7th EUPOS Meeting

NATIONAL REPORT OF SLOVENIA

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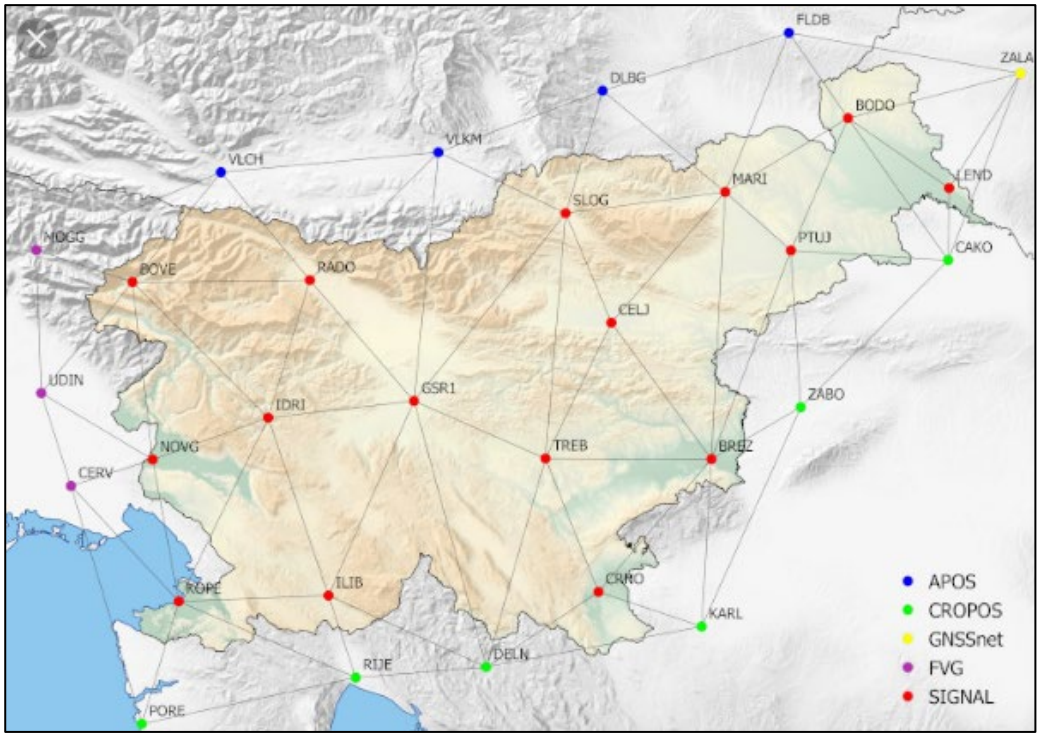
PRESENTATION TOPICS

- **Active GNSS Networks: SIGNAL & Zero Order Networks**
- **Newly Proposed EPN Stations**
- **Trimble Online Processing Service**
- **Passive GNSS Control Network**
- **New Freware Transformation Tools**
- **Targeted research project V2-1924**

SIGNAL NETWORK (GBAS)

- **16** continuously operating GNSS stations in Slovenia (8 Trimble + 8 Leica)
- **+14** continuously operating GNSS stations in Austria, Croatia, Hungary & Italy
- **1** EPN station (GSR1 – Ljubljana, EUREF Class A)
- Trimble Pivot Platform, Alberding Quality Control for monitoring

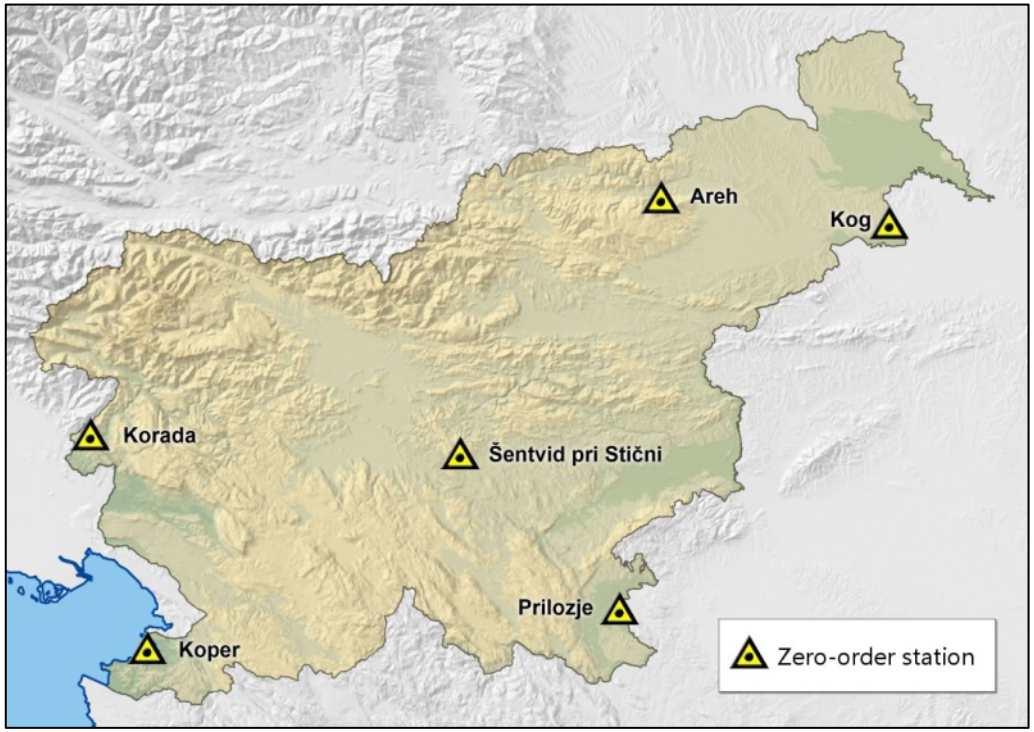


SIGNAL NETWORK (GBAS)

