, with the TU Delft logo at the bottom right.

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3D geoinformation group

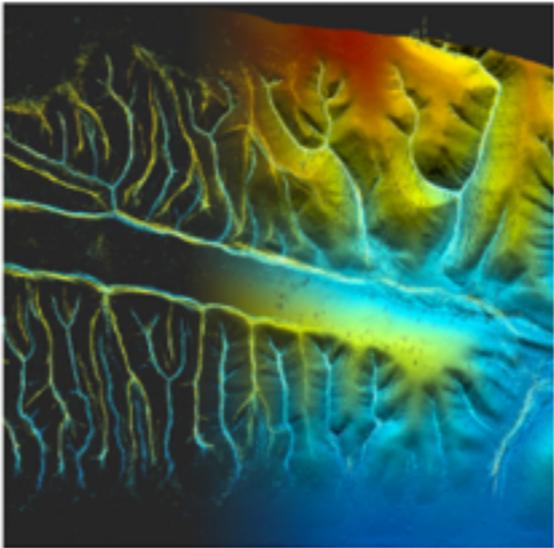
Department of Urbanism, Faculty of Architecture and the Built Environment, Delft University of Technology

Latest news

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19 Jan 2015

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Working with point clouds

Analysing raw point clouds

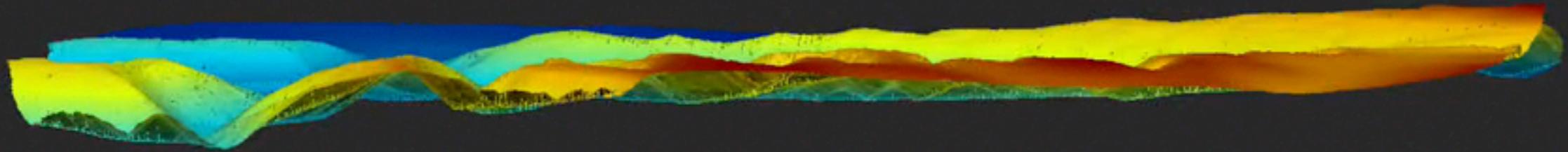
1. Simple data
2. Accurate
3. Fully 3D

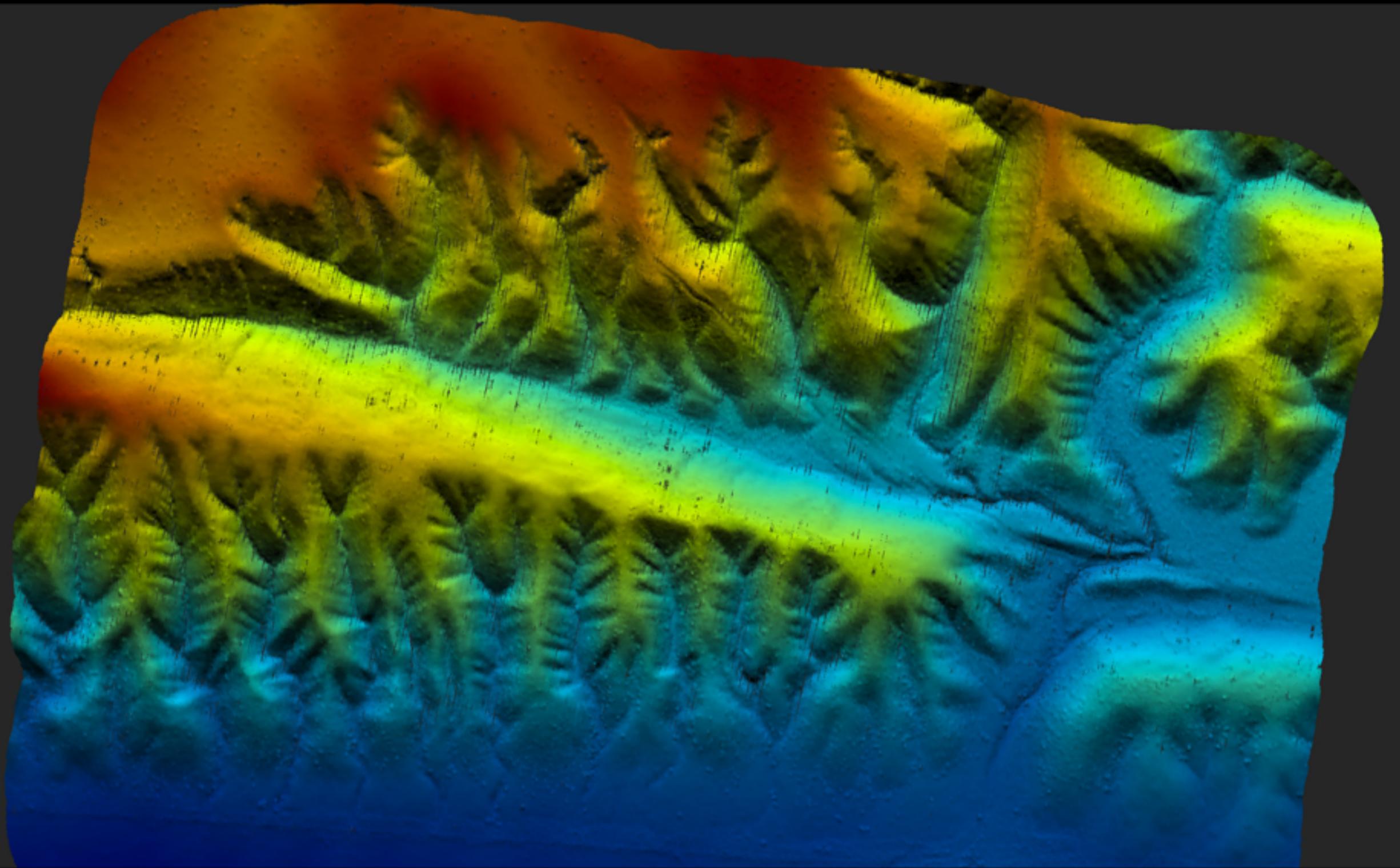


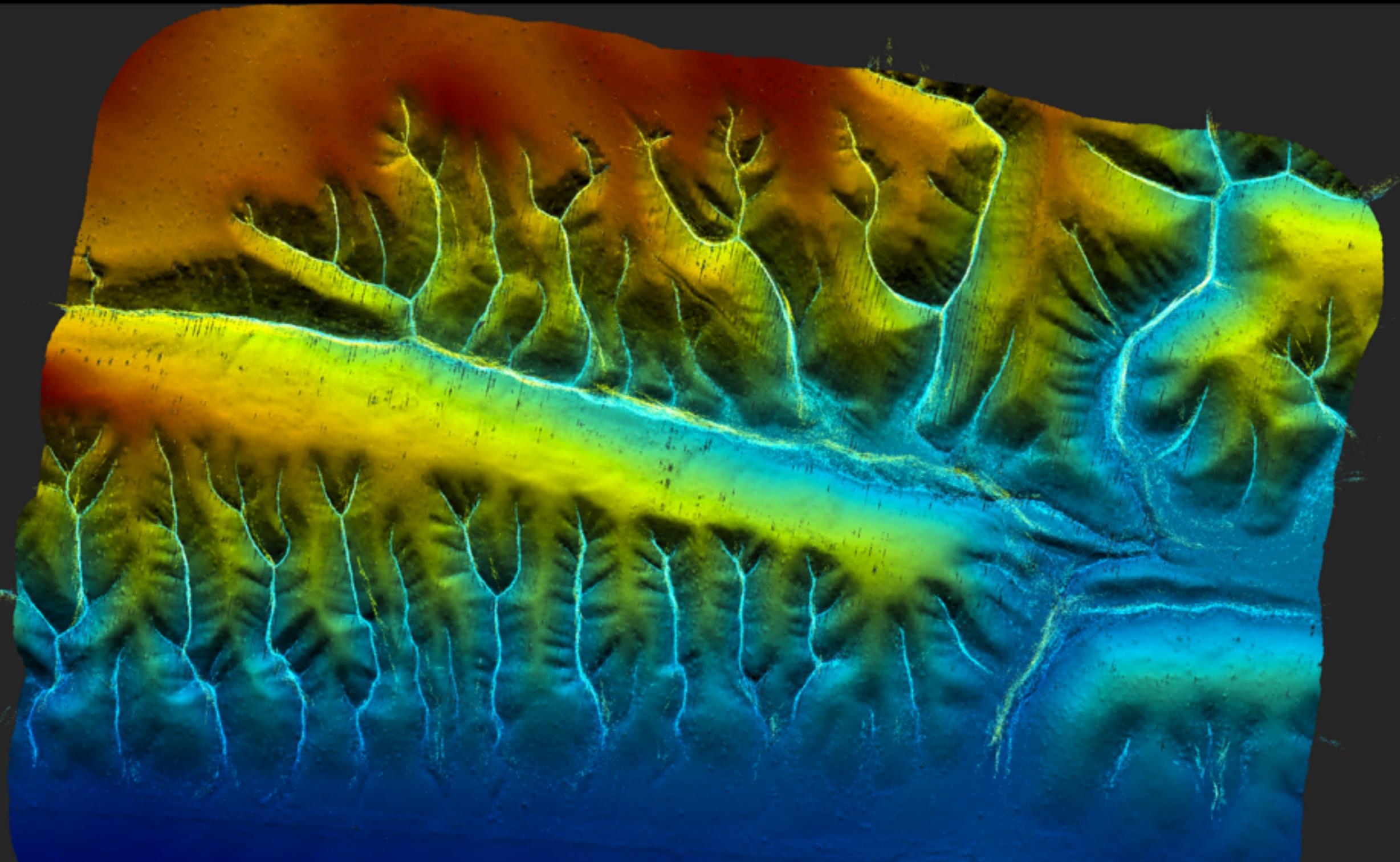
Oliver Kreylos [<https://www.youtube.com/watch?v=cyoJKbzqpZA>]

