

ARA-DAC Weekly Analysis Result: 2370 (GFA)

Technical Report

GPS Week: 2370 (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

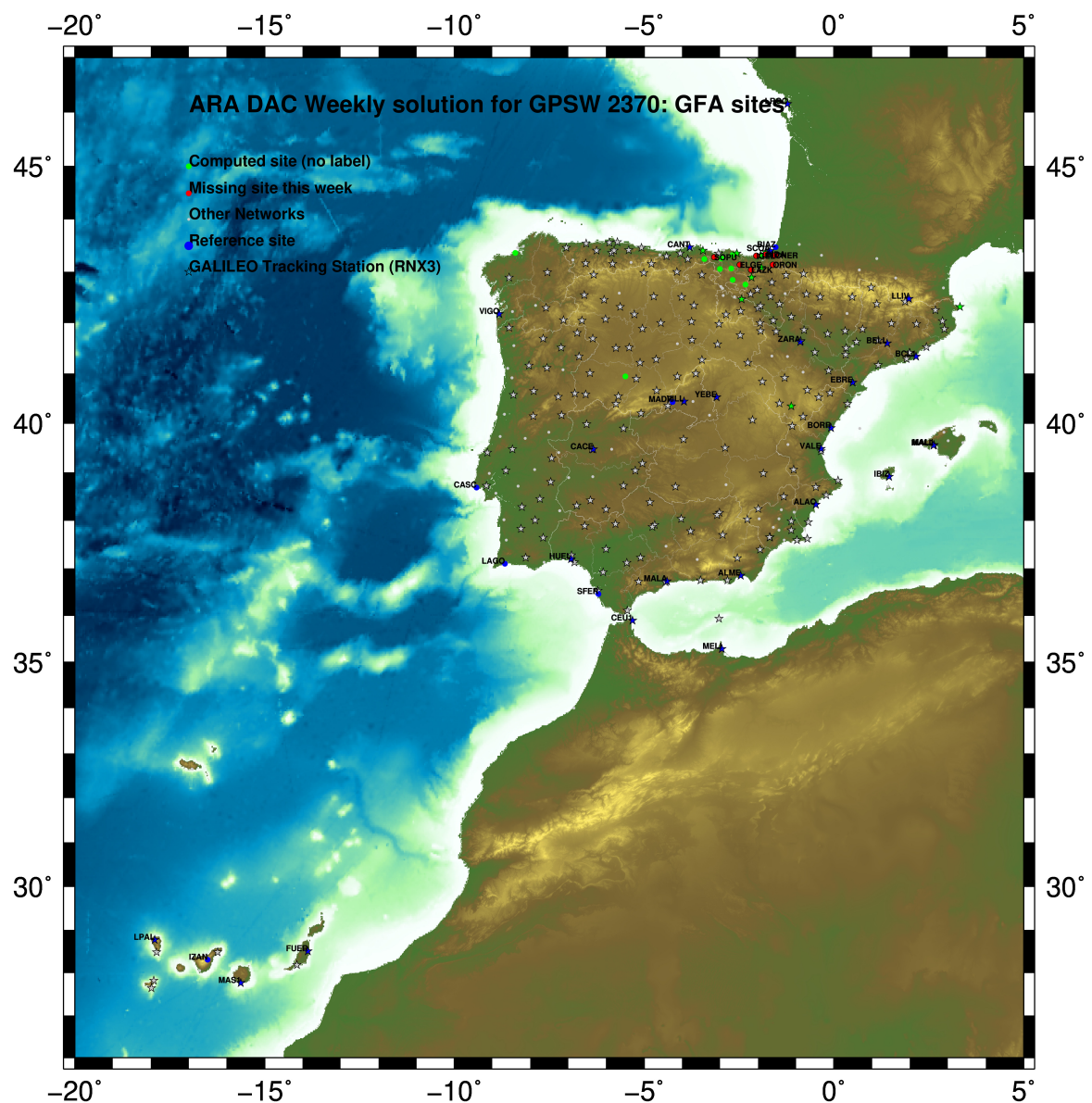


Fig.1: Computed Sites for GPS Week2370 (GFA)

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. In case no calibration values of an antenna/radome pairs are not available for a certain GNSS system at some station, the observation of this/these GNSS/GNSSs are excluded from the analysis of that station.
- Reference sites: the latest IGS cumulative solution is used to align our solution to the latest IGS20 release, regularly updated and available at: IGS0OPSSNX_1994002_00U_00U_CRD.SNX.gz. Following the EUREF guidelines, no other individual calibrations are included in the analysis starting GPSW 2238 (IGS20); also applies to repro3 solutions, which are based on IGS20 standards.
- 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: 3σ of single differences, in the weekly combination of daily normal equations (ADDNEQ)
- Station coordinates: minimum constraints (MC) to IGS 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 (IGS cumulative solution) are the ones used in the Minimal Constraints condition.

5.1 IGS20

The Reference Frame considered in this section is the IGS20 (IGS cumulative solution), mapped from 2015.0 to the observation epoch.

ARA FINAL WEEKLY COMBINATION: FINAL ORBITS						12-JUL-25 18:28
LOCAL GEODETIC DATUM: IGS20			EPOCH: 2025-06-11 11:59:45			
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	SYSTEM
111	ACOR 13434M001	4594489.47518	-678367.25541	4357066.32510	A	G
39	ALDA 19383M001	4687280.09721	-190876.44920	4308107.02927	A	GR
50	ALSA 19419M001	4677250.77073	-176770.27891	4319079.94759	A	GRE
53	AMUR 19388M001	4661499.38776	-244591.14072	4332269.95380	A	GR
384	BLAZ 10074M002	4634455.98354	-124344.85966	4365785.52655	W	GR
113	BRZR 19387M001	4662220.92919	-220769.78380	4333309.50934	A	GR
573	CACE 13447M001	4899866.45305	-544566.92055	4033770.28113	W	GRE
592	CANT 13438M001	4625924.25236	-307096.12161	4365771.62931	W	GRE
908	CREU 13432M001	4715420.06051	273178.17579	4271946.91417	A	GRE
135	EBRE 13410M001	4833519.92305	41537.51016	4147461.79127	W	GRE
182	EMAZ 17001M001	4645924.14498	-276949.75460	4347759.63881	A	GR
209	GERN 19389M001	4642811.25600	-217222.81129	4353278.94891	A	GR
257	HOND 15012M002	4640529.25441	-145676.87048	4358781.82886	A	GRE
240	ISPS 19484M001	4640596.41850	-206963.66339	4356391.99112	A	GRE
245	KAST 19499M001	4646949.01170	-240747.15231	4348015.06220	A	GR
252	LARE 19440M001	4632831.89482	-279026.03114	4360314.49780	A	GRE
261	LEIT 19428M001	4663520.87373	-155858.60482	4334519.95696	A	GRE
345	PAS2 19351S001	4644908.99739	-156644.95417	4353623.14991	A	GRE
493	PASA 19351S001	4644908.99738	-156644.95420	4353623.14992	A	GRE
553	RID1 13448M002	4708446.76457	-199490.16761	4284089.80702	A	GRE
558	SALA 13469M001	4803054.42837	-462130.95383	4158379.14959	A	GR
526	SCDA 10088M002	4639940.44007	-136224.82648	4359552.49658	W	GRE
443	TERU 13487M001	4867391.25889	-95523.22806	4108341.75745	A	GRE
493	VITO 19385M001	4679397.63652	-218436.38942	4314898.44006	A	GR
616	YEBE 13420M001	4848724.50914	-261631.81086	4123094.40190	W	GRE
655	ZARA 13462M001	4773803.10481	-73505.86835	4215454.16711	W	GRE

5.2 ETRF2000 (ETRS89) Coordinates

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

CONVERT TO ETRF2000						12-JUL-25 18:28
LOCAL GEODETIC DATUM: ETRF2000			EPOCH: 2025-06-11 11:59:45			
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	SYSTEM
111	ACOR 13434M001	4594489.82794	-678367.91122	4357065.83246	A	
39	ALDA 19383M001	4687280.51426	-190877.11564	4308106.53541	A	
50	ALSA 19419M001	4677251.19067	-176770.94405	4319079.45484	A	
53	AMUR 19388M001	4661499.79930	-244591.80408	4332269.46148	A	
384	BLAZ 10074M002	4634456.41472	-124345.51930	4365785.03841	W	
113	BRZR 19387M001	4662221.34416	-220770.44719	4333309.01731	A	
573	CACE 13447M001	4899866.79758	-544567.61401	4033769.76287	W	
592	CANT 13438M001	4625924.65793	-307096.78068	4365771.13929	W	
908	CREU 13432M001	4715420.53947	273177.50751	4271946.42439	A	
135	EBRE 13410M001	4833520.35922	41536.82635	4147461.28753	W	
182	EMAZ 17001M001	4645924.55328	-276950.41611	4347759.14743	A	
209	GERN 19389M001	4642811.67313	-217223.47224	4353278.45867	A	
257	HOND 15012M002	4640529.68202	-145676.53095	4358781.33986	A	
240	ISPS 19484M001	4640596.83732	-206964.32404	4356391.50123	A	
245	KAST 19499M001	4646949.42509	-240747.81384	4348014.57125	A	
252	LARE 19440M001	4632832.30387	-279026.69100	4360314.00757	A	
261	LEIT 19428M001	4663521.29789	-155859.26819	4334519.46575	A	
345	PAS2 19351S001	4644909.42303	-156645.61521	4353622.66036	A	
493	PASA 19351S001	4644909.42302	-156645.61524	4353622.66037	A	
553	RID1 13448M002	4708447.17841	-199490.83669	4284089.31112	A	
558	SALA 13469M001	4803054.79490	-462131.63525	4158378.64131	A	
526	SCDA 10088M002	4639940.86906	-136225.48684	4359552.00777	W	
443	TERU 13487M001	4867391.67260	-95523.91652	4108341.24868	A	
493	VITO 19385M001	4679398.05028	-218437.05494	4314897.94651	A	
616	YEBE 13420M001	4848724.90082	-261632.49748	4123093.89242	W	
655	ZARA 13462M001	4773803.53056	-73506.54517	4215453.66712	W	

