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 Priževoits

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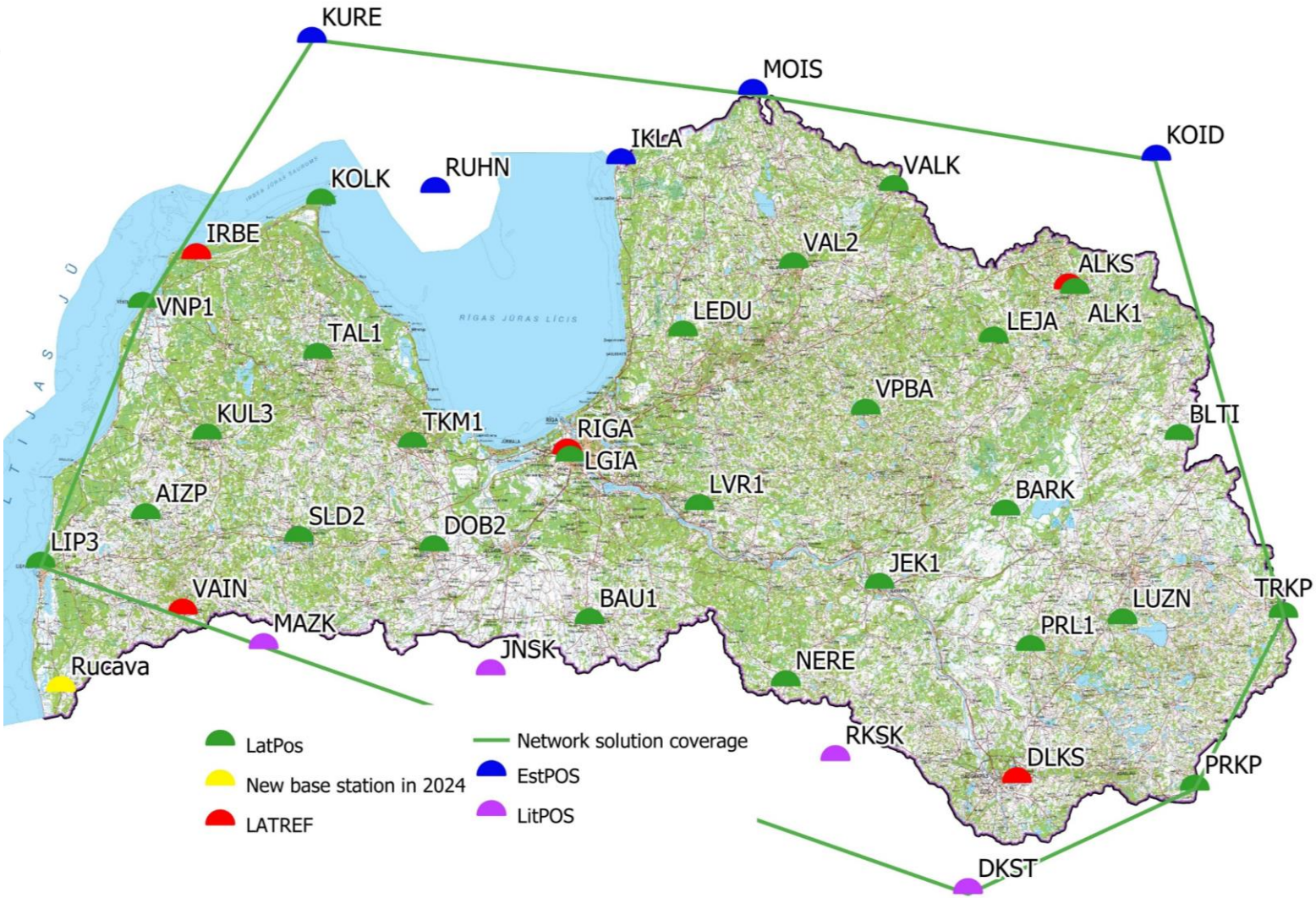
Technical characteristics of LatPos, till 05.03.2024

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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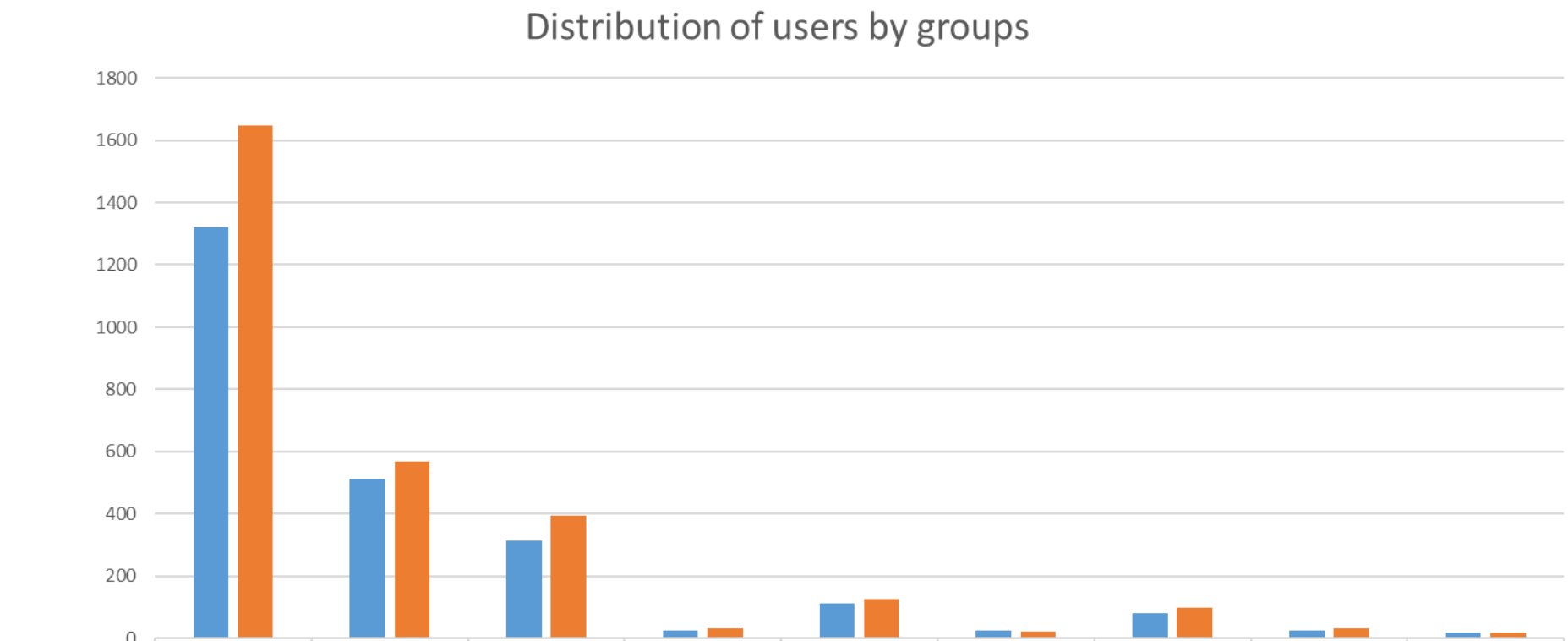
Distribution of LatPos users by group, till 05.03.2024



	Agriculture	Surveyor	Construction	Universities	Other	LGIA	State	Designing	Municipality
Till 05.04.2023	1321	511	314	27	113	24	82	27	17
Till 05.03.2024	1648	569	395	32	128	23	98	32	17

