# National report of SLOVAKIA

Karol Smolík, Branislav Droščák

Geodetic and Cartographic Institute BRATISLAVA

karol.smolik@skgeodesy.sk
branislav.droscak@skgeodesy.sk

EUPOS
European Position Determination System

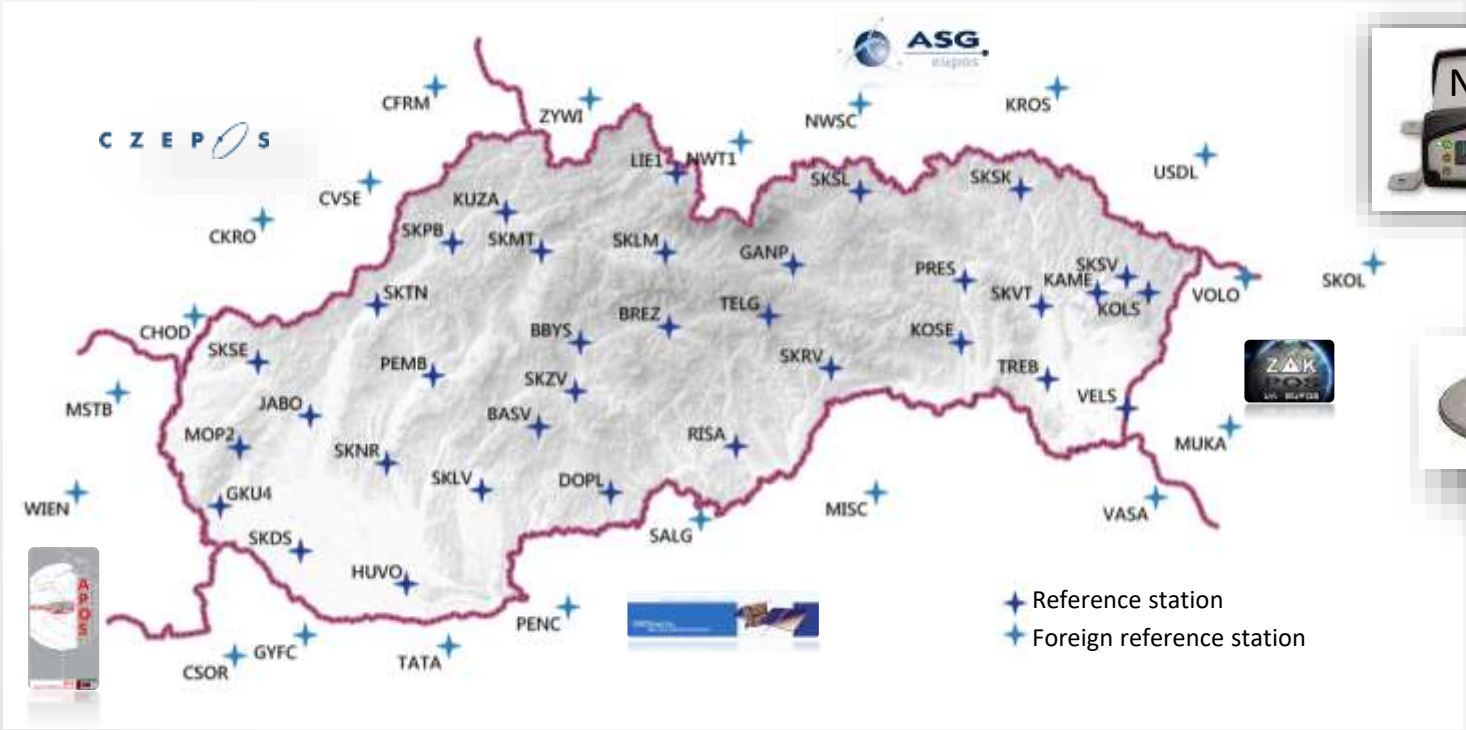
5th EUPOS® Council and Technical Meeting

November 14-15, 2018. Tallinn, Estonia

# SKPOS stations infrastructure

## Status in November 2018

- **34 Slovakian permanent stations**
  - All stations with TRIMBLE receivers and antennas
  - All stations observe GPS + GLONASS + Galileo + BeiDou
- **21 foreign permanent stations (APOS, gnssnet.hu, CZEPOS, ASG-EUPOS, ZAKPOS)**



