



CURRENT DEVELOPMENTS OF THE LITHUANIAN NATIONAL GEODETIC CONTROL

National report of LITHUANIA

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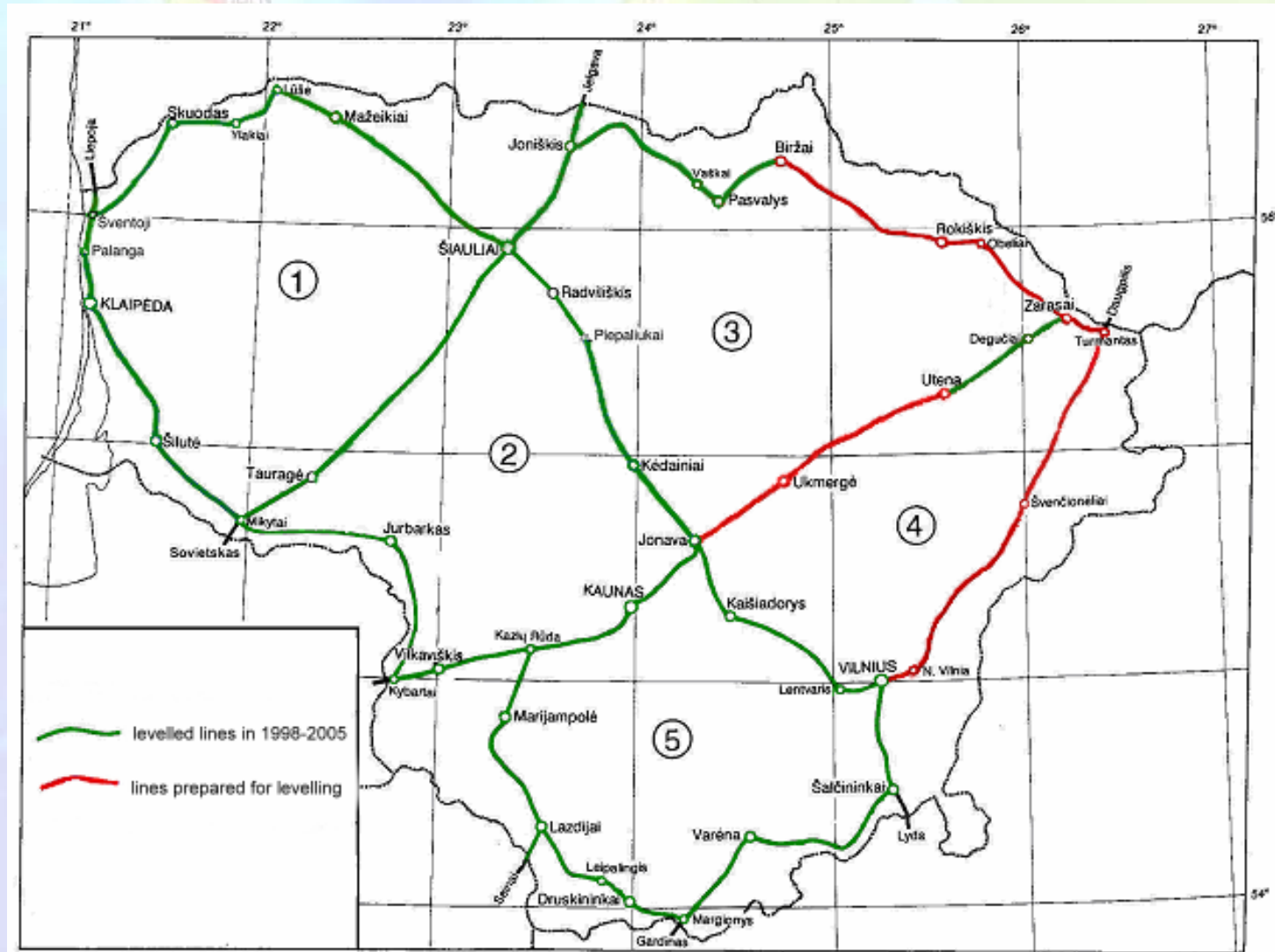


OUTLINE

- Current status of the National Geodetic Vertical Network
- Design of the permanent GPS stations network
- Nordic-Baltic GPS campaign



Current status of the National Geodetic Vertical Network (1)





Current status of the National Geodetic Vertical Network (2)



