



ZRC SAZU

Remote sensing and Earth observation data at ZRC SAZU

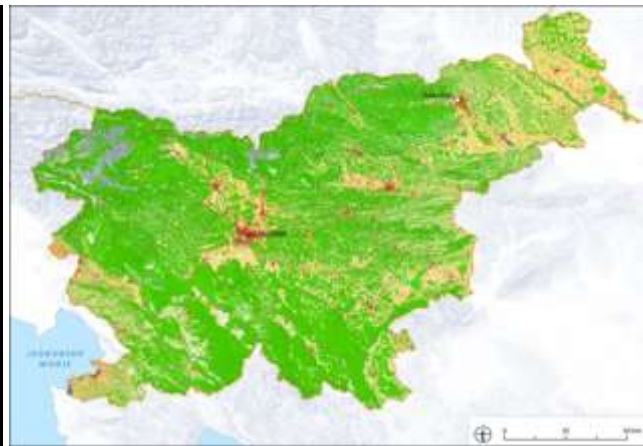
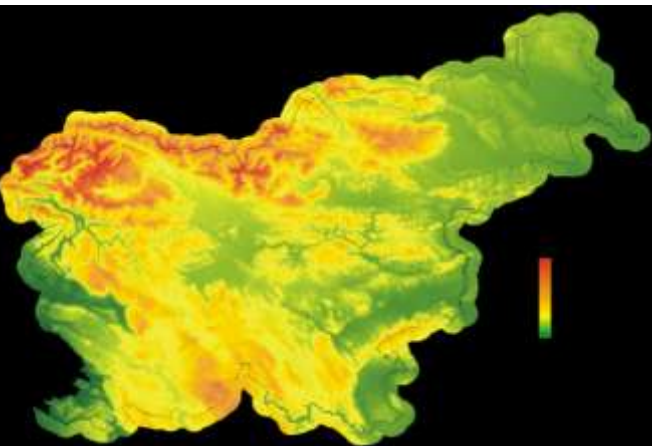
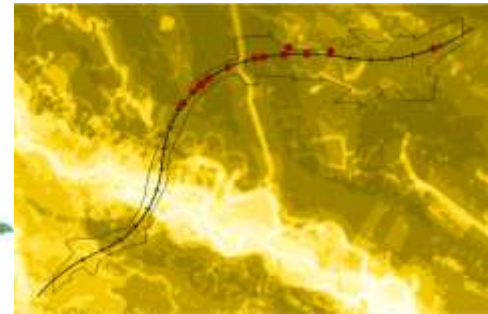
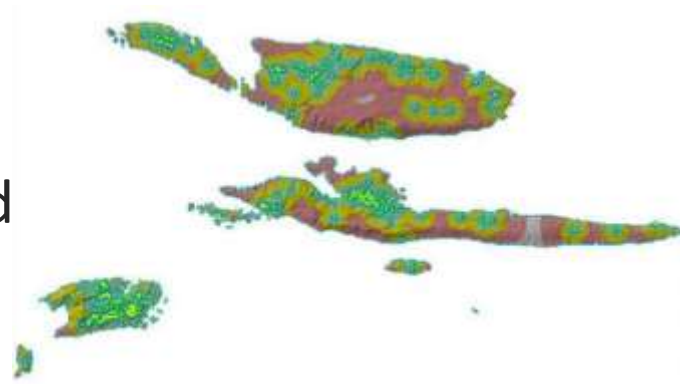
dr. Tatjana Veljanovski

2016-06-08 | Atrij ZRC | Ljubljana

Remote Sensing Department

Remote Sensing Department

- 20 years of experience
- application, research and development
- GIS and remote sensing
- pioneering group



Remote sensing research and applications

- topographic modelling and thematic mapping
- geometric and radiometric pre-processing
- LU/LC classification
- change detection

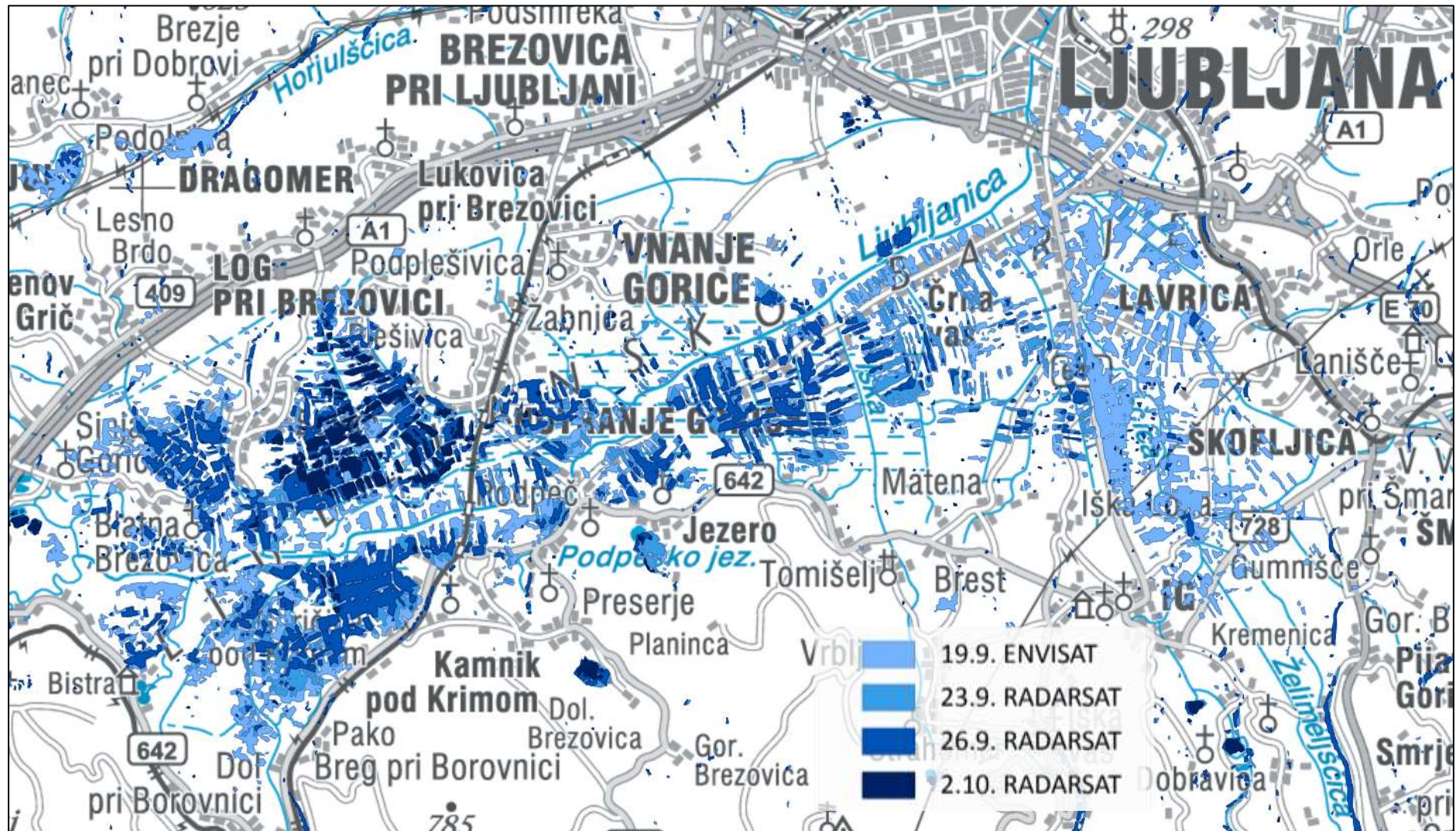
- disaster monitoring
- urban areas observation, water bodies mapping
- maritime surveillance
- vegetation development (and deviations) monitoring
- high precision relief and digital elevation modelling
- archaeological site observations, past lands recovering

