ARA-DAC Weekly Analysis Result: 2251 (GFA)

Technical Report

GPS Week: 2251 (GFA)

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

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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

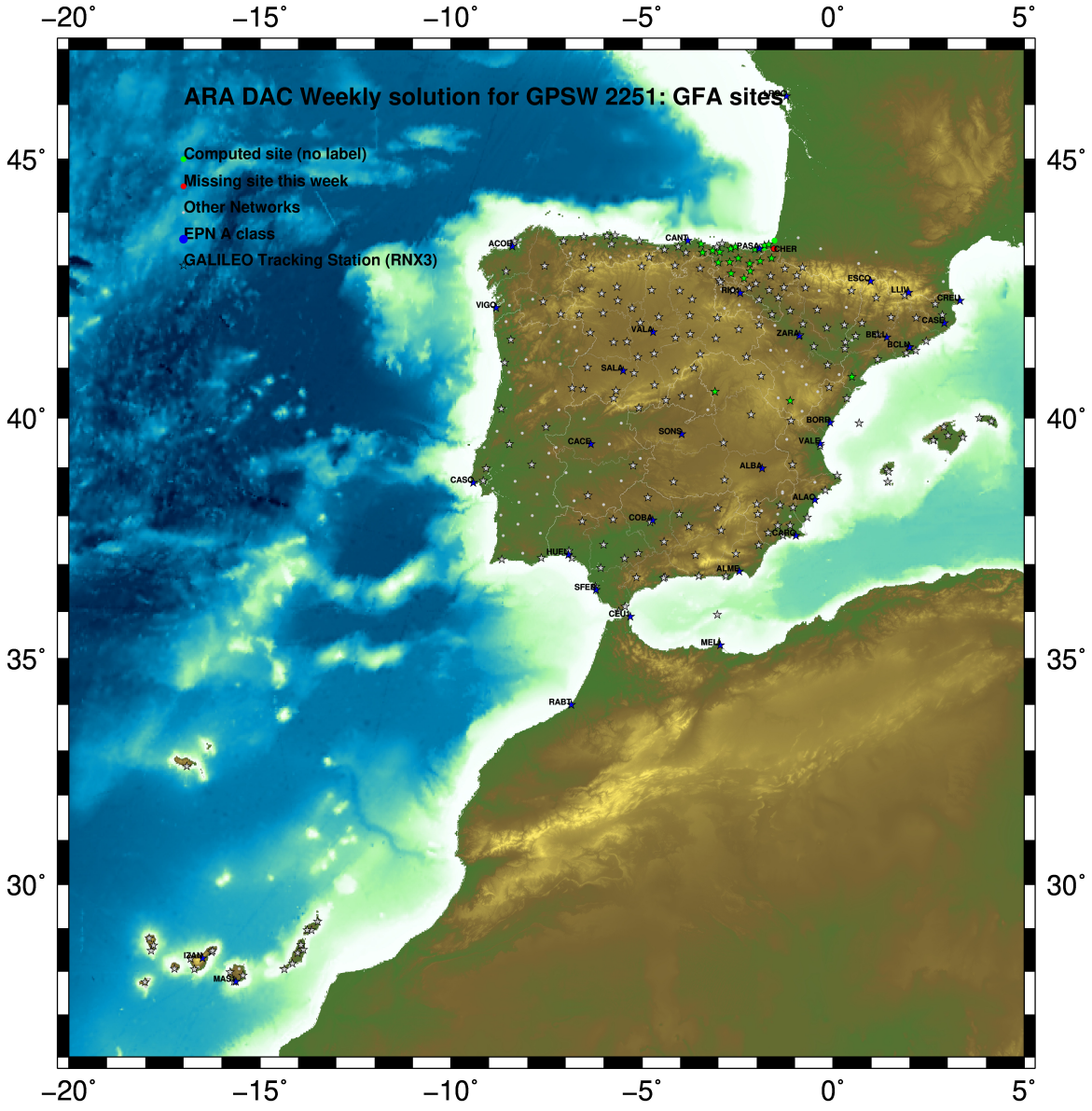

Fig.1: Computed Sites for GPS Week2251 (GFA)

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 is used if available starting GPS week 1986)
- 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.I20 file and individual calibrations from EPNC_20.ATX. EPN_A class sites (CRD + VEL) IGS20 used to define the reference frame (no EPN release is available at the time this report is generated). Following the EUREF guidelines, no other individual calibrations are included in the analysis starting GPSW 2238 (IGS20).
- Troposphere:
  - minimum elevation is 3 deg.; elevation dependent weighting.
  - VMF3 mapping function. ZPD parameters are estimated using the VMF3 mapping function.
  - CHENHER gradient estimation model.
- Ionosphere: no a priori model, ionospheric effect almost removed by iono free combination.
- Ocean Loading: FES2014b (Scherneck).
- Atmospheric loading: not corrected, following the latest recommendations for IGS20 products.
- Tidal displacements:
  - Mean pole model : IERS2010_v1.2.0
  - Subdaily pole model: DESAI2016
  - Nutation model : IAU2000R06

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. DE421 planetary ephemeris and JGM3 Earth geopotential model is used.
- Ambiguity: an advanced ambiguity resolution (AR) scheme is included:
  - Code-Based Widelane (WL) and Narrow Line (NR) AR for baselines shorter than 6000km, a Melbourne-Wuebbena wide-lane and narrow-lane AR is computed.
  - Phase-Based Widelane (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 IGS20

The Reference Frame considered in this section is a PRELIMINARY IGS20, based on the previously used IGb14 solution.

ARA FINAL WEEKLY COMBINATION: FINAL ORBITS 22-MAR-23 16:27

LOCAL GEODETIC DATUM: IGS20 EPOCH: 2023-03-01 11:59:45

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	SYSTEM
4	ACOR 13434M001	4594489.51704	-678367.36326	4357066.32160	W	GRE
39	ALDA 19383M001	4687280.11458	-190876.49552	4308107.00062	A	GRE
50	ALSA 19419M001	4677250.78941	-176770.32486	4319079.92096	A	GRE
53	AMUR 19388M001	4661499.40468	-244591.18635	4332269.92615	A	GRE
100	BIAZ 10074M002	4634456.00393	-124344.90619	4365785.50035	A	GR
101	BIDA 00000M000	4644177.77438	-145778.25477	4354832.52438	A	GR
113	BRZR 19387M001	4662220.94521	-220769.82787	4333309.48270	A	GRE
104	CACE 13447M001	4899866.46450	-544566.96551	4033770.25105	W	GRE
116	CANT 13438M001	4625924.27427	-307096.16580	4365771.60538	W	GRE
162	CREU 13432M001	4715420.08107	273178.13084	4271946.88881	W	GRE
204	EBRE 13410M001	4833519.94629	41537.46253	4147461.76357	A	GRE
180	ELGE 19353S001	4657557.34900	-202241.40048	4338991.93028	A	GRE
182	EMAZ 17001M001	4645924.17023	-276949.79928	4347759.61804	A	GRE
209	GERN 19389M001	4642811.27272	-217222.85223	4353278.91736	A	GRE
257	HOND 15012M002	4640529.27228	-145675.91578	4358781.80115	A	GRE
235	IGEL 19352S001	4645951.38249	-165574.43336	4352550.46538	A	GRE
240	ISPS 19484M001	4640596.43732	-206963.70662	4356391.96200	A	GRE
245	KAST 19499M001	4646949.03168	-240747.19946	4348015.03813	A	GRE
252	LARE 19440M001	4632831.91400	-279026.07210	4360314.47521	A	GRE
256	LAZK 19354S001	4666098.29148	-178186.12182	4330463.71239	A	GRE
261	LEIT 19428M001	4663520.89232	-155858.64860	4334519.93346	A	GRE
334	ORON 19427M001	4659695.73447	-130864.66681	4338948.92977	A	GRE
345	PAS2 19351S001	4644909.01470	-156644.99943	4353623.12064	A	GRE
493	PASA 19351S001	4644909.01469	-156644.99943	4353623.12066	W	GRE
553	RIO1 13448M002	4708446.78334	-199490.21173	4284089.78153	W	GRE
558	SALA 13469M001	4803054.44416	-462131.00073	4158379.12431	W	GRE
566	SCOA 10088M002	4639940.46258	-136224.87493	4359552.46408	A	GRE
418	SOPU 19386M001	4643997.86299	-255913.83695	4350063.18513	A	GRE
443	TERU 13487M001	4867391.27546	-95523.27387	4108341.72959	A	GRE
493	VITO 19385M001	4679397.65647	-218436.43350	4314898.41160	A	GRE
752	YEBE 13420M001	4848724.52490	-261631.85719	4123094.37628	A	GRE
755	ZARA 13462M001	4773803.12195	-73505.91521	4215454.14004	W	GRE

5.2 ETRF2000 (ETRS89) Coordinates

European **T**errestrial **R**eference **S**ystem, **1989** (**ETRS89**) is realized by ETRF2000 (Boucher and Altamimi, 2011) and (Altamimi, 2017).

