

ARA-DAC Weekly Analysis Result: 2123 (GFA)

Technical Report

GPS Week: 2123 (GFA)

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

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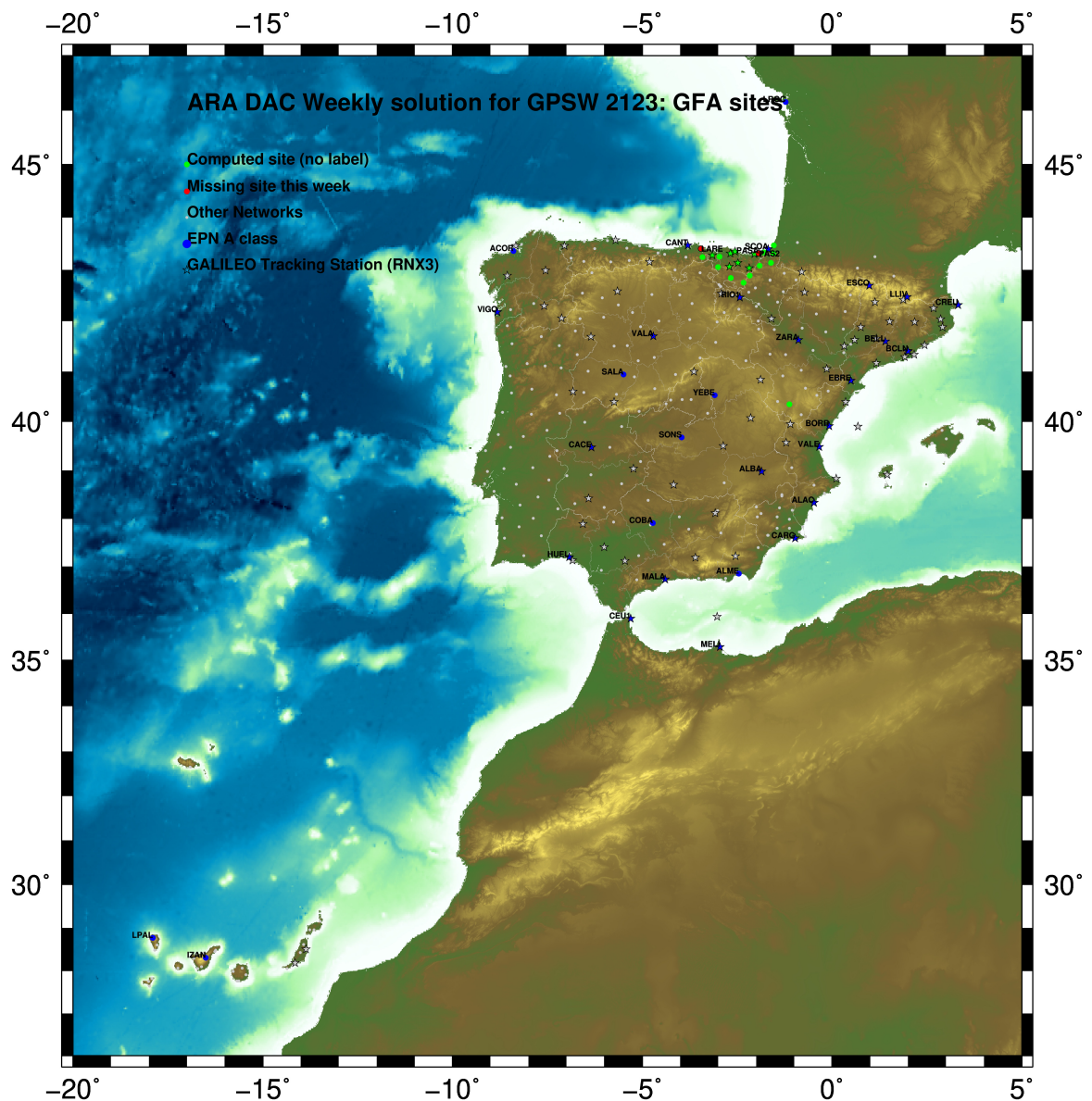
Report generated on 2020/10/04 at 13:06:33



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 Oct 04 13:06:20

Fig.1: Computed Sites for GPS Week2123 (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 C2085.

ARA LAC 2123 WEEK FINAL COMBINATION: PRECISE ORBITS 04-OCT-20 10:07						

LOCAL GEODETIC DATUM: IGS14 EPOCH: 2020-09-16 12:00:00						
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	
4	ACOR	13434M001	4594489.54511	-678367.41937	4357066.29977	W
39	ALDA	19383M001	4687280.14497	-190876.54191	4308106.96802	A
50	ALSA	19419M001	4677250.82000	-176770.36936	4319079.89088	A
53	AMUR	19388M001	4661499.43404	-244591.23444	4332269.90310	A
100	BLAZ	10074M002	4634456.03612	-124344.95330	4365785.47614	A
101	BIDA	00000M000	4644177.80770	-145778.29782	4354832.49634	A
113	BRZR	19387M001	4662220.97510	-220769.87773	4333309.45688	A
98	CACE	13447M001	4899866.48885	-544567.01368	4033770.21825	W
109	CANT	13438M001	4625924.29428	-307096.21146	4365771.57183	W
154	CHER	00000M000	4645880.00704	-125721.88568	4353624.10324	A
154	CREU	13432M001	4715420.11343	273178.08410	4271946.85669	W
190	EBRE	13410M001	4833519.97374	41537.41629	4147461.73334	W
180	ELGE	19353S001	4657557.39108	-202241.45224	4338991.88942	A
182	EMAZ	17001M001	4645924.19055	-276949.84290	4347759.59406	A
209	GERN	19389M001	4642811.30026	-217222.90262	4353278.89690	A
235	IGEL	19352S001	4645951.41592	-165574.48151	4352550.43840	A
240	ISPS	19484M001	4640596.46639	-206963.75528	4356391.93209	A
245	KAST	19499M001	4646949.06177	-240747.25076	4348015.00595	A
256	LAZK	19354S001	4666098.32625	-178186.16813	4330463.68682	A
261	LEIT	19428M001	4663520.91992	-155858.69444	4334519.89938	A
334	ORON	19427M001	4659695.76304	-130864.71170	4338948.89900	A
456	PASA	19351S001	4644909.04395	-156645.04631	4353623.09432	W
513	RIDI	13448M002	4708446.81202	-199490.26150	4284089.75495	W
518	SALA	13469M001	4803054.46854	-462131.04661	4158379.09373	W
526	SCDA	10088M002	4639940.48081	-136224.91673	4359552.43416	W
418	SOPU	19386M001	4643997.89095	-255913.88438	4350063.15764	A
443	TERU	13487M001	4867391.30651	-95523.32735	4108341.69494	A
493	VITO	19385M001	4679397.68472	-218436.48332	4314898.38336	A
698	YEBE	13420M001	4848724.55482	-261631.90614	4123094.34732	W
701	ZARA	13462M001	4773803.14991	-73505.95971	4215454.11065	W

5.2 ETRF2000 (ETRS89) Coordinates

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

ETRF2000 FINAL COORD. wk 2123 04-OCT-20 10:07						

LOCAL GEODETIC DATUM: ETRF2000 EPOCH: 2020-09-16 12:00:00						
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	
4	ACOR	13434M001	4594489.86166	-678367.98203	4357065.86513	W
39	ALDA	19383M001	4687280.51750	-190877.11365	4308106.53229	A
50	ALSA	19419M001	4677251.19504	-176770.93997	4319079.45612	A
53	AMUR	19388M001	4661499.80177	-244591.80352	4332269.46873	A
100	BLAZ	10074M002	4634456.42092	-124345.51911	4365785.04441	A
101	BIDA	00000M000	4644178.18910	-145778.86474	4354832.06658	A
113	BRZR	19387M001	4662221.34581	-220770.44683	4333309.02275	A
98	CACE	13447M001	4899866.79835	-544567.60906	4033769.76120	W
109	CANT	13438M001	4625924.65680	-307096.77683	4365771.13947	W
154	CHER	00000M000	4645880.39080	-125722.45273	4353623.67160	A
154	CREU	13432M001	4715420.53983	273177.51091	4271946.42450	W
190	EBRE	13410M001	4833520.36295	41536.82951	4147461.28896	W
180	ELGE	19353S001	4657557.76446	-202242.02078	4338991.45589	A
182	EMAZ	17001M001	4645924.55545	-276950.41038	4347759.16051	A
209	GERN	19389M001	4642811.67284	-217223.46959	4353278.46435	A
235	IGEL	19352S001	4645951.79474	-165575.04869	4352550.00625	A
240	ISPS	19484M001	4640596.84045	-206964.32199	4356391.49984	A
245	KAST	19499M001	4646949.43110	-240747.81825	4348014.57277	A
256	LAZK	19354S001	4666098.70194	-178186.73753	4330463.25292	A
261	LEIT	19428M001	4663521.29863	-155859.26350	4334519.46597	A
334	ORON	19427M001	4659696.14511	-130865.28027	4338948.46620	A
456	PASA	19351S001	4644909.42394	-156645.61334	4353622.66236	W
513	RIDI	13448M002	4708447.18176	-199490.83555	4284089.31744	W
518	SALA	13469M001	4803054.79714	-462131.63148	4158378.64541	W
526	SCDA	10088M002	4639940.86371	-136225.48317	4359552.00285	W
418	SOPU	19386M001	4643998.25858	-255914.45159	4350062.72450	A
443	TERU	13487M001	4867391.67620	-95523.91822	4108341.24618	A
493	VITO	19385M001	4679398.05438	-218437.05428	4314897.94791	A
698	YEBE	13420M001	4848724.90533	-261632.49547	4123093.89794	W
701	ZARA	13462M001	4773803.53004	-73506.54044	4215453.66956	W

