

ARA-DAC Weekly Analysis Result: 2075 (GFA)

Technical Report

GPS Week: 2075 (GFA)

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

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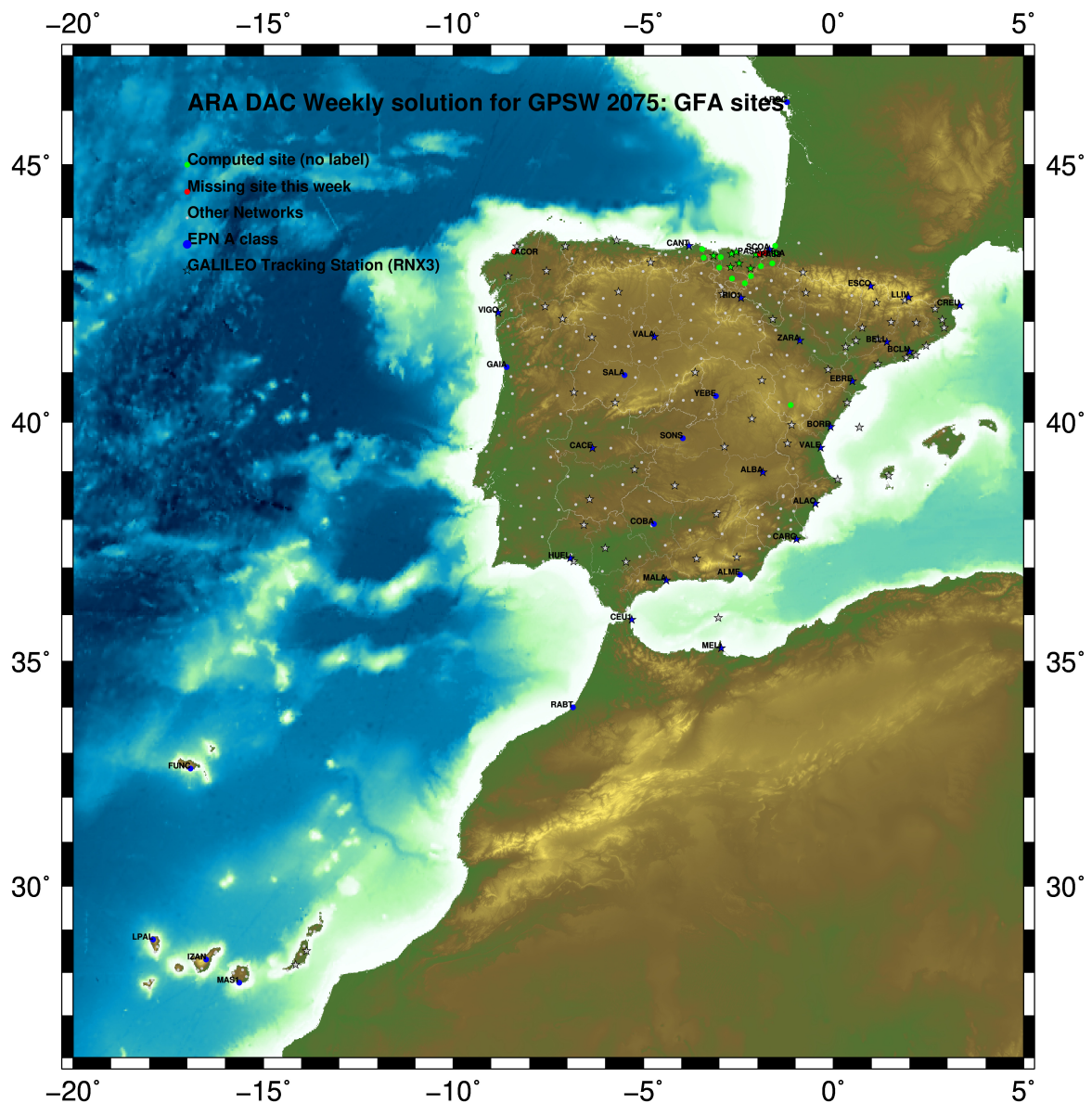
Report generated on 2019/11/03 at 15:03:29



1 Introduction

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

2 Map of Computed Sites



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Fig.1: Computed Sites for GPS Week2075 (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 C2010.

ARA LAC 2075 WEEK FINAL COMBINATION: PRECISE ORBITS					
03-NOV-19 11:54					

LOCAL GEODETIC DATUM: IGS14		EPOCH: 2019-10-16 12:00:00			
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
33	ALDA 19383M001	4687280.15728	-190876.55968	4308106.96065	A
42	ALSA 19419M001	4677250.82486	-176770.38766	4319079.87787	A
44	AMUR 19388M001	4661499.44677	-244591.25321	4332269.89419	A
78	BIAZ 10074M002	4634456.04783	-124344.97199	4365785.46675	A
89	BRZR 19387M001	4662220.98760	-220769.89629	4333309.44768	A
9	CACE 13447M001	4899866.49934	-544567.03092	4033770.20855	W
10	CANT 13438M001	4625924.30628	-307096.22716	4365771.56156	W
114	CHER 00000M000	4645880.31553	-125721.92244	4353624.37783	A
15	CREU 13432M001	4715420.12517	273178.06600	4271946.84545	W
16	EBRE 13410M001	4833519.98185	41537.39685	4147461.71787	W
135	ELGE 19353S001	4657557.40155	-202241.46988	4338991.88022	A
137	EMAZ 17001M001	4645924.20222	-276949.85897	4347759.58687	A
157	GERN 19389M001	4642811.31515	-217222.91928	4353278.89015	A
177	IGEL 19352S001	4645951.42473	-165574.49870	4352550.42722	A
182	ISPS 19484M001	4640596.47507	-206963.77191	4356391.92096	A
187	KAST 19499M001	4646949.07493	-240747.26831	4348014.99829	A
192	LARE 19440M001	4632831.94598	-279026.13323	4360314.43401	A
193	LAZK 19354S001	4666098.33816	-178186.18494	4330463.68158	A
197	LEIT 19428M001	4663520.93026	-155858.71151	4334519.89324	A
253	ORND 19427M001	4659695.77024	-130864.72888	4338948.88453	A
30	PASA 19351S001	4644909.05588	-156645.06342	4353623.08557	W
33	RI01 13448M002	4708446.82383	-199490.27853	4284089.74472	W
34	SALA 13469M001	4803054.47940	-462131.06413	4158379.08500	W
35	SCDA 10088M002	4639940.49260	-136224.93732	4359552.42262	W
313	SOPU 19386M001	4643997.90273	-255913.90287	4350063.15017	A
333	TERU 13487M001	4867391.31630	-95523.34482	4108341.68580	A
366	VITO 19385M001	4679397.69468	-218436.50116	4314898.37095	A
43	YEBE 13420M001	4848724.56260	-261631.92438	4123094.33632	W
44	ZARA 13462M001	4773803.16261	-73505.97755	4215454.10298	W

5.2 ETRF2000 (ETRS89) Coordinates

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

ETRF2000 FINAL COORD. wk 2075					
03-NOV-19 11:54					

LOCAL GEODETIC DATUM: ETRF2000		EPOCH: 2019-10-16 12:00:00			
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
33	ALDA 19383M001	4687280.52146	-190877.11333	4308106.53820	A
42	ALSA 19419M001	4677251.19148	-176770.94021	4319079.45636	A
44	AMUR 19388M001	4661499.80628	-244591.80429	4332269.47306	A
78	BIAZ 10074M002	4634456.42391	-124345.51986	4365785.04917	A
89	BRZR 19387M001	4662221.35000	-220770.44739	4333309.02679	A
9	CACE 13447M001	4899866.80237	-544567.60761	4033769.76532	W
10	CANT 13438M001	4625924.66072	-307096.77466	4365771.14239	W
114	CHER 00000M000	4645880.69060	-125722.47152	4353623.95936	A
15	CREU 13432M001	4715420.54167	273177.51107	4271946.42643	W
16	EBRE 13410M001	4833520.36226	41536.82866	4147461.28698	W
135	ELGE 19353S001	4657557.76654	-202242.02043	4338991.45992	A
137	EMAZ 17001M001	4645924.55898	-276950.40851	4347759.16654	A
157	GERN 19389M001	4642811.67936	-217223.46831	4353278.47079	A
177	IGEL 19352S001	4645951.79501	-165575.04791	4352550.00826	A
182	ISPS 19484M001	4640596.84072	-206964.32068	4356391.50190	A
187	KAST 19499M001	4646949.43599	-240747.81785	4348014.57833	A
192	LARE 19440M001	4632832.30337	-279026.68138	4360314.01466	A
193	LAZK 19354S001	4666098.70540	-178186.73631	4330463.26091	A
197	LEIT 19428M001	4663521.30043	-155859.26255	4334519.47305	A
253	ORND 19427M001	4659696.14368	-130865.27943	4338948.46493	A
30	PASA 19351S001	4644909.42729	-156645.61249	4353622.66679	W
33	RI01 13448M002	4708447.18531	-199490.83442	4284089.32054	W
34	SALA 13469M001	4803054.80096	-462131.63060	4158378.65029	W
35	SCDA 10088M002	4639940.86684	-136225.48581	4359552.00447	W
313	SOPU 19386M001	4643998.26214	-255914.45214	4350062.73025	A
333	TERU 13487M001	4867391.67777	-95523.91702	4108341.25064	A
366	VITO 19385M001	4679398.05607	-218437.05406	4314897.94877	A
43	YEBE 13420M001	4848724.90544	-261632.49513	4123093.90057	W
44	ZARA 13462M001	4773803.53419	-73506.53990	4215453.67530	W

