NATIONAL REPORT OF POLAND TO EUREF 2012

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Outline

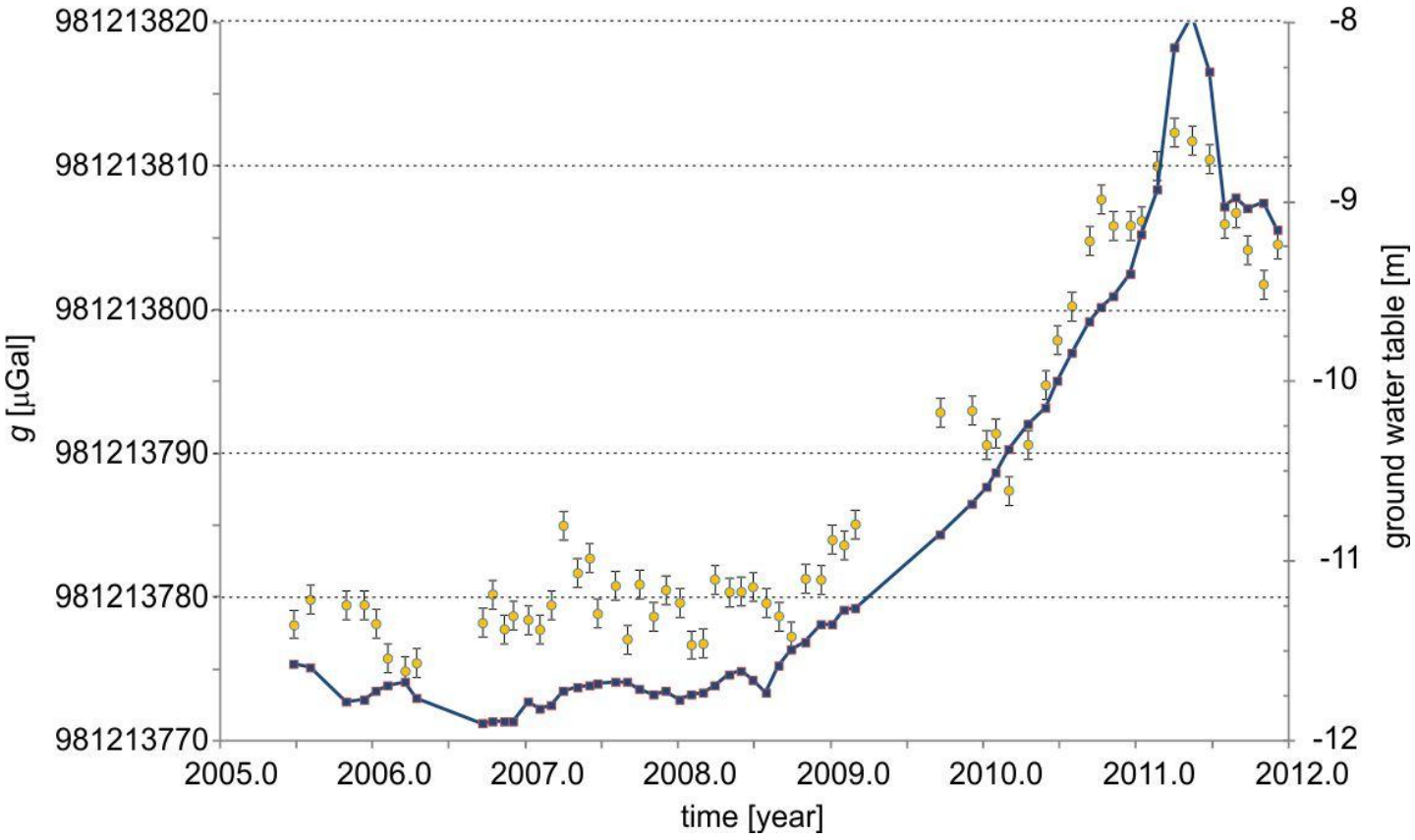
Main geodetic activities at the national level in Poland since 2010