- New station coordinates in **ETRS89/D96-17** since January 1st 2020.
- Renaming 6 stations to be compatible with their IERS DOMES numbers.
- Since beginning of 2020 replaced 7 GNSS receivers/antennas – network now fully Galileo capable.
- New station in **Koper (KOPR)**, existing location is problematic.
- Planing upgrade to **multi GNSS** in December with Trimble RTX module, currently in testing phase.
- TOP module issue in TPP 4.3.
- New website.

ZERO ORDER GNSS NETWORK

- **6** continuously operating GNSS stations in Slovenia (Leica)
- **4** of them are **twin stations**, **1** combined with a **tide gauge station**, **1** with a **seizmic station**, **1** near an old **triangulation point**, **1** near an **absolute gravimetric point**;
  all stations connected to the first order levelling network
- Operating for more than 5 years, Alberding Quality Control



ZERO ORDER GNSS NETWORK

- New station coordinates in **ETRS89/D96-17** since January 1st 2020.
- All stations are members of **EPOS Network** since October 2020.
- **1** GNSS receiver and antenna replaced.
- Sending station data to Slovenian Meteorological Service for **ZTD data**.
- New **0 Order Network website** as part of SIGNAL Network website.

ZERO-ORDER GNSS NETWORK

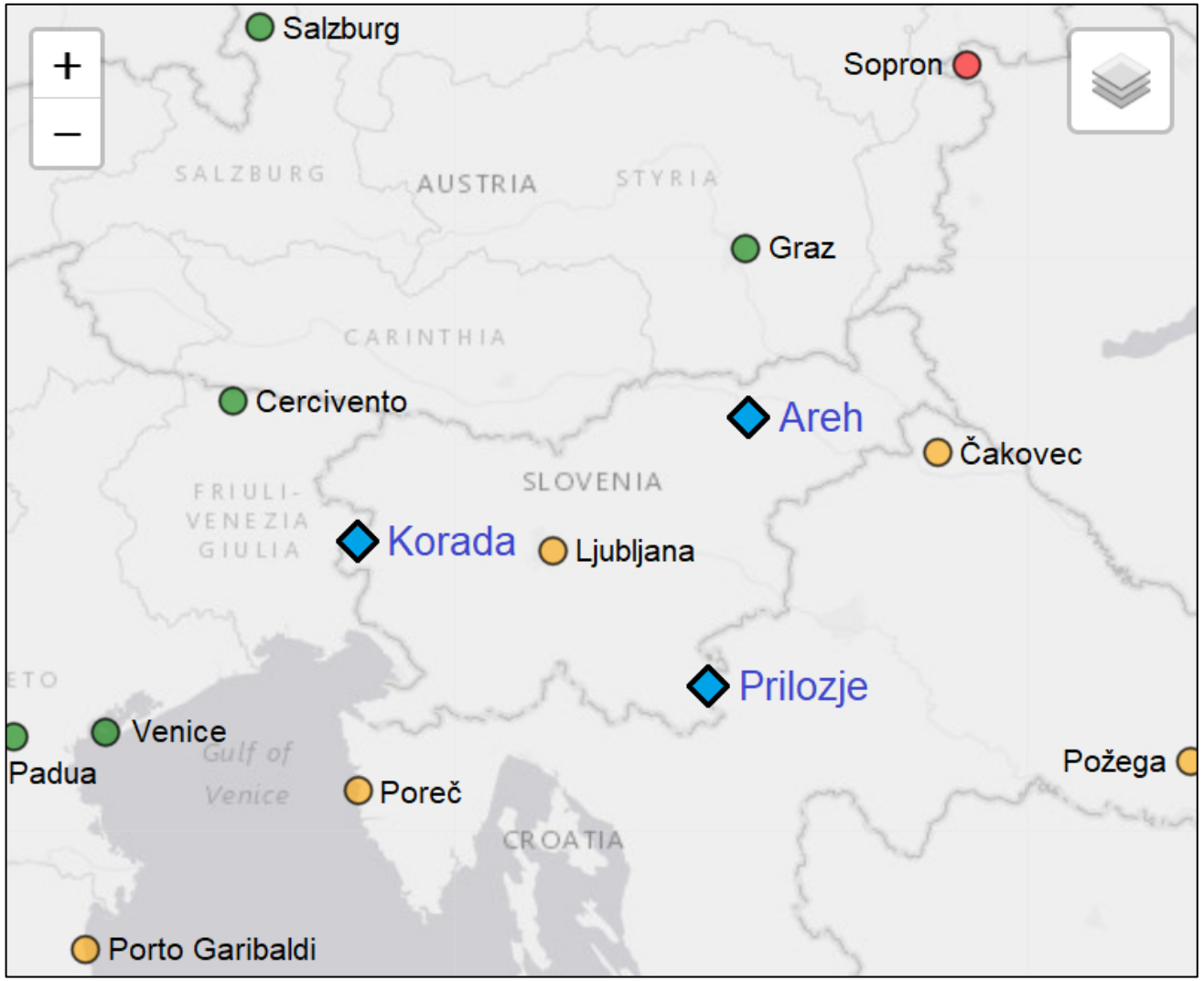
3 newly proposed EPN stations:

- ARA2 … Areh east
- KDA2 … Korada east
- PZA2 … Prilozje east

ZERO-ORDER GNSS NETWORK

3 newly proposed EPN stations:

- Areh
- Korada
- Prilozje



ZERO-ORDER GNSS NETWORK

… twin stations:

- ARA2 (Leica GR25) … collocated GNSS station ARA1 (Leica GR30),
  micro weather station (Vaisala WXT520)
  precision inclination sensor (Leica Nivel 210)
  collocated absolute gravity point
- KDA2 (Leica GR25) … collocated GNSS station KDA1 (Leica GR30),
  micro weather station (Vaisala WXT520)
  precision inclination sensor (Leica Nivel 210)
  collocated first-order triangulation point
- PZA2 (Leica GR30) … collocated GNSS station PZA1 (Leica GR25),
  micro weather station (Vaisala WXT520)
  precision inclination sensor (Leica Nivel 210)

… direct connection to the first-order levelling network

SIGNAL NETWORK SERVICES – OPEN ISSUE

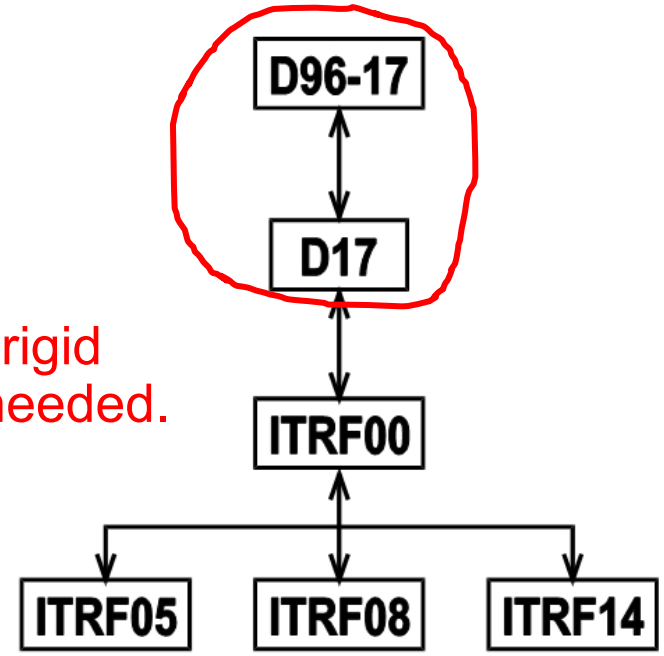
Trimble Online Processing (TOP) Module
(for fast static GNSS surveys)

… problems with the application setup
(resulting in low accuracy of coordinates)

… an appropriate transformation to ITRF2014 needed

… any experiances to share?

