NATIONAL REPORT OF SLOVENIA

GORAN TISAK, SANDI BERK, KLEMEN MEDVED

(SURVEYING AND MAPPING AUTHORITY OF THE REPUBLIC OF SLOVENIA, LJUBLJANA)

NIKO FABIANI, NATALIJA NOVAK

(GEODETIC INSTITUTE OF SLOVENIA, LJUBLJANA)

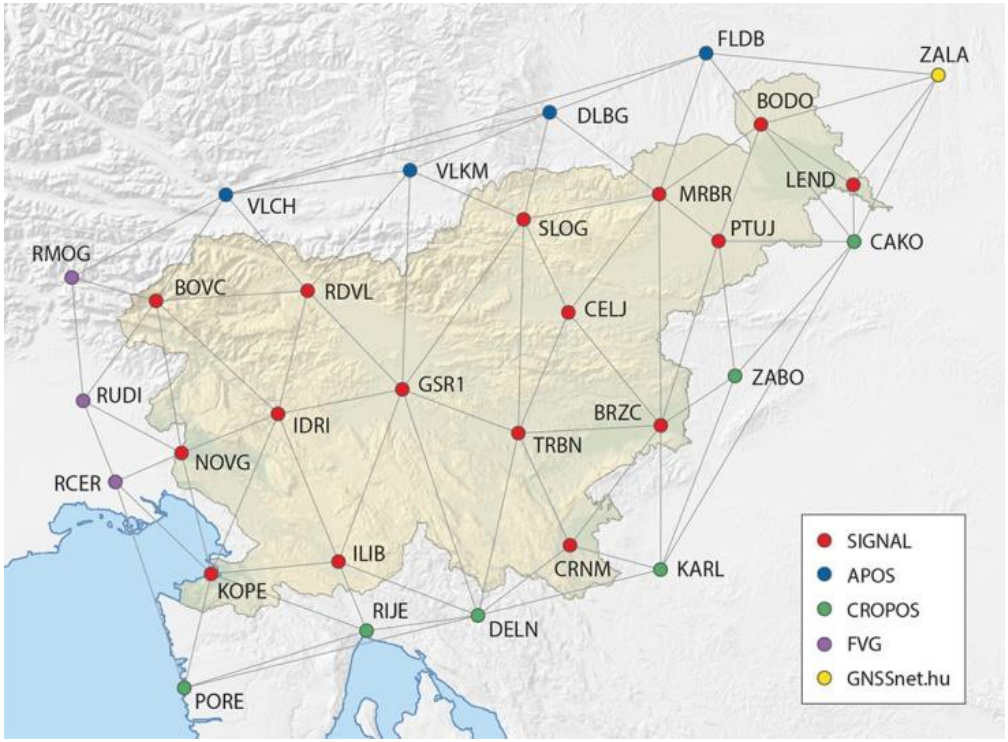
Ljubljana, November 15–16, 2022

PRESENTATION TOPICS

- Active GNSS Networks: SIGNAL & Zero Order Networks
- Passive GNSS Control Network
- Terrestrial reference frame
- Geodynamic measurements
- Other

SIGNAL NETWORK (GBAS)

- **16** continuously operating GNSS stations in Slovenia (9 Trimble + 7 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

