Maussanne study on GNSS measurements: preliminary results

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Beata Hejmanowska

Philippe Loudjani, Cozmin Lucau, Krasi Ganisheva

Parcel area validation method

What is going on? – very shortly

Buffer=perimeter*__tolerance__

Allowed discrepancy between declared and measured during control parcel area

Article 34
Determination of areas

Commission Regulation (EC) No 1122/2009 of 30 November 2009 laying down detailed rules for the implementation of Council Regulation (EC) No 73/2009 as regards cross-compliance, modulation and the integrated administration and control system, under the direct support schemes for farmers provided for that Regulation, as well as for the implementation of Council Regulation (EC) No 1234/2007 as regards cross-compliance under the support scheme provided for the wine sector

A measurement tolerance shall be defined by a buffer of **maximum** 1,5 m applied to the perimeter of the agricultural parcel. The maximum tolerance with regard to each agricultural parcelshall not, in absolute terms, exceed 1,0 ha.

PL official translation: „**maximum**” disappeared….

Tolerancja pomiaru jest określona przy uwzględnieniu 1,5-metrowej strefy buforowej wokół działki rolnej. Maksymalna tolerancja odnośnie do każdej działki rolnej nie może przekroczyć wartości bezwzględnej 1,0 ha.

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:316:0065:0112:PL:PDF

Parcel area validation method

What is going on – very shortly

- Wikcap - Buffer tolerance validation method

CONTROL

Buffer=perimeter***tolerance**

Allowed discrepancy between declared and measured during control parcel area

VALIDATION

Tolerance=2,8 *reproducibility=1,96 * sqrt2 *reproducibility

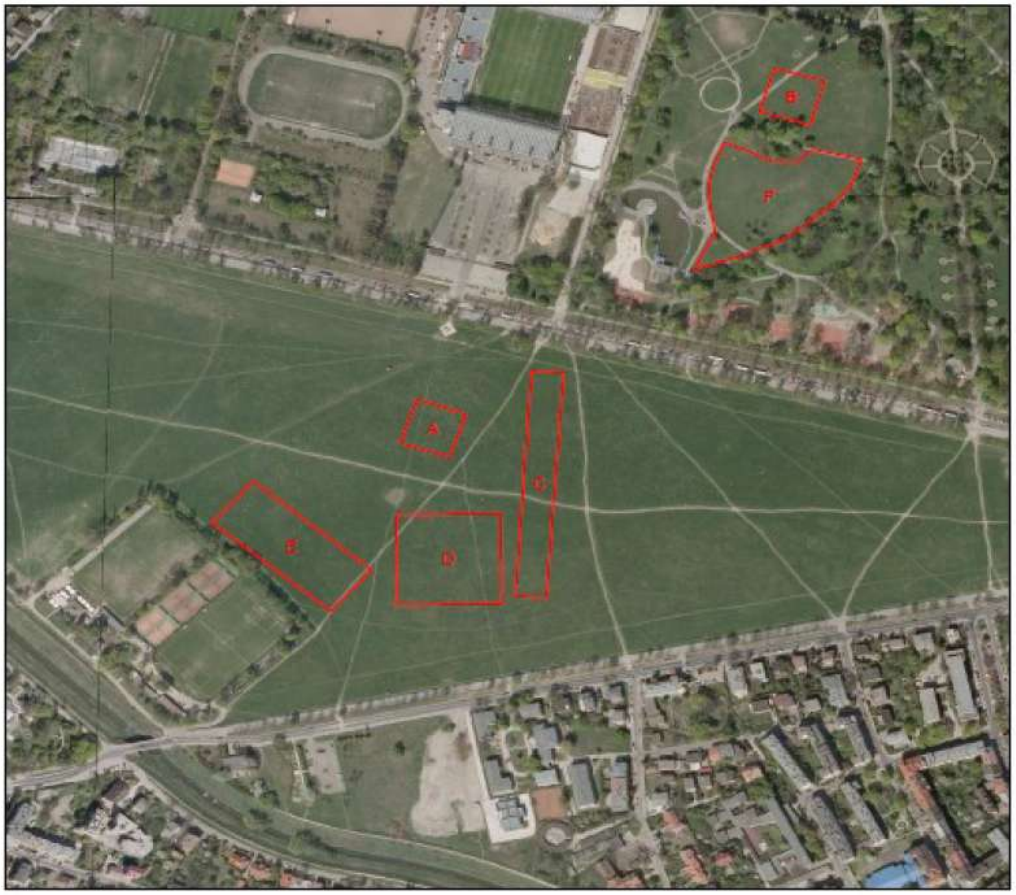
We compare two different controlers making the control using the same equipment and the same method

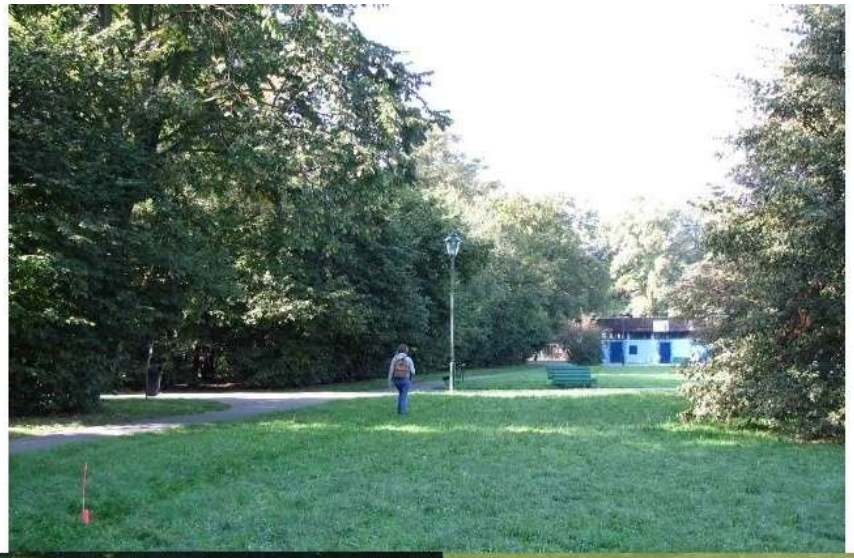
3.18 reproducibility conditions: Conditions where test results are obtained with the same method on identical test items in different laboratories with different

operators using different equipment.

3.19 reproducibility standard deviation: The standard deviation of test results obtained under reproducibility conditions. ISO 5725

Parcel area validation method using marked artificial parcels





Agenda

1. The aims of campaign
2. Test area, data and methodology
3. First results GPS
    - Very precisely measuremnts
    - No specific GPS
4. Area measurements on the orthoimagery
5. First conclusions

The aims of campaign

Validation since 2007….

- JRC table

GeoXT Trimble Standalone,

0,75m PL – validated in UWM PL

Test site in France → 0,5m FR - C,– V, validated by FR statistical analysis by JRC

The question appears: how does it work in reality?

Never answered before

The aims of campaign

Different approaches possible

- Full path: from validation to the real field control (3xvalidation, 3xreference measurements, 3xcontrol measurements)
- Proficiency test of parcel area measurement validation methods (1xreference, 8x control measurements)

What Is Proficiency Testing?

- Proficiency testing (comparative testing) is an important way of meeting the requirements of ISO/IEC 17025 in the area of quality assurance of laboratory results. It is also mandated by accreditation bodies that laboratories participate in proficiency testing programs for all types of analyses undertaken in that laboratory, when suitable programs exist.
- Proficiency testing involves a group of laboratories or analysts performing **the same analyses on the same samples and comparing results.** The key requirements of such comparisons are that the samples are homogenous and stable, and also that the set of samples analysed are appropriate to test and display similarities and differences in results.

ISO/IEC Guide 43-1:1997

Proficiency testing by interlaboratory comparisons -- Part 1: Development and operation of proficiency testing schemes

Parcel area validation method

What is going on – very shortly

- Wikcap - Buffer tolerance validation method

CONTROL

Buffer=perimeter***tolerance**

Allowed discrepancy between declared and measured during control parcel area

We did not compare

VALIDATION

Tolerance=2,8 *reproducibility=1,96 * sqrt2 *reproducibility

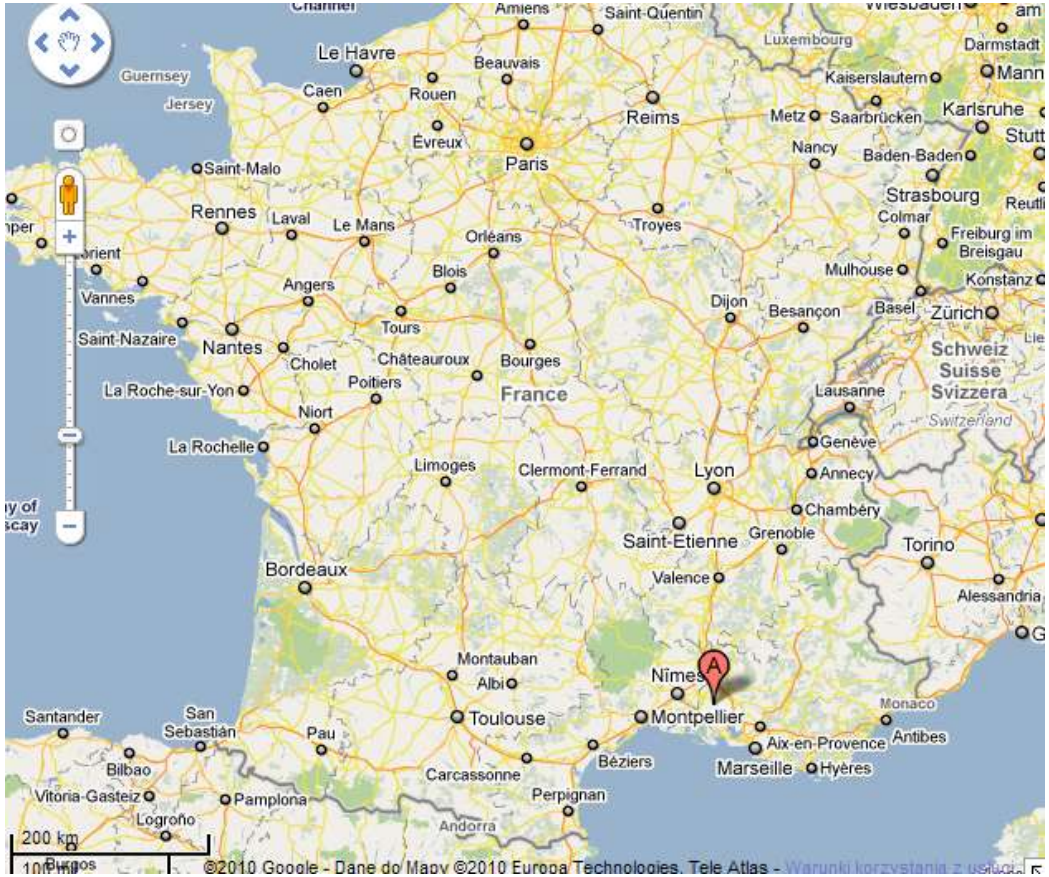
We compare two different controlers making the control using the same equipment and the same method

3.18 reproducibility conditions: Conditions where test results are obtained with the same method on identical test items in different laboratories with different

operators using different equipment.

