

ARA-DAC Weekly Analysis Result: 2188 (GFA)

Technical Report

GPS Week: 2188 (GFA)

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

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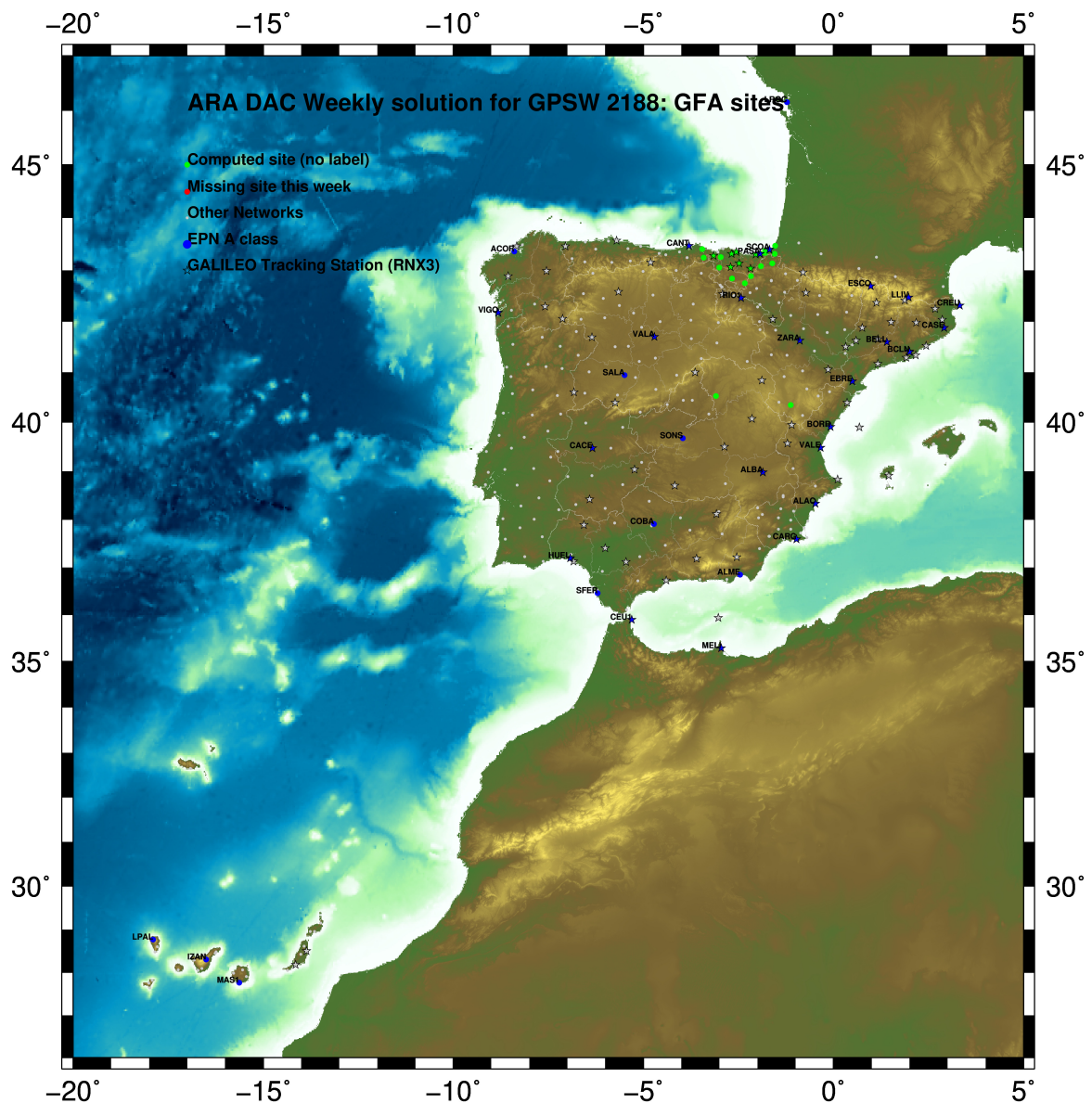
Report generated on 2022/01/02 at 15:12:54



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 2022 Jan 02 15:12:45

Fig.1: Computed Sites for GPS Week2188 (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 C2130.

ARA LAC 2188 WEEK FINAL COMBINATION: PRECISE ORBITS 02-JAN-22 11:37

LOCAL GEODETIC DATUM: IGB14 EPOCH: 2021-12-15 12:00:00

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
4	ACOR 13434M001	4594489.53260	-678367.38946	4357066.31193	W
39	ALDA 19383M001	4687280.13167	-190876.52352	4308106.99771	A
50	ALSA 19419M001	4677250.80047	-176770.34509	4319079.90415	A
53	AMUR 19388M001	4661499.42008	-244591.21074	4332269.91413	A
100	BIAZ 10074M002	4634456.01176	-124344.92743	4365785.48306	A
101	BIDA 00000M000	4644177.78910	-145778.27697	4354832.51184	A
113	BRZR 19387M001	4662220.95948	-220769.85046	4333309.47118	A
104	CACE 13447M001	4899866.47827	-544566.98766	4033770.23766	W
116	CANT 13438M001	4625924.28349	-307096.18676	4365771.58445	W
154	CHER 00000M000	4645879.98737	-125721.86218	4353624.11289	A
162	CREU 13432M001	4715420.09344	273178.10626	4271946.86988	W
204	EBRE 13410M001	4833519.95839	41537.43803	4147461.74614	W
180	ELGE 19353S001	4657557.36103	-202241.42321	4338991.91398	A
182	EMAZ 17001M001	4645924.17572	-276949.81817	4347759.60680	A
209	GERN 19389M001	4642811.28725	-217222.87499	4353278.90581	A
257	HOND 15012M002	4640529.28058	-145676.93685	4358761.78219	A
235	IGEL 19352S001	4645951.39772	-165574.45494	4352550.44760	A
240	ISPS 19484M001	4640596.44783	-208963.72937	4356391.94499	A
245	KAST 19499M001	4646949.04628	-240747.22455	4348015.02384	A
252	LARE 19440M001	4632831.92418	-279026.09489	4360314.46366	A
256	LAZK 19354S001	4666098.30338	-178186.14381	4330463.69621	A
261	LEIT 19428M001	4663520.90496	-155858.67006	4334519.91426	A
334	ORDN 19427M001	4659695.74465	-130864.68831	4338948.91143	A
345	PAS2 19351S001	4644909.02623	-156645.02057	4353623.10518	A
493	PASA 19351S001	4644909.02633	-156645.02060	4353623.10527	W
553	RID1 13448M002	4708446.79466	-199490.23597	4284089.76450	W
558	SALA 13469M001	4803054.45781	-462131.02283	4158379.11115	W
566	SCDA 10088M002	4639940.46474	-136224.89560	4359552.43841	W
418	SOPU 19386M001	4643997.87991	-255913.85864	4350063.17480	A
443	TERU 13487M001	4867391.28048	-95523.29676	4108341.70990	A
493	VITO 19385M001	4679397.67065	-218436.45520	4314898.39698	A
752	YEBE 13420M001	4848724.57627	-261631.88161	4123094.39545	A
755	ZARA 13462M001	4773803.13385	-73505.93819	4215454.12322	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 2188 02-JAN-22 11:37

LOCAL GEODETIC DATUM: ETRF2000 EPOCH: 2021-12-15 12:00:00

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
4	ACOR 13434M001	4594489.85956	-678367.97620	4357065.86159	W
39	ALDA 19383M001	4687280.51680	-190877.11969	4308106.54624	A
50	ALSA 19419M001	4677251.18821	-176770.94008	4319079.45369	A
53	AMUR 19388M001	4661499.80022	-244591.80414	4332269.46407	A
100	BIAZ 10074M002	4634456.40965	-124345.51743	4365785.03679	A
101	BIDA 00000M000	4644178.18345	-145778.86813	4354832.06449	A
113	BRZR 19387M001	4662221.34272	-220770.44389	4333309.02138	A
104	CACE 13447M001	4899866.79790	-544567.60840	4033769.76403	W
116	CANT 13438M001	4625924.65822	-307096.77631	4365771.13648	W
154	CHER 00000M000	4645880.38417	-125722.45348	4353623.66566	A
162	CREU 13432M001	4715420.53456	273177.50859	4271946.42209	W
204	EBRE 13410M001	4833520.36086	41536.82623	4147461.28568	W
180	ELGE 19353S001	4657557.74704	-202242.01606	4338991.46480	A
182	EMAZ 17001M001	4645924.55292	-276950.40991	4347759.15759	A
209	GERN 19389M001	4642811.67243	-217223.46621	4353278.45764	A
257	HOND 15012M002	4640529.67524	-145676.52760	4358761.33514	A
235	IGEL 19352S001	4645951.78939	-165575.04637	4352549.99985	A
240	ISPS 19484M001	4640596.83455	-206964.32031	4356391.49714	A
245	KAST 19499M001	4646949.42809	-240747.81630	4348014.57502	A
252	LARE 19440M001	4632832.30206	-279026.68515	4360314.01550	A
256	LAZK 19354S001	4666098.69180	-178186.73754	4330463.24664	A
261	LEIT 19428M001	4663521.29651	-155859.26344	4334519.46520	A
334	ORDN 19427M001	4659696.13970	-130865.28118	4338948.46301	A
345	PAS2 19351S001	4644909.41911	-156645.61185	4353622.65763	A
493	PASA 19351S001	4644909.41921	-156645.61188	4353622.65772	W
553	RID1 13448M002	4708447.17690	-199490.83454	4284089.31118	W
558	SALA 13469M001	4803054.79729	-462131.63264	4158378.64659	W
566	SCDA 10088M002	4639940.86065	-136225.48626	4359551.99153	W
418	SOPU 19386M001	4643998.25995	-255914.45010	4350062.72602	A
443	TERU 13487M001	4867391.66266	-95523.91281	4108341.24488	A
493	VITO 19385M001	4679398.05280	-218437.05055	4314897.94580	A
752	YEBE 13420M001	4848724.93852	-261632.49606	4123093.92979	A
755	ZARA 13462M001	4773803.52688	-73506.54371	4215453.66618	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 2188 02-JAN-22 11:37

