

National Report

 Slovakia



Geodetic and Cartographic Institute Bratislava

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EUREF 2023 SYMPOSIUM

23 - 26 May 2023 | Gothenburg



SKPOS®

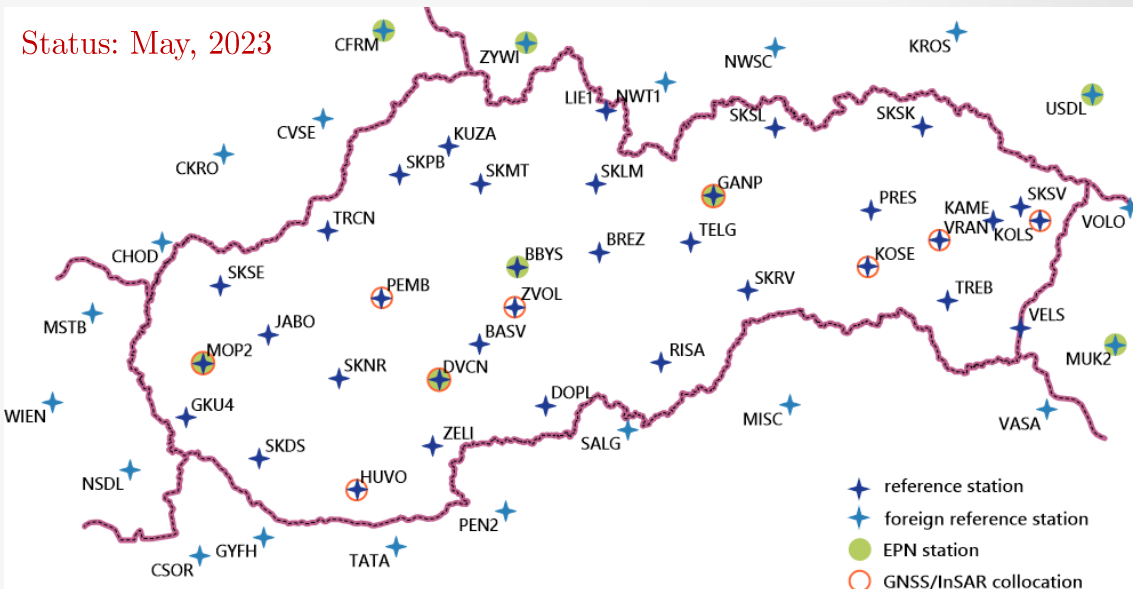
■ CORS Infrastructure (56):

- ✓ 35 in Slovakia
- ✓ 21 foreign

■ SKPOS stations in Slovakia (35):

- ✓ 35/35 GPS+GLO+GAL+BDS+SBS +QZS (all NETR9)
+QZS+IRS (4x ALLOY)
- ✓ 19/35 pillar/steel rods stabilization
- ✓ 9/35 GNSS/InSAR collocation (+3)
- ✓ 4/35 EPN: BBYS, GANP, MOP2, DVCN
- ✓ 1/35 IGS: GANP

