

ARA-DAC Weekly Analysis Result: 2130 (GFA)

Technical Report

GPS Week: 2130 (GFA)

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

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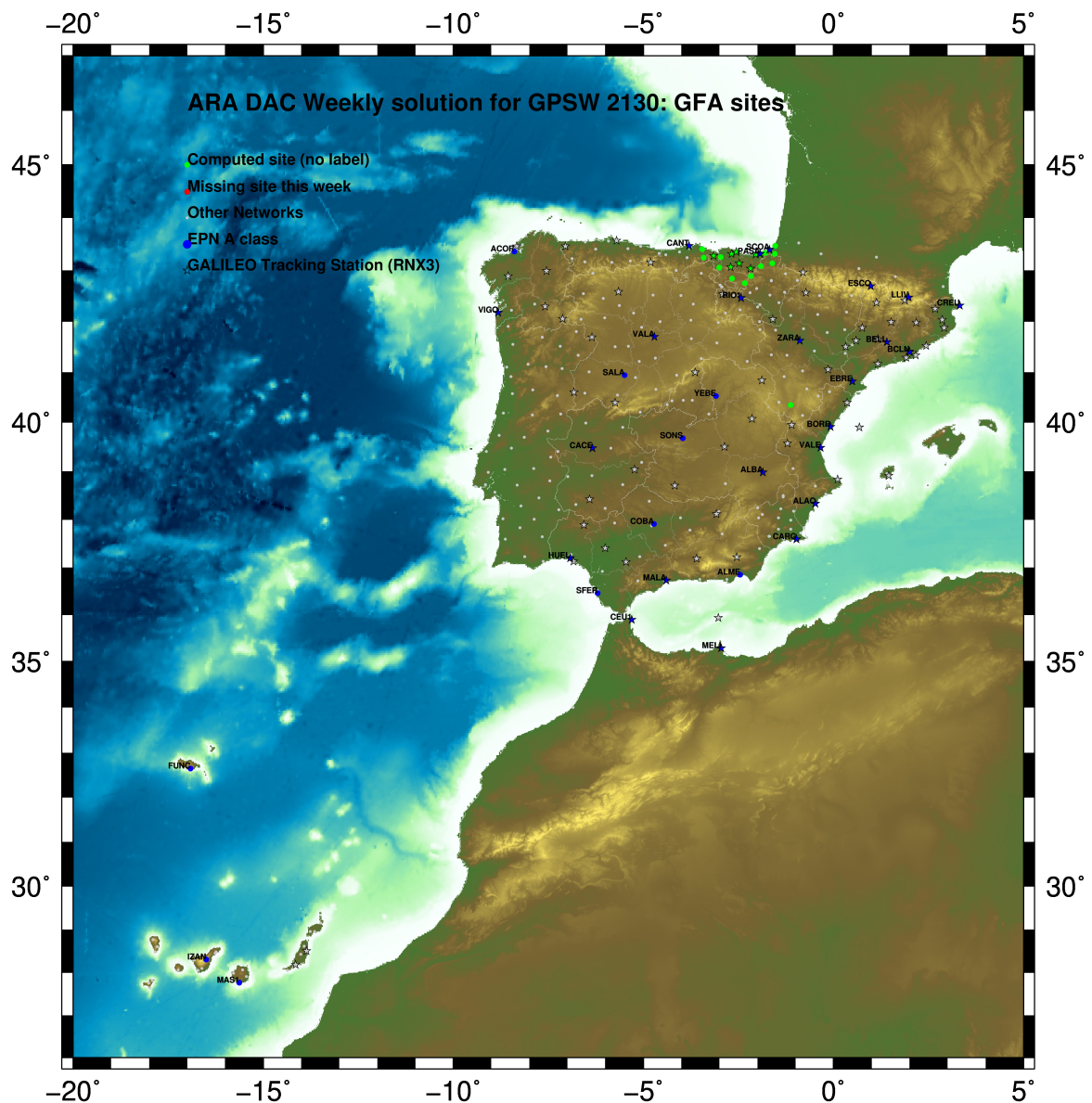
Report generated on 2020/11/22 at 14:41:46



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 Nov 22 14:41:37

Fig.1: Computed Sites for GPS Week2130 (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 2130 WEEK FINAL COMBINATION: PRECISE ORBITS						22-NOV-20 11:15
LOCAL GEODETIC DATUM: IGS14						EPOCH: 2020-11-04 12:00:00
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	
4	ACOR	13434M001	4594489.54335	-678367.41382	4357066.29957	W
39	ALDA	19383M001	4687280.14785	-190876.54011	4308106.97643	A
50	ALSA	19419M001	4677250.81534	-176770.36690	4319079.89236	A
53	AMUR	19388M001	4661499.43536	-244591.23328	4332269.90555	A
100	BLAZ	10074M002	4634456.03534	-124344.95029	4365785.47826	A
101	BIDA	00000M000	4644177.80471	-145778.29572	4354832.50099	A
113	BRZR	19387M001	4662220.97360	-220769.87330	4333309.45895	A
98	CACE	13447M001	4899866.48956	-544567.00978	4033770.22271	W
109	CANT	13438M001	4625924.29644	-307096.20805	4365771.57264	W
154	CHER	00000M000	4645880.00276	-125721.88362	4353624.10328	A
154	CREU	13432M001	4715420.11024	273178.08550	4271946.85691	W
190	EBRE	13410M001	4833519.97264	41537.41802	4147461.73416	W
180	ELGE	19353S001	4657557.38670	-202241.45494	4338991.89374	A
182	EMAZ	17001M001	4645924.18613	-276949.83888	4347759.59297	A
209	GERN	19389M001	4642811.30438	-217222.89818	4353278.89872	A
235	IGEL	19352S001	4645951.41220	-165574.47726	4352550.43899	A
240	ISPS	19484M001	4640596.46162	-206963.75121	4356391.93285	A
245	KAST	19499M001	4646949.06225	-240747.24628	4348015.01025	A
252	LARE	19440M001	4632831.93673	-279026.11563	4360314.44740	A
256	LAZK	19354S001	4666098.31928	-178186.16547	4330463.68316	A
261	LEIT	19428M001	4663520.91725	-155858.69148	4334519.90206	A
334	ORON	19427M001	4659695.76215	-130864.70936	4338948.90141	A
345	PAS2	19351S001	4644909.04308	-156645.04239	4353623.09560	A
456	PASA	19351S001	4644909.04298	-156645.04229	4353623.09557	W
513	RID1	13448M002	4708446.81192	-199490.25803	4284089.75570	W
518	SALA	13469M001	4803054.46697	-462131.04350	4158379.09474	W
526	SCDA	10088M002	4639940.47804	-136224.91603	4359552.43196	W
418	SOPU	19386M001	4643997.89248	-255913.87971	4350063.16307	A
443	TERU	13487M001	4867391.30943	-95523.32547	4108341.70279	A
493	VITO	19385M001	4679397.68796	-218436.47932	4314898.38585	A
698	YEBE	13420M001	4848724.55345	-261631.90399	4123094.34978	W
701	ZARA	13462M001	4773803.14860	-73505.95816	4215454.11145	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 2130						22-NOV-20 11:15
LOCAL GEODETIC DATUM: ETRF2000						EPOCH: 2020-11-04 12:00:00
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	
4	ACOR	13434M001	4594489.86103	-678367.97907	4357065.86324	W
39	ALDA	19383M001	4687280.52174	-190877.11448	4308106.53901	A
50	ALSA	19419M001	4677251.19175	-176770.94014	4319079.45591	A
53	AMUR	19388M001	4661499.80442	-244591.80498	4332269.46949	A
100	BLAZ	10074M002	4634456.42155	-124345.51870	4365785.04586	A
101	BIDA	00000M000	4644178.18750	-145778.86526	4354832.06755	A
113	BRZR	19387M001	4662221.34566	-220770.44502	4333309.02314	A
98	CACE	13447M001	4899866.80015	-544567.60789	4033769.76388	W
109	CANT	13438M001	4625924.66028	-307096.77602	4365771.13860	W
154	CHER	00000M000	4645880.38792	-125722.45328	4353623.66996	A
154	CREU	13432M001	4715420.53823	273177.50968	4271946.42304	W
190	EBRE	13410M001	4833520.36328	41536.82855	4147461.28805	W
180	ELGE	19353S001	4657557.76144	-202242.02610	4338991.45853	A
182	EMAZ	17001M001	4645924.55236	-276950.40898	4347759.15773	A
209	GERN	19389M001	4642811.67832	-217223.46777	4353278.46448	A
235	IGEL	19352S001	4645951.79241	-165575.04705	4352550.00516	A
240	ISPS	19484M001	4640596.83704	-206964.32053	4356391.49892	A
245	KAST	19499M001	4646949.43293	-240747.81638	4348014.57539	A
252	LARE	19440M001	4632832.30361	-279026.68429	4360314.01317	A
256	LAZK	19354S001	4666098.69634	-178186.73749	4330463.24757	A
261	LEIT	19428M001	4663521.29734	-155859.26316	4334519.46696	A
334	ORON	19427M001	4659696.14562	-130865.28054	4338948.46693	A
345	PAS2	19351S001	4644909.42446	-156645.61204	4353622.66196	A
456	PASA	19351S001	4644909.42436	-156645.61194	4353622.66193	W
513	RID1	13448M002	4708447.18301	-199490.83472	4284089.31649	W
518	SALA	13469M001	4803054.79675	-462131.63105	4158378.64467	W
526	SCDA	10088M002	4639940.86235	-136225.48507	4359551.99897	W
418	SOPU	19386M001	4643998.26145	-255914.44953	4350062.72825	A
443	TERU	13487M001	4867391.68046	-95523.91905	4108341.25227	A
493	VITO	19385M001	4679398.05897	-218437.05290	4314897.94870	A
698	YEBE	13420M001	4848724.90522	-261632.49602	4123093.89865	W
701	ZARA	13462M001	4773803.53012	-73506.54156	4215453.66864	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 2130                                22-NOV-20 11:15
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LOCAL GEODETIC DATUM: ETRF2014          EPOCH: 2020-11-04 12:00:00
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
4  ACDR 13434M001        4594489.81990      -678368.01719   4357065.91401   W
39 ALDA 19383M001        4687280.47834      -190877.15387   4308106.58966   A
50 ALSA 19419M001        4677251.14841      -176770.97961   4319079.50659   A
53 AMUR 19388M001        4661499.76145      -244591.84430   4332269.52018   A
100 BIAZ 10074M002        4634456.37847      -124345.55853   4365785.09669   A
101 BIDA 00000M000        4644178.14439      -145778.90497   4354832.11834   A
113 BRZR 19387M001        4662221.30261      -220770.48441   4333309.07384   A
98 CACE 13447M001        4899866.75552      -544567.64522   4033769.81387   W
109 CANT 13438M001        4625924.61784      -307096.81528   4365771.18937   W
154 CHER 00000M000        4645880.34473      -125722.49306   4353623.72075   A
154 CREU 13432M001        4715420.49294      273177.46887   4271946.47392   W
190 EBRE 13410M001        4833520.31759      41536.78898   4147461.33845   W
180 ELGE 19353S001        4657557.71837      -202242.06557   4338991.50925   A
182 EMAZ 17001M001        4645924.50964      -276950.44825   4347759.20846   A
209 GERN 19389M001        4642811.63544      -217223.50725   4353278.51525   A
235 IGEL 19352S001        4645951.74934      -165575.08669   4352550.05594   A
240 ISPS 19484M001        4640596.79416      -206964.36006   4356391.54969   A
245 KAST 19499M001        4646949.39009      -240747.85577   4348014.62613   A
252 LARE 19440M001        4632832.26102      -279026.72361   4360314.06393   A
256 LAZK 19354S001        4666098.65311      -178186.77701   4330463.29829   A
261 LEIT 19428M001        4663521.25407      -155859.30277   4334519.51769   A
334 ORDN 19427M001        4659696.10231      -130865.32025   4338948.51768   A
345 PAS2 19351S001        4644909.38137      -156645.65171   4353622.71275   A
456 PASA 19351S001        4644909.38127      -156645.65161   4353622.71272   W
513 RIO1 13448M002        4708447.13942      -199490.87399   4284089.36708   W
518 SALA 13469M001        4803054.75294      -462131.66906   4158378.69491   W
526 SOGA 10088M002        4639940.81925      -136225.52484   4359552.04978   W
443 SOPU 19386M001        4643998.21868      -255914.48888   4350062.77899   A
443 TERU 13487M001        4867391.63488      -95523.95802   4108341.30250   A
493 VITO 19385M001        4679398.01573      -218437.09223   4314897.99936   A
698 YEBE 13420M001        4848724.86036      -261632.53452   4123093.94884   W
701 ZARA 13462M001        4773803.48545      -73506.58099   4215453.71912   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 2130 WEEK FINAL COMBINATION: PRECISE ORBITS 22-NOV-20 11:15

