

EUREF 2013
Euref Symposium, Budapest

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



MOP2

From 2008
GPS+GLONASS
SKPOS
admin: SUT



GANP

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



Activities related to EPN

BBYS 11514M001 EPN station upgrade

EUREF Permanent Network

September 2012

Station Description

LOCATION: Banská Bystrica, Slovakia

LOG FILE: bbys_20130304.log (current) [View](#)

PICTURES:

OPERATIONAL CENTRE: GKU

OTHER NETWORKS: IGS, TOS, EGN

EPN INCLUSION: Since 035/2007 (GPSweek No 1413).

INACTIVITY PERIODS: None

COORDINATES: Published positions/velocities in ITRS and ETRS89

INDIVIDUAL ANTENNA CALIBRATIONS: None

ROB GNSS Research Group

EUREF

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

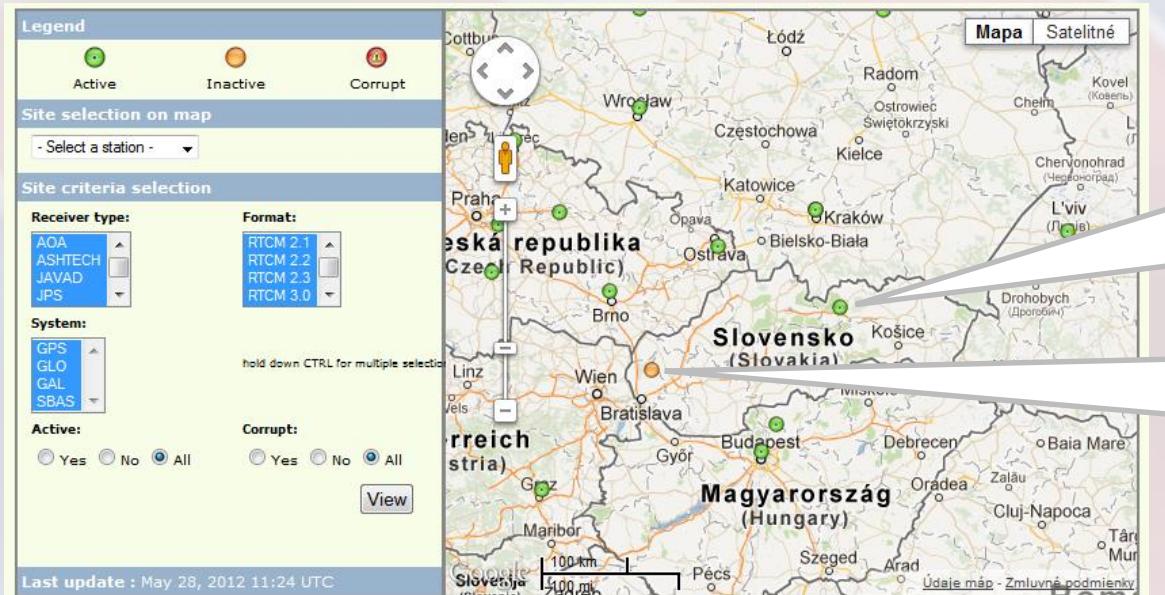


+



Activities related to EPN

EUREF-IP – 2 slovakian stations

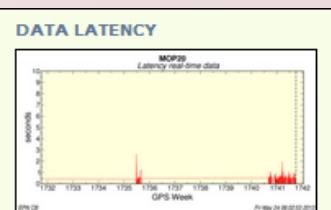


GANP

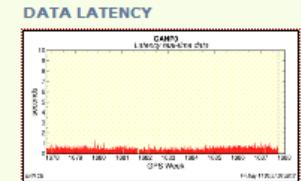
- recently **inactive**
- RTCM 3.0

MOP2

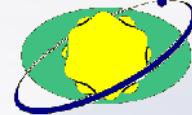
- active**
- RTCM 3.1



10004(1),1005(5),1007(5),1012(1),1013(10),1033(10))
BKG (broadcaster, registration)
MOP20 : RTCM 3.0
(1004(1),1006(10),1008(10),1012(1),1013(10),1033(10))
ROB (broadcaster, registration)
GANPO : RTCM 3.0
(1004(1),1006(10),1008(10),1012(1),1013(10),1033(10))

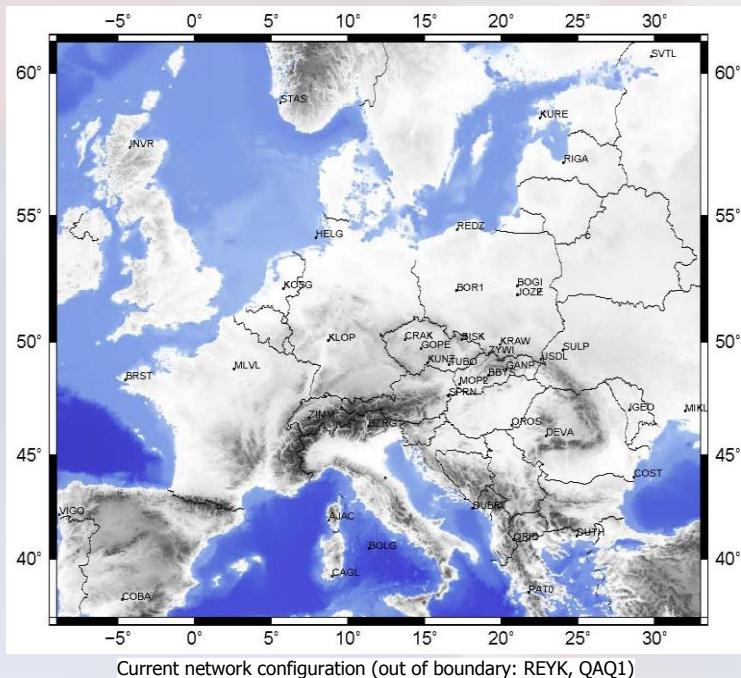


Activities related to EPN



LAC SUT

- Local Analysis Center of Slovak University of Technology



PROCESSING STRATEGY

Software	: Bernese GPS Software, version 5.0
Orbits and EOPs	: IGS final
Observations	: GPS
Elevation Cutoff	: 3°
Antenna PCV Model	: absolute
Ambiguity Resolution	: QIF
Troposphere	: dry Niell (a priori), wet Niell (estim.), gradients
Ocean Loading	: FES2004
Reference Frame	: IGS05 / IGS08 (since week 1632)
Reference Point	: BOR1
Products submitted	: SUTWWWW7.SNX weekly snx file SUTWWWWN.SNX daily snx file SUTWWWWN.TRO daily troposphere solution