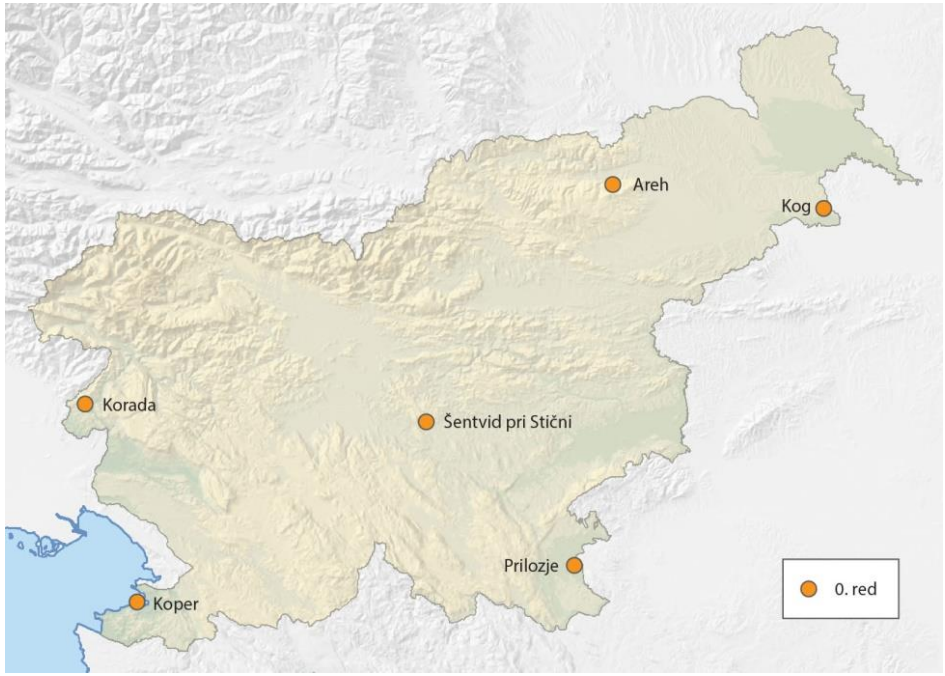


SIGNAL NETWORK – NEWS

- major upgrade in April 2022 – adding Gallileo GNSS capabilities for users
- new server for redundant (backup) system
- new data server for archive purposes
- TOP module issue still present in TPP 4.7 – in talks with Trimble to create a custom CRS
- VRS RINEX antenna name issue in TPP 4.7.2 (not present in 4.7.1)
- 3G network deactivated by one of the biggest telecommunications providers – some users experience problems in the field
- replacement of all network routers (backup connection was 3G GSM) on the stations due to 3G network deactivation
- problem in october 2022 with the network due to a sudden limitation of bandwidth in the SIGNAL Network Analysis Center - solved
- in the process of creating automated scripts to archive RINEX data directly from receivers (not TPP) and check data completeness
- near future: replacement of one NetR9 receiver due to hardware malfunction (second one with identical problem)

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 6 years, Alberding GNSS Status Software



Šentvid pri Stični

ZERO ORDER GNSS NETWORK

- all stations included in EPOS Network since October 2020
- 1 GNSS receiver (not antenna) replaced (due to Leica GRX1200 end of life time measuring problem)
- near future: updating/re-installing zero order network server with up-to-date Alberding software
- **3 EPN station** (PZA2, ARA2, KDA2) since January 2022
- Data are sent to two EPN Data Centres (BEV and BKG)
- Included to sub-networks of four EPN Analysis Centres (BEV, RGA, SGO, and UPA)

