

Updating the Finnish ALS based 2 meter grid elevation model

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a) Process of Production of Topographic Data,

b) Finnish Geospatial Research Institute FGI,

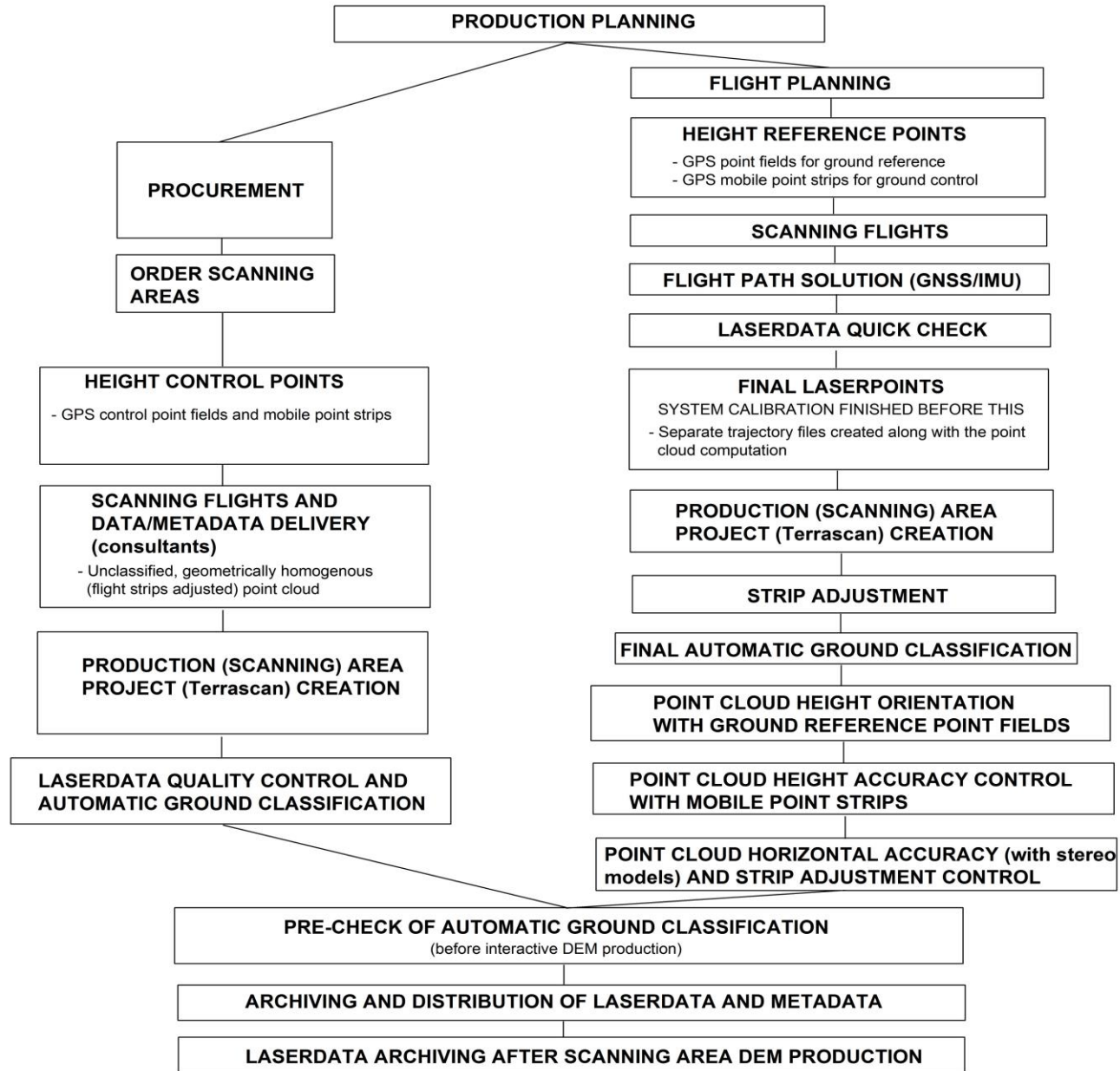
c) Application Development

12-13 January 2016

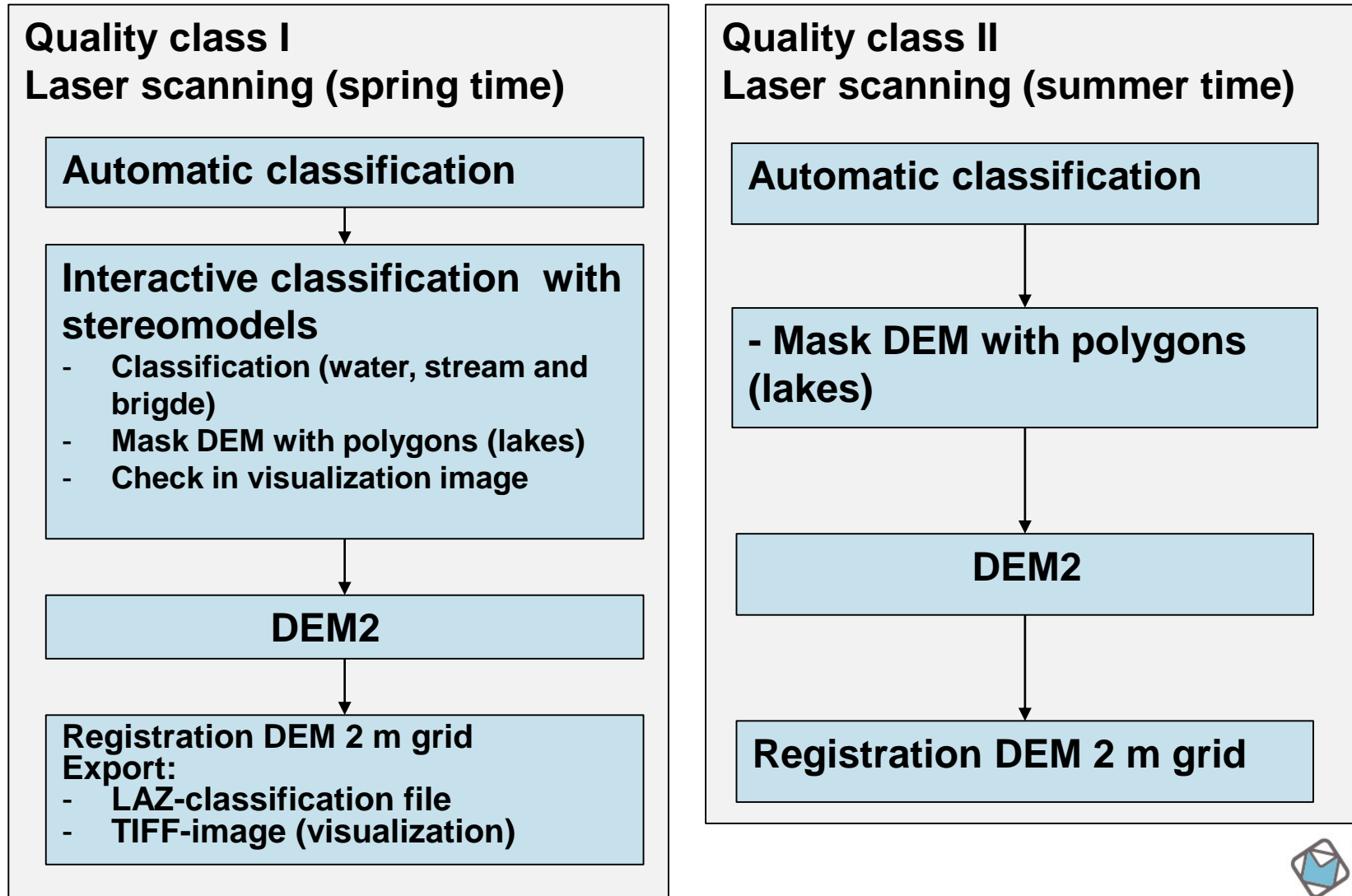


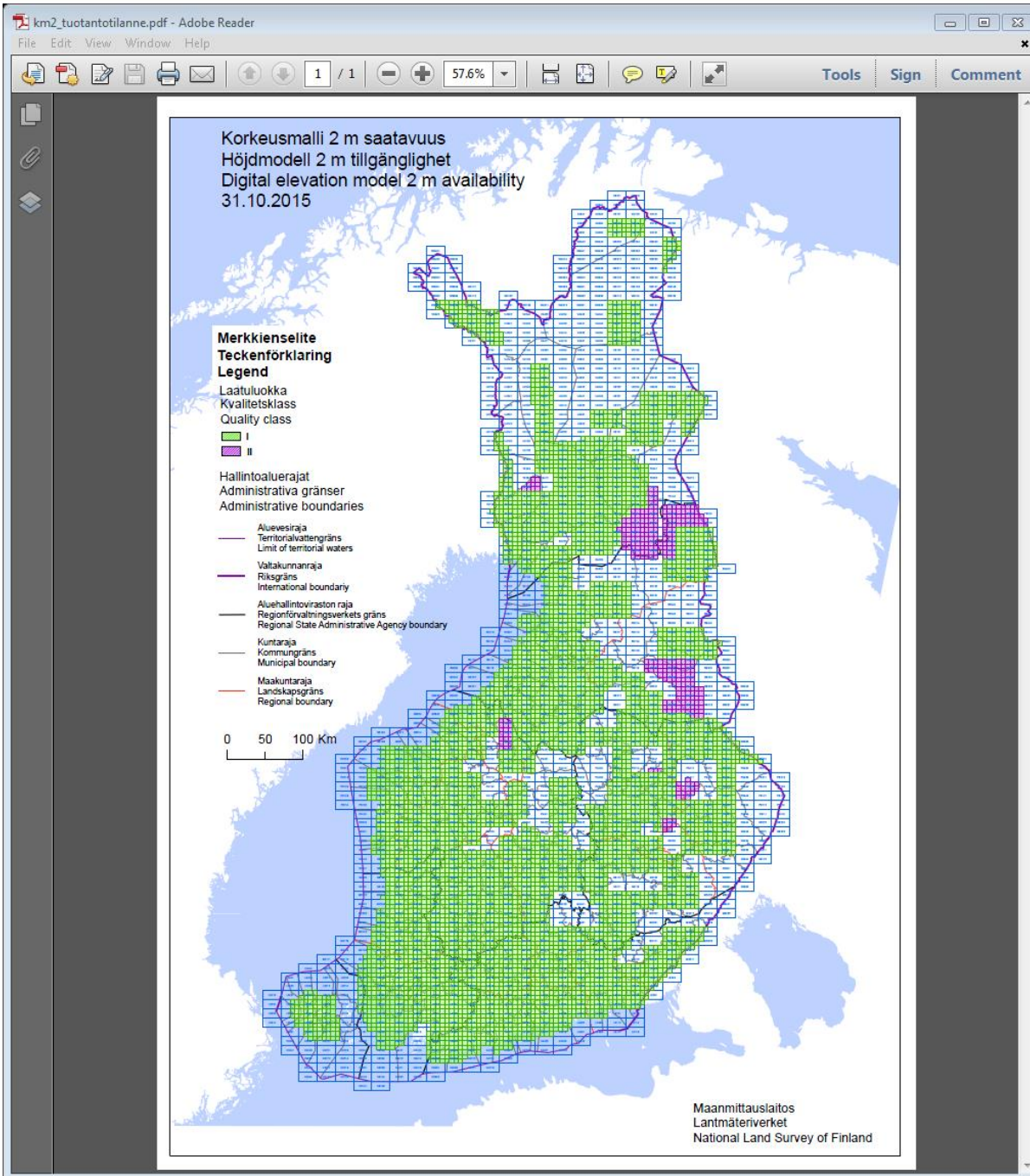
NLS LASERDATA PRODUCTION WORKFLOW, BASIC STEPS

Left: Data bought from scanning consultants
 Right: NLS scanning



The production of DEM2



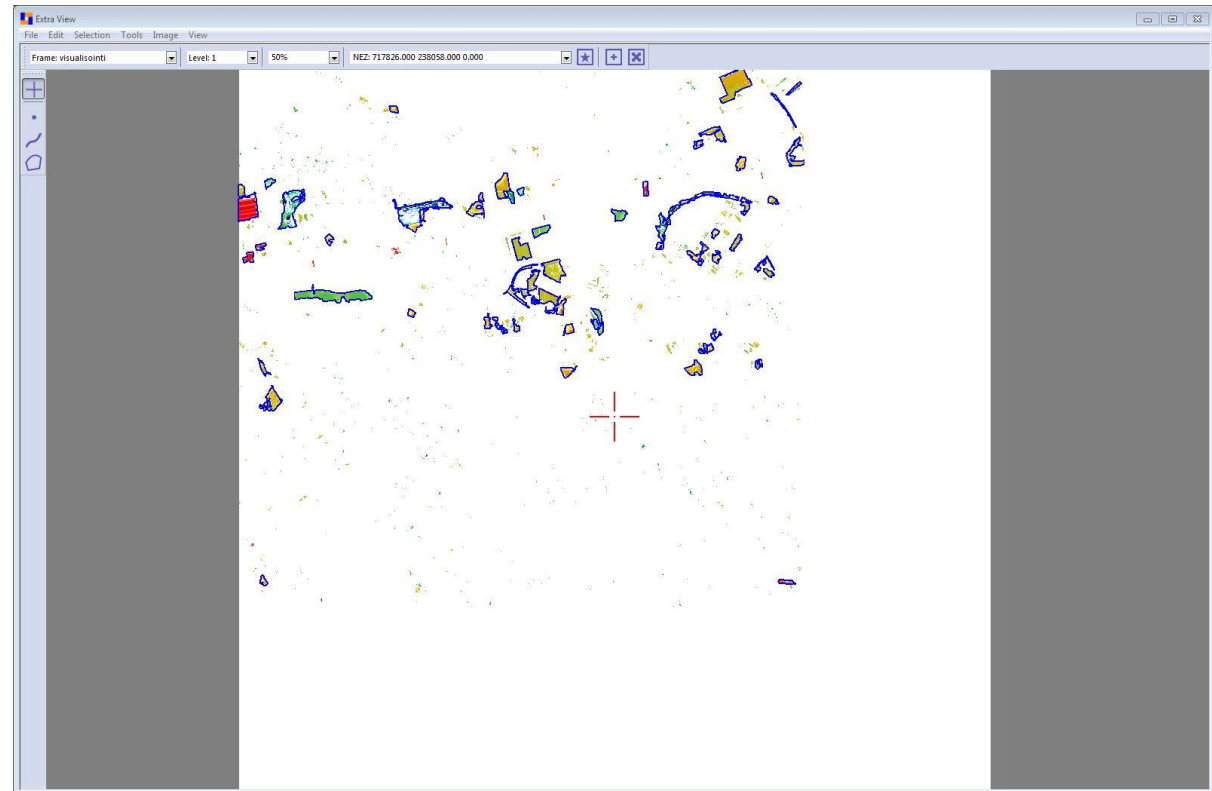


Why updating?

- The Finnish nationwide airborne laser scanning (ALS) data based 2 meter grid elevation model (DTM) is planned to be completed in 2019.
- Even now there are new laser scanning areas overlapping the existing old 2 m grid DTM.
