VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETAS

NŽT

NATIONAL REPORT OF LITHUANIA TO EUREF 2019

E. Paršeliūnas, D. Šlikas, R. Obuchovski, A. Būga, R. Baniulis,

K. Galinauskas, R. Kolosovskis, P. Petroškevičius, V. Puškorius,

M. Petniūnas, S. Valotka

Institute of Geodesy, Vilnius Gediminas Technical University

J. Aldonienė

Ministry of Agriculture

J. Špūraitė, R. Žygaitė

National Land Service under the Ministry of Agriculture

Atkurtai Lietuvai 100

Tallinn, Estonia, 2019

Outline

- CORS Network LitPOS
- LitPOS Reprocessing
- Gravity survey
- Orthophotomaping

LitPOS(1):

LitPOS (**Lit**huanian **P**ositioning **S**ystem), the network of permanent reference GNSS stations, became operational in July 2007. It provides data both for real-time and post-processing applications.

LitPOS stations cover the whole territory of Lithuania. Total number of LitPOS GNSS stations is **31**. LITPOS includs also **3** ASG-EUPOS Polish stations and **6** LATPOS Latvian stations

CORS Network - **LitPOS**

LitPOS(2)

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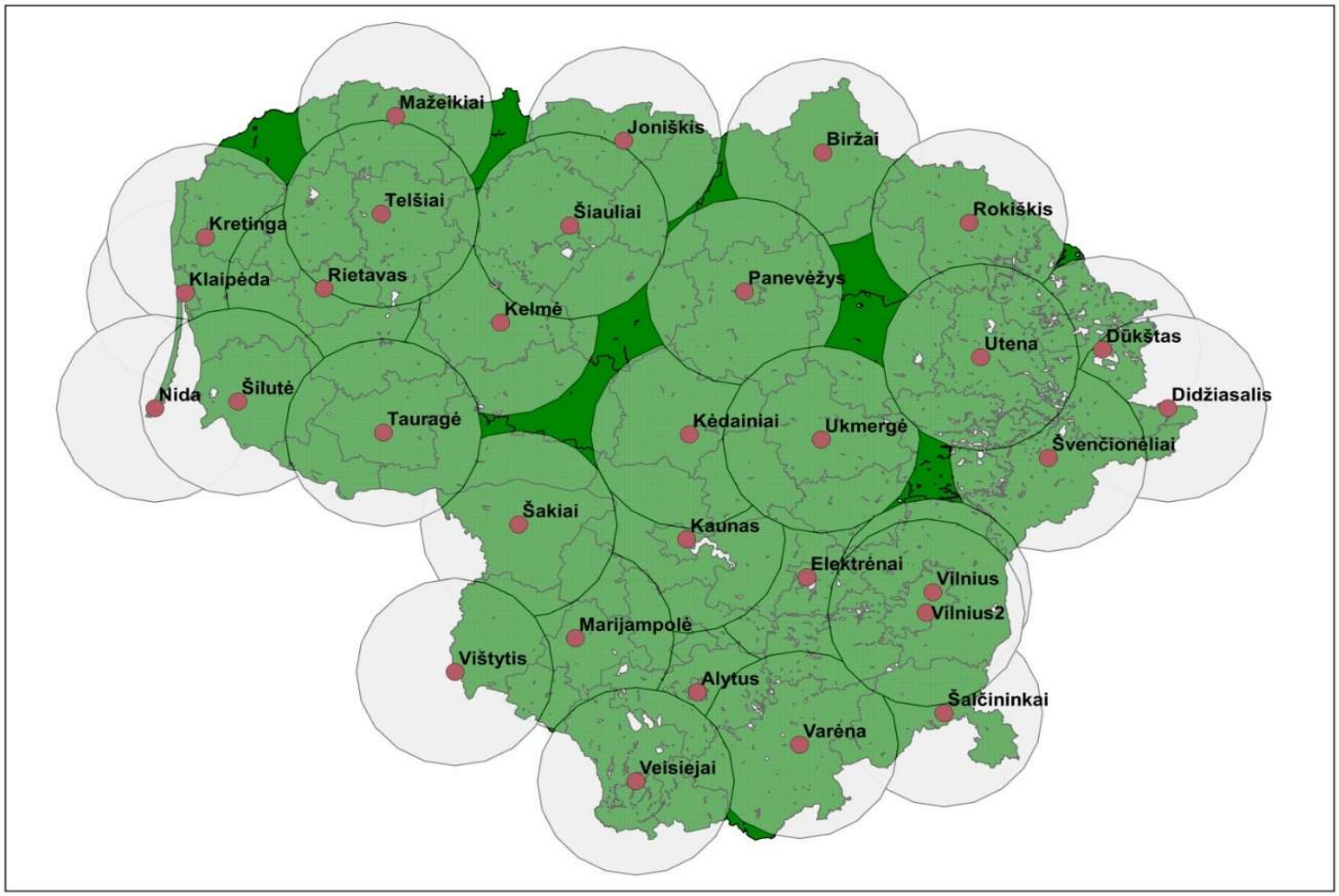

Coverage of LitPOS stations (R=35 km)

LitPOS(5)

