

Symposium of the IAG Subcommittee for Europe  
(EUREF)

Gävle, Sweden, 02 – 05 June, 2010

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**National Report of the Czech Republic**  
**EUREF Related Activities**  
**in the Czech Republic 2009 - 2010**  
**National Report**

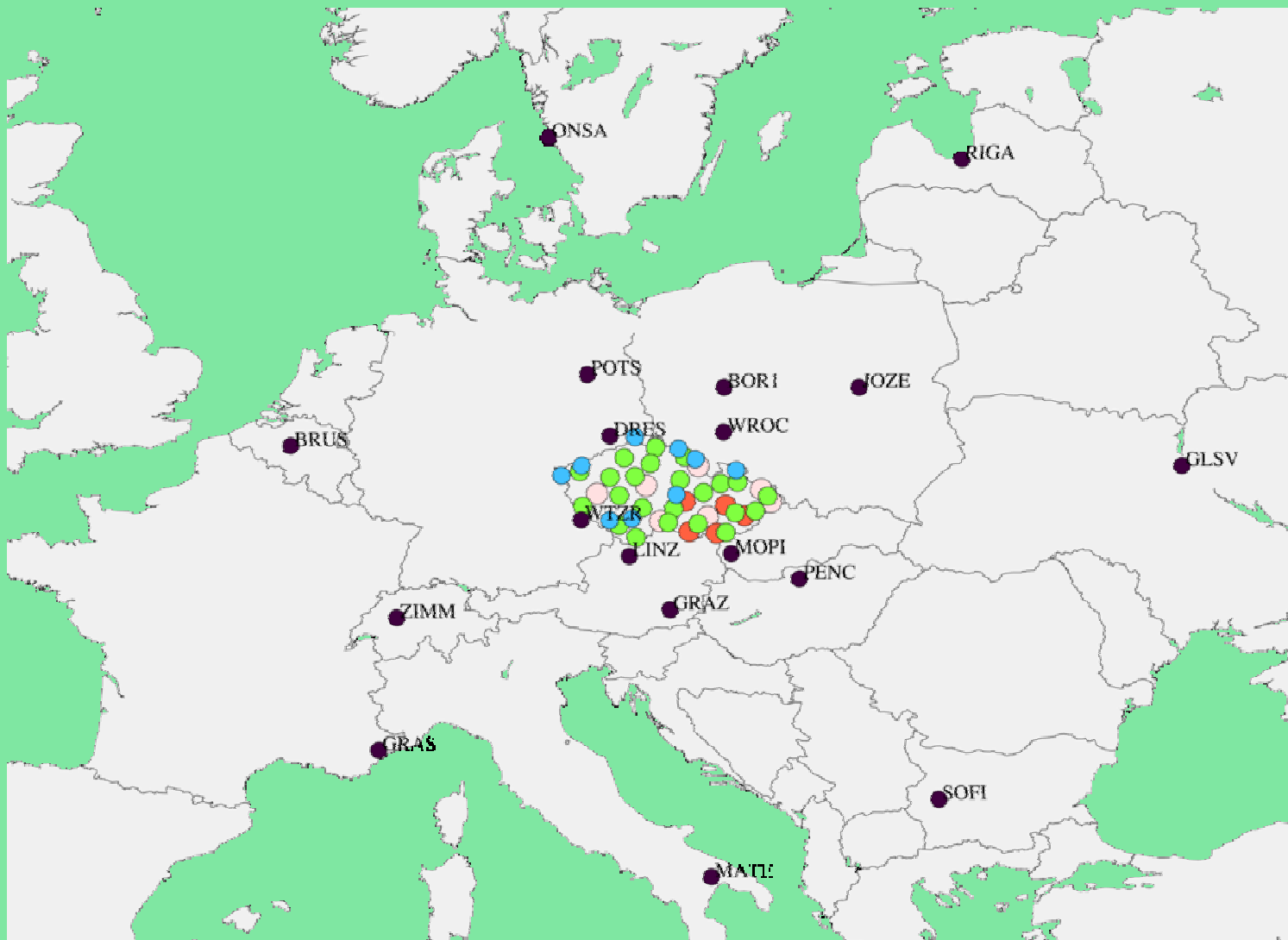
prepared by J. Douša, V. Filler, J. Kostecký, J. Kostecký (jr),  
J. Šimek, M. Lederer, J. Nágl, J. Řezníček

# New ETRS89 realization and implementation in the Czech Republic

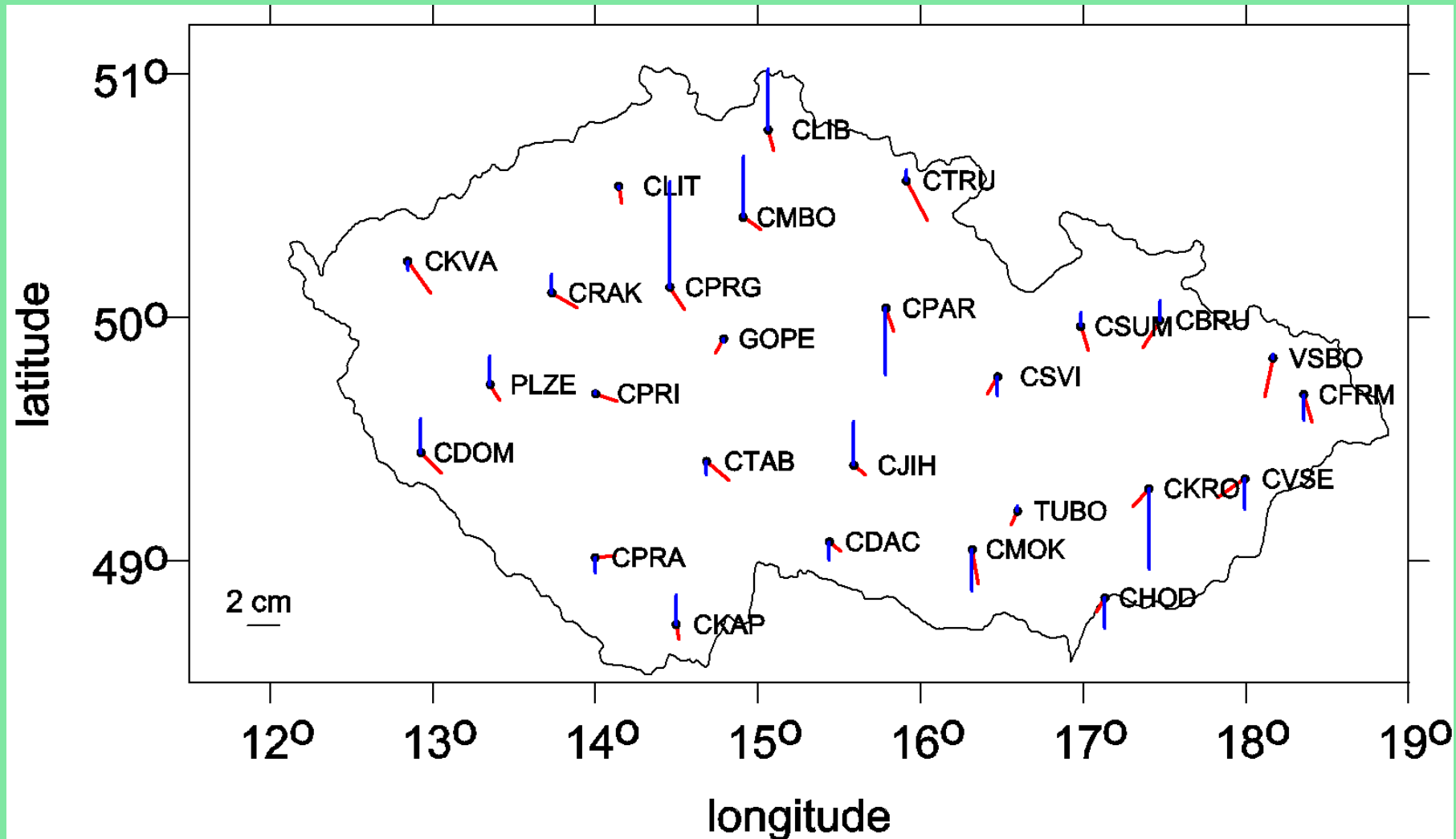
- EPN class A stations – coordinates and velocities
- Smooth coordinate time-series
- Fiducial stations from EPN cumulative solution
- Location close to the Czech border
- Up to 1000 km in all directions from the network centroid
- 17 EPN stations
- 44 CZEPOS stations – 4-year time series
- ETRF2000(R05)





