

ARA-DAC Weekly Analysis Result: 2199 (GFA)

Technical Report

GPS Week: 2199 (GFA)

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

ARA-DAC details:

Contact person: J. Zurutuza

Contact mail: geodesia@aranzadi.eus

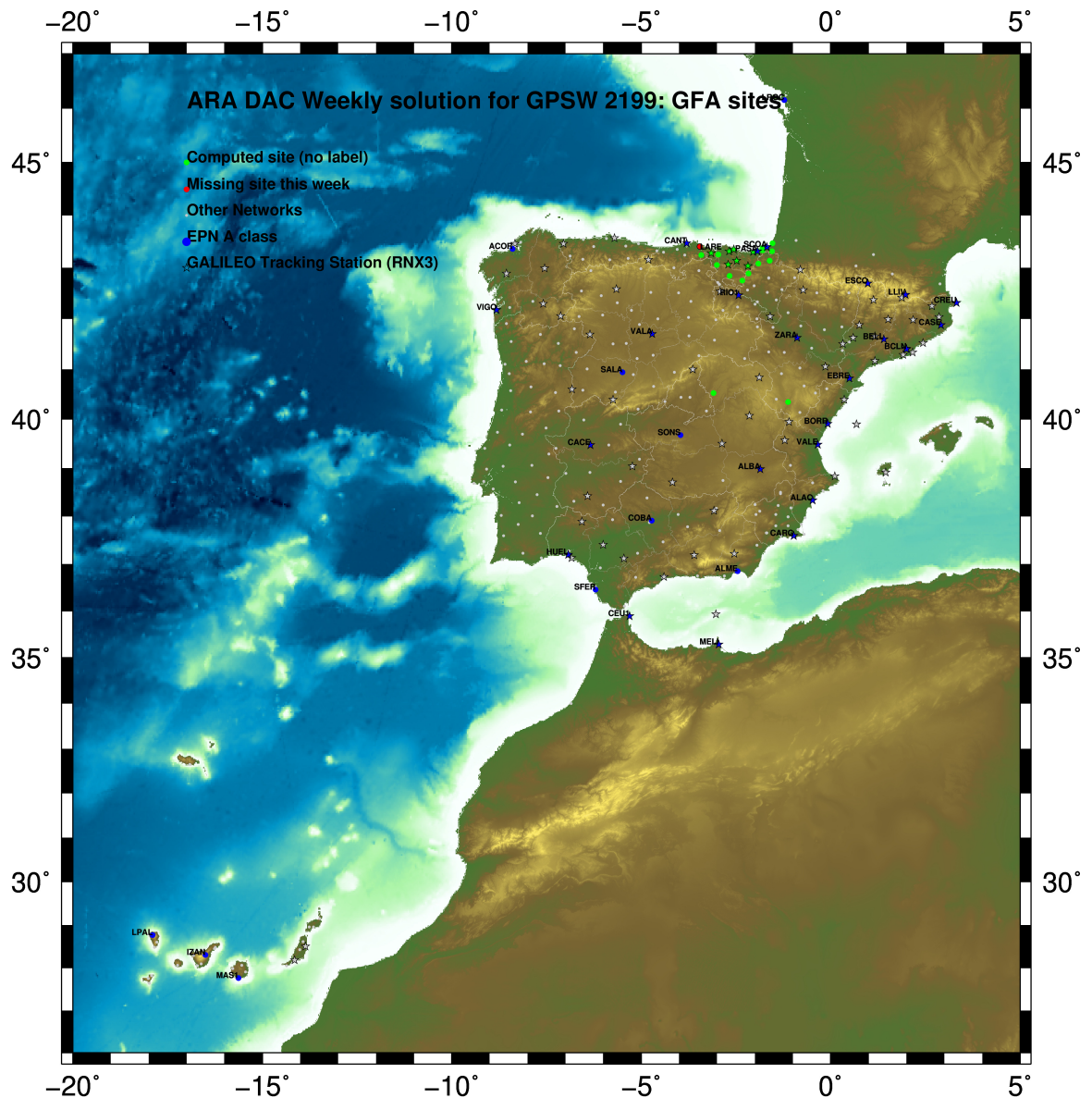
Report generated on 2022/03/20 at 13:40:30



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



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Fig.1: Computed Sites for GPS Week2199 (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 Wideline (WL) AR for baselines shorter than 6000km, a Melbourne-Wuebbena wide-lane and narrow-lane AR is computed.
 - Phase-Based Wideline (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 2199 WEEK FINAL COMBINATION: PRECISE ORBITS 20-MAR-22 10:12

LOCAL GEODETIC DATUM: IGB14 EPOCH: 2022-03-02 12:00:00

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
4	ACOR 13434M001	4594489.52960	-678367.38573	4357066.31354	W
39	ALDA 19383M001	4687280.12947	-190876.51426	4308106.99337	A
50	ALSA 19419M001	4677250.79859	-176770.34080	4319079.90613	A
53	AMUR 19388M001	4661499.41588	-244591.20600	4332269.91601	A
100	BIAZ 10074M002	4634456.01309	-124344.92367	4365785.48856	A
101	BIDA 00000M000	4644177.78495	-145778.27190	4354832.51334	A
113	BRZR 19387M001	4662220.95683	-220769.84706	4333309.47238	A
104	CACE 13447M001	4899866.47591	-544566.98358	4033770.23968	W
116	CANT 13438M001	4625924.28135	-307096.18302	4365771.58749	W
154	CHER 00000M000	4645879.98504	-125721.85772	4353624.11656	A
162	CREU 13432M001	4715420.09169	273178.11097	4271946.87328	W
204	EBRE 13410M001	4833519.95703	41537.44146	4147461.74817	W
180	ELGE 19353S001	4657557.35897	-202241.41767	4338991.91705	A
182	EMAZ 17001M001	4645924.17400	-276949.81483	4347759.60930	A
209	GERN 19389M001	4642811.28406	-217222.87136	4353278.90639	A
257	HOND 15012M002	4640529.27518	-145676.93223	4358761.78358	A
235	IGEL 19352S001	4645951.38835	-165574.45133	4352550.44857	A
240	ISPS 19484M001	4640596.44449	-206963.72555	4356391.94630	A
245	KAST 19499M001	4646949.04612	-240747.22063	4348015.02874	A
256	LAZK 19354S001	4666098.30286	-178186.13933	4330463.69990	A
261	LEIT 19428M001	4663520.89935	-155858.66594	4334519.91448	A
334	ORDN 19427M001	4659695.74225	-130866.68342	4338948.91380	A
345	PAS2 19351S001	4644909.02301	-156645.01616	4353623.10760	A
493	PASA 19351S001	4644909.02315	-156645.01616	4353623.10773	W
553	RID1 13448M002	4708446.79384	-199490.23246	4284089.78668	W
558	SALA 13469M001	4803054.45648	-462131.01922	4158379.11365	W
566	SCDA 10088M002	4639940.46103	-136224.89013	4359552.44408	W
418	SOPU 19386M001	4643997.87353	-255913.85507	4350063.17509	A
443	TERU 13487M001	4867391.28036	-95523.29327	4108341.71316	A
493	VITO 19385M001	4679397.66782	-218436.45168	4314898.40017	A
752	YEBE 13420M001	4848724.52851	-261631.87567	4123094.35921	A
755	ZARA 13462M001	4773803.13197	-73505.93288	4215454.12710	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 2199 20-MAR-22 10:12