- Optical:
 - Landsat
 - SPOT
 - RapidEye
 - PROBA-V, MERIS, MODIS, SPOT-VGT
 - WorldView, Pleiades, Ikonos, GeoEye, QuickBird
 - Sentinel-2
- SAR:
 - ENVISAT, RadarSat
 - Sentinel-1
- aerial photography
- lidar

Disaster monitoring

Floods, landslides, forest fires

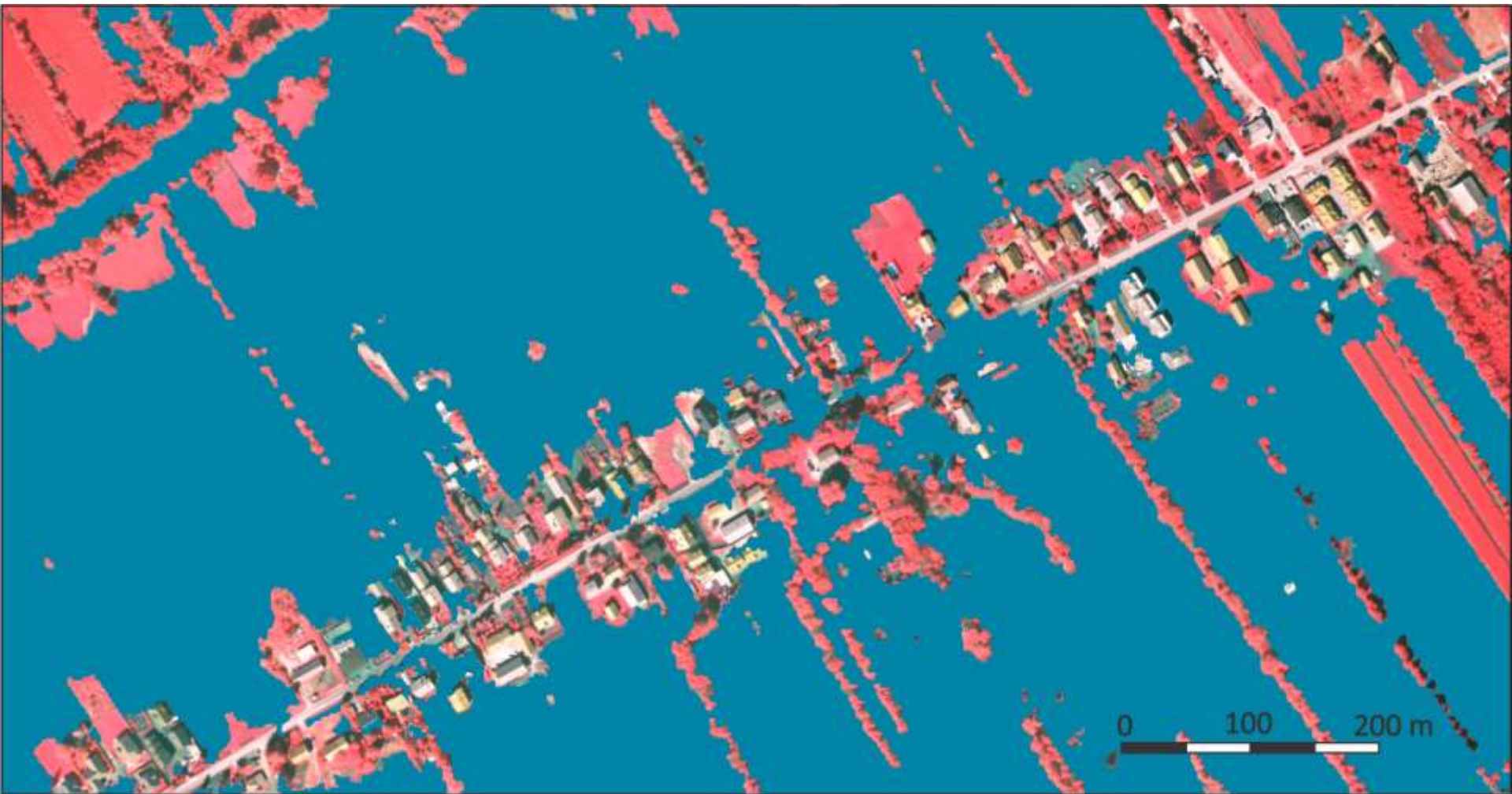
Floods dynamics around Ljubljana 2010



Detail of an area

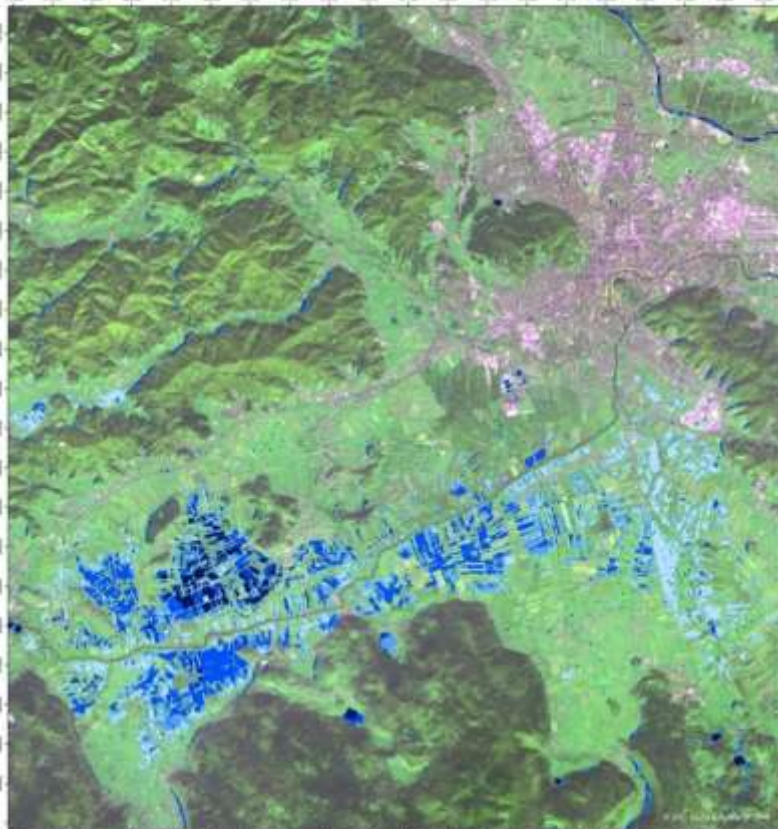


Classification



Rapid mapping products

Event / Dogodek: Floods in Slovenia 2010 / Poplave v Sloveniji 2010
 Mapped area / Kartirano območje: Ljubljana
 Situation map / Situacijska slika
 State / Stanje: 19.9. - 2.10.2010



Overview map / Pregledna karta

Legend / Legenda

- Water bodies: 19.9.2010 - 20.9.2010 (Kategorija: A200)
- Water bodies: 20.9.2010 - 21.9.2010 (Kategorija: A200)
- Water bodies: 21.9.2010 - 22.9.2010 (Kategorija: A200)
- Water bodies: 22.9.2010 - 23.9.2010 (Kategorija: A200)
- Water bodies: 23.9.2010 - 24.9.2010 (Kategorija: A200)
- Water bodies: 24.9.2010 - 25.9.2010 (Kategorija: A200)
- Water bodies: 25.9.2010 - 26.9.2010 (Kategorija: A200)
- Water bodies: 26.9.2010 - 27.9.2010 (Kategorija: A200)
- Water bodies: 27.9.2010 - 28.9.2010 (Kategorija: A200)
- Water bodies: 28.9.2010 - 29.9.2010 (Kategorija: A200)
- Water bodies: 29.9.2010 - 30.9.2010 (Kategorija: A200)
- Water bodies: 30.9.2010 - 1.10.2010 (Kategorija: A200)
- Water bodies: 1.10.2010 - 2.10.2010 (Kategorija: A200)

Processing and analysis / Obdelava in analiza

Processing and analysis: 19.9.2010 - 2.10.2010 (Kategorija: A200)

Obdelava in analiza

Obdelava in analiza: 19.9.2010 - 2.10.2010 (Kategorija: A200)