## EPN stations in the EUREF-Czech-2010 campaign



## PS: differences between ETRF2000(R05) and ETRF89(1989) coordinates

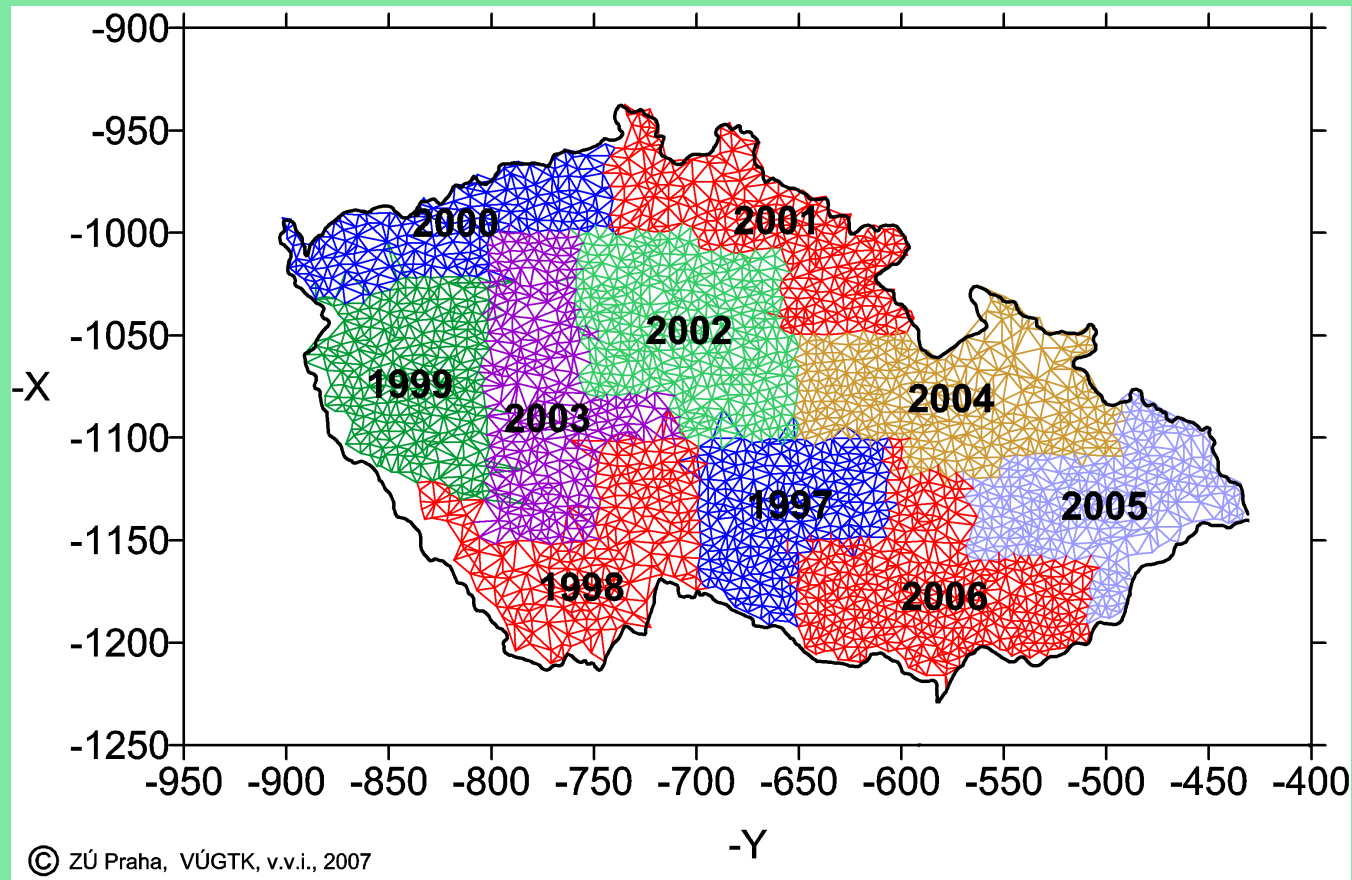


# Hierarchy of coordinates

- EUREF-EPN  CZEPOS + other permanent stations
- CZEPOS + other PS  DOPNUL (176 stations, 1995 – 1997)
- Adjustment of „selective maintenance“ network (3,160 stations) with loosely constrained DOPNUL + CZEPOS + other PS coordinates

