ARA-DAC Weekly Analysis Result: 2388 (GFA)

Technical Report

GPS Week: 2388 (GFA)

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

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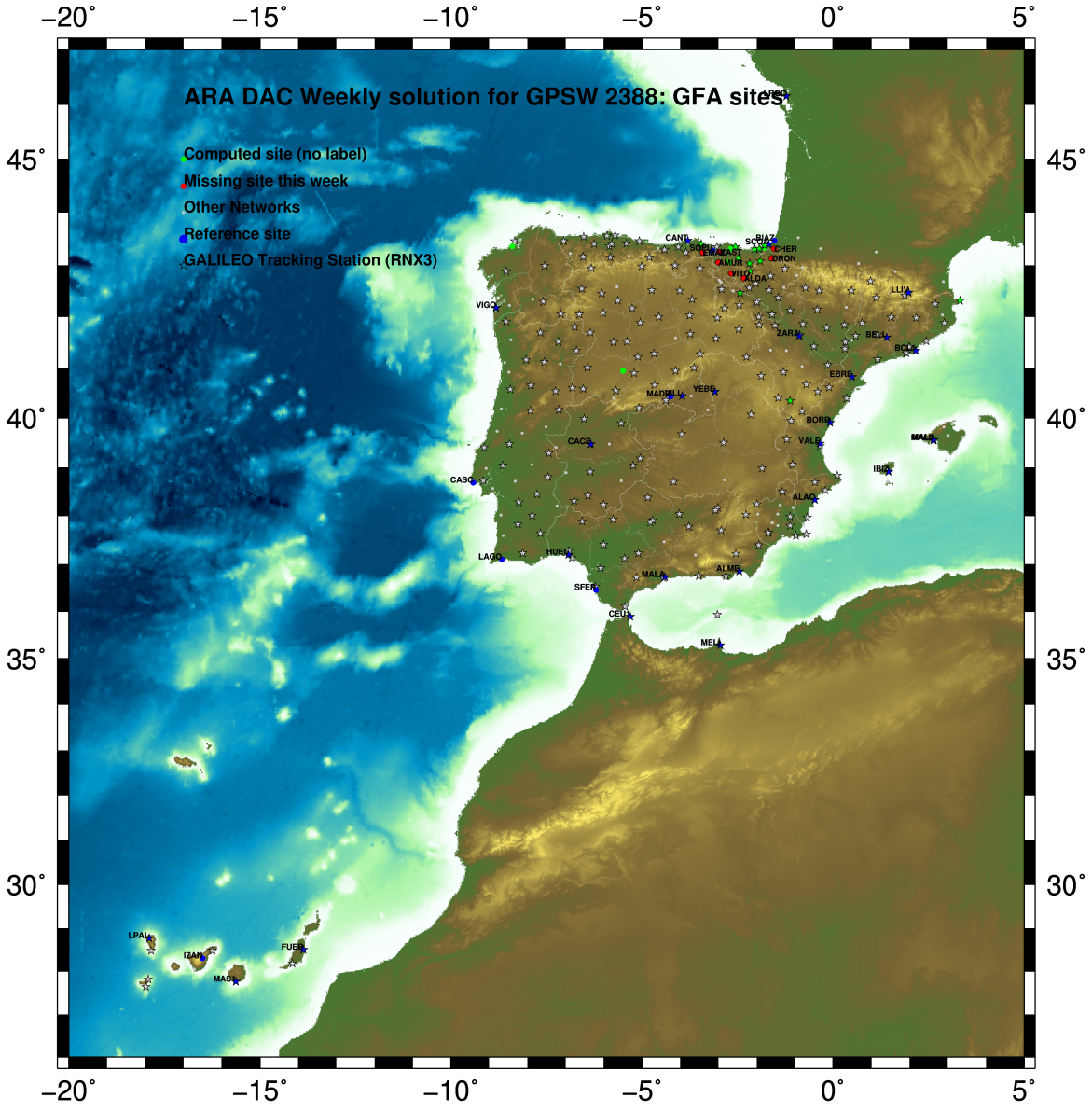
Contents

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



GMT 2025 Nov 03 10:34:39

Fig.1: Computed Sites for GPS Week2388 (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 03-NOV-25 08:56

LOCAL GEODETIC DATUM: IGS20 EPOCH: 2025-10-15 11:59:45

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	SYSTEM
111	ACOR 13434M001	4594489.46866	-678367.24430	4357066.32930	A	G
50	ALSA 19419M001	4677250.76736	-176770.27280	4319079.95099	A	GRE
384	BIAZ 10074M002	4634455.97534	-124344.85297	4365785.52665	W	GR
101	BIDA 00000M000	4644177.75110	-145778.19955	4354832.55465	A	GR
113	BRZR 19387M001	4662220.92278	-220769.77663	4333309.51304	A	GR
573	CACE 13447M001	4899866.45256	-544566.91288	4033770.28698	W	GRE
592	CANT 13438M001	4625924.24871	-307096.11478	4365771.63379	W	GRE
908	CREU 13432M001	4715420.05567	273178.18338	4271946.91591	A	GRE
135	EBRE 13410M001	4833519.91902	41537.51757	4147461.79485	W	GRE
180	ELGE 19353S001	4657557.32543	-202241.34856	4338991.96195	A	GRE
209	GERN 19389M001	4642811.24986	-217222.80329	4353278.95152	A	GR
257	HOND 15012M002	4640529.24912	-145675.86387	4358781.83098	A	GRE
235	IGEL 19352S001	4645951.35447	-165574.38177	4352550.49831	A	GRE
240	ISPS 19484M001	4640596.41337	-206963.65653	4356391.99465	A	GRE
252	LARE 19440M001	4632831.88711	-279026.02526	4360314.50324	A	GRE
256	LAZK 19354S001	4666098.27380	-178186.06986	4330463.74701	A	GRE
261	LEIT 19428M001	4663520.87076	-155858.59832	4334519.96170	A	GRE
345	PAS2 19351S001	4644908.99108	-156644.94832	4353623.15132	A	GRE
493	PASA 19351S001	4644908.99113	-156644.94834	4353623.15138	A	GRE
553	RIO1 13448M002	4708446.76192	-199490.16071	4284089.81125	A	GRE
558	SALA 13469M001	4803054.42635	-462130.94676	4158379.15581	A	GR
526	SCOA 10088M002	4639940.43484	-136224.82151	4359552.49716	W	GRE
715	SOPU 19386M001	4643997.83898	-255913.78550	4350063.21389	W	GR
443	TERU 13487M001	4867391.25403	-95523.22027	4108341.75961	A	GRE
616	YERE 13420M001	4848724.50647	-261631.80468	4123094.40785	W	GRE
655	ZARA 13462M001	4773803.10175	-73505.86255	4215454.17162	W	GRE

5.2 ETRF2000 (ETRS89) Coordinates

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

CONVERT TO ETRF2000 03-NOV-25 08:56

LOCAL GEODETIC DATUM: ETRF2000 EPOCH: 2025-10-15 11:59:45

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	SYSTEM
111	ACOR 13434M001	4594489.82430	-678367.90681	4357065.83238	A	
50	ALSA 19419M001	4677251.19082	-176770.94473	4319079.45396	A	
384	BIAZ 10074M002	4634456.41014	-124345.51935	4365785.03427	W	
101	BIDA 00000M000	4644178.18195	-145778.86722	4354832.06108	A	
113	BRZR 19387M001	4662221.34122	-220770.44679	4333309.01673	A	
573	CACE 13447M001	4899866.79989	-544567.61340	4033769.76420	W	
592	CANT 13438M001	4625924.65766	-307096.78058	4365771.13952	W	
908	CREU 13432M001	4715420.53870	273177.50829	4271946.42188	A	
135	EBRE 13410M001	4833520.35886	41536.82680	4147461.28672	W	
180	ELGE 19353S001	4657557.74697	-202242.01808	4338991.46634	A	
209	GERN 19389M001	4642811.67048	-217223.47099	4353278.45703	A	
257	HOND 15012M002	4640529.68032	-145676.53108	4358781.33774	A	
235	IGEL 19352S001	4645951.78233	-165575.04972	4352550.00429	A	
240	ISPS 19484M001	4640596.83570	-206964.32392	4356391.50051	A	
252	LARE 19440M001	4632832.29958	-279026.69186	4360314.00875	A	
256	LAZK 19354S001	4666098.69802	-178186.74038	4330463.25097	A	
261	LEIT 19428M001	4663521.29848	-155859.26846	4334519.46622	A	
345	PAS2 19351S001	4644909.42029	-156645.61611	4353622.65752	A	
493	PASA 19351S001	4644909.42034	-156645.61613	4353622.65758	A	
553	RIO1 13448M002	4708447.17922	-199490.83662	4284089.31104	A	
558	SALA 13469M001	4803054.79589	-462131.63512	4158378.64311	A	
526	SCOA 10088M002	4639940.86744	-136225.48861	4359552.00411	W	
715	SOPU 19386M001	4643998.25385	-255914.45345	4350062.71872	W	
443	TERU 13487M001	4867391.67120	-95523.91574	4108341.24641	A	
616	YERE 13420M001	4848724.90140	-261632.49829	4123093.89393	W	
655	ZARA 13462M001	4773803.53107	-73506.54627	4215453.66728	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).

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CONVERT TO ETRF2014                                                  03-NOV-25 08:56
--------------------------------------------------------------------------------
LOCAL GEODETIC DATUM: ETRF2014          EPOCH: 2025-10-15 11:59:45

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

111  ACOR 13434M001    4594489.78482  -678367.94305  4357065.88560    A
 50  ALSA 19419M001    4677251.14878  -176770.98255  4319079.50707    A
384  BIAZ 10074M002    4634456.36840  -124345.55758  4365785.08756    W
101  BIDA 00000M000    4644178.14018  -145778.90532  4354832.11432    A
113  BRZR 19387M001    4662221.29951  -220770.48452  4333309.06987    A
573  CACE 13447M001    4899866.75635  -544567.64873  4033769.81652    W
592  CANT 13438M001    4625924.61667  -307096.81814  4365771.19274    W
908  CREU 13432M001    4715420.49441   273177.46891  4271946.47522    A
135  EBRE 13410M001    4833520.31410    41536.78886  4147461.33951    W
180  ELGE 19353S001    4657557.70525  -202242.05590  4338991.51950    A
209  GERN 19389M001    4642811.62898  -217223.50882  4353278.51023    A
257  HOND 15012M002    4640529.63859  -145676.56920  4358781.39099    A
235  IGEL 19352S001    4645951.74061  -165575.08774  4352550.05751    A
240  ISPS 19484M001    4640596.79419  -206964.36180  4356391.55373    A
252  LARE 19440M001    4632832.25841  -279026.72950  4360314.06196    A
256  LAZK 19354S001    4666098.65611  -178186.77825  4330463.30412    A
261  LEIT 19428M001    4663521.25652  -155859.30643  4334519.51939    A
345  PAS2 19351S001    4644909.37855  -156645.65416  4353622.71075    A
493  PASA 19351S001    4644909.37860  -156645.65418  4353622.71081    A
553  RIO1 13448M002    4708447.13689  -199490.87421  4284089.36405    A
558  SALA 13469M001    4803054.75331  -462131.67124  4158378.69572    A
526  SCOA 10088M002    4639940.82568  -136225.52677  4359552.05737    W
715  SOPU 19386M001    4643998.21248  -255914.49112  4350062.77191    W
443  TERU 13487M001    4867391.62657   -95523.95298  4108341.29900    A
616  YEBE 13420M001    4848724.85760  -261632.53498  4123093.94649    W
655  ZARA 13462M001    4773803.48750   -73506.58404  4215453.72016    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).

