NATIONAL REPORT OF POLAND TO EUREF 2010

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Outline

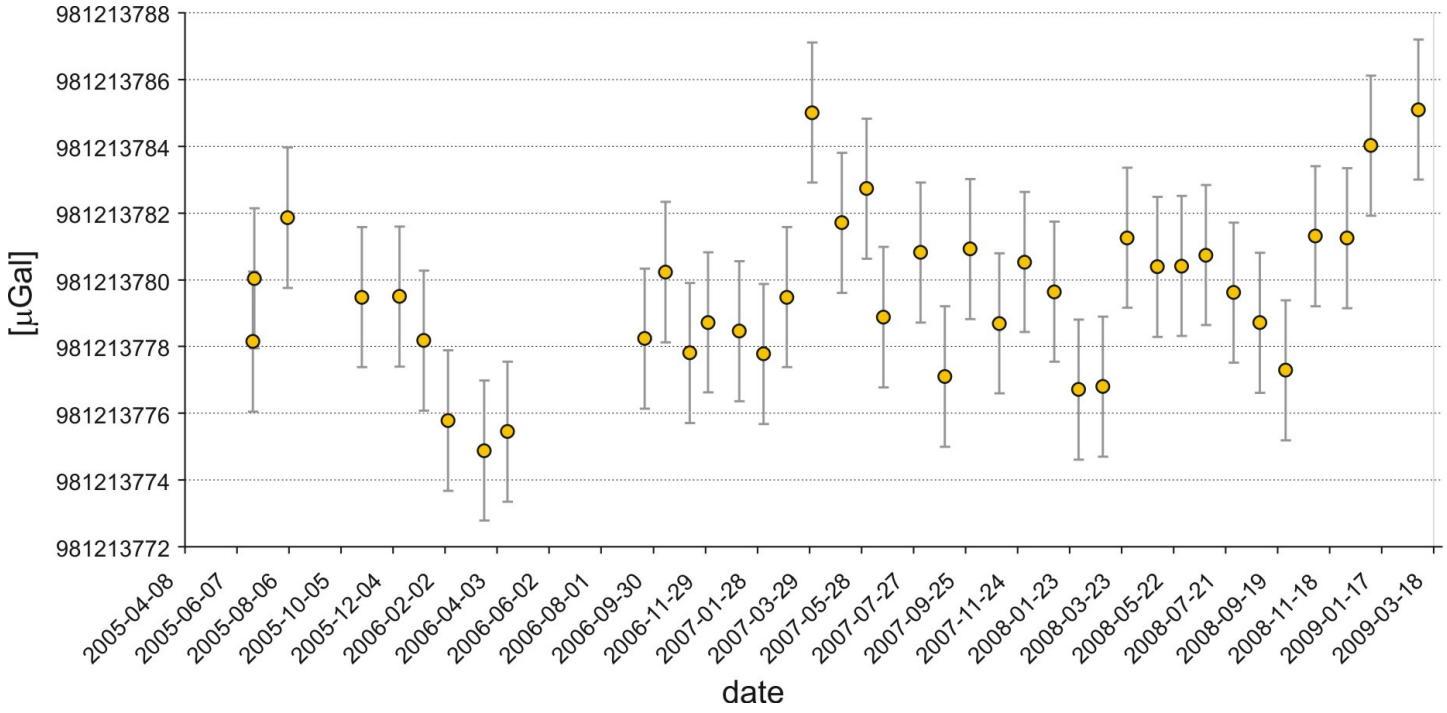
Main geodetic activities at the national level in Poland since 2008

- maintenance of the national **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
- modelling a **cm geoid** in Poland
- **Galileo** project
- **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