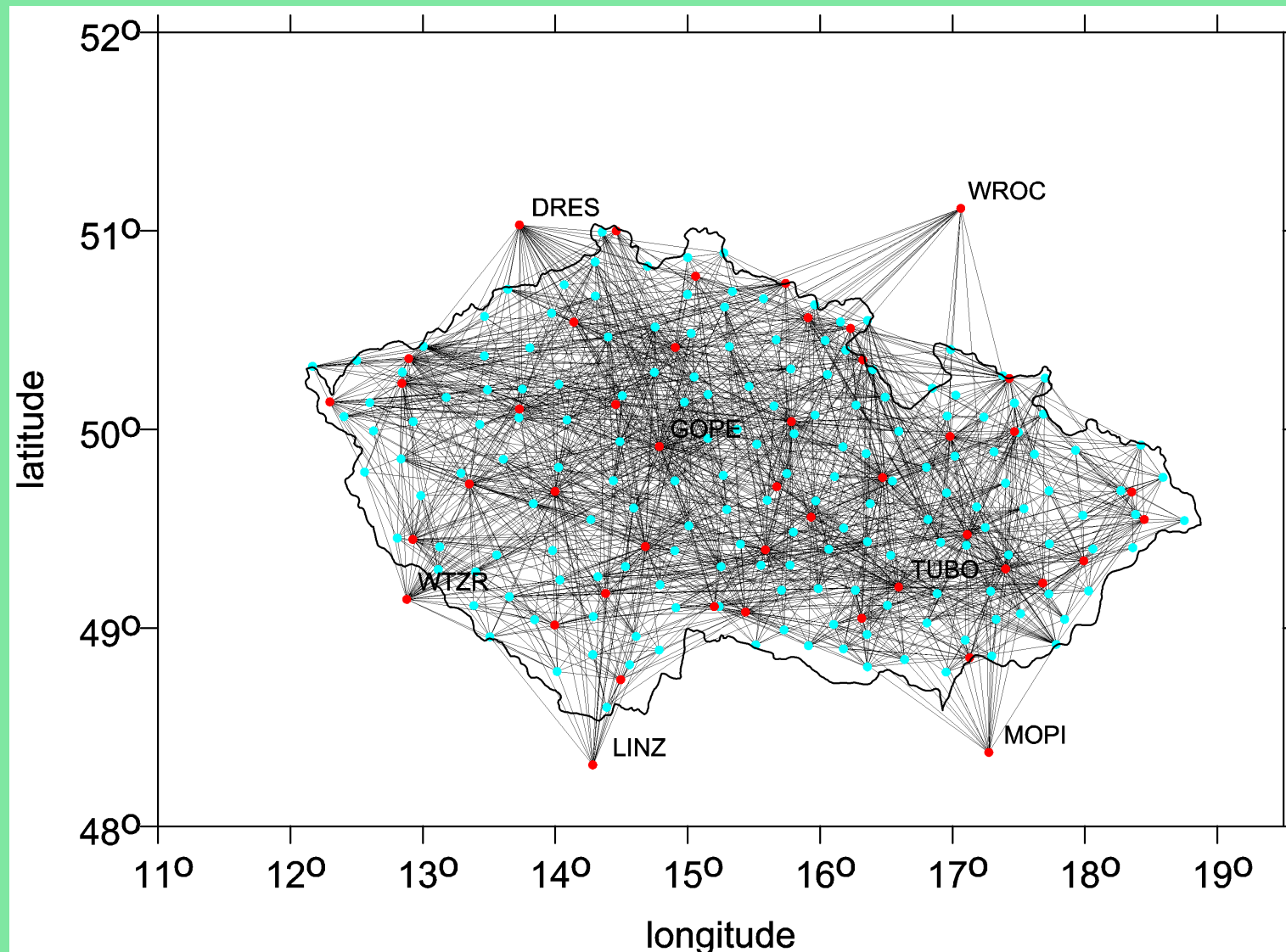
# ETRF densification in the Czech Rep.

Progress of densification by „Selective maintenance“  
performed by Land Survey Office



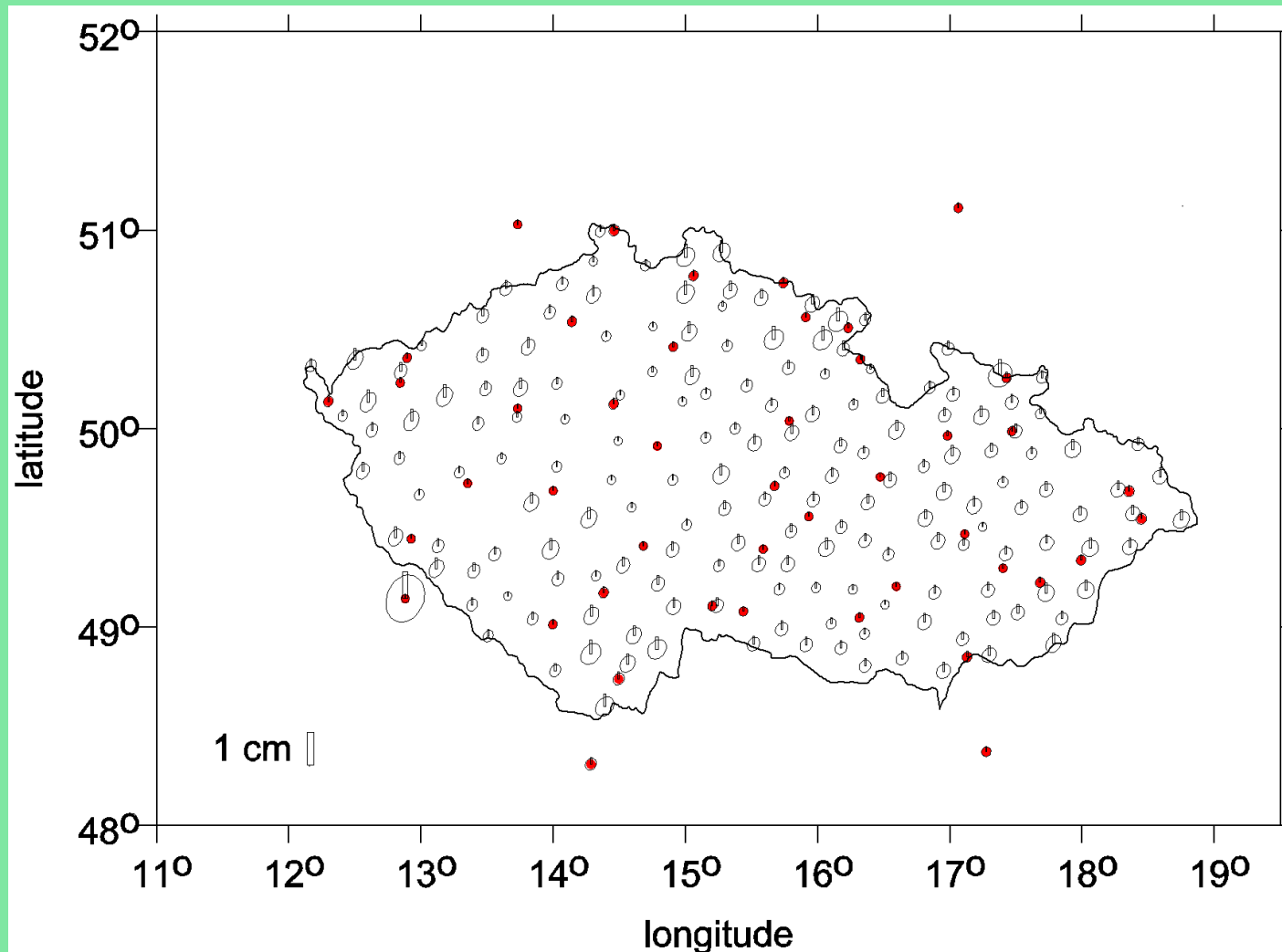
**1997 – 2007: 3,160 new (GPS) stations, accomplished  
by Land Survey Office**

