

ARA-DAC Weekly Analysis Result: 2120 (GFA)

Technical Report

GPS Week: 2120 (GFA)

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

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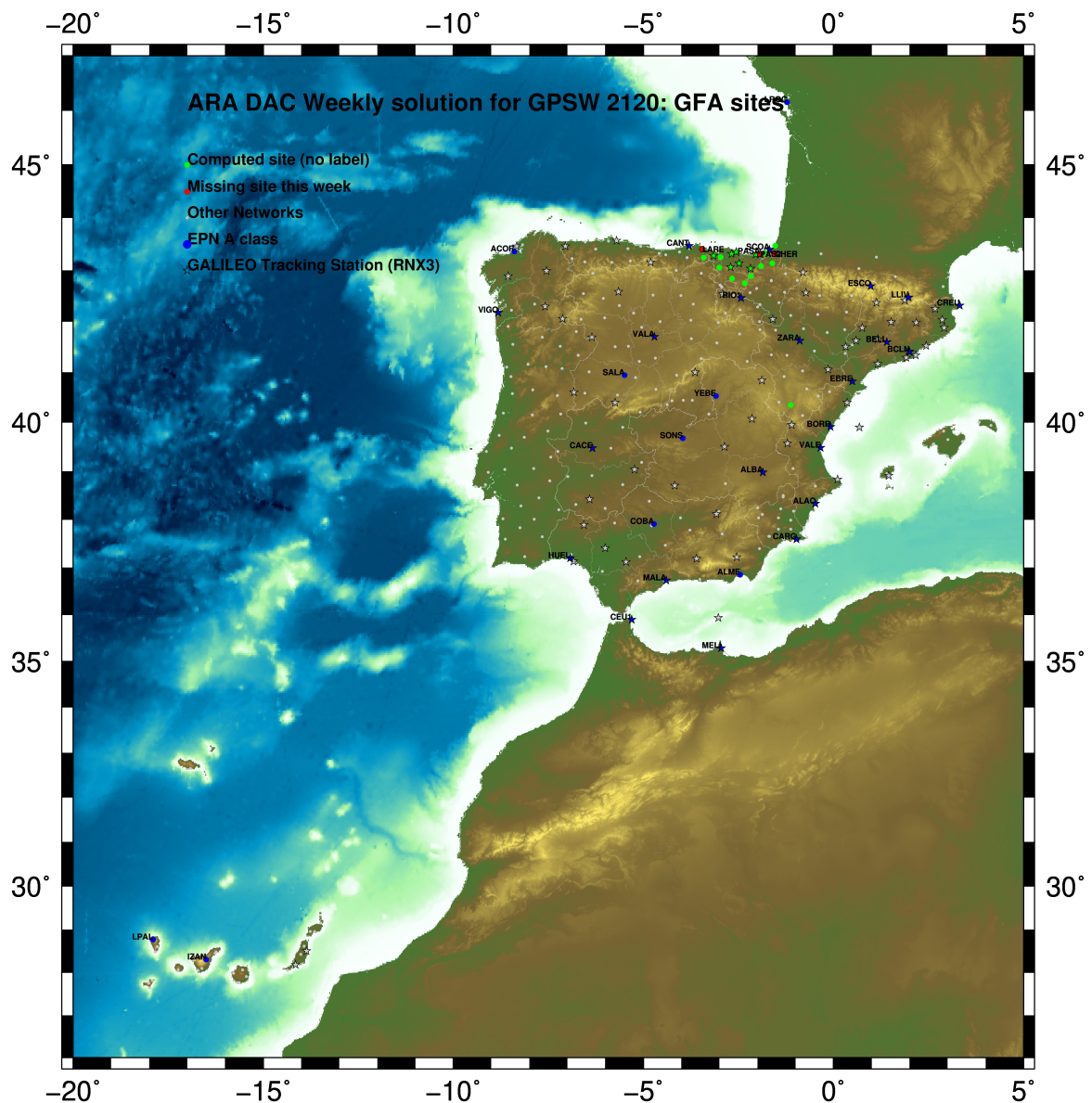
Report generated on 2020/09/13 at 01:53:52



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 2020 Sep 13 01:53:44

Fig.1: Computed Sites for GPS Week2120 (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) IGS14 used to define the reference frame (from GPSW 1934). If individual calibrations, other from these, are available, they are also included in the analysis.
- Troposphere:
 - 3 deg elev. cutoff; elevation dependent weighting
 - VMF1 mapping function. ZPD parameters are estimated using the VMF1 mapping function.
 - CHENHER gradient estimation model.
- Ionosphere: no a priori model, ionospheric effect almost removed by iono free combination.
- Ocean Loading: FES2004 (Scherneck).
- Atmosph. Loading: computed from a global grid using the GRDS1S2 program of Bernese 5.2.

4 Estimated Parameters

- Adjustment: Least Squares
- Rejection Criteria: 3*rms of single differences, in the weekly combination of daily normal equations (ADDNEQ)
- Station coordinates: minimum constraints (MC) to EPN A class sites (only translations).
- Troposphere: 3 deg. After having obtained coordinates valid for the entire week, tropospheric zenith delay is solved at each site at intervals of 1 hour throughout the week, holding the coordinates constrained at the weekly values.
- Ionospheric: second and third "High Order Ionosphere (HOI)" corrections used, using CODE files, to improve Ambiguity Resolution.
- Satellite clock bias: not estimated because are eliminated by double differencing the phase data.
- Receiver clock bias: not estimated because are eliminated by double differencing the phase data.
- Orbits and ERPs: CODE's orbits and ERP for both rapid and final solutions. DE405 planetary ephemeris and JGM3 Earth geopotential model is used.
- Tidal displacements: according to IERS2010 Conventions. Atmospheric loading corrections used.

- Ambiguity: an advanced ambiguity resolution (AR) scheme is included:
 - Code-Based Widelane (WL) AR for baselines shorter than 6000km, a Melbourne-Wuebbena wide-lane and narrow-lane AR is computed.
 - Phase-Based Widelane (L_5) AR for baselines shorter than 200km, the code-based wide-lane AR is replaced by a phase-only wide-lane with a subsequent narrow-lane AR.
 - Quasi-Ionosphere-Free (QIF)AR for the remaining real-valued ambiguities for baselines shorter than 2000km.
 - Direct L_1/L_2 AR for baselines shorter than 20km
- AR Verification: Each baseline is processed by introducing the resolved integer ambiguities and checking the residuals. If there is any problem, the ambiguities are re-initialized.

5 Computed Coordinates

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

5.1 IGS14

The Reference Frame considered in this section is IGS14, release C2085.

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ARA LAC 2120 WEEK FINAL COMBINATION: PRECISE ORBITS                12-SEP-20 22:55
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LOCAL GEODETIC DATUM: IGS14                EPOCH: 2020-08-26 12:00:00
-----
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
-----
  4 ACRD 13434M001        4594489.54618      -678367.42036      4357066.29885      W
 39 ALDA 19383M001        4687280.14533      -190876.54451      4308106.96945      A
 50 ALSA 19419M001        4677250.82144      -176770.37108      4319079.89495      A
 53 AMUR 19388M001        4661499.43377      -244591.23704      4332269.90150      A
100 BIAZ 10074M002        4634456.03571      -124344.95388      4365785.47327      A
101 BIDA 00000M000        4644177.80666      -145778.30012      4354832.49839      A
113 BRZR 19387M001        4662220.97730      -220769.87782      4333309.45927      A
 98 CACE 13447M001        4899866.48883      -544567.01414      4033770.21800      W
109 CANT 13438M001        4625924.29763      -307096.21244      4365771.57236      W
154 CREU 13432M001        4715420.11610      273178.08316      4271946.85829      W
190 EBRE 13410M001        4833519.97390      41537.41491      4147461.73317      W
180 ELGE 19353S001        4657557.38955      -202241.45200      4338991.88719      A
182 EMAZ 17001M001        4645924.19226      -276949.84279      4347759.59323      A
209 GERN 19389M001        4642811.30482      -217222.90309      4353278.89993      A
235 IGEL 19352S001        4645951.41493      -165574.48230      4352550.43644      A
240 ISPS 19484M001        4640596.46685      -206963.75557      4356391.93159      A
245 KAST 19499M001        4646949.06480      -240747.25188      4348015.01019      A
256 LAZK 19354S001        4666098.32296      -178186.16963      4330463.68597      A
261 LEIT 19428M001        4663520.92199      -155858.69677      4334519.90084      A
334 ORDN 19427M001        4659695.76538      -130864.71222      4338948.90060      A
456 PASA 19351S001        4644909.04387      -156645.04717      4353623.09323      W
513 RID1 13448M002        4708446.81276      -199490.26277      4284089.75343      W
518 SALA 13469M001        4803054.46756      -462131.04694      4158379.09207      W
526 SCDA 10088M002        4639940.48071      -136224.91927      4359552.43023      W
418 SOPU 19386M001        4643997.88995      -255913.88574      4350063.15708      A
443 TERU 13487M001        4867391.31043      -95523.32757      4108341.69861      A
493 VITO 19385M001        4679397.68828      -218436.48460      4314898.38598      A
698 YEBE 13420M001        4848724.55229      -261631.90726      4123094.34363      W
701 ZARA 13462M001        4773803.15136      -73505.96111      4215454.11023      W
    