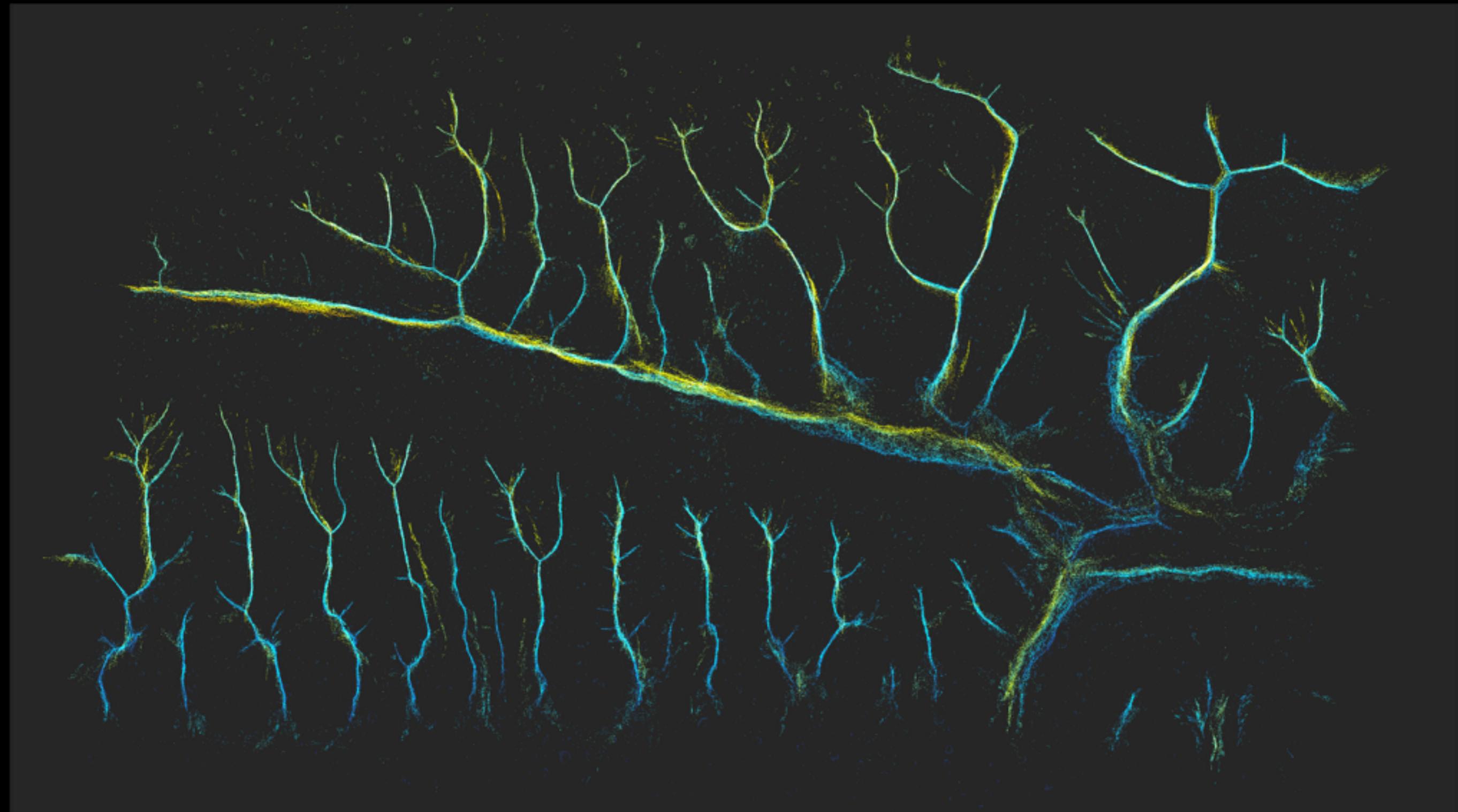


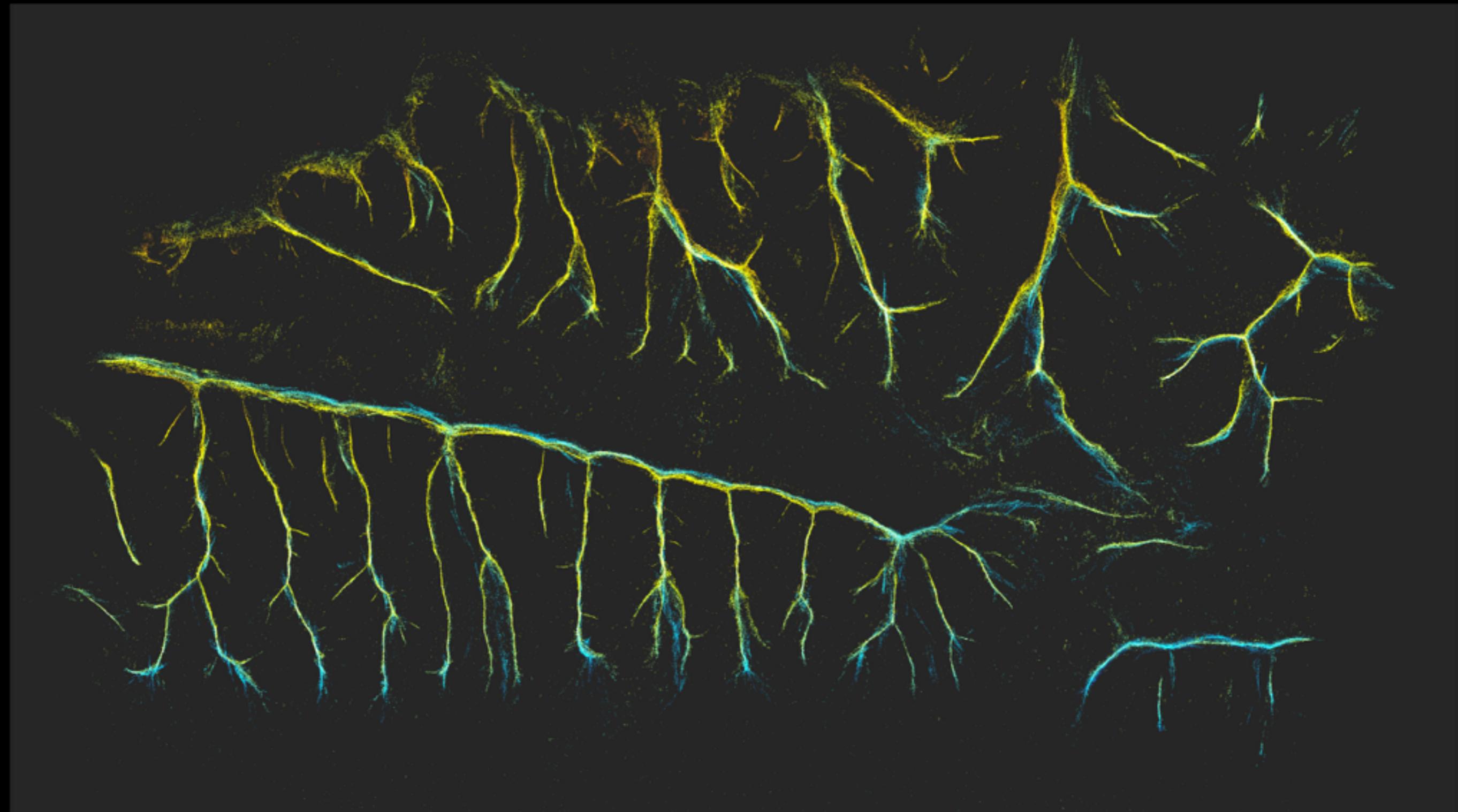
3D Skeleton

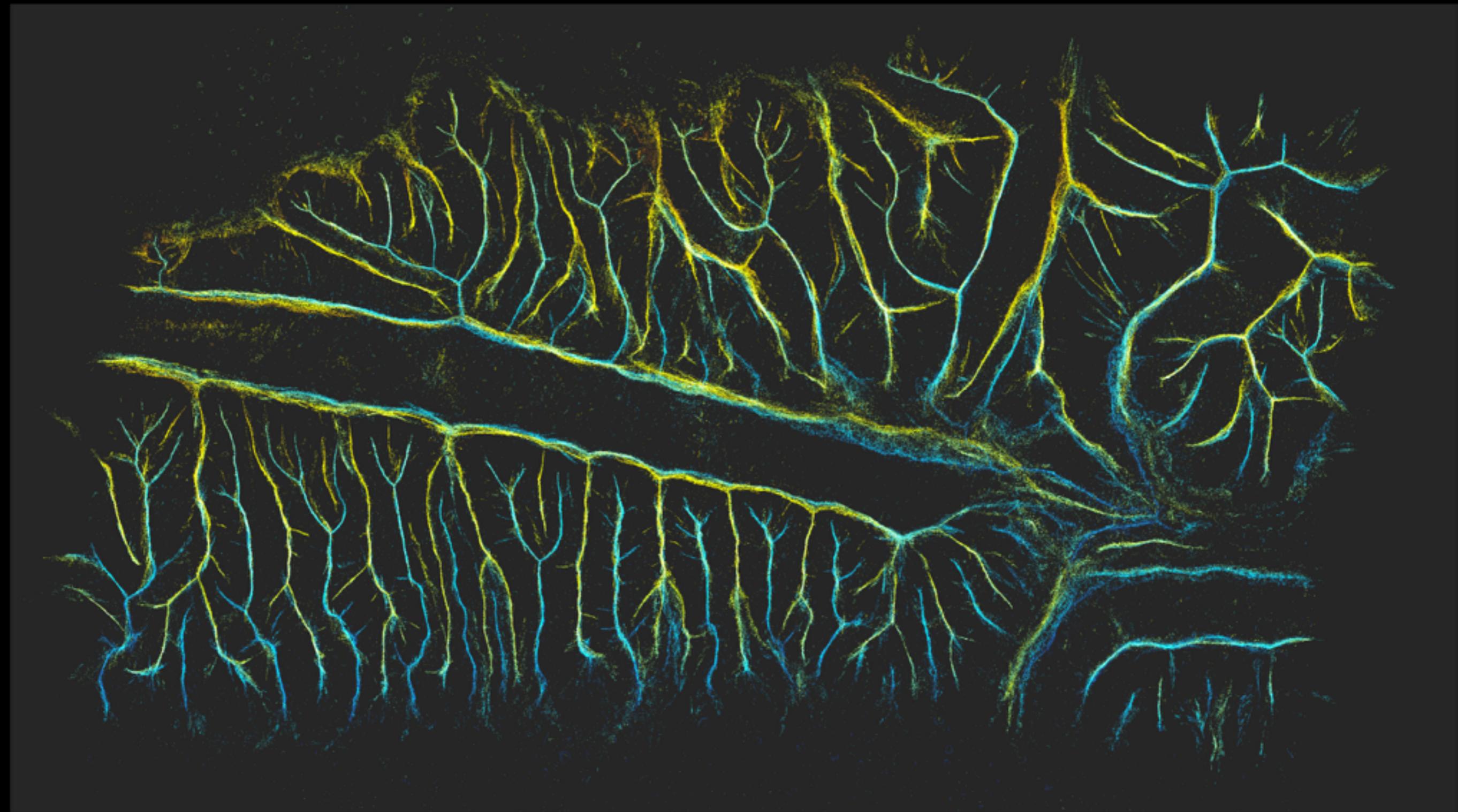




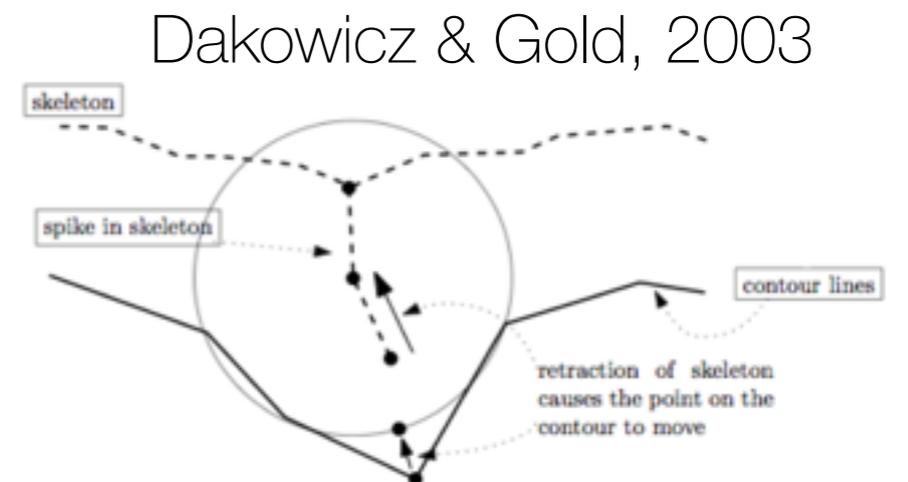
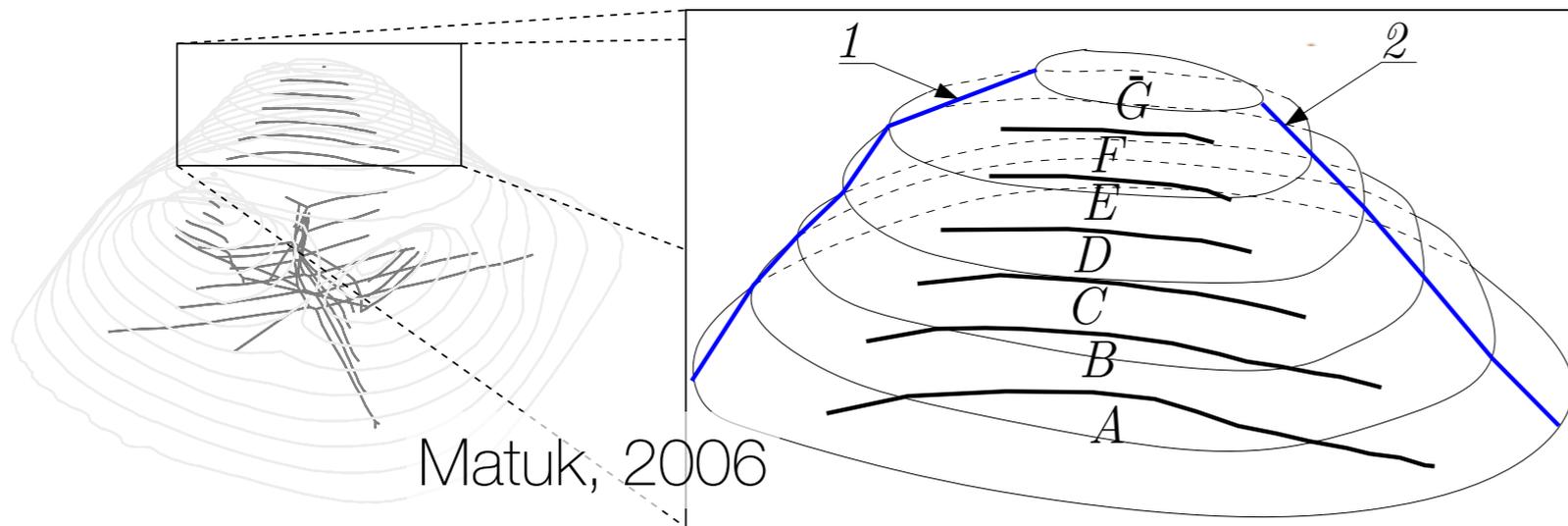
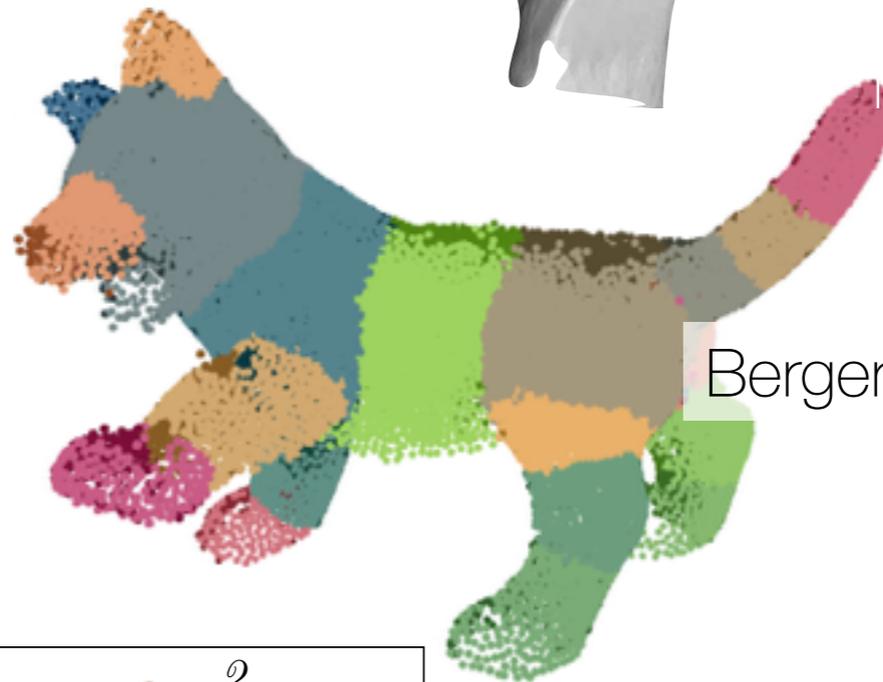
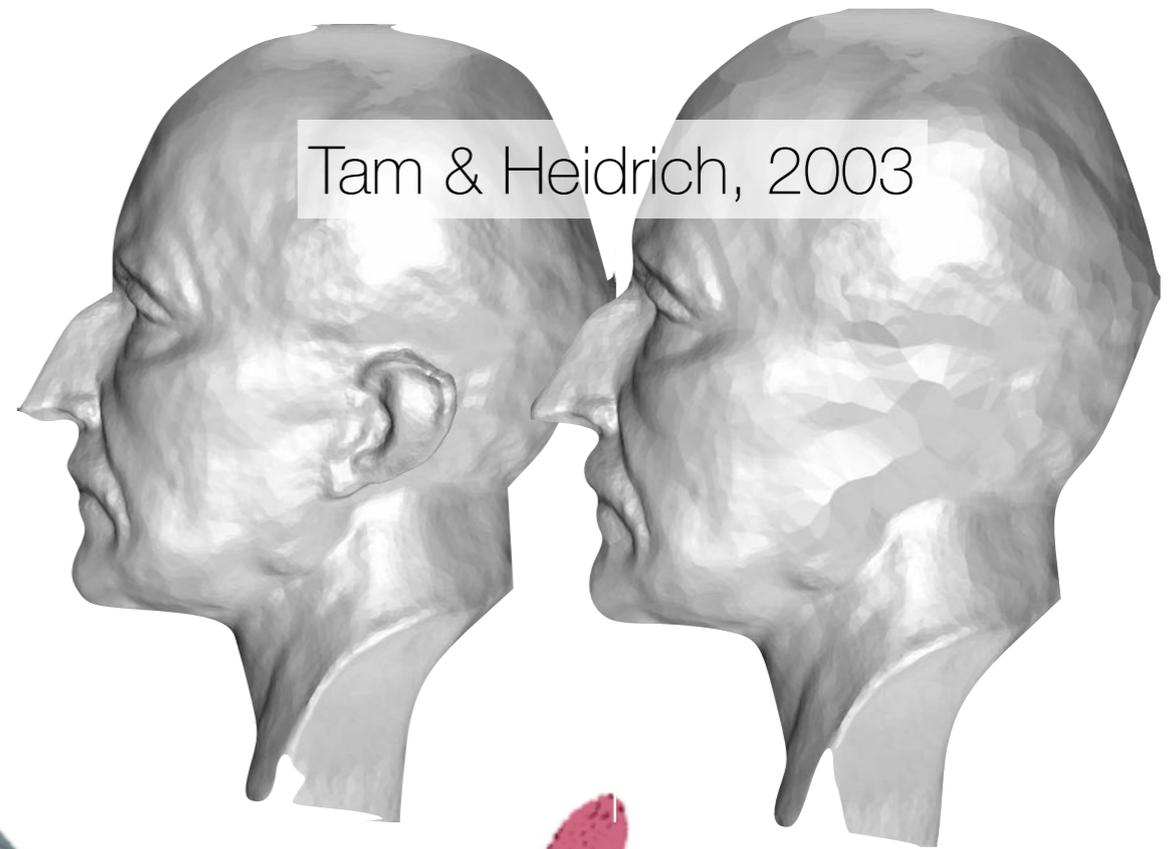
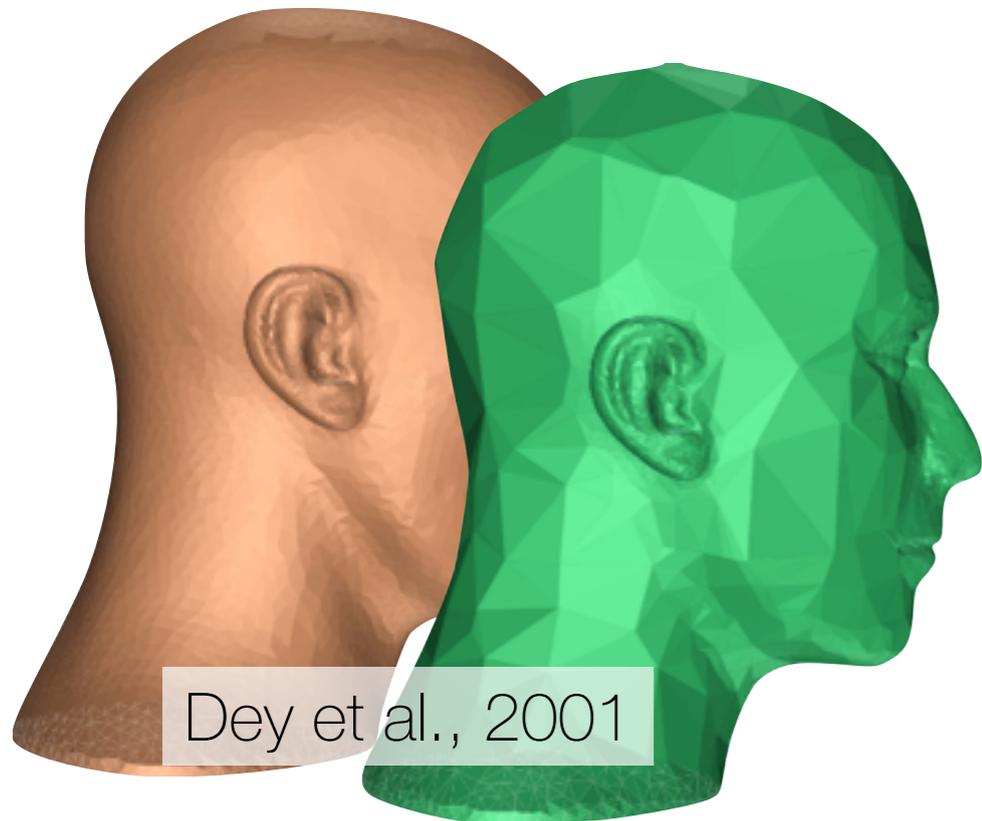








