

ARA-DAC Weekly Analysis Result: 2104 (GFA)

Technical Report

GPS Week: 2104 (GFA)

<http://geolabpasaia.org/gnss/ARA-euref/>

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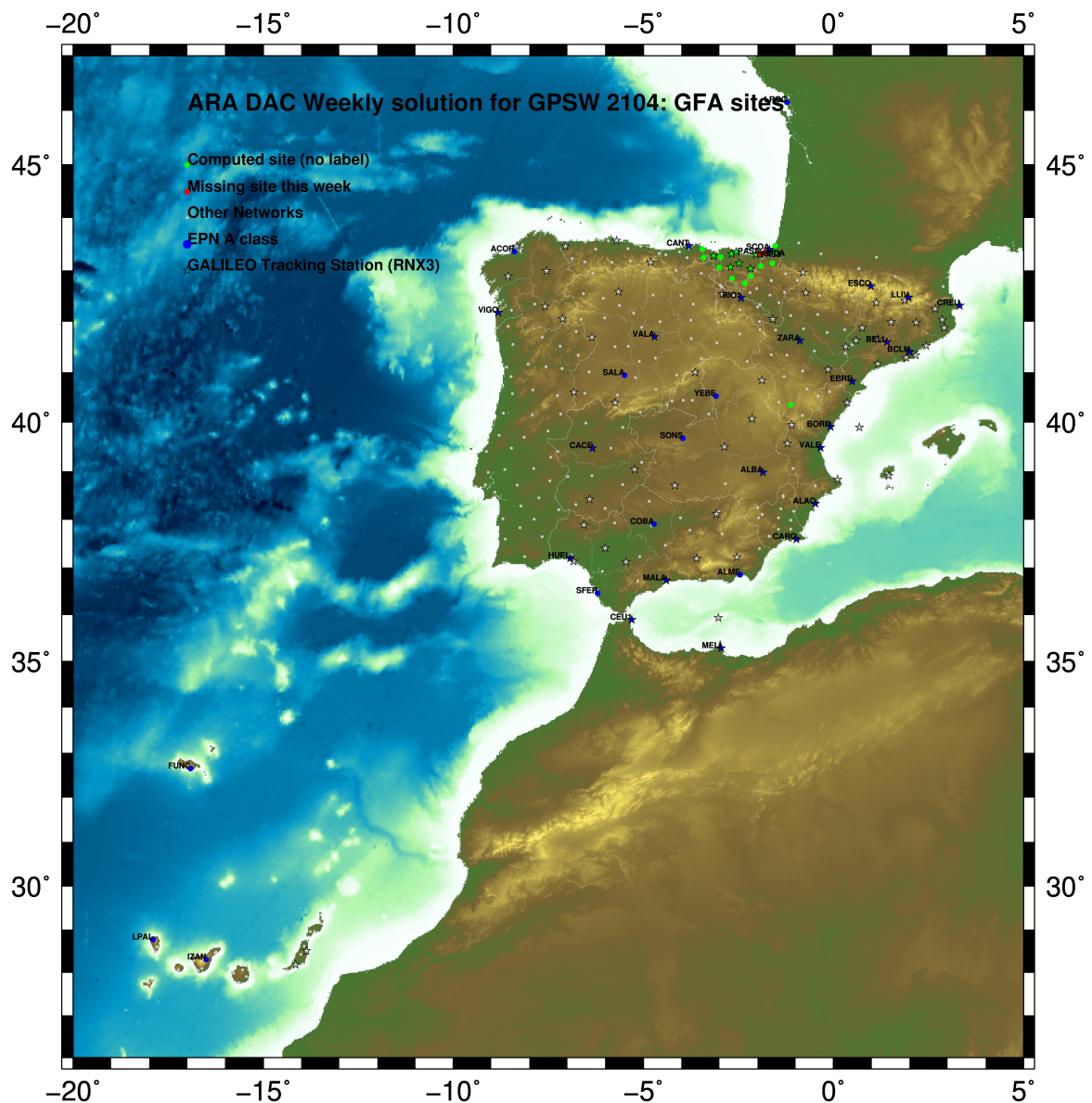
Report generated on 2020/05/24 at 05:24:15



1 Introduction

In may 2015 ARA (EUREF's acronym of the ARANZADI's Department of Applied Geodesy), kicks off as a EUREF's Operational Center. In July 2015, the Densification solutions ARA computes routinely in a weekly basis start being submitted to the EUREF's EPN Densification Project.

2 Map of Computed Sites



GM 2020 May 24 05:24:07

Fig.1: Computed Sites for GPS Week2104 (GFA)

3 Main Computation Parameters

The main parameters considered in the ARA analysis follow strictly the EPN recommendations.

- Preprocessing: Independent baselines are defined by the criterion of maximum common observations. Cycle slips are fixed with the MAUPRP program, analysing triple phase differences for each independent baseline. If MAUPRP does not fix all slips for one station, that station is edited out.
- Basic Observable : Carrier phase, L_1 and L_2 ; a priori sigma of single differences: 0.002 m.
 - sampling (for ambiguity resolution): 30 s
 - sampling (for final processing): 180 s
 - Systems: GPS+GLONASS observations are used (Galileo also used if available from GPSW 1986 on)
- Modelled observable: Double differences of carrier phase using different combinations based on the distance.
- Ground antenna phase center calibrations: Group APCV used from the PCV_COD.I14 file and individual calibrations from EPNC_14.ATX. EPN_A class sites (CRD + VEL) IGS14 used to define the reference frame (from GPSW 1934). If individual calibrations, other from these, are available, they are also included in the analysis.
- Troposphere:
 - 3 deg elev. cutoff; elevation dependent weighting
 - VMF1 mapping function. ZPD parameters are estimated using the VMF1 mapping function.
 - CHENHER gradient estimation model.
- Ionosphere: no a priori model, ionospheric effect almost removed by iono free combination.
- Ocean Loading: FES2004 (Scherneck).
- Atmosph. Loading: computed from a global grid using the GRDS1S2 program of Bernese 5.2.

4 Estimated Parameters

- Adjustment: Least Squares
- Rejection Criteria: 3*rms of single differences, in the weekly combination of daily normal equations (ADDNEQ)
- Station coordinates: minimum constraints (MC) to EPN A class sites (only translations).
- Troposphere: 3 deg. After having obtained coordinates valid for the entire week, tropospheric zenith delay is solved at each site at intervals of 1 hour throughout the week, holding the coordinates constrained at the weekly values.
- Ionospheric: second and third "High Order Ionosphere (HOI)" corrections used, using CODE files, to improve Ambiguity Resolution.
- Satellite clock bias: not estimated because are eliminated by double differencing the phase data.
- Receiver clock bias: not estimated because are eliminated by double differencing the phase data.
- Orbits and ERPs: CODE's orbits and ERP for both rapid and final solutions. DE405 planetary ephemeris and JGM3 Earth geopotential model is used.
- Tidal displacements: according to IERS2010 Conventions. Atmospheric loading corrections used.

- Ambiguity: an advanced ambiguity resolution (AR) scheme is included:
 - Code-Based Wideline (WL) AR for baselines shorter than 6000km, a Melbourne-Wuebbena wide-lane and narrow-lane AR is computed.
 - Phase-Based Wideline (L_5) AR for baselines shorter than 200km, the code-based wide-lane AR is replaced by a phase-only wide-lane with a subsequent narrow-lane AR.
 - Quasi-Ionosphere-Free (QIF)AR for the remaining real-valued ambiguities for baselines shorter than 2000km.
 - Direct L_1/L_2 AR for baselines shorter than 20km
- AR Verification: Each baseline is processed by introducing the resolved integer ambiguities and checking the residuals. If there is any problem, the ambiguities are re-initialized.

5 Computed Coordinates

In this section the adjusted coordinates are summarized. Note that the sites with an A flag are the computed ones, whereas sites flagged as W are the ones used in the Minimal Constraints condition.

5.1 IGS14

The Reference Frame considered in this section is IGS14, release C2055.

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ARA LAC 2104 WEEK FINAL COMBINATION: PRECISE ORBITS                23-MAY-20 23:02
-----
LOCAL GEODETIC DATUM: IGS14                EPOCH: 2020-05-06 12:00:00
-----
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
-----
 1 ACRD 13434M001         4594489.55033        -678367.42570        4357066.29515        W
34 ALDA 19383M001         4687280.14587        -190876.54748        4308106.96982        A
43 ALSA 19419M001         4677250.82215        -176770.37458        4319079.88524        A
45 AMUR 19388M001         4661499.43590        -244591.24185        4332269.89439        A
81 BIAZ 10074M002         4634456.03747        -124344.95939        4365785.46813        A
92 BRZR 19387M001         4662220.97739        -220769.88343        4333309.44925        A
 9 CACE 13447M001         4899866.49292        -544567.01862        4033770.21666        W
10 CANT 13438M001         4625924.29863        -307096.21658        4365771.56511        W
118 CHER 00000M000         4645880.30508        -125721.90795        4353624.38213        A
15 CREU 13432M001         4715420.11463         273178.07664        4271946.85151        W
17 EBRE 13410M001         4833519.97625         41537.40852        4147461.73083        W
139 ELGE 19353S001         4657557.39096        -202241.45802        4338991.88129        A
141 EMAZ 17001M001         4645924.19306        -276949.84905        4347759.58852        A
209 GERN 19389M001         4642811.30676        -217222.90815        4353278.89198        A
183 IGEL 19352S001         4645951.41488        -165574.48673        4352550.42934        A
188 ISPS 19484M001         4640596.46518        -206963.76077        4356391.92351        A
193 KAST 19499M001         4646949.06467        -240747.25735        4348015.00190        A
198 LARE 19440M001         4632831.93750        -279026.12157        4360314.43636        A
199 LAZK 19354S001         4666098.32844        -178186.17442        4330463.68184        A
203 LEIT 19428M001         4663520.92292        -155858.70032        4334519.89348        A
260 ORDN 19427M001         4659695.76490        -130864.71681        4338948.89496        A
 33 PASA 19351S001         4644909.04296        -166645.05100        4353623.08506        W
 36 RID1 13448M002         4708446.81282        -199490.26670        4284089.74859        W
 37 SALA 13469M001         4803054.47303        -462131.05355        4158379.09054        W
 38 SCDA 10088M002         4639940.48182        -136224.92384        4359552.42570        W
321 SOPU 19386M001         4643997.89585        -255913.88977        4350063.15531        A
342 TERU 13487M001         4867391.30924        -95523.33582        4108341.69244        A
375 VITO 19385M001         4679397.68876        -218436.48935        4314898.37804        A
 49 YEBE 13420M001         4848724.55372        -261631.91247        4123094.33941        W
 50 ZARA 13462M001         4773803.15175        -73505.96654        4215454.10441        W
    
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5.2 ETRF2000 (ETRS89) Coordinates

European Terrestrial Reference System, 1989 (ETRS89) is realized by ETRF2000 (Boucher and Altamimi, 2011) and (Altamimi, 2017).

