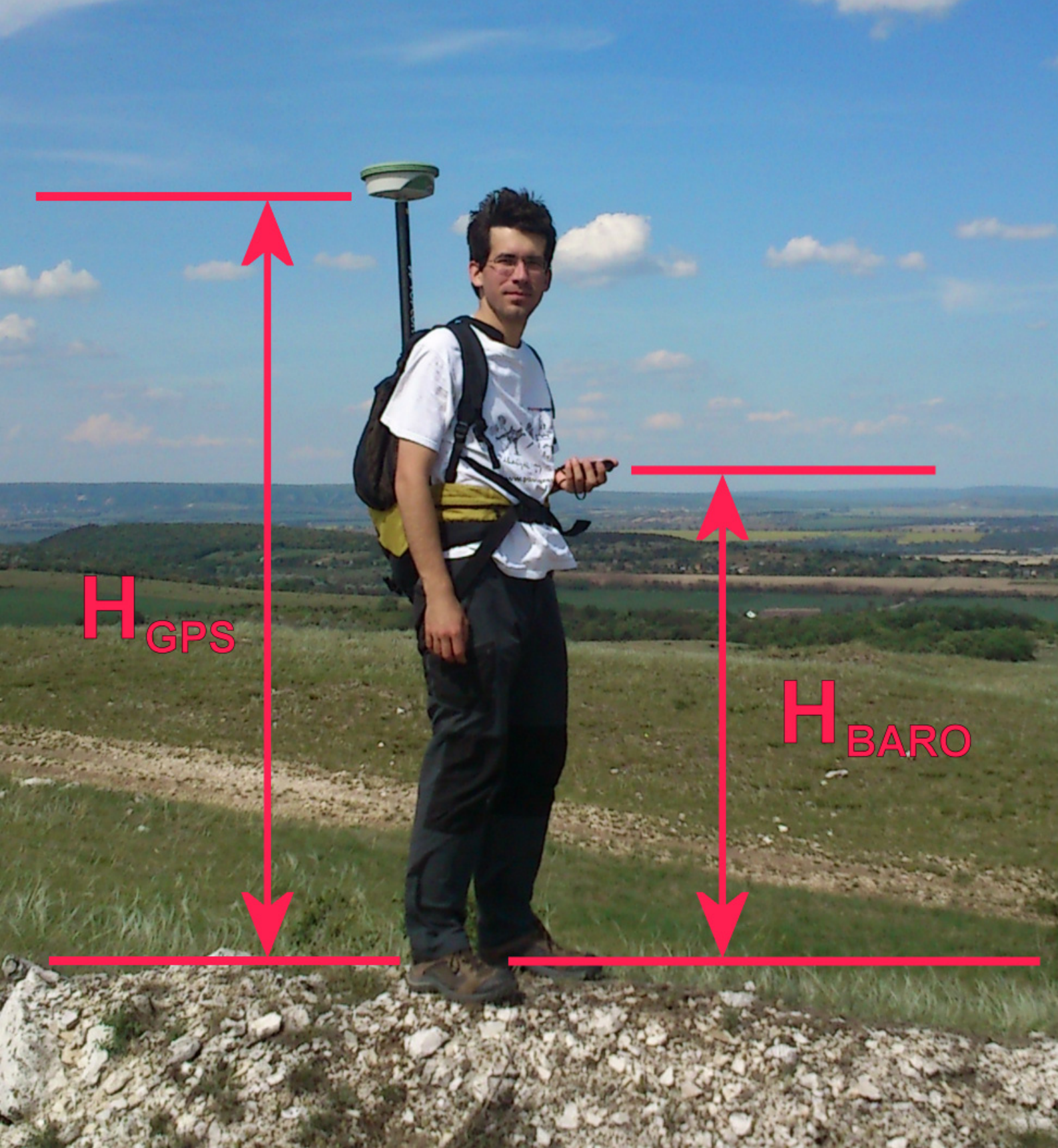
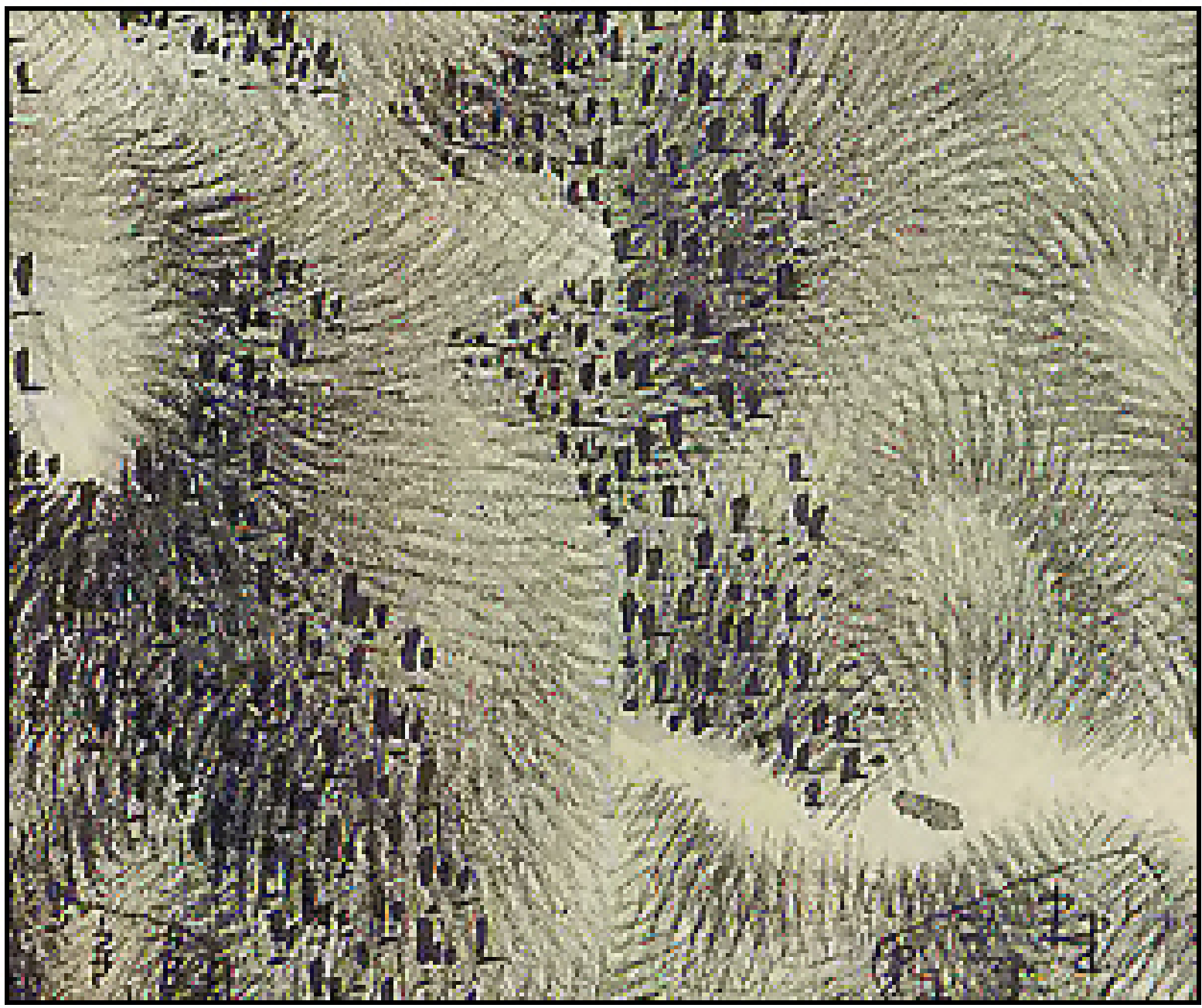
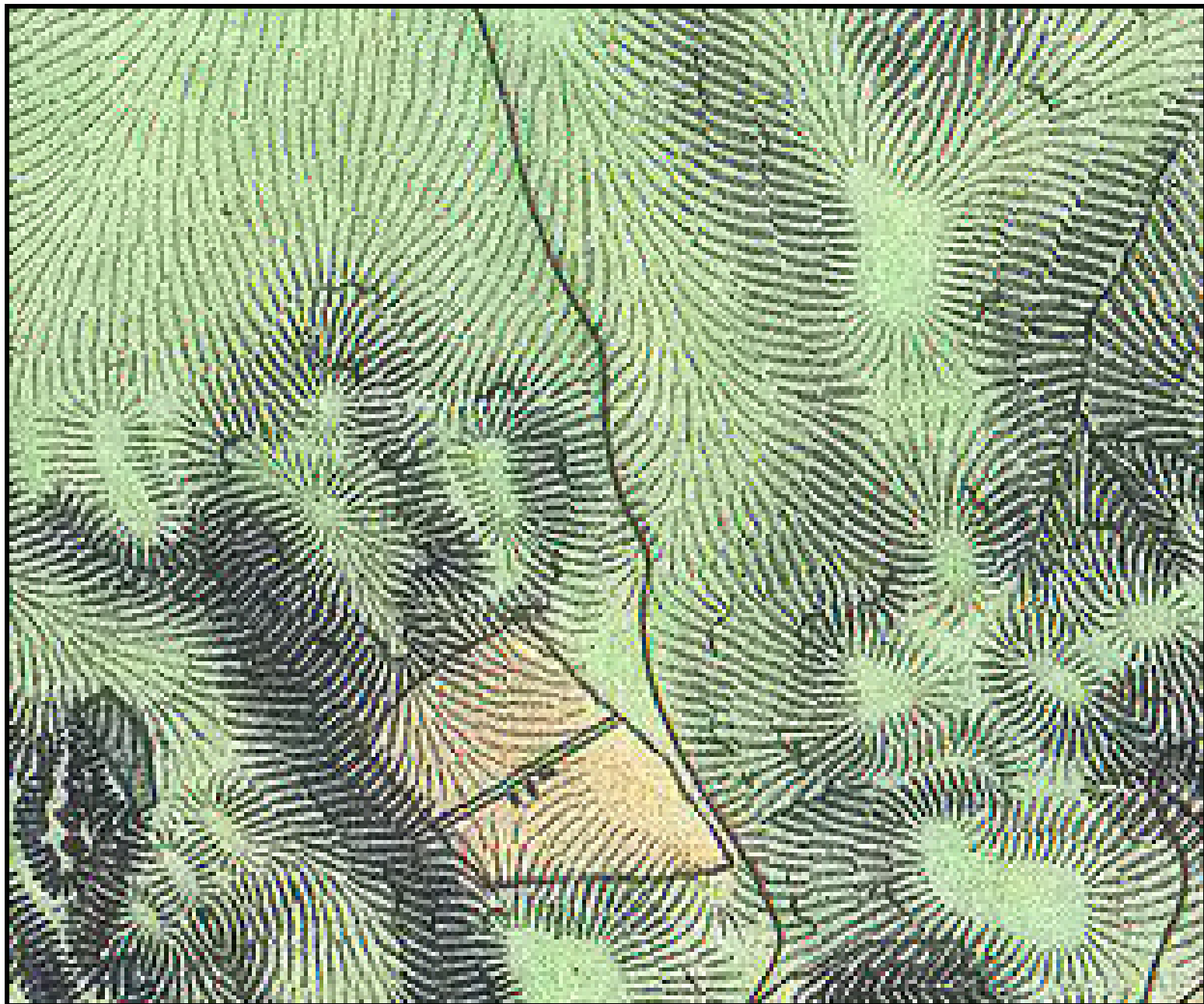