Applications



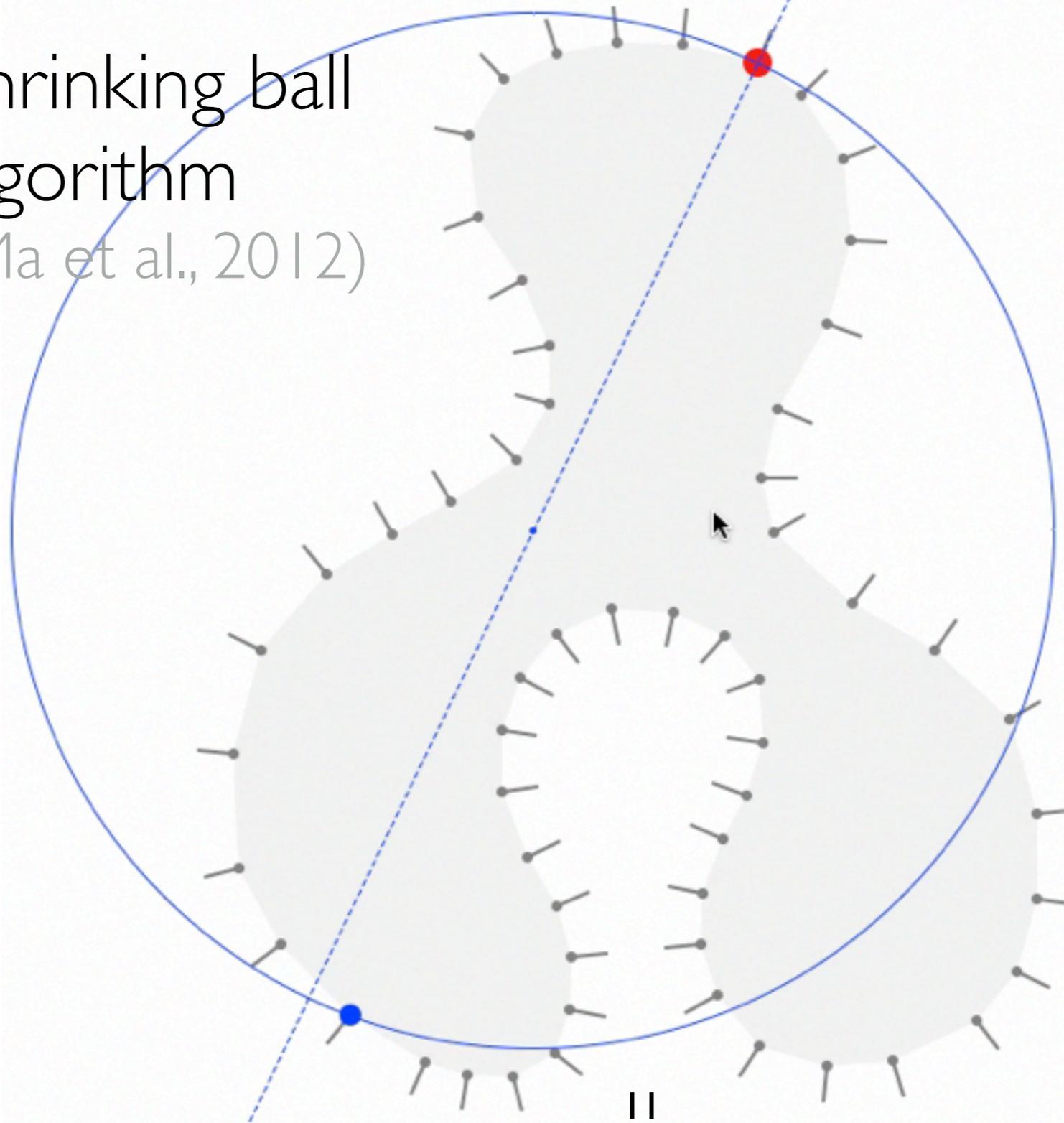
Hypotheses

Medial Axis Transform (MAT) of LiDAR point cloud:

1. *enables truly **3D** analysis*
2. *can be used to effectively **define features** in point clouds using its **geometry** and **topology***

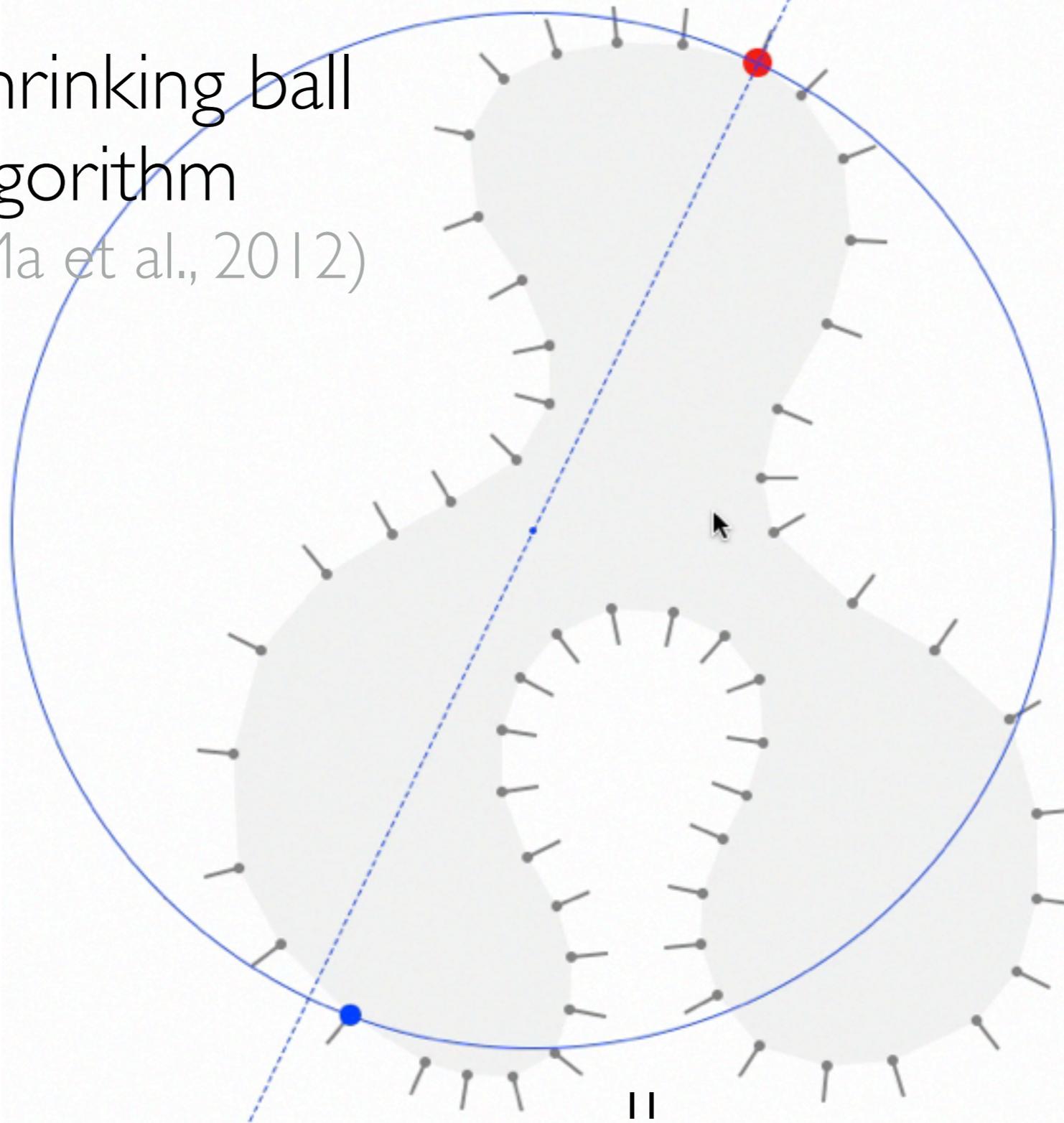
MAT approximation

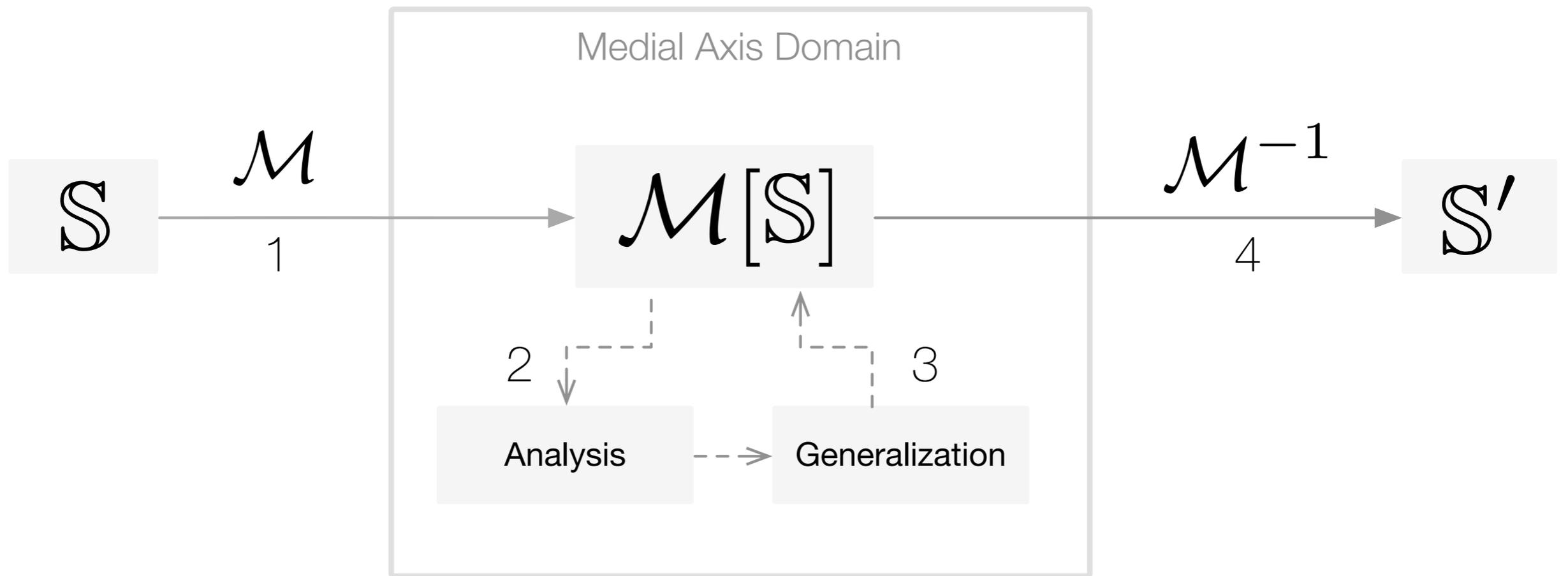
Shrinking ball
algorithm
(Ma et al., 2012)



MAT approximation

Shrinking ball
algorithm
(Ma et al., 2012)





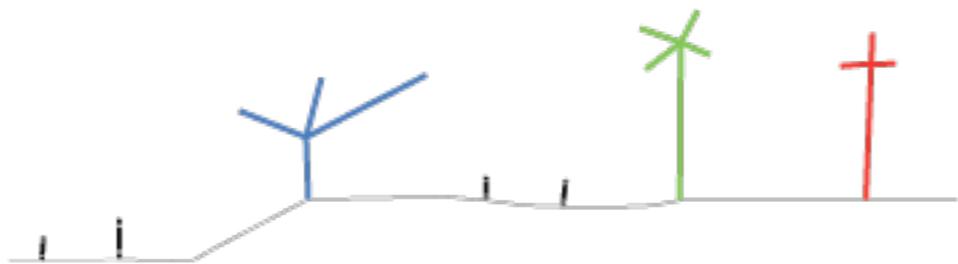
1



3



2



4



Current goal

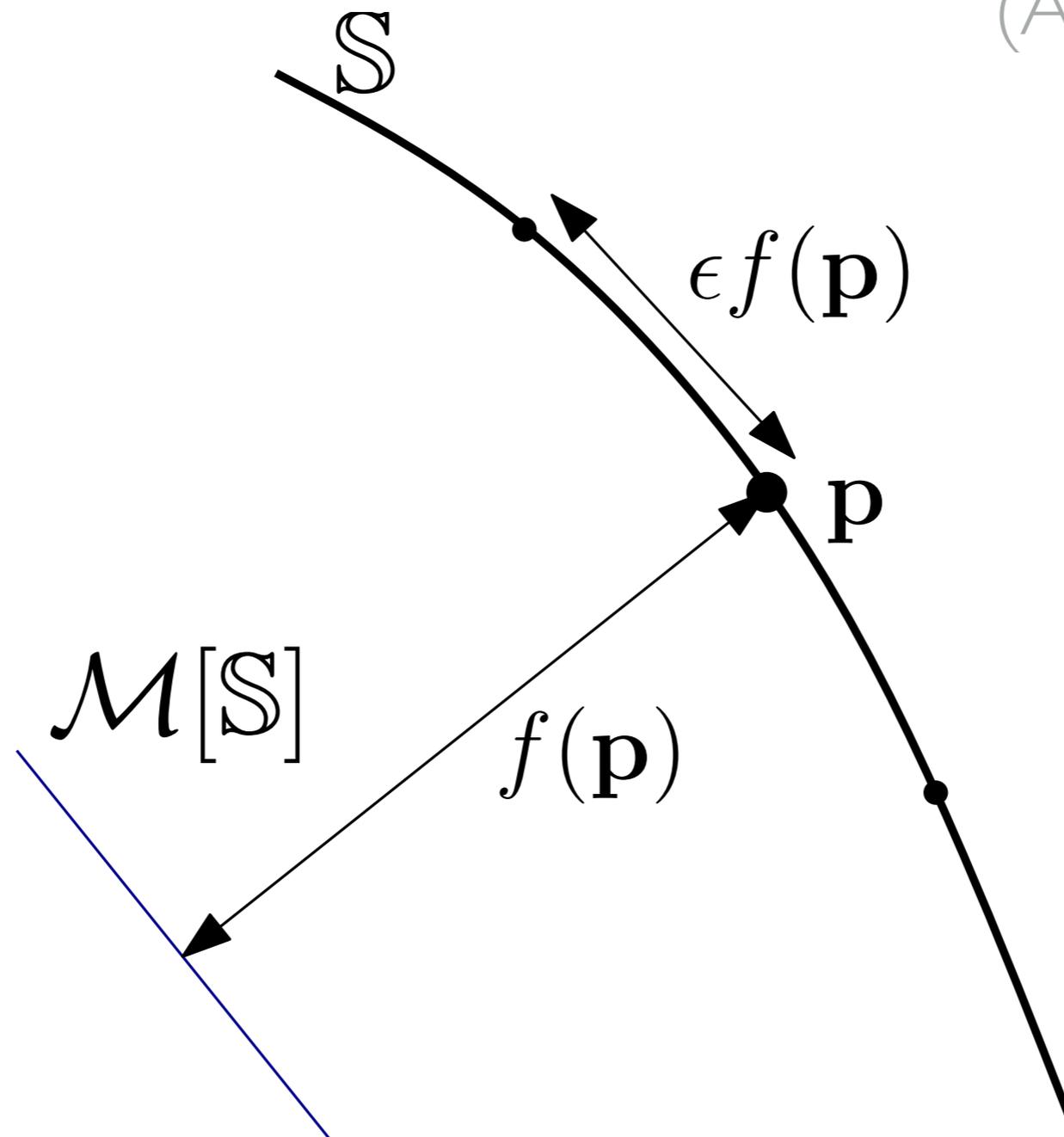
Simplification of LiDAR point clouds:

Reduce number of points while maintaining detail.