 LOCAL GEODETIC DATUM: ETRF2014 EPOCH: 2021-12-15 12:00:00

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
4	ACDR 13434M001	4594489.81881	-678368.01390	4357065.91291	W
39	ALDA 19383M001	4687280.47370	-190877.15871	4308106.59744	A
50	ALSA 19419M001	4677251.14517	-176770.97919	4319079.50492	A
53	AMUR 19388M001	4661499.75755	-244591.84308	4332269.51531	A
100	BLAZ 10074M002	4634456.36687	-124345.55690	4365785.08817	A
101	BIDA 00000M000	4644178.14064	-145778.90749	4354832.11583	A
113	BRZR 19387M001	4662221.29997	-220770.48291	4333309.07263	A
104	CACE 13447M001	4899866.75351	-544567.64528	4033769.81455	W
116	CANT 13438M001	4625924.61611	-307096.81518	4365771.18780	W
154	CHER 00000M000	4645880.34128	-125722.49289	4353623.71701	A
162	CREU 13432M001	4715420.48949	273177.46810	4271946.47352	W
204	EBRE 13410M001	4833520.31538	41536.78703	4147461.33661	W
180	ELGE 19353S001	4657557.70428	-202242.05516	4338991.51607	A
182	EMAZ 17001M001	4645924.51052	-276950.44881	4347759.20887	A
209	GERN 19389M001	4642811.62987	-217223.50532	4353278.50895	A
257	HOND 15012M002	4640529.63247	-145676.56697	4358781.38650	A
235	IGEL 19352S001	4645951.74663	-165575.08565	4352550.05118	A
240	ISPS 19484M001	4640596.79198	-206964.35947	4356391.54846	A
245	KAST 19499M001	4646949.38556	-240747.85532	4348014.62631	A
252	LARE 19440M001	4632832.25979	-279026.72409	4360314.06681	A
256	LAZK 19354S001	4666098.64887	-178186.77669	4330463.29790	A
261	LEIT 19428M001	4663521.25354	-155859.30268	4334519.51648	A
334	ORON 19427M001	4659696.09668	-130865.32052	4338948.51431	A
345	PAS2 19351S001	4644909.37633	-156645.65116	4353622.70897	A
493	PASA 19351S001	4644909.37643	-156645.65119	4353622.70906	W
553	RI01 13448M002	4708447.13359	-199490.87343	4284089.36231	W
558	SALA 13469M001	4803054.75376	-462131.67023	4158378.69737	W
566	SOA 10088M002	4639940.81786	-136225.52566	4359552.04289	W
418	SOPU 19386M001	4643998.21750	-255914.48907	4350062.77731	A
443	TERU 13487M001	4867391.61729	-95523.95139	4108341.29564	A
493	VITO 19385M001	4679398.00986	-218437.08951	4314897.99700	A
752	YEBE 13420M001	4848724.89390	-261632.53415	4123093.98052	A
755	ZARA 13462M001	4773803.48246	-73506.58276	4215453.71720	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 IGB14 solution and are given with respect to the Local frame (North-East-Up).

ARA LAC 2188 WEEK FINAL COMBINATION: PRECISE ORBITS 02-JAN-22 11:37

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	6	XXXX XX	0.67	0.66	2.19
ALDA 19383M001	7	XXXXXX	1.27	1.43	3.98
ALSA 19419M001	7	XXXXXX	1.84	0.47	1.88
AMUR 19388M001	7	XXXXXX	0.76	0.91	1.94
BLAZ 10074M002	7	XXXXXX	0.98	0.69	2.96
BIDA 00000M000	7	XXXXXX	0.72	0.66	3.31
BRZR 19387M001	5	XXXX	0.77	0.86	2.87
CACE 13447M001	7	XXXXXX	0.46	0.28	1.57
CANT 13438M001	7	XXXXXX	0.46	0.25	1.74
CHER 00000M000	7	XXXXXX	1.50	0.62	5.67
CREU 13432M001	7	XXXXXX	0.47	0.59	2.14
EBRE 13410M001	7	XXXXXX	0.47	0.28	3.17
ELGE 19353S001	7	XXXXXX	0.72	0.53	2.23
EMAZ 17001M001	7	XXXXXX	0.80	0.69	1.60
GERN 19389M001	5	XXXX	0.33	0.54	1.38
HOND 15012M002	7	XXXXXX	0.67	0.41	1.17
IGEL 19352S001	7	XXXXXX	0.80	0.42	2.79
ISPS 19484M001	7	XXXXXX	0.38	0.59	2.25
KAST 19499M001	7	XXXXXX	0.40	0.54	2.18
LARE 19440M001	7	XXXXXX	0.58	0.60	1.85
LAZK 19354S001	6	XXXXX	0.83	0.33	5.04
LEIT 19428M001	7	XXXXXX	1.62	0.95	2.83
ORON 19427M001	7	XXXXXX	0.28	0.51	2.18
PAS2 19351S001	7	XXXXXX	0.56	0.41	0.91
PASA 19351S001	7	XXXXXX	0.53	0.40	0.97
RI01 13448M002	7	XXXXXX	0.40	0.44	2.04
SALA 13469M001	7	XXXXXX	0.43	0.42	2.26
SCDA 10088M002	7	XXXXXX	2.02	1.13	2.38
SOPU 19386M001	5	XXXX	0.80	0.36	1.82
TERU 13487M001	7	XXXXXX	0.40	0.49	2.15
VITO 19385M001	7	XXXXXX	0.34	0.52	3.20
YEBE 13420M001	7	XXXXXX	0.21	0.22	1.20
ZARA 13462M001	7	XXXXXX	0.22	0.52	2.61

Comparison of individual solutions:

ACOR 13434M001	N	0.67	0.68	0.24	-0.81	-0.53	-0.88	-0.02
ACOR 13434M001	E	0.66	-0.89	-0.64	0.01	-0.62	-0.14	0.76
ACOR 13434M001	U	2.19	2.06	2.14	-1.34	-0.20	-1.45	-3.35
ALDA 19383M001	N	1.27	0.60	-0.87	-1.07	1.36	0.56	0.07
ALDA 19383M001	E	1.43	-1.86	1.07	-0.77	-1.35	1.03	1.96
ALDA 19383M001	U	3.98	-4.11	1.24	2.56	-5.24	5.68	0.77
ALSA 19419M001	N	1.84	1.78	0.12	0.76	0.74	0.47	-1.76
ALSA 19419M001	E	0.47	0.56	-0.50	-0.44	-0.53	0.41	0.22
ALSA 19419M001	U	1.88	-0.53	0.04	2.28	2.49	-1.72	-0.59
AMUR 19388M001	N	0.76	0.28	-0.04	-0.97	-0.32	0.01	0.46
AMUR 19388M001	E	0.91	0.78	-0.48	0.71	-0.55	-1.47	-0.16
AMUR 19388M001	U	1.94	-3.20	-0.37	-0.77	-1.92	0.06	-2.26
BLAZ 10074M002	N	0.98	0.32	-0.33	-1.22	-0.15	0.25	0.62
BLAZ 10074M002	E	0.69	-0.19	-0.73	-0.80	-0.27	0.41	-0.77
BLAZ 10074M002	U	2.96	0.07	-2.59	1.34	6.15	1.44	0.31
BIDA 00000M000	N	0.72	1.14	-0.43	-0.72	0.04	0.28	0.55
BIDA 00000M000	E	0.66	0.45	0.40	-0.85	-0.56	0.37	0.73
BIDA 00000M000	U	3.31	0.45	-2.00	-1.40	7.32	0.62	-0.67
BRZR 19387M001	N	0.77			1.16	-0.60	0.67	-0.48
BRZR 19387M001	E	0.86			-1.15	0.97	-0.00	0.82
BRZR 19387M001	U	2.87			-0.64	4.31	-0.49	-3.39
CACE 13447M001	N	0.46	-0.44	0.49	0.06	0.04	-0.53	-0.75
CACE 13447M001	E	0.28	-0.32	0.27	0.52	0.04	0.08	-0.01
CACE 13447M001	U	1.57	1.17	-2.37	0.74	1.51	1.77	0.13
CANT 13438M001	N	0.46	0.49	0.43	0.43	-0.47	0.00	-0.62
CANT 13438M001	E	0.25	0.22	-0.06	-0.04	-0.10	-0.19	0.03
CANT 13438M001	U	1.74	0.27	1.07	0.42	-2.48	0.45	-1.89
CHER 00000M000	N	1.50	-0.20	0.43	-0.55	-0.34	-0.24	1.25
CHER 00000M000	E	0.62	0.60	-0.36	-0.76	-1.02	0.21	0.01
CHER 00000M000	U	5.67	-1.56	3.05	3.62	3.22	0.93	-2.21
CREU 13432M001	N	0.47	-0.89	-0.36	0.41	-0.12	-0.07	0.44
CREU 13432M001	E	0.59	0.86	0.23	-0.53	-0.47	-0.07	-0.41
CREU 13432M001	U	2.14	0.99	0.97	0.72	4.12	0.40	-1.53
EBRE 13410M001	N	0.47	0.02	-0.71	0.14	0.50	0.21	-0.69
EBRE 13410M001	E	0.28	0.05	0.32	-0.29	-0.16	0.13	-0.14
EBRE 13410M001	U	3.17	-0.84	0.49	0.01	3.92	0.10	-1.25
ELGE 19353S001	N	0.72	-1.09	-0.33	-0.02	-0.19	0.68	0.81
ELGE 19353S001	E	0.53	0.62	-0.65	0.71	0.42	0.03	-0.42
ELGE 19353S001	U	2.23	-2.36	-2.25	-0.84	-0.59	0.21	-1.69
EMAZ 17001M001	N	0.80	0.43	-1.55	-0.47	-0.24	-0.11	0.74
EMAZ 17001M001	E	0.69	-0.75	0.07	0.31	0.90	-0.75	-0.07
EMAZ 17001M001	U	1.60	0.07	-0.87	-2.06	-1.40	-1.18	0.65
GERN 19389M001	N	0.33			0.27	-0.39	0.31	0.25
GERN 19389M001	E	0.54			0.77	-0.16	-0.08	-0.48
GERN 19389M001	U	1.38			-0.18	1.08	-0.35	-2.50
HOND 15012M002	N	0.67	0.87	0.43	0.13	-0.99	0.69	0.46
HOND 15012M002	E	0.41	0.12	0.45	0.24	-0.62	0.25	-0.36
HOND 15012M002	U	1.17	-0.55	1.49	-0.37	-0.72	1.69	-1.34
IGEL 19352S001	N	0.80	0.37	0.11	-0.25	1.43	-0.63	0.02
IGEL 19352S001	E	0.42	0.57	-0.39	0.16	0.28	-0.53	0.18
IGEL 19352S001	U	2.79	-2.15	2.51	-0.03	-0.06	-0.56	-3.61
ISPS 19484M001	N	0.38	-0.13	0.73	-0.17	-0.26	-0.03	0.27
ISPS 19484M001	E	0.59	1.09	0.32	-0.48	0.37	0.12	0.06
ISPS 19484M001	U	2.25	-2.71	0.30	1.30	-1.41	3.25	-2.82
KAST 19499M001	N	0.40	-0.58	0.14	-0.06	0.41	0.13	0.09
KAST 19499M001	E	0.54	-0.16	-0.91	0.58	0.41	-0.18	0.55
KAST 19499M001	U	2.18	-1.96	3.71	0.08	-0.76	0.24	-3.16
LARE 19440M001	N	0.58	0.26	0.98	-0.06	-0.90	-0.30	-0.11

