ASG-EUPOS reference system
Last year activities and future plans

Szymon Wajda

Prime specialist

ASG eupos

Bratislava, 21-22.11.2017

Contents

✓ **Introduction**

✓ **Last year activities**

✓ **Future plans**

✓ **Guidelines for RTK/RTN users**

✓ **Reference station protection**

Introduction

ASG-EUPOS Network:

101 ref. stations established in Poland by GUGiK, universities and research centres

26 ref. stations working in neighbouring countries

2 independent management and processing centers located in Warsaw and Katowice

Calculation software:

Trimble Pivot Platform ver. 3.10.1

Introduction

ASG-EUPOS Network:

101 ref. stations established in Poland by GUGiK, universities and research centres

26 ref. stations working in neighbouring countries

2 independent management and processing centers located in Warsaw and Katowice

Calculation software:

Trimble Pivot Platform ver. 3.10.1

ASG-EUPOS structure

Receiving module

Processing module

Usage module

RAW DATA

Management centre in Warsaw (main)

RAW DATA

RAW DATA

PZGiK portal

Management centre in Katowice (spare)

POZGEO POZGEO D

Static measurements [mm – cm]

NAWGEO

RTK/RTN surveying [cm]

KODGIS NAWGIS

DGNSS measurements [dm – m]

Source: http://www.asgeupos.pl

ASG-EUPOS services

Type of measurements	Service	Method	Carrier	Accuracy	Minimum requirements
Real-time surveying	NAWGIS	Kinematic (DGNSS)	Internet/ GPRS/UMTS/ LTE	1.0 - 3.0 m	L1 GPS (GNSS) receiver, communication device
	KODGIS			0.2 – 0.5 m	L1 GPS (GNSS) receiver, communication device
	NAWGEO	**Kinematic (RTK, RTN)**		**0.03 m (hor.) 0.05 m (vert.)**	**L1/L2 GNSS RTK receiver, communication device**
Post-processing	**POZGEO**	**Static**	**Internet**	**0.01-0.10 m**	**L1/L2 GNSS receiver L1 GPS /GNSS receiver**
	POZGEO D				

NAWGEO   **KODGIS**   **NAWGIS**   **POZGEO**   **POZGEO D**   **TECH. SUPPORT**

Source: http://www.asgeupos.pl
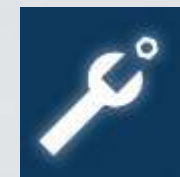
Monitoring of coordinates

✓ Maintenance of ETRS89 reference frame is provided by post-processing module working on *Bernese GNSS Software v. 5.2.*

✓ Besides of internal monitoring stations are processed by 4 external EPN Local Analysis Centres (LAC): WUT, MTU, ECC and BKG.

✓ Network RTK service is processed within EUPOS service quality monitoring http://monitoringEUPOS.gku.sk

✓ Internal monitoring modules of Trimble Pivot Platform

✓ For control measurements and manual post-processing the Leica GeoOffice software is exploited.

Online shop for subscriptions

Internet system for purchasing ASG-EUPOS services:

- User can create login in TPP database and place order for required subscription.

- Credit card and internet fast payment is possible.

