77th International Scientific Conference
of the University of Latvia (UL)
- Geodynamics and Geospatial research

# Research activities at the Institute of Geodesy and Geoinformatics (LU GGI)

Pētniecības aktualitātes LU Ģeodēzijas un ģeoinformātikas institūtā

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# Outline

Current projects:

- ERDF projects
- ESA project – preparatory study
- Copernicus
- IT solution for timber assessment

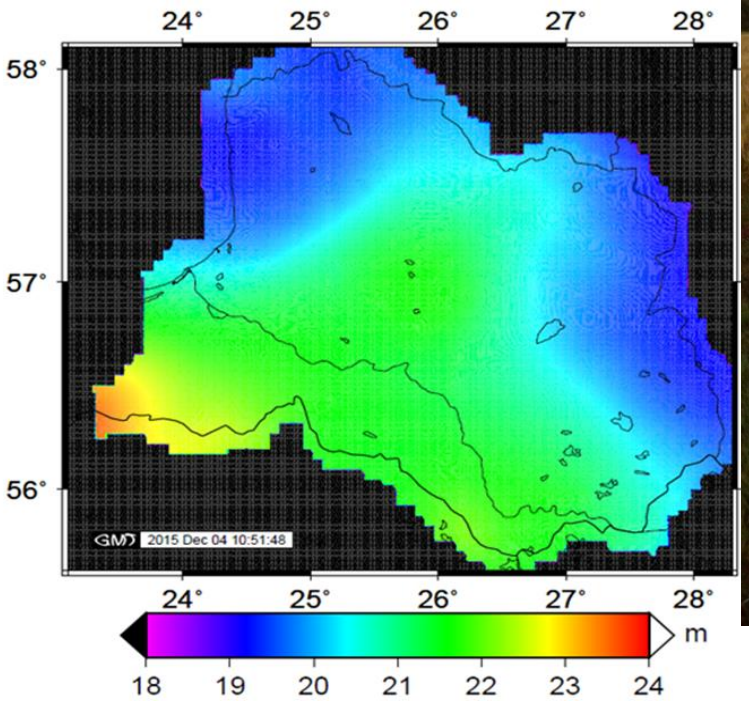
Other activities:

- EUPOS® and EPOS
- Space weather
- Doctoral studies
- Market studies

# 1st stage of the ERDF project

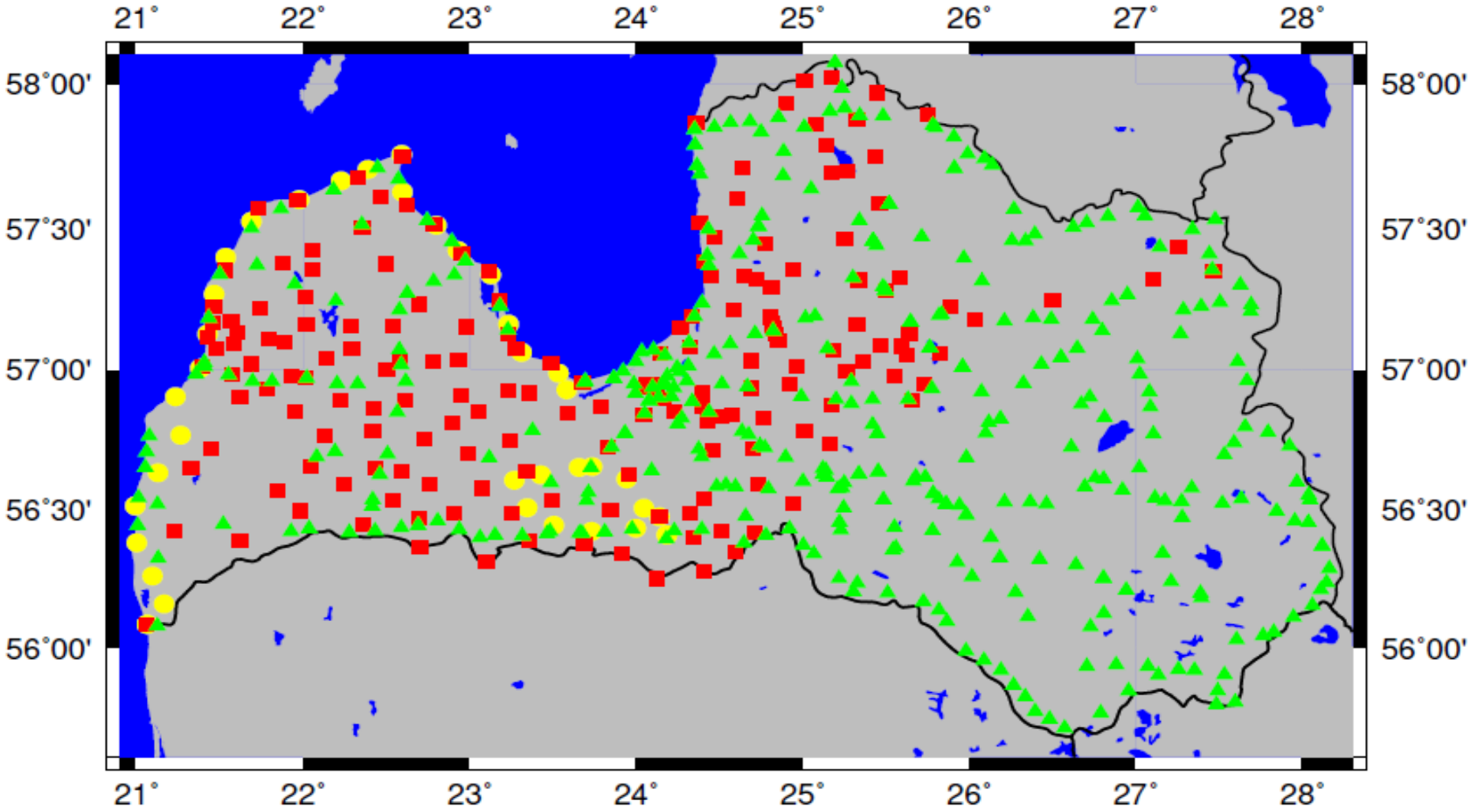
GNSS TPS GR5

Geoid model for
Eastern part of Latvia



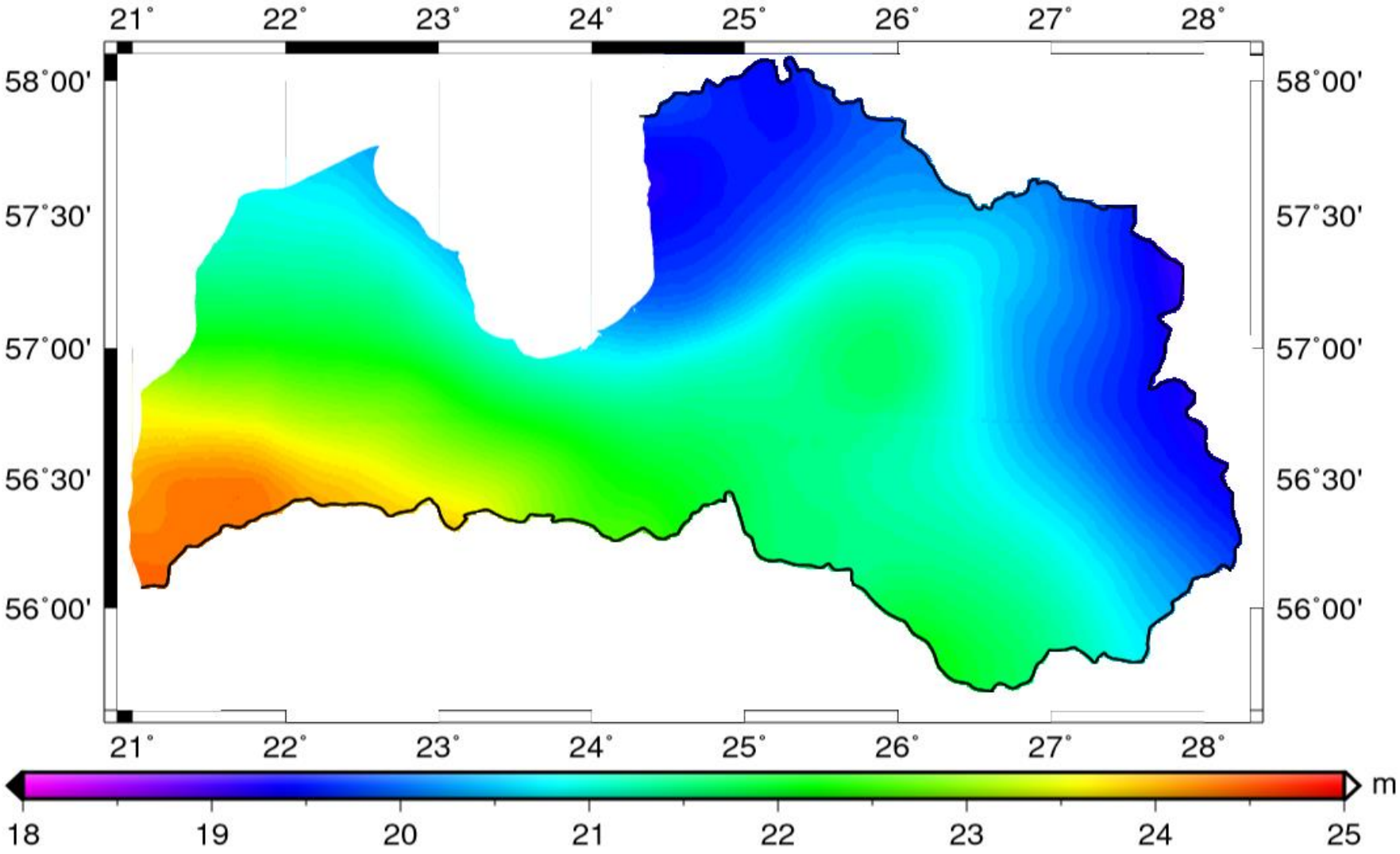

