

# ARA-DAC Weekly Analysis Result: 2205 (GFA)

## Technical Report

**GPS Week: 2205 (GFA)**

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

**ARA-DAC details:**

Contact person: J. Zurutuza

Contact mail: [geodesia@aranzadi.eus](mailto:geodesia@aranzadi.eus)

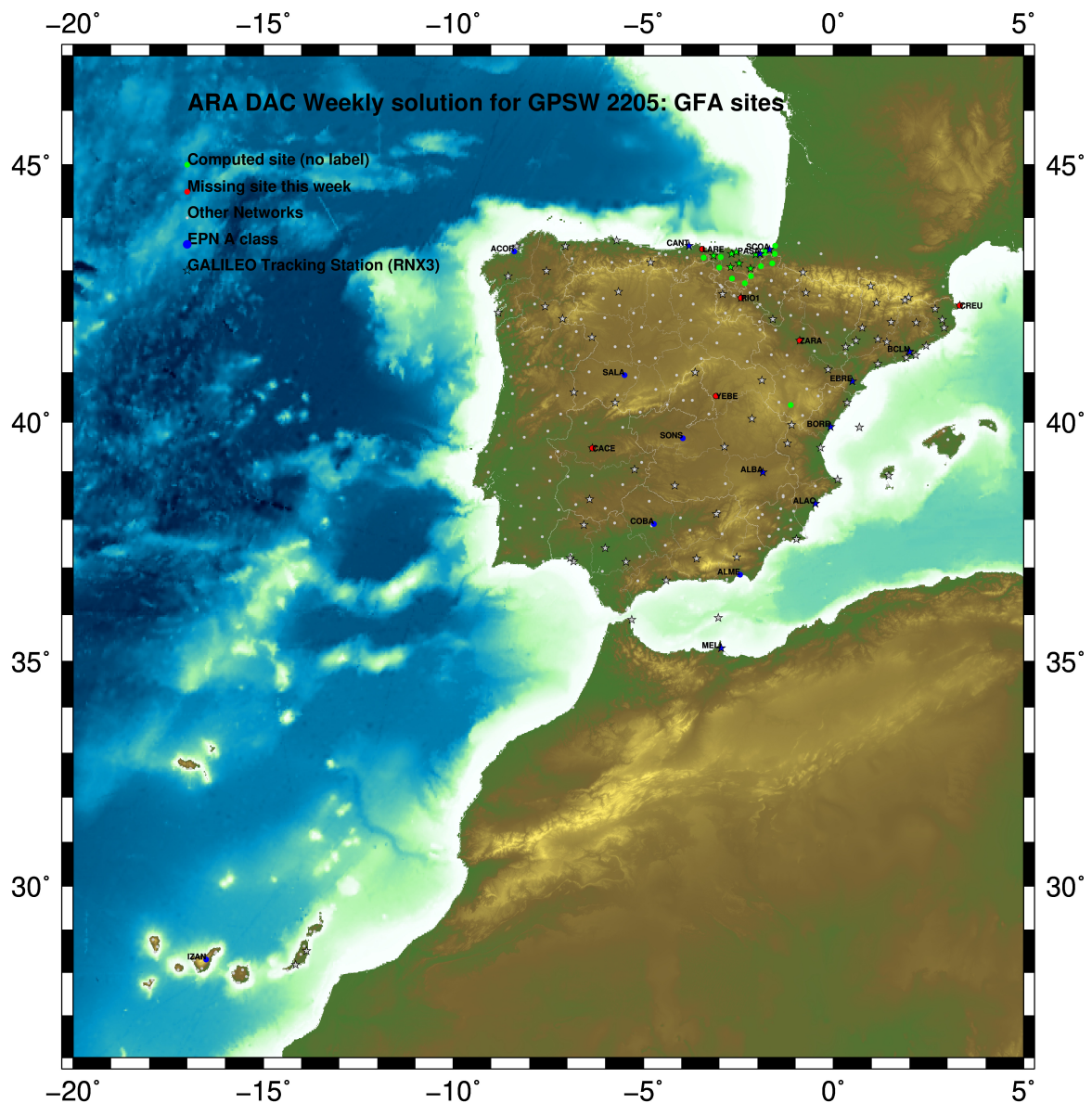
Report generated on 2022/05/01 at 12:51:43



# 1 Introduction

In may 2015 ARA (EUREF's acronym of the ARANZADI's Department of Applied Geodesy), kicks off as a EUREF's Operational Center. In July 2015, the Densification solutions ARA computes routinely in a weekly basis start being submitted to the EUREF's EPN Densification Project.

# 2 Map of Computed Sites



GM 2022 May 01 12:51:35

Fig.1: Computed Sites for GPS Week2205 (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.

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ARA LAC 2205 WEEK FINAL COMBINATION: PRECISE ORBITS                01-MAY-22 09:52
-----
LOCAL GEODETIC DATUM: IGB14                EPOCH: 2022-04-13 12:00:00
-----
NUM  STATION NAME          X (M)          Y (M)          Z (M)          FLAG
-----
  4  ACRD 13434M001        4594489.52889  -678367.38333  4357066.31590  W
 39  ALDA 19383M001        4687280.12225  -190876.51206  4308106.99603  A
 50  ALSA 19419M001        4677250.79421  -176770.33805  4319079.90600  A
 53  AMUR 19388M001        4661499.41482  -244591.20405  4332269.91705  A
100  BIAZ 10074M002        4634456.01243  -124344.92250  4365785.48908  A
101  BIDA 00000M000        4644177.78318  -145778.26947  4354832.51228  A
113  BRZR 19387M001        4662220.95167  -220769.84622  4333309.47002  A
116  CANT 13438M001        4625924.27736  -307096.18103  4365771.58720  W
154  CHER 00000M000        4645879.98281  -125721.85578  4353624.11655  A
204  EBRE 13410M001        4833519.95492   41537.44585  4147461.75165  W
180  ELGE 19353S001        4657557.35620  -202241.41745  4338991.91762  A
182  EMAZ 17001M001        4645924.16874  -276949.81240  4347759.60971  A
209  GERN 19389M001        4642811.28142  -217222.87081  4353278.90806  A
257  HOND 15012M002        4640529.27527  -145676.93023  4358781.78618  A
235  IGEL 19352S001        4645951.38628  -165574.44896  4352550.44914  A
240  ISPS 19484M001        4640596.43966  -206963.72446  4356391.94483  A
245  KAST 19499M001        4646949.03923  -240747.21845  4348015.02355  A
256  LAZK 19354S001        4666098.30135  -178186.13662  4330463.70178  A
261  LEIT 19428M001        4663520.89545  -155858.66282  4334519.91533  A
334  ORON 19427M001        4659695.74030  -130864.68136  4338948.91355  A
345  PAS2 19351S001        4644909.02102  -156645.01393  4353623.10823  A
493  PASA 19351S001        4644909.02125  -156645.01387  4353623.10832  W
558  SALA 13469M001        4803054.45322  -462131.01684  4158379.11375  W
566  SCDA 10088M002        4639940.46119  -136224.88694  4359552.44744  W
418  SODU 19386M001        4643997.86775  -255913.85258  4350063.17222  A
443  TERU 13487M001        4867391.27727  -95523.29069  4108341.71248  A
493  VITO 19385M001        4679397.66559  -218436.45072  4314898.40017  A

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### 5.2 ETRF2000 (ETRS89) Coordinates

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

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ETRF2000 FINAL COORD. wk 2205                01-MAY-22 09:52
-----
LOCAL GEODETIC DATUM: ETRF2000            EPOCH: 2022-04-13 12:00:00
-----
NUM  STATION NAME          X (M)          Y (M)          Z (M)          FLAG
-----
  4  ACRD 13434M001        4594489.85857  -678367.97636  4357065.86145  W
 39  ALDA 19383M001        4687280.51068  -190877.11462  4308106.53945  A
 50  ALSA 19419M001        4677251.18528  -176770.93942  4319079.45143  A
 53  AMUR 19388M001        4661499.79821  -244591.80382  4332269.46289  A
100  BIAZ 10074M002        4634456.41374  -124345.51883  4365785.03874  A
101  BIDA 00000M000        4644178.18092  -145778.86697  4354832.06086  A
113  BRZR 19387M001        4662221.33819  -220770.44601  4333309.01612  A
116  CANT 13438M001        4625924.65528  -307096.77690  4365771.13515  W
154  CHER 00000M000        4645880.38302  -125722.45342  4353623.66525  A
204  EBRE 13410M001        4833520.36086   41536.82751  4147461.28698  W
180  ELGE 19353S001        4657557.74552  -202242.01665  4338991.46435  A
182  EMAZ 17001M001        4645924.54916  -276950.41049  4347759.15641  A
209  GERN 19389M001        4642811.66990  -217223.46837  4353278.45581  A
257  HOND 15012M002        4640529.67332  -145676.52732  4358781.33506  A
235  IGEL 19352S001        4645951.78131  -165575.04673  4352549.99731  A
240  ISPS 19484M001        4640596.82969  -206964.32174  4356391.49290  A
245  KAST 19499M001        4646949.42330  -240747.81655  4348014.57064  A
256  LAZK 19354S001        4666098.69310  -178186.73672  4330463.24812  A
261  LEIT 19428M001        4663521.29036  -155859.26257  4334519.46217  A
334  ORON 19427M001        4659696.13874  -130865.28059  4338948.46104  A
345  PAS2 19351S001        4644909.41728  -156645.61155  4353622.65660  A
493  PASA 19351S001        4644909.41751  -156645.61149  4353622.65669  W
558  SALA 13469M001        4803054.79555  -462131.63318  4158378.64495  W
566  SCDA 10088M002        4639940.86051  -136225.48393  4359551.99649  W
418  SODU 19386M001        4643998.25104  -255914.45038  4350062.71935  A
443  TERU 13487M001        4867391.66272  -95523.91332  4108341.24321  A
493  VITO 19385M001        4679398.05101  -218437.05246  4314897.94487  A

