

ARA-DAC Weekly Analysis Result: 2140 (GFA)

Technical Report

GPS Week: 2140 (GFA)

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

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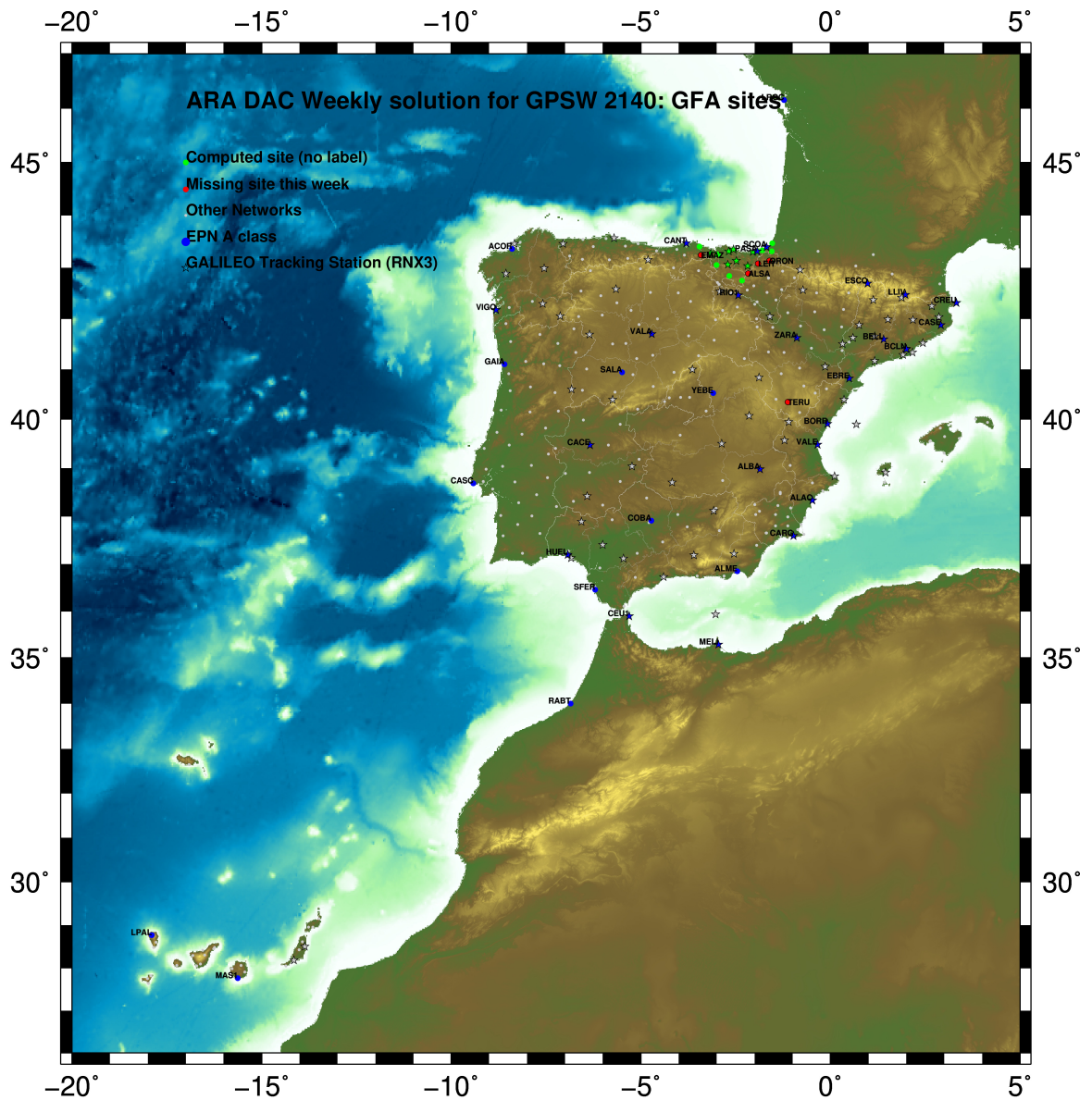
Report generated on 2021/01/31 at 12:45:35



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 2021 Jan 31 12:45:28

Fig.1: Computed Sites for GPS Week2140 (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) IGb14 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 IGb14

The Reference Frame considered in this section is IGb14, release C2115.

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ARA LAC 2140 WEEK FINAL COMBINATION: PRECISE ORBITS          31-JAN-21 10:09
-----
LOCAL GEODETIC DATUM: IGb14          EPOCH: 2021-01-13 12:00:00
-----
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
-----
 4 ACRD 13434M001          4594489.54110          -678367.40865          4357066.29991          W
39 ALDA 19383M001          4687280.13582          -190876.53677          4308106.97996          A
53 AMUR 19388M001          4661499.42800          -244591.22782          4332269.90085          A
100 BIAZ 10074M002          4634456.02959          -124344.94539          4365785.47712          A
101 BIDA 00000M000          4644177.79999          -145778.29291          4354832.50154          A
113 BRZR 19387M001          4662220.96879          -220769.86876          4333309.45821          A
100 CACE 13447M001          4899866.48466          -544567.00420          4033770.22305          W
111 CANT 13438M001          4625924.29409          -307096.20410          4365771.57297          W
154 CHER 00000M000          4645879.99884          -125721.87951          4353624.10324          A
156 CREU 13432M001          4715420.11017          273178.08901          4271946.86091          W
194 EBRE 13410M001          4833519.97400          41537.42045          4147461.73762          W
180 ELGE 19353S001          4657557.38149          -202241.44684          4338991.88785          A
209 GERN 19389M001          4642811.30008          -217222.89251          4353278.89415          A
235 IGEL 19352S001          4645951.40765          -165574.47351          4352550.43579          A
240 ISPS 19484M001          4640596.45999          -206963.74644          4356391.93421          A
245 KAST 19499M001          4646949.05674          -240747.24392          4348015.01111          A
252 LARE 19440M001          4632831.93494          -279026.11083          4360314.44986          A
256 LAZK 19354S001          4666098.31204          -178186.16127          4330463.68331          A
345 PAS2 19351S001          4644909.03764          -156645.03781          4353623.09404          A
464 PASA 19351S001          4644909.03770          -156645.03778          4353623.09410          W
522 RIO1 13448M002          4708446.80759          -199490.25300          4284089.75616          W
527 SALA 13469M001          4803054.46483          -462131.04047          4158379.09801          W
535 SCDA 10088M002          4639940.47706          -136224.91306          4359552.42785          W
418 SOPU 19386M001          4643997.88709          -255913.87713          4350063.16162          A
493 VITO 19385M001          4679397.68170          -218436.47298          4314898.38616          A
708 YEBE 13420M001          4848724.54892          -261631.90070          4123094.34883          W
711 ZARA 13462M001          4773803.14676          -73505.95396          4215454.11438          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 2140          31-JAN-21 10:09
-----
LOCAL GEODETIC DATUM: ETRF2000          EPOCH: 2021-01-13 12:00:00
-----
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
-----
 4 ACRD 13434M001          4594489.86038          -678367.97761          4357065.86116          W
39 ALDA 19383M001          4687280.51165          -190877.11490          4308106.54012          A
53 AMUR 19388M001          4661499.79897          -244591.80326          4332269.46237          A
100 BIAZ 10074M002          4634456.41781          -124345.51753          4365785.04233          A
101 BIDA 00000M000          4644178.18478          -145778.86617          4354832.06570          A
113 BRZR 19387M001          4662221.34277          -220770.44422          4333309.01998          A
100 CACE 13447M001          4899866.79681          -544567.60621          4033769.76166          W
111 CANT 13438M001          4625924.65980          -307096.77579          4365771.13653          W
154 CHER 00000M000          4645880.38601          -125722.45290          4353623.66752          A
156 CREU 13432M001          4715420.54042          273177.50942          4271946.42464          W
194 EBRE 13410M001          4833520.36668          41536.82713          4147461.28904          W
180 ELGE 19353S001          4657557.75817          -202242.02174          4338991.45023          A
209 GERN 19389M001          4642811.67596          -217223.46583          4353278.45751          A
235 IGEL 19352S001          4645951.78983          -165575.04703          4352549.99956          A
240 ISPS 19484M001          4640596.83736          -206964.31949          4356391.49788          A
245 KAST 19499M001          4646949.42933          -240747.81776          4348014.57384          A
252 LARE 19440M001          4632832.30372          -279026.68321          4360314.01323          A
256 LAZK 19354S001          4666098.69106          -178186.73703          4330463.24531          A
345 PAS2 19351S001          4644909.42100          -156645.61119          4353622.65801          A
464 PASA 19351S001          4644909.42106          -156645.61116          4353622.65807          W
522 RIO1 13448M002          4708447.18060          -199490.83346          4284089.31452          W
527 SALA 13469M001          4803054.79638          -462131.63186          4158378.64544          W
535 SCDA 10088M002          4639940.86337          -136225.48583          4359551.99247          W
418 SOPU 19386M001          4643998.25797          -255914.45068          4350062.72439          A
493 VITO 19385M001          4679398.05463          -218437.05032          4314897.94659          A
708 YEBE 13420M001          4848724.90250          -261632.49660          4123093.89519          W
711 ZARA 13462M001          4773803.53026          -73506.54118          4215453.66912          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).

