ARA-DAC Weekly Analysis Result: 2374 (GFA)

Technical Report

GPS Week: 2374 (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

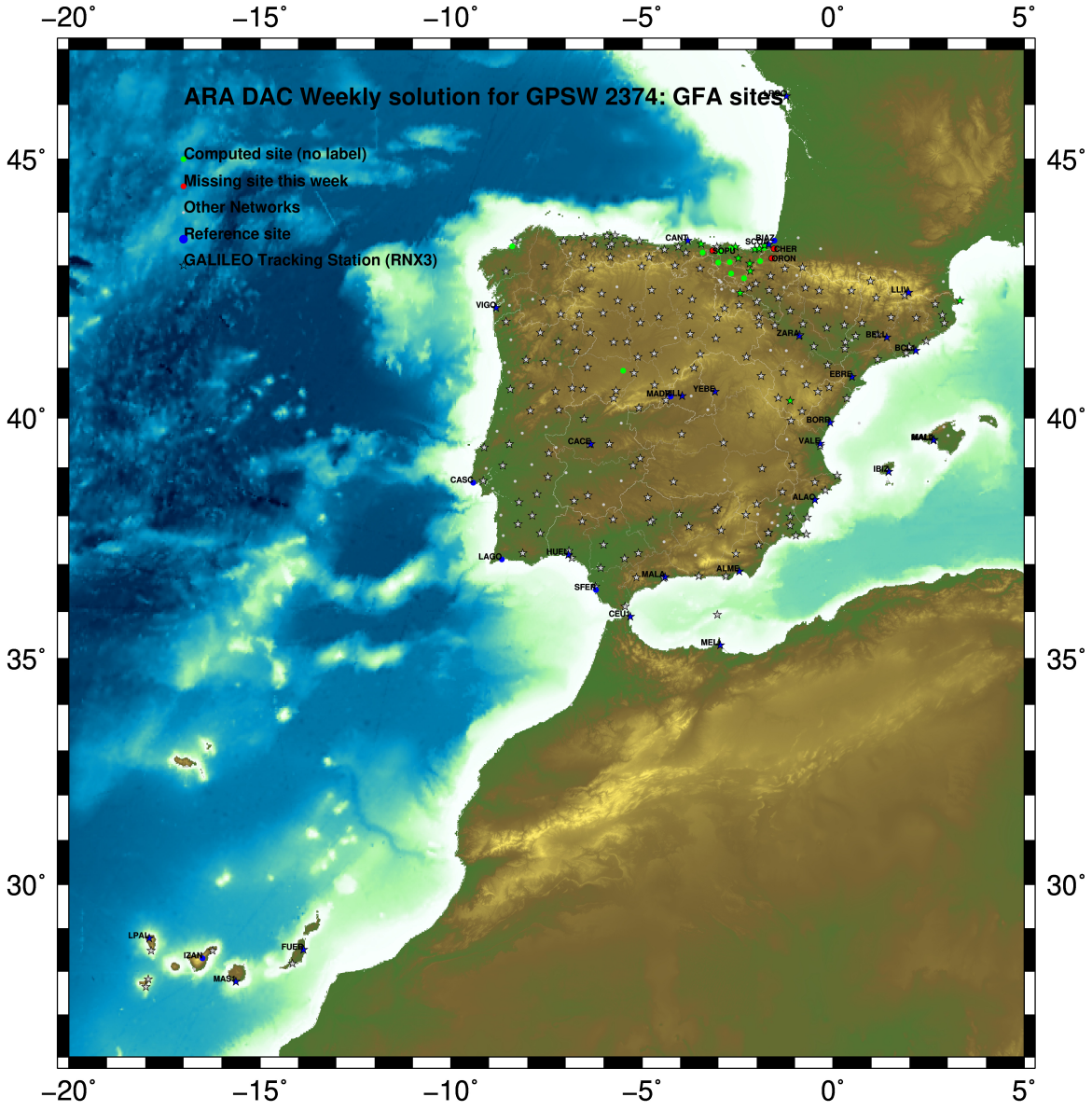

Fig.1: Computed Sites for GPS Week2374 (GFA)

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 observatione 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: 3*rms 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                      06-AUG-25 12:54
------------------------------------------------------------------------------
LOCAL GEODETIC DATUM: IGS20             EPOCH: 2025-07-09 11:59:45

NUM  STATION NAME           X (M)          Y (M)          Z (M)     FLAG     SYSTEM

111  ACOR 13434M001    4594489.47442  -678367.25275  4357066.32733    A      G
 39  ALDA 19383M001    4687280.09632  -190876.44750  4308107.02707    A      GR
 50  ALSA 19419M001    4677250.76774  -176770.27758  4319079.94767    A      GRE
 53  AMUR 19388M001    4661499.38449  -244591.13839  4332269.95452    A      GR
384  BIAZ 10074M002    4634455.97986  -124344.85751  4365785.52517    W      GR
101  BIDA 00000M000    4644177.75305  -145778.20469  4354832.55143    A      GR
113  BRZR 19387M001    4662220.92588  -220769.78180  4333309.50958    A      GR
573  CACE 13447M001    4899866.45193  -544566.91967  4033770.28227    W      GRE
592  CANT 13438M001    4625924.25354  -307096.12052  4365771.63296    W      GRE
908  CREU 13432M001    4715420.05876   273178.17860  4271946.91424    A      GRE
135  EBRE 13410M001    4833519.92664    41537.51362  4147461.79380    W      GRE
180  ELGE 19353S001    4657557.32902  -202241.35251  4338991.95897    A      GRE
182  EMAZ 17001M001    4645924.14551  -276949.75216  4347759.64080    A      GR
209  GERN 19389M001    4642811.25396  -217222.81057  4353278.95037    A      GR
257  HOND 15012M002    4640529.25255  -145675.86823  4358781.82875    A      GRE
235  IGEL 19352S001    4645951.36388  -165574.38722  4352550.49386    A      GRE
240  ISPS 19484M001    4640596.41599  -206963.66147  4356391.99082    A      GRE
245  KAST 19499M001    4646949.01193  -240747.15041  4348015.06486    A      GR
252  LARE 19440M001    4632831.89395  -279026.03035  4360314.49948    A      GRE
256  LAZK 19354S001    4666098.27301  -178186.07458  4330463.74116    A      GRE
261  LEIT 19428M001    4663520.86909  -155858.60329  4334519.95730    A      GR
345  PAS2 19351S001    4644908.99469  -156644.95297  4353623.14881    A      GRE
493  PASA 19351S001    4644908.99472  -156644.95299  4353623.14887    A      GRE
553  RIO1 13448M002    4708446.76282  -199490.16614  4284089.80632    A      GRE
558  SALA 13469M001    4803054.42618  -462130.95166  4158379.15058    A      GR
526  SCOA 10088M002    4639940.43711  -136224.82408  4359552.49794    W      GRE
443  TERU 13487M001    4867391.25601   -95523.22636  4108341.75723    A      GRE
493  VITO 19385M001    4679397.63585  -218436.38793  4314898.44277    A      GR
616  YEBE 13420M001    4848724.50812  -261631.80911  4123094.40336    W      GRE
655  ZARA 13462M001    4773803.10332   -73505.86757  4215454.16721    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).

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CONVERT TO ETRF2000                                             06-AUG-25 12:54
------------------------------------------------------------------------------
LOCAL GEODETIC DATUM: ETRF2000          EPOCH: 2025-07-09 11:59:45

NUM  STATION NAME           X (M)          Y (M)          Z (M)     FLAG     SYSTEM

111  ACOR 13434M001    4594489.82782  -678367.91005  4357065.83374    A
 39  ALDA 19383M001    4687280.51415  -190877.11545  4308106.53225    A
 50  ALSA 19419M001    4677251.18847  -176770.94423  4319079.45396    A
 53  AMUR 19388M001    4661499.79680  -244591.80325  4332269.46125    A
384  BIAZ 10074M002    4634456.41184  -124345.51865  4365785.03609    W
101  BIDA 00000M000    4644178.18111  -145778.86711  4354832.06116    A
113  BRZR 19387M001    4662221.34162  -220770.44670  4333309.01660    A
573  CACE 13447M001    4899866.79708  -544567.61470  4033769.76300    W
592  CANT 13438M001    4625924.65987  -307096.78109  4365771.14200    W
908  CREU 13432M001    4715420.53862   273177.50881  4271946.42352    A
135  EBRE 13410M001    4833520.36362    41536.82826  4147461.28908    W
180  ELGE 19353S001    4657557.74783  -202242.01677  4338991.46668    A
182  EMAZ 17001M001    4645924.55457  -276950.41517  4347759.14847    A
209  GERN 19389M001    4642811.67186  -217223.47302  4353278.45919    A
257  HOND 15012M002    4640529.68096  -145676.53019  4358781.33881    A
235  IGEL 19352S001    4645951.78897  -165575.04992  4352550.00314    A
240  ISPS 19484M001    4640596.83559  -206964.32362  4356391.49999    A
245  KAST 19499M001    4646949.42609  -240747.81344  4348014.57296    A
252  LARE 19440M001    4632832.30376  -279026.69171  4360314.00830    A
256  LAZK 19354S001    4666098.69449  -178186.73983  4330463.24844    A
261  LEIT 19428M001    4663521.29404  -155859.26816  4334519.46514    A
345  PAS2 19351S001    4644909.42112  -156645.61551  4353622.65832    A
493  PASA 19351S001    4644909.42115  -156645.61553  4353622.65838    A
553  RIO1 13448M002    4708447.17743  -199490.83674  4284089.30946    A
558  SALA 13469M001    4803054.79337  -462131.63462  4158378.64132    A
526  SCOA 10088M002    4639940.86691  -136225.48594  4359552.00819    W
443  TERU 13487M001    4867391.67049   -95523.91637  4108341.24747    A
493  VITO 19385M001    4679398.05038  -218437.05496  4314897.94827    A
616  YEBE 13420M001    4848724.90053  -261632.49728  4123093.89289    W
655  ZARA 13462M001    4773803.52986   -73506.54592  4215453.66626    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 06-AUG-25 12:54