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### 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 2205		01-MAY-22 09:52			
LOCAL GEODETIC DATUM: ETRF2014		EPOCH: 2022-04-13 12:00:00			
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
4	ACDR 13434M001	4594489.81793	-678368.01394	4357065.91293	W
39	ALDA 19383M001	4687280.46766	-190877.15353	4308106.59080	A
50	ALSA 19419M001	4677251.14231	-176770.97842	4319079.50282	A
53	AMUR 19388M001	4661499.75563	-244591.84264	4332269.51429	A
100	BIAZ 10074M002	4634456.37105	-124345.55819	4365785.09029	A
101	BIDA 00000M000	4644178.13820	-145778.90622	4354832.11236	A
113	BRZR 19387M001	4662221.29553	-220770.48492	4333309.06753	A
116	CANT 13438M001	4625924.61327	-307096.81566	4365771.18663	W
154	CHER 00000M000	4645880.34022	-125722.49273	4353623.71676	A
204	EBRE 13410M001	4833520.31544	41536.78842	4147461.33808	W
180	ELGE 19353S001	4657557.70284	-202242.05565	4338991.51578	A
182	EMAZ 17001M001	4645924.50685	-276950.44927	4347759.20784	A
209	GERN 19389M001	4642811.62743	-217223.50737	4353278.50728	A
257	HOND 15012M002	4640529.63064	-145676.56658	4358781.38657	A
235	IGEL 19352S001	4645951.73864	-165575.08590	4352550.04880	A
240	ISPS 19484M001	4640596.78721	-206964.36079	4356391.54438	A
245	KAST 19499M001	4646949.38086	-240747.85545	4348014.62209	A
256	LAZK 19354S001	4666098.65025	-178186.77576	4330463.29954	A
261	LEIT 19428M001	4663521.24747	-155859.30170	4334519.51361	A
334	ORON 19427M001	4659696.09581	-130865.31982	4338948.51250	A
345	PAS2 19351S001	4644909.37458	-156645.65076	4353622.70810	A
493	PASA 19351S001	4644909.37481	-156645.65070	4353622.70819	W
558	SALA 13469M001	4803054.75210	-462131.67064	4158378.69588	W
566	SCDA 10088M002	4639940.81780	-136225.52323	4359552.04801	W
418	SOPU 19386M001	4643998.20867	-255914.48924	4350062.77080	A
443	TERU 13487M001	4867391.61741	-95523.95179	4108341.29412	A
493	VITO 19385M001	4679398.00816	-218437.09130	4314897.99624	A

## 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 2205 WEEK FINAL COMBINATION: PRECISE ORBITS 01-MAY-22 09:52

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	7	XXXXXX	0.63	0.82	5.38
ALDA 19383M001	7	XXXXXX	2.00	1.96	4.88
ALSA 19419M001	7	XXXXXX	1.68	1.00	4.12
AMUR 19388M001	7	XXXXXX	0.57	1.15	2.15
BLAZ 10074M002	7	XXXXXX	1.30	0.62	3.81
BIDA 00000M000	7	XXXXXX	1.21	0.50	3.81
BRZR 19387M001	7	XXXXXX	1.43	2.01	5.00
CANT 13438M001	7	XXXXXX	1.40	1.42	2.09
CHER 00000M000	6	XX XXX	1.71	0.35	3.27
EBRE 13410M001	7	XXXXXX	0.89	0.63	3.22
ELGE 19353S001	7	XXXXXX	0.82	1.56	2.67
EMAZ 17001M001	7	XXXXXX	2.10	0.79	3.06
GERN 19389M001	7	XXXXXX	2.03	0.87	3.09
HOND 15012M002	7	XXXXXX	0.92	0.61	3.24
IGEL 19352S001	6	X XXXX	1.43	0.95	1.87
ISPS 19484M001	7	XXXXXX	1.22	1.56	6.77
KAST 19499M001	6	XXXXX	0.61	1.17	6.31
LAZK 19354S001	7	XXXXXX	1.16	1.11	3.42
LEIT 19428M001	7	XXXXXX	1.86	0.96	2.45
ORON 19427M001	7	XXXXXX	2.66	1.43	6.27
PAS2 19351S001	7	XXXXXX	0.95	0.94	2.27
PASA 19351S001	7	XXXXXX	0.97	1.00	2.49
SALA 13469M001	7	XXXXXX	0.39	0.52	0.91
SCOA 10088M002	7	XXXXXX	1.56	1.33	3.02
SOPU 19386M001	7	XXXXXX	0.84	1.36	4.42
TERU 13487M001	7	XXXXXX	0.51	0.36	2.76
VITO 19385M001	7	XXXXXX	0.91	0.33	2.17

Comparison of individual solutions:

ACOR 13434M001	N	0.63	-0.02	-0.53	-0.77	-0.87	-0.53	0.11	-0.66
ACOR 13434M001	E	0.82	-0.49	0.48	-0.57	1.57	-0.36	0.19	-0.77
ACOR 13434M001	U	5.38	4.71	11.32	0.99	-0.09	-2.71	3.00	-2.51
ALDA 19383M001	N	2.00	-3.71	0.05	-1.87	-0.90	0.58	0.92	2.19
ALDA 19383M001	E	1.96	2.87	1.95	1.56	-0.11	-1.05	-0.41	-2.69
ALDA 19383M001	U	4.88	1.62	-8.16	2.51	6.40	4.94	1.13	0.94
ALSA 19419M001	N	1.68	-0.04	3.45	-1.67	-0.85	-0.63	-1.00	-0.27
ALSA 19419M001	E	1.00	0.87	0.99	0.68	-0.06	-0.68	-0.48	-1.77
ALSA 19419M001	U	4.12	-4.66	-0.80	-5.45	1.76	2.10	3.97	5.16
AMUR 19388M001	N	0.57	-0.31	0.83	-0.08	0.34	-0.53	0.09	0.88
AMUR 19388M001	E	1.15	0.31	-1.38	2.27	-0.21	-0.46	0.11	0.68
AMUR 19388M001	U	2.15	-1.52	2.20	-3.03	-3.04	-0.22	-0.80	-1.17
BLAZ 10074M002	N	1.30	-1.86	1.57	1.89	-0.40	0.14	-0.60	-0.36
BLAZ 10074M002	E	0.62	-0.62	0.02	-0.76	0.89	0.38	-0.09	0.62
BLAZ 10074M002	U	3.81	0.31	3.50	1.97	-4.45	-5.67	-3.92	-1.84
BIDA 00000M000	N	1.21	-1.44	1.44	-1.46	0.78	0.77	-0.96	0.57
BIDA 00000M000	E	0.50	0.77	0.55	-0.22	-0.03	-0.69	0.01	-0.24
BIDA 00000M000	U	3.81	-7.00	-0.21	-5.49	-0.36	0.60	2.32	1.48
BRZR 19387M001	N	1.43	-1.25	2.97	-1.08	0.55	0.13	0.09	0.57
BRZR 19387M001	E	2.01	-1.80	-2.65	0.31	1.74	2.66	0.94	1.73
BRZR 19387M001	U	5.00	-4.38	-7.55	-2.46	-2.82	7.01	2.19	2.47
CANT 13438M001	N	1.40	0.58	3.07	-0.35	-0.07	-1.10	-0.57	-0.58
CANT 13438M001	E	1.42	-0.47	-2.91	0.78	1.00	0.89	0.93	0.43
CANT 13438M001	U	2.09	3.58	-0.36	1.89	0.26	-2.53	-1.72	-0.57
CHER 00000M000	N	1.71	1.73	-3.24		0.99	0.14	-0.18	0.28
CHER 00000M000	E	0.35	-0.45	0.49		0.36	-0.16	0.01	0.12
CHER 00000M000	U	3.27	0.87	-5.51		-4.07	2.38	-0.27	0.30
EBRE 13410M001	N	0.89	-0.05	-0.90	-0.79	0.30	1.03	1.49	-0.00
EBRE 13410M001	E	0.63	-0.38	0.69	0.94	-0.02	0.40	-0.08	-0.84
EBRE 13410M001	U	3.22	-0.44	2.27	4.11	6.05	-0.42	-1.67	-0.71
ELGE 19353S001	N	0.82	-0.55	0.95	-0.42	0.46	-0.40	0.67	1.34
ELGE 19353S001	E	1.56	-0.69	-1.40	-0.50	2.84	1.28	1.31	0.75
ELGE 19353S001	U	2.67	0.19	-5.26	-0.66	3.34	-0.36	-1.80	-0.27
EMAZ 17001M001	N	2.10	3.61	2.40	0.46	-1.26	-0.87	-0.92	-2.06
EMAZ 17001M001	E	0.79	0.47	-0.89	0.45	1.31	0.39	-0.38	-0.69
EMAZ 17001M001	U	3.06	-4.49	-3.32	2.39	0.01	1.10	-0.38	4.22
GERN 19389M001	N	2.03	0.20	-4.13	0.53	2.01	0.87	0.86	1.29
GERN 19389M001	E	0.87	0.39	-0.84	0.98	0.11	1.46	0.65	0.44
GERN 19389M001	U	3.09	-0.57	-4.81	2.95	-1.57	3.43	-0.93	-3.16
HOND 15012M002	N	0.92	0.82	-1.28	1.54	0.23	0.16	-0.51	-0.26
HOND 15012M002	E	0.61	0.25	-0.72	-0.26	-0.07	-0.23	0.41	-1.16
HOND 15012M002	U	3.24	2.24	3.64	-3.14	-3.97	-3.39	2.73	-0.31
IGEL 19352S001	N	1.43	2.78		0.09	-0.93	-0.78	-0.91	0.38
IGEL 19352S001	E	0.95	-1.56		0.85	0.20	-0.15	-0.65	-0.90
IGEL 19352S001	U	1.87	1.92		-2.37	-1.37	-1.00	2.10	-0.92
ISPS 19484M001	N	1.22	-0.92	2.46	1.17	-0.73	0.00	-0.28	0.26
ISPS 19484M001	E	1.56	-1.91	-0.82	-0.14	2.11	1.07	1.82	1.14
ISPS 19484M001	U	6.77	-7.34	-9.01	-1.22	4.14	10.35	1.52	-3.40
KAST 19499M001	N	0.61		-0.63	-0.31	0.69	0.42	0.57	0.65
KAST 19499M001	E	1.17		0.87	-1.54	0.78	1.20	0.89	0.95
KAST 19499M001	U	6.31		-7.82	-6.95	-0.14	8.85	2.25	2.56
LAZK 19354S001	N	1.16	-0.59	-0.95	-2.06	0.82	-0.28	1.08	0.81
LAZK 19354S001	E	1.11	1.01	-0.37	0.65	0.62	0.80	-1.38	-1.72
LAZK 19354S001	U	3.42	-0.25	2.68	-0.79	-1.89	-4.85	4.95	3.28
LEIT 19428M001	N	1.86	-1.78	3.54	0.16	-1.20	-1.23	-1.21	0.78
LEIT 19428M001	E	0.96	0.55	1.18	-0.06	-0.74	-1.40	-0.73	0.89
LEIT 19428M001	U	2.45	-2.88	3.32	-2.25	1.00	0.94	2.99	-0.84
ORON 19427M001	N	2.66	2.49	-4.96	-2.65	0.44	0.70	1.04	1.69
ORON 19427M001	E	1.43	-1.43	-2.54	-0.17	0.87	0.27	1.01	1.37
ORON 19427M001	U	6.27	11.52	-9.93	1.05	-0.87	-1.00	0.10	1.27
PAS2 19351S001	N	0.95	0.78	-1.65	-0.46	1.04	0.26	-0.87	0.05
PAS2 19351S001	E	0.94	-1.49	0.26	1.17	-1.05	0.02	-0.46	-0.57
PAS2 19351S001	U	2.27	0.56	1.35	2.62	-2.58	-3.17	2.08	-0.87
PASA 19351S001	N	0.97	0.81	-1.71	-0.32	0.98	0.27	-0.99	0.09