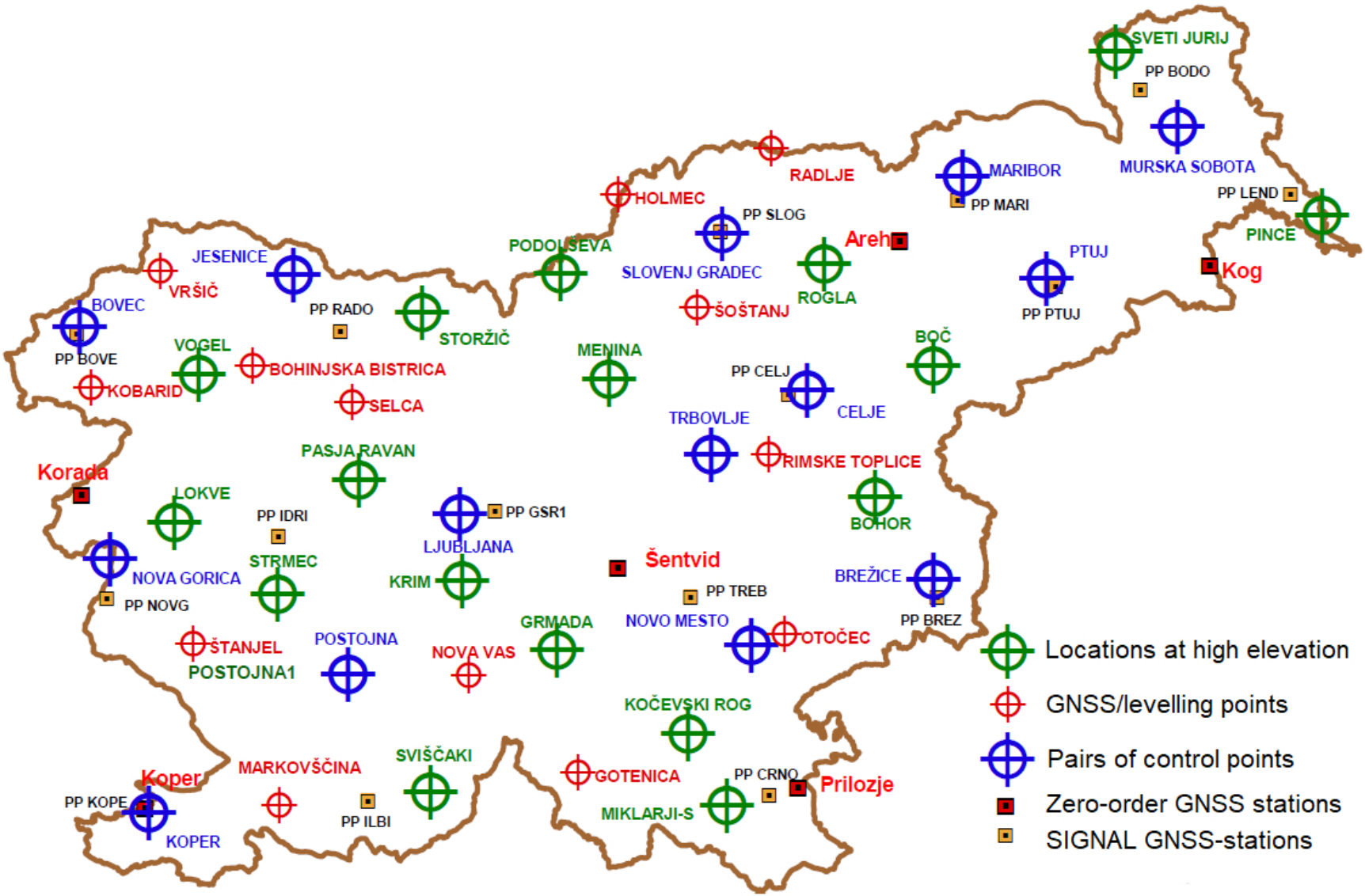
Specific character of D96-17: additional spatial rigid (6-parametric) transformation to ETRF2000 is needed.



PASSIVE GNSS CONTROL NETWORK

- **Established to:**
  - monitor the quality of GNSS network products and services
  - verify the quality of GNSS measurement methods and equipment
- **44 locations in total:**
  - 14 locations with callibration baselines (pairs of points) for testing according to ISO 17123-8
  - 17 control points at high elevations
  - 13 GNSS/levelling points