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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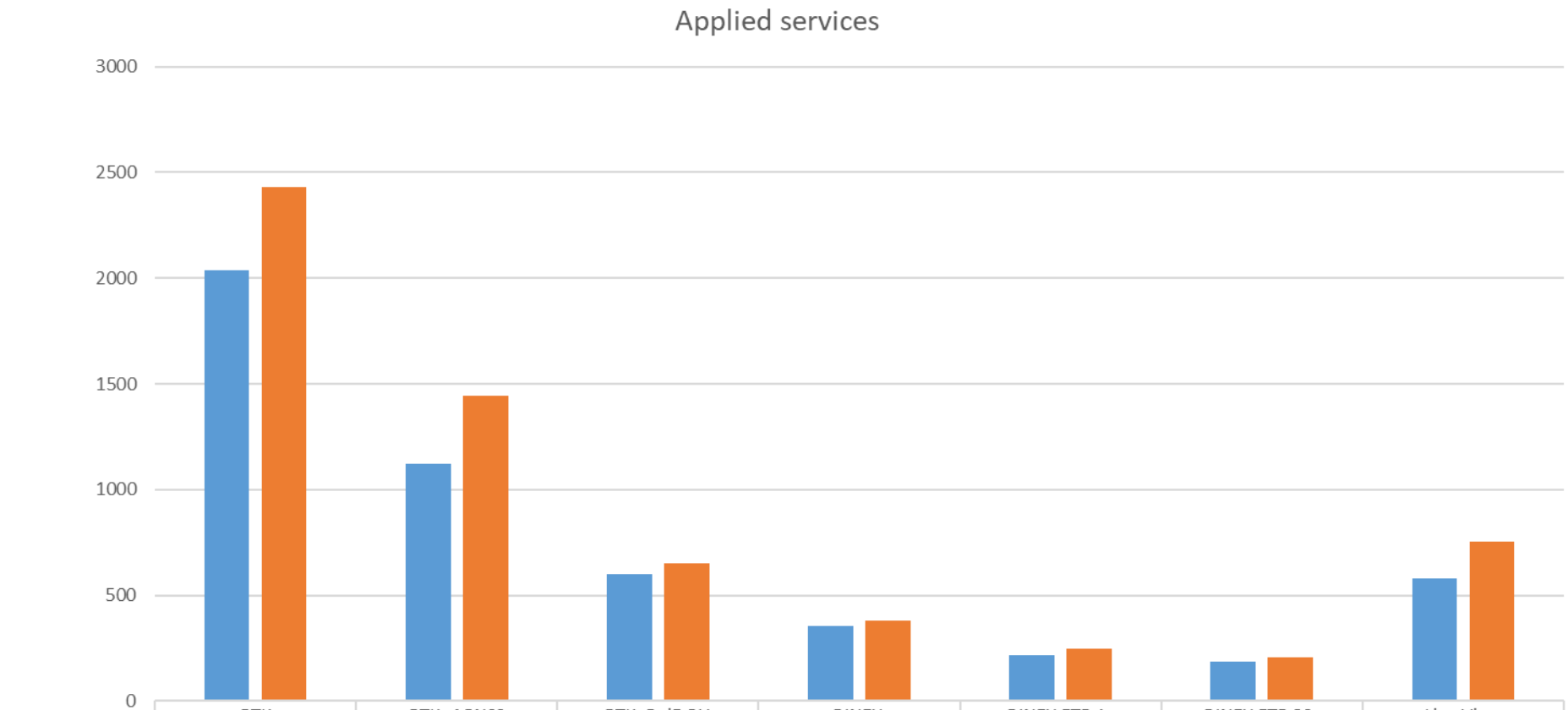
Number of applied services, till 05.03.2024



	RTK	RTK_4GNSS	RTK_BeiDOU	RINEX	RINEX FTP 1s	RINEX FTP 30s	Live View
Till 05.04.2023	2037	1124	600	355	216	184	579
Till 05.03.2024	2429	1446	652	380	250	208	755

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

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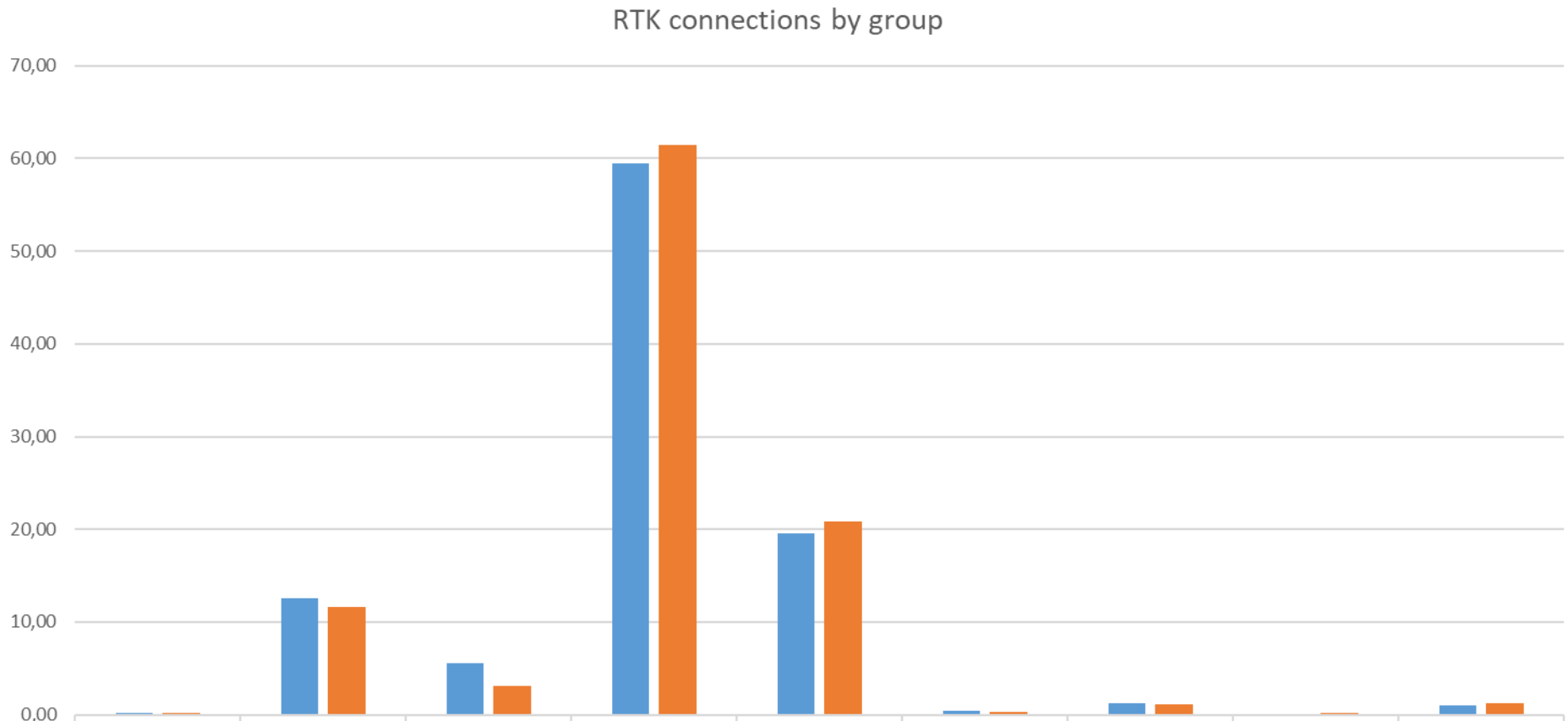
Number of RTK connections by group



	LGIA	Construction	Other	Agriculture	Surveyor	Municipality	Designing	Universities	State
2022	0,14	12,56	5,52	59,50	19,57	0,38	1,24	0,10	0,99
2023	0,17	11,64	3,10	61,40	20,87	0,30	1,13	0,17	1,21

