



Latvian Geospatial  
Information Agency

# Latvian Geospatial Information agency national report

NKG Science week and Working Group for GNSS positioning  
Hotel Reykjavík Grand, Iceland  
12.-14.03.2024

Department of Geodesy  
Geodetic measurements division  
senior geodetic engineer Andris Priževīts





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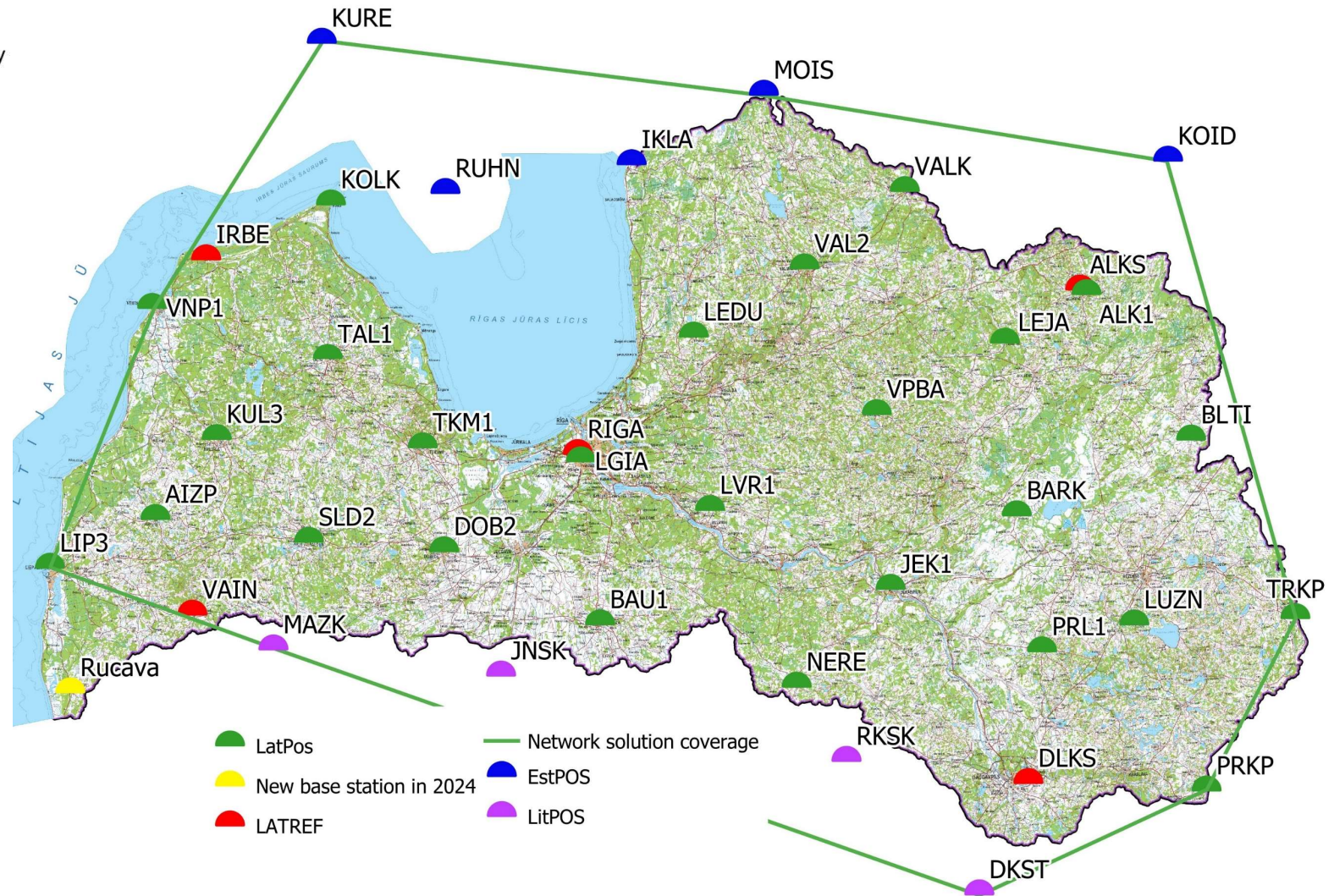
# Technical characteristics of LatPos, till 05.03.2024

Operating base  
stations:

- LatPos 26
- +  
•EstPOS 5
- +  
•LitPOS 4

Received GNSS  
systems:

- GPS NAVSTAR
- GLONASS
- Galileo
- BeiDOU



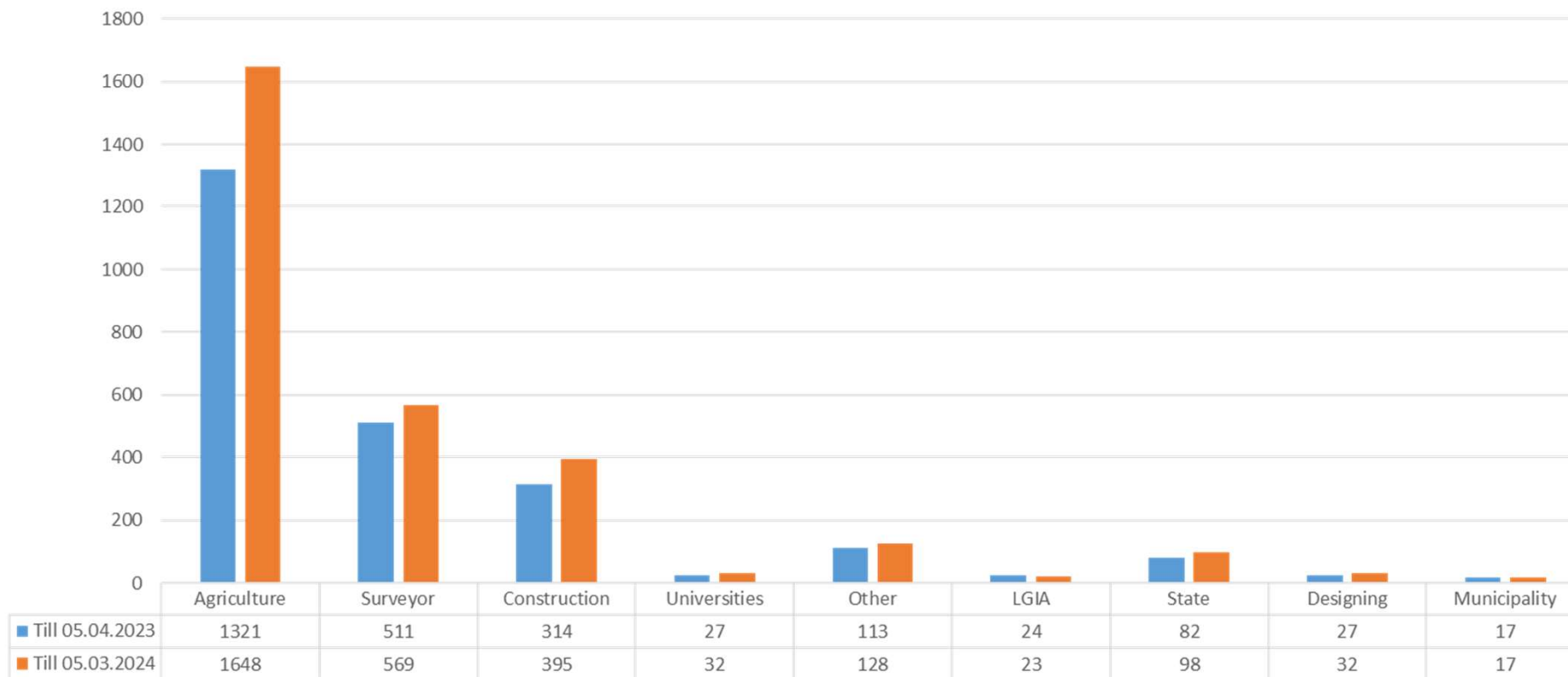
Since July 1, 2018, all services provided by LatPos are free of charge.