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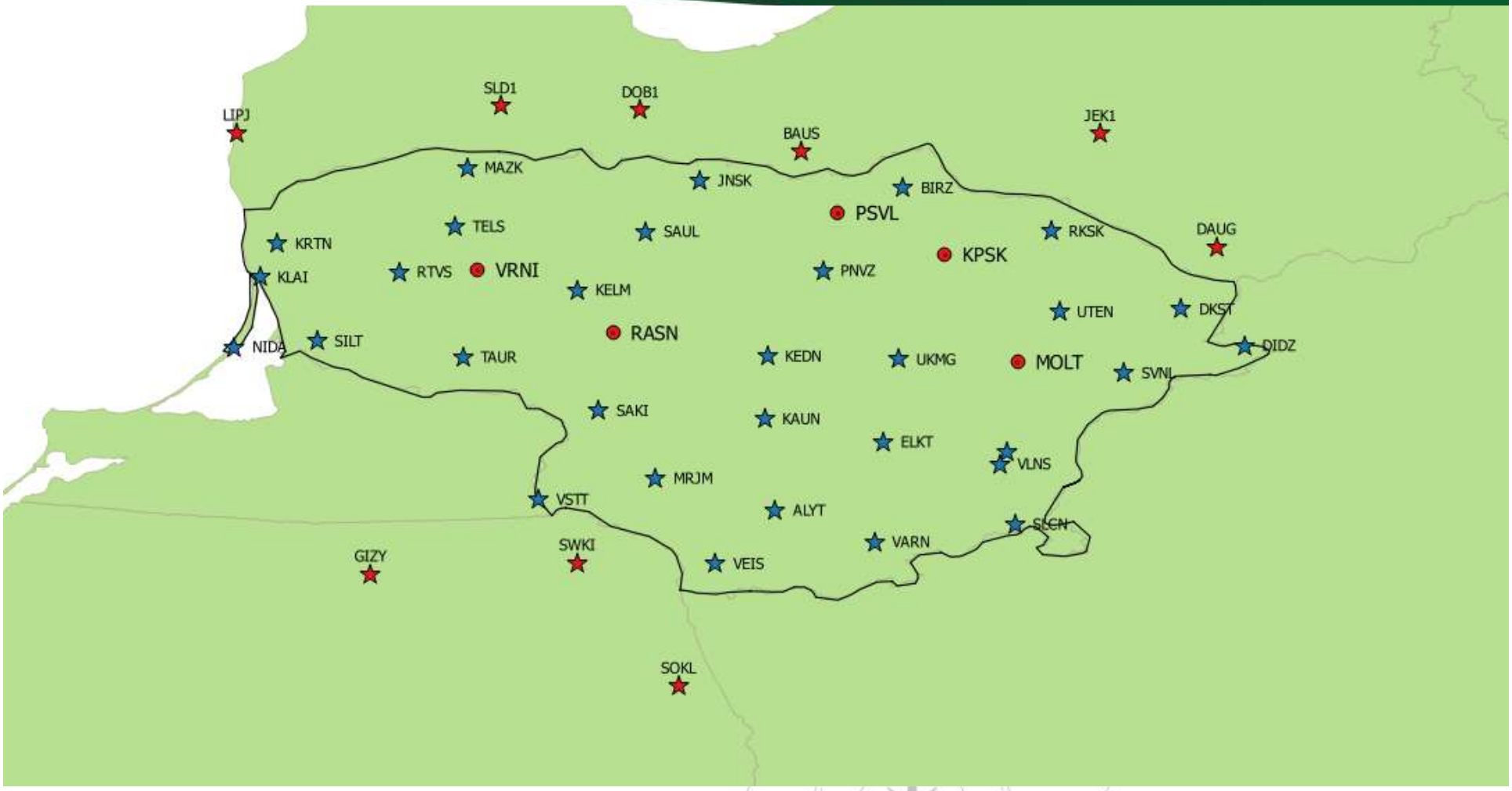

LitPOS densification 5 new stations during 2019 year (red dots)

LitPOS(3)

Users statistics (2019-01-31):

- **Number of LitPOS registered users: 1429 (+84)**
- **Numbers of active users: 794 (+142)**
- **Number of registered receivers: 3148**

LitPOS(4)

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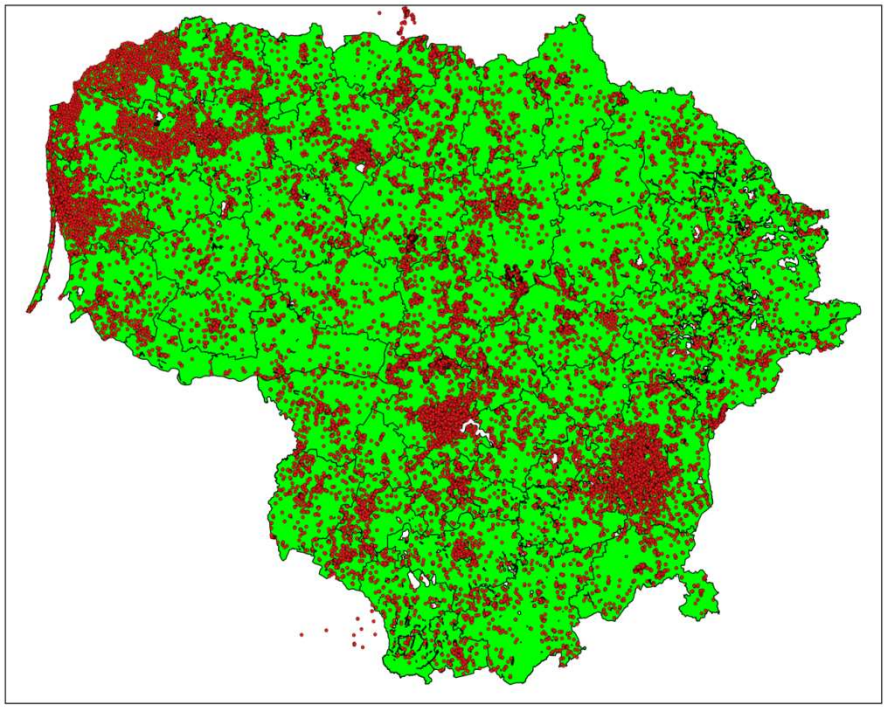
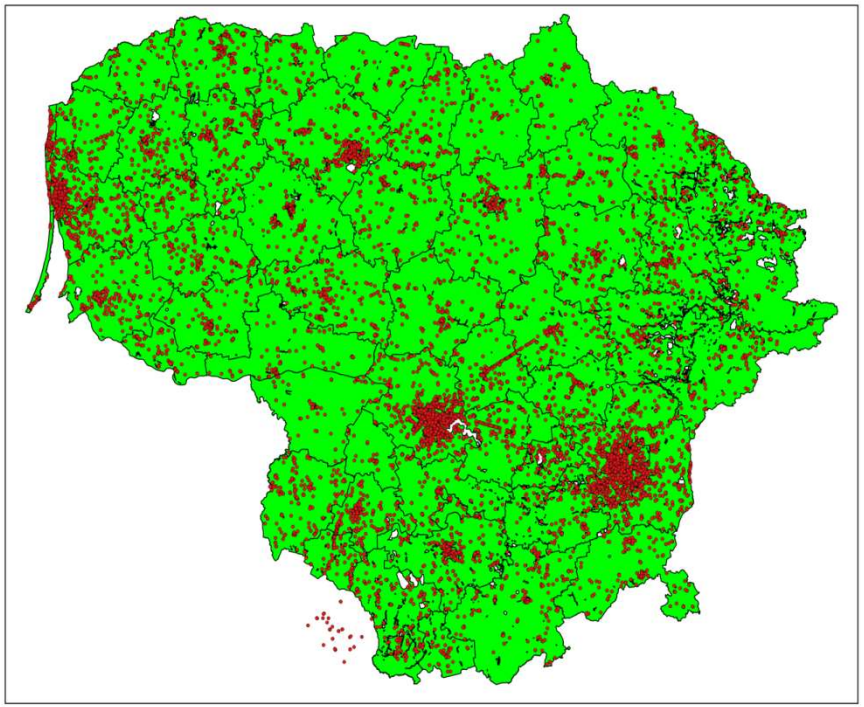
Users connections during August 2018





Users connections during December 2018

LitPOS(5)