Interpretation

Interpretation: 19.9.2010 - 2.10.2010 (Kategorija: A200)

Interpretacija

Interpretacija: 19.9.2010 - 2.10.2010 (Kategorija: A200)

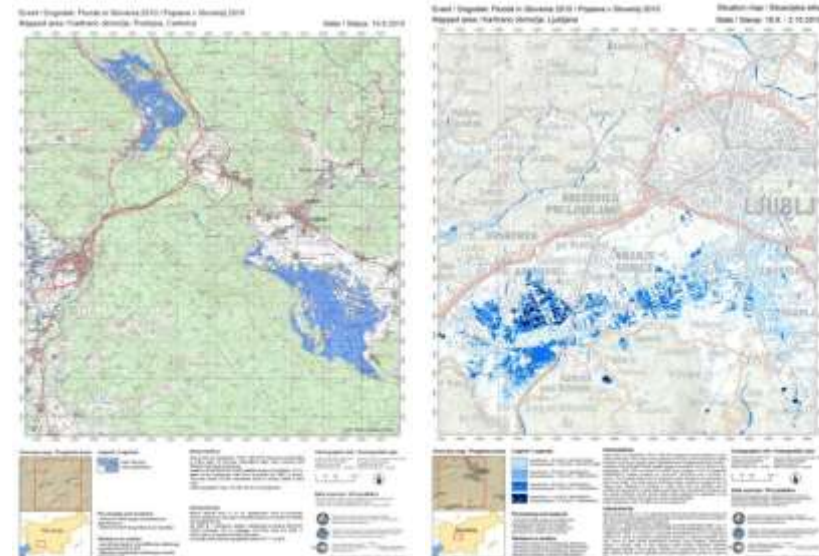
Cartographic info / Kartografski opis

Cartographic info: 19.9.2010 - 2.10.2010 (Kategorija: A200)

Data sources / Viri podatkov

Data sources: 19.9.2010 - 2.10.2010 (Kategorija: A200)