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	7	XXXXXX	1.30	1.06	3.37
ALDA 19383M001	6	XXXX XX	3.72	1.49	1.57
ALSA 19419M001	7	XXXXXX	3.54	0.65	6.19
AMUR 19388M001	7	XXXXXX	1.86	1.32	3.86
BLAZ 10074M002	7	XXXXXX	0.70	0.94	6.65
BIDA 00000M000	7	XXXXXX	2.18	3.17	11.44
BRZR 19387M001	7	XXXXXX	1.43	3.26	3.48
CACE 13447M001	7	XXXXXX	0.70	0.86	2.10
CANT 13438M001	4	XXXX	1.26	0.86	0.89
CHER 00000M000	6	XXXX X	0.92	13.51	10.73
CREU 13432M001	7	XXXXXX	0.92	0.37	2.91
EBRE 13410M001	7	XXXXXX	1.59	1.50	3.65
ELGE 19353S001	7	XXXXXX	2.95	5.04	5.80
EMAZ 17001M001	7	XXXXXX	1.48	1.51	2.13
GERN 19389M001	7	XXXXXX	1.99	0.56	3.03
IGEL 19352S001	7	XXXXXX	1.05	1.07	2.23
ISPS 19484M001	7	XXXXXX	1.76	1.57	4.54
KAST 19499M001	7	XXXXXX	3.98	0.88	8.57
LARE 19440M001	7	XXXXXX	1.15	1.75	5.05
LAZK 19354S001	7	XXXXXX	3.67	1.19	8.77
LEIT 19428M001	7	XXXXXX	1.94	1.02	1.81
ORON 19427M001	7	XXXXXX	1.53	0.85	4.04
PAS2 19351S001	7	XXXXXX	1.49	0.65	4.36
PASA 19351S001	7	XXXXXX	1.62	0.62	4.38
RIO1 13448M002	7	XXXXXX	0.97	0.56	2.79
SALA 13469M001	7	XXXXXX	0.51	0.59	3.19
SCOA 10088M002	7	XXXXXX	2.81	1.36	7.76
SOPU 19386M001	7	XXXXXX	1.22	2.11	2.71
TERU 13487M001	6	XXXXX	0.95	1.43	3.76
VITD 19385M001	7	XXXXXX	4.73	0.87	7.62
YEBE 13420M001	7	XXXXXX	0.60	1.01	4.68
ZARA 13462M001	7	XXXXXX	0.46	0.63	2.19

Comparison of individual solutions:

ACOR 13434M001	N	1.30	0.50	0.88	-0.81	-0.89	-1.06	-1.54	2.07
ACOR 13434M001	E	1.06	-0.44	-1.62	-0.29	1.36	-1.18	0.78	0.11
ACOR 13434M001	U	3.37	4.11	-3.63	3.47	-1.68	2.22	4.20	0.96
ALDA 19383M001	N	3.72	-1.03	-1.01	-1.83	-1.15		7.85	-0.95
ALDA 19383M001	E	1.49	-0.35	-1.24	-1.03	-0.67		2.79	0.37
ALDA 19383M001	U	1.57	2.27	-0.32	-0.32	-1.15		-1.10	-2.11
ALSA 19419M001	N	3.54	-1.78	0.48	-0.16	-0.67	-1.69	7.57	-3.32
ALSA 19419M001	E	0.65	-0.37	-1.21	-0.02	0.00	0.13	0.66	0.68
ALSA 19419M001	U	6.19	5.50	0.93	1.01	1.63	5.37	-12.00	-4.71
AMUR 19388M001	N	1.86	-0.57	-3.45	1.40	-0.33	-0.70	1.39	2.01
AMUR 19388M001	E	1.32	-0.58	-1.72	0.30	0.64	-0.05	0.23	2.56
AMUR 19388M001	U	3.86	-6.50	2.79	-0.84	-4.54	-3.80	-0.64	1.85
BLAZ 10074M002	N	0.70	-1.18	-0.66	0.00	-0.44	-0.62	0.54	0.48
BLAZ 10074M002	E	0.94	-0.54	-1.10	1.45	0.47	-0.21	0.54	1.09
BLAZ 10074M002	U	6.65	1.79	2.74	-2.45	-2.79	-5.92	-12.15	7.63
BIDA 00000M000	N	2.18	0.30	1.67	0.87	1.03	-0.58	-4.84	-0.04
BIDA 00000M000	E	3.17	-1.06	-0.83	-1.25	-2.02	-1.16	7.17	0.25
BIDA 00000M000	U	11.44	1.20	4.52	10.27	0.44	-2.78	-25.24	3.65
BRZR 19387M001	N	1.43	-0.15	0.29	-0.97	0.86	-0.71	-2.87	1.30
BRZR 19387M001	E	3.26	1.67	4.17	0.40	0.09	0.24	-6.53	-0.86
BRZR 19387M001	U	3.48	1.97	-0.79	0.14	-3.77	-7.13	-1.74	-0.41
CACE 13447M001	N	0.70	0.29	0.08	-0.16	0.18	0.11	0.23	-1.66
CACE 13447M001	E	0.86	0.16	0.09	-0.16	-1.51	1.35	0.48	0.17
CACE 13447M001	U	2.10	0.00	0.48	3.35	3.43	-0.51	1.47	-0.91
CANT 13438M001	N	1.26				-1.42	-0.03	1.52	0.66
CANT 13438M001	E	0.86				0.43	-1.09	0.93	0.05
CANT 13438M001	U	0.89				-0.73	0.61	-0.34	1.16
CHER 00000M000	N	0.92	-0.59	0.30	0.62	-0.89	1.28		0.99
CHER 00000M000	E	13.51	-0.18	-0.08	-30.18	-0.02	0.69		-0.90
CHER 00000M000	U	10.73	4.30	2.25	22.14	-4.71	-3.22		5.41
CREU 13432M001	N	0.92	-0.28	0.11	1.55	1.01	-0.20	1.04	-0.70
CREU 13432M001	E	0.37	-0.02	0.14	0.45	-0.07	-0.09	0.76	-0.09
CREU 13432M001	U	2.91	-4.84	-0.89	-2.41	1.78	-1.92	-3.60	1.05
EBRE 13410M001	N	1.59	0.74	0.82	1.24	-0.34	-0.94	3.33	-0.63
EBRE 13410M001	E	1.50	-1.42	-0.58	-0.70	-0.71	1.59	2.13	1.77
EBRE 13410M001	U	3.65	0.17	-2.90	-5.62	-4.98	2.96	2.48	0.67
ELGE 19353S001	N	2.95	2.11	-1.09	-4.13	-3.64	-0.09	0.67	3.98
ELGE 19353S001	E	5.04	-2.56	0.81	6.36	5.47	0.38	-8.05	-3.17
ELGE 19353S001	U	5.80	1.55	-4.13	-10.16	-4.50	-0.61	7.44	1.69
EMAZ 17001M001	N	1.48	-1.35	-1.03	-1.97	-1.10	0.88	2.10	-0.05
EMAZ 17001M001	E	1.51	0.91	1.27	1.02	-0.13	-1.36	-2.72	0.96
EMAZ 17001M001	U	2.13	1.58	-1.07	3.35	1.54	-1.96	-2.46	-0.04
GERN 19389M001	N	1.99	1.28	1.24	0.19	0.23	1.39	-3.39	-2.65
GERN 19389M001	E	0.56	0.56	0.30	-0.35	-0.77	0.34	-0.80	-0.00
GERN 19389M001	U	3.03	-0.66	-3.88	2.12	0.58	-1.09	-5.54	-1.70
IGEL 19352S001	N	1.05	1.05	-0.83	-1.62	-0.38	-0.22	0.96	-1.03
IGEL 19352S001	E	1.07	-0.13	-1.26	-0.27	0.22	-0.32	2.01	-1.01
IGEL 19352S001	U	2.23	-1.52	-2.20	1.14	-2.41	-1.19	-3.78	0.14
ISPS 19484M001	N	1.76	-1.55	-1.92	-1.42	-0.27	-0.29	0.25	3.21
ISPS 19484M001	E	1.57	0.05	-0.31	2.31	0.13	0.86	-2.36	-1.75
ISPS 19484M001	U	4.54	1.43	-6.00	-1.83	3.52	2.95	-3.34	-7.06
KAST 19499M001	N	3.98	0.01	0.92	2.89	3.03	0.65	-8.66	1.03
KAST 19499M001	E	0.88	-0.08	1.39	-0.70	-1.10	-0.13	-0.24	-1.00
KAST 19499M001	U	8.57	-0.03	-3.03	10.63	11.33	-1.21	-11.78	-7.06
LARE 19440M001	N	1.15	-0.26	0.21	-1.62	0.73	0.98	-0.75	-1.76
LARE 19440M001	E	1.75	-1.17	-2.01	-0.36	-0.43	0.18	3.55	0.11
LARE 19440M001	U	5.05	3.63	1.53	-0.60	0.74	4.55	-10.64	1.55
LAZK 19354S001	N	3.67	2.61	1.76	2.12	2.38	1.16	-7.31	-2.44
LAZK 19354S001	E	1.19	0.66	-1.66	0.15	-0.51	0.15	-1.07	1.97