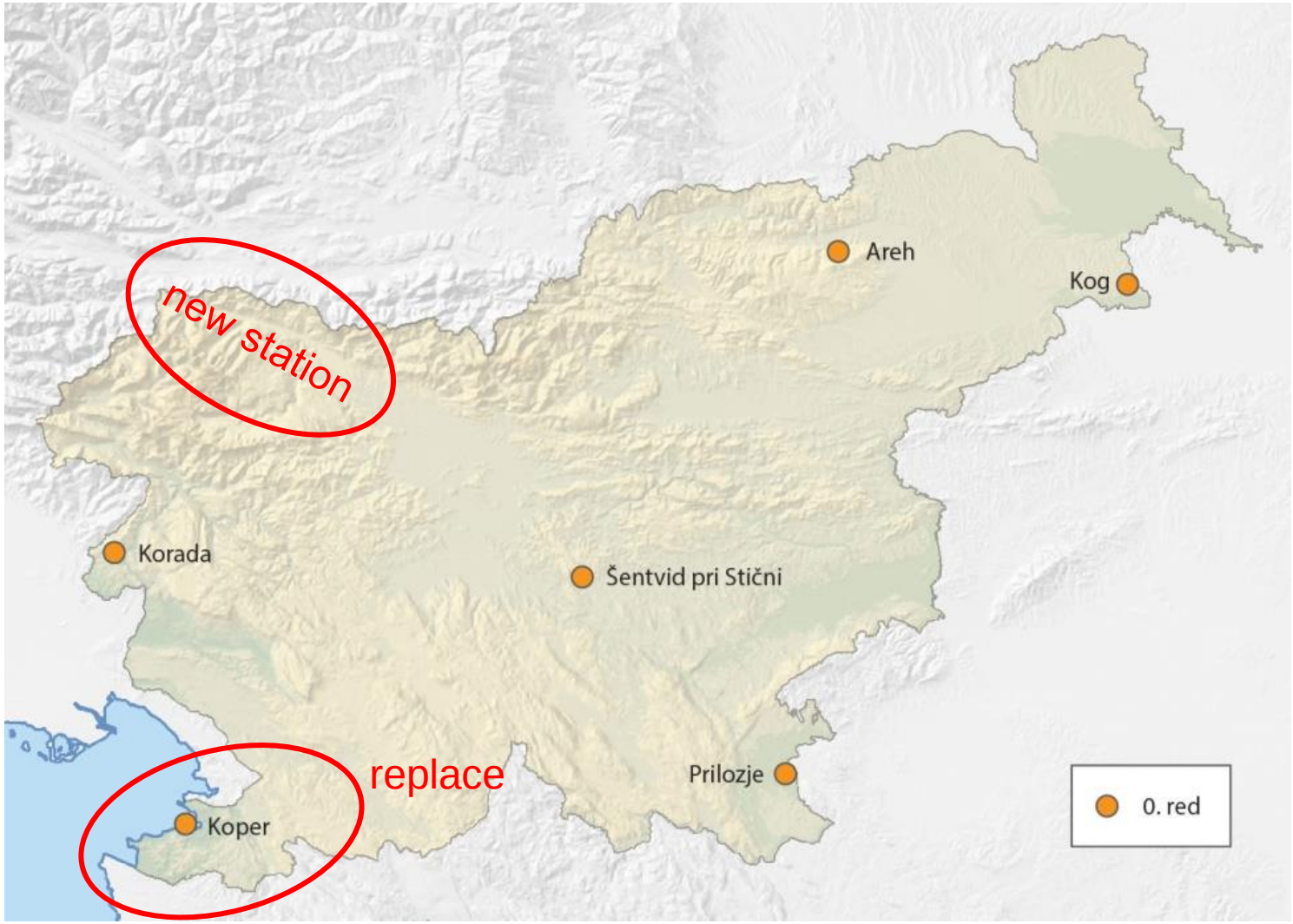
PZA2

ARA2

KDA2

ZERO ORDER GNSS NETWORK

Plans to upgrade (densify) network with 2 new stations:

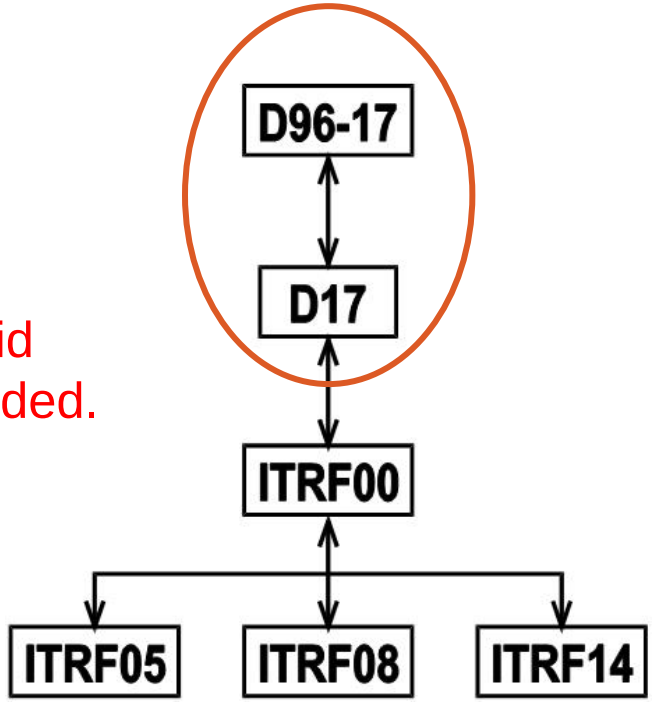


SIGNAL NETWORK SERVICES – OPEN ISSUE

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

- problems with the application setup
  (resulting in low accuracy of coordinates) reported to Trimble
- an appropriate transformation from/to ITRF2014 is promised
  to be implemented into the new version of Trimble Pivot Platform
- first tests of Trimble RTX online service
  show similar positional errors

