



LIETUVOS RESPUBLIKOS  
ŽEMĖS ŪKIO MINISTERIJA



VILNIAUS GEDIMINO  
TECHNIKOS UNIVERSITETAS

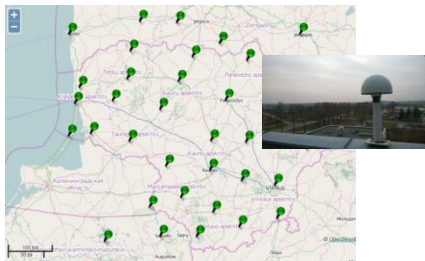


# NATIONAL REPORT OF LITHUANIA NKG Science week 2020

Eimuntas Paršeliūnas, Vytautas Paršeliūnas, Simonas Valotka

*Ministry of Agriculture*

Reykjavík, Iceland , 2020-03





- Juridical issues
- CORS Network LitPOS
- Vertical network
- Gravity survey



# LT juridical issues

## Law of Geodesy and Cartography

### Lietuvos Respublikos geodezijos ir kartografijos įstatymas

Rūšis:	Įstatymas
Identifikacinis kodas:	1011010ISTA00IX-415
Užregistravimo TAR data:	
<b>Galioja</b>  	Įsigalioja 2001-07-18
Kalba:	Lietuvių

Priėmimo data:	2001-06-28
Dokumento nr.:	IX-415
Priėmė:	Lietuvos Respublikos Seimas
Paskelbta:	Valstybės žinios, 2001-07-18, Nr. 62-2226

<b>Galiojanti suv</b>
Suvestinių reda
Pakeitimų proje
Eurovoc termin
Ryšys su ES tei

### Galiojanti suvestinė redakcija (nuo 2020-01-01)



### *Suvestinė redakcija nuo 2020-01-01*

Įstatymas paskelbtas: Žin. 2001, Nr. [62-2226](#), i. k. 1011010ISTA00IX-415

### *Nauja redakcija nuo 2010-05-11:*

Nr. [XI-786](#), 2010-04-27, Žin. 2010, Nr. 54-2649 (2010-05-11), i. k. 1101010ISTA00XI-786

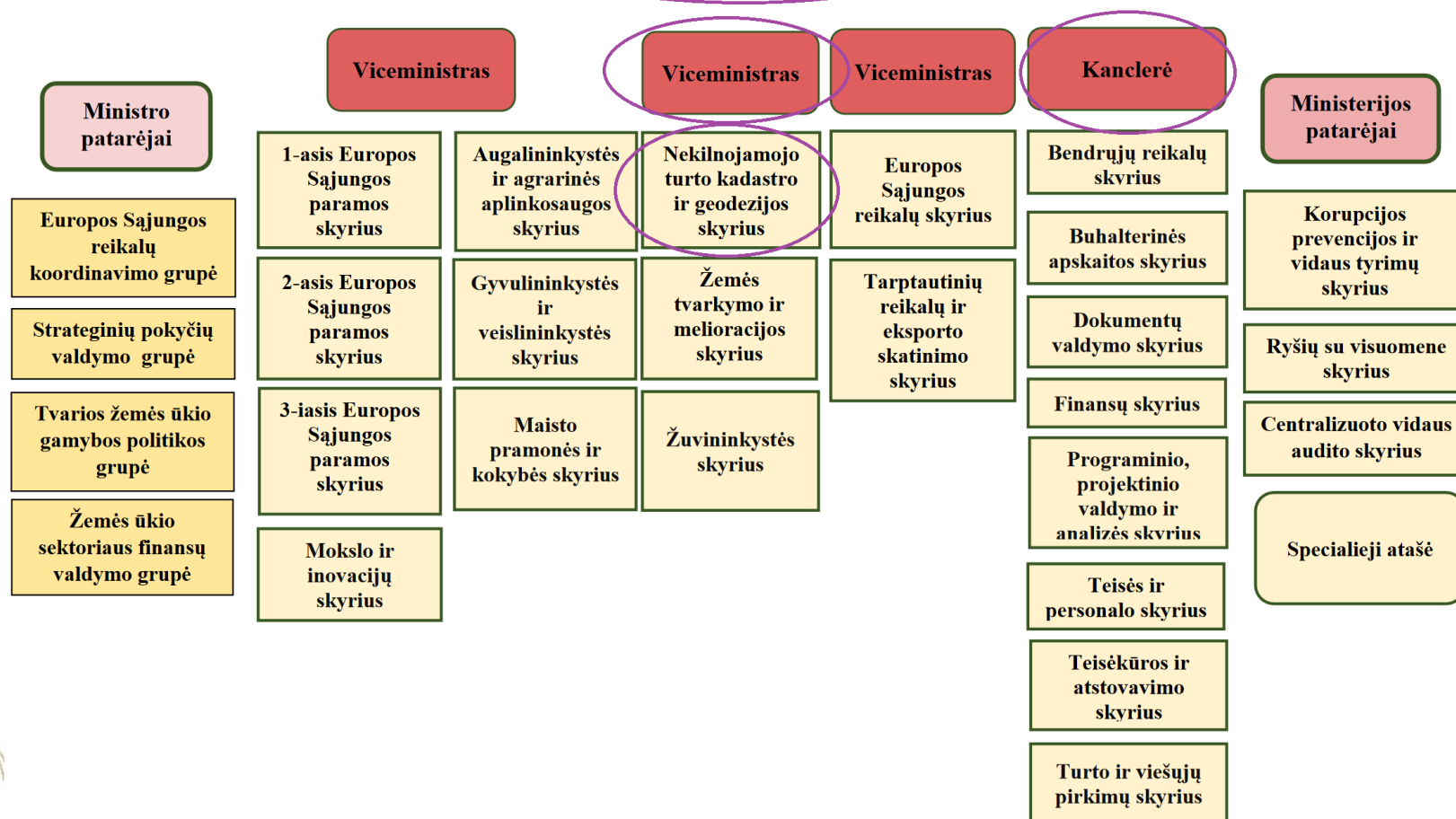
LIETUVOS RESPUBLIKOS  
GEODEZIJOS IR KARTOGRAFIJOS  
ĮSTATYMAS

# LT juridical issues

## Structures of Governmental institutions

### The Ministry of

**Ministras**

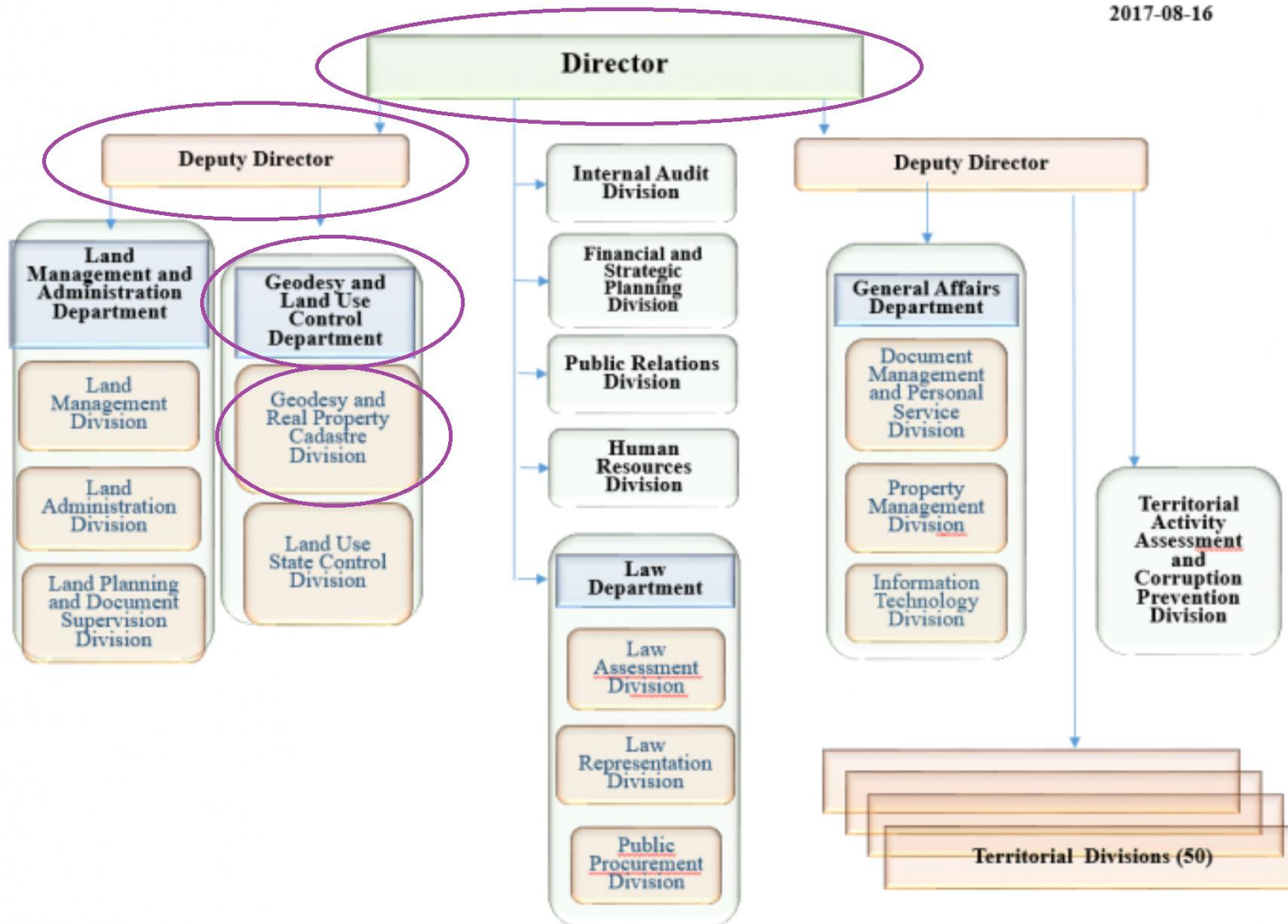


# LT juridical issues



## NATIONAL LAND SERVICE UNDER THE MINISTRY OF AGRICULTURE OF THE REPUBLIC OF LITHUANIA

2017-08-16





# LitPOS(1):

**LitPOS** (**L**ithuanian **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.

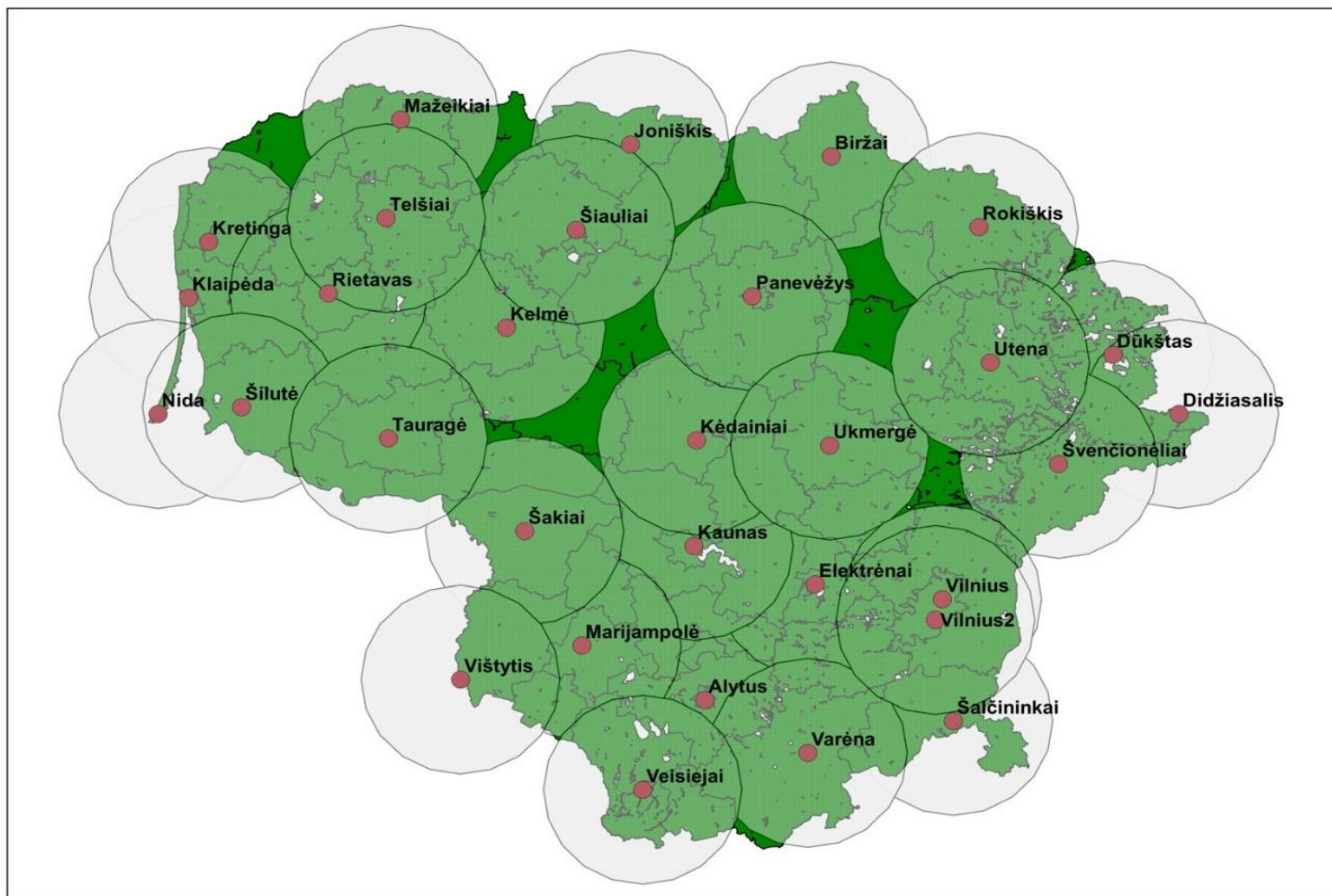
LitPOS stations consist of 3 ASG-EUPOS I stations.