- With regular bank transfer when money are transferred to our bank account subscription is automatically assigned in TPP database .
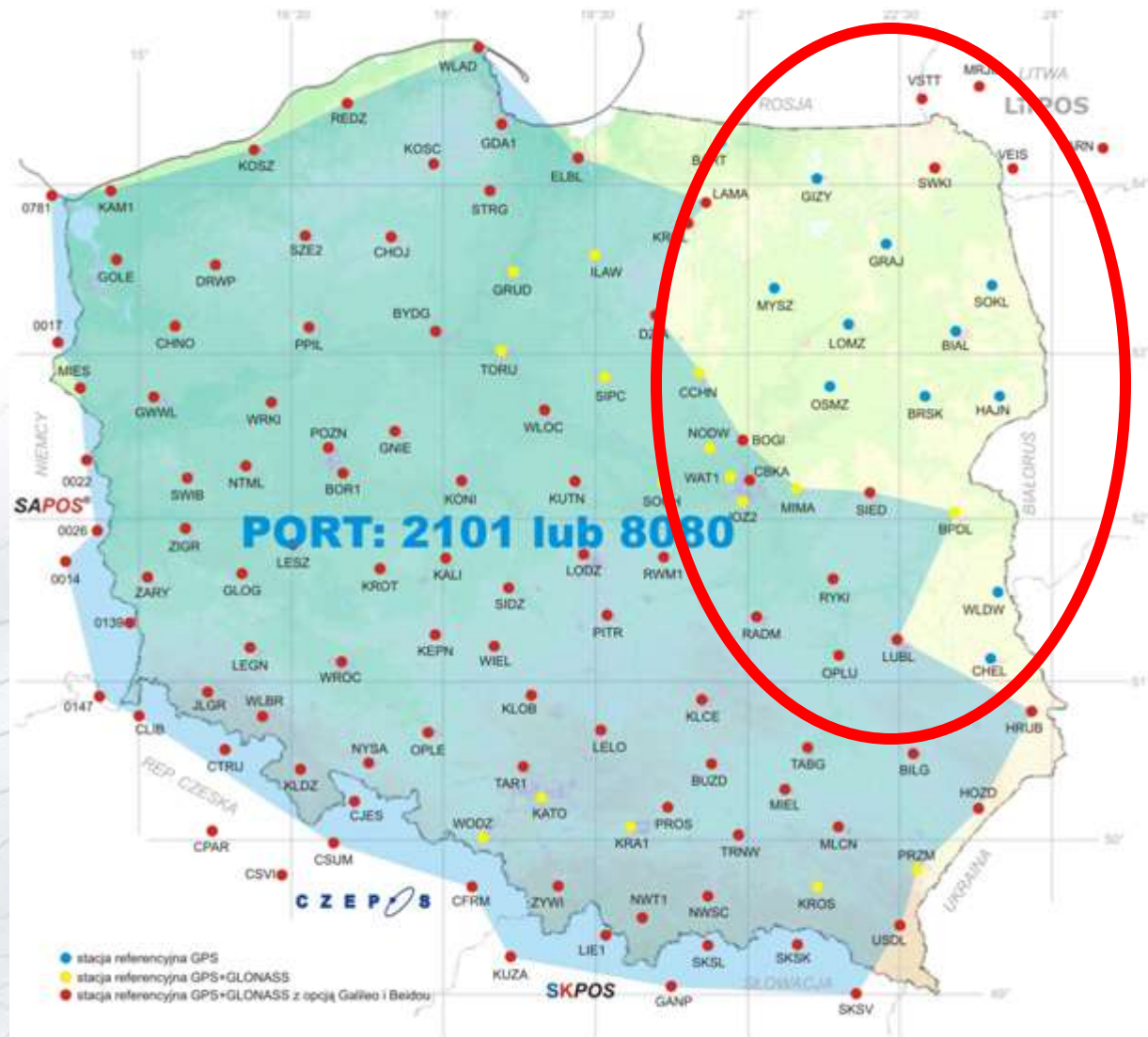
Northern-east part of Poland was without Network RTK from GPS+GLONASS systems.

12 reference stations with only GPS tracking possibilities were exchanged.

Source: http://www.asgeupos.pl

Whole area of Poland is covered with GPS+GLONASS Network RTK correction data.

Most of hardware is prepared for Galileo and Beidou tracking.

Present situation in ASG-EUPOS:

Number of receivers	Receiver name
14	TRIMBLE NETR5
56	TRIMBLE NETR9
1	LEICA GRX1200GGPRO
10	LEICA GRX1200+GNSS
38	LEICA GR10
1	LEICA GR50
1	JAVAD TRE_3 DELTA
2	TPS NET-G3A
3	TPS NET-G5
2	TRIMBLE NETRS (monitoring stations)

Present situation in ASG-EUPOS:

Number of receivers	Receiver name
~~14~~ 2	TRIMBLE NETR5
56	TRIMBLE NETR9
1	LEICA GRX1200GGPRO
10	LEICA GRX1200+GNSS
38	LEICA GR10
1	LEICA GR50
1	JAVAD TRE_3 DELTA
2	TPS NET-G3A
3	TPS NET-G5
2	TRIMBLE NETRS (monitoring stations)