LOCAL GEODETIC DATUM: ETRF2000 EPOCH: 2022-03-02 12:00:00

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
4	ACOR 13434M001	4594489.85832	-678367.97654	4357065.86054	W
39	ALDA 19383M001	4687280.51674	-190877.11456	4308106.53924	A
50	ALSA 19419M001	4677251.18848	-176770.93992	4319079.45201	A
53	AMUR 19388M001	4661499.79812	-244591.80352	4332269.46230	A
100	BIAZ 10074M002	4634456.41319	-124345.51777	4365785.03966	A
101	BIDA 00000M000	4644178.18149	-145778.86717	4354832.06336	A
113	BRZR 19387M001	4662221.34219	-220770.44460	4333309.01992	A
104	CACE 13447M001	4899866.79725	-544567.60861	4033769.76324	W
116	CANT 13438M001	4625924.65815	-307096.77666	4365771.13688	W
154	CHER 00000M000	4645880.38405	-125722.45312	4353623.66670	A
162	CREU 13432M001	4715420.53530	273177.50916	4271946.42285	W
204	EBRE 13410M001	4833520.36174	41536.82543	4147461.28499	W
180	ELGE 19353S001	4657557.74712	-202242.01463	4338991.46522	A
182	EMAZ 17001M001	4645924.55329	-276950.41068	4347759.15744	A
209	GERN 19389M001	4642811.67138	-217223.46668	4353278.45758	A
257	HOND 15012M002	4640529.67203	-145676.52708	4358761.33390	A
235	IGEL 19352S001	4645951.78220	-165575.04686	4352549.99818	A
240	ISPS 19484M001	4640596.83335	-206964.32059	4356391.49581	A
245	KAST 19499M001	4646949.43004	-240747.81649	4348014.57728	A
256	LAZK 19354S001	4666098.69343	-178186.73718	4330463.24768	A
261	LEIT 19428M001	4663521.29308	-155859.26344	4334519.46277	A
334	ORDN 19427M001	4659696.13949	-130865.28040	4338948.46273	A
345	PAS2 19351S001	4644909.41808	-156645.61154	4353622.65741	A
493	PASA 19351S001	4644909.41822	-156645.61154	4353622.65754	W
553	RID1 13448M002	4708447.17819	-199490.83518	4284089.31269	W
558	SALA 13469M001	4803054.79680	-462131.63326	4158378.64635	W
566	SCDA 10088M002	4639940.85915	-136225.48489	4359551.99457	W
418	SOPU 19386M001	4643998.25567	-255914.45063	4350062.72367	A
443	TERU 13487M001	4867391.66465	-95523.91358	4108341.24539	A
493	VITO 19385M001	4679398.05208	-218437.05116	4314897.94633	A
752	YEBE 13420M001	4848724.89275	-261632.49437	4123093.89080	A
755	ZARA 13462M001	4773803.52718	-73506.54259	4215453.66736	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 2199		20-MAR-22 10:12			
LOCAL GEODETIC DATUM: ETRF2014		EPOCH: 2022-03-02 12:00:00			
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
4	ACDR 13434M001	4594489.81764	-678368.01416	4357065.91196	W
39	ALDA 19383M001	4687280.47369	-190877.15351	4308106.59053	A
50	ALSA 19419M001	4677251.14549	-176770.97896	4319079.50334	A
53	AMUR 19388M001	4661499.75551	-244591.84239	4332269.51364	A
100	BLAZ 10074M002	4634456.37047	-124345.55717	4365785.09114	A
101	BIDA 00000M000	4644178.13874	-145778.90645	4354832.11480	A
113	BRZR 19387M001	4662221.29950	-220770.48355	4333309.07128	A
104	CACE 13447M001	4899866.75291	-544567.64540	4033769.81386	W
116	CANT 13438M001	4625924.61610	-307096.81546	4365771.18831	W
154	CHER 00000M000	4645880.34121	-125722.49247	4353623.71815	A
162	CREU 13432M001	4715420.49028	273177.46873	4271946.47438	W
204	EBRE 13410M001	4833520.31631	41536.78630	4147461.33602	W
180	ELGE 19353S001	4657557.70442	-202242.05366	4338991.51660	A
182	EMAZ 17001M001	4645924.51094	-276950.44950	4347759.20882	A
209	GERN 19389M001	4642811.62887	-217223.50572	4353278.50899	A
257	HOND 15012M002	4640529.62932	-145676.56638	4358781.38535	A
235	IGEL 19352S001	4645951.73949	-165575.08607	4352550.04961	A
240	ISPS 19484M001	4640596.79084	-206964.35968	4356391.54723	A
245	KAST 19499M001	4646949.38757	-240747.85543	4348014.62867	A
256	LAZK 19354S001	4666098.65056	-178186.77626	4330463.29905	A
261	LEIT 19428M001	4663521.25016	-155859.30261	4334519.51415	A
334	ORON 19427M001	4659696.09653	-130865.31968	4338948.51414	A
345	PAS2 19351S001	4644909.37535	-156645.65079	4353622.70885	A
493	PASA 19351S001	4644909.37549	-156645.65079	4353622.70898	W
553	RI01 13448M002	4708447.13494	-199490.87400	4284089.36392	W
558	SALA 13469M001	4803054.75333	-462131.67076	4158378.69722	W
566	SOA 10088M002	4639940.81641	-136225.52422	4359552.04603	W
418	SOPU 19386M001	4643998.21328	-255914.48953	4350062.77506	A
443	TERU 13487M001	4867391.61933	-95523.95209	4108341.29625	A
493	VITO 19385M001	4679398.00920	-218437.09005	4314897.99763	A
752	YEBE 13420M001	4848724.84817	-261632.53238	4123093.94162	A
755	ZARA 13462M001	4773803.48281	-73506.58158	4215453.71848	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 2199 WEEK FINAL COMBINATION: PRECISE ORBITS 20-MAR-22 10:12

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	7	XXXXXX	0.37	0.69	6.18
ALDA 19383M001	7	XXXXXX	0.63	1.01	2.70
ALSA 19419M001	7	XXXXXX	0.92	0.96	0.79
AMUR 19388M001	7	XXXXXX	1.39	0.89	4.00
BLAZ 10074M002	7	XXXXXX	1.12	1.28	3.69
BIDA 00000M000	7	XXXXXX	0.57	1.01	5.43
BRZR 19387M001	7	XXXXXX	1.51	0.41	2.36
CACE 13447M001	7	XXXXXX	0.38	0.70	2.92
CANT 13438M001	7	XXXXXX	0.69	0.46	4.94
CHER 00000M000	7	XXXXXX	0.77	1.51	4.76
CREU 13432M001	7	XXXXXX	0.65	0.81	2.12
EBRE 13410M001	7	XXXXXX	0.77	0.63	1.19
ELGE 19353S001	7	XXXXXX	1.81	0.96	3.36
EMAZ 17001M001	7	XXXXXX	1.19	0.88	4.45
GERN 19389M001	7	XXXXXX	0.80	0.66	3.81
HOND 15012M002	7	XXXXXX	0.73	0.39	2.63
IGEL 19352S001	7	XXXXXX	0.96	0.60	2.41
ISPS 19484M001	7	XXXXXX	0.95	1.94	5.35
KAST 19499M001	7	XXXXXX	1.19	0.65	8.10
LAZK 19354S001	4	XXXX	0.56	0.30	3.99
LEIT 19428M001	7	XXXXXX	0.76	0.67	1.75
ORON 19427M001	7	XXXXXX	0.79	0.72	1.66
PAS2 19351S001	7	XXXXXX	0.44	0.62	2.29
PASA 19351S001	7	XXXXXX	0.43	0.51	2.42
RI01 13448M002	7	XXXXXX	0.29	0.39	1.81
SALA 13469M001	7	XXXXXX	0.54	0.36	2.16
SCDA 10088M002	7	XXXXXX	1.18	1.14	2.66
SOPU 19386M001	7	XXXXXX	0.97	1.05	3.81
TERU 13487M001	6	XXXXX	0.45	0.38	2.66
VITD 19385M001	7	XXXXXX	0.44	1.03	2.23
YEBE 13420M001	7	XXXXXX	0.22	0.64	2.32
ZARA 13462M001	7	XXXXXX	0.34	0.23	2.15

Comparison of individual solutions:

ACOR 13434M001	N	0.37	-0.19	-0.32	0.19	-0.17	-0.71	-0.32	0.17
ACOR 13434M001	E	0.69	-0.51	-1.03	-0.15	0.61	-0.57	0.65	0.64
ACOR 13434M001	U	6.18	-7.53	3.00	-8.16	0.93	2.92	7.22	5.93
ALDA 19383M001	N	0.63	-0.31	0.56	0.03	-0.36	-0.62	-0.76	0.94
ALDA 19383M001	E	1.01	1.27	-0.14	-0.24	0.74	-0.80	0.53	-1.72
ALDA 19383M001	U	2.70	-3.45	-1.47	-3.39	0.91	1.53	3.69	1.14
ALSA 19419M001	N	0.92	-1.15	-0.16	-0.97	-0.41	0.61	1.49	-0.06
ALSA 19419M001	E	0.96	1.31	0.84	0.51	-0.84	-0.35	-1.27	-0.67
ALSA 19419M001	U	0.79	0.71	0.22	0.26	0.41	-1.32	0.44	0.99
AMUR 19388M001	N	1.39	-0.81	-0.45	-0.36	0.76	1.50	2.71	0.68
AMUR 19388M001	E	0.89	0.16	0.06	0.02	0.16	-0.25	0.65	-2.05
AMUR 19388M001	U	4.00	2.03	-2.04	2.88	-5.90	-0.02	-5.39	-3.92
BLAZ 10074M002	N	1.12	-1.76	-0.13	-1.39	0.60	0.50	-0.69	1.20
BLAZ 10074M002	E	1.28	-0.93	-0.71	-2.21	1.36	-0.47	0.51	-1.10
BLAZ 10074M002	U	3.69	2.04	-0.69	1.76	-3.29	0.67	4.04	6.82
BIDA 00000M000	N	0.57	-0.56	-0.91	-0.05	-0.03	-0.17	0.31	0.82
BIDA 00000M000	E	1.01	0.59	-1.02	-0.39	-0.76	-1.25	-0.78	1.36
BIDA 00000M000	U	5.43	1.24	-0.04	-1.11	4.28	5.87	-3.23	-10.53
BRZR 19387M001	N	1.51	0.60	1.90	1.68	-1.98	0.25	-1.19	-1.23
BRZR 19387M001	E	0.41	0.80	0.51	0.04	0.04	-0.16	-0.20	-0.13
BRZR 19387M001	U	2.36	-1.22	1.08	2.06	-2.98	1.87	-2.16	-3.06
CACE 13447M001	N	0.38	0.19	0.04	-0.36	-0.53	-0.50	-0.33	-0.22
CACE 13447M001	E	0.70	-0.23	-0.35	-0.12	-0.41	-0.44	0.23	1.54
CACE 13447M001	U	2.92	0.32	-1.45	-4.24	-0.84	5.05	-0.33	-2.17
CANT 13438M001	N	0.69	-0.05	0.14	0.98	-0.68	0.32	-1.11	0.20
CANT 13438M001	E	0.46	0.62	-0.34	-0.71	-0.28	0.16	0.19	0.35
CANT 13438M001	U	4.94	0.14	-5.60	8.62	-5.02	3.76	-0.93	-0.67
CHER 00000M000	N	0.77	-1.03	0.84	0.30	-0.26	-0.15	-1.29	0.01
CHER 00000M000	E	1.51	-0.69	0.25	-2.74	1.11	-0.33	-2.05	0.18
CHER 00000M000	U	4.76	3.56	-5.11	0.86	1.90	-0.02	-9.55	1.22
CREU 13432M001	N	0.65	-0.59	0.84	-0.96	0.17	-0.14	0.58	0.42
CREU 13432M001	E	0.81	-1.81	0.04	0.12	0.09	0.49	0.47	-0.36
CREU 13432M001	U	2.12	1.25	0.07	-1.09	-2.23	-4.38	-0.13	0.30
EBRE 13410M001	N	0.77	-0.11	-0.39	-0.62	0.13	0.16	1.68	-0.42
EBRE 13410M001	E	0.63	-0.55	1.12	-0.68	-0.34	-0.20	-0.05	0.46
EBRE 13410M001	U	1.19	-0.37	-0.13	-2.66	0.02	-0.01	-1.08	-0.39
ELGE 19353S001	N	1.81	1.56	0.63	2.02	0.91	-0.55	-2.92	-1.75
ELGE 19353S001	E	0.96	-0.16	-0.38	-0.95	1.27	0.06	1.62	-0.46
ELGE 19353S001	U	3.36	2.76	0.03	-2.48	4.42	-2.88	-3.60	-3.63
EMAZ 17001M001	N	1.19	0.95	1.06	1.28	-0.15	-0.21	-2.18	-0.15
EMAZ 17001M001	E	0.88	1.74	-0.25	-0.28	-0.07	-1.08	-0.22	0.48
EMAZ 17001M001	U	4.45	-2.48	-0.46	-0.84	-1.86	3.56	7.02	-6.83
GERN 19389M001	N	0.80	-0.21	0.63	0.87	-0.03	0.91	-0.98	-0.92
GERN 19389M001	E	0.66	0.78	0.48	-0.32	0.23	-1.12	0.57	0.07
GERN 19389M001	U	3.81	0.95	-3.38	0.75	0.83	6.04	-3.23	-5.15
HOND 15012M002	N	0.73	-0.54	-0.30	-0.58	-0.09	1.16	0.74	0.79
HOND 15012M002	E	0.39	0.03	0.02	0.27	-0.17	-0.67	-0.47	0.39
HOND 15012M002	U	2.63	1.38	2.65	-0.59	-5.56	-0.70	-0.90	0.16
IGEL 19352S001	N	0.96	0.77	1.24	1.10	0.35	-0.32	-1.15	-0.77
IGEL 19352S001	E	0.60	0.41	0.73	-0.67	0.08	0.20	-0.97	-0.24
IGEL 19352S001	U	2.41	1.27	-0.83	-0.71	-1.33	-1.58	4.50	-2.75
ISPS 19484M001	N	0.95	0.17	0.86	1.38	-1.58	-0.05	-0.51	0.04
ISPS 19484M001	E	1.94	3.12	0.99	-3.33	-0.35	-0.47	0.58	0.18
ISPS 19484M001	U	5.35	10.12	-2.51	-4.06	2.67	-3.86	-3.81	-3.11
KAST 19499M001	N	1.19	0.01	0.30	-0.42	-0.90	-0.06	-1.30	2.39
KAST 19499M001	E	0.65	1.01	-0.10	-0.87	0.15	-0.43	0.58	0.49
KAST 19499M001	U	8.10	-5.14	-6.77	-8.11	-0.37	5.54	-3.78	14.51
LAZK 19354S001	N	0.56	0.21	-0.49	-0.78	-0.20			
LAZK 19354S001	E	0.30	0.20	0.35	0.27	0.16			

