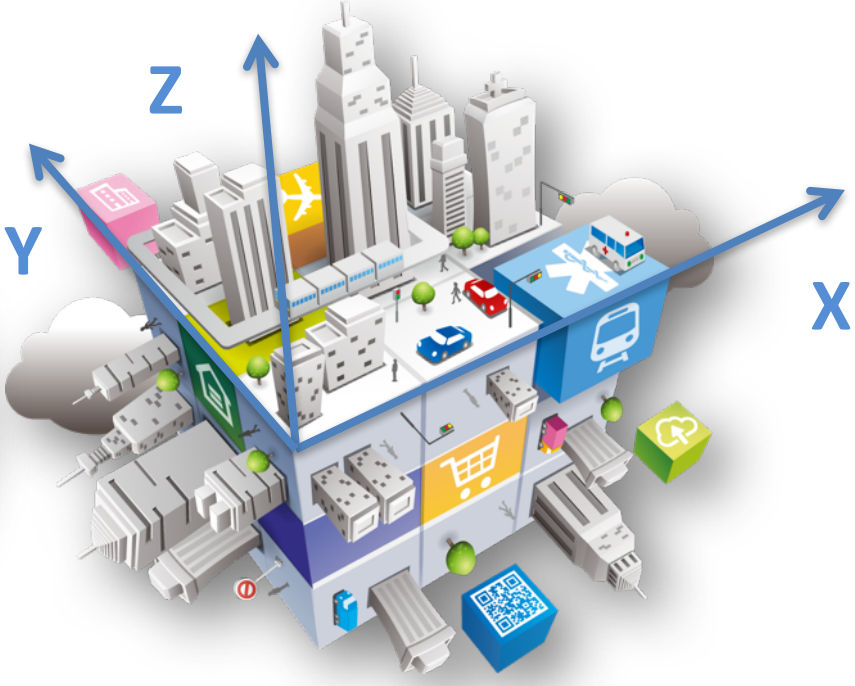
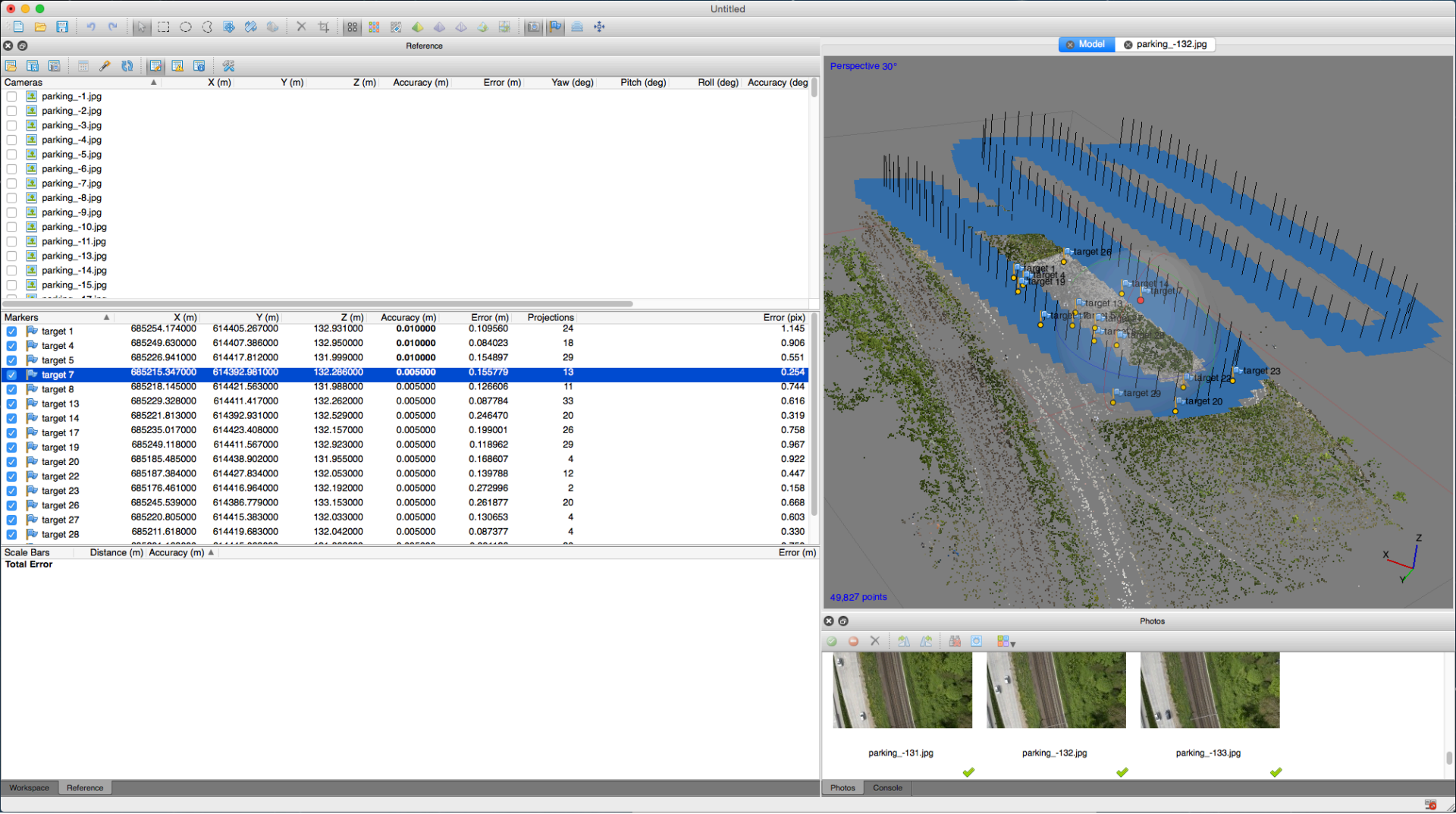
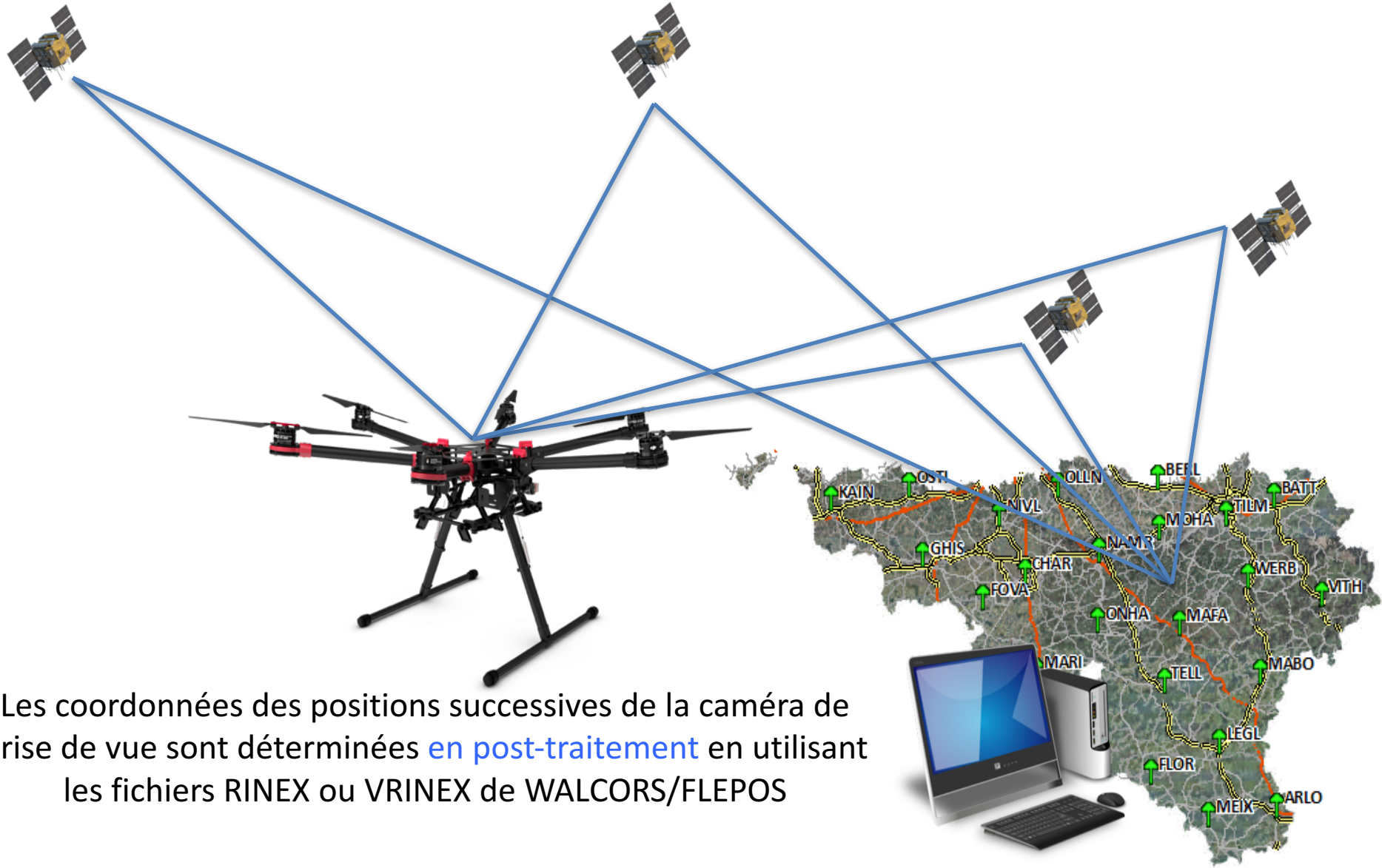


Les Géomètres Experts en … GNSS

Joël van Cranenbroeck, Managing Director

CREATIVE GEOSENSING SPRL-S CGEOS


Untitled
Reference
Cameras
X (m)
Y (m)
Z (m)
Accuracy (m)
Error (m)
Yaw (deg)
Pitch (deg)
Roll (deg)
Accuracy (deg
parking_-1.jpg
parking_-2.jpg
parking_-3.jpg
parking_-4.jpg
parking_-5.jpg
parking_-6.jpg
parking_-7.jpg
parking_-8.jpg
parking_-9.jpg
parking_-10.jpg
parking_-11.jpg
parking_-13.jpg
parking_-14.jpg
parking_-15.jpg
Markers
X (m)
Y (m)
Z (m)
Accuracy (m)
Error (m)
Projections
Error (pix)
target 1 685254.174000 614405.267000 132.931000 0.010000 0.109560 24 1.145
target 4 685249.630000 614407.386000 132.950000 0.010000 0.084023 18 0.906
target 5 685226.941000 614417.812000 131.999000 0.010000 0.154897 29 0.551
target 7 685215.347000 614392.981000 132.286000 0.005000 0.155779 13 0.254
target 8 685218.145000 614421.563000 131.988000 0.005000 0.126606 11 0.744
target 13 685229.328000 614411.417000 132.262000 0.005000 0.087784 33 0.616
target 14 685221.813000 614392.931000 132.529000 0.005000 0.246470 20 0.319
target 17 685235.017000 614423.408000 132.157000 0.005000 0.199001 26 0.758
target 19 685249.118000 614411.567000 132.923000 0.005000 0.118962 29 0.967
target 20 685185.485000 614438.902000 131.955000 0.005000 0.168607 4 0.922
target 22 685187.384000 614427.834000 132.053000 0.005000 0.139788 12 0.447
target 23 685176.461000 614416.964000 132.192000 0.005000 0.272996 2 0.158
target 26 685245.539000 614386.779000 133.153000 0.005000 0.261877 20 0.668
target 27 685220.805000 614415.383000 132.033000 0.005000 0.130653 4 0.603
target 28 685211.618000 614419.683000 132.042000 0.005000 0.087377 4 0.330
Scale Bars
Distance (m)
Accuracy (m)
Error (m)
Total Error
Workspace
Reference
Model
parking_-132.jpg
Perspective 30°
target 26
target 1
target 4
target 19
target 14
target 7
target 13
target 23
target 22
target 29
target 20
49,827 points
Photos
parking_-131.jpg
parking_-132.jpg
parking_-133.jpg
Photos
Console



