

ARA-DAC Weekly Analysis Result: 2135 (GFA)

Technical Report

GPS Week: 2135 (GFA)

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

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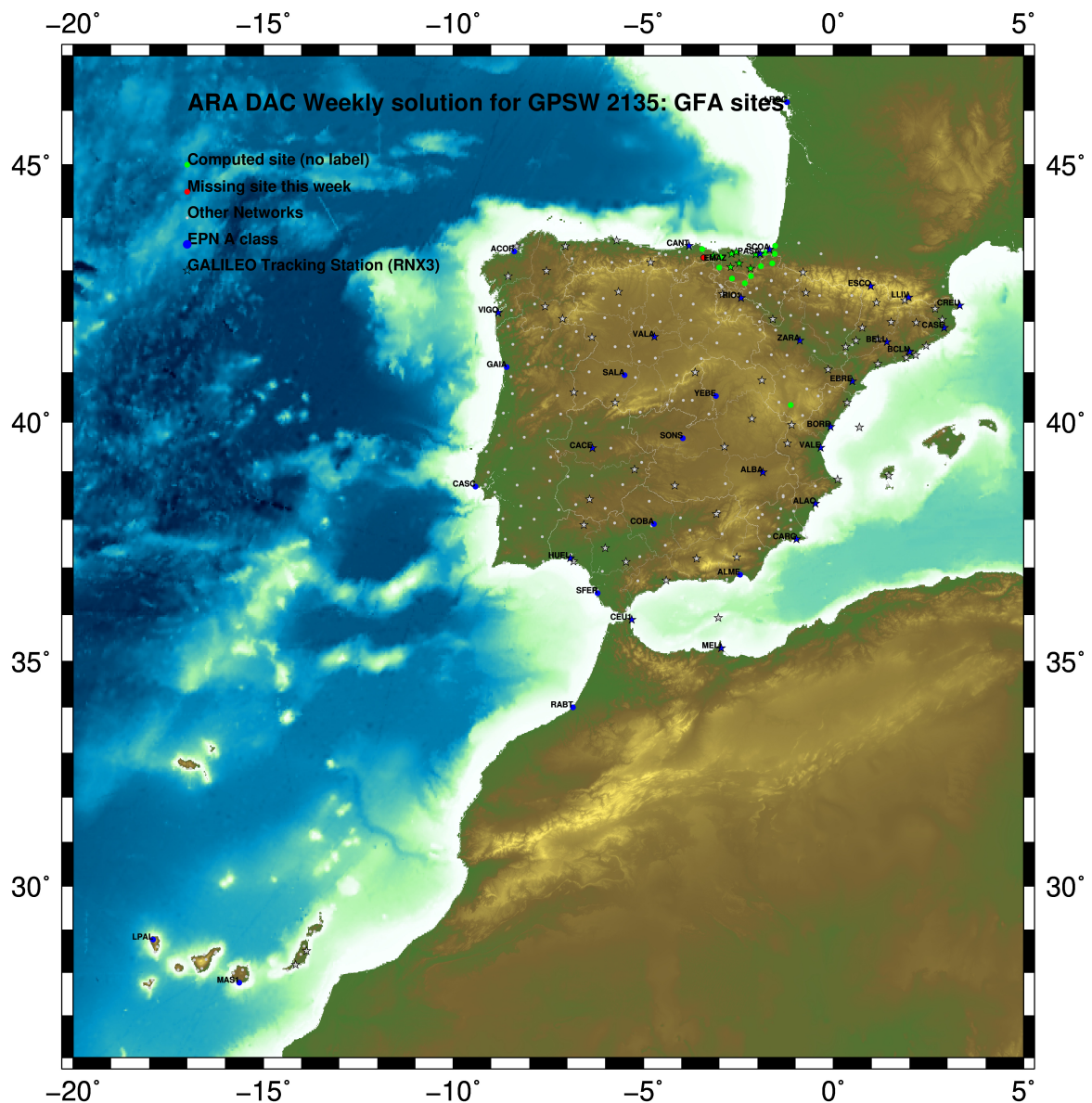
Report generated on 2020/12/27 at 13:58:10



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 Dec 27 13:58:00

Fig.1: Computed Sites for GPS Week2135 (GFA)

3 Main Computation Parameters

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

- Preprocessing: Independent baselines are defined by the criterion of maximum common observations. Cycle slips are fixed with the MAUPRP program, analysing triple phase differences for each independent baseline. If MAUPRP does not fix all slips for one station, that station is edited out.
- Basic Observable : Carrier phase, L_1 and L_2 ; a priori sigma of single differences: 0.002 m.
 - sampling (for ambiguity resolution): 30 s
 - sampling (for final processing): 180 s
 - Systems: GPS+GLONASS observations are used (Galileo also used if available from GPSW 1986 on)
- Modelled observable: Double differences of carrier phase using different combinations based on the distance.
- Ground antenna phase center calibrations: Group APCV used from the PCV_COD.I14 file and individual calibrations from EPNC_14.ATX. EPN_A class sites (CRD + VEL) IGB14 used to define the reference frame (from GPSW 1934). If individual calibrations, other from these, are available, they are also included in the analysis.
- Troposphere:
 - 3 deg elev. cutoff; elevation dependent weighting
 - VMF1 mapping function. ZPD parameters are estimated using the VMF1 mapping function.
 - CHENHER gradient estimation model.
- Ionosphere: no a priori model, ionospheric effect almost removed by iono free combination.
- Ocean Loading: FES2004 (Scherneck).
- Atmosph. Loading: computed from a global grid using the GRDS1S2 program of Bernese 5.2.

4 Estimated Parameters

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

- Ambiguity: an advanced ambiguity resolution (AR) scheme is included:
 - Code-Based 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 IGB14

The Reference Frame considered in this section is IGB14, release C2115.

ARA LAC 2135 WEEK FINAL COMBINATION: PRECISE ORBITS 27-DEC-20 10:38

LOCAL GEODETIC DATUM: IGB14 EPOCH: 2020-12-09 12:00:00

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
4	ACOR 13434M001	4594489.54171	-678367.41208	4357066.29832	W
39	ALDA 19383M001	4687280.14604	-190876.53762	4308106.97476	A
50	ALSA 19419M001	4677250.81137	-176770.36533	4319079.89137	A
53	AMUR 19388M001	4661499.43308	-244591.22938	4332269.90613	A
100	BLAZ 10074M002	4634456.03177	-124344.94620	4365785.47846	A
101	BIDA 00000M000	4644177.80385	-145778.29394	4354832.50211	A
113	BRZR 19387M001	4662220.97329	-220769.87138	4333309.45870	A
100	CACE 13447M001	4899866.48574	-544567.00784	4033770.22095	W
111	CANT 13438M001	4625924.29513	-307096.20563	4365771.57217	W
154	CHER 00000M000	4645879.99937	-125721.88229	4353624.10239	A
156	CREU 13432M001	4715420.11092	273178.08924	4271946.85878	W
194	EBRE 13410M001	4833519.95932	41537.41447	4147461.72688	W
180	ELGE 19353S001	4657557.38166	-202241.44513	4338991.88410	A
209	GERN 19389M001	4642811.30603	-217222.89743	4353278.89885	A
235	IGEL 19352S001	4645951.40990	-165574.47505	4352550.43693	A
240	ISPS 19484M001	4640596.45888	-206963.74812	4356391.93167	A
245	KAST 19499M001	4646949.05872	-240747.24604	4348015.00982	A
252	LARE 19440M001	4632831.93584	-279026.11440	4360314.44882	A
256	LAZK 19354S001	4666098.29684	-178186.16250	4330463.66997	A
261	LEIT 19428M001	4663520.91425	-155858.68927	4334519.90095	A
334	ORON 19427M001	4659695.75738	-130864.70884	4338948.90070	A
345	PAS2 19351S001	4644909.04086	-156645.03953	4353623.09645	A
464	PASA 19351S001	4644909.04085	-156645.03953	4353623.09645	W
522	RID1 13448M002	4708446.81090	-199490.25614	4284089.75787	W
527	SALA 13469M001	4803054.46539	-462131.04230	4158379.09609	W
535	SCDA 10088M002	4639940.47701	-136224.91343	4359552.42848	W
418	SOPU 19386M001	4643997.88996	-255913.87961	4350063.16200	A
443	TERU 13487M001	4867391.30967	-95523.32021	4108341.70063	A
493	VITO 19385M001	4679397.68649	-218436.47469	4314898.38893	A
708	YEBE 13420M001	4848724.54881	-261631.90191	4123094.34713	W
711	ZARA 13462M001	4773803.15052	-73505.95608	4215454.11547	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 2135 27-DEC-20 10:38

LOCAL GEODETIC DATUM: ETRF2000 EPOCH: 2020-12-09 12:00:00

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
4	ACOR 13434M001	4594489.86019	-678367.97918	4357065.86078	W
39	ALDA 19383M001	4687280.52090	-190877.11387	4308106.53613	A
50	ALSA 19419M001	4677251.18876	-176770.94044	4319079.45371	A
53	AMUR 19388M001	4661499.80310	-244591.80295	4332269.46786	A
100	BLAZ 10074M002	4634456.41899	-124345.51647	4365785.04486	A
101	BIDA 00000M000	4644178.18764	-145778.86534	4354832.06747	A
113	BRZR 19387M001	4662221.34631	-220770.44497	4333309.02168	A
100	CACE 13447M001	4899866.79711	-544567.60790	4033769.76084	W
111	CANT 13438M001	4625924.65991	-307096.77546	4365771.13693	W
154	CHER 00000M000	4645880.38553	-125722.45382	4353623.66787	A
156	CREU 13432M001	4715420.54004	273177.51153	4271946.42371	W
194	EBRE 13410M001	4833520.35098	41536.82307	4147461.27953	W
180	ELGE 19353S001	4657557.75737	-202242.01816	4338991.44768	A
209	GERN 19389M001	4642811.68094	-217223.46888	4353278.46341	A
235	IGEL 19352S001	4645951.79110	-165575.04670	4352550.00190	A
240	ISPS 19484M001	4640596.83527	-206964.31930	4356391.49654	A
245	KAST 19499M001	4646949.43036	-240747.81801	4348014.57376	A
252	LARE 19440M001	4632832.30367	-279026.68492	4360314.01339	A
256	LAZK 19354S001	4666098.67488	-178186.73639	4330463.23318	A
261	LEIT 19428M001	4663521.29533	-155859.26282	4334519.46465	A
334	ORON 19427M001	4659696.14185	-130865.28189	4338948.46502	A
345	PAS2 19351S001	4644909.42323	-156645.61104	4353622.66161	A
464	PASA 19351S001	4644909.42322	-156645.61104	4353622.66161	W
522	RID1 13448M002	4708447.18295	-199490.83471	4284089.31744	W
527	SALA 13469M001	4803054.79600	-462131.63177	4158378.64477	W
535	SCDA 10088M002	4639940.86232	-136225.48434	4359551.99430	W
418	SOPU 19386M001	4643998.25988	-255914.45129	4350062.72598	A
443	TERU 13487M001	4867391.68066	-95523.91573	4108341.24886	A
493	VITO 19385M001	4679398.05846	-218437.05015	4314897.95057	A
708	YEBE 13420M001	4848724.90149	-261632.49587	4123093.89475	W
711	ZARA 13462M001	4773803.53303	-73506.54139	4215453.67144	W