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	-0.73	0.72	0.30
12	ALAC 13433M001	I W	-0.74	-0.06	-1.30
15	ALBA 13452M001	I W	0.25	-1.04	-4.40
21	ALME 13437M001	I W	-2.15	-0.76	2.71
47	BCLN 13412M001	I W	-0.99	-2.70	-1.48
52	BELL 13431M001	I W	0.31	-1.14	2.92
71	BORR 13480M001	I W	-1.85	-1.27	-2.32
76	BRST 10004M004	I W	-1.14	-1.39	6.56
104	CACE 13447M001	I W	0.09	-0.31	2.19
116	CANT 13438M001	I W	-0.52	0.57	-1.17
117	CARG 19412M001	I W	2.46	-1.85	-4.56
122	CASE 13494M001	I W	-1.38	0.99	-1.65
128	CEU1 13449M002	I W	0.49	-0.70	-4.74
143	COBA 13453M001	I W	0.02	0.45	-5.14
162	CREU 13432M001	I W	-1.59	1.43	2.33
204	EBRE 13410M001	I W	0.50	2.36	-0.88
222	ESCO 13435M001	I W	-3.62	-0.66	6.33
299	HUEL 13451M001	I W	-0.80	-1.91	1.38
316	IZAN 31309M002	I W	0.31	1.56	-4.76
385	LLIV 13436M001	I W	1.09	1.25	2.38
390	LPAL 81701M001	I W	5.74	-0.57	-3.05
392	LROC 10023M001	I W	-1.00	0.10	4.59
421	MAS1 31303M002	I W	1.60	0.62	-4.73
432	MELI 19379M001	I W	2.08	1.12	-1.08
493	PASA 19351S001	I W	0.16	-1.24	0.62
553	RIO1 13448M002	I W	-1.28	-0.14	-0.23
558	SALA 13469M001	I W	0.41	1.41	-5.18
566	SCOA 10088M002	I W	-0.86	-0.66	0.62
574	SFER 13402M004	I W	1.76	-2.85	-1.34
599	SONS 13446M001	I W	1.24	3.82	5.05
700	VALA 13463M002	I W	0.29	1.18	2.12
704	VALE 13439M001	I W	0.27	2.50	-2.53
715	VIGO 13450M001	I W	1.42	-1.67	1.75
755	ZARA 13462M001	I W	-0.94	0.86	3.05
764	ZIMM 14001M004	I W	-0.91	-0.02	5.65
	RMS / COMPONENT		1.63	1.49	3.46
	MEAN		-0.00	0.00	-0.00
	MIN		-3.62	-2.85	-5.18
	MAX		5.74	3.82	6.56

NUMBER OF PARAMETERS : 3
NUMBER OF COORDINATES : 105
RMS OF TRANSFORMATION : 2.37 MM

BARYCENTER COORDINATES:

LATITUDE : 39 59 39.06
LONGITUDE : - 3 32 13.48
HEIGHT : -37.255 KM

PARAMETERS:

TRANSLATION IN N : 0.00 +- 0.40 MM
TRANSLATION IN E : 0.00 +- 0.40 MM
TRANSLATION IN U : -0.00 +- 0.40 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          18461823
NUMBER OF UNKNOWN               216477
NUMBER OF DEGREES OF FREEDOM    18245346
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)     180
VARIANCE FACTOR                  1.690286125588069

Helmert Transformation Parameters With Respect to Combined Solution:
-----
Sol  Rms (m)      Translation (m)      Rotation (")      Scale (ppm)
      X          Y          Z          X          Y          Z
-----
  1  0.00220      0.0449  0.0531 -0.0343 -0.0010  0.0018  0.0015 -0.00159
  2  0.00176     -0.0091  0.0008  0.0028 -0.0000 -0.0003 -0.0000  0.00081
  3  0.00207      0.0223  0.0479 -0.0237 -0.0008  0.0010  0.0014 -0.00020
  4  0.00196     -0.0345 -0.0142  0.0415  0.0002 -0.0018 -0.0005 -0.00021
  5  0.00212      0.0001 -0.0258  0.0082  0.0005 -0.0002 -0.0007 -0.00098
  6  0.00227     -0.0129 -0.0660  0.0161  0.0013 -0.0007 -0.0017 -0.00046
  7  0.00207     -0.0310 -0.0649  0.0369  0.0011 -0.0016 -0.0018 -0.00052
```

```
Statistics of individual solutions:
-----
File  RMS (m)      DOF  Chi**2/DOF  #Observations authentic / pseudo  #Parameters explicit / implicit / singular
-----
  1  0.00128      2633663      1.63      2664163      3      891      29612      0
  2  0.00129      2623185      1.65      2654317      3      906      30229      0
  3  0.00132      2590338      1.74      2621665      3      963      30367      0
  4  0.00135      2578195      1.82      2611624      3      963      32469      0
  5  0.00133      2580051      1.78      2613352      3      966      32338      0
  6  0.00127      2632105      1.62      2664049      3      966      30981      1
  7  0.00125      2602208      1.55      2632653      3      942      29506      2
```

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 22:058:00000 22:064:86370 LEICA GR50 -----
ALDA  A  1 P 22:058:00000 22:064:86370 LEICA GR10 -----
ALSA  A  1 P 22:058:00000 22:064:86370 LEICA GR50 -----
AMUR  A  1 P 22:058:00000 22:064:86370 LEICA GR10 -----
BIAZ  A  1 P 22:058:00000 22:064:86370 SPECTRA SP90M -----
BIDA  A  1 P 22:058:00000 22:064:86370 LEICA GR10 -----
BRZR  A  1 P 22:058:00000 22:064:86370 LEICA GR30 -----
CACE  A  1 P 22:058:00000 22:064:86370 TRIMBLE NETR9 -----
CANT  A  1 P 22:058:00000 22:064:86370 LEICA GR10 -----
CHER  A  1 P 22:058:00000 22:064:86370 LEICA GR30 -----
CREU  A  1 P 22:058:00000 22:064:86370 LEICA GR50 -----
EBRE  A  1 P 22:058:00000 22:064:86370 LEICA GR50 -----
ELGE  A  1 P 22:058:00000 22:064:86370 LEICA GR30 -----
EMAZ  A  1 P 22:058:00000 22:064:86370 LEICA GR30 -----
GERN  A  1 P 22:058:00000 22:064:86370 LEICA GR30 -----
HOND  A  1 P 22:058:00000 22:064:86370 LEICA GR50 -----
IGEL  A  1 P 22:058:00000 22:064:86370 LEICA GR30 -----
ISPS  A  1 P 22:058:00000 22:064:86370 TRIMBLE NETR9 -----
KAST  A  1 P 22:058:00000 22:064:86370 LEICA GR30 -----
LAZK  A  1 P 22:058:00000 22:061:86370 LEICA GR30 -----
LEIT  A  1 P 22:058:00000 22:064:86370 LEICA GR50 -----
ORON  A  1 P 22:058:00000 22:064:86370 LEICA GR50 -----
PAS2  A  1 P 22:058:00030 22:064:86370 STONEX SC2200 -----
PASA  A  1 P 22:058:00000 22:064:86370 LEICA GR30 -----
RIO1  A  1 P 22:058:00000 22:064:86370 LEICA GR25 -----
SALA  A  1 P 22:058:00000 22:064:86370 LEICA GR50 -----
SCOA  A  1 P 22:058:00000 22:064:86370 LEICA GR50 -----
SOPU  A  1 P 22:058:00000 22:064:86370 LEICA GR30 -----
TERU  A  1 P 22:058:00000 22:063:86370 LEICA GR50 -----
VITO  A  1 P 22:058:00000 22:064:86370 LEICA GR10 -----
YEBE  A  1 P 22:058:00000 22:064:86370 LEICA GR50 -----
ZARA  A  1 P 22:058:00000 22:064:86370 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 22:058:00000 22:064:86370 LEIAS04      LEIS -----
ALDA  A  1 P 22:058:00000 22:064:86370 LEIAS10      NONE -----
ALSA  A  1 P 22:058:00000 22:064:86370 LEIAS10      NONE -----
AMUR  A  1 P 22:058:00000 22:064:86370 LEIAS10      NONE -----
```

```

BIAZ A 1 P 22:058:00000 22:064:86370 LEIAR25 LEIT -----
BIDA A 1 P 22:058:00000 22:064:86370 LEIAS10 NONE -----
BRZR A 1 P 22:058:00000 22:064:86370 LEIAS10 NONE -----
CACE A 1 P 22:058:00000 22:064:86370 TRM29659.00 NONE -----
CANT A 1 P 22:058:00000 22:064:86370 LEIAR25_R4 LEIT 25066
CHER A 1 P 22:058:00000 22:064:86370 LEIAR10 NONE -----
CREU A 1 P 22:058:00000 22:064:86370 LEIAR25_R4 NONE 26357
EBRE A 1 P 22:058:00000 22:064:86370 LEIAR25_R4 NONE 26359
ELGE A 1 P 22:058:00000 22:064:86370 LEIAR25_R4 LEIT -----
EMAZ A 1 P 22:058:00000 22:064:86370 LEIAS10 NONE -----
GERN A 1 P 22:058:00000 22:064:86370 LEIAS10 NONE -----
HOND A 1 P 22:058:00000 22:064:86370 LEIAR20 LEIM 41012
IGEL A 1 P 22:058:00000 22:064:86370 LEIAR20 LEIM 43011
ISPS A 1 P 22:058:00000 22:064:86370 TRM59900.00 SCIS -----
KAST A 1 P 22:058:00000 22:064:86370 LEIAS10 NONE -----
LAZK A 1 P 22:058:00000 22:061:86370 LEIAR25_R4 LEIT -----
LEIT A 1 P 22:058:00000 22:064:86370 LEIAR10 NONE -----
ORDN A 1 P 22:058:00000 22:064:86370 LEIAR10 NONE -----
PAS2 A 1 P 22:058:00030 22:064:86370 LEIAR20 LEIM 73034
PASA A 1 P 22:058:00000 22:064:86370 LEIAR20 LEIM 73034
RID1 A 1 P 22:058:00000 22:064:86370 LEIAR25_R4 LEIT 25138
SALA A 1 P 22:058:00000 22:064:86370 LEIAR25 NONE -----
SCDA A 1 P 22:058:00000 22:064:86370 TRM55971.00 NONE -----
SOPU A 1 P 22:058:00000 22:064:86370 LEIAS10 NONE -----
TERU A 1 P 22:058:00000 22:063:86370 LEIAR20 LEIM 49044
VITO A 1 P 22:058:00000 22:064:86370 LEIAS10 NONE -----
YEBE A 1 P 22:058:00000 22:064:86370 LEIAR20 LEIM 49016
ZARA A 1 P 22:058:00000 22:064:86370 TRM29659.00 NONE -----