Levelling accuracy characteristics

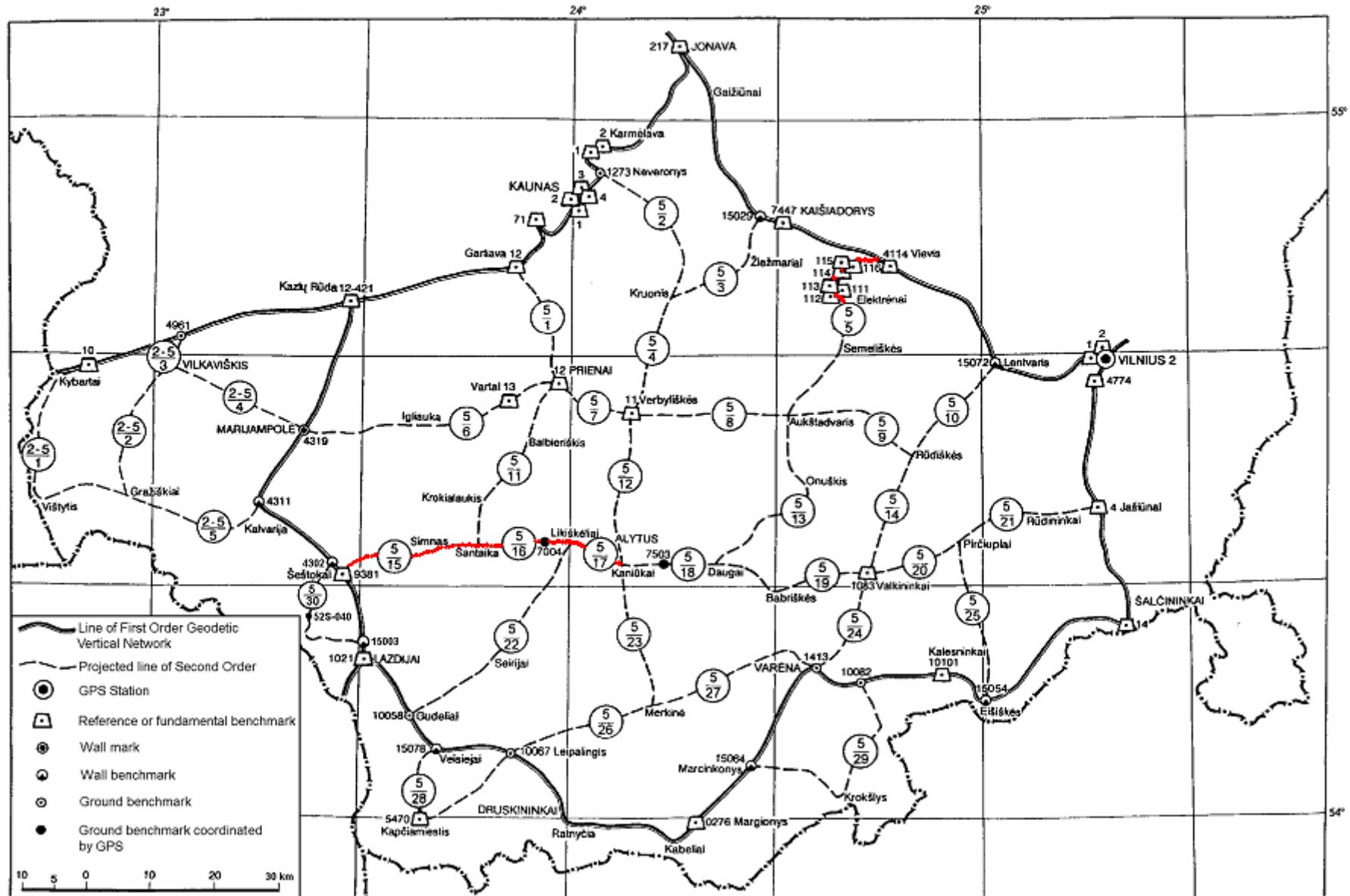
Year of levelling	m_{km} , mm
1998	0,48
1999	0,42
2001	0,39
2002	0,41
2003	0,43
2004	0,47

Misclosures of vertical network polygons

Polygon No	Polygon perimeter km	Actual misclosure mm	Allowable misclosure mm
1	491,1	+4,67	22,16
2	517,8	+14,41	22,76
5	499,9	-10,73	22,36



