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National Report of the Czech Republic

Czech Office for Surveying, Mapping and Cadastre:

Land Survey Office,

*Department of
Geodetic Control*

Jan Řezníček

*Research Institute of Geodesy,
Topography and Cartography,*

*Geodetic Observatory
Pecný*

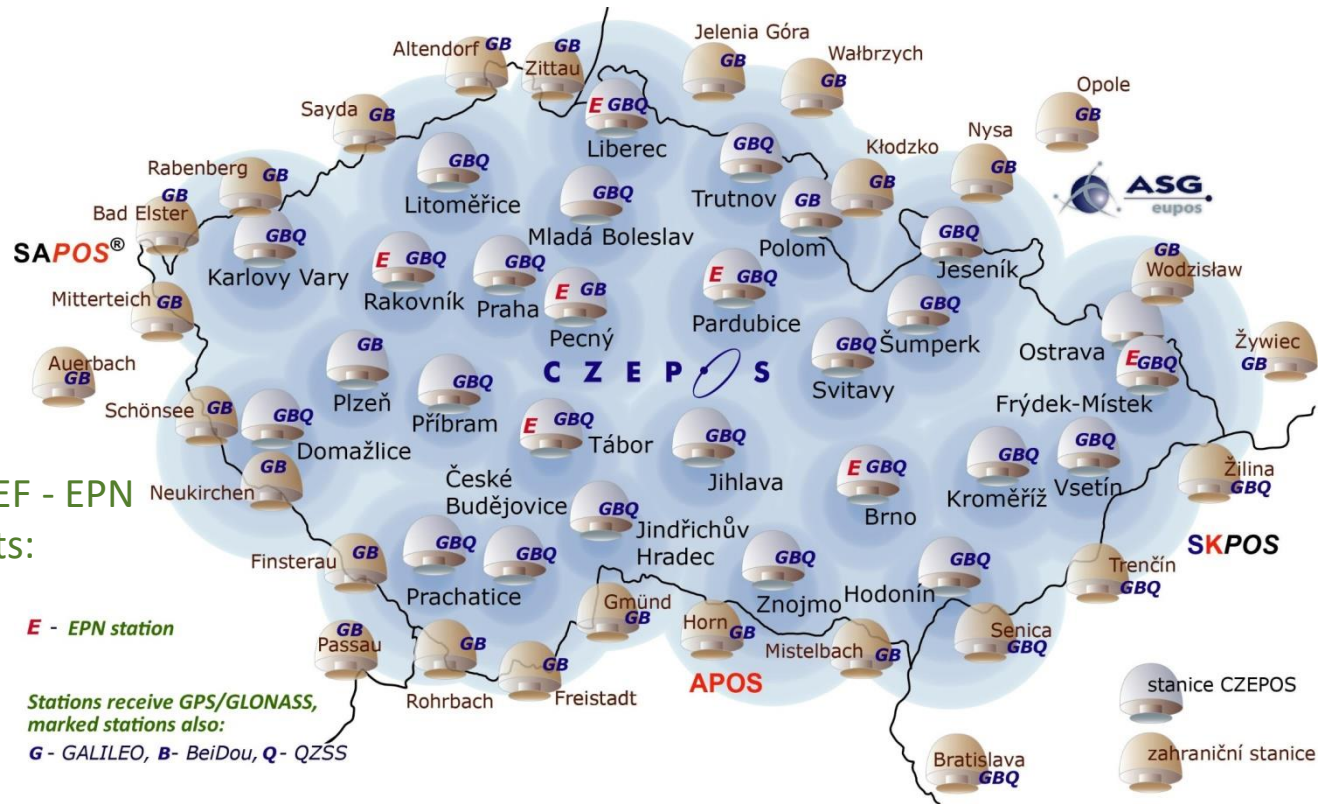
Jan Douša

Administration of CZEPOS network



C Z E P O S

- 28 Czech stations
- 27 neighboring stations
- real-time services
- post-processing products
- GPS/GLONASS
- Galileo + BeiDou (since 2017)
- 7 stations involved in EUREF - EPN
- cooperation within projects: EUPOS, EPOS, GISCAD-OV



