

National report of Slovakia 2013

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Department of theoretical Geodesy

EUREF 2013, annual symposium
29-31.June 2013, Budapest, Hungary



Outline

- Activities related to *EPN*
- Activities of LAC SUT
- **SKPOS** – Slovak real time positioning service
 - status
 - application for **SKPOS** network solution quality control
 - application for **SKPOS** monitoring and RTK users performance
- National Height System
- New Geoportal web page

Activities related to EPN Slovakian stations in EPN (May 2013)

MOPI

From 1996
only GPS
admin: SUT



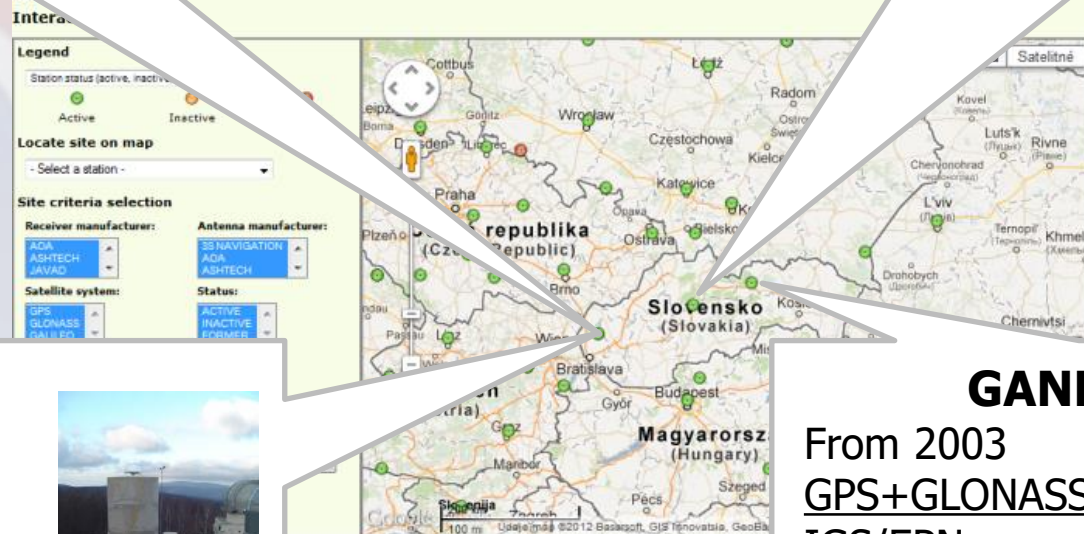
BBYS

From 2007
GPS+GLONASS+Galileo
SKPOS
admin: GKU+TOPU



EUREF Permanent Network

| NETWORK & DATA | PRODUCTS & SERVICES | DOCUMENTATION |
|--|--|--|
| Station list, Maps, Tracking status, Access, Proposed sites, Site log, Site picture submission | Data analysis, Weekly EPN solutions, Coordinates, Time series, Tropospheric delays, ETR58S/ITRS transformation | Formats, Guideline calibration, Papers |



MOP2

From 2008
GPS+GLONASS
SKPOS
admin: SUT



GANP

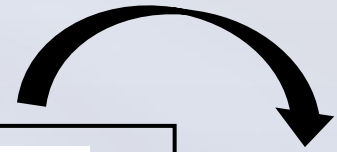
From 2003
GPS+GLONASS+Galileo
IGS/EPN
SKPOS
admin: GKU



BBYS 11514M001 EPN station upgrade

Activities related to EPN

September 2012



HOME **EUREF Permanent Network** ROB GNSS Research Group ***** EUREF eur-1

ORGANISATION Creation, Management, Structure, Relation to IGS, Projects

NETWORK & DATA Station list, Maps, Tracking status, Data access, Proposed stations, Station log submission, Station picture submission

PRODUCTS & SERVICES Data analysis, Weekly EPN solutions, Coordinates, Position time series, Tropospheric delays, ETRS89/ITRS transformation, Satellite Orbit & Clock Correction Streams

DOCUMENTATION Formats, Guidelines, Equipment & calibration, Papers, FAQ

NEWS, EVENTS & LINKS News, Mails, Calendar, Workshops, FTP server, Site map, Web history, Links

NETWORK & DATA > STATION LIST > **BBYS_11514M001**

Station Description

LOCATION: Banska Bystrica, Slovakia

LOG FILE: bbys_20130304.log (current) View

PICTURES:

| | |
|---------------------------------|---|
| OPERATIONAL CENTRE | GKU |
| OTHER NETWORKS | IGS, IGS, EGN |
| EPN INCLUSION | Since 035/2007 (GPSweek No 1413). |
| INACTIVITY PERIODS | None |
| COORDINATES | Published positions/velocities in ITRS and ETRS89 |
| INDIVIDUAL ANTENNA CALIBRATIONS | None |

Trimble 5700
2005 - 2012
GPS only

Trimble NetR9
2012 -
GPS+GLO+GAL
L5

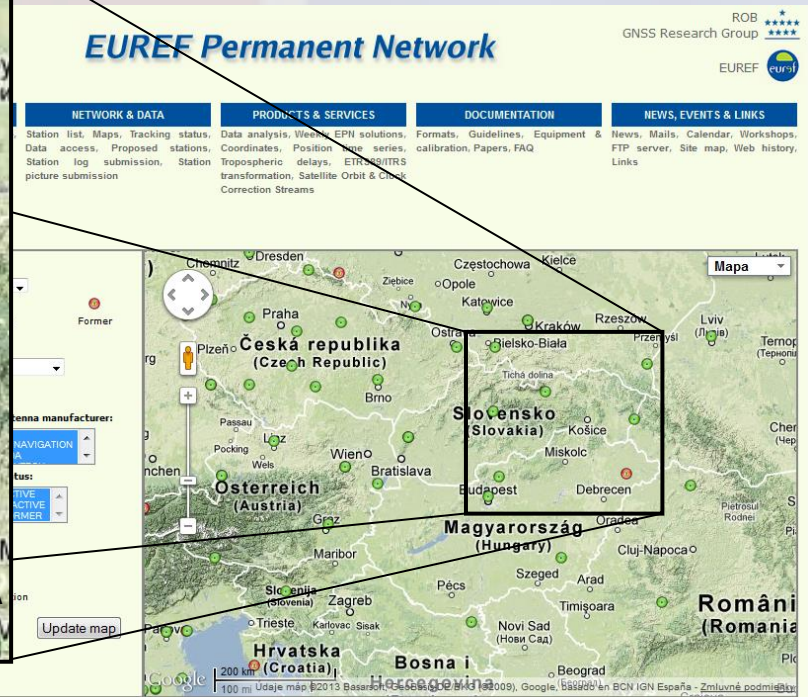


SKPOS station **KOSE** was offered to EUREF Permanent Network

- Iron-concrete pier/pillar stabilisation in 2012
- Trimble NetR9 + Choke ring calibrated antenna



+



Activities related to EPN

EUREF-IP – 2 slovakian stations

- **GANP**
 - recently inactive
 - RTCM 3.0

- **MOP2**
 - active
 - RTCM 3.1

REAL-TIME

ACCESS : free, using [Ntrip](#)

AVAILABLE FROM

BKG ([broadcaster](#), [registration](#))
MOP20 : RTCM 3.1 (1004(1),1005(5),1007(5),1012(1))

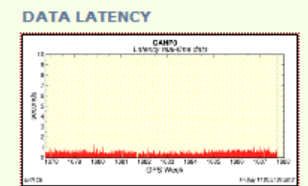
ROB ([broadcaster](#), [registration](#))
MOP20 : RTCM 3.1 (1004(1),1005(5),1007(5),1012(1))
MOP2 : RTCM 3 (1(1),3(10),20(1),21(1))

DATA LATENCY

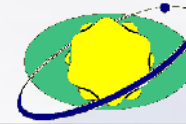
12007(4),12008(10),12009(10),12010(1),1013(10),1033(10))