Design of the Geodetic Vertical Second Order Network - 5th polygon





Design of the Geodetic Vertical Second Order Network

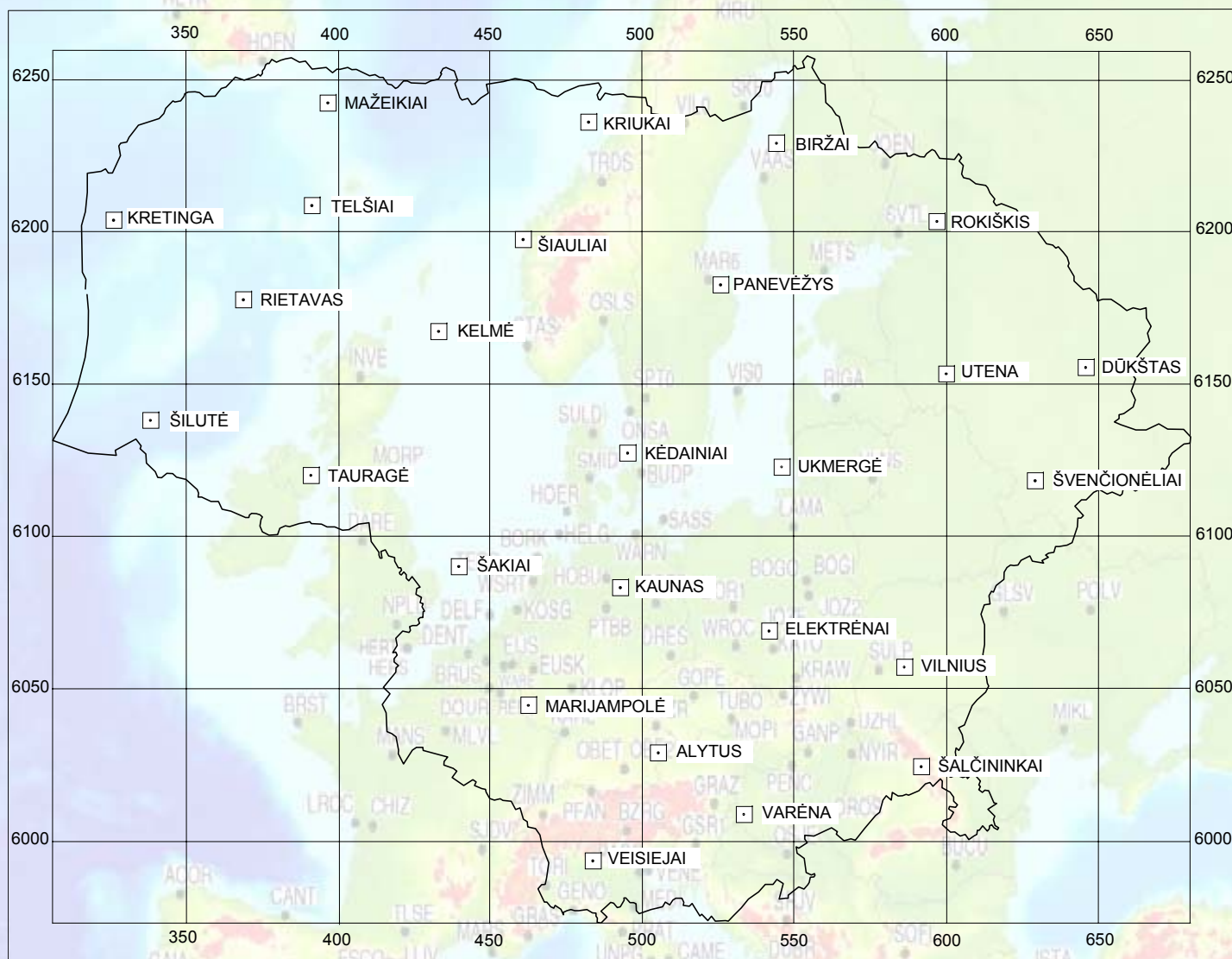
General characteristics

Region	Average length of line, km	Area, thousand km ²	Perimeter of projected network, km	Projected lines			Density of projected network, km/1000 km ²
				Number of lines	Runs which coincide with lines of old levelling, km	New runs, km	
South	27,4	12,6	958	35	692	266	76,0
East	32,8	11,5	854	26	276	578	74,3
North	29,6	15,3	1094	37	635	459	71,5
West	27,5	15,2*	1154	42	812	342	75,9
Centre	31,5	10,2	818	26	708	110	80,2
	29,4	64,8	4878	166	3123	1755	75,3

Number of points - 3300 (new - 2800)



Design of the permanent GPS stations network





Improvement and extension of ETRS 89 in Latvia and Lithuania based on the NKG 2003 GPS campaign

The present ETRS 89 realizations in Latvia and Lithuania are based on the EUREF-BAL'92 campaign, which has an estimated accuracy of the same level as the original EUREF 89 campaign (class C standard).