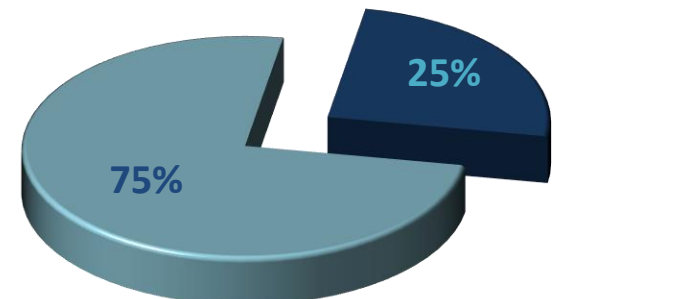
2023/05: 2500 users

since 2021

HxGN SmartNet

■ private sector

■ public sector



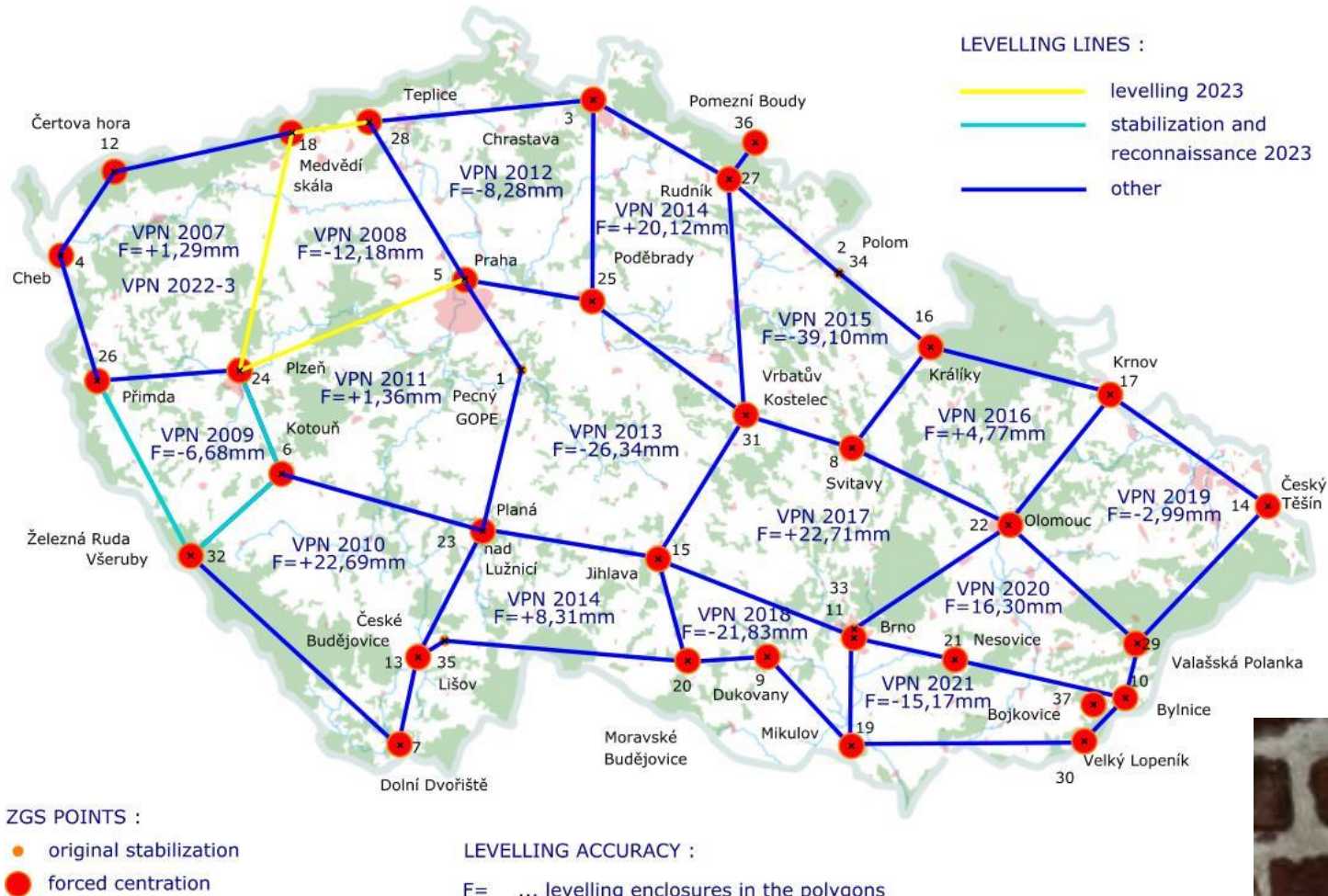
Levelling measurements



Baltic Height System
(national realization - Bpv)



