

National presentation of Slovakia for PosKEN 2015

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Outline

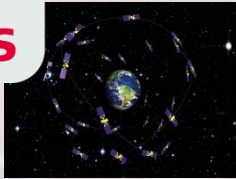
- News related to GNSS and Galileo (ESA)
- Updates in legislation related to GNSS and geodesy
- Status of national GNSS service **SKPOS**[®]
 - status of infrastructure
 - services portfolio
 - number of users
 - applications
 - preparations for Galileo
- Projects supported by data from **SKPOS**[®]

News related to GNSS and Galileo (ESA)



- **February 2015** - Slovakia become ESA cooperating state – Slovakia have to now fulfill the ESA Plan for cooperating states (PECS)
- News
 - Slovak organization for Space activities (SOSA) is organizing in 1.december 2015 conference „First Slovakian PECS projects“
 - Resort of geodesy was/is not involved into this process

News related to GNSS and Galileo (ESA)



Ministerstvo školstva,
vedy, výskumu a športu
Slovenskej republiky

- GNSS in Slovakia is considered as a part of
 - **electronics communication** - the national strategy of the electronics communication is under the Department of electronics communication of the Slovak Ministry of transport, construction and regional development
 - **space research and technology** - GNSS as a part of space research and technology is under the Slovak Ministry of Education, Science, Research and Sport





Updates in legislation related to GNSS + geodesy



News related to GNSS and Galileo (ESA)

- Amendments to the law of Geodesy and cartography number 215/1995 Z.z. was prepared (till now not accepted)
- What is new in prepared amendments:
 - New definition of Geodetic controls:
 - Geodetic control represents a reference base for unequivocal spatial and temporal localization of spatial and physical information in geodetic reference systems with prescribed accuracy; they comprise the **points of specialized national geodetic networks** (National spatial network, National trigonometric network, National levelling network and National gravimetric network), the system of means and procedures defining their parameters with prescribed accuracy and documentation, **reference models** representing relation between the frames of geodetic reference systems and **services** allowing work in real time or post-processing, or data transformation between the systems.
 - New definition of Transformation service
 - Permanent receiver was introduced as a part of geodetic controls surveying point – due to better protection

Geoportal (www.geoportal.sk) – all important information about Geodesy and GNSS

The screenshot displays the Geoportal website interface. At the top, there is a browser window with several tabs open, including 'Alberding Quality Control', 'Prekladac Google', 'gravity anomaly measure', 'Doručene (4) - brano.dro', 'EUREF Permanent GNSS', and 'downloads - Faculty of Ci'. The address bar shows 'www.geoportal.sk/geoportal.html'. The website header features the 'Geoportál' logo, a search bar with the text 'Vyhľadavanie', and navigation links for 'Prihlásenie', 'Mapa stránok', 'Textová verzia', and language options 'SK' and 'EN'. Below the header is a main navigation menu with links for 'GEODETIKÉ ZÁKLADY', 'KATASTER', 'ZBGIS A ŠMD', 'ARCHÍV', 'APLIKÁCIE', 'SLUŽBY', 'INSPIRE', and 'FAQ'. A yellow box contains the 'Podmienky použitia' (Terms of Use) section, with a 'Súhlasím' (I agree) button. The main content area is divided into several sections: 'ODKAZY' (Links) with a list of links like 'GKÚ', 'Produkty a služby', 'SKPOS', 'Katastrálny portál', 'ÚGKK SR', and 'Objednávky'; 'KONTAKTNÉ ÚDAJE' (Contact Information) for the Geodetic and Cartographic Institute of Bratislava; 'Mapový klient ZBGIS' (Map client ZBGIS) described as a web application for working with ZBGIS data; 'Transformačná služba' (Transformation service) for authorized coordinate conversion; 'Konverzná služba' (Conversion service) for format conversion; 'Vyhľadavacia služba' (Search service) for finding metadata; 'Mapy' (Maps) with a map of Slovakia; 'OZNAMY A AKTUALITY' (Announcements and News) with recent news items like 'DVRM 01.03.2015' and 'Aktualizácia technickej správy 19.02.2015'; and 'Všetky kontakty' (All contacts). The bottom of the page shows a Windows taskbar with various application icons and a system tray with the date '28. 5. 2015' and time '14:59'.

New web Terminological dictionary

(<http://www.skgeodesy.sk/sk/terminologicky-slovník/>) – under preparation


The screenshot shows a web browser window with the URL www.skgeodesy.sk/sk/terminologicky-slovník/. The page features the logo of ÚGKK SR (Úrad geodézie, kartografie a katastra Slovenskej republiky) and a search bar with the text "Vyhľadavanie". Navigation links include "Kontakty", "Mapa stránok", "Textová verzia", and language options "SK" and "EN". A menu bar contains "ÚGKK", "GKÚ", "VÚGK", "KATASTERPORTÁL", "GEOPORTÁL", and "PORTÁL ESKN". The main content area is titled "Terminologický slovník" and includes a search input field with a "Vyhľadať" button. Below the search field is a horizontal menu of letters from A to Z, with "A" selected. The list of terms under "Písmeno: A" includes: "absolútna výšková kóta", "aerotriangulácia", "aktualizácia mapy", "aktualizované vydanie", "aktuálnosť mapy", and "analogová snímka". A red watermark "Only in Slovak language!" is overlaid on the right side of the page. The Windows taskbar at the bottom shows the date and time as 23:11 on 20.11.2015.