Monitoring stations

With National Geological Institute new monitoring stations are established and operated.
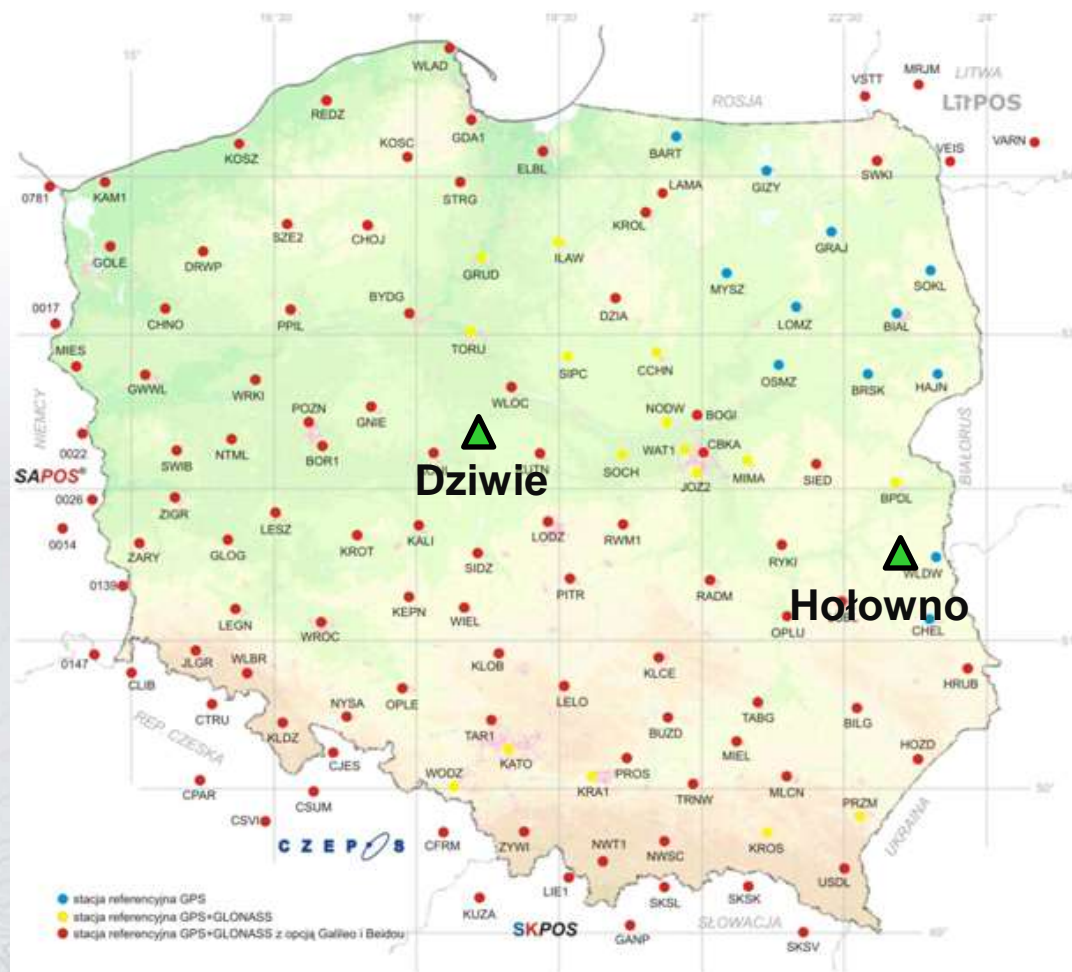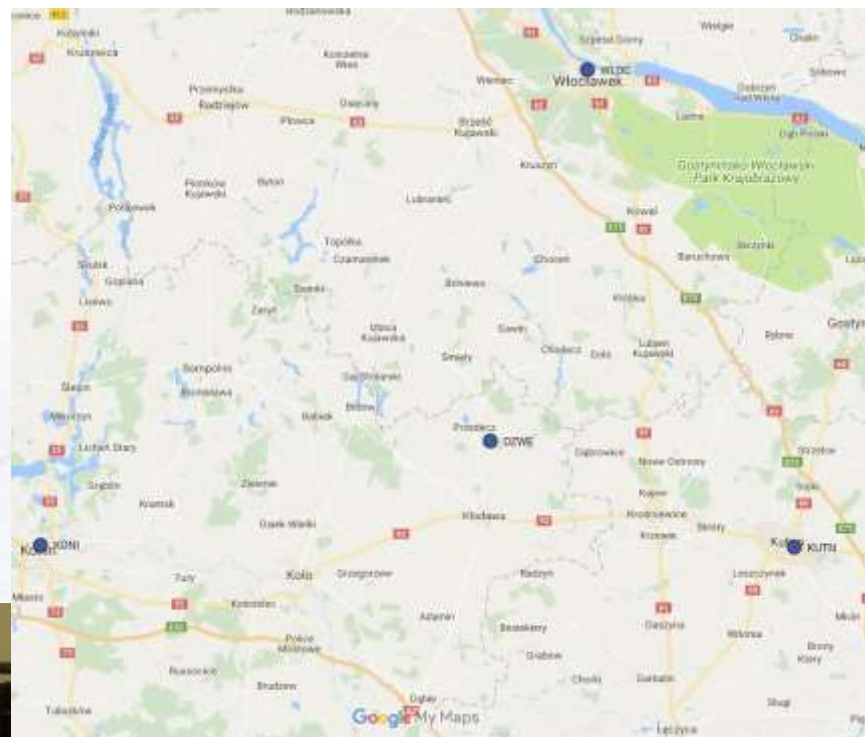
Monitoring station HOLO in Hołowno.
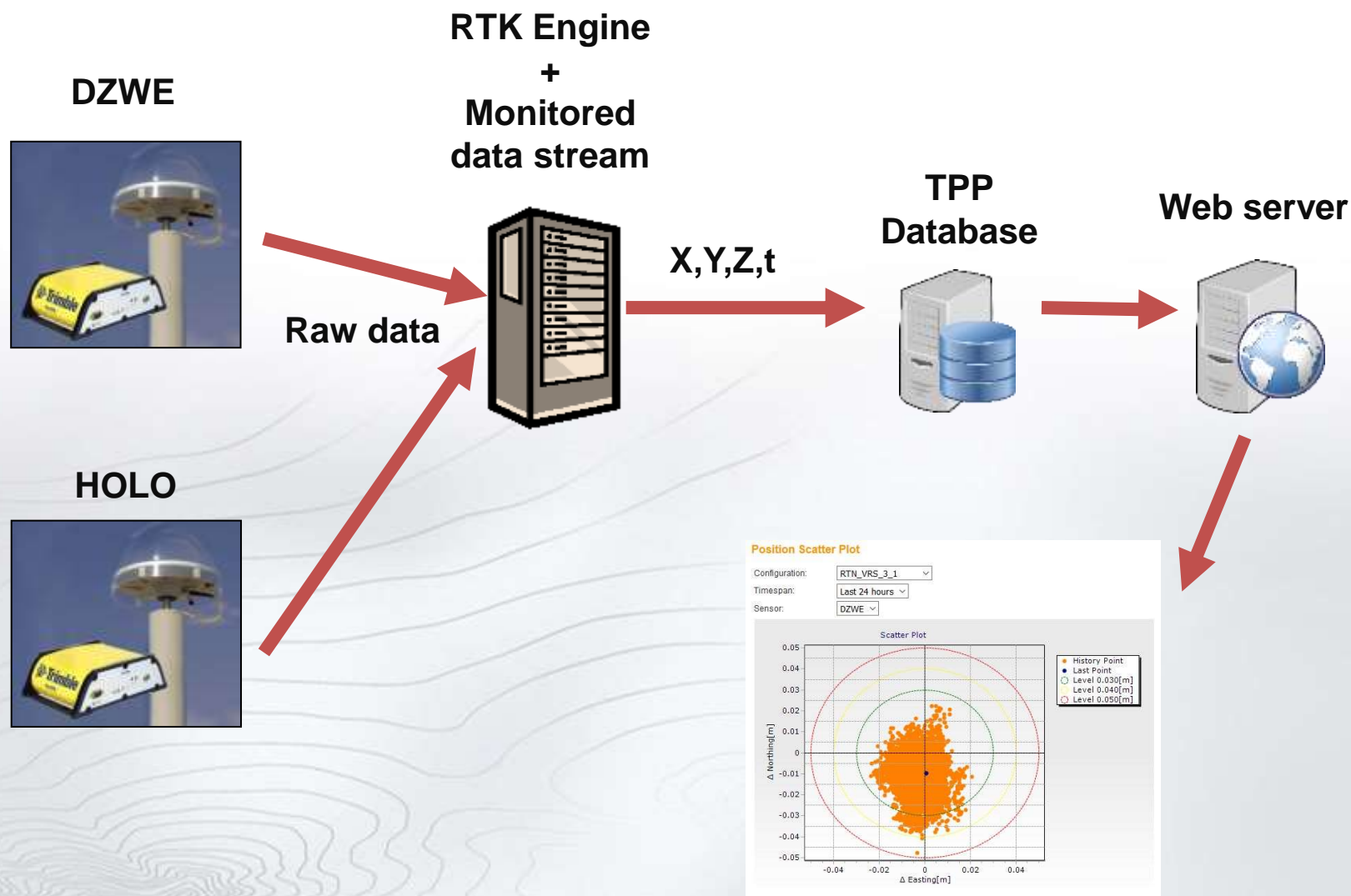

