Ground Deformation Detection and Risk Information Service (EO4MASRISK) – NoR Report

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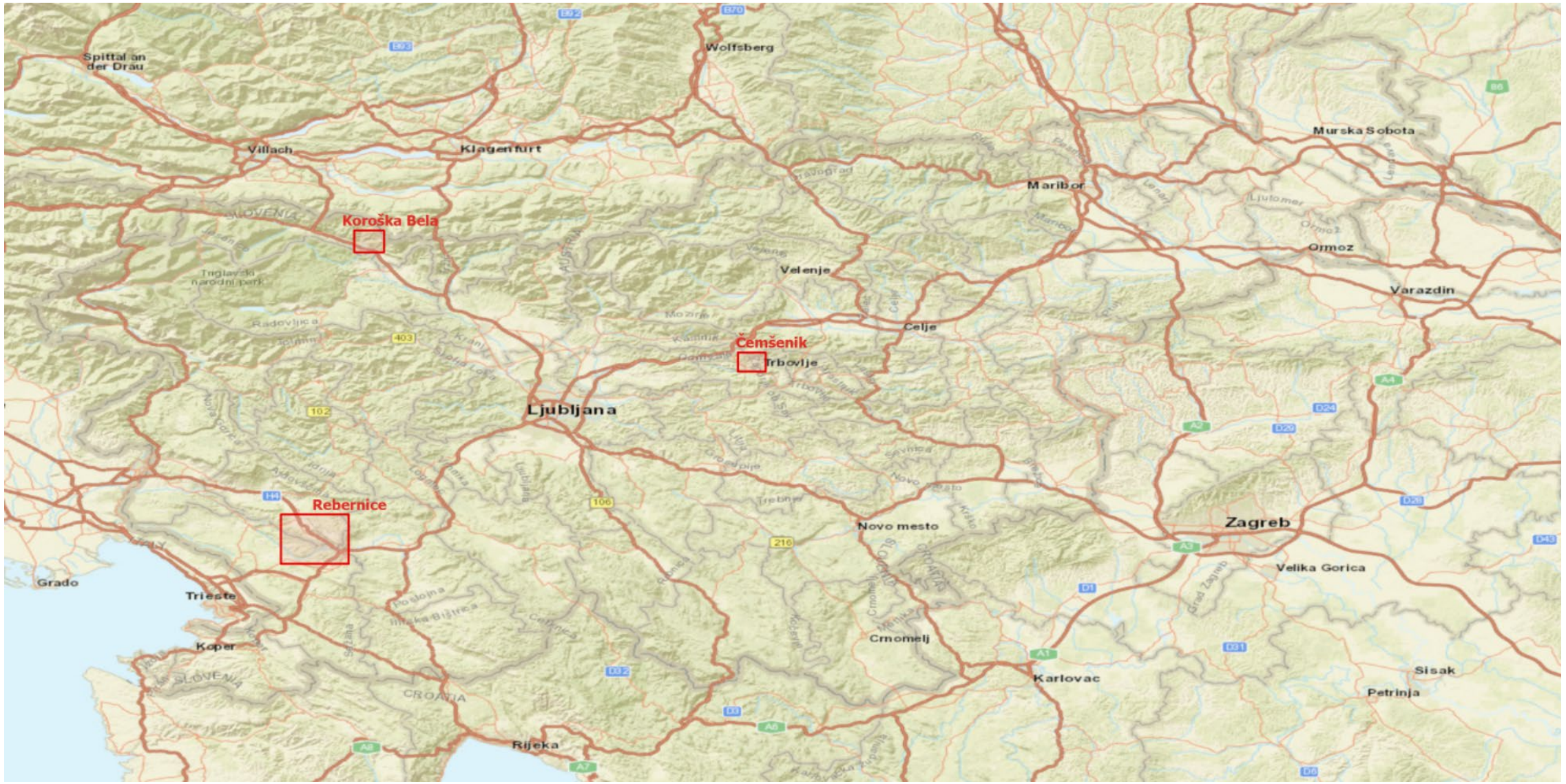
EO4MASRISK