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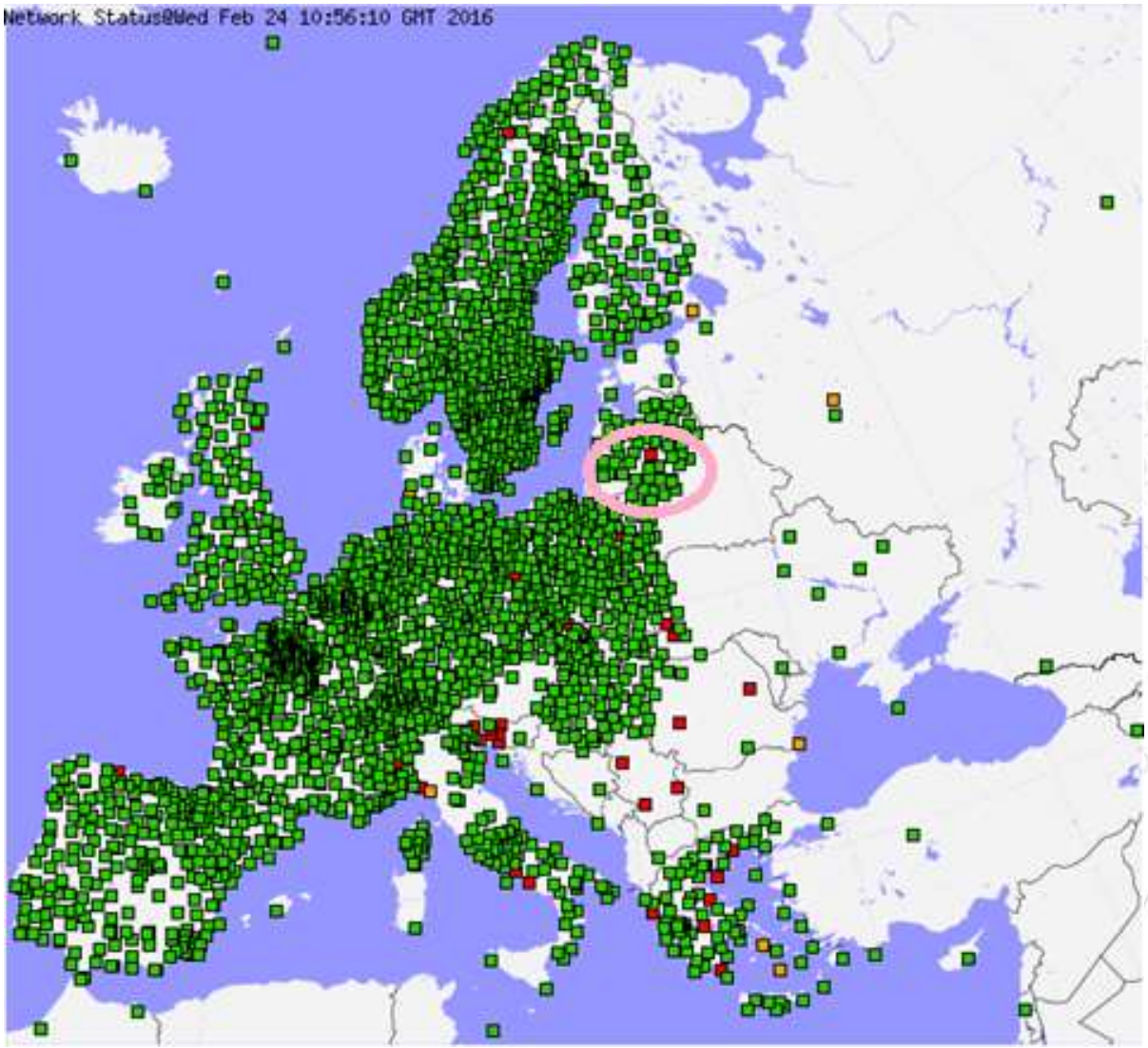
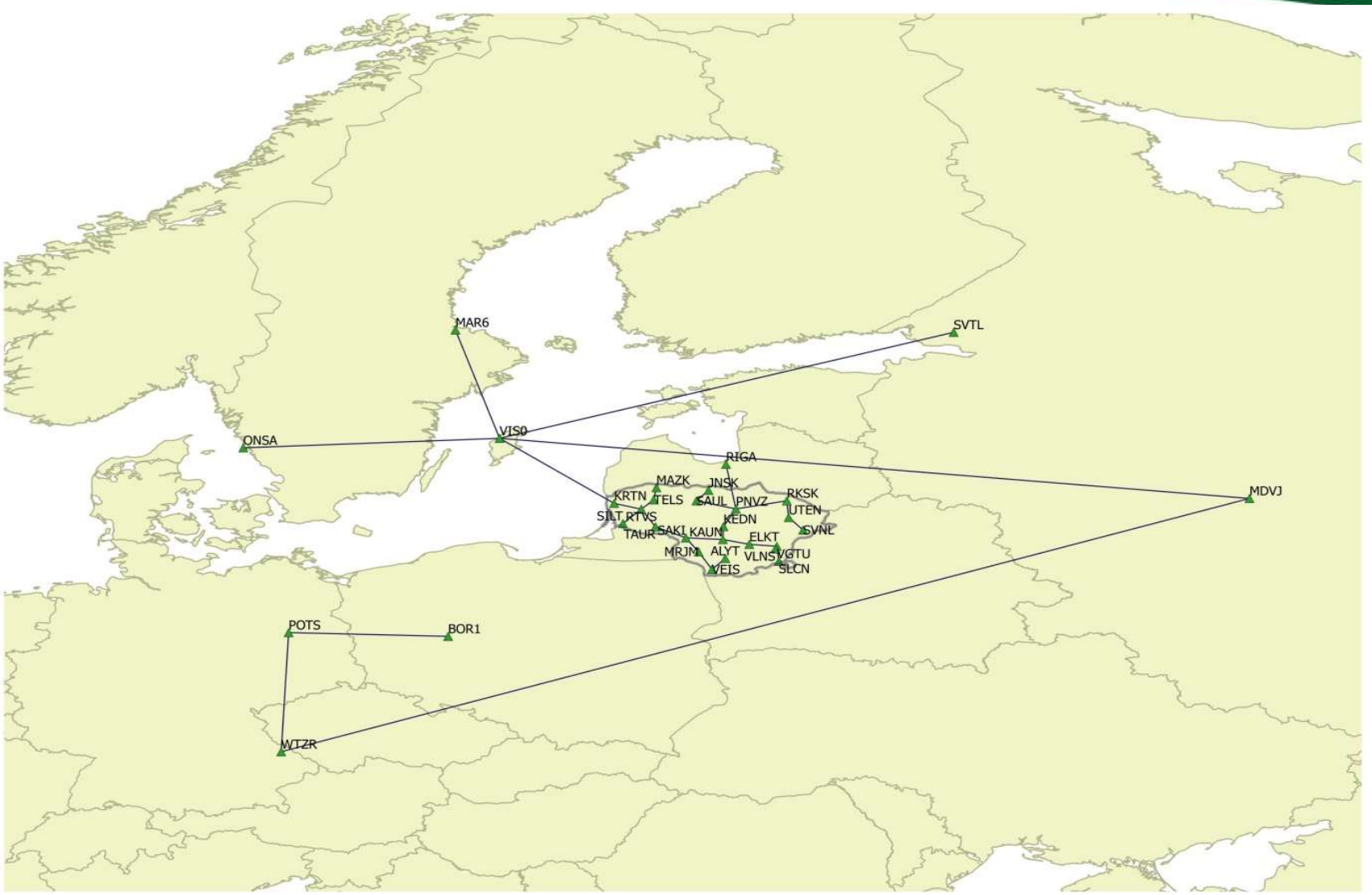
LitPOS in EUMET network