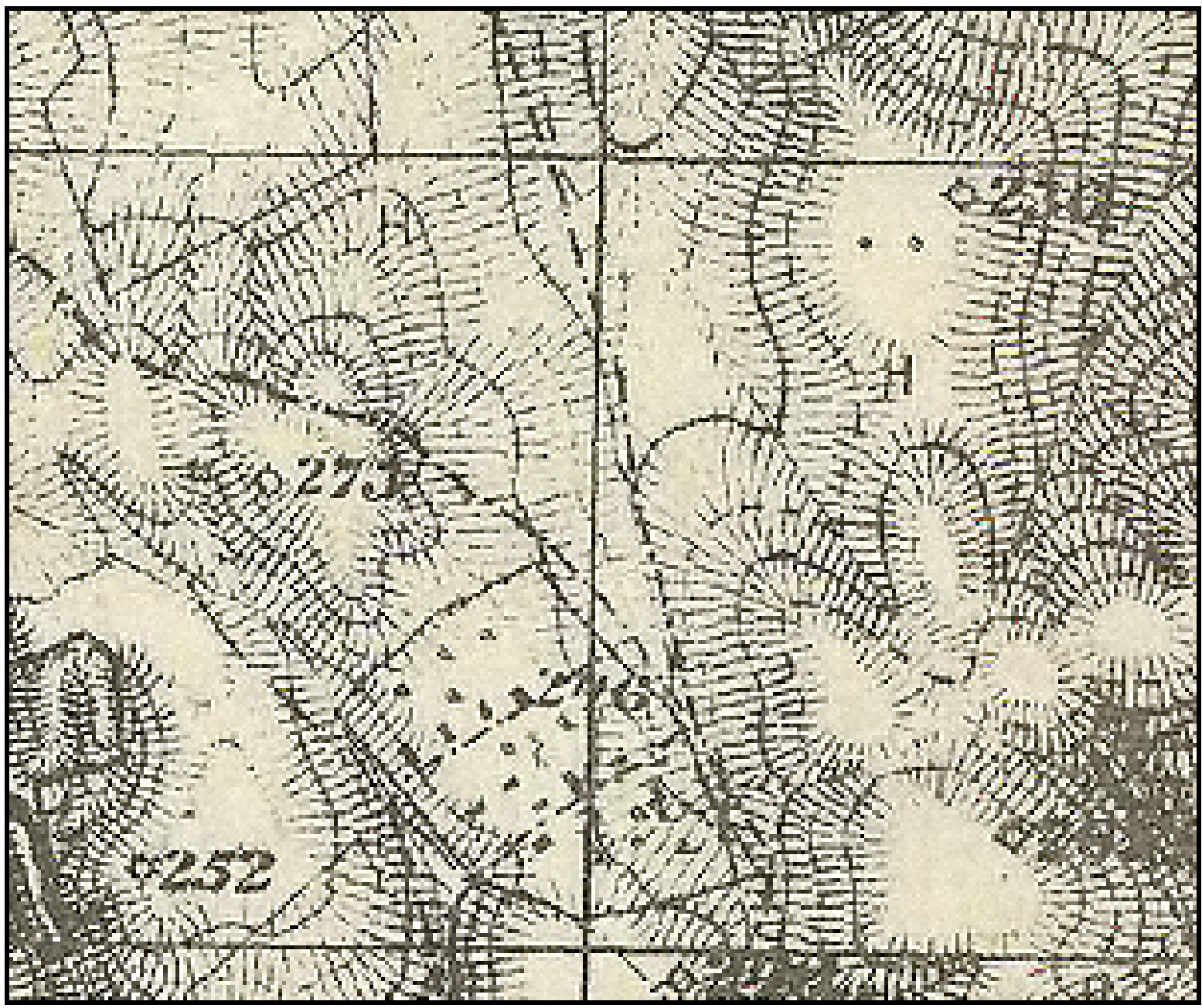


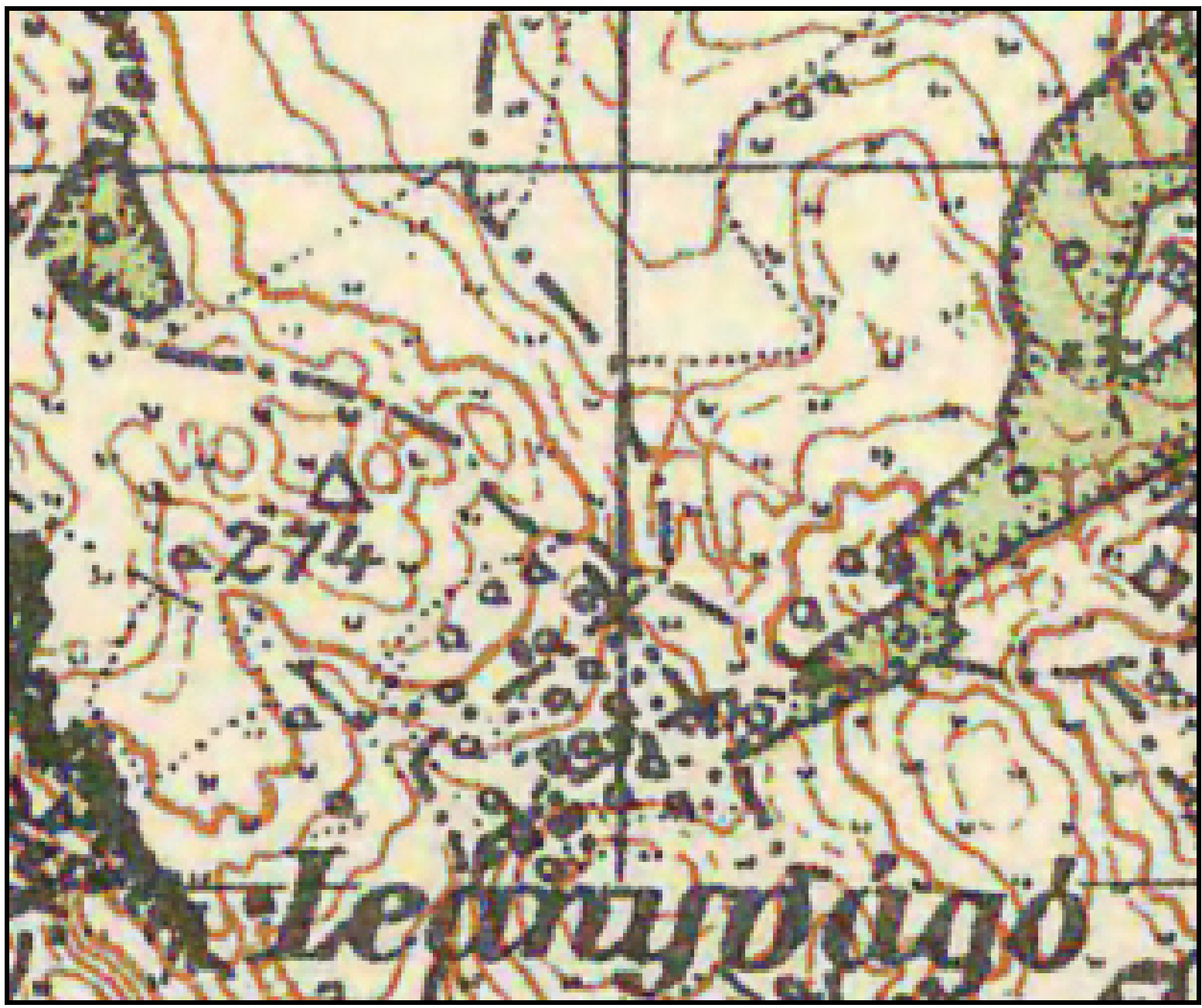
H_{GPS}

H_{BARO}

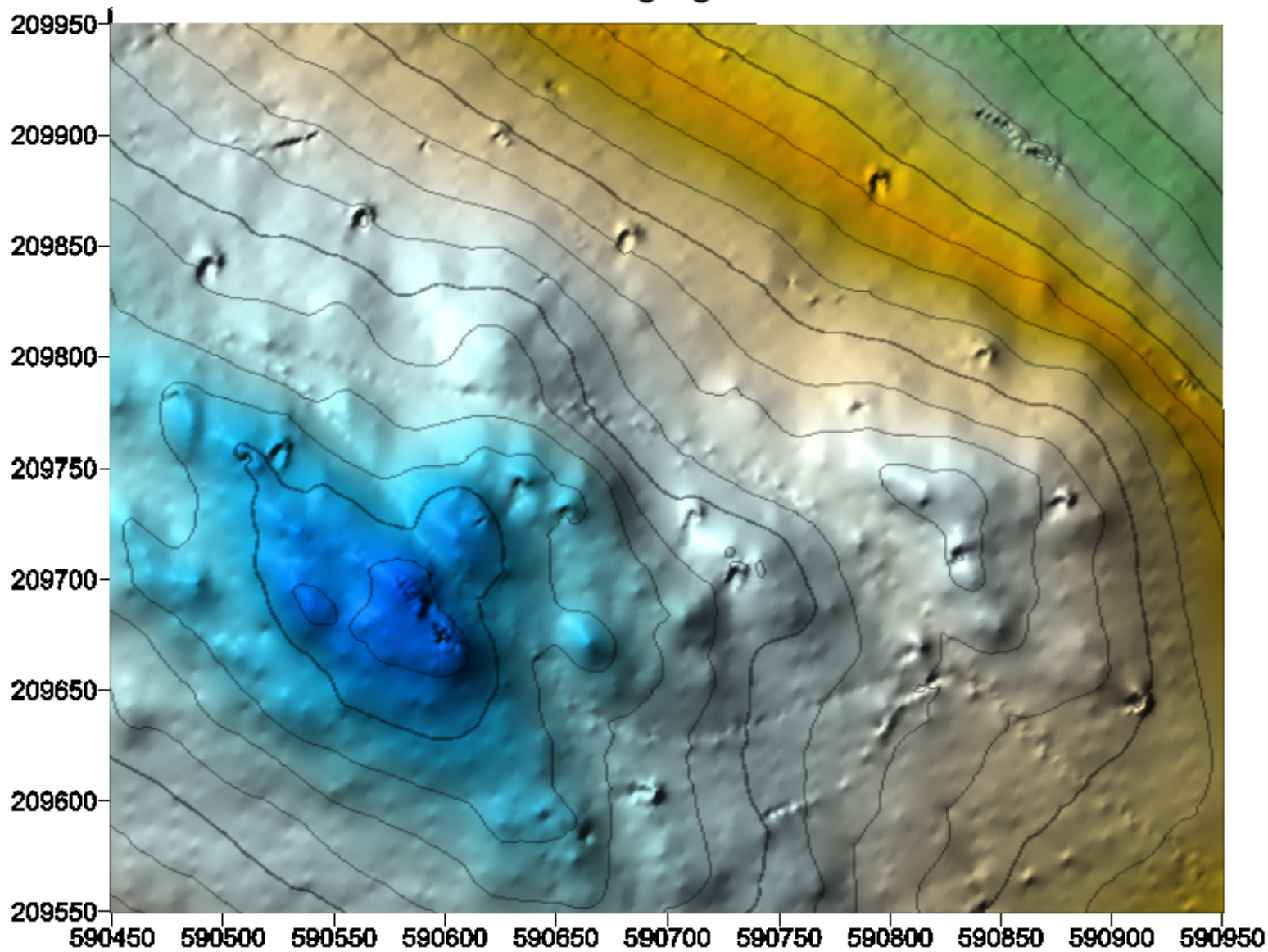




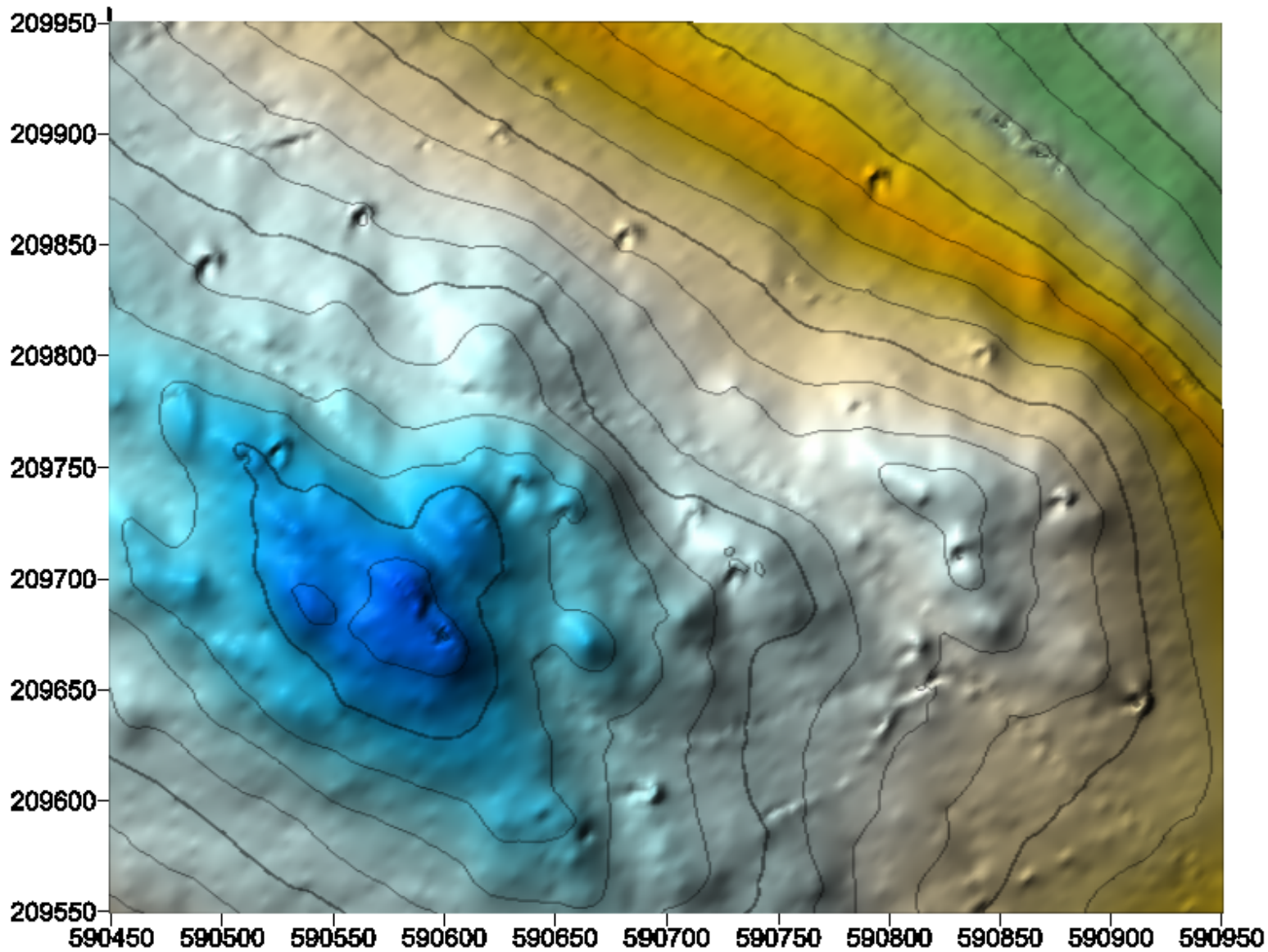




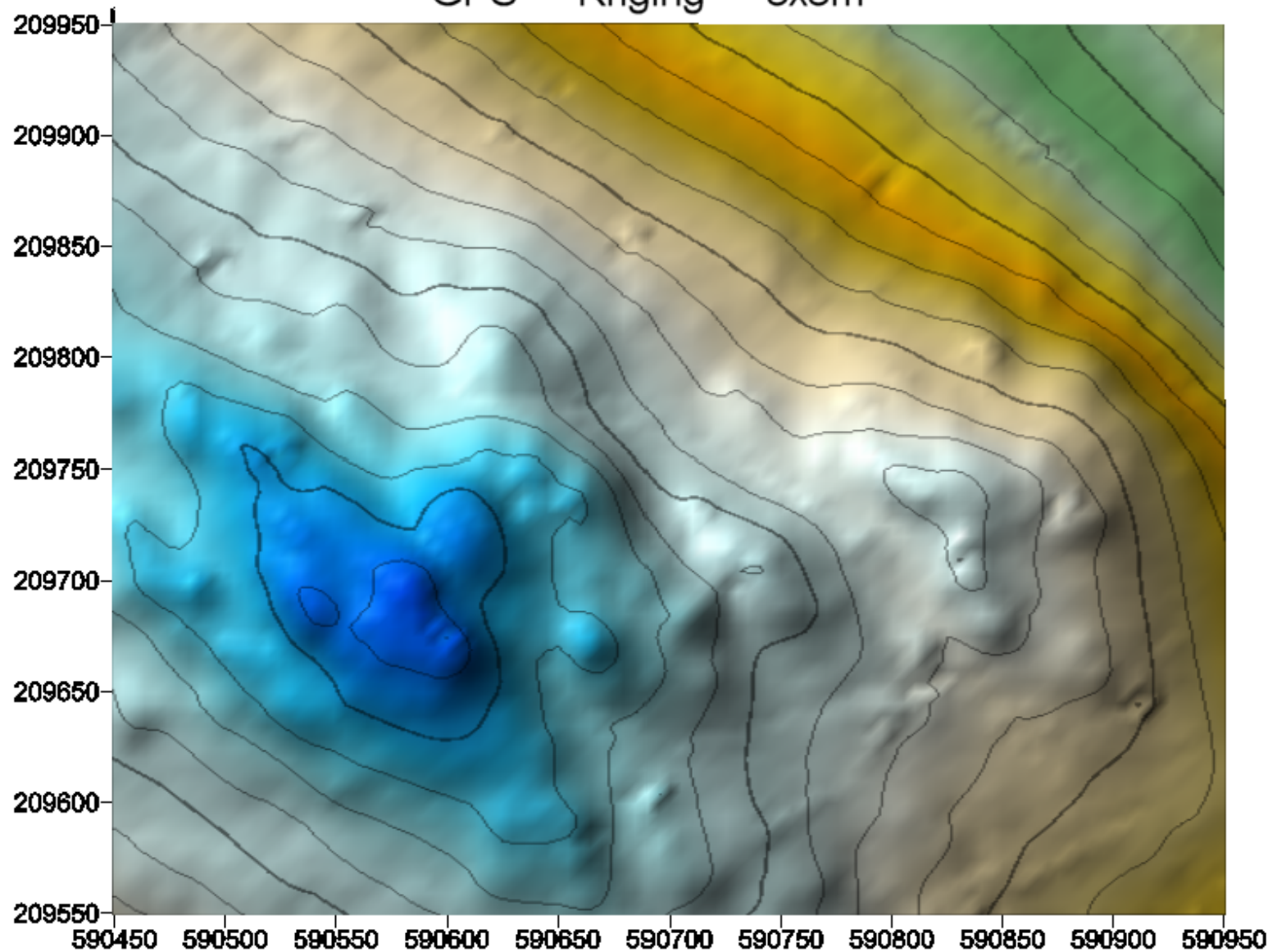
GPS - Kriging - 1x1m



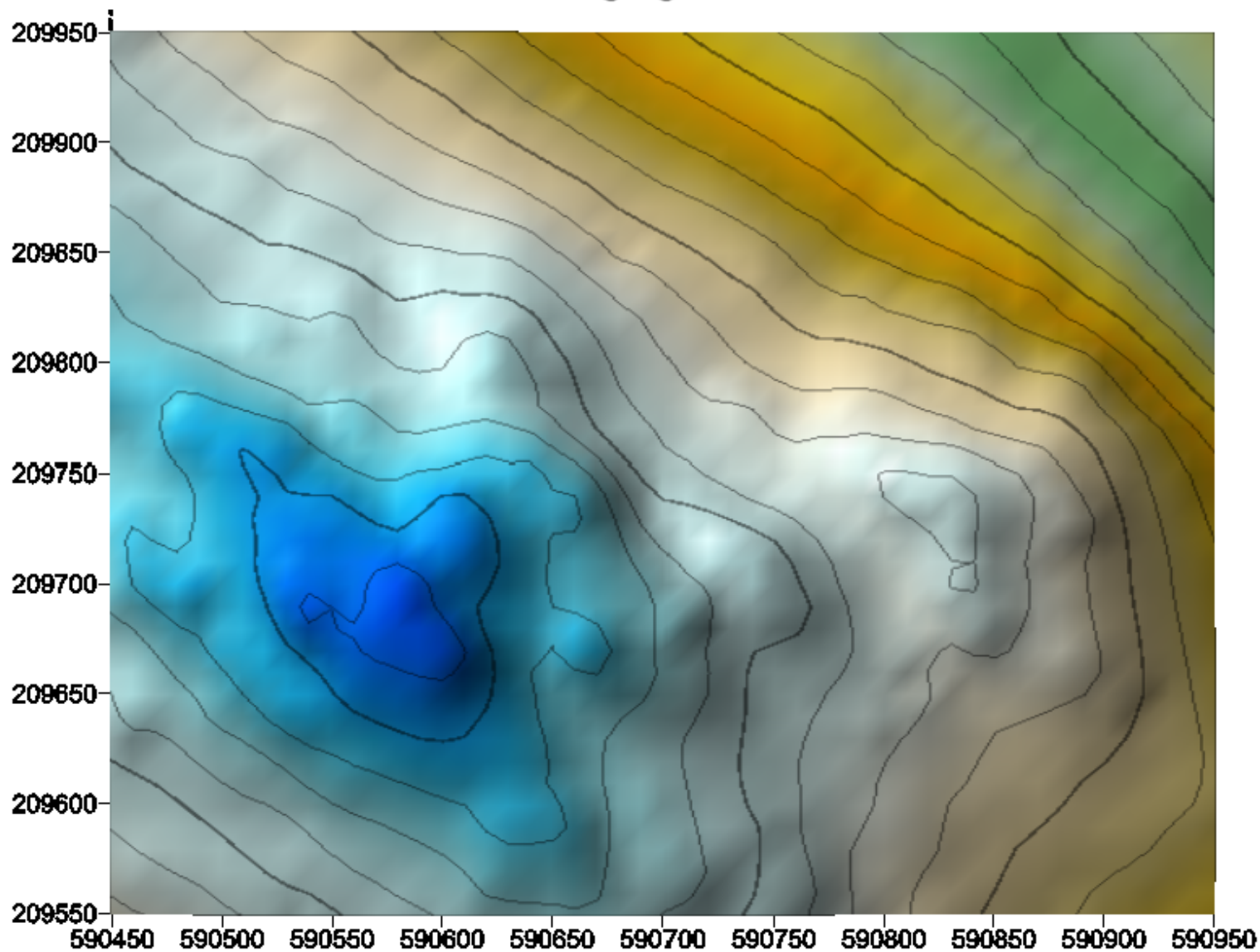
GPS - Kriging - 2x2m



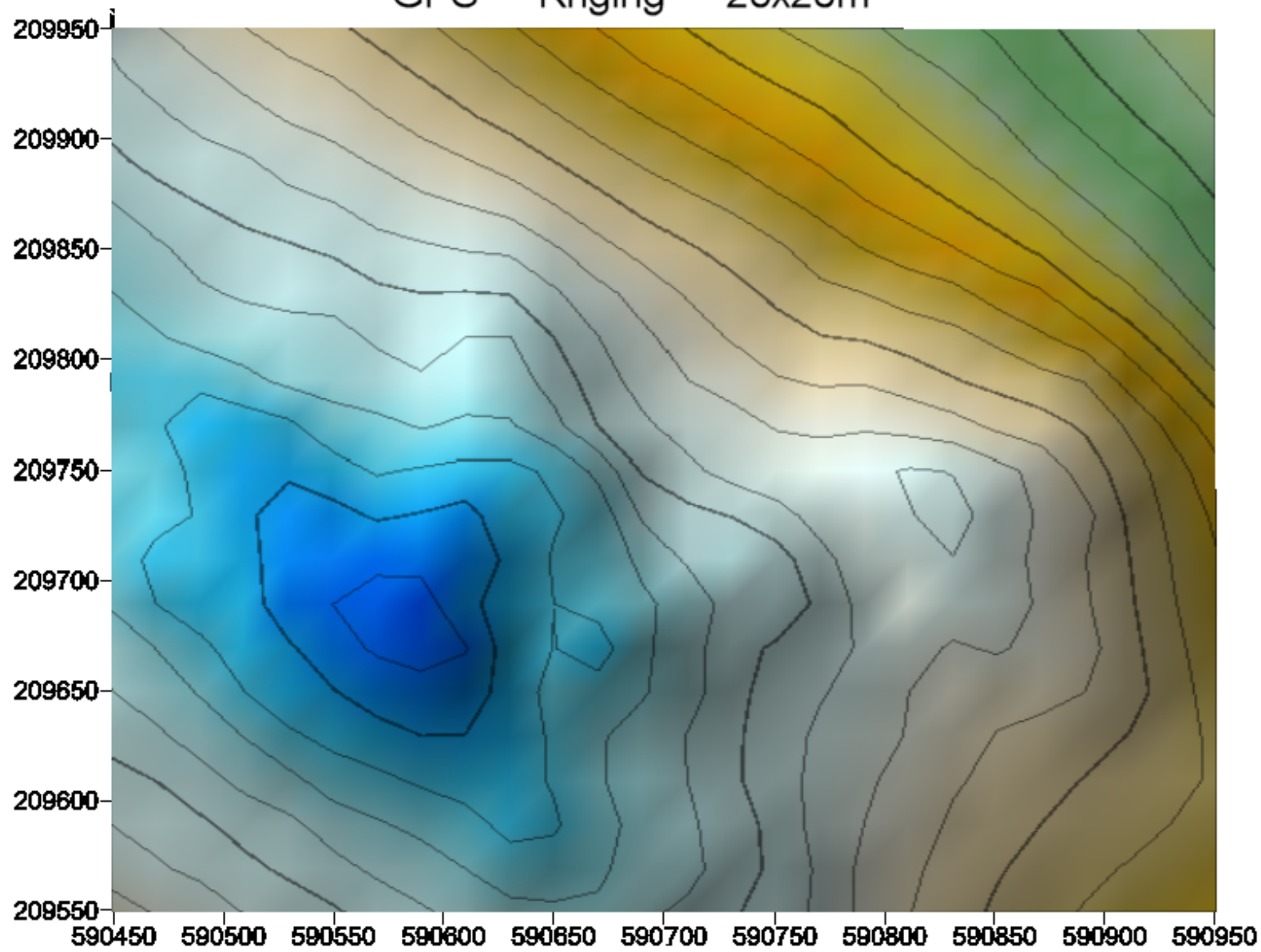
GPS - Kriging - 5x5m



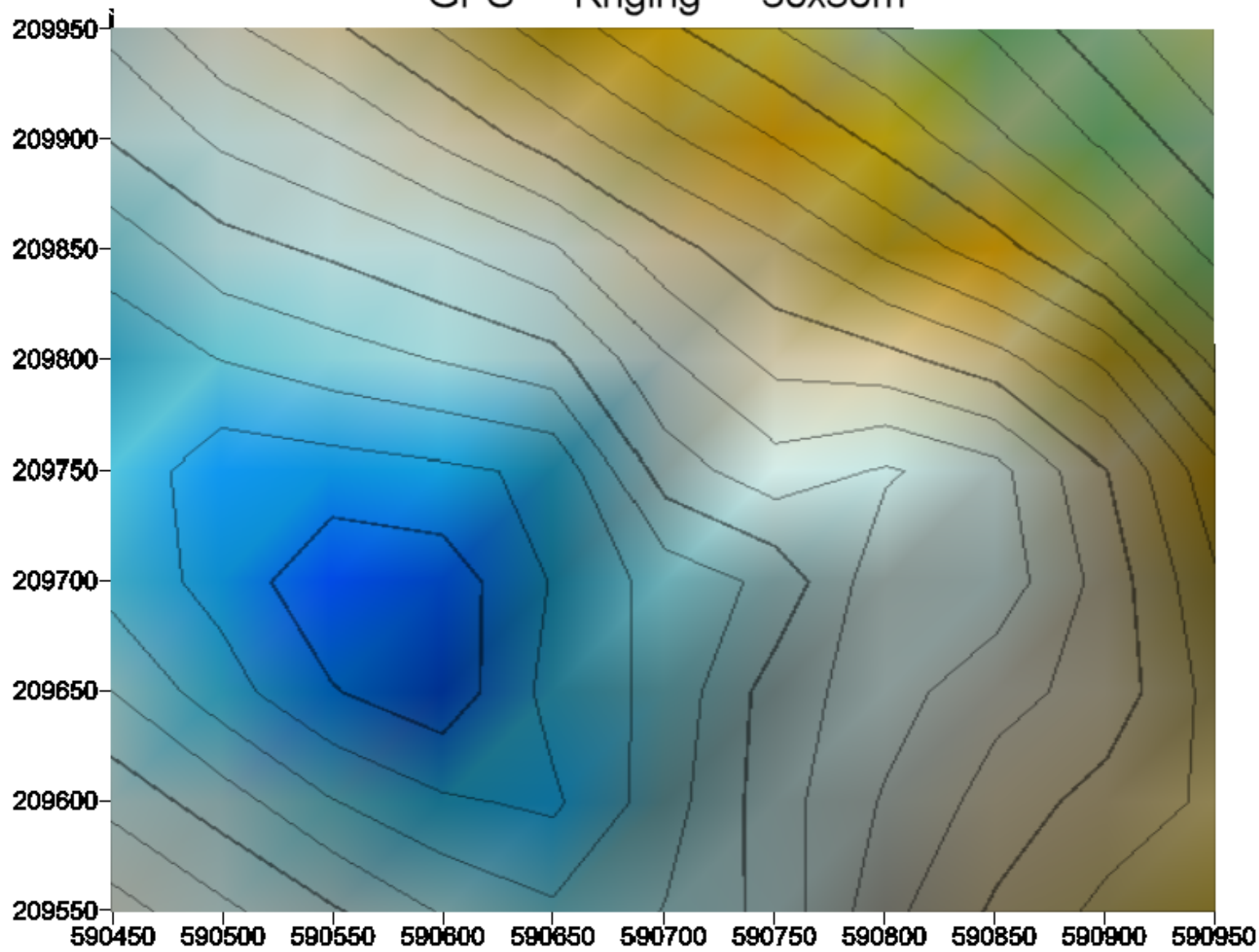
GPS - Kriging - 10x10m



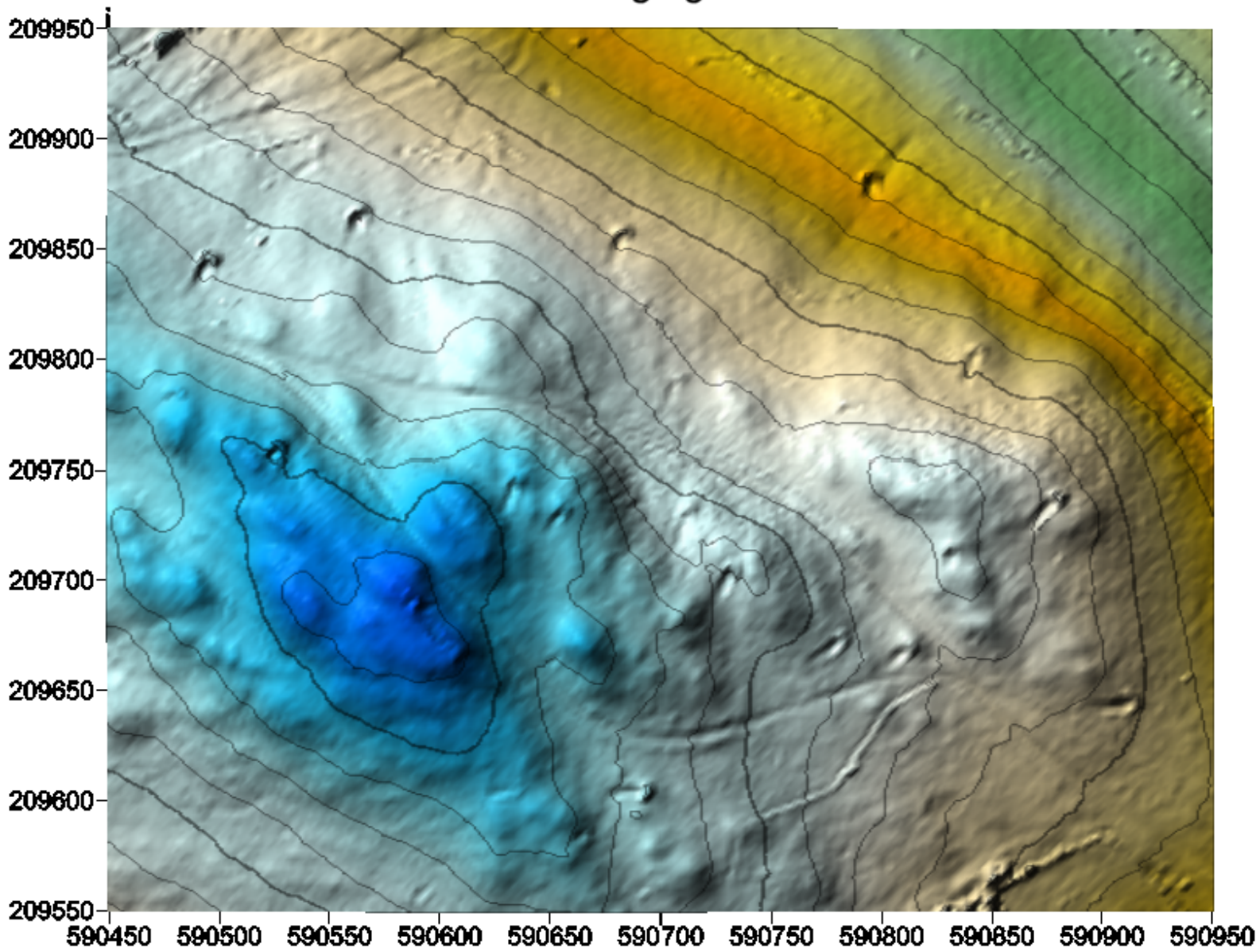
GPS - Kriging - 20x20m

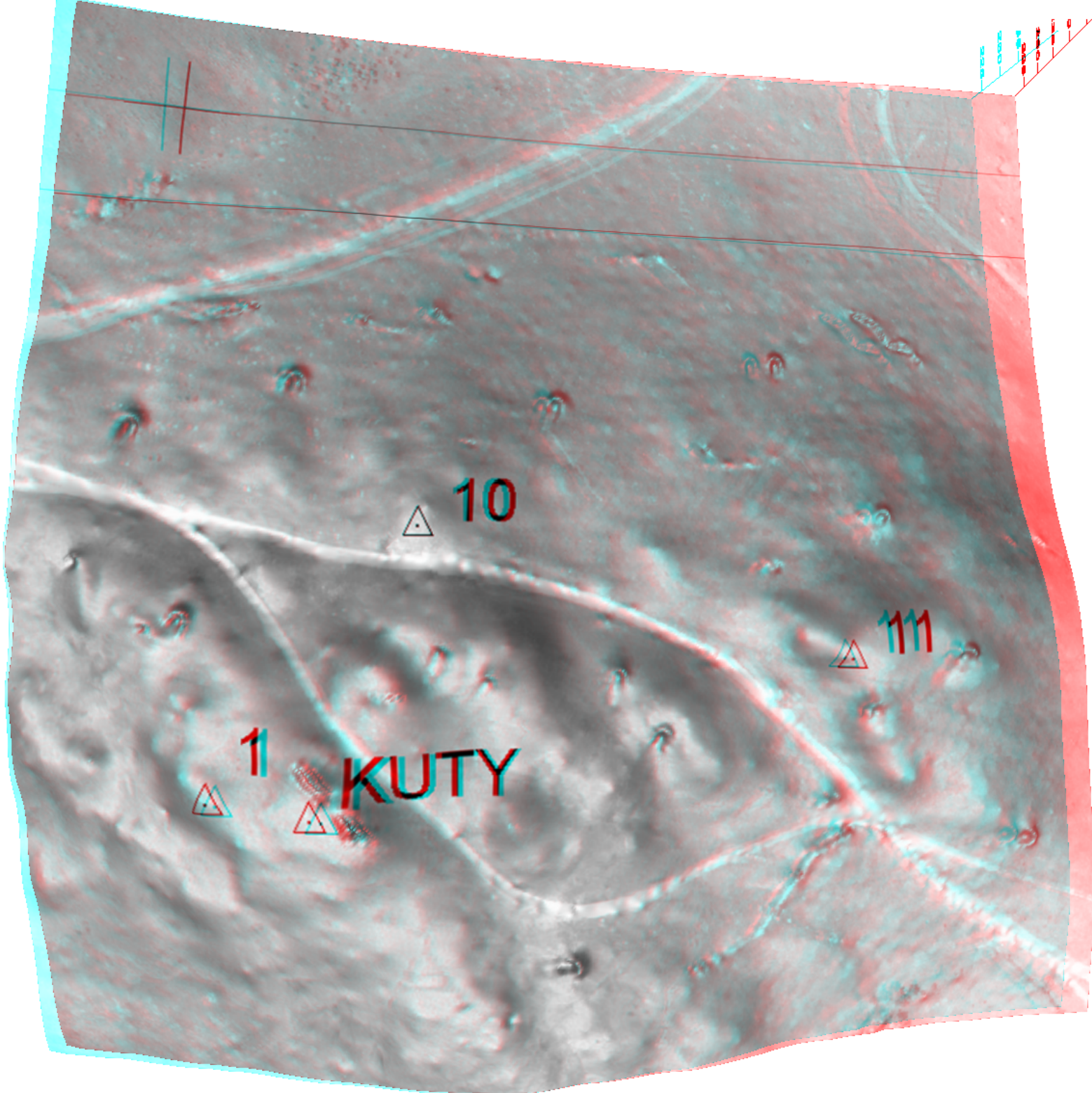


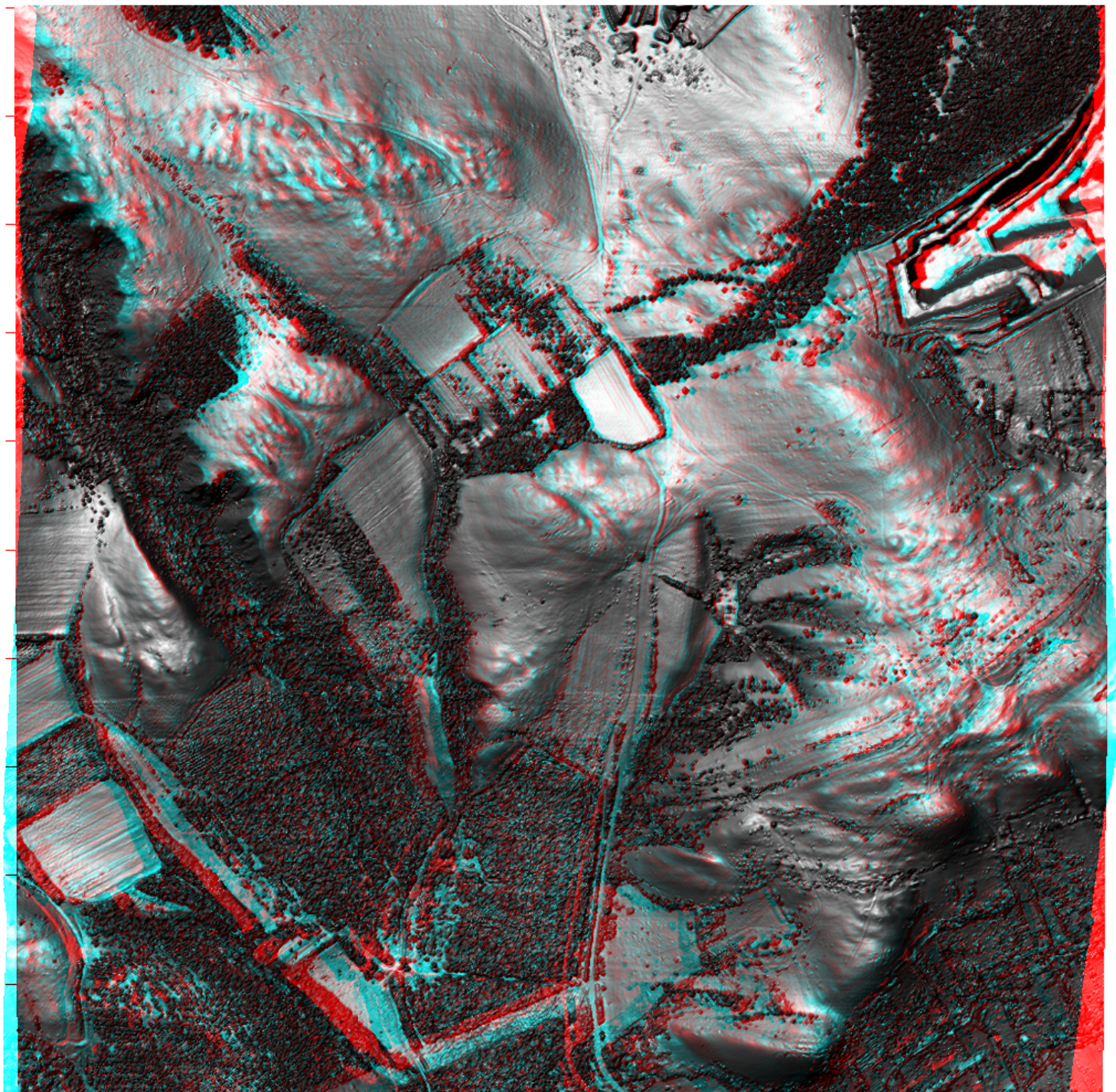
GPS - Kriging - 50x50m

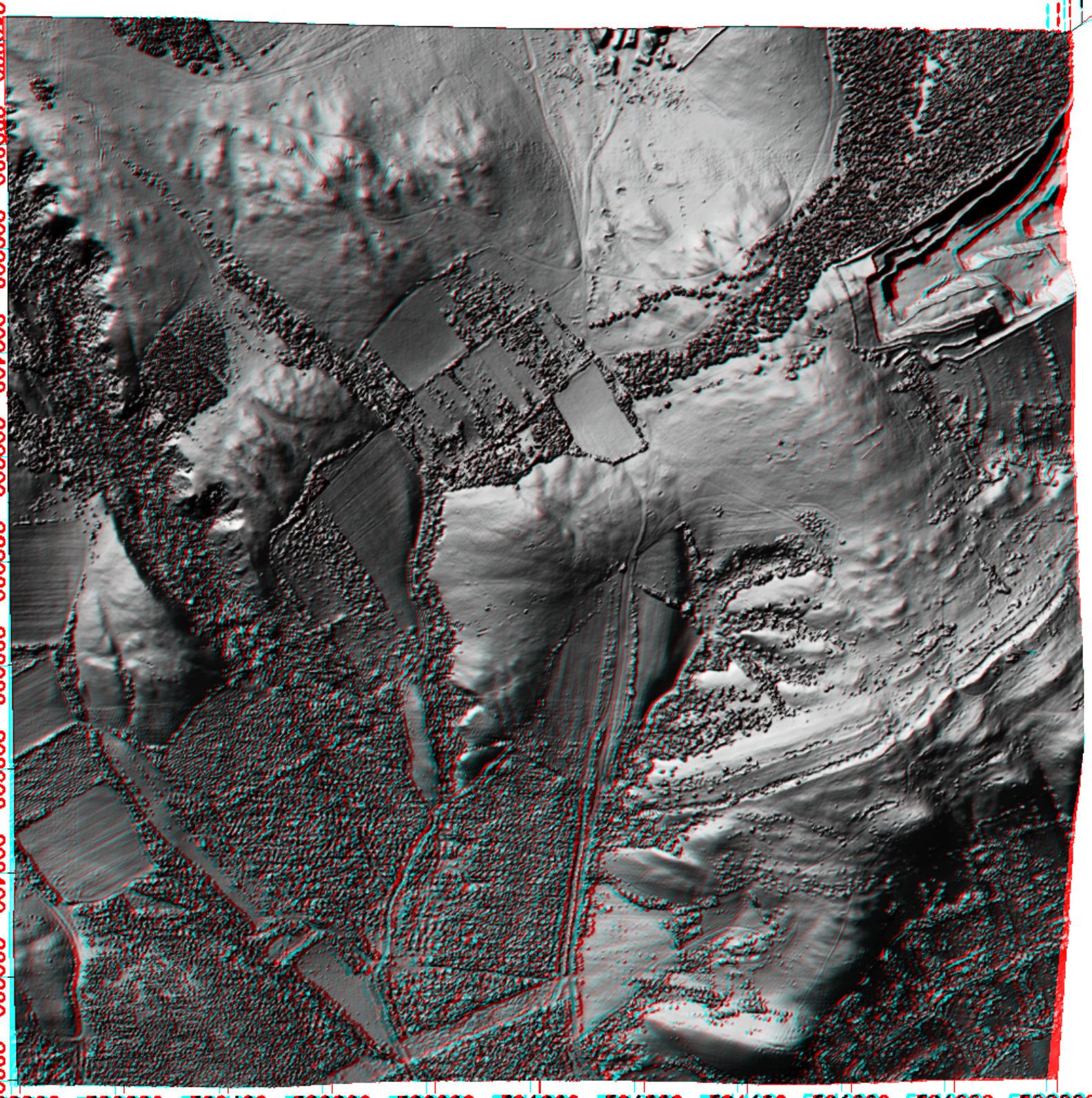


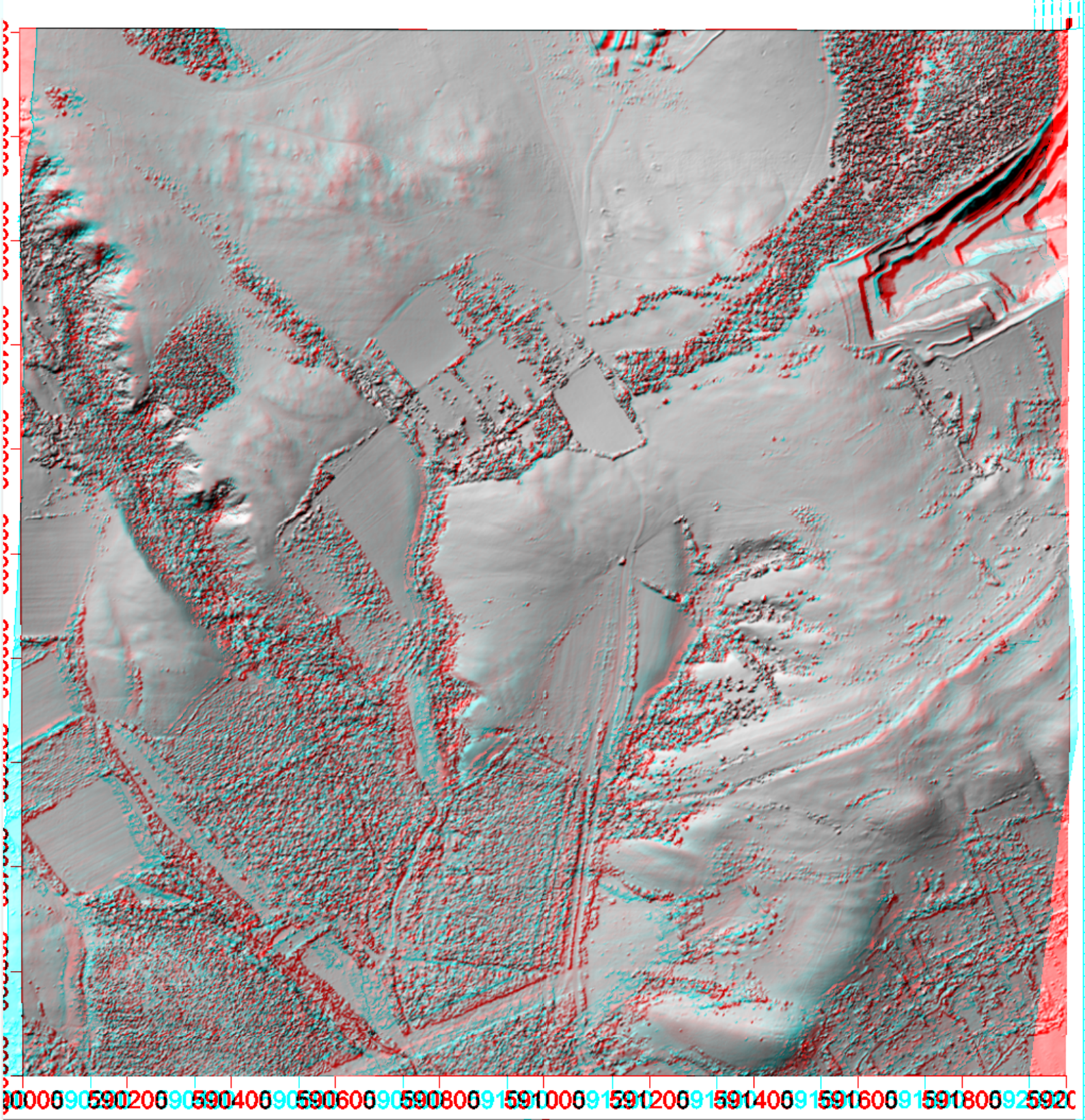
LiDAR - Kriging - 2x2m

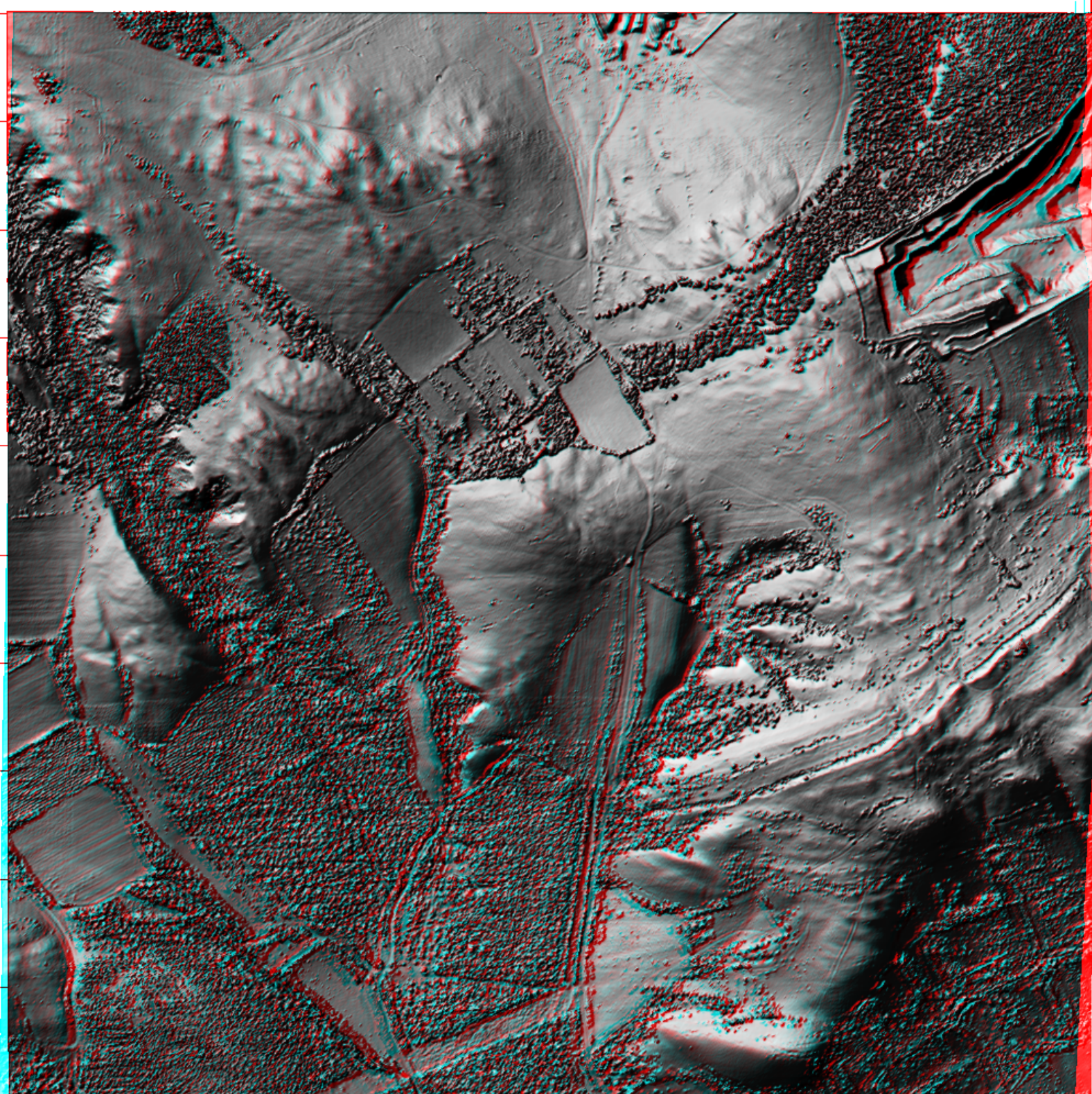


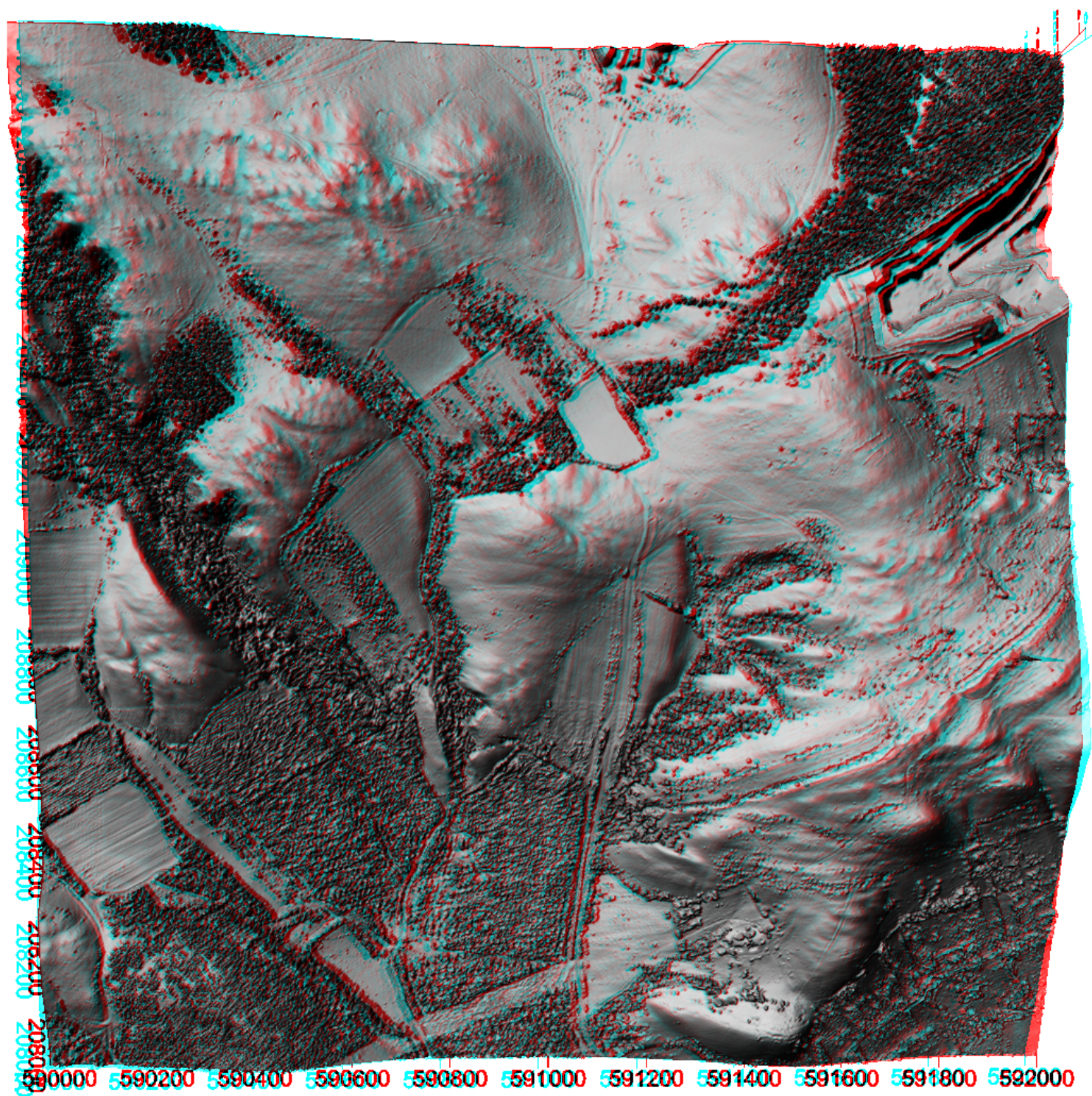


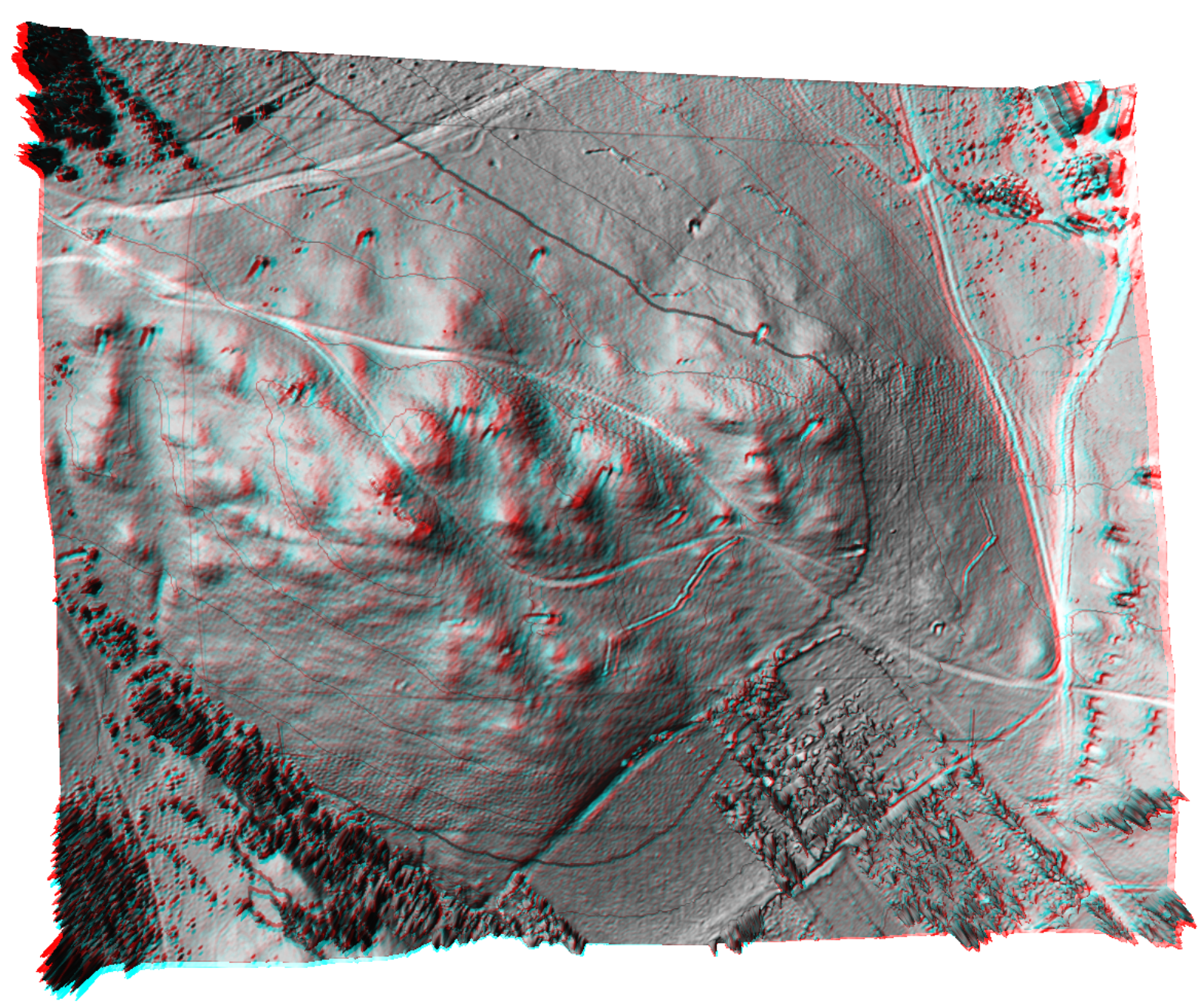


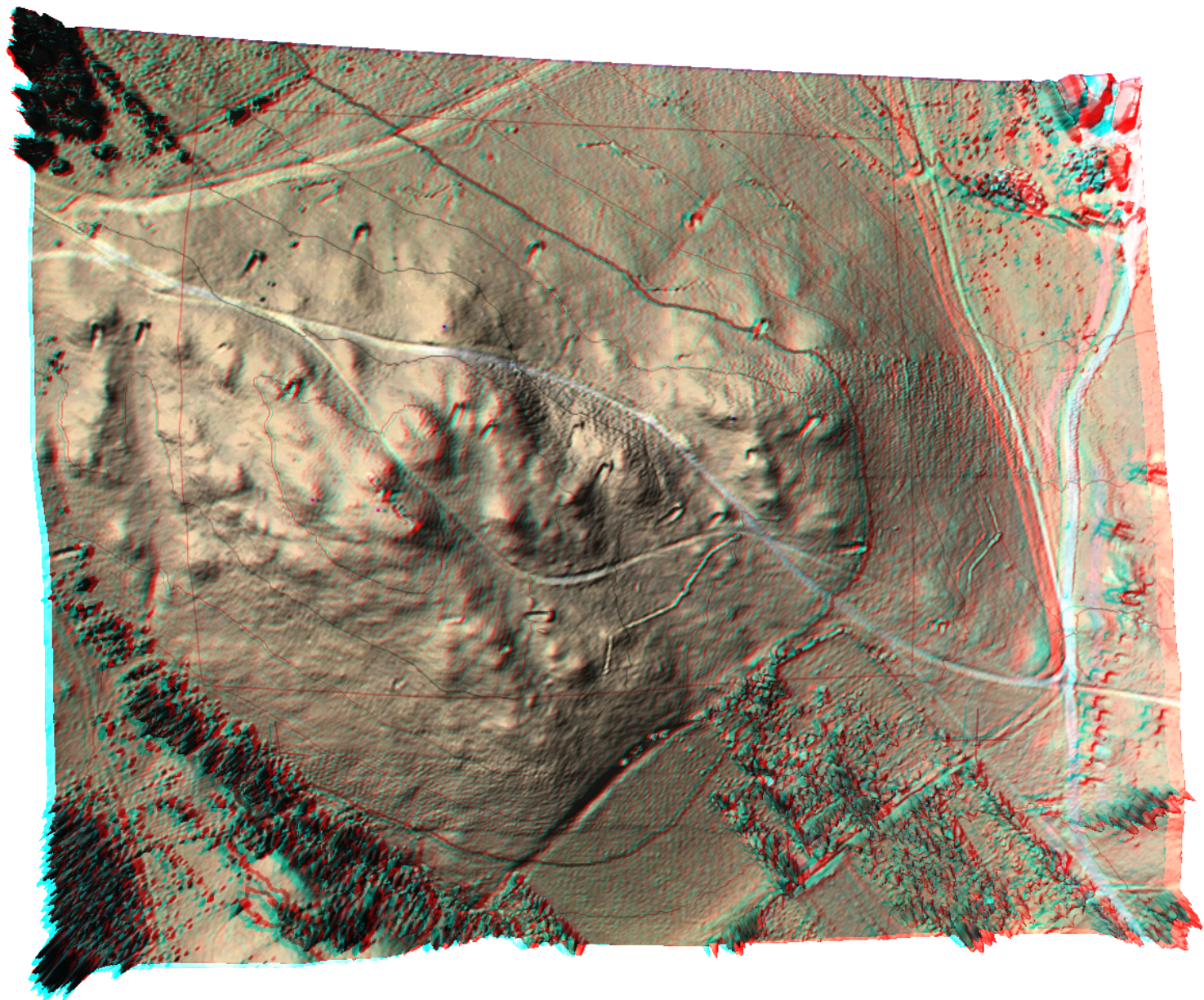


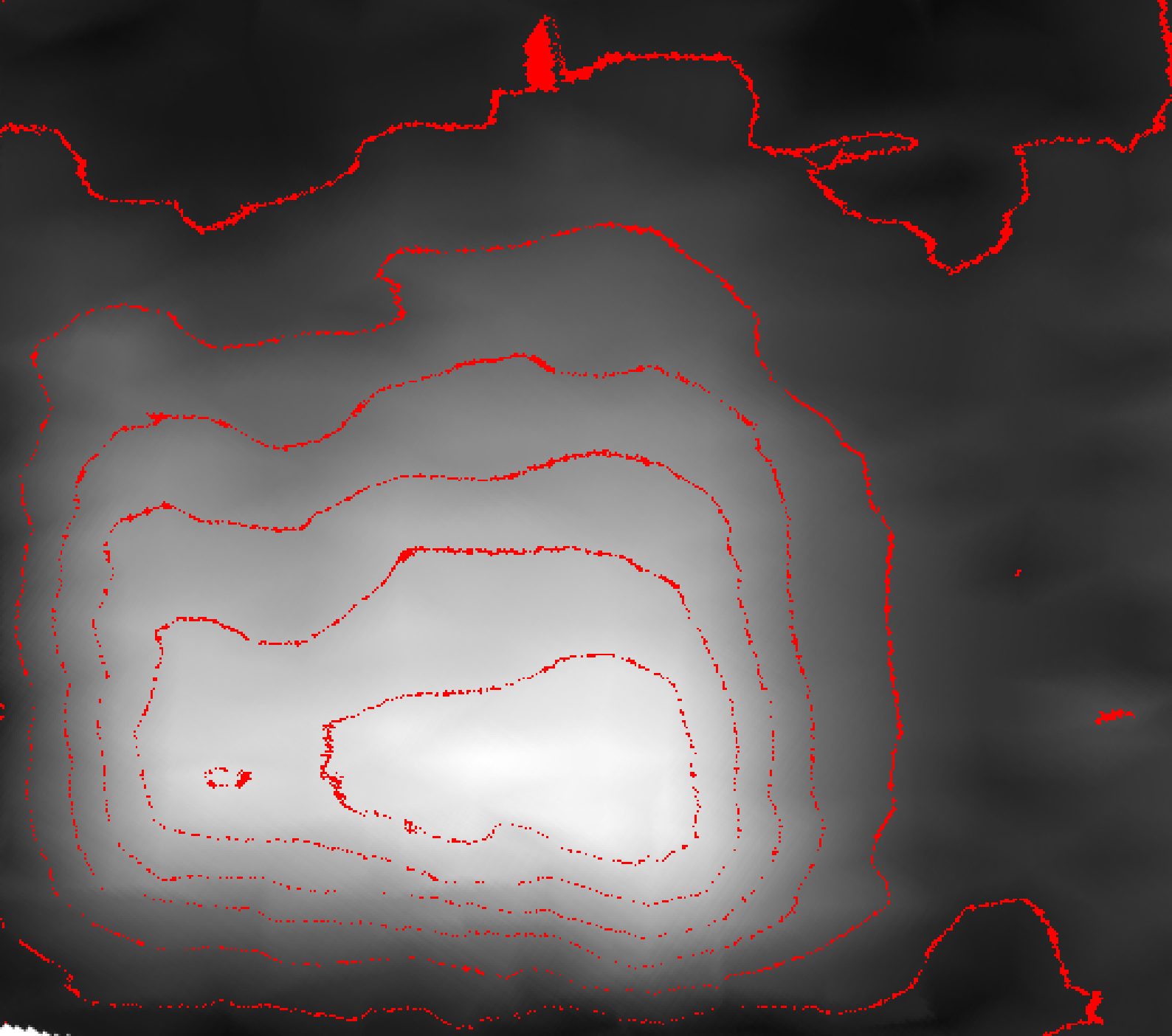


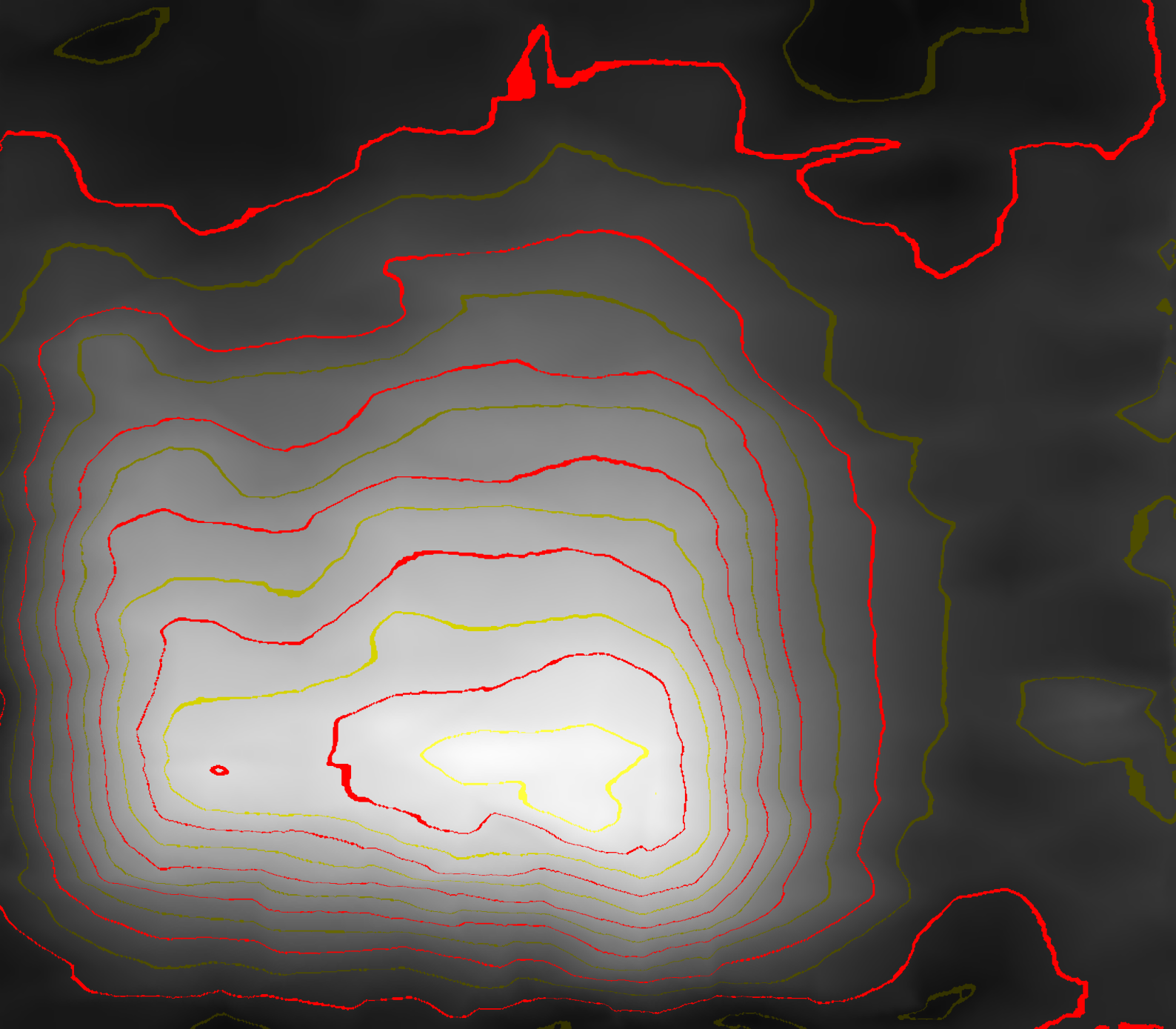








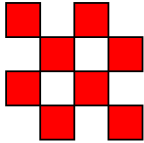






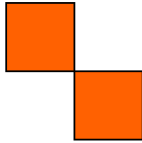
LiDAR

1



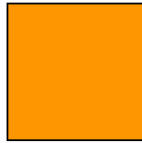
GPS-1

6



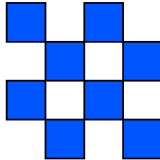
GPS-2

12



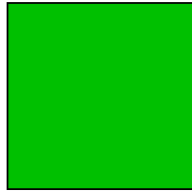
GPS-4

24



BM1

7



TOPO

32

SRTM

75

1

2

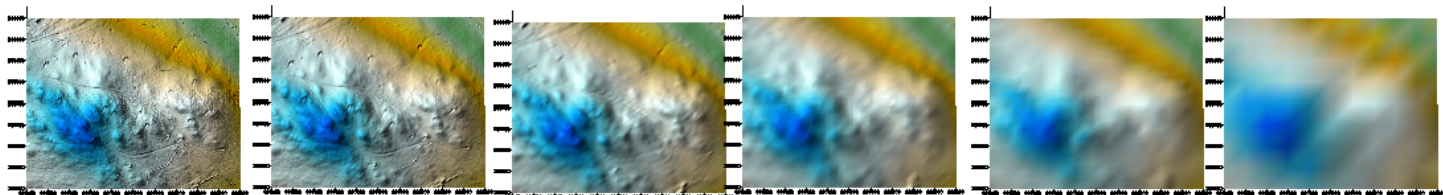
5

10

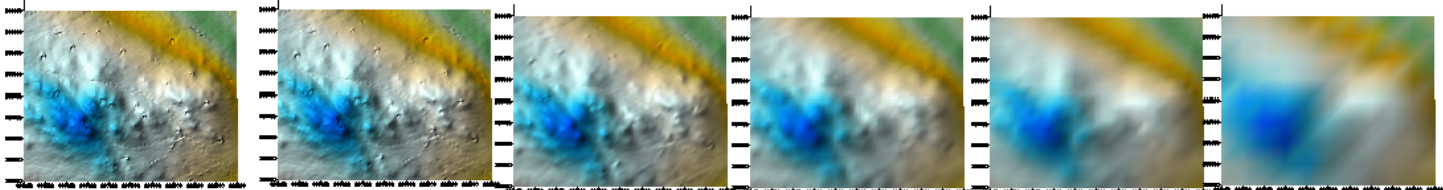
20

50

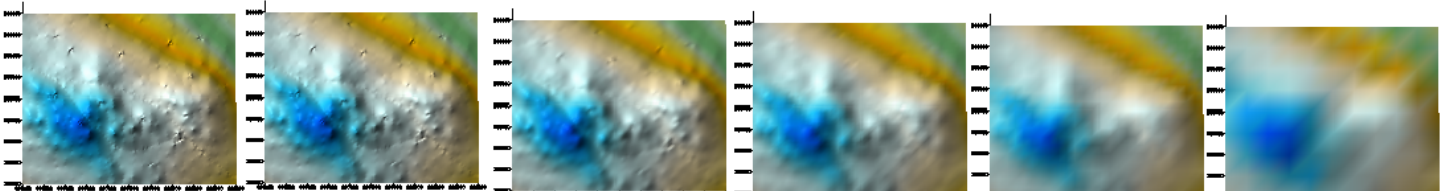
LIDAR



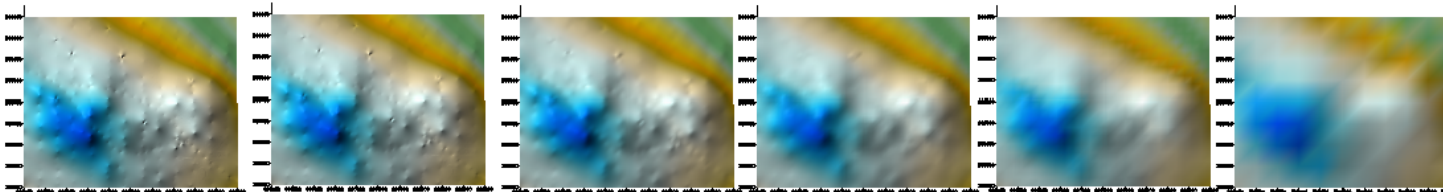
GPS 1



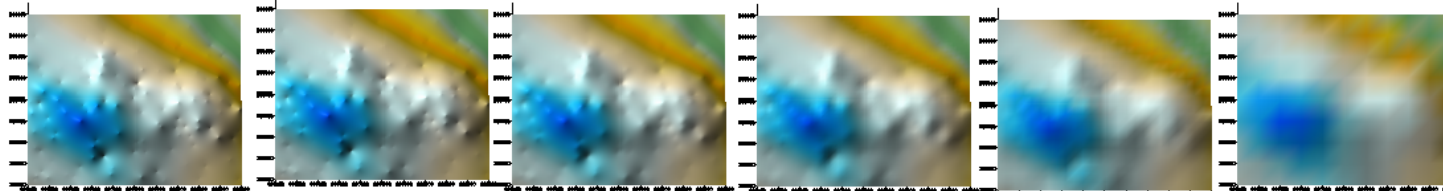
GPS 2



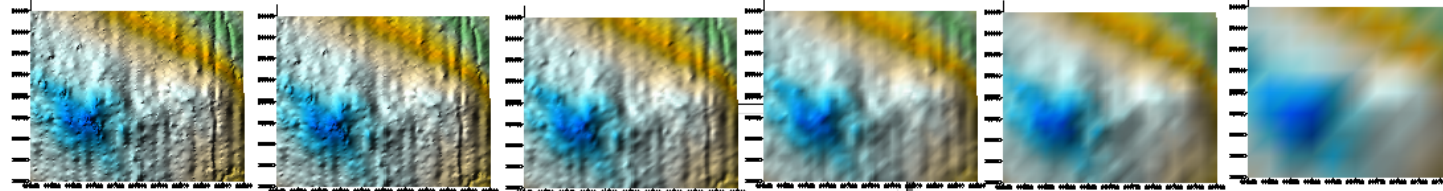
GPS 4



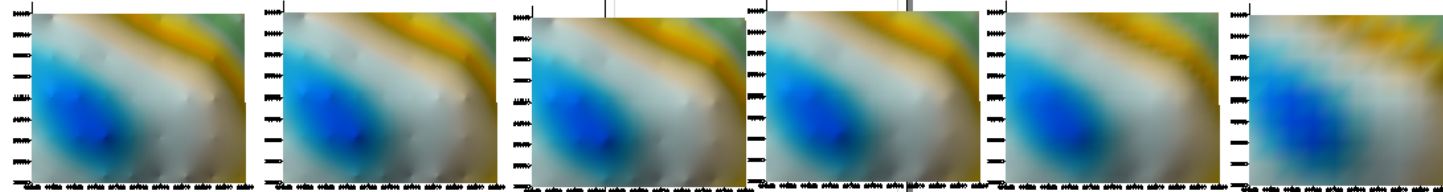
TOPO



BM1



SRTM



Barometrikus formula P-re

$$P_h = P_0 \cdot e^{[-(Mg\Delta h)/(RT)]}$$

Nyomás a referenciaszinten (P0) = 101325 Pa

A referenciaszint magassága (H0) = 0 m

A vizsgált pont magassága (H0+Δh) = 200 m

hőmérséklet (T) = 285 K

magasságkülönbség (Δh) = 200 m

k=	1,38E-23
Na=	6,02E+23 1/mol
R=	8,314473 J/(molK)
M=	0,028965 kg/mol
g=	9,807
e=	2,71828183

Nyomás a vizsgált magasságon (Ph) = 98924,61 Pa

m	deltaP [Pa]
1000	0
999	12
990	120
980	240
950	
900	1206
800	
700	
600	
500	
0	12740

Barometrikus formula H-ra

$$\Delta h = - \ln(P_h/P_0) * RT / (M \cdot g)$$

Nyomás a referenciaszinten (P0) = 101000 Pa

A referenciaszint magassága (H0) = 100 m

Nyomás a vizsgált pontban (Ph) = 100000 Pa

hőmérséklet (T) = 285 K

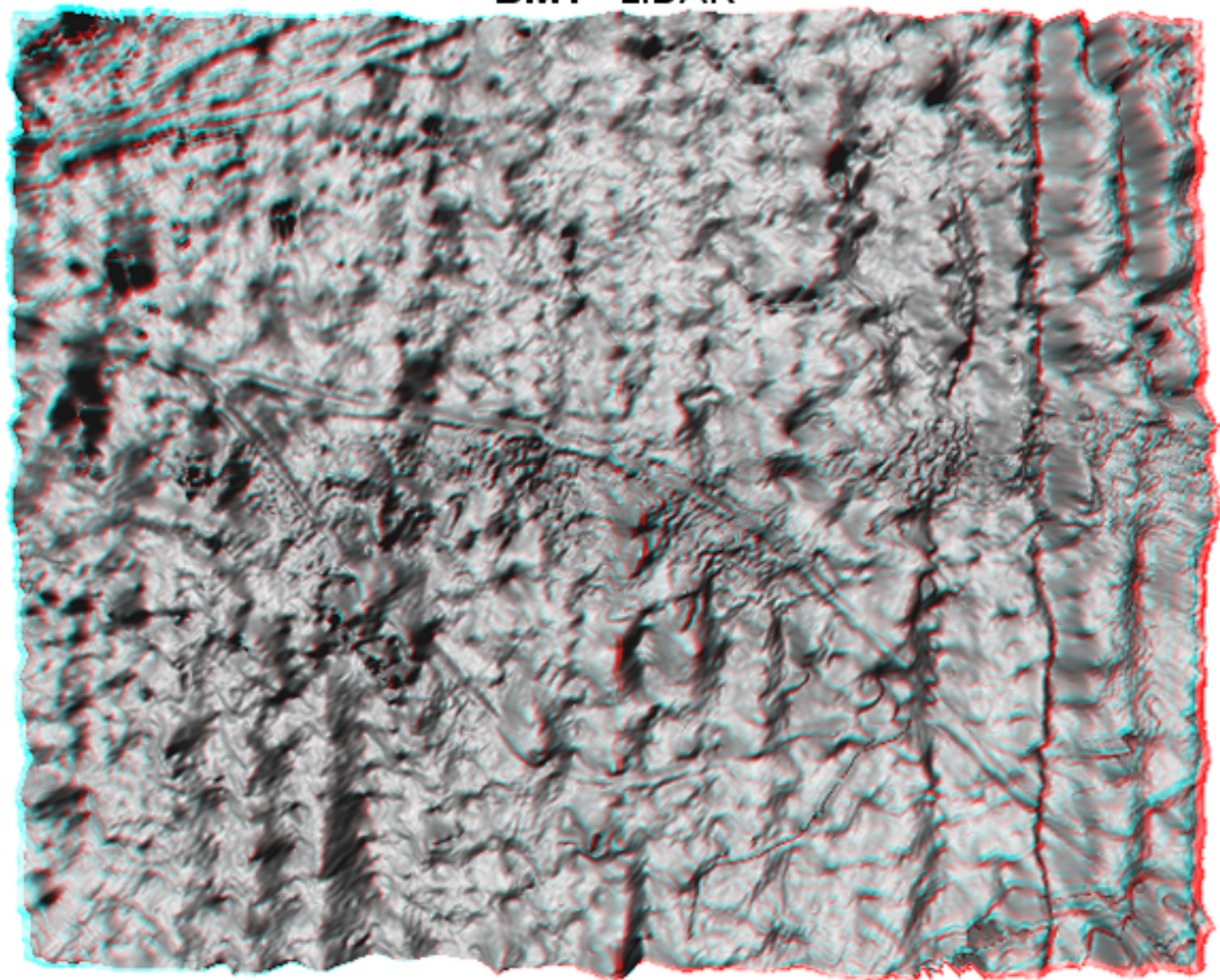
nyomáskülönbség (Ph-P0) = -1000 Pa

k=	1,38E-23
Na=	6,02E+23 1/mol
R=	8,314473 J/(molK)
M=	0,028965 kg/mol
g=	9,807
e=	2,71828183

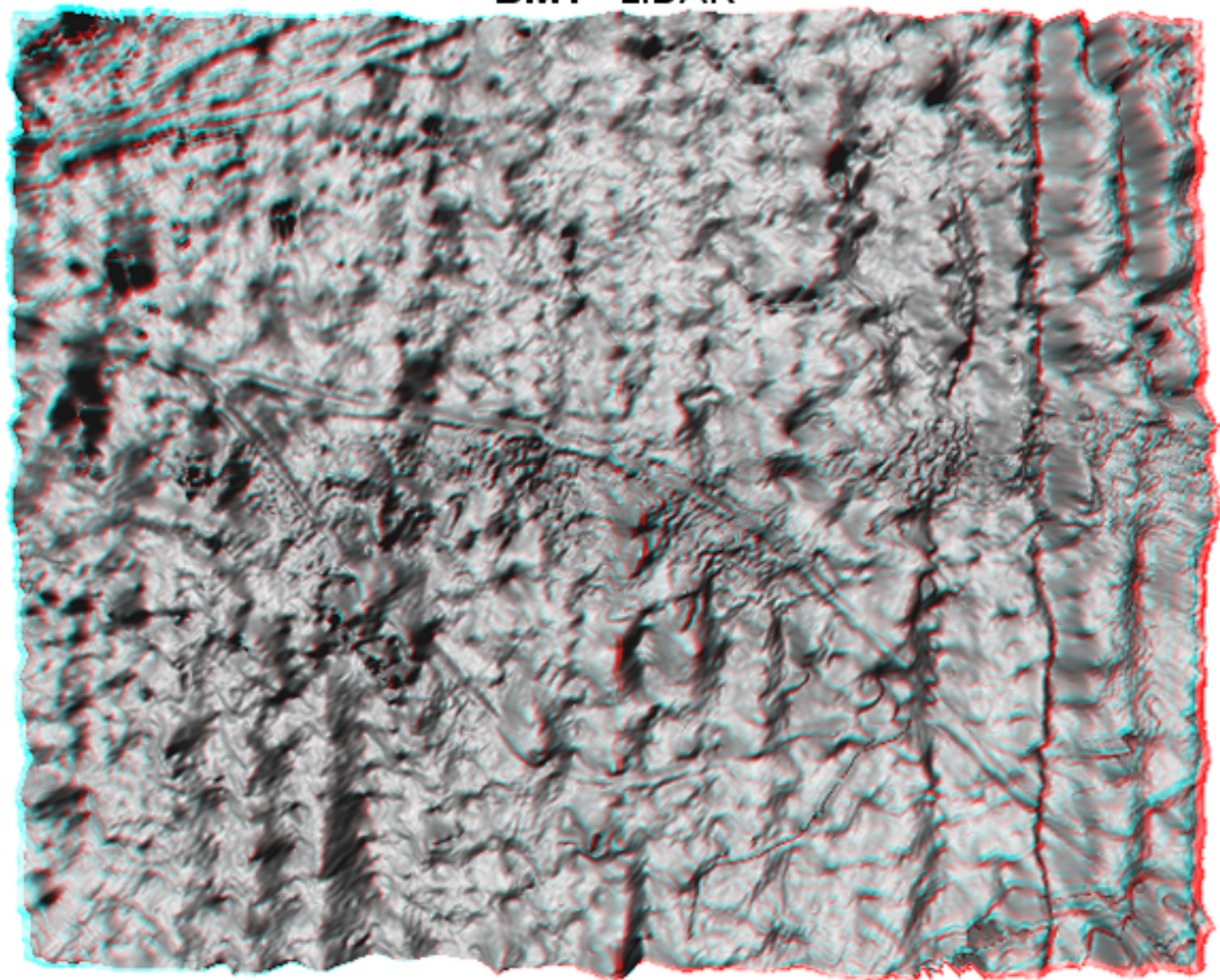
A vizsgált pont magassága (H0+Δh) = 183,01 m