CONVERT TO ETRF2000 22-MAR-23 16:27

LOCAL GEODETIC DATUM: ETRF2000 EPOCH: 2023-03-01 11:59:45

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	SYSTEM
4	ACOR 13434M001	4594489.85075	-678367.97476	4357065.85724	W	
39	ALDA 19383M001	4687280.50856	-190877.11700	4308106.53512	A	
50	ALSA 19419M001	4677251.18610	-176770.94513	4319079.45650	A	
53	AMUR 19388M001	4661499.79349	-244591.80494	4332269.46210	A	
100	BIAZ 10074M002	4634456.41115	-124345.52131	4365785.04021	A	
101	BIDA 00000M000	4644178.17793	-145778.87108	4354832.06313	A	
113	BRZR 19387M001	4662221.33724	-220770.44650	4333309.01891	A	
104	CACE 13447M001	4899866.79049	-544567.61231	4033769.76269	W	
116	CANT 13438M001	4625924.65749	-307096.78037	4365771.14348	W	
162	CREU 13432M001	4715420.53308	273177.50761	4271946.42714	W	
204	EBRE 13410M001	4833520.35818	41536.82475	4147461.28881	A	
180	ELGE 19353S001	4657557.74390	-202242.01851	4338991.46714	A	
182	EMAZ 17001M001	4645924.55601	-276950.41614	4347759.15487	A	
209	GERN 19389M001	4642811.66677	-217223.46857	4353278.45526	A	
257	HOND 15012M002	4640529.67616	-145676.53167	4358781.34021	A	
235	IGEL 19352S001	4645951.78327	-165575.04994	4352550.00371	A	
240	ISPS 19484M001	4640596.83296	-206964.32268	4356391.50022	A	
245	KAST 19499M001	4646949.42223	-240747.81635	4348014.57536	A	
252	LARE 19440M001	4632832.30048	-279026.68742	4360314.01311	A	
256	LAZK 19354S001	4666098.68887	-178186.74078	4330463.24885	A	
261	LEIT 19428M001	4663521.29296	-155859.26721	4334519.47044	A	
334	ORON 19427M001	4659696.13874	-130865.28490	4338948.46741	A	
345	PAS2 19351S001	4644909.41673	-156645.61586	4353622.65918	A	
493	PASA 19351S001	4644909.41672	-156645.61586	4353622.65920	W	
553	RIO1 13448M002	4708447.17431	-199490.83570	4284089.31412	W	
558	SALA 13469M001	4803054.79077	-462131.63625	4158378.64530	W	
566	SCOA 10088M002	4639940.86776	-136225.49072	4359552.00332	A	
418	SOPU 19386M001	4643998.25171	-255914.45352	4350062.72240	A	
443	TERU 13487M001	4867391.66630	-95523.91600	4108341.25012	A	
493	VITO 19385M001	4679398.04736	-218437.05413	4314897.94639	A	
752	YEBE 13420M001	4848724.89509	-261632.49759	4123093.89615	A	
755	ZARA 13462M001	4773803.52408	-73506.54643	4215453.66880	W	

5.3 ETRF2014 (ETRS89) Coordinates

European **T**errestrial **R**eference **S**ystem, **1989** (**ETRS89**) is realized by ETRF2014 (Boucher and Altamimi, 2011) and (Altamimi, 2017).

CONVERT TO ETRF2014 22-MAR-23 16:27

LOCAL GEODETIC DATUM: ETRF2014 EPOCH: 2023-03-01 11:59:45

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	SYSTEM
4	ACOR 13434M001	4594489.81040	-678368.01200	4357065.90916	W	
39	ALDA 19383M001	4687280.46577	-190877.15561	4308106.58690	A	
50	ALSA 19419M001	4677251.14337	-176770.98383	4319079.50832	A	
53	AMUR 19388M001	4661499.75116	-244591.84347	4332269.51394	A	
100	BIAZ 10074M002	4634456.36870	-124345.56039	4365785.09219	A	
101	BIDA 00000M000	4644178.13545	-145778.91004	4354832.11507	A	
113	BRZR 19387M001	4662221.29482	-220770.48511	4333309.07076	A	
104	CACE 13447M001	4899866.74636	-544567.64871	4033769.81377	W	
116	CANT 13438M001	4625924.61574	-307096.81883	4365771.19540	W	
162	CREU 13432M001	4715420.48825	273177.46747	4271946.47917	W	
204	EBRE 13410M001	4833520.31293	41536.78595	4147461.34033	A	
180	ELGE 19353S001	4657557.70147	-202242.05721	4338991.51901	A	
182	EMAZ 17001M001	4645924.51395	-276950.45462	4347759.20673	A	
209	GERN 19389M001	4642811.62454	-217223.50728	4353278.50717	A	
257	HOND 15012M002	4640529.63371	-145676.57064	4358781.39216	A	
235	IGEL 19352S001	4645951.74083	-165575.08882	4352550.05564	A	
240	ISPS 19484M001	4640596.79073	-206964.36143	4356391.55214	A	
245	KAST 19499M001	4646949.38004	-240747.85495	4348014.62724	A	
252	LARE 19440M001	4632832.25856	-279026.72595	4360314.06502	A	
256	LAZK 19354S001	4666098.64626	-178186.77953	4330463.30071	A	
261	LEIT 19428M001	4663521.25031	-155859.30605	4334519.52232	A	
334	ORON 19427M001	4659696.09604	-130865.32384	4338948.51931	A	
345	PAS2 19351S001	4644909.37428	-156645.65477	4353622.71111	A	
493	PASA 19351S001	4644909.37427	-156645.65477	4353622.71113	W	
553	RIO1 13448M002	4708447.13131	-199490.87418	4284089.36584	W	
558	SALA 13469M001	4803054.74754	-462131.67337	4158378.69666	W	
566	SCOA 10088M002	4639940.82529	-136225.52973	4359552.05528	A	
418	SOPU 19386M001	4643998.20959	-255914.49209	4350062.77429	A	
443	TERU 13487M001	4867391.62117	-95523.95416	4108341.30146	A	
493	VITO 19385M001	4679398.00475	-218437.09267	4314897.99819	A	
752	YEBE 13420M001	4848724.85073	-261632.53524	4123093.94745	A	
755	ZARA 13462M001	4773803.47992	-73506.58508	4215453.72041	W	

6 Quality Control

6.1 Mean and Daily Repeatabilities

In this section, the mean and daily repeatabilities of the sites are shown. Repatabilities refer to the IGS20 solution and are given with respect to the Local frame (North-East-Up).

ARA FINAL WEEKLY COMBINATION: FINAL ORBITS 22-MAR-23 16:27

Station	#Days	Weekday 0123456	Repeatability (mm) N	E	U
ACOR 13434M001	7	XXXXXXX	0.44	0.48	1.17
ALDA 19383M001	7	XXXXXXX	1.51	0.42	1.38
ALSA 19419M001	7	XXXXXXX	1.57	0.38	1.99
AMUR 19388M001	7	XXXXXXX	0.69	0.66	1.28
BIAZ 10074M002	7	XXXXXXX	0.61	0.39	2.92
BIDA 00000M000	7	XXXXXXX	0.76	0.54	1.97
BRZR 19387M001	7	XXXXXXX	0.53	0.59	4.73
CACE 13447M001	6	XX XXXX	0.63	0.42	1.33
CANT 13438M001	7	XXXXXXX	0.55	0.59	2.47
CREU 13432M001	7	XXXXXXX	0.73	1.25	2.17
EBRE 13410M001	7	XXXXXXX	0.68	0.99	2.80
ELGE 19353S001	7	XXXXXXX	0.88	0.71	2.52
EMAZ 17001M001	7	XXXXXXX	0.81	0.74	3.44
GERN 19389M001	7	XXXXXXX	0.88	0.66	2.84
HOND 15012M002	7	XXXXXXX	0.60	0.49	2.38
IGEL 19352S001	7	XXXXXXX	0.71	0.58	2.55
ISPS 19484M001	7	XXXXXXX	0.43	0.52	2.01
KAST 19499M001	7	XXXXXXX	0.60	0.72	2.41
LARE 19440M001	7	XXXXXXX	0.67	0.54	1.96
LAZK 19354S001	7	XXXXXXX	1.21	0.98	5.00
LEIT 19428M001	7	XXXXXXX	0.87	0.45	3.19
ORON 19427M001	7	XXXXXXX	0.84	0.49	1.83
PAS2 19351S001	7	XXXXXXX	0.50	0.44	2.25
PASA 19351S001	7	XXXXXXX	0.50	0.41	2.24
RIO1 13448M002	7	XXXXXXX	0.56	0.72	2.95
SALA 13469M001	7	XXXXXXX	0.11	0.42	0.87
SCOA 10088M002	7	XXXXXXX	0.71	0.89	2.75
SOPU 19386M001	7	XXXXXXX	1.10	0.75	2.34
TERU 13487M001	7	XXXXXXX	0.35	0.63	1.33
VITO 19385M001	7	XXXXXXX	0.94	0.65	0.90
YEBE 13420M001	7	XXXXXXX	0.50	0.34	1.66
ZARA 13462M001	7	XXXXXXX	0.72	0.60	1.31

Comparison of individual solutions:

ACOR 13434M001	N	0.44	-0.50	-0.14	-0.55	-0.31	0.61	-0.35	-0.02
ACOR 13434M001	E	0.48	-0.65	-0.15	-0.51	-0.26	-0.20	0.10	-0.75
ACOR 13434M001	U	1.17	-1.46	1.03	0.84	0.23	-1.15	1.01	-1.38
ALDA 19383M001	N	1.51	1.41	1.66	-0.97	2.21	-0.53	-1.34	-1.07
ALDA 19383M001	E	0.42	0.73	-0.25	-0.52	-0.31	-0.26	-0.19	-0.11
ALDA 19383M001	U	1.38	-1.90	0.80	0.51	0.67	2.24	-0.25	1.21
ALSA 19419M001	N	1.57	2.81	0.28	-1.79	0.20	0.24	-1.80	-0.48
ALSA 19419M001	E	0.38	0.16	0.05	-0.61	0.21	0.43	-0.49	0.09
ALSA 19419M001	U	1.99	-0.56	-3.03	0.95	2.75	2.19	-1.03	-0.17
AMUR 19388M001	N	0.69	1.23	0.26	-0.83	0.01	-0.21	-0.36	-0.66
AMUR 19388M001	E	0.66	0.92	0.04	-0.37	-0.70	-0.70	-0.33	-0.73
AMUR 19388M001	U	1.28	-0.61	-0.03	-0.40	0.38	0.72	2.58	-1.40
BIAZ 10074M002	N	0.61	0.61	-0.39	-0.32	0.63	-0.80	0.23	-0.71
BIAZ 10074M002	E	0.39	0.58	0.02	-0.62	0.01	-0.25	-0.17	-0.33
BIAZ 10074M002	U	2.92	-2.22	1.75	3.30	2.73	4.68	0.87	-1.52
BIDA 00000M000	N	0.76	1.03	0.35	-0.64	0.09	0.31	-0.80	-1.06
BIDA 00000M000	E	0.54	0.05	0.25	-1.08	0.52	-0.50	0.03	0.01
BIDA 00000M000	U	1.97	-0.95	2.51	1.45	1.68	3.10	1.00	0.79
BRZR 19387M001	N	0.53	0.33	0.55	0.09	0.28	-0.61	-0.59	-0.67
BRZR 19387M001	E	0.59	-0.04	0.79	-0.73	-0.79	-0.38	-0.39	-0.09
BRZR 19387M001	U	4.73	0.84	-3.66	-3.30	-1.78	-4.42	9.15	1.68
CACE 13447M001	N	0.63	0.81	-1.04		-0.25	-0.15	-0.23	0.38
CACE 13447M001	E	0.42	0.11	-0.14		-0.20	-0.15	-0.09	0.89
CACE 13447M001	U	1.33	1.87	0.59		0.92	0.51	-1.45	1.35
CANT 13438M001	N	0.55	0.78	-0.77	-0.07	0.55	0.18	-0.40	0.30
CANT 13438M001	E	0.59	0.81	-0.66	-0.70	-0.17	-0.21	0.43	-0.52
CANT 13438M001	U	2.47	-2.50	-0.64	4.31	-0.22	2.36	1.03	-2.18
CREU 13432M001	N	0.73	-0.06	0.40	-0.58	1.21	0.25	-1.00	-0.40
CREU 13432M001	E	1.25	1.17	2.32	0.39	-0.08	-0.82	-0.94	-0.98
CREU 13432M001	U	2.17	-1.96	-2.11	0.42	-0.01	1.80	1.60	-3.75
EBRE 13410M001	N	0.68	-1.11	0.48	0.75	0.28	-0.44	-0.62	0.24
EBRE 13410M001	E	0.99	0.75	1.54	-1.27	0.81	0.08	-0.79	-0.00
EBRE 13410M001	U	2.80	3.35	-1.41	-1.58	-3.26	1.80	2.29	-3.48
ELGE 19353S001	N	0.88	-0.43	0.43	-0.05	1.00	0.76	-1.43	-0.82
ELGE 19353S001	E	0.71	0.88	0.29	-1.04	-0.79	-0.68	-0.06	-0.14
ELGE 19353S001	U	2.52	-1.17	-1.67	-4.30	3.38	1.81	0.81	-0.08
EMAZ 17001M001	N	0.81	1.35	0.62	-0.04	0.02	-0.60	-1.10	-0.31
EMAZ 17001M001	E	0.74	-0.21	0.10	-0.34	1.23	-0.39	-0.39	-1.15
EMAZ 17001M001	U	3.44	-0.71	-3.12	-1.41	-2.77	-0.66	5.80	4.15
GERN 19389M001	N	0.88	1.18	0.42	-0.83	0.31	0.02	-1.15	-0.96
GERN 19389M001	E	0.66	0.58	-0.27	-0.75	-0.57	-0.78	0.78	-0.31
GERN 19389M001	U	2.84	0.42	-2.63	2.31	0.45	0.35	5.84	-1.25
HOND 15012M002	N	0.60	1.06	0.03	-0.55	0.11	-0.17	-0.69	-0.46
HOND 15012M002	E	0.49	0.68	0.22	-0.27	-0.63	0.17	-0.54	-0.34
HOND 15012M002	U	2.38	-2.01	3.58	3.15	0.79	2.07	1.23	0.87
IGEL 19352S001	N	0.71	0.16	-0.62	-0.58	1.41	-0.27	-0.28	-0.39
IGEL 19352S001	E	0.58	0.59	0.41	-0.38	-0.14	0.35	-0.68	-0.85
IGEL 19352S001	U	2.55	-1.11	1.66	3.13	-0.91	4.64	1.52	0.81
ISPS 19484M001	N	0.43	-0.28	-0.17	-0.64	0.66	-0.20	-0.35	0.06
ISPS 19484M001	E	0.52	0.50	-0.07	-0.41	-1.07	-0.20	-0.05	-0.07
ISPS 19484M001	U	2.01	0.87	3.19	2.24	-1.58	2.08	-1.17	-0.02
KAST 19499M001	N	0.60	0.31	0.04	-0.28	-0.44	-0.18	0.64	-1.17
KAST 19499M001	E	0.72	0.07	-0.54	-0.37	-0.87	-0.72	1.18	-0.06
KAST 19499M001	U	2.41	0.20	-1.78	1.87	-1.65	1.03	4.83	0.97
LARE 19440M001	N	0.67	1.17	-0.65	-0.28	0.16	-0.17	-0.87	0.04
LARE 19440M001	E	0.54	0.25	-0.09	-1.10	0.31	-0.35	0.13	-0.50
LARE 19440M001	U	1.96	-2.89	0.65	2.85	0.14	0.79	1.28	-1.99
LAZK 19354S001	N	1.21	2.40	-0.33	-0.81	-0.60	0.54	-1.00	-0.74
LAZK 19354S001	E	0.98	0.67	1.43	0.85	-0.58	-0.84	-0.94	-0.82

LAZK	19354S001	U	5.00	-0.27	-7.47	-4.08	8.16	2.38	-0.09	2.34
LEIT	19428M001	N	0.87	1.52	0.30	-0.69	-0.39	-0.14	-0.83	-0.89
LEIT	19428M001	E	0.45	-0.32	0.15	0.60	0.46	-0.19	-0.61	-0.31
LEIT	19428M001	U	3.19	1.31	1.96	-0.62	-0.04	6.15	1.51	-3.90
ORON	19427M001	N	0.84	1.50	0.02	-0.30	-0.16	-0.95	-0.84	-0.52
ORON	19427M001	E	0.49	0.92	-0.20	-0.46	0.06	-0.50	-0.23	-0.23
ORON	19427M001	U	1.83	-0.81	1.42	0.61	-0.67	3.35	1.45	1.81
PAS2	19351S001	N	0.50	0.24	0.05	-0.24	0.58	-0.78	-0.65	0.11
PAS2	19351S001	E	0.44	0.80	-0.07	-0.26	-0.14	-0.22	-0.51	-0.31
PAS2	19351S001	U	2.25	-1.67	2.51	3.00	1.05	2.94	1.47	0.53
PASA	19351S001	N	0.50	0.20	0.00	-0.30	0.67	-0.70	-0.66	0.12
PASA	19351S001	E	0.41	0.73	-0.02	-0.28	-0.12	-0.19	-0.52	-0.31
PASA	19351S001	U	2.24	-1.57	2.53	2.97	0.89	2.98	1.54	0.50
RIO1	13448M002	N	0.56	0.47	-0.73	-0.24	0.35	0.72	-0.34	-0.55
RIO1	13448M002	E	0.72	0.61	0.28	-0.43	-0.15	-0.81	-0.09	-1.33
RIO1	13448M002	U	2.95	1.50	2.57	3.71	-2.10	3.26	-0.95	-3.71
SALA	13469M001	N	0.11	0.02	0.10	-0.08	-0.16	0.11	0.03	-0.11
SALA	13469M001	E	0.42	-0.42	0.63	-0.61	-0.32	0.02	-0.14	-0.10
SALA	13469M001	U	0.87	-0.54	1.20	0.47	0.49	0.30	-0.81	1.26
SCOA	10088M002	N	0.71	1.11	0.18	-0.03	0.19	-0.34	-1.04	-0.74
SCOA	10088M002	E	0.89	1.19	0.85	0.08	-0.07	-0.91	-1.00	-0.89
SCOA	10088M002	U	2.75	-3.15	3.31	2.69	2.60	2.04	2.49	0.20
SOPU	19386M001	N	1.10	1.52	-0.64	-1.38	-1.20	0.94	-0.55	0.26
SOPU	19386M001	E	0.75	0.49	-0.91	0.32	0.23	-1.23	0.47	-0.66
SOPU	19386M001	U	2.34	1.30	-0.35	4.39	2.10	-2.09	1.16	-1.31
TERU	13487M001	N	0.35	-0.31	-0.50	-0.15	0.27	-0.49	0.18	-0.08
TERU	13487M001	E	0.63	-0.47	-0.51	0.33	-0.98	0.33	0.46	-0.70
TERU	13487M001	U	1.33	1.36	-0.53	-1.61	0.85	-1.99	-0.68	0.84
VITO	19385M001	N	0.94	1.69	-0.06	-0.45	0.39	-0.29	-1.35	-0.40
VITO	19385M001	E	0.65	1.16	-0.31	-0.42	-0.42	-0.58	0.18	-0.59
VITO	19385M001	U	0.90	1.20	0.52	0.01	-0.89	0.33	0.86	-1.23
YEBE	13420M001	N	0.50	0.35	0.81	-0.17	-0.25	-0.43	-0.41	-0.50
YEBE	13420M001	E	0.34	0.26	-0.16	-0.65	-0.02	-0.35	-0.21	0.10
YEBE	13420M001	U	1.66	-0.87	-1.45	1.68	2.22	2.35	0.51	0.29
ZARA	13462M001	N	0.72	1.14	0.64	-0.39	-0.08	-0.53	-0.92	-0.33
ZARA	13462M001	E	0.60	0.54	0.83	-0.80	0.31	-0.56	-0.33	0.10
ZARA	13462M001	U	1.31	-2.22	-2.25	0.13	-0.10	-0.50	-0.13	0.28

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.