5.3 ETRF2014 (ETRS89) Coordinates

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

CONVERT TO ETRF2014						12-JUL-25 18:28
LOCAL GEODETIC DATUM: ETRF2014						EPOCH: 2025-06-11 11:59:45
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	SYSTEM
111	ACOR 13434M001	4594489.78835	-678367.94759	4357065.88551	A	
39	ALDA 19383M001	4687280.47207	-190877.15348	4308106.58831	A	
50	ALSA 19419M001	4677251.14854	-176770.98199	4319079.50778	A	
53	AMUR 19388M001	4661499.75759	-244591.84183	4332269.51444	A	
384	BIAZ 10074M002	4634456.37288	-124345.55764	4365785.09152	W	
113	BRZR 19387M001	4662221.30236	-220770.48503	4333309.07027	A	
573	CACE 13447M001	4899866.75396	-544567.64948	4033769.81503	W	
592	CANT 13438M001	4625924.61684	-307096.81836	4365771.19234	W	
908	CREU 13432M001	4715420.49510	273177.46803	4271946.47756	A	
135	EBRE 13410M001	4833520.31440	41536.78830	4147461.34015	W	
182	EMAZ 17001M001	4645924.51187	-276950.45381	4347759.20042	A	
209	GERN 19389M001	4642811.63153	-217223.51018	4353278.51171	A	
257	HOND 15012M002	4640529.64019	-145676.56918	4358781.39295	A	
240	ISPS 19484M001	4640596.79572	-206964.36203	4356391.55428	A	
245	KAST 19499M001	4646949.38354	-240747.85168	4348014.62426	A	
252	LARE 19440M001	4632832.26261	-279026.72876	4360314.06060	A	
261	LEIT 19428M001	4663521.25584	-155859.30628	4334519.51875	A	
345	PAS2 19351S001	4644909.38119	-156645.65338	4353622.71342	A	
493	PASA 19351S001	4644909.38118	-156645.65341	4353622.71343	A	
553	RI01 13448M002	4708447.13599	-199490.87440	4284089.36396	A	
558	SALA 13469M001	4803054.75223	-462131.67150	4158378.69376	A	
526	SC0A 10088M002	4639940.82721	-136225.52511	4359552.06086	W	
443	TERU 13487M001	4867391.62790	-95523.95388	4108341.30111	A	
493	VITO 19385M001	4679398.00827	-218437.09271	4314897.99942	A	
616	YEBE 13420M001	4848724.85695	-261632.53429	4123093.94481	W	
655	ZARA 13462M001	4773803.48691	-73506.58306	4215453.71984	W	

5.4 ETRF2020 (ETRS89) Coordinates

European Terrestrial Reference System, 1989 (**ETRS89**) is realized by ETRF2020 (Boucher and Altamimi, 2011) and (Altamimi, 2017).

CONVERT TO ETRF2020						12-JUL-25 18:28
LOCAL GEODETIC DATUM: ETRF2020						EPOCH: 2025-06-11 11:59:45
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	SYSTEM
111	ACOR 13434M001	4594489.78448	-678367.93290	4357065.89347	A	
39	ALDA 19383M001	4687280.46688	-190877.13829	4308106.59654	A	
50	ALSA 19419M001	4677251.14328	-176770.96684	4319079.51599	A	
53	AMUR 19388M001	4661499.75250	-244591.82675	4332269.52261	A	
384	BIAZ 10074M002	4634456.36735	-124345.54260	4365785.09967	W	
113	BRZR 19387M001	4662221.29719	-220770.46994	4333309.07845	A	
573	CACE 13447M001	4899866.75050	-544567.63376	4033769.82353	W	
592	CANT 13438M001	4625924.61185	-307096.80342	4365771.20044	W	
908	CREU 13432M001	4715420.48860	273177.48350	4271946.48591	A	
135	EBRE 13410M001	4833520.30891	41536.80405	4147461.34866	W	
182	EMAZ 17001M001	4645924.50683	-276950.43879	4347759.20856	A	
209	GERN 19389M001	4642811.62630	-217223.49515	4353278.51985	A	
257	HOND 15012M002	4640529.63474	-145676.55412	4358781.40110	A	
240	ISPS 19484M001	4640596.79045	-206964.34701	4356391.56242	A	
245	KAST 19499M001	4646949.37839	-240747.83664	4348014.63241	A	
252	LARE 19440M001	4632832.25755	-279026.71378	4360314.06872	A	
261	LEIT 19428M001	4663521.25048	-155859.29115	4334519.52694	A	
345	PAS2 19351S001	4644909.37578	-156645.63832	4353622.72158	A	
493	PASA 19351S001	4644909.37577	-156645.63835	4353622.72159	A	
553	RI01 13448M002	4708447.13089	-199490.85916	4284089.37221	A	
558	SALA 13469M001	4803054.74822	-462131.65605	4158378.70212	A	
526	SC0A 10088M002	4639940.82173	-136225.51006	4359552.06902	W	
443	TERU 13487M001	4867391.62292	-95523.93808	4108341.30965	A	
493	VITO 19385M001	4679398.00314	-218437.07757	4314898.00763	A	
616	YEBE 13420M001	4848724.85243	-261632.51862	4123093.95329	W	
655	ZARA 13462M001	4773803.48160	-73506.56755	4215453.72823	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 IGS20 solution and are given with respect to the Local frame (North-East-Up).

GFA FINAL WEEKLY COMBINATION: FINAL ORBITS						12-JUL-25 18:28			
Station	#Days	Weekday 0123456	Repeatability (mm)						
			N	E	U				
ACOR 13434M001	7	XXXXXXX	0.99	1.29	2.83				
ALDA 19383M001	7	XXXXXXX	1.70	1.49	3.04				
ALSA 19419M001	7	XXXXXXX	2.10	0.90	7.37				
AMUR 19388M001	7	XXXXXXX	1.16	1.16	6.50				
BIAZ 10074M002	7	XXXXXXX	0.61	1.15	4.78				
BRZR 19387M001	7	XXXXXXX	1.62	1.61	5.98				
CACE 13447M001	7	XXXXXXX	1.22	0.83	3.25				
CANT 13438M001	7	XXXXXXX	0.93	0.88	2.63				
CREU 13432M001	7	XXXXXXX	0.84	1.54	4.07				
EBRE 13410M001	7	XXXXXXX	0.83	0.88	3.91				
EMAZ 17001M001	7	XXXXXXX	1.91	1.08	3.76				
GERN 19389M001	7	XXXXXXX	0.85	0.74	3.48				
HOND 15012M002	7	XXXXXXX	0.75	0.95	4.32				
ISPS 19484M001	7	XXXXXXX	0.73	0.35	4.17				
KAST 19499M001	7	XXXXXXX	1.69	1.34	6.18				
LARE 19440M001	7	XXXXXXX	0.53	1.21	4.32				
LEIT 19428M001	3	XXX	0.83	0.43	1.73				
PAS2 19351S001	7	XXXXXXX	1.27	0.71	4.71				
PASA 19351S001	7	XXXXXXX	1.27	0.71	4.71				
RI01 13448M002	7	XXXXXXX	1.29	1.08	3.63				
SALA 13469M001	7	XXXXXXX	1.04	0.53	2.34				
SCDA 10088M002	7	XXXXXXX	1.67	2.02	3.35				
TERU 13487M001	7	XXXXXXX	1.60	0.57	4.37				
VITO 19385M001	7	XXXXXXX	1.24	0.81	2.35				
YEBE 13420M001	7	XXXXXXX	0.53	0.99	2.06				
ZARA 13462M001	7	XXXXXXX	1.29	0.72	3.47				
Comparison of individual solutions:									
ACOR 13434M001	N	0.99	-0.65	-0.95	-1.48	-0.27	0.60	1.28	0.52
ACOR 13434M001	E	1.29	0.79	1.11	0.23	-0.08	-1.48	-1.18	-2.11
ACOR 13434M001	U	2.83	0.33	0.59	3.90	3.60	-4.24	-1.02	-0.67
ALDA 19383M001	N	1.70	0.71	0.70	1.19	1.08	2.32	-2.89	0.09
ALDA 19383M001	E	1.49	-1.24	-0.58	0.01	0.93	0.68	2.21	2.27
ALDA 19383M001	U	3.04	0.71	-1.85	2.54	3.49	-3.85	3.08	-2.94
ALSA 19419M001	N	2.10	0.40	1.26	-0.24	0.66	1.42	-4.13	2.26
ALSA 19419M001	E	0.90	0.19	0.10	0.30	1.23	1.29	1.22	-0.32
ALSA 19419M001	U	7.37	-2.84	-4.71	-2.39	4.07	-4.83	14.24	6.85
AMUR 19388M001	N	1.16	-0.06	-0.93	0.51	-0.42	2.18	0.61	1.26
AMUR 19388M001	E	1.16	-0.43	-0.53	0.85	0.67	2.42	0.45	0.63
AMUR 19388M001	U	6.50	0.02	2.09	-1.11	5.67	-12.35	4.43	6.62
BIAZ 10074M002	N	0.61	0.18	0.78	1.02	-0.08	0.40	-0.09	0.59
BIAZ 10074M002	E	1.15	-0.72	-1.09	-0.04	0.64	1.69	1.31	1.13
BIAZ 10074M002	U	4.78	-3.87	-4.07	-1.44	9.11	-0.83	-0.98	4.34
BRZR 19387M001	N	1.62	0.04	0.70	2.34	-2.28	-0.09	1.78	1.20
BRZR 19387M001	E	1.61	-0.83	-0.68	0.86	0.52	0.38	0.25	3.64
BRZR 19387M001	U	5.98	1.96	-2.07	1.31	-1.21	-7.91	-2.65	11.55
CACE 13447M001	N	1.22	-0.18	0.53	-1.34	-1.94	0.68	1.11	1.19
CACE 13447M001	E	0.83	0.07	-0.41	0.39	-0.81	-0.50	0.20	-1.70
CACE 13447M001	U	3.25	2.43	-1.90	1.26	-3.36	-0.57	5.89	2.42
CANT 13438M001	N	0.93	-1.07	0.24	-0.64	1.64	-0.30	0.84	0.25
CANT 13438M001	E	0.88	0.29	-0.35	0.39	-0.73	-0.88	1.52	0.80
CANT 13438M001	U	2.63	1.83	2.98	-1.15	-0.94	0.90	-5.12	0.06
CREU 13432M001	N	0.84	1.64	-0.10	0.77	-0.19	0.29	-0.67	-0.61
CREU 13432M001	E	1.54	-2.18	-1.03	0.49	1.32	0.17	1.97	1.57
CREU 13432M001	U	4.07	-7.10	3.75	0.41	4.51	2.51	1.66	2.28
EBRE 13410M001	N	0.83	0.04	-0.31	1.52	-0.63	0.68	-0.53	0.78
EBRE 13410M001	E	0.88	-0.81	0.97	1.71	0.14	0.08	0.23	0.26
EBRE 13410M001	U	3.91	-2.32	6.41	6.23	-1.29	-0.52	1.17	-1.84
EMAZ 17001M001	N	1.91	-1.76	-1.09	-0.78	2.94	1.89	1.14	-1.86
EMAZ 17001M001	E	1.08	0.53	0.07	-1.30	-0.28	2.16	0.24	-0.43
EMAZ 17001M001	U	3.76	-0.73	-2.18	2.83	-5.06	1.12	-5.18	4.25
GERN 19389M001	N	0.85	-0.38	0.28	0.76	-0.73	-0.92	0.88	1.15
GERN 19389M001	E	0.74	-0.07	0.15	0.36	1.29	-1.16	0.41	0.08
GERN 19389M001	U	3.48	-4.94	2.33	1.04	0.05	2.05	-2.20	5.74
HOND 15012M002	N	0.75	-0.39	0.63	1.10	-0.24	0.05	0.95	0.84
HOND 15012M002	E	0.95	0.11	0.53	0.96	-0.64	0.10	1.93	-0.27
HOND 15012M002	U	4.32	-5.14	-1.33	2.02	8.06	-2.10	2.60	-1.83
ISPS 19484M001	N	0.73	-0.25	-0.41	0.71	-0.56	-0.13	1.37	0.50
ISPS 19484M001	E	0.35	0.33	-0.03	0.64	0.14	-0.34	0.13	0.24
ISPS 19484M001	U	4.17	-4.21	2.73	-1.56	-0.21	1.09	-2.25	8.38
KAST 19499M001	N	1.69	0.04	-0.53	1.62	-2.95	-0.09	1.96	1.29
KAST 19499M001	E	1.34	-0.77	-0.02	2.04	0.04	-1.38	-0.70	1.89
KAST 19499M001	U	6.18	-4.32	1.48	5.78	-4.19	-4.40	-2.64	11.45
LARE 19440M001	N	0.53	-0.25	0.37	0.30	-0.87	0.64	0.45	0.03
LARE 19440M001	E	1.21	0.20	-0.62	0.83	0.46	-1.15	2.24	-1.09
LARE 19440M001	U	4.32	-3.64	3.39	1.92	2.72	-8.16	1.31	-2.82
LEIT 19428M001	N	0.83	-0.04	1.08	0.47				
LEIT 19428M001	E	0.43	0.37	-0.44	0.19				
LEIT 19428M001	U	1.73	-1.63	-1.55	0.95				
PAS2 19351S001	N	1.27	0.14	-1.10	1.25	-0.69	1.08	2.27	0.12
PAS2 19351S001	E	0.71	-0.34	0.04	0.36	0.97	0.20	1.34	0.11
PAS2 19351S001	U	4.71	-6.87	-4.83	0.48	5.63	2.83	4.74	0.58
PASA 19351S001	N	1.27	0.09	-1.16	1.20	-0.59	1.10	2.29	0.15
PASA 19351S001	E	0.71	-0.32	0.10	0.35	0.97	0.17	1.35	0.05
PASA 19351S001	U	4.71	-6.82	-4.87	0.53	5.53	2.87	4.82	0.49
RI01 13448M002	N	1.29	-1.53	0.19	2.18	0.10	0.11	-0.44	1.60
RI01 13448M002	E	1.08	-0.27	0.39	0.82	-0.16	0.76	2.35	0.13
RI01 13448M002	U	3.63	-0.41	-4.68	1.18	4.88	1.12	5.50	0.25
SALA 13469M001	N	1.04	-1.09	-0.14	-0.46	-0.87	-0.00	0.20	2.06
SALA 13469M001	E	0.53	0.35	-0.29	-0.19	0.22	-0.93	-0.58	0.42
SALA 13469M001	U	2.34	-2.91	0.26	-1.86	1.79	-3.93	-0.67	1.34
SCDA 10088M002	N	1.67	-1.63	0.62	1.99	1.94	1.01	-1.98	0.99
SCDA 10088M002	E	2.02	-2.48	-0.11	2.20	1.72	1.18	2.30	-1.98

