

ARA-DAC Weekly Analysis Result: 2186 (GFA)

Technical Report

GPS Week: 2186 (GFA)

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

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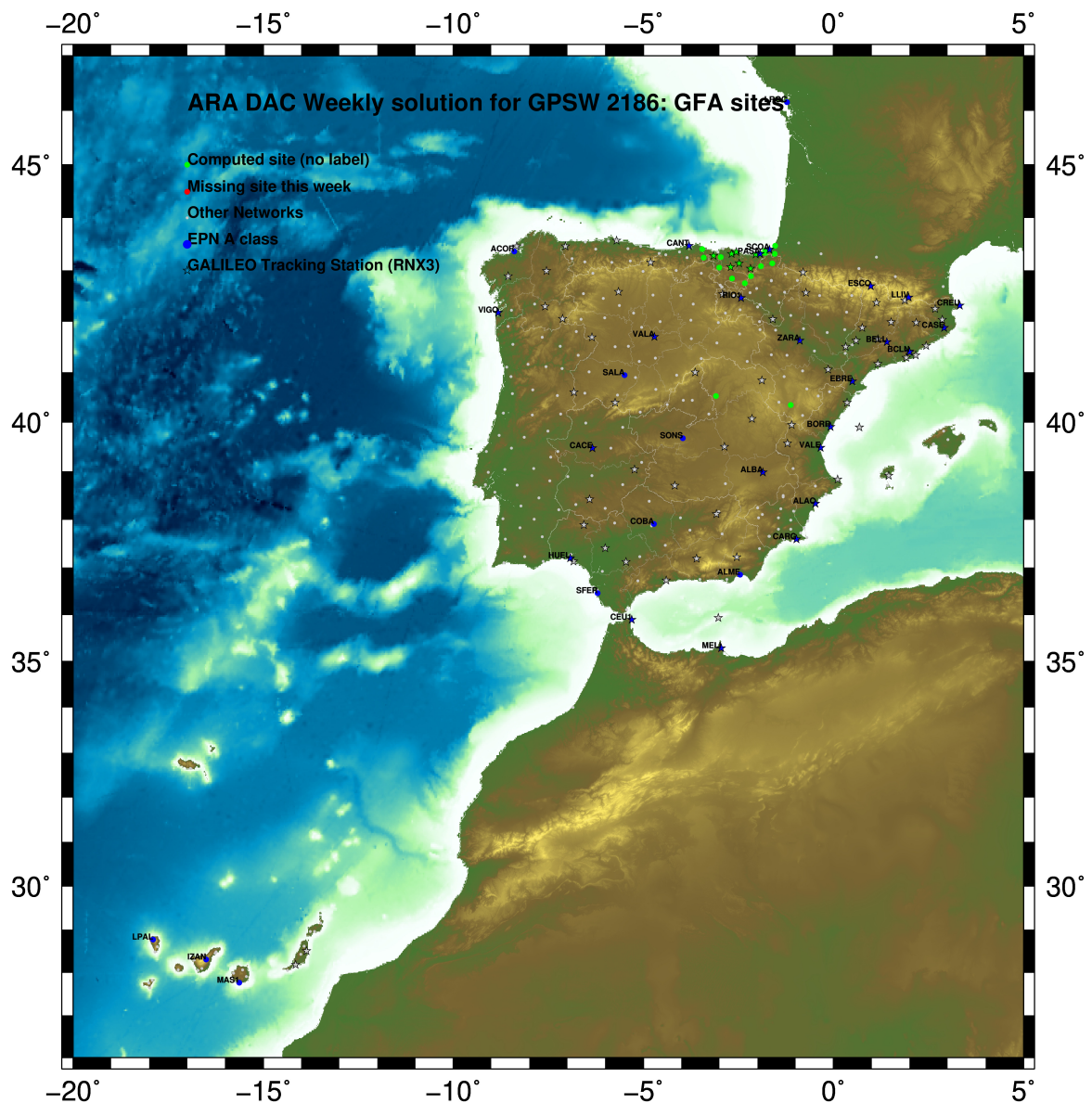
Report generated on 2021/12/19 at 18:18:41