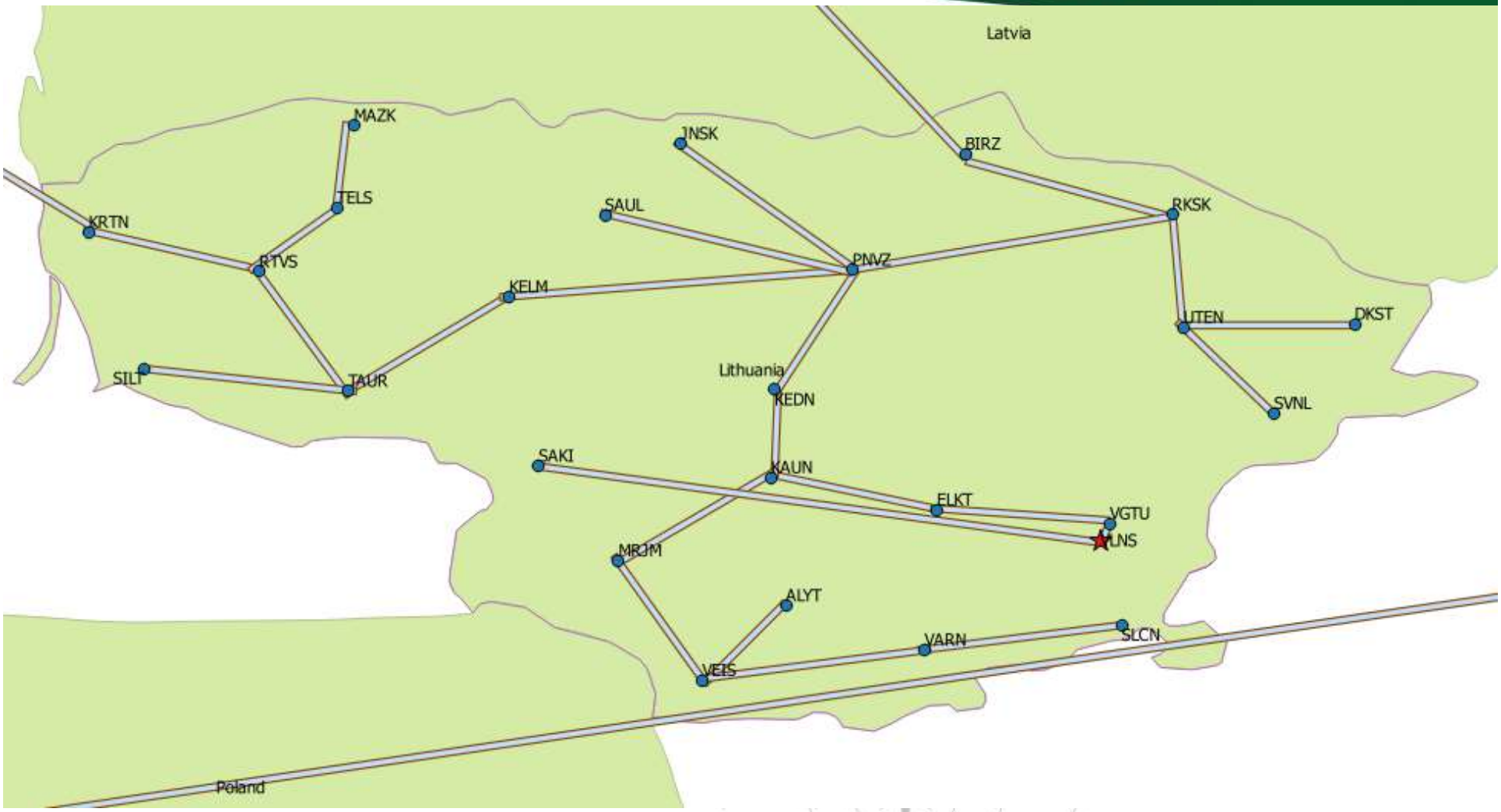


- **LitPOS Reprocessing**

LitPOS_Repro(2):



LitPOS_Repro(3):



LitPOS_Repro(4):

Main characteristics:

- Software: **BSW5.2** update 2016 01 08
- Network: **25+6+3** LitPOS stations +**10** IGS/EPN fiducial stations
- GNSS: **GPS**
- Antennas PCV: **absolute** and **individual calibration**
- Precise orbits, etc.: **CODE**
- Tropospheric refraction: **VMF**
- Ocean tide model: **FES2004**
- Baselines processing strategy: **OBS-MAX**
- Ambiquities resolution strategy: **QIF**
- ITRF realisation: **IGb08** (EPN_A_IGb08_C1845.SNX) (ITRF2014 -GPS week 1934 (29 January 2017)
- Cut-off angle: **3, 10, 25**
- Period: **2008-2014**; (2015-2018 GPS week 2000)
- Products: **Daily** and **weekly SNX** (**NEQ + COV**)
- Coordinates Time Series: analysis by **GITSA, FODITS, TSview**

LitPOS_Repro(5):

- **2008-2017 weekly SINEX** files (with **COV matrix**) was uploaded to **EPN ftp server** with intention to fill the gap of Lithuania in European dense velocity field.

- Reprocessing of **2008-2017 daily solutions** is finished and **weekly solutions** (with **NEQ matrix**) was uploaded to **NKG ftp server**.

- **Operational processing** started from **GPS week 1934.**

LitPOS_Repro(5):