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 2123                                04-OCT-20 10:07
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LOCAL GEODETIC DATUM: ETRF2014          EPOCH: 2020-09-16 12:00:00
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
4  ACRD 13434M001        4594489.82050    -678368.02020    4357065.91583    W
39 ALDA 19383M001        4687280.47407    -190877.15309    4308106.58288    A
50 ALSA 19419M001        4677251.15167    -176770.97949    4319079.50674    A
53 AMUR 19388M001        4661499.75875    -244591.84288    4332269.51936    A
100 BIAZ 10074M002        4634456.37781    -124345.55898    4365785.09518    A
101 BIDA 00000M000        4644178.14595    -145778.90451    4354832.11730    A
113 BRZR 19387M001        4662221.30272    -220770.48627    4333309.07339    A
98 CACE 13447M001        4899866.75368    -544567.64644    4033769.81113    W
109 CANT 13438M001        4625924.61433    -307096.81613    4365771.19018    W
154 CHER 00000M000        4645880.34757    -125722.49255    4353623.72233    A
154 CREU 13432M001        4715420.49451    273177.47006    4271946.47531    W
190 EBRE 13410M001        4833520.31724    41536.78990    4147461.33929    W
180 ELGE 19353S001        4657557.72136    -202242.06030    4338991.50655    A
182 EMAZ 17001M001        4645924.51270    -276950.44970    4347759.21117    A
209 GERN 19389M001        4642811.62993    -217223.50912    4353278.51504    A
235 IGEL 19352S001        4645951.75164    -165575.08838    4352550.05696    A
240 ISPS 19484M001        4640596.79753    -206964.36156    4356391.55055    A
245 KAST 19499M001        4646949.38822    -240747.85768    4348014.62345    A
256 LAZK 19354S001        4666098.65868    -178186.77709    4330463.30357    A
261 LEIT 19428M001        4663521.25532    -155859.30315    4334519.51663    A
334 ORON 19427M001        4659696.10176    -130865.32001    4338948.51689    A
456 PASA 19351S001        4644909.38082    -156645.65307    4353622.71308    W
513 RIO1 13448M002        4708447.13814    -199490.87487    4284089.36796    W
518 SALA 13469M001        4803054.75331    -462131.66954    4158378.69559    W
526 SOA 10088M002        4639940.82058    -136225.52298    4359552.05359    W
418 SOPU 19386M001        4643998.21578    -255914.49098    4350062.77518    A
443 TERU 13487M001        4867391.63059    -95523.95724    4108341.29634    A
493 VITO 19385M001        4679398.01111    -218437.09365    4314897.99850    A
698 YEBE 13420M001        4848724.86044    -261632.53401    4123093.94807    W
701 ZARA 13462M001        4773803.48534    -73506.57992    4215453.71998    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 2123 WEEK FINAL COMBINATION: PRECISE ORBITS 04-OCT-20 10:07

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	7	XXXXXX	1.16	0.76	4.14
ALDA 19383M001	7	XXXXXX	4.24	1.23	3.68
ALSA 19419M001	7	XXXXXX	2.92	1.67	6.28
AMUR 19388M001	7	XXXXXX	1.55	1.31	2.41
BLAZ 10074M002	7	XXXXXX	0.90	1.55	2.04
BIDA 00000M000	7	XXXXXX	1.07	1.66	5.96
BRZR 19387M001	7	XXXXXX	0.99	1.61	5.67
CACE 13447M001	7	XXXXXX	0.80	1.12	4.37
CANT 13438M001	7	XXXXXX	2.25	0.77	3.37
CHER 00000M000	5	XXX X	0.77	1.68	3.81
CREU 13432M001	7	XXXXXX	0.50	0.99	2.45
EBRE 13410M001	7	XXXXXX	0.83	1.15	3.92
ELGE 19353S001	7	XXXXXX	1.24	2.01	4.09
EMAZ 17001M001	6	XXX XX	3.00	0.91	2.71
GERN 19389M001	7	XXXXXX	0.97	1.12	3.37
IGEL 19352S001	7	XXXXXX	1.75	1.17	4.80
ISPS 19484M001	7	XXXXXX	2.41	2.83	8.75
KAST 19499M001	7	XXXXXX	1.56	0.86	6.08
LAZK 19354S001	7	XXXXXX	2.53	0.84	7.44
LEIT 19428M001	7	XXXXXX	1.88	1.33	3.94
ORDN 19427M001	7	XXXXXX	1.03	1.28	4.25
PASA 19351S001	7	XXXXXX	1.26	1.23	2.93
RIO1 13448M002	7	XXXXXX	1.14	0.51	3.01
SALA 13469M001	7	XXXXXX	0.91	0.76	2.14
SCDA 10088M002	7	XXXXXX	2.14	2.18	5.94
SOPU 19386M001	7	XXXXXX	1.10	1.49	4.30
TERU 13487M001	7	XXXXXX	0.93	0.84	5.65
VITD 19385M001	7	XXXXXX	2.08	0.56	3.43
YEBE 13420M001	7	XXXXXX	1.41	0.93	2.78
ZARA 13462M001	7	XXXXXX	0.97	0.76	4.16

Comparison of individual solutions:

ACOR 13434M001	N	1.16	-0.33	-0.60	-0.84	0.04	2.40	0.04	1.06
ACOR 13434M001	E	0.76	0.51	-0.88	1.15	0.69	0.85	-0.03	-0.30
ACOR 13434M001	U	4.14	3.71	1.21	7.13	-3.51	-3.07	-2.38	3.10
ALDA 19383M001	N	4.24	-4.15	-2.31	-1.78	-1.06	-0.37	8.60	-2.58
ALDA 19383M001	E	1.23	-0.21	2.39	-0.24	-1.36	-0.49	0.07	-1.07
ALDA 19383M001	U	3.68	1.45	0.53	1.15	2.42	-5.16	-4.03	-5.38
ALSA 19419M001	N	2.92	-4.76	-0.69	-1.80	2.31	-1.20	4.23	-0.16
ALSA 19419M001	E	1.67	0.76	0.61	2.10	-2.86	-1.45	0.78	-0.74
ALSA 19419M001	U	6.28	-6.34	7.11	2.53	2.10	4.55	-6.78	-8.28
AMUR 19388M001	N	1.55	-2.60	0.57	-1.47	0.33	1.32	-1.79	-0.32
AMUR 19388M001	E	1.31	-1.14	-0.96	0.22	-0.30	-0.10	2.61	-1.04
AMUR 19388M001	U	2.41	-2.87	-3.68	-1.26	0.83	2.42	1.65	-1.49
BLAZ 10074M002	N	0.90	-0.37	0.76	-1.01	-1.35	-0.96	0.66	0.10
BLAZ 10074M002	E	1.55	1.05	1.53	-0.78	-0.23	0.23	-3.13	0.72
BLAZ 10074M002	U	2.04	-1.71	0.01	3.92	-2.39	-0.63	0.21	-0.79
BIDA 00000M000	N	1.07	0.04	-1.02	0.02	0.34	0.09	-1.77	1.59
BIDA 00000M000	E	1.66	-1.41	1.03	-0.02	-1.61	0.01	3.17	-0.94
BIDA 00000M000	U	5.96	5.81	2.99	3.28	-1.29	0.39	-12.56	0.59
BRZR 19387M001	N	0.99	0.63	-0.06	-0.42	1.51	0.76	1.33	0.84
BRZR 19387M001	E	1.61	1.92	-0.40	2.13	-0.89	-0.99	-2.29	-0.39
BRZR 19387M001	U	5.67	-3.42	-4.78	7.12	2.01	1.50	-9.88	-1.90
CACE 13447M001	N	0.80	-0.94	0.55	-0.49	-0.82	0.32	0.05	1.29
CACE 13447M001	E	1.12	0.08	-1.18	0.91	-0.83	1.80	1.16	-0.06
CACE 13447M001	U	4.37	4.35	0.51	4.58	2.84	-7.99	0.06	-1.66
CANT 13438M001	N	2.25	-2.31	-0.34	-2.88	-2.61	-0.34	2.30	2.12
CANT 13438M001	E	0.77	0.16	-0.11	0.81	-0.06	0.31	-1.65	-0.15
CANT 13438M001	U	3.37	2.22	4.25	-0.06	-1.83	2.25	0.66	-6.03
CHER 00000M000	N	0.77	-0.05	-1.01	-1.11	0.20			0.32
CHER 00000M000	E	1.68	-0.71	2.16	1.23	-1.55			-1.51
CHER 00000M000	U	3.81	0.92	-0.65	6.13	-4.40			0.03
CREU 13432M001	N	0.50	-0.04	-0.89	0.07	-0.03	0.39	-0.71	0.20
CREU 13432M001	E	0.99	0.48	0.19	0.67	-1.00	-0.32	-1.18	1.64
CREU 13432M001	U	2.45	-2.04	2.92	-4.24	-1.85	0.90	-0.82	0.56
EBRE 13410M001	N	0.83	-0.27	-1.04	-0.85	0.21	-0.88	1.19	-0.27
EBRE 13410M001	E	1.15	0.21	-1.94	-0.50	1.30	0.23	-0.77	1.23
EBRE 13410M001	U	3.92	-3.41	-4.84	-3.02	-2.56	1.21	2.81	5.67
ELGE 19353S001	N	1.24	0.04	-0.21	0.68	0.42	2.35	1.70	-0.37
ELGE 19353S001	E	2.01	0.18	-0.63	3.28	0.90	-3.39	-0.87	-0.18
ELGE 19353S001	U	4.09	-5.25	-1.26	0.71	-0.75	2.84	2.41	-7.49
EMAZ 17001M001	N	3.00	0.08	-0.28	-1.62	-1.47		6.12	-1.64
EMAZ 17001M001	E	0.91	1.27	-0.42	0.40	0.02		-1.48	-0.15
EMAZ 17001M001	U	2.71	-4.52	-3.98	-0.05	0.53		-0.22	0.40
GERN 19389M001	N	0.97	0.13	0.12	0.47	0.14	1.54	0.62	1.62
GERN 19389M001	E	1.12	1.14	0.45	0.52	-0.03	0.55	-1.48	-1.82
GERN 19389M001	U	3.37	-0.59	3.28	0.41	-0.93	-1.21	-3.85	-6.29
IGEL 19352S001	N	1.75	0.65	0.84	-0.52	-0.19	-1.38	1.99	3.32
IGEL 19352S001	E	1.17	0.01	-1.26	1.00	0.16	-0.80	1.82	-1.29
IGEL 19352S001	U	4.80	-1.19	1.65	3.69	-4.69	1.93	-9.35	-2.69
ISPS 19484M001	N	2.41	-1.56	0.37	-0.38	-0.15	0.97	5.59	0.13
ISPS 19484M001	E	2.83	-3.90	0.16	3.97	0.91	2.43	-2.22	-2.34
ISPS 19484M001	U	8.75	2.23	3.84	4.05	-0.92	5.79	-17.95	-8.14
KAST 19499M001	N	1.56	1.47	-0.14	2.66	1.72	-0.67	-1.06	0.90
KAST 19499M001	E	0.86	-0.09	0.01	0.72	-0.48	-0.86	1.04	-1.37
KAST 19499M001	U	6.08	1.15	-10.53	7.88	-0.89	2.21	-5.80	-2.82
LAZK 19354S001	N	2.53	1.42	-1.84	0.90	2.52	-1.06	-4.83	1.13
LAZK 19354S001	E	0.84	-0.22	0.08	-0.47	-0.22	-1.23	1.53	-0.32
LAZK 19354S001	U	7.44	-3.64	9.30	5.79	-0.57	3.82	-4.13	-12.92
LEIT 19428M001	N	1.88	-0.38	1.94	-2.76	-1.61	-0.64	2.49	-0.68
LEIT 19428M001	E	1.33	1.09	-0.71	1.74	-1.18	-0.61	0.69	-1.90
LEIT 19428M001	U	3.94	-6.00	0.66	3.42	-1.49	2.75	3.34	-4.91
ORDN 19427M001	N	1.03	-0.59	-0.46	0.88	-0.38	-0.27	-1.94	1.03

