

# ARA-DAC Weekly Analysis Result: 2275 (GFA)

## Technical Report

**GPS Week: 2275 (GFA)**

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

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### 3 Main Computation Parameters

The main parameters considered in the ARA analysis follow strictly the EPN recommendations.

- Preprocessing: Independent baselines are defined by the criterion of maximum common observations. Cycle slips are fixed with the MAUPRP program, analysing triple phase differences for each independent baseline. If MAUPRP does not fix all slips for one station, that station is edited out.
- Basic Observable : Carrier phase,  $L_1$  and  $L_2$ ; a priori sigma of single differences:0.002 m.
  - sampling (for ambiguity resolution): 30 s
  - sampling (for final processing): 180 s
  - Systems: GPS+GLONASS observations are used (Galileo is used if available starting GPS week 1986)
- Modelled observable: Double differences of carrier phase using different combinations based on the distance.
- Ground antenna phase center calibrations: Group APCV used from the PCV\_COD.I20 file and individual calibrations from EPNC\_20.ATX. In case no calibration values of an antenna/radome pairs are not available for a certain GNSS system at some station, the observation of this/these GNSS/GNSSs are excluded from the analysis of that station.
- EPN\_A class sites (CRD + VEL) IGS20 used to define the reference frame (no EPN release is available at the time this report is generated). Following the EUREF guidelines, no other individual calibrations are included in the analysis starting GPSW 2238 (IGS20).
- Calibraciones de antena: calibraciones absolutas del IGS, incluidas en el fichero igs20.atx. A partir de la semana GPS 2238 (IGS20) No se incluyen calibraciones absolutas individuales de ninguna otra antena.
- El datum se establece con las estaciones EPN de clase A (coordenadas y velocidades) en datum IGS20 (solución PRELIMINAR, basada en IGB14). En caso de no disponer de datos de calibración de una determinada antena/radomo para cierto sistema GNSS, las observaciones de éste se omiten en el cálculo de la estación.
- Troposphere:
  - minimum elevation is 3 deg.; elevation dependent weighting.
  - VMF3 mapping function. ZPD parameters are estimated using the VMF3 mapping function.
  - CHENHER gradient estimation model.
- Ionosphere: no a priori model, ionospheric effect almost removed by iono free combination.
- Ocean Loading: FES2014b (Scherneck).
- Atmospheric loading: not corrected, following the latest recommendations for IGS20 products.
- Tidal displacements:
  - Mean pole model : IERS2010\_v1.2.0
  - Subdaily pole model: DESAI2016
  - Nutation model : IAU2000R06

## 4 Estimated Parameters

- Adjustment: Least Squares
- Rejection Criteria: 3\*rms of single differences, in the weekly combination of daily normal equations (ADDNEQ)
- Station coordinates: minimum constraints (MC) to 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. DE421 planetary ephemeris and JGM3 Earth geopotential model is used.
- Ambiguity: an advanced ambiguity resolution (AR) scheme is included:
  - Code-Based Widelane (WL) and Narrow Line (NR) AR for baselines shorter than 6000km, a Melbourne-Wuebbena wide-lane and narrow-lane AR is computed.
  - Phase-Based Widelane ( $L_5$ ) AR for baselines shorter than 200km, the code-based wide-lane AR is replaced by a phase-only wide-lane with a subsequent narrow-lane AR.
  - Quasi-Ionosphere-Free (QIF) AR for the remaining real-valued ambiguities for baselines shorter than 2000km.
  - Direct  $L_1/L_2$  AR for baselines shorter than 20km
- AR Verification: Each baseline is processed by introducing the resolved integer ambiguities and checking the residuals. If there is any problem, the ambiguities are re-initialized.

## 5 Computed Coordinates

In this section the adjusted coordinates are summarized. Note that the sites with an A flag are the computed ones, whereas sites flagged as W are the ones used in the Minimal Constraints condition.

### 5.1 IGS20

The Reference Frame considered in this section is a PRELIMINARY IGS20, based on the previously used IGB14 solution.

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ARA FINAL WEEKLY COMBINATION: FINAL ORBITS                                03-SEP-23 23:54
-----
LOCAL GEODETIC DATUM: IGS20                EPOCH: 2023-08-16 11:59:45
-----
NUM  STATION NAME      X (M)      Y (M)      Z (M)      FLAG  SYSTEM
-----
  4  ACRD 13434M001    4594489.51452 -678367.35490 4357066.33076 W   G
  50 ALSA 19419M001    4677250.78632 -176770.31504 4319079.92958 A   GRE
 100 BIAZ 10074M002    4634455.99663 -124344.89662 4365785.50458 A   GR
 101 BIDA 00000M000    4644177.77221 -145778.24219 4354832.53204 A   GR
 104 CACE 13447M001    4899866.46121 -544566.95771 4033770.25624 W   GRE
 116 CANT 13438M001    4625924.26808 -307096.15741 4365771.61116 W   GRE
 162 CREU 13432M001    4715420.07498 273178.14074 4271946.89217 W   GRE
 204 EBRE 13410M001    4833519.93968 41537.47438 4147461.76718 A   GRE
 180 ELGE 19353S001    4657557.34662 -202241.39059 4338991.93800 A   GRE
 257 HOND 15012M002    4640529.26829 -145676.90548 4358761.80706 A   GRE
 235 IGEL 19352S001    4645951.37940 -165574.42444 4352550.47433 A   GRE
 240 ISPS 19484M001    4640596.43080 -206963.69632 4356391.96613 A   GRE
 252 LARE 19440M001    4632831.90426 -279026.06657 4360314.47788 A   GRE
 256 LAZK 19354S001    4666098.28853 -178186.11131 4330463.72034 A   GRE
 261 LEIT 19428M001    4663520.88928 -155858.64012 4334519.93847 A   GRE
 334 ORDN 19427M001    4659695.72994 -130864.65477 4338948.93697 A   GRE
 493 PASA 19351S001    4644909.01073 -156644.99069 4353623.12778 W   GRE
 553 RID1 13448M002    4708446.77958 -199490.20350 4284089.78904 W   GRE
 558 SALA 13469M001    4803054.43792 -462130.98992 4158379.12818 W   GR
 566 SCDA 10088M002    4639940.45563 -136224.86145 4359552.47976 A   GRE
 443 TERU 13487M001    4867391.27035 -95523.26435 4108341.73302 A   GRE
 752 YEBE 13420M001    4848724.52315 -261631.84716 4123094.38201 A   GRE
 755 ZARA 13462M001    4773803.11926 -73505.90347 4215454.14696 W   GRE
    
```

### 5.2 ETRF2000 (ETRS89) Coordinates

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

```

CONVERT TO ETRF2000                                                    03-SEP-23 23:54
-----
LOCAL GEODETIC DATUM: ETRF2000                EPOCH: 2023-08-16 11:59:45
-----
NUM  STATION NAME      X (M)      Y (M)      Z (M)      FLAG  SYSTEM
-----
  4  ACRD 13434M001    4594489.85207 -678367.97534 4357065.86070 W
  50 ALSA 19419M001    4677251.18770 -176770.94436 4319079.45941 A
 100 BIAZ 10074M002    4634456.40868 -124345.52072 4365785.03879 A
 101 BIDA 00000M000    4644178.18055 -145778.86750 4354832.06513 A
 104 CACE 13447M001    4899866.79094 -544567.61392 4033769.76185 W
 116 CANT 13438M001    4625924.65581 -307096.78096 4365771.14359 W
 162 CREU 13432M001    4715420.53242 273177.50843 4271946.42483 W
 204 EBRE 13410M001    4833520.35647 41536.82732 4147461.28658 A
 180 ELGE 19353S001    4657557.74619 -202242.01764 4338991.46917 A
 257 HOND 15012M002    4640529.67695 -145676.53036 4358781.34046 A
 235 IGEL 19352S001    4645951.78492 -165575.05002 4352550.00700 A
 240 ISPS 19484M001    4640596.83112 -206964.32137 4356391.49869 A
 252 LARE 19440M001    4632832.29529 -279026.69087 4360314.01011 A
 256 LAZK 19354S001    4666098.69062 -178186.73931 4330463.25111 A
 261 LEIT 19428M001    4663521.29467 -155859.26776 4334519.46976 A
 334 ORDN 19427M001    4659696.13900 -130865.28188 4338948.46893 A
 493 PASA 19351S001    4644909.41752 -156645.61612 4353622.66066 W
 553 RID1 13448M002    4708447.17516 -199490.83656 4284089.31588 W
 558 SALA 13469M001    4803054.78855 -462131.63469 4158378.64327 W
 566 SCDA 10088M002    4639940.86561 -136225.48623 4359552.01334 A
 443 TERU 13487M001    4867391.66581 -95523.91582 4108341.24764 A
 752 YEBE 13420M001    4848724.89768 -261632.49688 4123093.89596 A
 755 ZARA 13462M001    4773803.52615 -73506.54389 4215453.66992 W
    
```

### 5.3 ETRF2014 (ETRS89) Coordinates

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

```

CONVERT TO ETRF2014                                                    03-SEP-23 23:54
-----
LOCAL GEODETIC DATUM: ETRF2014                EPOCH: 2023-08-16 11:59:45
-----
NUM  STATION NAME      X (M)      Y (M)      Z (M)      FLAG  SYSTEM
-----
    