5.3 ETRF2014 (ETRS89) Coordinates

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

ETRF2014 FINAL COORD. wk 2075 03-NOV-19 11:54

LOCAL GEODETIC DATUM: ETRF2014 EPOCH: 2019-10-16 12:00:00

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
33	ALDA 19383M001	4687280.47683	-190877.15313	4308106.58668	A
42	ALSA 19419M001	4677251.14690	-176770.98009	4319079.50487	A
44	AMUR 19388M001	4661499.76206	-244591.84400	4332269.52158	A
78	BLAZ 10074M002	4634456.37960	-124345.56010	4365785.09781	A
89	BRZR 19387M001	4662221.30572	-220770.48718	4333309.07531	A
9	CACE 13447M001	4899866.75649	-544567.64532	4033769.81324	W
10	CANT 13438M001	4625924.61705	-307096.81429	4365771.19098	W
114	CHER 00000M000	4645880.64618	-125722.51171	4353624.00797	A
15	CREU 13432M001	4715420.49520	273177.46978	4271946.47514	W
16	EBRE 13410M001	4833520.31538	41536.78863	4147461.33525	W
135	ELGE 19353S001	4657557.72225	-202242.06030	4338991.50846	A
137	EMAZ 17001M001	4645924.51502	-276950.44817	4347759.21508	A
157	GERN 19389M001	4642811.63526	-217223.50819	4353278.51937	A
177	IGEL 19352S001	4645951.75071	-165575.08796	4352550.05684	A
182	ISPS 19484M001	4640596.79660	-206964.36060	4356391.55048	A
187	KAST 19499M001	4646949.39191	-240747.85763	4348014.62688	A
192	LARE 19440M001	4632832.25954	-279026.72108	4360314.06324	A
193	LAZK 19354S001	4666098.66094	-178186.77624	4330463.30945	A
197	LEIT 19428M001	4663521.25693	-155859.30256	4334519.52160	A
253	ORON 19427M001	4659696.09914	-130865.31955	4338948.51351	A
30	PASA 19351S001	4644909.38298	-156645.65257	4353622.71539	W
33	RI01 13448M002	4708447.14049	-199490.87411	4284089.36896	W
34	SALA 13469M001	4803054.75591	-462131.66899	4158378.69841	W
35	SC0A 10088M002	4639940.82251	-136225.52598	4359552.05309	W
313	SOPU 19386M001	4643998.21813	-255914.49187	4350062.77880	A
333	TERU 13487M001	4867391.63098	-95523.95644	4108341.29876	A
366	VITO 19385M001	4679398.01160	-218437.09379	4314897.99725	A
43	YEBE 13420M001	4848724.85935	-261632.53404	4123093.94865	W
44	ZARA 13462M001	4773803.48831	-73506.57977	4215453.72364	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 2075 WEEK FINAL COMBINATION: PRECISE ORBITS 03-NOV-19 11:54

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ALDA 19383M001	7	XXXXXX	1.60	1.14	4.46
ALSA 19419M001	7	XXXXXX	2.79	2.07	4.13
AMUR 19388M001	7	XXXXXX	3.01	3.12	6.06
BLAZ 10074M002	7	XXXXXX	2.03	1.94	3.58
BRZR 19387M001	7	XXXXXX	3.31	1.91	6.78
CACE 13447M001	7	XXXXXX	1.04	0.71	2.36
CANT 13438M001	4	XXXX	0.68	0.87	1.21
CHER 00000M000	6	X XXXX	2.43	1.79	7.26
CREU 13432M001	7	XXXXXX	2.09	2.10	4.83
EBRE 13410M001	7	XXXXXX	1.08	1.08	5.94
ELGE 19353S001	7	XXXXXX	2.73	4.06	4.38
EMAZ 17001M001	7	XXXXXX	2.23	1.40	2.62
GERN 19389M001	7	XXXXXX	1.25	1.16	2.80
IGEL 19352S001	7	XXXXXX	1.31	1.19	3.25
ISPS 19484M001	7	XXXXXX	1.89	1.85	4.85
KAST 19499M001	7	XXXXXX	0.94	1.67	5.21
LARE 19440M001	7	XXXXXX	2.19	1.68	2.28
LAZK 19354S001	7	XXXXXX	1.94	1.95	5.65
LEIT 19428M001	7	XXXXXX	3.77	1.39	5.03
ORDN 19427M001	7	XXXXXX	3.39	1.36	5.14
PASA 19351S001	7	XXXXXX	1.50	1.07	1.98
RI01 13448M002	6	XX XXXX	0.87	0.63	4.53
SALA 13469M001	7	XXXXXX	0.37	0.60	2.80
SCDA 10088M002	7	XXXXXX	2.59	1.21	4.00
SOPU 19386M001	7	XXXXXX	1.45	1.63	3.24
TERU 13487M001	7	XXXXXX	1.23	1.59	4.26
VITO 19385M001	7	XXXXXX	2.06	1.90	4.39
YEBE 13420M001	7	XXXXXX	0.83	1.04	2.13
ZARA 13462M001	7	XXXXXX	0.89	0.61	2.53

Comparison of individual solutions:

ALDA 19383M001	N	1.60	-0.31	2.53	-1.29	-1.88	-1.33	-1.32	-0.44
ALDA 19383M001	E	1.14	-0.30	-2.40	-0.83	-0.92	-0.26	-0.33	-0.48
ALDA 19383M001	U	4.46	-2.39	-3.32	-4.38	-8.71	-0.02	2.75	0.02
ALSA 19419M001	N	2.79	4.49	3.08	-0.13	-2.83	-2.78	0.14	-1.19
ALSA 19419M001	E	2.07	-0.11	-1.14	0.43	3.30	-1.61	1.72	-2.79
ALSA 19419M001	U	4.13	-6.29	-6.28	2.59	0.80	2.83	1.29	2.48
AMUR 19388M001	N	3.01	-5.34	-2.90	2.28	0.99	2.54	1.81	1.22
AMUR 19388M001	E	3.12	-2.09	-6.29	2.08	3.13	0.06	-0.28	-0.51
AMUR 19388M001	U	6.06	-9.08	-9.86	3.96	2.61	1.00	-0.21	4.23
BLAZ 10074M002	N	2.03	0.18	4.34	-1.11	-1.81	0.53	0.90	0.45
BLAZ 10074M002	E	1.94	-0.57	-3.41	2.12	1.20	1.94	0.82	-0.59
BLAZ 10074M002	U	3.58	3.30	-3.33	1.19	0.73	-3.48	-4.77	4.26
BRZR 19387M001	N	3.31	-0.55	6.47	1.00	2.14	-3.19	1.23	-2.48
BRZR 19387M001	E	1.91	-2.22	-0.36	0.93	3.57	0.19	1.44	-1.10
BRZR 19387M001	U	6.78	-0.08	-1.24	9.81	-7.94	-10.07	3.71	-0.12
CACE 13447M001	N	1.04	0.82	1.63	0.37	0.16	-1.37	-1.08	0.15
CACE 13447M001	E	0.71	0.00	0.75	0.69	0.59	-0.70	-0.15	1.06
CACE 13447M001	U	2.36	-0.31	-2.75	-0.02	0.57	-2.89	-3.08	-2.77
CANT 13438M001	N	0.68				0.49	-0.05	-0.76	-0.76
CANT 13438M001	E	0.87				-0.39	0.08	-0.02	-1.44
CANT 13438M001	U	1.21				-1.14	-1.39	0.86	0.64
CHER 00000M000	N	2.43	-3.96		0.50	1.03	-2.80	1.74	1.31
CHER 00000M000	E	1.79	1.43		-0.49	2.42	2.43	-0.32	-1.38
CHER 00000M000	U	7.26	-11.62		5.78	9.21	2.83	1.32	-0.61
CREU 13432M001	N	2.09	1.94	0.03	1.16	-0.36	1.90	-0.43	-4.13
CREU 13432M001	E	2.10	-0.99	0.21	-0.40	0.42	2.02	-0.24	-4.59
CREU 13432M001	U	4.83	-5.66	-1.49	5.52	2.90	4.49	4.54	-5.14
EBRE 13410M001	N	1.08	-0.93	-0.49	1.95	-0.33	1.29	-0.52	0.34
EBRE 13410M001	E	1.08	-0.11	0.02	-2.12	-0.51	0.91	-1.09	0.39
EBRE 13410M001	U	5.94	1.76	3.19	10.34	-4.61	-7.43	3.91	0.14
ELGE 19353S001	N	2.73	-2.31	6.11	-0.45	0.24	1.27	-0.12	-0.32
ELGE 19353S001	E	4.06	-6.73	-3.95	2.35	1.93	4.10	3.18	1.28
ELGE 19353S001	U	4.38	8.78	-3.68	-1.58	-3.29	-2.06	-1.98	-1.66
EMAZ 17001M001	N	2.23	3.52	-2.65	-2.36	-1.29	-0.41	-1.68	0.28
EMAZ 17001M001	E	1.40	1.34	1.91	0.06	-0.39	-0.99	-1.59	-1.63
EMAZ 17001M001	U	2.62	-3.84	-0.39	1.58	-0.74	0.34	-3.34	3.46
GERN 19389M001	N	1.25	-0.30	2.62	1.26	-0.35	0.53	0.23	0.64
GERN 19389M001	E	1.16	1.08	-0.42	-0.89	0.30	1.06	2.09	-0.64
GERN 19389M001	U	2.80	-1.53	-0.02	1.91	-6.30	0.57	-0.03	-1.10
IGEL 19352S001	N	1.31	1.20	-1.64	0.41	0.93	0.92	1.54	1.38
IGEL 19352S001	E	1.19	1.32	-0.52	0.90	-0.69	0.20	2.19	-0.66
IGEL 19352S001	U	3.25	-0.08	2.81	-0.90	-7.25	-1.13	0.93	0.03
ISPS 19484M001	N	1.89	3.79	2.16	-0.44	0.22	-1.41	0.39	-0.09
ISPS 19484M001	E	1.85	4.15	0.06	-0.59	-0.16	-0.23	1.31	-1.08
ISPS 19484M001	U	4.85	4.74	-5.61	-2.29	-3.55	-7.47	2.00	3.06
KAST 19499M001	N	0.94	0.24	-0.41	0.47	1.14	0.55	1.10	1.43
KAST 19499M001	E	1.67	1.38	-2.06	0.03	2.48	0.49	1.65	-1.23
KAST 19499M001	U	5.21	-3.84	6.38	-1.45	-8.00	-4.65	3.26	3.01
LARE 19440M001	N	2.19	3.89	0.46	0.12	-1.54	0.87	-2.54	-1.94
LARE 19440M001	E	1.68	3.41	0.58	-0.28	-0.28	-1.95	0.00	-1.06
LARE 19440M001	U	2.28	-3.03	0.90	0.35	-3.97	1.29	1.10	1.52
LAZK 19354S001	N	1.94	-0.23	-0.82	0.58	-0.62	3.65	2.80	-0.15
LAZK 19354S001	E	1.95	-2.45	-1.65	1.00	0.35	0.98	3.13	1.51
LAZK 19354S001	U	5.65	-8.20	-1.30	-1.46	-5.08	6.41	-3.53	6.41
LEIT 19428M001	N	3.77	6.38	1.03	-3.31	-3.48	-2.08	-1.45	3.72
LEIT 19428M001	E	1.39	1.22	-1.56	-1.23	-0.58	0.30	-0.54	2.33
LEIT 19428M001	U	5.03	-0.57	3.76	-2.62	-9.48	-2.70	4.29	3.87
ORDN 19427M001	N	3.39	-0.06	-7.27	-0.02	1.68	3.41	0.80	1.00
ORDN 19427M001	E	1.36	0.02	-2.06	0.78	1.66	-1.61	0.79	-0.56
ORDN 19427M001	U	5.14	-3.48	-4.74	7.09	3.52	-2.16	3.46	-6.70
PASA 19351S001	N	1.50	-1.23	3.12	0.30	0.37	0.88	1.14	-0.17
PASA 19351S001	E	1.07	0.44	-1.59	1.66	0.90	0.76	0.12	0.12