LAZK	19354S001	U	8.77	-1.36	6.38	-13.62	-0.29	9.87	-9.38	6.94
LEIT	19428M001	N	1.94	-2.55	-0.28	-0.35	0.01	-1.37	3.34	1.69
LEIT	19428M001	E	1.02	-0.14	-1.90	-0.55	0.87	1.02	-0.32	0.64
LEIT	19428M001	U	1.81	1.30	-0.74	-1.16	-3.05	1.86	1.38	-1.22
ORDN	19427M001	N	1.53	-0.07	0.74	0.55	-0.07	0.23	2.01	-3.00
ORDN	19427M001	E	0.85	0.86	-1.80	0.10	0.24	0.17	0.44	-0.19
ORDN	19427M001	U	4.04	1.08	2.95	-0.56	-5.24	-1.30	6.66	-3.78
PAS2	19351S001	N	1.49	0.20	0.67	0.26	1.26	0.36	-2.05	-2.62
PAS2	19351S001	E	0.65	0.36	-0.74	0.62	-0.12	-0.03	-1.16	0.35
PAS2	19351S001	U	4.36	0.80	-2.88	4.30	-5.76	-2.63	3.03	-6.12
PASA	19351S001	N	1.62	0.31	0.83	0.25	1.41	0.38	-2.44	-2.62
PASA	19351S001	E	0.62	0.16	-0.72	0.67	-0.04	-0.10	-1.08	0.39
PASA	19351S001	U	4.38	0.58	-2.32	4.05	-6.33	-2.97	3.34	-5.75
RID1	13448M002	N	0.97	1.14	1.22	0.24	-0.16	-0.74	-1.49	0.16
RID1	13448M002	E	0.56	0.33	-0.63	-0.66	-0.22	0.02	0.90	0.28
RID1	13448M002	U	2.79	-0.60	-0.43	-2.74	-3.30	3.57	3.70	-1.21
SALA	13469M001	N	0.51	0.74	0.04	-0.61	0.66	0.13	-0.17	0.38
SALA	13469M001	E	0.59	0.31	0.85	-0.06	0.17	-0.86	-0.65	0.28
SALA	13469M001	U	3.19	2.82	-0.25	-2.88	-1.31	-1.38	-2.87	5.72
SCDA	10088M002	N	2.81	2.70	0.78	-3.13	-1.60	-1.99	4.13	-2.49
SCDA	10088M002	E	1.36	0.63	0.57	0.68	1.83	1.01	-1.91	-1.40
SCDA	10088M002	U	7.76	4.75	2.82	-0.93	-6.27	1.80	-16.38	4.33
SOPU	19386M001	N	1.22	-0.21	0.67	0.05	0.67	-1.85	1.14	-1.82
SOPU	19386M001	E	2.11	-2.35	-2.03	-0.60	-0.03	0.90	3.80	-1.15
SOPU	19386M001	U	2.71	-1.18	-1.48	3.55	1.45	0.67	-4.90	-1.07
TERU	13487M001	N	0.95	-0.37	-0.46	0.51	0.54	-0.21	1.89	
TERU	13487M001	E	1.43	0.13	0.01	-0.41	-0.13	2.24	-2.23	
TERU	13487M001	U	3.76	-4.79	-3.58	-0.31	-1.41	-4.17	3.94	
VITO	19385M001	N	4.73	2.64	2.74	1.46	1.89	4.05	-9.68	-2.04
VITO	19385M001	E	0.87	-0.00	-0.11	0.73	0.48	-1.30	1.43	-0.22
VITO	19385M001	U	7.62	3.33	2.08	2.37	-1.08	5.14	-17.31	-0.06
YEBE	13420M001	N	0.60	-0.35	-0.13	-0.52	-0.36	-0.13	-1.00	0.78
YEBE	13420M001	E	1.01	-0.04	-0.56	0.38	0.29	-1.65	-1.07	1.31
YEBE	13420M001	U	4.68	1.88	-3.38	6.84	1.21	-2.31	7.37	2.87
ZARA	13462M001	N	0.46	0.67	0.59	-0.63	-0.18	0.17	-0.16	0.08
ZARA	13462M001	E	0.63	0.04	0.00	0.52	-0.51	-0.90	1.00	-0.21
ZARA	13462M001	U	2.19	0.56	-1.54	-3.42	-1.84	2.82	1.68	-0.35

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	-1.29	-1.03	0.72
10	ALAC 13433M001	I W	-1.09	1.15	2.32
13	ALBA 13452M001	I W	-0.53	-0.75	0.92
19	ALME 13437M001	I W	-0.42	1.10	-2.17
41	BCLN 13412M001	I W	-0.19	0.02	4.06
46	BELL 13431M001	I W	-2.14	-1.76	6.59
65	BORR 13480M001	I W	-1.04	-1.31	0.28
98	CACE 13447M001	I W	1.12	1.21	0.61
109	CANT 13438M001	I W	0.56	0.21	-0.05
110	CARG 19412M001	I W	0.92	-1.79	-0.42
121	CEU1 13449M002	I W	0.02	-0.07	-1.09
135	COBA 13453M001	I W	0.44	1.08	-5.01
154	CREU 13432M001	I W	-0.09	2.13	1.75
190	EBRE 13410M001	I W	-0.23	-0.38	-1.23
208	ESCO 13435M001	I W	0.47	2.62	-0.49
219	FUNC 13911S001	I W	-1.59	-9.19	-2.55
286	HUEL 13451M001	I W	2.52	-0.86	-6.13
300	IZAN 31309M002	I W	0.22	0.54	-1.60
359	LLIV 13436M001	I W	0.06	0.28	-2.11
389	MAS1 31303M002	I W	1.49	-0.32	2.23
400	MELI 19379M001	I W	1.36	0.24	-0.23
456	PASA 19351S001	I W	-0.37	0.36	-2.51
513	RID1 13448M002	I W	-0.36	1.03	-3.77
518	SALA 13469M001	I W	0.81	1.09	0.15
526	SCDA 10088M002	I W	-4.13	1.27	-0.90
534	SFER 13402M004	I W	0.39	-1.06	2.19
557	SONS 13446M001	I W	0.16	0.74	-0.53
654	VALA 13463M002	I W	0.67	0.51	0.35
658	VALE 13439M001	I W	0.17	1.58	1.47
669	VIGO 13450M001	I W	-0.29	-0.31	2.33
698	YEBE 13420M001	I W	0.43	1.46	0.81
701	ZARA 13462M001	I W	0.62	0.58	3.20
84	MALA 13443M001	I W	1.32	-0.40	0.80
	RMS / COMPONENT		1.20	1.96	2.53
	MEAN		-0.00	0.00	-0.00
	MIN		-4.13	-9.19	-6.13
	MAX		2.52	2.62	6.59

NUMBER OF PARAMETERS : 3
NUMBER OF COORDINATES : 99
RMS OF TRANSFORMATION : 1.97 MM

BARYCENTER COORDINATES:

LATITUDE : 39 17 33.36
LONGITUDE : - 4 1 12.41
HEIGHT : -29.198 KM

PARAMETERS:

TRANSLATION IN N : -0.00 +- 0.34 MM
TRANSLATION IN E : -0.00 +- 0.34 MM
TRANSLATION IN U : -0.00 +- 0.34 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          18346390
NUMBER OF UNKNOWN(S)           223880
NUMBER OF DEGREES OF FREEDOM    18122510
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)     180
VARIANCE FACTOR                 1.890633262905040

Helmert Transformation Parameters With Respect to Combined Solution:
-----
Sol  Rms (m)      Translation (m)      Rotation (")
      X          Y          Z          X          Y          Z          Scale (ppm)
-----
  1  0.00224      0.0283  0.0193 -0.0345  -0.0002  0.0015  0.0006  0.00011
  2  0.00220     -0.0032 -0.0132 -0.0007  0.0003 -0.0000 -0.0003  0.00004
  3  0.00292     -0.0219 -0.0362  0.0231  0.0007 -0.0010 -0.0009 -0.00003
  4  0.00258     -0.0231 -0.0279  0.0330  0.0003 -0.0013 -0.0009 -0.00074
  5  0.00232     -0.0053  0.0049  0.0155  -0.0002 -0.0005  0.0001 -0.00083
  6  0.00354      0.0140 -0.0182 -0.0107  0.0004  0.0006 -0.0004 -0.00078
  7  0.00232      0.0076  0.0016 -0.0134  -0.0000  0.0005  0.0000  0.00045
```