```

4	ACOR	13434M001	4594489.81188	-678368.01240	4357065.91284	W
50	ALSA	19419M001	4677251.14509	-176770.98291	4319079.51146	A
100	BIAZ	10074M002	4634456.36636	-124345.55965	4365785.09100	A
101	BIDA	00000M000	4644178.13819	-145778.90631	4354832.11730	A
104	CACE	13447M001	4899866.74692	-544567.65013	4033769.81315	W
116	CANT	13438M001	4625924.61419	-307096.81926	4365771.19674	W
162	CREU	13432M001	4715420.48769	273177.46842	4271946.47709	W
204	EBRE	13410M001	4833520.31130	41536.78867	4147461.33832	A
180	ELGE	19353S001	4657557.70388	-202242.05619	4338991.52126	A
257	HOND	15012M002	4640529.63463	-145676.56918	4358781.39264	A
235	IGEL	19352S001	4645951.74261	-165575.08875	4352550.05915	A
240	ISPS	19484M001	4640596.78901	-206964.35997	4356391.55083	A
252	LARE	19440M001	4632832.25351	-279026.72924	4360314.06224	A
256	LAZK	19354S001	4666098.64814	-178186.77790	4330463.30319	A
261	LEIT	19428M001	4663521.25213	-155859.30644	4334519.52187	A
334	ORDN	19427M001	4659696.09642	-130865.32067	4338948.52106	A
493	PASA	19351S001	4644909.37519	-156645.65488	4353622.71282	W
553	RI01	13448M002	4708447.13228	-199490.87489	4284089.36783	W
558	SALA	13469M001	4803054.74543	-462131.67164	4158378.69484	W
566	SC0A	10088M002	4639940.82326	-136225.52509	4359552.06553	A
443	TERU	13487M001	4867391.62076	-95523.95382	4108341.29920	A
752	YEBE	13420M001	4848724.85341	-261632.53436	4123093.94748	A
755	ZARA	13462M001	4773803.48210	-73506.58238	4215453.72175	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 IGS20 solution and are given with respect to the Local frame (North-East-Up).

GFA FINAL WEEKLY COMBINATION: FINAL ORBITS 03-SEP-23 23:54

Station	#Days	Weekday O123456	Repeatability (mm)		
			N	E	U
ACDR 13434M001	6	XXXXX X	1.62	0.87	8.05
ALSA 19419M001	7	XXXXXXX	1.49	1.26	4.55
BIAZ 10074M002	7	XXXXXXX	0.64	0.72	4.56
BIDA 00000M000	7	XXXXXXX	0.72	0.52	3.91
CACE 13447M001	7	XXXXXXX	0.50	0.70	3.05
CANT 13438M001	7	XXXXXXX	0.62	0.80	2.91
CREU 13432M001	7	XXXXXXX	0.77	0.47	5.30
EBRE 13410M001	7	XXXXXXX	0.79	1.67	2.43
ELGE 19353S001	7	XXXXXXX	0.94	1.07	4.35
HOND 15012M002	7	XXXXXXX	0.67	0.58	3.72
IGEL 19352S001	7	XXXXXXX	0.89	0.60	2.50
ISPS 19484M001	7	XXXXXXX	0.83	1.18	2.16
LARE 19440M001	7	XXXXXXX	1.29	0.77	3.99
LAZK 19354S001	7	XXXXXXX	1.04	1.28	3.58
LEIT 19428M001	7	XXXXXXX	1.17	0.81	3.46
ORON 19427M001	7	XXXXXXX	1.29	0.71	2.53
PASA 19351S001	7	XXXXXXX	0.53	0.54	4.71
RIO1 13448M002	7	XXXXXXX	0.92	0.60	4.41
SALA 13469M001	7	XXXXXXX	1.16	0.66	2.05
SCDA 10088M002	7	XXXXXXX	1.19	1.94	3.60
TERU 13487M001	7	XXXXXXX	0.94	0.79	2.44
YEBE 13420M001	7	XXXXXXX	0.74	0.21	2.11
ZARA 13462M001	7	XXXXXXX	0.59	0.73	2.65

Comparison of individual solutions:

ACDR 13434M001	N	1.62	2.03	0.62	0.26	0.04	1.09	-2.70
ACDR 13434M001	E	0.87	1.08	-1.07	0.61	-0.83	-0.12	0.67
ACDR 13434M001	U	8.05	-2.54	-9.72	-2.27	-3.64	12.37	-7.20
ALSA 19419M001	N	1.49	0.31	-1.84	0.94	2.26	0.57	-1.67
ALSA 19419M001	E	1.26	0.65	-2.77	-0.13	-0.61	0.13	0.93
ALSA 19419M001	U	4.55	1.80	-3.01	0.43	1.84	-1.39	-9.66
BIAZ 10074M002	N	0.64	-0.84	-0.31	0.95	0.69	-0.43	-0.20
BIAZ 10074M002	E	0.72	-0.44	-1.43	-0.16	-0.14	0.86	0.15
BIAZ 10074M002	U	4.56	3.19	-6.96	2.30	-6.08	1.71	3.11
BIDA 00000M000	N	0.72	0.15	-1.33	0.15	1.01	0.19	0.22
BIDA 00000M000	E	0.52	-0.45	0.47	-0.12	-0.19	-1.03	-0.24
BIDA 00000M000	U	3.91	6.39	-4.16	0.44	-4.25	-0.75	0.01
CACE 13447M001	N	0.50	-0.88	-0.33	0.20	0.12	-0.41	-0.28
CACE 13447M001	E	0.70	0.35	0.54	0.68	-0.80	0.72	-0.61
CACE 13447M001	U	3.05	1.71	-4.92	-2.24	2.80	2.26	3.14
CANT 13438M001	N	0.62	-0.58	0.38	1.13	0.31	0.63	0.15
CANT 13438M001	E	0.80	0.67	0.08	-1.28	0.19	-0.38	-0.63
CANT 13438M001	U	2.91	0.11	-1.37	-4.73	3.15	1.42	2.91
CREU 13432M001	N	0.77	-0.72	-0.02	0.53	0.46	1.26	-0.61
CREU 13432M001	E	0.47	0.34	-0.48	0.42	-0.45	-0.19	-0.06
CREU 13432M001	U	5.30	5.83	6.20	-1.64	-0.96	-5.96	-7.33
EBRE 13410M001	N	0.79	0.73	-0.35	0.46	-1.03	0.51	-0.04
EBRE 13410M001	E	1.67	1.29	-2.52	-1.78	1.54	-1.05	-0.51
EBRE 13410M001	U	2.43	-1.09	0.13	-1.21	3.02	2.16	-3.42
ELGE 19353S001	N	0.94	-0.58	0.63	1.05	-0.59	0.42	0.43
ELGE 19353S001	E	1.07	-1.08	-0.07	-0.39	1.10	-0.22	-1.10
ELGE 19353S001	U	4.35	1.66	0.13	2.15	-1.86	-3.17	5.50
HOND 15012M002	N	0.67	-0.19	-0.76	0.62	1.03	0.14	0.01
HOND 15012M002	E	0.58	-1.11	0.52	-0.58	0.09	-0.31	0.17
HOND 15012M002	U	3.72	5.18	-2.78	3.11	-3.44	-1.05	-2.37
IGEL 19352S001	N	0.89	-1.29	-0.72	0.45	0.17	0.14	1.51
IGEL 19352S001	E	0.60	-0.98	-0.33	0.00	0.62	-0.07	-0.83
IGEL 19352S001	U	2.50	2.55	-1.12	1.21	-4.42	-1.71	-0.10
ISPS 19484M001	N	0.83	0.31	1.00	0.13	1.45	0.47	-0.86
ISPS 19484M001	E	1.18	-0.21	-0.95	-0.41	-1.22	-0.67	1.55
ISPS 19484M001	U	2.16	-1.87	-2.37	2.01	3.37	0.07	0.73
LARE 19440M001	N	1.29	0.96	0.86	2.41	-1.34	0.51	0.66
LARE 19440M001	E	0.77	-1.11	0.22	-0.61	0.72	-1.09	-0.28
LARE 19440M001	U	3.99	-4.30	0.59	-3.47	1.21	-2.02	6.66
LAZK 19354S001	N	1.04	-0.41	-1.45	0.61	1.25	0.94	-0.57
LAZK 19354S001	E	1.28	-0.51	-0.08	-1.21	2.41	-0.93	-0.76
LAZK 19354S001	U	3.58	0.24	-2.80	-0.24	-6.98	-1.67	1.08
LEIT 19428M001	N	1.17	-0.40	0.04	0.51	2.30	-1.37	0.74
LEIT 19428M001	E	0.81	-0.86	-1.32	0.18	-0.80	-0.48	0.72
LEIT 19428M001	U	3.46	4.28	-4.02	-0.26	-2.39	-0.46	-5.49
ORON 19427M001	N	1.29	-1.42	-0.40	-0.49	0.76	-0.61	2.57
ORON 19427M001	E	0.71	-1.28	-0.50	-0.21	0.45	-0.72	0.37
ORON 19427M001	U	2.53	1.54	-5.31	0.56	-1.35	0.55	-1.32
PASA 19351S001	N	0.53	-0.89	-0.42	0.30	0.62	0.03	0.01
PASA 19351S001	E	0.54	-0.79	-0.27	0.59	0.24	-0.70	-0.42
PASA 19351S001	U	4.71	7.18	0.41	2.32	-6.61	-2.90	-1.93
RIO1 13448M002	N	0.92	0.48	0.07	1.22	-0.09	1.21	-0.15
RIO1 13448M002	E	0.60	-1.13	-0.07	0.27	-0.18	-0.87	-0.20
RIO1 13448M002	U	4.41	5.69	-1.60	-7.33	0.47	1.03	-5.14
SALA 13469M001	N	1.16	2.00	-0.18	-0.57	0.96	-0.70	-0.52
SALA 13469M001	E	0.66	-0.38	-0.63	1.02	-0.66	-0.10	-0.72
SALA 13469M001	U	2.05	-0.61	-2.45	-0.83	0.24	4.01	1.23
SCDA 10088M002	N	1.19	-1.52	-1.37	0.34	1.70	-0.71	0.15
SCDA 10088M002	E	1.94	-3.22	-0.51	-0.76	-0.97	-0.36	2.38
SCDA 10088M002	U	3.60	6.25	-3.06	1.01	-1.74	-1.62	-2.86
TERU 13487M001	N	0.94	0.54	0.28	0.26	1.40	-0.16	0.51
TERU 13487M001	E	0.79	0.81	-0.54	-0.03	0.83	-0.89	1.13
TERU 13487M001	U	2.44	-0.75	3.04	-4.21	-2.38	-1.24	0.71
YEBE 13420M001	N	0.74	0.26	-0.11	0.38	-0.15	0.18	1.22
YEBE 13420M001	E	0.21	-0.09	-0.18	0.08	0.34	-0.02	-0.16
YEBE 13420M001	U	2.11	0.94	-0.37	0.25	-4.20	2.34	1.56
ZARA 13462M001	N	0.59	0.24	-0.12	-0.50	-0.15	0.29	0.29
ZARA 13462M001	E	0.73	-1.70	-0.27	-0.35	0.23	-0.11	0.14
ZARA 13462M001	U	2.65	0.50	-1.93	-4.32	-0.50	1.38	-3.62

## 6.2 Datum verification

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

TRANSFORMATION IN EQUATORIAL SYSTEM (X, Y, Z):  
RESIDUALS IN LOCAL SYSTEM (NORTH, EAST, UP)

LIST OF REMOVED STATIONS:

OUTLIER CRITERIA: 15.00 15.00 20.00

NUM	NAME	FLG	RESIDUALS IN MILLIMETERS		
1	ACOR 13434M001	I W	-2.03	2.92	-0.76
2	ALAC 13433M001	I W	-1.28	2.12	4.39
3	ALBA 13452M001	I W	4.41	-1.51	-6.28
4	ALME 13437M001	I W	-1.18	0.49	6.78
5	BCLN 13412M001	I W	2.66	-2.63	3.12
6	BELL 13431M001	I W	0.03	-1.34	0.37
7	BORR 13480M001	I W	-0.98	2.24	0.87
8	BRST 10004M004	I W	-2.98	1.26	3.67
9	CACE 13447M001	I W	1.09	2.32	4.73
10	CANT 13438M001	I W	-3.56	2.76	-7.55
11	CARG 19412M001	I W	1.29	3.17	-2.52
12	CASE 13494M001	I W	-3.59	-0.22	1.47
13	CEU1 13449M002	I W	2.33	-1.05	0.60
14	COBA 13453M001	I W	1.73	1.38	-3.95
15	CREU 13432M001	I W	-2.28	-0.21	0.39
17	ESCO 13435M001	I W	-3.24	1.06	-3.06
18	HUEL 13451M001	I W	10.21	-7.31	10.66
20	IZAN 31309M002	I W	2.30	3.63	0.28
21	LLIV 13436M001	I W	-0.88	0.20	2.70
23	LROC 10023M001	I W	1.30	1.22	6.32
25	MAS1 31303M002	I W	1.68	0.32	-1.41
26	PASA 19351S001	I W	0.76	1.08	-5.48
27	RABT 35001M002	I W	1.11	0.57	-11.38
28	RID1 13448M002	I W	-3.04	-1.33	-3.04
29	SALA 13469M001	I W	1.08	0.80	-0.68
31	SFER 13402M004	I W	-3.28	-12.15	1.80
32	SONS 13446M001	I W	-1.00	0.77	-1.26
33	VALA 13463M002	I W	1.44	-1.59	-0.63
34	VALE 13439M001	I W	-4.57	2.53	-7.89
35	VIGO 13450M001	I W	2.51	0.12	4.04
38	ZARA 13462M001	I W	-0.88	-0.63	-1.39
39	ZIMM 14001M004	I W	-2.03	-3.00	1.98
RMS / COMPONENT			2.94	3.10	4.63
IQR			3.72	2.94	5.69
MEAN			-0.03	-0.06	-0.10
MEDIAN			-0.42	0.53	0.32
MIN			-4.57	-12.15	-11.38
MAX			10.21	3.63	10.66
OVERALL RMS/IQR/MAX(3D)			3.64	3.44	16.47
					HUEL 13451M001 #SUM
ALL	RMS / COMPONENT		2.94	3.10	4.63
ALL	IQR		3.72	2.94	5.69
ALL	MEAN		-0.03	-0.06	-0.10
ALL	MEDIAN		-0.42	0.53	0.32
ALL	MIN		-4.57	-12.15	-11.38
ALL	MAX		10.21	3.63	10.66
ALL	OVERALL RMS/IQR/MAX(3D)		3.64	3.44	16.47
					HUEL 13451M001 #SUM_ALL

NUMBER OF PARAMETERS : 3  
NUMBER OF STATIONS : 32  
NUMBER OF COORDINATES : 96  
RMS OF TRANSFORMATION : 3.64 MM

PARAMETERS:

TRANSLATION IN X : -0.00 +- 0.64 MM  
TRANSLATION IN Y : -0.00 +- 0.64 MM  
TRANSLATION IN Z : -0.00 +- 0.64 MM

NUMBER OF ITERATIONS : 1



### 6.3 Adjustment Statistics

In this section, the summary of the global adjustment and not subnetworks are shown. Also, the Helmert parameters of the combined solution with respect to the daily solutions are shown.