Coordinates velocities estimation

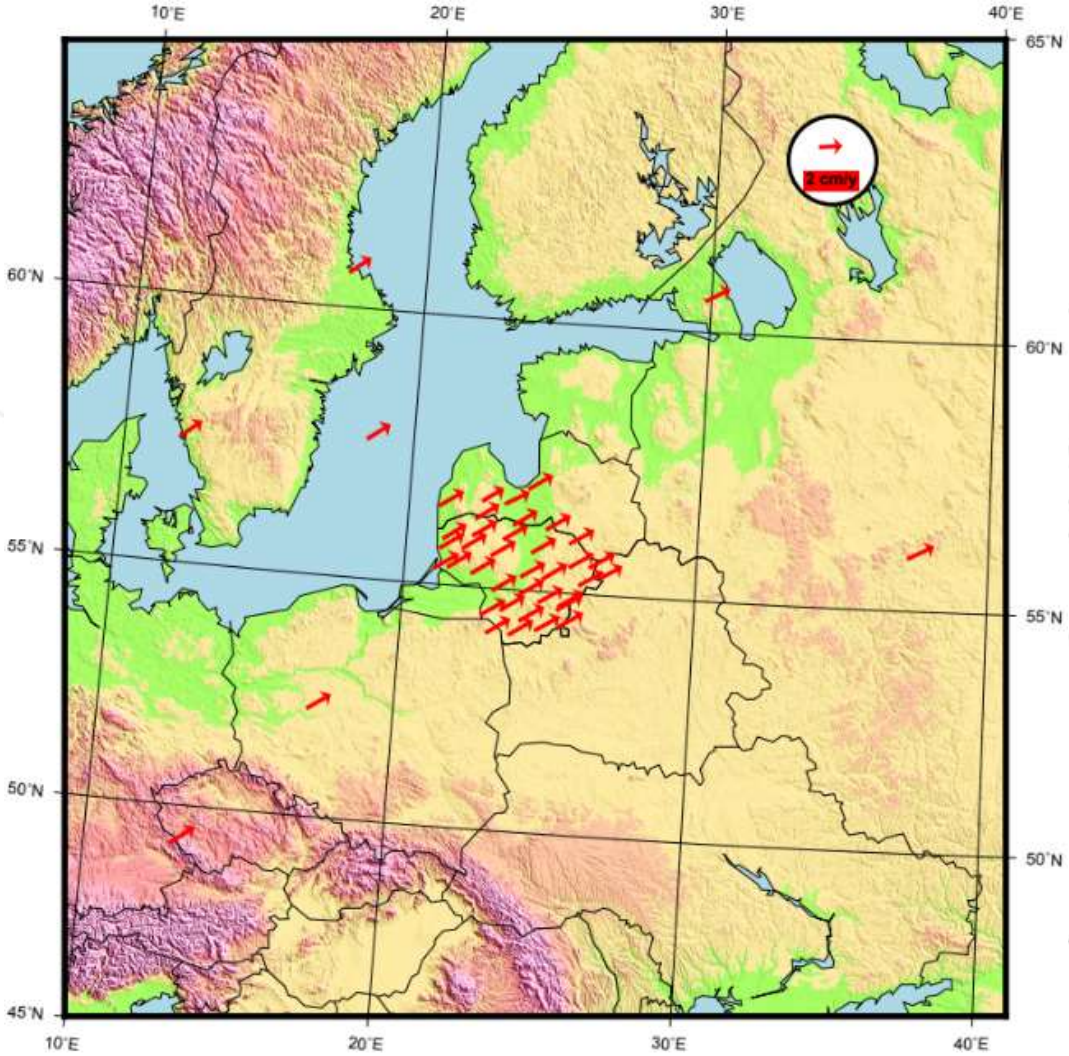
Input data - daily sinex files (10 degree cut off angle) with NEQ obtained from BERNESE using NKG guidelines.

Time span of reprocessing 2007-2018 (stations with less then 3 years of data were excluded from calculations).

Velocities were calculated using CATREF software package.

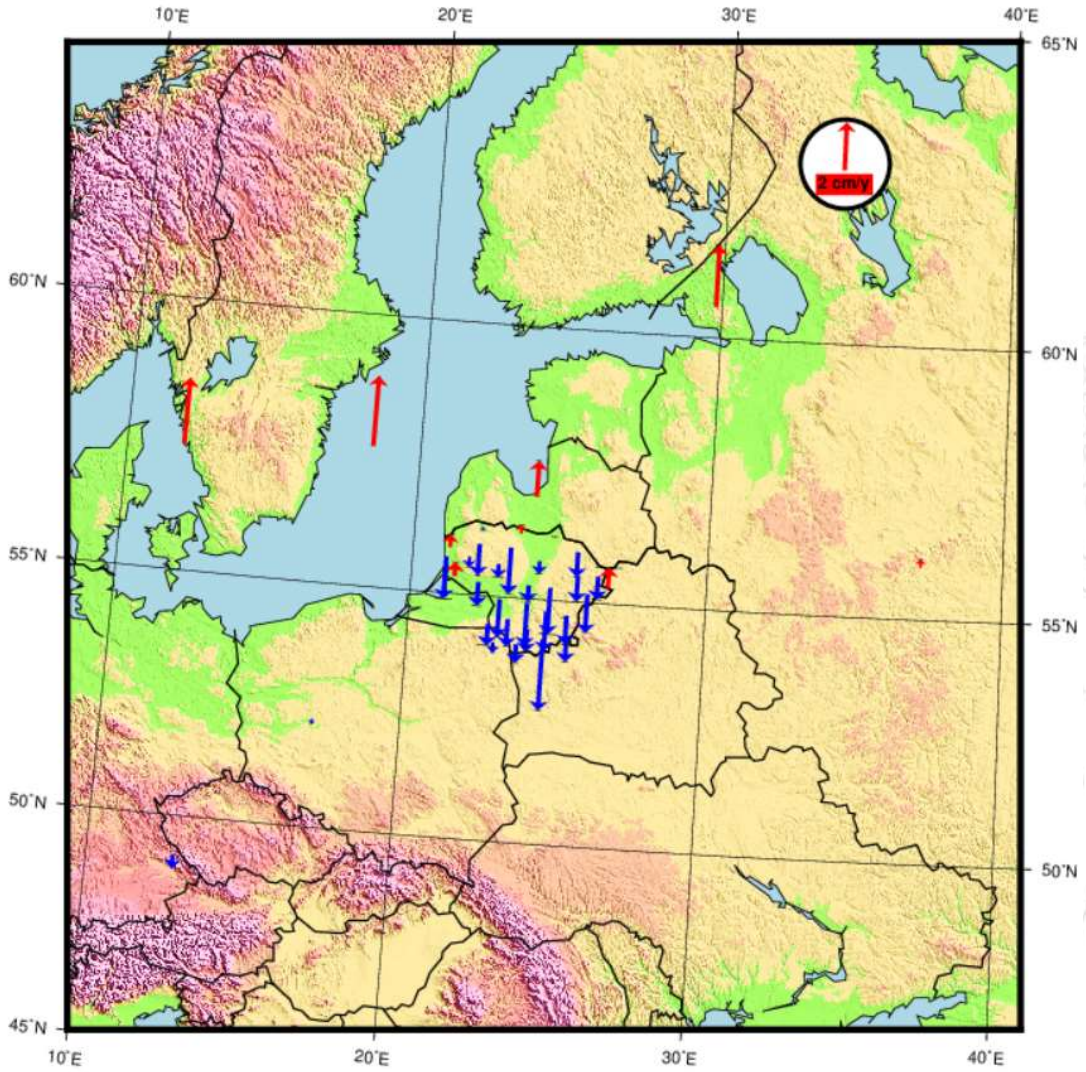
LitPOS_Repro(5):

Changes of LitPOS stations plane coordinates (N E component)