# Re-computation of the National GNSS reference network (DOPNUL) - 176 stations; red dots = PS

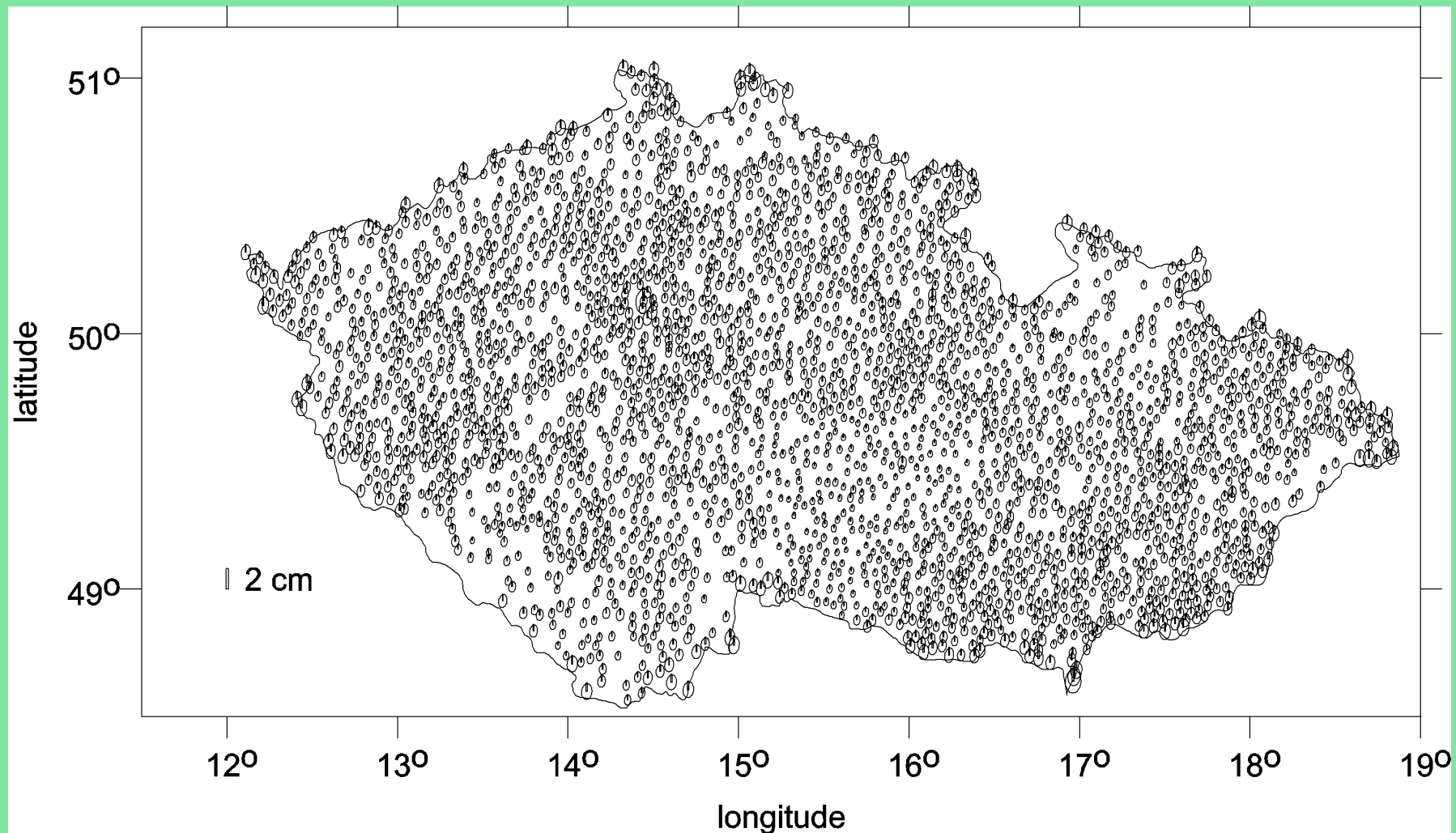




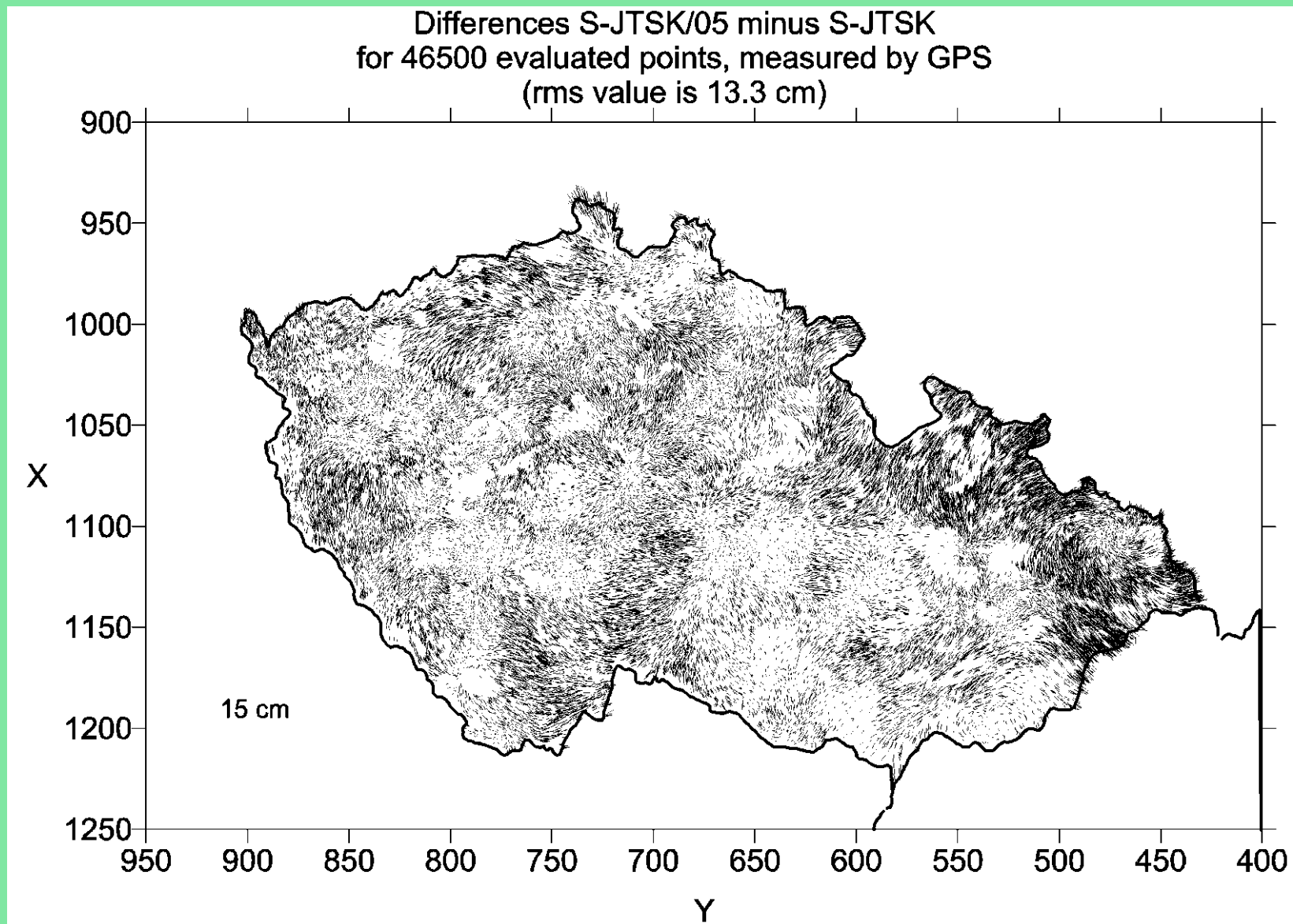
# Results of adjustment of the National GNSS reference network (DOPNUL) - 176 stations