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CONVERT TO ETRF2020                                                  03-NOV-25 08:56
--------------------------------------------------------------------------------
LOCAL GEODETIC DATUM: ETRF2020          EPOCH: 2025-10-15 11:59:45

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

111  ACOR 13434M001    4594489.78088  -678367.92821  4357065.89358    A
 50  ALSA 19419M001    4677251.14344  -176770.96724  4319079.51531    A
384  BIAZ 10074M002    4634456.36278  -124345.54238  4365785.09573    W
101  BIDA 00000M000    4644178.13465  -145778.89009  4354832.12250    A
113  BRZR 19387M001    4662221.29426  -220770.46927  4333309.07807    A
573  CACE 13447M001    4899866.75283  -544567.63284  4033769.82505    W
592  CANT 13438M001    4625924.61160  -307096.80304  4365771.20086    W
908  CREU 13432M001    4715420.48781   273177.48454  4271946.48359    A
135  EBRE 13410M001    4833520.30853    41536.80478  4147461.34805    W
180  ELGE 19353S001    4657557.69993  -202242.04066  4338991.52770    A
209  GERN 19389M001    4642811.62367  -217223.49363  4353278.51840    A
257  HOND 15012M002    4640529.63305  -145676.55398  4358781.39917    A
235  IGEL 19352S001    4645951.73515  -165575.07252  4352550.06569    A
240  ISPS 19484M001    4640596.78884  -206964.34662  4356391.56190    A
252  LARE 19440M001    4632832.25327  -279026.71436  4360314.07010    A
256  LAZK 19354S001    4666098.65074  -178186.76297  4330463.31234    A
261  LEIT 19428M001    4663521.25107  -155859.29115  4334519.52761    A
345  PAS2 19351S001    4644909.37306  -156645.63894  4353622.71894    A
493  PASA 19351S001    4644909.37311  -156645.63896  4353622.71900    A
553  RIO1 13448M002    4708447.13171  -199490.85880  4284089.37233    A
558  SALA 13469M001    4803054.74922  -462131.65563  4158378.70410    A
526  SCOA 10088M002    4639940.82011  -136225.51156  4359552.06555    W
715  SOPU 19386M001    4643998.20729  -255914.47595  4350062.78007    W
443  TERU 13487M001    4867391.62151   -95523.93701  4108341.30757    A
616  YEBE 13420M001    4848724.85301  -261632.51914  4123093.95499    W
655  ZARA 13462M001    4773803.48210   -73506.56837  4215453.72858    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 03-NOV-25 08:56

Station	#Days	Weekday 0123456	Repeatability (mm) N	E	U
ACOR 13434M001	7	XXXXXXX	1.10	0.98	3.80
ALSA 19419M001	7	XXXXXXX	2.09	0.50	3.92
BIAZ 10074M002	7	XXXXXXX	0.54	0.68	3.74
BIDA 00000M000	7	XXXXXXX	0.80	0.62	2.73
BRZR 19387M001	7	XXXXXXX	0.63	0.29	3.03
CACE 13447M001	7	XXXXXXX	0.78	0.74	3.04
CANT 13438M001	7	XXXXXXX	0.47	0.37	2.36
CREU 13432M001	7	XXXXXXX	0.75	1.00	4.88
EBRE 13410M001	6	XXXXXX	1.28	1.01	3.69
ELGE 19353S001	7	XXXXXXX	0.79	0.33	3.20
GERN 19389M001	7	XXXXXXX	1.13	0.42	2.67
HOND 15012M002	7	XXXXXXX	0.66	0.37	3.16
IGEL 19352S001	7	XXXXXXX	0.77	0.53	2.21
ISPS 19484M001	7	XXXXXXX	0.44	0.38	2.64
LARE 19440M001	2	XX	0.13	0.62	0.99
LAZK 19354S001	7	XXXXXXX	0.56	1.21	3.03
LEIT 19428M001	7	XXXXXXX	1.89	0.84	2.87
PAS2 19351S001	7	XXXXXXX	0.43	0.65	2.72
PASA 19351S001	7	XXXXXXX	0.41	0.61	2.59
RIO1 13448M002	7	XXXXXXX	0.46	0.54	3.73
SALA 13469M001	7	XXXXXXX	0.53	0.41	1.63
SCOA 10088M002	6	XXX XXX	1.41	0.59	4.60
SOPU 19386M001	7	XXXXXXX	0.76	0.61	4.26
TERU 13487M001	7	XXXXXXX	0.94	0.57	2.28
YEBE 13420M001	7	XXXXXXX	0.92	0.72	2.82
ZARA 13462M001	7	XXXXXXX	0.67	0.66	3.36

Comparison of individual solutions:

ACOR 13434M001	N	1.10	-0.58	1.66	-1.14	-0.08	-1.27	-0.58	0.93
ACOR 13434M001	E	0.98	-0.73	0.83	0.21	0.15	0.05	-0.01	-2.10
ACOR 13434M001	U	3.80	-1.12	-3.08	1.33	5.86	2.40	5.84	-0.32
ALSA 19419M001	N	2.09	-3.55	-1.01	2.38	-0.03	1.84	1.91	-0.03
ALSA 19419M001	E	0.50	0.46	0.05	0.60	0.60	0.37	-0.63	-0.18
ALSA 19419M001	U	3.92	1.63	6.15	-4.80	0.83	4.30	2.59	-1.63
BIAZ 10074M002	N	0.54	0.72	0.09	-0.62	-0.49	0.43	0.43	-0.50
BIAZ 10074M002	E	0.68	0.08	-0.96	0.15	0.79	0.82	0.48	-0.56
BIAZ 10074M002	U	3.74	3.14	3.23	-6.18	1.28	-1.63	1.69	4.29
BIDA 00000M000	N	0.80	-0.94	0.72	-0.83	-0.47	0.79	0.93	-0.19
BIDA 00000M000	E	0.62	0.09	-0.97	0.91	0.45	-0.36	0.49	0.05
BIDA 00000M000	U	2.73	0.67	3.82	-3.68	2.96	-1.22	2.28	0.90
BRZR 19387M001	N	0.63	-0.52	0.34	-0.25	-0.86	-0.30	0.69	0.81
BRZR 19387M001	E	0.29	0.03	-0.35	0.48	0.07	0.05	0.02	0.39
BRZR 19387M001	U	3.03	2.46	2.11	-1.89	-2.25	-1.96	1.72	5.41
CACE 13447M001	N	0.78	0.54	-0.77	0.67	1.07	0.27	-0.74	-0.75
CACE 13447M001	E	0.74	-0.90	0.80	-0.78	-0.06	0.26	-0.35	-1.02
CACE 13447M001	U	3.04	-0.94	-1.31	-2.37	2.09	-5.11	-3.06	2.76
CANT 13438M001	N	0.47	0.13	0.16	-0.86	-0.30	-0.51	0.29	0.29
CANT 13438M001	E	0.37	0.03	-0.64	0.13	0.24	0.33	0.43	-0.24
CANT 13438M001	U	2.36	-1.53	4.86	-0.81	0.76	-1.23	0.74	2.04
CREU 13432M001	N	0.75	0.24	0.63	1.07	-0.37	0.95	-0.14	0.86
CREU 13432M001	E	1.00	-1.14	-1.28	1.23	-0.75	0.04	0.37	0.91
CREU 13432M001	U	4.88	7.68	8.20	0.66	-0.45	3.76	-0.96	0.91
EBRE 13410M001	N	1.28		1.69	-0.21	-0.99	1.73	0.41	1.10
EBRE 13410M001	E	1.01		-1.54	0.98	-0.75	0.26	0.38	0.98
EBRE 13410M001	U	3.69		5.43	1.92	3.82	1.01	4.20	-1.23
ELGE 19353S001	N	0.79	0.86	0.41	0.48	-1.40	-0.67	-0.17	0.37
ELGE 19353S001	E	0.33	0.25	-0.58	0.29	0.15	0.21	0.34	0.01
ELGE 19353S001	U	3.20	-1.39	1.85	-5.16	1.12	2.96	2.34	3.75
GERN 19389M001	N	1.13	-0.53	0.58	-0.13	-1.86	-0.13	0.09	1.90
GERN 19389M001	E	0.42	-0.10	-0.50	0.47	0.02	0.17	-0.12	0.72
GERN 19389M001	U	2.67	-1.45	3.83	-3.35	2.65	2.20	1.69	-0.05
HOND 15012M002	N	0.66	-0.12	0.10	-0.24	-1.17	-0.16	0.82	0.67
HOND 15012M002	E	0.37	0.00	-0.51	0.65	0.33	0.07	-0.05	0.11
HOND 15012M002	U	3.16	3.49	2.81	-5.15	3.17	0.36	1.60	-0.82
IGEL 19352S001	N	0.77	-0.52	-0.19	-0.53	-0.76	0.14	0.24	1.52
IGEL 19352S001	E	0.53	0.28	-0.59	0.85	0.41	0.27	-0.50	-0.12
IGEL 19352S001	U	2.21	0.45	1.59	-2.86	-0.21	2.89	3.06	0.79
ISPS 19484M001	N	0.44	-0.35	0.44	-0.32	-0.61	0.12	0.00	0.61
ISPS 19484M001	E	0.38	-0.29	-0.01	-0.09	0.14	0.71	-0.22	0.43
ISPS 19484M001	U	2.64	0.17	3.98	-3.98	0.26	2.04	2.24	0.93
LARE 19440M001	N	0.13						0.04	0.12
LARE 19440M001	E	0.62						0.38	-0.49
LARE 19440M001	U	0.99						-0.17	0.98
LAZK 19354S001	N	0.56	-0.03	0.95	-0.33	-0.47	0.70	0.39	0.14
LAZK 19354S001	E	1.21	-0.85	-0.29	2.65	-0.12	-0.50	-0.27	0.76
LAZK 19354S001	U	3.03	-1.37	4.92	-1.96	0.94	3.38	3.57	-0.26
LEIT 19428M001	N	1.89	-0.13	0.29	1.75	0.37	1.22	0.54	-4.06
LEIT 19428M001	E	0.84	-0.02	-0.88	-0.10	-0.74	0.58	0.22	1.58
LEIT 19428M001	U	2.87	0.96	4.64	-1.16	1.85	3.01	-0.43	-3.61
PAS2 19351S001	N	0.43	0.22	0.31	-0.23	-0.84	-0.13	0.24	0.35
PAS2 19351S001	E	0.65	0.60	-1.16	0.68	0.41	0.30	-0.02	-0.30
PAS2 19351S001	U	2.72	0.32	3.71	-3.70	-1.01	2.61	2.57	1.59
PASA 19351S001	N	0.41	0.23	0.29	-0.16	-0.84	-0.08	0.22	0.27
PASA 19351S001	E	0.61	0.57	-1.09	0.60	0.42	0.23	0.12	-0.27
PASA 19351S001	U	2.59	0.33	3.76	-3.49	-1.04	2.12	2.40	1.53
RIO1 13448M002	N	0.46	0.61	0.64	-0.41	-0.10	0.52	0.13	0.18
RIO1 13448M002	E	0.54	-0.30	-0.19	1.16	0.44	0.28	-0.05	0.03
RIO1 13448M002	U	3.73	3.28	6.31	-2.19	-1.25	5.04	-0.16	-0.99
SALA 13469M001	N	0.53	-0.16	0.03	-0.08	-0.59	-0.97	-0.43	-0.40
SALA 13469M001	E	0.41	-0.41	0.37	-0.39	0.24	-0.53	0.17	-0.45
SALA 13469M001	U	1.63	0.80	-1.96	0.01	0.25	-0.31	1.98	-2.71
SCOA 10088M002	N	1.41	0.41	1.35	-0.30		-1.70	-1.14	1.91
SCOA 10088M002	E	0.59	0.79	-0.27	0.47		-0.25	-0.79	0.37