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# Distribution of LatPos users by group, till 05.03.2024

Distribution of users by groups



Users themselves choose which field of activity is most suitable for them, based on the LatPos terms of use

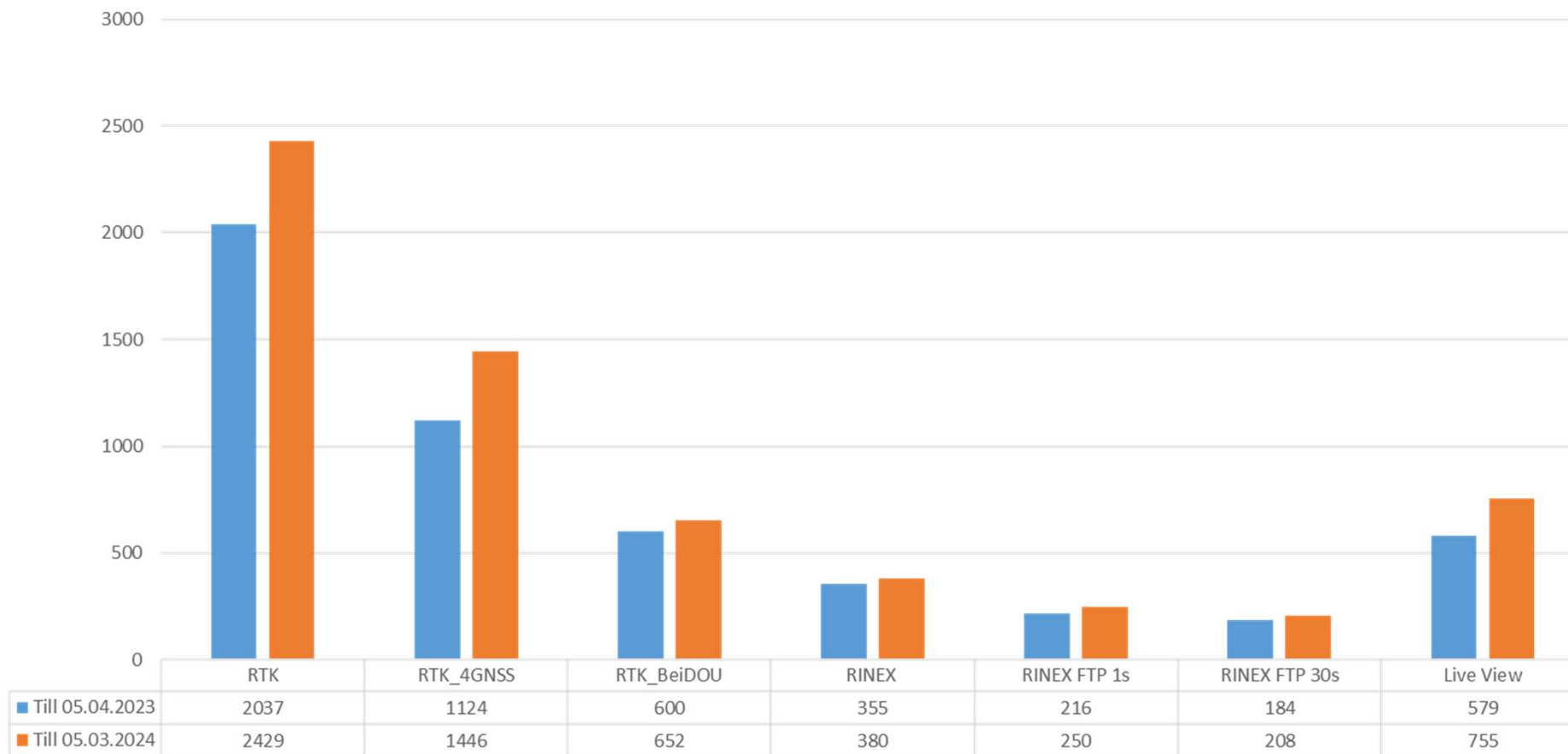
2942 active user accounts were registered until 05.03.2024.



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# Number of applied services, till 05.03.2024

Applied services



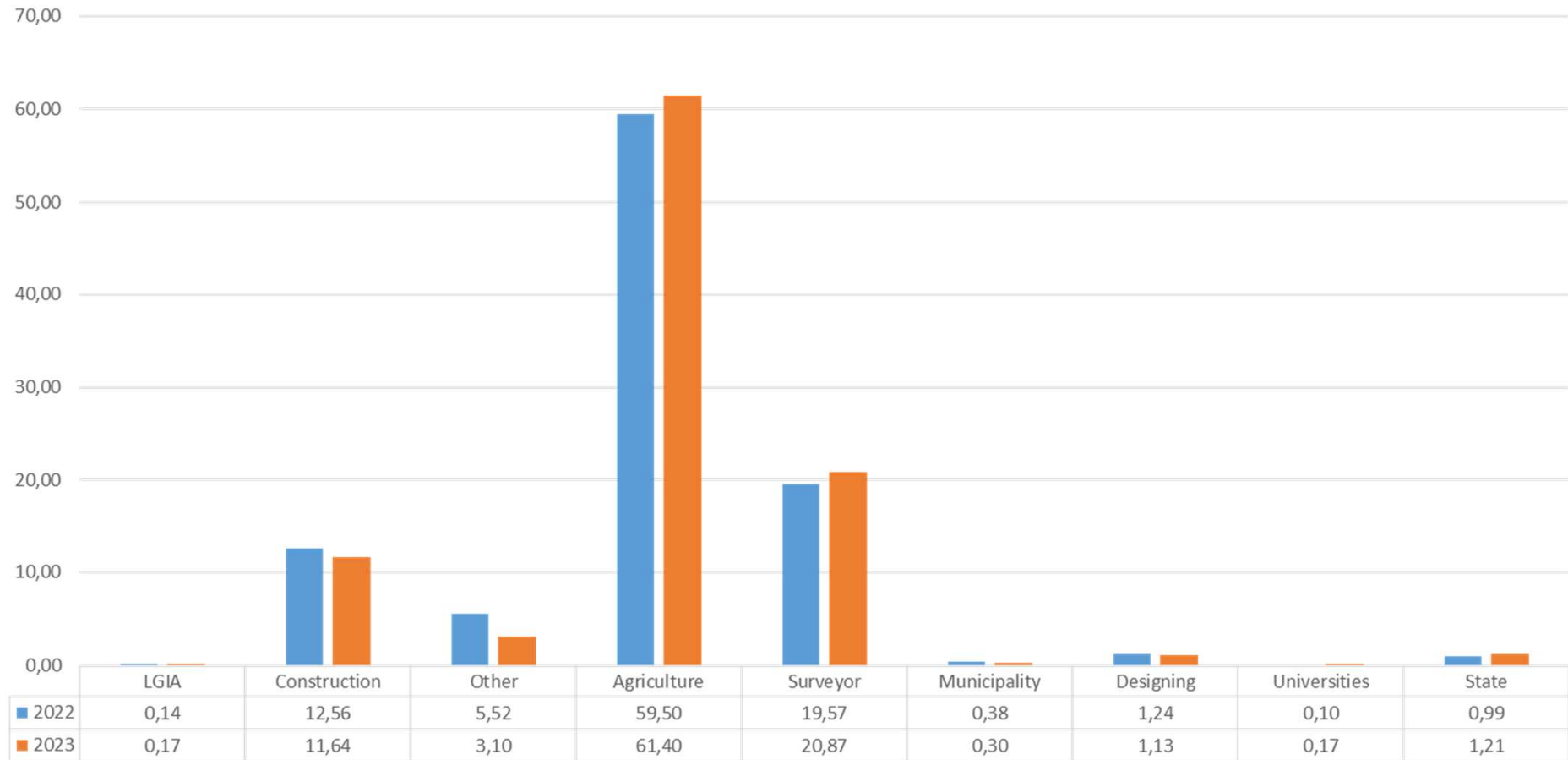
According to available data, RTK service is mostly used by farmers



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# Number of RTK connections by group