ORDN 19427M001	E	1.28	-0.44	-0.48	1.76	1.04	0.09	-2.19	-0.64
ORDN 19427M001	U	4.25	-2.78	-1.17	2.38	0.54	6.62	-7.01	-0.41
PASA 19351S001	N	1.26	-0.34	0.78	-0.08	0.05	0.34	2.64	1.31
PASA 19351S001	E	1.23	1.03	0.57	0.97	0.60	-0.30	-1.09	-2.26
PASA 19351S001	U	2.93	-1.25	-1.15	0.64	-5.67	2.25	-2.72	-1.88
RIO1 13448M002	N	1.14	-1.72	-0.14	-1.46	0.09	0.90	1.22	-0.64
RIO1 13448M002	E	0.51	0.03	-0.09	-0.25	-0.54	-0.70	0.83	-0.05
RIO1 13448M002	U	3.01	-4.13	0.05	-2.04	3.04	2.88	-3.68	1.43
SALA 13469M001	N	0.91	-0.70	-0.22	-0.68	0.48	-0.96	1.23	1.15
SALA 13469M001	E	0.76	0.92	-0.33	0.74	0.65	-1.17	0.12	-0.31
SALA 13469M001	U	2.14	3.12	2.21	-1.27	-1.19	1.04	2.97	-0.09
SCDA 10088M002	N	2.14	-1.00	-0.76	-2.03	-2.40	0.96	3.77	0.98
SCDA 10088M002	E	2.18	0.05	4.05	-0.85	-1.25	1.10	0.32	-2.90
SCDA 10088M002	U	5.94	0.79	-1.33	6.41	-2.36	-0.03	-11.53	5.47
SOPU 19386M001	N	1.10	1.58	-0.48	0.33	1.36	1.35	0.81	-0.35
SOPU 19386M001	E	1.49	0.86	0.33	0.32	0.50	0.48	0.08	-3.44
SOPU 19386M001	U	4.30	1.80	-5.69	4.48	-1.13	1.84	-5.38	-4.64
TERU 13487M001	N	0.93	1.02	0.31	-0.67	0.07	-0.41	-1.76	-0.57
TERU 13487M001	E	0.84	0.18	-0.19	1.28	-0.70	-0.76	-0.57	1.07
TERU 13487M001	U	5.65	-8.53	6.46	-4.55	-4.36	1.66	2.58	5.31
VITO 19385M001	N	2.08	-0.18	0.80	-0.02	1.82	-1.59	-4.41	0.25
VITO 19385M001	E	0.56	-0.19	-0.69	0.52	-0.15	-0.84	0.60	-0.17
VITO 19385M001	U	3.43	-1.54	3.67	2.58	1.64	-0.39	-5.26	-4.17
YEBE 13420M001	N	1.41	-1.22	-0.04	-0.52	-0.41	0.66	-0.41	3.07
YEBE 13420M001	E	0.93	-0.17	0.76	-1.04	0.06	1.78	-0.55	-0.12
YEBE 13420M001	U	2.78	2.42	-3.29	1.96	2.24	-3.73	-1.90	1.80
ZARA 13462M001	N	0.97	-1.29	-0.00	-1.36	-0.74	0.85	0.93	-0.11
ZARA 13462M001	E	0.76	0.58	-0.10	1.10	0.01	-1.03	-0.46	-0.81
ZARA 13462M001	U	4.16	-6.45	-4.85	-3.36	1.14	1.24	4.59	1.84

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		
4	ACOR 13434M001	I W	-2.17	1.45	-0.82
10	ALAC 13433M001	I W	0.58	-0.22	1.56
13	ALBA 13452M001	I W	1.36	-1.29	1.04
19	ALME 13437M001	I W	0.14	1.34	0.80
41	BCLN 13412M001	I W	0.06	-0.71	0.05
46	BELL 13431M001	I W	-1.15	-2.44	3.72
65	BORR 13480M001	I W	0.64	-2.10	-0.24
70	BRST 10004M004	I W	-3.11	1.75	-5.77
98	CACE 13447M001	I W	1.99	2.62	3.78
109	CANT 13438M001	I W	-2.32	1.29	2.13
110	CARG 19412M001	I W	2.64	-0.89	-1.98
121	CEU1 13449M002	I W	-0.16	0.29	-0.35
135	COBA 13453M001	I W	0.95	0.64	-2.36
154	CREU 13432M001	I W	-0.21	0.79	-0.26
190	EBRE 13410M001	I W	-1.10	-1.28	-1.43
208	ESCO 13435M001	I W	1.12	1.21	-4.56
286	HUEL 13451M001	I W	3.52	-2.80	-7.12
300	IZAN 131309M002	I W	0.47	-0.90	6.71
359	LLIV 13436M001	I W	0.78	0.23	1.91
364	LPAL 81701M001	I W	-2.55	-0.77	6.43
366	LROC 10023M001	I W	0.14	0.64	-3.84
400	MELI 19379M001	I W	1.75	-1.11	-2.27
456	PASA 19351S001	I W	-0.86	1.84	-2.34
513	RID1 13448M002	I W	-1.73	2.01	-3.39
518	SALA 13469M001	I W	0.47	1.53	-0.47
526	SCOA 10088M002	I W	-6.23	-0.67	-4.14
557	SONS 13446M001	I W	-1.81	-0.53	-1.98
588	TERC 131909M001	I W	4.75	-3.45	2.96
654	VALA 13463M002	I W	1.14	-0.36	0.87
658	VALE 13439M001	I W	0.45	0.25	-0.41
669	VIGO 13450M001	I W	-0.74	1.37	4.42
698	YEBE 13420M001	I W	1.03	0.99	1.28
701	ZARA 13462M001	I W	-0.20	-0.45	2.88
710	ZIMM 14001M004	I W	-1.42	0.55	1.59
84	MALA 13443M001	I W	1.79	-0.79	1.59
	RMS / COMPONENT		2.01	1.44	3.19
	MEAN		-0.00	-0.00	-0.00
	MIN		-6.23	-3.45	-7.12
	MAX		4.75	2.62	6.71

NUMBER OF PARAMETERS : 3
NUMBER OF COORDINATES : 105
RMS OF TRANSFORMATION : 2.33 MM

BARYCENTER COORDINATES:

LATITUDE : 40 19 0.07
LONGITUDE : - 3 55 28.24
HEIGHT : -38.454 KM

PARAMETERS:

TRANSLATION IN N : 0.00 +- 0.39 MM
TRANSLATION IN E : 0.00 +- 0.39 MM
TRANSLATION IN U : 0.00 +- 0.39 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          14444617
NUMBER OF UNKNOWN               193370
NUMBER OF DEGREES OF FREEDOM    14261247
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)      180
VARIANCE FACTOR                  2.504106321721244

Helmert Transformation Parameters With Respect to Combined Solution:
-----
Sol  Rms (m)      Translation (m)      Rotation (")      Scale (ppm)
      X          Y          Z          X          Y          Z
-----
  1  0.00289    -0.0150 -0.0476  0.0166  0.0009 -0.0007 -0.0013  -0.00025
  2  0.00236     0.0096 -0.0039 -0.0151  0.0002  0.0006  0.0000   0.00033
  3  0.00247    -0.0014 -0.0309 -0.0013  0.0006 -0.0000 -0.0008  -0.00007
  4  0.00214    -0.0171 -0.0085  0.0114  0.0001 -0.0006 -0.0003   0.00084
  5  0.00240     0.0088  0.0013 -0.0059 -0.0000  0.0003  0.0000  -0.00040
  6  0.00295    -0.0054  0.0015  0.0093 -0.0001 -0.0003 -0.0000  -0.00024
  7  0.00246    -0.0001  0.0231 -0.0031 -0.0004  0.0001  0.0007   0.00050
```

