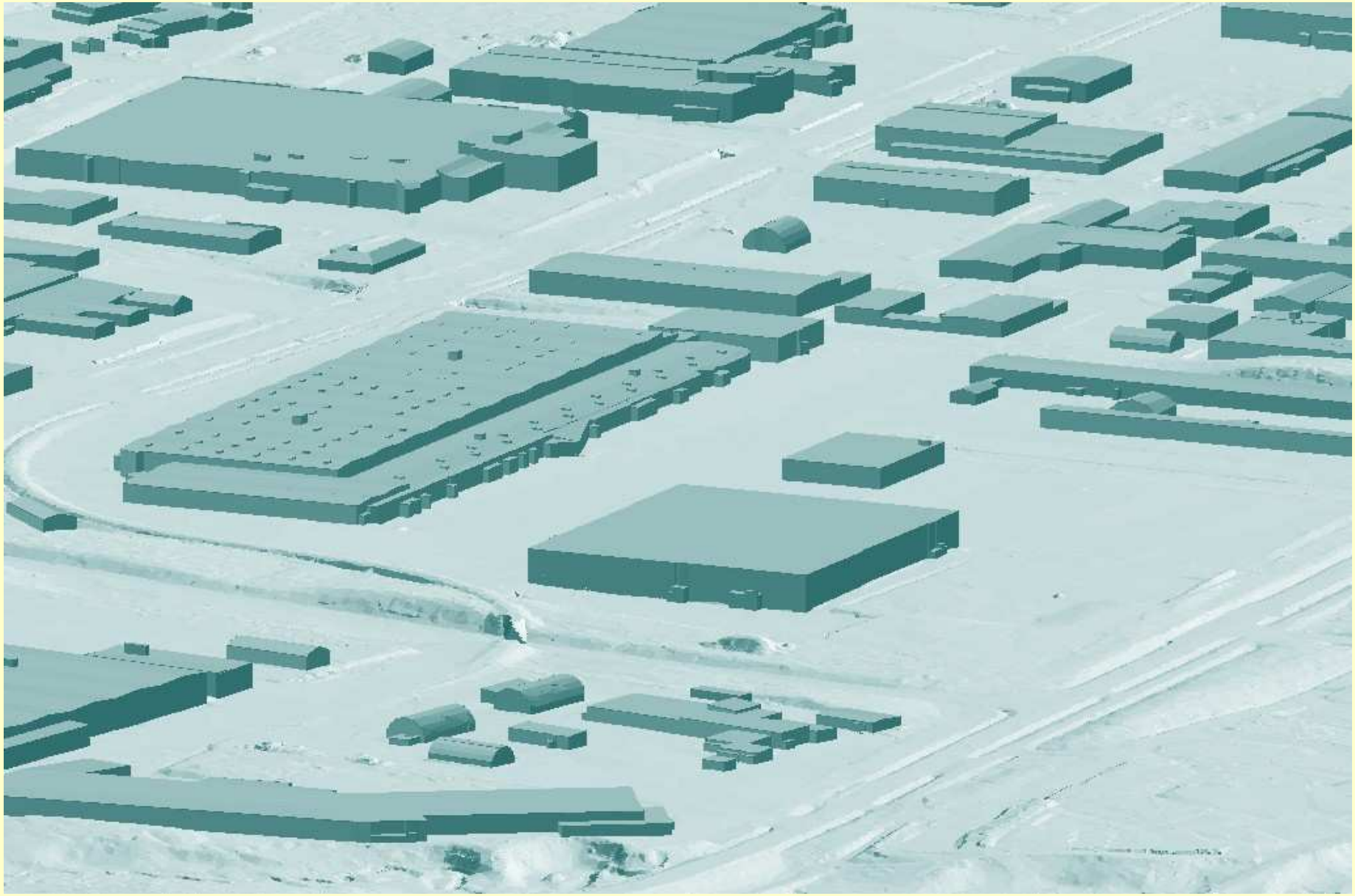
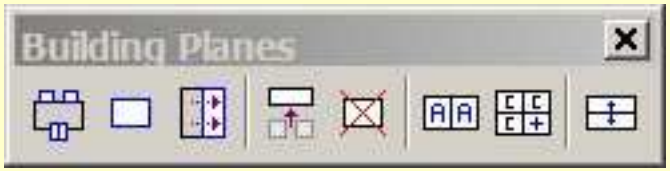
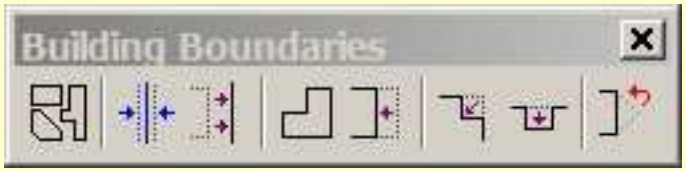
Building Vectorization