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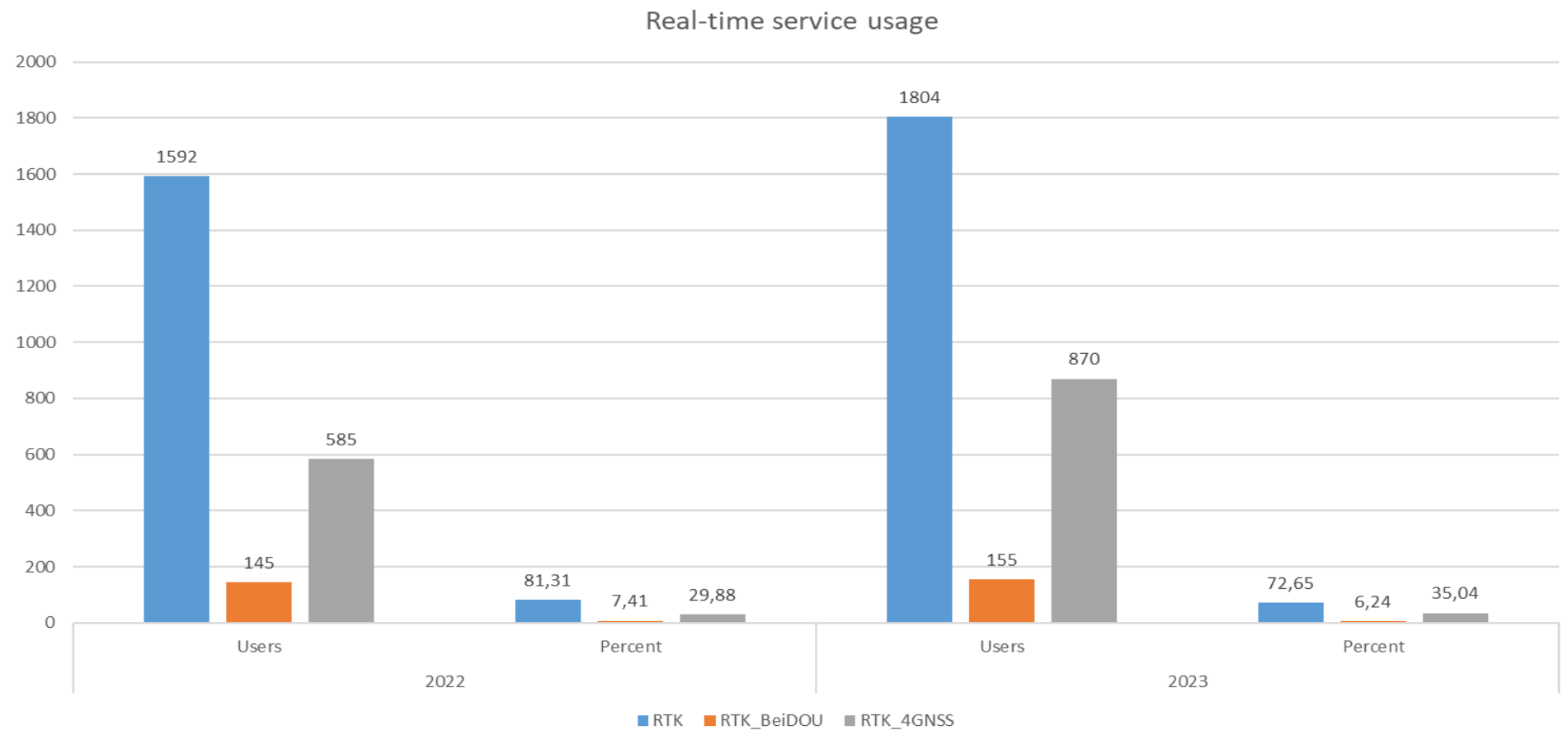
Distribution of users of real-time services



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

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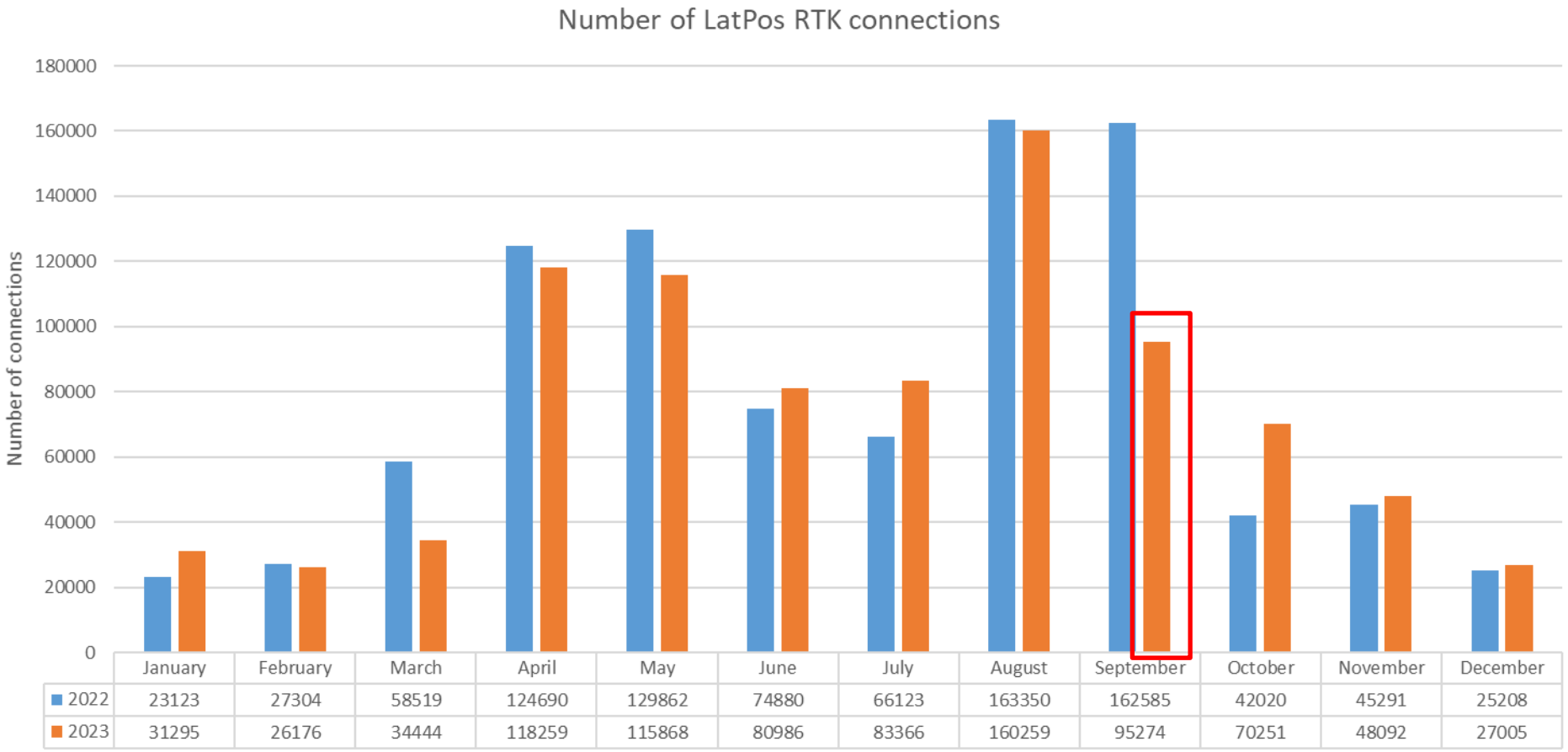
Activity of LatPos users (RTK) connections