- EO4MASRISK utilizes Sentinel-1 data, evolving from periodically updated ground deformation maps to early mapping and monitoring of landslide activity to increase urban resilience.
- The EO4MASRISK service functionality will provide
  - Ground deformation time series
  - Ground deformation yearly velocity map
  - Landslide activity map
  - Map of vulnerable elements at risk, e.g. buildings and infrastructure
  - Datasets of the economic value of a property
  - Potential damage map

Area of interest

Čemšenik (orientation of the landslide to the south)
Rebrnice (orientation west, south-west)
Koroška Bela (north-east-south-west)

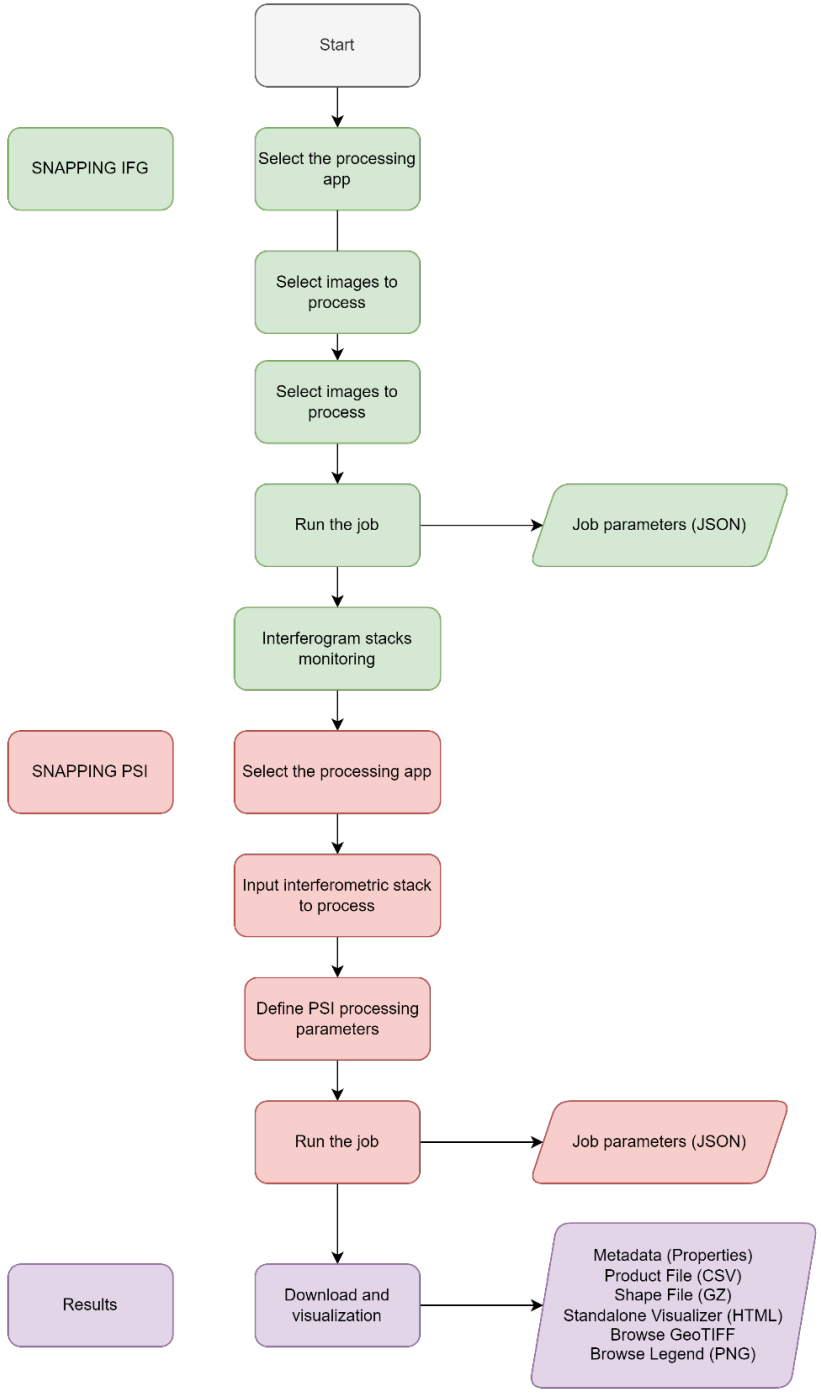


