

ARA-DAC Weekly Analysis Result: 2056 (GFA)

Technical Report

GPS Week: 2056 (GFA)

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

ARA-DAC details:

Contact person: J. Zurutuza

Contact mail: geodesia@aranzadi.eus

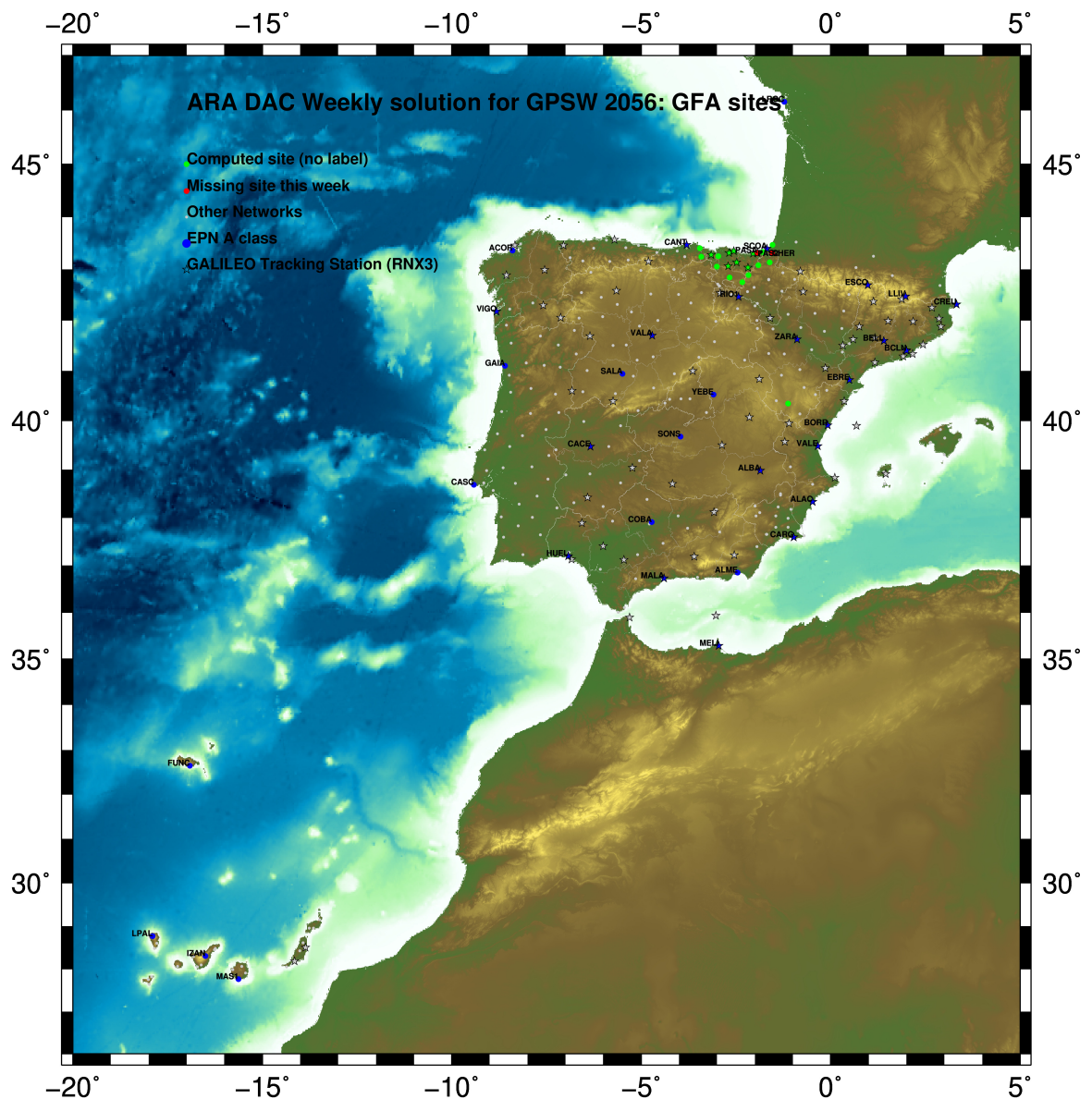
Report generated on 2019/06/23 at 01:04:33



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 2019 Jun 23 01:04:25

Fig.1: Computed Sites for GPS Week2056 (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 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 IGS14

The Reference Frame considered in this section is IGS14, release C2010.

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ARA LAC 2056 WEEK FINAL COMBINATION: PRECISE ORBITS                22-JUN-19 23:15
-----
LOCAL GEODETIC DATUM: IGS14                      EPOCH: 2019-06-05 12:00:00
-----
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
-----
 1 ACRD 13434M001         4594489.55644         -678367.44629         4357066.28213         W
 33 ALDA 19383M001         4687280.15585         -190876.56562         4308106.95758         A
 42 ALSA 19419M001         4677250.83098         -176770.39348         4319079.87444         A
 44 AMUR 19388M001         4661499.44854         -244591.26104         4332269.88441         A
 78 BIAZ 10074M002         4634456.05269         -124344.97877         4365785.46137         A
 79 BIDA 00000M000         4644177.82349         -145778.32571         4354832.48585         A
 89 BRZR 19387M001         4662220.99208         -220769.90212         4333309.44445         A
 9 CACE 13447M001         4899866.50174         -544567.03695         4033770.20420         W
 10 CANT 13438M001         4625924.31357         -307096.23500         4365771.55928         W
 15 CREU 13432M001         4715420.12724         273178.05849         4271946.84012         W
 16 EBRE 13410M001         4833519.98802         41537.38915         4147461.71498         W
 135 ELGE 19353S001         4657557.40571         -202241.47596         4338991.87387         A
 137 EMAZ 17001M001         4645924.20486         -276949.86741         4347759.57989         A
 157 GERN 19389M001         4642811.31937         -217222.92688         4353278.88464         A
 177 IGEL 19352S001         4645951.42890         -165574.50534         4352550.42111         A
 182 ISPS 19484M001         4640596.48085         -206963.77906         4356391.91799         A
 187 KAST 19499M001         4646949.07954         -240747.27801         4348014.99450         A
 192 LARE 19440M001         4632831.94928         -279026.14049         4360314.42826         A
 193 LAZK 19354S001         4666098.34356         -178186.19299         4330463.67762         A
 197 LEIT 19428M001         4663520.93431         -155858.71930         4334519.88626         A
 253 ORDN 19427M001         4659695.77400         -130864.73504         4338948.88118         A
 30 PASA 19351S001         4644909.05986         -156645.07014         4353623.08137         W
 33 RID1 13448M002         4708446.82769         -199490.28512         4284089.74148         W
 34 SALA 13469M001         4803054.48278         -462131.07152         4158379.08003         W
 35 SCDA 10088M002         4639940.49756         -136224.94172         4359552.41720         W
 313 SOPU 19386M001         4643997.90685         -255913.90954         4350063.14584         A
 333 TERU 13487M001         4867391.32121         -95523.35331         4108341.68327         A
 366 VITO 19385M001         4679397.69751         -218436.50804         4314898.36799         A
 43 YEBE 13420M001         4848724.56471         -261631.93044         4123094.32854         W
 44 ZARA 13462M001         4773803.16763         -73505.98454         4215454.09833         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 2056                                22-JUN-19 23:15
-----
LOCAL GEODETIC DATUM: ETRF2000                      EPOCH: 2019-06-05 12:00:00
-----
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
-----
 1 ACRD 13434M001         4594489.86319         -678367.98421         4357065.86532         W
 33 ALDA 19383M001         4687280.51633         -190877.11213         4308106.53972         A
 42 ALSA 19419M001         4677251.19387         -176770.93890         4319079.45751         A
 44 AMUR 19388M001         4661499.80140         -244591.80501         4332269.46785         A
 78 BIAZ 10074M002         4634456.42493         -124345.51957         4365785.04832         A
 79 BIDA 00000M000         4644178.19247         -145778.86759         4354832.07180         A
 89 BRZR 19387M001         4662221.35080         -220770.44611         4333309.02813         A
 9 CACE 13447M001         4899866.80179         -544567.60623         4033769.76581         W
 10 CANT 13438M001         4625924.66443         -307096.77543         4365771.14466         W
 15 CREU 13432M001         4715420.53942         273177.51071         4271946.42565         W
 16 EBRE 13410M001         4833520.36454         41536.82827         4147461.28877         W
 135 ELGE 19353S001         4657557.76699         -202242.01940         4338991.45813         A
 137 EMAZ 17001M001         4645924.55801         -276950.40986         4347759.16412         A
 157 GERN 19389M001         4642811.67988         -217223.46882         4353278.46983         A
 177 IGEL 19352S001         4645951.79541         -165575.04747         4352550.00669         A
 182 ISPS 19484M001         4640596.84278         -206964.32075         4356391.50348         A
 187 KAST 19499M001         4646949.43694         -240747.82046         4348014.57909         A
 192 LARE 19440M001         4632832.30305         -279026.68156         4360314.01346         A
 193 LAZK 19354S001         4666098.70706         -178186.73725         4330463.26152         A
 197 LEIT 19428M001         4663521.30071         -155859.26323         4334519.47062         A
 253 ORDN 19427M001         4659696.14362         -130865.27849         4338948.46613         A
 30 PASA 19351S001         4644909.42748         -156645.61213         4353622.66714         W
 33 RID1 13448M002         4708447.18550         -199490.83384         4284089.32190         W
 34 SALA 13469M001         4803054.80114         -462131.63069         4158378.65005         W
 35 SCDA 10088M002         4639940.86798         -136225.48313         4359552.00359         W
 313 SOPU 19386M001         4643998.26261         -255914.45172         4350062.73047         A
 333 TERU 13487M001         4867391.67901         -95523.91815         4108341.25284         A
 366 VITO 19385M001         4679398.05523         -218437.05380         4314897.95039         A
 43 YEBE 13420M001         4848724.90410         -261632.49384         4123093.89753         W
 44 ZARA 13462M001         4773803.53542         -73506.53965         4215453.67530         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 2056		22-JUN-19 23:15			
LOCAL GEODETIC DATUM: ETRF2014		EPOCH: 2019-06-05 12:00:00			
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
1	ACDR 13434M001	4594489.82068	-678368.02279	4357065.91374	W
33	ALDA 19383M001	4687280.47162	-190877.15205	4308106.58803	A
42	ALSA 19419M001	4677251.14922	-176770.97891	4319079.50585	A
44	AMUR 19388M001	4661499.75711	-244591.84484	4332269.51621	A
78	BLAZ 10074M002	4634456.38054	-124345.55992	4365785.09679	A
79	BIDA 00000M000	4644178.14805	-145778.90783	4354832.12024	A
89	BRZR 19387M001	4662221.30643	-220770.48602	4333309.07649	A
9	CACE 13447M001	4899866.75585	-544567.64409	4033769.81356	W
10	CANT 13438M001	4625924.62066	-307096.81518	4365771.19308	W
15	CREU 13432M001	4715420.49289	273177.46932	4271946.47418	W
16	EBRE 13410M001	4833520.31761	41536.78812	4147461.33689	W
135	ELGE 19353S001	4657557.72261	-202242.05940	4338991.50651	A
137	EMAZ 17001M001	4645924.51396	-276950.44964	4347759.21250	A
157	GERN 19389M001	4642811.63569	-217223.50882	4353278.51824	A
177	IGEL 19352S001	4645951.75103	-165575.08763	4352550.05511	A
182	ISPS 19484M001	4640596.79858	-206964.36079	4356391.55190	A
187	KAST 19499M001	4646949.39278	-240747.86036	4348014.62748	A
192	LARE 19440M001	4632832.25913	-279026.72139	4360314.06187	A
193	LAZK 19354S001	4666098.66253	-178186.77729	4330463.30989	A
197	LEIT 19428M001	4663521.25613	-155859.30336	4334519.51901	A
253	ORON 19427M001	4659696.09901	-130865.31872	4338948.51454	A
30	PASA 19351S001	4644909.38309	-156645.65233	4353622.71557	W
33	RI01 13448M002	4708447.14060	-199490.87365	4284089.37016	W
34	SALA 13469M001	4803054.75602	-462131.66922	4158378.69801	W
35	SOA 10088M002	4639940.82357	-136225.52342	4359552.05204	W
313	SOPU 19386M001	4643998.21852	-255914.49158	4350062.77887	A
333	TERU 13487M001	4867391.63217	-95523.95769	4108341.30081	A
366	VITO 19385M001	4679398.01069	-218437.09366	4314897.99871	A
43	YEBE 13420M001	4848724.85796	-261632.53289	4123093.94546	W
44	ZARA 13462M001	4773803.48948	-73506.57964	4215453.72347	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 2056 WEEK FINAL COMBINATION: PRECISE ORBITS 22-JUN-19 23:15

