

CEGRN Status as of 2026

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CEGRN CONSORTIUM

Agenda

1. The CEGRN Consortium
2. The CEGRN Computation Status
3. Future Work and Conclusions

The Central European GPS Geodynamic Reference Network CEGRN Consortium

The Central European GPS Geodynamic Reference Network (CEGRN) Consortium has its origin in the framework of the project called CERGOP (Central European Research on Geodynamics Project) **that started in 1994.**

The CERGOP consisted originally of 11 countries of Central Europe. In 1998, 3 more countries joined this initiative and, altogether, agreed to organize the CEGRN consortium to operate, maintain and develop the (CEGRN network). The long term project is running since 1994 and was sponsored twice by EU projects: **CERGOP-1** and **CERGOP-2** (Environment Central European Geodynamics Project, funded by the European Union from 2003 to 2006) under the 5th Framework Programme. The main study areas cover the Adriatic Microplate, the Balkans and Dinarides, the Carpathians, the Eastern Alps and the Pannonian Basin, being all of them active tectonic zones.

As for CERGOP, new members have been joined the CEGRN over time.

2011: EUREF – CEGRN MoU

The Central European GPS Geodynamic Reference Network CEGRN Consortium

Before 2017, we only had RINEX data available (1 week/2 years, around mid-June).

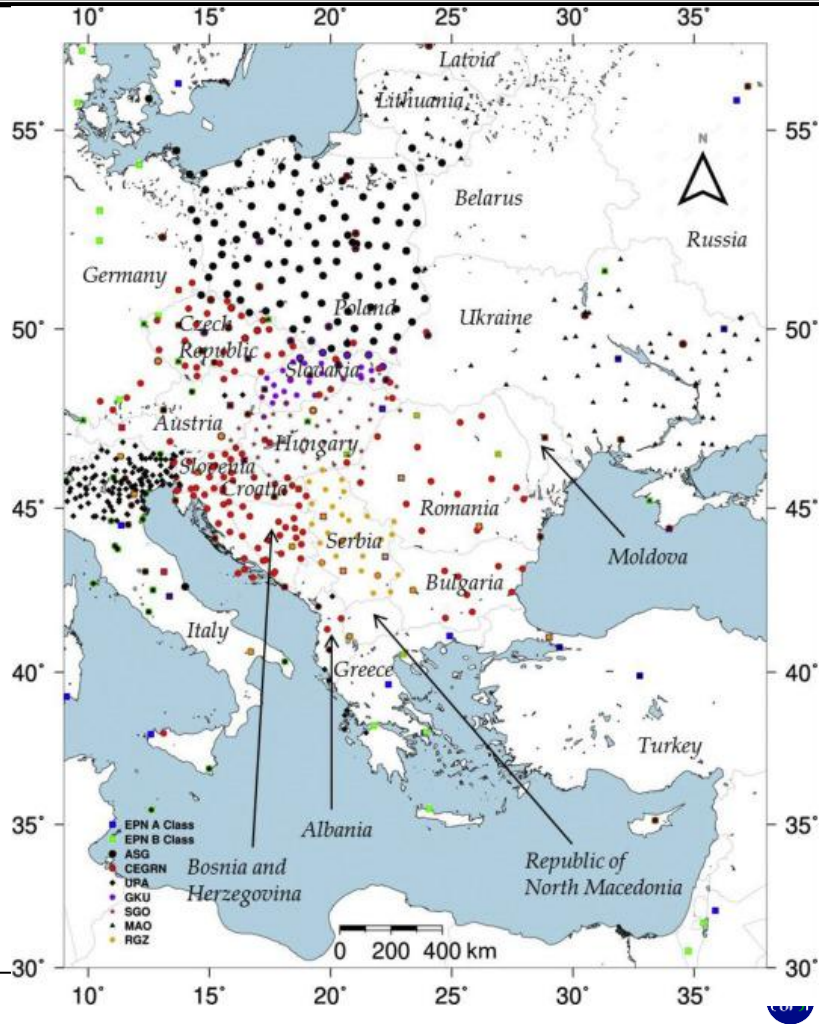
Currently, most CEGRN ACs are computing their SNX files using strict guidelines that allow us to combine them.