ETRF2014 FINAL COORD. wk 2140 31-JAN-21 10:09

 LOCAL GEODETIC DATUM: ETRF2014 EPOCH: 2021-01-13 12:00:00

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
4	ACDR 13434M001	4594489.81932	-678368.01566	4357065.91202	W
39	ALDA 19383M001	4687280.46830	-190877.15423	4308106.59086	A
53	AMUR 19388M001	4661499.75605	-244591.84251	4332269.51317	A
100	BIAZ 10074M002	4634456.37479	-124345.55729	4365785.09325	A
101	BIDA 00000M000	4644178.14172	-145778.90583	4354832.11659	A
113	BRZR 19387M001	4662221.29978	-220770.48355	4333309.07078	A
100	CACE 13447M001	4899866.75222	-544567.64346	4033769.81175	W
111	CANT 13438M001	4625924.61743	-307096.81498	4365771.18739	W
154	CHER 00000M000	4645880.34287	-125722.49262	4353623.71841	A
156	CREU 13432M001	4715420.49517	273177.46867	4271946.47561	W
194	EBRE 13410M001	4833520.32103	41536.78762	4147461.33953	W
180	ELGE 19353S001	4657557.71516	-202242.06115	4338991.50105	A
209	GERN 19389M001	4642811.63314	-217223.50524	4353278.50837	A
235	IGEL 19352S001	4645951.74682	-165575.08661	4352550.05043	A
240	ISPS 19484M001	4640596.79453	-206964.35895	4356391.54875	A
245	KAST 19499M001	4646949.38655	-240747.85708	4348014.62468	A
252	LARE 19440M001	4632832.26119	-279026.72246	4360314.06408	A
256	LAZK 19354S001	4666098.64788	-178186.77649	4330463.29612	A
345	PAS2 19351S001	4644909.37797	-156645.65080	4353622.70888	A
464	PASA 19351S001	4644909.37803	-156645.65077	4353622.70894	W
522	RI01 13448M002	4708447.13706	-199490.87267	4284089.36520	W
527	SALA 13469M001	4803054.75262	-462131.66980	4158378.69578	W
535	SC0A 10088M002	4639940.82032	-136225.52553	4359552.04337	W
418	SOPU 19386M001	4643998.21525	-255914.48996	4350062.77523	A
493	VITO 19385M001	4679398.01145	-218437.08958	4314897.99734	A
708	YEBE 13420M001	4848724.85768	-261632.53502	4123093.94548	W
711	ZARA 13462M001	4773803.48564	-73506.58054	4215453.71969	W

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 IGB14 solution and are given with respect to the Local frame (North-East-Up).

ARA LAC 2140 WEEK FINAL COMBINATION: PRECISE ORBITS 31-JAN-21 10:09

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	7	XXXXXX	0.57	0.73	1.35
ALDA 19383M001	7	XXXXXX	1.11	0.98	4.13
AMUR 19388M001	7	XXXXXX	0.87	1.50	1.77
BLAZ 10074M002	7	XXXXXX	1.15	1.12	2.45
BIDA 00000M000	7	XXXXXX	1.23	1.04	2.53
BRZR 19387M001	6	XX XXX	0.86	0.57	2.73
CACE 13447M001	7	XXXXXX	0.40	0.45	2.24
CANT 13438M001	7	XXXXXX	0.32	0.70	2.48
CHER 00000M000	7	XXXXXX	0.86	0.89	2.19
CREU 13432M001	7	XXXXXX	1.96	1.26	3.52
EBRE 13410M001	7	XXXXXX	2.75	0.76	9.21
ELGE 19353S001	7	XXXXXX	2.03	2.11	4.67
GERN 19389M001	7	XXXXXX	0.81	1.18	4.53
IGEL 19352S001	7	XXXXXX	1.00	0.73	1.84
ISPS 19484M001	7	XXXXXX	0.70	0.70	3.11
KAST 19499M001	7	XXXXXX	1.09	0.49	3.88
LARE 19440M001	7	XXXXXX	1.18	0.52	2.14
LAZK 19354S001	7	XXXXXX	0.83	1.40	10.90
PAS2 19351S001	7	XXXXXX	0.82	0.54	1.77
PASA 19351S001	7	XXXXXX	0.81	0.54	1.78
RID1 13448M002	7	XXXXXX	1.93	0.94	2.57
SALA 13469M001	7	XXXXXX	0.55	0.63	0.81
SCDA 10088M002	7	XXXXXX	1.02	0.78	2.57
SOPU 19386M001	7	XXXXXX	0.71	1.04	2.10
VITO 19385M001	7	XXXXXX	0.94	0.86	1.56
YEBE 13420M001	7	XXXXXX	0.82	0.38	0.89
ZARA 13462M001	7	XXXXXX	1.08	1.03	8.65

Comparison of individual solutions:

ACOR 13434M001	N	0.57	0.50	0.08	-0.65	-0.66	0.09	-0.74	-0.49
ACOR 13434M001	E	0.73	-0.94	-1.20	-0.20	-0.41	-0.72	0.02	0.37
ACOR 13434M001	U	1.35	1.47	-1.36	-1.77	0.25	1.44	-1.20	-0.44
ALDA 19383M001	N	1.11	0.63	0.93	-0.26	-1.90	-0.29	-1.18	-1.01
ALDA 19383M001	E	0.98	-1.06	-0.05	-1.46	-0.65	-0.90	-0.96	0.55
ALDA 19383M001	U	4.13	-0.41	8.06	-2.01	0.32	0.86	-4.18	-3.88
AMUR 19388M001	N	0.87	1.12	-1.35	-0.66	-0.07	0.18	-0.98	0.00
AMUR 19388M001	E	1.50	-0.09	-2.77	-1.10	-1.77	0.06	1.23	0.09
AMUR 19388M001	U	1.77	-1.99	1.60	0.51	-0.18	-1.27	-2.62	-1.87
BLAZ 10074M002	N	1.15	-0.37	-0.82	-2.28	0.39	0.58	1.09	0.49
BLAZ 10074M002	E	1.12	-1.29	-1.70	-1.31	0.28	1.06	-0.19	-0.22
BLAZ 10074M002	U	2.45	-1.66	2.78	2.75	1.05	-2.72	-2.97	0.84
BIDA 00000M000	N	1.23	-0.01	-0.37	-0.88	-1.10	0.55	2.34	-1.05
BIDA 00000M000	E	1.04	-1.11	-1.38	-0.63	0.29	0.15	-1.54	0.64
BIDA 00000M000	U	2.53	-3.00	-0.07	-1.43	0.84	-0.12	5.15	0.16
BRZR 19387M001	N	0.86	1.08	-0.79	0.53		0.13	-0.10	1.25
BRZR 19387M001	E	0.57	0.13	0.05	0.15		0.75	0.40	0.93
BRZR 19387M001	U	2.73	1.70	-0.17	-1.30		5.49	1.33	0.80
CACE 13447M001	N	0.40	-0.09	0.11	-0.84	-0.25	0.17	-0.21	-0.30
CACE 13447M001	E	0.45	-0.17	0.77	0.42	0.17	-0.25	0.52	0.23
CACE 13447M001	U	2.24	2.93	1.01	0.79	-3.26	-2.01	0.03	-2.28
CANT 13438M001	N	0.32	0.34	-0.03	0.11	-0.44	-0.51	-0.03	0.19
CANT 13438M001	E	0.70	-0.43	0.16	-0.41	0.79	-0.09	0.61	1.24
CANT 13438M001	U	2.48	-0.70	0.98	3.41	1.28	4.05	1.30	-2.02
CHER 00000M000	N	0.86	0.04	0.51	0.18	-0.58	1.59	-1.11	0.05
CHER 00000M000	E	0.89	-0.73	-1.13	-0.09	-0.32	-1.57	-0.53	0.13
CHER 00000M000	U	2.19	-1.00	0.35	-1.07	3.43	-0.24	1.65	-3.47
CREU 13432M001	N	1.96	1.68	1.00	-0.05	0.49	1.09	-4.18	-0.56
CREU 13432M001	E	1.26	0.67	0.04	-1.96	-0.45	-0.48	2.17	0.33
CREU 13432M001	U	3.52	-4.32	-2.14	0.36	1.49	-4.81	5.02	0.73
EBRE 13410M001	N	2.75	1.84	0.95	-0.57	0.23	-2.36	-5.60	1.98
EBRE 13410M001	E	0.76	0.07	-0.04	-0.91	-0.25	-0.13	1.50	0.58
EBRE 13410M001	U	9.21	-4.47	-3.72	0.62	-4.08	1.76	21.32	-0.19
ELGE 19353S001	N	2.03	4.57	0.33	0.11	0.66	-0.57	-1.68	-0.14
ELGE 19353S001	E	2.11	-3.31	0.74	-0.25	0.09	-0.10	3.14	2.30
ELGE 19353S001	U	4.67	-7.05	-0.87	4.94	2.20	6.38	-0.69	3.15
GERN 19389M001	N	0.81	0.12	0.69	0.38	1.39	-0.16	-0.38	1.08
GERN 19389M001	E	1.18	-0.24	0.65	0.27	0.05	-1.01	0.08	2.61
GERN 19389M001	U	4.53	-3.09	-1.15	-2.21	-2.30	4.28	8.06	4.33
IGEL 19352S001	N	1.00	0.60	-0.82	0.68	1.47	0.28	-0.56	1.38
IGEL 19352S001	E	0.73	-0.29	-0.42	0.16	0.30	0.26	1.40	0.89
IGEL 19352S001	U	1.84	1.15	1.83	0.04	-0.27	3.11	-0.82	2.31
ISPS 19484M001	N	0.70	0.72	0.22	-0.30	1.05	0.15	0.11	1.07
ISPS 19484M001	E	0.70	-0.09	0.07	0.01	0.18	-0.18	1.02	1.35
ISPS 19484M001	U	3.11	2.58	4.93	2.31	-2.05	3.19	-2.32	-1.40
KAST 19499M001	N	1.09	1.89	-1.16	-0.19	0.44	0.64	1.22	0.18
KAST 19499M001	E	0.49	0.37	0.03	-0.05	0.37	0.13	1.03	0.32
KAST 19499M001	U	3.88	6.30	-2.60	0.16	-0.36	4.05	4.92	1.74
LARE 19440M001	N	1.18	-0.82	-1.13	-1.09	1.21	-0.27	0.43	1.88
LARE 19440M001	E	0.52	-0.10	0.35	0.64	0.89	-0.31	0.33	0.25
LARE 19440M001	U	2.14	2.93	2.54	3.02	0.18	1.29	-0.51	1.17
LAZK 19354S001	N	0.83	0.43	0.70	-0.21	0.53	0.40	1.66	-0.47
LAZK 19354S001	E	1.40	3.20	-0.78	-0.49	-0.45	-0.06	0.23	0.66
LAZK 19354S001	U	10.90	-18.52	7.22	10.25	10.35	6.15	-8.24	0.22
PAS2 19351S001	N	0.82	0.74	0.04	0.97	1.07	-0.04	-0.71	0.97
PAS2 19351S001	E	0.54	-0.02	-0.02	0.11	0.16	0.26	1.06	0.71
PAS2 19351S001	U	1.77	2.27	0.07	0.09	-0.42	3.04	0.10	2.07
PASA 19351S001	N	0.81	0.85	-0.02	0.95	1.00	-0.01	-0.67	0.94
PASA 19351S001	E	0.54	0.00	-0.05	0.14	0.25	0.31	1.18	0.42
PASA 19351S001	U	1.78	2.52	0.49	0.01	-0.46	3.00	-0.42	1.73
RID1 13448M002	N	1.93	-0.67	1.23	-1.18	-1.06	-2.58	3.30	-0.57
RID1 13448M002	E	0.94	1.14	-0.82	-0.75	-1.21	-1.02	-0.56	-0.02
RID1 13448M002	U	2.57	1.50	1.70	-0.10	-0.31	-3.74	-2.07	4.00
SALA 13469M001	N	0.55	0.84	0.11	0.66	-0.71	-0.04	-0.25	-0.27