LOCAL GEODETIC DATUM: ETRF2014 EPOCH: 2025-07-09 11:59:45

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	SYSTEM
111	ACOR 13434M001	4594489.78825	-678367.94639	4357065.88682	A	
39	ALDA 19383M001	4687280.47197	-190877.15326	4308106.58520	A	
50	ALSA 19419M001	4677251.14635	-176770.98215	4319079.50695	A	
53	AMUR 19388M001	4661499.75510	-244591.84098	4332269.51425	A	
384	BIAZ 10074M002	4634456.37003	-124345.55697	4365785.08924	W	
101	BIDA 00000M000	4644178.13926	-145778.90530	4354832.11427	A	
113	BRZR 19387M001	4662221.29984	-220770.48451	4333309.06960	A	
573	CACE 13447M001	4899866.75348	-544567.65014	4033769.81520	W	
592	CANT 13438M001	4625924.61880	-307096.81874	4365771.19508	W	
908	CREU 13432M001	4715420.49427	273177.46935	4271946.47672	A	
135	EBRE 13410M001	4833520.31882	41536.79024	4147461.34174	W	
180	ELGE 19353S001	4657557.70604	-202242.05468	4338991.51971	A	
182	EMAZ 17001M001	4645924.51318	-276950.45284	4347759.20150	A	
209	GERN 19389M001	4642811.63029	-217223.51094	4353278.51226	A	
257	HOND 15012M002	4640529.63915	-145676.56840	4358781.39193	A	
235	IGEL 19352S001	4645951.74718	-165575.08803	4352550.05623	A	
240	ISPS 19484M001	4640596.79401	-206964.36159	4356391.55307	A	
245	KAST 19499M001	4646949.38455	-240747.85125	4348014.62601	A	
252	LARE 19440M001	4632832.26252	-279026.72944	4360314.06138	A	
256	LAZK 19354S001	4666098.65251	-178186.77780	4330463.30146	A	
261	LEIT 19428M001	4663521.25201	-155859.30622	4334519.51818	A	
345	PAS2 19351S001	4644909.37931	-156645.65365	4353622.71142	A	
493	PASA 19351S001	4644909.37934	-156645.65367	4353622.71148	A	
553	RIO1 13448M002	4708447.13503	-199490.87442	4284089.36234	A	
558	SALA 13469M001	4803054.75073	-462131.67084	4158378.69380	A	
526	SCOA 10088M002	4639940.82507	-136225.52418	4359552.06132	W	
443	TERU 13487M001	4867391.62581	-95523.95371	4108341.29994	A	
493	VITO 19385M001	4679398.00839	-218437.09271	4314898.00122	A	
616	YEBE 13420M001	4848724.85667	-261632.53407	4123093.94532	W	
655	ZARA 13462M001	4773803.48623	-73506.58378	4215453.71901	W	

5.4 ETRF2020 (ETRS89) Coordinates

European **T**errestrial **R**eference **S**ystem, **1989** (**ETRS89**) is realized by ETRF2020 (Boucher and Altamimi, 2011) and (Altamimi, 2017).

CONVERT TO ETRF2020 06-AUG-25 12:54

LOCAL GEODETIC DATUM: ETRF2020 EPOCH: 2025-07-09 11:59:45

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	SYSTEM
111	ACOR 13434M001	4594489.78437	-678367.93167	4357065.89479	A	
39	ALDA 19383M001	4687280.46676	-190877.13804	4308106.59343	A	
50	ALSA 19419M001	4677251.14107	-176770.96695	4319079.51516	A	
53	AMUR 19388M001	4661499.74999	-244591.82586	4332269.52243	A	
384	BIAZ 10074M002	4634456.36447	-124345.54189	4365785.09739	W	
101	BIDA 00000M000	4644178.13380	-145778.89020	4354832.12243	A	
113	BRZR 19387M001	4662221.29465	-220770.46939	4333309.07778	A	
573	CACE 13447M001	4899866.75001	-544567.63438	4033769.82370	W	
592	CANT 13438M001	4625924.61379	-307096.80376	4365771.20318	W	
908	CREU 13432M001	4715420.48775	273177.48486	4271946.48508	A	
135	EBRE 13410M001	4833520.31331	41536.80603	4147461.35026	W	
180	ELGE 19353S001	4657557.70079	-202242.03956	4338991.52788	A	
182	EMAZ 17001M001	4645924.50812	-276950.43779	4347759.20965	A	
209	GERN 19389M001	4642811.62504	-217223.49587	4353278.52041	A	
257	HOND 15012M002	4640529.63368	-145676.55331	4358781.40009	A	
235	IGEL 19352S001	4645951.74178	-165575.07293	4352550.06440	A	
240	ISPS 19484M001	4640596.78873	-206964.34652	4356391.56122	A	
245	KAST 19499M001	4646949.37939	-240747.83618	4348014.63416	A	
252	LARE 19440M001	4632832.25744	-279026.71443	4360314.06950	A	
256	LAZK 19354S001	4666098.64720	-178186.76264	4330463.30966	A	
261	LEIT 19428M001	4663521.24663	-155859.29107	4334519.52637	A	
345	PAS2 19351S001	4644909.37388	-156645.63856	4353622.71958	A	
493	PASA 19351S001	4644909.37391	-156645.63858	4353622.71964	A	
553	RIO1 13448M002	4708447.12991	-199490.85914	4284089.37060	A	
558	SALA 13469M001	4803054.74670	-462131.65536	4158378.70217	A	
526	SCOA 10088M002	4639940.81957	-136225.50910	4359552.06948	W	
443	TERU 13487M001	4867391.62081	-95523.93788	4108341.30849	A	
493	VITO 19385M001	4679398.00324	-218437.07753	4314898.00943	A	
616	YEBE 13420M001	4848724.85213	-261632.51836	4123093.95380	W	
655	ZARA 13462M001	4773803.48090	-73506.56824	4215453.72740	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).

GFA FINAL WEEKLY COMBINATION: FINAL ORBITS 06-AUG-25 12:54

Station	#Days	Weekday 0123456	Repeatability (mm) N	E	U
ACOR 13434M001	7	XXXXXXX	1.20	0.94	4.51
ALDA 19383M001	7	XXXXXXX	1.60	1.95	6.31
ALSA 19419M001	7	XXXXXXX	1.86	1.20	5.19
AMUR 19388M001	7	XXXXXXX	0.99	1.29	5.99
BIAZ 10074M002	4	XXXX	0.89	1.75	7.41
BIDA 00000M000	7	XXXXXXX	1.11	1.55	6.11
BRZR 19387M001	7	XXXXXXX	1.07	0.78	5.47
CACE 13447M001	7	XXXXXXX	0.55	0.76	3.63
CANT 13438M001	7	XXXXXXX	0.70	1.02	3.95
CREU 13432M001	7	XXXXXXX	1.18	1.47	8.27
EBRE 13410M001	7	XXXXXXX	1.16	2.17	6.97
ELGE 19353S001	7	XXXXXXX	0.72	1.27	6.18
EMAZ 17001M001	7	XXXXXXX	1.24	1.46	7.63
GERN 19389M001	7	XXXXXXX	1.54	1.78	7.38
HOND 15012M002	7	XXXXXXX	0.95	1.04	5.63
IGEL 19352S001	6	XXXXXX	1.01	0.77	3.57
ISPS 19484M001	7	XXXXXXX	1.44	0.73	6.27
KAST 19499M001	7	XXXXXXX	1.96	0.98	6.53
LARE 19440M001	7	XXXXXXX	0.67	1.19	5.16
LAZK 19354S001	6	XXXXXX	0.87	1.14	6.09
LEIT 19428M001	7	XXXXXXX	1.76	1.03	7.20
PAS2 19351S001	7	XXXXXXX	0.69	0.79	6.52
PASA 19351S001	7	XXXXXXX	0.68	0.81	6.59
RIO1 13448M002	7	XXXXXXX	1.03	0.44	5.27
SALA 13469M001	7	XXXXXXX	0.30	0.81	4.00
SCOA 10088M002	7	XXXXXXX	1.93	1.67	7.20
TERU 13487M001	7	XXXXXXX	1.10	0.85	3.55
VITO 19385M001	7	XXXXXXX	1.35	1.07	7.46
YEBE 13420M001	7	XXXXXXX	0.82	0.78	1.83
ZARA 13462M001	7	XXXXXXX	0.55	1.04	5.56

Comparison of individual solutions:

ACOR 13434M001	N	1.20	-1.51	2.05	-0.47	0.09	1.25	0.65	0.04
ACOR 13434M001	E	0.94	-0.45	-0.44	0.40	-0.06	-0.89	-1.79	-0.88
ACOR 13434M001	U	4.51	-3.54	1.29	6.09	3.89	-2.51	-6.27	3.16
ALDA 19383M001	N	1.60	0.60	2.07	1.87	-0.27	-0.03	-2.55	-0.85
ALDA 19383M001	E	1.95	-0.41	-2.25	-0.87	-1.78	-1.05	2.97	1.93
ALDA 19383M001	U	6.31	6.14	10.83	-3.89	-3.30	4.43	1.46	6.03
ALSA 19419M001	N	1.86	0.87	1.79	2.32	0.39	-1.10	-3.11	0.64
ALSA 19419M001	E	1.20	-0.69	-0.58	-0.72	-0.65	-0.87	2.02	1.44
ALSA 19419M001	U	5.19	7.16	2.13	1.23	-5.94	6.84	2.13	4.21
AMUR 19388M001	N	0.99	-0.78	1.22	-0.58	-0.32	-0.78	1.63	-0.31
AMUR 19388M001	E	1.29	-1.08	-1.15	-0.15	-0.83	-0.81	1.13	2.22
AMUR 19388M001	U	5.99	5.29	2.60	-0.63	-11.13	7.14	2.07	1.11
BIAZ 10074M002	N	0.89				-0.77	0.49	-1.11	-0.55
BIAZ 10074M002	E	1.75				-1.48	-1.54	0.35	2.13
BIAZ 10074M002	U	7.41				-3.61	0.44	12.25	-1.17
BIDA 00000M000	N	1.11	-0.64	1.21	1.41	-1.42	-1.18	-0.20	-0.35
BIDA 00000M000	E	1.55	-2.13	-1.93	0.80	-0.56	-0.60	0.79	2.08
BIDA 00000M000	U	6.11	5.48	-1.14	-1.47	-3.48	6.82	11.40	1.51
BRZR 19387M001	N	1.07	-0.69	-0.20	-1.62	0.48	-0.25	1.66	-0.87
BRZR 19387M001	E	0.78	0.16	0.18	-0.00	-0.37	-1.49	0.32	-1.05
BRZR 19387M001	U	5.47	1.22	3.83	2.04	-9.06	3.64	7.03	3.77
CACE 13447M001	N	0.55	0.20	0.51	0.24	-0.35	0.72	-0.38	-0.83
CACE 13447M001	E	0.76	0.67	-0.41	0.62	-0.78	-0.67	-0.88	0.82
CACE 13447M001	U	3.63	-1.80	-1.78	3.65	-0.41	-4.31	-1.00	-6.29
CANT 13438M001	N	0.70	-0.44	-0.44	0.06	0.62	-1.05	0.33	0.98
CANT 13438M001	E	1.02	-0.76	-0.28	0.36	-1.14	-1.75	-0.19	0.99
CANT 13438M001	U	3.95	2.87	-0.93	0.86	-2.05	7.48	3.44	-3.44
CREU 13432M001	N	1.18	0.90	1.94	-1.62	-0.59	-0.11	0.71	0.52
CREU 13432M001	E	1.47	-0.97	-0.60	-0.99	-0.61	-2.18	0.90	2.19
CREU 13432M001	U	8.27	2.97	6.43	-5.98	-10.48	1.35	6.19	13.20
EBRE 13410M001	N	1.16	2.36	-0.60	-0.86	0.20	-0.58	0.91	0.52
EBRE 13410M001	E	2.17	-3.80	1.51	1.67	-1.05	-1.05	-0.94	2.37
EBRE 13410M001	U	6.97	-3.34	13.50	-5.06	-1.50	5.01	2.67	6.16
ELGE 19353S001	N	0.72	-1.27	0.18	0.70	0.11	-0.03	-0.98	-0.16
ELGE 19353S001	E	1.27	-1.77	0.86	-0.66	-1.36	-1.25	0.55	1.27
ELGE 19353S001	U	6.18	4.42	6.73	1.37	-9.55	1.73	8.17	-1.09
EMAZ 17001M001	N	1.24	-1.03	-1.58	-0.91	1.68	0.77	1.19	0.23
EMAZ 17001M001	E	1.46	2.35	-0.65	-1.24	-0.92	-1.59	-0.02	-1.38
EMAZ 17001M001	U	7.63	8.95	10.93	2.17	-8.70	-8.15	0.61	-1.52
GERN 19389M001	N	1.54	0.17	2.13	0.41	-2.50	0.42	-1.60	-0.70
GERN 19389M001	E	1.78	-1.76	-3.13	1.91	-0.51	-0.07	-0.39	1.41
GERN 19389M001	U	7.38	10.24	6.89	0.03	-7.60	-1.36	9.48	-4.96
HOND 15012M002	N	0.95	-1.81	0.54	1.10	-0.50	-0.55	0.14	-0.28
HOND 15012M002	E	1.04	-1.01	-0.86	0.49	-0.88	-0.97	0.19	1.66
HOND 15012M002	U	5.63	10.31	0.71	-2.23	-1.61	5.42	6.80	-0.01
IGEL 19352S001	N	1.01		0.81	0.56	-1.80	-0.75	0.20	0.52
IGEL 19352S001	E	0.77		0.16	1.02	-0.89	-1.04	-0.21	0.12
IGEL 19352S001	U	3.57		2.52	0.68	-3.58	0.56	5.97	2.86
ISPS 19484M001	N	1.44	0.34	1.18	1.26	-2.89	-0.89	-0.50	-0.05
ISPS 19484M001	E	0.73	-1.00	-0.11	0.17	-1.37	-0.38	-0.14	0.38
ISPS 19484M001	U	6.27	11.66	4.50	-0.48	-3.72	-3.49	6.81	-2.69
KAST 19499M001	N	1.96	-1.91	3.46	-0.22	1.51	-1.61	-0.05	-1.60
KAST 19499M001	E	0.98	-0.99	1.00	0.24	-0.23	-1.79	-0.62	0.31
KAST 19499M001	U	6.53	6.09	7.60	2.79	-8.54	-0.16	8.40	-3.14
LARE 19440M001	N	0.67	-0.90	-0.06	-0.18	1.28	0.05	-0.24	0.41
LARE 19440M001	E	1.19	-1.74	-1.35	1.20	0.63	-0.57	-0.48	-1.13
LARE 19440M001	U	5.16	3.68	-0.02	0.52	-9.81	1.12	6.59	2.17
LAZK 19354S001	N	0.87		0.97	-0.08	-0.49	0.64	1.43	-0.41
LAZK 19354S001	E	1.14		-1.83	1.06	-0.50	1.01	0.79	0.40
LAZK 19354S001	U	6.09		-2.59	4.71	-7.71	1.50	7.34	6.40
LEIT 19428M001	N	1.76	-2.26	1.71	2.32	0.23	0.38	-2.23	0.19

