

NATIONAL REPORT



SLOVAKIA



Geodetic and Cartographic Institute Bratislava

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Research Institute of Geodesy and Cartography

Peter Korcak



Slovak University of Technology in Bratislava

Martin Imrisek

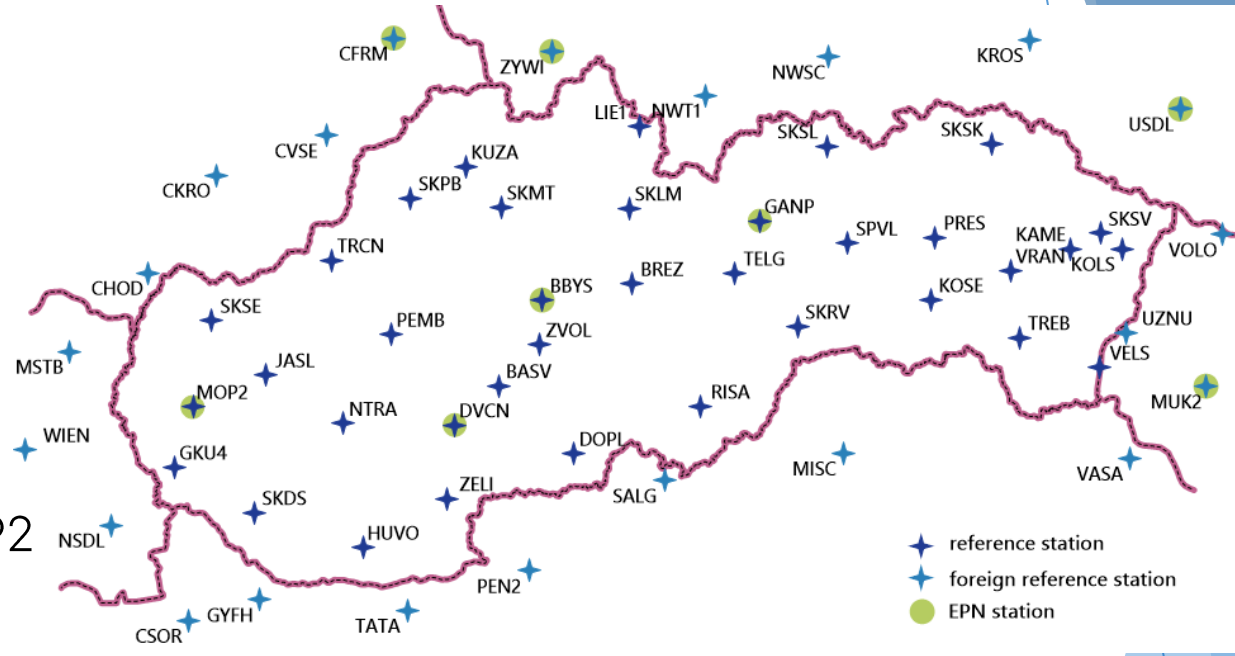


GKU BRATISLAVA

SKPOS®

CORS Network:

- ▶ 36 stations (+ 22 foreign)
- ▶ 36 GPS+GLO+GAL+BDS+SBS
- ▶ 22 pillar/drilled rod stabilization
- ▶ 4 EPN: BBYS, DVCN, GANP, MOP2
- ▶ 1 IGS: GANP



Real-time positioning service:



18 years
of operation



99,99%
service availability



3300+
users

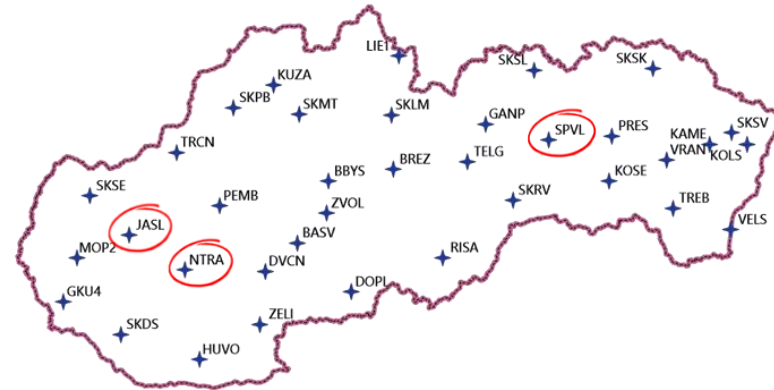




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News since last EUREF Symposium:



► 06/2023 3 new stations in operation (JASL, NTRA, SPVL)



JASL



NTRA



SPVL



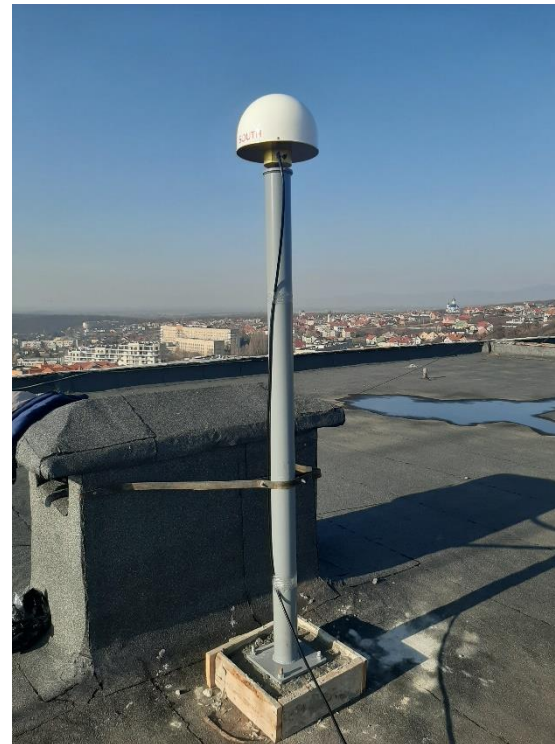
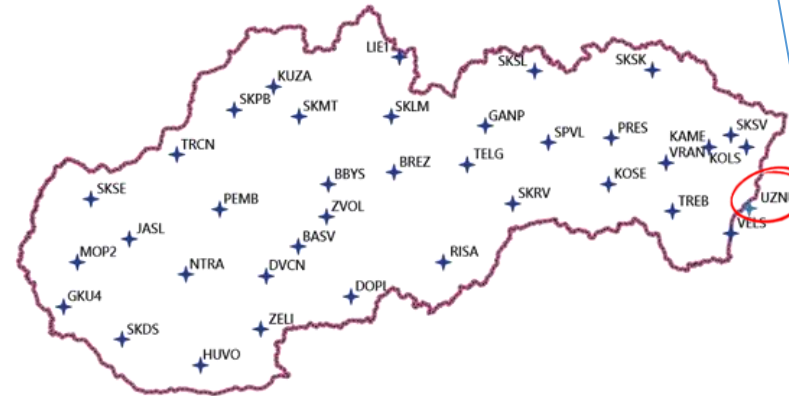
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- ▶ 06/2023 3 new stations in operation (JASL, NTRA, SPVL)
- ▶ **03/2024 1 new foreign station in Ukraine (UZNU)**