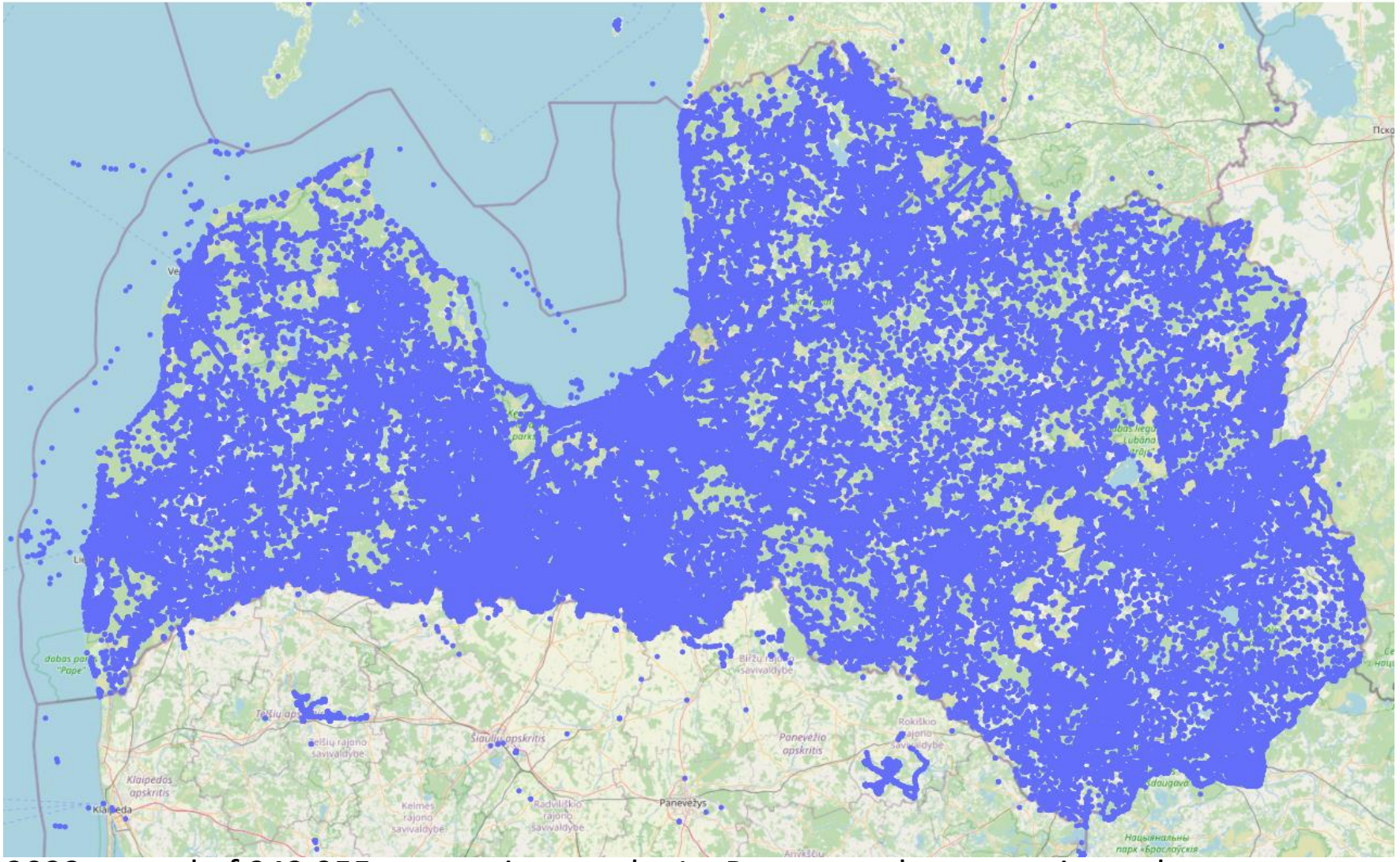


	January	February	March	April	May	June	July	August	September	October	November	December
2022	23123	27304	58519	124690	129862	74880	66123	163350	162585	42020	45291	25208
2023	31295	26176	34444	118259	115868	80986	83366	160259	95274	70251	48092	27005

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.

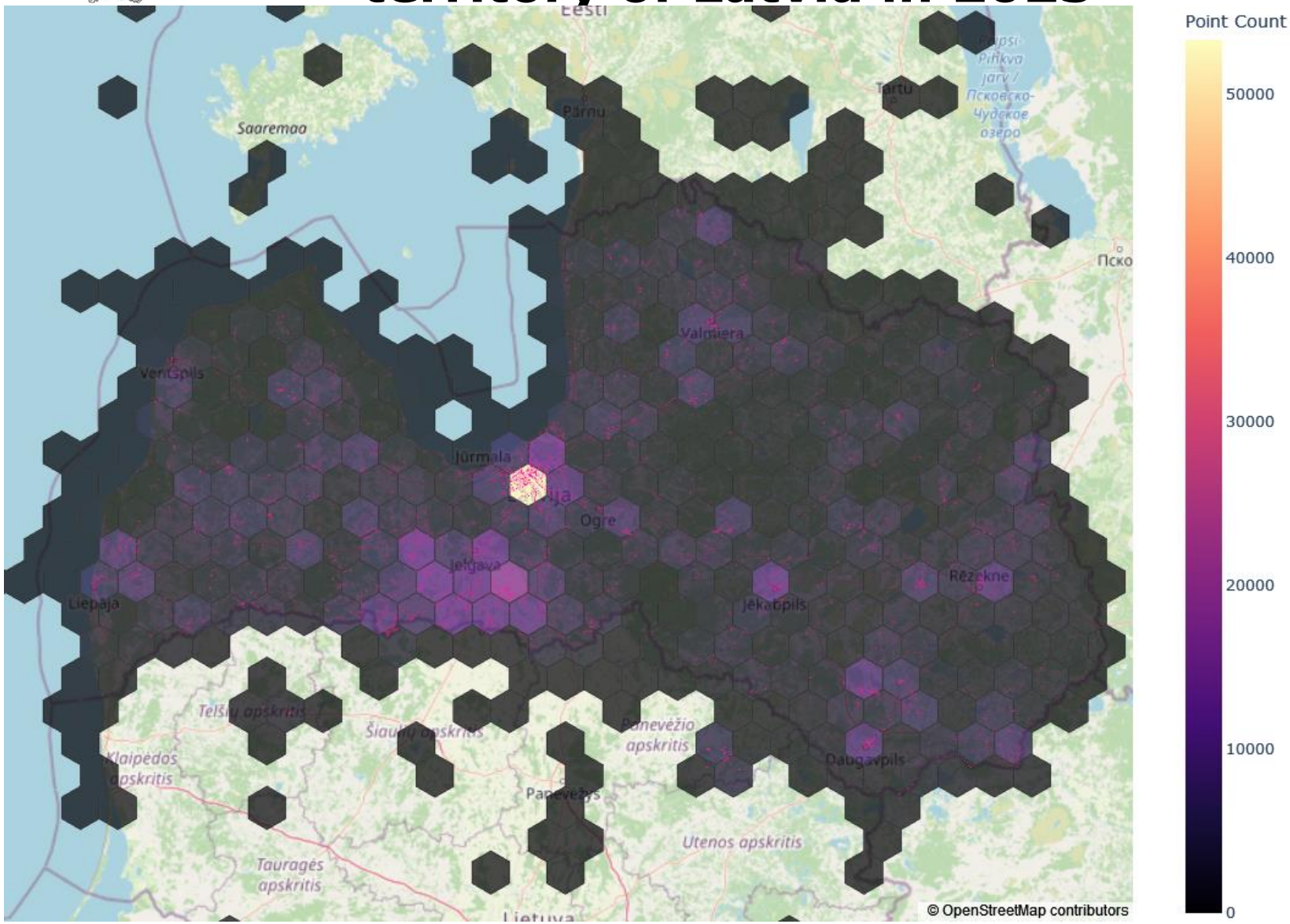
Location of RTK users in the territory of Latvia in 2023