5.3 ETRF2014 (ETRS89) Coordinates

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

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ETRF2014 FINAL COORD. wk 2135                                27-DEC-20 10:38
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LOCAL GEODETIC DATUM: ETRF2014          EPOCH: 2020-12-09 12:00:00
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
4  ACRD 13434M001         4594489.81910    -678368.01727   4357065.91160    W
39 ALDA 19383M001         4687280.47753    -190877.15323   4308106.58682    A
50 ALSA 19419M001         4677251.14544    -176770.97989   4319079.50444    A
53 AMUR 19388M001         4661499.76015    -244591.84223   4332269.51860    A
100 BIAZ 10074M002         4634456.37593    -124345.55627   4365785.09574    A
101 BIDA 00000M000         4644178.14456    -145778.90503   4354832.11831    A
113 BRZR 19387M001         4662221.30329    -220770.48433   4333309.07243    A
100 CACE 13447M001         4899866.75250    -544567.64519   4033769.81088    W
111 CANT 13438M001         4625924.61750    -307096.81468   4365771.18775    W
154 CHER 00000M000         4645880.34237    -125722.49356   4353623.71871    A
156 CREU 13432M001         4715420.49477    273177.47075    4271946.47464    W
194 EBRE 13410M001         4833520.30531     41536.78354    4147461.32998    W
180 ELGE 19353S001         4657557.71433    -202242.05760   4338991.49846    A
209 GERN 19389M001         4642811.63809    -217223.50833   4353278.51422    A
235 IGEL 19352S001         4645951.74806    -165575.08632   4352550.05272    A
240 ISPS 19484M001         4640596.79242    -206964.35880   4356391.54736    A
245 KAST 19499M001         4646949.38754    -240747.85737   4348014.62454    A
252 LARE 19440M001         4632832.26111    -279026.72420   4360314.06420    A
256 LAZK 19354S001         4666098.63168    -178186.77588   4330463.28394    A
261 LEIT 19428M001         4663521.25208    -155859.30239   4334519.51543    A
334 ORON 19427M001         4659696.09856    -130865.32157   4338948.51582    A
345 PAS2 19351S001         4644909.38017    -156645.65069   4353622.71245    A
464 PASA 19351S001         4644909.38016    -156645.65069   4353622.71245    W
522 RIO1 13448M002         4708447.13939    -199490.87396   4284089.36808    W
527 SALA 13469M001         4803054.75222    -462131.66974   4158378.69506    W
535 SOA 10088M002         4639940.81924    -136225.52407   4359552.04515    W
418 SOPU 19386M001         4643998.21714    -255914.49061   4350062.77676    A
443 TERU 13487M001         4867391.63510    -95523.95467   4108341.29914    A
493 VITO 19385M001         4679398.01525    -218437.08945   4314898.00128    A
708 YEBE 13420M001         4848724.85665    -261632.53433   4123093.94499    W
711 ZARA 13462M001         4773803.48838    -73506.58079    4215453.72196    W

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6 Quality Control

6.1 Mean and Daily Repeatabilities

In this section, the mean and daily repeatabilities of the sites are shown. Repeatabilities refer to the IGB14 solution and are given with respect to the Local frame (North-East-Up).

ARA LAC 2135 WEEK FINAL COMBINATION: PRECISE ORBITS 27-DEC-20 10:38

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	7	XXXXXX	0.99	1.02	3.18
ALDA 19383M001	7	XXXXXX	1.06	1.58	3.80
ALSA 19419M001	7	XXXXXX	1.69	1.04	2.00
AMUR 19388M001	7	XXXXXX	1.96	0.69	2.38
BIAZ 10074M002	7	XXXXXX	1.10	1.24	1.39
BIDA 00000M000	7	XXXXXX	1.99	1.45	3.07
BRZR 19387M001	7	XXXXXX	2.10	1.24	2.88
CACE 13447M001	7	XXXXXX	1.01	1.23	1.72
CANT 13438M001	7	XXXXXX	0.59	0.61	2.03
CHER 00000M000	7	XXXXXX	1.43	1.57	4.34
CREU 13432M001	7	XXXXXX	1.49	0.77	3.45
EBRE 13410M001	7	XXXXXX	2.79	6.71	6.27
ELGE 19353S001	7	XXXXXX	1.35	0.74	1.95
GERN 19389M001	7	XXXXXX	0.40	1.50	3.27
IGEL 19352S001	7	XXXXXX	1.02	0.71	1.81
ISPS 19484M001	7	XXXXXX	0.39	0.70	2.93
KAST 19499M001	7	XXXXXX	1.43	1.15	3.49
LARE 19440M001	7	XXXXXX	0.84	0.95	2.80
LAZK 19354S001	7	XXXXXX	0.51	0.67	4.91
LEIT 19428M001	7	XXXXXX	1.14	1.75	7.46
ORON 19427M001	7	XXXXXX	0.89	1.67	3.34
PAS2 19351S001	7	XXXXXX	1.12	0.60	2.66
PASA 19351S001	7	XXXXXX	1.12	0.59	2.74
RI01 13448M002	7	XXXXXX	0.80	0.43	2.53
SALA 13469M001	7	XXXXXX	0.73	0.56	1.71
SCOA 10088M002	7	XXXXXX	1.75	0.71	2.90
SOPU 19386M001	7	XXXXXX	1.34	1.67	2.45
TERU 13487M001	1	X	0.35	0.78	0.23
VITO 19385M001	7	XXXXXX	0.63	1.65	1.44
YEBE 13420M001	7	XXXXXX	0.71	0.92	3.23
ZARA 13462M001	7	XXXXXX	0.66	0.49	2.41

Comparison of individual solutions:

ACOR 13434M001	N	0.99	-1.64	0.58	0.22	0.49	0.36	1.26	0.93
ACOR 13434M001	E	1.02	0.06	1.06	0.26	1.07	-0.15	1.83	-0.73
ACOR 13434M001	U	3.18	1.75	0.25	1.80	5.87	2.23	-2.88	2.59
ALDA 19383M001	N	1.06	0.84	1.39	-0.76	0.45	-1.82	0.13	-0.13
ALDA 19383M001	E	1.58	1.89	2.24	1.10	0.01	0.64	-0.49	-2.14
ALDA 19383M001	U	3.80	-4.67	3.00	-4.22	1.43	5.63	1.44	-1.48
ALSA 19419M001	N	1.69	-0.66	-2.57	1.27	-0.35	0.14	-1.13	2.67
ALSA 19419M001	E	1.04	0.24	-0.90	1.76	0.42	1.26	-0.80	-0.27
ALSA 19419M001	U	2.00	2.77	-2.57	-1.67	1.08	2.23	0.18	-0.83
AMUR 19388M001	N	1.96	2.22	0.72	1.79	-0.80	-3.07	1.79	-1.01
AMUR 19388M001	E	0.69	0.11	-0.64	-0.29	-0.40	0.34	1.01	1.03
AMUR 19388M001	U	2.38	-0.76	-1.98	0.91	-4.16	-1.40	2.64	1.56
BIAZ 10074M002	N	1.10	0.95	0.91	-0.00	1.25	-0.83	-0.75	-1.64
BIAZ 10074M002	E	1.24	2.44	0.12	-0.38	1.56	0.19	-0.72	-0.39
BIAZ 10074M002	U	1.39	-2.36	-0.25	-1.17	0.57	0.09	2.09	-0.08
BIDA 00000M000	N	1.99	-0.37	2.13	1.38	1.78	-2.03	-3.15	-0.13
BIDA 00000M000	E	1.45	-1.76	0.03	-0.79	0.45	0.62	2.62	1.23
BIDA 00000M000	U	3.07	2.56	-1.36	-3.95	-3.91	0.11	3.70	1.89
BRZR 19387M001	N	2.10	2.36	1.36	2.53	0.84	-1.95	-2.70	-0.94
BRZR 19387M001	E	1.24	1.85	-0.21	-0.24	1.99	-0.94	0.29	-0.83
BRZR 19387M001	U	2.88	-1.22	-4.44	-0.68	-1.00	-0.90	4.77	1.90
CACE 13447M001	N	1.01	-0.68	-1.21	-0.43	0.11	-0.16	-0.79	1.83
CACE 13447M001	E	1.23	0.14	-0.72	-0.86	1.07	1.06	-1.30	1.98
CACE 13447M001	U	1.72	-0.07	2.19	2.41	0.63	-2.40	0.66	0.73
CANT 13438M001	N	0.59	-0.95	0.32	0.16	-0.23	-0.05	0.16	0.98
CANT 13438M001	E	0.61	-0.32	-0.25	-0.10	0.99	0.02	1.02	0.23
CANT 13438M001	U	2.03	-0.02	-2.64	2.24	-0.84	-3.15	-1.22	0.81
CHER 00000M000	N	1.43	0.02	-0.46	1.53	2.42	0.70	-1.65	-0.75
CHER 00000M000	E	1.57	0.46	-1.13	-0.61	3.18	1.26	0.27	1.07
CHER 00000M000	U	4.34	1.13	-0.35	-0.25	9.93	0.05	-3.28	1.52
CREU 13432M001	N	1.49	0.39	0.07	0.78	-0.79	0.59	1.54	-3.03
CREU 13432M001	E	0.77	-0.15	0.56	0.92	0.07	-1.18	0.93	-0.37
CREU 13432M001	U	3.45	-1.63	-1.27	2.16	-0.75	3.57	-3.95	5.80
EBRE 13410M001	N	2.79	-5.50	1.15	1.50	-1.16	1.97	1.65	2.26
EBRE 13410M001	E	6.71	10.74	3.03	0.29	4.28	-4.62	-6.90	-7.62
EBRE 13410M001	U	6.27	1.05	9.51	-9.01	-4.06	0.17	6.68	-1.47
ELGE 19353S001	N	1.35	1.02	2.48	0.80	-0.68	-1.57	-0.25	-0.43
ELGE 19353S001	E	0.74	-0.75	0.50	0.45	-0.15	-0.35	1.29	0.70
ELGE 19353S001	U	1.95	-3.61	1.02	0.43	1.89	-1.63	0.99	-1.13
GERN 19389M001	N	0.40	0.46	0.13	0.60	0.11	-0.40	0.29	0.34
GERN 19389M001	E	1.50	-2.09	1.58	0.09	0.30	-0.62	2.49	-0.07
GERN 19389M001	U	3.27	-4.05	-1.17	2.38	-1.72	-4.16	3.66	2.66
IGEL 19352S001	N	1.02	1.37	1.47	0.51	-0.19	-1.30	-0.36	-0.21
IGEL 19352S001	E	0.71	-0.48	0.08	0.43	0.26	0.38	1.50	-0.34
IGEL 19352S001	U	1.81	-3.10	-2.00	-0.56	2.04	0.10	1.19	0.41
ISPS 19484M001	N	0.39	-0.21	0.11	0.25	-0.08	0.22	0.35	0.79
ISPS 19484M001	E	0.70	-0.55	0.69	0.17	-0.48	0.77	1.13	-0.03
ISPS 19484M001	U	2.93	-3.30	-1.31	3.73	-2.77	-2.30	3.44	0.23
KAST 19499M001	N	1.43	2.05	-0.67	1.30	-0.22	-0.53	-1.98	1.32
KAST 19499M001	E	1.15	1.01	-1.47	0.37	1.96	-0.42	-0.54	0.60
KAST 19499M001	U	3.49	-3.35	-0.54	3.03	-0.30	-5.12	-0.75	5.05
LARE 19440M001	N	0.84	1.44	0.13	0.82	-0.57	-0.65	-0.52	-0.66
LARE 19440M001	E	0.95	1.09	-0.54	1.05	1.23	-0.00	-1.15	0.06
LARE 19440M001	U	2.80	0.54	-3.50	1.52	1.62	-5.22	1.47	0.31
LAZK 19354S001	N	0.51	-0.64	0.11	0.57	-0.77	0.25	-0.31	0.26
LAZK 19354S001	E	0.67	0.74	0.01	-0.22	-0.40	1.37	0.07	0.30
LAZK 19354S001	U	4.91	1.98	0.49	3.57	5.30	2.05	-4.53	-8.65
LEIT 19428M001	N	1.14	0.51	-0.78	-0.40	-2.23	0.31	0.39	1.25
LEIT 19428M001	E	1.75	-1.88	1.20	0.10	-1.86	1.11	2.91	0.41
LEIT 19428M001	U	7.46	-3.73	5.18	0.02	-14.11	2.28	9.09	2.42