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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 2120                12-SEP-20 22:55
-----
LOCAL GEODETIC DATUM: ETRF2000                EPOCH: 2020-08-26 12:00:00
-----
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
-----
  4 ACRD 13434M001        4594489.86225      -678367.98191      4357065.86493      W
 39 ALDA 19383M001        4687280.51728      -190877.11512      4308106.53445      A
 50 ALSA 19419M001        4677251.19590      -176770.94056      4319079.46092      A
 53 AMUR 19388M001        4661499.80092      -244591.80500      4332269.46785      A
100 BIAZ 10074M002        4634456.41991      -124345.51857      4365785.04326      A
101 BIDA 00000M000        4644178.18746      -145778.86593      4354832.06735      A
113 BRZR 19387M001        4662221.34743      -220770.44580      4333309.02587      A
 98 CACE 13447M001        4899866.79786      -544567.60834      4033769.76172      W
109 CANT 13438M001        4625924.65959      -307096.77669      4365771.14072      W
154 CREU 13432M001        4715420.54182      273177.51110      4271946.42682      W
190 EBRE 13410M001        4833520.36250      41536.82929      4147461.28953      W
180 ELGE 19353S001        4657557.76234      -202242.01942      4338991.45439      A
182 EMAZ 17001M001        4645924.55659      -276950.40915      4347759.16040      A
209 GERN 19389M001        4642811.67682      -217223.46895      4353278.46810      A
235 IGEL 19352S001        4645951.79316      -165575.04836      4352550.00501      A
240 ISPS 19484M001        4640596.84032      -206964.32116      4356391.50006      A
245 KAST 19499M001        4646949.43356      -240747.81825      4348014.57774      A
256 LAZK 19354S001        4666098.69806      -178186.73790      4330463.25280      A
261 LEIT 19428M001        4663521.30010      -155859.26471      4334519.46815      A
334 ORDN 19427M001        4659696.14685      -130865.27967      4338948.46852      A
456 PASA 19351S001        4644909.42326      -156645.61309      4353622.66199      W
513 RID1 13448M002        4708447.18193      -199490.83568      4284089.31665      W
518 SALA 13469M001        4803054.79566      -462131.63066      4158378.64450      W
526 SCDA 10088M002        4639940.86301      -136225.48459      4359551.99964      W
418 SOPU 19386M001        4643998.25701      -255914.45183      4350062.72467      A
443 TERU 13487M001        4867391.67954      -95523.91728      4108341.25060      A
493 VITO 19385M001        4679398.05736      -218437.05443      4314897.95125      A
698 YEBE 13420M001        4848724.90226      -261632.49543      4123093.89500      W
701 ZARA 13462M001        4773803.53089      -73506.54070      4215453.66988      W
    
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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 2120 12-SEP-20 22:55

 LOCAL GEODETIC DATUM: ETRF2014 EPOCH: 2020-08-26 12:00:00

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
4	ACDR 13434M001	4594489.82107	-678368.02010	4357065.91561	W
39	ALDA 19383M001	4687280.47383	-190877.15458	4308106.58500	A
50	ALSA 19419M001	4677251.15250	-176770.98011	4319079.51150	A
53	AMUR 19388M001	4661499.75790	-244591.84438	4332269.51845	A
100	BIAZ 10074M002	4634456.37678	-124345.55846	4365785.09400	A
101	BIDA 00000M000	4644178.14430	-145778.90571	4354832.11804	A
113	BRZR 19387M001	4662221.30433	-220770.48526	4333309.07648	A
98	CACE 13447M001	4899866.75318	-544567.64575	4033769.81162	W
109	CANT 13438M001	4625924.61710	-307096.81601	4365771.19140	W
154	CREU 13432M001	4715420.49649	273177.47024	4271946.47760	W
190	EBRE 13410M001	4833520.31678	41536.78966	4147461.33984	W
180	ELGE 19353S001	4657557.71923	-202242.05896	4338991.50502	A
182	EMAZ 17001M001	4645924.51382	-276950.44849	4347759.21103	A
209	GERN 19389M001	4642811.63389	-217223.50849	4353278.51876	A
235	IGEL 19352S001	4645951.75005	-165575.08807	4352550.05569	A
240	ISPS 19484M001	4640596.79739	-206964.36075	4356391.55074	A
245	KAST 19499M001	4646949.39066	-240747.85770	4348014.62838	A
256	LAZK 19354S001	4666098.65479	-178186.77749	4330463.30341	A
261	LEIT 19428M001	4663521.25678	-155859.30438	4334519.51879	A
334	ORON 19427M001	4659696.10349	-130865.31943	4338948.51918	A
456	PASA 19351S001	4644909.38013	-156645.65283	4353622.71268	W
513	RI01 13448M002	4708447.13829	-199490.87503	4284089.36715	W
518	SALA 13469M001	4803054.75181	-462131.66874	4158378.69465	W
526	SC0A 10088M002	4639940.81986	-136225.52442	4359552.05035	W
418	SOPU 19386M001	4643998.21419	-255914.49124	4350062.77531	A
443	TERU 13487M001	4867391.63392	-95523.95632	4108341.30073	A
493	VITO 19385M001	4679398.01408	-218437.09383	4314898.00182	A
698	YEBE 13420M001	4848724.85736	-261632.53399	4123093.94510	W
701	ZARA 13462M001	4773803.48618	-73506.58019	4215453.72026	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 IGS14 solution and are given with respect the Local frame (North-East-Up).

ARA LAC 2120 WEEK FINAL COMBINATION: PRECISE ORBITS 12-SEP-20 22:55

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	7	XXXXXX	0.62	0.60	3.17
ALDA 19383M001	7	XXXXXX	1.03	0.78	3.32
ALSA 19419M001	7	XXXXXX	0.76	0.95	4.10
AMUR 19388M001	7	XXXXXX	1.22	0.58	3.31
BLAZ 10074M002	7	XXXXXX	1.16	1.00	4.46
BIDA 00000M000	7	XXXXXX	1.62	1.21	4.04
BRZR 19387M001	7	XXXXXX	0.68	0.67	3.07
CACE 13447M001	7	XXXXXX	0.43	0.91	4.73
CANT 13438M001	7	XXXXXX	1.04	0.92	3.17
CREU 13432M001	7	XXXXXX	1.32	0.88	4.55
EBRE 13410M001	7	XXXXXX	0.87	0.76	2.05
ELGE 19353S001	7	XXXXXX	1.09	0.74	4.02
EMAZ 17001M001	7	XXXXXX	3.13	5.68	13.56
GERN 19389M001	7	XXXXXX	0.98	0.79	6.96
IGEL 19352S001	7	XXXXXX	0.60	0.74	3.76
ISPS 19484M001	7	XXXXXX	0.71	1.69	5.16
KAST 19499M001	7	XXXXXX	0.65	1.39	5.62
LAZK 19354S001	7	XXXXXX	0.97	1.69	7.62
LEIT 19428M001	7	XXXXXX	1.01	0.91	2.93
ORDN 19427M001	7	XXXXXX	0.42	0.83	3.41
PASA 19351S001	7	XXXXXX	0.75	0.58	4.25
RI01 13448M002	7	XXXXXX	0.53	0.36	4.26
SALA 13469M001	7	XXXXXX	0.87	0.86	2.96
SCOA 10088M002	7	XXXXXX	0.89	2.33	4.50
SOPU 19386M001	7	XXXXXX	1.22	1.43	3.97
TERU 13487M001	7	XXXXXX	1.12	0.66	3.25
VITO 19385M001	7	XXXXXX	0.85	0.91	2.62
YEBE 13420M001	7	XXXXXX	0.44	0.83	1.80
ZARA 13462M001	7	XXXXXX	0.95	0.83	2.55

Comparison of individual solutions:

ACOR 13434M001	N	0.62	0.05	1.10	-0.97	-0.24	0.21	0.13	-0.26
ACOR 13434M001	E	0.60	0.46	0.33	0.67	0.27	-0.84	-0.79	-0.05
ACOR 13434M001	U	3.17	1.21	3.13	5.76	-2.23	-2.46	1.34	-1.70
ALDA 19383M001	N	1.03	1.22	0.04	0.70	0.56	-1.08	-1.52	-0.79
ALDA 19383M001	E	0.78	-1.35	0.00	0.50	0.89	0.63	-0.60	-0.02
ALDA 19383M001	U	3.32	-3.42	0.25	3.85	-5.42	-0.72	2.32	-2.01
ALSA 19419M001	N	0.76	0.51	0.10	0.47	-0.88	-0.97	-0.75	0.85
ALSA 19419M001	E	0.95	0.49	-0.48	-0.40	0.63	0.57	-0.89	-1.82
ALSA 19419M001	U	4.10	-2.44	0.25	-5.65	2.67	-3.50	5.07	-4.23
AMUR 19388M001	N	1.22	1.16	-1.33	-0.40	1.75	-0.68	-0.99	-1.06
AMUR 19388M001	E	0.58	0.49	0.04	-1.13	0.38	0.45	-0.24	-0.28
AMUR 19388M001	U	3.31	-4.60	-2.17	1.67	-2.83	4.09	2.71	2.21
BLAZ 10074M002	N	1.16	-0.60	-1.02	-0.55	-0.55	-0.86	2.27	-0.48
BLAZ 10074M002	E	1.00	-0.96	-0.37	-1.95	0.45	-0.41	0.07	0.86
BLAZ 10074M002	U	4.46	-1.67	1.78	-0.59	-8.69	3.65	-2.45	4.28
BIDA 00000M000	N	1.62	0.22	-0.98	-1.29	-0.42	-1.39	3.22	0.75
BIDA 00000M000	E	1.21	1.79	-0.81	-0.50	-0.30	0.98	-1.80	0.60
BIDA 00000M000	U	4.04	-6.75	-1.82	2.47	-2.12	0.89	1.67	5.89
BRZR 19387M001	N	0.68	-0.19	0.38	0.63	-0.68	0.35	1.12	-0.60
BRZR 19387M001	E	0.67	-0.42	-0.80	0.87	0.25	0.12	0.99	0.17
BRZR 19387M001	U	3.07	1.38	-2.90	1.98	-1.78	-4.34	1.05	-4.40
CACE 13447M001	N	0.43	-0.08	0.26	0.07	0.95	0.20	-0.18	0.18
CACE 13447M001	E	0.91	0.03	-0.32	1.82	-0.08	0.03	-0.20	-1.24
CACE 13447M001	U	4.73	0.27	2.26	2.72	-6.86	-5.90	5.04	3.77
CANT 13438M001	N	1.04	-1.64	0.41	0.82	-0.74	-0.50	-0.44	-1.41
CANT 13438M001	E	0.92	-0.36	-0.93	0.02	-0.46	-0.93	-0.88	-1.49
CANT 13438M001	U	3.17	1.89	-0.58	-2.87	-1.61	3.66	-5.63	0.58
CREU 13432M001	N	1.32	2.48	-0.64	0.66	-0.15	-0.17	-0.67	-1.70
CREU 13432M001	E	0.88	-0.34	-0.74	-0.94	-0.31	0.23	-0.38	1.67
CREU 13432M001	U	4.55	3.11	-3.03	1.84	-4.71	7.00	-5.04	-2.31
EBRE 13410M001	N	0.87	-1.36	-0.30	0.60	0.74	1.12	-0.32	-0.55
EBRE 13410M001	E	0.76	-0.11	0.16	-1.44	-0.63	0.48	-0.56	0.67
EBRE 13410M001	U	2.05	-1.97	-2.00	-1.74	0.78	-1.02	0.41	3.55
ELGE 19353S001	N	1.09	2.25	-0.09	0.64	0.35	-0.75	-0.87	-0.50
ELGE 19353S001	E	0.74	0.34	-0.59	-0.68	0.28	-0.02	1.46	0.33
ELGE 19353S001	U	4.02	-5.90	0.63	4.34	-3.78	-1.89	2.19	-4.49
EMAZ 17001M001	N	3.13	-0.38	-0.19	-4.30	0.22	0.28	-6.13	-1.52
EMAZ 17001M001	E	5.68	-2.56	0.74	-1.25	2.21	1.21	13.37	0.35
EMAZ 17001M001	U	13.56	-1.56	1.85	22.54	-11.33	-16.24	13.13	4.96
GERN 19389M001	N	0.98	-0.89	0.24	2.19	-0.20	-0.20	-0.11	-0.05
GERN 19389M001	E	0.79	-0.26	0.05	-0.71	-0.12	0.82	1.55	-0.20
GERN 19389M001	U	6.96	-4.74	-6.61	-0.11	-9.00	-2.64	3.02	11.29
IGEL 19352S001	N	0.60	-0.43	0.28	0.10	0.85	0.04	0.44	-0.98
IGEL 19352S001	E	0.74	1.14	-0.62	0.22	0.88	0.35	-0.75	0.33
IGEL 19352S001	U	3.76	2.65	-1.68	0.90	-5.91	0.16	3.21	-5.39
ISPS 19484M001	N	0.71	0.15	0.13	0.45	-0.98	1.18	0.56	-0.36
ISPS 19484M001	E	1.69	0.56	-1.36	-0.91	3.56	0.31	-1.17	-0.09
ISPS 19484M001	U	5.16	-1.70	-7.46	6.04	-0.23	-6.69	3.53	-2.70
KAST 19499M001	N	0.65	0.07	1.00	0.18	-0.86	-0.01	-0.21	0.83
KAST 19499M001	E	1.39	0.69	-0.56	-1.29	1.03	-0.21	2.61	-1.09
KAST 19499M001	U	5.62	-5.12	-3.08	3.15	-8.56	-1.42	8.24	-0.92
LAZK 19354S001	N	0.97	0.22	-1.57	0.44	0.06	-1.46	0.67	0.58
LAZK 19354S001	E	1.69	1.76	0.94	-0.42	0.66	1.22	-1.97	-2.69
LAZK 19354S001	U	7.62	6.56	0.98	-3.51	7.47	7.55	-6.40	-11.75
LEIT 19428M001	N	1.01	0.77	-1.20	-0.46	-1.42	-0.38	1.21	0.55
LEIT 19428M001	E	0.91	-0.62	0.35	-0.84	0.41	0.25	-1.50	1.15
LEIT 19428M001	U	2.93	-5.83	0.93	-1.38	0.60	2.74	2.22	-1.40
ORDN 19427M001	N	0.42	0.33	-0.32	-0.54	-0.49	-0.03	-0.29	0.46
ORDN 19427M001	E	0.83	0.62	-0.50	-0.91	0.06	1.29	-0.80	-0.58
ORDN 19427M001	U	3.41	1.11	-0.57	1.27	-2.78	-2.91	5.65	-4.30
PASA 19351S001	N	0.75	-0.19	-0.54	0.50	1.19	-0.40	0.90	-0.60
PASA 19351S001	E	0.58	0.42	0.18	-0.08	0.64	0.90	-0.05	-0.77

