

ARA-DAC Weekly Analysis Result: 2252 (GFA)

Technical Report

GPS Week: 2252 (GFA)

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

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Report generated on 2023/04/03 at 19:10:17

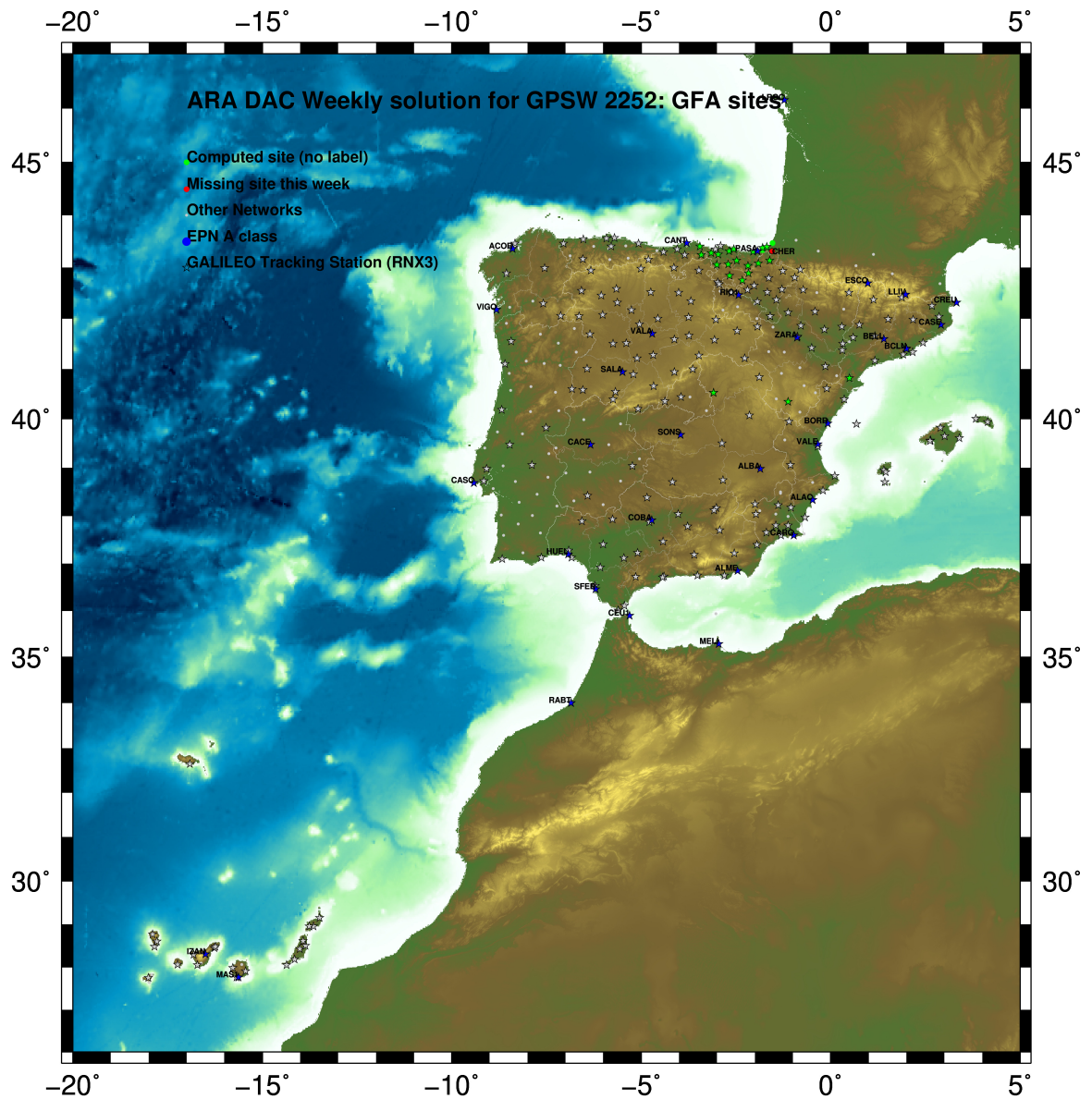


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1 Introduction

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



GM 2023 Apr 03 19:10:12

Fig.1: Computed Sites for GPS Week2252 (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 03-APR-23 18:26

LOCAL GEODETIC DATUM: IGS20 EPOCH: 2023-03-08 11:59:45

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	SYSTEM
4	ACOR 13434M001	4594489.51774	-678367.36330	4357066.32402	W	GRE
39	ALDA 19383M001	4687280.11639	-190876.49302	4308107.00030	A	GRE
50	ALSA 19419M001	4677250.78880	-176770.32577	4319079.91988	A	GRE
53	AMUR 19388M001	4661499.40628	-244591.18717	4332269.92809	A	GRE
100	BIAZ 10074M002	4634456.00252	-124344.90601	4365785.50006	A	GR
101	BIDA 00000M000	4644177.77636	-145778.25357	4354832.52664	A	GR
113	BRZR 19387M001	4662220.94156	-220769.83281	4333309.47765	A	GRE
104	CACE 13447M001	4899866.46370	-544566.96578	4033770.25017	W	GRE
116	CANT 13438M001	4625924.27354	-307096.16622	4365771.60629	W	GRE
162	CREU 13432M001	4715420.08136	273178.13187	4271946.88907	W	GRE
204	EBRE 13410M001	4833519.94535	41537.46449	4147461.76323	A	GRE
180	ELGE 19353S001	4657557.35057	-202241.40078	4338991.93383	A	GRE
182	EMAZ 17001M001	4645924.16665	-276949.79867	4347759.61824	A	GRE
209	GERN 19389M001	4642811.27394	-217222.85330	4353278.91969	A	GRE
257	HOND 15012M002	4640529.27345	-145676.91616	4358761.80228	A	GRE
235	IGEL 19352S001	4645951.38399	-165574.43379	4352550.46893	A	GRE
240	ISPS 19484M001	4640596.43597	-206963.70530	4356391.96154	A	GRE
245	KAST 19499M001	4646949.03015	-240747.20014	4348015.03674	A	GRE
252	LARE 19440M001	4632831.91291	-279026.07244	4360314.47797	A	GRE
256	LAZK 19354S001	4666098.29676	-178186.12008	4330463.71826	A	GRE
261	LEIT 19428M001	4663520.89495	-155858.64864	4334519.93518	A	GRE
334	ORDN 19427M001	4659695.73474	-130864.66599	4338948.93028	A	GRE
345	PAS2 19351S001	4644909.01599	-156644.99957	4353623.12243	A	GRE
493	PASA 19351S001	4644909.01598	-156644.99958	4353623.12247	W	GRE
553	RID1 13448M002	4708446.78120	-199490.21205	4284089.78092	W	GRE
558	SALA 13469M001	4803054.44465	-462131.00117	4158379.12486	W	GRE
566	SCDA 10088M002	4639940.46380	-136224.87482	4359552.46679	A	GRE
418	SOPU 19386M001	4643997.86228	-255913.83752	4350063.18686	A	GRE
443	TERU 13487M001	4867391.27753	-95523.27432	4108341.73223	A	GRE
493	VITO 19385M001	4679397.65650	-218436.43397	4314898.41116	A	GRE
752	YEBE 13420M001	4848724.52507	-261631.85657	4123094.37656	A	GRE
755	ZARA 13462M001	4773803.12413	-73505.91393	4215454.14159	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 03-APR-23 18:26

LOCAL GEODETIC DATUM: ETRF2000 EPOCH: 2023-03-08 11:59:45

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	SYSTEM
4	ACOR 13434M001	4594489.85161	-678367.97518	4357065.85943	W	
39	ALDA 19383M001	4687280.51056	-190877.11488	4308106.53456	A	
50	ALSA 19419M001	4677251.18569	-176770.94642	4319079.45518	A	
53	AMUR 19388M001	4661499.79529	-244591.80614	4332269.46380	A	
100	BIAZ 10074M002	4634456.40994	-124345.52150	4365785.03969	A	
101	BIDA 00000M000	4644178.18011	-145778.87026	4354832.06415	A	
113	BRZR 19387M001	4662221.33378	-220770.45181	4333309.01362	A	
104	CACE 13447M001	4899866.78984	-544567.61298	4033769.76156	W	
116	CANT 13438M001	4625924.65695	-307096.78117	4365771.14416	W	
162	CREU 13432M001	4715420.53360	273177.50826	4271946.42716	W	
204	EBRE 13410M001	4833520.35745	41536.82632	4147461.28823	A	
180	ELGE 19353S001	4657557.74567	-202242.01919	4338991.47045	A	
182	EMAZ 17001M001	4645924.55262	-276950.41591	4347759.15483	A	
209	GERN 19389M001	4642811.66818	-217223.47001	4353278.45735	A	
257	HOND 15012M002	4640529.67753	-145676.53242	4358781.34110	A	
235	IGEL 19352S001	4645951.78496	-165575.05074	4352550.00703	A	
240	ISPS 19484M001	4640596.83181	-206964.32173	4356391.49953	A	
245	KAST 19499M001	4646949.42089	-240747.81740	4348014.57373	A	
252	LARE 19440M001	4632832.29958	-279026.68813	4360314.01563	A	
256	LAZK 19354S001	4666098.69435	-178186.73942	4330463.25448	A	
261	LEIT 19428M001	4663521.29579	-155859.26763	4334519.47192	A	
334	ORDN 19427M001	4659696.13921	-130865.28446	4338948.46768	A	
345	PAS2 19351S001	4644909.41822	-156645.61637	4353622.66074	A	
493	PASA 19351S001	4644909.41821	-156645.61638	4353622.66078	W	
553	RID1 13448M002	4708447.17236	-199490.83639	4284089.31327	W	
558	SALA 13469M001	4803054.79143	-462131.63707	4158378.64561	W	
566	SCDA 10088M002	4639940.86918	-136225.49099	4359552.00579	A	
418	SOPU 19386M001	4643998.25119	-255914.45447	4350062.72390	A	
443	TERU 13487M001	4867391.66857	-95523.91684	4108341.25252	A	
493	VITO 19385M001	4679398.04758	-218437.05497	4314897.94571	A	
752	YEBE 13420M001	4848724.89544	-261632.49736	4123093.89618	A	
755	ZARA 13462M001	4773803.52646	-73506.54553	4215453.67011	W	