- maintenance of the **gravity control**
- operational work of **permanent EPN/IGS stations**
- data processing at **Local Analysis Centres at WUT and MUT**
- GNSS for **meteorology**
- monitoring of **ionosphere**
- status of the **ASG-EUPOS** network in Poland
- the use of data from **satellite gravity missions**
- **Earth tides** monitoring
- activity in **SLR**
- **geodynamics**

Maintenance of national gravity control (1)

Jozefoslaw Astrogeodetic Observatory of WUT

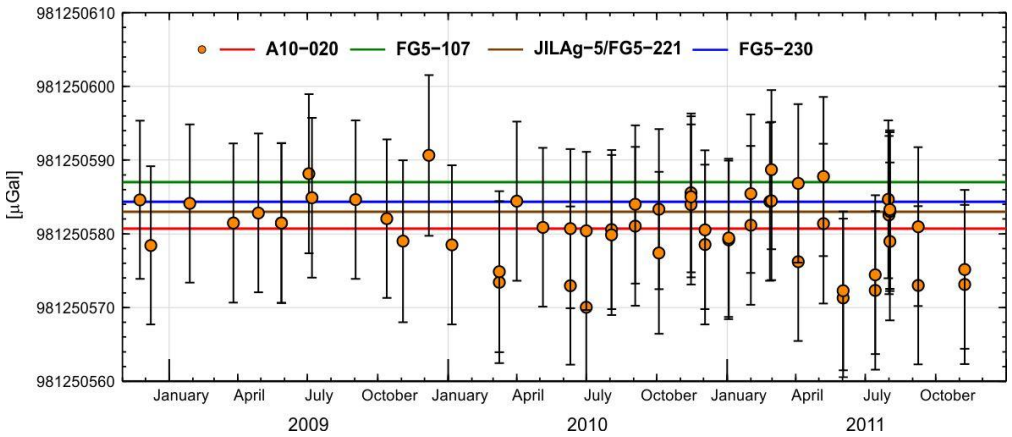
1. quasi-permanent absolute gravity measurements with FG5-230

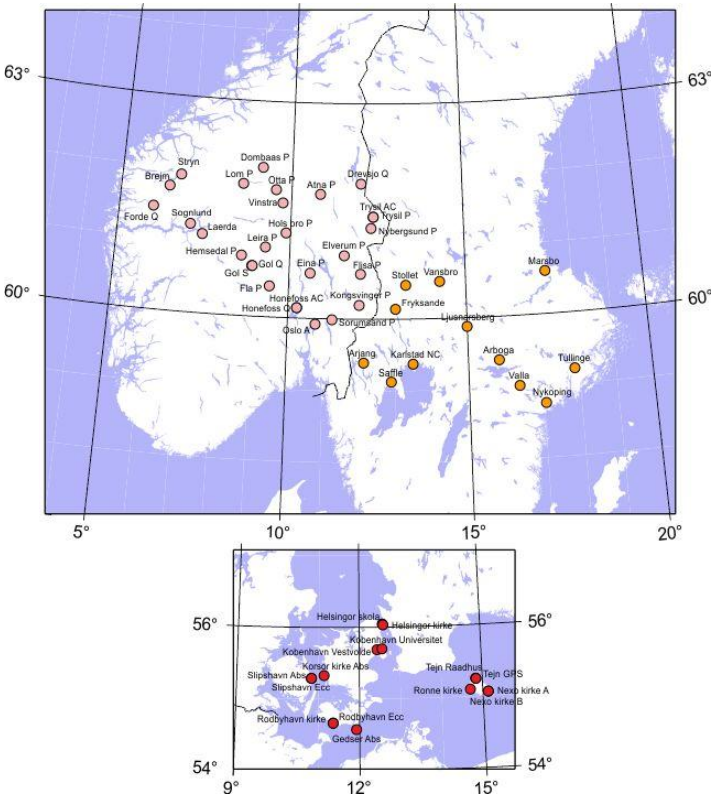


Maintenance of national gravity control (2)