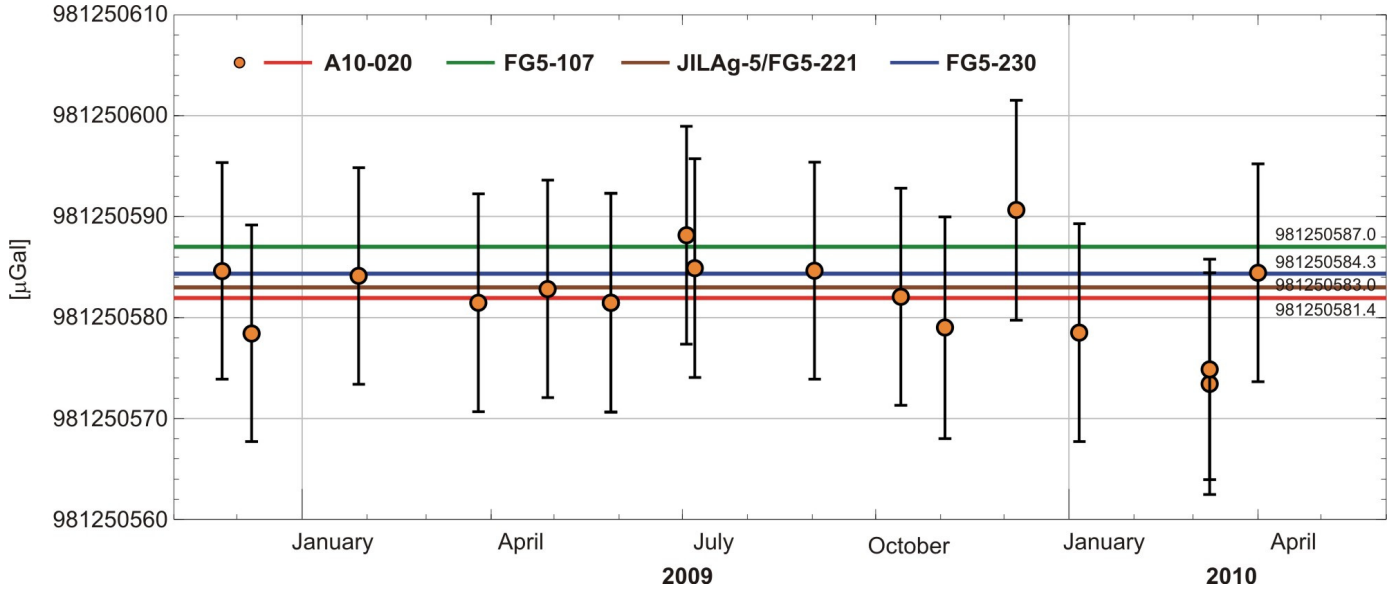


2. continuing gravity record with LCR ET-26

Maintenance of national gravity control (2)

Borowa Gora Observatory of IGiK

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



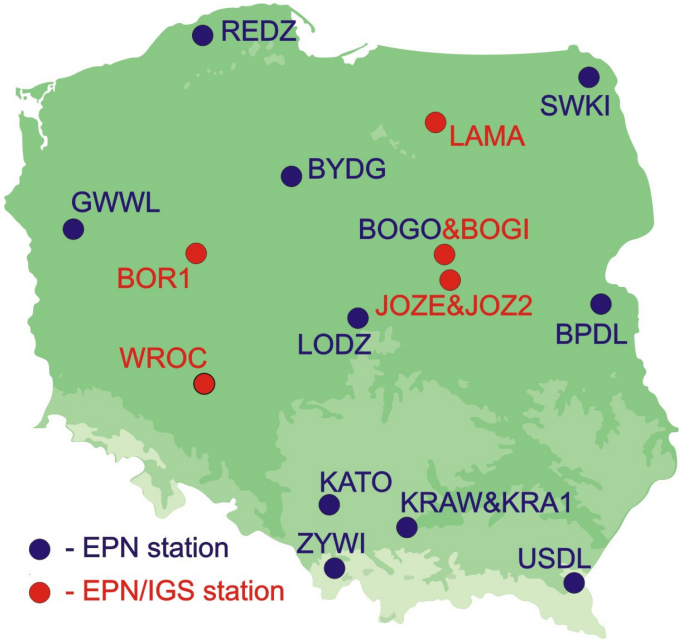
Re-survey of the Finnish gravity network with A10-020 of IGiK

ICAG2009 in the BIPM (FG5-230 & A10-020)

Operational work of permanent 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)