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	7	XXXXXX	0.69	0.62	3.17
ALDA 19383M001	7	XXXXXX	1.02	0.79	3.36
ALSA 19419M001	7	XXXXXX	2.20	1.15	4.42
AMUR 19388M001	7	XXXXXX	1.27	1.47	2.64
BIAZ 10074M002	7	XXXXXX	1.06	0.84	3.49
BIDA 00000M000	7	XXXXXX	0.62	1.06	1.91
BRZR 19387M001	7	XXXXXX	1.16	2.02	4.67
CACE 13447M001	7	XXXXXX	0.79	0.65	2.76
CANT 13438M001	7	XXXXXX	0.67	0.88	2.61
CREU 13432M001	7	XXXXXX	0.87	0.43	3.92
EBRE 13410M001	7	XXXXXX	0.88	1.40	3.64
ELGE 19353S001	7	XXXXXX	0.81	0.60	3.59
EMAZ 17001M001	7	XXXXXX	1.13	0.66	2.89
GERN 19389M001	7	XXXXXX	1.22	1.07	3.49
IGEL 19352S001	7	XXXXXX	1.09	1.28	2.27
ISPS 19484M001	7	XXXXXX	0.70	1.09	4.37
KAST 19499M001	7	XXXXXX	0.87	1.52	2.98
LARE 19440M001	7	XXXXXX	0.77	1.03	2.58
LAZK 19354S001	7	XXXXXX	1.41	0.90	3.83
LEIT 19428M001	7	XXXXXX	0.85	1.12	4.41
ORDN 19427M001	7	XXXXXX	2.15	1.00	3.60
PASA 19351S001	7	XXXXXX	0.97	1.41	1.71
RI01 13448M002	7	XXXXXX	0.56	0.86	2.67
SALA 13469M001	7	XXXXXX	0.53	0.57	2.62
SCDA 10088M002	7	XXXXXX	0.79	1.06	3.89
SOPU 19386M001	7	XXXXXX	0.97	1.19	2.75
TERU 13487M001	7	XXXXXX	0.74	1.02	2.32
VITO 19385M001	7	XXXXXX	1.07	0.91	3.09
YEBE 13420M001	7	XXXXXX	1.12	0.58	2.02
ZARA 13462M001	7	XXXXXX	0.91	1.17	1.80

Comparison of individual solutions:

ACOR 13434M001	N	0.69	0.61	0.24	-0.78	0.17	-0.40	-1.26	-0.16
ACOR 13434M001	E	0.62	-0.63	-0.57	-0.85	-0.00	0.78	-0.01	0.53
ACOR 13434M001	U	3.17	0.20	3.54	-2.41	-3.58	-0.07	5.38	0.41
ALDA 19383M001	N	1.02	-0.10	-0.37	-0.81	0.69	2.13	0.45	-0.64
ALDA 19383M001	E	0.79	0.56	1.10	0.65	-0.01	-0.18	0.15	1.31
ALDA 19383M001	U	3.36	-3.13	-1.72	5.78	-2.11	0.11	-1.13	-3.99
ALSA 19419M001	N	2.20	-1.90	1.59	-3.73	1.45	2.07	0.01	1.58
ALSA 19419M001	E	1.15	0.21	-0.22	2.64	-0.06	0.55	-0.74	0.09
ALSA 19419M001	U	4.42	-0.55	4.28	5.23	-5.59	-4.98	-3.87	0.03
AMUR 19388M001	N	1.27	0.53	1.22	-1.24	2.04	-0.16	-1.20	0.82
AMUR 19388M001	E	1.47	1.19	0.98	0.78	1.16	0.26	-2.73	1.08
AMUR 19388M001	U	2.64	-1.36	-1.08	-4.20	-4.16	0.16	-1.38	-1.40
BIAZ 10074M002	N	1.06	-0.67	-0.85	1.64	1.30	0.81	0.21	-0.66
BIAZ 10074M002	E	0.84	-0.18	1.61	-0.53	0.52	-0.69	-0.45	0.63
BIAZ 10074M002	U	3.49	5.84	-0.04	-4.70	-3.87	0.17	1.08	-0.85
BIDA 00000M000	N	0.62	0.06	0.36	0.74	0.61	0.77	-0.69	-0.44
BIDA 00000M000	E	1.06	0.23	1.44	0.52	-1.31	0.48	-1.15	1.03
BIDA 00000M000	U	1.91	0.75	-0.78	-1.60	0.56	-3.84	1.60	0.67
BRZR 19387M001	N	1.16	1.27	0.24	-2.06	0.15	1.00	0.11	1.06
BRZR 19387M001	E	2.02	2.13	1.36	-0.38	-0.39	-0.24	-3.62	2.17
BRZR 19387M001	U	4.67	2.98	-1.90	-1.06	7.78	-3.00	-6.83	0.95
CACE 13447M001	N	0.79	0.62	0.52	-1.62	0.15	-0.10	0.65	-0.12
CACE 13447M001	E	0.65	0.15	-1.07	-0.79	0.10	-0.04	0.75	0.40
CACE 13447M001	U	2.76	-2.02	-1.08	-3.99	4.43	2.14	-0.65	-0.13
CANT 13438M001	N	0.67	-0.23	-0.58	-0.04	-0.43	1.04	1.00	0.01
CANT 13438M001	E	0.88	-0.57	0.38	0.23	-0.08	1.62	-1.16	-0.40
CANT 13438M001	U	2.61	-3.25	-4.84	1.74	-0.32	1.70	-0.72	0.61
CREU 13432M001	N	0.87	0.72	0.51	0.06	-0.08	0.26	-1.92	-0.10
CREU 13432M001	E	0.43	-0.39	0.01	0.57	0.55	0.03	-0.50	-0.24
CREU 13432M001	U	3.82	2.45	-5.64	0.52	3.64	2.99	-4.46	2.70
EBRE 13410M001	N	0.88	0.49	0.58	0.68	0.80	-0.23	-0.89	-1.46
EBRE 13410M001	E	1.40	-0.17	1.30	-0.50	-2.11	0.31	2.14	-0.80
EBRE 13410M001	U	3.64	0.18	-1.30	-6.07	1.84	-1.60	5.10	2.96
ELGE 19353S001	N	0.81	-0.68	-0.28	1.21	0.25	0.98	0.82	-0.49
ELGE 19353S001	E	0.60	-0.06	0.37	0.57	0.14	-0.21	-0.87	0.94
ELGE 19353S001	U	3.59	4.94	1.44	-5.58	-3.60	0.66	-1.48	2.01
EMAZ 17001M001	N	1.13	-0.26	0.18	-1.71	-0.56	-0.57	1.99	-0.15
EMAZ 17001M001	E	0.66	-0.55	0.11	-1.07	0.97	0.10	0.44	-0.14
EMAZ 17001M001	U	2.89	0.64	0.24	2.98	4.07	-4.75	0.60	-1.17
GERN 19389M001	N	1.22	-0.35	-0.49	2.56	0.81	0.70	-0.54	-0.81
GERN 19389M001	E	1.07	1.14	0.69	-0.15	-1.50	0.57	-1.08	1.15
GERN 19389M001	U	3.49	1.55	-2.59	-0.15	4.75	-6.25	-0.51	1.38
IGEL 19352S001	N	1.09	-0.22	-0.17	-0.04	0.06	1.12	2.15	-1.08
IGEL 19352S001	E	1.28	-0.10	0.81	-1.37	0.17	1.13	-1.74	1.74
IGEL 19352S001	U	2.27	0.78	2.85	0.19	-4.12	-1.64	-0.94	1.23
ISPS 19484M001	N	0.70	-0.70	-0.60	0.41	0.52	0.81	0.86	0.49
ISPS 19484M001	E	1.09	1.24	1.11	-1.67	0.60	-0.99	0.42	0.13
ISPS 19484M001	U	4.37	8.05	-2.14	1.25	-5.08	-3.33	-2.15	1.46
KAST 19499M001	N	0.87	-0.73	-0.11	-0.30	1.24	1.51	-0.07	0.28
KAST 19499M001	E	1.52	0.12	1.08	-2.06	0.96	1.99	-1.79	0.61
KAST 19499M001	U	2.98	2.57	-1.94	-2.80	3.29	-4.44	-0.42	2.12
LARE 19440M001	N	0.77	-1.22	0.32	0.74	-0.28	-0.79	0.74	-0.36
LARE 19440M001	E	1.03	-1.69	0.07	-0.58	0.34	-0.22	1.73	0.11
LARE 19440M001	U	2.58	1.70	-3.61	-2.13	2.81	-1.24	2.38	2.06
LAZK 19354S001	N	1.41	0.41	1.81	1.01	1.66	-1.04	-1.91	-0.02
LAZK 19354S001	E	0.90	0.40	0.74	-1.11	-1.23	0.88	0.61	0.52
LAZK 19354S001	U	3.83	0.46	1.16	-1.00	-6.27	-2.76	6.22	-0.36
LEIT 19428M001	N	0.85	-0.99	0.05	1.24	1.02	0.72	-0.15	-0.46
LEIT 19428M001	E	1.12	0.27	-0.55	2.57	0.24	-0.00	0.47	-0.52
LEIT 19428M001	U	4.41	-2.22	5.07	4.10	-5.41	0.38	-5.83	-2.44
ORDN 19427M001	N	2.15	1.05	1.33	0.92	1.95	-4.30	-0.54	1.23