SCOA	10088M002	U	4.60	2.61	8.79	-3.99		-2.14	-1.00	0.51
SOPU	19386M001	N	0.76	0.91	0.12	-0.19	-0.46	-0.68	1.09	-0.85
SOPU	19386M001	E	0.61	0.06	-0.97	0.37	0.88	0.04	0.56	-0.20
SOPU	19386M001	U	4.26	-2.31	7.15	-1.72	-4.34	-0.45	4.66	2.93
TERU	13487M001	N	0.94	0.18	0.97	-0.02	-0.39	1.51	-0.17	1.37
TERU	13487M001	E	0.57	0.34	-0.02	-0.38	0.78	0.16	-0.98	-0.26
TERU	13487M001	U	2.28	3.87	1.92	-0.59	-3.44	0.32	0.19	0.31
YEBE	13420M001	N	0.92	-0.56	0.33	0.29	-0.74	-1.95	-0.32	0.38
YEBE	13420M001	E	0.72	0.16	0.18	-1.10	0.66	-0.81	0.58	-0.64
YEBE	13420M001	U	2.82	-3.62	0.71	1.93	0.97	1.96	1.65	-4.79
ZARA	13462M001	N	0.67	-0.02	0.96	0.10	-0.83	0.78	0.45	0.49
ZARA	13462M001	E	0.66	0.53	0.91	0.98	0.42	0.18	-0.35	-0.40
ZARA	13462M001	U	3.36	1.54	6.47	0.34	1.26	3.46	2.72	-1.50

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	1.60	-1.59	0.38
3	ALME 13437M001	I W	-0.60	0.03	1.71
4	BCL1 19482M001	I W	-0.62	-1.41	4.29
5	BELL 13431M001	I W	-1.77	0.75	1.80
6	BIAZ 10074M002	I W	1.49	0.59	-0.37
7	BORR 13480M001	I W	-5.34	-0.98	0.77
8	BRST 10004M004	I W	-1.30	-1.69	0.57
9	CACE 13447M001	I W	2.26	0.50	-3.26
10	CANT 13438M001	I W	0.26	1.10	-0.22
11	CASC 13909S001	I W	1.71	-0.06	1.80
12	CEU1 13449M002	I W	0.62	-0.03	-7.52
14	EBRE 13410M001	I W	-3.07	0.02	0.27
16	FLRS 31907M001	I W	1.23	5.28	-1.16
17	FUER 31330M001	I W	0.38	-0.40	5.39
19	HUEL 13451M001	I W	2.83	2.86	-9.59
20	IBIZ 13454S001	I W	-0.18	0.54	-0.13
21	IZAN 31309M002	I W	-0.36	-2.55	0.17
22	LAGO 13903M001	I W	1.01	-0.09	2.83
23	LLIV 13436M001	I W	-1.97	1.89	7.27
24	LPAL 81701M001	I W	2.36	1.40	-0.66
25	LROC 10023M001	I W	-0.17	0.53	2.37
26	MADR 13407S012	I W	-0.73	0.62	-2.66
27	MAL1 13444M002	I W	3.44	-2.31	-6.77
28	MALA 13443M001	I W	2.79	-0.89	4.18
29	MALL 13444M001	I W	-0.60	0.14	-0.01
30	MAS1 31303M002	I W	-1.02	-2.69	5.54
31	MELI 19379M001	I W	0.70	-0.83	0.98
32	PDEL 31906M004	I W	-0.24	-2.74	-5.22
33	SCOA 10088M002	I W	-2.25	-0.02	-11.19
34	SFER 13402M004	I W	-0.60	-6.17	1.07
35	SOPU 19386M001	I W	-0.42	1.01	1.84
36	VALE 13439M001	I W	0.31	2.56	-4.59
37	VIGO 13450M001	I W	1.71	2.78	0.85
38	VILL 13406M001	I W	-0.66	-0.94	4.06
39	YEBE 13420M001	I W	-0.55	-0.05	1.33
40	ZARA 13462M001	I W	0.01	0.53	-3.13
41	ZIMM 14001M004	I W	-1.00	0.02	5.28
	RMS / COMPONENT		1.74	1.94	4.16
	IQR		1.89	1.56	3.00
	MEAN		0.03	-0.06	-0.05
	MEDIAN		-0.18	0.02	0.57
	MIN		-5.34	-6.17	-11.19
	MAX		3.44	5.28	7.27
	OVERALL RMS/IQR/MAX(3D)		2.84	2.34	11.41

SCOA 10088M002 #SUM

ALL	RMS / COMPONENT		1.74	1.94	4.16	
ALL	IQR		1.89	1.56	3.00	
ALL	MEAN		0.03	-0.06	-0.05	
ALL	MEDIAN		-0.18	0.02	0.57	
ALL	MIN		-5.34	-6.17	-11.19	
ALL	MAX		3.44	5.28	7.27	
ALL	OVERALL RMS/IQR/MAX(3D)		2.84	2.34	11.41	SCOA 10088M002 #SUM_ALL

NUMBER OF PARAMETERS : 3
NUMBER OF STATIONS : 37
NUMBER OF COORDINATES : 111
RMS OF TRANSFORMATION : 2.84 MM

PARAMETERS:

TRANSLATION IN X : -0.00 +- 0.47 MM
TRANSLATION IN Y : 0.00 +- 0.47 MM
TRANSLATION IN Z : -0.00 +- 0.47 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                       19747615
 NUMBER OF UNKNOWNS                             195089
 NUMBER OF DEGREES OF FREEDOM                 19552526
 PHASE MEASUREMENTS SIGMA                      0.00100
 SAMPLING INTERVAL (SECONDS)                       180
 VARIANCE FACTOR                    1.901852163122353
```

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 25:285:00000 25:291:86370 LEICA GR50           ----- -----------
 ALSA  A    1 P 25:285:00000 25:291:86370 LEICA GR50           ----- -----------
 BIAZ  A    1 P 25:285:00000 25:291:86370 SPECTRA SP90M        ----- -----------
 BIDA  A    1 P 25:285:00000 25:291:86370 LEICA GR10           ----- -----------
 BRZR  A    1 P 25:285:00000 25:291:86370 LEICA GR30           ----- -----------
 CACE  A    1 P 25:285:00000 25:291:86370 LEICA GR50           ----- -----------
 CANT  A    1 P 25:285:00000 25:291:86370 LEICA GR50           ----- -----------
 CREU  A    1 P 25:285:00000 25:291:86370 LEICA GR50           ----- -----------
 EBRE  A    1 P 25:286:00000 25:291:86370 LEICA GR50           ----- -----------
 ELGE  A    1 P 25:285:00000 25:291:86370 LEICA GR30           ----- -----------
 GERN  A    1 P 25:285:00000 25:291:86370 LEICA GR30           ----- -----------
 HOND  A    1 P 25:285:00000 25:291:86370 LEICA GR50           ----- -----------
 IGEL  A    1 P 25:285:00000 25:291:86370 LEICA GR30           ----- -----------
 ISPS  A    1 P 25:285:00000 25:291:86370 LEICA GR50           ----- -----------
 LARE  A    1 P 25:290:00000 25:291:86370 LEICA GR50           ----- -----------
 LAZK  A    1 P 25:285:00000 25:291:86370 LEICA GR30           ----- -----------
 LEIT  A    1 P 25:285:00000 25:291:86370 LEICA GR50           ----- -----------
 PAS2  A    1 P 25:285:00000 25:291:86370 STONEX SC2200        ----- -----------
 PASA  A    1 P 25:285:00000 25:291:86370 LEICA GR30           ----- -----------
 RIO1  A    1 P 25:285:00000 25:291:86370 LEICA GR50           ----- -----------
 SALA  A    1 P 25:285:00000 25:291:86370 LEICA GR50           ----- -----------
 SCOA  A    1 P 25:285:00000 25:291:86370 LEICA GR50           ----- -----------
 SOPU  A    1 P 25:285:00000 25:291:86370 LEICA GR30           ----- -----------
 TERU  A    1 P 25:285:00000 25:291:86370 LEICA GR50           ----- -----------
 YEBE  A    1 P 25:285:00000 25:291:86370 LEICA GR50           ----- -----------
 ZARA  A    1 P 25:285:00000 25:291:86370 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 25:285:00000 25:291:86370 LEIAT504          LEIS -----
 ALSA  A    1 P 25:285:00000 25:291:86370 LEIAR10           NONE -----
 BIAZ  A    1 P 25:285:00000 25:291:86370 LEIAR25           LEIT -----
 BIDA  A    1 P 25:285:00000 25:291:86370 LEIAS10           NONE -----
 BRZR  A    1 P 25:285:00000 25:291:86370 LEIAS10           NONE -----
 CACE  A    1 P 25:285:00000 25:291:86370 LEIAR20           LEIM -----
 CANT  A    1 P 25:285:00000 25:291:86370 LEIAR25.R4        LEIT -----
 CREU  A    1 P 25:285:00000 25:291:86370 LEIAR25.R4        NONE -----
 EBRE  A    1 P 25:286:00000 25:291:86370 LEIAR25.R4        NONE -----
 ELGE  A    1 P 25:285:00000 25:291:86370 LEIAR25.R4        LEIT -----
 GERN  A    1 P 25:285:00000 25:291:86370 LEIAS10           NONE -----
 HOND  A    1 P 25:285:00000 25:291:86370 LEIAR20           LEIM -----
 IGEL  A    1 P 25:285:00000 25:291:86370 LEIAR20           LEIM -----
 ISPS  A    1 P 25:285:00000 25:291:86370 LEIAR20           LEIM -----
 LARE  A    1 P 25:290:00000 25:291:86370 LEIAR20           LEIM -----
 LAZK  A    1 P 25:285:00000 25:291:86370 LEIAR25.R4        LEIT -----
 LEIT  A    1 P 25:285:00000 25:291:86370 LEIAR10           NONE -----
 PAS2  A    1 P 25:285:00000 25:291:86370 LEIAR20           LEIM -----
 PASA  A    1 P 25:285:00000 25:291:86370 LEIAR20           LEIM -----
 RIO1  A    1 P 25:285:00000 25:291:86370 LEIAR25.R4        LEIT -----
 SALA  A    1 P 25:285:00000 25:291:86370 LEIAR25           NONE -----
 SCOA  A    1 P 25:285:00000 25:291:86370 TRM55971.00       NONE -----
 SOPU  A    1 P 25:285:00000 25:291:86370 LEIAS10           NONE -----
 TERU  A    1 P 25:285:00000 25:291:86370 LEIAR20           LEIM -----
 YEBE  A    1 P 25:285:00000 25:291:86370 LEIAR20           LEIM -----
 ZARA  A    1 P 25:285:00000 25:291:86370 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 25:285:00000 25:291:86370 UNE   3.0460   0.0000   0.0000
 ALSA  A    1 P 25:285:00000 25:291:86370 UNE   0.0000   0.0000   0.0000
 BIAZ  A    1 P 25:285:00000 25:291:86370 UNE   0.0000   0.0000   0.0000
```

```
BIDA  A    1 P 25:285:00000 25:291:86370 UNE   0.0000   0.0000   0.0000
BRZR  A    1 P 25:285:00000 25:291:86370 UNE   0.0771   0.0000   0.0000
CACE  A    1 P 25:285:00000 25:291:86370 UNE   0.0600   0.0000   0.0000
CANT  A    1 P 25:285:00000 25:291:86370 UNE   3.0490   0.0000   0.0000
CREU  A    1 P 25:285:00000 25:291:86370 UNE   0.0770   0.0000   0.0000
EBRE  A    1 P 25:286:00000 25:291:86370 UNE   0.0770   0.0000   0.0000
ELGE  A    1 P 25:285:00000 25:291:86370 UNE   0.0000   0.0000   0.0000
GERN  A    1 P 25:285:00000 25:291:86370 UNE   0.0771   0.0000   0.0000
HOND  A    1 P 25:285:00000 25:291:86370 UNE   0.0771   0.0000   0.0000
IGEL  A    1 P 25:285:00000 25:291:86370 UNE   0.0000   0.0000   0.0000
ISPS  A    1 P 25:285:00000 25:291:86370 UNE   0.0350   0.0000   0.0000
LARE  A    1 P 25:290:00000 25:291:86370 UNE   0.0000   0.0000   0.0000
LAZK  A    1 P 25:285:00000 25:291:86370 UNE   0.0000   0.0000   0.0000
LEIT  A    1 P 25:285:00000 25:291:86370 UNE   0.0000   0.0000   0.0000
PAS2  A    1 P 25:285:00000 25:291:86370 UNE   0.0000   0.0000   0.0000
PASA  A    1 P 25:285:00000 25:291:86370 UNE   0.0000   0.0000   0.0000
RIO1  A    1 P 25:285:00000 25:291:86370 UNE   0.0606   0.0000   0.0000
SALA  A    1 P 25:285:00000 25:291:86370 UNE   0.0600   0.0000   0.0000
SCOA  A    1 P 25:285:00000 25:291:86370 UNE   0.0000   0.0000   0.0000
SOPU  A    1 P 25:285:00000 25:291:86370 UNE   0.0771   0.0000   0.0000
TERU  A    1 P 25:285:00000 25:291:86370 UNE   0.0600   0.0000   0.0000
YEBE  A    1 P 25:285:00000 25:291:86370 UNE   0.0600   0.0000   0.0000
ZARA  A    1 P 25:285:00000 25:291:86370 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:

```
2025-11-02 03:18 UTC | BIDA2850.25O | RECEIVER TYPE       |  LEICA GR30 -> LEICA GR10 (source: bida_20200626.log
2025-11-02 03:18 UTC | BIDA2850.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.52/6.525 (source: bida_20200626.log
2025-11-02 06:29 UTC | BIDA2860.25O | RECEIVER TYPE       |  LEICA GR30 -> LEICA GR10 (source: bida_20200626.log
2025-11-02 06:29 UTC | BIDA2860.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.52/6.525 (source: bida_20200626.log
2025-11-02 09:33 UTC | BIDA2870.25O | RECEIVER TYPE       |  LEICA GR30 -> LEICA GR10 (source: bida_20200626.log
2025-11-02 09:33 UTC | BIDA2870.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.52/6.525 (source: bida_20200626.log
2025-11-02 13:18 UTC | BIDA2880.25O | RECEIVER TYPE       |  LEICA GR30 -> LEICA GR10 (source: bida_20200626.log
2025-11-02 13:18 UTC | BIDA2880.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.52/6.525 (source: bida_20200626.log
2025-11-02 20:22 UTC | BIDA2890.25O | RECEIVER TYPE       |  LEICA GR30 -> LEICA GR10 (source: bida_20200626.log
2025-11-02 20:22 UTC | BIDA2890.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.52/6.525 (source: bida_20200626.log
2025-11-03 01:35 UTC | BIDA2900.25O | RECEIVER TYPE       |  LEICA GR30 -> LEICA GR10 (source: bida_20200626.log
2025-11-03 01:35 UTC | BIDA2900.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.52/6.525 (source: bida_20200626.log
2025-11-02 16:27 UTC | BIDA2910.25O | RECEIVER TYPE       |  LEICA GR30 -> LEICA GR10 (source: bida_20200626.log
2025-11-02 16:27 UTC | BIDA2910.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.52/6.525 (source: bida_20200626.log
2025-11-02 03:18 UTC | BRZR2850.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.80/7.900 (source: brzr00esp_20240315.log
2025-11-02 06:29 UTC | BRZR2860.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.80/7.900 (source: brzr00esp_20240315.log
2025-11-02 09:33 UTC | BRZR2870.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.80/7.900 (source: brzr00esp_20240315.log
2025-11-02 13:18 UTC | BRZR2880.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.80/7.900 (source: brzr00esp_20240315.log
2025-11-02 20:22 UTC | BRZR2890.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.80/7.900 (source: brzr00esp_20240315.log
2025-11-03 01:35 UTC | BRZR2900.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.80/7.900 (source: brzr00esp_20240315.log
2025-11-02 16:27 UTC | BRZR2910.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.80/7.900 (source: brzr00esp_20240315.log
2025-11-03 01:35 UTC | CANT2900.25O | RECEIVER TYPE       |  LEICA GR10 -> LEICA GR50 (source: cant00esp_20250509.log
2025-11-03 01:35 UTC | CANT2900.25O | RECEIVER FIRM. VERS. |  4.00/6.713 -> 4.80/7.900 (source: cant00esp_20250509.log
2025-11-02 16:27 UTC | CANT2910.25O | RECEIVER TYPE       |  LEICA GR10 -> LEICA GR50 (source: cant00esp_20250509.log
2025-11-02 16:27 UTC | CANT2910.25O | RECEIVER FIRM. VERS. |  4.00/6.713 -> 4.80/7.900 (source: cant00esp_20250509.log
2025-11-02 03:18 UTC | ISPS2850.25O | ANTENNA SER. NO.     |   -> 24238009 (source: isps00esp_20250114.log
2025-11-02 06:29 UTC | ISPS2860.25O | ANTENNA SER. NO.     |   -> 24238009 (source: isps00esp_20250114.log
2025-11-02 09:33 UTC | ISPS2870.25O | ANTENNA SER. NO.     |   -> 24238009 (source: isps00esp_20250114.log
2025-11-02 13:18 UTC | ISPS2880.25O | ANTENNA SER. NO.     |   -> 24238009 (source: isps00esp_20250114.log
2025-11-02 20:22 UTC | ISPS2890.25O | ANTENNA SER. NO.     |   -> 24238009 (source: isps00esp_20250114.log
2025-11-03 01:35 UTC | ISPS2900.25O | ANTENNA SER. NO.     |   -> 24238009 (source: isps00esp_20250114.log
2025-11-02 16:27 UTC | ISPS2910.25O | ANTENNA SER. NO.     |   -> 24238009 (source: isps00esp_20250114.log
2025-11-02 03:18 UTC | LEIT2850.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.83.342 (source: leit00esp_20250924.log
2025-11-02 06:29 UTC | LEIT2860.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.83.342 (source: leit00esp_20250924.log
2025-11-02 09:33 UTC | LEIT2870.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.83.342 (source: leit00esp_20250924.log
2025-11-02 13:18 UTC | LEIT2880.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.83.342 (source: leit00esp_20250924.log
2025-11-02 20:22 UTC | LEIT2890.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.83.342 (source: leit00esp_20250924.log
2025-11-03 01:35 UTC | LEIT2900.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.83.342 (source: leit00esp_20250924.log
2025-11-02 16:27 UTC | LEIT2910.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.83.342 (source: leit00esp_20250924.log
2025-11-02 03:18 UTC | PASA2850.25O | RECEIVER FIRM. VERS. |  4.83/7.900 -> 4.80/7.900 (source: pasa00esp_20240418.log
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9 References

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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

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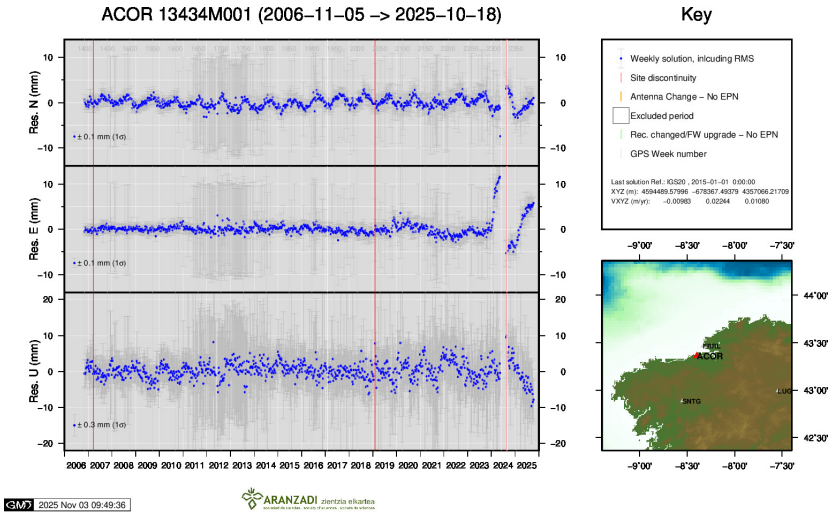
10 Cumulative Time Series

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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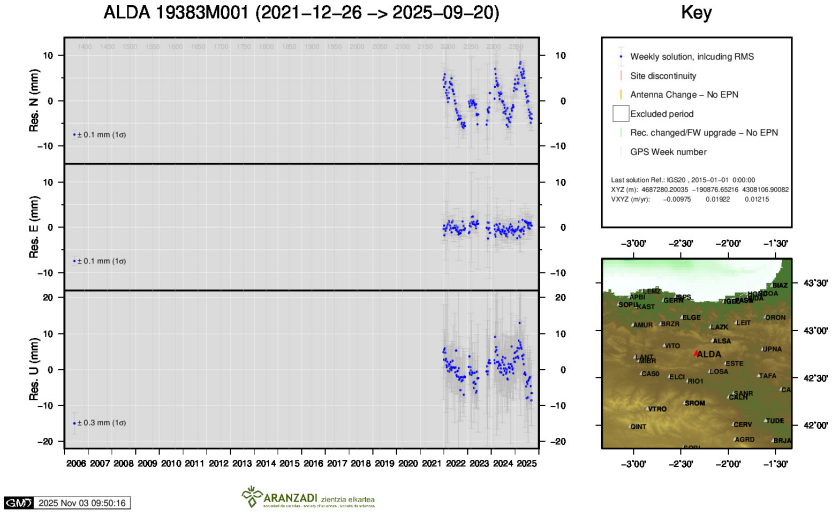