CORS Network - LitPOS



# LitPOS(2)

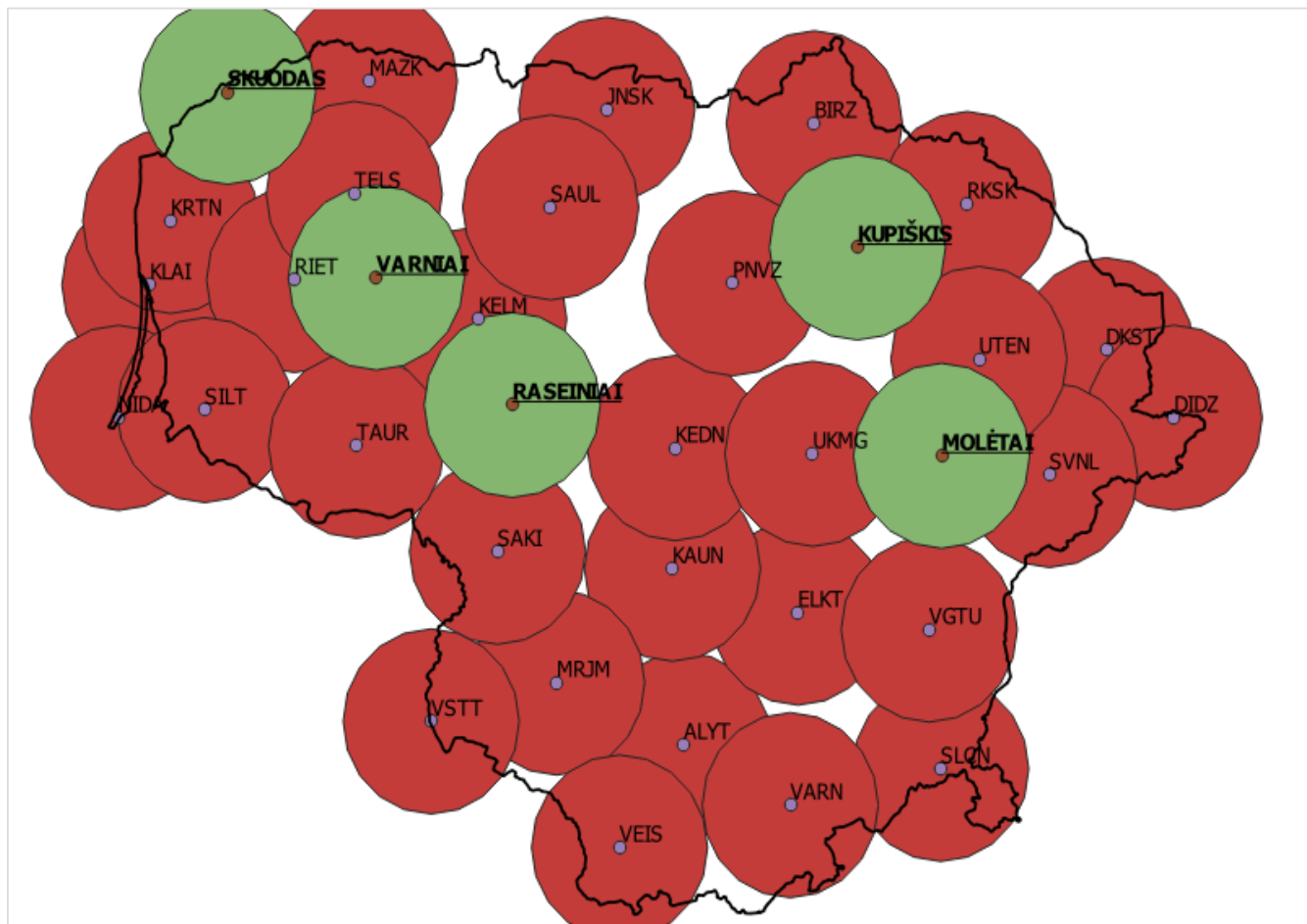
:



Coverage of LitPOS stations ( $R=35$  km)

# LitPOS(3)

:



LitPOS densification: **5** new stations during **2020** year



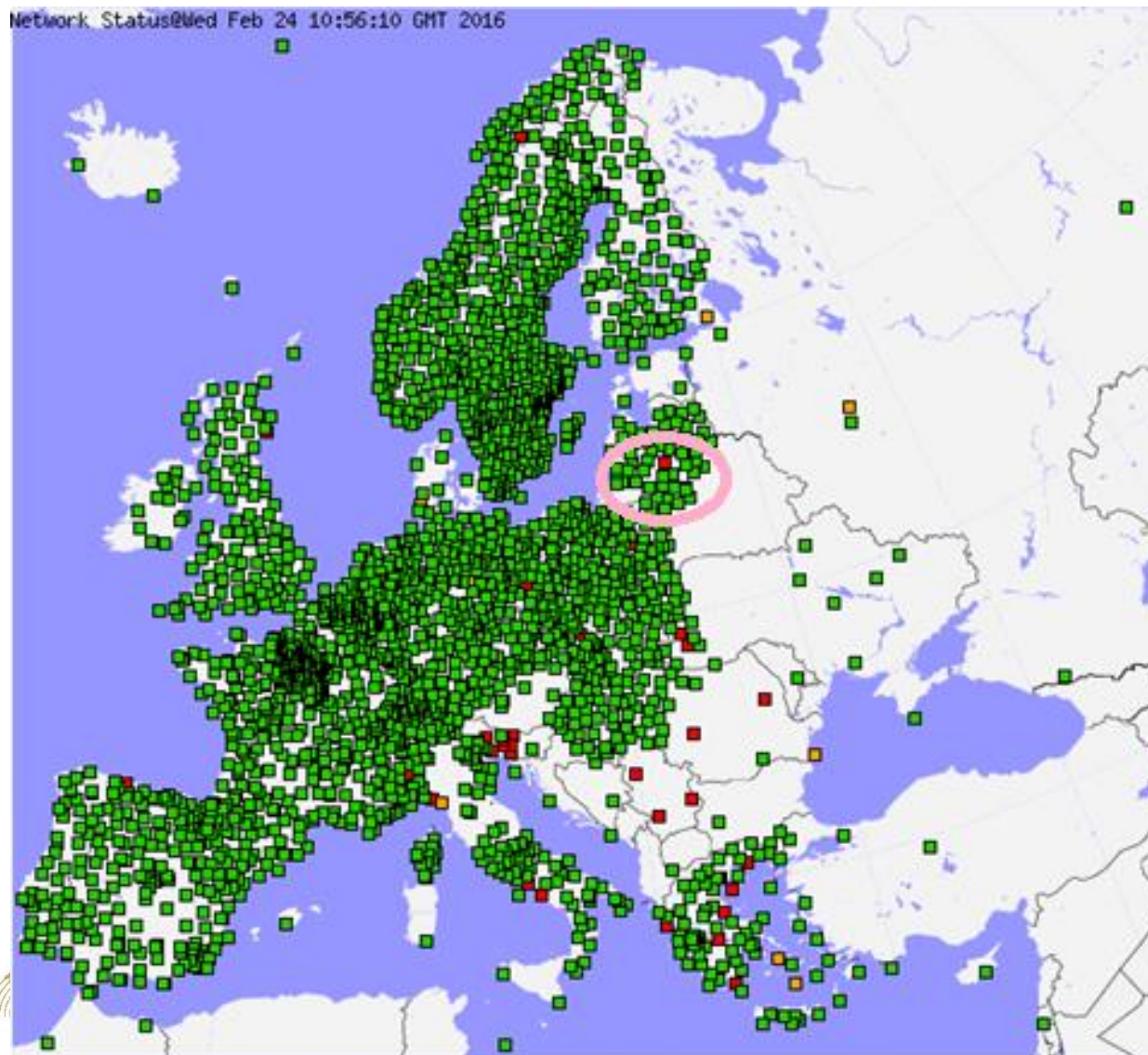
# LitPOS(4)

