



# News from Slovakia 2013


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24<sup>th</sup> conference of EUPOS ISC,  
29-30.10.2013, Berlin, Germany

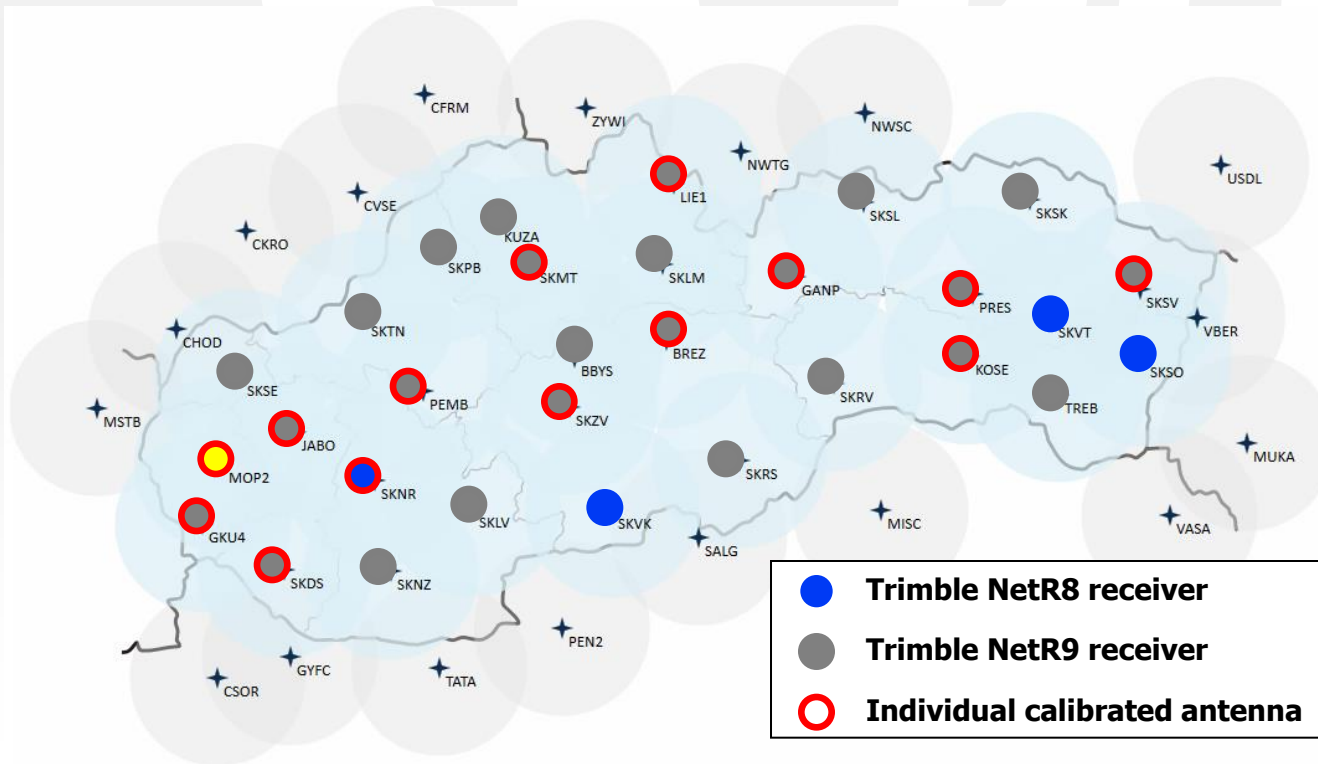
# Agenda

- **SKPOS**<sup>®</sup>
  - status in October 2013
  - control software, services
  - number of users, field of applications, charges
  - statistics
- Applications related to **SKPOS**<sup>®</sup>
- Activities related to  **EUPOS**<sup>®</sup>
- **SKPOS**<sup>®</sup> time series analysis
- Other GNSS news from Slovakia