LEIT	19428M001	E	1.03	-0.77	-1.06	0.65	0.93	0.65	-1.49	0.86
LEIT	19428M001	U	7.20	8.88	3.41	-0.21	-10.48	4.55	6.82	6.60
PAS2	19351S001	N	0.69	-1.51	0.38	-0.23	-0.11	0.00	0.43	-0.46
PAS2	19351S001	E	0.79	0.21	-0.81	0.57	-0.78	-1.12	-0.23	0.92
PAS2	19351S001	U	6.52	12.98	1.56	-1.24	-2.69	-0.97	8.41	1.83
PASA	19351S001	N	0.68	-1.49	0.35	-0.22	-0.19	0.01	0.46	-0.41
PASA	19351S001	E	0.81	0.27	-0.87	0.55	-0.79	-1.14	-0.15	0.90
PASA	19351S001	U	6.59	12.86	1.20	-1.26	-2.85	-0.91	8.94	1.90
RIO1	13448M002	N	1.03	-0.47	1.35	0.68	-1.26	0.76	1.26	-0.21
RIO1	13448M002	E	0.44	-0.72	-0.58	0.36	0.16	0.35	0.02	0.17
RIO1	13448M002	U	5.27	9.22	5.36	-3.21	-3.33	4.24	3.18	1.88
SALA	13469M001	N	0.30	0.33	0.40	-0.20	-0.06	-0.20	-0.24	-0.37
SALA	13469M001	E	0.81	-1.30	-0.41	-0.95	0.75	0.04	-0.79	-0.00
SALA	13469M001	U	4.00	-0.18	-6.66	2.92	4.44	-3.85	-2.77	-0.94
SCOA	10088M002	N	1.93	1.16	2.96	-0.22	-1.52	-3.04	-0.69	0.09
SCOA	10088M002	E	1.67	0.23	-2.88	-1.61	-0.07	-0.22	0.88	2.21
SCOA	10088M002	U	7.20	10.18	-1.69	0.78	-7.80	4.03	11.08	2.10
TERU	13487M001	N	1.10	-1.35	-0.87	0.98	-0.34	-0.07	-1.89	-0.14
TERU	13487M001	E	0.85	1.19	-0.11	-0.61	0.06	1.07	-1.02	-0.56
TERU	13487M001	U	3.55	-1.66	-3.27	-1.36	-3.15	1.46	6.93	-0.54
VITO	19385M001	N	1.35	1.82	-0.01	1.05	-1.06	-0.71	1.98	-0.99
VITO	19385M001	E	1.07	-1.92	-0.42	-0.28	0.36	-0.44	0.87	1.35
VITO	19385M001	U	7.46	4.77	6.89	-0.37	-12.26	4.97	5.31	7.75
YEBE	13420M001	N	0.82	-0.09	-0.13	-1.11	0.14	1.66	-0.03	-0.05
YEBE	13420M001	E	0.78	-0.84	-0.45	-1.08	-0.68	-0.90	0.44	-0.35
YEBE	13420M001	U	1.83	0.46	-1.91	1.46	-0.80	-1.73	-2.57	-1.99
ZARA	13462M001	N	0.55	0.44	-0.41	0.43	0.31	-0.76	-0.50	-0.61
ZARA	13462M001	E	1.04	-0.60	-1.83	1.02	0.38	0.35	1.16	-0.36
ZARA	13462M001	U	5.56	7.43	-2.31	-3.05	3.88	6.91	7.15	1.35

6.2 Datum verification

In this section, the datum verification is shown. A 3 parameter Helmert 3D (3 translations) is computed to the minimally constrained sites.

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	2.46	-1.50	0.36
3	ALME 13437M001	I W	0.37	0.53	5.50
4	BCL1 19482M001	I W	0.75	-2.62	3.00
5	BELL 13431M001	I W	-0.25	-0.91	0.79
6	BIAZ 10074M002	I W	1.19	-0.16	-2.20
7	BORR 13480M001	I W	-5.20	-0.35	-5.24
8	BRST 10004M004	I W	-1.98	-1.85	1.42
9	CACE 13447M001	I W	1.41	2.36	-0.30
10	CANT 13438M001	I W	-0.02	1.56	-3.28
11	CASC 13909S001	I W	-2.15	-0.22	17.58
12	CEU1 13449M002	I W	0.71	0.46	-4.53
14	EBRE 13410M001	I W	-1.61	-1.30	-4.66
16	FLRS 31907M001	I W	1.21	3.51	-9.24
17	FUER 31330M001	I W	1.33	0.11	1.06
19	HUEL 13451M001	I W	2.17	3.11	-6.24
20	IBIZ 13454S001	I W	0.20	0.89	-0.33
21	IZAN 31309M002	I W	0.51	-0.19	-2.23
22	LAGO 13903M001	I W	0.80	0.90	0.56
23	LLIV 13436M001	I W	-2.21	0.87	5.35
24	LPAL 81701M001	I W	3.08	1.05	-3.99
25	LROC 10023M001	I W	1.53	-0.41	0.34
26	MADR 13407S012	I W	1.34	1.90	0.11
27	MAL1 13444M002	I W	4.87	-2.02	-9.33
28	MALA 13443M001	I W	1.44	0.44	9.14
29	MALL 13444M001	I W	-0.71	-1.47	-0.48
30	MAS1 31303M002	I W	0.02	-1.15	-0.43
31	MELI 19379M001	I W	0.04	-1.49	3.39
32	PDEL 31906M004	I W	-0.65	1.15	1.97
33	SCOA 10088M002	I W	-5.63	-2.55	-12.93
34	SFER 13402M004	I W	-1.08	-4.20	1.17
35	VALE 13439M001	I W	-1.01	1.18	-6.86
36	VIGO 13450M001	I W	1.16	2.31	4.29
37	VILL 13406M001	I W	-0.61	-1.08	2.38
38	YEBE 13420M001	I W	-0.27	-0.77	2.84
39	ZARA 13462M001	I W	0.08	0.40	-1.26
40	ZIMM 14001M004	I W	-1.19	-1.28	7.13
	RMS / COMPONENT		2.00	1.68	5.60
	IQR		2.13	2.26	6.24
	MEAN		0.06	-0.08	-0.14
	MEDIAN		0.14	-0.17	0.22
	MIN		-5.63	-4.20	-12.93
	MAX		4.87	3.51	17.58
	OVERALL RMS/IQR/MAX(3D)		3.57	2.56	17.71

CASC 13909S001 #SUM

ALL	RMS / COMPONENT		2.00	1.68	5.60	
ALL	IQR		2.13	2.26	6.24	
ALL	MEAN		0.06	-0.08	-0.14	
ALL	MEDIAN		0.14	-0.17	0.22	
ALL	MIN		-5.63	-4.20	-12.93	
ALL	MAX		4.87	3.51	17.58	
ALL	OVERALL RMS/IQR/MAX(3D)		3.57	2.56	17.71	CASC 13909S001 #SUM_ALL

NUMBER OF PARAMETERS : 3
NUMBER OF STATIONS : 36
NUMBER OF COORDINATES : 108
RMS OF TRANSFORMATION : 3.57 MM

PARAMETERS:

TRANSLATION IN X : 0.00 +- 0.59 MM
TRANSLATION IN Y : -0.00 +- 0.59 MM
TRANSLATION IN Z : -0.00 +- 0.59 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                       18942683
 NUMBER OF UNKNOWNS                             203891
 NUMBER OF DEGREES OF FREEDOM                 18738792
 PHASE MEASUREMENTS SIGMA                      0.00100
 SAMPLING INTERVAL (SECONDS)                       180
 VARIANCE FACTOR                     3.537825289540367
```

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 25:187:00000 25:193:86370 LEICA GR50           ----- -----------
 ALDA  A    1 P 25:187:00000 25:193:86370 LEICA GR30           ----- -----------
 ALSA  A    1 P 25:187:00000 25:193:86370 LEICA GR50           ----- -----------
 AMUR  A    1 P 25:187:00000 25:193:86370 LEICA GR30           ----- -----------
 BIAZ  A    1 P 25:190:00000 25:193:86370 SPECTRA SP90M        ----- -----------
 BIDA  A    1 P 25:187:00000 25:193:86370 LEICA GR10           ----- -----------
 BRZR  A    1 P 25:187:00000 25:193:86370 LEICA GR30           ----- -----------
 CACE  A    1 P 25:187:00000 25:193:86370 LEICA GR50           ----- -----------
 CANT  A    1 P 25:187:00000 25:193:86370 LEICA GR50           ----- -----------
 CREU  A    1 P 25:187:00000 25:193:86370 LEICA GR50           ----- -----------
 EBRE  A    1 P 25:187:00000 25:193:86370 LEICA GR50           ----- -----------
 ELGE  A    1 P 25:187:00000 25:193:86370 LEICA GR30           ----- -----------
 EMAZ  A    1 P 25:187:00000 25:193:86370 LEICA GR30           ----- -----------
 GERN  A    1 P 25:187:00000 25:193:86370 LEICA GR30           ----- -----------
 HOND  A    1 P 25:187:00000 25:193:86370 LEICA GR50           ----- -----------
 IGEL  A    1 P 25:188:00000 25:193:86370 LEICA GR30           ----- -----------
 ISPS  A    1 P 25:187:00000 25:193:86370 LEICA GR50           ----- -----------
 KAST  A    1 P 25:187:00000 25:193:86370 LEICA GR30           ----- -----------
 LARE  A    1 P 25:187:00000 25:193:86370 LEICA GR50           ----- -----------
 LAZK  A    1 P 25:188:00000 25:193:86370 LEICA GR30           ----- -----------
 LEIT  A    1 P 25:187:00000 25:193:86370 LEICA GRX1200GGPRO   ----- -----------
 PAS2  A    1 P 25:187:00000 25:193:86370 STONEX SC2200        ----- -----------
 PASA  A    1 P 25:187:00000 25:193:86370 LEICA GR30           ----- -----------
 RIO1  A    1 P 25:187:00000 25:193:86370 LEICA GR50           ----- -----------
 SALA  A    1 P 25:187:00000 25:193:86370 LEICA GR50           ----- -----------
 SCOA  A    1 P 25:187:00000 25:193:86370 LEICA GR50           ----- -----------
 TERU  A    1 P 25:187:00000 25:193:86370 LEICA GR50           ----- -----------
 VITO  A    1 P 25:187:00000 25:193:86370 LEICA GR30           ----- -----------
 YEBE  A    1 P 25:187:00000 25:193:86370 LEICA GR50           ----- -----------
 ZARA  A    1 P 25:187:00000 25:193:86370 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 25:187:00000 25:193:86370 LEIAT504         LEIS -----
 ALDA  A    1 P 25:187:00000 25:193:86370 LEIAS10          NONE -----
 ALSA  A    1 P 25:187:00000 25:193:86370 LEIAR10          NONE -----
 AMUR  A    1 P 25:187:00000 25:193:86370 LEIAS10          NONE -----
 BIAZ  A    1 P 25:190:00000 25:193:86370 LEIAR25          LEIT -----
 BIDA  A    1 P 25:187:00000 25:193:86370 LEIAS10          NONE -----
 BRZR  A    1 P 25:187:00000 25:193:86370 LEIAS10          NONE -----
 CACE  A    1 P 25:187:00000 25:193:86370 LEIAR20          LEIM -----
 CANT  A    1 P 25:187:00000 25:193:86370 LEIAR25.R4       LEIT -----
 CREU  A    1 P 25:187:00000 25:193:86370 LEIAR25.R4       NONE -----
 EBRE  A    1 P 25:187:00000 25:193:86370 LEIAR25.R4       NONE -----
 ELGE  A    1 P 25:187:00000 25:193:86370 LEIAR25.R4       LEIT -----
 EMAZ  A    1 P 25:187:00000 25:193:86370 LEIAS10          NONE -----
 GERN  A    1 P 25:187:00000 25:193:86370 LEIAS10          NONE -----
 HOND  A    1 P 25:187:00000 25:193:86370 LEIAR20          LEIM -----
 IGEL  A    1 P 25:188:00000 25:193:86370 LEIAR20          LEIM -----
 ISPS  A    1 P 25:187:00000 25:193:86370 LEIAR20          LEIM -----
 KAST  A    1 P 25:187:00000 25:193:86370 LEIAS10          NONE -----
 LARE  A    1 P 25:187:00000 25:193:86370 LEIAR20          LEIM -----
 LAZK  A    1 P 25:188:00000 25:193:86370 LEIAR25.R4       LEIT -----
 LEIT  A    1 P 25:187:00000 25:193:86370 LEIAR10          NONE -----
 PAS2  A    1 P 25:187:00000 25:193:86370 LEIAR20          LEIM -----
 PASA  A    1 P 25:187:00000 25:193:86370 LEIAR20          LEIM -----
 RIO1  A    1 P 25:187:00000 25:193:86370 LEIAR25.R4       LEIT -----
 SALA  A    1 P 25:187:00000 25:193:86370 LEIAR25          NONE -----
 SCOA  A    1 P 25:187:00000 25:193:86370 TRM55971.00      NONE -----
 TERU  A    1 P 25:187:00000 25:193:86370 LEIAR20          LEIM -----
 VITO  A    1 P 25:187:00000 25:193:86370 LEIAS10          NONE -----
 YEBE  A    1 P 25:187:00000 25:193:86370 LEIAR20          LEIM -----
 ZARA  A    1 P 25:187:00000 25:193:86370 TRM29659.00      NONE -----
```

7.3 Eccentricities

```
*                                        UP______ NORTH___ EAST____
*SITE PT SOLN T DATA_START__ DATA_END____ AXE ARP->BENCHMARK(M)_________
 ACOR  A    1 P 25:187:00000 25:193:86370 UNE   3.0460   0.0000   0.0000
 ALDA  A    1 P 25:187:00000 25:193:86370 UNE   0.0000   0.0000   0.0000
 ALSA  A    1 P 25:187:00000 25:193:86370 UNE   0.0000   0.0000   0.0000
 AMUR  A    1 P 25:187:00000 25:193:86370 UNE   0.0000   0.0000   0.0000
 BIAZ  A    1 P 25:190:00000 25:193:86370 UNE   0.0000   0.0000   0.0000
 BIDA  A    1 P 25:187:00000 25:193:86370 UNE   0.0000   0.0000   0.0000
 BRZR  A    1 P 25:187:00000 25:193:86370 UNE   0.0771   0.0000   0.0000
 CACE  A    1 P 25:187:00000 25:193:86370 UNE   0.0600   0.0000   0.0000
 CANT  A    1 P 25:187:00000 25:193:86370 UNE   3.0490   0.0000   0.0000
 CREU  A    1 P 25:187:00000 25:193:86370 UNE   0.0770   0.0000   0.0000
 EBRE  A    1 P 25:187:00000 25:193:86370 UNE   0.0770   0.0000   0.0000
 ELGE  A    1 P 25:187:00000 25:193:86370 UNE   0.0000   0.0000   0.0000
 EMAZ  A    1 P 25:187:00000 25:193:86370 UNE   0.0350   0.0000   0.0000
 GERN  A    1 P 25:187:00000 25:193:86370 UNE   0.0771   0.0000   0.0000
 HOND  A    1 P 25:187:00000 25:193:86370 UNE   0.0771   0.0000   0.0000
 IGEL  A    1 P 25:188:00000 25:193:86370 UNE   0.0000   0.0000   0.0000
 ISPS  A    1 P 25:187:00000 25:193:86370 UNE   0.0350   0.0000   0.0000
 KAST  A    1 P 25:187:00000 25:193:86370 UNE   0.0350   0.0000   0.0000
 LARE  A    1 P 25:187:00000 25:193:86370 UNE   0.0000   0.0000   0.0000
 LAZK  A    1 P 25:188:00000 25:193:86370 UNE   0.0000   0.0000   0.0000
 LEIT  A    1 P 25:187:00000 25:193:86370 UNE   0.0000   0.0000   0.0000
 PAS2  A    1 P 25:187:00000 25:193:86370 UNE   0.0000   0.0000   0.0000
 PASA  A    1 P 25:187:00000 25:193:86370 UNE   0.0000   0.0000   0.0000
 RIO1  A    1 P 25:187:00000 25:193:86370 UNE   0.0606   0.0000   0.0000
 SALA  A    1 P 25:187:00000 25:193:86370 UNE   0.0600   0.0000   0.0000
 SCOA  A    1 P 25:187:00000 25:193:86370 UNE   0.0000   0.0000   0.0000
 TERU  A    1 P 25:187:00000 25:193:86370 UNE   0.0600   0.0000   0.0000
 VITO  A    1 P 25:187:00000 25:193:86370 UNE   0.0000   0.0000   0.0000
 YEBE  A    1 P 25:187:00000 25:193:86370 UNE   0.0600   0.0000   0.0000
 ZARA  A    1 P 25:187:00000 25:193:86370 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:

```
2025-08-04 12:42 UTC | BIDA1870.25O | RECEIVER TYPE       |  LEICA GR30 -> LEICA GR10 (source: bida_20200626.log
2025-08-04 12:42 UTC | BIDA1870.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.52/6.525 (source: bida_20200626.log
2025-08-04 16:10 UTC | BIDA1880.25O | RECEIVER TYPE       |  LEICA GR30 -> LEICA GR10 (source: bida_20200626.log
2025-08-04 16:10 UTC | BIDA1880.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.52/6.525 (source: bida_20200626.log
2025-08-04 19:06 UTC | BIDA1890.25O | RECEIVER TYPE       |  LEICA GR30 -> LEICA GR10 (source: bida_20200626.log
2025-08-04 19:06 UTC | BIDA1890.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.52/6.525 (source: bida_20200626.log
2025-08-04 22:42 UTC | BIDA1900.25O | RECEIVER TYPE       |  LEICA GR30 -> LEICA GR10 (source: bida_20200626.log
2025-08-04 22:42 UTC | BIDA1900.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.52/6.525 (source: bida_20200626.log
2025-08-05 04:16 UTC | BIDA1910.25O | RECEIVER TYPE       |  LEICA GR30 -> LEICA GR10 (source: bida_20200626.log
2025-08-05 04:16 UTC | BIDA1910.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.52/6.525 (source: bida_20200626.log
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```

9 References

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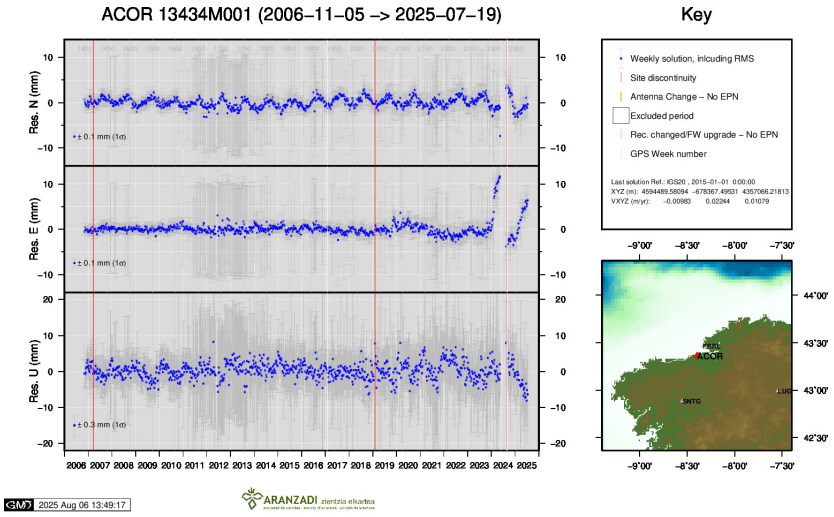
10 Cumulative Time Series