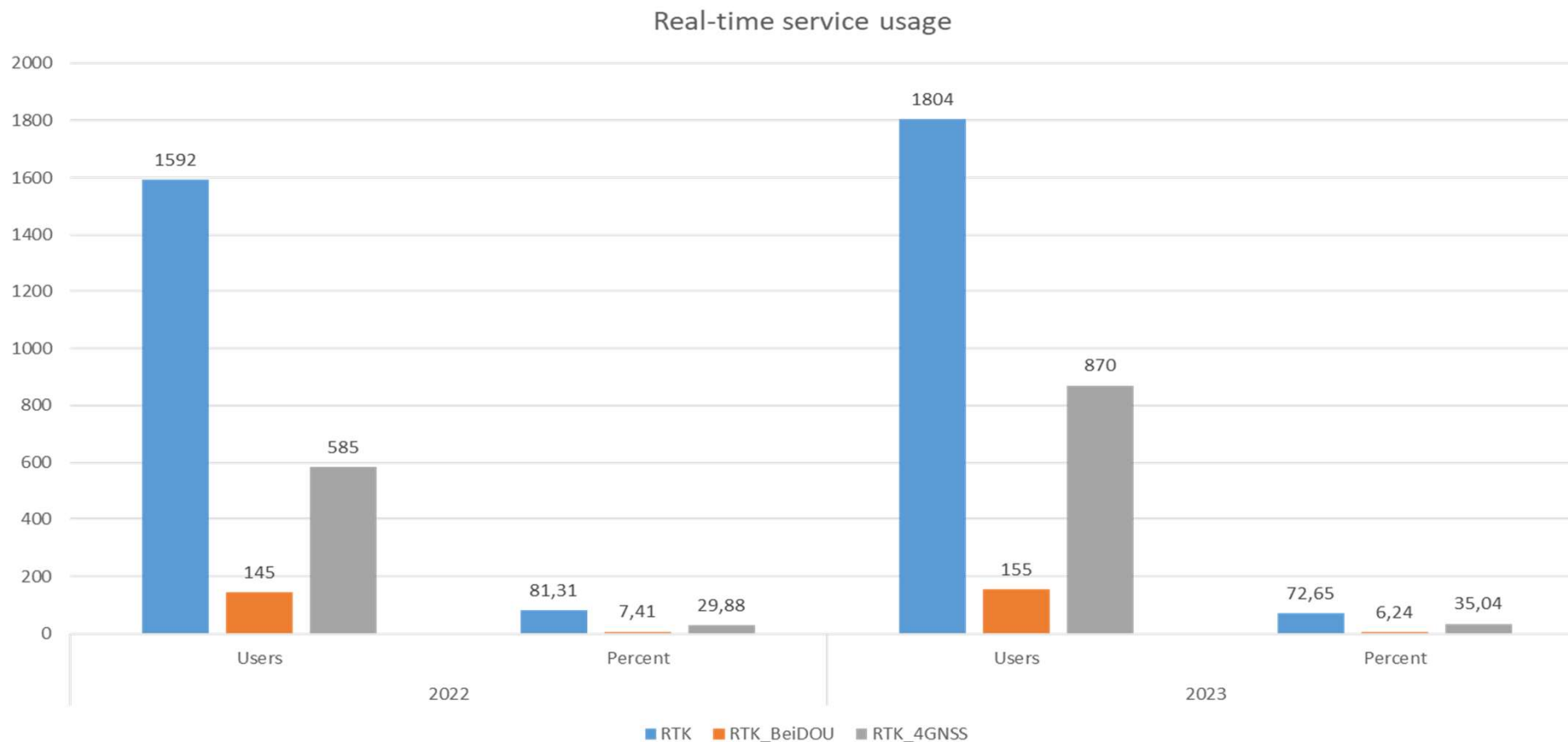
RTK connections by group





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# Distribution of users of real-time services



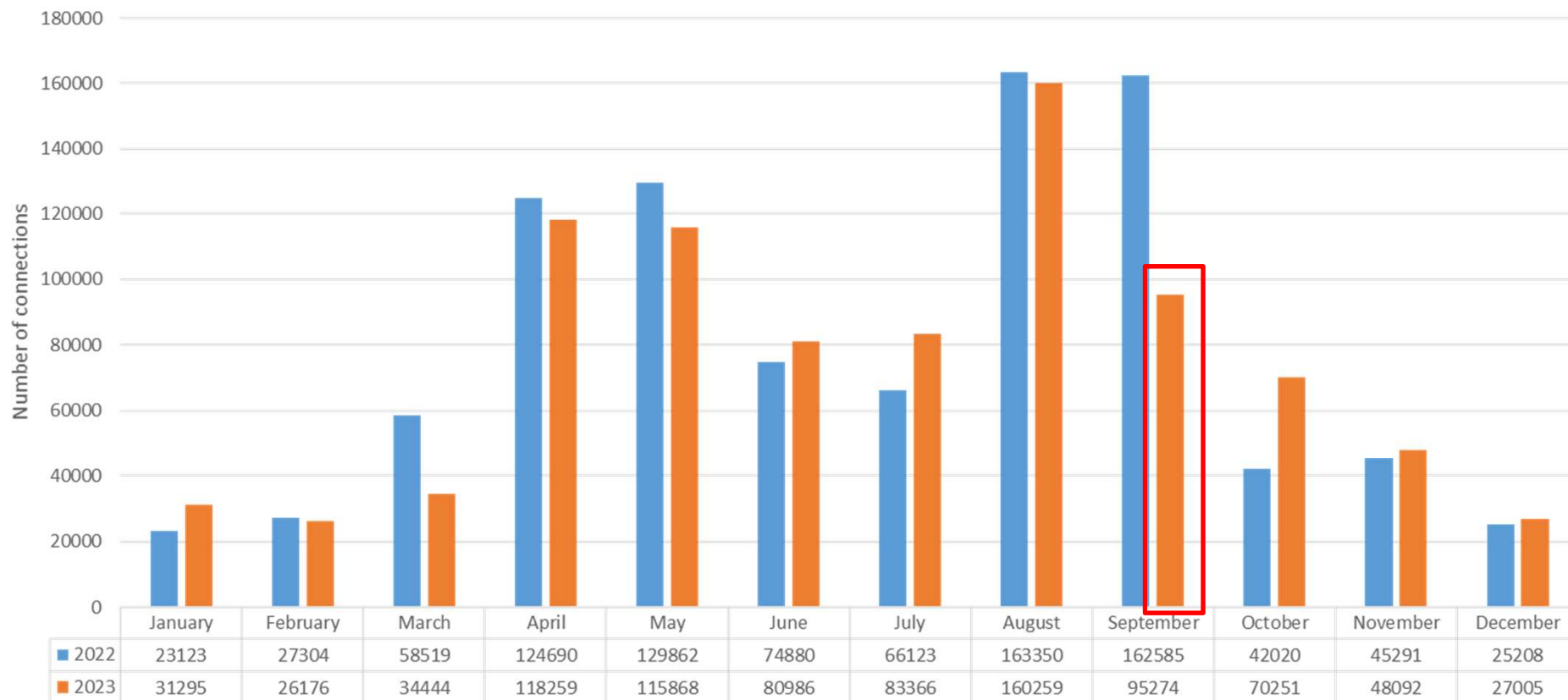
The actual number of RTK service users is shown. Which is different from the number of RTK services applied for



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# Activity of LatPos users (RTK) connections