ORDN 19427M001	E	1.00	0.97	1.02	1.69	0.19	-0.78	-0.50	-0.51
ORDN 19427M001	U	3.60	2.33	-0.16	-0.17	1.45	-7.54	0.40	-3.63
PASA 19351S001	N	0.97	-0.33	-0.28	2.00	0.63	0.75	-0.27	-0.66
PASA 19351S001	E	1.41	1.02	0.89	-0.47	0.49	0.06	-2.76	1.40
PASA 19351S001	U	1.71	-0.29	1.28	0.53	-1.91	-2.18	2.08	-1.69
RID1 13448M002	N	0.56	-0.57	0.38	0.43	-0.43	0.13	0.07	0.99
RID1 13448M002	E	0.86	-0.03	1.22	0.90	0.25	0.77	-0.27	-1.18
RID1 13448M002	U	2.67	1.29	-2.75	1.22	-4.40	1.96	-2.74	-1.16
SALA 13469M001	N	0.53	0.85	0.10	-0.51	-0.81	0.01	-0.11	-0.08
SALA 13469M001	E	0.57	-0.31	0.06	-0.85	0.71	-0.50	0.56	-0.22
SALA 13469M001	U	2.62	2.29	0.56	4.16	-0.01	2.76	-2.81	-1.67
SCDA 10088M002	N	0.79	-0.96	-0.38	0.62	0.92	1.15	0.21	0.18
SCDA 10088M002	E	1.06	0.61	1.68	0.69	-0.20	-1.00	-1.36	0.39
SCDA 10088M002	U	3.89	1.14	2.95	-3.22	-7.79	0.82	1.83	2.39
SOPU 19386M001	N	0.97	-0.05	-0.10	1.48	0.56	-0.63	1.44	-0.80
SOPU 19386M001	E	1.19	0.18	0.86	0.38	-0.53	-0.94	-1.33	2.16
SOPU 19386M001	U	2.75	2.78	-3.02	-3.93	0.89	-2.38	1.95	1.72
TERU 13487M001	N	0.74	0.04	-0.61	-0.57	0.32	0.76	0.99	-0.95
TERU 13487M001	E	1.02	-1.42	-0.38	1.26	0.25	0.70	0.40	-1.34
TERU 13487M001	U	2.32	-2.32	1.39	2.42	0.39	2.84	-3.23	0.70
VITO 19385M001	N	1.07	0.80	-0.40	1.34	1.63	-0.86	-0.95	0.00
VITO 19385M001	E	0.91	-0.58	-0.22	1.54	1.41	0.10	0.03	0.47
VITO 19385M001	U	3.09	-1.39	0.13	-0.94	0.53	-0.10	-7.35	0.23
YEBE 13420M001	N	1.12	-1.65	0.53	-0.13	-1.06	0.67	1.22	1.18
YEBE 13420M001	E	0.58	-0.07	-0.18	0.16	-0.02	-1.25	-0.61	-0.17
YEBE 13420M001	U	2.02	-0.55	3.33	-1.43	-0.63	0.20	0.14	3.26
ZARA 13462M001	N	0.91	0.75	-0.10	-0.95	-0.53	1.58	-0.79	0.30
ZARA 13462M001	E	1.17	1.08	1.59	1.28	-1.24	0.20	-1.17	0.05
ZARA 13462M001	U	1.80	-2.67	-0.19	0.57	-1.28	-0.44	-0.01	-3.19

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		
1	ACOR 13434M001	I W	-1.23	-0.36	2.74
2	ALAC 13433M001	I W	1.04	-0.60	-0.46
3	ALBA 13452M001	I W	0.43	-0.76	-0.43
4	ALME 13437M001	I W	-1.26	-0.32	6.23
5	BCLN 13412M001	I W	0.39	0.48	-0.81
6	BELL 13431M001	I W	0.59	1.81	-0.51
7	BORR 13480M001	I W	-0.67	-2.04	0.06
8	BRST 10004M004	I W	-1.00	0.45	-0.57
9	CACE 13447M001	I W	0.72	0.59	1.36
10	CANT 13438M001	I W	-1.23	0.14	-2.86
11	CARG 19412M001	I W	1.44	0.17	1.84
12	CASC 13909S001	I W	1.27	-0.75	1.79
14	COBA 13453M001	I W	1.56	0.62	-4.23
15	CREU 13432M001	I W	-0.39	1.02	2.33
16	EBRE 13410M001	I W	0.38	1.03	-0.26
17	ESCO 13435M001	I W	1.36	0.08	-0.88
18	FUNC 13911S001	I W	2.49	0.70	-3.72
19	GAI A 13902M001	I W	-0.19	-0.75	4.93
21	HUEL 13451M001	I W	1.17	-2.06	1.61
22	IZAN 31309M002	I W	-0.08	0.03	0.32
23	LLIV 13436M001	I W	-0.55	-0.01	2.79
24	LPAL 81701M001	I W	-1.83	-0.17	-1.60
25	LROC 10023M001	I W	1.40	-0.65	3.09
26	MALA 13443M001	I W	0.22	-1.40	-0.17
27	MAS1 31303M002	I W	0.16	0.34	1.75
29	MELI 19379M001	I W	1.23	0.02	-1.53
30	PASA 19351S001	I W	-0.99	1.05	-3.89
31	PDEL 31906M004	I W	-0.48	-0.04	0.22
33	RIO1 13448M002	I W	-1.77	0.25	-6.64
34	SALA 13469M001	I W	-0.08	1.17	-3.58
35	SCOA 10088M002	I W	-3.66	-0.49	-3.44
38	SONS 13446M001	I W	-1.35	0.29	-5.26
40	VALA 13463M002	I W	-0.76	-0.18	-1.70
41	VALE 13439M001	I W	-0.32	0.78	-0.45
42	VIGO 13450M001	I W	-0.11	0.12	5.61
43	YEBE 13420M001	I W	1.30	-0.87	4.86
44	ZARA 13462M001	I W	0.08	0.13	-2.31
45	ZIMM 14001M004	I W	0.73	0.18	3.76
	RMS / COMPONENT		1.21	0.82	3.05
	MEAN		-0.00	0.00	0.00
	MIN		-3.66	-2.06	-6.64
	MAX		2.49	1.81	6.23

NUMBER OF PARAMETERS : 3
NUMBER OF COORDINATES : 114
RMS OF TRANSFORMATION : 1.95 MM

BARYCENTER COORDINATES:

LATITUDE : 39 53 17.56
LONGITUDE : - 4 51 17.75
HEIGHT : -44.890 KM

PARAMETERS:

TRANSLATION IN N : -0.00 +- 0.32 MM
TRANSLATION IN E : 0.00 +- 0.32 MM
TRANSLATION IN U : -0.00 +- 0.32 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          17304800
NUMBER OF UNKNOWN              202848
NUMBER OF DEGREES OF FREEDOM    17101952
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)      180
VARIANCE FACTOR                  2.173739786168256

Helmert Transformation Parameters With Respect to Combined Solution:
-----
Sol  Rms (m)      Translation (m)      Rotation (")
      X          Y          Z          X          Y          Z      Scale (ppm)
-----
  1  0.00182     -0.0077 -0.0001  0.0059  0.0001 -0.0003  0.0001  0.00037
  2  0.00204     -0.0046 -0.0120  0.0060  0.0003 -0.0002 -0.0003 -0.00033
  3  0.00208     -0.0015 -0.0210  0.0043  0.0004 -0.0001 -0.0006 -0.00054
  4  0.00227     -0.0016  0.0046  0.0008 -0.0001 -0.0001  0.0001  0.00003
  5  0.00215      0.0123 -0.0033 -0.0092  0.0002  0.0005 -0.0000 -0.00047
  6  0.00207     -0.0056  0.0083  0.0046 -0.0002 -0.0002  0.0002  0.00031
  7  0.00187      0.0032  0.0164  0.0047 -0.0004 -0.0000  0.0004 -0.00050
```