PASA 19351S001	E	1.00	-1.41	0.48	1.25	-1.15	-0.03	-0.58	-0.73
PASA 19351S001	U	2.49	-0.03	1.88	2.70	-3.30	-3.08	2.39	-0.54
SALA 13469M001	N	0.39	0.25	-0.10	-0.31	-0.18	0.09	0.15	0.82
SALA 13469M001	E	0.52	-0.53	-0.63	0.63	0.25	-0.02	0.35	0.59
SALA 13469M001	U	0.91	-0.72	-0.56	0.31	-0.14	1.29	-0.71	-1.36
SCDA 10088M002	N	1.56	2.83	0.57	0.70	-0.61	-1.01	-0.89	-1.89
SCDA 10088M002	E	1.33	-0.00	2.77	-0.58	0.45	-1.14	-0.43	-0.95
SCDA 10088M002	U	3.02	-3.36	0.52	1.39	-2.93	-3.74	-3.32	2.77
SOPU 19386M001	N	0.84	1.09	1.63	0.22	-0.14	-0.42	-0.31	0.14
SOPU 19386M001	E	1.36	0.93	3.03	-0.11	0.35	-0.89	0.20	0.16
SOPU 19386M001	U	4.42	-2.62	-7.19	-0.10	-3.04	5.96	3.56	-1.04
TERU 13487M001	N	0.51	0.09	0.54	-0.83	0.12	0.36	0.20	0.64
TERU 13487M001	E	0.36	0.36	-0.37	-0.47	0.47	0.16	0.16	0.02
TERU 13487M001	U	2.76	1.73	3.19	-0.86	5.20	-0.11	0.02	-2.15
VITO 19385M001	N	0.91	-1.35	-0.67	-0.22	0.84	0.59	0.70	1.04
VITO 19385M001	E	0.33	0.40	0.18	0.06	0.37	0.00	-0.53	-0.14
VITO 19385M001	U	2.17	-3.09	-0.97	-2.80	2.23	0.03	0.02	-2.24



## 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	-1.31	0.89	-0.76
12	ALAC 13433M001	I W	-0.28	-1.00	-2.72
15	ALBA 13452M001	I W	0.47	-2.01	-5.64
21	ALME 13437M001	I W	-0.99	-0.83	4.61
47	BCLN 13412M001	I W	-0.62	-3.49	0.33
71	BORR 13480M001	I W	-1.93	-0.76	0.42
116	CANT 13438M001	I W	-1.02	0.95	1.99
143	COBA 13453M001	I W	2.11	0.67	-3.42
204	EBRE 13410M001	I W	-1.74	0.30	-1.47
316	IZAN 31309M002	I W	1.45	2.58	1.60
432	MELI 19379M001	I W	2.93	0.25	0.58
493	PASA 19351S001	I W	0.36	-1.29	1.49
558	SALA 13469M001	I W	0.67	1.35	-3.48
566	SCDA 10088M002	I W	-1.53	-1.76	-1.84
599	SONS 13446M001	I W	1.45	4.13	8.32
RMS / COMPONENT			1.50	1.91	3.48
MEAN			0.00	-0.00	0.00
MIN			-1.93	-3.49	-5.64
MAX			2.93	4.13	8.32

NUMBER OF PARAMETERS : 3  
NUMBER OF COORDINATES : 45  
RMS OF TRANSFORMATION : 2.45 MM

BARYCENTER COORDINATES:

LATITUDE : 39 33 19.86  
LONGITUDE : - 3 34 9.67  
HEIGHT : -25.352 KM

PARAMETERS:

TRANSLATION IN N : 0.00 +- 0.63 MM  
TRANSLATION IN E : 0.00 +- 0.63 MM  
TRANSLATION IN U : -0.00 +- 0.63 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          16579978
NUMBER OF UNKNOWN              193263
NUMBER OF DEGREES OF FREEDOM    16386715
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)      180
VARIANCE FACTOR                  1.841555873475597

Helmert Transformation Parameters With Respect to Combined Solution:
-----
Sol  Rms (m)      Translation (m)      Rotation (")      Scale (ppm)
      X          Y          Z          X          Y          Z
-----
  1  0.00217      0.0003 -0.0316 -0.0025  0.0007  0.0001 -0.0008 -0.00002
  2  0.00256      0.0061 -0.0263 -0.0013  0.0005  0.0002 -0.0007 -0.00061
  3  0.00205      0.0164  0.0125 -0.0161 -0.0002  0.0007  0.0004 -0.00024
  4  0.00174      0.0054  0.0052 -0.0040 -0.0001  0.0002  0.0002 -0.00030
  5  0.00189      0.0051 -0.0029 -0.0134  0.0001  0.0005 -0.0001  0.00043
  6  0.00176     -0.0099 -0.0268 -0.0004  0.0005 -0.0002 -0.0008  0.00099
  7  0.00184     -0.0037  0.0229  0.0024 -0.0005 -0.0001  0.0005  0.00045
```

```
Statistics of individual solutions:
-----
File  RMS (m)      DOF  Chi**2/DOF  #Observations authentic / pseudo  #Parameters explicit / implicit / singular
-----
  1  0.00135      2362608      1.81      2391615      3      891      28119      0
  2  0.00144      2346051      2.07      2375733      3      885      28800      0
  3  0.00139      2124040      1.95      2149938      3      774      25127      0
  4  0.00131      2419709      1.71      2447715      3      894      27115      0
  5  0.00133      2394030      1.78      2422121      3      882      27212      0
  6  0.00132      2369704      1.73      2398823      3      888      28234      0
  7  0.00134      2365395      1.81      2394033      3      879      27762      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 22:100:00000 22:106:86370 LEICA GR50 -----
ALDA  A  1 P 22:100:00000 22:106:86370 LEICA GR10 -----
ALSA  A  1 P 22:100:00000 22:106:86370 LEICA GR50 -----
AMUR  A  1 P 22:100:00000 22:106:86370 LEICA GR10 -----
BIAZ  A  1 P 22:100:00000 22:106:86370 SPECTRA SP90M -----
BIDA  A  1 P 22:100:00000 22:106:86370 LEICA GR10 -----
BRZR  A  1 P 22:100:00000 22:106:86370 LEICA GR30 -----
CANT  A  1 P 22:100:00000 22:106:86370 LEICA GR10 -----
CHER  A  1 P 22:100:00000 22:106:86370 LEICA GR30 -----
EBRE  A  1 P 22:100:00000 22:106:86370 LEICA GR50 -----
ELGE  A  1 P 22:100:00000 22:106:86370 LEICA GR30 -----
EMAZ  A  1 P 22:100:00000 22:106:86370 LEICA GR30 -----
GERN  A  1 P 22:100:00000 22:106:86370 LEICA GR30 -----
HOND  A  1 P 22:100:00000 22:106:86370 LEICA GR50 -----
IGEL  A  1 P 22:100:00000 22:106:86370 LEICA GR30 -----
ISPS  A  1 P 22:100:00000 22:106:86370 TRIMBLE NETR9 -----
KAST  A  1 P 22:101:00000 22:106:86370 LEICA GR30 -----
LAZK  A  1 P 22:100:00000 22:106:86370 LEICA GR30 -----
LEIT  A  1 P 22:100:00000 22:106:86370 LEICA GR50 -----
ORON  A  1 P 22:100:00000 22:106:86370 LEICA GR50 -----
PAS2  A  1 P 22:100:00030 22:106:86370 STONEX SC2200 -----
PASA  A  1 P 22:100:00000 22:106:86370 LEICA GR30 -----
SALA  A  1 P 22:100:00000 22:106:86370 LEICA GR50 -----
SCOA  A  1 P 22:100:00000 22:106:86370 LEICA GR50 -----
SOPU  A  1 P 22:100:00000 22:106:86370 LEICA GR30 -----
TERU  A  1 P 22:100:00000 22:106:86370 LEICA GR50 -----
VITO  A  1 P 22:100:00000 22:106:86370 LEICA GR10 -----
```

### 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 22:100:00000 22:106:86370 LEIAT504      LEIS -----
ALDA  A  1 P 22:100:00000 22:106:86370 LEIAS10      NONE -----
ALSA  A  1 P 22:100:00000 22:106:86370 LEIAR10      NONE -----
AMUR  A  1 P 22:100:00000 22:106:86370 LEIAS10      NONE -----
BIAZ  A  1 P 22:100:00000 22:106:86370 LEIAR25      LEIT -----
BIDA  A  1 P 22:100:00000 22:106:86370 LEIAS10      NONE -----
BRZR  A  1 P 22:100:00000 22:106:86370 LEIAS10      NONE -----
CANT  A  1 P 22:100:00000 22:106:86370 LEIAR25_R4    LEIT 25066
CHER  A  1 P 22:100:00000 22:106:86370 LEIAR10      NONE -----
```