Digital Zenith Camera

# Fulfilled observations

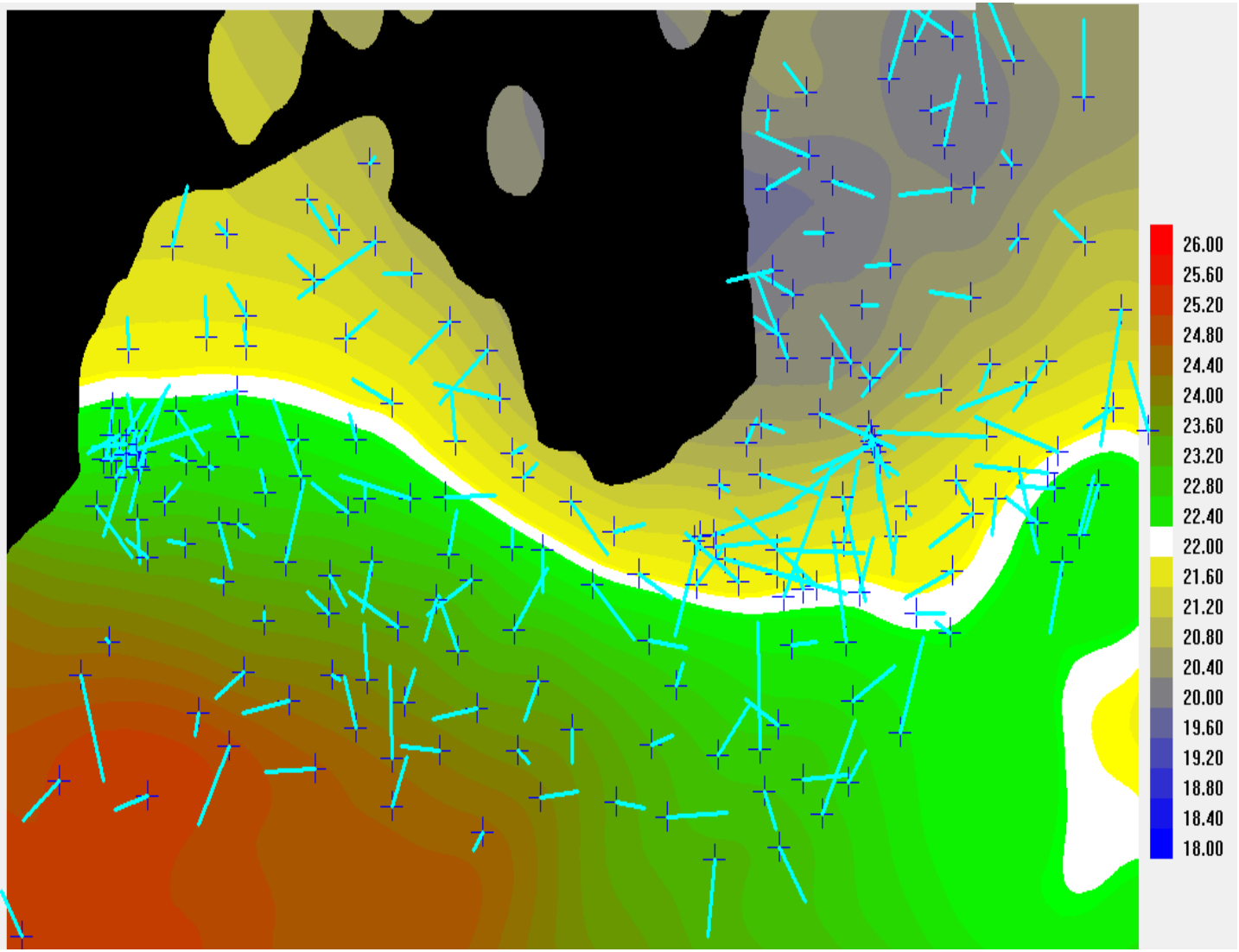



Green triangles – GNSS/levelling points, red squares – Vertical Deflection observations, yellow circles – gravity observations

