Kathmandu, Nepal 14–16 November
REGIONAL CONFERENCE 2024
Climate Responsive Land Governance and Disaster Resilience: Safeguarding Land Rights

Presented at the FIG Regional Conference 2024,
14-16 November 2024 in Kathmandu, Nepal

GNSS data processing package to address climate change and disaster-induces challenges in safeguarding land rights

Presenter – Noyanov Yuri

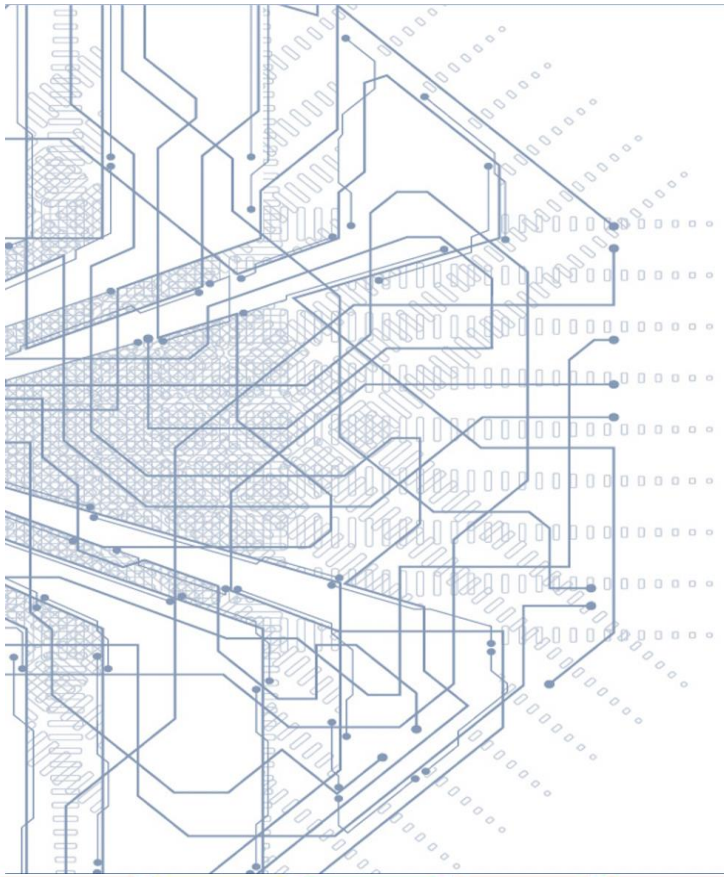
The climate change tends to disasters

Geodetic references are often destroyed and long-distance re-shooting is required