3.19 reproducibility standard deviation: The standard deviation of test results obtained under reproducibility conditions. ISO 5725

Test area


Le Havre
Caen
Rouen
Beauvais
Amiens
Saint-Quentin
Reims
Paris
Évreux
Saint-Malo
Rennes
Laval
Le Mans
Orléans
Troyes
Angers
Blois
Vannes
Tours
Saint-Nazaire
Nantes
Cholet
Châteauroux
Bourges
Poitiers
La Roche-sur-Yon
France
Niort
La Rochelle
Limoges
Clermont-Ferrand
Lyon
Saint-Etienne
Grenoble
Valence
Bordeaux
Montauban
Albi
Toulouse
Nîmes
Montpellier
Pau
Béziers
Carcassonne
Perpignan
Marseille
Aix-en-Provence
Antibes
Monaco
Santander
San Sebastián
Bilbao
Vitoria-Gasteiz
Pamplona
Logroño
Burgos
Andorra
Luxembourg
Darmstadt
Kaiserslautern
Metz
Saarbrücken
Karlsruhe
Nancy
Baden-Baden
Strasbourg
Colmar
Freiburg im Breisgau
Mulhouse
Konstanz
Dijon
Besançon
Basel
Zürich
Schweiz
Suisse
Svizzera
Switzerland
Lausanne
Genève
Annecy
Chambéry
Torino
Alessandria
Guernsey
Jersey
200 km
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Test area and methodology

32 parcles, 2 tests sites 1x1km

Data and methodology

Orthoimagery

- Existing: WV2, GE1
- Bing utlracamm xd
- UAV

GPS

- Trimble
- Garmin, Magellan

mini/small UAVs

- miniUAVs (aprox. 2 kg)
- material sintético ligero
- autopiloto
- 500 gr. carga útil
- autonomía 1 hora (max. 1:30h)
- velocidad crucero 40 km/h, máxima 60 km/h
- lanzamiento manual. No necesita pista de aterrizaje

- smallUAVs (6-13kg)
- material fibra
- autopiloto
- 1.5-3 kg carga útil
- autonomía 2 hora (max. 3h)
- velocidad crucero 60 km/h, máxima 100 km/h
- lanzamiento con catapulta. No necesita pista de aterrizaje

Trabajamos con las plataformas ligeras más avanzadas del mercado, donde integramos los sensores de imagen, y la electrónica de navegación y posicionamiento.

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Experts

Expert no	Name of expert	Organization	Country
0	Maciej MURAWA	Agency for Restructuring and Modernisation of Agriculture (ARMA)	PL
1	Alan TRAILL	Scottish Government – RPID Rural Payments & Inspectorate Directorate Land Service Branch	UK-Scot
2	Maria NISKANEN	Swedish Board of Agriculture	SE
3	Edgars BORDANS	Latvian Paying Agency, Rural Support Service, Area Control Methodology Division of Control Department	LV
4	Krasimira GANISHEVA	JRC Ispra IT	EC
5	Luc HANSEN	Unit of control	LU
6	Antoine DUBOIS	ASP (Agence de Service et de Paiement)	FR
7	Patrick FLORY	ASP (Agence de Service et de Paiement)	FR
8	Stanislav ROSNEV	State Fund Agriculture - Paying Agency, Sofia Bulgaria	BG

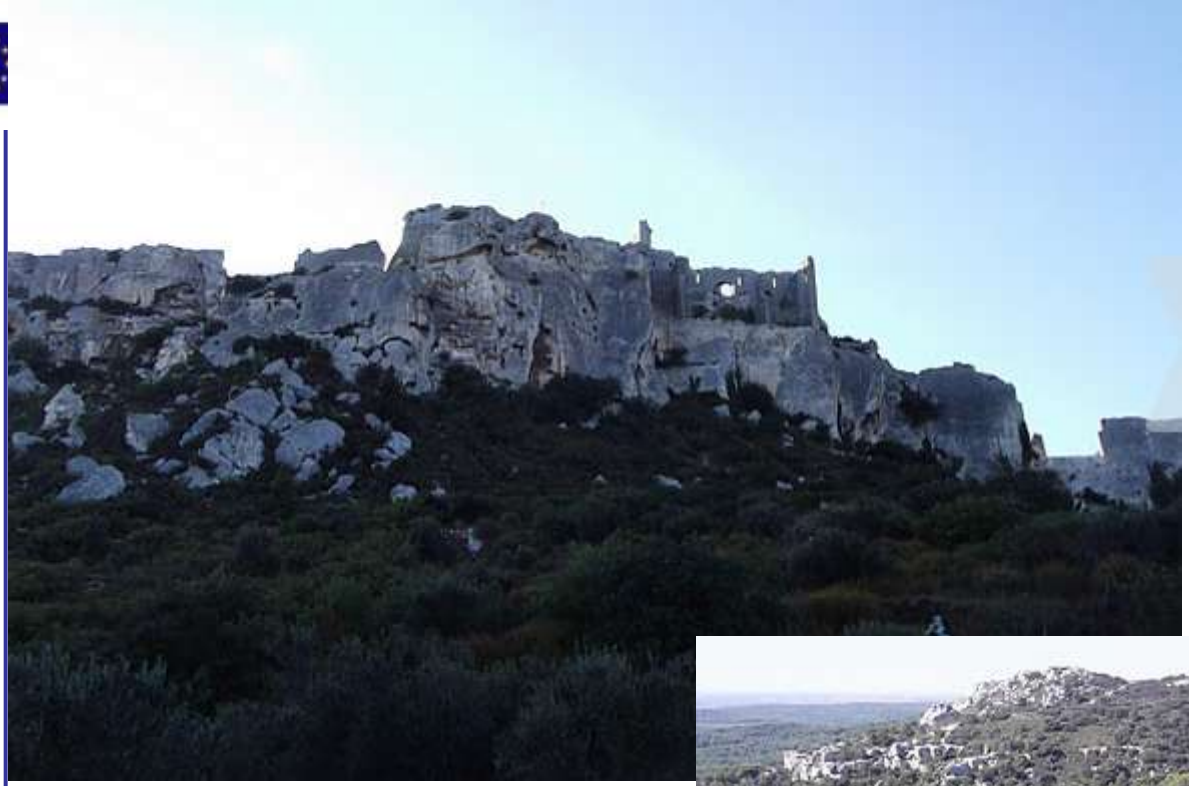
Data and methodology

- 28 parcels
- Continuous and vertex methods
- Without pegs, with pegs
- Each parcel was measured 4 times by each operator.
- Summarizing we have 4 sets: without pegs C (continuous), without pegs V (vertex), with pegs C (continuous), with pegs V (vertex).
- Each set is composed of 240 area measurements (28parcels x 8experts).
- We collected 896 results of the area measurements (28parcels x 8xperts x 4repeatitions).