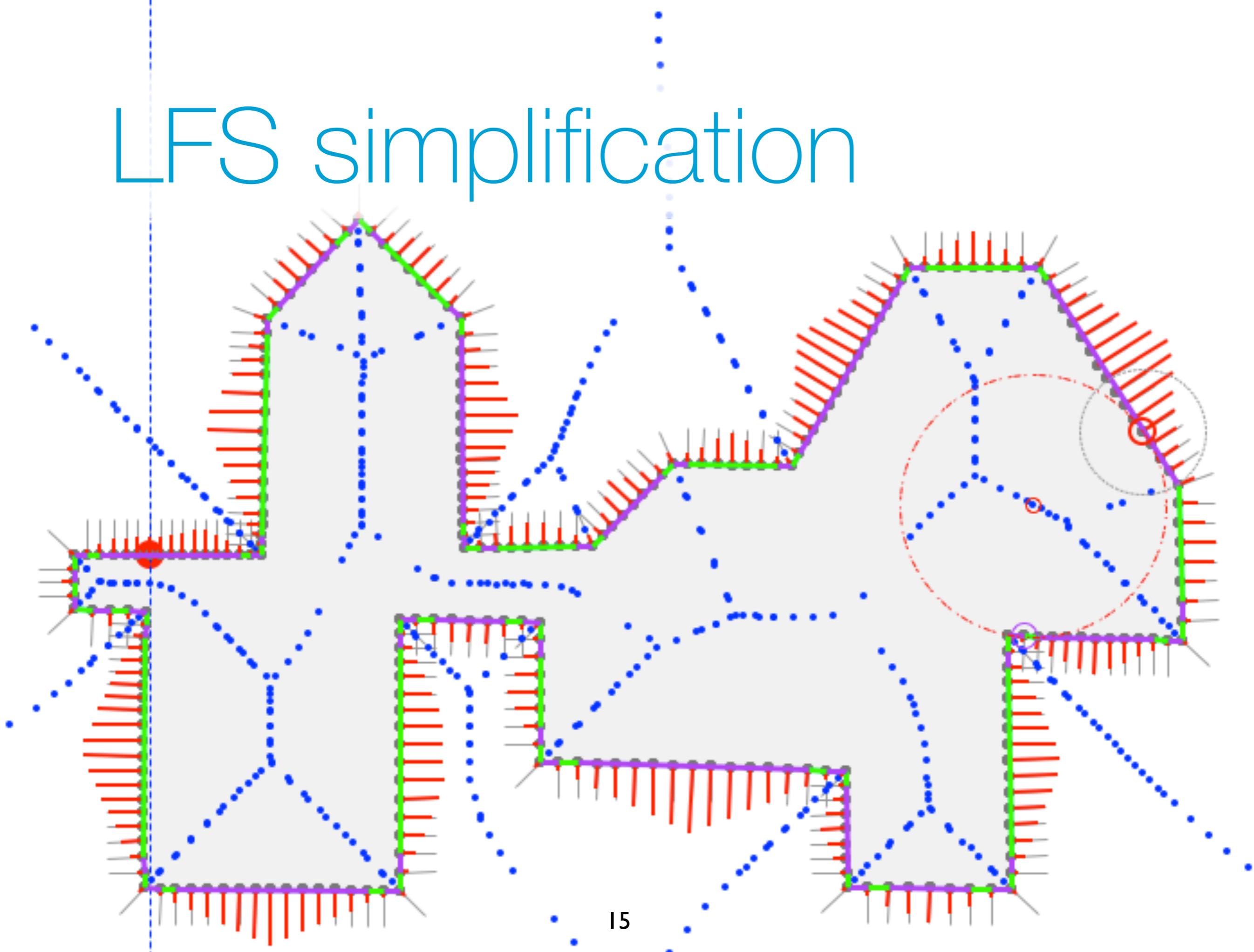
E.g. for visualisation, creation 3DTOP10NL

Local Feature Size (LFS)

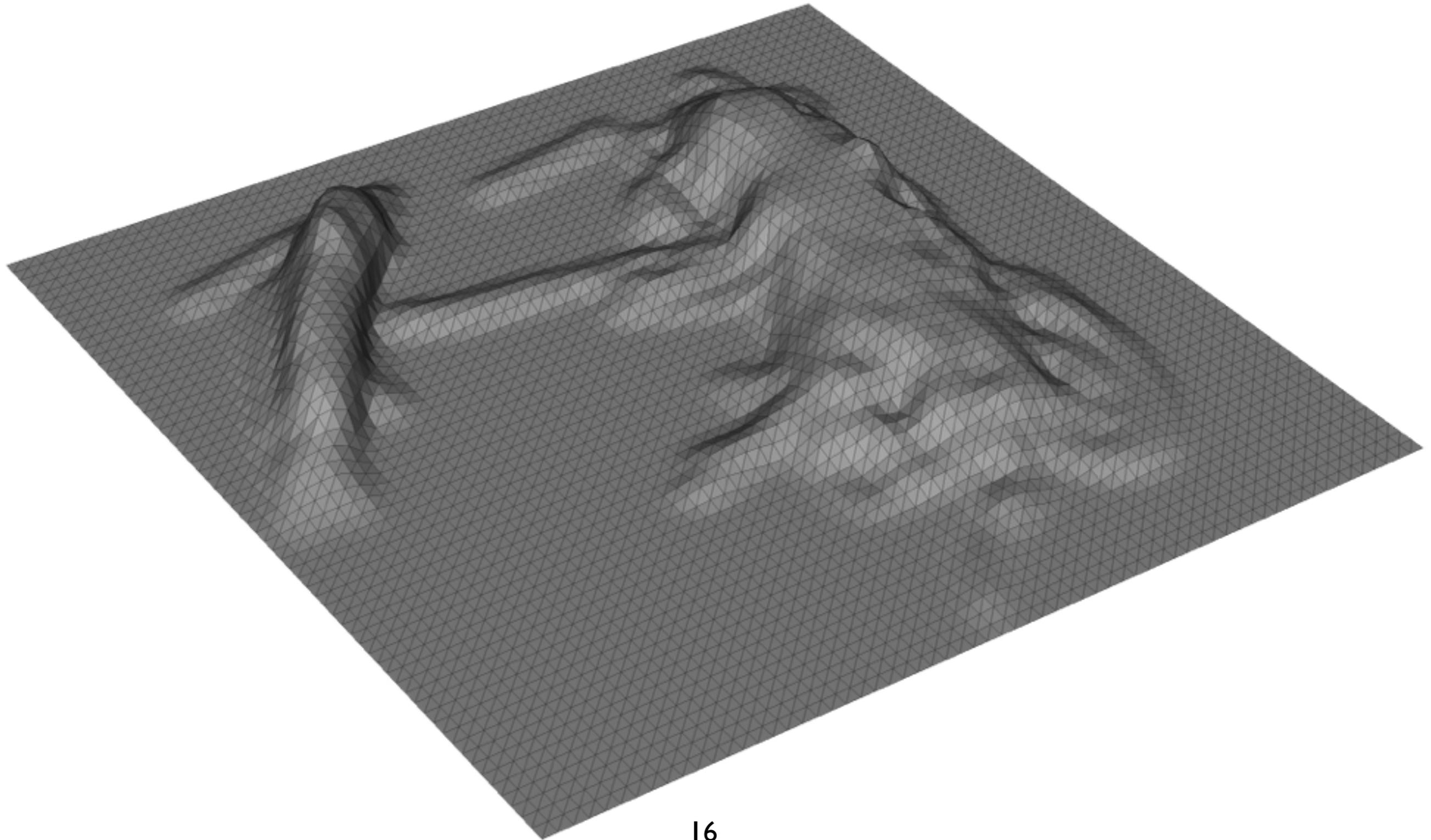
(Amenta 1998)