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ETRF2000 FINAL COORD. wk 2104                23-MAY-20 23:02
-----
LOCAL GEODETIC DATUM: ETRF2000            EPOCH: 2020-05-06 12:00:00
-----
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
-----
 1 ACRD 13434M001         4594489.86480        -678367.98141        4357065.86679        W
34 ALDA 19383M001         4687280.51570        -190877.11203        4308106.54037        A
43 ALSA 19419M001         4677251.19446        -176770.93801        4319079.45675        A
45 AMUR 19388M001         4661499.80097        -244591.80379        4332269.46629        A
81 BIAZ 10074M002         4634456.41942        -124345.51806        4365785.04364        A
92 BRZR 19387M001         4662221.34541        -220770.44538        4333309.02139        A
 9 CACE 13447M001         4899866.80050        -544567.60663        4033769.76606        W
10 CANT 13438M001         4625924.65855        -307096.77487        4365771.13901        W
118 CHER 00000M000         4645880.68599        -125722.46785        4353623.95673        A
15 CREU 13432M001         4715420.53772         273177.51079        4271946.42555        W
17 EBRE 13410M001         4833520.36261         41536.82916        4147461.29279        W
139 ELGE 19353S001         4657557.76162        -202242.01941        4338991.45403        A
141 EMAZ 17001M001         4645924.55534        -276950.40942        4347759.16123        A
209 GERN 19389M001         4642811.67662        -217223.46800        4353278.46568        A
183 IGEL 19352S001         4645951.79092        -165575.04676        4352550.00344        A
188 ISPS 19484M001         4640596.83650        -206964.32035        4356391.49751        A
193 KAST 19499M001         4646949.43133        -240747.81771        4348014.57498        A
198 LARE 19440M001         4632832.30041        -279026.68052        4360314.01007        A
199 LAZK 19354S001         4666098.70139        -178186.73665        4330463.25421        A
203 LEIT 19428M001         4663521.29885        -155859.26221        4334519.46633        A
260 ORDN 19427M001         4659696.14415        -130865.27821        4338948.46842        A
 33 PASA 19351S001         4644909.42015        -166645.61089        4353622.65935        W
 36 RID1 13448M002         4708447.17990        -199490.83353        4284089.31738        W
 37 SALA 13469M001         4803054.79947        -462131.63115        4158378.64860        W
 38 SCDA 10088M002         4639940.86189        -136225.48313        4359552.00063        W
321 SOPU 19386M001         4643998.26082        -255914.44986        4350062.72843        A
342 TERU 13487M001         4867391.67631        -95523.91925        4108341.25005        A
375 VITO 19385M001         4679398.05575        -218437.05313        4314897.94887        A
 49 YEBE 13420M001         4848724.90182        -261632.49443        4123093.89642        W
 50 ZARA 13462M001         4773803.52911        -73506.53995        4215453.66964        W
    
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5.3 ETRF2014 (ETRS89) Coordinates

European Terrestrial Reference System, 1989 (ETRS89) is realized by ETRF2014 (Boucher and Altamimi, 2011) and (Altamimi, 2017).

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ETRF2014 FINAL COORD. wk 2104                                23-MAY-20 23:02
-----
LOCAL GEODETIC DATUM: ETRF2014          EPOCH: 2020-05-06 12:00:00
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
1  ACDR 13434M001        4594489.82256      -678368.01963    4357065.91562    W
34 ALDA 19383M001        4687280.47119      -190877.15164    4308106.58910    A
43 ALSA 19419M001        4677251.15001      -176770.97771    4319079.50551    A
45 AMUR 19388M001        4661499.75689      -244591.84330    4332269.51505    A
81 BIAZ 10074M002        4634456.37523      -124345.55811    4365785.09253    A
92 BRZR 19387M001        4662221.30125      -220770.48498    4333309.07016    A
9  CACE 13447M001        4899866.75471      -544567.64411    4033769.81421    W
10 CANT 13438M001        4625924.61500      -307096.81430    4365771.18784    W
118 CHER 00000M000        4645880.64170      -125722.50785    4353624.00559    A
15 CREU 13432M001        4715420.49134      273177.46965    4271946.47451    W
17 EBRE 13410M001        4833520.31580      41536.78932    4147461.34131    W
139 ELGE 19353S001        4657557.71744      -202242.05910    4338991.50282    A
141 EMAZ 17001M001        4645924.51151      -276950.44888    4347759.21002    A
209 GERN 19389M001        4642811.63264      -217223.50769    4353278.51451    A
183 IGEL 19352S001        4645951.74675      -165575.08663    4352550.05228    A
188 ISPS 19484M001        4640596.79252      -206964.36009    4356391.54635    A
193 KAST 19499M001        4646949.38738      -240747.85731    4348014.62379    A
198 LARE 19440M001        4632832.25672      -279026.72003    4360314.05889    A
199 LAZK 19354S001        4666098.65705      -178186.77639    4330463.30299    A
203 LEIT 19428M001        4663521.25447      -155859.30204    4334519.51513    A
260 ORON 19427M001        4659696.09973      -130865.31814    4338948.51724    A
33 PASA 19351S001        4644909.37596      -156645.65079    4353622.70820    W
36 RIO1 13448M002        4708447.13520      -199490.87303    4284089.36605    W
37 SALA 13469M001        4803054.75453      -462131.66932    4158378.69697    W
38 SOGA 10088M002        4639940.81769      -136225.52312    4359552.04950    W
321 SOPU 19386M001        4643998.21695      -255914.48941    4350062.77724    A
342 TERU 13487M001        4867391.62960      -95523.95848    4108341.29841    A
375 VITO 19385M001        4679398.01140      -218437.09267    4314897.99760    A
49 YEBE 13420M001        4848724.85583      -261632.53313    4123093.94475    W
50 ZARA 13462M001        4773803.48333      -73506.57963    4215453.71822    W

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6 Quality Control

6.1 Mean and Daily Repeatabilities

In this section, the mean and daily repeatabilities of the sites are shown. Repeatabilities refer to the IGS14 solution and are given with respect the Local frame (North-East-Up).

ARA LAC 2104 WEEK FINAL COMBINATION: PRECISE ORBITS 23-MAY-20 23:02

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	7	XXXXXX	1.44	0.56	3.83
ALDA 19383M001	7	XXXXXX	2.43	1.32	2.27
ALSA 19419M001	7	XXXXXX	2.58	0.63	7.38
AMUR 19388M001	7	XXXXXX	1.91	1.22	2.50
BLAZ 10074M002	7	XXXXXX	1.20	0.64	4.00
BRZR 19387M001	7	XXXXXX	1.29	1.36	5.44
CACE 13447M001	7	XXXXXX	0.72	0.84	2.75
CANT 13438M001	7	XXXXXX	1.26	0.89	3.83
CHER 00000M000	7	XXXXXX	1.46	1.09	3.92
CREU 13432M001	7	XXXXXX	1.07	0.41	3.16
EBRE 13410M001	7	XXXXXX	0.97	0.27	3.13
ELGE 19353S001	7	XXXXXX	1.81	2.37	1.92
EMAZ 17001M001	7	XXXXXX	1.08	0.84	2.10
GERN 19389M001	7	XXXXXX	1.10	1.26	5.90
IGEL 19352S001	7	XXXXXX	1.37	0.86	3.68
ISPS 19484M001	7	XXXXXX	1.01	2.44	3.06
KAST 19499M001	7	XXXXXX	1.11	0.90	3.76
LARE 19440M001	7	XXXXXX	0.68	1.31	2.81
LAZK 19354S001	7	XXXXXX	1.58	0.97	6.52
LEIT 19428M001	7	XXXXXX	1.78	0.70	4.01
ORDN 19427M001	7	XXXXXX	2.33	1.33	6.88
PASA 19351S001	7	XXXXXX	0.50	1.63	4.04
RI01 13448M002	7	XXXXXX	0.55	0.99	2.34
SALA 13469M001	3	XXX	2.14	1.27	3.95
SCDA 10088M002	7	XXXXXX	1.05	1.62	4.84
SOPU 19386M001	7	XXXXXX	0.55	1.06	6.30
TERU 13487M001	7	XXXXXX	0.64	1.01	3.17
VITD 19385M001	7	XXXXXX	1.50	0.93	5.77
YEBE 13420M001	7	XXXXXX	0.64	0.55	3.18
ZARA 13462M001	7	XXXXXX	0.41	0.81	1.66

Comparison of individual solutions:

ACOR 13434M001	N	1.44	-0.09	0.76	-2.02	2.63	0.15	0.91	-0.13
ACOR 13434M001	E	0.56	-0.04	0.97	-0.58	0.31	-0.32	0.48	-0.42
ACOR 13434M001	U	3.83	-1.93	2.36	4.12	2.34	-2.49	-5.89	3.91
ALDA 19383M001	N	2.43	0.59	-0.60	1.55	2.37	-1.67	-4.72	-1.22
ALDA 19383M001	E	1.32	-0.85	-0.61	-0.87	-1.88	2.19	0.42	-0.06
ALDA 19383M001	U	2.27	-2.66	1.26	0.45	2.72	2.58	1.81	-2.15
ALSA 19419M001	N	2.58	-0.46	-2.68	1.95	1.27	1.11	-4.50	2.40
ALSA 19419M001	E	0.63	0.79	0.17	-1.08	-0.64	0.09	-0.23	-0.31
ALSA 19419M001	U	7.38	-1.04	-2.72	-1.77	-2.72	11.96	7.61	-10.33
AMUR 19388M001	N	1.91	-0.88	1.27	-2.67	-0.69	0.65	3.38	0.21
AMUR 19388M001	E	1.22	1.29	-1.52	-0.21	-0.77	-0.66	1.63	-1.09
AMUR 19388M001	U	2.50	2.06	-2.26	4.02	-0.44	1.09	3.22	0.33
BLAZ 10074M002	N	1.20	-0.26	0.86	-0.34	-0.50	0.68	-2.49	0.92
BLAZ 10074M002	E	0.64	0.54	1.05	-0.69	-0.41	-0.52	-0.02	0.38
BLAZ 10074M002	U	4.00	-0.42	5.50	2.26	-1.39	-1.75	1.55	-7.29
BRZR 19387M001	N	1.29	-0.96	1.15	-2.65	0.46	0.62	0.23	0.31
BRZR 19387M001	E	1.36	2.52	-0.96	-0.22	0.29	-0.05	-1.79	-0.72
BRZR 19387M001	U	5.44	-1.59	-4.98	3.37	5.56	-2.74	-6.71	7.43
CACE 13447M001	N	0.72	-0.15	0.40	1.13	0.90	-0.26	-0.85	0.01
CACE 13447M001	E	0.84	0.59	0.96	-1.27	-0.01	0.35	0.00	-1.10
CACE 13447M001	U	2.75	0.44	0.15	2.60	-3.89	-0.16	2.02	-4.39
CANT 13438M001	N	1.26	-0.62	2.53	0.06	-0.05	-0.38	-0.31	-1.61
CANT 13438M001	E	0.89	-0.28	1.01	-1.44	-0.41	0.94	-0.35	-0.67
CANT 13438M001	U	3.83	-0.28	1.70	3.51	2.44	3.83	-6.74	-2.62
CHER 00000M000	N	1.46	-0.28	-2.60	-1.10	-0.52	0.63	1.75	0.97
CHER 00000M000	E	1.09	1.23	0.35	-0.59	0.64	0.32	-2.07	-0.52
CHER 00000M000	U	3.92	1.13	-0.19	5.99	0.26	-0.65	-1.18	-7.30
CREU 13432M001	N	1.07	-1.04	-0.52	-1.42	-0.64	1.49	-0.14	0.90
CREU 13432M001	E	0.41	-0.23	0.45	-0.28	-0.72	0.25	0.17	0.27
CREU 13432M001	U	3.16	4.74	1.00	-2.30	-1.81	-2.48	2.68	-3.80
EBRE 13410M001	N	0.97	0.44	-0.27	0.66	0.11	-0.29	-2.21	-0.16
EBRE 13410M001	E	0.27	-0.14	-0.26	-0.18	0.36	0.11	0.17	0.40
EBRE 13410M001	U	3.13	6.30	-3.01	-0.13	-2.18	1.58	-1.45	-0.92
ELGE 19353S001	N	1.81	0.04	2.02	-1.70	-2.02	-1.25	2.61	-0.40
ELGE 19353S001	E	2.37	0.82	-2.98	3.52	1.09	0.35	-2.39	-2.17
ELGE 19353S001	U	1.92	-1.22	-2.52	0.61	-0.79	2.54	2.21	-1.41
EMAZ 17001M001	N	1.08	0.97	-0.63	0.71	-0.82	0.74	0.42	-1.95
EMAZ 17001M001	E	0.84	-0.38	1.70	0.18	-0.45	-0.36	-0.18	-0.88
EMAZ 17001M001	U	2.10	0.32	-1.84	1.87	3.37	-2.47	1.15	-0.74
GERN 19389M001	N	1.10	-1.81	0.20	-0.93	0.26	1.39	-0.74	0.72
GERN 19389M001	E	1.26	0.33	0.70	0.47	0.84	-0.50	-0.89	-2.63
GERN 19389M001	U	5.90	-1.67	-2.21	0.72	-5.77	-3.28	0.35	12.51
IGEL 19352S001	N	1.37	-0.66	-1.16	-0.83	-0.82	0.65	2.71	-0.64
IGEL 19352S001	E	0.86	0.51	-1.26	0.24	-0.04	-0.68	-1.37	-0.48
IGEL 19352S001	U	3.68	1.48	-2.65	1.36	2.16	3.71	4.24	-5.82
ISPS 19484M001	N	1.01	0.28	-2.02	-0.53	0.49	0.91	-0.62	0.40
ISPS 19484M001	E	2.44	1.01	4.33	-0.93	-0.77	0.17	-1.89	-3.31
ISPS 19484M001	U	3.06	2.55	-2.13	1.01	-2.53	1.78	-4.69	3.57
KAST 19499M001	N	1.11	-0.84	-0.10	-0.42	0.39	-0.84	-1.13	2.09
KAST 19499M001	E	0.90	0.09	1.07	-1.68	-0.73	0.01	0.27	-0.48
KAST 19499M001	U	3.76	-0.12	-3.20	-3.48	-0.50	-1.24	2.07	7.50
LARE 19440M001	N	0.68	0.31	-0.21	-0.31	0.35	0.08	0.64	-1.42
LARE 19440M001	E	1.31	1.05	2.36	-0.41	-0.84	-0.93	0.01	-1.38
LARE 19440M001	U	2.81	2.75	1.29	0.80	4.40	-2.56	-2.46	-2.35
LAZK 19354S001	N	1.58	0.90	-1.57	1.93	0.88	-2.58	-0.71	0.28
LAZK 19354S001	E	0.97	0.61	0.55	-1.86	0.38	0.46	-0.87	-0.64
LAZK 19354S001	U	6.52	-0.87	-4.29	0.28	-2.46	4.48	11.83	-8.33
LEIT 19428M001	N	1.78	-0.37	-0.11	2.35	-0.67	-1.20	-2.76	1.97
LEIT 19428M001	E	0.70	-0.30	1.21	-0.55	-0.53	-0.11	-0.20	-0.88
LEIT 19428M001	U	4.01	4.48	0.12	1.22	-0.44	-1.60	4.31	-7.31
ORDN 19427M001	N	2.33	-0.35	-3.21	-1.31	-1.31	-0.32	2.77	3.31

ORDN 19427M001	E	1.33	0.37	-1.74	1.65	0.14	0.40	-0.05	-2.13
ORDN 19427M001	U	6.88	-3.32	-4.22	0.45	-4.03	5.70	12.40	-7.26
PASA 19351S001	N	0.50	-0.77	0.57	0.28	-0.34	-0.48	-0.24	0.26
PASA 19351S001	E	1.63	0.56	1.04	1.15	-0.15	-0.62	-2.41	-2.65
PASA 19351S001	U	4.04	6.37	-0.11	-4.80	2.81	-0.69	4.19	-2.86
RID1 13448M002	N	0.55	-0.52	0.28	-0.13	-0.34	-0.02	0.99	-0.61
RID1 13448M002	E	0.99	0.14	0.52	0.09	0.59	-0.67	-2.16	0.29
RID1 13448M002	U	2.34	0.44	-0.86	-1.52	-2.17	4.31	1.94	-1.58
SALA 13469M001	N	2.14				-2.42	0.13	1.81	
SALA 13469M001	E	1.27				0.97	1.00	-1.15	
SALA 13469M001	U	3.95				-5.45	1.21	0.03	
SCDA 10088M002	N	1.05	-1.60	-0.67	-0.28	-0.85	0.64	1.53	0.33
SCDA 10088M002	E	1.62	-1.39	2.53	-1.51	-0.13	-1.23	1.48	1.17
SCDA 10088M002	U	4.84	4.23	1.03	-4.24	4.28	3.02	-4.29	-7.59
SOPU 19386M001	N	0.55	0.03	0.01	-0.25	-1.01	0.71	0.02	-0.44
SOPU 19386M001	E	1.06	-0.34	-0.46	0.86	0.04	-0.48	-2.09	1.00
SOPU 19386M001	U	6.30	-4.64	4.80	-5.51	-3.39	-5.38	6.37	9.06
TERU 13487M001	N	0.64	-0.03	0.05	-0.28	0.37	-0.50	0.26	-1.39
TERU 13487M001	E	1.01	0.01	2.00	-0.06	-0.14	-1.26	-0.49	0.49
TERU 13487M001	U	3.17	0.92	1.23	0.94	-6.38	0.95	-3.35	2.00
VITO 19385M001	N	1.50	0.64	0.28	-0.92	0.57	-2.71	2.10	0.12
VITO 19385M001	E	0.93	0.58	0.23	-1.37	-0.80	-0.68	-0.26	1.35
VITO 19385M001	U	5.77	2.89	-2.69	-5.40	-1.77	-0.79	0.21	12.29
YEBE 13420M001	N	0.64	-0.29	-0.13	0.32	-0.45	1.07	-0.80	0.53
YEBE 13420M001	E	0.55	-0.17	-0.23	0.17	0.56	-0.28	-0.04	1.14
YEBE 13420M001	U	3.18	-0.66	-0.49	3.97	-2.59	-2.84	4.58	2.93
ZARA 13462M001	N	0.41	0.11	-0.35	0.39	0.34	0.12	0.08	-0.76
ZARA 13462M001	E	0.81	0.18	-0.62	0.87	0.12	-0.71	0.27	-1.49
ZARA 13462M001	U	1.66	1.23	0.47	-1.90	-2.64	-0.07	-1.98	0.48

6.2 Datum verification

In this section, the datum verification is shown. A 3 parameter Helmert 3D (3 translations) is computed to the minimally constrained sites.

LOCAL GEODETIC DATUM: IGS14
RESIDUALS IN LOCAL SYSTEM (NORTH, EAST, UP)

NUM	NAME	FLG	RESIDUALS IN MILLIMETERS		
1	ACOR 13434M001	I W	-1.08	-0.51	-2.39
2	ALAC 13433M001	I W	0.45	-0.90	-0.55
3	ALBA 13452M001	I W	0.27	-1.91	-3.24
4	ALME 13437M001	I W	-1.71	0.89	0.76
5	BCLN 13412M001	I W	-0.85	-1.11	0.91
6	BELL 13431M001	I W	0.28	0.55	2.65
7	BORR 13480M001	I W	0.89	-2.39	-0.24
8	BRST 10004M004	I W	-2.49	-1.27	-0.39
9	CACE 13447M001	I W	-0.02	0.35	1.61
10	CANT 13438M001	I W	-0.82	-0.32	3.61
11	CARG 19412M001	I W	-0.36	-0.38	-0.87
13	CEU1 13449M002	I W	0.18	-0.43	-3.52
14	COBA 13453M001	I W	0.68	0.24	-5.44
15	CREU 13432M001	I W	-1.58	0.99	2.75
17	EBRE 13410M001	I W	-4.55	-0.06	-1.73
18	ESCO 13435M001	I W	-0.53	-0.03	1.84
19	FUNC 13911S001	I W	2.86	0.71	0.21
22	HUEL 13451M001	I W	1.79	-1.98	-8.62
23	IZAN 31309M002	I W	0.78	-1.01	-3.93
25	LLIV 13436M001	I W	0.05	-0.01	4.31
26	LPAL 81701M001	I W	-0.85	0.83	-3.70
27	LROC 10023M001	I W	0.55	-1.45	2.71
28	MALA 13443M001	I W	-0.26	-1.30	-0.30
32	MELI 19379M001	I W	1.09	-1.20	-5.29
33	PASA 19351S001	I W	-0.18	0.10	5.09
34	PDEL 31906M004	I W	11.59	7.44	-3.26
36	RID1 13448M002	I W	-2.59	-0.09	-0.69
37	SALA 13469M001	I W	-0.50	1.47	-3.14
38	SCOA 10088M002	I W	-4.43	-0.45	1.32
39	SFER 13402M004	I W	-0.04	-0.47	-1.16
42	SONS 13446M001	I W	-0.01	0.49	-3.53
44	TERC 31909M001	I W	0.74	4.17	-1.52
46	VALA 13463M002	I W	-0.93	-0.30	2.34
47	VALE 13439M001	I W	-0.66	0.50	0.90
48	VIGO 13450M001	I W	0.84	-1.29	4.64
49	YEBE 13420M001	I W	0.50	0.31	6.77
50	ZARA 13462M001	I W	0.06	-0.56	5.30
51	ZIMM 14001M004	I W	0.85	0.40	5.79
	RMS / COMPONENT		2.41	1.69	3.51
	MEAN		-0.00	-0.00	0.00
	MIN		-4.55	-2.39	-8.62
	MAX		11.59	7.44	6.77