European Vertical Reference System
(EVRS)

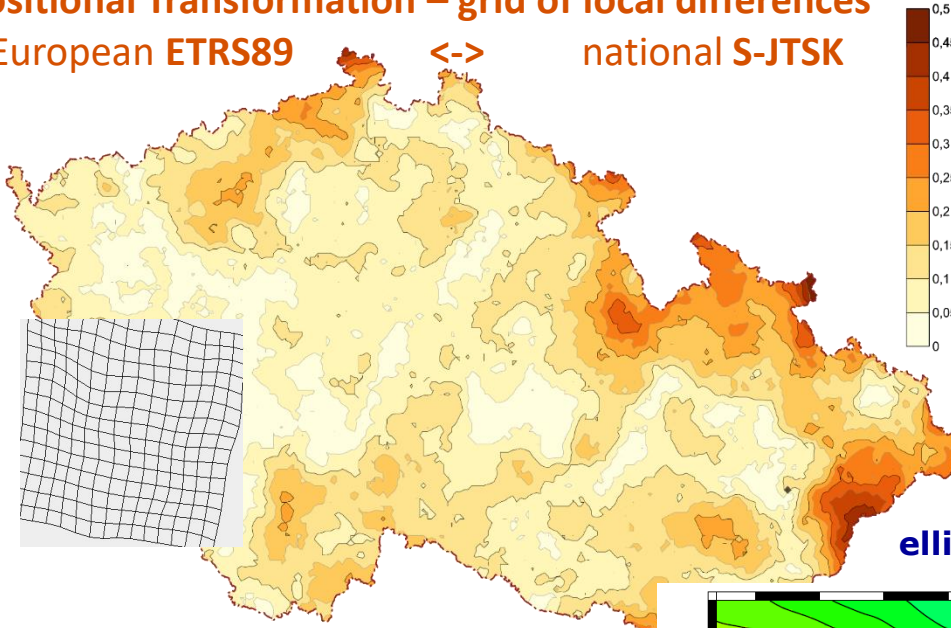


National realization of EVRS - precise leveling → grid densification
results of leveling 2007 – 2018 were sent to BKG → **part of EVRF2019**

Transformation grids



Positional Transformation – grid of local differences European ETRS89 <-> national S-JTSK