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 2021 Dec 19 18:18:32

Fig.1: Computed Sites for GPS Week2186 (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 Wideline (WL) AR for baselines shorter than 6000km, a Melbourne-Wuebbena wide-lane and narrow-lane AR is computed.
 - Phase-Based Wideline (L_5) AR for baselines shorter than 200km, the code-based wide-lane AR is replaced by a phase-only wide-lane with a subsequent narrow-lane AR.
 - Quasi-Ionosphere-Free (QIF)AR for the remaining real-valued ambiguities for baselines shorter than 2000km.
 - Direct L_1/L_2 AR for baselines shorter than 20km
- AR Verification: Each baseline is processed by introducing the resolved integer ambiguities and checking the residuals. If there is any problem, the ambiguities are re-initialized.

5 Computed Coordinates

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

5.1 IGB14

The Reference Frame considered in this section is IGB14, release C2130.

ARA LAC 2186 WEEK FINAL COMBINATION: PRECISE ORBITS 19-DEC-21 14:51

LOCAL GEODETIC DATUM: IGB14 EPOCH: 2021-12-01 12:00:00

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
4	ACOR 13434M001	4594489.53260	-678367.39152	4357066.31107	W
39	ALDA 19383M001	4687280.13292	-190876.52148	4308106.98418	A
50	ALSA 19419M001	4677250.80024	-176770.34614	4319079.90532	A
53	AMUR 19388M001	4661499.42193	-244591.21101	4332269.91845	A
100	BIAZ 10074M002	4634456.01597	-124344.92778	4365785.48486	A
101	BIDA 00000M000	4644177.79392	-145778.27820	4354832.51498	A
113	BRZR 19387M001	4662220.96459	-220769.85164	4333309.47403	A
104	CACE 13447M001	4899866.47742	-544566.98777	4033770.23524	W
116	CANT 13438M001	4625924.28451	-307096.18771	4365771.58621	W
154	CHER 00000M000	4645879.99307	-125721.86375	4353624.11581	A
162	CREU 13432M001	4715420.09627	273178.10752	4271946.87117	W
204	EBRE 13410M001	4833519.95714	41537.43528	4147461.74624	W
180	ELGE 19353S001	4657557.36284	-202241.42198	4338991.91252	A
182	EMAZ 17001M001	4645924.18049	-276949.82020	4347759.60807	A
209	GERN 19389M001	4642811.29185	-217222.87773	4353278.90904	A
257	HOND 15012M002	4640529.28410	-145676.93727	4358761.78433	A
235	IHEL 19352S001	4645951.40533	-165574.45577	4352550.45301	A
240	ISPS 19484M001	4640596.44902	-206963.73109	4356391.94331	A
245	KAST 19499M001	4646949.05184	-240747.22612	4348015.02925	A
252	LARE 19440M001	4632831.92611	-279026.09638	4360314.46088	A
256	LAZK 19354S001	4666098.28502	-178186.14324	4330463.67970	A
261	LEIT 19428M001	4663520.90651	-155858.67116	4334519.91649	A
334	ORDN 19427M001	4659695.74659	-130864.68970	4338948.91260	A
345	PAS2 19351S001	4644909.03087	-156645.02122	4353623.10787	A
493	PASA 19351S001	4644909.03037	-156645.02118	4353623.10748	W
553	RID1 13448M002	4708446.79893	-199490.23700	4284089.76698	W
558	SALA 13469M001	4803054.45768	-462131.02418	4158379.11116	W
566	SCDA 10088M002	4639940.46946	-136224.89657	4359552.44130	W
418	SOPU 19386M001	4643997.88216	-255913.86158	4350063.17635	A
443	TERU 13487M001	4867391.28270	-95523.29738	4108341.70971	A
493	VITO 19385M001	4679397.67407	-218436.45578	4314898.39948	A
752	YEBE 13420M001	4848724.57410	-261631.88366	4123094.39421	A
755	ZARA 13462M001	4773803.13619	-73505.93831	4215454.12471	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 2186 19-DEC-21 14:51