5.3 ETRF2014 (ETRS89) Coordinates

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

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CONVERT TO ETRF2014                                03-APR-23 18:26
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LOCAL GEODETIC DATUM: ETRF2014                    EPOCH: 2023-03-08 11:59:45
NUM  STATION NAME      X (M)      Y (M)      Z (M)      FLAG  SYSTEM
4    AOCR 13434M001    4594489.81127 -678368.01241 4357065.91135 W
39   ALDA 19383M001    4687280.46778 -190877.15348 4308106.58636 A
50   ALSA 19419M001    4677251.14296 -176770.98512 4319079.50701 A
53   AMUR 19388M001    4661499.75295 -244591.84466 4332269.51565 A
100  BIAZ 10074M002    4634456.36750 -124345.56057 4365785.09168 A
101  BIDA 00000M000    4644178.13763 -145778.90921 4354832.11610 A
113  BRZR 19387M001    4662221.29136 -220770.49042 4333309.06548 A
104  CACE 13447M001    4899866.74572 -544567.64936 4033769.81265 W
116  CANT 13438M001    4625924.61520 -307096.81962 4365771.19608 W
162  CREU 13432M001    4715420.48877 273177.46813 4271946.47920 W
204  EBRE 13410M001    4833520.31220 41536.78753 4147461.33976 A
180  ELGE 19353S001    4657557.70324 -202242.05788 4338991.52233 A
182  EMAZ 17001M001    4645924.51056 -276950.45438 4347759.20671 A
209  GERN 19389M001    4642811.62596 -217223.50872 4353278.50927 A
257  HOND 15012M002    4640529.63509 -145676.57139 4358781.39307 A
235  IGEL 19352S001    4645951.74254 -165575.08962 4352550.05896 A
240  ISPS 19484M001    4640596.78958 -206964.36048 4356391.55146 A
245  KAST 19499M001    4646949.37870 -240747.86600 4348014.62563 A
252  LARE 19440M001    4632832.25767 -279026.72665 4360314.06755 A
256  LAZK 19354S001    4666098.65175 -178186.77816 4330463.30635 A
261  LEIT 19428M001    4663521.25314 -155859.30646 4334519.52381 A
334  ORON 19427M001    4659696.09651 -130865.32339 4338948.51960 A
345  PAS2 19351S001    4644909.37577 -156645.65528 4353622.71268 A
493  PASA 19351S001    4644909.37577 -156645.65529 4353622.71272 W
553  RIO1 13448M002    4708447.12937 -199490.87487 4284089.36500 W
558  SALA 13469M001    4803054.74820 -462131.67419 4158378.69697 W
566  SOA 10088M002    4639940.82671 -136225.52999 4359552.05776 A
418  SOPU 19386M001    4643998.20908 -255914.49302 4350062.77579 A
443  TERU 13487M001    4867391.62343 -95523.95499 4108341.30386 A
493  VITO 19385M001    4679398.00497 -218437.09351 4314897.99752 A
752  YEBE 13420M001    4848724.85108 -261632.53500 4123093.94749 A
755  ZARA 13462M001    4773803.48231 -73506.58418 4215453.72172 W

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6 Quality Control

6.1 Mean and Daily Repeatabilities

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

ARA FINAL WEEKLY COMBINATION: FINAL ORBITS 03-APR-23 18:26

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	7	XXXXXX	1.40	1.35	5.67
ALDA 19383M001	7	XXXXXX	0.87	1.77	6.73
ALSA 19419M001	7	XXXXXX	0.44	4.38	2.29
AMUR 19388M001	7	XXXXXX	2.47	1.65	5.34
BLAZ 10074M002	7	XXXXXX	0.84	0.75	4.76
BIDA 00000M000	7	XXXXXX	0.70	0.84	5.56
BRZR 19387M001	7	XXXXXX	4.49	5.26	5.22
CACE 13447M001	7	XXXXXX	0.81	1.14	5.17
CANT 13438M001	6	XX XXX	1.15	0.78	2.94
CREU 13432M001	7	XXXXXX	0.77	0.63	2.66
EBRE 13410M001	5	XXXX	1.41	2.06	5.73
ELGE 19353S001	7	XXXXXX	1.23	0.72	3.58
EMAZ 17001M001	7	XXXXXX	0.90	0.98	1.68
GERN 19389M001	7	XXXXXX	0.93	1.53	6.68
HOND 15012M002	7	XXXXXX	0.93	0.74	4.50
IGEL 19352S001	7	XXXXXX	2.40	0.63	4.58
ISPS 19484M001	7	XXXXXX	1.40	1.21	4.74
KAST 19499M001	7	XXXXXX	1.47	0.90	5.46
LARE 19440M001	3	XXX	1.12	0.47	2.29
LAZK 19354S001	7	XXXXXX	1.34	1.31	6.96
LEIT 19428M001	7	XXXXXX	1.15	0.96	4.57
ORON 19427M001	7	XXXXXX	0.92	1.39	2.44
PAS2 19351S001	7	XXXXXX	0.79	0.60	4.78
PASA 19351S001	7	XXXXXX	0.79	0.61	4.76
RI01 13448M002	7	XXXXXX	0.90	1.25	1.46
SALA 13469M001	7	XXXXXX	0.47	0.66	1.97
SCDA 10088M002	7	XXXXXX	1.13	1.03	3.99
SOPU 19386M001	7	XXXXXX	1.02	1.61	2.86
TERU 13487M001	7	XXXXXX	0.82	1.27	6.23
VITD 19385M001	7	XXXXXX	1.52	0.71	3.08
YEBE 13420M001	6	XX XXX	0.88	0.54	2.68
ZARA 13462M001	7	XXXXXX	0.90	0.86	2.97

Comparison of individual solutions:

Station	Day	N	E	U	
ACOR 13434M001	N	1.40	-0.23	-0.34	-0.07	-0.53	-2.52	-1.28	-1.81
ACOR 13434M001	E	1.35	-0.14	-0.75	-0.43	0.35	-2.98	-0.70	-0.75
ACOR 13434M001	U	5.67	-7.45	-2.83	4.68	-6.30	-5.51	-0.46	6.10
ALDA 19383M001	N	0.87	1.11	0.69	0.64	-0.55	0.33	-0.83	1.17
ALDA 19383M001	E	1.77	-1.68	-2.24	-0.07	2.69	1.49	-0.29	1.18
ALDA 19383M001	U	6.73	-2.66	-2.01	0.10	13.23	5.72	-2.90	-6.65
ALSA 19419M001	N	0.44	-0.22	0.25	0.39	0.01	0.96	0.01	-0.00
ALSA 19419M001	E	4.38	2.35	2.27	1.82	-7.25	-5.59	2.35	3.45
ALSA 19419M001	U	2.29	0.15	2.57	-3.38	0.06	-1.76	2.55	1.93
AMUR 19388M001	N	2.47	-0.24	-0.21	3.54	-4.81	-0.83	-0.17	0.03
AMUR 19388M001	E	1.65	0.11	0.38	2.80	-2.71	0.48	0.01	0.85
AMUR 19388M001	U	5.34	-4.69	-1.01	8.37	-6.35	-2.25	2.66	5.06
BLAZ 10074M002	N	0.84	0.57	-0.05	1.66	0.75	-0.44	-0.52	0.32
BLAZ 10074M002	E	0.75	0.71	0.44	0.71	-0.73	-0.30	-0.02	1.25
BLAZ 10074M002	U	4.76	-1.47	1.87	-3.50	6.74	6.47	4.93	2.56
BIDA 00000M000	N	0.70	0.18	0.97	1.12	0.37	0.56	-0.55	-0.07
BIDA 00000M000	E	0.84	0.25	-0.45	-0.48	1.78	0.19	0.61	0.37
BIDA 00000M000	U	5.56	-1.46	-2.74	-1.66	7.36	2.42	3.71	9.98
BRZR 19387M001	N	4.49	3.16	3.39	1.53	-7.21	-6.43	1.17	1.60
BRZR 19387M001	E	5.26	4.78	4.63	-0.65	-6.43	-7.24	0.03	5.24
BRZR 19387M001	U	5.22	1.30	4.11	-5.25	-2.50	-6.37	-0.72	8.37
CACE 13447M001	N	0.81	-0.11	-0.61	-1.09	-0.09	0.51	-0.97	-1.06
CACE 13447M001	E	1.14	0.97	0.15	0.32	-2.38	0.36	0.21	0.95
CACE 13447M001	U	5.17	3.29	-3.22	10.38	-4.19	-3.35	-1.20	1.01
CANT 13438M001	N	1.15	0.11	-0.34	0.90		0.15	-2.02	-1.23
CANT 13438M001	E	0.78	0.47	0.25	0.49		-1.26	0.55	-0.79
CANT 13438M001	U	2.94	-3.35	-0.49	1.85		-0.37	5.32	-0.20
CREU 13432M001	N	0.77	0.63	0.26	1.12	0.97	0.75	0.60	-0.06
CREU 13432M001	E	0.63	-0.86	-0.81	0.67	-0.45	-0.32	-0.32	0.34
CREU 13432M001	U	2.66	-2.75	-2.15	-3.48	0.31	0.06	-0.54	4.21
EBRE 13410M001	N	1.41	0.21	1.04	0.10		-2.03	1.64	
EBRE 13410M001	E	2.06	-0.91	-1.15	2.53	1.81	-2.25		
EBRE 13410M001	U	5.73	-1.65	-1.34	-5.73	-6.24	7.40		
ELGE 19353S001	N	1.23	-0.04	-0.18	1.18	0.92	0.01	-1.39	-2.19
ELGE 19353S001	E	0.72	-0.27	-0.21	-0.17	1.18	0.99	-0.72	0.37
ELGE 19353S001	U	3.58	-5.17	-3.23	-0.19	5.79	1.23	2.14	0.36
EMAZ 17001M001	N	0.90	-1.23	-0.42	0.37	0.40	-0.47	-0.96	-1.32
EMAZ 17001M001	E	0.98	-0.27	-0.51	-0.47	-0.16	1.07	-0.65	-1.90
EMAZ 17001M001	U	1.68	-0.70	-1.52	1.50	2.04	-1.88	-1.82	-0.91
GERN 19389M001	N	0.93	-0.36	-0.43	0.47	-1.36	-0.63	-0.00	-1.54
GERN 19389M001	E	1.53	1.20	0.90	0.41	0.58	-2.06	-1.34	-2.29
GERN 19389M001	U	6.68	-4.48	-2.15	-1.45	-5.08	-6.06	2.21	13.18
HOND 15012M002	N	0.93	0.30	0.60	0.83	1.72	-0.23	0.34	-0.98
HOND 15012M002	E	0.74	0.91	0.97	0.15	-0.28	-0.71	0.22	0.95
HOND 15012M002	U	4.50	-1.43	0.39	1.01	3.54	1.25	2.39	9.92
IGEL 19352S001	N	2.40	-0.34	-0.82	0.00	5.45	0.92	-0.95	-1.53
IGEL 19352S001	E	0.63	0.66	0.64	0.66	-0.65	0.35	-0.19	0.73
IGEL 19352S001	U	4.58	-1.00	-2.34	-0.09	6.03	5.72	4.50	5.50
ISPS 19484M001	N	1.40	0.28	-0.11	-0.60	1.26	-0.13	-2.07	-2.34
ISPS 19484M001	E	1.21	-1.82	-0.80	-0.82	1.92	-0.23	-0.59	-0.17
ISPS 19484M001	U	4.74	-3.88	2.12	0.55	-6.24	-5.21	3.08	6.28
KAST 19499M001	N	1.47	0.29	0.48	-0.64	-2.32	-2.19	-0.63	1.30
KAST 19499M001	E	0.90	0.75	0.70	-1.00	-0.72	-0.74	-1.24	-0.48
KAST 19499M001	U	5.46	0.28	0.17	-1.39	-2.66	-10.82	0.17	7.26
LARE 19440M001	N	1.12	0.79	0.61	-1.23				
LARE 19440M001	E	0.47	-0.53	-0.18	0.36				
LARE 19440M001	U	2.29	-2.40	-2.12	-0.52				
LAZK 19354S001	N	1.34	-1.60	-0.78	1.23	2.05	1.08	0.61	-0.57
LAZK 19354S001	E	1.31	-1.55	-1.88	0.30	-0.32	1.72	0.57	0.97