EBRE	A	1	P	22:100:00000	22:106:86370	LEIAR25_R4	NONE	26359
ELGE	A	1	P	22:100:00000	22:106:86370	LEIAR25_R4	LEIT	-----
EMAZ	A	1	P	22:100:00000	22:106:86370	LEIAS10	NONE	-----
GERN	A	1	P	22:100:00000	22:106:86370	LEIAS10	NONE	-----
HOND	A	1	P	22:100:00000	22:106:86370	LEIAR20	LEIM	41012
IGEL	A	1	P	22:100:00000	22:106:86370	LEIAR20	LEIM	43011
ISPS	A	1	P	22:100:00000	22:106:86370	TRM59900.00	SCIS	-----
KAST	A	1	P	22:101:00000	22:106:86370	LEIAS10	NONE	-----
LAZK	A	1	P	22:100:00000	22:106:86370	LEIAR25_R4	LEIT	-----
LEIT	A	1	P	22:100:00000	22:106:86370	LEIAR10	NONE	-----
ORON	A	1	P	22:100:00000	22:106:86370	LEIAR10	NONE	-----
PAS2	A	1	P	22:100:00030	22:106:86370	LEIAR20	LEIM	73034
PASA	A	1	P	22:100:00000	22:106:86370	LEIAR20	LEIM	73034
SALA	A	1	P	22:100:00000	22:106:86370	LEIAR25	NONE	-----
SCDA	A	1	P	22:100:00000	22:106:86370	TRM55971.00	NONE	-----
SOPU	A	1	P	22:100:00000	22:106:86370	LEIAS10	NONE	-----
TERU	A	1	P	22:100:00000	22:106:86370	LEIAR20	LEIM	49044
VITO	A	1	P	22:100:00000	22:106:86370	LEIAS10	NONE	-----

### 7.3 Eccentricities

*SITE	PT	SOLN	T	DATA_START_	DATA_END_	AXE	UP	NORTH	EAST
							ARB->BENCHMARK(M)		
ACOR	A	1	P	22:100:00000	22:106:86370	UNE	3.0460	0.0000	0.0000
ALDA	A	1	P	22:100:00000	22:106:86370	UNE	0.0000	0.0000	0.0000
ALSA	A	1	P	22:100:00000	22:106:86370	UNE	0.0000	0.0000	0.0000
AMUR	A	1	P	22:100:00000	22:106:86370	UNE	0.0000	0.0000	0.0000
BIAZ	A	1	P	22:100:00000	22:106:86370	UNE	0.0000	0.0000	0.0000
BIDA	A	1	P	22:100:00000	22:106:86370	UNE	0.0000	0.0000	0.0000
BRZR	A	1	P	22:100:00000	22:106:86370	UNE	0.0771	0.0000	0.0000
CANT	A	1	P	22:100:00000	22:106:86370	UNE	3.0490	0.0000	0.0000
CHER	A	1	P	22:100:00000	22:106:86370	UNE	0.0000	0.0000	0.0000
EBRE	A	1	P	22:100:00000	22:106:86370	UNE	0.0770	0.0000	0.0000
ELGE	A	1	P	22:100:00000	22:106:86370	UNE	0.0000	0.0000	0.0000
EMAZ	A	1	P	22:100:00000	22:106:86370	UNE	0.0350	0.0000	0.0000
GERN	A	1	P	22:100:00000	22:106:86370	UNE	0.0771	0.0000	0.0000
HOND	A	1	P	22:100:00000	22:106:86370	UNE	0.0771	0.0000	0.0000
IGEL	A	1	P	22:100:00000	22:106:86370	UNE	0.0000	0.0000	0.0000
ISPS	A	1	P	22:100:00000	22:106:86370	UNE	0.0350	0.0000	0.0000
KAST	A	1	P	22:101:00000	22:106:86370	UNE	0.0350	0.0000	0.0000
LAZK	A	1	P	22:100:00000	22:106:86370	UNE	0.0000	0.0000	0.0000
LEIT	A	1	P	22:100:00000	22:106:86370	UNE	0.0000	0.0000	0.0000
ORON	A	1	P	22:100:00000	22:106:86370	UNE	0.0000	0.0000	0.0000
PAS2	A	1	P	22:100:00030	22:106:86370	UNE	0.0000	0.0000	0.0000
PASA	A	1	P	22:100:00000	22:106:86370	UNE	0.0000	0.0000	0.0000
SALA	A	1	P	22:100:00000	22:106:86370	UNE	0.0600	0.0000	0.0000
SCDA	A	1	P	22:100:00000	22:106:86370	UNE	0.0000	0.0000	0.0000
SOPU	A	1	P	22:100:00000	22:106:86370	UNE	0.0771	0.0000	0.0000
TERU	A	1	P	22:100:00000	22:106:86370	UNE	0.0600	0.0000	0.0000
VITO	A	1	P	22:100:00000	22:106:86370	UNE	0.0000	0.0000	0.0000

## 8 References

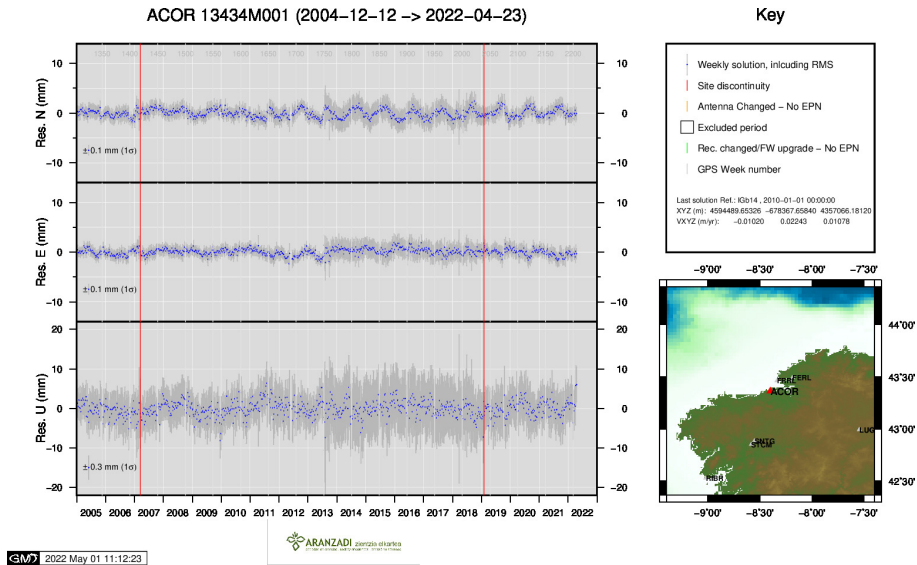
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign*. [etrs89.ensg.ign.fr/memo-V8.pdf](http://etrs89.ensg.ign.fr/memo-V8.pdf)

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

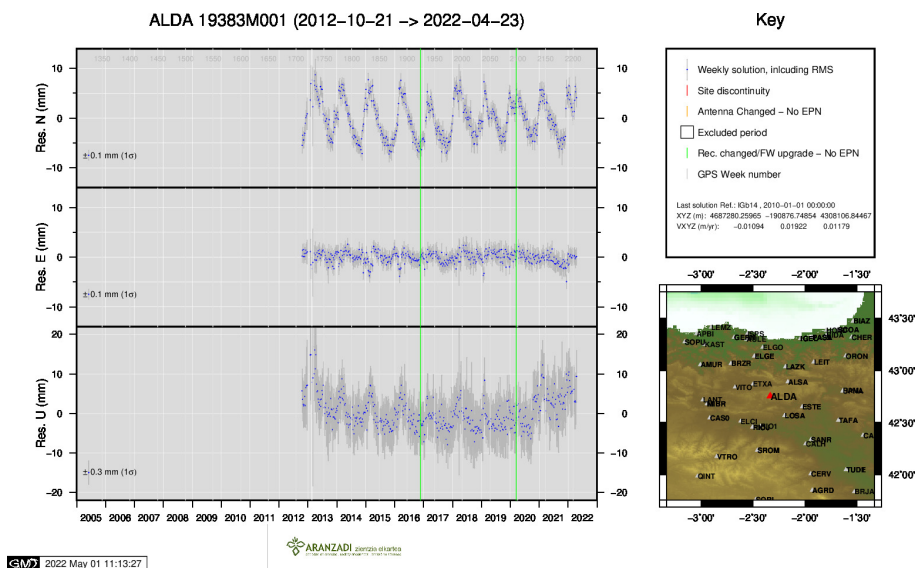
Z. Altamimi (2018): *EUREF Technical Note 1: Relationship and Transformation between the International and the European Terrestrial Reference Systems*. [etrs89.ensg.ign.fr/pub/EUREF-TN-1.pdf](http://etrs89.ensg.ign.fr/pub/EUREF-TN-1.pdf)