SNAPPING – Surface motioN mAPPING Sentinel-1 on-demand processing service

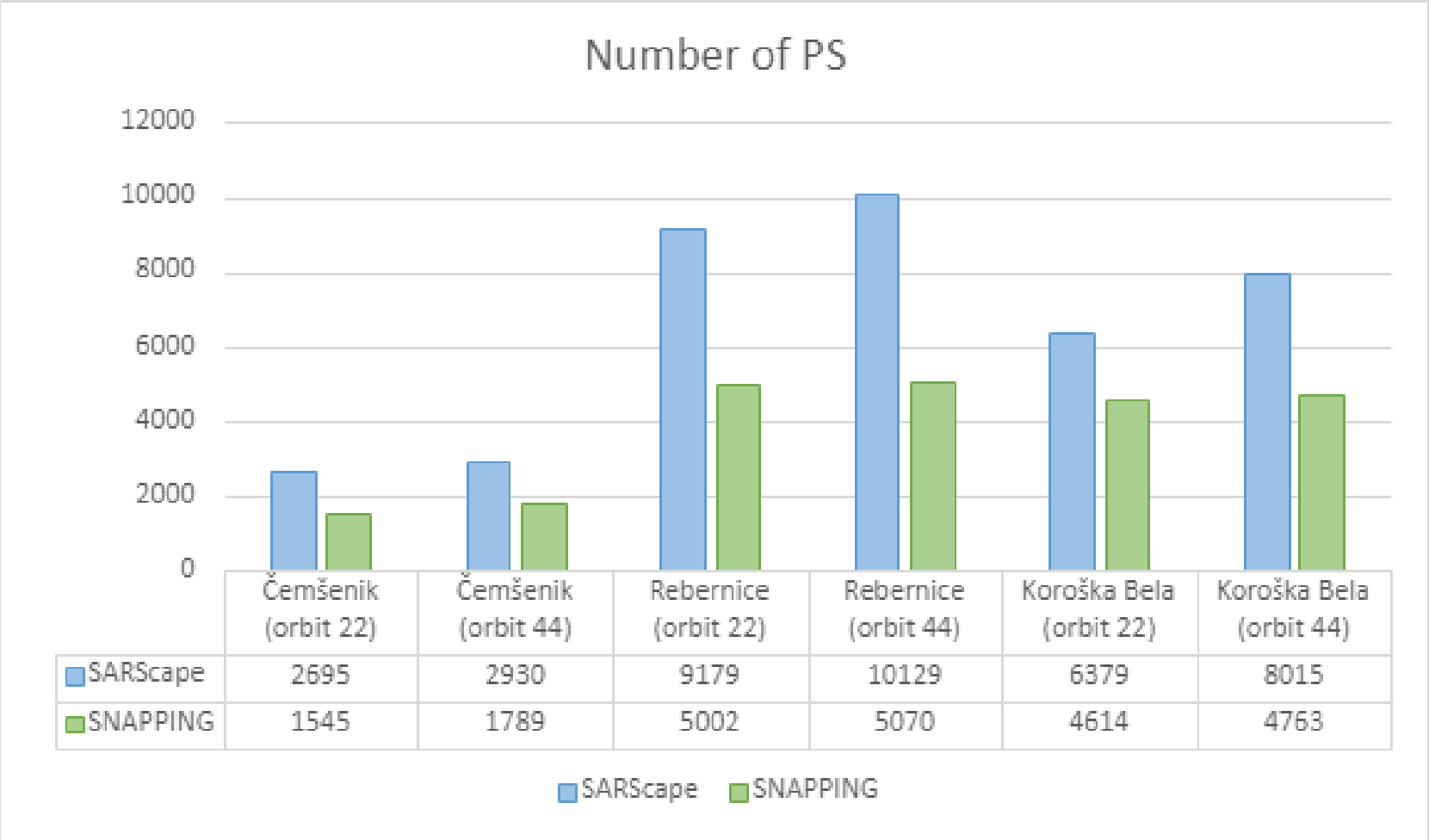
- InSAR processing service called deployed in the Geohazard Exploitation Platform (GEP)
- SNAPPING – Surface motioN mAPPING Sentinel-1 on-demand processing service — Geohazards Thematic Exploitation Platform 3.15 documentation (terradue.com)
- Based on the open-source SNAP toolbox and StaMPS software, implemented and integrated on-line by Aristotle University of Thessaloniki and University of Jaen, with the support of Terradue
- It is using radar data from the Copernicus Sentinel-1 mission and it is based on the Persistent Scatters Interferometry (PSI) technique