NUMBER OF PARAMETERS : 3
NUMBER OF COORDINATES : 114
RMS OF TRANSFORMATION : 2.64 MM

BARYCENTER COORDINATES:

LATITUDE : 40 1 0.61
LONGITUDE : - 4 56 37.74
HEIGHT : -46.825 KM

PARAMETERS:

TRANSLATION IN N : 0.01 +- 0.43 MM
TRANSLATION IN E : 0.01 +- 0.43 MM
TRANSLATION IN U : 0.00 +- 0.43 MM

6.3 Adjustment Statistics

In this section, the summary of the global adjustment and not subnetworks are shown. Also, the Helmert parameters of the combined solution with respect the daily solutions are shown.

```
* STATISTICAL PARAMETER-----VALUE(S)-----
NUMBER OF OBSERVATIONS          15031159
NUMBER OF UNKNOWN              189925
NUMBER OF DEGREES OF FREEDOM    14841234
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)      180
VARIANCE FACTOR                  2.246493166937094

Helmert Transformation Parameters With Respect to Combined Solution:
-----
Sol  Rms (m)      Translation (m)      Rotation (")
      X          Y          Z          X          Y          Z          Scale (ppm)
-----
  1  0.00192      0.0082  0.0160 -0.0124 -0.0001  0.0005  0.0005  0.00060
  2  0.00220     -0.0092 -0.0026  0.0128  0.0001 -0.0005 -0.0000 -0.00011
  3  0.00199     -0.0119 -0.0267  0.0122  0.0004 -0.0005 -0.0008 -0.00005
  4  0.00185     -0.0022  0.0014  0.0017 -0.0000 -0.0001  0.0000  0.00008
  5  0.00199      0.0065 -0.0043 -0.0099  0.0002  0.0004 -0.0001  0.00023
  6  0.00226      0.0027  0.0028  0.0044 -0.0000 -0.0001  0.0001 -0.00077
  7  0.00264     -0.0171 -0.0379  0.0157  0.0007 -0.0007 -0.0010 -0.00009
```

```
Statistics of individual solutions:
-----
File  RMS (m)      DOF  Chi**2/DOF  #Observations authentic / pseudo  #Parameters explicit / implicit / singular
-----
  1  0.00141      2134111  1.99          2160671      3          840  25723  0
  2  0.00156      2097797  2.42          2126327      3          852  27681  0
  3  0.00148      2127592  2.18          2155997      3          867  27541  0
  4  0.00141      2127309  1.99          2154221      3          861  26054  0
  5  0.00147      2131232  2.16          2158653      3          843  26581  0
  6  0.00154      2116483  2.36          2144782      3          867  27435  0
  7  0.00160      2101640  2.56          2130508      3          852  28019  0
```

7 Equipment

7.1 Receiver List

Serial numbers not shown.

```
*SITE PT SOLN T DATA_START__ DATA_END____ DESCRIPTION_____ S/N__ FIRMWARE____
ACOR  A  1 P 20:124:00000 20:130:86370 LEICA GR50 -----
ALDA  A  1 P 20:124:00000 20:130:86370 LEICA GR10 -----
ALSA  A  1 P 20:124:00000 20:130:86370 LEICA GR50 -----
AMUR  A  1 P 20:124:00000 20:130:86370 LEICA GR10 -----
BIAZ  A  1 P 20:124:00000 20:130:86370 TRI SP90M -----
BRZR  A  1 P 20:124:00000 20:130:86370 LEICA GR30 -----
CACE  A  1 P 20:124:00000 20:130:86370 TRIMBLE NETR9 -----
CANT  A  1 P 20:124:00000 20:130:86370 LEICA GR10 -----
CHER  A  1 P 20:124:00000 20:130:86370 LEICA GRX1200+GNSS -----
CREU  A  1 P 20:124:00000 20:130:86370 LEICA GR50 -----
EBRE  A  1 P 20:124:00000 20:130:86370 LEICA GR50 -----
ELGE  A  1 P 20:124:00000 20:130:86370 LEICA GR30 -----
EMAZ  A  1 P 20:124:00000 20:130:86370 LEICA GR30 -----
GERN  A  1 P 20:124:00000 20:130:86370 LEICA GR30 -----
IGEL  A  1 P 20:124:00000 20:130:86370 LEICA GR30 -----
ISPS  A  1 P 20:124:00000 20:130:86370 TRIMBLE NETR9 -----
KAST  A  1 P 20:124:00000 20:130:86370 LEICA GR30 -----
LARE  A  1 P 20:124:00000 20:130:86370 LEICA GRX1200GGPRO -----
LAZK  A  1 P 20:124:00000 20:130:86370 LEICA GR30 -----
LEIT  A  1 P 20:124:00000 20:130:86370 LEICA GR50 -----
ORON  A  1 P 20:124:00000 20:130:86370 LEICA GR50 -----
PASA  A  1 P 20:124:00000 20:130:86370 LEICA GR30 -----
RIO1  A  1 P 20:124:00000 20:130:86370 LEICA GR25 -----
SALA  A  1 P 20:127:46800 20:129:53970 LEICA GRX1200+GNSS -----
SCOA  A  1 P 20:124:00000 20:130:86370 LEICA GR25 -----
SOPU  A  1 P 20:124:00000 20:130:86370 LEICA GR30 -----
TERU  A  1 P 20:124:00000 20:130:86370 LEICA GRX1200GGPRO -----
VITO  A  1 P 20:124:00000 20:130:86370 LEICA GR10 -----
YEBE  A  1 P 20:124:00000 20:130:86370 TRIMBLE NETR9 -----
ZARA  A  1 P 20:124:00000 20:130:86370 TRIMBLE NETR9 -----
```

7.2 Antennas

Serial number ONLY provided in case individual calibrations are available.

```
*SITE PT SOLN T DATA_START__ DATA_END____ DESCRIPTION_____ S/N__
ACOR  A  1 P 20:124:00000 20:130:86370 LEIAT504      LEIS -----
ALDA  A  1 P 20:124:00000 20:130:86370 LEIAS10       NONE -----
ALSA  A  1 P 20:124:00000 20:130:86370 LEIAR10       NONE -----
AMUR  A  1 P 20:124:00000 20:130:86370 LEIAS10       NONE -----
BIAZ  A  1 P 20:124:00000 20:130:86370 LEIAR25       LEIT -----
BRZR  A  1 P 20:124:00000 20:130:86370 LEIAS10       NONE -----
```

CACE	A	1	P	20:124:00000	20:130:86370	TRM29659.00	NONE	----
CANT	A	1	P	20:124:00000	20:130:86370	LEIAR25.R4	LEIT	25066
CHER	A	1	P	20:124:00000	20:130:86370	LEIAX1203+GNSS	NONE	----
CREU	A	1	P	20:124:00000	20:130:86370	LEIAR25.R4	NONE	26357
EBRE	A	1	P	20:124:00000	20:130:86370	LEIAR25.R4	NONE	26359
ELGE	A	1	P	20:124:00000	20:130:86370	LEIAR25.R4	LEIT	----
EMAZ	A	1	P	20:124:00000	20:130:86370	LEIAS10	NONE	----
GERN	A	1	P	20:124:00000	20:130:86370	LEIAS10	NONE	----
IGEL	A	1	P	20:124:00000	20:130:86370	LEIAR20	LEIM	----
ISPS	A	1	P	20:124:00000	20:130:86370	TRM59900.00	SCIS	----
KAST	A	1	P	20:124:00000	20:130:86370	LEIAS10	NONE	----
LARE	A	1	P	20:124:00000	20:130:86370	LEIAT504	NONE	----
LAZK	A	1	P	20:124:00000	20:130:86370	LEIAR25.R4	LEIT	----
LEIT	A	1	P	20:124:00000	20:130:86370	LEIAR10	NONE	----
ORDN	A	1	P	20:124:00000	20:130:86370	LEIAR10	NONE	----
PASA	A	1	P	20:124:00000	20:130:86370	LEIAR20	LEIM	73034
RIO1	A	1	P	20:124:00000	20:130:86370	LEIAR25.R4	LEIT	25138
SALA	A	1	P	20:127:46800	20:129:53970	LEIAR25	NONE	----
SCOA	A	1	P	20:124:00000	20:130:86370	TRM55971.00	NONE	----
SOPU	A	1	P	20:124:00000	20:130:86370	LEIAS10	NONE	----
TERU	A	1	P	20:124:00000	20:130:86370	LEIAT504GG	LEIS	----
VITO	A	1	P	20:124:00000	20:130:86370	LEIAS10	NONE	----
YEBE	A	1	P	20:124:00000	20:130:86370	TRM29659.00	NONE	----
ZARA	A	1	P	20:124:00000	20:130:86370	TRM29659.00	NONE	----

7.3 Eccentricities

*SITE	PT	SOLN	T	DATA_START_	DATA_END_	AXE	UP_	NORTH_	EAST_
							ARP->BENCHMARK(M)		
ACOR	A	1	P	20:124:00000	20:130:86370	UNE	3.0460	0.0000	0.0000
ALDA	A	1	P	20:124:00000	20:130:86370	UNE	0.0000	0.0000	0.0000
ALSA	A	1	P	20:124:00000	20:130:86370	UNE	0.0000	0.0000	0.0000
AMUR	A	1	P	20:124:00000	20:130:86370	UNE	0.0000	0.0000	0.0000
BIAZ	A	1	P	20:124:00000	20:130:86370	UNE	0.0000	0.0000	0.0000
BRZR	A	1	P	20:124:00000	20:130:86370	UNE	0.0771	0.0000	0.0000
CACE	A	1	P	20:124:00000	20:130:86370	UNE	0.0600	0.0000	0.0000
CANT	A	1	P	20:124:00000	20:130:86370	UNE	3.0490	0.0000	0.0000
CHER	A	1	P	20:124:00000	20:130:86370	UNE	0.0000	0.0000	0.0000
CREU	A	1	P	20:124:00000	20:130:86370	UNE	0.0770	0.0000	0.0000
EBRE	A	1	P	20:124:00000	20:130:86370	UNE	0.0770	0.0000	0.0000
ELGE	A	1	P	20:124:00000	20:130:86370	UNE	0.0000	0.0000	0.0000
EMAZ	A	1	P	20:124:00000	20:130:86370	UNE	0.0350	0.0000	0.0000
GERN	A	1	P	20:124:00000	20:130:86370	UNE	0.0771	0.0000	0.0000
IGEL	A	1	P	20:124:00000	20:130:86370	UNE	0.0000	0.0000	0.0000
ISPS	A	1	P	20:124:00000	20:130:86370	UNE	0.0350	0.0000	0.0000
KAST	A	1	P	20:124:00000	20:130:86370	UNE	0.0350	0.0000	0.0000
LARE	A	1	P	20:124:00000	20:130:86370	UNE	0.0000	0.0000	0.0000
LAZK	A	1	P	20:124:00000	20:130:86370	UNE	0.0000	0.0000	0.0000
LEIT	A	1	P	20:124:00000	20:130:86370	UNE	0.0000	0.0000	0.0000
ORDN	A	1	P	20:124:00000	20:130:86370	UNE	0.0000	0.0000	0.0000
PASA	A	1	P	20:124:00000	20:130:86370	UNE	0.0000	0.0000	0.0000
RIO1	A	1	P	20:124:00000	20:130:86370	UNE	0.0606	0.0000	0.0000
SALA	A	1	P	20:127:46800	20:129:53970	UNE	0.0600	0.0000	0.0000
SCOA	A	1	P	20:124:00000	20:130:86370	UNE	0.0000	0.0000	0.0000
SOPU	A	1	P	20:124:00000	20:130:86370	UNE	0.0771	0.0000	0.0000
TERU	A	1	P	20:124:00000	20:130:86370	UNE	0.0600	0.0000	0.0000
VITO	A	1	P	20:124:00000	20:130:86370	UNE	0.0000	0.0000	0.0000
YEBE	A	1	P	20:124:00000	20:130:86370	UNE	0.0000	0.0000	0.0000
ZARA	A	1	P	20:124:00000	20:130:86370	UNE	3.2590	0.0000	0.0000