```

7.3 Eccentricities

```

*
*SITE PT SOLN T DATA_START_ DATA_END_ AXE ARP->BENCHMARK(M) UP_----- NORTH_-- EAST_----
ACOR A 1 P 22:058:00000 22:064:86370 UNE 3.0460 0.0000 0.0000
ALDA A 1 P 22:058:00000 22:064:86370 UNE 0.0000 0.0000 0.0000
ALSA A 1 P 22:058:00000 22:064:86370 UNE 0.0000 0.0000 0.0000
AMUR A 1 P 22:058:00000 22:064:86370 UNE 0.0000 0.0000 0.0000
BIAZ A 1 P 22:058:00000 22:064:86370 UNE 0.0000 0.0000 0.0000
BIDA A 1 P 22:058:00000 22:064:86370 UNE 0.0000 0.0000 0.0000
BRZR A 1 P 22:058:00000 22:064:86370 UNE 0.0771 0.0000 0.0000
CACE A 1 P 22:058:00000 22:064:86370 UNE 0.0600 0.0000 0.0000
CANT A 1 P 22:058:00000 22:064:86370 UNE 3.0490 0.0000 0.0000
CHER A 1 P 22:058:00000 22:064:86370 UNE 0.0000 0.0000 0.0000
CREU A 1 P 22:058:00000 22:064:86370 UNE 0.0770 0.0000 0.0000
EBRE A 1 P 22:058:00000 22:064:86370 UNE 0.0770 0.0000 0.0000
ELGE A 1 P 22:058:00000 22:064:86370 UNE 0.0000 0.0000 0.0000
EMAZ A 1 P 22:058:00000 22:064:86370 UNE 0.0350 0.0000 0.0000
GERN A 1 P 22:058:00000 22:064:86370 UNE 0.0771 0.0000 0.0000
HOND A 1 P 22:058:00000 22:064:86370 UNE 0.0771 0.0000 0.0000
IGEL A 1 P 22:058:00000 22:064:86370 UNE 0.0000 0.0000 0.0000
ISPS A 1 P 22:058:00000 22:064:86370 UNE 0.0350 0.0000 0.0000
KAST A 1 P 22:058:00000 22:064:86370 UNE 0.0350 0.0000 0.0000
LAZK A 1 P 22:058:00000 22:061:86370 UNE 0.0000 0.0000 0.0000
LEIT A 1 P 22:058:00000 22:064:86370 UNE 0.0000 0.0000 0.0000
ORDN A 1 P 22:058:00000 22:064:86370 UNE 0.0000 0.0000 0.0000
PAS2 A 1 P 22:058:00030 22:064:86370 UNE 0.0000 0.0000 0.0000
PASA A 1 P 22:058:00000 22:064:86370 UNE 0.0000 0.0000 0.0000
RID1 A 1 P 22:058:00000 22:064:86370 UNE 0.0606 0.0000 0.0000
SALA A 1 P 22:058:00000 22:064:86370 UNE 0.0600 0.0000 0.0000
SCDA A 1 P 22:058:00000 22:064:86370 UNE 0.0000 0.0000 0.0000
SOPU A 1 P 22:058:00000 22:064:86370 UNE 0.0771 0.0000 0.0000
TERU A 1 P 22:058:00000 22:063:86370 UNE 0.0600 0.0000 0.0000
VITO A 1 P 22:058:00000 22:064:86370 UNE 0.0000 0.0000 0.0000
YEBE A 1 P 22:058:00000 22:064:86370 UNE 0.0600 0.0000 0.0000
ZARA A 1 P 22:058:00000 22:064:86370 UNE 3.2590 0.0000 0.0000

```

8 References

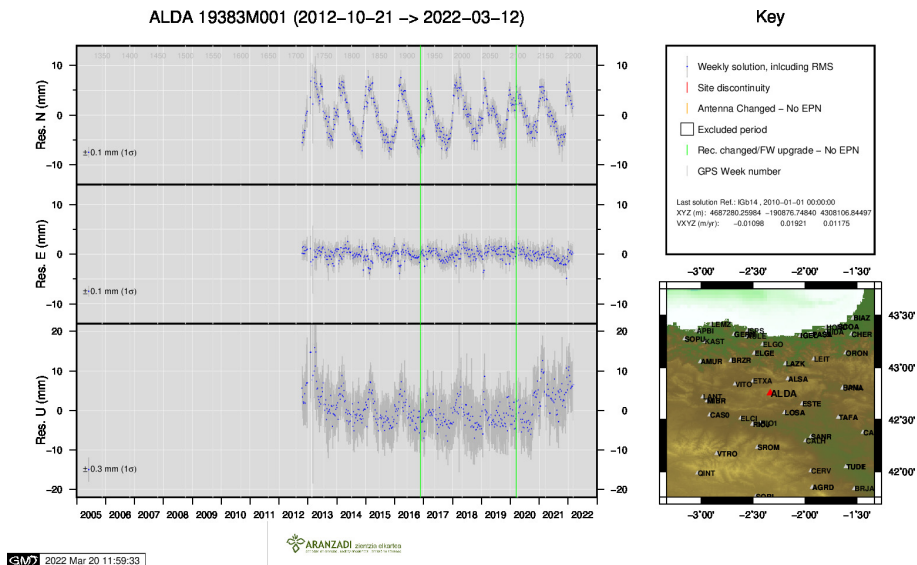
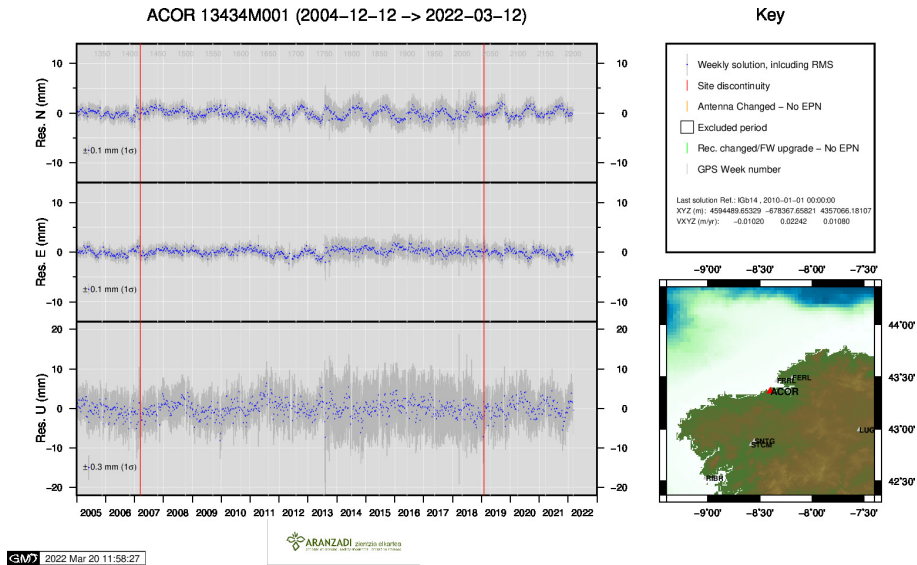
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign*. etrs89.ensg.ign.fr/memo-V8.pdf