EVRS (EVRF2007) implemented into Official transformation service

Súbor Upraviť Zobrazit' História Záložky Nástroje Pomocník

Prihláste sa - Účty Google Slovenská technická univer... Referáty 2015 Google Translate

https://zbgis.skgeodesy.sk/zbgistransform/

 **Transformačná služba ETRS89 - S-JTSK**
Úradu geodézie, kartografie a katastra Slovenskej republiky

Transformačná služba

Formát vstupných údajov Transformácia bodu jednotlivivo Pomoc

Výškový systém

Vstupný súradnicový systém ETRS89-LatLonh Vybrať

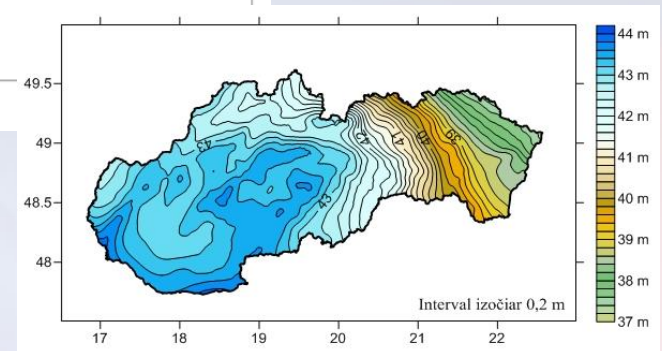
Výstupný súradnicový systém Vybrať

Transformovať

NEW

EVRS (EVRF2007_AMST)

DMQSK2014-E = Digital model of quasigeoid
ETRS89-h (ETRF2000) ↔ EVRS (EVRF2007)



Official technical report on ETRS89 – S-JTSK relation was published on www.geoportal.sk

The screenshot shows the Geoportál website interface. The main navigation menu includes: **GEODETICKÉ ZÁKLADY**, **KATASTER**, **ZBGIS A ŠMD**, **ARCHÍV**, **APLIKÁCIE**, **SLUŽBY**, **INSPIRE**, and **FAQ**. The 'GEODETICKÉ ZÁKLADY' menu is expanded, showing options: **Úvod**, **Pod SKPOS**, **Geodetické body GZ**, **Na stiahnutie** (highlighted with a red box), and **Objednať**. The 'Na stiahnutie' option is also highlighted in red in the main content area. The main content area displays the title 'Geodetický a kartografický ústav Bratislava' and the address 'Chlumeckého 4, 827 45 Bratislava'. Below this, the title of the technical report is shown: 'SÚRADNICOVÝ SYSTÉM JEDNOTNEJ TRIGONOMETRICKEJ SIETE KATASTRÁLNEJ A JEHO VZŤAH K EURÓPSKEMU TERESTRICKÉMU REFERENČNÉMU SYSTÉMU 1989 (Verzia 2.0)'. The author's name 'Ing. Dr. Štefan Bratislav, PhD.' is also visible. The website footer shows the URL 'www.geoportal.sk/sk/geodeticke-zaklady/na-stiahnutie/' and the system tray with the date '28. 5. 2015' and time '15:07'.

Only in Slovak language!

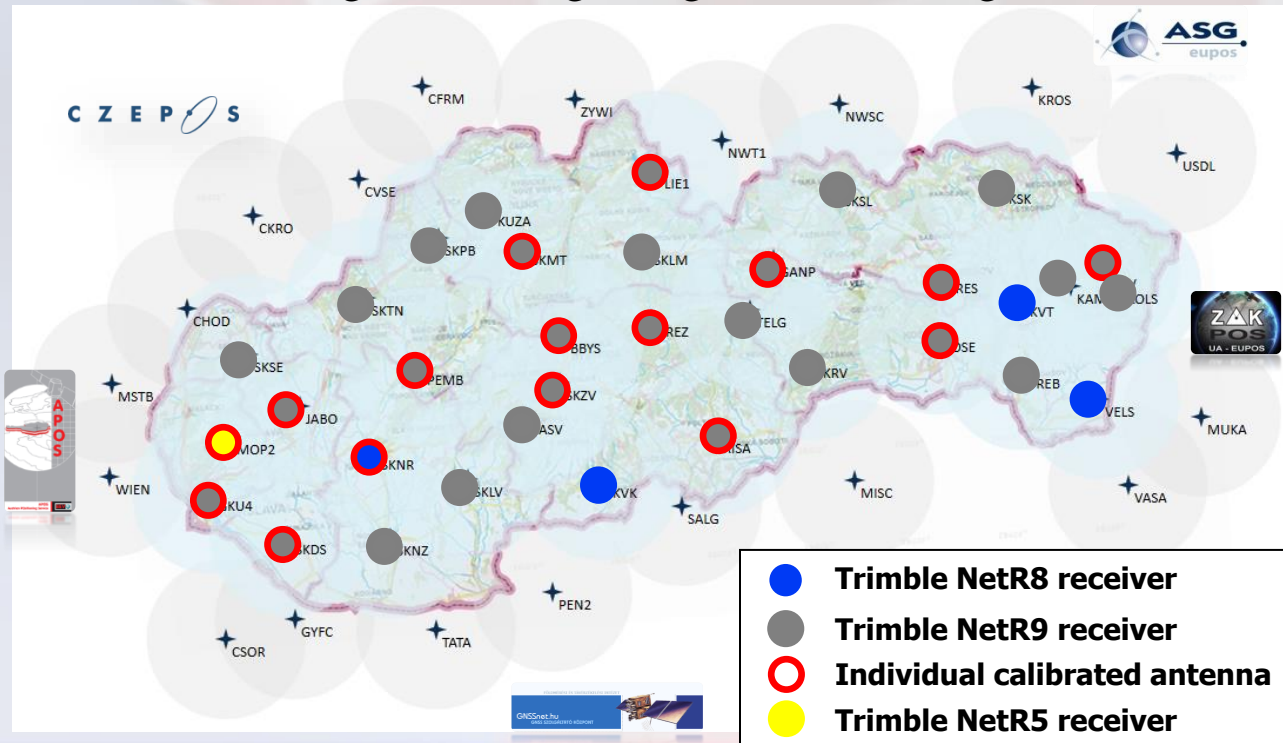




Status of national GNSS service **SKPOS[®]**

SKPOS[®] infrastructure (status in November 2015)