# Results of adjustment of densification action „Selective Maintenance“ - 3,160 points Error ellipses and rms errors of heights



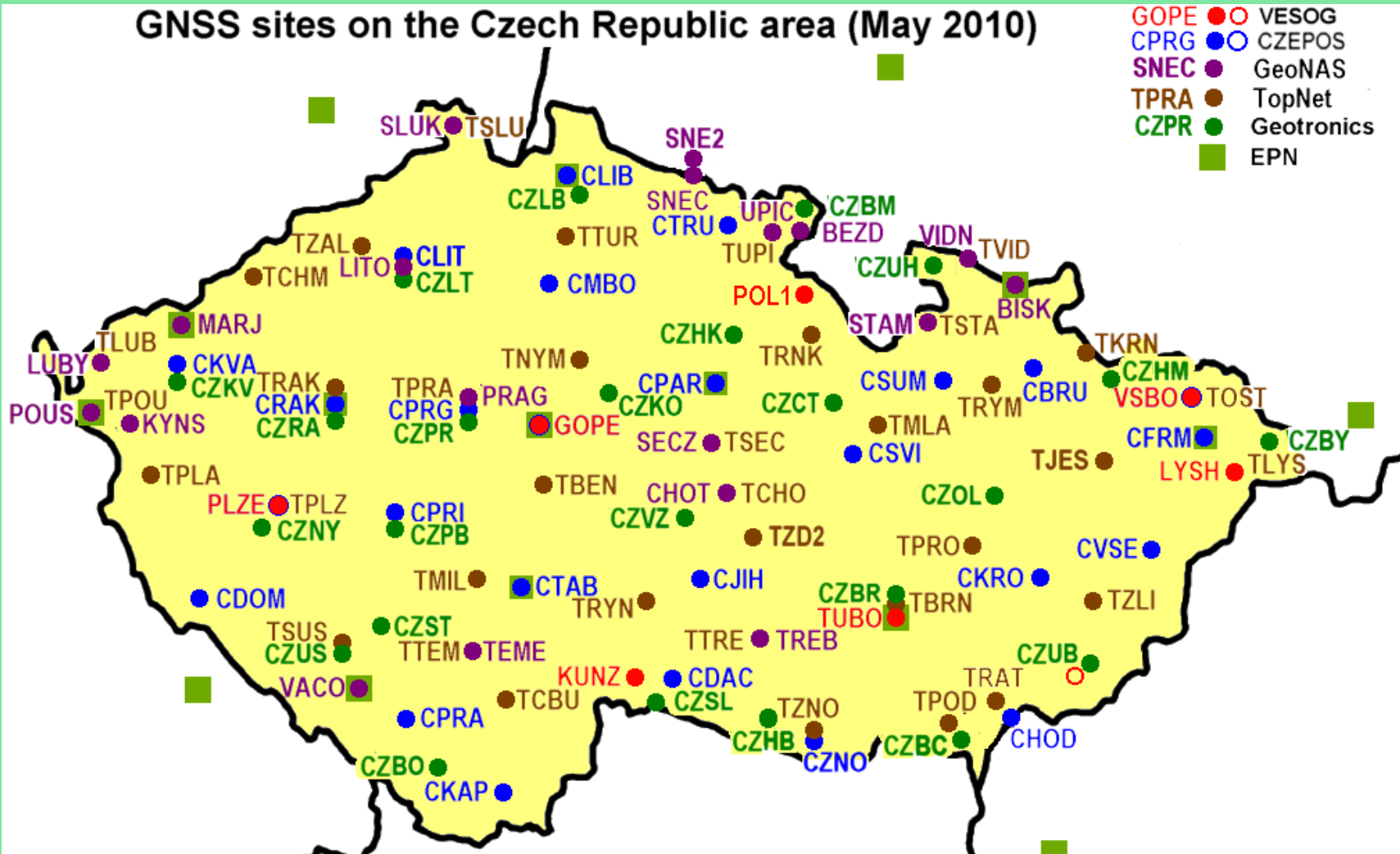
# Differences between the old and the new national user system: S-JTSK/05 – S-JTSK



# Permanent GNSS networks in the CR (1)

- CZEPOS: <http://czepos.cuzk.cz>, Czech Positioning System, 27 PS, operated by the Land Survey Office + 27 PS of neighbour countries
- GEONAS: <http://geonas.irms.asc.cz>, 19 PS, experimental monitoring network operated by the Institute of Rock Structure and Mechanics, Acad. Sci. CR
- VESOG: <http://pecny.asu.cas.cz/vesog/>, research and experimental GNSS network operated by the RIGTC GOP and academic institutions, 7 PS, 1 PS proposed
- TopNet: <http://www.geodis.cz>, 23 PS, includes also 11 GEONAS and 3 VESOG PS, operated by the private company GEODIS Brno
- Trimble VRS NOW Czech: <http://www.geotronics.vrsnow>, 24 sites + 8 sites of Trimble VRS NOW Deutschland, operated by Geotronics Praha, s.r.o. private company
- several smaller networks, operated by private companies, e.g. *byS@T* and others