## 9 Cumulative Time Series

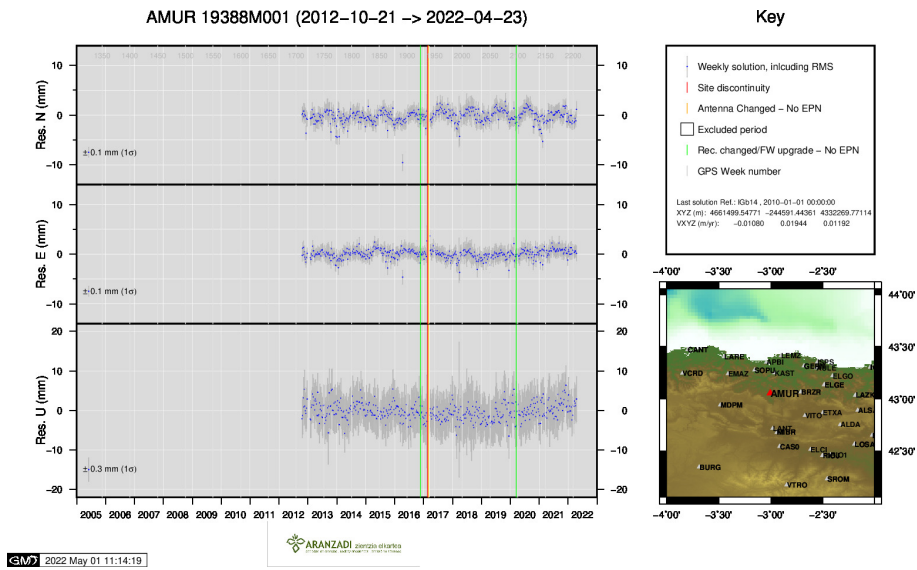
Time series of stations. Latest plots at: <http://geolabpasaia.org/gnss/ARA-net/TSeries/>, or click on the caption of each image.