TRANSFORMATION IN EQUATORIAL SYSTEM (X, Y, Z):
RESIDUALS IN LOCAL SYSTEM (NORTH, EAST, UP)

LIST OF REMOVED STATIONS:

OUTLIER CRITERIA: 15.00 15.00 20.00

NUM	NAME	FLG	RESIDUALS IN MILLIMETERS		
1	ACOR 13434M001	I W	-0.57	1.21	3.86
2	ALAC 13433M001	I W	-2.56	2.95	1.93
3	ALBA 13452M001	I W	4.28	-2.27	-7.63
4	ALME 13437M001	I W	-1.71	-0.46	3.75
5	BCLN 13412M001	I W	1.04	-1.19	0.25
6	BELL 13431M001	I W	-0.52	-0.63	1.00
7	BORR 13480M001	I W	-1.05	-1.80	-1.26
8	BRST 10004M004	I W	-2.50	-1.08	0.97
9	CACE 13447M001	I W	-0.13	1.30	4.97
10	CANT 13438M001	I W	-2.43	2.24	-8.17
11	CARG 19412M001	I W	1.91	0.35	-2.91
12	CASE 13494M001	I W	-4.18	1.62	-3.92
13	CEU1 13449M002	I W	0.56	-0.07	-1.50
14	COBA 13453M001	I W	1.79	1.70	-4.85
15	CREU 13432M001	I W	-3.53	0.74	-1.32
17	ESCO 13435M001	I W	-6.45	0.98	6.09
18	HUEL 13451M001	I W	9.01	-8.44	11.66
20	IZAN 31309M002	I W	1.11	1.26	-1.91
21	LLIV 13436M001	I W	-0.73	0.05	0.94
23	LROC 10023M001	I W	-1.87	1.90	9.62
25	MAS1 31303M002	I W	0.18	-1.01	-6.10
26	MELI 19379M001	I W	3.19	3.05	-3.06
27	PASA 19351S001	I W	1.18	1.04	-3.06
28	PDEL 31906M004	I W	1.65	-3.16	4.27
29	RABT 35001M002	I W	-0.02	0.01	-10.06
30	RIO1 13448M002	I W	-2.21	-1.84	-0.87
31	SALA 13469M001	I W	0.91	2.43	-3.21
33	SFER 13402M004	I W	-2.58	-8.98	4.96
34	SONS 13446M001	I W	1.76	4.27	-0.89
35	VALA 13463M002	I W	0.37	2.22	0.40
36	VALE 13439M001	I W	-4.40	4.76	-8.52
37	VIGO 13450M001	I W	2.97	0.14	0.83
40	ZARA 13462M001	I W	-1.31	2.27	1.40
41	ZIMM 14001M004	I W	-2.27	-0.45	4.53
305	CASC 13909S001	A W	3.52	-7.49	7.54
	RMS / COMPONENT		2.90	3.12	5.07
	IQR		3.92	2.98	6.92
	MEAN		-0.16	-0.07	-0.01
	MEDIAN		-0.13	0.35	0.25
	MIN		-6.45	-8.98	-10.06
	MAX		9.01	4.76	11.66
	OVERALL RMS/IQR/MAX(3D)		3.82	3.70	16.98 HUEL 13451M001 #SUM

ALL	RMS / COMPONENT		2.90	3.12	5.07		
ALL	IQR		3.92	2.98	6.92		
ALL	MEAN		-0.16	-0.07	-0.01		
ALL	MEDIAN		-0.13	0.35	0.25		
ALL	MIN		-6.45	-8.98	-10.06		
ALL	MAX		9.01	4.76	11.66		
ALL	OVERALL RMS/IQR/MAX(3D)		3.82	3.70	16.98	HUEL 13451M001	#SUM_ALL

NUMBER OF PARAMETERS : 3
NUMBER OF STATIONS : 35
NUMBER OF COORDINATES : 105
RMS OF TRANSFORMATION : 3.82 MM

PARAMETERS:

TRANSLATION IN X : -0.00 +- 0.65 MM
TRANSLATION IN Y : 0.00 +- 0.65 MM
TRANSLATION IN Z : 0.00 +- 0.65 MM

NUMBER OF ITERATIONS : 1

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.

7 Equipment

7.1 Receiver List

Serial numbers not shown.

7.2 Antennas

Serial number ONLY provided in case individual calibrations are used.

7.3 Eccentricities

8 Inconsistencies (logsheet-RINEX metadata)

The following inconsistencies were found comparing the data available in the logsheets and the RINEX headers:

```
2023-03-20 14:12 UTC | ALSA0570.23O | RECEIVER FIRM. VERS. |  4.31/7.403 -> 4.31 (source: alsa00esp_20181108.log
2023-03-20 14:12 UTC | ISPS0570.23O | RECEIVER FIRM. VERS. |  5.30 -> 5.22 (source: isps00esp_20220907.log
2023-03-20 14:12 UTC | LARE0570.23O | RECEIVER FIRM. VERS. |  4.52/7.711 -> 4.31/7.403 (source: lare00esp_20230308.log
2023-03-20 14:12 UTC | LEIT0570.23O | RECEIVER FIRM. VERS. |  4.31/7.403 -> 4.31 (source: leit00esp_20181204.log
2023-03-20 14:12 UTC | ORON0570.23O | RECEIVER FIRM. VERS. |  4.31/7.403 -> 4.31 (source: oron00esp_20181101.log
2023-03-20 17:21 UTC | ALSA0580.23O | RECEIVER FIRM. VERS. |  4.31/7.403 -> 4.31 (source: alsa00esp_20181108.log
2023-03-20 17:21 UTC | ISPS0580.23O | RECEIVER FIRM. VERS. |  5.30 -> 5.22 (source: isps00esp_20220907.log
2023-03-20 17:21 UTC | LARE0580.23O | RECEIVER FIRM. VERS. |  4.52/7.711 -> 4.31/7.403 (source: lare00esp_20230308.log
2023-03-20 17:21 UTC | LEIT0580.23O | RECEIVER FIRM. VERS. |  4.31/7.403 -> 4.31 (source: leit00esp_20181204.log
2023-03-20 17:21 UTC | ORON0580.23O | RECEIVER FIRM. VERS. |  4.31/7.403 -> 4.31 (source: oron00esp_20181101.log
2023-03-20 20:57 UTC | ALSA0590.23O | RECEIVER FIRM. VERS. |  4.31/7.403 -> 4.31 (source: alsa00esp_20181108.log
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2023-03-20 20:57 UTC | LARE0590.23O | RECEIVER FIRM. VERS. |  4.52/7.711 -> 4.31/7.403 (source: lare00esp_20230308.log
2023-03-20 20:57 UTC | LEIT0590.23O | RECEIVER FIRM. VERS. |  4.31/7.403 -> 4.31 (source: leit00esp_20181204.log
2023-03-20 20:57 UTC | ORON0590.23O | RECEIVER FIRM. VERS. |  4.31/7.403 -> 4.31 (source: oron00esp_20181101.log
2023-03-21 02:09 UTC | ALSA0600.23O | RECEIVER FIRM. VERS. |  4.31/7.403 -> 4.31 (source: alsa00esp_20181108.log
2023-03-21 02:09 UTC | ISPS0600.23O | RECEIVER FIRM. VERS. |  5.30 -> 5.22 (source: isps00esp_20220907.log
2023-03-21 02:09 UTC | LARE0600.23O | RECEIVER FIRM. VERS. |  4.52/7.711 -> 4.31/7.403 (source: lare00esp_20230308.log
2023-03-21 02:09 UTC | LEIT0600.23O | RECEIVER FIRM. VERS. |  4.31/7.403 -> 4.31 (source: leit00esp_20181204.log
2023-03-21 02:09 UTC | ORON0600.23O | RECEIVER FIRM. VERS. |  4.31/7.403 -> 4.31 (source: oron00esp_20181101.log
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2023-03-21 06:00 UTC | ORON0610.23O | RECEIVER FIRM. VERS. |  4.31/7.403 -> 4.31 (source: oron00esp_20181101.log
2023-03-21 09:05 UTC | ALSA0620.23O | RECEIVER FIRM. VERS. |  4.31/7.403 -> 4.31 (source: alsa00esp_20181108.log
2023-03-21 09:05 UTC | ISPS0620.23O | RECEIVER FIRM. VERS. |  5.30 -> 5.22 (source: isps00esp_20220907.log
2023-03-21 09:05 UTC | LARE0620.23O | RECEIVER FIRM. VERS. |  4.52/7.711 -> 4.31/7.403 (source: lare00esp_20230308.log
2023-03-21 09:05 UTC | LEIT0620.23O | RECEIVER FIRM. VERS. |  4.31/7.403 -> 4.31 (source: leit00esp_20181204.log
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2023-03-22 16:24 UTC | ISPS0630.23O | RECEIVER FIRM. VERS. |  5.30 -> 5.22 (source: isps00esp_20220907.log
2023-03-22 16:24 UTC | LARE0630.23O | RECEIVER FIRM. VERS. |  4.52/7.711 -> 4.31/7.403 (source: lare00esp_20230308.log
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2023-03-22 16:24 UTC | ORON0630.23O | RECEIVER FIRM. VERS. |  4.31/7.403 -> 4.31 (source: oron00esp_20181101.log
```

9 References

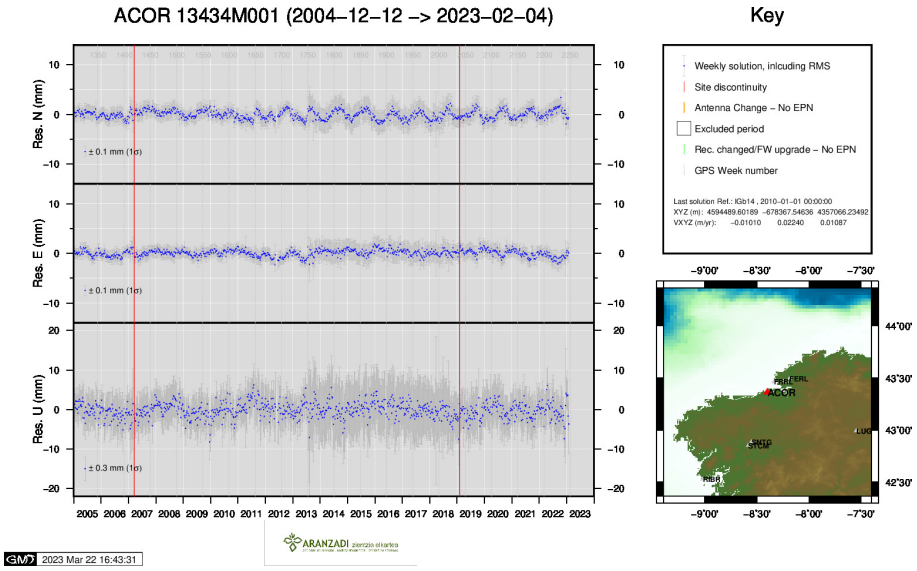
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign.* etrs89.ensg.ign.fr/memo-V8.pdf

EPN Coordination Group and the EPN Central Bureau (2018): *Guidelines for the EPN Analysis Centres.* epncb.oma.be/$_d$*ocumentation/guidelines/guidelines*$_a$*nalysis*$_c$*entres.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

10 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.