Picasa™ Web Albums | Eksploruj | Galeria użytkownika antoine dubois

antoine dubois > **JRC - MAUSSANE'S GPS WEEK**

Pokaz slajdów | Udostępnianie | Pobierz



Joint Research Centre

Joint Research Centre

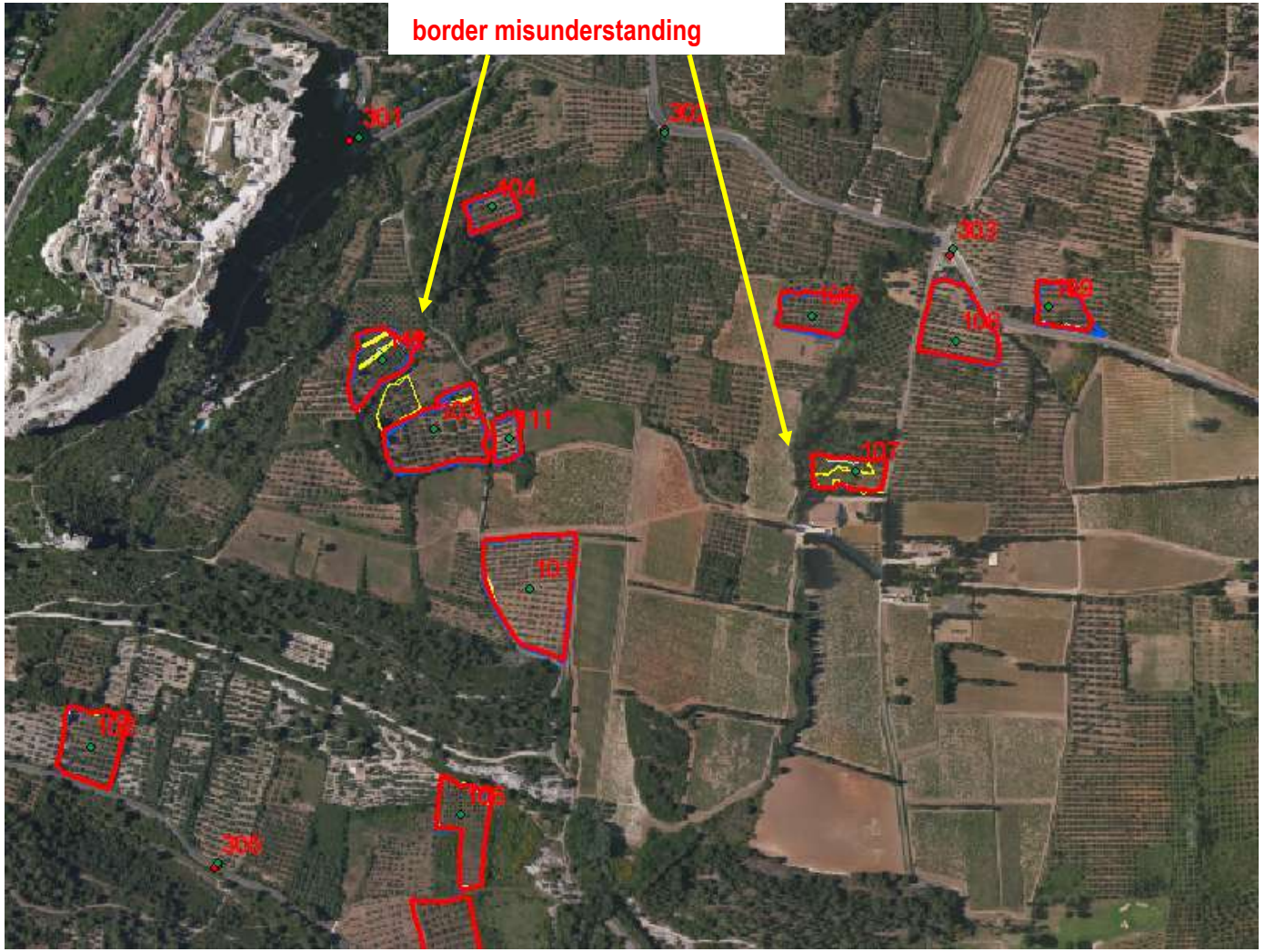

Nitrophoska
spécial
Nitrophoska

Joint Research Centre

Data analysis methodology

- Difference of the parcel area measured by two controlers
- 2 ways for proficiency tests (PT):
  - observed tolerance (OT)= difference/perimeter, comparison with the tolerance from validation (VT);
    if OT<=VT in 95 cases on 100, PT passed, else PT failed
  - Observed area difference (OAD) compared with the allowed area discrepancy (AAD)
    if OAD<=AAD in 95 cases on 100, PT passed , else PT failed

Measurements without pegs, test site 1



Without pegs (if you see only red reference parcel it means that the reference border cover the measurements of ob 3, if you see some disturbance it means the fluctuations of border measured is bigger) – test site 1

Measurements without pegs, test site 1, zoom

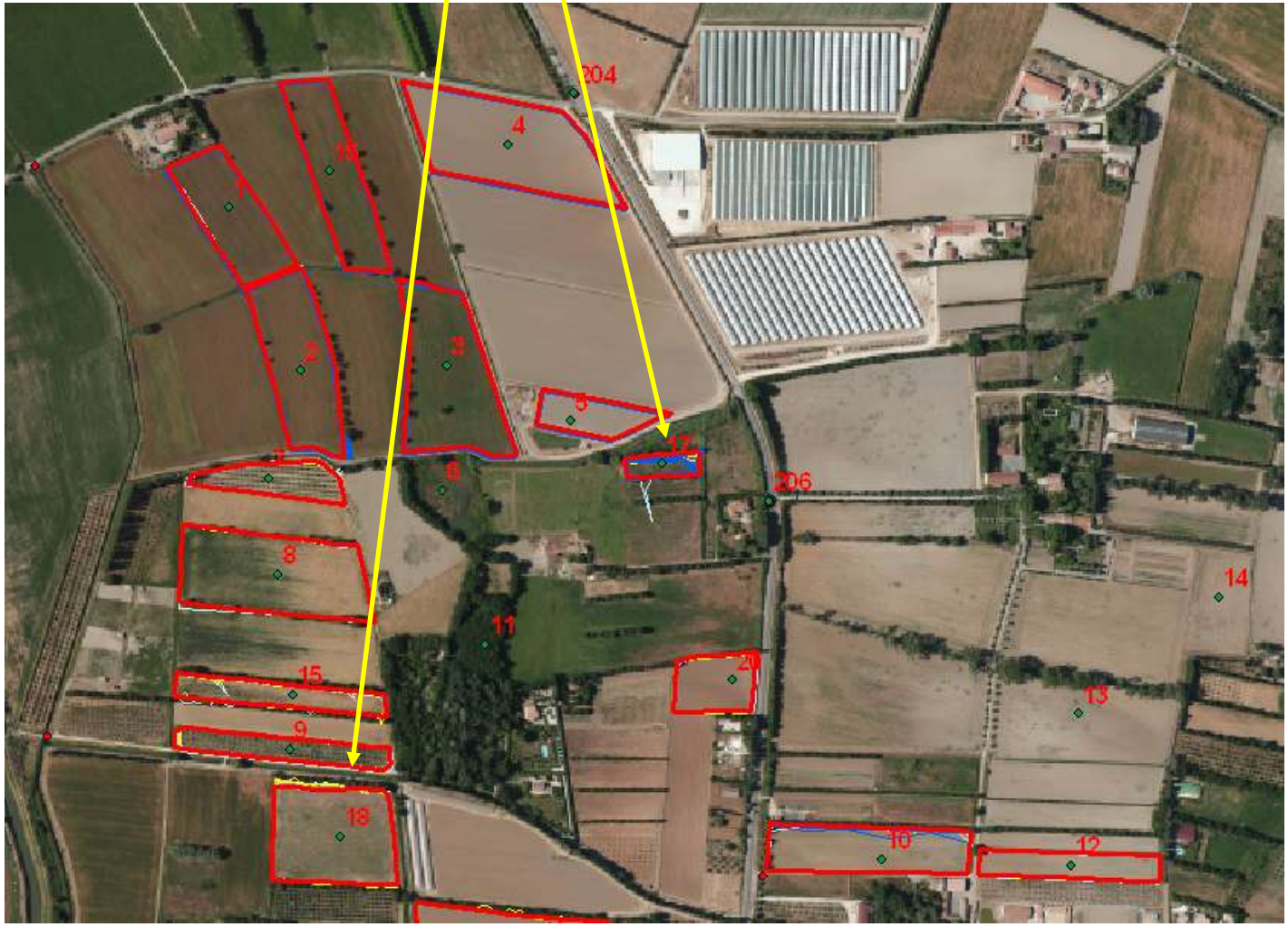
Without pegs C V ob2 (cyan), ob3 (yellow) and ob 6 (blue), reference (red) – test site 1

Measurements with pegs, test site, 1 zoom

With pegs C V ob2 (cyan), ob3 (yellow) and ob 6 (blue), reference (red) – test site 1

Measurements without pegs, test site 2

there is not border misunderstanding,
obsstacles, trees along the border



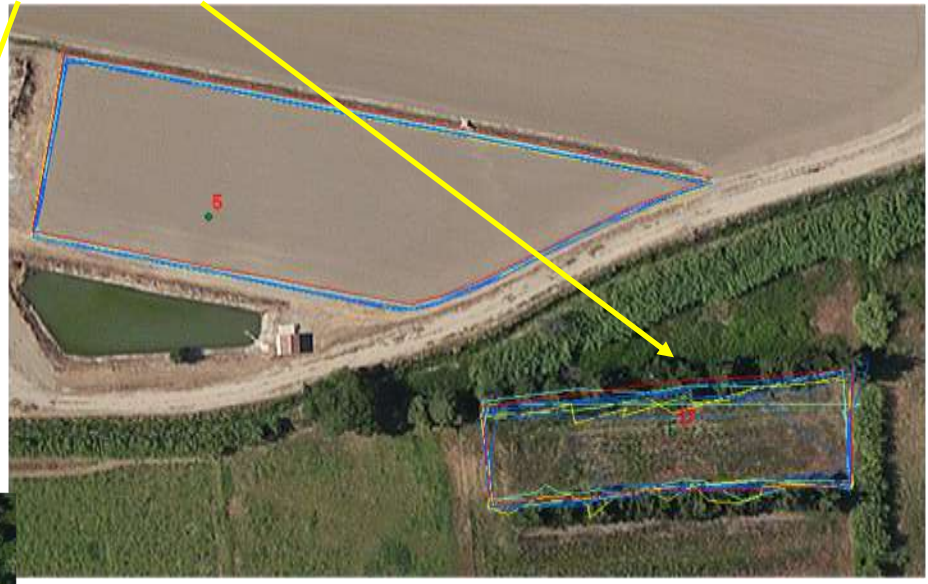
Without pegs (if you see only red reference parcel it means that the reference border cover the measurements of ob 3, if you see some disturbance it means the fluctuations of border measured is bigger) – test site 2

Measurements without pegs, test site 2, zoom

Without pegs C V ob2 (cyan), ob3 (yellow) and ob 6 (blue), reference (red) – test site 2

Measurements withpegs, test site 2, zoom

Does not help very much, obstacles play main role



With pegs C V ob2 (cyan), ob3 (yellow) and ob 6 (blue), reference (red) – test site 2

Experts

The most accurate

RTK →

„almost „ RTK →

Expert no	Name of expert	Organization	Country
0	Maciej MURAWA	Agency for Restructuring and Modernisation of Agriculture (ARMA)	PL
1	Alan TRAILL	Scottish Government – RPID Rural Payments & Inspectorate Directorate Land Service Branch	UK-Scot
2	Maria NISKANEN	Swedish Board of Agriculture	SE
3	Edgars BORDANS	Latvian Paying Agency, Rural Support Service, Area Control Methodology Division of Control Department	LV
4	Krasimira GANISHEVA	JRC Ispra IT	EC
5	Luc HANSEN	Unit of control	LU
6	Antoine DUBOIS	ASP (Agence de Service et de Paiement)	FR
7	Patrick FLORY	ASP (Agence de Service et de Paiement)	FR
8	Stanislav ROSNEV	State Fund Agriculture - Paying Agency, Sofia Bulgaria	BG