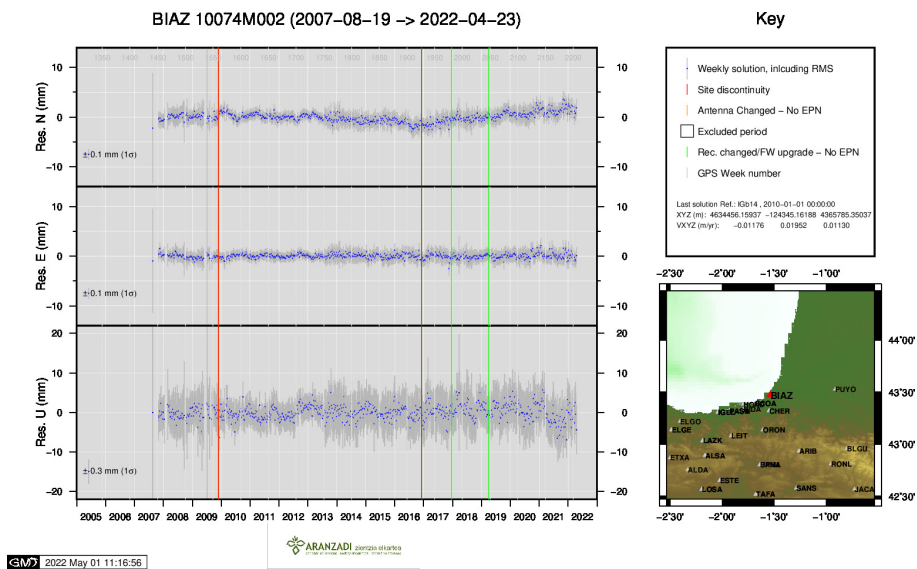
1 ) ACOR



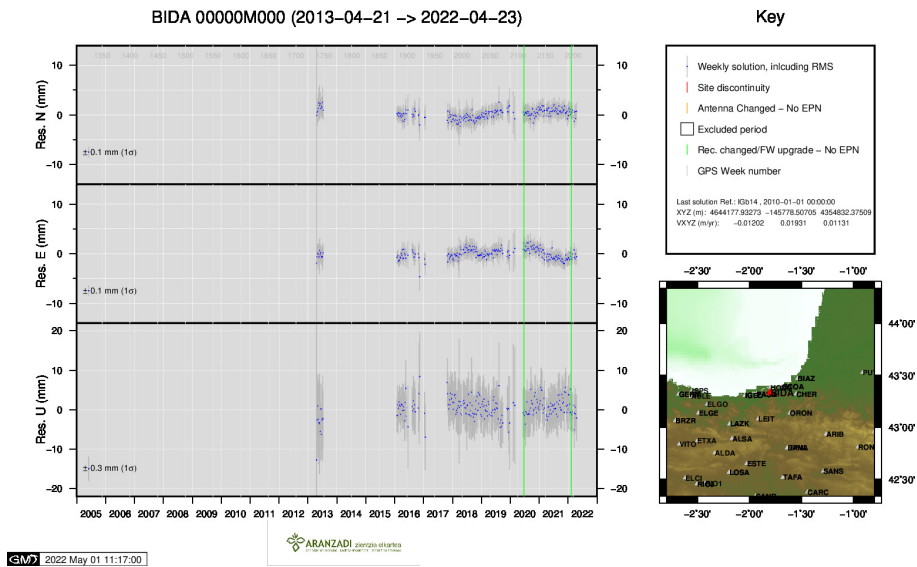
2 ) ALDA



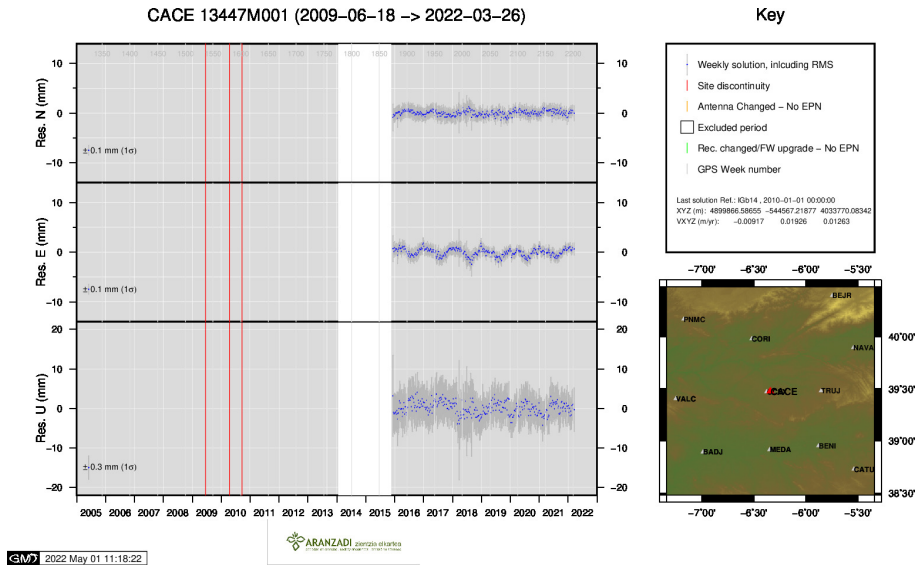
3 ) AMUR



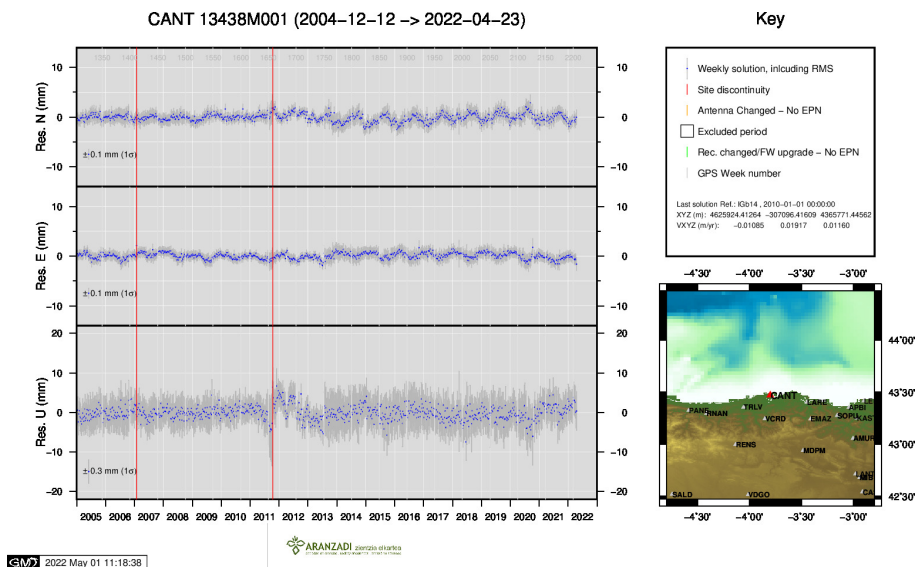
4 ) BIAZ



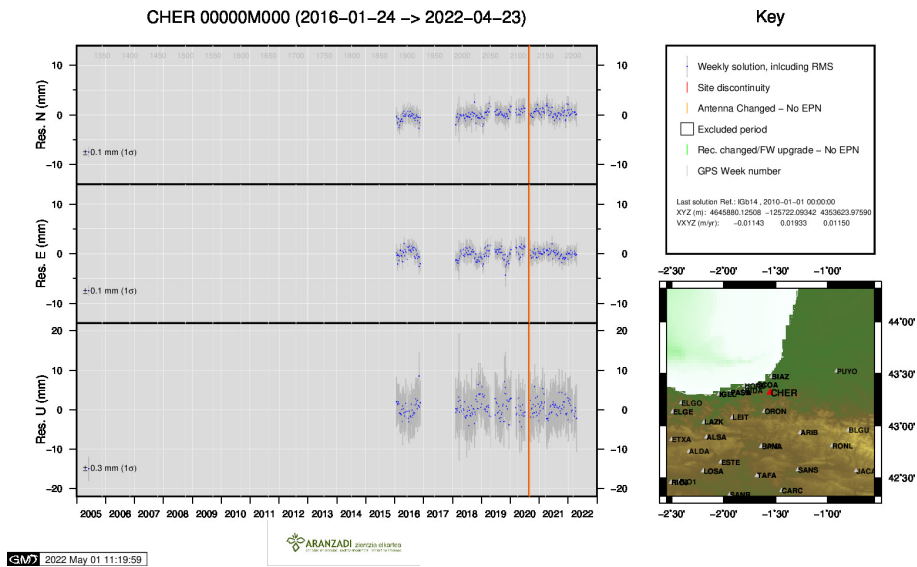
5 ) BIDA



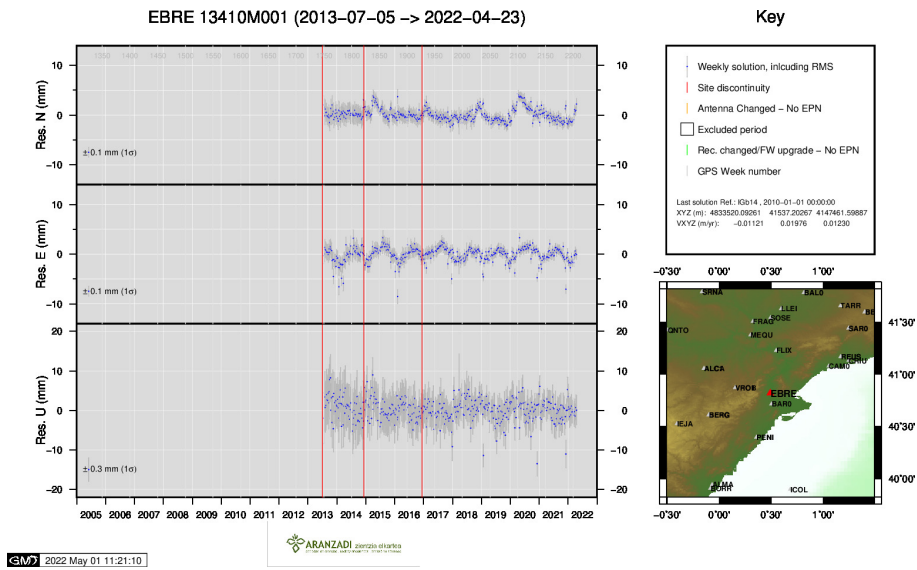
6 ) CACE



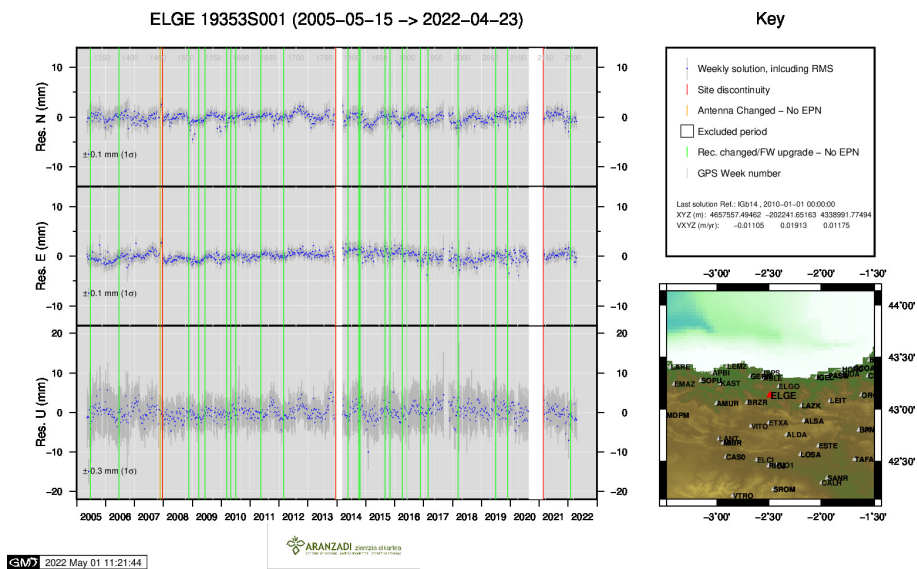
7 ) CANT



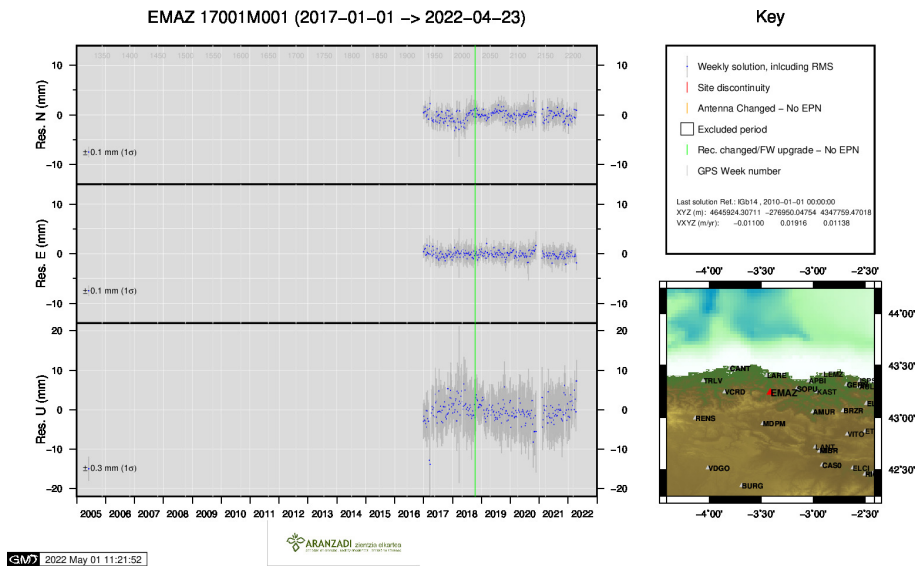
8 ) CHER



9 ) EBRE

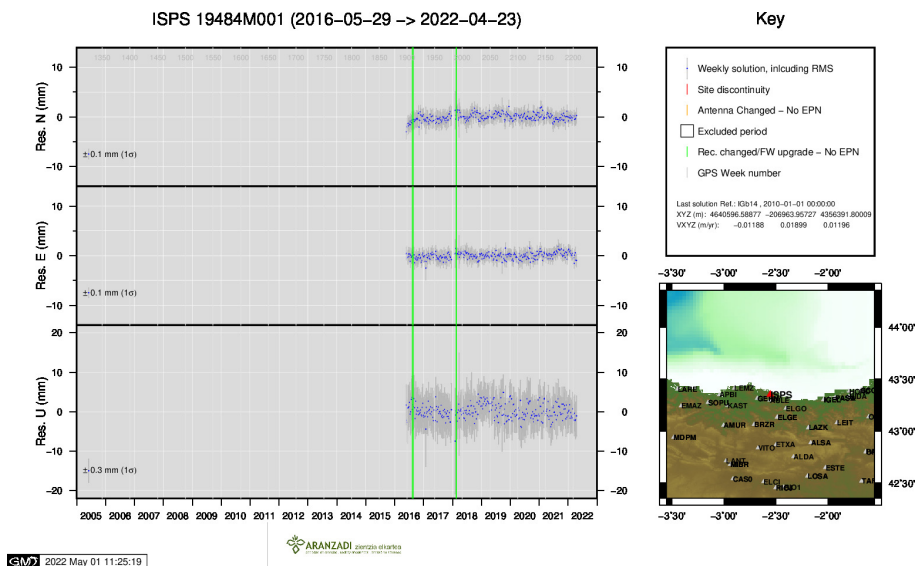
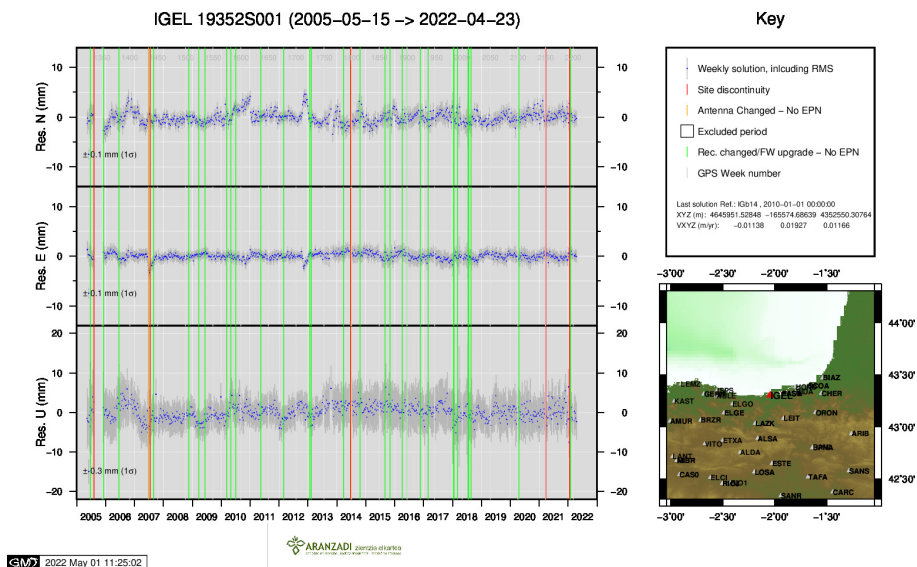
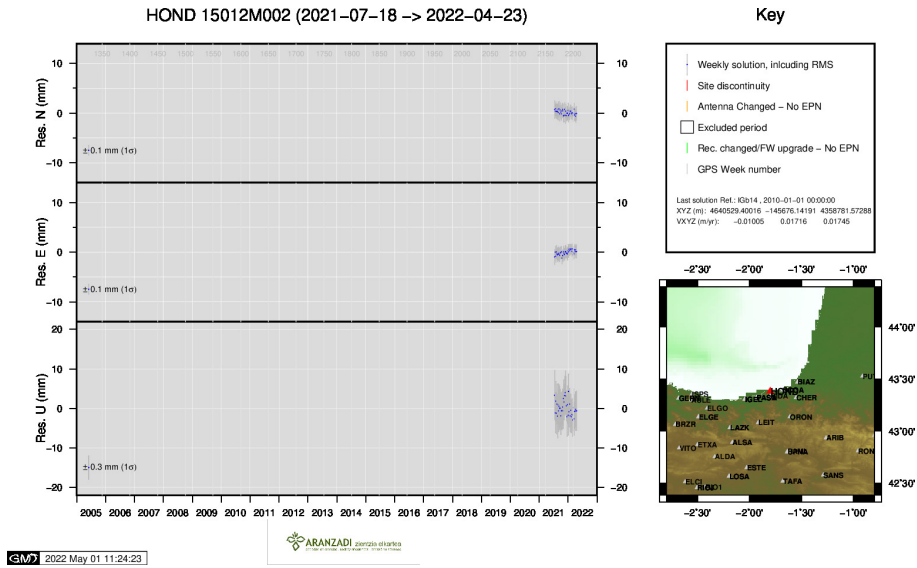