Borowa Gora Geodetic-Geophysical Observatory of IGiK

1. quasi-permanent absolute gravity measurements with A10-020





2. re-survey of the gravity network with A10-020 of IGiK in Sweden, Norway and Denmark

Maintenance of national gravity control (3)

Modernization of the gravity control in Poland (WUT & IGiK)

1. field reconnaissance

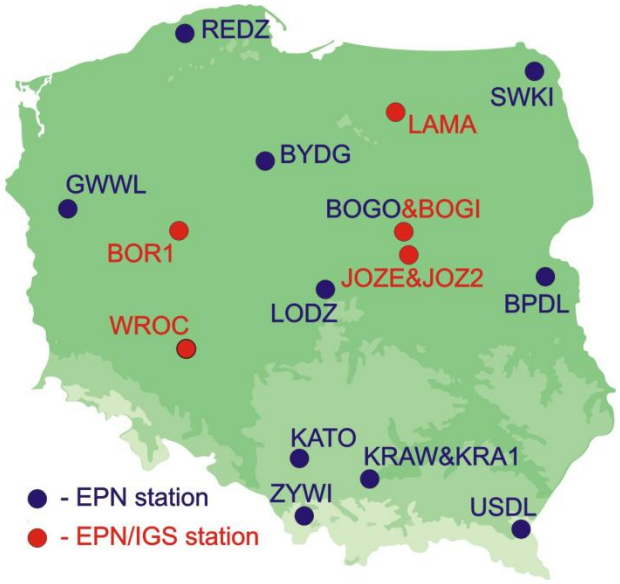
2. project of the new gravity control

3. realization planned to start in 2012

Operational work of permanent GNSS IGS/EUREF stations

EPN stations in Poland

- Biala Podlaska (BPDL)
- Borowa Gora (BOGI)
- Borowa Gora (BOGO)
- Borowiec (BOR1)
- Bydgoszcz (BYDG)
- Gorzow Wielkopolski (GWWL)
- Jozefoslaw (JOZE)
- Jozefoslaw (JOZ2)
- Katowice (KATO)
- Krakow (KRAW)
- Krakow (KRA1)
- Lamkowko (LAMA)
- Lodz (LODZ)
- Redzikowo (REDZ)
- Suwalki (SWKI)
- Ustrzyki Dolne (USDL)
- Wroclaw (WROC)
- Zywiec (ZYWI)