ORDN 19427M001	N	0.89	-0.55	-1.01	0.57	-1.11	-0.15	1.27	0.44
ORDN 19427M001	E	1.67	1.38	-1.40	1.28	1.22	1.58	-2.67	0.35
ORDN 19427M001	U	3.34	3.96	2.37	0.36	2.49	-0.47	-3.53	-5.15
PAS2 19351S001	N	1.12	1.72	1.15	0.73	-0.16	-1.25	-1.08	0.16
PAS2 19351S001	E	0.60	-0.05	-0.08	-0.02	1.10	0.05	0.96	-0.10
PAS2 19351S001	U	2.66	2.08	-2.67	0.62	-1.53	-4.18	3.26	0.38
PASA 19351S001	N	1.12	1.80	1.08	0.77	-0.24	-1.12	-1.07	0.03
PASA 19351S001	E	0.59	0.05	-0.24	-0.14	1.03	0.21	0.96	-0.04
PASA 19351S001	U	2.74	1.48	-2.43	0.89	-1.17	-4.84	3.30	0.77
RID1 13448M002	N	0.80	-0.98	-0.50	1.47	0.39	-0.45	-0.14	-0.32
RID1 13448M002	E	0.43	0.22	0.35	-0.05	0.28	0.91	-0.09	0.05
RID1 13448M002	U	2.53	-0.19	-1.56	-1.78	2.74	4.12	-0.24	-2.88
SALA 13469M001	N	0.73	-1.11	-0.02	0.79	-0.71	0.74	0.36	0.37
SALA 13469M001	E	0.56	0.06	-0.74	-0.55	0.15	0.08	0.36	0.95
SALA 13469M001	U	1.71	0.54	0.99	-1.31	1.89	-3.02	1.34	0.29
SCDA 10088M002	N	1.75	-3.02	-1.59	0.13	0.69	0.99	0.06	2.27
SCDA 10088M002	E	0.71	0.16	-0.57	0.54	1.40	0.06	-0.23	0.61
SCDA 10088M002	U	2.90	-5.26	1.14	0.62	-3.09	2.64	1.68	1.36
SOPU 19386M001	N	1.34	1.51	1.63	-0.23	0.08	-1.55	1.42	-1.19
SOPU 19386M001	E	1.67	-2.39	-0.18	-0.52	-0.31	2.20	1.99	1.33
SOPU 19386M001	U	2.45	1.28	0.82	-0.47	-2.24	-1.57	-4.04	3.09
TERU 13487M001	N	0.35							0.35
TERU 13487M001	E	0.78							-0.78
TERU 13487M001	U	0.23							-0.23
VITO 19385M001	N	0.63	0.05	0.57	-0.44	-0.84	-0.80	-0.41	0.61
VITO 19385M001	E	1.65	1.31	0.51	2.04	0.82	0.86	-2.51	-1.57
VITO 19385M001	U	1.44	0.55	-1.56	-0.03	-0.00	2.16	-2.26	0.08
YEBE 13420M001	N	0.71	-0.95	-0.19	0.20	-0.44	1.15	0.58	-0.45
YEBE 13420M001	E	0.92	-0.77	0.40	-1.28	0.21	-0.38	1.51	0.46
YEBE 13420M001	U	3.23	1.45	5.16	-4.68	-1.23	2.22	1.45	-1.80
ZARA 13462M001	N	0.66	-0.63	0.51	-1.17	-0.20	0.11	0.61	0.39
ZARA 13462M001	E	0.49	-0.37	-0.14	0.36	0.76	0.36	0.58	0.32
ZARA 13462M001	U	2.41	-0.57	-4.60	2.99	-1.31	-0.92	-0.27	-1.33

6.2 Datum verification

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

LOCAL GEODETIC DATUM: Igb14
RESIDUALS IN LOCAL SYSTEM (NORTH, EAST, UP)

NUM	NAME	FLG	RESIDUALS IN MILLIMETERS		
4	ACOR 13434M001	I W	0.71	-0.64	1.83
11	ALAC 13433M001	I W	1.24	-1.96	-3.23
14	ALBA 13452M001	I W	-0.01	-2.19	-5.08
20	ALME 13437M001	I W	-0.53	-0.35	6.72
43	BCLN 13412M001	I W	-0.22	0.20	3.40
48	BELL 13431M001	I W	-0.48	-3.47	0.38
67	BORR 13480M001	I W	-1.33	-3.26	-2.31
72	BRST 10004M004	I W	0.38	-0.48	2.90
100	CACE 13447M001	I W	2.15	0.16	4.05
111	CANT 13438M001	I W	1.44	-0.42	-0.30
112	CARG 19412M001	I W	1.30	-2.33	-1.29
116	CASC 13909S001	I W	0.33	1.15	1.19
117	CASE 13494M001	I W	-1.11	-0.67	1.91
123	CEU1 13449M002	I W	-1.77	3.55	2.15
137	COBA 13453M001	I W	0.09	0.63	-2.41
156	CREU 13432M001	I W	1.08	-1.01	-0.81
194	EBRE 13410M001	I W	-2.22	5.81	12.54
212	ESCO 13435M001	I W	-0.86	-1.02	-8.88
229	GAIA 13902M001	I W	-1.18	1.60	1.36
291	HUEL 13451M001	I W	-0.85	2.08	0.50
365	LLIV 13436M001	I W	0.11	0.49	7.05
370	LPAL 81701M001	I W	-1.46	1.09	-0.82
372	LROC 10023M001	I W	-0.12	1.13	-1.26
395	MAS1 31303M002	I W	1.48	-0.87	-1.54
406	MELI 19379M001	I W	0.80	3.46	5.36
464	PASA 19351S001	I W	-0.37	-0.53	-4.11
505	RABT 35001M002	I W	0.36	-0.81	-8.33
522	RID1 13448M002	I W	-0.60	-0.22	-6.72
527	SALA 13469M001	I W	0.76	0.59	-1.74
535	SCOA 10088M002	I W	0.02	-0.68	1.14
543	SFER 13402M004	I W	1.49	-1.54	1.42
566	SONS 13446M001	I W	1.40	0.95	-3.96
664	VALA 13463M002	I W	-0.03	2.09	0.79
668	VALE 13439M001	I W	1.77	-0.88	-1.84
679	VIGO 13450M001	I W	-0.28	1.65	0.63
708	YEBE 13420M001	I W	0.01	0.31	4.03
711	ZARA 13462M001	I W	0.77	0.02	-3.21
720	ZIMM 14001M004	I W	-4.27	-3.64	-1.53
	RMS / COMPONENT		1.26	1.92	4.20
	MEAN		0.00	0.00	0.00
	MIN		-4.27	-3.64	-8.88
	MAX		2.15	5.81	12.54

NUMBER OF PARAMETERS : 3
NUMBER OF COORDINATES : 114
RMS OF TRANSFORMATION : 2.76 MM

BARYCENTER COORDINATES:

LATITUDE : 40 8 17.01
LONGITUDE : - 3 31 8.57
HEIGHT : -30.049 KM

PARAMETERS:

TRANSLATION IN N : 0.00 +- 0.45 MM
TRANSLATION IN E : 0.00 +- 0.45 MM
TRANSLATION IN U : -0.00 +- 0.45 MM

6.3 Adjustment Statistics

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

```
* STATISTICAL PARAMETER-----VALUE(S)-----
NUMBER OF OBSERVATIONS          17971882
NUMBER OF UNKNOWN               214371
NUMBER OF DEGREES OF FREEDOM    17757511
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)      180
VARIANCE FACTOR                  1.961298627188582

Helmert Transformation Parameters With Respect to Combined Solution:
-----
Sol  Rms (m)      Translation (m)      Rotation (")
      X          Y          Z          X          Y          Z      Scale (ppm)
-----
  1  0.00239     0.0177  0.0011 -0.0164  0.0001  0.0008  0.0001  -0.00035
  2  0.00229     0.0158  0.0142 -0.0158 -0.0002  0.0007  0.0005  -0.00027
  3  0.00242     -0.0103 -0.0064  0.0045  0.0001 -0.0003 -0.0002  0.00086
  4  0.00241     -0.0146 -0.0080  0.0093  0.0002 -0.0005 -0.0002  0.00083
  5  0.00271     0.0133  0.0271 -0.0138 -0.0004  0.0006  0.0009  -0.00002
  6  0.00566     0.0034  0.0132 -0.0017 -0.0003  0.0001  0.0003  -0.00009
  7  0.00325     0.0072 -0.0007 -0.0083  0.0000  0.0004  0.0000  -0.00008
```

```
Statistics of individual solutions:
-----
File  RMS (m)      DOF  Chi**2/DOF  #Observations authentic / pseudo  #Parameters explicit / implicit / singular
-----
  1  0.00128     2584881  1.64          2615023      3          963      29182      0
  2  0.00138     2584433  1.92          2615632      3          960      30242      0
  3  0.00140     2602151  1.95          2633354      3          951      30255      0
  4  0.00134     2548293  1.80          2579270      3          957      30023      0
  5  0.00141     2475556  1.98          2507211      3          939      30719      0
  6  0.00150     2425422  2.26          2458672      3          936      32317      0
  7  0.00144     2531135  2.06          2562720      3          936      30652      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 20:341:00000 20:347:86370 LEICA GR50      -----
ALDA  A  1 P 20:341:00000 20:347:86370 LEICA GR10      -----
ALSA  A  1 P 20:341:00000 20:347:86370 LEICA GR50      -----
AMUR  A  1 P 20:341:00000 20:347:86370 LEICA GR10      -----
BIAZ  A  1 P 20:341:00000 20:347:86370 SPECTRA SP90M   -----
BIDA  A  1 P 20:341:00000 20:347:86370 LEICA GR10      -----
BRZR  A  1 P 20:341:00000 20:347:86370 LEICA GR30      -----
CACE  A  1 P 20:341:00000 20:347:86370 TRIMBLE NETR9   -----
CANT  A  1 P 20:341:00000 20:347:86370 LEICA GR10      -----
CHER  A  1 P 20:341:00000 20:347:86370 LEICA GR30      -----
CREU  A  1 P 20:341:00000 20:347:86370 LEICA GR50      -----
EBRE  A  1 P 20:341:00000 20:347:86370 LEICA GR50      -----
ELGE  A  1 P 20:341:00000 20:347:86370 LEICA GR30      -----
GERN  A  1 P 20:341:00000 20:347:86370 LEICA GR30      -----
IGEL  A  1 P 20:341:00000 20:347:86370 LEICA GR30      -----
ISPS  A  1 P 20:341:00000 20:347:86370 TRIMBLE NETR9   -----
KAST  A  1 P 20:341:00000 20:347:86370 LEICA GR30      -----
LARE  A  1 P 20:341:00000 20:347:86370 LEICA GR50      -----
LAZK  A  1 P 20:341:00000 20:347:86370 LEICA GR30      -----
LEIT  A  1 P 20:341:00000 20:347:86370 LEICA GR50      -----
ORON  A  1 P 20:341:00000 20:347:86370 LEICA GR50      -----
PAS2  A  1 P 20:341:00030 20:347:86370 STONEX SC2200   -----
PASA  A  1 P 20:341:00000 20:347:86370 LEICA GR30      -----
RIO1  A  1 P 20:341:00000 20:347:86370 LEICA GR25      -----
SALA  A  1 P 20:341:00000 20:347:86370 LEICA GRX1200+GNSS -----
SCOA  A  1 P 20:341:00000 20:347:86370 LEICA GR25      -----
SOPU  A  1 P 20:341:00000 20:347:86370 LEICA GR30      -----
TERU  A  1 P 20:344:32400 20:344:86370 LEICA GRX1200GGPRO -----
VITO  A  1 P 20:341:00000 20:347:86370 LEICA GR10      -----
YEBE  A  1 P 20:341:00000 20:347:86370 TRIMBLE NETR9   -----
ZARA  A  1 P 20:341:00000 20:347:86370 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 20:341:00000 20:347:86370 LEIAT504      LEIS  -----
ALDA  A  1 P 20:341:00000 20:347:86370 LEIAS10      NONE  -----
ALSA  A  1 P 20:341:00000 20:347:86370 LEIAR10      NONE  -----
AMUR  A  1 P 20:341:00000 20:347:86370 LEIAS10      NONE  -----
BIAZ  A  1 P 20:341:00000 20:347:86370 LEIAR25      LEIT  -----
```

BIDA	A	1	P	20:341:00000	20:347:86370	LEIAS10	NONE	----
BRZR	A	1	P	20:341:00000	20:347:86370	LEIAS10	NONE	----
CACE	A	1	P	20:341:00000	20:347:86370	TRM29659.00	NONE	----
CANT	A	1	P	20:341:00000	20:347:86370	LEIAR25_R4	LEIT	25066
CHER	A	1	P	20:341:00000	20:347:86370	LEIAR10	NONE	----
CREU	A	1	P	20:341:00000	20:347:86370	LEIAR25_R4	NONE	26357
EBRE	A	1	P	20:341:00000	20:347:86370	LEIAR25_R4	NONE	26359
ELGE	A	1	P	20:341:00000	20:347:86370	LEIAR25_R4	LEIT	----
GERN	A	1	P	20:341:00000	20:347:86370	LEIAS10	NONE	----
IGEL	A	1	P	20:341:00000	20:347:86370	LEIAR20	LEIM	----
ISPS	A	1	P	20:341:00000	20:347:86370	TRM59900.00	SCIS	----
KAST	A	1	P	20:341:00000	20:347:86370	LEIAS10	NONE	----
LARE	A	1	P	20:341:00000	20:347:86370	LEIAR20	LEIM	----
LAZK	A	1	P	20:341:00000	20:347:86370	LEIAR25_R4	LEIT	----
LEIT	A	1	P	20:341:00000	20:347:86370	LEIAR10	NONE	----
ORDN	A	1	P	20:341:00000	20:347:86370	LEIAR10	NONE	----
PAS2	A	1	P	20:341:00030	20:347:86370	LEIAR20	LEIM	73034
PASA	A	1	P	20:341:00000	20:347:86370	LEIAR20	LEIM	73034
RIO1	A	1	P	20:341:00000	20:347:86370	LEIAR25_R4	LEIT	25138
SALA	A	1	P	20:341:00000	20:347:86370	LEIAR25	NONE	----
SCDA	A	1	P	20:341:00000	20:347:86370	TRM55971.00	NONE	----
SOPU	A	1	P	20:341:00000	20:347:86370	LEIAS10	NONE	----
TERU	A	1	P	20:344:32400	20:344:86370	LEIAT504GG	LEIS	----
VITO	A	1	P	20:341:00000	20:347:86370	LEIAS10	NONE	----
YEBE	A	1	P	20:341:00000	20:347:86370	TRM29659.00	NONE	----
ZARA	A	1	P	20:341:00000	20:347:86370	TRM29659.00	NONE	----

7.3 Eccentricities

*SITE	PT	SOLN	T	DATA_START_	DATA_END_	AXE	ARP->BENCHMARK(M)	UP_	NORTH_	EAST_
ACOR	A	1	P	20:341:00000	20:347:86370	UNE	3.0460	0.0000	0.0000	0.0000
ALDA	A	1	P	20:341:00000	20:347:86370	UNE	0.0000	0.0000	0.0000	0.0000
ALSA	A	1	P	20:341:00000	20:347:86370	UNE	0.0000	0.0000	0.0000	0.0000
AMUR	A	1	P	20:341:00000	20:347:86370	UNE	0.0000	0.0000	0.0000	0.0000
BIAZ	A	1	P	20:341:00000	20:347:86370	UNE	0.0000	0.0000	0.0000	0.0000
BIDA	A	1	P	20:341:00000	20:347:86370	UNE	0.0000	0.0000	0.0000	0.0000
BRZR	A	1	P	20:341:00000	20:347:86370	UNE	0.0771	0.0000	0.0000	0.0000
CACE	A	1	P	20:341:00000	20:347:86370	UNE	0.0600	0.0000	0.0000	0.0000
CANT	A	1	P	20:341:00000	20:347:86370	UNE	3.0490	0.0000	0.0000	0.0000
CHER	A	1	P	20:341:00000	20:347:86370	UNE	0.0000	0.0000	0.0000	0.0000
CREU	A	1	P	20:341:00000	20:347:86370	UNE	0.0770	0.0000	0.0000	0.0000
EBRE	A	1	P	20:341:00000	20:347:86370	UNE	0.0770	0.0000	0.0000	0.0000
ELGE	A	1	P	20:341:00000	20:347:86370	UNE	0.0000	0.0000	0.0000	0.0000
GERN	A	1	P	20:341:00000	20:347:86370	UNE	0.0771	0.0000	0.0000	0.0000
IGEL	A	1	P	20:341:00000	20:347:86370	UNE	0.0000	0.0000	0.0000	0.0000
ISPS	A	1	P	20:341:00000	20:347:86370	UNE	0.0350	0.0000	0.0000	0.0000
KAST	A	1	P	20:341:00000	20:347:86370	UNE	0.0350	0.0000	0.0000	0.0000
LARE	A	1	P	20:341:00000	20:347:86370	UNE	0.0000	0.0000	0.0000	0.0000
LAZK	A	1	P	20:341:00000	20:347:86370	UNE	0.0000	0.0000	0.0000	0.0000
LEIT	A	1	P	20:341:00000	20:347:86370	UNE	0.0000	0.0000	0.0000	0.0000
ORON	A	1	P	20:341:00000	20:347:86370	UNE	0.0000	0.0000	0.0000	0.0000
PAS2	A	1	P	20:341:00030	20:347:86370	UNE	0.0000	0.0000	0.0000	0.0000
PASA	A	1	P	20:341:00000	20:347:86370	UNE	0.0000	0.0000	0.0000	0.0000
RIO1	A	1	P	20:341:00000	20:347:86370	UNE	0.0606	0.0000	0.0000	0.0000
SALA	A	1	P	20:341:00000	20:347:86370	UNE	0.0600	0.0000	0.0000	0.0000
SCDA	A	1	P	20:341:00000	20:347:86370	UNE	0.0000	0.0000	0.0000	0.0000
SOPU	A	1	P	20:341:00000	20:347:86370	UNE	0.0771	0.0000	0.0000	0.0000
TERU	A	1	P	20:344:32400	20:344:86370	UNE	0.0600	0.0000	0.0000	0.0000
VITO	A	1	P	20:341:00000	20:347:86370	UNE	0.0000	0.0000	0.0000	0.0000
YEBE	A	1	P	20:341:00000	20:347:86370	UNE	0.0000	0.0000	0.0000	0.0000
ZARA	A	1	P	20:341:00000	20:347:86370	UNE	3.2590	0.0000	0.0000	0.0000