First results – comparison RTK, op1, Alan

				diff_buffer					
				without_C	without_V	with_C	with_V	abs(with_V)	
1	-69,95	90,56	31,26	-0,15	-0,15	0,20	0,07	0,07	
2	-24,29	92,09	45,55	0,12	-0,04	0,17	0,08	0,08	
3	-45,08	130,95	35,54	0,30	-0,07	0,22	0,06	0,06	
4	-150,01	-84,96	-29,76	-0,36	-0,23	-0,13	-0,05	0,05	
5	29,92	41,50	22,05	0,02	0,08	0,12	0,06	0,06	
7	-227,92	-34,50	40,01	-0,75	-0,56	-0,08	0,10	0,10	
8	77,95	173,44	40,77	0,44	0,13	0,28	0,07	0,07	trees S N
9	-563,25	-143,38	-32,07	-1,08	-1,04	-0,27	-0,06	0,06	
10	120,51	22,09	112,17	-0,12	0,21	0,04	0,20	0,20	
12	-159,68	-56,33	-33,10	-0,33	-0,34	-0,12	-0,07	0,07	
15									
16									
17	37,21	208,65	93,47	0,61	0,17	0,96	0,43	0,43	extremelly difficult
18	-879,03	-58,58	-486,11	-0,94	-1,78	-0,12	-0,99	0,99	
19	17,88	264,14	66,35	0,04	0,03	0,43	0,11	0,11	
20	139,79	86,90	87,70	0,25	0,45	0,28	0,28	0,28	
101	-113,28	62,97	47,86	-0,16	-0,24	0,14	0,10	0,10	
102	-122,51	84,55	57,48	-0,05	-0,38	0,27	0,18	0,18	
103	-2465,97	278,79	-1,20	-5,81	-6,09	0,69	0,00	0,00	possibly misunderstanding
104	35,84	116,21	32,53	0,68	0,18	0,59	0,17	0,17	
105	-62,95	123,23	13,05	0,10	-0,23	0,46	0,05	0,05	
106	-122,53	40,64	39,65	0,14	-0,31	0,10	0,10	0,10	misunderstanding with pegs
107	-125,73	75,33	11,83	0,08	-0,50	0,30	0,05	0,05	extremelly difficult
108	-96,71	96,20	24,36	-0,10	-0,29	0,29	0,07	0,07	
109	-45,02	56,05	7,17	-0,31	-0,20	0,25	0,03	0,03	
110	-113,01	117,16	20,17	-0,24	-0,20	0,21	0,04	0,04	misunderstanding with pegs
111	-4,52	53,98	13,76	1,08	-0,03	0,32	0,08	0,08	
112	-32,53	205,47	9,48	0,35	-0,10	0,64	0,03	0,03	extremelly difficult
			mean	**-0,24**	**-0,44**	**0,24**	**0,046**	**0,067**	**median**
			1,96*SD	**2,411**	**2,411**	**0,548**	**0,460**	**0,394**	**percentile (0,95)**
			exceeding of the limit	**0,23**	**0,15**	**0,15**	**0,038**		

The most accurate

In yellow buffer greater then 0,50 m

Only with pegs V

PT passed!

(<4% of buffer geater then 0,50m)

In other cases ca. 20% results greater then 0,50m)

Experts

Expert no	Name of expert	Organization	Country
0	Maciej MURAWA	Agency for Restructuring and Modernisation of Agriculture (ARMA)	PL
1	Alan TRAILL	Scottish Government – RPID Rural Payments & Inspectorate Directorate Land Service Branch	UK-Scot
2	Maria NISKANEN	Swedish Board of Agriculture	SE
3	Edgars BORDANS	Latvian Paying Agency, Rural Support Service, Area Control Methodology Division of Control Department	LV
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7	Patrick FLORY	ASP (Agence de Service et de Paiement)	FR
8	Stanislav ROSNEV	State Fund Agriculture - Paying Agency, Sofia Bulgaria	BG

Experts from France used to the agriculture fields conditions on our test area → 6, 7

First results – comparison op6, op7, French

	RTK area	RTK perim	without_C	without_V	with_C	with_V	
1	11047	459	0,30	0,23	0,09	-0,15	
2	14480	548	-0,10	-0,14	0,07	0,04	
3	17966	606	-0,12	0,28	0,01	0,06	
4	20434	660	-0,45	-0,21	-0,18	-0,01	
5	5005	356	-0,22	-0,02	-0,07	-0,06	
7	5756	406	0,34	0,61	0,00	-0,21	
8	18967	611	4,22	4,24	0,10	0,04	trees S N
9	6294	541	0,49	0,66	-0,11	-0,04	
10	12054	567	-2,71	-1,06	-0,22	-0,54	
12	6150	475	-0,33	-0,09	-0,26	0,02	
15		542,67 m	-0,33	-1,23	0,88	0,72	
16		570,69 m	0,28	0,05	-0,09	0,09	
17	2056	217	-0,06	-0,61	0,18	-0,20	extremelly difficult
18	15062	493	0,19	-0,97	-0,04	-0,66	
19	20423	616	0,27	1,15	-0,24	-0,04	
20	5836	310	-0,65	-0,80	-0,22	0,01	
101	12937	463	0,17	0,28	0,02	-0,04	
102	6031	319	0,40	0,36	0,15	0,08	
103	8829	405	-1,61	0,16	-0,14	0,23	possibly misunderstanding
104	2297	197	0,18	0,05	0,31	0,31	
105	3806	268	-0,15	0,13	-0,29	-0,03	
106	5430	390	0,52	0,46	-0,09	-0,08	misunderstanding with pegs
107	3239	254	0,27	0,34	-0,03	0,08	extremelly difficult
108	6781	331	0,30	0,49	-0,18	0,04	
109	2962	226	0,97	0,09	-0,07	-0,01	
110	13335	556	-0,04	0,07	-0,02	0,02	misunderstanding with pegs
111	1675	168	0,26	-0,70	0,12	-0,25	
112	4576	320	-0,15	0,21	-0,03	0,14	extremelly difficult
			0,31	**0,46**	**0,04**	**0,12**	

0,39 m (0,50m)

Validated,

statistisc by JRC, 2010

Only with pegs C

PT passed!

(<4% of buffer geater then 0,50m)

In other cases ca. 30% results greater then 0,50m)

First results – accurate GPS 0.5 m, all together

Expert no	Name of expert	organization	country	Equipment buffer limit
2	Maria NISKANEN	Swedish Board of Agriculture	SE	Nomad TDS Use GLONASS Auto Integrated SBAS (Tracking mode auto) 0,5m (C, V)
3	Edgars BORDANS	Latvian Paying Agency, Rural Support Service, Area Control Methodology Division of Control Department	LV	Trimble GeoXT 2005 post-processing with Trimble GPS Pathfinder Office 4.20 JRC table: 0,5 m (C, V)
5	Luc HANSEN	Unit of control	LU	GeoXT Trimble differential correction **Buffer unknown-not validated** JRC table: 0,5 m (C, V)
6	Antoine DUBOIS	ASP (Agence de Service et de Paiement)	FR	Trimbe GeoXT 2008 D3E - ArpentGIS mobile 4.8 Post-processing JRC table: 0,5 m (C, V) **Validated, statistical analysis by JRC……**
7	Patrick FLORY	ASP (Agence de Service et de Paiement)	FR	GeoXT Trimble Standalone JRC table: 0,75m PL, 0,5m FR - C,– V, **Validated, statistical analysis by JRC…..**

First results – proficiency test GeoXT 0,5 m RTK with pegs V

Assumed buffer limit

	0,5					0,75					1,0					1,5				
	v2	v3	v5	v6	v7	v2	v3	v5	v6	v7	v2	v3	v5	v6	v7	v2	v3	v5	v6	v7
1	47	-45	1087	214	147	47	-45	1087	214	147	47	-45	1087	214	147	47	-45	1087	214	147
2	80	54	0	56	80	80	54	0	56	80	80	54	0	56	80	80	54	0	56	80
3	66	19	-34	130	166	66	19	-34	130	166	66	19	-34	130	166	66	19	-34	130	166
4	234	-44	-36	41	34	234	-44	-36	41	34	234	-44	-36	41	34	234	-44	-36	41	34
5	5	-33	15	27	5	5	-33	15	27	5	5	-33	15	27	5	5	-33	15	27	5
6	-44	-53	-14	41	-44	-44	-53	-14	41	-44	-44	-53	-14	41	-44	-44	-53	-14	41	-44
7	167	214	-53	143	167	167	214	-53	143	167	167	214	-53	143	167	167	214	-53	143	167
8	-106	-100	-46	18	-6	-106	-100	-46	18	-6	-106	-100	-46	18	-6	-106	-100	-46	18	-6
9	-146	-73	-16	158	-146	-146	-73	-16	158	-146	-146	-73	-16	158	-146	-146	-73	-16	158	-146
10	-50	-43	-80	42	50	-50	-43	-80	42	50	-50	-43	-80	42	50	-50	-43	-80	42	50
no RTK																				
no RTK																				
17	156	313	106	200	156	156	313	106	200	156	156	313	106	200	156	156	313	106	200	156
18	-638	-473	-588	-311	-638	-638	-473	-588	-311	-638	-638	-473	-588	-311	-638	-638	-473	-588	-311	-638
19	423	22	123	-250	-277	423	22	123	-250	-277	423	22	123	-250	-277	423	22	123	-250	-277
20	36	-39	16	33	36	36	-39	16	33	36	36	-39	16	33	36	36	-39	16	33	36
101	37	-18	17	57	37	37	-18	17	57	37	37	-18	17	57	37	37	-18	17	57	37
102	131	363	61	104	131	131	363	61	104	131	131	363	61	104	131	131	363	61	104	131
103	129	-5	119	38	129	129	-5	119	38	129	129	-5	119	38	129	129	-5	119	38	129
104	-3	69	37	36	97	-3	69	37	36	97	-3	69	37	36	97	-3	69	37	36	97
105	6	18	6	14	6	6	18	6	14	6	6	18	6	14	6	6	18	6	14	6
106	30	17	40	63	30	30	17	40	63	30	30	17	40	63	30	30	17	40	63	30
107	139	12	9	19	39	139	12	9	19	39	139	12	9	19	39	139	12	9	19	39
108	181	46	61	67	81	181	46	61	67	81	181	46	61	67	81	181	46	61	67	81
109	-38	45	2	63	62	-38	45	2	63	62	-38	45	2	63	62	-38	45	2	63	62
110	35	128	-5	26	35	35	128	-5	26	35	35	128	-5	26	35	35	128	-5	26	35
111	-25	5	15	18	-25	-25	5	15	18	-25	-25	5	15	18	-25	-25	5	15	18	-25
112	-24	23	96	31	76	-24	23	96	31	76	-24	23	96	31	76	-24	23	96	31	76
	0.19	**0.12**	**0.08**	**0.12**	**0.12**	**0.04**	**0.12**	**0.04**	**0.04**	**0.04**	**0.04**	**0.08**	**0.08**	**0.00**	**0.04**	**0.00**	**0.00**	**0.04**	**0.00**	**0.00**

0,50 m buffer - PT failed!