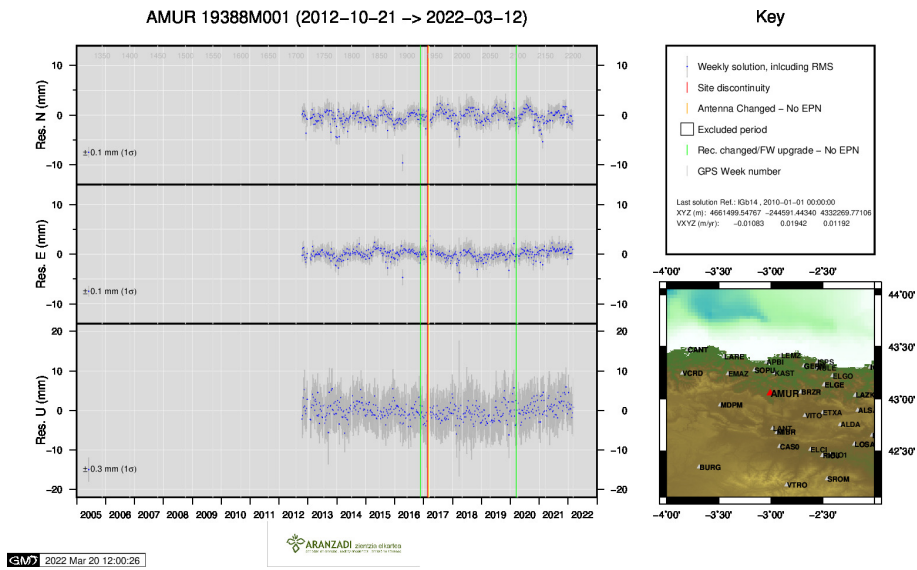
EPN Coordination Group and the EPN Central Bureau (2018): *Guidelines for the EPN Analysis Centres*. epncb.oma.be/documentation/guidelines/guidelines_analysis_centres.pdf