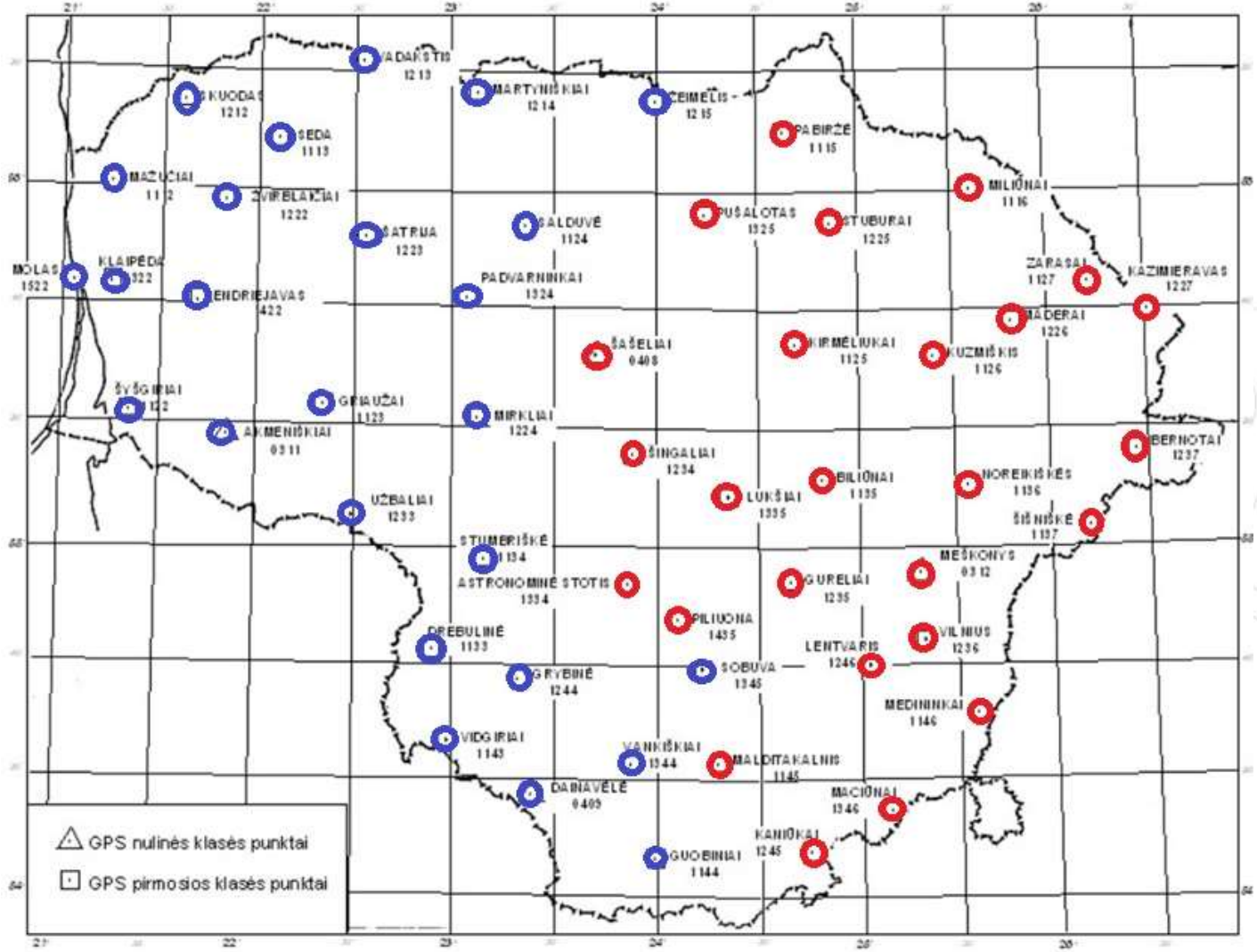


LitPOS_Repro(5):

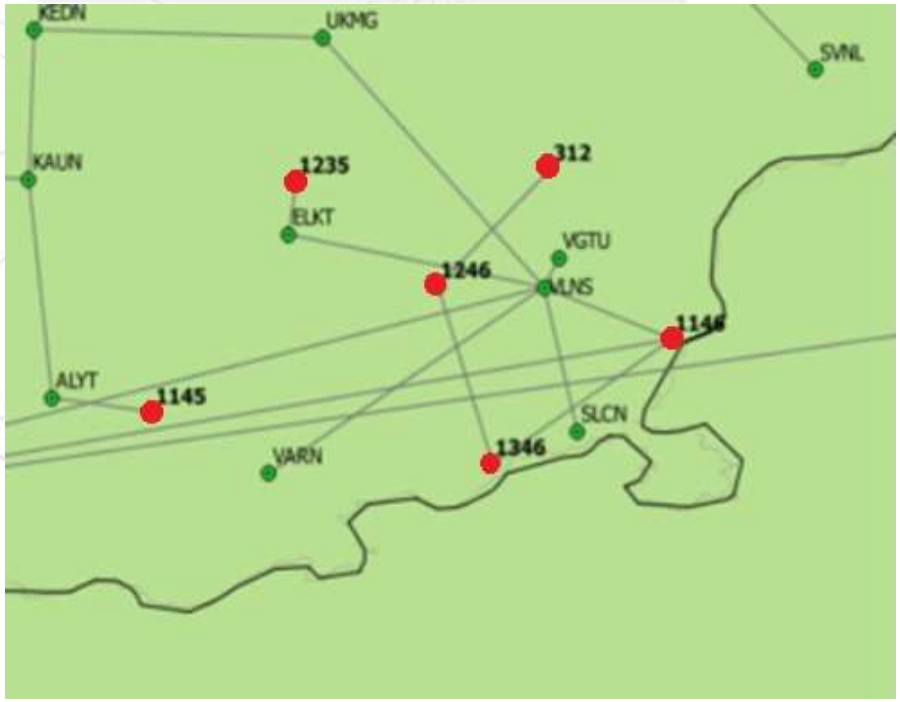
Changes of LitPOS stations heights (Up component)