# SKPOS® infrastructure

## October 2013

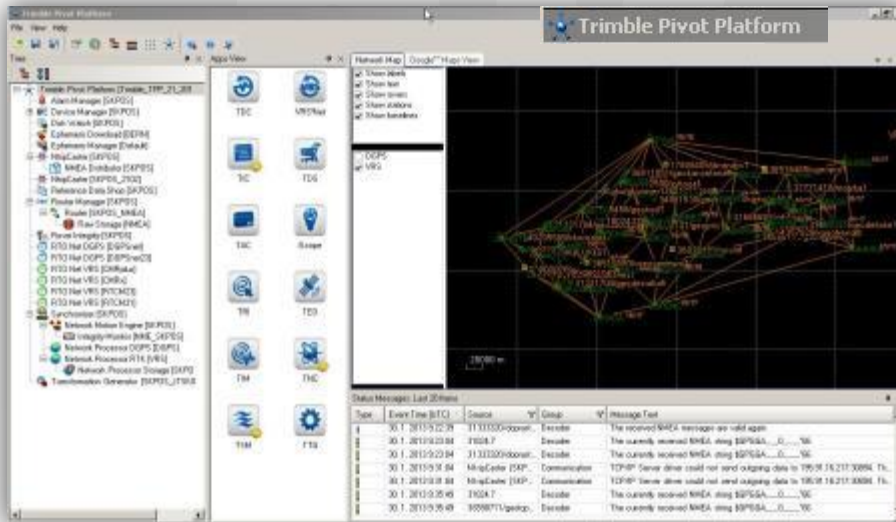
- **30 slovakian permanent stations (14 individual calibrated)**
  - All stations with TRIMBLE receivers and antennas
  - All stations observe GPS+GLONASS signals (few Galileo)
- **18 foreign permanent stations - NEW**



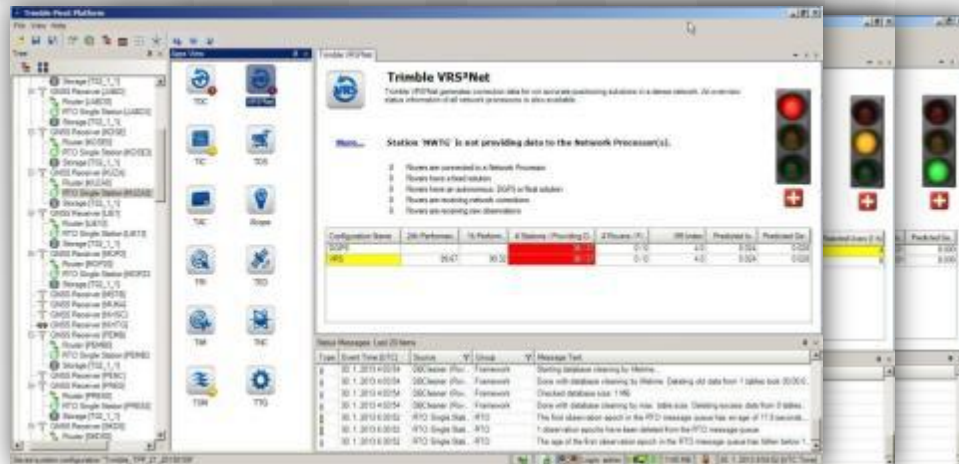
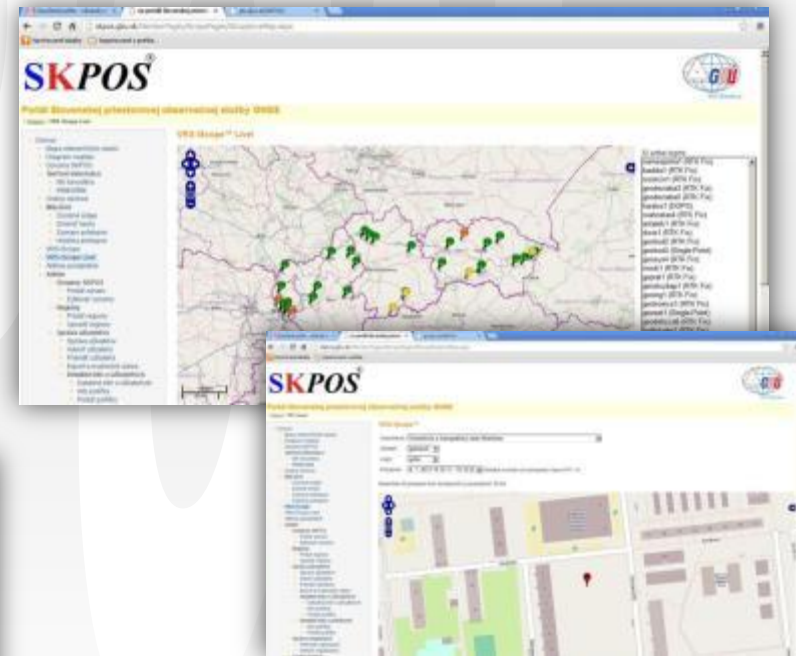
# SKPOS®