```
Statistics of individual solutions:
-----
File  RMS (m)      DOF  Chi**2/DOF  #Observations authentic / pseudo  #Parameters explicit / implicit / singular
-----
  1  0.00128      2698411  1.63          2730080      3          993  30679  0
  2  0.00133      2601125  1.76          2634334      3          993  32219  0
  3  0.00135      2457445  1.83          2488476      3          927  30107  0
  4  0.00135      2614043  1.81          2647172      3          993  32139  0
  5  0.00139      2656745  1.94          2690700      3          996  32962  0
  6  0.00147      2549732  2.17          2583805      3          984  33092  0
  7  0.00142      2539171  2.02          2571823      3          981  31674  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 20:306:00000 20:312:86370 LEICA GR50 -----
ALDA  A  1 P 20:306:00000 20:312:86370 LEICA GR10 -----
ALSA  A  1 P 20:306:00000 20:312:86370 LEICA GR50 -----
AMUR  A  1 P 20:306:00000 20:312:86370 LEICA GR10 -----
BIAZ  A  1 P 20:306:00000 20:312:86370 SPECTRA SP90M -----
BIDA  A  1 P 20:306:00000 20:312:86370 LEICA GR10 -----
BRZR  A  1 P 20:306:00000 20:312:86370 LEICA GR30 -----
CACE  A  1 P 20:306:00000 20:312:86370 TRIMBLE NETR9 -----
CANT  A  1 P 20:309:00000 20:312:86370 LEICA GR10 -----
CHER  A  1 P 20:306:00000 20:312:86370 LEICA GR30 -----
CREU  A  1 P 20:306:00000 20:312:86370 LEICA GR50 -----
EBRE  A  1 P 20:306:00000 20:312:86370 LEICA GR50 -----
ELGE  A  1 P 20:306:00000 20:312:86370 LEICA GR30 -----
EMAZ  A  1 P 20:306:00000 20:312:86370 LEICA GR30 -----
GERN  A  1 P 20:306:00000 20:312:86370 LEICA GR30 -----
IGEL  A  1 P 20:306:00000 20:312:86370 LEICA GR30 -----
ISPS  A  1 P 20:306:00000 20:312:86370 TRIMBLE NETR9 -----
KAST  A  1 P 20:306:00000 20:312:86370 LEICA GR30 -----
LARE  A  1 P 20:306:00000 20:312:86370 LEICA GR50 -----
LAZK  A  1 P 20:306:00000 20:312:86370 LEICA GR30 -----
LEIT  A  1 P 20:306:00000 20:312:86370 LEICA GR50 -----
ORON  A  1 P 20:306:00000 20:312:86370 LEICA GR50 -----
PAS2  A  1 P 20:306:00030 20:312:86370 STONEX SC2200 -----
PASA  A  1 P 20:306:00000 20:312:86370 LEICA GR30 -----
RIO1  A  1 P 20:306:00000 20:312:86370 LEICA GR25 -----
SALA  A  1 P 20:306:00000 20:312:86370 LEICA GRX1200+GNSS -----
SCOA  A  1 P 20:306:00000 20:312:86370 LEICA GR25 -----
SOPU  A  1 P 20:306:00000 20:312:86370 LEICA GR30 -----
TERU  A  1 P 20:306:00000 20:311:61170 LEICA GRX1200GGPRO -----
VITO  A  1 P 20:306:00000 20:312:86370 LEICA GR10 -----
YEBE  A  1 P 20:306:00000 20:312:86370 TRIMBLE NETR9 -----
ZARA  A  1 P 20:306:00000 20:312:86370 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 20:306:00000 20:312:86370 LEIAT504      LEIS -----
ALDA  A  1 P 20:306:00000 20:312:86370 LEIAS10      NONE -----
ALSA  A  1 P 20:306:00000 20:312:86370 LEIAR10      NONE -----
AMUR  A  1 P 20:306:00000 20:312:86370 LEIAS10      NONE -----
```

```

BIAZ A 1 P 20:306:00000 20:312:86370 LEIAR25 LEIT ----
BIDA A 1 P 20:306:00000 20:312:86370 LEIAS10 NONE ----
BRZR A 1 P 20:306:00000 20:312:86370 LEIAS10 NONE ----
CACE A 1 P 20:306:00000 20:312:86370 TRM29659.00 NONE ----
CANT A 1 P 20:309:00000 20:312:86370 LEIAR25.R4 LEIT 25066
CHER A 1 P 20:306:00000 20:312:86370 LEIAR10 NONE ----
CREU A 1 P 20:306:00000 20:312:86370 LEIAR25.R4 NONE 26357
EBRE A 1 P 20:306:00000 20:312:86370 LEIAR25.R4 NONE 26359
ELGE A 1 P 20:306:00000 20:312:86370 LEIAR25.R4 LEIT ----
EMAZ A 1 P 20:306:00000 20:312:86370 LEIAS10 NONE ----
GERN A 1 P 20:306:00000 20:312:86370 LEIAS10 NONE ----
IGEL A 1 P 20:306:00000 20:312:86370 LEIAR20 LEIM ----
ISPS A 1 P 20:306:00000 20:312:86370 TRM59900.00 SCIS ----
KAST A 1 P 20:306:00000 20:312:86370 LEIAS10 NONE ----
LARE A 1 P 20:306:00000 20:312:86370 LEIAR20 LEIM ----
LAZK A 1 P 20:306:00000 20:312:86370 LEIAR25.R4 LEIT ----
LEIT A 1 P 20:306:00000 20:312:86370 LEIAR10 NONE ----
ORDN A 1 P 20:306:00000 20:312:86370 LEIAR10 NONE ----
PAS2 A 1 P 20:306:00030 20:312:86370 LEIAR20 LEIM 73034
PASA A 1 P 20:306:00000 20:312:86370 LEIAR20 LEIM 73034
RID1 A 1 P 20:306:00000 20:312:86370 LEIAR25.R4 LEIT 25138
SALA A 1 P 20:306:00000 20:312:86370 LEIAR25 NONE ----
SCDA A 1 P 20:306:00000 20:312:86370 TRM55971.00 NONE ----
SOPU A 1 P 20:306:00000 20:312:86370 LEIAS10 NONE ----
TERU A 1 P 20:306:00000 20:311:61170 LEIAT504GG LEIS ----
VITO A 1 P 20:306:00000 20:312:86370 LEIAS10 NONE ----
YEBE A 1 P 20:306:00000 20:312:86370 TRM29659.00 NONE ----
ZARA A 1 P 20:306:00000 20:312:86370 TRM29659.00 NONE ----

```

7.3 Eccentricities