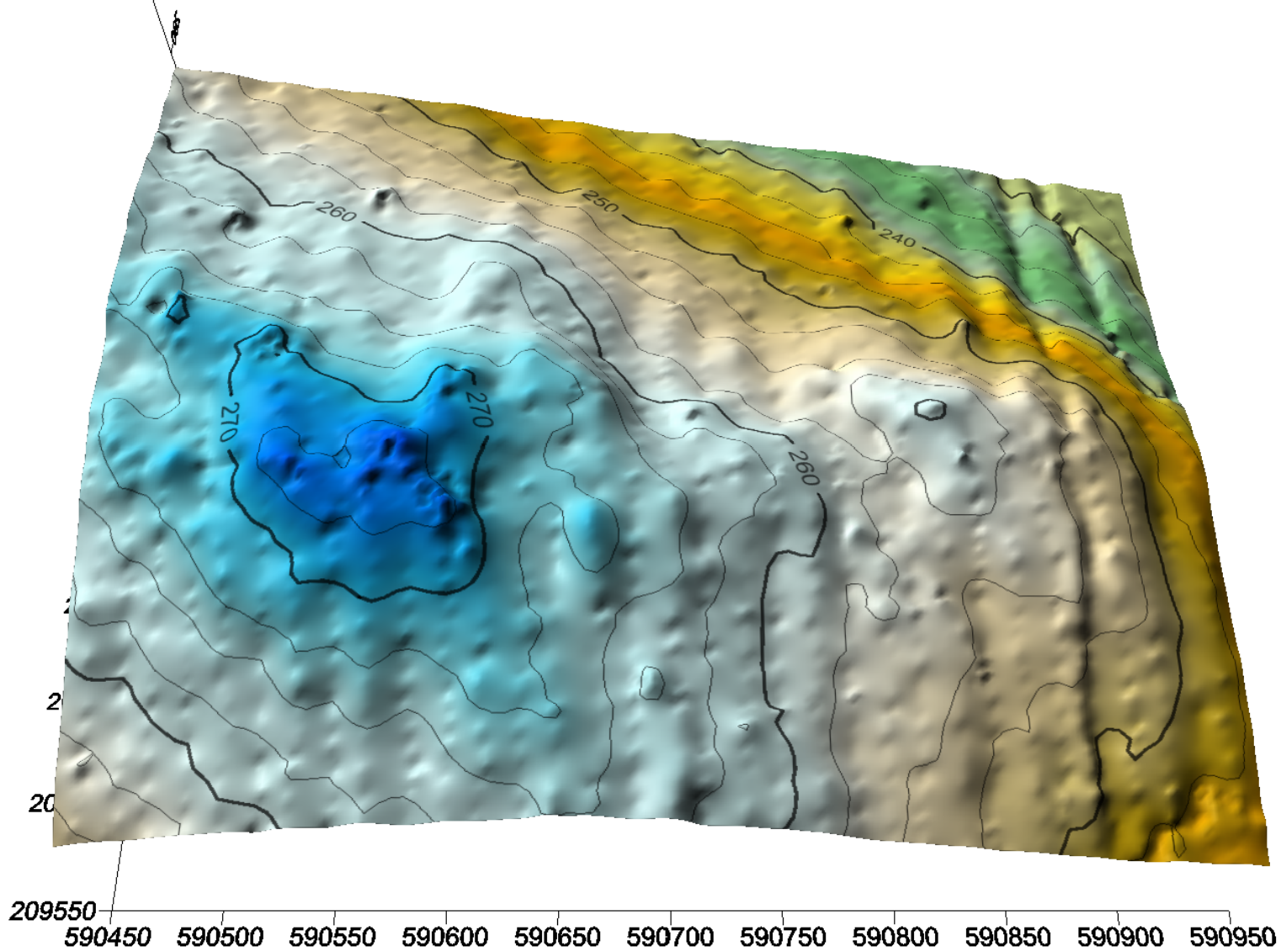
m	deltaP [Pa]
1000	0
999	12
990	120
980	240
950	
900	1206
800	
700	
600	
500	
0	12740

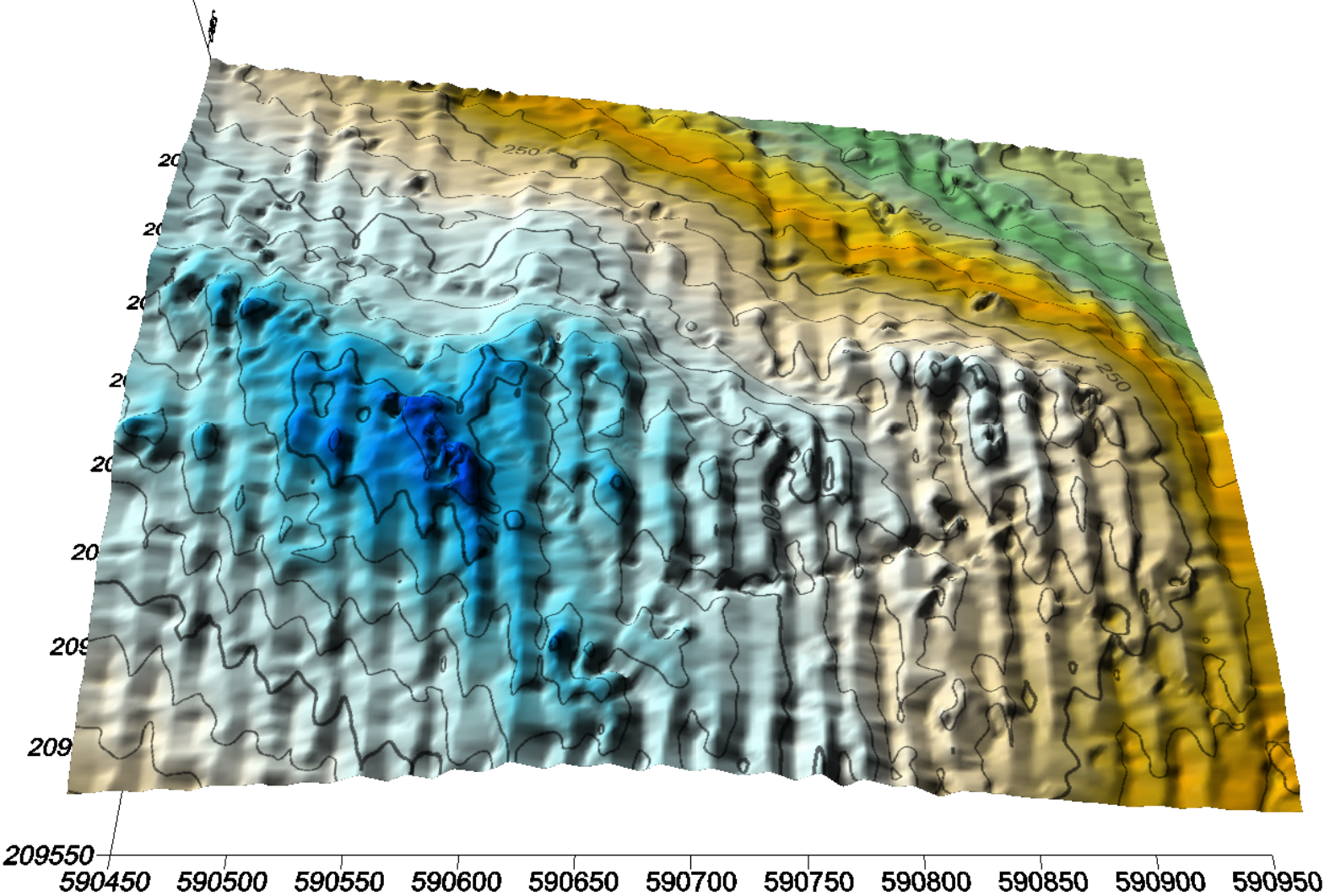
BM1 - LiDAR



BM1 - LiDAR











EOV
Balti magasság

CSÓR - ISZKASZENTGYÖRGY

592000

210500

M = 1:5000

208500

590000

ISZK
ŐrNY

1 KUTY

12kő

14HP

13

15

2

3

10

11

8

7kő

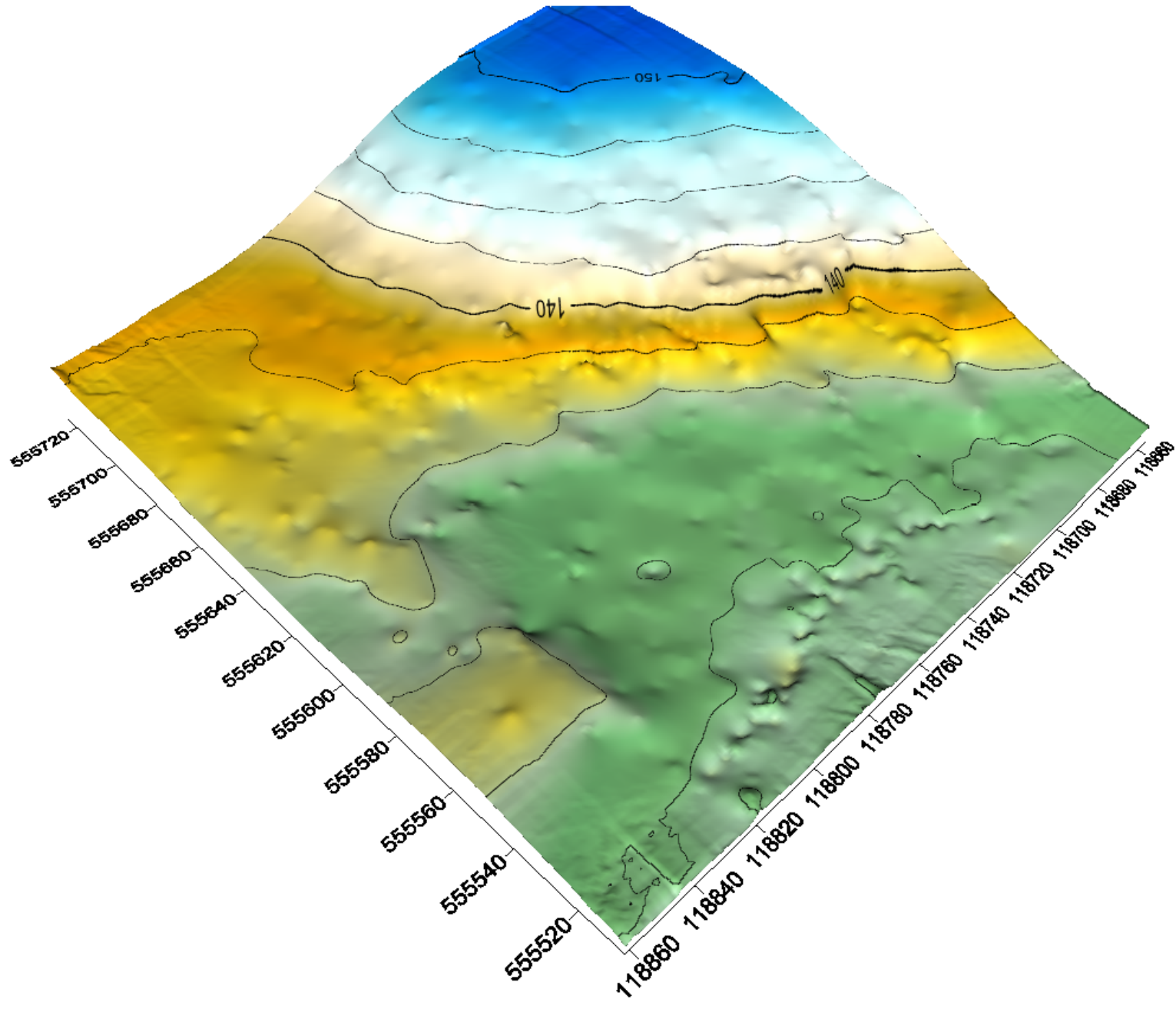
5

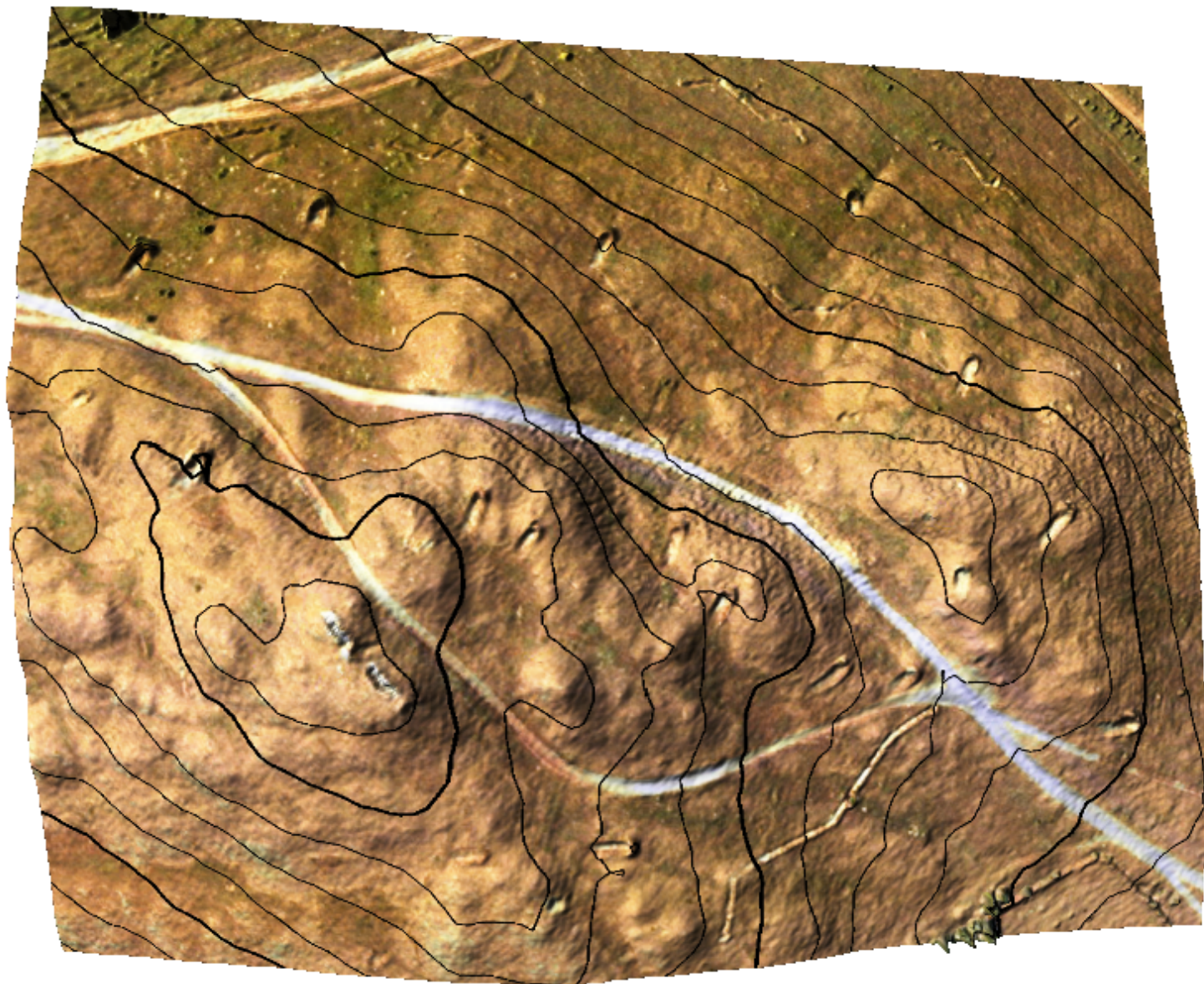
4kő

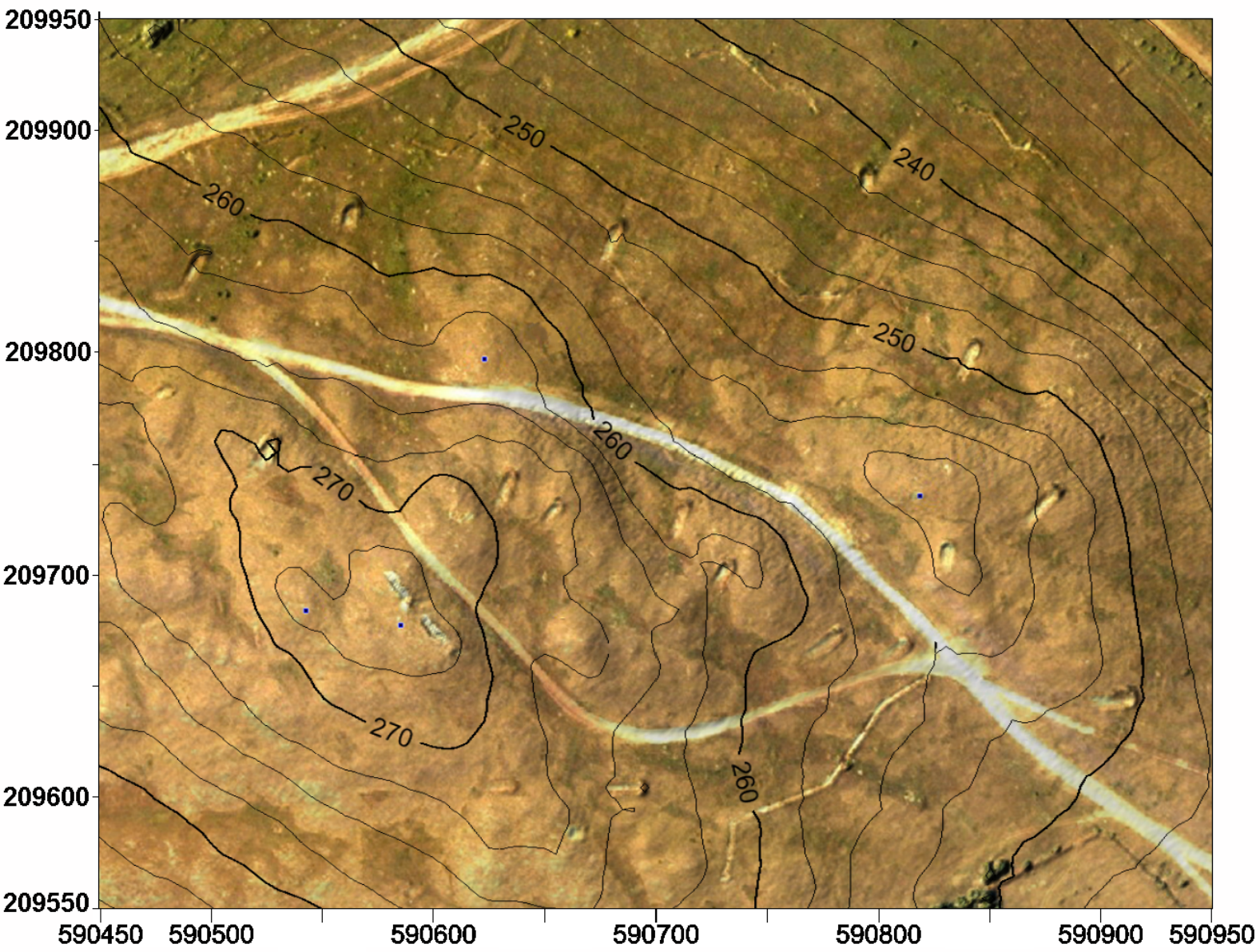
20

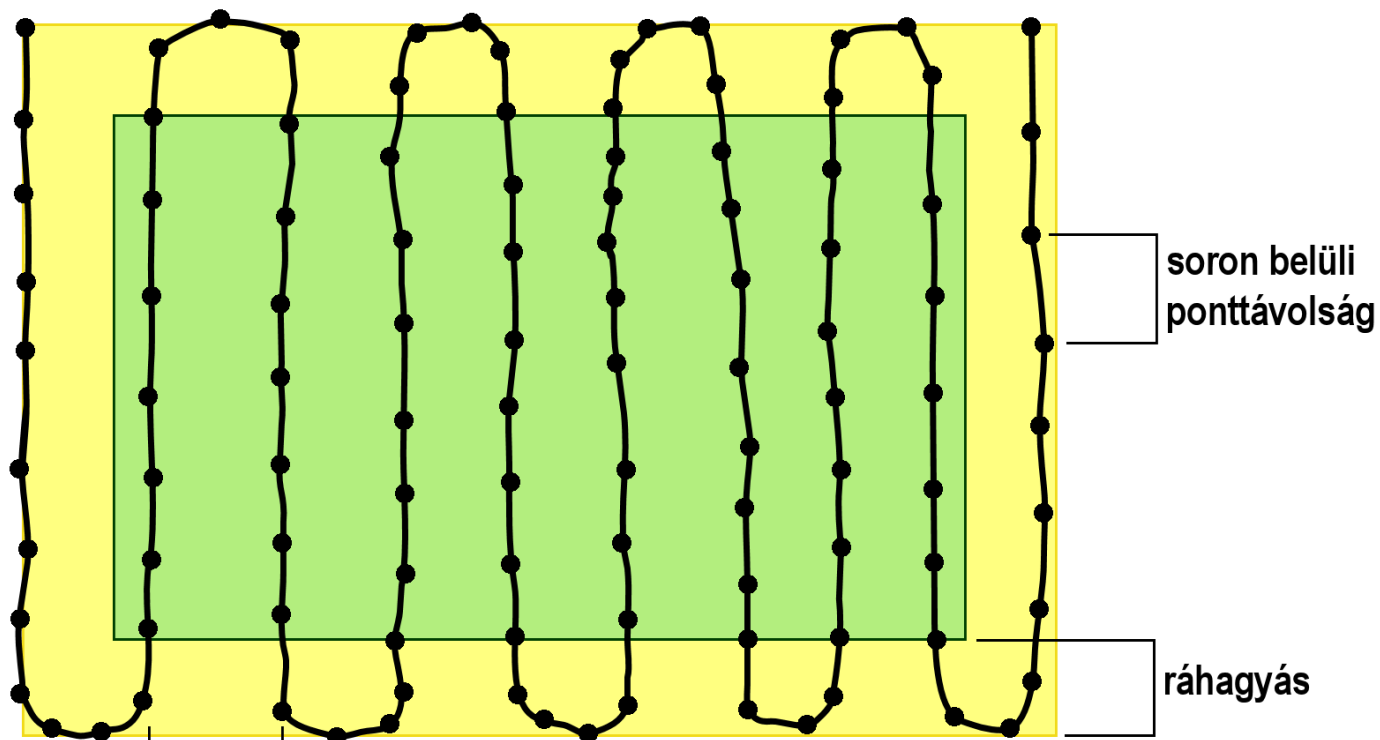
22











sorköz

soron belüli
ponttávolság

ráhagyás

 = felmérendő terület

 = ráhagyás

 = trackvonal és trackpont

0 30 m

- valamennyi mért pont
- minden pont, ami a területre, vagy egy észleléssel azon túl esik
- minden második sorban minden második pont
- minden negyedik sorban minden negyedik pont

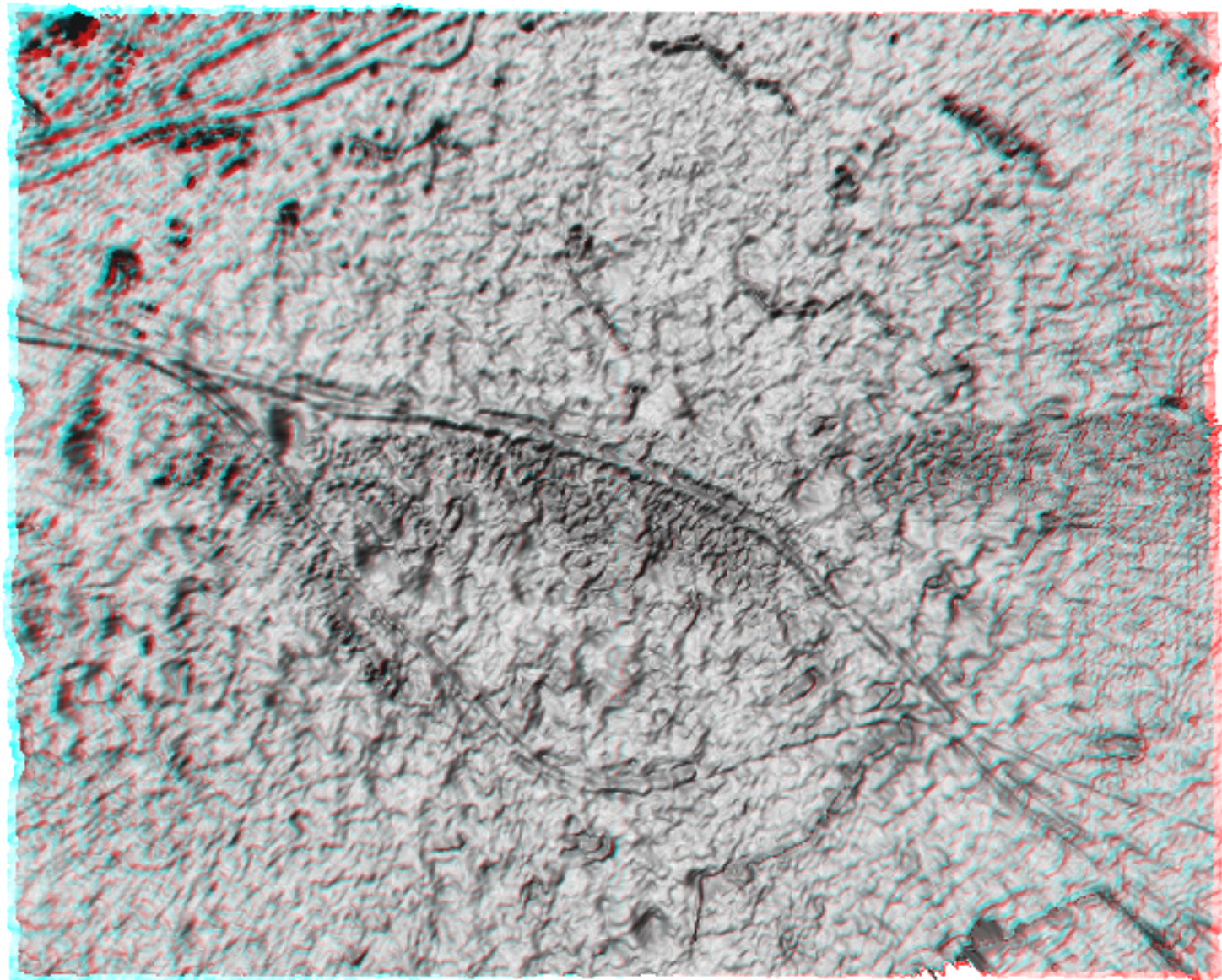


0 30 m

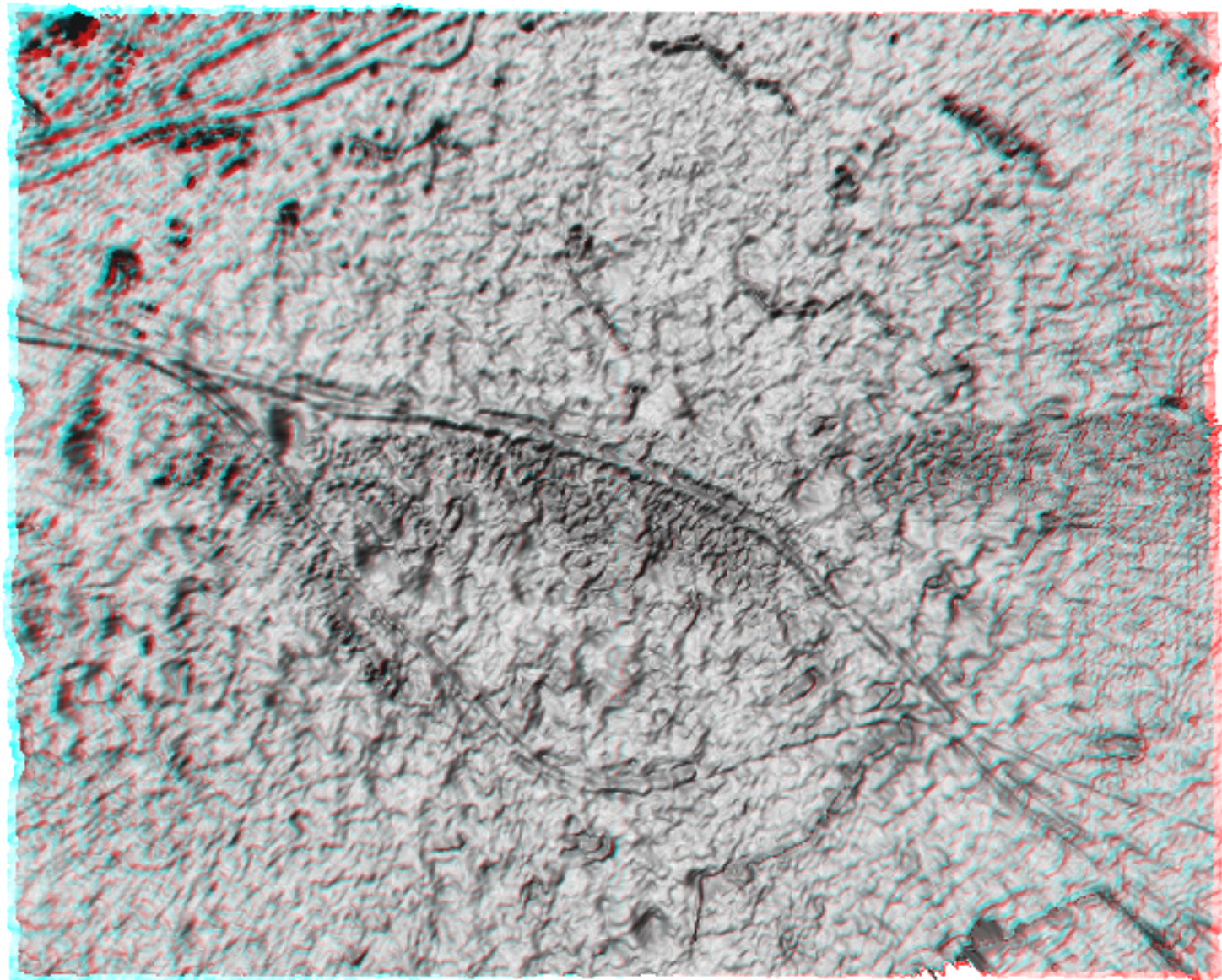
- valamennyi mért pont
- minden pont, ami a területre, vagy egy észleléssel azon túl esik
- minden második sorban minden második pont
- minden negyedik sorban minden negyedik pont