0,75 m buffer - PT passed

First results – proficiency test GeoXT 0,5 m RTK without pegs V

Assumed buffer limit

	0,5					0,75					1,0					1,5				
	v2	v3	v5	v6	v7	v2	v3	v5	v6	v7	v2	v3	v5	v6	v7	v2	v3	v5	v6	v7
1	147	-96	-463	-59	47	147	-96	-463	-59	47	147	-96	-463	-59	47	147	-96	-463	-59	47
2	-120	203	-450	-42	-120	-120	203	-450	-42	-120	-120	203	-450	-42	-120	-120	203	-450	-42	-120
3	-34	-16	-574	-106	66	-34	-16	-574	-106	66	-34	-16	-574	-106	66	-34	-16	-574	-106	66
4	334	-140	-406	-30	-166	334	-140	-406	-30	-166	334	-140	-406	-30	-166	334	-140	-406	-30	-166
5	105	-95	-45	14	5	105	-95	-45	14	5	105	-95	-45	14	5	105	-95	-45	14	5
6	-144	51	-74	-290	-44	-144	51	-74	-290	-44	-144	51	-74	-290	-44	-144	51	-74	-290	-44
7	-433	158	-543	174	2767	-433	158	-543	174	2767	-433	158	-543	174	2767	-433	158	-543	174	2767
8	594	376	224	-265	94	594	376	224	-265	94	594	376	224	-265	94	594	376	224	-265	94
9	154	-12	4	452	-146	154	-12	4	452	-146	154	-12	4	452	-146	154	-12	4	452	-146
10	-250	-28	-310	-108	-150	-250	-28	-310	-108	-150	-250	-28	-310	-108	-150	-250	-28	-310	-108	-150
no RTK																				
no RTK																				
17	256	214	-54	188	56	256	214	-54	188	56	256	214	-54	188	56	256	214	-54	188	56
18	-438	-464	-288	38	-438	-438	-464	-288	38	-438	-438	-464	-288	38	-438	-438	-464	-288	38	-438
19	223	71	43	-684	23	223	71	43	-684	23	223	71	43	-684	23	223	71	43	-684	23
20	136	25	-354	183	-64	136	25	-354	183	-64	136	25	-354	183	-64	136	25	-354	183	-64
101	237	311	-3	6	137	237	311	-3	6	137	237	311	-3	6	137	237	311	-3	6	137
102	131	6031	-269	-85	31	131	6031	-269	-85	31	131	6031	-269	-85	31	131	6031	-269	-85	31
103	729	-1294	-171	163	229	729	-1294	-171	163	229	729	-1294	-171	163	229	729	-1294	-171	163	229
104	197	61	-93	88	97	197	61	-93	88	97	197	61	-93	88	97	197	61	-93	88	97
105	6	-57	-144	-128	-94	6	-57	-144	-128	-94	6	-57	-144	-128	-94	6	-57	-144	-128	-94
106	530	59	-50	-48	130	530	59	-50	-48	130	530	59	-50	-48	130	530	59	-50	-48	130
107	39	1268	-191	54	139	39	1268	-191	54	139	39	1268	-191	54	139	39	1268	-191	54	139
108	81	-63	-169	-82	81	81	-63	-169	-82	81	81	-63	-169	-82	81	81	-63	-169	-82	81
109	-38	-30	-38	-58	-38	-38	-30	-38	-58	-38	-38	-30	-38	-58	-38	-38	-30	-38	-58	-38
110	-65	1	95	94	135	-65	1	95	94	135	-65	1	95	94	135	-65	1	95	94	135
111	-25	-6	15	93	-25	-25	-6	15	93	-25	-25	-6	15	93	-25	-25	-6	15	93	-25
112	776	417	46	208	276	776	417	46	208	276	776	417	46	208	276	776	417	46	208	276
	0.38	**0.31**	**0.46**	**0.23**	**0.15**	**0.19**	**0.19**	**0.23**	**0.04**	**0.08**	**0.12**	**0.15**	**0.08**	**0.04**	**0.04**	**0.04**	**0.12**	**0.00**	**0.00**	**0.04**

0,50 and 0,75 m buffer - PT failed!

1,0 m buffer - PT passed

First results – proficiency test GeoXT 0,5 m RTK with pegs C

Assumed buffer limit

	0,5					0,75					1,0					1,5				
	v2	v3	v5	v6	v7	v2	v3	v5	v6	v7	v2	v3	v5	v6	v7	v2	v3	v5	v6	v7
1	47	80	-3	5	47	47	80	-3	5	47	47	80	-3	5	47	47	80	-3	5	47
2	180	-131	30	39	80	180	-131	30	39	80	180	-131	30	39	80	180	-131	30	39	80
3	-34	16	66	158	166	-34	16	66	158	166	-34	16	66	158	166	-34	16	66	158	166
4	-166	73	-66	50	-66	-166	73	-66	50	-66	-166	73	-66	50	-66	-166	73	-66	50	-66
5	5	35	-25	30	5	5	35	-25	30	5	5	35	-25	30	5	5	35	-25	30	5
6	-144	-185	-74	-42	-44	-144	-185	-74	-42	-44	-144	-185	-74	-42	-44	-144	-185	-74	-42	-44
7	67	-63	-23	106	167	67	-63	-23	106	167	67	-63	-23	106	167	67	-63	-23	106	167
8	-406	-124	-106	-147	-206	-406	-124	-106	-147	-206	-406	-124	-106	-147	-206	-406	-124	-106	-147	-206
9	354	-10	-186	-124	-246	354	-10	-186	-124	-246	354	-10	-186	-124	-246	354	-10	-186	-124	-246
10	-50	-10	-80	-27	-150	-50	-10	-80	-27	-150	-50	-10	-80	-27	-150	-50	-10	-80	-27	-150
no RTK																				
no RTK																				
17	356	245	96	218	256	356	245	96	218	256	356	245	96	218	256	356	245	96	218	256
18	-538	-594	-448	-117	-138	-538	-594	-448	-117	-138	-538	-594	-448	-117	-138	-538	-594	-448	-117	-138
19	423	69	133	372	223	423	69	133	372	223	423	69	133	372	223	423	69	133	372	223
20	36	-52	-44	5	-64	36	-52	-44	5	-64	36	-52	-44	5	-64	36	-52	-44	5	-64
101	37	44	37	30	37	37	44	37	30	37	37	44	37	30	37	37	44	37	30	37
102	131		41	84	131	131		41	84	131	131		41	84	131	131		41	84	131
103	129	204	109	186	129	129	204	109	186	129	129	204	109	186	129	129	204	109	186	129
104	97	6	57	35	97	97	6	57	35	97	97	6	57	35	97	97	6	57	35	97
105	106	15	16	83	6	106	15	16	83	6	106	15	16	83	6	106	15	16	83	6
106	30	60	60	66	30	30	60	60	66	30	30	60	60	66	30	30	60	60	66	30
107	39	74	-1	48	39	39	74	-1	48	39	39	74	-1	48	39	39	74	-1	48	39
108	81	15	71	42	-19	81	15	71	42	-19	81	15	71	42	-19	81	15	71	42	-19
109	62	-16	-18	77	62	62	-16	-18	77	62	62	-16	-18	77	62	62	-16	-18	77	62
110	35	151	-5	49	35	35	151	-5	49	35	35	151	-5	49	35	35	151	-5	49	35
111	75	-1	15	55	75	75	-1	15	55	75	75	-1	15	55	75	75	-1	15	55	75
112	176	37	26	84	76	176	37	26	84	76	176	37	26	84	76	176	37	26	84	76
	0.23	**0.12**	**0.04**	**0.08**	**0.04**	**0.08**	**0.08**	**0.04**	**0.00**	**0.04**	**0.08**	**0.08**	**0.04**	**0.04**	**0.04**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

0,50 m buffer - PT failed!