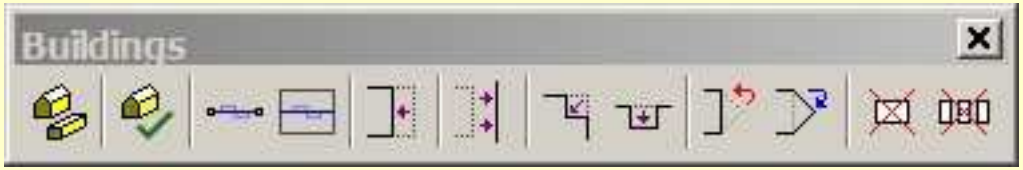
Old Building Vectorization





- Manual tools for working on one building at a time
- Meant for producing accurate vector models
- Appeared in software 2003
- First tested on Helsinki Univ of Technology area
- 2.3 sq km originally took 3 days to vectorize
- With some improvement in tools, the same area took 1.5 days to vectorize in 2004
- One building was not vectorized due to irregular, small details

New Building Vectorization



- For airborne laser data + images
- Three goals:
  - Produce approximate 3D vector models automatically
  - Produce accurate 3D vector models faster than old tools
  - Vectorize buildings with non-planar roofs

New Building Vectorization

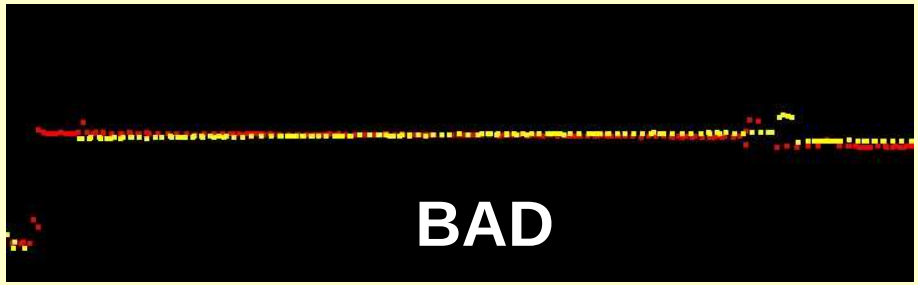
- Relies on following classification done:
  - Ground
  - Height from ground
  - Buildings
- **Vectorize Buildings** tool produces 3D vector models automatically
  - Can run as a macro for whole project
- **Check Buildings Models** tool lets you review automatic models one at a time against an airborne raw image
  - Tools for editing automatically generated models

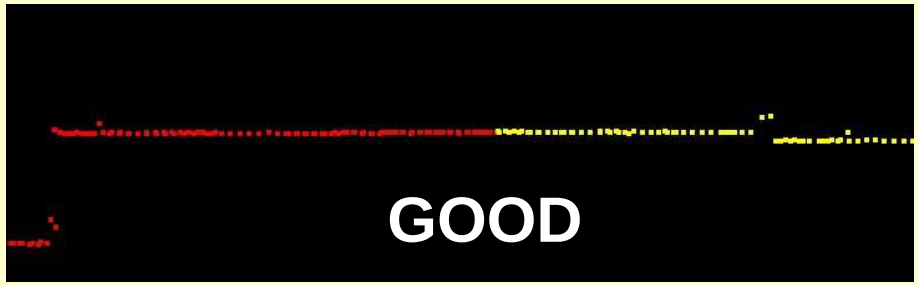
New Building Vectorization

- Automatic vectorization can be used for production
  - First version that does something useful
  - Will improve gradually
- Manual editing is some distance from production level

Requirements on Data Set

- Clean data on the roofs:
  - No overlapping flightlines with significant mismatches
  - TerraMatch done
  - Cut overlap done