```
Statistics of individual solutions:
-----
File  RMS (m)      DOF  Chi**2/DOF  #Observations authentic / pseudo  #Parameters explicit / implicit / singular
-----
  1  0.00142      2397138      2.02                2426365      3      966      28264      0
  2  0.00144      2426196      2.08                2455415      3      969      28253      0
  3  0.00153      2423691      2.35                2454074      3      978      29408      0
  4  0.00151      2445158      2.29                2475352      3      981      29216      0
  5  0.00147      2463369      2.17                2493222      3      990      28866      0
  6  0.00152      2465231      2.32                2495638      3      987      29423      0
  7  0.00139      2475325      1.94                2504734      3      987      28425      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 19:153:00000 19:159:86370 LEICA GR10      -----
ALDA  A   1 P 19:153:00000 19:159:86370 LEICA GR10      -----
ALSA  A   1 P 19:153:00000 19:159:86370 LEICA GR50      -----
AMUR  A   1 P 19:153:00000 19:159:86370 LEICA GR10      -----
BIAZ  A   1 P 19:153:00000 19:159:86370 TRI SP90M      -----
BIDA  A   1 P 19:153:00000 19:159:86370 LEICA GR10      -----
BRZR  A   1 P 19:153:00000 19:159:86370 LEICA GR30      -----
CACE  A   1 P 19:153:00000 19:159:86370 TRIMBLE NETR9  -----
CANT  A   1 P 19:153:00000 19:159:86370 LEICA GR10      -----
CREU  A   1 P 19:153:00000 19:159:86370 LEICA GR50      -----
EBRE  A   1 P 19:153:00000 19:159:86370 LEICA GR50      -----
ELGE  A   1 P 19:153:00000 19:159:86370 LEICA GR10      -----
EMAZ  A   1 P 19:153:00000 19:159:86370 LEICA GR30      -----