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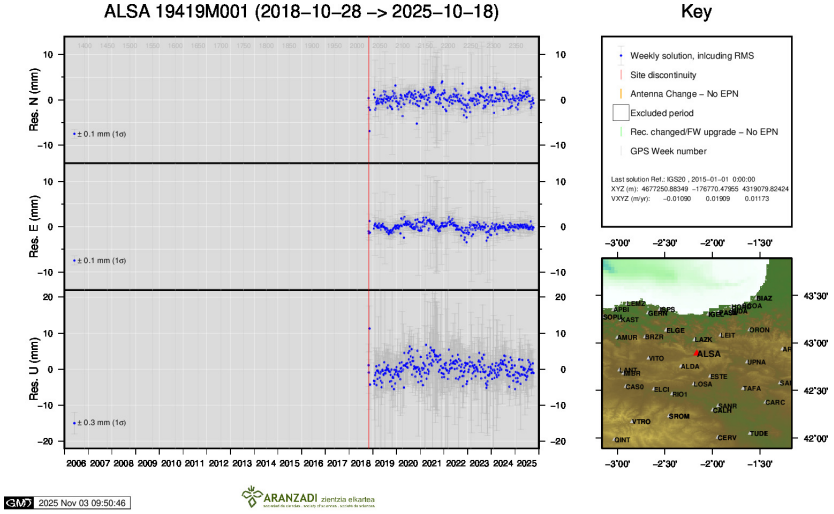

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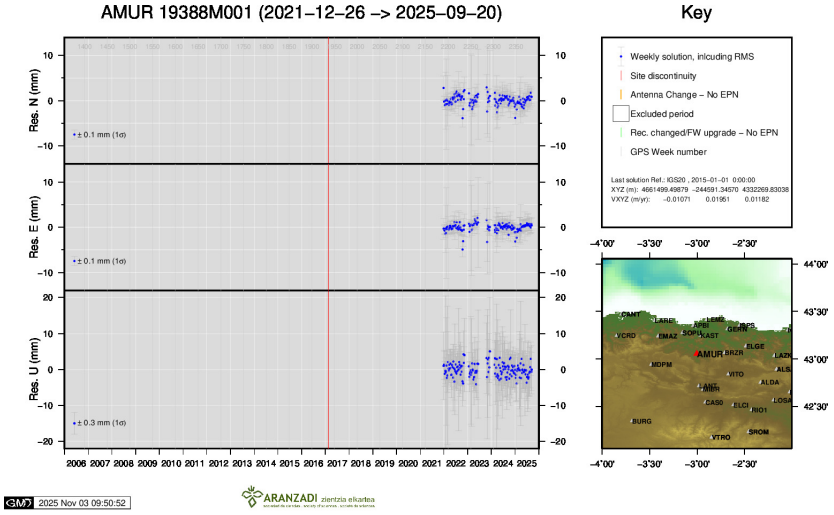

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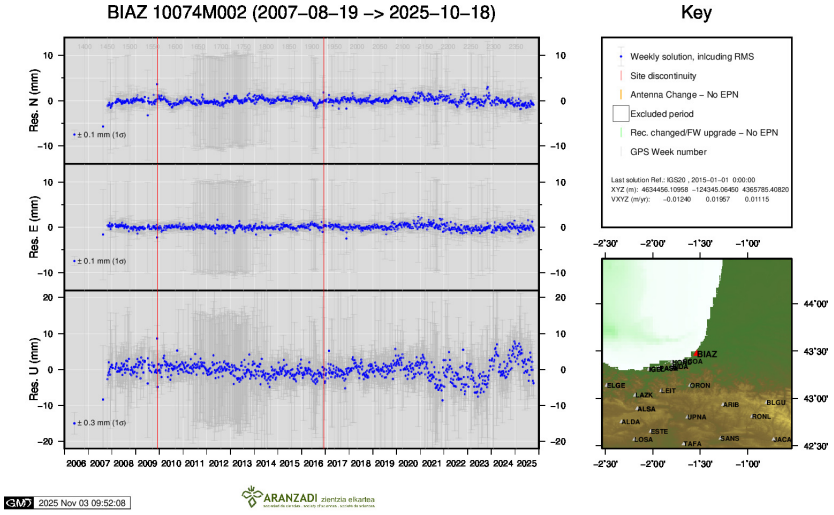

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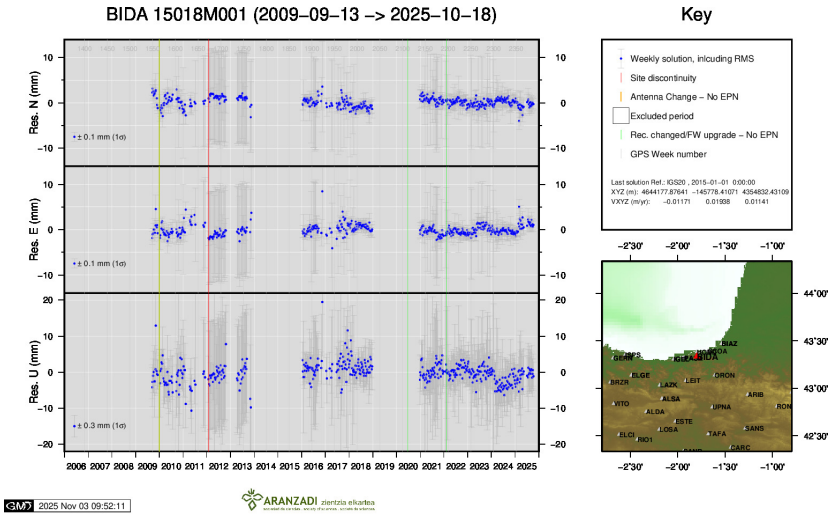

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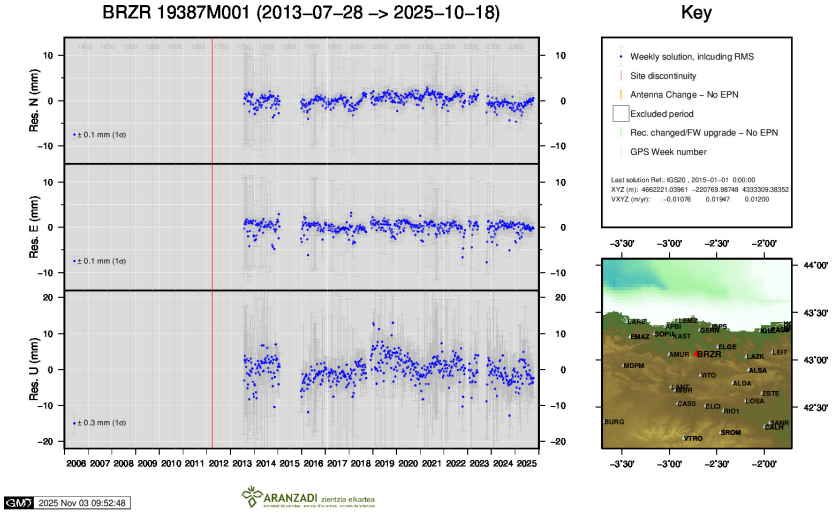

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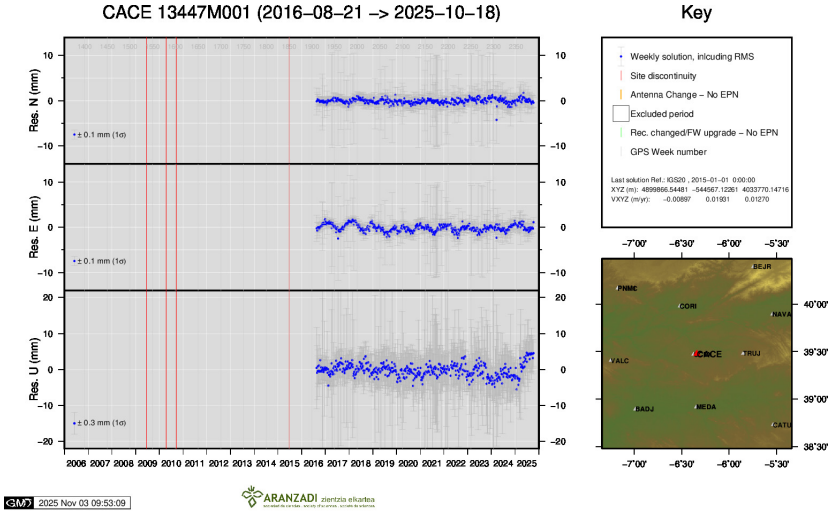

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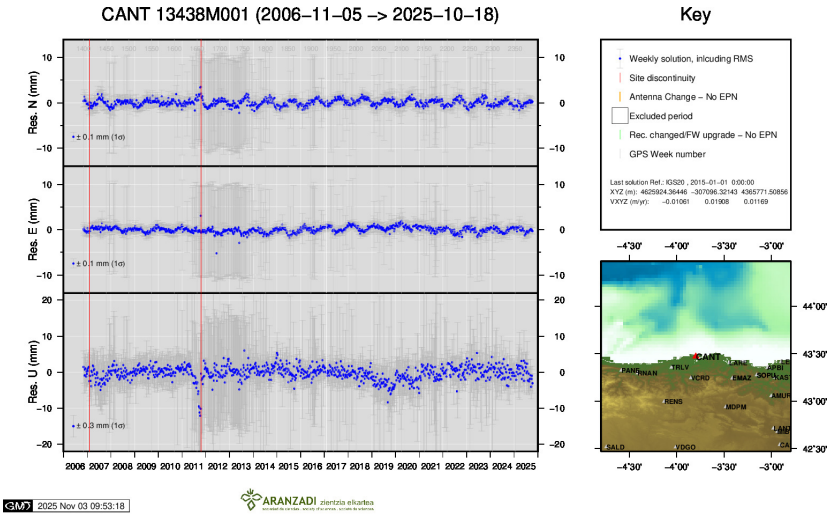