PASSIVE GNSS CONTROL NETWORK

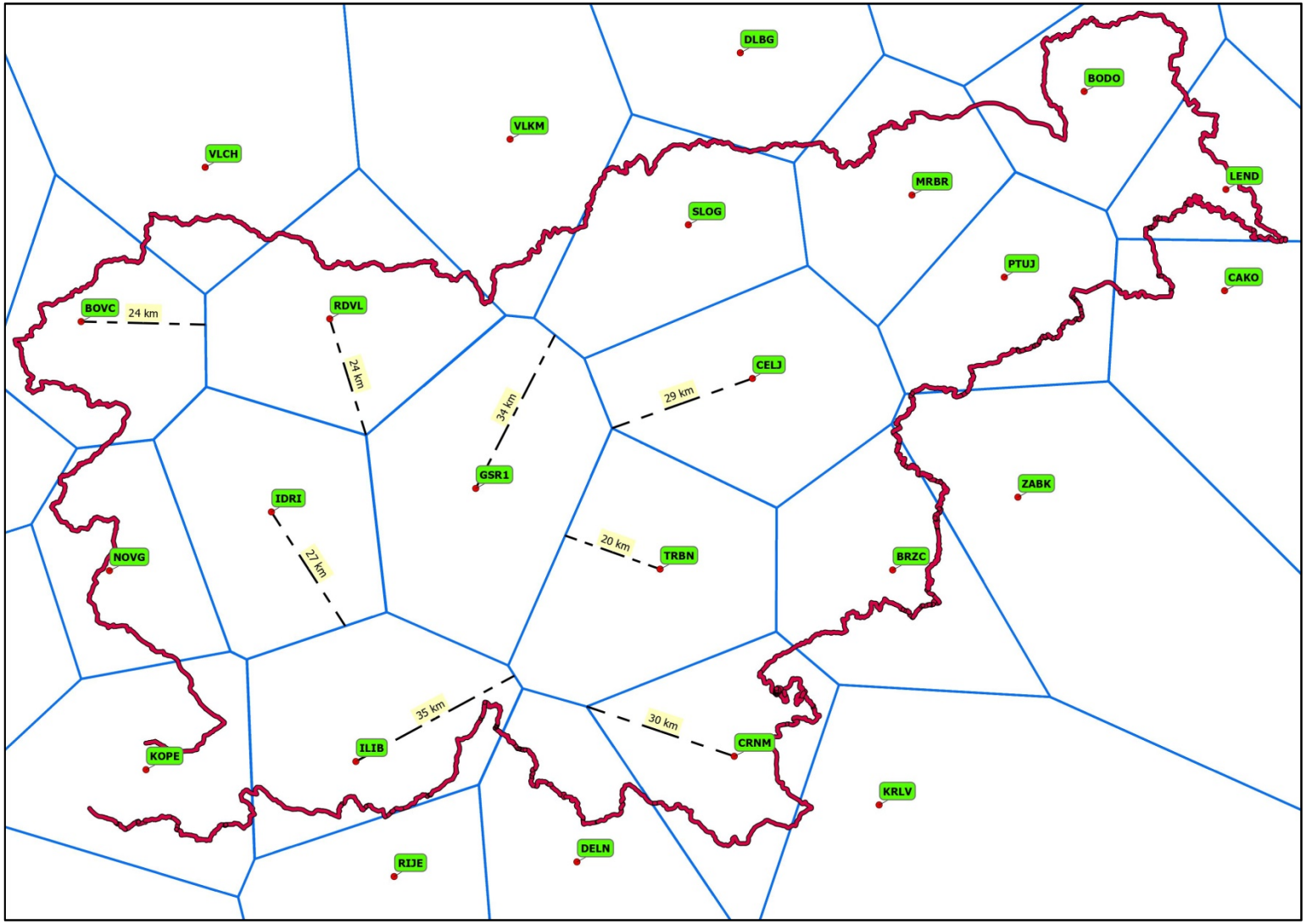


PASSIVE GNSS CONTROL NETWORK

Test measurements on pairs of control points

RTK QUALITY CONTROL IN CRITICAL AREAS

- **More than 20 km from the nearest GNSS station**



FREEWARE TOOLS FOR TRANSFORMATIONS

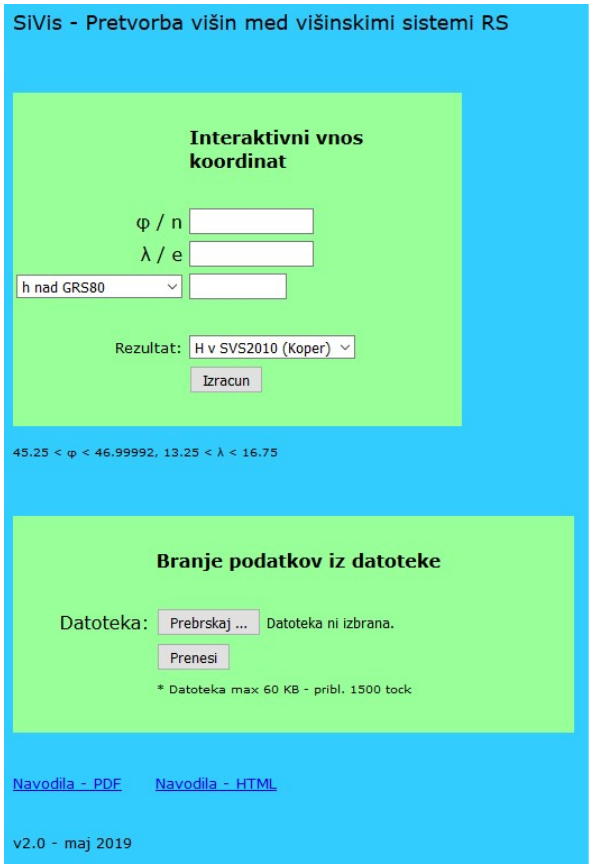
SiVis … an online application for:

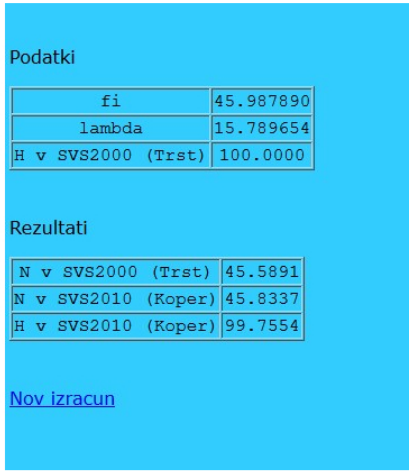
- height transformation between the old and new Slovenian hight reference systems (SVS2000 ↔ SVS2010)

… only for GNSS-based heights

Format:

- TXT



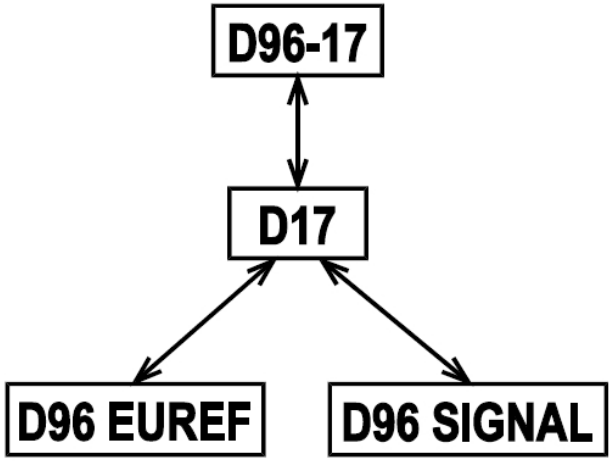


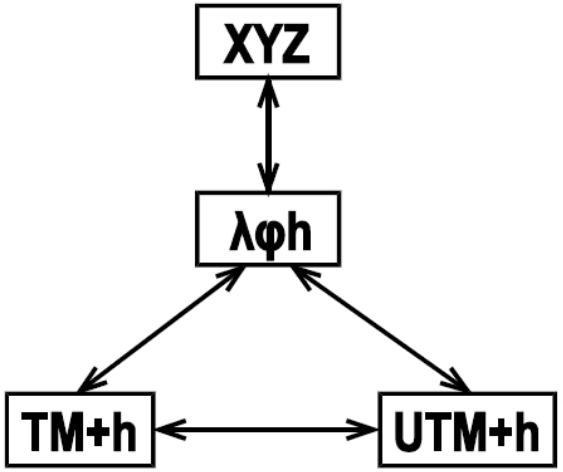
FREEWARE TOOLS FOR TRANSFORMATIONS

ETRS89-SI … a desktop application for:

- coordinate transformation between the Slovenian realizations of ETRS89 (D17, D96-17, D96 EUREF, D96 SIGNAL)

Datum transformations & Coordinate conversions



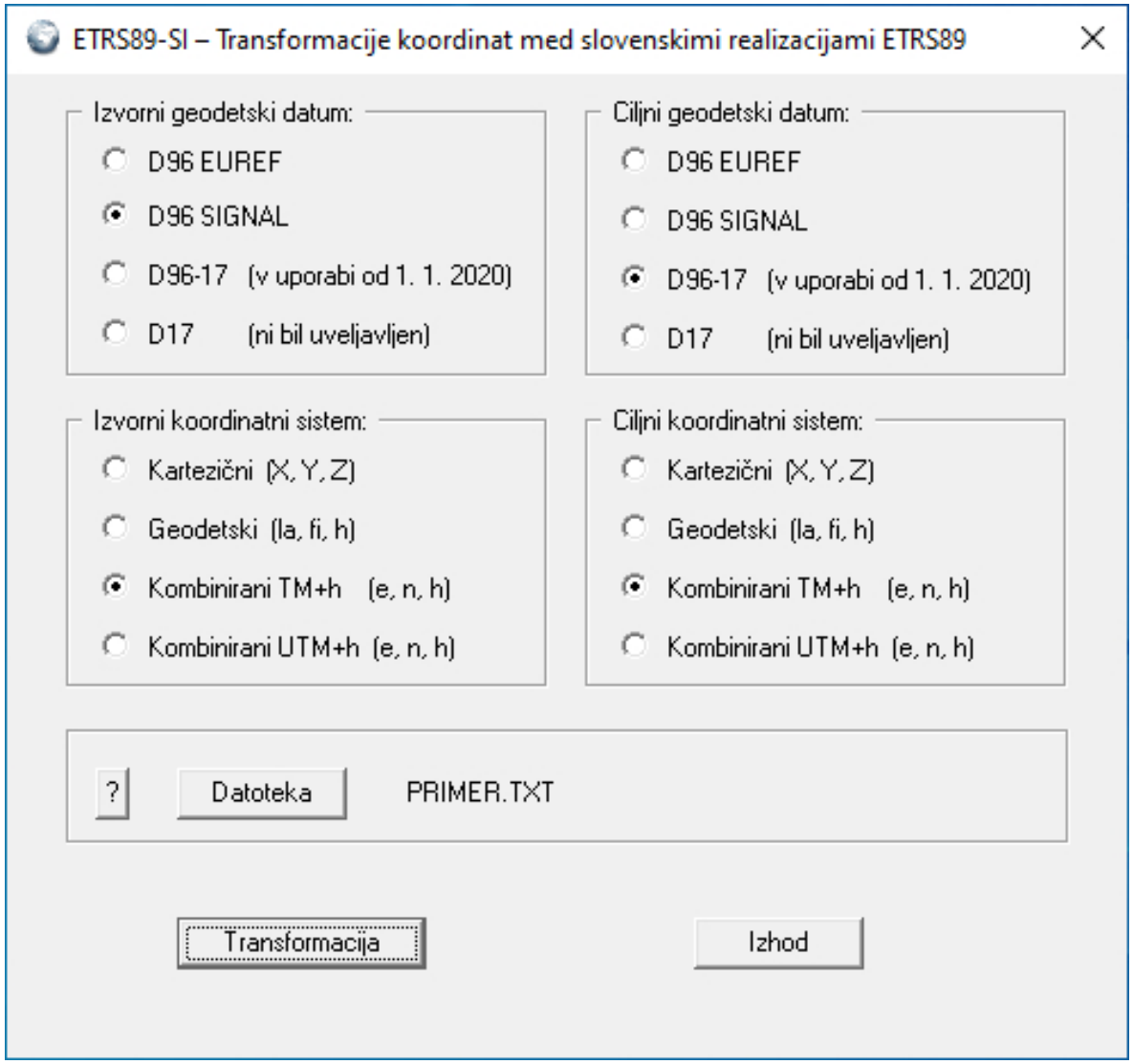


FREEWARE TOOLS FOR TRANSFORMATIONS

ETRS89-SI

Formats:

- CRD
- CSV
- TXT
- XYZ

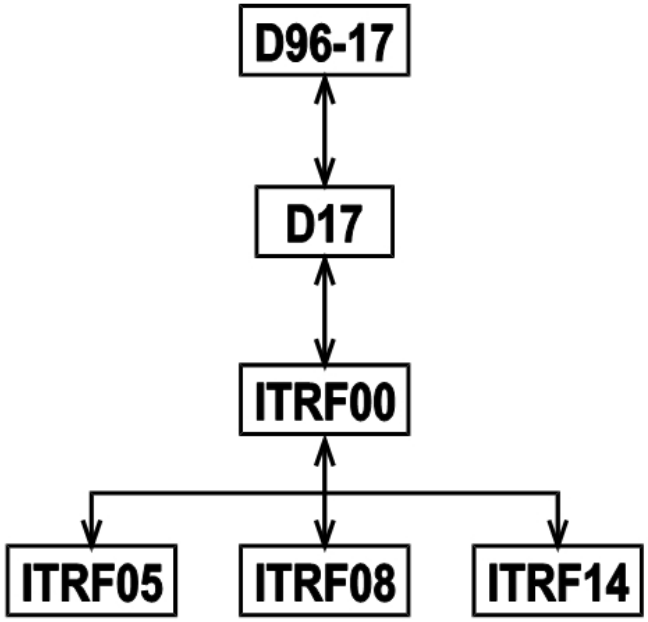


FREEWARE TOOLS FOR TRANSFORMATIONS

ITRS-SI … a desktop application for:

- time-dependent coordinate and velocity transformation between the Slovenian realizations of ETRS89 (D17, D96-17) and realizations of ITRS (ITRF2000, ITRF2005, ITRF2008, ITRF2014)

Datum transformations



Source and target frames

Transformacija iz ↓ v →	D96-17	D17	ITRF00	ITRF05	ITRF08	ITRF14
D96-17	–	2	1	1	1	1
D17	2	–	1	1	1	1
ITRF00	1	1	2	2	2	2
ITRF05	1	1	2	2	2	2
ITRF08	1	1	2	2	2	2
ITRF14	1	1	2	2	2	2

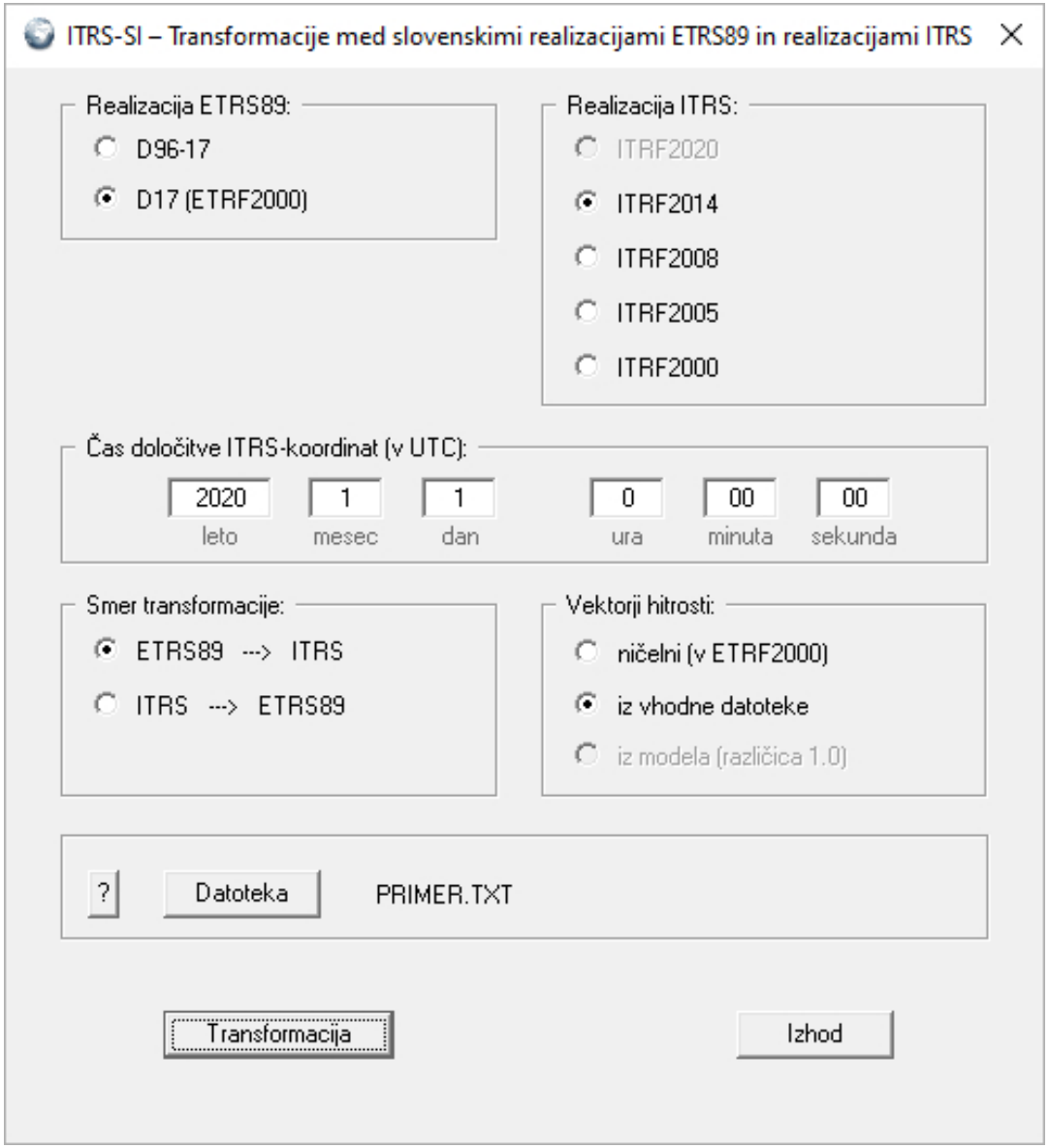
… with the number of transformation steps