- Updating process for the production of the 2 meter grid elevation model does not exist.
- Choices for updating are photogrammetry, ALS data locally, and totally new model from ALS data.
- Planning project is going on in 2015-2016.
- Exploitation of the new ALS data
- Updating has to be cheaper than making the first version of the 2 meter grid elevation model from scratch.
- Updating will be done using ALS data locally at selected change detected places.

EspaEngine

- The process is based on new development and functionalities of the Finnish EspaEngine software.
- Change detection is done by comparing ground in the new automatically classified point cloud with ground in the old point cloud.
- A difference DTM with a chosen threshold value is computed map sheet-wise



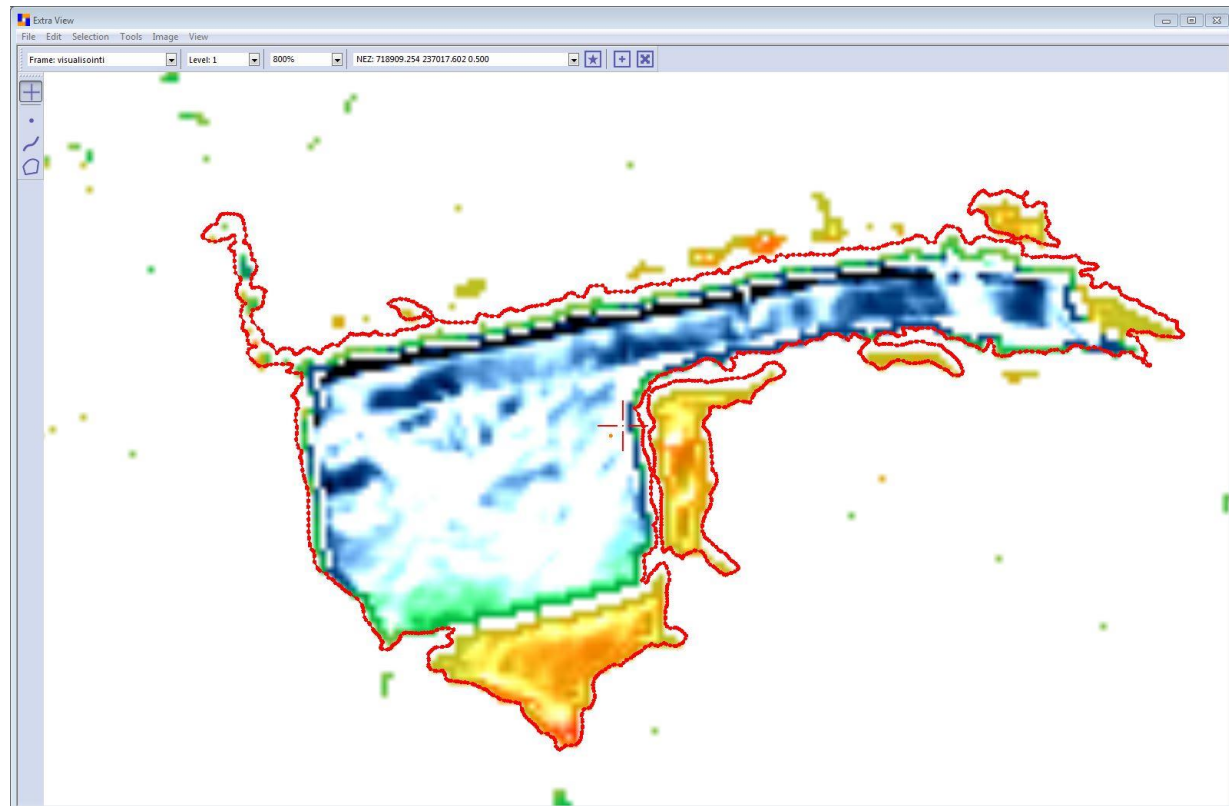
- Extra View

Extra View

- Promising functionality
 - Usability suggestions for smooth interactive operating
 - Zooming (scroll and drag)
 - Undo/redo
 - Choosing of lines and points (several at a time)
 - Also visualization of difference height model covering the whole map sheet (Also other areas than those exceeding the threshold value)
- Visualization of the mosaic covering the whole new scanning area? From this mosaic the points of interest and mapsheets for interactive work are chosen.

EspaEngine

- Operator can accept or reject or edit replacement area polygons suggested by the software or he/she can create new polygons.
- Manual editing of the point cloud inside a replacement area is possible, if needed.