- satellite maps and interpreted maps



Mapping of water bodies

Sentinel-1 data service

Processing chain

Automatic data
download from Data Hub
with Open Serach API

Geometric
pre-processing with
Sentinel-1 Toolbox

Water detection and
filtering

Spatial modelling
and production of
time series

Map dissemination



Historical analyses

Cultural heritage recovery

Breginj, cultural heritage, earthquake, aerial photography



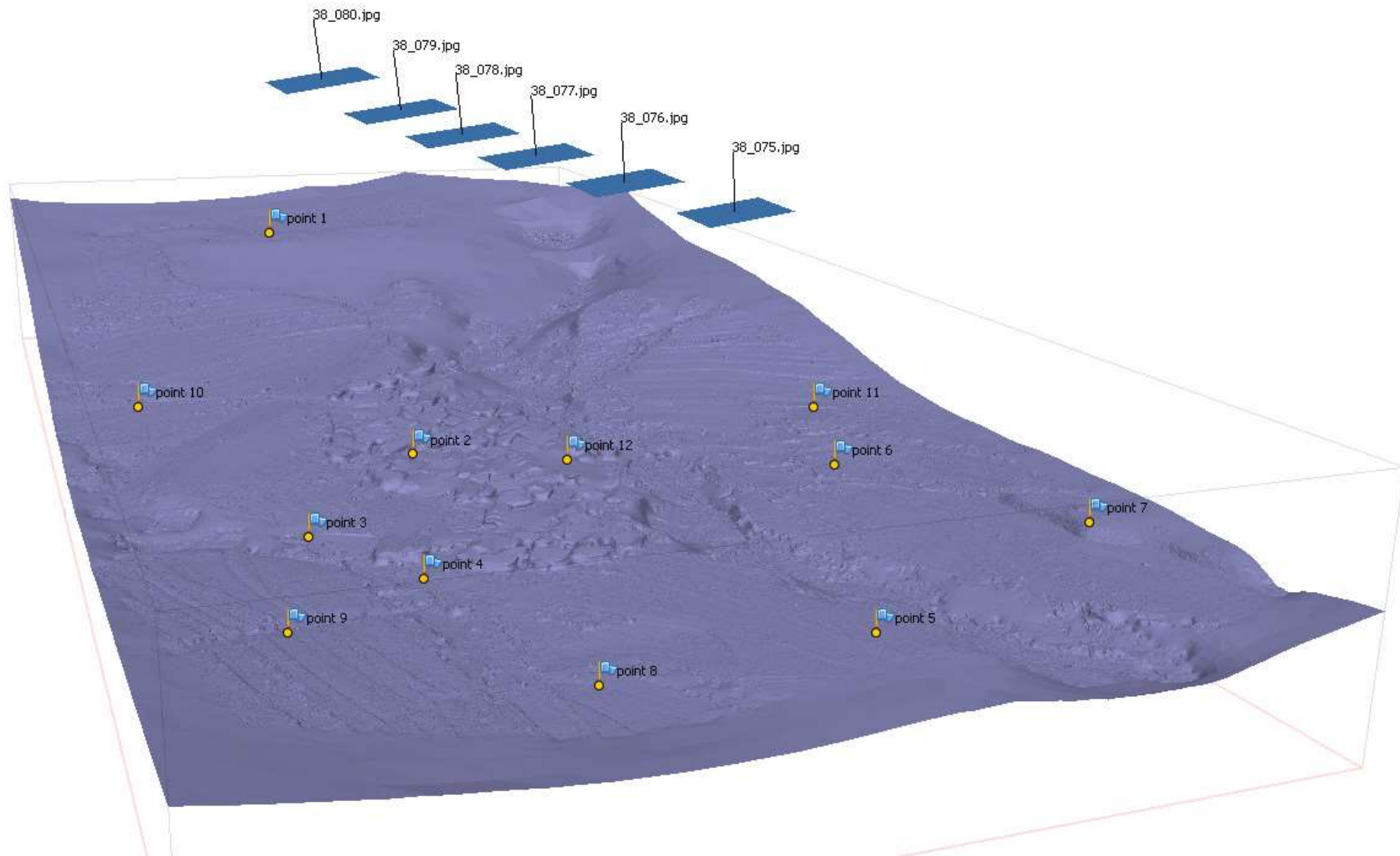
Photo: Jaka Čop

Breginj

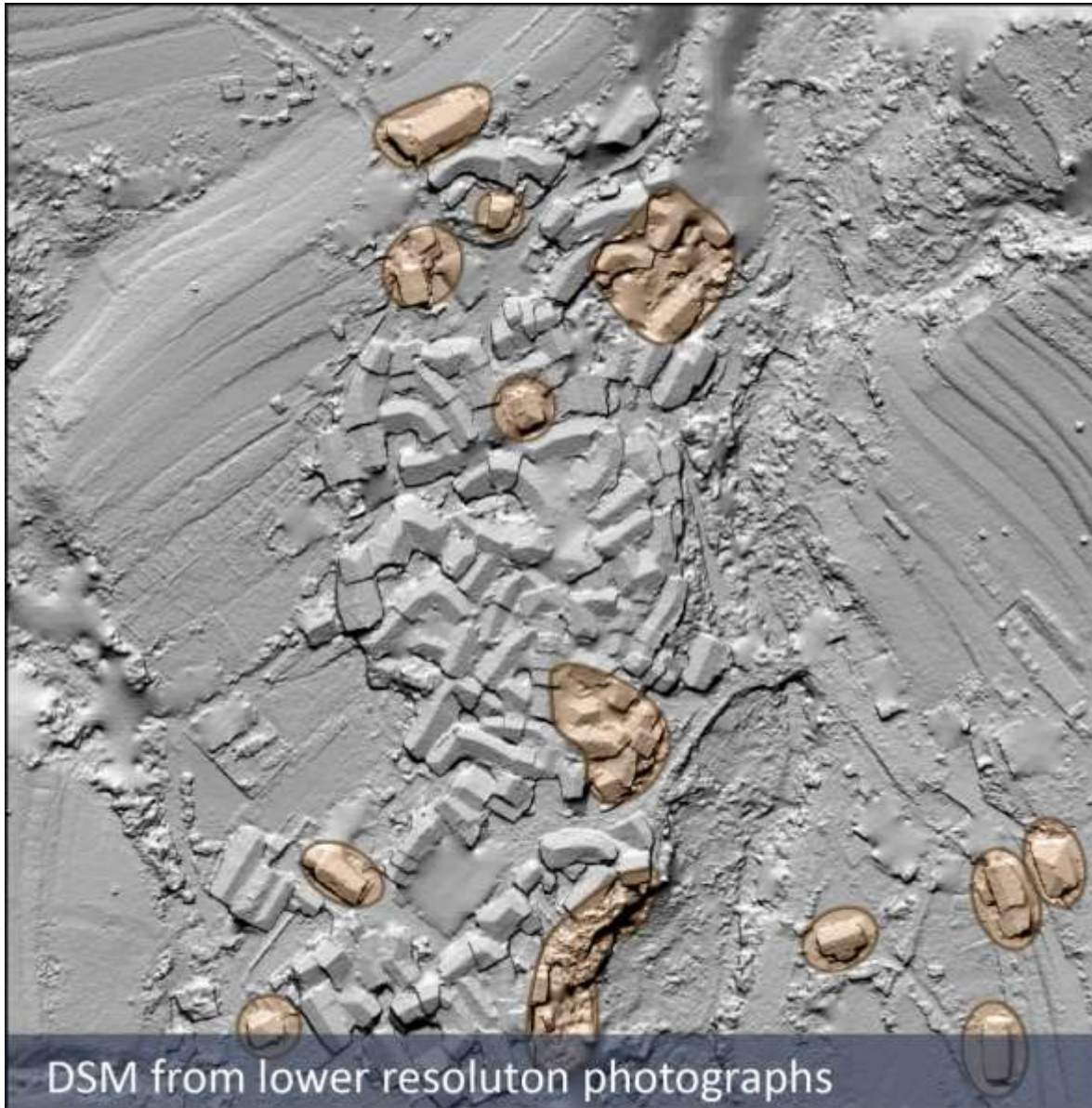
1978



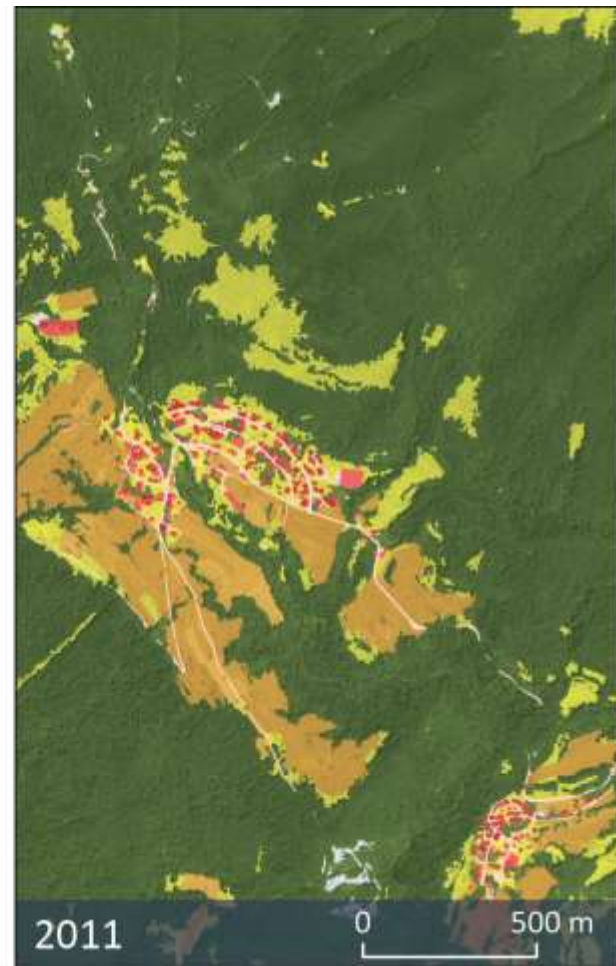
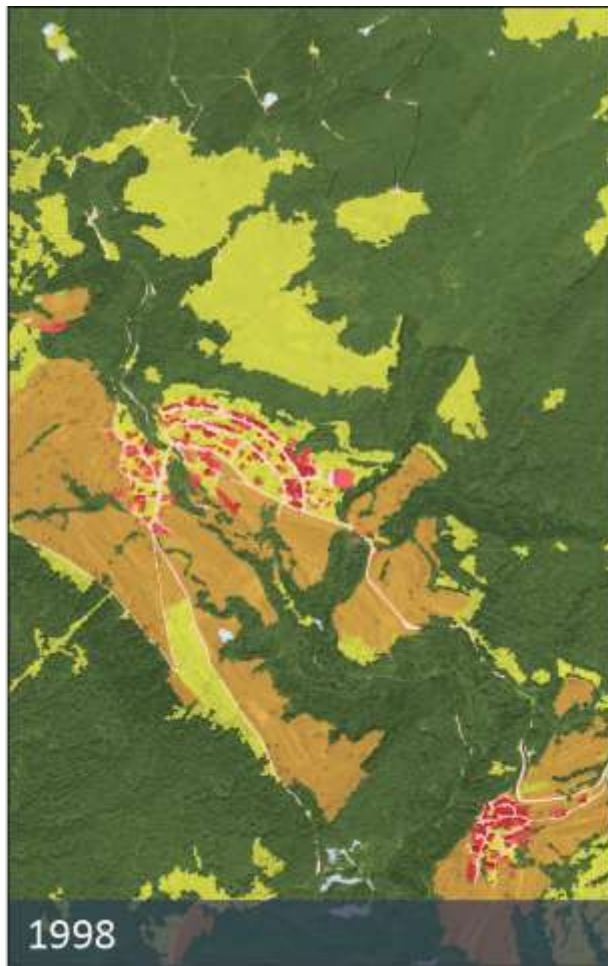
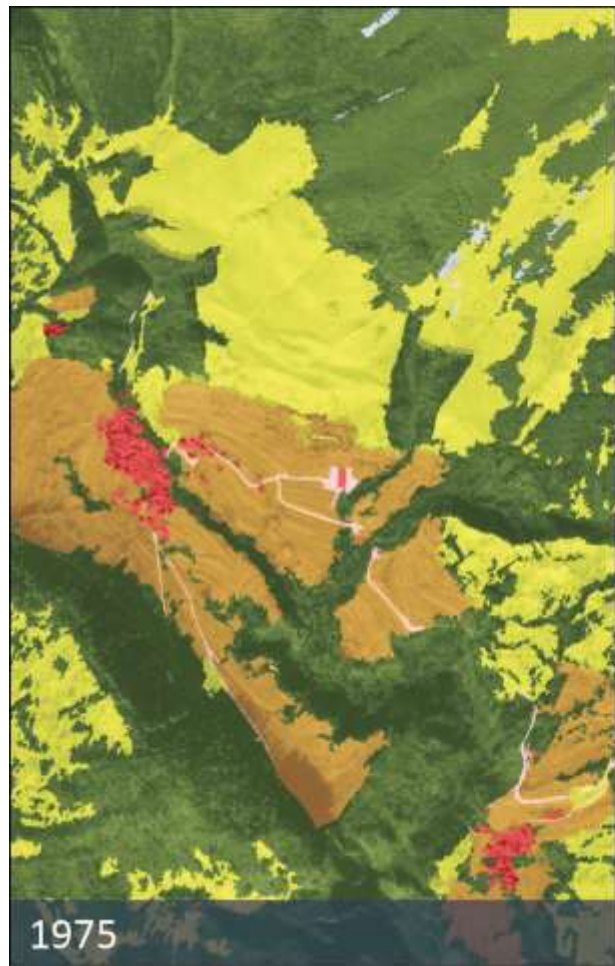
3D model of old settlement