8 References

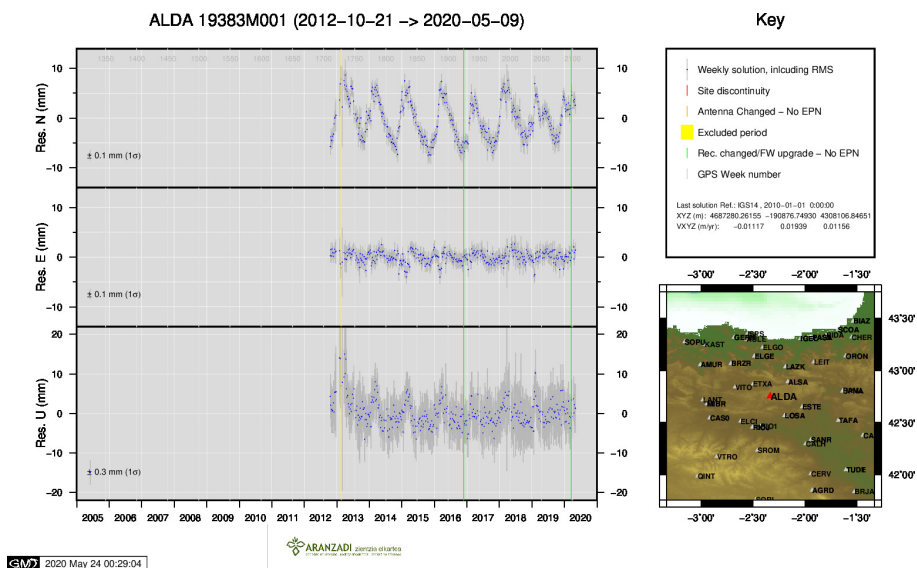
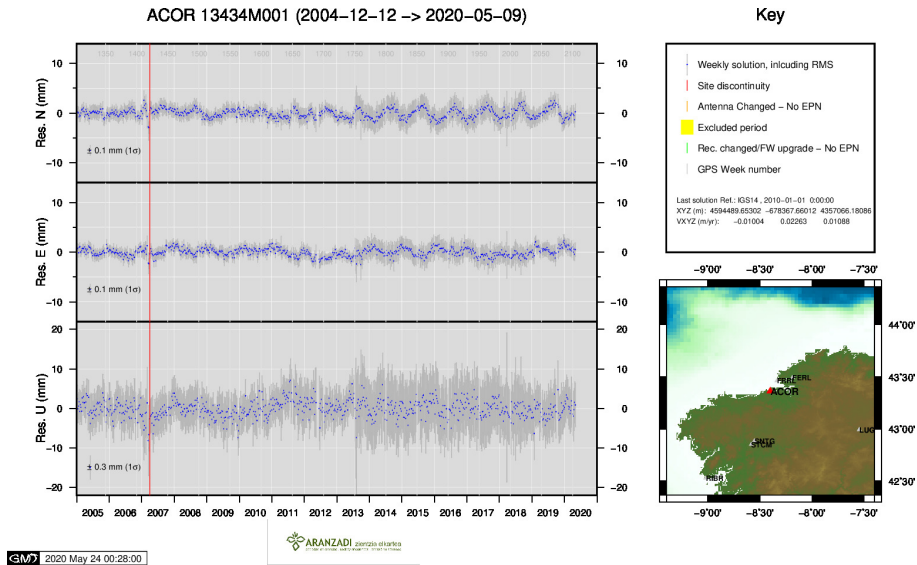
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign*. etrs89.ensg.ign.fr/memo-V8.pdf

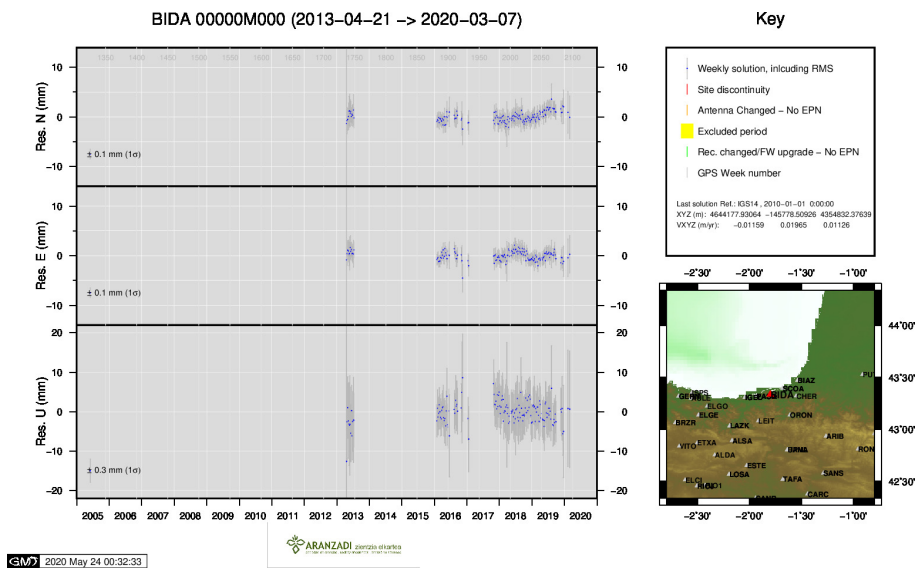
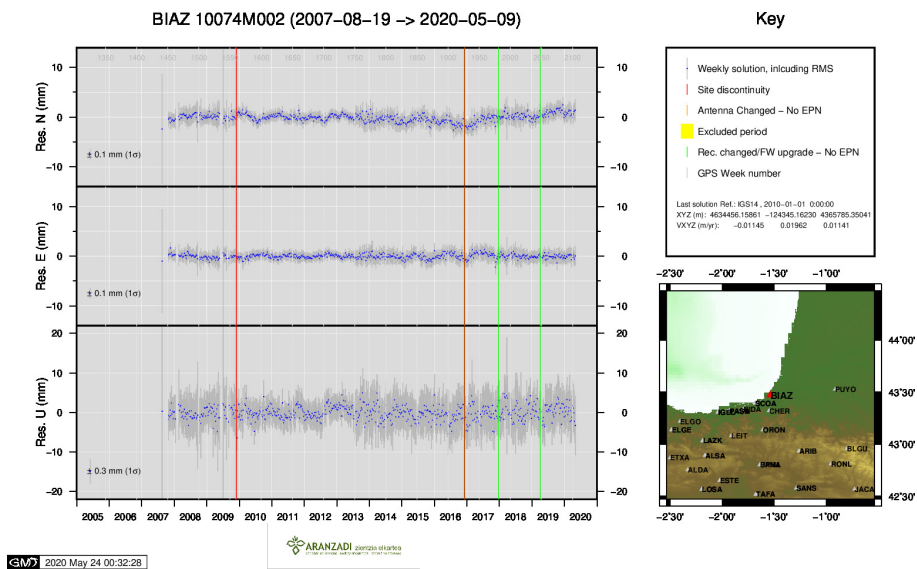
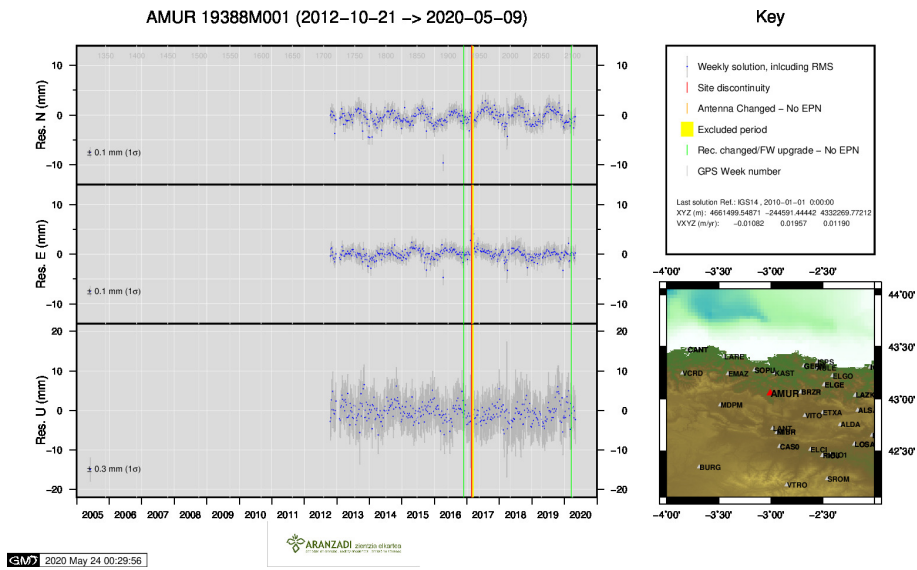
EPN Coordination Group and the EPN Central Bureau (2018): *Guidelines for the EPN Analysis Centres*. epncb.oma.be/documentation/guidelines/guidelines_analysis_centres.pdf