LAZK	19354S001	U	6.96	-7.86	-0.86	0.39	5.28	11.60	2.27	-7.78
LEIT	19428M001	N	1.15	0.73	0.47	-0.34	-0.33	2.39	-0.14	-1.13
LEIT	19428M001	E	0.96	0.01	0.20	0.62	-0.05	-1.48	-1.01	1.37
LEIT	19428M001	U	4.57	-5.91	-3.10	-1.56	4.40	5.40	5.07	-2.00
ORDN	19427M001	N	0.92	-0.16	-0.50	0.61	0.97	-1.52	0.54	0.93
ORDN	19427M001	E	1.39	-0.65	-0.30	0.68	-2.18	-0.56	1.79	1.55
ORDN	19427M001	U	2.44	0.71	3.22	1.67	0.13	1.36	3.68	-2.60
PAS2	19351S001	N	0.79	1.02	0.72	0.85	-0.16	-0.60	0.97	-0.40
PAS2	19351S001	E	0.60	0.57	0.37	0.46	0.39	-0.68	0.07	0.92
PAS2	19351S001	U	4.78	-2.15	-2.29	0.51	5.39	4.19	4.89	7.53
PASA	19351S001	N	0.79	1.05	0.67	0.86	-0.18	-0.60	0.97	-0.35
PASA	19351S001	E	0.61	0.54	0.31	0.46	0.47	-0.69	0.06	0.97
PASA	19351S001	U	4.76	-2.16	-2.25	0.59	5.29	4.19	5.01	7.42
RID1	13448M002	N	0.90	-1.04	-0.46	-0.20	0.98	-0.12	0.65	1.47
RID1	13448M002	E	1.25	1.06	0.87	1.23	-1.37	-0.26	1.99	-0.16
RID1	13448M002	U	1.46	-0.52	0.71	-0.30	1.24	1.72	2.56	-0.94
SALA	13469M001	N	0.47	0.14	0.43	-0.54	-0.18	0.21	-0.35	-0.78
SALA	13469M001	E	0.66	0.38	0.12	0.08	-1.05	-0.16	0.50	1.05
SALA	13469M001	U	1.97	-2.01	-2.39	1.96	0.64	2.28	1.83	0.87
SCDA	10088M002	N	1.13	-0.75	-0.61	-0.39	0.55	1.50	1.99	0.20
SCDA	10088M002	E	1.03	-0.14	-0.09	-0.35	-0.11	2.02	0.16	1.47
SCDA	10088M002	U	3.99	-1.74	-0.07	-0.23	4.00	5.07	4.84	5.21
SOPU	19386M001	N	1.02	-0.89	0.11	0.67	-0.72	-0.83	-1.95	-0.15
SOPU	19386M001	E	1.61	1.03	1.09	-0.56	0.51	-3.04	0.18	-1.86
SOPU	19386M001	U	2.86	-3.38	-4.55	3.66	-1.79	-0.29	0.42	-0.12
TERU	13487M001	N	0.82	-0.30	-0.80	0.79	-1.32	0.02	-0.76	-0.59
TERU	13487M001	E	1.27	0.14	-0.08	1.10	0.29	1.04	-1.92	-1.89
TERU	13487M001	U	6.23	-2.00	-0.62	-7.73	-1.34	9.35	-5.90	-6.67
VITO	19385M001	N	1.52	1.08	0.84	0.36	-2.80	-1.62	-0.86	0.83
VITO	19385M001	E	0.71	0.57	0.62	-0.84	0.57	0.50	0.78	0.66
VITO	19385M001	U	3.08	-2.50	-0.22	4.86	1.77	-1.76	4.49	-0.72
YEBE	13420M001	N	0.88	-0.14	-0.02		0.87	-0.36	-0.70	-1.57
YEBE	13420M001	E	0.54	-0.00	0.46		-0.44	0.65	-0.07	0.80
YEBE	13420M001	U	2.68	-0.20	0.37		-0.74	-3.19	5.00	0.31
ZARA	13462M001	N	0.90	-0.72	-0.00	0.51	0.10	1.93	0.49	-0.24
ZARA	13462M001	E	0.86	-0.55	0.25	0.24	-0.91	1.41	0.23	1.08
ZARA	13462M001	U	2.97	-1.27	-2.43	-2.99	-1.81	1.87	4.07	3.59

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	-1.53	1.54	1.65
2	ALAC 13433M001	I W	-1.79	2.40	1.52
3	ALBA 13452M001	I W	4.38	-2.79	-8.17
4	ALME 13437M001	I W	-0.75	-0.32	4.95
5	BCLN 13412M001	I W	0.40	1.08	-1.73
6	BELL 13431M001	I W	-0.55	-2.03	2.23
7	BORR 13480M001	I W	-0.65	-3.10	-0.95
8	BRST 10004M004	I W	-2.60	0.75	2.84
9	CACE 13447M001	I W	0.39	2.00	6.12
10	CANT 13438M001	I W	-3.25	3.06	-8.30
11	CARG 19412M001	I W	2.34	-0.05	-2.91
12	CASE 13494M001	I W	-3.60	0.83	-4.00
13	CEU1 13449M002	I W	1.18	-0.48	0.54
14	COBA 13453M001	I W	2.04	2.14	-5.39
15	CREU 13432M001	I W	-3.17	0.12	-1.76
17	ESCO 13435M001	I W	-5.03	-0.71	0.46
18	HUEL 13451M001	I W	8.67	-8.82	12.58
20	IZAN 31309M002	I W	1.23	2.60	-2.05
21	LLIV 13436M001	I W	-0.98	0.21	1.06
23	LROC 10023M001	I W	-1.53	2.77	6.54
25	MAS1 31303M002	I W	1.07	-0.16	-1.80
26	MELI 19379M001	I W	3.30	3.43	-1.26
27	PASA 19351S001	I W	1.07	1.51	-5.27
28	PDEL 31906M004	I W	1.74	-1.54	5.41
29	RABT 35001M002	I W	0.31	0.29	-5.10
30	RIO1 13448M002	I W	-2.88	-1.07	1.11
31	SALA 13469M001	I W	1.17	3.18	-3.99
33	SFER 13402M004	I W	-2.50	-9.24	6.44
34	SONS 13446M001	I W	1.45	4.64	-0.11
35	VALA 13463M002	I W	0.24	2.01	-0.81
36	VALE 13439M001	I W	-3.72	3.76	-9.75
37	VIGO 13450M001	I W	1.84	0.91	3.51
40	ZARA 13462M001	I W	-0.72	1.32	-1.25
41	ZIMM 14001M004	I W	-2.60	-1.51	-2.20
305	CASC 13909S001	A W	3.86	-7.73	7.78
RMS / COMPONENT			2.75	3.26	4.86
IQR			3.95	3.21	5.76
MEAN			-0.03	0.03	-0.06
MEDIAN			0.24	0.75	-0.81
MIN			-5.03	-9.24	-9.75
MAX			8.67	4.64	12.58
OVERALL RMS/IQR/MAX(3D)			3.73	3.80	17.65
					HUEL 13451M001 #SUM
ALL RMS / COMPONENT			2.75	3.26	4.86
ALL IQR			3.95	3.21	5.76
ALL MEAN			-0.03	0.03	-0.06
ALL MEDIAN			0.24	0.75	-0.81
ALL MIN			-5.03	-9.24	-9.75
ALL MAX			8.67	4.64	12.58
ALL OVERALL RMS/IQR/MAX(3D)			3.73	3.80	17.65
					HUEL 13451M001 #SUM_ALL

NUMBER OF PARAMETERS : 3
NUMBER OF STATIONS : 35
NUMBER OF COORDINATES : 105
RMS OF TRANSFORMATION : 3.73 MM

PARAMETERS:

TRANSLATION IN X : -0.00 +- 0.63 MM
TRANSLATION IN Y : 0.00 +- 0.63 MM
TRANSLATION IN Z : 0.00 +- 0.63 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          2051177
NUMBER OF UNKNOWNNS             213070
NUMBER OF DEGREES OF FREEDOM    20298107
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)     180
VARIANCE FACTOR                  887.566959601501821
```

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 23:064:00000 23:070:86370 LEICA GR50 -----
ALDA A 1 P 23:064:00000 23:070:86370 LEICA GR30 -----
ALSA A 1 P 23:064:00000 23:070:86370 LEICA GR50 -----
AMUR A 1 P 23:064:00000 23:070:86370 LEICA GR30 -----
BIAZ A 1 P 23:064:00000 23:070:86370 SPECTRA SP90M -----
BIDA A 1 P 23:064:00000 23:070:86370 LEICA GR10 -----
BRZR A 1 P 23:064:00000 23:070:86370 LEICA GR30 -----
CACE A 1 P 23:064:00000 23:070:86370 TRIMBLE NETR9 -----
CANT A 1 P 23:064:00000 23:070:86370 LEICA GR10 -----
CREU A 1 P 23:064:00000 23:070:86370 LEICA GR50 -----
EBRE A 1 P 23:064:00000 23:068:86370 LEICA GR50 -----
ELGE A 1 P 23:064:00000 23:070:86370 LEICA GR30 -----
EMAZ A 1 P 23:064:00000 23:070:86370 LEICA GR30 -----
GERN A 1 P 23:064:00000 23:070:86370 LEICA GR30 -----
HOND A 1 P 23:064:00000 23:070:86370 LEICA GR50 -----
IGEL A 1 P 23:064:00000 23:070:86370 LEICA GR30 -----
ISPS A 1 P 23:064:00000 23:070:86370 TRIMBLE NETR9 -----
KAST A 1 P 23:064:00000 23:070:86370 LEICA GR30 -----
LARE A 1 P 23:064:00000 23:066:86370 LEICA GR50 -----
LAZK A 1 P 23:064:00000 23:070:86370 LEICA GR30 -----
LEIT A 1 P 23:064:00000 23:070:86370 LEICA GR50 -----
ORON A 1 P 23:064:00000 23:070:86370 LEICA GR50 -----
PAS2 A 1 P 23:064:00000 23:070:86370 STONEX SC2200 -----
PASA A 1 P 23:064:00000 23:070:86370 LEICA GR30 -----
RIO1 A 1 P 23:064:00000 23:070:86370 LEICA GR25 -----
SALA A 1 P 23:064:00000 23:070:86370 LEICA GR50 -----
SCDA A 1 P 23:064:00000 23:070:86370 LEICA GR50 -----
SOPU A 1 P 23:064:00000 23:070:86370 LEICA GR30 -----
TERU A 1 P 23:064:00000 23:070:86370 LEICA GR50 -----
VITO A 1 P 23:064:00000 23:070:86370 LEICA GR30 -----
YEBE A 1 P 23:064:00000 23:070:86370 LEICA GR50 -----
ZARA A 1 P 23:064:00000 23:070:86370 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 23:064:00000 23:070:86370 LEIAT504 LEIS -----
ALDA A 1 P 23:064:00000 23:070:86370 LEIAS10 NONE -----
ALSA A 1 P 23:064:00000 23:070:86370 LEIAR10 NONE -----
AMUR A 1 P 23:064:00000 23:070:86370 LEIAS10 NONE -----
BIAZ A 1 P 23:064:00000 23:070:86370 LEIAR25 LEIT -----
BIDA A 1 P 23:064:00000 23:070:86370 LEIAS10 NONE -----
BRZR A 1 P 23:064:00000 23:070:86370 LEIAS10 NONE -----
CACE A 1 P 23:064:00000 23:070:86370 TRM29659.00 NONE -----
CANT A 1 P 23:064:00000 23:070:86370 LEIAR25_R4 LEIT -----
CREU A 1 P 23:064:00000 23:070:86370 LEIAR25_R4 NONE -----
EBRE A 1 P 23:064:00000 23:068:86370 LEIAR25_R4 NONE -----
ELGE A 1 P 23:064:00000 23:070:86370 LEIAR25_R4 LEIT -----
EMAZ A 1 P 23:064:00000 23:070:86370 LEIAS10 NONE -----
GERN A 1 P 23:064:00000 23:070:86370 LEIAS10 NONE -----
HOND A 1 P 23:064:00000 23:070:86370 LEIAR20 LEIM -----
IGEL A 1 P 23:064:00000 23:070:86370 LEIAR20 LEIM -----
ISPS A 1 P 23:064:00000 23:070:86370 TRM59900.00 SCIS -----
KAST A 1 P 23:064:00000 23:070:86370 LEIAS10 NONE -----
LARE A 1 P 23:064:00000 23:066:86370 LEIAR20 LEIM -----
LAZK A 1 P 23:064:00000 23:070:86370 LEIAR25_R4 LEIT -----
LEIT A 1 P 23:064:00000 23:070:86370 LEIAR10 NONE -----
ORON A 1 P 23:064:00000 23:070:86370 LEIAR10 NONE -----
PAS2 A 1 P 23:064:00000 23:070:86370 LEIAR20 LEIM -----
PASA A 1 P 23:064:00000 23:070:86370 LEIAR20 LEIM -----
RIO1 A 1 P 23:064:00000 23:070:86370 LEIAR25_R4 LEIT -----
SALA A 1 P 23:064:00000 23:070:86370 LEIAR25 NONE -----
SCDA A 1 P 23:064:00000 23:070:86370 TRM55971.00 NONE -----
SOPU A 1 P 23:064:00000 23:070:86370 LEIAS10 NONE -----
TERU A 1 P 23:064:00000 23:070:86370 LEIAR20 LEIM -----
VITO A 1 P 23:064:00000 23:070:86370 LEIAS10 NONE -----
YEBE A 1 P 23:064:00000 23:070:86370 LEIAR20 LEIM -----
ZARA A 1 P 23:064:00000 23:070:86370 TRM29659.00 NONE -----
```

7.3 Eccentricities

*SITE	PT	SOLN	T	DATA_START	DATA_END	AXE	ARP->BENCHMARK(M)	UP	NORTH	EAST
ACDR	A	1	P	23:064:00000	23:070:86370	UNE	3.0460	0.0000	0.0000	0.0000
ALDA	A	1	P	23:064:00000	23:070:86370	UNE	0.0000	0.0000	0.0000	0.0000
ALSA	A	1	P	23:064:00000	23:070:86370	UNE	0.0000	0.0000	0.0000	0.0000
AMUR	A	1	P	23:064:00000	23:070:86370	UNE	0.0000	0.0000	0.0000	0.0000
BIAZ	A	1	P	23:064:00000	23:070:86370	UNE	0.0000	0.0000	0.0000	0.0000
BIDA	A	1	P	23:064:00000	23:070:86370	UNE	0.0000	0.0000	0.0000	0.0000
BRZR	A	1	P	23:064:00000	23:070:86370	UNE	0.0771	0.0000	0.0000	0.0000
CACE	A	1	P	23:064:00000	23:070:86370	UNE	0.0600	0.0000	0.0000	0.0000
CANT	A	1	P	23:064:00000	23:070:86370	UNE	3.0490	0.0000	0.0000	0.0000
CREU	A	1	P	23:064:00000	23:070:86370	UNE	0.0770	0.0000	0.0000	0.0000
EBRE	A	1	P	23:064:00000	23:068:86370	UNE	0.0770	0.0000	0.0000	0.0000
ELGE	A	1	P	23:064:00000	23:070:86370	UNE	0.0000	0.0000	0.0000	0.0000
EMAZ	A	1	P	23:064:00000	23:070:86370	UNE	0.0350	0.0000	0.0000	0.0000
GERN	A	1	P	23:064:00000	23:070:86370	UNE	0.0771	0.0000	0.0000	0.0000
HOND	A	1	P	23:064:00000	23:070:86370	UNE	0.0771	0.0000	0.0000	0.0000
IGEL	A	1	P	23:064:00000	23:070:86370	UNE	0.0000	0.0000	0.0000	0.0000
ISPS	A	1	P	23:064:00000	23:070:86370	UNE	0.0350	0.0000	0.0000	0.0000
KAST	A	1	P	23:064:00000	23:070:86370	UNE	0.0350	0.0000	0.0000	0.0000
LARE	A	1	P	23:064:00000	23:066:86370	UNE	0.0000	0.0000	0.0000	0.0000
LAZK	A	1	P	23:064:00000	23:070:86370	UNE	0.0000	0.0000	0.0000	0.0000
LEIT	A	1	P	23:064:00000	23:070:86370	UNE	0.0000	0.0000	0.0000	0.0000
ORDN	A	1	P	23:064:00000	23:070:86370	UNE	0.0000	0.0000	0.0000	0.0000
PAS2	A	1	P	23:064:00000	23:070:86370	UNE	0.0000	0.0000	0.0000	0.0000
PASA	A	1	P	23:064:00000	23:070:86370	UNE	0.0000	0.0000	0.0000	0.0000
RID1	A	1	P	23:064:00000	23:070:86370	UNE	0.0606	0.0000	0.0000	0.0000
SALA	A	1	P	23:064:00000	23:070:86370	UNE	0.0600	0.0000	0.0000	0.0000
SCDA	A	1	P	23:064:00000	23:070:86370	UNE	0.0000	0.0000	0.0000	0.0000
SOPU	A	1	P	23:064:00000	23:070:86370	UNE	0.0771	0.0000	0.0000	0.0000
TERU	A	1	P	23:064:00000	23:070:86370	UNE	0.0600	0.0000	0.0000	0.0000
VITO	A	1	P	23:064:00000	23:070:86370	UNE	0.0000	0.0000	0.0000	0.0000
YEBE	A	1	P	23:064:00000	23:070:86370	UNE	0.0600	0.0000	0.0000	0.0000
ZARA	A	1	P	23:064:00000	23:070:86370	UNE	3.2590	0.0000	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:

2023-03-27 04:28 UTC		ALSA0640.230		RECEIVER FIRM. VERS.		4.31/7.403 -> 4.31 (source: alsa00esp_20181108.log
2023-03-27 04:28 UTC		ISPS0640.230		RECEIVER FIRM. VERS.		5.30 -> 5.22 (source: isps00esp_20220907.log
2023-03-27 04:28 UTC		LARE0640.230		RECEIVER FIRM. VERS.		4.52/7.711 -> 4.31/7.403 (source: lare00esp_20230308.log
2023-03-27 04:28 UTC		LEIT0640.230		RECEIVER FIRM. VERS.		4.31/7.403 -> 4.31 (source: leit00esp_20181204.log
2023-03-27 04:28 UTC		ORON0640.230		RECEIVER FIRM. VERS.		4.31/7.403 -> 4.31 (source: oron00esp_20181101.log
2023-04-02 14:10 UTC		ALSA0650.230		RECEIVER FIRM. VERS.		4.31/7.403 -> 4.31 (source: alsa00esp_20181108.log
2023-04-02 14:10 UTC		ISPS0650.230		RECEIVER FIRM. VERS.		5.30 -> 5.22 (source: isps00esp_20220907.log
2023-04-02 14:10 UTC		LARE0650.230		RECEIVER FIRM. VERS.		4.52/7.711 -> 4.31/7.403 (source: lare00esp_20230308.log
2023-04-02 14:10 UTC		LEIT0650.230		RECEIVER FIRM. VERS.		4.31/7.403 -> 4.31 (source: leit00esp_20181204.log
2023-04-02 14:10 UTC		ORON0650.230		RECEIVER FIRM. VERS.		4.31/7.403 -> 4.31 (source: oron00esp_20181101.log
2023-03-27 11:23 UTC		ALSA0660.230		RECEIVER FIRM. VERS.		4.31/7.403 -> 4.31 (source: alsa00esp_20181108.log
2023-03-27 11:24 UTC		ISPS0660.230		RECEIVER FIRM. VERS.		5.30 -> 5.22 (source: isps00esp_20220907.log
2023-03-27 11:24 UTC		LARE0660.230		RECEIVER FIRM. VERS.		4.52/7.711 -> 4.31/7.403 (source: lare00esp_20230308.log
2023-03-27 11:24 UTC		LEIT0660.230		RECEIVER FIRM. VERS.		4.31/7.403 -> 4.31 (source: leit00esp_20181204.log
2023-03-27 11:24 UTC		ORON0660.230		RECEIVER FIRM. VERS.		4.31/7.403 -> 4.31 (source: oron00esp_20181101.log
2023-03-27 14:37 UTC		ALSA0670.230		RECEIVER FIRM. VERS.		4.31/7.403 -> 4.31 (source: alsa00esp_20181108.log
2023-03-27 14:37 UTC		ISPS0670.230		RECEIVER FIRM. VERS.		5.30 -> 5.22 (source: isps00esp_20220907.log
2023-03-27 14:37 UTC		LEIT0670.230		RECEIVER FIRM. VERS.		4.31/7.403 -> 4.31 (source: leit00esp_20181204.log
2023-03-27 14:37 UTC		ORON0670.230		RECEIVER FIRM. VERS.		4.31/7.403 -> 4.31 (source: oron00esp_20181101.log
2023-03-27 17:50 UTC		ALSA0680.230		RECEIVER FIRM. VERS.		4.31/7.403 -> 4.31 (source: alsa00esp_20181108.log
2023-03-27 17:50 UTC		ISPS0680.230		RECEIVER FIRM. VERS.		5.30 -> 5.22 (source: isps00esp_20220907.log
2023-03-27 17:50 UTC		LEIT0680.230		RECEIVER FIRM. VERS.		4.31/7.403 -> 4.31 (source: leit00esp_20181204.log
2023-03-27 17:50 UTC		ORON0680.230		RECEIVER FIRM. VERS.		4.31/7.403 -> 4.31 (source: oron00esp_20181101.log
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9 References

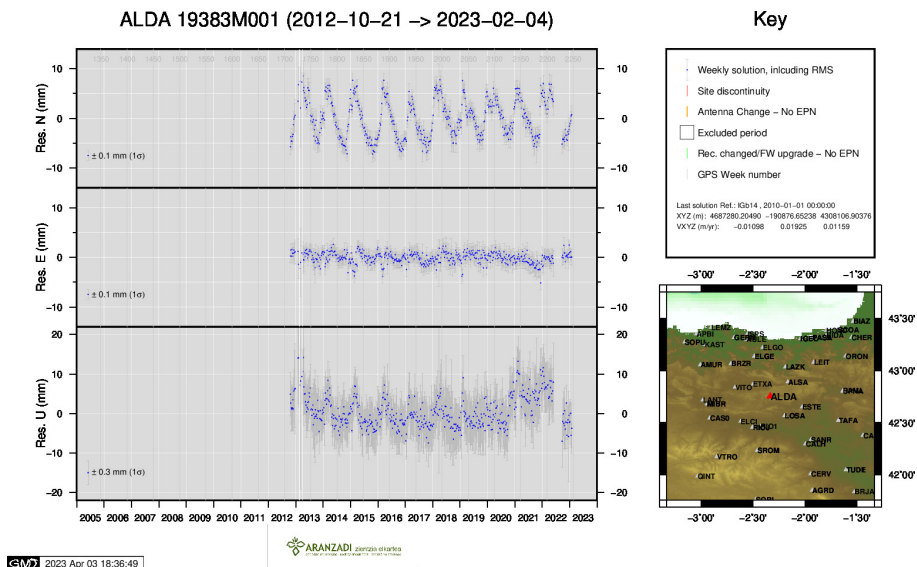
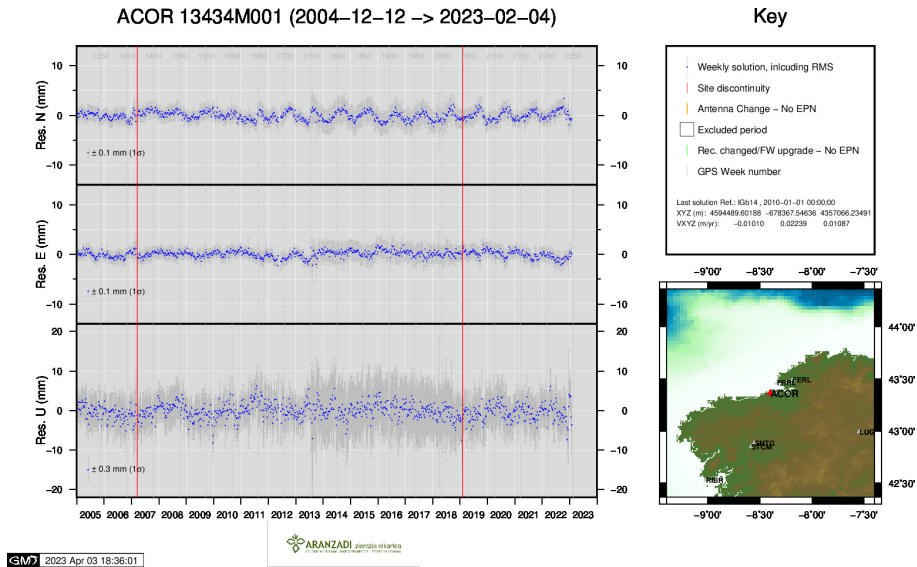
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign*. etrs89.ensg.ign.fr/memo-V8.pdf

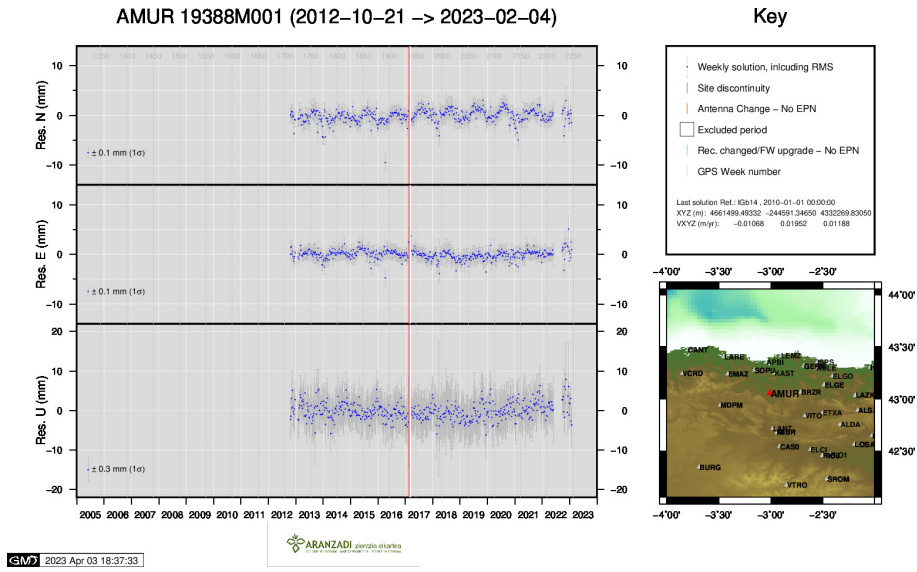
EPN Coordination Group and the EPN Central Bureau (2018): *Guidelines for the EPN Analysis Centres*. epncb.oma.be/documentation/guidelines/guidelines_analysis_centres.pdf