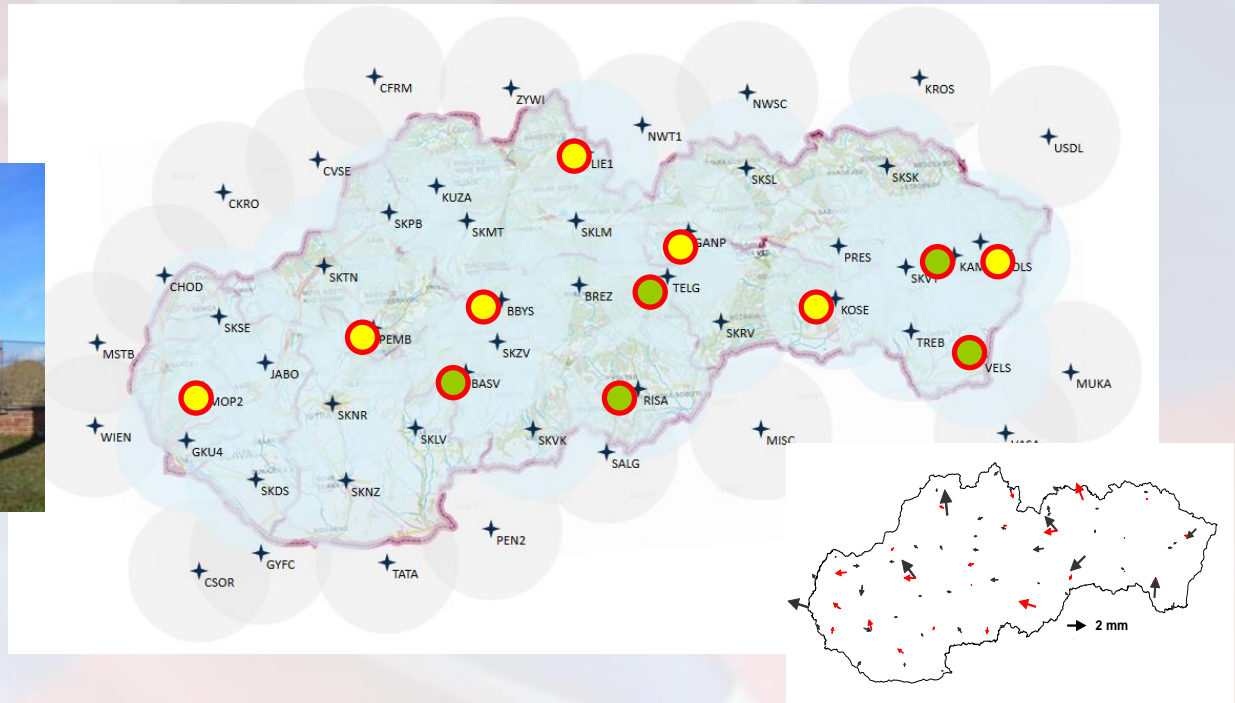
- **34 Slovakian permanent stations (16 individual calibrated)**
 - All stations with TRIMBLE receivers and antennas
 - 29 stations observe GPS+GLONASS+BeiDou+Galileo
- **19 foreign permanent stations (APOS, Gnsnet.hu, CZEPOS, ASG-EUPOS, ZAKPOS)**
 - data exchange according to signed bilateral agreements



SKPOS®

infrastructure for geodynamics research

- 12 from 34 SKPOS® permanent stations have monumentation suitable for geodynamic research purposes
 - 7 stations reinforced-concrete pier monumentation
 - 5 stations deep drilled braced mark monumentation (5m deep)



SKPOS®

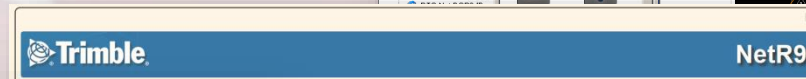
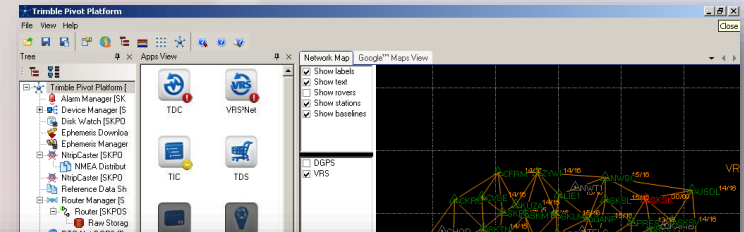
control software & receivers firmware versions

- **Trimble® Pivot™ Platform GNSS Infrastructure Software**

- Main software: version 3.5.8 (RTCM 3.2 MSM support)

- **Receivers firmware**

- Trimble NetR9 receivers: version 5.10
- Trimble NetR8 receivers: version 4.87



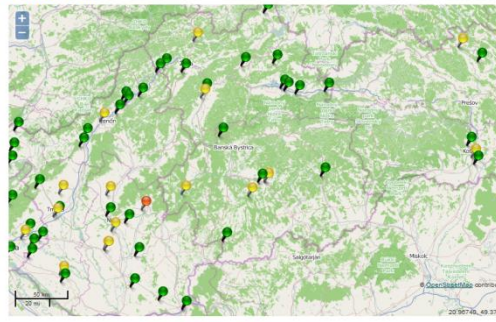
SKPOS®

Portál Slovenskej priestorovej observačnej služby GNSS

» Domov » VRS iScope Live!