43,0 km

Hołowno

27,5 km

63,1 km
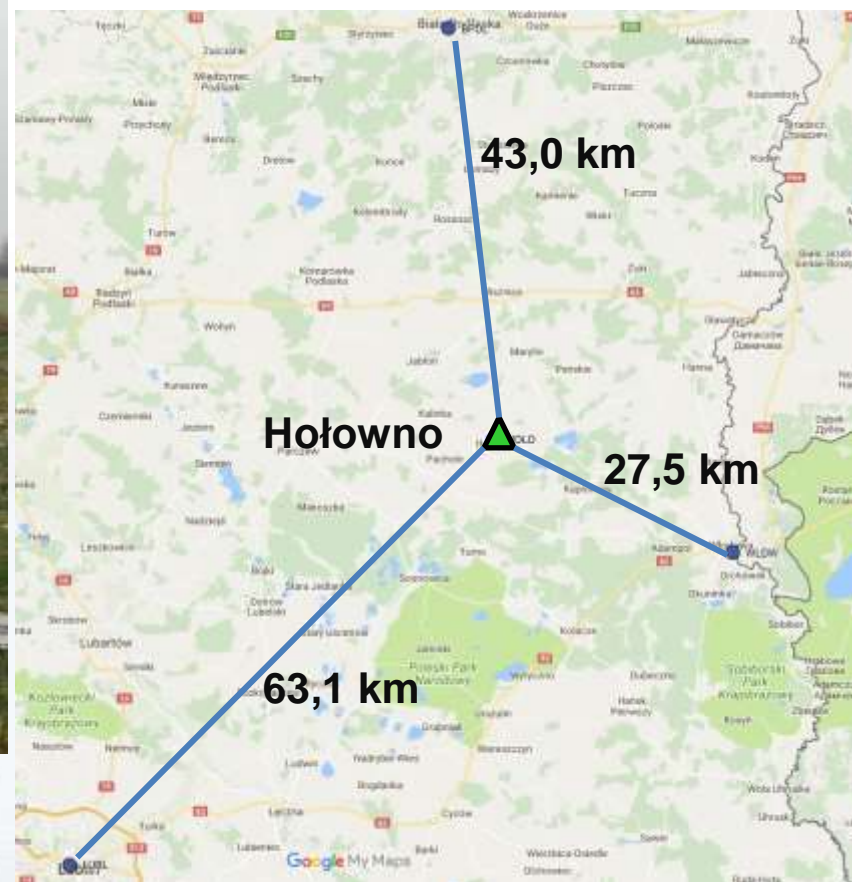
Monitoring stations

Monitoring station DZWE in Dziwie.