## control software

### Trimble Pivot Platform ver. 2.5.7



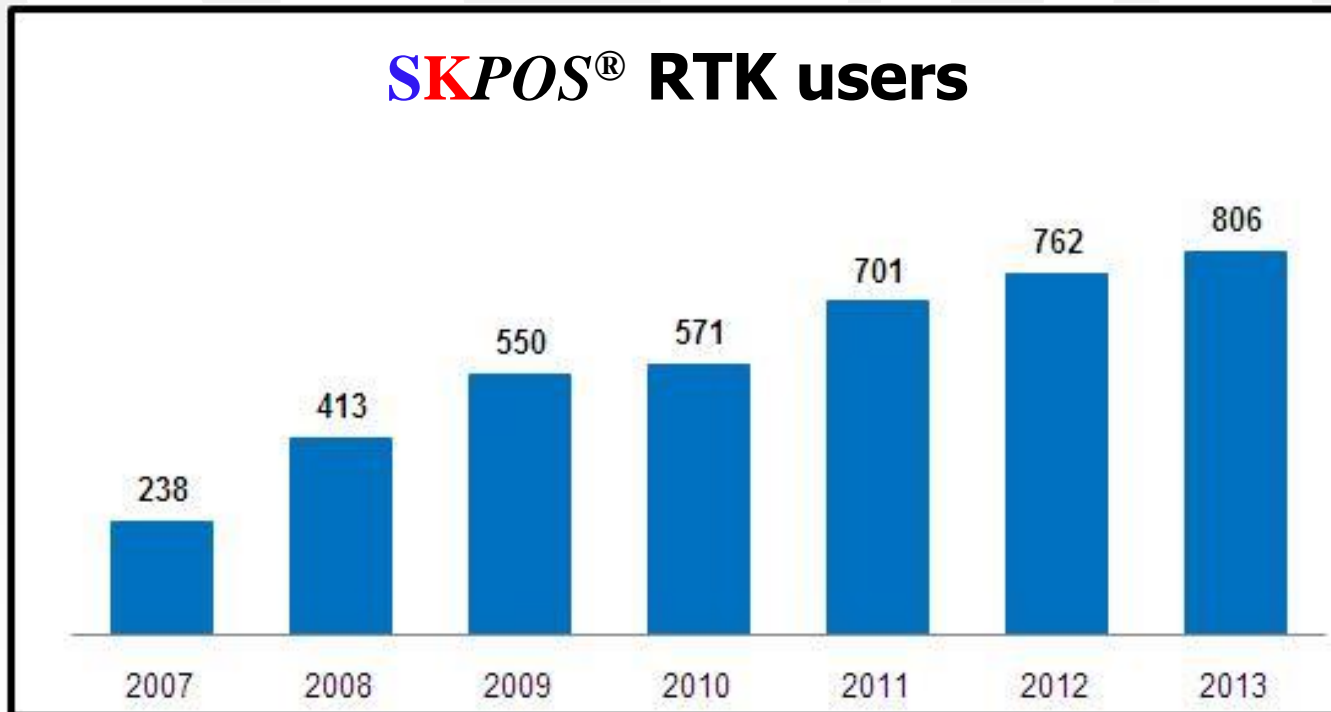
### I-Scope module (11.11.2011)



Only network solution (Network RTK) no Single RTK

Service	Accuracy	Data format	Interval
<b>SKPOS_MM</b> post-processing (VRS or permanent station data)	mm - cm	RINEX: 2.10, 2.11, 3.0 DAT, TGD, T01, T02	1 sec. – x sec.
<b>SKPOS_CM_23</b> <b>SKPOS_CM_31</b> <b>SKPOS_CM_CMRX</b> <b>SKPOS_CM_CMR+</b> RTK (VRS concept)	2 – 4 cm	RTCM 2.3 RTCM 3.1 CMRX CMR+	1 sec.
<b>SKPOS_DM_SVK</b> <b>SKPOS_DM_SVK_23</b> RTK (VRS concept)	0,3 – 1 m	RTCM 2.1 RTCM 2.3	1 sec.