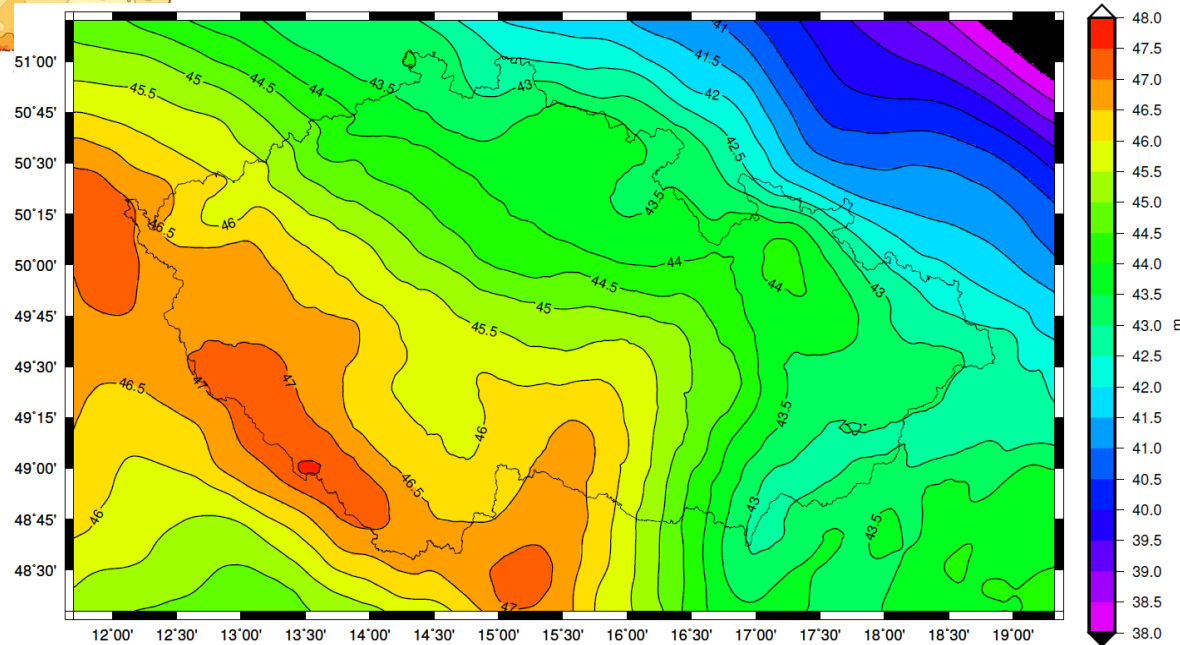


- Actual realization 2017
 - computed from 4000 identical points observed with GNSS
- 2018 – present:
 - additional identical points observed

ellipsoidal heights GRS80 <-> Baltic Height System

Quasigeoid QGZÚ-2014:

- computed in cooperation with Research Institute of Geodesy and Cartography
- **new GNSS/gravimetric measurements**



Transformation Service of Geoportal ČÚZK



ČÚZK: Geoportál

https://geoportal.cuzk.cz/...

Česky English

Geoportal ČÚZK
Access to map products and services

Welcome Applications Data Services INSPIRE Open data

E-shop Geoviewer Cadastre Archiv-WEB Remote Access VDP Geodetic App. Terrain analyses Name:

You are here: Applications / Geodetic App.

Coordinate Transformation

Individual coordinates

Coordinates: Date:

Transformation: -- input CRS -- -- output CRS -- send

Result: -- input CRS --

Text file

File: or Date:

Transformation: -- input CRS -- -- output CRS -- send

☐ View GML tr

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-- vstupní SRS --

- ETRS89 (BLh /DEG)
- ETRS89 (BLh /DMS)
- ETRS89 (XYZ /geocentric)
- S-JTSK + Bpv (YXH)
- S-JTSK + Bpv (-Y-XH /east-north)
- S-JTSK/05 + Bpv (YXH)
- S-JTSK/05 + Bpv (-Y-XH /east-north)
- ETRS89-LAEA + EVRS (YXH)
- ETRS89-LCC + EVRS (NEH)
- ETRS89-TM33 + EVRS (NEH)
- ETRS89-TM34 + EVRS (NEH)
- WGS 84 (BLh /DEG)
- WGS 84 (BLh /DMS)
- WGS 84 (XYZ / geocentric)
- WGS 84 / UTM 33 (ENh)
- WGS 84 / UTM 34 (ENh)
- WGS 84 / Pseudo-Mercator (XYh)

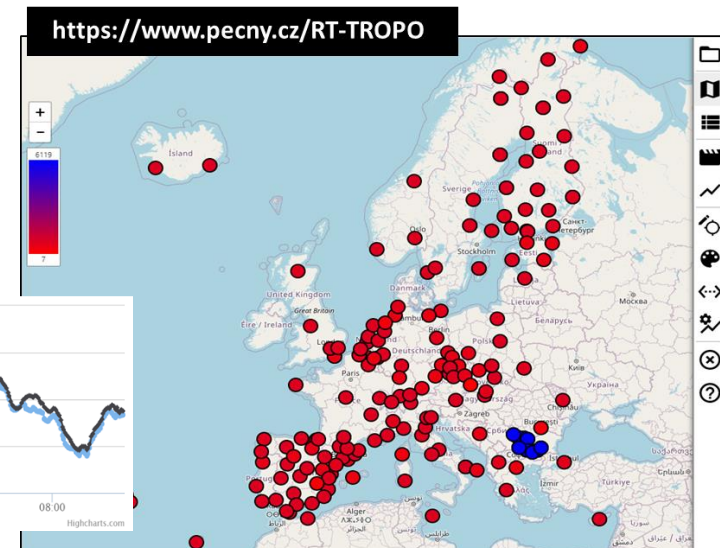
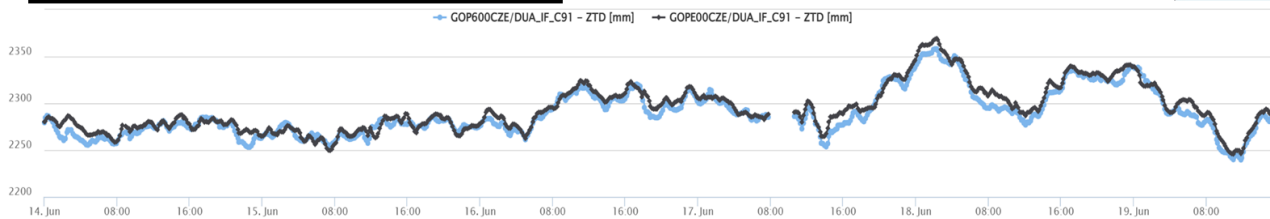
- **Observations:**