Data flow

Visualization:

- Each monitored data stream in separate graph

Monitoring stations
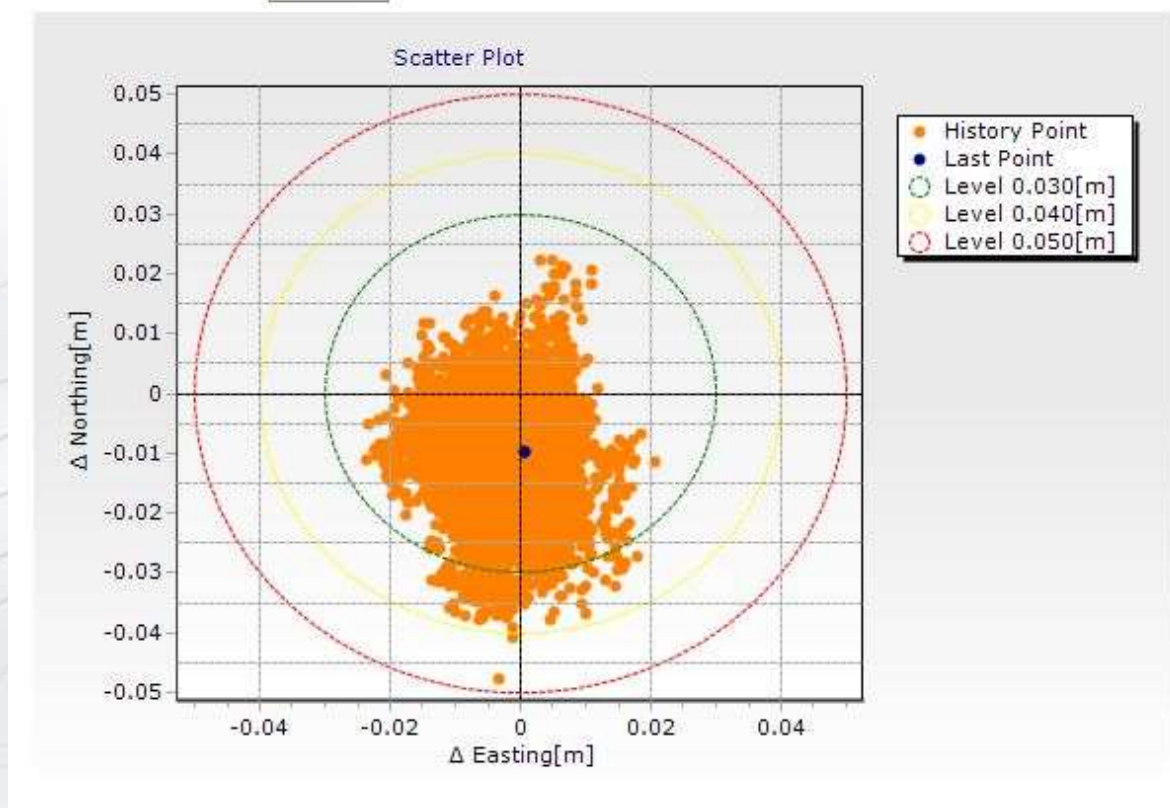
Visualization:

- **Each monitored data stream in separate graph**

- **Timespan definition**
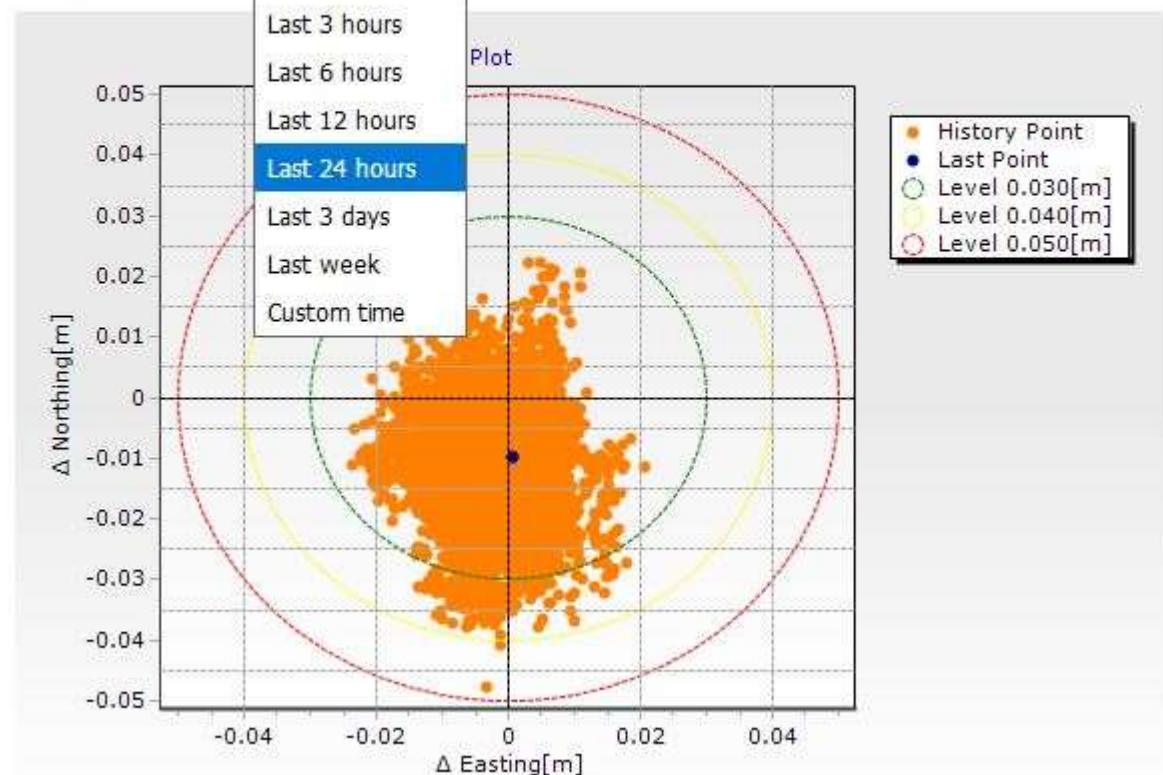
Visualization:

- **Each monitored data stream in separate graph**

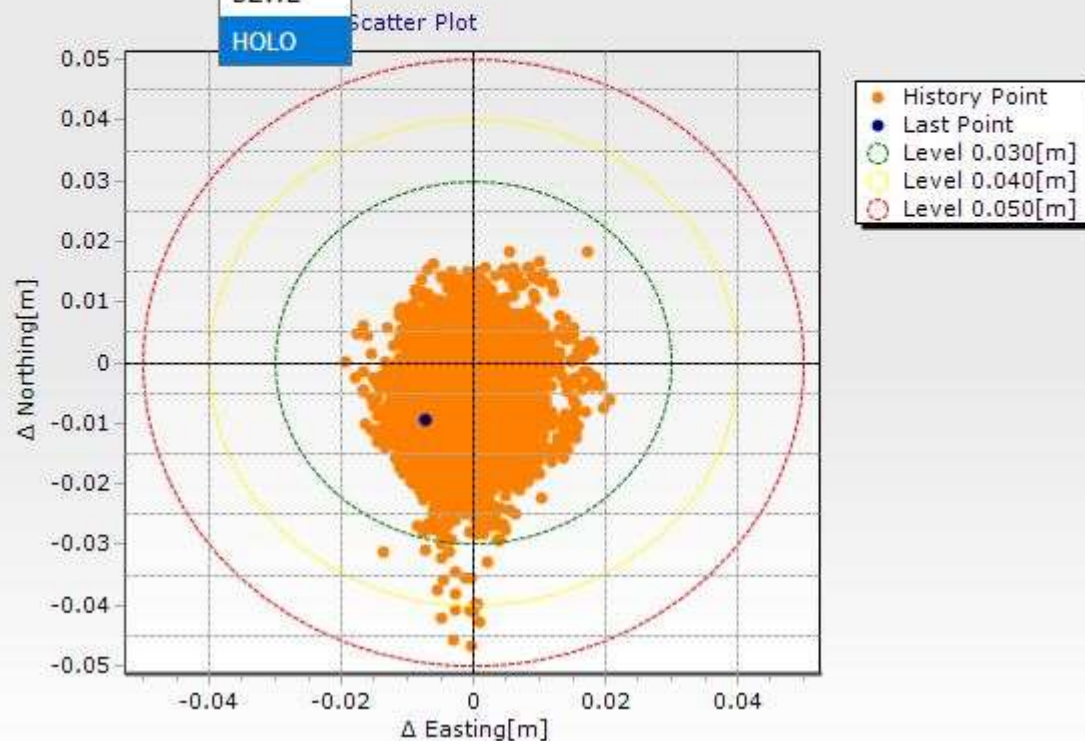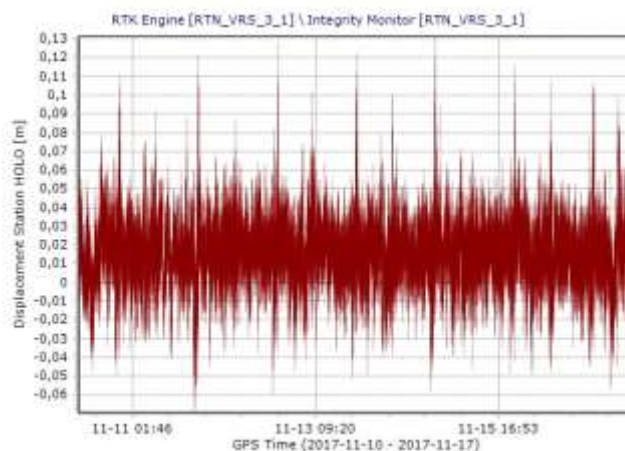- **Timespan definitione**