Number of LatPos RTK connections



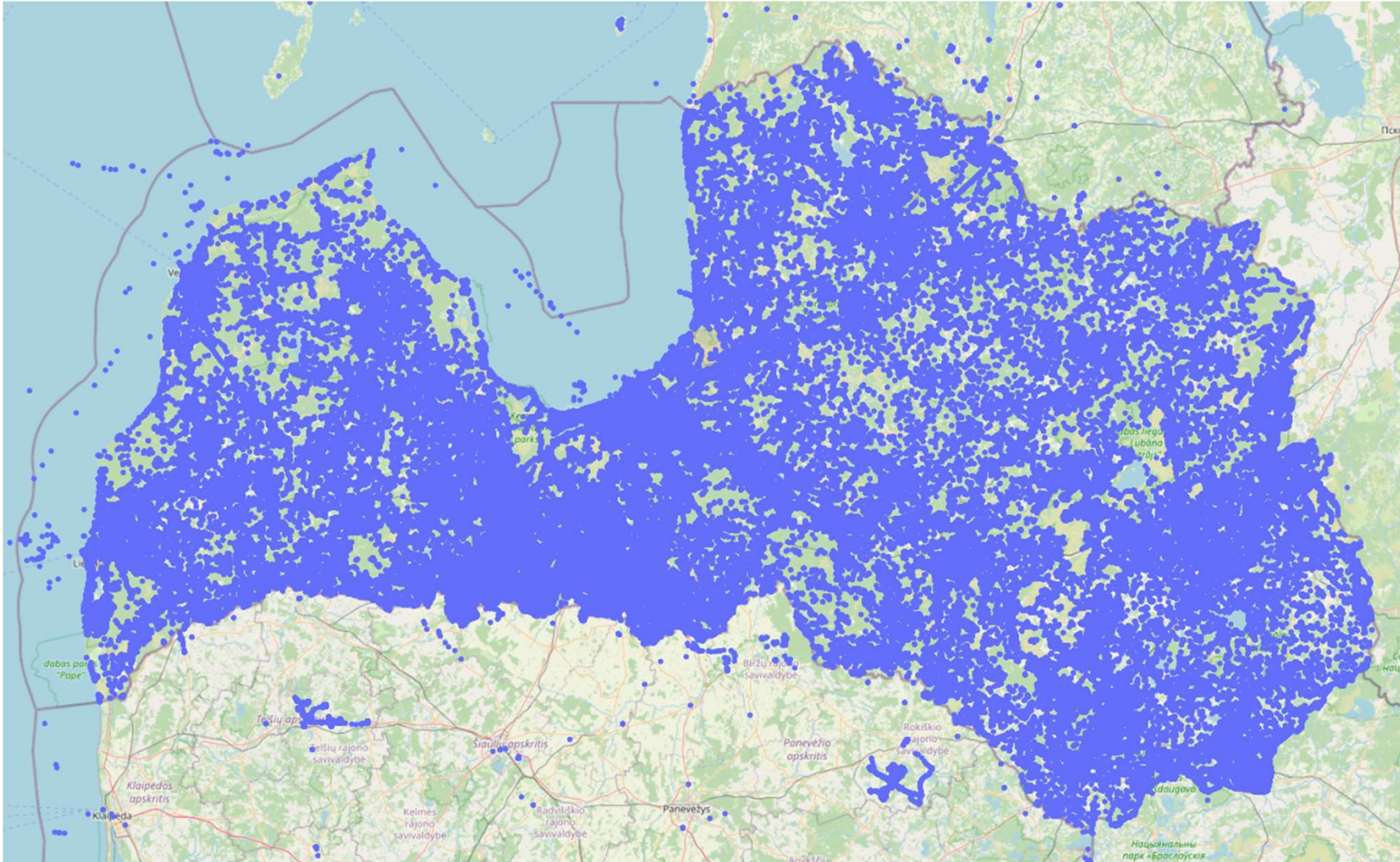
The data for September 2023 is incomplete, so the number of connections is not exact

In 2022, a total of 942 955 connections to the LatPos network were registered.

In 2023, a total of 891 275 connections to the LatPos network were registered.



# Location of RTK users in the territory of Latvia in 2023

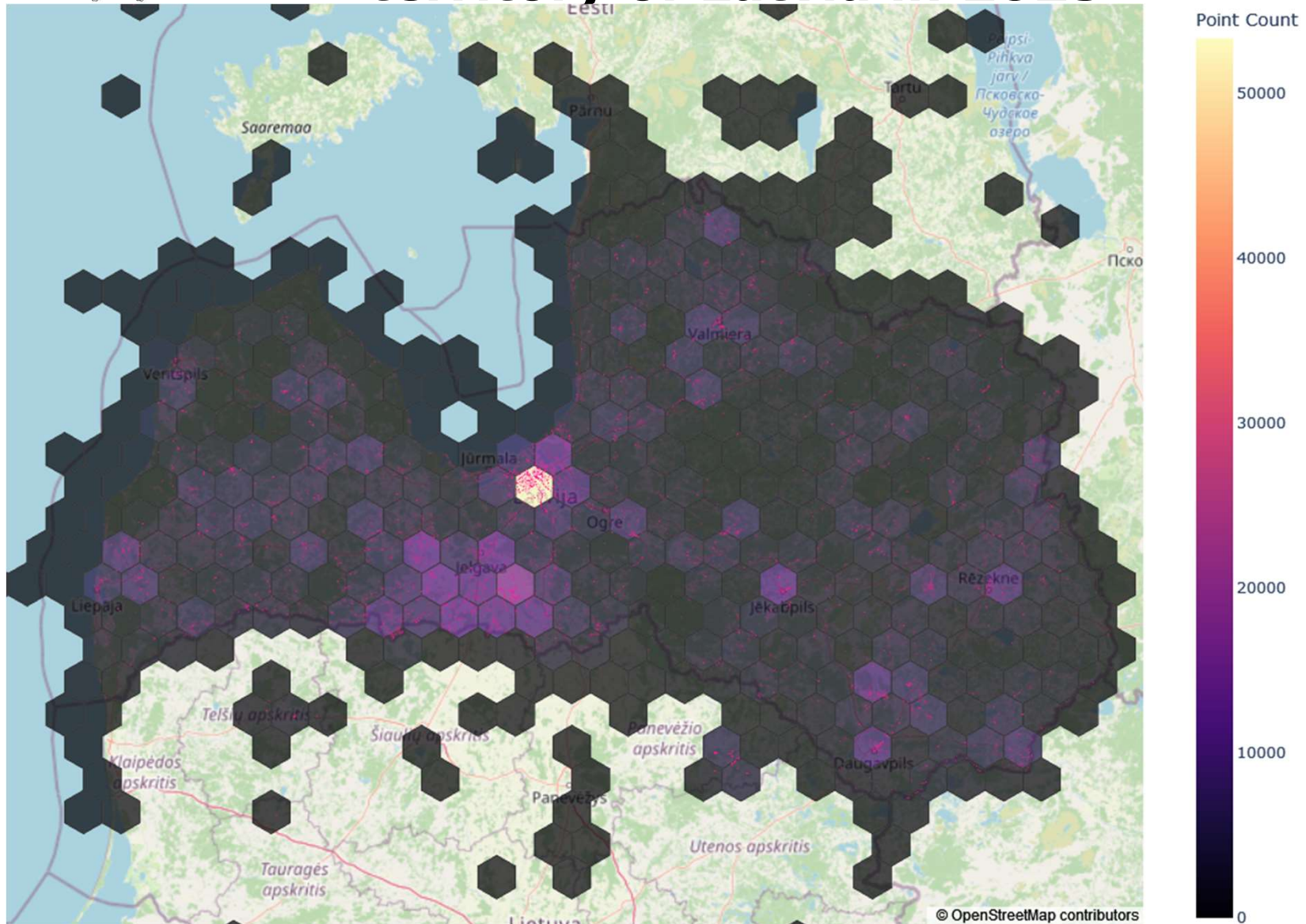


In 2023, a total of 942,955 connections to the LatPos network were registered





# Total activity of RTK users in the territory of Latvia in 2023



Area of one cell, 78km<sup>2</sup>

© OpenStreetMap contributors

Image prepared using Python



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# RINEX file quality control and future plans

- Gnut/Anubis Real Time software will be used to monitor RINEX data quality.





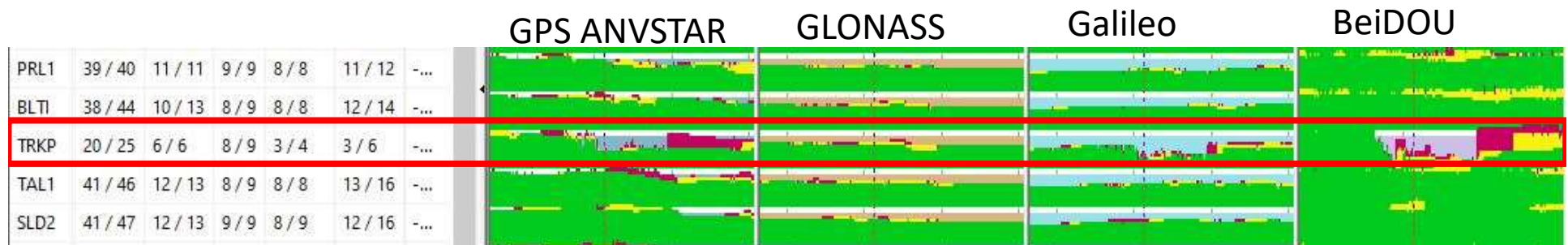
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# Interference detection

All LatPos base station receivers use Interference Detection Tool built into LEICA GR30 receivers, potential GNSS signal interference is stored.