ALL PROCESSING OUTPUTS

Daily solution	: CRD, COV, SNX, ION, INX, TRO, TRP
Weekly combination	: CRD, COV, SNX, OUT, SUM
4-hour solution	: CRD, COV

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

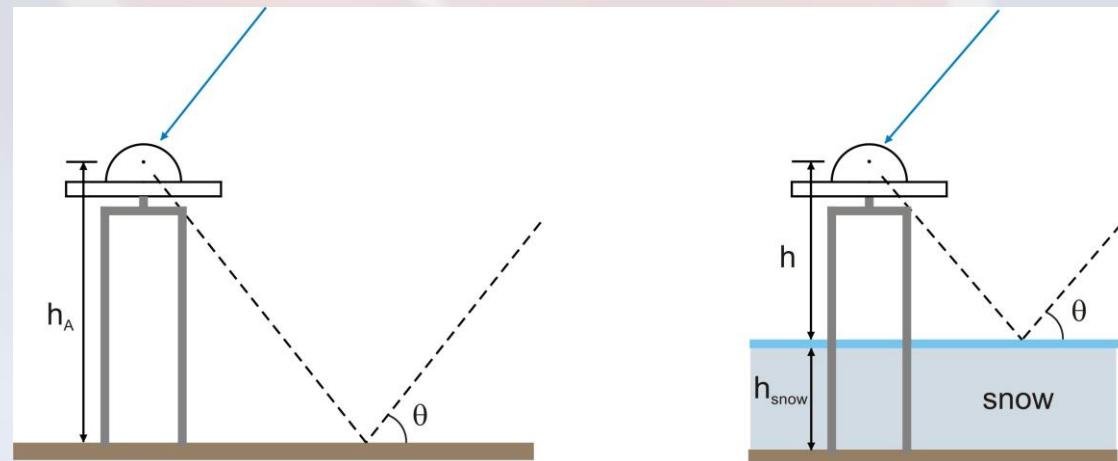
LAC SUT activities

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

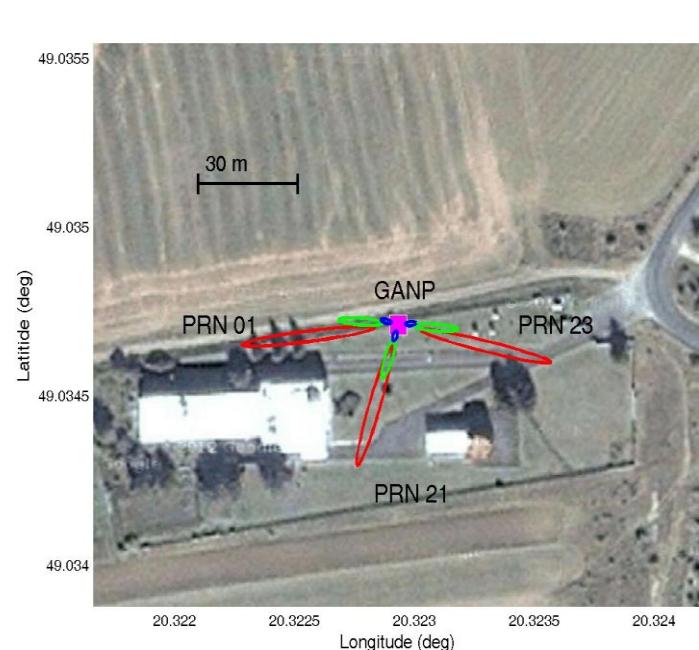
Variations of effective depth of reflector at IGS and EPN permanent station GANP

- Analyzed period winter 2011/ 20012, 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 $\theta=30^\circ$

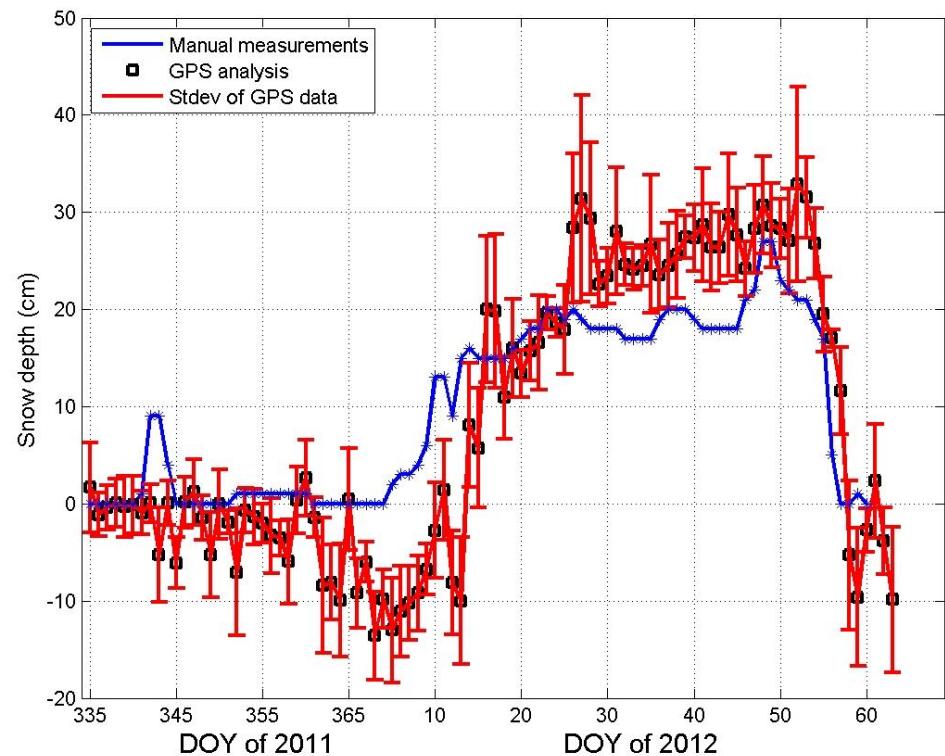


LAC SUT activities

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)