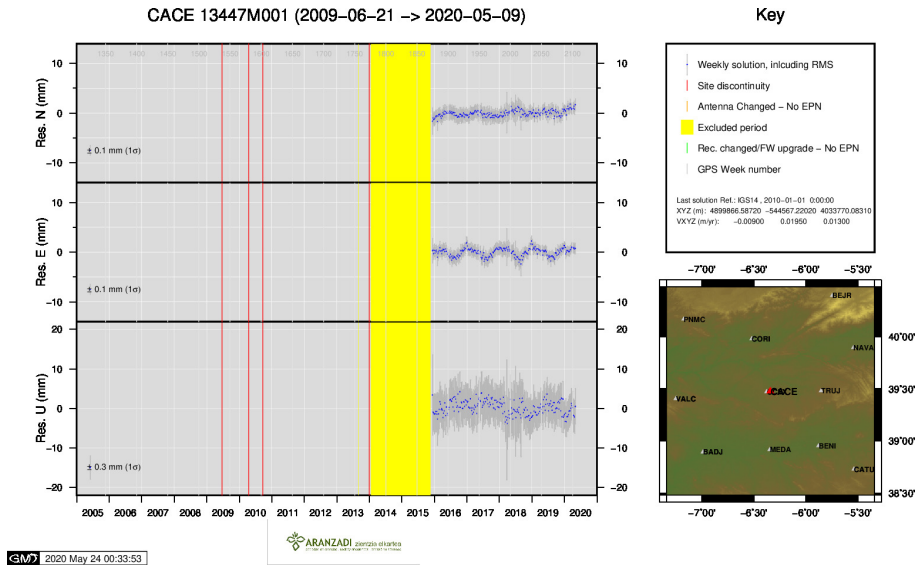
Z. Altamimi (2018): *EUREF Technical Note 1: Relationship and Transformation between the International and the European Terrestrial Reference Systems*. etrs89.ensg.ign.fr/pub/EUREF-TN-1.pdf

9 Cumulative Time Series

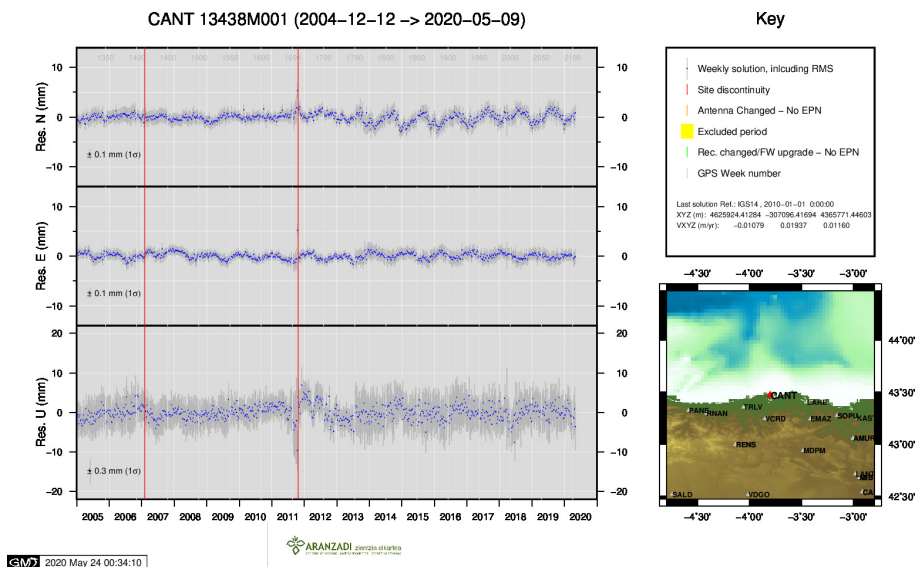
Time series of stations. Latest plots at: <http://geolabpasaia.org/gnss/ARA-net/TSeries/>, or click on the caption of each image.