date_time	system	signal	bandwidth	power	density	MHz
2024-02-09 09:13:59	GPS	L1 C/A	1,17	-73,31	-128,74	1575,78
2024-02-09 10:04:41	Galileo	E6	0,59	-65,36	-118,33	1278,23
2024-02-09 10:26:41	Galileo	E6	1,03	-59,77	-111,39	1278,38
2024-02-09 11:34:12	Galileo	E6	0,73	-54,82	-105,04	1280,8
2024-02-09 11:57:55	GPS	L1 C/A	41,24	-56,73	-129,15	1588,71
2024-02-09 12:48:06	GPS	L1 C/A	14,94	-54,28	-122,02	1576,15
2024-02-09 13:13:46	Galileo	E6	0,37	-71,55	-122,97	1282,08
2024-02-09 13:48:34	GPS	L1 C/A	1,54	-73,66	-133,45	1575,16
2024-02-09 13:53:48	Galileo	E6	0,29	-72,53	-122,74	1277,87
2024-02-09 14:48:34	GPS	L1 C/A	58,67	-46,32	-117,5	1588,2
2024-02-09 14:56:27	Galileo	E6	0,44	-71,43	-125,36	1282,63
2024-02-09 15:48:34	GLONASS	L1 C/A	1,25	-72,46	-131,75	1602,11
2024-02-09 16:41:49	Galileo	E6	0,59	-64,69	-118,46	1282,11
2024-02-09 16:48:34	GLONASS	L1 C/A	6,81	-64,45	-128,56	1601,16
2024-02-09 17:00:19	Galileo	E6	0,29	-71,53	-122,14	1280,5
2024-02-09 17:48:34	GPS	L1 C/A	4,1	-69,26	-133,19	1574,54

Interference with GPS NAVSTAR, Galileo and BeiDOU GNSS signals on 09.02.2024 in the period from 11:20 to 11:40

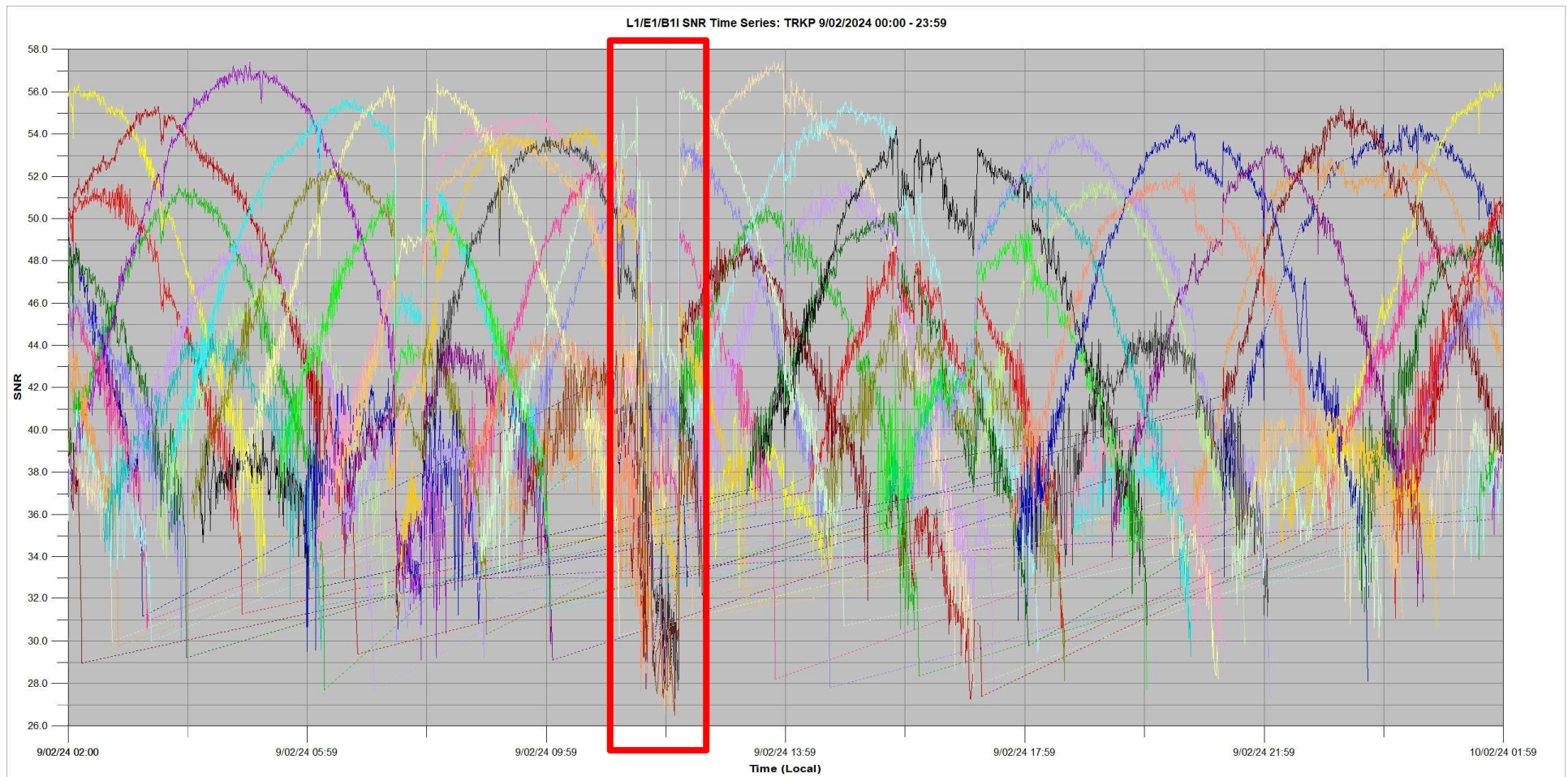




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# Interference detection (2)

A similar picture is in the L2/B1C and L5/E5a/B2a SNR times series





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# Future plans

- Fully learn G-Nut/Anubis Real Time software for data analysis
- Ensure continuous operation of base stations, data stream and provide RTK correction without interruption
- Ensure the availability of the network solution in almost the entire territory of Latvia
- Establish a new base station in 2024 in Rucava



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**Thank you for your attention!**  
**Paldies par uzmanību!**





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# Latvian Geospatial Information Agency

## National report

**NKG Working Group of Reference Frames (WGRF)**  
**NKG Science Week 2024, Reykjavik, Iceland, 12.-14.03.2024.**

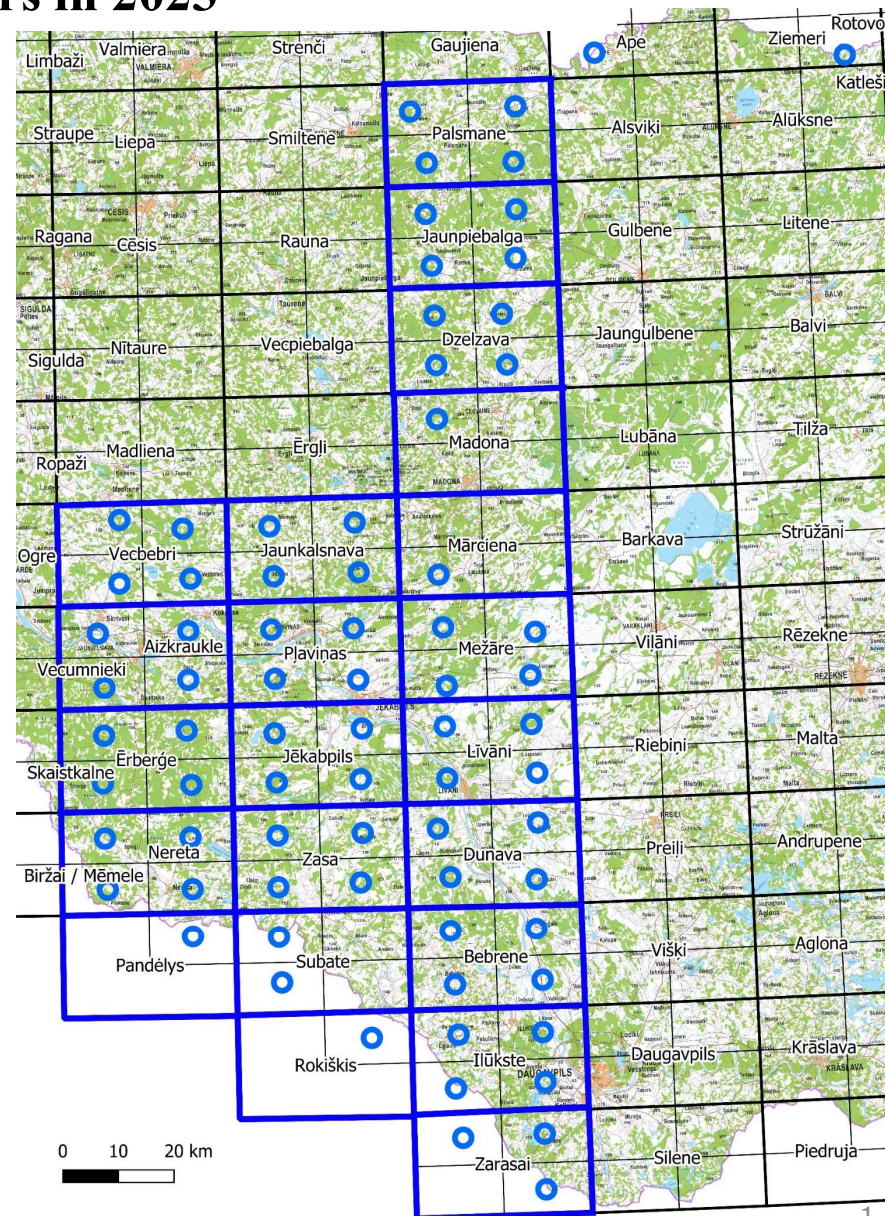
Department of Geodesy  
Geodetic data control division  
Head of Division Aigars Keiselis