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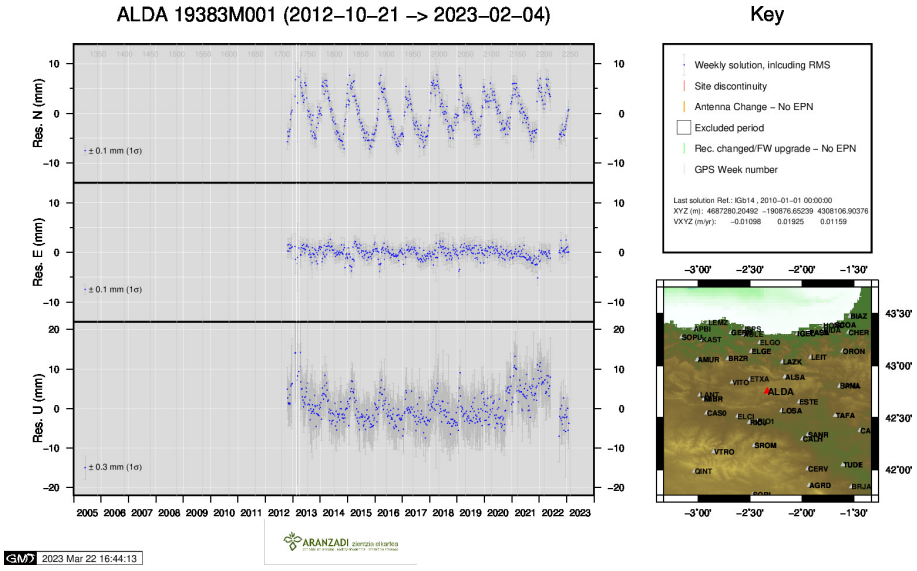
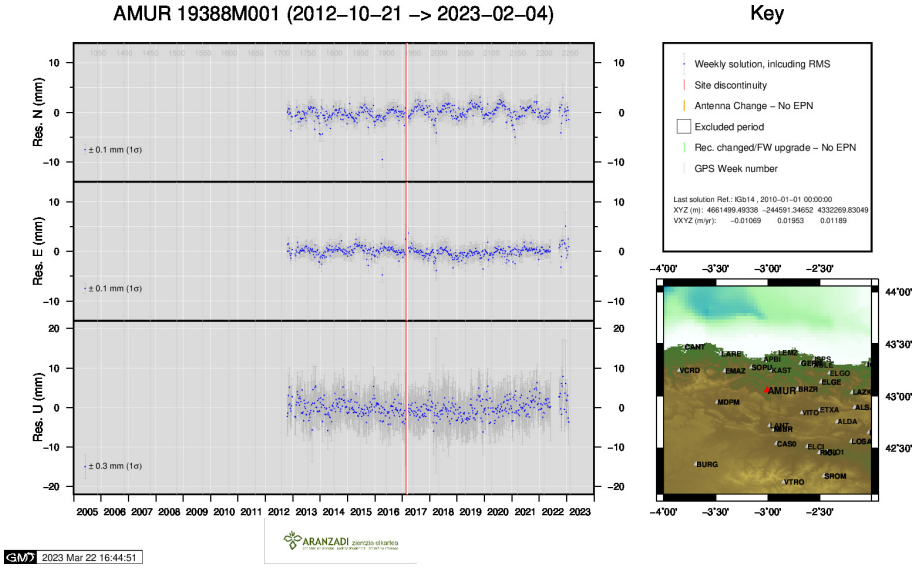
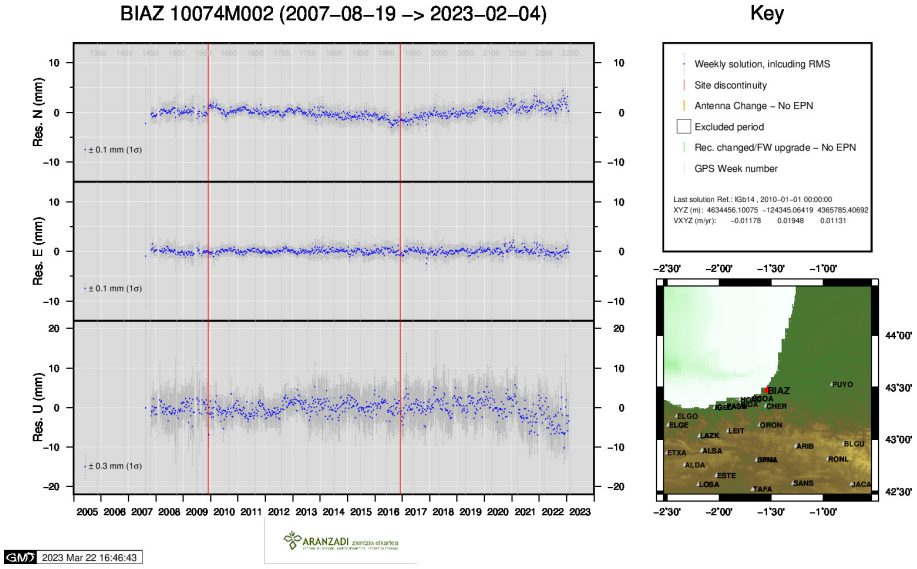