2 800+ real-time users



 <https://skpos.gku.sk/en>

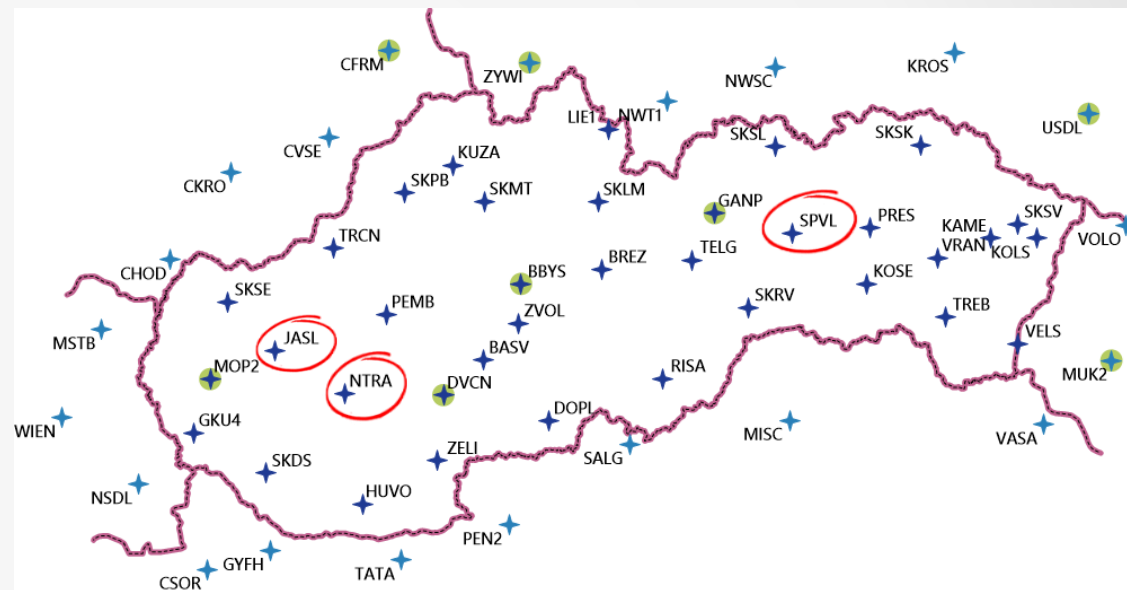


SKPOS[®]

■ 3 new SKPOS stations:

- ✓ ALLOY + Zephyr 3 Geodetic
- ✓ GNSS/InSAR collocation
- ✓ not yet included in SKPOS network

Testing



JASL00SVK
(replace JABO00SVK)



NTRA00SVK
(replace SKNR00SVK)



SPVL00SVK



EPN Operational Center (GKÚ)

- RINEX distribution of all EPN stations in Slovakia:



BBYS00SVK



DVCN00SVK



GANP00SVK



MOP200SVK & MOPI00SVK



EPN Densification Analysis Center (GKU)

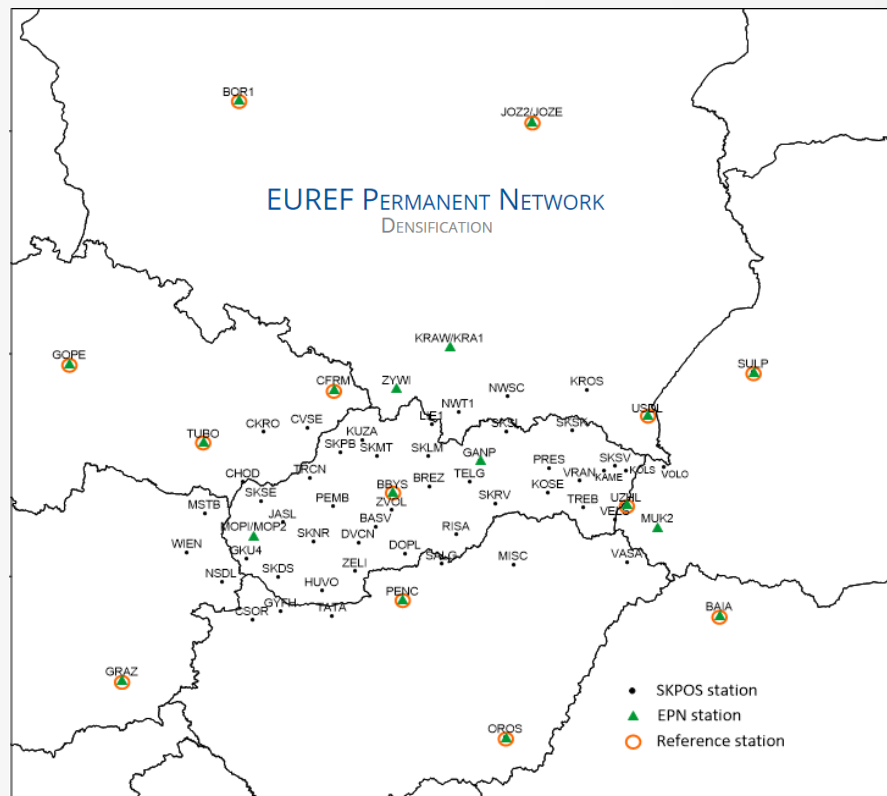
■ SKPOS network processing:

- ✓ final GRE daily & weekly coordinate solutions
- ✓ 71 stations (SKPOS+EPN)
- NEW** ✓ Bernese GNSS Software 5.4 (since week 2238)
- ✓ IGS20 reference frame
- ✓ SKPOS repro3



■ Contributions to:

- ✓ EPN Densifications
- ✓ EUREF Dense Velocities
- ✓ CEGRN





EDM calibration baseline

■ Description:

- ✓ location: Vinicne, Slovakia
- ✓ 7 pillars with deep stabilization

- ✓ 2020 - build
- ✓ 2023 - parameters defined **NEW**



■ Height monitoring:

- ✓ monthly (07/2021 - now)
- ✓ precise levelling

■ Position monitoring:

- ✓ 72h GNSS campaign (09/2022)
- ✓ laser tracker (10/2022)

■ Length monitoring:

- ✓ Mekometer (10/2022)





Transformation service

+ Adriatic height system (Trieste):

- ✓ old height system used in Czechoslovakia (1945 - 1957)
- ✓ heights aligned to benchmark: Lisov
- ✓ new DMQSK2022-A quasigeoid model
- ✓ Adria ↔ Bpv, EVRS (EVRF2007), ETRS89 (ETRF2000)

+ S-42/83:

- ✓ old military system used in Czechoslovakia
- ✓ mandatory system used in SK/PL border

+ Gauss-Krüger M34:

- ✓ mandatory system used in SK/AT border

45 000+ visitors/year

The screenshot shows the ZBGIS Transformation service interface. At the top, there are navigation tabs for 'Transformation service', 'Conversion service', and 'Help'. The main form includes the following fields and options:

- Input format:** A dropdown menu set to 'TXT/CSV'.
- Input file:** A text input field with a 'BROWSE' button and a file upload icon.
- Input coordinates system:** A dropdown menu set to 'ETRS89-LatLon [EPSG:4258]'.
- Input height system:** A dropdown menu set to 'ETRS89-h [EPSG:4937]'.
- Output coordinates system:** A dropdown menu set to 'ETRS89-LatLon [EPSG:4258]'.
- Output height system:** A dropdown menu with 'No height transformation' selected. A scrollable list of options is visible, including 'No height transformation', 'Bpv [EPSG:8357]', 'EVRS (EVRF2007_AMST) [EPSG:5621]', 'Jadran (CS.JNS/J - ZNB Lisov)', and 'Dot'.
- Columns separator:** A dropdown menu set to 'Space'.
- Output coordinates system (second instance):** A dropdown menu set to 'Choose'. A scrollable list of coordinate systems is visible, including 'Bessel1841-LatLon (JTSK) [EPSG:4156]', 'Bessel1841-LatLon (JTSK03) [EPSG:8351]', 'ETRS89-LatLon [EPSG:4258]', 'ETRS89-XYZ [EPSG:4936]', 'ETRS89-LAEA [EPSG:3035]', 'ETRS89-LCC [EPSG:3034]', 'ETRS89-TM33 [EPSG:3045]', 'ETRS89-TM34 [EPSG:3046]', 'ETRS89-LCC_SK', 'S-42, GK 6°, zone 3', 'S-42, GK 6°, zone 4 [EPSG:28404]', 'S-42, GK 3°, zone 6', 'S-42, GK 3°, zone 7 [EPSG:2523]', 'S-42, GK 3°, zone 8 [EPSG:2524]', 'S-42/83, GK 6°, zone 3 [EPSG:3835]', 'S-42/83, GK 6°, zone 4 [EPSG:3836]', 'S-42/83, GK 3°, zone 6 [EPSG:3841]', 'S-42/83, GK 3°, zone 7 [EPSG:4417]', 'S-42/83, GK 3°, zone 8 [EPSG:4434]', and 'GK M34 [EPSG:31259]'.
- Output height system (second instance):** A dropdown menu set to 'No height transformation'.
- Buttons:** 'CLEAR' and 'TRANSFORM' buttons are located at the bottom right of the form.