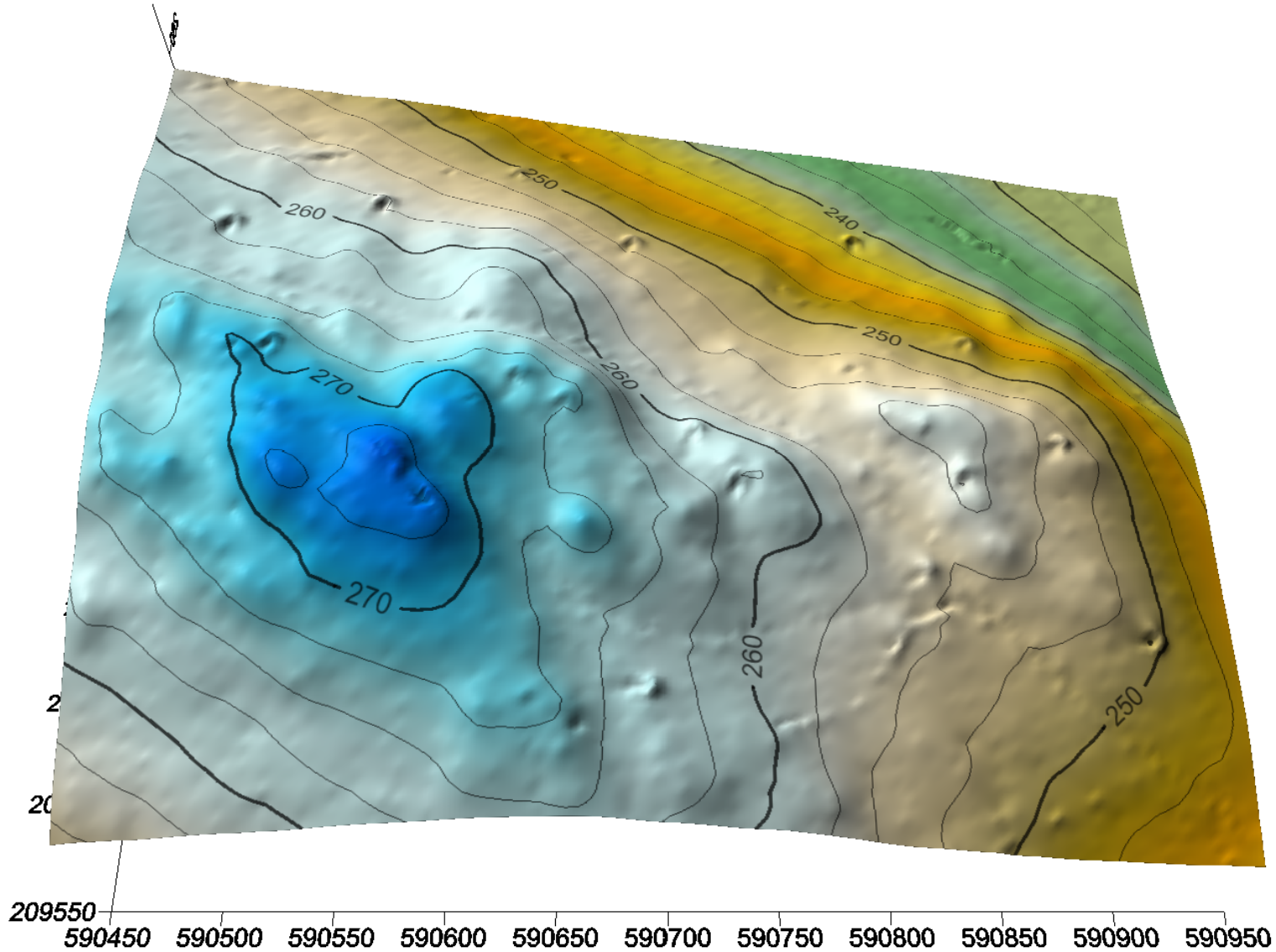


GPS 1 - LiDAR

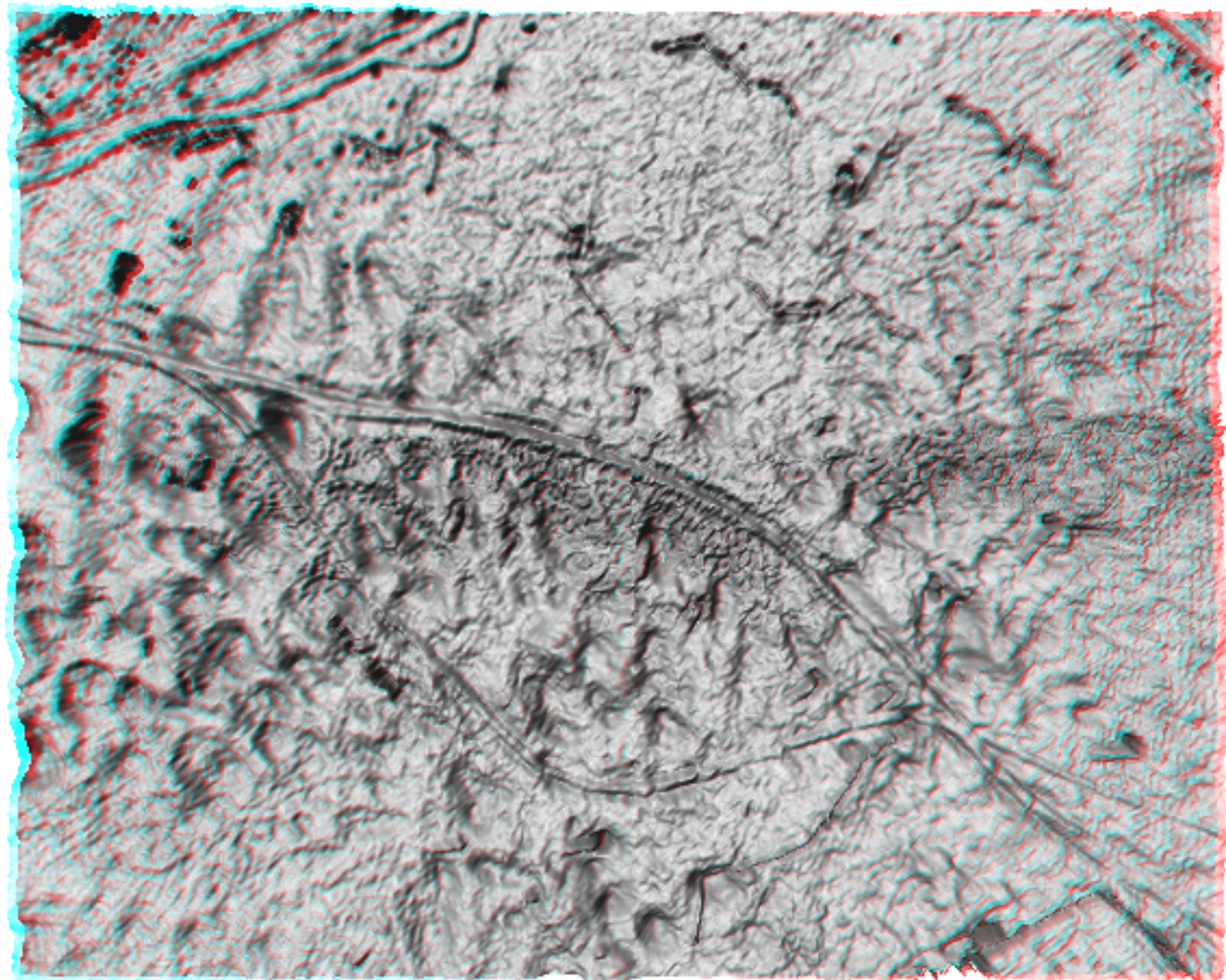


GPS 1 - LiDAR

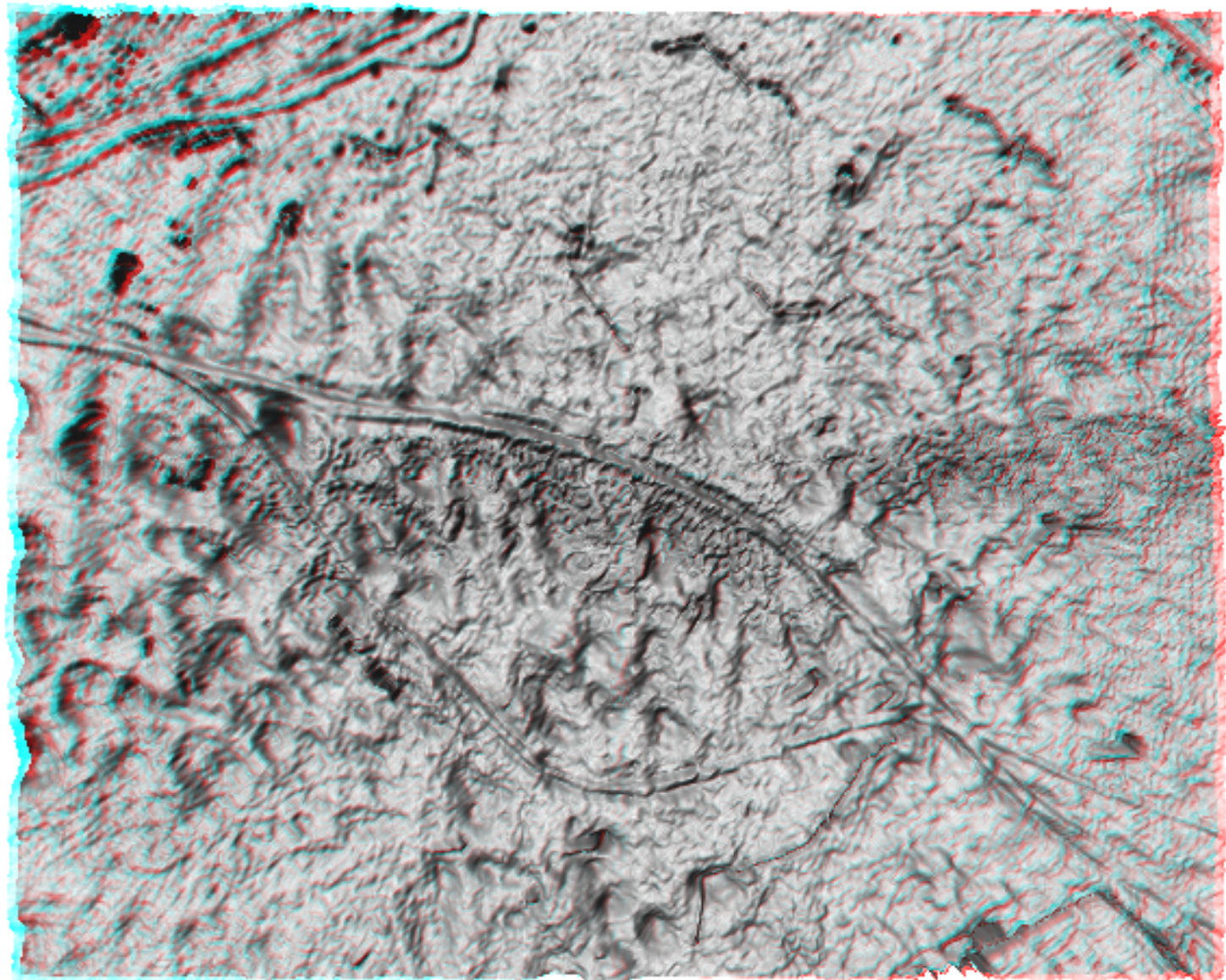


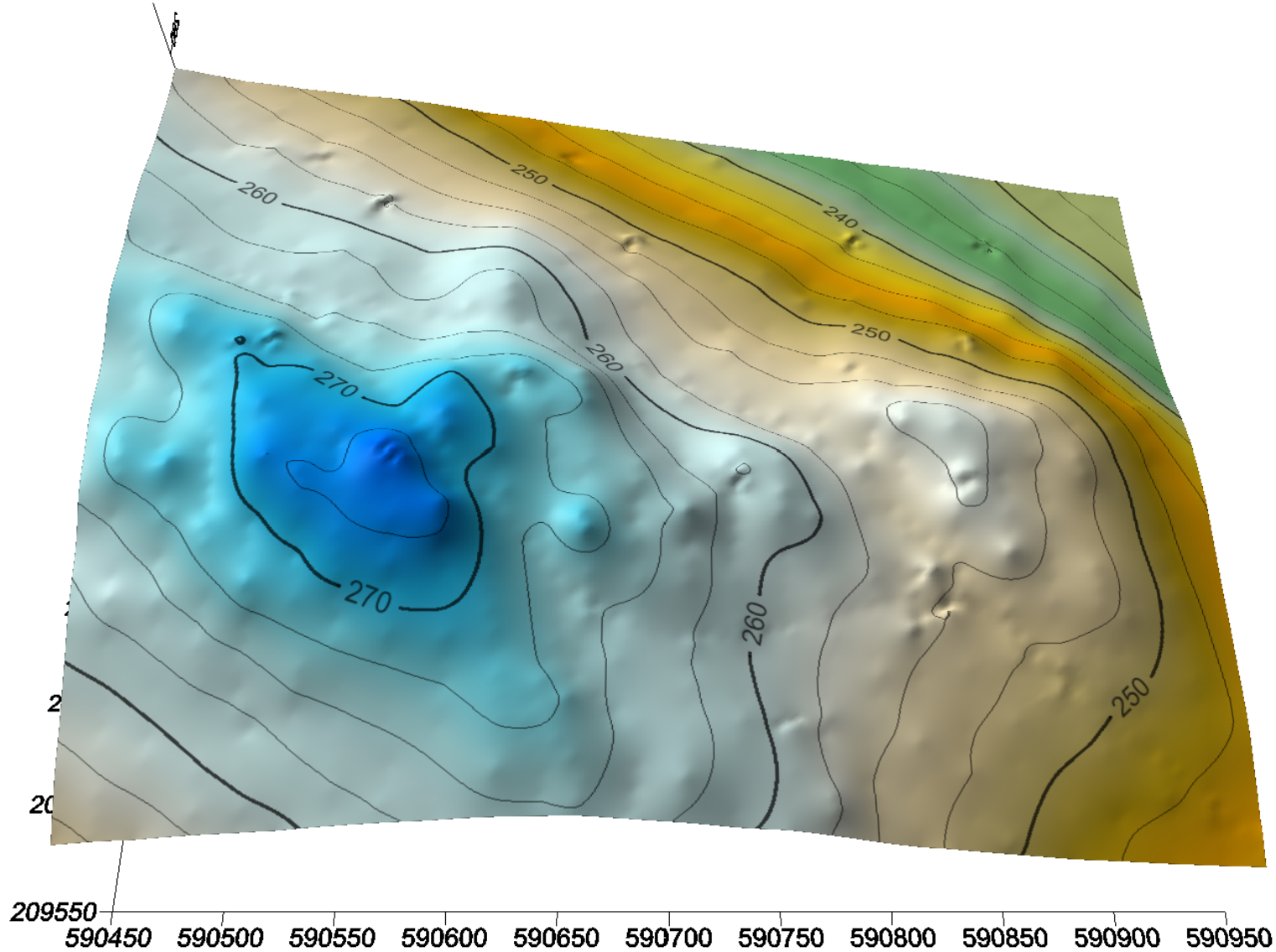


GPS 2 - LiDAR

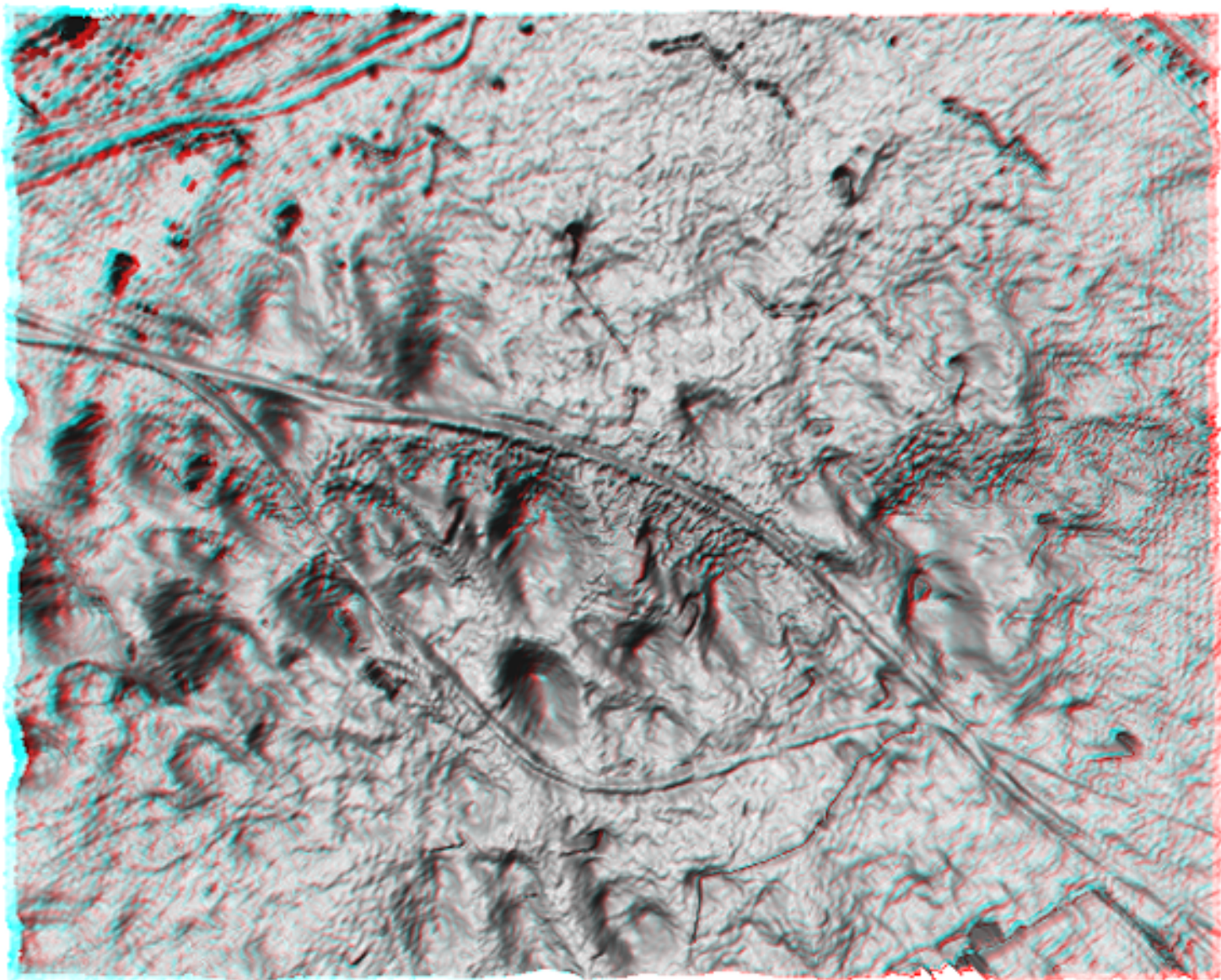


GPS 2 - LiDAR

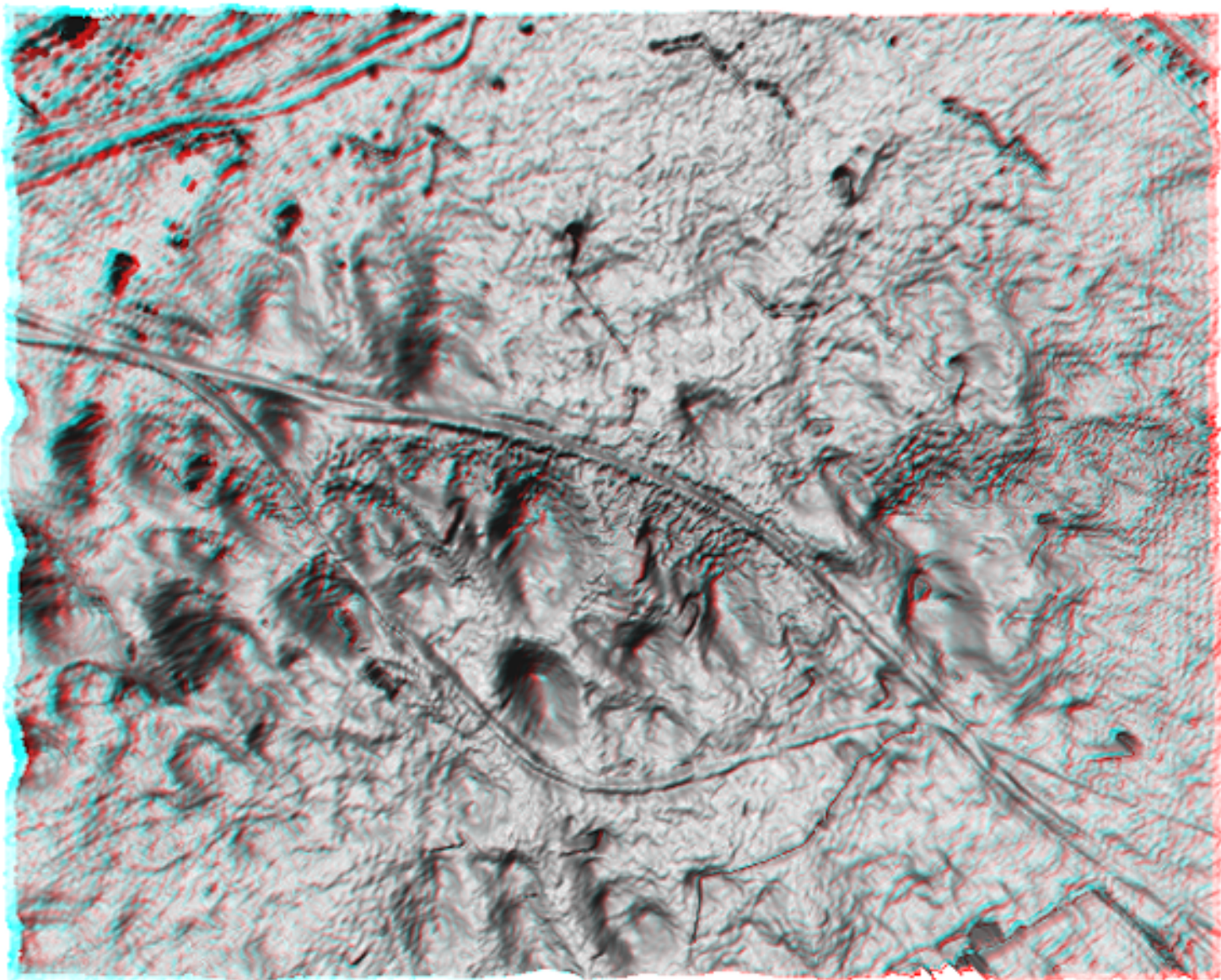


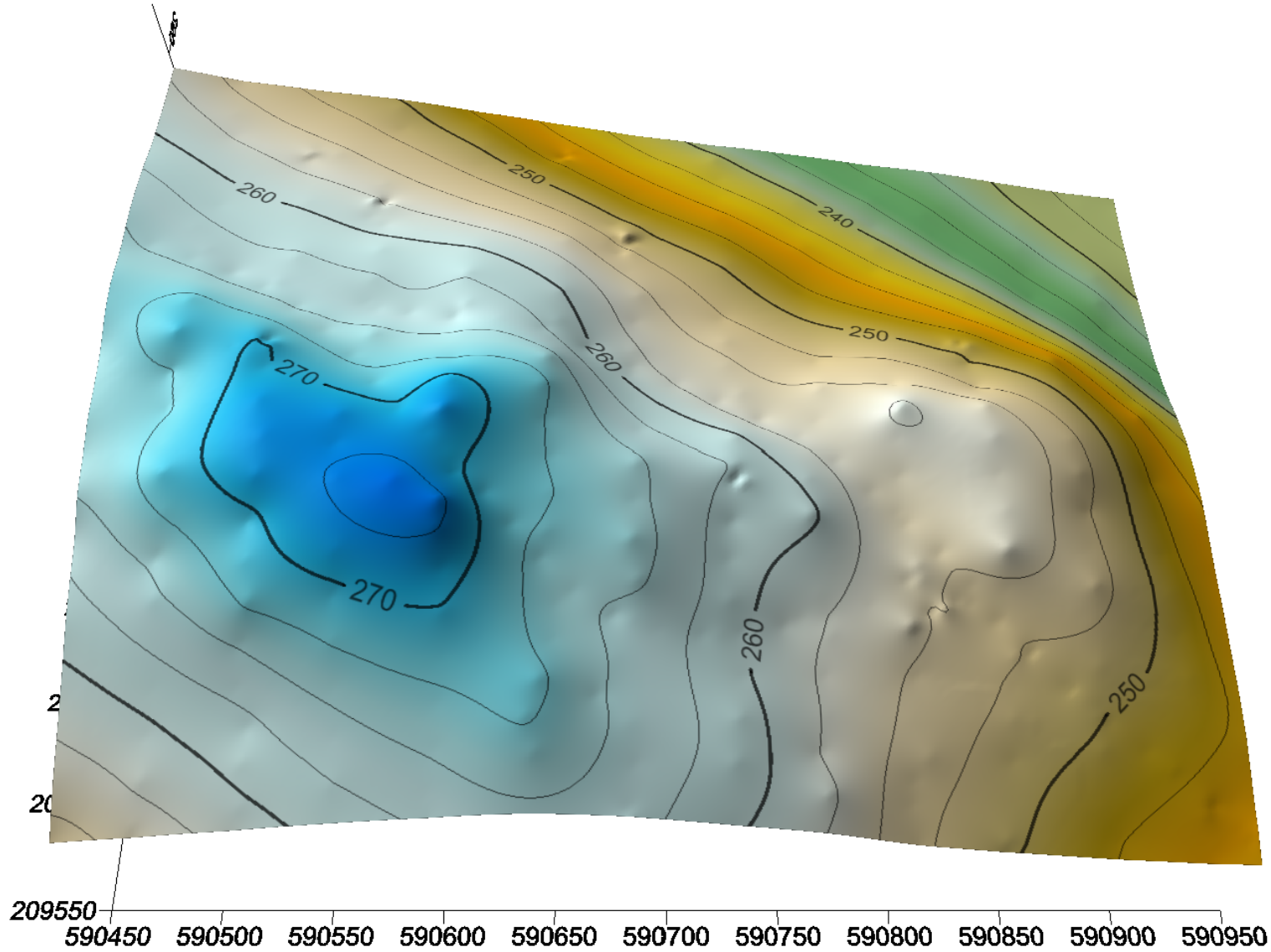


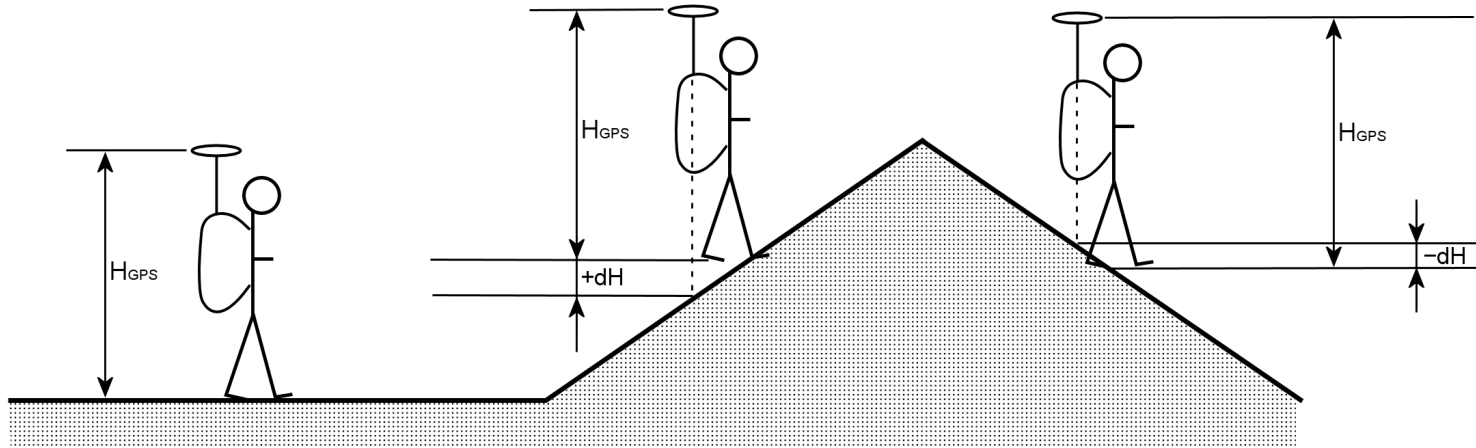
GPS 4 - LiDAR



GPS 4 - LiDAR







technológia	grid res.	observations	grid nodes	avg obs/nds	Zmin	Zmax
	rácsméret	mért pontok	rácspontok	mértp / rácsp		
A DDM-ek statisztikái						
LiDAR	1	200901	200901	1,0	225,98	274,67
LiDAR	2	200901	50451	4,0	225,98	274,61
LiDAR	5	200901	8181	24,6	225,98	274,33
LiDAR	10	200901	2091	96,1	225,98	274,26
LiDAR	20	200901	546	368,0	225,98	274,26
LiDAR	50	200901	99	2029,3	225,98	272,29
LiDAR átlag						
GPS1	1	6000	200901	0,03	225,47	274,42
GPS1	2	6000	50451	0,12	225,47	274,30
GPS1	5	6000	8181	0,73		
GPS1	10	6000	2091	2,87	225,47	273,69
GPS1	20	6000	546	11,0		
GPS1	50	6000	99	60,6		
GPS1 átlag						
GPS2	1	1500	200901	0,01		
GPS2	2	1500	50451	0,03	225,56	274,17
GPS2	5	1500	8181	0,18		
GPS2	10	1500	2091	0,72	225,57	273,87
GPS2	20	1500	546	2,7		
GPS2	50	1500	99	15,2		
GPS2 átlag						
GPS4	1	450	200901	0,00		
GPS4	2	450	50451	0,01	225,53	273,45
GPS4	5	450	8181	0,06		
GPS4	10	450	2091	0,22	225,53	273,40
GPS4	20	450	546	0,8		
GPS4	50	450	99	4,5		
GPS4 átlag						
TOPO	1	200	200901	0,001		
TOPO	2	200	50451	0,004	225,12	273,71
TOPO	5	200	8181	0,024		
TOPO	10	200	2091	0,096	225,12	273,46
TOPO	20	200	546	0,366		
TOPO	50	200	99	2,020		
TOPO átlag						
BM1	1	4600	200901	0,02		
BM1	2	4600	50451	0,09	225,32	275,02
BM1	5	4600	8181	0,56		
BM1	10	4600	2091	2,20	225,32	274,68
BM1	20	4600	546	8,4		
BM1	50	4600	99	46,5		
BM1 átlag						
SRTM	1	70	200901	0,000		
SRTM	2	70	50451	0,001	223,80	268,00
SRTM	5	70	8181	0,009		

SRTM	10	70	2091	0,033	223,80	267,98
SRTM	20	70	546	0,128		
SRTM	50	70	99	0,707		
SRTM átlag						
A LiDAR-hoz viszonyított különbségmodellek sta						
GPS1_kr-L	1		200901		-4,6986	0,3160
GPS1_kr-L	2		50451		-4,6986	0,2523
GPS1_kr-L	5		8181		-4,3412	0,1970
GPS1_kr-L	10		2091		-2,4541	0,1970
GPS1_kr-L	20		546		-1,8608	0,0937
GPS1_kr-L	50		99		-1,8608	-0,1168
GPS1_nn-L	2		50451		-4,7866	0,2385
GPS1_nn-L	10		2091		-2,4409	0,1785
GPS1_tli-L	2		50451		-4,8195	0,2161
GPS1_tli-L	10		2091		-2,4003	0,1959
GPS1-L átlag						
GPS2_kr-L	1		200901		-4,6868	0,3777
GPS2_kr-L	2		50451		-4,6868	0,3638
GPS2_kr-L	5		8181		-4,2919	0,2545
GPS2_kr-L	10		2091		-2,3833	0,1331
GPS2_kr-L	20		546		-1,8608	0,0939
GPS2_kr-L	50		99		-1,8056	-0,0333
GPS2-L átlag						
GPS4_kr-L	1		200901		-4,6892	1,2286
GPS4_kr-L	2		50451		-4,6892	1,2093
GPS4_kr-L	5		8181		-4,2922	1,1997
GPS4_kr-L	10		2091		-2,7541	1,1997
GPS4_kr-L	20		546		-2,7059	1,1219
GPS4_kr-L	50		99		-1,6455	0,8988
GPS4-L átlag						
TOPO_kr-L	1		200901		-4,6794	2,2056
TOPO_kr-L	2		50451		-4,6794	2,1806
TOPO_kr-L	5		8181		-4,2667	1,9859
TOPO_kr-L	10		2091		-3,5467	1,9321
TOPO_kr-L	20		546		-3,0190	1,8971
TOPO_kr-L	50		99		-1,8027	1,9321
TOPO_nn-L	2		50451		-4,6658	2,1460
TOPO_nn-L	10		2091		-3,6152	1,6032
TOPO_tli-L	2		50451		-4,6941	2,2578
TOPO_tli-L	10		2091		-3,8478	1,8021
TOPO-L átlag						
BM1_kr-L	1		200901		-4,3047	2,4396
BM1_kr-L	2		50451		-4,3047	2,3700
BM1_kr-L	5		8181		-3,8829	2,1525
BM1_kr-L	10		2091		-1,7902	2,1525
BM1_kr-L	20		546		-1,4468	2,1525
BM1_kr-L	50		99		-1,5464	1,1938
BM1_nn-L	2		50451		-4,3074	2,1873
BM1_nn-L	10		2091		-1,6386	2,1833
BM1_tli-L	2		50451		-4,5500	2,3439
BM1_tli-L	10		2091		-1,6600	2,2991

BM1-L átlag						
BM2_kr-L	2		50451		-5,7175	4,9177
BM2_kr-L	10		2091		-5,0357	2,6068
BM2-L átlag						
SRTM_kr-L	1		200901		-7,4822	0,7686
SRTM_kr-L	2		50451		-7,4822	0,7515
SRTM_kr-L	5		8181		-7,3548	0,7523
SRTM_kr-L	10		2091		-7,2799	0,1994
SRTM_kr-L	20		546		-7,0370	0,0984
SRTM_kr-L	50		99		-6,6703	-0,0028
SRTM-L átlag						
Interpoláció-típusok krigeléshez viszonyított különbség						
GPS1_nn - GPS1_kr	2		50451		-0,5676	0,4043
GPS1_nn - GPS1_kr	10		2091		-0,2284	0,1451
GPS1_tli - GPS1_kr	2		50451		-0,5551	0,4339
GPS1_tli - GPS1_kr	10		2091		-0,3178	0,3237
TOPO_nn - TOPO_kr	2		50451		-1,1777	0,6138
TOPO_nn - TOPO_kr	10		2091		-1,1527	0,5113
TOPO_tli - TOPO_kr	2		50451		-1,7665	1,4567
TOPO_tli - TOPO_kr	10		2091		-1,7296	1,4447
BM1_nn - BM1_kr	2		50451		-0,4370	0,4851
BM1_nn - BM1_kr	10		2091		-0,4370	0,3466
BM1_tli - BM1_kr	2		50451		-1,1052	0,7454
BM1_tli - BM1_kr	10		2091		-0,7222	0,5896

SZÁMOLO	5	8200	8181	1,002
---------	---	------	------	-------

GRID INFO							
Range	Mean	Median	10%TrimMean	RMS	Variance	Std Dev	IQR
Zmax - Zmin				négyzetes közép	szórás^2	szórás	interquartile range
48,69	255,93	256,86	256,37	256,14	108,2	10,40	15,02
48,63	255,91	256,84	256,35	256,12	108,6	10,42	15,04
48,35	255,83	256,80	256,27	256,04	109,4	10,46	15,13
48,28	255,70	256,74	256,13	255,91	111,1	10,54	15,20
48,28	255,44	256,58	255,86	255,66	114,1	10,68	15,36
46,31	254,68	256,23	254,91	254,92	122,1	11,05	15,94
	255,9	256,8	256,3				15,1
48,95	255,46	256,41	255,90	255,67	108,6	10,42	14,97
48,83	255,44	256,40	255,87	255,65	109,0	10,44	15,00
48,22	255,23	256,30	255,66	255,44	111,3	10,55	15,22
	255,4	256,4	255,8				15,0
48,61	255,44	256,40	255,88	255,65	108,6	10,42	14,90
48,30	255,23	256,34	255,66	255,44	110,9	10,53	15,05
	255,4	256,4	255,8				15,0
47,92	255,39	256,39	255,83	255,60	108,0	10,39	14,78
47,87	255,19	256,27	255,62	255,40	110,3	10,50	14,94
	255,3	256,3	255,8				14,8
48,59	255,43	256,53	255,90	255,65	109,6	10,47	15,16
48,34	255,22	256,45	255,70	255,45	112,1	10,59	15,35
	255,3	256,5	255,8				15,2
49,70	255,87	257,02	256,34	256,09	105,9	10,29	14,54
49,36	255,67	256,98	256,13	255,88	108,6	10,42	14,76
	255,8	257,0	256,2				14,6
44,20	252,81	253,85	253,23	253,01	99,6	9,98	15,80

44,18	252,60	253,71	253,02	252,80	101,8	10,09	15,95
	252,7	253,8	253,1				15,8
5,0146	-0,4696	-0,4722	-0,4666	0,4935	0,0230	0,1517	0,1891
4,9509	-0,4697	-0,4725	-0,4667	0,4936	0,0230	0,1517	0,1894
4,5382	-0,4698	-0,4712	-0,4663	0,4958	0,0251	0,1583	0,1898
2,6511	-0,4696	-0,4725	-0,4674	0,4917	0,0212	0,1457	0,1878
1,9545	-0,4712	-0,4744	-0,4678	0,4952	0,0233	0,1525	0,1838
1,7440	-0,4847	-0,4790	-0,4768	0,5208	0,0367	0,1916	0,1771
5,0251	-0,4709	-0,4723	-0,4673	0,4957	0,0240	0,1550	0,1886
2,6194	-0,4698	-0,4719	-0,4669	0,4932	0,0225	0,1500	0,1873
5,0356	-0,4700	-0,4722	-0,4670	0,4959	0,0249	0,1579	0,1912
2,5962	-0,4704	-0,4721	-0,4679	0,4945	0,0232	0,1524	0,1864
	-0,47	-0,47	-0,47		0,023	0,15	0,19
5,0645	-0,4696	-0,4673	-0,4635	0,5075	0,0370	0,1923	0,2160
5,0506	-0,4697	-0,4678	-0,4635	0,5075	0,0369	0,1922	0,2156
4,5464	-0,4695	-0,4670	-0,4632	0,5092	0,0388	0,1974	0,2175
2,5164	-0,4691	-0,4665	-0,4634	0,5045	0,0344	0,1856	0,2132
1,9547	-0,4712	-0,4744	-0,4678	0,4952	0,0233	0,1525	0,1839
1,7723	-0,4628	-0,4466	-0,4545	0,5090	0,0454	0,2130	0,2347
	-0,47	-0,47	-0,46		0,037	0,19	0,22
5,9178	-0,5124	-0,4881	-0,4979	0,6249	0,1279	0,3576	0,3193
5,8985	-0,5123	-0,4884	-0,4977	0,6245	0,1275	0,3571	0,3188
5,4919	-0,5114	-0,4854	-0,4966	0,6245	0,1284	0,3584	0,3188
3,9538	-0,5093	-0,4870	-0,4947	0,6181	0,1227	0,3503	0,3128
3,8278	-0,5036	-0,4872	-0,4875	0,6111	0,1201	0,3465	0,2788
2,5443	-0,4758	-0,4642	-0,4742	0,5693	0,0988	0,3143	0,3222
	-0,51	-0,49	-0,50		0,13	0,35	0,32
6,8850	-0,4741	-0,5379	-0,4876	0,8067	0,4259	0,6526	0,7319
6,8600	-0,4735	-0,5377	-0,4871	0,8062	0,4257	0,6524	0,7315
6,2526	-0,4714	-0,5343	-0,4851	0,8059	0,4273	0,6537	0,7333
5,4788	-0,4676	-0,5280	-0,4826	0,7986	0,4192	0,6475	0,7255
4,9161	-0,4618	-0,5422	-0,4819	0,8009	0,4289	0,6549	0,7199
3,7348	-0,4288	-0,5177	-0,4664	0,7790	0,4274	0,6537	0,7561
6,8118	-0,5509	-0,5648	-0,5496	0,8418	0,4052	0,6366	0,6767
5,2184	-0,5435	-0,5552	-0,5444	0,8341	0,4005	0,6328	0,6726
6,9519	-0,5455	-0,5687	-0,5466	0,8640	0,4489	0,6700	0,6977
5,6499	-0,5396	-0,5556	-0,5417	0,8568	0,4431	0,6657	0,6873
	-0,47	-0,53	-0,49		0,43	0,65	0,71
6,7443	-0,0170	-0,0577	-0,0213	0,5654	0,3194	0,5651	0,7536
6,6747	-0,0183	-0,0590	-0,0227	0,5654	0,3193	0,5651	0,7539
6,0354	-0,0221	-0,0621	-0,0264	0,5670	0,3210	0,5666	0,7578
3,9427	-0,0239	-0,0730	-0,0311	0,5633	0,3168	0,5629	0,7444
3,5993	-0,0305	-0,0945	-0,0418	0,5660	0,3200	0,5657	0,7364
2,7402	-0,0672	-0,0699	-0,0723	0,5646	0,3175	0,5635	0,8255
6,4947	-0,0235	-0,0605	-0,0261	0,5450	0,2965	0,5445	0,7255
3,8219	-0,0265	-0,0745	-0,0318	0,5413	0,2924	0,5408	0,7116
6,8939	-0,0231	-0,0560	-0,0260	0,5585	0,3114	0,5580	0,7479
3,9591	-0,0265	-0,0762	-0,0332	0,5543	0,3067	0,5538	0,7529

	-0,02	-0,06	-0,03		0,31	0,56	0,74
10,6352	-1,0451	-0,9411	-1,0187	1,4925	1,1355	1,0656	1,4864
7,6425	-1,0472	-0,9599	-1,0151	1,5347	1,2593	1,1222	1,5725
	-1,05	-0,95	-1,02		1,20	1,09	1,53
8,2508	-3,0959	-3,0504	-3,0805	3,4101	2,0446	1,4299	1,8988
8,2337	-3,0963	-3,0517	-3,0811	3,4101	2,0413	1,4287	1,8994
8,1071	-3,0972	-3,0512	-3,0817	3,4097	2,0337	1,4261	1,8950
7,4793	-3,0983	-3,0584	-3,0844	3,4085	2,0192	1,4210	1,8872
7,1354	-3,1016	-3,0433	-3,0928	3,4085	2,0014	1,4147	1,8141
6,6675	-3,1018	-3,1547	-3,1148	3,4001	1,9588	1,3996	1,8829
	-3,10	-3,05	-3,08		2,03	1,42	1,89
0,9719	-0,0016	0,0005	-0,0001	0,0358	0,0013	0,0358	0,0239
0,3735	-0,0011	0,0003	0,0001	0,0348	0,0012	0,0348	0,0238
0,9890	-0,0003	0,0003	0,0004	0,0440	0,0019	0,0440	0,0334
0,6415	-0,0008	0,0001	0,0001	0,0441	0,0019	0,0441	0,0350
1,7915	-0,0773	-0,0308	-0,0665	0,1946	0,0319	0,1786	0,2007
1,6640	-0,0759	-0,0282	-0,0650	0,1967	0,0329	0,1815	0,2024
3,2232	-0,0719	-0,0237	-0,0575	0,2655	0,0653	0,2556	0,2415
3,1743	-0,0720	-0,0234	-0,0562	0,2708	0,0682	0,2612	0,2465
0,9221	-0,0051	-0,0016	-0,0040	0,0825	0,0068	0,0824	0,0814
0,7836	-0,0027	-0,0005	-0,0013	0,0823	0,0068	0,0823	0,0829
1,8506	-0,0048	-0,0010	-0,0036	0,1237	0,0153	0,1236	0,1225
1,3118	-0,0027	0,0001	-0,0012	0,1272	0,0162	0,1272	0,1237

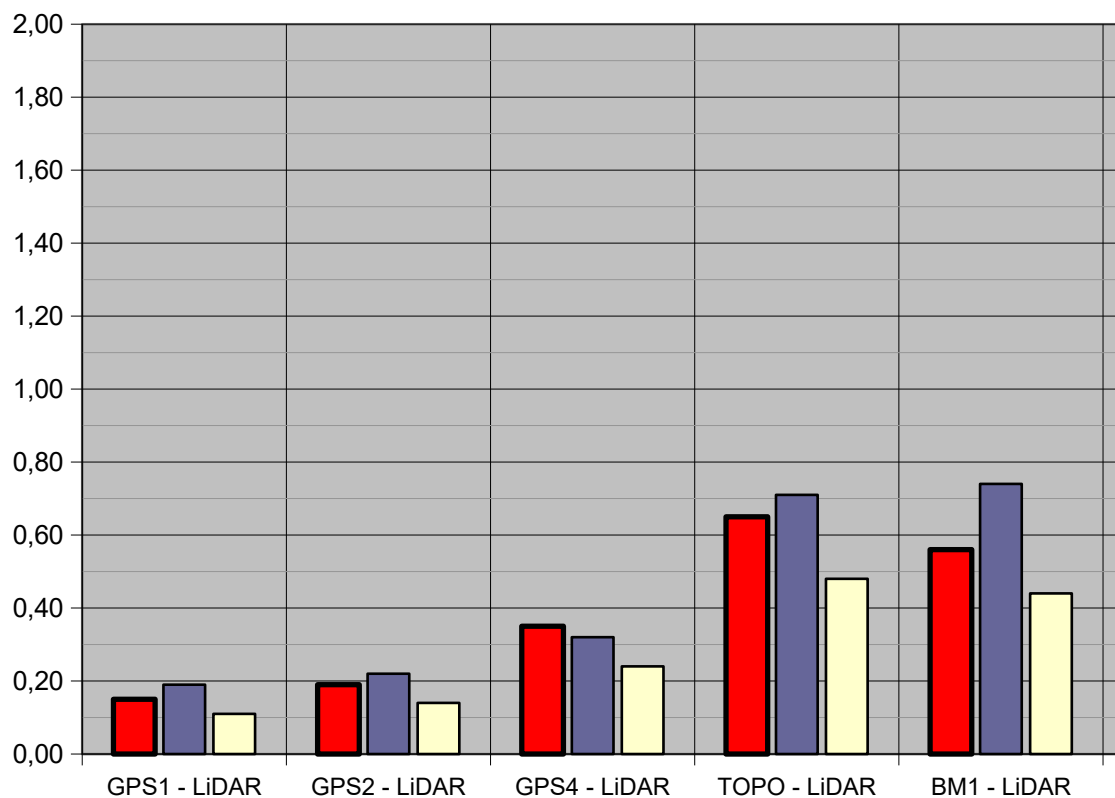
0,1093	0,000339	-4,09	80,29	0,2436
0,1094	0,000675	-4,01	78,36	0,2436
0,1104	0,001751	-5,26	107,83	0,2457
0,1085	0,003187	-1,90	25,60	0,2418
0,1078	0,006525	-2,27	22,95	0,2452
0,1188	0,019254	-3,60	27,50	0,2712
0,1111	0,000690	-3,79	71,88	0,2458
0,1106	0,003301	-1,89	23,76	0,2432
0,1129	0,000703	-3,74	71,69	0,2459
0,1119	0,003332	-1,77	22,34	0,2445
0,11			75	
0,1373	0,000429	-2,25	31,99	0,2575
0,1373	0,000856	-2,21	31,44	0,2575
0,1384	0,002178	-2,90	45,47	0,2593
0,1353	0,004058	-1,23	11,76	0,2545
0,1078	0,006525	-2,27	22,95	0,2452
0,1438	0,021409	-2,48	17,02	0,2590
0,14			30	
0,2385	0,000798	-1,12	9,92	0,3905
0,2382	0,001590	-1,12	9,90	0,3900
0,2380	0,003962	-1,22	11,02	0,3900
0,2337	0,007661	-1,05	8,97	0,3820
0,2218	0,014830	-1,33	11,26	0,3735
0,2161	0,031591	-0,05	7,64	0,3242
0,24			10	
0,4846	0,001456	0,31	4,56	0,6507
0,4845	0,002905	0,31	4,56	0,6499
0,4853	0,007227	0,30	4,59	0,6495
0,4806	0,014156	0,34	4,50	0,6377
0,4821	0,028028	0,42	4,59	0,6414
0,4794	0,065702	0,72	4,16	0,6069
0,4662	0,002834	-0,09	4,75	0,7087
0,4623	0,013839	-0,07	4,77	0,6957
0,4860	0,002983	-0,04	5,00	0,7464
0,4823	0,014557	-0,05	5,07	0,7340
0,48			4,5	
0,4487	0,001261	0,14	3,13	0,3197
0,4488	0,002516	0,14	3,13	0,3196
0,4497	0,006264	0,12	3,27	0,3215
0,4474	0,012310	0,25	3,03	0,3172
0,4457	0,024211	0,39	3,10	0,3204
0,4506	0,056631	0,00	2,91	0,3188
0,4328	0,002424	0,10	3,17	0,2970
0,4301	0,011826	0,22	3,02	0,2930
0,4442	0,002484	0,10	3,19	0,3119
0,4412	0,012110	0,25	3,04	0,3072

0,44			3,2	
0,8526	0,004744	-0,37	3,14	2,2276
0,8947	0,024541	-0,43	3,24	2,3554
0,87			3,2	
1,1322	0,003190	-0,12	2,65	11,6292
1,1313	0,006361	-0,12	2,65	11,6287
1,1291	0,015767	-0,12	2,65	11,6262
1,1247	0,031075	-0,13	2,65	11,6177
1,1192	0,060544	-0,11	2,63	11,6176
1,1002	0,140662	-0,10	2,59	11,5604
1,13			2,6	
0,0219	0,000159	-1,26	17,16	0,0013
0,0218	0,000767	-0,95	8,75	0,0012
0,0279	0,000196	-0,76	12,78	0,0019
0,0281	0,000965	-0,52	10,70	0,0019
0,1324	0,000795	-1,04	4,27	0,0379
0,1335	0,003969	-1,14	5,00	0,0386
0,1745	0,001138	-1,20	7,68	0,0705
0,1760	0,005712	-1,35	8,64	0,0733
0,0582	0,000367	-0,30	5,61	0,0068
0,0581	0,001799	-0,41	5,56	0,0068
0,0872	0,000550	-0,26	6,27	0,0153
0,0893	0,002781	-0,33	5,82	0,0162

Kiértékelés

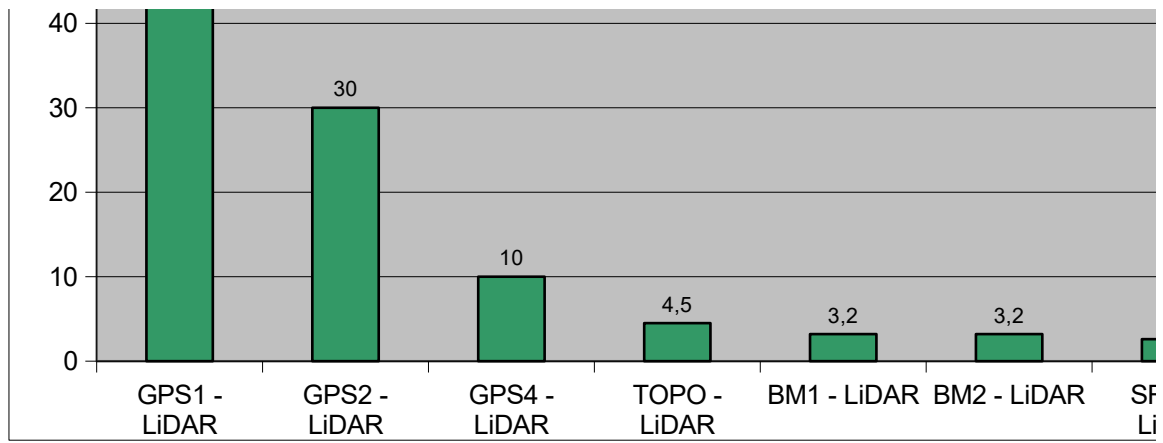
technológiák	Pontok száma	Átlag	Medián	10% csonk. átlag	Variancia	Szórás
LiDAR	200000	---	---	---	0,010	0,10
GPS1 - LiDAR	6000	-0,47	-0,47	-0,47	0,023	0,15
GPS2 - LiDAR	1500	-0,47	-0,47	-0,46	0,037	0,19
GPS4 - LiDAR	450	-0,51	-0,49	-0,50	0,13	0,35
TOPO - LiDAR	200	-0,47	-0,53	-0,49	0,43	0,65
BM1 - LiDAR	4600	-0,02	-0,06	-0,03	0,31	0,56
BM2 - LiDAR	6000	-1,05	-0,95	-1,02	1,20	1,09
SRTM - LiDAR	70	-3,10	-3,05	-3,08	2,03	1,42

Pontosságvizsgálat



Kurtózis



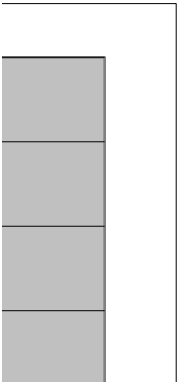
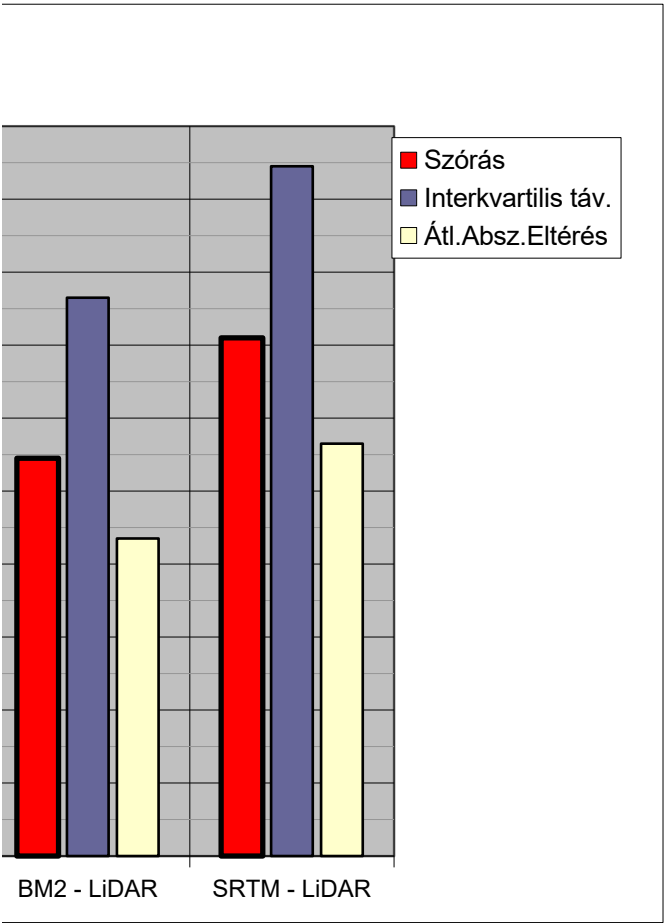


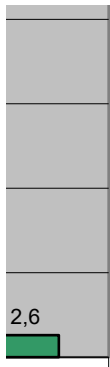


Interkvartilis táv.	Átl.Absz.Eltérés	kurtózis	100/kurt.
---	0,08	---	---
0,19	0,11	75	1,3
0,22	0,14	30	3,3
0,32	0,24	10	10,0
0,71	0,48	4,5	22,2
0,74	0,44	3,2	31,3
1,53	0,87	3,2	31,3
1,89	1,13	2,6	38,5

"Pont- hasznosság"
0,1
1,1
3,5
6,3
7,7
0,4
0,2
10,1

Pontosság	%
	150
24	100
18	75
9	37
5	20
4,5	15
2,8	10
2,2	10





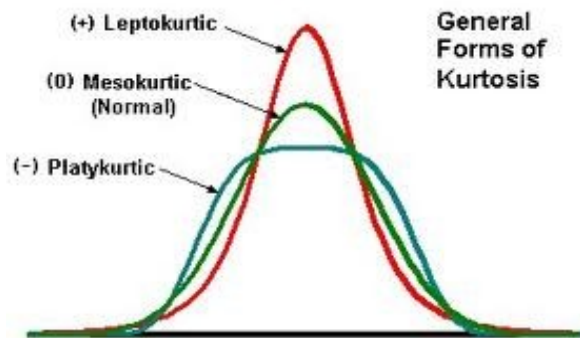
RTM -
DAR

P O N T O Z Á S				
Időigény_M	Időigény_F	%	Felszerelés ára	%
1000	0	10000	X	100
9	2	70	4000	100
5		50		
3		30		
8	3	70	1500	40
10	5	100	200	5
0	3	20	100	2

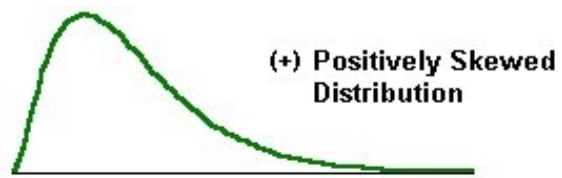
Forrás:

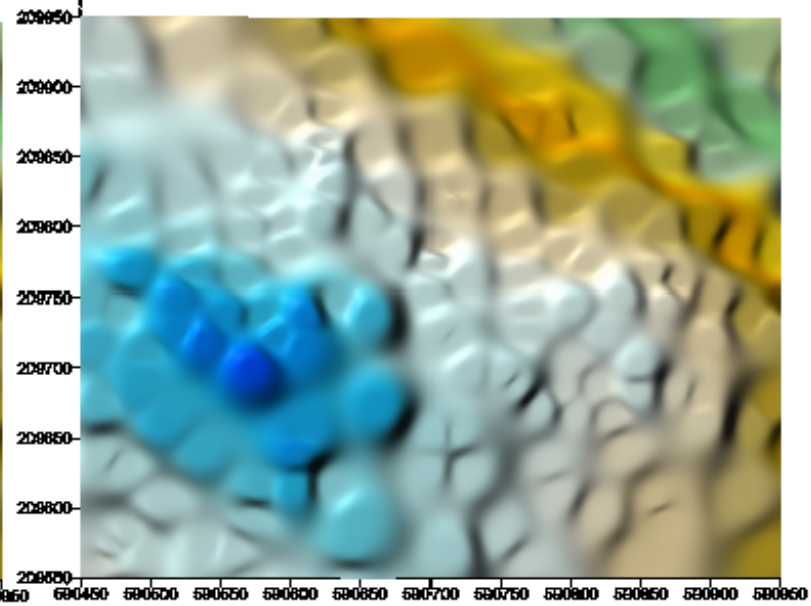
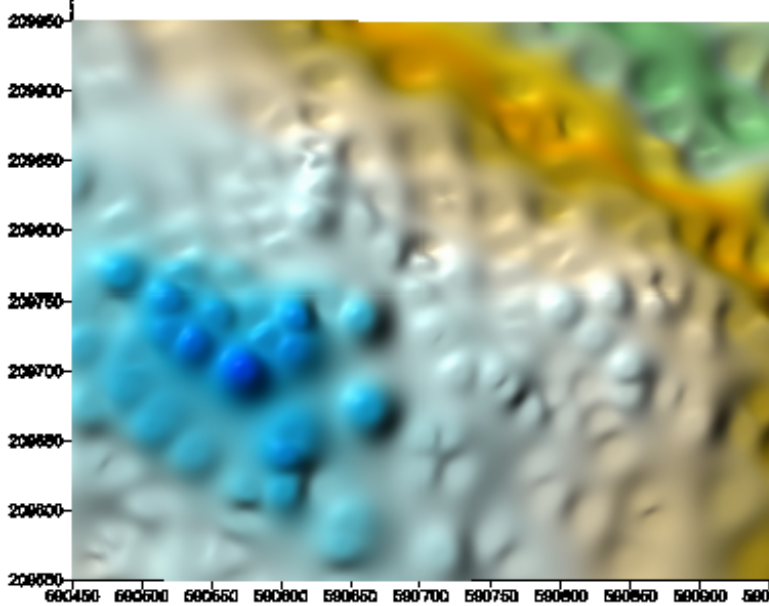
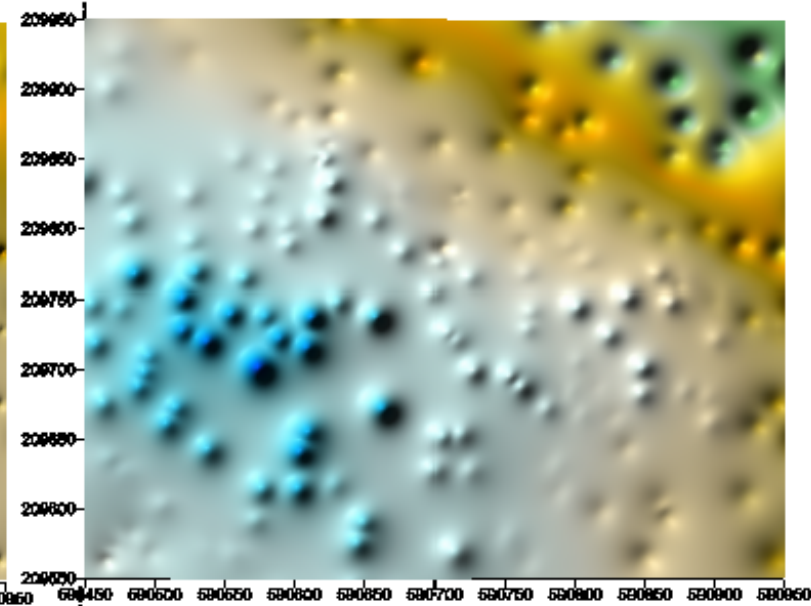
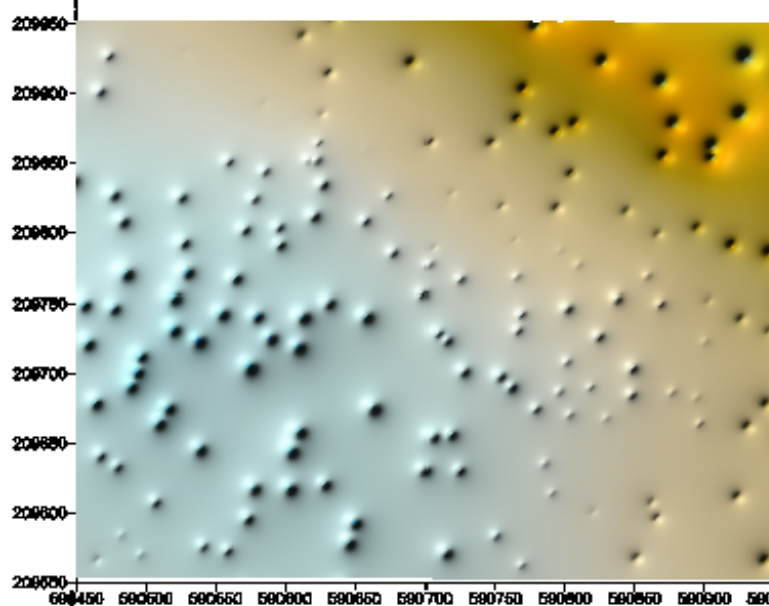
<http://mvpprograms.com/help/mvpstats/distributions/SkewnessKurtosis>

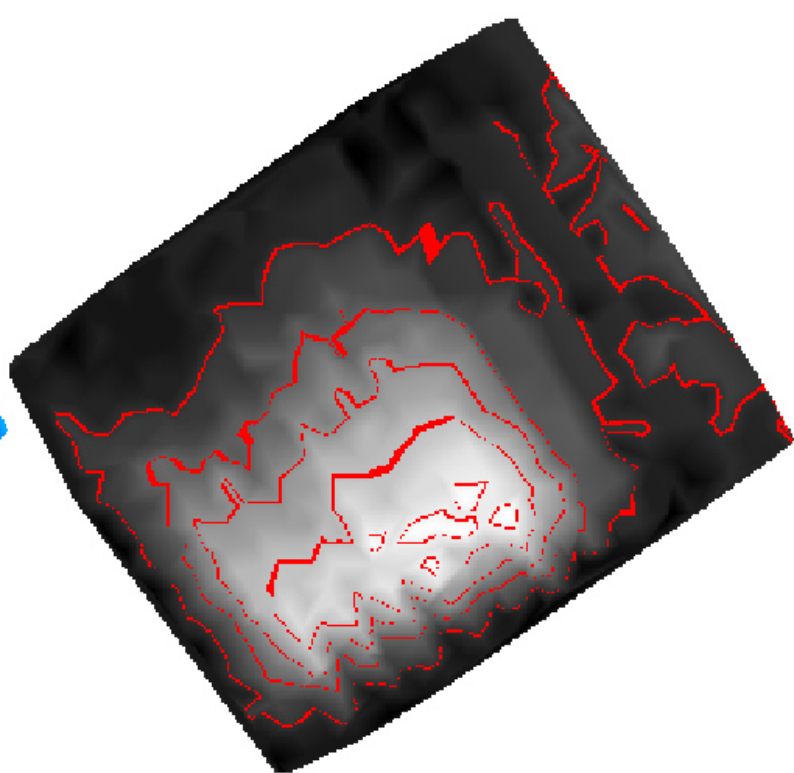
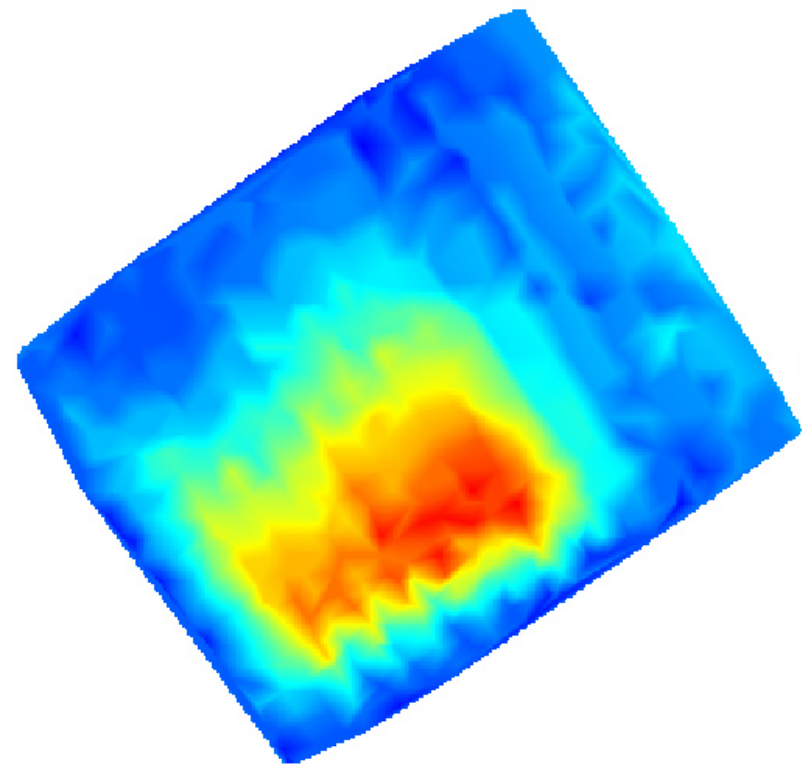
Kurtózis (kurtosis)



Ferdeség (skewness)