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

Image prepared using Python

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



Area of one cell, 78km^2

Image prepared using Python

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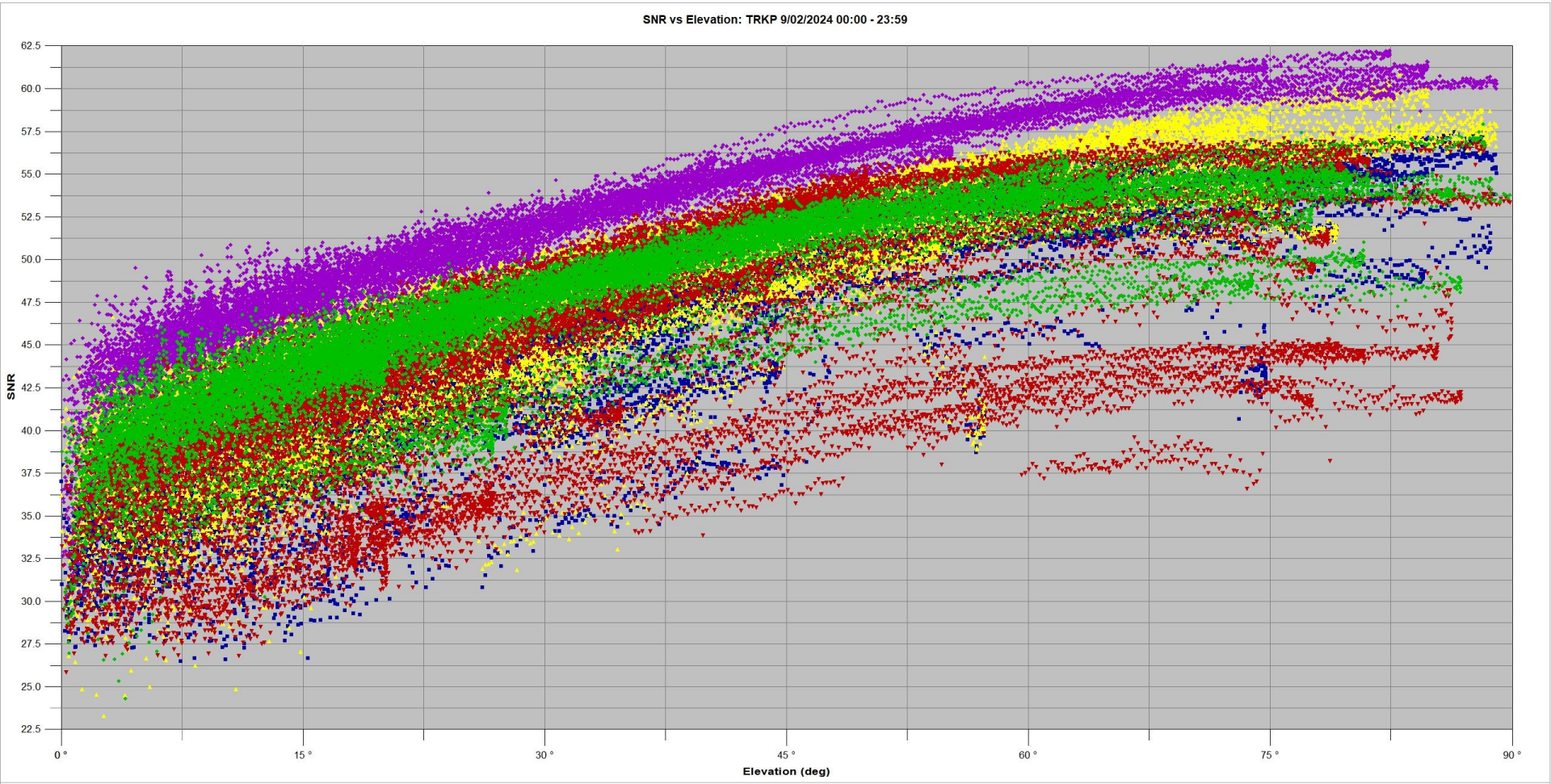
RINEX file quality control and future plans

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



Interference detection

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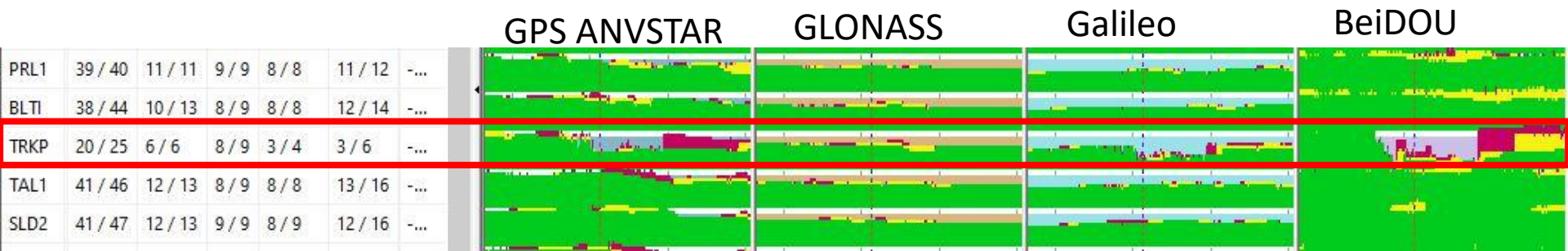
date_time	system	signal	bandwidth	power	density	MHz
2024-02-09 09:13:59	GPS	L1 C/A	1,17	-73,31	-128,74	1575,78
2024-02-09 10:04:41	Galileo	E6	0,59	-65,36	-118,33	1278,23
2024-02-09 10:26:41	Galileo	E6	1,03	-59,77	-111,39	1278,38
2024-02-09 11:34:12	Galileo	E6	0,73	-54,82	-105,04	1280,8
2024-02-09 11:57:55	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

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

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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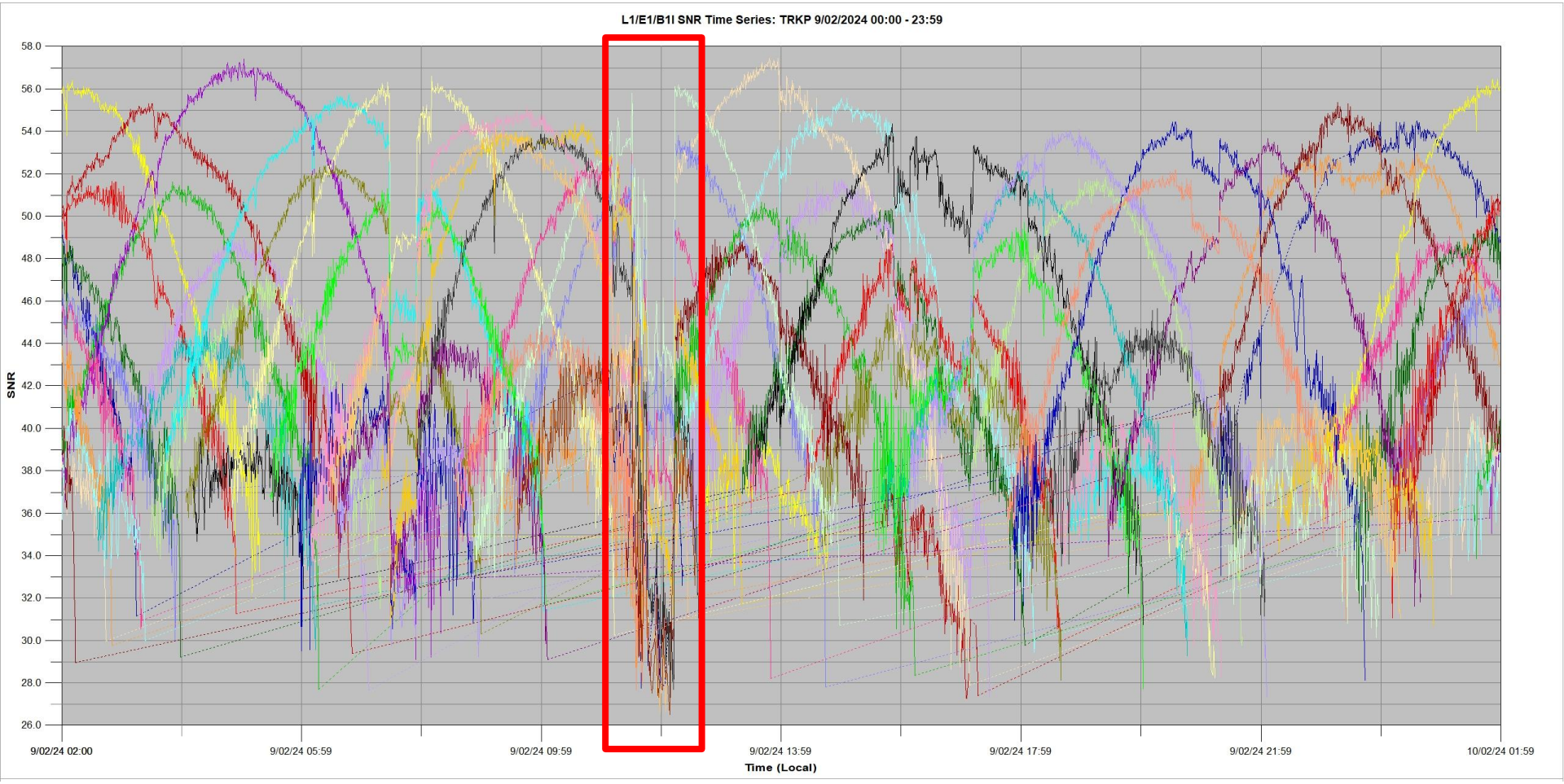
Interference detection (2)