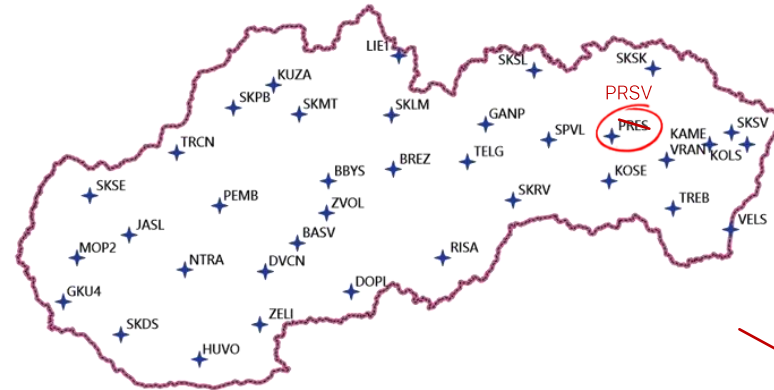
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News since last EUREF Symposium:



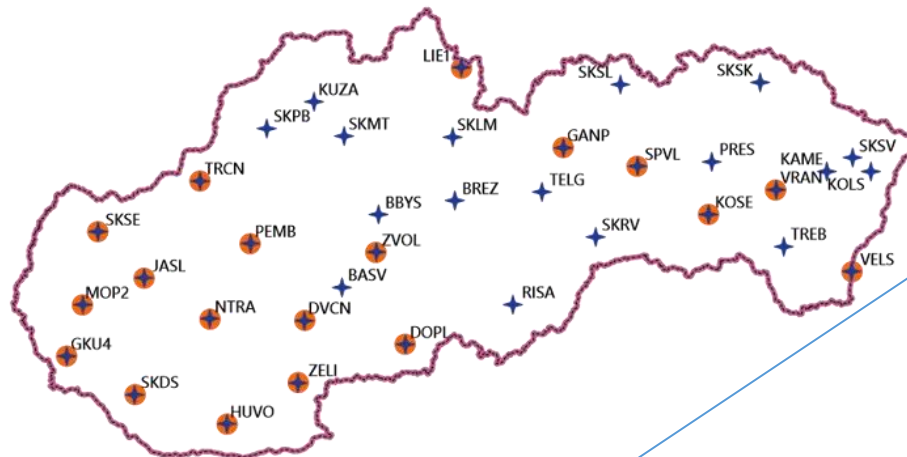
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HW

- ▶ **08/2023 9 new Trimble Alloy receivers (West SVK)**





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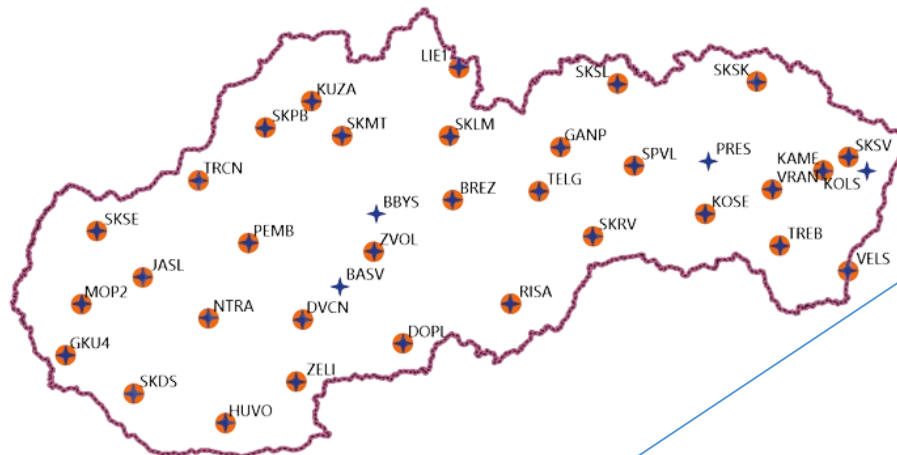
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- ▶ **04/2024 13 new Trimble Alloy receivers (Center + East SVK)**





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News since last EUREF Symposium:



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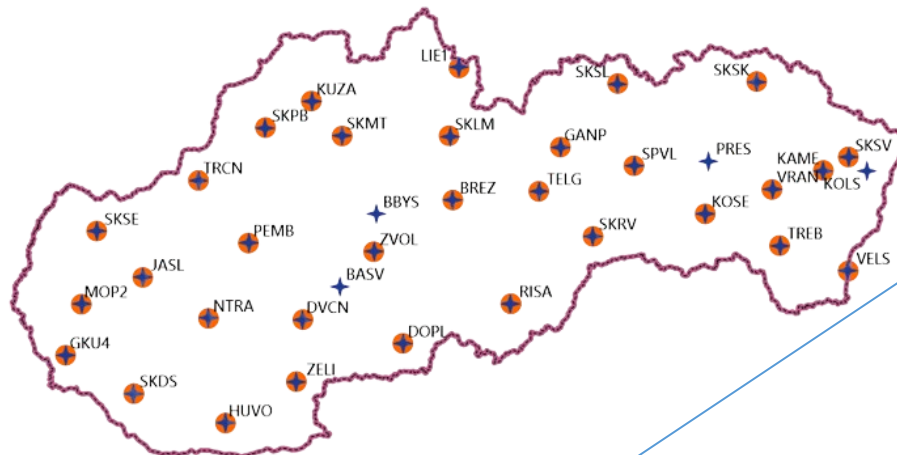
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32/36 Trimble Alloy (BeiDou-3 support)