# SKPOS stations infrastructure

## Receivers changes

- 4 new Trimble Alloy receivers

Trimble NetR8

**Full Galileo capability**

CORS: GANP, SKNR, VELS

Trimble Alloy

# SKPOS stations infrastructure

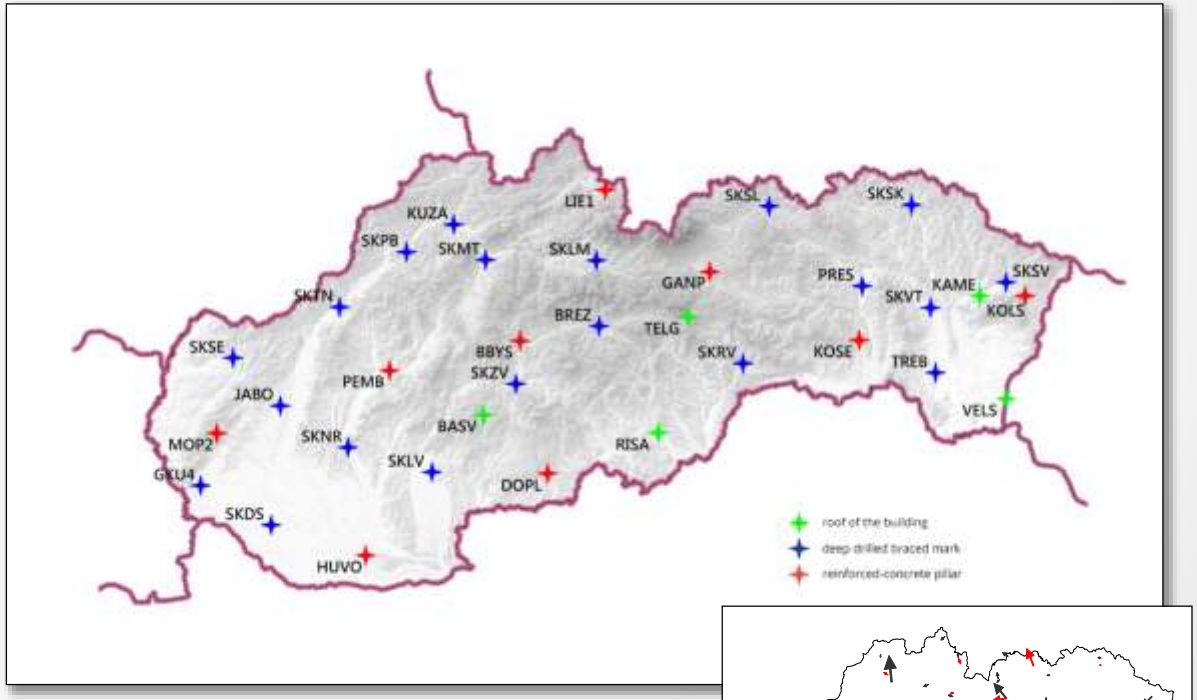
## 2 stations relocation in 2017 year

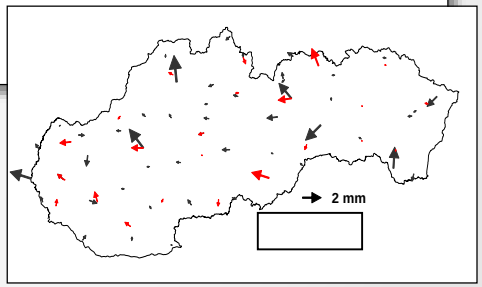
- Reinforced-concrete pillar instead of roof monumentation
- Contribution to geokinematics reseach (multipurpose usage of CORS = GKÚ philosphy)

# SKPOS stations infrastructure

## geodynamics research monumentation

- together 14 of 34 slovakian SKPOS permanent stations (41%) have monumentation suitable for geodynamic research purposes