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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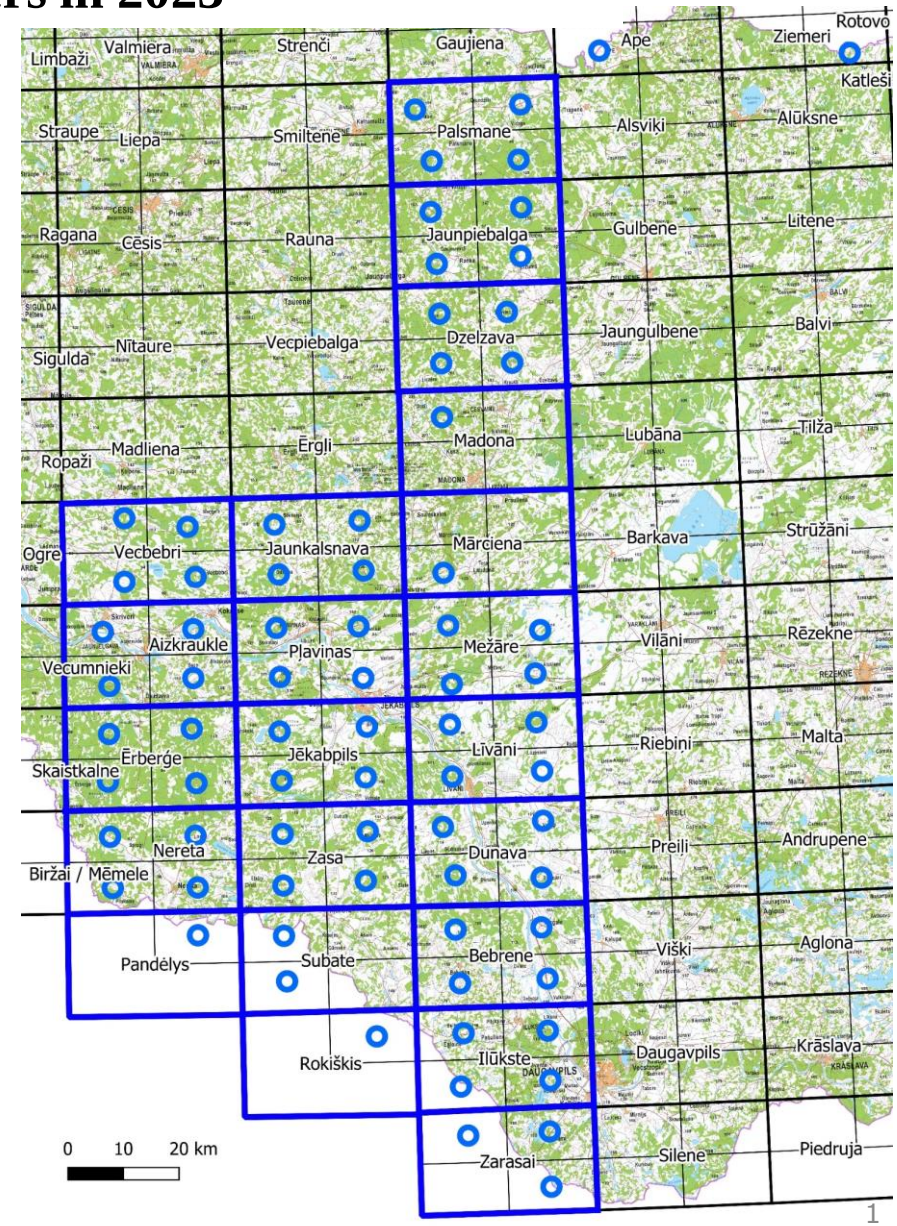
NKG Working Group of Reference Frames (WGRF)

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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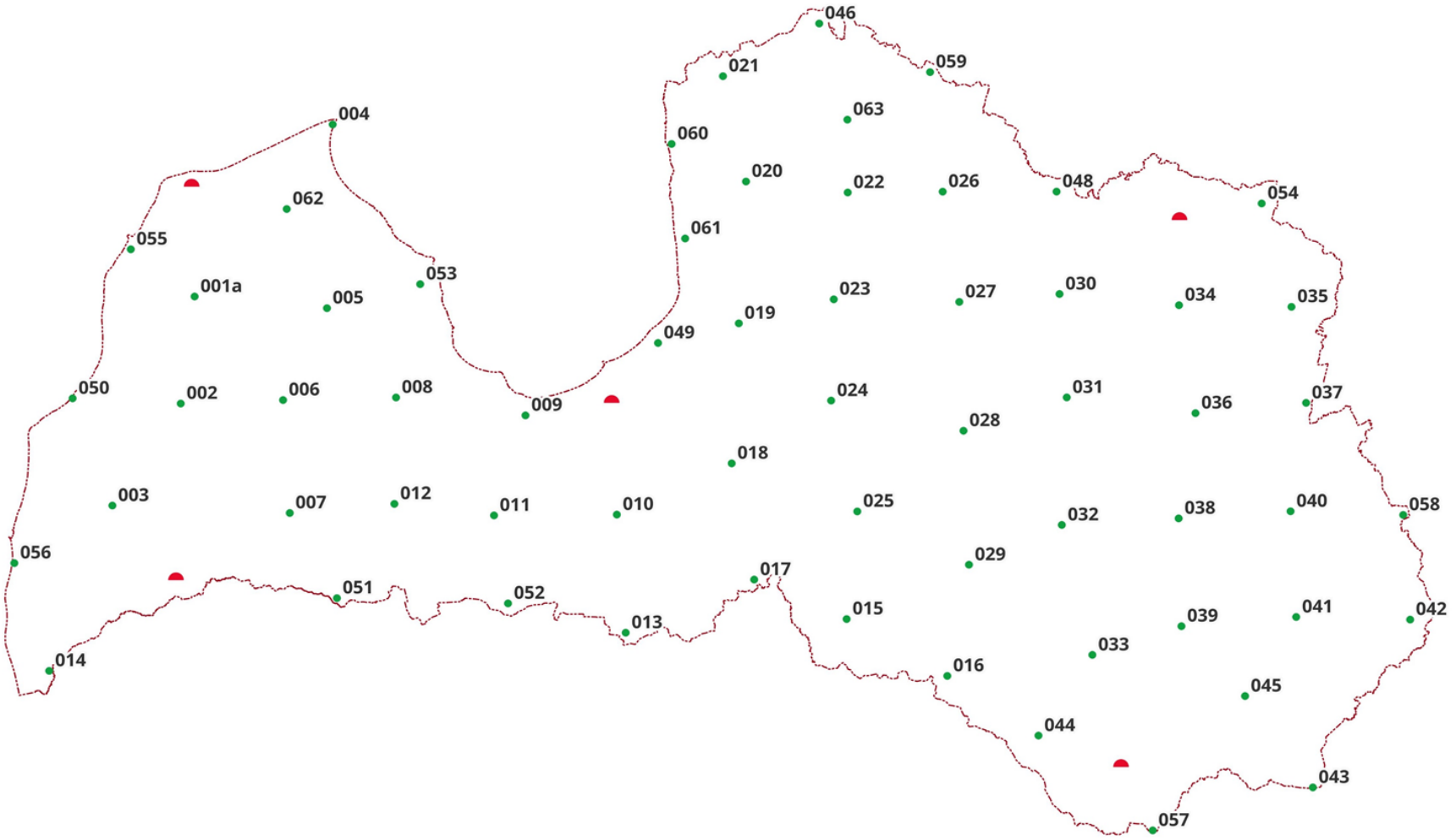
The great network (1)

