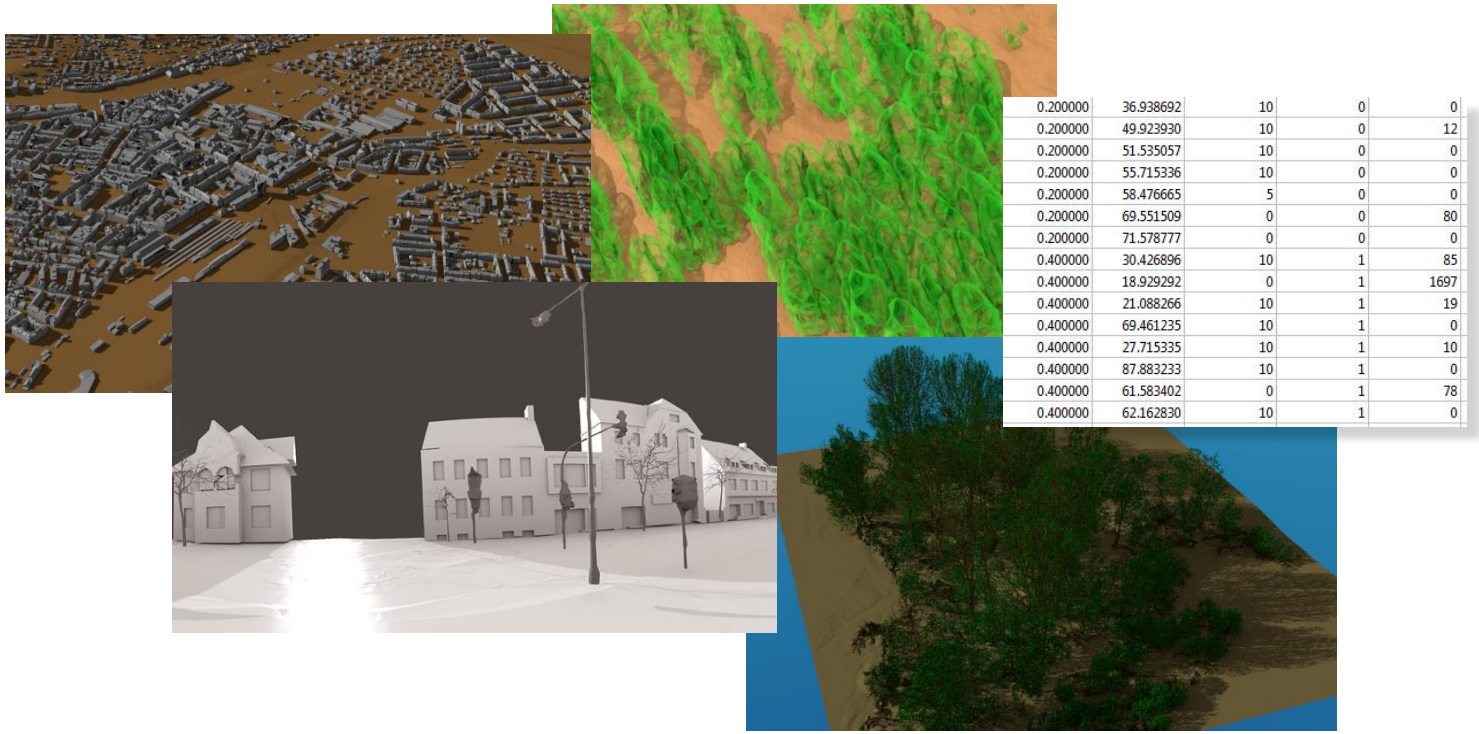
Automatic Information Extraction from LiDAR-Data



0.200000	36.938692	10	0	0
0.200000	49.923930	10	0	12
0.200000	51.535057	10	0	0
0.200000	55.715336	10	0	0
0.200000	58.476665	5	0	0
0.200000	69.551509	0	0	80
0.200000	71.578777	0	0	0
0.400000	30.426896	10	1	85
0.400000	18.929292	0	1	1697
0.400000	21.088266	10	1	19
0.400000	69.461235	10	1	0
0.400000	27.715335	10	1	10
0.400000	87.883233	10	1	0
0.400000	61.583402	0	1	78
0.400000	62.162830	10	1	0

Which information?