BKG ([broadcaster](#), [registration](#))
GANP0 : RTCM 3.0
(1004(1),1006(10),1008(10),1012(1),1013(10),1033(10))

ROB ([broadcaster](#), [registration](#))
GANP0 : RTCM 3.0
(1004(1),1006(10),1008(10),1012(1),1013(10),1033(10))



Activities related to EPN



LAC SUT

- **Local Analysis Center of Slovak University of Technology**

- Standard continual processing of EPN subnetwork
- Future planned: extension of network
 - 5 stations (Croatia, Serbia)

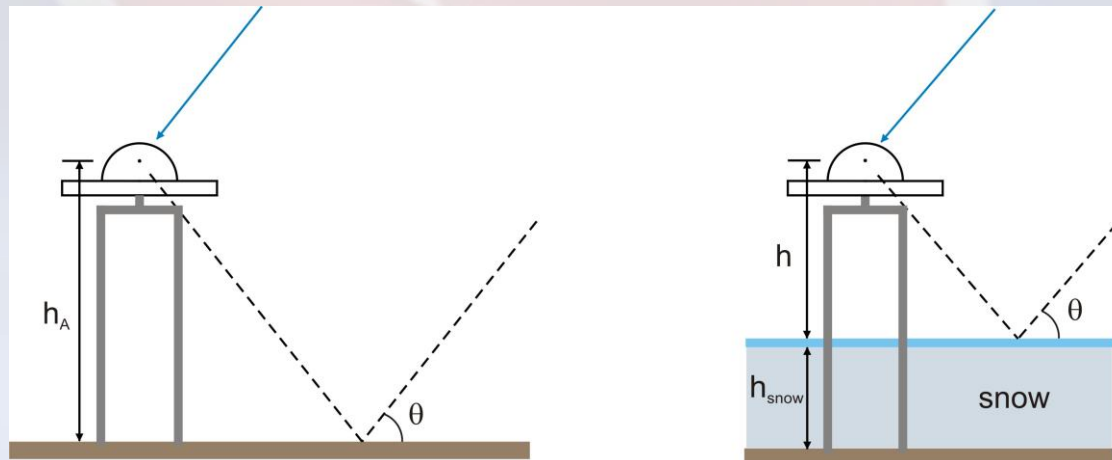
LAC SUT activities

Snow depth sensing using GPS multipath

- Analysis of GPS multipath allows to detect actual the antenna height h above the reflecting surface and enables to monitor the time variability of the depth of the reflector.
- Snow cover in the vicinity of GPS antenna causes decrease of effective h relatively to antenna height h_A above the terrain related to surface without snow. The time variability of h is then interpreted as variability of snow depth (Larson, Billich, Ozeki, Heki and others).

$$h_{SNOW} = h_A - h$$

Variation of height h of reflection surface due to height h_{SNOW} of the actual snow cover



LAC SUT activities

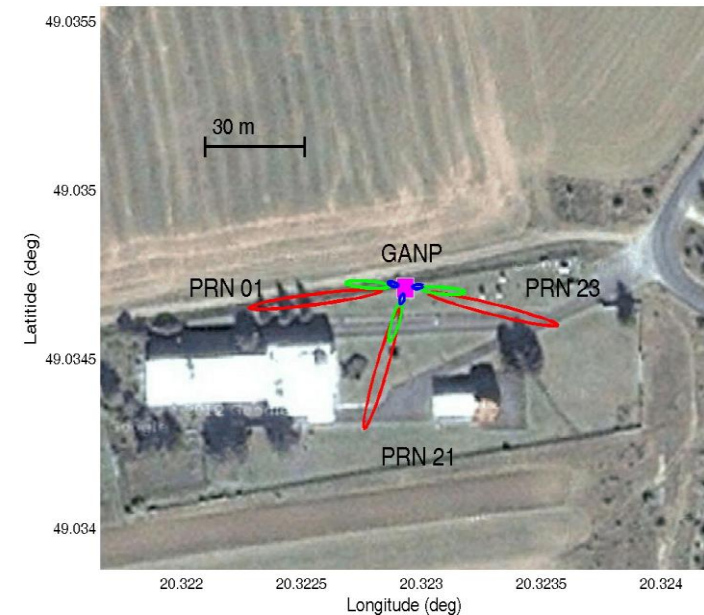
Variations of effective depth of reflector at IGS and EPN permanent station GANP

- Analyzed period winter 2011/ 2012, flat area, nominal antenna height above terrain 2.85 m
- GPS data applied for multipath analysis: Signal-to-noise ratio SNR1, SNR2, and geometry-free linear combination of carrier phases $L4=L1-L2$
- Snow data – manual daily observations of height of snow cover at meteo station Poprad (situated 4 km from GANP)

GNSS antenna and the site environment



First Fresnel zones for $\theta=5^\circ$, $\theta=10^\circ$ and $\theta=30^\circ$