- over 860 registrations (October 2013)
- still increasing



## field of applications

- 94% - surveying, cadastral, cartography geodesy and GIS
- 5% (40) users from precise farming,
- 1% forestry, archeology etc.

The image shows a screenshot of the SKPOS web portal. The browser address bar displays [www.skpos.gku.sk/Map/SensorMap.aspx](http://www.skpos.gku.sk/Map/SensorMap.aspx). The page title is "Portál Slovenskej priestorovej observačnej služby GNSS". The main content area features a map titled "Mapa referenčných staníc" (Map of reference stations) showing numerous green pins representing GNSS stations across Slovakia. A sidebar on the left contains navigation links: "Domov", "Mapa referenčných staníc", "Prihlásiť", "Registrovat", "Externé odkazy", "Monitoring SKPOS", and "Monitoring CZEPOS". A small inset image shows a surveyor in an orange safety vest using a GNSS receiver. To the right, a diagram illustrates the data flow: GNSS satellites (represented by blue icons) transmit signals to a ground station (a yellow and green receiver) and a tractor (a green tractor), which then uses the data for precise farming applications.

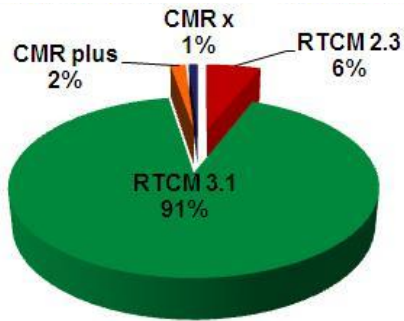
- **2013 year**
  - the same charge as 2012 and 2011 year
  - flat rate **90 €** per 365 days from the date of registration
- price involve
  - 2000 hours for DGNSS measurement
  - 1000 hours for the RTK measurement
  - 100 hours for the RINEX downloading
- after limit overdraw – additional charges
  - single station RINEX 0,1 EUR/min
  - VRS RINEX 0,05 EUR/min
  - RTK measurement = new registration 90 EUR