SCDA 10088M002	U	3.35	-0.91	-3.04	0.54	5.84	-3.59	2.94	-1.13
TERU 13487M001	N	1.60	2.63	1.47	2.15	0.47	-0.26	0.73	-0.90
TERU 13487M001	E	0.57	0.25	-0.40	0.66	0.82	0.49	0.09	0.61
TERU 13487M001	U	4.37	-0.11	2.40	-6.81	-4.03	-4.38	2.60	4.46
VITO 19385M001	N	1.24	-0.31	1.01	1.76	-0.92	1.27	-1.08	1.15
VITO 19385M001	E	0.81	-0.55	0.32	1.18	0.62	0.93	0.53	0.76
VITO 19385M001	U	2.35	1.35	-2.53	-0.02	2.10	0.55	-2.06	4.01
YEBE 13420M001	N	0.53	-0.12	0.45	-0.85	-0.06	0.26	0.55	-0.63
YEBE 13420M001	E	0.99	0.72	-0.16	-0.95	-0.92	-0.64	-0.19	1.77
YEBE 13420M001	U	2.06	0.02	-0.77	-2.96	1.16	-2.34	-2.24	2.04
ZARA 13462M001	N	1.29	0.91	-0.09	2.18	-0.50	0.40	-1.61	1.16
ZARA 13462M001	E	0.72	-0.22	0.36	1.10	-0.11	1.23	-0.03	0.42
ZARA 13462M001	U	3.47	0.35	2.74	-2.65	5.99	0.36	4.61	0.43

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				
2	ALAC 13433M001	I W	1.37	-0.93	0.38		
3	ALME 13437M001	I W	-0.54	0.08	1.39		
4	BCL1 19482M001	I W	-1.01	-1.80	6.02		
5	BELL 13431M001	I W	-0.98	0.17	0.37		
6	BIAZ 10074M002	I W	1.45	0.41	-5.71		
7	BORR 13480M001	I W	-4.35	-0.24	1.77		
8	BRST 10004M004	I W	-0.84	-1.90	3.10		
9	CACE 13447M001	I W	1.74	1.68	-0.49		
10	CANT 13438M001	I W	0.58	1.30	0.08		
11	CASC 13909S001	I W	1.88	0.02	4.59		
12	CEU1 13449M002	I W	0.70	0.26	-5.12		
14	EBRE 13410M001	I W	-3.29	0.60	-0.23		
16	FLRS 31907M001	I W	-1.28	-2.62	-9.76		
17	FUER 31330M001	I W	-0.04	-0.74	-1.67		
19	HUEL 13451M001	I W	1.83	2.55	-6.18		
20	IBIZ 13454S001	I W	-0.06	0.94	2.32		
21	IZAN 31309M002	I W	-1.04	-1.29	-4.03		
22	LAGO 13903M001	I W	0.99	-0.52	0.39		
23	LLIV 13436M001	I W	-4.02	1.63	4.83		
24	LPAL 81701M001	I W	1.74	0.81	-5.36		
25	LROC 10023M001	I W	1.12	0.02	0.15		
26	MADR 13407S012	I W	1.54	1.97	0.21		
27	MAL1 13444M002	I W	3.90	-1.96	-3.37		
28	MALA 13443M001	I W	-0.09	-0.04	19.65		
29	MALL 13444M001	I W	0.02	-0.88	4.35		
30	MAS1 31303M002	I W	-0.81	-1.99	-0.17		
31	MELI 19379M001	I W	0.59	-1.03	0.95		
32	PDEL 31906M004	I W	-0.86	-1.64	-1.93		
33	SCOA 10088M002	I W	-3.83	-1.68	-14.06		
34	SFER 13402M004	I W	-0.93	-2.34	-3.88		
35	VALE 13439M001	I W	0.31	1.61	-3.21		
36	VIGO 13450M001	I W	1.57	1.00	1.06		
37	VILL 13406M001	I W	-0.20	-0.70	3.98		
38	YEBE 13420M001	I W	0.31	-0.53	2.95		
39	ZARA 13462M001	I W	-0.09	-0.32	-2.27		
40	ZIMM 14001M004	I W	-0.69	-0.52	8.98		
	RMS / COMPONENT		1.77	1.33	5.60		
	IQR		2.14	1.87	5.92		
	MEAN		-0.09	-0.24	0.00		
	MEDIAN		-0.05	-0.28	0.18		
	MIN		-4.35	-2.62	-14.06		
	MAX		3.90	2.55	19.65		
OVERALL RMS/IQR/MAX(3D)			3.48	2.37	19.65	MALA 13443M001	#SUM
ALL	RMS / COMPONENT		1.77	1.33	5.60		
ALL	IQR		2.14	1.87	5.92		
ALL	MEAN		-0.09	-0.24	0.00		
ALL	MEDIAN		-0.05	-0.28	0.18		
ALL	MIN		-4.35	-2.62	-14.06		
ALL	MAX		3.90	2.55	19.65		
ALL	OVERALL RMS/IQR/MAX(3D)		3.48	2.37	19.65	MALA 13443M001	#SUM_ALL

NUMBER OF PARAMETERS : 3
NUMBER OF STATIONS : 36
NUMBER OF COORDINATES : 108
RMS OF TRANSFORMATION : 3.48 MM

NUMBER OF PARAMETERS : 3
NUMBER OF STATIONS : 36
NUMBER OF COORDINATES : 108
RMS OF TRANSFORMATION : 3.48 MM

PARAMETERS:

TRANSLATION IN X : -0.00 +- 0.58 MM
TRANSLATION IN Y : 0.00 +- 0.58 MM
TRANSLATION IN Z : 0.01 +- 0.58 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.

```
*. STATISTICAL PARAMETER----- VALUE(S)-----
NUMBER OF OBSERVATIONS              19414215
NUMBER OF UNKNOWNNS                 213342
NUMBER OF DEGREES OF FREEDOM        19200873
PHASE MEASUREMENTS SIGMA             0.00100
SAMPLING INTERVAL (SECONDS)          180
VARIANCE FACTOR                      2.740662342711687
```

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 25:159:00000 25:165:86370 LEICA GR50 -----
ALDA A 1 P 25:159:00000 25:165:86370 LEICA GR30 -----
ALSA A 1 P 25:159:00000 25:165:86370 LEICA GR50 -----
AMUR A 1 P 25:159:00000 25:165:86370 LEICA GR30 -----
BIAZ A 1 P 25:159:00000 25:165:86370 SPECTRA SP90M -----
BRZR A 1 P 25:159:00000 25:165:86370 LEICA GR30 -----
CACE A 1 P 25:159:00030 25:165:86370 LEICA GR50 -----
CANT A 1 P 25:159:00000 25:165:86370 LEICA GR50 -----
CREU A 1 P 25:159:00000 25:165:86370 LEICA GR50 -----
EBRE A 1 P 25:159:00000 25:165:86370 LEICA GR50 -----
EMAZ A 1 P 25:159:00000 25:165:86370 LEICA GR30 -----
GERN A 1 P 25:159:00000 25:165:86370 LEICA GR30 -----
HOND A 1 P 25:159:00000 25:165:86370 LEICA GR50 -----
ISPS A 1 P 25:159:00000 25:165:86370 LEICA GR50 -----
KAST A 1 P 25:159:00000 25:165:86370 LEICA GR30 -----
LARE A 1 P 25:159:00000 25:165:86370 LEICA GR50 -----
LEIT A 1 P 25:159:00000 25:161:86370 LEICA GR50 -----
PAS2 A 1 P 25:159:00000 25:165:86370 STONEX SC2200 -----
PASA A 1 P 25:159:00000 25:165:86370 LEICA GR30 -----
RI01 A 1 P 25:159:00000 25:165:86370 LEICA GR50 -----
SALA A 1 P 25:159:00000 25:165:86370 LEICA GR50 -----
SCOA A 1 P 25:159:00000 25:165:86370 LEICA GR50 -----
TERU A 1 P 25:159:00000 25:165:86370 LEICA GR50 -----
VITO A 1 P 25:159:00000 25:165:86370 LEICA GR30 -----
YEBE A 1 P 25:159:00000 25:165:86370 LEICA GR50 -----
ZARA A 1 P 25:159:00000 25:165:86370 TRIMBLE NETR9 -----
```

7.2 Antennas

Serial number ONLY provided in case individual calibrations are used.