Structure-From-Motion DSMs



Historical land use



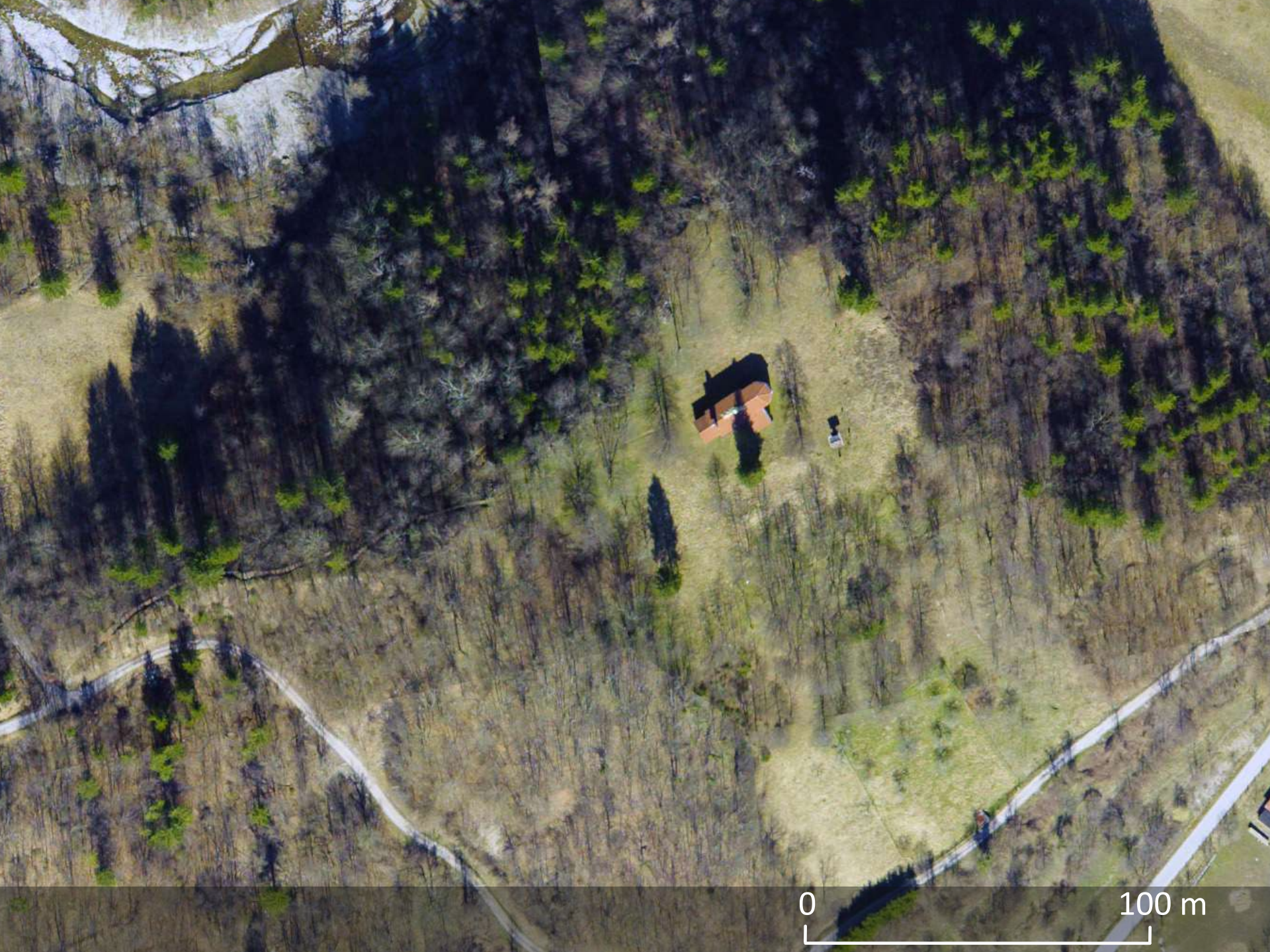
Observation of archaeological sites

Lidar data processing and visualizations

St. Helena

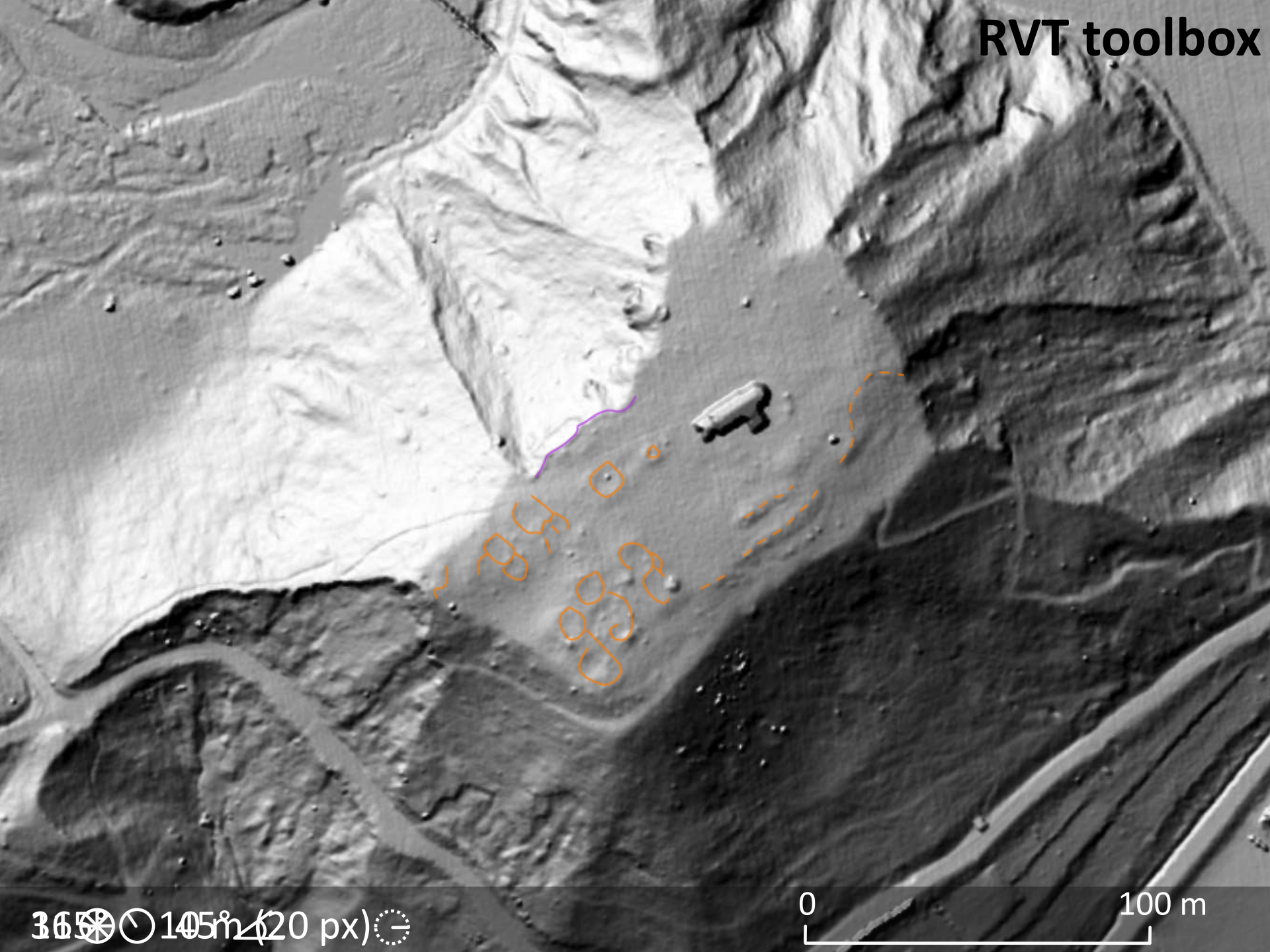
- a fortified camp
- late Roman period





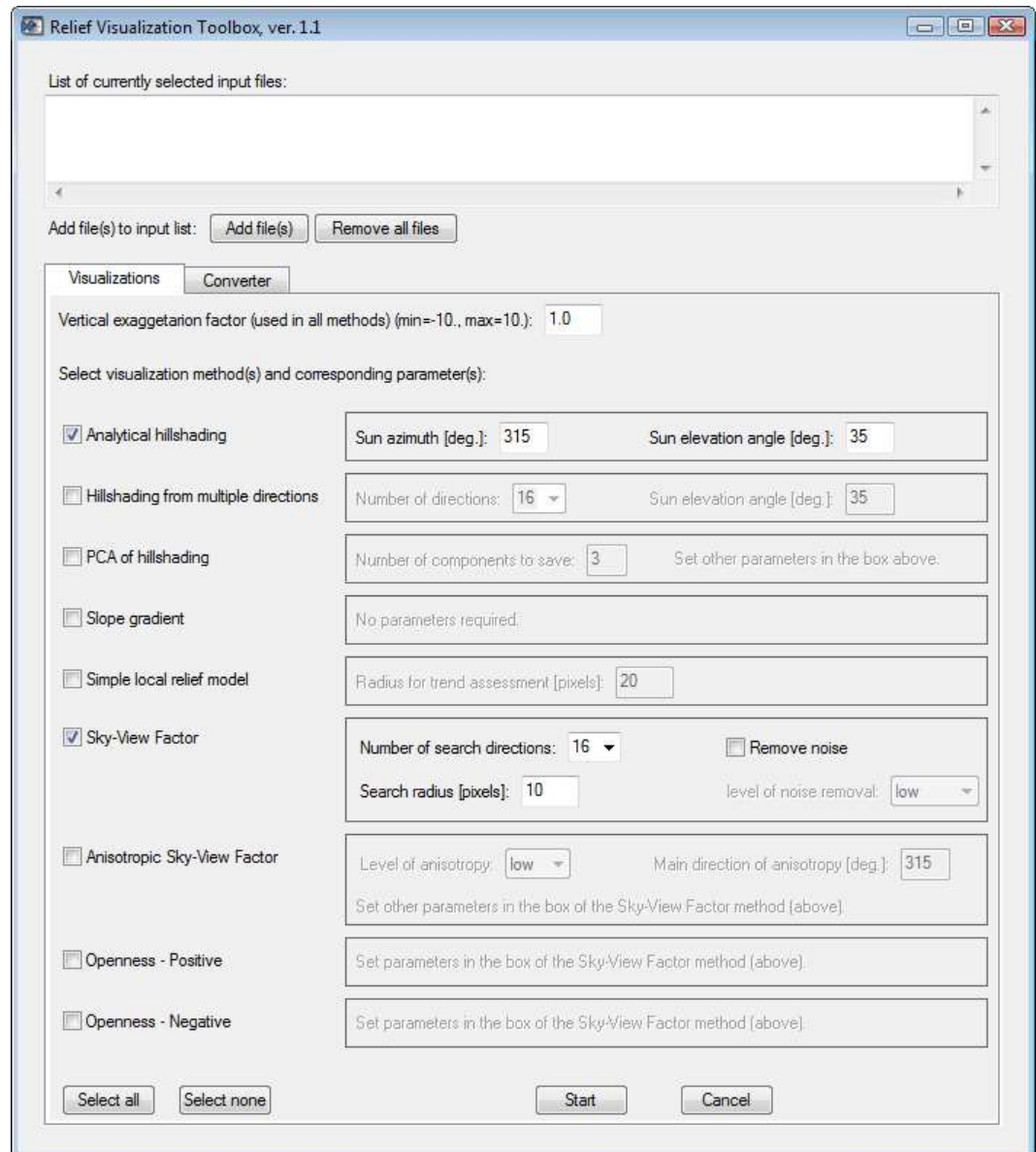
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100 m



Relief Visualization Toolbox (RVT)