```
* STATISTICAL PARAMETER-----VALUE(S)-----
NUMBER OF OBSERVATIONS          14715559
NUMBER OF UNKNOWN(S)            156053
NUMBER OF DEGREES OF FREEDOM    14559506
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)     180
VARIANCE FACTOR                  2.233296099556919
```

## 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 23:225:00000 23:231:86370 LEICA GR50 -----
ALSA A 1 P 23:225:00000 23:231:86370 LEICA GR50 -----
BIAZ A 1 P 23:225:00000 23:231:86370 SPECTRA SP90M -----
BIDA A 1 P 23:225:00000 23:231:86370 LEICA GR10 -----
CACE A 1 P 23:225:00000 23:231:86370 TRIMBLE NETR9 -----
CANT A 1 P 23:225:00000 23:231:86370 LEICA GR10 -----
CREU A 1 P 23:225:00000 23:231:86370 LEICA GR50 -----
EBRE A 1 P 23:225:00000 23:231:86370 LEICA GR50 -----
ELGE A 1 P 23:225:00000 23:231:86370 LEICA GR30 -----
HOND A 1 P 23:225:00000 23:231:86370 LEICA GR50 -----
IGEL A 1 P 23:225:00000 23:231:86370 LEICA GR30 -----
ISPS A 1 P 23:225:00000 23:231:86370 TRIMBLE NETR9 -----
LARE A 1 P 23:225:00000 23:231:86370 LEICA GR50 -----
LAZK A 1 P 23:225:00000 23:231:86370 LEICA GR30 -----
LEIT A 1 P 23:225:00000 23:231:86370 LEICA GR50 -----
ORON A 1 P 23:225:00000 23:231:86370 LEICA GR50 -----
PASA A 1 P 23:225:00000 23:231:86370 LEICA GR30 -----
RI01 A 1 P 23:225:00000 23:231:86370 LEICA GR25 -----
SALA A 1 P 23:225:00000 23:231:86370 LEICA GR50 -----
SCDA A 1 P 23:225:00000 23:231:86370 LEICA GR50 -----
TERU A 1 P 23:225:00000 23:231:86370 LEICA GR50 -----
YEBE A 1 P 23:225:00000 23:231:86370 LEICA GR50 -----
ZARA A 1 P 23:225:00000 23:231:86370 TRIMBLE NETR9 -----
```

### 7.2 Antennas

Serial number ONLY provided in case individual calibrations are used.

```
*SITE PT SOLN T DATA_START__ DATA_END_____ DESCRIPTION----- S/N__ DAZI
ACOR A 1 P 23:225:00000 23:231:86370 LEIAT504 LEIS -----
ALSA A 1 P 23:225:00000 23:231:86370 LEIAR10 NONE -----
BIAZ A 1 P 23:225:00000 23:231:86370 LEIAR25 LEIT -----
BIDA A 1 P 23:225:00000 23:231:86370 LEIAS10 NONE -----
CACE A 1 P 23:225:00000 23:231:86370 TRM29659.00 NONE -----
CANT A 1 P 23:225:00000 23:231:86370 LEIAR25_R4 LEIT -----
CREU A 1 P 23:225:00000 23:231:86370 LEIAR25_R4 NONE -----
EBRE A 1 P 23:225:00000 23:231:86370 LEIAR25_R4 NONE -----
ELGE A 1 P 23:225:00000 23:231:86370 LEIAR25_R4 LEIT -----
HOND A 1 P 23:225:00000 23:231:86370 LEIAR20 LEIM -----
IGEL A 1 P 23:225:00000 23:231:86370 LEIAR20 LEIM -----
ISPS A 1 P 23:225:00000 23:231:86370 TRM59900.00 SCIS -----
LARE A 1 P 23:225:00000 23:231:86370 LEIAR20 LEIM -----
LAZK A 1 P 23:225:00000 23:231:86370 LEIAR25_R4 LEIT -----
LEIT A 1 P 23:225:00000 23:231:86370 LEIAR10 NONE -----
ORON A 1 P 23:225:00000 23:231:86370 LEIAR10 NONE -----
PASA A 1 P 23:225:00000 23:231:86370 LEIAR20 LEIM -----
RI01 A 1 P 23:225:00000 23:231:86370 LEIAR25_R4 LEIT -----
SALA A 1 P 23:225:00000 23:231:86370 LEIAR25 NONE -----
SCDA A 1 P 23:225:00000 23:231:86370 TRM55971.00 NONE -----
TERU A 1 P 23:225:00000 23:231:86370 LEIAR20 LEIM -----
YEBE A 1 P 23:225:00000 23:231:86370 LEIAR20 LEIM -----
ZARA A 1 P 23:225:00000 23:231:86370 TRM29659.00 NONE -----
```