Landslides PS InSAR Processing

- InSAR processing for the period from January 2017 to December 2021
- InSAR processing with SARScape
- InSAR processing with SNAPPING
- Results mapping – per point and area, accuracy estimation
- Comparison of SARScape and SNAPPING

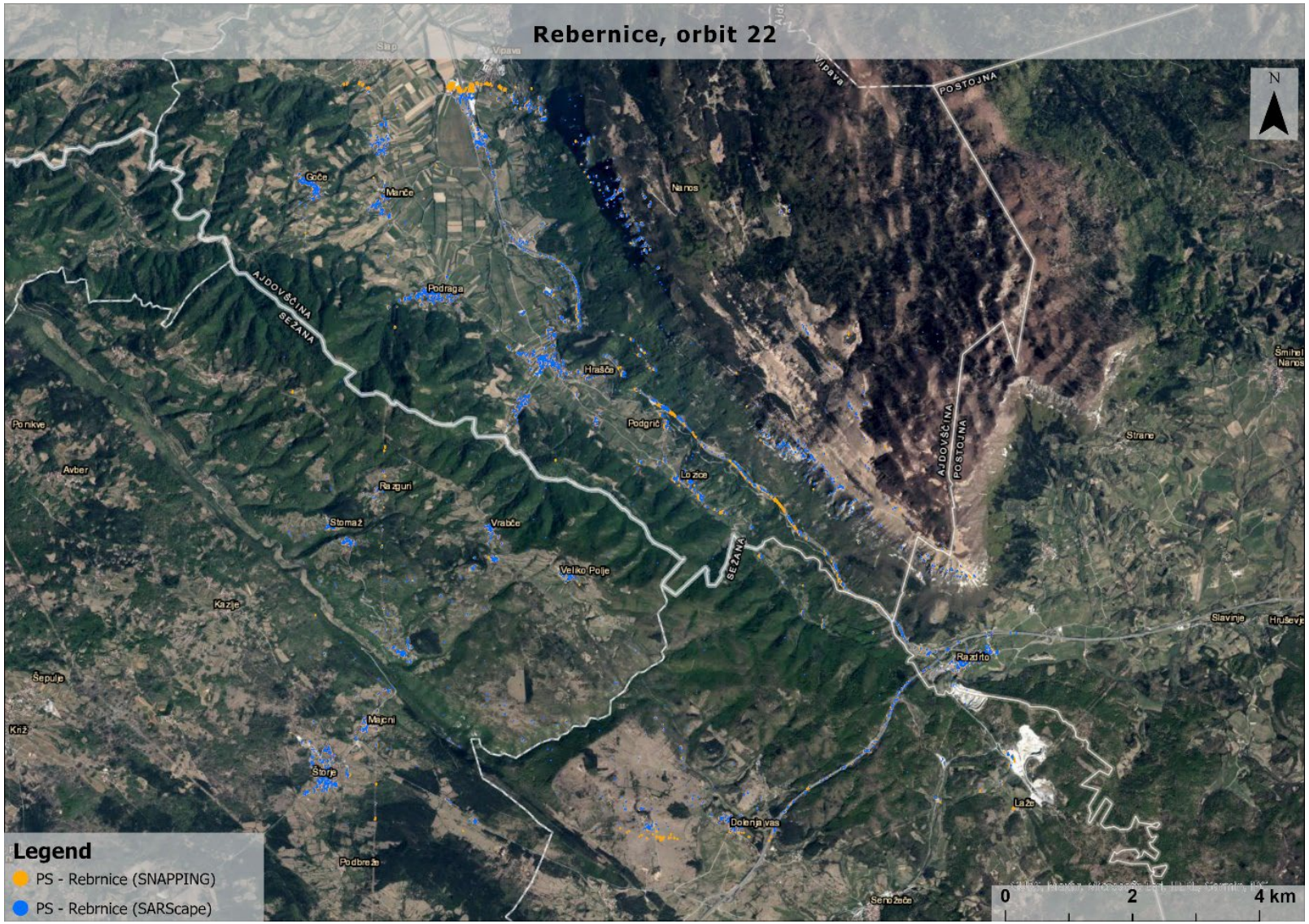