iaps.zrc-sazu.si/en/rvt



Advanced maritime surveillance

Detection and identification of vessels

Sea roughness removal



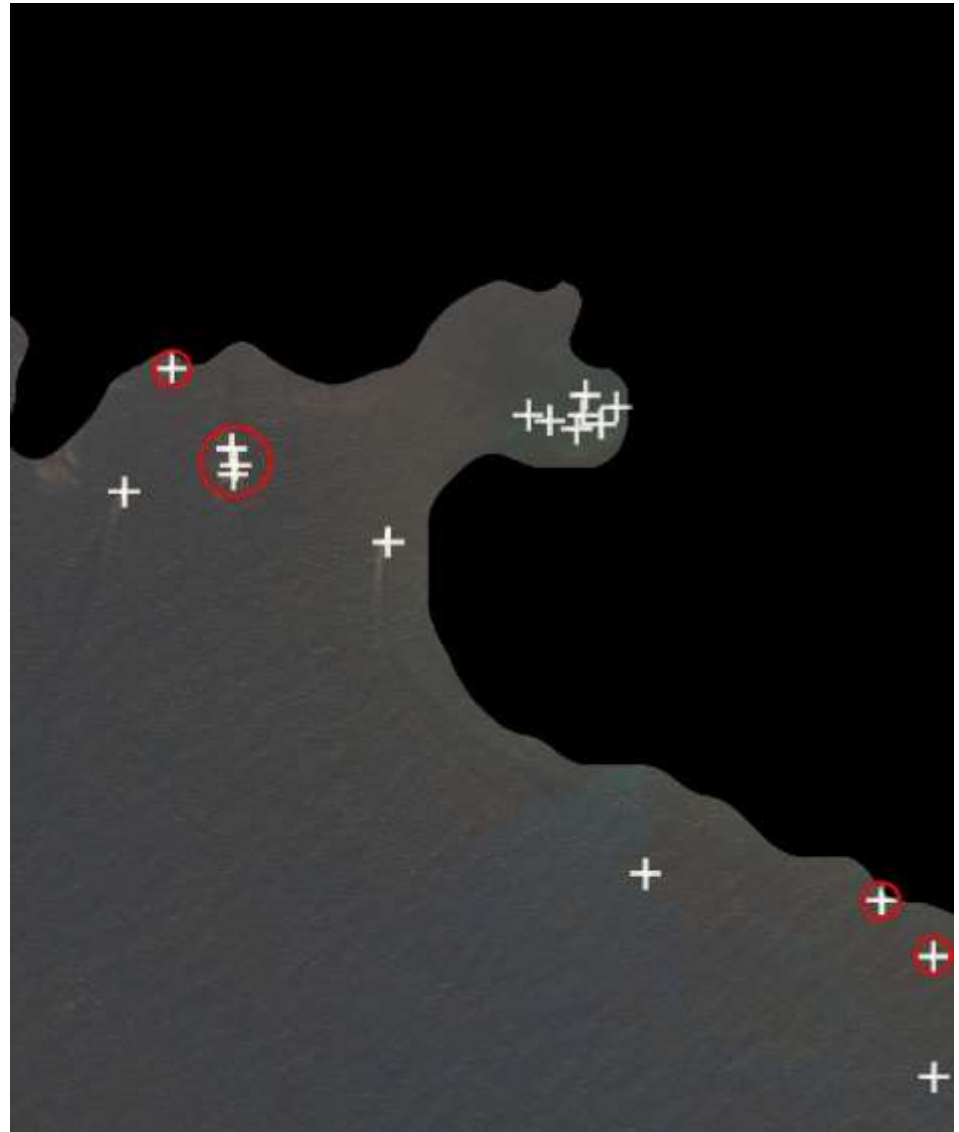
Vessels detection

~80%

overall accuracy

works with all optical sensors

Lampedusa, Italija
WorldView-2

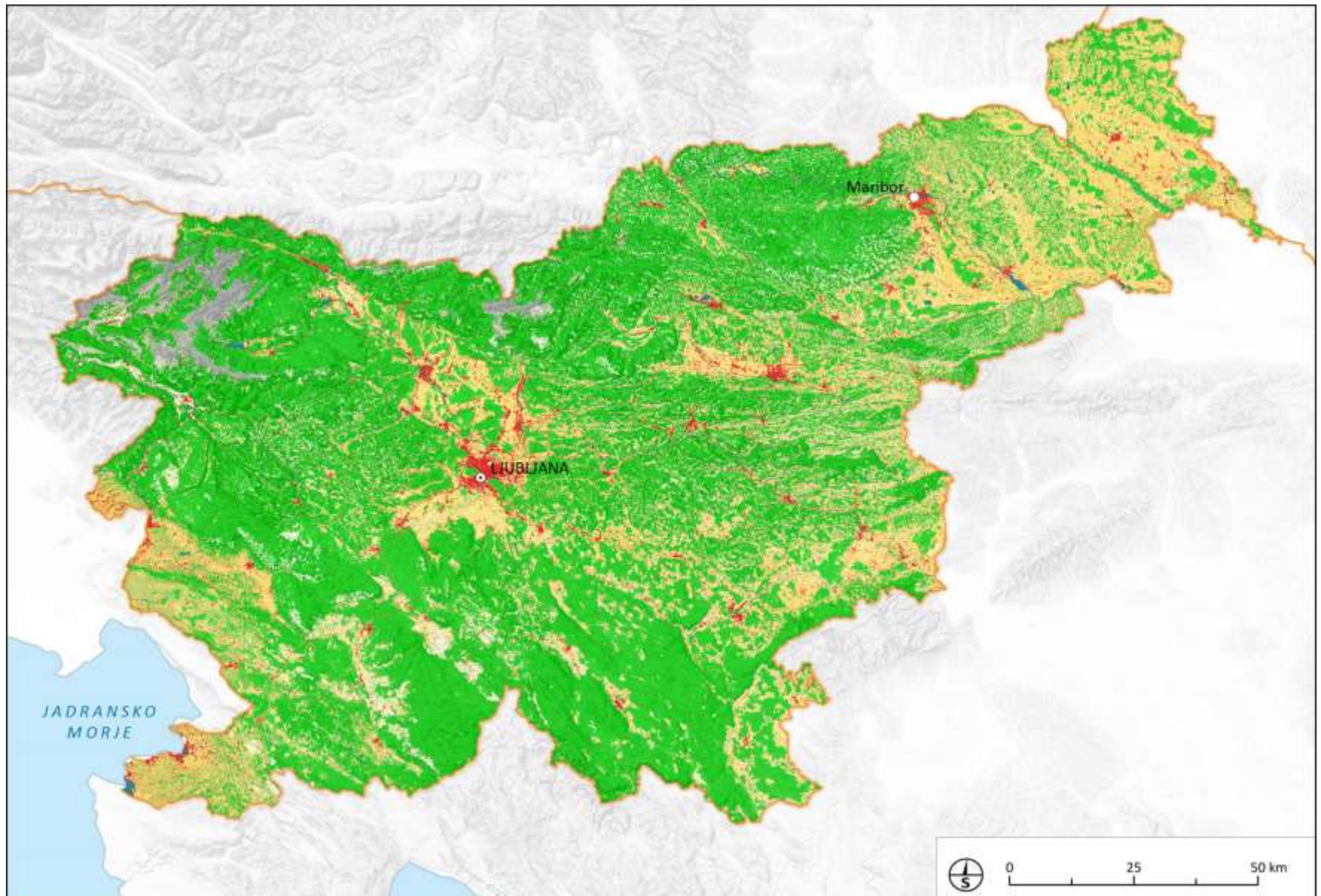


SILIS

Satellite images for a Slovenian land information system

Classification and change detection

Land cover classification of Slovenia: 1992



- a prototype of an accurate, countrywide, harmonized land information system that covers present and future needs of its users in Slovenia
- designed for straightforward continuous updating

Workflow

Database development

Satellite data preparation

Data model adaptation for LU/CL/Ch maps assessment

LU/LC/Ch products validation and dissemination

sensor corrected satellite image

geometric correction