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



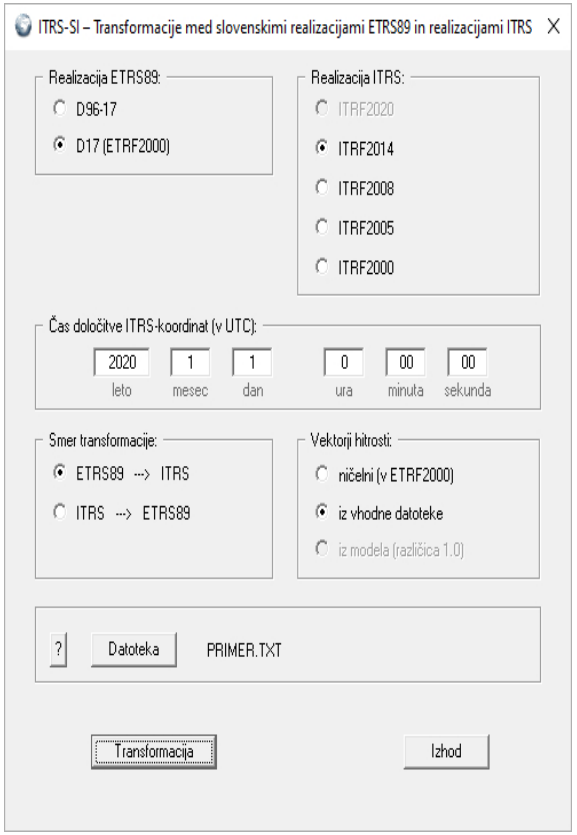
TERRESTRIAL REFERENCE FRAME

New realisation of ETRS89 in Slovenia (D96-17) implemented on 1st January 2020

New freeware tool (standalone desktop application) for time-dependent transformations between the Slovenian and international terrestrial reference frames – ITRS-SI

Six terrestrial reference frames are supported:

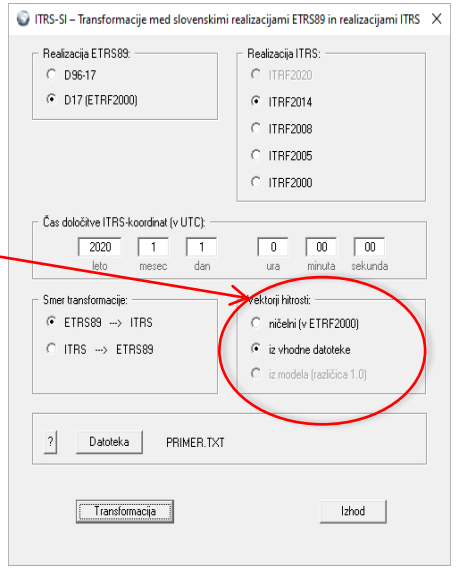
- ETRS89/D17
- ETRS89/D96-17
- latest four releases of the ITRF (2000, 2005, 2008, 2014)