Most ACs have computed former RNX using repro3 data.

The current CEGRN RINEX computation is done only for countries that provide no SNX data (1 week od data/2 years).

Former data: **repro3** (ongoing: 2015 to 2023 done)

In order to share, discuss and have fully harmonized solutions, we have developed a Portal that can be also used for EPND (see the EPND/CEGRN Portal presentation).



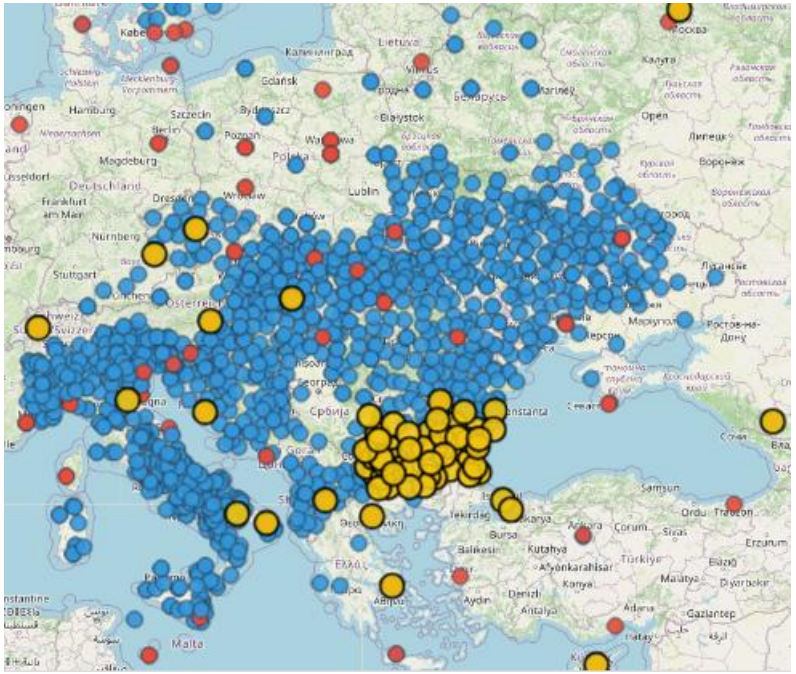
The CEGRN Computation Status

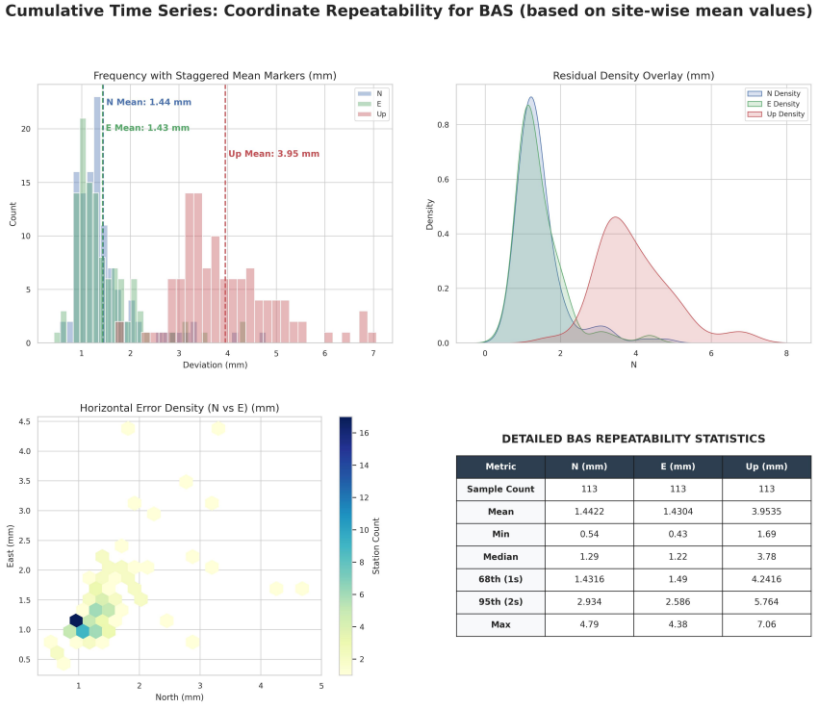
Former RINEX observations are being reprocessed using repro3 products (IGS20 standards); currently 2015 to 2023 is done:



The CEGRN Computation Status (SNX level, 3+ years of data, aligned to IGS)

BAS 2017/01/01 to 2025/12/31 (Software to compute the GNSS Observations: GAMIT)



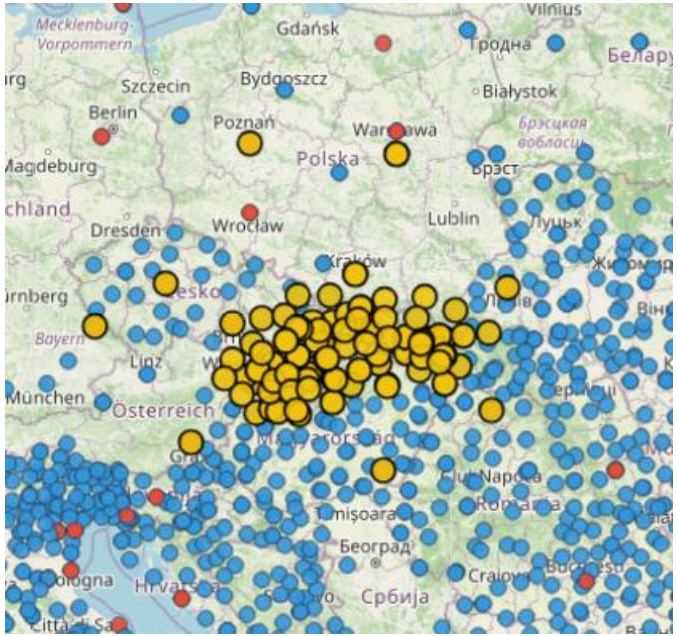


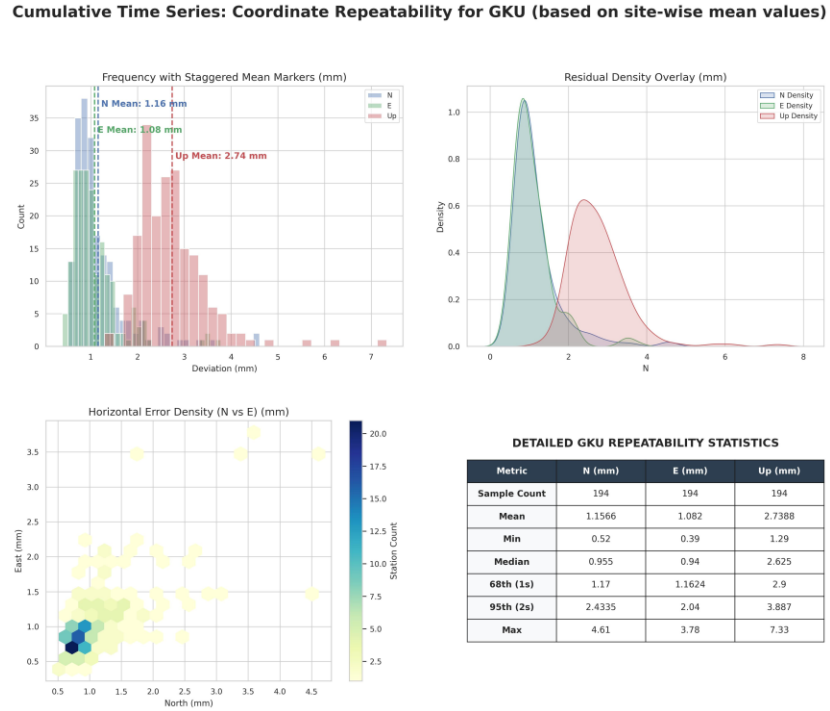
DETAILED BAS REPEATABILITY STATISTICS

Metric	N (mm)	E (mm)	Up (mm)
Sample Count	113	113	113
Mean	1.4422	1.4304	3.9535
Min	0.54	0.43	1.69
Median	1.29	1.22	3.78
68th (1s)	1.4316	1.49	4.2416
95th (2s)	2.934	2.586	5.764
Max	4.79	4.38	7.06