LARE 19440M001	E	0.60	0.07	-0.88	-0.52	0.48	0.12	0.34	0.87
LARE 19440M001	U	1.85	-0.60	-3.58	-0.86	-1.21	1.47	0.37	-1.65
LAZK 19354S001	N	0.83		-1.02	-0.76	0.87	-0.64	-0.47	0.66
LAZK 19354S001	E	0.33		0.25	-0.18	-0.64	-0.22	0.00	-0.08
LAZK 19354S001	U	5.04		-3.57	-0.01	-0.38	-3.01	3.50	9.64
LEIT 19428M001	N	1.62	0.32	-3.31	0.92	1.09	-0.21	1.60	-0.22
LEIT 19428M001	E	0.95	-0.02	-0.95	-0.49	-1.21	0.32	1.59	0.44
LEIT 19428M001	U	2.83	-3.06	-3.17	-0.56	-0.27	2.71	-1.65	4.28
ORDN 19427M001	N	0.28	0.50	-0.05	-0.38	-0.13	0.03	0.23	0.00
ORDN 19427M001	E	0.51	0.62	0.13	-0.59	-0.31	0.14	0.21	-0.82
ORDN 19427M001	U	2.18	-0.63	-1.28	1.17	-1.86	-0.90	-1.21	4.40
PAS2 19351S001	N	0.56	0.88	-0.18	-0.24	0.34	0.15	0.34	0.86
PAS2 19351S001	E	0.41	-0.15	0.34	-0.13	-0.85	0.20	0.26	0.16
PAS2 19351S001	U	0.91	-0.23	1.43	0.38	-0.88	-1.19	0.27	0.64
PASA 19351S001	N	0.53	0.87	-0.14	-0.05	0.12	0.14	0.37	0.84
PASA 19351S001	E	0.40	-0.10	0.29	-0.13	-0.83	0.27	0.24	0.08
PASA 19351S001	U	0.97	-0.87	1.43	0.58	-0.58	-1.31	0.33	0.58
RIDI 13448M002	N	0.40	0.68	-0.02	0.40	-0.34	-0.48	-0.10	0.01
RIDI 13448M002	E	0.44	0.68	-0.61	-0.31	-0.29	-0.35	-0.04	0.04
RIDI 13448M002	U	2.04	-0.03	-2.83	1.77	0.89	0.19	-1.61	3.21
SALA 13469M001	N	0.43	0.37	0.38	0.15	0.41	0.13	-0.76	0.17
SALA 13469M001	E	0.42	-0.19	-0.60	-0.63	0.00	0.11	-0.28	0.41
SALA 13469M001	U	2.26	-0.87	-1.95	-1.86	-1.65	-1.16	4.22	-0.89
SCDA 10088M002	N	2.02	3.60	2.55	-0.07	-1.47	-1.20	-0.86	-0.89
SCDA 10088M002	E	1.13	1.00	1.97	-0.18	-1.26	-0.54	-0.16	-0.91
SCDA 10088M002	U	2.38	0.07	-0.66	-0.95	3.67	-0.94	-1.16	4.12
SOPU 19386M001	N	0.80			1.09	-0.95	-0.25	0.50	0.38
SOPU 19386M001	E	0.36			0.27	0.45	0.26	-0.40	0.04
SOPU 19386M001	U	1.82			-2.79	-0.14	2.17	0.00	-0.85
TERU 13487M001	N	0.40	-0.40	-0.31	0.33	0.67	0.08	0.25	-0.28
TERU 13487M001	E	0.49	0.07	-0.21	0.46	-0.02	-0.95	0.38	-0.33
TERU 13487M001	U	2.15	-1.52	1.43	0.47	2.43	2.41	-0.08	3.38
VITO 19385M001	N	0.34	0.23	0.10	-0.27	0.03	-0.59	0.31	0.37
VITO 19385M001	E	0.52	-0.66	0.20	0.02	-0.95	0.19	0.05	-0.46
VITO 19385M001	U	3.20	-2.20	-4.80	1.73	-2.57	2.71	-1.64	3.71
YEBE 13420M001	N	0.21	0.09	-0.19	0.01	-0.26	0.14	-0.35	0.11
YEBE 13420M001	E	0.22	-0.34	-0.31	-0.09	0.12	0.20	-0.12	-0.01
YEBE 13420M001	U	1.20	0.05	0.59	1.26	-0.42	-1.10	0.14	-2.29
ZARA 13462M001	N	0.22	0.12	-0.13	0.04	-0.39	-0.27	-0.22	0.01
ZARA 13462M001	E	0.52	1.04	0.15	-0.03	-0.12	-0.15	-0.46	-0.48
ZARA 13462M001	U	2.61	-0.57	-0.41	-0.29	1.29	-1.01	-2.93	5.38

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	-0.69	-0.37	-0.75
12	ALAC 13433M001	I W	-1.42	-0.22	2.01
15	ALBA 13452M001	I W	-1.09	-1.12	-1.52
21	ALME 13437M001	I W	-2.49	-1.69	0.56
47	BCLN 13412M001	I W	-0.41	-1.40	2.09
52	BELL 13431M001	I W	1.09	-0.01	4.52
71	BORR 13480M001	I W	-2.45	-0.19	-0.73
76	BRST 10004M004	I W	-0.57	-1.13	0.19
104	CACE 13447M001	I W	-0.17	-0.35	1.37
116	CANT 13438M001	I W	-0.17	0.27	-0.70
117	CARG 19412M001	I W	0.66	-2.03	-3.06
122	CASE 13494M001	I W	-2.29	2.26	-0.16
128	CEU1 13449M002	I W	-0.88	-1.16	-6.88
143	COBA 13453M001	I W	-0.21	0.04	-5.29
162	CREU 13432M001	I W	-1.40	2.08	3.51
204	EBRE 13410M001	I W	-0.52	1.68	-0.44
222	ESCO 13435M001	I W	-2.81	0.88	5.08
299	HUEL 13451M001	I W	-0.45	-2.68	-5.36
316	IZAN 31309M002	I W	-1.17	0.53	-6.25
385	LLIV 13436M001	I W	0.41	1.91	3.60
390	LPAL 81701M001	I W	9.85	-3.47	3.29
392	LROC 10023M001	I W	-0.74	0.74	2.45
421	MAS1 31303M002	I W	-0.45	-0.08	-4.34
432	MELI 19379M001	I W	0.71	0.63	-6.96
493	PASA 19351S001	I W	0.70	-0.89	0.14
553	RIO1 13448M002	I W	-0.88	-0.57	1.93
558	SALA 13469M001	I W	0.46	0.87	-5.38
566	SCOA 10088M002	I W	2.53	0.73	1.80
574	SFER 13402M004	I W	1.71	-2.23	-1.89
599	SONS 13446M001	I W	0.16	3.23	5.19
700	VALA 13463M002	I W	0.30	1.54	2.42
704	VALE 13439M001	I W	-0.24	1.51	0.10
715	VIGO 13450M001	I W	2.00	-2.65	0.07
755	ZARA 13462M001	I W	-0.10	2.13	4.25
764	ZIMM 14001M004	I W	1.02	1.22	5.11
	RMS / COMPONENT		2.10	1.59	3.59
	MEAN		0.00	0.00	0.00
	MIN		-2.81	-3.47	-6.96
	MAX		9.85	3.23	5.19

NUMBER OF PARAMETERS : 3
NUMBER OF COORDINATES : 105
RMS OF TRANSFORMATION : 2.57 MM

BARYCENTER COORDINATES:

LATITUDE : 39 59 39.06
LONGITUDE : - 3 32 13.48
HEIGHT : -37.255 KM

PARAMETERS:

TRANSLATION IN N : -0.00 +- 0.43 MM
TRANSLATION IN E : 0.00 +- 0.43 MM
TRANSLATION IN U : -0.00 +- 0.43 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          18542526
NUMBER OF UNKNOWN               206093
NUMBER OF DEGREES OF FREEDOM    18334433
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)      180
VARIANCE FACTOR                  1.462323620260981