```
Statistics of individual solutions:
-----
File  RMS (m)      DOF  Chi**2/DOF  #Observations authentic / pseudo  #Parameters explicit / implicit / singular
-----
  1  0.00144    2096070      2.07                2122829          3          867    25895    0
  2  0.00155    2071767      2.40                2099989          3          861    27364    0
  3  0.00155    2070496      2.39                2098915          3          858    27564    0
  4  0.00155    2008077      2.39                2035519          3          843    26602    0
  5  0.00165    1871252      2.72                1899547          3          798    27500    0
  6  0.00175    2021101      3.05                2051988          3          849    30041    0
  7  0.00157    2107444      2.47                2135830          3          867    27522    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 20:257:00000 20:263:86370 LEICA GR50      -----
ALDA  A   1 P 20:257:00000 20:263:86370 LEICA GR10      -----
ALSA  A   1 P 20:257:00000 20:263:86370 LEICA GR50      -----
AMUR  A   1 P 20:257:00000 20:263:86370 LEICA GR10      -----
BIAZ  A   1 P 20:257:00000 20:263:86370 TRI SP90M      -----
BIDA  A   1 P 20:257:00000 20:263:86370 LEICA GR10      -----
BRZR  A   1 P 20:257:00000 20:263:86370 LEICA GR30      -----
CACE  A   1 P 20:257:00000 20:263:86370 TRIMBLE NETR9  -----
CANT  A   1 P 20:257:00000 20:263:86370 LEICA GR10      -----
CHER  A   1 P 20:257:00000 20:263:77460 LEICA GR30      -----
CREU  A   1 P 20:257:00000 20:263:86370 LEICA GR50      -----
EBRE  A   1 P 20:257:00000 20:263:86370 LEICA GR50      -----