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

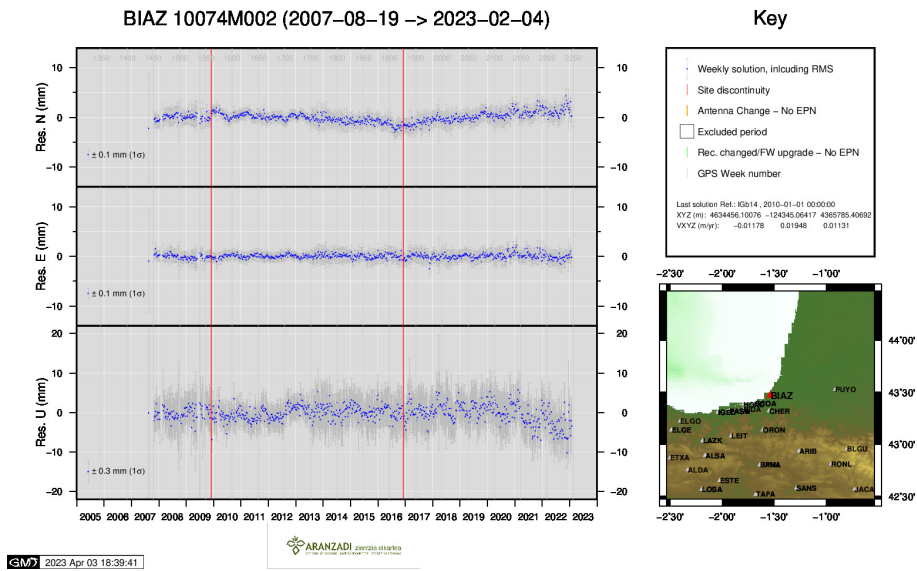
10 Cumulative Time Series

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

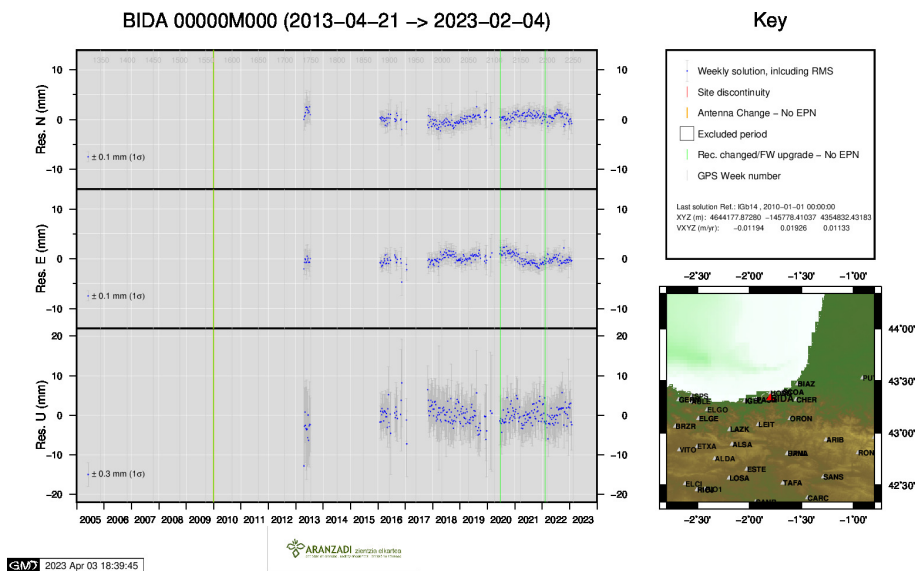




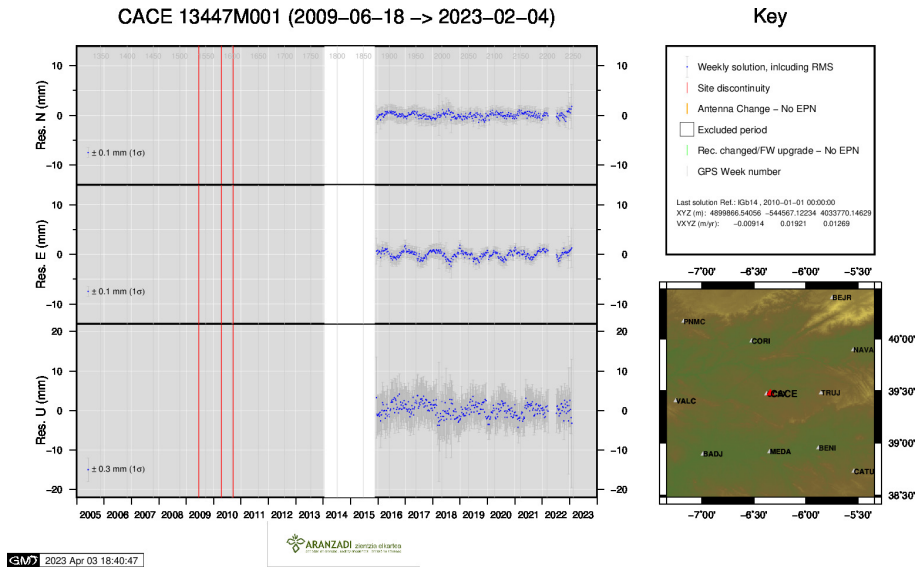
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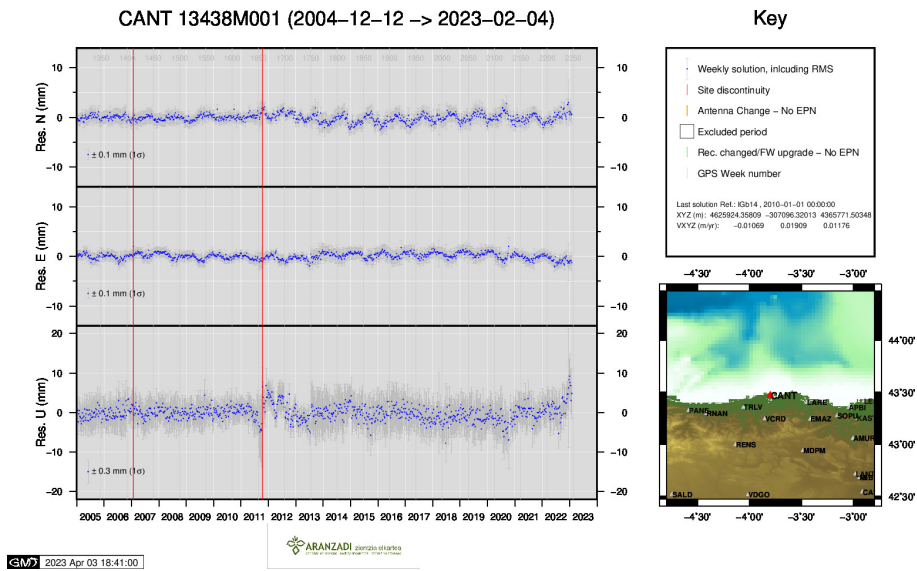
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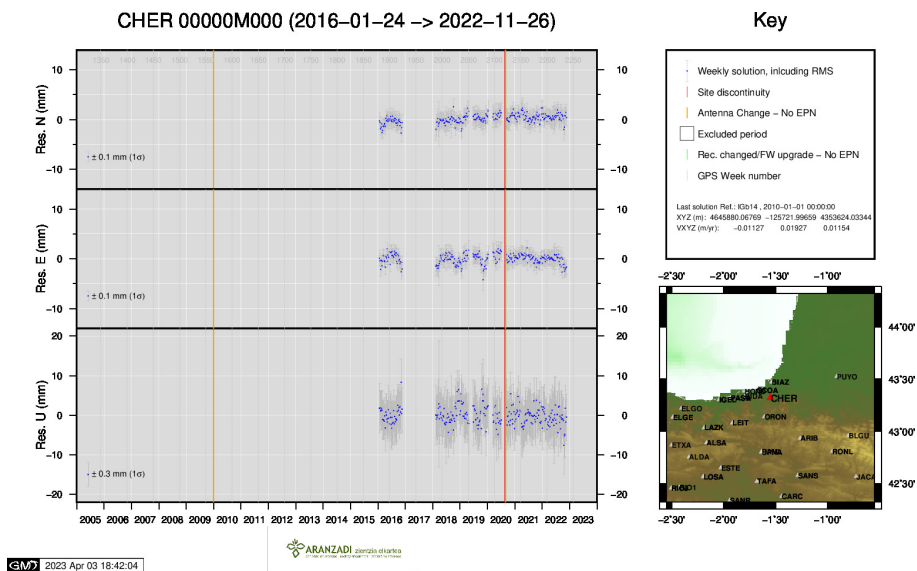
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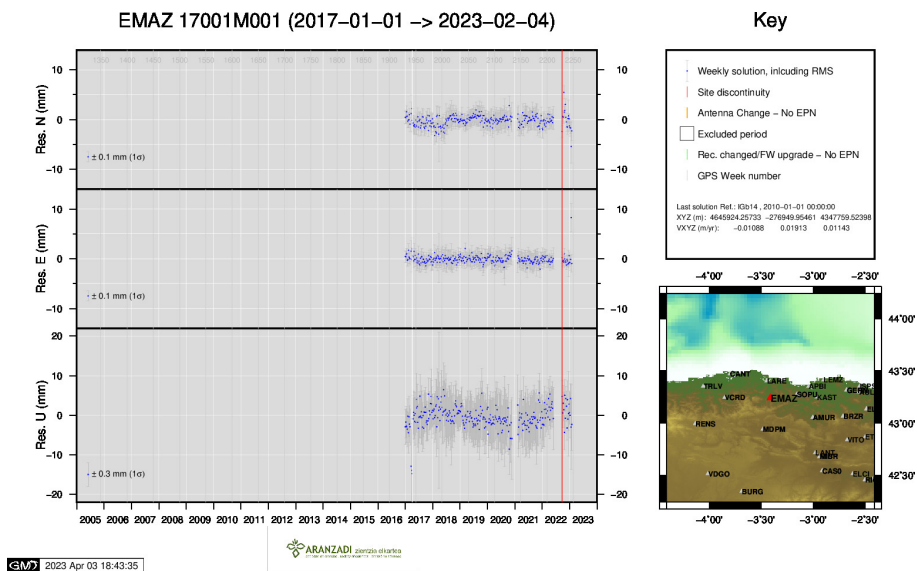
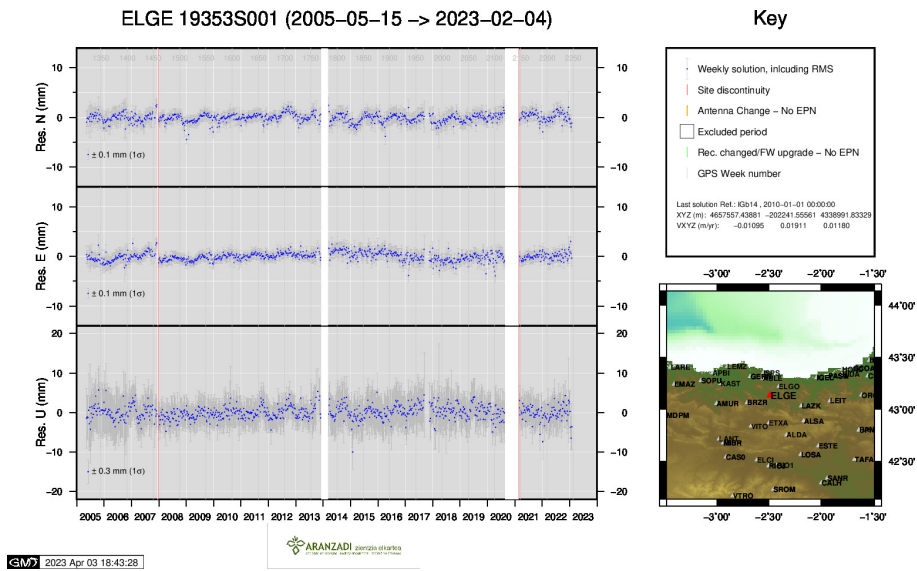
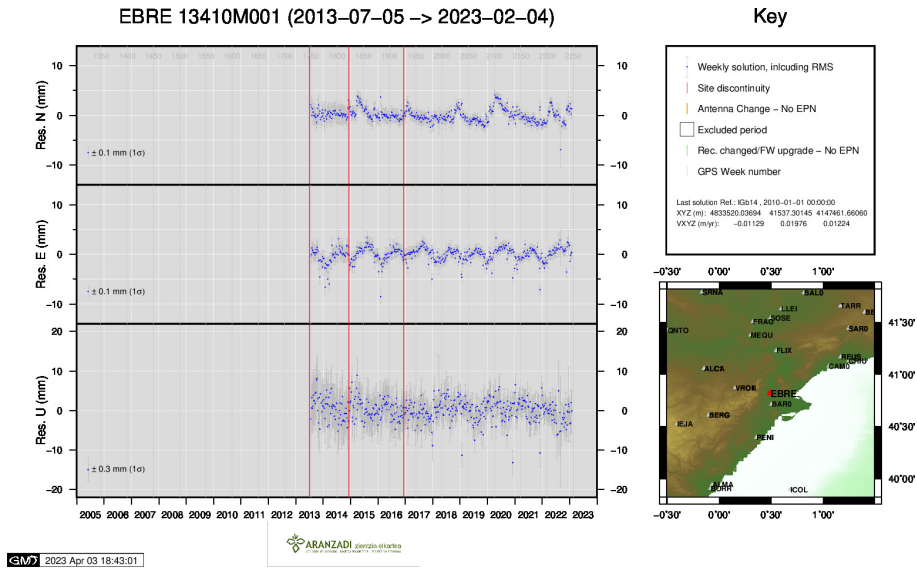
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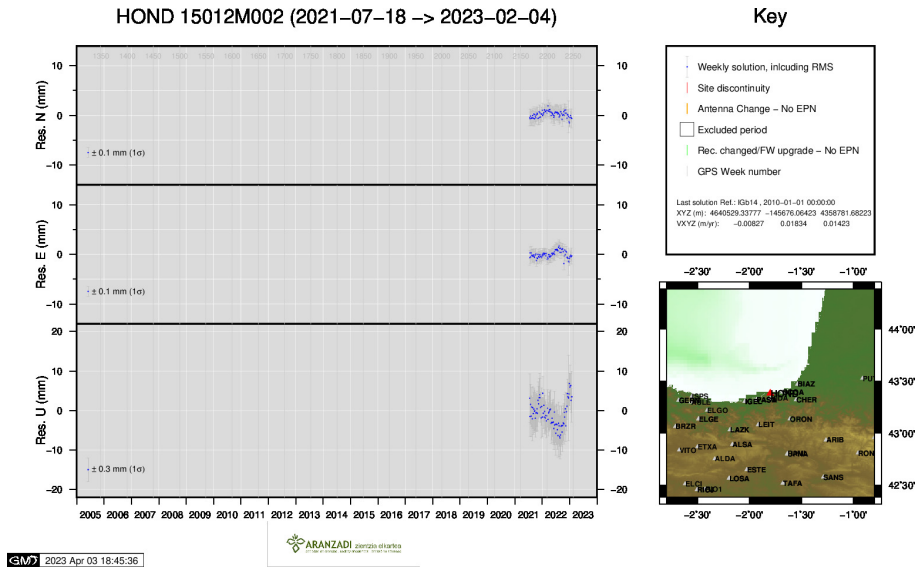