GNSS, absolute/super-conducting gravimetry, seismology, environment

- **Analyses & developments:**

- gravimetry data post-processing & software development
- DORIS - 3rd reprocessing
- GNSS activities:
 - *monitoring data quality of CORS networks & NTRIP/RTK services*
 - *Solutions in real-time / near-real time / (ultra-)rapid / re-processing*
 - *global precise products (orbits and clocks) & precise point positioning*
 - *troposphere monitoring & modelling*
 - *G-Nut software*

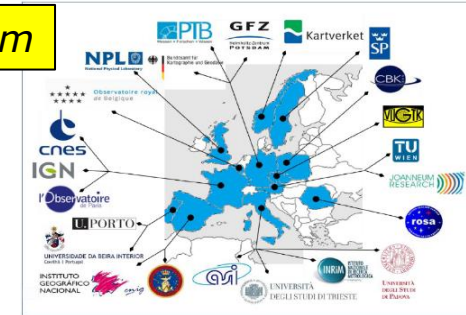
RT ZTD from collocation stations @ GOP



GOP contributions to independent monitoring of EGNOS & Galileo OS + HAS / EGNOS performance:



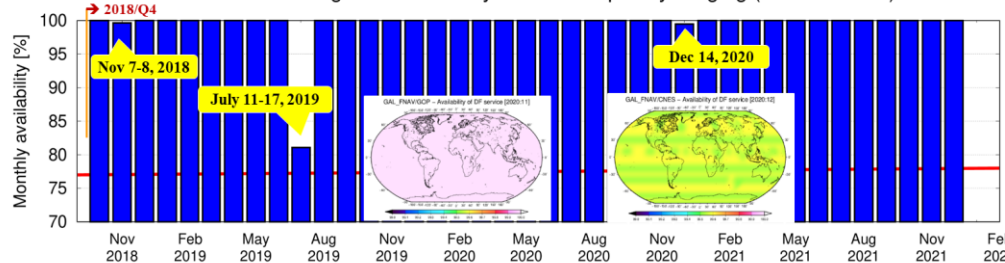
consortium



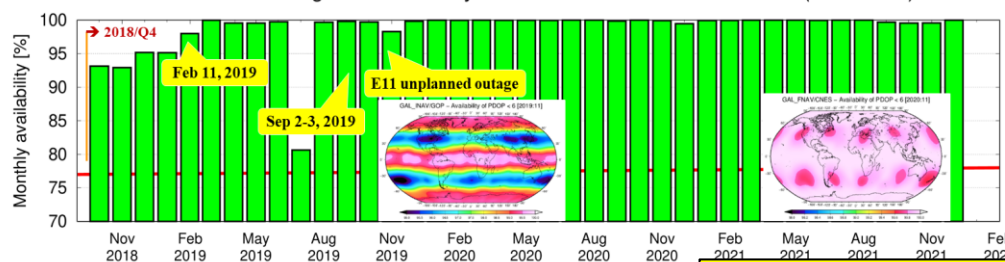
EUSPA projects:

- **GRC-MS** (2018-2022) – Galileo Reference Centre – Member States
- **SPMS** (2015-2022) – EGNOS Service Performance Monitoring
- **GEMOP** (2023-2029) – Galileo and EGNOS monitoring of Performances by
 - ➔ reference orbit + clock + navig products, OS / HAS / EGNOS positioning performance KP
 - ➔ reference station data quality, tropospheric effects

