

ARA-DAC Weekly Analysis Result: 2225 (GFA)

Technical Report

GPS Week: 2225 (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

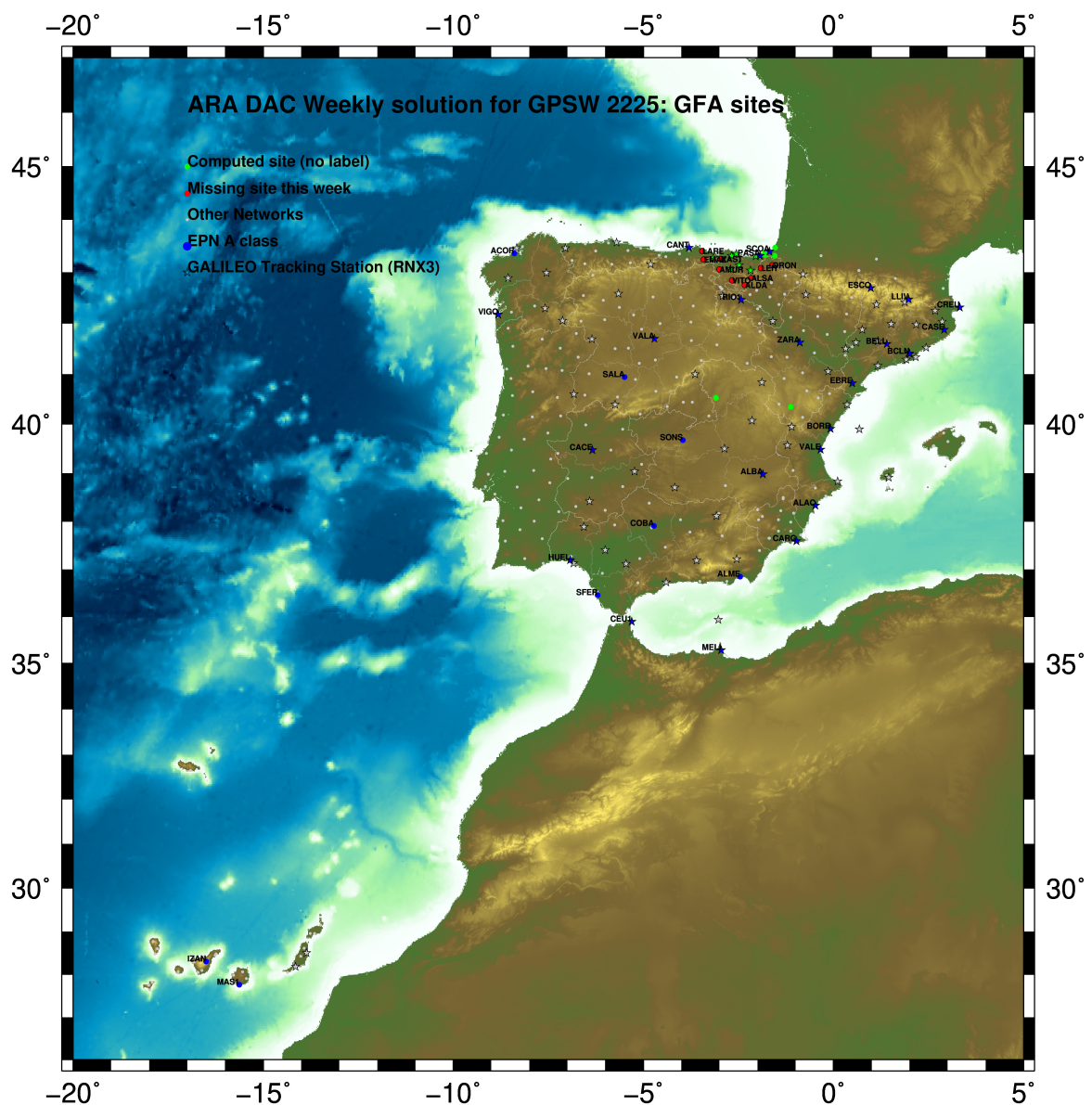


Fig.1: Computed Sites for GPS Week2225 (GFA)

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 also used if available from GPSW 1986 on)
- 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.I14 file and individual calibrations from EPNC_14.ATX. EPN_A class sites (CRD + VEL) IGB14 used to define the reference frame (from GPSW 1934). If individual calibrations, other from these, are available, they are also included in the analysis.
- Troposphere:
 - 3 deg elev. cutoff; elevation dependent weighting
 - VMF1 mapping function. ZPD parameters are estimated using the VMF1 mapping function.
 - CHENHER gradient estimation model.
- Ionosphere: no a priori model, ionospheric effect almost removed by iono free combination.
- Ocean Loading: FES2004 (Scherneck).
- Atmosph. Loading: computed from a global grid using the GRDS1S2 program of Bernese 5.2.

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. DE405 planetary ephemeris and JGM3 Earth geopotential model is used.
- Tidal displacements: according to IERS2010 Conventions. Atmospheric loading corrections used.

- Ambiguity: an advanced ambiguity resolution (AR) scheme is included:
 - Code-Based Widelane (WL) 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 IGb14

The Reference Frame considered in this section is IGb14, release C2130.

ARA LAC 2225 WEEK FINAL COMBINATION: PRECISE ORBITS					18-SEP-22 18:34
LOCAL GEODETIC DATUM: IGb14					EPOCH: 2022-08-31 12:00:00
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
4	ACOR 13434M001	4594489.52299	-678367.37549	4357066.32016	W
100	BLAZ 10074M002	4634456.00796	-124344.91562	4365785.49311	A
101	BIDA 00000M000	4644177.78204	-145778.26256	4354832.52293	A
113	BRZR 19387M001	4662220.95300	-220769.83740	4333309.48187	A
104	CACE 13447M001	4899866.46994	-544566.97646	4033770.24383	W
116	CANT 13438M001	4625924.27674	-307096.17473	4365771.59667	W
154	CHER 00000M000	4645879.98278	-125721.84958	4353624.12428	A
162	CREU 13432M001	4715420.08709	273178.12195	4271946.87934	W
204	EBRE 13410M001	4833519.95134	41537.45651	4147461.75522	W
180	ELGE 19353S001	4657557.35624	-202241.40943	4338991.92717	A
209	GERN 19389M001	4642811.27859	-217222.86514	4353278.91994	A
257	HOND 15012M002	4640529.27117	-145676.92255	4358781.78897	A
235	IGEL 19352S001	4645951.38482	-165574.44274	4352550.45824	A
240	ISPS 19484M001	4640596.43988	-206963.71561	4356391.95273	A
256	LAZK 19354S001	4666098.30120	-178186.12957	4330463.71068	A
345	PAS2 19351S001	4644909.01815	-156645.00801	4353623.11454	A
493	PASA 19351S001	4644909.01857	-156645.00804	4353623.11482	W
553	RI01 13448M002	4708446.79004	-199490.22431	4284089.77770	W
558	SALA 13469M001	4803054.45107	-462131.00877	4158379.12057	W
566	SC0A 10088M002	4639940.45850	-136224.87967	4359552.46132	W
418	SOPU 19386M001	4643997.86782	-255913.84630	4350063.18109	A
443	TERU 13487M001	4867391.27492	-95523.28232	4108341.71629	A
752	YEBE 13420M001	4848724.52525	-261631.86555	4123094.36481	A
755	ZARA 13462M001	4773803.12807	-73505.92236	4215454.13455	W

5.2 ETRF2000 (ETRS89) Coordinates

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

ETRF2000 FINAL COORD. wk 2225					18-SEP-22 18:34
LOCAL GEODETIC DATUM: ETRF2000					EPOCH: 2022-08-31 12:00:00
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
4	ACOR 13434M001	4594489.85587	-678367.97593	4357065.86088	W
100	BLAZ 10074M002	4634456.41330	-124345.51940	4365785.03799	A
101	BIDA 00000M000	4644178.18376	-145778.86752	4354832.06671	A
113	BRZR 19387M001	4662221.34337	-220770.44467	4333309.02314	A
104	CACE 13447M001	4899866.79533	-544567.61163	4033769.76076	W
116	CANT 13438M001	4625924.65842	-307096.77804	4365771.13982	W
154	CHER 00000M000	4645880.38700	-125722.45468	4353623.66819	A
162	CREU 13432M001	4715420.53659	273177.51035	4271946.42267	W
204	EBRE 13410M001	4833520.36136	41536.83047	4147461.28561	W
180	ELGE 19353S001	4657557.74944	-202242.01611	4338991.46908	A
209	GERN 19389M001	4642811.67095	-217223.47016	4353278.46288	A
257	HOND 15012M002	4640529.67321	-145676.52709	4358781.33306	A
235	IGEL 19352S001	4645951.78381	-165575.04797	4352550.00161	A
240	ISPS 19484M001	4640596.83381	-206964.32035	4356391.49599	A
256	LAZK 19354S001	4666098.69686	-178186.73716	4330463.25219	A
345	PAS2 19351S001	4644909.41837	-156645.61309	4353622.65811	A
493	PASA 19351S001	4644909.41879	-156645.61312	4353622.65839	W
553	RI01 13448M002	4708447.17939	-199490.83683	4284089.31538	W
558	SALA 13469M001	4803054.79675	-462131.63278	4158378.64677	W
566	SC0A 10088M002	4639940.86182	-136225.48411	4359552.00558	W
418	SOPU 19386M001	4643998.25492	-255914.45156	4350062.72341	A
443	TERU 13487M001	4867391.66421	-95523.91270	4108341.24202	A
752	YEBE 13420M001	4848724.89418	-261632.49430	4123093.88989	A
755	ZARA 13462M001	4773803.52844	-73506.54198	4215453.66843	W

5.3 ETRF2014 (ETRS89) Coordinates

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

ETRF2014 FINAL COORD. wk 2225					18-SEP-22 18:34
LOCAL GEODETIC DATUM: ETRF2014					EPOCH: 2022-08-31 12:00:00
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG

4	ACOR	13434M001	4594489.81535	-678368.01336	4357065.91255	W
100	BIAZ	10074M002	4634456.37071	-124345.55863	4365785.08972	A
101	BIDA	00000M000	4644178.14115	-145778.90664	4354832.11840	A
113	BRZR	19387M001	4662221.30082	-220770.48345	4333309.07474	A
104	CACE	13447M001	4899866.75110	-544567.64822	4033769.81161	W
116	CANT	13438M001	4625924.61652	-307096.81667	4365771.19149	W
154	CHER	00000M000	4645880.34430	-125722.49386	4353623.71988	A
162	CREU	13432M001	4715420.49167	273177.47006	4271946.47445	W
204	EBRE	13410M001	4833520.31601	41536.79151	4147461.33688	W
180	ELGE	19353S001	4657557.70688	-202242.05498	4338991.52070	A
209	GERN	19389M001	4642811.62858	-217223.05903	4353278.51454	A
257	HOND	15012M002	4640529.63063	-145676.56623	4358781.38476	A
235	IGEL	19352S001	4645951.74124	-165575.08702	4352550.05329	A
240	ISPS	19484M001	4640596.79143	-206964.35927	4356391.54767	A
256	LAZK	19354S001	4666098.65412	-178186.77607	4330463.30380	A
345	PAS2	19351S001	4644909.37578	-156645.65217	4353622.70980	A
493	PASA	19351S001	4644909.37620	-156645.65220	4353622.71008	W
553	RI01	13448M002	4708447.13626	-199490.87549	4284089.36686	W
558	SALA	13469M001	4803054.75339	-462131.67010	4158378.69789	W
566	SC0A	10088M002	4639940.81921	-136225.52329	4359552.05729	W
418	SOPU	19386M001	4643998.21267	-255914.49030	4350062.77505	A
443	TERU	13487M001	4867391.61898	-95523.95104	4108341.29312	A
752	YEBE	13420M001	4848724.84971	-261632.53213	4123093.94095	A
755	ZARA	13462M001	4773803.48418	-73506.58080	4215453.71979	W

6 Quality Control

6.1 Mean and Daily Repeatabilities

In this section, the mean and daily repeatabilities of the sites are shown. Repeatabilities refer to the IGB14 solution and are given with respect to the Local frame (North-East-Up).

ARA LAC 2225 WEEK FINAL COMBINATION: PRECISE ORBITS 18-SEP-22 18:34

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	7	XXXXXX	2.00	0.31	3.29
BIAZ 10074M002	7	XXXXXX	1.67	0.98	5.28
BIDA 00000M000	7	XXXXXX	0.68	1.19	5.53
BRZR 19387M001	5	XXXX	0.91	1.02	4.07
CACE 13447M001	7	XXXXXX	1.02	1.14	2.56
CANT 13438M001	7	XXXXXX	0.93	0.61	4.39
CHER 00000M000	7	XXXXXX	0.47	1.21	3.13
CREU 13432M001	7	XXXXXX	1.78	0.81	5.12
EBRE 13410M001	3	X XX	3.27	1.19	3.94
ELGE 19353S001	7	XXXXXX	1.45	0.66	3.48
GERN 19389M001	7	XXXXXX	0.83	0.66	3.39
HOND 15012M002	7	XXXXXX	0.45	0.75	5.08
IGEL 19352S001	7	XXXXXX	1.40	0.76	2.26
ISPS 19484M001	7	XXXXXX	0.64	1.09	4.39
LAZK 19354S001	7	XXXXXX	0.74	1.24	4.88
PAS2 19351S001	7	XXXXXX	0.66	0.60	3.99
PASA 19351S001	7	XXXXXX	0.61	0.52	3.13
RI01 13448M002	7	XXXXXX	0.62	0.87	3.19
SALA 13469M001	7	XXXXXX	0.63	0.69	1.83
SCOA 10088M002	6	XXXXX	2.22	2.10	6.29
SOPU 19386M001	7	XXXXXX	1.67	0.73	5.12
TERU 13487M001	7	XXXXXX	1.46	1.11	4.08
YEBE 13420M001	7	XXXXXX	1.08	0.90	2.19
ZARA 13462M001	7	XXXXXX	0.70	0.93	3.78

Comparison of individual solutions:

ACOR 13434M001	N	2.00	0.66	3.88	-1.13	-0.56	-1.02	-1.56	1.83
ACOR 13434M001	E	0.31	-0.04	-0.18	0.47	0.26	0.19	0.42	-0.13
ACOR 13434M001	U	3.29	-2.62	5.79	2.80	-2.37	0.62	3.23	-0.37
BIAZ 10074M002	N	1.67	-1.12	2.74	-2.05	-0.36	-0.81	0.83	1.53
BIAZ 10074M002	E	0.98	0.69	-1.41	-0.39	0.42	-0.79	1.52	0.08
BIAZ 10074M002	U	5.28	7.12	-7.52	3.75	2.65	5.69	-2.39	0.87
BIDA 00000M000	N	0.68	-0.70	0.40	-0.61	0.43	-1.05	0.49	-0.50
BIDA 00000M000	E	1.19	1.50	0.03	-1.56	-0.36	0.36	-0.39	-1.86
BIDA 00000M000	U	5.53	-5.05	-2.22	5.19	2.79	7.61	-7.66	1.33
BRZR 19387M001	N	0.91			1.34	-1.12	-0.53	-0.01	0.05
BRZR 19387M001	E	1.02			-0.02	1.59	-0.59	-0.99	0.53
BRZR 19387M001	U	4.07			1.15	6.36	-4.01	-1.68	-2.40
CACE 13447M001	N	1.02	-1.28	-0.10	1.12	0.82	-0.06	-1.55	0.59
CACE 13447M001	E	1.14	-1.15	-1.44	1.10	1.13	0.05	1.33	-0.25
CACE 13447M001	U	2.56	2.24	-0.19	-4.60	0.58	-0.14	-2.23	2.81
CANT 13438M001	N	0.93	-0.53	1.88	0.27	-0.98	0.31	0.46	-0.05
CANT 13438M001	E	0.61	0.71	1.29	-0.06	0.05	-0.17	-0.17	-0.03
CANT 13438M001	U	4.39	-1.36	-6.73	-1.89	3.28	6.53	3.37	-0.11
CHER 00000M000	N	0.47	-0.43	0.29	-0.46	0.39	0.20	-0.41	0.69
CHER 00000M000	E	1.21	1.32	-2.45	-0.26	0.98	0.09	0.18	-0.22
CHER 00000M000	U	3.13	-0.12	-2.01	6.31	0.18	3.34	0.42	1.89
CREU 13432M001	N	1.78	-1.78	-1.51	-1.70	0.71	0.69	3.10	0.16
CREU 13432M001	E	0.81	-0.59	0.96	-0.25	0.15	-0.56	-1.40	0.55
CREU 13432M001	U	5.12	-0.49	-2.41	6.16	-4.66	7.50	-5.53	-2.17
EBRE 13410M001	N	3.27			-2.59			3.10	-2.25
EBRE 13410M001	E	1.19			-0.07			-1.25	1.13
EBRE 13410M001	U	3.94			0.52			0.09	-5.54
ELGE 19353S001	N	1.45	2.15	1.63	0.45	-1.89	-0.28	-1.02	0.71
ELGE 19353S001	E	0.66	1.09	0.17	-0.40	0.76	0.55	0.25	-0.55
ELGE 19353S001	U	3.48	2.82	-7.29	-0.87	-0.47	-1.62	2.09	1.91
GERN 19389M001	N	0.83	-0.57	1.48	0.78	-0.83	-0.01	0.40	0.43
GERN 19389M001	E	0.66	1.04	0.56	-0.13	0.28	-1.01	0.22	0.24
GERN 19389M001	U	3.39	-4.12	-1.93	1.75	4.76	-1.34	4.34	1.43
HOND 15012M002	N	0.45	0.17	0.23	0.14	-0.10	0.76	-0.35	0.62
HOND 15012M002	E	0.75	0.07	1.78	-0.28	-0.10	0.22	0.23	0.09
HOND 15012M002	U	5.08	7.97	-9.21	-1.35	0.34	0.84	-1.88	-0.65
IGEL 19352S001	N	1.40	0.17	3.26	0.09	-0.39	0.01	-0.94	-0.24
IGEL 19352S001	E	0.76	0.72	0.87	-0.87	1.06	-0.12	-0.16	0.52
IGEL 19352S001	U	2.26	1.99	-3.47	-2.03	2.87	-0.60	-0.78	-1.15
ISPS 19484M001	N	0.64	-0.26	1.15	0.12	-0.21	0.49	-0.40	0.80
ISPS 19484M001	E	1.09	-0.93	1.55	-1.05	0.81	-0.59	0.10	1.32
ISPS 19484M001	U	4.39	-1.51	-5.59	-2.80	5.76	0.50	2.05	6.06
LAZK 19354S001	N	0.74	1.14	0.04	0.23	-0.62	-0.24	-0.03	1.22
LAZK 19354S001	E	1.24	0.21	2.85	-0.12	0.25	-0.86	-0.43	0.13
LAZK 19354S001	U	4.88	3.19	-4.63	0.26	-6.15	4.81	-5.67	4.29
PAS2 19351S001	N	0.66	-0.61	1.28	0.44	0.54	0.12	-0.25	0.10
PAS2 19351S001	E	0.60	0.79	0.96	-0.04	-0.31	-0.23	0.62	0.26
PAS2 19351S001	U	3.99	1.56	-6.98	-2.88	2.79	-2.99	0.25	4.38
PASA 19351S001	N	0.61	-0.16	1.09	0.15	0.60	0.00	-0.63	0.45
PASA 19351S001	E	0.52	0.37	1.02	0.14	-0.11	-0.24	0.45	0.39
PASA 19351S001	U	3.13	2.43	-5.49	-1.46	1.75	-2.85	-0.88	2.94
RI01 13448M002	N	0.62	0.72	0.38	0.70	0.32	-0.75	-0.52	-0.44
RI01 13448M002	E	0.87	-0.17	-1.30	-0.04	1.60	0.30	-0.25	-0.31
RI01 13448M002	U	3.19	2.75	-5.52	-2.94	-2.45	1.15	0.97	2.48
SALA 13469M001	N	0.63	-0.65	0.18	0.94	-0.27	0.17	0.95	-0.20
SALA 13469M001	E	0.69	0.84	-1.25	-0.12	0.52	-0.20	-0.03	0.54
SALA 13469M001	U	1.83	-1.99	2.16	2.66	0.00	-1.33	-0.44	-1.56
SCOA 10088M002	N	2.22		-0.46	-1.26	3.01	0.64	-0.02	-3.64
SCOA 10088M002	E	2.10		-0.40	0.46	1.67	-0.25	-3.12	-3.04
SCOA 10088M002	U	6.29		0.86	5.51	5.05	2.96	-9.19	-6.92
SOPU 19386M001	N	1.67	0.21	3.73	-0.13	-1.37	-0.89	0.44	0.04
SOPU 19386M001	E	0.73	0.80	-0.23	0.75	-0.89	-0.36	0.07	1.00
SOPU 19386M001	U	5.12	5.50	-10.13	2.34	2.08	0.02	2.94	2.53
TERU 13487M001	N	1.46	1.46	-0.97	-2.06	0.80	-0.58	2.07	-0.42
TERU 13487M001	E	1.11	0.54	0.14	-1.87	0.74	-0.67	-1.60	-0.21
TERU 13487M001	U	4.08	4.00	8.21	0.75	-1.97	0.57	-1.68	-2.96
YEBE 13420M001	N	1.08	0.36	2.18	-1.03	0.48	-0.07	-0.05	-0.94