Les coordonnées des positions successives de la caméra de prise de vue sont déterminées en post-traitement en utilisant les fichiers RINEX ou VRINEX de WALCORS/FLEPOS

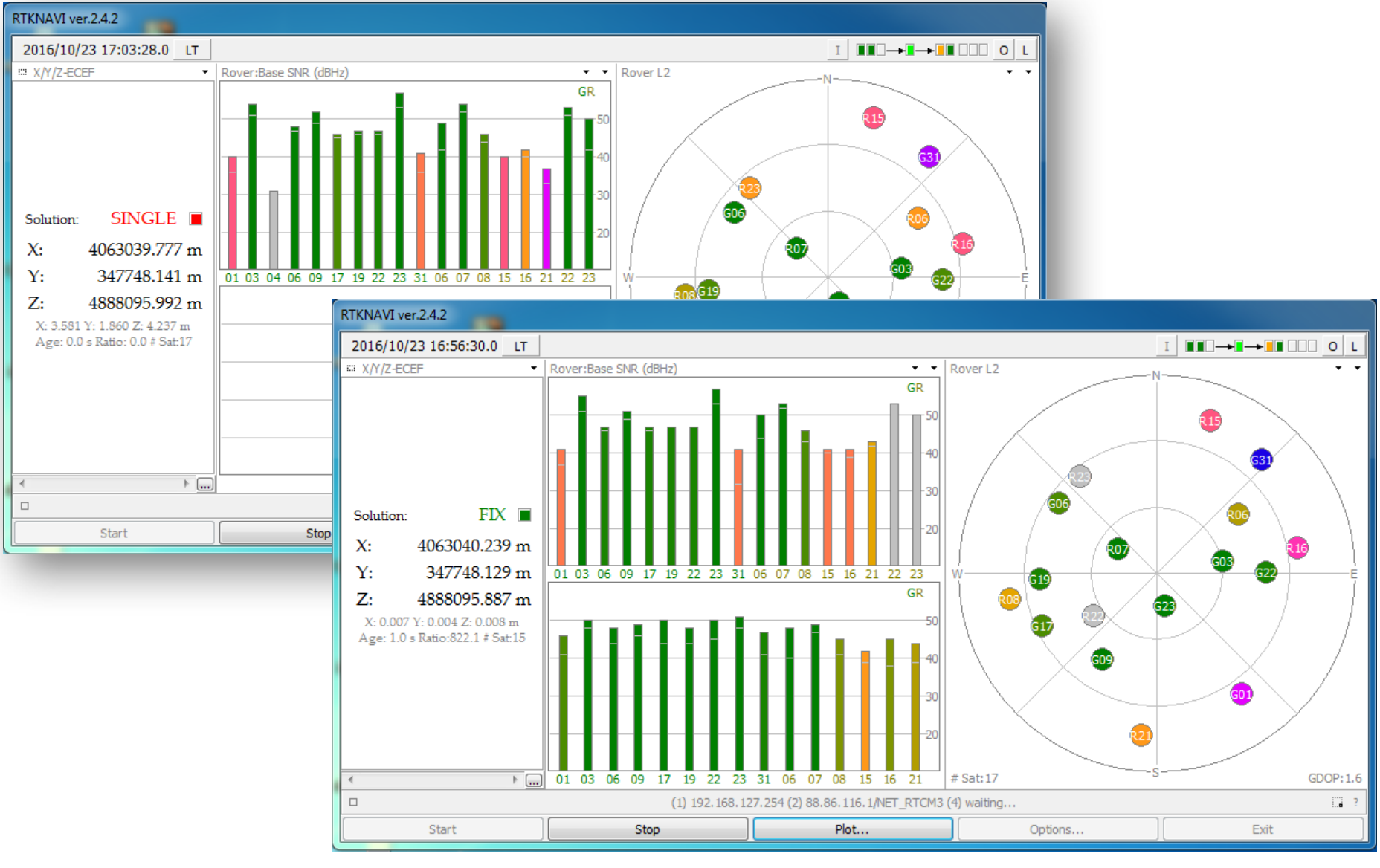
Connecter la station de REFERENCE à un MODEM

Observations et éphémérides au format RTCM 3.x

Connecter le récepteur MOBILE à la ligne de communication

1. Acquérir les observations GNSS du MOBILE et de la REFERENCE
2. Acquérir les XYZ de la REFERENCE
3. Former les différences doubles
4. Calcul en FLOAT, puis INTEGER RTK-FIX
5. Appliquer la transformation « LAMBERT »
6. Appliquer la correction « Géoïde »
7. Stocker le point

Le format RTCM (Radio Technical Commission for Maritime Services) est un format standardisé « binaire » développé pour échanger des observations GNSS en temps réel indépendamment des formats propriétaires.


RTKNAVI ver.2.4.2
2016/10/23 17:03:28.0 LT
X/Y/Z-ECEF
Rover:Base SNR (dBHz)
Rover L2
Solution: SINGLE
X: 4063039.777 m
Y: 347748.141 m
Z: 4888095.992 m
X: 3.581 Y: 1.860 Z: 4.237 m
Age: 0.0 s Ratio: 0.0 # Sat:17
Start
Stop
RTKNAVI ver.2.4.2
2016/10/23 16:56:30.0 LT
X/Y/Z-ECEF
Rover:Base SNR (dBHz)
Rover L2
Solution: FIX
X: 4063040.239 m
Y: 347748.129 m
Z: 4888095.887 m
X: 0.007 Y: 0.004 Z: 0.008 m
Age: 1.0 s Ratio:822.1 # Sat:15
Sat:17
GDOP:1.6
(1) 192.168.127.254 (2) 88.86.116.1/NET_RTCM3 (4) waiting...
Start
Stop
Plot...
Options...
Exit

RTKNAVI ver.2.4.2: RTK Monitor

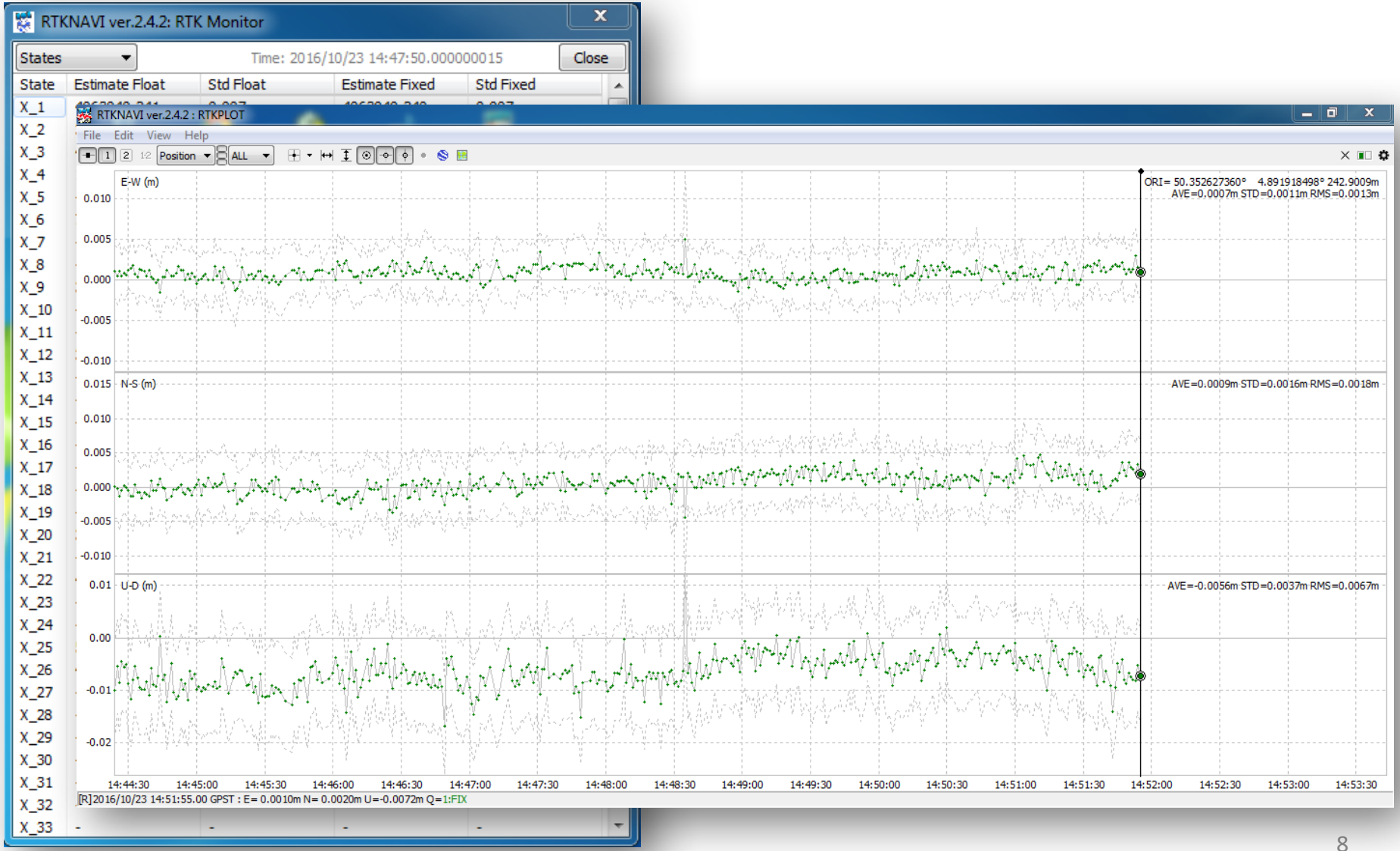
RTK | Close

Parameter	Value
RTKLIB V	
RTK Serv	
RTK Serv	
Processi	
Positioni	
Frequen	
Elevatio	
SNR Mas	
SNR Mas	
SNR Mas	
Rec Dyn	
Ionosph	
Satellite	
Excludec	
Navi Sys	
Accumul	
CPU Tim	
Missing (	
Bytes in	
# of Inp	
# of Inp	
# of Inp	
Solution	
Time of F	
Time Syt	
Solution	
Age of D	
Ratio for	
# of Sat	
# of Sat	
# of Vali	
GDOP/PD	
# of Rea	
# of All B	
Pos X/Y/	
Lat/Lon/	