First-order GPS network re-measurements in 2018-2019



LitPOS network baselines together with first-order points



Gravity survey

- **Gravity survey**

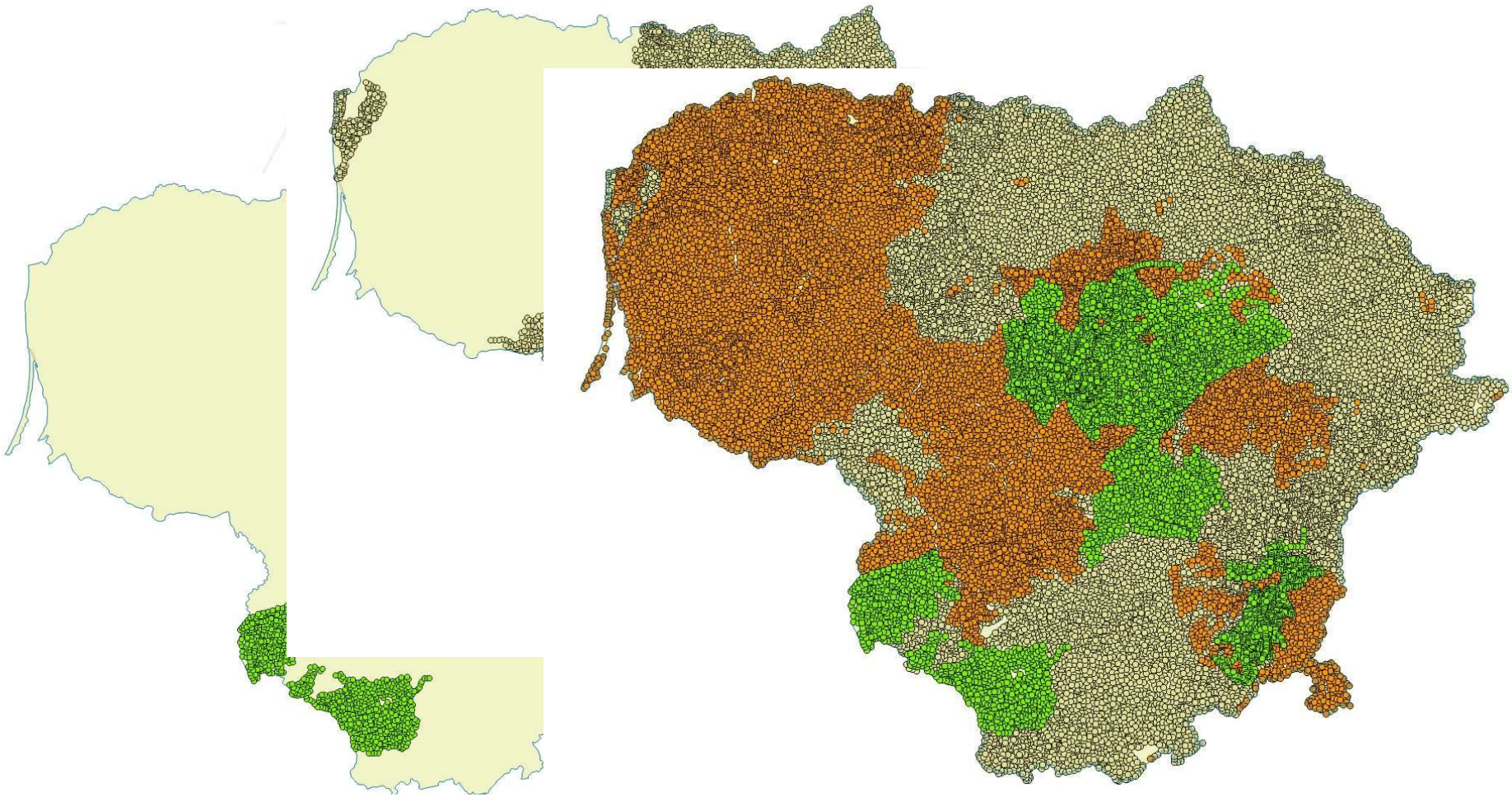
Gravity survey (5)

Project "GRAVIMETRIC SURVEY OF THE LITHUANIAN TERRITORY"

- The gravity survey is based on the Lithuanian state gravity control network, which consists of **686** points. The standard deviations of the gravity acceleration at these points are not bigger than **10 µGal**.
- **5** Scintrex CG-5 gravimeters employed.
- Total number of gravity points: 30 000 (**32 951**).
- Density of gravity points: **1 point in 2 km^2**.
- The average distance between gravity points should be about **1.5 – 2 km**.
- RMS error of the gravity acceleration at the gravity survey points < **60 µGal** (**18.8 µGal**)
- RMS error of Bouguer anomalies < **80 µGal** (**23 µGal**).
- RMS error of interpolated values of Bouguer anomalies <**100 µGal (33 µGal).**
- The accuracy of the gravity points coordinates < **0.20 m (0.025 m)**, the accuracy of the normal heights, applying geoid model LIT15G, < **0.15 m (0.02 m)**.

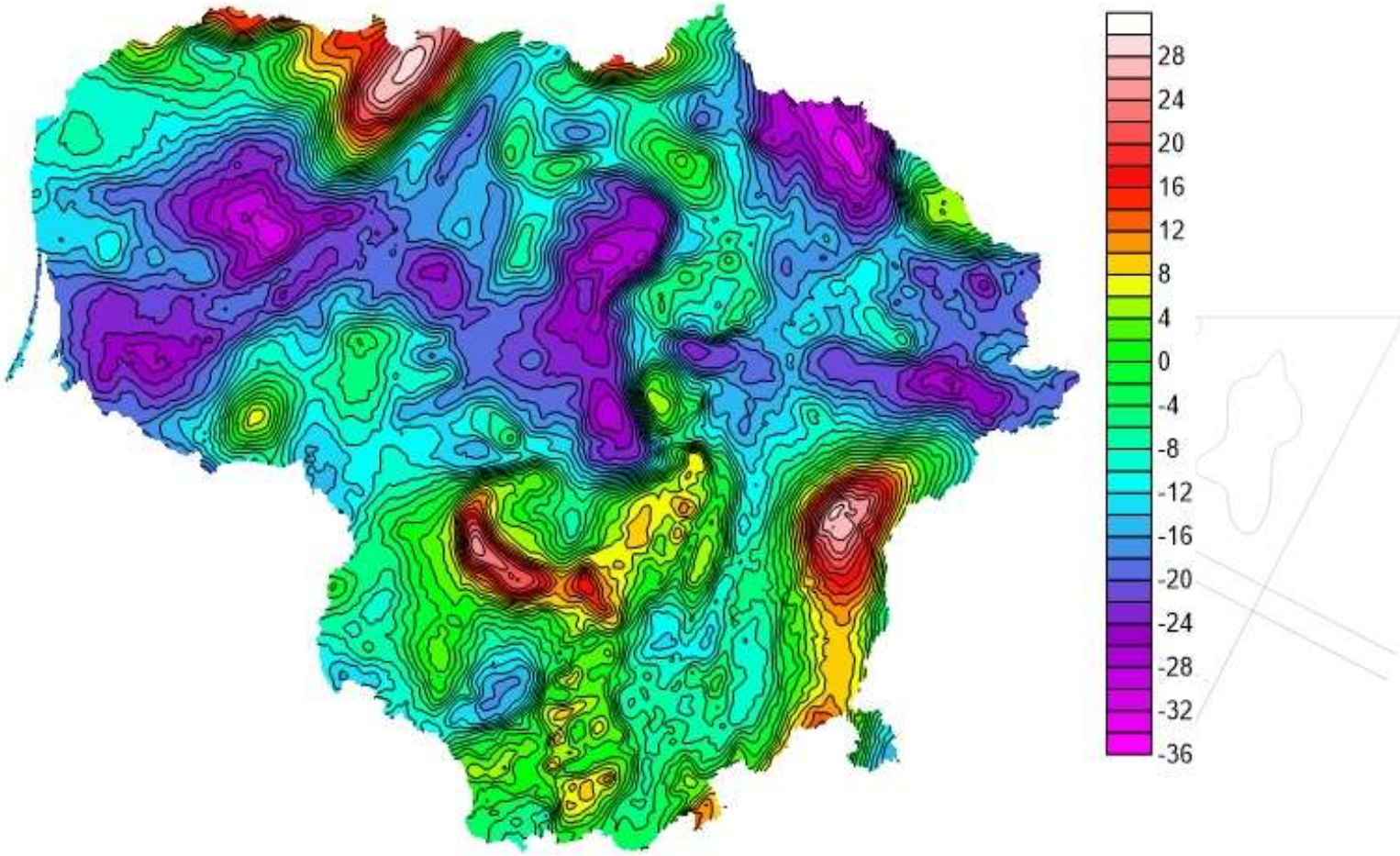
Gravity survey (6)