- **List of monitored stations**

Visualization:

- **For TPP administrators more graphs and analises**

Future plans
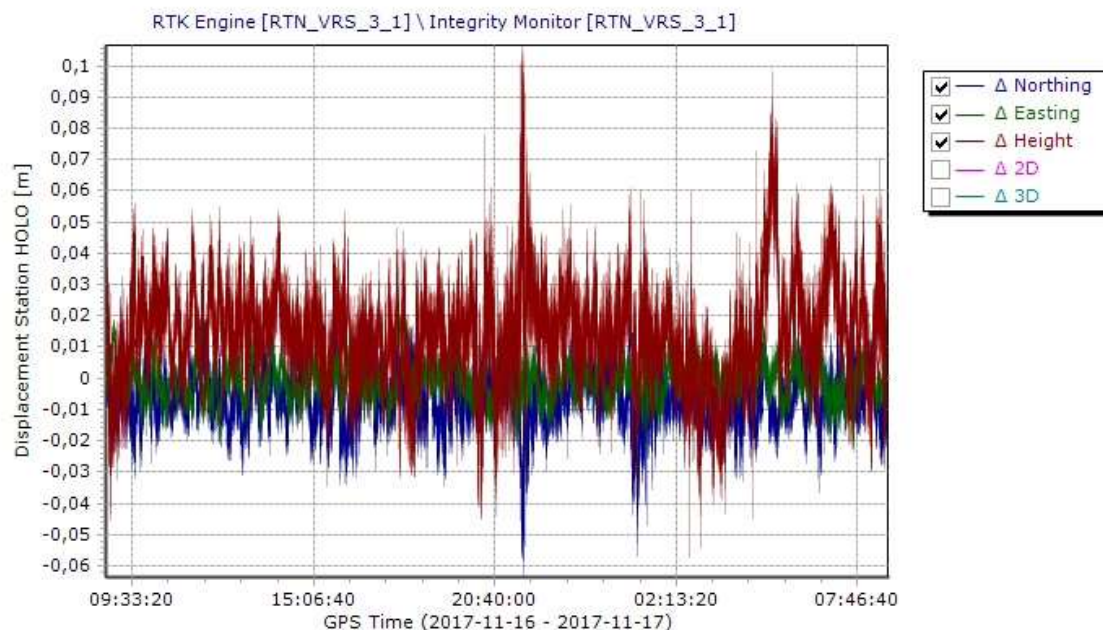
✓ **New servers for TPP database**