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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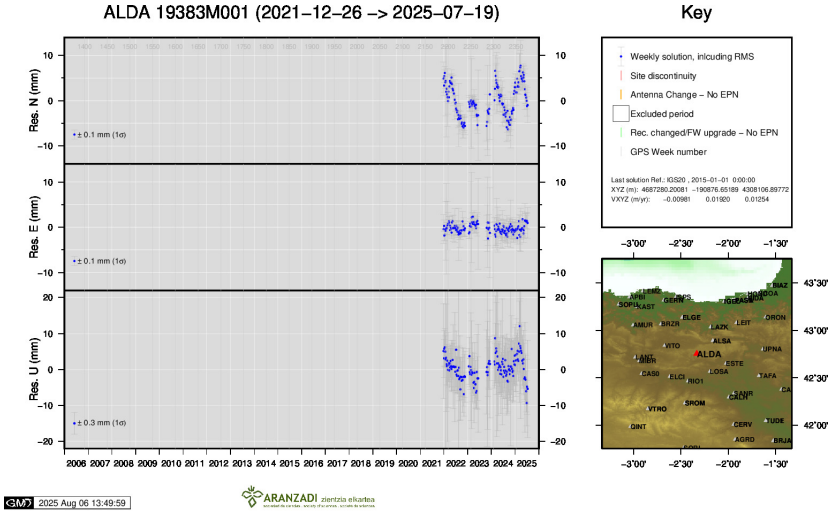

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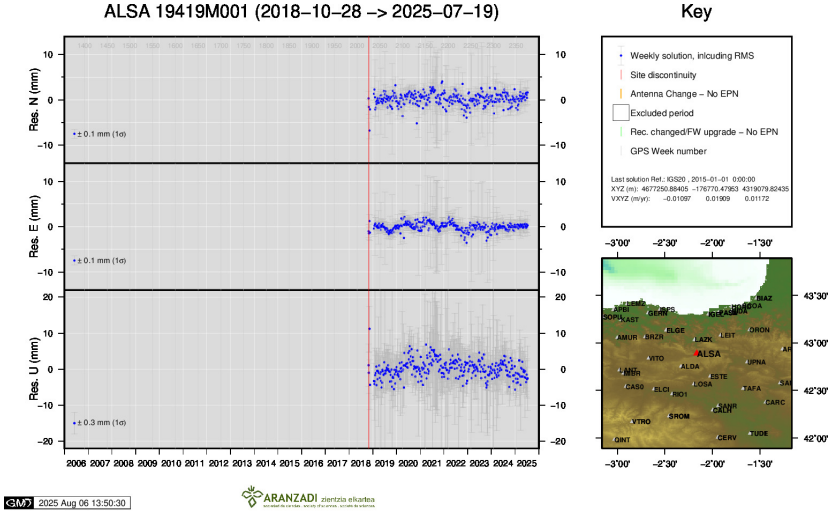

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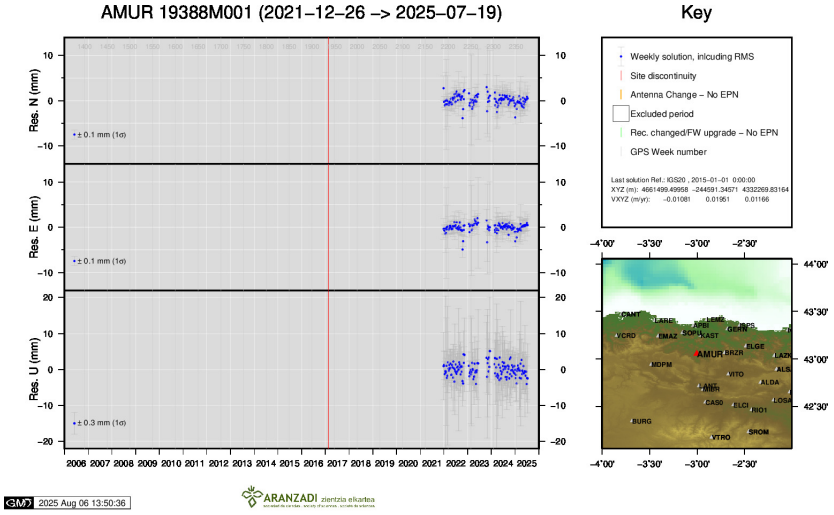

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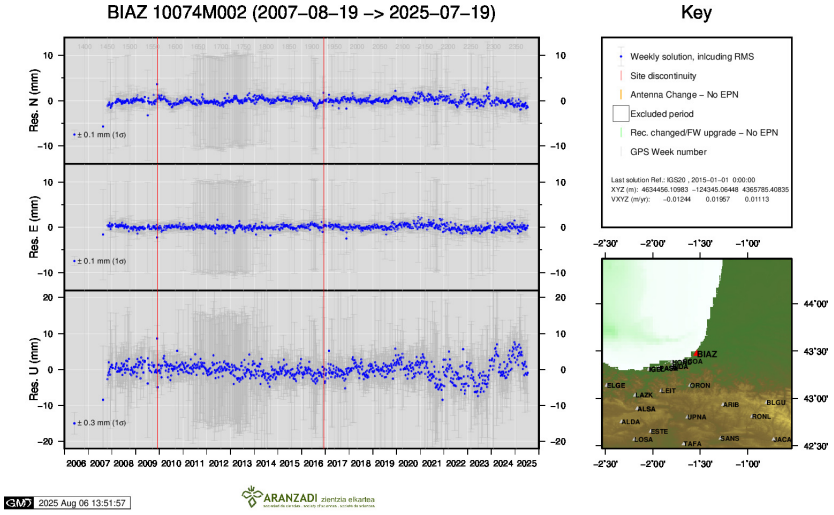

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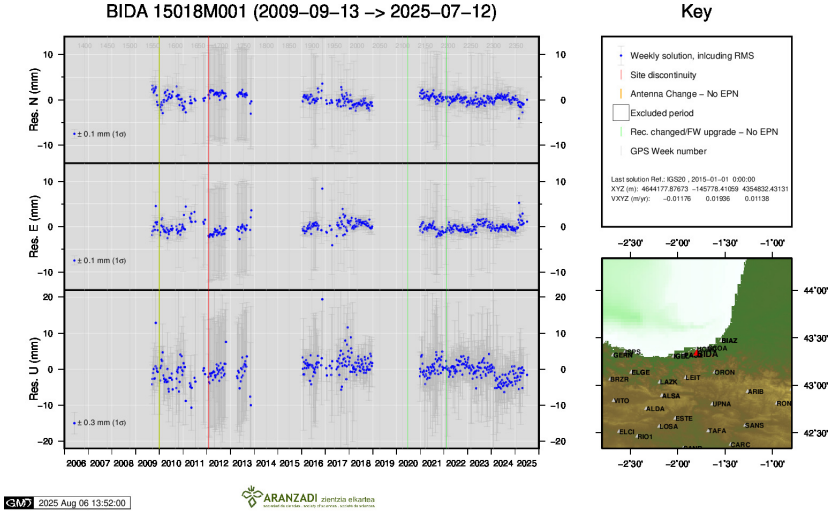

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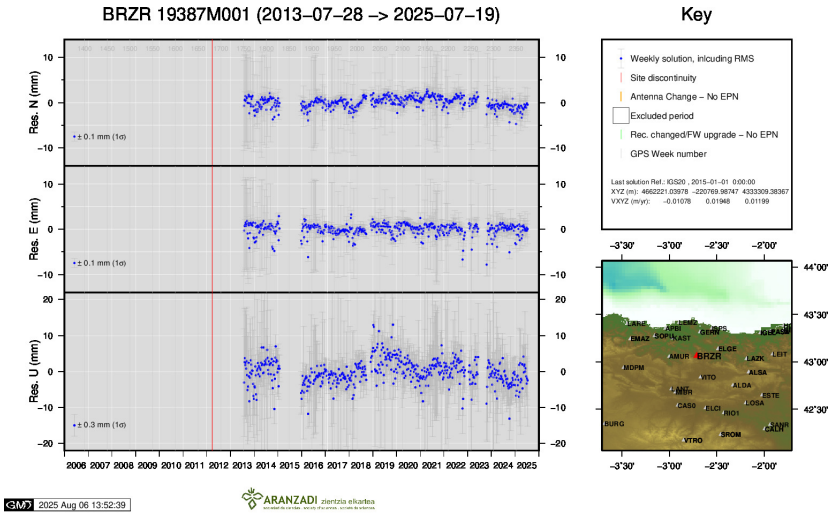

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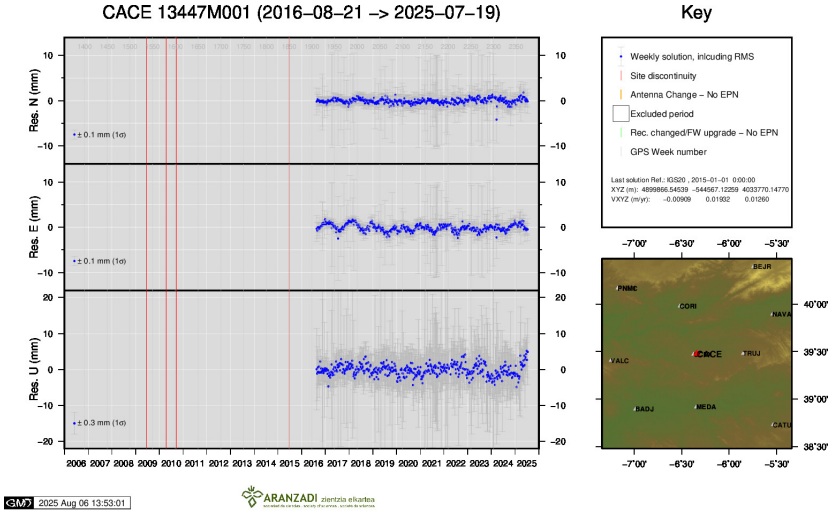

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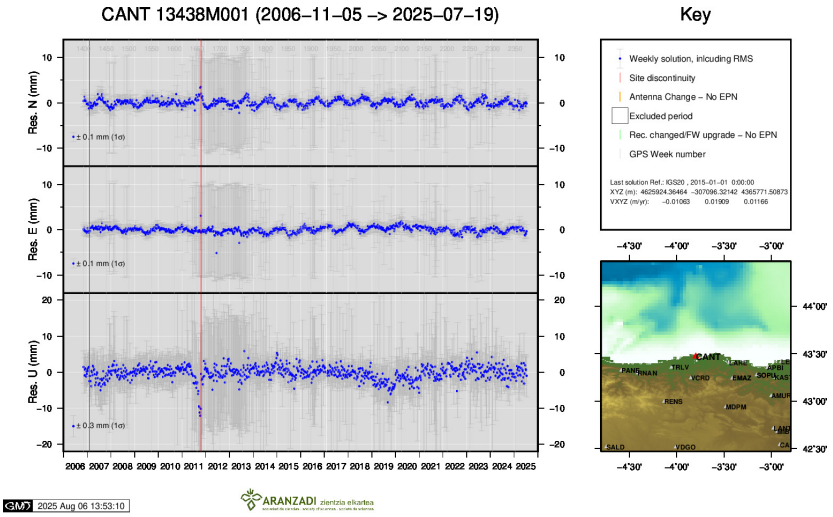