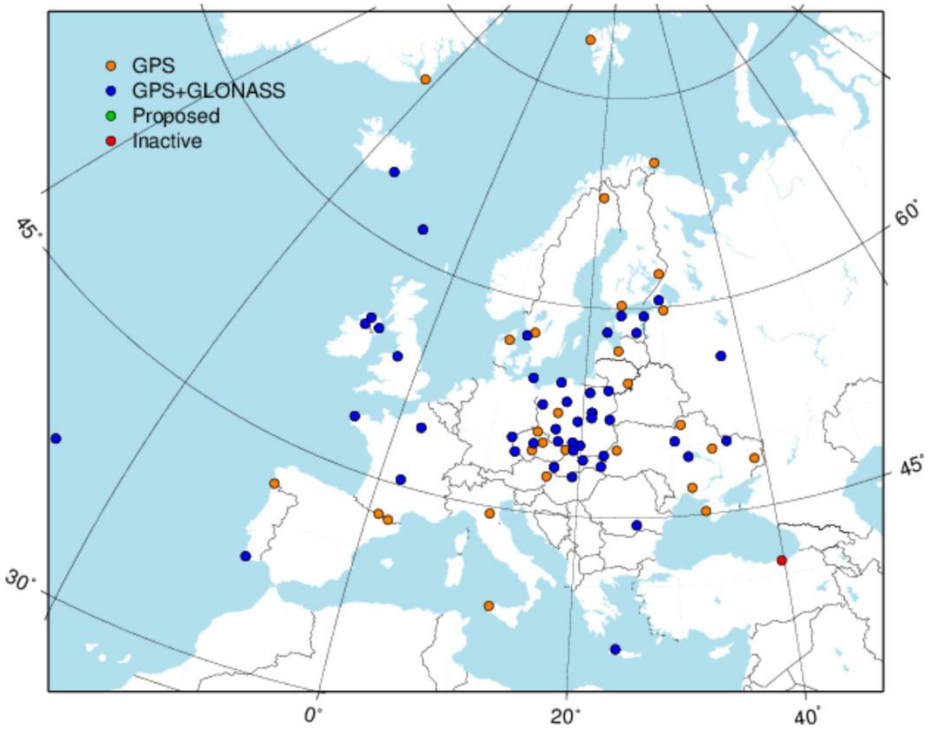
EPN Stations participating in EUREF-IP

- ♥ BOGI
- ♥ BOR1
- ♥ JOZ2
- ♥ KRA1
- ♥ KRAW
- ♥ LAMA
- ♥ WROC

Data processing at LACs

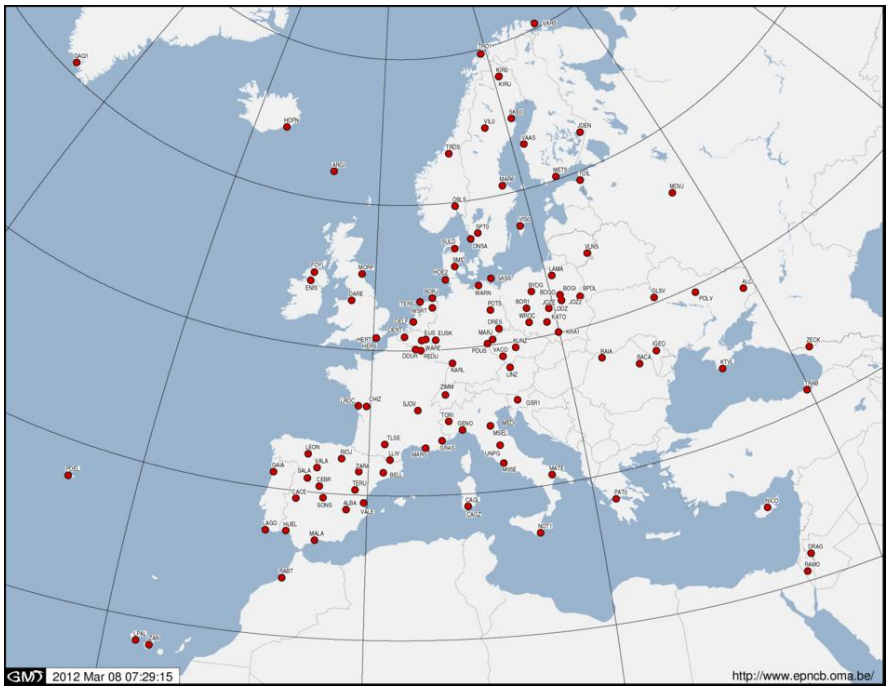
WUT

data from 80 EPN stations routinely processed



MUT

data from 114 EPN stations routinely processed



Reprocessing of EPN data

WUT and MUT: EPN Reprocessing Project