# Observations and calculations of geomagnetic parameters in 2023



- Observations and calculations for 1:25k map sheets (75 points);
- Observations and calculations for heliports.







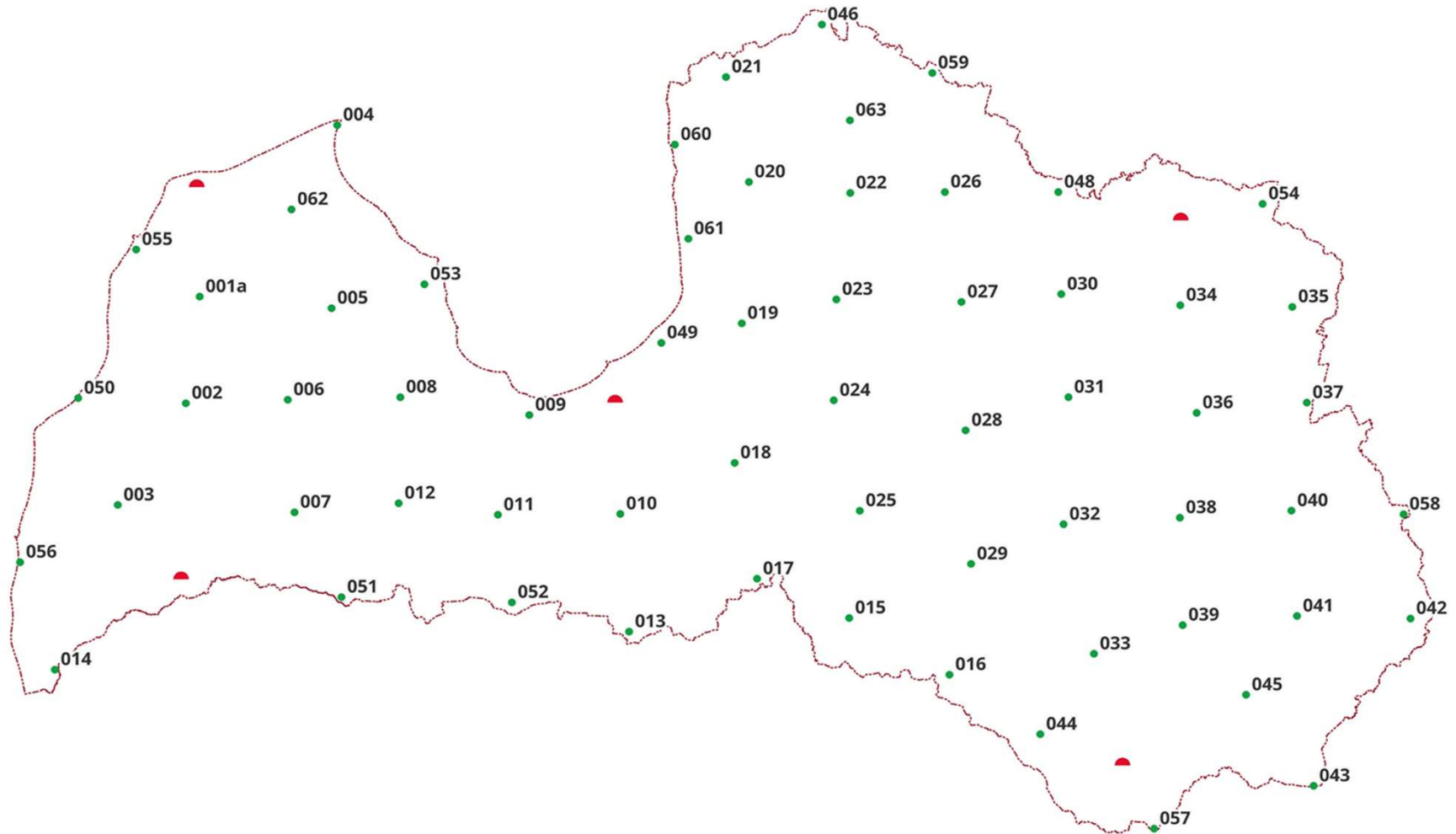
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# The great network (1)

- The great network will serve for datum maintenance
- Densification for 5 LATREF stations
- Distance between benchmarks 35 km
- 62 benchmarks in network
- Homogenous spread over territory of Latvia



## The great network (2)

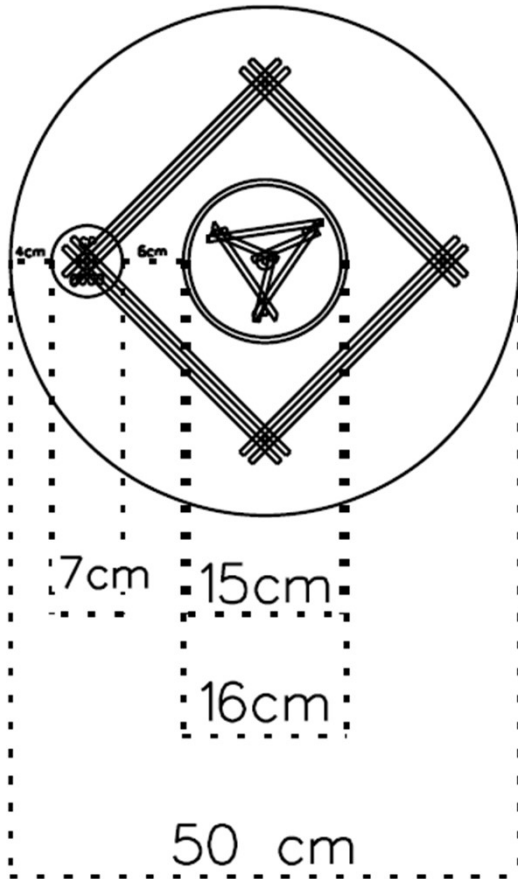


- Benchmarks will be established on state or local municipality property only



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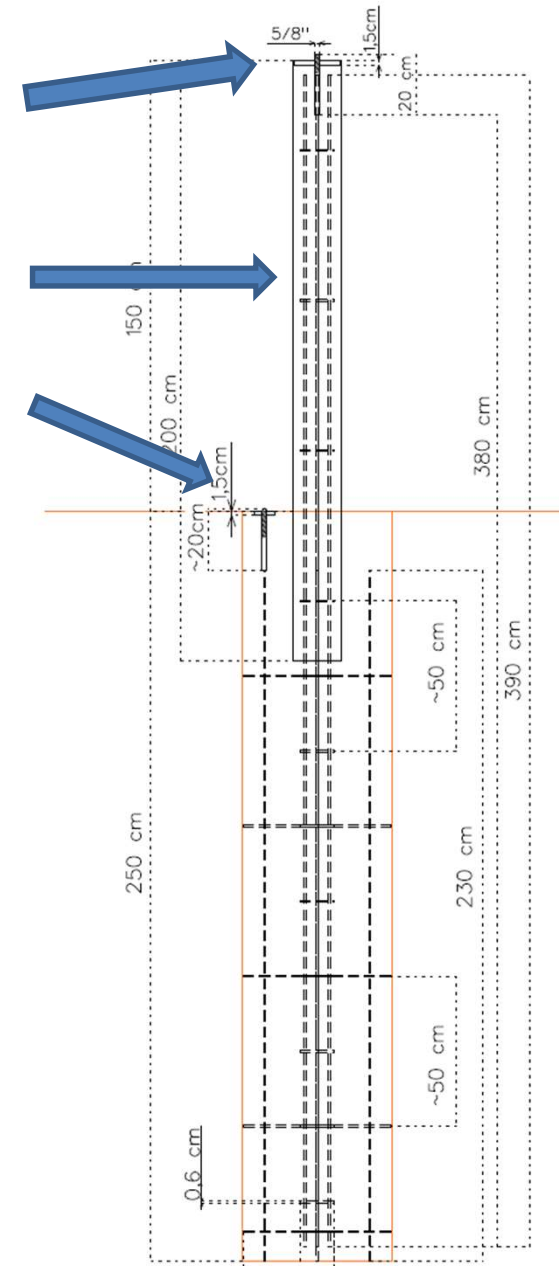
# The great network (3)



**Forced center**

**Concrete in  
PVC pipe**

**Levelling  
benchmark**



## The great network (4)



➤ First benchmark established in 28.09.2023.