? surface area

? cubic capacity

? crown volume

? window area

? solar potential

? leaf-area

? tree height

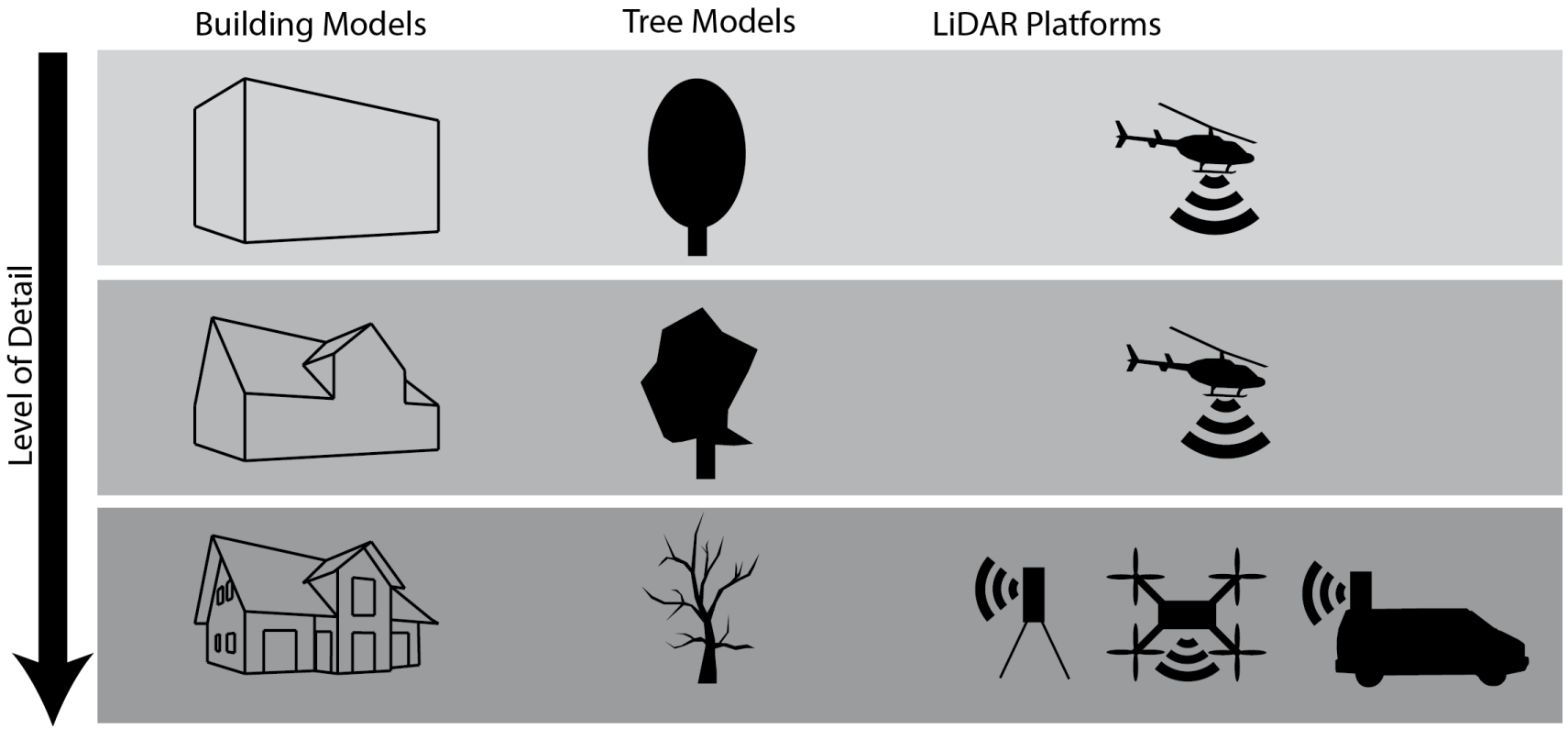
? wood volume

? footprint & dimensions

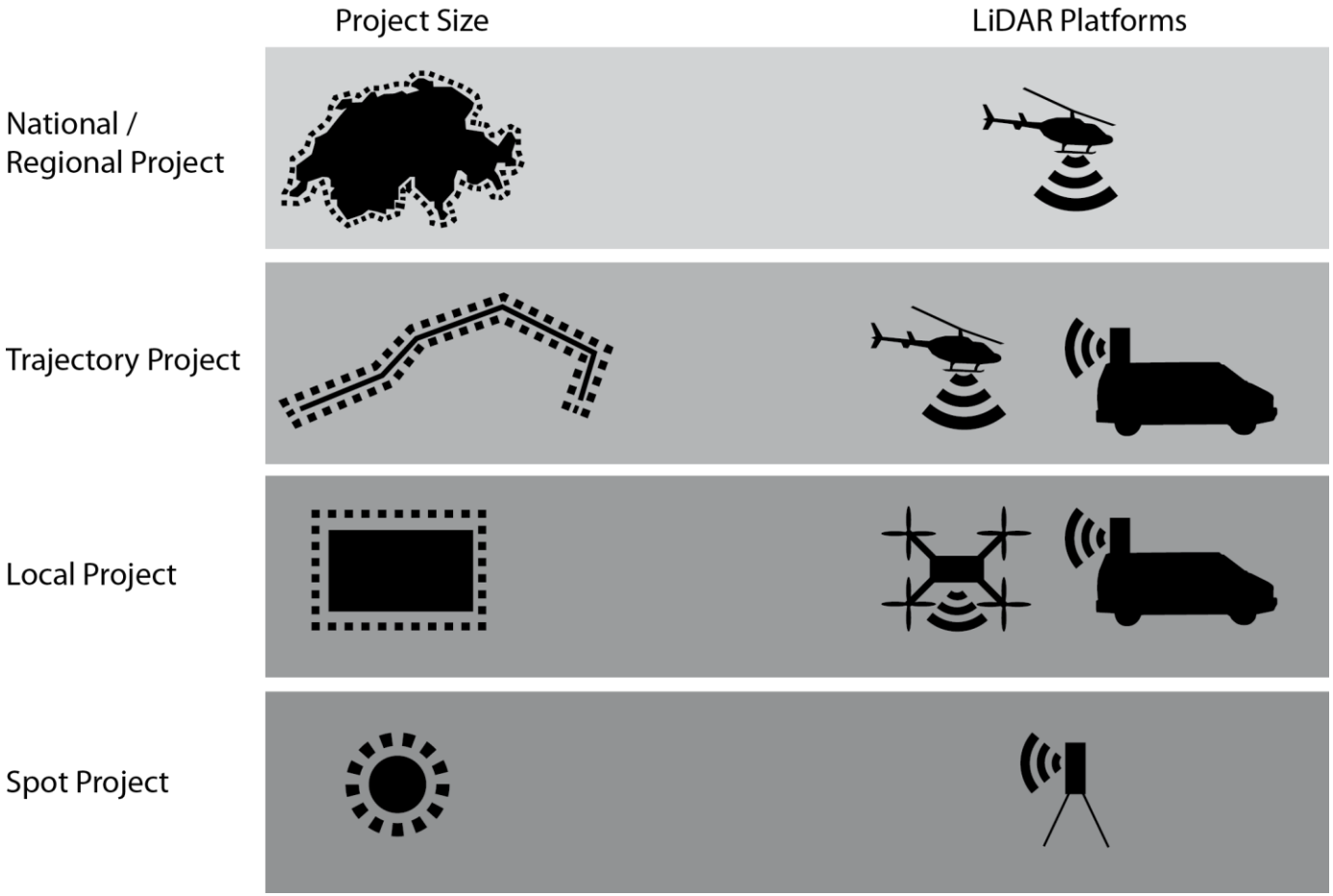
? thermal efficiency

? urban cooling effects

Which level of detail and platform?