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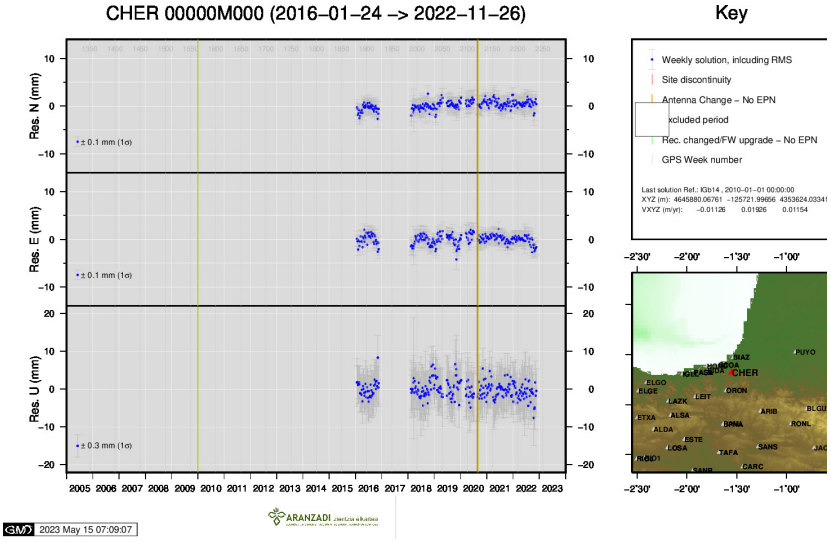

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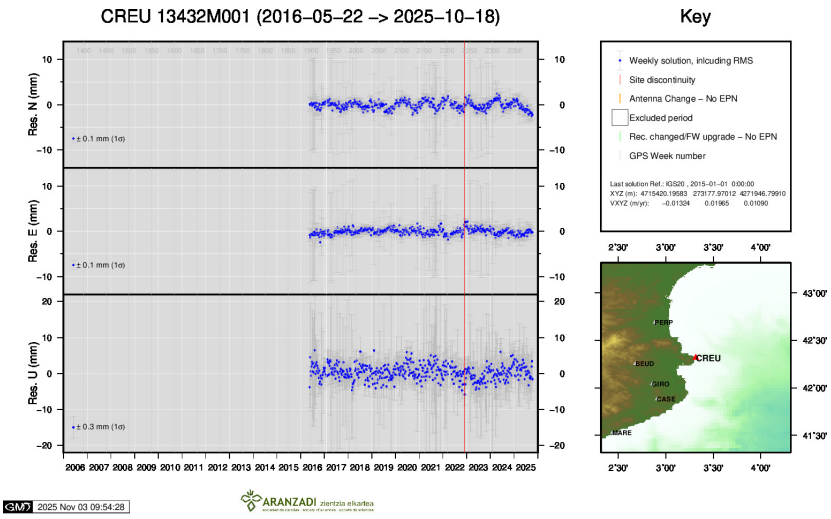

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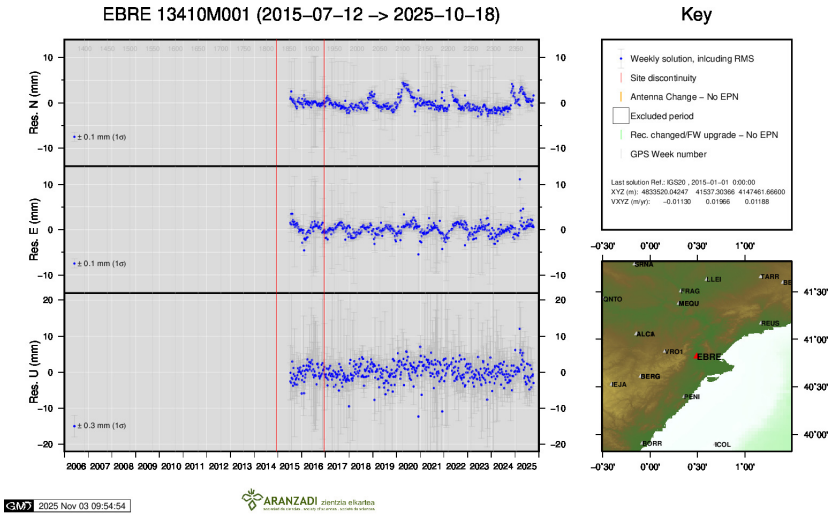

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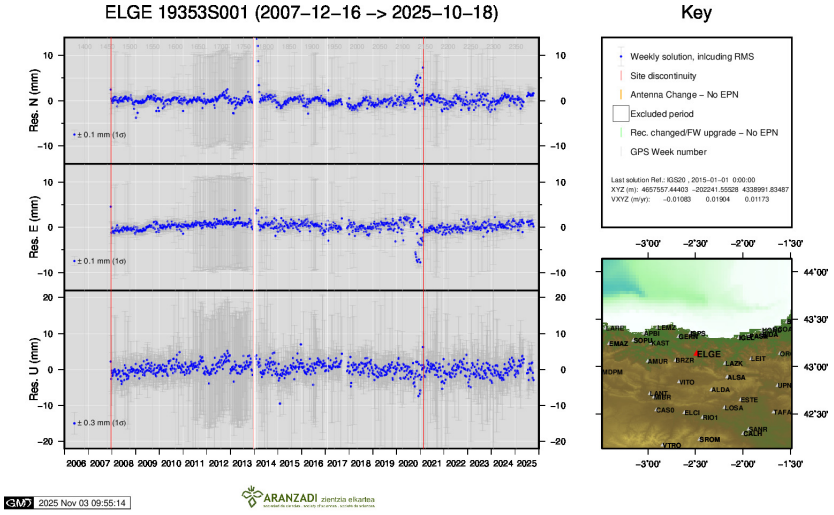

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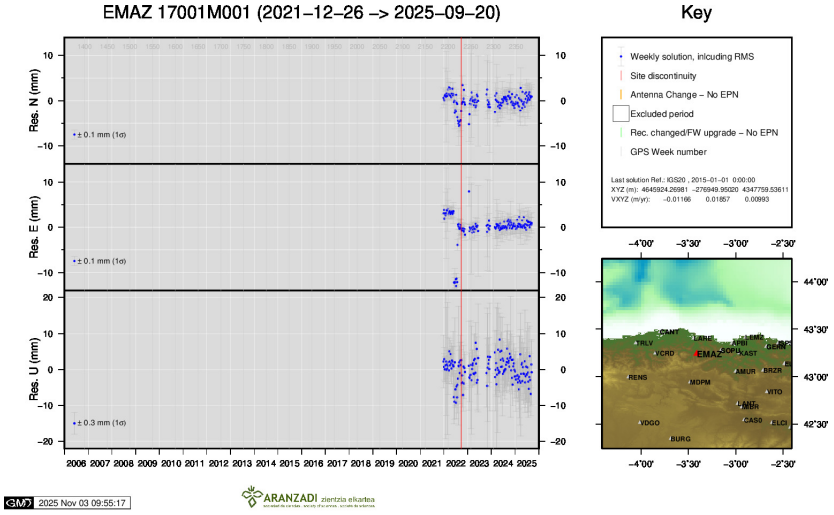

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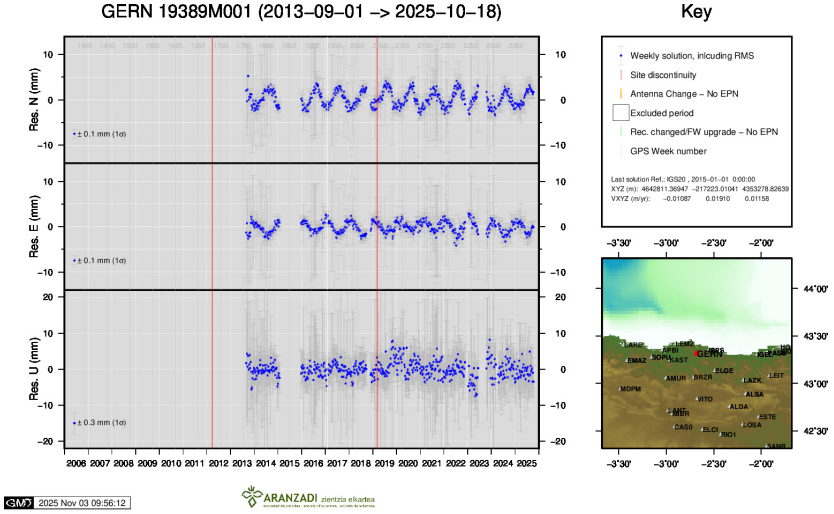

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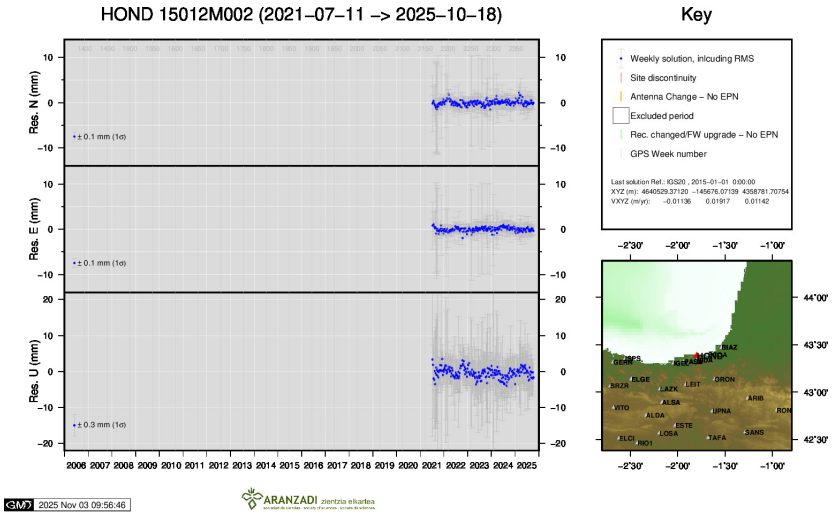

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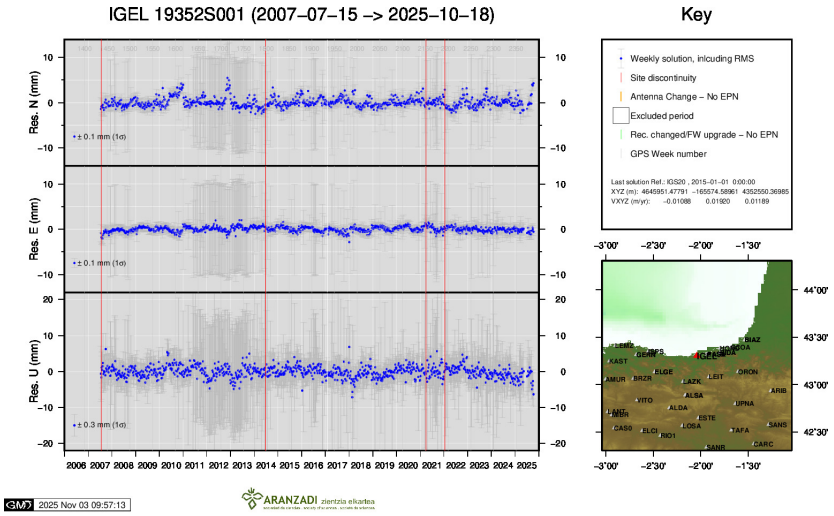