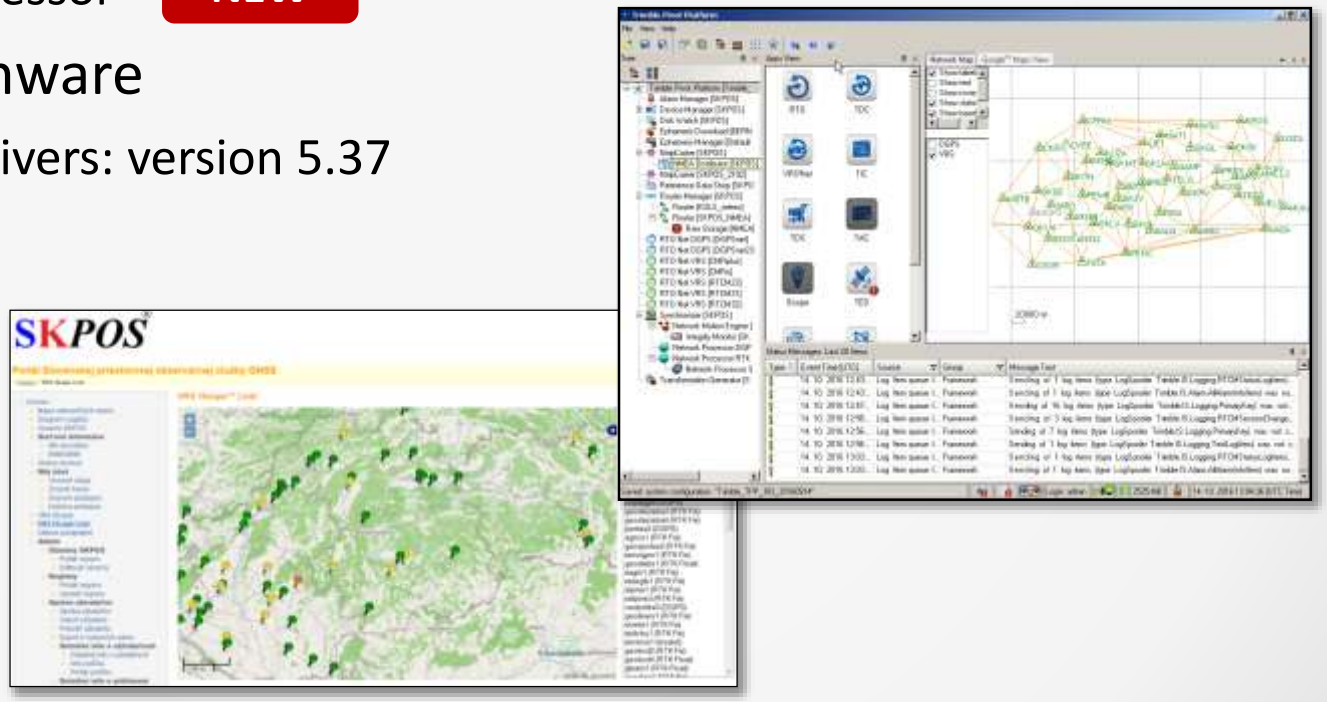


# SKPOS

## control software

- Trimble® Pivot™ Platform GNSS Infrastructure Software
  - Main software: version 3.10.5
  - Back-up software: version 3.10.5
  - RTXNet Processor **NEW**
- Receivers firmware
  - Trimble receivers: version 5.37



# SKPOS – Galileo and BeiDou

## Full capability Galileo and BeiDou

| SKPOS | Component | GPS + GLONASS + Galileo + BeiDou |
|---|---|---|
| Hardware | Antennas | 34 (34) |
| | Receivers | 34 (34) |
| Software<br>Trimble Pivot | RINEX CORS, VRS | |
| | RTK VRS **2018-10-16** | |

# SKPOS – User´s experience with Galileo

- More satellites = better precision
- sufficient # of satellites in problematic regions
- Better accessibility for measuring in forests
- Better accessibility for measuring in urban areas

# Experience with mixture of hardware brands

- All Slovakian stations equipped by Trimble receivers and antennas
- Foreign stations use Trimble or Leica hardware
  - Trimble Pivot support only Leica GR30 and Leica GR50
  - Extra Non-Trimble license needed