# Permanent GNSS networks in the CR (2)





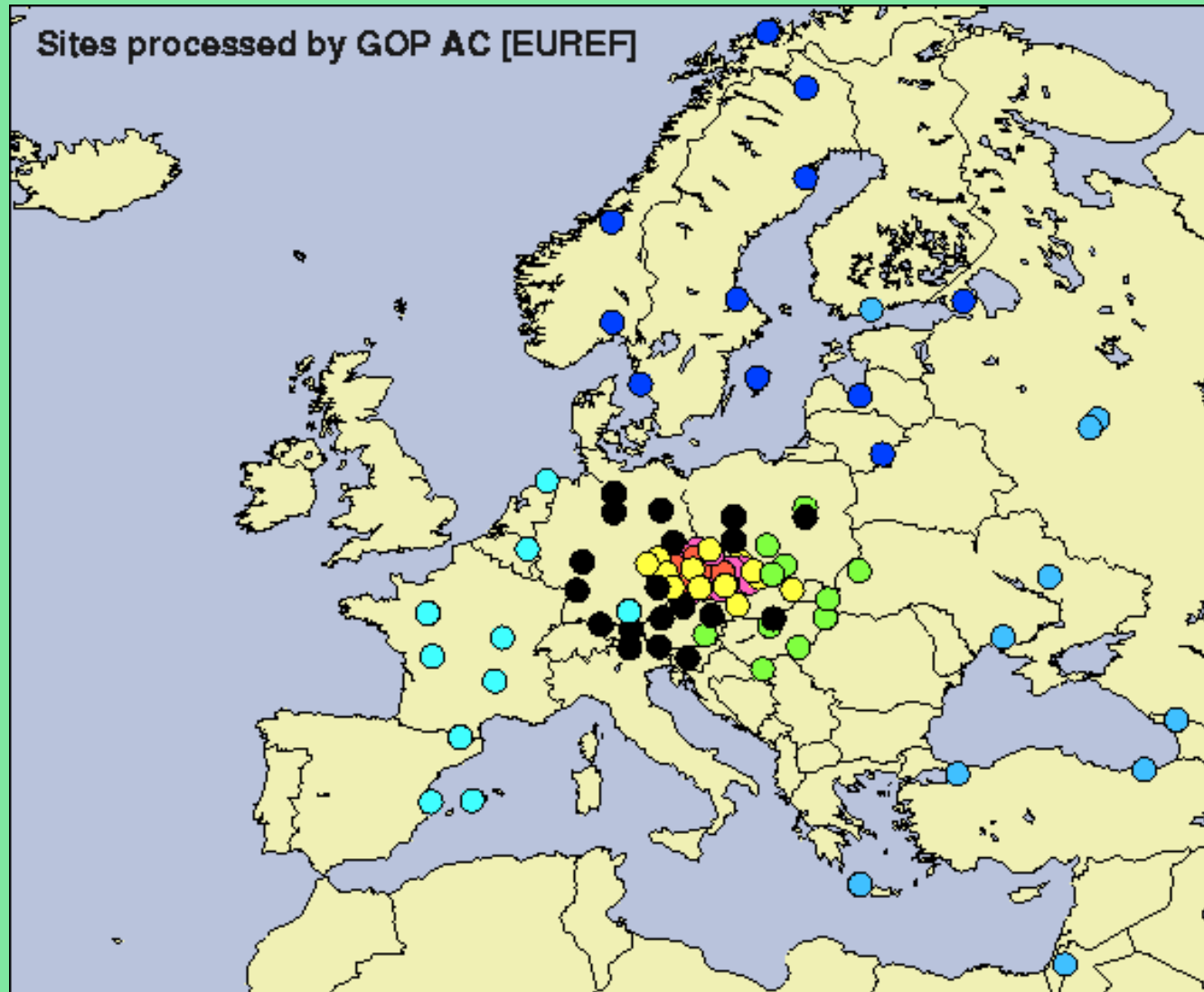
# CZEPOS: cross-border links



# EPN Local Analysis Center GOP

- data analysis from 79 IGS/EPN + 49 Czech PS
- EPN standards and processing strategy
- extension of services and products
- precise GLONASS ultra-rapid orbits
- hourly data files from RT streams
- NRT ZTD procedure extended to GLONASS
- EPN routine processing extended to rapid and hourly solutions
- Monitoring of permanent stations in the Czech Republic

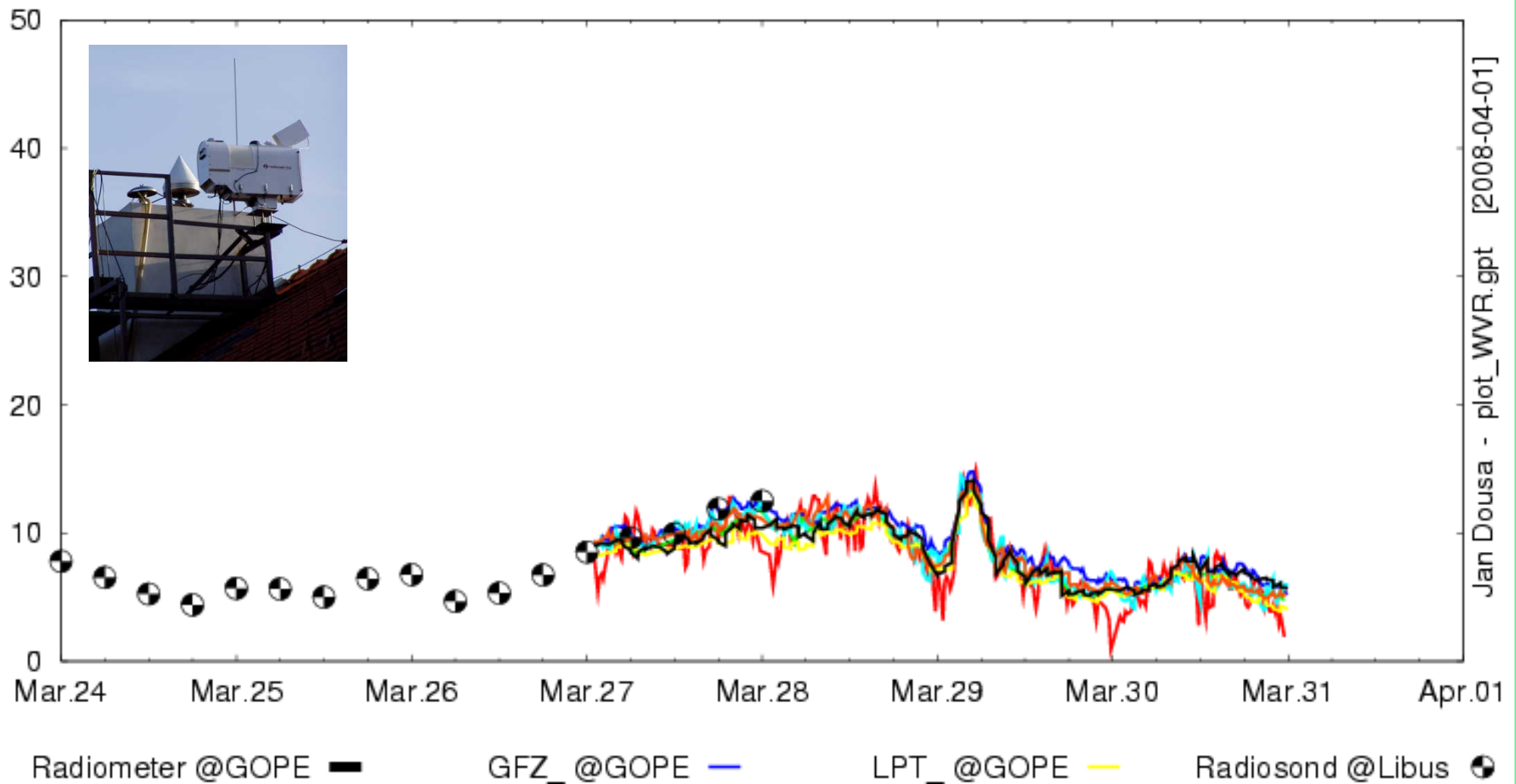
# EPN Local Analysis Center GOP: EPN subnetwork processed by LAC GOP