RTKNAVI ver.2.4.2: RTK Monitor

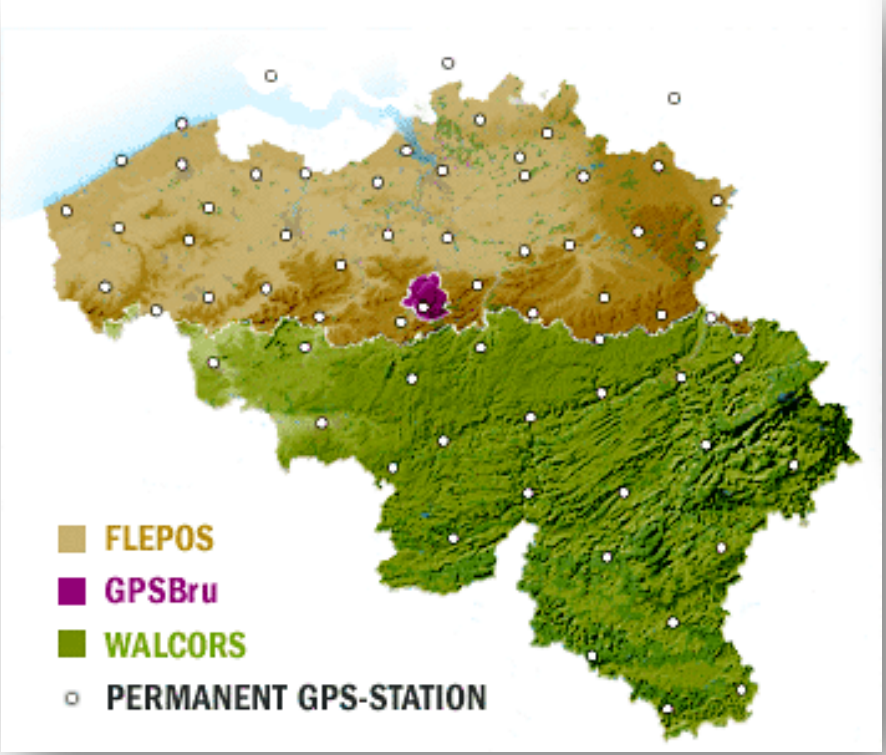
Obs Data | Normal | Close

Trcv (GPST)	SAT	RCV	P1 (m)	P2 (m)	P5 (m)	L1 (cycle)	L2 (cycle)	L5 (cycle)	D1 (Hz)	D2 (Hz)	D5 (Hz)	S1	S2	S5	I	I	I	C1	C2	C5
2016/10/23 14:44:03.000	G01	1	23012264.988	23012270.488	0.000	120930276.149	94231372.809	0.000	0.000	0.000	0.000	43.8	40.8	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	G03	1	20689413.282	20689416.302	0.000	108723660.917	84719273.127	0.000	0.000	0.000	0.000	52.2	56.2	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	G06	1	22678161.350	22678165.750	0.000	119174569.525	92863379.805	0.000	0.000	0.000	0.000	44.0	43.0	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	G09	1	22111821.374	22111825.114	0.000	116198432.559	90544251.067	0.000	0.000	0.000	0.000	47.8	48.0	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	G17	1	22359956.672	22359957.952	0.000	117502395.062	91560315.727	0.000	0.000	0.000	0.000	48.2	47.8	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	G19	1	22209362.592	22209361.872	0.000	116711020.208	90943669.425	0.000	0.000	0.000	0.000	48.2	48.8	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	G22	1	21689917.876	21689916.216	0.000	113981334.910	88816635.782	0.000	0.000	0.000	0.000	49.2	49.5	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	G23	1	20848044.782	20848043.382	0.000	109557247.831	85369292.650	0.000	0.000	0.000	0.000	53.0	55.8	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	G31	1	23469230.344	23469231.084	0.000	123331663.861	96102601.570	0.000	0.000	0.000	0.000	42.2	32.0	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	R06	1	20253999.988	20253998.328	0.000	108079271.108	84061675.354	0.000	0.000	0.000	0.000	50.5	44.5	0.0	0	0	0	L1C	L2C	
2016/10/23 14:44:03.000	R07	1	19590428.672	19590427.652	0.000	104869146.311	81564909.260	0.000	0.000	0.000	0.000	53.8	51.8	0.0	0	0	0	L1C	L2C	
2016/10/23 14:44:03.000	R08	1	22874012.428	22874011.288	0.000	122489306.775	95269467.268	0.000	0.000	0.000	0.000	43.2	41.5	0.0	0	0	0	L1C	L2C	
2016/10/23 14:44:03.000	R15	1	22751610.512	22751615.132	0.000	121577738.542	94560482.593	0.000	0.000	0.000	0.000	39.8	40.0	0.0	0	0	0	L1C	L2C	
2016/10/23 14:44:03.000	R16	1	22426734.132	22426735.212	0.000	119799606.462	93177481.496	0.000	0.000	0.000	0.000	40.2	38.0	0.0	0	0	0	L1C	L2C	
2016/10/23 14:44:03.000	R21	1	22244059.292	22244060.352	0.000	119032451.186	92580801.421	0.000	0.000	0.000	0.000	46.0	43.5	0.0	0	0	0	L1C	L2C	
2016/10/23 14:44:03.000	R22	1	19760368.292	19760368.712	0.000	105482229.274	82041755.671	0.000	0.000	0.000	0.000	54.0	51.5	0.0	0	0	0	L1C	L2C	
2016/10/23 14:44:03.000	R23	1	21778150.396	21778154.296	0.000	116498437.025	90609920.575	0.000	0.000	0.000	0.000	48.0	40.5	0.0	0	0	0	L1C	L2C	
2016/10/23 14:44:03.000	G01	2	23012266.308	23012263.928	0.000	120930273.879	94231370.747	0.000	0.000	0.000	0.000	48.2	43.0	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	G03	2	20689412.702	20689408.122	0.000	108723597.442	84719667.689	0.000	0.000	0.000	0.000	50.5	48.5	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	G06	2	22678163.910	22678160.690	0.000	119174556.828	92863278.642	0.000	0.000	0.000	0.000	48.2	43.5	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	G09	2	22111822.534	22111818.694	0.000	116198413.877	90544203.244	0.000	0.000	0.000	0.000	50.0	45.2	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	G17	2	22359958.712	22359952.172	0.000	117502375.140	91560265.054	0.000	0.000	0.000	0.000	50.0	45.0	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	G19	2	22209364.472	22209355.972	0.000	116710997.333	90943598.806	0.000	0.000	0.000	0.000	49.5	45.2	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	G22	2	21689918.176	21689908.716	0.000	113981288.432	88816549.660	0.000	0.000	0.000	0.000	50.0	45.5	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	G23	2	20848044.382	20848035.222	0.000	109557213.739	85369220.518	0.000	0.000	0.000	0.000	50.8	47.2	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	G31	2	23469232.404	23469225.304	0.000	123331647.655	96102553.648	0.000	0.000	0.000	0.000	48.8	40.5	0.0	0	0	0	L1C	L2W	
2016/10/23 14:44:03.000	R06	2	20254123.548	20254123.468	0.000	108079884.199	84062131.343	0.000	0.000	0.000	0.000	48.8	41.5	0.0	0	0	0	L1C	L2P	
2016/10/23 14:44:03.000	R07	2	19590551.872	19590550.652	0.000	104869758.853	81565363.203	0.000	0.000	0.000	0.000	49.0	47.2	0.0	0	0	0	L1C	L2P	
2016/10/23 14:44:03.000	R08	2	22874137.748	22874137.988	0.000	122489971.577	95269982.616	0.000	0.000	0.000	0.000	44.0	41.0	0.0	0	0	0	L1C	L2P	
2016/10/23 14:44:03.000	R15	2	22751739.272	22751742.332	0.000	121578396.562	94560987.641	0.000	0.000	0.000	0.000	44.0	38.2	0.0	0	0	0	L1C	L2P	
2016/10/23 14:44:03.000	R16	2	22426860.252	22426862.832	0.000	119800265.178	93177995.461	0.000	0.000	0.000	0.000	42.8	37.8	0.0	0	0	0	L1C	L2P	
2016/10/23 14:44:03.000	R21	2	22244184.992	22244185.612	0.000	119033123.680	92581319.319	0.000	0.000	0.000	0.000	45.8	41.8	0.0	0	0	0	L1C	L2P	


RTKNAVI ver.2.4.2: RTK Monitor
States
Time: 2016/10/23 14:47:50.000000015
Close
State
Estimate Float
Std Float
Estimate Fixed
Std Fixed
X_1
X_2
X_3
X_4
X_5
X_6
X_7
X_8
X_9
X_10
X_11
X_12
X_13
X_14
X_15
X_16
X_17
X_18
X_19
X_20
X_21
X_22
X_23
X_24
X_25
X_26
X_27
X_28
X_29
X_30
X_31
X_32
X_33
RTKNAVI ver.2.4.2 : RTKPLOT
File
Edit
View
Help
Position
ALL
E-W (m)
ORI= 50.352627360° 4.891918498° 242.9009m
AVE=0.0007m STD=0.0011m RMS=0.0013m
N-S (m)
AVE=0.0009m STD=0.0016m RMS=0.0018m
U-D (m)
AVE=-0.0056m STD=0.0037m RMS=0.0067m
14:44:30
14:45:00
14:45:30
14:46:00
14:46:30
14:47:00
14:47:30
14:48:00
14:48:30
14:49:00
14:49:30
14:50:00
14:50:30
14:51:00
14:51:30
14:52:00
14:52:30
14:53:00
14:53:30
[R]2016/10/23 14:51:55.00 GPST : E= 0.0010m N= 0.0020m U=-0.0072m Q=1:FIX