Úrad geodézie, kartografie a katastra
Slovenskej republiky

■ New orthophoto:

- ✓ 2nd cycle of AP (2020-2022)
- ✓ **GSD: 20 cm/pixel**
- ✓ 4 channels (RGBN, 8 bit)
- ✓ $RMSE_{xy} = 21 \text{ cm}$

FREE



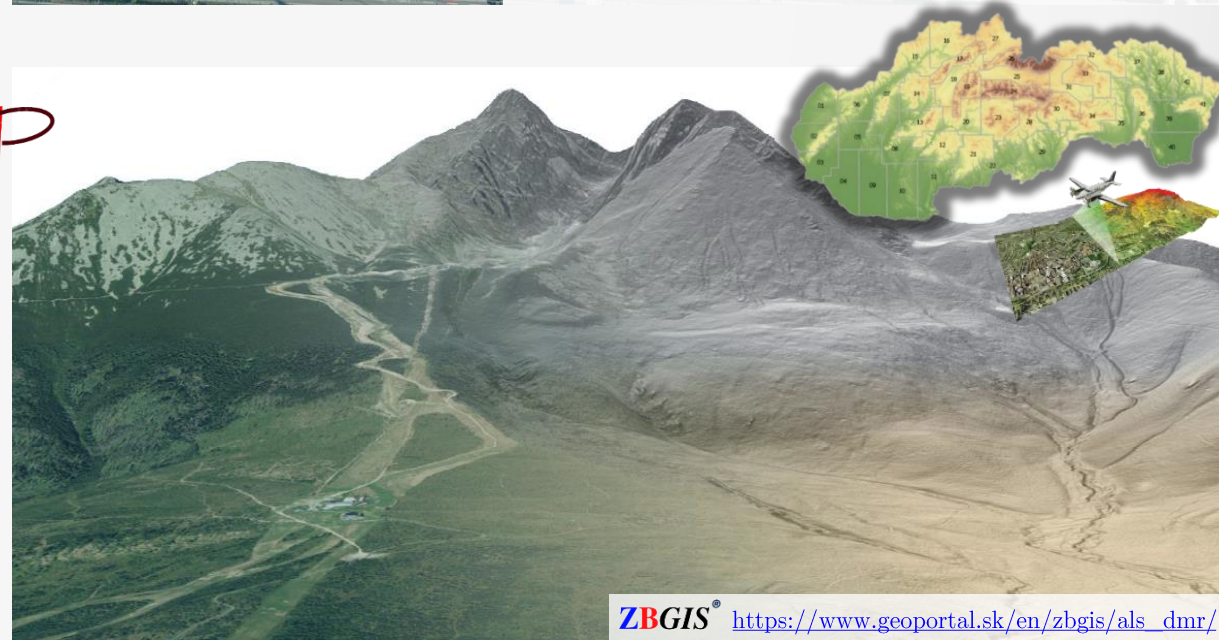
65M+ views/year

ZBGIS® <https://www.geoportal.sk/en/zbgis/orthophotomosaic/>

■ New 5th generation DTM:

- ✓ 1st cycle of ALS (2017-2023)
- ✓ 42 locations
- ✓ **1 x 1 m resolution (17-49 pts/m²)**
- ✓ $RMSE_H = 2 - 8 \text{ cm}$
- ✓ 2nd cycle of ALS started (5/73 finished)