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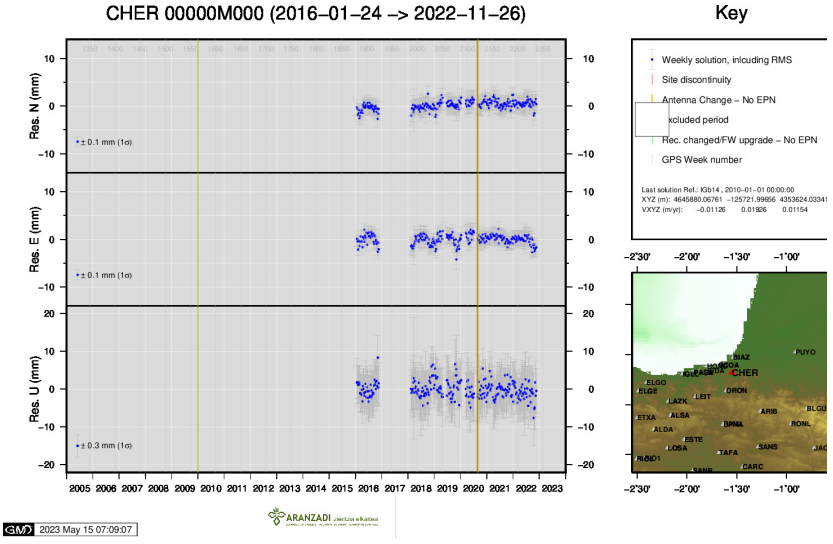

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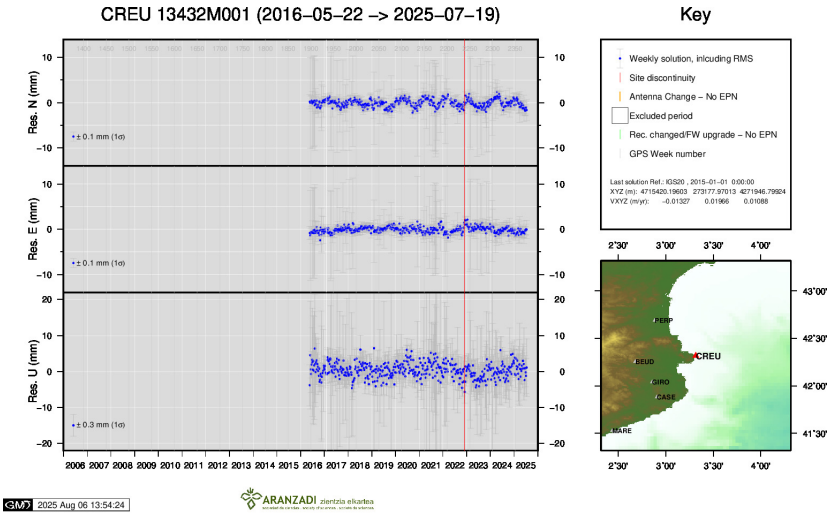

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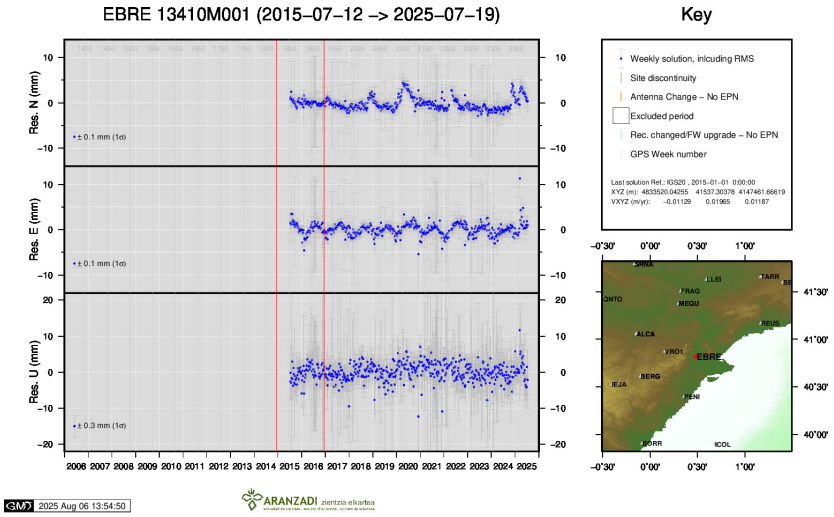

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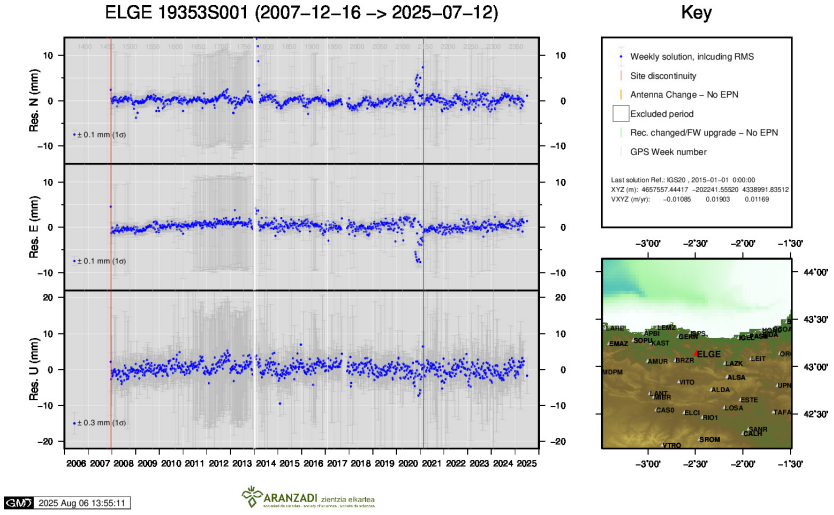

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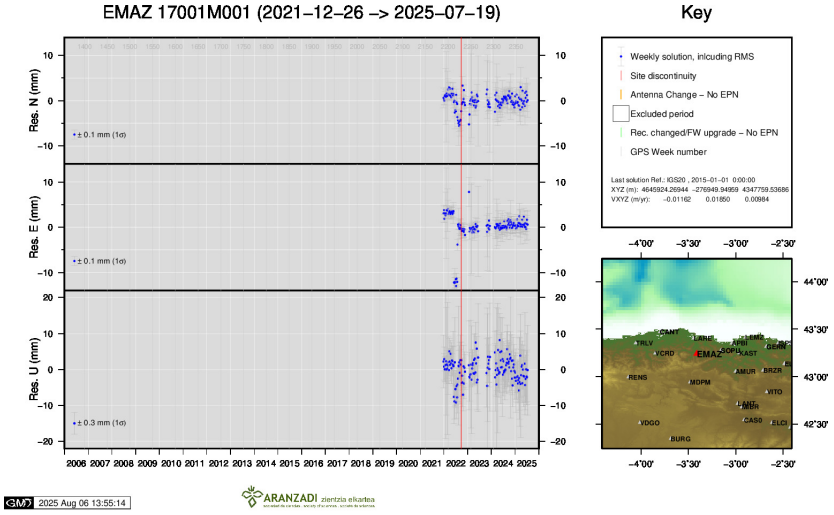

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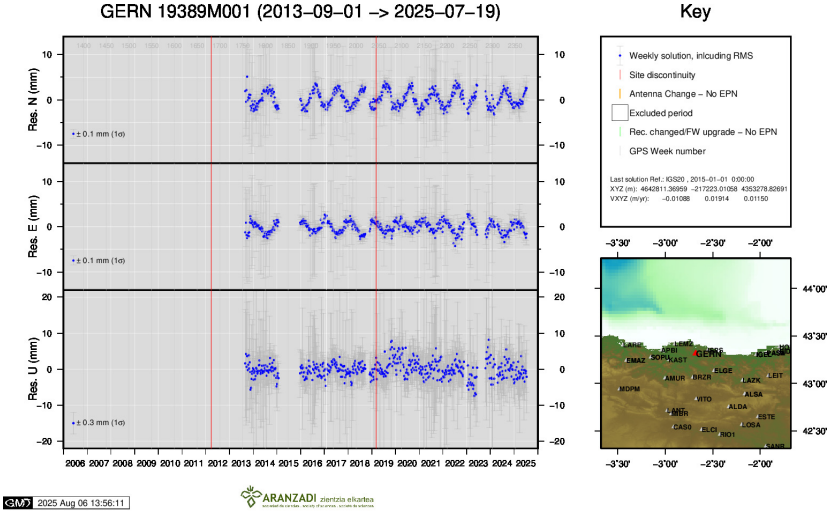

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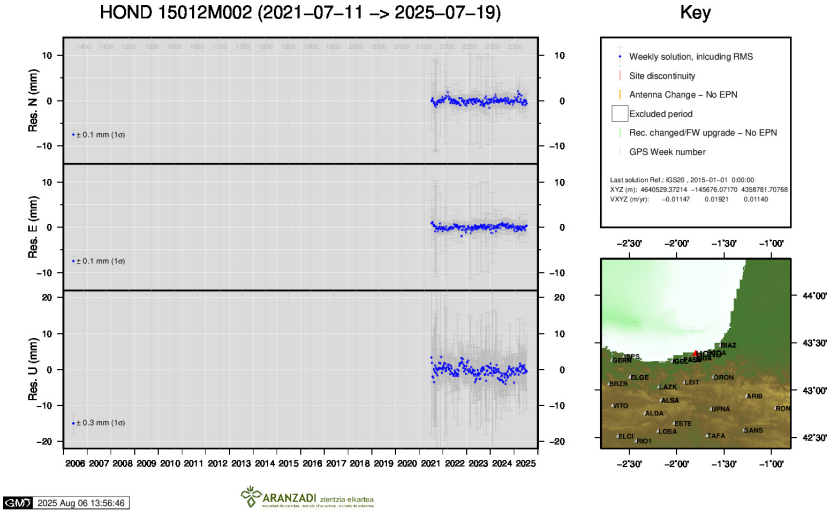

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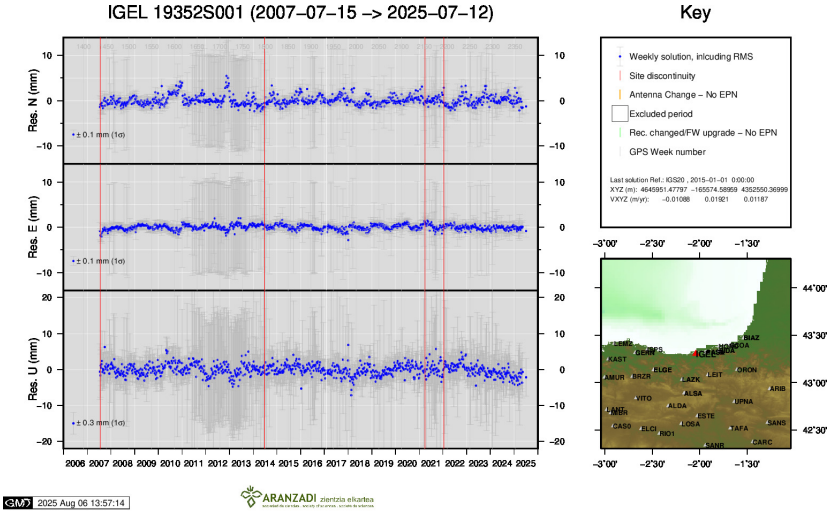