ProGeo software helps

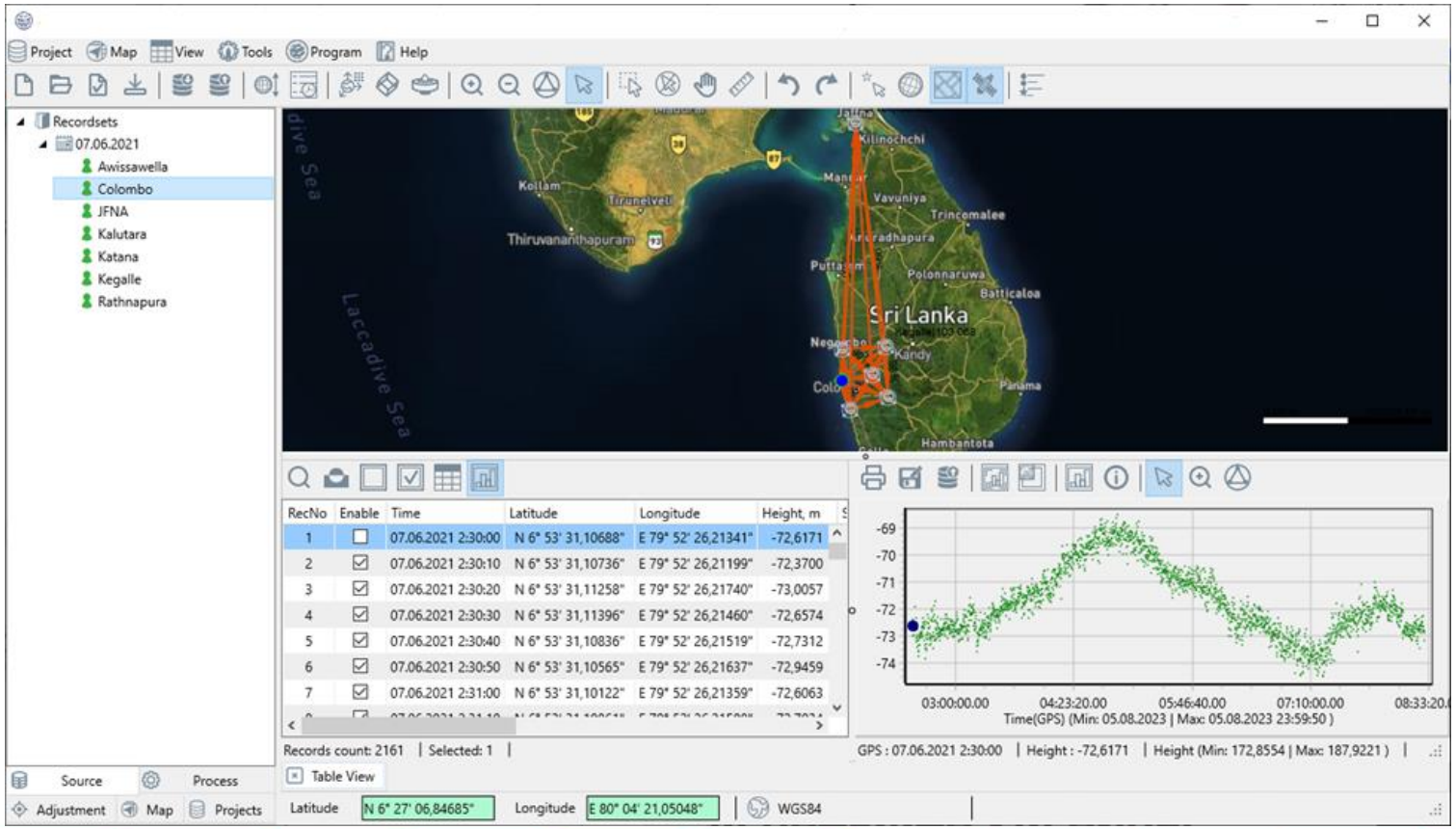
- https://progeo.expert/
- Cloud GNSS services
- Pro Geo Office – desktop software
- ProGeoMobile – field software

ProGeo Net: CORS & RTN



- Web interface
- OS Windows/Linux
- NTRIP caster : transport RTCM / MSM/CMR messages
- Network monitoring
  - GNSS data analysis
  - Position calculation – adjustment, PPP
  - VRS service
- Coordinate systems database : 2629 projections (including LDP), 305 datum, 50 ellipsoid, COGO, actual geoids.

Cloud services



- **ProGeoNet – CORS & RTN**
- GNSS data post-processing
- Coordinates transformation, datum, localization, batch processing
- RTCM > RINEX
- RINEX file version downgrading, thinning, Time calculator
- Scientific GNSS calculator