# Current Qgeoid Model

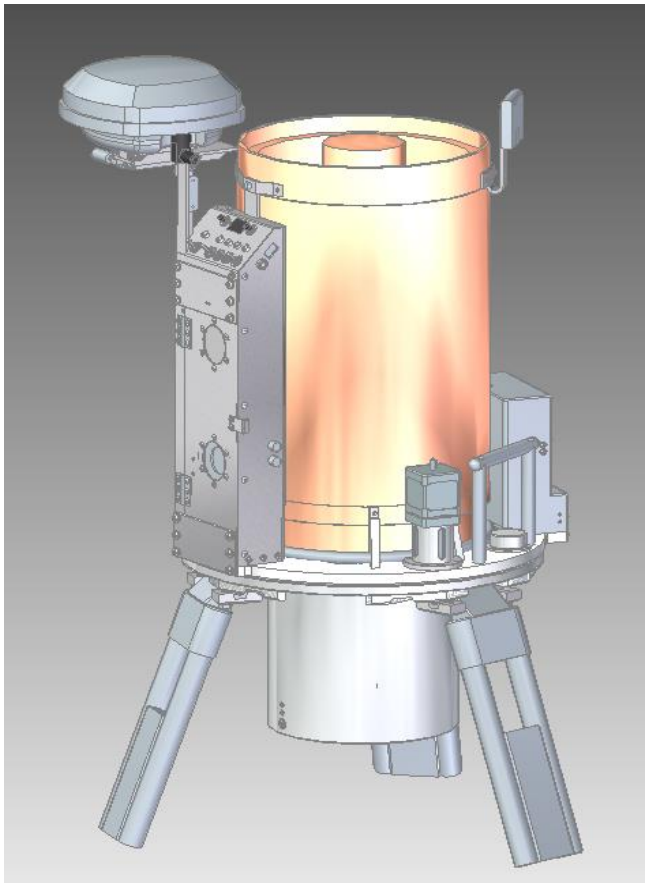


# Zenith camera observations: differences from global geoid GGM+

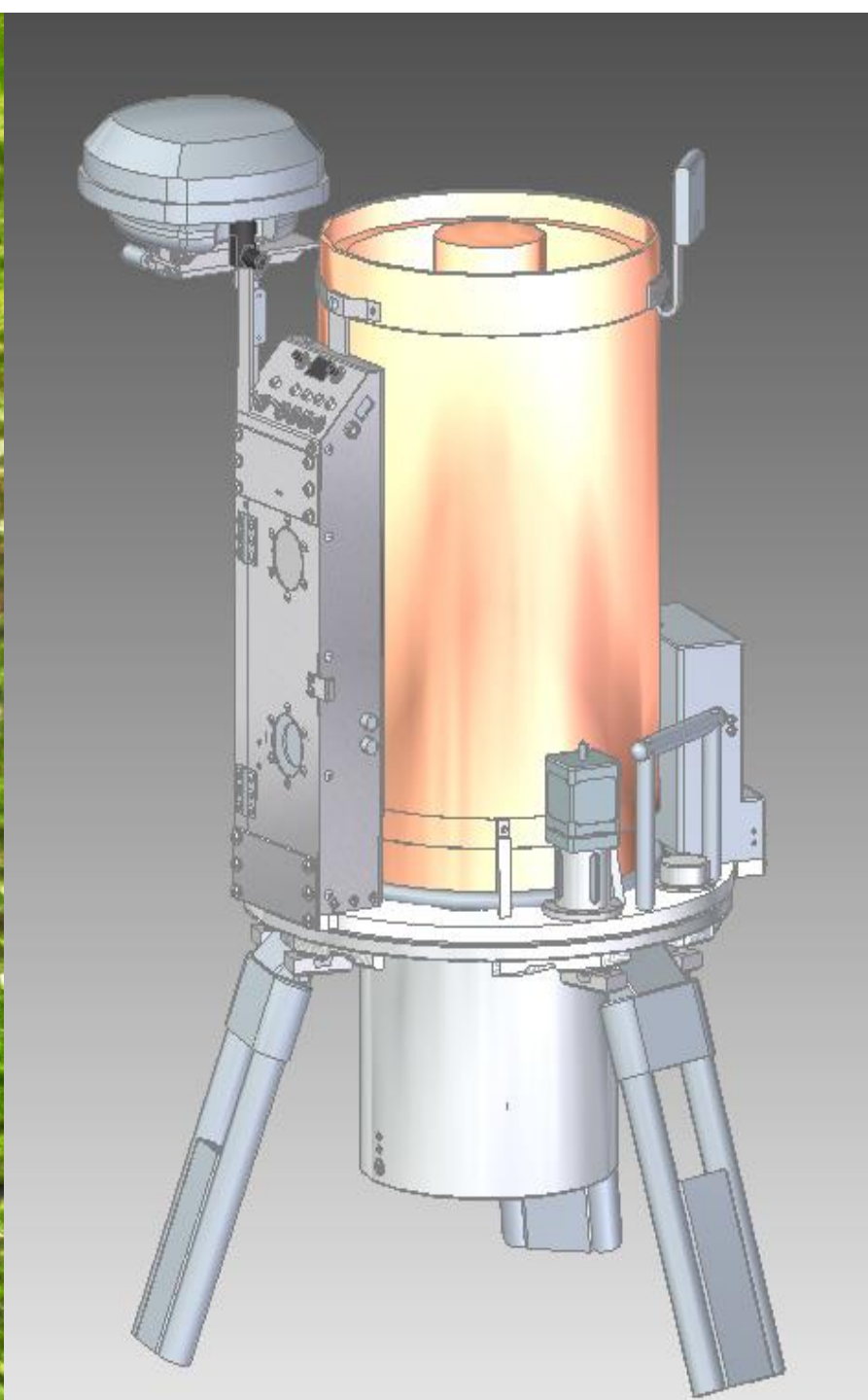



- 200 sites (2017-2018)
- 1 – 1.5 hours per site
- max 6 sites per night
- accuracy ~ 0.1″
- differences from GGM+:
  - average 0.02″
  - rms 0.4″
  - amplitude up to ~1″
- applications:
  - regional geoid models,
  - local geological features,
  - alternative to levelling

- **Elaboration of measurement methodology,**
- **Measurement control software corrections and complements,**
- **Data processing improvements and automation,**
- **Transition to GAIA data release 2 star catalog,**
- **Revision of mechanical design, development of a new model,**
- **Manufacturing of 2 new instruments has started,**
- **Negotiations on possible commercial application have started**