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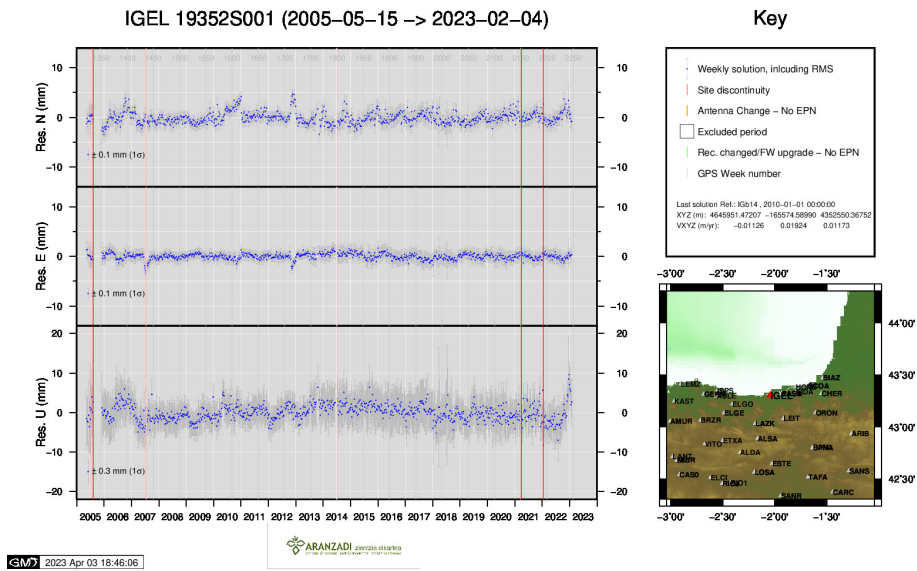


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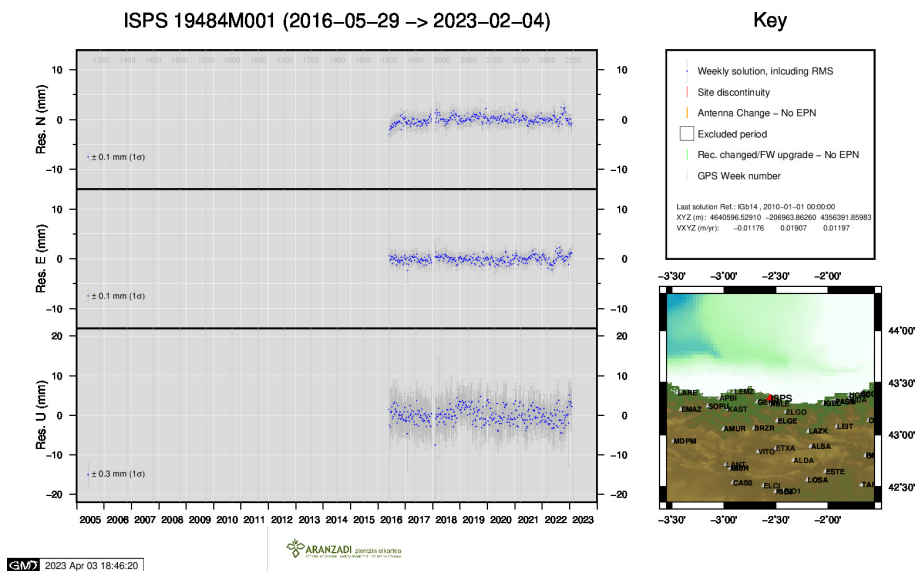




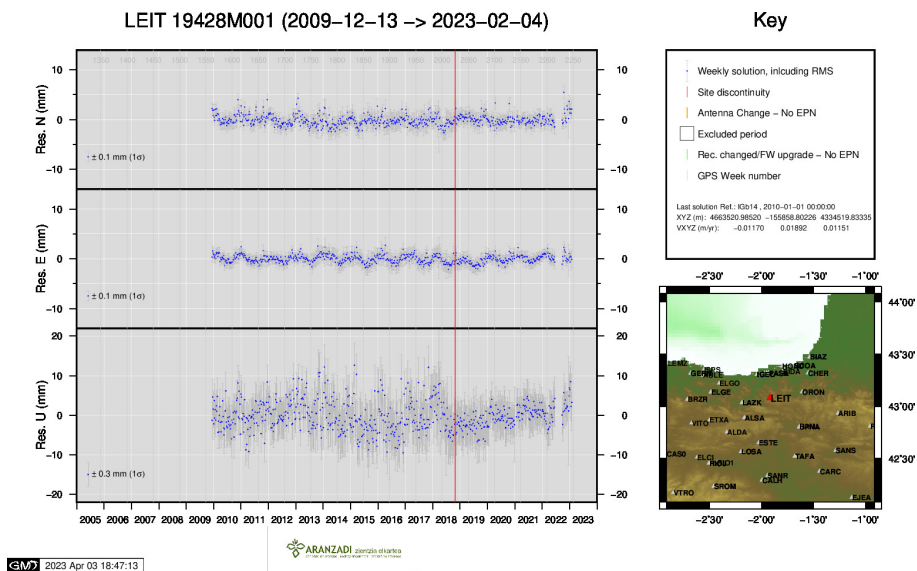
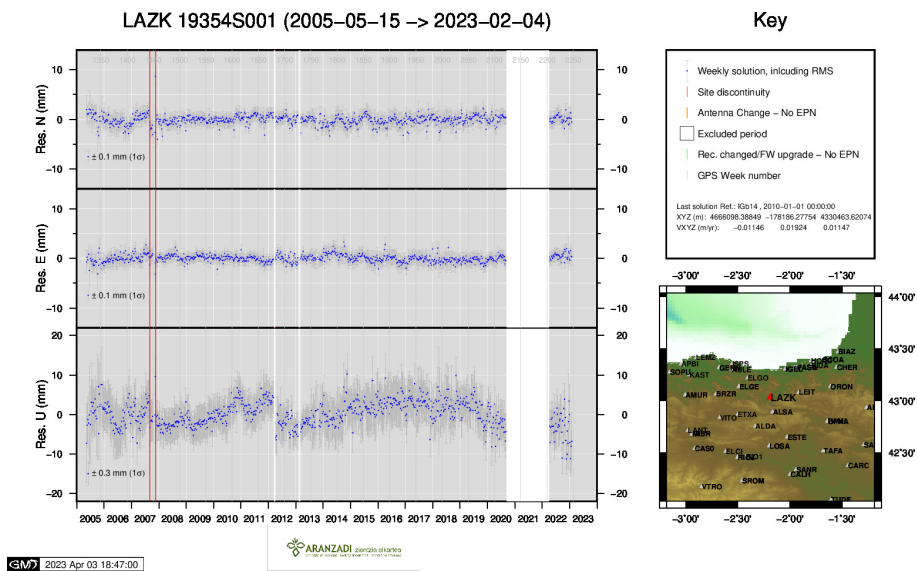
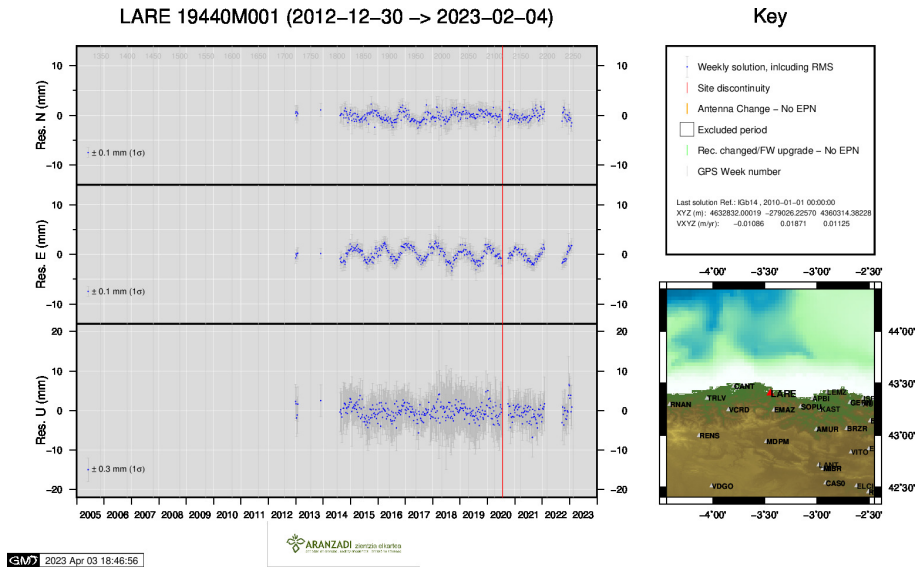
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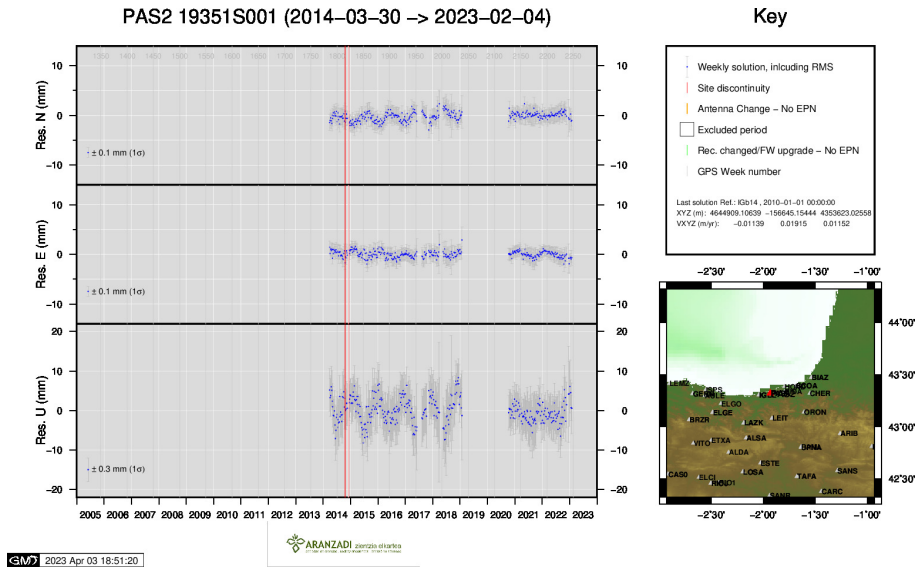