### 7.3 Eccentricities

```
*
* SITE PT SOLN T DATA_START__ DATA_END_____ AXE ARP->BENCHMARK(M)-----
ACOR A 1 P 23:225:00000 23:231:86370 UNE 3.0460 0.0000 0.0000
ALSA A 1 P 23:225:00000 23:231:86370 UNE 0.0000 0.0000 0.0000
BIAZ A 1 P 23:225:00000 23:231:86370 UNE 0.0000 0.0000 0.0000
BIDA A 1 P 23:225:00000 23:231:86370 UNE 0.0000 0.0000 0.0000
CACE A 1 P 23:225:00000 23:231:86370 UNE 0.0600 0.0000 0.0000
CANT A 1 P 23:225:00000 23:231:86370 UNE 3.0490 0.0000 0.0000
CREU A 1 P 23:225:00000 23:231:86370 UNE 0.0770 0.0000 0.0000
EBRE A 1 P 23:225:00000 23:231:86370 UNE 0.0770 0.0000 0.0000
ELGE A 1 P 23:225:00000 23:231:86370 UNE 0.0000 0.0000 0.0000
```

HOND	A	1	P	23:225:00000	23:231:86370	UNE	0.0771	0.0000	0.0000
IGEL	A	1	P	23:225:00000	23:231:86370	UNE	0.0000	0.0000	0.0000
ISPS	A	1	P	23:225:00000	23:231:86370	UNE	0.0350	0.0000	0.0000
LARE	A	1	P	23:225:00000	23:231:86370	UNE	0.0000	0.0000	0.0000
LAZK	A	1	P	23:225:00000	23:231:86370	UNE	0.0000	0.0000	0.0000
LEIT	A	1	P	23:225:00000	23:231:86370	UNE	0.0000	0.0000	0.0000
ORON	A	1	P	23:225:00000	23:231:86370	UNE	0.0000	0.0000	0.0000
PASA	A	1	P	23:225:00000	23:231:86370	UNE	0.0000	0.0000	0.0000
RIO1	A	1	P	23:225:00000	23:231:86370	UNE	0.0606	0.0000	0.0000
SALA	A	1	P	23:225:00000	23:231:86370	UNE	0.0600	0.0000	0.0000
SCOA	A	1	P	23:225:00000	23:231:86370	UNE	0.0000	0.0000	0.0000
TERU	A	1	P	23:225:00000	23:231:86370	UNE	0.0600	0.0000	0.0000
YEBE	A	1	P	23:225:00000	23:231:86370	UNE	0.0600	0.0000	0.0000
ZARA	A	1	P	23:225:00000	23:231:86370	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:

```

2023-09-03 03:35 UTC | ISP82250.230 | RECEIVER FIRM. VERS. | 5.30 -> 5.22 (source: isps00esp_20220907.log)
2023-09-03 06:26 UTC | ISP82260.230 | RECEIVER FIRM. VERS. | 5.30 -> 5.22 (source: isps00esp_20220907.log)
2023-09-03 08:52 UTC | ISP82270.230 | RECEIVER FIRM. VERS. | 5.30 -> 5.22 (source: isps00esp_20220907.log)
2023-09-03 11:16 UTC | ISP82280.230 | RECEIVER FIRM. VERS. | 5.30 -> 5.22 (source: isps00esp_20220907.log)
2023-09-03 14:02 UTC | ISP82290.230 | RECEIVER FIRM. VERS. | 5.30 -> 5.22 (source: isps00esp_20220907.log)
2023-09-03 16:56 UTC | ISP82300.230 | RECEIVER FIRM. VERS. | 5.30 -> 5.22 (source: isps00esp_20220907.log)
2023-09-03 19:46 UTC | ISP82310.230 | RECEIVER FIRM. VERS. | 5.30 -> 5.22 (source: isps00esp_20220907.log)

```

## 9 References

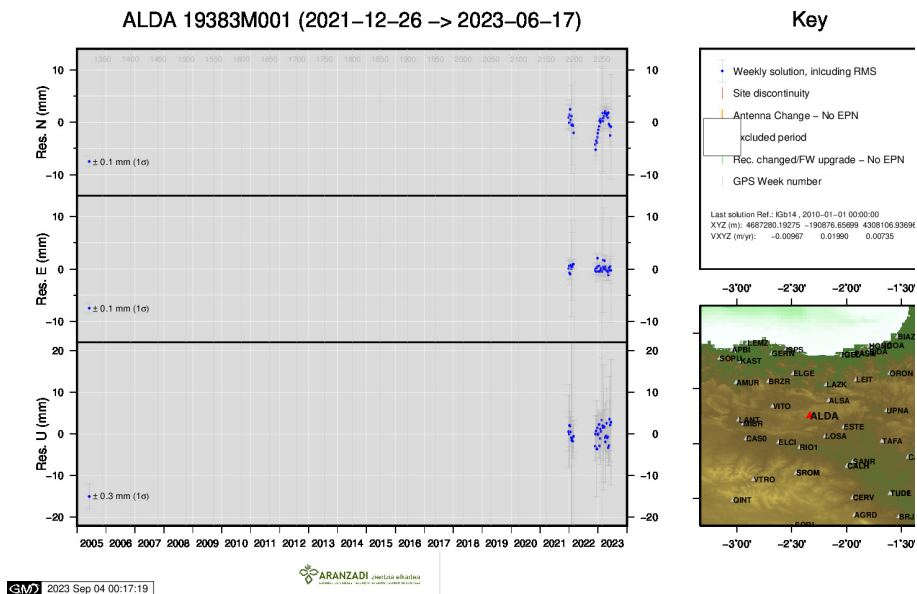
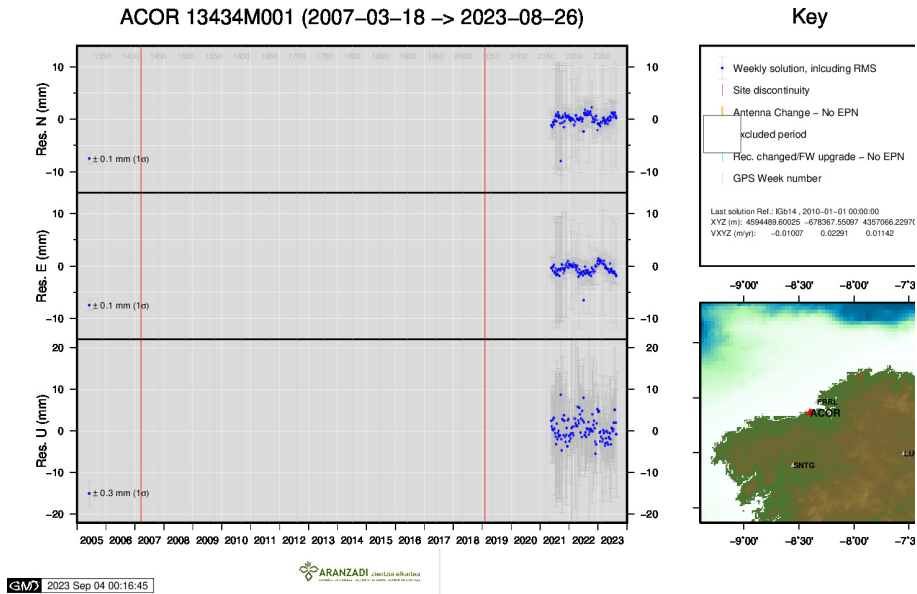
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign*. [etrs89.ensg.ign.fr/memo-V8.pdf](https://etrs89.ensg.ign.fr/memo-V8.pdf)

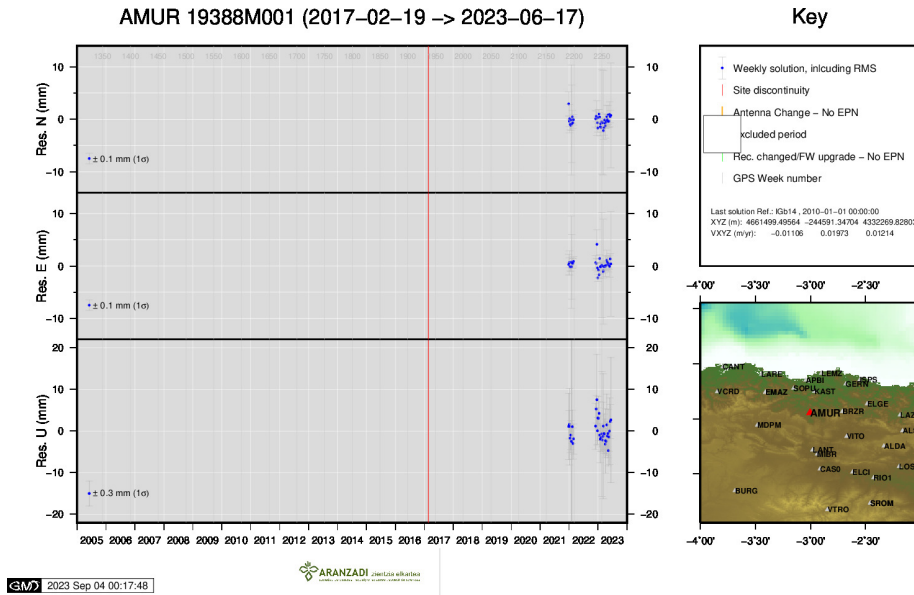
EPN Coordination Group and the EPN Central Bureau (2018): *Guidelines for the EPN Analysis Centres*. [epncb.oma.be/documentation/guidelines/guidelines\\_analysis\\_centres.pdf](https://epncb.oma.be/documentation/guidelines/guidelines_analysis_centres.pdf)

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](https://etrs89.ensg.ign.fr/pub/EUREF-TN-1.pdf)