- ▼ Domov
- ▼ Mapa referenčných staníc
- ▼ Diagram rozkroku
- ▼ Ošsmeny SKPOS
- ▼ Sieťové informácie
- ▼ iScope
- ▼ Online schody
- ▼ Můj účet
- ▼ Ošsmené údaje
- ▼ Zmeniť heslo
- ▼ Zoznam prístupov
- ▼ História prístupov
- ▼ VRS iScope
- ▼ VRS iScope Live!
- ▼ Aktuálne preoptované
- ▼ Adresy
- ▼ Ošsmeny SKPOS
- ▼ Pridať oznam
- ▼ Editovať oznamy
- ▼ Regiony
- ▼ Pridať regiony
- ▼ Upraviť regiony
- ▼ Správa užívateľov
- ▼ Správa užívateľov
- ▼ Vyhľad užívateľa
- ▼ Pobrať užívateľa
- ▼ Export smluvných adres
- ▼ Detailné info o užívateľoch
- ▼ Detailné info o užívateľoch
- ▼ Info poľára
- ▼ Pridať poľára
- ▼ Detailné info o prístupoch

VRS iScope™ Live!



- 66 active logins:
- ppdodhappka1 (RTK Fix)
- xvrtk1 (RTK Fix)
- dashon1 (RTK Fix)
- rosincin1 (DGPS)
- geoddeln1 (RTK Fix)
- vodnec1 (RTK Fix)
- geoddeln1 (RTK Fix)
- poplag19 (DGPS)
- poplag2 (DGPS)
- poplag20 (DGPS)
- poplag26 (DGPS)
- geoddeln2a3 (RTK Fix)
- geoddeln2b4 (RTK Fix)
- pentas2 (DGPS)
- aprica1 (RTK Fix)
- geospolse2 (RTK Fix)
- xenvege1 (RTK Fix)
- geoddeln1 (RTK Fix)
- xagm1 (RTK Fix)
- raztegi1 (RTK Fix)
- alpine1 (RTK Fix)
- xalpine3 (RTK Fix)
- casnyne3 (DGPS)
- geolenn1 (RTK Fix)
- zmetel1 (RTK Fix)
- xbilicky1 (RTK Fix)
- stornicz1 (invalid)
- geokod2 (RTK Fix)
- geokod4 (RTK Fix)
- geam1 (RTK Fix)



Receiver Type: NetR9
System Name: GKU4
Serial Number: 6212K83327
Ethernet IP: 192.168.244.218
Firmware Version: 4.85
2014-02-12
More...

The Globe & Triangle logos are trademarks of Trimble Navigation Limited registered in the United States Patent and Trademark Office and other countries. EVEREST, Maxwell, RTK, and trademarks are the property of their respective owners.

tek3 was not connected to mountpoint SKPOS_CM_OMRplus. Reason...
tek3 was not connected to mountpoint SKPOS_CM_OMRplus. Reason...
tek3 was not connected to mountpoint SKPOS_CM_OMRplus. Reason...
Login admin | 2021 MB | 10.9.2014 11:12:40 [UTC Time]

**SKPOS[®]**

packages – data formats - charges

Package	Content	Duration	Format	Flat rate
SKPOS_mm	RINEX 1000 h	year	RINEX 2.x, 3.x	50 €
SKPOS_cm (year)	RTK unlimited + 50 h RINEX	year	RTCM 2.3, 3.1, CMR _x , CMR ₊	50 €
SKPOS_cm (month)	RTK unlimited	month	RTCM 2.3, 3.1, CMR _x , CMR ₊	19 €
SKPOS_dm	DGNSS unlimited	year	RTCM 2.1	20 €