FREEWARE TOOLS FOR TRANSFORMATIONS

ITRS-SI

Formats:

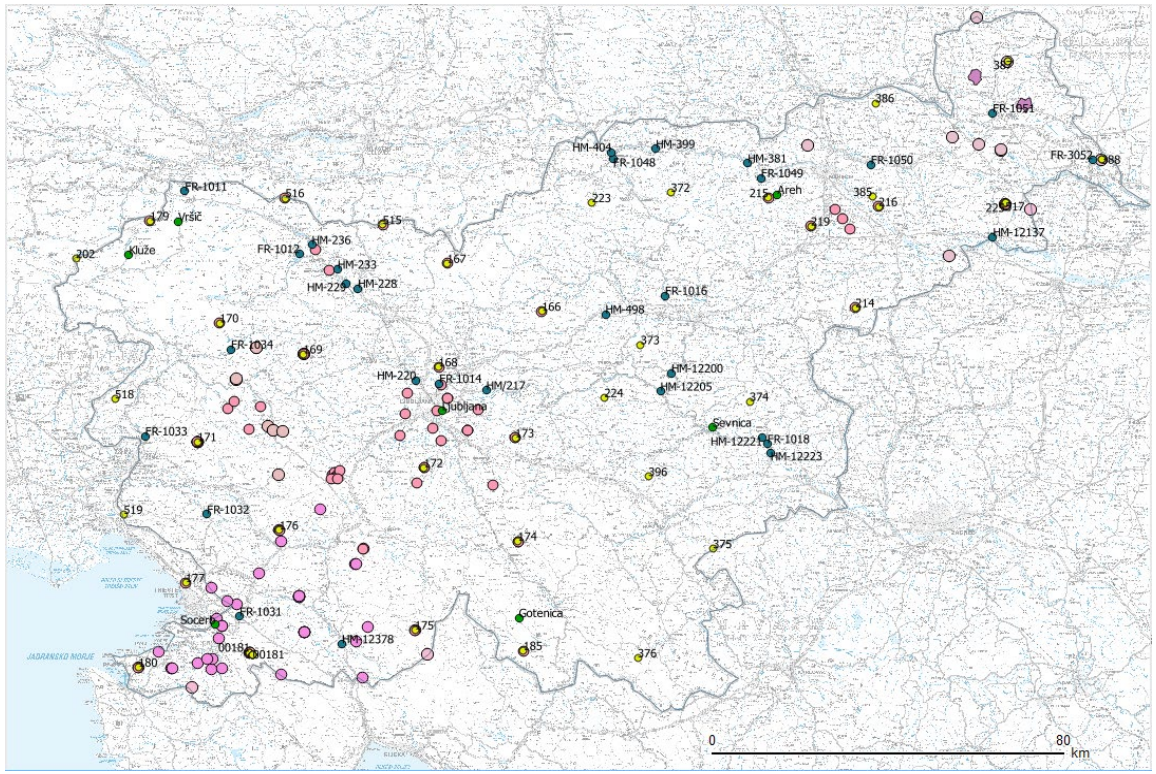
- CRD & VEL
- CSV
- TXT
- XYZ



TARGETED RESEARCH PROJECT V2-1924: PERMANENT GEODETIC MARKS AS A BASIS FOR THE HIGH-QUALITY PERFORMANCE OF THE GEODETIC PROFESSION, 2019-2021

Conducted by Geodetic Institute of Slovenia and University of Ljubljana, Faculty of Civil and Geodetic Engineering

Financed by the Slovenian Research Agency and the Surveying and Mapping Authority of the Republic Slovenia.



Identified locations of interesting geodetic marks with potential for future cultural heritage preservation. Pink – proposals from interviews, blue – benchmarks, green – gravimetric points, yellow – first order trigonometric points.

Past cadastral and at the same time trigonometric mark, 1819

Past trigonometric pillar, 1926

Thank you for your attention