PASA 19351S001	U	4.25	-0.99	-0.97	1.35	-6.64	-2.10	6.12	-4.28
RID1 13448M002	N	0.53	0.65	-0.01	0.28	-0.23	-0.04	-1.06	-0.15
RID1 13448M002	E	0.36	-0.57	0.03	0.39	0.19	-0.05	-0.18	-0.47
RID1 13448M002	U	4.26	3.29	1.83	-5.81	-2.64	-1.74	6.23	-3.47
SALA 13469M001	N	0.87	0.42	1.28	0.97	-0.51	0.54	0.00	-1.13
SALA 13469M001	E	0.86	1.02	0.76	0.11	-0.20	0.41	-1.59	0.09
SALA 13469M001	U	2.96	-4.04	0.69	1.93	2.97	-1.37	2.06	4.11
SCDA 10088M002	N	0.89	0.01	0.46	0.17	0.65	0.82	-0.70	-1.70
SCDA 10088M002	E	2.33	1.05	-0.01	1.17	1.83	2.09	-4.54	-1.32
SCDA 10088M002	U	4.50	-3.98	5.86	5.28	-0.50	2.07	-4.72	-4.08
SOPU 19386M001	N	1.22	1.00	-0.02	2.02	0.06	-1.07	0.62	-1.51
SOPU 19386M001	E	1.43	1.38	-0.01	1.12	0.92	1.04	-0.97	-2.49
SOPU 19386M001	U	3.97	-2.38	-1.93	-0.93	-6.90	1.22	-3.15	5.03
TERU 13487M001	N	1.12	2.21	-0.62	0.37	-0.98	-0.24	0.08	-1.03
TERU 13487M001	E	0.66	-0.09	0.25	0.26	0.29	0.12	-0.37	-1.50
TERU 13487M001	U	3.25	0.60	-3.90	4.21	3.98	-0.37	-1.88	-3.28
VITO 19385M001	N	0.85	0.92	0.31	-0.12	0.31	-1.23	-0.11	-1.34
VITO 19385M001	E	0.91	-0.66	-0.36	-0.36	0.06	0.91	-1.50	1.09
VITO 19385M001	U	2.62	-1.61	0.36	-3.81	1.55	-0.92	1.14	4.42
YEBE 13420M001	N	0.44	0.20	-0.36	0.49	0.55	-0.31	0.57	-0.11
YEBE 13420M001	E	0.83	1.07	-0.26	-1.00	-0.23	0.44	0.31	1.26
YEBE 13420M001	U	1.80	-2.36	0.15	3.41	-0.45	0.18	1.39	0.21
ZARA 13462M001	N	0.95	0.64	0.36	0.76	0.27	-0.29	-0.84	-1.85
ZARA 13462M001	E	0.83	1.16	-0.41	-0.05	0.80	-0.28	-0.62	-1.21
ZARA 13462M001	U	2.55	-1.53	-2.49	-0.23	0.92	1.86	1.46	-4.89

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: IGS14
RESIDUALS IN LOCAL SYSTEM (NORTH, EAST, UP)

NUM	NAME	FLG	RESIDUALS IN MILLIMETERS		
4	ACOR 13434M001	I W	-1.62	1.11	-0.99
10	ALAC 13433M001	I W	0.35	0.23	1.69
13	ALBA 13452M001	I W	1.51	-0.66	-1.12
19	ALME 13437M001	I W	0.03	1.67	-0.23
41	BCLN 13412M001	I W	-0.72	-1.18	0.04
46	BELL 13431M001	I W	-1.78	-2.38	3.50
65	BORR 13480M001	I W	0.79	-2.46	-2.50
70	BRST 10004M004	I W	-1.81	1.77	-0.04
98	CACE 13447M001	I W	1.24	2.00	3.90
109	CANT 13438M001	I W	-1.48	0.98	-0.74
110	CARG 19412M001	I W	0.93	0.39	-2.35
121	CEU1 13449M002	I W	0.87	-0.39	-0.89
135	COBA 13453M001	I W	1.35	0.12	-4.36
154	CREU 13432M001	I W	-0.68	0.47	-3.22
190	EBRE 13410M001	I W	-1.79	-1.01	-1.43
208	ESCO 13435M001	I W	0.44	1.85	-4.83
286	HUEL 13451M001	I W	4.41	-3.21	-5.60
300	IZAN 31309M002	I W	-0.48	-0.06	8.45
359	LLIV 13436M001	I W	0.39	0.82	-1.08
364	LPAL 81701M001	I W	-1.42	-1.25	5.98
366	LROC 10023M001	I W	0.26	1.00	-3.05
400	MELI 19379M001	I W	2.01	-1.44	-1.69
456	PASA 19351S001	I W	-1.02	1.65	-1.49
513	RIO1 13448M002	I W	-0.99	2.17	-2.97
518	SALA 13469M001	I W	0.16	0.84	1.37
526	SCOA 10088M002	I W	-4.15	0.82	-1.49
557	SONS 13446M001	I W	-1.64	-0.94	-0.58
588	TERC 31909M001	I W	4.54	-3.17	-0.39
654	VALA 13463M002	I W	1.05	-0.47	1.42
658	VALE 13439M001	I W	-0.35	0.24	-2.35
669	VIGO 13450M001	I W	-1.01	1.45	3.23
698	YEBE 13420M001	I W	1.30	1.20	5.54
701	ZARA 13462M001	I W	0.15	-0.21	2.08
710	ZIMM 14001M004	I W	-2.16	-0.22	0.13
84	MALA 13443M001	I W	1.37	-1.74	6.04
	RMS / COMPONENT		1.74	1.47	3.24
	MEAN		0.00	-0.00	0.00
	MIN		-4.15	-3.21	-5.60
	MAX		4.54	2.17	8.45

NUMBER OF PARAMETERS : 3
NUMBER OF COORDINATES : 105
RMS OF TRANSFORMATION : 2.29 MM

BARYCENTER COORDINATES:

LATITUDE : 40 19 0.06
LONGITUDE : - 3 55 28.24
HEIGHT : -38.454 KM

PARAMETERS:

TRANSLATION IN N : 0.00 +- 0.39 MM
TRANSLATION IN E : 0.00 +- 0.39 MM
TRANSLATION IN U : -0.00 +- 0.39 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 the daily solutions are shown.

```
* STATISTICAL PARAMETER-----VALUE(S)-----
NUMBER OF OBSERVATIONS          14791909
NUMBER OF UNKNOWN               190163
NUMBER OF DEGREES OF FREEDOM    14601746
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)      180
VARIANCE FACTOR                  2.477420492028855

Helmert Transformation Parameters With Respect to Combined Solution:
-----
Sol  Rms (m)      Translation (m)      Rotation (")      Scale (ppm)
      X          Y          Z          X          Y          Z
-----
 1  0.00226    -0.0039 -0.0067  0.0012  0.0001 -0.0001 -0.0002  0.00040
 2  0.00192    -0.0005 -0.0067 -0.0039  0.0001  0.0001 -0.0002  0.00050
 3  0.00238    -0.0073 -0.0044  0.0093  0.0001 -0.0004 -0.0001  -0.00005
 4  0.00227     0.0252  0.0103 -0.0290 -0.0001  0.0013  0.0003  -0.00019
 5  0.00222    -0.0016  0.0108  0.0039  -0.0003 -0.0001  0.0002  -0.00019
 6  0.00304    -0.0086 -0.0457  0.0140  0.0008 -0.0005 -0.0012  -0.00075
 7  0.00353    -0.0010  0.0079 -0.0025  0.0000 -0.0000  0.0003  0.00033
```

```
Statistics of individual solutions:
-----
File  RMS (m)      DOF  Chi**2/DOF  #Observations authentic / pseudo  #Parameters explicit / implicit / singular
-----
 1  0.00153    2094931    2.34          2122359          3          855    26576    0
 2  0.00148    2092794    2.19          2120151          3          861    26499    0
 3  0.00151    2112382    2.27          2139863          3          864    26620    0
 4  0.00151    2116963    2.28          2144247          3          861    26426    0
 5  0.00157    2109332    2.47          2137357          3          861    27167    0
 6  0.00170    2034919    2.89          2063806          3          858    28032    0
 7  0.00169    2035304    2.86          2064126          3          852    27973    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 20:236:00000 20:242:86370 LEICA GR50 -----
ALDA A 1 P 20:236:00000 20:242:86370 LEICA GR10 -----
ALSA A 1 P 20:236:00000 20:242:86370 LEICA GR50 -----
AMUR A 1 P 20:236:00000 20:242:86370 LEICA GR10 -----
BIAZ A 1 P 20:236:00000 20:242:75570 TRI SP90M -----
BIDA A 1 P 20:236:00000 20:242:86370 LEICA GR10 -----
BRZR A 1 P 20:236:00000 20:242:86370 LEICA GR30 -----
CACE A 1 P 20:236:00000 20:242:86370 TRIMBLE NETR9 -----
CANT A 1 P 20:236:00000 20:242:86370 LEICA GR10 -----
CREU A 1 P 20:236:00000 20:242:86370 LEICA GR50 -----
EBRE A 1 P 20:236:00000 20:242:86370 LEICA GR50 -----
ELGE A 1 P 20:236:00000 20:242:86370 LEICA GR30 -----
EMAZ A 1 P 20:236:00000 20:242:86370 LEICA GR30 -----
GERN A 1 P 20:236:00000 20:242:86370 LEICA GR30 -----
IGEL A 1 P 20:236:00000 20:242:86370 LEICA GR30 -----
ISPS A 1 P 20:236:00000 20:242:86370 TRIMBLE NETR9 -----
KAST A 1 P 20:236:00000 20:242:86370 LEICA GR30 -----
LAZK A 1 P 20:236:00000 20:242:86370 LEICA GR30 -----
LEIT A 1 P 20:236:00000 20:242:86370 LEICA GR50 -----
ORON A 1 P 20:236:00000 20:242:86370 LEICA GR50 -----
PASA A 1 P 20:236:00000 20:242:86370 LEICA GR30 -----
RI01 A 1 P 20:236:00000 20:242:86370 LEICA GR25 -----
SALA A 1 P 20:236:00000 20:242:86370 LEICA GRX1200+GNSS -----
SCDA A 1 P 20:236:00000 20:242:86370 LEICA GR25 -----
SOPU A 1 P 20:236:00000 20:242:86370 LEICA GR30 -----
TERU A 1 P 20:236:00000 20:242:86370 LEICA GRX1200GGPRO -----
VITO A 1 P 20:236:00000 20:242:86370 LEICA GR10 -----
YEBE A 1 P 20:236:00000 20:242:86370 TRIMBLE NETR9 -----
ZARA A 1 P 20:236:00000 20:242:86370 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 20:236:00000 20:242:86370 LEIAT504 LEIS -----
ALDA A 1 P 20:236:00000 20:242:86370 LEIAS10 NONE -----
ALSA A 1 P 20:236:00000 20:242:86370 LEIAR10 NONE -----
AMUR A 1 P 20:236:00000 20:242:86370 LEIAS10 NONE -----
BIAZ A 1 P 20:236:00000 20:242:75570 LEIAR25 LEIT -----
BIDA A 1 P 20:236:00000 20:242:86370 LEIAS10 NONE -----
BRZR A 1 P 20:236:00000 20:242:86370 LEIAS10 NONE -----
```

CACE	A	1	P	20:236:00000	20:242:86370	TRM29659.00	NONE	----
CANT	A	1	P	20:236:00000	20:242:86370	LEIAR25.R4	LEIT	25066
CREU	A	1	P	20:236:00000	20:242:86370	LEIAR25.R4	NONE	26357
EBRE	A	1	P	20:236:00000	20:242:86370	LEIAR25.R4	NONE	26359
ELGE	A	1	P	20:236:00000	20:242:86370	LEIAR25.R4	LEIT	----
EMAZ	A	1	P	20:236:00000	20:242:86370	LEIAS10	NONE	----
GERN	A	1	P	20:236:00000	20:242:86370	LEIAS10	NONE	----
IGEL	A	1	P	20:236:00000	20:242:86370	LEIAR20	LEIM	----
ISPS	A	1	P	20:236:00000	20:242:86370	TRM59900.00	SCIS	----
KAST	A	1	P	20:236:00000	20:242:86370	LEIAS10	NONE	----
LAZK	A	1	P	20:236:00000	20:242:86370	LEIAR25.R4	LEIT	----
LEIT	A	1	P	20:236:00000	20:242:86370	LEIAR10	NONE	----
ORDN	A	1	P	20:236:00000	20:242:86370	LEIAR10	NONE	----
PASA	A	1	P	20:236:00000	20:242:86370	LEIAR20	LEIM	73034
RID1	A	1	P	20:236:00000	20:242:86370	LEIAR25.R4	LEIT	25138
SALA	A	1	P	20:236:00000	20:242:86370	LEIAR25	NONE	----
SCDA	A	1	P	20:236:00000	20:242:86370	TRM55971.00	NONE	----
SOPU	A	1	P	20:236:00000	20:242:86370	LEIAS10	NONE	----
TERU	A	1	P	20:236:00000	20:242:86370	LEIAT504GG	LEIS	----
VITO	A	1	P	20:236:00000	20:242:86370	LEIAS10	NONE	----
YEBE	A	1	P	20:236:00000	20:242:86370	TRM29659.00	NONE	----
ZARA	A	1	P	20:236:00000	20:242:86370	TRM29659.00	NONE	----

7.3 Eccentricities

*SITE	PT	SOLN	T	DATA_START_	DATA_END_	AXE	UP_	NORTH_	EAST_
							ARP->	BENCHMARK(M)	-----
ACOR	A	1	P	20:236:00000	20:242:86370	UNE	3.0460	0.0000	0.0000
ALDA	A	1	P	20:236:00000	20:242:86370	UNE	0.0000	0.0000	0.0000
ALSA	A	1	P	20:236:00000	20:242:86370	UNE	0.0000	0.0000	0.0000
AMUR	A	1	P	20:236:00000	20:242:86370	UNE	0.0000	0.0000	0.0000
BIAZ	A	1	P	20:236:00000	20:242:75570	UNE	0.0000	0.0000	0.0000
BIDA	A	1	P	20:236:00000	20:242:86370	UNE	0.0000	0.0000	0.0000
BRZR	A	1	P	20:236:00000	20:242:86370	UNE	0.0771	0.0000	0.0000
CACE	A	1	P	20:236:00000	20:242:86370	UNE	0.0600	0.0000	0.0000
CANT	A	1	P	20:236:00000	20:242:86370	UNE	3.0490	0.0000	0.0000
CREU	A	1	P	20:236:00000	20:242:86370	UNE	0.0770	0.0000	0.0000
EBRE	A	1	P	20:236:00000	20:242:86370	UNE	0.0770	0.0000	0.0000
ELGE	A	1	P	20:236:00000	20:242:86370	UNE	0.0000	0.0000	0.0000
EMAZ	A	1	P	20:236:00000	20:242:86370	UNE	0.0350	0.0000	0.0000
GERN	A	1	P	20:236:00000	20:242:86370	UNE	0.0771	0.0000	0.0000
IGEL	A	1	P	20:236:00000	20:242:86370	UNE	0.0000	0.0000	0.0000
ISPS	A	1	P	20:236:00000	20:242:86370	UNE	0.0350	0.0000	0.0000
KAST	A	1	P	20:236:00000	20:242:86370	UNE	0.0350	0.0000	0.0000
LAZK	A	1	P	20:236:00000	20:242:86370	UNE	0.0000	0.0000	0.0000
LEIT	A	1	P	20:236:00000	20:242:86370	UNE	0.0000	0.0000	0.0000
ORDN	A	1	P	20:236:00000	20:242:86370	UNE	0.0000	0.0000	0.0000
PASA	A	1	P	20:236:00000	20:242:86370	UNE	0.0000	0.0000	0.0000
RID1	A	1	P	20:236:00000	20:242:86370	UNE	0.0606	0.0000	0.0000
SALA	A	1	P	20:236:00000	20:242:86370	UNE	0.0600	0.0000	0.0000
SCDA	A	1	P	20:236:00000	20:242:86370	UNE	0.0000	0.0000	0.0000
SOPU	A	1	P	20:236:00000	20:242:86370	UNE	0.0771	0.0000	0.0000
TERU	A	1	P	20:236:00000	20:242:86370	UNE	0.0600	0.0000	0.0000
VITO	A	1	P	20:236:00000	20:242:86370	UNE	0.0000	0.0000	0.0000
YEBE	A	1	P	20:236:00000	20:242:86370	UNE	0.0000	0.0000	0.0000
ZARA	A	1	P	20:236:00000	20:242:86370	UNE	3.2590	0.0000	0.0000