YEBE	13420M001	E	0.90	-1.16	-0.38	-0.60	0.90	0.16	1.46	0.03
YEBE	13420M001	U	2.19	2.68	-2.18	-2.94	1.90	-1.83	0.99	-0.40
ZARA	13462M001	N	0.70	0.46	-0.54	0.89	0.27	-0.03	-0.97	-0.79
ZARA	13462M001	E	0.93	1.08	-1.08	1.12	-0.49	0.64	0.37	-0.91
ZARA	13462M001	U	3.78	-4.79	-1.11	-1.89	6.55	-0.66	1.81	-3.33

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.

LOCAL GEODETIC DATUM: IGB14
RESIDUALS IN LOCAL SYSTEM (NORTH, EAST, UP)

NUM	NAME	FLG	RESIDUALS IN MILLIMETERS		
4	ACOR 13434M001	I W	-2.72	1.83	0.67
12	ALAC 13433M001	I W	1.06	-0.76	6.65
15	ALBA 13452M001	I W	2.08	-0.71	-2.93
21	ALME 13437M001	I W	-0.71	1.06	9.84
47	BCLN 13412M001	I W	0.44	-3.79	-3.61
52	BELL 13431M001	I W	0.04	0.68	3.48
71	BORR 13480M001	I W	1.26	-1.31	-2.63
76	BRST 10004M004	I W	-2.75	0.60	-3.78
104	CACE 13447M001	I W	1.00	2.31	4.71
116	CANT 13438M001	I W	-2.57	1.81	-3.93
117	CARG 19412M001	I W	2.23	0.86	-3.44
122	CASE 13494M001	I W	-2.18	0.06	1.05
128	CEU1 13449M002	I W	1.71	-2.44	-4.93
143	COBA 13453M001	I W	1.62	0.89	-3.55
162	CREU 13432M001	I W	-0.83	0.08	1.14
204	EBRE 13410M001	I W	-0.63	-2.79	-1.19
222	ESCO 13435M001	I W	-2.19	0.70	-5.85
299	HUEL 13451M001	I W	6.94	2.61	1.17
316	IZAN 31309M002	I W	-0.92	0.77	10.75
385	LLIV 13436M001	I W	2.11	0.09	0.53
421	MAS1 31303M002	I W	1.69	-0.83	5.98
432	MELI 19379M001	I W	4.69	-1.28	-1.27
493	PASA 19351S001	I W	-0.09	0.14	-1.41
553	RIO1 13448M002	I W	-2.73	1.16	-3.37
558	SALA 13469M001	I W	0.16	0.73	-6.09
566	SCOA 10088M002	I W	-7.65	-1.84	-9.56
574	SFER 13402M004	I W	3.21	-3.47	2.11
599	SONS 13446M001	I W	-1.61	0.70	8.12
700	VALA 13463M002	I W	0.38	-0.45	0.19
704	VALE 13439M001	I W	-0.95	4.46	-2.30
715	VIGO 13450M001	I W	1.43	-0.05	5.54
755	ZARA 13462M001	I W	-1.17	-0.15	0.80
764	ZIMM 14001M004	I W	-2.37	-1.68	-2.87
RMS / COMPONENT			2.62	1.74	4.78
MEAN			-0.00	0.00	0.00
MIN			-7.65	-3.79	-9.56
MAX			6.94	4.46	10.75

NUMBER OF PARAMETERS : 3
NUMBER OF COORDINATES : 99
RMS OF TRANSFORMATION : 3.31 MM

BARYCENTER COORDINATES:

LATITUDE : 40 6 50.57
LONGITUDE : - 3 6 19.03
HEIGHT : -30.515 KM

PARAMETERS:

TRANSLATION IN N : -0.01 +- 0.58 MM
TRANSLATION IN E : -0.01 +- 0.58 MM
TRANSLATION IN U : 0.00 +- 0.58 MM

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              14054666
NUMBER OF UNKNOWN                   162152
NUMBER OF DEGREES OF FREEDOM        13892514
PHASE MEASUREMENTS SIGMA             0.00100
SAMPLING INTERVAL (SECONDS)          180
VARIANCE FACTOR                      2.482774027518289
```

Helmert Transformation Parameters With Respect to Combined Solution:

Sol	Rms (m)	Translation (m)			Rotation (")			Scale (ppm)
		X	Y	Z	X	Y	Z	
1	0.00209	0.0033	0.0068	0.0058	-0.0002	-0.0001	0.0002	-0.00094
2	0.00284	0.0112	-0.0130	-0.0358	0.0008	0.0011	0.0001	0.00196
3	0.00243	-0.0367	-0.0197	0.0531	0.0003	-0.0021	-0.0006	-0.00082
4	0.00187	0.0110	0.0040	-0.0202	-0.0001	0.0007	0.0001	0.00073
5	0.00233	0.0098	-0.0221	-0.0230	0.0004	0.0008	-0.0006	0.00077
6	0.00223	-0.0063	0.0047	0.0102	-0.0000	-0.0004	0.0002	-0.00024
7	0.00218	0.0052	0.0051	0.0014	-0.0001	0.0000	0.0001	-0.00082

Statistics of individual solutions:

File	RMS (m)	DOF	Chi**2/DOF	#Observations authentic	/ pseudo	#Parameters explicit	/ implicit	/ singular	
1	0.00163	1932991	2.66		1956657	3	684	22985	0
2	0.00178	1873896	3.16		1898499	3	687	23919	0
3	0.00152	2020875	2.31		2044687	3	687	23128	0
4	0.00153	1967956	2.34		1990822	3	657	22212	0
5	0.00150	1985861	2.24		2009028	3	681	22489	0
6	0.00155	2096997	2.39		2122185	3	714	24477	0
7	0.00151	2009876	2.28		2032788	3	693	22222	0

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 22:240:00000 22:246:86370 LEICA GR50 -----
BIAZ A 1 P 22:240:00000 22:246:86370 SPECTRA SP90M -----
BIDA A 1 P 22:240:00000 22:246:86370 LEICA GR10 -----
BRZR A 1 P 22:242:00000 22:246:86370 LEICA GR30 -----
CACE A 1 P 22:240:00000 22:246:86370 TRIMBLE NETR9 -----
CANT A 1 P 22:240:00000 22:246:86370 LEICA GR10 -----
CHER A 1 P 22:240:00000 22:246:79170 LEICA GR30 -----
CREU A 1 P 22:240:00000 22:246:86370 LEICA GR50 -----
EBRE A 1 P 22:241:00000 22:246:49860 LEICA GR50 -----
ELGE A 1 P 22:240:00000 22:246:86370 LEICA GR30 -----
GERN A 1 P 22:240:00000 22:246:86370 LEICA GR30 -----
HOND A 1 P 22:240:00000 22:246:86370 LEICA GR50 -----
IGEL A 1 P 22:240:00000 22:246:86370 LEICA GR30 -----
ISPS A 1 P 22:240:00000 22:246:86370 TRIMBLE NETR9 -----
LAZK A 1 P 22:240:00000 22:246:86370 LEICA GR30 -----
PAS2 A 1 P 22:240:00030 22:246:86370 STONEX SC2200 -----
PASA A 1 P 22:240:00000 22:246:86370 LEICA GR30 -----
RI01 A 1 P 22:240:00000 22:246:86370 LEICA GR25 -----
SALA A 1 P 22:240:00000 22:246:86370 LEICA GR50 -----
SCOA A 1 P 22:241:00000 22:246:75570 LEICA GR50 -----
SOPU A 1 P 22:240:00000 22:246:86370 LEICA GR30 -----
TERU A 1 P 22:240:00000 22:246:86370 LEICA GR50 -----
YEBE A 1 P 22:240:00000 22:246:86370 LEICA GR50 -----
ZARA A 1 P 22:240:00000 22:246:86370 TRIMBLE NETR9 -----
```