# SKPOS portfolio

## data formats – content - charges

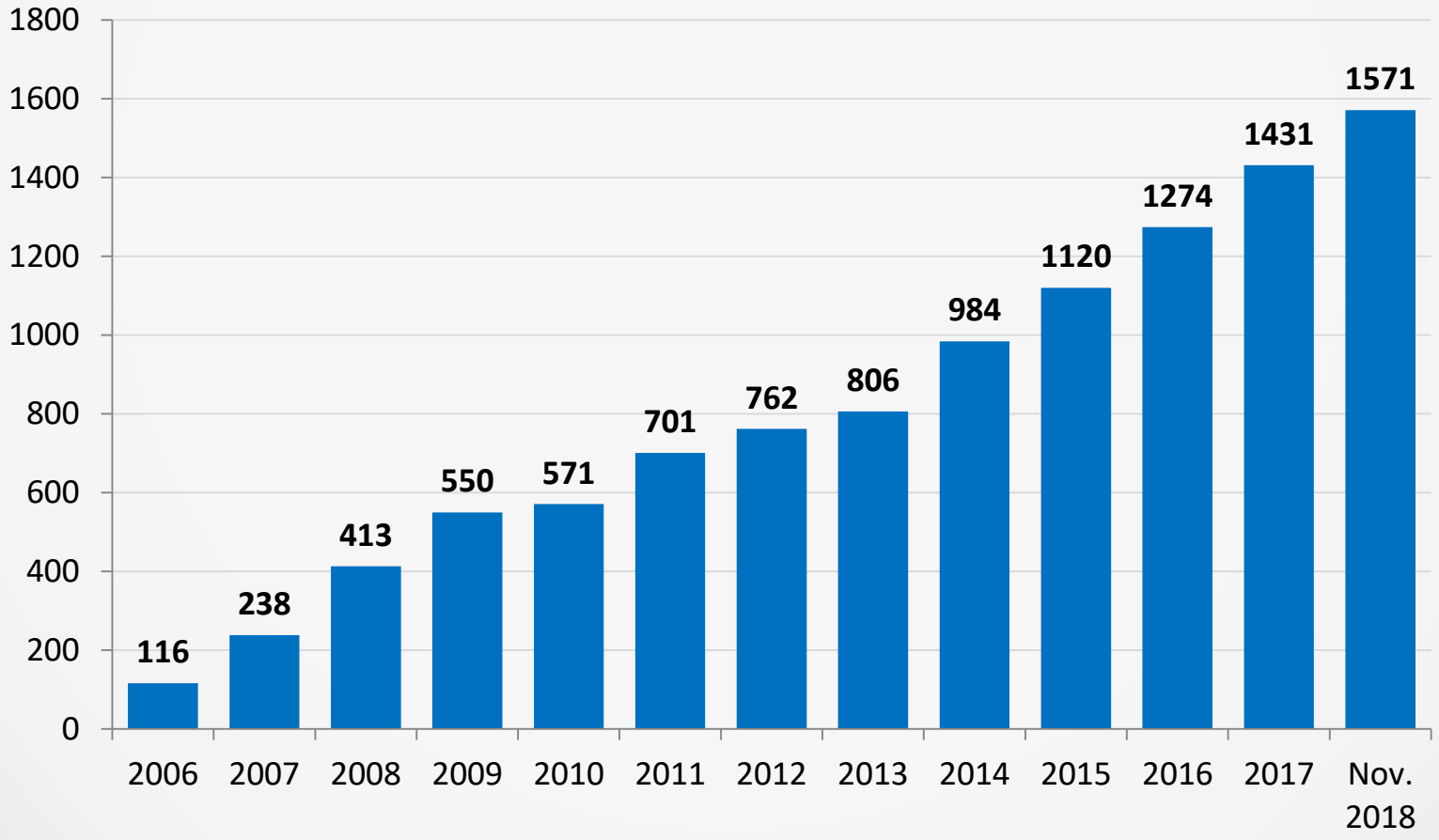
**Only network solution (Network RTK in VRS concept) is provided.**
**No single RTK!**

| 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, RTCM 3.2 MSM, CMRx, CMR+ | 50 € |
| **SKPOS_cm (month)** | RTK unlimited | month | RTCM 2.3, 3.1 RTCM 3.2 MSM, CMRx, CMR+ | 19 € |
| **SKPOS_dm** | DGNSS unlimited | year | RTCM 2.1, 2.3 | 20 € |