8 References

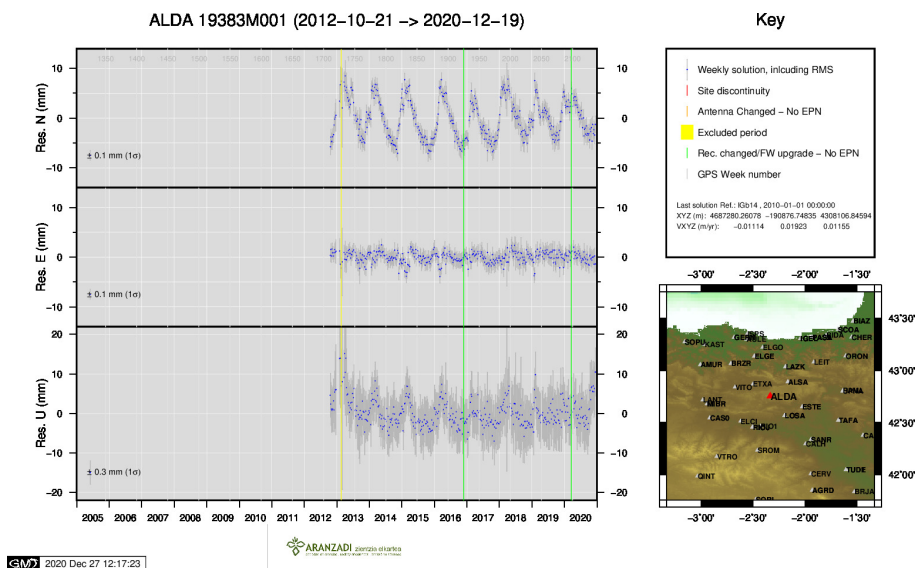
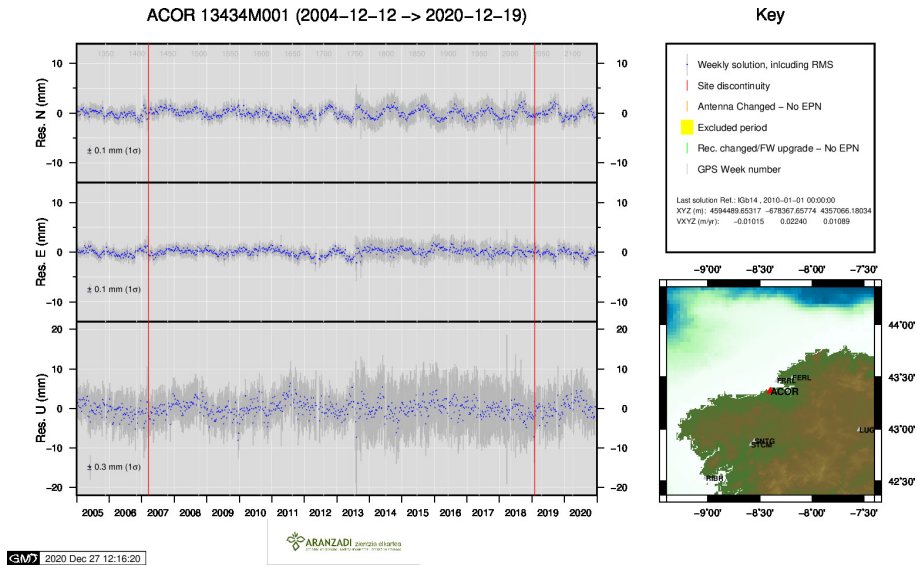
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign*. etrs89.ensg.ign.fr/memo-V8.pdf

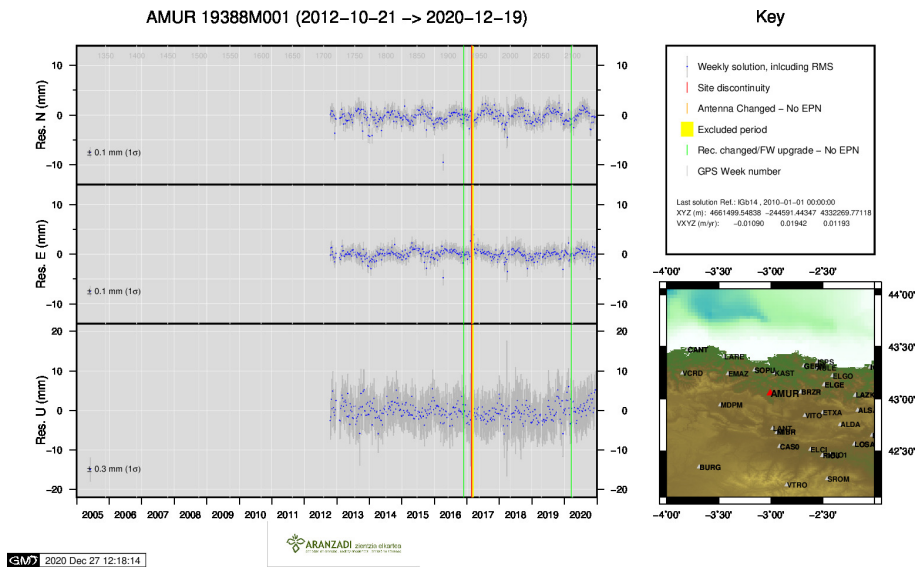
EPN Coordination Group and the EPN Central Bureau (2018): *Guidelines for the EPN Analysis Centres*. epncb.oma.be/documentation/guidelines/guidelines_analysis_centres.pdf