GERN  A   1 P 19:153:00000 19:159:86370 LEICA GR30      -----
IGEL  A   1 P 19:153:00000 19:159:86370 LEICA GR30      -----
ISPS  A   1 P 19:153:00000 19:159:86370 TRIMBLE NETR9  -----
KAST  A   1 P 19:153:00000 19:159:86370 LEICA GR30      -----
LARE  A   1 P 19:153:00000 19:159:86370 LEICA GRX1200GGPRO -----
LAZK  A   1 P 19:153:00000 19:159:86370 LEICA GR10      -----
LEIT  A   1 P 19:153:00000 19:159:86370 LEICA GR50      -----
ORON  A   1 P 19:153:00000 19:159:86370 LEICA GR50      -----
PASA  A   1 P 19:153:00000 19:159:86370 LEICA GR10      -----
RIO1  A   1 P 19:153:00000 19:159:86370 LEICA GR25      -----
SALA  A   1 P 19:153:00000 19:159:86370 LEICA GRX1200+GNSS -----
SCOA  A   1 P 19:153:00000 19:159:86370 LEICA GR25      -----
SOPU  A   1 P 19:153:00000 19:159:86370 LEICA GR30      -----
TERU  A   1 P 19:153:00000 19:159:86370 LEICA GRX1200GGPRO -----
VITO  A   1 P 19:153:00000 19:159:86370 LEICA GR10      -----
YEBE  A   1 P 19:153:00000 19:159:86370 TRIMBLE NETR9  -----
ZARA  A   1 P 19:153:00000 19:159:86370 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 19:153:00000 19:159:86370 LEIAT504      LEIS -----
ALDA  A   1 P 19:153:00000 19:159:86370 LEIAS10      NONE -----
ALSA  A   1 P 19:153:00000 19:159:86370 LEIAS10      NONE -----
AMUR  A   1 P 19:153:00000 19:159:86370 LEIAS10      NONE -----
BIAZ  A   1 P 19:153:00000 19:159:86370 LEIAR25      LEIT -----
BIDA  A   1 P 19:153:00000 19:159:86370 LEIAS10      NONE -----
```

BRZR	A	1	P	19:153:00000	19:159:86370	LEIAS10	NONE	----
CACE	A	1	P	19:153:00000	19:159:86370	TRM29659.00	NONE	----