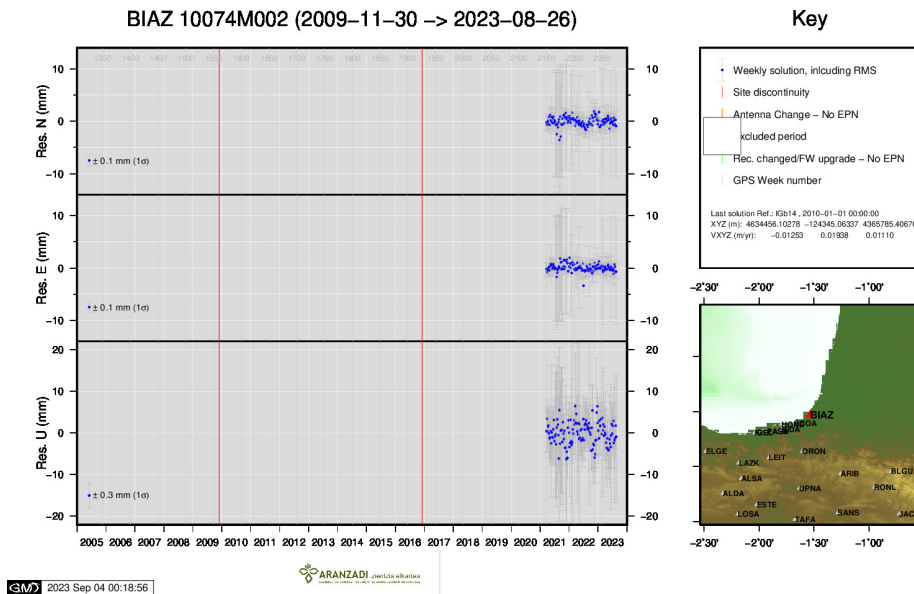
## 10 Cumulative Time Series

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

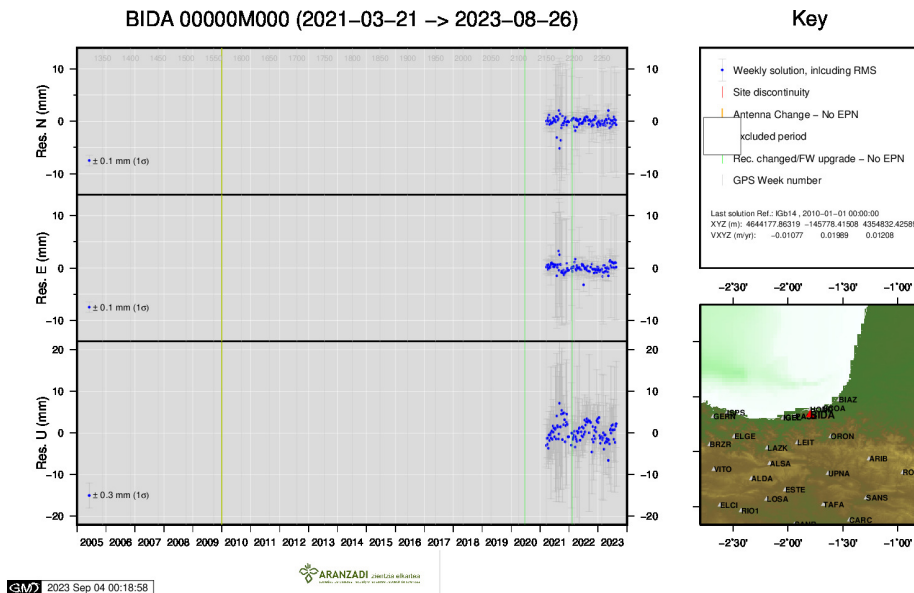




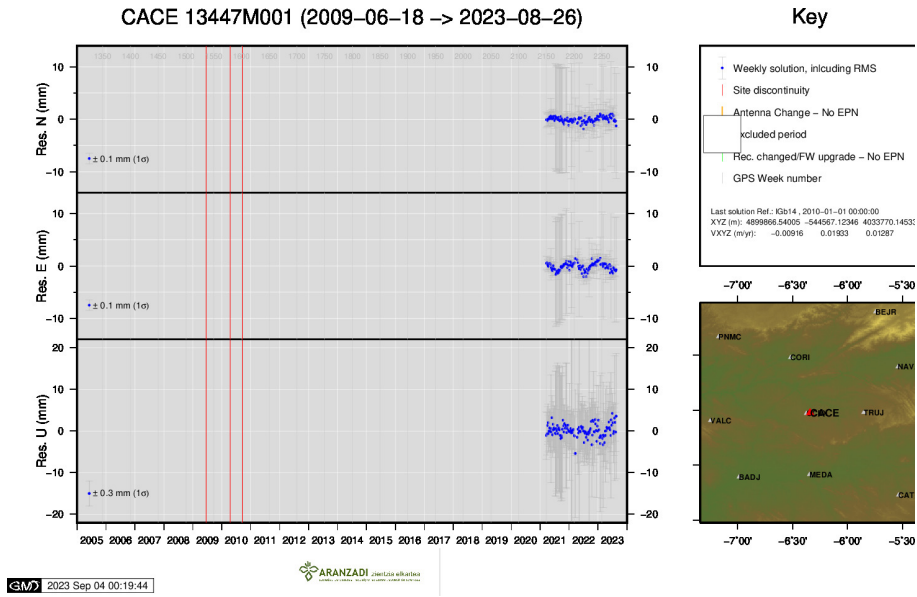
3 ) AMUR



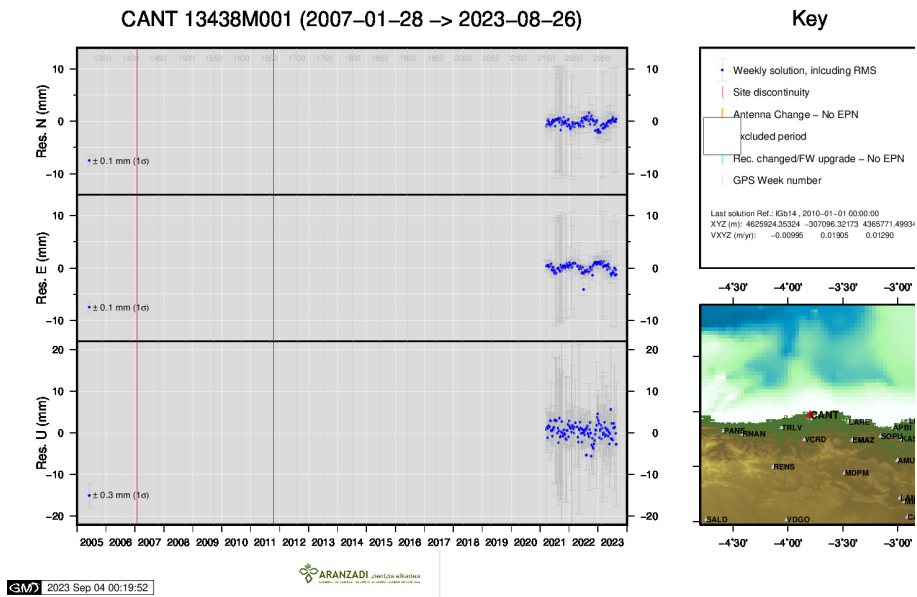
4 ) BIAZ



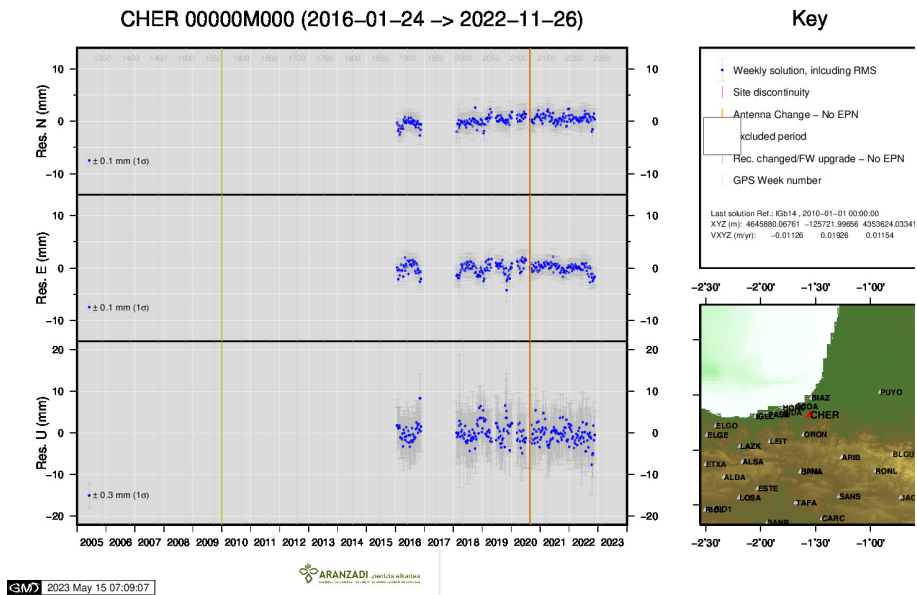