SALA 13469M001	E	0.63	-0.19	-0.10	-0.64	0.10	1.35	0.05	0.35
SALA 13469M001	U	0.81	-0.05	1.01	-1.54	-0.07	0.55	0.11	-0.48
SCDA 10088M002	N	1.02	1.43	1.16	-0.04	-0.90	-1.30	-0.33	-0.52
SCDA 10088M002	E	0.78	-0.45	-1.33	-0.44	-0.28	-0.12	-1.16	0.19
SCDA 10088M002	U	2.57	-2.61	-1.07	2.13	1.42	-1.16	-2.41	4.23
SOPU 19386M001	N	0.71	0.43	0.31	-0.68	0.81	0.57	1.08	0.36
SOPU 19386M001	E	1.04	-0.79	1.20	-0.48	0.71	1.32	-0.67	1.21
SOPU 19386M001	U	2.10	2.03	3.00	2.03	1.10	0.03	1.74	2.23
VITO 19385M001	N	0.94	0.42	0.95	-0.06	-0.47	-0.90	-1.78	0.09
VITO 19385M001	E	0.86	-0.39	-0.56	-1.08	-1.22	0.91	-0.06	-0.68
VITO 19385M001	U	1.56	-0.56	1.88	0.76	0.05	-0.78	-1.99	-2.37
YEBE 13420M001	N	0.82	-1.62	0.58	0.68	0.53	0.10	0.55	0.14
YEBE 13420M001	E	0.38	-0.51	0.12	0.34	-0.33	0.34	0.52	-0.11
YEBE 13420M001	U	0.89	0.32	-0.02	-0.92	-1.80	-0.24	-0.69	0.23
ZARA 13462M001	N	1.08	2.08	0.79	-0.56	0.72	0.29	-0.73	0.81
ZARA 13462M001	E	1.03	1.76	-1.30	-0.74	-0.97	0.19	0.26	-0.14
ZARA 13462M001	U	8.65	17.89	-2.02	-4.30	-7.31	-2.25	-6.62	1.91

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: Igb14
RESIDUALS IN LOCAL SYSTEM (NORTH, EAST, UP)

NUM	NAME	FLG	RESIDUALS IN MILLIMETERS		
4	ACOR 13434M001	I W	0.46	-1.92	1.26
11	ALAC 13433M001	I W	0.14	1.41	2.72
14	ALBA 13452M001	I W	-1.01	-0.40	1.63
20	ALME 13437M001	I W	-1.86	-0.64	3.79
43	BCLN 13412M001	I W	-0.19	-0.12	1.09
48	BELL 13431M001	I W	-0.35	-3.57	0.02
67	BORR 13480M001	I W	-1.07	-2.53	-1.80
72	BRST 10004M004	I W	-0.40	-1.24	2.56
100	CACE 13447M001	I W	1.30	-1.60	3.74
111	CANT 13438M001	I W	1.70	-0.10	-0.09
112	CARG 19412M001	I W	0.95	-2.07	0.21
116	CASC 13909S001	I W	-1.72	-0.03	1.06
117	CASE 13494M001	I W	-1.65	0.94	-0.19
123	CEU1 13449M002	I W	0.85	-1.17	-2.64
137	COBA 13453M001	I W	-0.00	-0.02	-0.24
156	CREU 13432M001	I W	0.67	1.06	-1.88
194	EBRE 13410M001	I W	0.42	0.77	-5.46
212	ESCO 13435M001	I W	0.31	1.92	-0.06
229	GAIA 13902M001	I W	0.40	-1.59	3.03
291	HUEL 13451M001	I W	-3.16	4.01	0.96
365	LLIV 13436M001	I W	-0.77	2.32	0.46
370	LPAL 81701M001	I W	-2.75	1.74	-8.94
372	LROC 10023M001	I W	0.02	0.33	1.84
395	MAS1 31303M002	I W	1.15	-1.57	-2.09
406	MELI 19379M001	I W	0.64	1.48	-0.79
464	PASA 19351S001	I W	0.95	-0.30	-0.37
505	RABT 35001M002	I W	-0.09	-0.35	-9.62
522	RID1 13448M002	I W	0.04	-1.38	-3.07
527	SALA 13469M001	I W	0.52	0.61	-2.60
535	SCOA 10088M002	I W	2.13	0.70	1.25
543	SFER 13402M004	I W	0.62	-1.84	4.96
664	VALA 13463M002	I W	0.58	1.69	1.80
668	VALE 13439M001	I W	1.00	2.19	-0.39
679	VIGO 13450M001	I W	-0.12	-0.66	1.67
708	YEBE 13420M001	I W	0.33	0.90	2.88
711	ZARA 13462M001	I W	0.71	-0.08	0.28
720	ZIMM 14001M004	I W	-0.74	1.11	3.04
RMS / COMPONENT			1.15	1.58	3.12
MEAN			-0.00	0.00	-0.00
MIN			-3.16	-3.57	-9.62
MAX			2.13	4.01	4.96

NUMBER OF PARAMETERS : 3
NUMBER OF COORDINATES : 111
RMS OF TRANSFORMATION : 2.12 MM

BARYCENTER COORDINATES:

LATITUDE : 40 9 2.16
LONGITUDE : - 3 30 24.76
HEIGHT : -30.874 KM

PARAMETERS:

TRANSLATION IN N : 0.00 +- 0.35 MM
TRANSLATION IN E : 0.00 +- 0.35 MM
TRANSLATION IN U : 0.00 +- 0.35 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 to the daily solutions are shown.

```
* STATISTICAL PARAMETER-----VALUE(S)-----
NUMBER OF OBSERVATIONS          15356490
NUMBER OF UNKNOWN(S)            178264
NUMBER OF DEGREES OF FREEDOM    15178216
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)      180
VARIANCE FACTOR                  1.654444156967676

Helmert Transformation Parameters With Respect to Combined Solution:
-----
Sol  Rms (m)      Translation (m)      Rotation (")      Scale (ppm)
      X          Y          Z          X          Y          Z
-----
  1  0.00424    -0.0003  0.0134  0.0082  -0.0004 -0.0002  0.0002  -0.00057
  2  0.00252    -0.0004  0.0046 -0.0028  -0.0001  0.0001  0.0001   0.00026
  3  0.00194    -0.0002 -0.0135  0.0037   0.0003 -0.0001 -0.0003  -0.00046
  4  0.00181    -0.0013 -0.0246 -0.0009   0.0005 -0.0000 -0.0006   0.00008
  5  0.00176    -0.0039 -0.0135  0.0039   0.0003 -0.0002 -0.0003  -0.00005
  6  0.00223     0.0038 -0.0122 -0.0039   0.0003  0.0002 -0.0003  -0.00019
  7  0.00157    -0.0036 -0.0141  0.0030   0.0003 -0.0001 -0.0004   0.00004
```

```
Statistics of individual solutions:
-----
File  RMS (m)      DOF  Chi**2/DOF  #Observations authentic / pseudo  #Parameters explicit / implicit / singular
-----
  1  0.00127    2370286    1.62      2397962      3      867      26812      0
  2  0.00128    2158431    1.64      2185053      3      828      25797      0
  3  0.00126    2144308    1.58      2169427      3      831      24291      0
  4  0.00128    2165562    1.63      2192455      3      828      26068      0
  5  0.00131    1979870    1.71      2004118      3      747      23504      0
  6  0.00131    2172953    1.71      2200546      3      831      26765      0
  7  0.00127    2182003    1.61      2206919      3      819      24100      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 21:01:00000 21:01:016:86370 LEICA GR50 -----
ALDA A 1 P 21:01:00000 21:01:016:86370 LEICA GR10 -----
AMUR A 1 P 21:01:00000 21:01:016:86370 LEICA GR10 -----
BIAZ A 1 P 21:01:00000 21:01:016:86370 SPECTRA SP90M -----
BIDA A 1 P 21:01:00000 21:01:016:86370 LEICA GR10 -----
BRZR A 1 P 21:01:00000 21:01:016:86370 LEICA GR30 -----
CACE A 1 P 21:01:00000 21:01:016:86370 TRIMBLE NETR9 -----
CANT A 1 P 21:01:00000 21:01:016:86370 LEICA GR10 -----
CHER A 1 P 21:01:00000 21:01:016:86370 LEICA GR30 -----
CREU A 1 P 21:01:00000 21:01:016:86370 LEICA GR50 -----
EBRE A 1 P 21:01:00000 21:01:016:86370 LEICA GR50 -----
ELGE A 1 P 21:01:00000 21:01:016:86370 LEICA GR30 -----
GERN A 1 P 21:01:00000 21:01:016:86370 LEICA GR30 -----
IGEL A 1 P 21:01:00000 21:01:016:86370 LEICA GR30 -----
ISPS A 1 P 21:01:00000 21:01:016:86370 TRIMBLE NETR9 -----
KAST A 1 P 21:01:00000 21:01:016:86370 LEICA GR30 -----
LARE A 1 P 21:01:00000 21:01:016:86370 LEICA GR50 -----
LAZK A 1 P 21:01:00000 21:01:016:86370 LEICA GR30 -----
PAS2 A 1 P 21:01:00030 21:01:016:86370 STONEX SC2200 -----
PASA A 1 P 21:01:00000 21:01:016:86370 LEICA GR30 -----
RIO1 A 1 P 21:01:00000 21:01:016:86370 LEICA GR25 -----
SALA A 1 P 21:01:00000 21:01:016:86370 LEICA GRX1200+GNSS -----
SCDA A 1 P 21:01:00000 21:01:016:86370 LEICA GR25 -----
SOPU A 1 P 21:01:00000 21:01:016:86370 LEICA GR30 -----
VITO A 1 P 21:01:00000 21:01:016:86370 LEICA GR10 -----
YEBE A 1 P 21:01:00000 21:01:016:86370 TRIMBLE NETR9 -----
ZARA A 1 P 21:01:00000 21:01:016:86370 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 21:01:00000 21:01:016:86370 LEIAT504 LEIS -----
ALDA A 1 P 21:01:00000 21:01:016:86370 LEIAS10 NONE -----
AMUR A 1 P 21:01:00000 21:01:016:86370 LEIAS10 NONE -----
BIAZ A 1 P 21:01:00000 21:01:016:86370 LEIAR25 LEIT -----
BIDA A 1 P 21:01:00000 21:01:016:86370 LEIAS10 NONE -----
BRZR A 1 P 21:01:00000 21:01:016:86370 LEIAS10 NONE -----
CACE A 1 P 21:01:00000 21:01:016:86370 TRM29659.00 NONE -----
CANT A 1 P 21:01:00000 21:01:016:86370 LEIAR25.R4 LEIT 25066
CHER A 1 P 21:01:00000 21:01:016:86370 LEIAR10 NONE -----
```