ELGE  A   1 P 20:257:00000 20:263:86370 LEICA GR30      -----
EMAZ  A   1 P 20:257:00000 20:263:86370 LEICA GR30      -----
GERN  A   1 P 20:257:00000 20:263:86370 LEICA GR30      -----
IGEL  A   1 P 20:257:00000 20:263:86370 LEICA GR30      -----
ISPS  A   1 P 20:257:00000 20:263:86370 TRIMBLE NETR9  -----
KAST  A   1 P 20:257:00000 20:263:86370 LEICA GR30      -----
LAZK  A   1 P 20:257:00000 20:263:86370 LEICA GR30      -----
LEIT  A   1 P 20:257:00000 20:263:86370 LEICA GR50      -----
ORON  A   1 P 20:257:00000 20:263:86370 LEICA GR50      -----
PASA  A   1 P 20:257:00000 20:263:86370 LEICA GR30      -----
RIO1  A   1 P 20:257:00000 20:263:86370 LEICA GR25      -----
SALA  A   1 P 20:257:00000 20:263:86370 LEICA GRX1200+GNSS -----
SCOA  A   1 P 20:257:00000 20:263:86370 LEICA GR25      -----
SOPU  A   1 P 20:257:00000 20:263:86370 LEICA GR30      -----
TERU  A   1 P 20:257:00000 20:263:86370 LEICA GRX1200GGPRO -----
VITO  A   1 P 20:257:00000 20:263:86370 LEICA GR10      -----
YEBE  A   1 P 20:257:00000 20:263:86370 TRIMBLE NETR9  -----
ZARA  A   1 P 20:257:00000 20:263:86370 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 20:257:00000 20:263:86370 LEIAT504      LEIS -----
ALDA  A   1 P 20:257:00000 20:263:86370 LEIAS10      NONE -----
ALSA  A   1 P 20:257:00000 20:263:86370 LEIAR10      NONE -----
AMUR  A   1 P 20:257:00000 20:263:86370 LEIAS10      NONE -----
BIAZ  A   1 P 20:257:00000 20:263:86370 LEIAR25      LEIT -----
BIDA  A   1 P 20:257:00000 20:263:86370 LEIAS10      NONE -----
```

BRZR	A	1	P	20:257:00000	20:263:86370	LEIAS10	NONE	----