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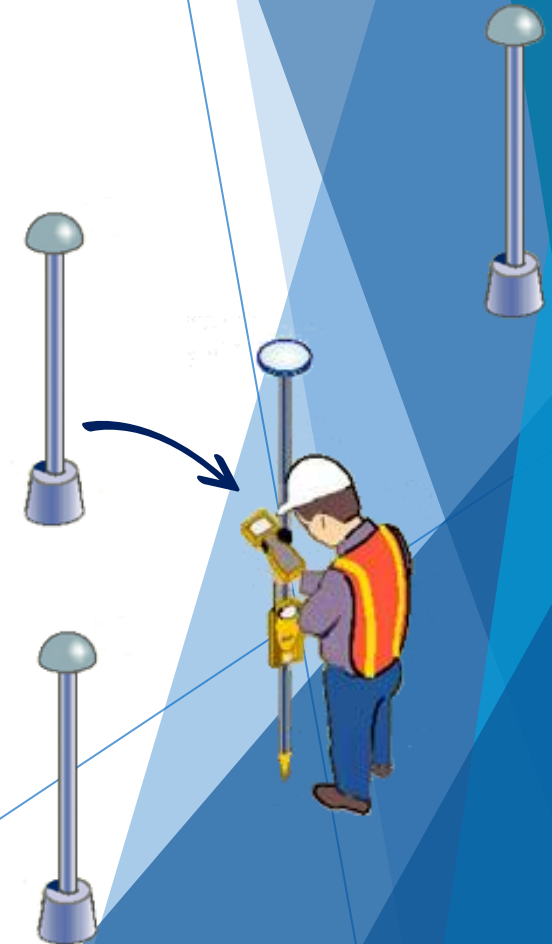
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- ▶ **01/2024 new mountpoint "Nearest reference station"**





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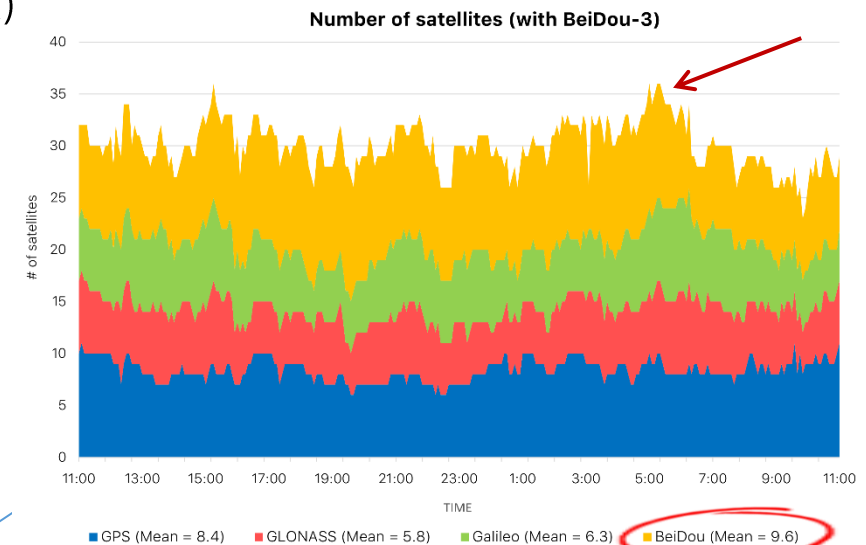
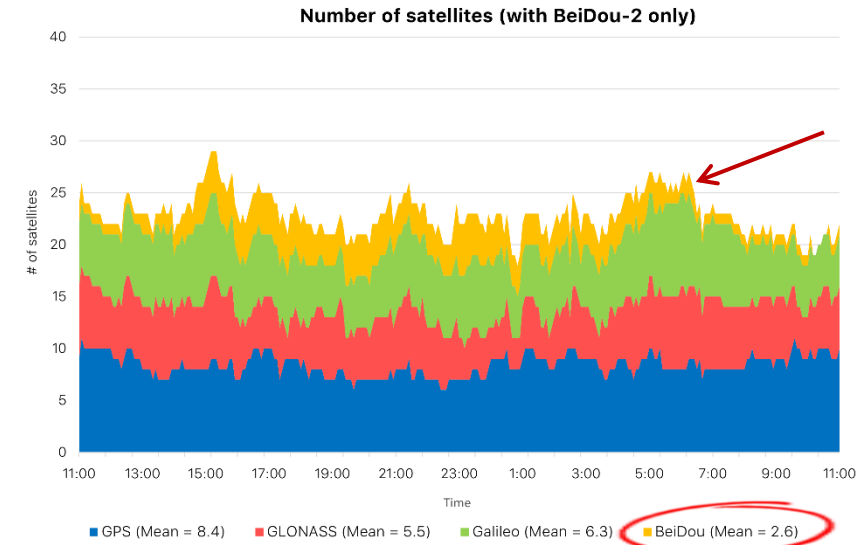
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NSC

- ▶ 01/2024 new mountpoint "Nearest reference station"
- ▶ **05/2024 BeiDou-3 available for Network RTK users**





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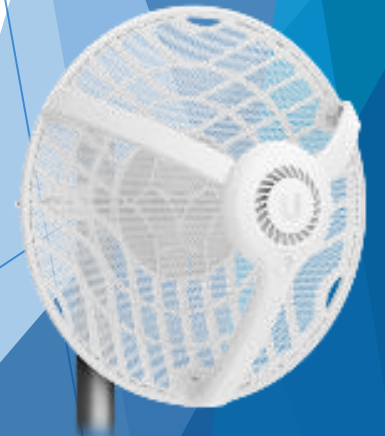
NSC

- ▶ 01/2024 new mountpoint "Nearest reference station"
- ▶ 05/2024 BeiDou-3 available for Network RTK users