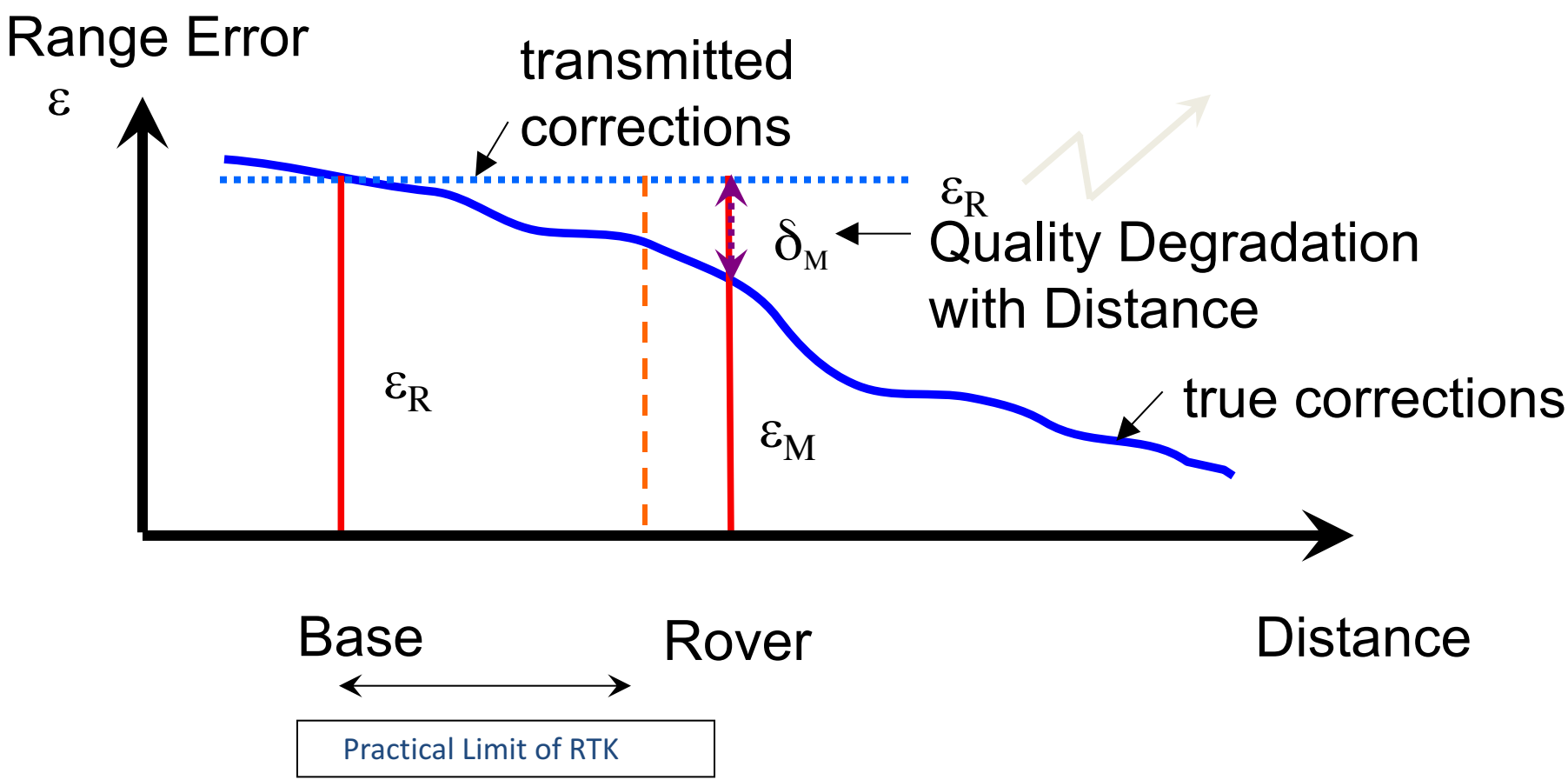
Les réseaux GNSS RTK

Infrastructure de Positionnement en Belgique



23 + 35 + 1 Stations CORS
en Belgique

RTK - Distance Dependency



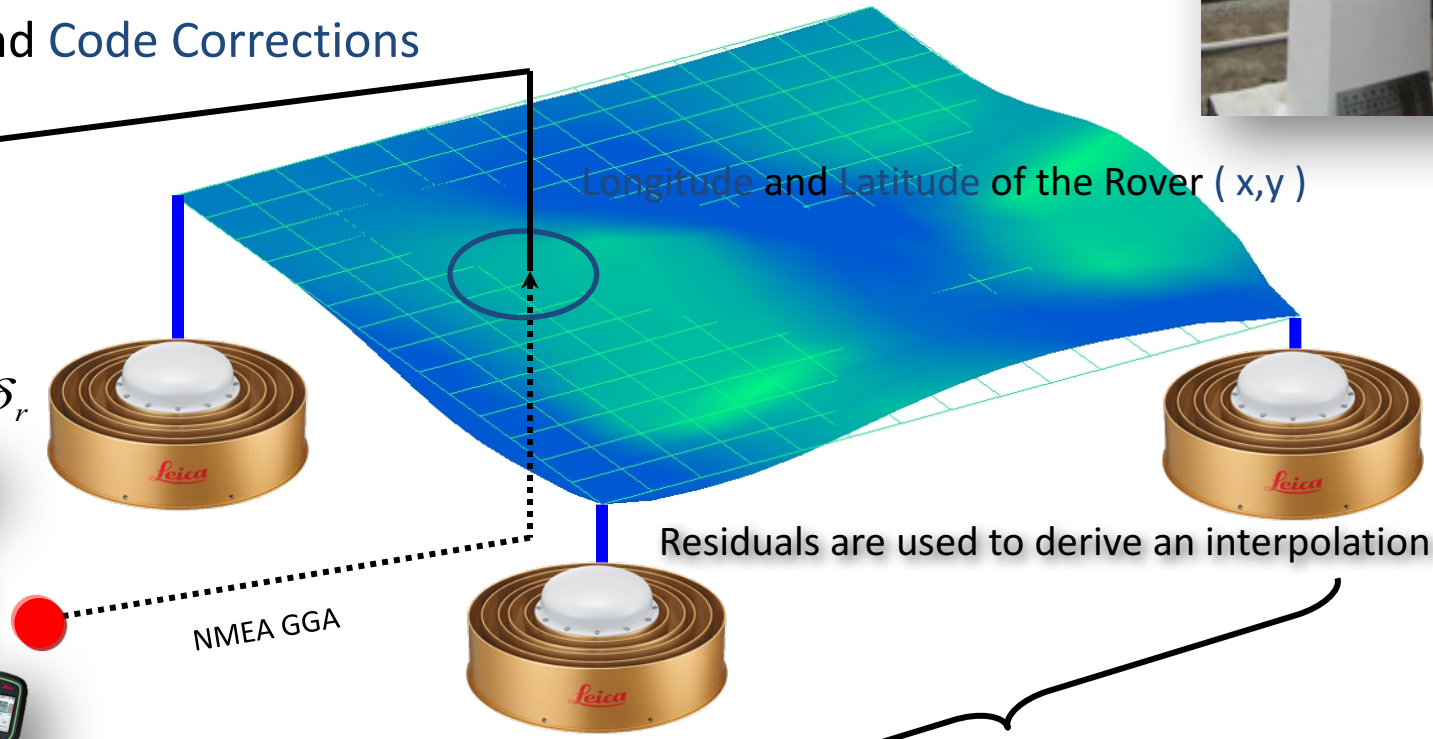
Derived Observation Corrections

$$\delta_{r0} = \alpha\left(N_0(\varphi - \varphi_R) + E_0(\lambda - \lambda_R)\cos(\varphi_R)\right)$$

$$\delta_{r1} = \beta \cdot H\left(N_1(\varphi - \varphi_R) + E_1(\lambda - \lambda_R)\cos(\varphi_R)\right)$$

Phase and Code Corrections

$$R_k = R - \delta_r$$



Residuals are used to derive an interpolation model

Typically 80km – 125 km

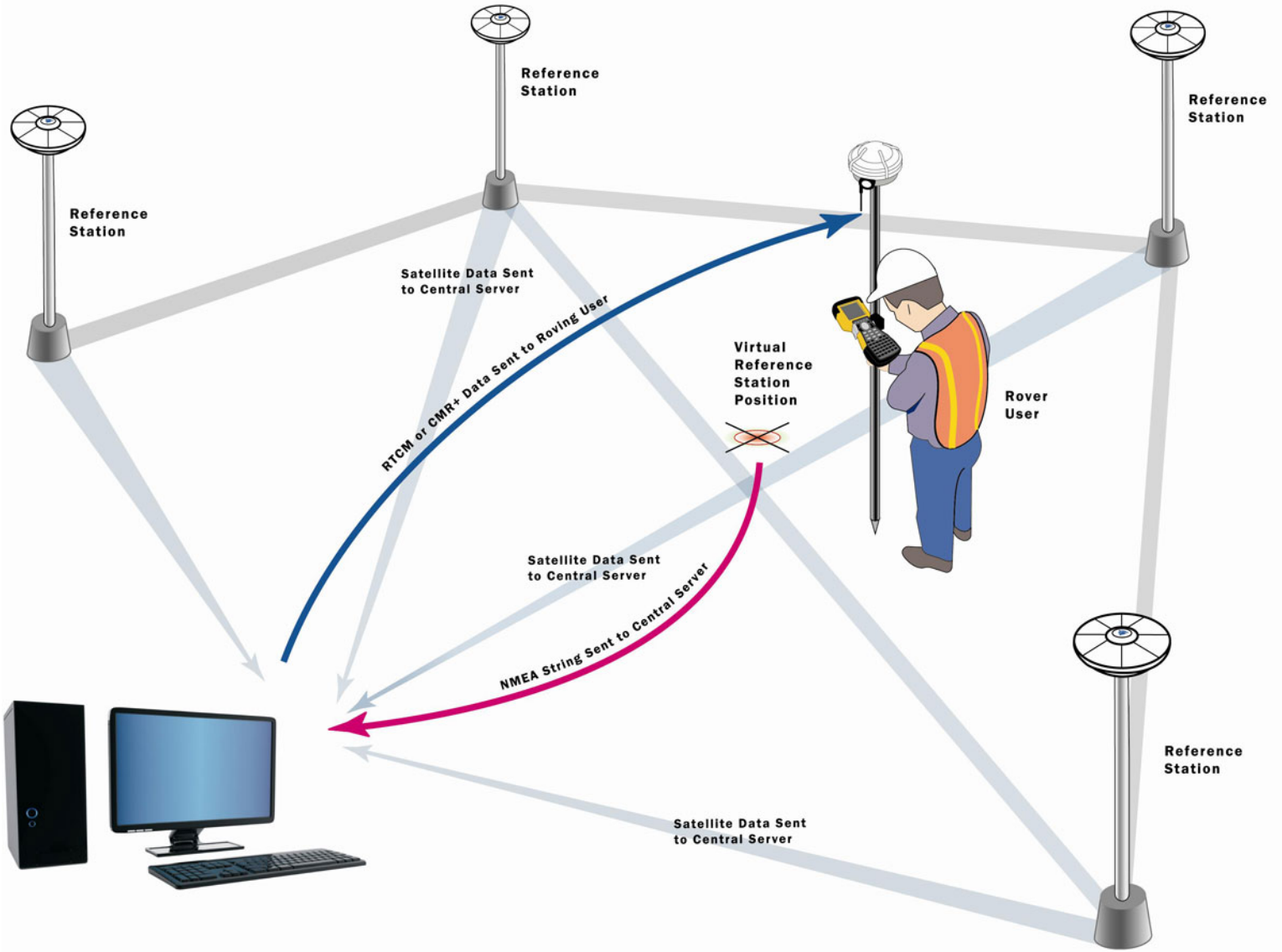
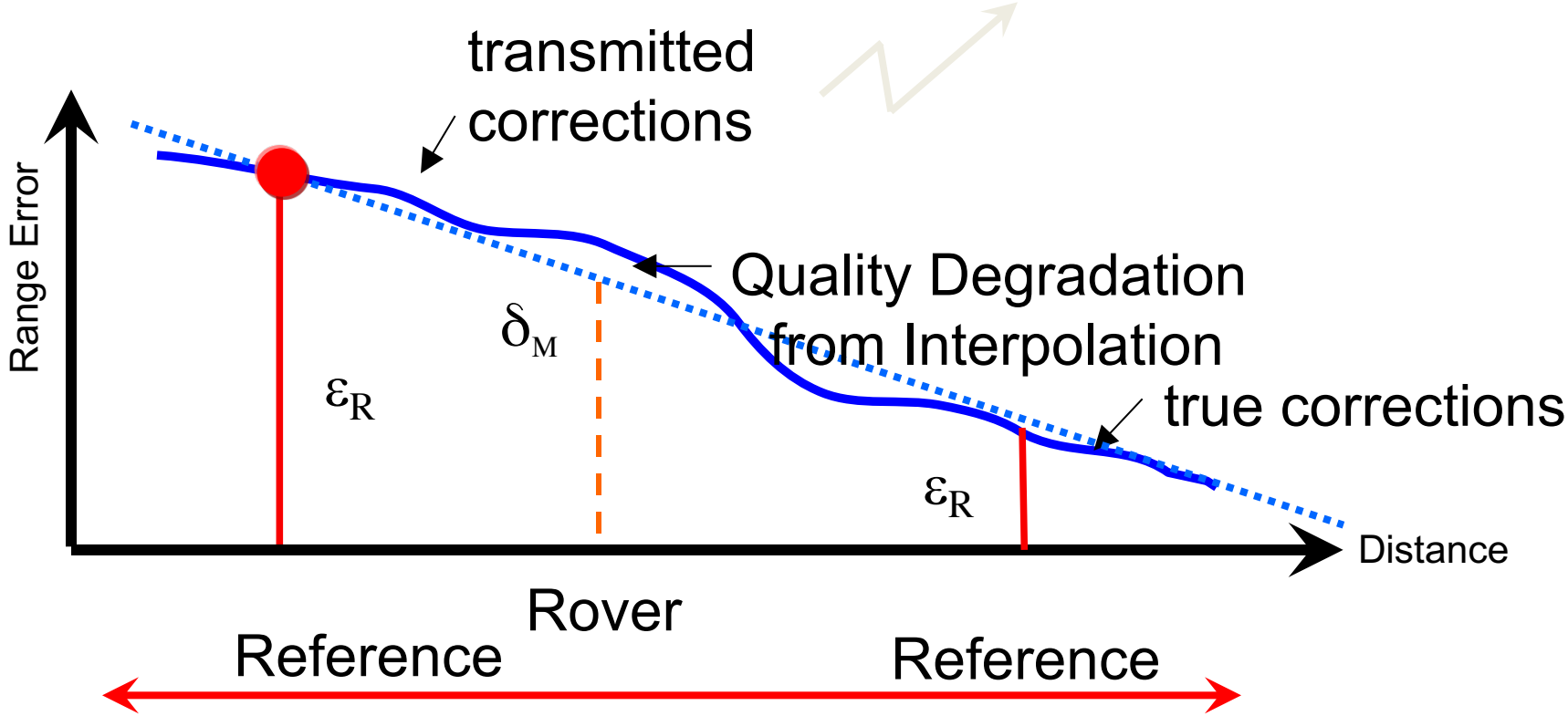