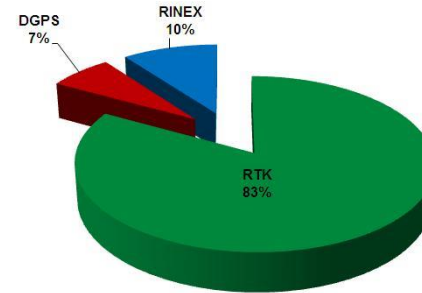


# Statistics (Jan – Oct 2013)

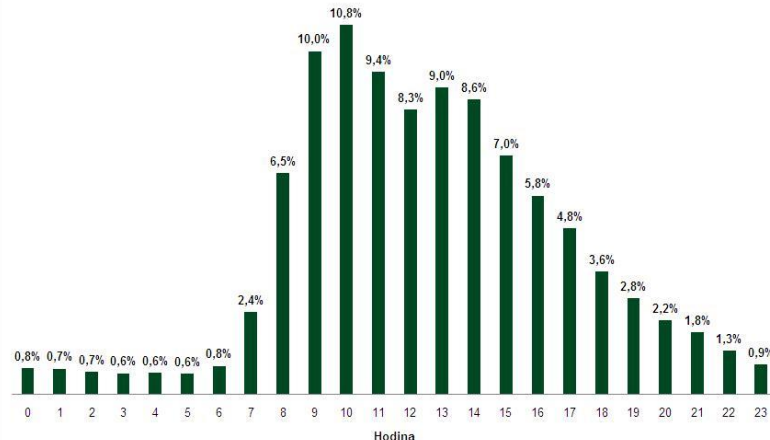
## Data format usage



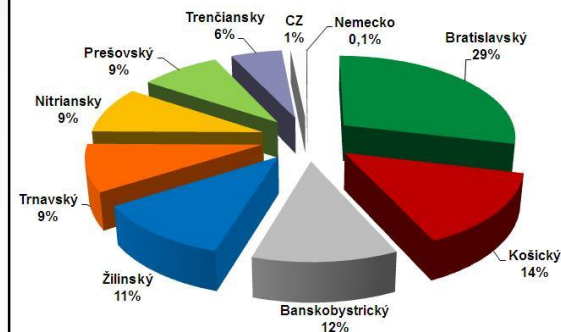
## Type of service usage



## RTK usage according day time



## Service usage according region



# Application „Verify user“ for cadastre verifiers

- Application for verification of SKPOS® using in cadastre
- Application is based on NMEA messages received from users

The image displays two screenshots of the SKPOS application interface, titled "SKPOS - overenie užívateľa (testovacia prevádzka)".

**Left Screenshot:** Shows a regional map of Slovakia with a search form for user verification. The search form includes the following fields:

- Meno: gzfric
- Dátum: 24.10.2012
- Hodina (od): 2
- Hodina (do): 23

The search form also has a "Clear All" button and an "Over" button. The map shows various regions including Bratislava, Trnava, Nitra, Trenčín, and Žilina. A scale bar at the bottom indicates 0, 6, 12, 24, 36, and 48 km.

**Right Screenshot:** Shows a detailed map of a specific area with a data popup for a user named "gzfric". The popup displays the following information:

Užívateľ	gzfric
Dátum	24.10.2012
Čas (UTC)	06:36
Kvalita	4
Počet satelitov	8
HDDOP	2.58
Výška	893.4379

The map shows a detailed view of a specific area with various features and labels, including "k.ú. Dema Mestská", "Horná Mariková", "k.ú. Papradno", and "Papradno". A scale bar at the bottom indicates 0, 12, 24, 36, and 48 m.

# ASMARUP - Application for SKPOS<sup>®</sup> Monitoring And RTK Users Performance

- application for SKPOS<sup>®</sup> user initialisation time analysis
- available only for administrators (GKU)

172.16.5.146/asmarup/index.php?date1=&date2=&user=&time1=&time2=&ini\_time1=&ini\_time2=&sat1=&sat2=&rtcm=&skpos=&send=&lang=en

ASMARUP SERIES

## Application for SKPOS monitoring and RTK users performance

Date from:  to:  Language:

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:

Vyhřadávat:

Uživatel'	Dátum	Čas (SEC)	Inicializačný čas [s]	Počet satelitov	MountPoint
uzivatel1	15.11.2011	7:09:01	22	13	SKPOS_CM_2,3
		9:17:00	22	14	SKPOS_CM_2,3
		9:37:24	21	9	SKPOS_CM_2,3
		10:20:11	22	14	SKPOS_CM_2,3
		10:21:29	12	16	SKPOS_CM_2,3
		10:39:54	32	14	SKPOS_CM_2,3
		11:11:47	22	14	SKPOS_CM_2,3
		11:19:43	22	14	SKPOS_CM_2,3
		11:21:43	23	12	SKPOS_CM_2,3
		11:29:26	22	15	SKPOS_CM_2,3
		11:30:33	22	15	SKPOS_CM_2,3
		11:32:19	33	15	SKPOS_CM_2,3
		11:38:07	13	15	SKPOS_CM_3,0
		11:39:12	17	15	SKPOS_CM_3,0
		11:41:02	12	14	SKPOS_CM_3,0
		11:46:37	22	15	SKPOS_CM_3,0
		11:51:12	22	14	SKPOS_CM_3,0