# GNSS Meteorology

PWV from GPS, Radiometer, Radiosondes @ GOPE/Libus

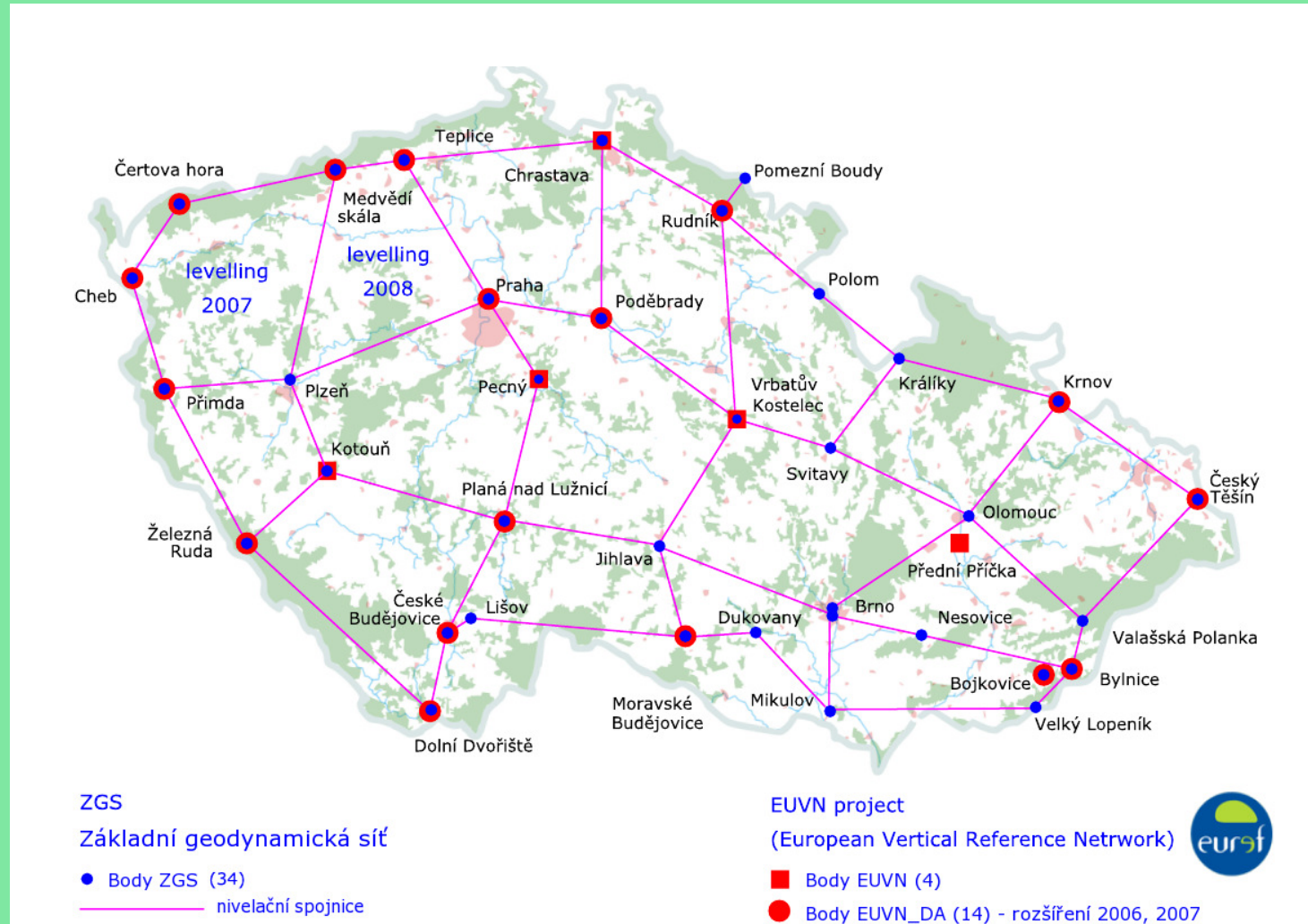


# ECGN, gravity, geodynamics

- 14 stations of the Czech Geodynamic Network in EUVN\_DA\_database
- 304 km levelling loop in the geodynamic network
- superconducting (OSG-050) and absolute gravimetry (FG5 No. 215) at GOP, environmental effects on gravity
- ICAG at BIPM in Sèvres
- 4 absolute gravity sites in Slovakia, 3 absolute sites in Hungary
- Repeated absolute gravity measurements at GNSS permanent stations GOPE, POL1, KUNZ and ZDIB