TLI 2

Nat.Nb. 2

Krig 2

Krig 10

GPS 1

avg = -0.5

GPS 2

avg = -0.5

GPS 4

avg = -0.5

TOPO

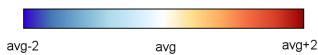
avg = -0.5

BM1

avg = 0.0

SRTM

avg = -3.0



TLI 2

Nat.Nb. 2

Krig 2

Krig 10

GPS 1

avg = -0.5

GPS 2

avg = -0.5

GPS 4

avg = -0.5

TOPO

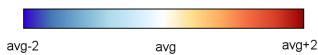
avg = -0.5

BM1

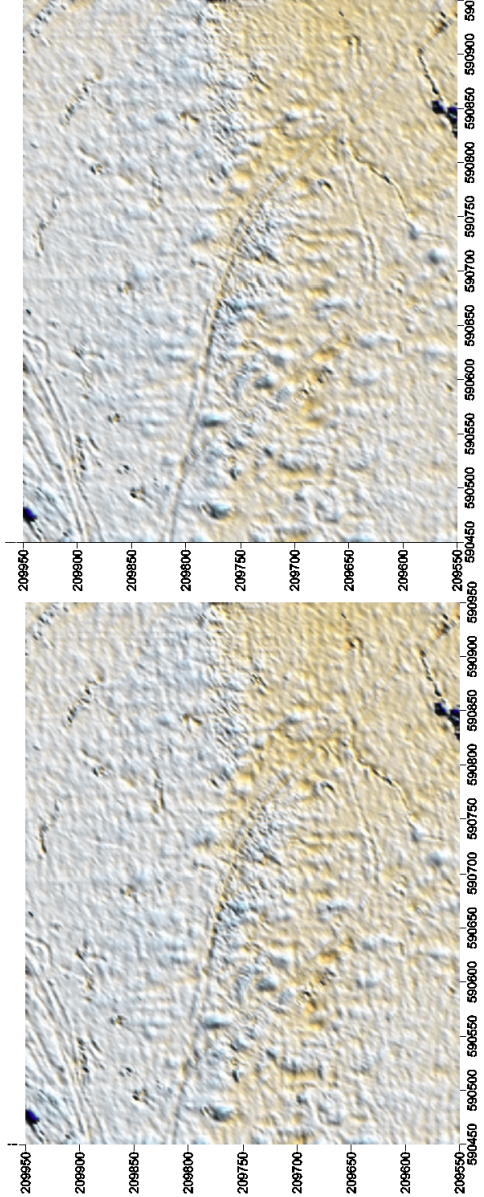
avg = 0.0

SRTM

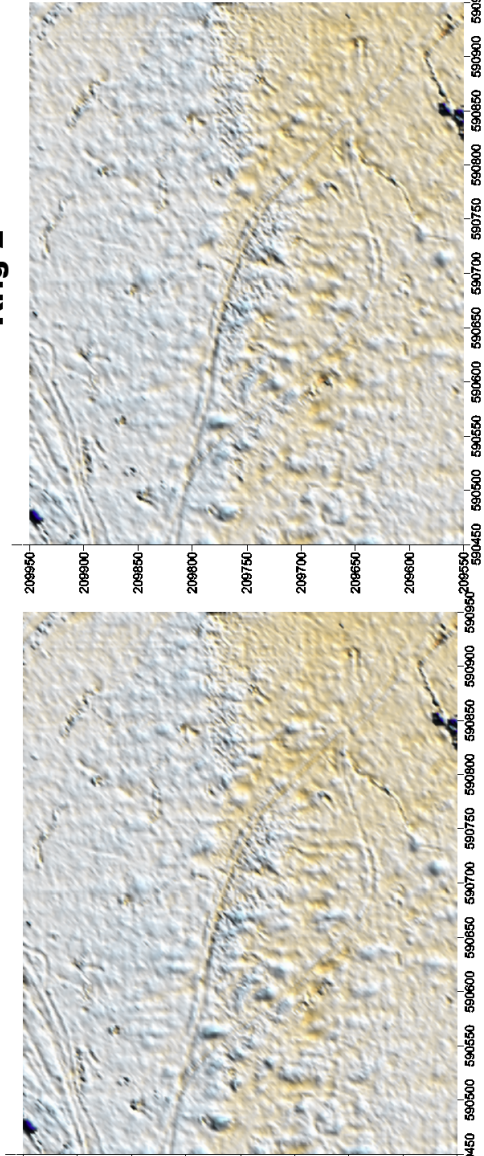
avg = -3.0



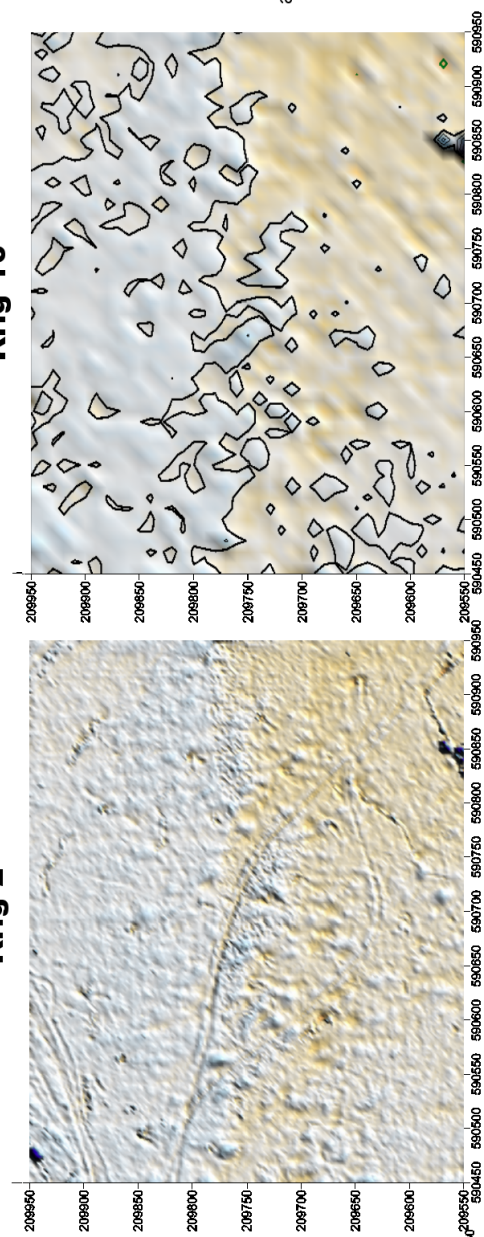
TLI 2



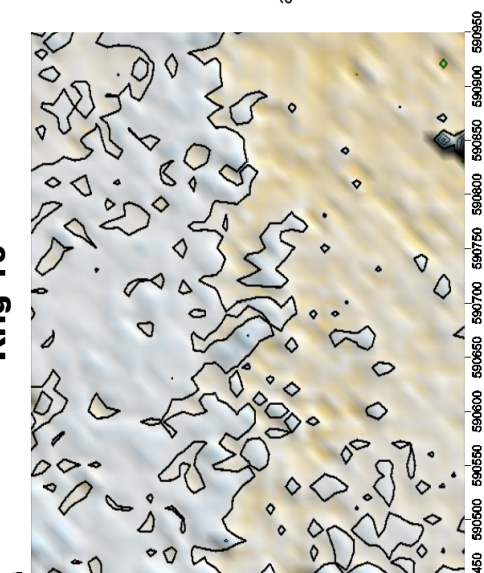
Nat.Nb. 2



Krig 2

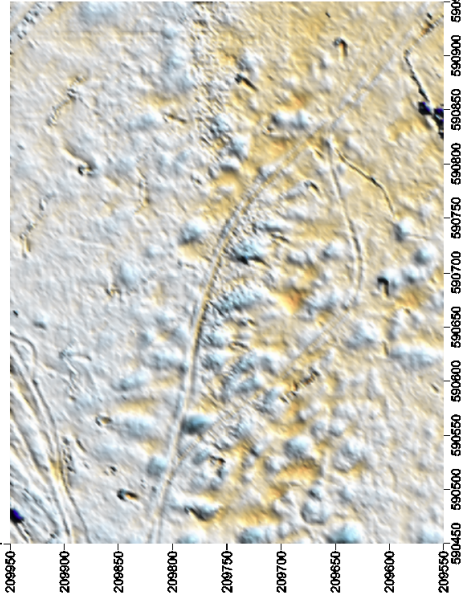


Krig 10



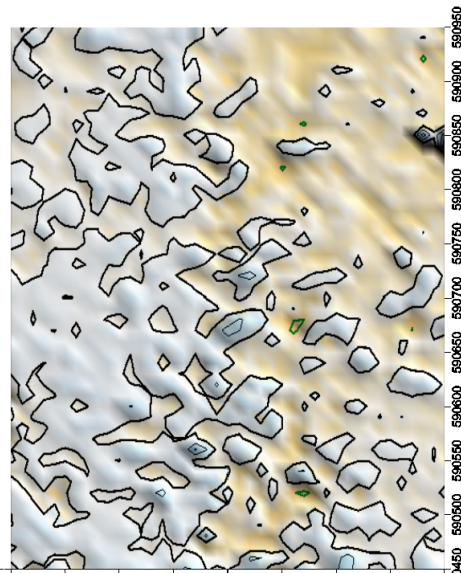
GPS 1

avg = -0.5



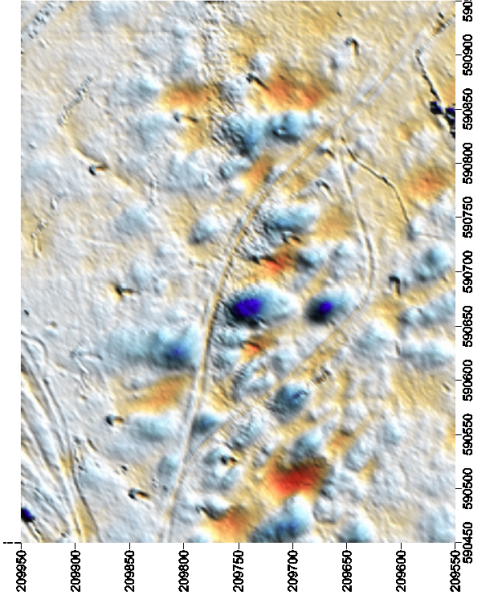
GPS 2

avg = -0.5



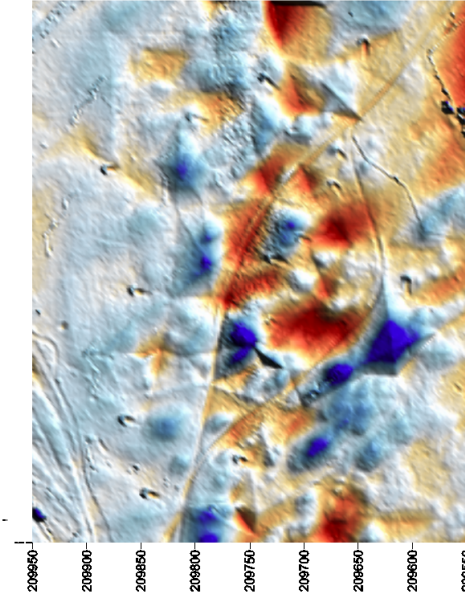
GPS 4

avg = -0.5

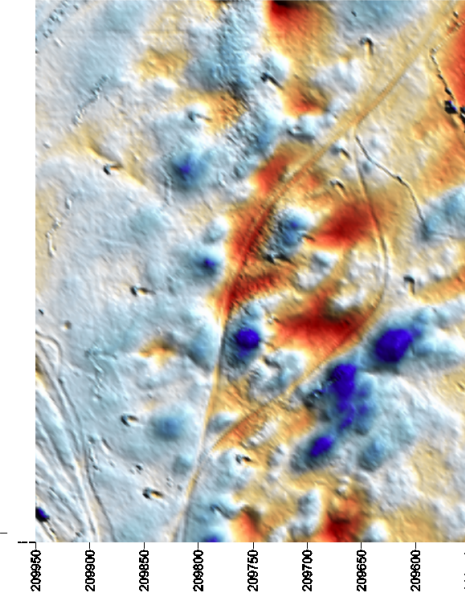


szintköz = 0.5m
vastag fekete vonal = átlag
vastag zöld vonal = nulla

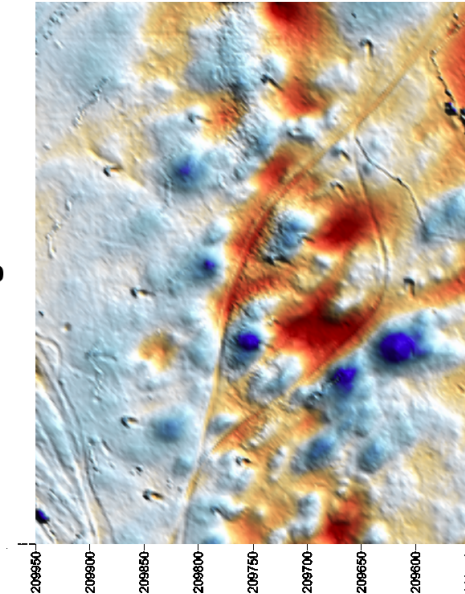
TLI 2



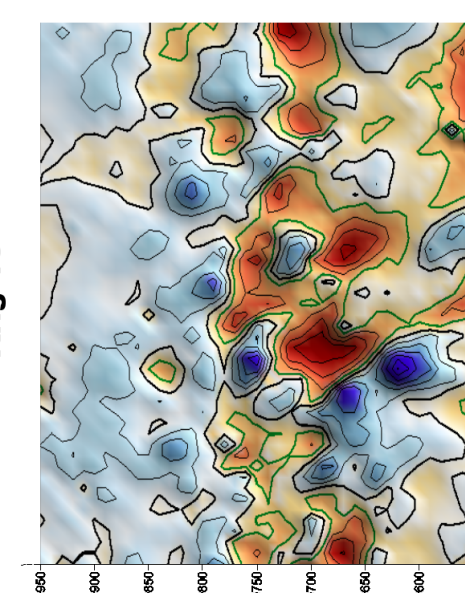
Nat.Nb. 2



Krig 2



Krig 10



TOPO

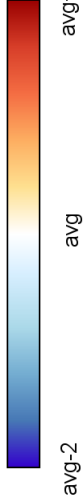
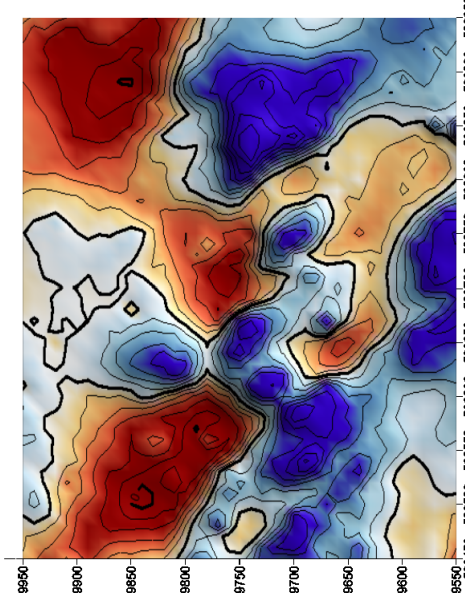
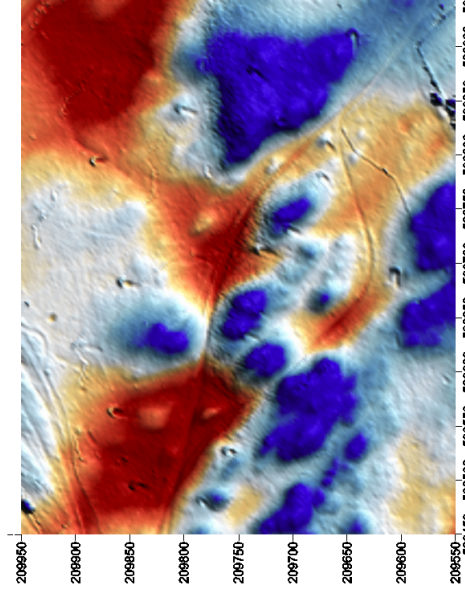
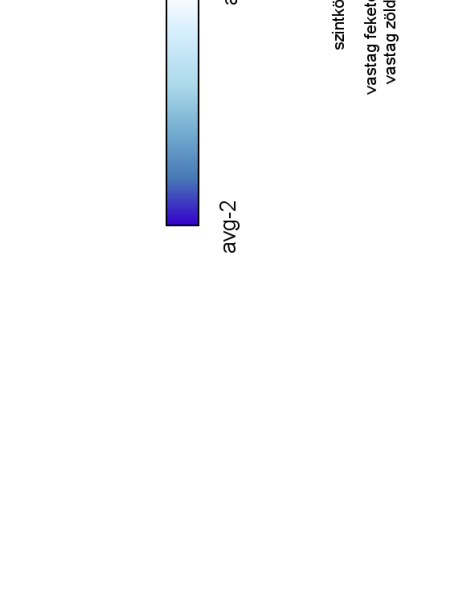
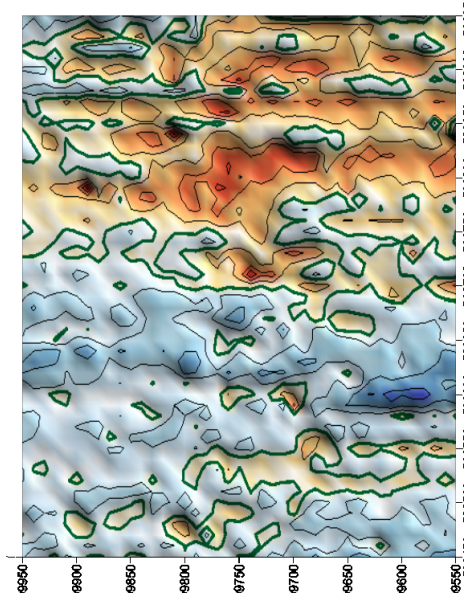
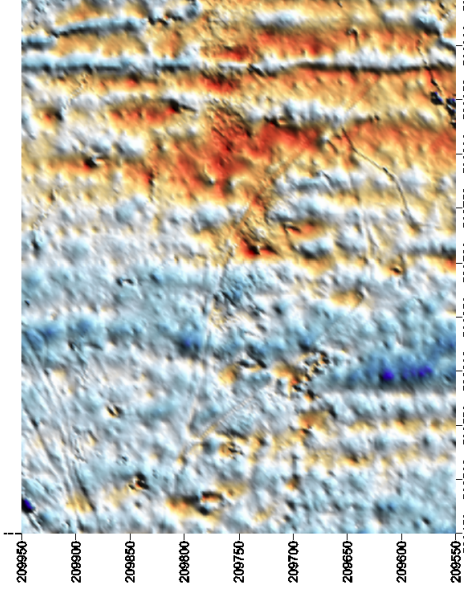
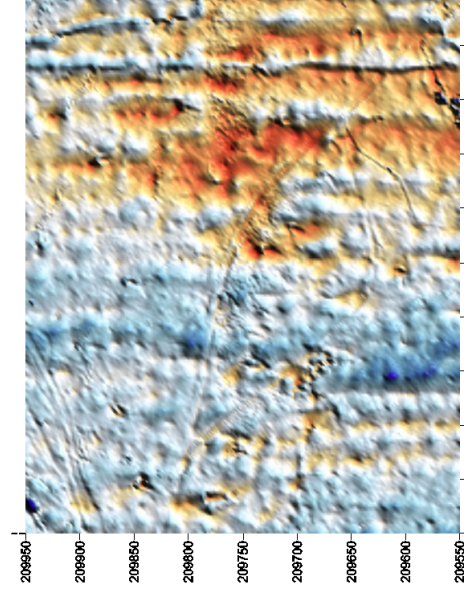
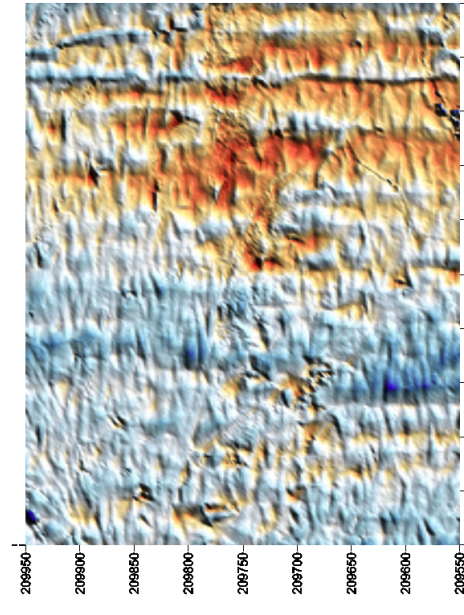
avg = -0.5

BM1

avg = 0.0

SRTM

avg = -3.0



szintköz = 0,5m
vastag fekete vonal = átlag
vastag zöld vonal = nulla



Ceslar

Dietrich

Palatium

Würzburg

Würzburg

Alba Regalis

Würzburg

Dietrich

Palatium

Vidua

Ladan

Ester

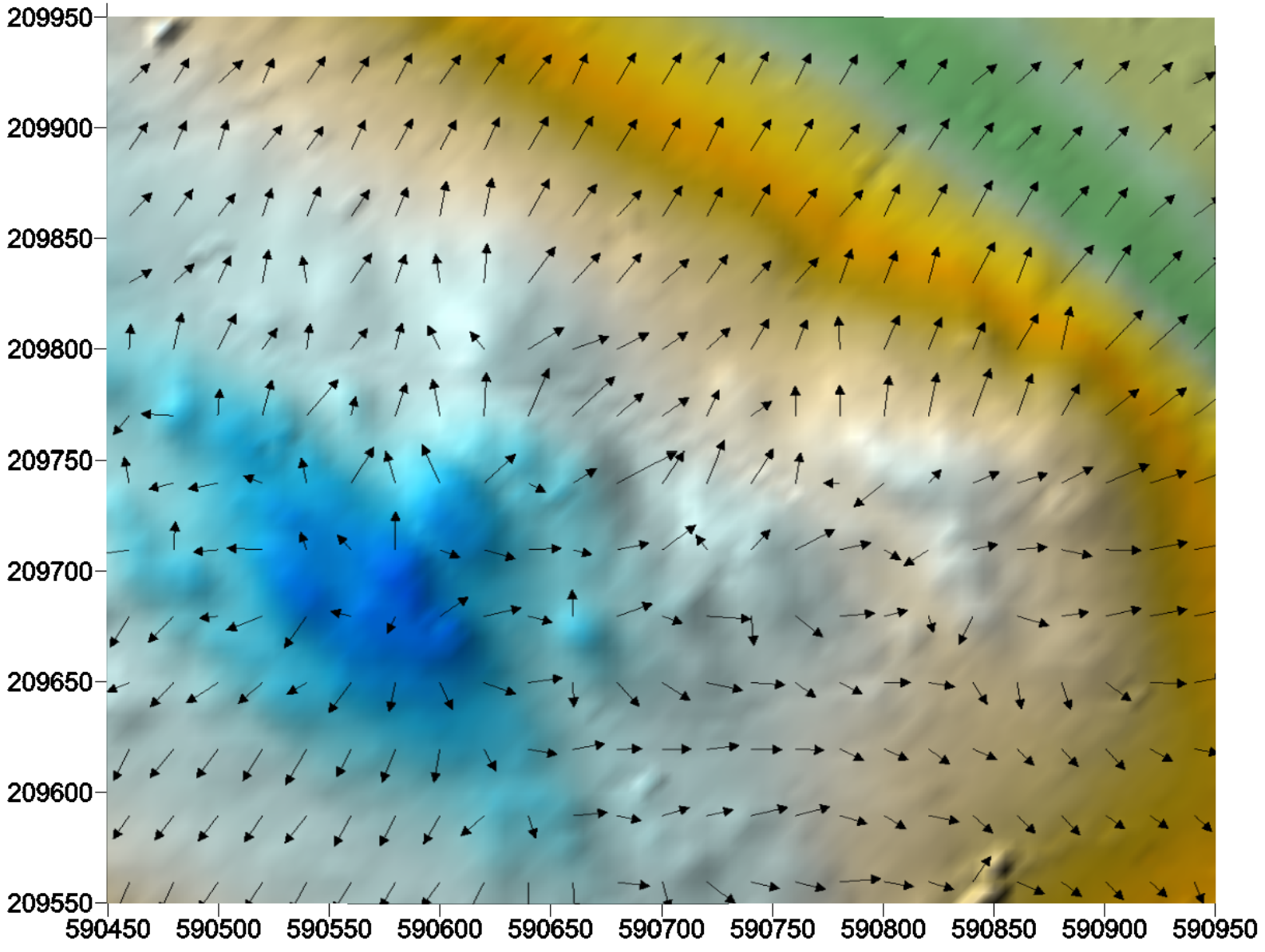
Rauhe

Rauhe

Moria

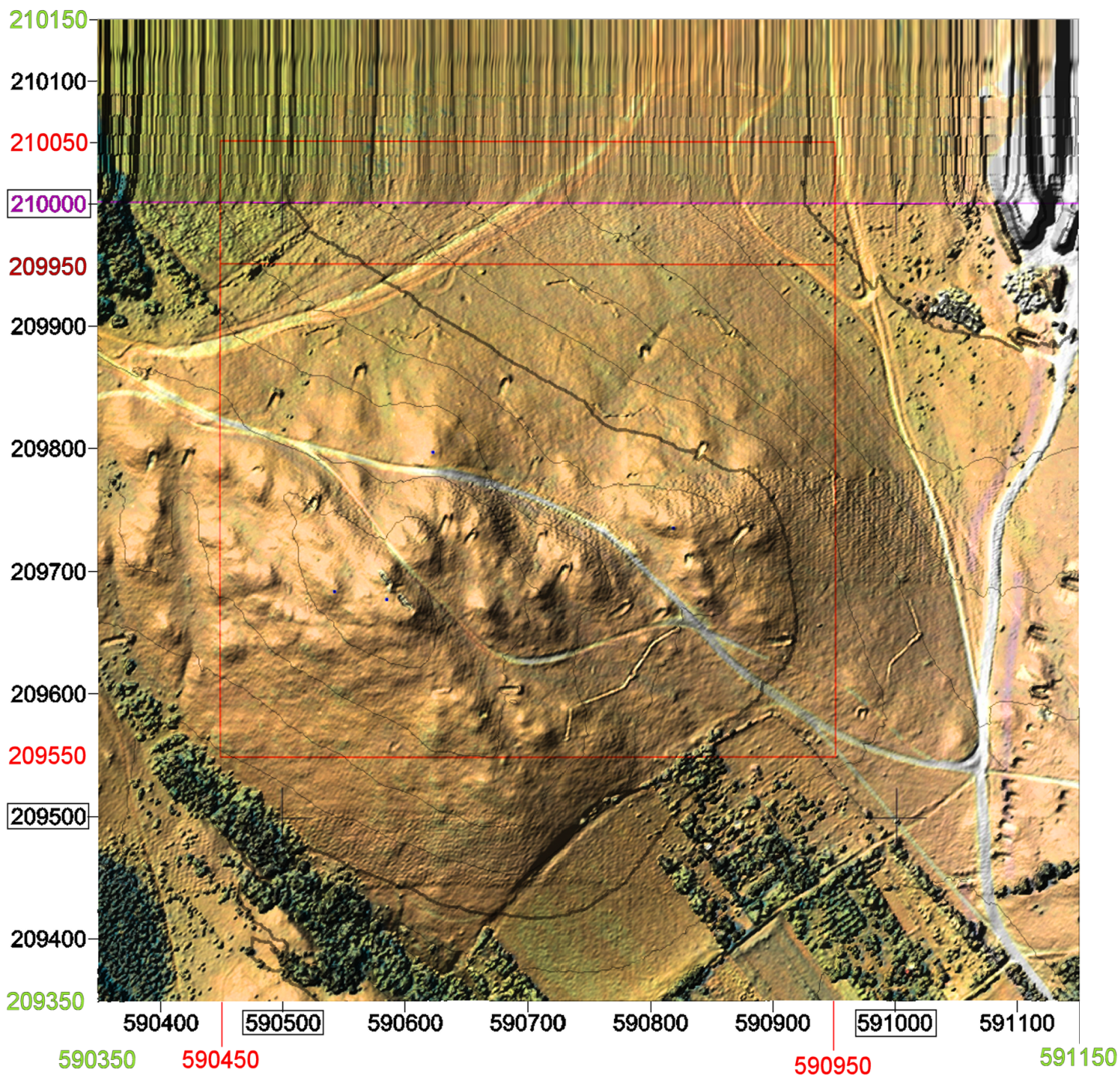
Ester

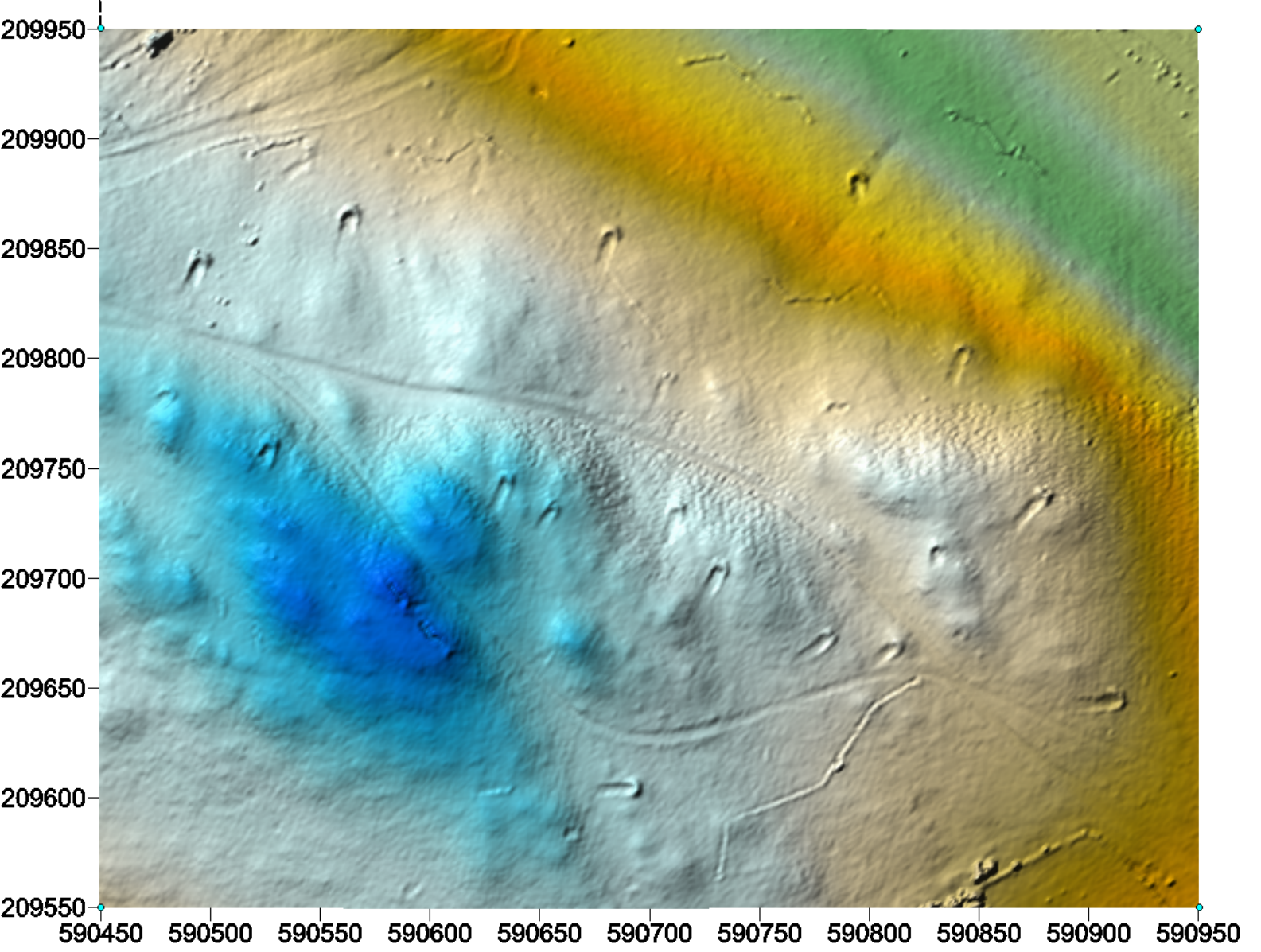
Rauhe

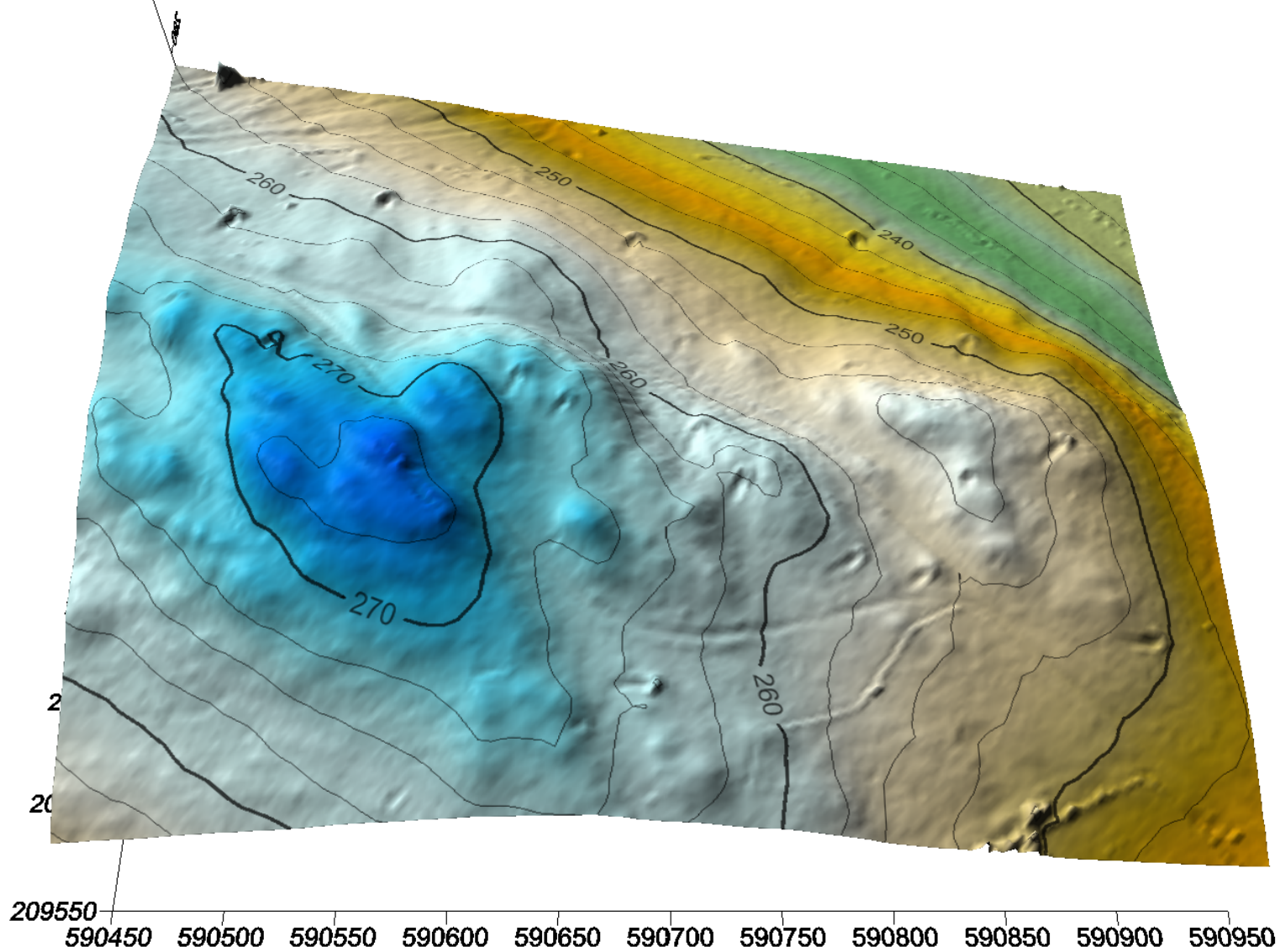


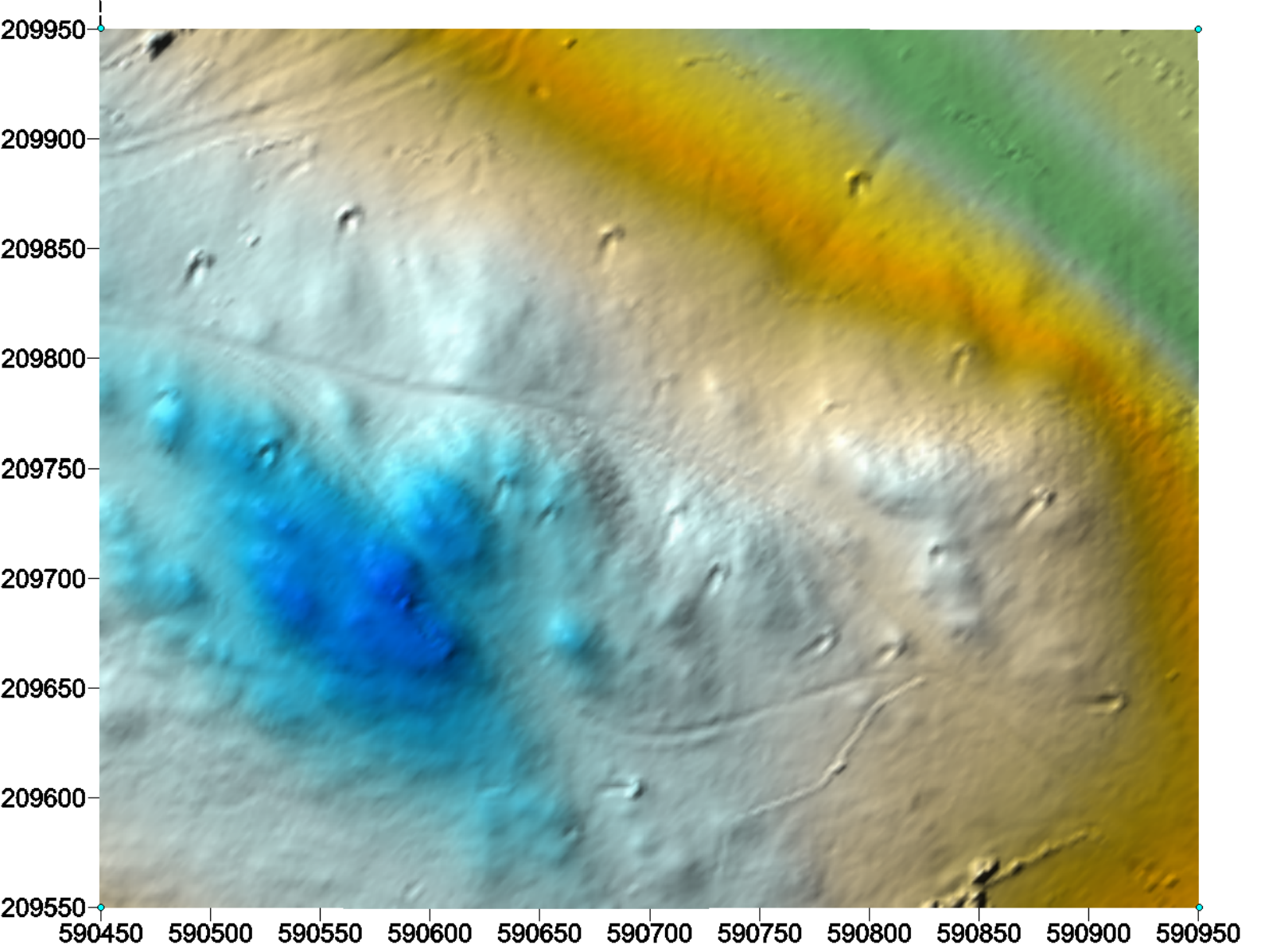
LiDAR pontosság

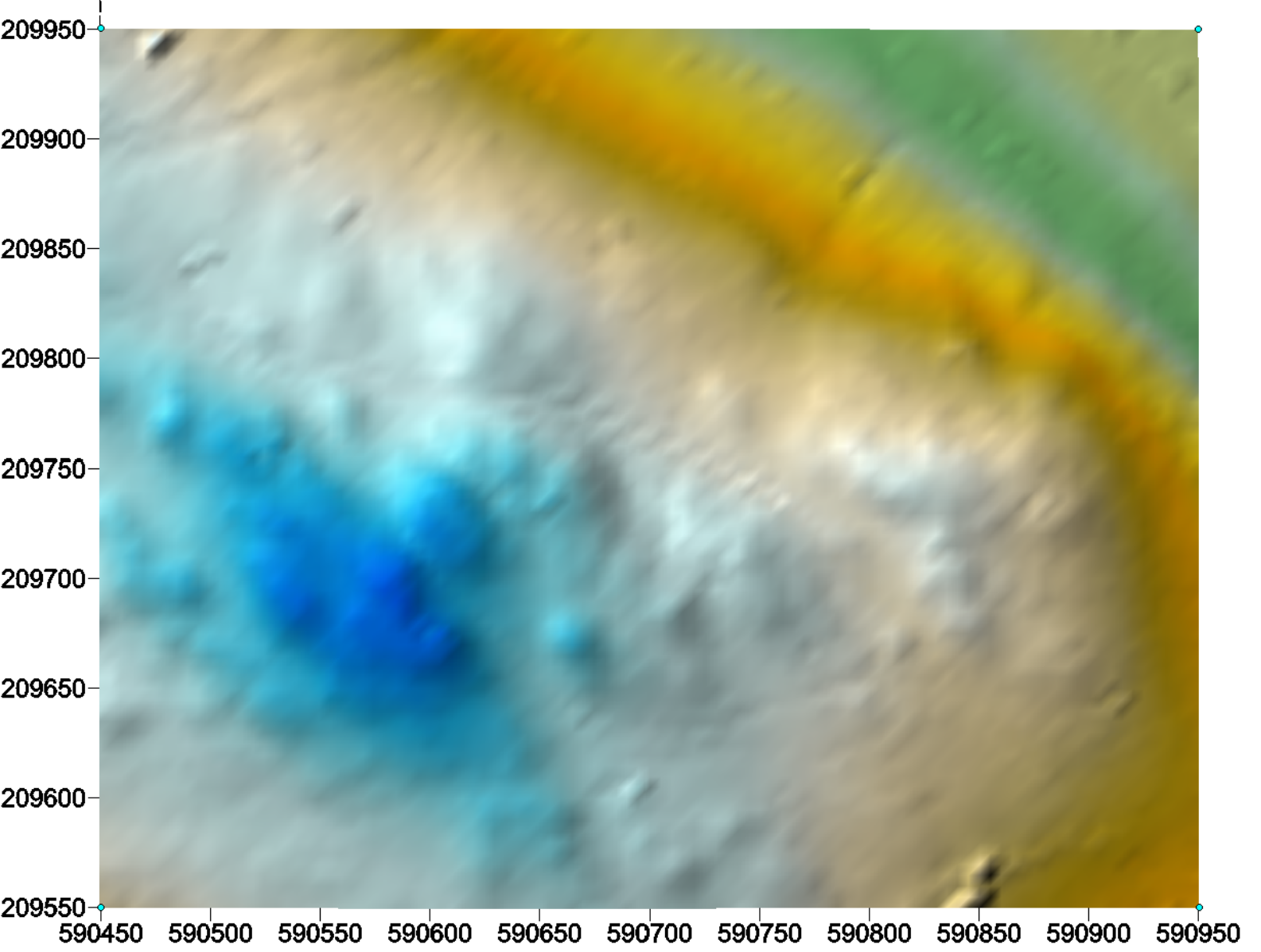
Átlag	Átl.Absz.Elt.	Variancia	Szórás
0,21	0,21	0,04	
-0,15	0,15	0,02	
-0,13	0,13	0,02	
0,09	0,09	0,01	
-0,02	0,02	0,00	
0,00	0,00	0,00	
-0,05	0,05	0,00	
-0,05	0,05	0,00	
0,04	0,04	0,00	
0,02	0,02	0,00	
-0,004	0,076	0,010	0,099