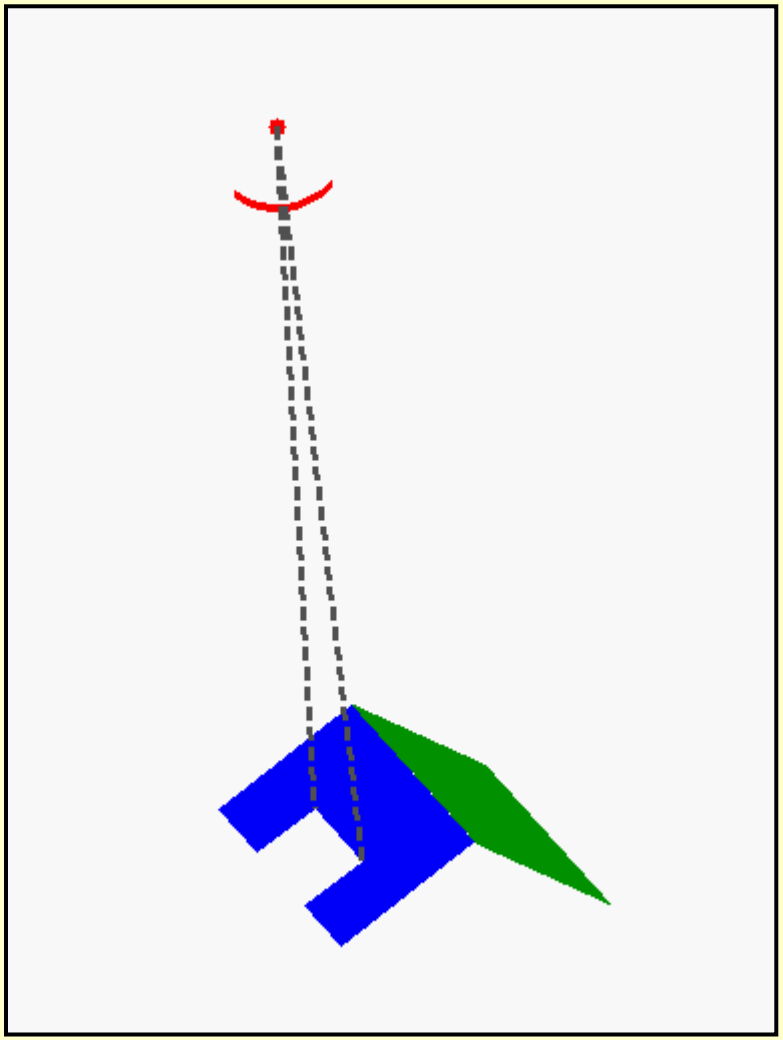




- Images for manual editing:
  - TerraPhoto mission and image list
  - Best possible positioning
  - Aerial triangulation done

Monoscopic measurement

- Roof plane equation is known
- Camera orientation is known
- We can measure points on the plane using one raw image



Buildings & Data Density

- Higher point density → more accurate models
- Low density < 2 points / m²
  - Good models of large buildings
  - More problems with small buildings
  - Loss of detail structures
- Medium density 2-10 points / m²
  - Good models
- High density > 10 points / m²
  - Accurate models
  - Can do details