Source Table

lk.progeo.expert

Progeo Net

2120 | "NIIMA Progress" | Exit

NTRIP caster and converter 1.17.3, Web 2.18
License until: 02.01.2025 03:00:00

ENG

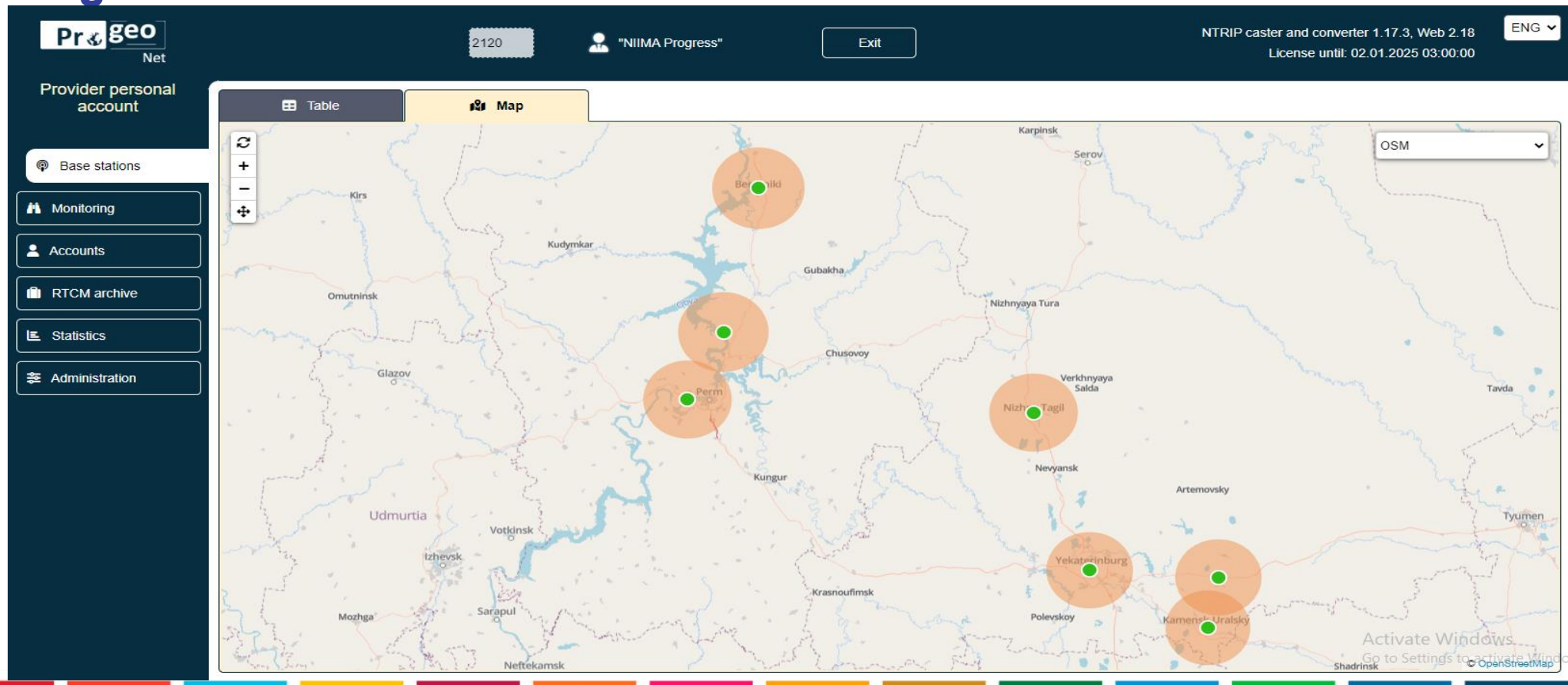
Provider personal account

- Base stations
- Monitoring
- Accounts
- RTCM archive
- Statistics
- Administration