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## The Great Network (5)



- Intended additional construction for the passive reflector for InSAR as well



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# Latvian geodetic coordinate system LKS-2020

The screenshot shows the GeoRepository website interface. The main content area displays search results for 'LKS-2020'. The results are presented in a table with the following columns: NAME, CODE, TYPE, EXTENT, DATA SOURCE, REMARKS, and REVISION DATE. There are four entries listed, all with a revision date of March 1, 2023.

NAME	CODE	TYPE	EXTENT	DATA SOURCE	REMARKS	REVISION DATE
LKS-2020	10303	geocentric	Latvia	EPSG	Replaces LKS-92 (CRS code 4948...	March 1, 2023
LKS-2020	10304	geographic 3D	Latvia	EPSG	Replaces LKS-92 (CRS code 4949...	March 1, 2023
LKS-2020	10305	geographic 2D	Latvia	EPSG	Replaces LKS-92 (CRS code 4661...	March 1, 2023
LKS-2020 / Latvia TM	10306	projected	Latvia	EPSG	Replaces LKS-92 / Latvia TM (C...	March 1, 2023

➤ nTV2 surface file for conversion between LKS-92/LKS2020 geodetic reference systems is ready

➤ The other works of implementation of LKS-2020 are still in progress





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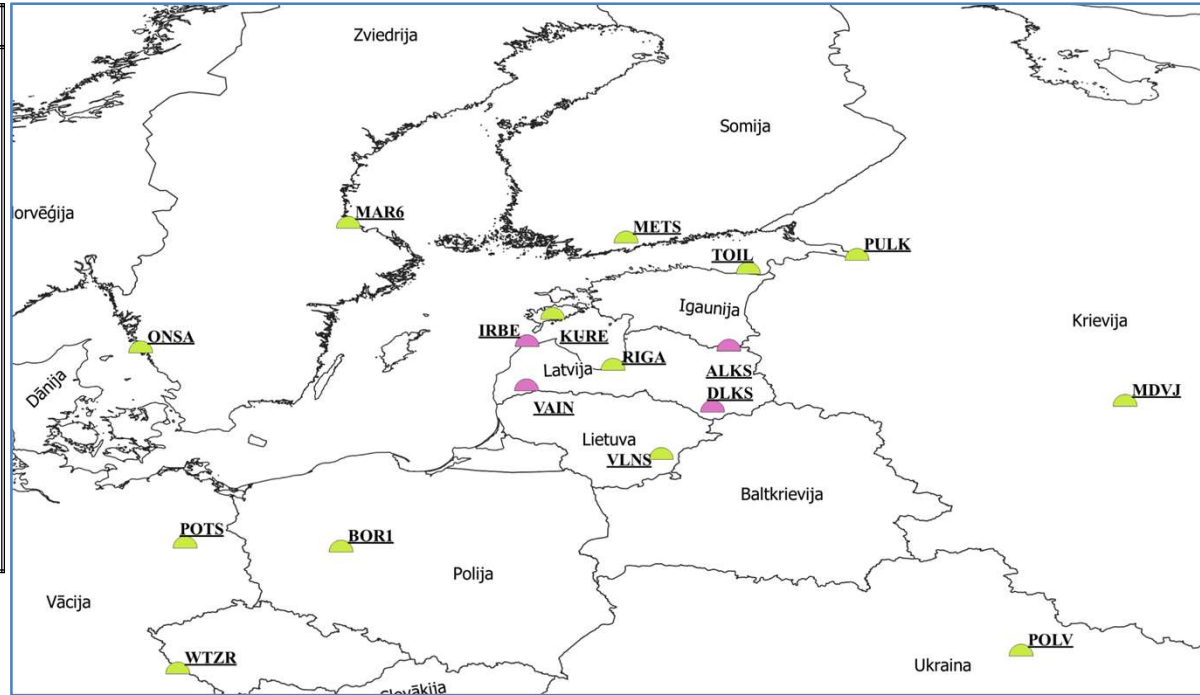
**LAT base stations**

ALKS (10731M002)  
DLKS (10704M003)  
IRBE (10726M001)  
VAIN (10736M001)

**RN base stations**

BOR1 (12205M002)  
KURE (10604S001)  
MAR6 (10405M002)  
MDVJ (12309M005)  
METS (10503S011)  
ONSA (10402M004)  
POLV (12336M001)  
POTS (14106M003)  
PULK (12305M001)  
RIGA (12302M002)  
TOIL (10605S001)  
VLNS (10801M001)  
WTZR (14201M010)

# NKG GNSS AC: LAT AC (1)



- **Final Daily Coordinate Solution till GPS week 2302**
- **Final Weekly Coordinate Solution till GPS week 2302**

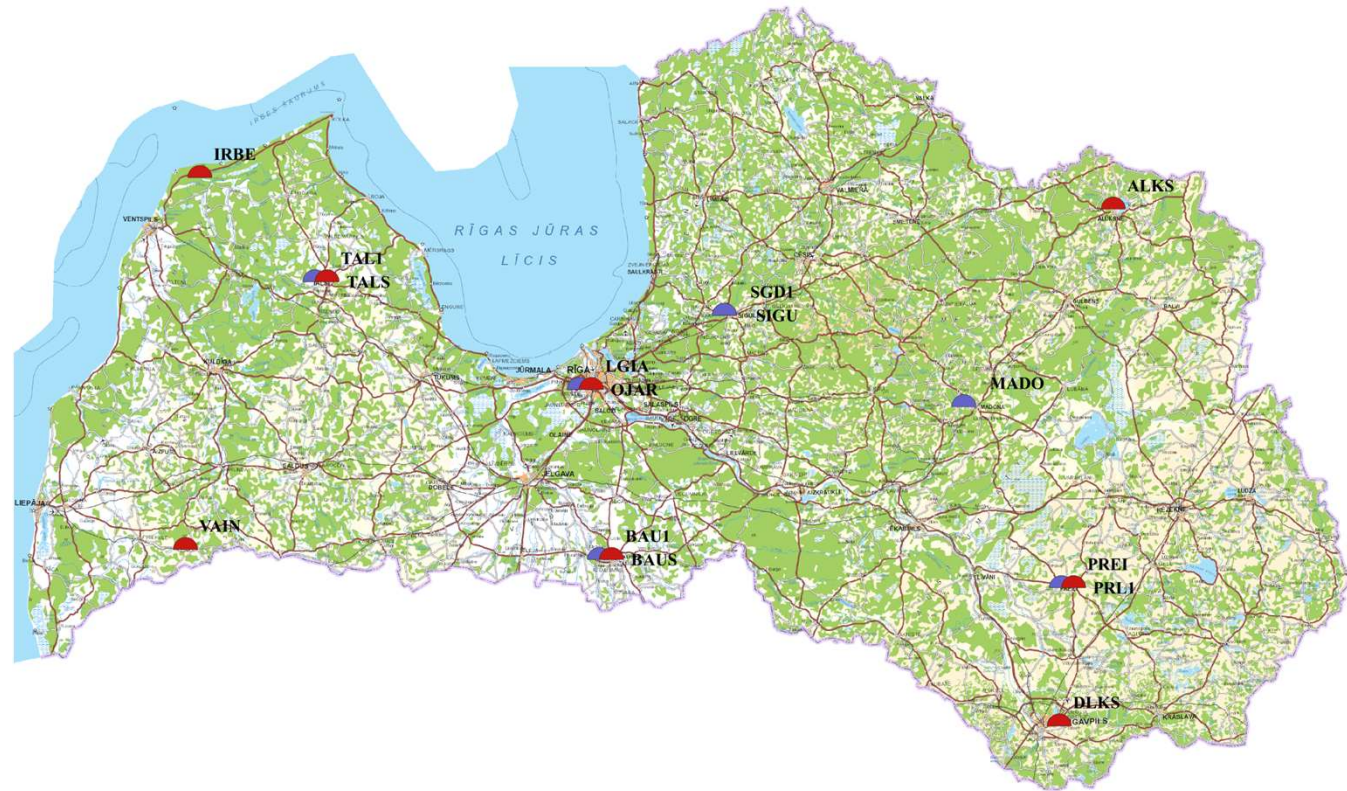


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## NKG GNSS AC: LAT AC (2)