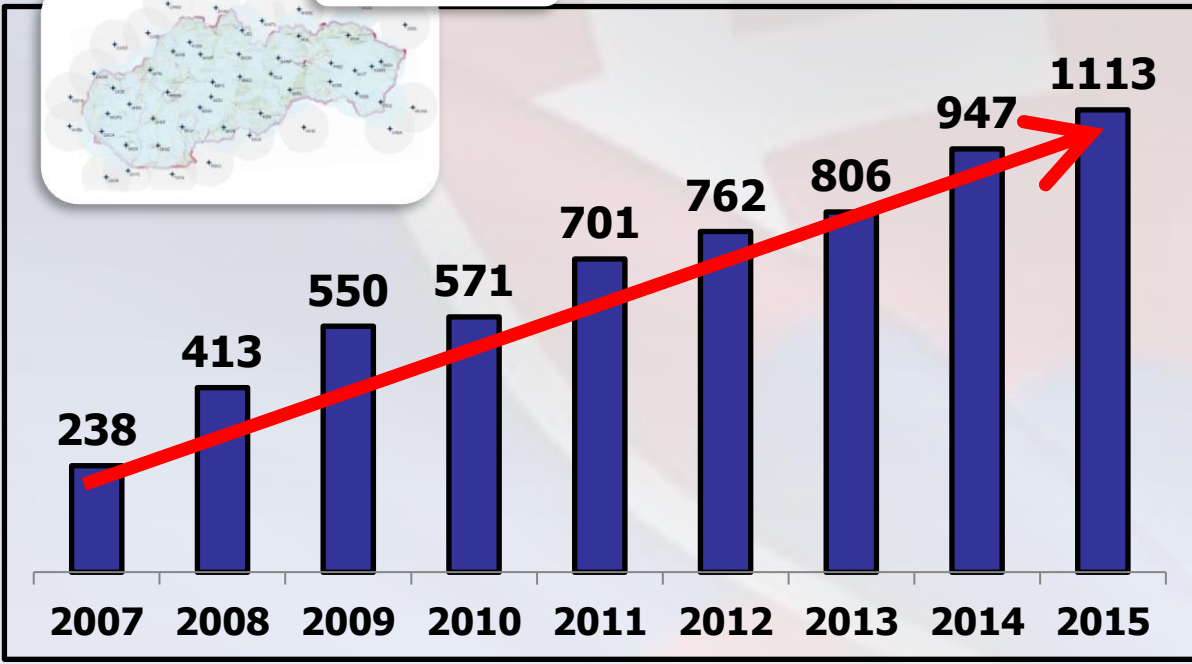
SKPOS®

number of users

- over 1100 registrations (Nov. 2015)
- number is still increasing



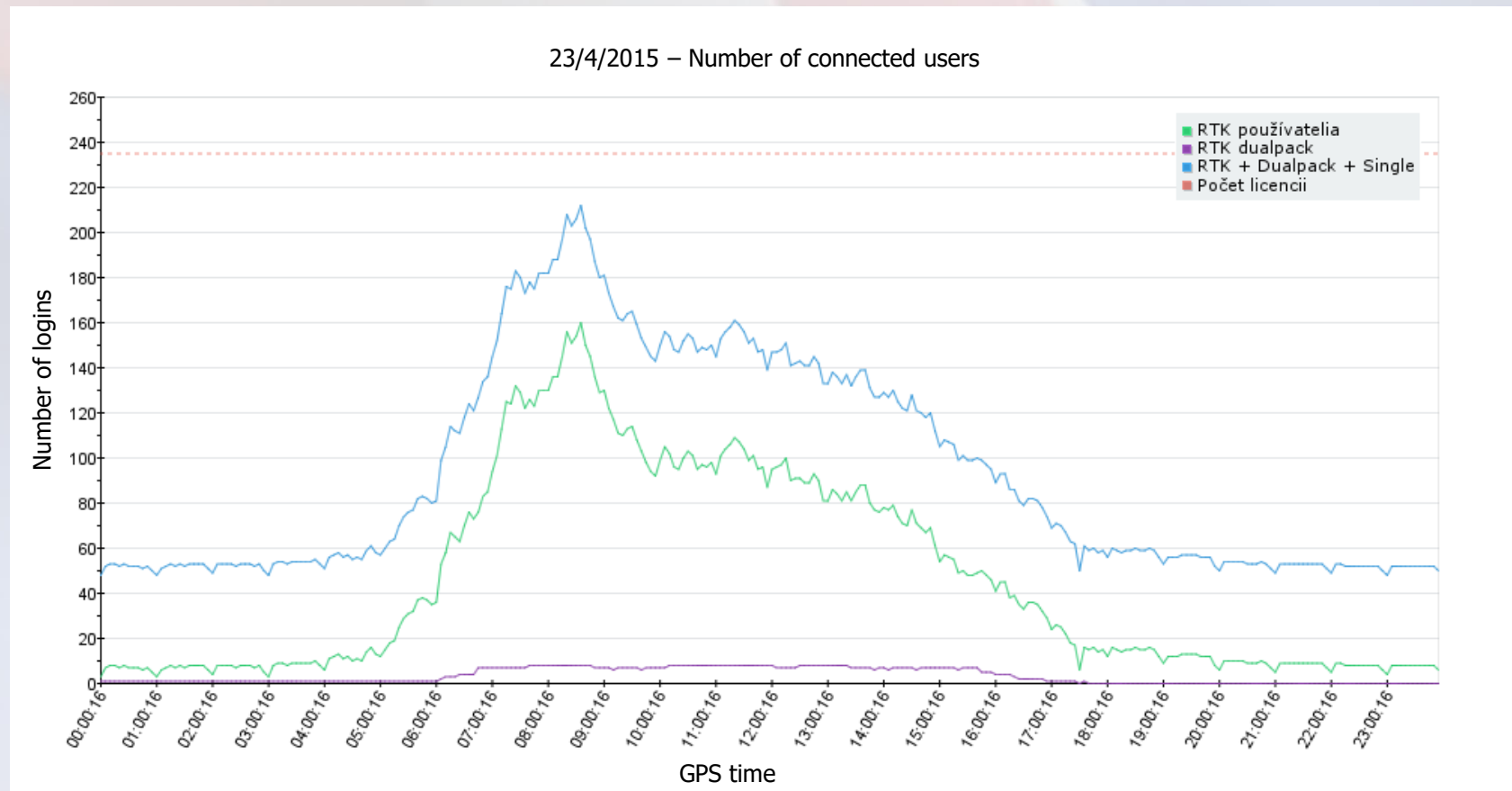
SKPOS®



SKPOS®

simultaneous logins

- Maximum: **212** simultaneous logins (23/4/2015)



SKPOS®

type of users (information from 2014)

- Surveying fields (cadastre, surveying, mapping, GIS) - **92%**
- Other fields - **8%**



New SKPOS® web page (from 13.11.2015)

- new responsive and user-friendly web page
- information for users about

- actual news,
- infrastructure
- services and prices,
- quality monitoring,
- user registration,
- ...

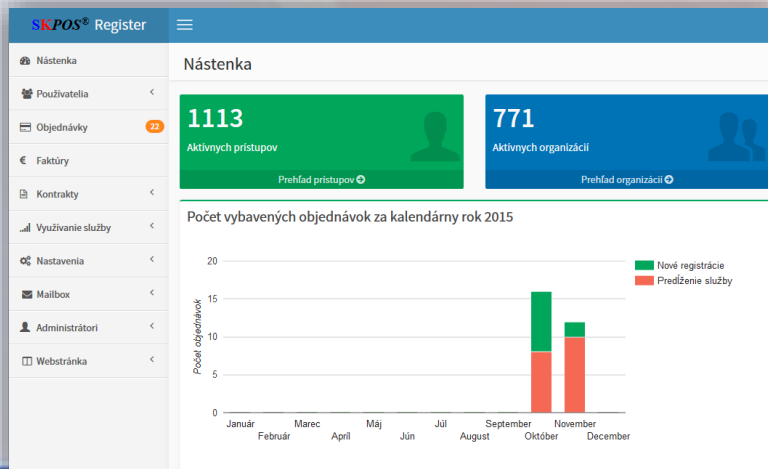
<http://skpos.gku.sk>



New SKPOS® Register (from 13.11.2015)

- a complex user management and user registration system
- corrects defects of default Trimble Pivot Platform registration
- registrations and orders explicitly by web form = electronic invoice
- automation number of processes
- significantly shorten the order process

No paper orders and no paper contracts for subscription!
Only by electronics!