PASA	19351S001	U	1.98	1.04	-0.35	-1.38	-0.01	-2.88	0.36	-3.47
RIO1	13448M002	N	0.87	-0.10	1.44		-0.59	0.64	-0.47	-0.83
RIO1	13448M002	E	0.63	0.02	-0.52		-0.01	0.28	0.24	-1.24
RIO1	13448M002	U	4.53	6.26	2.72		-1.83	-1.87	-6.32	3.03
SALA	13469M001	N	0.37	0.37	0.28	0.10	0.23	0.48	-0.44	-0.32
SALA	13469M001	E	0.60	-0.33	0.02	0.47	0.43	1.03	-0.69	-0.40
SALA	13469M001	U	2.80	4.44	0.73	-0.51	2.48	-3.20	-1.46	2.81
SCDA	10088M002	N	2.59	1.05	5.73	-0.52	-1.11	1.20	0.04	-1.84
SCDA	10088M002	E	1.21	2.25	-0.25	1.06	-0.59	0.87	0.24	-1.19
SCDA	10088M002	U	4.00	-5.08	-1.42	0.53	0.53	-0.72	-2.67	7.75
SOPU	19386M001	N	1.45	2.38	1.50	-0.73	-0.34	-0.81	0.98	1.55
SOPU	19386M001	E	1.63	1.02	-1.05	0.32	0.30	-0.76	3.55	-0.75
SOPU	19386M001	U	3.24	-0.30	0.23	1.55	-6.47	-3.00	-1.00	2.90
TERU	13487M001	N	1.23	-0.35	-0.33	0.17	0.52	0.40	-0.93	2.74
TERU	13487M001	E	1.59	0.20	0.88	-0.21	-1.40	0.56	-2.65	2.26
TERU	13487M001	U	4.26	1.56	7.33	3.06	4.13	-3.73	-3.47	0.22
VITO	19385M001	N	2.06	-3.84	-0.33	-0.21	2.25	0.20	2.31	-0.10
VITO	19385M001	E	1.90	-2.24	0.88	1.85	-0.74	-3.27	0.98	-0.41
VITO	19385M001	U	4.39	1.71	-4.72	3.61	-7.04	4.04	0.32	-3.40
YEBE	13420M001	N	0.83	-0.90	0.58	-0.46	-0.14	-1.11	1.11	-0.57
YEBE	13420M001	E	1.04	-0.19	0.57	0.17	-1.09	0.08	1.54	1.59
YEBE	13420M001	U	2.13	-0.35	-1.83	0.23	-3.45	-2.39	-2.47	-0.04
ZARA	13462M001	N	0.89	-0.22	0.43	-0.12	-0.44	0.23	-1.92	0.79
ZARA	13462M001	E	0.61	-1.14	-0.15	-0.19	0.44	-0.77	-0.22	-0.25
ZARA	13462M001	U	2.53	-2.64	1.41	-0.92	-0.66	-4.68	0.20	2.50

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		
2	ALAC 13433M001	I W	0.24	-0.90	-0.91
3	ALBA 13452M001	I W	-0.55	-0.89	0.23
4	ALME 13437M001	I W	-1.92	0.43	5.16
5	BCLN 13412M001	I W	0.57	-1.32	0.29
6	BELL 13431M001	I W	-0.63	1.11	0.60
7	BORR 13480M001	I W	-0.62	-1.78	-0.36
8	BRST 10004M004	I W	-0.86	1.37	1.50
9	CACE 13447M001	I W	1.63	1.58	0.86
10	CANT 13438M001	I W	-1.91	-0.41	1.22
11	CARG 19412M001	I W	0.69	-0.59	1.90
13	CEU1 13449M002	I W	0.19	0.25	-0.30
14	COBA 13453M001	I W	1.53	0.51	-4.36
15	CREU 13432M001	I W	0.29	0.45	-0.10
16	EBRE 13410M001	I W	0.09	0.73	2.40
17	ESCO 13435M001	I W	1.64	0.29	-4.09
18	FUNC 13911S001	I W	2.72	-1.11	4.07
19	GAIA 13902M001	I W	4.09	1.03	-6.07
21	HUEL 13451M001	I W	2.82	-0.67	-3.99
22	IZAN 13109M002	I W	-1.35	-2.35	2.63
23	LLIV 13436M001	I W	-1.35	-1.68	-3.85
24	LPAL 81701M001	I W	-3.32	-0.91	4.25
25	LROC 10023M001	I W	-0.23	0.41	-1.42
26	MALA 13443M001	I W	-0.05	-1.48	0.85
27	MAS1 31303M002	I W	-0.71	-1.88	8.17
29	MELI 19379M001	I W	0.62	-0.23	0.68
30	PASA 19351S001	I W	-0.80	1.34	-4.00
31	PDEL 31906M004	I W	9.98	2.90	8.23
32	RABT 35001M002	I W	-0.04	0.19	-2.99
33	RIO1 13448M002	I W	-1.04	0.67	-5.85
34	SALA 13469M001	I W	-0.32	0.94	-4.03
35	SCOA 10088M002	I W	-5.13	2.12	-3.99
38	SONS 13446M001	I W	-0.44	-0.56	-3.41
40	VALA 13463M002	I W	-1.12	-0.28	-0.71
41	VALE 13439M001	I W	-0.89	0.51	0.34
42	VIGO 13450M001	I W	-1.56	1.04	4.63
43	YEBE 13420M001	I W	-0.20	0.01	1.69
44	ZARA 13462M001	I W	-0.84	0.29	-1.76
45	ZIMM 14001M004	I W	-1.22	-1.14	2.48
	RMS / COMPONENT		2.33	1.17	3.53
	MEAN		0.00	-0.00	-0.00
	MIN		-5.13	-2.35	-6.07
	MAX		9.98	2.90	8.23

NUMBER OF PARAMETERS : 3
NUMBER OF COORDINATES : 114
RMS OF TRANSFORMATION : 2.53 MM

BARYCENTER COORDINATES:

LATITUDE : 39 33 46.25
LONGITUDE : - 4 42 48.95
HEIGHT : -45.292 KM

PARAMETERS:

TRANSLATION IN N : 0.00 +- 0.41 MM
TRANSLATION IN E : -0.00 +- 0.41 MM
TRANSLATION IN U : 0.00 +- 0.41 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          16614556
NUMBER OF UNKNOWN               209375
NUMBER OF DEGREES OF FREEDOM    16405181
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)     180
VARIANCE FACTOR                  2.340846672539913

Helmert Transformation Parameters With Respect to Combined Solution:
-----
Sol  Rms (m)      Translation (m)      Rotation (")      Scale (ppm)
      X          Y          Z          X          Y          Z
-----
  1  0.00267      0.0073 -0.0124  0.0048  0.0002  0.0000 -0.0003  -0.00143
  2  0.00289     -0.0061 -0.0038  0.0007  0.0002 -0.0001 -0.0000   0.00069
  3  0.00250     -0.0060 -0.0057  0.0142 -0.0000 -0.0005 -0.0002  -0.00050
  4  0.00237      0.0175  0.0047 -0.0143 -0.0000  0.0007  0.0002  -0.00068
  5  0.00249      0.0039 -0.0141 -0.0040  0.0003  0.0002 -0.0003  -0.00040
  6  0.00275      0.0136 -0.0178 -0.0160  0.0005  0.0007 -0.0004  -0.00027
  7  0.00229      0.0215  0.0118 -0.0199 -0.0002  0.0009  0.0004  -0.00052
```

```
Statistics of individual solutions:
-----
File  RMS (m)      DOF  Ch3**2/DOF  #Observations authentic / pseudo  #Parameters explicit / implicit / singular
-----
  1  0.00151      2390254      2.28          2420284      3          993      29040      0
  2  0.00169      2309924      2.86          2342539      3          978      31640      0
  3  0.00138      2251711      1.91          2281625      3          996      28921      0
  4  0.00144      2403897      2.08          2434260      3          1005     29361      0
  5  0.00156      2342137      2.44          2374580      3          1008     31438      0
  6  0.00150      2330598      2.26          2360480      3          972      28913      0
  7  0.00156      2370759      2.44          2400788      3          984      29048      0
```

7 Equipment

7.1 Receiver List

Serial numbers not shown.