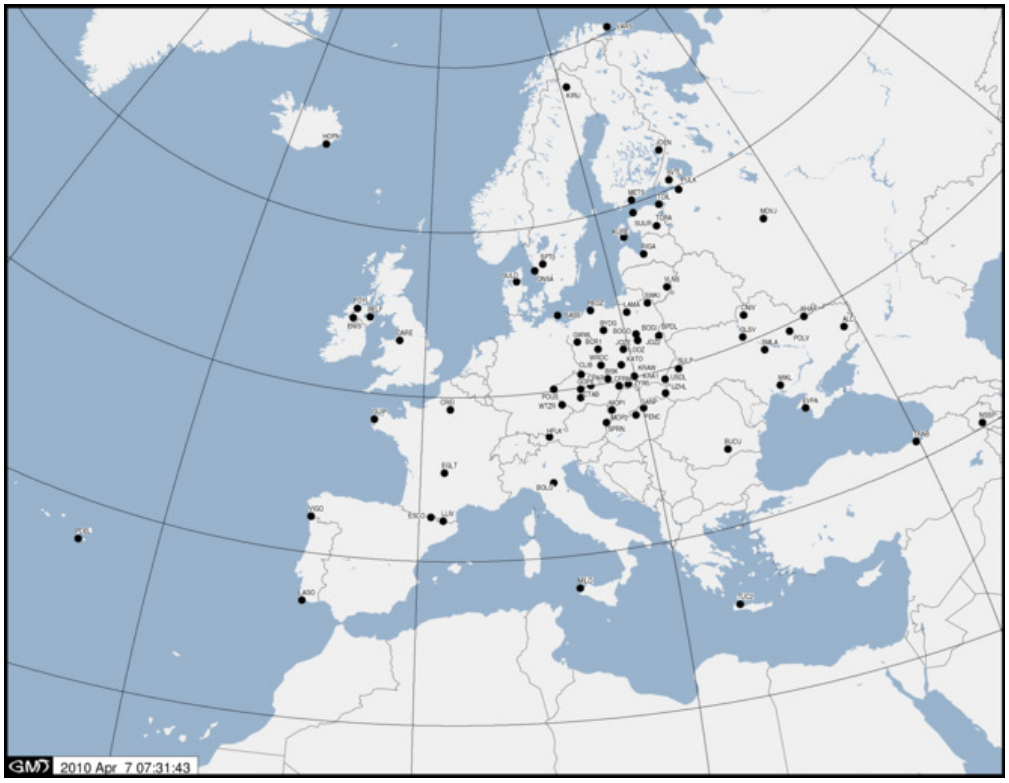
Stations participating in EUREF-IP

- BOGI
- BOR1
- JOZ2
- JOZ3
- KRAW
- LAM5
- WARS
- WROC

Data processing at LACs

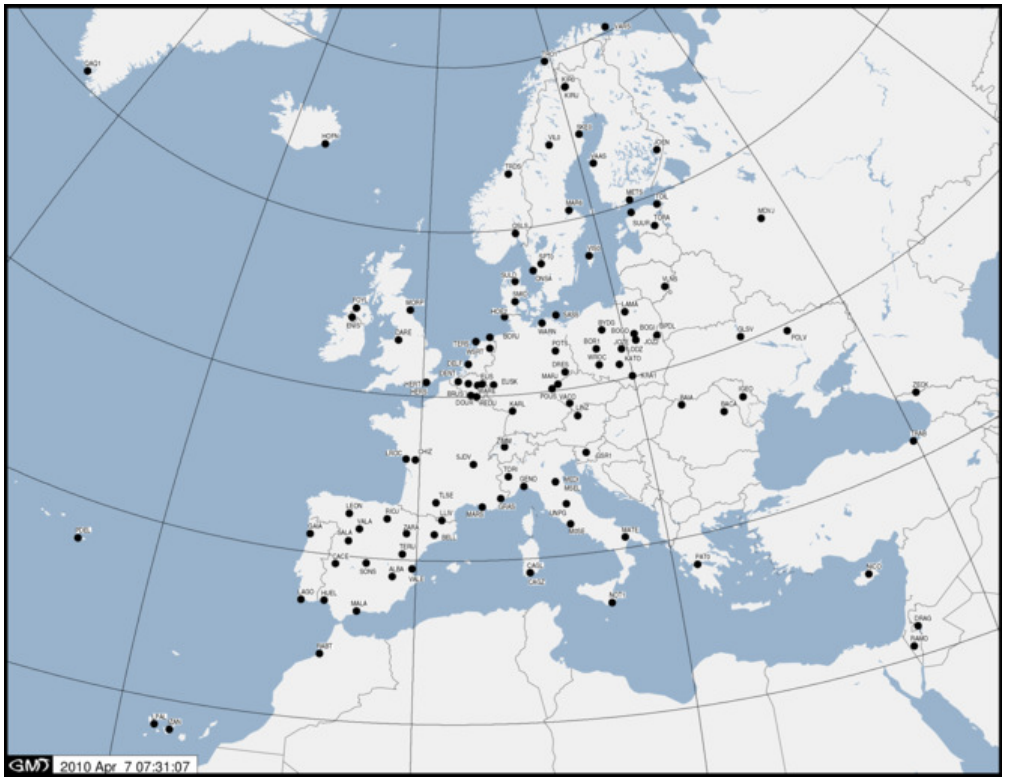
WUT

data from 74 EPN stations routinely processed