The CEGRN Computation Status (SNX level, 3+ years of data, aligned to IGS)

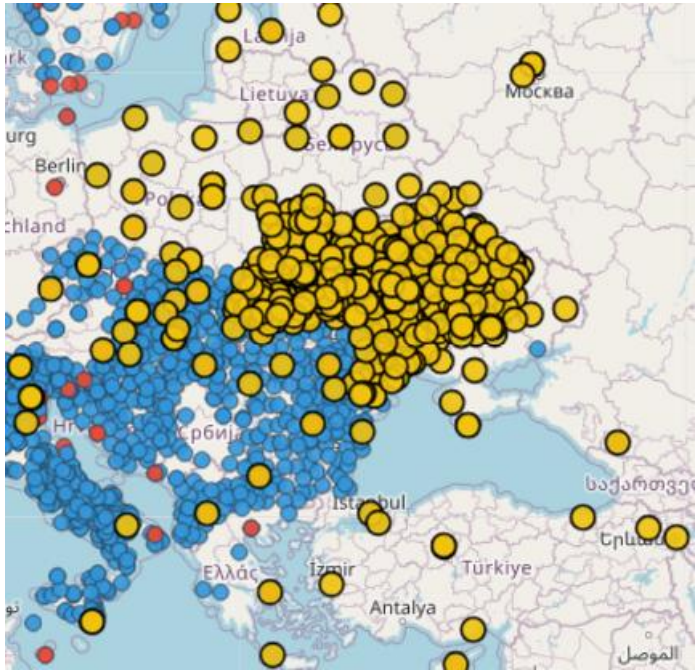
GKU 2007/01/01 to 2026/01/31 (Software to compute the GNSS Observations: BSW5.4)

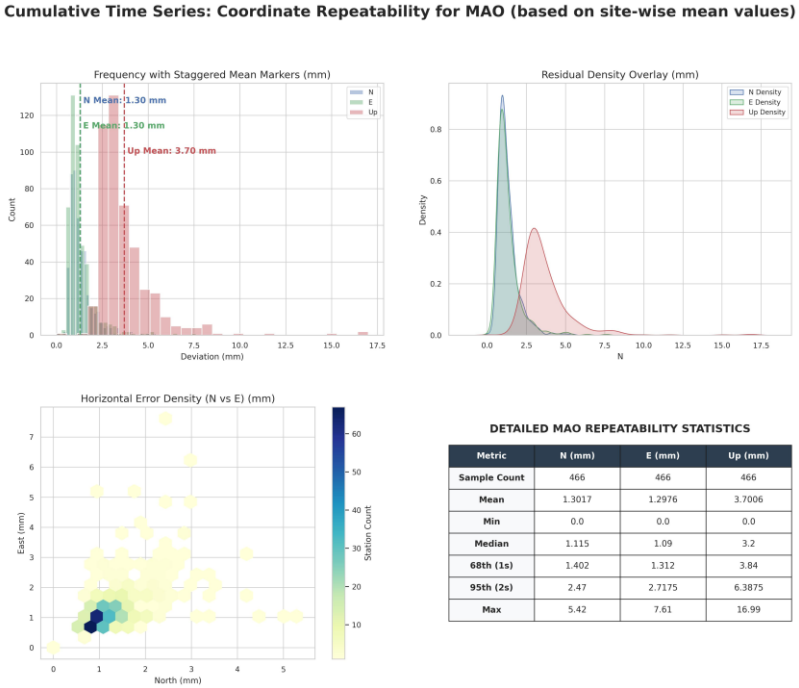




Metric	N (mm)	E (mm)	Up (mm)
Sample Count	194	194	194
Mean	1.1566	1.082	2.7388
Min	0.52	0.39	1.29
Median	0.955	0.94	2.625
68th (1s)	1.17	1.1624	2.9
95th (2s)	2.4335	2.04	3.887
Max	4.61	3.78	7.33