# SKPOS

## number of users

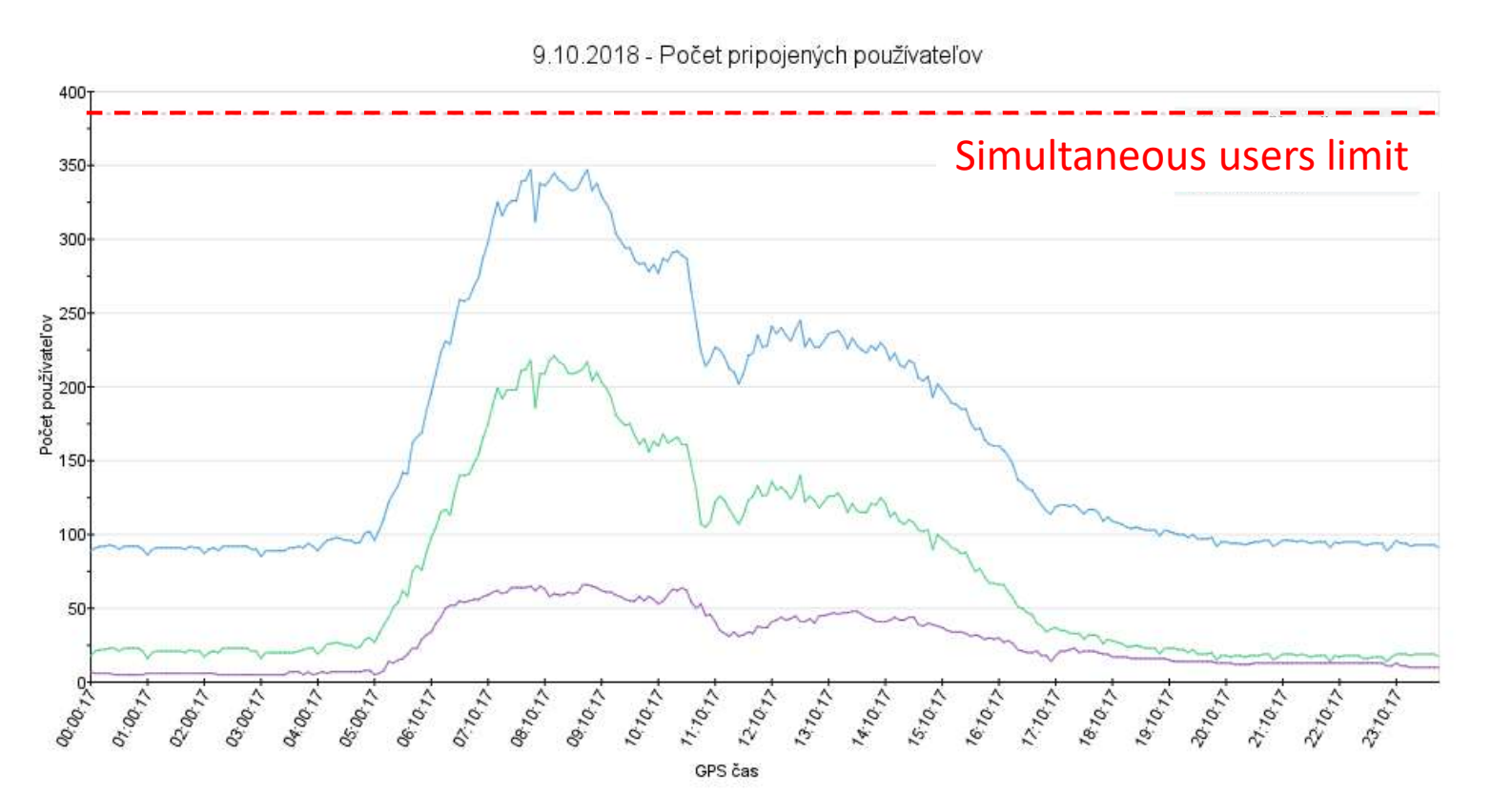
- almost 1,600 registrations (Nov. 2018)



# SKPOS

## number of users – 100 new user license

- Most busy days only 40 licenses under limit
- Purchased 100 new licenses for simultaneous user connections – now 485 simultaneous licenses