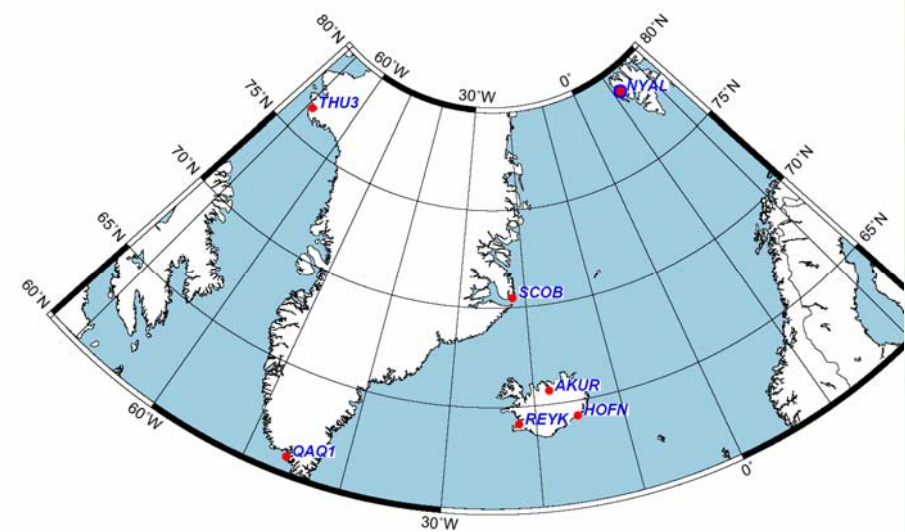
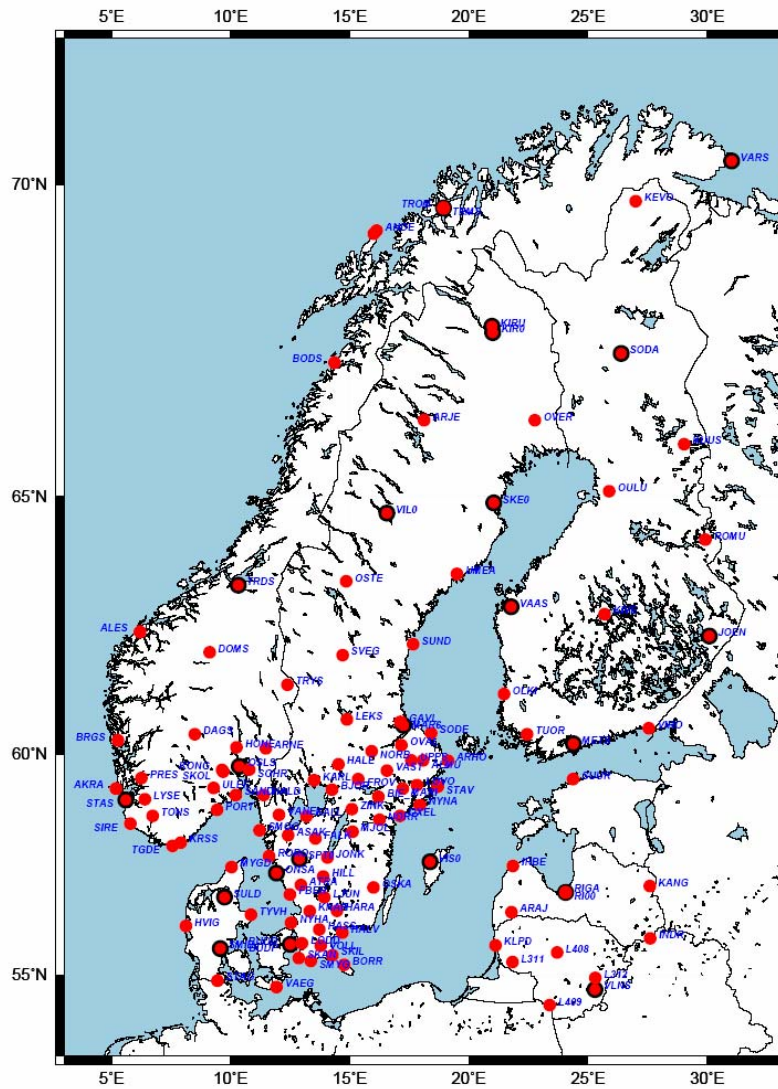
Latvia and Lithuania wish to replace their EUREF-BAL'92 realization with an ETRS 89 realization based on the NKG 2003 GPS campaign and ask for the results submitted to the EUREF Technical Working Group to be accepted as class B standard.