Which project size and platform?

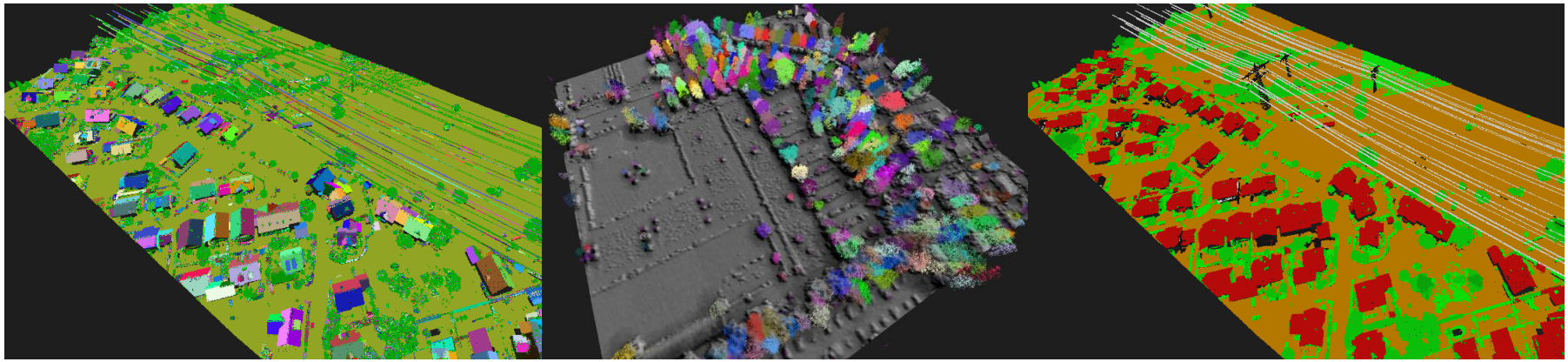


Requirements

- Extraction of **object** information
  - per building
  - per roof
  - per window
  - per tree
- Intersection with ancillary data (e.g. cadastre)
- Highest geometrical detail
- Large area aquisition
- Standard format outputs (e.g. cityGML, dxf, COLLADA, …)

- **Complete automation**!

Main processing steps



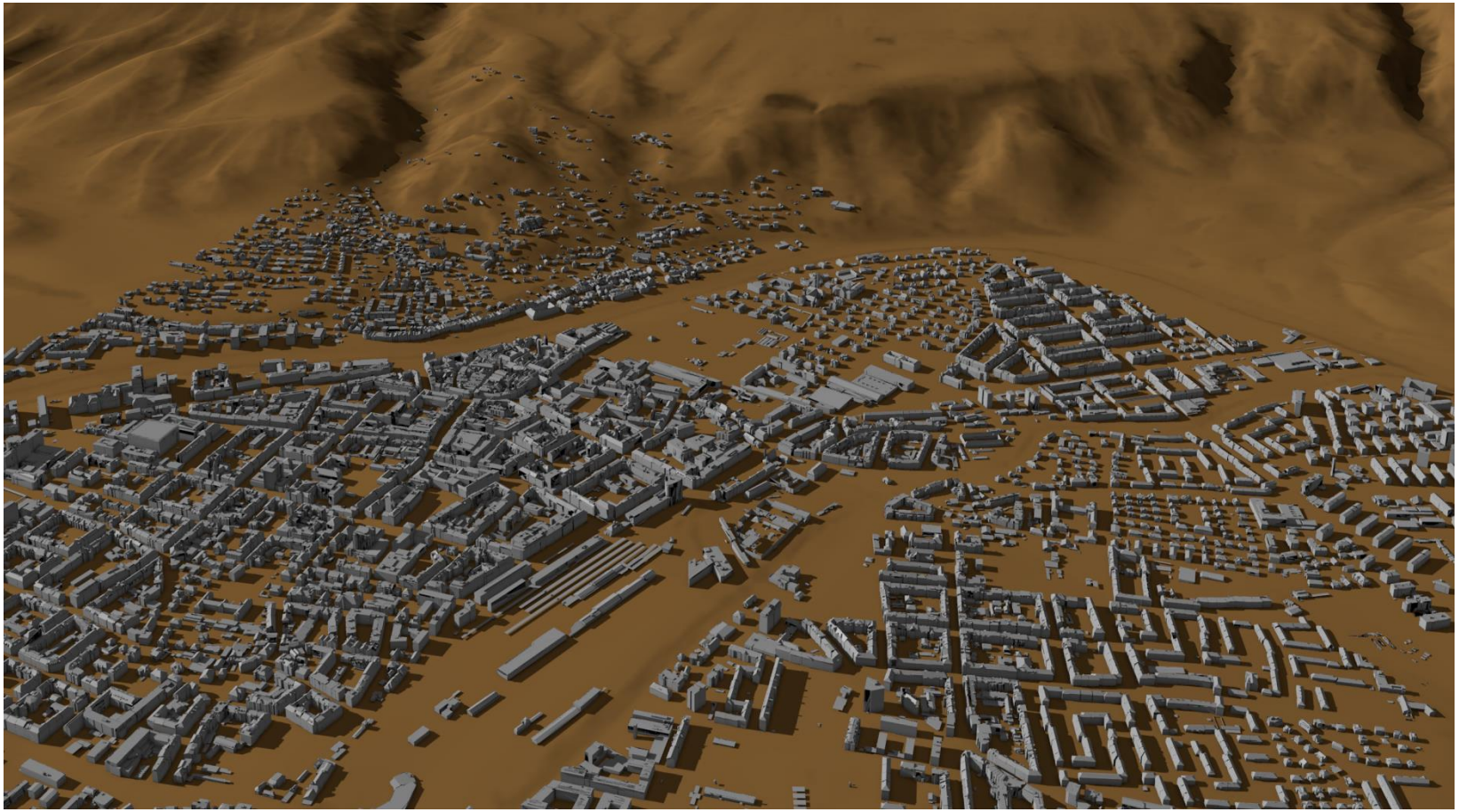
Extraction and segmentation of objects:
- Buildings
- Roof facettes
- Single trees
- Cable segments