orthorectification

radiometric corrections
atmospheric corrections
topographic normalization

image ready for analyses

LISA data model

adapted data model for
LC/LU/Ch mapping



validation



products distribution study

Detailed land cover classification



PROBA-V 100 m

Development of vegetation products

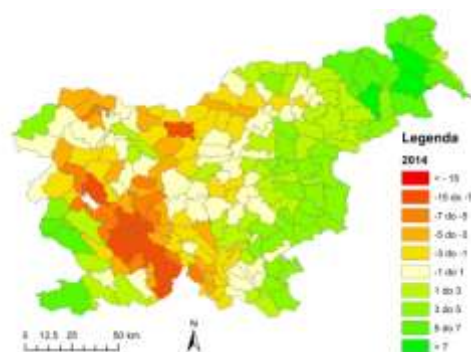
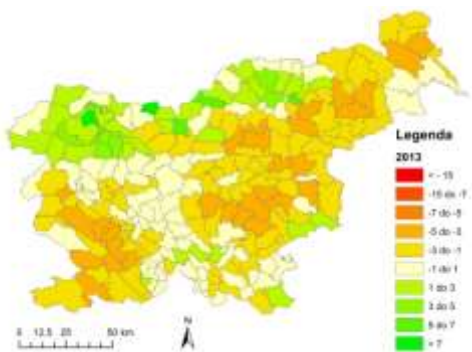
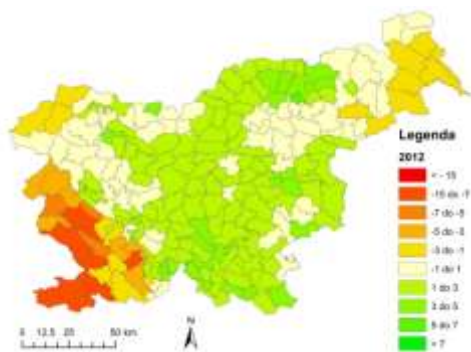
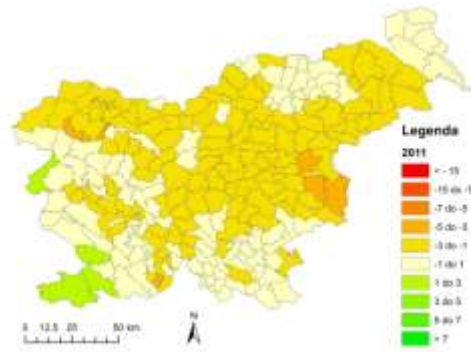
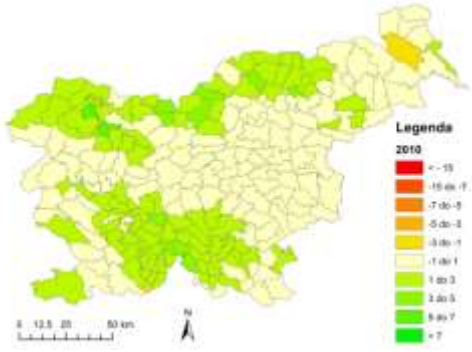
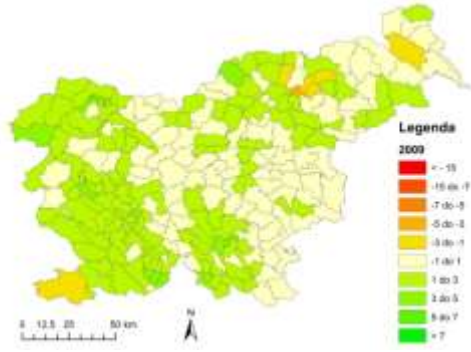
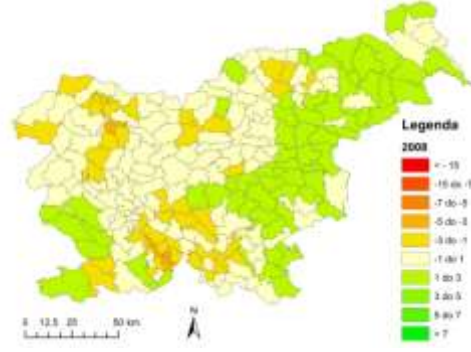
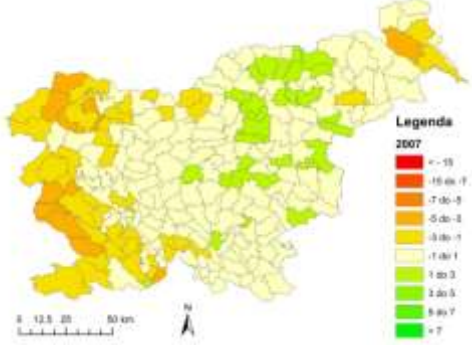
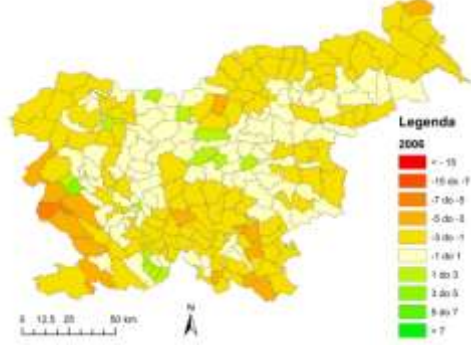
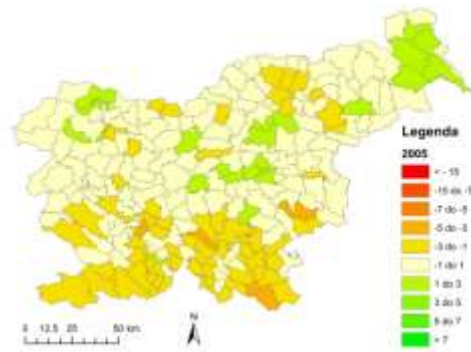
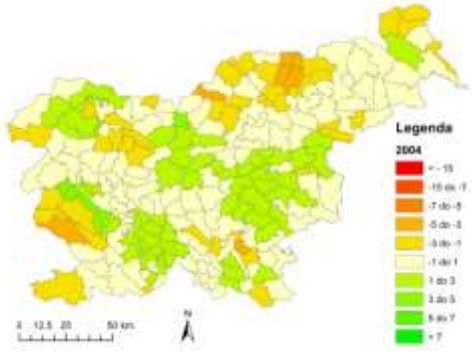
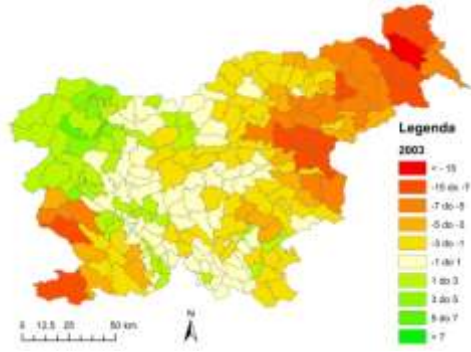
Vegetation and bio-physical products development