VPN

- ▶ **09/2023 new internet provider for SKPOS ( speed,  delay)**





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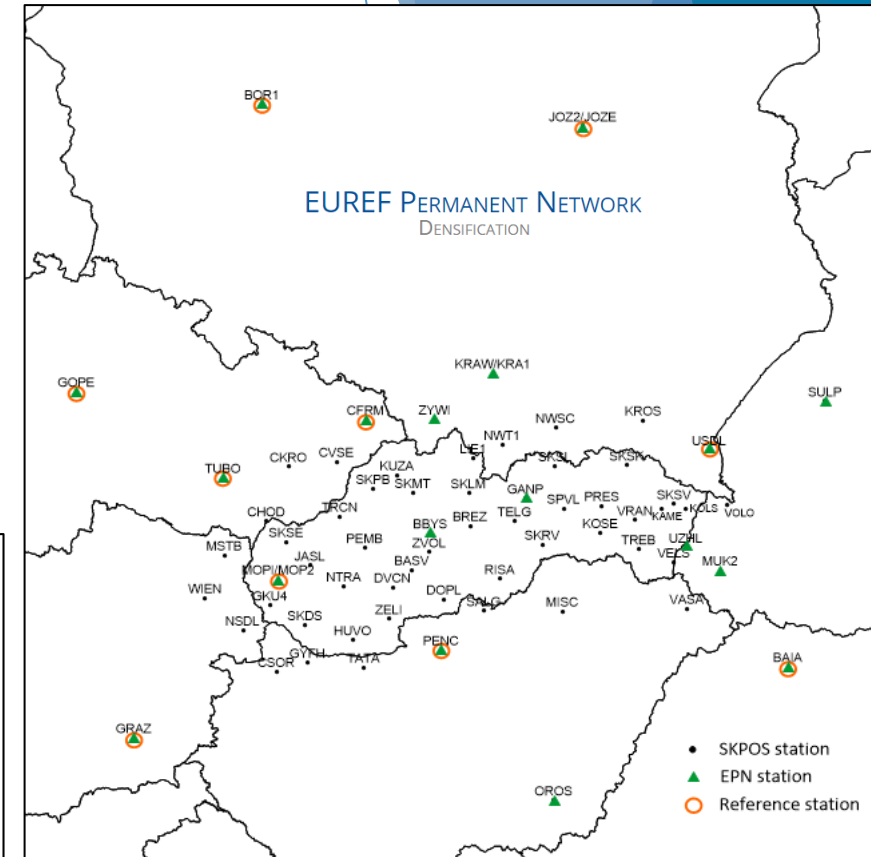
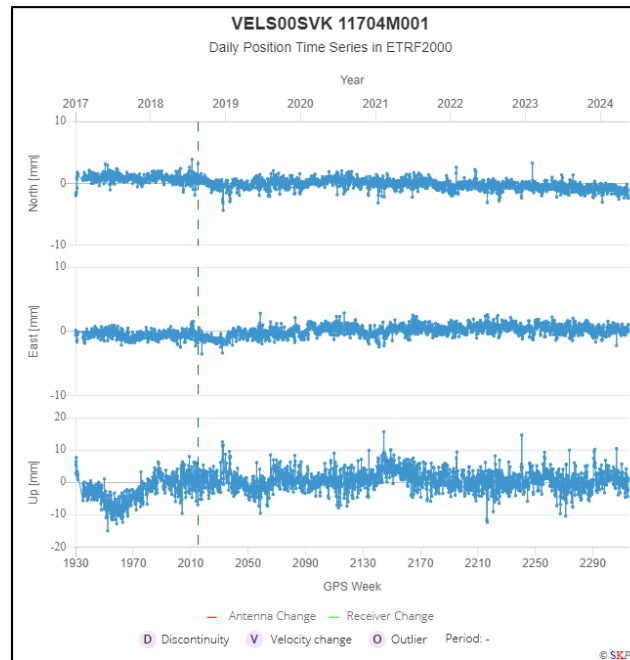
EPN Densification Analysis Center (GKU)

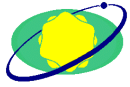
SKPOS network processing:

- ▶ Final daily GRE coordinate solutions
- ▶ 71 stations (SKPOS+EPN)
- ▶ Bernese GNSS Software 5.4
- ▶ IGS20 reference frame
- ▶ **SKPOS repro3 in progress**
(2017-2022 done)

Contributions to:

- ▶ EPN Densification
- ▶ CEGRN





EPN Analysis Center (SUT)

EPN-subnetwork processing:

- ▶ 92 EPN stations
- ▶ Bernese GNSS Software 5.4 
- ▶ IGS20 reference frame
- ▶ **EPN repro3 in progress**

Provided 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)

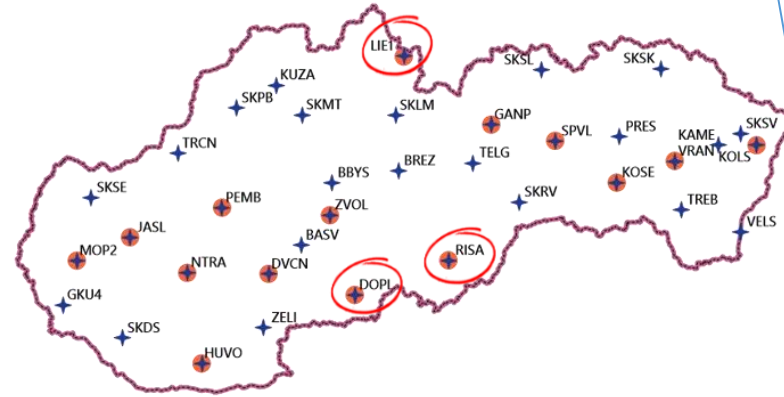




InSAR

National InSAR reflector network:

- ▶ 15 GNSS/InSAR collocated stations
- ▶ 3 new passive corner reflectors installed at existing stations



DOPL



LIE1



RISA



SKVRF2024 – New National realization of EVRS (EVRF2019)

Input data:

- ▶ Levelling (1st order: 1996 – 2019, 2nd order: 1987 – 2017)
- ▶ Gravity – calculated from interpolated value of the CBA

Two-step network adjustment:

1. step – 1st order

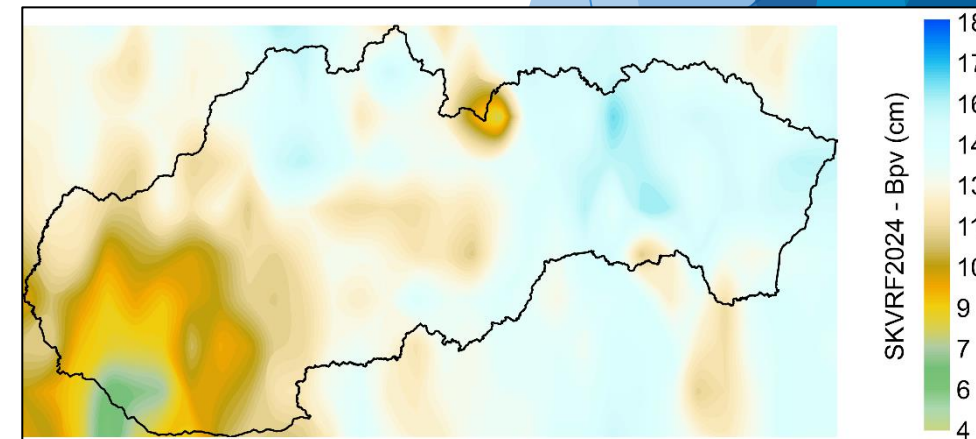
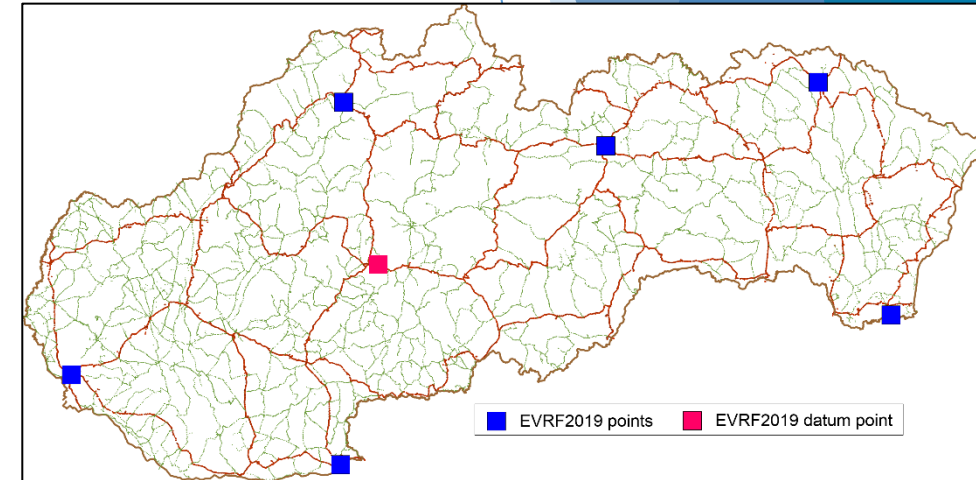
- ▶ 7 reference points with standard deviation from EVRF2019 (BKG)

2. step – 2nd order

- ▶ Connected to the 1st order fix points (adjusted in 1. step)

Differences SKVRF2024 (EVRF2019) vs. Bpv1957:

- ▶ 4 – 18 cm

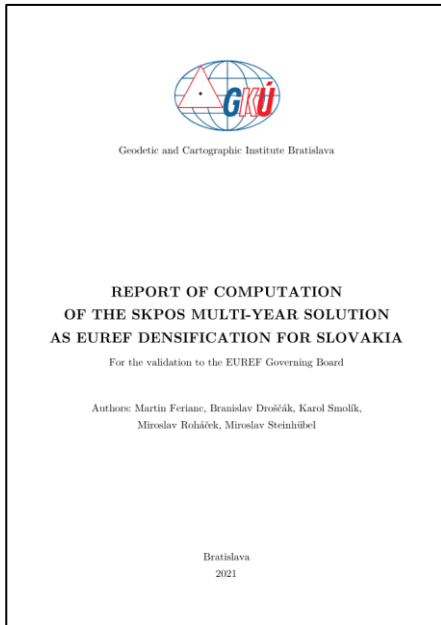




Update of NMCA's Decree 300/2009

§ 2 Binding geodetic reference systems and realizations:

- ▶ SKTRF2022 (ETRF2000)
- ▶ SKVRF2024 (EVRF2019)



EUREF 2022 Symposium, Zagreb

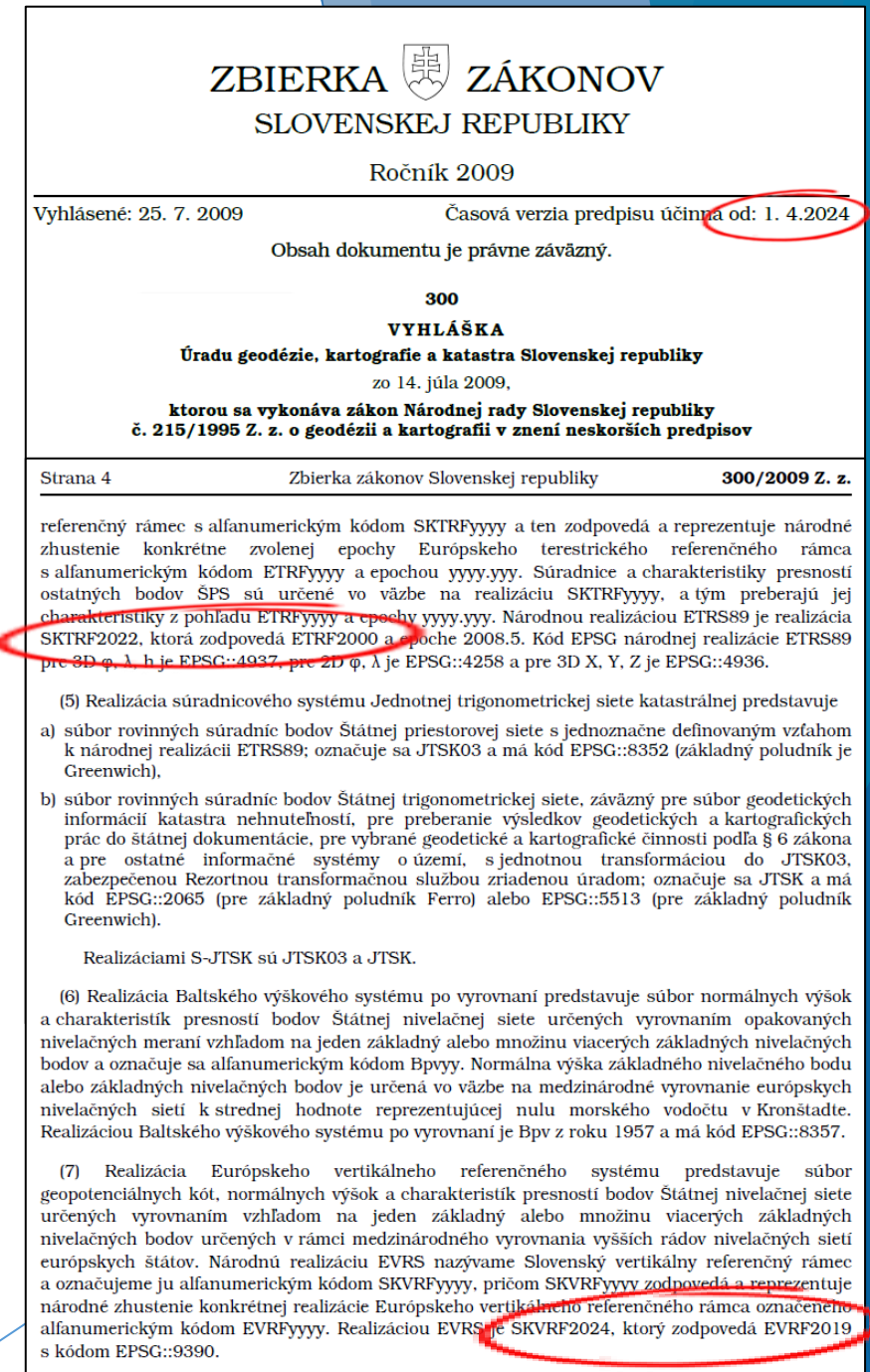
Resolution No. 1.