Orbit number, persistent scatterers in the area and observations

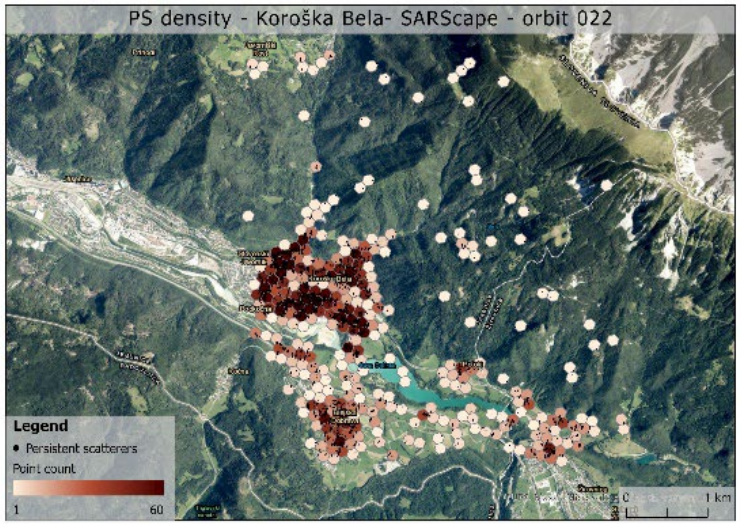


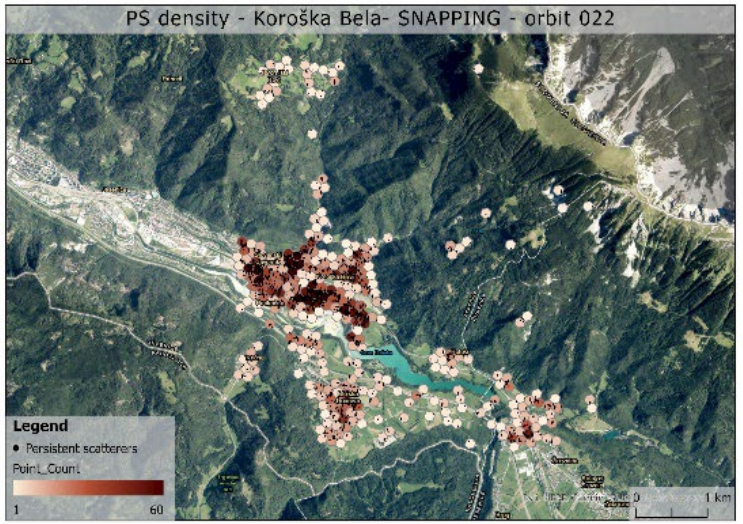
	Čemšenik (orbit 22)	Čemšenik (orbit 44)	Rebernice (orbit 22)	Rebernice (orbit 44)	Koroška Bela (orbit 22)	Koroška Bela (orbit 44)
SARScape	2695	2930	9179	10129	6379	8015
SNAPPING	1545	1789	5002	5070	4614	4763