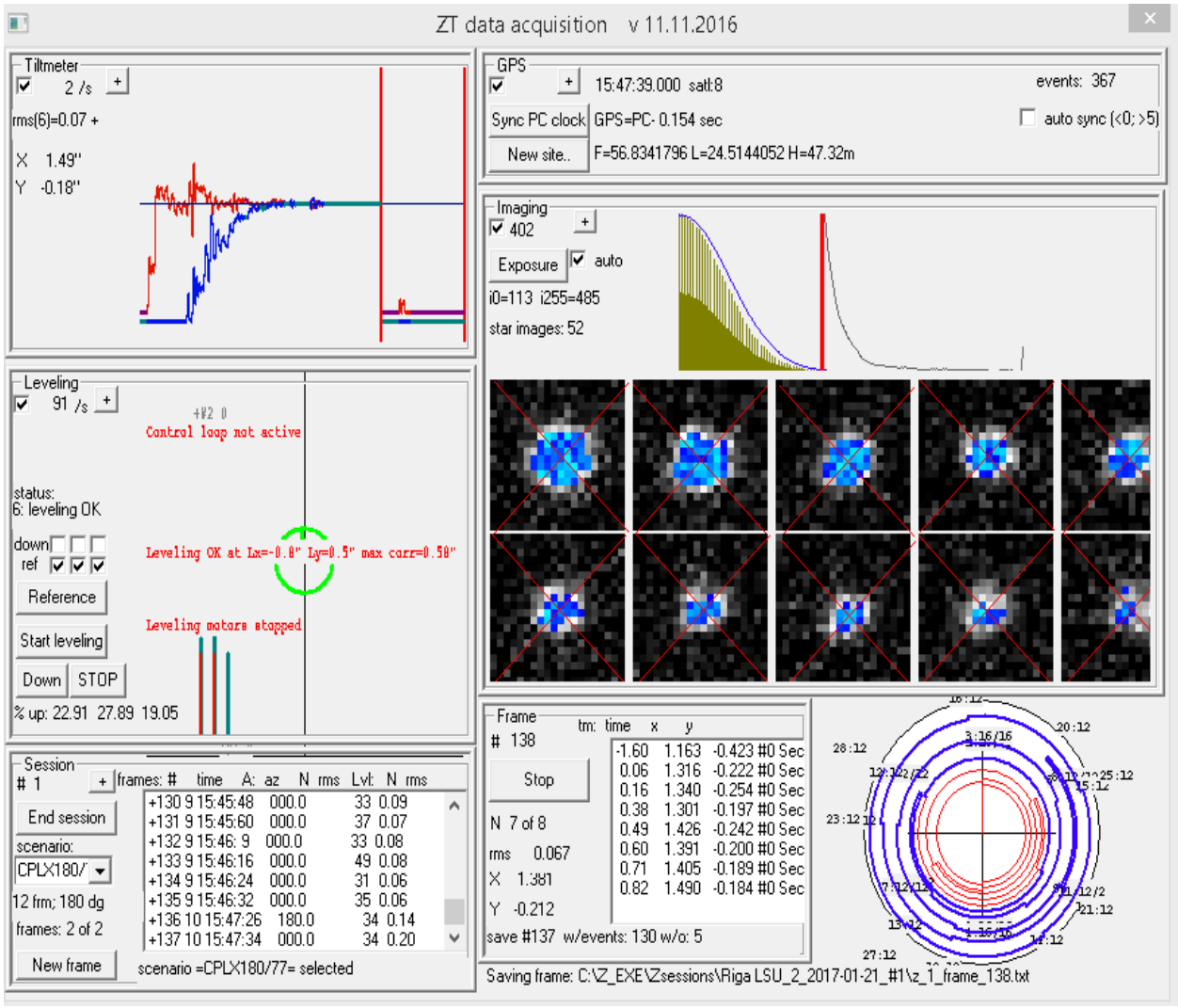



Hemisphere
MEADE
LX200



# •Measurement control

- All observation functionality within single interface window,
- Automatic mode supported,
- Measurement sequence specified in scenario script,
- 16 bit image intensity preserved,
- Support of uneven background intensity distributon analysis, improving twilight performance,

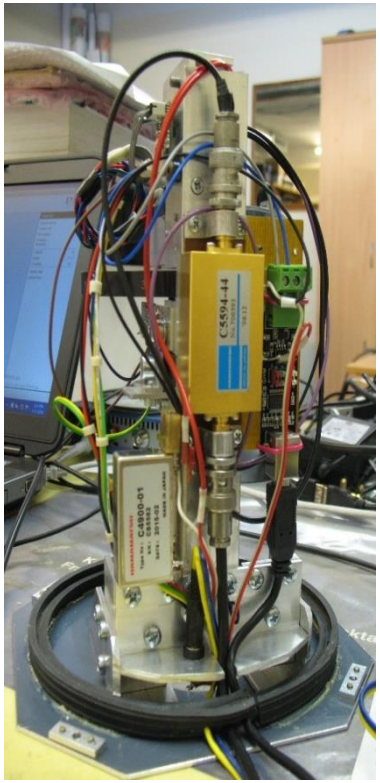


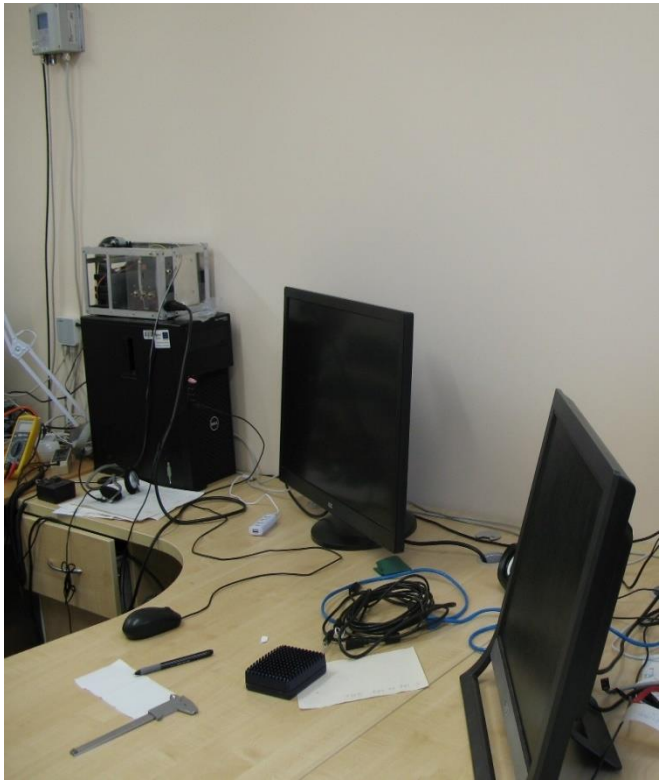
# Multi-purpose optical tracking instrument

- After completion of instrument dome and control room setup in the former library building at *Lielvārdes street 24*, installation and adjustment of instrument and its control facilities are underway.