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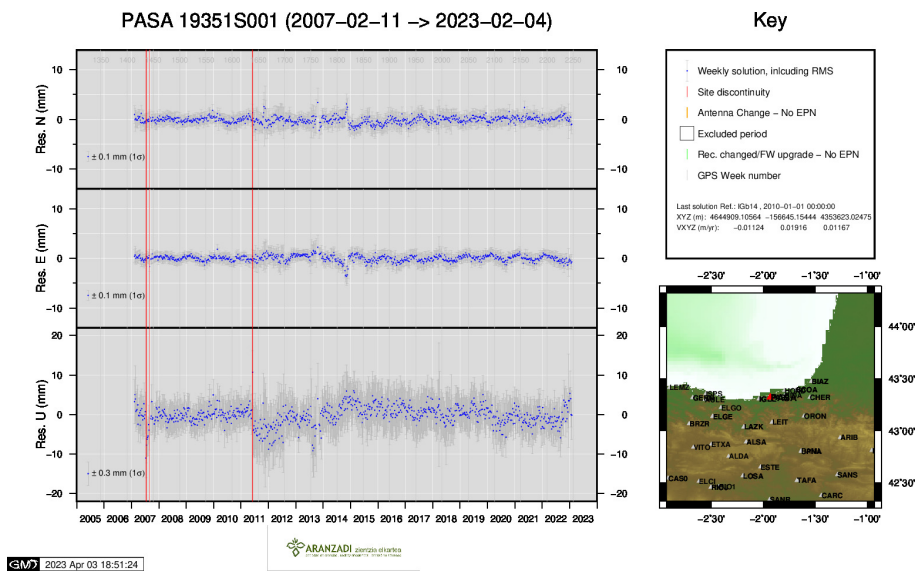


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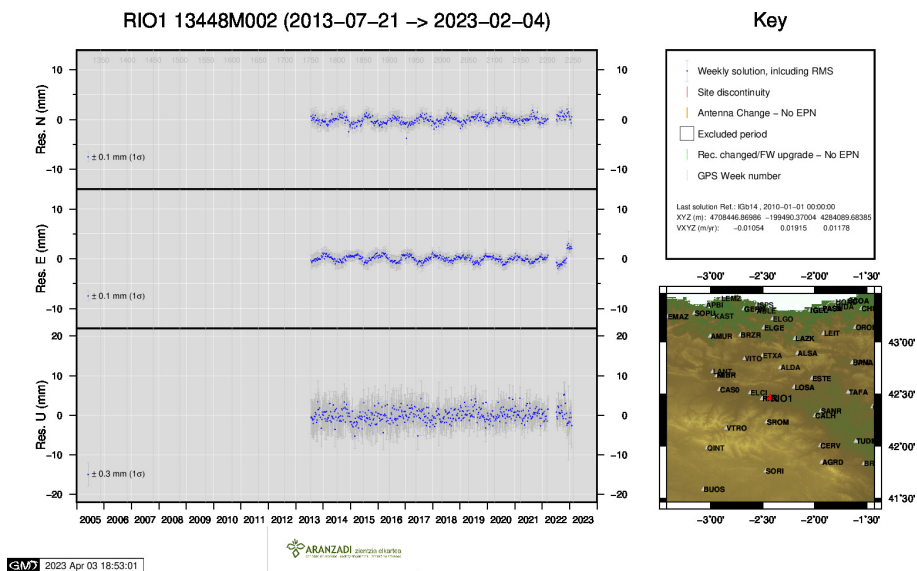




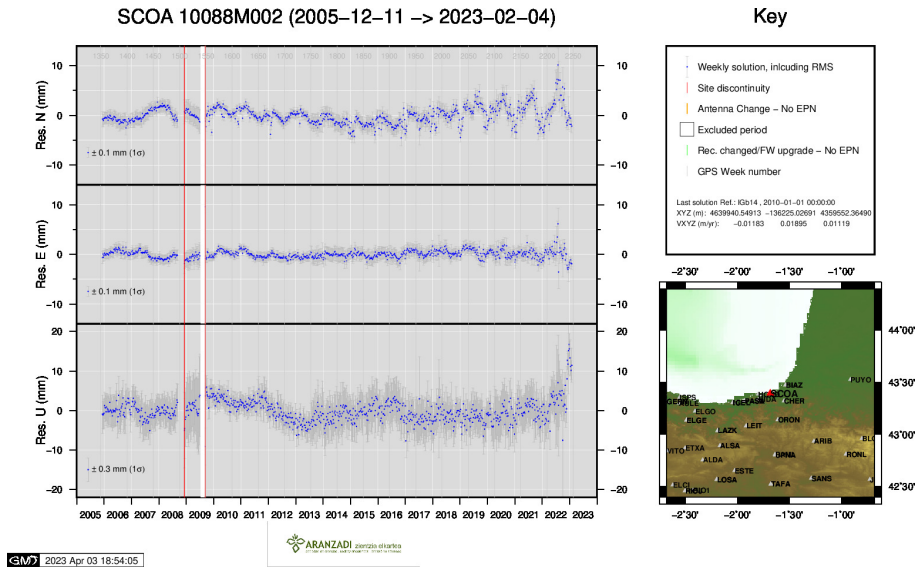
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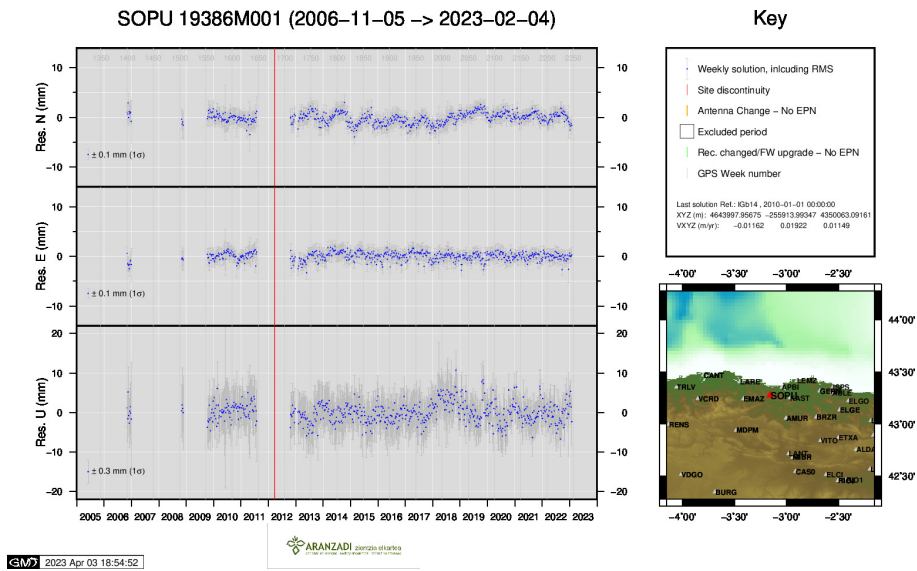
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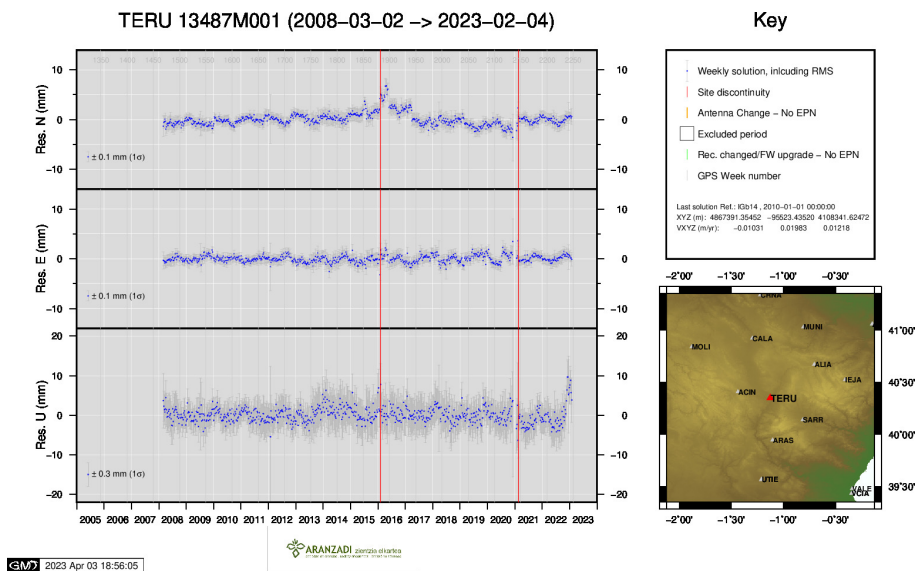
20) RIO1



21) SCOA



22) SOPU



23) TERU