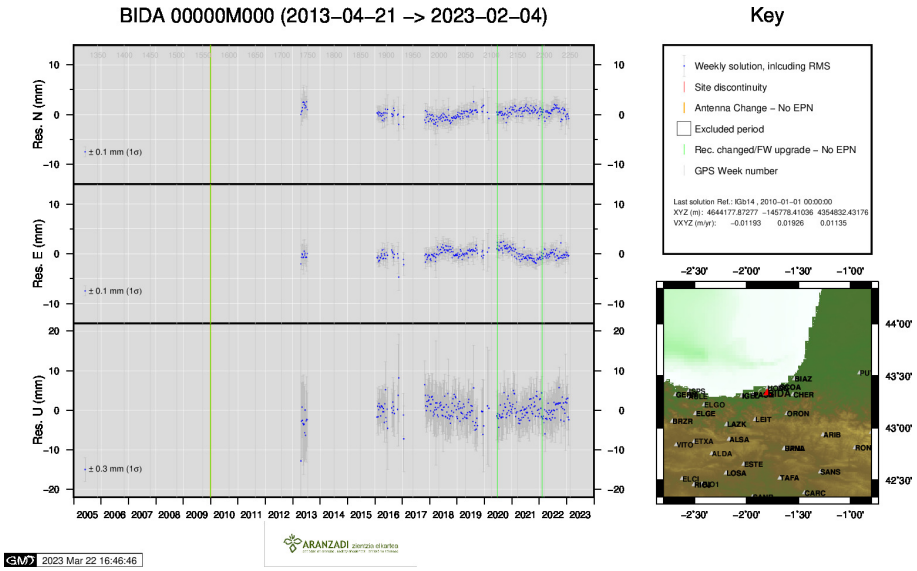
2) ALDA



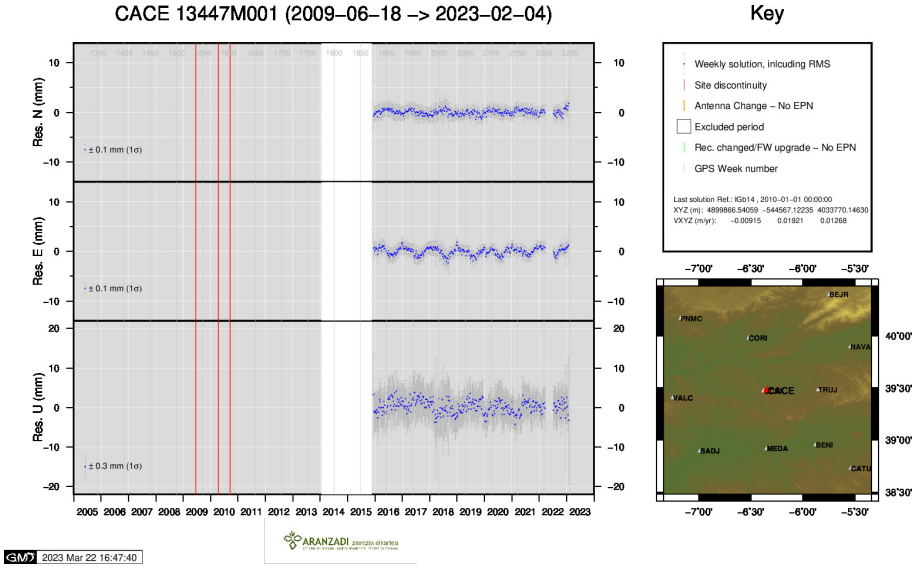
3) AMUR



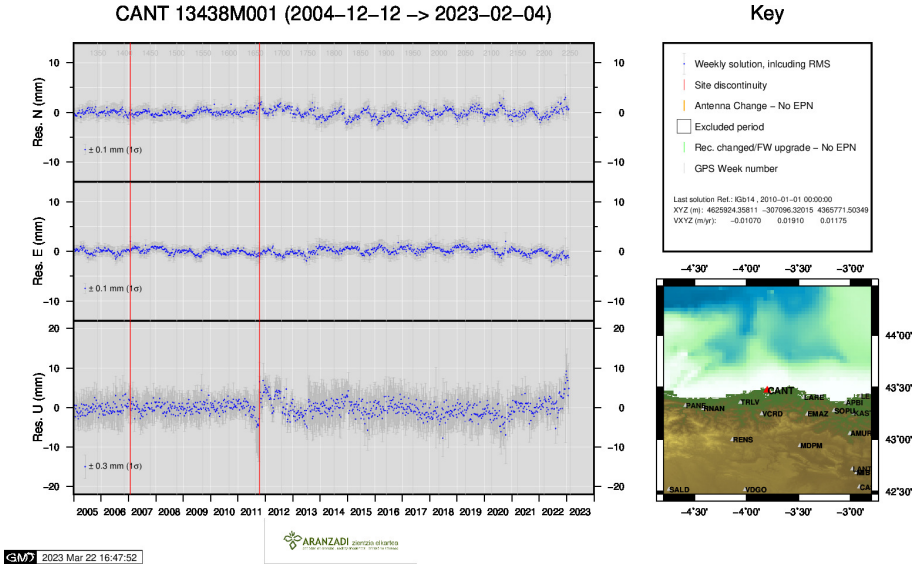
4) BIAZ



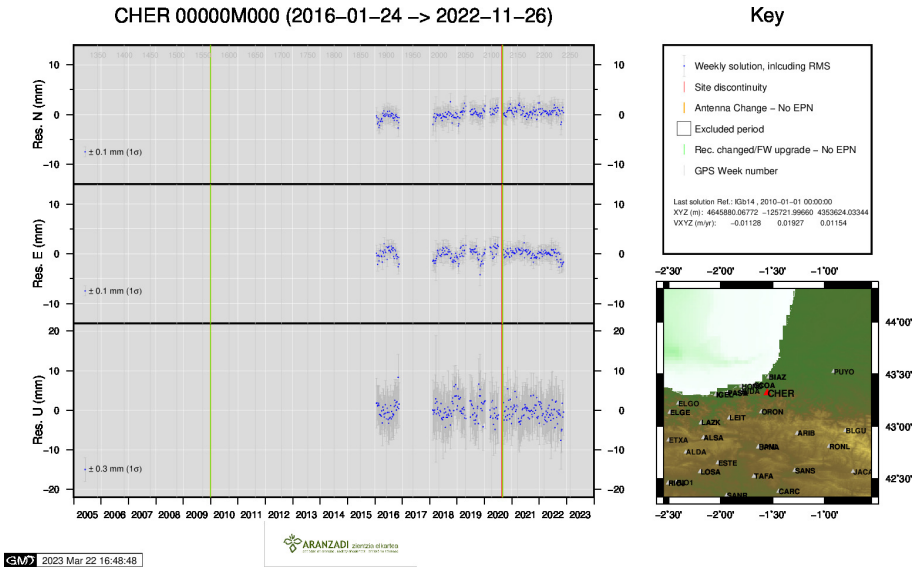
5) BIDA



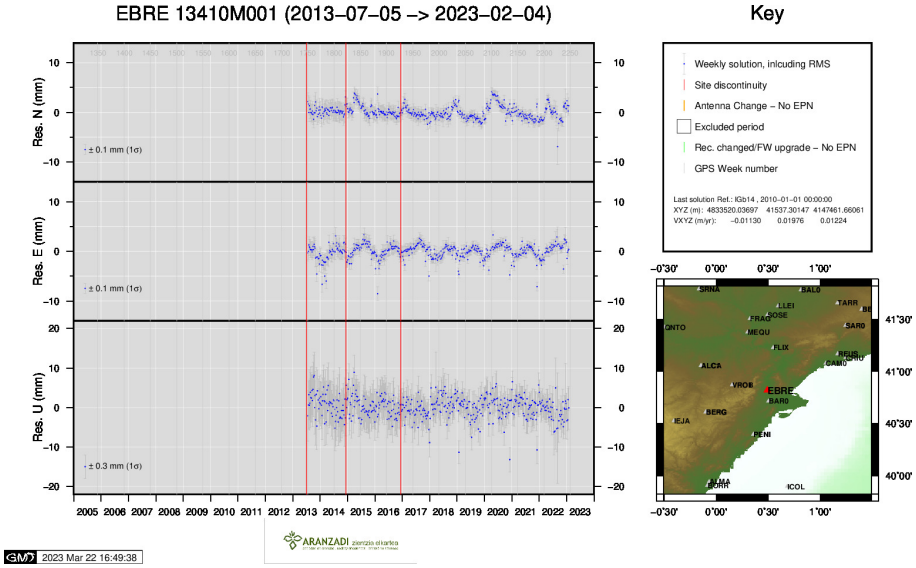
6) CACE



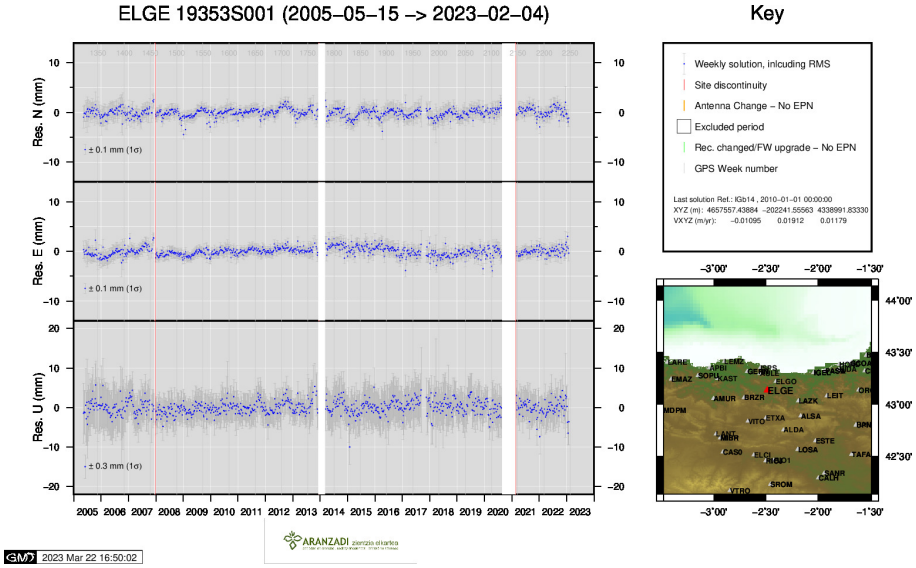
7) CANT



8) CHER



9) EBRE



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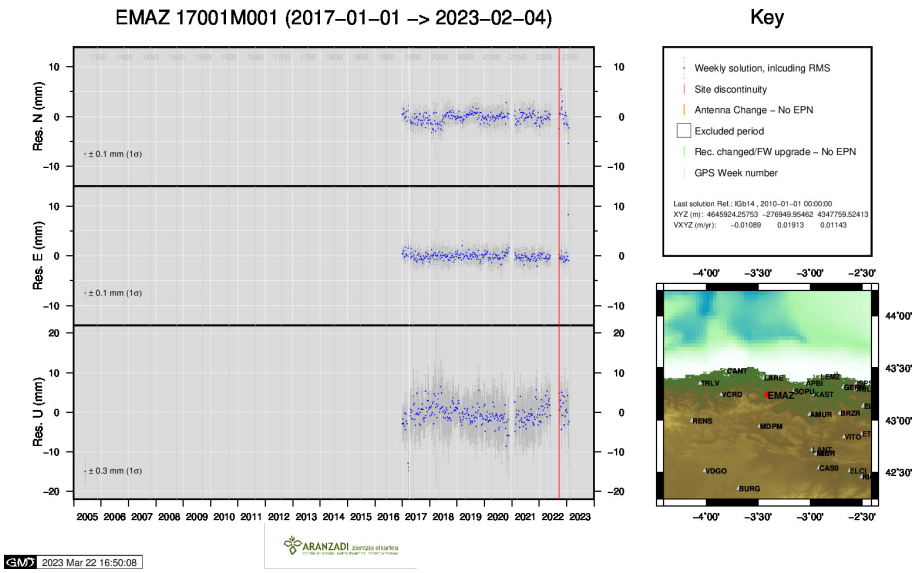
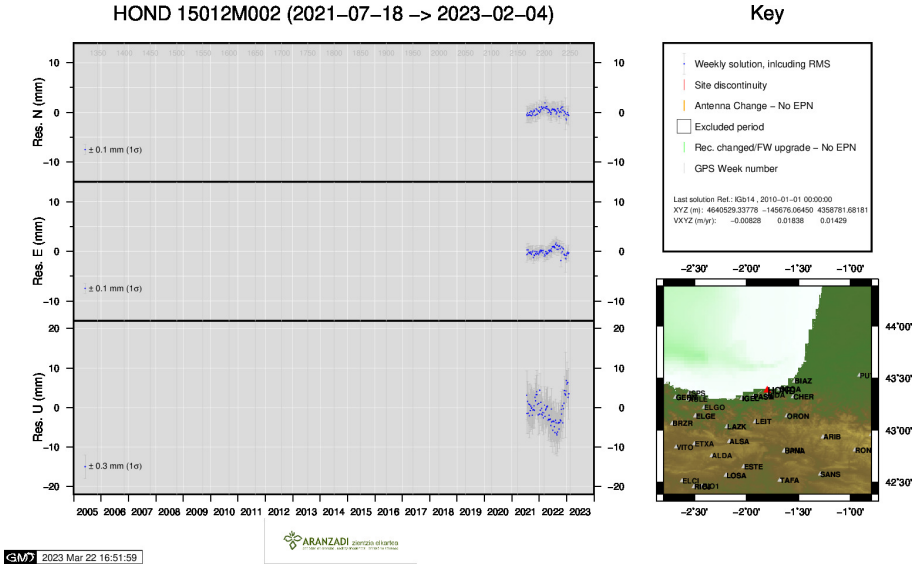
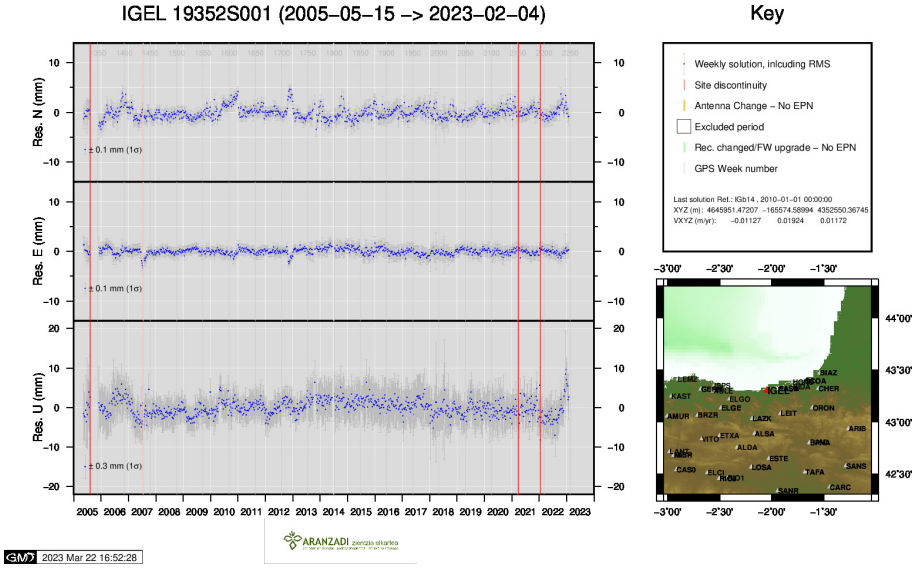