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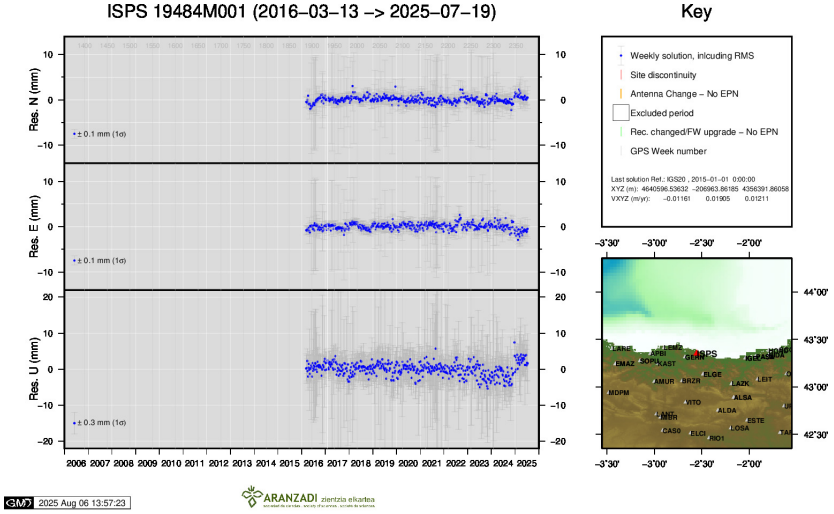

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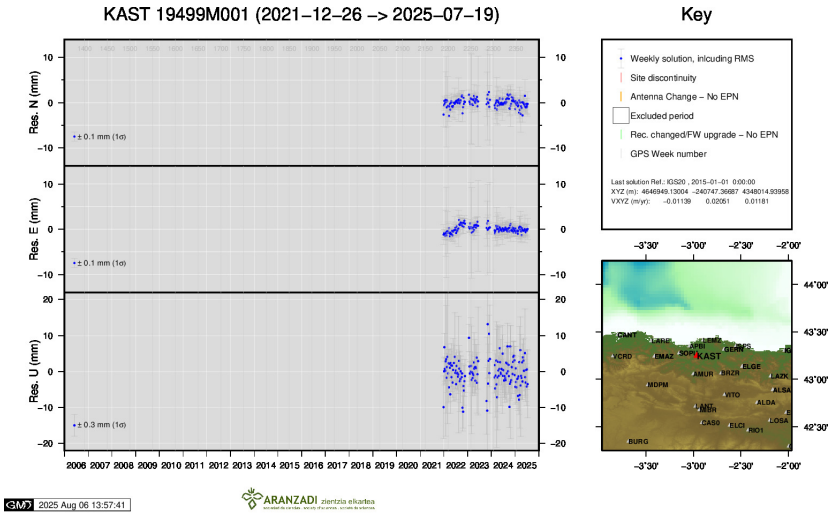

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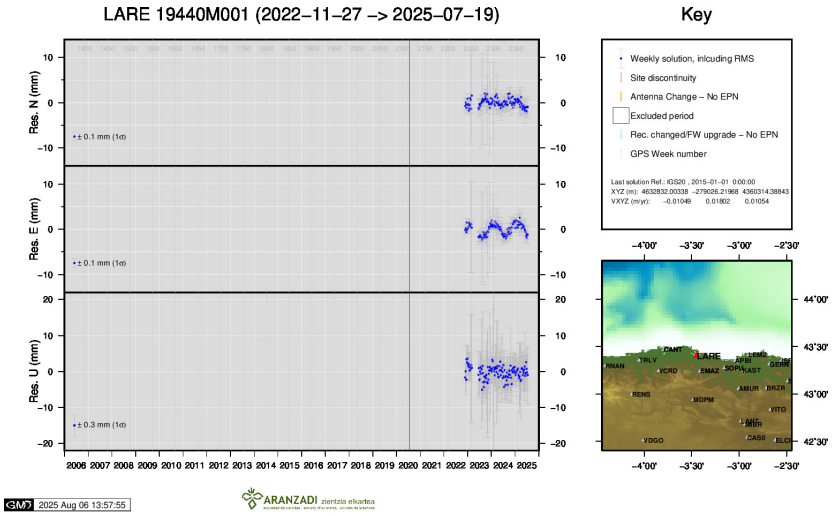

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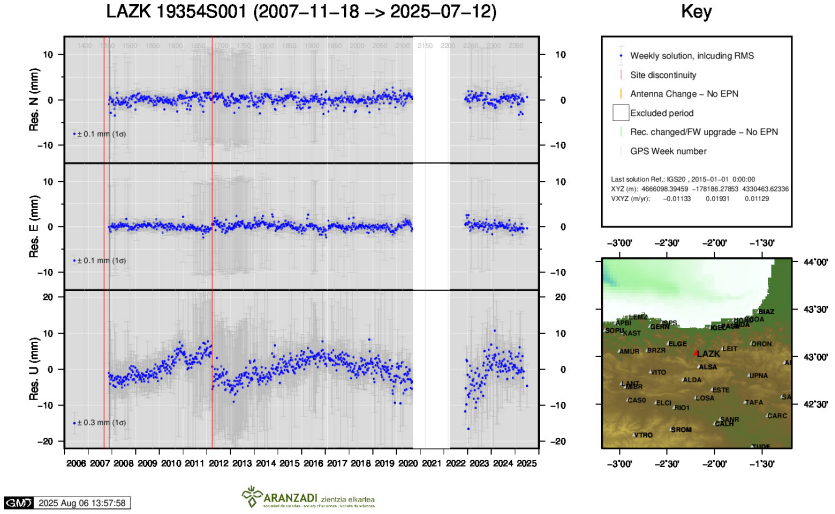

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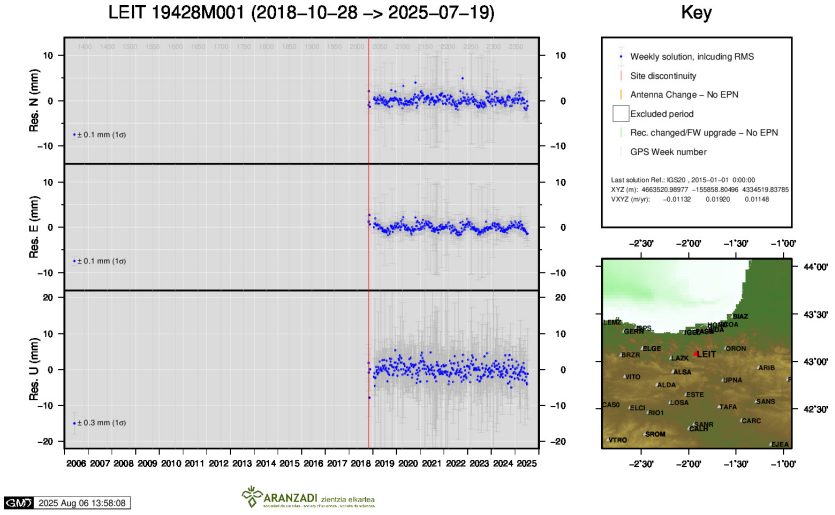

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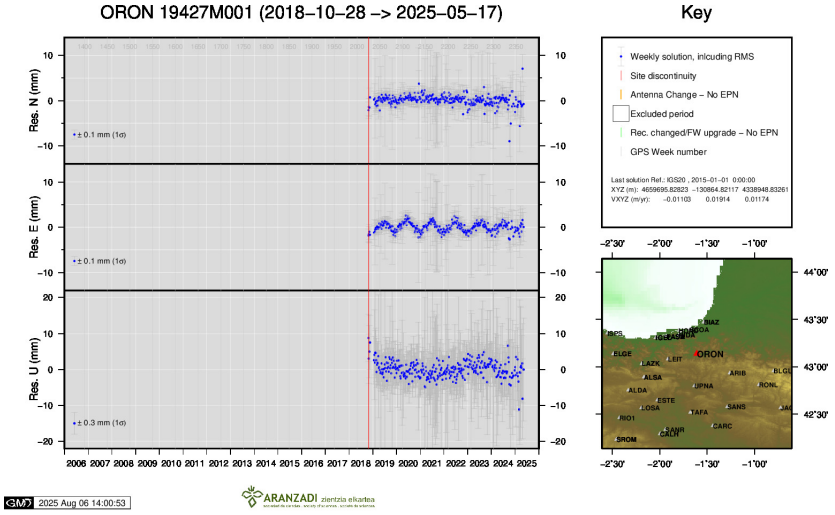

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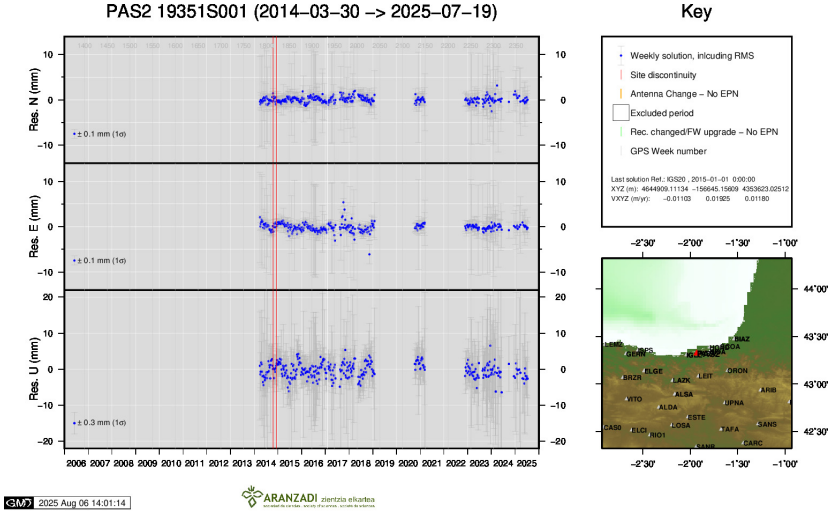

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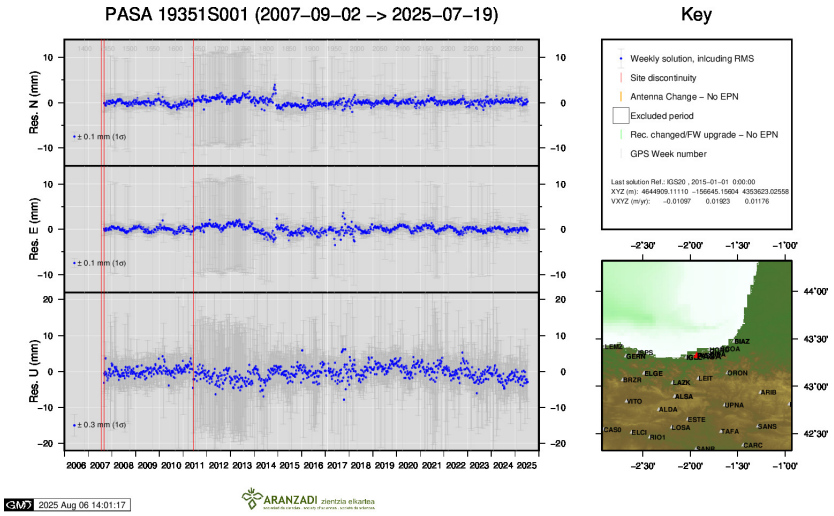