CREU	A	1	P	21:010:00000	21:016:86370	LEIAR25.R4	NONE	26357
EBRE	A	1	P	21:010:00000	21:016:86370	LEIAR25.R4	NONE	26359
ELGE	A	1	P	21:010:00000	21:016:86370	LEIAR25.R4	LEIT	----
GERN	A	1	P	21:010:00000	21:016:86370	LEIAS10	NONE	----
IGEL	A	1	P	21:010:00000	21:016:86370	LEIAR20	LEIM	----
ISPS	A	1	P	21:010:00000	21:016:86370	TRM59900.00	SCIS	----
KAST	A	1	P	21:010:00000	21:016:86370	LEIAS10	NONE	----
LARE	A	1	P	21:010:00000	21:016:86370	LEIAR20	LEIM	----
LAZK	A	1	P	21:010:00000	21:016:86370	LEIAR25.R4	LEIT	----
PAS2	A	1	P	21:010:00030	21:016:86370	LEIAR20	LEIM	73034
PASA	A	1	P	21:010:00000	21:016:86370	LEIAR20	LEIM	73034
RI01	A	1	P	21:010:00000	21:016:86370	LEIAR25.R4	LEIT	25138
SALA	A	1	P	21:010:00000	21:016:86370	LEIAR25	NONE	----
SCDA	A	1	P	21:010:00000	21:016:86370	TRM55971.00	NONE	----
SOPU	A	1	P	21:010:00000	21:016:86370	LEIAS10	NONE	----
VITO	A	1	P	21:010:00000	21:016:86370	LEIAS10	NONE	----
YEBE	A	1	P	21:010:00000	21:016:86370	TRM29659.00	NONE	----
ZARA	A	1	P	21:010:00000	21:016:86370	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	21:010:00000	21:016:86370	UNE	3.0460	0.0000	0.0000
ALDA	A	1	P	21:010:00000	21:016:86370	UNE	0.0000	0.0000	0.0000
AMUR	A	1	P	21:010:00000	21:016:86370	UNE	0.0000	0.0000	0.0000
BIAZ	A	1	P	21:010:00000	21:016:86370	UNE	0.0000	0.0000	0.0000
BIDA	A	1	P	21:010:00000	21:016:86370	UNE	0.0000	0.0000	0.0000
BRZR	A	1	P	21:010:00000	21:016:86370	UNE	0.0771	0.0000	0.0000
CACE	A	1	P	21:010:00000	21:016:86370	UNE	0.0600	0.0000	0.0000
CANT	A	1	P	21:010:00000	21:016:86370	UNE	3.0490	0.0000	0.0000
CHER	A	1	P	21:010:00000	21:016:86370	UNE	0.0000	0.0000	0.0000
CREU	A	1	P	21:010:00000	21:016:86370	UNE	0.0770	0.0000	0.0000
EBRE	A	1	P	21:010:00000	21:016:86370	UNE	0.0770	0.0000	0.0000
ELGE	A	1	P	21:010:00000	21:016:86370	UNE	0.0000	0.0000	0.0000
GERN	A	1	P	21:010:00000	21:016:86370	UNE	0.0771	0.0000	0.0000
IGEL	A	1	P	21:010:00000	21:016:86370	UNE	0.0000	0.0000	0.0000
ISPS	A	1	P	21:010:00000	21:016:86370	UNE	0.0350	0.0000	0.0000
KAST	A	1	P	21:010:00000	21:016:86370	UNE	0.0350	0.0000	0.0000
LARE	A	1	P	21:010:00000	21:016:86370	UNE	0.0000	0.0000	0.0000
LAZK	A	1	P	21:010:00000	21:016:86370	UNE	0.0000	0.0000	0.0000
PAS2	A	1	P	21:010:00030	21:016:86370	UNE	0.0000	0.0000	0.0000
PASA	A	1	P	21:010:00000	21:016:86370	UNE	0.0000	0.0000	0.0000
RI01	A	1	P	21:010:00000	21:016:86370	UNE	0.0606	0.0000	0.0000
SALA	A	1	P	21:010:00000	21:016:86370	UNE	0.0600	0.0000	0.0000
SCDA	A	1	P	21:010:00000	21:016:86370	UNE	0.0000	0.0000	0.0000
SOPU	A	1	P	21:010:00000	21:016:86370	UNE	0.0771	0.0000	0.0000
VITO	A	1	P	21:010:00000	21:016:86370	UNE	0.0000	0.0000	0.0000
YEBE	A	1	P	21:010:00000	21:016:86370	UNE	0.0000	0.0000	0.0000
ZARA	A	1	P	21:010:00000	21:016:86370	UNE	3.2590	0.0000	0.0000

8 References

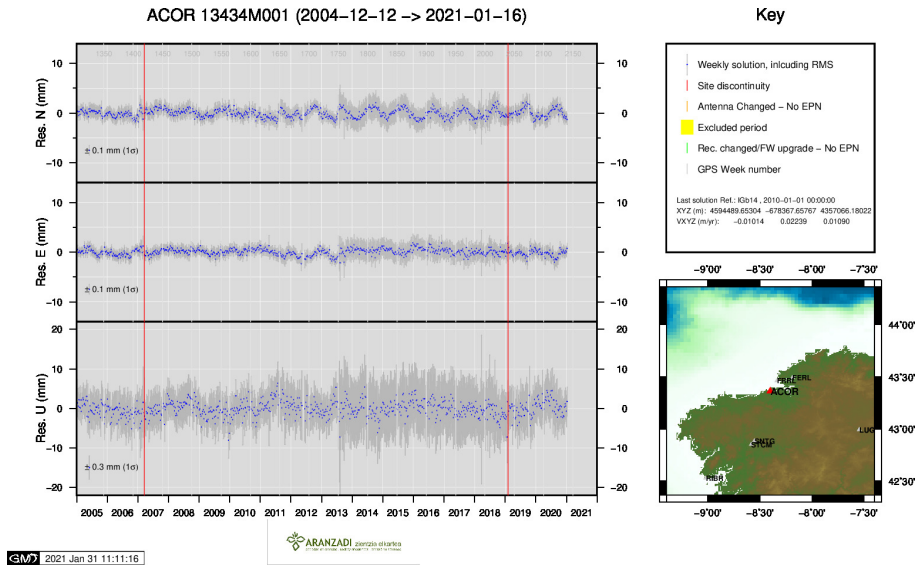
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign*. etrs89.ensg.ign.fr/memo-V8.pdf