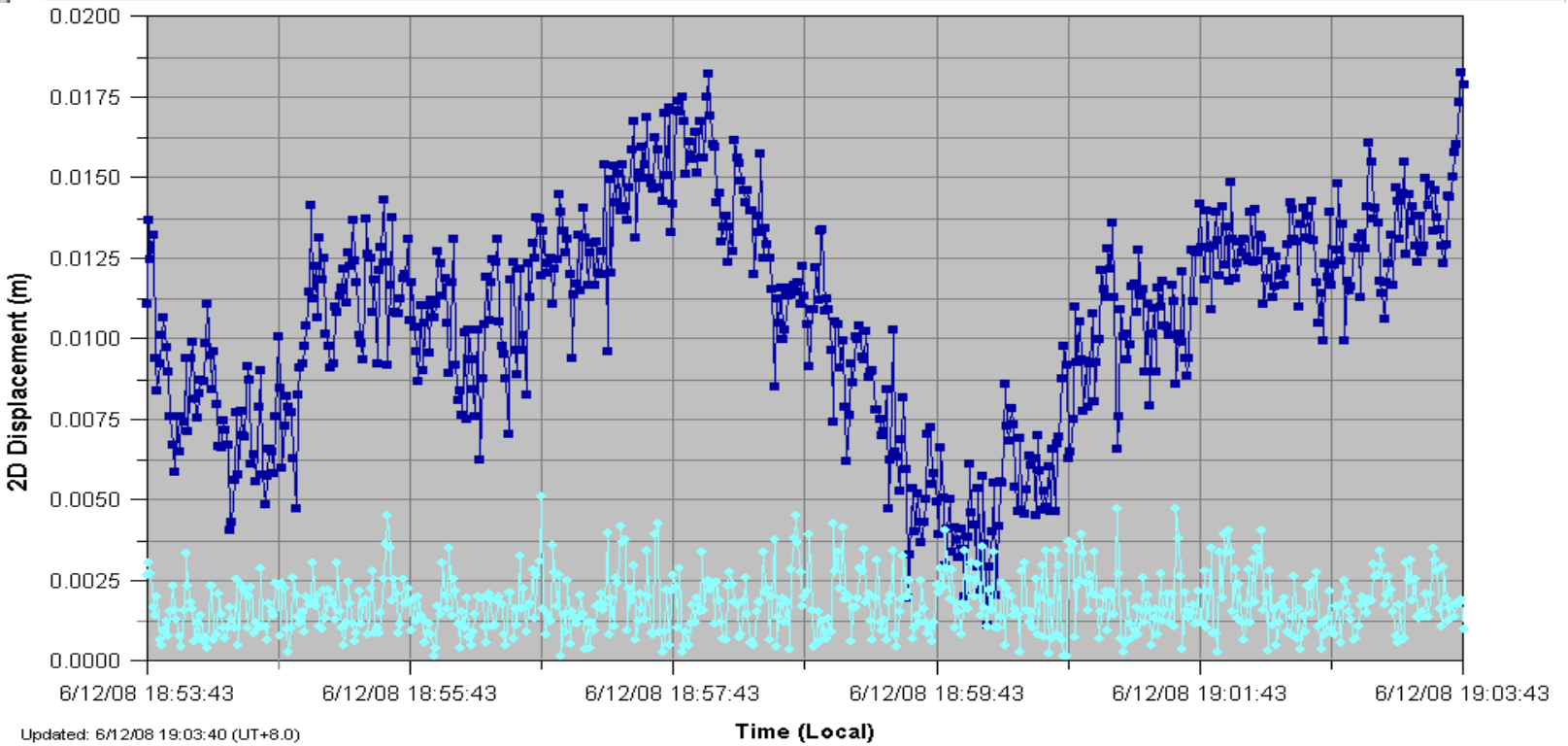
Image courtesy of Trimble

Master Station(s) in **Master Auxilliary Concept**



With a GNSS Network RTK (interpolation & extrapolation) no more distance dependency. The choice of the Master Station can be any Reference station selected within the cell.

		CQ [m]	GDOP	Distance	Use network	Ref-Site code	Site code	Sats	Last Change	Latitude	Longitud
yes		0.408	2.1	91.722 km	no	CHGZ	YONG	10	06.12.2008 10:33:53	36° 44′ 52.05379″ N	103° 1
yes		0.025	5.5	91.722 km	MAX	INTG	YONG	7	06.12.2008 10:33:57	36° 44′ 52.05371″ N	103° 1
yes		0.093	4.0	75.964 km	no	CHGZ	HONG	9	06.12.2008 10:33:54	36° 15′ 58.56418″ N	103° 0
yes		0.026	5.5	75.964 km	MAX	INTG	HONG	7	06.12.2008 10:33:57	36° 15′ 58.56428″ N	103° 0
yes		0.023	5.5	51.083 km	MAX	INTG	ZHCH	7	06.12.2008 10:33:52	36° 29′ 50.23644″ N	103° 3
yes		0.083	4.0	51.083 km	no	CHGZ	ZHCH	9	06.12.2008 10:33:58	36° 29′ 50.23623″ N	103° 3
yes		0.047	2.1	33.383 km	no	CHGZ	GAOL	10	06.12.2008 10:33:55	36° 20′ 57.20094″ N	103° 5
yes		0.024	2.3	33.383 km	MAX	INTG	GAOL	10	06.12.2008 10:33:43	36° 20′ 57.20127″ N	103° 5
yes		0.017	2.3	31.244 km	MAX	INTG	XGYZ	10	06.12.2008 10:33:56	35° 56′ 44.50325″ N	104° 0
yes		0.067	2.3	31.244 km	no	INTG	XGYZ	10	06.12.2008 10:33:51	35° 56′ 44.50325″ N	104° 0
yes		0.476	2.1	30.970 km	no	CHGZ	XINC	11	06.12.2008 10:32:57	36° 08′ 31.04639″ N	103° 2
yes		0.026	5.5	30.970 km	MAX	INTG	XINC	9	06.12.2008 10:33:59	36° 08′ 31.04644″ N	103° 2
yes		0.018	2.3	0.000 km	MAX	INTG	CHGZ	10	06.12.2008 10:33:59	36° 03′ 45.31290″ N	103° 4



GNSS Network RTK - Modèles

- TRIMBLE (Herbert LANDAU)
  - VRS™ Virtual Reference Station (Wanninger University of Hannover)
  - PPP-RTK, RTX
- LEICA (Hans-Juergen EULER)
  - i-MAX Individualized MAX
  - MAX Master Auxiliary Concept (2 modes) ne supporte pas BEIDOU
- Geo++ (Gerhard WUEBBENA)
  - PRS (Pseudo Reference Station)
  - FKP
  - RTCM-SSR

Tous ces modèles produisent au récepteur GNSS RTK le même résultat ! C'est l'industrie GNSS qui essaye de se différencier ! On reconnait aujourd'hui que **VRS™** et sa variante **i-MAX** sont devenus grâce à l'internet mobile les modèles les plus populaires ...

Ntrip Browser ver.2.4.2

File Edit View Help

157.164.253.36:8081 STR CAS NET SRC MAP

Mountpoint	ID	Format	Format-Details	Ca	Nav-System	Network	Cour	Latitude	Longitude	NM	So	Generator	Com	Au	Fe	Bitrate
VRS2021G	VRS2021G	RTCM 2	Messages 20 21	2	GPS	WALCORS	BE	49.93	4.07	1	0	Leica GNSS Spider	none	N	N	9600
VRS1819G	VRS1819G	RTCM 2	Messages 18 19	2	GPS	WALCORS	BE	49.93	4.07	1	1	Leica GNSS Spider	none	N	N	9600
VRS1819GG	VRS1819GG	RTCM 2	Messages 18 19	2	GPS & GLO	WALCORS	BE	49.93	4.07	1	1	Leica GNSS Spider	none	N	N	9600
VRS31G	VRS31G	RTCM 3		2	GPS	WALCORS	BE	49.93	4.07	1	1	Leica GNSS Spider	none	N	N	9600
VRS31GG	VRS31GG	RTCM 3		2	GPS & GLO	WALCORS	BE	49.93	4.07	1	1	Leica GNSS Spider	none	N	N	9600
FKP2021G	FKP2021G	RTCM 2	Messages 20 21	2	GPS	WALCORS	BE	49.93	4.07	1	1	Leica GNSS Spider	none	B	N	9600
MAX1516G	MAX1516G	RTCM 3	1015 1016	2	GPS	WALCORS	BE	49.93	4.07	1	1	Leica GNSS Spider	none	N	N	9600
MAX1516GG	MAX1516GG	RTCM 3	1015 1016	2	GPS & GLO	WALCORS	BE	49.93	4.07	1	1	Leica GNSS Spider	none	N	N	9600
MAX17G	MAX17G	RTCM 3	1017	2	GPS	WALCORS	BE	49.93	4.07	1	1	Leica GNSS Spider	none	N	N	9600
MAX17GG	MAX17GG	RTCM 3	1017	2	GPS & GLO	WALCORS	BE	49.93	4.07	1	1	Leica GNSS Spider	none	N	N	9600
VRSCMRPGG	VRSCMRPGG	CMR+		2	GPS & GLO	WALCORS	BE	49.93	4.07	1	1	Leica GNSS Spider	none	N	N	9600
MAXLEI4GG	MAXLEI4GG	Leica		2	GPS & GLO	WALCORS	BE	49.93	4.07	1	1	Leica GNSS Spider	none	N	N	9600
NEAR3GG	NEAR3GG	RTCM 3		2	GPS & GLO	WALCORS	BE	50.21	6.43	1	0	Leica GNSS Spider	none	N	N	9600