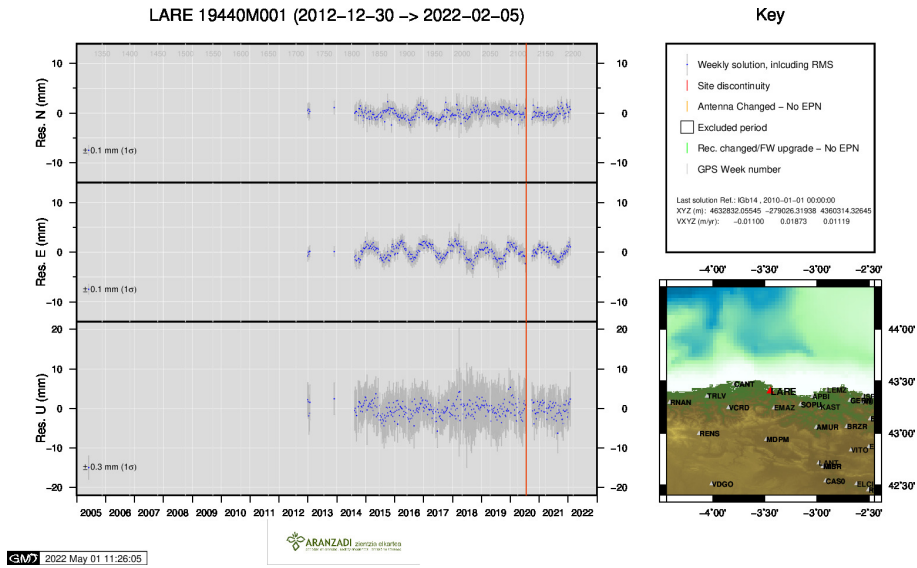
10 ) ELGE



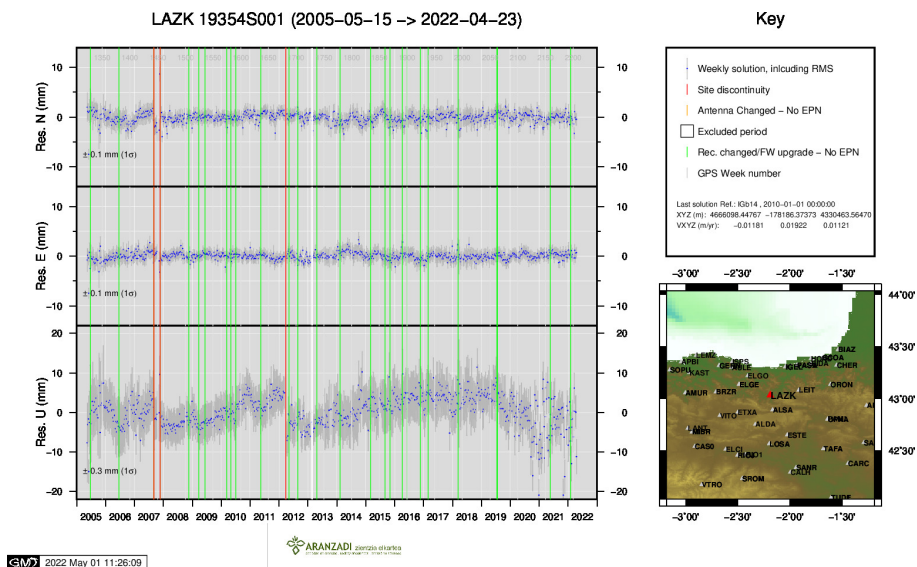
11 ) EMAZ



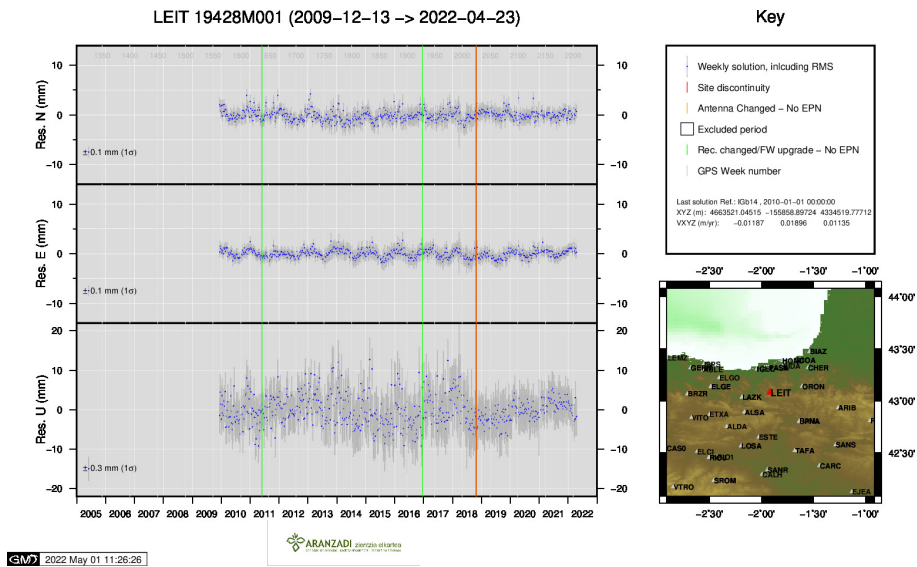




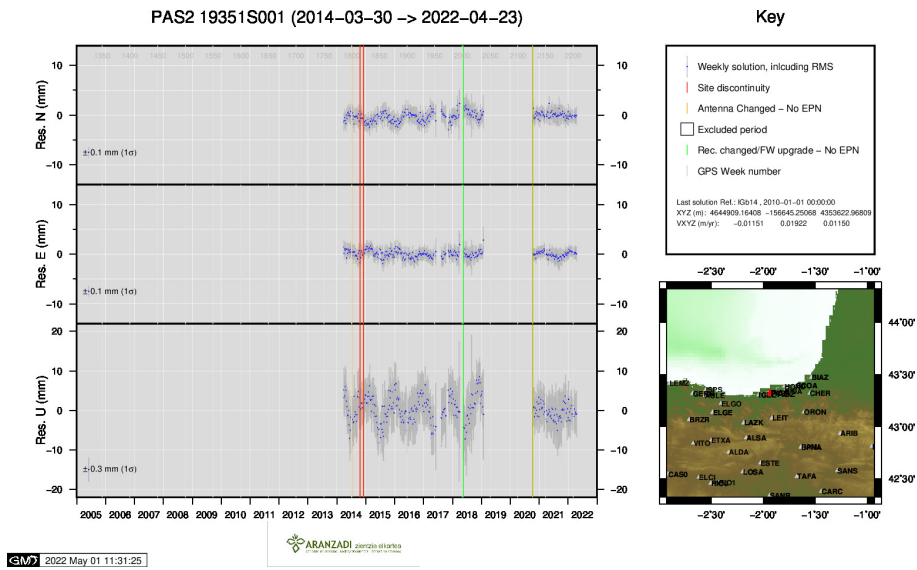
15 ) LARE



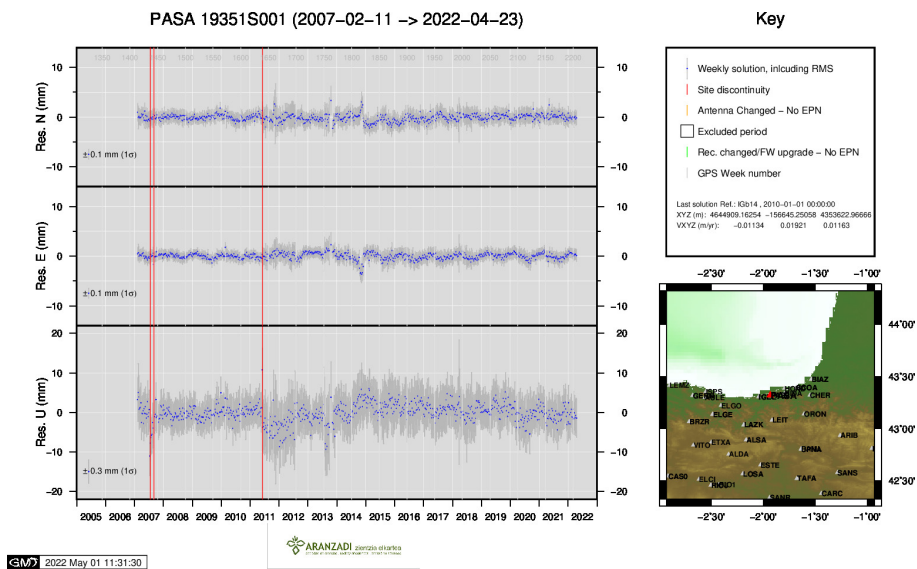
16 ) LAZK



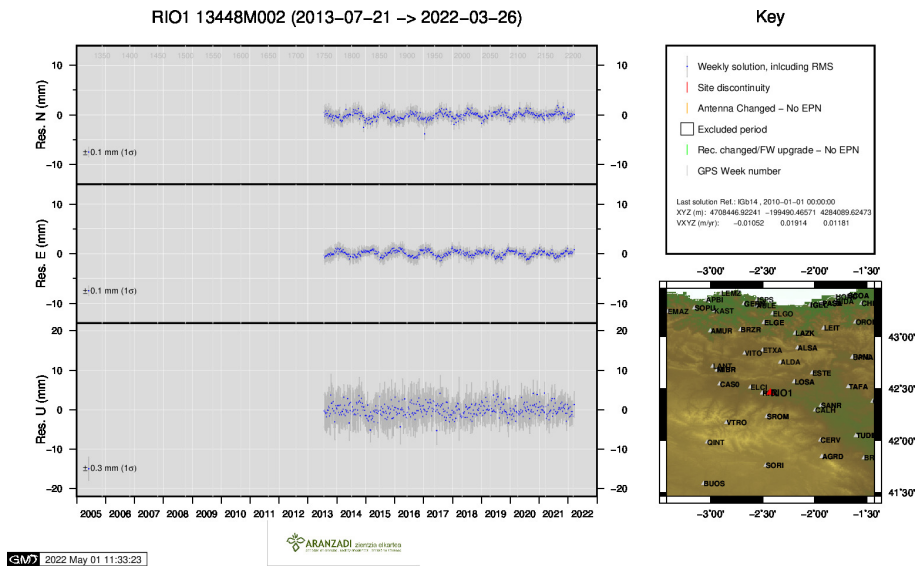
17 ) LEIT