Helmert Transformation Parameters With Respect to Combined Solution:
-----
Sol  Rms (m)      Translation (m)      Rotation (")
      X          Y          Z          X          Y          Z          Scale (ppm)
-----
  1  0.00153     -0.0024  0.0109 -0.0018  -0.0002  0.0000  0.0003  0.00057
  2  0.00142      0.0030  0.0049 -0.0026  -0.0000  0.0001  0.0002 -0.00008
  3  0.00117     -0.0050 -0.0171  0.0148  0.0003 -0.0005 -0.0004 -0.00096
  4  0.00207     -0.0089 -0.0304  0.0142  0.0006 -0.0005 -0.0008 -0.00045
  5  0.00158     -0.0022 -0.0134  0.0041  0.0002 -0.0002 -0.0004 -0.00024
  6  0.00131     -0.0090 -0.0171  0.0079  0.0003 -0.0004 -0.0005  0.00016
  7  0.00184      0.0003 -0.0138 -0.0039  0.0003  0.0001 -0.0003  0.00028
```

```
Statistics of individual solutions:
-----
File  RMS (m)      DOF  Ch#**2/DOF  #Observations authentic / pseudo  #Parameters explicit / implicit / singular
-----
  1  0.00122      2688501      1.48          2718941      3          978      29465      0
  2  0.00119      2609028      1.42          2638339      3          981      28333      0
  3  0.00119      2623980      1.43          2653759      3          996      28786      0
  4  0.00121      2605041      1.47          2636772      3          984      30750      0
  5  0.00120      2633139      1.45          2664123      3          981      30006      0
  6  0.00122      2576524      1.48          2607721      3          987      30213      0
  7  0.00122      2592367      1.48          2622871      3          981      29526      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 21:346:00000 21:352:86370 LEICA GR50      -----
ALDA  A   1 P 21:346:00000 21:352:86370 LEICA GR10      -----
ALSA  A   1 P 21:346:00000 21:352:86370 LEICA GR50      -----
AMUR  A   1 P 21:346:00000 21:352:86370 LEICA GR10      -----
BIAZ  A   1 P 21:346:00000 21:352:79170 SPECTRA SP90M   -----
BIDA  A   1 P 21:346:00000 21:352:86370 LEICA GR10      -----
BRZR  A   1 P 21:348:00000 21:352:86370 LEICA GR30      -----
CACE  A   1 P 21:346:00000 21:352:86370 TRIMBLE NETR9   -----
CANT  A   1 P 21:346:00000 21:352:86370 LEICA GR10      -----
CHER  A   1 P 21:346:00000 21:352:14310 LEICA GR30      -----
CREU  A   1 P 21:346:00000 21:352:86370 LEICA GR50      -----
EBRE  A   1 P 21:346:00000 21:352:86370 LEICA GR50      -----
ELGE  A   1 P 21:346:00000 21:352:86370 LEICA GR30      -----
EMAZ  A   1 P 21:346:00000 21:352:86370 LEICA GR30      -----
GERN  A   1 P 21:348:00000 21:352:86370 LEICA GR30      -----
HOND  A   1 P 21:346:00030 21:352:86370 LEICA GR50      -----
IGEL  A   1 P 21:346:00000 21:352:86370 LEICA GR30      -----
ISPS  A   1 P 21:346:00000 21:352:86370 TRIMBLE NETR9   -----
KAST  A   1 P 21:346:00000 21:352:86370 LEICA GR30      -----
LARE  A   1 P 21:346:00000 21:352:86370 LEICA GR50      -----
LAZK  A   1 P 21:347:00000 21:352:86370 LEICA GR30      -----
LEIT  A   1 P 21:346:00000 21:352:86370 LEICA GR50      -----
ORON  A   1 P 21:346:00000 21:352:86370 LEICA GR50      -----
PAS2  A   1 P 21:346:00030 21:352:86370 STONEX SC2200   -----
PASA  A   1 P 21:346:00030 21:352:86370 LEICA GR30      -----
RIO1  A   1 P 21:346:00000 21:352:86370 LEICA GR25      -----
SALA  A   1 P 21:346:00000 21:352:86370 TRIMBLE NETR9   -----
SCOA  A   1 P 21:346:00000 21:352:86370 LEICA GR25      -----
SOPU  A   1 P 21:348:00000 21:352:86370 LEICA GR30      -----
TERU  A   1 P 21:346:00000 21:352:86370 LEICA GR50      -----
VITO  A   1 P 21:346:00000 21:352:86370 LEICA GR10      -----
YEBE  A   1 P 21:346:00000 21:352:86370 LEICA GR50      -----
ZARA  A   1 P 21:346:00000 21:352:86370 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 21:346:00000 21:352:86370 LEIAT504      LEIS -----
ALDA  A   1 P 21:346:00000 21:352:86370 LEIAS10      NONE -----
ALSA  A   1 P 21:346:00000 21:352:86370 LEIAR10      NONE -----
```

```

AMUR A 1 P 21:346:00000 21:352:86370 LEIAS10 NONE -----
BIAZ A 1 P 21:346:00000 21:352:79170 LEIAR25 LEIT -----
BIDA A 1 P 21:346:00000 21:352:86370 LEIAS10 NONE -----
BRZR A 1 P 21:348:00000 21:352:86370 LEIAS10 NONE -----
CACE A 1 P 21:346:00000 21:352:86370 TRM29659.00 NONE -----
CANT A 1 P 21:346:00000 21:352:86370 LEIAR25_R4 LEIT 25066
CHER A 1 P 21:346:00000 21:352:14310 LEIAR10 NONE -----
CREU A 1 P 21:346:00000 21:352:86370 LEIAR25_R4 NONE 26357
EBRE A 1 P 21:346:00000 21:352:86370 LEIAR25_R4 NONE 26359
ELGE A 1 P 21:346:00000 21:352:86370 LEIAR25_R4 LEIT -----
EMAZ A 1 P 21:346:00000 21:352:86370 LEIAS10 NONE -----
GERN A 1 P 21:348:00000 21:352:86370 LEIAS10 NONE -----
HOND A 1 P 21:346:00030 21:352:86370 LEIAR20 LEIM 41012
IGEL A 1 P 21:346:00000 21:352:86370 LEIAS10 NONE -----
ISPS A 1 P 21:346:00000 21:352:86370 TRM59900.00 SCIS -----
KAST A 1 P 21:346:00000 21:352:86370 LEIAS10 NONE -----
LARE A 1 P 21:346:00000 21:352:86370 LEIAR20 LEIM -----
LAZK A 1 P 21:347:00000 21:352:86370 LEIAR25_R4 LEIT -----
LEIT A 1 P 21:346:00000 21:352:86370 LEIAR10 NONE -----
ORDN A 1 P 21:346:00000 21:352:86370 LEIAR10 NONE -----
PAS2 A 1 P 21:346:00030 21:352:86370 LEIAR20 LEIM 73034
PASA A 1 P 21:346:00030 21:352:86370 LEIAR20 LEIM 73034
RIO1 A 1 P 21:346:00000 21:352:86370 LEIAR25_R4 LEIT 25138
SALA A 1 P 21:346:00000 21:352:86370 LEIAR25 NONE -----
SCDA A 1 P 21:346:00000 21:352:86370 TRM55971.00 NONE -----
SOPU A 1 P 21:348:00000 21:352:86370 LEIAS10 NONE -----
TERU A 1 P 21:346:00000 21:352:86370 LEIAR20 LEIM 49044
VITO A 1 P 21:346:00000 21:352:86370 LEIAS10 NONE -----
YEBE A 1 P 21:346:00000 21:352:86370 LEIAR20 LEIM 49016
ZARA A 1 P 21:346:00000 21:352:86370 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 21:346:00000 21:352:86370 UNE 3.0460 0.0000 0.0000
ALDA A 1 P 21:346:00000 21:352:86370 UNE 0.0000 0.0000 0.0000
ALSA A 1 P 21:346:00000 21:352:86370 UNE 0.0000 0.0000 0.0000
AMUR A 1 P 21:346:00000 21:352:86370 UNE 0.0000 0.0000 0.0000
BIAZ A 1 P 21:346:00000 21:352:79170 UNE 0.0000 0.0000 0.0000
BIDA A 1 P 21:346:00000 21:352:86370 UNE 0.0000 0.0000 0.0000
BRZR A 1 P 21:348:00000 21:352:86370 UNE 0.0771 0.0000 0.0000
CACE A 1 P 21:346:00000 21:352:86370 UNE 0.0600 0.0000 0.0000
CANT A 1 P 21:346:00000 21:352:86370 UNE 3.0490 0.0000 0.0000
CHER A 1 P 21:346:00000 21:352:14310 UNE 0.0000 0.0000 0.0000
CREU A 1 P 21:346:00000 21:352:86370 UNE 0.0770 0.0000 0.0000
EBRE A 1 P 21:346:00000 21:352:86370 UNE 0.0770 0.0000 0.0000
ELGE A 1 P 21:346:00000 21:352:86370 UNE 0.0000 0.0000 0.0000
EMAZ A 1 P 21:346:00000 21:352:86370 UNE 0.0350 0.0000 0.0000
GERN A 1 P 21:348:00000 21:352:86370 UNE 0.0771 0.0000 0.0000
HOND A 1 P 21:346:00030 21:352:86370 UNE 0.0771 0.0000 0.0000
IGEL A 1 P 21:346:00000 21:352:86370 UNE 0.0000 0.0000 0.0000
ISPS A 1 P 21:346:00000 21:352:86370 UNE 0.0350 0.0000 0.0000
KAST A 1 P 21:346:00000 21:352:86370 UNE 0.0350 0.0000 0.0000
LARE A 1 P 21:346:00000 21:352:86370 UNE 0.0000 0.0000 0.0000
LAZK A 1 P 21:347:00000 21:352:86370 UNE 0.0000 0.0000 0.0000
LEIT A 1 P 21:346:00000 21:352:86370 UNE 0.0000 0.0000 0.0000
ORDN A 1 P 21:346:00000 21:352:86370 UNE 0.0000 0.0000 0.0000
PAS2 A 1 P 21:346:00030 21:352:86370 UNE 0.0000 0.0000 0.0000
PASA A 1 P 21:346:00030 21:352:86370 UNE 0.0000 0.0000 0.0000
RIO1 A 1 P 21:346:00000 21:352:86370 UNE 0.0606 0.0000 0.0000
SALA A 1 P 21:346:00000 21:352:86370 UNE 0.0600 0.0000 0.0000
SCDA A 1 P 21:346:00000 21:352:86370 UNE 0.0000 0.0000 0.0000
SOPU A 1 P 21:348:00000 21:352:86370 UNE 0.0771 0.0000 0.0000
TERU A 1 P 21:346:00000 21:352:86370 UNE 0.0600 0.0000 0.0000
VITO A 1 P 21:346:00000 21:352:86370 UNE 0.0000 0.0000 0.0000
YEBE A 1 P 21:346:00000 21:352:86370 UNE 0.0000 0.0000 0.0000
ZARA A 1 P 21:346:00000 21:352:86370 UNE 3.2590 0.0000 0.0000
    