The IAG Reference Frame Sub-commission for Europe (EUREF)

recognising that the multi-year solution for the Slovakian SKPOS network was completed and presented to the EUREF Governing Board (GB) by representatives of Slovakia and that these results were accepted by the GB as Class A standard

endorses the set of points for Slovakia, as submitted to the GB, as a national realisation of ETRS89

SKTRF2022
(ETRF2000)



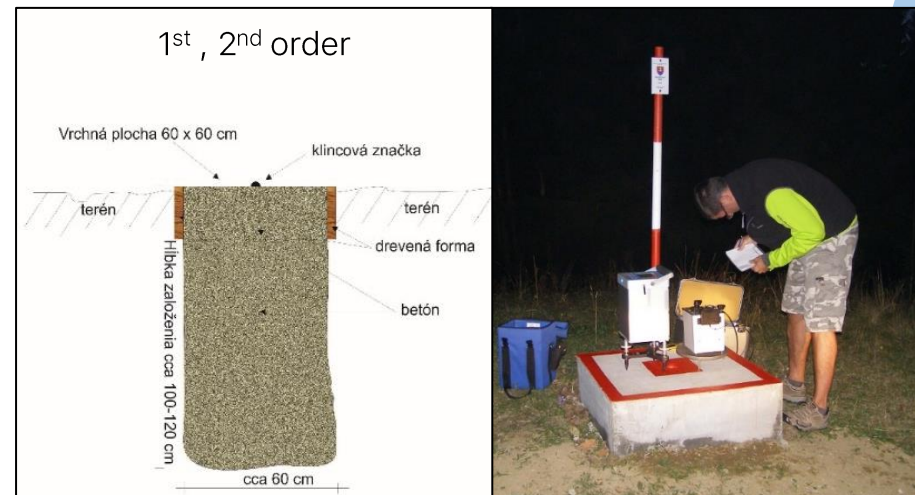
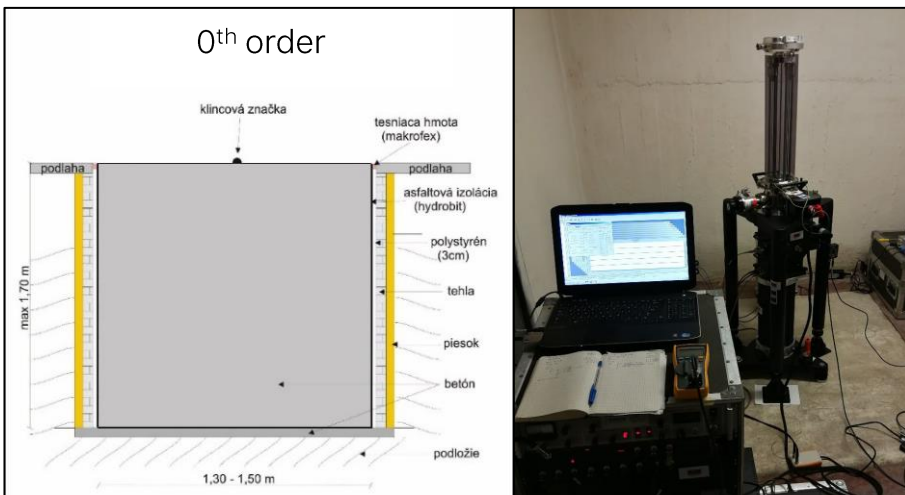
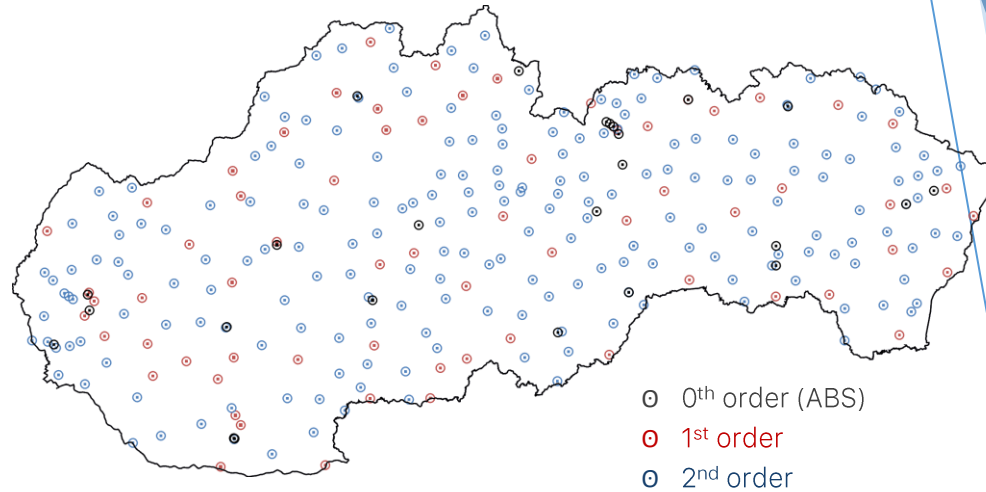