source table received

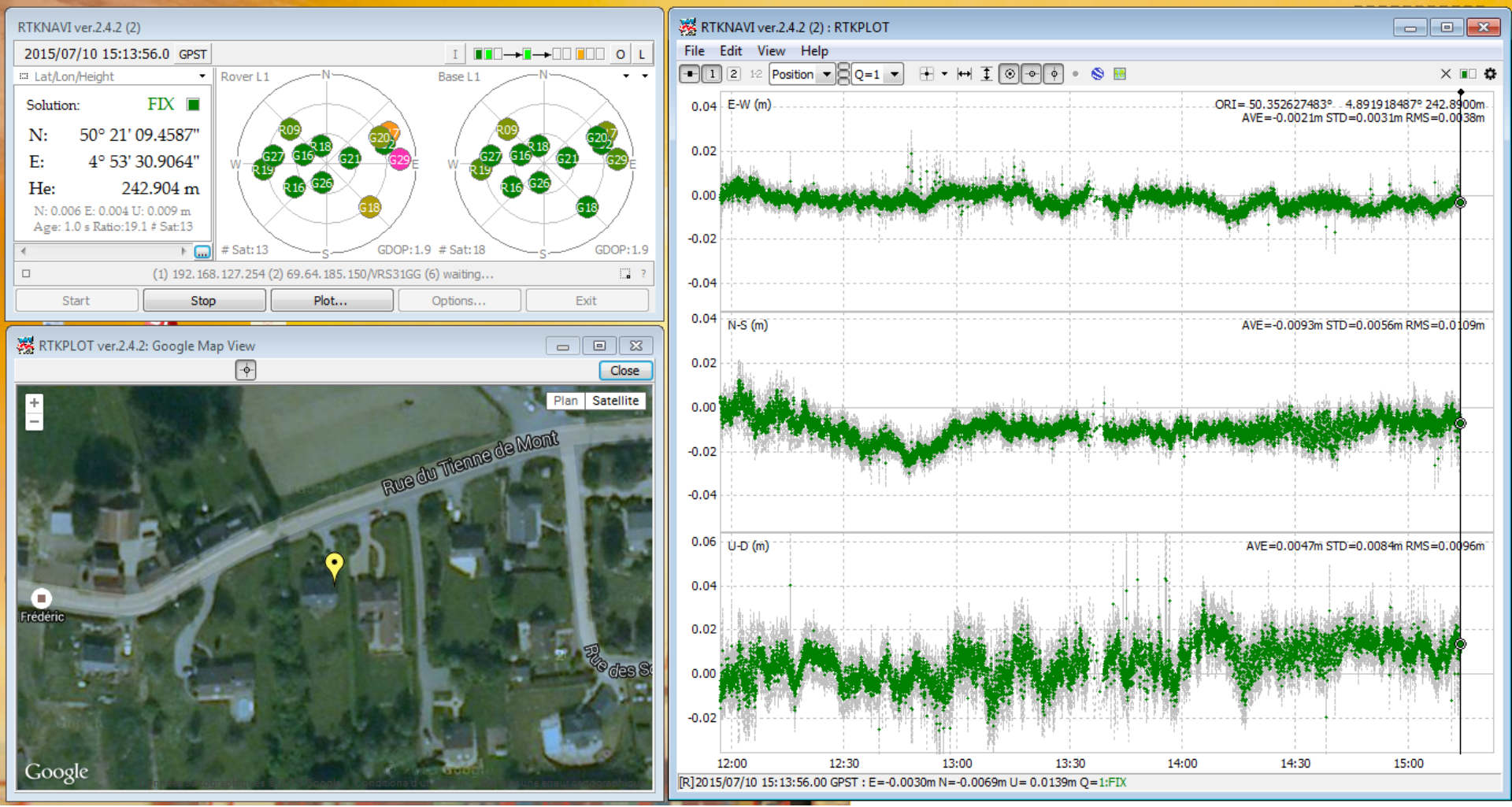
Ntrip Browser ver.2.4.2

File Edit View Help

193.190.76.53:2101 STR CAS NET SRC MAP

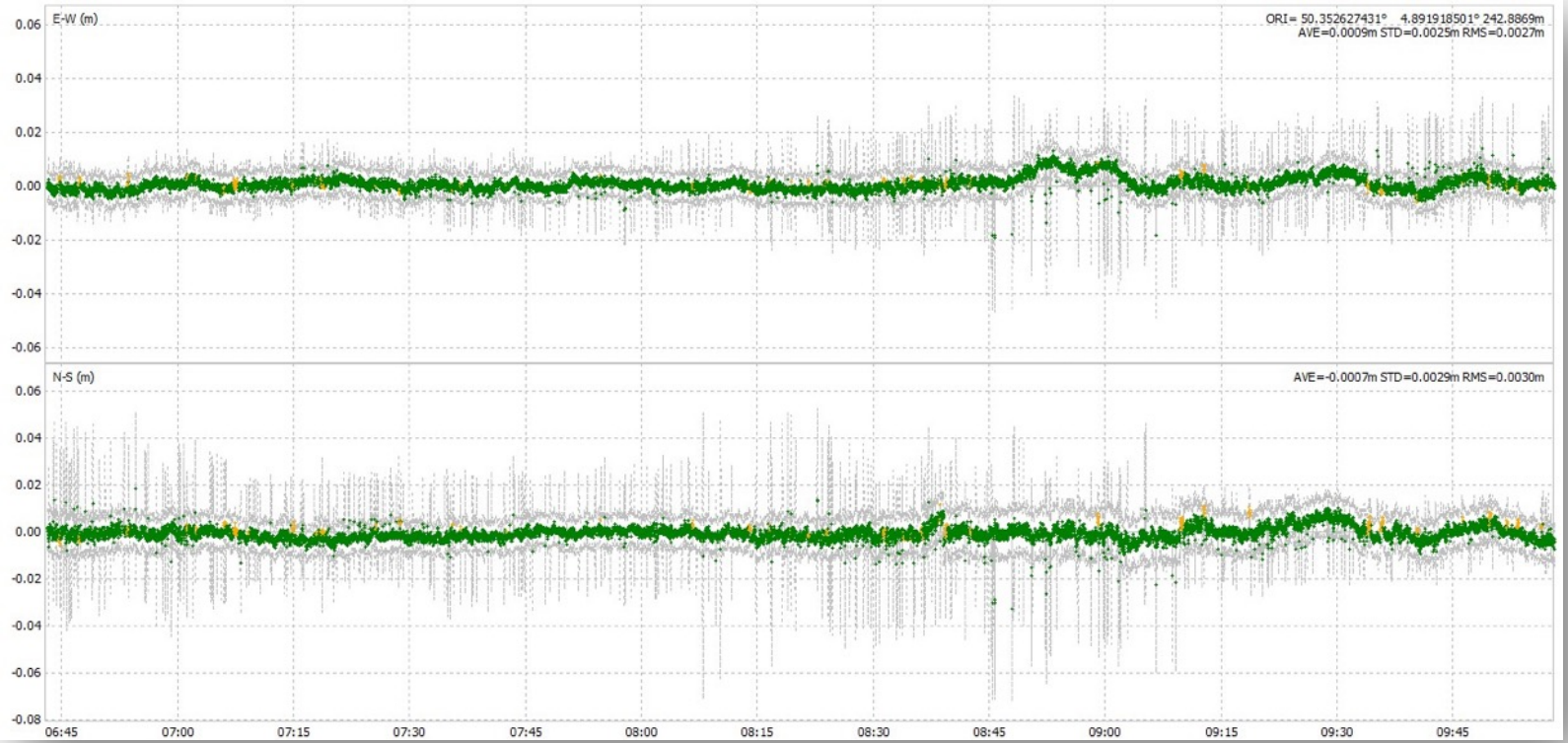
Mountpoint	ID	Format	Format-Details	Ca	Nav-System	Network	Cour	Latitude	Longitude	NMEA	Solutio	Generator
FLEPOSVRS31	Flepos_Vrs_Rtcm31	RTCM 3.1	1004(1),1005/1007(5),PBS(10)	2	GPS	Flepos	BEL	51.03	3.73	1	1	Trimble VRS?
FLEPOSVRS23	Flepos_Vrs_Rtcm23	RTCM 2.3	1(1),3(10),18(1),19(1)	2	GPS	Flepos	BEL	51.05	3.73	1	1	Trimble VRS?
FLEPOSNRS31	Flepos_Nrs_Rtcm31	RTCM 3.1	1004(1),1005/1007/1033(5)	2	GPS	Flepos	BEL	51.05	3.73	1	1	Trimble VRS?
FLEPOSVRS31GLO	Flepos_Vrs_Rtcm31_GpsGlo	RTCM 3.1	1004(1),1005/1007(5),PBS(10)	2	GPS+GLONASS	Flepos	BEL	51.05	3.73	1	1	Trimble VRS?
FLEPOSNRS31GLO	Flepos_Nrs_Rtcm31_GpsGlo	RTCM 3.1	1004/1012(1),1005/1007/1033(5)	2	GPS+GLONASS	Flepos	BEL	51.05	3.73	1	1	Trimble VRS?
FLEPOSVRS23GLO	Flepos_Vrs_Rtcm23_GpsGlo	RTCM 2.3	1(1),3(10),18(1),19(1)	2	GPS+GLONASS	Flepos	BEL	51.05	3.73	1	1	Trimble VRS?

source table received



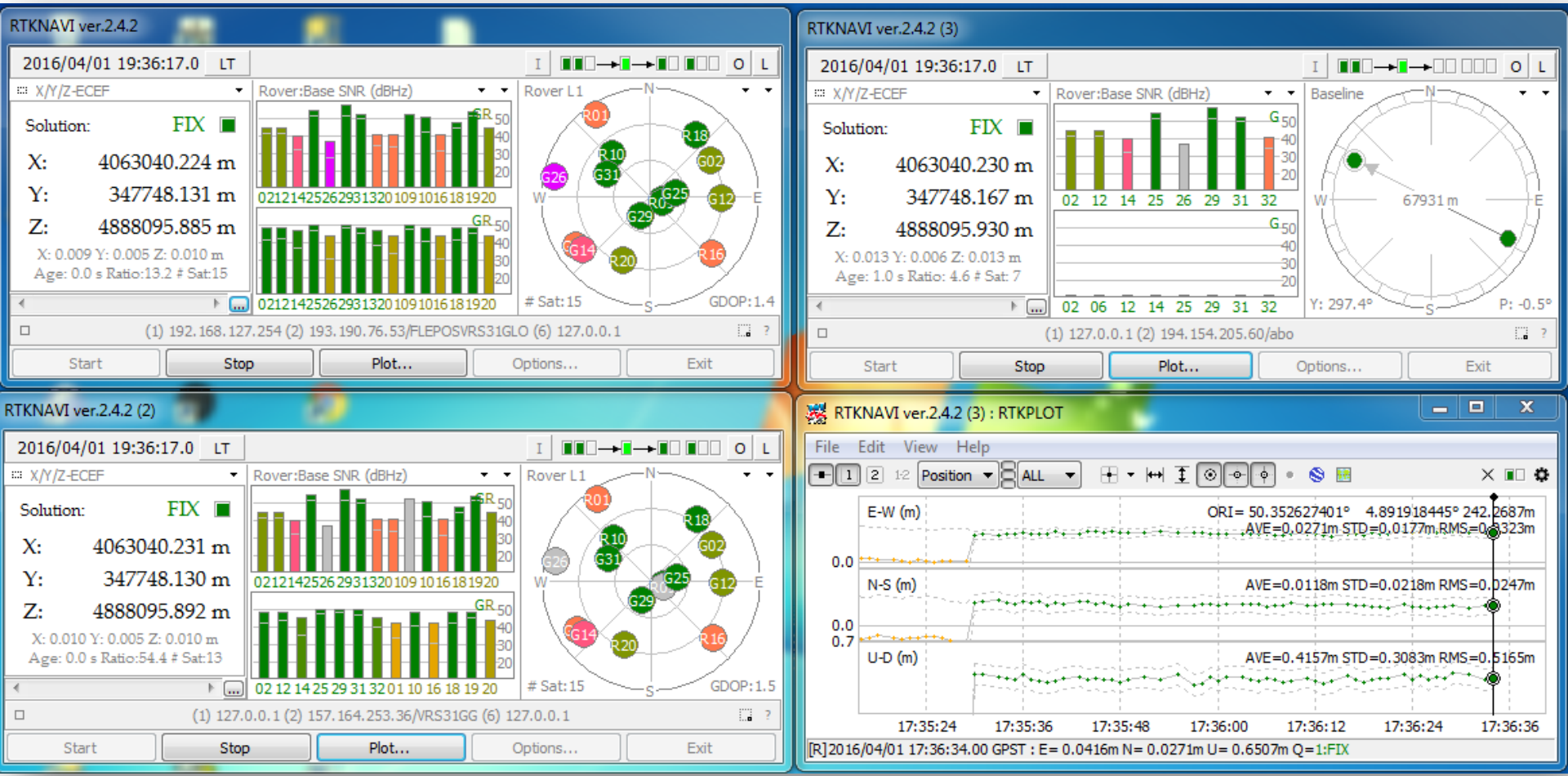
Calcul permanent des solutions GNSS Réseaux RTK en vue d'établir l'intégrité et la fiabilité des réseaux WALCORS et FLEPOS