```

8 Inconsistencies (logsheet-RINEX metadata)

The following inconsistencies were found comparing the data available in the logsheets and the RINEX headers:

```

2021-12-26 23:33 UTC | MUL13460.210 | ANTENNA TYPE | LEIATS04GG LEIS -> LEIAR25 LEIT
2021-12-27 23:29 UTC | MUL13470.210 | ANTENNA TYPE | LEIATS04GG LEIS -> LEIAR25 LEIT
2021-12-28 23:32 UTC | BRZR3480.210 | RECEIVER FIRM. VERS. | 4.51/7.710 -> 4.31/7.403
2021-12-28 23:32 UTC | GERN3480.210 | RECEIVER FIRM. VERS. | 4.51/7.710 -> 4.31/7.403
2021-12-28 23:32 UTC | MUL13480.210 | ANTENNA TYPE | LEIATS04GG LEIS -> LEIAR25 LEIT
2021-12-28 23:32 UTC | SOPU3480.210 | RECEIVER FIRM. VERS. | 4.51/7.710 -> 4.31/7.403
2021-12-29 23:30 UTC | BRZR3490.210 | RECEIVER FIRM. VERS. | 4.51/7.710 -> 4.31/7.403
2021-12-29 23:30 UTC | GERN3490.210 | RECEIVER FIRM. VERS. | 4.51/7.710 -> 4.31/7.403
2021-12-29 23:30 UTC | MUL13490.210 | ANTENNA TYPE | LEIATS04GG LEIS -> LEIAR25 LEIT
2021-12-29 23:30 UTC | SOPU3490.210 | RECEIVER FIRM. VERS. | 4.51/7.710 -> 4.31/7.403
2021-12-30 23:22 UTC | BRZR3500.210 | RECEIVER FIRM. VERS. | 4.51/7.710 -> 4.31/7.403
2021-12-30 23:22 UTC | GERN3500.210 | RECEIVER FIRM. VERS. | 4.51/7.710 -> 4.31/7.403
2021-12-30 23:22 UTC | MUL13500.210 | ANTENNA TYPE | LEIATS04GG LEIS -> LEIAR25 LEIT
2021-12-30 23:22 UTC | SOPU3500.210 | RECEIVER FIRM. VERS. | 4.51/7.710 -> 4.31/7.403
2021-12-31 23:18 UTC | BRZR3510.210 | RECEIVER FIRM. VERS. | 4.51/7.710 -> 4.31/7.403
2021-12-31 23:18 UTC | GERN3510.210 | RECEIVER FIRM. VERS. | 4.51/7.710 -> 4.31/7.403
2021-12-31 23:18 UTC | MUL13510.210 | ANTENNA TYPE | LEIATS04GG LEIS -> LEIAR25 LEIT
2021-12-31 23:19 UTC | SOPU3510.210 | RECEIVER FIRM. VERS. | 4.51/7.710 -> 4.31/7.403
2022-01-01 23:48 UTC | BRZR3520.210 | RECEIVER FIRM. VERS. | 4.51/7.710 -> 4.31/7.403
2022-01-01 23:48 UTC | GERN3520.210 | RECEIVER FIRM. VERS. | 4.51/7.710 -> 4.31/7.403
2022-01-01 23:48 UTC | MUL13520.210 | ANTENNA TYPE | LEIATS04GG LEIS -> LEIAR25 LEIT
2022-01-01 23:48 UTC | SOPU3520.210 | RECEIVER FIRM. VERS. | 4.51/7.710 -> 4.31/7.403
    