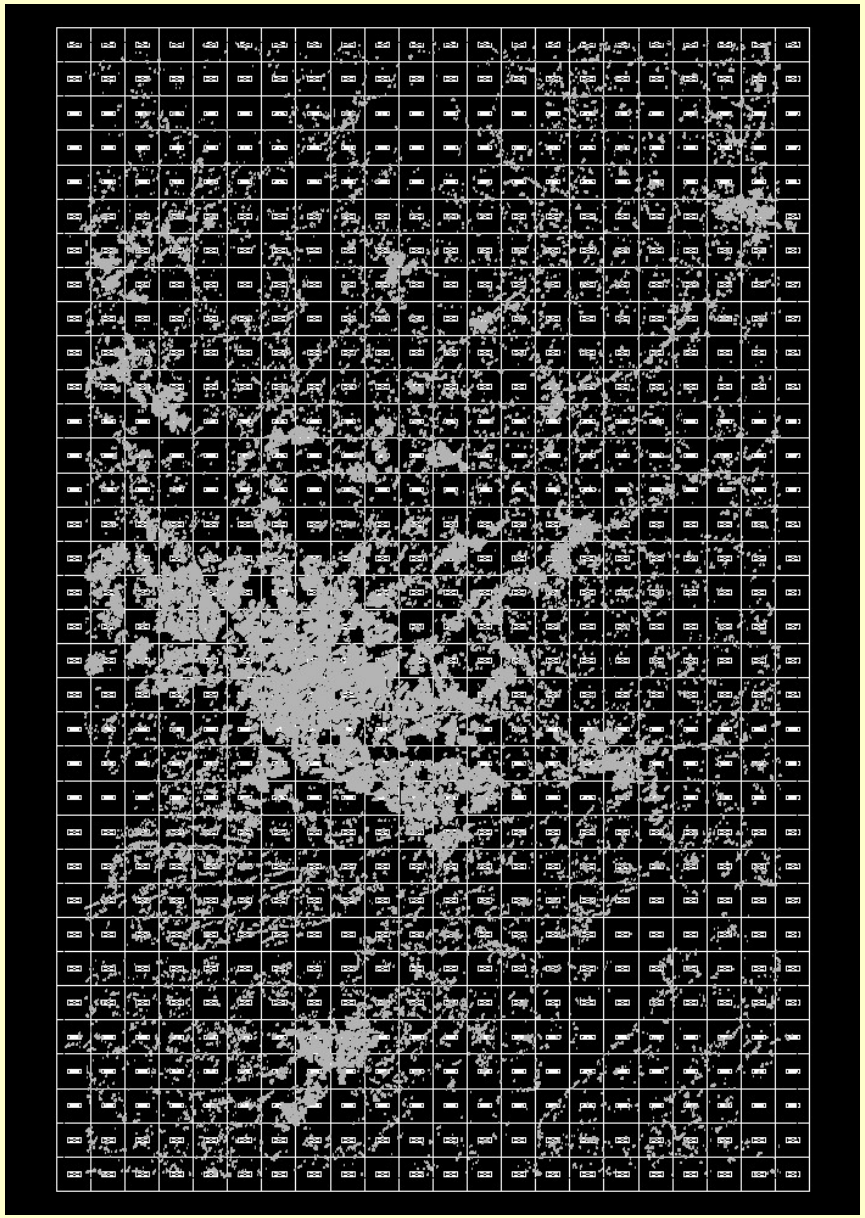
Viikki

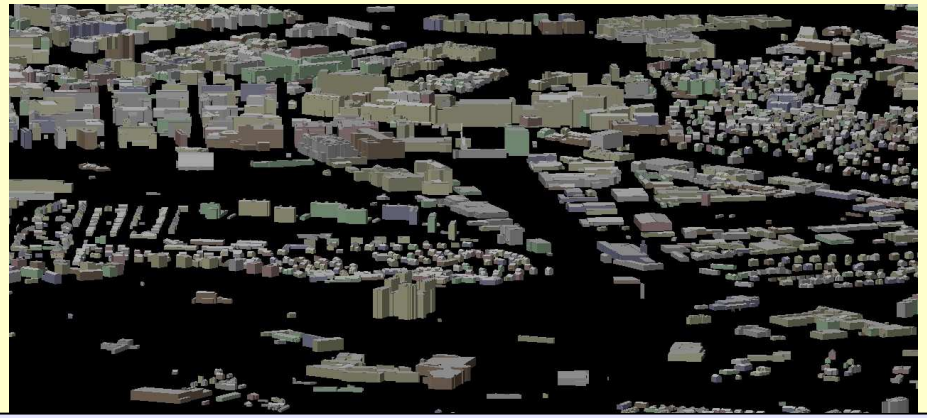
- NLS data from Viikki, Helsinki
- About 0.7 points / m^2