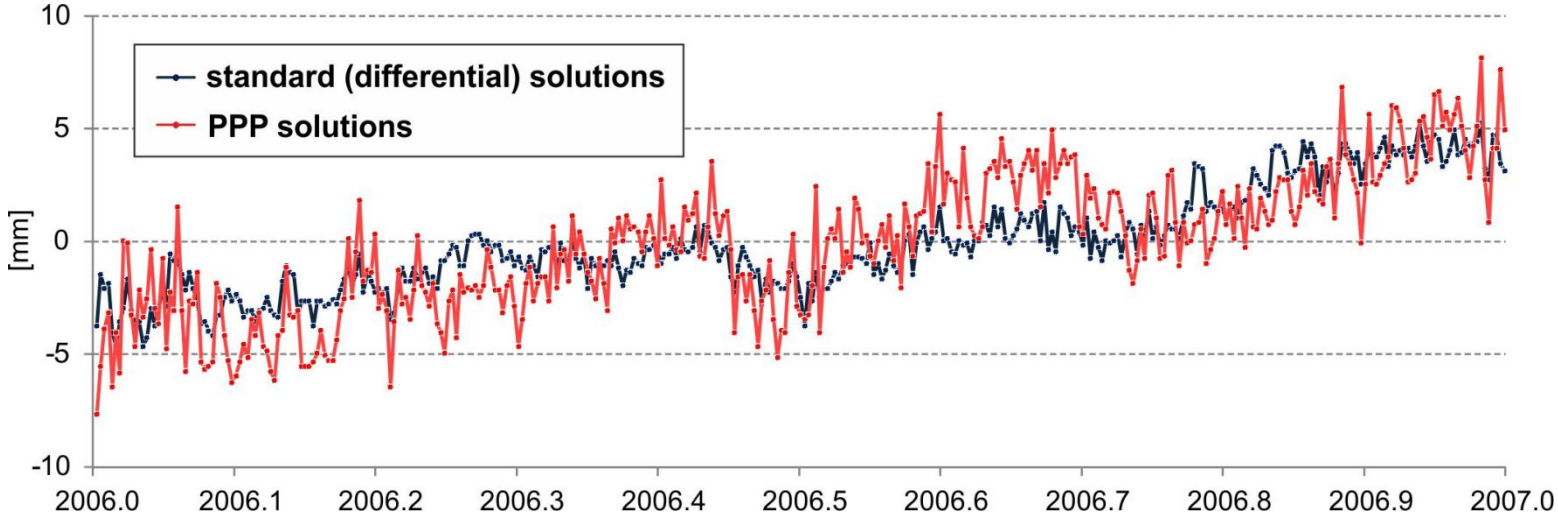
WUT: 1996-2005 data of 60 stations in 2011 (Bernese)

MUT: 1996-2007 data of 114 stations in 2011 (Bernese&GAMIT/GLOBK)

MUT processed also all data from EPN with PPP approach (Bernese)

THE EXAMPLE (NYA1 station, Y component):

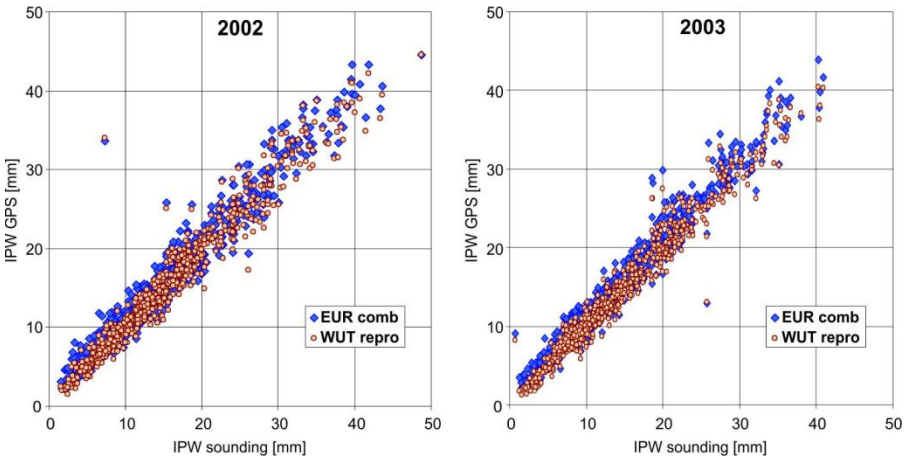
PPP results against those obtained using differential method