MUT

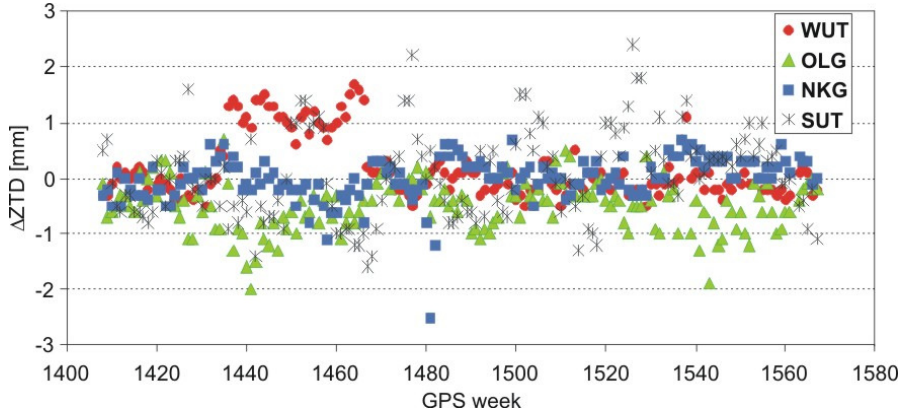
data from 114 EPN stations routinely processed



GPS for meteorology

WUT

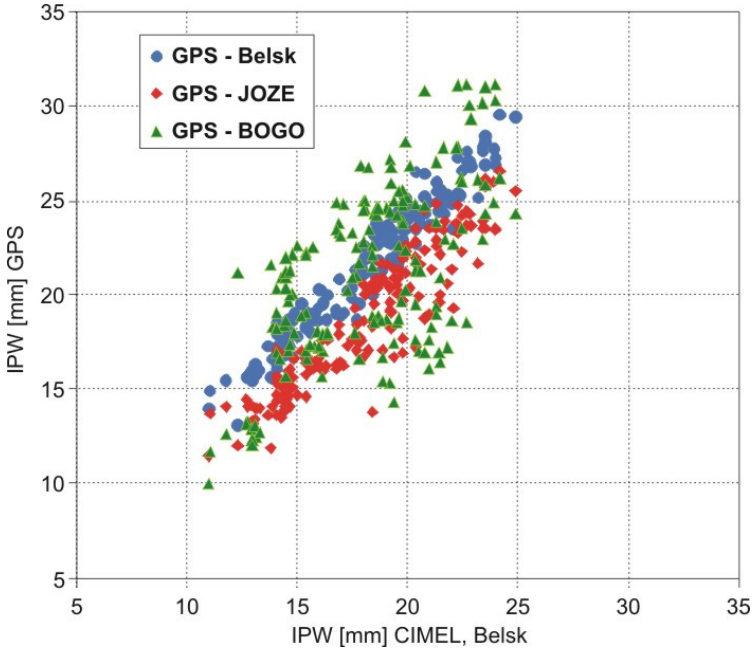
Decrease of ZTD differences between WUT LAC solutions and EPN combination after 2007