Activities in 2017:

- installation and adjustment of optical systems and tracking hardware;
- installation of control computer network, tracking and image processing software;
- Adjustment and complements of SLR control and data processing software;
- installation and adjustment of transmitting pulse laser;
- installation of meteostation, GNSS receiver, time standard, other accessories;
- installation of event timer and result registration hardware;
- design and construction of reflected pulse processing assembly;
- determination of instrument position and orientation;



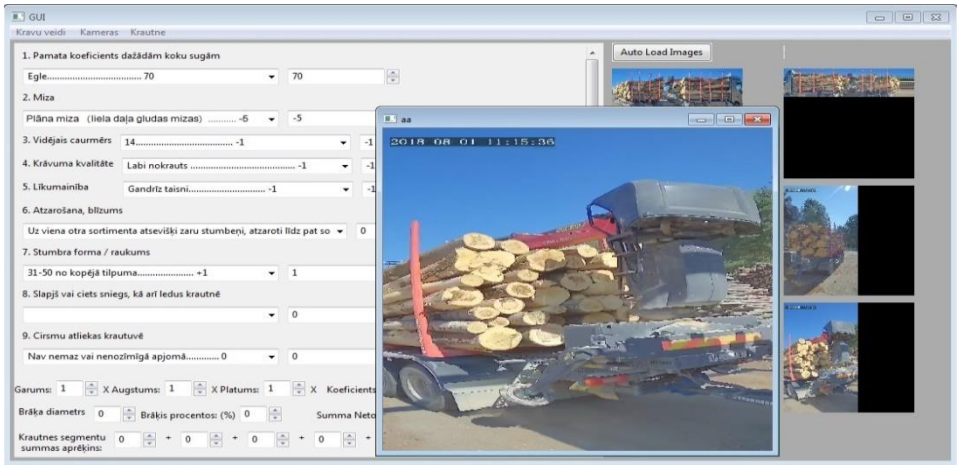
The project will proceed with:

- collecting of positional observation data for mount error model determination;
- installation and adjustment of reflected pulse processing assembly;
- installation of calibration target facility;
- adjustment of transmitting coude path;
- collecting of data for coude adjustment actuator model;
- test observations;

# Copernicus


Caroline-Herschel Framework Partnership Agreement for Copernicus User Uptake


- In the framework of the effective collaboration project of GGI and JSC Latvia's State Forests a measurement line has been created for the surveying of the volume of timber assortment, as well as developed software for geometric measurement of logs and wood chips loads using video files.




# GNSS Latvian CORS

EUPOS®
European Position Determination System

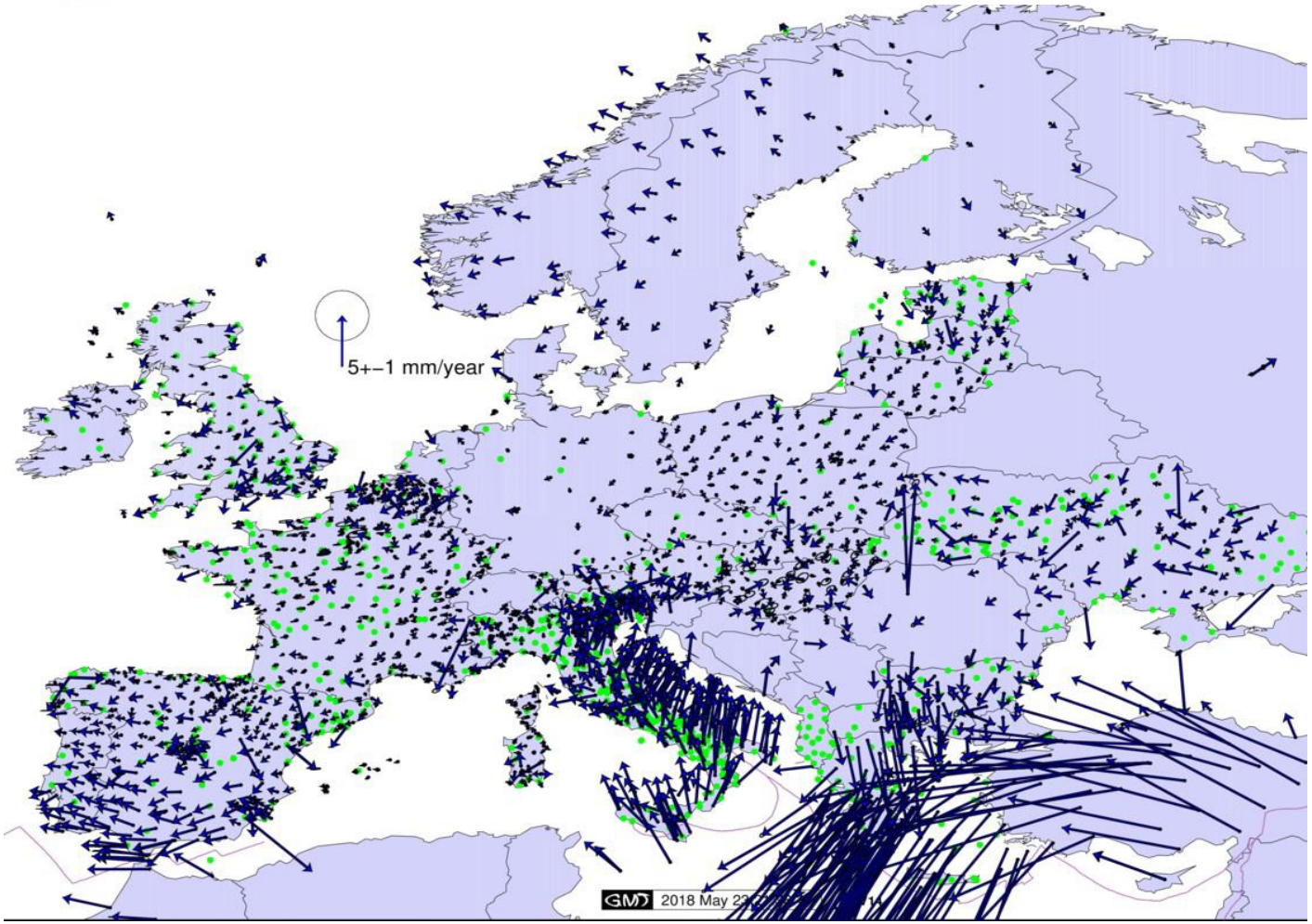
Ingus Mitrofanovs – Vice-chair
elected for period 2018-2022