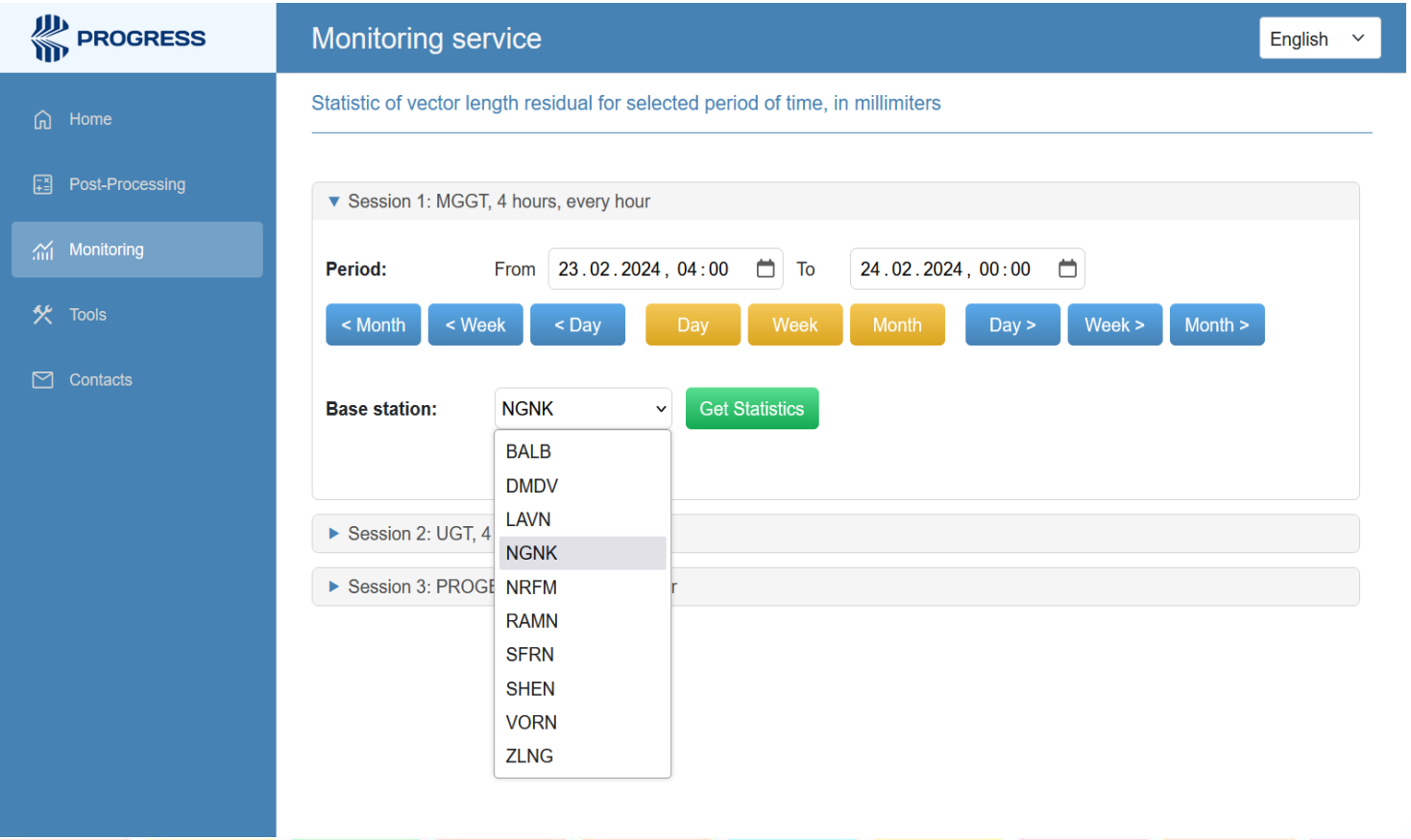
Table | Map

Mountpoint	Identifier	Format	Navigation systems	Latitude	Longitude	Source
IONO201	IGS-SSR	RTCM 3.1 (4076_201(15))		40.59°	356.29°	UPC-Software
PERM_19	Perm19	RTCM 3 (1005(10), 1007(10...	GPS+GLONASS	58°	56°	TRE_3L
UGT-N-TAGIL_18	Nizhny Tagil	RTCM 3 (1006(10), 1008(10...	GPS+GLONASS	57.91°	59.95°	DELTA
UGT_BGDN_18	Bogdanovich	RTCM 3 (1006(10), 1008(10...	GPS+GLONASS	56.76°	62.06°	DELTA
UGT_BRZK_19	Berezniki	RTCM 3 (1005(10), 1007(10...	GPS+GLONASS	59.42°	56.81°	TRE_3L
UGT_DBR_18	Dobrianka	RTCM 3 (1006(10), 1008(10...	GPS+GLONASS	58.46°	56.41°	TRE_3L
UGT_EKB_19	Ekaterinburg	RTCM 3 (1005(10), 1007(10...	GPS+GLONASS	56.81°	60.59°	DELTA
UGT_KMNSK_19	Kamensk-Uralsky	RTCM 3 (1005(10), 1007(10...	GPS+GLONASS	56.4°	61.94°	TRE_3L

Map of RTK coverage area



Position monitoring service



- Real time monitoring
- Periodically (1-4 hours) RTCM data post-processing and network adjustment
- Daily PPP post processing