0,75 m buffer - PT passed

First results – proficiency test GeoXT 0,5 m RTK without pegs C

Assumed buffer limit

	0,5m					0,75					1,0m					1,5m				
	v2	v3	v5	v6	v7	v2	v3	v5	v6	v7	v2	v3	v5	v6	v7	v2	v3	v5	v6	v7
1	147	-57	-473	-89	47	147	-57	-473	-89	47	147	-57	-473	-89	47	147	-57	-473	-89	47
2	-120	13	-510	34	-20	-120	13	-510	34	-20	-120	13	-510	34	-20	-120	13	-510	34	-20
3	-34	-62	-564	39	-34	-34	-62	-564	39	-34	-34	-62	-564	39	-34	-34	-62	-564	39	-34
4	334	-234	-366	33	-266	334	-234	-366	33	-266	334	-234	-366	33	-266	334	-234	-366	33	-266
5	105	64	35	85	5	105	64	35	85	5	105	64	35	85	5	105	64	35	85	5
6	-144	145	-84	-284	-144	-144	145	-84	-284	-144	-144	145	-84	-284	-144	-144	145	-84	-284	-144
7	-433	107	-543	191	2767	-433	107	-543	191	2767	-433	107	-543	191	2767	-433	107	-543	191	2767
8	594	384	124	-372	-106	594	384	124	-372	-106	594	384	124	-372	-106	594	384	124	-372	-106
9	154	-12	204	1491	-46	154	-12	204	1491	-46	154	-12	204	1491	-46	154	-12	204	1491	-46
10	-250	-153	-320	-93	-250	-250	-153	-320	-93	-250	-250	-153	-320	-93	-250	-250	-153	-320	-93	-250
no RTK																				
no RTK																				
17	256	297	-44	370	356	256	297	-44	370	356	256	297	-44	370	356	256	297	-44	370	356
18	-438	-635	-548	-431	-338	-438	-635	-548	-431	-338	-438	-635	-548	-431	-338	-438	-635	-548	-431	-338
19	223	-486	13	57	223	223	-486	13	57	223	223	-486	13	57	223	223	-486	13	57	223
20	136	-116	-424	-63	-264	136	-116	-424	-63	-264	136	-116	-424	-63	-264	136	-116	-424	-63	-264
101	237	166	-23	57	137	237	166	-23	57	137	237	166	-23	57	137	237	166	-23	57	137
102	131	-11	-269	105	231	131	-11	-269	105	231	131	-11	-269	105	231	131	-11	-269	105	231
103	729	-1177	-21	382	-271	729	-1177	-21	382	-271	729	-1177	-21	382	-271	729	-1177	-21	382	-271
104	197	79	-73	62	97	197	79	-73	62	97	197	79	-73	62	97	197	79	-73	62	97
105	6	-74	-104	46	6	6	-74	-104	46	6	6	-74	-104	46	6	6	-74	-104	46	6
106	530	52	-240	-72	130	530	52	-240	-72	130	530	52	-240	-72	130	530	52	-240	-72	130
107	39	1276	-191	-130	-61	39	1276	-191	-130	-61	39	1276	-191	-130	-61	39	1276	-191	-130	-61
108	81	0	-249	-17	81	81	0	-249	-17	81	81	0	-249	-17	81	81	0	-249	-17	81
109	-38	-75	-128	-156	62	-38	-75	-128	-156	62	-38	-75	-128	-156	62	-38	-75	-128	-156	62
110	-65	42	-15	157	135	-65	42	-15	157	135	-65	42	-15	157	135	-65	42	-15	157	135
111	-25	15	-5	31	75	-25	15	-5	31	75	-25	15	-5	31	75	-25	15	-5	31	75
112	776	410	-64	224	176	776	410	-64	224	176	776	410	-64	224	176	776	410	-64	224	176
	0,42	0,22	0,5(							0,12	0,12	0.12							0,00	0,04

0,50 and 0,75 m buffer - PT failed!

?

1,0 m buffer - PT passed

First results – proficiency test GeoXT 0,5 m

- After data analyse from the tables above, proficiency test (PT) assuming buffer 0,5 m:
- For measurements **without pegs** PT doesn't confirm the possibility of the applying buffer limit of 0,5m **in any cases**; in more than 30% cases we obtained exceeding of the limit for continuous method, the results for vertex method were different depending on the expert: 30- 40 % exceeding for experts: ob5 and ob5, and better for French experts: ob6 and ob7 ca. 20%
- For measurements **with pegs** PT:
  - Continuous method **- confirm** the possibility of the applying buffer of 0,5 m - in 2 cases, in 2 case doesn't confirm
  - Vertex method **– doesn't confirm** the possibility of the applying buffer of 0,5 m in any cases
- **There influence of the operators is visible (probably theirs experience) the best results were obtained by French experts: ob6 and ob7).**

First results – proficiency test GeoXT 0,5 m

We can try to state „confirmation of PT” :

- With pegs C, V for buffer 0,75 m
- Without pegs C, V for buffer 1,0 m

Soft conclusion as yet, more analysis needed

We presented the PT for the most precisely GNSS equipments

How does it look for the more common, less precisely equipments?

Results of proficiency tests for Garmin and Magellan with pegs V

PT for Magellan always failed!

	0,5		0,75		1		1,25		1,5	
	v4	v5	v4	v5	v4	v5	v4	v5	v4	v5
1	-244	-903	-244	-903	-244	-903	-244	-903	-244	-903
2	-153	-1300	-153	-1300	-153	-1300	-153	-1300	-153	-1300
3	-111	-1654	-111	-1654	-111	-1654	-111	-1654	-111	-1654
4	-608	-1836	-608	-1836	-608	-1836	-608	-1836	-608	-1836
5	-445	-505	-445	-505	-445	-505	-445	-505	-445	-505
6	-313	-614	-313	-614	-313	-614	-313	-614	-313	-614
7	355	-1863	355	-1863	355	-1863	355	-1863	355	-1863
8	-328	-736	-328	-736	-328	-736	-328	-736	-328	-736
9	658	-836	658	-836	658	-836	658	-836	658	-836
10	-106	-610	-106	-610	-106	-610	-106	-610	-106	-610
no RTK										
no RTK										
17	75	-384	75	-384	75	-384	75	-384	75	-384
18	-811	-1838	-811	-1838	-811	-1838	-811	-1838	-811	-1838
19	-270	-1527	-270	-1527	-270	-1527	-270	-1527	-270	-1527
20	-174	-454	-174	-454	-174	-454	-174	-454	-174	-454
101	-71	-893	-71	-893	-71	-893	-71	-893	-71	-893
102	216	-449	216	-449	216	-449	216	-449	216	-449
103	249	-751	249	-751	249	-751	249	-751	249	-751
104	-65	-203	-65	-203	-65	-203	-65	-203	-65	-203
105	-106	-274	-106	-274	-106	-274	-106	-274	-106	-274
106	0	-240	0	-240	0	-240	0	-240	0	-240
107	-152	-371	-152	-371	-152	-371	-152	-371	-152	-371
108	-170	-519	-170	-519	-170	-519	-170	-519	-170	-519
109	-36	-358	-36	-358	-36	-358	-36	-358	-36	-358
110	-58	-1185	-58	-1185	-58	-1185	-58	-1185	-58	-1185
111	6	-155	6	-155	6	-155	6	-155	6	-155
112	106	-274	106	-274	106	-274	106	-274	106	-274
	0,42	**1,00**	**0,19**	**1,00**	**0,12**	**0,85**	**0,04**	**0,81**	**0,04**	**0,58**

0,50, 0,75 and 1,0 m buffer - PT failed!

1,25 m buffer - PT passed

Results of proficiency tests for Garmin and Magellan with pegs C

PT for Magellan always failed!

	0,5		0,75		1		1,25		1,5	
	v4	v8	v4	v8	v4	v8	v4	v8	v4	v8
1	**-200**	-903,00	-200	-903	-200	-903	-200	-903	-200	-903
2	**20**	-1230,00	20	-1230	20	-1230	20	-1230	20	-1230
3	**-317**	-1424,00	-317	-1424	-317	-1424	-317	-1424	-317	-1424
4	**-190**	-1936,00	-190	-1936	-190	-1936	-190	-1936	-190	-1936
5	**-322**	-415,00	-322	-415	-322	-415	-322	-415	-322	-415
6	**-97**	-674,00	-97	-674	-97	-674	-97	-674	-97	-674
7	**417**	-1593,00	417	-1593	417	-1593	417	-1593	417	-1593
8	**-833**	-536,00	-833	-536	-833	-536	-833	-536	-833	-536
9	**799**	-1156,00	799	-1156	799	-1156	799	-1156	799	-1156
10	**-18**	-580,00	-18	-580	-18	-580	-18	-580	-18	-580
no RTK										
no RTK										
17	**33**	-34,00	33	-34	33	-34	33	-34	33	-34
18	**-257**	-1708,00	-257	-1708	-257	-1708	-257	-1708	-257	-1708
19	**33**	-1427,00	33	-1427	33	-1427	33	-1427	33	-1427
20	**-35**	-564,00	-35	-564	-35	-564	-35	-564	-35	-564
101	**18**	-1073,00	18	-1073	18	-1073	18	-1073	18	-1073
102	**94**	-519,00	94	-519	94	-519	94	-519	94	-519
103	**148**	-521,00	148	-521	148	-521	148	-521	148	-521
104	**-1**	107,00	-1	107	-1	107	-1	107	-1	107
105	**36**	-294,00	36	-294	36	-294	36	-294	36	-294
106	**86**	-540,00	86	-540	86	-540	86	-540	86	-540
107	**-147**	-291,00	-147	-291	-147	-291	-147	-291	-147	-291
108	**-56**	-469,00	-56	-469	-56	-469	-56	-469	-56	-469
109	**-85**	-168,00	-85	-168	-85	-168	-85	-168	-85	-168
110	**217**	-1215,00	217	-1215	217	-1215	217	-1215	217	-1215
111	**94**	-115,00	94	-115	94	-115	94	-115	94	-115
112	**111**	-324,00	111	-324	111	-324	111	-324	111	-324
	0,12	**0,96**	**0,08**	**0,92**	**0,08**	**0,88**	**0,08**	**0,65**	**0,04**	**0,50**

0,50, 0,75, 1,25 and 1,0 m buffer - PT failed!

1,5 m buffer - PT passed

Results of proficiency tests for Garmin and Magellan without pegs C

PT for Magellan always failed!

	0,5		0,75		1		1,25		1,5	
	v4	v8	v4	v8	v4	v8	v4	v8	v4	v8
1	510	-763	510	-763	510	-763	510	-763	510	-763
2	40	-940	40	-940	40	-940	40	-940	40	-940
3	-97	-1044	-97	-1044	-97	-1044	-97	-1044	-97	-1044
4	232	-1986	232	-1986	232	-1986	232	-1986	232	-1986
5	-92	-505	-92	-505	-92	-505	-92	-505	-92	-505
6	133	-674	133	-674	133	-674	133	-674	133	-674
7	-279	-1573	-279	-1573	-279	-1573	-279	-1573	-279	-1573
8	-199	-46	-199	-46	-199	-46	-199	-46	-199	-46
9	378	-636	378	-636	378	-636	378	-636	378	-636
10	18	-620	18	-620	18	-620	18	-620	18	-620
no RTK										
no RTK										
17	138	156	138	156	138	156	138	156	138	156
18	-280	-1278	-280	-1278	-280	-1278	-280	-1278	-280	-1278
19	96	-1657	96	-1657	96	-1657	96	-1657	96	-1657
20	-11	-594	-11	-594	-11	-594	-11	-594	-11	-594
101	586	-253	586	-253	586	-253	586	-253	586	-253
102	-109	-199	-109	-199	-109	-199	-109	-199	-109	-199
103	686	519	686	519	686	519	686	519	686	519
104	74	-53	74	-53	74	-53	74	-53	74	-53
105	204	-114	204	-114	204	-114	204	-114	204	-114
106	531	-310	531	-310	531	-310	531	-310	531	-310
107	178	399	178	399	178	399	178	399	178	399
108	-86	-519	-86	-519	-86	-519	-86	-519	-86	-519
109	-42	-128	-42	-128	-42	-128	-42	-128	-42	-128
110	489	-1065	489	-1065	489	-1065	489	-1065	489	-1065
111	135	-25	135	-25	135	-25	135	-25	135	-25
112	13	-254	13	-254	13	-254	13	-254	13	-254
	0,35	**0,69**	**0,21**	**0,65**	**0,15**	**0,58**	**0,12**	**0,62**	**0,04**	**0,42**

0,50, 0,75, 1,25 and 1,0 m buffer - PT failed!