```
*SITE PT SOLN T DATA_START__ DATA_END_____ DESCRIPTION_____ S/N__ DAZI
ACOR A 1 P 25:159:00000 25:165:86370 LEIAT504 LEIS -----
ALDA A 1 P 25:159:00000 25:165:86370 LEIAS10 NONE -----
ALSA A 1 P 25:159:00000 25:165:86370 LEIAR10 NONE -----
AMUR A 1 P 25:159:00000 25:165:86370 LEIAS10 NONE -----
BIAZ A 1 P 25:159:00000 25:165:86370 LEIAR25 LEIT -----
BRZR A 1 P 25:159:00000 25:165:86370 LEIAS10 NONE -----
CACE A 1 P 25:159:00030 25:165:86370 LEIAR20 LEIM -----
CANT A 1 P 25:159:00000 25:165:86370 LEIAR25.R4 LEIT -----
CREU A 1 P 25:159:00000 25:165:86370 LEIAR25.R4 NONE -----
EBRE A 1 P 25:159:00000 25:165:86370 LEIAR25.R4 NONE -----
EMAZ A 1 P 25:159:00000 25:165:86370 LEIAS10 NONE -----
GERN A 1 P 25:159:00000 25:165:86370 LEIAS10 NONE -----
HOND A 1 P 25:159:00000 25:165:86370 LEIAR20 LEIM -----
ISPS A 1 P 25:159:00000 25:165:86370 LEIAR20 LEIM -----
KAST A 1 P 25:159:00000 25:165:86370 LEIAS10 NONE -----
LARE A 1 P 25:159:00000 25:165:86370 LEIAR20 LEIM -----
LEIT A 1 P 25:159:00000 25:161:86370 LEIAR10 NONE -----
PAS2 A 1 P 25:159:00000 25:165:86370 LEIAR20 LEIM -----
PASA A 1 P 25:159:00000 25:165:86370 LEIAR20 LEIM -----
RI01 A 1 P 25:159:00000 25:165:86370 LEIAR25.R4 LEIT -----
SALA A 1 P 25:159:00000 25:165:86370 LEIAR25 NONE -----
SCOA A 1 P 25:159:00000 25:165:86370 TRM55971.00 NONE -----
TERU A 1 P 25:159:00000 25:165:86370 LEIAR20 LEIM -----
VITO A 1 P 25:159:00000 25:165:86370 LEIAS10 NONE -----
YEBE A 1 P 25:159:00000 25:165:86370 LEIAR20 LEIM -----
ZARA A 1 P 25:159:00000 25:165:86370 TRM29659.00 NONE -----
```

7.3 Eccentricities