```

*
*SITE PT SOLN T DATA_START_ DATA_END_ AXE ARP->BENCHMARK(M) UP_ NORTH_ EAST_
ACOR A 1 P 20:306:00000 20:312:86370 UNE 3.0460 0.0000 0.0000
ALDA A 1 P 20:306:00000 20:312:86370 UNE 0.0000 0.0000 0.0000
ALSA A 1 P 20:306:00000 20:312:86370 UNE 0.0000 0.0000 0.0000
AMUR A 1 P 20:306:00000 20:312:86370 UNE 0.0000 0.0000 0.0000
BIAZ A 1 P 20:306:00000 20:312:86370 UNE 0.0000 0.0000 0.0000
BIDA A 1 P 20:306:00000 20:312:86370 UNE 0.0000 0.0000 0.0000
BRZR A 1 P 20:306:00000 20:312:86370 UNE 0.0771 0.0000 0.0000
CACE A 1 P 20:306:00000 20:312:86370 UNE 0.0600 0.0000 0.0000
CANT A 1 P 20:309:00000 20:312:86370 UNE 3.0490 0.0000 0.0000
CHER A 1 P 20:306:00000 20:312:86370 UNE 0.0000 0.0000 0.0000
CREU A 1 P 20:306:00000 20:312:86370 UNE 0.0770 0.0000 0.0000
EBRE A 1 P 20:306:00000 20:312:86370 UNE 0.0770 0.0000 0.0000
ELGE A 1 P 20:306:00000 20:312:86370 UNE 0.0000 0.0000 0.0000
EMAZ A 1 P 20:306:00000 20:312:86370 UNE 0.0350 0.0000 0.0000