```

9 References

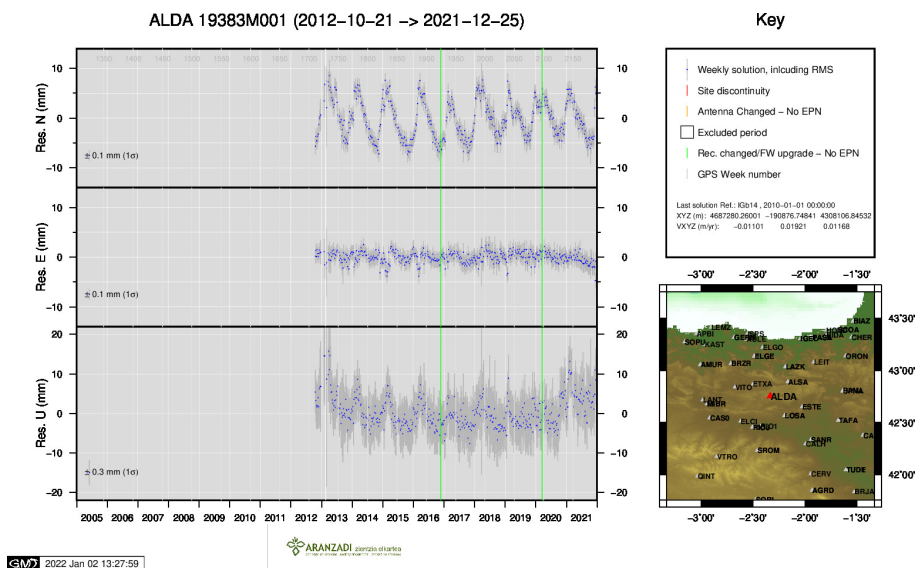
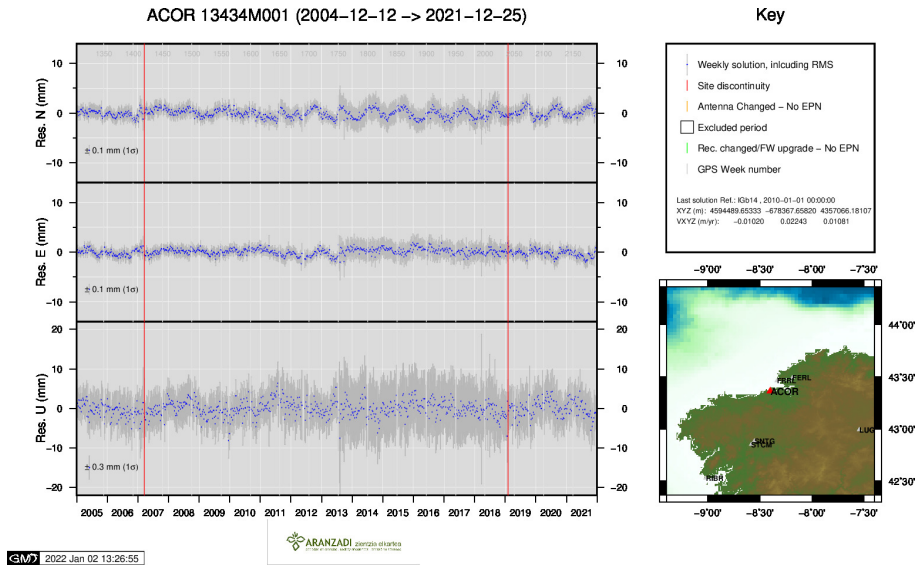
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign*. etrs89.ensg.ign.fr/memo-V8.pdf

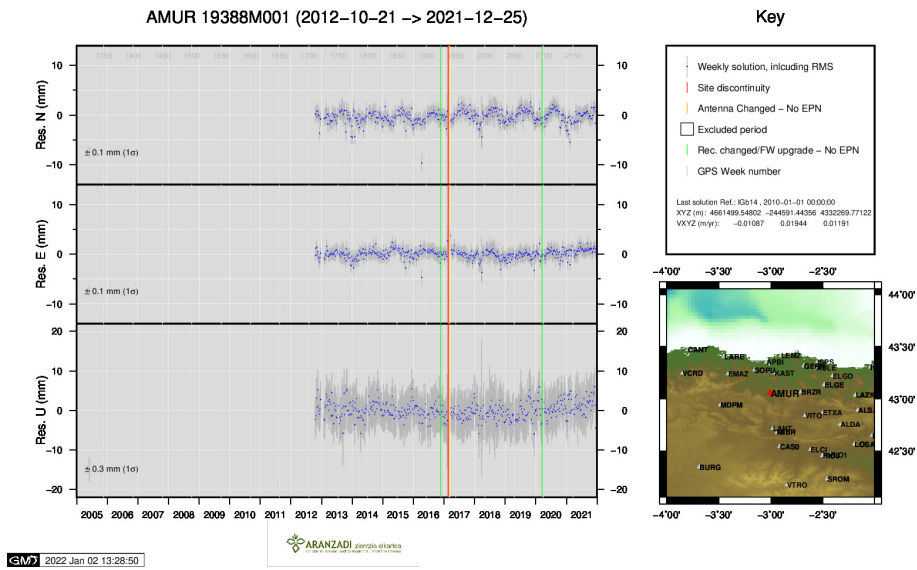
EPN Coordination Group and the EPN Central Bureau (2018): *Guidelines for the EPN Analysis Centres*. epncb.oma.be/documentation/guidelines/guidelines_analysis_centres.pdf

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