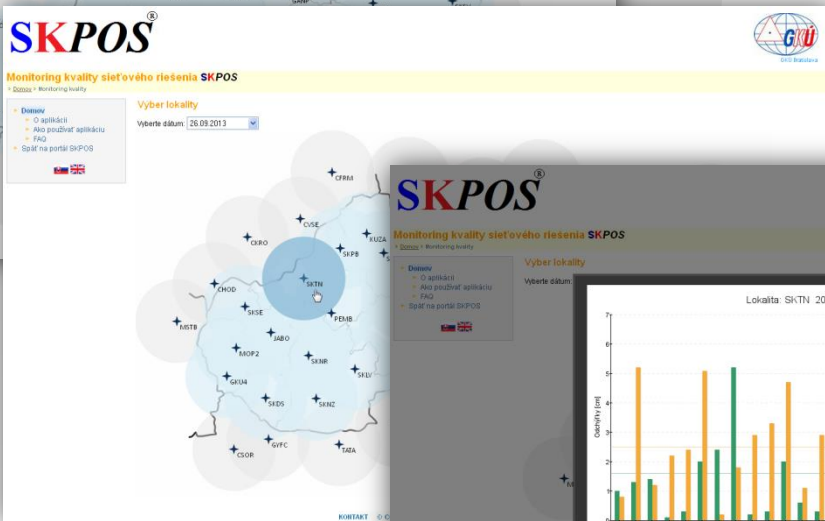
Predošlá 1 2 3 4 5 Ďalšia Posledná

Počet hodnôt: 681308  
 Minimálna hodnota: 1  
 Maximálna hodnota: 300  
 Priemer: 30,87  
 Stredná chyba: 0,048  
 Standardná odchýlka: 30,98  
 o1: 79% inicializačných časov

# Application „Monitoring of SKPOS® network solution quality“

<http://monitoringskpos.gku.sk>

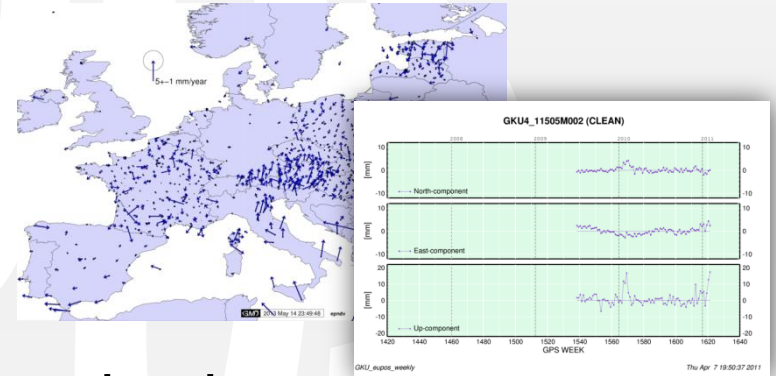
- virtual principle (no monitoring stations)
- baseline processing – RTKNAVI sw.
- monitoring of whole Slovakia
- random spot testing
- independent from SKPOS control sw.
- user friendly environment
  - Date selection
  - Locality selection
- graphical output



# Activities related to **EUPOS**<sup>®</sup>

European Position Determination System

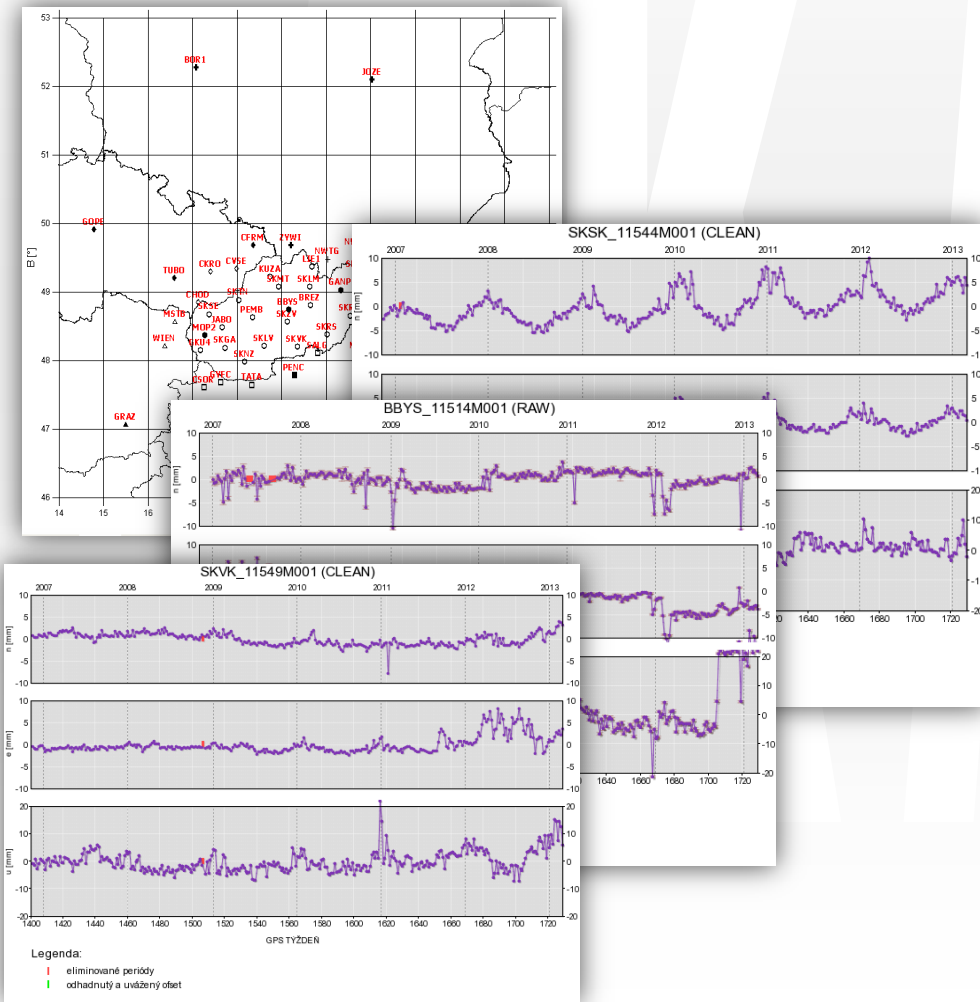
- contribution to  **EUPOS**<sup>®</sup> Combination Center
  - SINEX files (**GKUwww7.SNX**) - GPS weeks 1408-1729