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

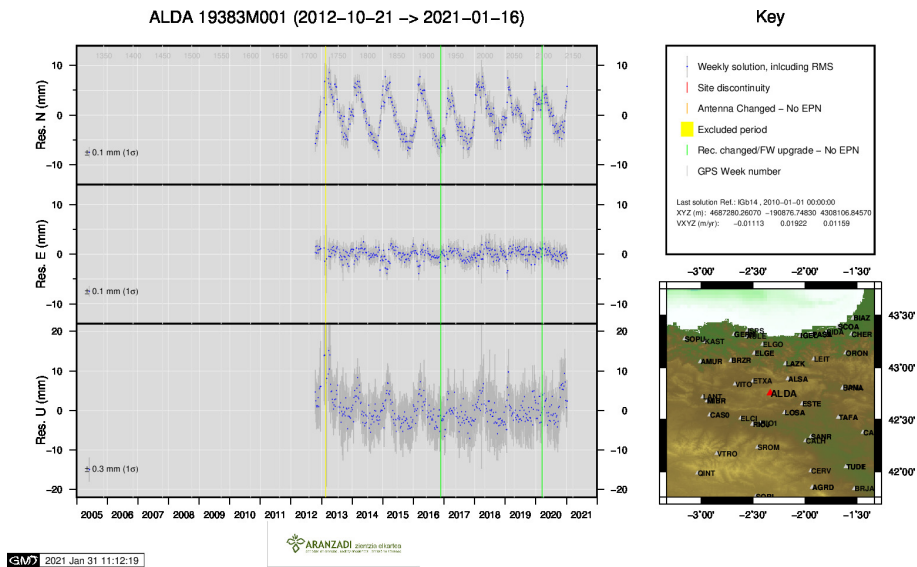
Z. Altamimi (2018): *EUREF Technical Note 1: Relationship and Transformation between the International and the European Terrestrial Reference Systems*. etrs89.ensg.ign.fr/pub/EUREF-TN-1.pdf

9 Cumulative Time Series

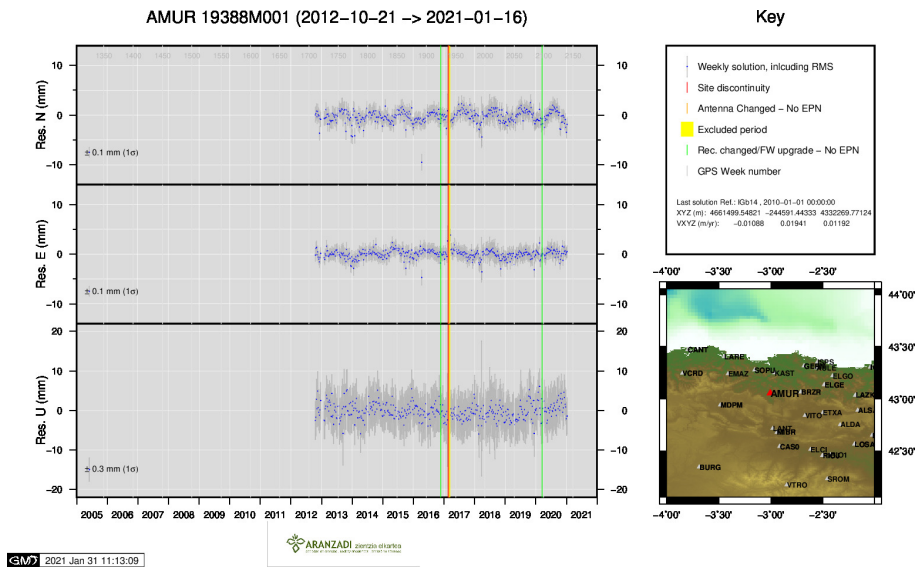
Time series of stations. Latest plots at: <http://geolabpasaia.org/gnss/ARA-net/TSeries/>, or click on the caption of each image.