The screenshot shows the 'Objednávky' page in the SKPOS Register. The page title is 'Objednávky' with a subtitle 'Prehľad nových objednávok'. There is a search bar labeled 'Hľadaj:'. Below is a table of new orders with columns for 'Dátum registrácie', 'Login', 'Kontrola údajov', and 'Vyšľadenie faktúry'.

Dátum registrácie	Login	Kontrola údajov	Vyšľadenie faktúry
2015-11-18 09:48:56	jurajvarga	Kontrola	Vyšľadenie faktúry
2015-11-17 18:43:59	sabova1	Miroslav Steinhübel ✓ 2015-11-18 07:03:48	Miroslav Steinhübel ✓ 2015-11-18 07:04:11
2015-11-16 15:46:53	polka	Miroslav Steinhübel ✓ 2015-11-18 06:55:46	Miroslav Steinhübel ✓ 2015-11-18 06:57:55
2015-11-16 09:43:48	bohumi1	Karol Smolík ✓ 2015-11-16 10:17:58	Miroslav Steinhübel ✓ 2015-11-18 06:50:53
2015-11-16 05:27:18	xgeocraft1	Karol Smolík ✓ 2015-11-16 08:53:10	Karol Smolík ✓ 2015-11-16 08:53:53
2015-11-13 11:48:58	xstobb1	Miroslav Steinhübel ✓ 2015-11-13 11:55:56	Miroslav Steinhübel ✓ 2015-11-13 11:56:12
2015-11-11 10:05:15	hnat	Elena Beňová ✓ 2015-11-11 11:53:11	Elena Beňová ✓ 2015-11-11 11:53:21

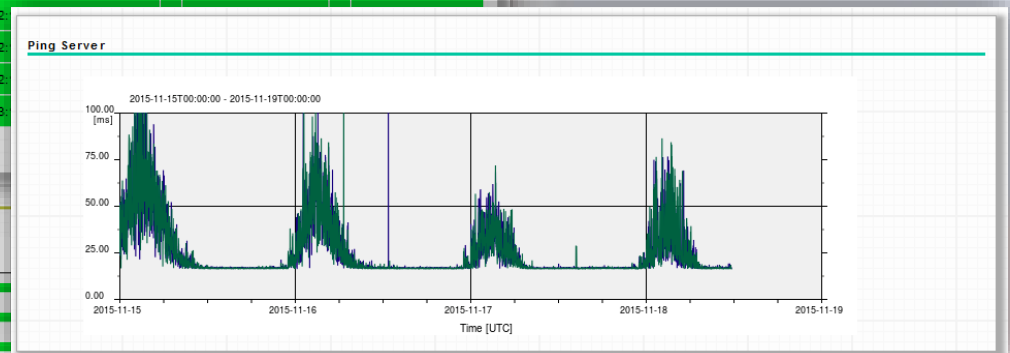
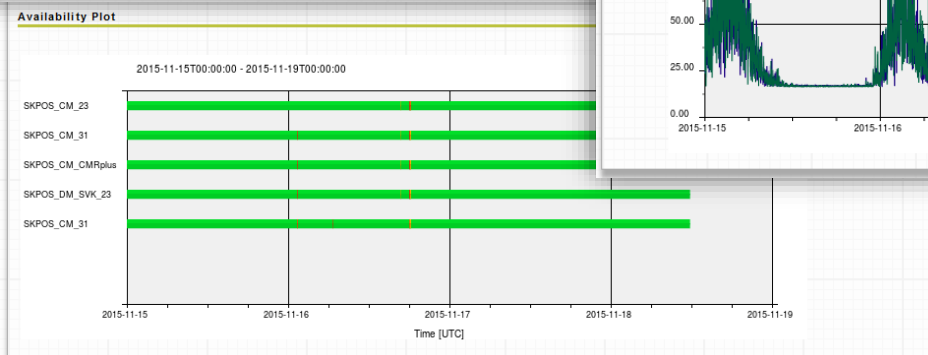
Alberding Checkstream application

- Independent NTRIP Caster monitoring tool
- Check the availability and consistency of mountpoints on specific caster
- Checkstream periodically samples the selected data streams to determine their availability

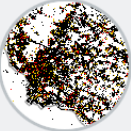
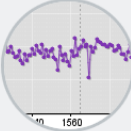

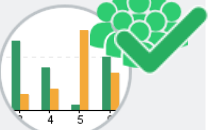
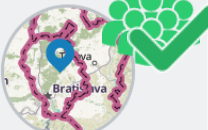
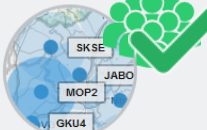
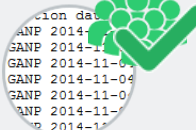

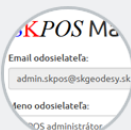

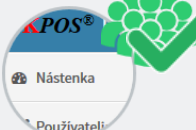


Statistics

Stream	Caster	Subnet	Activation	Last Accessed	Σ	Connection		Message		Data Age	
						Last Error(24h),(NWH)	Σ	Last Error(24h)	Σ	Last Error(24h)	
SKPOS_CM_23 [0]	195.28.70.16.2101	SKPOS	2015-05-27T11:04:45	00:00:12	4	1 d 17:32:11 (99.94 %),(100.00 %)	1	1 d 19:03:11 (99.98%)	0	00:00:00 (100.00%)	
SKPOS_CM_31 [0]	195.28.70.16.2101	SKPOS	2015-05-27T09:23:20	00:00:12	5	1 d 17:32:11					
SKPOS_CM_CMPlus [0]	195.28.70.16.2101	SKPOS	2015-05-27T09:23:20	00:00:12	5	1 d 17:32:11					
SKPOS_DM_SVK_23 [0]	195.28.70.16.2101	SKPOS	2015-05-27T11:05:19	00:00:12	5	1 d 17:32:11					
SKPOS_CM_31 [0]	195.28.70.17.2101	SKPOS	2015-05-27T09:23:20	00:00:12	6	1 d 17:33:11					