- Contribution to  **EUPOS**<sup>®</sup> station database
  - Slovakian part actualisation



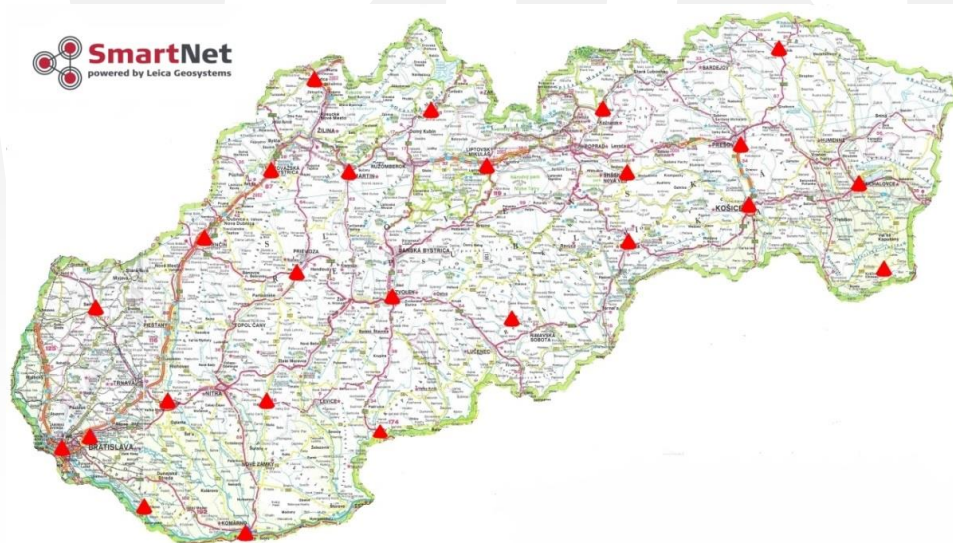
## time series analysis

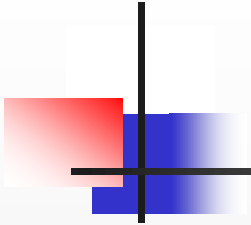


- Precise processing
  - Bernese software 5.0 (→ 5.2)
  - 2007-2013
  
- Times series analysis
  - jump determination
  - trend & season variation estimation
  
- Experience from analysis
  - jumps
  - unknow jumps
  - seasonal variation
  - anomaly behaviour
  - stable behaviour

# Other news from Slovakia

- private permanent network „Leica **SmartNet** Slovensko“
- 26 permanent stations
- officially not allowed for “cadastral usage”
- Service is charged (more expensive than **SKPOS**<sup>®</sup>)





SKYPO

Thank you  
for your attention