LOCAL GEODETIC DATUM: ETRF2000 EPOCH: 2021-12-01 12:00:00

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
4	ACOR 13434M001	4594489.85924	-678367.97751	4357065.86121	W
39	ALDA 19383M001	4687280.51767	-190877.11690	4308106.53320	A
50	ALSA 19419M001	4677251.18759	-176770.94038	4319079.45534	A
53	AMUR 19388M001	4661499.80169	-244591.80367	4332269.46887	A
100	BIAZ 10074M002	4634456.41345	-124345.51704	4365785.03907	A
101	BIDA 00000M000	4644178.18787	-145778.86862	4354832.06811	A
113	BRZR 19387M001	4662221.34744	-220770.44432	4333309.02471	A
104	CACE 13447M001	4899866.79674	-544567.60773	4033769.76212	W
116	CANT 13438M001	4625924.65886	-307096.77652	4365771.13872	W
154	CHER 00000M000	4645880.38947	-125722.45430	4353623.66906	A
162	CREU 13432M001	4715420.53694	273177.51061	4271946.42386	W
204	EBRE 13410M001	4833520.35920	41536.82425	4147461.28628	W
180	ELGE 19353S001	4657557.74846	-202242.01408	4338991.46382	A
182	EMAZ 17001M001	4645924.55732	-276950.41120	4347759.15935	A
209	GERN 19389M001	4642811.67665	-217223.46820	4353278.46135	A
257	HOND 15012M002	4640529.67836	-145676.52728	4358761.33776	A
235	IHEL 19352S001	4645951.79661	-165575.04645	4352550.00574	A
240	ISPS 19484M001	4640596.83535	-206964.32129	4356391.49594	A
245	KAST 19499M001	4646949.43326	-240747.81713	4348014.58091	A
252	LARE 19440M001	4632832.30361	-279026.68589	4360314.01320	A
256	LAZK 19354S001	4666098.67305	-178186.73623	4330463.23062	A
261	LEIT 19428M001	4663521.29767	-155859.26380	4334519.46791	A
334	ORDN 19427M001	4659696.14124	-130865.28182	4338948.46466	A
345	PAS2 19351S001	4644909.42336	-156645.61175	4353622.66080	A
493	PASA 19351S001	4644909.42286	-156645.61171	4353622.66041	W
553	RID1 13448M002	4708447.18078	-199490.83481	4284089.31415	W
558	SALA 13469M001	4803054.79683	-462131.63323	4158378.64710	W
566	SCDA 10088M002	4639940.86497	-136225.48648	4359551.99490	W
418	SOPU 19386M001	4643998.26182	-255914.45229	4350062.72806	A
443	TERU 13487M001	4867391.66449	-95523.91265	4108341.24519	A
493	VITO 19385M001	4679398.05584	-218437.05038	4314899.94878	A
752	YEBE 13420M001	4848724.93599	-261632.49734	4123093.92905	A
755	ZARA 13462M001	4773803.52882	-73506.54306	4215453.66816	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 2186                                19-DEC-21 14:51
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LOCAL GEODETIC DATUM: ETRF2014          EPOCH: 2021-12-01 12:00:00
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
4  ACRD 13434M001         4594489.81847    -678368.01523   4357065.91251   W
39 ALDA 19383M001         4687280.47455    -190877.15593   4308106.58437   A
50 ALSA 19419M001         4677251.14453    -176770.97950   4319079.50655   A
53 AMUR 19388M001         4661499.75901    -244591.84262   4332269.52010   A
100 BIAZ 10074M002         4634456.37066    -124345.55652   4365785.09043   A
101 BIDA 00000M000         4644178.14505    -145778.90798   4354832.11944   A
113 BRZR 19387M001         4662221.30468    -220770.48335   4333309.07594   A
104 CACE 13447M001         4899866.75234    -544567.64462   4033769.81262   W
116 CANT 13438M001         4625924.61675    -307096.81540   4365771.19002   W
154 CHER 00000M000         4645880.34656    -125722.49373   4353623.72039   A
162 CREU 13432M001         4715420.49186    273177.47010   4271946.47527   W
204 EBRE 13410M001         4833520.31372    41536.78504   4147461.33719   W
180 ELGE 19353S001         4657557.70569    -202242.05319   4338991.51508   A
182 EMAZ 17001M001         4645924.51490    -276950.45010   4347759.21060   A
209 GERN 19389M001         4642811.63407    -217223.50733   4353278.51264   A
257 HOND 15012M002         4640529.63558    -145676.56666   4358781.38910   A
235 IGEL 19352S001         4645951.75384    -165575.08574   4352550.05705   A
240 ISPS 19484M001         4640596.79277    -206964.36046   4356391.54724   A
245 KAST 19499M001         4646949.39072    -240747.85615   4348014.63218   A
252 LARE 19440M001         4632832.26133    -279026.72484   4360314.06449   A
256 LAZK 19354S001         4666098.63010    -178186.77539   4330463.28186   A
261 LEIT 19428M001         4663521.25468    -155859.30305   4334519.51917   A
334 ORON 19427M001         4659696.09821    -130865.32118   4338948.51594   A
345 PAS2 19351S001         4644909.38056    -156645.65108   4353622.71212   A
493 PASA 19351S001         4644909.38006    -156645.65104   4353622.71173   W
553 RIO1 13448M002         4708447.13747    -199490.87372   4284089.36526   W
558 SALA 13469M001         4803054.75329    -462131.67082   4158378.69786   W
566 SOA 10088M002         4639940.82217    -136225.52590   4359552.04624   W
418 SOPU 19386M001         4643998.21935    -255914.49128   4350062.77933   A
443 TERU 13487M001         4867391.61912    -95523.95125   4108341.29593   A
493 VITO 19385M001         4679398.01289    -218437.08935   4314897.99996   A
752 YEBE 13420M001         4848724.89136    -261632.53544   4123093.97976   A
755 ZARA 13462M001         4773803.48439    -73506.58213   4215453.71916   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 2186 WEEK FINAL COMBINATION: PRECISE ORBITS 19-DEC-21 14:51