GNSS observation results at the Latvian continuously operating station (CORS) networks LatPos and EUPOS-Riga

- 2007 – 2018 daily observations of 26 LatPos stations and 5 EUPOS®-Riga processed at the Institute of Geodesy and Geoinformatics
- Weekly solutions in SINEX data format regularly transmitted to EPN Densification Centre

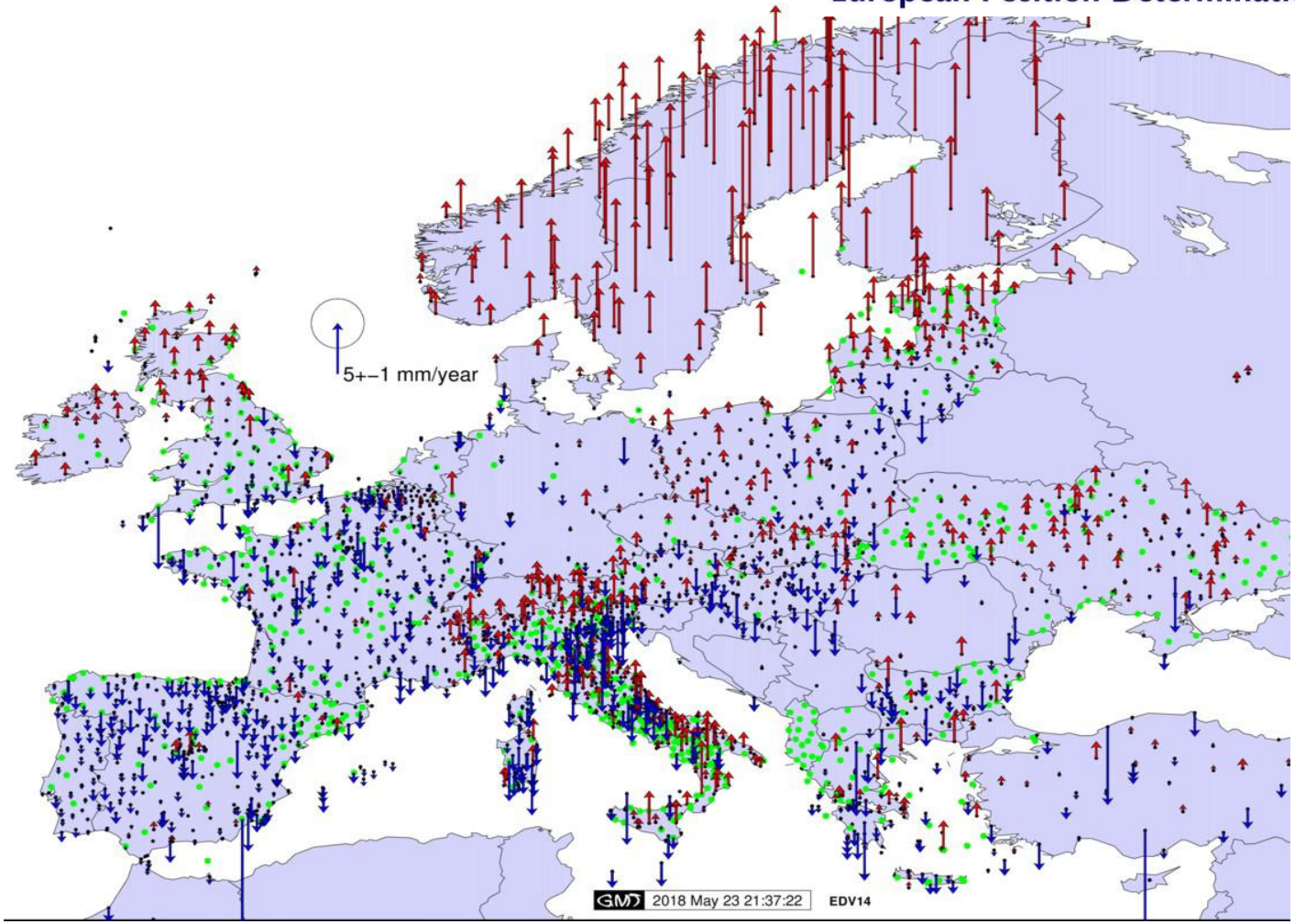
EUPOS®

European Position Determination System

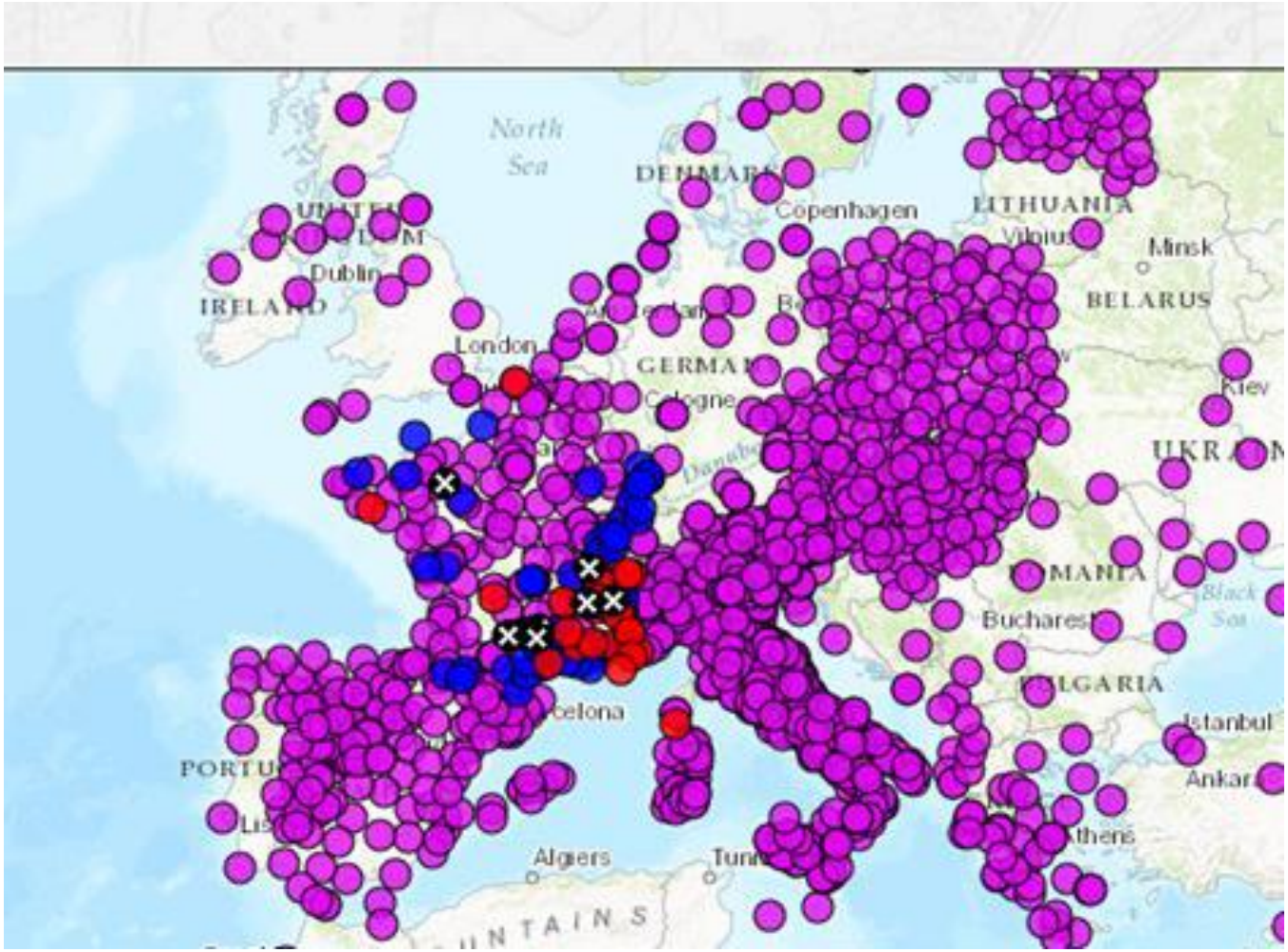


EUPOS®

European Position Determination System



# Latvian CORS data in EPOS (R.Fernandes et all, 2018)



# Space weather studies

- The space weather impact on GNSS positioning, navigation and timing has been included in the most important research programmes worldwide.
- The data set on Latvian CORS station observation results is an important basis for space weather impact on GNSS positioning, navigation and timing in latitude of 57ºN.
- 2 papers on this issue have been published by GGI in BJMC.

# Doctoral studies on the basis of research in GGI

- Geodesy is a sub-sector in a branch of Civil engineering in Latvian classification of sciences.
- Therefore, the Doctoral studies for geodesy have been performed in the Riga Technical University in the doctoral study programme of Civil engineering.
- However, the doctoral studies of GGI researchers have been performed on the research basis of GGI under supervision of GGI leading researchers.

# Thank you!

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