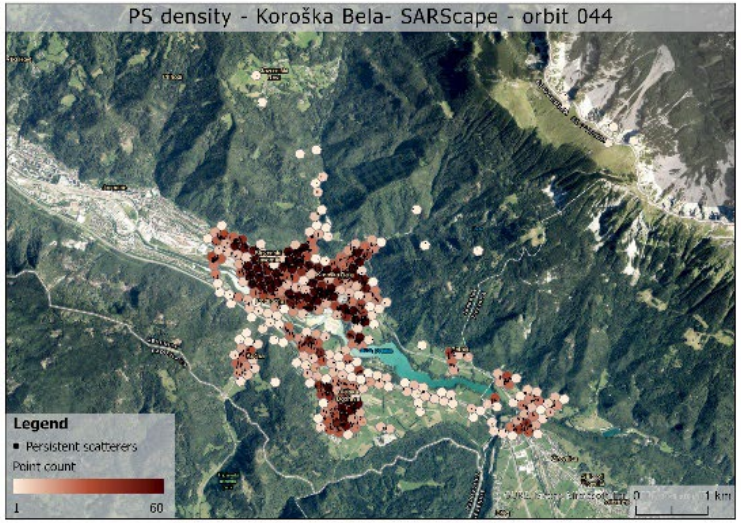
Point distribution in Rebrnice

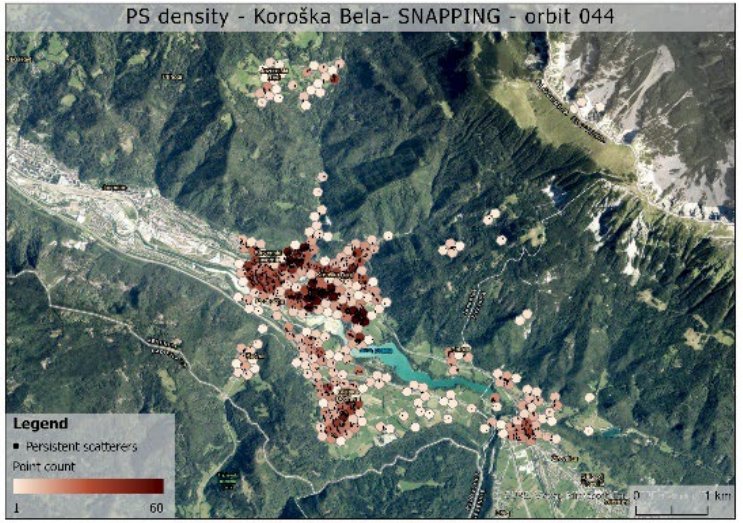


PS density in Koroška Bela for orbit 22 and 44 and for SARScape and SNAPPING results