CANT	A	1	P	19:153:00000	19:159:86370	LEIAR25.R4	LEIT	25066
CREU	A	1	P	19:153:00000	19:159:86370	LEIAR25.R4	NONE	26357
EBRE	A	1	P	19:153:00000	19:159:86370	LEIAR25.R4	NONE	26359
ELGE	A	1	P	19:153:00000	19:159:86370	LEIAR25.R4	LEIT	----
EMAZ	A	1	P	19:153:00000	19:159:86370	LEIAS10	NONE	----
GERN	A	1	P	19:153:00000	19:159:86370	LEIAS10	NONE	----
IGEL	A	1	P	19:153:00000	19:159:86370	LEIAR20	LEIM	----
ISPS	A	1	P	19:153:00000	19:159:86370	TRM59900.00	SCIS	----
KAST	A	1	P	19:153:00000	19:159:86370	LEIAS10	NONE	----
LARE	A	1	P	19:153:00000	19:159:86370	LEIAT504	NONE	----
LAZK	A	1	P	19:153:00000	19:159:86370	LEIAR25.R4	LEIT	----
LEIT	A	1	P	19:153:00000	19:159:86370	LEIAR10	NONE	----
ORDN	A	1	P	19:153:00000	19:159:86370	LEIAR10	NONE	----
PASA	A	1	P	19:153:00000	19:159:86370	LEIAR20	LEIM	73034
RIO1	A	1	P	19:153:00000	19:159:86370	LEIAR25.R4	LEIT	25138
SALA	A	1	P	19:153:00000	19:159:86370	LEIAR25	NONE	----
SCOA	A	1	P	19:153:00000	19:159:86370	TRM55971.00	NONE	----
SOPU	A	1	P	19:153:00000	19:159:86370	LEIAS10	NONE	----
TERU	A	1	P	19:153:00000	19:159:86370	LEIAT504GG	LEIS	----
VITO	A	1	P	19:153:00000	19:159:86370	LEIAS10	NONE	----
YEBE	A	1	P	19:153:00000	19:159:86370	TRM29659.00	NONE	----
ZARA	A	1	P	19:153:00000	19:159:86370	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	19:153:00000	19:159:86370	UNE	3.0460	0.0000	0.0000
ALDA	A	1	P	19:153:00000	19:159:86370	UNE	0.0000	0.0000	0.0000
ALSA	A	1	P	19:153:00000	19:159:86370	UNE	0.0000	0.0000	0.0000
AMUR	A	1	P	19:153:00000	19:159:86370	UNE	0.0000	0.0000	0.0000
BIAZ	A	1	P	19:153:00000	19:159:86370	UNE	0.0000	0.0000	0.0000
BIDA	A	1	P	19:153:00000	19:159:86370	UNE	0.0000	0.0000	0.0000