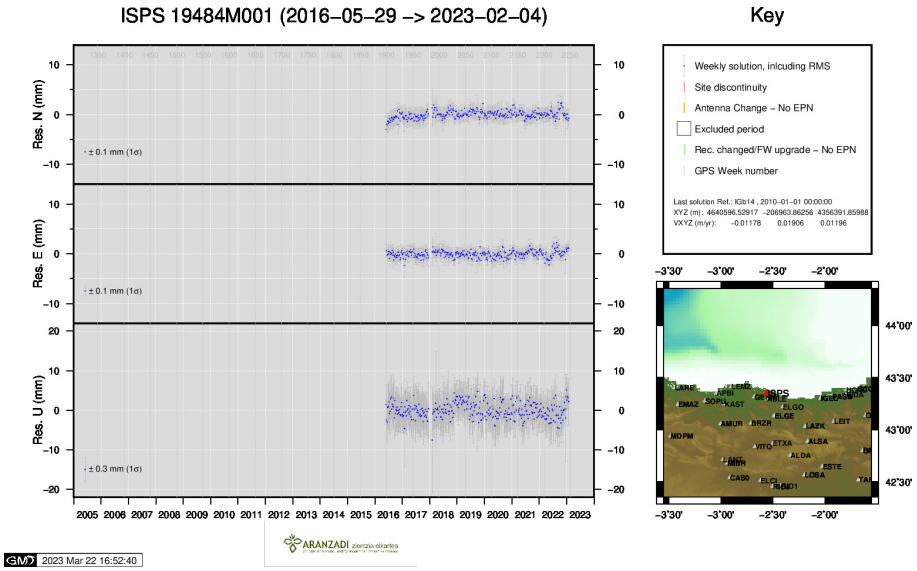
11) EMAZ



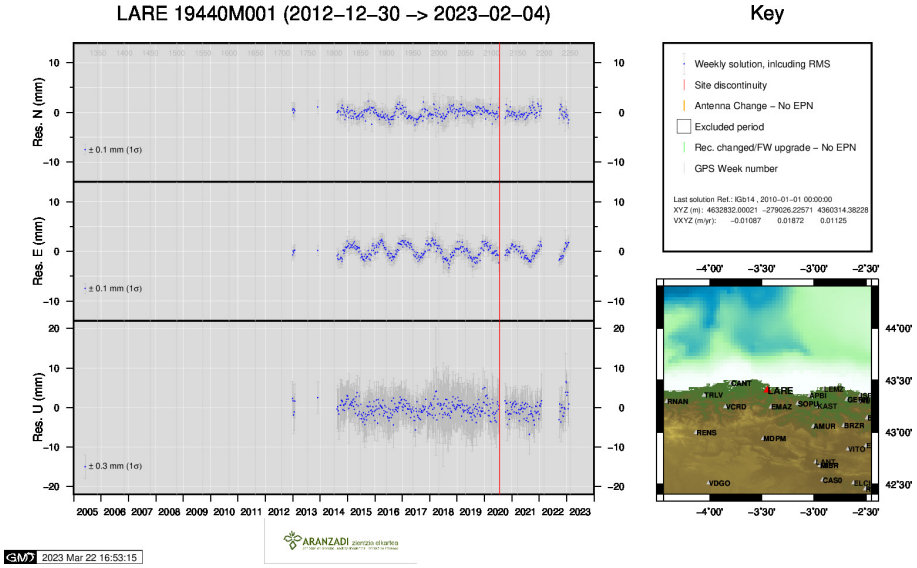
12) HOND



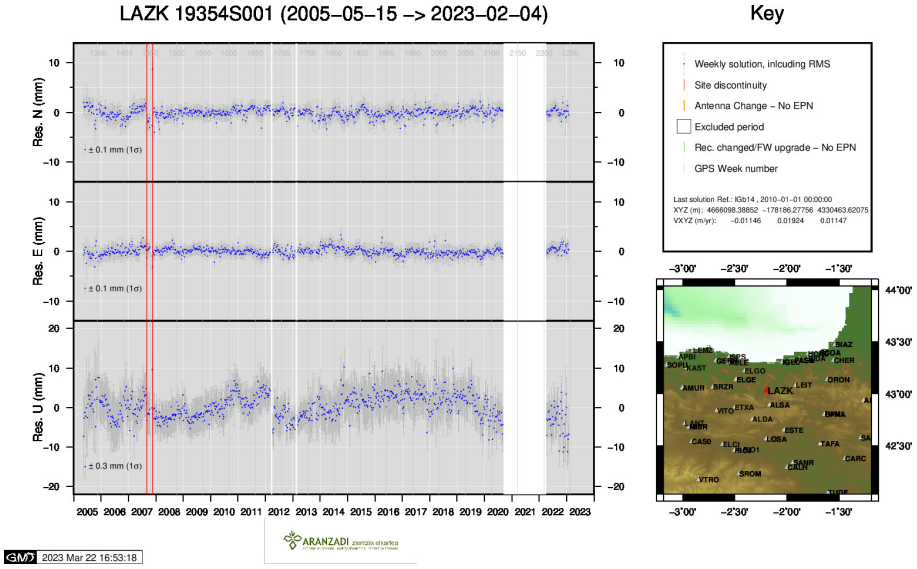
13) IGEL



14) ISPS



15) LARE



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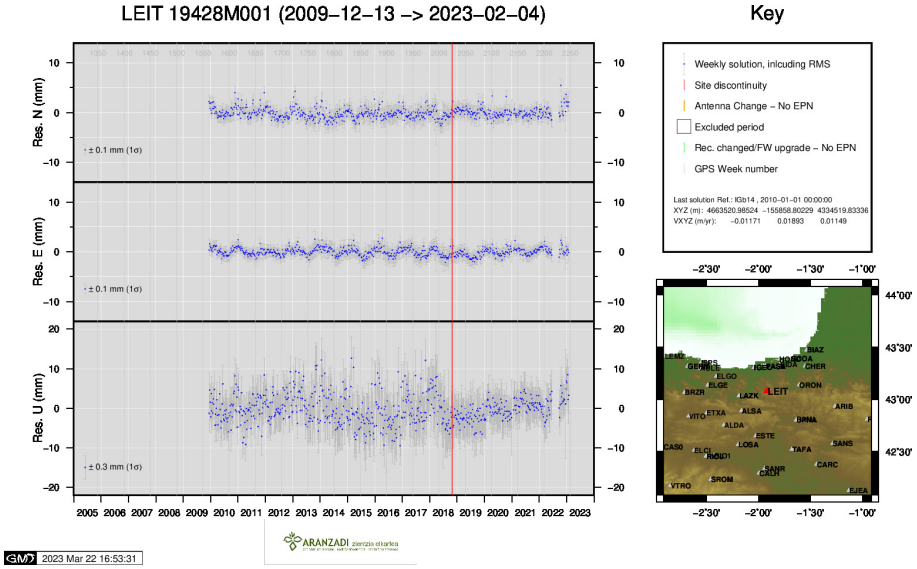

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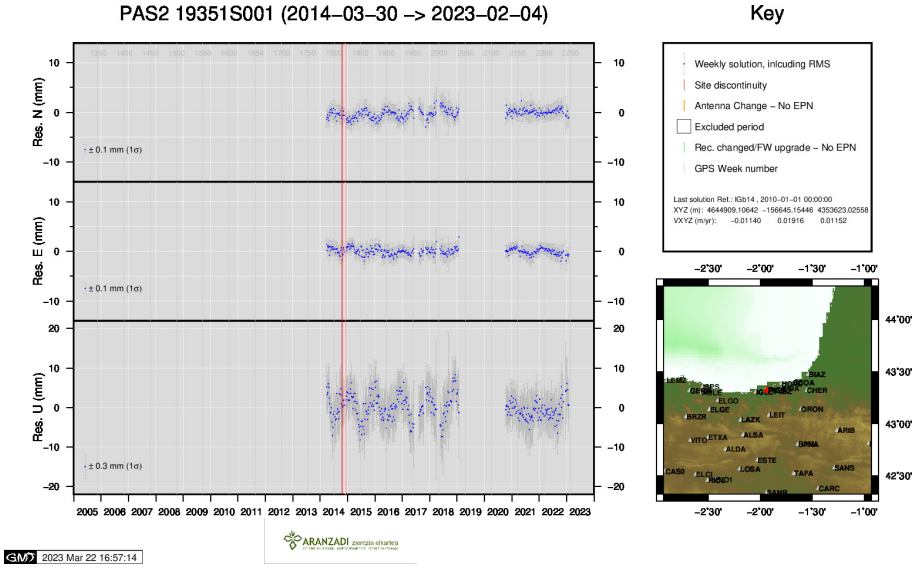

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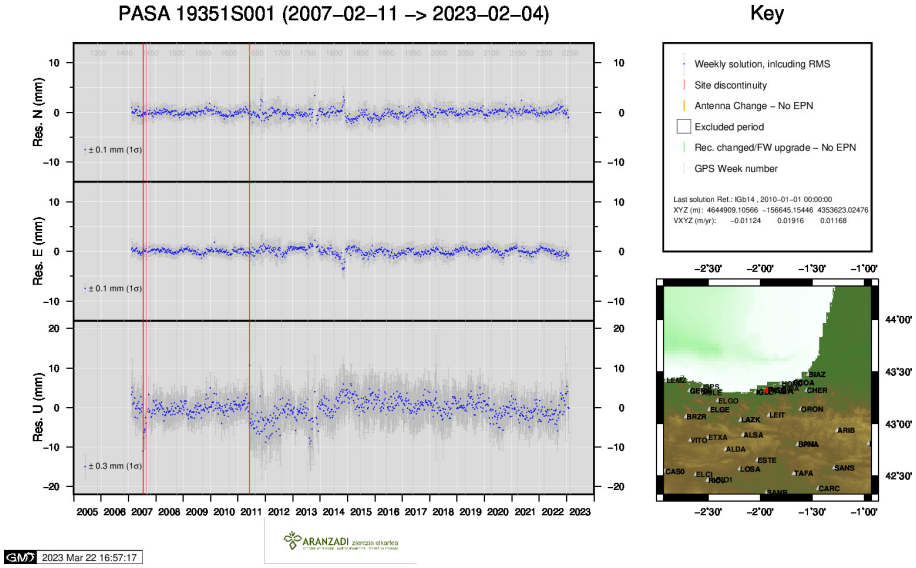