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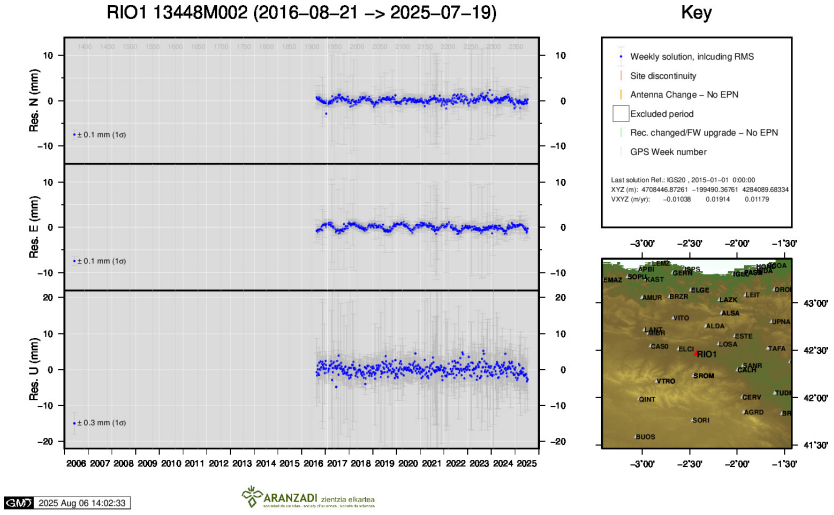

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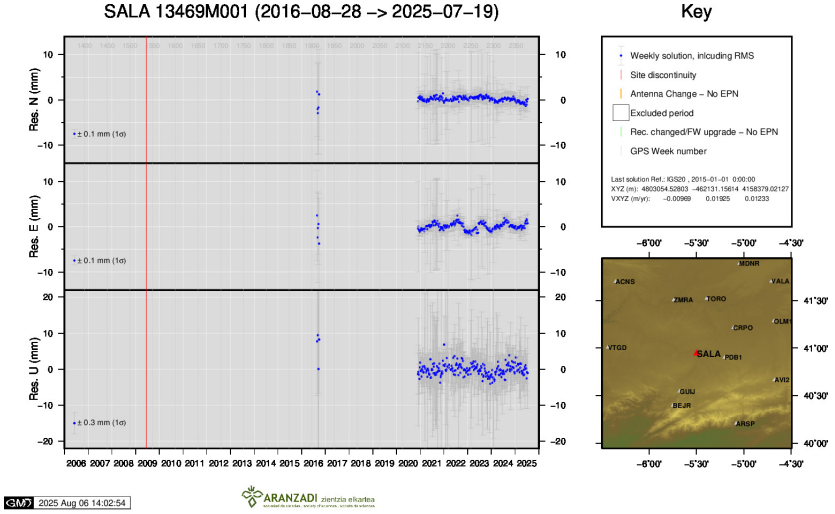

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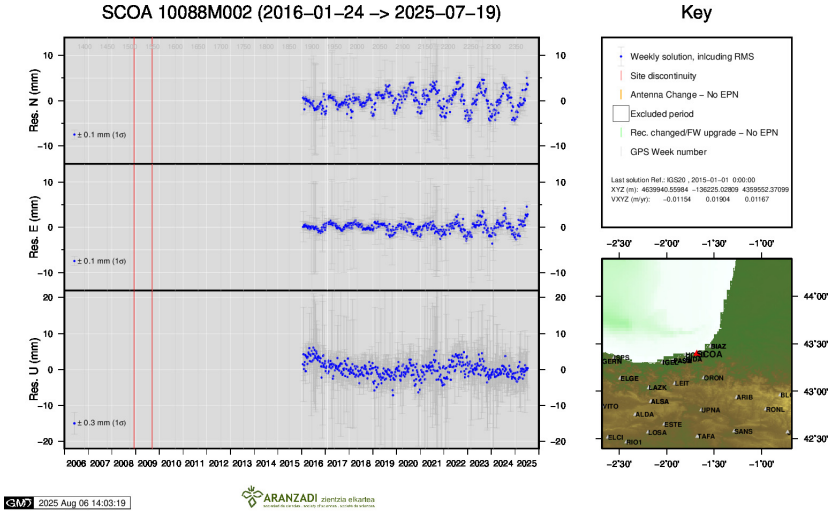

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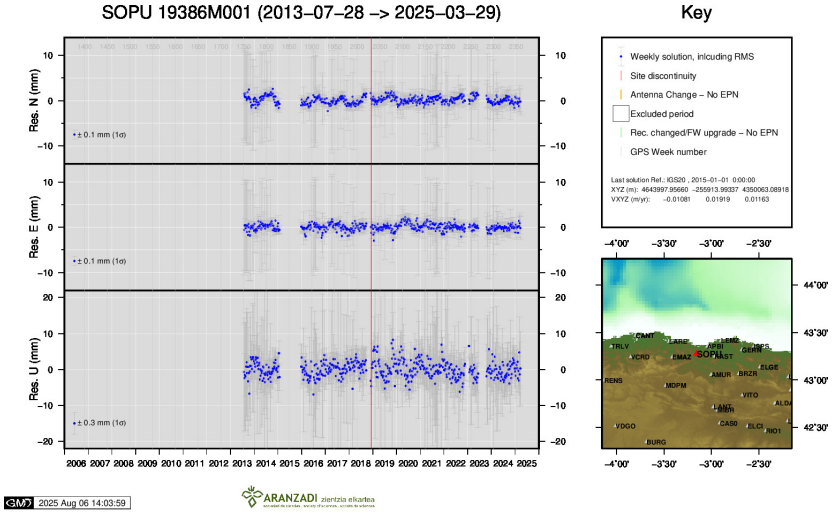

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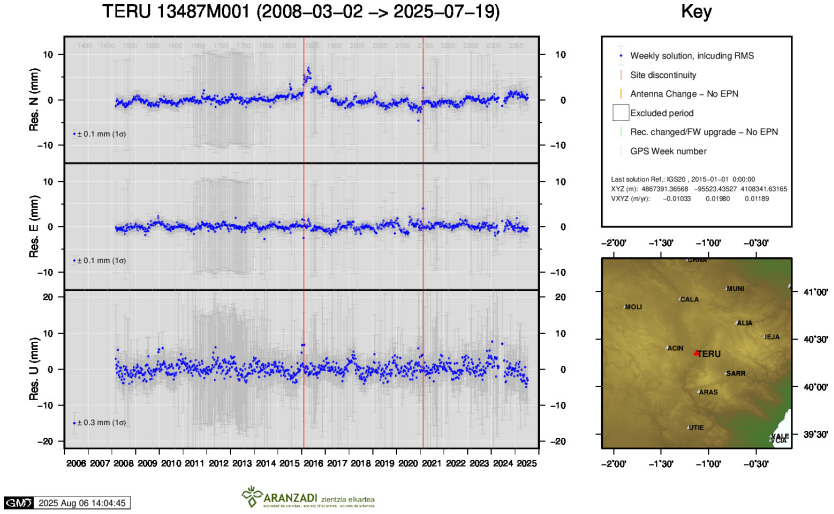

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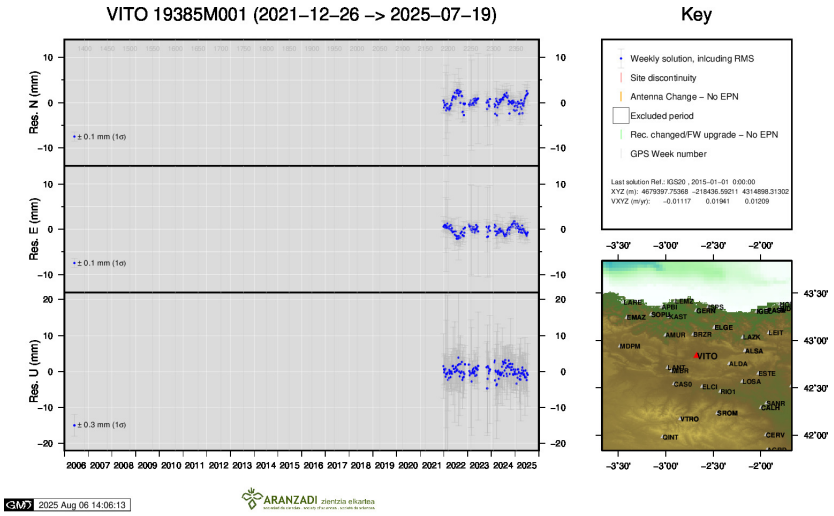

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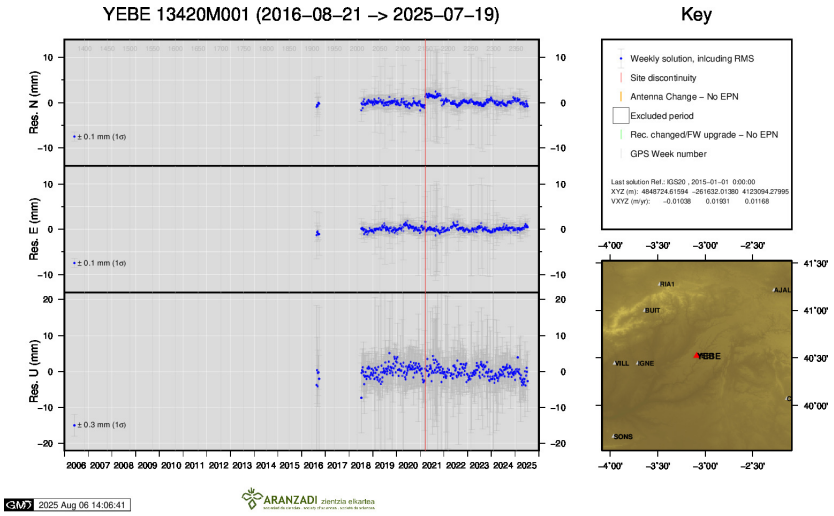

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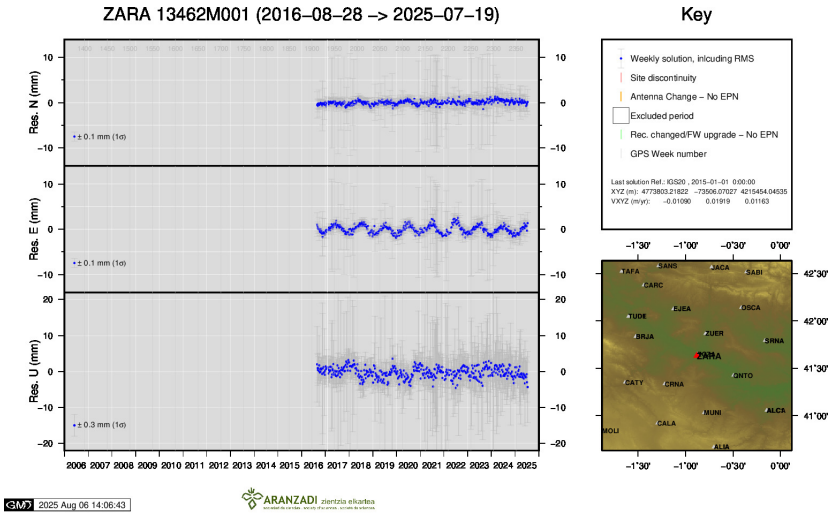
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Antenna Change – No EPN
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2025 Aug 06 14:06:43
ARANZADI zientzia elkartea

33) ZARA