GERN A 1 P 20:306:00000 20:312:86370 UNE 0.0771 0.0000 0.0000
IGEL A 1 P 20:306:00000 20:312:86370 UNE 0.0000 0.0000 0.0000
ISPS A 1 P 20:306:00000 20:312:86370 UNE 0.0350 0.0000 0.0000
KAST A 1 P 20:306:00000 20:312:86370 UNE 0.0350 0.0000 0.0000
LARE A 1 P 20:306:00000 20:312:86370 UNE 0.0000 0.0000 0.0000
LAZK A 1 P 20:306:00000 20:312:86370 UNE 0.0000 0.0000 0.0000
LEIT A 1 P 20:306:00000 20:312:86370 UNE 0.0000 0.0000 0.0000
ORDN A 1 P 20:306:00000 20:312:86370 UNE 0.0000 0.0000 0.0000
PAS2 A 1 P 20:306:00030 20:312:86370 UNE 0.0000 0.0000 0.0000
PASA A 1 P 20:306:00000 20:312:86370 UNE 0.0000 0.0000 0.0000
RID1 A 1 P 20:306:00000 20:312:86370 UNE 0.0606 0.0000 0.0000
SALA A 1 P 20:306:00000 20:312:86370 UNE 0.0600 0.0000 0.0000
SCDA A 1 P 20:306:00000 20:312:86370 UNE 0.0000 0.0000 0.0000
SOPU A 1 P 20:306:00000 20:312:86370 UNE 0.0771 0.0000 0.0000
TERU A 1 P 20:306:00000 20:311:61170 UNE 0.0600 0.0000 0.0000