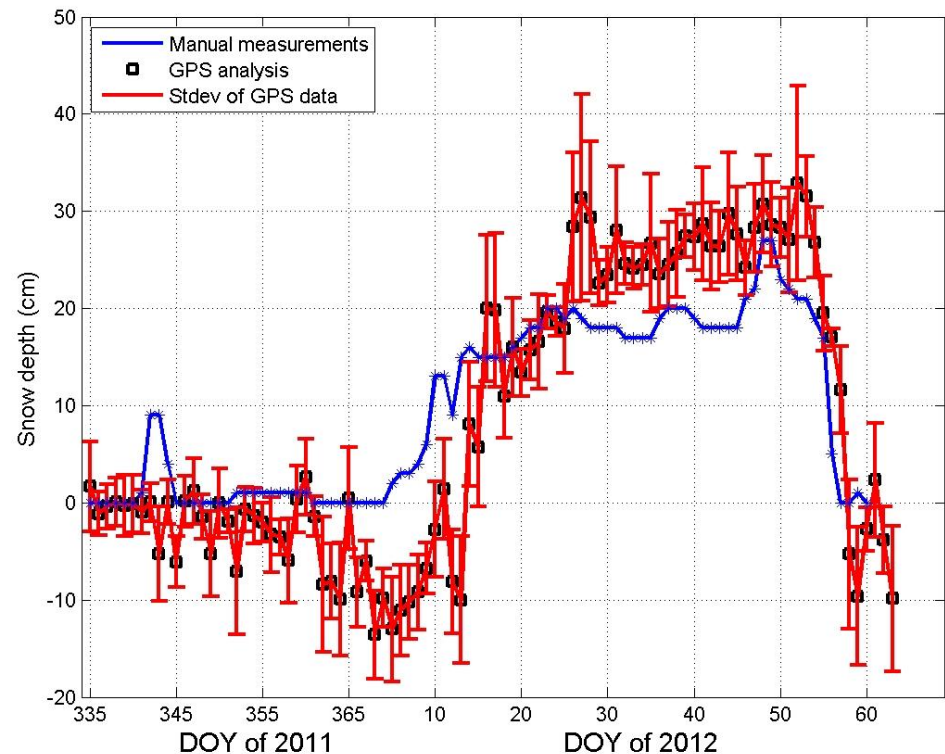


LAC SUT activities

GANP - variations of snow depth

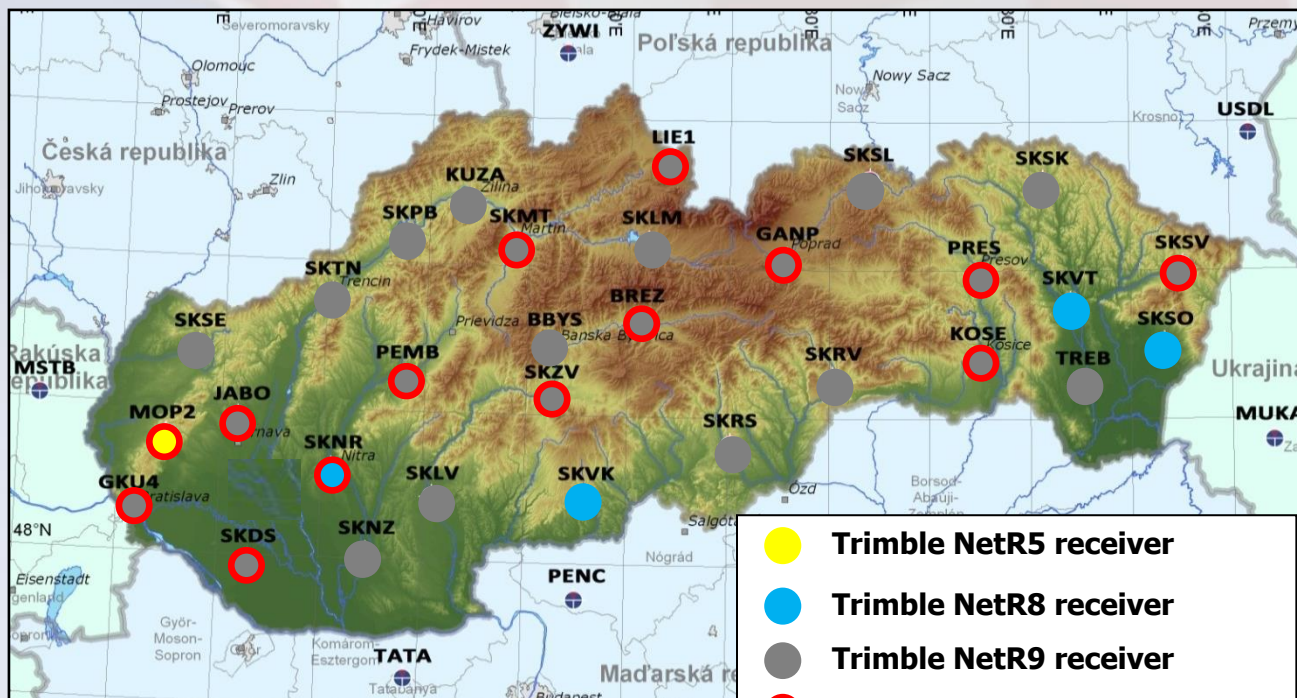
- GPS: combination of three independently estimated series of snow depth (SNR1, SNR2 and L4)
- The GPS multipath analysis reflects reliably the snow depth variations
- The negative estimate of h_{SNOW} for some intervals could be associated with local terrain inequality.
- The minor inconsistencies could be due to separation between GANP and Poprad. Meteo data – daily observations of height of snow layer are from meteo station Poprad (4 km from GANP)

Comparison of manual daily snow depth observation with GPS estimate

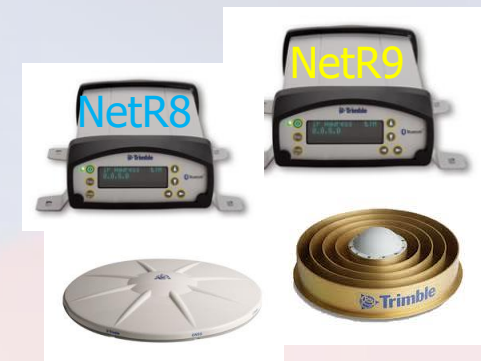
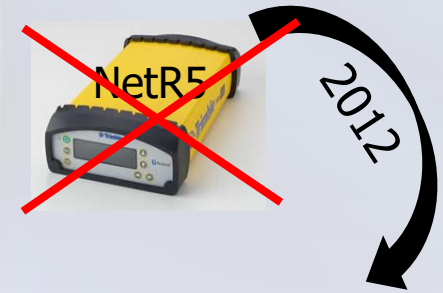


Slovak real time positioning service - **SKPOS** status in May 2013

- **30 slovakian + 6 foreign permanent stations**
 - all stations equipped with TRIMBLE receivers and antennas
 - all stations observe GPS+GLONASS signals, more Galileo
 - 14 antennas with individual absolute calibration



- Trimble NetR5 receiver
- Trimble NetR8 receiver
- Trimble NetR9 receiver
- Individual calibrated antenna



Slovak real time positioning service - SKPOS service control software

Trimble Pivot Platform

Network Map Google™ Maps View

20000 m

Status Messages: Last 20 Items

| Type | Event Time [UTC] | Source | Group | Message Text |
|------|-------------------|--------------------|---------------|--|
| I | 30.1.2013 9:22:39 | 31333320/dsprat... | Decoder | The received NMEA messages are valid again. |
| I | 30.1.2013 9:23:04 | 310247 | Decoder | The currently received NMEA string \$GPGGA_0..._56 |
| I | 30.1.2013 9:23:04 | 31333320/dsprat... | Decoder | The currently received NMEA string \$GPGGA_0..._56 |
| I | 30.1.2013 9:31:04 | NrtzCater [SKP... | Communication | TCPIP Server driver could not send outgoing data to 195.91.16.217:30984. Th... |
| I | 30.1.2013 9:31:04 | NrtzCater [SKP... | Communication | TCPIP Server driver could not send outgoing data to 195.91.16.217:30984. Th... |
| I | 30.1.2013 9:35:49 | 310247 | Decoder | The currently received NMEA string \$GPGGA_0..._56 |
| I | 30.1.2013 9:35:49 | 38590711/gpocap... | Decoder | The currently received NMEA string \$GPGGA_0..._56 |

SKPOS

Portál Slovenskej priestorovej observácie služby GNSS

VRS IScope™ Live!

33 active loggers

- Indická1 (RTK Fix)
- Indická2 (RTK Fix)
- Indická3 (RTK Fix)
- Indická4 (RTK Fix)
- Indická5 (RTK Fix)
- Indická6 (RTK Fix)
- Indická7 (RTK Fix)
- Indická8 (RTK Fix)
- Indická9 (RTK Fix)
- Indická10 (RTK Fix)
- Indická11 (RTK Fix)
- Indická12 (RTK Fix)
- Indická13 (RTK Fix)
- Indická14 (RTK Fix)
- Indická15 (RTK Fix)
- Indická16 (RTK Fix)
- Indická17 (RTK Fix)
- Indická18 (RTK Fix)
- Indická19 (RTK Fix)
- Indická20 (RTK Fix)
- Indická21 (RTK Fix)
- Indická22 (RTK Fix)
- Indická23 (RTK Fix)
- Indická24 (RTK Fix)
- Indická25 (RTK Fix)
- Indická26 (RTK Fix)
- Indická27 (RTK Fix)
- Indická28 (RTK Fix)
- Indická29 (RTK Fix)
- Indická30 (RTK Fix)
- Indická31 (RTK Fix)
- Indická32 (RTK Fix)
- Indická33 (RTK Fix)

SKPOS

Portál Slovenskej priestorovej observácie služby GNSS

VRS IScope™ Live!

33 active loggers

Indická1 (RTK Fix)

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Indická7 (RTK Fix)

Indická8 (RTK Fix)

Indická9 (RTK Fix)

Indická10 (RTK Fix)

Indická11 (RTK Fix)

Indická12 (RTK Fix)

Indická13 (RTK Fix)

Indická14 (RTK Fix)

Indická15 (RTK Fix)

Indická16 (RTK Fix)

Indická17 (RTK Fix)

Indická18 (RTK Fix)

Indická19 (RTK Fix)

Indická20 (RTK Fix)

Indická21 (RTK Fix)

Indická22 (RTK Fix)

Indická23 (RTK Fix)

Indická24 (RTK Fix)

Indická25 (RTK Fix)

Indická26 (RTK Fix)

Indická27 (RTK Fix)

Indická28 (RTK Fix)

Indická29 (RTK Fix)

Indická30 (RTK Fix)

Indická31 (RTK Fix)

Indická32 (RTK Fix)

Indická33 (RTK Fix)

Trimble VRSNet

Trimble VRSNet generates correction data for cm accurate positioning solutions in a dense network. An overview status information of all network processors is also available.