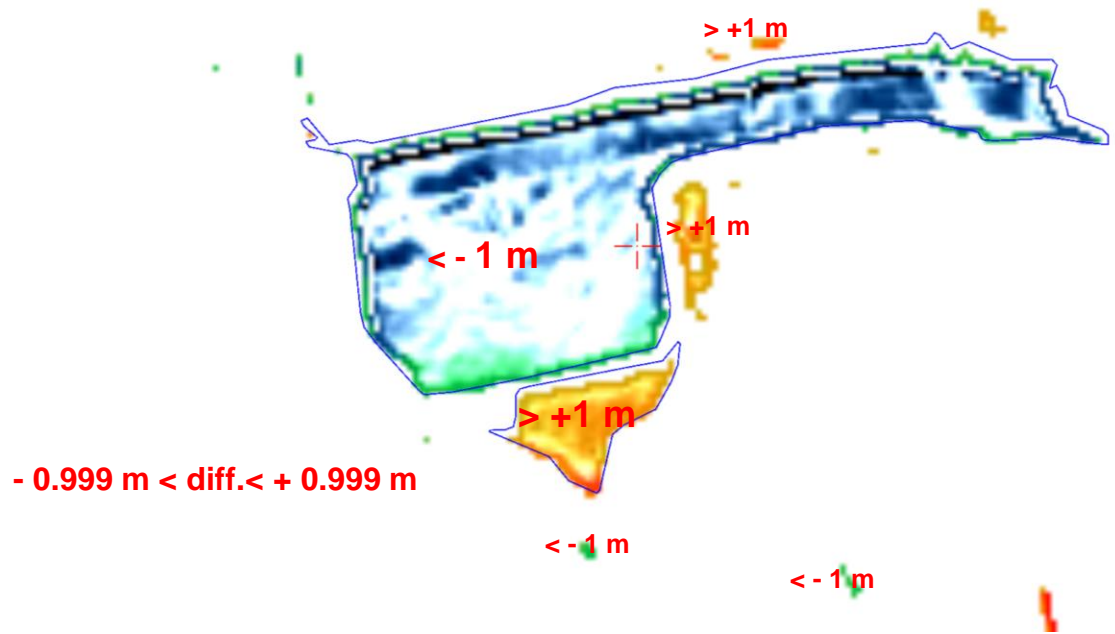
- Extra View

”Lines” (elevation difference threshold value) 1.0 m

New point cloud – Old point cloud = Difference elevation model

Areas > 900m²

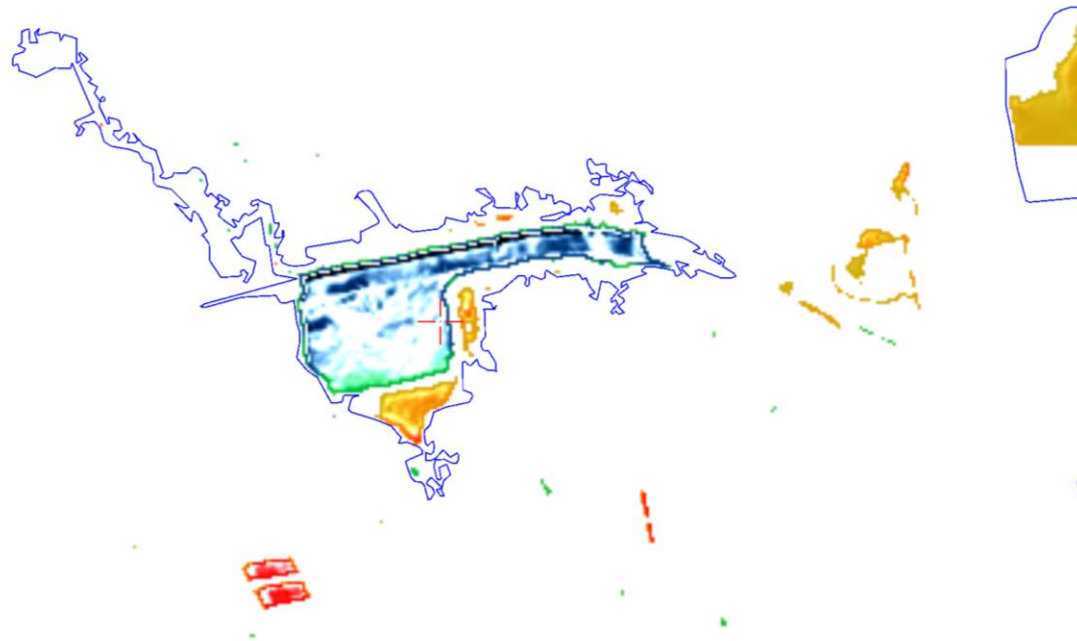
Erotuskorkeusmalli >1m (Lines=1.0), rajaukset >900m² (Area=15), tunneli -> kallioleikkaus