7.2 Antennas

Serial number ONLY provided in case individual calibrations are available.

```
*SITE PT SOLN T DATA_START_ DATA_END_ DESCRIPTION_ S/N_
ACOR A 1 P 22:240:00000 22:246:86370 LEIAT504 LEIS -----
BIAZ A 1 P 22:240:00000 22:246:86370 LEIAR25 LEIT -----
BIDA A 1 P 22:240:00000 22:246:86370 LEIAS10 NONE -----
BRZR A 1 P 22:242:00000 22:246:86370 LEIAS10 NONE -----
CACE A 1 P 22:240:00000 22:246:86370 TRM29659.00 NONE -----
CANT A 1 P 22:240:00000 22:246:86370 LEIAR25.R4 LEIT 25066
CHER A 1 P 22:240:00000 22:246:79170 LEIAR10 NONE -----
CREU A 1 P 22:240:00000 22:246:86370 LEIAR25.R4 NONE 26357
EBRE A 1 P 22:241:00000 22:246:49860 LEIAR25.R4 NONE 26359
ELGE A 1 P 22:240:00000 22:246:86370 LEIAR25.R4 LEIT -----
GERN A 1 P 22:240:00000 22:246:86370 LEIAS10 NONE -----
HOND A 1 P 22:240:00000 22:246:86370 LEIAR20 LEIM 41012
```

IGEL	A	1	P	22:240:00000	22:246:86370	LEIAR20	LEIM 43011
ISPS	A	1	P	22:240:00000	22:246:86370	TRM59900.00	SCIS -----
LAZK	A	1	P	22:240:00000	22:246:86370	LEIAR25.R4	LEIT -----
PAS2	A	1	P	22:240:00030	22:246:86370	LEIAR20	LEIM 73034
PASA	A	1	P	22:240:00000	22:246:86370	LEIAR20	LEIM 73034
RI01	A	1	P	22:240:00000	22:246:86370	LEIAR25.R4	LEIT 25138
SALA	A	1	P	22:240:00000	22:246:86370	LEIAR25	NONE -----
SCOA	A	1	P	22:241:00000	22:246:75570	TRM55971.00	NONE -----
SOPU	A	1	P	22:240:00000	22:246:86370	LEIAS10	NONE -----
TERU	A	1	P	22:240:00000	22:246:86370	LEIAR20	LEIM 49044
YEBE	A	1	P	22:240:00000	22:246:86370	LEIAR20	LEIM 49016
ZARA	A	1	P	22:240:00000	22:246:86370	TRM29659.00	NONE -----

7.3 Eccentricities

* SITE	PT	SOLN	T	DATA_START_	DATA_END_	AXE	UP	NORTH	EAST
							ARP->BENCHMARK(M)		
ACOR	A	1	P	22:240:00000	22:246:86370	UNE	3.0460	0.0000	0.0000
BIATZ	A	1	P	22:240:00000	22:246:86370	UNE	0.0000	0.0000	0.0000
BIDA	A	1	P	22:240:00000	22:246:86370	UNE	0.0000	0.0000	0.0000
BRZR	A	1	P	22:242:00000	22:246:86370	UNE	0.0771	0.0000	0.0000
CACE	A	1	P	22:240:00000	22:246:86370	UNE	0.0600	0.0000	0.0000
CANT	A	1	P	22:240:00000	22:246:86370	UNE	3.0490	0.0000	0.0000
CHER	A	1	P	22:240:00000	22:246:79170	UNE	0.0000	0.0000	0.0000
CREU	A	1	P	22:240:00000	22:246:86370	UNE	0.0770	0.0000	0.0000
EBRE	A	1	P	22:241:00000	22:246:49860	UNE	0.0770	0.0000	0.0000
ELGE	A	1	P	22:240:00000	22:246:86370	UNE	0.0000	0.0000	0.0000
GERN	A	1	P	22:240:00000	22:246:86370	UNE	0.0771	0.0000	0.0000
HOND	A	1	P	22:240:00000	22:246:86370	UNE	0.0771	0.0000	0.0000
IGEL	A	1	P	22:240:00000	22:246:86370	UNE	0.0000	0.0000	0.0000
ISPS	A	1	P	22:240:00000	22:246:86370	UNE	0.0350	0.0000	0.0000
LAZK	A	1	P	22:240:00000	22:246:86370	UNE	0.0000	0.0000	0.0000
PAS2	A	1	P	22:240:00030	22:246:86370	UNE	0.0000	0.0000	0.0000
PASA	A	1	P	22:240:00000	22:246:86370	UNE	0.0000	0.0000	0.0000
RI01	A	1	P	22:240:00000	22:246:86370	UNE	0.0606	0.0000	0.0000
SALA	A	1	P	22:240:00000	22:246:86370	UNE	0.0600	0.0000	0.0000
SCOA	A	1	P	22:241:00000	22:246:75570	UNE	0.0000	0.0000	0.0000
SOPU	A	1	P	22:240:00000	22:246:86370	UNE	0.0771	0.0000	0.0000
TERU	A	1	P	22:240:00000	22:246:86370	UNE	0.0600	0.0000	0.0000
YEBE	A	1	P	22:240:00000	22:246:86370	UNE	0.0600	0.0000	0.0000
ZARA	A	1	P	22:240:00000	22:246:86370	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:

2022-09-11	23:51	UTC		HOND2400.220		RECEIVER FIRM. VERS.		4.60/7.811 -> 4.50/7.710
2022-09-12	23:48	UTC		HOND2410.220		RECEIVER FIRM. VERS.		4.60/7.811 -> 4.50/7.710
2022-09-13	23:50	UTC		HOND2420.220		RECEIVER FIRM. VERS.		4.60/7.811 -> 4.50/7.710
2022-09-15	00:15	UTC		HOND2430.220		RECEIVER FIRM. VERS.		4.60/7.811 -> 4.50/7.710
2022-09-16	00:10	UTC		HOND2440.220		RECEIVER FIRM. VERS.		4.60/7.811 -> 4.50/7.710
2022-09-16	23:51	UTC		HOND2450.220		RECEIVER FIRM. VERS.		4.60/7.811 -> 4.50/7.710
2022-09-17	23:44	UTC		HOND2460.220		RECEIVER FIRM. VERS.		4.60/7.811 -> 4.50/7.710

9 References

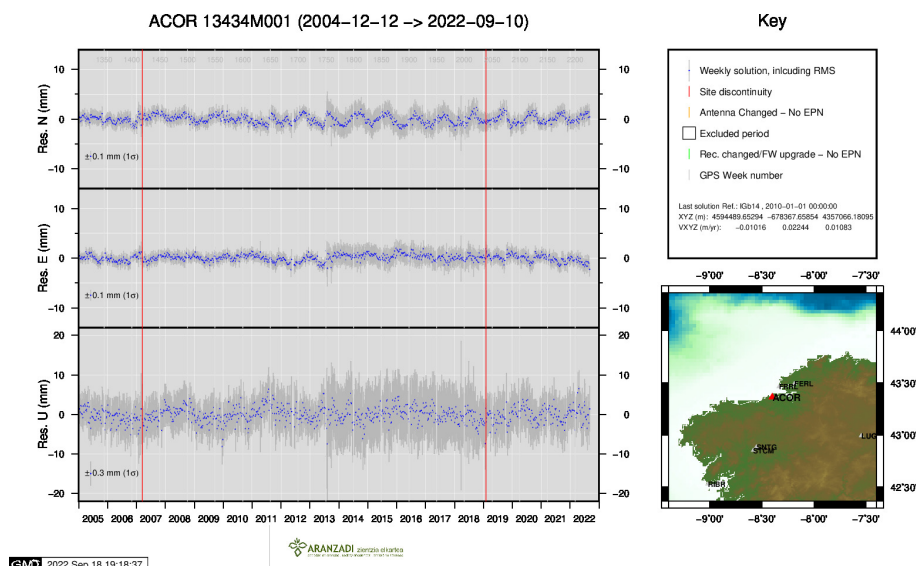
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign*. etrs89.ensg.ign.fr/memo-V8.pdf

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

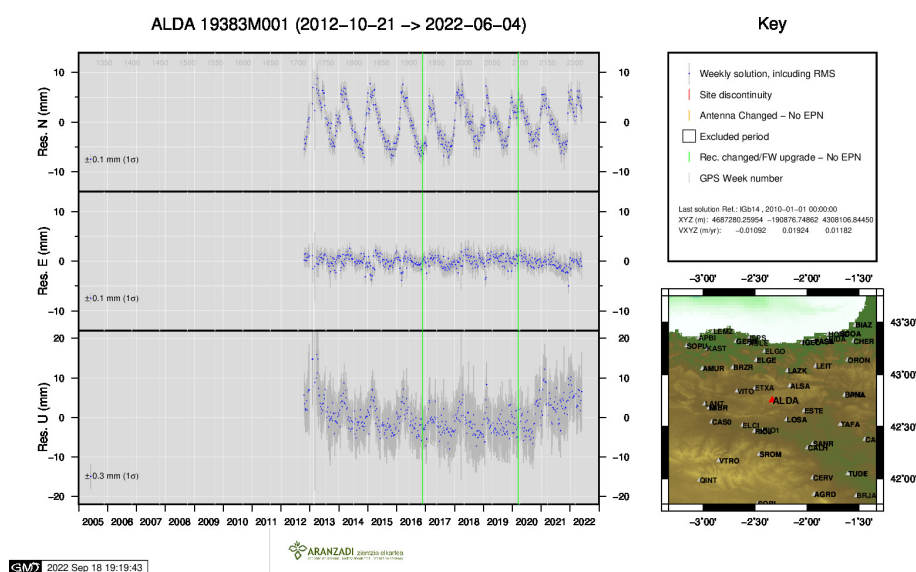
Z. Altamimi (2018): *EUREF Technical Note 1: Relationship and Transformation between the International and the European Terrestrial Reference Systems*. etrs89.ensg.ign.fr/pub/EUREF-TN-1.pdf