More... **Station 'NWTG' is not providing data to the Network Processor(s).**

- 0 Rovers are connected to a Network Processor
- 0 Rovers have a float solution
- 0 Rovers have an autonomous, DGPS or float solution
- 0 Rovers are receiving network corrections
- 0 Rovers are receiving raw observations

| Configuration Name | 24h Perform. | 1h Perform. | # Stations / Providing D. | # Rovers / FL | R5 Index | Predicted to | Predicted Gs. |
|--------------------|--------------|-------------|---------------------------|---------------|----------|--------------|---------------|
| DGPS | 99.67 | 99.32 | 32 / 21 | 0 / 0 | 4.0 | 0.034 | 0.039 |
| VRS | | | 31 / 21 | 0 / 0 | 4.0 | 0.024 | 0.033 |

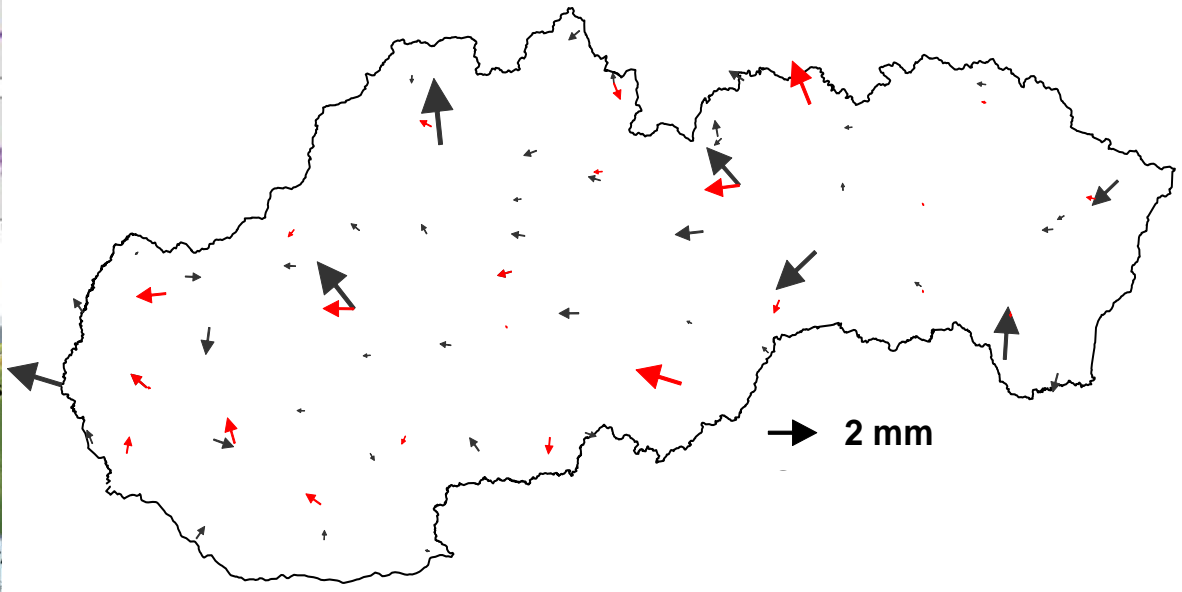
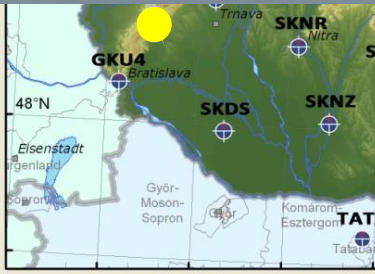
Expected Users (1h)

| Configuration Name | Expected Users | Predicted Gs. |
|--------------------|----------------|---------------|
| DGPS | 221 | 0.030 |
| VRS | 221 | 0.030 |

Status Messages: Last 20 Items

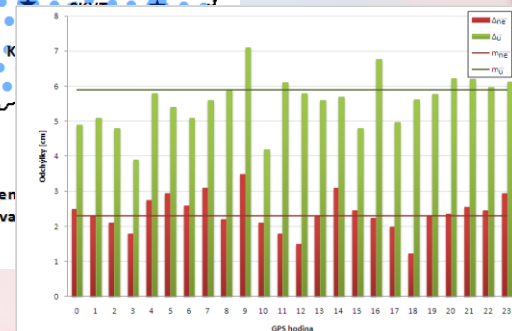
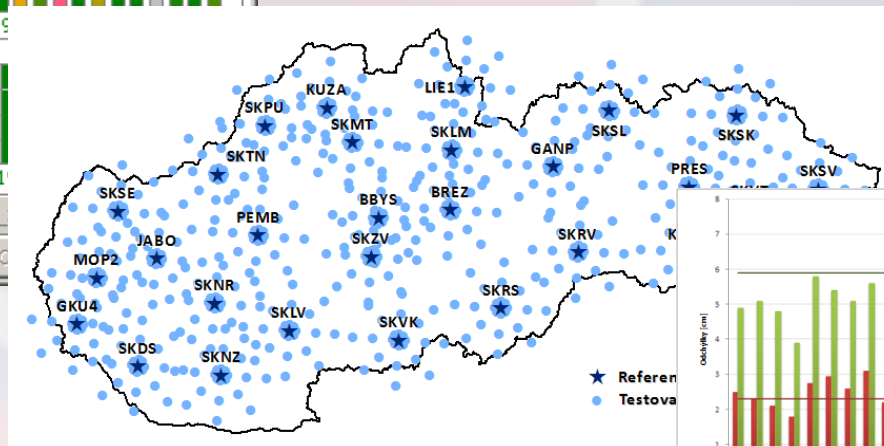
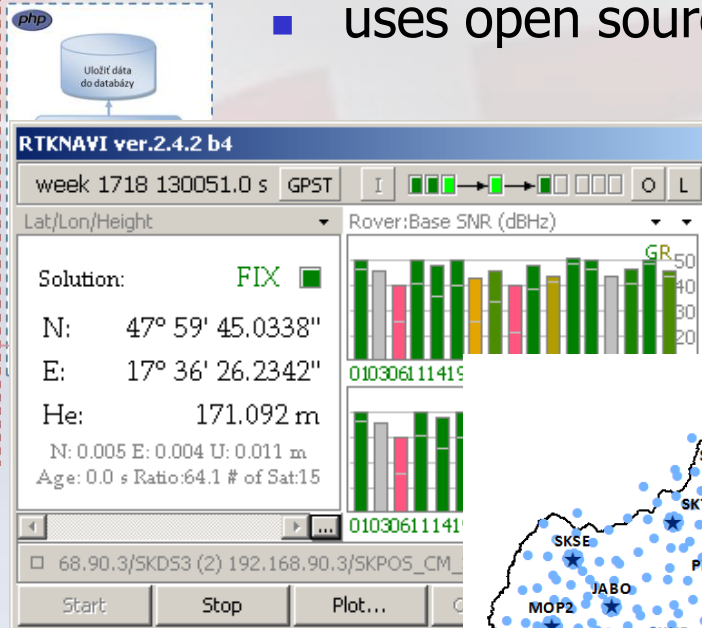
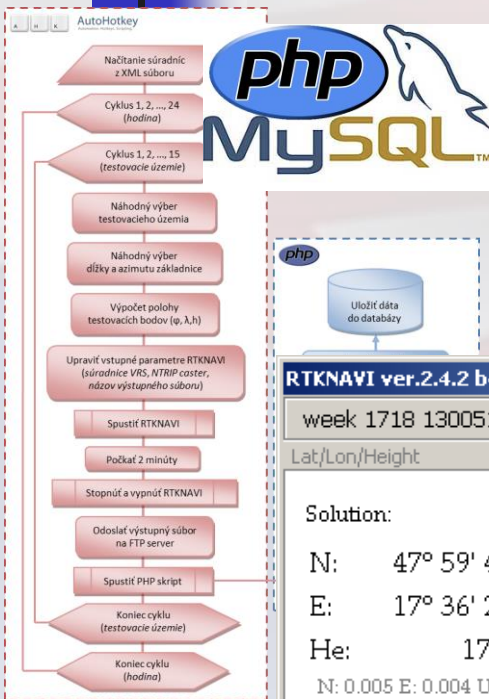
| Type | Event Time [UTC] | Source | Group | Message Text |
|------|-------------------|--------------------|-----------|--|
| I | 30.1.2013 4:03:54 | DBCleaner (Rov... | Framework | Starting database cleaning by lifetime. |
| I | 30.1.2013 4:03:54 | DBCleaner (Rov... | Framework | Done with database cleaning by lifetime. Deleting old data from 1 tables took 00:00:0. |
| I | 30.1.2013 4:03:54 | DBCleaner (Rov... | Framework | Checked database size: 1 MB |
| I | 30.1.2013 4:03:54 | DBCleaner (Rov... | Framework | Done with database cleaning by max. table size. Deleting excess data from 0 tables. |
| I | 30.1.2013 6:30:52 | RT0 Single Stat... | RT0 | The first observation epoch in the RT0 message queue has an age of 17.8 seconds. |
| I | 30.1.2013 6:30:52 | RT0 Single Stat... | RT0 | 1 observation epochs have been deleted from the RT0 message queue. |
| I | 30.1.2013 6:30:52 | RT0 Single Stat... | RT0 | The age of the first observation epoch in the RT0 message queue has fallen below 1. |