Classification:
- Ground
- Buildings
- Vegetation
- Power Lines

- Road signs

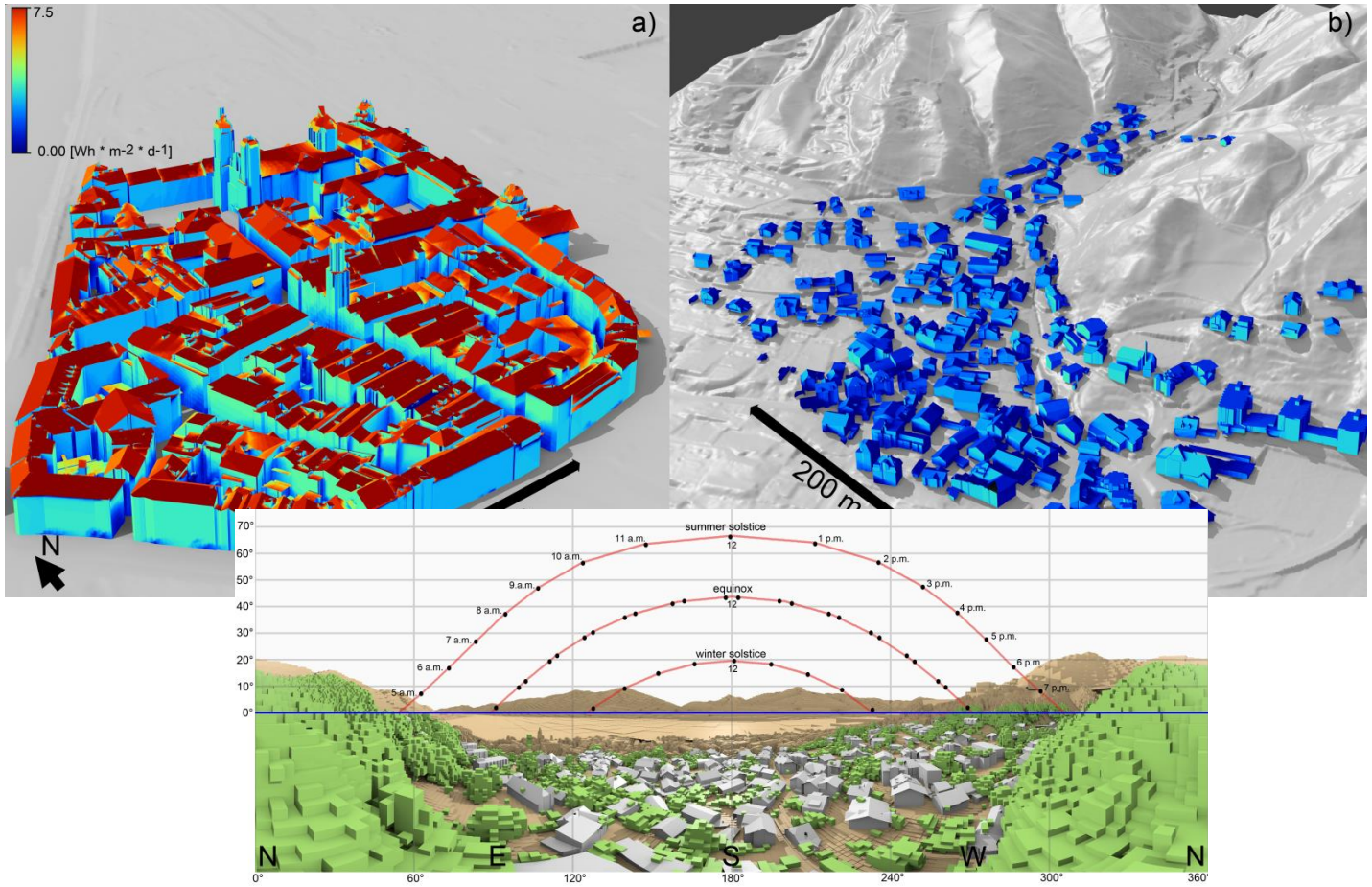
Processing examples

3D building reconstruction from airborne LiDAR data (Project: Innsbruck (A))