```
*SITE PT SOLN T DATA_START__ DATA_END_____ DESCRIPTION_____ S/N__ FIRMWARE___
ALDA A 1 P 19:286:00000 19:292:86370 LEICA GR10 -----
ALSA A 1 P 19:286:00000 19:292:86370 LEICA GR50 -----
AMUR A 1 P 19:286:00000 19:292:86370 LEICA GR10 -----
BIAZ A 1 P 19:286:00000 19:292:86370 TRI SP90M -----
BRZR A 1 P 19:286:00000 19:292:86370 LEICA GR30 -----
CACE A 1 P 19:286:00000 19:292:86370 TRIMBLE NETR9 -----
CANT A 1 P 19:289:00000 19:292:86370 LEICA GR10 -----
CHER A 1 P 19:286:00000 19:292:86370 LEICA GRX1200+GNSS -----
CREU A 1 P 19:286:00000 19:292:86370 LEICA GR50 -----
EBRE A 1 P 19:286:00000 19:292:86370 LEICA GR50 -----
ELGE A 1 P 19:286:00000 19:292:86370 LEICA GR30 -----
EMAZ A 1 P 19:286:00000 19:292:86370 LEICA GR30 -----
GERN A 1 P 19:286:00000 19:292:86370 LEICA GR30 -----
IGEL A 1 P 19:286:00000 19:292:86370 LEICA GR30 -----
ISPS A 1 P 19:286:00000 19:292:86370 TRIMBLE NETR9 -----
KAST A 1 P 19:286:00000 19:292:86370 LEICA GR30 -----
LARE A 1 P 19:286:00000 19:292:86370 LEICA GRX1200GGPRO -----
LAZK A 1 P 19:286:00000 19:292:86370 LEICA GR30 -----
LEIT A 1 P 19:286:00000 19:292:86370 LEICA GR50 -----
ORON A 1 P 19:286:00000 19:292:86370 LEICA GR50 -----
PASA A 1 P 19:286:00000 19:292:86370 LEICA GR30 -----
RIO1 A 1 P 19:286:00000 19:292:86370 LEICA GR25 -----
SALA A 1 P 19:286:00000 19:292:86370 LEICA GRX1200+GNSS -----
SCDA A 1 P 19:286:00000 19:292:86370 LEICA GR25 -----
SOPU A 1 P 19:286:00000 19:292:86370 LEICA GR30 -----
TERU A 1 P 19:286:00000 19:292:86370 LEICA GRX1200GGPRO -----
VITO A 1 P 19:286:00000 19:292:86370 LEICA GR10 -----
YEBE A 1 P 19:286:00000 19:292:86370 TRIMBLE NETR9 -----
ZARA A 1 P 19:286:00000 19:292:86370 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__
ALDA A 1 P 19:286:00000 19:292:86370 LEIAS10 NONE -----
ALSA A 1 P 19:286:00000 19:292:86370 LEIAR10 NONE -----
AMUR A 1 P 19:286:00000 19:292:86370 LEIAS10 NONE -----
BIAZ A 1 P 19:286:00000 19:292:86370 LEIAR25 LEIT -----
BRZR A 1 P 19:286:00000 19:292:86370 LEIAS10 NONE -----
CACE A 1 P 19:286:00000 19:292:86370 TRM29659.00 NONE -----
CANT A 1 P 19:289:00000 19:292:86370 LEIAR25.R4 LEIT 25066
```

```

CHER A 1 P 19:286:00000 19:292:86370 LELAX1203+GNSS NONE -----
CREU A 1 P 19:286:00000 19:292:86370 LELAR25.R4 NONE 26357
EBRE A 1 P 19:286:00000 19:292:86370 LELAR25.R4 NONE 26359
ELGE A 1 P 19:286:00000 19:292:86370 LELAR25.R4 LEIT -----
EMAZ A 1 P 19:286:00000 19:292:86370 LELAS10 NONE -----
GERN A 1 P 19:286:00000 19:292:86370 LELAS10 NONE -----
IGEL A 1 P 19:286:00000 19:292:86370 LELAR20 LEIM -----
ISPS A 1 P 19:286:00000 19:292:86370 TRM59900.00 SCIS -----
KAST A 1 P 19:286:00000 19:292:86370 LELAS10 NONE -----
LARE A 1 P 19:286:00000 19:292:86370 LELAT504 NONE -----
LAZK A 1 P 19:286:00000 19:292:86370 LELAR25.R4 LEIT -----
LEIT A 1 P 19:286:00000 19:292:86370 LELAR10 NONE -----
ORDN A 1 P 19:286:00000 19:292:86370 LELAR10 NONE -----
PASA A 1 P 19:286:00000 19:292:86370 LELAR20 LEIM 73034
RID1 A 1 P 19:286:00000 19:292:86370 LELAR25.R4 LEIT 25138
SALA A 1 P 19:286:00000 19:292:86370 LELAR25 NONE -----
SCDA A 1 P 19:286:00000 19:292:86370 TRM55971.00 NONE -----
SOPU A 1 P 19:286:00000 19:292:86370 LELAS10 NONE -----
TERU A 1 P 19:286:00000 19:292:86370 LELAT504GG LEIS -----
VITO A 1 P 19:286:00000 19:292:86370 LELAS10 NONE -----
YEBE A 1 P 19:286:00000 19:292:86370 TRM29659.00 NONE -----
ZARA A 1 P 19:286:00000 19:292:86370 TRM29659.00 NONE -----

```

7.3 Eccentricities