Slovak real time positioning service - **SKPOS** Pilier/pier monumentation





Slovak real time positioning service - **SKPOS** network solution quality monitoring

- new application for monitoring of **SKPOS** network solution (corrections) quality
- written in PHP coding language
- uses open source software RTKLIB



Slovak real time positioning service - **SKPOS** network solution quality monitoring

Firefox | Doručená pošta (2) - brano.droscak@... | Univerzita naregata.sk - Prvé preteky u... | EUREF Permanent GNSS Network > N... | Mapový klient ZBGIS | Google Translate | Quality monitoring of network soluti... | 172.16.5.146/monitoring/?lang=en#



Quality monitoring of network solution SKPOS

> Home > Quality monitoring

- Home
- Quality monitoring
- About
- Test the application
- Back to the SKPOS portal

Locality selection

Choose date: 11.04.2013

CONTACT © COPYRIGHT 2013, GKÚ BRATISLAVA

15:04
24. 5. 2013

Slovak real time positioning service - **SKPOS** network solution quality monitoring

The screenshot shows a web browser window displaying the SKPOS network solution quality monitoring interface. The browser's address bar shows the URL `172.16.5.146/monitoring/?lang=en#`. The page features the SKPOS logo and the title "Quality monitoring of network solution SKPOS". A navigation menu on the left includes links for Home, Quality monitoring, About, Test the application, and Back to the SKPOS portal. The main content area is titled "Locality selection" and includes a date selector set to "11.04.2013". A calendar for April 2013 is displayed, with the 11th of April highlighted. The map shows the Slovak Republic with various monitoring stations marked by blue stars and labeled with codes such as SKSE, SKMT, SKLM, SKRS, SKSV, and SKSO. The map also shows the borders of the Slovak Republic and the locations of the monitoring stations. The bottom of the page contains the text "CONTACT © COPYRIGHT 2013, GKÚ BRATISLAVA".

Quality monitoring of network solution SKPOS

Home

- Quality monitoring
- About
- Test the application
- Back to the SKPOS portal

Locality selection

Choose date: 11.04.2013

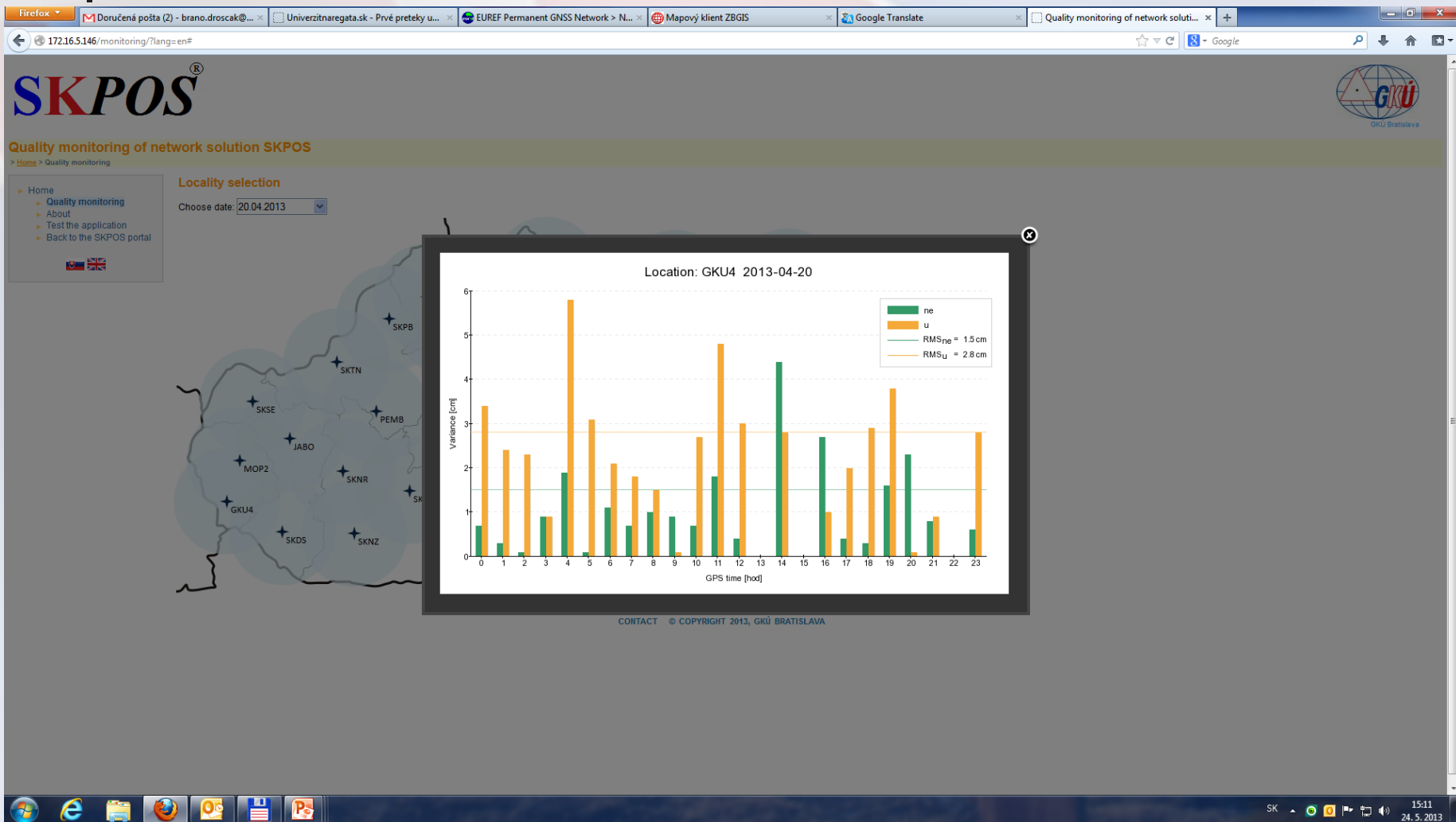
| April 2013 | | | | | | |
|------------|----|----|----|----|----|----|
| Su | Mo | Tu | We | Th | Fr | Sa |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | | | | |

CONTACT © COPYRIGHT 2013, GKÚ BRATISLAVA

Slovak real time positioning service - **SKPOS** network solution quality monitoring

The screenshot shows a web browser window displaying the SKPOS network solution quality monitoring interface. The browser's address bar shows the URL `172.16.5.146/monitoring/?lang=en#`. The page features the SKPOS logo at the top left and the GKÚ Bratislava logo at the top right. Below the logos, the main heading is "Quality monitoring of network solution SKPOS". A navigation menu on the left includes "Home", "Quality monitoring", "About", "Test the application", and "Back to the SKPOS portal". The "Quality monitoring" section is active, showing a "Locality selection" dropdown menu set to "11.04.2013". The main content area displays a map of Slovakia with numerous monitoring stations marked by blue stars and labeled with codes such as KUZA, SKPB, SKMT, SKLM, GANP, PRES, SKVT, SKSV, SKTN, BBYS, BREZ, SKRV, KOSE, SKSO, SKSE, JABO, PEMB, SKZV, SKRS, MOP2, SKNR, SKLV, SKVK, SKDS, and SKNZ. The station GKU4 is highlighted with a larger blue circle. At the bottom of the page, there is a footer with the text "CONTACT © COPYRIGHT 2013, GKÚ BRATISLAVA". The Windows taskbar at the bottom shows the system tray with the date and time "15:07 24. 5. 2013".