Description of the Campaign (1)



Stations in the Nordic-Baltic part of the NKG 2003 campaign



Stations in the Atlantic part of the NKG 2003 campaign



Description of the Campaign (2)



Campaign specifications

Network:

133 stations (old defining bench marks, EPN stations, other national permanent stations in the Nordic countries),
+Baltic countries (Latvia 6 (4); Lithuania 6 (4); Estonia (1))
+Iceland +GR

Duration:

7 days,
Week 40 in 2003,
GPS week 1238,

Coordinator:

F.B. Madsen, DK/DNSC



Description of the Campaign (3)



Points in Lithuania

Equipment used in Lithuania

<i>Station</i>	<i>Antenna</i>	<i>Receiver</i>	<i>H</i>	<i>E</i>	<i>N</i>
KLPD	ASH700936E	ASHTECH Z-XI13	0.0000	0.0000	0.0000
L311	ASH701008.01B	ASHTECH UZ-12	1.7700	0.0000	0.0000
L312	ASH700228D	ASHTECH Z-XI13	1.6513	0.0000	0.0000
L408	ASH701008.01B	ASHTECH UZ-12	1.6760	0.0000	0.0000
L409	ASH701008.01B	ASHTECH UZ-12	1.7503	0.0000	0.0000
VLNS	ASH700936A_M	ASHTECH Z-XI13	0.0730	0.0000	0.0000



Description of the Campaign (4)



Points in Lithuania - VLNS



EPN site



Description of the Campaign (5)