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

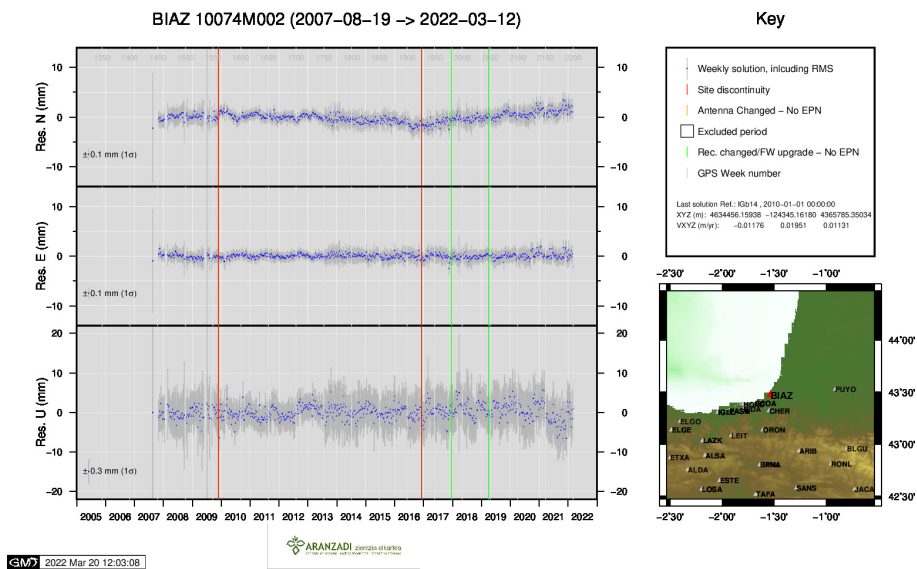
9 Cumulative Time Series

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

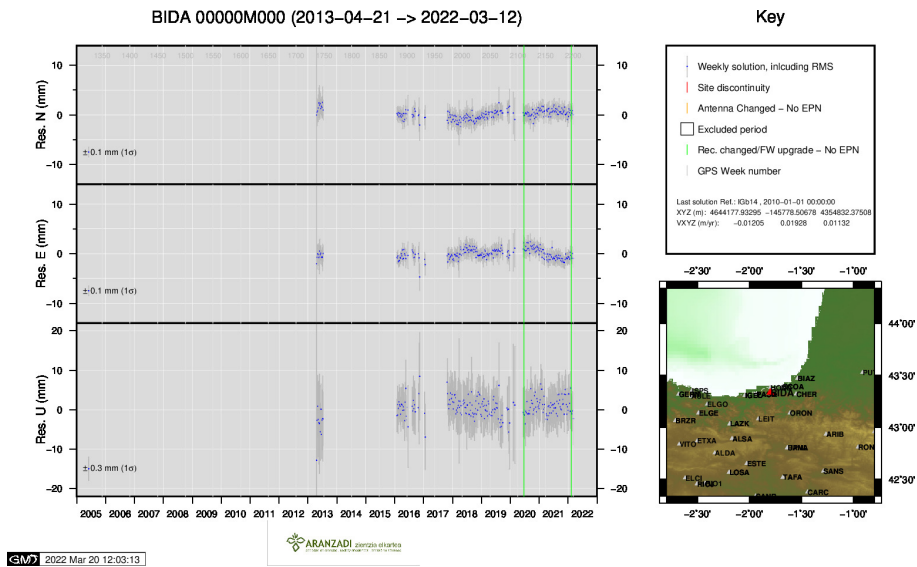




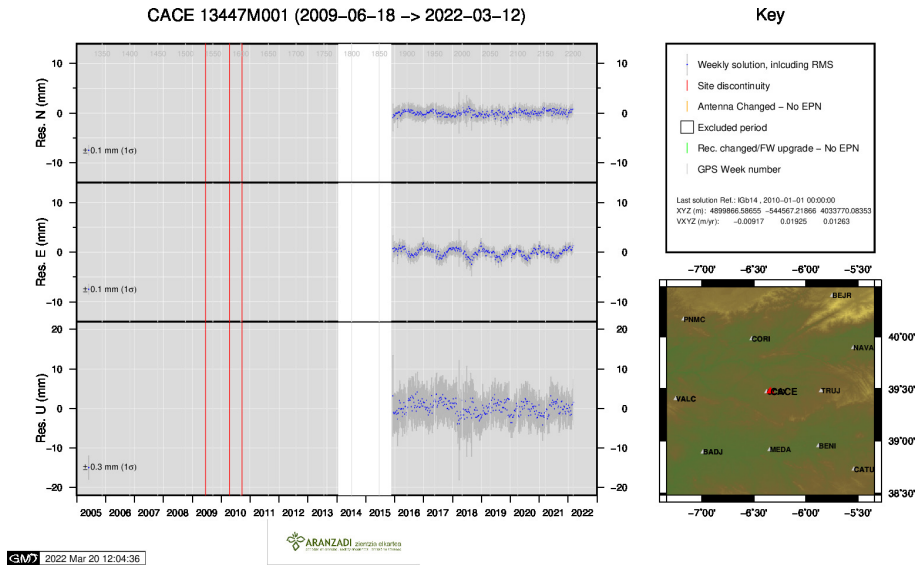
3) AMUR



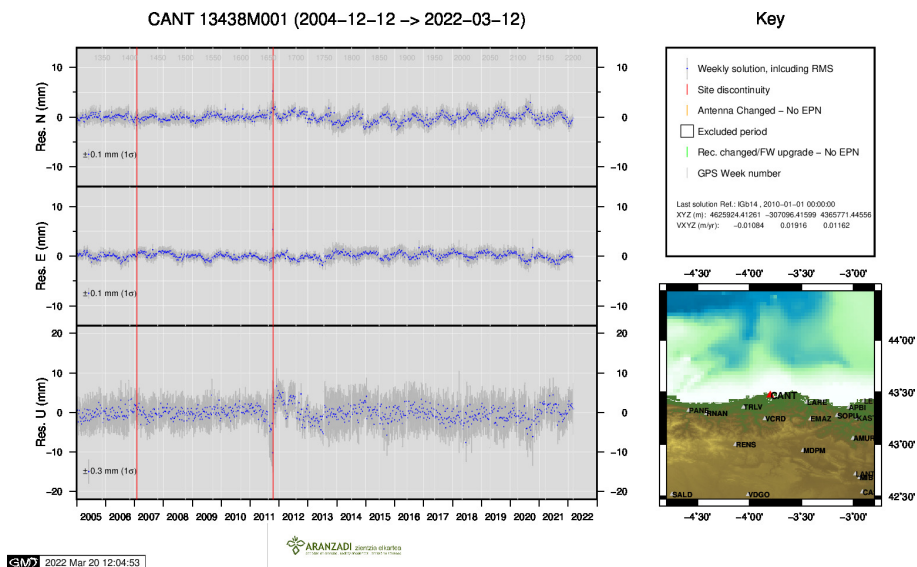
4) BIAZ



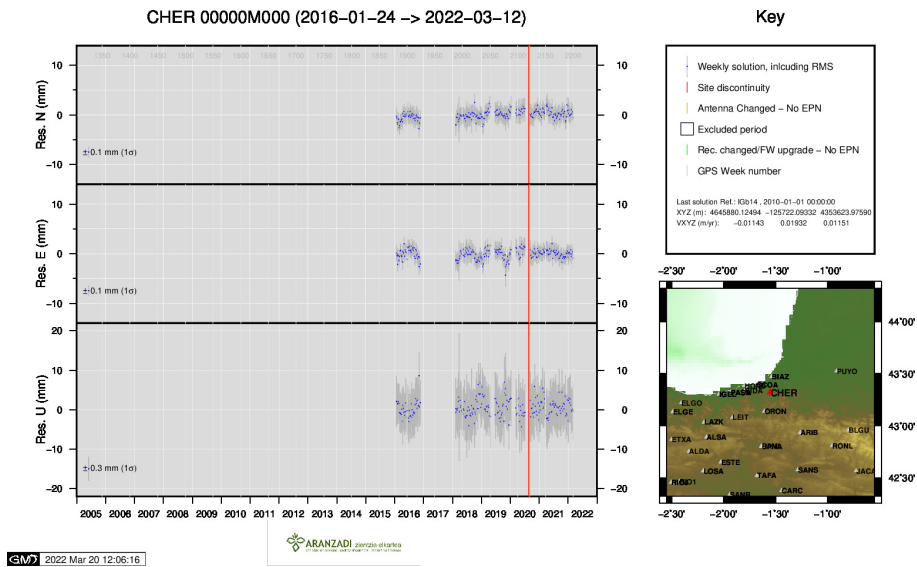
5) BIDA



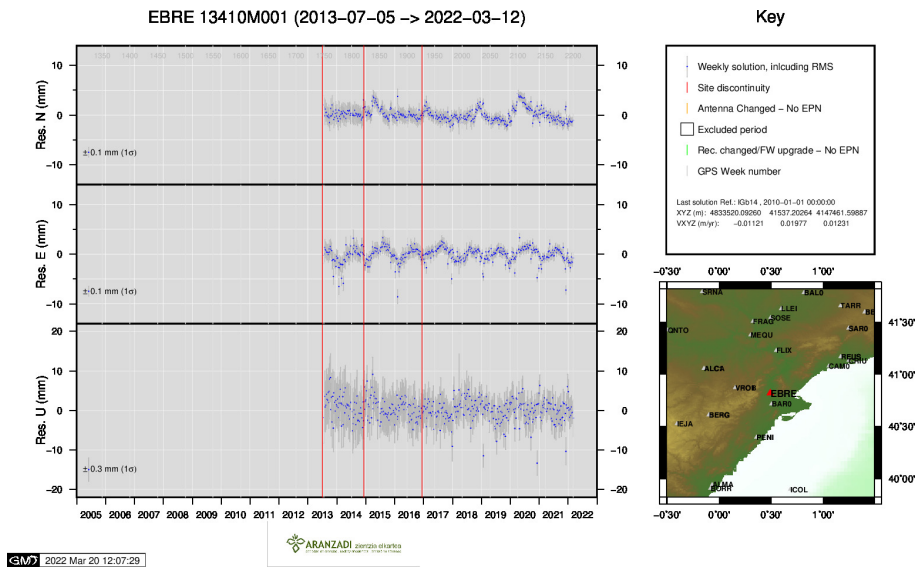
6) CACE