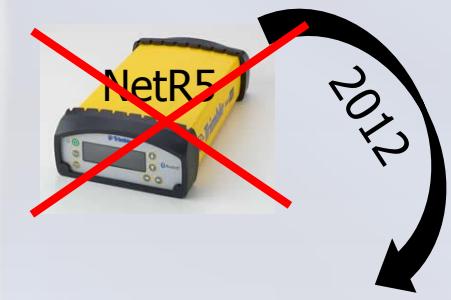
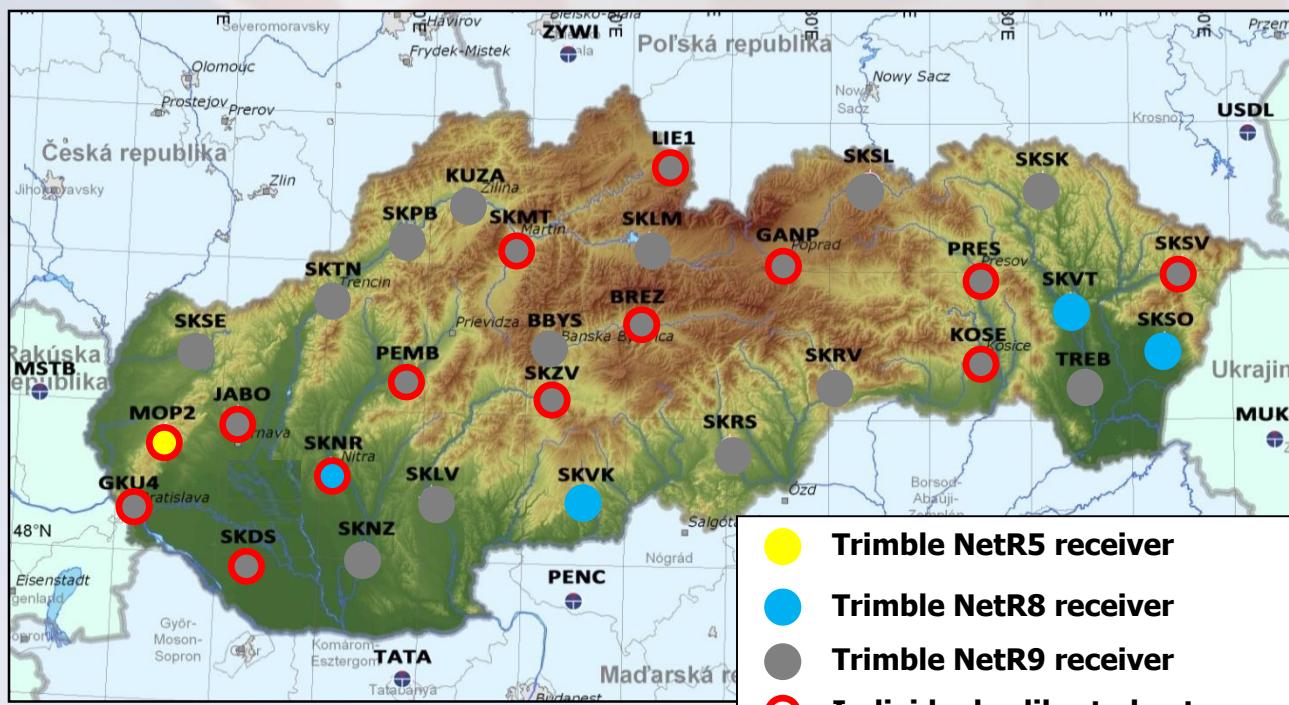
Comparison of manual daily snow depth observation with GPS estimate



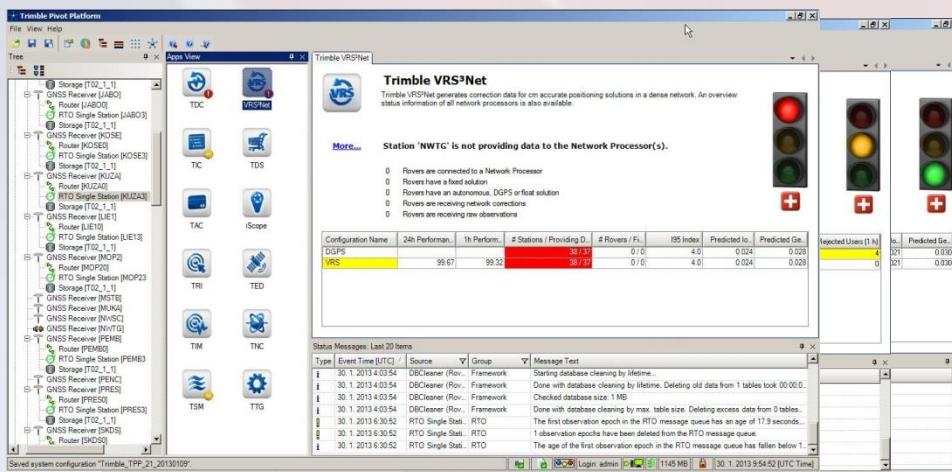
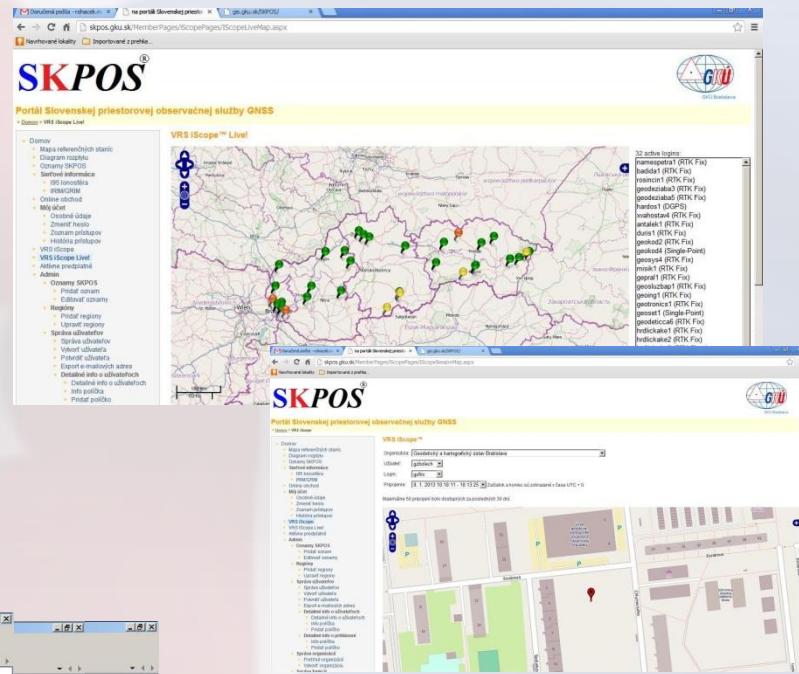
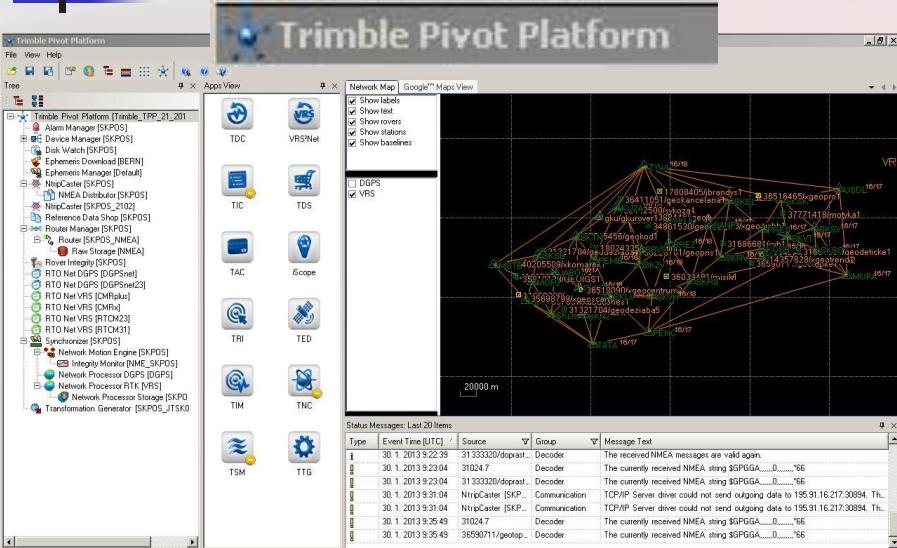
Slovak real time positioning service - SKPOS status in May 2013