VITO A 1 P 20:306:00000 20:312:86370 UNE 0.0000 0.0000 0.0000
YEBE A 1 P 20:306:00000 20:312:86370 UNE 0.0000 0.0000 0.0000
ZARA A 1 P 20:306:00000 20:312:86370 UNE 3.2590 0.0000 0.0000

```

8 References

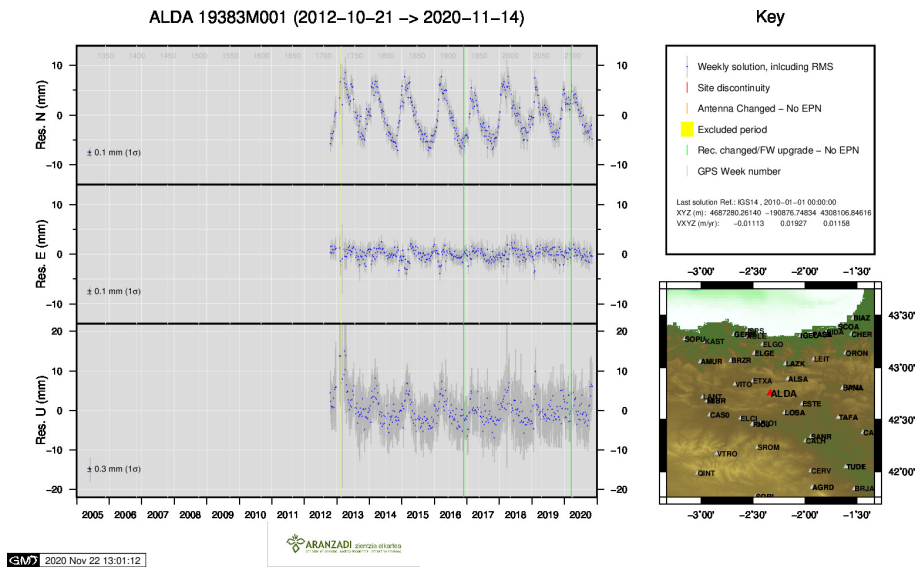
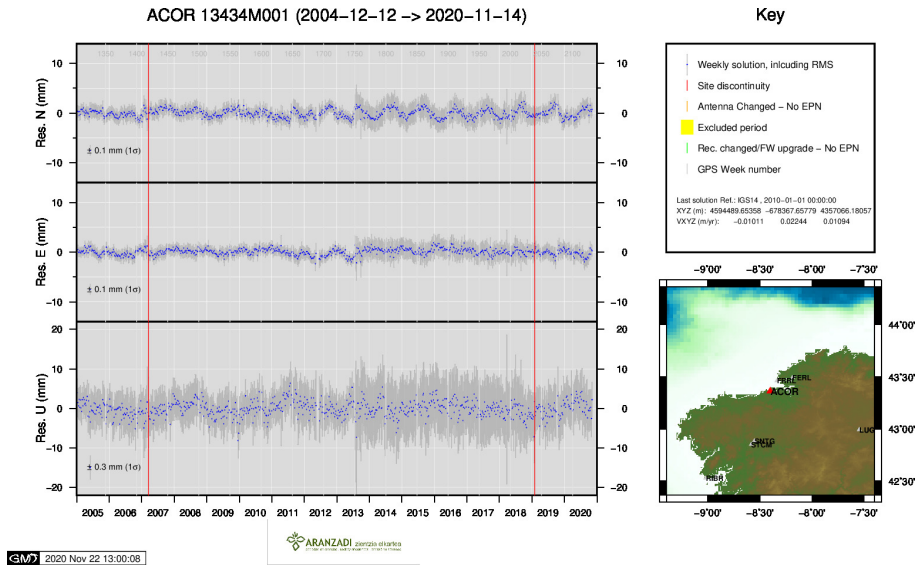
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign*. etrs89.ensg.ign.fr/memo-V8.pdf

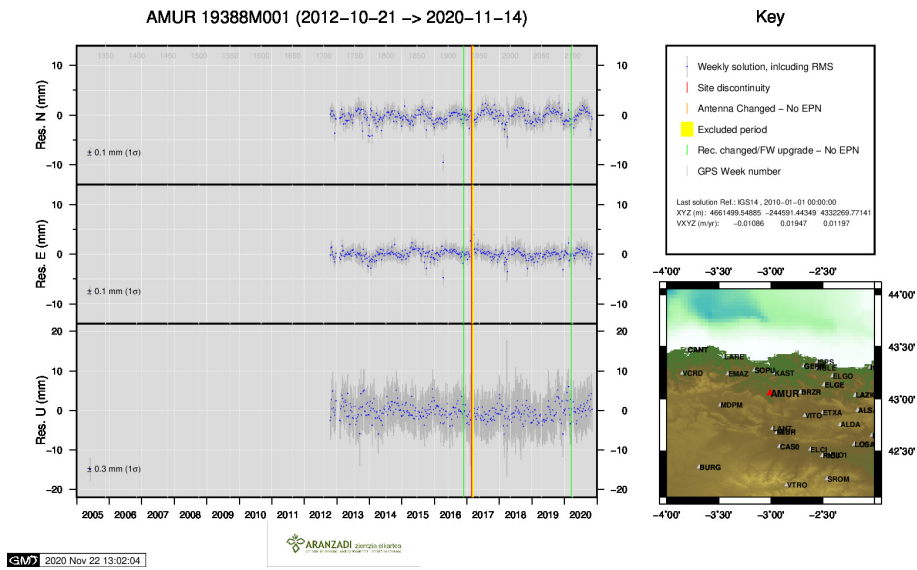
EPN Coordination Group and the EPN Central Bureau (2018): *Guidelines for the EPN Analysis Centres*. epncb.oma.be/documentation/guidelines/guidelines_analysis_centres.pdf

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

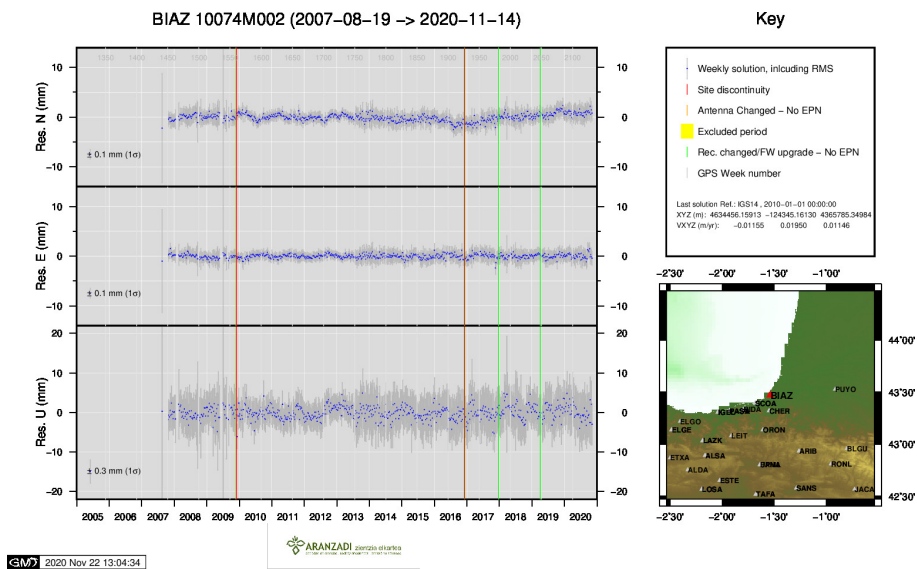
9 Cumulative Time Series

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

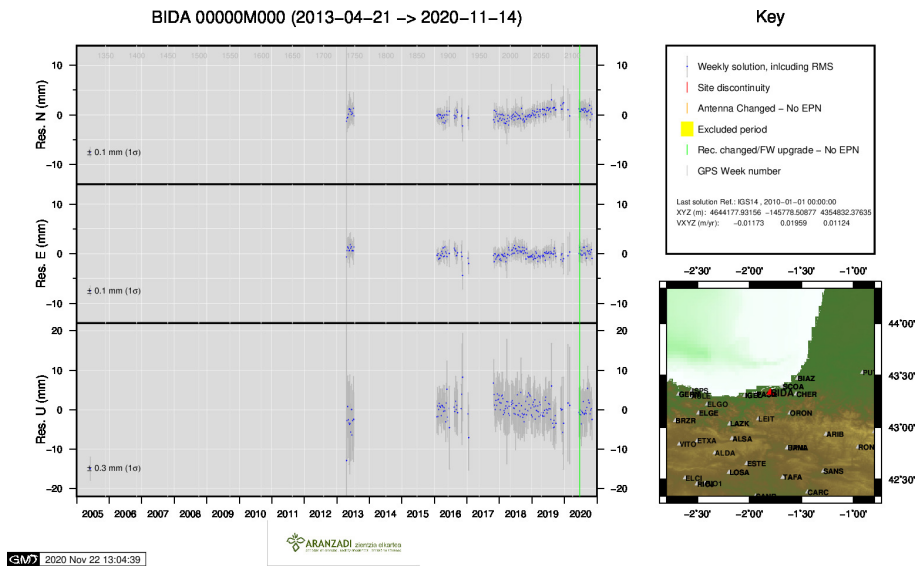




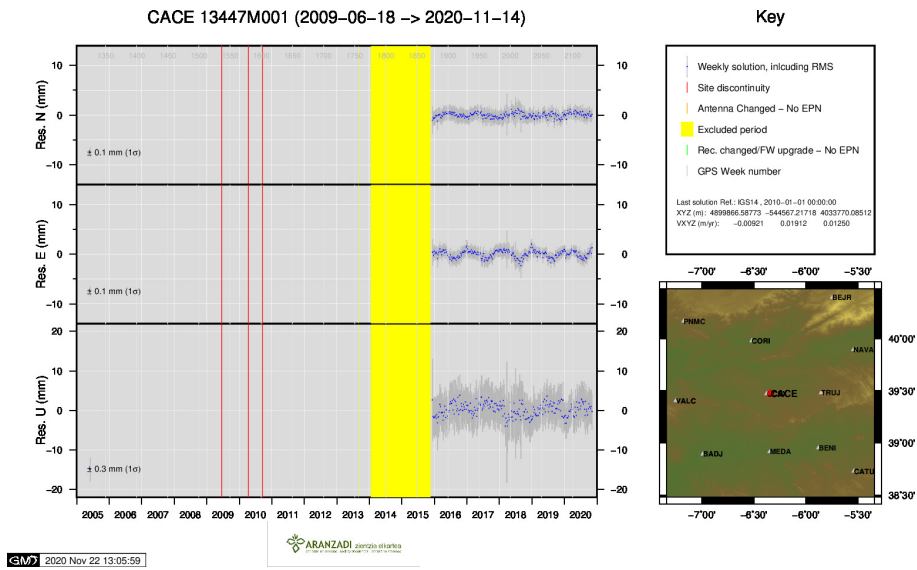
3) AMUR



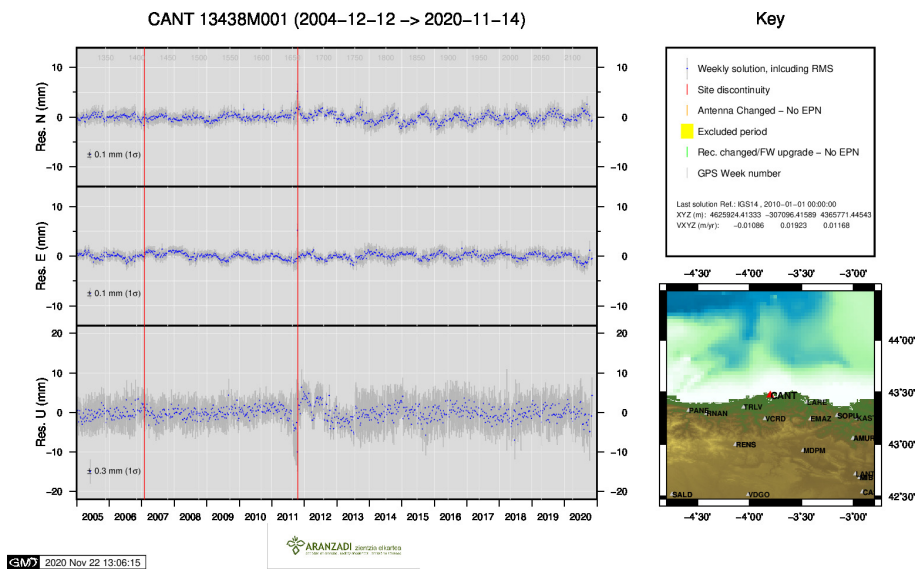
4) BIAZ