## Users statistics (2019-01-31):

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

# LitPOS(5)

## LitPOS in EUMET network



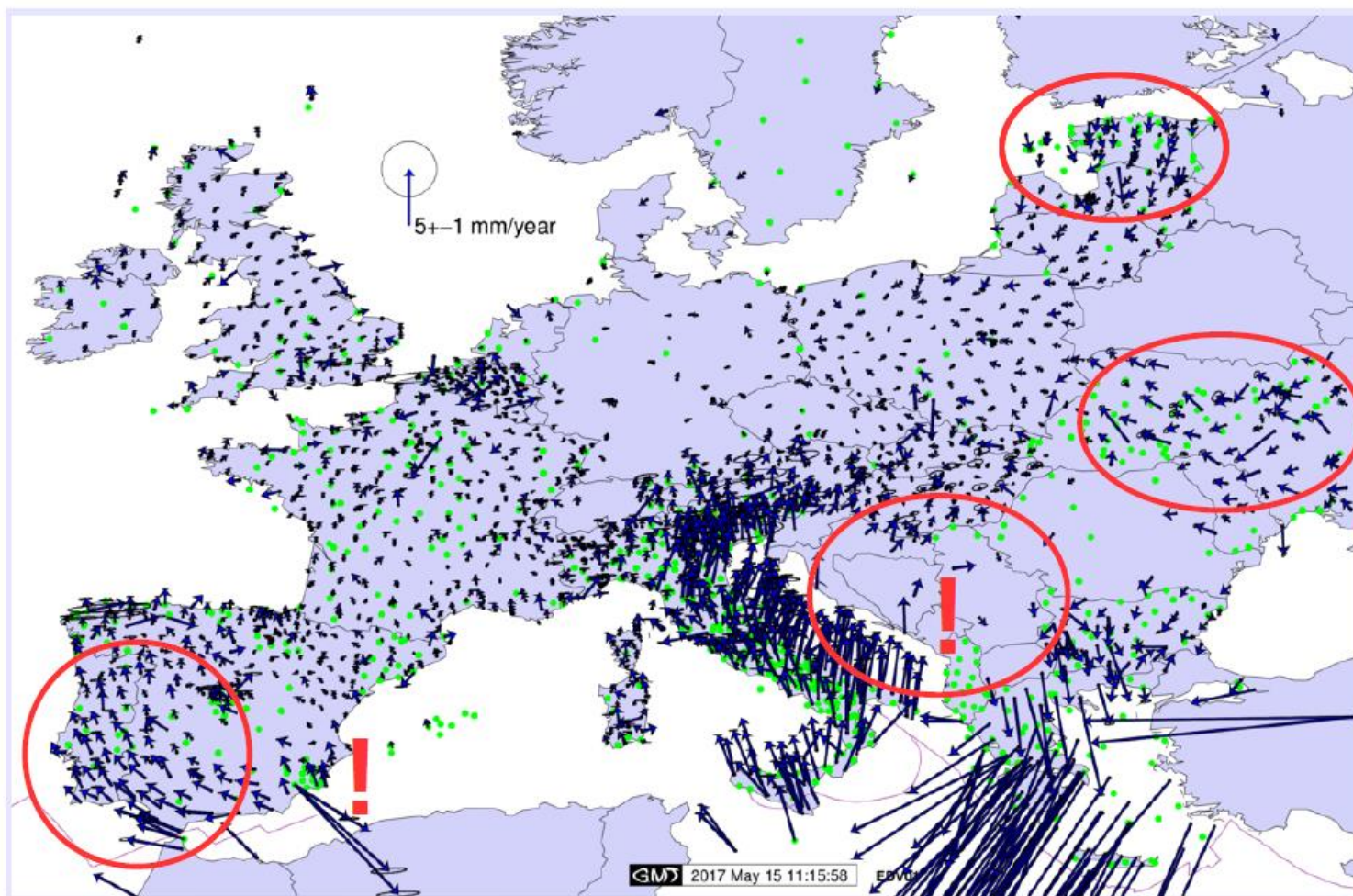


# LitPOS(6)

## LitPOS in EPN network

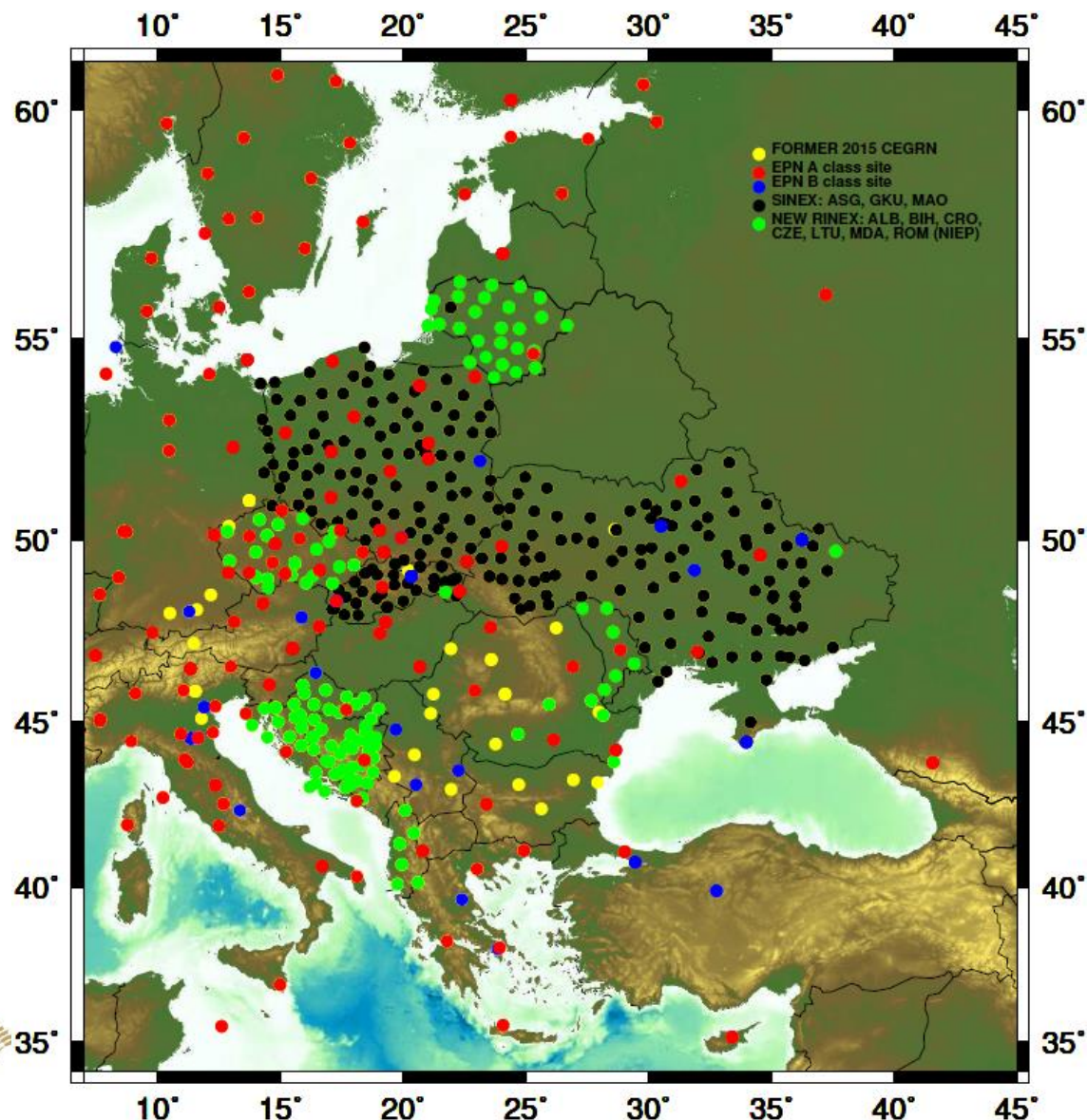
ETRF2000 VELOCITIES  $L > 3$  years

**CLEAR TECTONIC PATTERNS ARE OBSERVED**



# LitPOS(7)

## LitPOS in CEGRN network





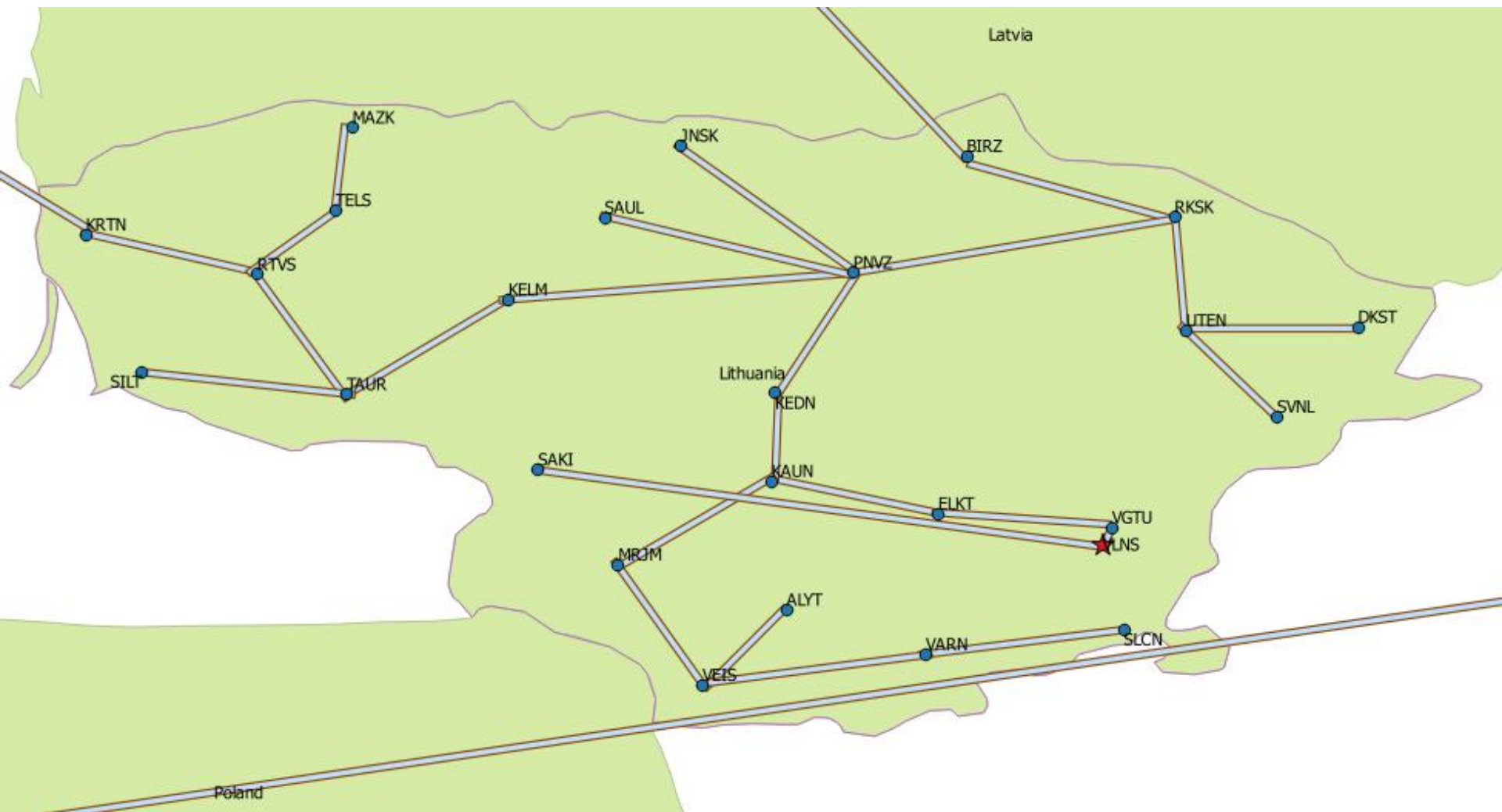
# LitPOS (8)

## LitPOS processing



# LitPOS (9)

## LitPOS processing



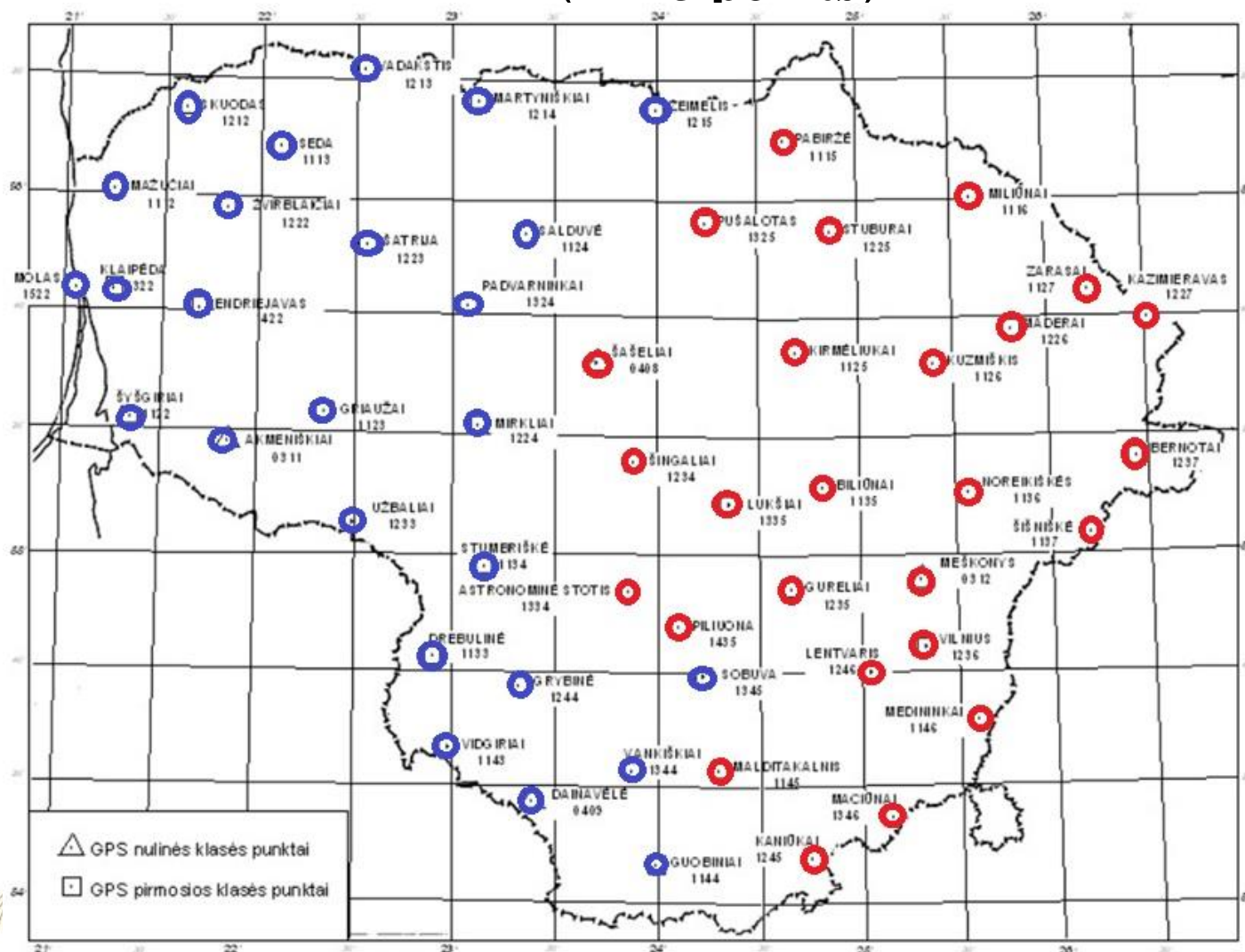
# LitPOS (10)

- **Weekly SINEX** files (with **COV matrix**) were 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**.