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Gravimetry

(Old) National Gravimetric Network:

- ▶ 0th order (25 ABS points)
- ▶ 1st order (66 points)
- ▶ 2nd order (260 points)
- ▶ national realization (1995): S-Gr95





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Gravimetry

(New) National Gravimetric Network:

- ▶ 0th order (17 points)
- ▶ 1st order (84 points)
- ▶ vertical gravimetric baseline

Gravity measurements (2023-2024):

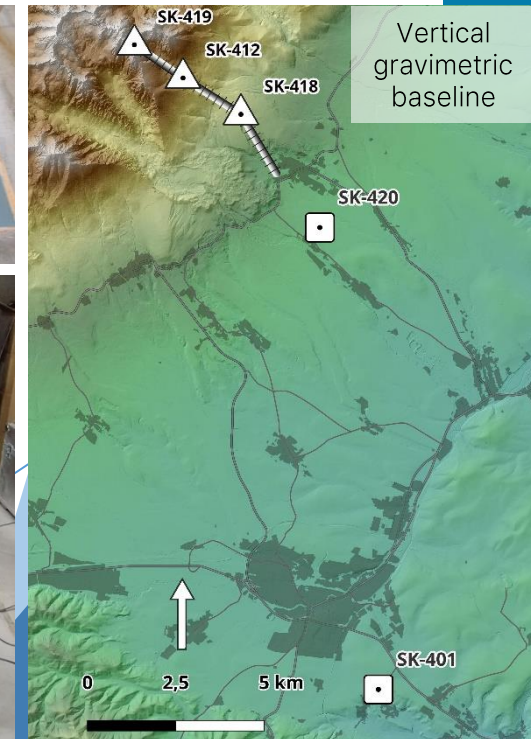
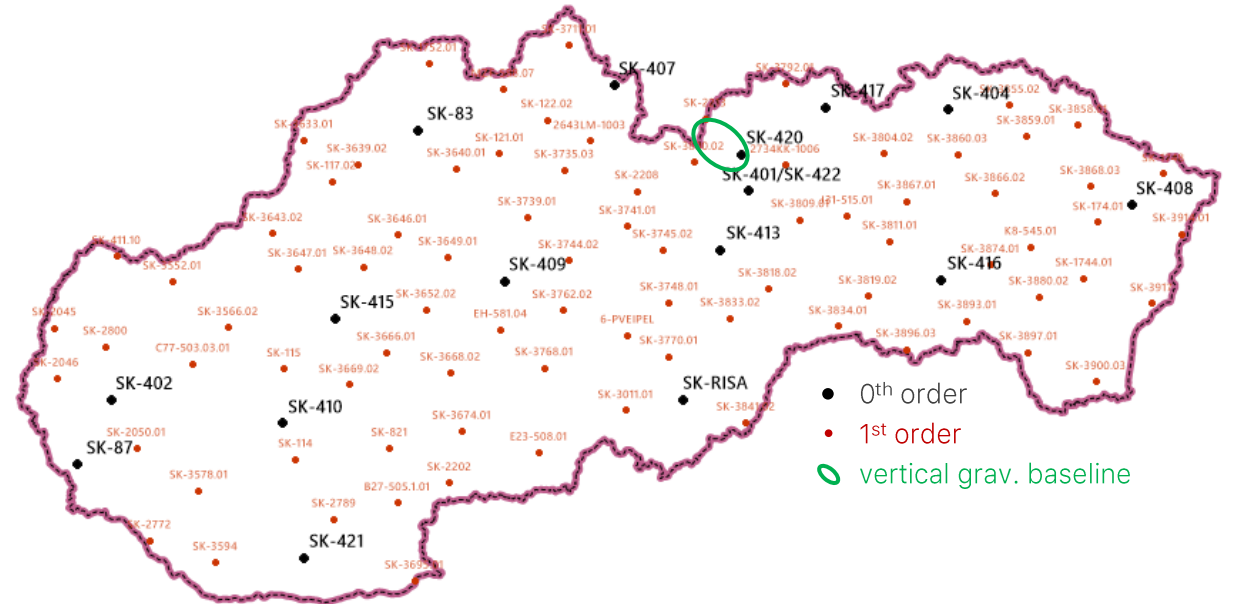
- ▶ 0th order SUT Bratislava (FG5X-247)
- ▶ 1st order IGiK, Warsaw (A10-020)
- ▶ gradients GKU Bratislava (CG-5)

absolute
gravimeters

relative
gravimeter

Network adjustment (2025):

- ▶ New national realization S-Gr





EDM calibration baseline

Baseline description:

- ▶ Location: Viničné, Slovakia
- ▶ Length: 606.7 m
- ▶ 7 pillars
- ▶ Heerbrugg (Schwendener) design

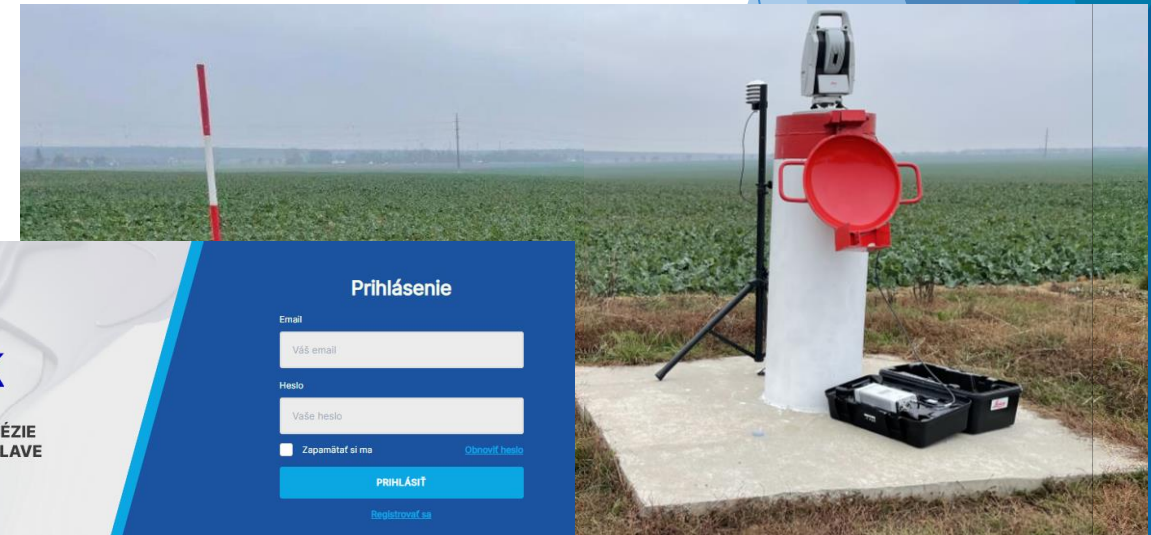
2nd GNSS campaign:

- ▶ 72-hours GNSS campaign (03/2024)
- ▶ ETRS89 coordinates estimation

NEW

EDM calibration:

- ▶ **in operation since 05/2024**
- ▶ registration: <https://kcg.vugk.sk/> →



VÚGK
VÝSKUMNÝ ÚSTAV GEODÉZIE
A KARTOGRAFIE V BRATISLAVE

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Geospatial data

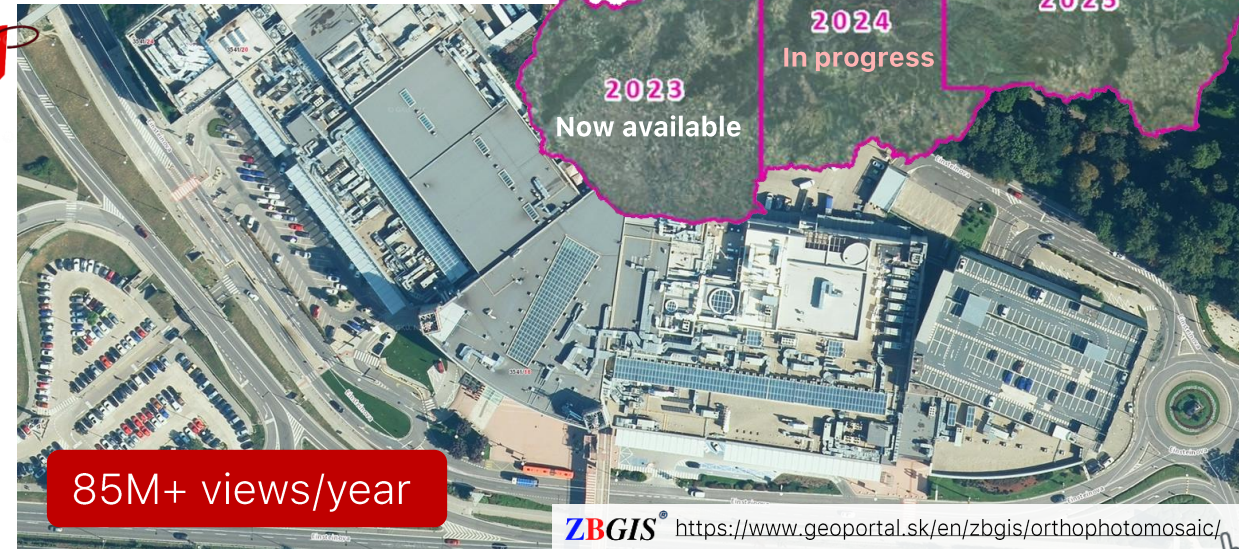
New orthophoto:

- ▶ 3rd cycle of AP (2023-2025)
- ▶ **GSD: 15 cm/pixel**
- ▶ 4 channels (RGBN, 8 bit)
- ▶ $RMSE_{xy} = 17 \text{ cm}$

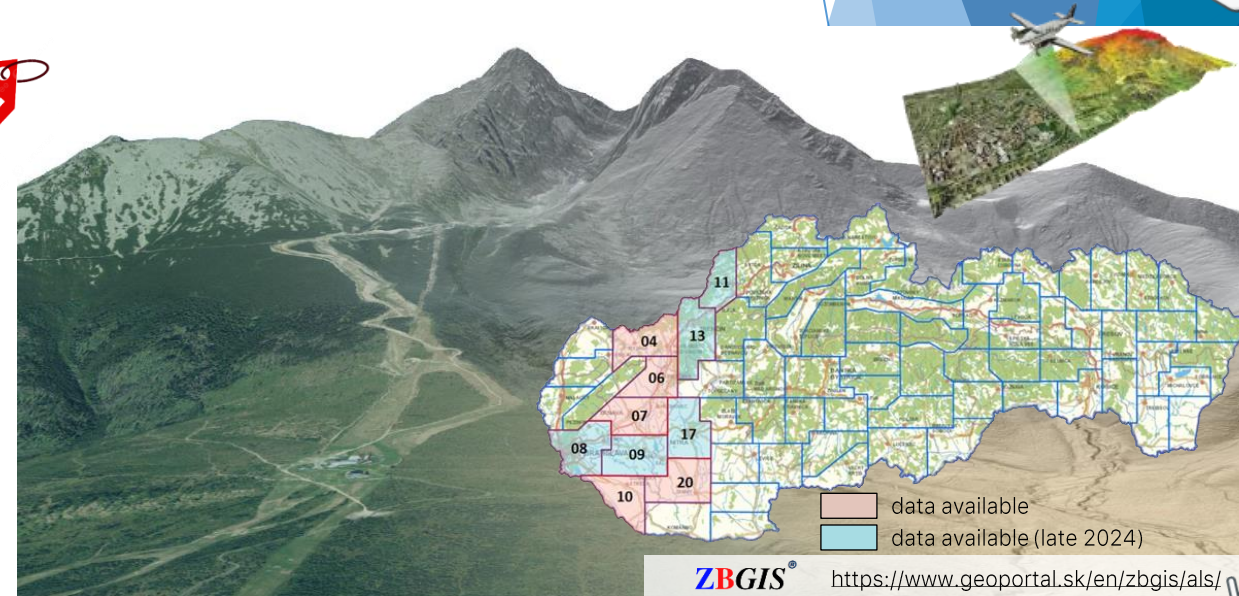
New DTM 6.0/DSM 2.0:

- ▶ 2nd cycle of ALS (2022-2026)
- ▶ 73 locations
- ▶ **1 x 1 m resolution (34-45 pts/m²)**
- ▶ $RMSE_h = 2 - 8 \text{ cm}$

FREE



FREE



THANK YOU



Martin Ferianc



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skpos@skgeodesy.sk



EUREF 2024 SYMPOSIUM

5th – 7th June 2024 | Barcelona