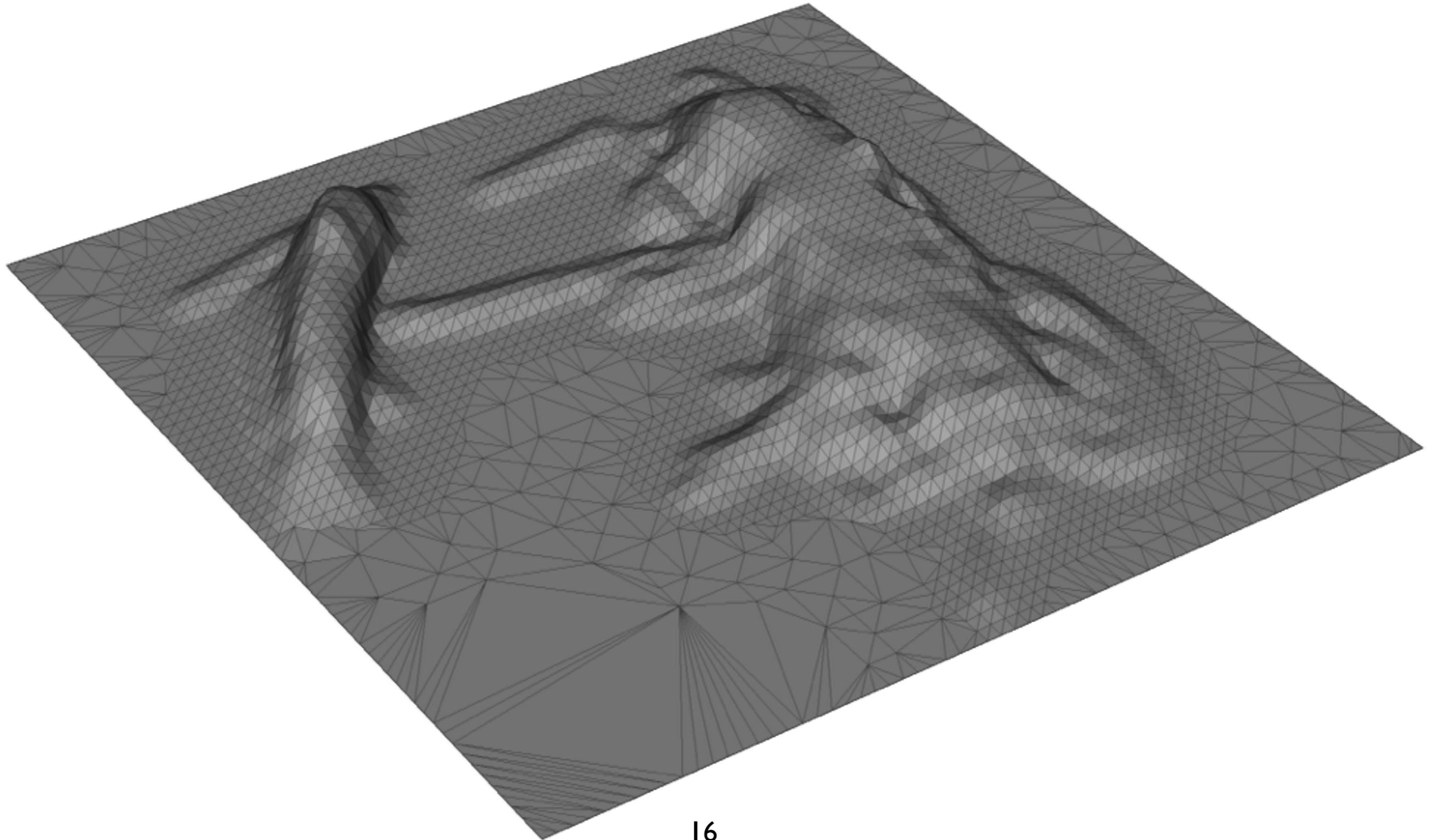
LFS simplification



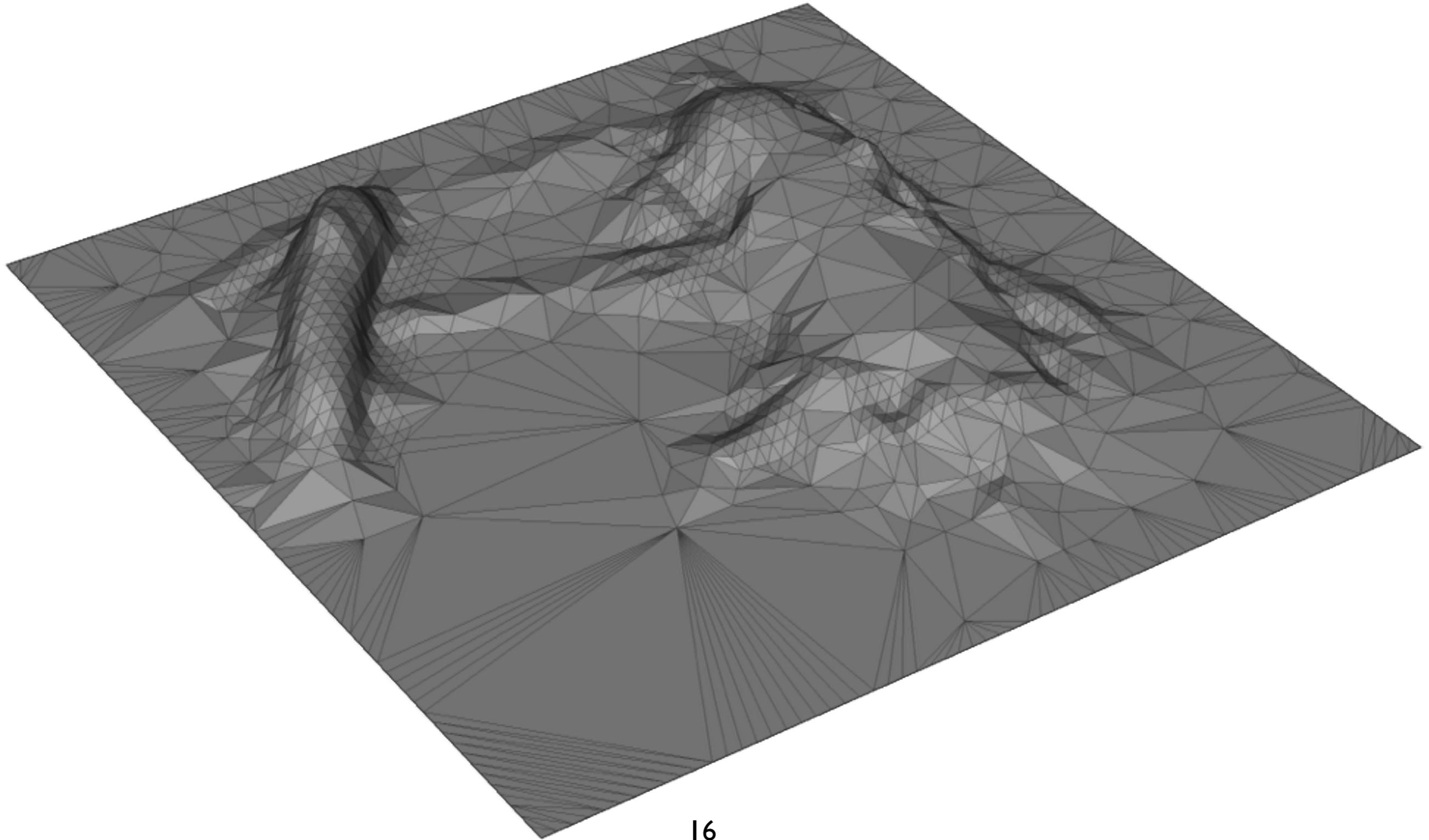
LFS simplification



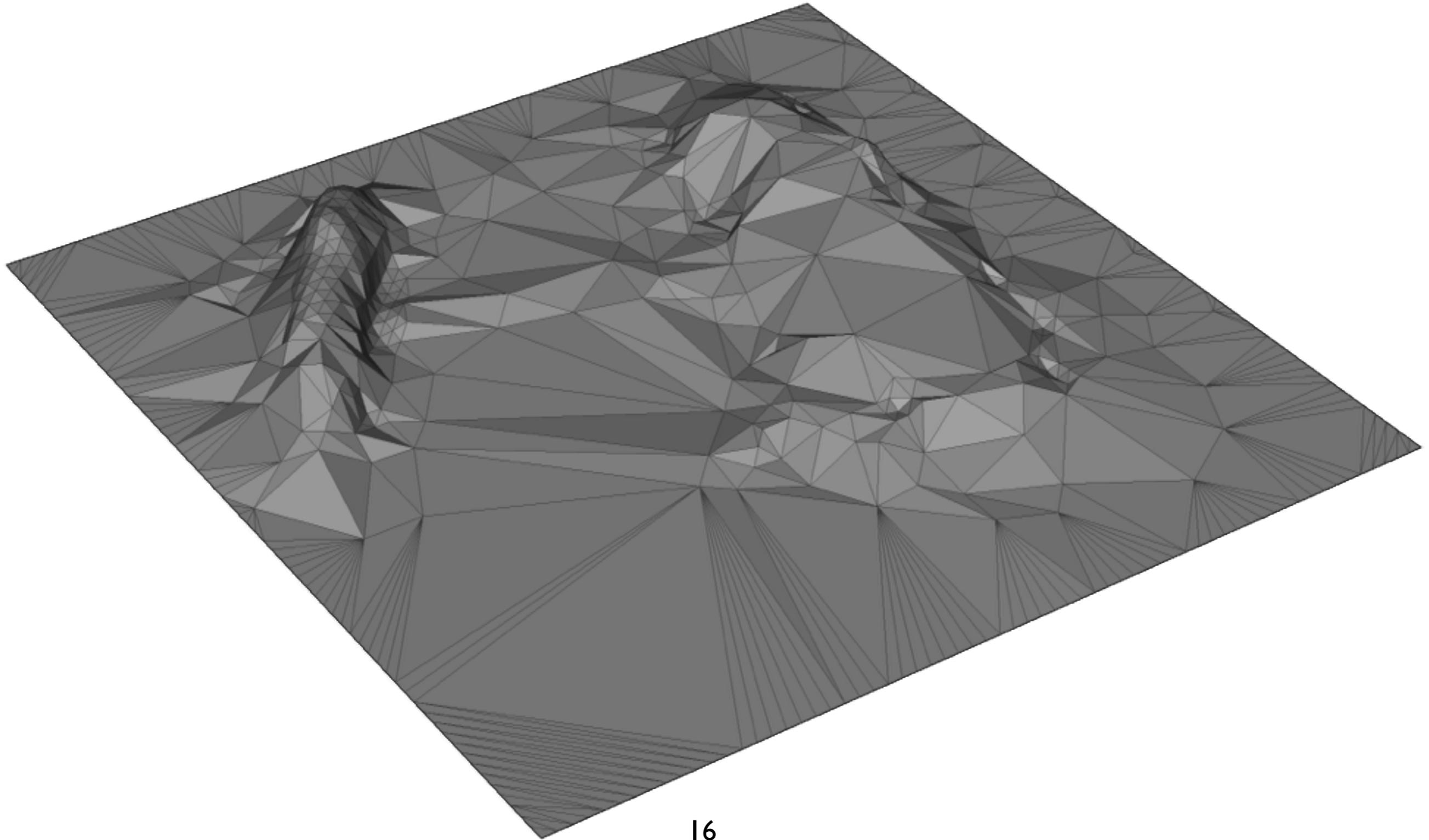
LFS simplification



LFS simplification

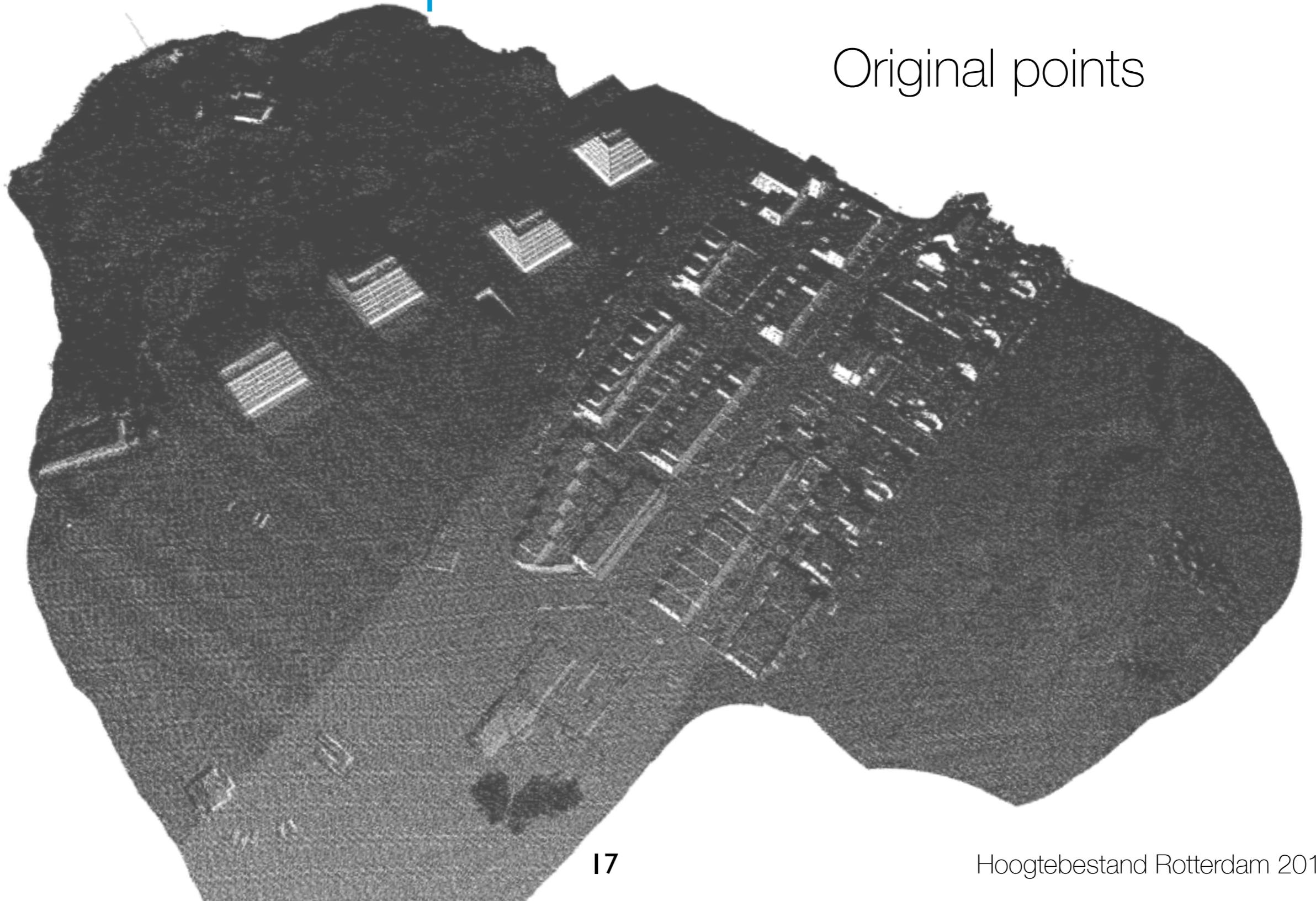


LFS simplification



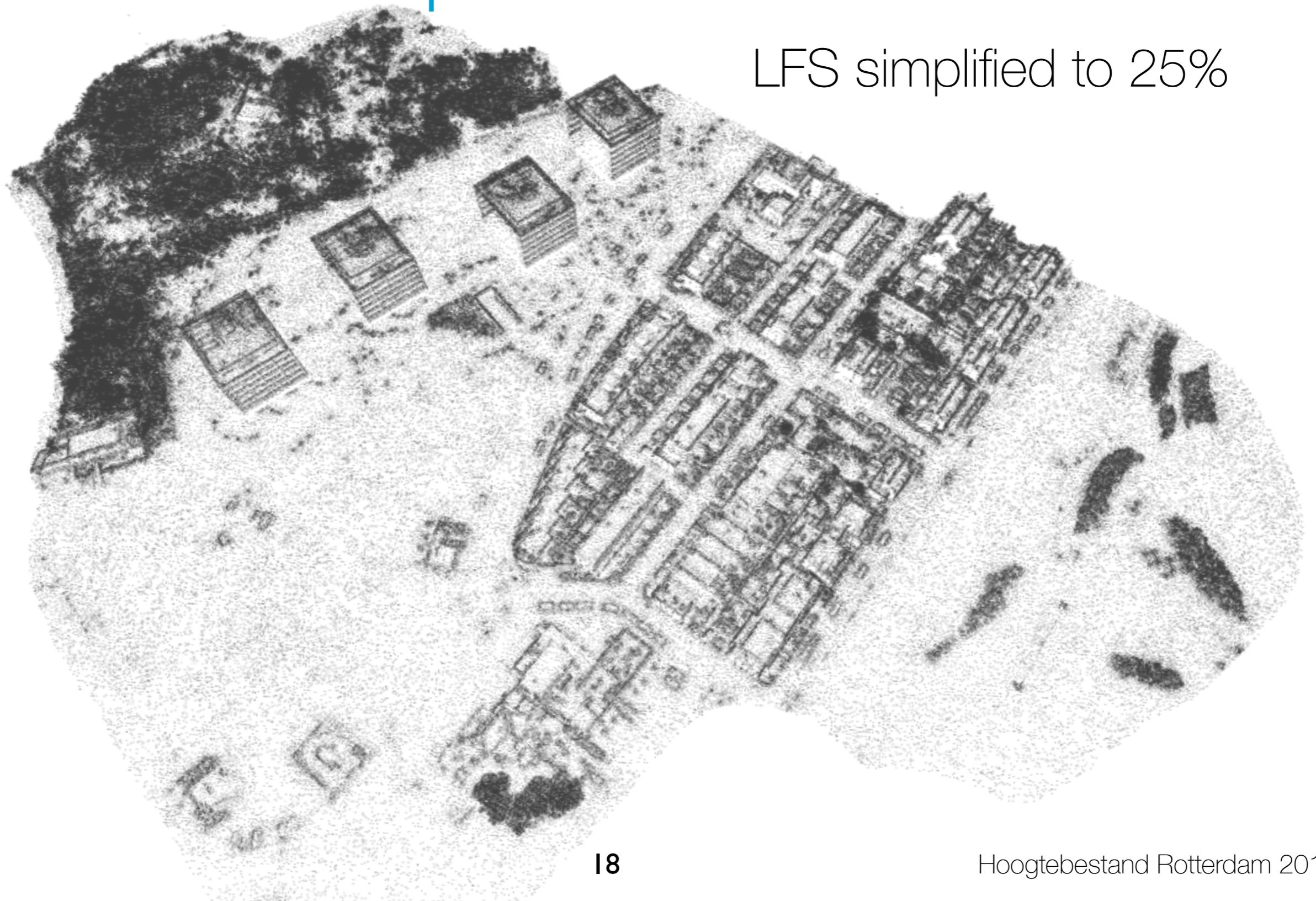
LFS simplification

Original points



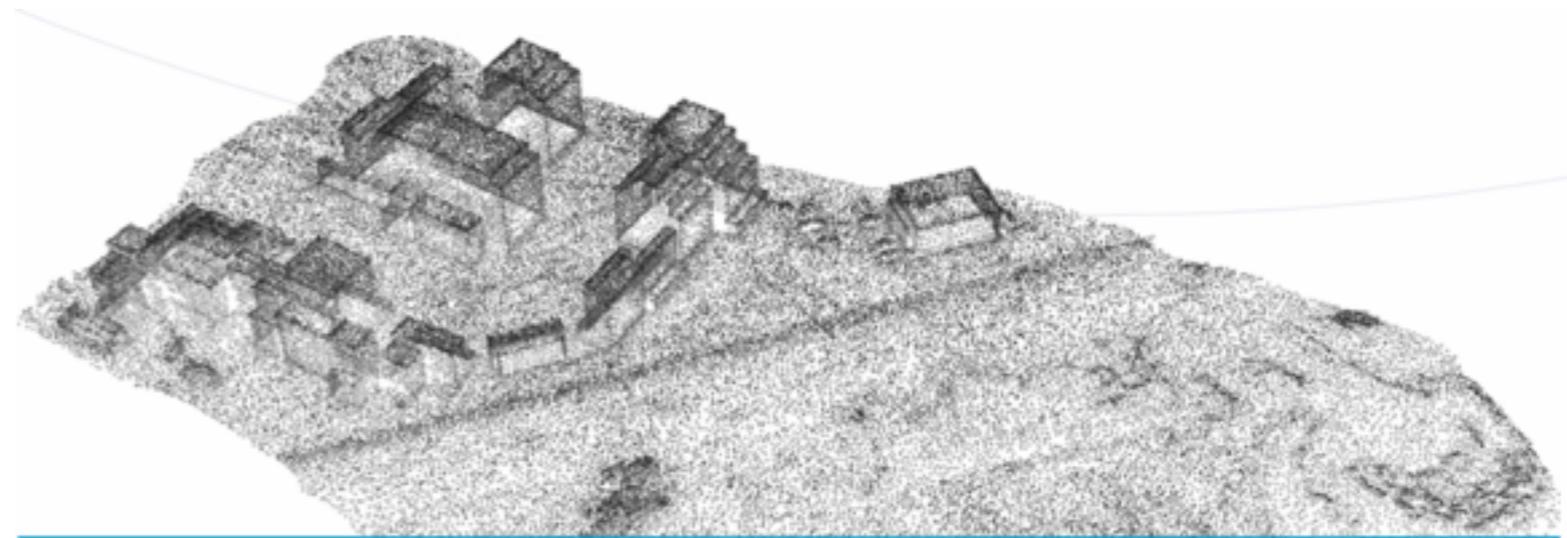
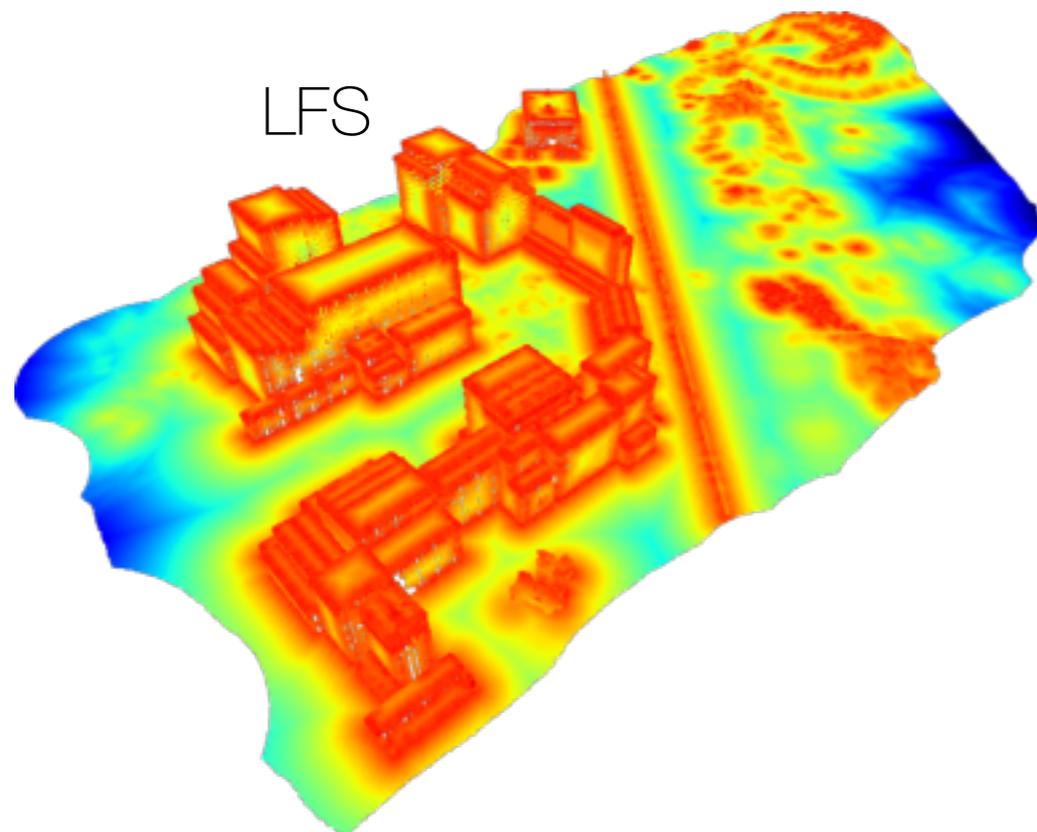
LFS simplification