# **Zero and First-order GPS network re-measurements in 2018-2019**



## Zero and First-order GPS network re-measurements in 2018-2019 (4+48 points)



# Zero and First-order GPS network re-measurements in 2018-2019 (4+48 points)



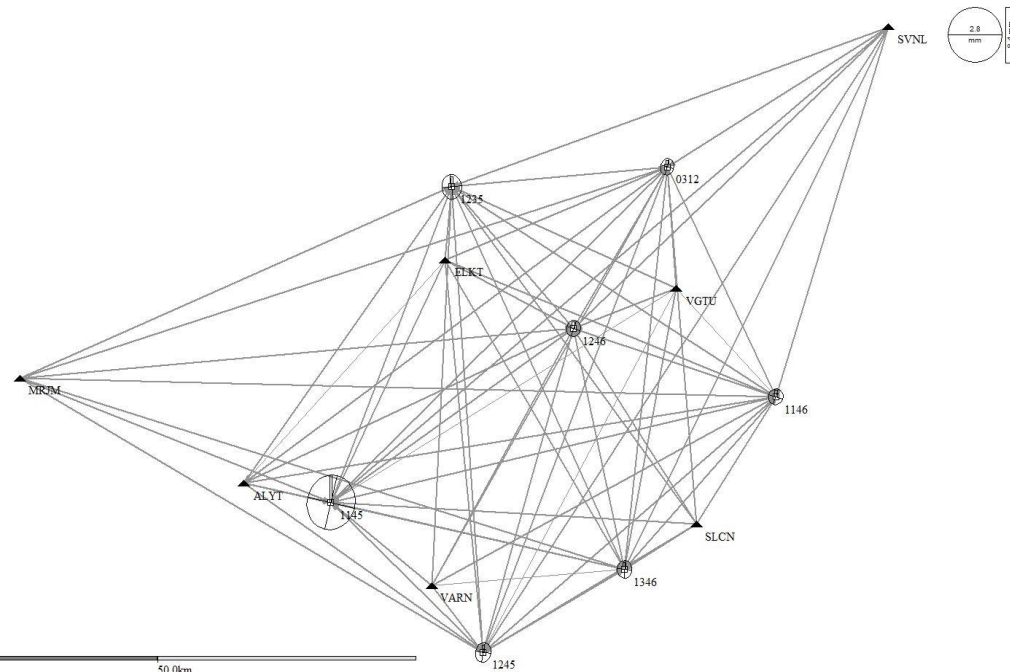
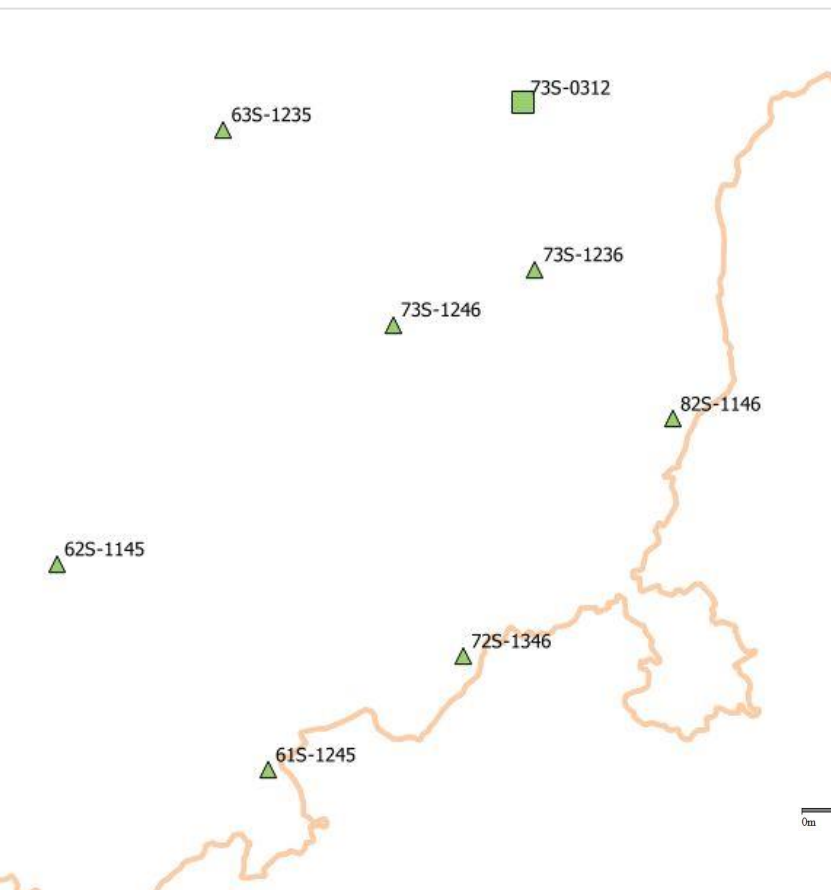




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# Zero and First-order GPS network re-measurements in 2018-2019 (4+48 points)