```

*
*SITE PT SOLN T DATA_START_ DATA_END_ AXE ARP->BENCHMARK(M) UP_ NORTH_ EAST_
ALDA A 1 P 19:286:00000 19:292:86370 UNE 0.0000 0.0000 0.0000
ALSA A 1 P 19:286:00000 19:292:86370 UNE 0.0000 0.0000 0.0000
AMUR A 1 P 19:286:00000 19:292:86370 UNE 0.0000 0.0000 0.0000
BIAZ A 1 P 19:286:00000 19:292:86370 UNE 0.0000 0.0000 0.0000
BRZR A 1 P 19:286:00000 19:292:86370 UNE 0.0771 0.0000 0.0000
CACE A 1 P 19:286:00000 19:292:86370 UNE 0.0600 0.0000 0.0000
CANT A 1 P 19:289:00000 19:292:86370 UNE 3.0490 0.0000 0.0000
CHER A 1 P 19:286:00000 19:292:86370 UNE 0.0000 0.0000 0.0000
CREU A 1 P 19:286:00000 19:292:86370 UNE 0.0770 0.0000 0.0000
EBRE A 1 P 19:286:00000 19:292:86370 UNE 0.0770 0.0000 0.0000
ELGE A 1 P 19:286:00000 19:292:86370 UNE 0.0000 0.0000 0.0000
EMAZ A 1 P 19:286:00000 19:292:86370 UNE 0.0350 0.0000 0.0000
GERN A 1 P 19:286:00000 19:292:86370 UNE 0.0771 0.0000 0.0000