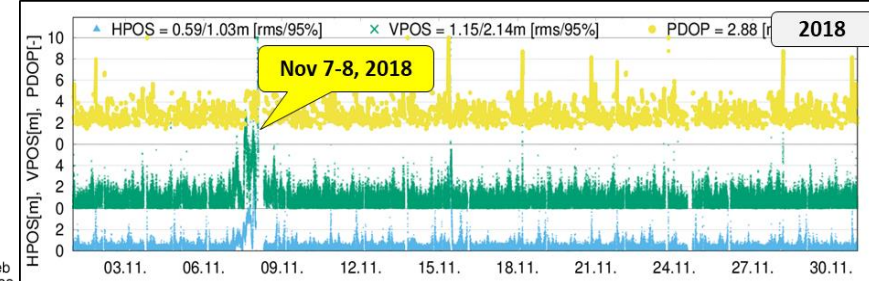
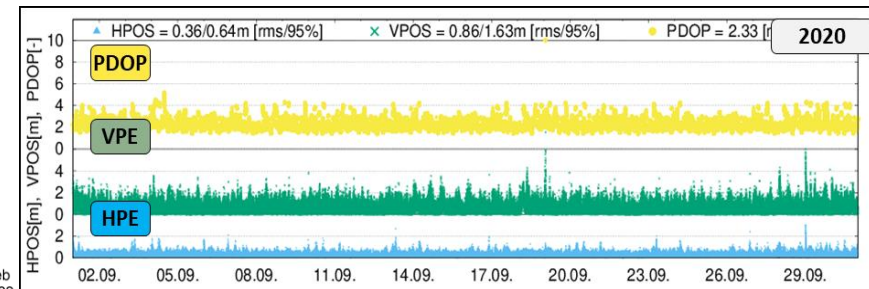
Galileo FNAV - global availability of Dual-Frequency ranging (Initial Service)



Galileo FNAV - global availability of Global 3D Dilution of Precision (PDOP < 6)



Service volume



Site positioning

Selected scientific project within GNSS domain



- **Monitoring of RTK networks & corrections** by using Galileo HAS
- **GISCAD-OV (H2020)** – Galileo Improved Services for Cadastral Augmentation Development: On-field Validation
- **TILDE (ESA)** – Terrestrial Intraplate Litospheric Deformation of the Earth

TILDE (objectives):

- *Long-term PPP re-processing in support of local improvement of solid earth tide (SET) model*
- *Relation of occurrences of earthquakes & volcanic activities with solid earth tides*

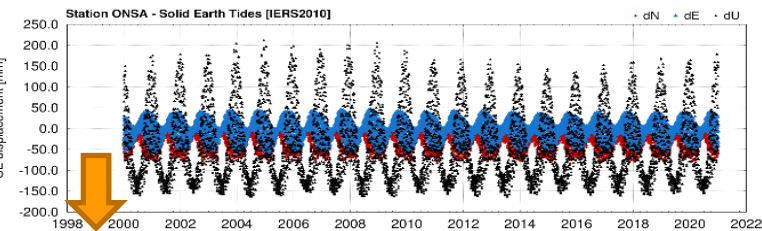
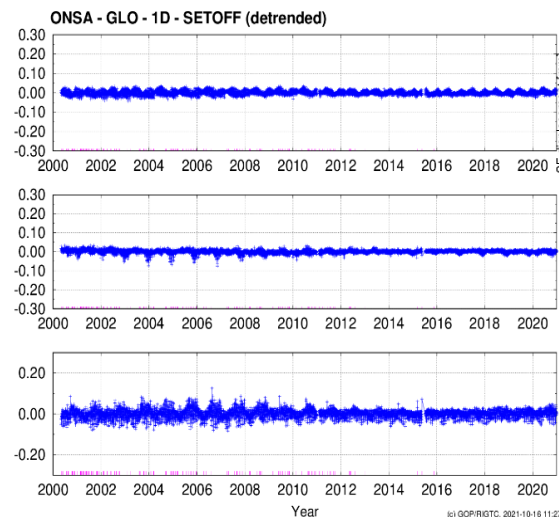
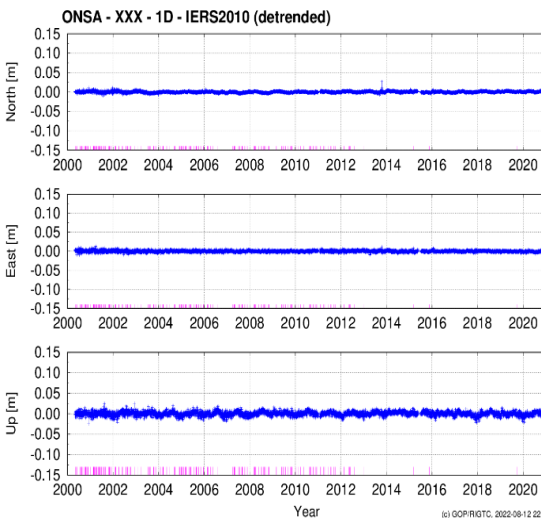
PPP + SET-on