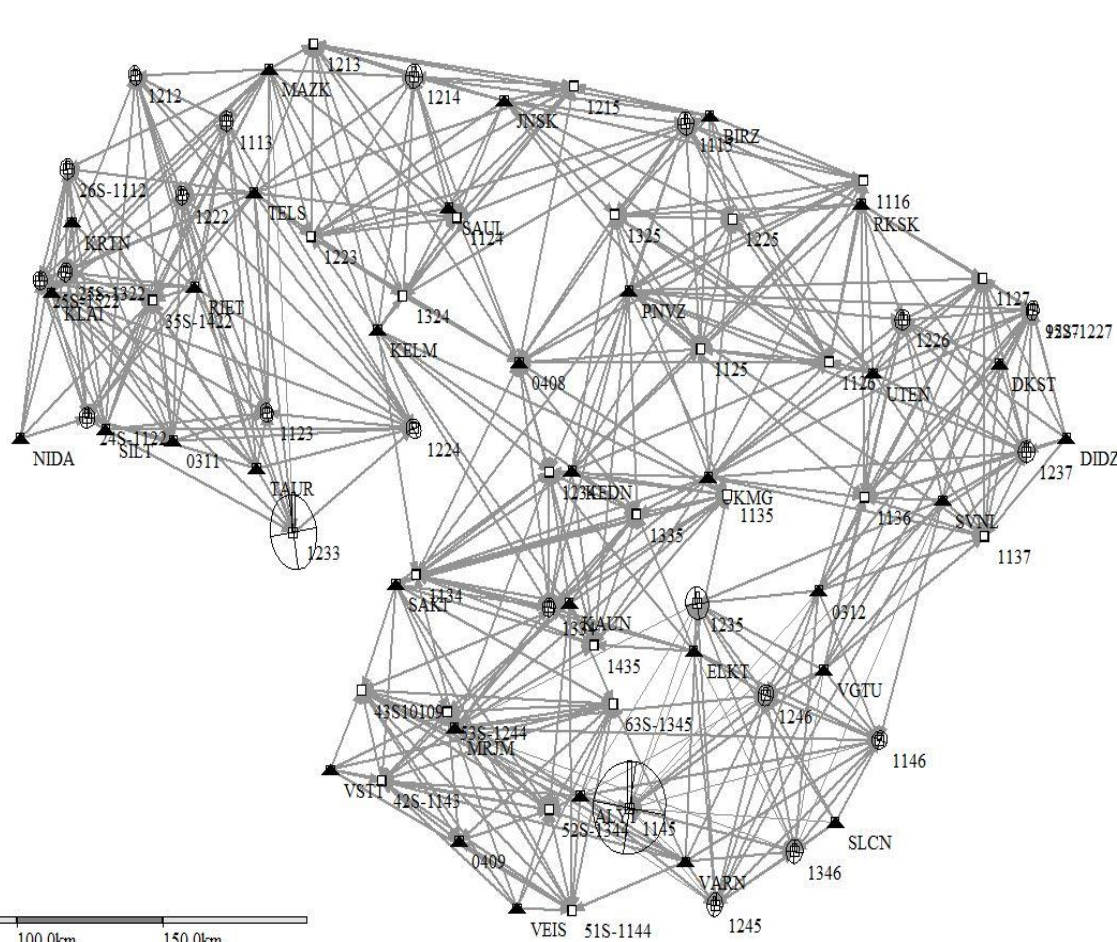
4 days sessions  
8 receivers



# Zero and First-order GPS network re-measurements in 2018-2019

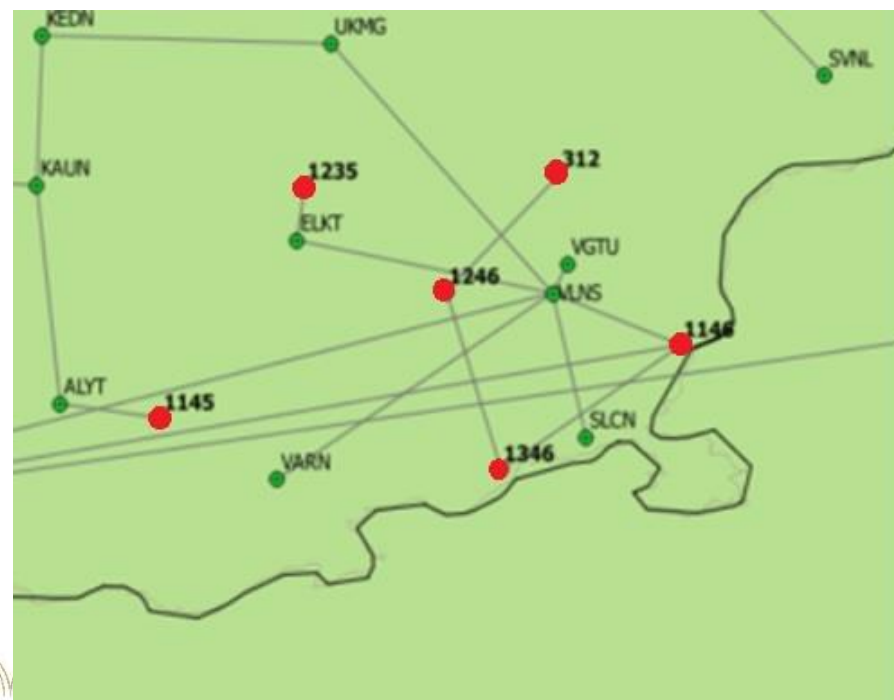
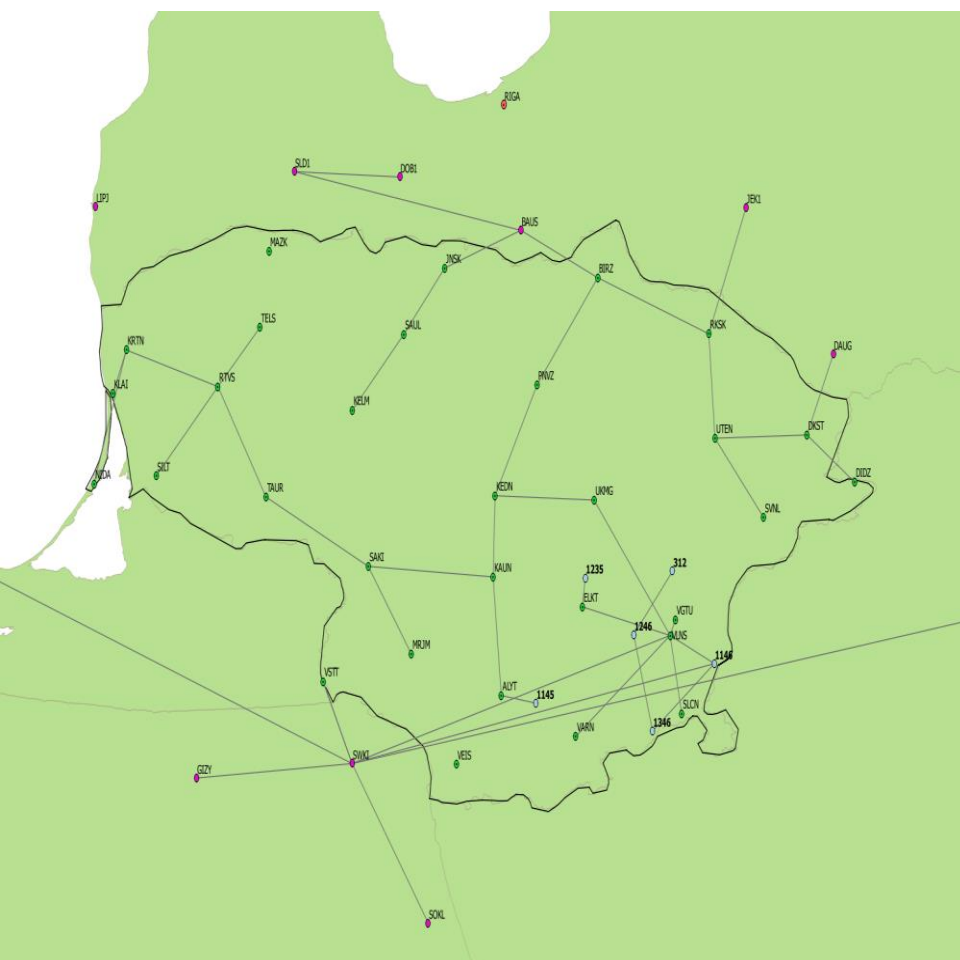
## (4+48 points)

9 sessions



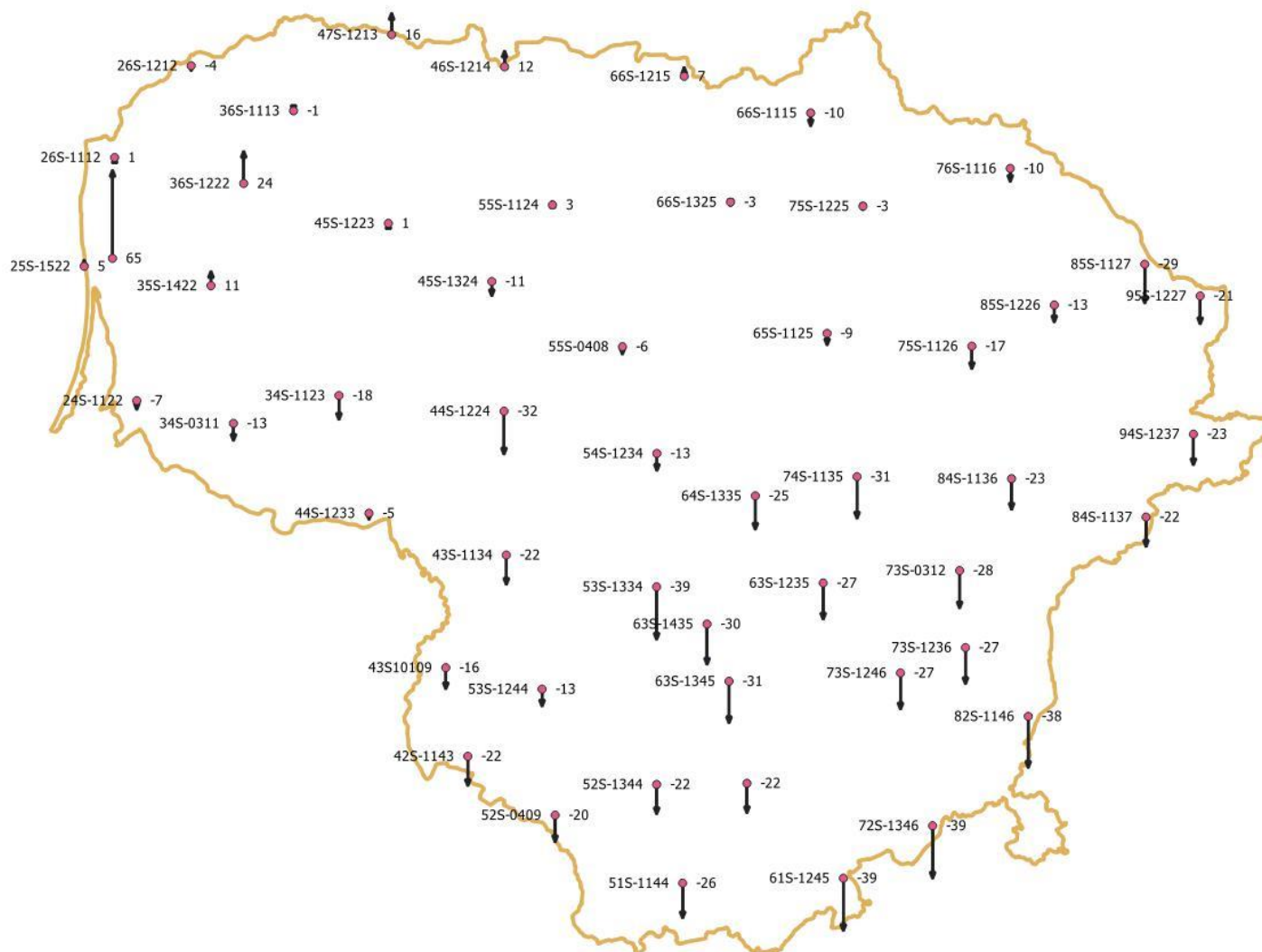


# LitPOS network baselines together with first-order points

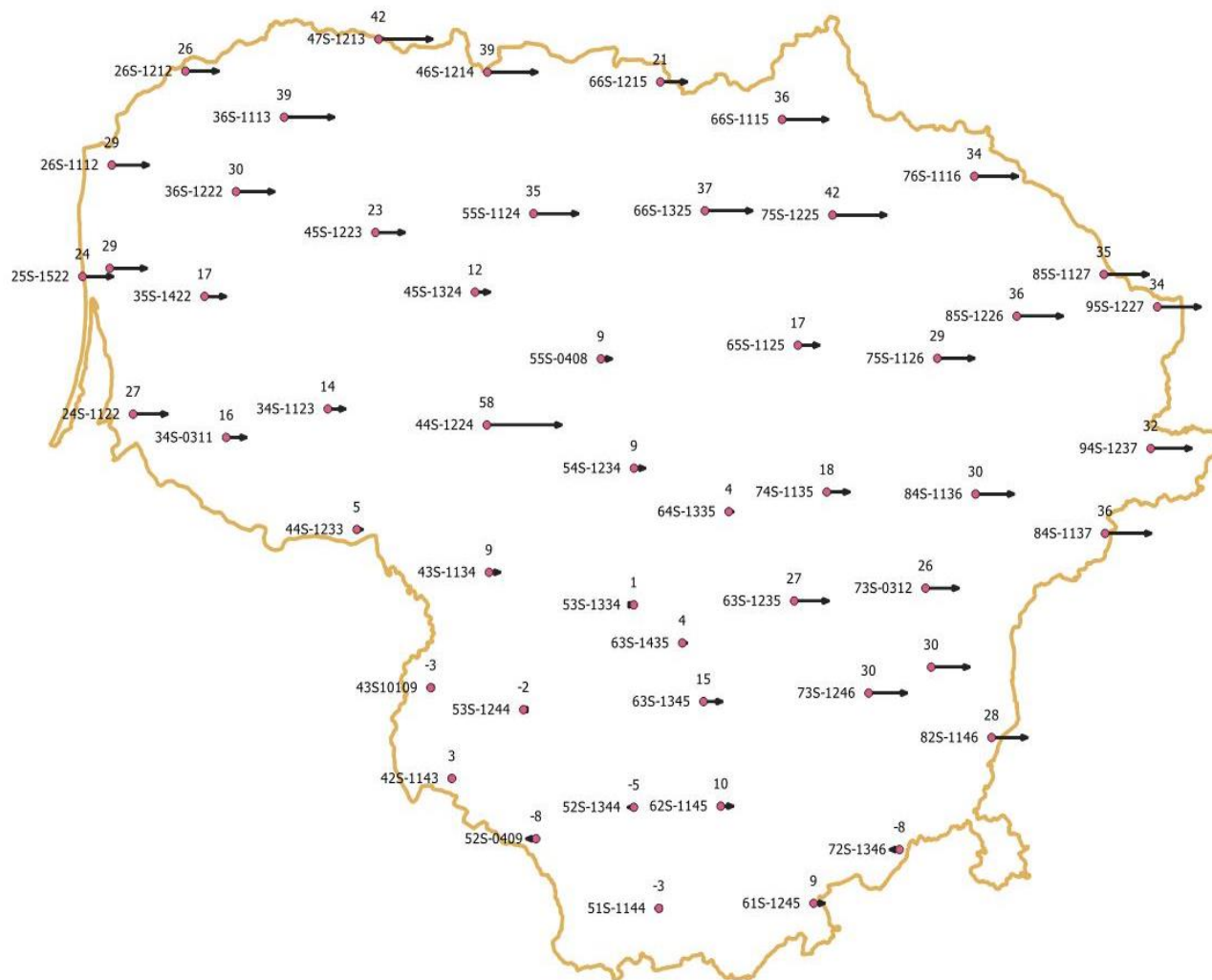


# Zero and First-order GPS network re-measurements in 2018-2019 (4+48 points)

Punkto kodas	$X$ , m	$m_X$ mm	$Y$ , m	$m_Y$ mm	$Z$ , m	$m_Z$ mm
36S-1113	3298012.3818	1.5	1337868.3628	0.9	5275244.2023	1.8
66S-1115	3234675.7179	1.7	1482718.1836	1.2	5275655.5636	2.4
76S-1116	3222292.8532	0.8	1543985.6146	0.6	5265797.0629	1.1
34S-1123	3357540.0261	1.3	1379550.3295	0.9	5227030.8213	1.7
55S-1124	3287900.4697	1.4	1420005.5500	0.9	5260196.1099	1.9
65S-1125	3283047.8099	0.9	1509751.3407	0.6	5238277.0822	1.3
75S-1126	3267782.4271	0.9	1551392.9103	0.6	5235776.9253	1.2
85S-1127	3227104.1026	1.2	1591130.2039	0.8	5248970.0988	1.6
43S-1134	3373211.0529	0.8	1442546.4534	0.6	5200005.6624	1.1