IGEL A 1 P 19:286:00000 19:292:86370 UNE 0.0000 0.0000 0.0000
ISPS A 1 P 19:286:00000 19:292:86370 UNE 0.0350 0.0000 0.0000
KAST A 1 P 19:286:00000 19:292:86370 UNE 0.0350 0.0000 0.0000
LARE A 1 P 19:286:00000 19:292:86370 UNE 0.0000 0.0000 0.0000
LAZK A 1 P 19:286:00000 19:292:86370 UNE 0.0000 0.0000 0.0000
LEIT A 1 P 19:286:00000 19:292:86370 UNE 0.0000 0.0000 0.0000
ORDN A 1 P 19:286:00000 19:292:86370 UNE 0.0000 0.0000 0.0000
PASA A 1 P 19:286:00000 19:292:86370 UNE 0.0000 0.0000 0.0000
RID1 A 1 P 19:286:00000 19:292:86370 UNE 0.0606 0.0000 0.0000
SALA A 1 P 19:286:00000 19:292:86370 UNE 0.0600 0.0000 0.0000
SCDA A 1 P 19:286:00000 19:292:86370 UNE 0.0000 0.0000 0.0000
SOPU A 1 P 19:286:00000 19:292:86370 UNE 0.0771 0.0000 0.0000
TERU A 1 P 19:286:00000 19:292:86370 UNE 0.0600 0.0000 0.0000
VITO A 1 P 19:286:00000 19:292:86370 UNE 0.0000 0.0000 0.0000