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

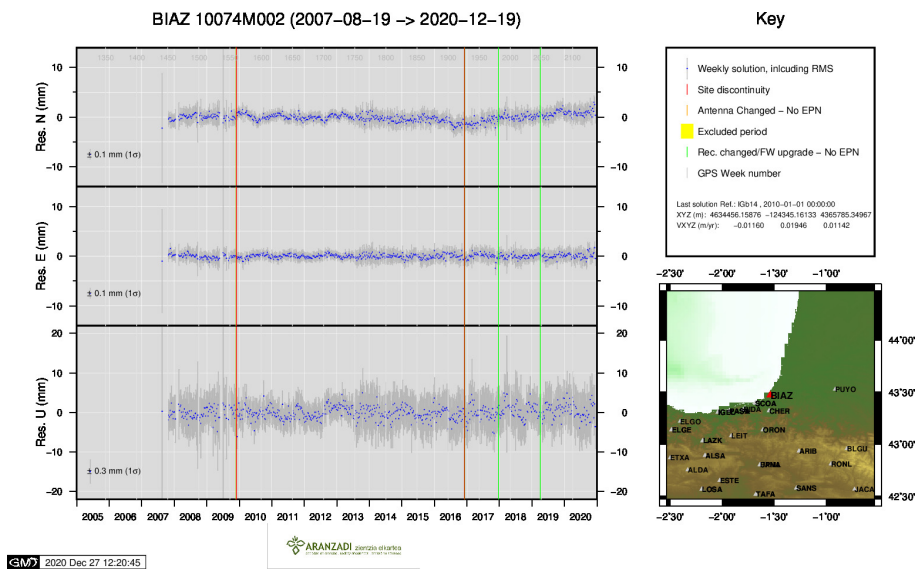
9 Cumulative Time Series

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

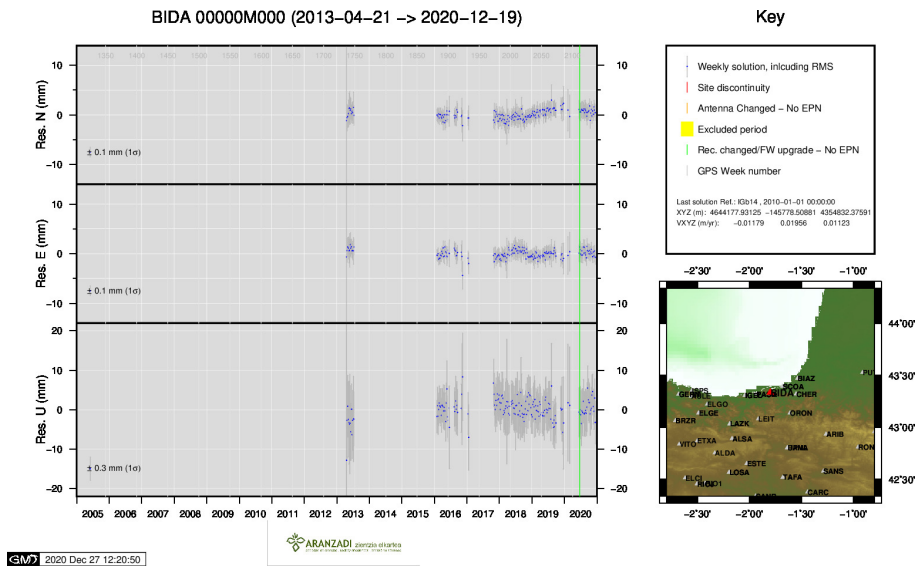




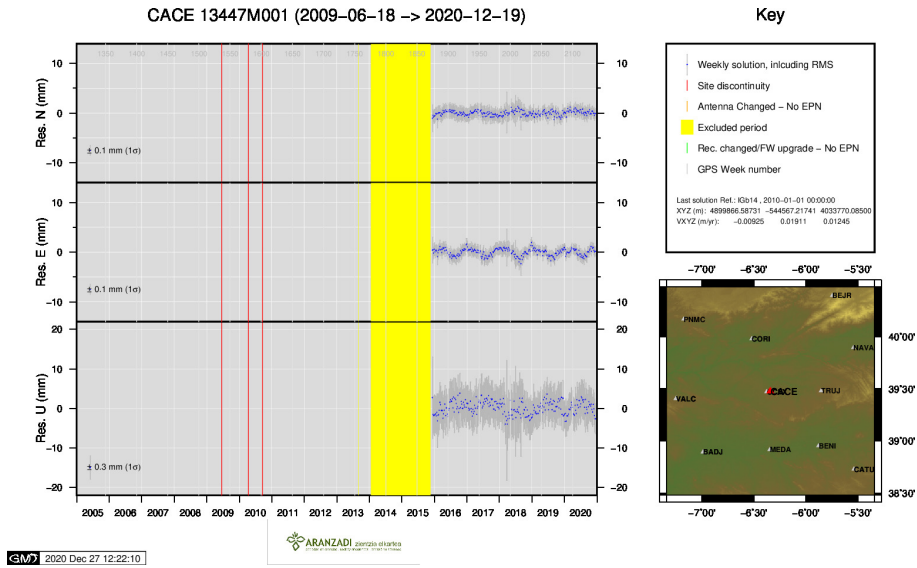
3) AMUR



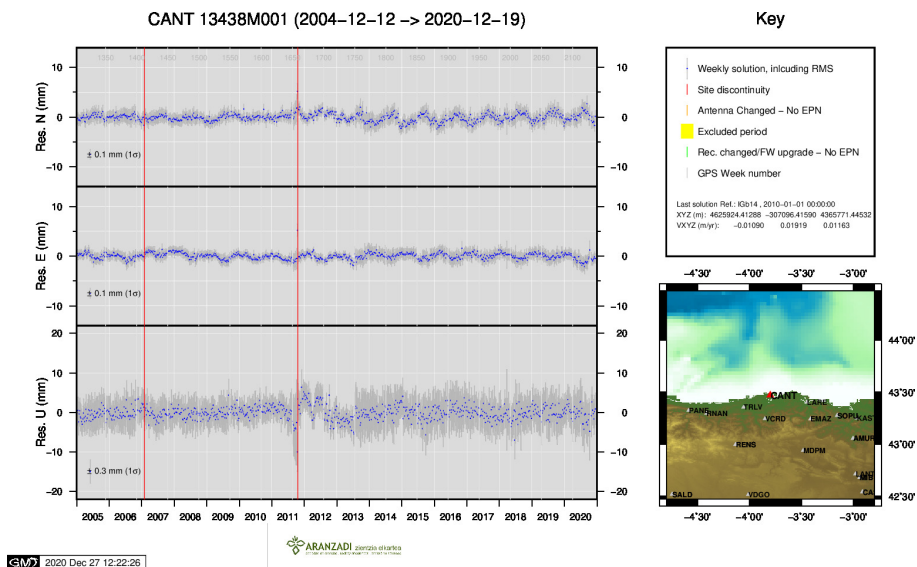
4) BIAZ



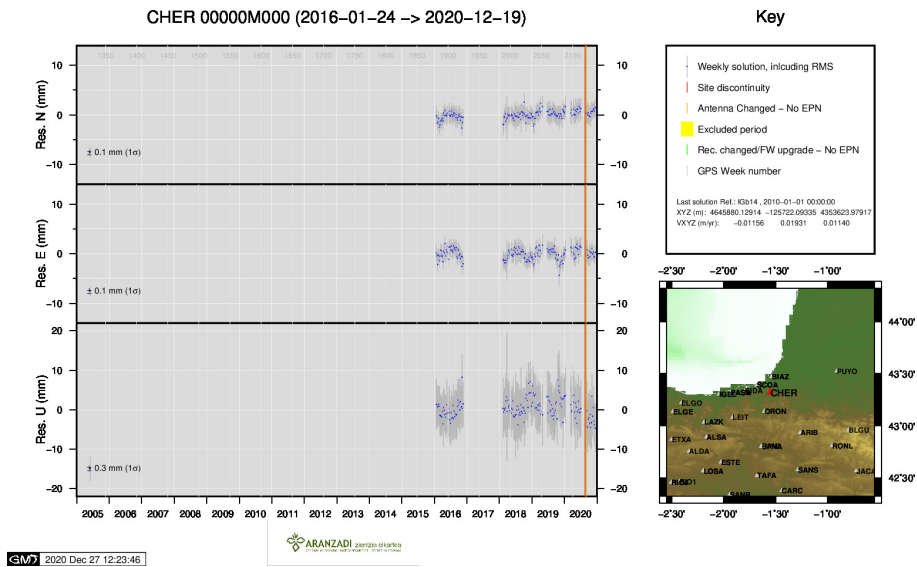
5) BIDA



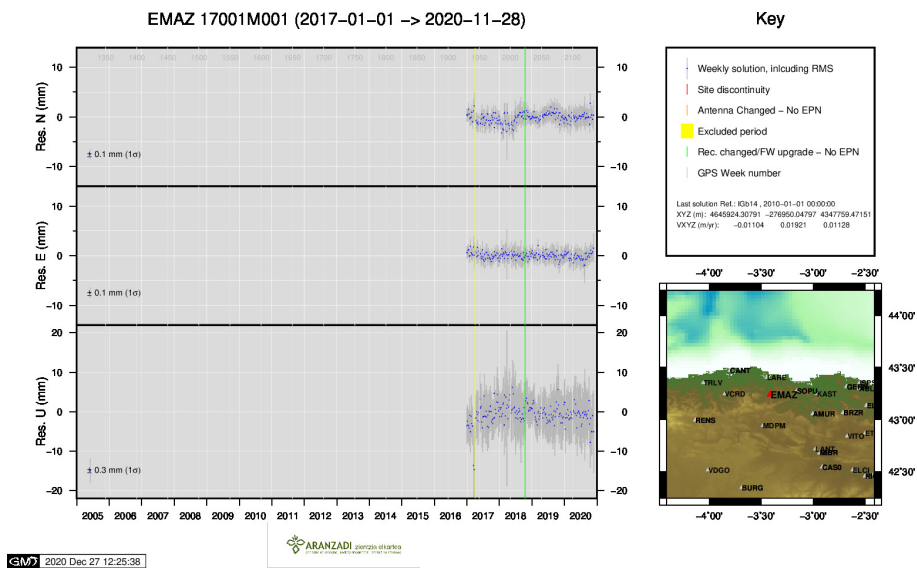
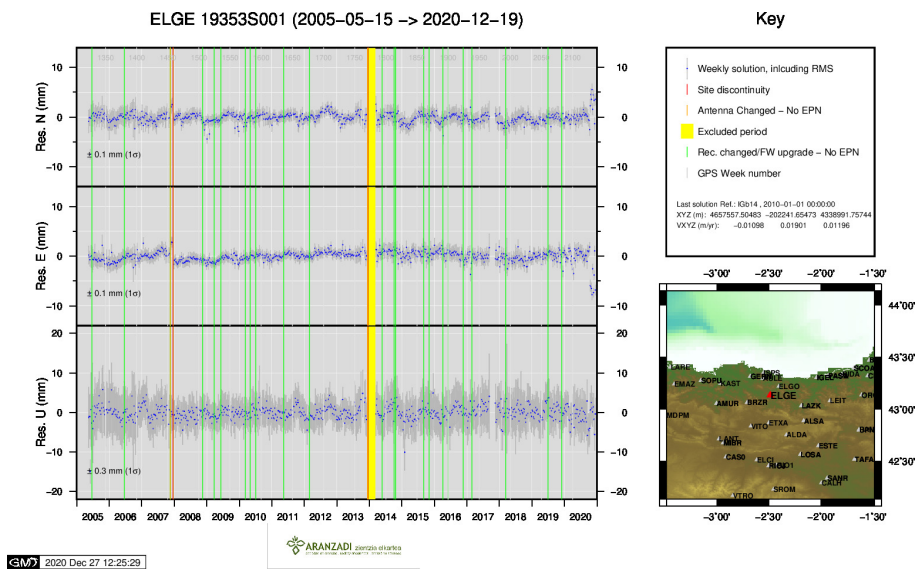
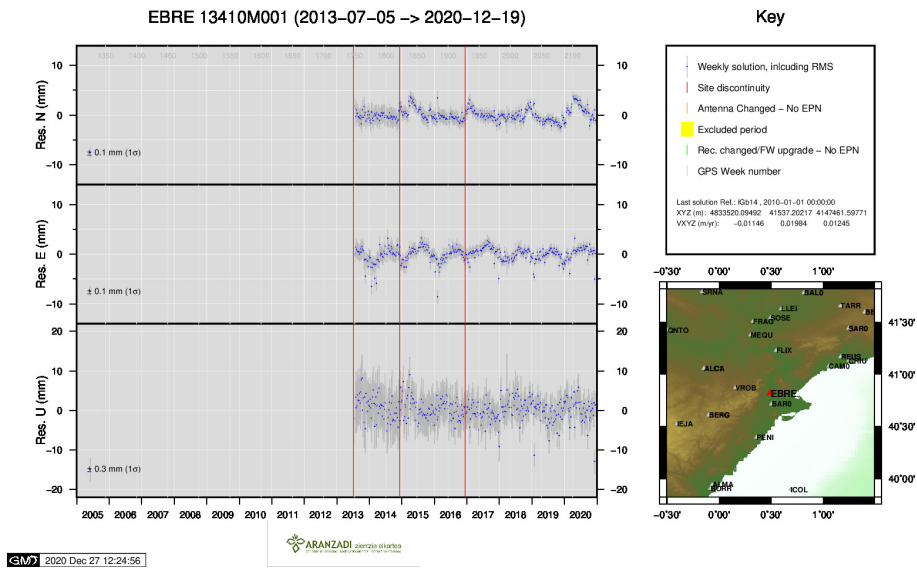
6) CACE