- **30 slovakian + 6 foreign permanent stations**

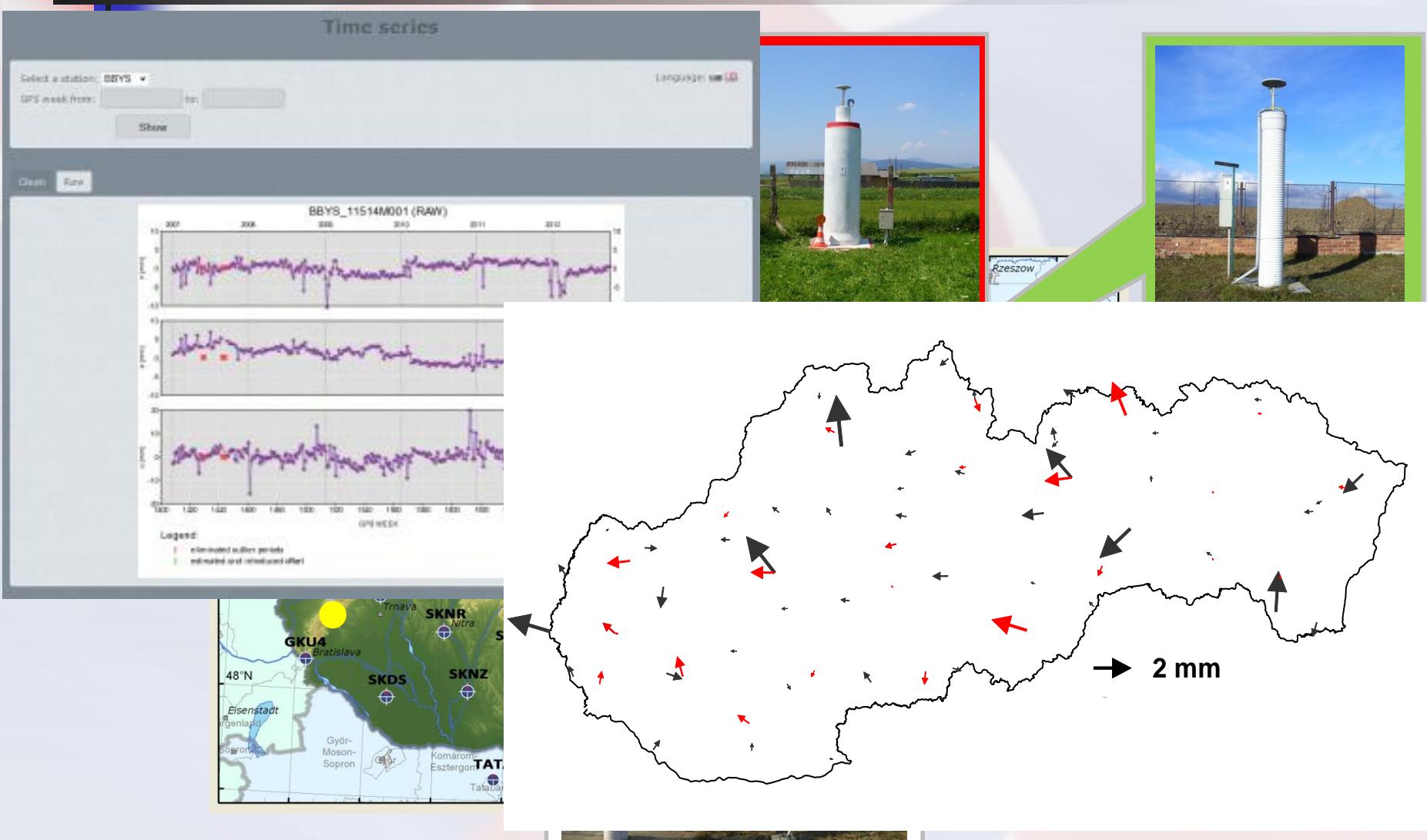
- all stations equipped with TRIMBLE receivers and antennas
- all stations observe GPS+GLONASS signals, more Galileo
- 14 antennas with individual absolute calibration