Monitoring forest state, disturbance detection in forests

Feeding the SFI VegX dissemination and analytical tool

Global to regional spatio-temporal compositing

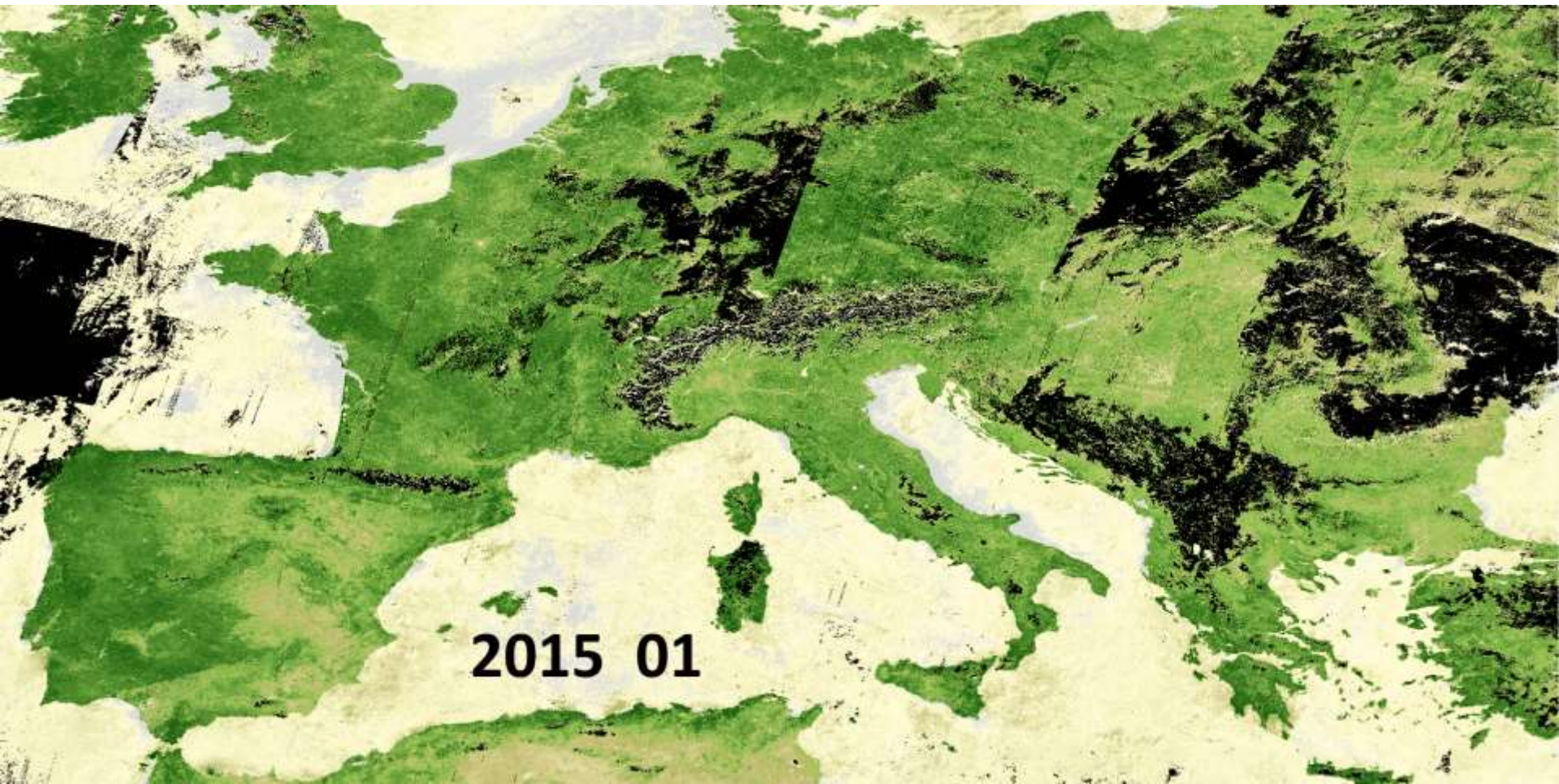
- 100 m vegetation and bio-physical products development
- optimal spatio-temporal compositing
- application of vegetation products for forestry
 - detection of deviations: ice storm damage, forest fires, wind throws



fAPAR forest interannual differences in forest state 2003-2014

Monthly mosaic of NDVI composites: Europe

- PROBA-V 100 m
- regional to global compositing – big data processing
- various compositing techniques
- composites of various vegetation indicators: NDVI, EVI, MSAVI, fAPAR, LAI, fCOVER...



What is behind...

- working with a large set of various EO data
- systematic approach
- development of autonomous procedures
- verification of processes and outputs
- developing and adapting knowledge about EO image processing to user needs
- outputs: provision of EO data ready for services

Where to...

- systematic high frequency EO monitoring - for specific users (e.g. forestry, water management)
- to become a relevant information provider to companies and government bodies in relation to land inventories and sustainable monitoring
- participating in international collaboration on sustained Earth observation and providing data processing for global users



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