YEBE A 1 P 19:286:00000 19:292:86370 UNE 0.0000 0.0000 0.0000
ZARA A 1 P 19:286:00000 19:292:86370 UNE 3.2590 0.0000 0.0000

```

8 References

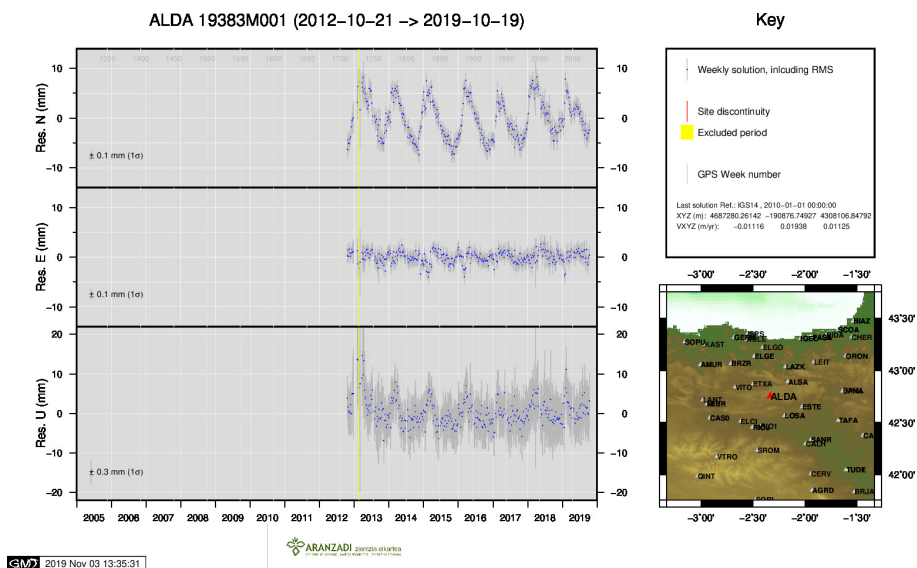
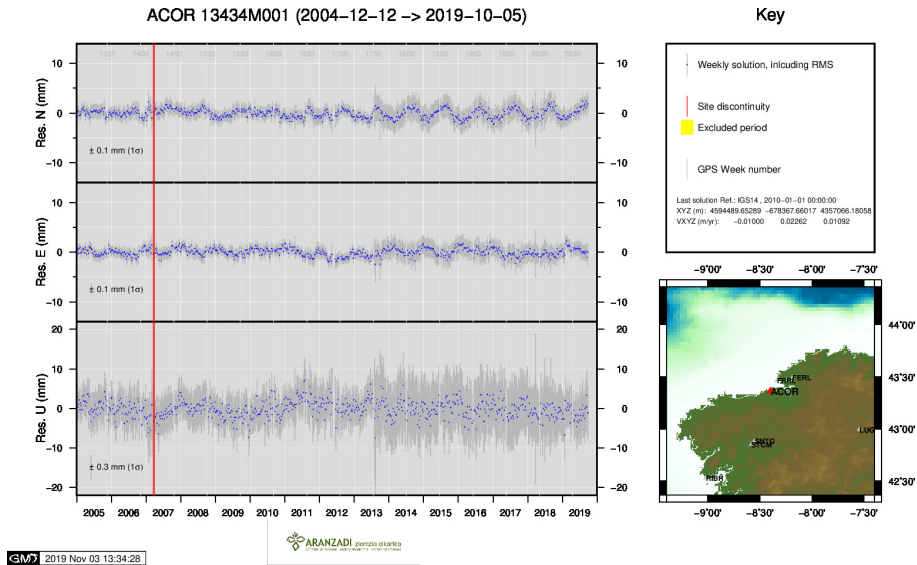
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign*. etrs89.ensg.ign.fr/memo-V8.pdf

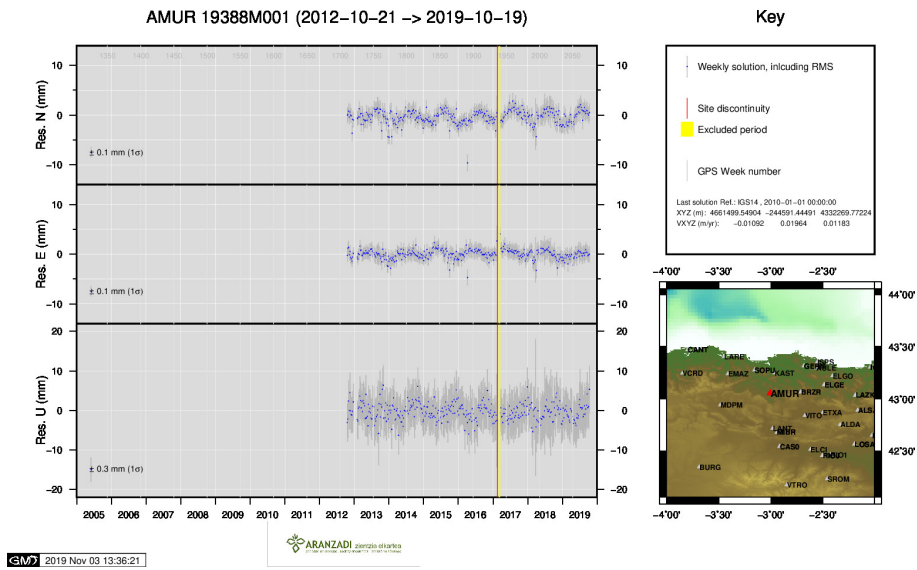
EPN Coordination Group and the EPN Central Bureau (2018): *Guidelines for the EPN Analysis Centres*. epncb.oma.be/documentation/guidelines/guidelines_analysis_centres.pdf

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

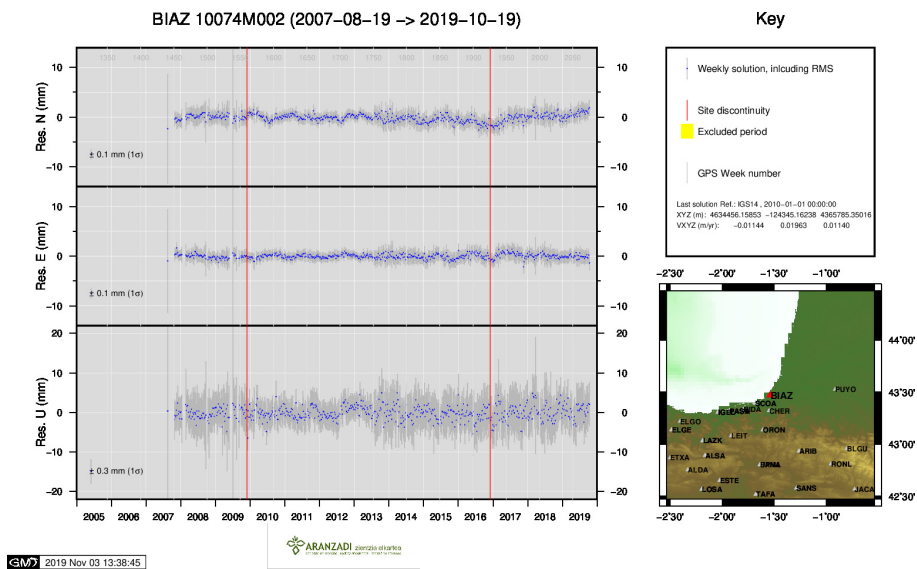
9 Cumulative Time Series

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

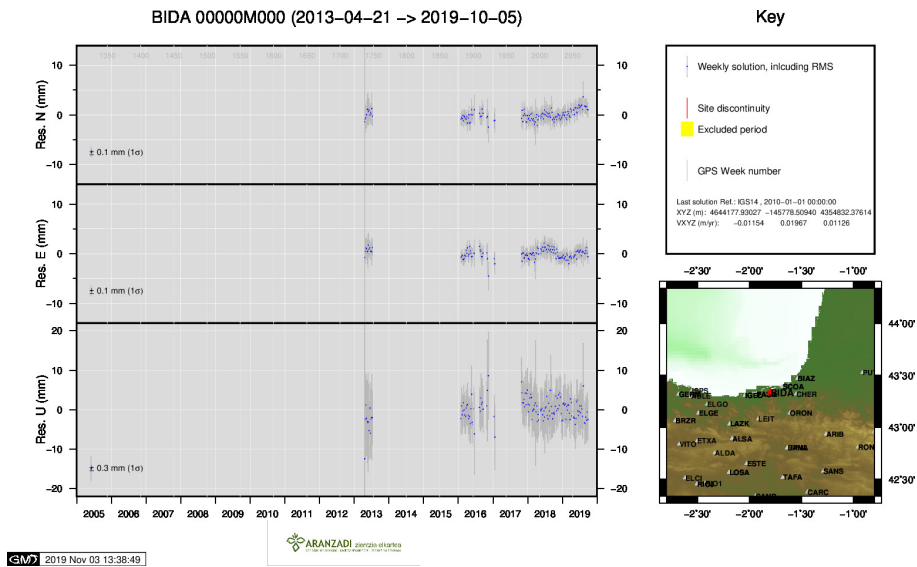




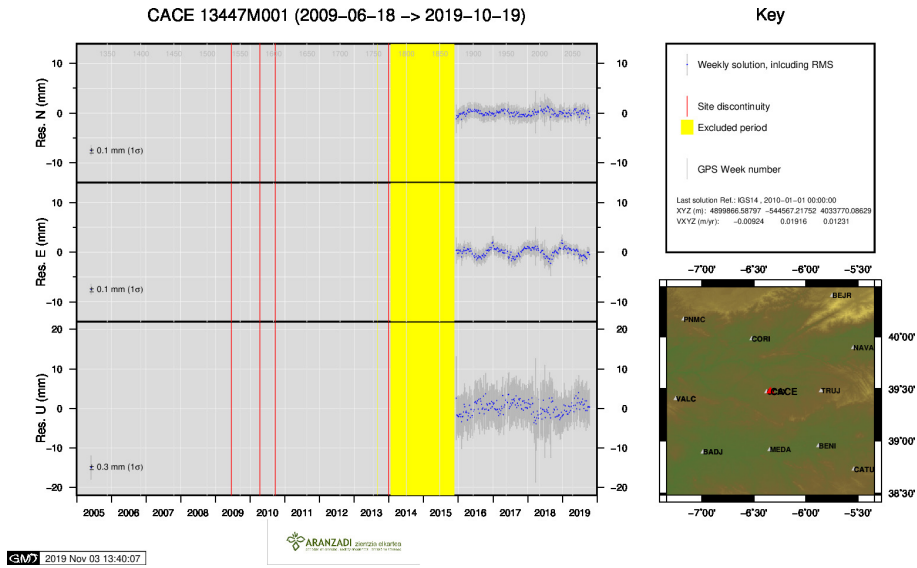
3) AMUR



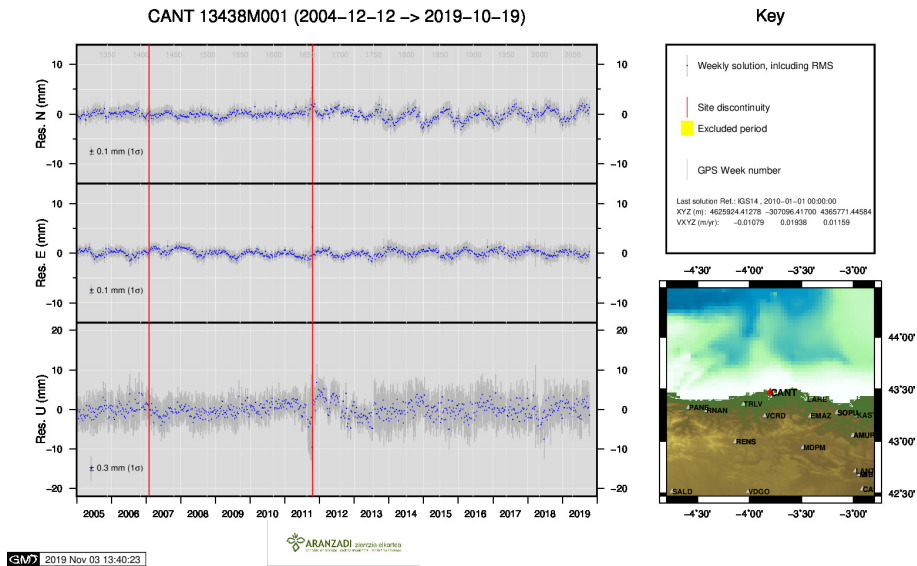
4) BIAZ



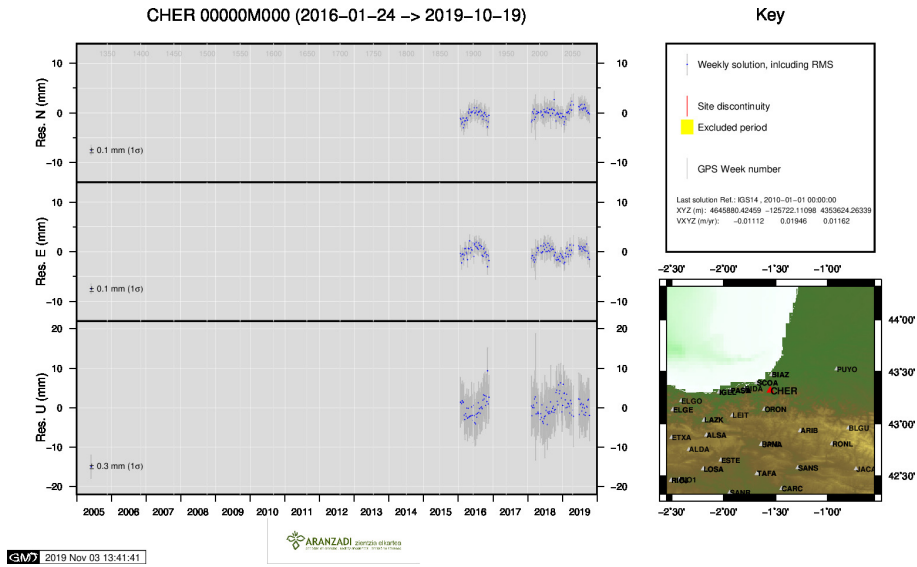