```
*
*SITE PT SOLN T DATA_START__ DATA_END_____ AXE ARP-->BENCHMARK(M)-----
ACOR A 1 P 25:159:00000 25:165:86370 UNE 3.0460 0.0000 0.0000
ALDA A 1 P 25:159:00000 25:165:86370 UNE 0.0000 0.0000 0.0000
ALSA A 1 P 25:159:00000 25:165:86370 UNE 0.0000 0.0000 0.0000
```

AMUR	A	1	P	25:159:00000	25:165:86370	UNE	0.0000	0.0000	0.0000
BLAZ	A	1	P	25:159:00000	25:165:86370	UNE	0.0000	0.0000	0.0000
BRZR	A	1	P	25:159:00000	25:165:86370	UNE	0.0771	0.0000	0.0000
CACE	A	1	P	25:159:00030	25:165:86370	UNE	0.0600	0.0000	0.0000
CANT	A	1	P	25:159:00000	25:165:86370	UNE	3.0490	0.0000	0.0000
CREU	A	1	P	25:159:00000	25:165:86370	UNE	0.0770	0.0000	0.0000
EBRE	A	1	P	25:159:00000	25:165:86370	UNE	0.0770	0.0000	0.0000
EMAZ	A	1	P	25:159:00000	25:165:86370	UNE	0.0350	0.0000	0.0000
GERN	A	1	P	25:159:00000	25:165:86370	UNE	0.0771	0.0000	0.0000
HOND	A	1	P	25:159:00000	25:165:86370	UNE	0.0771	0.0000	0.0000
ISPS	A	1	P	25:159:00000	25:165:86370	UNE	0.0350	0.0000	0.0000
KAST	A	1	P	25:159:00000	25:165:86370	UNE	0.0350	0.0000	0.0000
LARE	A	1	P	25:159:00000	25:165:86370	UNE	0.0000	0.0000	0.0000
LEIT	A	1	P	25:159:00000	25:161:86370	UNE	0.0000	0.0000	0.0000
PAS2	A	1	P	25:159:00000	25:165:86370	UNE	0.0000	0.0000	0.0000
PASA	A	1	P	25:159:00000	25:165:86370	UNE	0.0000	0.0000	0.0000
RID1	A	1	P	25:159:00000	25:165:86370	UNE	0.0606	0.0000	0.0000
SALA	A	1	P	25:159:00000	25:165:86370	UNE	0.0600	0.0000	0.0000
SCDA	A	1	P	25:159:00000	25:165:86370	UNE	0.0000	0.0000	0.0000
TERU	A	1	P	25:159:00000	25:165:86370	UNE	0.0600	0.0000	0.0000
VITO	A	1	P	25:159:00000	25:165:86370	UNE	0.0000	0.0000	0.0000
YEBE	A	1	P	25:159:00000	25:165:86370	UNE	0.0600	0.0000	0.0000
ZARA	A	1	P	25:159:00000	25:165:86370	UNE	3.2590	0.0000	0.0000