GNSS for meteorology

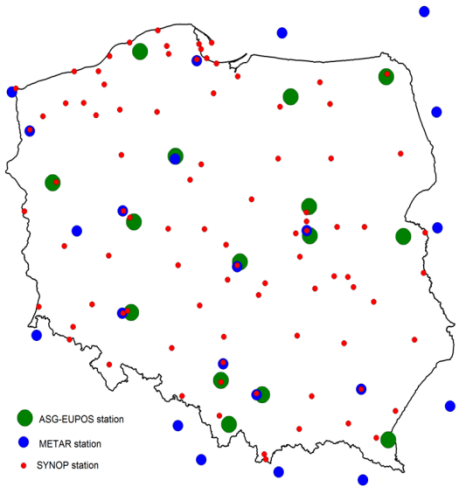
WUT

1. ZTD form WUT LAC solutions
2. IPW from radiosounding in Legionowo vs. GPS from JOZE in 2002 and 2003: original EPN combination, and WUT LAC reprocessing



Wroclaw Univ. of Envir. & Life Sciences

1. GNSS tomographic model
2. ground meteo observations in Poland and neighbouring countries available from METAR and SYNOP meteo stations



MUT

1. NRT tropospheric model for ASG-EUPOS

University of Warmia and Mazury, Olsztyn

1. troposphere modelling for precise GPS rapid static positioning in mountainous areas

Monitoring ionosphere

University of Warmia and Mazury, Olsztyn

1. Study the ionosphere and its changes with the use of GNSS signals

- **study the occurrence of TEC fluctuations at the northern and southern high latitude ionosphere during severe geomagnetic storm**
- **analysis of the ionosphere during geomagnetic disturbances**

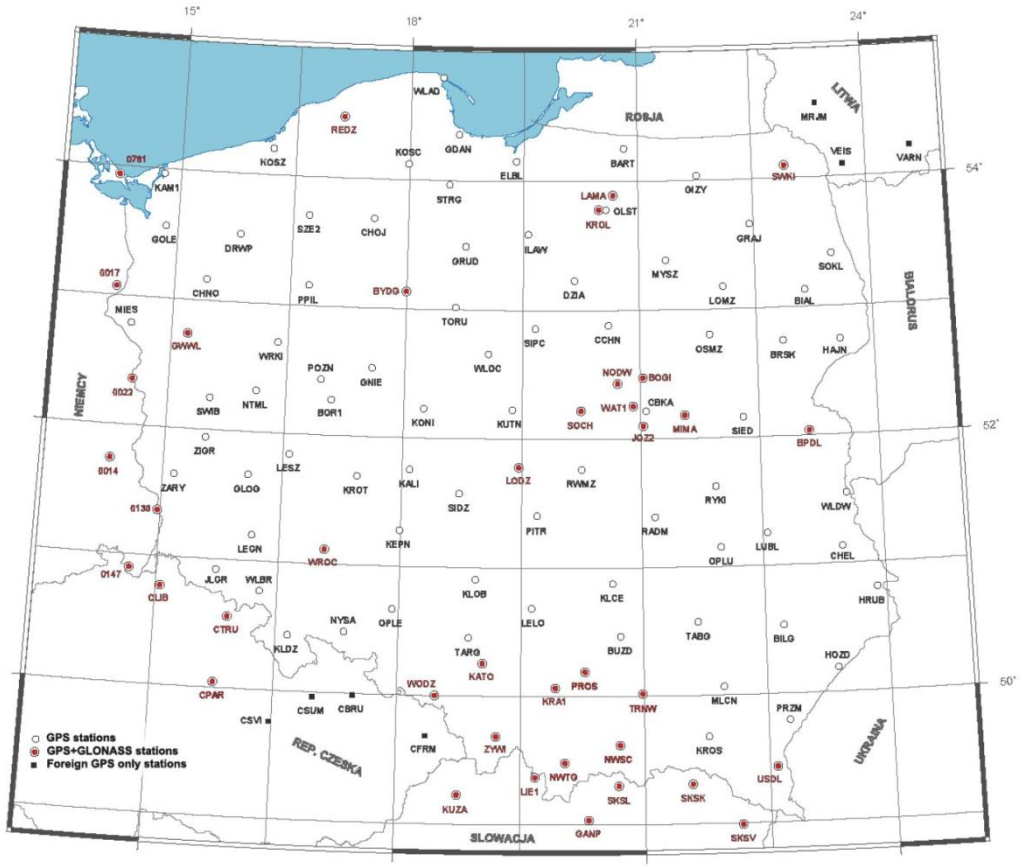
2. Running the IGS Ionosphere Combination Centre