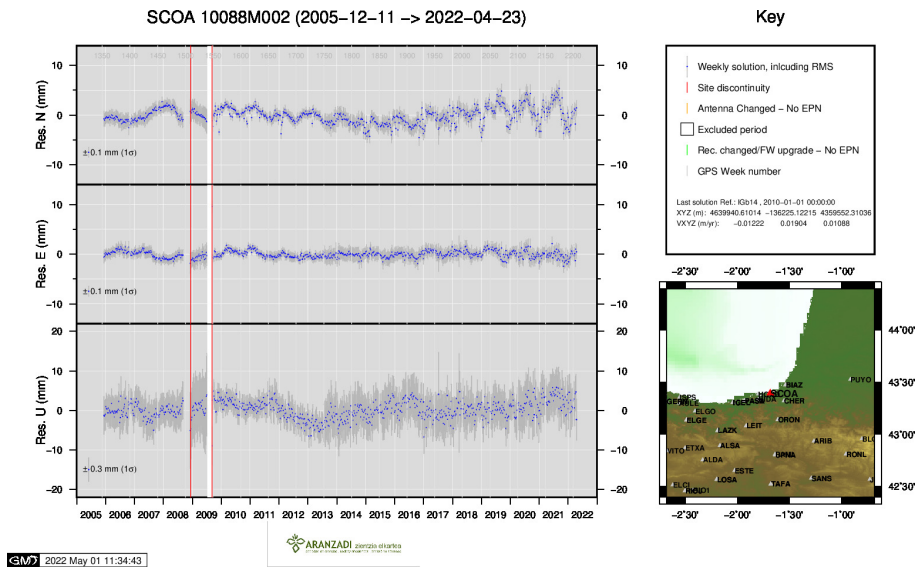
18 ) PAS2



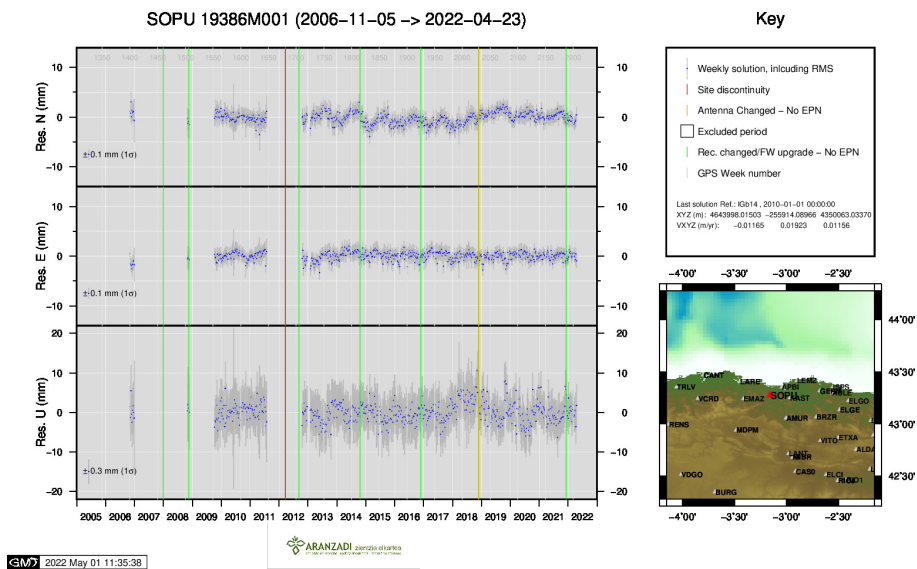
19 ) PASA



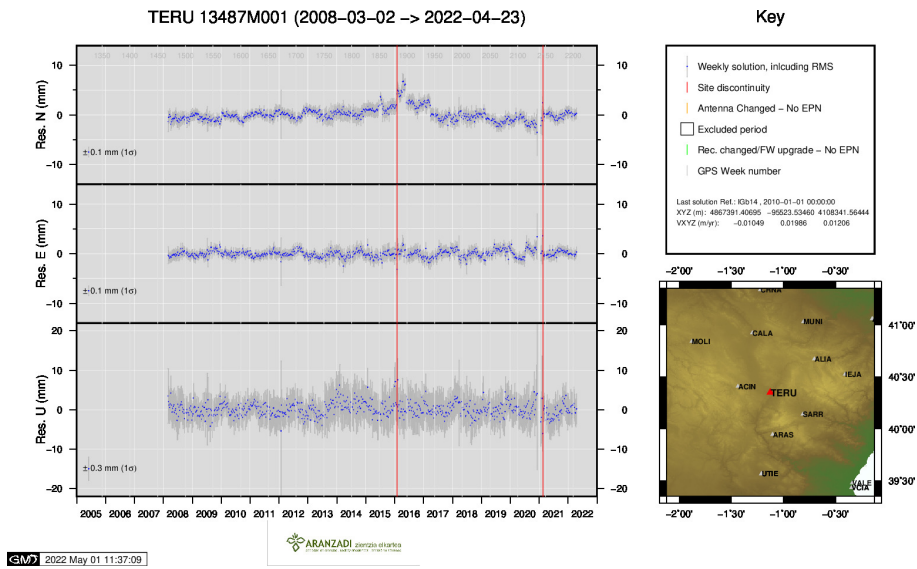
20 ) RIO1



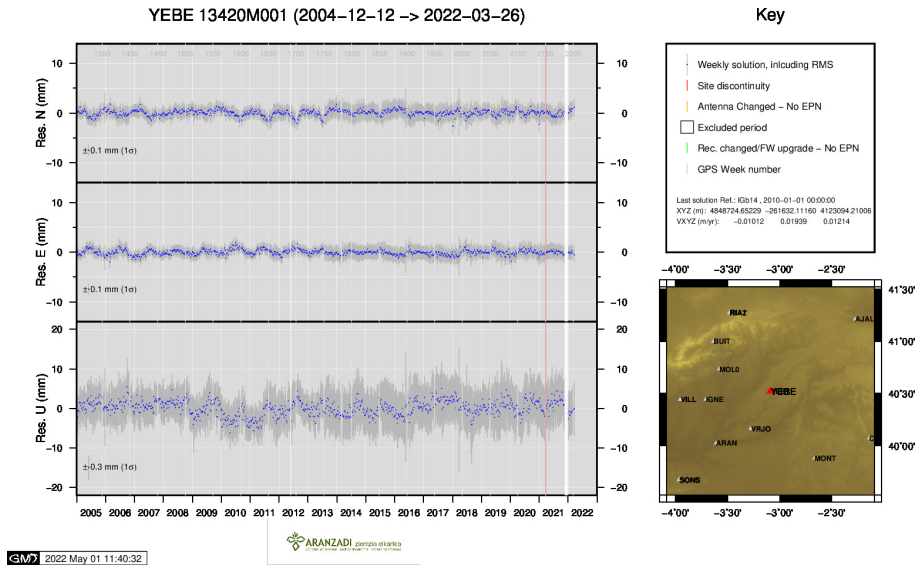
21 ) SCOA



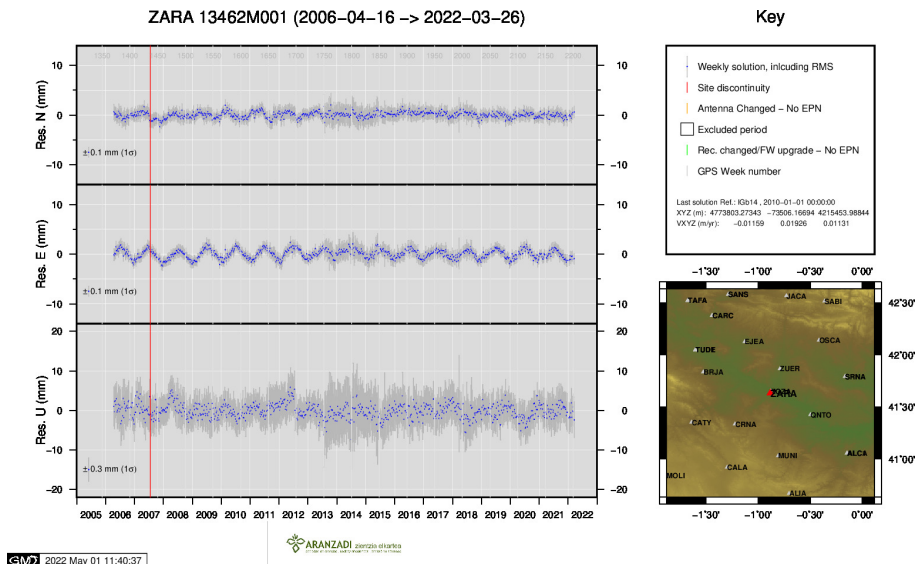
22 ) SOPU



23 ) TERU



24 ) YEBE



25 ) ZARA