LFS simplified to 25%

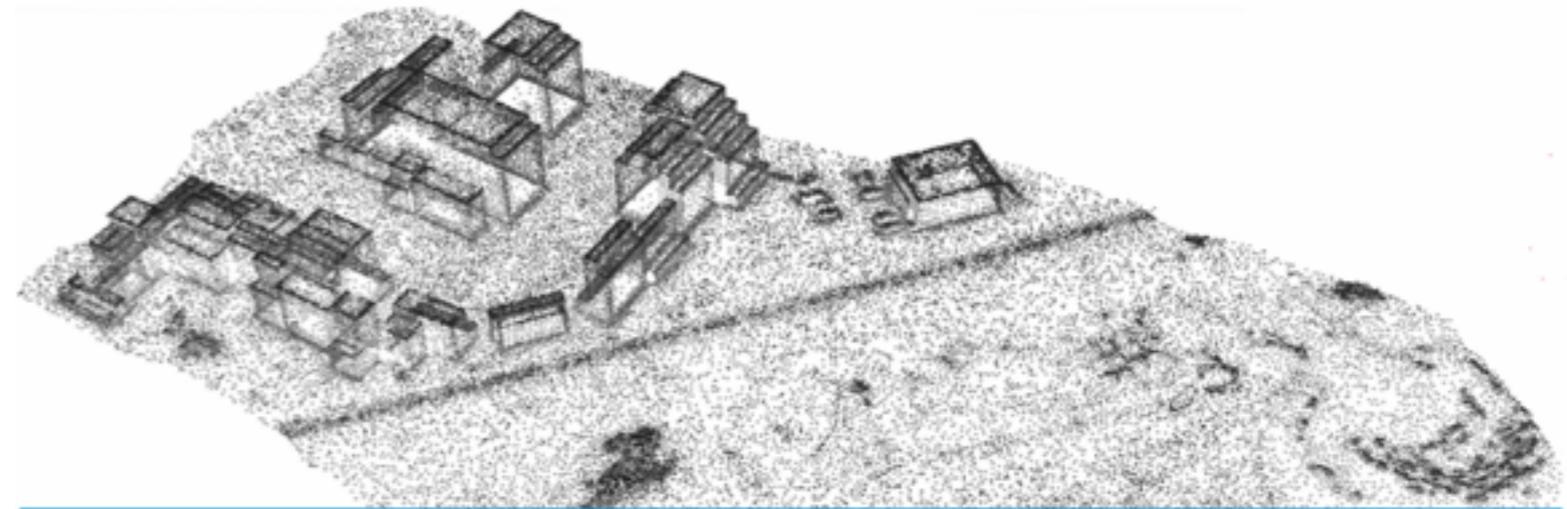


Results

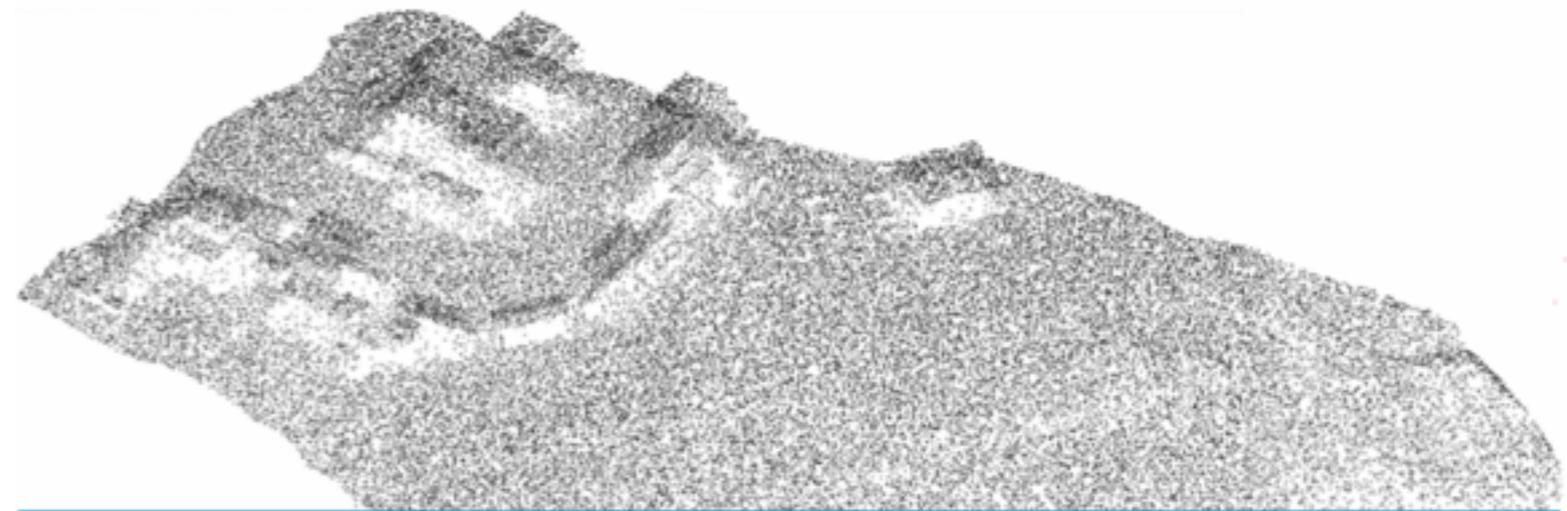
Reduced to 11%



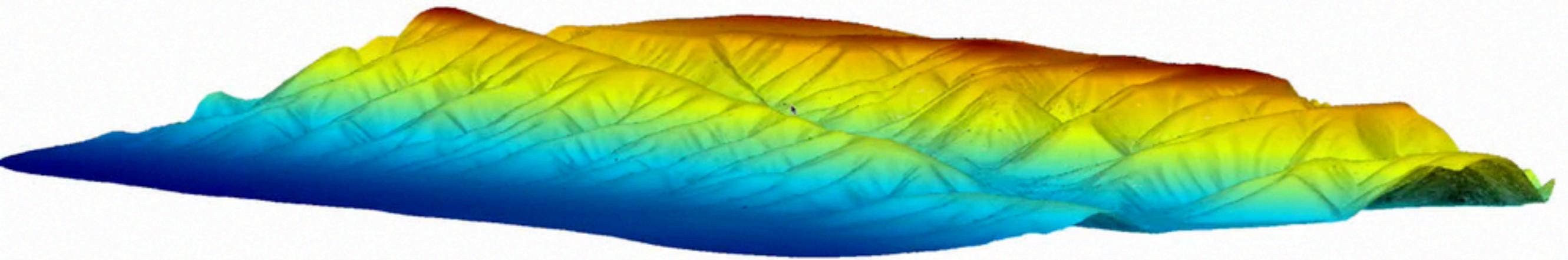
Local feature size simplification (linear)



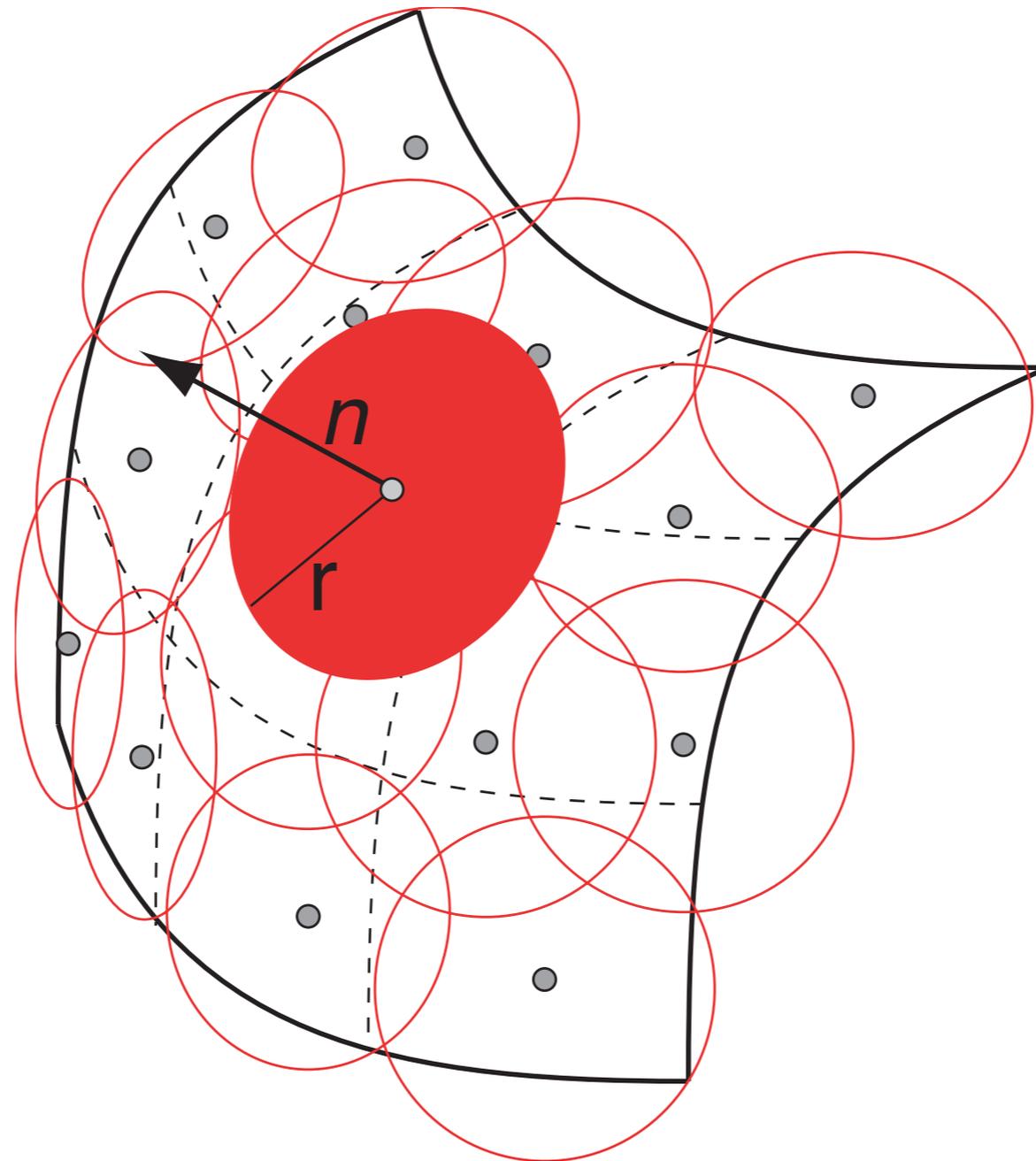
Local feature size simplification (quadratic)