8 References

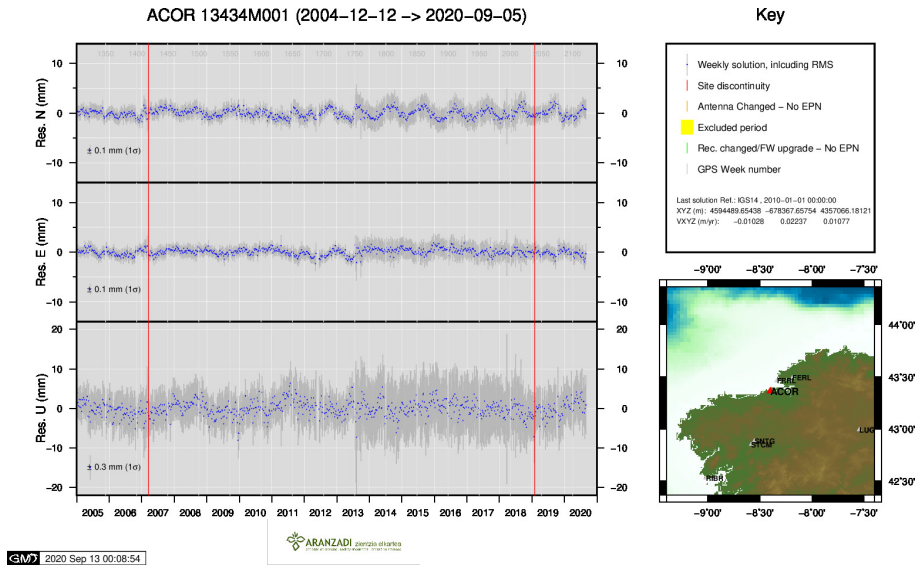
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign*. etrs89.ensg.ign.fr/memo-V8.pdf

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

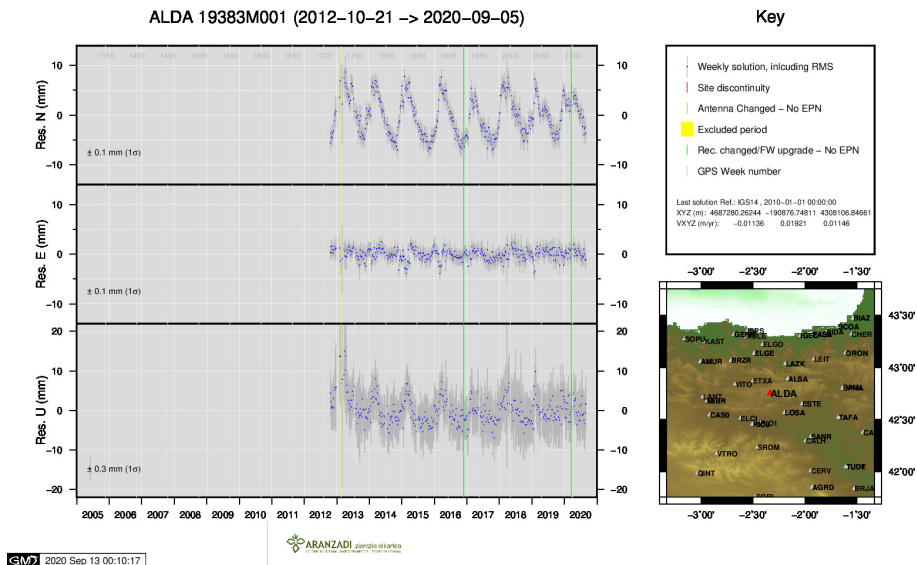
Z. Altamimi (2018): *EUREF Technical Note 1: Relationship and Transformation between the International and the European Terrestrial Reference Systems*. etrs89.ensg.ign.fr/pub/EUREF-TN-1.pdf

9 Cumulative Time Series

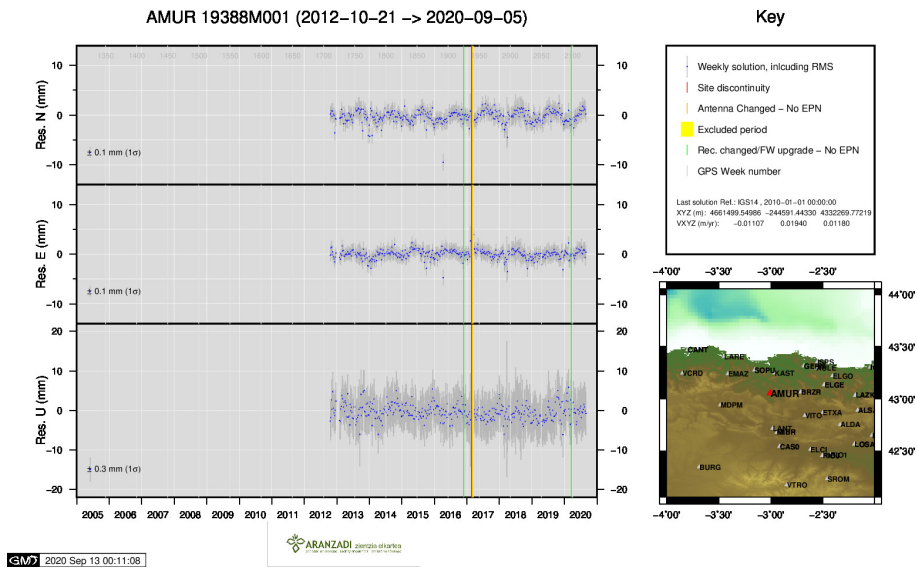
Time series of stations. Latest plots at: <http://geolabpasaia.org/gnss/ARA-net/TSeries/>, or click on the caption of each image.