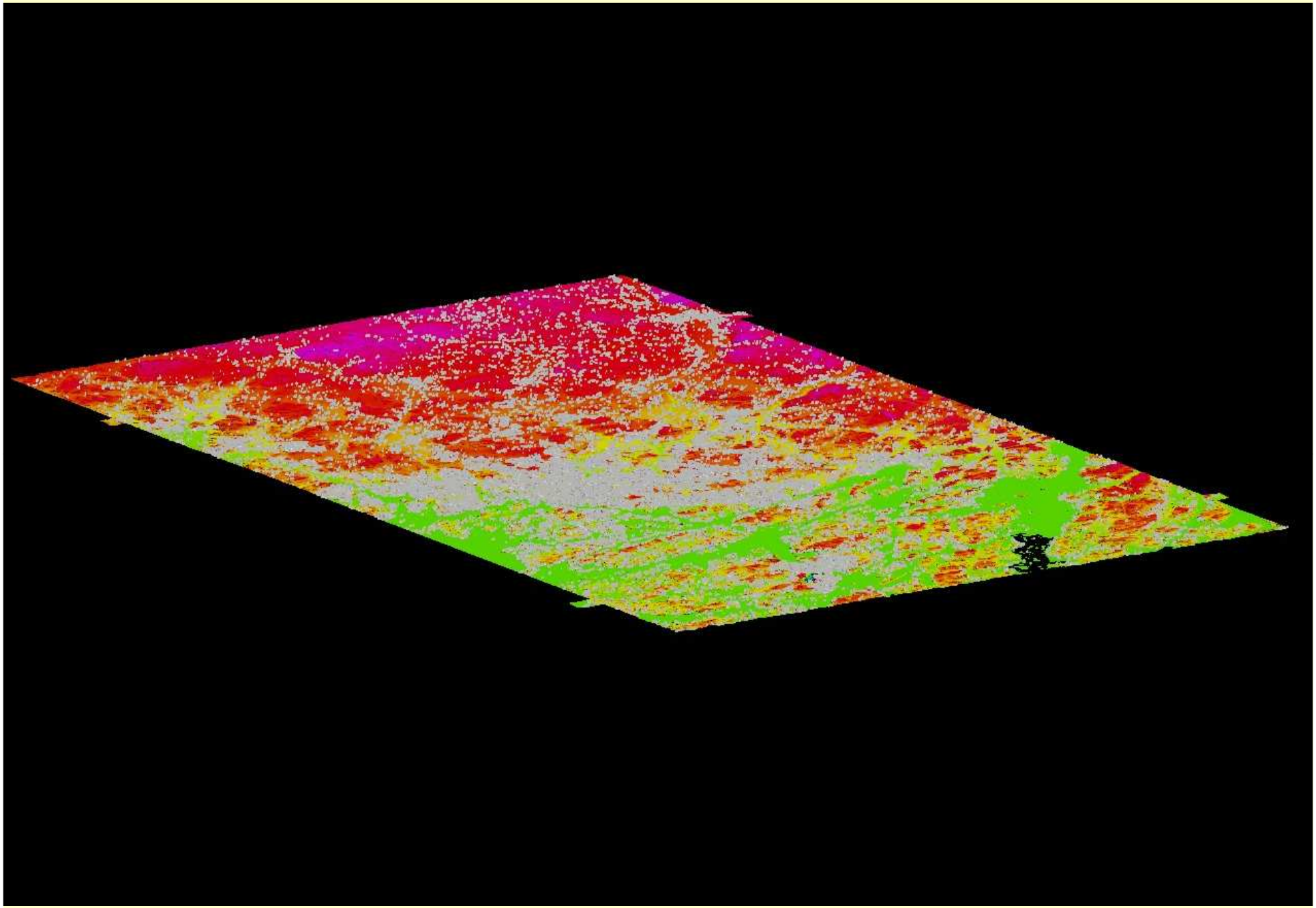
Turku Area

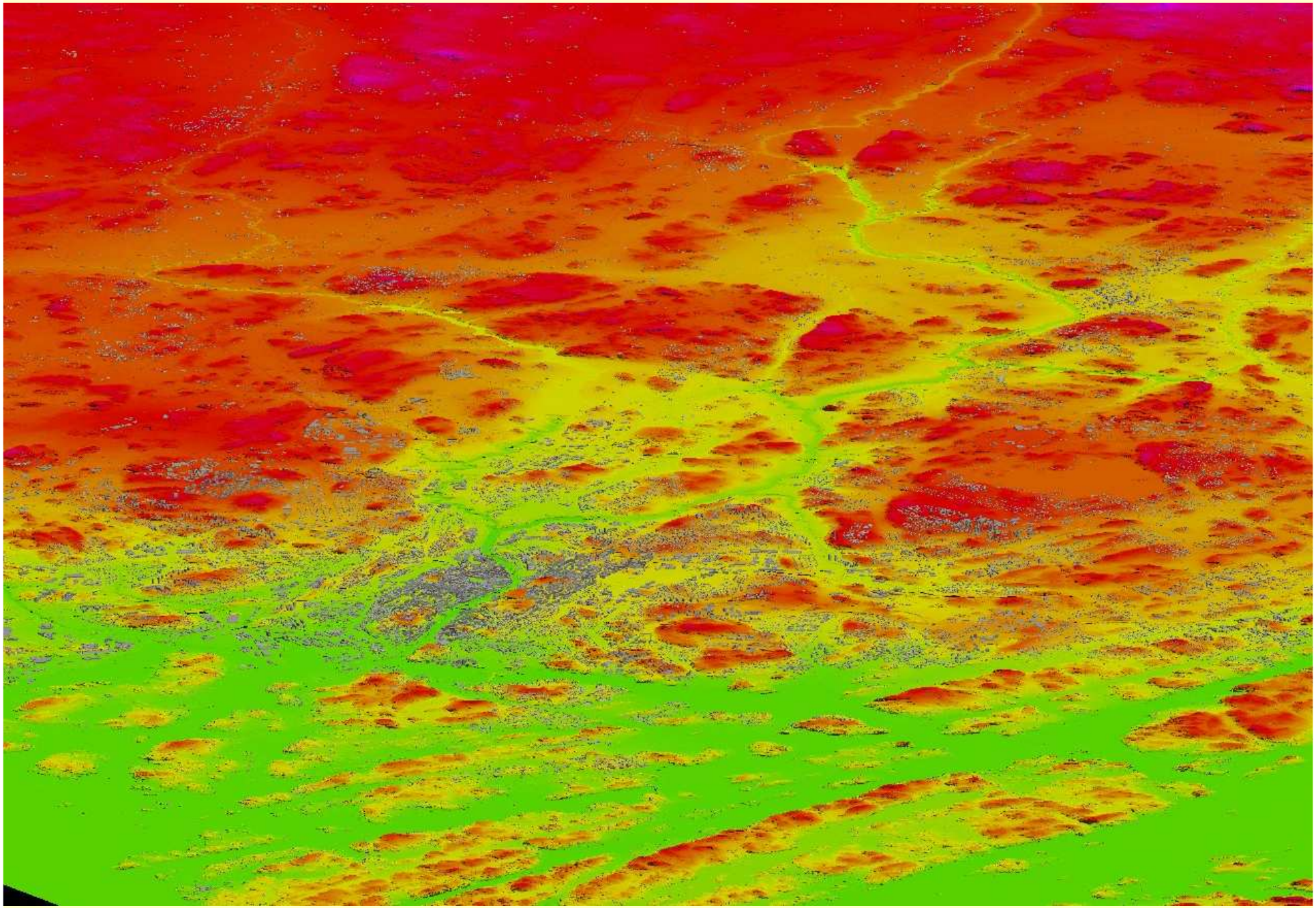
- Close to 2000 km² of NLS data
- 3 billion points -- 1.5 points / m² after cut overlap
- Matching of flightlines done
- Automatic ground done – no manual editing
- Automatic building classification do – no manual editing
- Automatic vectorization done – no manual editing
- Vectorization took 6 hours on notebook & USB drive