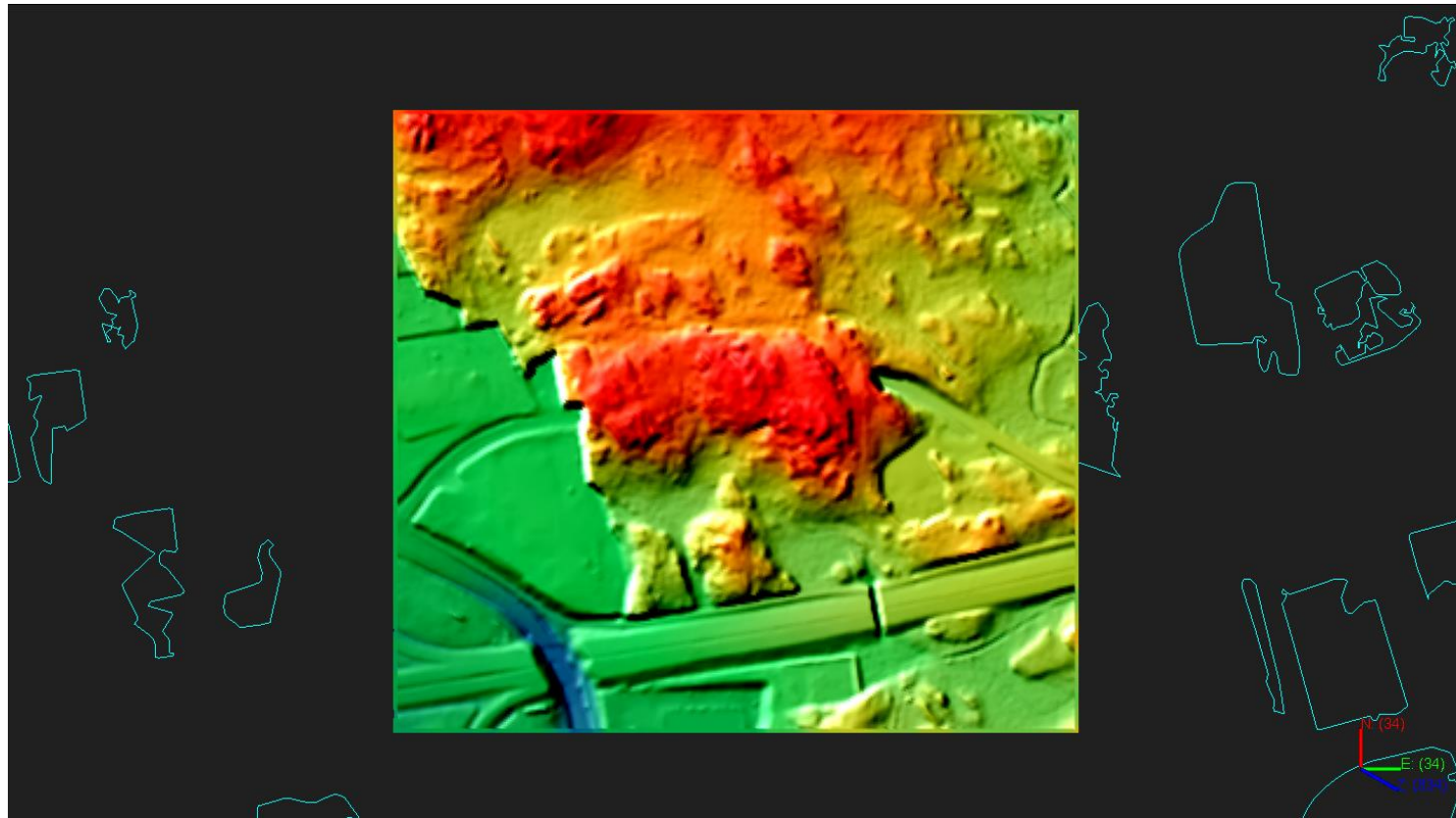
Extension of the change area polygon

- Change area polygon extended till threshold value 0.2
- The Raisio tunnel area is in the middle of the picture.
- This kind of border polygon is a good one as an automatic product?

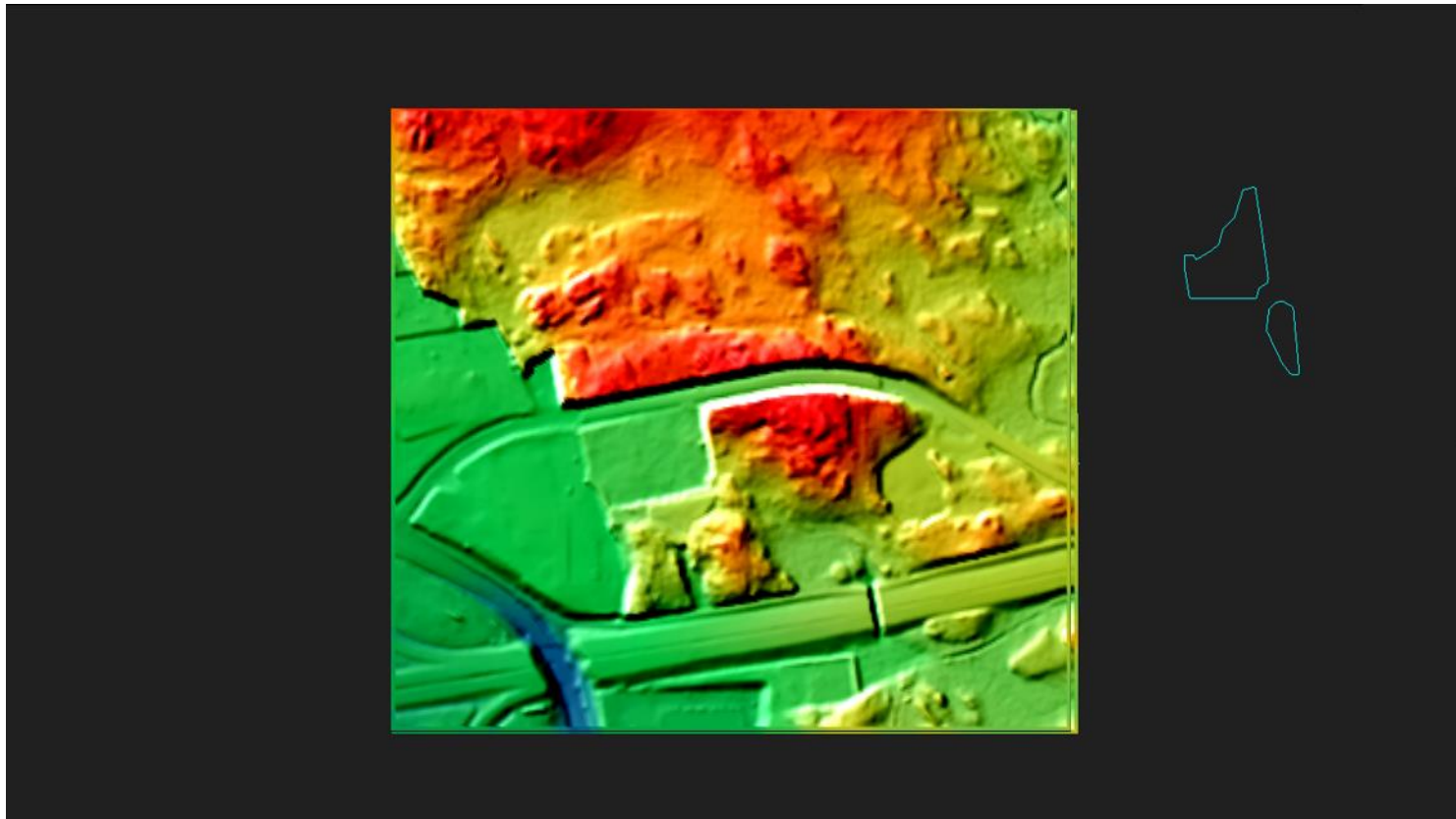
Erotuskorkeusmalli >1m (Lines=1.0), rajauslaajennus >20cm (Lines=0.2) koko laajuudessaan