8 Inconsistencies (logsheet-RINEX metadata)

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

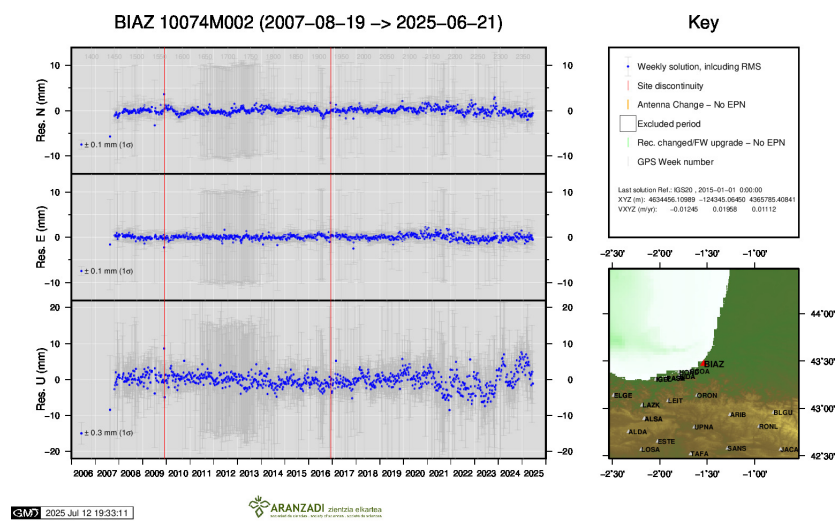
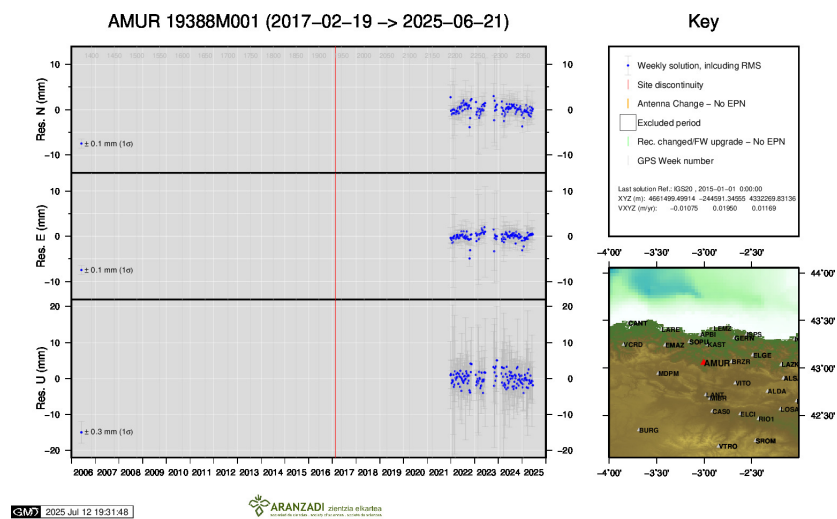
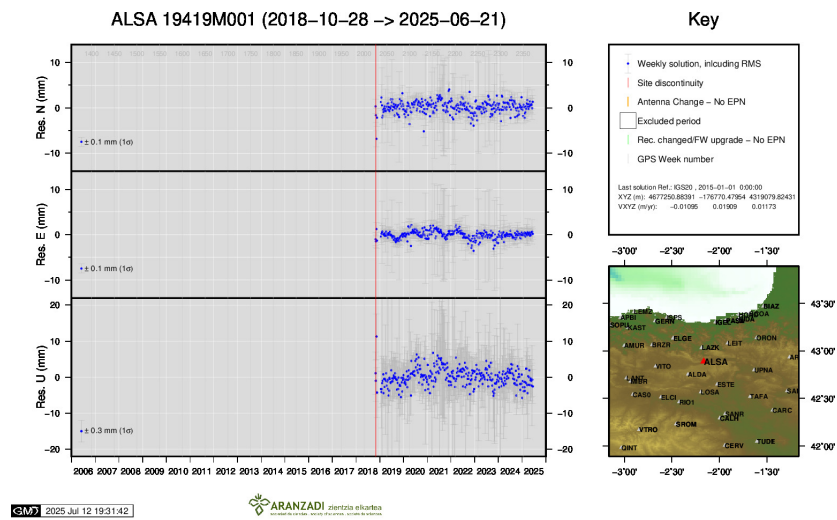
2025-06-29 03:26 UTC	CANT1590.250	RECEIVER TYPE		LEICA GR10	->	LEICA GR50	(source: cant00esp_20250509.log
2025-06-29 03:26 UTC	CANT1590.250	RECEIVER FIRM. VERS.		4.00/6.713	->	4.80/7.900	(source: cant00esp_20250509.log
2025-06-29 06:38 UTC	CANT1600.250	RECEIVER TYPE		LEICA GR10	->	LEICA GR50	(source: cant00esp_20250509.log
2025-06-29 06:38 UTC	CANT1600.250	RECEIVER FIRM. VERS.		4.00/6.713	->	4.80/7.900	(source: cant00esp_20250509.log
2025-06-29 10:30 UTC	CANT1610.250	RECEIVER TYPE		LEICA GR10	->	LEICA GR50	(source: cant00esp_20250509.log
2025-06-29 10:30 UTC	CANT1610.250	RECEIVER FIRM. VERS.		4.00/6.713	->	4.80/7.900	(source: cant00esp_20250509.log
2025-06-29 13:46 UTC	CANT1620.250	RECEIVER TYPE		LEICA GR10	->	LEICA GR50	(source: cant00esp_20250509.log
2025-06-29 13:46 UTC	CANT1620.250	RECEIVER FIRM. VERS.		4.00/6.713	->	4.80/7.900	(source: cant00esp_20250509.log
2025-06-29 17:06 UTC	CANT1630.250	RECEIVER TYPE		LEICA GR10	->	LEICA GR50	(source: cant00esp_20250509.log
2025-06-29 17:06 UTC	CANT1630.250	RECEIVER FIRM. VERS.		4.00/6.713	->	4.80/7.900	(source: cant00esp_20250509.log
2025-07-10 18:52 UTC	CANT1640.250	RECEIVER TYPE		LEICA GR10	->	LEICA GR50	(source: cant00esp_20250509.log
2025-07-10 18:52 UTC	CANT1640.250	RECEIVER FIRM. VERS.		4.00/6.713	->	4.80/7.900	(source: cant00esp_20250509.log
2025-07-10 15:13 UTC	CANT1650.250	RECEIVER TYPE		LEICA GR10	->	LEICA GR50	(source: cant00esp_20250509.log