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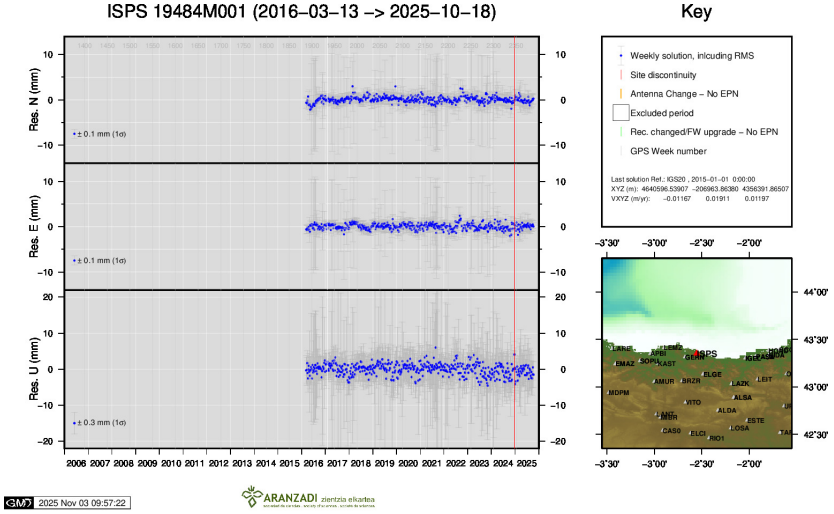

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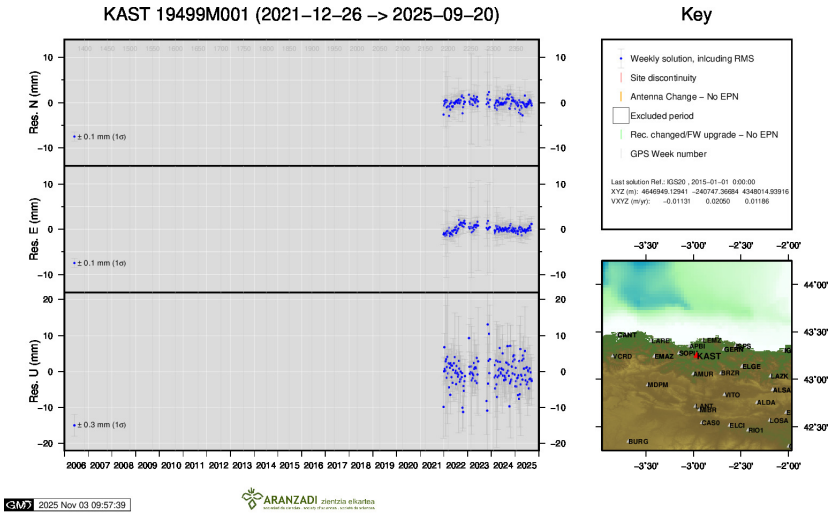

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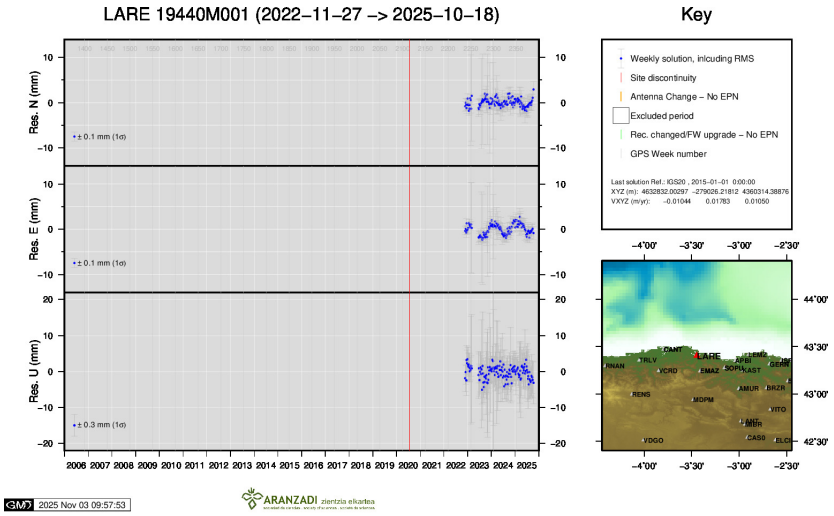

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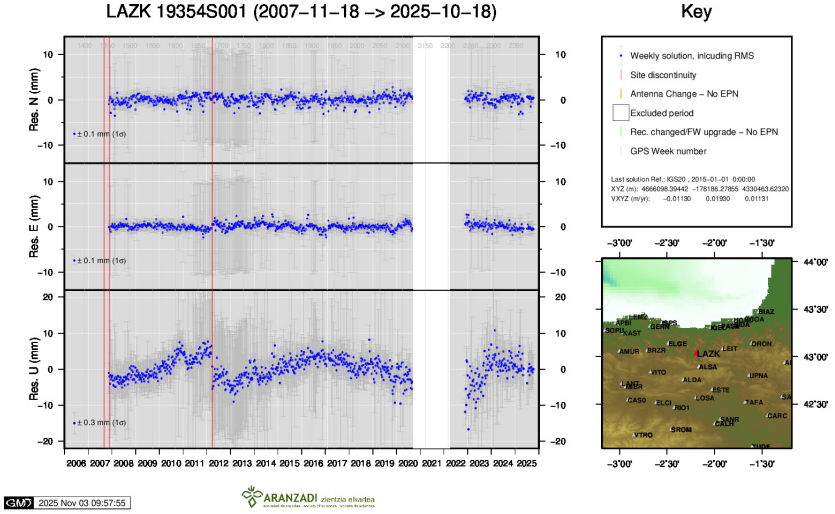

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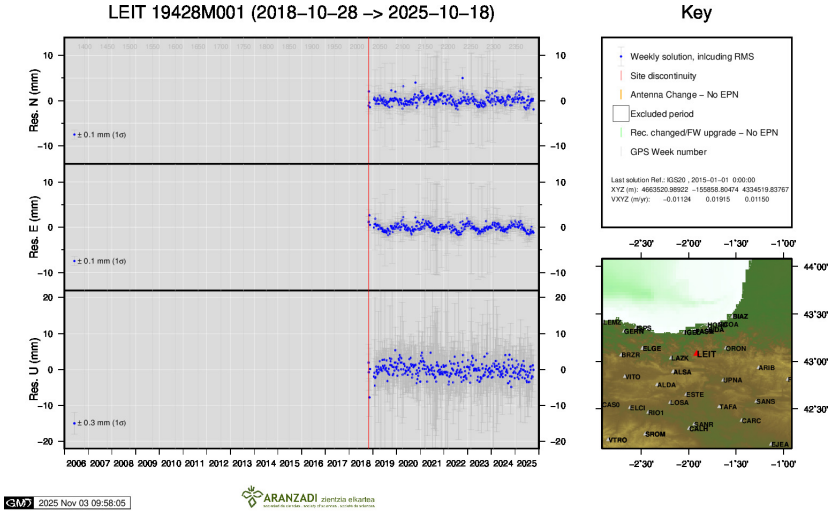

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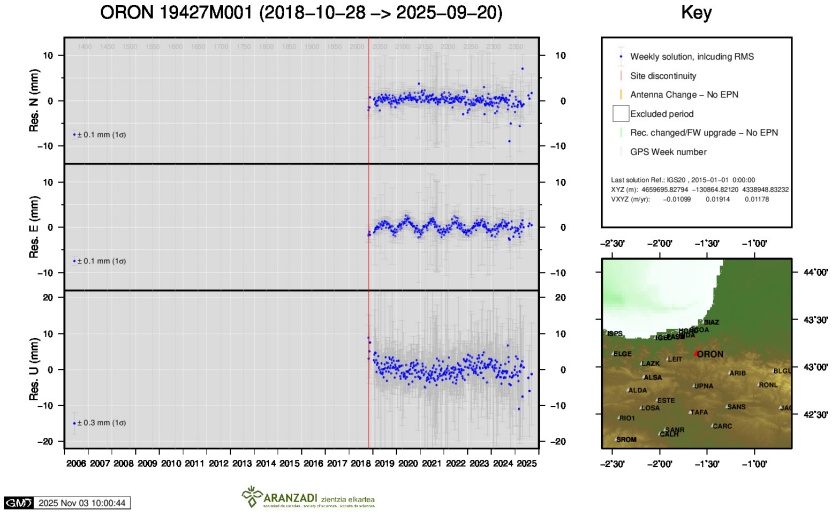

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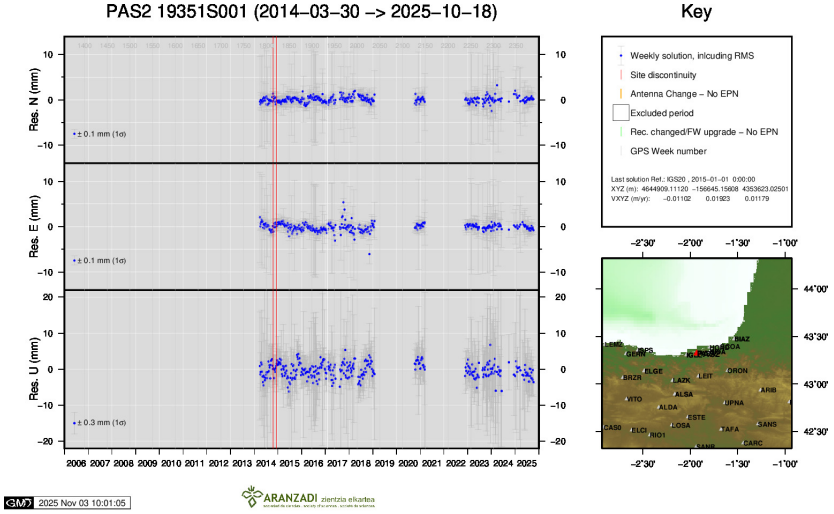

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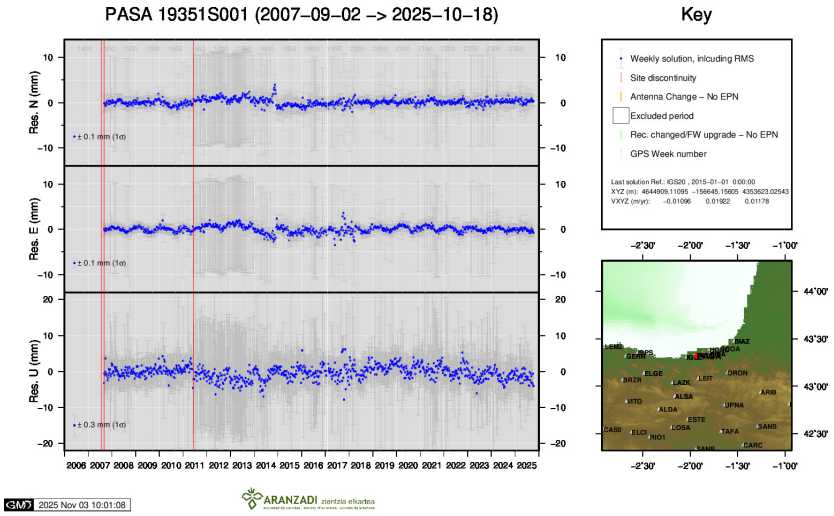