Hourly baseline deviations

PROGRESS

- Home
- Post Processing
- Monitoring
- Tools
- Contacts

Monitoring service

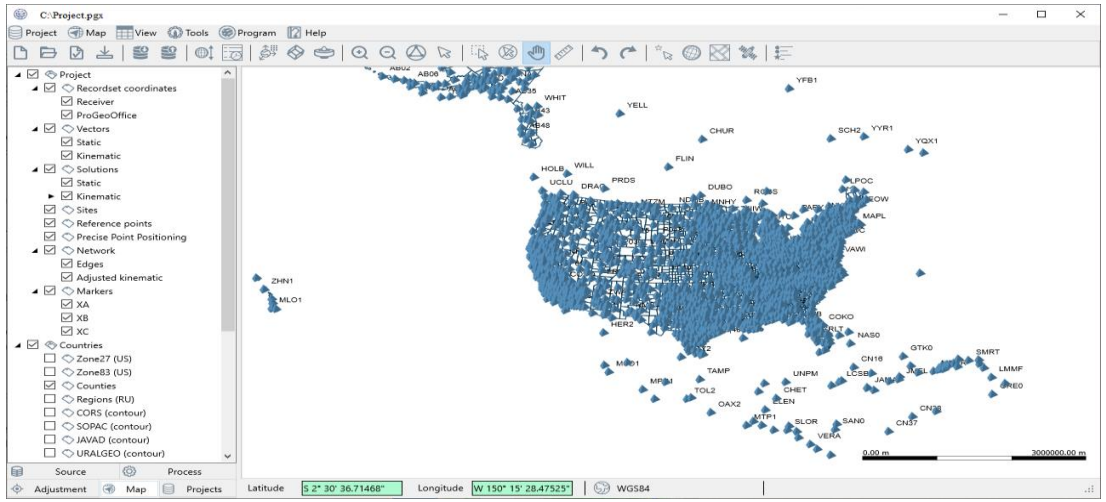
English

Statistic of vector length residual for selected period of time, in millimiters

Residual, mm: 0-10 | 11-50 | 51-100 | 101-500 | >500

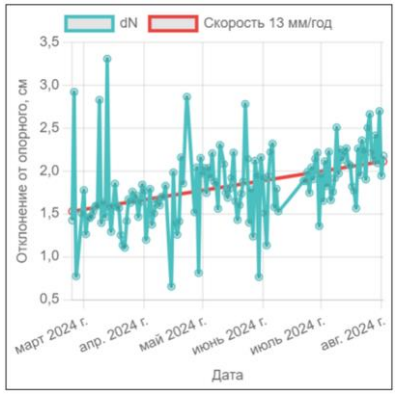
Vector	Length,km	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19
NGNK-BALB	136	17	12	10	12	0	14	16	18	22	22	20	11	8	10	9	
NGNK-DMDV	64	7	7	6	7	4	8	6	7	7	7	7	4	4	2	3	
NGNK-LAVN	61	3	6	7	11	7	12	12	12	11	9	7	3	6	4	1	
NGNK-NRFM	119	14	13	18	12	24	28	15	20	27	11	15	11	8	1	7	
NGNK-PT04	57																
NGNK-RAMN	36	8	8	8	6	5	5	5	4	6	7	4	4	3	3	3	
NGNK-SFRN	51	3	2	1	3	2	3	6	6	5	6	4	3	1	1	2	
NGNK-SHEH	100	8	9	7	8	9	6	7	8	11	11	12	8	6	1	4	
NGNK-VORN	100	4	19	6	1	7	11	11	22	15	14	12	11	3	7	10	
NGNK-ZLNG	79	31	14	6	5	6	3	10	9	10	5	10	7	8	16	5	