CACE	A	1	P	20:257:00000	20:263:86370	TRM29659.00	NONE	----
CANT	A	1	P	20:257:00000	20:263:86370	LEIAR25_R4	LEIT	25066
CHER	A	1	P	20:257:00000	20:263:77460	LEIAR10	NONE	----
CREU	A	1	P	20:257:00000	20:263:86370	LEIAR25_R4	NONE	26357
EBRE	A	1	P	20:257:00000	20:263:86370	LEIAR25_R4	NONE	26359
ELGE	A	1	P	20:257:00000	20:263:86370	LEIAR25_R4	LEIT	----
EMAZ	A	1	P	20:257:00000	20:263:86370	LEIAS10	NONE	----
GERN	A	1	P	20:257:00000	20:263:86370	LEIAS10	NONE	----
IGEL	A	1	P	20:257:00000	20:263:86370	LEIAR20	LEIM	----
ISPS	A	1	P	20:257:00000	20:263:86370	TRM59900.00	SCIS	----
KAST	A	1	P	20:257:00000	20:263:86370	LEIAS10	NONE	----
LAZK	A	1	P	20:257:00000	20:263:86370	LEIAR25_R4	LEIT	----
LEIT	A	1	P	20:257:00000	20:263:86370	LEIAR10	NONE	----
ORDN	A	1	P	20:257:00000	20:263:86370	LEIAR10	NONE	----
PASA	A	1	P	20:257:00000	20:263:86370	LEIAR20	LEIM	73034
RIO1	A	1	P	20:257:00000	20:263:86370	LEIAR25_R4	LEIT	25138
SALA	A	1	P	20:257:00000	20:263:86370	LEIAR25	NONE	----
SCOA	A	1	P	20:257:00000	20:263:86370	TRM55971.00	NONE	----
SOPU	A	1	P	20:257:00000	20:263:86370	LEIAS10	NONE	----
TERU	A	1	P	20:257:00000	20:263:86370	LEIAT504GG	LEIS	----
VITO	A	1	P	20:257:00000	20:263:86370	LEIAS10	NONE	----
YEBE	A	1	P	20:257:00000	20:263:86370	TRM29659.00	NONE	----
ZARA	A	1	P	20:257:00000	20:263:86370	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	20:257:00000	20:263:86370	UNE	3.0460	0.0000	0.0000
ALDA	A	1	P	20:257:00000	20:263:86370	UNE	0.0000	0.0000	0.0000
ALSA	A	1	P	20:257:00000	20:263:86370	UNE	0.0000	0.0000	0.0000
AMUR	A	1	P	20:257:00000	20:263:86370	UNE	0.0000	0.0000	0.0000
BIAZ	A	1	P	20:257:00000	20:263:86370	UNE	0.0000	0.0000	0.0000