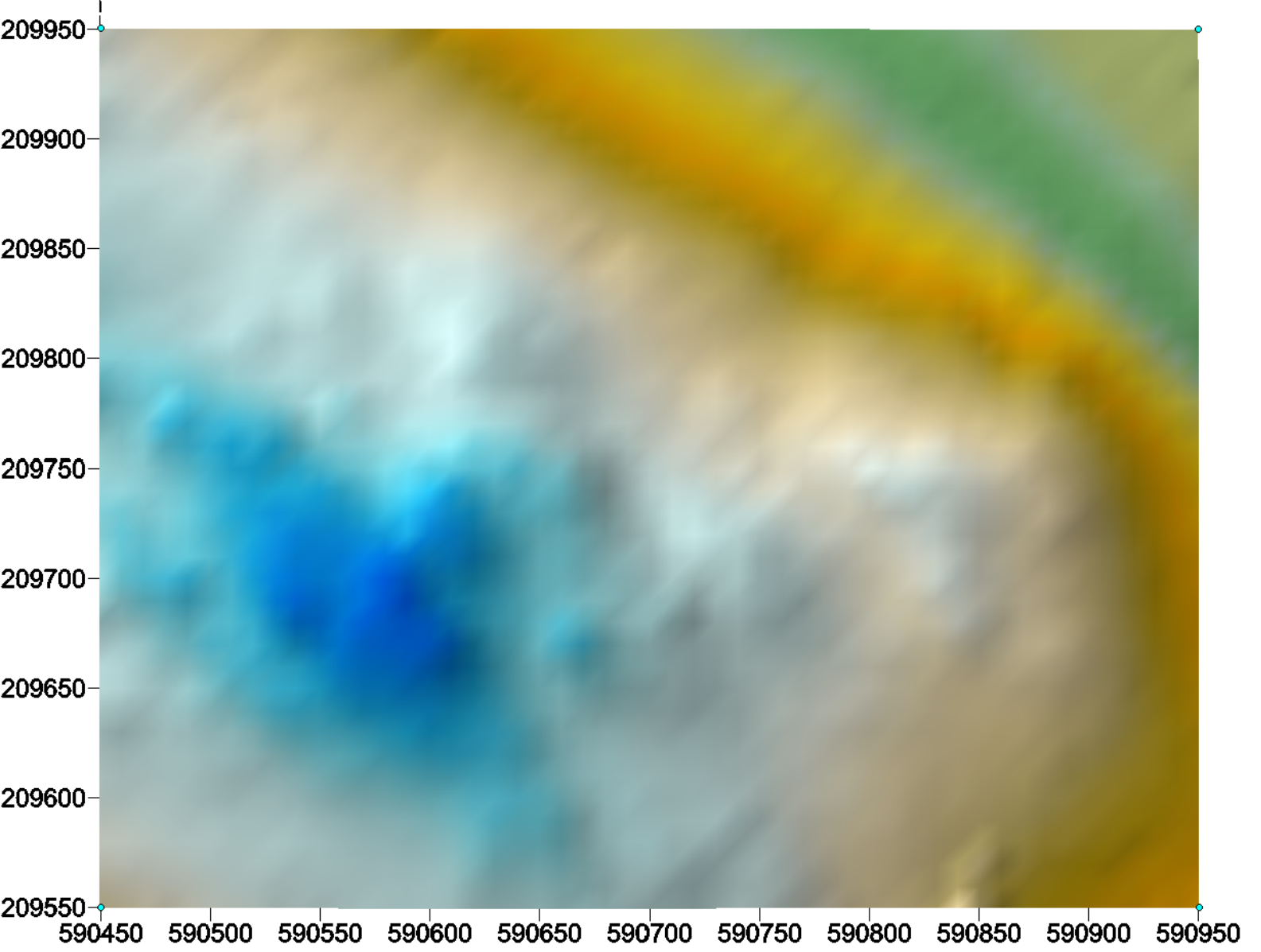


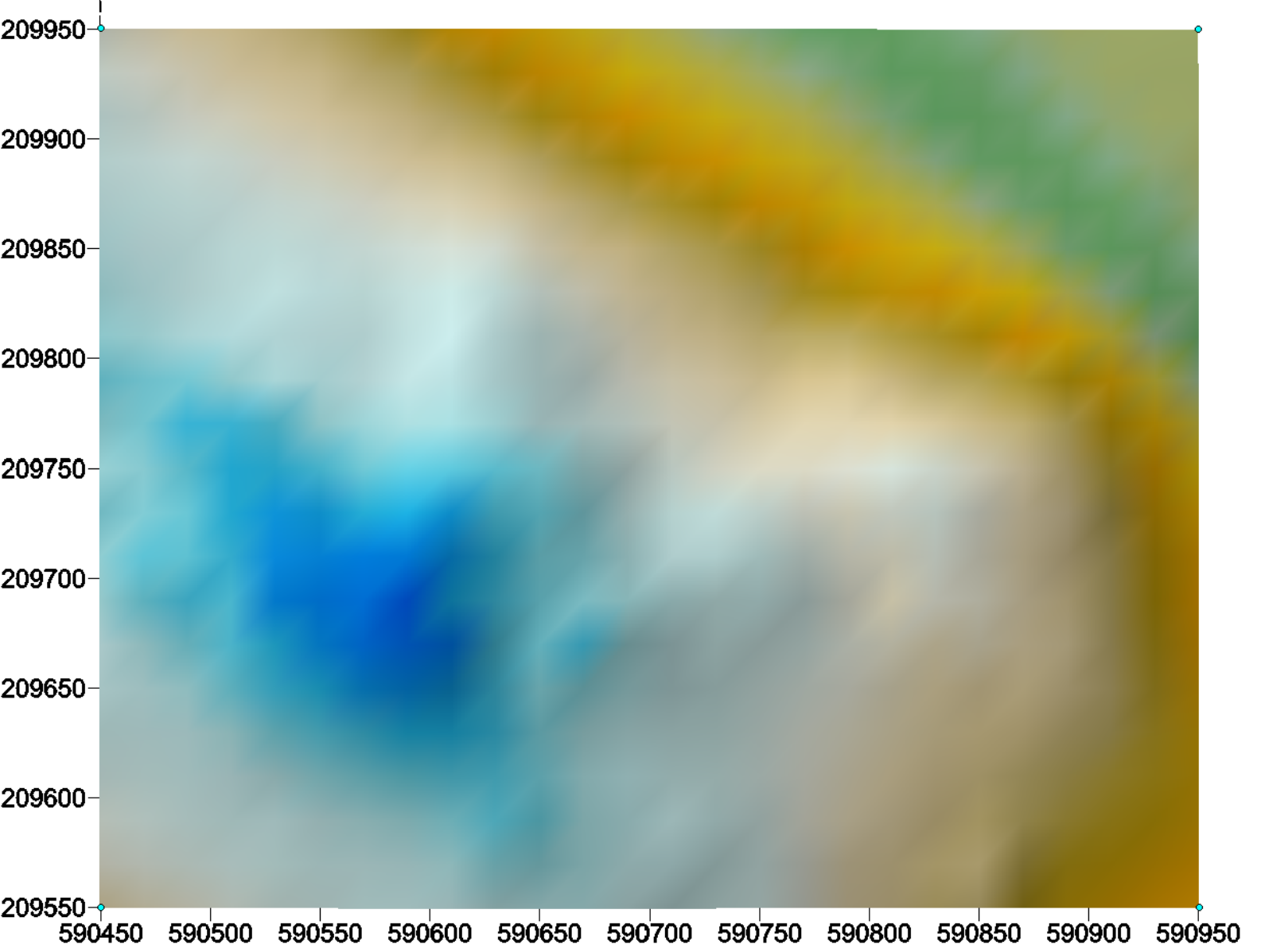


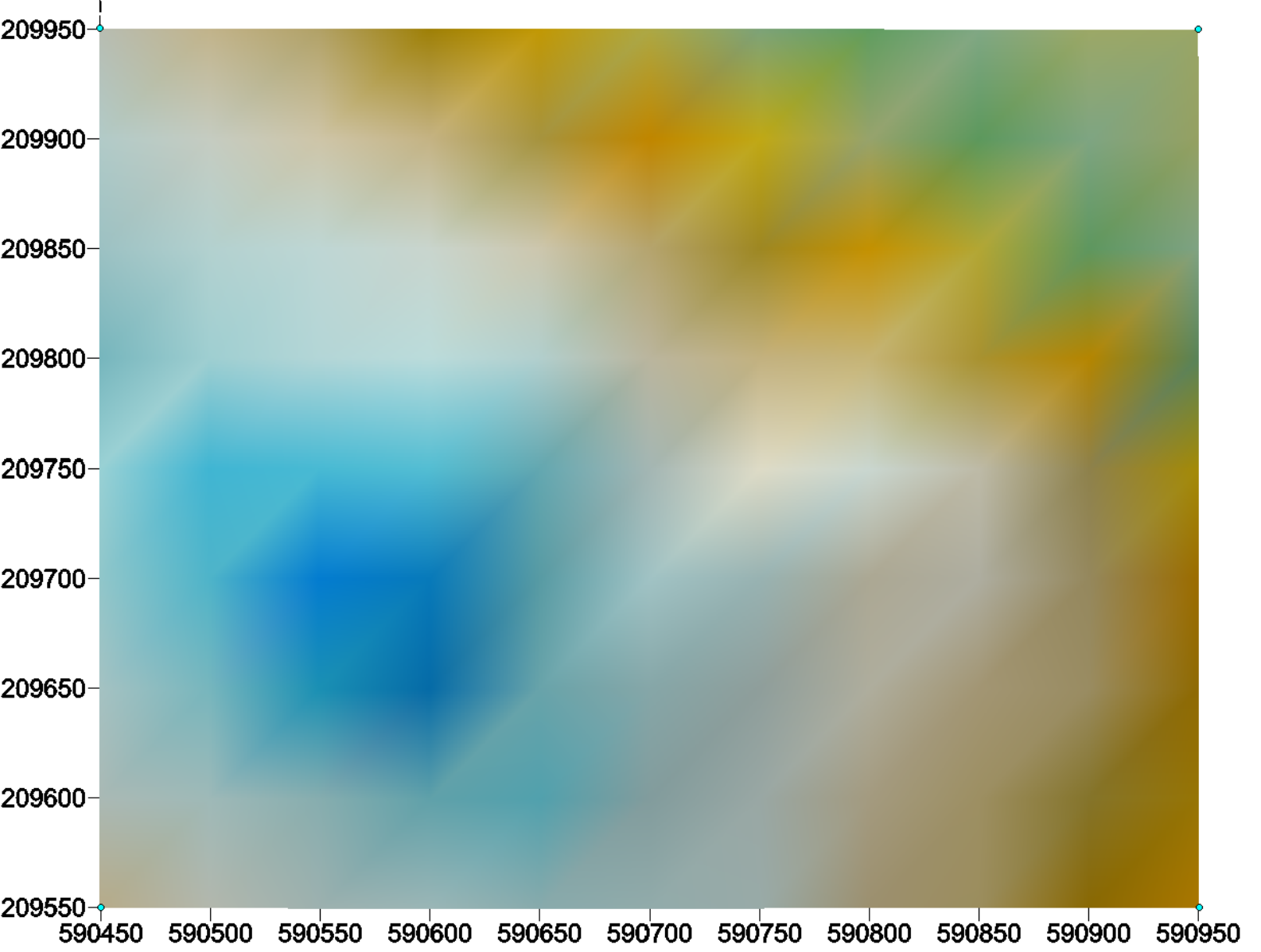




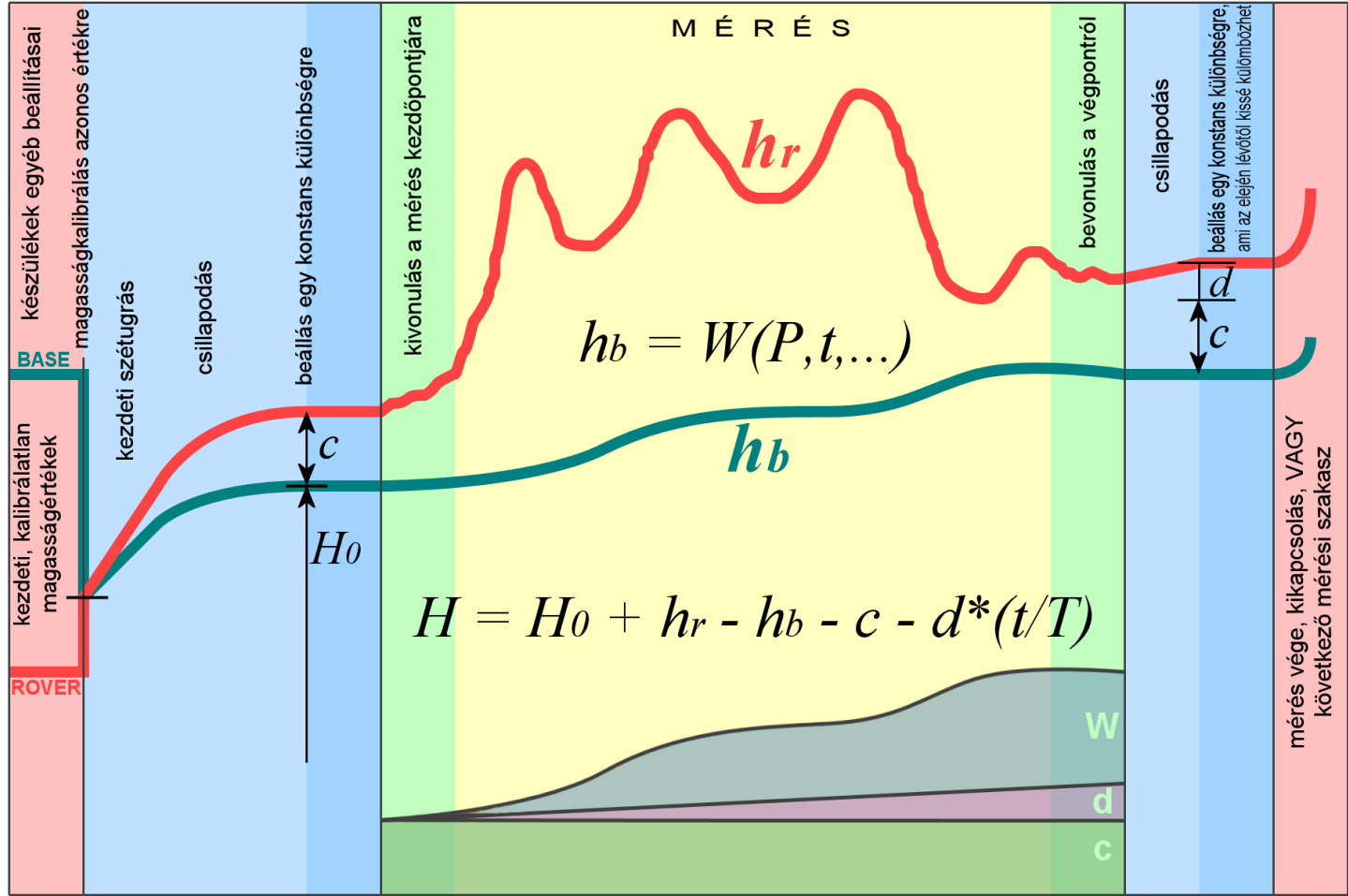






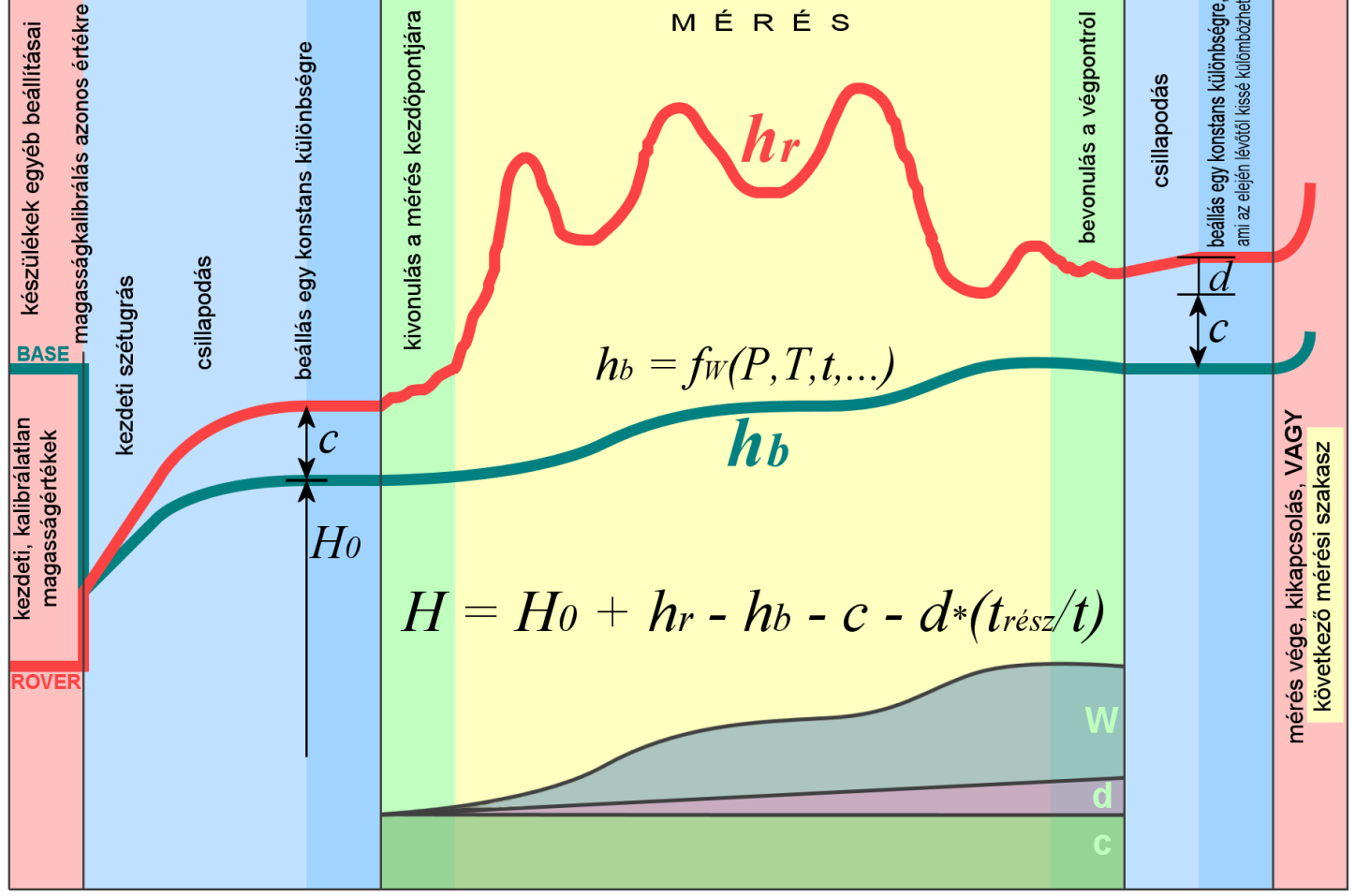


H



t

H



t

Méréstervezés Á.F. barometrikai

Felmérési terület adatai

a oldal =	500 [m]
b oldal =	500 [m]
terület =	18000 [m ²]
képletben használt t =	22250 [m ²]

Tervezési paraméterek

sorköz =	5 [m]
ráhagyás =	10 [m]
soron belüli ponttávolság =	3 [m]
bejárési sebesség =	3 [km/h]

Mérési igények és eredményadatok kimutatása

bejárando hossz =	4748 [m]
tiszta időigény =	1,6 [h]
teljes időigény =	2,7 [h]
szükséges rögzítési időköz =	3,6 [sec]
beállítható rögzítési időköz =	3 [sec]
tényleges soron bel. pt.táv =	2,5 [m]
pontok száma =	1899 [db]
átlagos pontsűrűség =	8,5 [db/a]

Árkalkuláció

terepi munkaórák =	3 [h]
feldolgozás ideje =	4 [h]
összes mérnökóra =	7 [h]
mérnökóra egységár =	5000 [Ft]
alapdíj =	3000 [Ft]
profit árrés =	10%
nettó ár =	41500 [Ft]
áfa =	27%
bruttó ár =	52705 [Ft]
áránlat =	52800 [Ft]

us magassági felméréshez

Ha ez a cella üres, akkor az a;b oldalakkal számol, különben ezzel.
(túllógással korrigált)

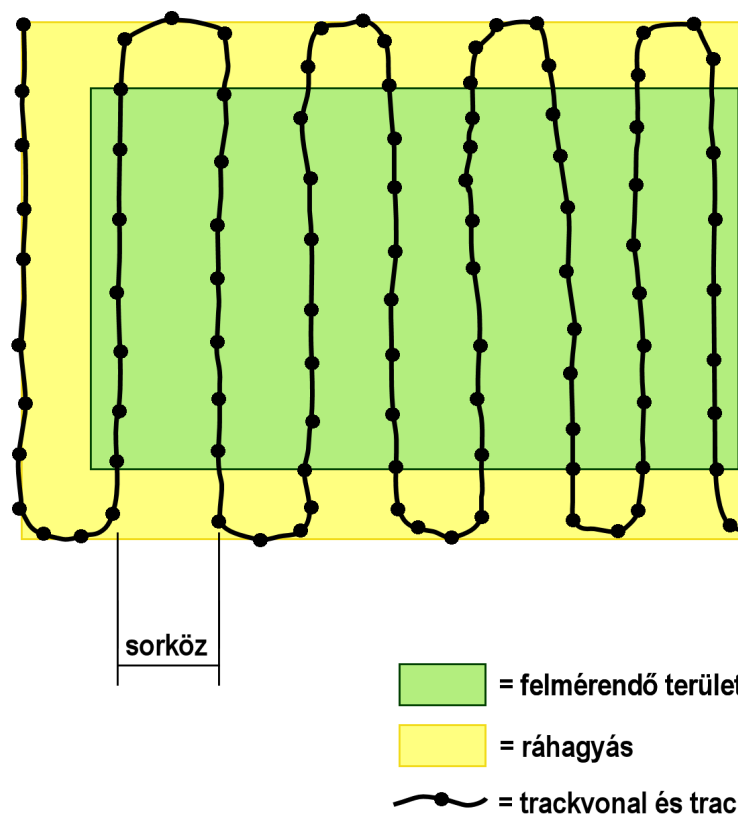
(sortávolság)

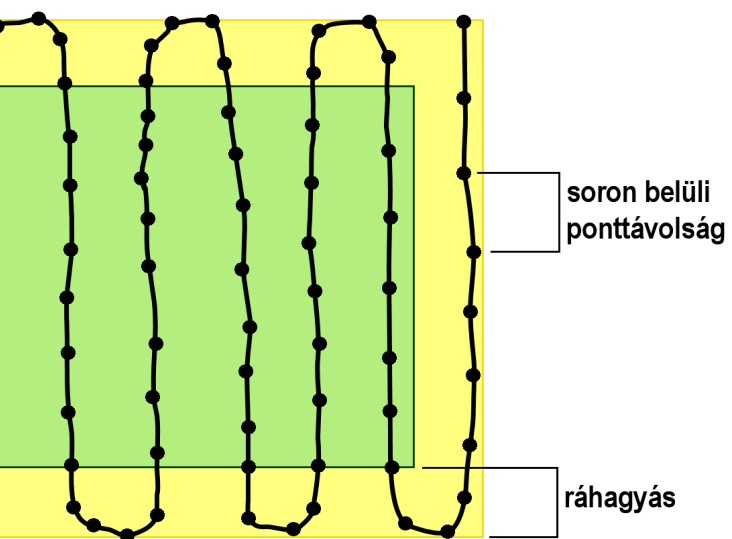
(átlagos)

legnagyobb egész másodpercre kerekítve
(átlagos)

10x10m-enként

durva becslés





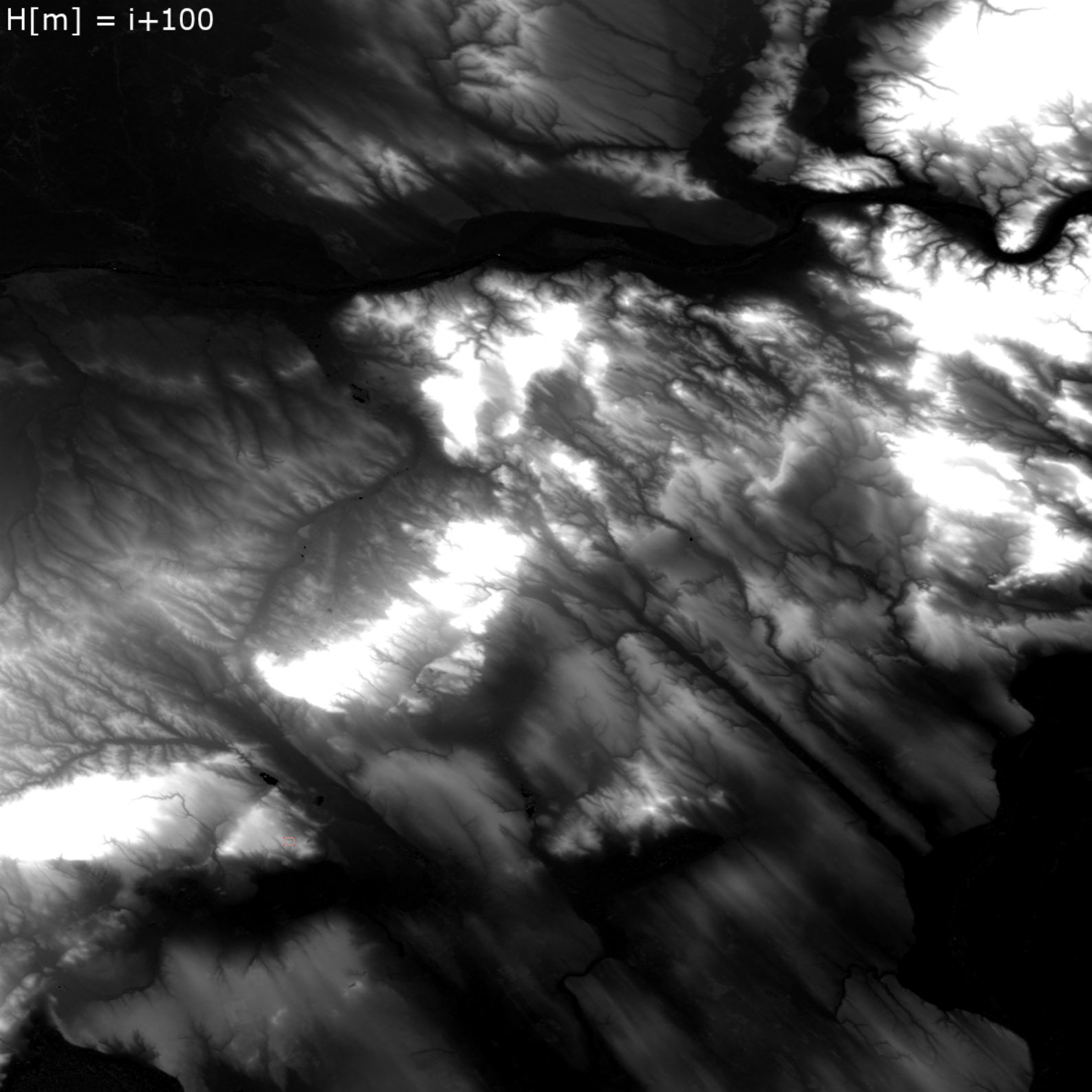
 = felmérendő terület

 = ráhagyás

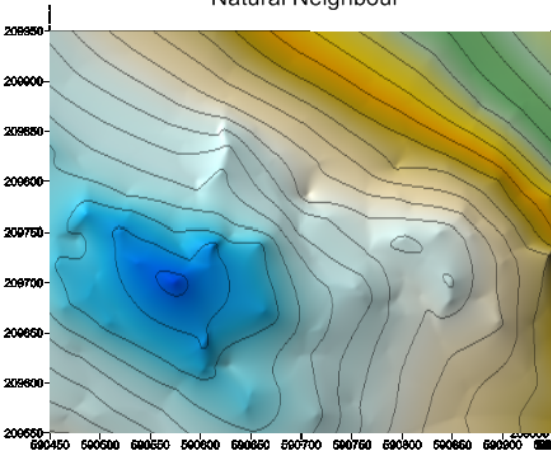
 = trackvonal és trackpont



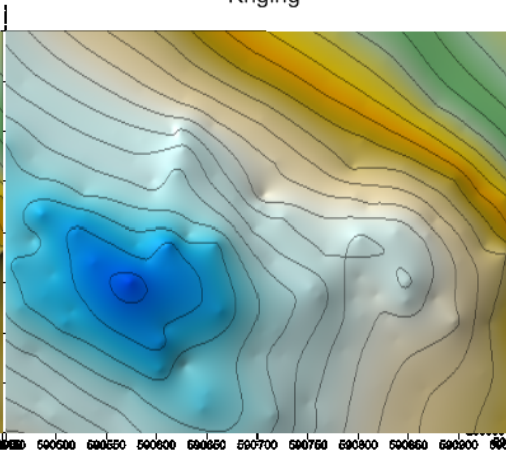
H[m] = i+100



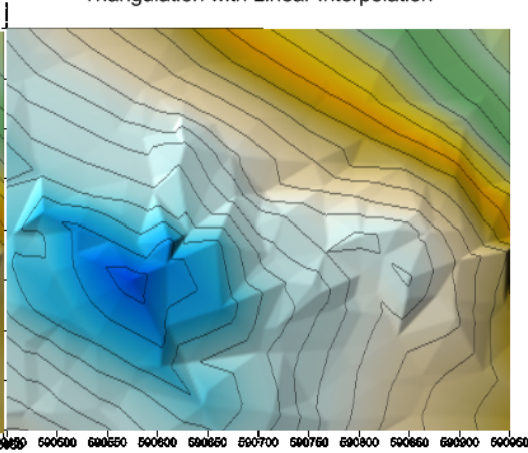
Natural Neighbour

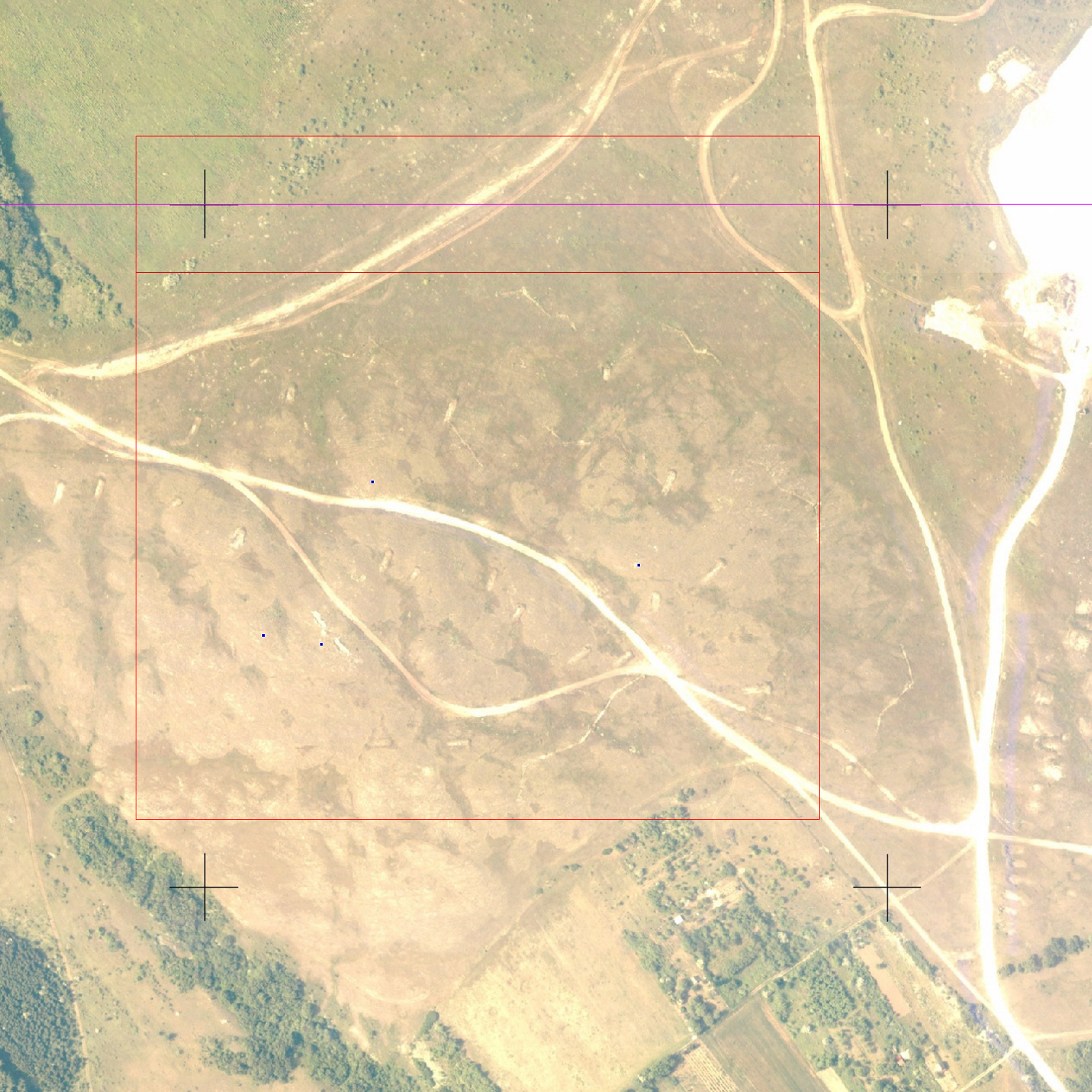


Kriging



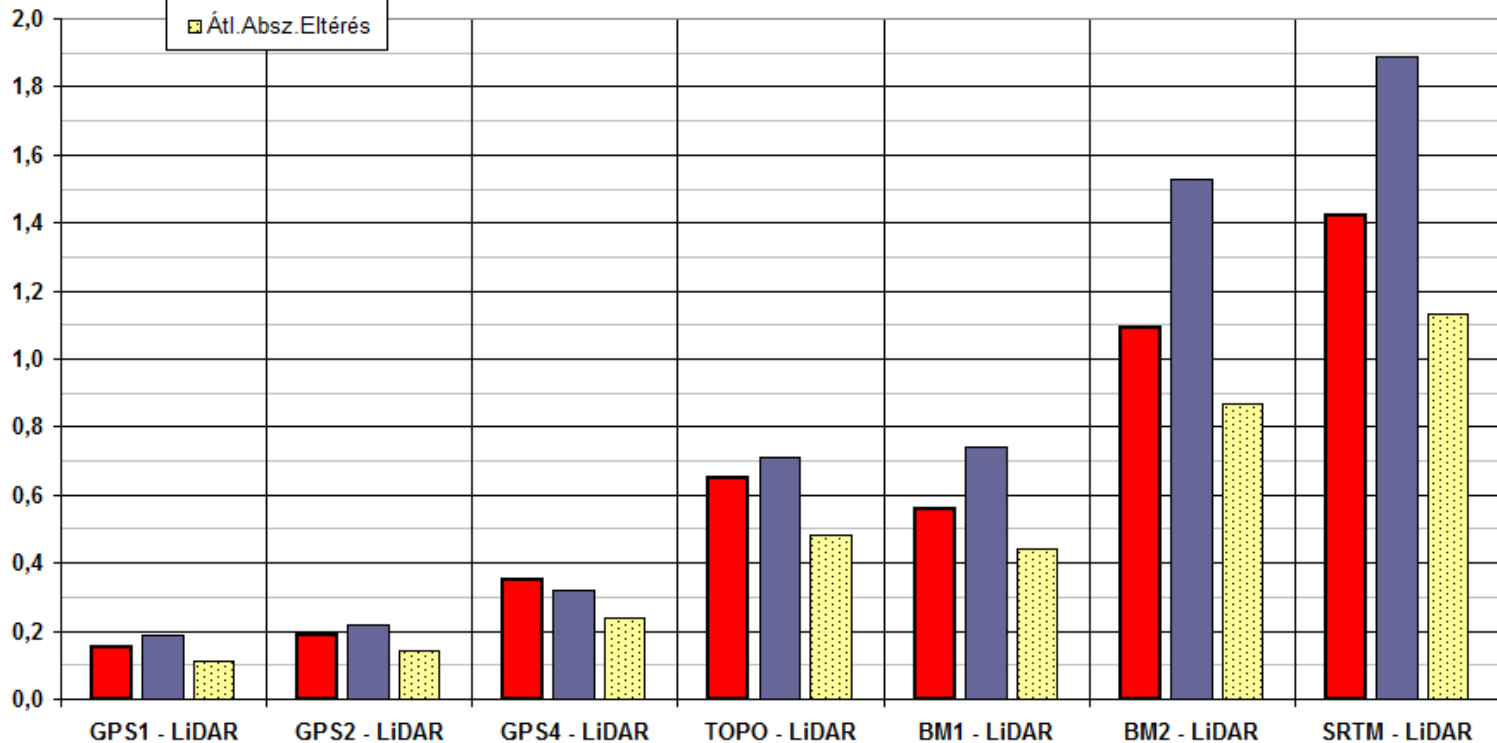
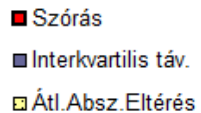
Triangulation with Linear Interpolation

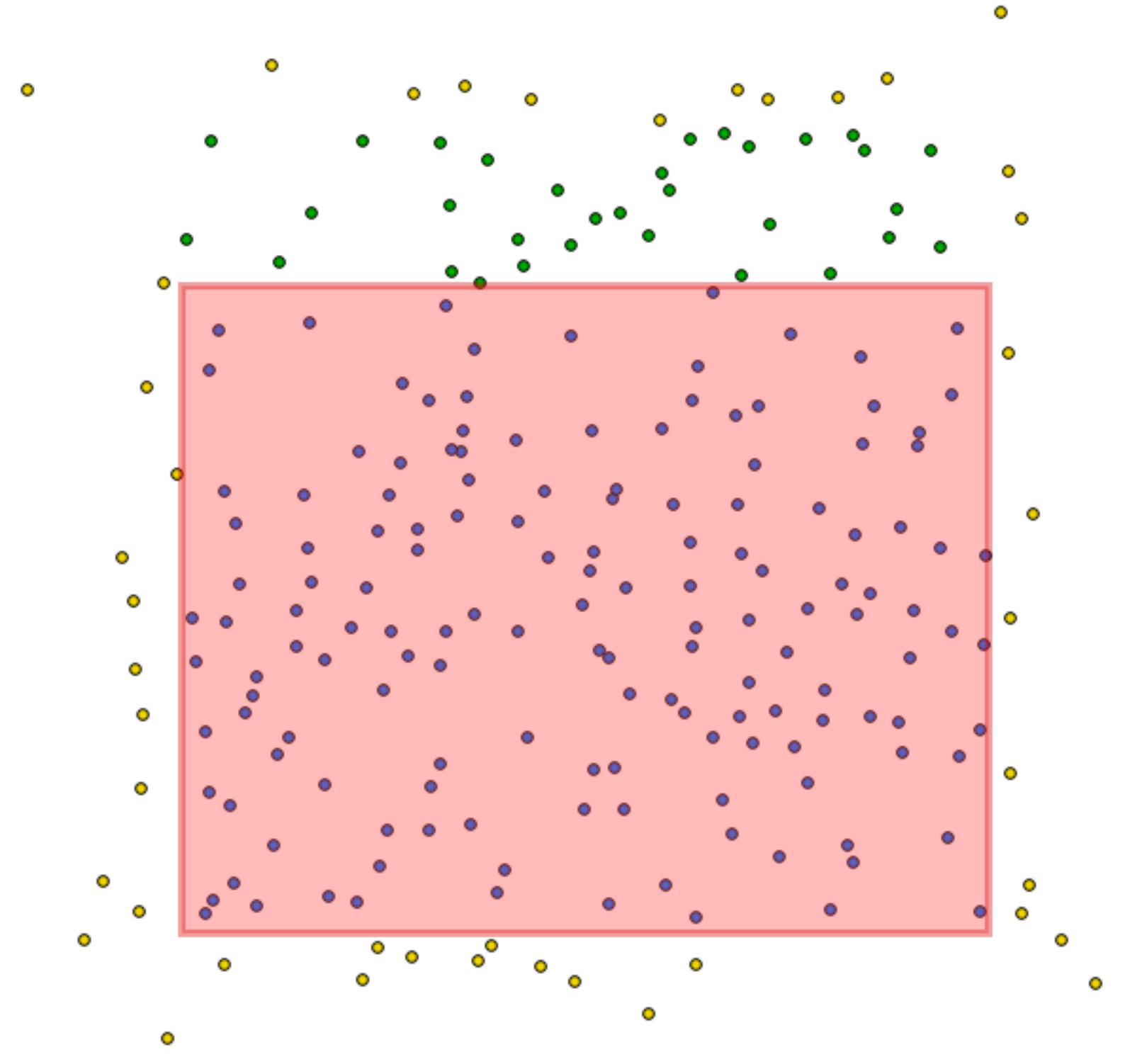




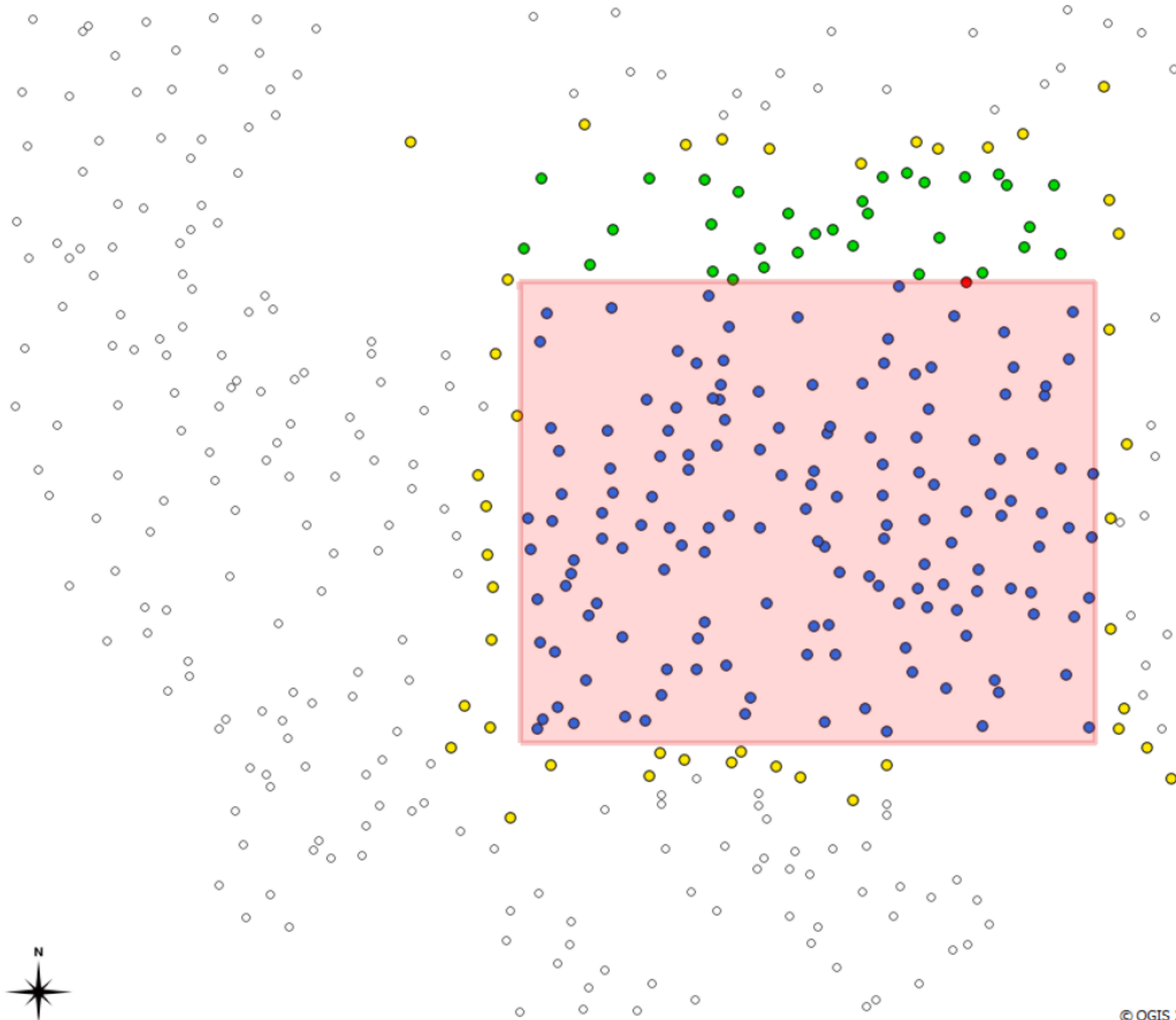


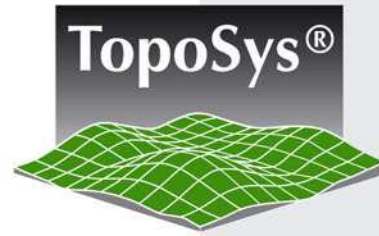
Pontosságvizsgálat





0 300 m





Project - Documentation

Quantil – Hungary

Reference Number: A08-150

Date: 29 August 2008

TopoSys Team:

Sales:	Mrs. Dipl.-Ing. Emese Farkas
Operator:	Mr. Thomas Weinert
Processing:	Mrs. Dipl.-Ing. Heide Heckmann

Table of Contents

1	SHORT DESCRIPTION OF THE PROJECT.....	3
2	ABBREVIATIONS.....	4
3	FLIGHT PARAMETERS	5
3.1	FLIGHT ALTITUDE.....	5
3.2	DATE OF FLIGHTS.....	5
4	GPS REFERENCE STATION.....	5
5	TRANSFORMATION TO THE LOCAL COORDINATE SYSTEM/S.....	5
6	PROCESSING OF THE DIFFERENT DATASETS	6
6.1	DSM AND DTM PROCESSING.....	6
6.1.1	<i>File format – Name convention of the Binary Raster Data (DSM/DTM).....</i>	<i>6</i>
6.1.2	<i>File format – Name convention of the ASCII Raster Data (DSM/DTM).....</i>	<i>7</i>
6.2	PROCESSING OF THE TRUE-ORTHO IMAGES.....	7
6.2.1	<i>File format – Name convention for True-Ortho Images.....</i>	<i>7</i>
6.3	PROCESSING OF THE LIDAR POINT CLOUD DATA.....	7
6.3.1	<i>File format – Name convention of the Binary LIDAR Point Cloud Data.....</i>	<i>8</i>
7	QUALITY CHECK	9
7.1	GPS PROCESSING.....	9
7.2	LIDAR DATA PROCESSING	9
7.3	RELATIVE CHECK OF THE LIDAR DATA	9
7.4	ABSOLUTE CHECK OF THE LIDAR DATA	9

1 Short description of the project

Project Name:	Quantil – Hungary
Areas	Two areas: Székesfehérvár – Area 1, Fehérvár – Area 2
Number of flights:	One single flight for both areas
Date of flights:	30/05/2008
Date of delivery:	29 August 2008
Registration Mode:	First and Last Echo, RGBI
Delivered data:	DSM-FE, DTM-LE, FDTM, RGB, CIR, LIDAR point cloud FE/LE
Data medium:	DVD
GPS-Master Station:	from client
Size of tiles:	2000 m x 2000 m
Horizontal Spacing LIDAR:	1.00 m
Horizontal Spacing RGBI:	0.50 m
Vertical Spacing:	0.01 m
Number of Tiles:	Székesfehérvár – Area 1, 4 tiles 2 000 x 2 000 m Fehérvár – Area 2, 12 tiles 2 000 x 2 000 m
Σ tiles = 16 tiles 2 000 x 2 000 m for Székesfehérvár – Area 1 and Fehérvár – Area 2	
Destination Coordinate System:	EOV (HD72)
Reference Data:	Provided by the Costumer 13 Polygons of Houses 15 Height Control Points
Accuracy:	
Absolute	horizontal < ±0.50 m; height < ±0.15 m

2 Abbreviations

DSM-FE	<u>D</u> igital <u>S</u> urface <u>M</u> odel- <u>F</u> irst- <u>E</u> cho - Height model including vegetation/buildings processed from First Echo data
DSM-LE	<u>D</u> igital <u>S</u> urface <u>M</u> odel- <u>L</u> ast- <u>E</u> cho - Height model including vegetation/buildings processed from Last Echo data
DTM	<u>D</u> igital <u>T</u> errain <u>M</u> odel - Height model without vegetation/buildings processed from Last Echo data, contains holes
FDTM	<u>F</u> illed <u>D</u> igital <u>T</u> errain <u>M</u> odel - Height model without vegetation/buildings processed from Last Echo data, holes are interpolated
dGPS	<u>d</u> ifferential <u>G</u> lobal <u>P</u> ositioning <u>S</u> ystem
INS	<u>I</u> nertial <u>N</u> avigation <u>S</u> ystem
RGB	3 Channel image: <u>R</u> ed R, <u>G</u> reen G, <u>B</u> lue B
CIR3	Channel image: <u>C</u> olored <u>I</u> nfra <u>R</u> ed: NIR, R, G
NIR	1 Channel image: <u>N</u> ear <u>I</u> nfra <u>R</u> ed NIR
TIN	<u>T</u> riangular <u>I</u> rregular <u>N</u> etwork

3 Flight Parameters

3.1 Flight Altitude

The flight altitude was about 1 000 m (3280 ft) above ground level for Székesfehérvár – Area 1, and of 1 400 m (4 593 ft) above ground level for Fehérvár – Area 2.

3.2 Date of Flights

The campaign was flown at the following times:

Székesfehérvár – Area 1, East-West Direction: 2008-05-08, 11:28 – 12:09 UTC

Székesfehérvár – Area 1, North-South Direction: 2008-05-08, 12:11 – 12:56 UTC

Fehérvár – Area 2: 2008-05-08, 13:00 – 14:39 UTC

3.3 Remarks

The flight was made with a Hungarian company – TELECOPTER, hired by the client.

In the area there are some flight holes. After landing, the operator calculated the coverage and saw these holes, and these holes are of our acquaintance. After reporting this situation to the Client, this entity replied that this should not be a problem, as this was only a test flight project, without the need for re-flights.

4 GPS Reference Station

To calculate the flight path of the aircraft the following GPS reference stations were used during the time of flight:

Székesfehérvár – Area 1: SZFV GPS Reference Station

Fehérvár – Area 2: ISZK GPS Reference Station

The processing of the dGPS data was done with the PosPac V4.31 software package by Applanix.

5 Transformation to the Local Coordinate System/s

The standard parameters were used for the transformation from WGS84 into the Local Coordinate System EOVS (HD72).

6 Processing of the different datasets

6.1 DSM and DTM Processing

The coordinates (Northing, Easting and Height) for the desired coordinate system are calculated using the post-processed data from the GPS processing, the INS (Inertial Navigation System) and the single laser distance measurements.

In a following step, the points are sorted into tiles of 2000 m x 2000 m with a gridsize of 1.0 m and a height resolution of 0.01 m as requested by the customer.

The sorting algorithm takes care about the used processing method (sorting with preference to the higher values into the grid = First Echo, sorting with preference to the lower values into the grid = Last Echo).

The model may show spots of no-reflection (no detectable reflection of the laser beam), which will result in areas not containing any data. Typically, these will be still water bodies, black topped surfaces, glass roofs, smoke clouds, white frost, etc. These pixels are not interpolated.

The absolute accuracy of the LIDAR data was checked with independent control polygons of buildings and height control points.

The following products are processed:

The DSM-FE data (Digital Surface Model) contains height information on buildings, vegetation, terrain and other features, based on the recorded First-Echo data. Noisy pixels are removed by filtering.

The DTM data (Digital Terrain Model) are derived from the DSM-LE. In order to obtain a model without buildings and vegetation a further filtering step is necessary. The holes resulting from the DTM filtering are not interpolated.

The FDTM data (Filled Digital Terrain Model) are derived from the DSM-LE. In order to obtain a model without buildings and vegetation a further filtering step is necessary. The holes resulting from the DTM filtering are interpolated.

6.1.1 File format – Name convention of the Binary Raster Data (DSM/DTM)

The elevation data is saved for each line from north to south and from west to east in tiles.

The binary data contain the height as a value (2Byte unsigned integer, Byte order PC-Intel format). The height values are stored in [cm] (without decimal places) – so the received values must be divided by 100 to get it in metres.

The gridded data set are saved in the TopoSys Raw Binary Format (*.tor).

Name of the tile, e.g.: sal662120.tor

MNOrrrhvv.tor	binary raster file (grid size 2 000 m)
MNOrrrhvv.tol	georeferencing text file, TopoSys format
MNOrrrhvv.aux	georeferencing text file, PCI format

M: processing mode (s*: DSM; t*: DTM; d*: difference model)
N: a-d is the quadrant index in the coordinate system (a=1; b=2; c=3; **d**=4)
O: index of echo mode (f=first, l=last)
rrr: 1. to 3. digit of Easting – lower left corner (Ea= **588** 000)
hhh: 1. to 3. digit of Northing – lower left corner (No=**204** 000)
v: **int** only at FDTM or name of an additional coordinate system

The binary files can be converted to ASCII by using the TopoSys Converter.

6.1.2 File format – Name convention of the ASCII Raster Data (DSM/DTM)

The gridded data set are converted into an ASCII format (Easting, Northing, Height).

Name of the tile, e.g.: sal662120.coo

These files are named as follows:

MNOrrrhvhv .tor	binary raster file (grid size 2 000 m)
MNOrrrhvhv .tol	georeferencing text file, TopoSys format
MNOrrrhvhv .aux	georeferencing text file, PCI format

M: processing mode (s*: DSM; t*: DTM; d*: difference model)
N: a-d is the quadrant index in the coordinate system (a=1; b=2; c=3; **d**=4)
O: index of echo mode (f=first, l= last)
rrr: 1. to 3. digit of Easting – lower left corner (Ea= **588** 000)
hhh: 1. to 3. digit of Northing – lower left corner (No= **204** 000)
v: *int* only at FDTM

6.2 Processing of the True-Ortho images

The RGB/CIR data are recorded with a true-color 4-channel line camera, which recorded the data simultaneously with the LIDAR line scanner. The image data are strip wise orthorectified and georeferenced using the DSM-FE/DSM-LE. The image data are then mosaicked.

The size of the tiles and the tile-coding corresponds to the LIDAR data.

The 4-channel true-ortho images are split into two separate 3-channel images (RGB/CIR).

6.2.1 File format – Name convention for True-Ortho Images

The data were delivered as RGB and CIR images as 8bit georeferenced TIFF.

Name of the tile, e.g.: rgb_a144158.tif

These files are named as follows:

RGB_ drrrhvh .tif	image file
RGB_ drrrhvh .tfw	georeferencing file

resp.

CIR_ drrrhvh .tif	image file
CIR_ drrrhvh .tfw	georeferencing file

d: a-d is the quadrant index in the coordinate system (**a**=1; b=2; c=3; d=4)
rrr: 1. to 3. digit of the Easting – lower left corner (Ea=**588** 000)
First coordinate system
hhh: 1. to 3. digit of Northing – lower left corner (No= **204** 000)
First coordinate system

6.3 Processing of the LIDAR Point Cloud Data

The complete point cloud data was processed strip wise from the adjusted First-Echo and Last-Echo data.

The Last-Echo data also contains the recorded intensity values.

6.3.1 File format – Name convention of the Binary LIDAR Point Cloud Data

The raw data have been stored strip wise in binary format.

These files are named as follows:

dat***le_abs**.xyz: Point cloud from Last-Echo (E, N, H)
dat***fe_abs**.xyz: Point cloud from First-Echo (N, E, H)
dat*.txt: Files with additional Information

*: 4-digits of flight number + 3-digits of dataset number

The binary files can be converted strip wise into ASCII by using the TopoSys Converter.

7 Quality Check

The quality control was done in several steps.

In a first phase there is a check of the GPS post-processing calculation. Then the recorded LIDAR data are analyzed before the relative accuracy of the LIDAR data are checked (horizontal and vertical of the scan strips relatively together).

By using the reference control data (polygons of houses and height control points), the LIDAR data are finally checked for their absolute accuracy.

The DSM has an accuracy of better than 0.50 m in location as well as <0.15 m in height. We undergo the quality check of our data in the following steps:

7.1 GPS Processing

No problems were encountered in the DGPS processing.

7.2 LIDAR data Processing

In the next step the measurements of the reference fiber are compared with the optical length. There were no drifts, errors or other problems found during the reference fiber analysis.

In order to eliminate outliers, an absolute minimum and maximum terrain height are estimated for the processing of the model.

7.3 Relative check of the LIDAR data

In the relative check, the height correctness of neighbouring strips is examined, in order to maintain a maximum difference of 0.15 m between strips (e.g. for strips flown at different times). This means that the elevation model is self-consistent with an accuracy of better than 0.15 m in height.

The profiles show that the maximum difference between the scan strips is less than 0.15 m (a quality criterion is reached). In order to verify this criteria not only in a profile but also for the whole area, emboss images were derived from each tile of the DSM. The data was then visually examined. Even small height differences in the DSM or the DTM can be easily detected using this method. Also drifts in the GPS-Processing can be detected very easily.

The quality control showed no significant height difference >0.15 m between the scan strips.

Strip deformations can result from misalignment of the bore-sights of IMU and scanner. This is calibrated once during the factory calibration (and regular controlling) and does not change during normal operation.

The flight direction changes between the adjacent scan strips during the data recording. This avoids that an offset in the boresight angles causes a tilt of each strip and becomes visible in the profiles. There is no such visible tilt and thus the quality criteria of the factory calibration are ok.

7.4 Absolute check of the LIDAR Data

In this processing step the complete height model is shifted in Easting and Northing if necessary. The quality criteria for this processing step are ± 0.50 m.