The CEGRN Computation Status (SNX level, 3+ years of data, aligned to IGS) **MAO** 1997/12/07 to 2026/01/08 (Software to compute the GNSS Observations: BSW5.4). **Preliminary solution: observations are not continuous (gaps).**

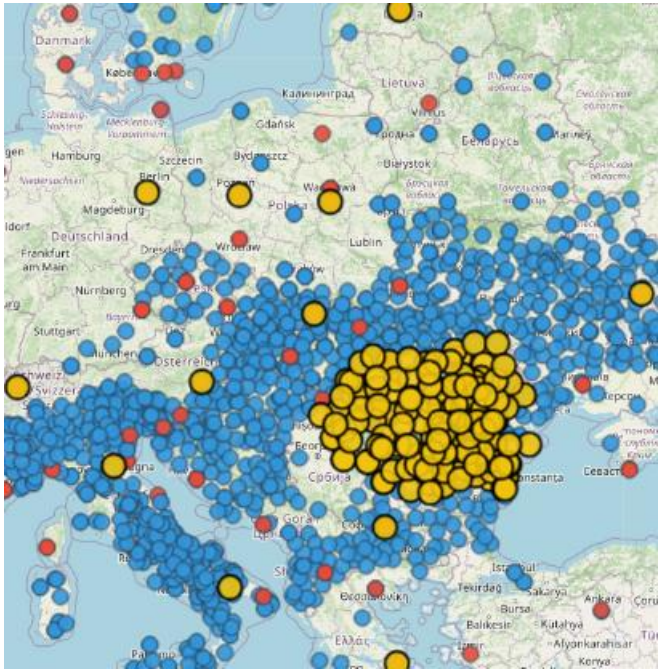


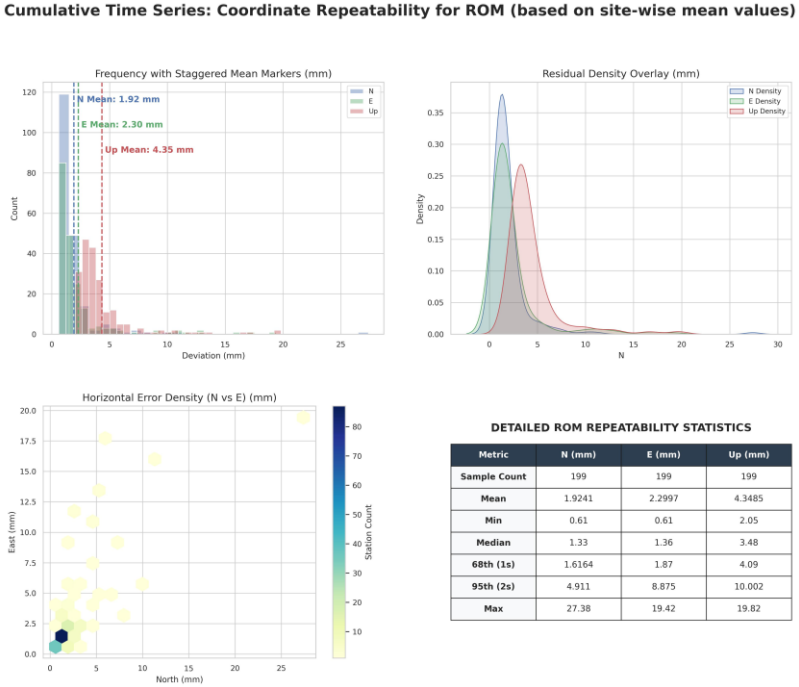


DETAILED MAO REPEATABILITY STATISTICS

Metric	N (mm)	E (mm)	Up (mm)
Sample Count	466	466	466
Mean	1.3017	1.2976	3.7006
Min	0.0	0.0	0.0
Median	1.115	1.09	3.2
68th (1s)	1.402	1.312	3.84
95th (2s)	2.47	2.7175	6.3875
Max	5.42	7.61	16.99

The CEGRN Computation Status (SNX level, 3+ years of data, aligned to IGS)
ROM 2022/11/27 to 2025/12/31 (Software to compute the GNSS Observations: BSW5.4). Still working on this solution.