- **ionospheric products in IONEX format (spatial resolution of 5.0° × 2.5°, and temporal resolution of 2 hours)**
- **latency of the final and rapid GIMs: 10 days and 1 day, respectively**

ASG-EUPOS network in Poland

Reference stations of ASG-EUPOS network

- **100 of the Polish part**
- **22 foreign**



- **upgrade**
- **new stations**
- **replaced/excluded**

- **new Trimble software implemeted**

- **new service for precise farming**

- **ETRF2000 coordinates since 1 May 2012**

- **growing number of regular users (>6700)**
- **RTK service most popular (up to 650 simult. conn.)**

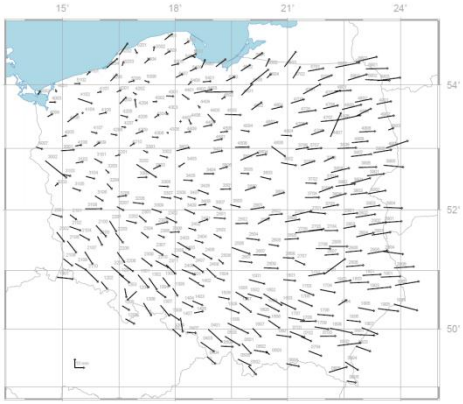
ASG-EUPOS network in Poland

ETRS89 extension campaign

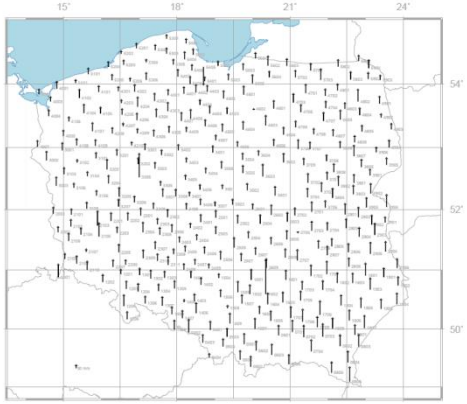
Integration of ASG-EUPOS reference station network with 1st order geodetic control network

- simultaneous GNSS measurements performed in 2008–2011 on all stations of ASG-EUPOS as well as on EUREF-POL, EUVN and POLREF points
  - independently processed by Space Research Centre of PAS and WUT
  - verified at WUELS and MUT
- coordinates in ETRF2000 (ep. 2011.0) of ASG-EUPOS stations calculated

direct comparison of ETRF2000 (epoch 2011.0) and EUREF89 (epoch 1992.0)