BIDA	A	1	P	20:257:00000	20:263:86370	UNE	0.0000	0.0000	0.0000
BRZR	A	1	P	20:257:00000	20:263:86370	UNE	0.0771	0.0000	0.0000
CACE	A	1	P	20:257:00000	20:263:86370	UNE	0.0600	0.0000	0.0000
CANT	A	1	P	20:257:00000	20:263:86370	UNE	3.0490	0.0000	0.0000
CHER	A	1	P	20:257:00000	20:263:77460	UNE	0.0000	0.0000	0.0000
CREU	A	1	P	20:257:00000	20:263:86370	UNE	0.0770	0.0000	0.0000
EBRE	A	1	P	20:257:00000	20:263:86370	UNE	0.0770	0.0000	0.0000
ELGE	A	1	P	20:257:00000	20:263:86370	UNE	0.0000	0.0000	0.0000
EMAZ	A	1	P	20:257:00000	20:263:86370	UNE	0.0350	0.0000	0.0000
GERN	A	1	P	20:257:00000	20:263:86370	UNE	0.0771	0.0000	0.0000
IGEL	A	1	P	20:257:00000	20:263:86370	UNE	0.0000	0.0000	0.0000
ISPS	A	1	P	20:257:00000	20:263:86370	UNE	0.0350	0.0000	0.0000
KAST	A	1	P	20:257:00000	20:263:86370	UNE	0.0350	0.0000	0.0000
LAZK	A	1	P	20:257:00000	20:263:86370	UNE	0.0000	0.0000	0.0000
LEIT	A	1	P	20:257:00000	20:263:86370	UNE	0.0000	0.0000	0.0000
ORDN	A	1	P	20:257:00000	20:263:86370	UNE	0.0000	0.0000	0.0000
PASA	A	1	P	20:257:00000	20:263:86370	UNE	0.0000	0.0000	0.0000
RIO1	A	1	P	20:257:00000	20:263:86370	UNE	0.0606	0.0000	0.0000
SALA	A	1	P	20:257:00000	20:263:86370	UNE	0.0600	0.0000	0.0000
SCOA	A	1	P	20:257:00000	20:263:86370	UNE	0.0000	0.0000	0.0000
SOPU	A	1	P	20:257:00000	20:263:86370	UNE	0.0771	0.0000	0.0000
TERU	A	1	P	20:257:00000	20:263:86370	UNE	0.0600	0.0000	0.0000
VITO	A	1	P	20:257:00000	20:263:86370	UNE	0.0000	0.0000	0.0000
YEBE	A	1	P	20:257:00000	20:263:86370	UNE	0.0000	0.0000	0.0000
ZARA	A	1	P	20:257:00000	20:263:86370	UNE	3.2590	0.0000	0.0000

8 References

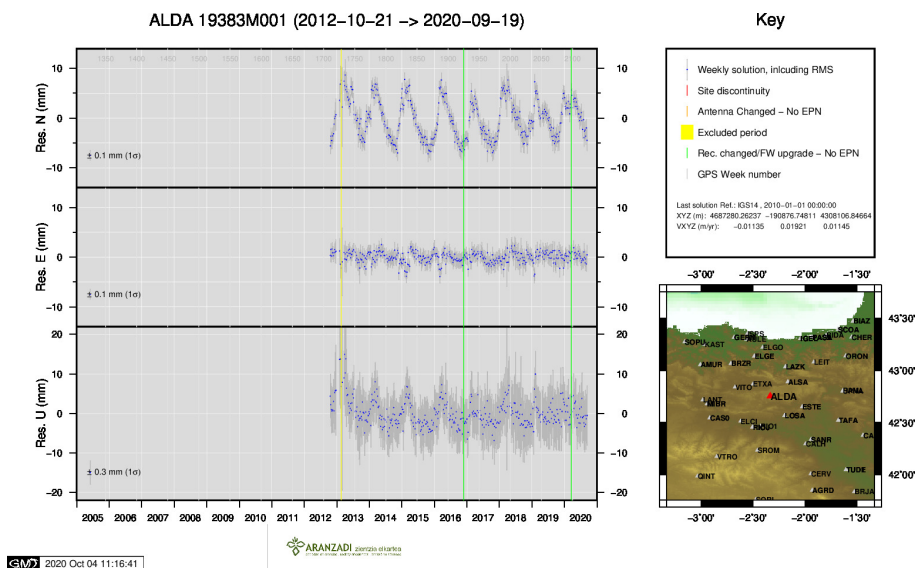