Applications for administration and analysis

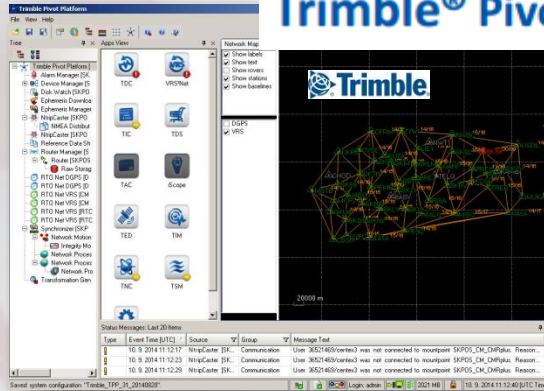
 <p>ASMARUP Analýza inicializačných časov používateľov SKPOS</p>	 <p>Časové rady Časové rady referenčných staníc SKPOS</p>	 <p>Monitoring používateľov Počet pripojených používateľov</p>	 <p>Oneskorenie staníc Oneskorenie referenčných staníc SKPOS</p>
 <p>Monitoring sieťového riešenia Desktop Desktop verzia - Monitoring kvality sieťového riešenia</p>	 <p>Monitoring sieťového riešenia Mobile Mobilná verzia - Monitoring kvality sieťového riešenia</p>	 <p>EUPOS monitoring EUPOS network RTK quality monitoring</p>	 <p>EUPOS monitoring API API na export dát z databázy EUPOS network RTK quality monitoring</p>
 <p>NMEA Analyzer Analýza meraní používateľov z NMEA správy</p>	 <p>SKPOS Mailer Hromadné odosielanie emailov používateľom SKPOS</p>	 <p>SKPOS web Webová stránka služby SKPOS</p>	 <p>SKPOS Register Správa používateľov, organizácií a objednávok</p>



SKPOS®

Preparation and plans for accommodating Galileo

Trimble® Pivot Platform GNSS Infrastructure Software



- **SKPOS®** control software Trimble Pivot Platform ver. 3.5.8
 - ✓ support RTCM 3.2 MSM (GPS+GLONASS only)
 - ✗ now **not** support RTCM 3.2 MSM (**all GNSS**)
- Plan
 - test and compare RTCM 3.1 and RTCM 3.2 format






Projects supported by data from **SKPOS**[®]

EPN, IGS

EPN CB HOME

EUREF PERMANENT NETWORK

ROB *****
GNSS RESEARCH GROUP *****
EUREF 

ORGANISATION	NETWORK & DATA	PRODUCTS & SERVICES	DOCUMENTATION
About Components Working groups Management Contributors Collaborations Site map	Station list Maps Tracking status Data access Proposed stations Station log submission Station picture submission	Data analysis Daily/weekly positions Positions & velocities Tropospheric delays ETRF/ITRF transformation Position time series Satellite orbit & clock correction streams	Formats Guidelines Equipment & calibration Papers FAQ

NETWORK & DATA > **MAPS**

INTERACTIVE MAP

Legend

Station status (active, inactive, former)