Slovak real time positioning service - SKPOS service control software

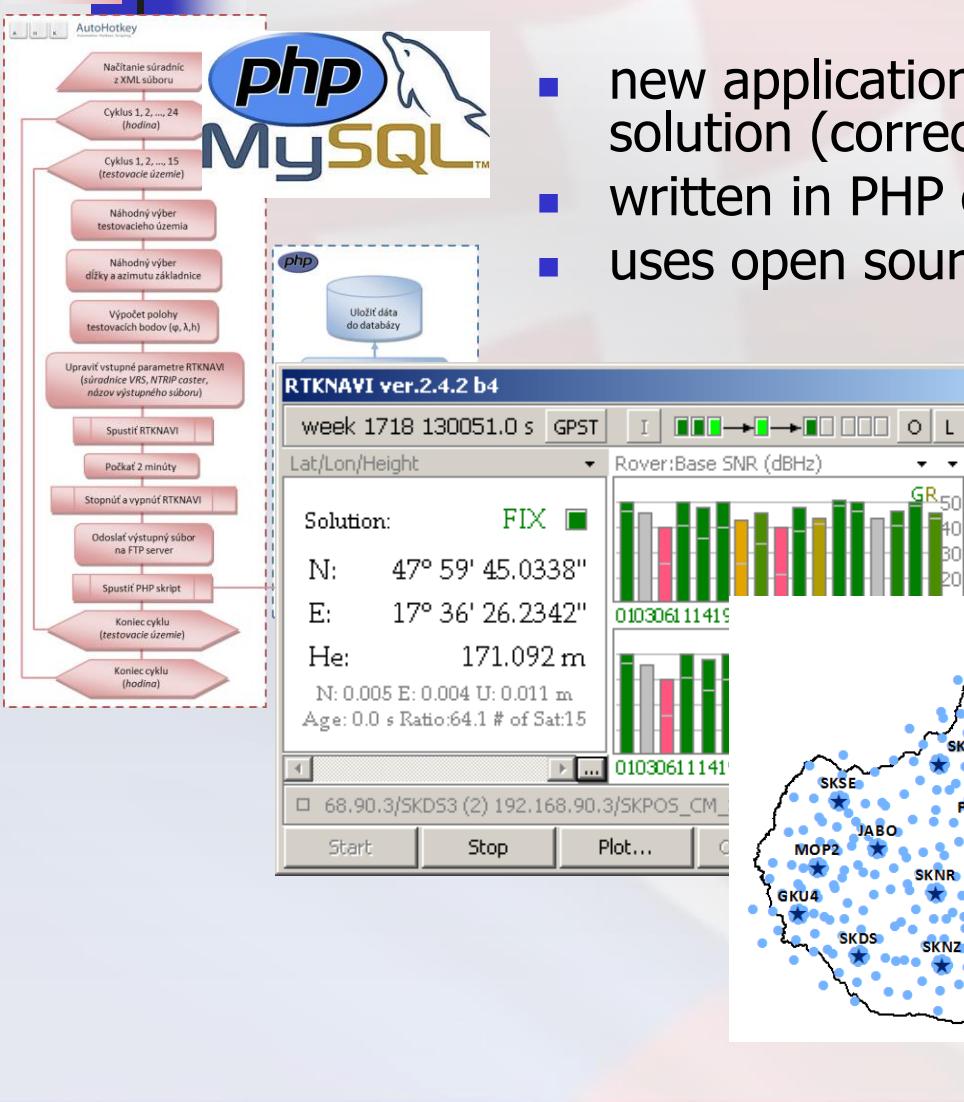


Slovak real time positioning service - SKPOS Pilier/pier monumentation



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



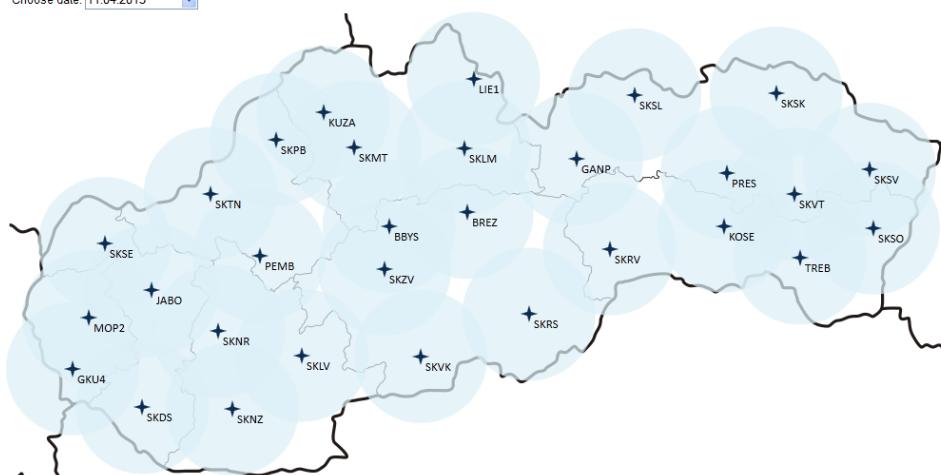
Slovak real time positioning service - SKPOS network solution quality monitoring

Firefox Doručená pošta (2) - brano.droscak@... Univerzitnaregata.sk - Prvé preteky u... EUREF Permanent GNSS Network > N... Mapový klient ZBGIS Google Translate Quality monitoring of network solut... 17.2.16.5.146/monitoring/?lang=en# 

SKPOS®

Quality monitoring of network solution SKPOS
[Home](#) > Quality monitoring

Locality selection
Choose date: 11.04.2013



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Windows taskbar icons: Internet Explorer, Firefox, File Explorer, Photos, Mail, Paint, Photoshop, etc.

System tray icons: Volume, Battery, Network, etc.
15:04 24. 5. 2013

Slovak real time positioning service - SKPOS network solution quality monitoring

Firefox Doručená pošta (2) - brano.drosak@... Univerzitnaregata.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# Google 24. 5. 2013

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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				

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172.16.5.146/monitoring/?lang=en#

SK 24. 5. 2013

GKÚ Bratislava

Slovak real time positioning service - SKPOS network solution quality monitoring

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Choose date: 11.04.2013

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172.16.5.146/monitoring/?lang=en#

SK 24. 5. 2013 15:07

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

Firefox Doručená pošta (2) - brano.drosak@... Univerzitnaregata.sk - Prvé preteky u... EUREF Permanent GNSS Network > N... Mapový klient ZBGIS Google Translate Quality monitoring of network solut... 17.16.5.146/monitoring/?lang=en# Google

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Locality selection
Choose date: 20.04.2013

SKOS map showing localities: SKPB, SKTN, PEMB, SKSE, JABO, MOP2, SKNR, GKU4, SKDS, SKNZ.

Location: GKU4 2013-04-20

Bar chart showing Variance [cm] vs GPS time [hod]. The chart compares horizontal (ne) and vertical (u) variances. RMS values are indicated: RMS_{ne} = 1.5 cm and RMS_u = 2.8 cm.