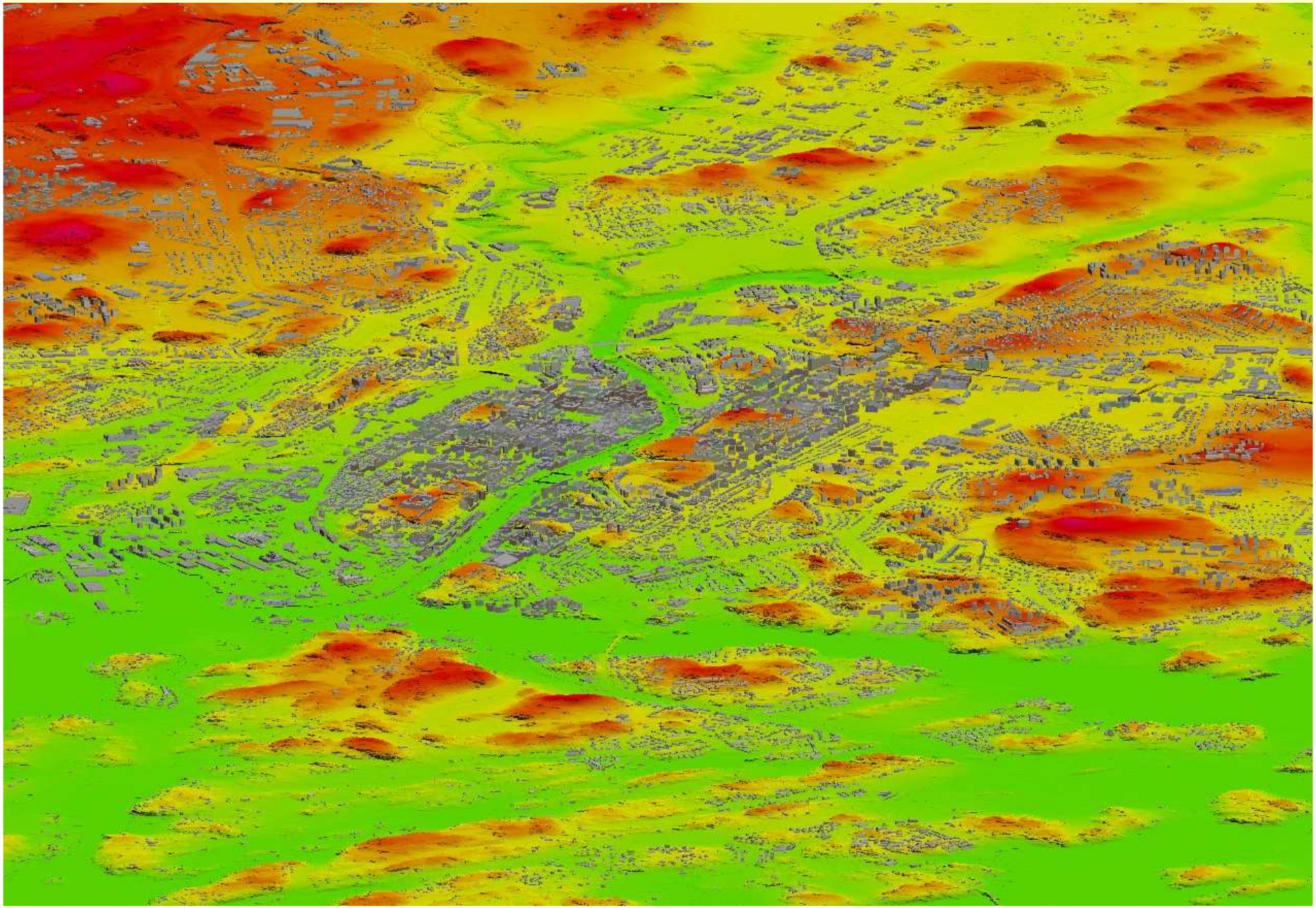
Turku Area

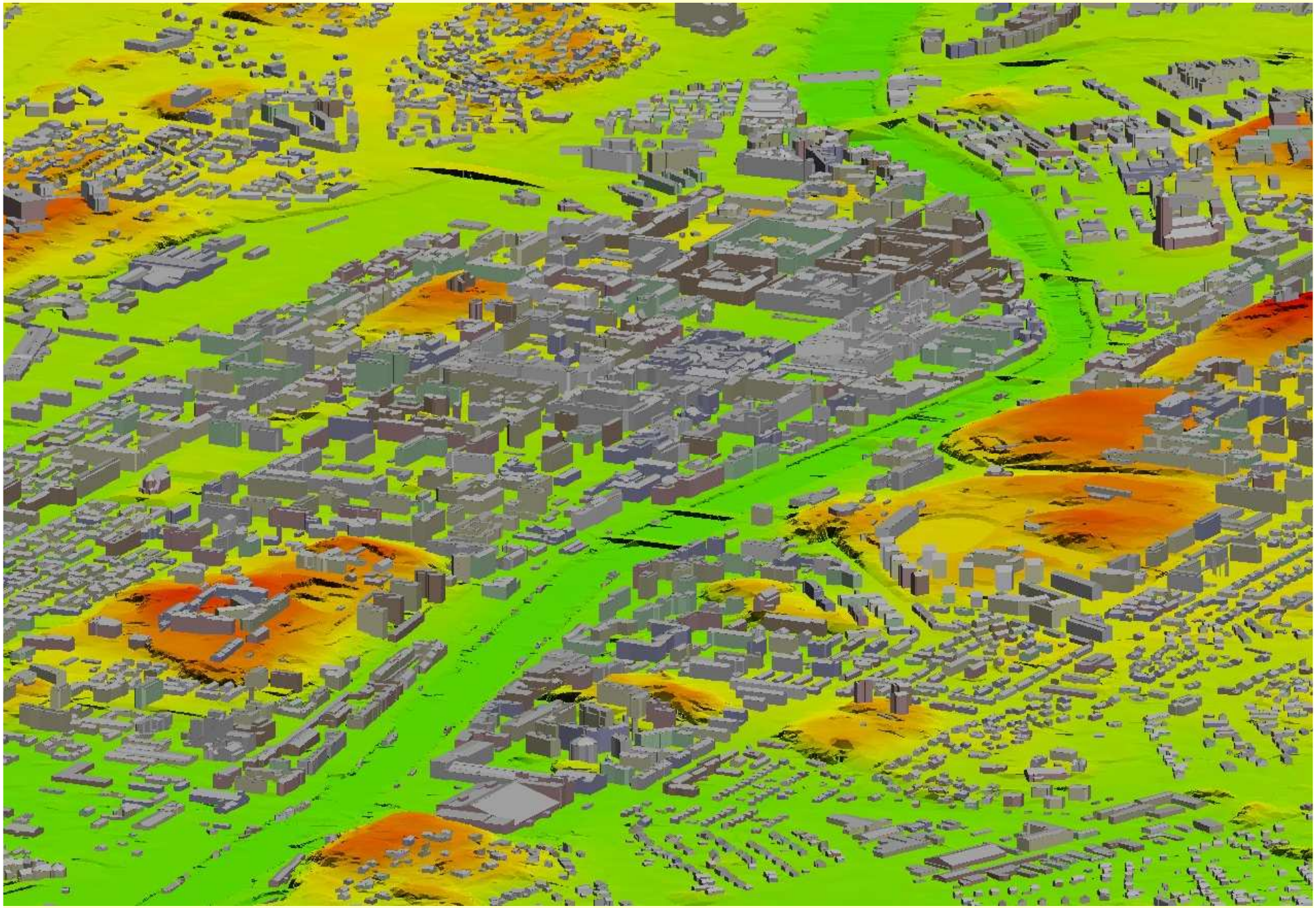