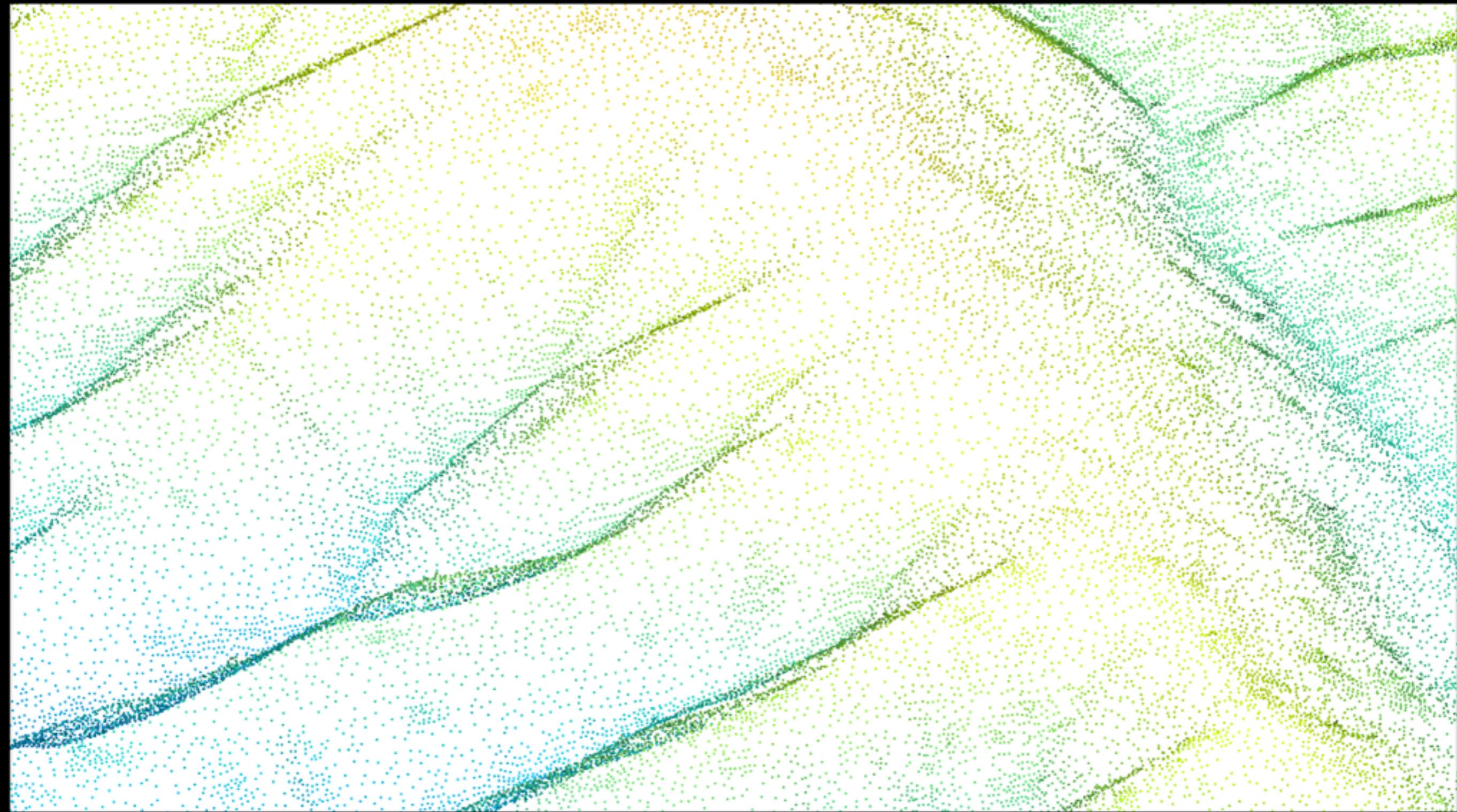


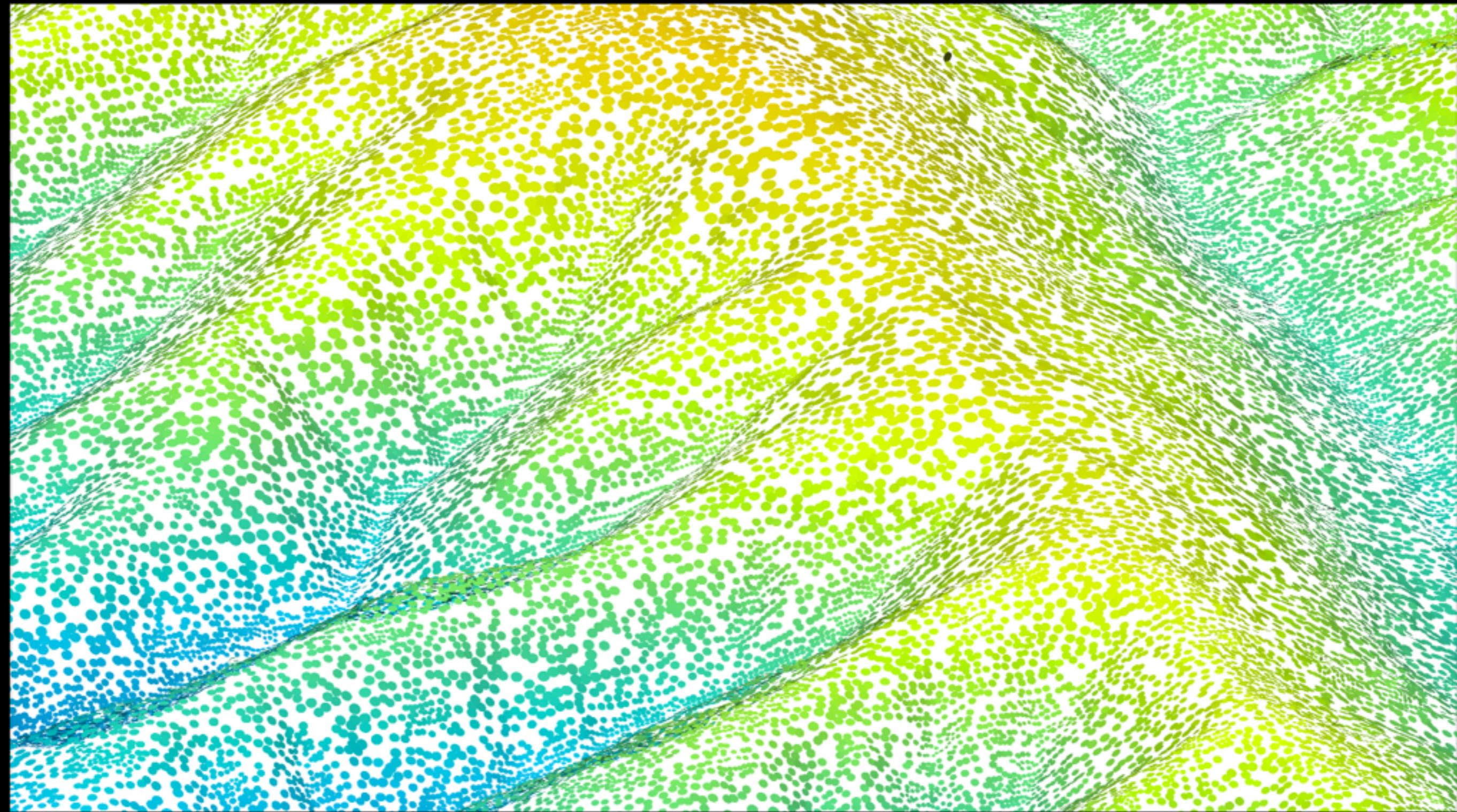
Random point thinning

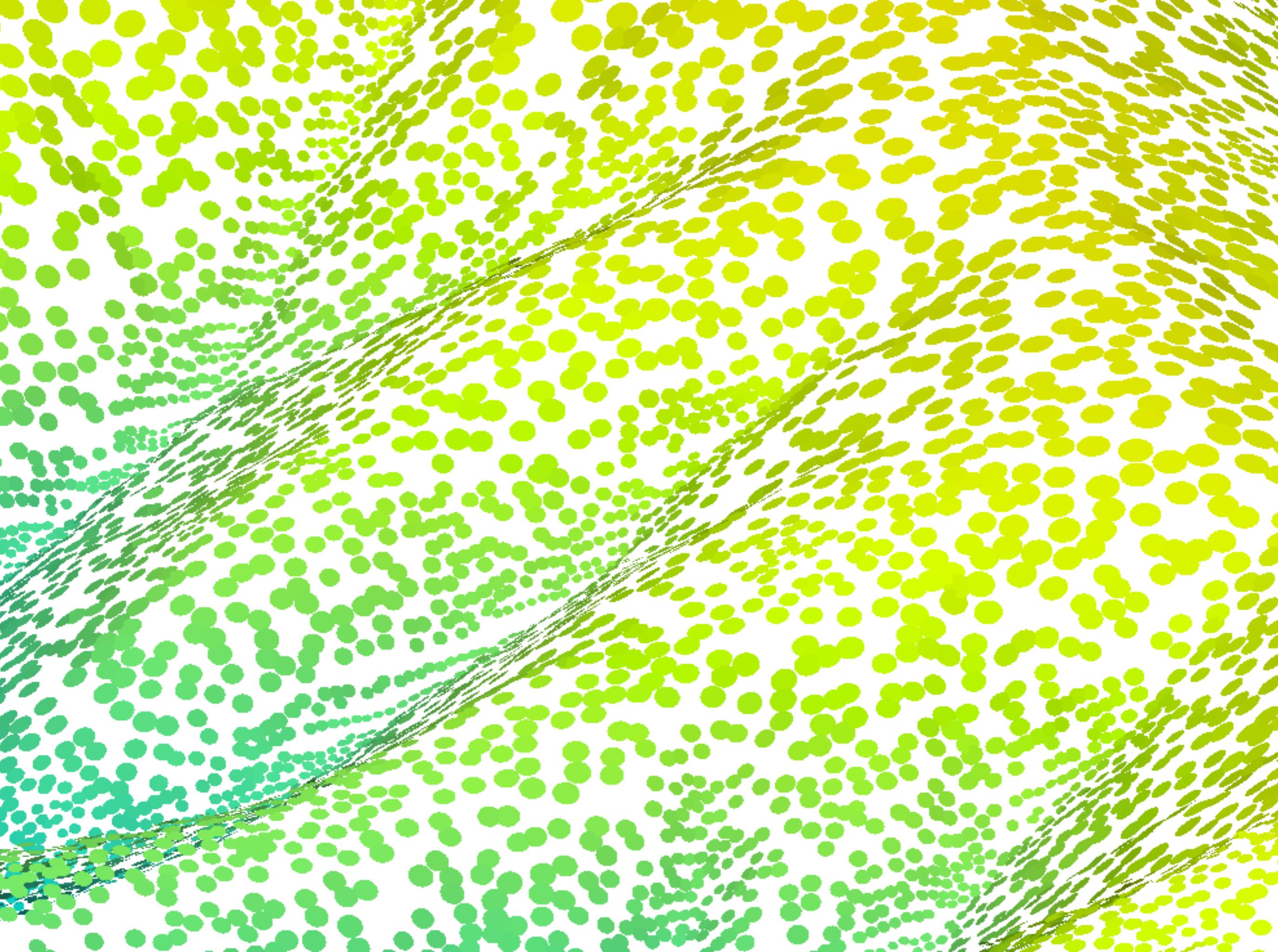


Point splatting







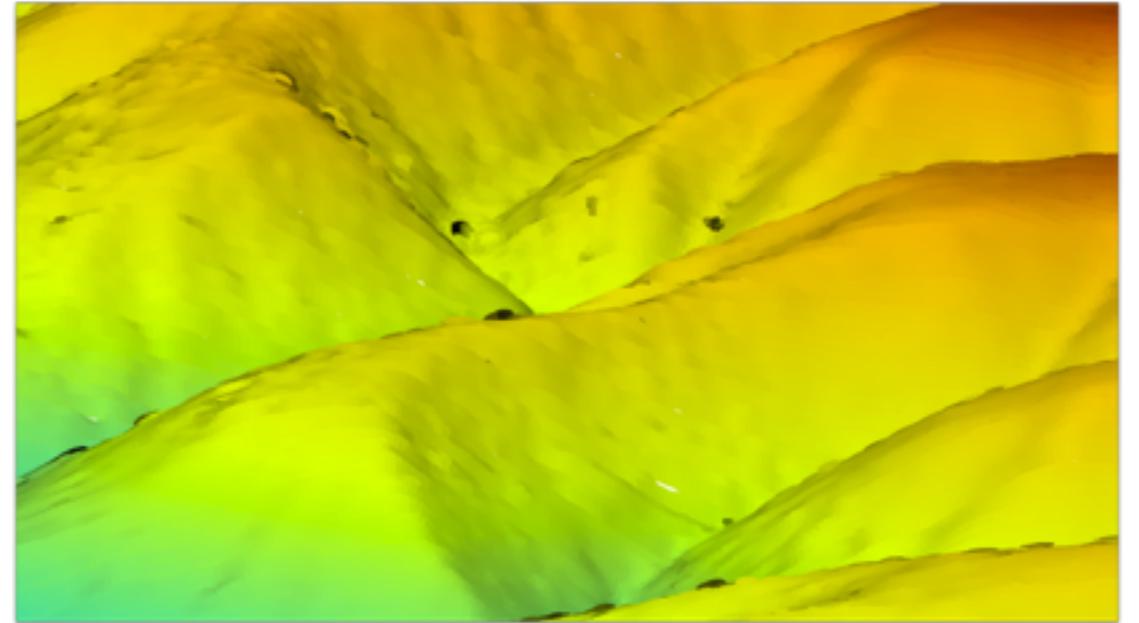


LFS Point splatting

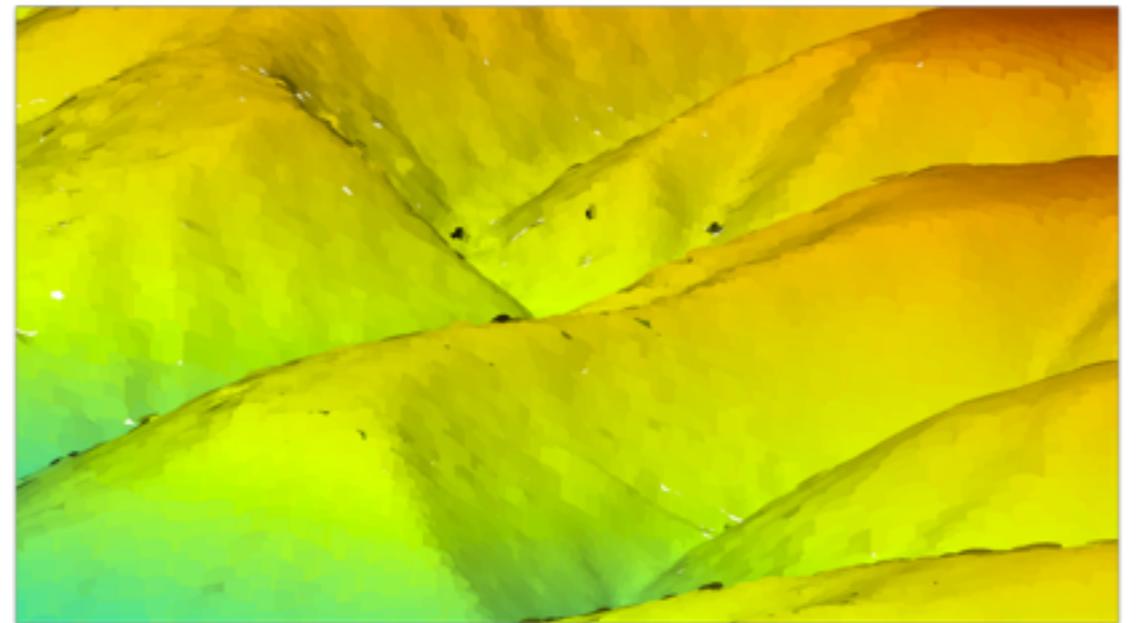
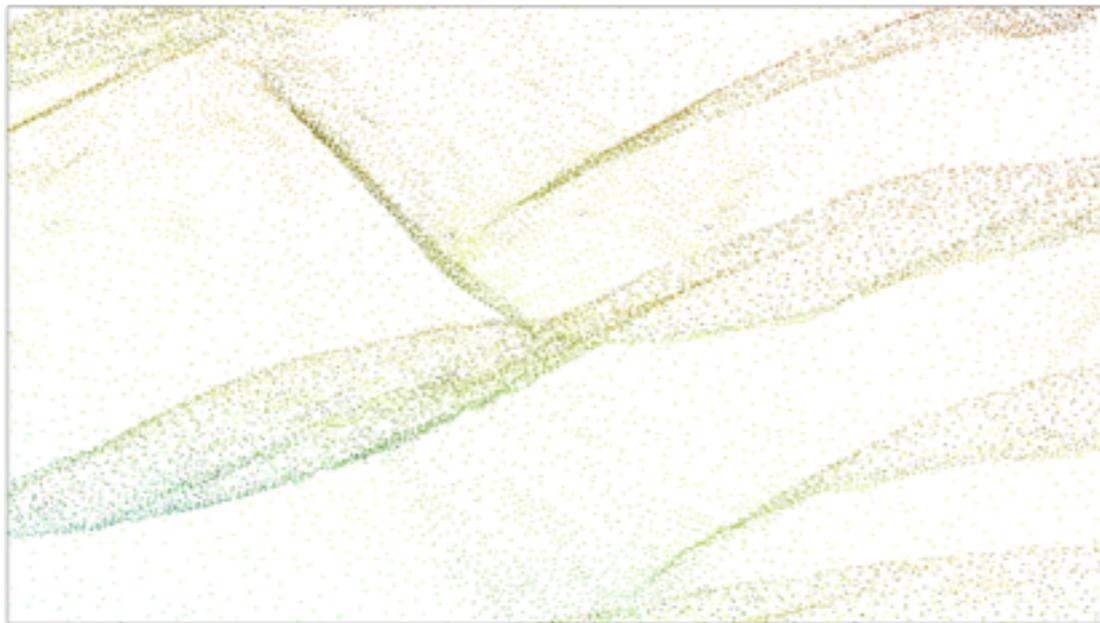
Simple points