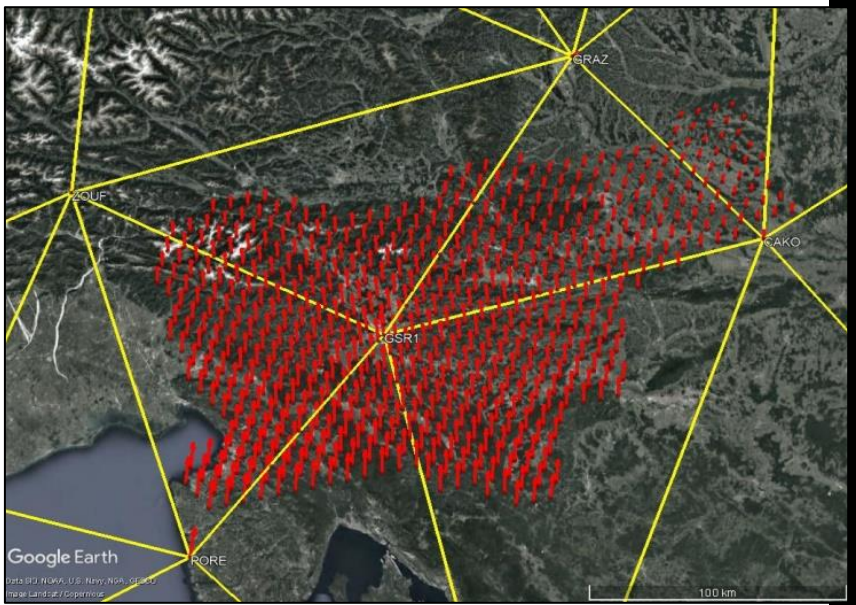


TERRESTRIAL REFERENCE FRAME

There are <u>three options</u> for handling velocities

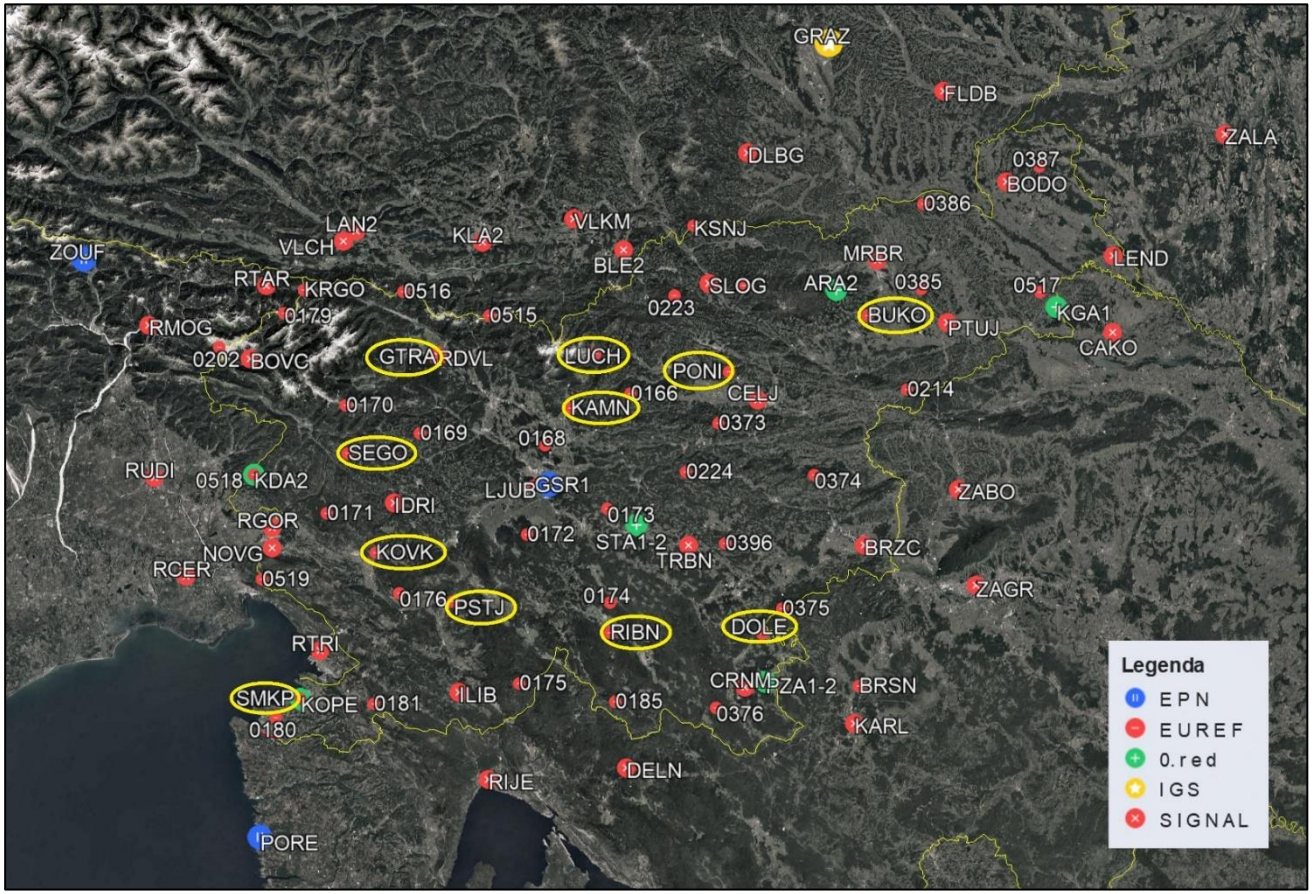
- zero velocities in ETRF2000 (i.e., assuming that the country is part of tectonically stable Europe)
- velocities taken from the input file (transformation of CORS stations with known velocities)
- interpolated velocities based on a verified position/velocity dataset (velocity field modelling)





GEODYNAMIC MEASUREMENTS

- national geokinematic model
- used active (SIGNAL + Zero Order) and passive GNSS network points
- densification in the tectonically ‘interesting’ areas



GEODYNAMIC MEASUREMENTS

Rules for campain-based geodynamic sites measurements in 2022:

- 72-hour static GNSS measurements (3 daily sessions 12:00 UTC–12:00 UTC)
- Javad Triumph-LS receiver
- 1-second interval
- 0-degree cutoff angle
- GPS+GLONASS+Galileo+BeiDou

PERMANENT GEODETIC MARKS

- Important permanent geodetic marks from the era of classical geodesy
- Inscription of selected old geodetic marks in the Registry of Cultural Heritage

Cadastral municipality boundary mark

Thank you for your attention