FREE



ZBGIS® https://www.geoportal.sk/en/zbgis/als_dmr/

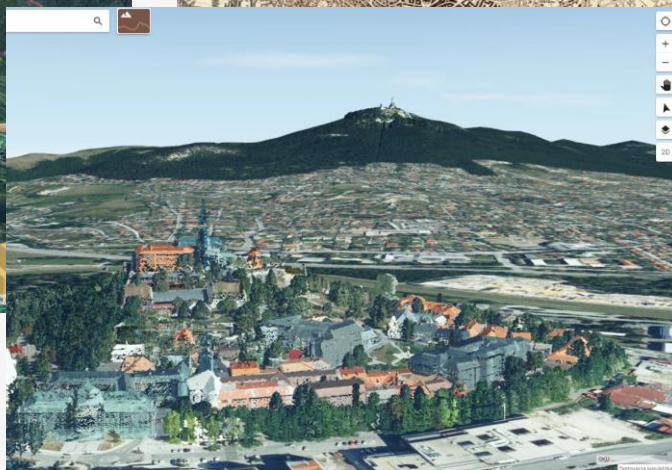
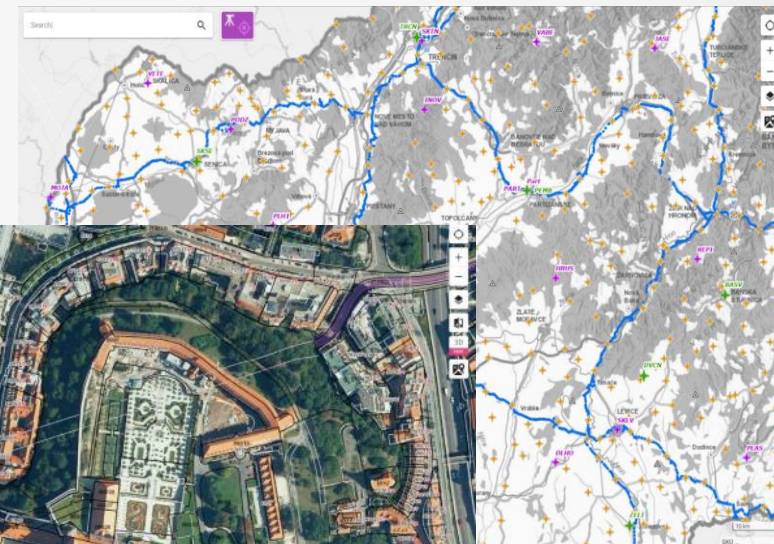
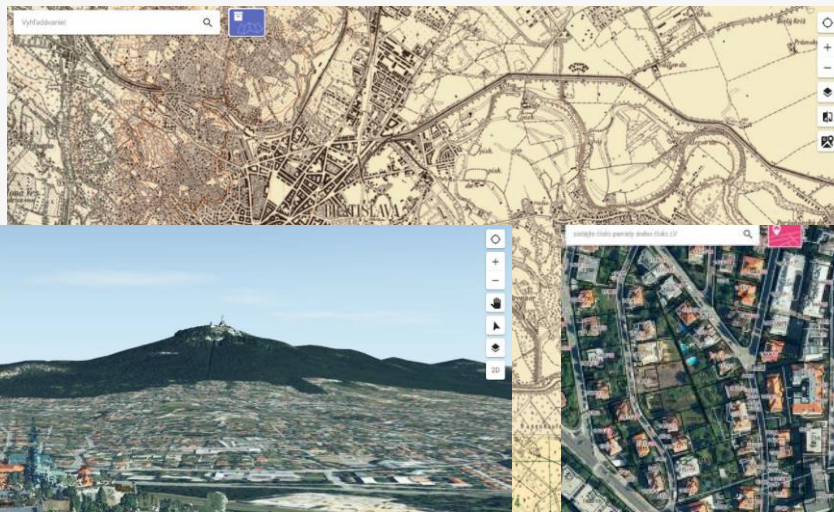


■ ZBGIS[®] Map Client:

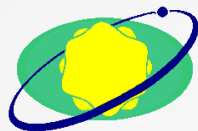
- ✓ win of „Special Achievement in GIS Award 2014“
- ✓ win of „Special Achievement in GIS Award 2018“
- NEW** ✓ win of „Special Achievement in GIS Award 2023“



<https://zbgis.skgeodesy.sk/mkzbgis/en/>



22M+ visitors/year



■ EPN subnetwork processing:

✓ 84 EPN stations (+30)