GRAVITY OBSERVATIONS IN 2016-2017-2018



Gravity survey (6)

Bouguer anomalies map of Lithuania



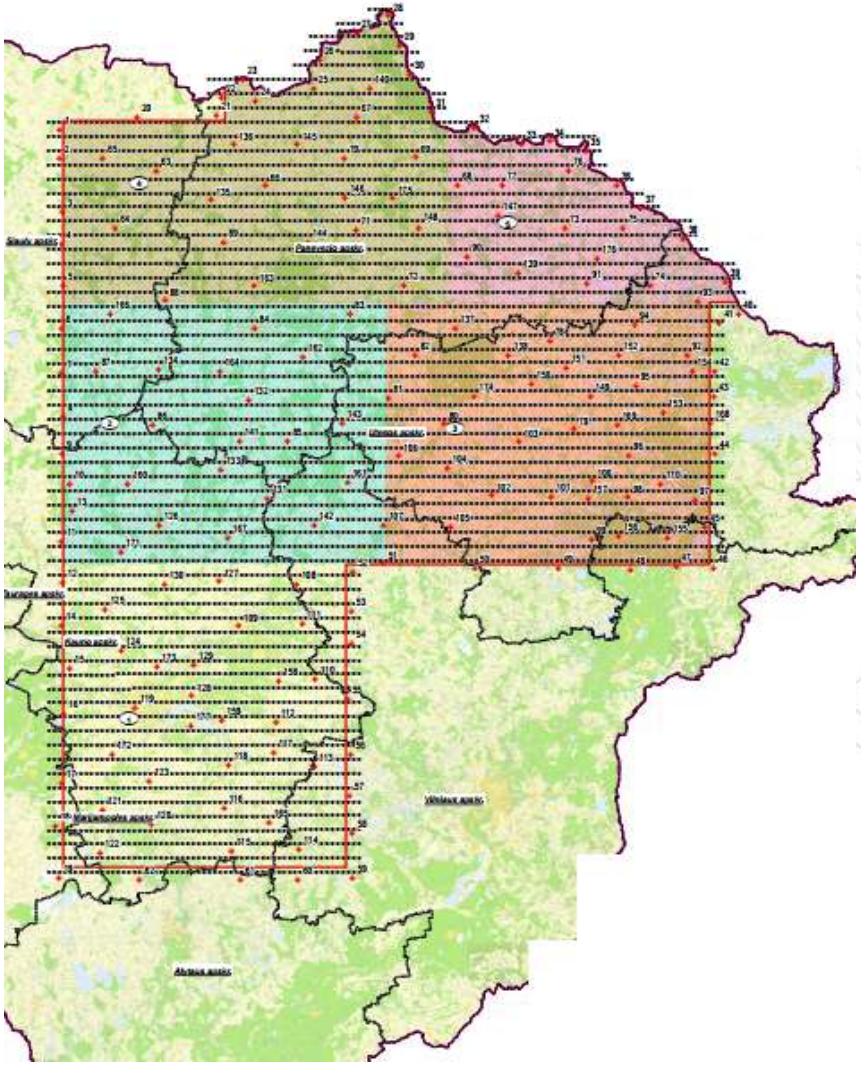
Isoanomalies step – 2 mGal. Earth's crust density – 2.67 g/cm^3.

- **Orthophotomaping**

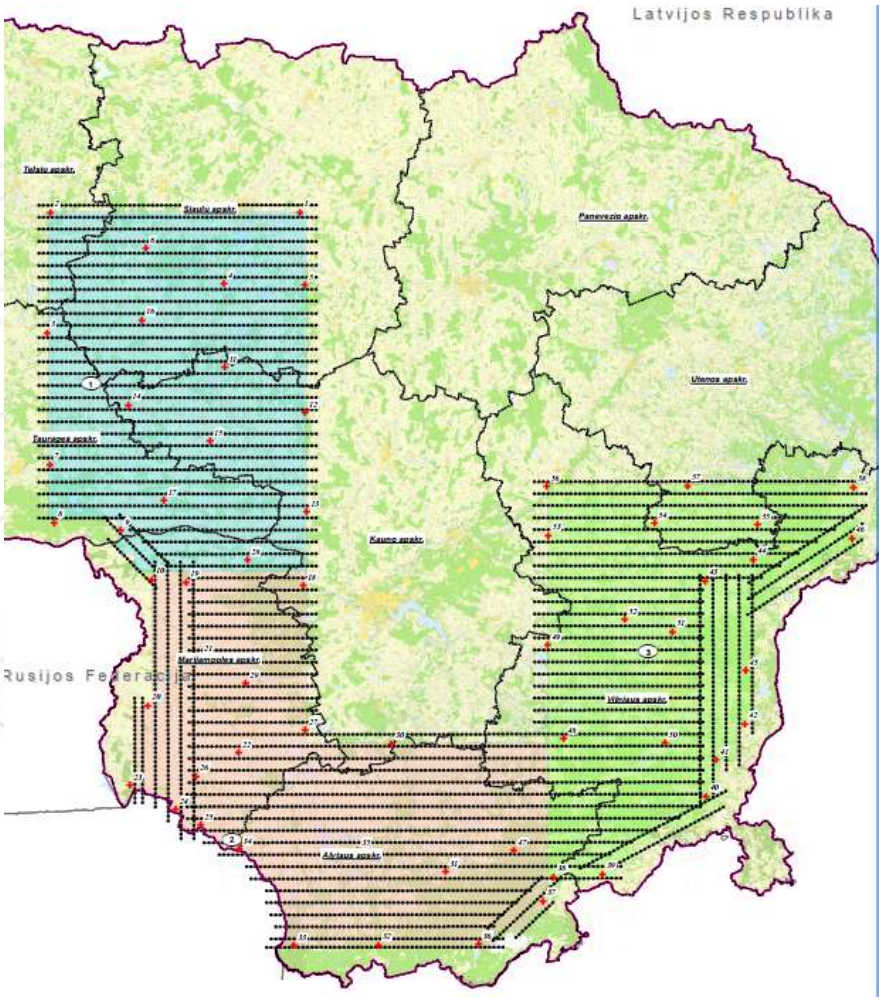
Orthophotomaping

Period 2018-2020

2018



2019



Future plans

- GNSS observations at **250** benchmarks of Vertical Network of Lithuania in **2019-2020**
- Development of the 3rd order Vertical Network of Lithuania in **2019-2022** (**4000** km)

THANKS FOR YOUR ATTENTION !

www.gi.ap.vgtu.lt

www.nzt.lt

www.geoportal.lt

www.litpos.lt

www.zis.lt