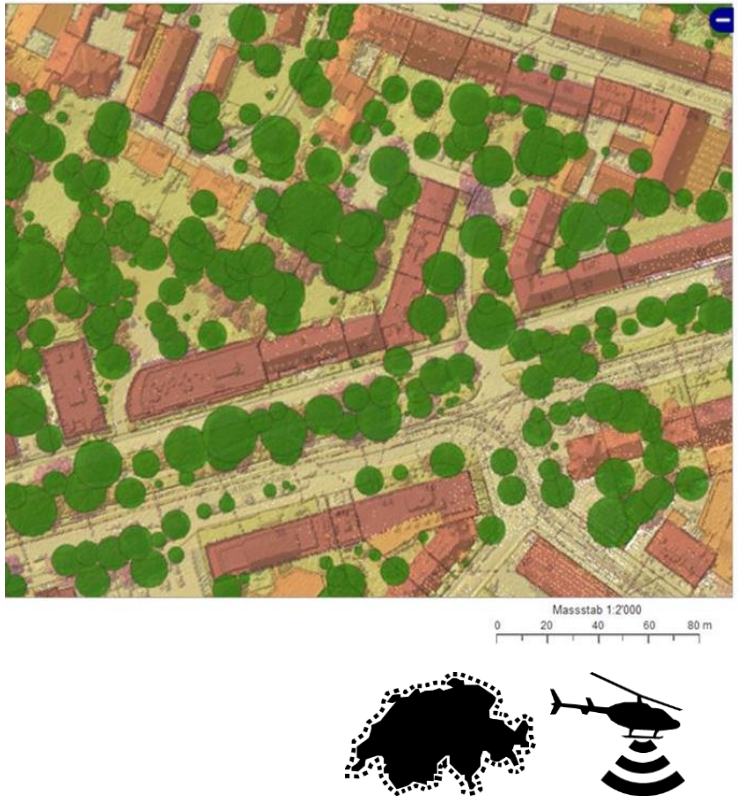


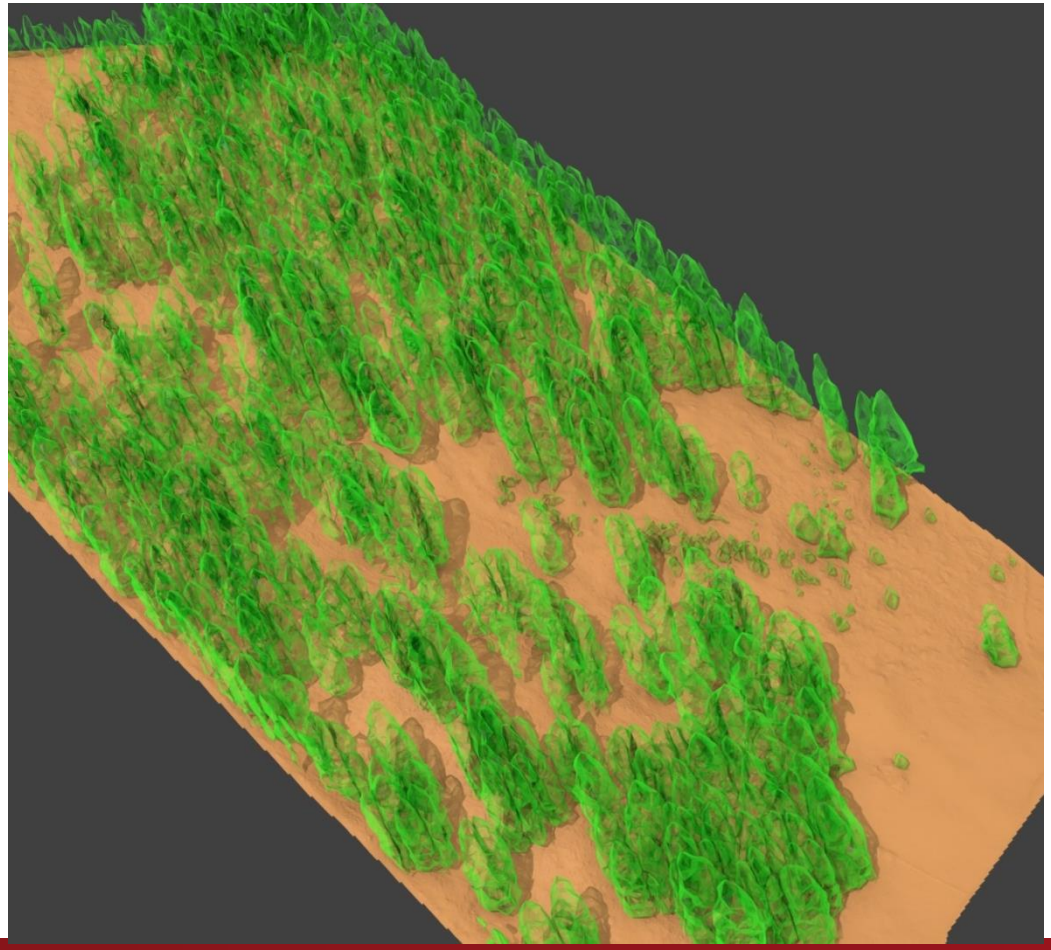
3D building reconstruction from airborne LiDAR data (Project: Obertilliach (A))

3D Solar potential assessment from airborne LiDAR data (Project: Innsbruck (A))