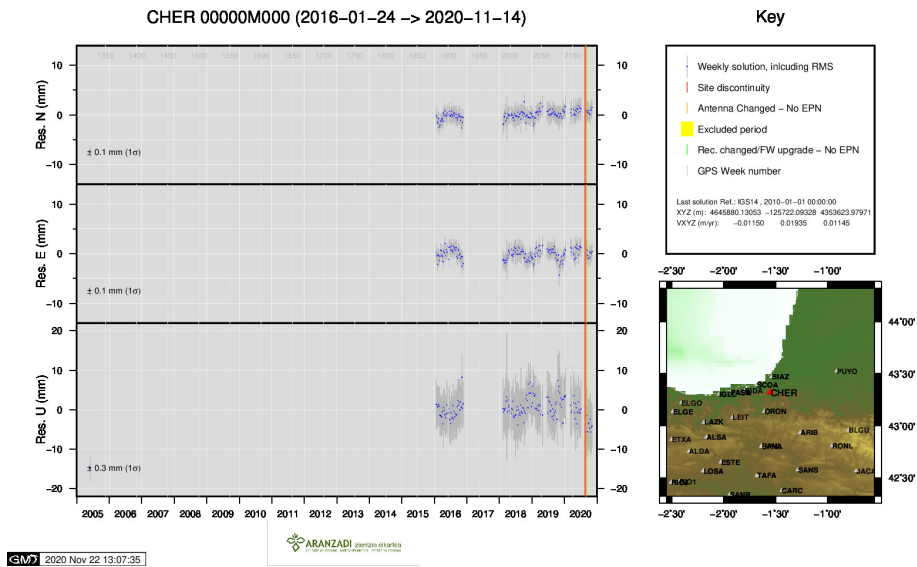
5) BIDA



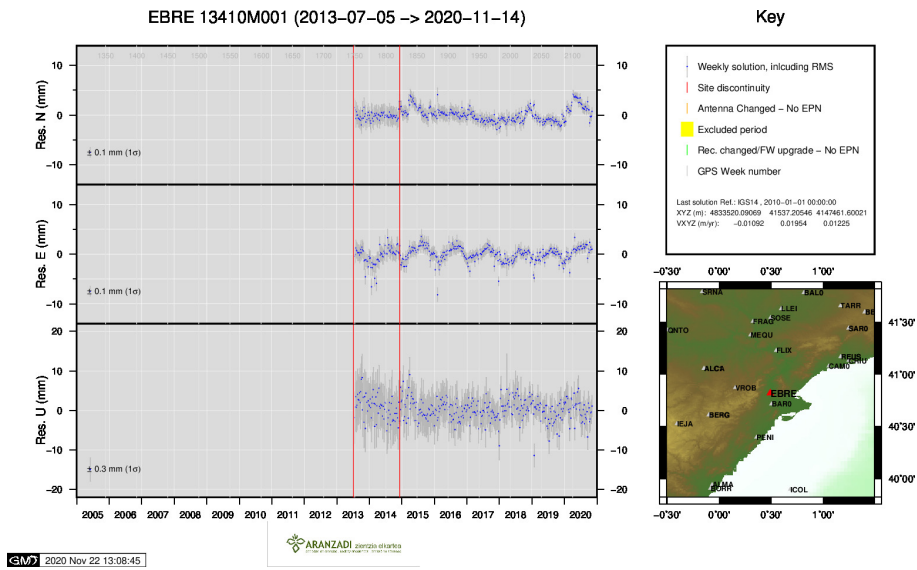
6) CACE



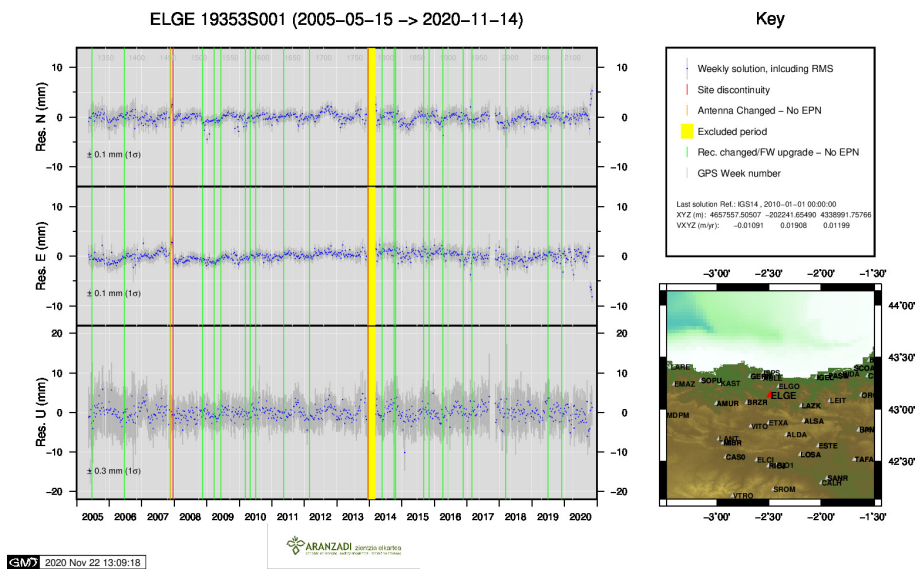
7) CANT



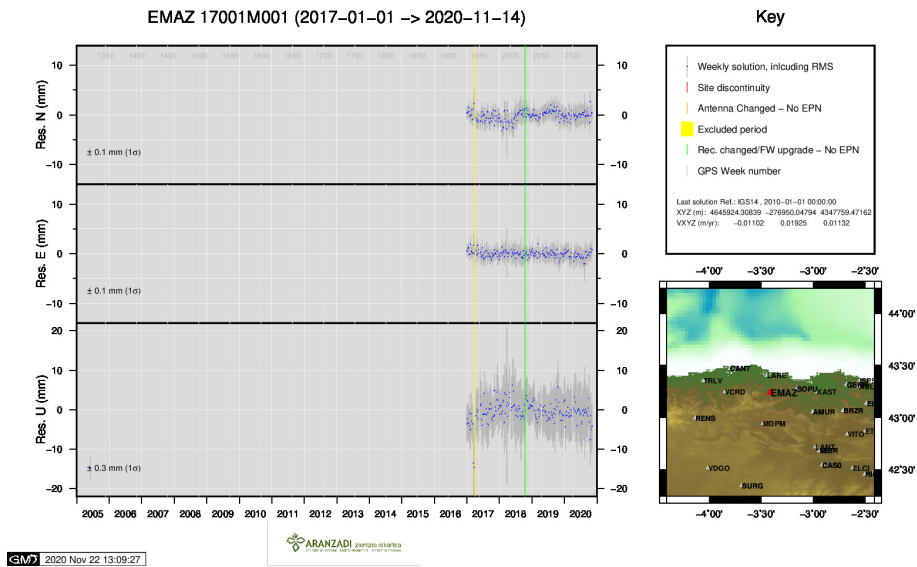
8) CHER



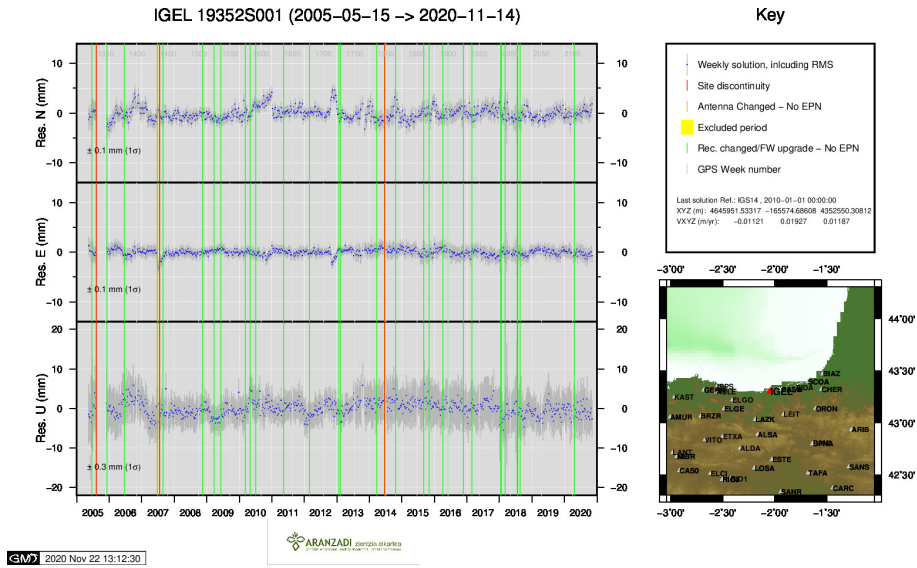
9) EBRE



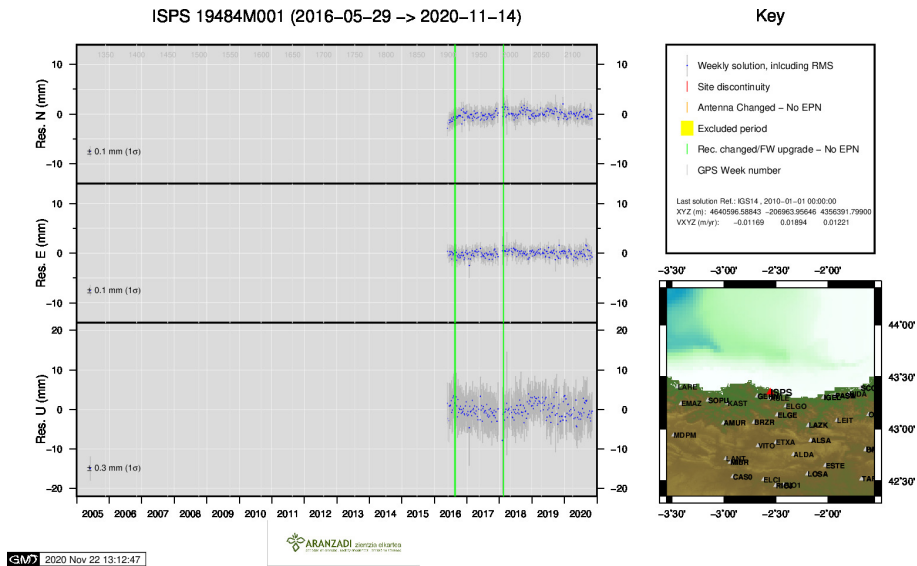
10) ELGE



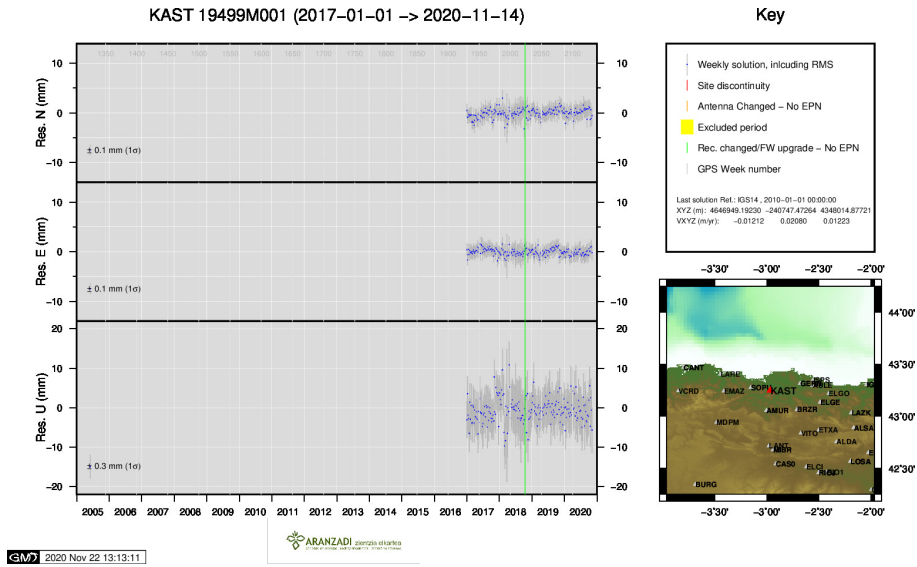
11) EMAZ



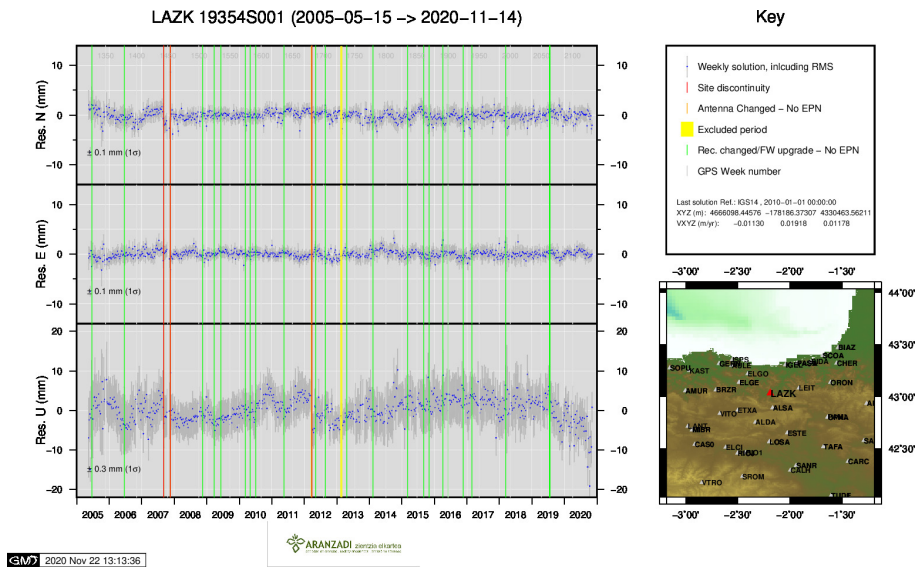
12) IGEL



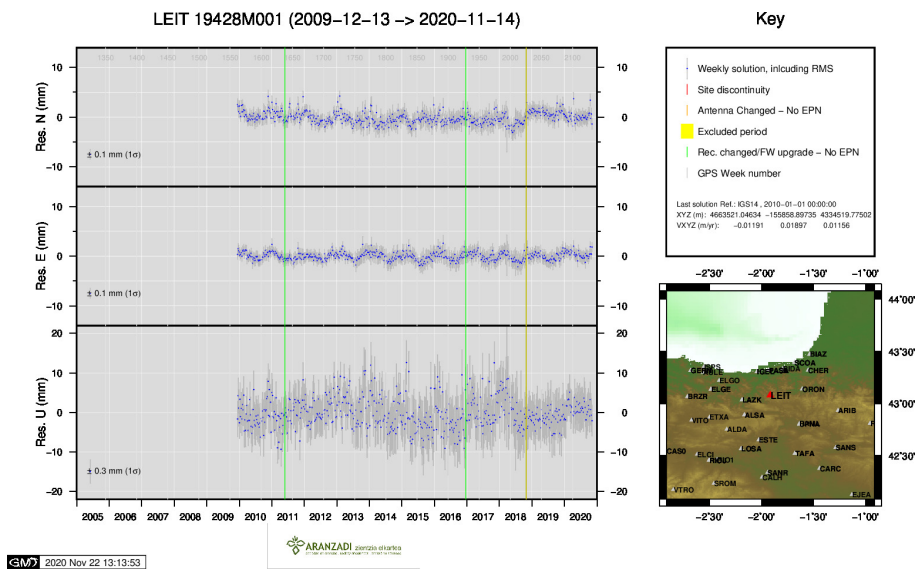
13) ISPS



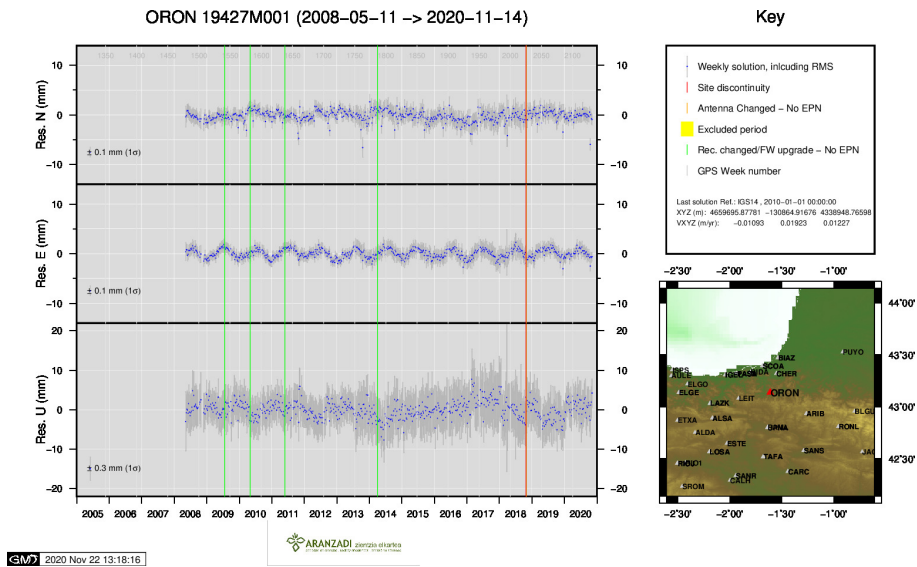
14) KAST



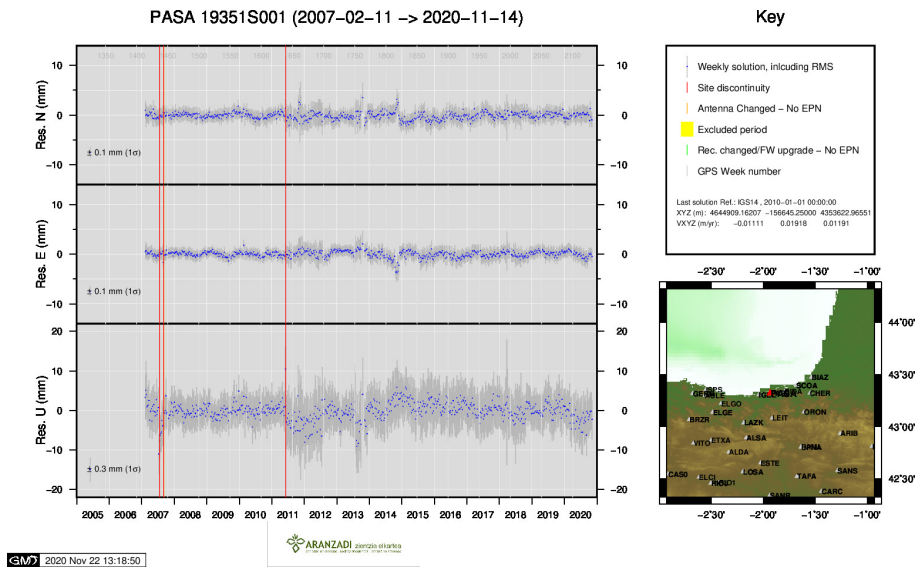
15) LAZK



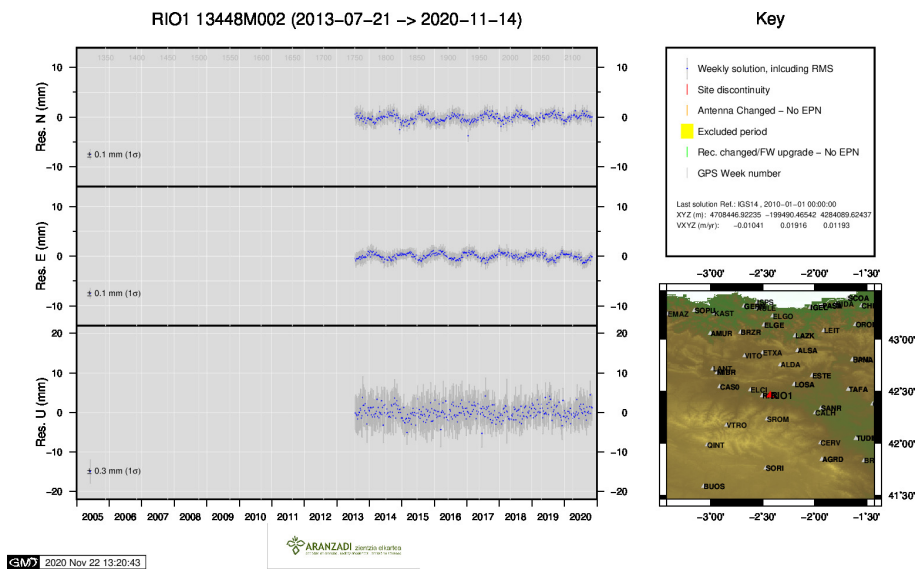
16) LEIT



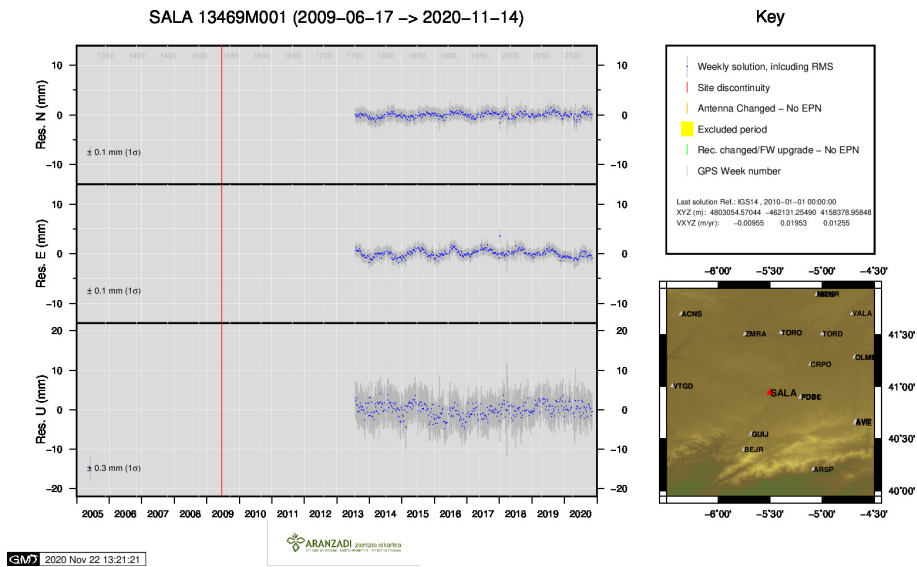
17) ORON



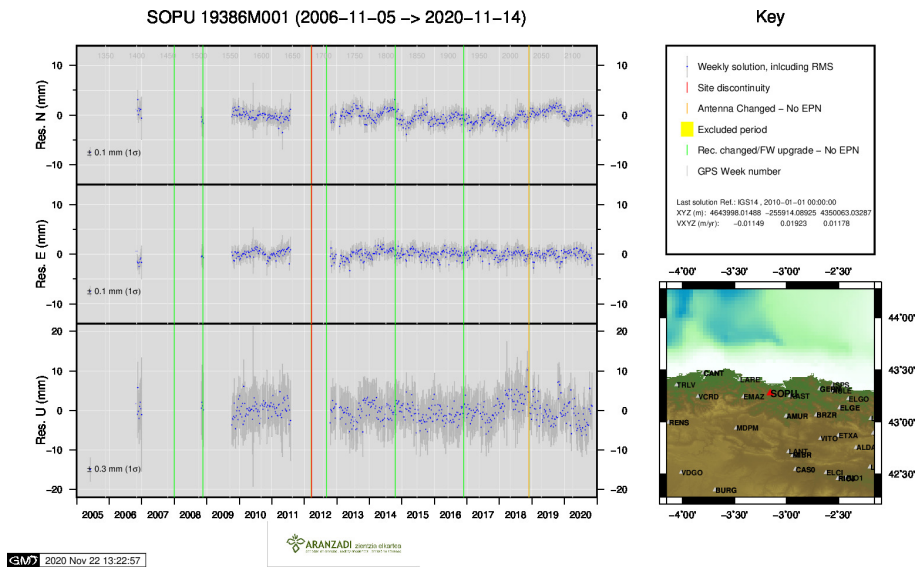
18) PASA



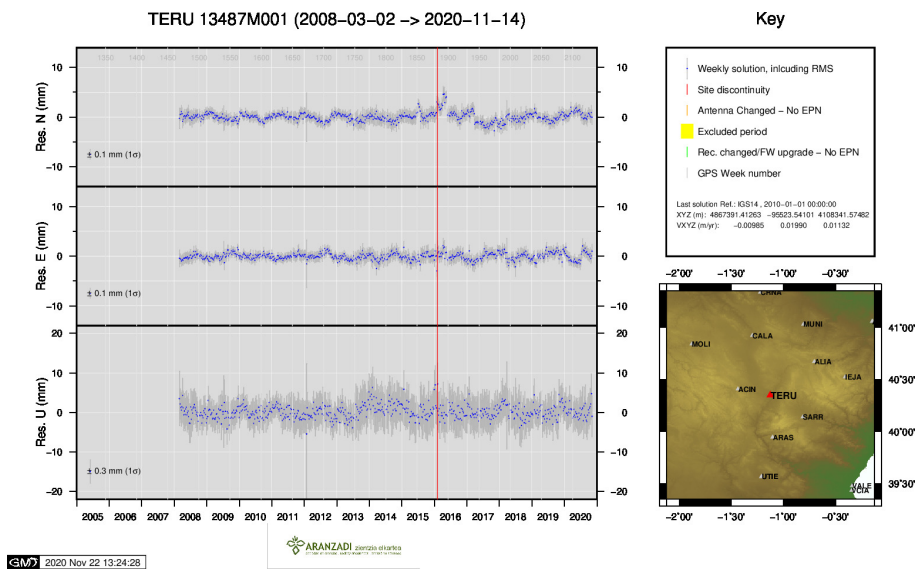
19) RIO1



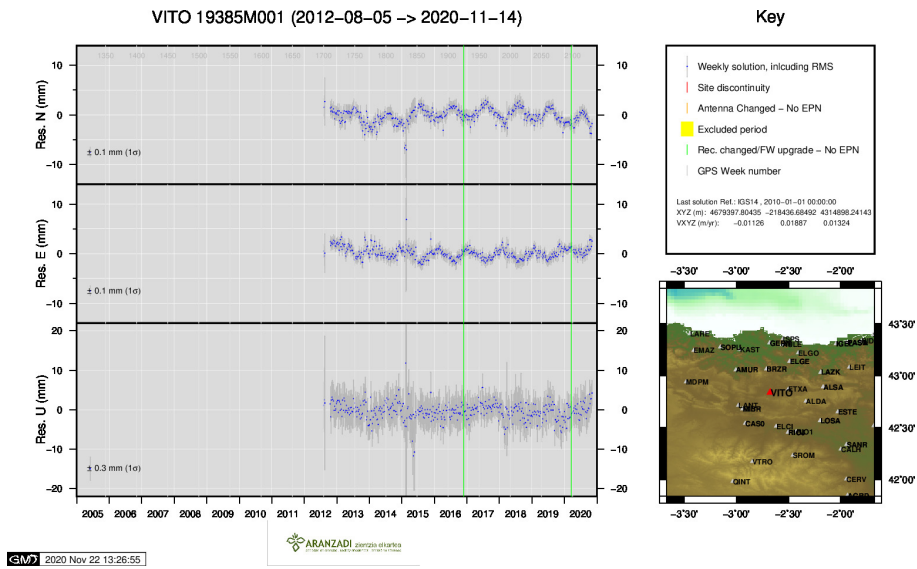
20) SALA



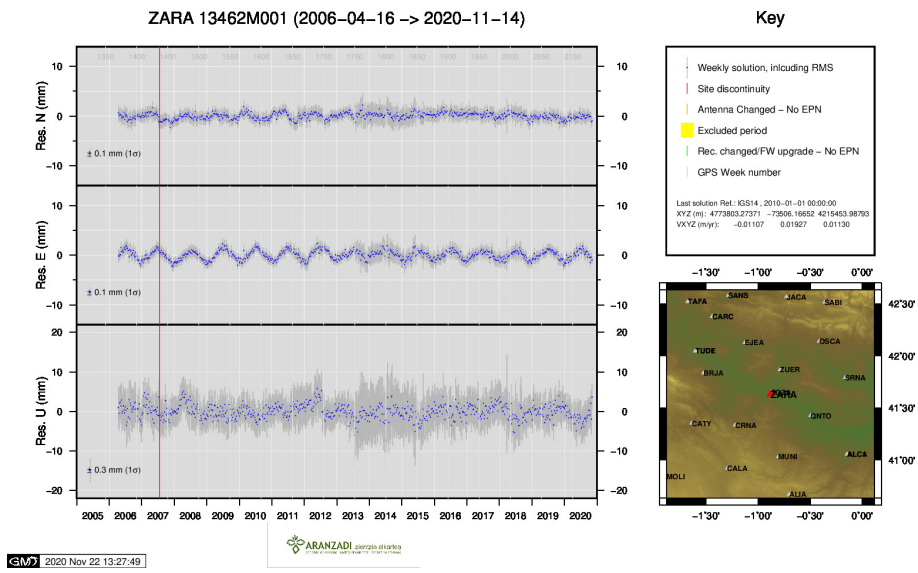
21) SOPU



22) TERU



23) VITO



24) ZARA