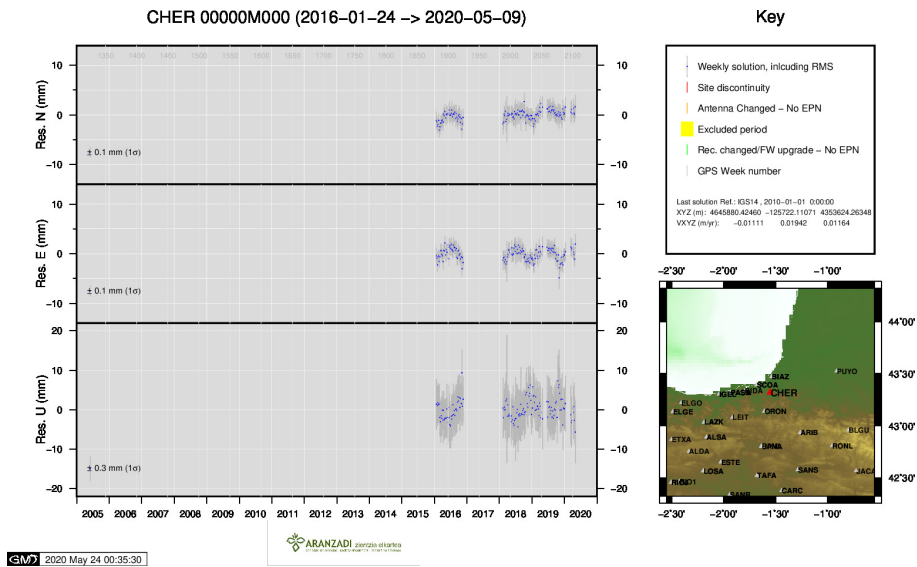




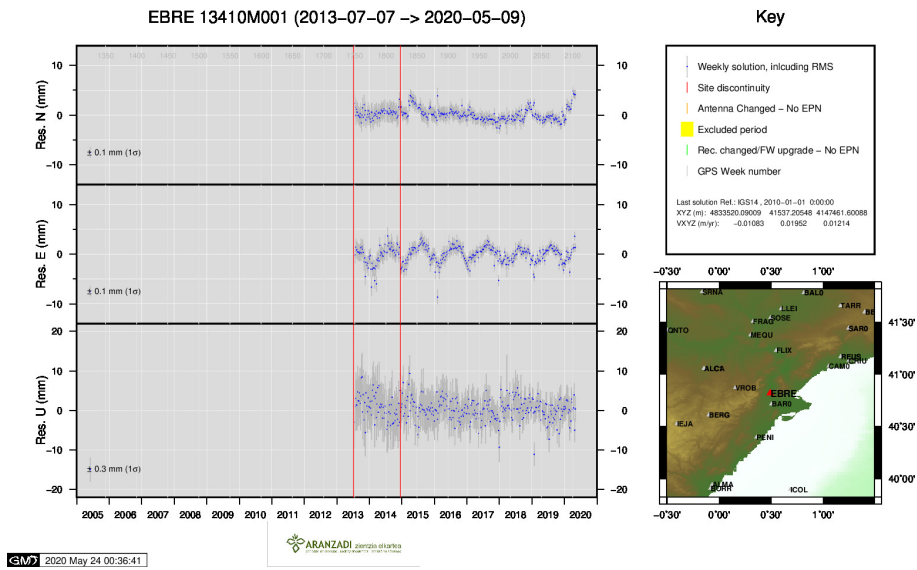
6) CACE



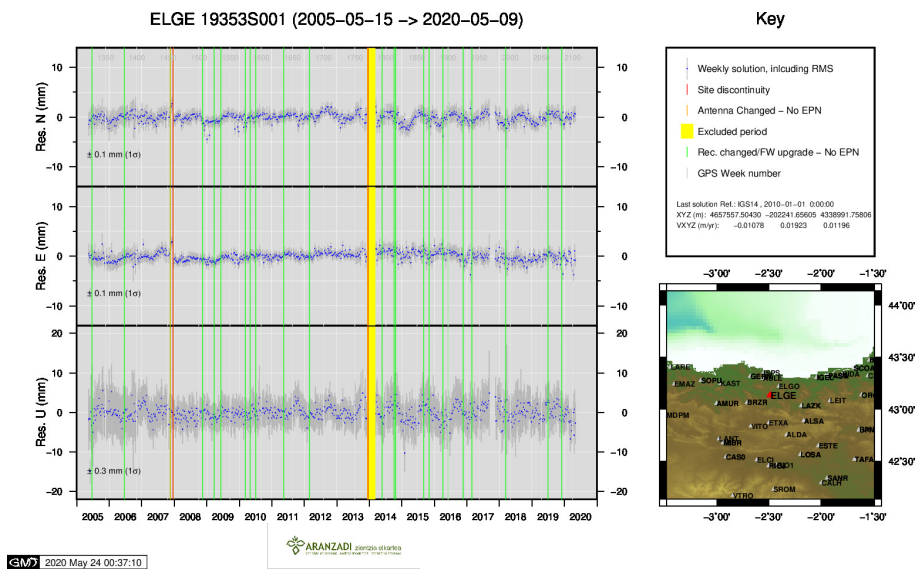
7) CANT



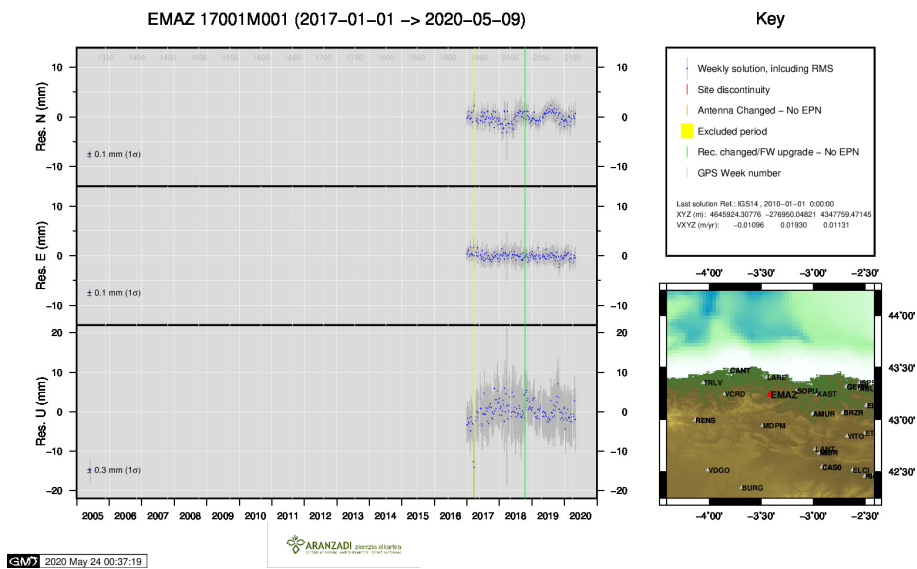
8) CHER



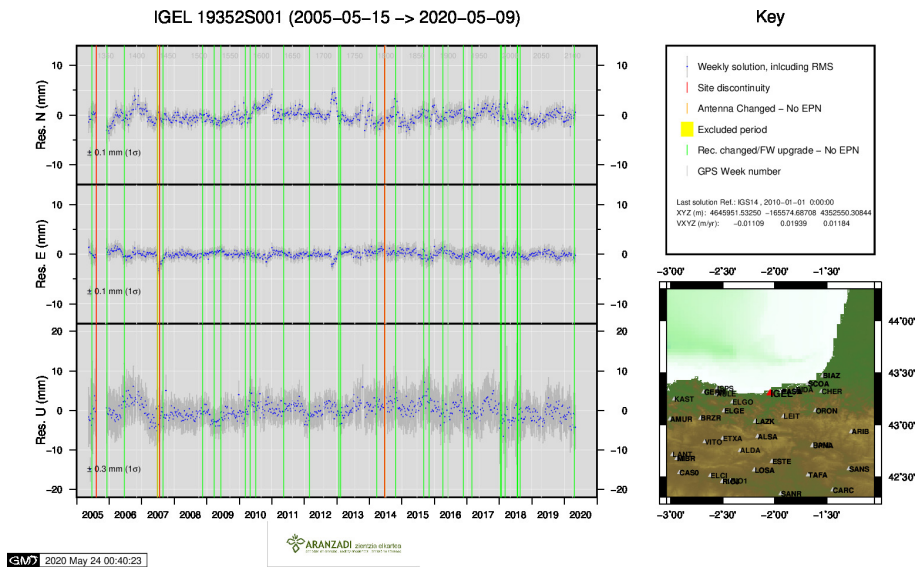
9) EBRE



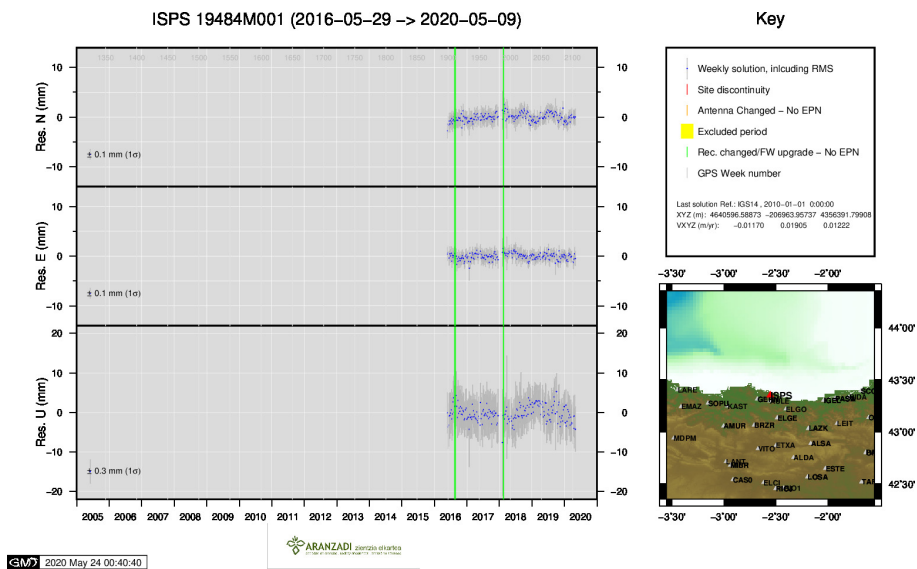
10) ELGE



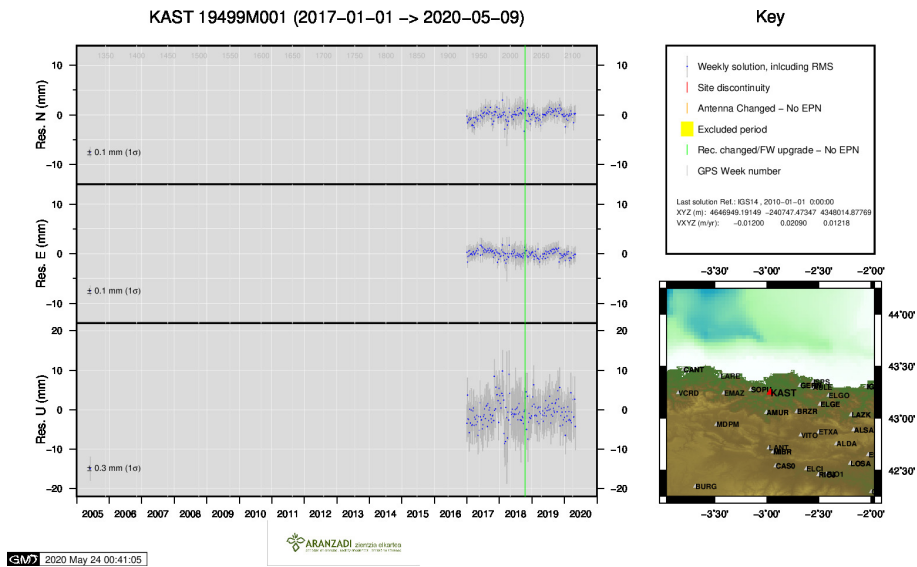
11) EMAZ



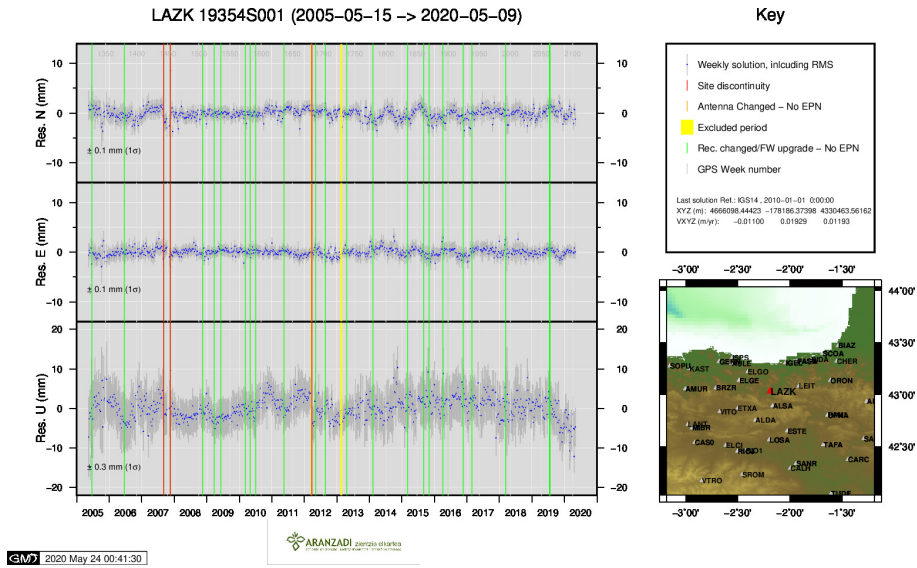
12) IGEL



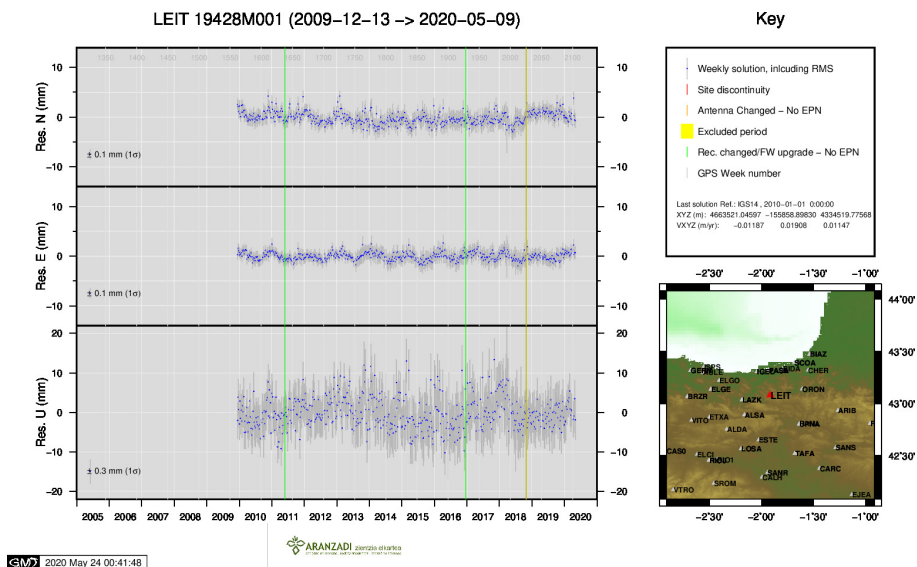
13) ISPS