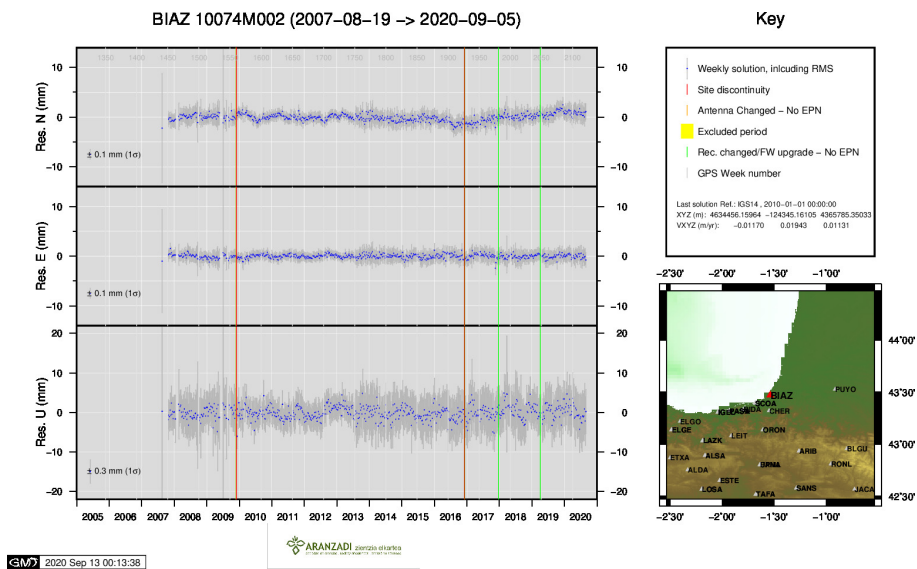
1) ACOR



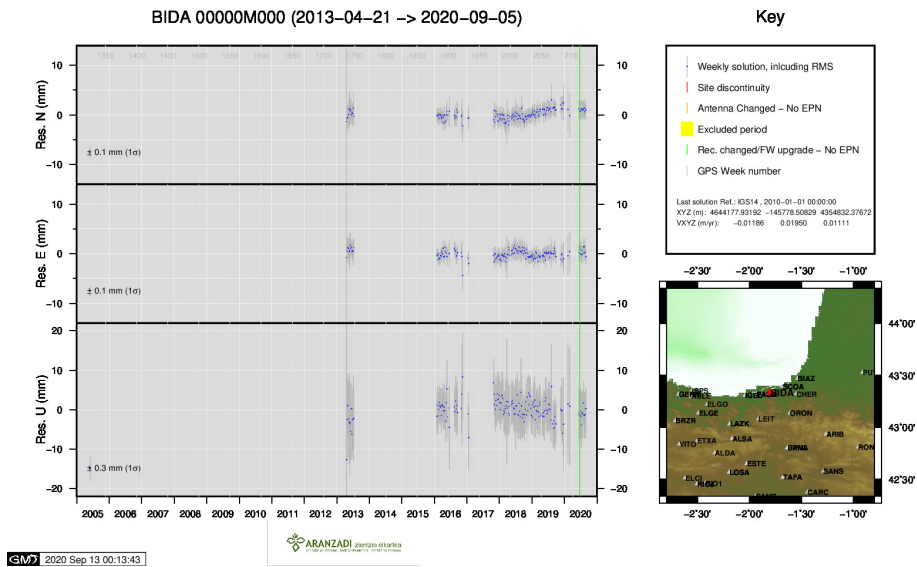
2) ALDA



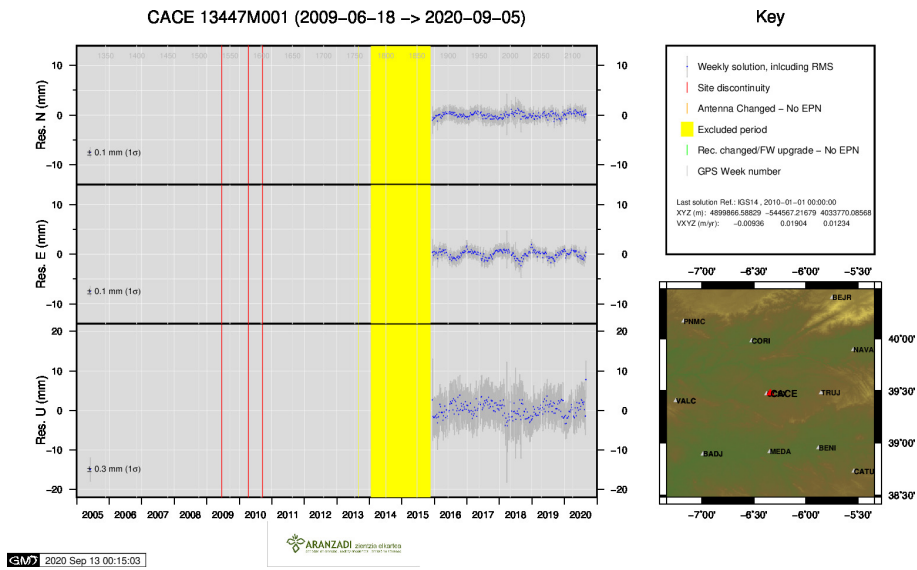
3) AMUR



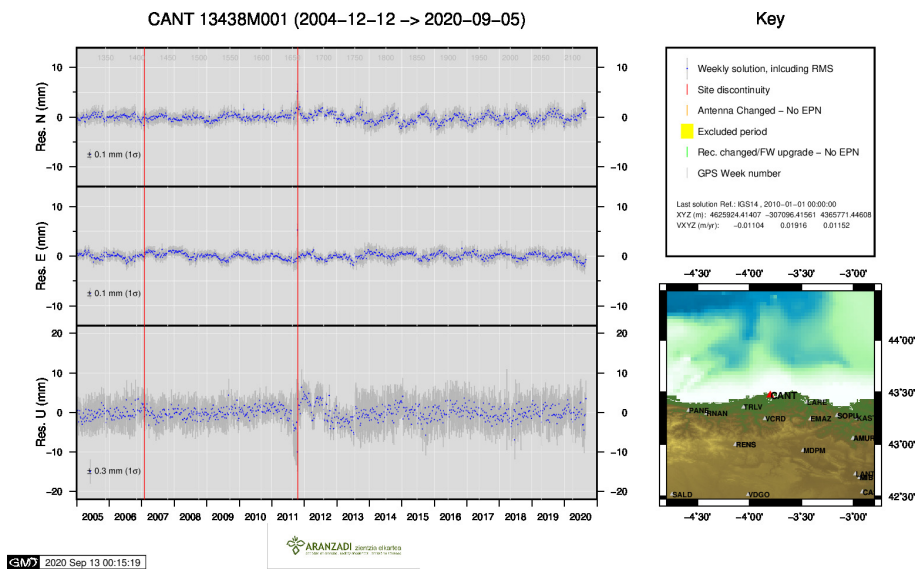
4) BIAZ



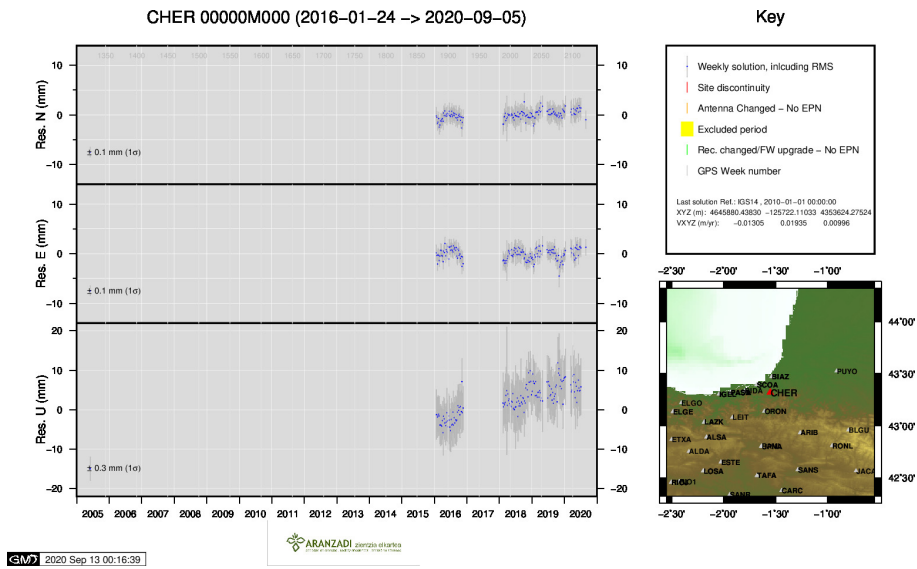
5) BIDA



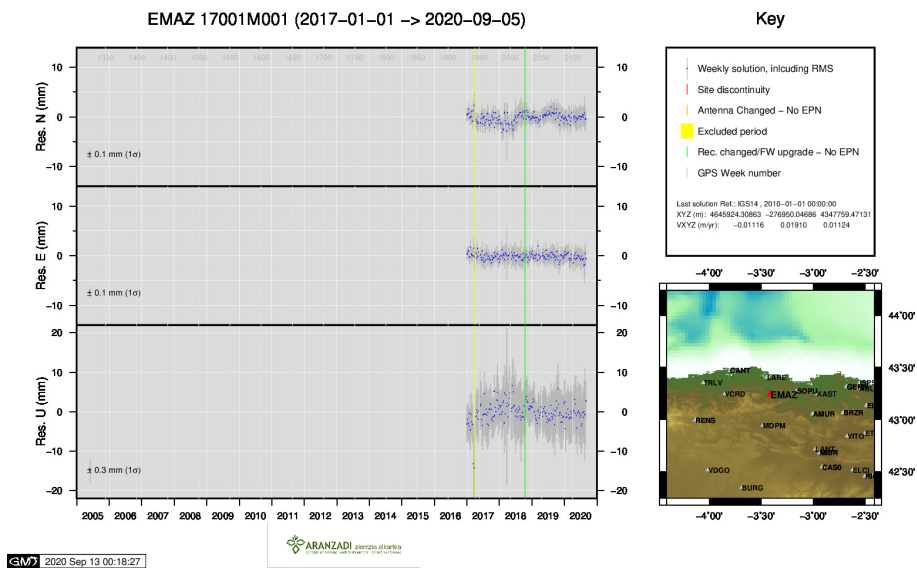
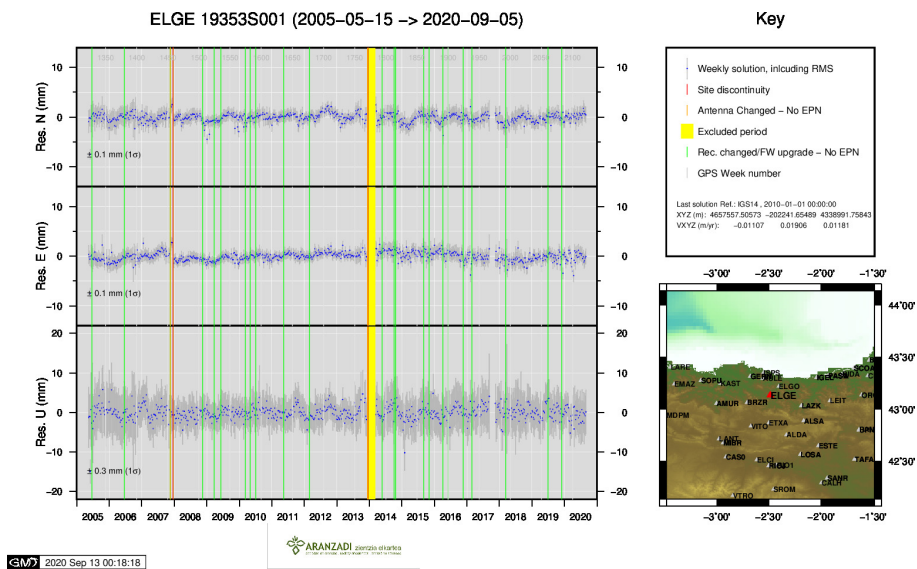
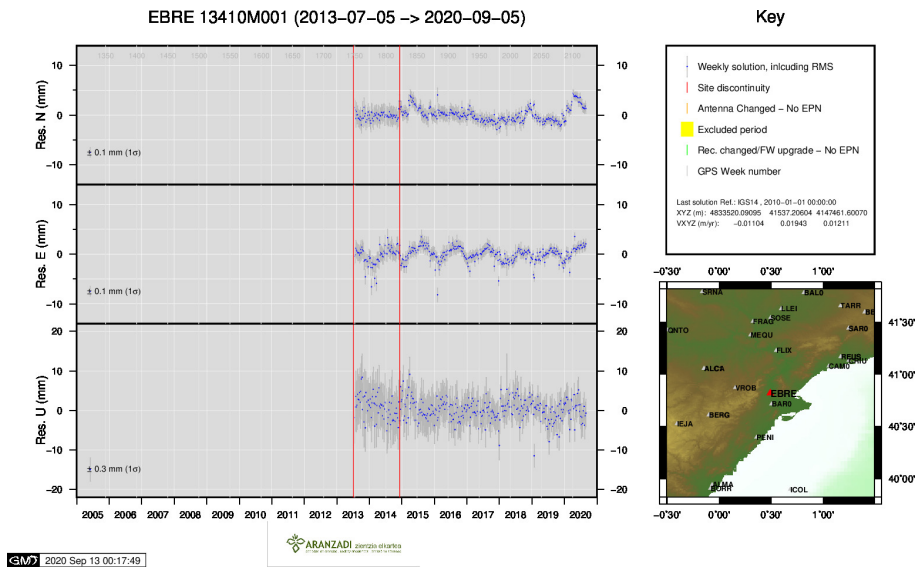
6) CACE