- 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

The great network (3)

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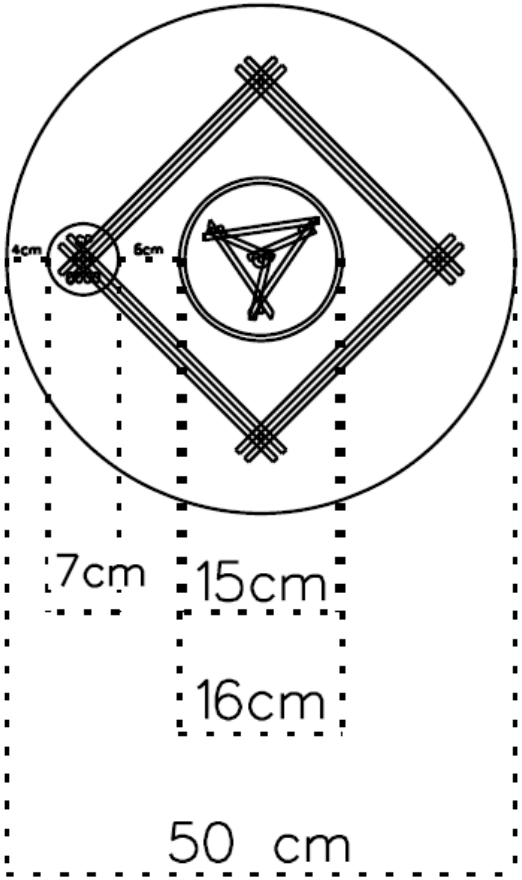
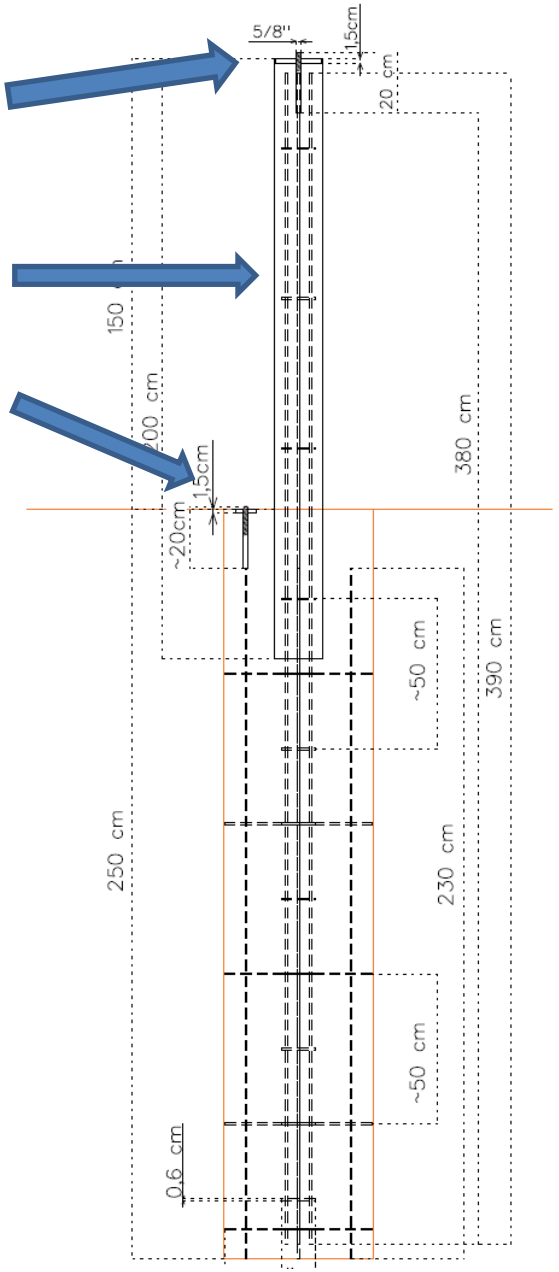
Forced center

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

Latvian geodetic coordinate system LKS-2020

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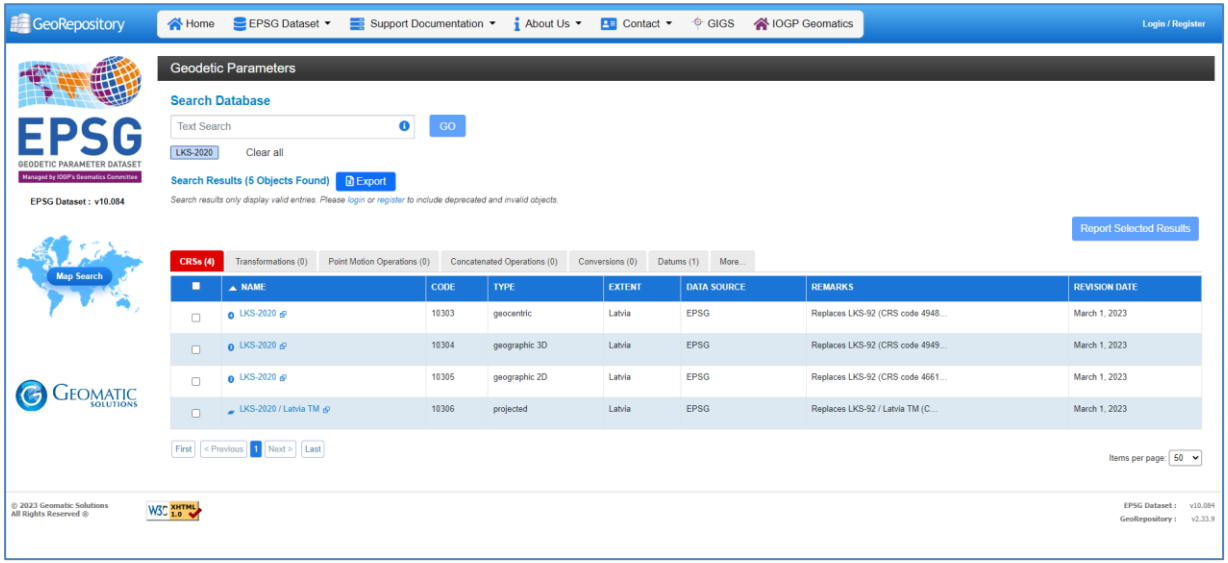

- **nTV2 surface file for conversion between LKS-92/LKS2020 geodetic reference systems is ready**

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

NKG GNSS AC: LAT AC (1)