1,5 m buffer - PT passed

Results of proficiency tests for Garmin and Magellan without pegs V

PT for Magellan always failed!

	0,5		0,75		1		1,25		1,5	
	v4	v8	v4	v8	v4	v8	v4	v8	v4	v8
1	-426	-813	-426	-813	-426	-813	-426	-813	-426	-813
2	113	-850	113	-850	113	-850	113	-850	113	-850
3	407	-904	407	-904	407	-904	407	-904	407	-904
4	-692	-1926	-692	-1926	-692	-1926	-692	-1926	-692	-1926
5	-46	-335	-46	-335	-46	-335	-46	-335	-46	-335
6	-538	-604	-538	-604	-538	-604	-538	-604	-538	-604
7	324	-1313	324	-1313	324	-1313	324	-1313	324	-1313
8	-471	214	-471	214	-471	214	-471	214	-471	214
9	123	-1286	123	-1286	123	-1286	123	-1286	123	-1286
10	90	-510	90	-510	90	-510	90	-510	90	-510
no RTK										
no RTK										
17	104	266	104	266	104	266	104	266	104	266
18	-463	-1088	-463	-1088	-463	-1088	-463	-1088	-463	-1088
19	-87	-1877	-87	-1877	-87	-1877	-87	-1877	-87	-1877
20	-38	-254	-38	-254	-38	-254	-38	-254	-38	-254
101	600	-643	600	-643	600	-643	600	-643	600	-643
102	167	-459	167	-459	167	-459	167	-459	167	-459
103	829	279	829	279	829	279	829	279	829	279
104	22	-43	22	-43	22	-43	22	-43	22	-43
105	250	-254	250	-254	250	-254	250	-254	250	-254
106	448	-570	448	-570	448	-570	448	-570	448	-570
107	309	-351	309	-351	309	-351	309	-351	309	-351
108	-28	-579	-28	-579	-28	-579	-28	-579	-28	-579
109	-50	-178	-50	-178	-50	-178	-50	-178	-50	-178
110	-7	-935	-7	-935	-7	-935	-7	-935	-7	-935
111	116	-45	116	-45	116	-45	116	-45	116	-45
112	-124	-174	-124	-174	-124	-174	-124	-174	-124	-174
	0,54	**0,88**	**0,42**	**0,77**	**0,27**	**0,69**	**0,12**	**0,58**	**0,04**	**0,31**

0,50, 0,75, 1,25 and 1,0 m buffer - PT failed!

1,5 m buffer - PT passed

Results of proficiency tests for Garmin and Magellan

- Garmin:
  - With pegs V confirmed PT for 1,25 m
  - In other cases: with C, without C, V for 1,5 m

- **Magellan: all measurements area outside the limits of 1,5 m**

Results for GNSS measurements

- For the most accurate GPS GeoXT (0,5m) satisfactory results we obtained for measurement **without pegs for buffer 1,0 m and for the pegs for buffer 0,75m**
- Garmin was quite good, below 1,5 m
- Was Magellan validated?
- Should we still keep the class 0,5 m as a treshold?

Proficiency tests using orthoimages

Orthoimagery from 2011 - NEW

- New Bing utlracamm xd (0,30 m)
- UAV (SKYMAGING) – (0,10/0,20 m)

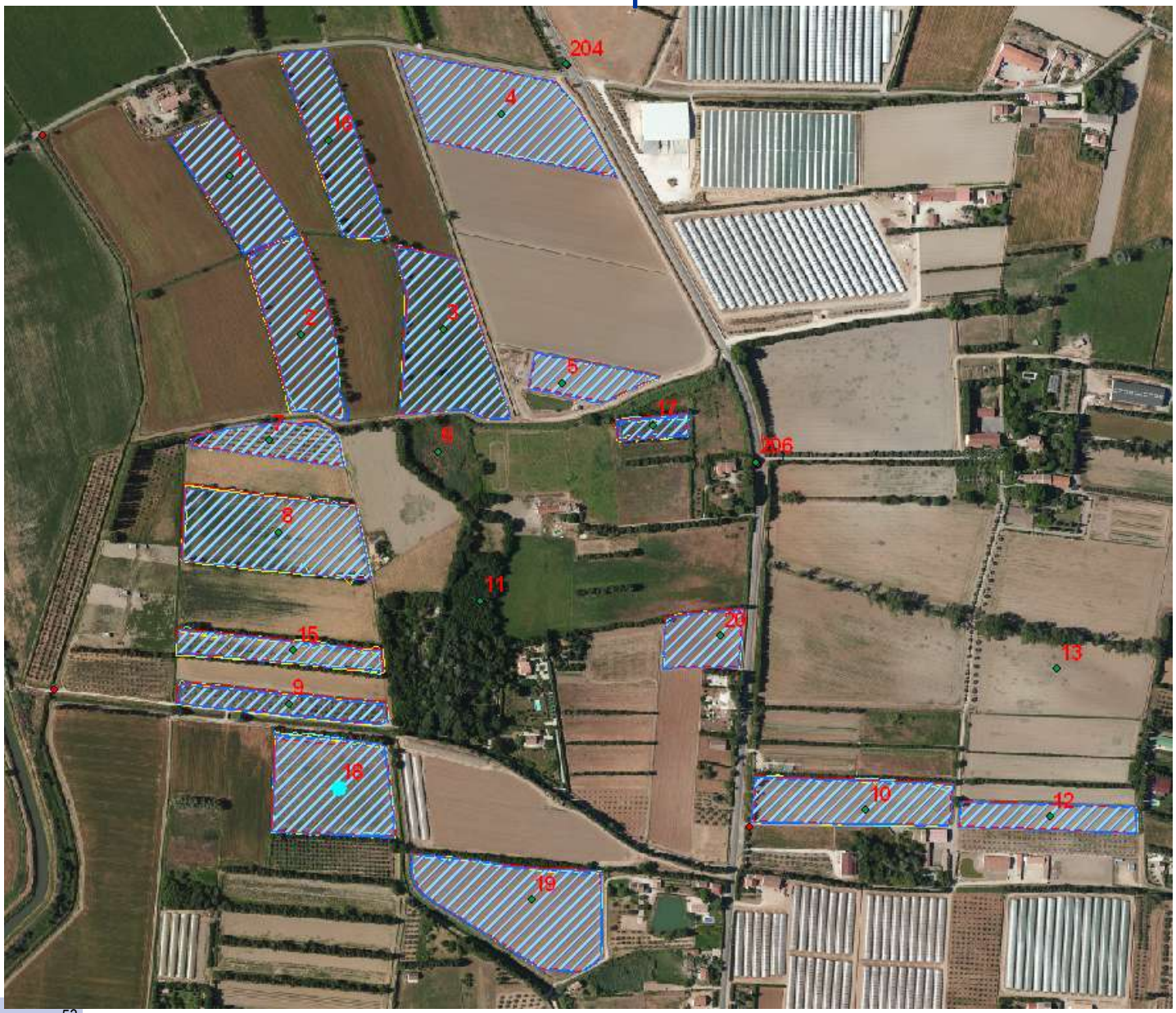
mini/small UAVs

- **miniUAVs (aprox. 2 kg)**
- material sintético ligero
- autopiloto
- 500 gr. carga útil
- autonomía 1 hora (max. 1:30h)
- velocidad crucero 40 km/h, máxima 60 km/h
- lanzamiento manual. No necesita pista de aterrizaje

- **smallUAVs (6-13kg)**
- material fibra
- autopiloto
- 1.5-3 kg carga útil
- autonomía 2 hora (max. 3h)
- velocidad crucero 60 km/h, máxima 100 km/h
- lanzamiento con catapulta. No necesita pista de aterrizaje

Trabajamos con las plataformas ligeras más avanzadas del mercado, donde integramos los sensores de imagen, y la electrónica de navegación y posicionamiento.

The same parcels: test site 1 and 2 were digitized and the areas compred with the RTK



Results of proficiency tests for orthoimagery 0,30m

Id	area	perimeter	RTK area	RTK perim	diff/perim	abs(diff/perim)	diff/perim	abs(diff/perim)	
1	10721,0	455,1	11047	459	0,710	0,71	0,710	0,710	
2	14043,6	548,6	14480	548	0,796	0,80	0,796	0,796	
3	17588,6	604,5	17966	606	0,623	0,62	0,623	0,623	
4	20639,3	662,6	20434	660	-0,311	0,31	-0,311	0,311	
5	5230,0	356,7	5005	356	-0,632	0,63	-0,632	0,632	
7	5919,3	410,8	5756	406	-0,402	0,40	-0,402	0,402	
8	18293,2	602,8	18967	611	1,103	1,10	1,103	1,103	nothing special
9	5288,0	526,8	6294	541	1,860	1,86			wrong border recognition on the image
10	12029,0	572,5	12054	567	0,044	0,04	0,044	0,044	
12	6257,3	475,9	6150	475	-0,226	0,23	-0,226	0,226	
17	1771,1	203,8	2056	217	1,313	1,31			very bad border
18	15465,1	499,4	15062	493	-0,818	0,82	-0,818	0,818	
19	20285,6	618,4	20423	616	0,223	0,22	0,223	0,223	
20	5735,9	304,7	5836	310	0,323	0,32	0,323	0,323	
101	12848,4	461,4	12937	463	0,191	0,19	0,191	0,191	
102	5795,5	301,6	6031	319	0,738	0,74	0,738	0,738	
103	9158,3	407,7	8829	405	-0,813	0,81	-0,813	0,813	
104	2298,1	193,5	2297	197	-0,006	0,01	-0,006	0,006	
105	3860,4	262,6	3806	268	-0,203	0,20	-0,203	0,203	
106	5562,9	387,8	5430	390	-0,341	0,34	-0,341	0,341	
107	3673,4	264,3	3239	254	-1,710	1,71			very bad border
108	6936,2	333,7	6781	331	-0,469	0,47	-0,469	0,469	
109	3048,3	223,4	2962	226	-0,382	0,38	-0,382	0,382	
110	13344,9	574,2	13335	556	-0,018	0,02	-0,018	0,018	
111	1649,3	162,4	1675	168	0,153	0,15	0,153	0,153	
112	4673,1	317,6	4576	320	-0,303	0,30	-0,303	0,303	
				mean	**0,033**		**-0,047**		
				median	**-0,012**		**-0,018**		
				1,96*SD	**1,448**	**1,368**	**1,014**	**0,875**	**Percentile(0,95)**

Buffer calculated on the 95% probability limit

all data

Outliers removed

Percentile approach

Proficiency tests using orthoimages

Orthoimagery from 2011

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Trabajamos con las plataformas ligeras más avanzadas del mercado, donde integramos los sensores de imagen, y la electrónica de navegación y posicionamiento.