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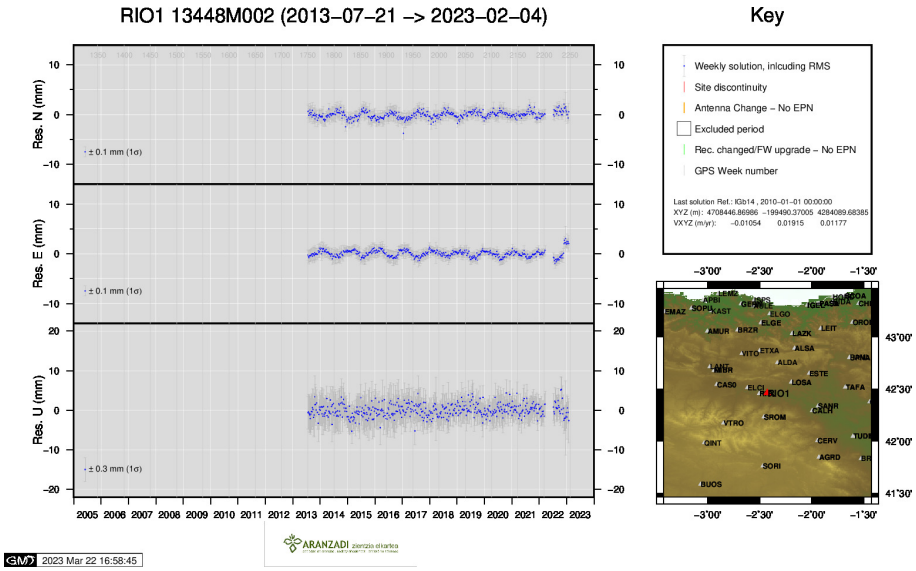

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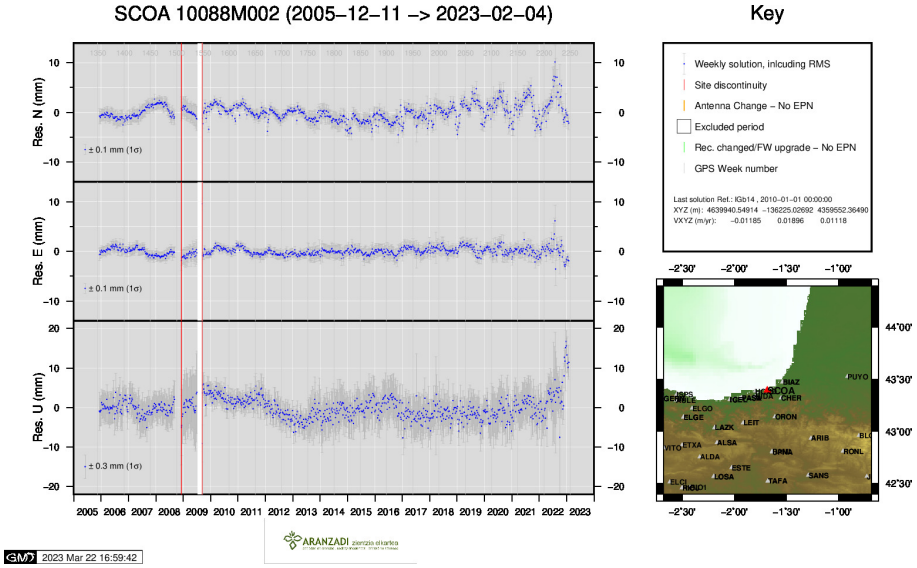

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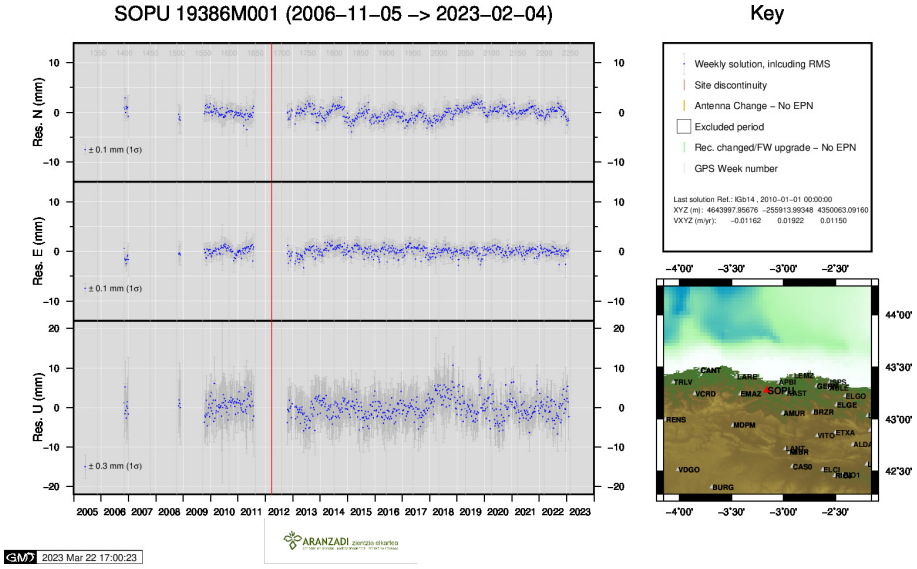

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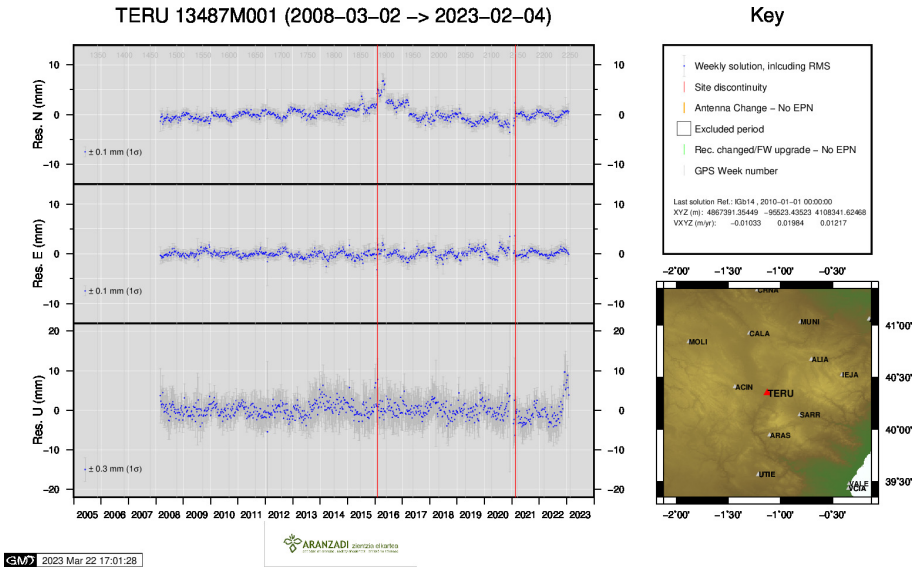

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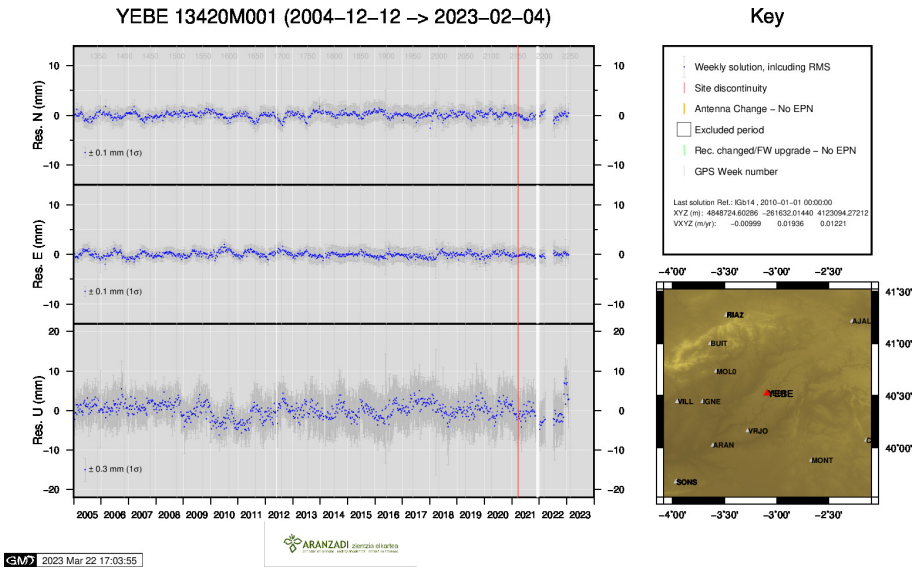

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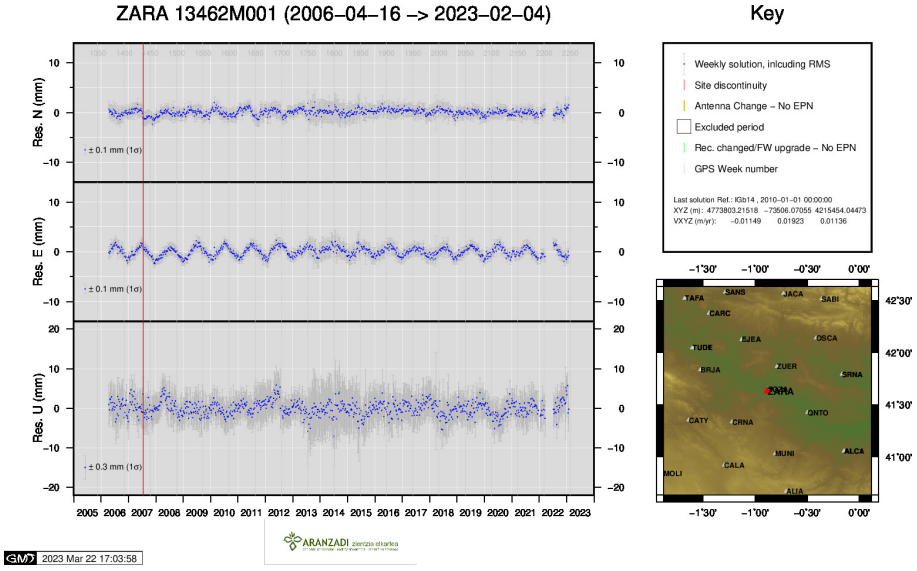

25) ZARA