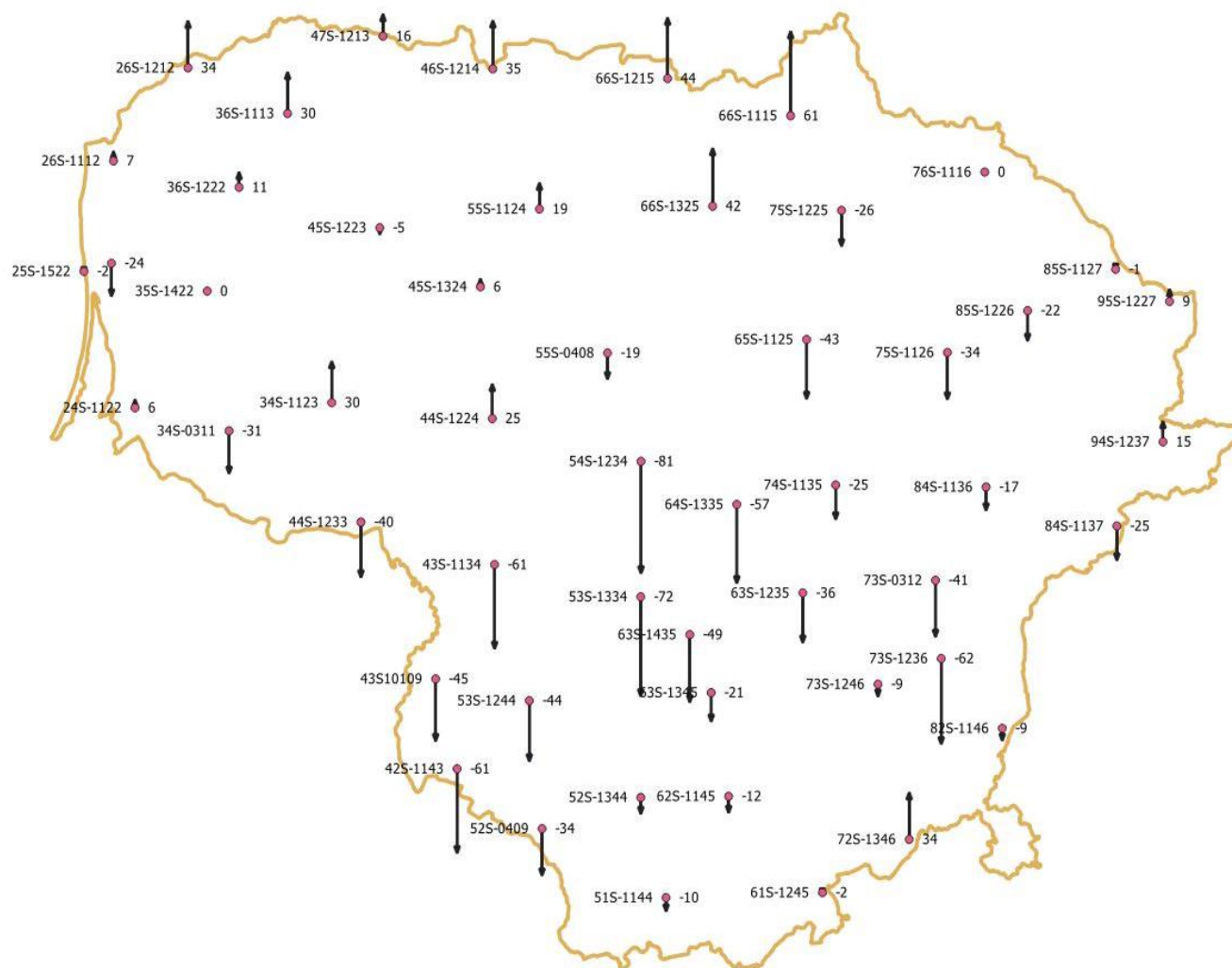


# Zero and First-order GPS network re-measurements in 2018-2019 (4+48 points)





# Zero and First-order GPS network re-measurements in 2018-2019 (4+48 points)

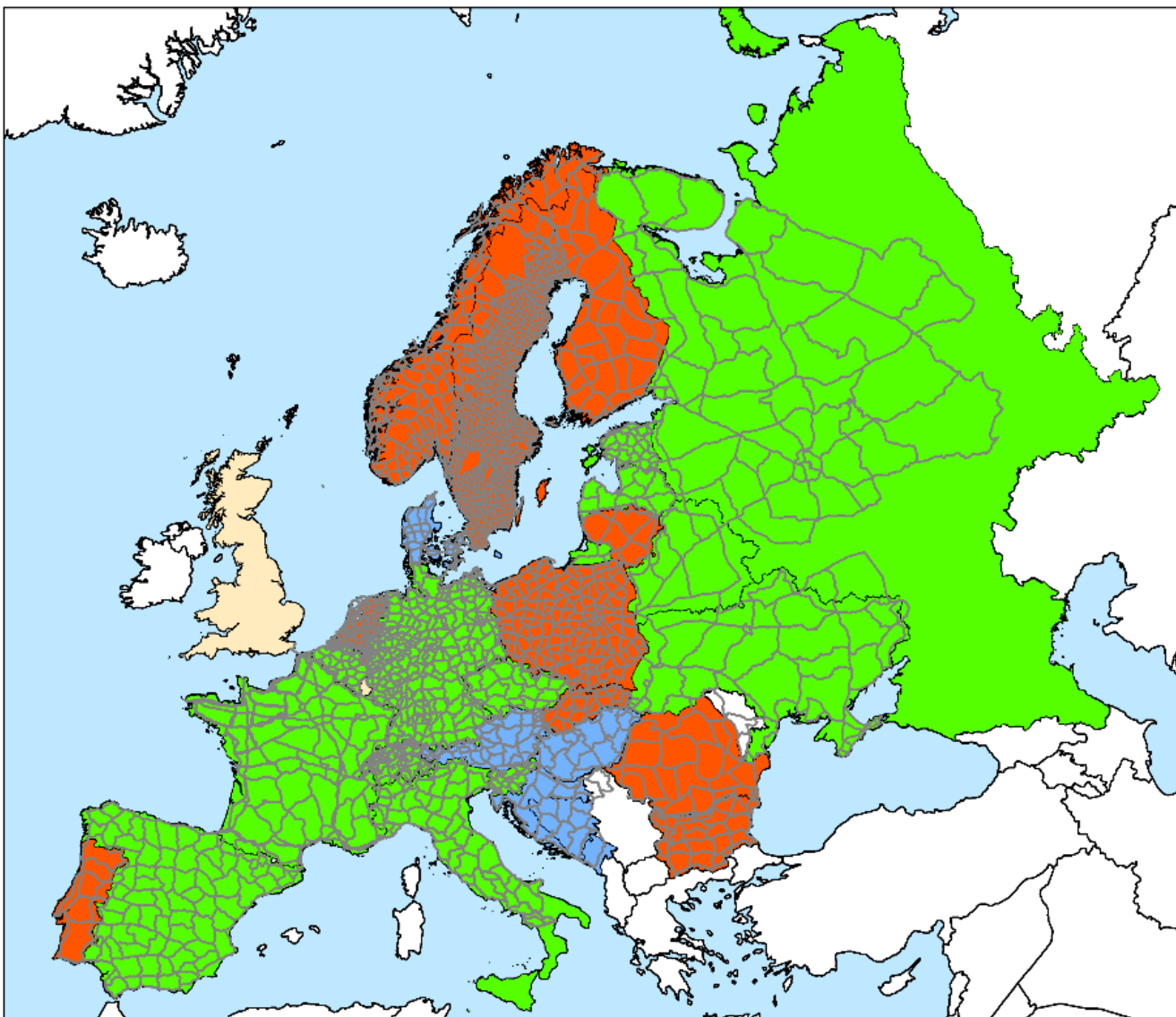


# Vertical network



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## Vertical network in UELN



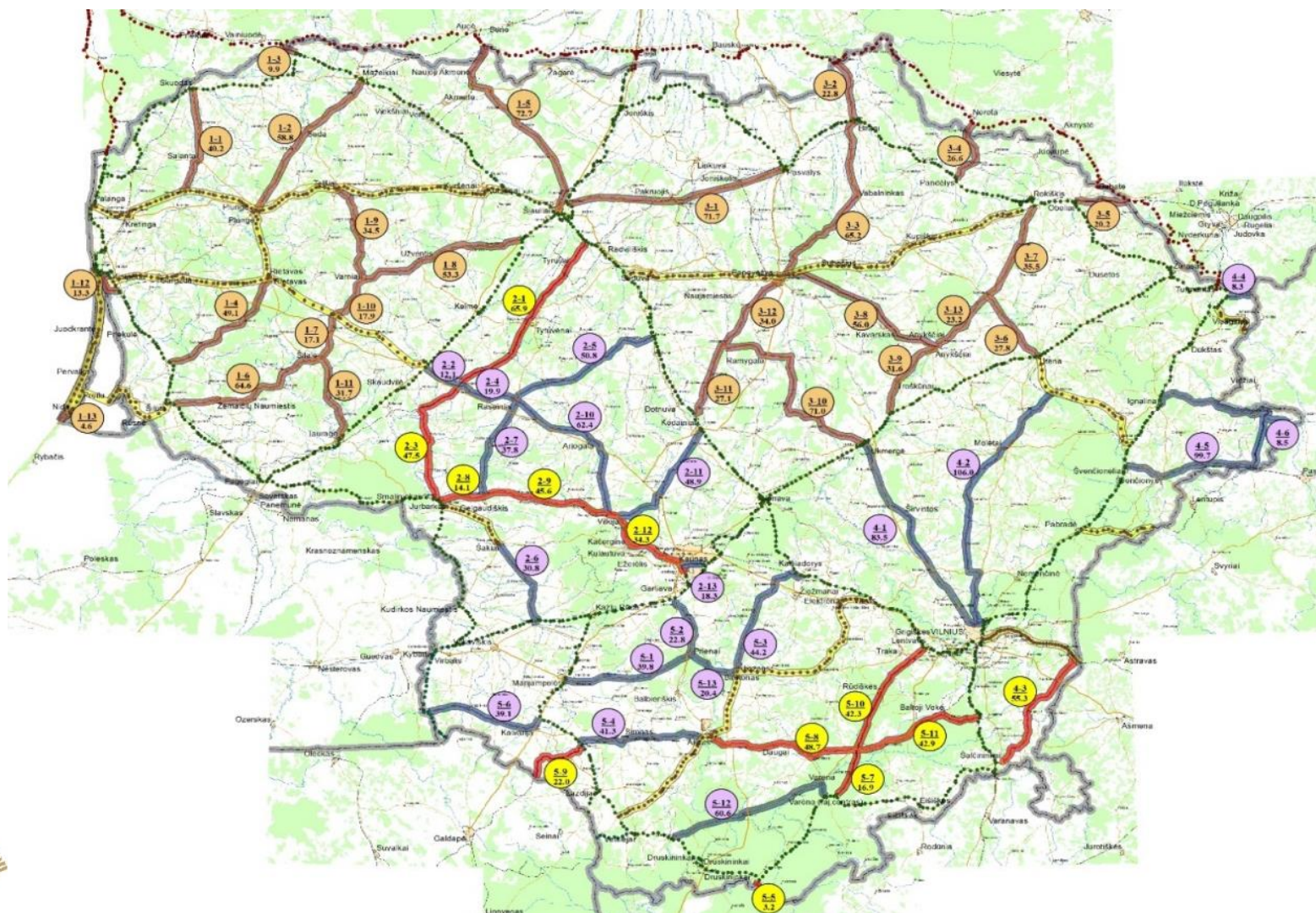








## Vertical network II order



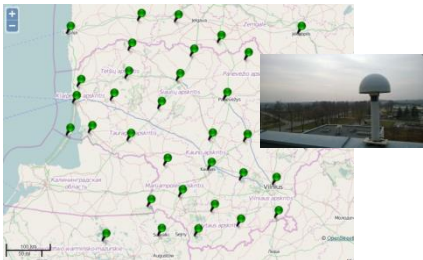
## Vertical network III order



2019-2020: **2000** km

2021-2022: **2000** km





- **Gravity survey**

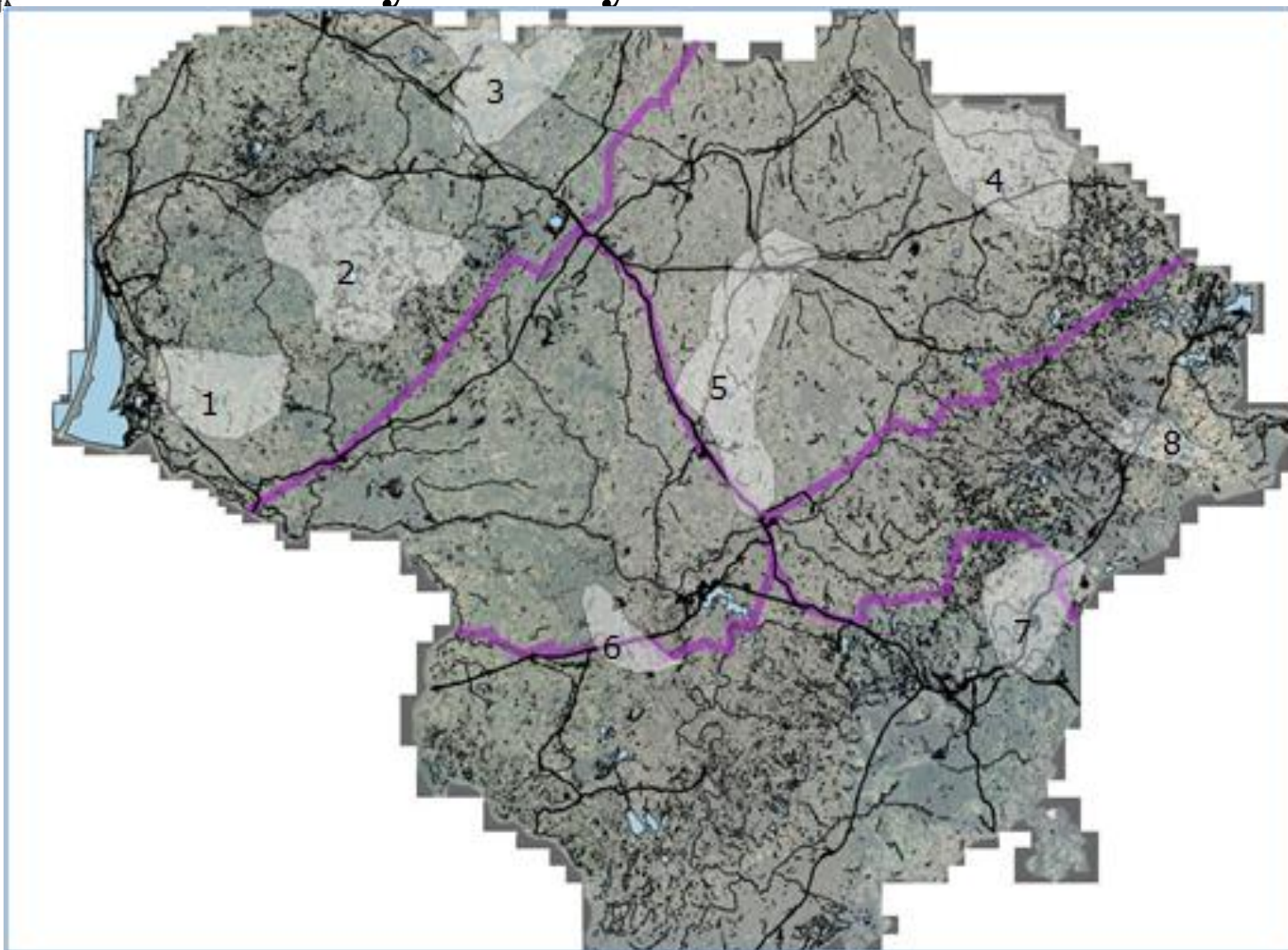


# Gravity survey

## 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  $\mu\text{Gal}$** .
  - **5** Scintrex CG-5 gravimeters employed.
  - Total number of gravity points: 30 000 (**32 951**).
  - Density of gravity points: **1 point in 2  $\text{km}^2$** .
- 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  $\mu\text{Gal}$**  (**18.8  $\mu\text{Gal}$** )
  - RMS error of Bouguer anomalies < **80  $\mu\text{Gal}$**  (**23  $\mu\text{Gal}$** ).
- RMS error of interpolated values of Bouguer anomalies < **100  $\mu\text{Gal}$**  (**33  $\mu\text{Gal}$** ).
  - 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**).