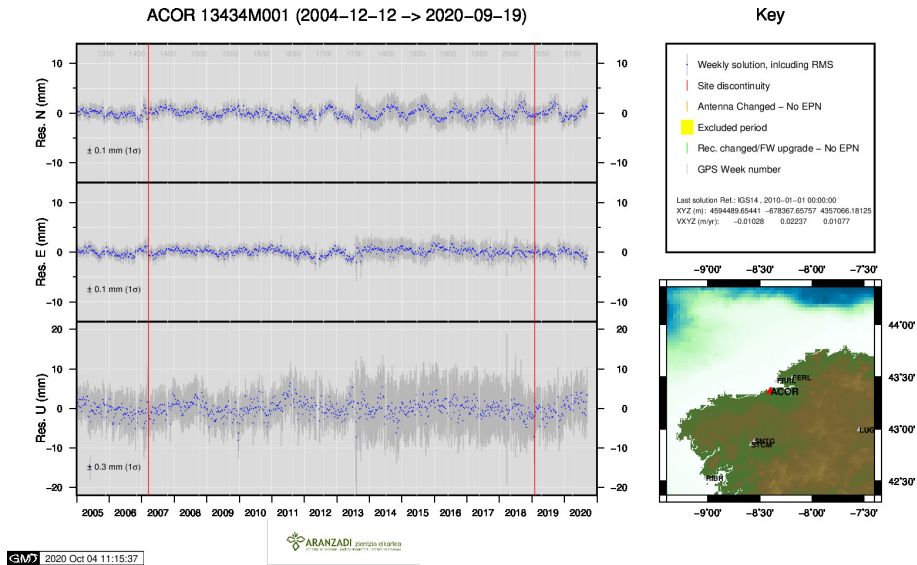
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign*. etrs89.ensg.ign.fr/memo-V8.pdf

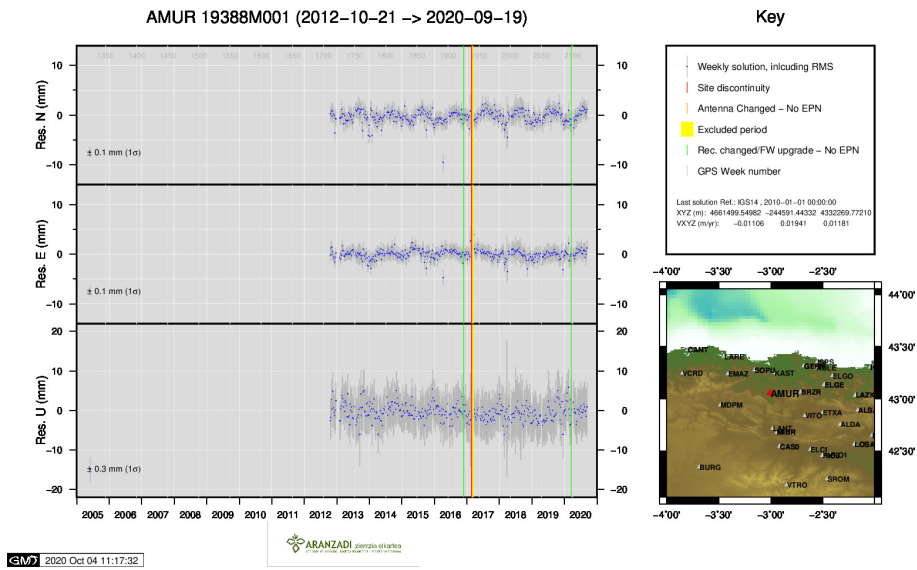
EPN Coordination Group and the EPN Central Bureau (2018): *Guidelines for the EPN Analysis Centres*. epncb.oma.be/documentation/guidelines/guidelines_analysis_centres.pdf

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

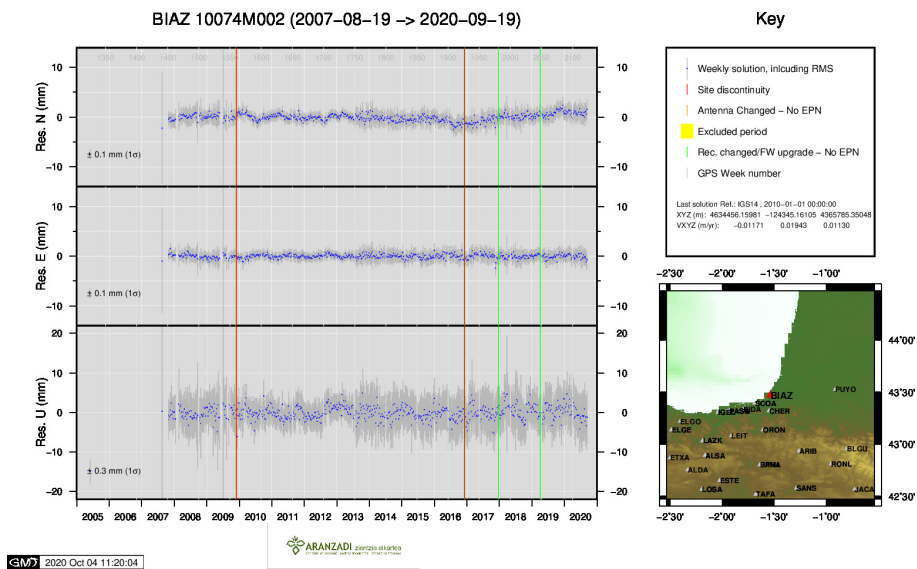
9 Cumulative Time Series

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

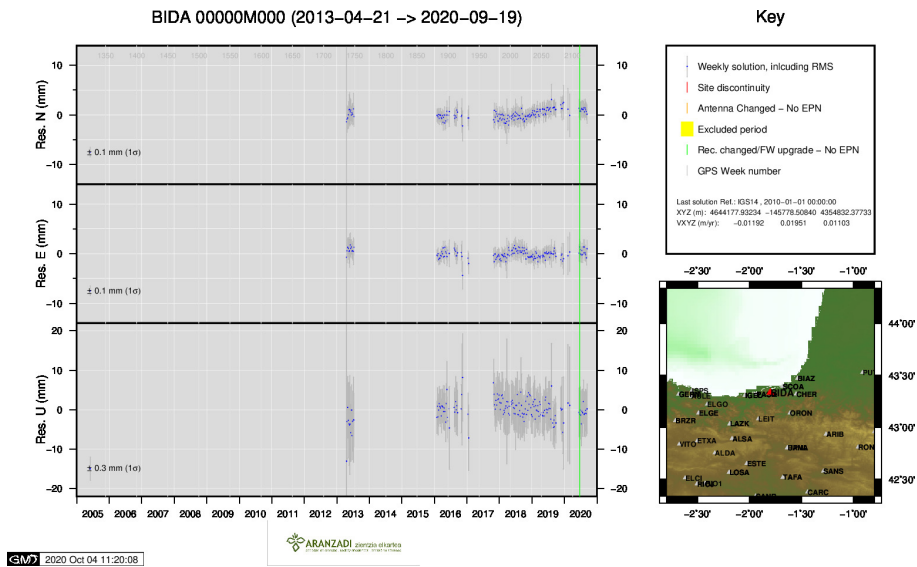




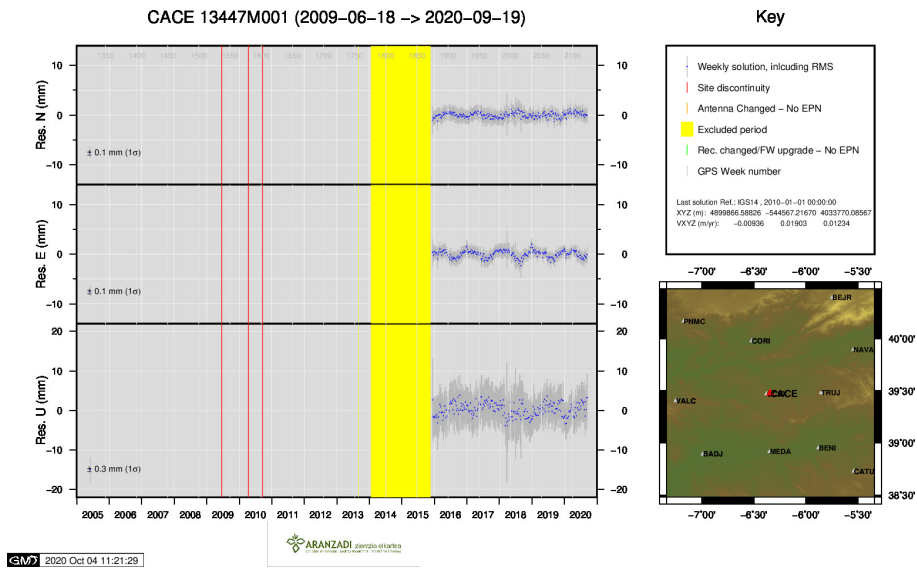
3) AMUR



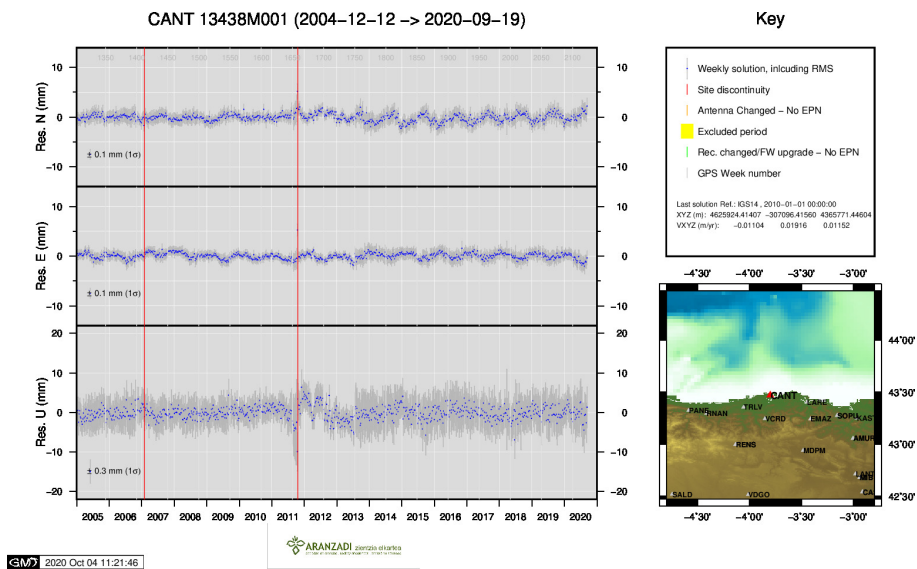
4) BIAZ



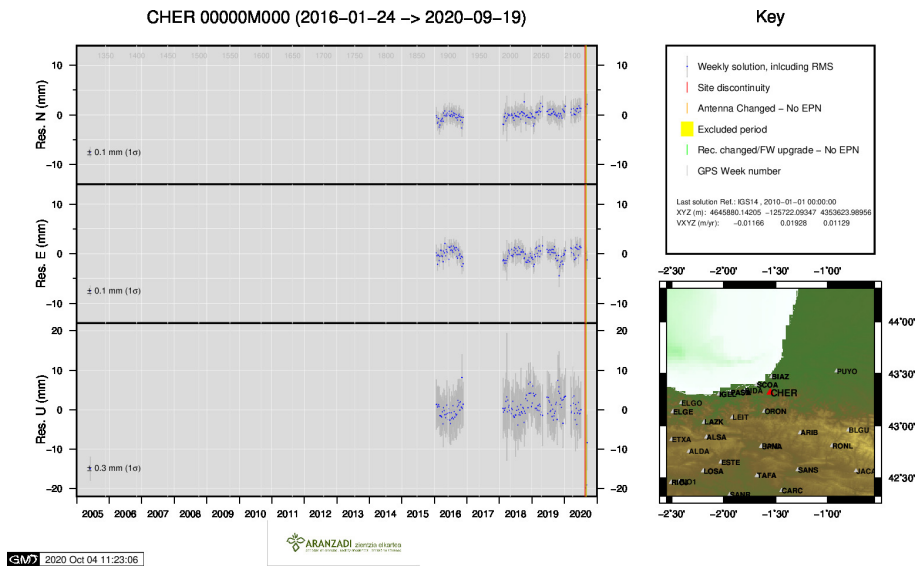
5) BIDA



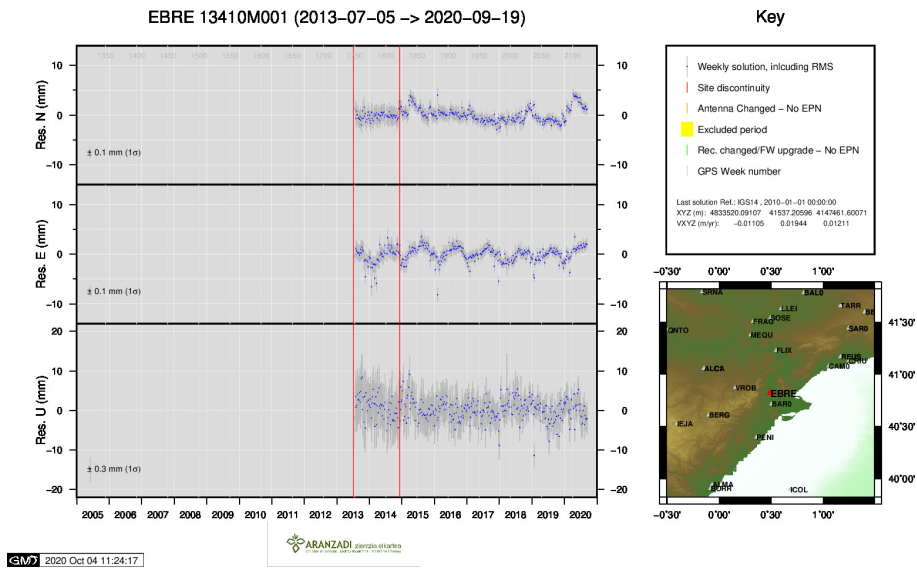
6) CACE



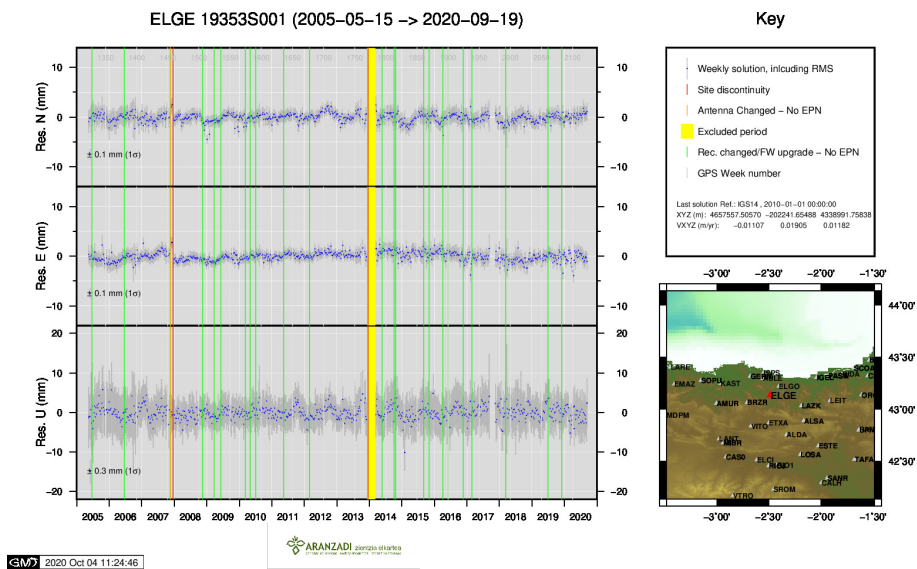
7) CANT



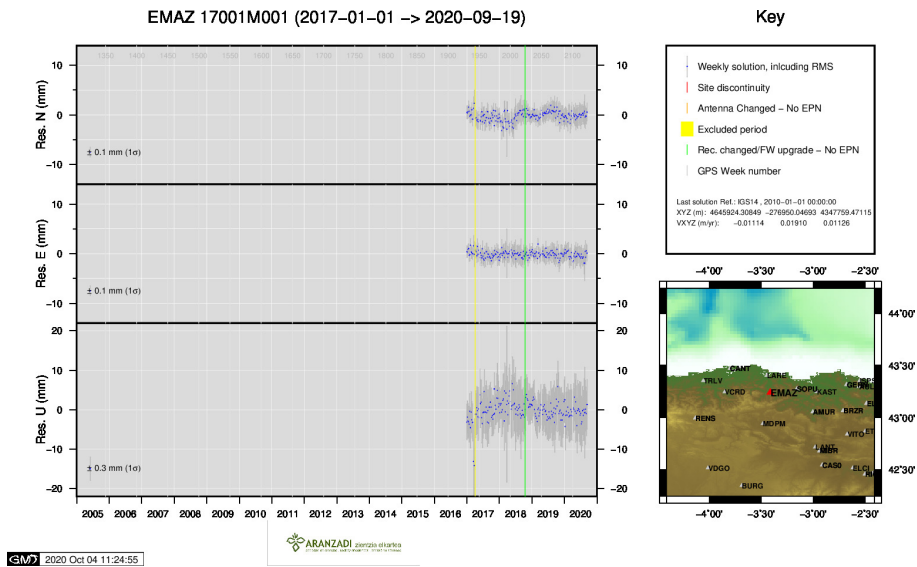
8) CHER



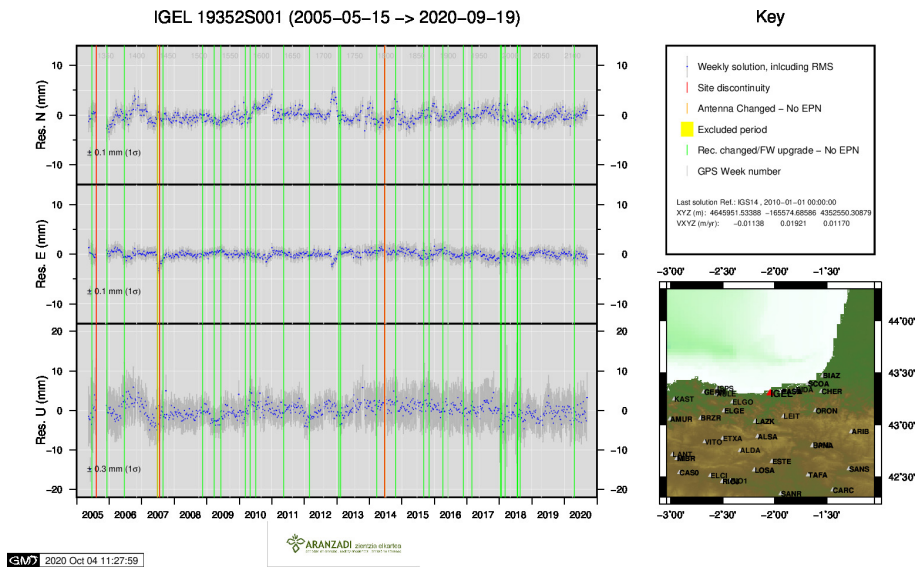
9) EBRE



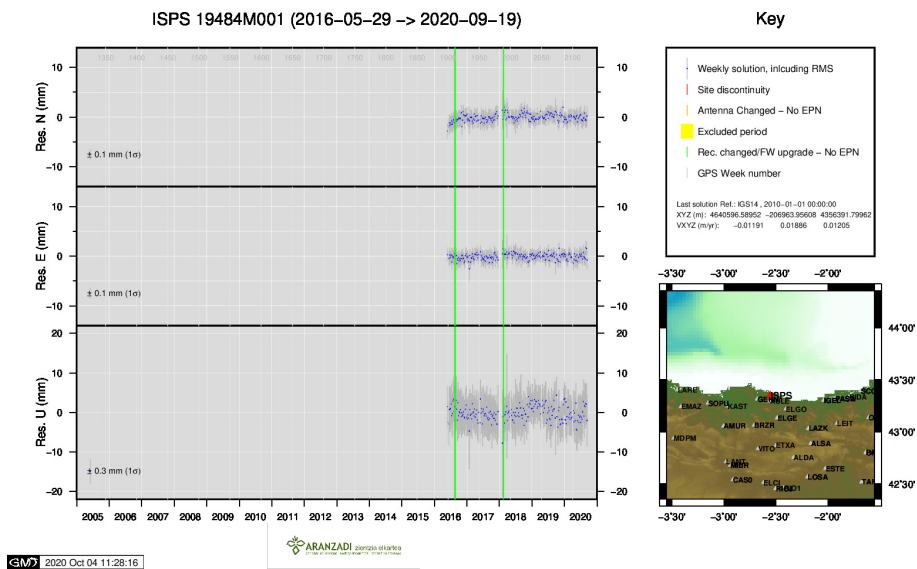
10) ELGE



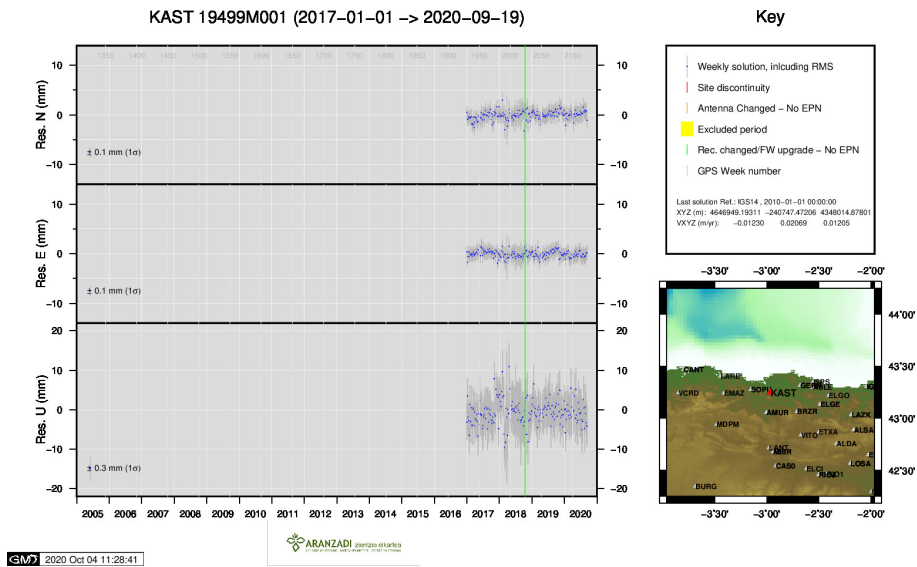
11) EMAZ



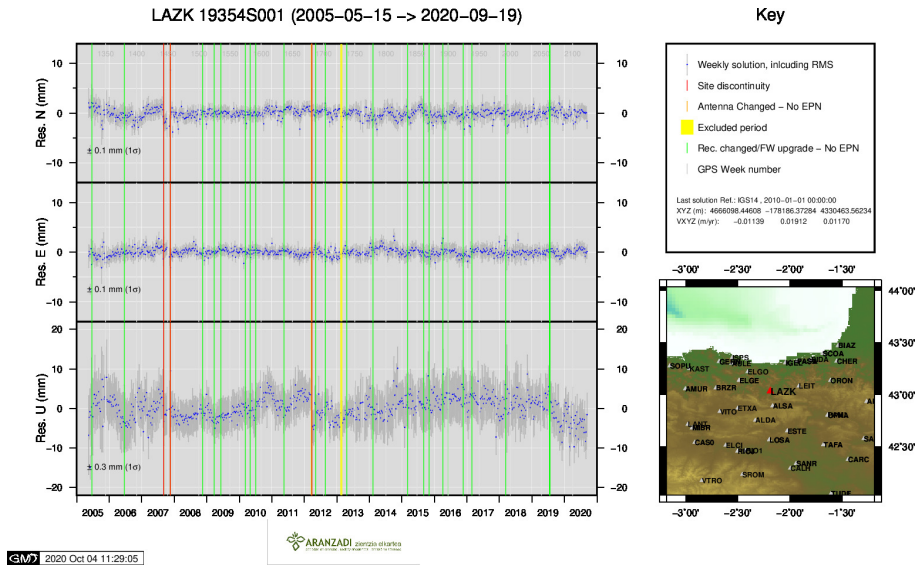
12) IGEL



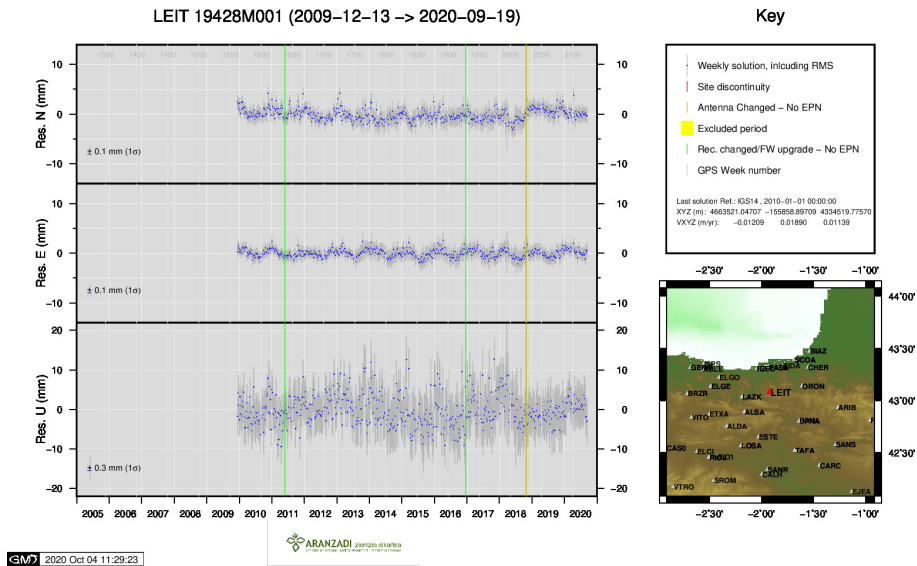
13) ISPS



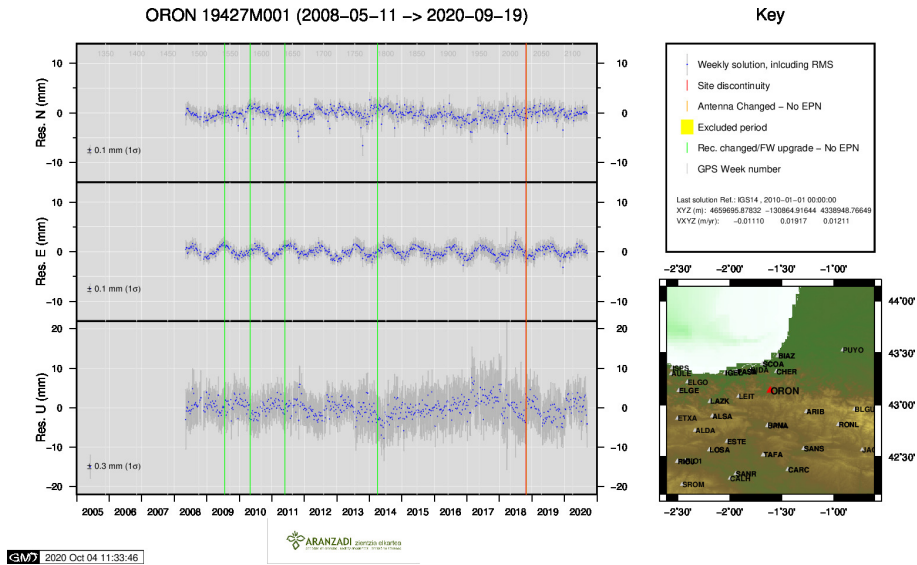
14) KAST



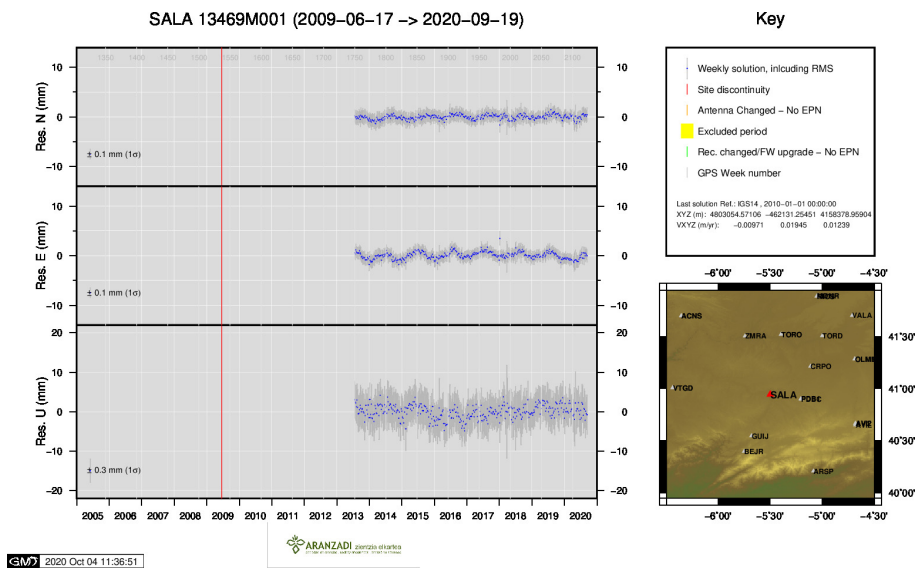
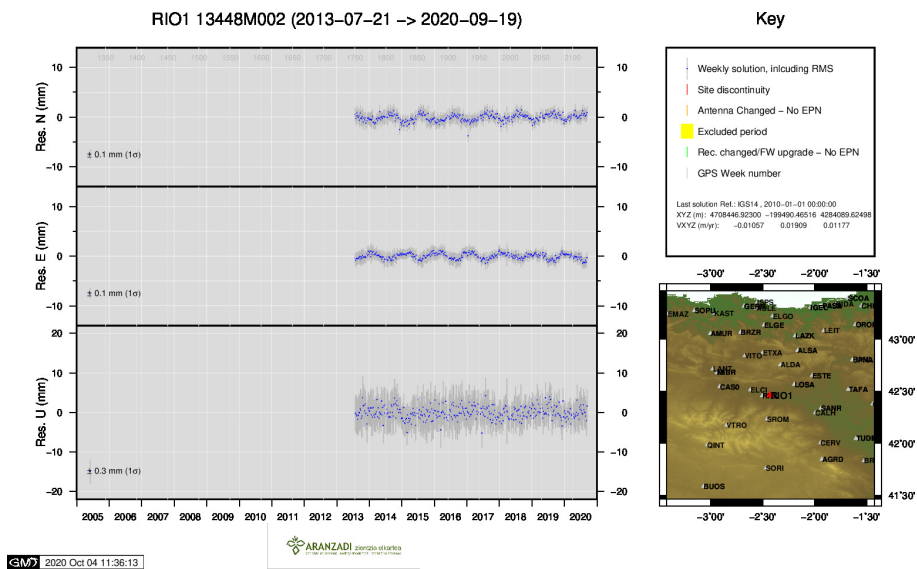
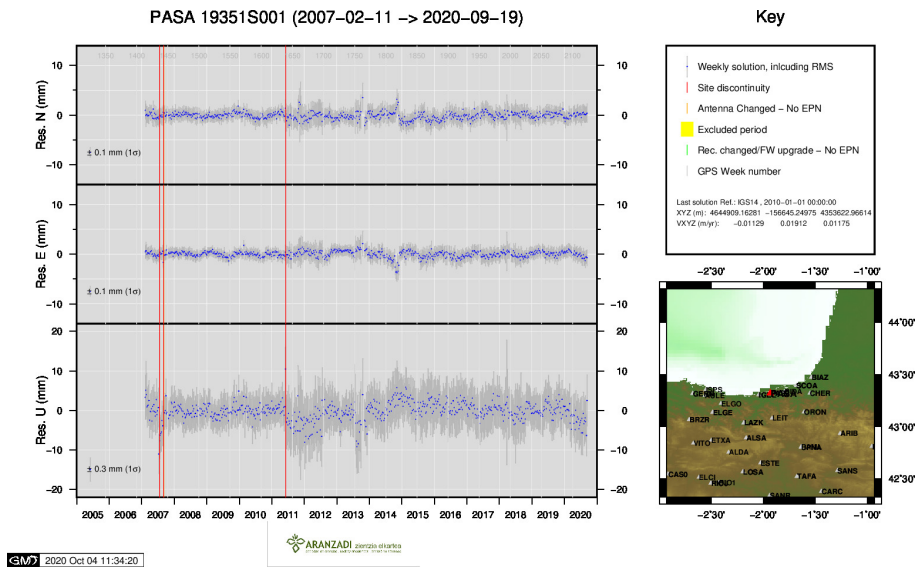
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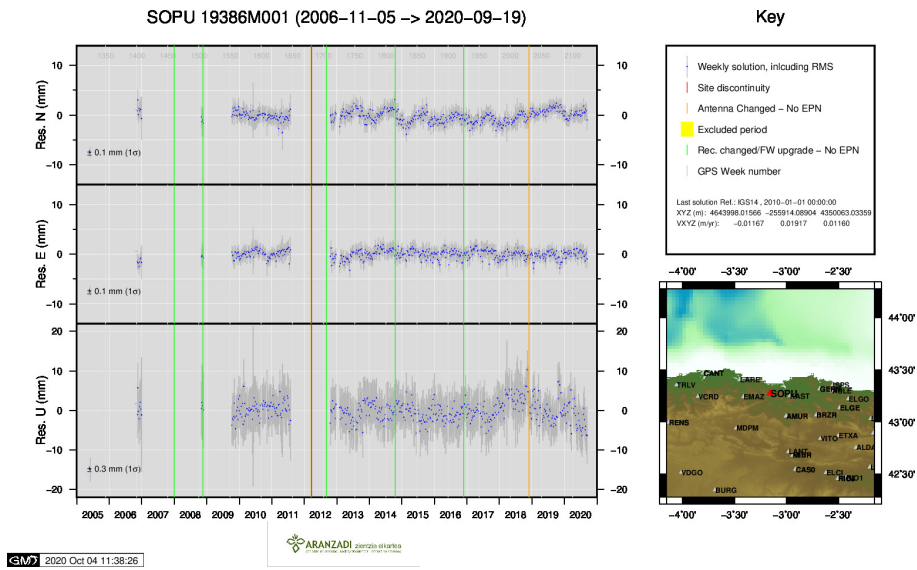


16) LEIT

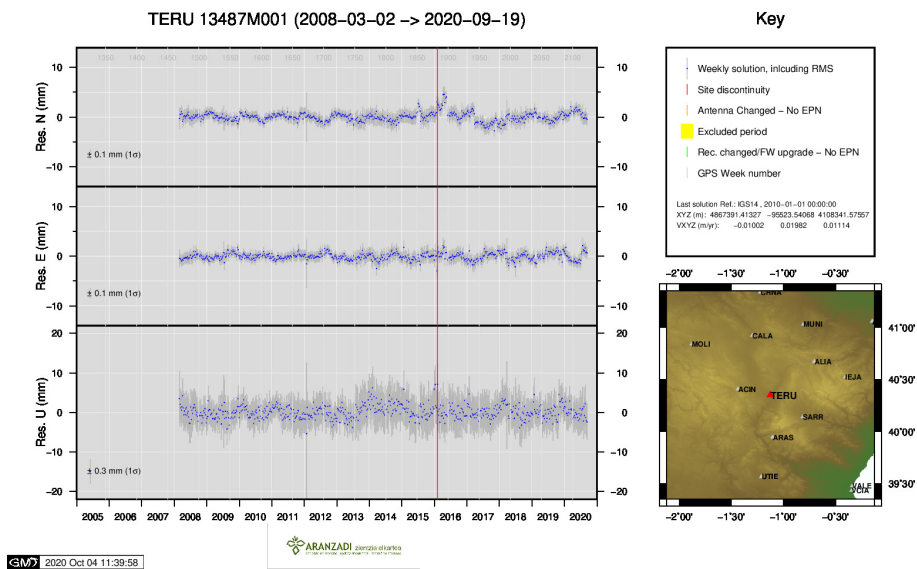


17) ORON

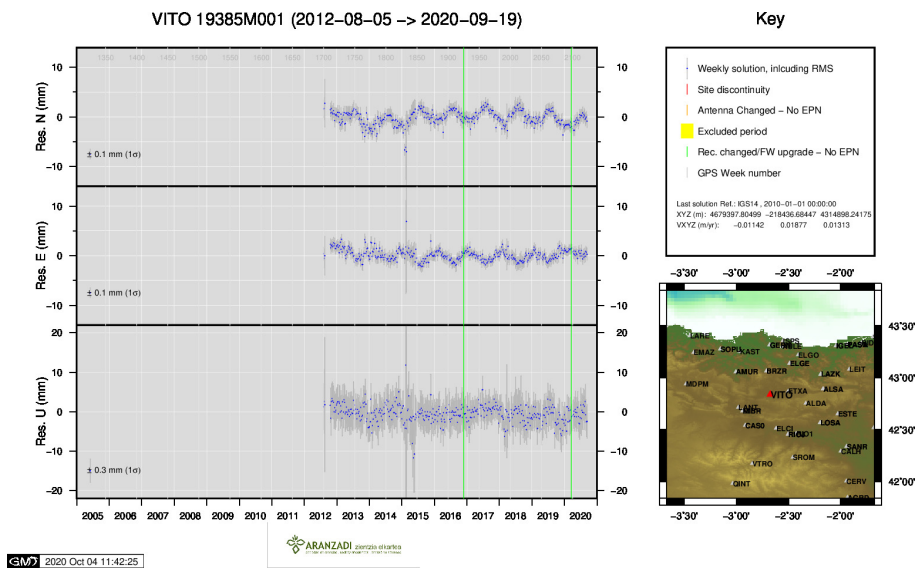




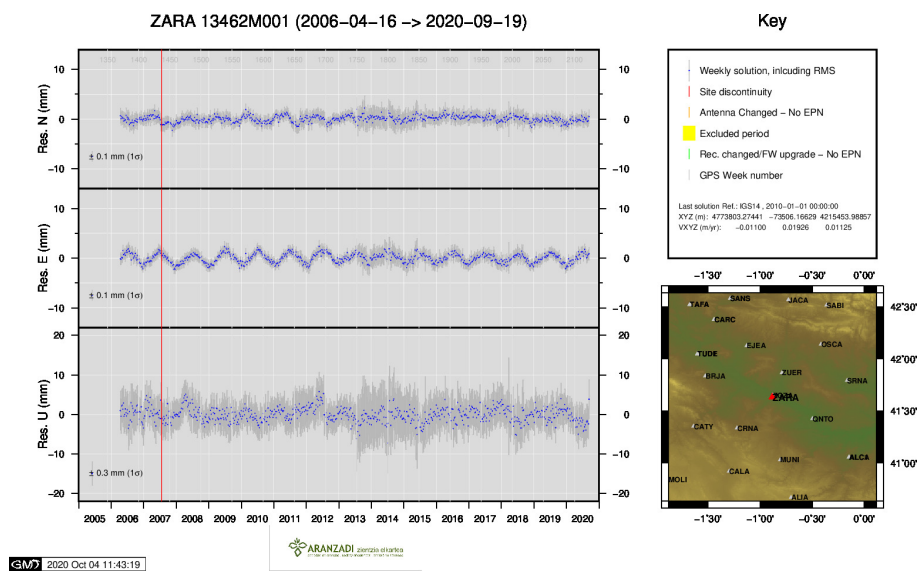
21) SOPU



22) TERU



23) VITO



24) ZARA