5 ) BIDA



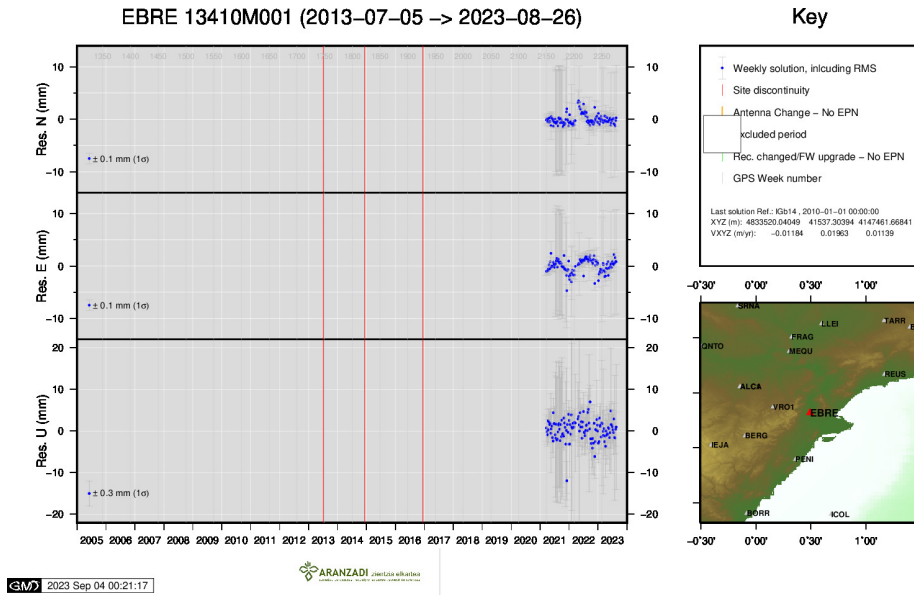
6 ) CACE



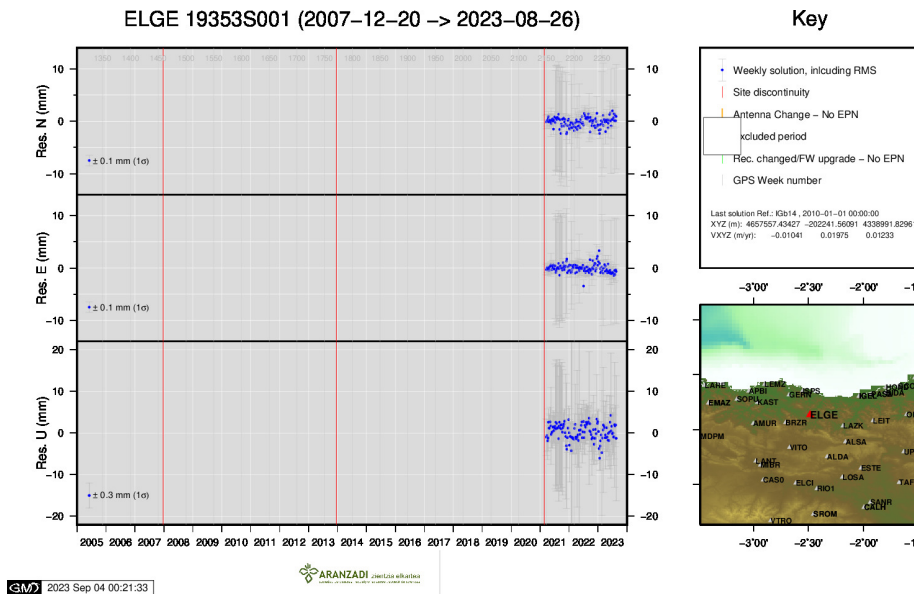
7 ) CANT



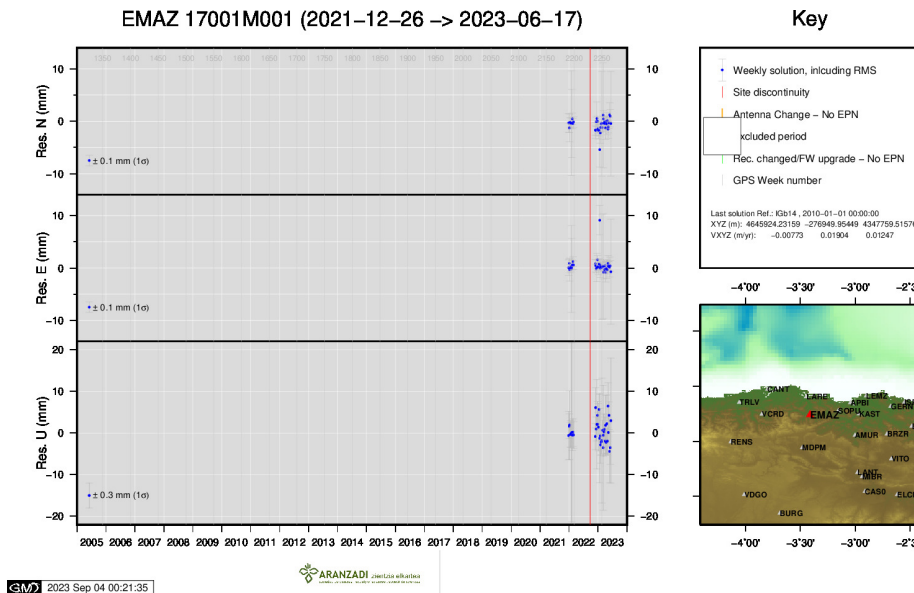
8 ) CHER



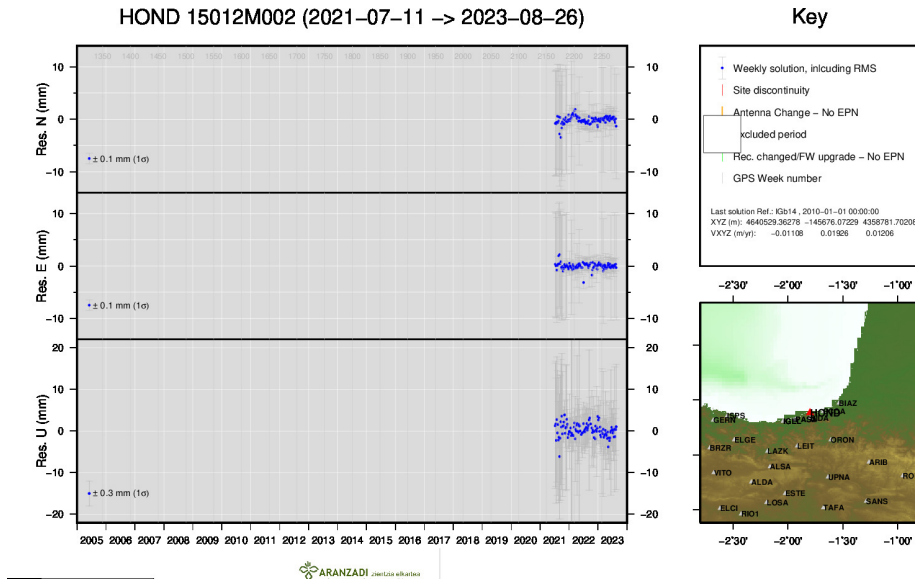
9 ) EBRE



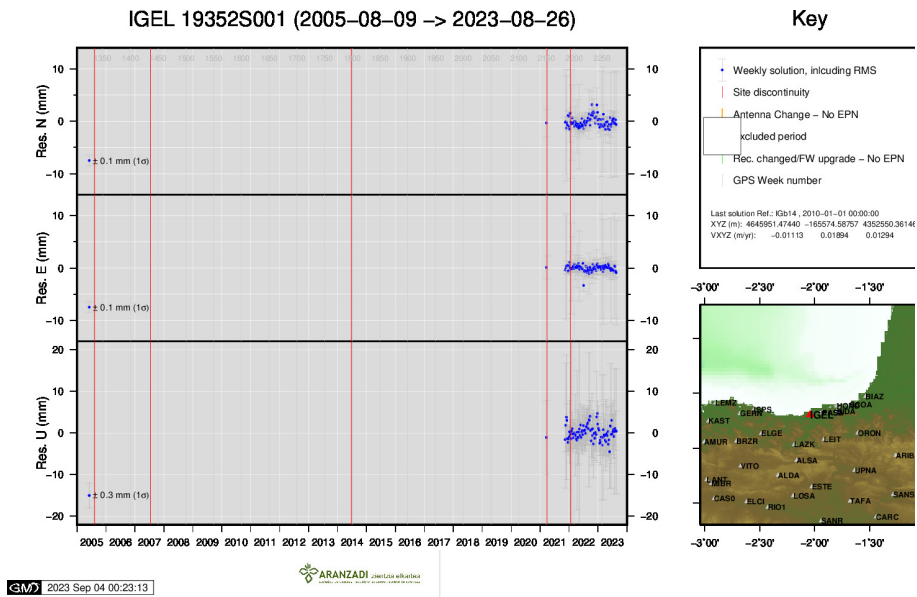
10 ) ELGE



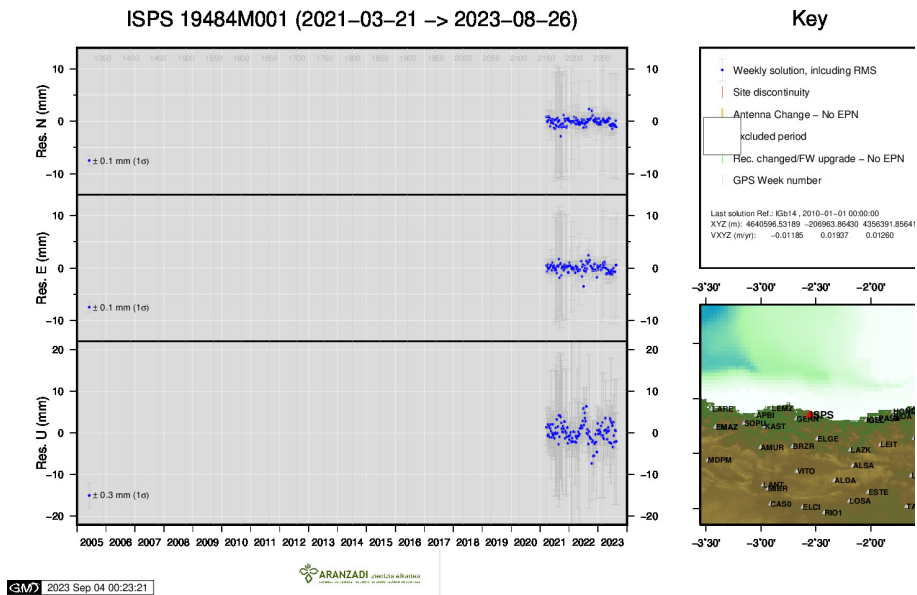