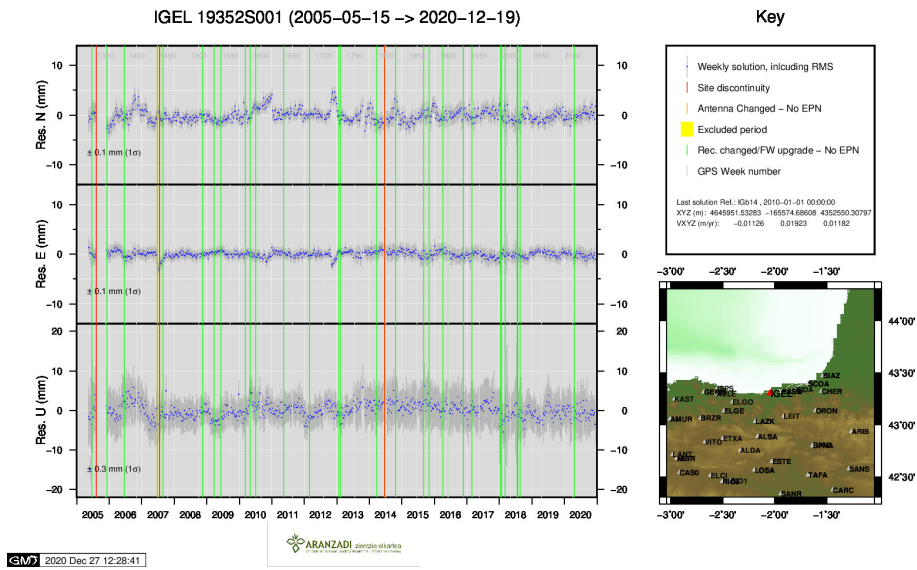


7) CANT

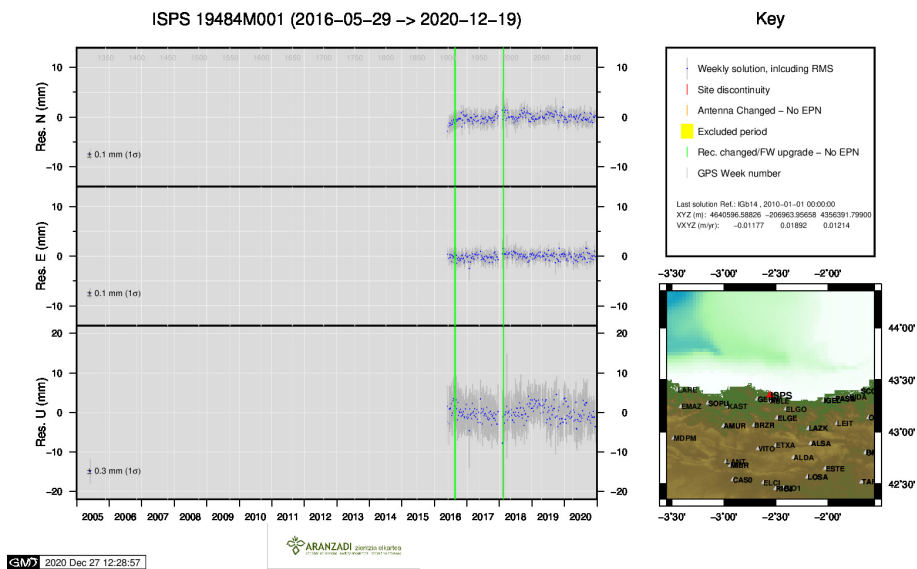


8) CHER

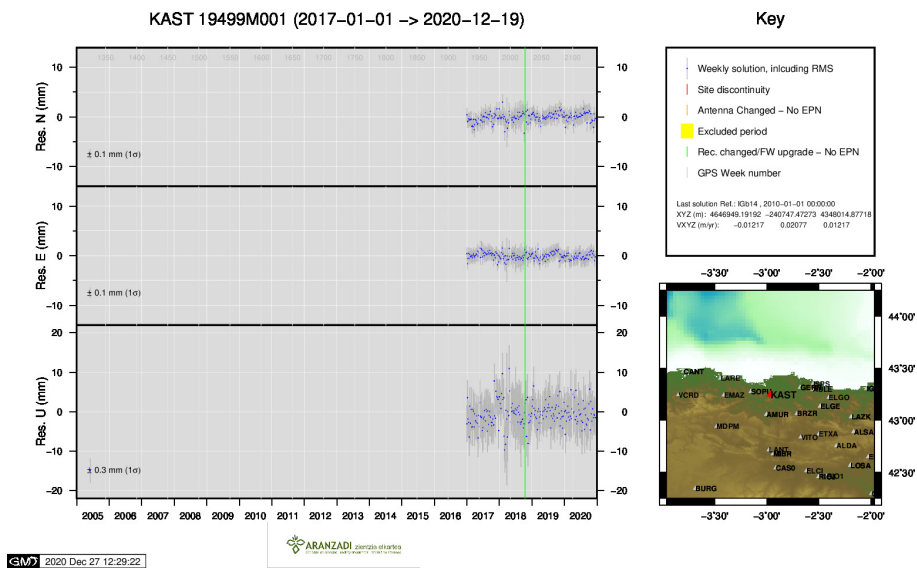




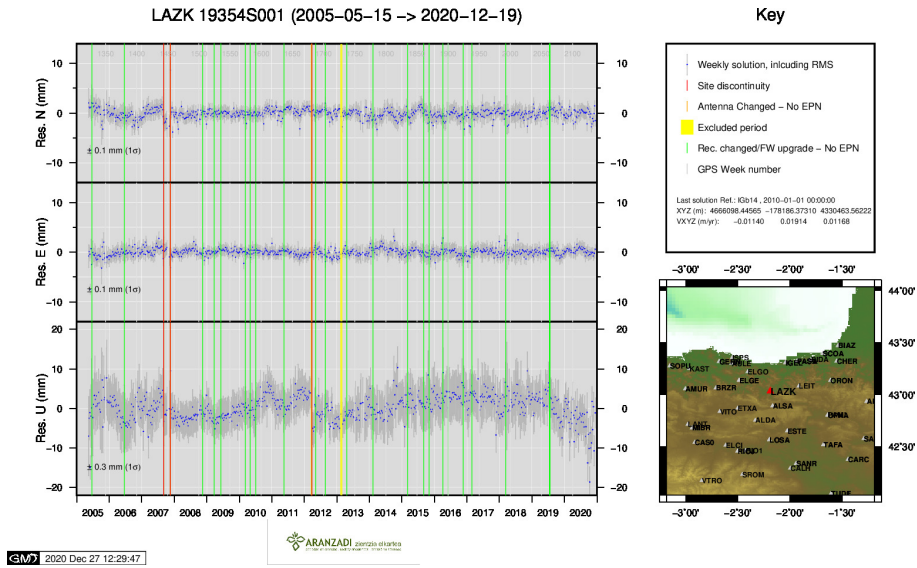
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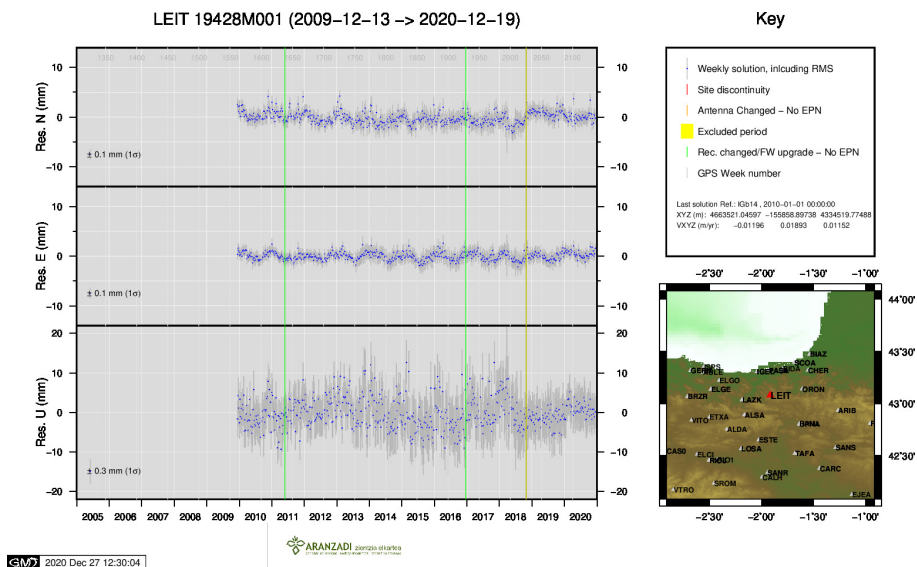
13) ISPS