10 Cumulative Time Series

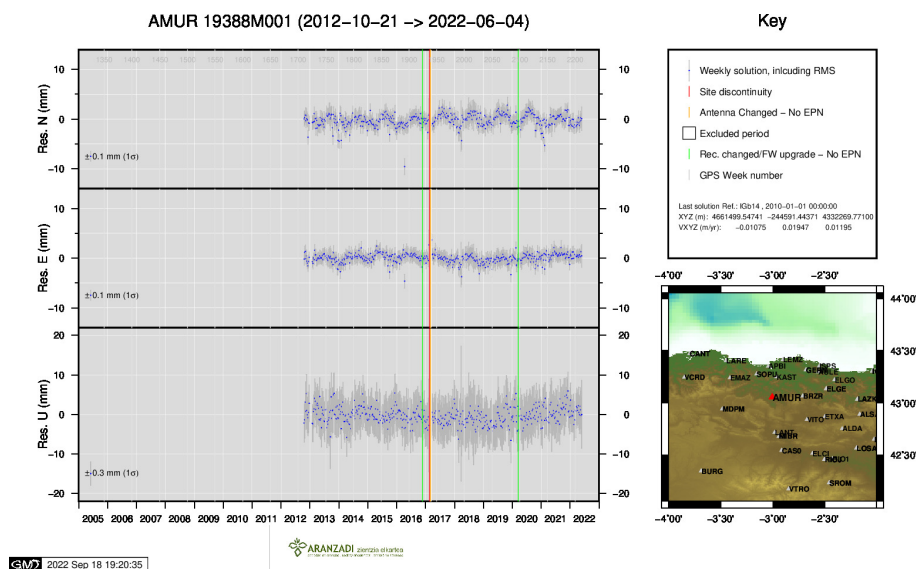
Time series of stations. Latest plots at: <http://geolabpasaia.org/gnss/ARA-net/TSeries/>, or click on the caption of each image.