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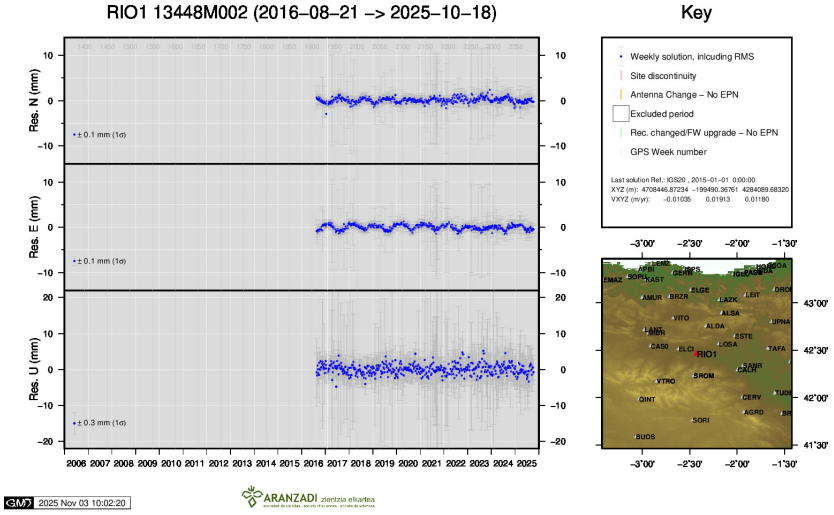

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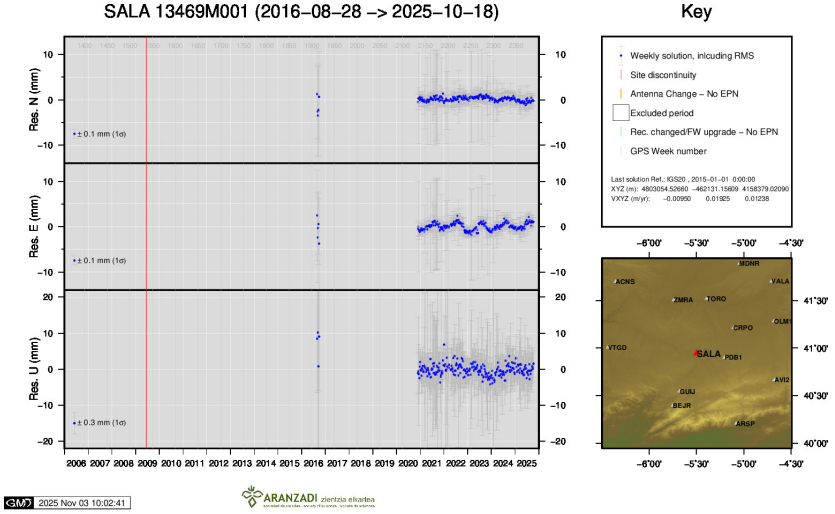

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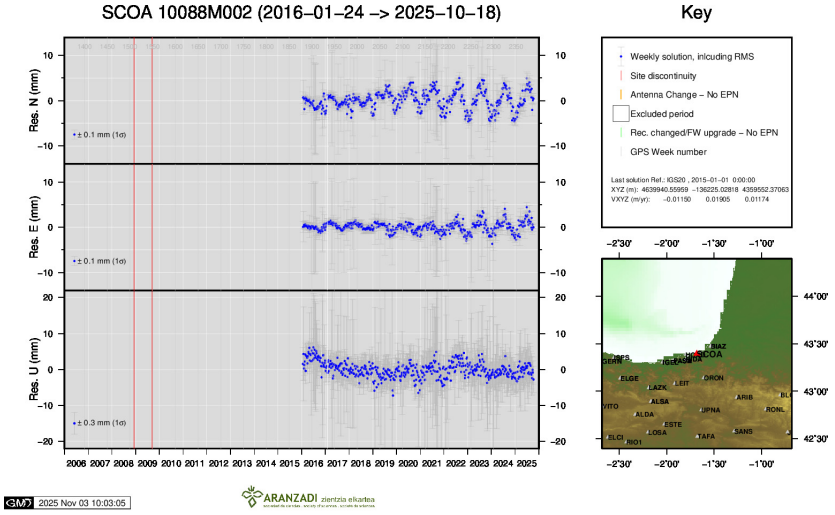

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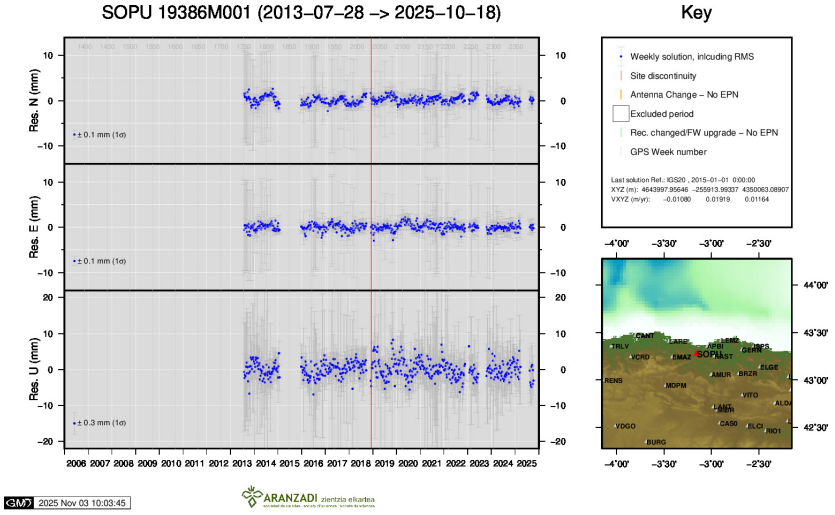

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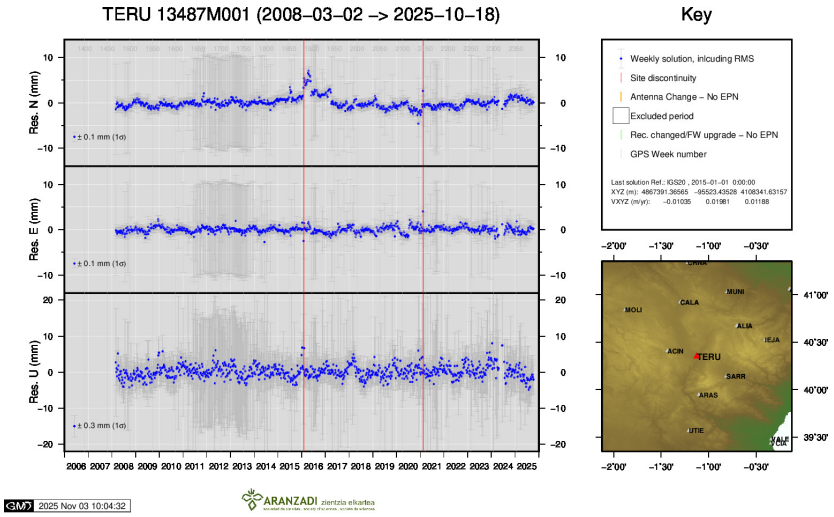

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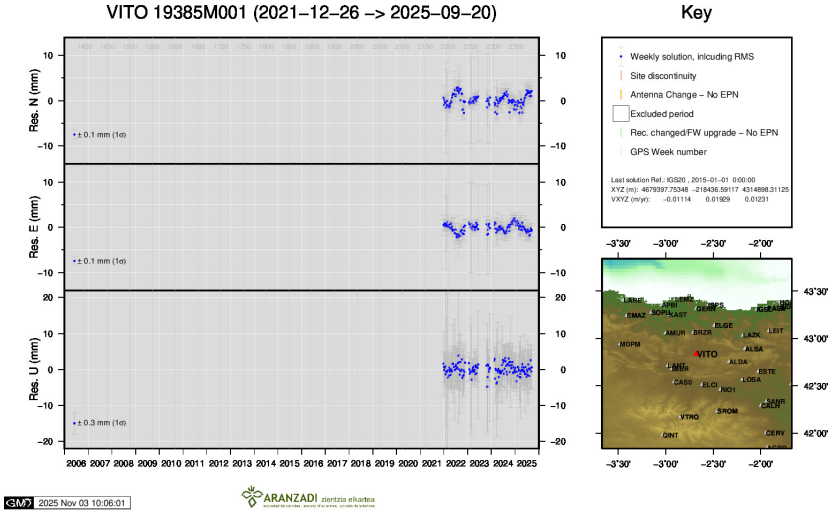

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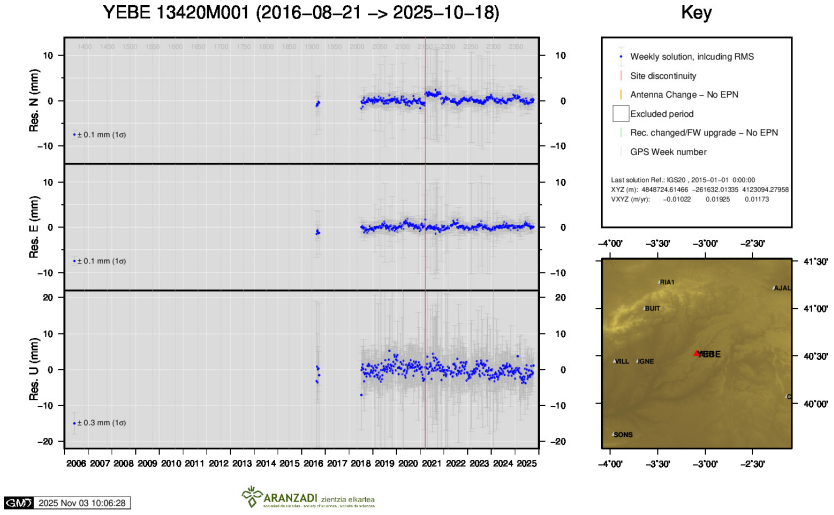

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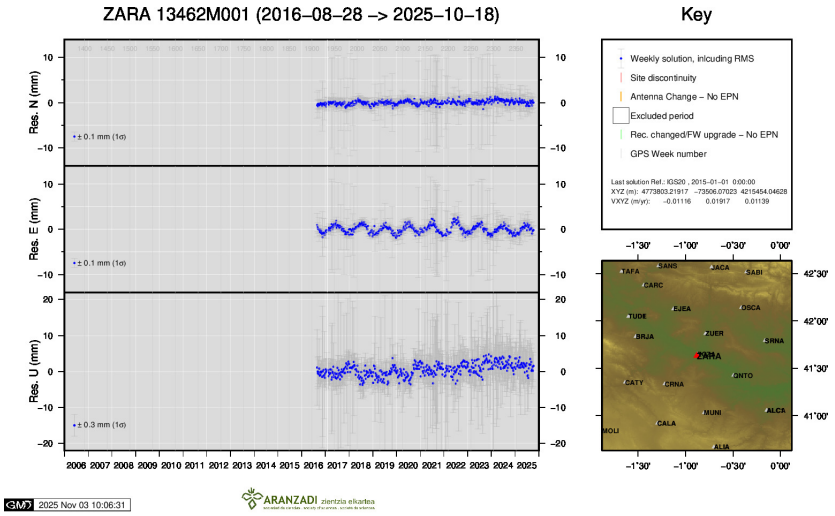
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33) ZARA