Good agreement of IPW obtained from GPS (different EPN solutions and combination) with those from

- **radiosoundings**
- **sun photometer**

⇨ **decreasing data conformity with the increase of GPS receiver distance**



Wroclaw Univ. of Envir. & Life Sciences

The use of 3D tomography for the investigation of the distribution of the wet refractivity

- **building up the strategy and methodology to construct near real-time GNSS tomography model of the troposphere over the network of receivers**

Monitoring ionosphere

University of Warmia and Mazury, Olsztyn

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

- dynamics of latitudal profiles
- TEC maps over Europe of high spatial and temporal resolution
- mid-latitude ionospheric trough over Europe

Studies on the improvement of GNSS precise positioning

- methodology for GNSS ultra rapid positioning
  (single minutes of dual frequency GNSS observables for 50-70 km baseline required)

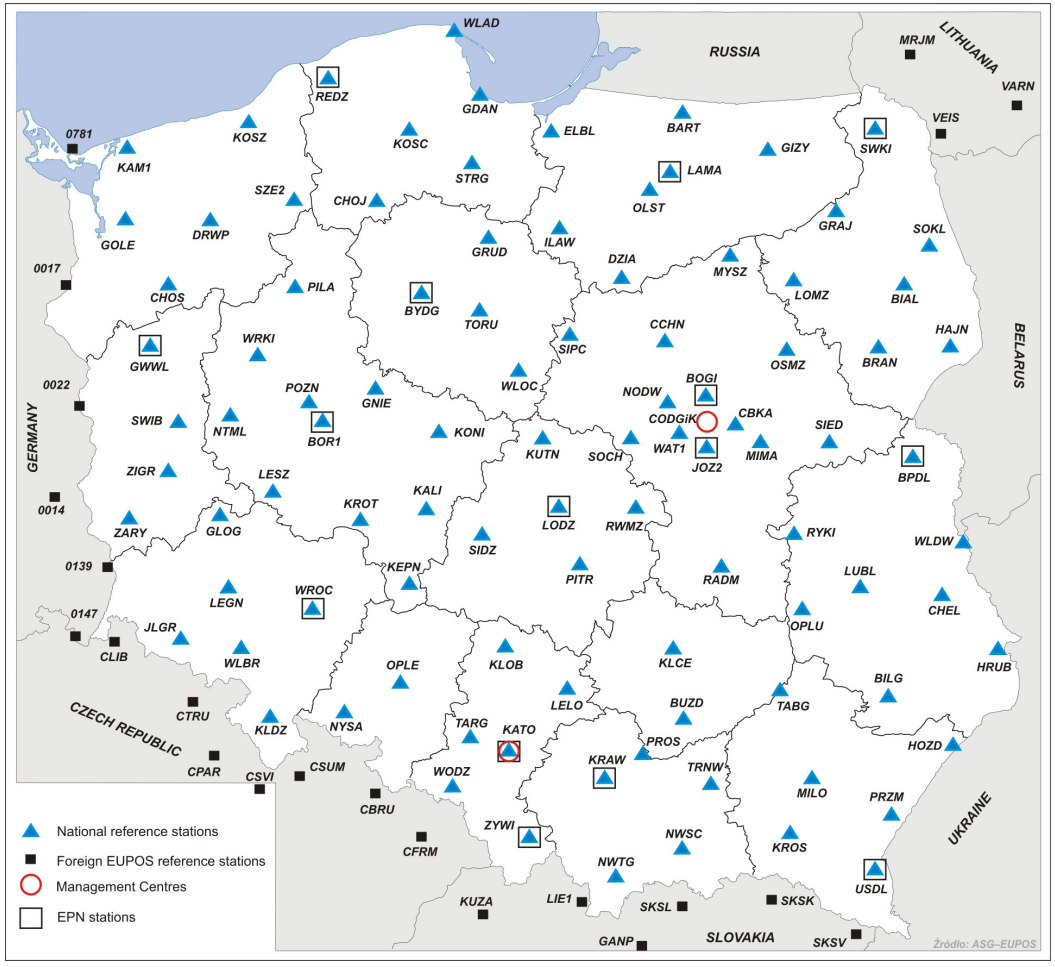
Running the IGS Ionosphere Combination Centre