2025-07-10 15:13 UTC	CANT1650.250	RECEIVER FIRM. VERS.		4.00/6.713	->	4.80/7.900	(source: cant00esp_20250509.log
2025-06-29 03:26 UTC	ISPS1590.250	ANTENNA SER. NO.			->	24238009	(source: isps00esp_20250114.log
2025-06-29 06:38 UTC	ISPS1600.250	ANTENNA SER. NO.			->	24238009	(source: isps00esp_20250114.log
2025-06-29 10:30 UTC	ISPS1610.250	ANTENNA SER. NO.			->	24238009	(source: isps00esp_20250114.log
2025-06-29 13:46 UTC	ISPS1620.250	ANTENNA SER. NO.			->	24238009	(source: isps00esp_20250114.log
2025-06-29 17:06 UTC	ISPS1630.250	ANTENNA SER. NO.			->	24238009	(source: isps00esp_20250114.log
2025-07-10 18:52 UTC	ISPS1640.250	ANTENNA SER. NO.			->	24238009	(source: isps00esp_20250114.log
2025-07-10 15:13 UTC	ISPS1650.250	ANTENNA SER. NO.			->	24238009	(source: isps00esp_20250114.log

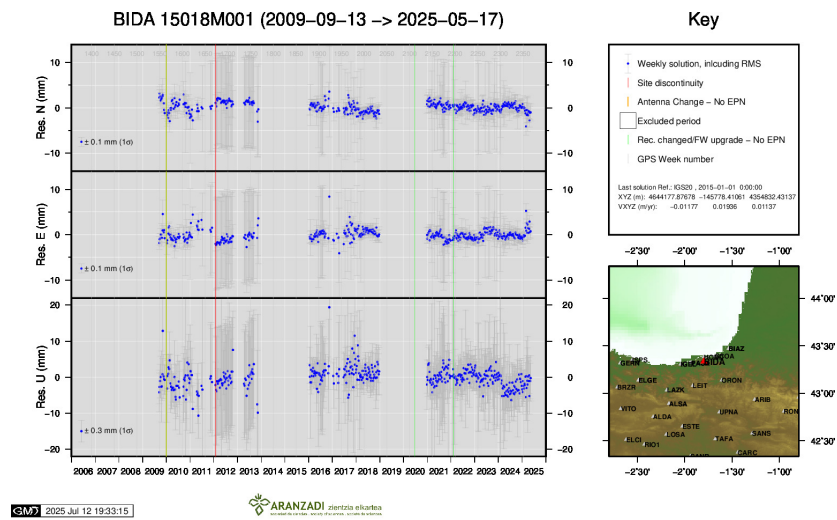
9 References

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- EPN Coordination Group and the EPN Central Bureau (2018): *Guidelines for the EPN Analysis Centres*. epncb.oma.be/documentation/guidelines/guidelines_analysis_centres.pdf
- Johnston, G., Riddell, A., Hausler, G. (2017). The International GNSS Service. Teunissen, Peter J.G., Montenbruck, O. (Eds.), Springer Handbook of Global Navigation Satellite Systems (1st ed., pp. 967-982). Cham, Switzerland: Springer International Publishing. DOI: 10.1007/978-3-319-42928-1
- 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

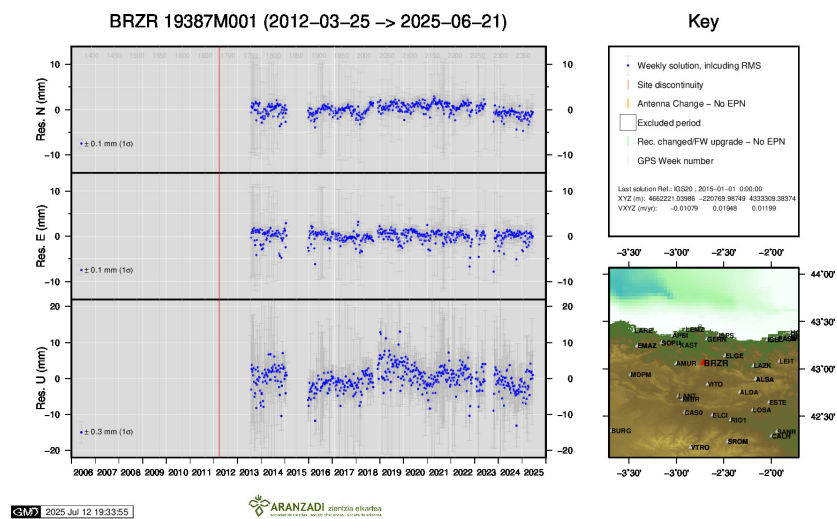
Time series of stations. Latest plots at: <http://geolabpasaia.org/gnss/ARA-net/TSeries/>, or click on the caption of each image.



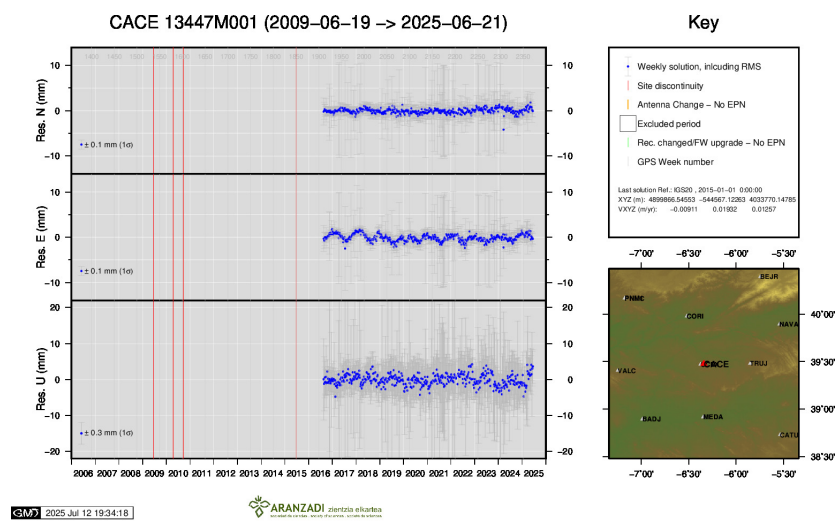




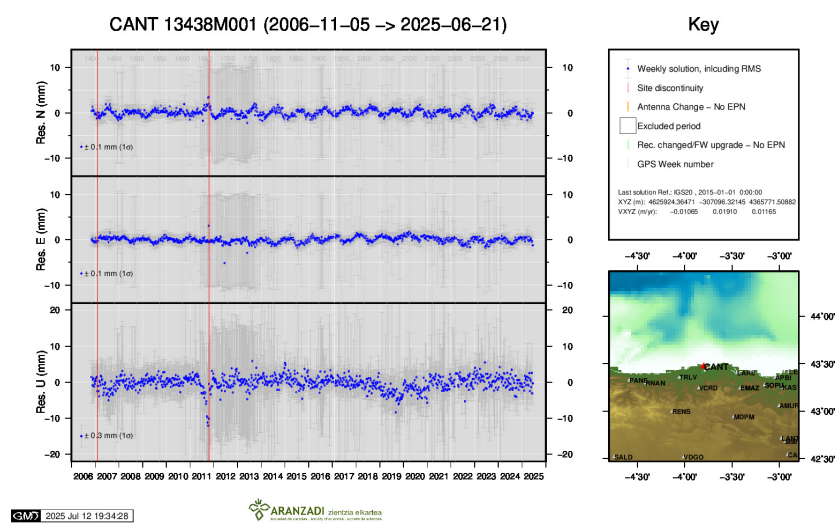
6) BIDA