GPS time [hod]	ne [cm]	u [cm]
0	0.5	3.5
1	0.5	2.5
2	0.5	2.2
3	0.8	0.8
4	2.0	5.8
5	1.0	3.0
6	1.2	2.2
7	0.8	1.8
8	1.0	1.5
9	0.8	0.5
10	0.8	2.8
11	1.8	4.8
12	0.5	3.0
13	0.5	0.5
14	4.5	2.8
15	2.8	0.5
16	2.5	1.0
17	0.5	2.0
18	0.5	2.8
19	1.5	4.5
20	2.5	0.5
21	0.8	0.8
22	0.5	0.5
23	0.5	3.0

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Windows taskbar icons: Internet Explorer, Firefox, File Explorer, Control Panel, Paint, Photoshop, etc. System tray icons: battery, signal strength, volume, etc. Date: 24.5.2013 Time: 15:11

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:

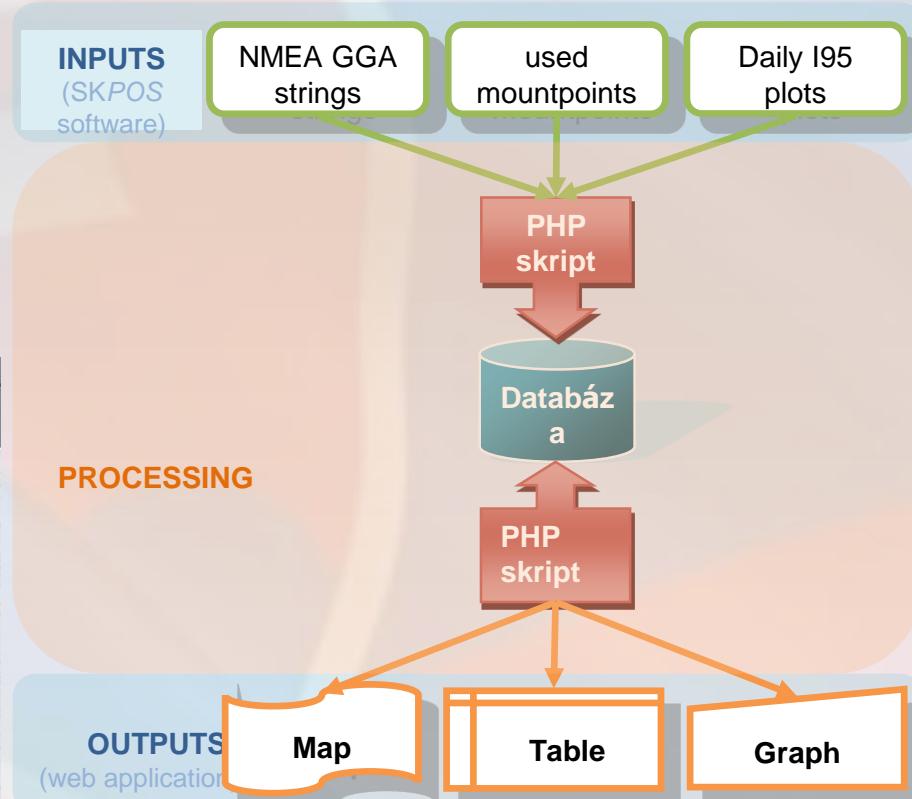
Number of satellites from: to:

MountPoint: SKPOS_CM_2,3 SKPOS_CM_3,0 SKPOS_CM_CMR All

Display the reference stations SKPOS:

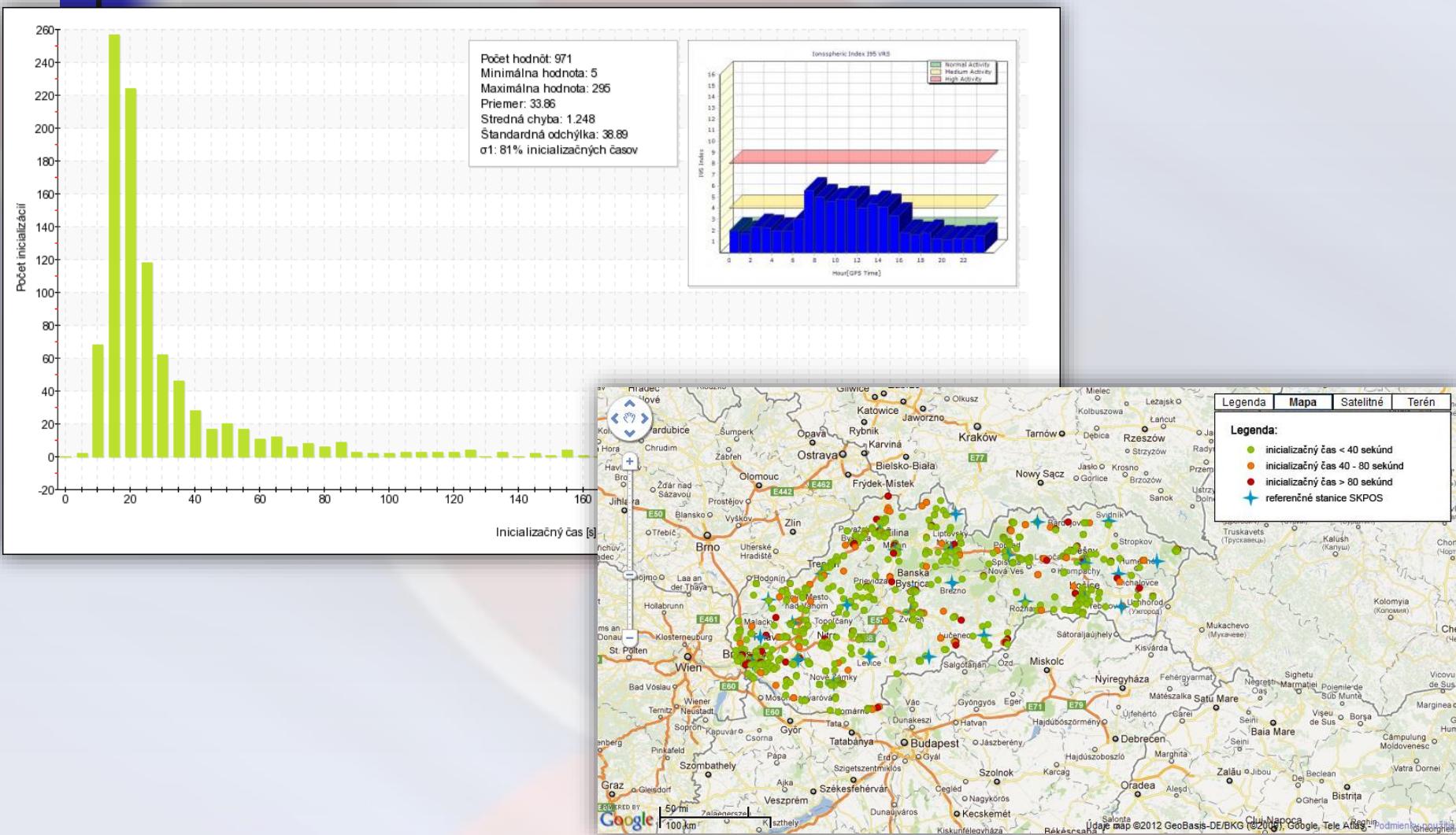
Choose location:

Show



Application **ASMARUP**

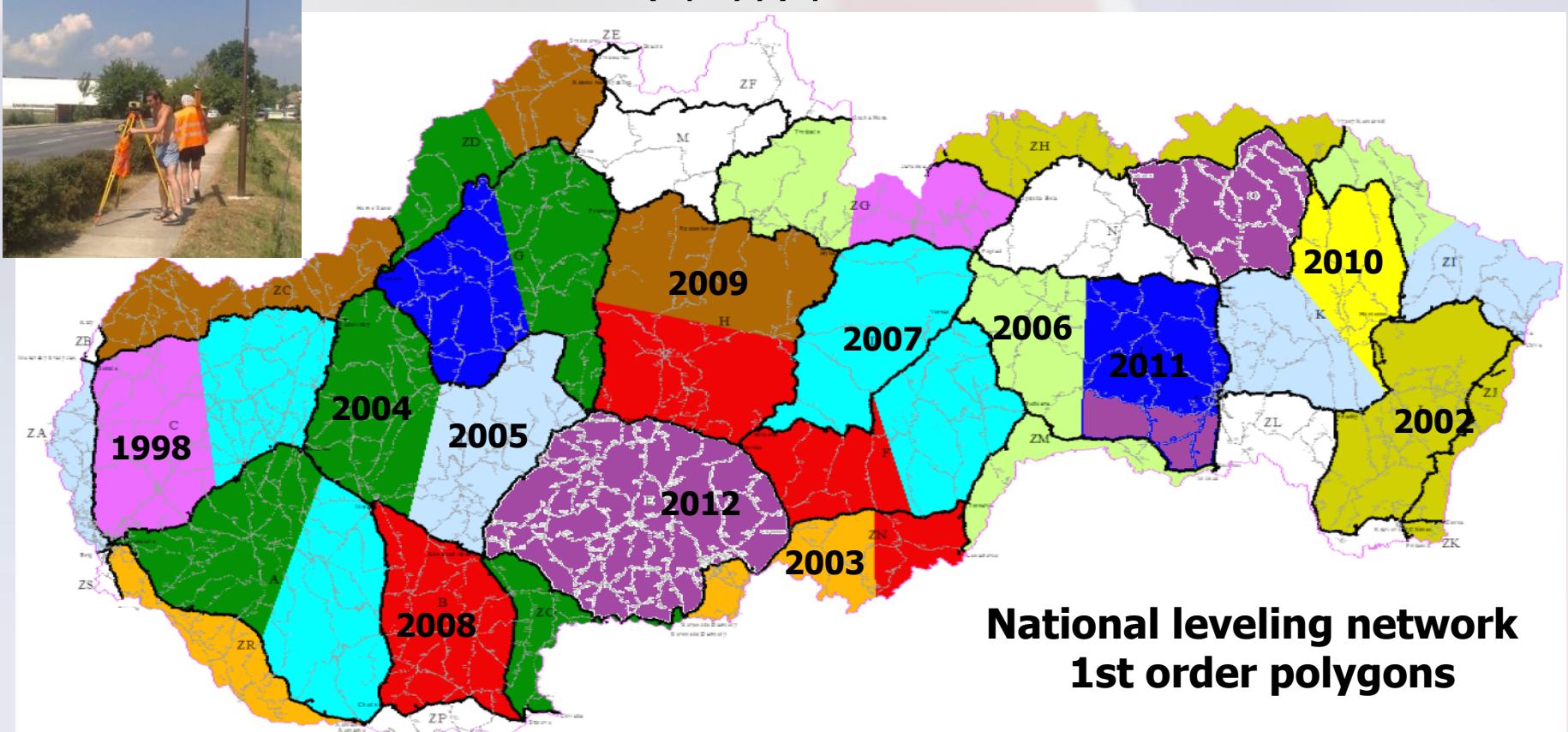
Application for SKPOS monitoring and RTK users performance



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

Mapo
aplík
s údaj



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](#)

pozitia

Vyplňanie 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 kopírováním produktov zverejnených na tomto webovom portáli zakladá občianskoprávnu aj trestnoprávnu zodpovednosť.



Mapový klient ZBGIS
Mapový klient ZBGIS je webová aplikácia, ktorá slúži na prácu s údajmi ZBGIS, zobrazenie, vyhľadávanie a analýzu priestorových údajov.

[Vstúpiť](#)



Transformačná služba
Aplikácia Transformačná služba výkonáva autorizovanú transformáciu súradnic bodov medzi závislými geodetickými systémami.

[Vstúpiť](#)



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

[Vstúpiť](#)



Vyhľadávacia služba
Slúži na vyhľadávanie metaúdajových záznamov publikovaných pripojeným katalógovým serverom.

[Vstúpiť](#)



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

[Vstúpiť](#)

Transformation service

služba
u
ov medzi
stémami.



Inspire

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

[Vstúpiť](#)

Searching service

Slúži na vyhľadávanie metaúdajových záznamov publikovaných pripojeným katalógovým serverom.

[Vstúpiť](#)



MAPOVÝ Klient ZBGIS®

Úradu geodézie, kartografie a katastra Slovenskej republiky



PORTÁL ÚGKK SR BOL VYTVORENÝ
ZA FINANČNEJ PODPORY EÚ

TESTOVACIA PREVÁDZKA

Meranie Kreslenie Údaje Kompozícia



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

The screenshot displays a map of a town with several geographical features highlighted:

- A red line highlights a specific area, likely a railway line.
- A purple polygon covers a large industrial or construction site area.
- Green areas represent parks or forests.
- Red buildings indicate residential or commercial structures.
- Black dots represent individual points of interest.