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	2	XX	1.39	0.27	2.55
ALDA 19383M001	7	XXXXXX	2.63	2.41	7.30
ALSA 19419M001	7	XXXXXX	3.09	1.26	5.62
AMUR 19388M001	7	XXXXXX	1.12	0.87	3.95
BLAZ 10074M002	7	XXXXXX	0.76	1.18	2.09
BIDA 00000M000	7	XXXXXX	1.40	0.96	2.32
BRZR 19387M001	7	XXXXXX	2.71	3.38	5.22
CACE 13447M001	7	XXXXXX	0.96	0.65	1.38
CANT 13438M001	5	XXXX	0.76	0.63	2.01
CHER 00000M000	7	XXXXXX	0.74	0.92	1.98
CREU 13432M001	7	XXXXXX	1.22	0.66	3.69
EBRE 13410M001	7	XXXXXX	2.37	3.15	9.73
ELGE 19353S001	7	XXXXXX	0.68	1.11	2.52
EMAZ 17001M001	7	XXXXXX	1.02	1.19	4.27
GERN 19389M001	7	XXXXXX	0.97	1.25	2.83
HOND 15012M002	5	XXXX	1.04	0.58	1.42
IGEL 19352S001	7	XXXXXX	1.04	0.79	4.91
ISPS 19484M001	5	XXXX	0.87	1.02	2.57
KAST 19499M001	7	XXXXXX	2.47	0.71	6.85
LARE 19440M001	7	XXXXXX	0.73	0.85	1.54
LAZK 19354S001	7	XXXXXX	1.46	1.06	6.74
LEIT 19428M001	6	XXXXX	1.22	1.27	3.13
ORON 19427M001	7	XXXXXX	0.95	0.66	2.48
PAS2 19351S001	5	X XXX	0.66	0.75	2.44
PASA 19351S001	7	XXXXXX	0.62	0.75	1.71
RI01 13448M002	7	XXXXXX	2.11	0.46	2.81
SALA 13469M001	5	XXXX	0.19	0.30	2.24
SCDA 10088M002	7	XXXXXX	0.68	0.84	1.36
SOPU 19386M001	7	XXXXXX	1.17	1.02	4.56
TERU 13487M001	5	XXXX	0.80	0.40	4.11
VITO 19385M001	7	XXXXXX	2.82	3.85	5.96
YEBE 13420M001	7	XXXXXX	0.73	0.67	1.69
ZARA 13462M001	7	XXXXXX	1.46	0.86	3.69

Comparison of individual solutions:

ACOR 13434M001	N	1.39						1.23	-0.65
ACOR 13434M001	E	0.27						0.06	-0.26
ACOR 13434M001	U	2.55						-0.68	2.46
ALDA 19383M001	N	2.63	-4.51	-0.60	-1.04	-0.83	-2.12	2.63	2.78
ALDA 19383M001	E	2.41	2.32	4.61	0.47	0.01	1.24	-1.85	-1.78
ALDA 19383M001	U	7.30	-9.91	-4.30	-1.56	-5.43	-3.20	10.79	6.65
ALSA 19419M001	N	3.09	4.10	-1.82	-3.38	-2.71	4.03	0.12	-1.47
ALSA 19419M001	E	1.26	2.27	-0.15	-0.67	-0.45	-1.86	-0.27	-0.35
ALSA 19419M001	U	5.62	-10.57	-2.90	2.48	3.67	-3.22	5.42	3.17
AMUR 19388M001	N	1.12	1.02	0.36	-1.87	-1.52	-0.43	-0.30	0.55
AMUR 19388M001	E	0.87	-0.66	-0.38	-0.64	-0.18	0.44	1.81	-0.26
AMUR 19388M001	U	3.95	2.11	2.46	-8.51	2.81	0.02	-0.32	-1.55
BLAZ 10074M002	N	0.76	1.06	0.22	-0.15	-0.79	1.06	0.68	-0.05
BLAZ 10074M002	E	1.18	1.14	-0.41	-1.77	-1.16	0.07	-1.47	-0.55
BLAZ 10074M002	U	2.09	-0.52	0.40	0.88	1.06	1.74	2.10	-4.07
BIDA 00000M000	N	1.40	0.93	2.34	0.06	0.65	-0.31	-0.19	-2.19
BIDA 00000M000	E	0.96	0.00	0.25	-0.84	-1.12	-0.62	-1.75	0.23
BIDA 00000M000	U	2.32	3.78	-1.04	-2.13	-2.33	0.37	-0.46	2.59
BRZR 19387M001	N	2.71	6.00	-1.68	-0.03	-0.30	-0.66	-1.54	-1.47
BRZR 19387M001	E	3.38	7.63	-1.16	-1.08	0.35	-1.07	0.24	-2.54
BRZR 19387M001	U	5.22	9.17	4.34	-6.30	2.62	-0.93	-1.51	-3.35
CACE 13447M001	N	0.96	-0.93	0.01	0.27	-1.28	1.68	0.25	-0.31
CACE 13447M001	E	0.65	0.59	0.54	0.07	-0.19	0.90	-0.37	-0.94
CACE 13447M001	U	1.38	-1.64	0.01	2.13	0.70	-1.32	-1.31	-0.50
CANT 13438M001	N	0.76			-1.12	0.03	-0.90	0.10	-0.49
CANT 13438M001	E	0.63			-0.06	0.40	-0.87	0.46	0.66
CANT 13438M001	U	2.01			0.63	3.75	-0.67	-0.40	-1.10
CHER 00000M000	N	0.74	1.14	0.72	-0.58	0.37	0.56	0.12	-0.80
CHER 00000M000	E	0.92	-0.30	0.39	-0.31	-0.85	-1.23	-1.58	0.15
CHER 00000M000	U	1.98	-0.23	-1.86	0.60	-1.36	3.24	2.09	-1.71
CREU 13432M001	N	1.22	-1.83	-1.07	0.82	0.30	0.05	0.56	1.84
CREU 13432M001	E	0.66	0.97	0.22	-0.74	0.27	-0.25	-0.23	-0.96
CREU 13432M001	U	3.69	3.95	-2.53	-2.14	-3.41	0.87	0.84	6.49
EBRE 13410M001	N	2.37	-0.54	4.55	-0.52	-2.27	-2.10	1.60	-0.45
EBRE 13410M001	E	3.15	-6.54	0.90	1.62	3.35	-1.28	0.50	-0.50
EBRE 13410M001	U	9.73	-13.40	-10.97	7.34	1.79	1.17	6.87	12.77
ELGE 19353S001	N	0.68	0.40	-0.64	0.51	-0.33	0.39	-1.14	-0.62
ELGE 19353S001	E	1.11	1.42	0.03	-1.36	-0.27	1.74	-0.69	-0.01
ELGE 19353S001	U	2.52	-3.26	-2.19	-1.30	3.10	0.78	2.88	1.62
EMAZ 17001M001	N	1.02	1.04	-0.92	1.22	1.05	-0.88	-0.68	-0.73
EMAZ 17001M001	E	1.19	-0.55	-0.55	0.00	0.77	0.55	1.41	-2.23
EMAZ 17001M001	U	4.27	-0.33	7.36	-6.82	2.37	-0.86	-1.35	-0.52
GERN 19389M001	N	0.97	0.94	-1.16	-0.69	0.26	1.02	-1.33	-0.24
GERN 19389M001	E	1.25	-0.62	-0.24	0.94	-1.59	0.57	2.26	-0.41
GERN 19389M001	U	2.83	0.88	1.59	-2.13	-0.83	-3.73	0.59	5.03
HOND 15012M002	N	1.04			-0.92	-0.24	1.45	0.78	-0.83
HOND 15012M002	E	0.58			-0.62	-0.54	-0.02	-0.82	-0.06
HOND 15012M002	U	1.42			0.39	-0.23	-0.01	-2.66	0.87
IGEL 19352S001	N	1.04	1.06	0.02	-0.26	1.47	0.64	0.50	-1.58
IGEL 19352S001	E	0.79	-1.04	-0.53	-0.67	-1.08	-0.07	-0.19	0.84
IGEL 19352S001	U	4.91	-1.86	8.67	4.03	-4.54	-3.78	-1.78	-3.47
ISPS 19484M001	N	0.87			0.24	-1.67	-0.38	0.04	0.17
ISPS 19484M001	E	1.02			0.41	-1.70	0.34	0.73	0.68
ISPS 19484M001	U	2.57			1.60	-3.64	2.27	-2.33	-0.37
KAST 19499M001	N	2.47	-0.35	4.83	0.48	-1.42	-0.91	-1.32	-2.87
KAST 19499M001	E	0.71	0.30	-0.53	0.91	-1.00	0.20	0.89	-0.03
KAST 19499M001	U	6.85	3.22	14.14	-0.21	-1.67	-3.68	-3.94	-6.24
LARE 19440M001	N	0.73	0.14	-0.49	1.06	-0.16	-0.20	-0.80	-1.07