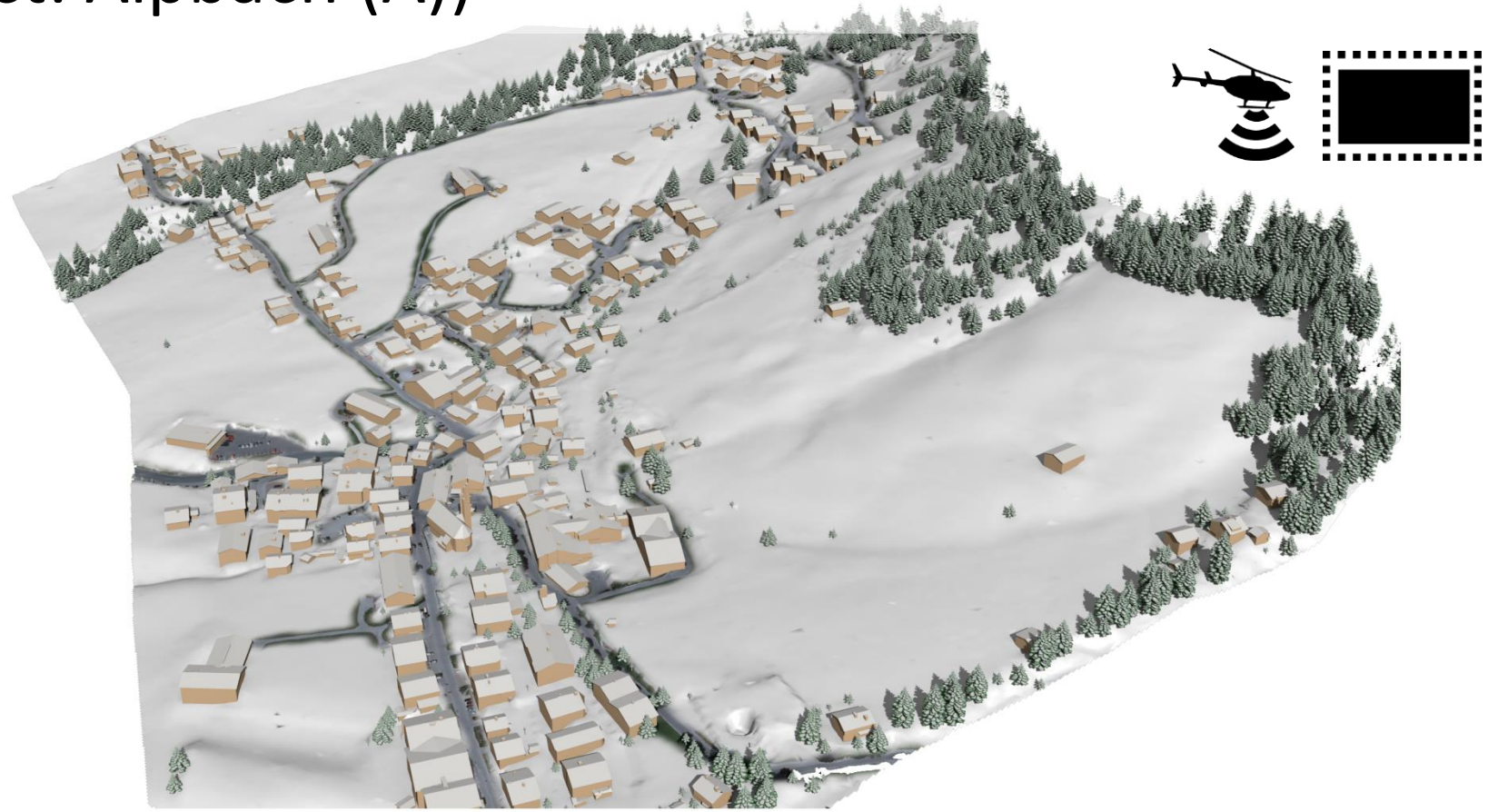


Single tree metrics from airborne LiDAR data (Projects: Basel (CH); Stubai Valley (A))

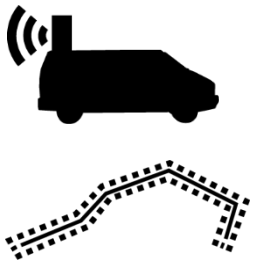




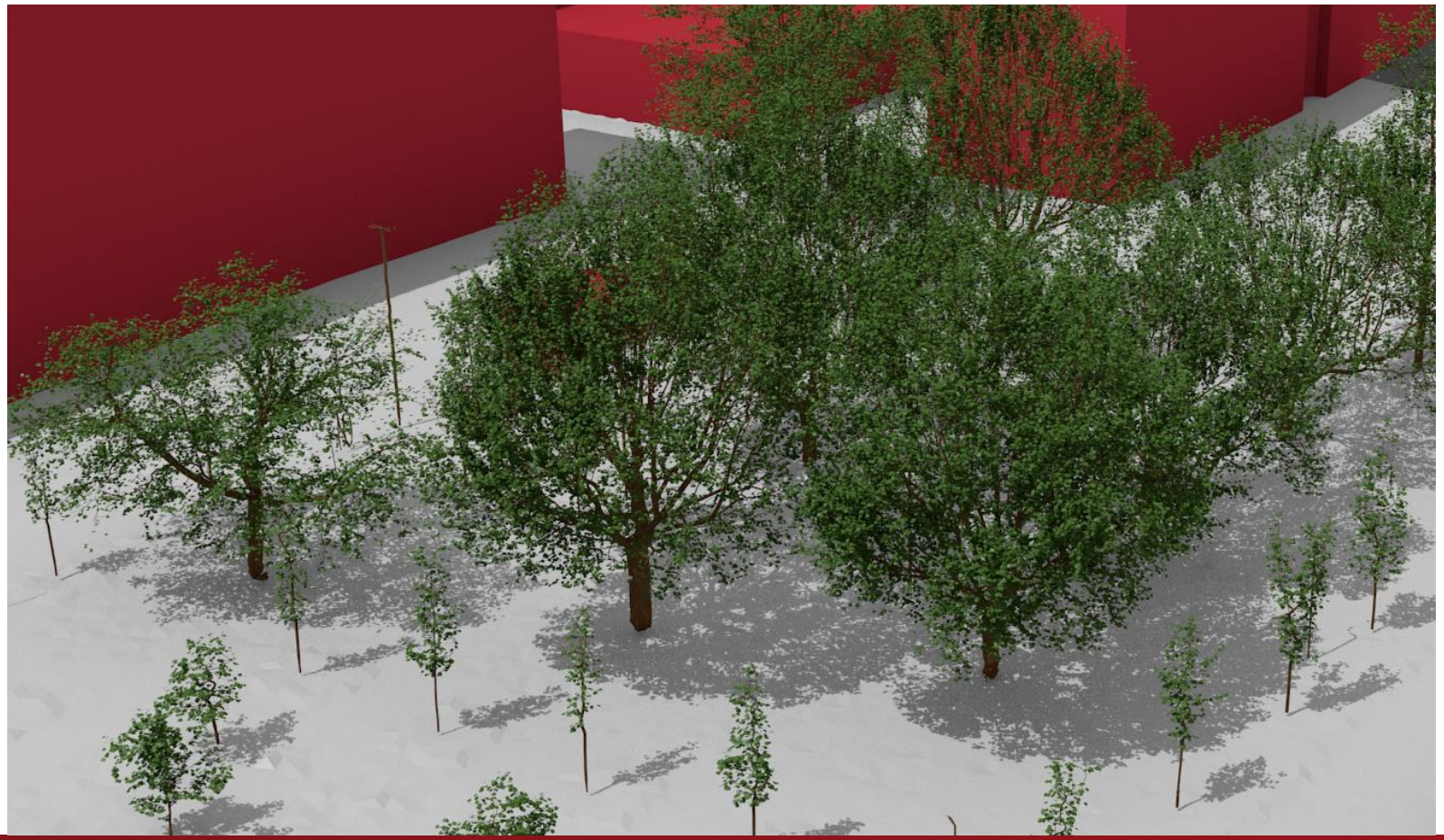
Integration of products from airborne LiDAR data (Project: Alpbach (A))