Several windows are open in the interface:

- Detail objektu**: Shows detailed information about the selected object:
 - Precision: Horizontal (Photogrammetric < 1m), Vertical (Photogrammetric < 1m)
 - Source: ArcGeo
 - Type: Building usage (Warehouse)
 - Condition: Conditioned
 - Date of status change: 5/30/2008
 - Object status: Surveyed
 - DIGEST code: AL015
 - Height above ground: 8.9
 - Building usage: Unusable
 - Name: N/A
 - Object status: Surveyed
 - DIGEST code: (DSD32F40-206C-4BB2-9422-A0DFC327FC04)
- Zoznam objektov výberu / identifikácie**: Shows categories of objects:
 - Topografický podklad (ZB GIS)
 - Amfiteáter
 - Bazén, požarna nádrž
 - Brod
 - Budova
 - Cesta
 - Chmeľnica
 - Chorlík
- Výsledky**: Shows results for different layers:
 - Železnica**: 2 items
 - DIGEST code: AN010 Category: Main track, link
 - DIGEST code: AN010 Category: Main track, link
 - Budova**: 38 items
 - Cesta**: 9 items
 - DIGEST code: AP030 Surface type: Unpaved/unpaved -32768
 - DIGEST code: AP030 Surface type: Hardened/paved -32768
 - DIGEST code: AP030 Surface type: Hardened/paved -32768
 - DIGEST code: AP030 Surface type: Hardened/paved -32768
 - DIGEST code: AP030 Surface type: Unpaved/unpaved -32768
 - DIGEST code: AP030 Surface type: Hardened/paved -32768
 - DIGEST code: AP030 Surface type: Unpaved/unpaved -32768
 - DIGEST code: AP030 Surface type: Hardened/paved -32768
 - DIGEST code: AP030 Surface type: Hardened/paved 000064/000075

Other visible elements include a scale bar (0-300 m), a north arrow, and a legend in the bottom right corner.



Transformačná služba ETRS89 - S-JTSK

Úradu geodézie, kartografie a katastra Slovenskej republiky
TESTOVACIA PREVÁDZKA



PORÁD 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

Nahranný súbor



Vstupný súradnicový systém



Výstupný súradnicový systém



Transformovať

Validácia vstupu

Výsledok validácie

Nastavenie spracovania vstupného 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

Ukážka súboru

Čiarka

Bodka

Súbor obsahuje hlavičku

Y

X

vyska

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

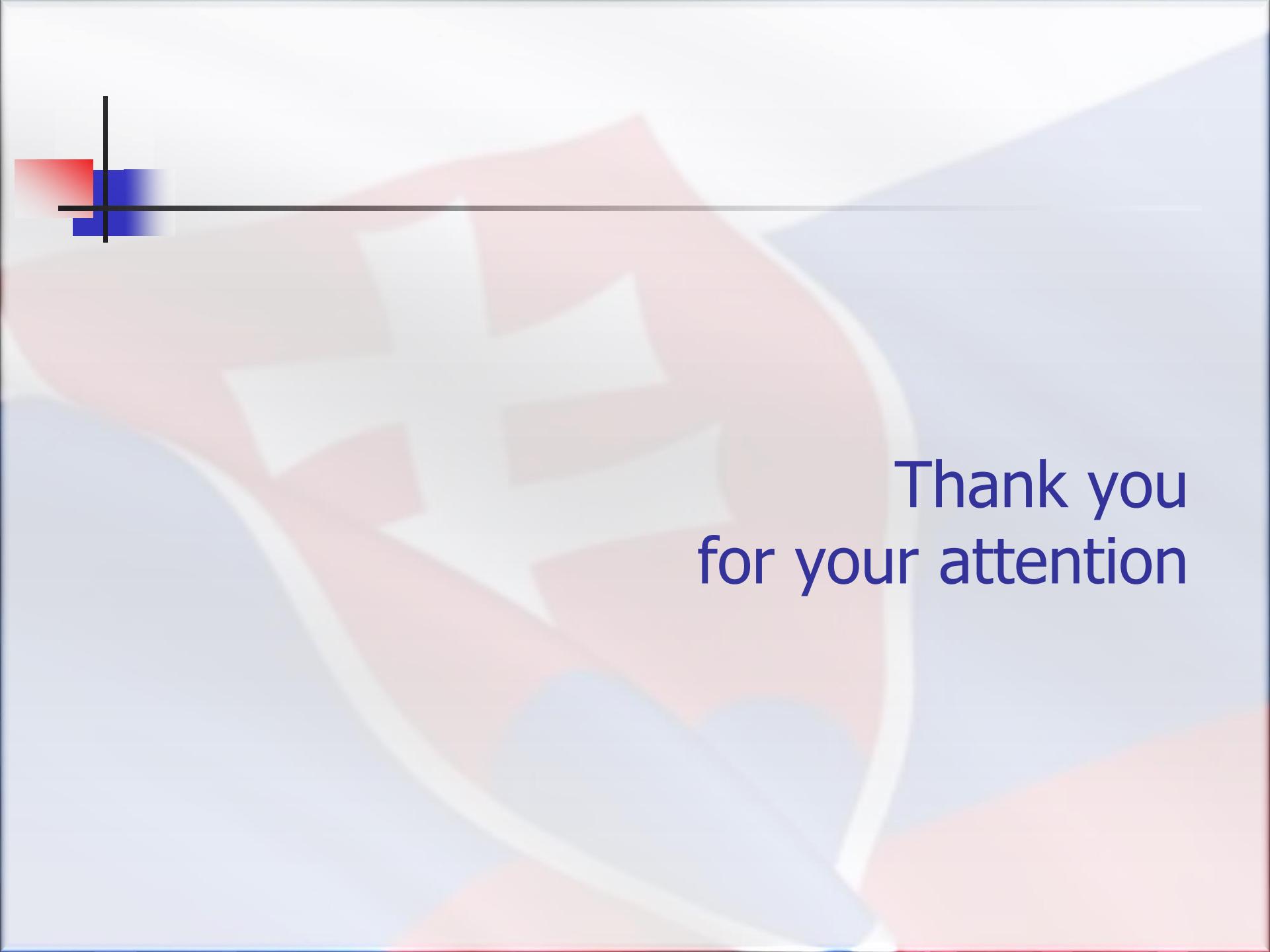
Výstupný formát údajov



Konvertovať

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

Prepísať názvy v hlavičke súboru



Thank you
for your attention