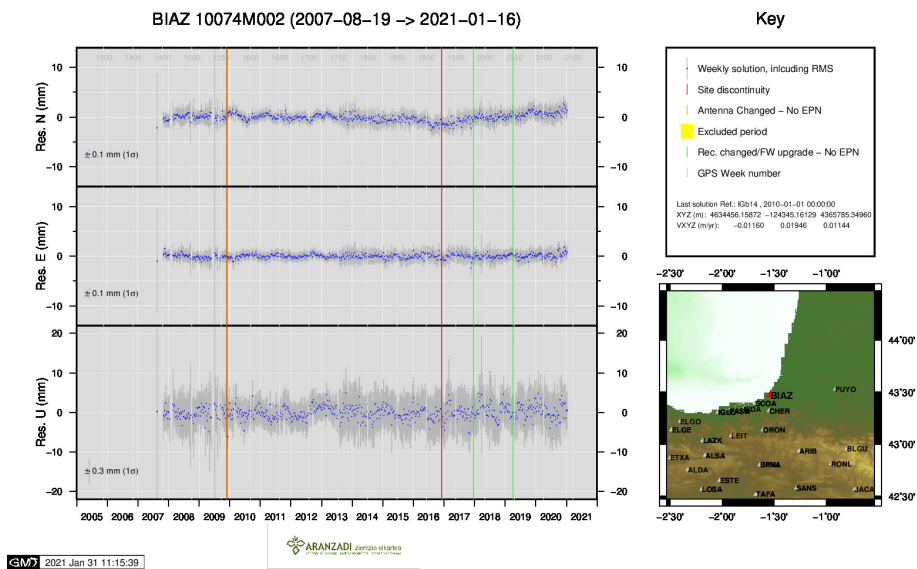
1) ACOR



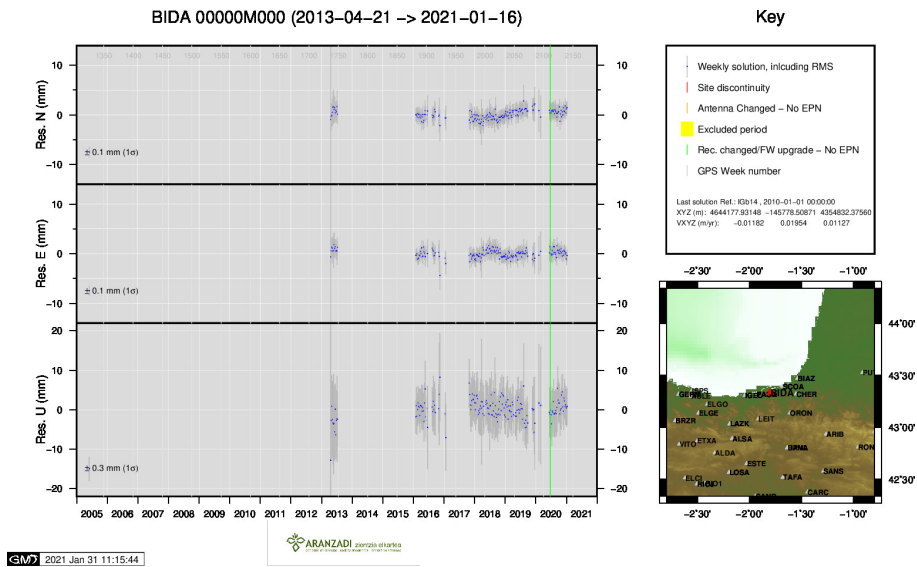
2) ALDA



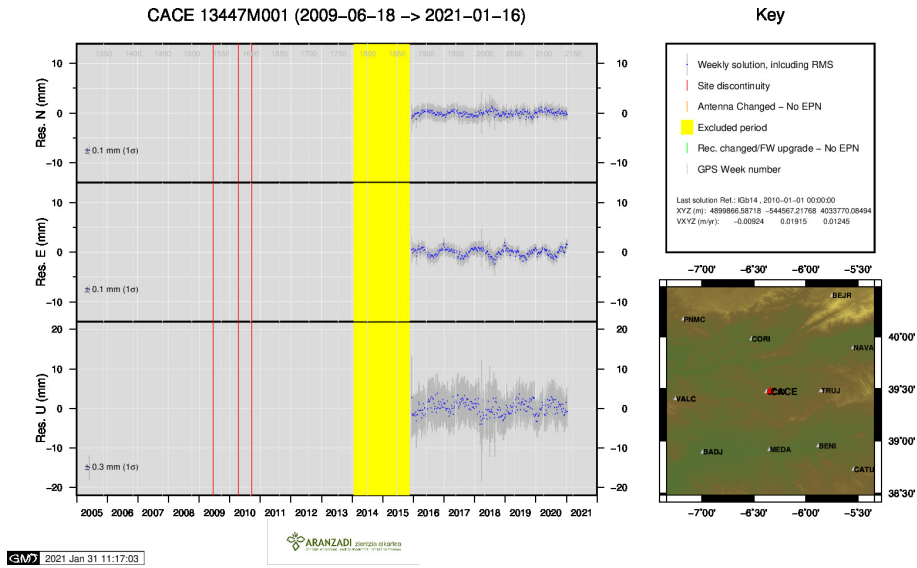
3) AMUR



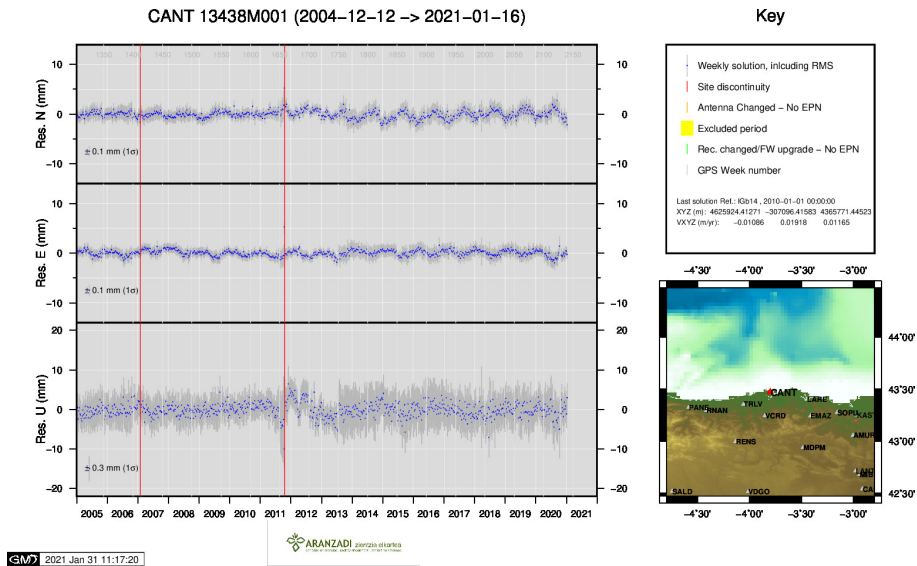
4) BLAZ



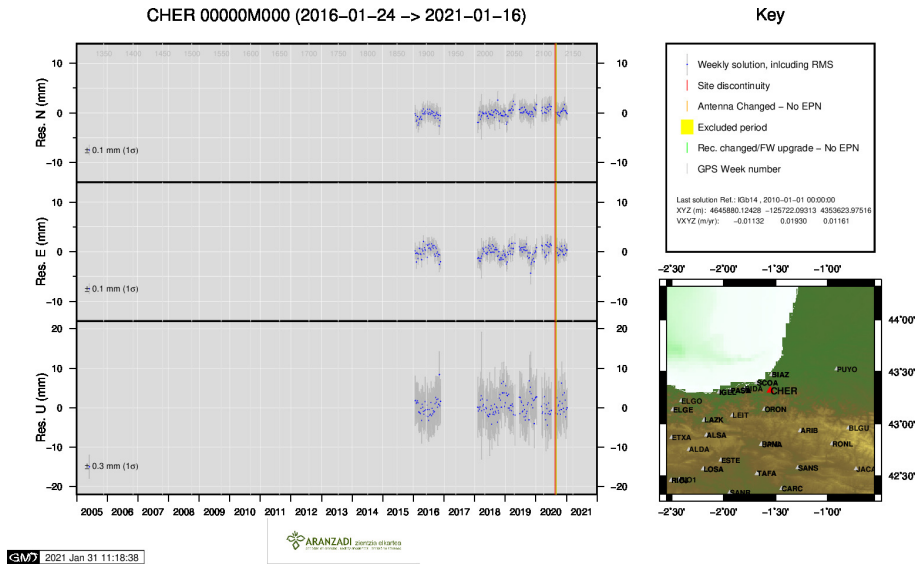
5) BIDA



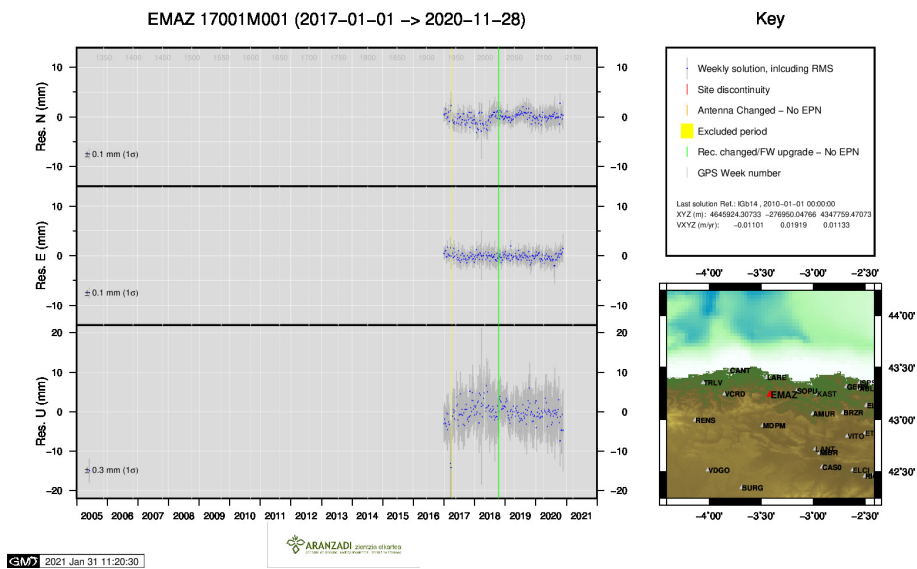
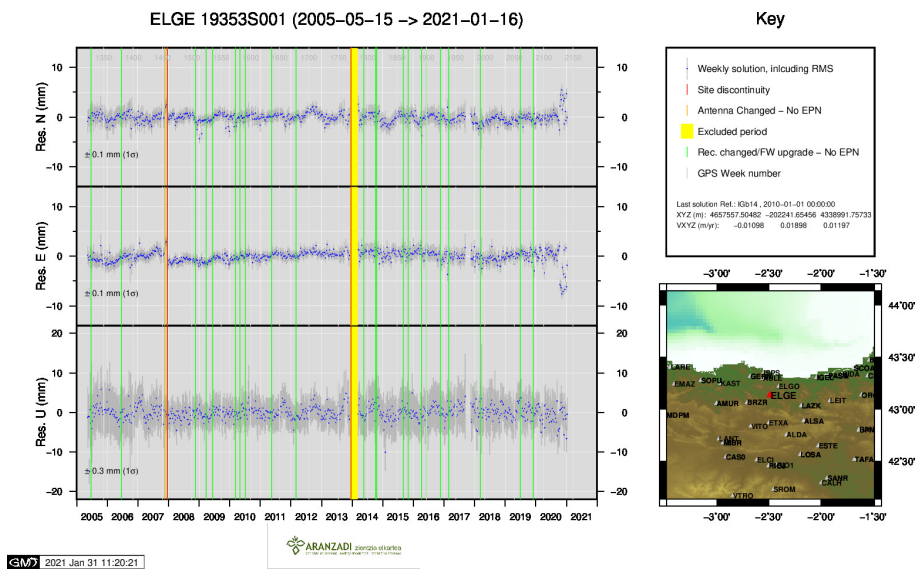
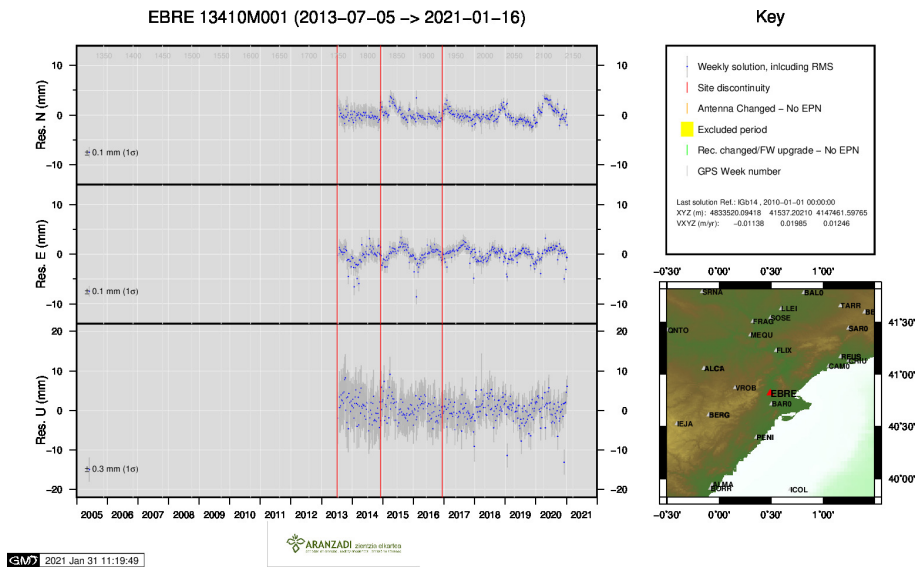
6) CACE