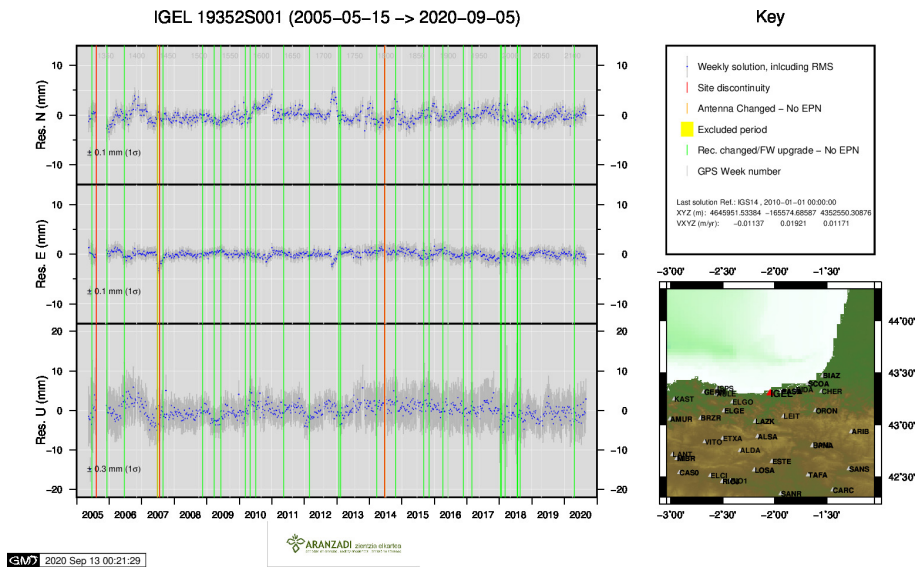


7) CANT

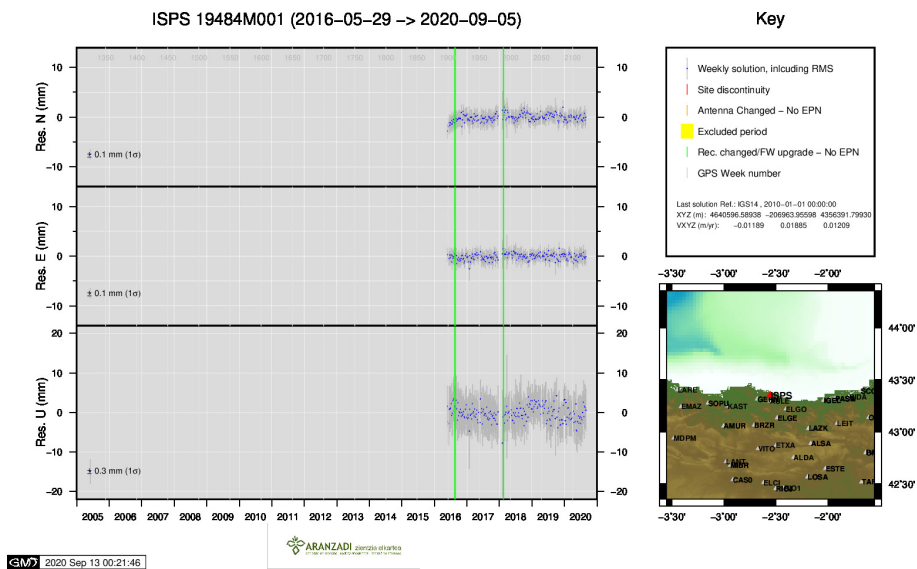


8) CHER

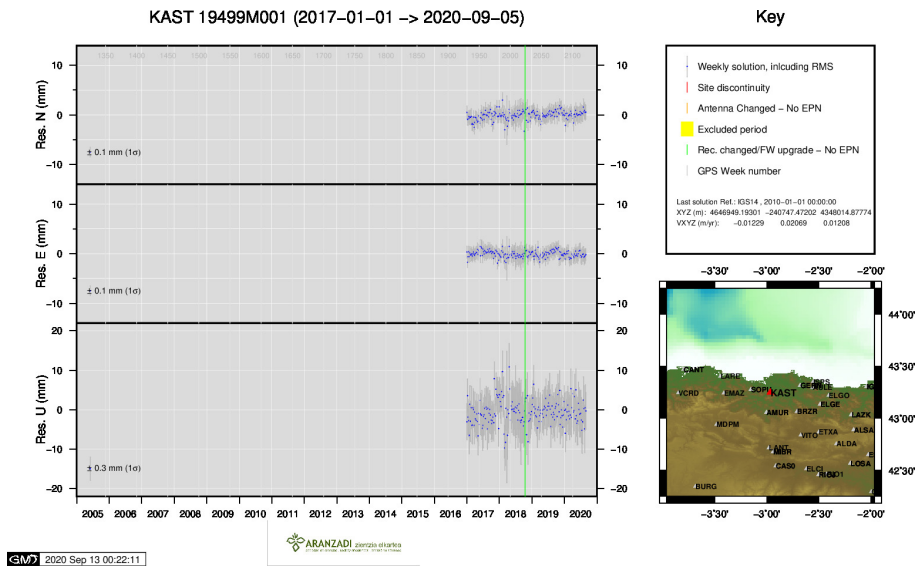




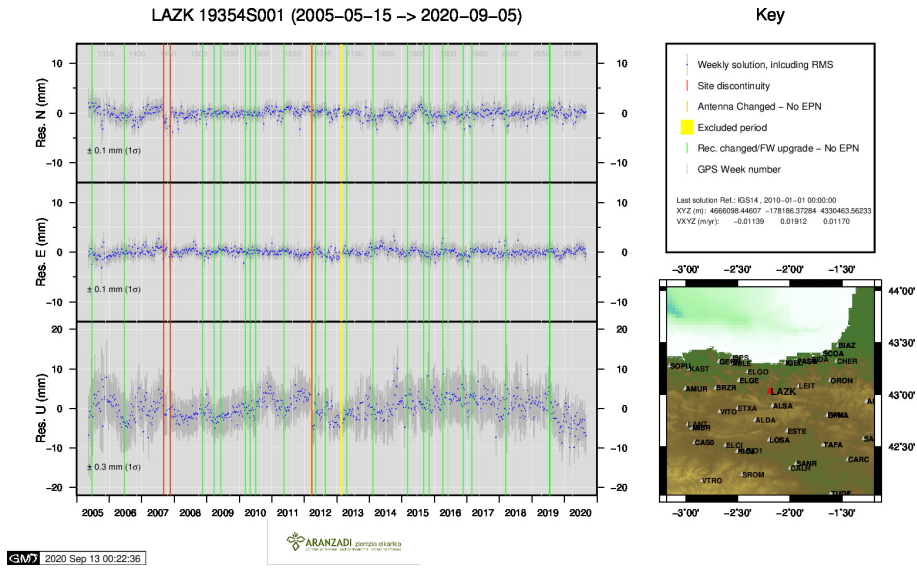
12) IGEL



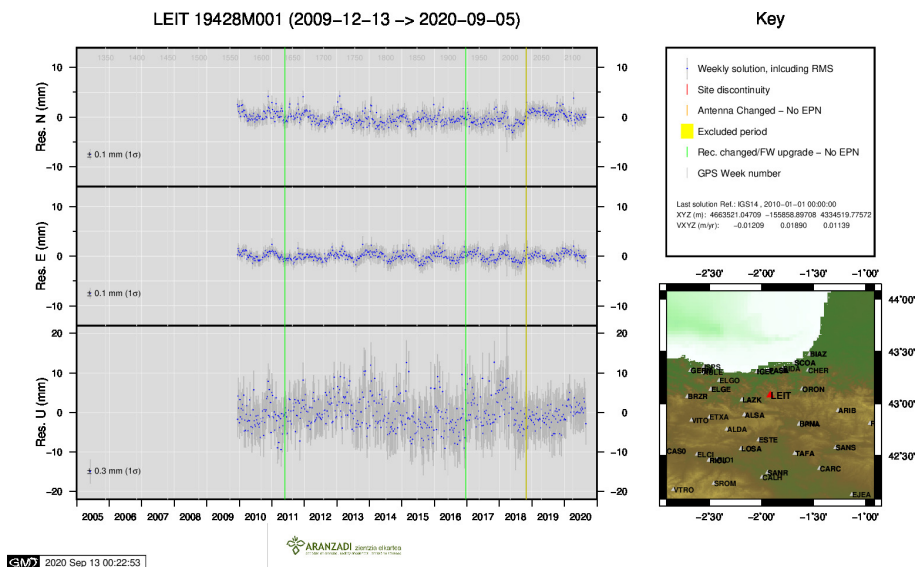
13) ISPS



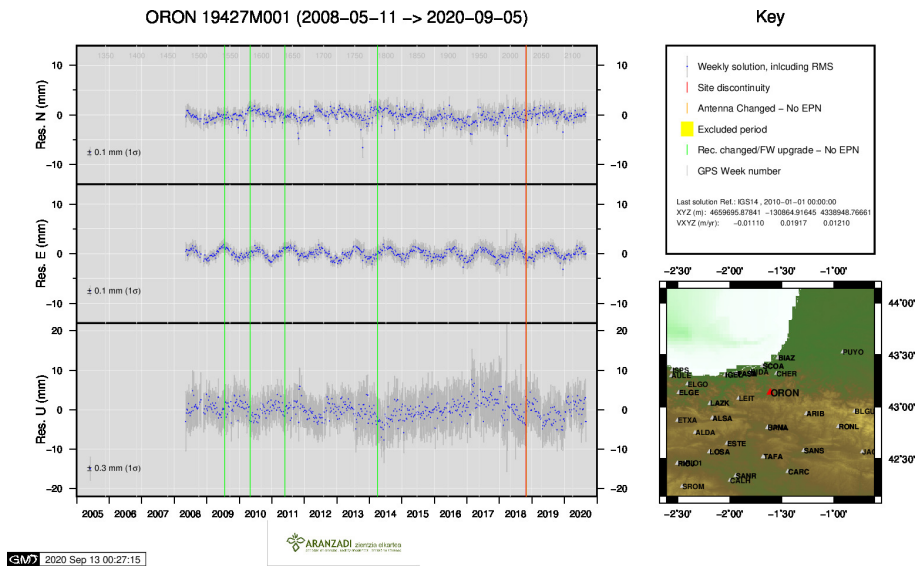
14) KAST



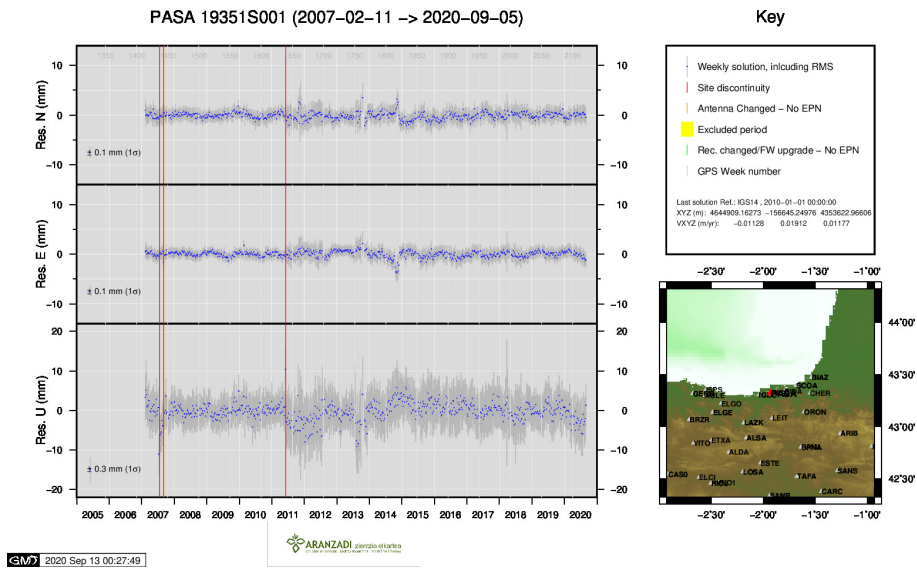
15) LAZK