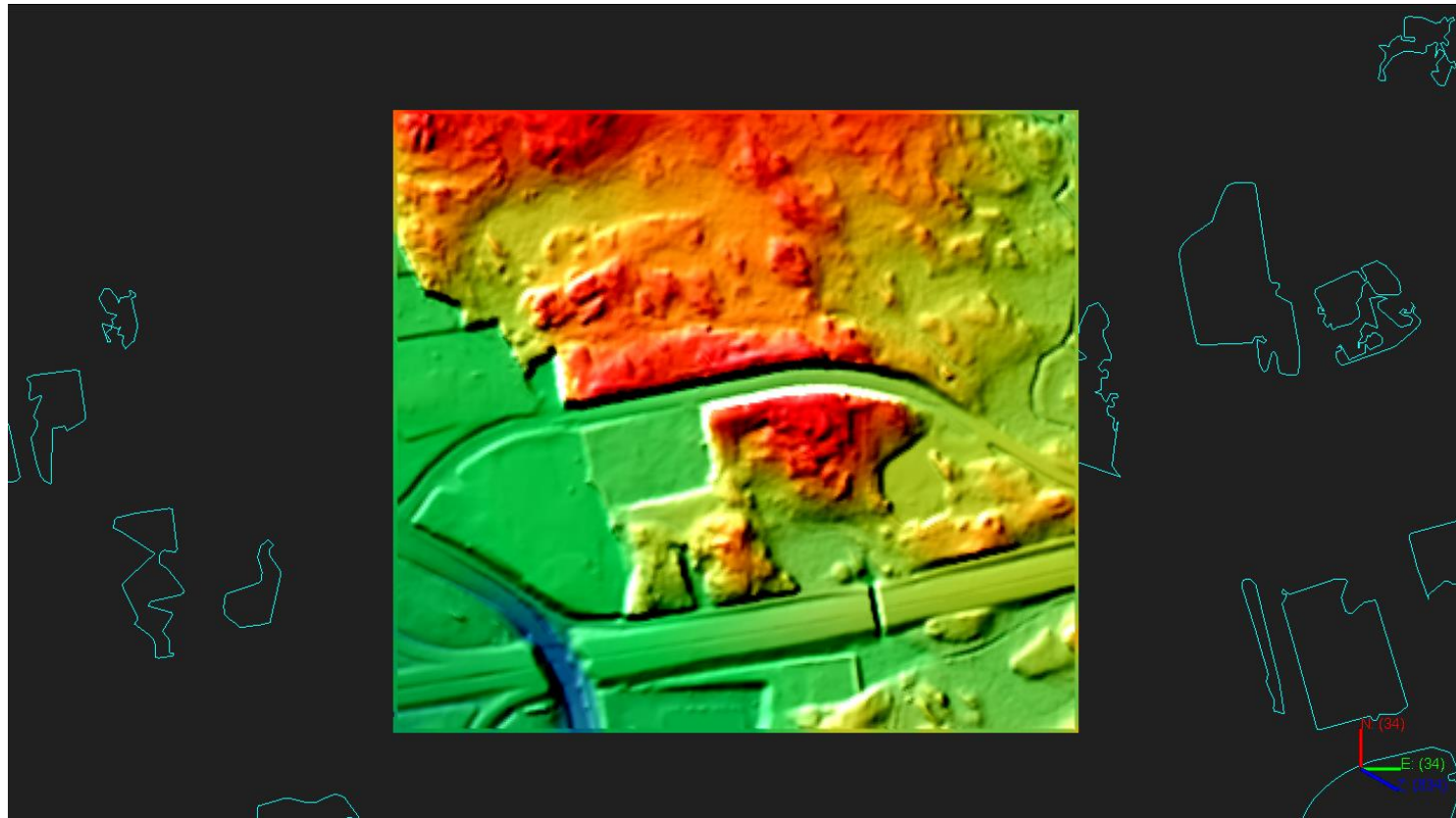
Visualization (starting point)



Visualization (lines 1.0 m)