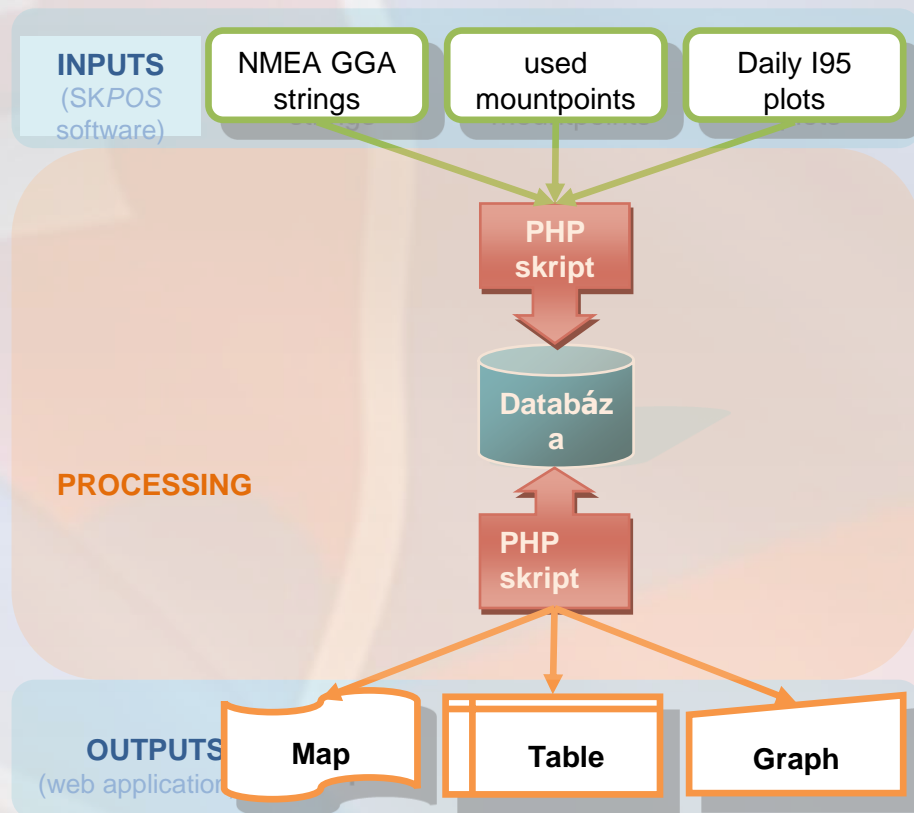
Slovak real time positioning service - **SKPOS** network solution quality monitoring



Application **ASMARUP**

Application for **SKPOS** monitoring and RTK users performance

- Application let us to monitor and analyses RTK users initialisation times determined from NMEA messages according to:
 - date and time
 - particular user
 - length of the initialisation time
 - number of satellites
 - used mountpoint
 - user position



Application for SKPOS monitoring and RTK user

Date from: to:

User:

Time (SEC) from: to:

Initializations from: to:

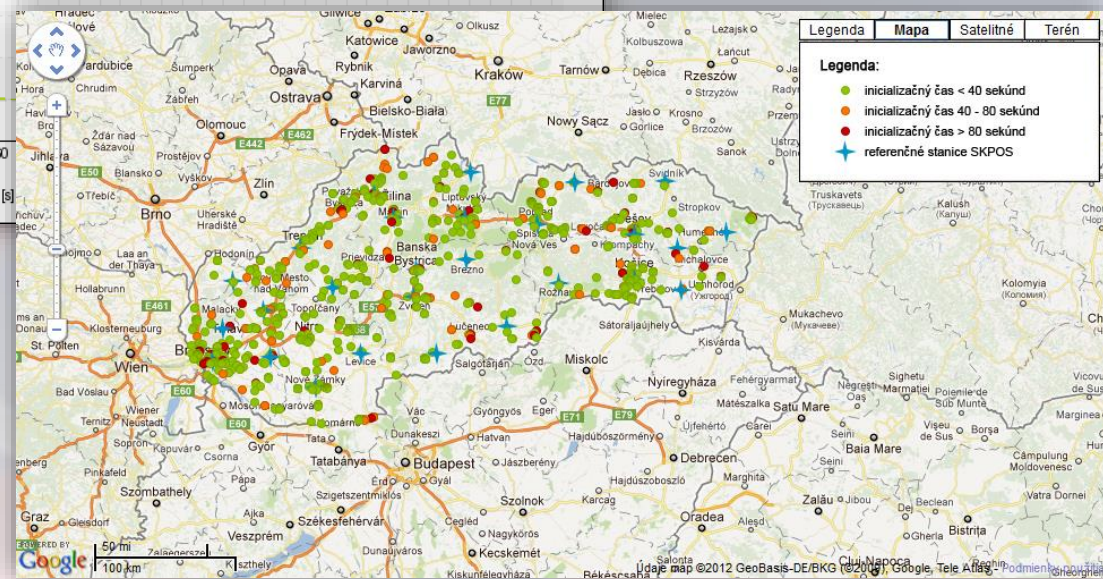
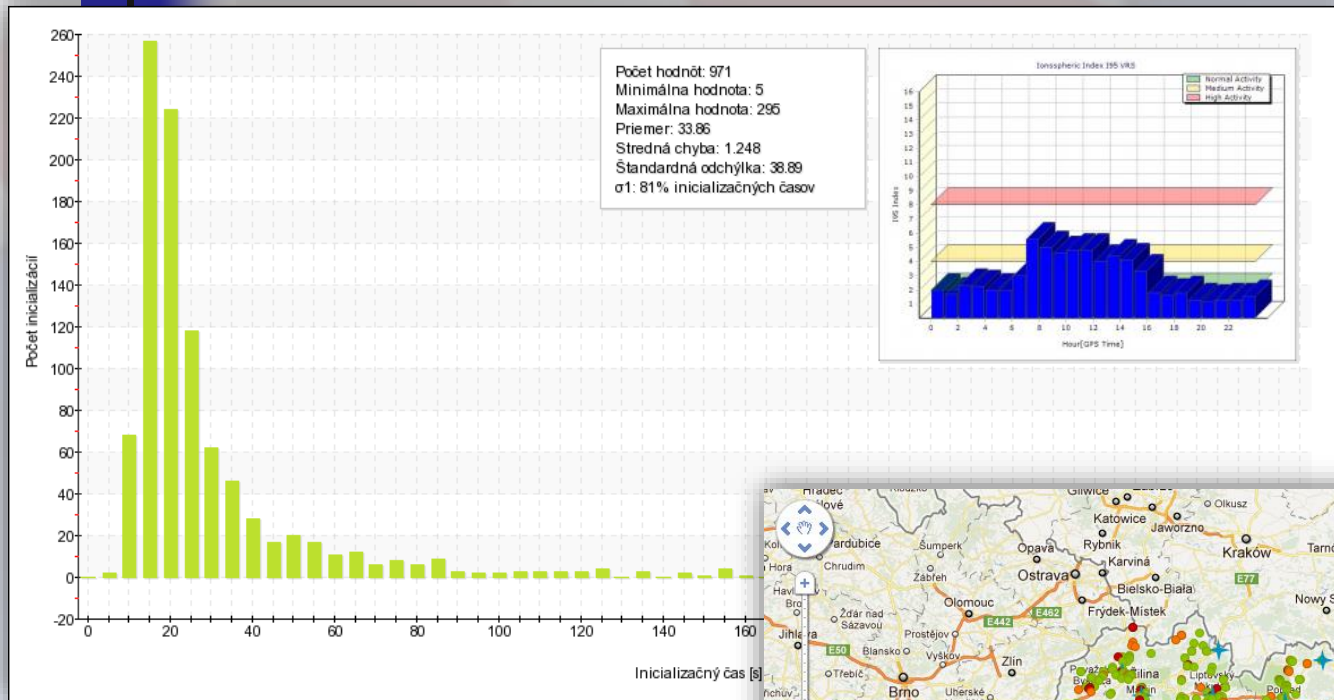
Number of satellites from: to:

MountPoint: SKPOS_CM_2.3 SKPOS_CM_3.0 SKPOS_CM_CMR All

Display the reference stations SKPOS:

Choose location:

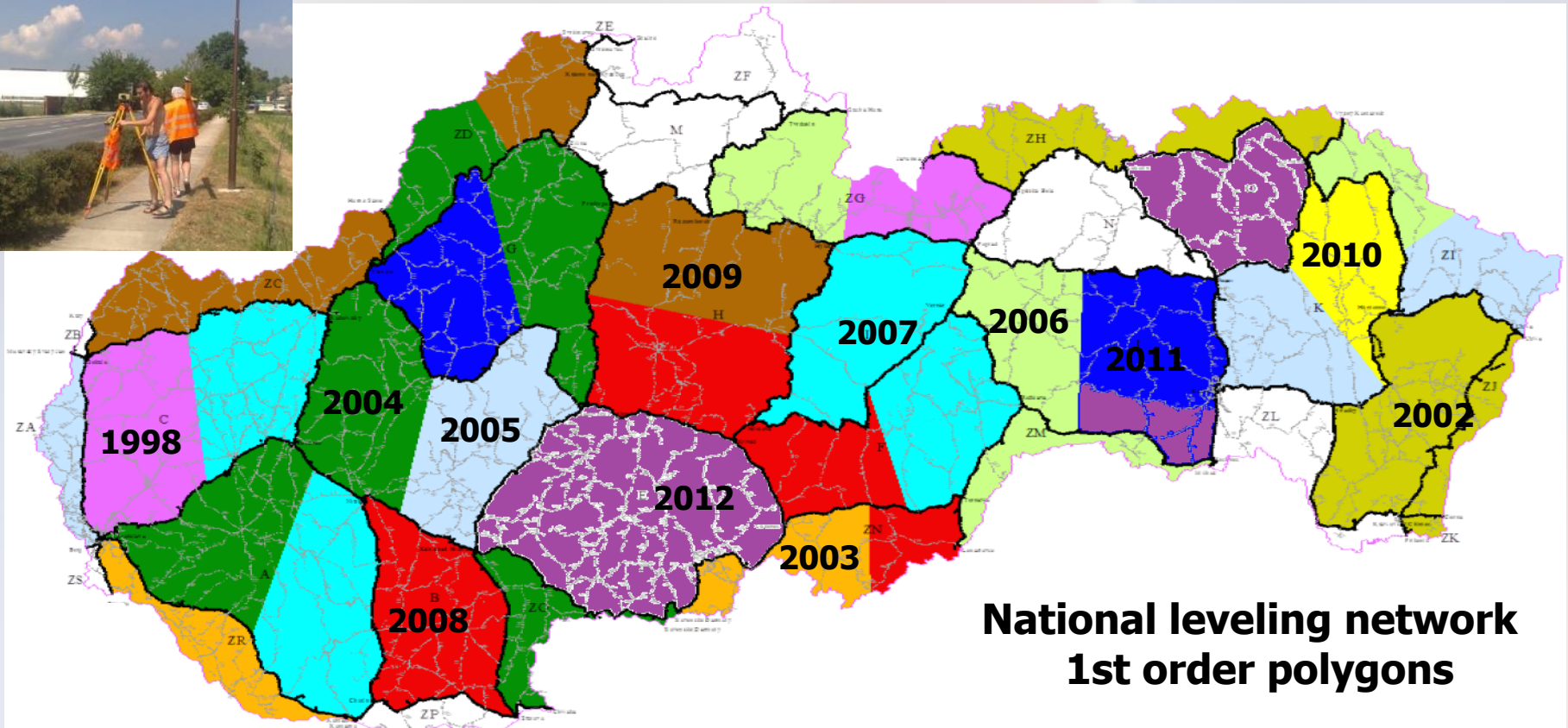
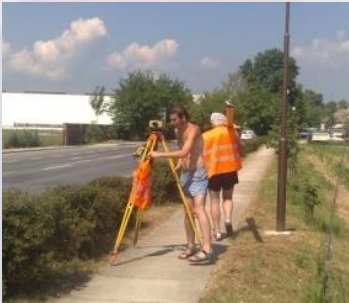
Application **ASMARUP** Application for SKPOS monitoring and RTK users performance



National Height System

2nd order leveling lines measurement

- Height system: **Balt** / realization **Bpv** (Balt after adjustment)
- Works in 2012 year: 665 km of 2nd order leveling lines
- New realisation of Balt (Bpvyy) planed in 2015-2016





Map client ZBGIS

Mapová aplikácia s údajmi



Metadata editor

Metaúdajový editor (MDE) je webová aplikácia, ktorá slúži na vytváranie nových alebo na editáciu existujúcich metaúdajových záznamov.

Vstúpiť

Conversion service

Konverzná služba slúži na konverziu formátov. Je to komplexný nástroj pre konverziu údajov rôznych formátov.

Vstúpiť



Geoportál

Vyhľadávanie



SLUŽBY

MAPOVÝ KLIENT ZBGIS

VYHĽADÁVACIA SLUŽBA

TRANSFORMAČNÁ SLUŽBA

www.geoportal.sk

Služby

Uverejnenie alebo zverejňovanie celého kartografického diela alebo jeho podstatnej časti bez súhlasu autora, a to aj pre osobnú potrebu, je priamo alebo nepriamo obchodný, je v zmysle zákona č. 618/2003 Z. z. (autorský zákon) zakázané. Nerešpektovanie tohto zákona pri kopírovaní produktov zverejnených na tomto webovom portáli zakladá občianskoprávnú aj trestnoprávnú zodpovednosť.



Transformation service



Mapový klient ZBGIS

Mapový klient ZBGIS je webová aplikácia, ktorá slúži na prácu s údajmi ZBGIS, zobrazovanie, vyhľadávacie a analýzy priestorových údajov.

Vstúpiť



Transformačná služba

Aplikácia Transformačná služba vykonáva autorizovanú transformáciu súradníc bodov medzi záväznými geodetickými systémami.

Vstúpiť



Konverzná služba

Konverzná služba slúži na konverziu formátov. Je to komplexný nástroj pre konverziu údajov rôznych formátov.

Vstúpiť



Vyhľadávacia služba

Služi na vyhľadávacie metaúdajových záznamov publikovaných pripojeným katalógovým serverom.

Vstúpiť



Inspire

ÚGKK SR zabezpečuje sprístupnenie referenčných údajov a informácií rezortu aj pomocou elektronických služieb, ktoré spĺňajú požiadavky smernice INSPIRE.

Vstúpiť



Metaúdajový editor

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Vstúpiť



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Vstúpiť

Searching service

Služi na vyhľadávacie metaúdajových záznamov publikovaných pripojeným katalógovým serverom.