11 ) EMAZ



12 ) HOND

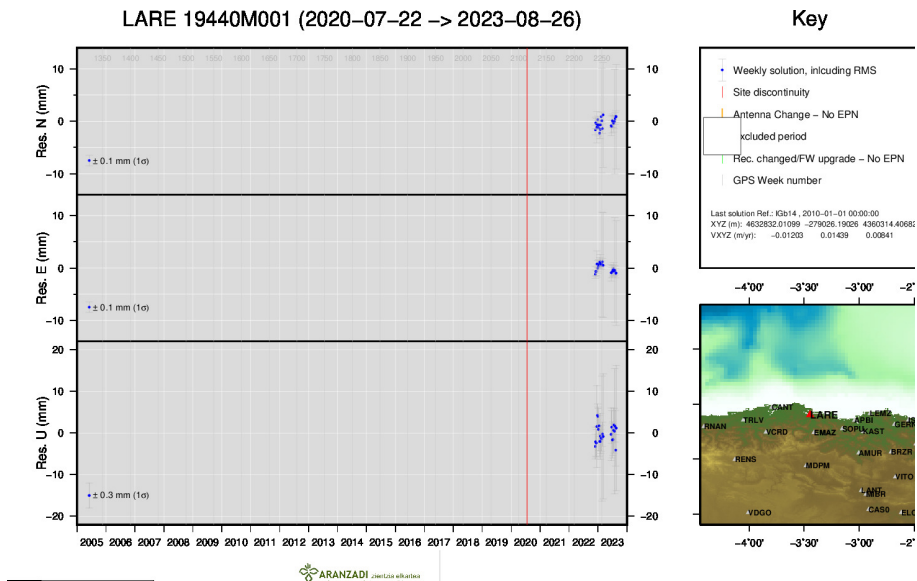


13 ) IGEL

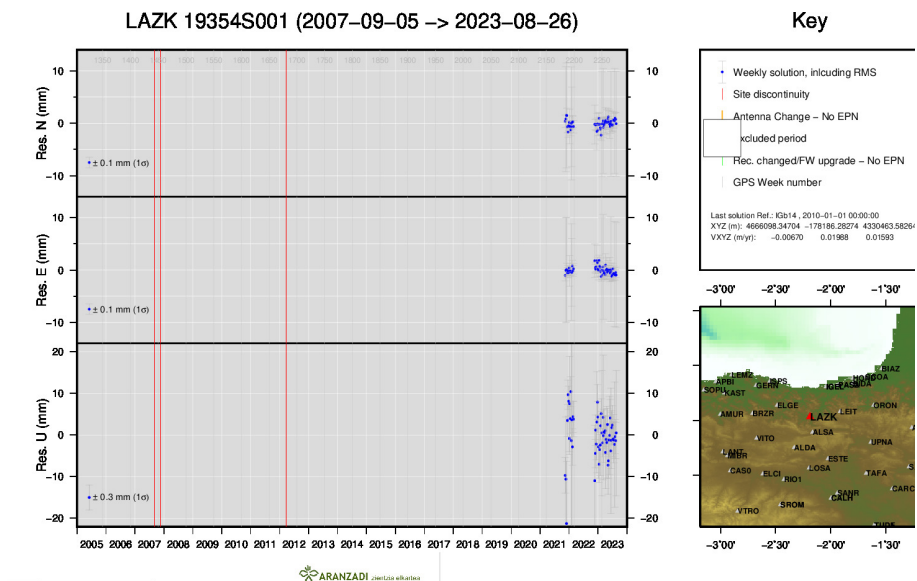


14 ) ISPS

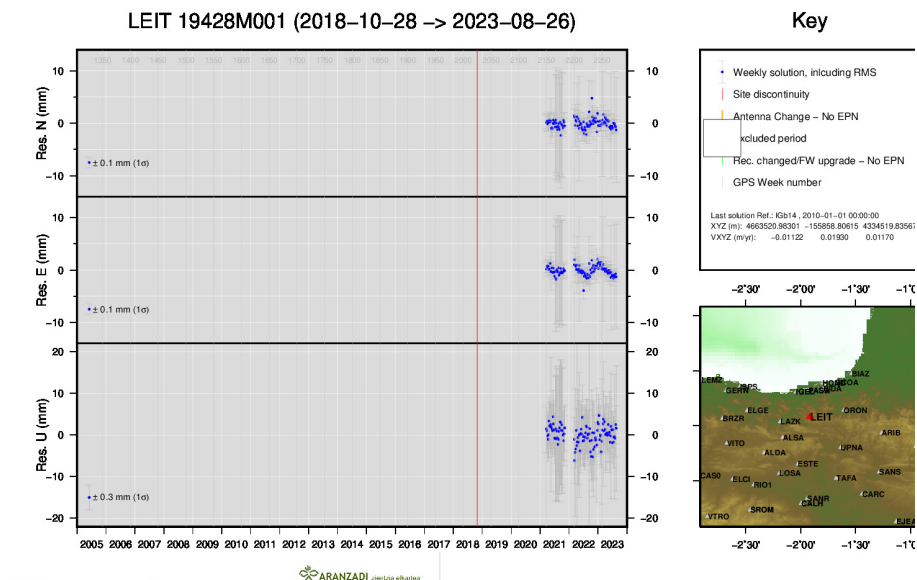




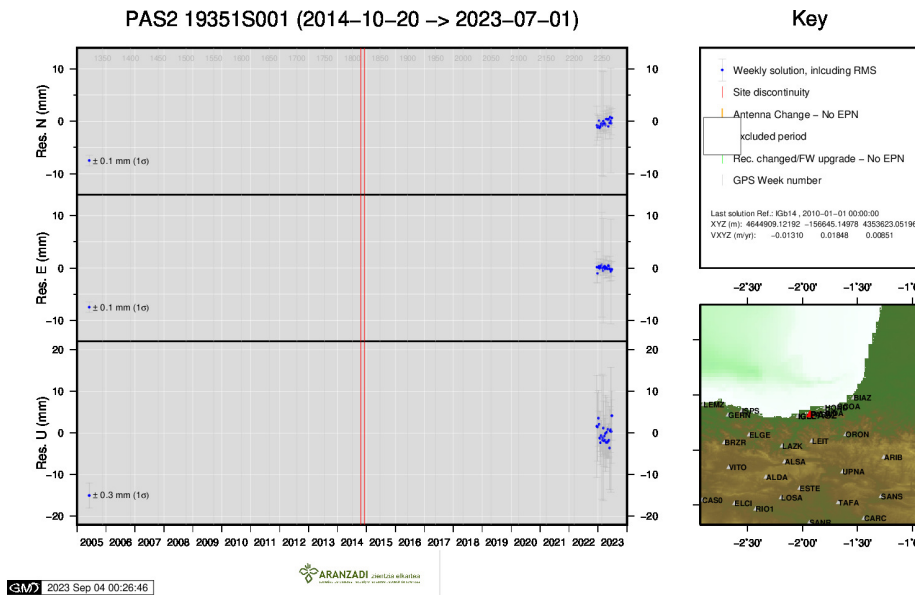
15 ) LARE



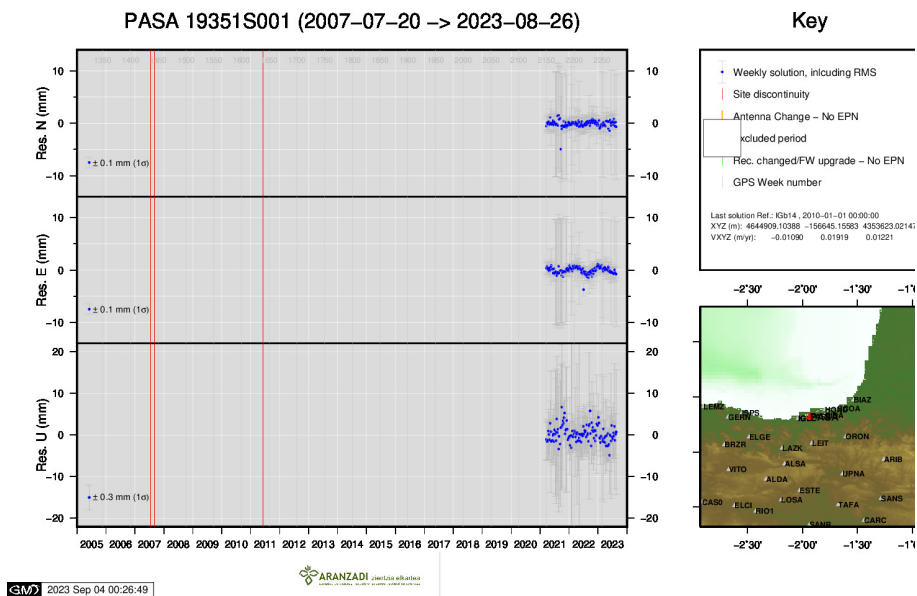
16 ) LAZK



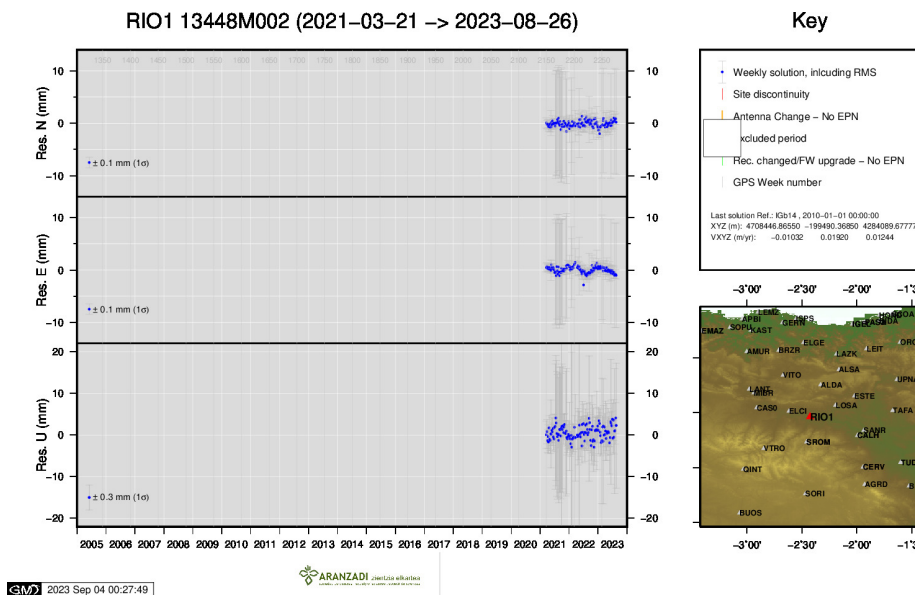