# SKPOS

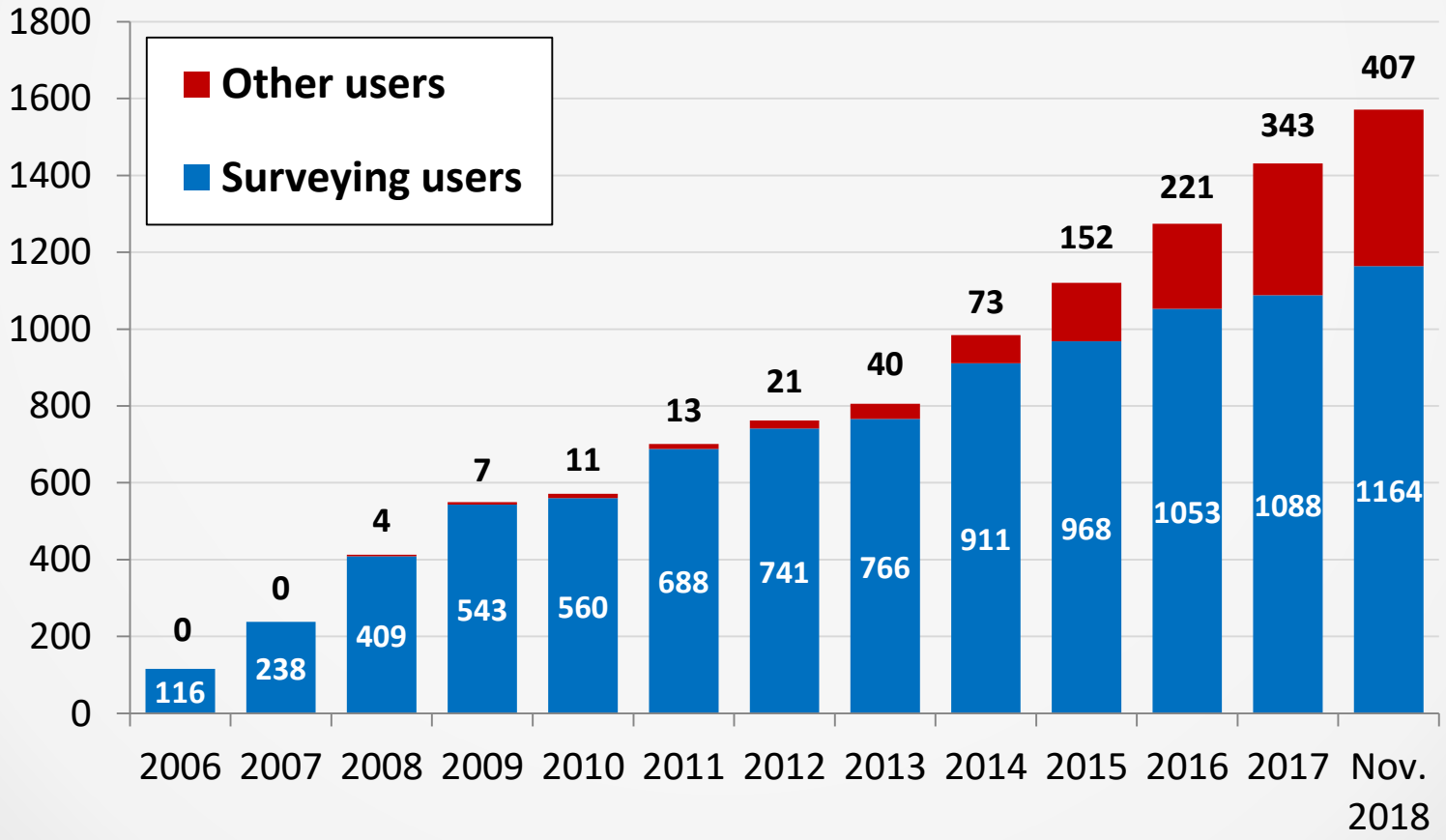
## Type of users (precise values from registration forms)

- Surveying fields (cadastre, surveying, mapping, GIS) – **73 %**
- Other fields (precise agriculture, machine guarding) – **27 %**