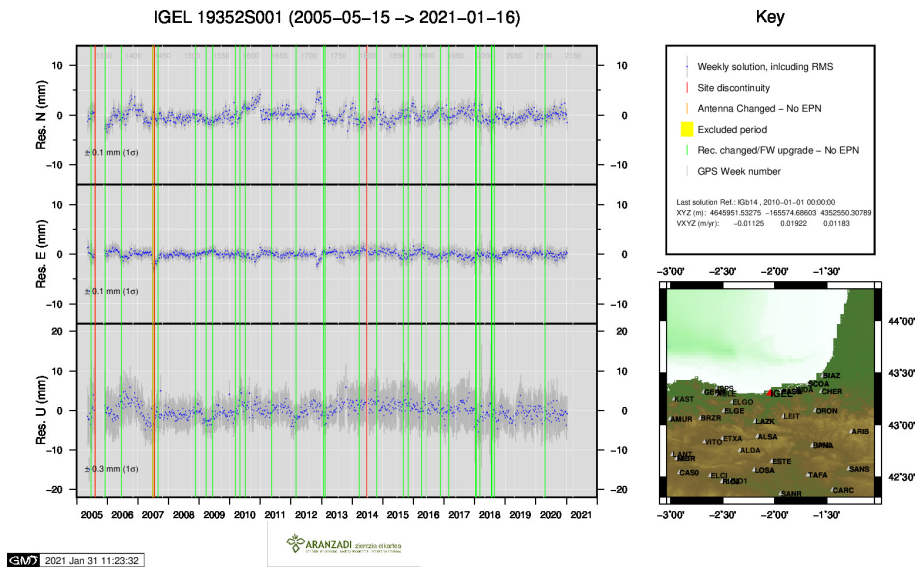


7) CANT

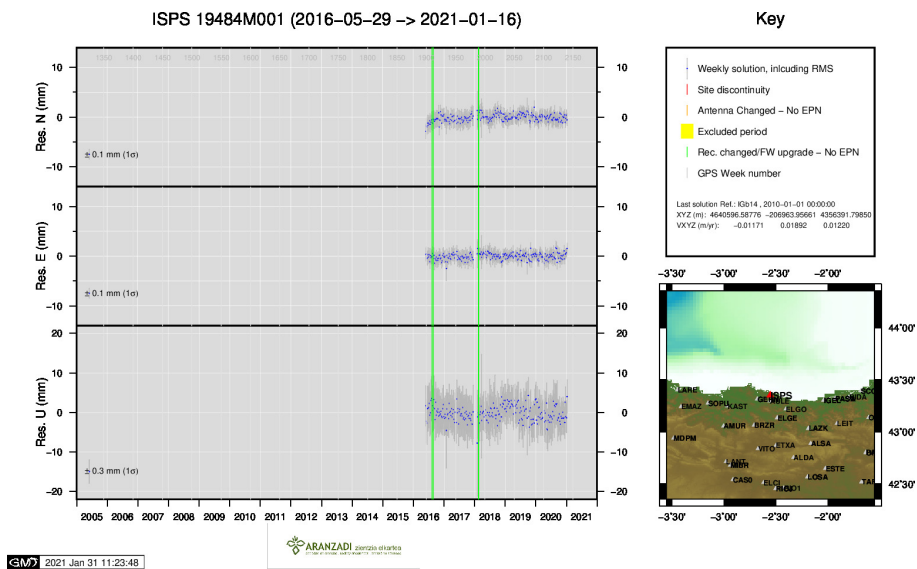


8) CHER

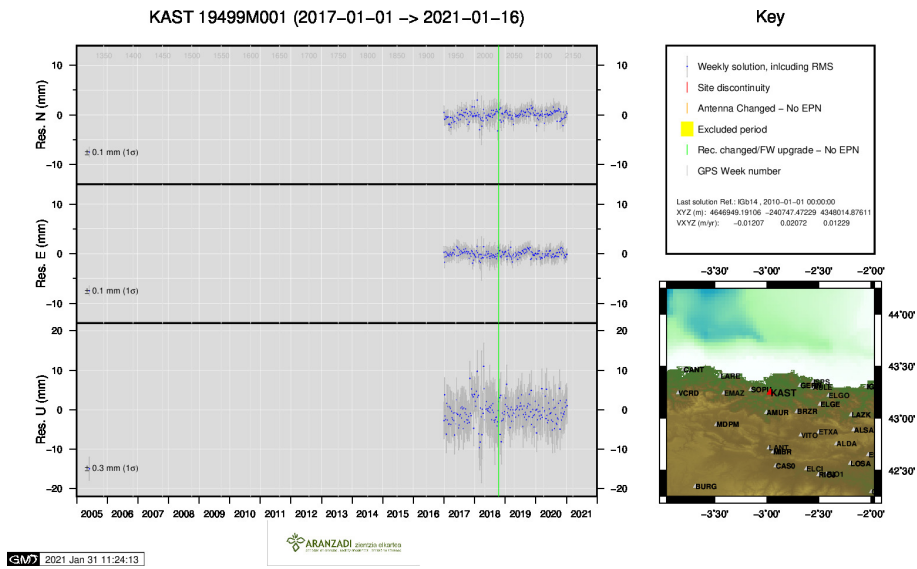




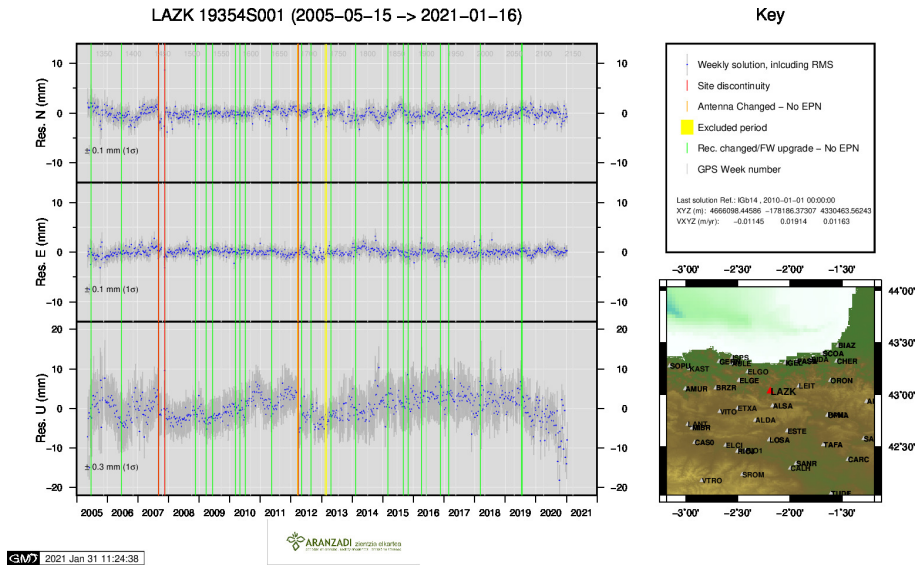
12) IGEL



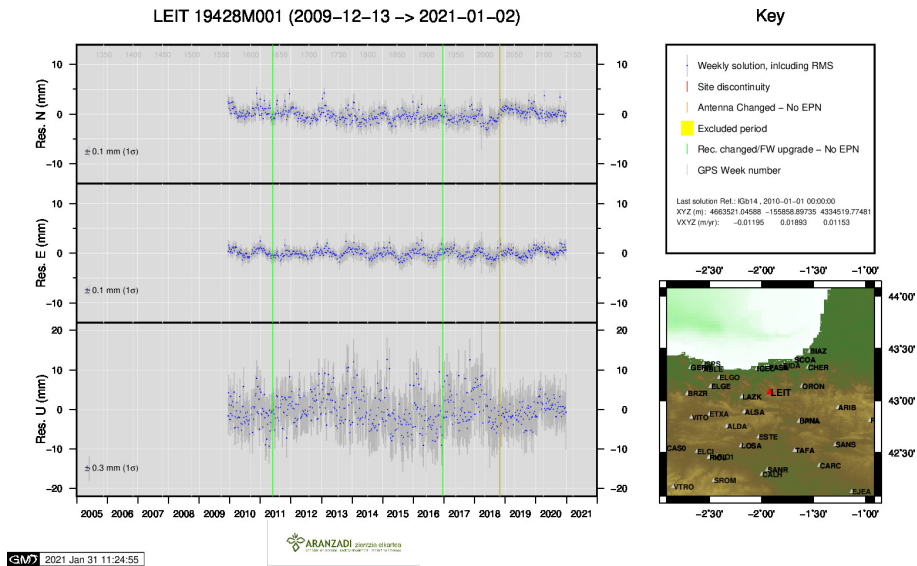
13) ISPS



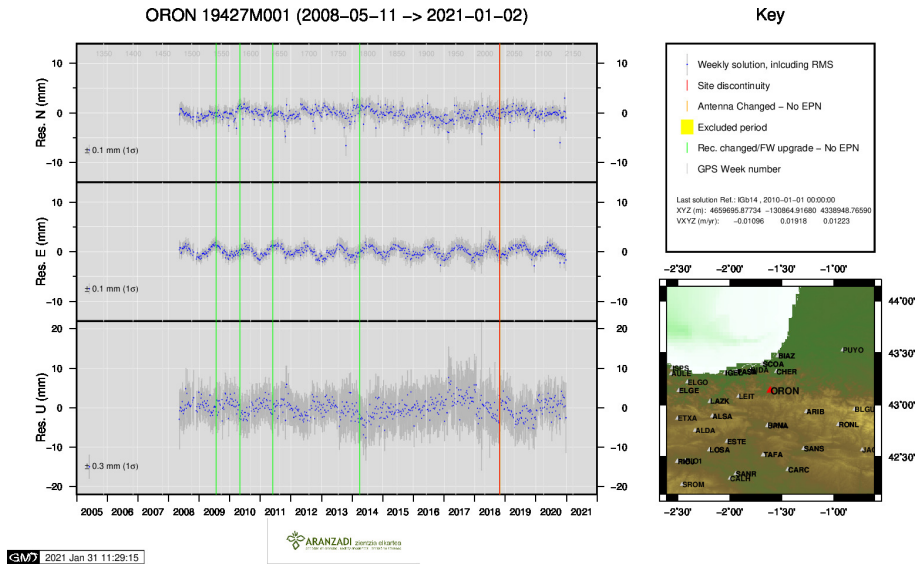
14) KAST



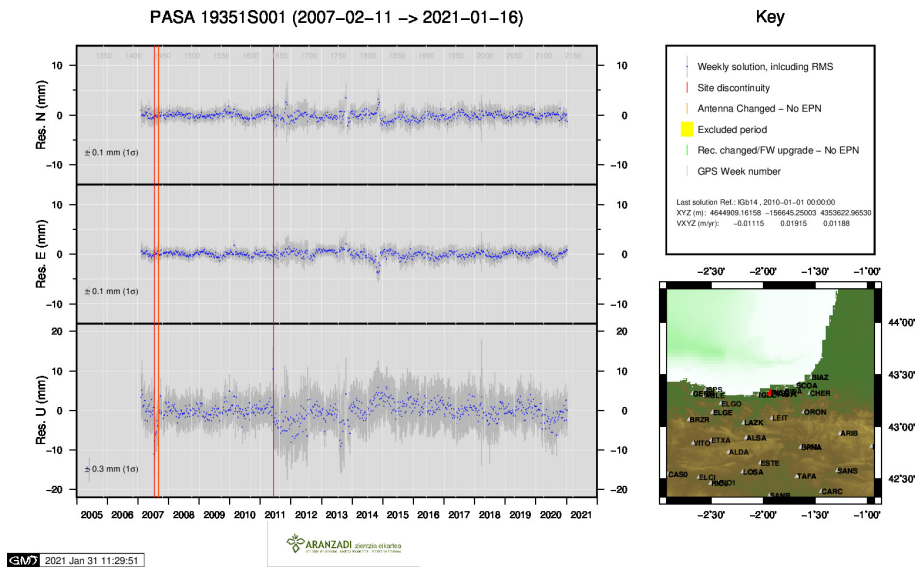
15) LAZK