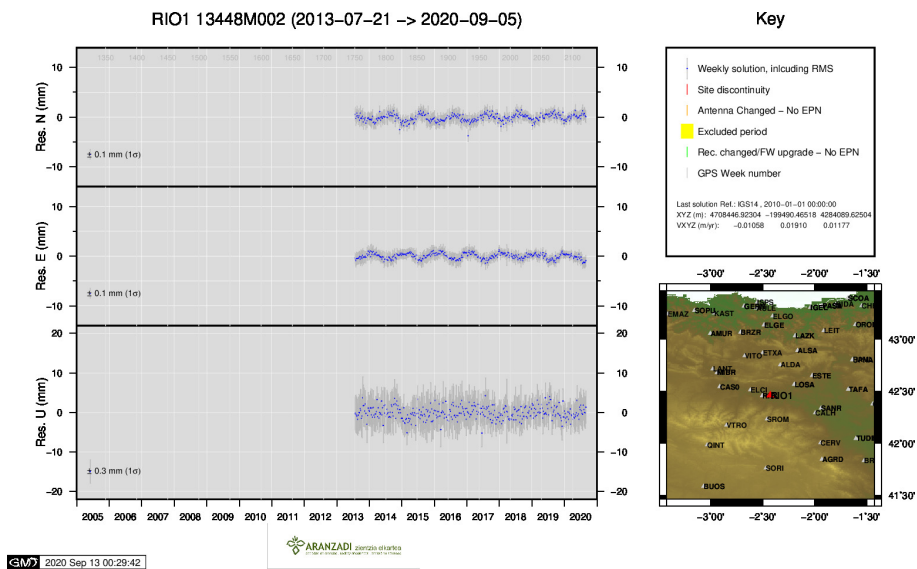
16) LEIT



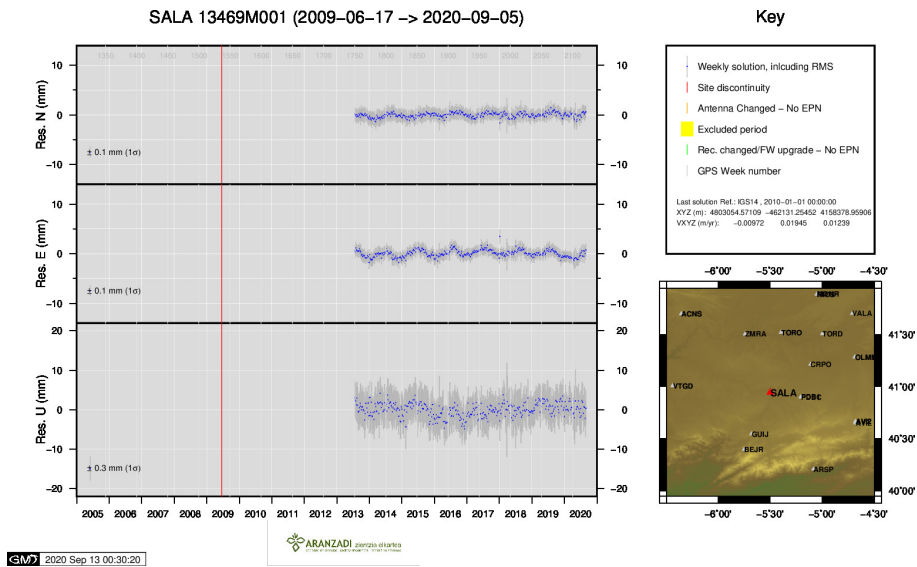
17) ORON



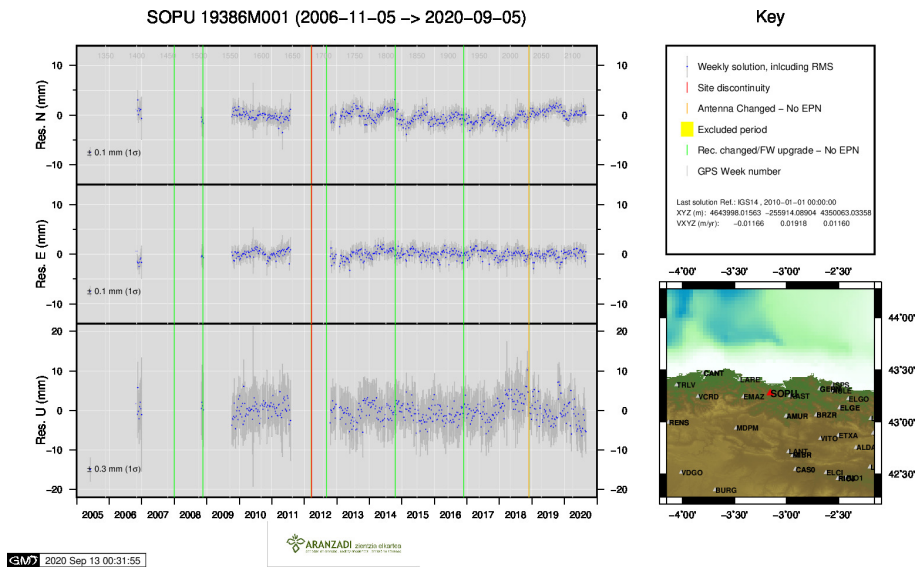
18) PASA



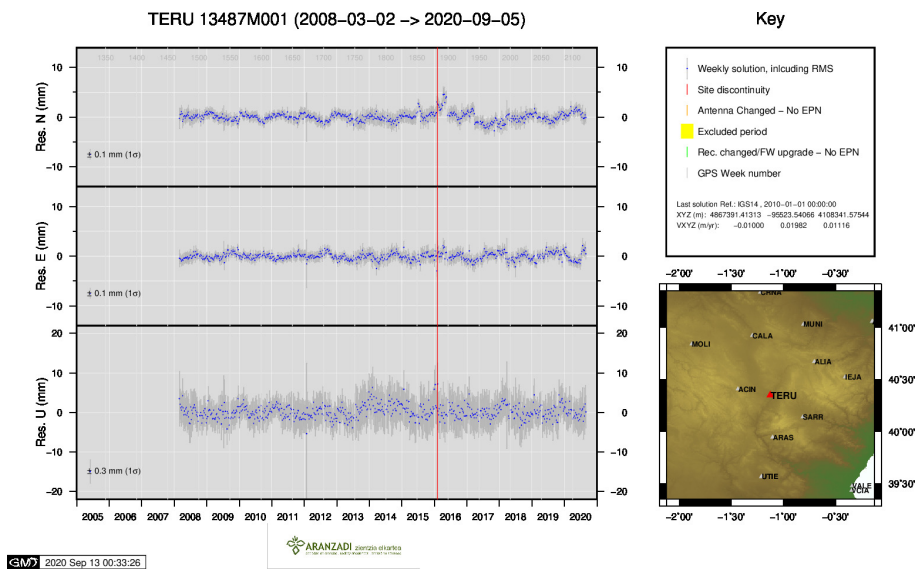
19) RIO1



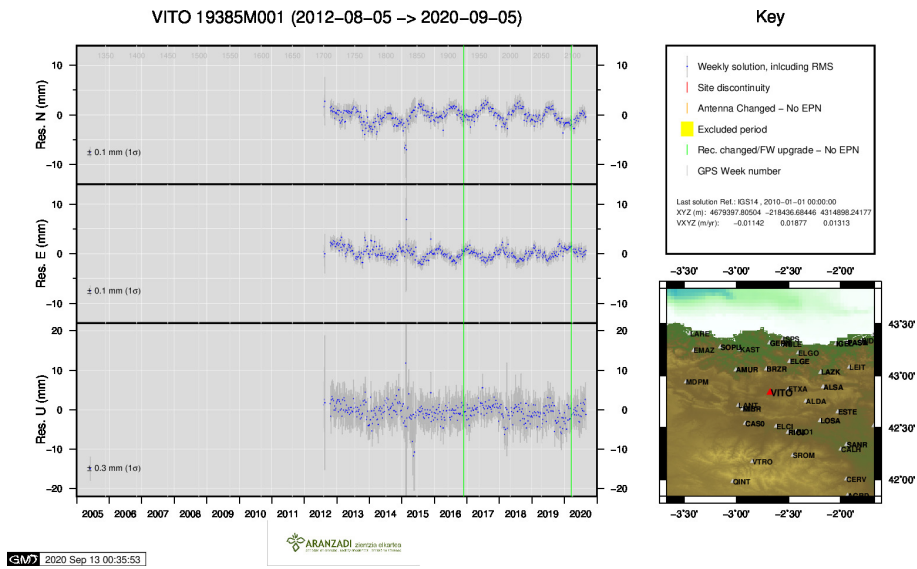
20) SALA



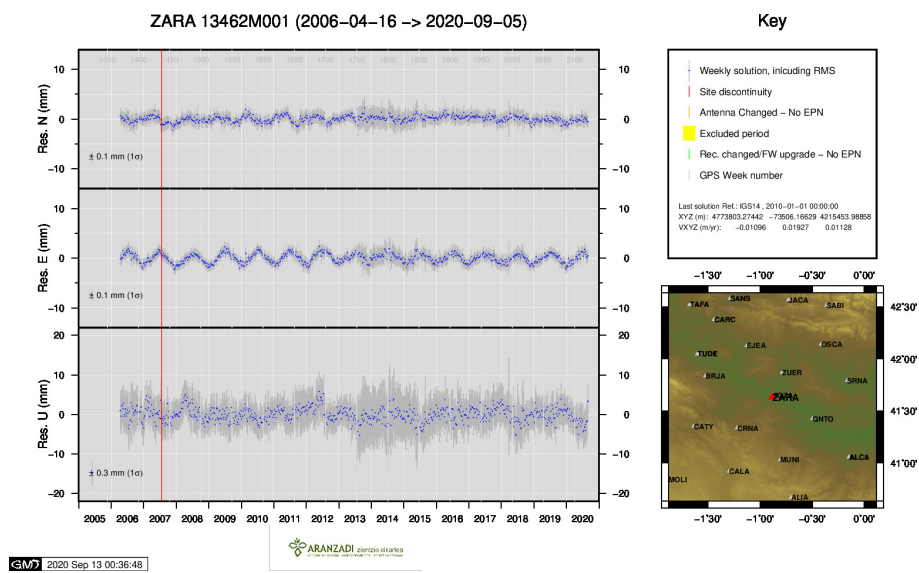
21) SOPU



22) TERU



23) VITO



24) ZARA