100 CORS US: PPP processing

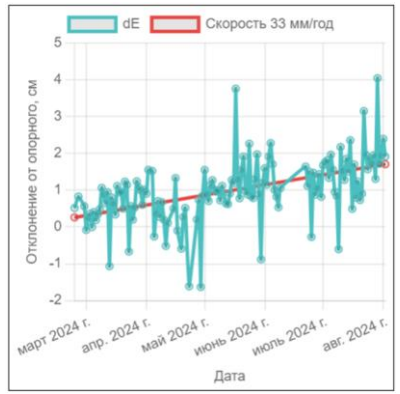


Velocities

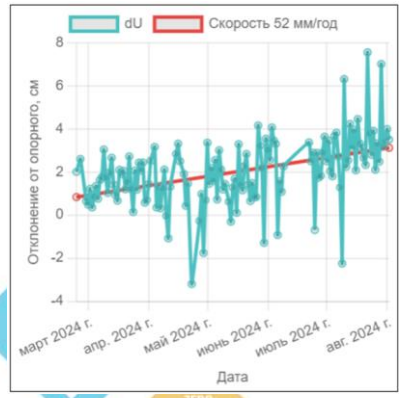
North

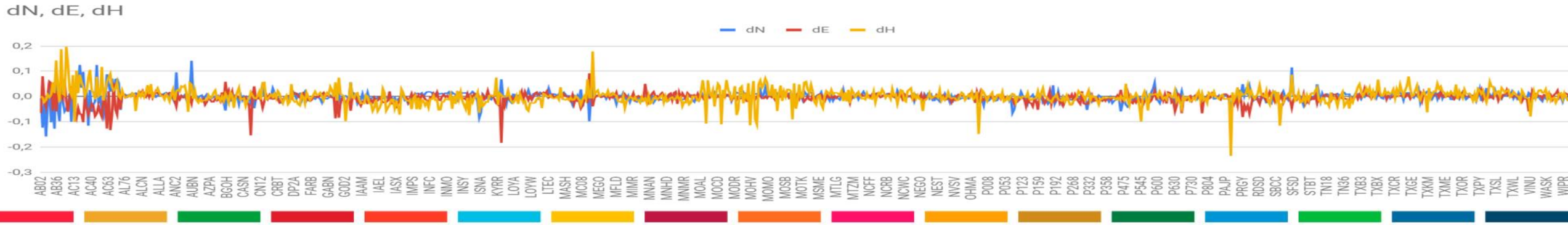


East

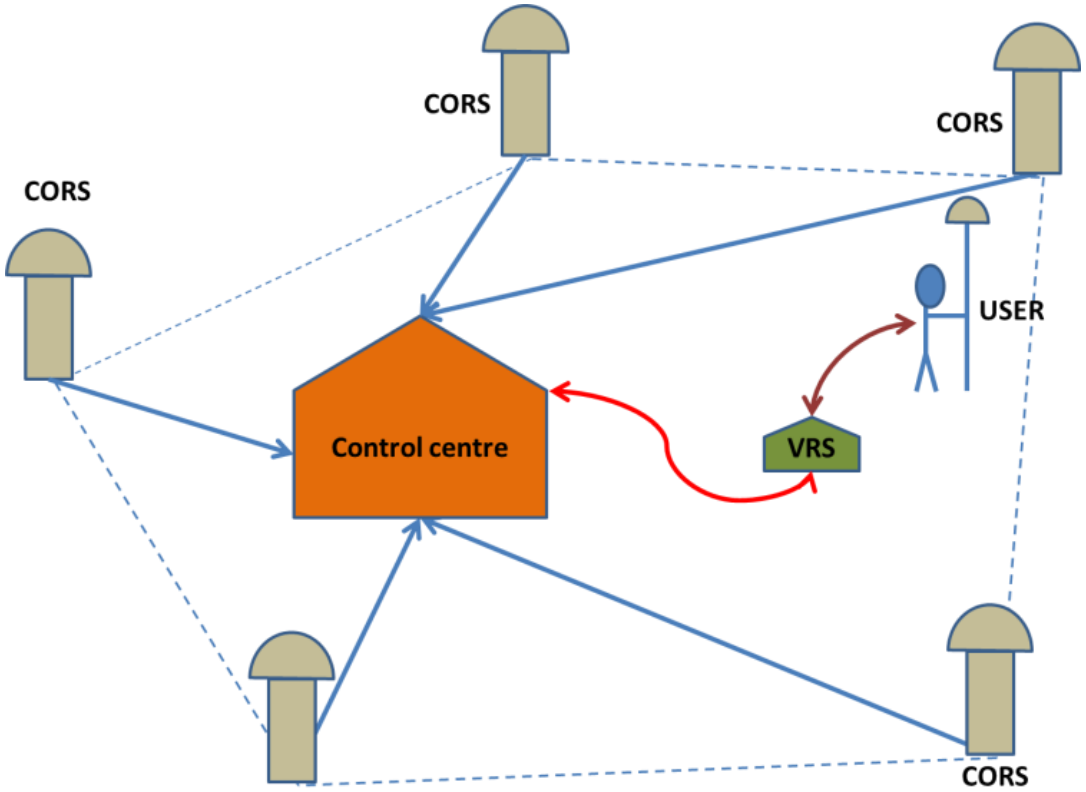


Up





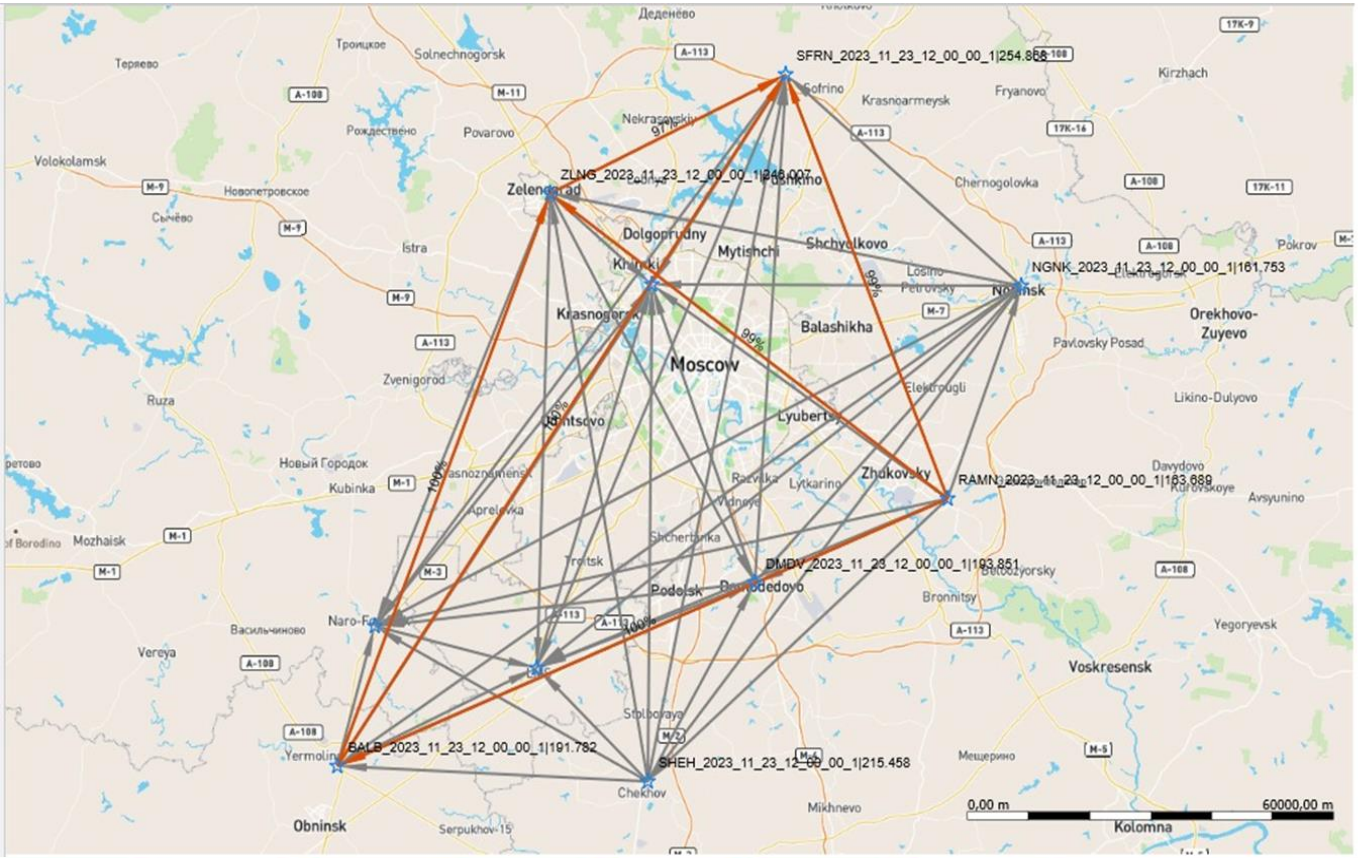
RTK (Real-Time-Kinematic) and VRS (Virtual Base Stations)



At least 3 permanent stations are required - CORS, transmitting code and phase measurements to the data center.

Advantages: fast fixed solution.

Virtual Base Station - VRS



VRS cluster : BALB, SFRN, DMDV, ZLNG.

Customer's receiver is in BALB-SFRN, DMDV triangle.

Distance to:
BALB – 92 km;
DMDV – 47 km;
SFRN – 39 km.

Direct RTK vs VRS, fixes per hour

13.07.2024 11:00	0.00	0.00	71.00	94.28
13.07.2024 12:00	0.00	0.00	43.51	92.25
13.07.2024 13:00	0.00	12.60	98.90	93.08
13.07.2024 14:00	0.00	8.29	99.77	99.47
13.07.2024 15:00	0.00	1.63	45.29	94.92
13.07.2024 16:00	0.00	0.0	99.46	87.33
13.07.2024 17:00	0.00	0.0	76.77	73.98
13.07.2024 18:00	0.00	18.97	47.43	48.13

Thanks for your attention

11.11.2024