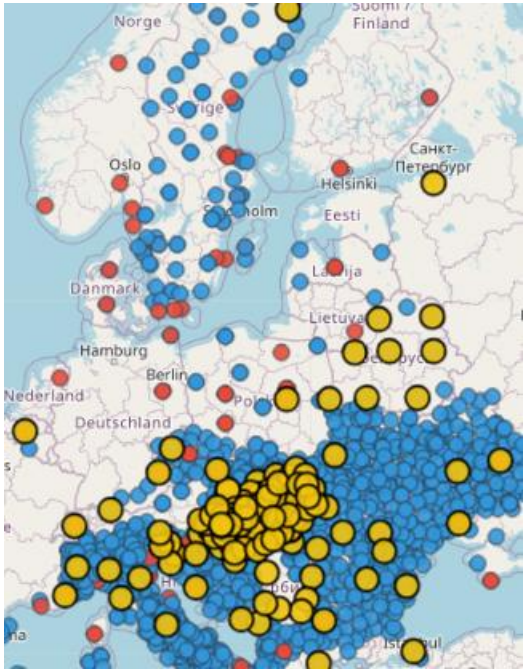


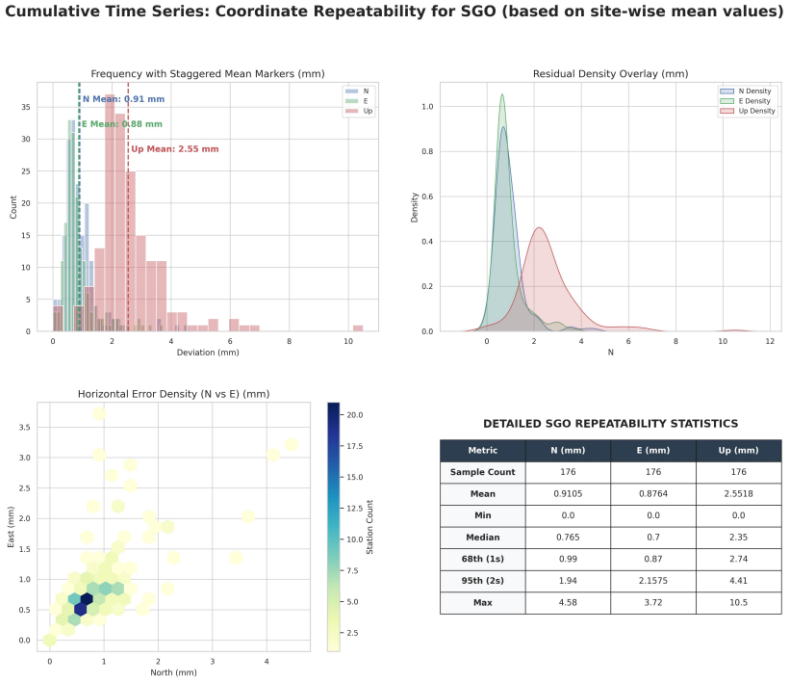


DETAILED ROM REPEATABILITY STATISTICS

Metric	N (mm)	E (mm)	Up (mm)
Sample Count	199	199	199
Mean	1.9241	2.2997	4.3485
Min	0.61	0.61	2.05
Median	1.33	1.36	3.48
68th (1s)	1.6164	1.87	4.09
95th (2s)	4.911	8.875	10.002
Max	27.38	19.42	19.82