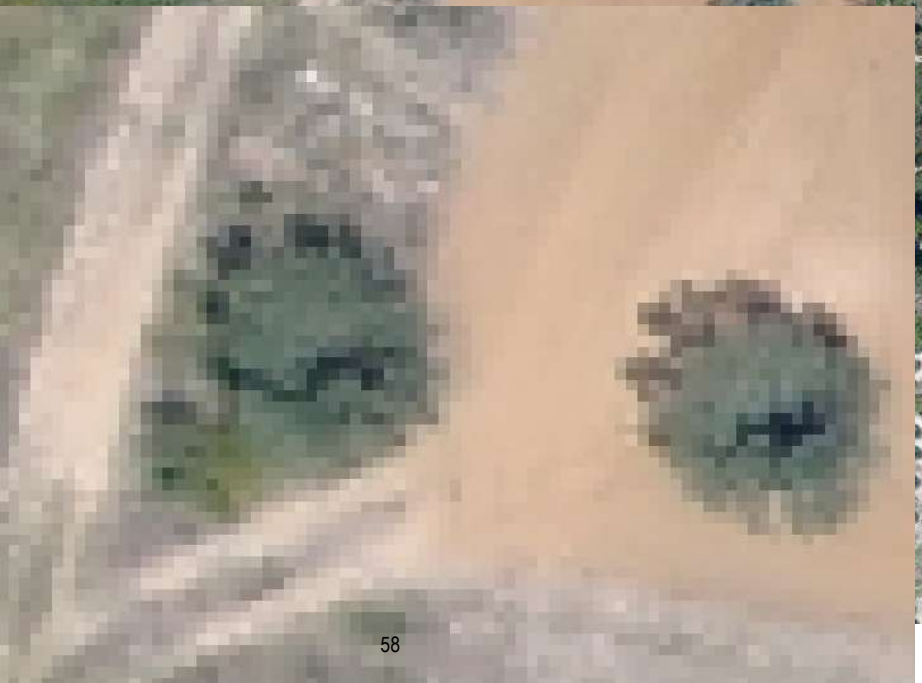
Joint Research Centre

EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

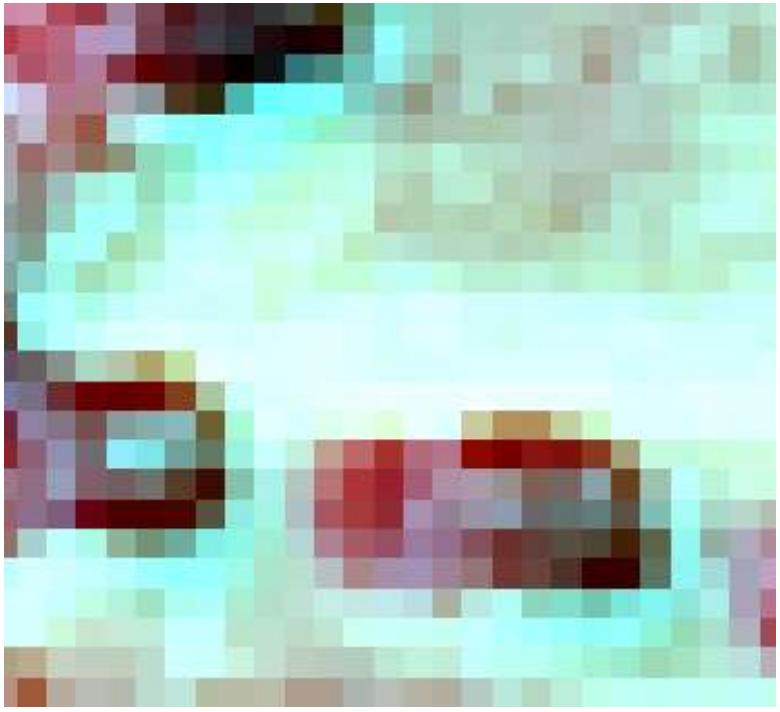
UAV for Mausanne (GSD = 0.1 m) RGB, campaign September 2011

EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

UAV for Mausanne (GSD = 0.2 m) RGB, campaign September 2011



Bing utlracamm xd and UAV



Results of proficiency tests for orthoimagery UAV 0,20m

	RTK area	RTK perim	diff	buffer	abs(buffer)	
1	11047	459	-207	-0,451	0,451	
2	14480	548	181	0,331	0,331	
3	17966	606	488	0,806	0,806	
4	20434	660	-55	-0,083	0,083	
5	5005	356	151	0,424	0,424	
7	5756	406	-115	-0,283	0,283	
8	18967	611	82	0,134	0,134	trees S N
9	6294	541	-272	-0,502	0,502	
10	12054	567	663	1,170	1,170	
12	6150	475	207	0,435	0,435	
17	2056	217	311	1,432	-	extremelly difficult
18	15062	493	-99	-0,201	0,201	
19	20423	616	-513	-0,833	0,833	
20	5836	310	-122	-0,393	0,393	
101	12937	463	45	0,098	0,098	
102	6031	319	78	0,243	0,243	
103	8829	405	4	0,010	0,010	possibly misunderstanding
104	2297	197	-112	-0,568	0,568	
105	3806	268	-100	-0,374	0,374	
106	5430	390	-71	-0,181	0,181	misunderstanding with pegs
107	3239	254	-201	-0,793	0,793	extremelly difficult
108	6781	331	-173	-0,523	0,523	
110	13335	556	138	0,248	0,248	misunderstanding with pegs
111	1675	168	3	0,015	0,015	
112	4576	320	-244	-0,761	0,761	extremelly difficult
			mean	**-0,024**		
			median	**-0,083**		
			1,96*SD	**1,115**	**0,829**	**percentile(0,95)**

Buffer calculated on the 95% probability limit

Percentile approach

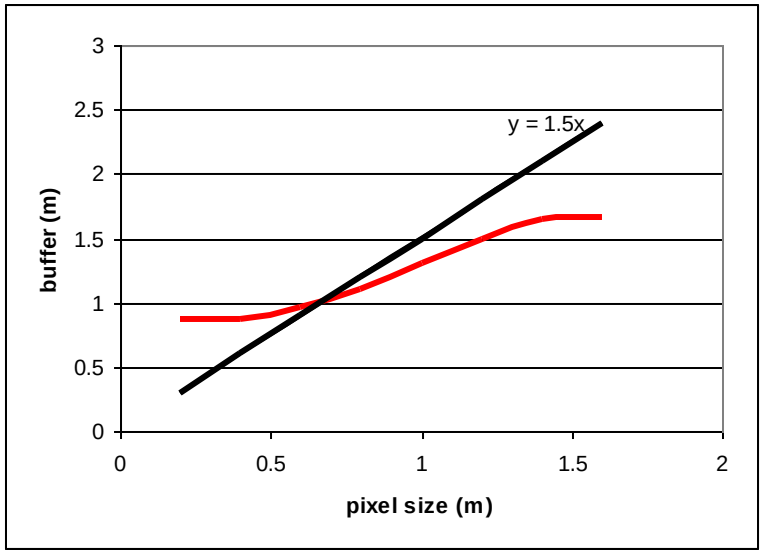
First results of PT for orthoimagery

- Pixel size 0,30 m
  - taking into account all measurement (even removing one gross error doesn't change much) the confirmation PT we obtained for 1,5m buffer limit (1,37 m).
  - **however if excluded also bad borders the PT can be confirmed for buffer of 1,0m (0,88 m).**
- Pixel size 0,20 m
  - taking into account **all measurement** the confirmation PT we obtained for 1,25m buffer limit (1,12 m).
  - **however if excluded one extremaly difficult border the PT can be confirmed for buffer of 1,0m (0,83 m).**

First results of PT for orthoimagery

- Our former recommedation for RS:
  - 1,5 x 0,30 m = 0,45 m
  - 1,5 x 0,20 m = 0,30 m

  Is not realistic! What confirms our current recommendation on wikicap.



Summary of PT in Mausanne

- Proficiency test for the validation method of the buffer tolerance limit was performed by JRC the first time
- GNSS tests:
  - Group 1: six of the most accurate, now available equipments
  - Group 2: two common used, less precisely equipments
- Results of PT for group 1:
  - PT failed for the buffer limit (0,50m) calculated during validation procedure
  - PT passed for the areas marked by pegs for buffer 0,75 m, and for natural borders for buffer 1.0 m
- Results of PT for group 2:
  - Garmin passed PT generally for 1,5 m
  - Magellan did not pass PT at all – was tested in BG: 0,75 nad 1,0m buffer limit is reported on wikicap
- PT using airborne ortoimages passed for pixel size of 0,20 and 0,30 m for buffer ca. 0.9 m

Thank you very much for your attention

and for your collaboration ☺

It was reaally hard work 10 km per day in very hot weather!

Beata Hejmanowska, AGH University of Science and Technology, Kraków, Poland

galia@agh.edu.pl