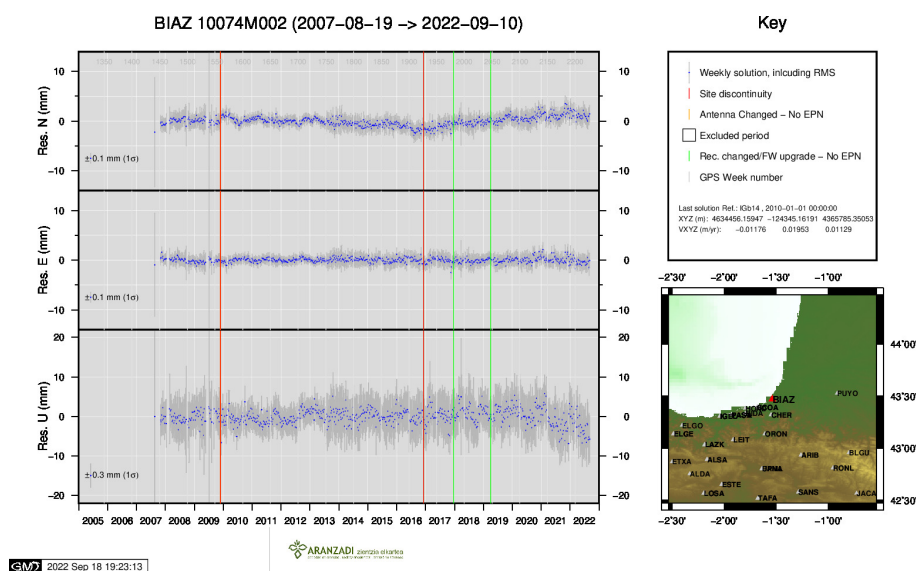
1) ACOR



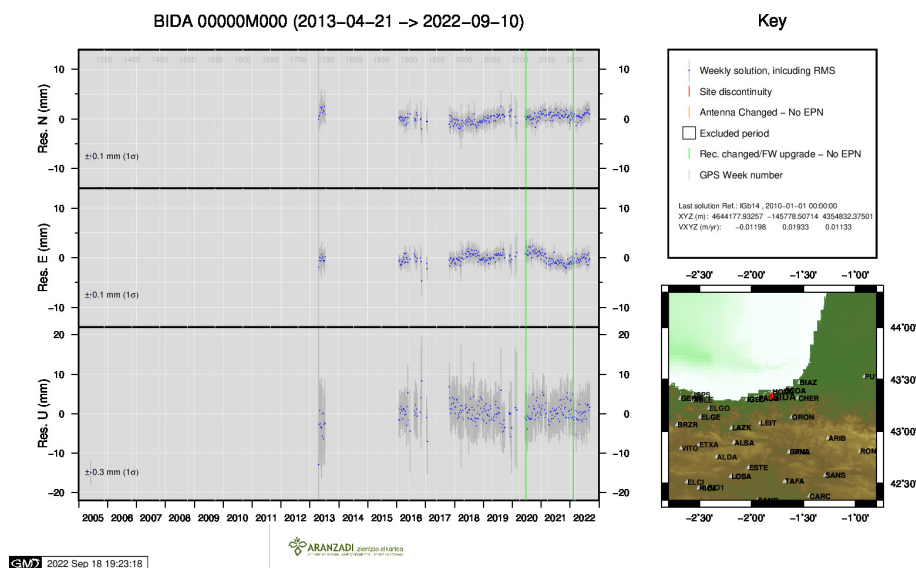
2) ALDA



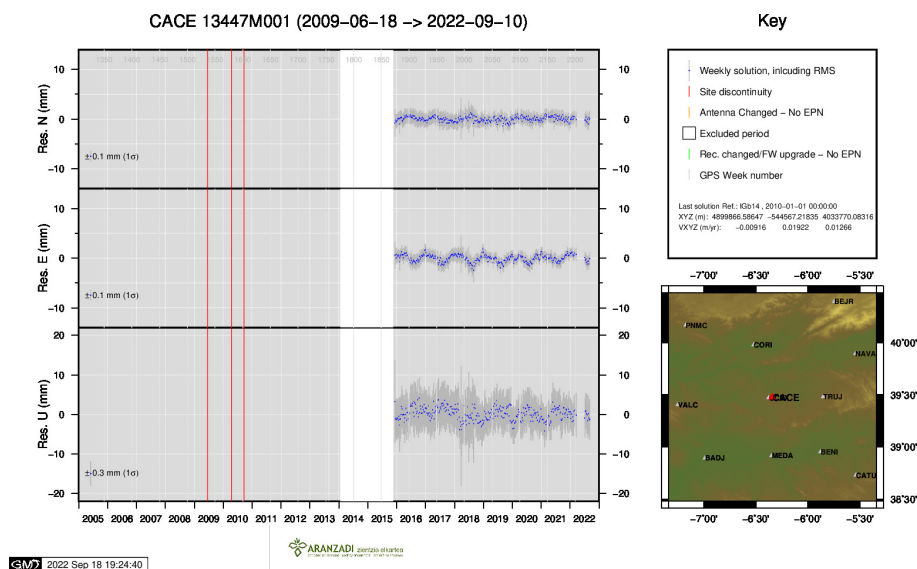
3) AMUR



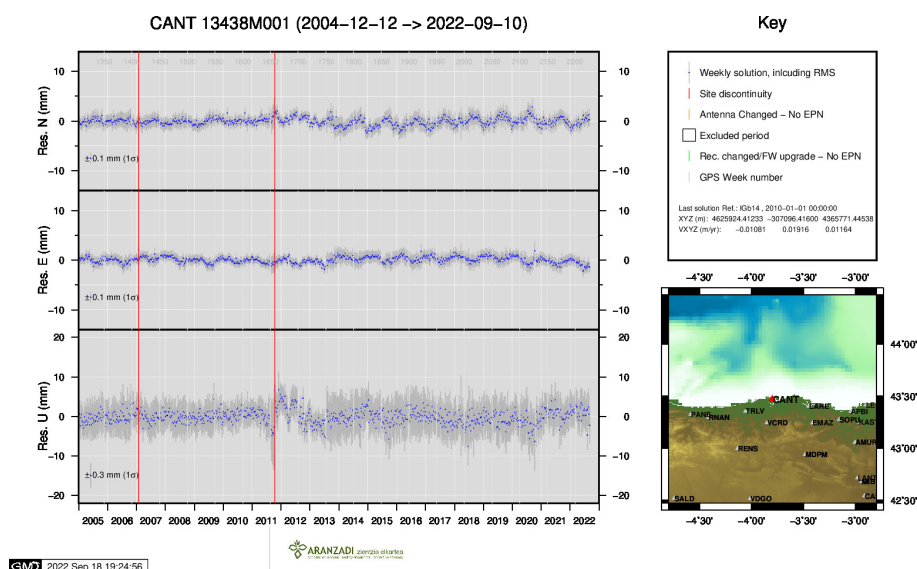
4) BIAZ



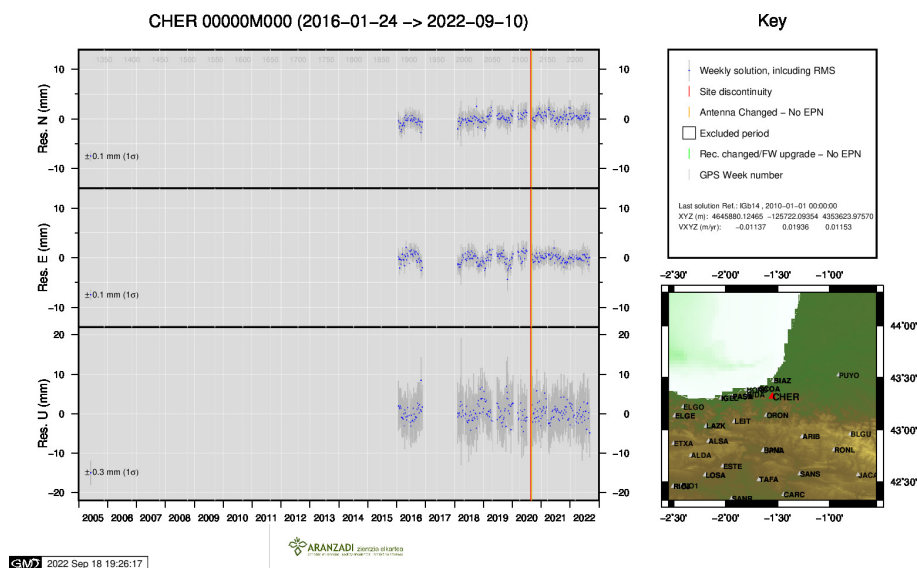
5) BIDA



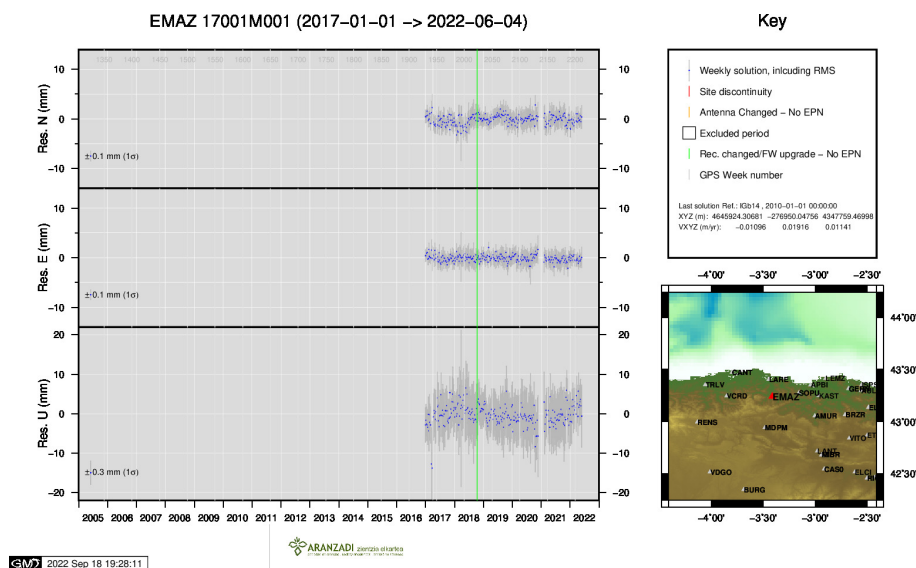
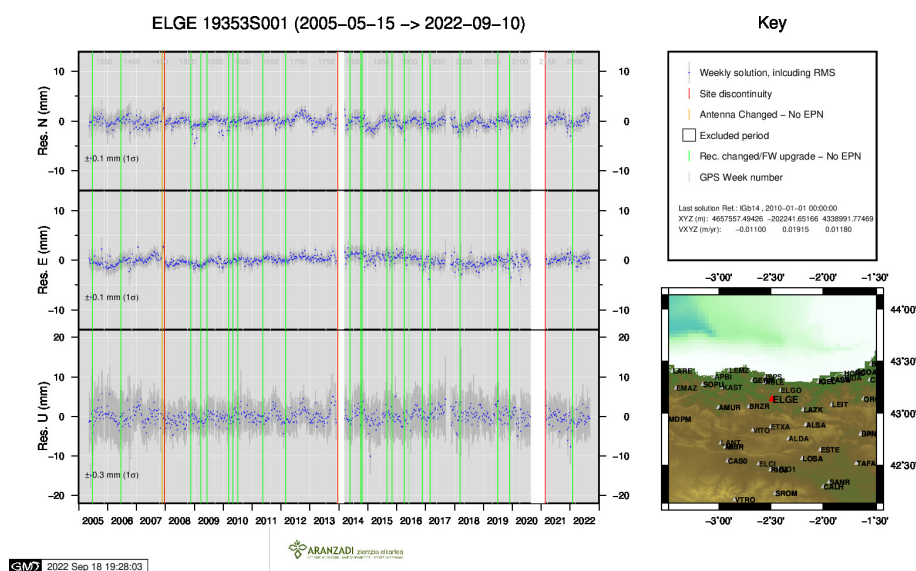
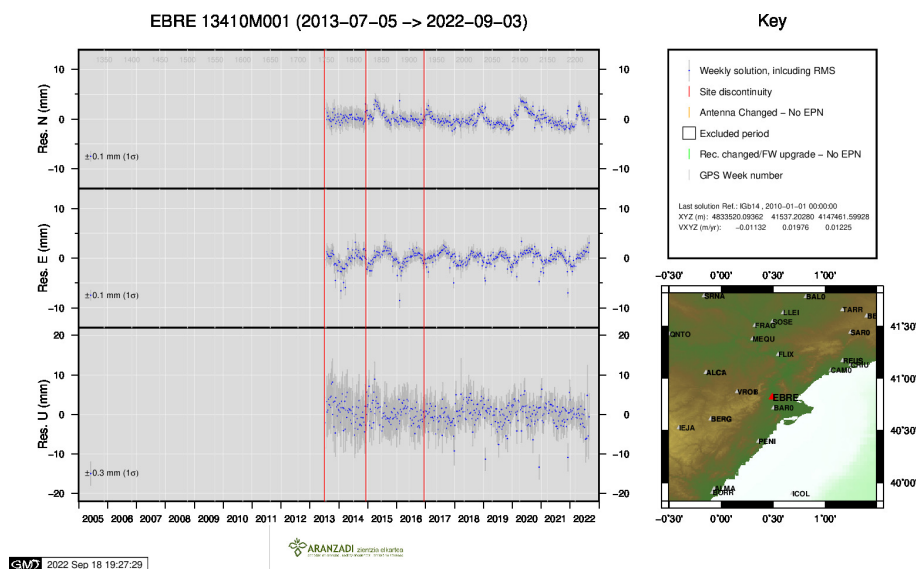
6) CACE