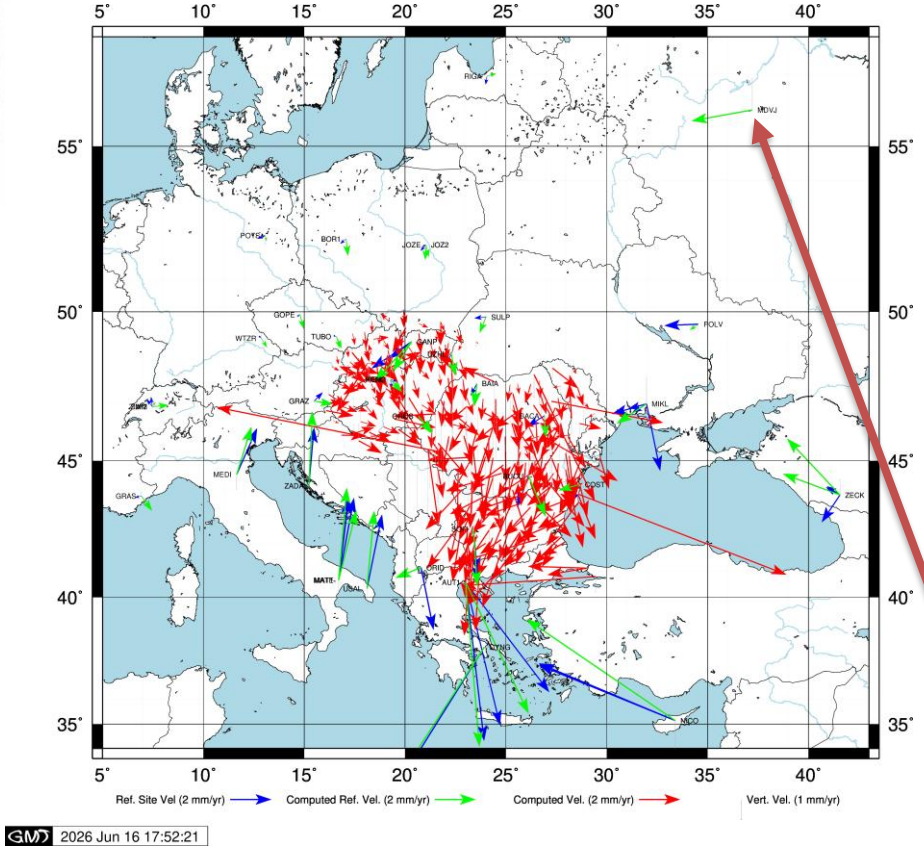
The CEGRN Computation Status (SNX level, 3+ years of data, aligned to IGS)
SGO 2022/11/27 to 2026/03/17 (Software to compute the GNSS Observations: BSW5.4).





Metric	N (mm)	E (mm)	Up (mm)
Sample Count	176	176	176
Mean	0.9105	0.8764	2.5518
Min	0.0	0.0	0.0
Median	0.765	0.7	2.35
68th (1s)	0.99	0.87	2.74
95th (2s)	1.94	2.1575	4.41
Max	4.58	3.72	10.5

The CEGRN Computation Status: Preliminary Solution (needs more work!)



We use MC on P+V (IGS stations), weighted variances to enable the combination of all the solutions. Software: BSW54 (ADDNEQ2)

Mean Differences vs IGS20 nominal coordinates:
NEU, in mm (**64 IGS stations, epoch 2025.0**):
-0.06 +/- 2.54; 0.04 +/- 2.08; -0.02 +/- 4.46

Differences in the Velocities:

	VN (mm/yr)	VE (mm/yr)	VUp (mm/yr)
Mean	-0.09	0.03	-0.05
rms	0.83	0.74	1.75
Min.	-1.08	-2.63	-3.31
Max.	2.65	1.38	5.69

Largest differences in MDVJ

Future Work and Conclusions

- We show the current status of the CEGRN, after the repro3 campaigns of a few ACs
- The AC-wise solution allows to combine solutions computed at different intervals, from daily to weekly and to 1 week/2 years at the normal equation level
- This approach relies on the ACs, so complies with the National ITRF/ETRF realizations
- More solutions are expected in the upcoming months

- Next steps: switch the reference frame from the IGS solutions to the EPN
- Check all the AC-wise solutions and compute the combined solution

- Scalable, so including new solutions is quite straightforward and does not need a full reprocessing of all the solutions (just the final stacking)

Thank you for your attention

Questions/Comments?