The model is absolute corrected in location, when the vector polygons of the houses show at each side the same constant distance to the raster data.

Based on the reference data which was provided by the Costumer, the absolute accuracy of 0.50 m in location (figures 2ff) and better than 0.15 m in height (see table 1) was achieved and proven.

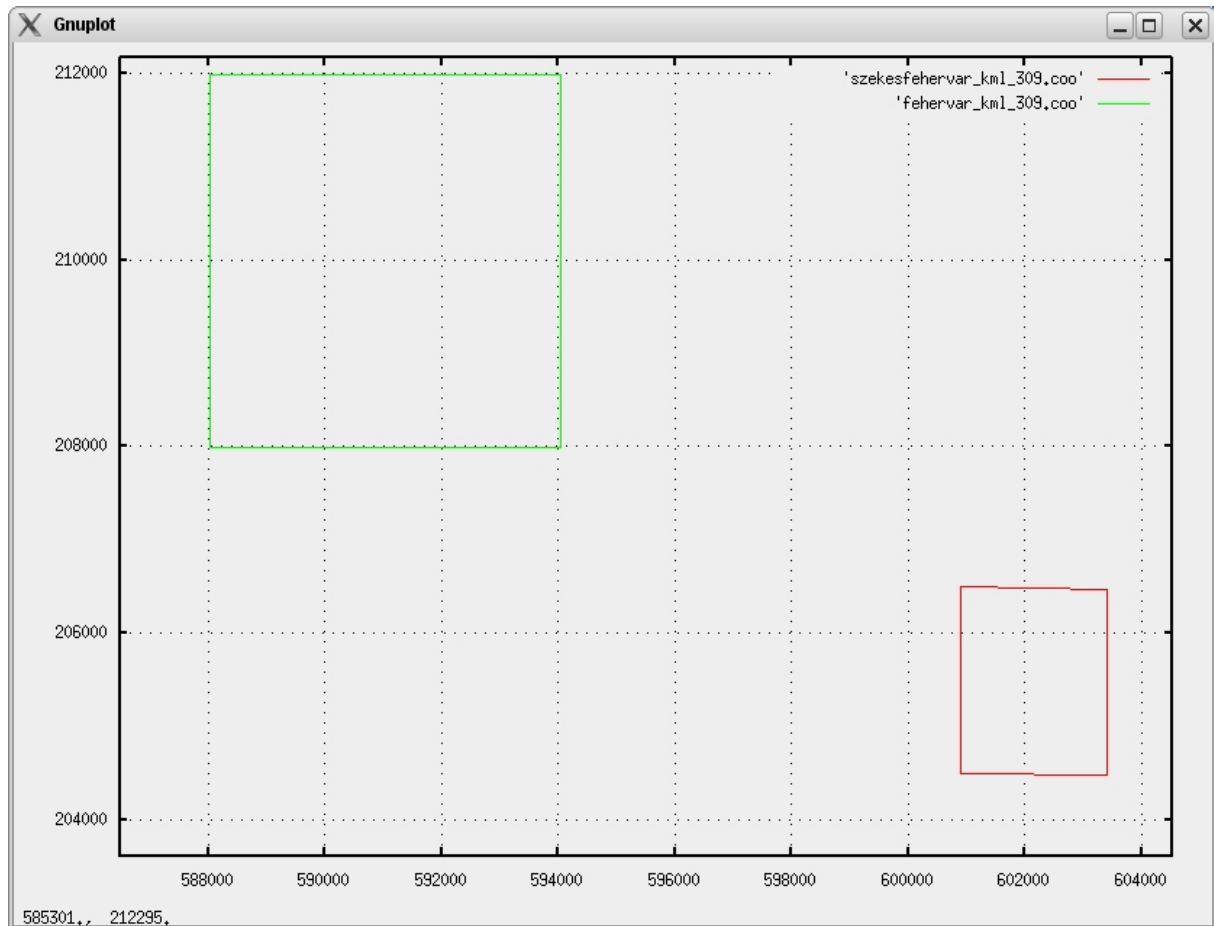


Figure 1: Overview of tiles.

Horizontal accuracy:

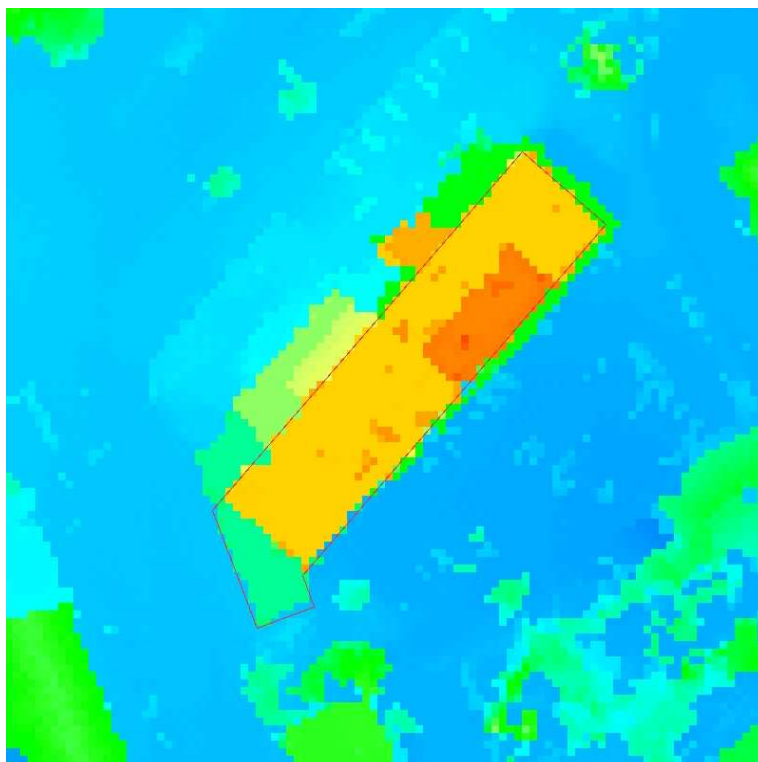


Figure 2: Székesfehérvár – Area 1: building 1.

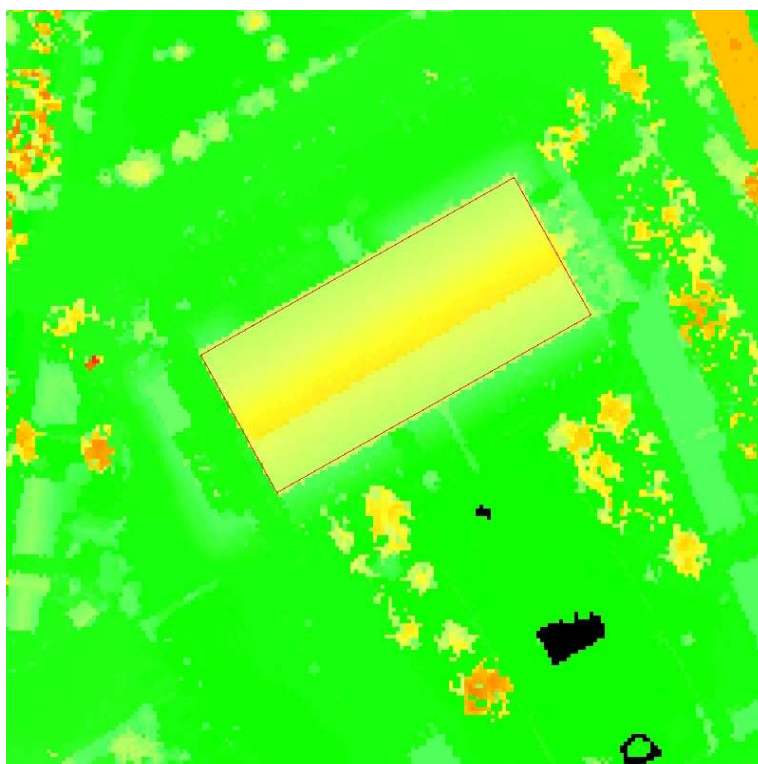


Figure 3: Székesfehérvár – Area 1: building 2.

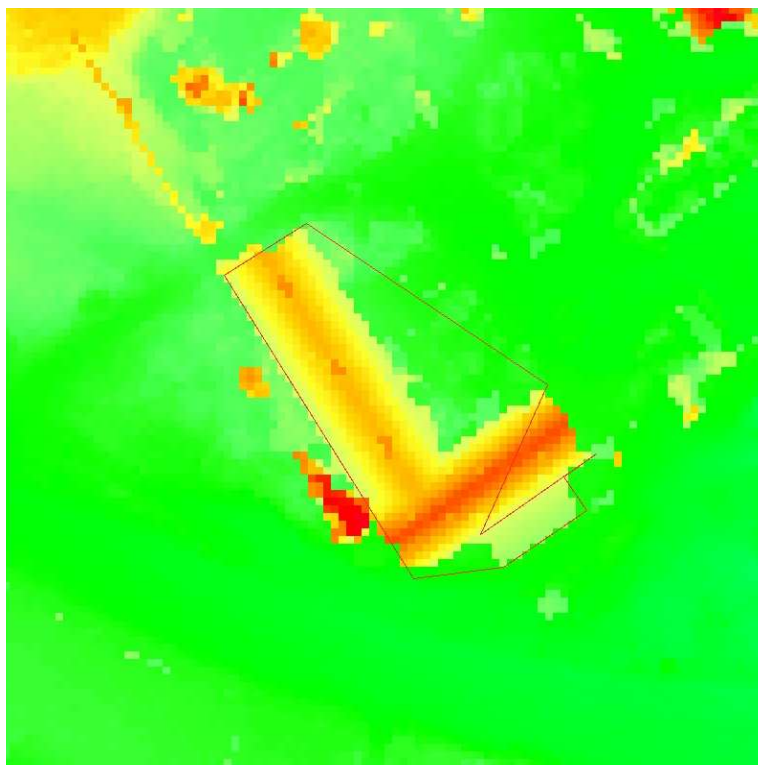


Figure 4: Fehérvár – Area 2: building 1.

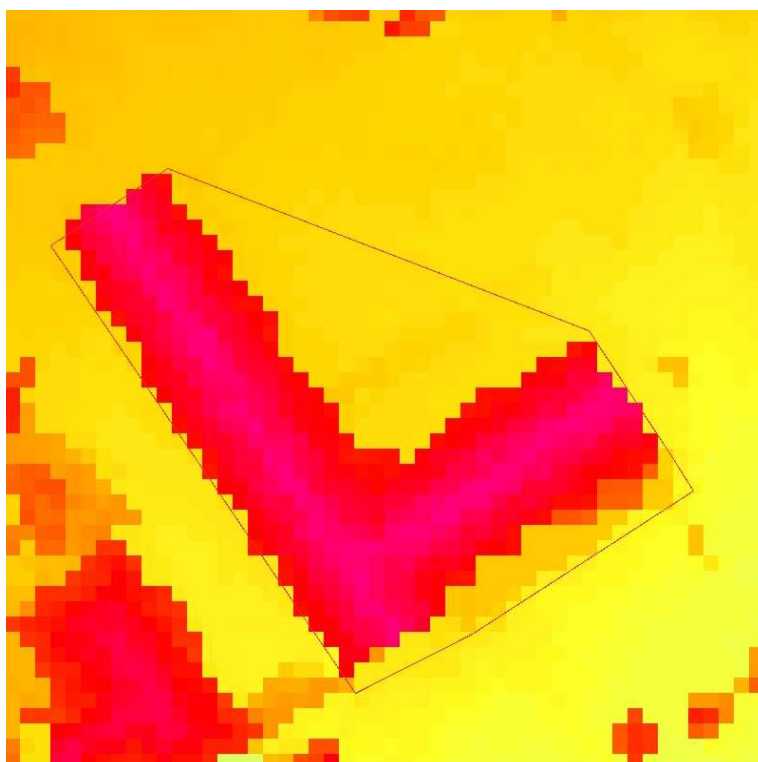


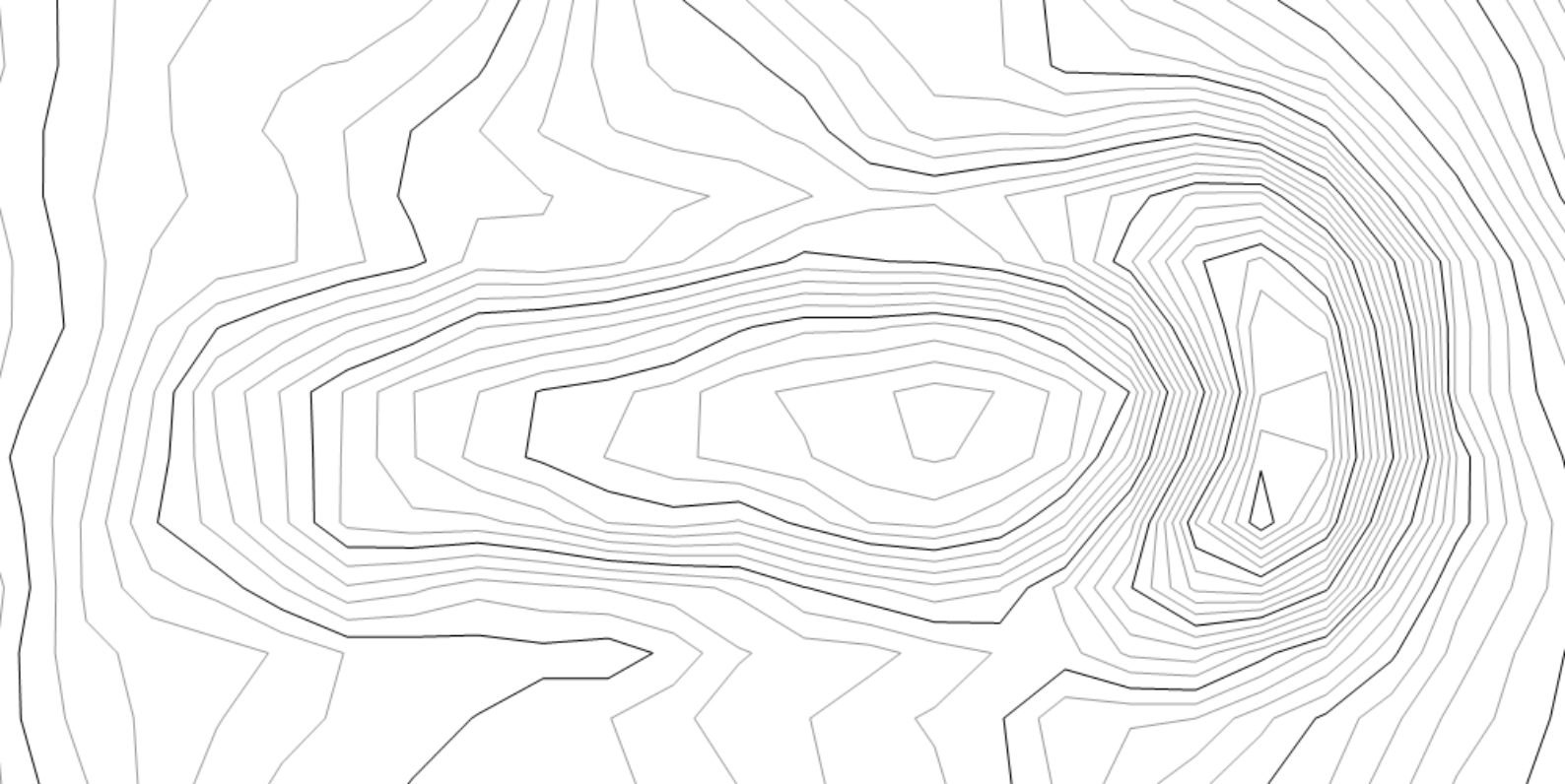
Figure 5: Fehérvár – Area 2: building 2.

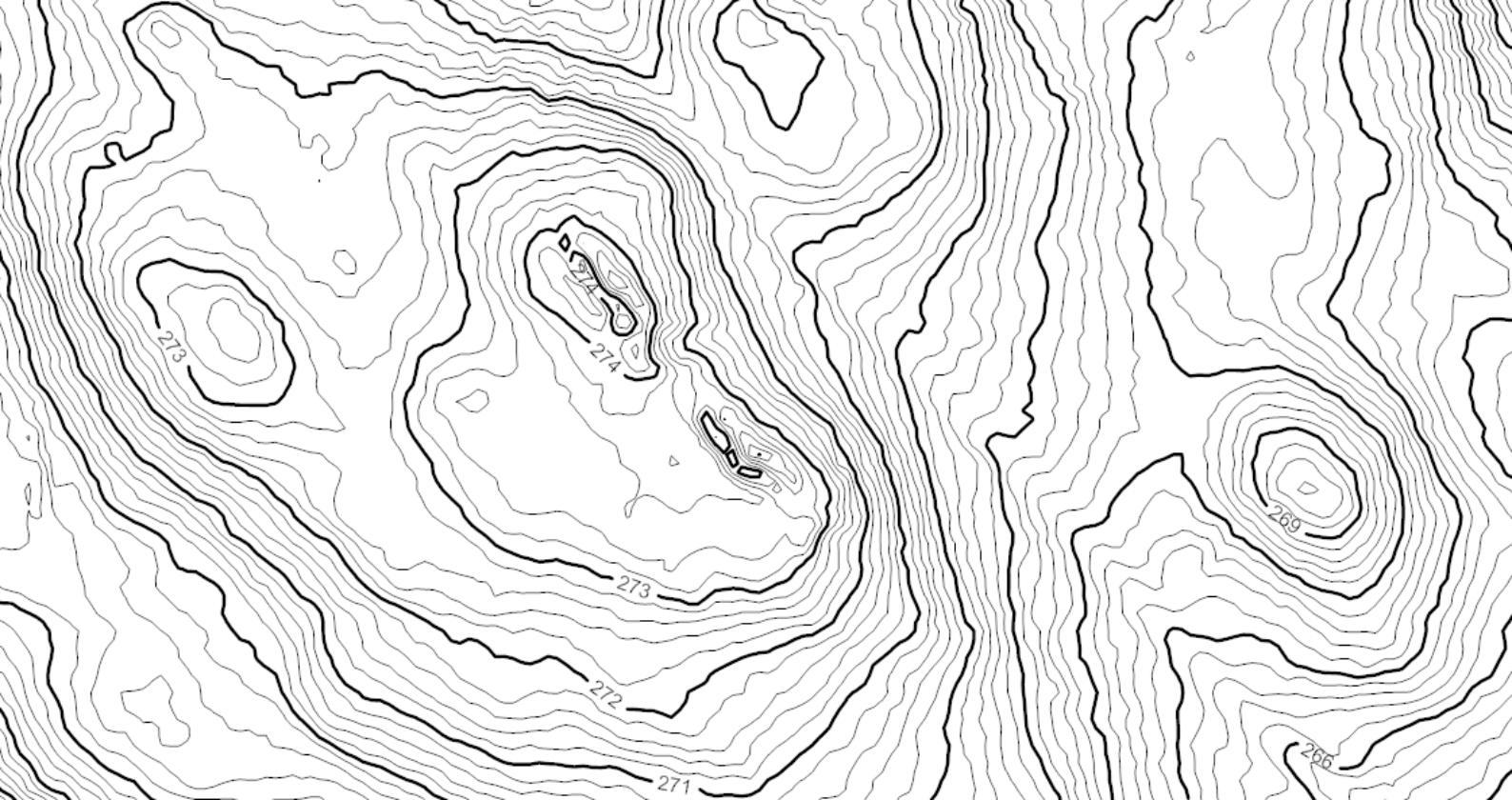
Height accuracy:

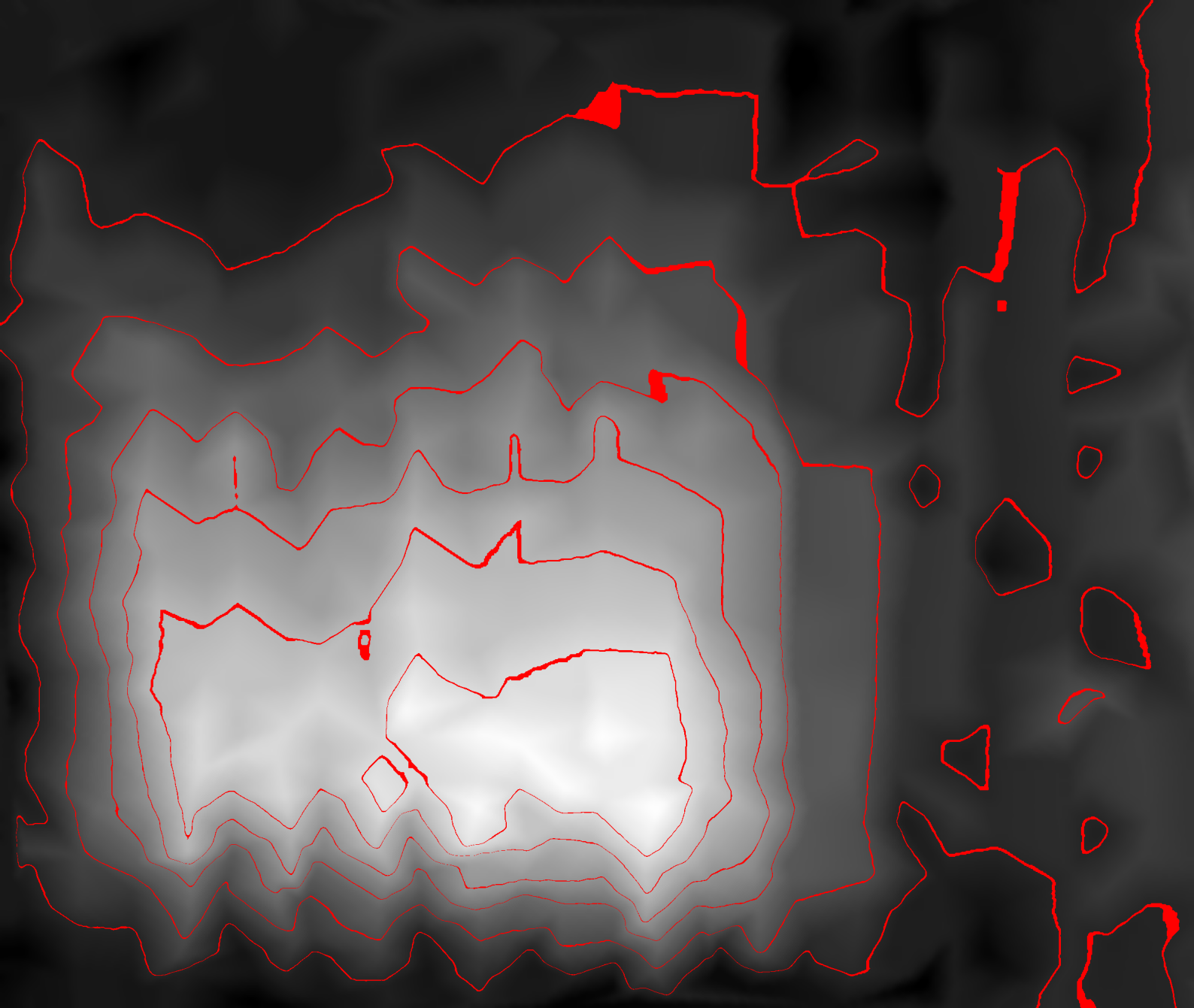
Table 1: Height report.

Szekesferhevar - Area 1					
East	North	Reference Height (m)	Calculated Height (m)	Reference Height - Calculated Height (m)	(Reference Height - Calculated Height (m)) ²
601304.07	204638.82	106.29	106.08	0.21	0.04
602180.51	205555.01	108.64	108.79	-0.15	0.02
601792.87	205368.46	110.30	110.43	-0.13	0.02
601883.63	205845.06	109.74	109.65	0.09	0.01
603329.76	205755.81	115.66	115.68	-0.02	0.00
601241.28	206021.28	108.43	108.43	0.00	0.00

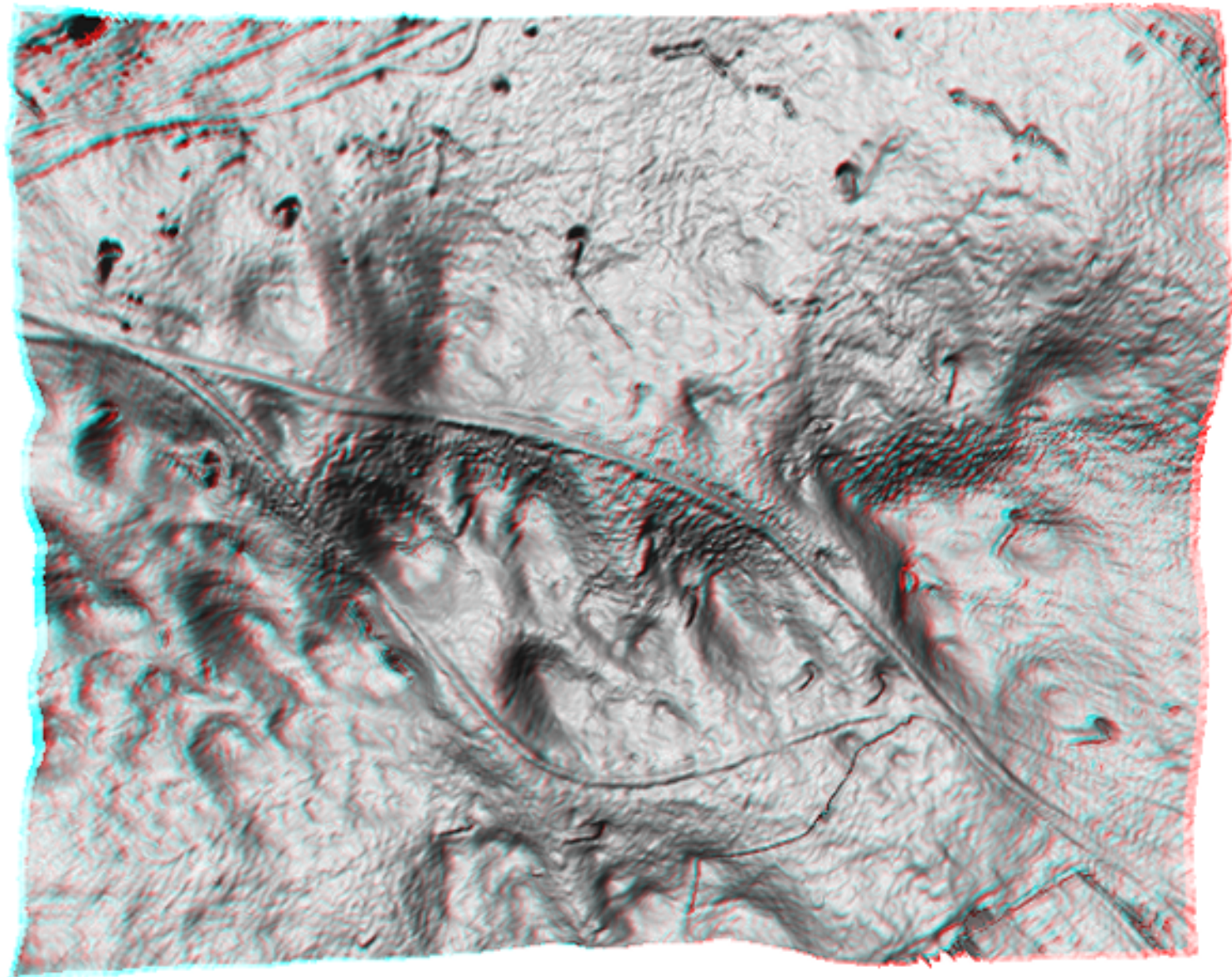
Ferrehevar - Area 2					
East	North	Reference Height (m)	Calculated Height (m)	Reference Height - Calculated Height (m)	(Reference Height - Calculated Height (m)) ²
588576.54	210491.61	285.99	286.04	-0.05	0.00
589162.53	210638.76	275.67	275.72	-0.05	0.00
591008.48	209489.82	241.40	241.36	0.04	0.00
592696.64	209701.84	143.35	143.33	0.02	0.00



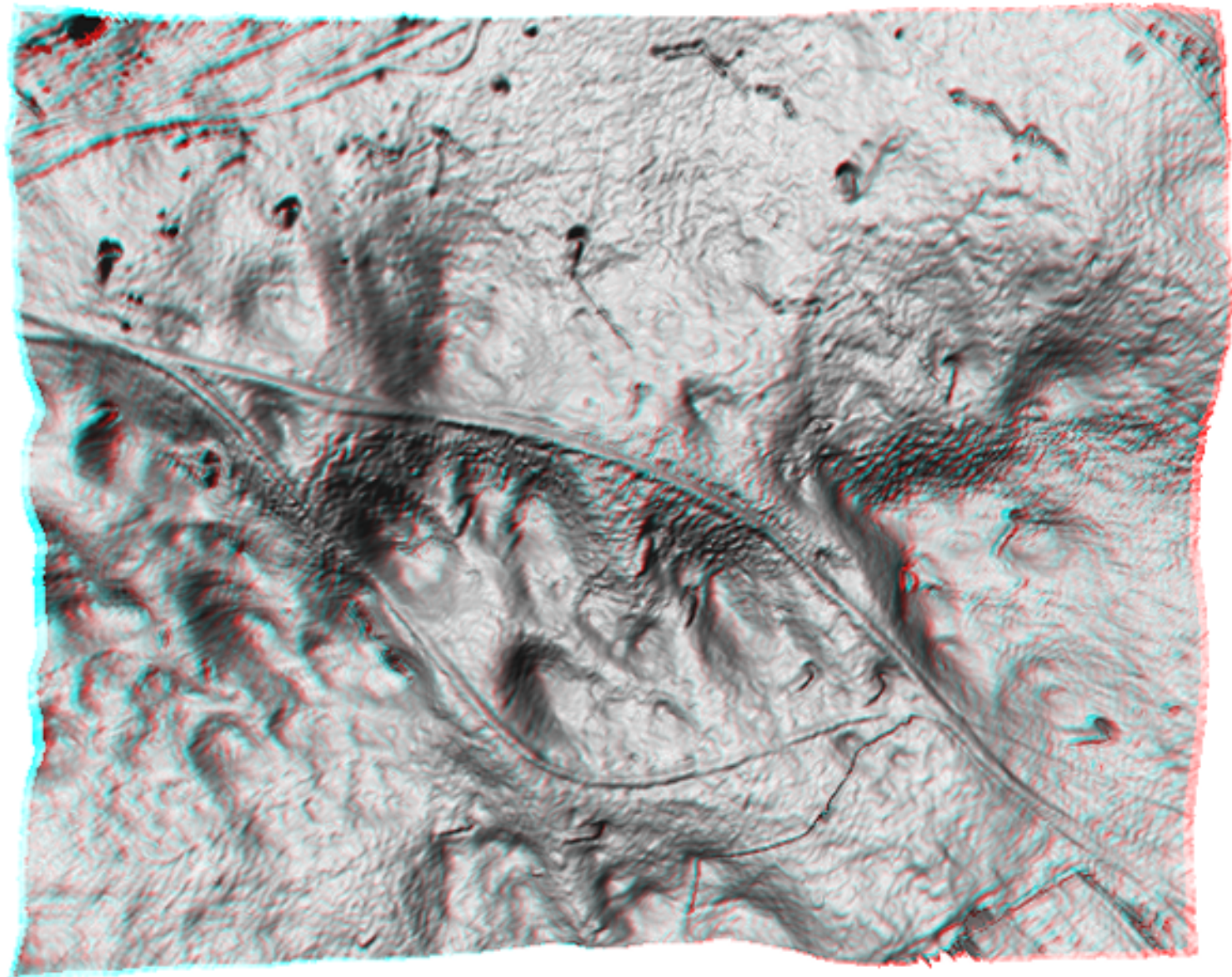




SRTM - LiDAR



SRTM - LiDAR



	$\Phi = N\ 47-$	$\Lambda = E\ 18-$	15-39	15-42	15-45	15-48	15-51
		dY dX H-200	0,9333 92,65	0,9333 92,65	0,9333 92,65	0,9333 92,64	0,9333 92,64
13-54	6		590436,9 210032,1 52	590500,0 210031,5 45	590563,1 210030,8 41	590626,2 210030,2 36	590689,3 210029,5 34
13-51	5		590436,0 209939,5 57	590499,1 209938,8 51	590562,2 209938,2 48	590625,3 209937,5 44	590688,4 209936,9 40
13-48	4		590435,0 209846,8 63	590498,1 209846,2 62	590561,2 209845,5 59	590624,3 209844,9 54	590687,4 209844,2 50
13-45	3		590434,1 209754,2 62	590497,2 209753,5 66	590560,3 209752,9 67	590623,4 209752,2 64	590686,5 209751,6 59
13-42	2		590433,2 209661,5 58	590496,3 209660,9 63	590559,4 209660,3 67	590622,5 209659,6 68	590685,6 209659,0 63
13-39	1		590432,2 209568,9 53	590495,3 209568,2 56	590558,4 209567,6 59	590621,5 209567,0 62	590684,6 209566,4 60
13-36	0		590431,3 209476,2 50	590494,4 209475,6 48	590557,5 209475,0 49	590620,6 209474,3 52	590683,7 209473,7 54
			0	1	2	3	4

ID	EOV_Y	EOV_X	SRTM_H	FI	LA
70001	590436,9	210032,1	252	47-13-54	18-15-39
70002	590436,0	209939,5	257	47-13-51	18-15-39
70003	590435,0	209846,8	263	47-13-48	18-15-39
70004	590434,1	209754,2	262	47-13-45	18-15-39
70005	590433,2	209661,5	258	47-13-42	18-15-39
70006	590432,2	209568,9	253	47-13-39	18-15-39
70007	590431,3	209476,2	250	47-13-36	18-15-39
70008	590500,0	210031,5	245	47-13-54	18-15-42
70009	590499,1	209938,8	251	47-13-51	18-15-42
70010	590498,1	209846,2	262	47-13-48	18-15-42
70011	590497,2	209753,5	266	47-13-45	18-15-42
70012	590496,3	209660,9	263	47-13-42	18-15-42
70013	590495,3	209568,2	256	47-13-39	18-15-42
70014	590494,4	209475,6	248	47-13-36	18-15-42
70015	590563,1	210030,8	241	47-13-54	18-15-45
70016	590562,2	209938,2	248	47-13-51	18-15-45
70017	590561,2	209845,5	259	47-13-48	18-15-45
70018	590560,3	209752,9	267	47-13-45	18-15-45
70019	590559,4	209660,3	267	47-13-42	18-15-45
70020	590558,4	209567,6	259	47-13-39	18-15-45

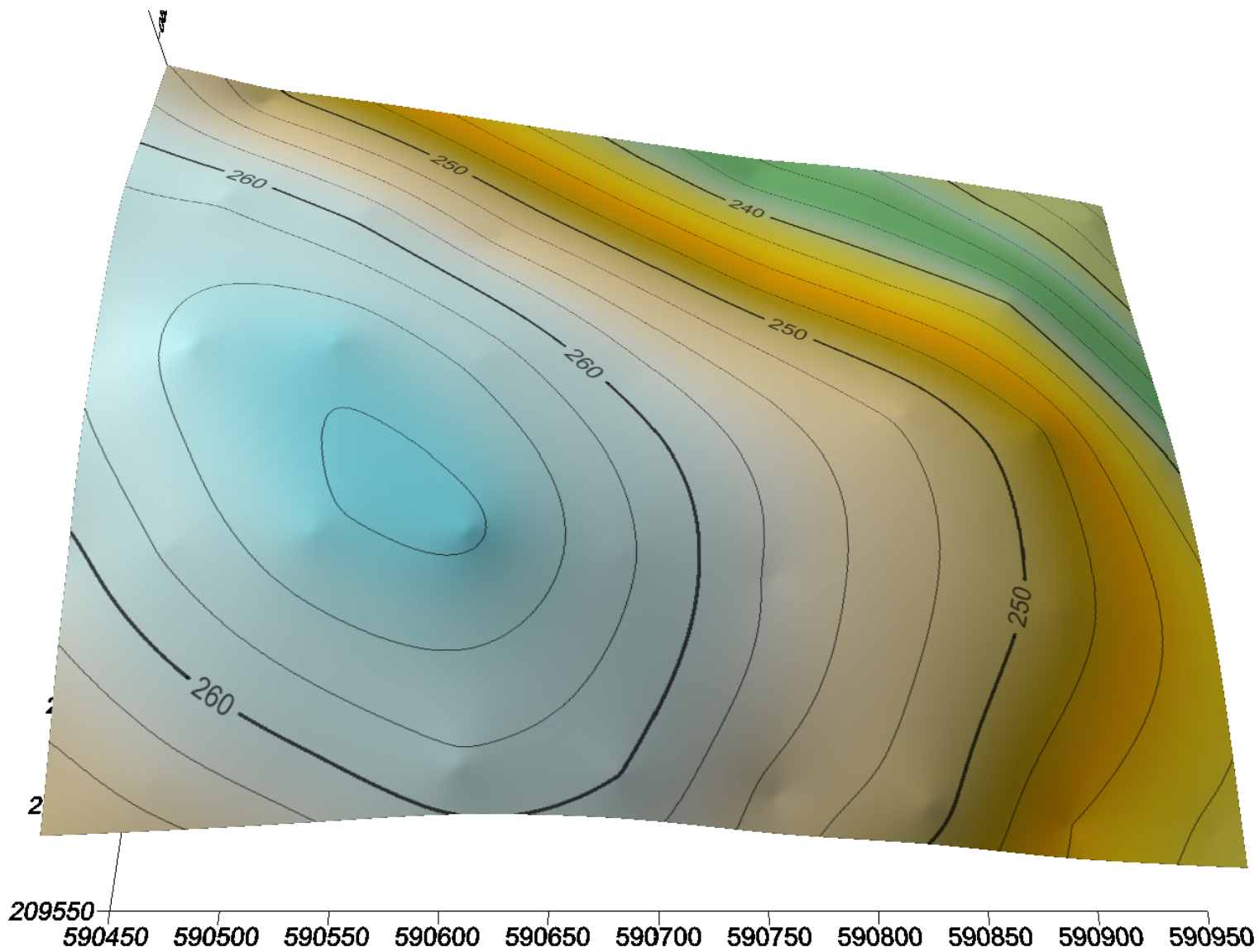
70021	590557,5	209475,0	249	47-13-36	18-15-45
70022	590626,2	210030,2	236	47-13-54	18-15-48
70023	590625,3	209937,5	244	47-13-51	18-15-48
70024	590624,3	209844,9	254	47-13-48	18-15-48
70025	590623,4	209752,2	264	47-13-45	18-15-48
70026	590622,5	209659,6	268	47-13-42	18-15-48
70027	590621,5	209567,0	262	47-13-39	18-15-48
70028	590620,6	209474,3	252	47-13-36	18-15-48
70029	590689,3	210029,5	234	47-13-54	18-15-51
70030	590688,4	209936,9	240	47-13-51	18-15-51
70031	590687,4	209844,2	250	47-13-48	18-15-51
70032	590686,5	209751,6	259	47-13-45	18-15-51
70033	590685,6	209659,0	263	47-13-42	18-15-51
70034	590684,6	209566,4	260	47-13-39	18-15-51
70035	590683,7	209473,7	254	47-13-36	18-15-51
70036	590752,4	210028,9	231	47-13-54	18-15-54
70037	590751,5	209936,3	236	47-13-51	18-15-54
70038	590750,5	209843,6	246	47-13-48	18-15-54
70039	590749,6	209751,0	255	47-13-45	18-15-54
70040	590748,7	209658,4	257	47-13-42	18-15-54
70041	590747,7	209565,7	254	47-13-39	18-15-54
70042	590746,8	209473,1	250	47-13-36	18-15-54
70043	590815,5	210028,3	227	47-13-54	18-15-57
70044	590814,6	209935,6	234	47-13-51	18-15-57
70045	590813,6	209843,0	243	47-13-48	18-15-57
70046	590812,7	209750,3	252	47-13-45	18-15-57
70047	590811,8	209657,8	253	47-13-42	18-15-57
70048	590810,8	209565,1	251	47-13-39	18-15-57
70049	590809,9	209472,5	245	47-13-36	18-15-57
70050	590878,6	210027,6	224	47-13-54	18-16-00
70051	590877,7	209935,0	230	47-13-51	18-16-00
70052	590876,7	209842,4	240	47-13-48	18-16-00
70053	590875,8	209749,7	248	47-13-45	18-16-00
70054	590874,9	209657,1	249	47-13-42	18-16-00
70055	590873,9	209564,5	245	47-13-39	18-16-00
70056	590873,0	209471,9	243	47-13-36	18-16-00
70057	590941,7	210027,0	220	47-13-54	18-16-03
70058	590940,8	209934,3	226	47-13-51	18-16-03
70059	590939,8	209841,7	233	47-13-48	18-16-03
70060	590938,9	209749,1	241	47-13-45	18-16-03
70061	590938,0	209656,5	244	47-13-42	18-16-03
70062	590937,0	209563,9	242	47-13-39	18-16-03
70063	590936,1	209471,2	240	47-13-36	18-16-03
70064	591004,8	210026,3	218	47-13-54	18-16-06
70065	591003,9	209933,7	219	47-13-51	18-16-06
70066	591002,9	209841,1	226	47-13-48	18-16-06
70067	591002,0	209748,4	234	47-13-45	18-16-06
70068	591001,1	209655,9	240	47-13-42	18-16-06
70069	591000,1	209563,3	240	47-13-39	18-16-06
70070	590999,2	209470,6	238	47-13-36	18-16-06

15-54	15-57	16-00	16-03	16-06	
0,9333 92,64	0,9333 92,64	0,9333 92,64	0,9333 92,633	0,9333 92,633	
590752,4 210028,9 31	590815,5 210028,3 27	590878,6 210027,6 24	590941,7 210027,0 20	591004,8 210026,3 18	63,1 -0,63
590751,5 209936,3 36	590814,6 209935,6 34	590877,7 209935,0 30	590940,8 209934,3 26	591003,9 209933,7 19	63,1 -0,63
590750,5 209843,6 46	590813,6 209843,0 43	590876,7 209842,4 40	590939,8 209841,7 33	591002,9 209841,1 26	63,1 -0,63
590749,6 209751,0 55	590812,7 209750,3 52	590875,8 209749,7 48	590938,9 209749,1 41	591002,0 209748,4 34	63,1 -0,63
590748,7 209658,4 57	590811,8 209657,8 53	590874,9 209657,1 49	590938,0 209656,5 44	591001,1 209655,9 40	63,1 -0,62
590747,7 209565,7 54	590810,8 209565,1 51	590873,9 209564,5 45	590937,0 209563,9 42	591000,1 209563,3 40	63,1 -0,62
590746,8 209473,1 50	590809,9 209472,5 45	590873,0 209471,9 43	590936,1 209471,2 40	590999,2 209470,6 38	63,1 -0,62
5	6	7	8	9	

0,9333 92,64	0,9333 92,64	0,9333 92,64	0,9333 92,633	0,9333 92,633	
590752,4 210028,9 31	590815,5 210028,3 27	590878,6 210027,6 24	590941,7 210027,0 20	591004,8 210026,3 18	63,1 -0,63
590751,5 209936,3 36	590814,6 209935,6 34	590877,7 209935,0 30	590940,8 209934,3 26	591003,9 209933,7 19	63,1 -0,63
590750,5 209843,6 46	590813,6 209843,0 43	590876,7 209842,4 40	590939,8 209841,7 33	591002,9 209841,1 26	63,1 -0,63
590749,6 209751,0 55	590812,7 209750,3 52	590875,8 209749,7 48	590938,9 209749,1 41	591002,0 209748,4 34	63,1 -0,63
590748,7 209658,4 57	590811,8 209657,8 53	590874,9 209657,1 49	590938,0 209656,5 44	591001,1 209655,9 40	63,1 -0,62
590747,7 209565,7 54	590810,8 209565,1 51	590873,9 209564,5 45	590937,0 209563,9 42	591000,1 209563,3 40	63,1 -0,62
590746,8 209473,1 50	590809,9 209472,5 45	590873,0 209471,9 43	590936,1 209471,2 40	590999,2 209470,6 38	63,1 -0,62
5	6	7	8	9	

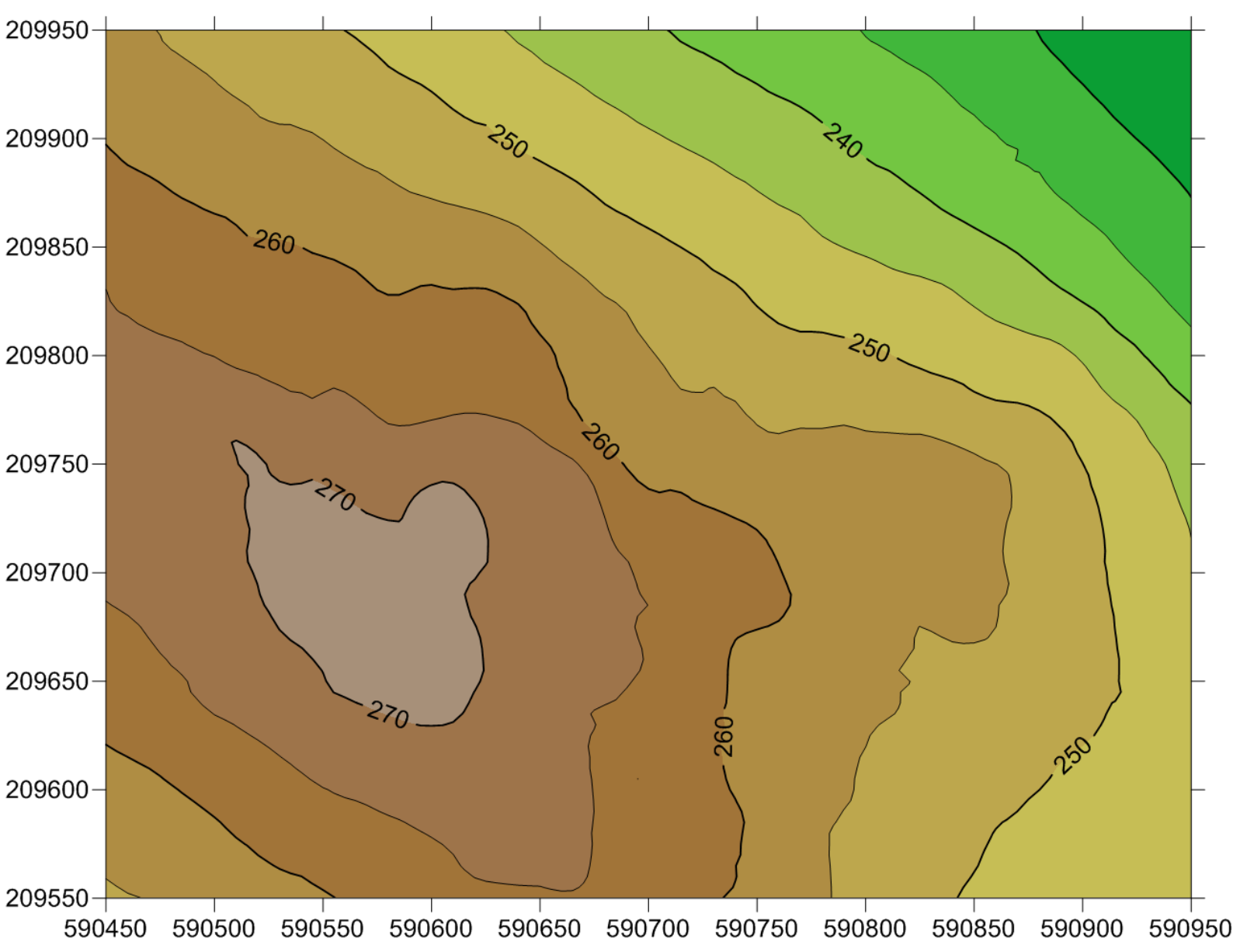
	18-15-39	18-15-42	18-15-45	18-15-48	18-15-51	18-15-54	18-15-57	18-16-00	18-16-03	18-16-06	
47-13-54											
47-13-51											
47-13-48											
47-13-45											
47-13-42											
47-13-39											
47-13-36											
	SRTM magasság = intenzitásérték + 100										