Points in Lithuania - KLPD

CGPS antenna



CGPSBM

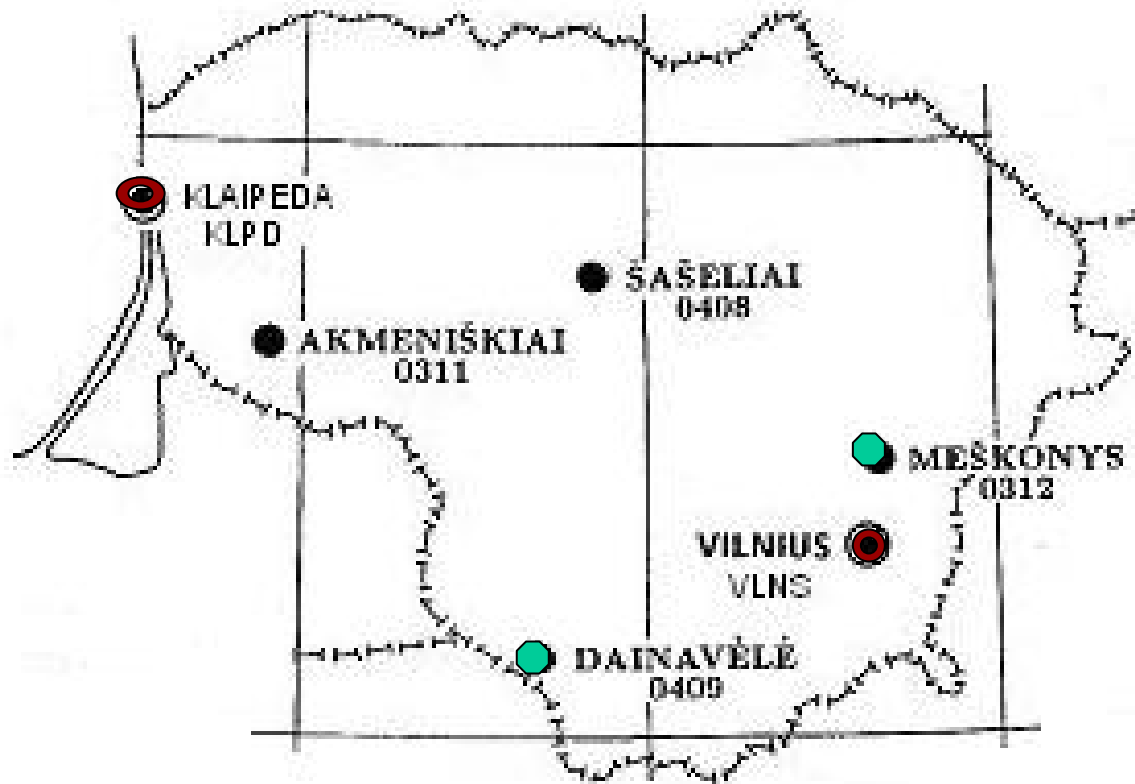
**ESEAS, TIGA-IP
site**



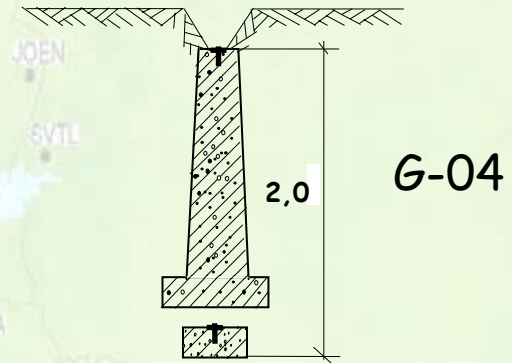
Description of the Campaign (6)



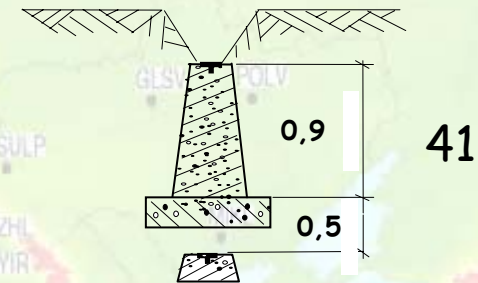
Points in Lithuania - EUREF points



Monuments



0311, 0312, 0408



0409

0312, 0409 - EUREF POL 92 points (class B)



Results (1)



Geocentric Cartesian coordinates in ETRS 89 epoch 2003.75 (based on ITRF 2000) for a subset of the NKG2003 campaign

Station	Country	X	Y	Z
ARAJ	Latvia	3277266.901	1309685.665	5295146.602
INDR	Latvia	3177703.862	1662049.956	5257080.228
IRBE	Latvia	3183612.378	1276706.499	5359310.711
KANG	Latvia	3078175.306	1608797.614	5331767.505
RI00	Latvia	3183914.38	1421473.491	5322796.718
RIGA	Latvia	3183899.552	1421478.321	5322810.644
KLPD	Lithuania	3359228.479	1297490.297	5246690.181
L311	Lithuania	3376643.347	1352769.794	5221718.728
L312	Lithuania	3320254.356	1570665.037	5197158.071
L408	Lithuania	3311606.955	1453968.652	5236111.119
L409	Lithuania	3425868.215	1482315.546	5154672.319
VLNS	Lithuania	3343600.978	1580417.56	5179337.131



Results (2)

Geodetic coordinates in ETRS 89 epoch 2003.75 (based on ITRF 2000) for a subset of the NKG2003 campaign

Station	Latitude			Longitude			Height
ARAJ	56	29	36.583375	21	46	58.8127	208.5617
INDR	55	52	44.774145	27	36	40.09091	213.6403
IRBE	57	33	15.896995	21	51	7.177188	40.6837
KANG	57	5	40.532341	27	35	37.1829	163.8277
RI00	56	56	54.462143	24	3	30.94915	29.3677
RIGA	56	56	55.021188	24	3	31.56767	34.7296
KLPD	55	42	55.269141	21	7	7.968095	42.7467
L311	55	19	6.736029	21	49	56.29229	92.5081
L312	54	55	51.389147	25	19	0.314766	229.5565
L408	55	32	44.811092	23	42	14.35198	138.3876
L409	54	16	19.514616	23	23	50.3639	228.4221
VLNS	54	39	11.305031	25	17	55.19055	240.8512



Summary

- Estimated accuracy: **0.5-1 cm (95%)** for the horizontal coordinates and **1-2 cm (95%)** for the vertical at the epoch of the observation.
- Improvement and extension of ETRS 89 in Latvia and Lithuania based on the NKG 2003 GPS campaign was done.
- NMA's of Latvia and Lithuania ask EUREF to adopt this solution as an ETRS 89 realization and to accept the selected 12 points (located in Latvia and Lithuania) as national EUREF-points as class B standard (about 1 cm at the epoch of observations).



Acknowledgement

National Land Service and geodetic community of Lithuania expresses the gratitude to all Nordic-Baltic colleagues for their hard work during observation and processing the campaign and kind understanding of the needs of Baltic colleagues.

Especially we would like to thank the brilliant person, lady **Lotti Jivall** for her patience and great input to computations of the results of campaign which finally guaranteed the improvement of the geodetic reference of Latvia and Lithuania to class B standard.