Active Inactive Former

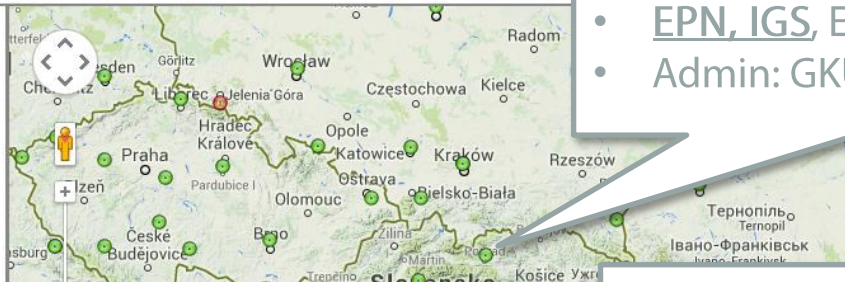
Locate station on map

- Select a station -

Station criteria selection

Receiver manufacturer: AOA ASHTECH JAVAD

Antenna manufacturer: 3S NAVIGATION AOA ASHTECH



GANP

- From: 2003
- GPS, GLONASS, Galileo, BeiDou
- EPN, IGS, EUREF-IP
- Admin: GKÚ



MOP2

- From : 2008
- GPS, GLONASS
- EPN
- Admin: STU



BBYS

- From : 2007
- GPS, GLONASS, Galileo, BeiDou
- EPN
- Admin: GKÚ + TOPÚ



EUPOS combination centre → EUREF densification project

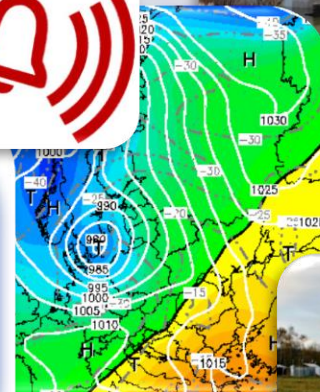
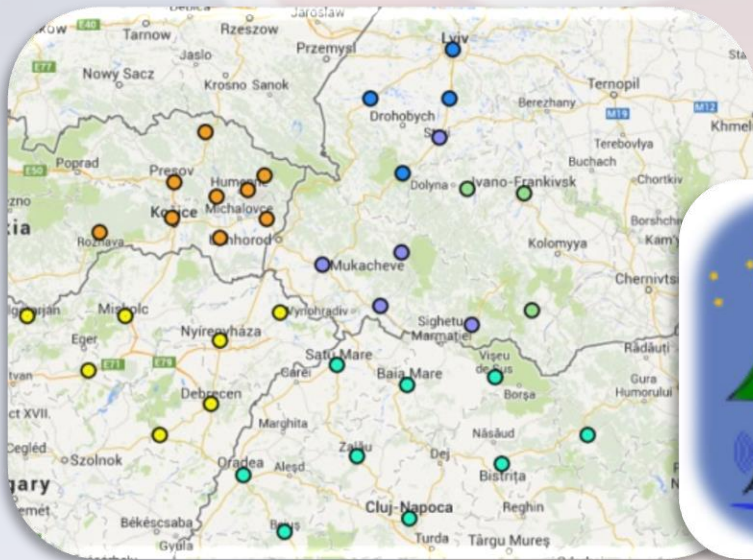
- GKU Bratislava (**SKPOS**[®] national center)
 - Follows *EUPOS* standards
 - Keeps station information in *EUPOS* station database
 - Contributes to *EUPOS* combination centre with SINEX solutions



Collaboration with Vihorlat observatory

Space emergency system project

- Multilateral project: Ukraine-Slovakia-Hungary-Romania
- Agreement signed in December 2014
- new KOLS permanent station is part of **SKPOS**[®]
- goal: creation of Space emergency system
- www.meteognss.net



National center for diagnosing the earth surface deformations in Slovakia

- ITMS research project (<http://www.geokinematika.sk>)
- Surface deformations monitored on 9 geodynamics points by
 - Permanent GNSS stations (5 **SKPOS**[®] stations)
 - Absolute gravity measurements

The screenshot shows the website for the National Center for Diagnosing the Earth Surface Deformations in Slovakia. The page includes a navigation menu, a header with logos for the project and STU, and a main content area with the following sections:

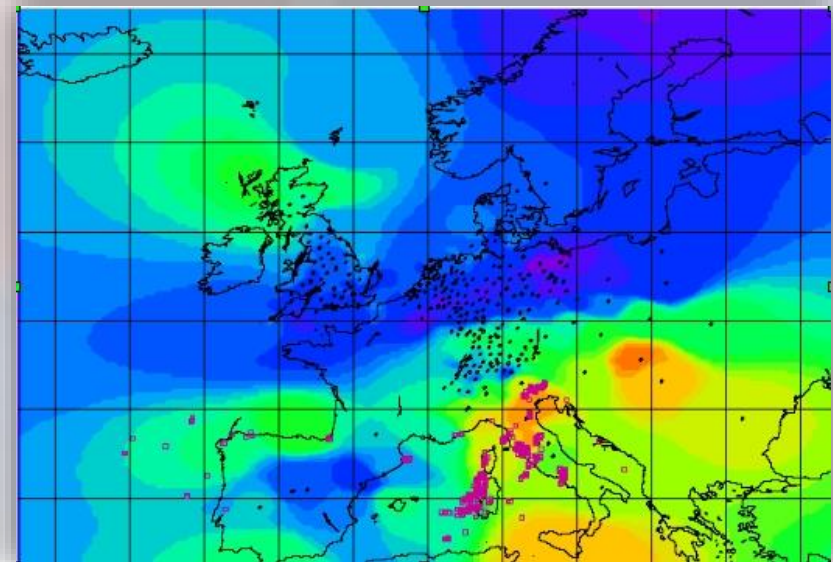
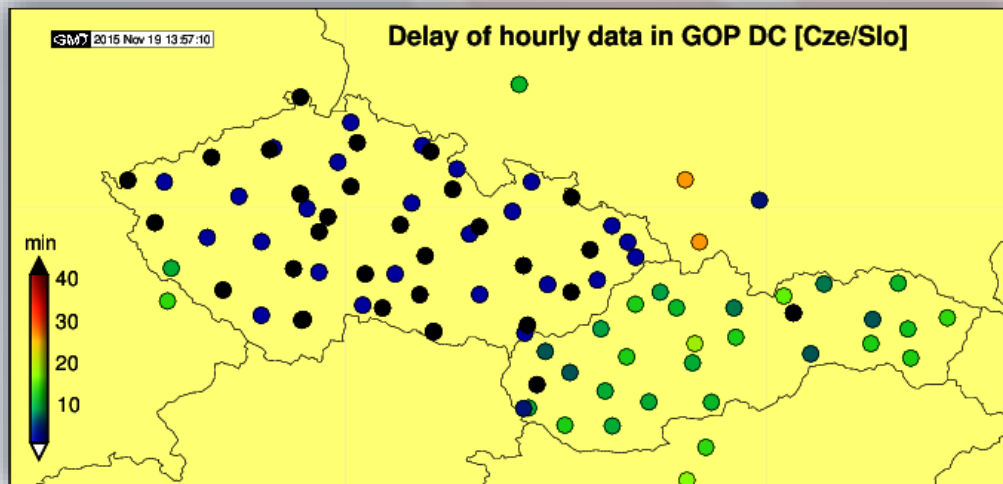
- ABOUT THE PROJECT**
- MONITORED SITES NETWORK**
- SATELLITE AND GRAVIMETRIC MEASUREMENTS ANALYSIS**
- PROJECT OUTPUT**
- CONTACT**

The main text describes the project's aim: "The aim of the National Center For Diagnosing the Earth Surface Deformations in Slovakia is to identify the Earth surface deformations on the basis of research results by applying the satellite, gravimetric and tropospheric measurements." It also mentions that the center maintains a permanent database of earth crust dynamics and focuses on risk assessment for construction and monitoring of large structures.



E-GVAP programme

- EUMETNET GPS Water Vapour Programme
- **Goal:** prepare GPS derived ZTD/IWV for operational meteorological use
- data from **SKPOS**[®] stations supports EGVAP via GOP data center







**Thank you
for your attention**