Walcors VRS31GG vs Leica SmartNET



Nous avons mis en évidence une différence constante de 10 cm en altitude entre les solutions réseaux WALCORS et Leica SmartNET. Il s'agissait d'une faute dans la définition des antennes GNSS de la part de Leica SmartNET.

Walcors/Flepos/SPS Lux



Station MONT, Yvoir

	STATION IGN BRUXELLES 62 km			LUX I-MAX LUXEMBOURG 65 km			VRS31GG WALCORS			FLEPOS VRS31GGLO		
	X LB72	Y LB72	H DNG	X LB72	Y LB72	H DNG	X LB72	Y LB72	H DNG	X LB72	Y LB72	H DNG
1	187228,937	115864,986	190,219	187228,949	115865,040	190,257	187228,926	115864,995	190,242	187228,933	115864,999	190,279
2	187228,935	115864,983	190,215	187228,947	115865,039	190,252	187228,924	115864,994	190,235	187228,926	115865,002	190,255
3	187228,933	115864,983	190,205	187228,945	115865,039	190,257	187228,923	115864,994	190,231	187228,927	115865,002	190,255
4	187228,931	115864,986	190,198	187228,943	115865,041	190,252	187228,923	115864,996	190,230	187228,928	115865,001	190,263
5	187228,934	115864,988	190,178	187228,941	115865,043	190,248	187228,923	115864,997	190,237	187228,929	115865,001	190,266
6	187228,933	115864,989	190,169	187228,943	115865,043	190,251	187228,923	115864,997	190,234	187228,928	115865,001	190,264
7	187228,933	115864,987	190,167	187228,945	115865,042	190,246	187228,924	115864,997	190,234	187228,929	115865,001	190,267
8	187228,929	115864,988	190,153	187228,944	115865,039	190,244	187228,925	115864,995	190,240	187228,930	115865,000	190,269
9	187228,930	115864,986	190,151	187228,944	115865,038	190,241	187228,923	115864,997	190,236	187228,928	115865,001	190,267
10	187228,929	115864,989	190,158	187228,948	115865,037	190,241	187228,925	115864,995	190,241	187228,929	115865,001	190,266
Moyenne	**187228,932**	**115864,987**	**190,181**	**187228,945**	**115865,040**	**190,249**	**187228,924**	**115864,996**	**190,236**	**187228,929**	**115865,001**	**190,265**
Ecart-Type	0,003	0,002	0,026	0,002	0,002	0,006	0,001	0,001	0,004	0,001888562	0,000875595	0,006887186
Médianne	187228,933	115864,987	190,174	187228,945	115865,040	190,250	187228,924	115864,996	190,236	187228,929	115865,001	190,266
Max	187228,937	115864,989	190,219	187228,949	115865,043	190,257	187228,926	115864,997	190,242	187228,933	115865,002	190,279
Min	187228,929	115864,983	190,151	187228,941	115865,037	190,241	187228,923	115864,994	190,230	187228,926	115864,999	190,255
Différence	0,008	0,006	0,068	0,008	0,006	0,016	0,003	0,003	0,012	0,007	0,003	0,024
Δ WALCORS	**0,008**	**-0,009**	**-0,055**	**0,021**	**0,044**	**0,013**	**0,000**	**0,000**	**0,000**	**0,005**	**0,005**	**-0,029**

Single RTK

Applications Topographiques du GNSS

Système de levé hybride (Station Totale Robotisée + GNSS RTK sur la canne à prisme).

Permet de faire des levés :

- Conventionnels à la station totale robotisée et prisme actif (laser)
- GNSS RTK supporté par les réseaux GNSS RTK
- Combinaison des systèmes de levés avec aide mutuelle

Envois de données « terrain » au bureau à l'aide de MAGNET OFFICE

AGRICULTURE

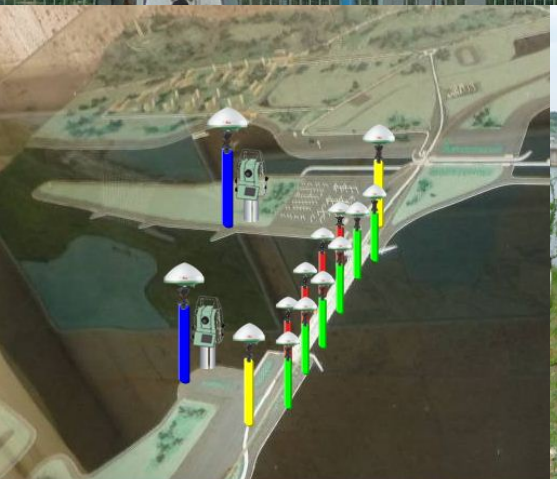
Les tracteurs agricoles sont de plus en plus équipés en GNSS RTK ainsi que les autres machines. De nouvelles demandes émergent.

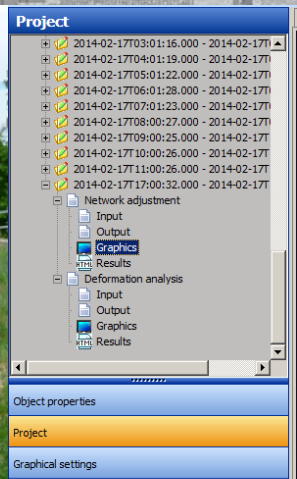
ENGINS DE CHANTIER

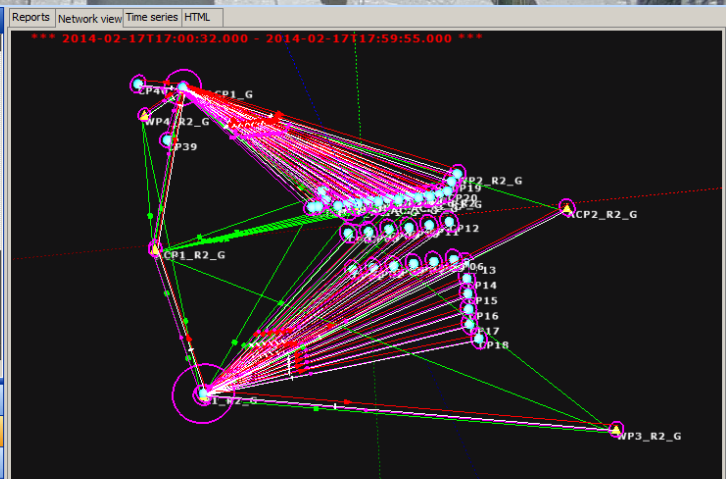
Les engins de chantier sont de plus en plus équipés en GNSS RTK ainsi que les autres machines. De nouvelles demandes émergent.