- 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 (1)

Reference stations of ASG-EUPOS network

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



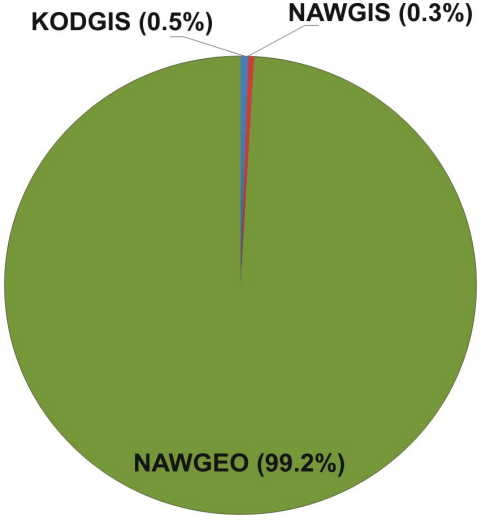
ASG-EUPOS network contains 19 EPN stations

Services of ASG-EUPOS are realized in ETRS89

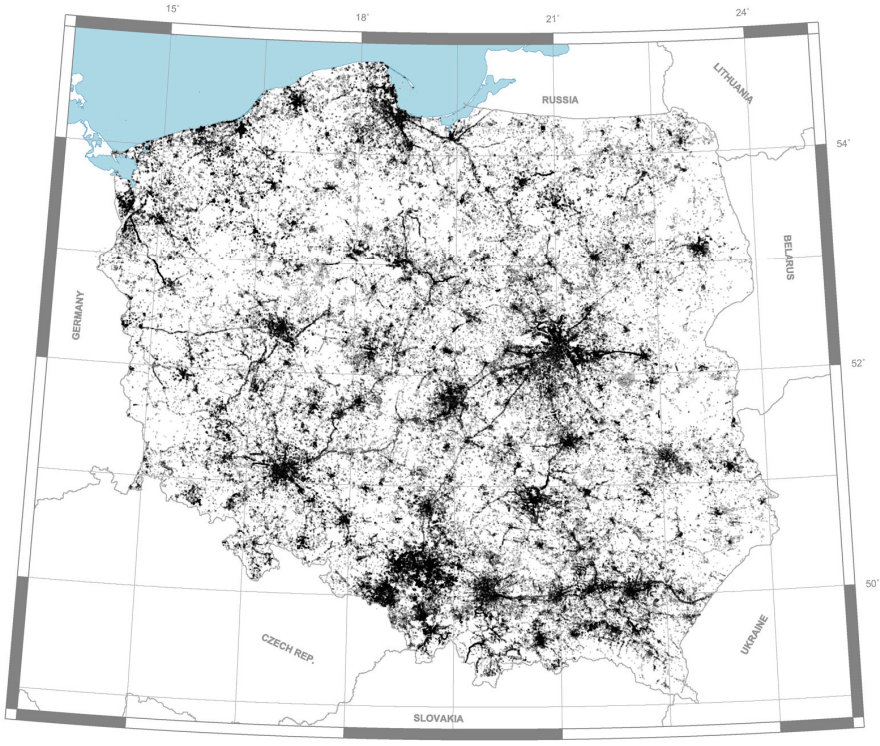
ASG-EUPOS network in Poland (2)

>5000 registered users
of the ASG-EUPOS system
at the end of 2009
(2820 registered users
at the end of 2008)

NAWGEO – an RTK service for highest precision real-time measurements most popular among real-time services the



ASG-EUPOS system usage
2008.5 - 2010



Modelling a cm geoid for Poland

UWM, IGiK

Quasigeoid determination with LS collocation
using combined
- **gravity data**
- **deflections of the vertical, and**
- **DTMs**