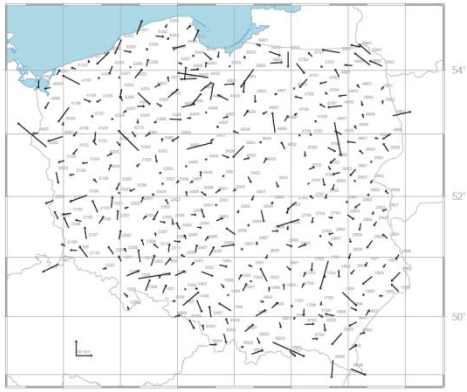


horizontal coordinates



ellipsoidal heights

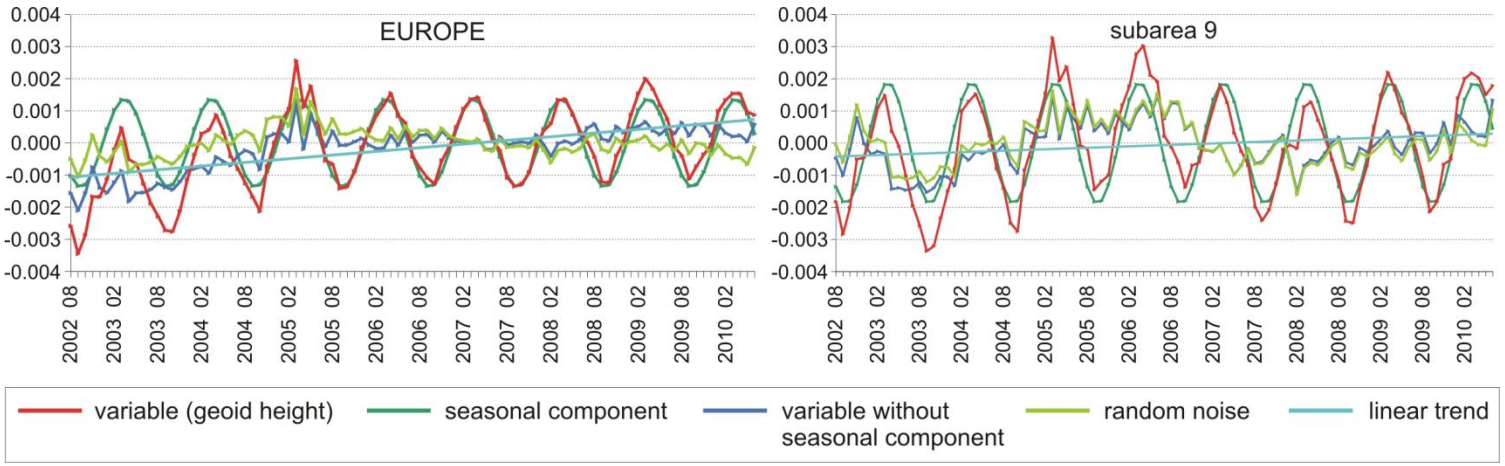
horizontal residuals obtained after 7-par. Helmert's transformation between ETRF2000 (epoch 2011) and EUREF89 (epoch 1992)



Use of data from satellite gravity mission

Institute of Geodesy and Cartography, Warsaw

- **analysis of temporal variations of the gravity field over Europe from GRACE data in terms of geoid height and mass variation**



- **validation of GOCE geopotential models over Poland using the EGM2008 and GPS/levelling data**

Earth tides monitoring

Jozefoslaw Astrogeodetic Observatory of WUT

- **gravity record using LCR ET-26 gravimeter since January 2002**
  - **analysis of tidal record**

Borowa Gora Geodetic-Geophysical Observatory of IGiK

- **gravity record using LCR G gravimeter since January 2010**
  - **analysis of tidal record**

Satellite Laser Ranging

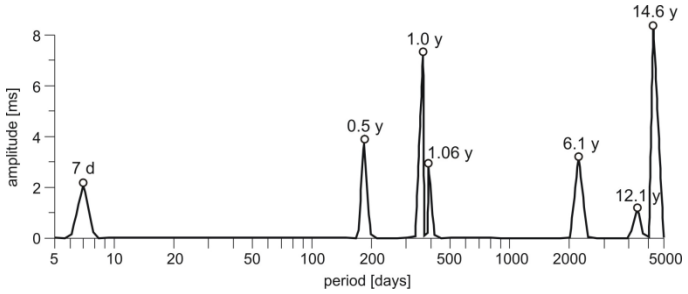
SRC PAS Borowiec station operates within ILRS and EURULAS

- **no SLR observations in 2011 – laser damage**
- **analysis of SLR data**
  - **quality estimate of reference frames**
  - **acuracy estimate of SLR data**
  - **satellite orbit analysis**

Geodynamics

Institute of Geodesy and Cartography, Warsaw

- complex spectral analysis of a long-standing rotational time data series from 1986.0-2010.6 based on astronomical observations conducted at Borowa Gora Observatory



WUT

- investigation of the influence of continental water storage on geodetic measurements

Wroclaw Univ. of Envir. & Life Sciences & MUT

- analysis of sub-diurnal noise in time series of GPS network solutions