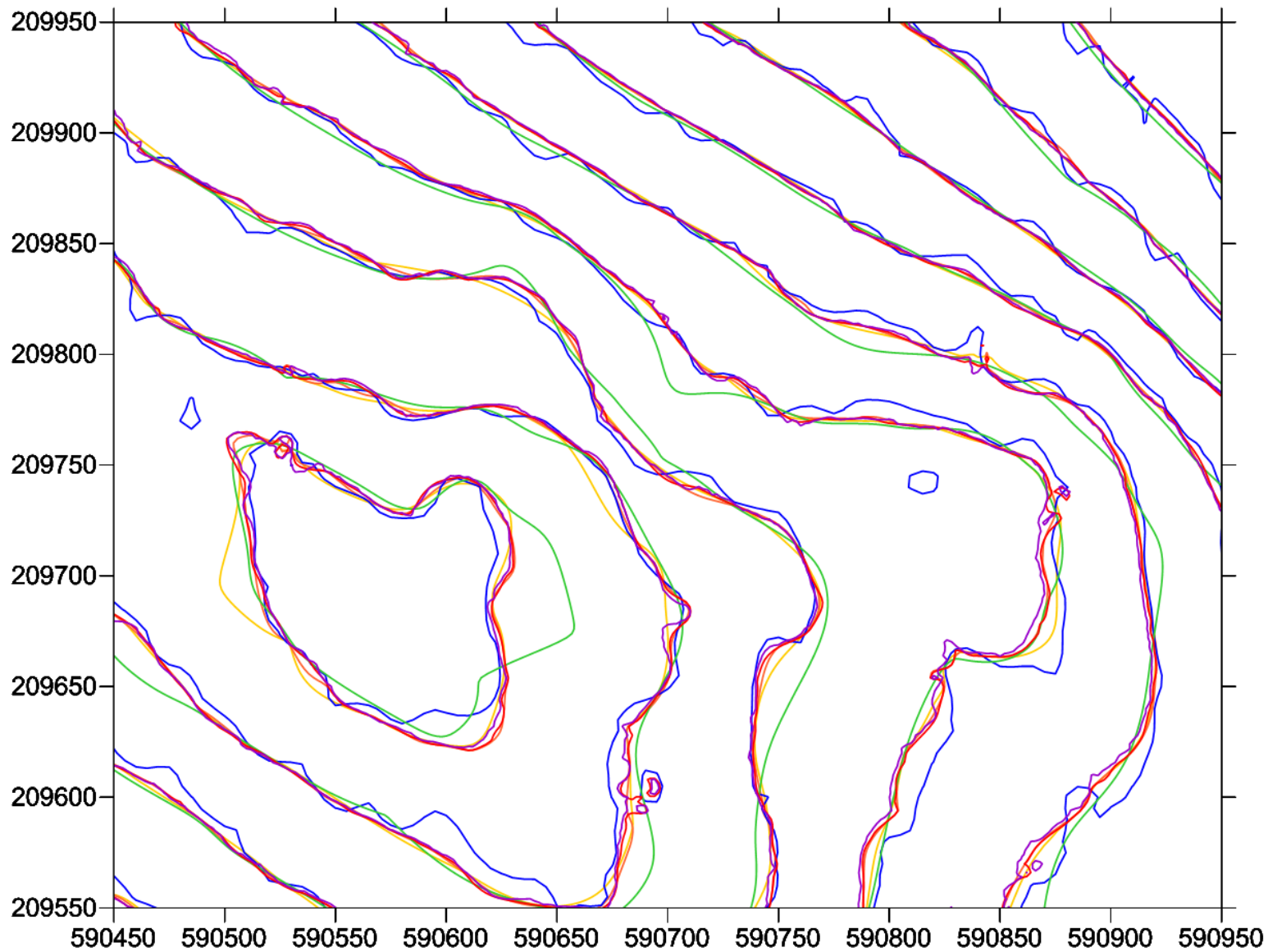


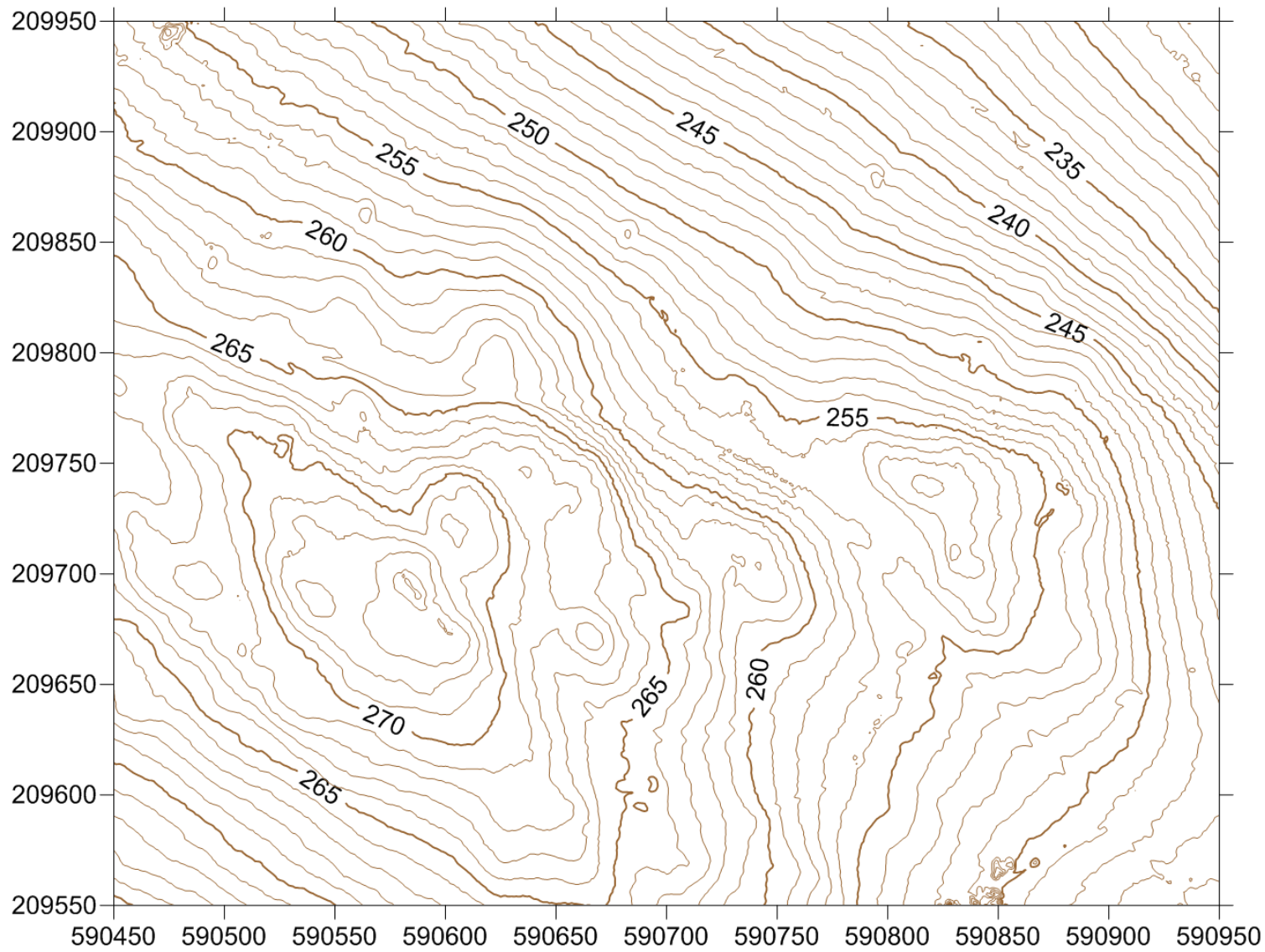


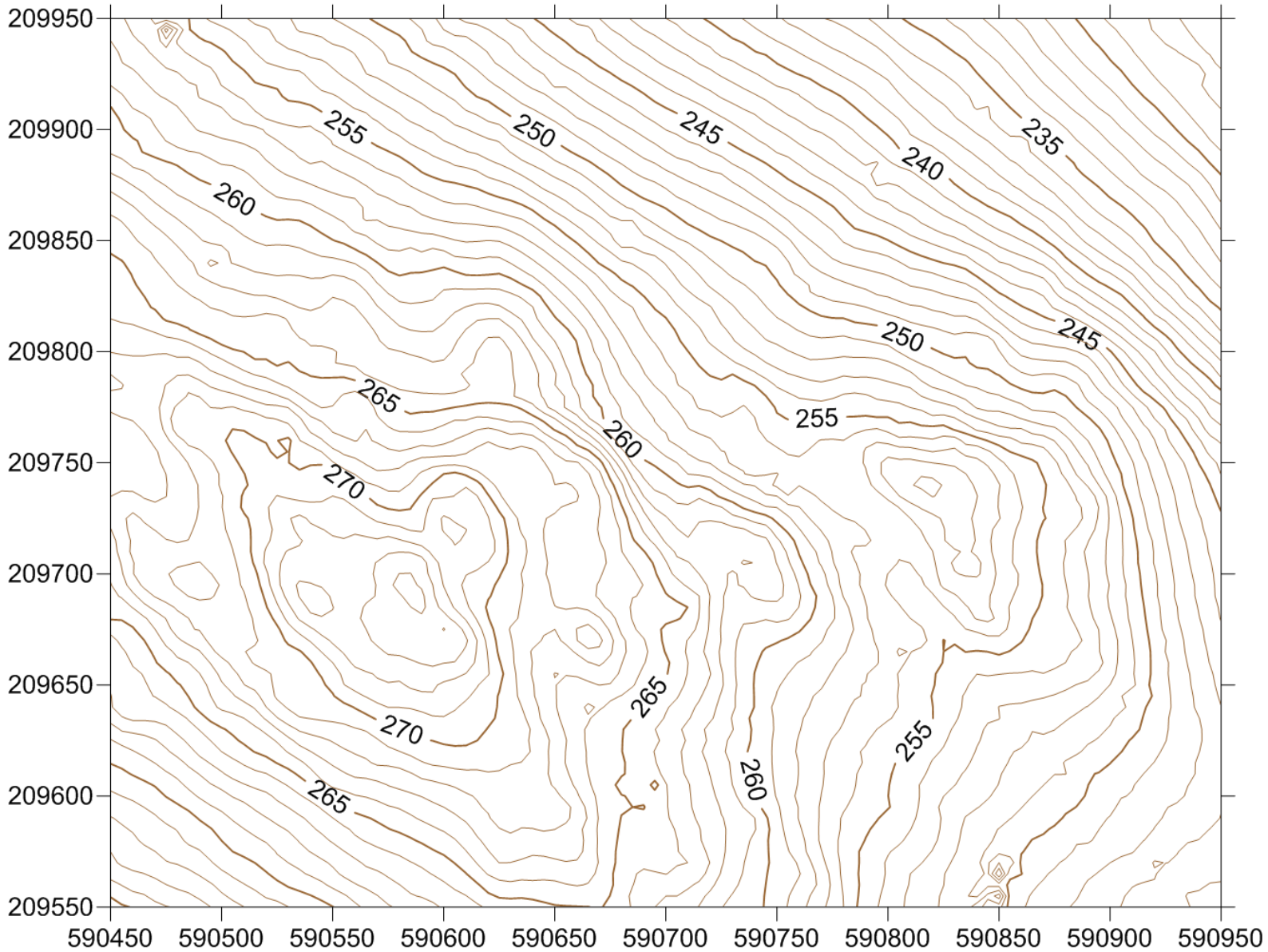


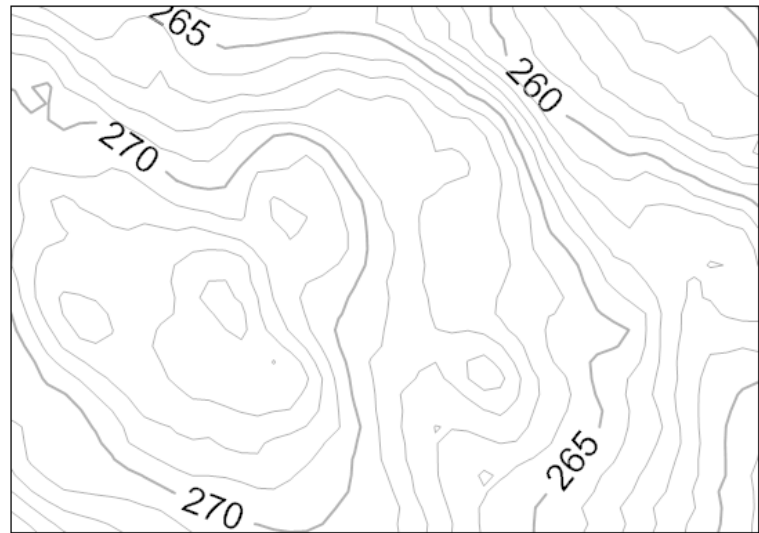
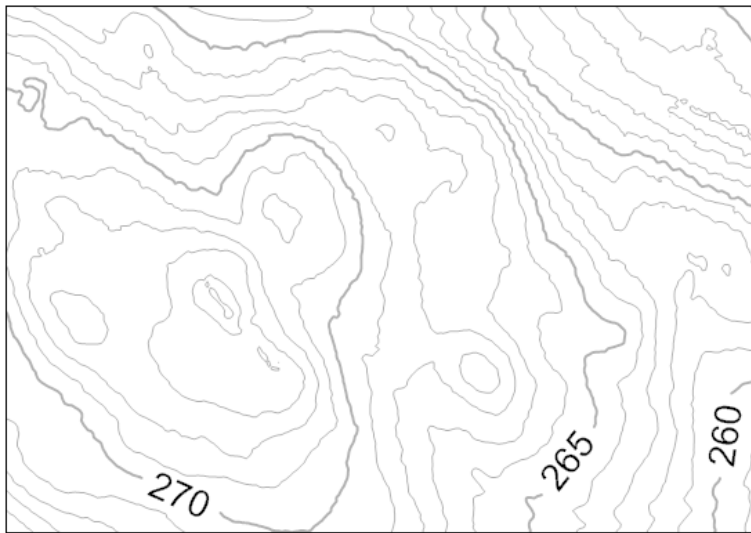
	18-15-39	18-15-42	18-15-45	18-15-48	18-15-51	18-15-54	18-15-57	18-16-00	18-16-03	18-16-06	
47-13-54											
47-13-51											
47-13-48											
47-13-45											
47-13-42											
47-13-39											
47-13-36											
	SRTM magasság = intenzitásérték + 100										

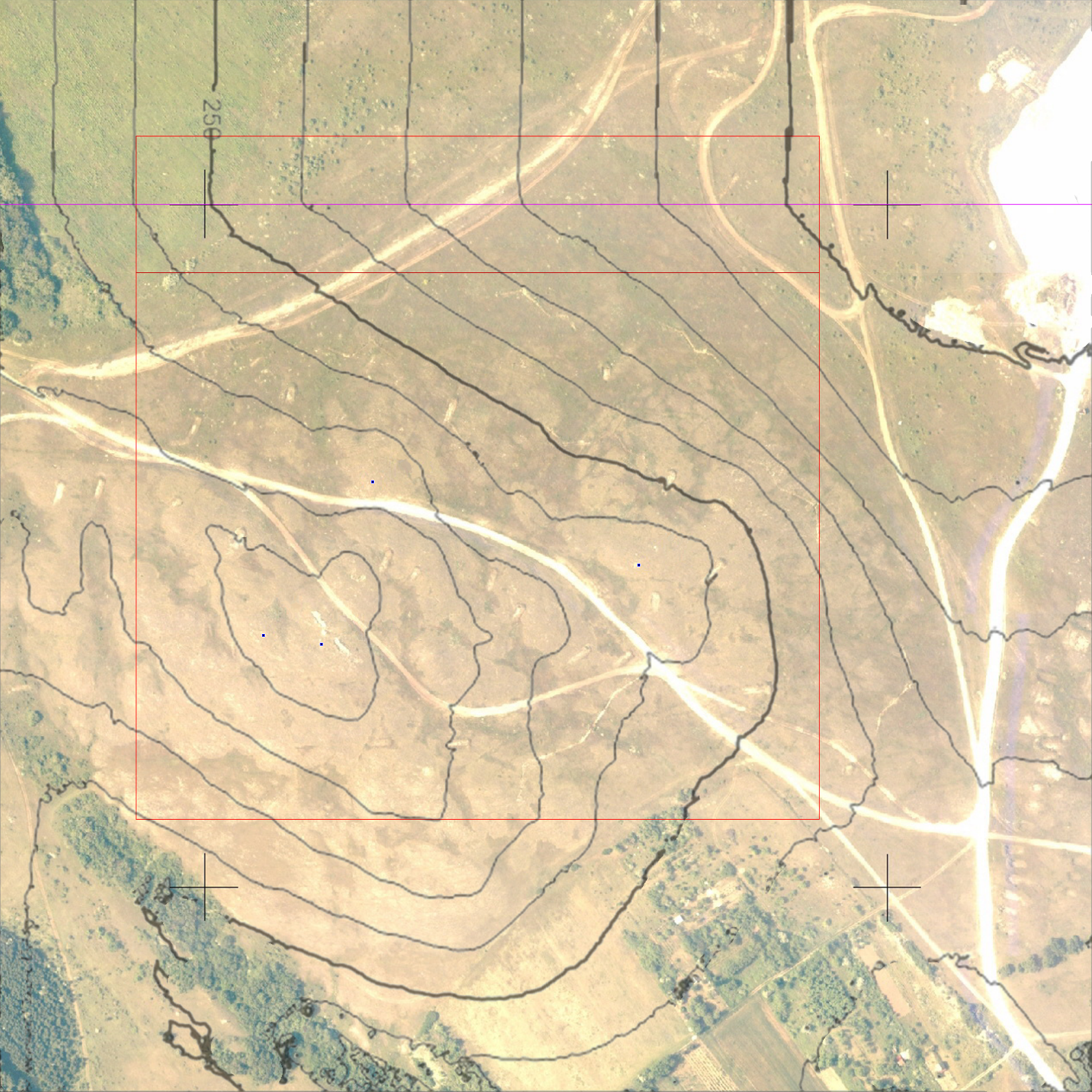




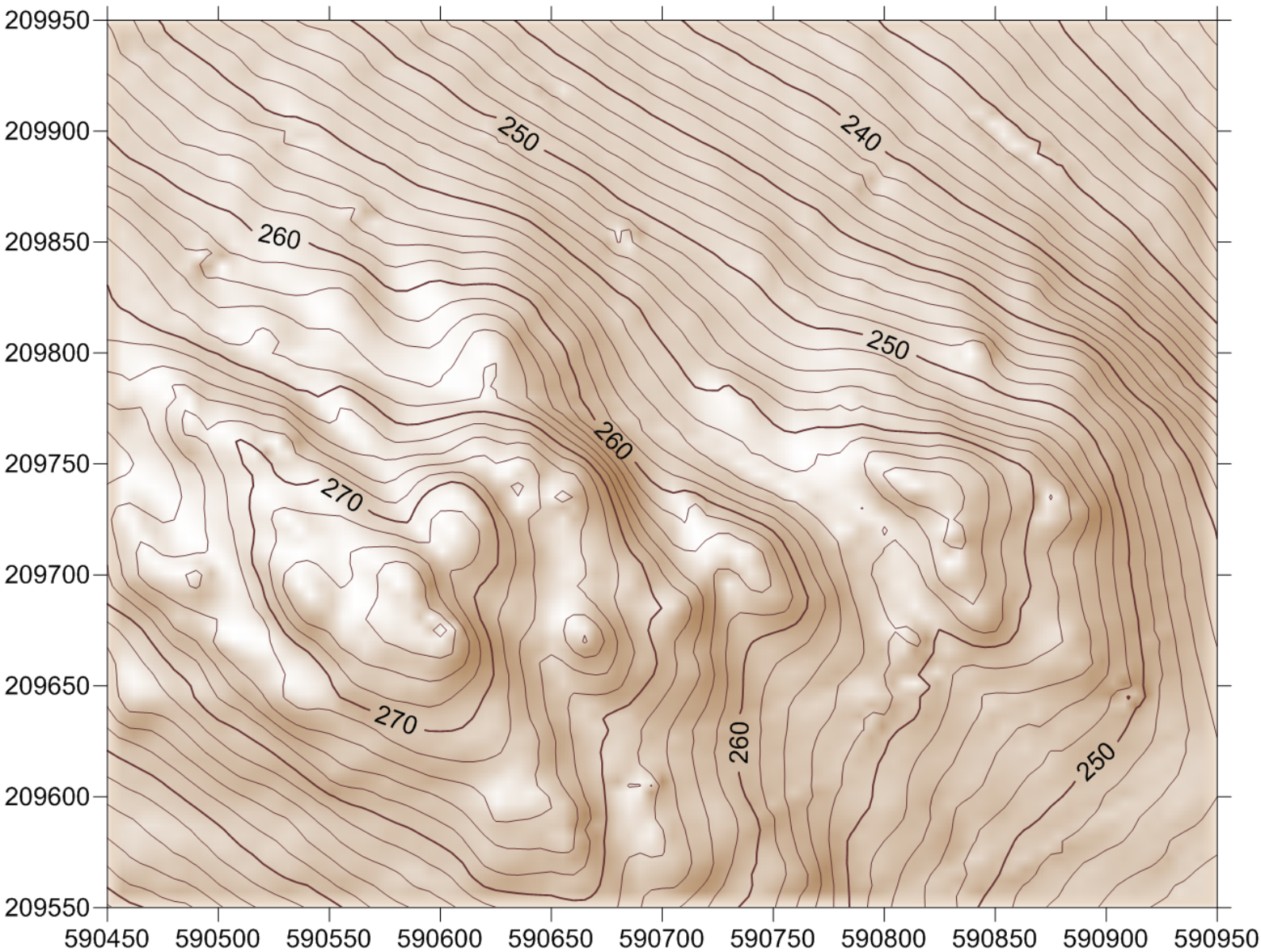


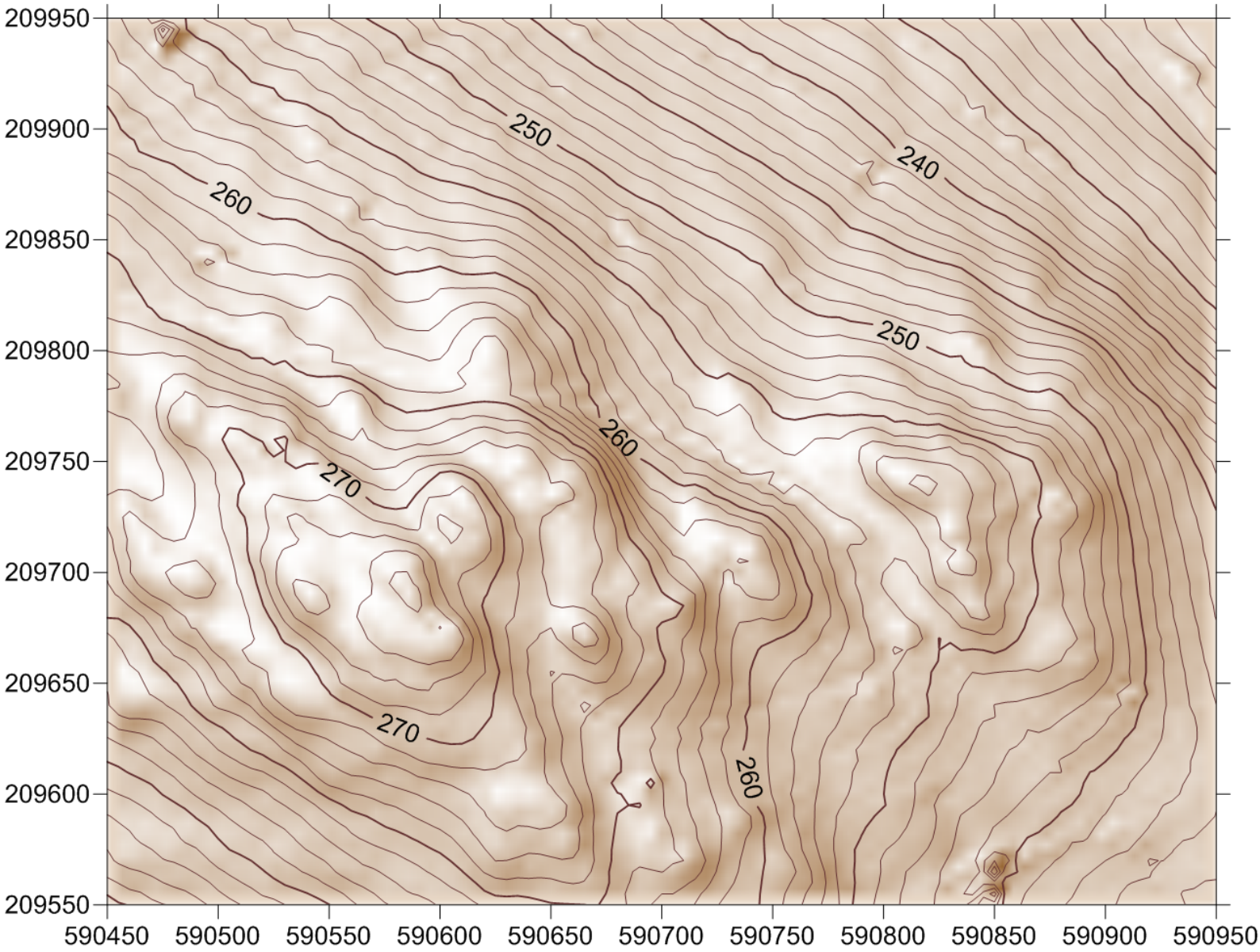






250



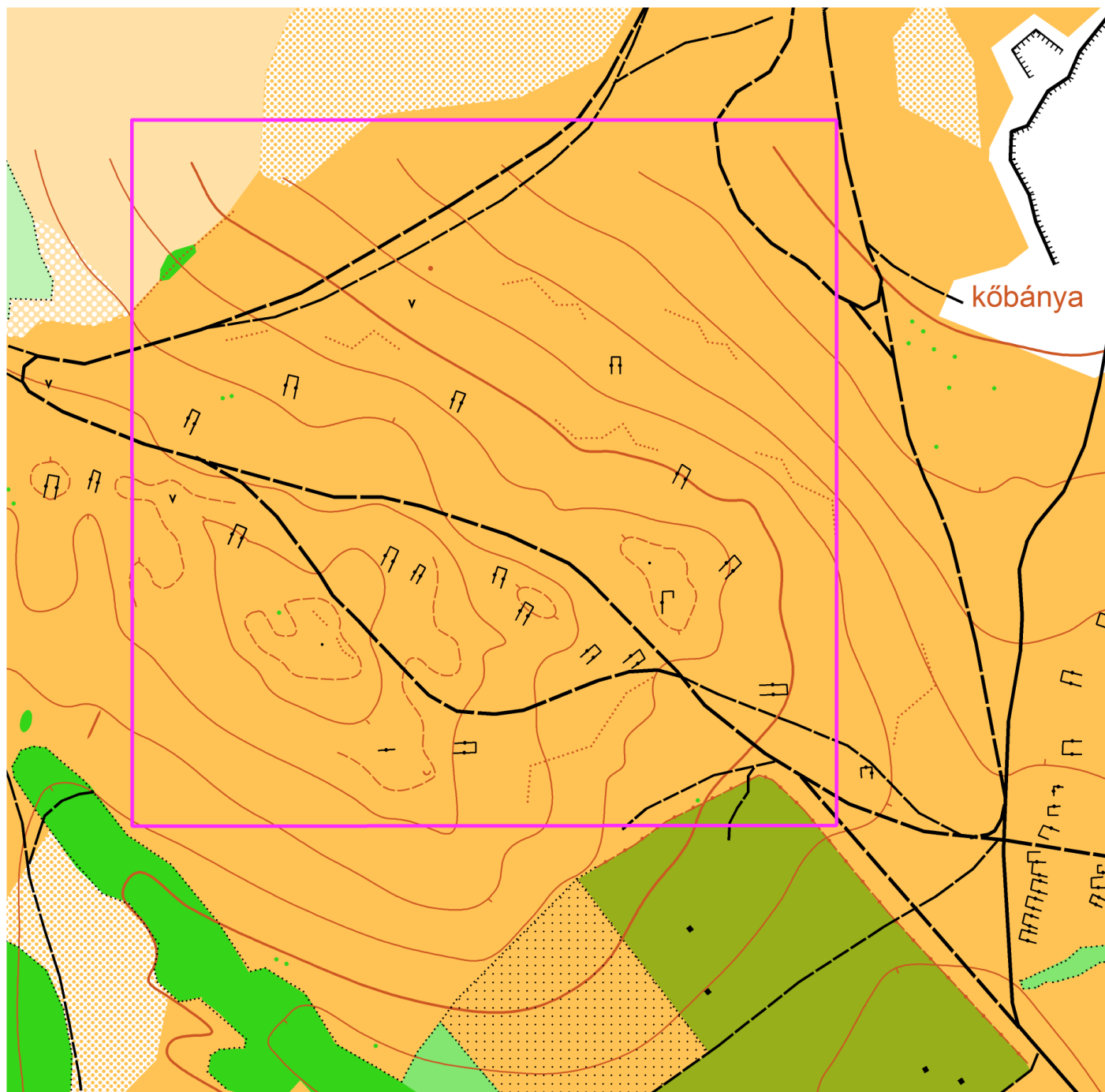


Gomba-hegy - Leányvágó

méretarány 1:5000
alapszintköz 5m

0

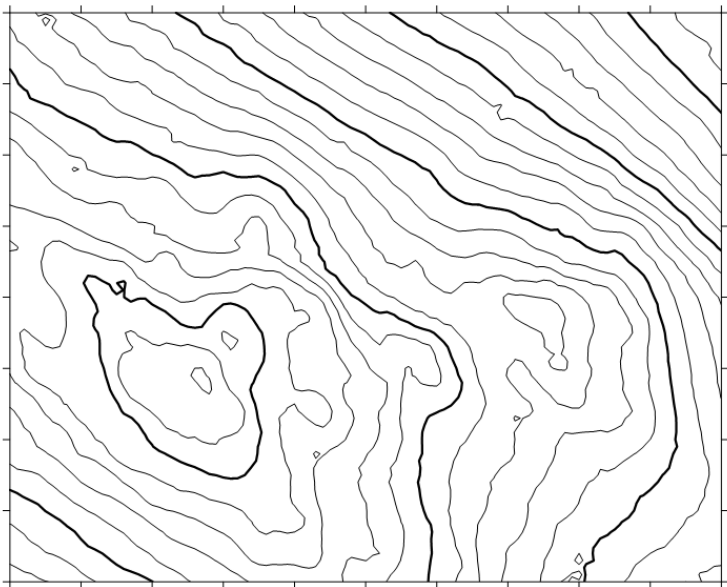
500 m



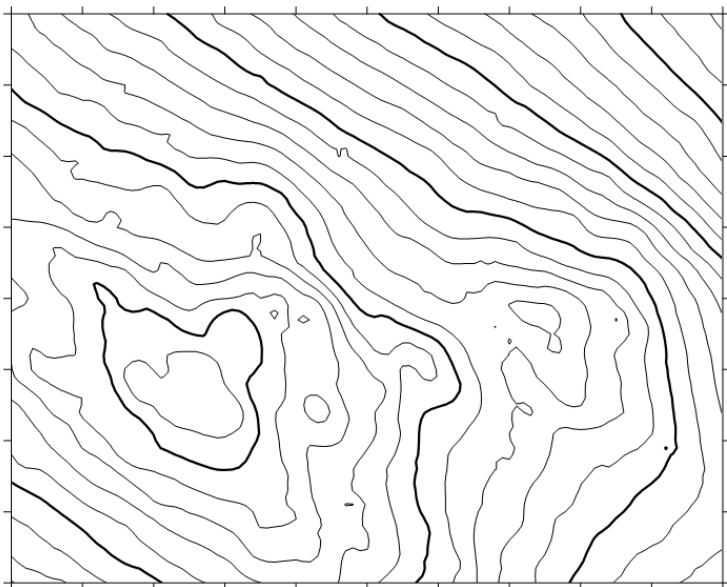
Készítette: Miklós Ákos, 2012.

A 2008-as LiDAR felmérés felhasználásával.

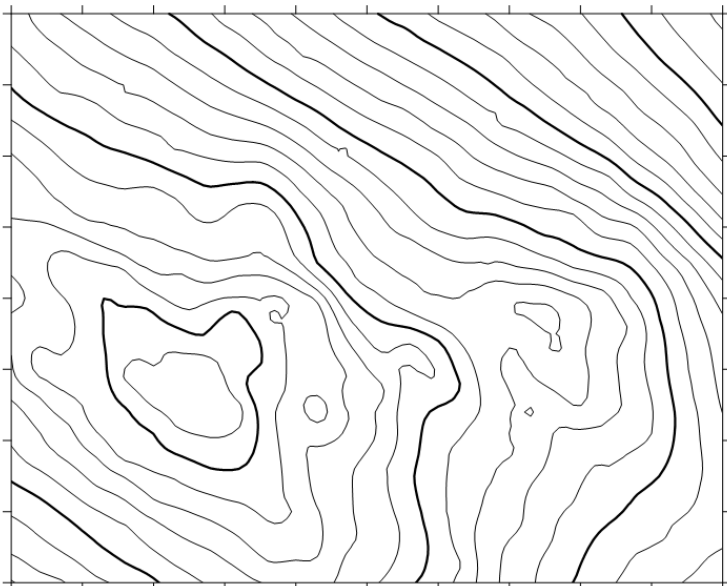
LiDAR



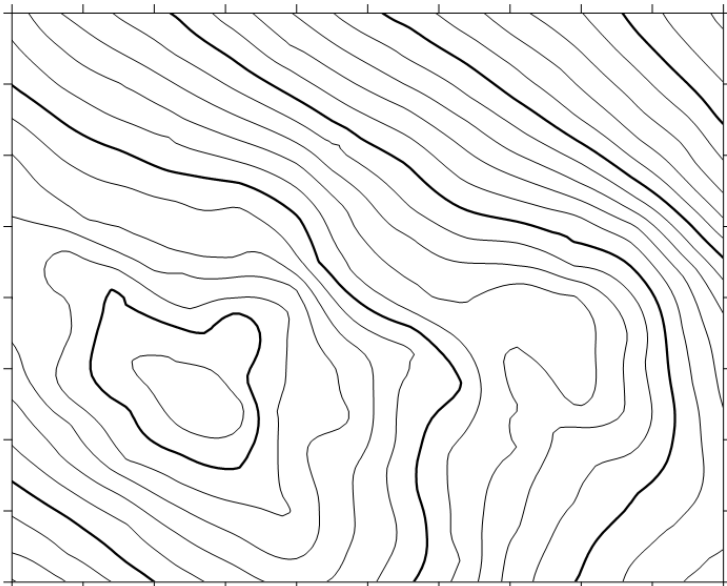
GPS 1



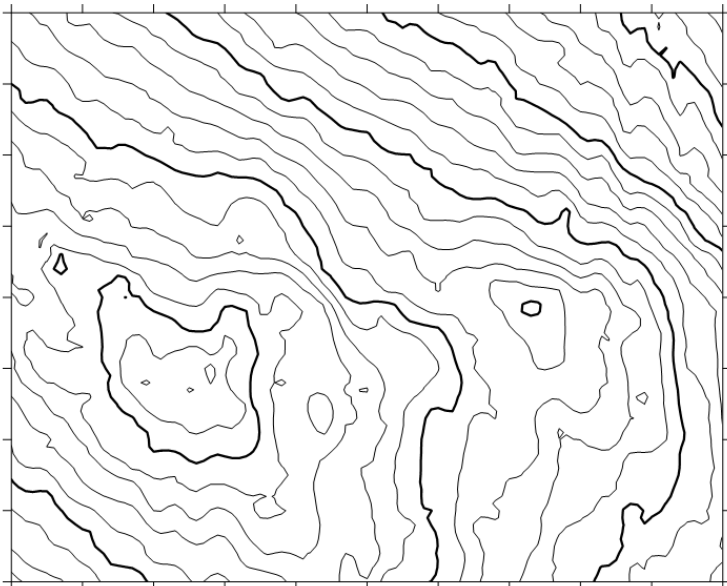
GPS 2



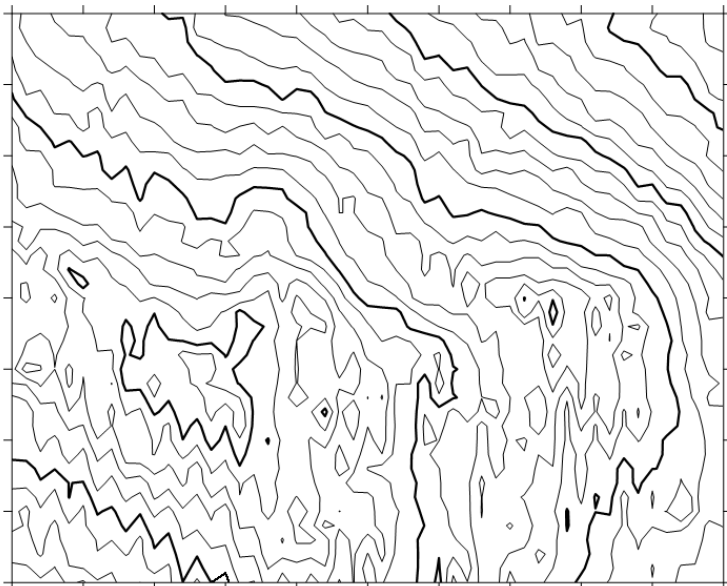
GPS 4



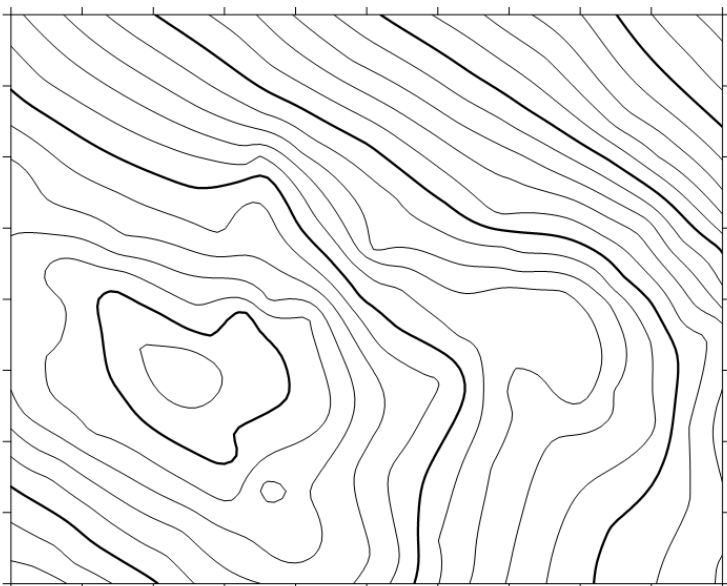
BM1



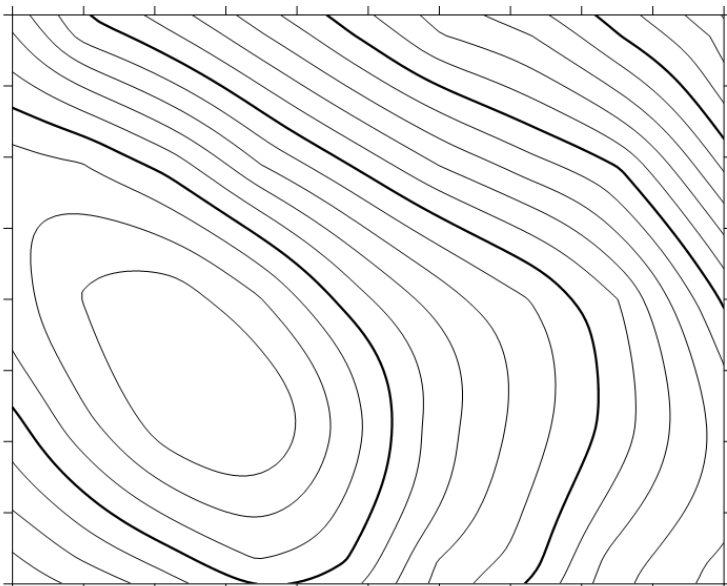
BM2

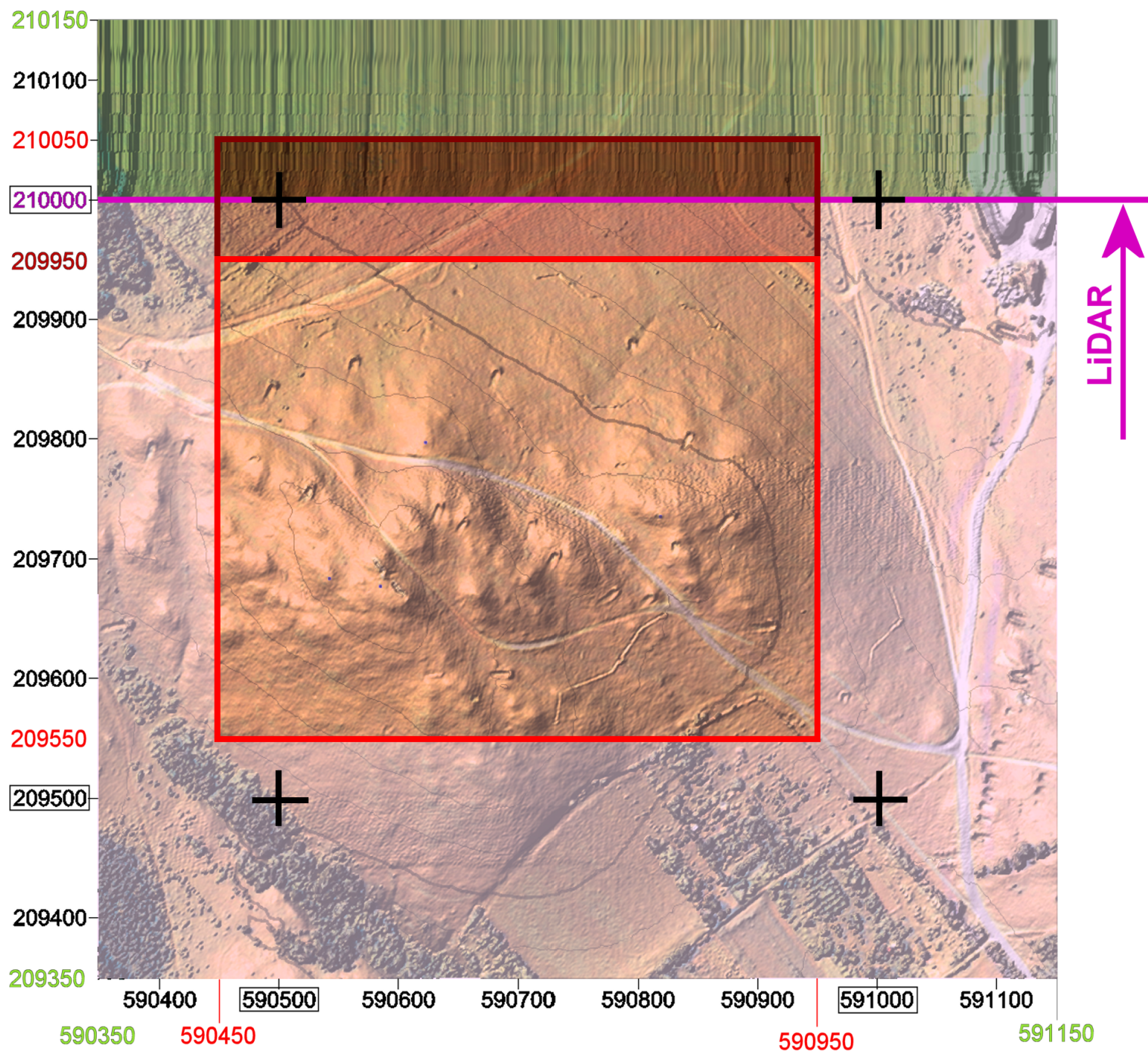


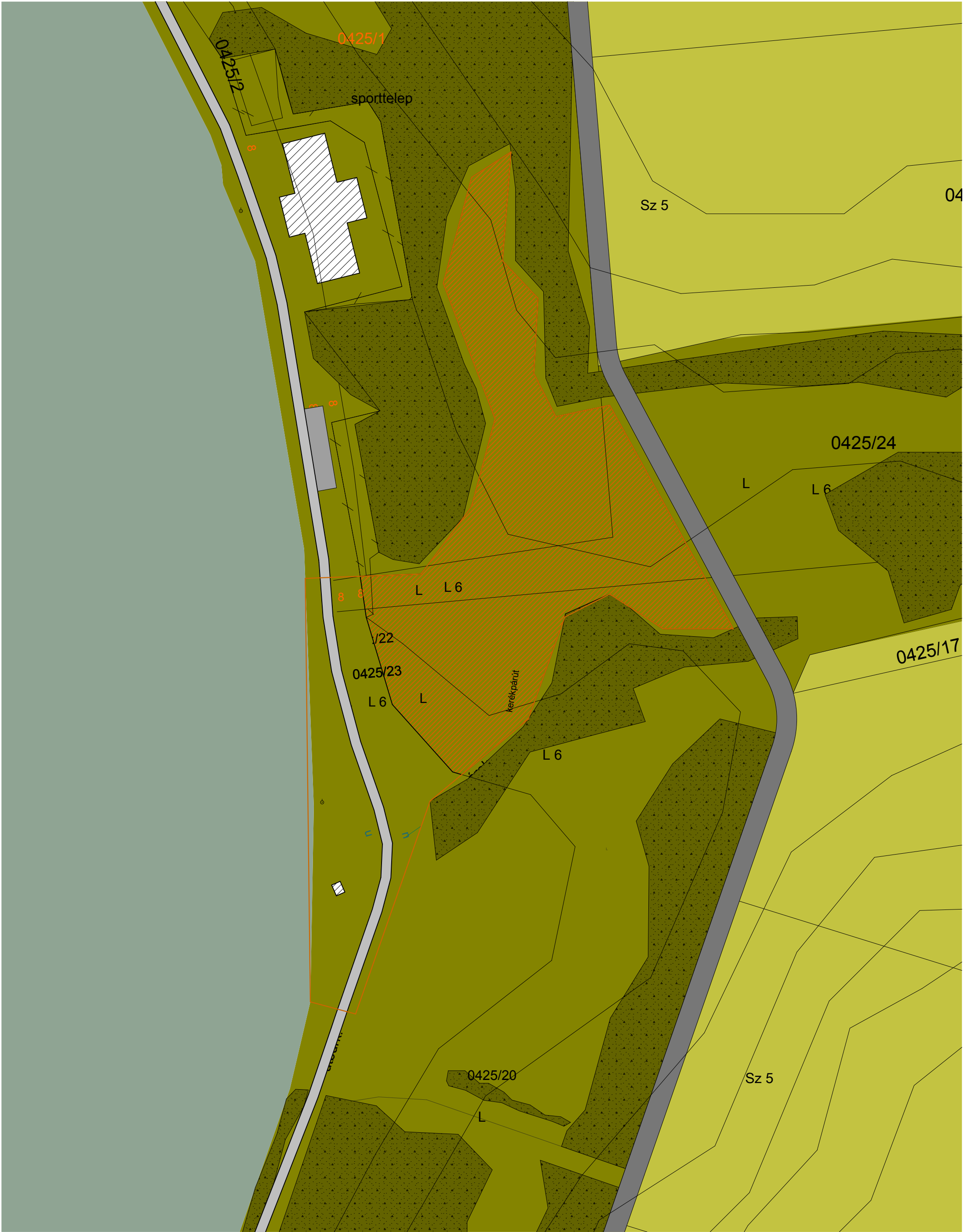
TOPO



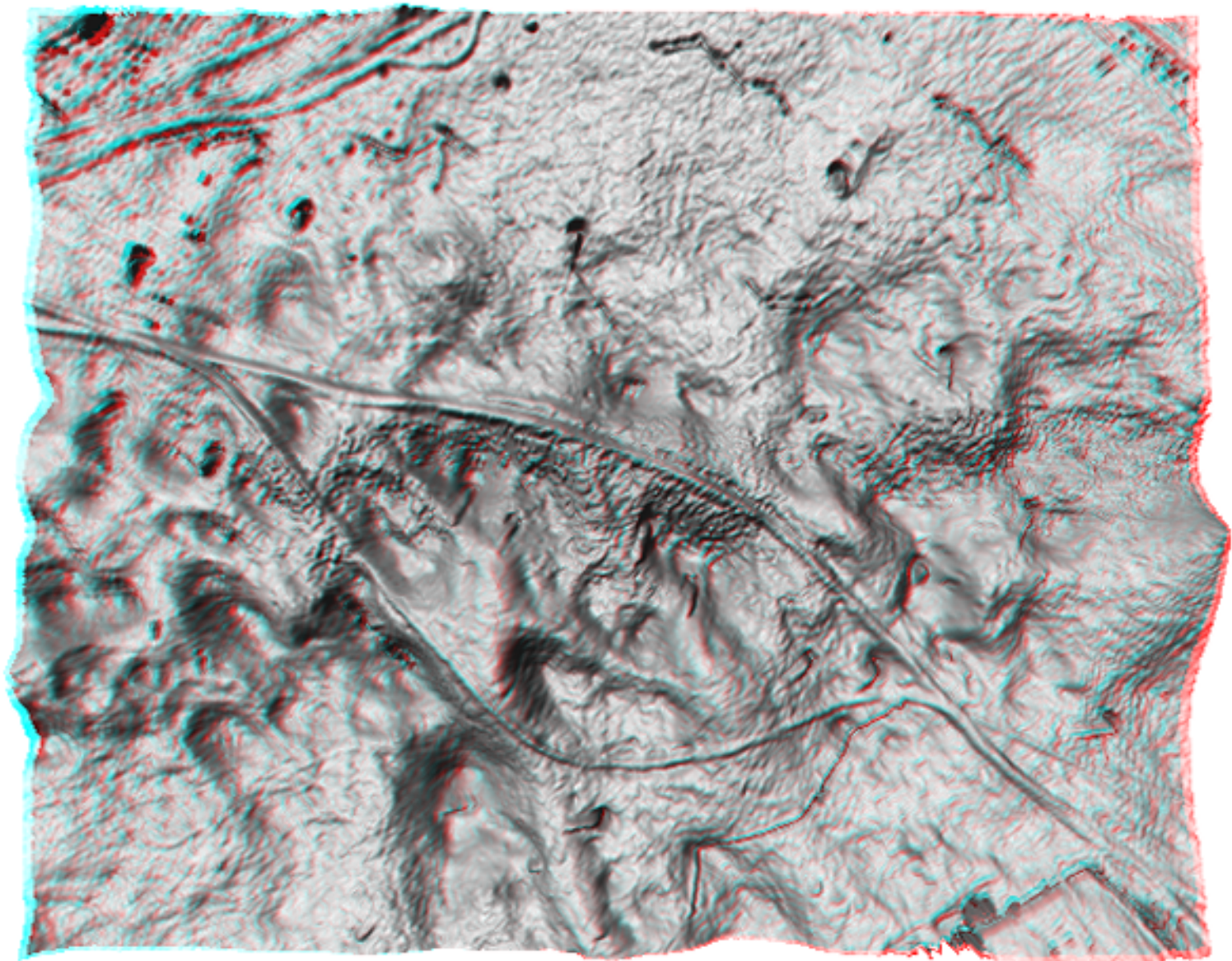
SRTM







TOPO - LiDAR



TOPO - LiDAR