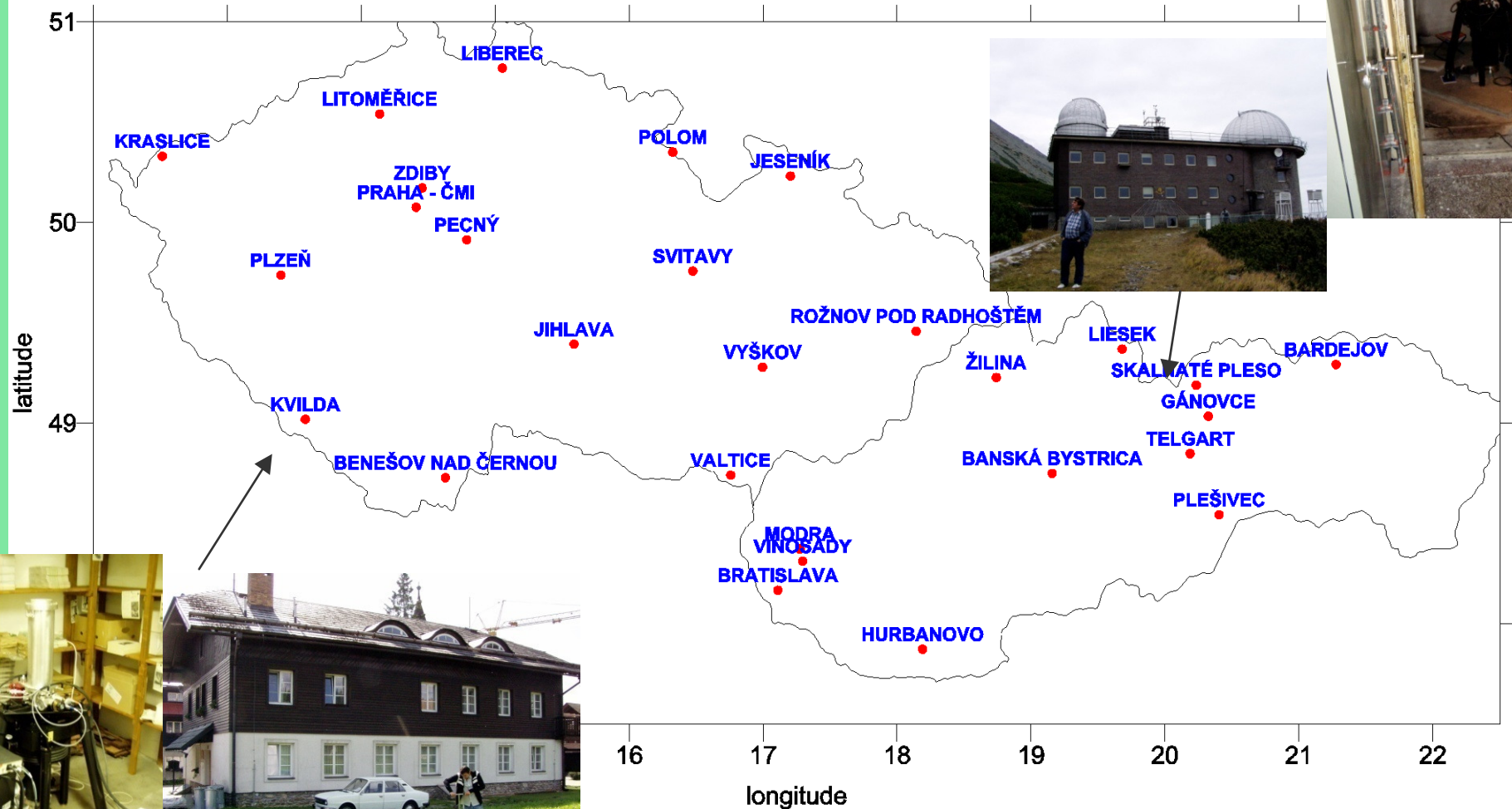
# Geodynamical network of the Czech Republic

## Land Survey Office



# Absolute gravity networks in CR and Slovakia measured by RIGTC-GOP with FG5 No 215

# Absolute gravity measurement stations observed by gravimeter VÚGTK FG5 No. 215 in Czech Republic and Slovakia





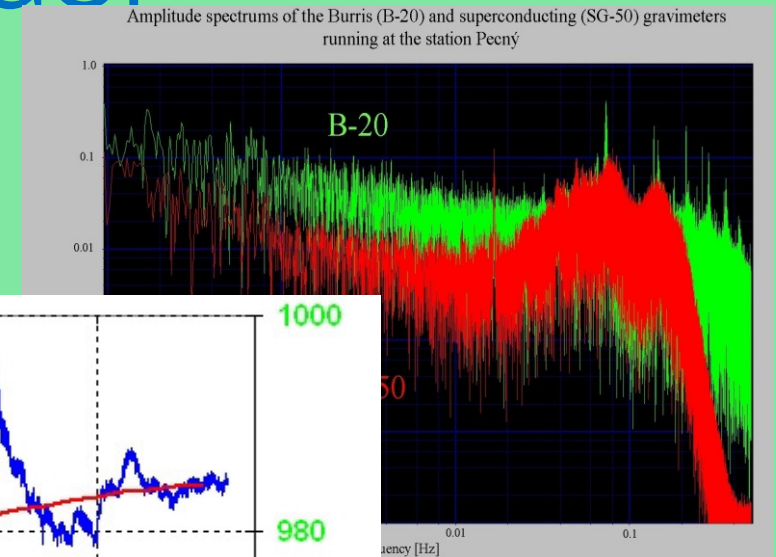
# Tidal Gravimetry at GO Pecný and Environmental Effects

- gravity time series by GWR OSG-050, Askania Gs15 No. 228 and by LCR 137
- calibration by FG5 No. 215 absolute gravimeter
- very broadband 3-D seismometer
- climatological station
- meteorological parameters
- soil moisture
- ground water level

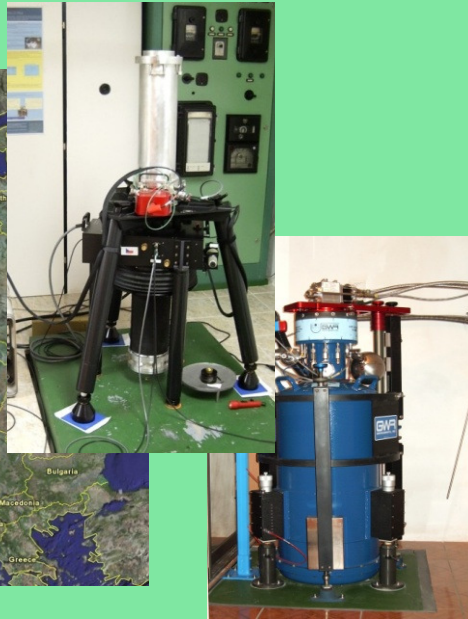


# Superconducting gravimeter GWR OSG-050 at GOP

Corrected for synthetic earth tides and atmospheric pressure effects using single admittance factor ( $0.3 \mu\text{Gal/hPa}$ ).



# Absolute gravity series at GOP



FG5#215 since August 2001 and OSG-050 since February 2007.

Results corrected for: • synthetic earth tides • air pressure variations using the coefficient  $-0.3 \mu\text{Gal/hPa}$  • polar motion using IERS data • drift of the SG ( $2.2 \mu\text{Gal/year}$ ).