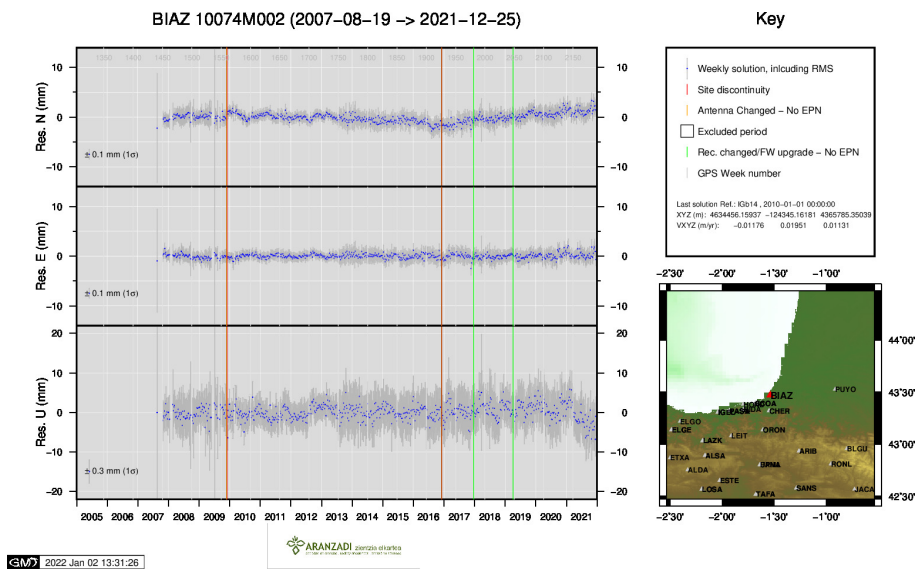
10 Cumulative Time Series

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

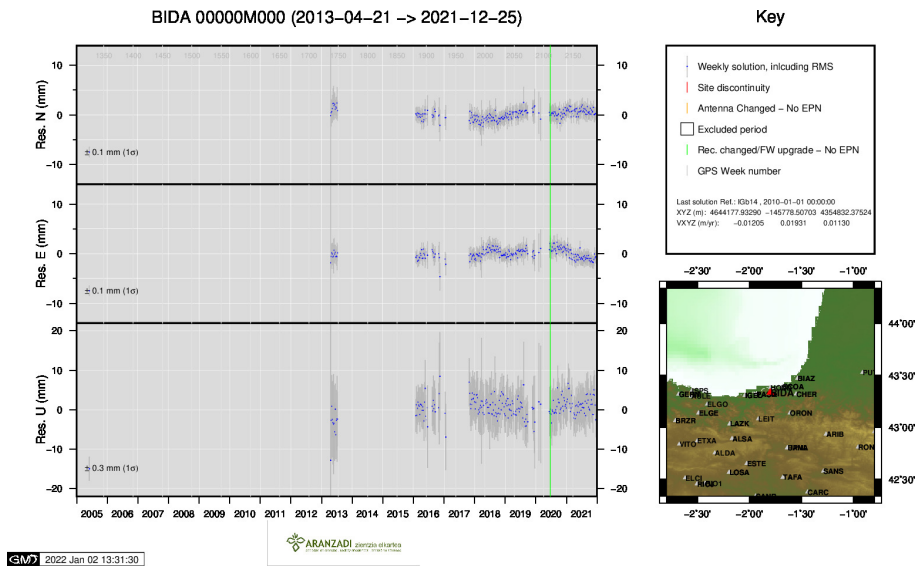




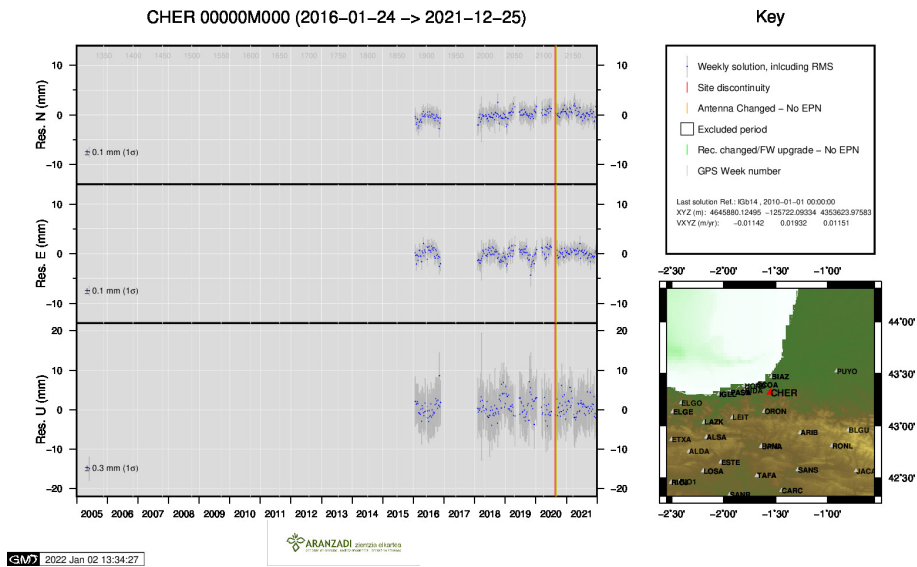
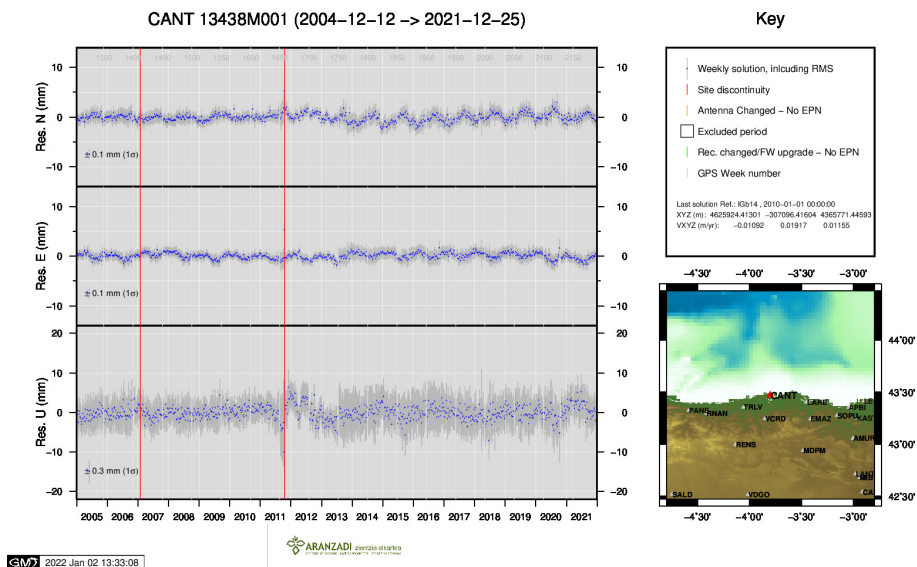
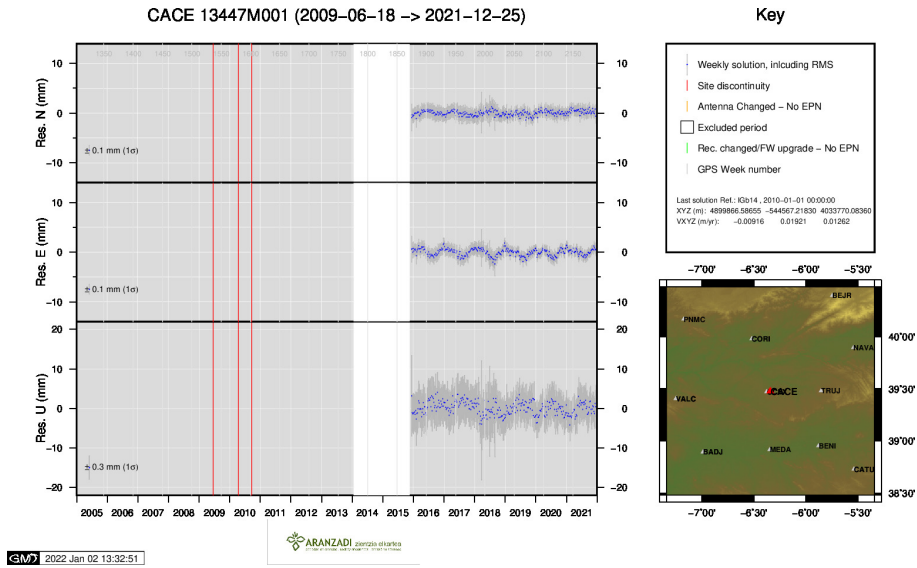
3) AMUR

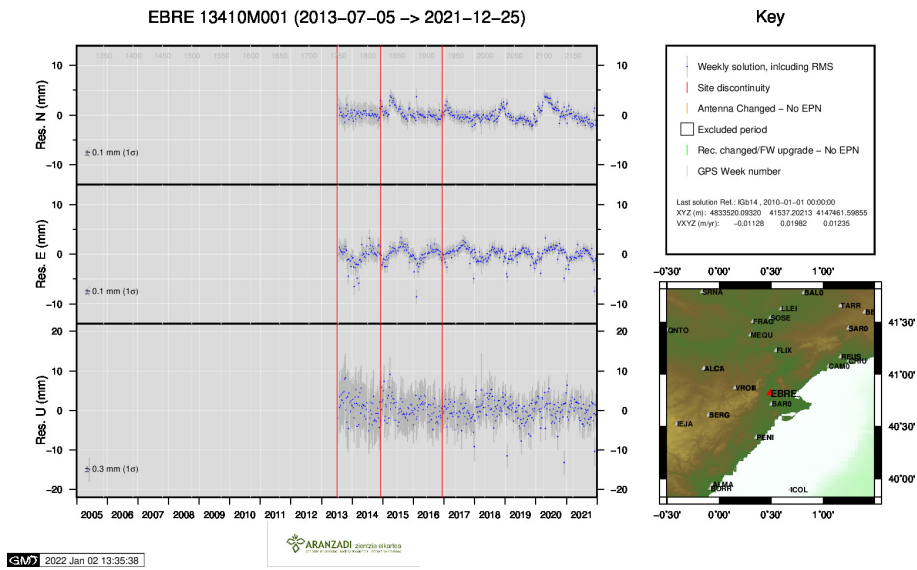


4) BIAZ

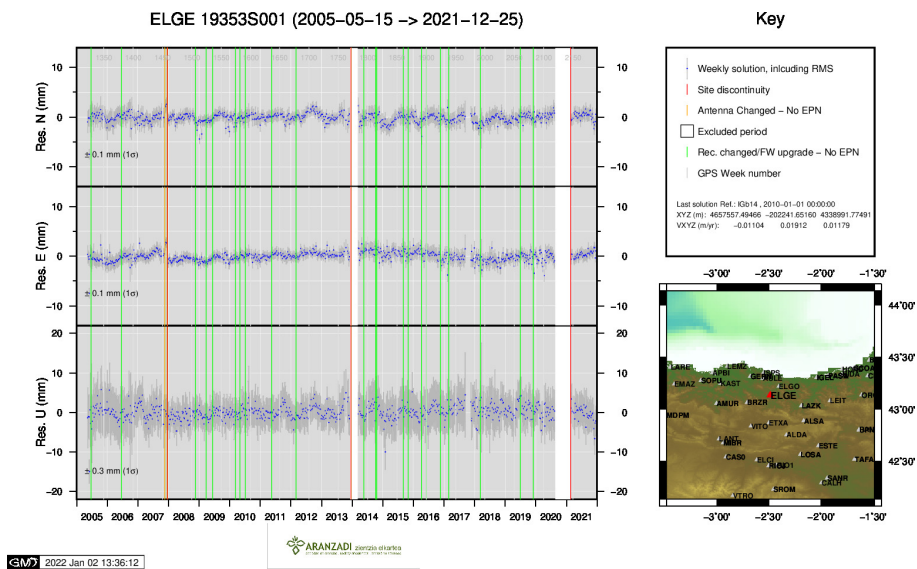


5) BIDA

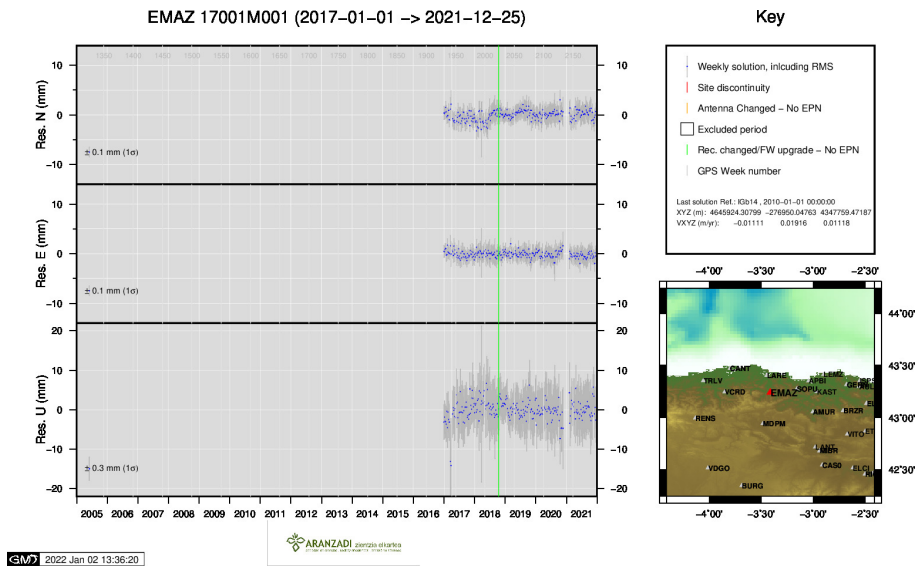




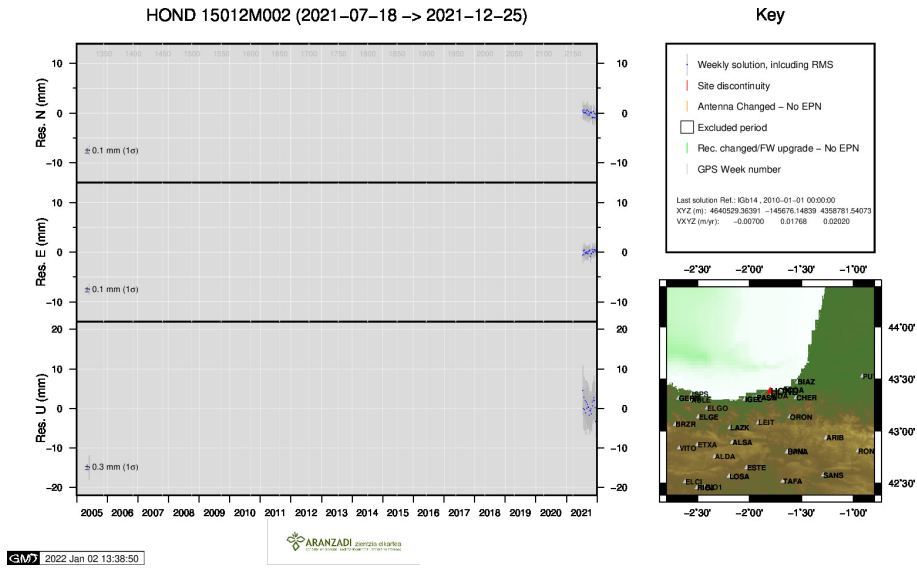