Vstúpiť

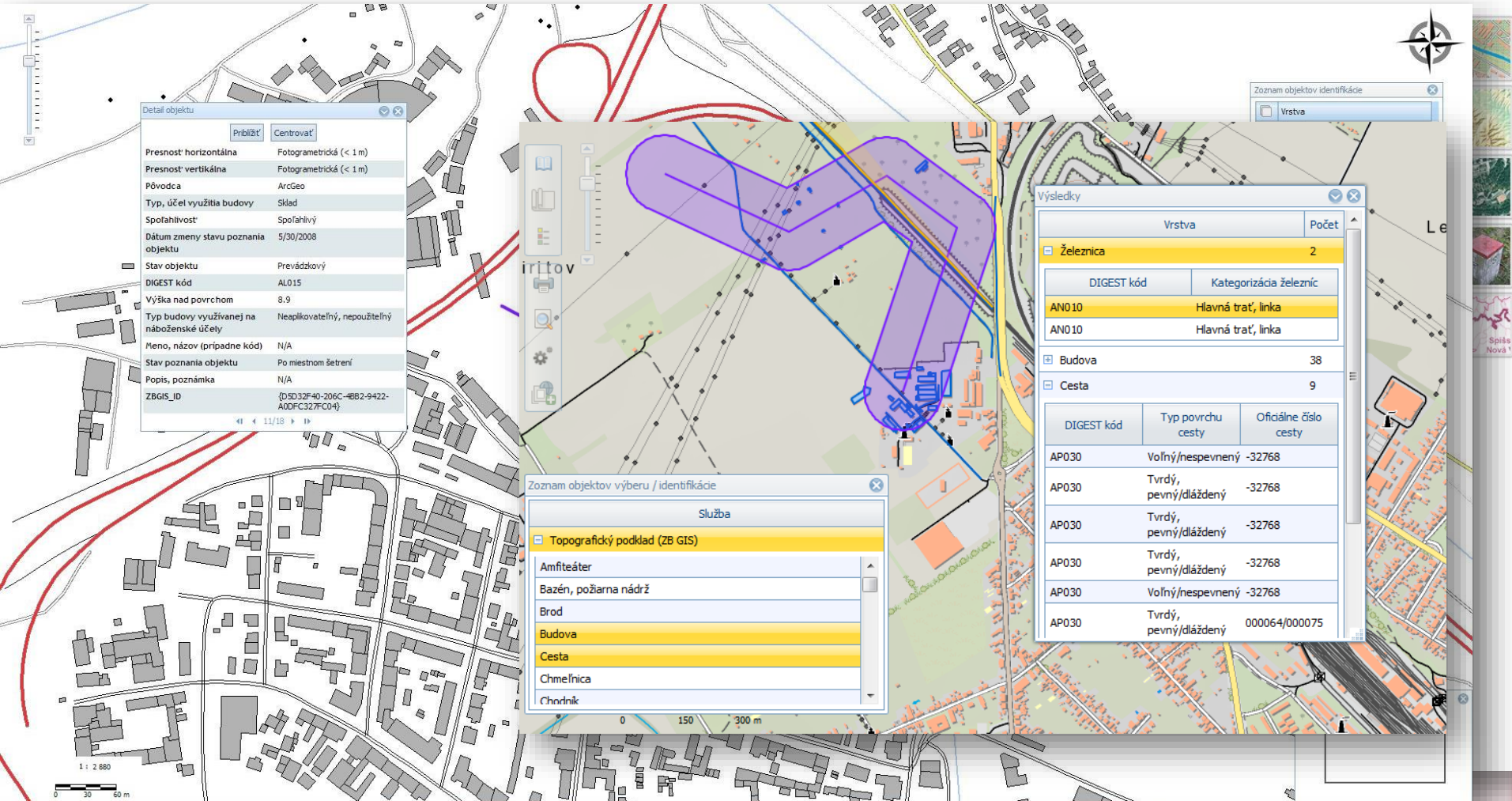


TESTOVACIA PREVÁDZKA

Meranie Kreslenie Údaje Kompozícia

XY

Vyhľadať podľa geografického názvu... S-JTSK ? Y: 158 923 X: 1 152 212



Detaili objektu

| | |
|---|--|
| Presnosť horizontálna | Fotogrametrická (< 1 m) |
| Presnosť vertikálna | Fotogrametrická (< 1 m) |
| Pôvodca | ArcGeo |
| Typ, účel využitia budovy | Sklad |
| Spofahlivosť | Spofahlivý |
| Dátum zmeny stavu poznania objektu | 5/30/2008 |
| Stav objektu | Prevádzkový |
| DIGEST kód | ALD15 |
| Výška nad povrchom | 8.9 |
| Typ budovy využívanej na náboženské účely | Neaplikovateľný, nepoužiteľný |
| Meno, názov (prípadne kód) | N/A |
| Stav poznania objektu | Po miestnom šetrení |
| Popis, poznámka | N/A |
| ZBGIS_ID | (D5D32F40-206C-4EB2-9422-A0DFC327FC04) |

11/18

Zoznam objektov výberu / identifikácie

Služba

- Topografický podklad (ZB GIS)
- Amfiteáter
- Bazén, požiarňa nádrž
- Brod
- Budova**
- Cesta**
- Chmelnica
- Chodník

Výsledky

| Služba | Počet |
|---|-------|
| <input checked="" type="checkbox"/> Železnica | 2 |
| <input type="checkbox"/> Budova | 38 |
| <input type="checkbox"/> Cesta | 9 |

| DIGEST kód | Kategorizácia železníc |
|------------|------------------------|
| AN010 | Hlavná trať, linka |
| AN010 | Hlavná trať, linka |

| DIGEST kód | Typ povrchu cesty | Oficiálne číslo cesty |
|------------|-------------------------|-----------------------|
| AP030 | Voľný/nespevný | -32768 |
| AP030 | Tvrдый, pevný/dláždzený | -32768 |
| AP030 | Tvrдый, pevný/dláždzený | -32768 |
| AP030 | Tvrдый, pevný/dláždzený | -32768 |
| AP030 | Voľný/nespevný | -32768 |
| AP030 | Tvrдый, pevný/dláždzený | 000064/000075 |

Zoznam objektov identifikácie

Vrstva



Spisová Nová 1



Transformačná služba ETRS89 - S-JTSK

Úradu geodézie, kartografie a katastra Slovenskej republiky

TESTOVACIA PREVÁDZKA



PORTÁL ÚGKK SR BOL VYTVORENÝ ZA FINANČNEJ PODPORY EÚ

Transformačná služba

Formát vstupných údajov

Vybrať

Pomoc

Vstupný súbor *.zip

Vybrať súbor Nie je vybratý žiadny súbor Načítaj

Nahrany súbor

Vstupný súradnicový systém

▼

Výstupný súradnicový systém

▼

Transformovať

Validácia vstupu

Výsledok validácie

Transformačná služba



KONVERZNÁ SLUŽBA ZBGIS®

Úradu geodézie, kartografie a katastra Slovenskej republiky

TESTOVACIA PREVÁDZKA

Konverzná služba

Vstupný formát údajov

Vybrať

Pomoc

Vstupný súbor *.zip

Vybrať súbor Nie je vybratý žiadny súbor

Načítaj

Výstupný formát údajov

▼

Konvertovať

- Vyberte hodnotu...
- Vyberte hodnotu...
- ESRI Shapefile
- Personal geodatabase
- File geodatabase
- MicroStation DGN
- AutoCAD DXF/DWG
- VGI
- TXT/CSV
- GML
- Intergraph MDB
- MapInfo TAB

Nastavenie spracovania vstupného súboru

Ukážka súboru

| ID | Y | X | vyska |
|----|------------|-------------|-------|
| | Y | X | výška |
| 1 | 530213.665 | 1329075.273 | 100 |
| 1 | 526479.939 | 1329420.652 | 100 |
| 1 | 522746.000 | 1329763.576 | 100 |
| 1 | 519011.848 | 1330104.046 | 100 |

Oddelovač stĺpcov

Čiarka

Oddelovač desatinných miest

Bodka

Súbor obsahuje hlavičku

Y

X

vyska

Nastavenie spracovania výstupného súboru

Prepísať názvy v hlavičke súboru



Thank you
for your attention