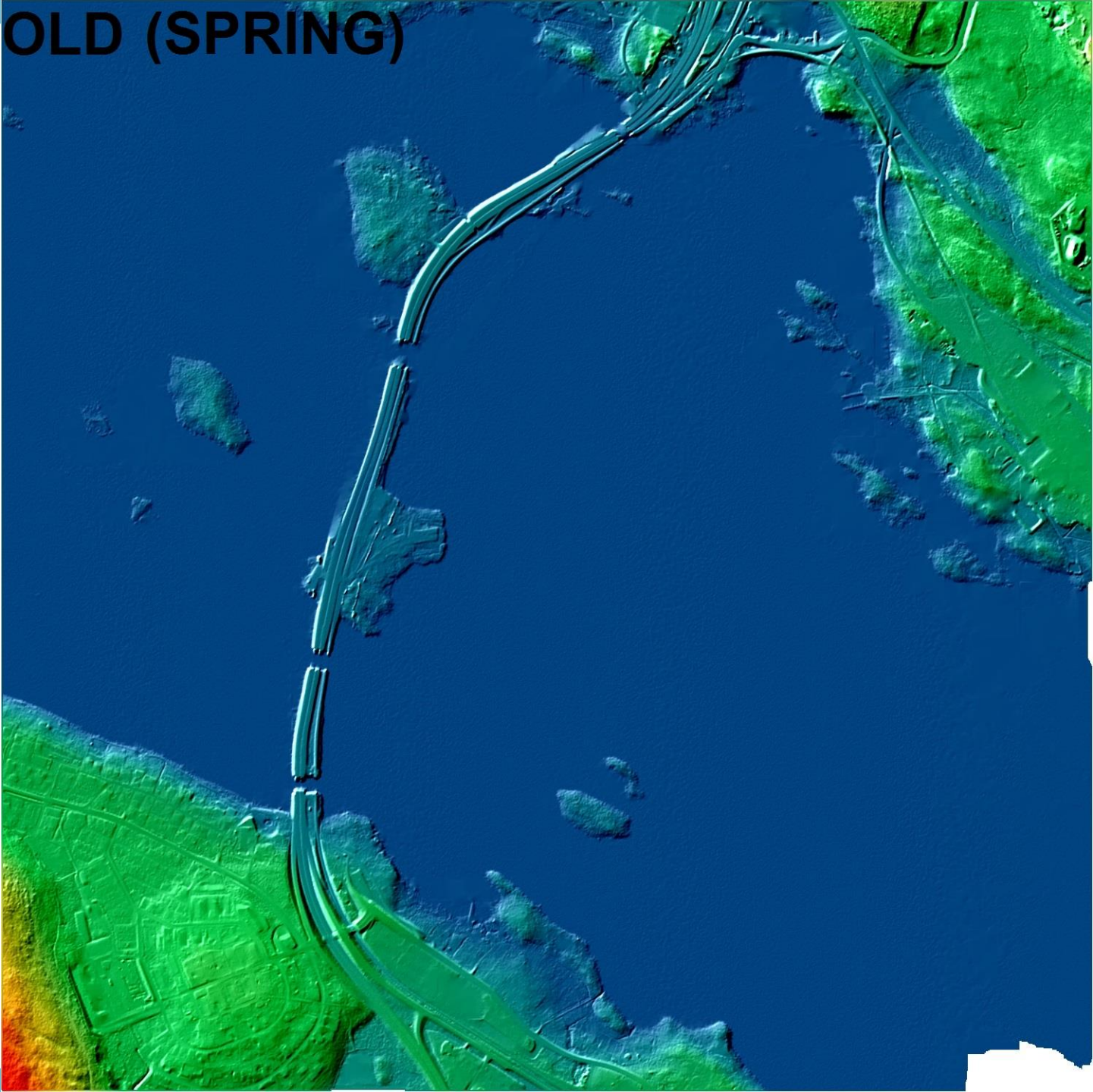


Visualization (lines 0.3 m)