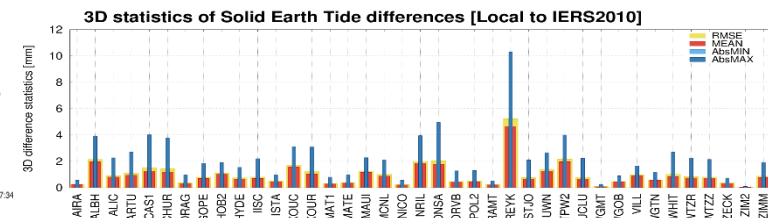
PPP + SET-off



local SET modelling



SET local – global

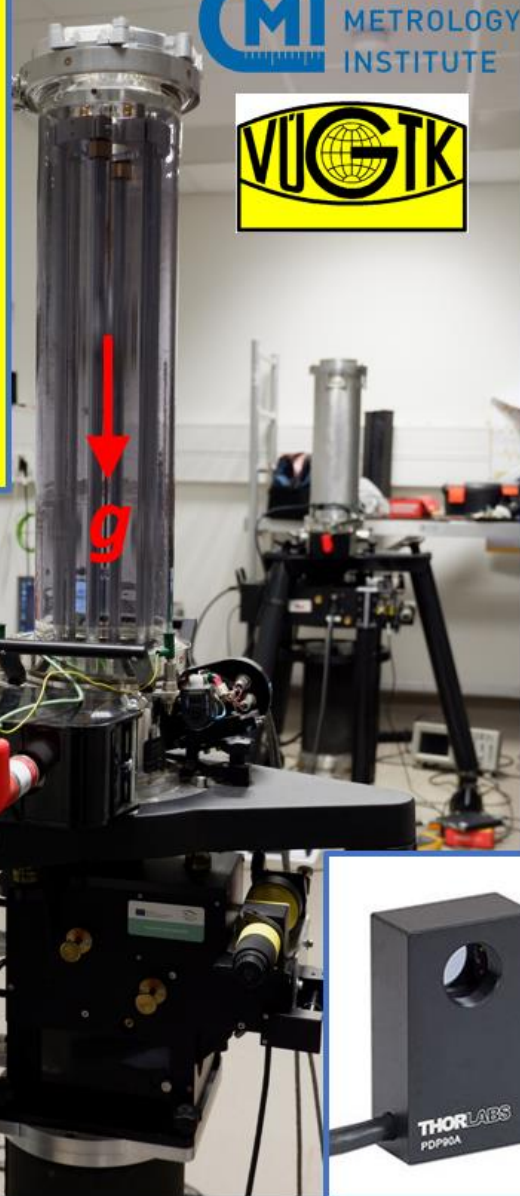


FG5 and FG5X gravimeters

equipped by additional detectors and software allow to determine corrections due to:

- fringe signal distortion
- electronic dispersion
- verticality misalignment
 - Coriolis force

Improved standard uncertainty
from $3.0 \text{ E-}8 \text{ m/s}^2$
to $2.2 \text{ E-}8 \text{ m/s}^2$



- a close cooperation with the Czech Metrology Institute on the **development** of the national **standard for gravity acceleration**
- **gravity variations and uncertainties from environmental effects** have been estimated at 8 from 20 absolute stations in the Czech Republic (based on a large number of repeated absolute measurements).