5) BIDA



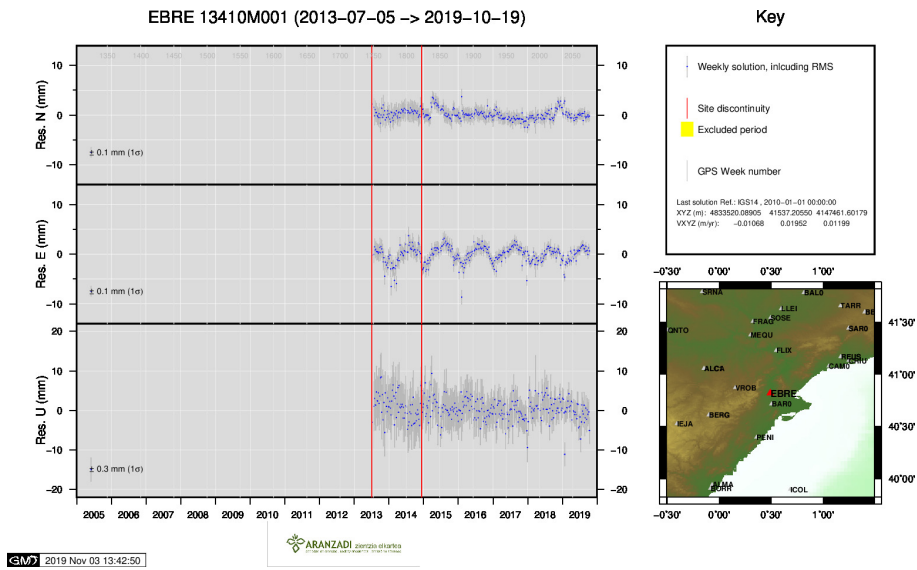
6) CACE



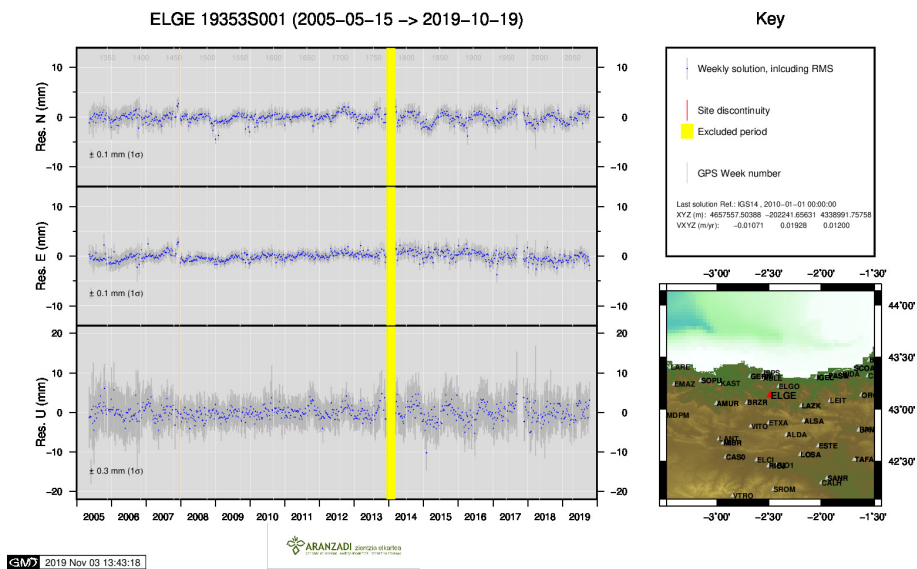
7) CANT



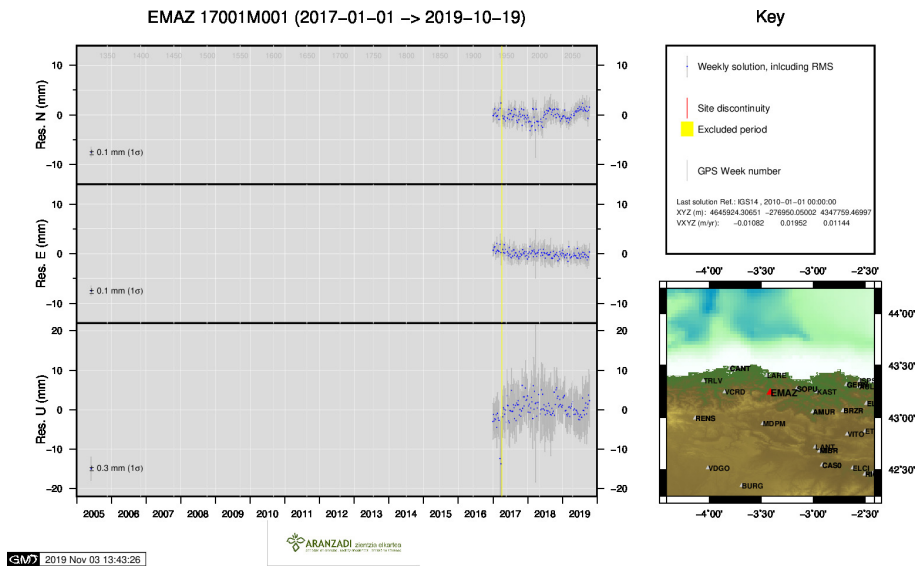
8) CHER



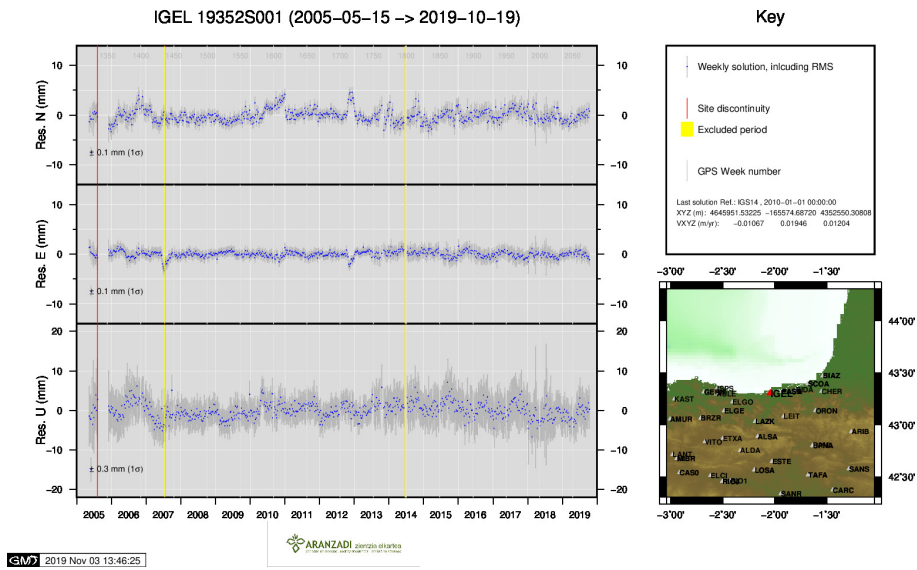
9) EBRE



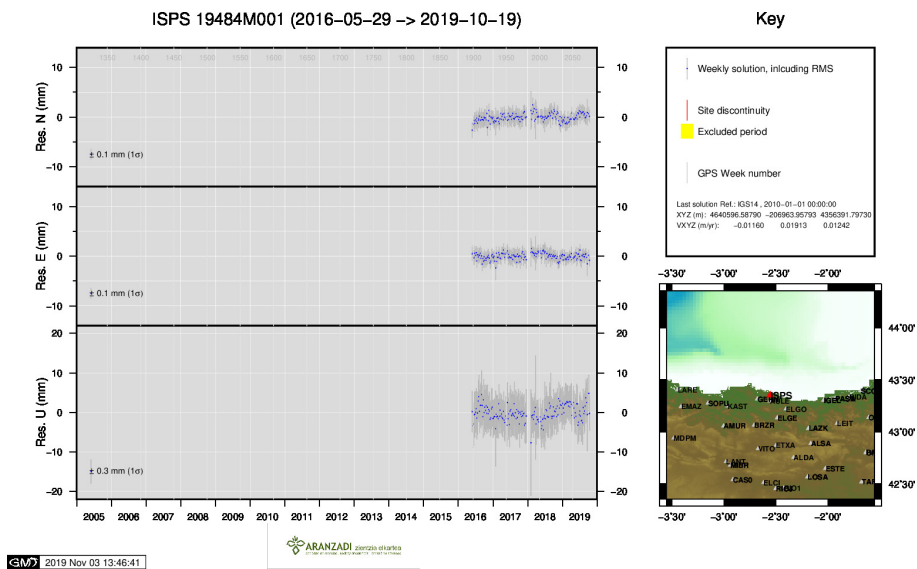
10) ELGE



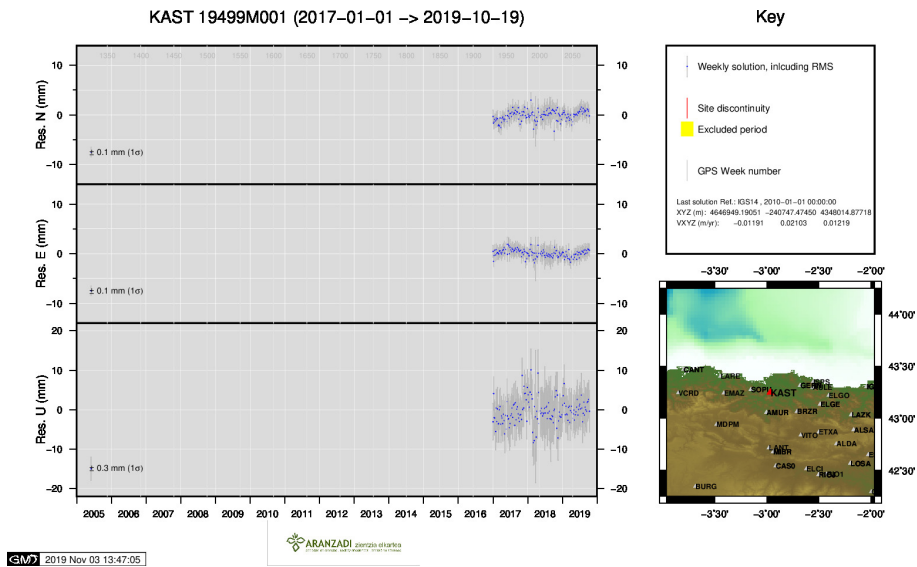
11) EMAZ



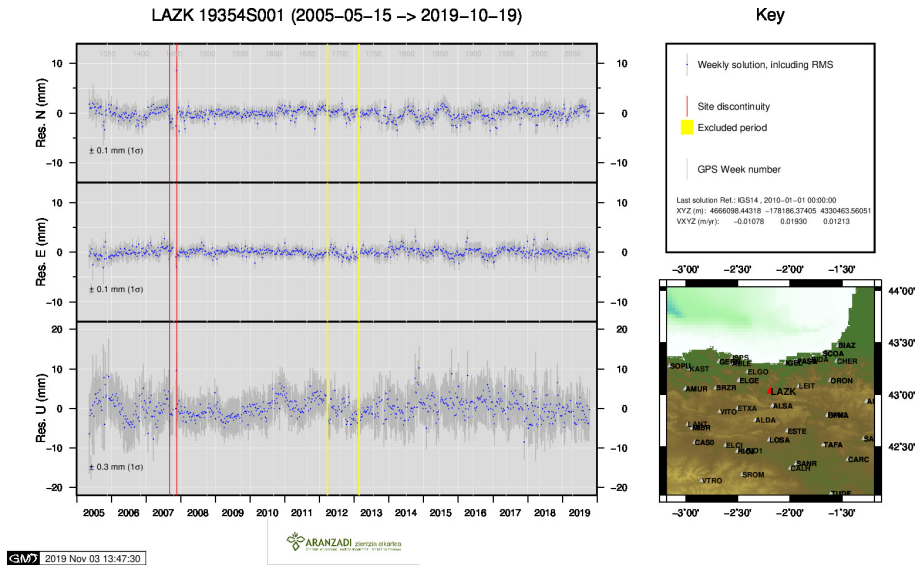
12) IGEL



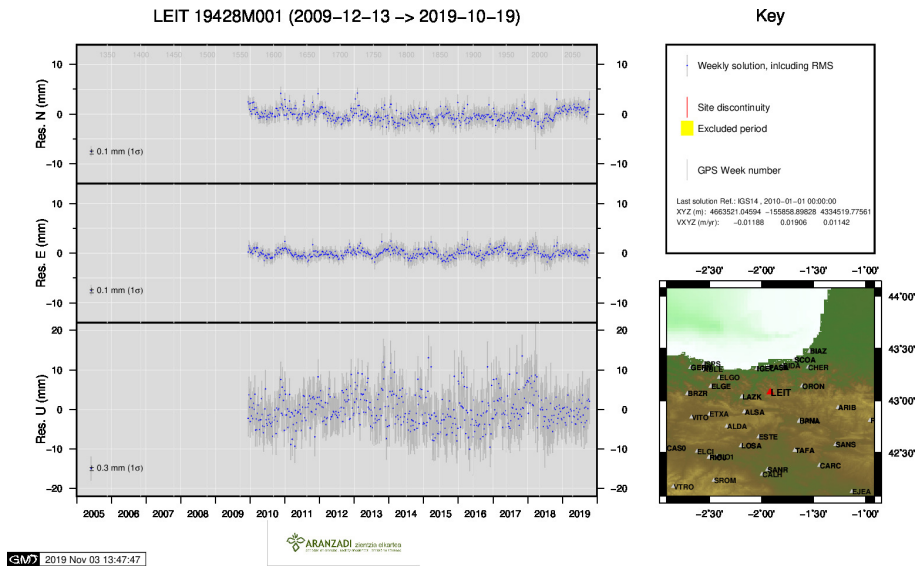
13) ISPS



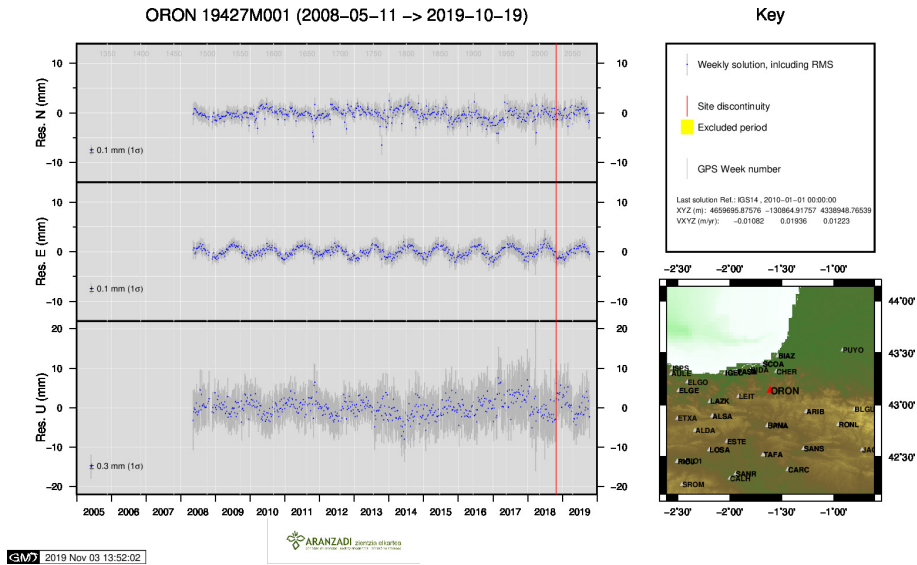
14) KAST



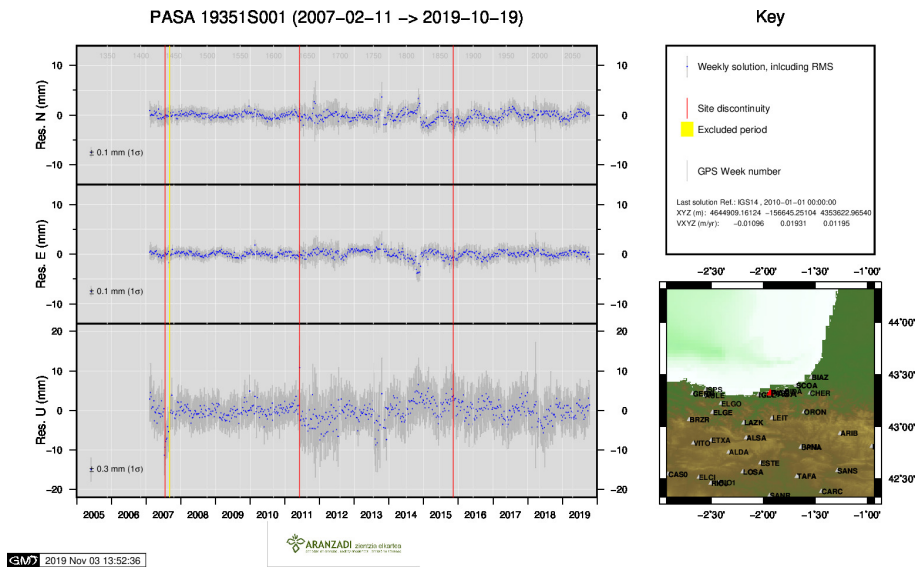
15) LAZK



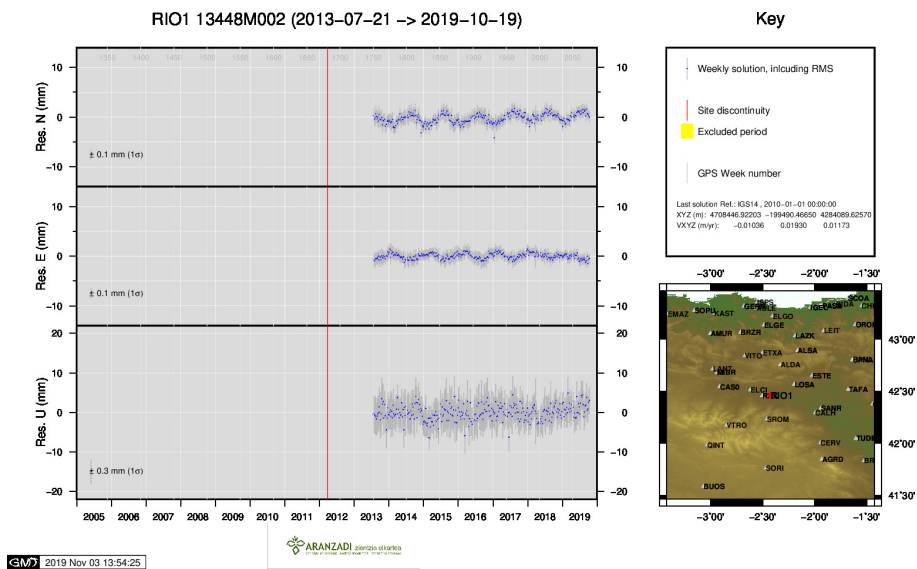
16) LEIT



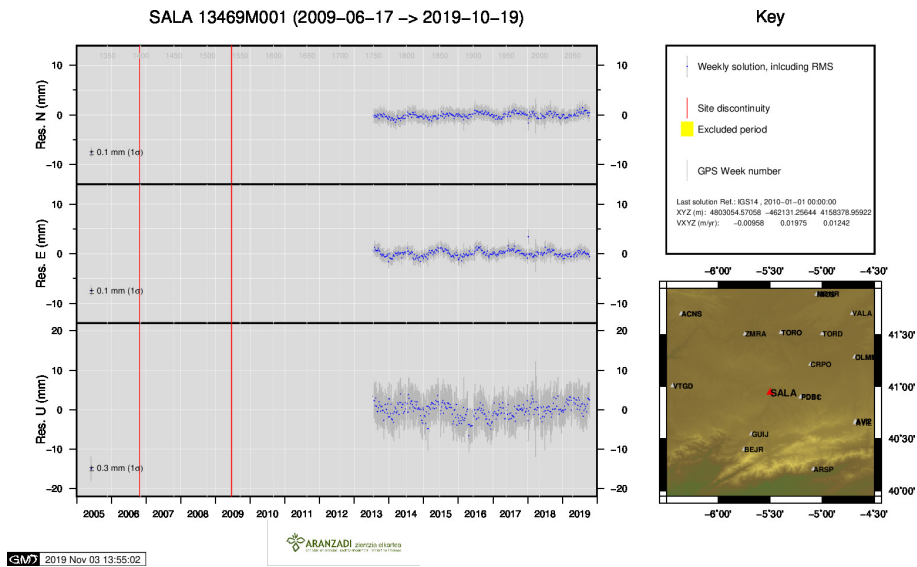
17) ORON



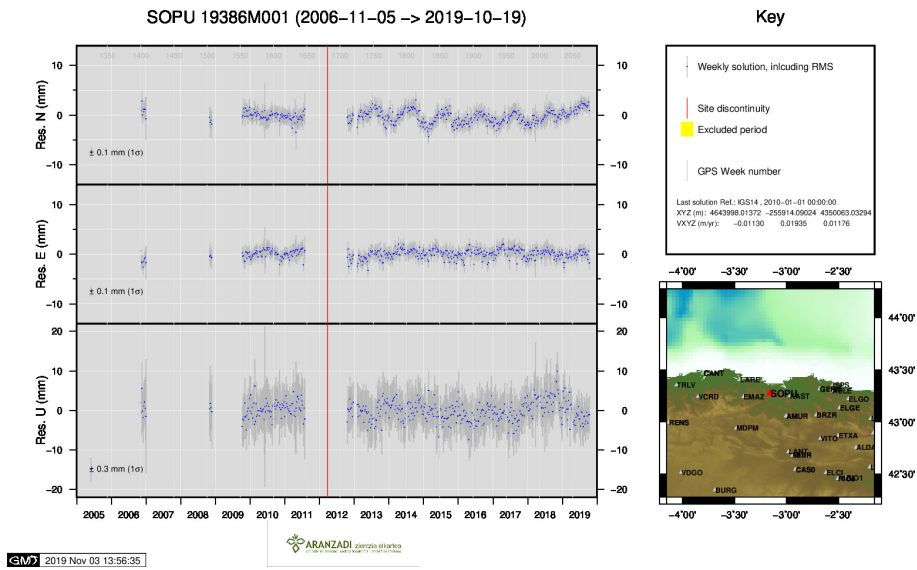
18) PASA



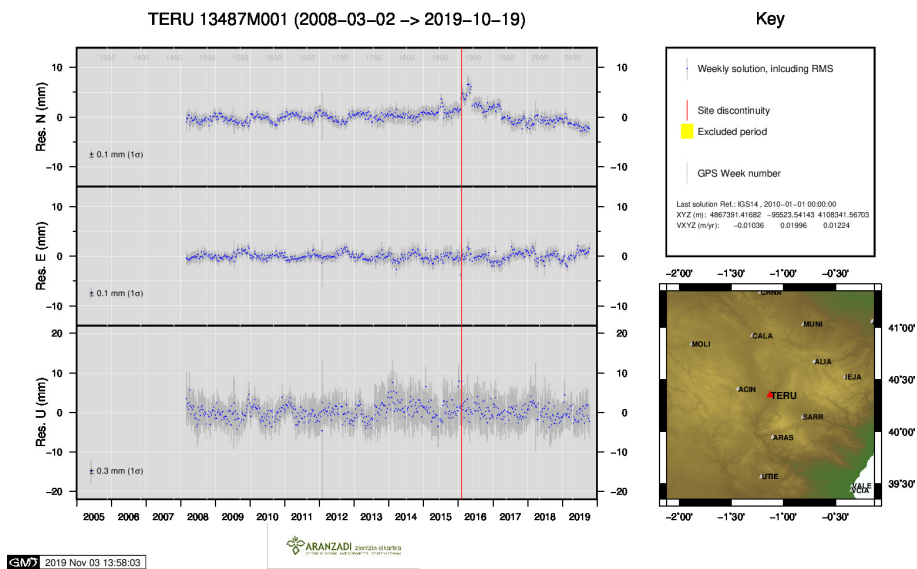
19) RIO1



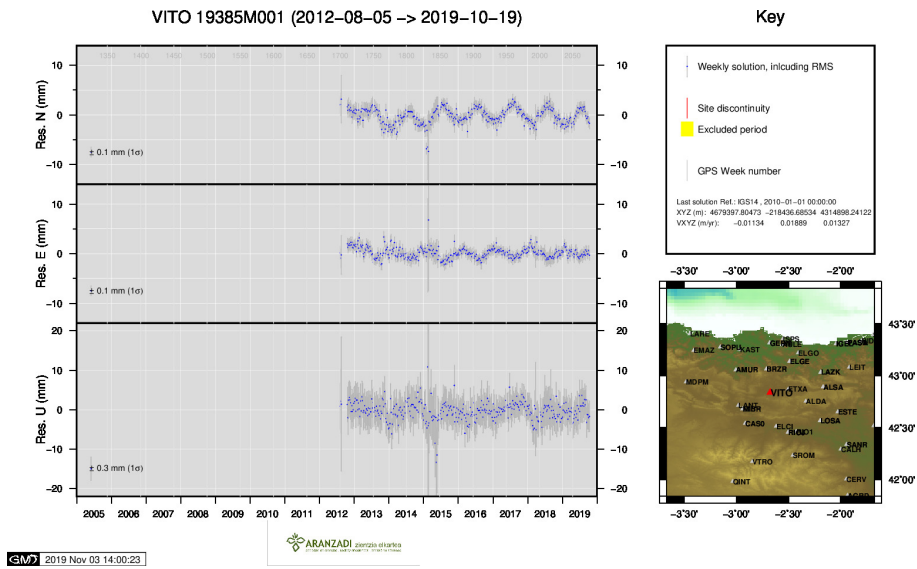
20) SALA



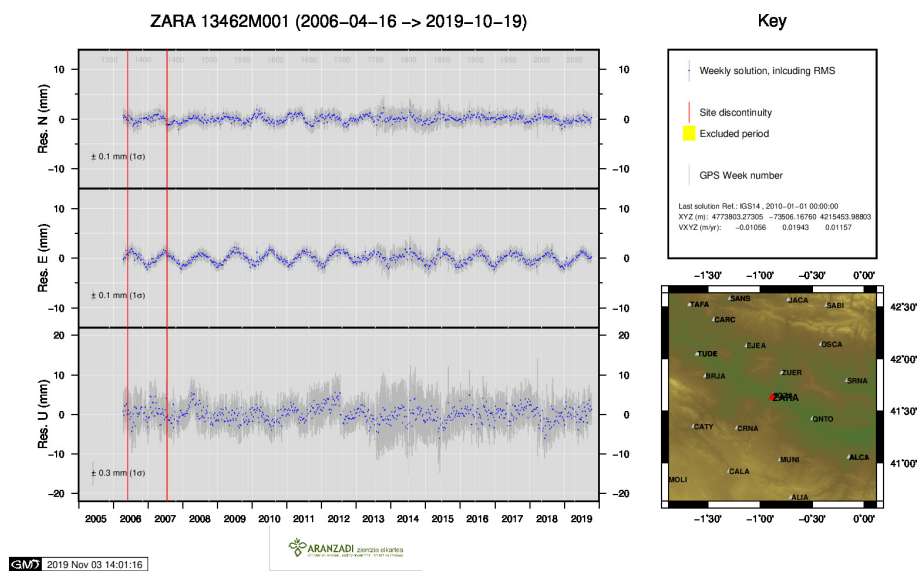
21) SOPU



22) TERU



23) VITO



24) ZARA