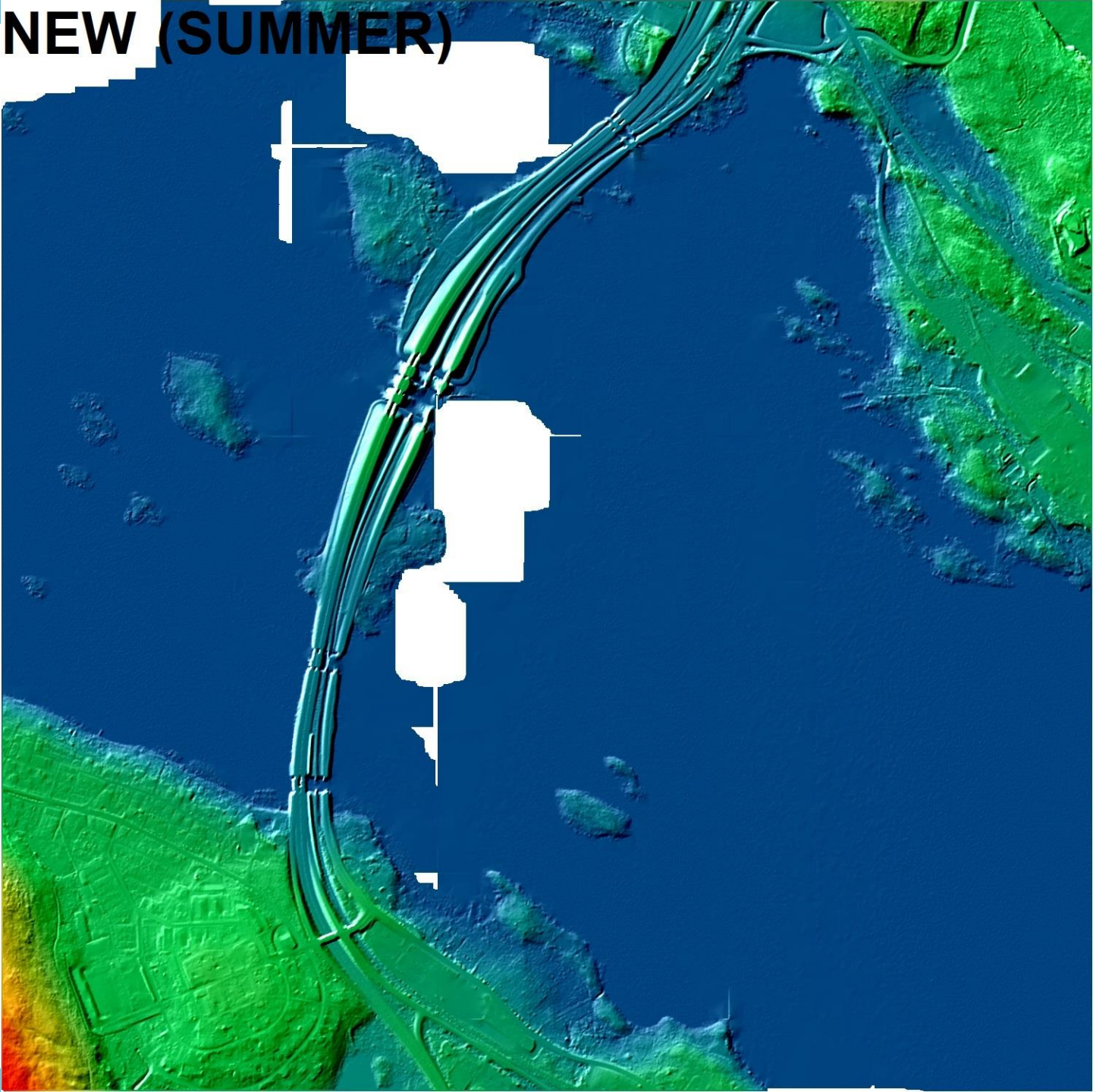


Example of a mapsheet (3x3 km²) with many changes – elevation differences

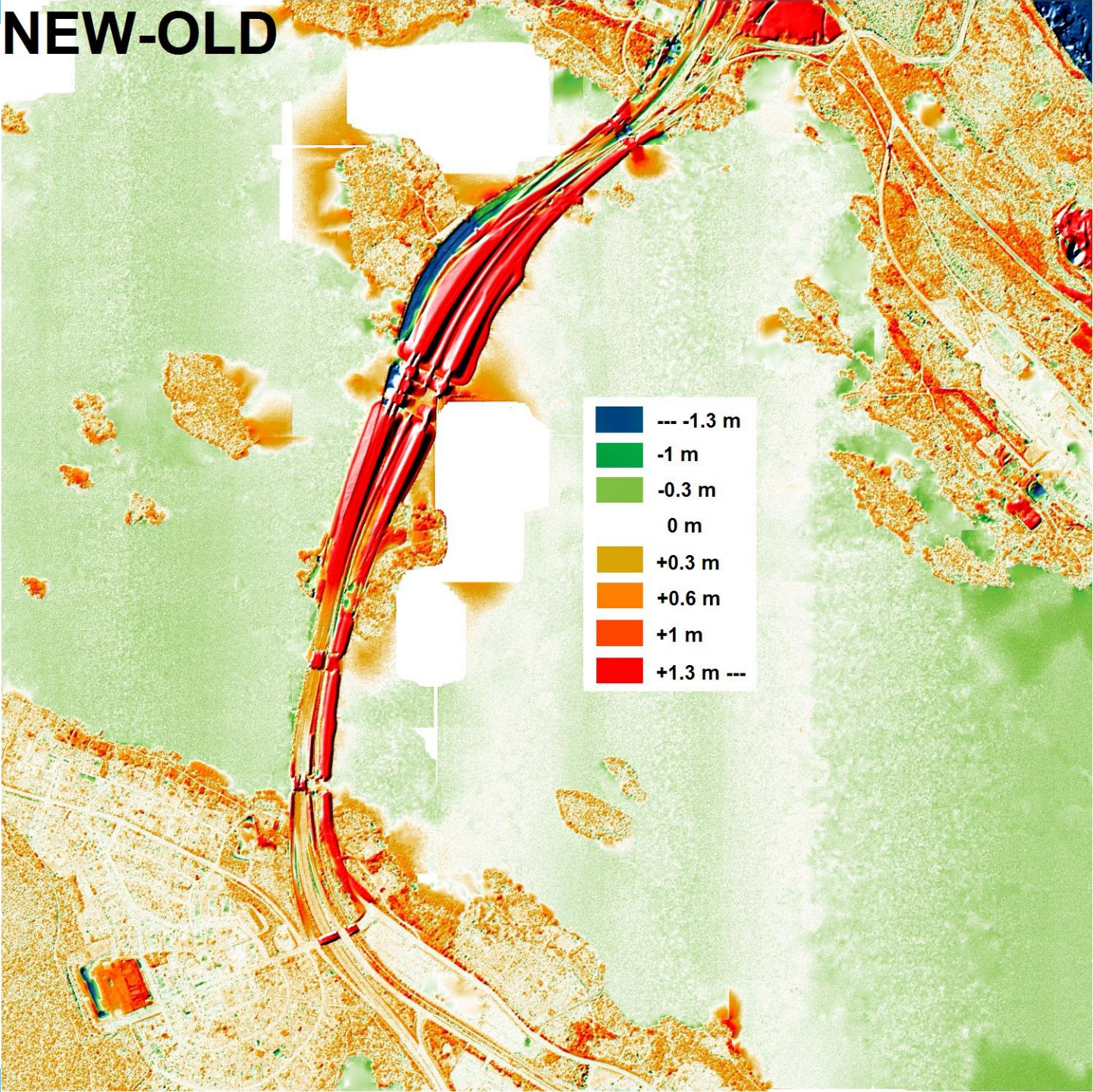
OLD (SPRING)



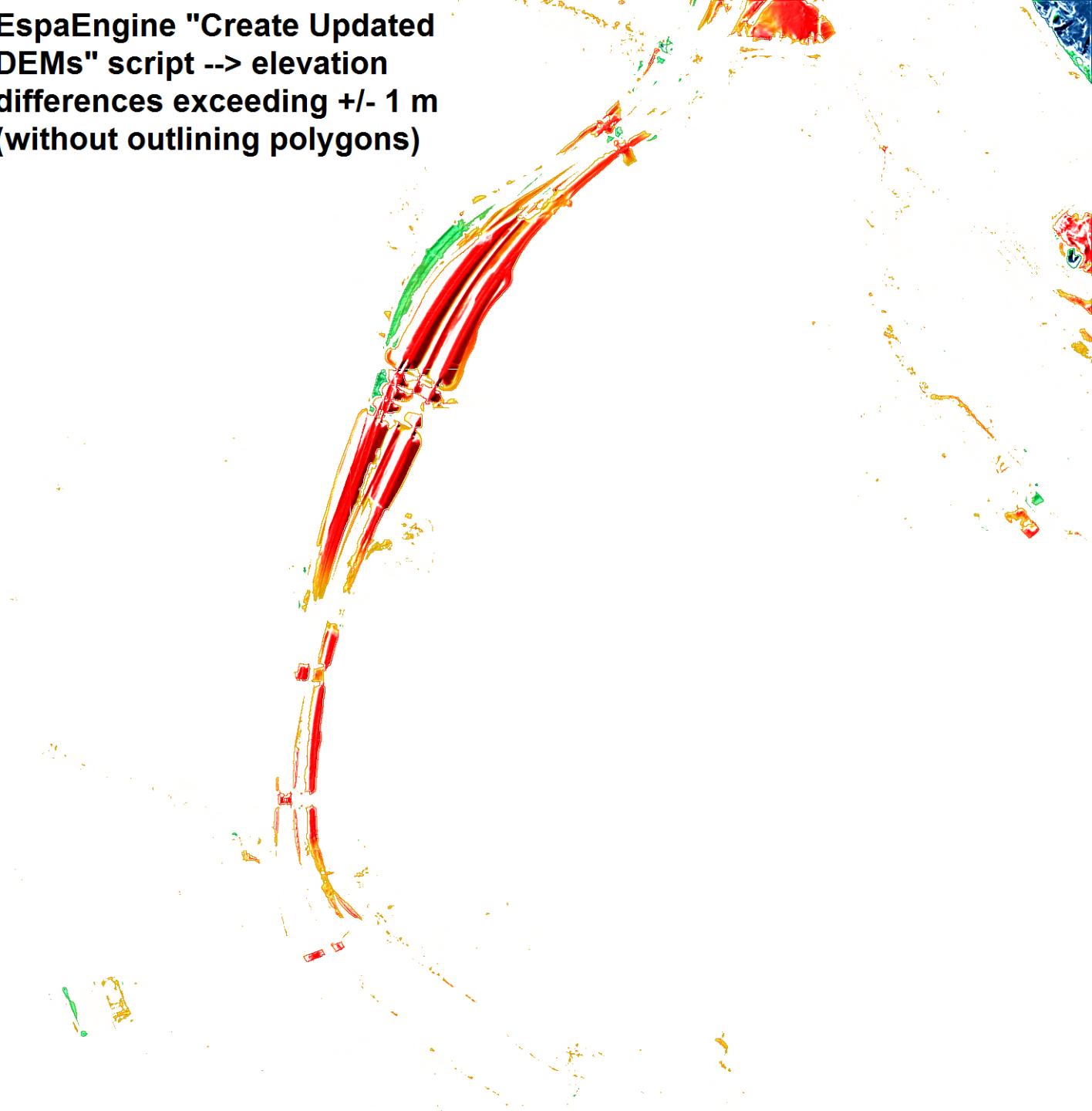
NEW (SUMMER)



NEW-OLD



EspaEngine "Create Updated DEMs" script --> elevation differences exceeding +/- 1 m (without outlining polygons)



End products

- Locally updated 2 meter DTM
- Locally updated point cloud that is a combination of older and new laser data
- This new combination point cloud will be the reference for change detection when updating the DTM in the future.

Thank You!