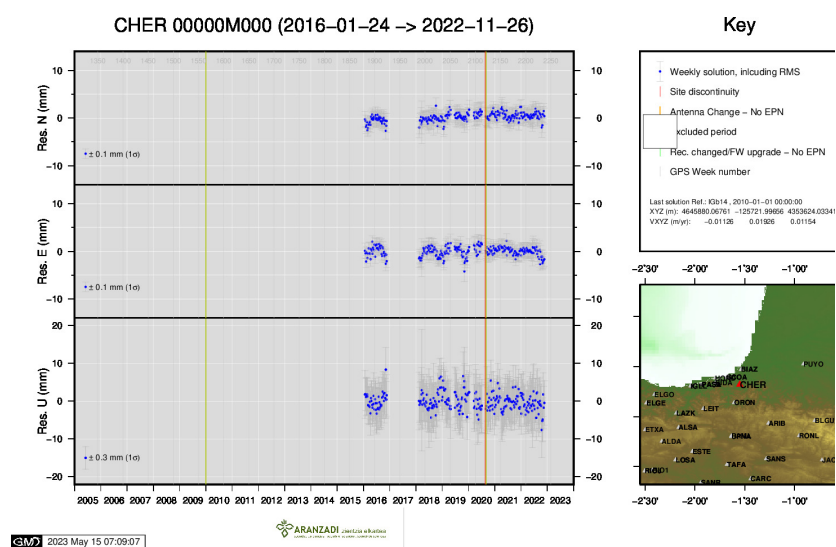
7) BRZR



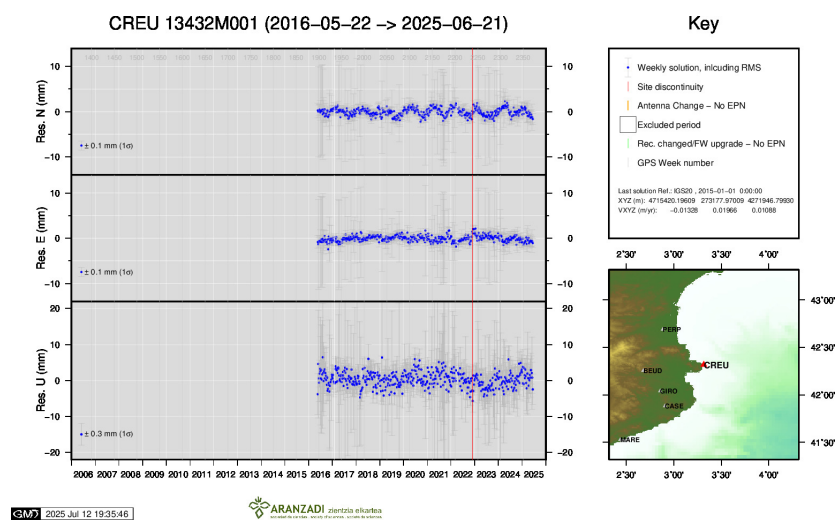
8) CACE



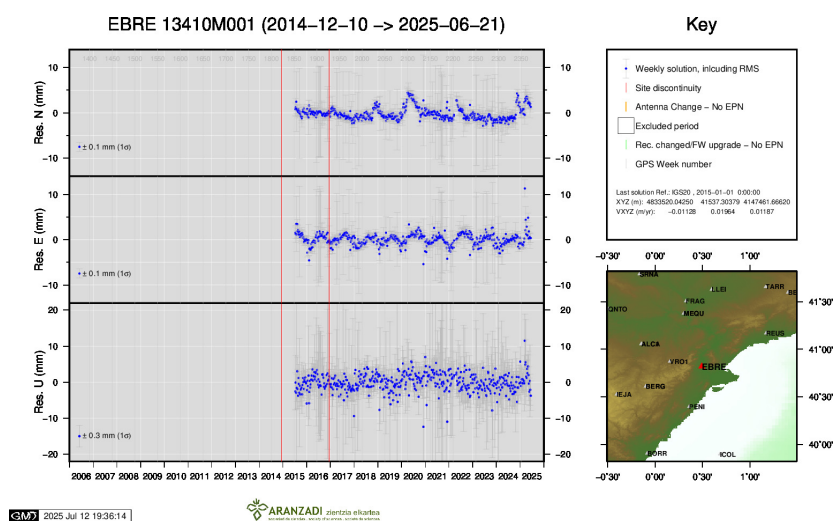
9) CANT



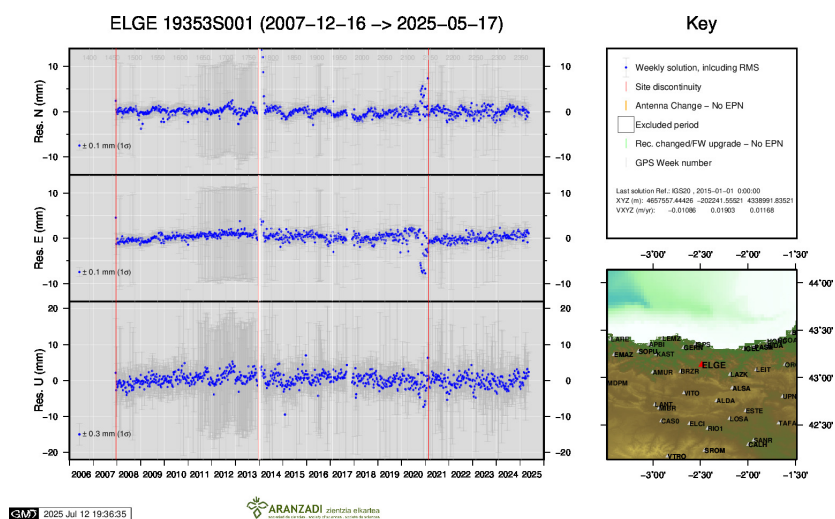
10) CHER



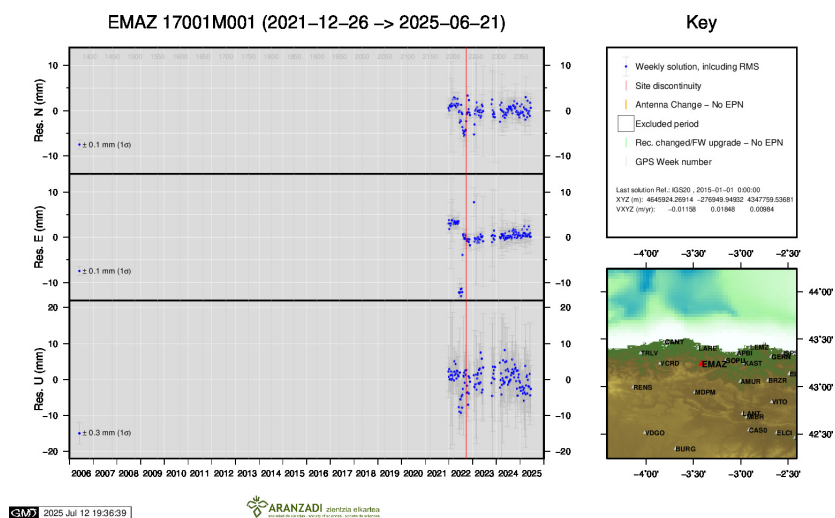
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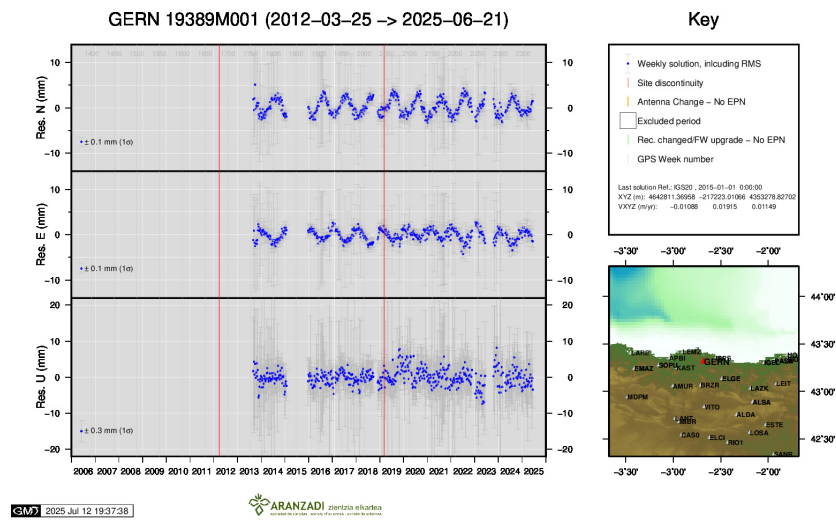
12) EBRE



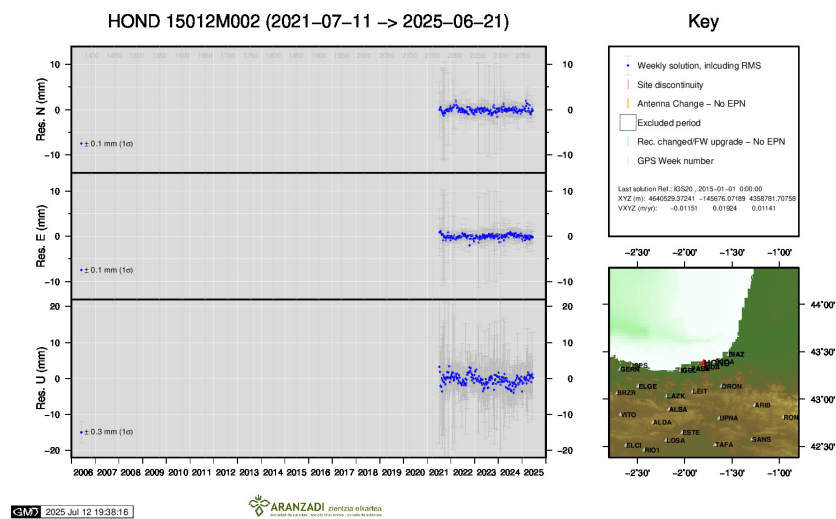
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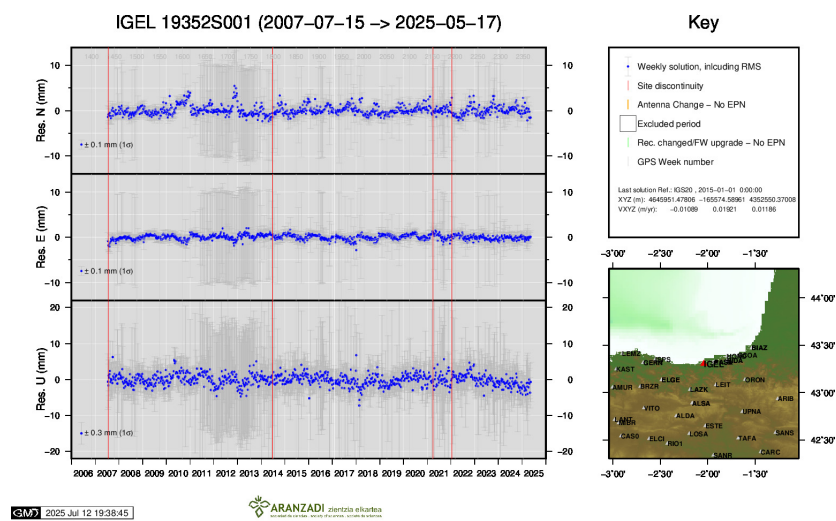
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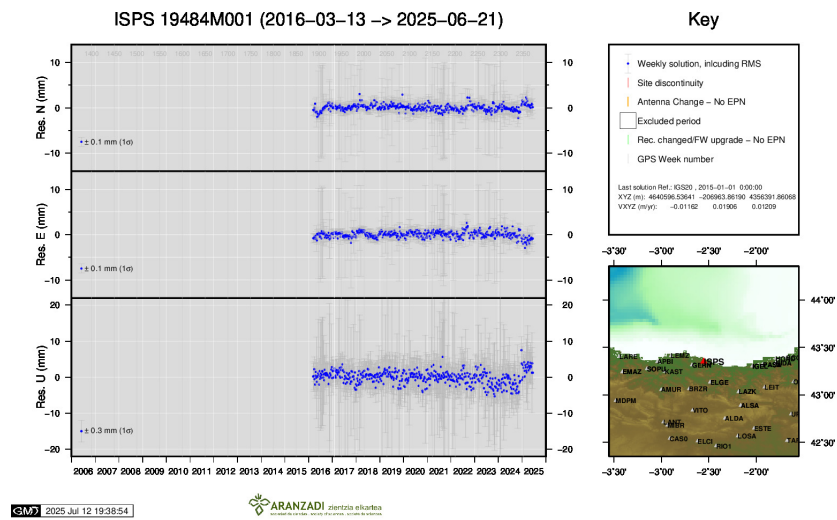
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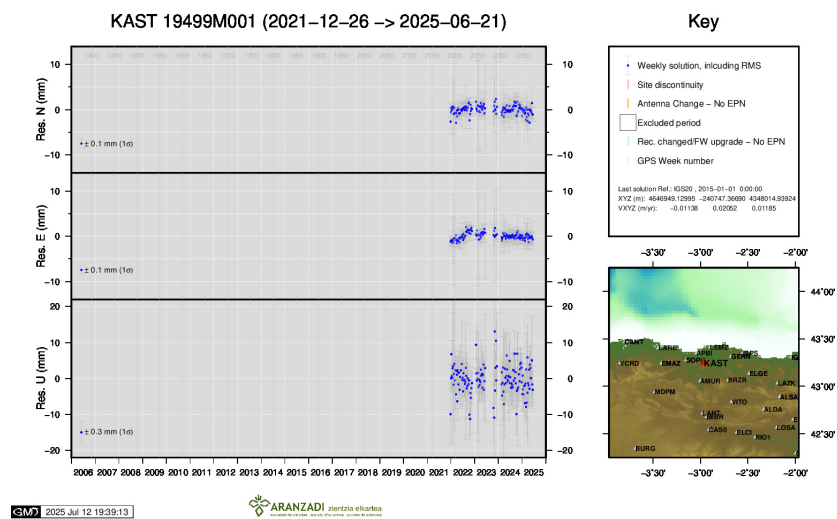
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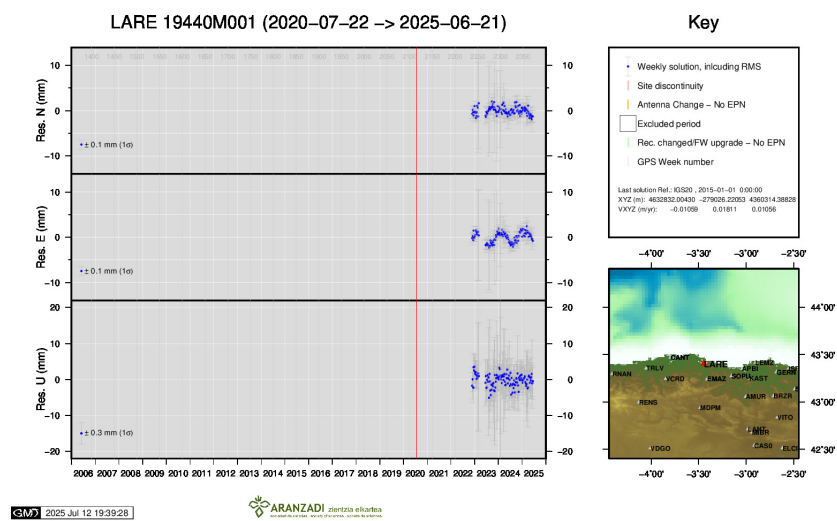
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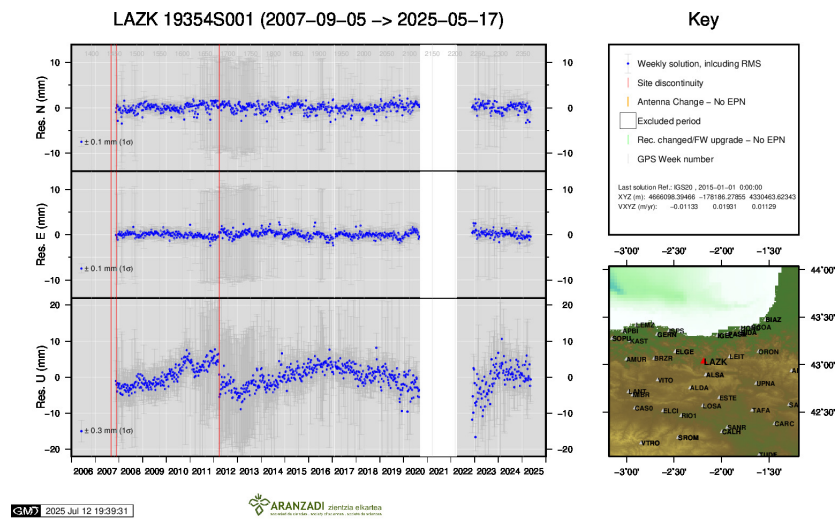
18) ISPS



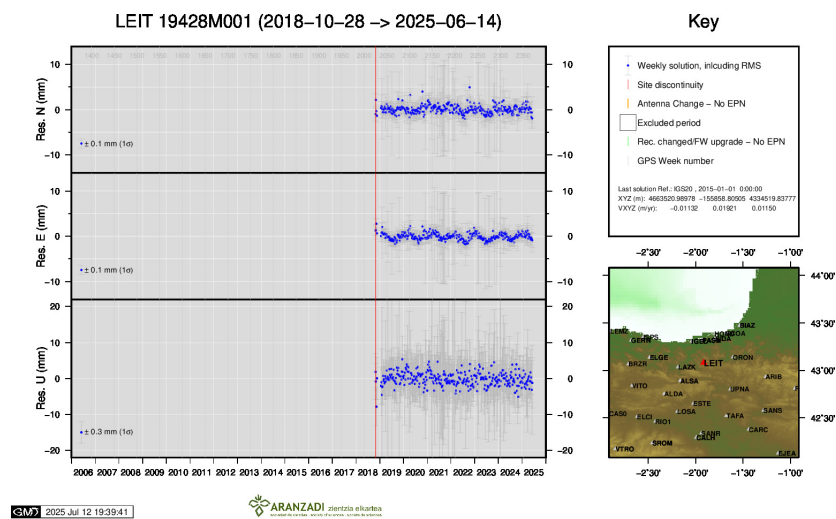
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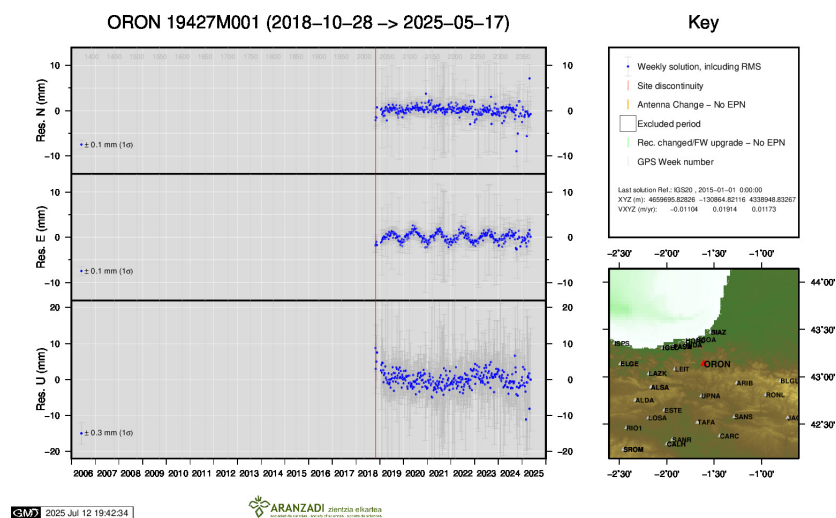
20) LARE



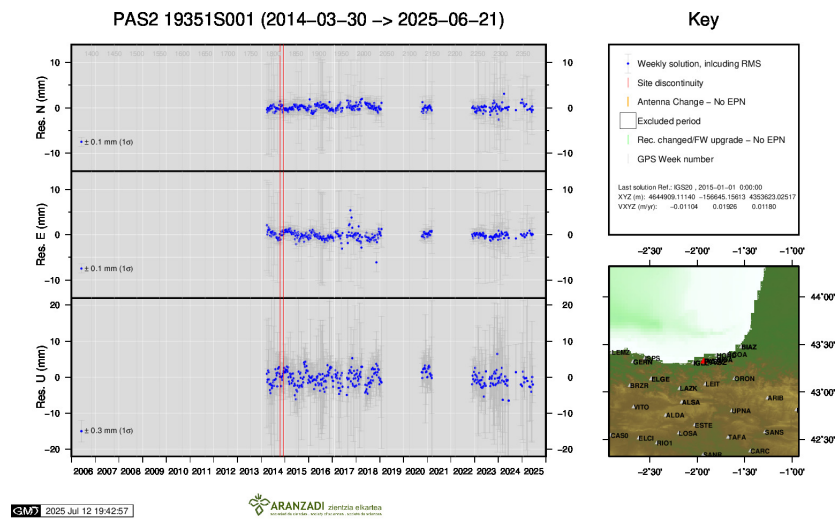
21) LAZK



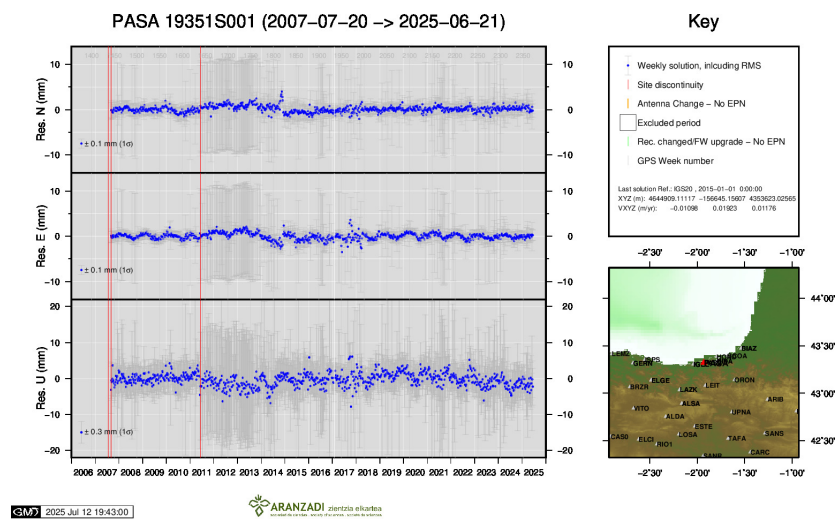
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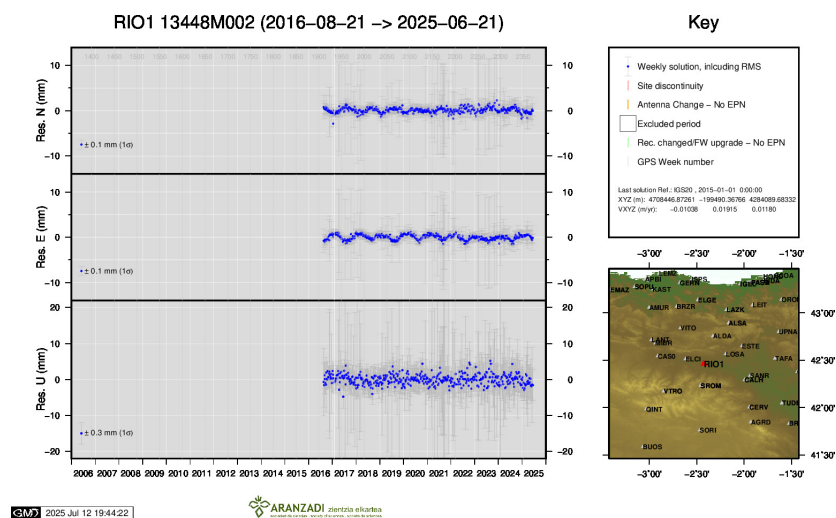
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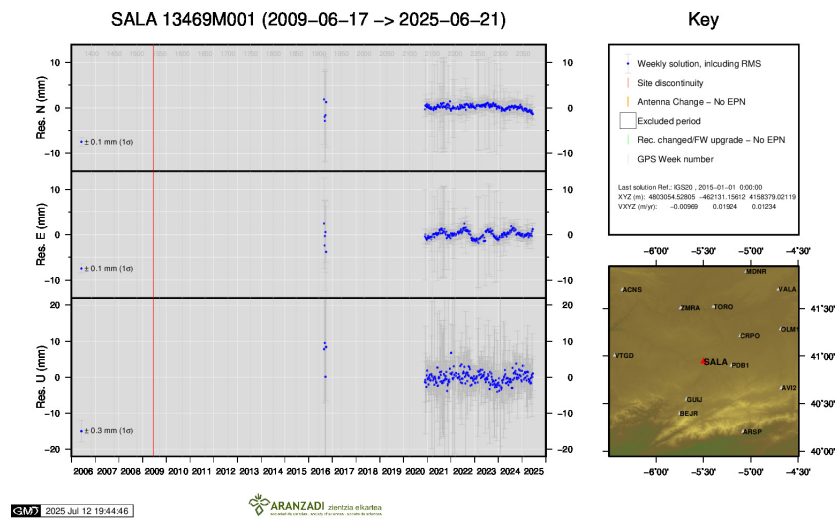
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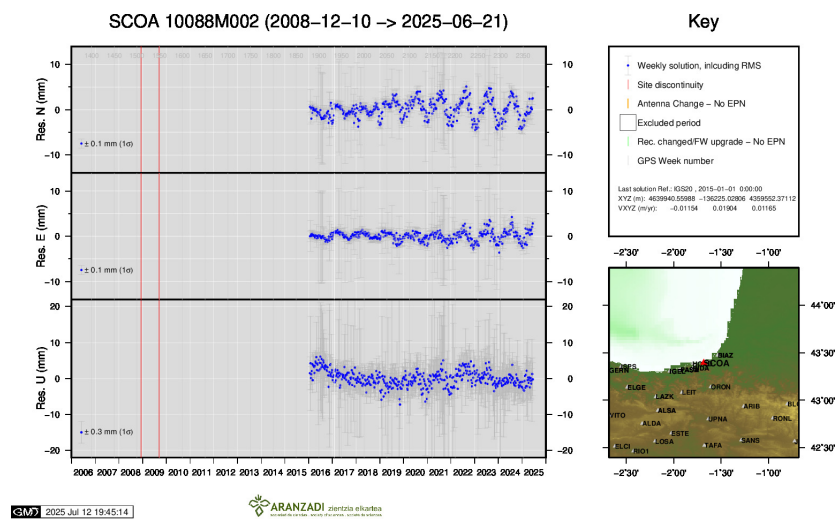
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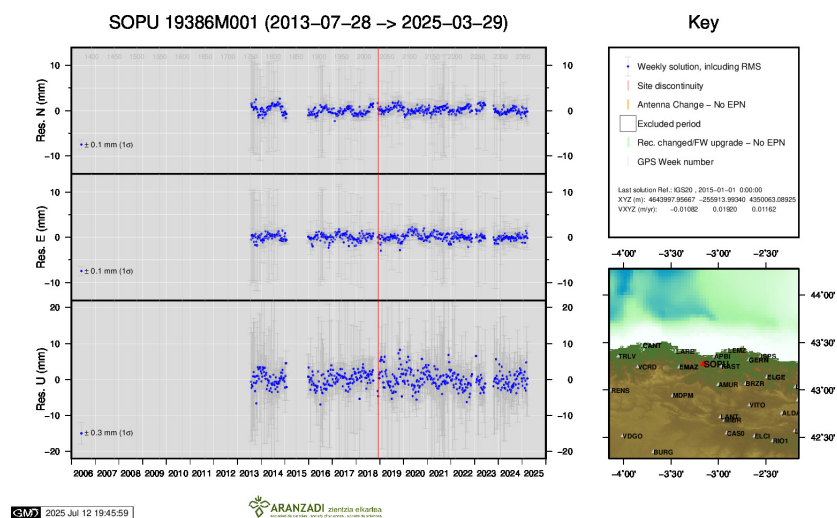
26) RIO1



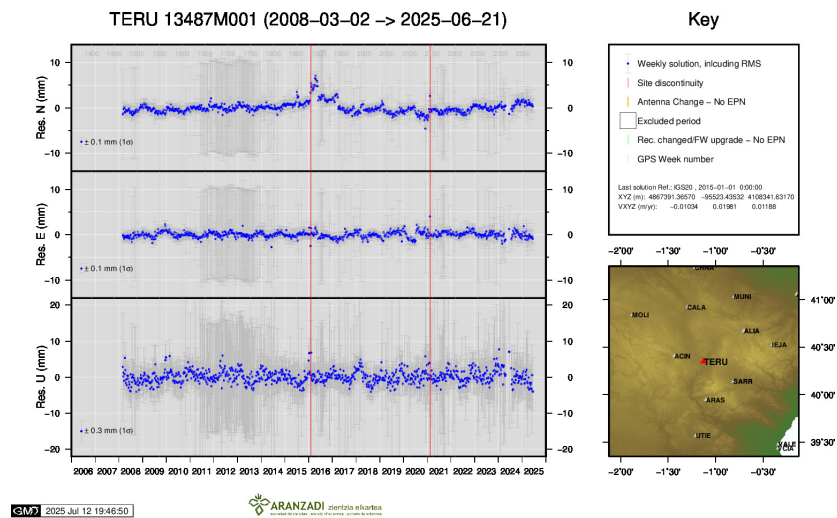
27) SALA



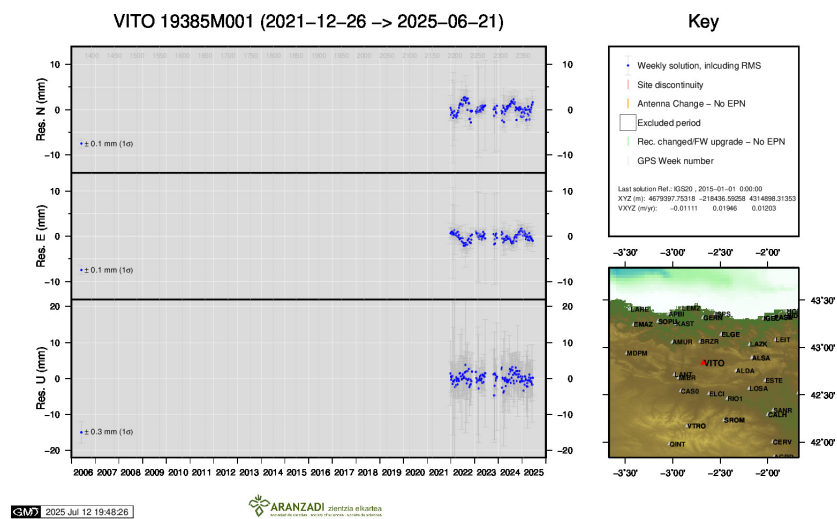
28) SCOA



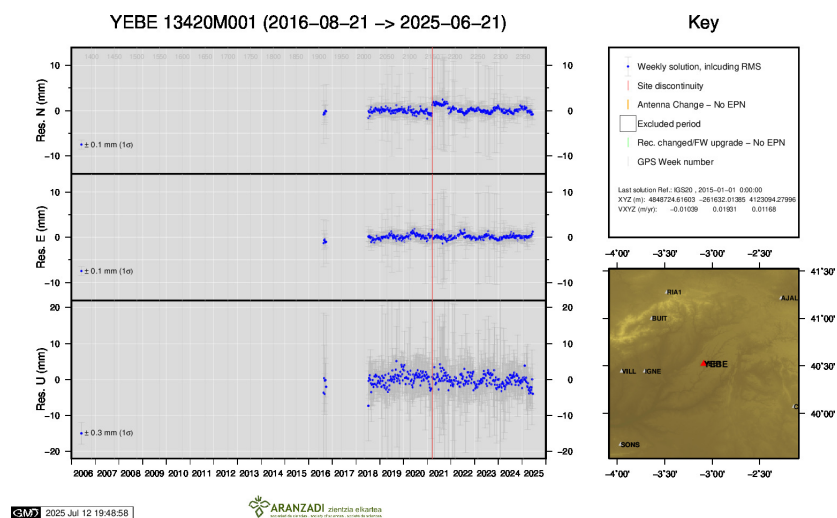
29) SOPU



30) TERU



31) VITO



32) YEBE