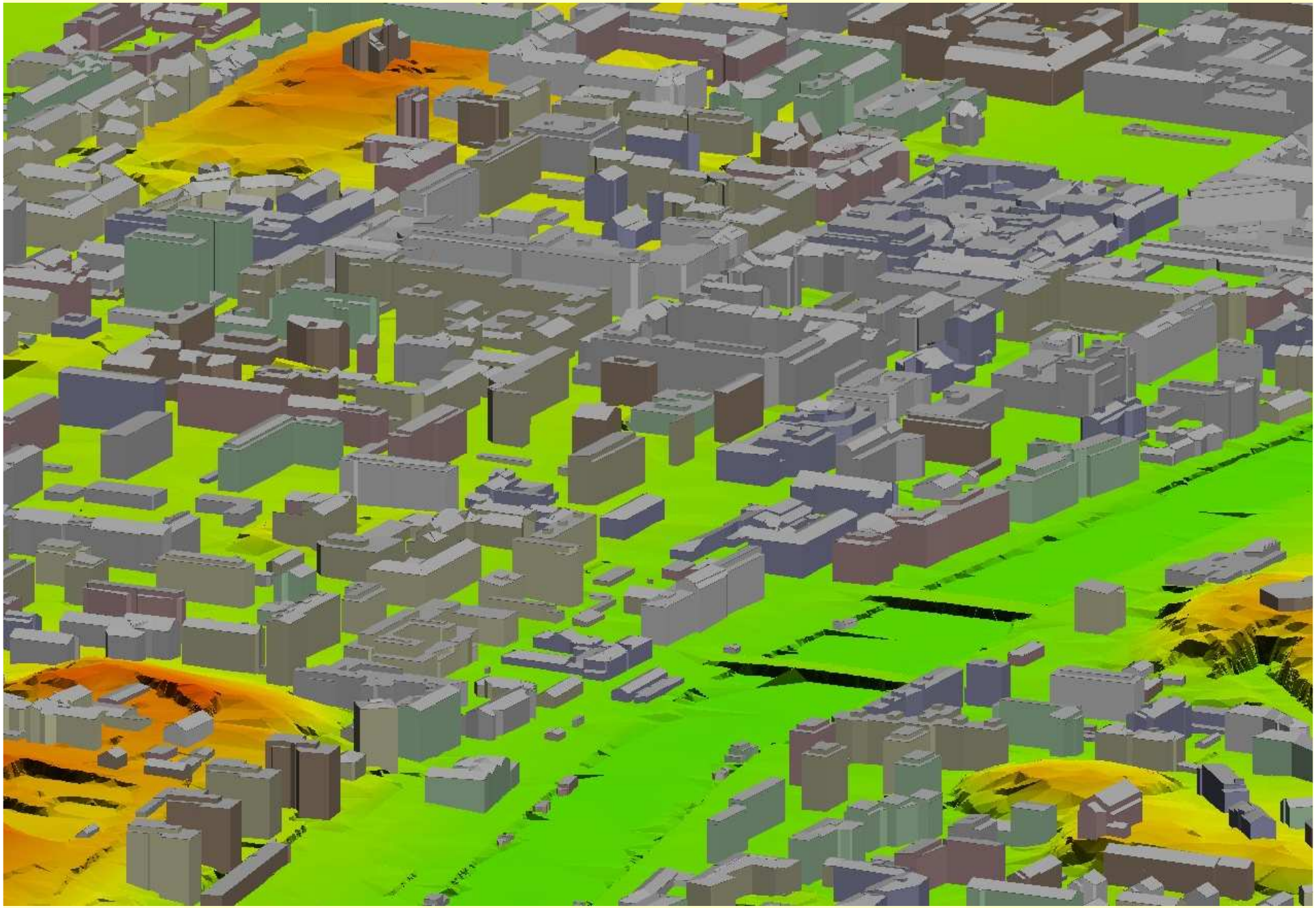


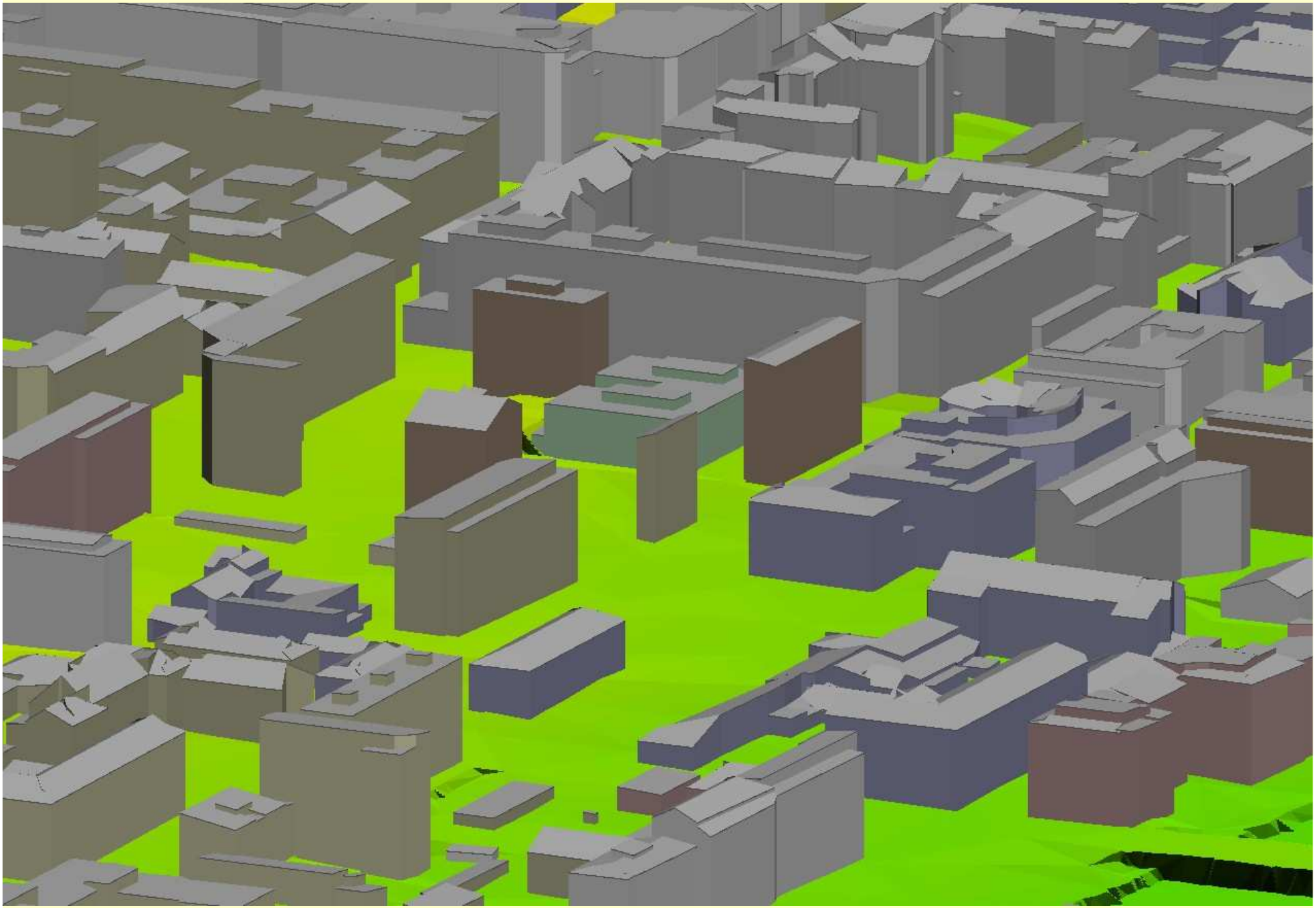












Jönköping

- Blom TopEye, Sweden

- 400 m altitude
- About 10 points / m² after cut overlap
- Images with 4.5 cm pixel size