IGiK

Investigation of the accuracy of terrain corrections
- **analytical formulae**
- **numerical estimation**

UWM, IGiK

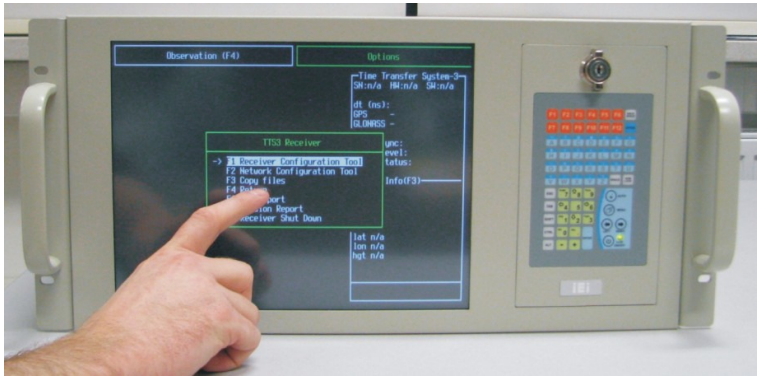
Evaluation of the performance of the new EGM2008 global geopotential model over Poland
- **GPS/levelling**
- **regional quasigeoid models**

Galileo Project

Space Research Centre PAS

GESS+ in Warsaw - station GWAR of the global Galileo ground control network

TTS-4 receiver (GPS, GLONASS, and Galileo) with touch-control screen developed at the Astrogeodynamical Observatory at Borowiec



Work on the Precise Time Facility for Galileo at the Astrogeodynamical Observatory at Borowiec has passed from the design phase to realization

Earth tides monitoring

Jozefoslaw Astrogeodetic Observatory of WUT

gravity record using LCR ET-26 gravimeter since January 2002

- studying tidal effects
- monitoring of environmental effects - continuation
- calibration of LCR ET-26 with FG5-230

Geodynamic Laboratory of Space Research Centre PAS in Ksiaz

- non-tidal signal observed by long water-tube tiltmeter is confirmed to reflect geodynamic phenomenon
- the hypothesis of relation between plate tectonic motions and tilting of foundation in Ksiaz laboratory was presented

Satellite Laser Ranging

Borowiec station operates within ILRS and EURULAS

in 2009

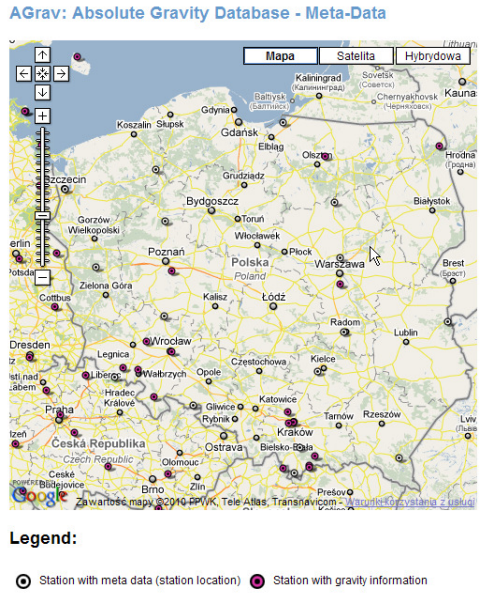
- **720 successful passes of 17 SLR satellites with the normal point precision of 5 mm and accuracy of 25 mm**
- **comparison of positions and velocities of all SLR stations in 1993-2009 determined with GPS and SLR**
- **determination of positions and velocities of all SLR stations from Starlette, Stella, and Ajisai continued**

Geodynamics

WUT

- continuation of monitoring non-tidal gravity changes at 4 absolute gravity stations: Borowiec, Jozefoslaw, Lamkowko, Ojcow using the FG5-230 gravimeter (over 3 years decrease of gravity with a rate 2 - 3 μGal/y)

- set of stations chosen for absolute gravity survey to construct a unified gravimetric level for geodynamics



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developed methodology of reference stations selection for connecting local network to IGS and EPN station network to enable the realization of the reference system in the local network

- tested on the example of the GPS GEOSUD network