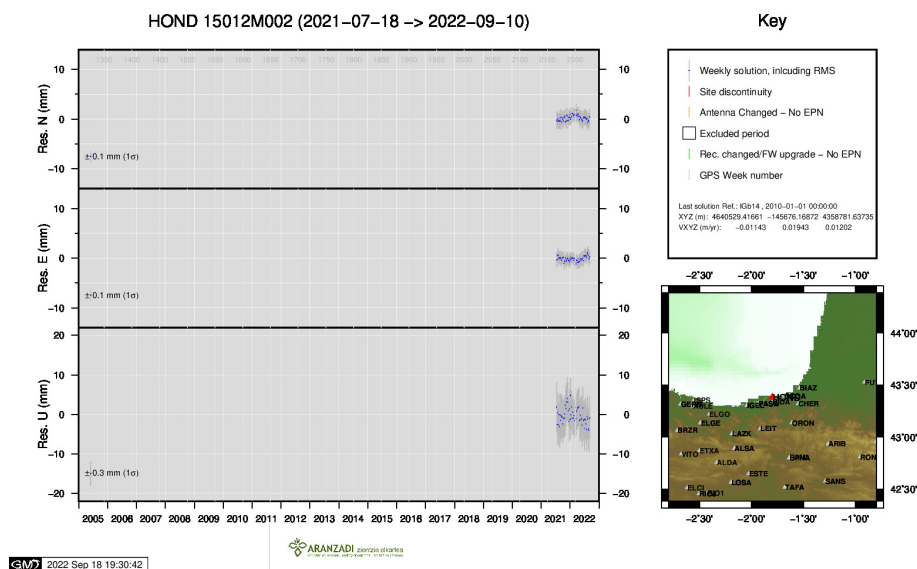


7) CANT

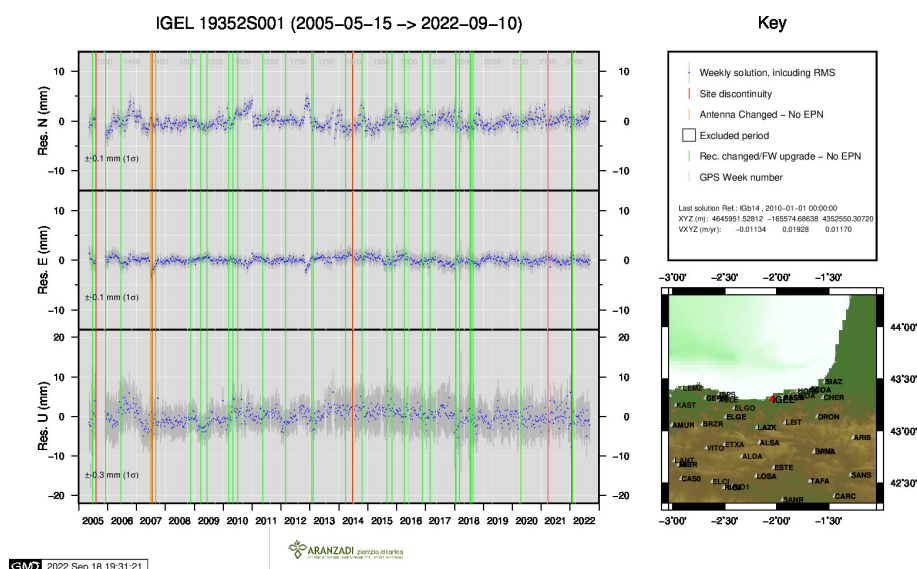


8) CHER

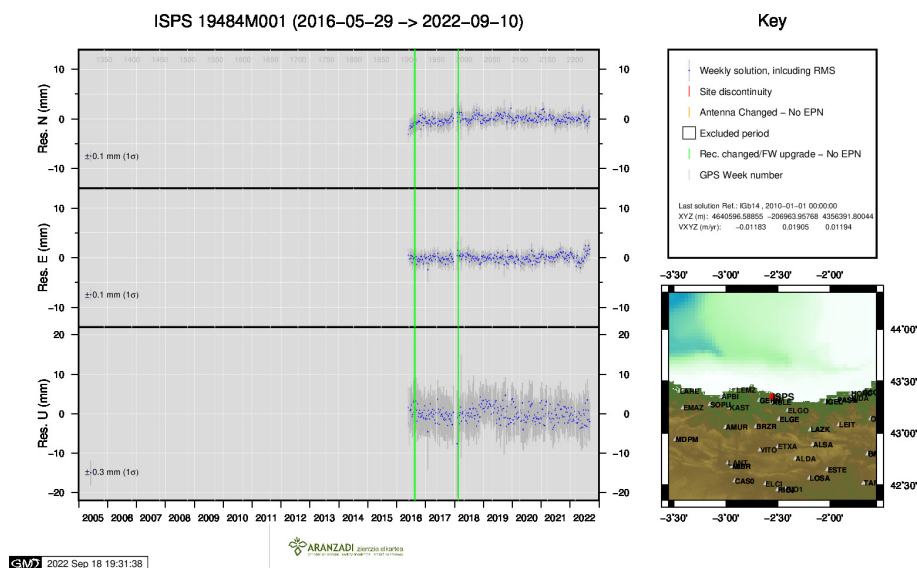




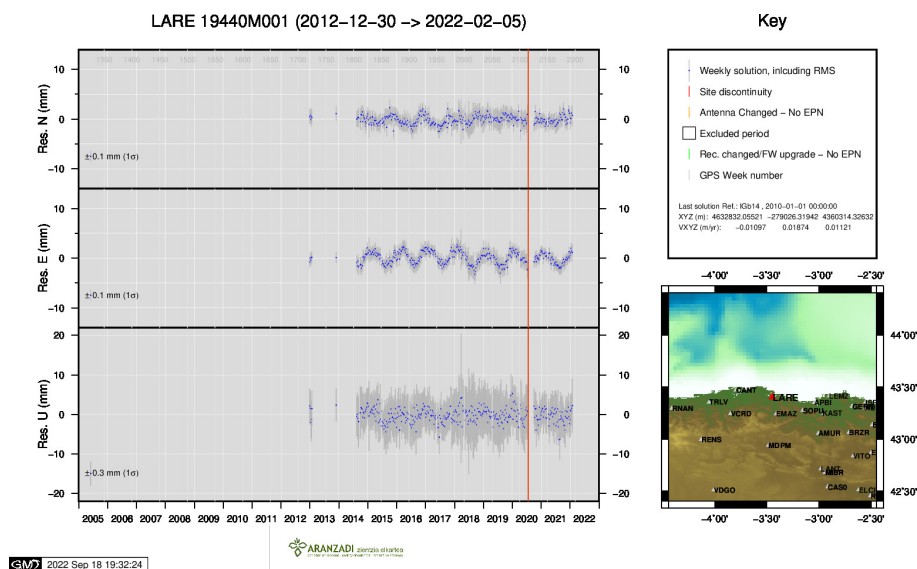
12) HOND



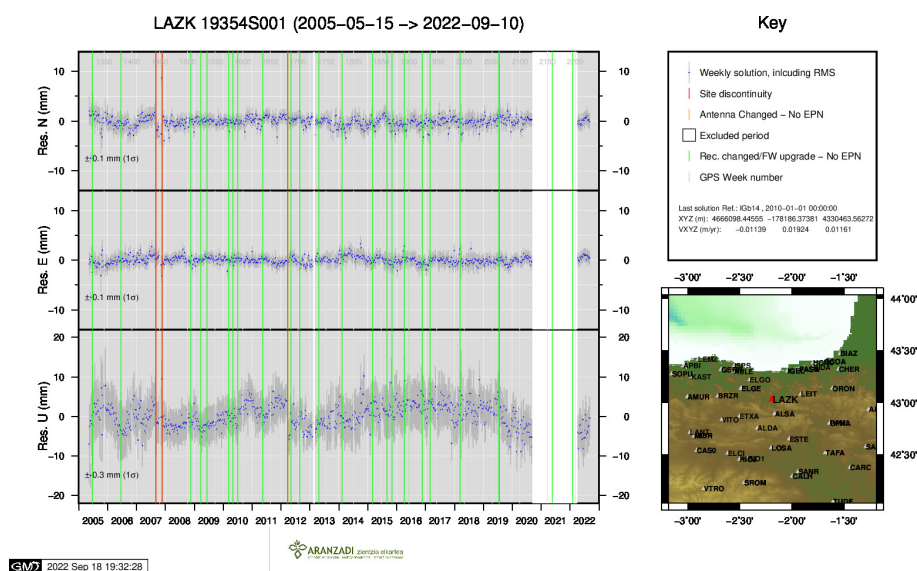
13) IGEL



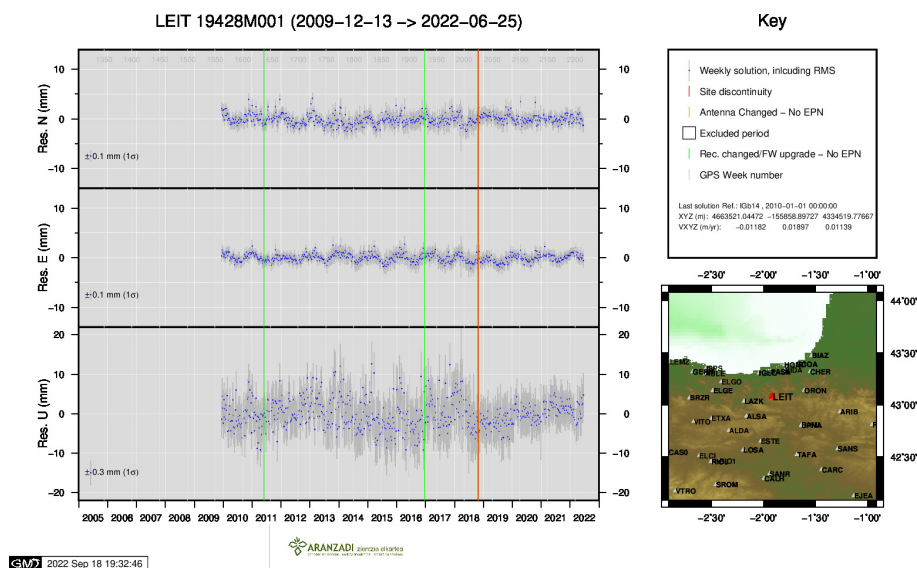
14) ISPS



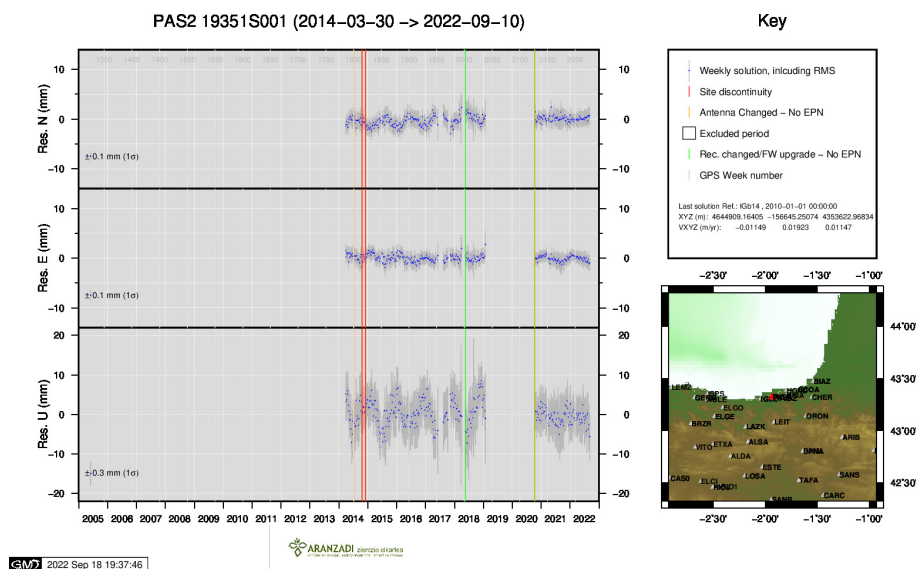
15) LARE



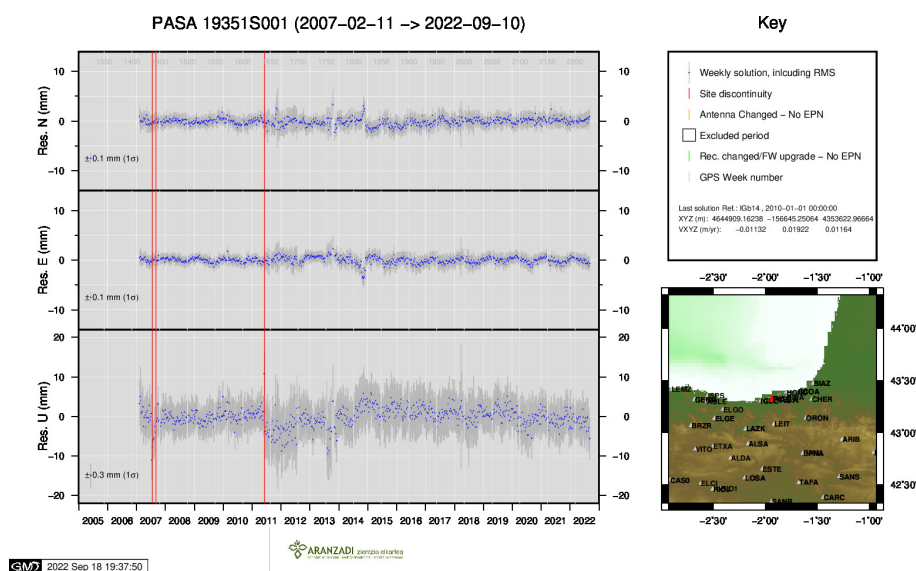