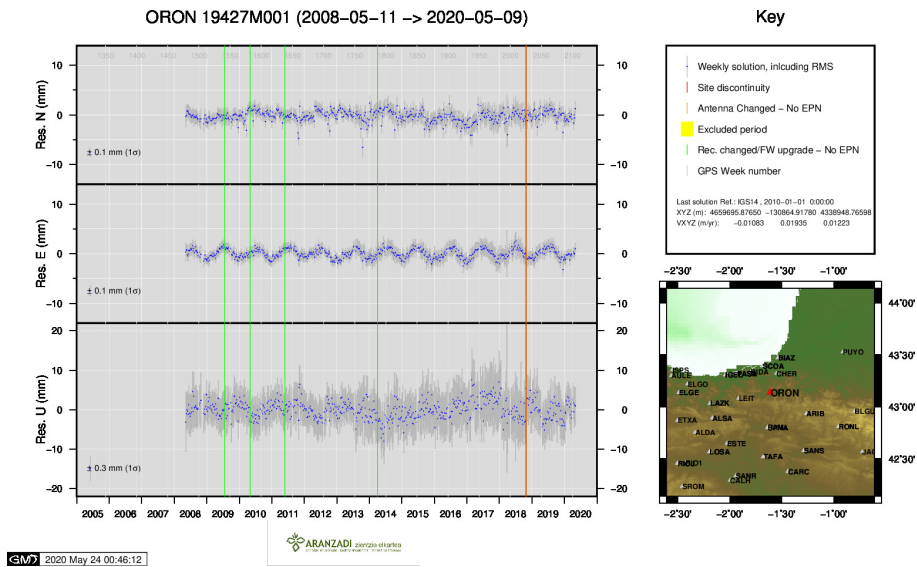
14) KAST



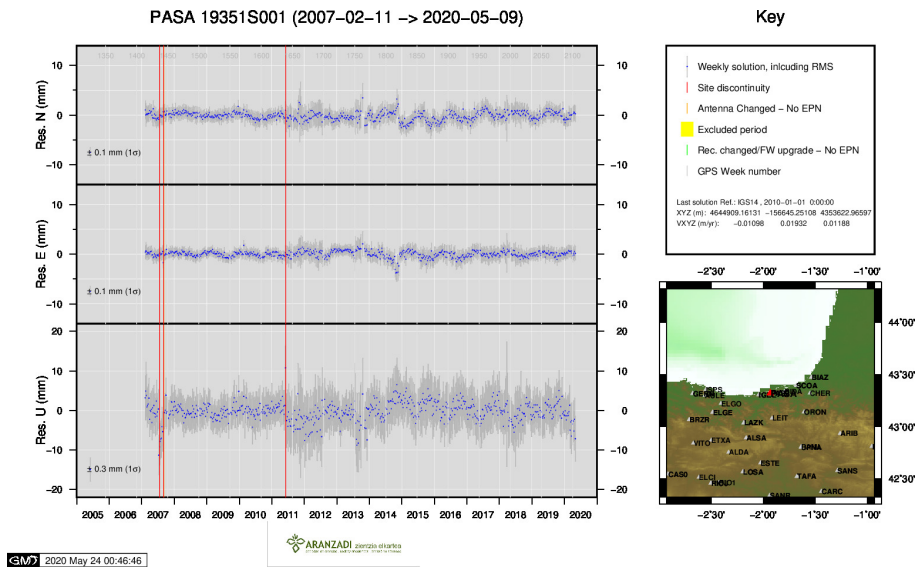
15) LAZK



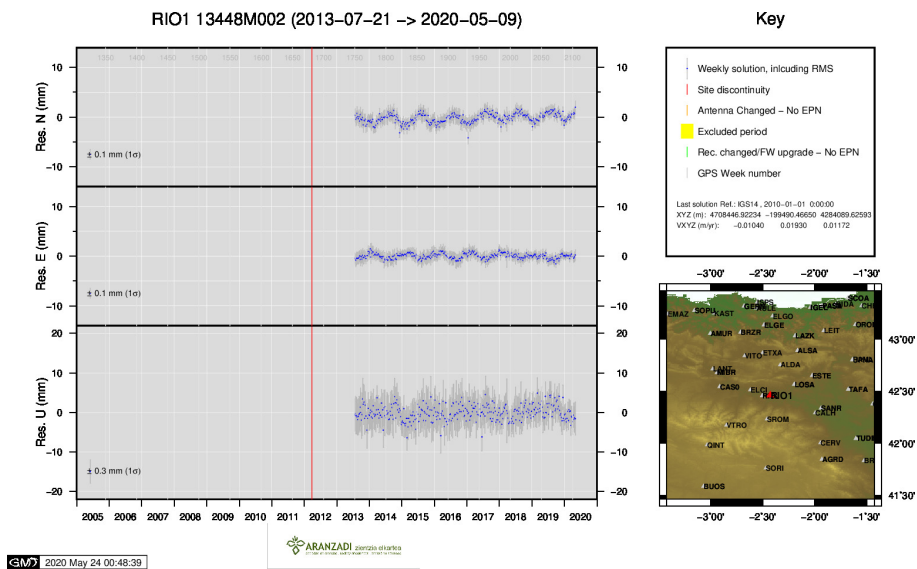
16) LEIT



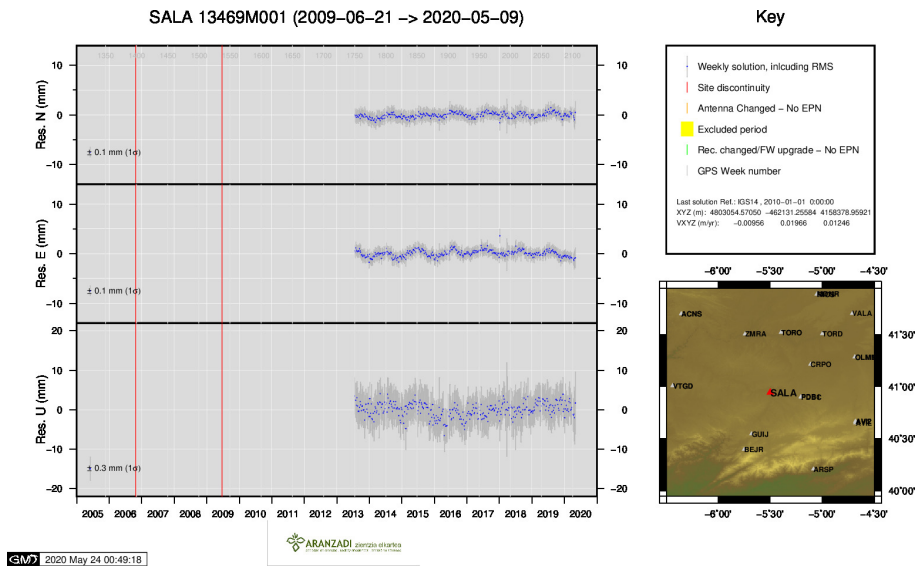
17) ORON



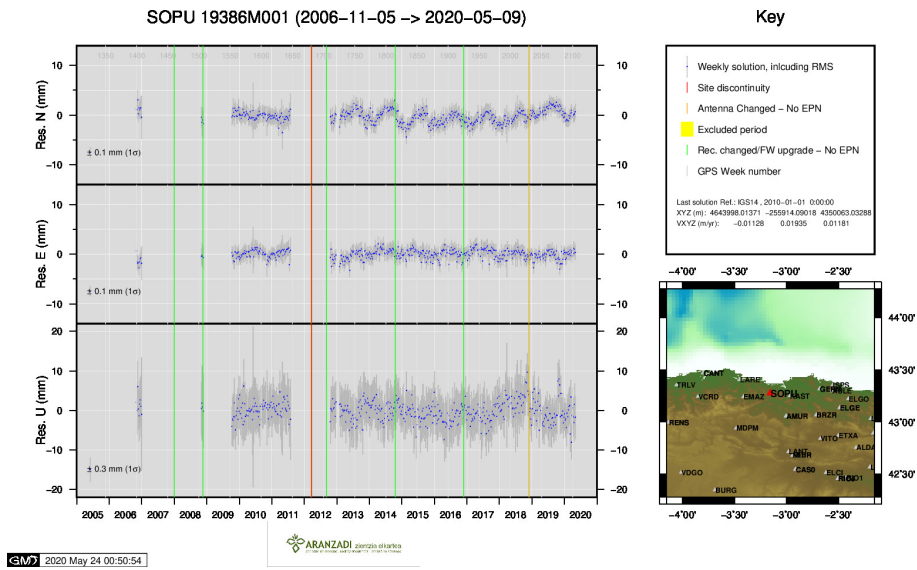
18) PASA



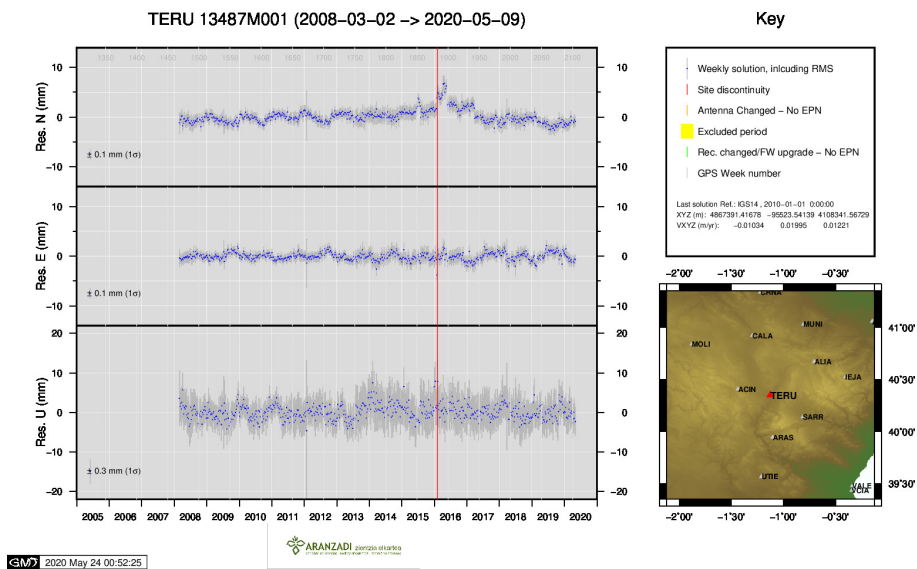
19) RIO1



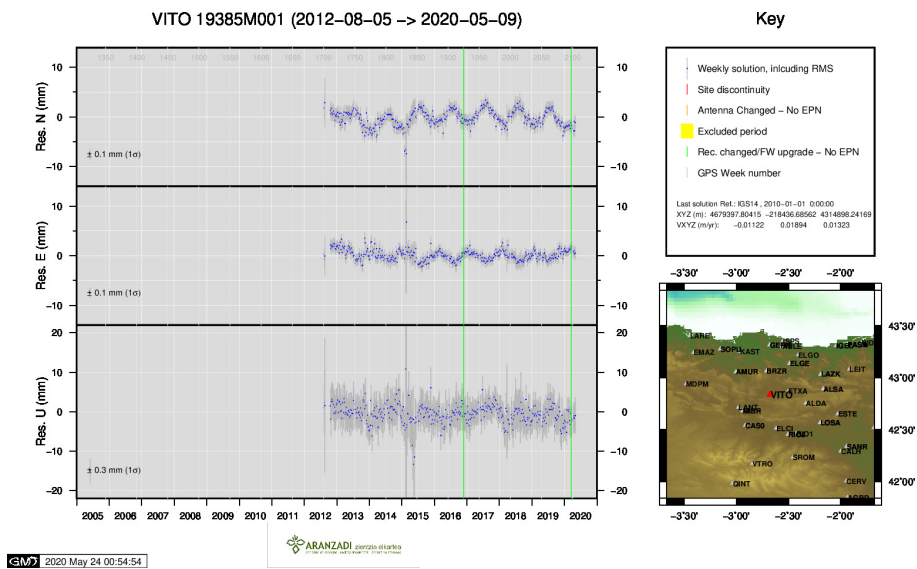
20) SALA



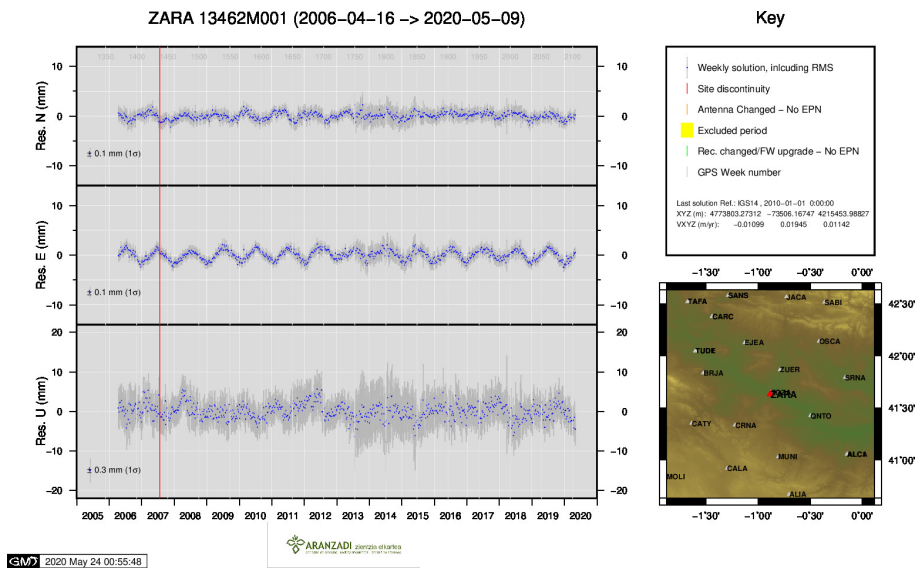
21) SOPU



22) TERU



23) VITO



24) ZARA