- Dividing existing DB for calculation and accounting databases

✓ **RTCM 10403.1 (10402.3) ⟶ RTCM 10403.2**

- Transfer of correction data for users measurements

✓ **RINEX 2.3 (2.11) ⟶ RINEX 3.02**

- Observation data storage in ASG-EUPOS

✓ **FTP server for education and research institiions**

- Change in infrastracture configuration for security reasons

Future plans

- ✓ **Calculation software upgrade to Galileo**

    - Software modernization for RTN data provision from GPS, GLONASS and Galileo

- ✓ **Instalation of receivers purchased in year2017**

    - Due to time limitations receivers will not be installed in 2017

- ✓ **Densification of network in some regions**

    - Densification will improve accuracy and avaiability in higher activity of ionosphere
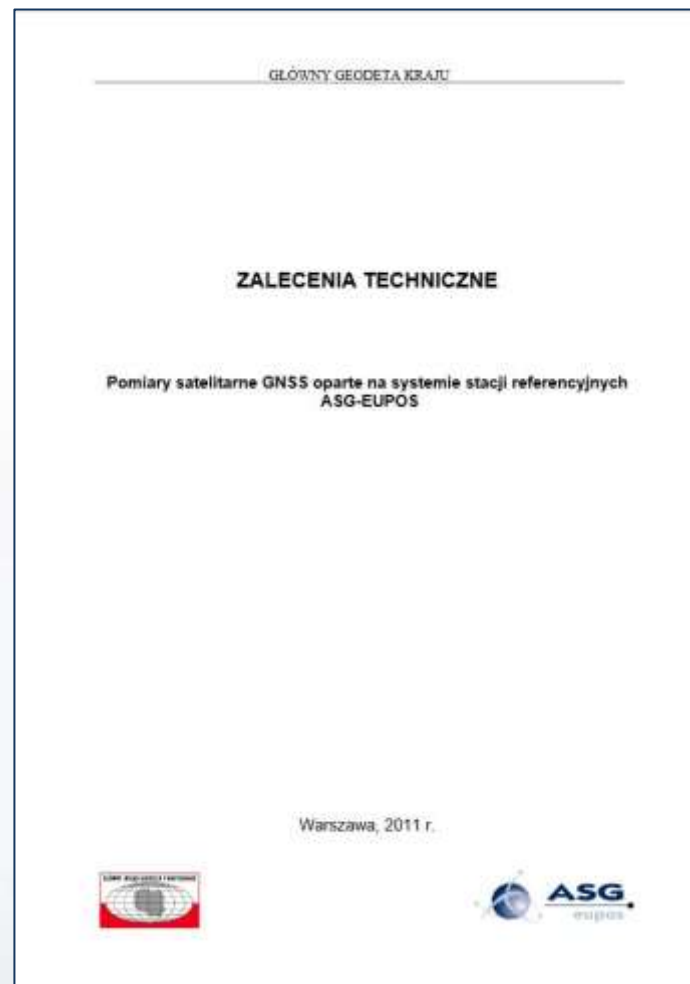
Future plans

Densification:

- 19 new reference stations are planned to be established

- 4 reference stations need to be moved due to bulding ownership changes

- On some sites geodetic assignemt with terrestial points should be remeasured

Guidelines in scope of RTK/RTN:

- **Since beggining of ASG-EUPOS there were prepared some regulations regarding RTK/RTN measurement, but it were not officially published, so usage was not mandatory.**

- **Since 2012 there are official sandards for geodetic and cartographic surveys wich includes some regulations regarding RTK/RTN measurement.**

- **There are not official guidelines how to measure, what conditions should be fulfilled, how check te equipment and measurement.**

GŁÓWNY GEODETA KRAJU

ZALECENIA TECHNICZNE

Pomiary satelitarne GNSS oparte na systemie stacji referencyjnych ASG-EUPOS

Warszawa, 2011 r.

ASG

- **Group of ASG-EUPOS administrators had prepared some good practises and advises how to measure with ASG-EUPOS.**

- **There are also description of services, GNSS technologies, instructions how to register and purchase the subscription, how to read informations about status of the network, and much more.**

Reference station protection

- **Reference station equipment placed in server rooms or in rooms without public access (locked door required).**

- **Usually receiver, UPS, communication modems locked in server rack.**

- **Lighting protection mast mounted in close environment of GNSS antenna.**

- **Lighting fuse mounted on the antenna cable.**

- **High class UPS for stable source of power and secured from interuptions from electric network (power jumps).**

EUPOS technical standards

- **EUPOS Technical standards:**

- **1. General:**

- **GPS+GLONASS in all services (Galileo and Beidou in progress)**

- **ETRF2000 epoch 2011.0 as reference frame of ETRS89 in Poland**

- **System avaiability at least 99% - fullfilled but ASG_EUPO shoud implement tools for monitoring of avaiability**

EUPOS technical standards

- **EUPOS Technical standards:**

- **2. Services:**

- **DGNSS, RTK, Network RTK (VRS,MAC,FKP), Geodetic (observations in RINEX files)**

- **Implemented standards: RTCM 10402.3, RTCM 10403.1, RTCM 10410.1 (NTRIP), RINEX 2.11 and RINEX 3.02, NMEA 0183,**

- **Quasigeoid model provided to users**

- **EUPOS Technical standards:**

- **3. Technical and organizational standards:**

- **Distances between stations at level of 70km (densification planned in near future)**

- **All GUGiK sites equiped with high class GNSS equipment and UPS and lighting protection surge. Reference stations owned by external institutions sometimes not fullfill this standards.**

- **All GUGiK GNSS antennas individually calibrated and absolute PCV model calculated**

- **What is not fullfilled:**

- ASG-EUPOS has 2 menagement centers and one NTRIP Caster and web server in each. Swich between them is not fully automated and need some manual work.

-On some stations we can observe unstability and this stations will be relocated in the future

- Changes to RTCM 10403.2 and RINEX 3.02 should be performed in near future.

Conclusions

- **ASG-EUPOS is at last step to exchange GNSS equipment to work with Galileo and Beidou**

- **Next year software is planned to upgrade software to implement Galileo in RTN services**

- **Densification will improve accuracy in some regions and is planned for year 2018**

- **Webpage modifications and tools for monitoring of network's status will be prepared**

- **ASG-EUPOS fullfill EUPOS standards but in some topics it could be improved.**

Thank for your attention . . .

www.eupos.org

www.asgeupos.pl

www.gugik.gov.pl

Contact:

Head Office of Geodesy and Cartography

Department of Geodesy, Cartography and Geographic Information Systems

Wspolna 2 Str., 00-926 Warsaw, Poland

Phone +4822 6618265

　　　　+4822 6618038

E-mail biuro.eupos@gugik.gov.pl