DRONES PHOTOGRAMMETRIQUES

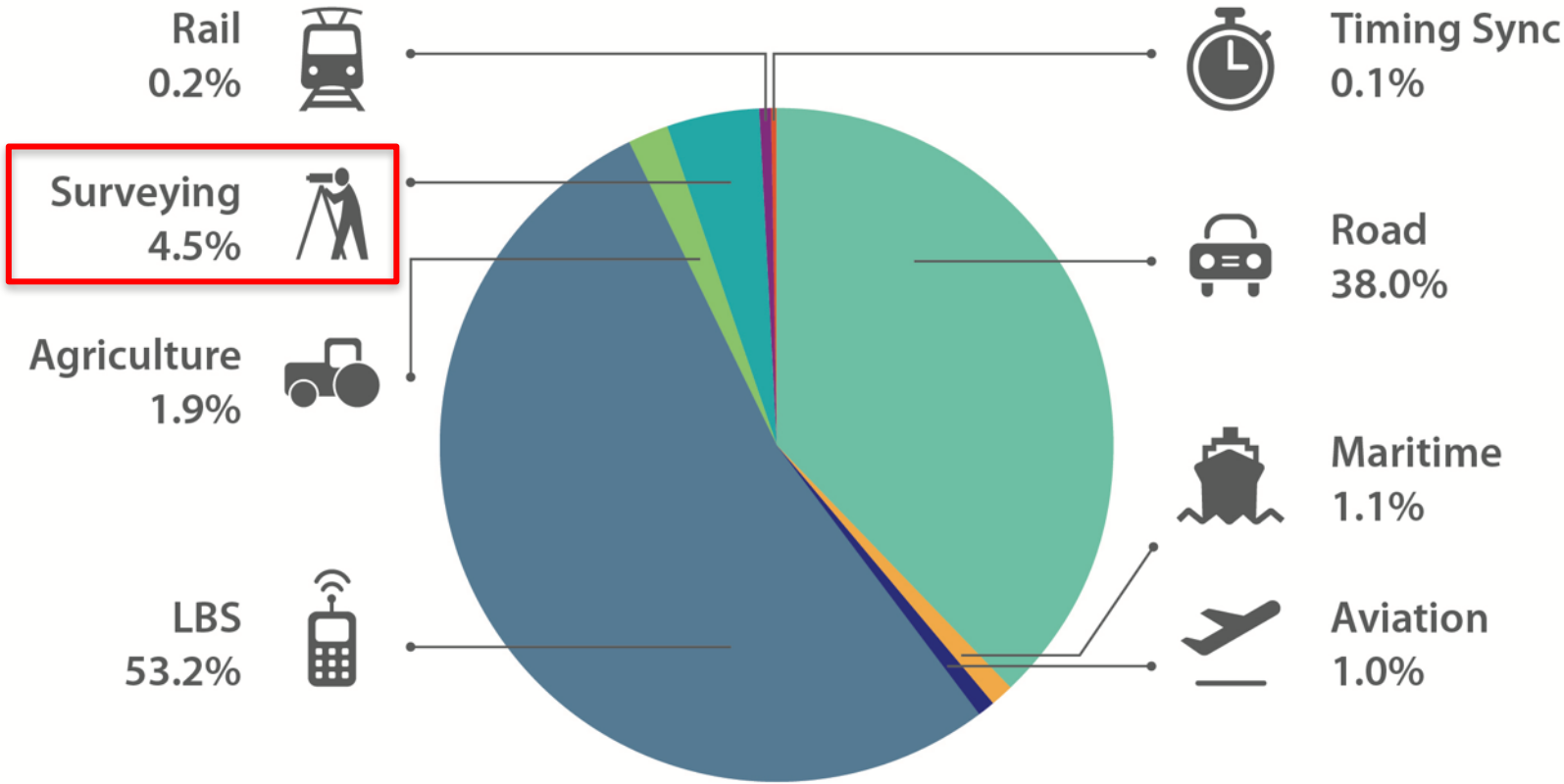
MONITORING



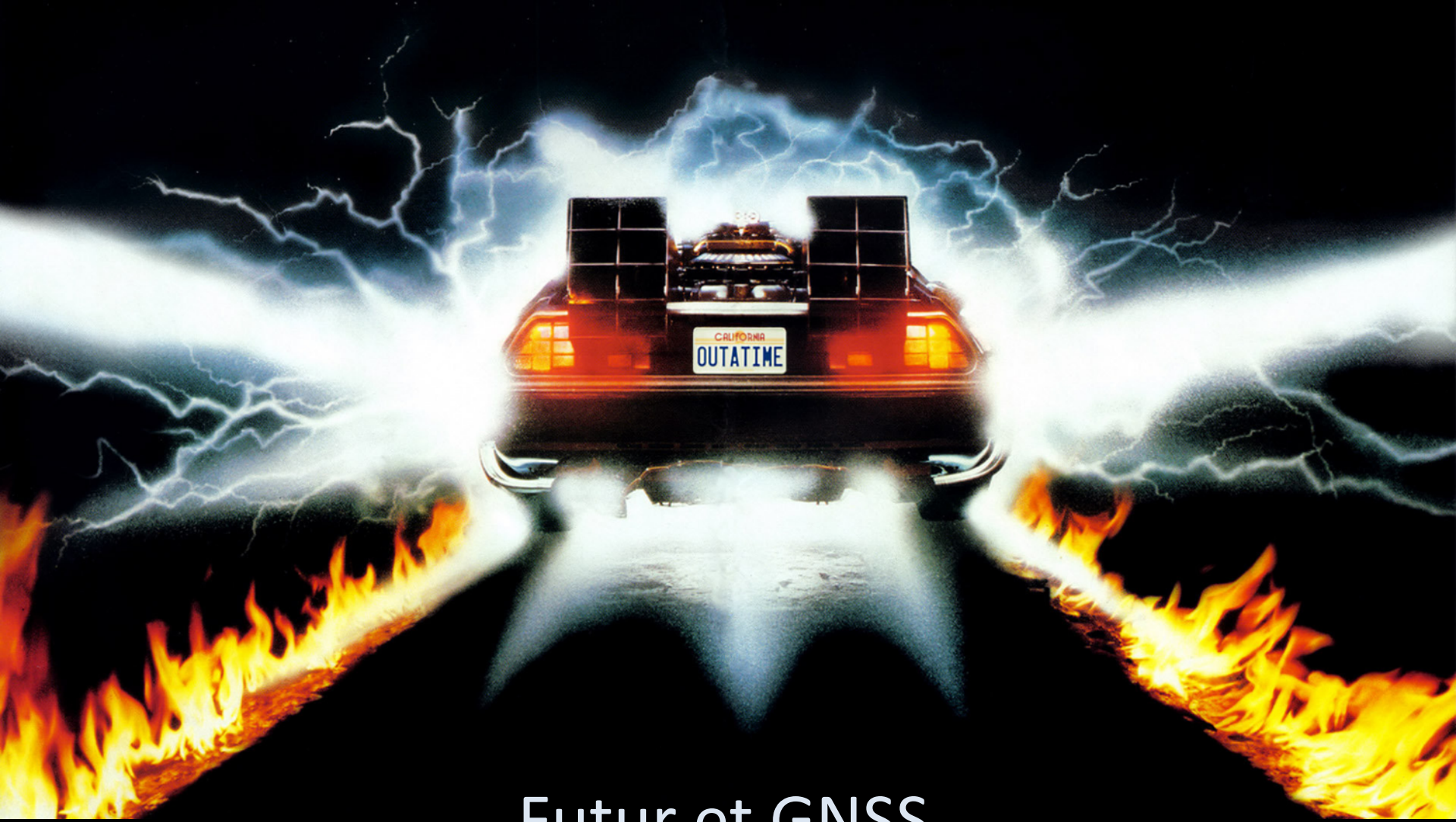

Project
2014-02-17T03:01:16.000 - 2014-02-17T
2014-02-17T04:01:19.000 - 2014-02-17T
2014-02-17T05:01:22.000 - 2014-02-17T
2014-02-17T06:01:28.000 - 2014-02-17T
2014-02-17T07:01:23.000 - 2014-02-17T
2014-02-17T08:00:27.000 - 2014-02-17T
2014-02-17T09:00:25.000 - 2014-02-17T
2014-02-17T10:00:26.000 - 2014-02-17T
2014-02-17T11:00:26.000 - 2014-02-17T
2014-02-17T17:00:32.000 - 2014-02-17T
Network adjustment
Input
Output
Graphics
Results
Deformation analysis
Input
Output
Graphics
Results
Object properties
Project
Graphical settings


Reports
Network view
Time series
HTML
*** 2014-02-17T17:00:32.000 - 2014-02-17T17:59:55.000 ***
CP1_R2_G
CP2_R2_G
WP3_R2_G
WP4_R2_G
P39
P12
P13
P14
P15
P16
P18

GNSS Market Shares



L'intérêt grandissant pour des solutions abordables GNSS RTK motivent les « hobbyists »



Futur et GNSS

Why the Price of Precision Receivers Will Drop

February 5, 2013 By Eric Gakstatter

Facebook Twitter Google LinkedIn

For quite some time, I've been writing in *GPS World* magazine and speaking at conferences about the declining prices of high-precision GNSS receivers and how the cost of high-precision data (especially vertical) is going to decline substantially. For my colleagues in Asia, Africa, Europe, and South America, you've already seen this. Dual-frequency, multi-constellation GNSS receiver prices in those areas are significantly lower than in the United States and Canada.

Eric Gakstatter

Previously, I've presented to you that I think dual-frequency (L1/L5), dual-constellation (GPS/Galileo) GNSS receivers will be inexpensive in the future. My reasoning, simply, is that L5 is an open signal (legacy L2 is not) and supported by both GPS and Galileo. Furthermore, both GPS and Galileo use a CDMA radio technology, so designing a GPS/Galileo receiver is a heck of a lot easier than a GPS/GLONASS receiver. Therefore, unlike today's GNSS receiver competitive landscape of only a dozen or so manufacturers of high-precision GNSS

TODAY'S NEWS more news

After the storm: Drone flights enable speedy cellular inspections

UAV inspections: Using drones for powerline monitoring in India

Largest unmanned naval exercise weighs anchor

12 miles to life: Chesapeake Bay flight shows role for UAS in emergencies

u-blox brings centimeter-level precision GNSS technology to the mass market

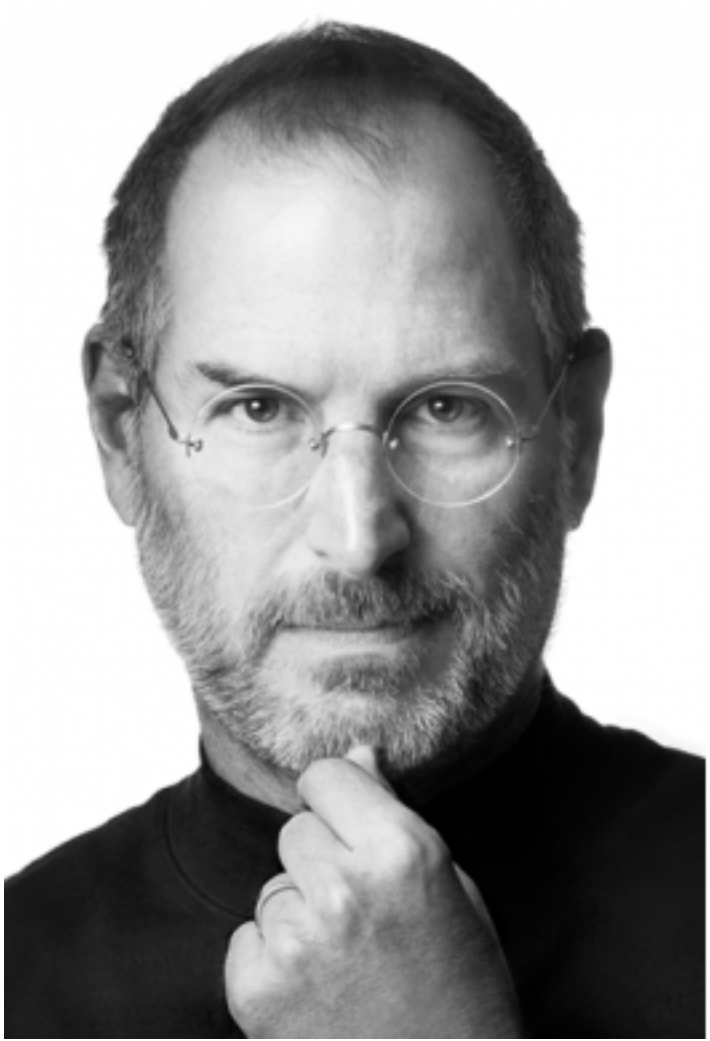
The NEO-M8P offers high precision technology in small design for applications such as unmanned vehicles and robotic guidance systems

Thalwil, Switzerland – February 15, 2016 – u-blox (SIX:UBXN), a global leader in wireless and positioning modules and chips, launched today the NEO-M8P GNSS receiver modules delivering high performance down to centimeter-level accuracy.

Measuring merely 12.2 x 16 x 2.4 mm, NEO-M8P is the smallest high precision GNSS RTK (real time kinematic) module available on the market based on GPS and GLONASS satellite-based navigation systems. The rover with the u-blox NEO-M8P-0 receives corrections from the u-blox base receiver NEO-M8P-2 via a communication link that uses the RTCM (Radio Technical Commission for Maritime Services) protocol, enabling centimeter-level positioning accuracy. The RTK algorithms are pre-integrated into the module. As a result, the size and weight are significantly reduced, and

GNSS et Futur ?

- Le prix des récepteurs GNSS haute précision est en train de chuter ! (Loi de Moore)
- Les services offerts par les infrastructures de positionnement vont s'accroître.
- Le GNSS RTK pour tous (mass market) ... actuellement 5% du marché concerne les géomètres !
- Dans les zones non couvertes par le GNSS, des solutions locales (LBS, « Indoor » positioning) seront déployées.
- Le géomètre restera t'il l'expert en GNSS et comment ?



"because the ones who are crazy enough to think that they can change the world, are the ones who do."

Steve Jobs (1955 - 2011)

Joël van Cranenbroeck, Managing Director
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MERCI POUR VOTRE ATTENTION !