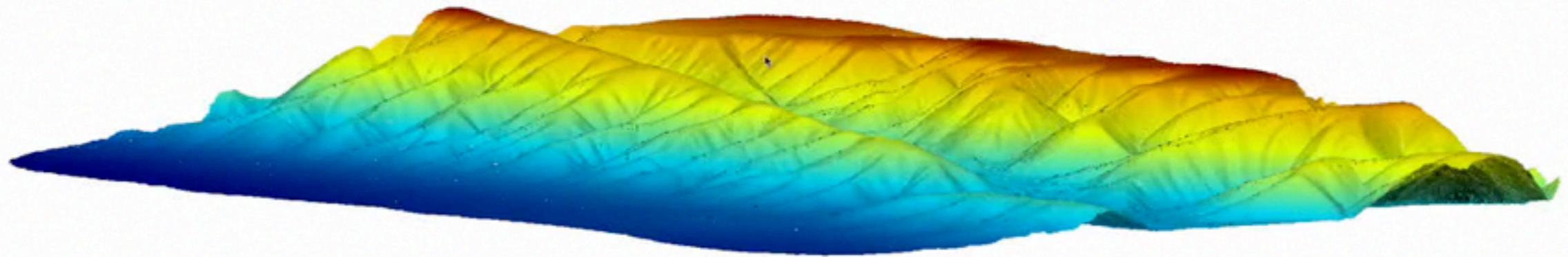
Splats

Full data

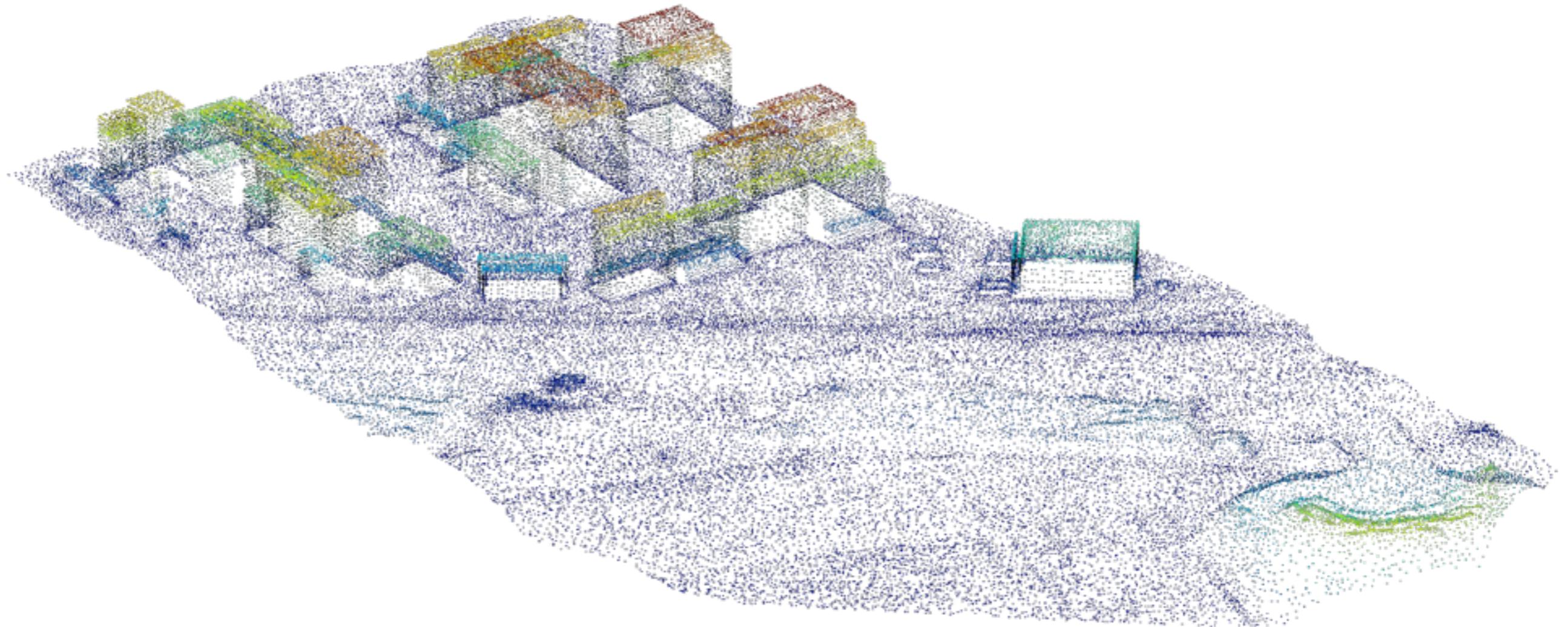


LFS simplified

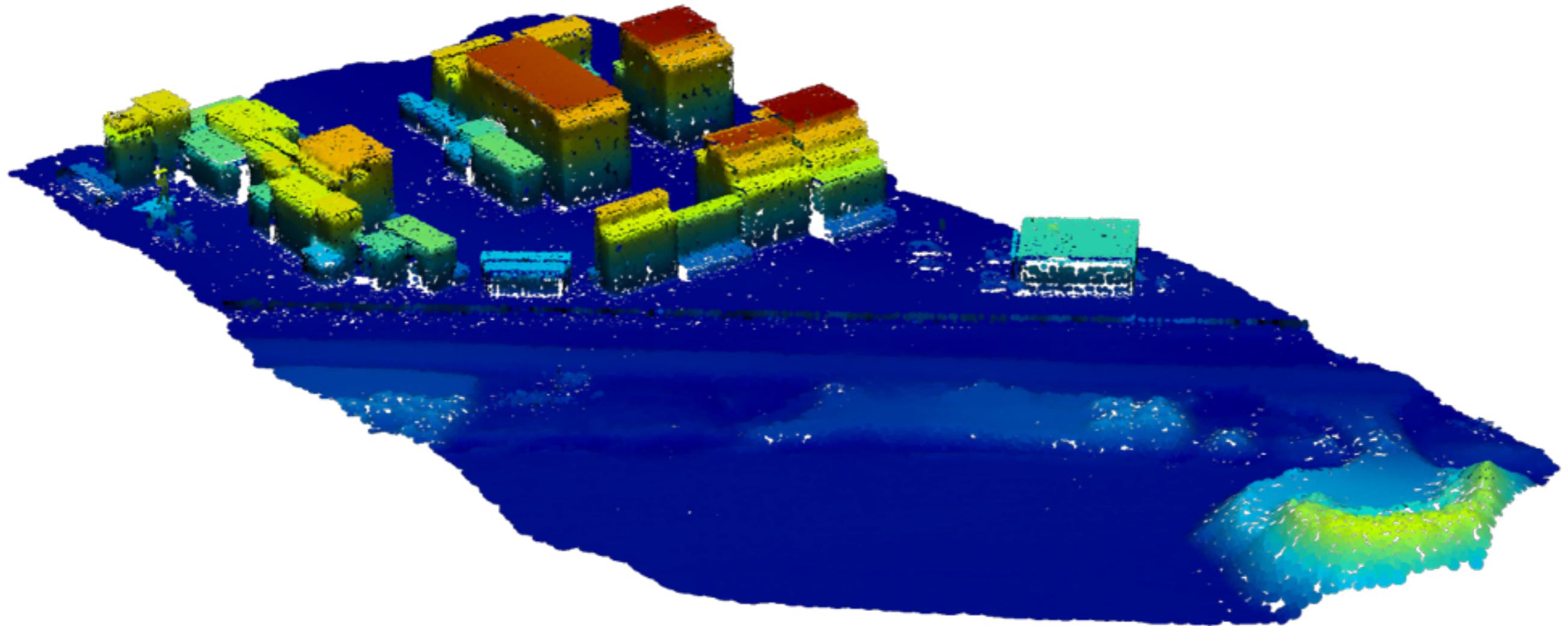


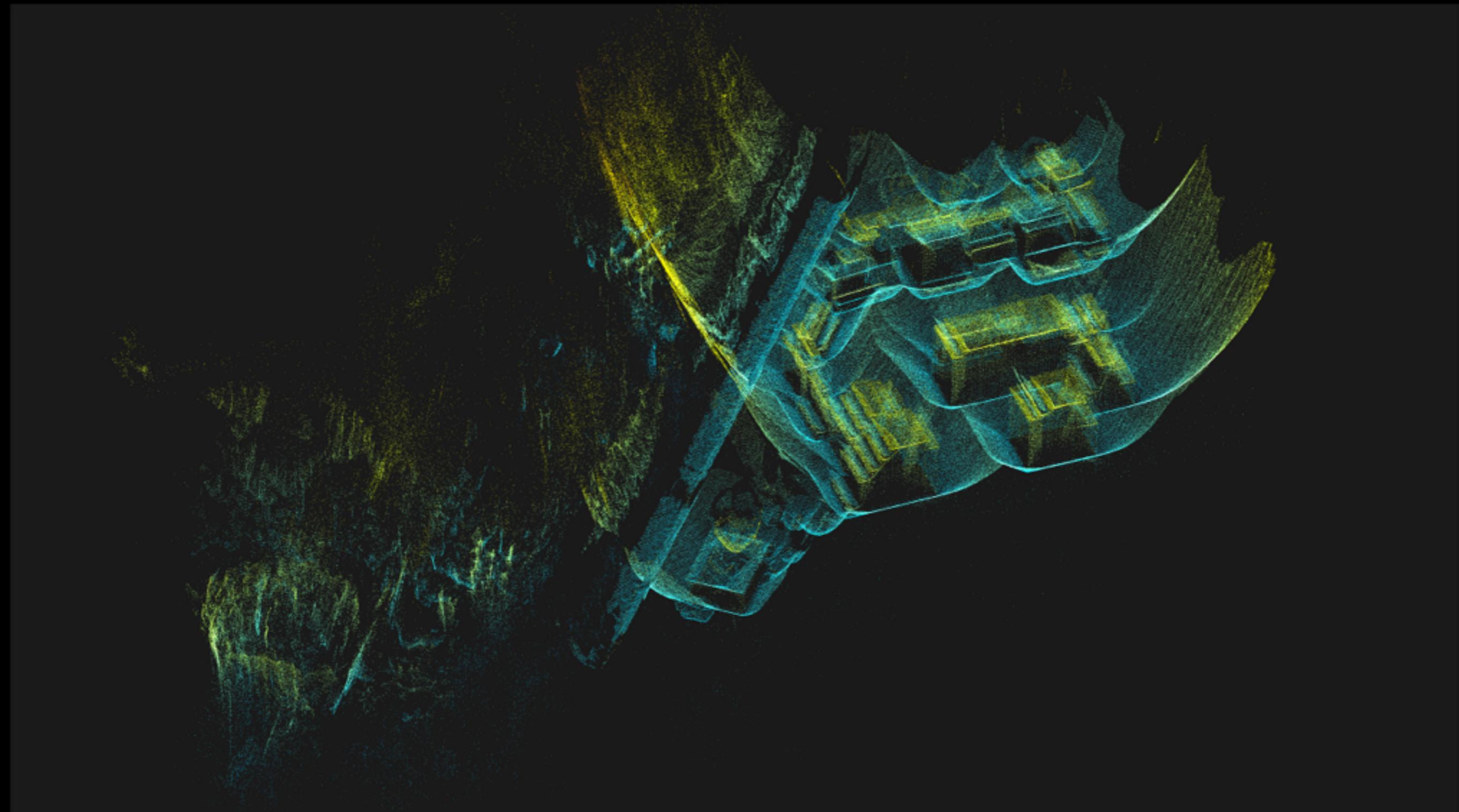


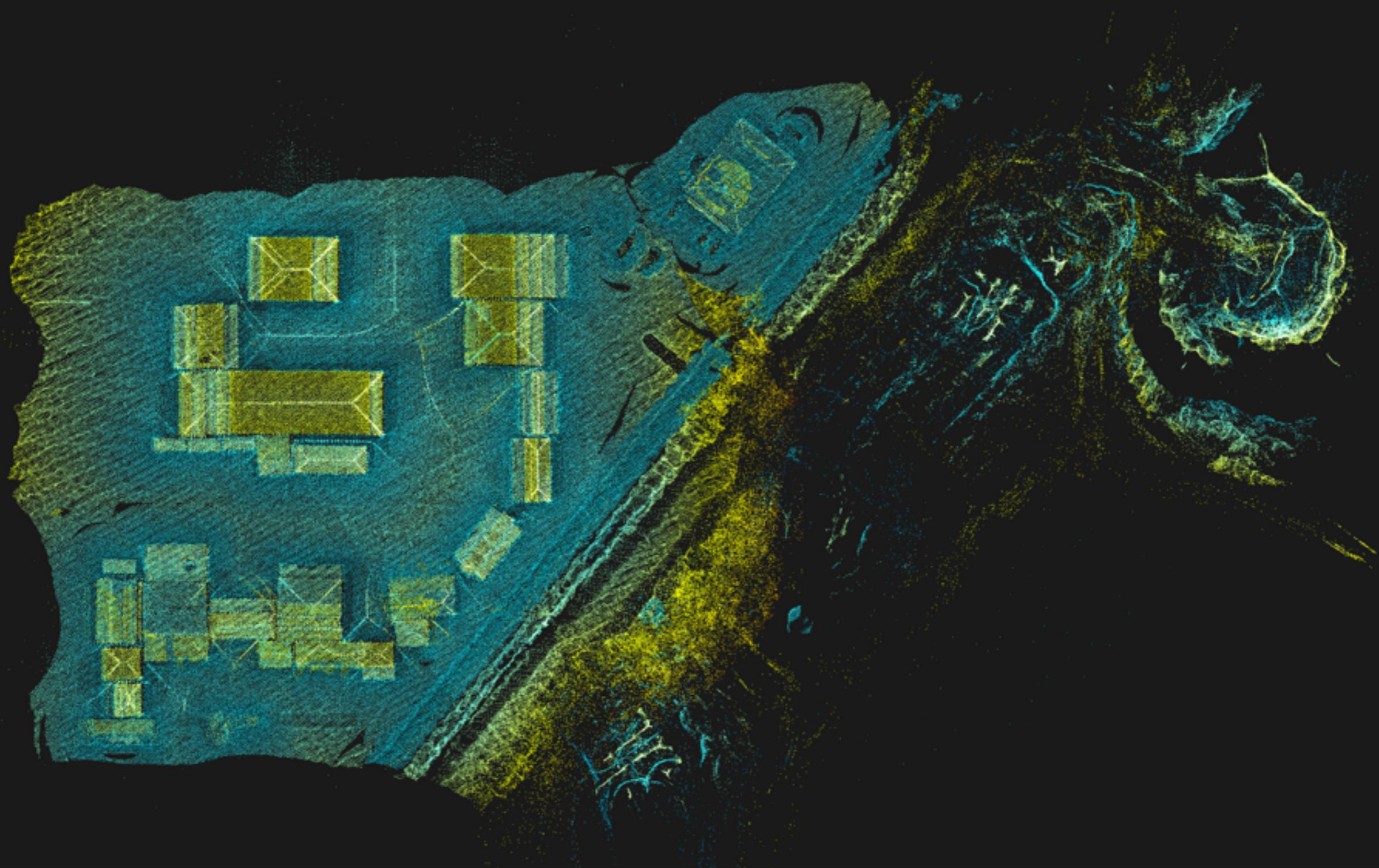
LFS point splatting



LFS point splatting



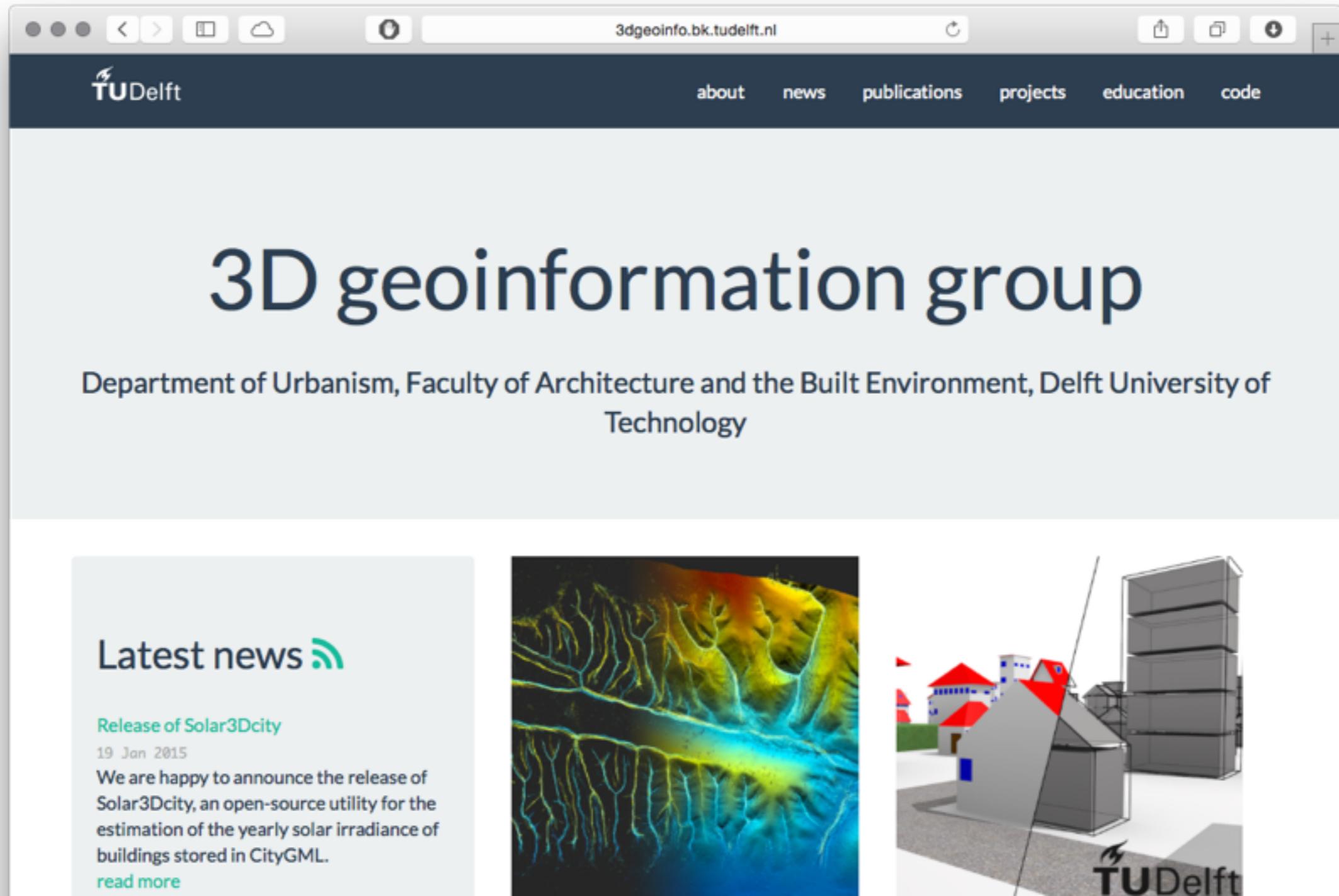




What is next?

1. Segmentation
2. Classification
3. High level feature detection

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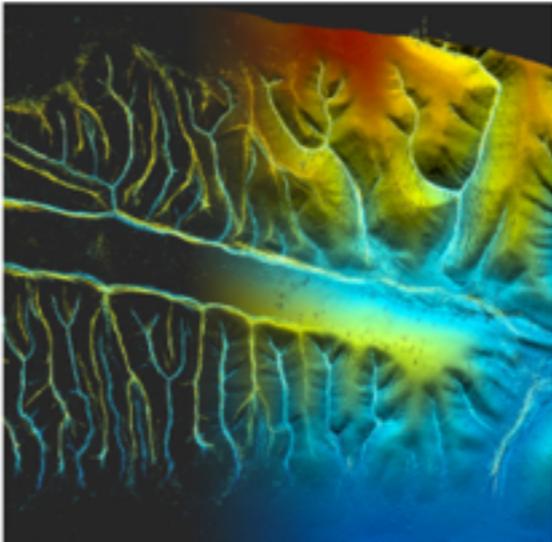
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Latest news

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19 Jan 2015

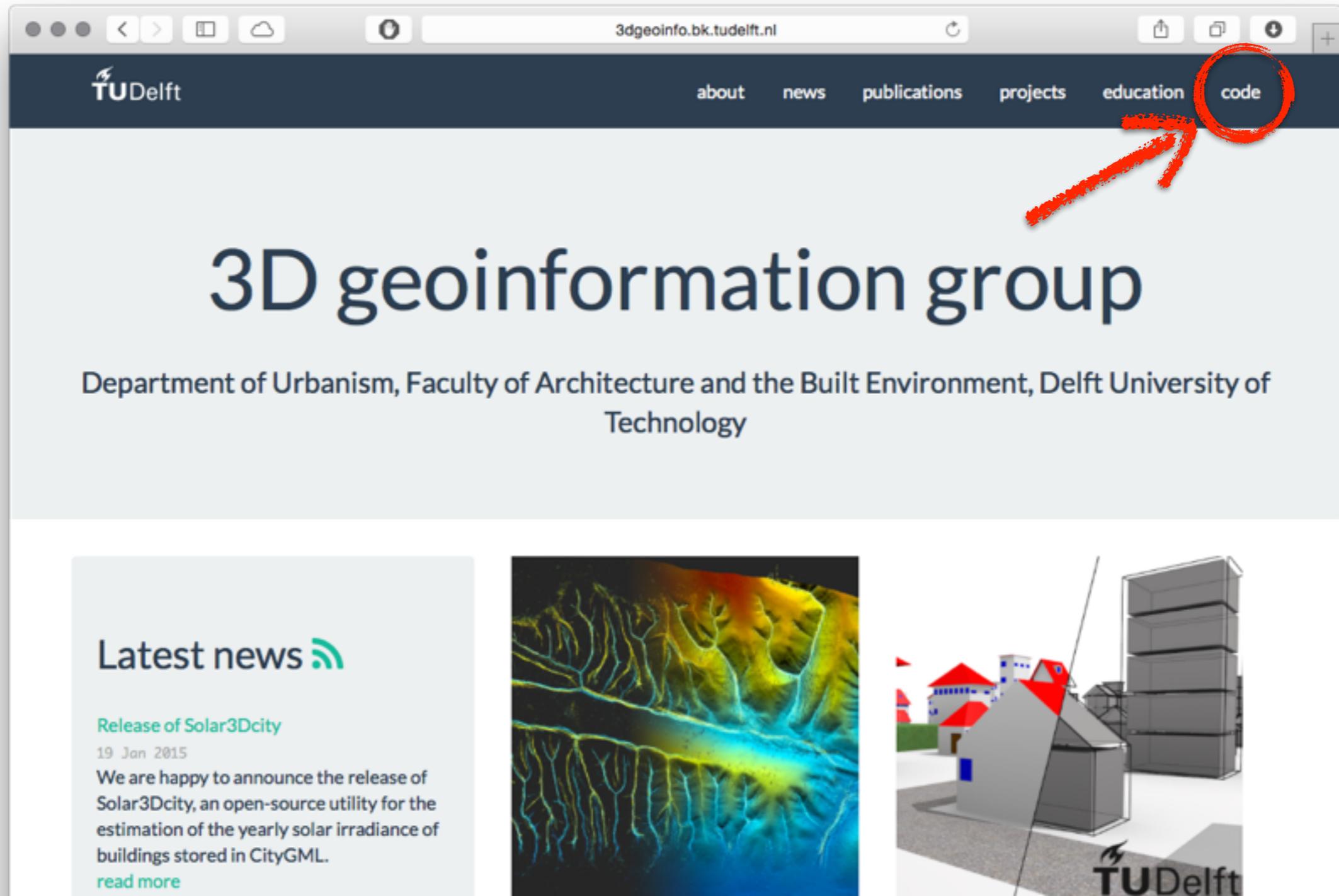
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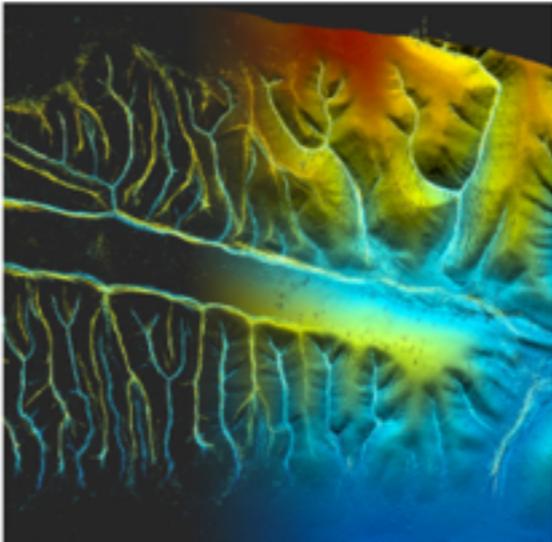
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