9) EBRE



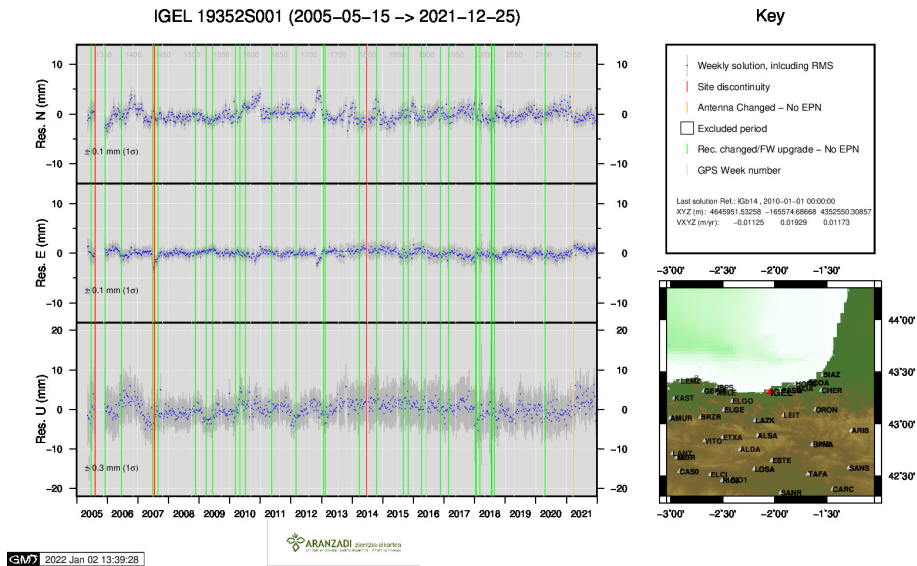
10) ELGE



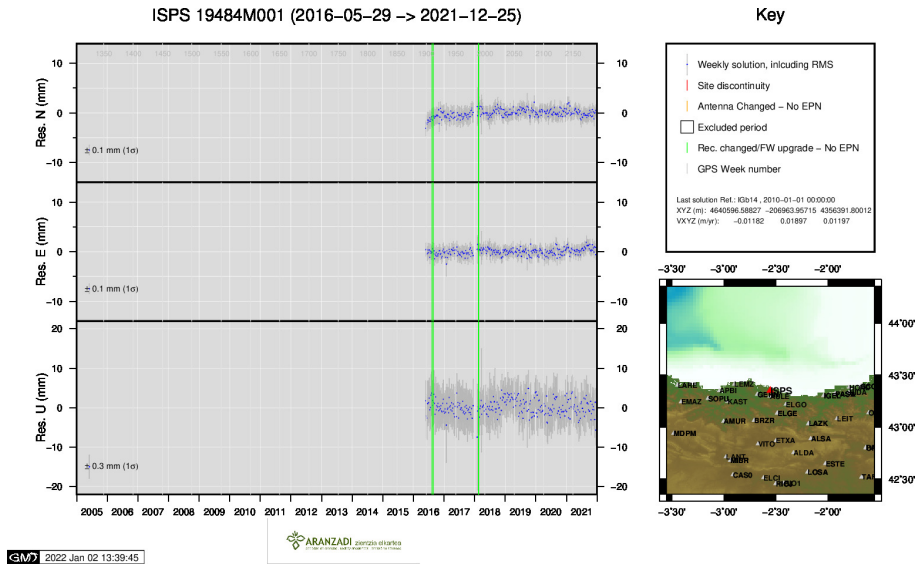
11) EMAZ



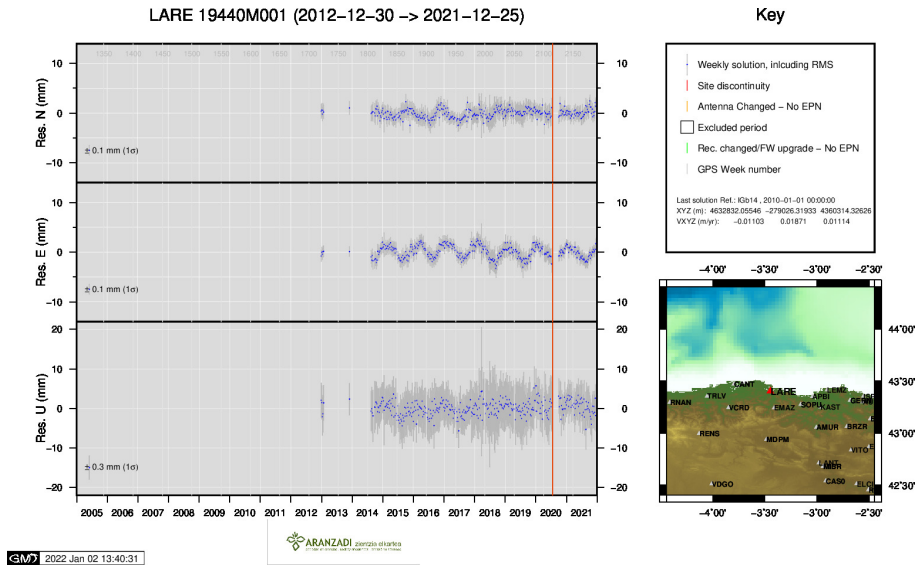
12) HOND



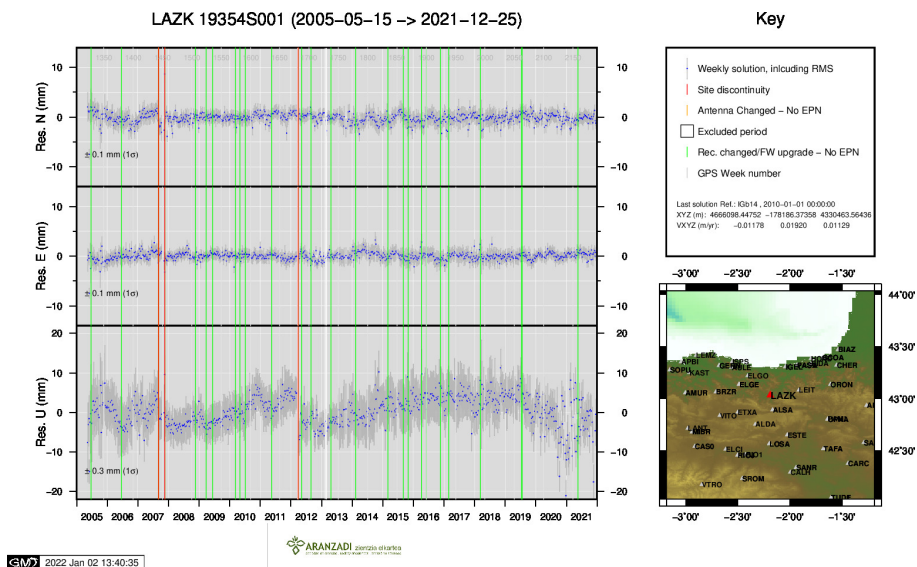
13) IGEL



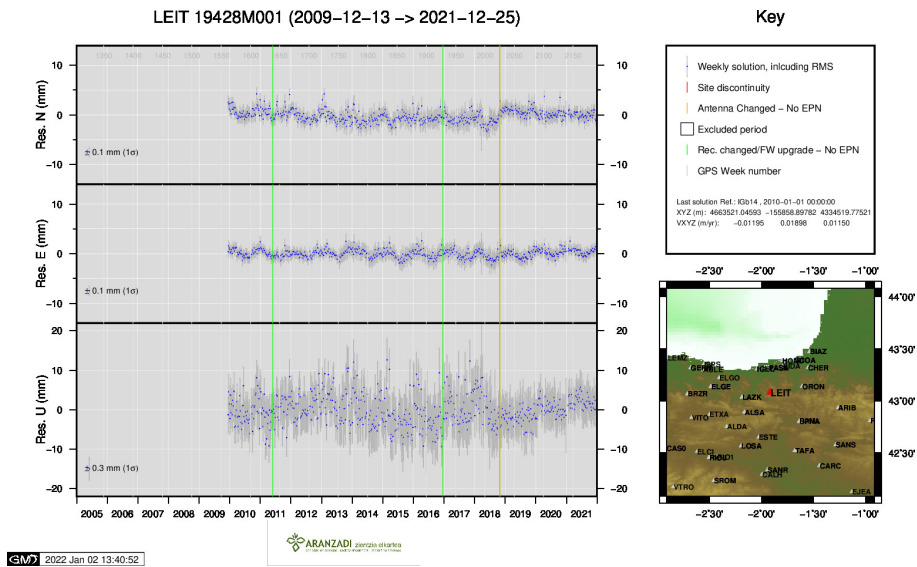
14) ISPS



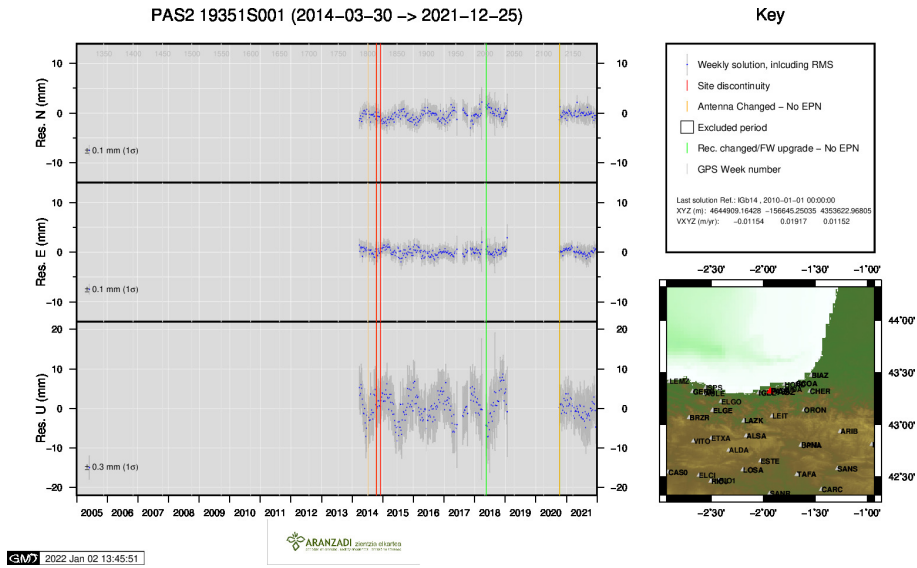
15) LARE



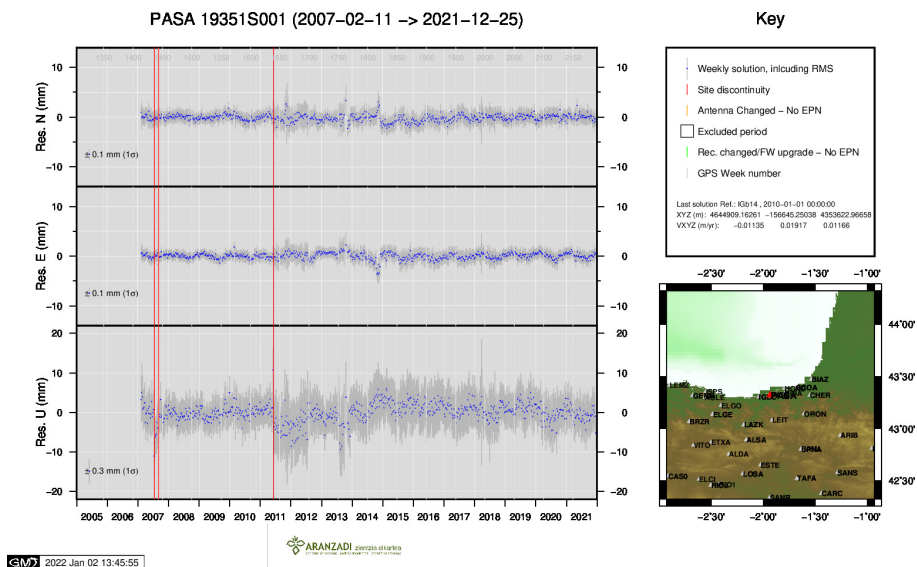
16) LAZK



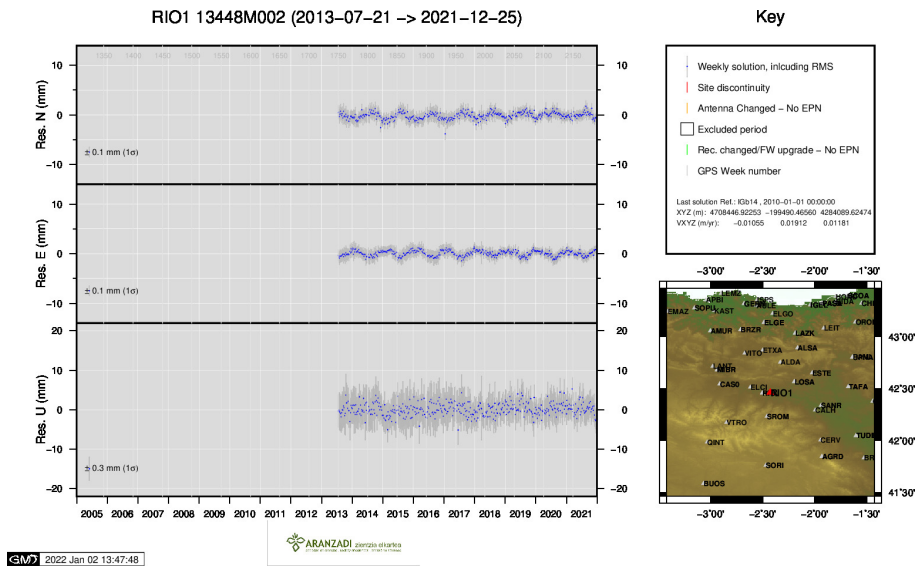
17) LEIT



18) PAS2



19) PASA



20) RIO1