16) LAZK



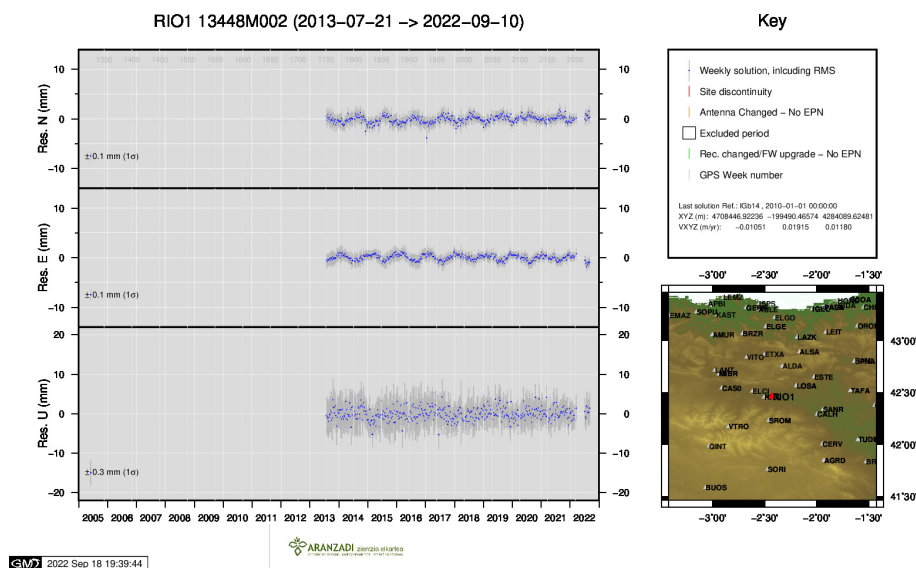
17) LEIT



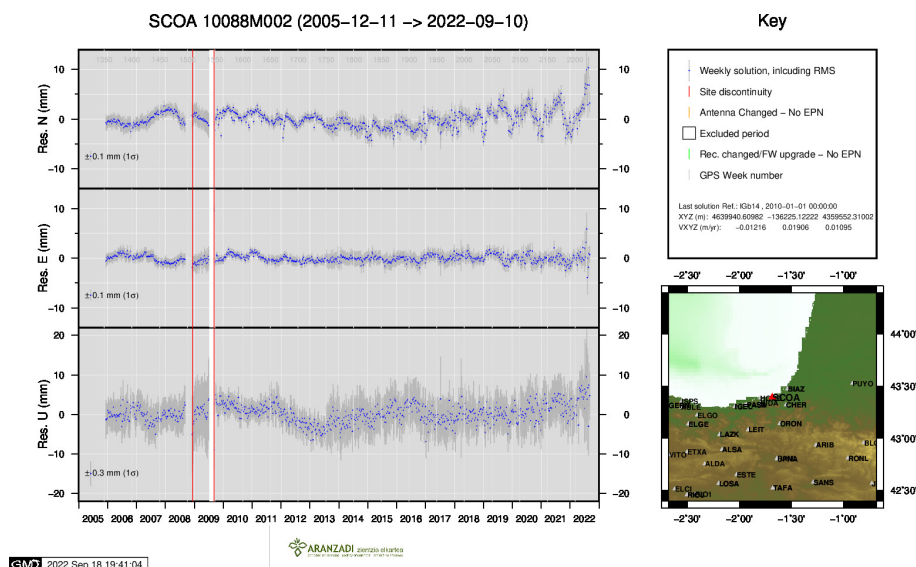
18) PAS2



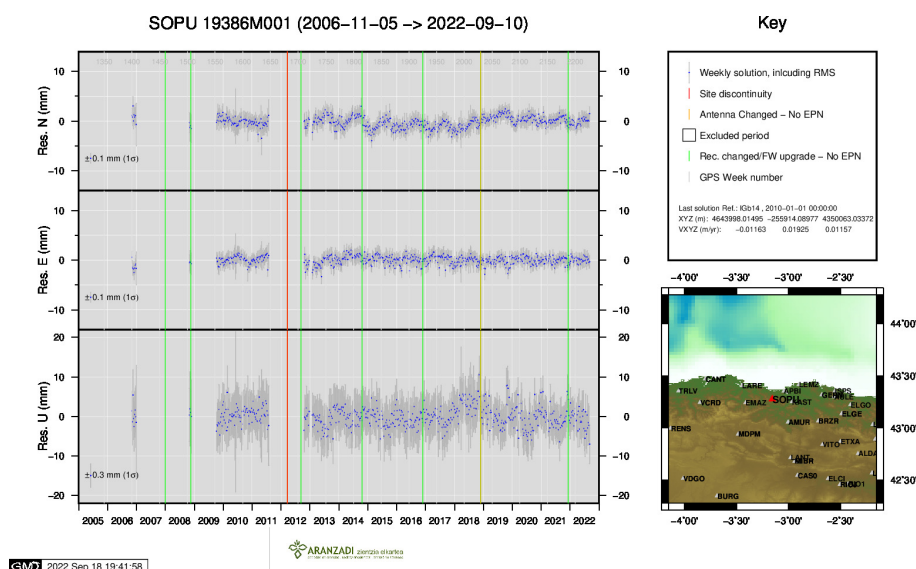
19) PASA



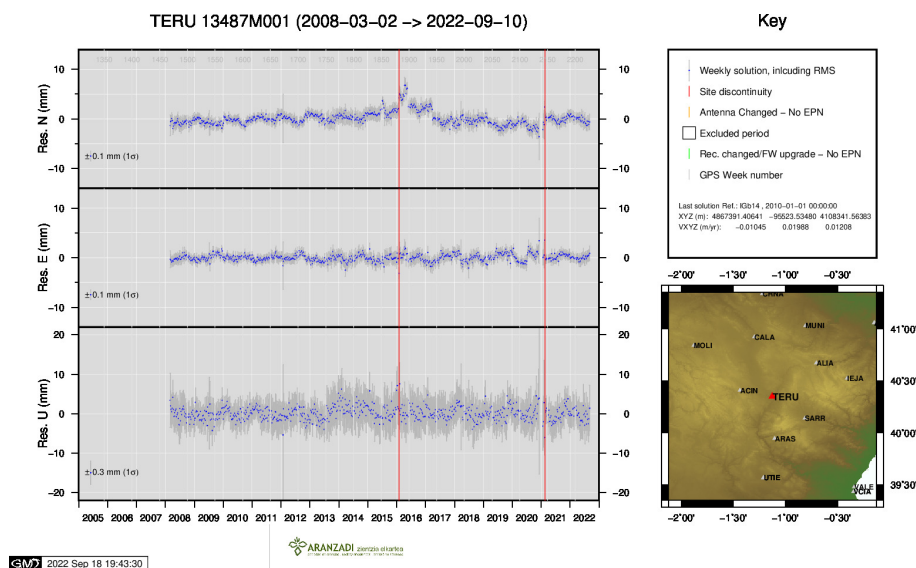
20) RIO1



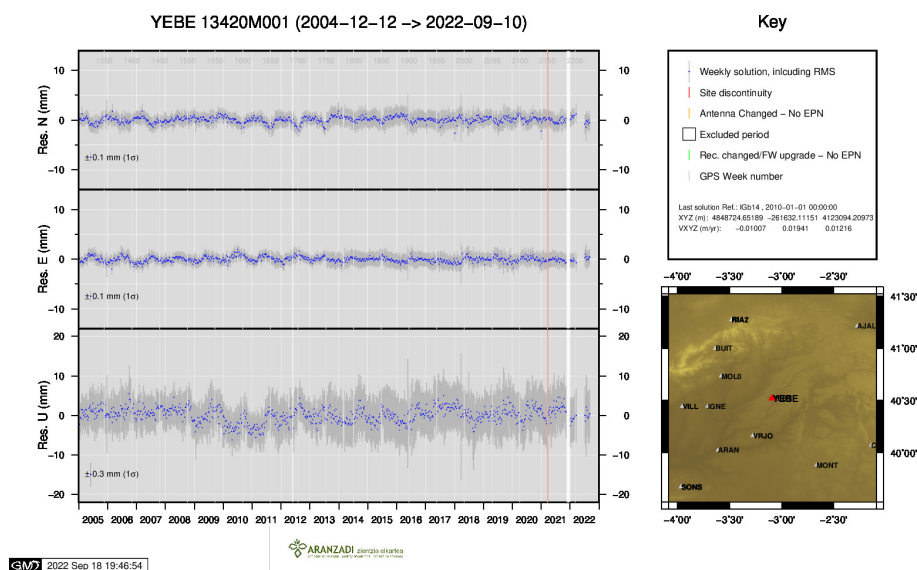
21) SCOA



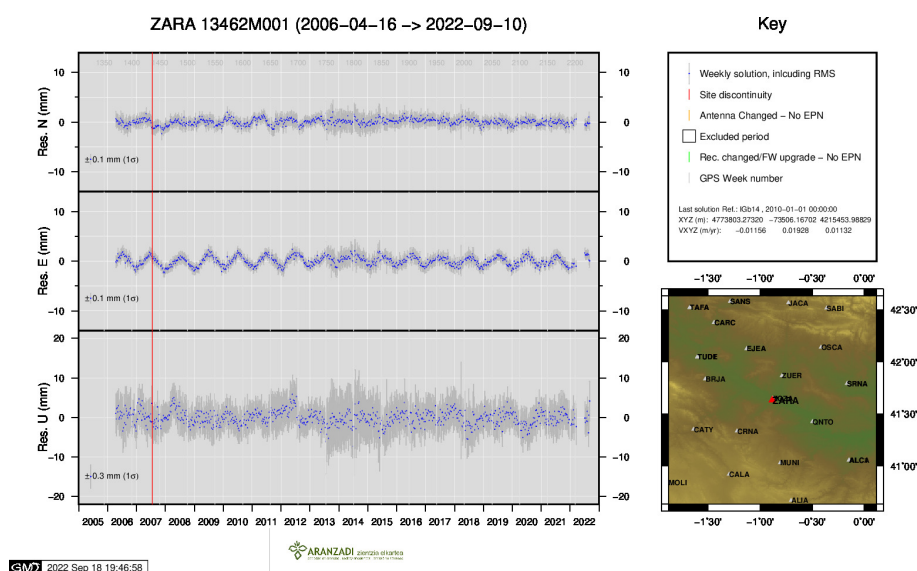
22) SOPU



23) TERU



24) YEBE



25) ZARA