BRZR	A	1	P	19:153:00000	19:159:86370	UNE	0.0771	0.0000	0.0000
CACE	A	1	P	19:153:00000	19:159:86370	UNE	0.0600	0.0000	0.0000
CANT	A	1	P	19:153:00000	19:159:86370	UNE	3.0490	0.0000	0.0000
CREU	A	1	P	19:153:00000	19:159:86370	UNE	0.0770	0.0000	0.0000
EBRE	A	1	P	19:153:00000	19:159:86370	UNE	0.0770	0.0000	0.0000
ELGE	A	1	P	19:153:00000	19:159:86370	UNE	0.0000	0.0000	0.0000
EMAZ	A	1	P	19:153:00000	19:159:86370	UNE	0.0350	0.0000	0.0000
GERN	A	1	P	19:153:00000	19:159:86370	UNE	0.0771	0.0000	0.0000
IGEL	A	1	P	19:153:00000	19:159:86370	UNE	0.0000	0.0000	0.0000
ISPS	A	1	P	19:153:00000	19:159:86370	UNE	0.0350	0.0000	0.0000
KAST	A	1	P	19:153:00000	19:159:86370	UNE	0.0350	0.0000	0.0000
LARE	A	1	P	19:153:00000	19:159:86370	UNE	0.0000	0.0000	0.0000
LAZK	A	1	P	19:153:00000	19:159:86370	UNE	0.0000	0.0000	0.0000
LEIT	A	1	P	19:153:00000	19:159:86370	UNE	0.0000	0.0000	0.0000
ORDN	A	1	P	19:153:00000	19:159:86370	UNE	0.0000	0.0000	0.0000
PASA	A	1	P	19:153:00000	19:159:86370	UNE	0.0000	0.0000	0.0000
RIO1	A	1	P	19:153:00000	19:159:86370	UNE	0.0606	0.0000	0.0000
SALA	A	1	P	19:153:00000	19:159:86370	UNE	0.0600	0.0000	0.0000
SCOA	A	1	P	19:153:00000	19:159:86370	UNE	0.0000	0.0000	0.0000
SOPU	A	1	P	19:153:00000	19:159:86370	UNE	0.0771	0.0000	0.0000
TERU	A	1	P	19:153:00000	19:159:86370	UNE	0.0600	0.0000	0.0000
VITO	A	1	P	19:153:00000	19:159:86370	UNE	0.0000	0.0000	0.0000
YEBE	A	1	P	19:153:00000	19:159:86370	UNE	0.0000	0.0000	0.0000
ZARA	A	1	P	19:153:00000	19:159:86370	UNE	3.2590	0.0000	0.0000

8 References

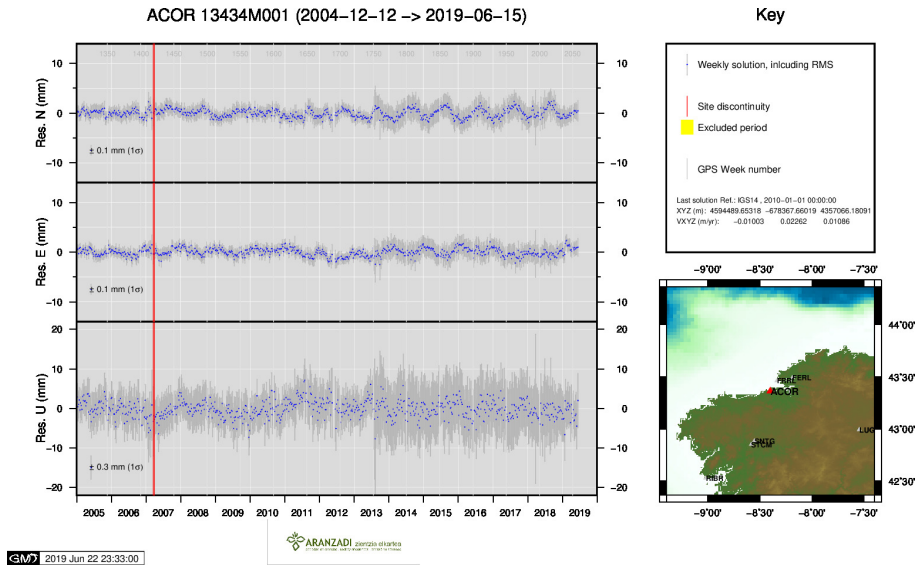
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign*. etrs89.ensg.ign.fr/memo-V8.pdf