# SKPOS

## Type of users (precise values from registration forms)

- In 2017 more new SKPOS users were from non geodetic field



# SKPOS web page

## new items

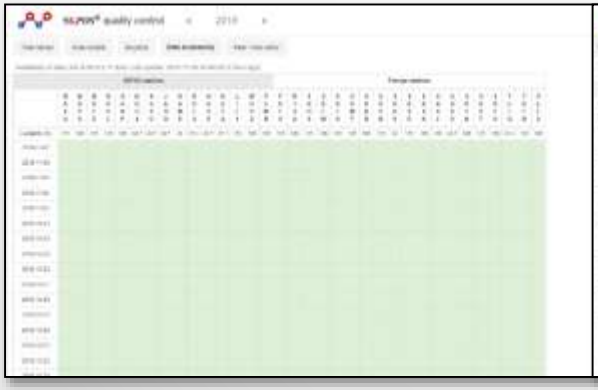
- list of reference stations
- coordinates
- antenna calibration files
- sitelogs

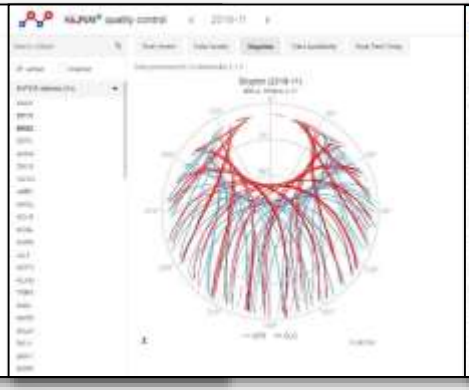
### Reference stations

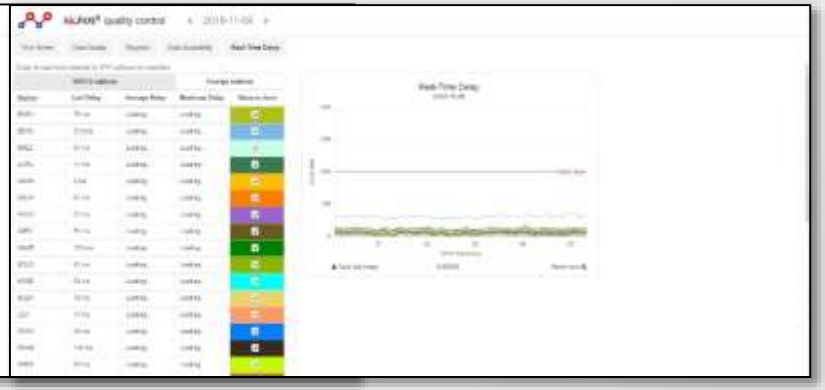
| # | Reference station | Location | Coordinates Change format ETRS89 (ETRF2000) epoch 2008.5 | | | Antenna | Receiver |
|---|---|---|---|---|---|---|---|
| | | | X (m) | Y (m) | Z (m) | | |
| 1 | BASV | Banská Štiavnica | 4009952.2193 | 1374556.6500 | 4750511.3543 | TRM55971.00 NONE | TRIMBLE NETR9 |
| 2 | BBYS | Banská Bystrica | 3980359.1445 | 1382291.8716 | 4772771.7709 | TRM59800.00 NONE | TRIMBLE NETR9 |
| 3 | BREZ | Brezno | 3963889.0095 | 1414440.8746 | 4777131.8796 | TRM55971.00 NONE | TRIMBLE NETR9 |
| 4 | DOPL | Dolné Plachtince | 4019049.1891 | 1408890.6541 | 4732383.5840 | TRM55971.00 NONE | TRIMBLE NETR9 |
| 5 | GANP | Gánovce | 3929181.8684 | 1455236.5018 | 4793653.7059 | TRM59800.00 SCIS | TRIMBLE NETR9 |

# New App – SKPOS Quality Control

- Time Series
- RINEX Data Quality
- Skyplots
- Data Availability
- Real-time Delay
- More features under development







# Users´feedback - most criticized issues

- Web survey for users
- 53% responses
- Average rating **1.8** (1 best, 5 worst)
- Only a few negative ratings:
  - Weak internet coverage
  - Notification of outages via SMS or e-mail
  - Problems with increased ionosphere activity

# Thank you for your attention

Karol Smolík
Geodetic and Cartographic Institute BRATISLAVA
karol.smolik@skgeodesy.sk