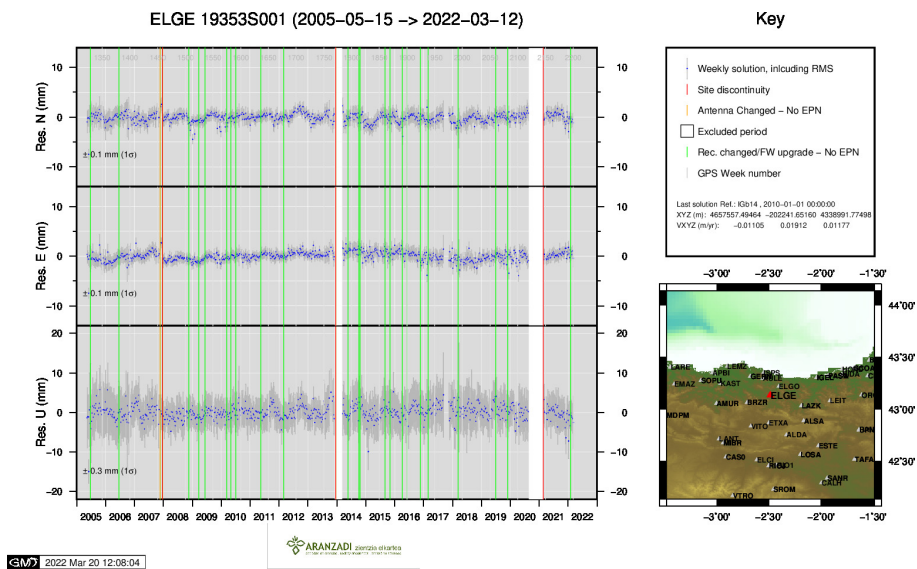
7) CANT



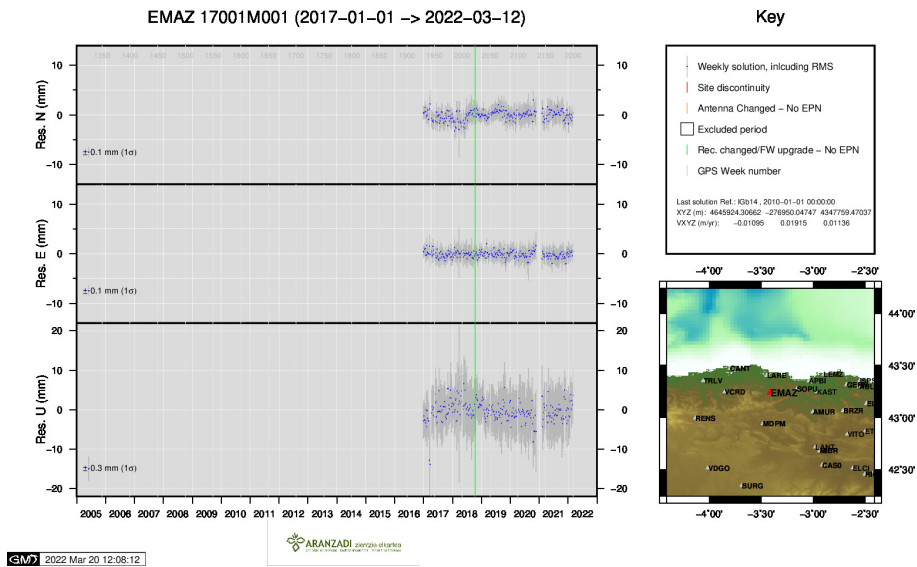
8) CHER



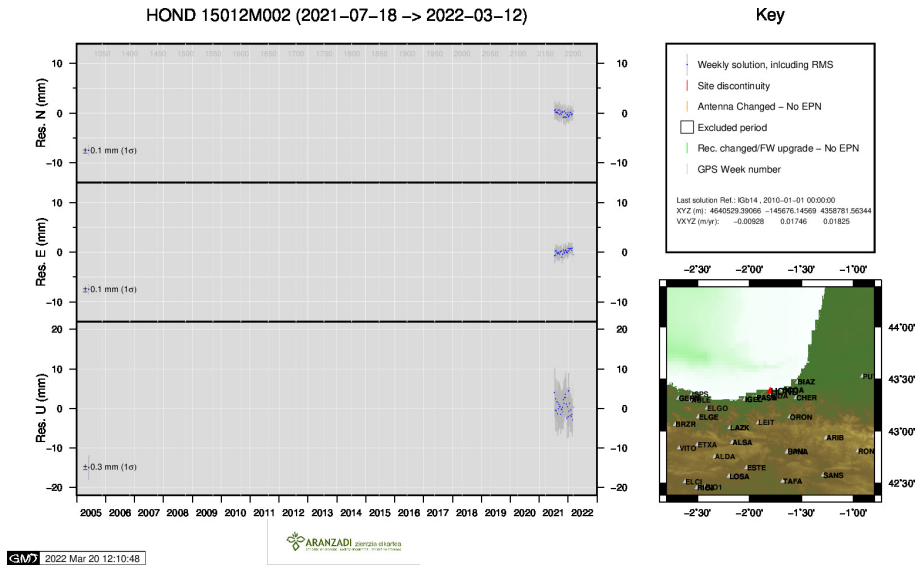
9) EBRE



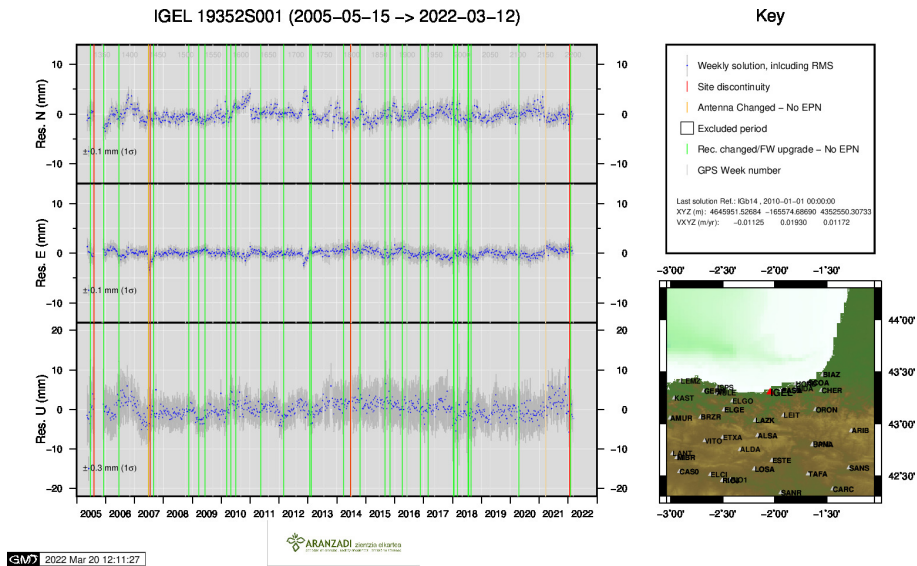
10) ELGE



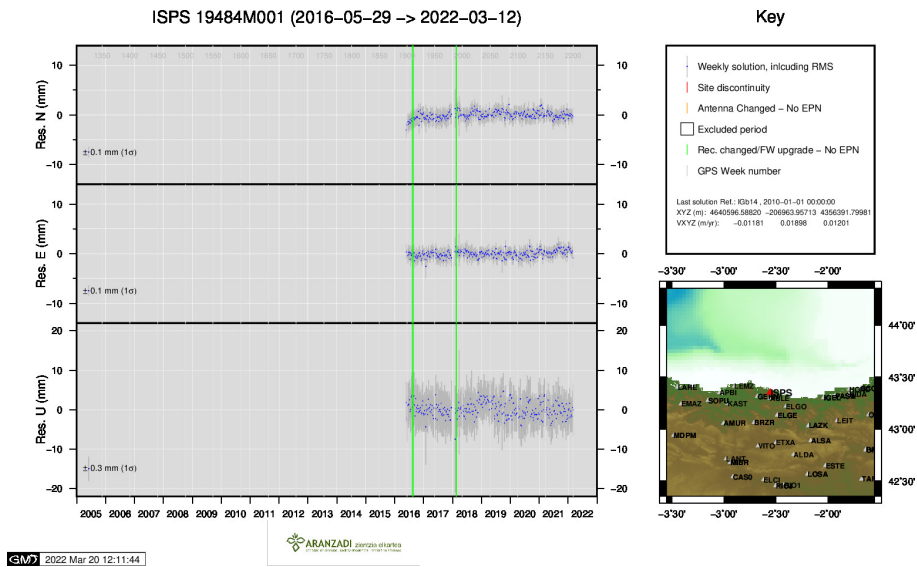
11) EMAZ



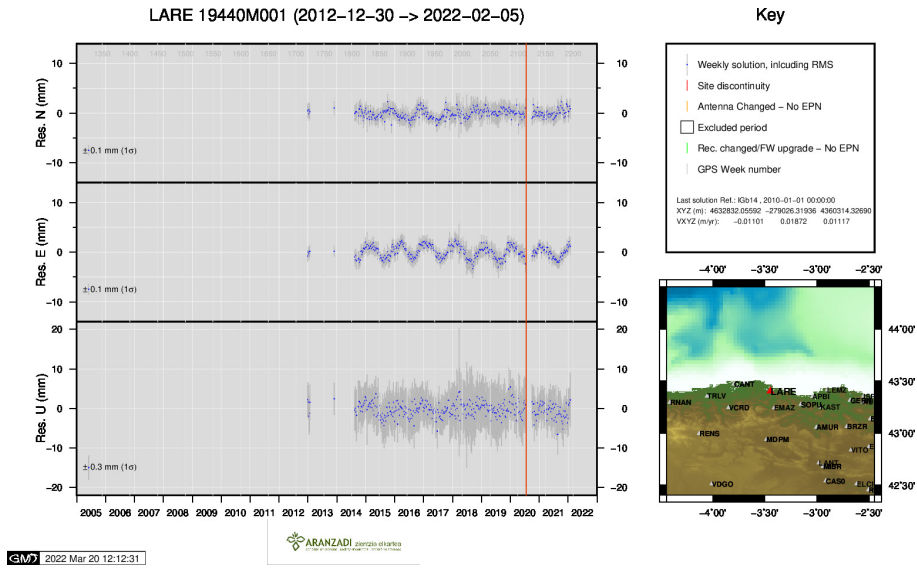
12) HOND



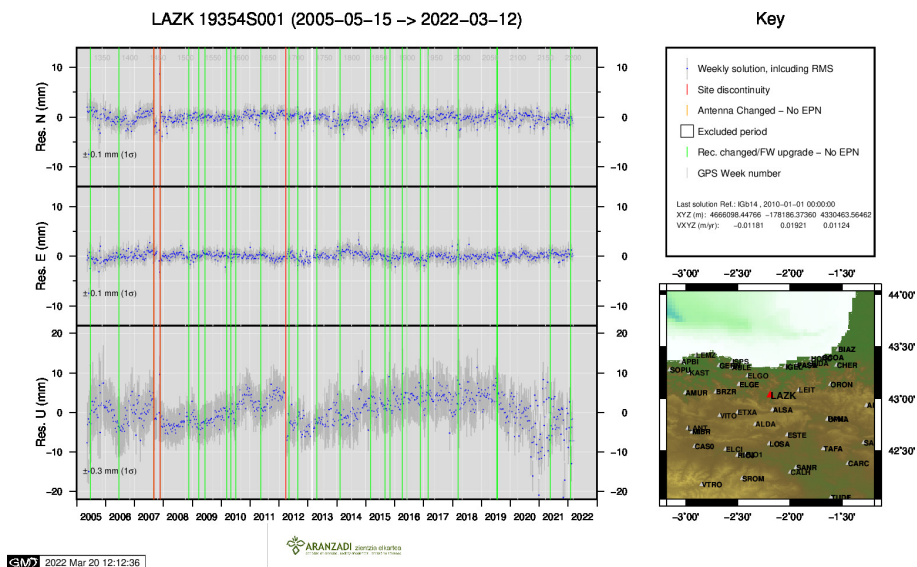
13) IGEL



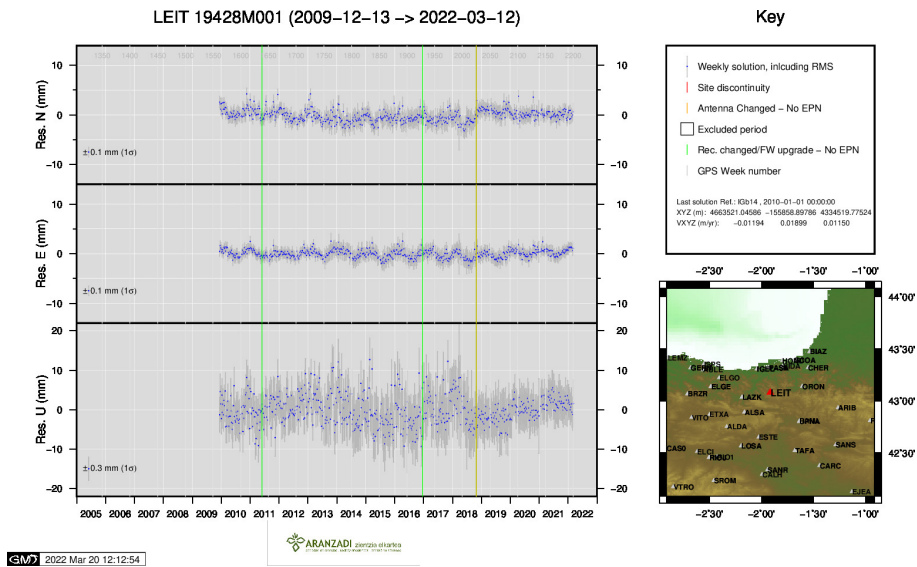
14) ISPS