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

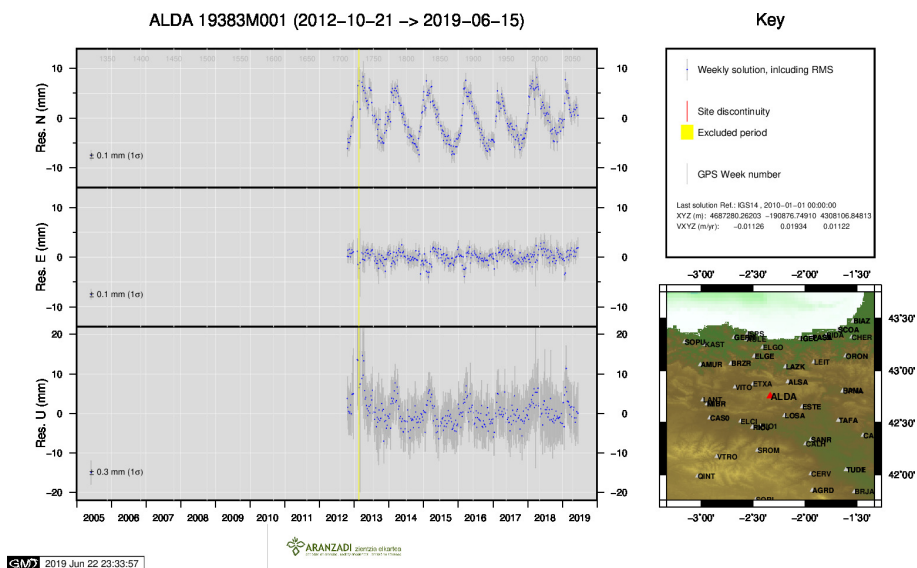
Z. Altamimi (2018): *EUREF Technical Note 1: Relationship and Transformation between the International and the European Terrestrial Reference Systems*. etrs89.ensg.ign.fr/pub/EUREF-TN-1.pdf

9 Cumulative Time Series

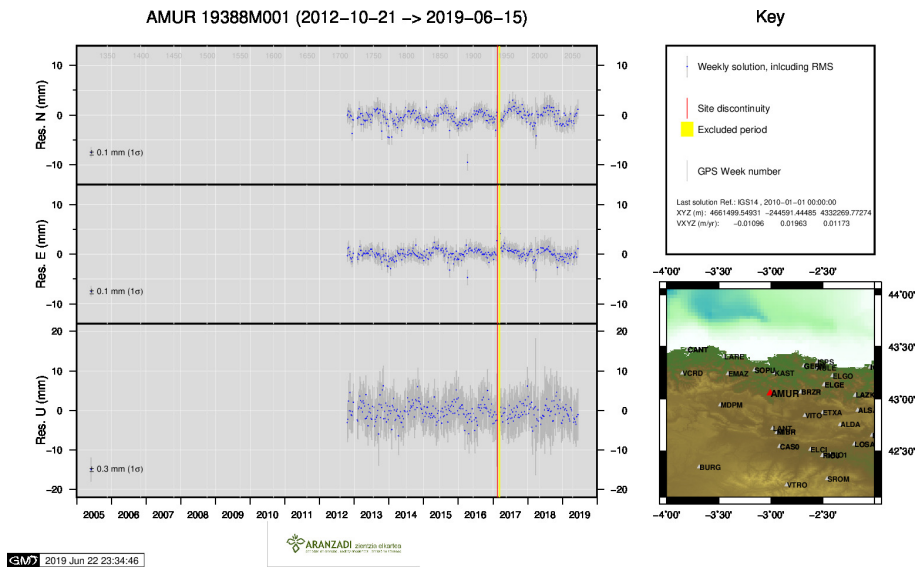
Time series of stations. Latest plots at: <http://geolabpasaia.org/gnss/ARA-net/TSeries/>, or click on the caption of each image.



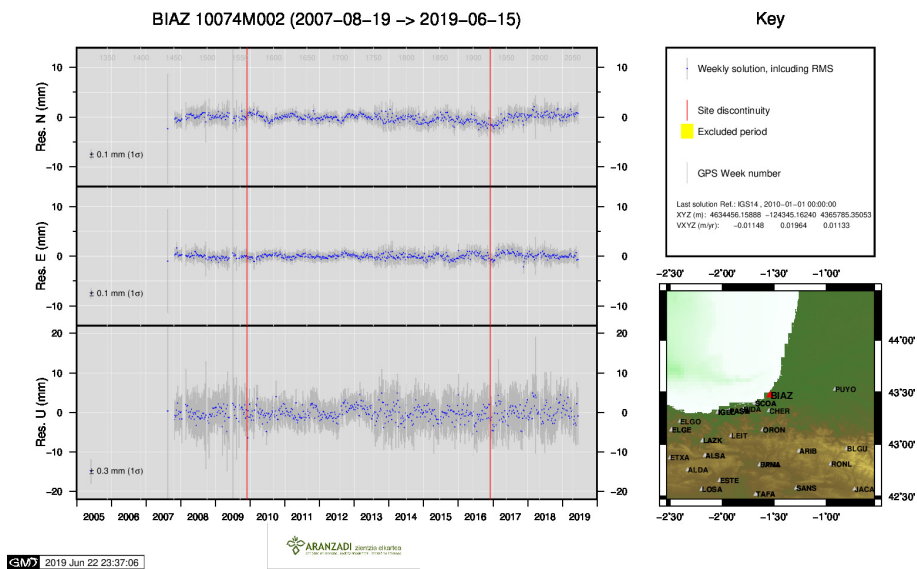
1) ACOR



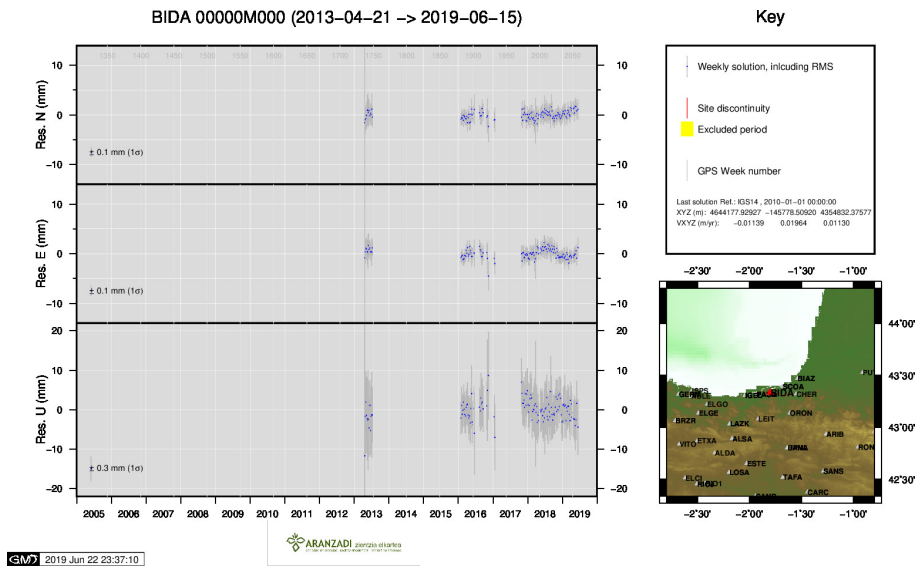
2) ALDA



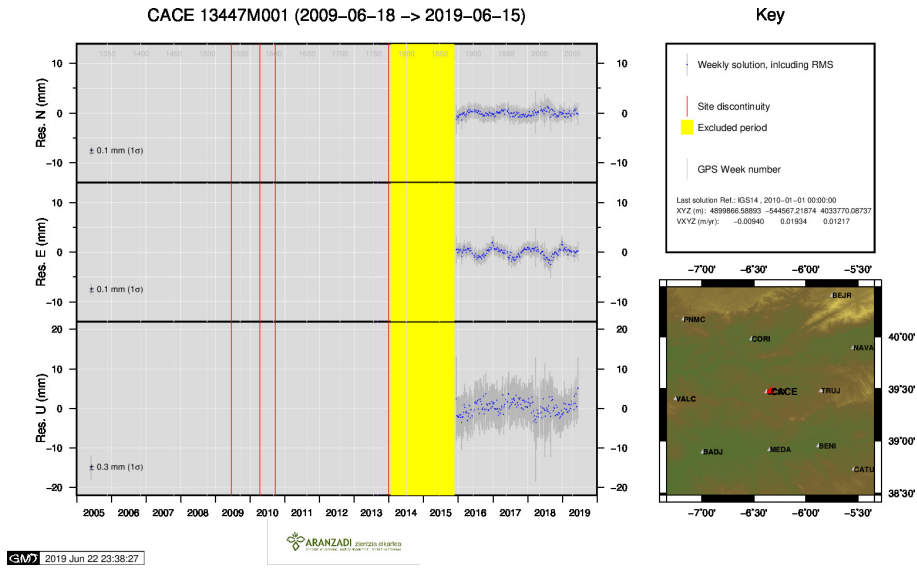
3) AMUR



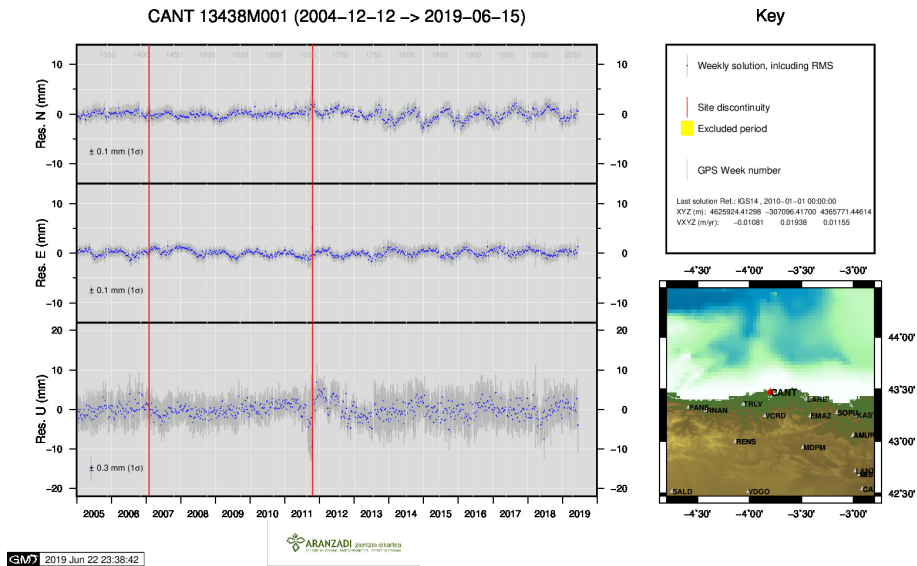
4) BIAZ



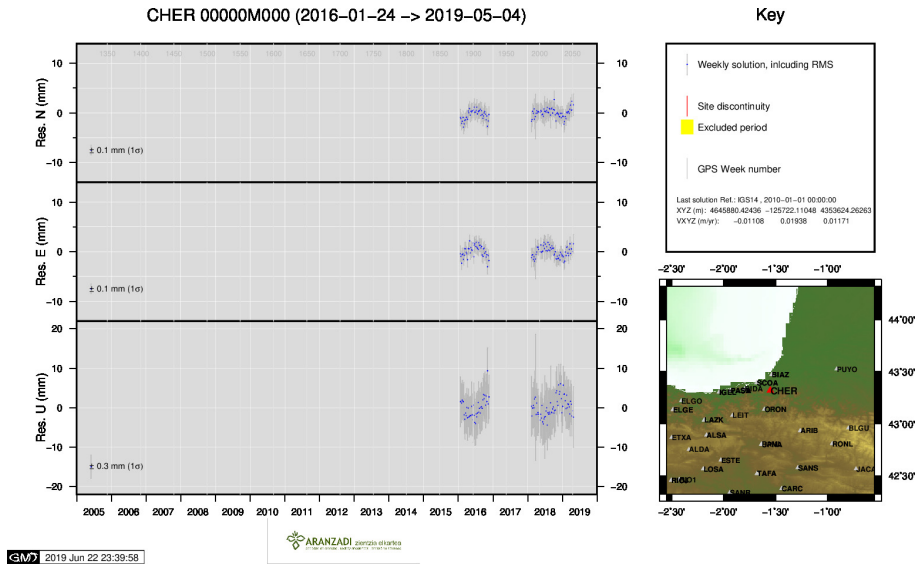
5) BIDA



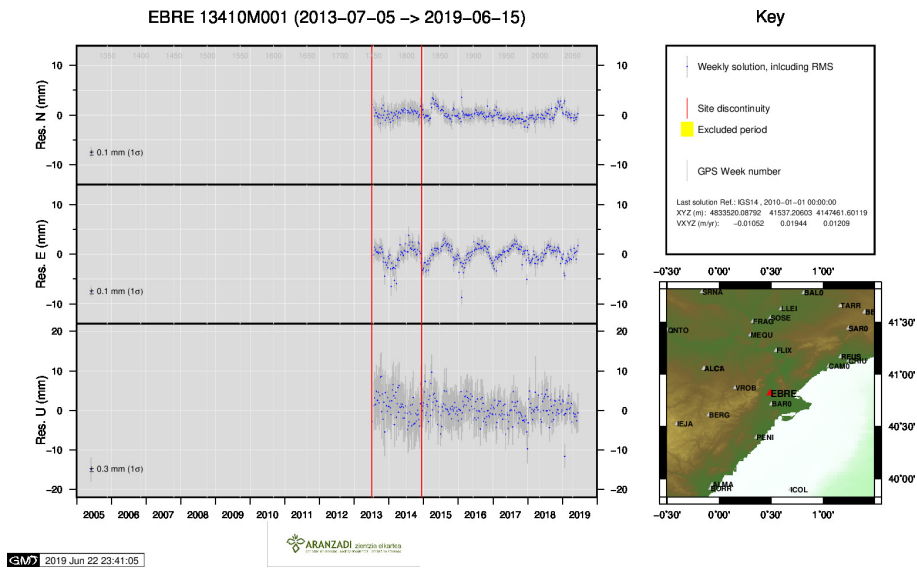
6) CACE



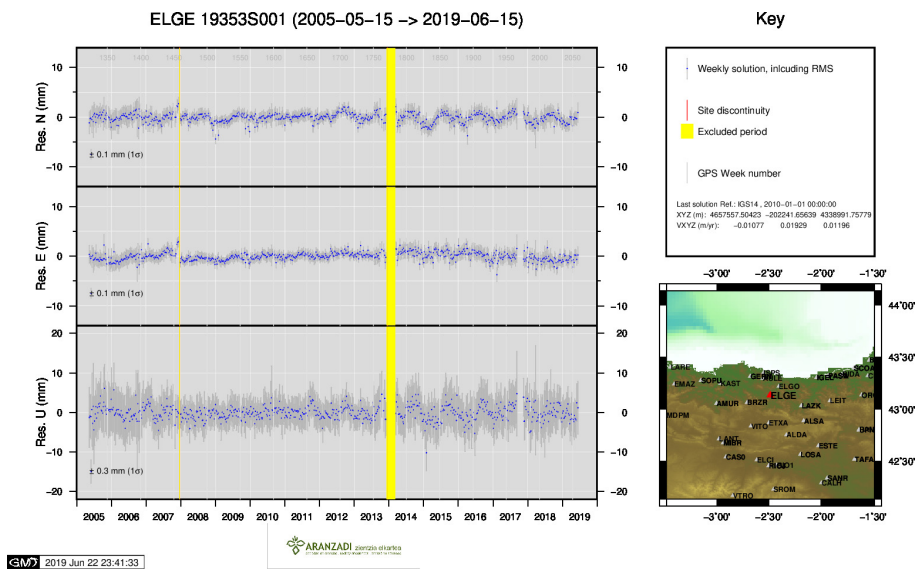
7) CANT



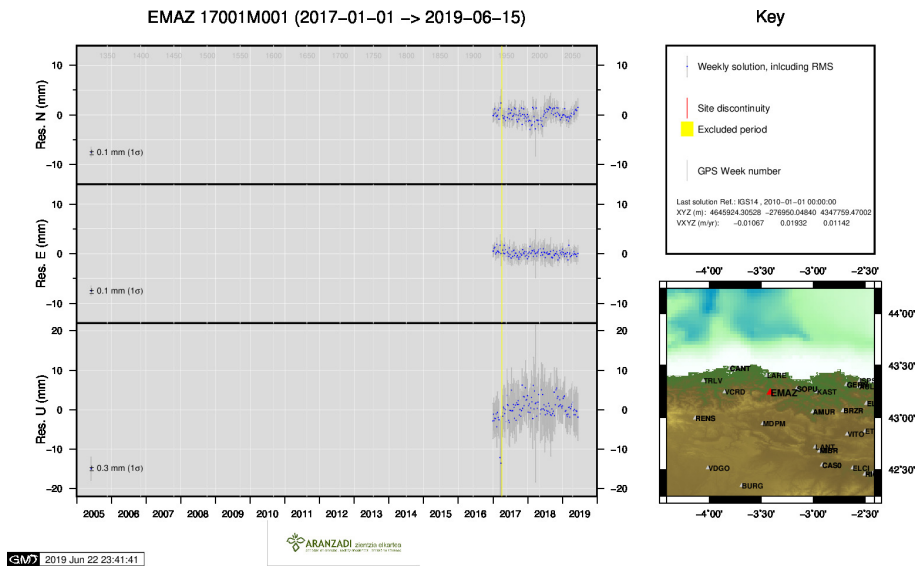
8) CHER



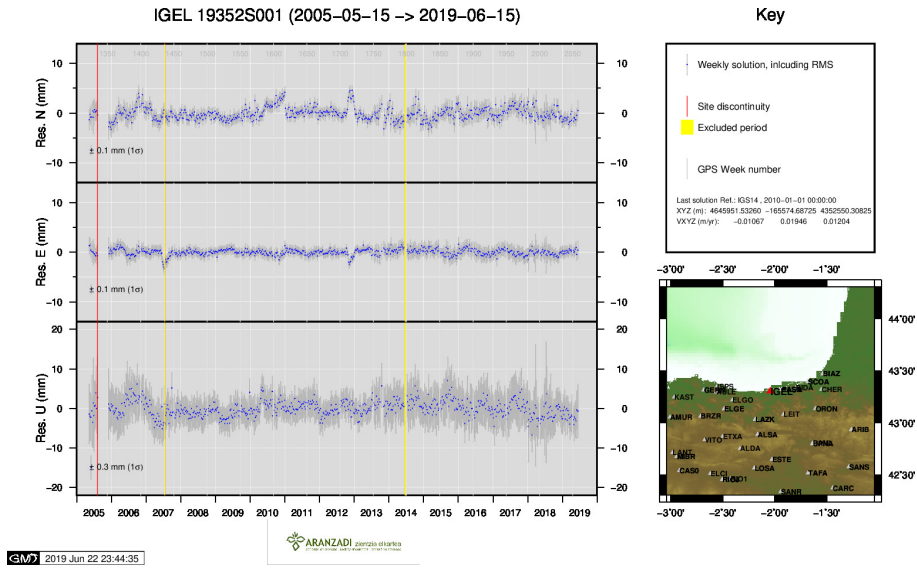
9) EBRE



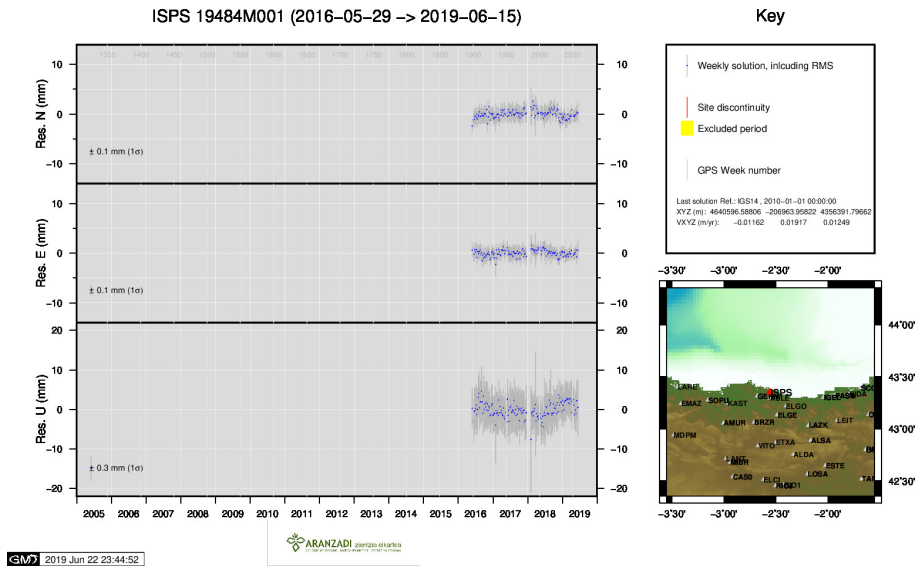
10) ELGE



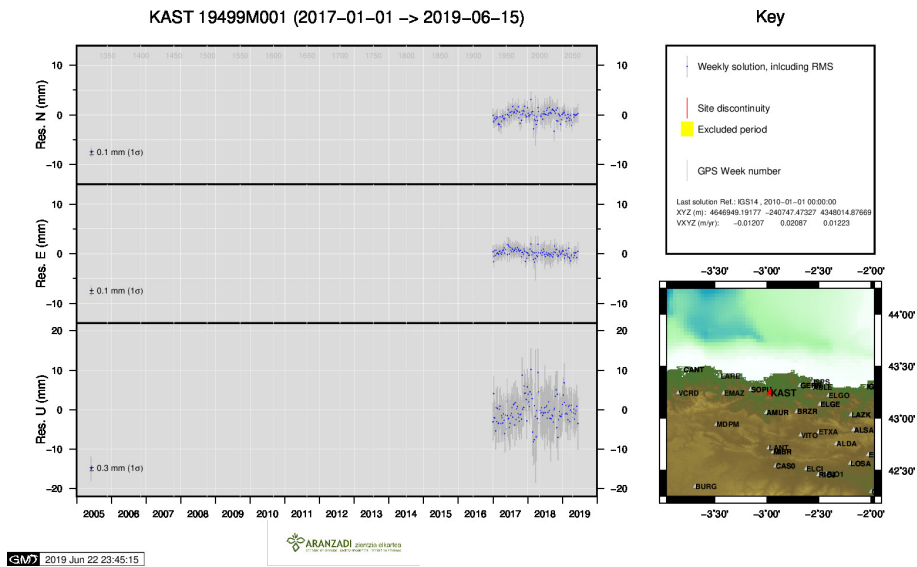
11) EMAZ



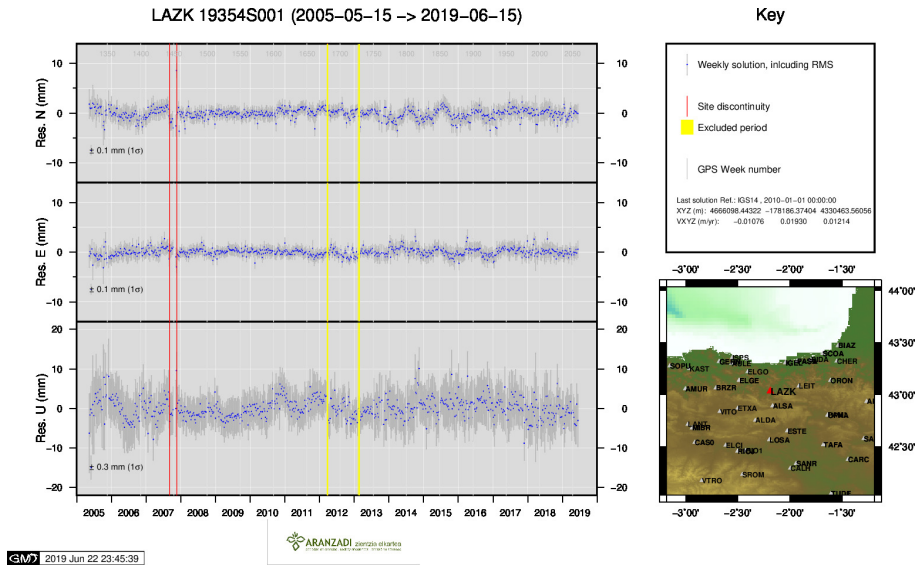
12) IGEL



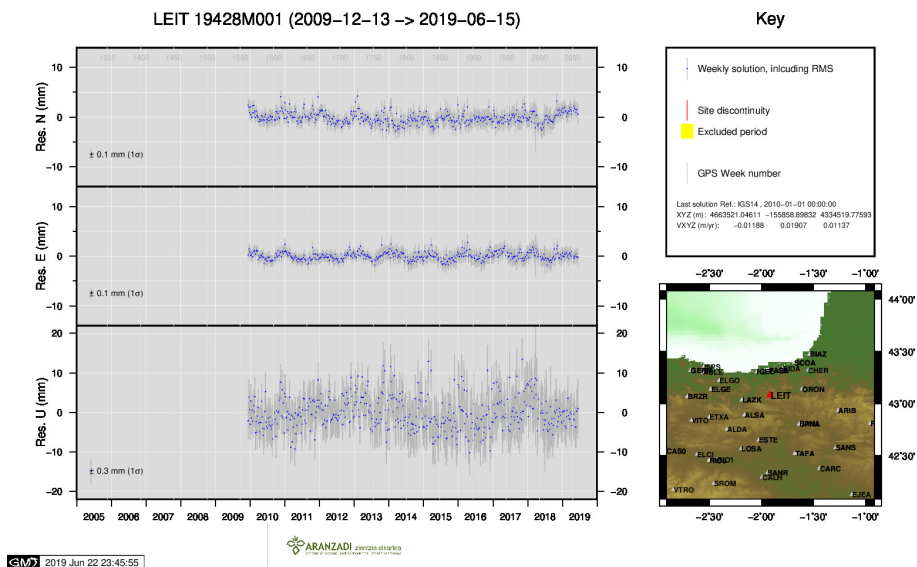
13) ISPS



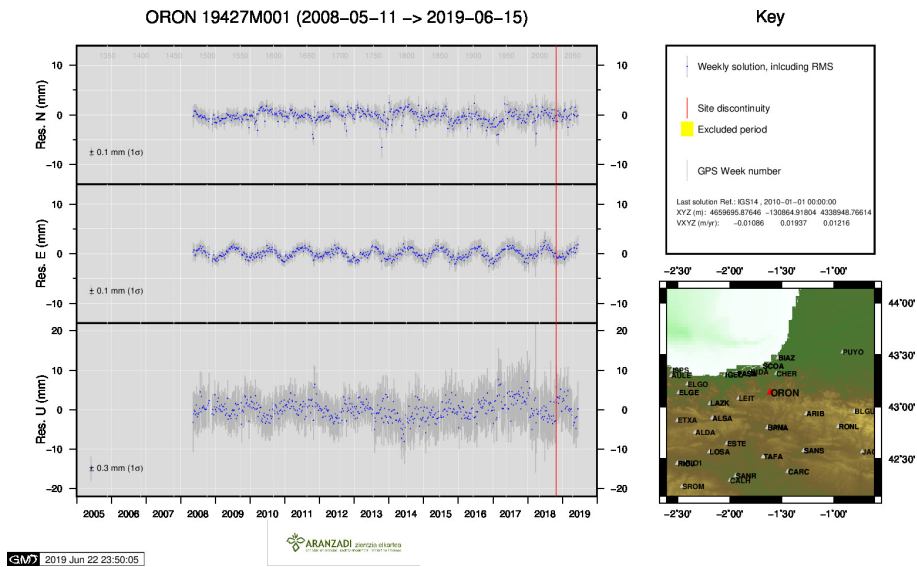
14) KAST



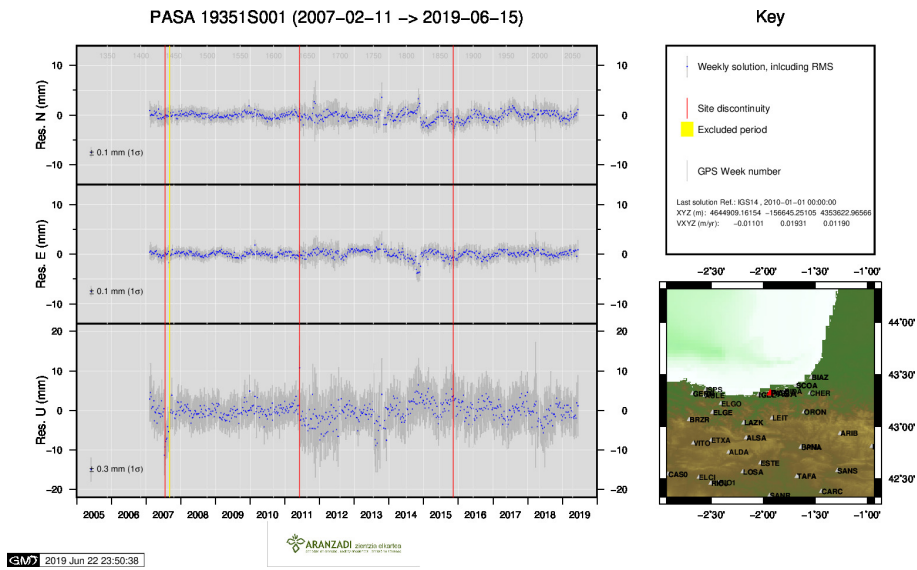
15) LAZK



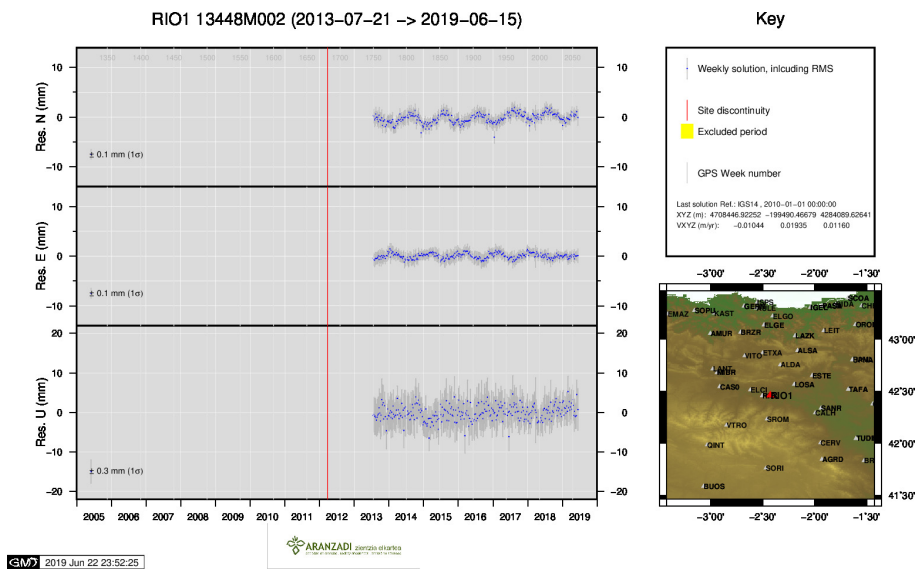
16) LEIT



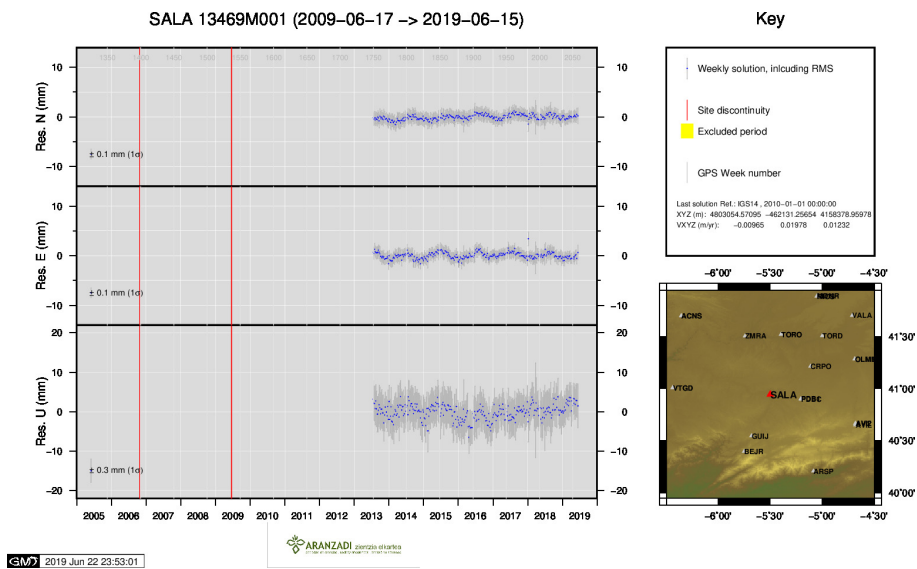
17) ORON



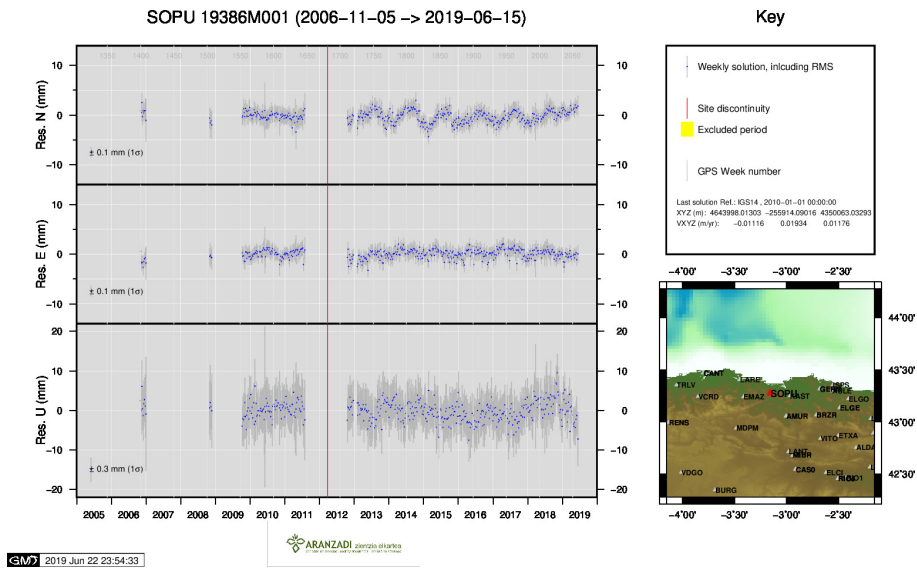
18) PASA



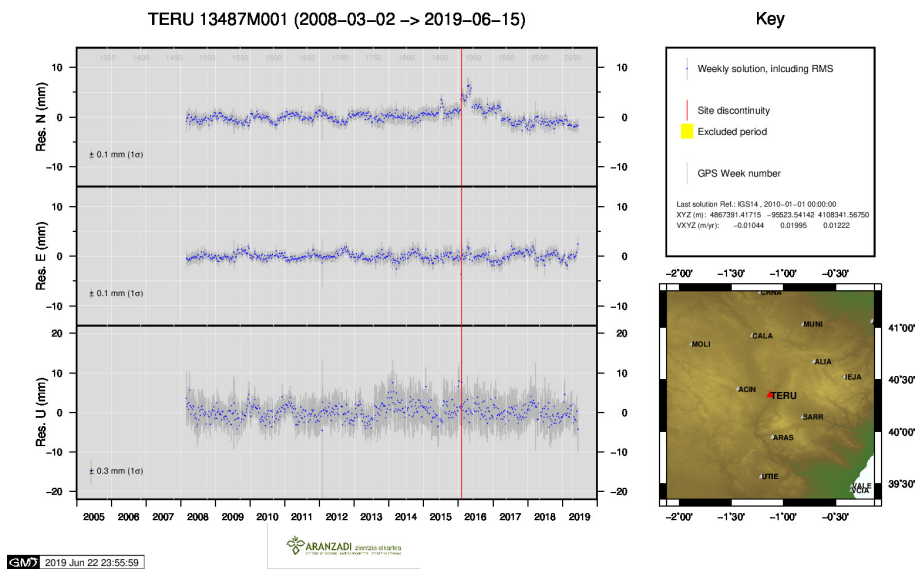
19) RIO1



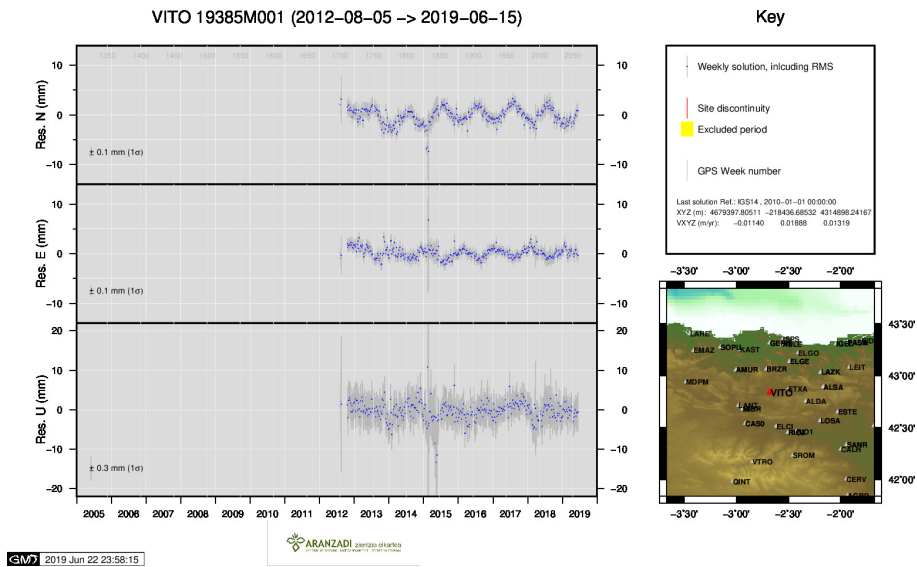
20) SALA



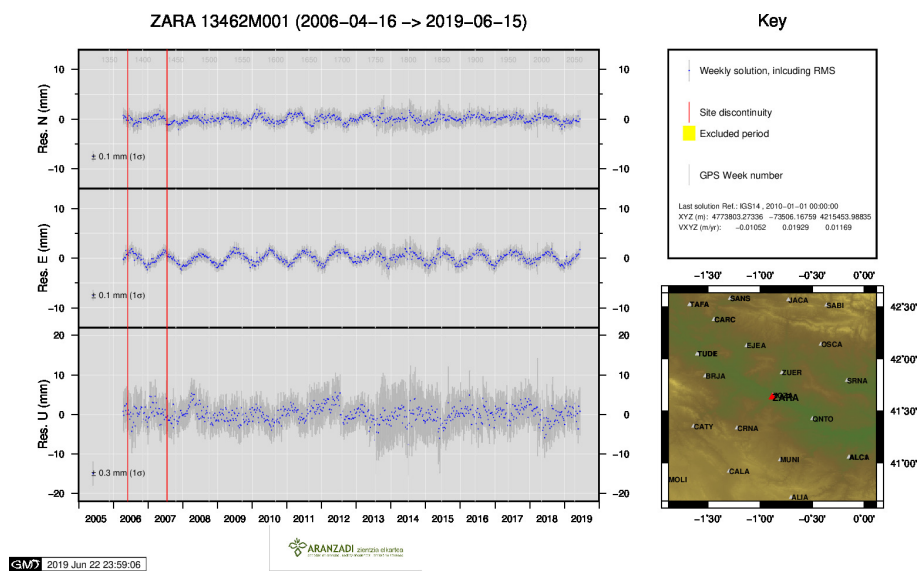
21) SOPU



22) TERU



23) VITO



24) ZARA