Road Inventory Reconstruction from mobile LiDAR data (Project: Rheine (D))

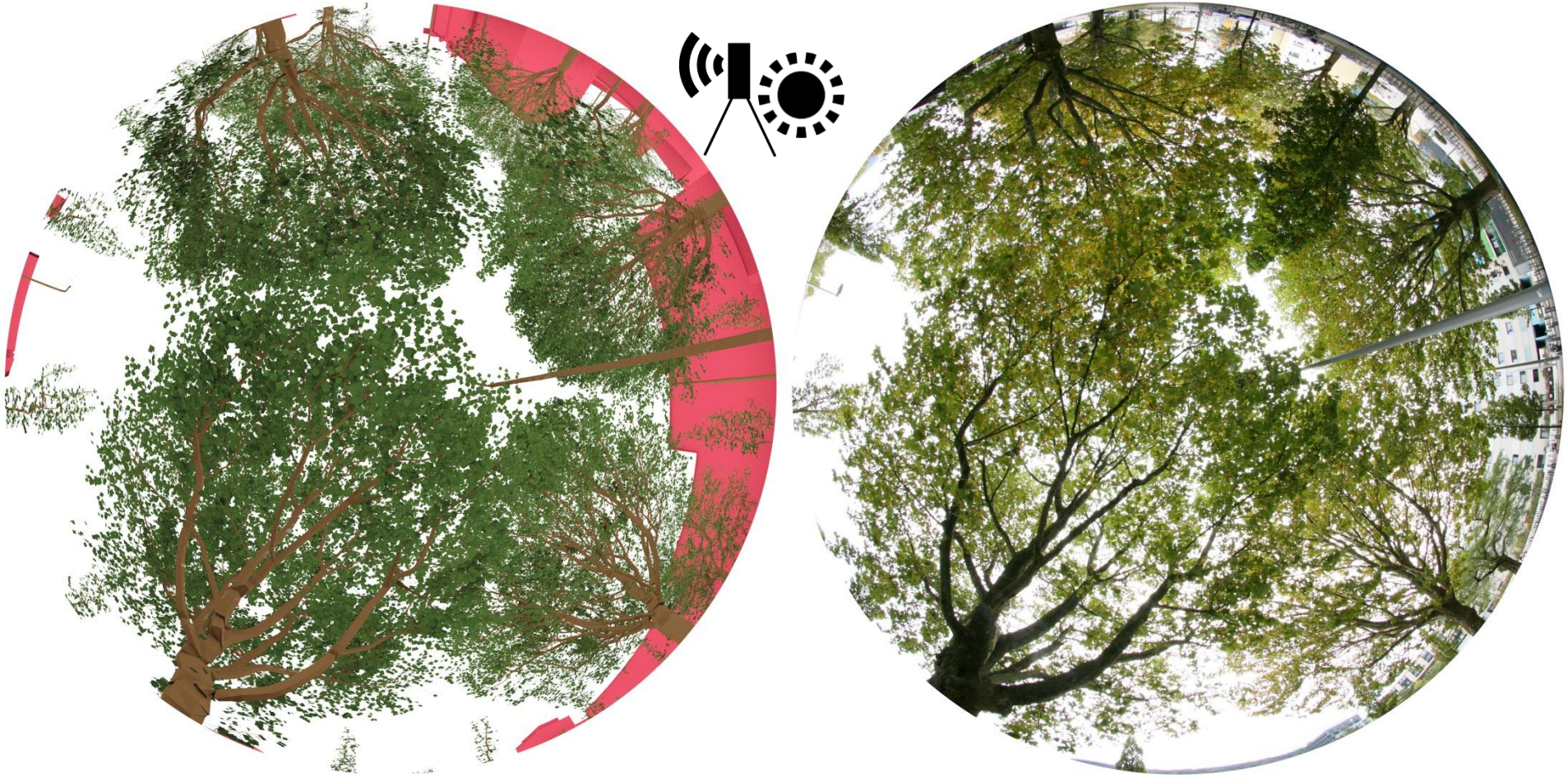


Road Inventory Reconstruction from terrestrial LiDAR data (Project: Innsbruck (A))