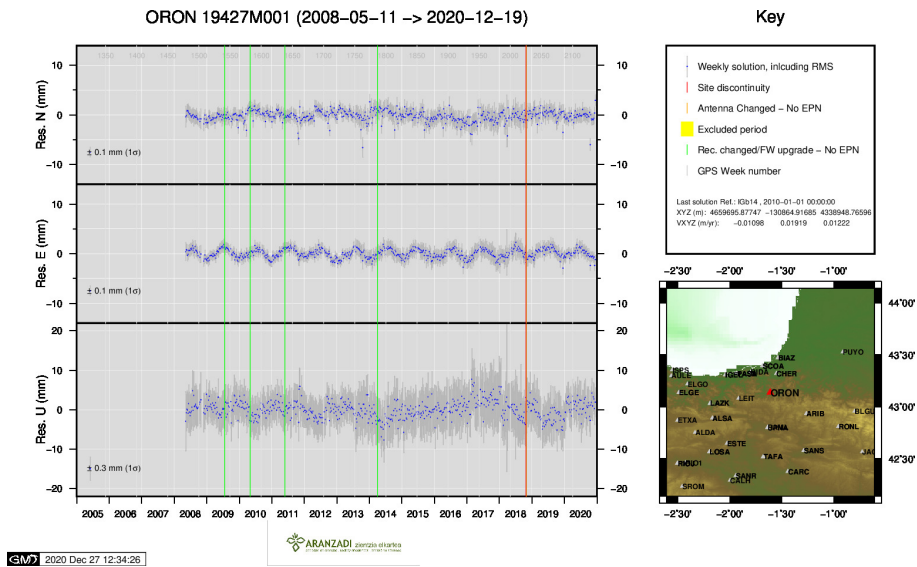
14) KAST



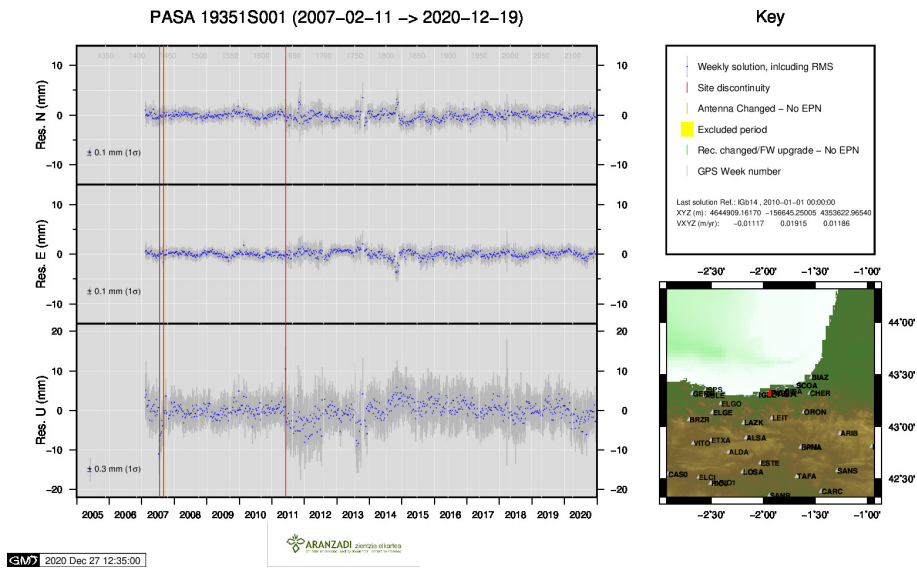
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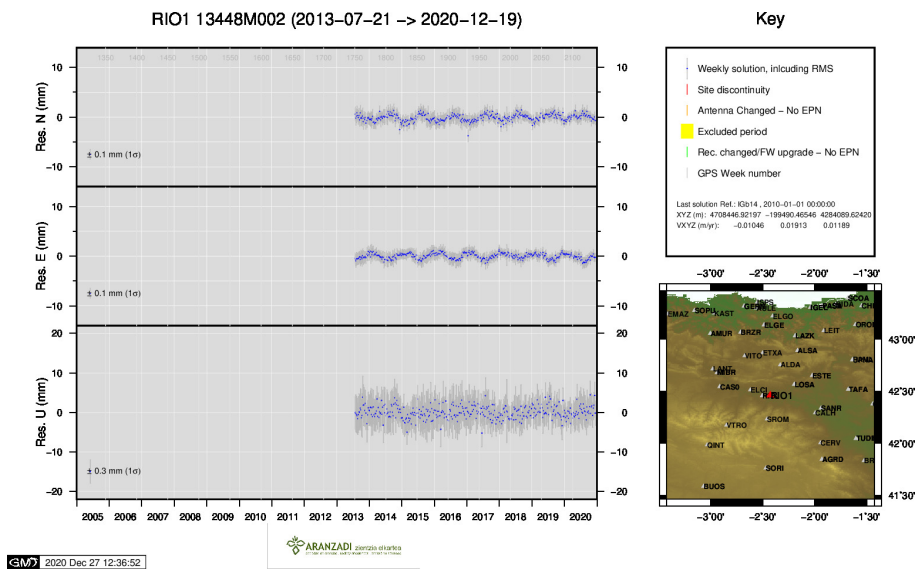
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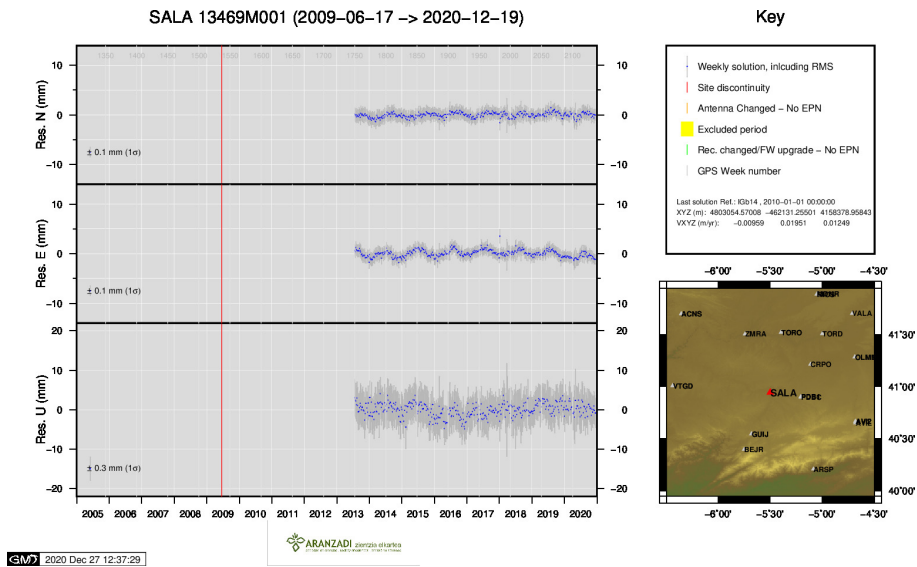
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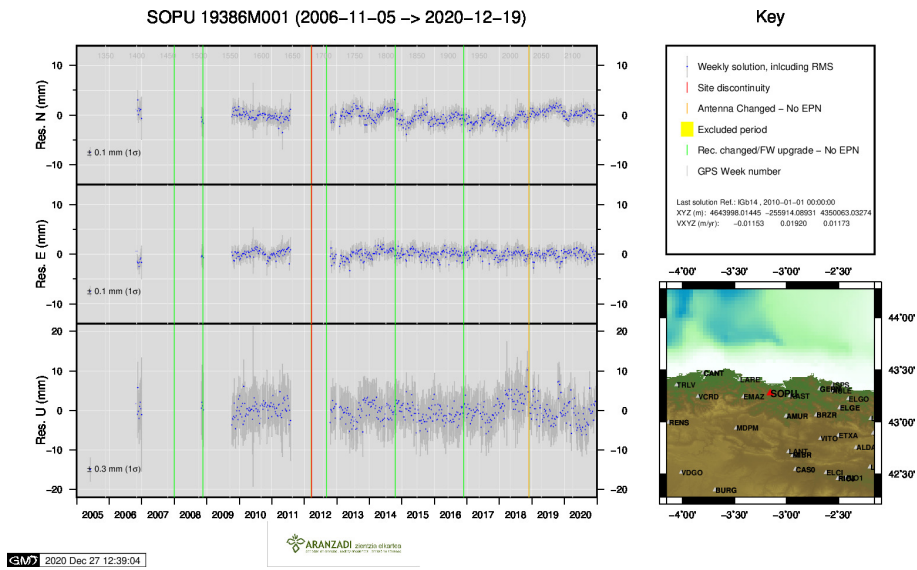
18) PASA



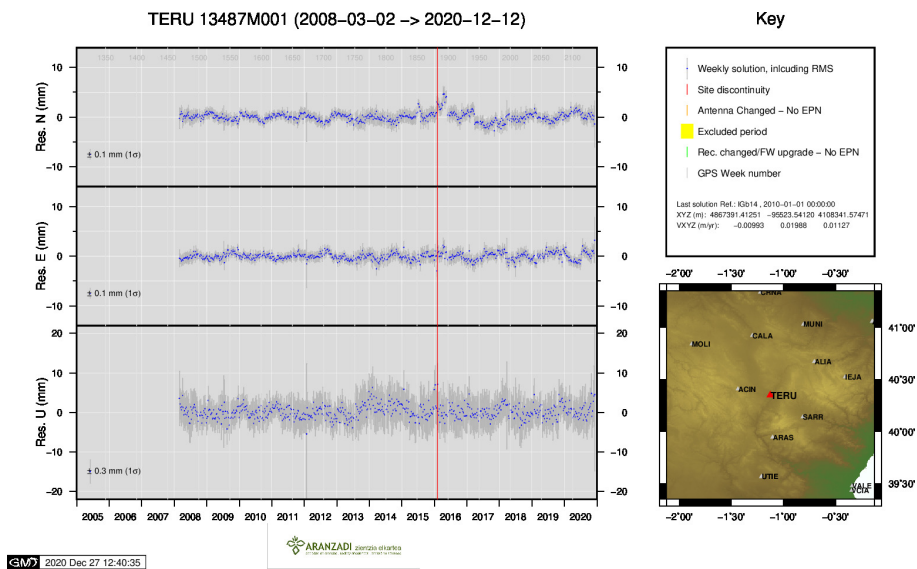
19) RIO1



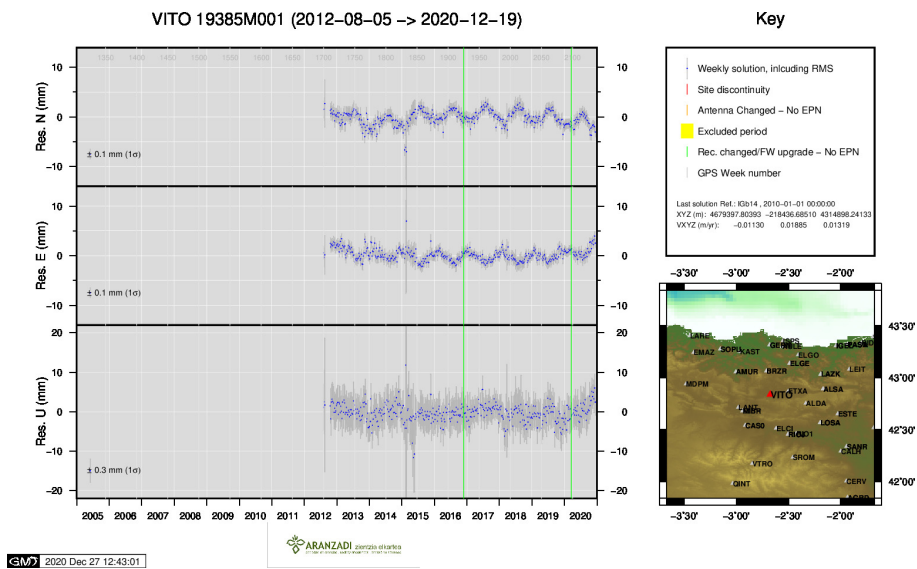
20) SALA



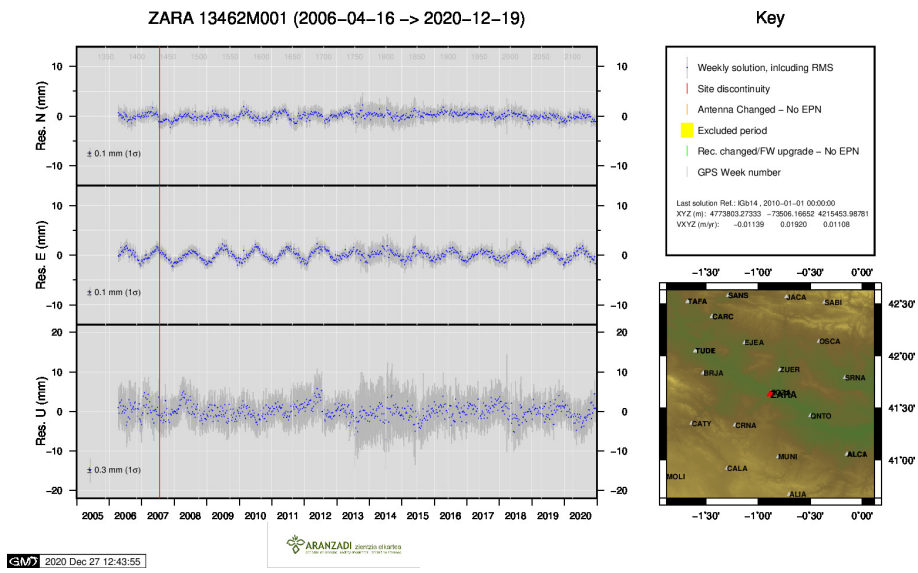
21) SOPU



22) TERU



23) VITO



24) ZARA