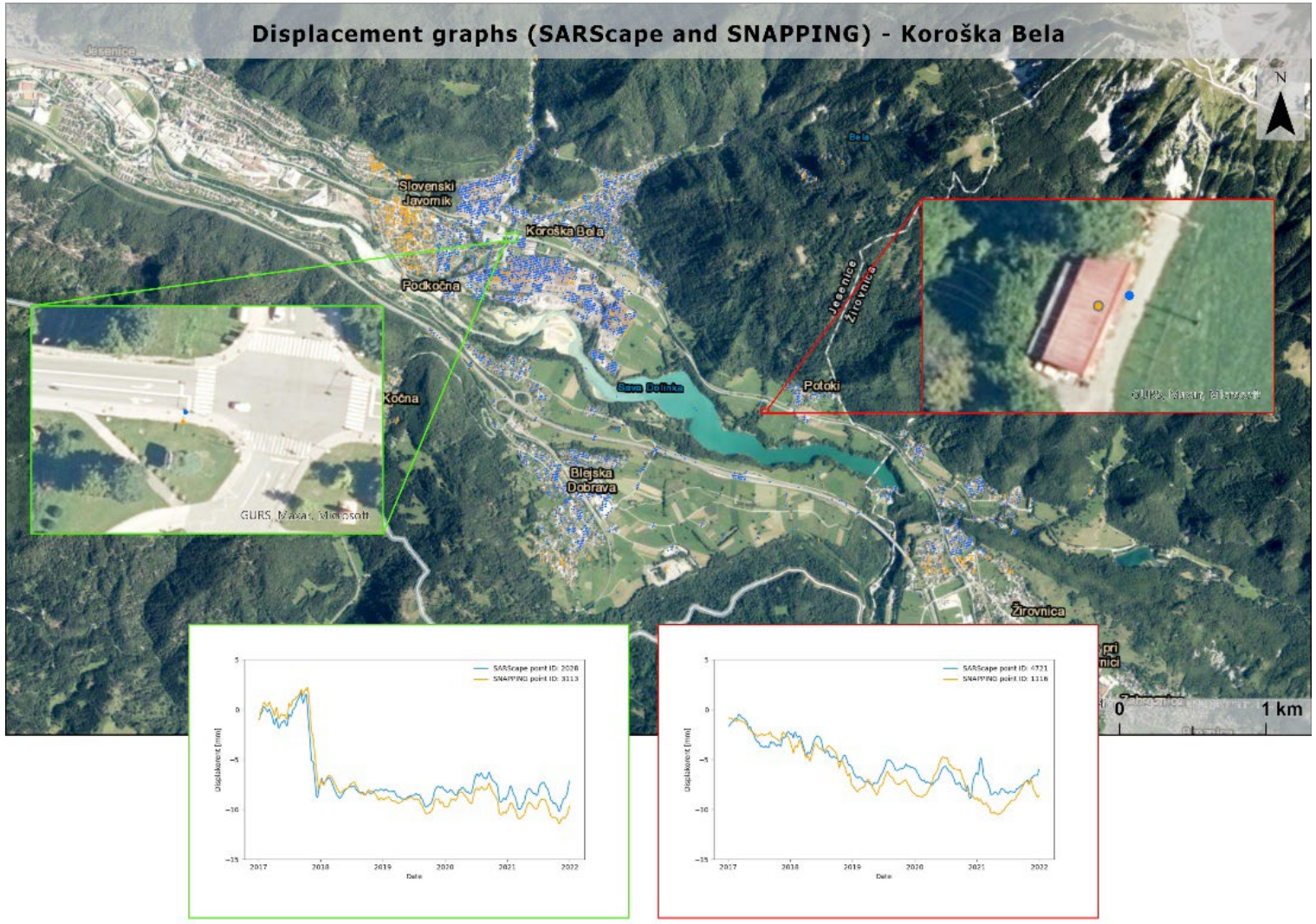








Comparison of time series obtained with SARScape and SNAPPING for Koroška Bela



Conclusions

- SARScape and SNAPPING are generating comparable results
- The density of PS varies slightly, and the distribution is somewhat different
- The end user can, however, make an equal interpretation when using either of the tools
- The largest advantage of SNAPPING is low (no) investment in processing hardware since the user only needs a web browser
- Interferometric stacking and PS processing have been taking several days on Geohazards TEP (area of 80 by 80 km)
- The processing cost on Geohazards TEP is comparable to that on a workstation with SARScape when an area of a smaller country (like Slovenia) is considered

References

- Jemec Auflič, Mateja, Oštir, Krištof, Šegina, Ela, Peternel, Tina, Ivačič, Matjaž, Beden, Andrej. Ground deformation detection and assessment of landslide potential damage with support of Copernicus. In: Landslide science for sustainable development : proceedings of the 6th World Landslide Forum : Florence Italy, 14-17 November 2023 : abstract book. Firenze: OIC, 2023. Str. [494].
- Oštir, Krištof, Jemec Auflič, Mateja. Using Sentinel satellite data to monitor landslides and floods. Slovenian Environmental Agency. September 2023.