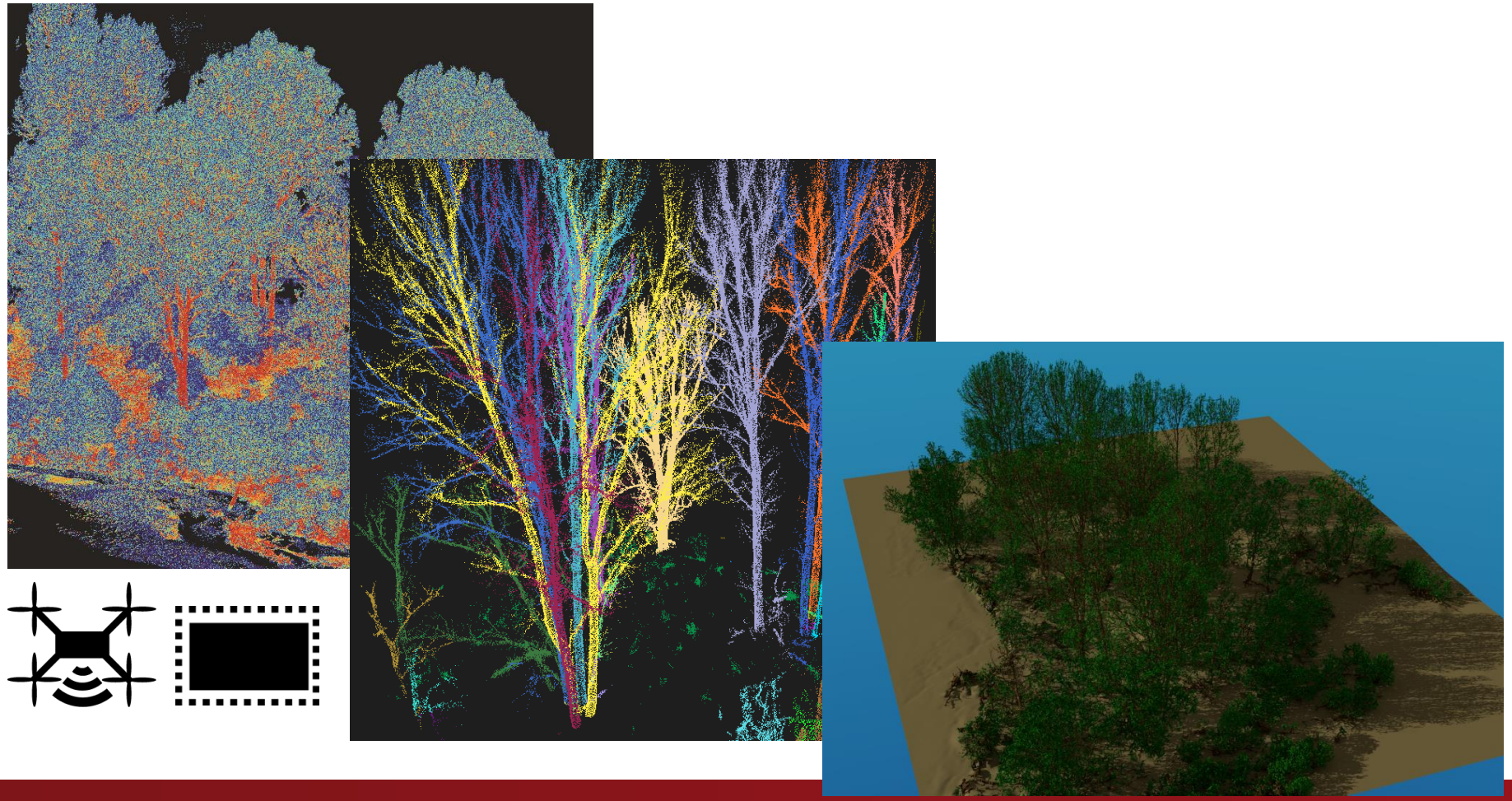


Road Inventory Reconstruction from terrestrial LiDAR data (Project: Innsbruck (A))

Road Inventory Reconstruction from terrestrial LiDAR data (Project: Innsbruck (A))

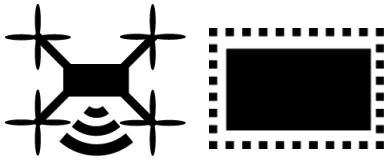


Forest Reconstruction from UAS-borne LiDAR data (Project: Loosdorf (A))



Products

- Above ground biomass per tree (AGB)
- Estimated leaf area per tree
- Crown diameters
- Diameters at breast height (DBH)



distance	diff_angle	iteration	num_parents	num_childs	hierarchy2	volume
0.200000	17.153268	10	0	86	0	0.000250
0.200000	17.157861	0	0	1719	0	0.008408
0.200000	18.688158	0	0	0	0	0.002359
0.200000	36.938692	10	0	0	0	0.000250
0.200000	49.923930	10	0	12	0	0.000250
0.200000	51.535057	10	0	0	0	0.000250
0.200000	55.715336	10	0	0	0	0.000250
0.200000	58.476665	5	0	0	0	0.000250
0.200000	69.551509	0	0	80	0	0.012278
0.200000	71.578777	0	0	0	0	0.009491
0.400000	30.426896	10	1	85	0	0.000250
0.400000	18.929292	0	1	1697	0	0.008373
0.400000	21.088266	10	1	19	1	0.000250
0.400000	69.461235	10	1	0	1	0.000250
0.400000	27.715335	10	1	10	0	0.000250
0.400000	87.883233	10	1	0	1	0.000250
0.400000	61.583402	0	1	78	0	0.006401
0.400000	62.162830	10	1	0	1	0.000250
0.600000	68.437799	10	2	84	0	0.000250
0.600000	2.766802	0	2	1687	0	0.010300
0.600000	5.021630	10	2	8	1	0.000250
0.600000	92.640970	10	2	18	1	0.000250

Conclusion

- Automatic information extraction is possible for multiple levels of detail (LOD)!
- The LOD is dependent on project size and sensor platform.
- Derived LiDAR-products can support decision making.

Thank you for your attention!

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- **Founded in 2007, 10 years of market experience**
- **Spin-off from the University of Innsbruck (Geography Dept.) and alpS-Centre for Climate Change Adaptation**
- **Research and development driven company**
- **Offering software solutions and analysis services for 3D point clouds**
- **Participating in research projects**
- **Customers: Research Institutions, Companies, Governmental Agencies**