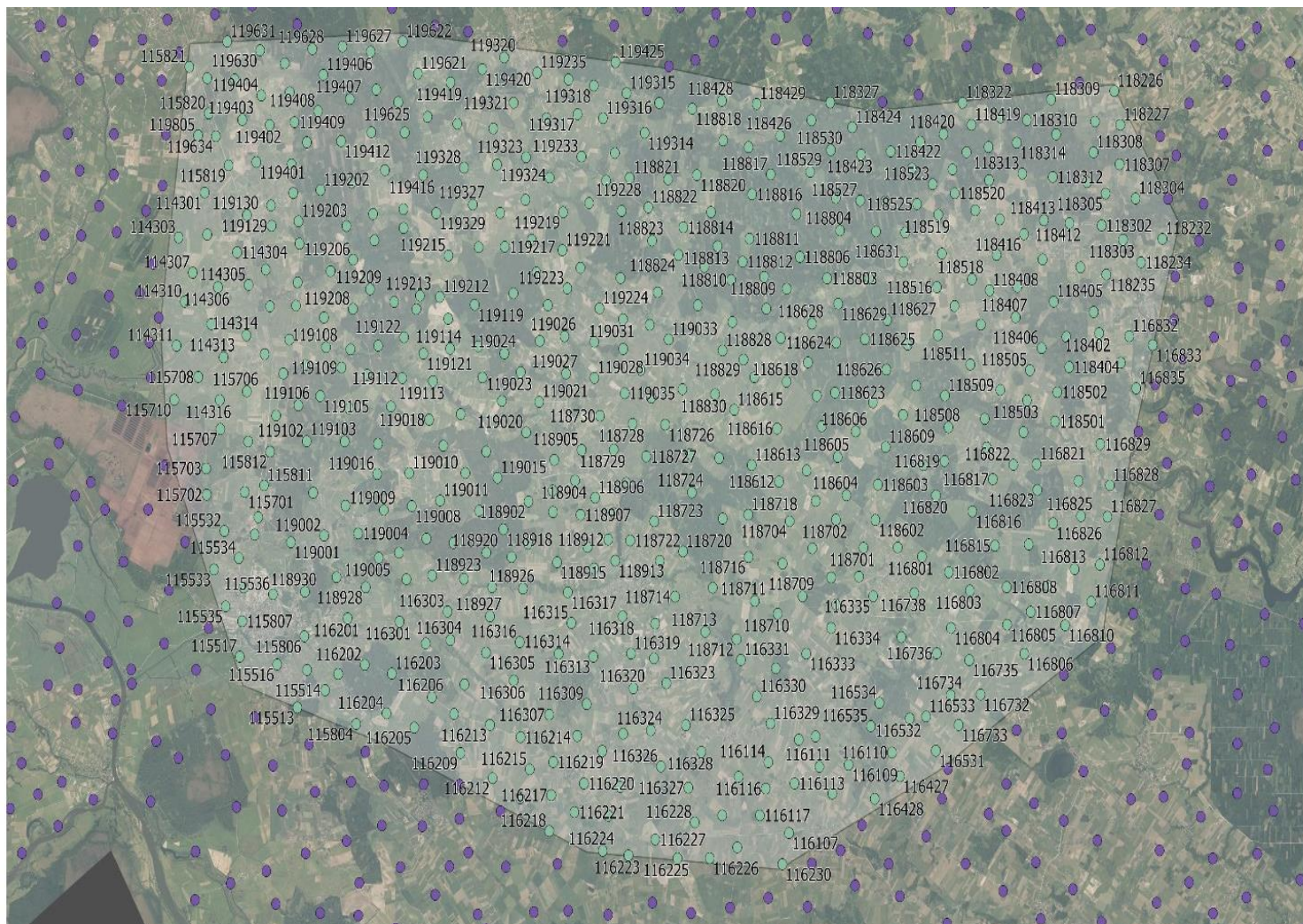
# Gravity survey



Regions of disturbed gravity field



# Gravity survey

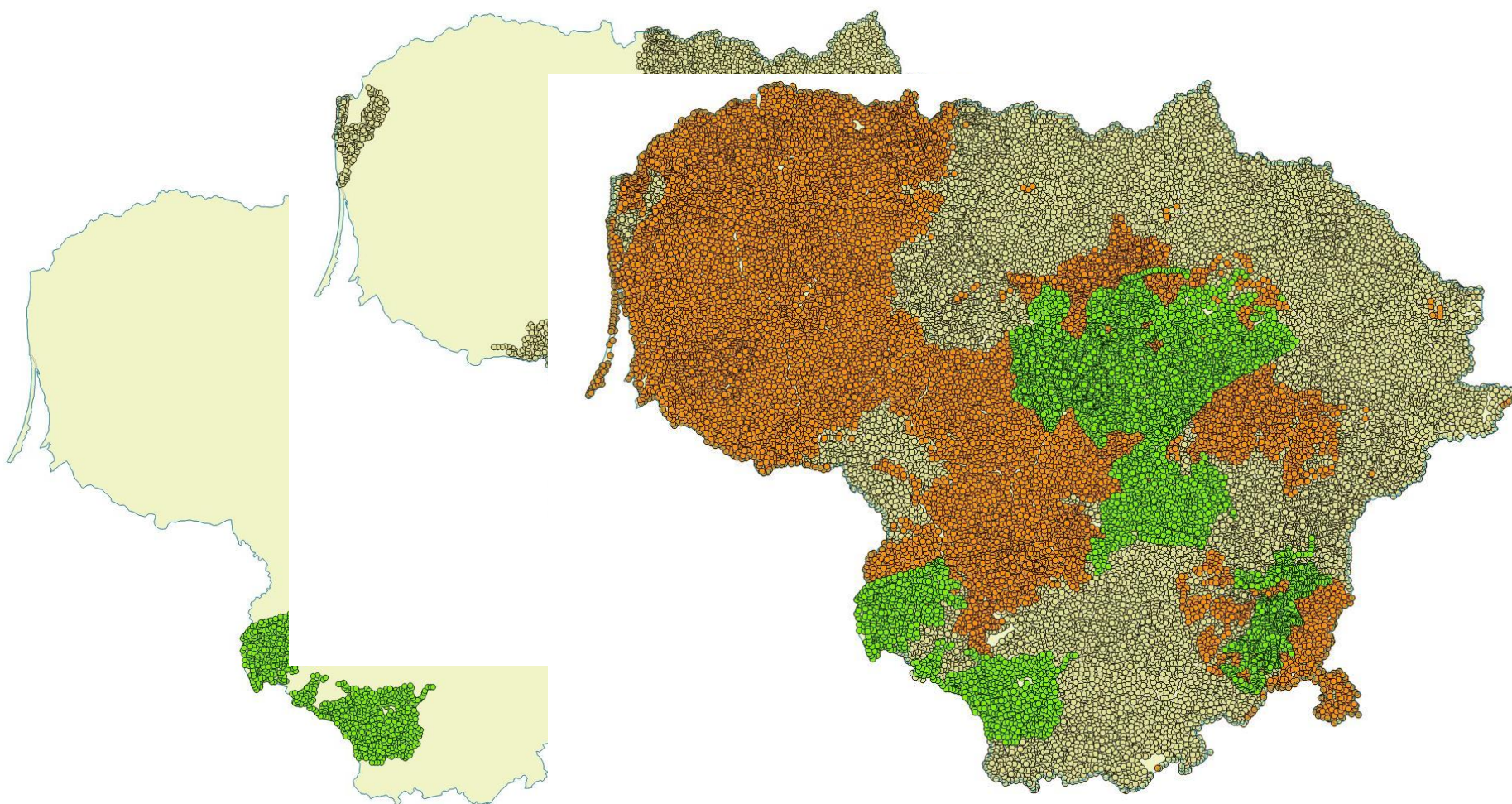


Regions of disturbed gravity field

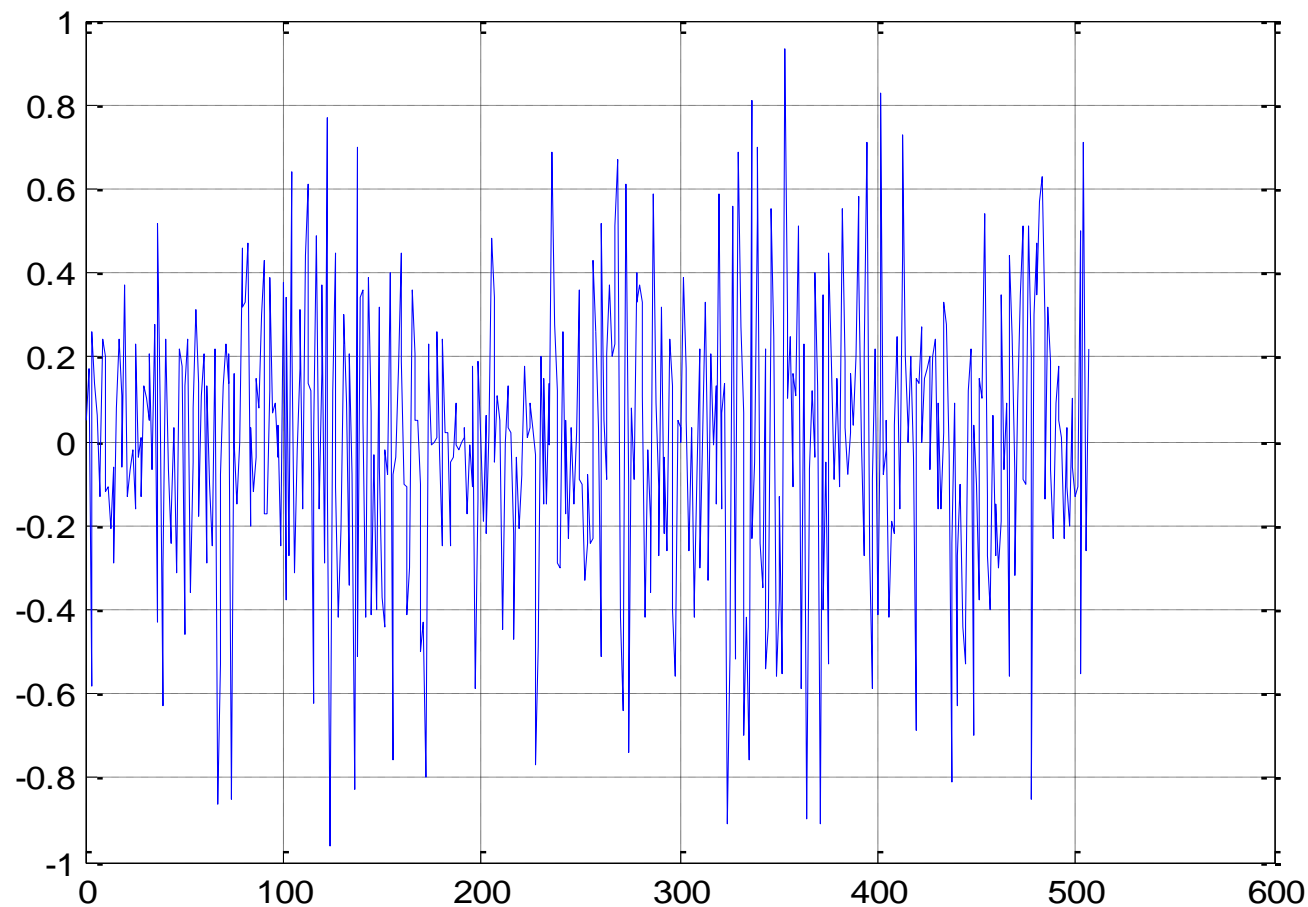


# Gravity survey

## GRAVITY OBSERVATIONS IN 2016-2017-2018



# Gravity survey

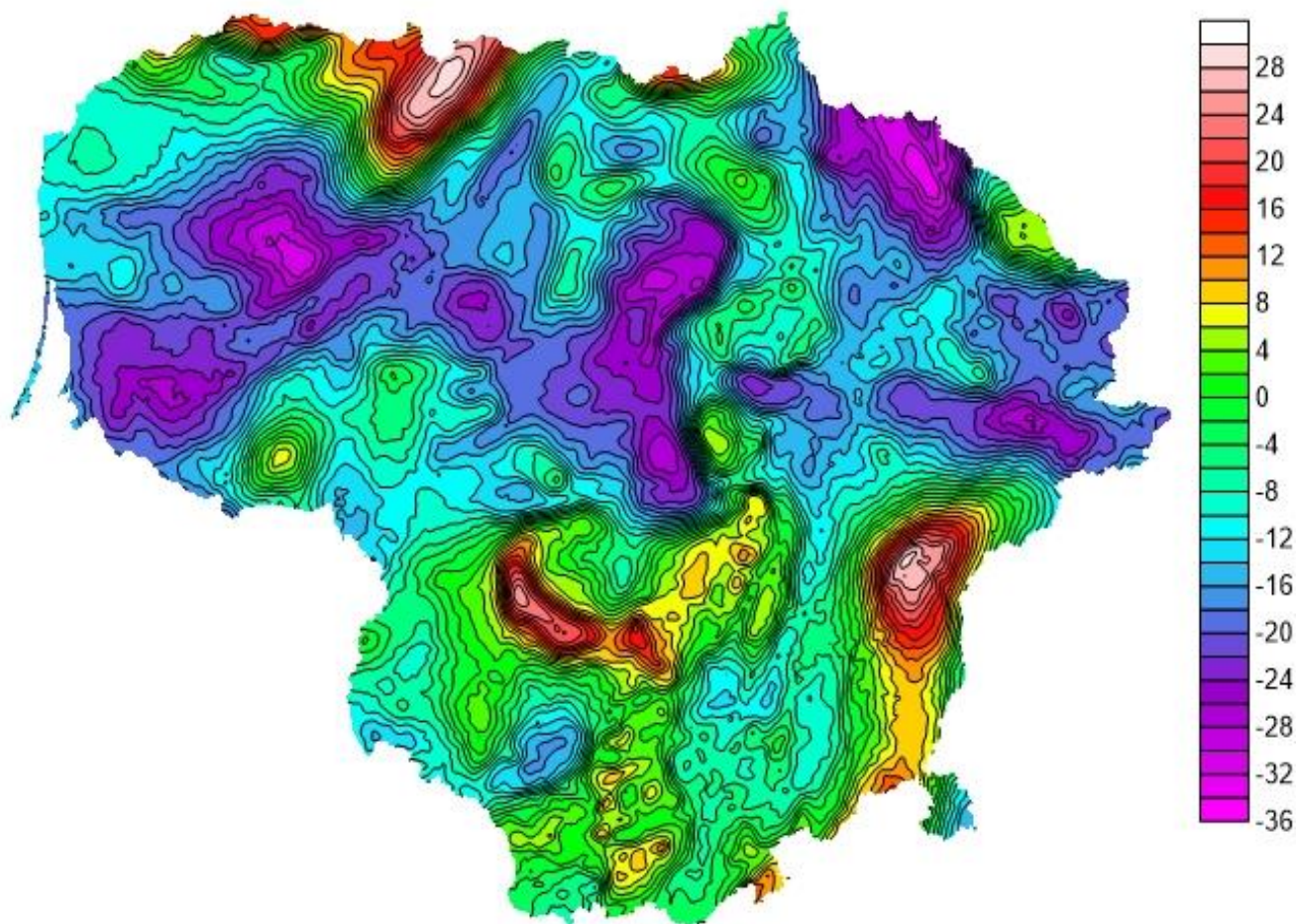


Gravity values differences at control points, mGal



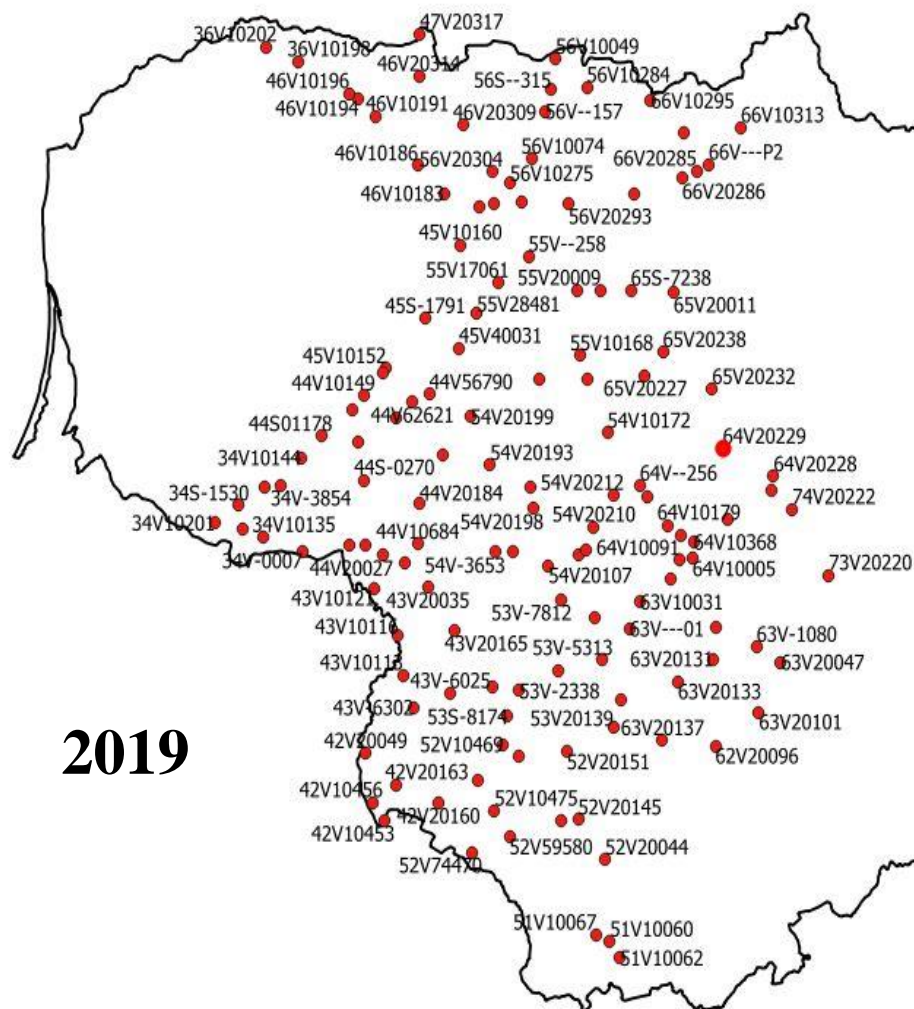
# Gravity survey

## Bouguer anomalies map of Lithuania



Isoanomalies step – 2 mGal. Earth's crust density –  $2.67 \text{ g/cm}^3$ .

# Determination of Ellipsoidal heights of First and Second order vertical networks points (250)



2019

Feature	Value
vert	
MAPID	1
(Derived)	
(Actions)	
MSLINK	129
MAPID	1
PKOD	64V20229
PTIP	V
PPAV	
PKLAS	2
AVYKD	VG TU GI
ADAT	15.12.31
AREZ	Y
HN	83.219999999999999
MHN	0.004300000000000
HNMET	2
HDAT	15.12.31
HVYKD	VG TU GI
BL	55
BM	20
BS	16.076390000000000
LL	24
LM	28
LS	4.154350000000000
HE	106.825999999999999
MHE	0.005000000000000
HEMET	GPS
X	6133709.035000000149012
Y	529679.6809999999982305
ZTIP	155
ZDAT	
ZVYKD	
SAR	Y
GAUB	N
APK	Y
SKOD	
KRADR	<a href="file:///C:/GPD/2018/VERTIKALUS/ANTRA/64V20229.PDF">file:///C:/GPD/2018/VERTIKALUS/ANTRA/64V20229.PDF</a>
PAST	gruntinis

Mode: Current layer

☐ Auto open form

# Present/Future plans

- GNSS observations at **250** benchmarks of Vertical Network of Lithuania in **2019-2020**
- Development of the III<sup>rd</sup> order Vertical Network of Lithuania in **2019-2022** (**4000** km)
- Gravity survey in the Baltic sea (Lithuanian waters) in **2021-2022**
- Re-measurements at the points of secular variations of the geomagnetic field (6 points) in **2021**
- Second Re-measurement of the I<sup>rd</sup> order Vertical Network of Lithuania in **2023-2025** (**1800** km)



**Thank You for your attention!**