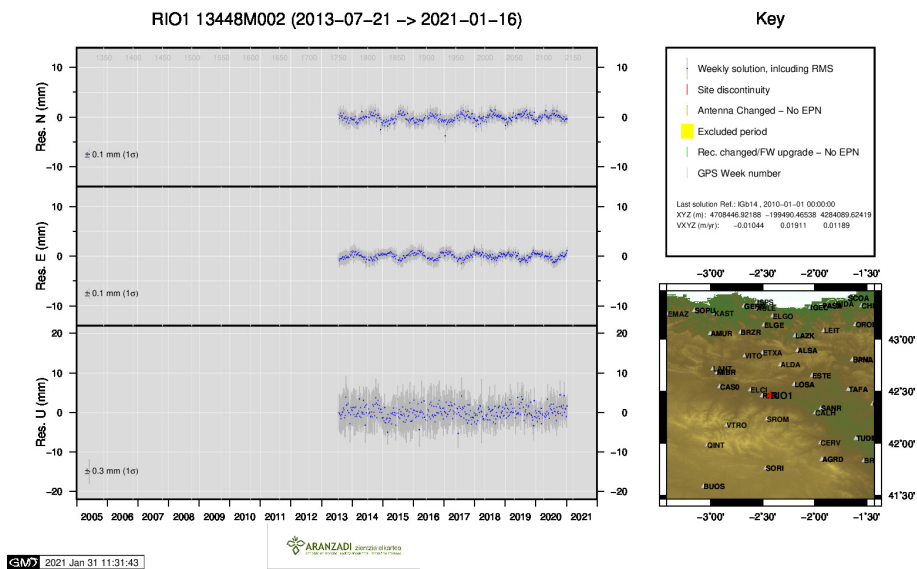
16) LEIT



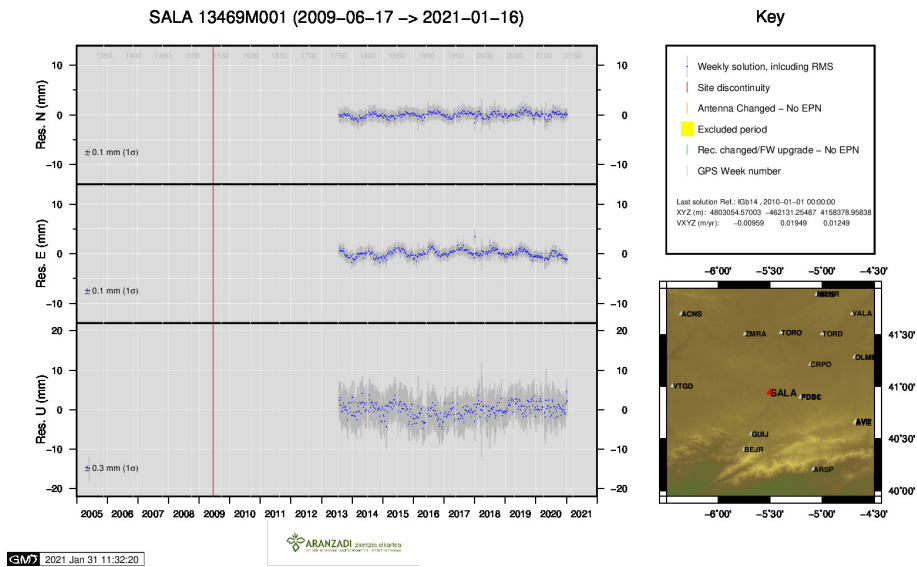
17) ORON



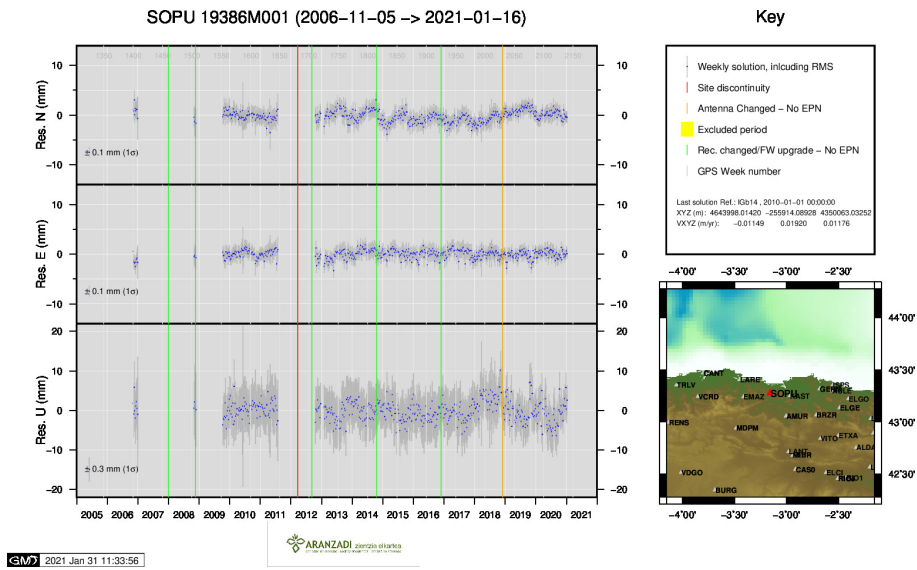
18) PASA



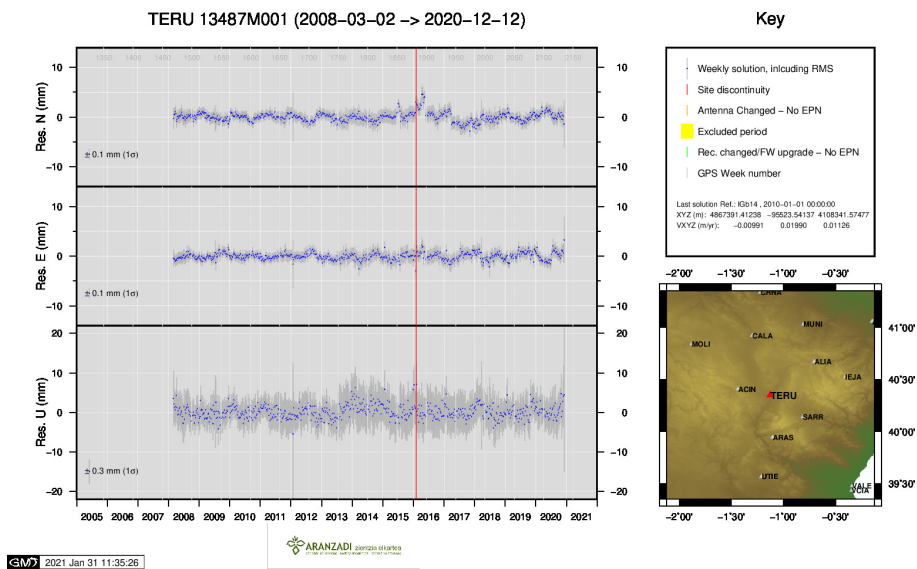
19) RIO1



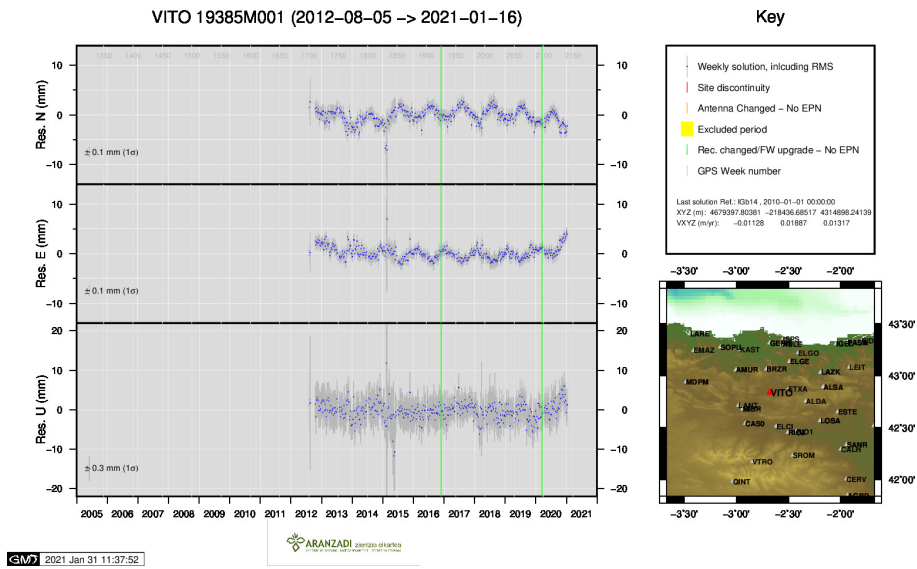
20) SALA



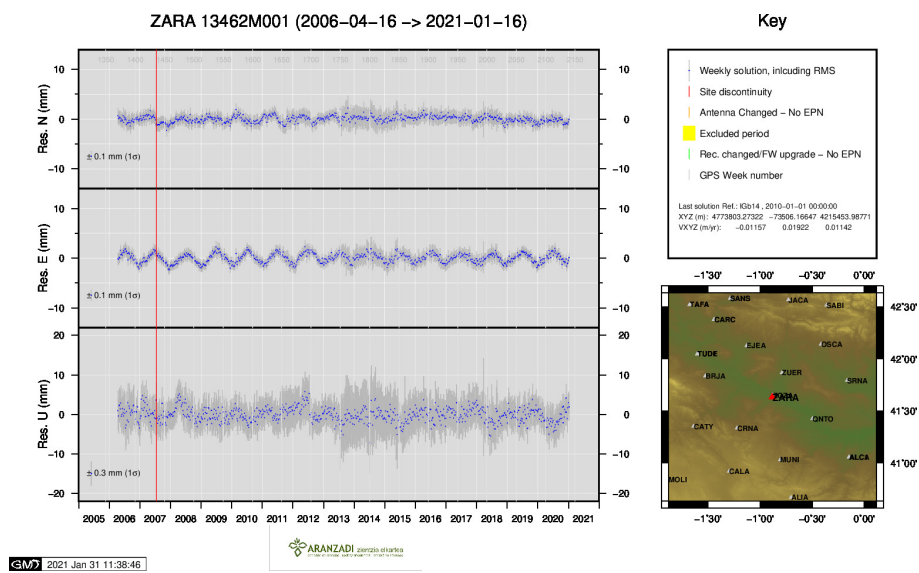
21) SOPU



22) TERU



23) VITO



24) ZARA