17 ) LEIT



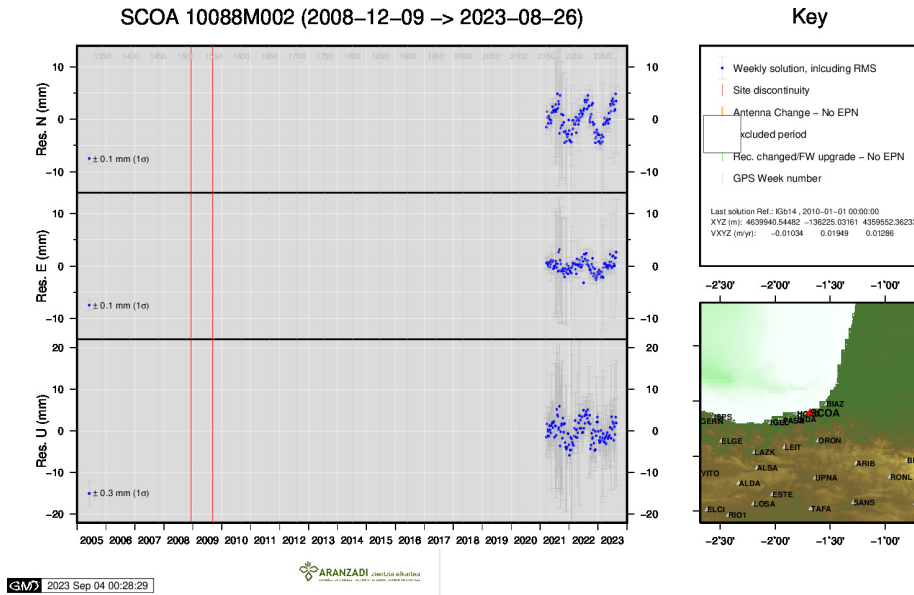
18 ) PAS2



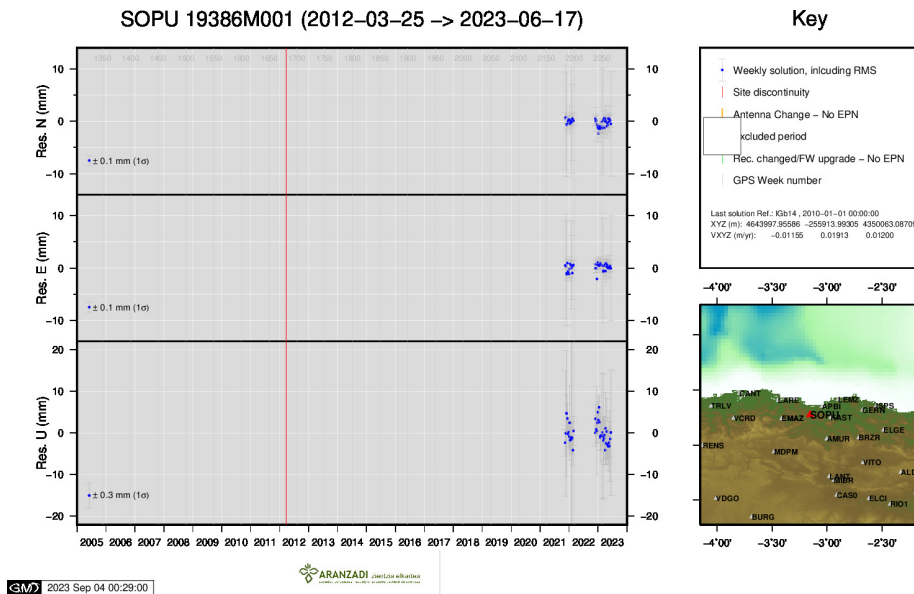
19 ) PASA



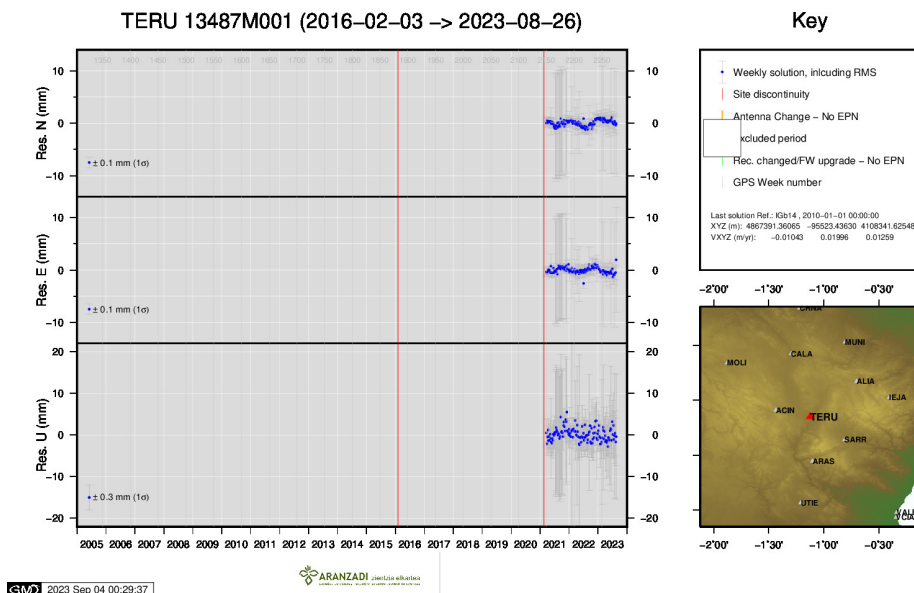
20 ) RIO1



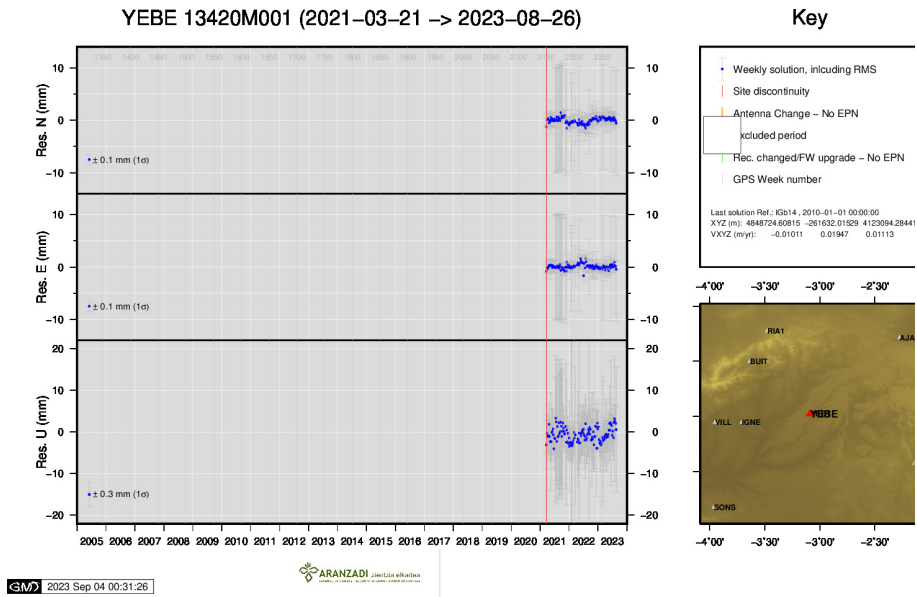
21 ) SCOA



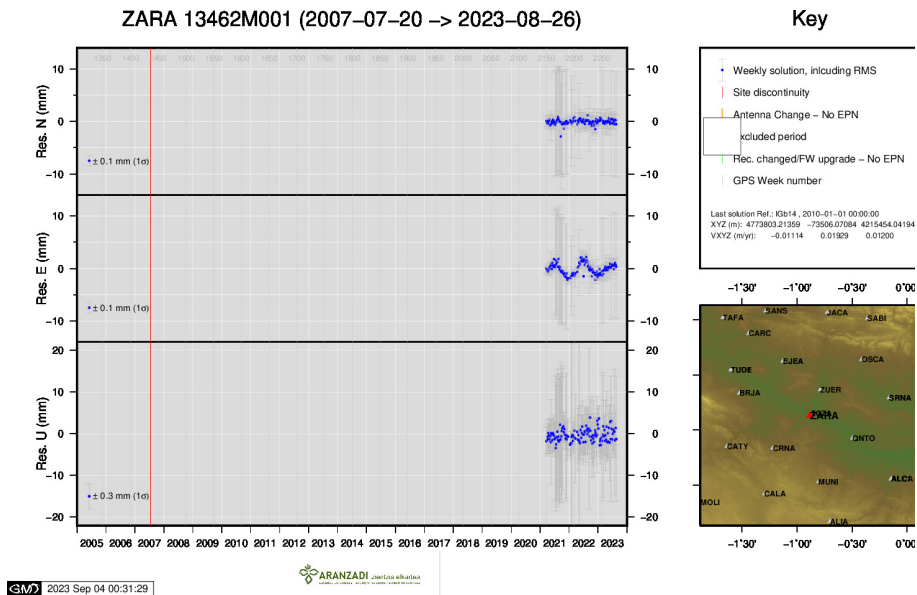
22 ) SOPU



23 ) TERU



24 ) YEBE



25 ) ZARA