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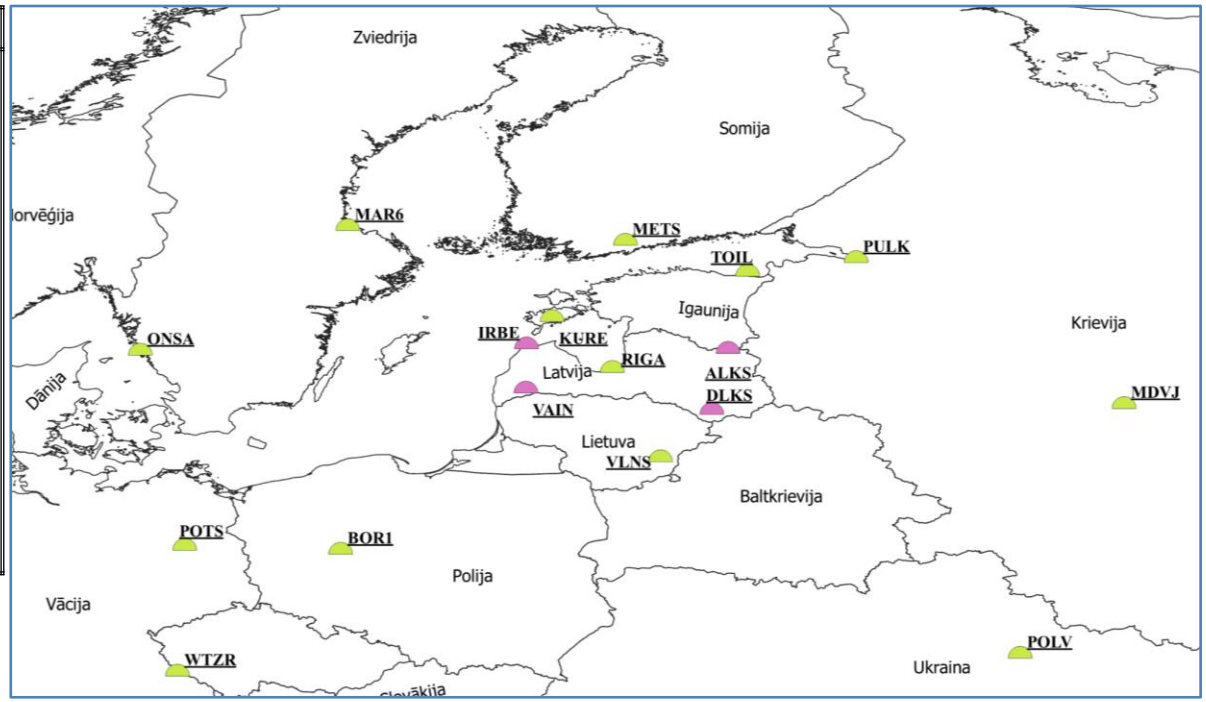
LAT base stations
ALKS (10731M002)
DLKS (10704M003)
IRBE (10726M001)
VAIN (10736M001)

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)



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

NKG GNSS AC: LAT AC (2)

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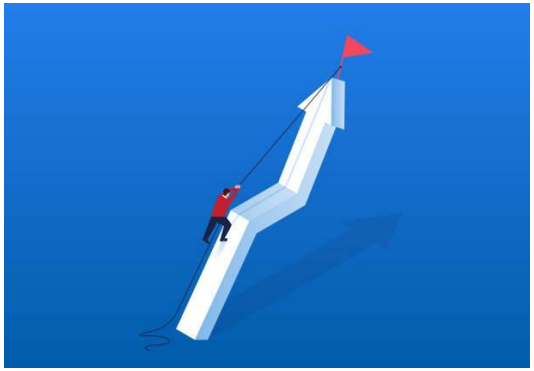
Latvian base stations for Repro2
BAUS (10703M001)
BAU1 (10740M001)
DLKS (10704M003)
MADO (10712M001)
OJAR (10713M001)
LGIA (10713M002)
PREI (10714M001)
PRL1 (10741M001)
SIGU (10716M001)
SGD1 (10716M002)
TALS (10717M001)
TAL1 (10717M002)
IRBE (10726M001)
ALKS (10731M002)
VAIN (10736M001)



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

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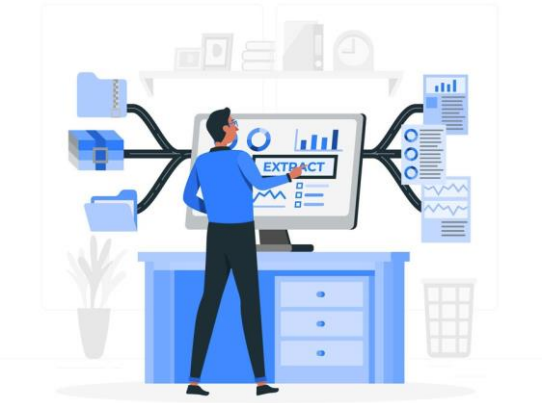
NKG GNSS AC: LAT AC (3)



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

NKG LNG (1)

Background

Latvian Geospatial Information Agency

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

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

NKG LNG (3)

Structure

Latvian Geospatial Information Agency

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

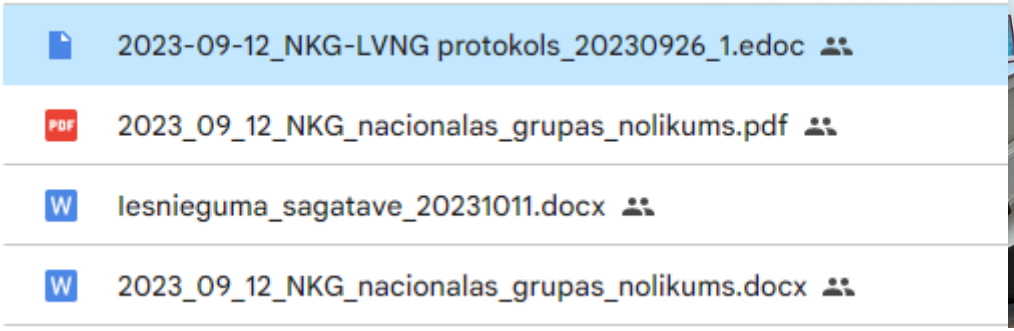
2 delegates to NKG Presidium – Ivars Liepiņš (LGIA), Janis Kaminskis (RTU)

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.

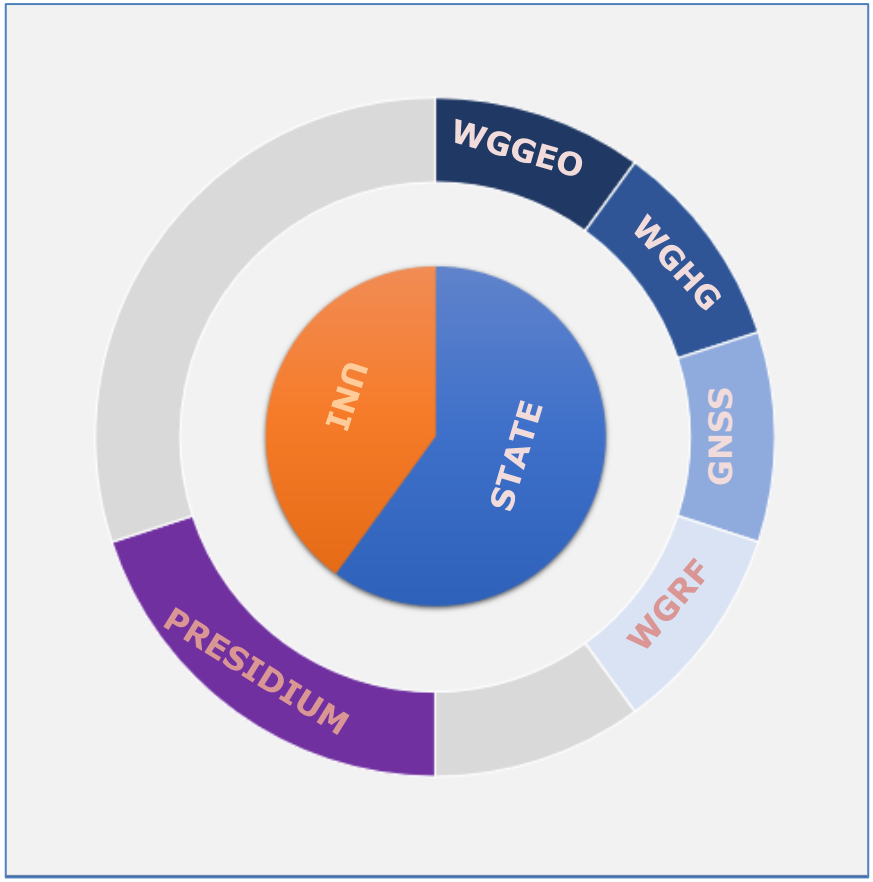


NKG LNG (4)

Functions

Latvian Geospatial Information Agency

- 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!

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