NEW ✓ Bernese GNSS Software 5.4

✓ IGS20 reference frame

✓ contribution to EPN Repro3

■ Analysis center solutions:

✓ final weekly coordinate solutions (1180 - now)

✓ final daily coordinate solutions (1180 - now)

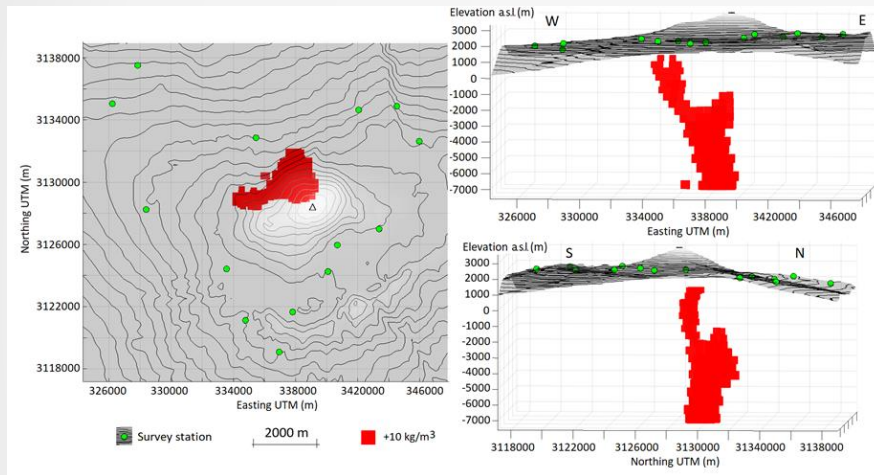
✓ rapid daily coordinate solutions (2044 - now)

✓ hourly ultra rapid coordinate solutions (2154 - now)



Volcano geodesy/gravimetry

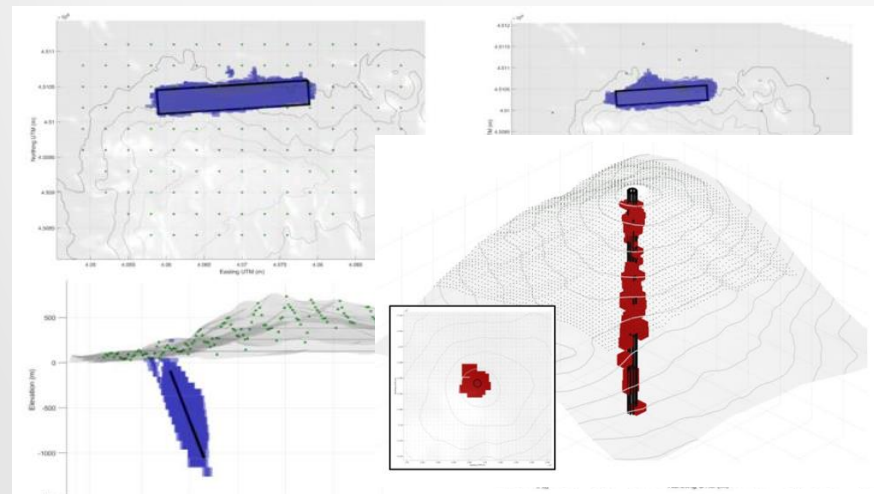
Interpretation of spatiotemporal gravity changes based on Growth^{SW} inversion method



Vajda Peter, Antonio G. Camacho, José Fernández (2023) Benefits and limitations of the Growth inversion approach in volcano gravimetry demonstrated on the revisited Tenerife 2004–2005 unrest. *Surveys in Geophysics* (2023) 44: 527–554 (Q1, IF(2021) = 7.965, Springer Nature)



Etna, Italy (2018)



Bódi Jozef, Peter Vajda*, Antonio G. Camacho, Juraj Papčo, José Fernández (2023) On gravimetric detection of thin elongated sources using the Growth inversion approach *Surveys in Geophysics* (Online 29 April 2023), <https://doi.org/10.1007/s10712-023-09790-z>, (Q1, IF(2021) = 7.965, Springer Nature)

Thank you



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