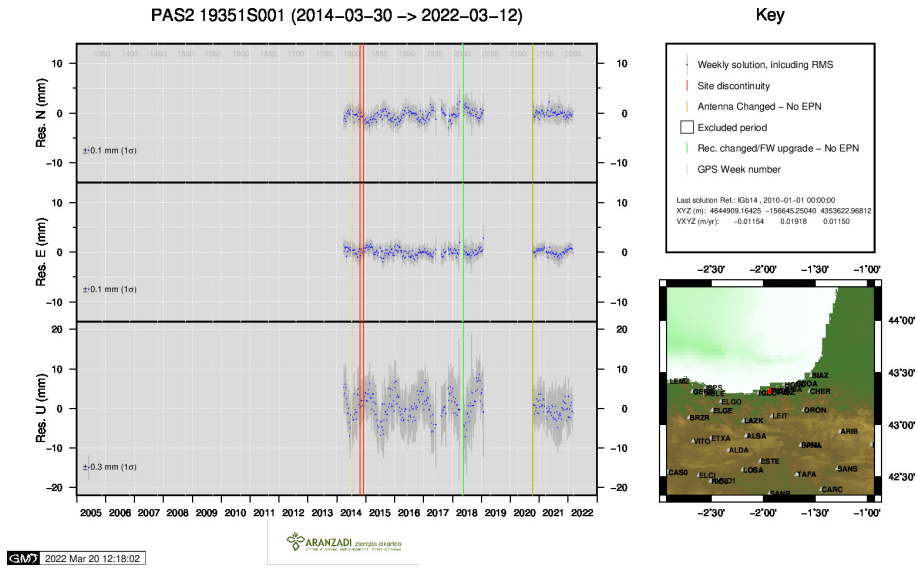
15) LARE



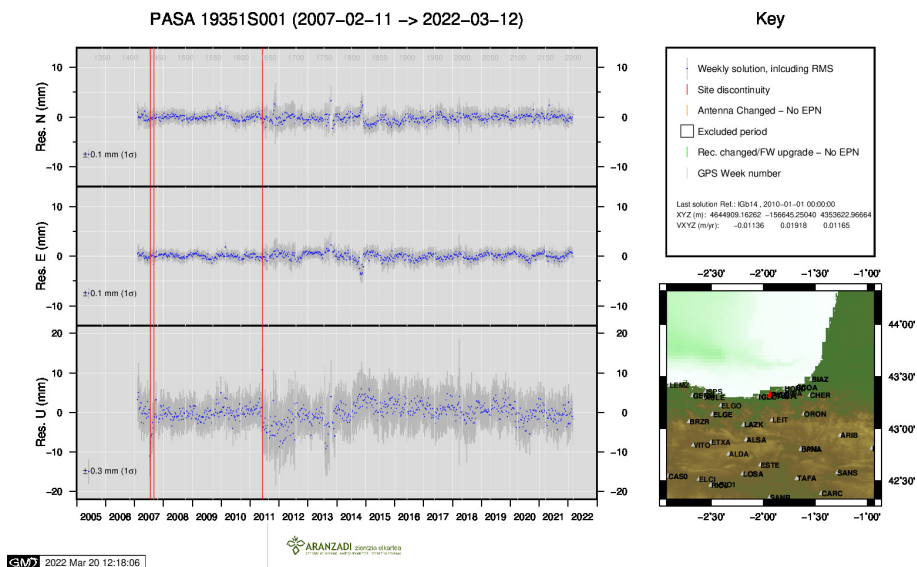
16) LAZK



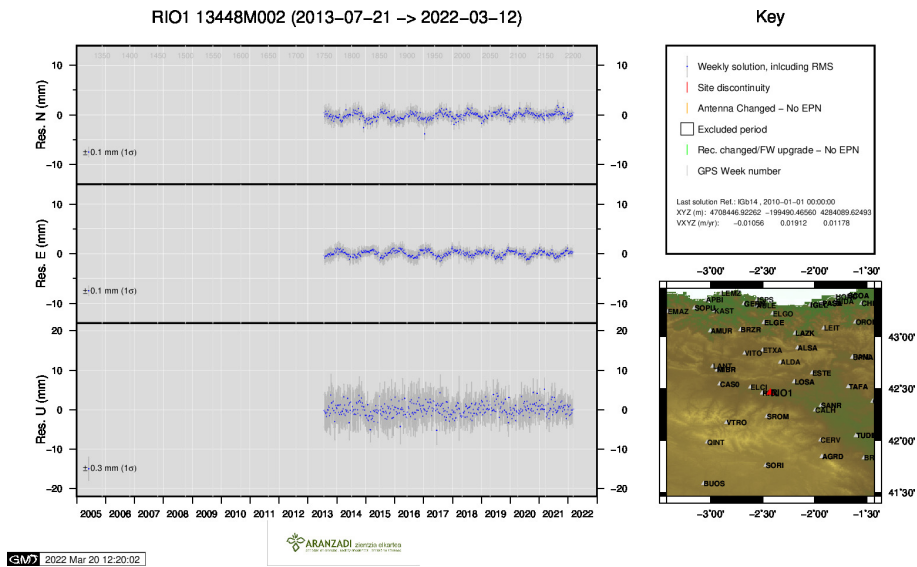
17) LEIT



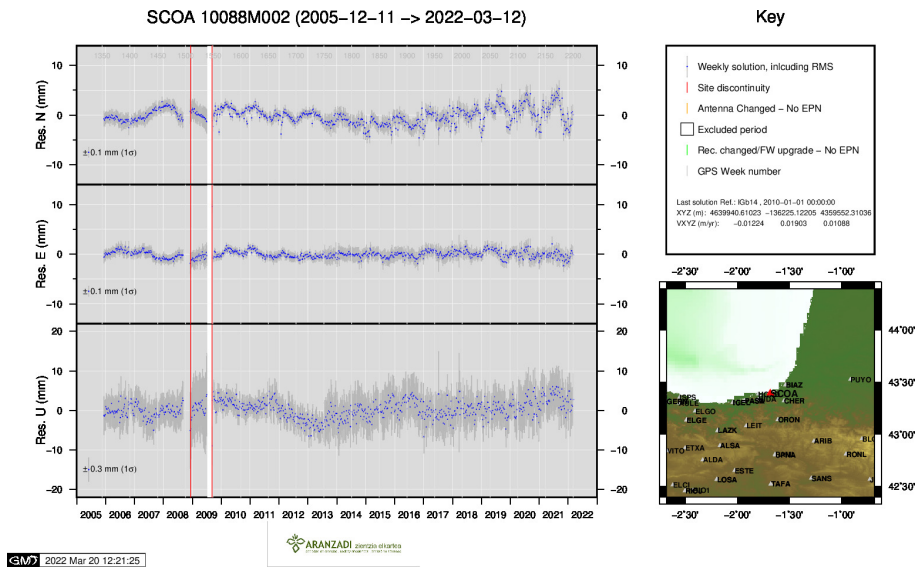
18) PAS2



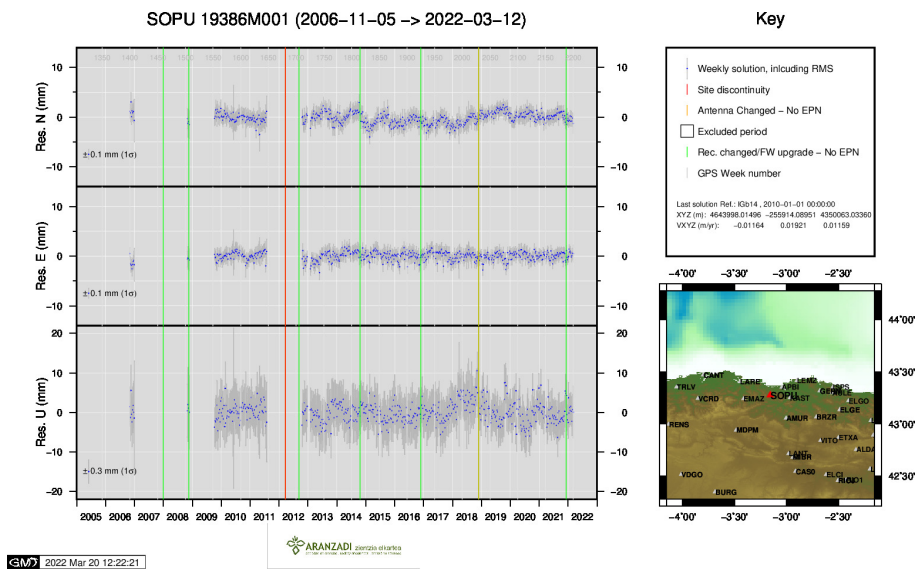
19) PASA



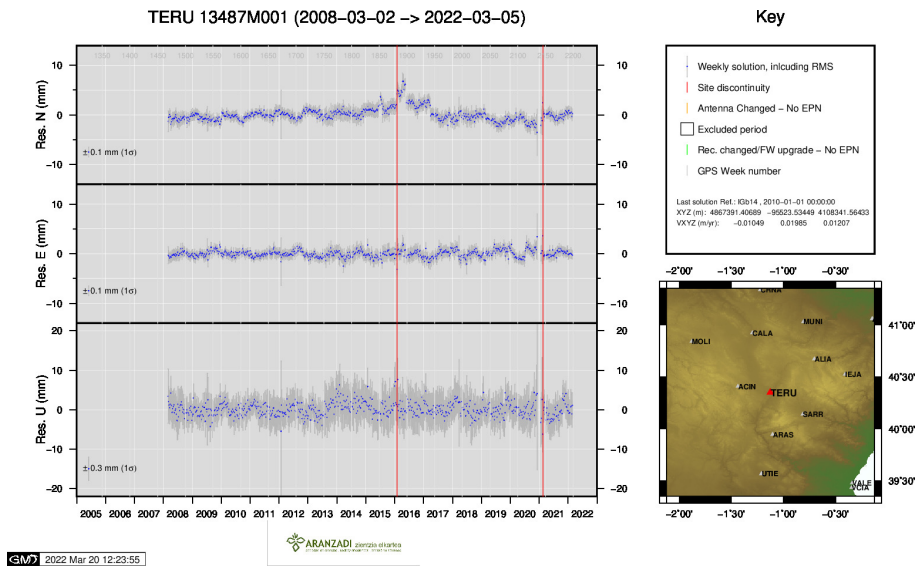
20) RIO1



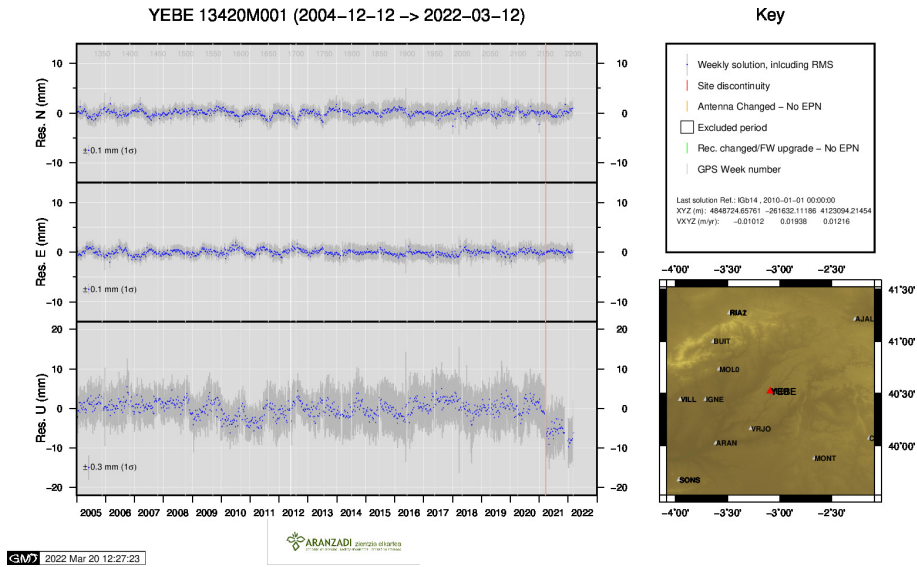
21) SCOA



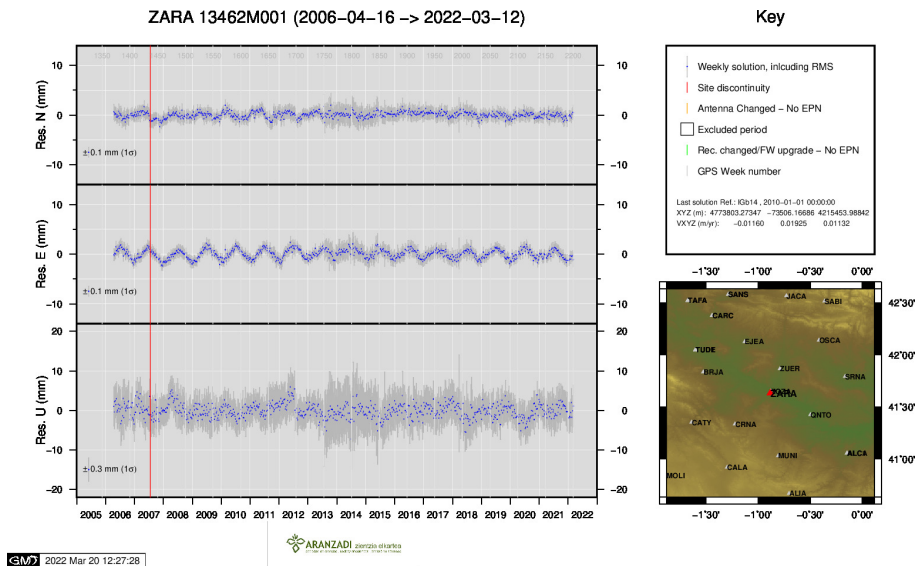
22) SOPU



23) TERU



24) YEBE



25) ZARA