### Latvian base stations for Repro2

BAUS (10703M001)  
BAU1 (10740M001)  
DLKS (10704M003)  
MADO (10712M001)  
OJAR (10713M001)  
LGIA (10713M002)  
PREI (10714M001)  
PRL1 (10741M001)  
SIGU (10716M001)  
SGD1 (10716M002)  
TALS (10717M001)  
TAL1 (10717M002)  
IRBE (10726M001)  
ALKS (10731M002)  
VAIN (10736M001)



- **Data collection and preparation works for Repro2 are still in progress**

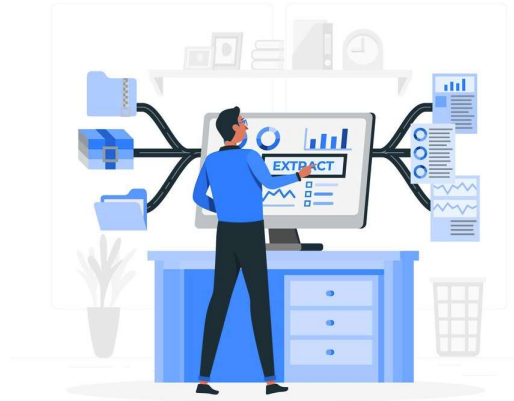






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## NKG GNSS AC: LAT AC (3)



RINEX data	CODE products	Troposphere model	
Status: done	-	VMF3_EI	Status: done
	-	VMF3_OP	Status: done



# NKG LNG (1)

## Background

NKG General Assembly 2022

Bylaws describe National Group (NG) functions as:

Unites NKG members residing in one of the Member States;

Delegates two NKG members to presidium;

Provides NKG secretary with membership information;

### §4 Membership

Individuals mentioned in §1 can join the Commission as members. Members are divided into eight **National Groups** and a member can belong to only one **National Group**. The **National Groups** are free to organize themselves and keep information of their members at their own discretion.

### §6 Presidium

Each **National Group** nominates two representatives to the Presidium based on their own rules and practices. These representatives should, whenever possible, represent both the National Mapping and Cadastral Agencies (NMCAs) and scientific community (universities etc.) at the national level. The number of terms a person can serve in the Presidium is not limited.

In decisions taken by voting, **each National Group has one vote**. A quorum is reached

Tasks of the Secretary are:

- To collect the memberships lists of the **National Groups**, and

Popularize NKG, inform of NKG activities, entice potential new members!  
The level of organization of National Groups is up to each Member state...

# NKG LNG (2)

## Foundation



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Latvia University  
of Life Sciences  
and Technologies



RIGA TECHNICAL  
UNIVERSITY



UNIVERSITY  
OF LATVIA



19th General Assembly of Nordic Geodetic Commission

New Bylaws - Member States should (can?) organize through National groups

2023.01.24. Latvian Geospatial Information Agency initiates a sit down between Agency and professors of leading universities (Riga Technical University, University of Latvia, Latvia University of Life Sciences and Technologies)

2023.09.12. Statutory meeting; Bylaws accepted, 9 founding members



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## NKG LNG (3)

### Structure

Chairman Vents Zuševics (LGIA), secretary – vacant. 4 year term, in future will be synchronized with general assembly rhythm

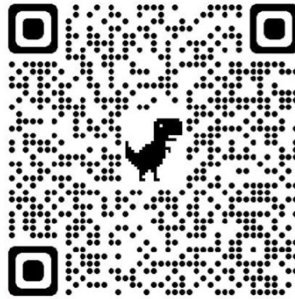
2 delegates to NKG Presidium – Ivars Liepiņš (LGIA), Janis Kaminskis (RTU)

Membership status – voluntary, by filling out form

All documentation on view accessible Google Drive

Meetings at least twice a year – after WG meeting and around presidium meeting

Decisions of board and other important information is published on Agency's homepage; other members can publish on their platforms.



2023-09-12\_NKG-LVNG protokols\_20230926\_1.edoc

2023\_09\_12\_NKG\_nacionalas\_grupas\_nolikums.pdf

Iesnieguma\_sagatave\_20231011.docx

2023\_09\_12\_NKG\_nacionalas\_grupas\_nolikums.docx





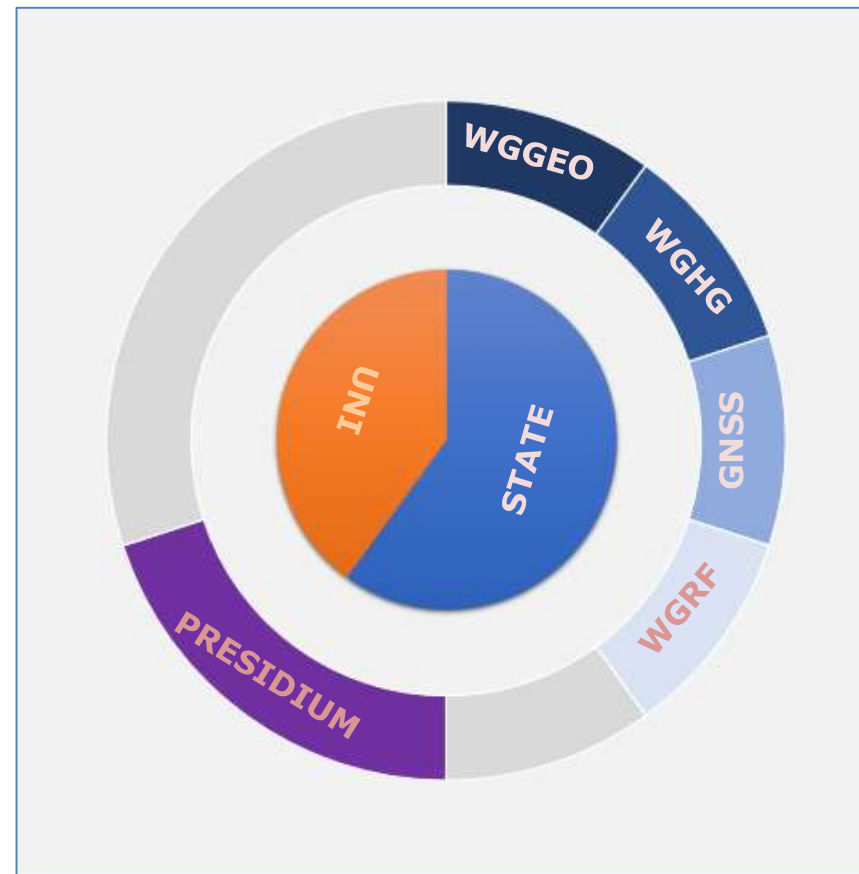
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## NKG LNG (4)

### Functions

- Gather and disseminate NKG-related information within Member state;
- Further international contacts and cooperation with Working groups and Service providers;
- Popularize NKG work and projects to specialists in Latvia;
- Popularize geodesy in the society in general;
- Disseminate NKG information to LNG members;
- Organize member attraction



2023-09-12\_NKG-LVNG protokols\_20230926\_1.edoc

2023\_09\_12\_NKG\_nacionalas\_grupas\_nolikums.pdf

Iesnieguma\_sagatave\_20231011.docx

2023\_09\_12\_NKG\_nacionalas\_grupas\_nolikums.docx



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**Thank you for your attention!**

**Takk fyrir athyglina!**

**Paldies par Jūsu uzmanību!**

Aigars Keiselis

[Aigars.Keiselis@lgia.gov.lv](mailto:Aigars.Keiselis@lgia.gov.lv)