LARE 19440M001	E	0.85	0.75	0.48	0.17	-0.31	0.43	0.47	-1.73
LARE 19440M001	U	1.54	0.50	1.47	-0.89	-0.48	-1.81	-0.12	2.75
LAZK 19354S001	N	1.46	0.98	0.14	-2.06	-1.02	2.18	-0.99	0.91
LAZK 19354S001	E	1.06	-0.97	0.60	-1.01	-0.13	-1.55	0.18	1.42
LAZK 19354S001	U	6.74	-3.67	-7.13	11.57	6.18	-1.01	-1.63	-5.69
LEIT 19428M001	N	1.22		1.61	-0.78	0.20	0.47	0.72	-1.85
LEIT 19428M001	E	1.27		0.80	-0.39	-1.86	-1.18	-0.90	1.26
LEIT 19428M001	U	3.13		-4.20	-0.08	-2.71	1.32	0.84	4.64
ORDN 19427M001	N	0.95	0.54	0.61	-1.65	-0.86	0.96	-0.35	0.56
ORDN 19427M001	E	0.66	-0.25	-0.33	-0.30	0.22	-0.38	0.81	-1.23
ORDN 19427M001	U	2.48	-4.19	-0.37	0.80	1.01	0.89	3.63	-1.90
PAS2 19351S001	N	0.66	0.74			0.71	-0.47	0.67	-0.03
PAS2 19351S001	E	0.75	-0.93			-0.68	-0.41	-0.56	0.65
PAS2 19351S001	U	2.44	-2.14			-2.64	-0.15	-1.75	3.02
PASA 19351S001	N	0.62	0.63	0.89	-0.07	0.58	-0.67	0.58	-0.12
PASA 19351S001	E	0.75	-0.91	-0.07	-1.01	-0.75	-0.33	-0.57	0.71
PASA 19351S001	U	1.71	-1.60	-1.13	-0.52	-1.00	0.29	-1.52	3.17
RIDI 13448M002	N	2.11	-0.16	0.55	0.57	0.96	-4.63	1.68	0.93
RIDI 13448M002	E	0.46	-0.80	-0.26	-0.28	-0.58	0.08	0.38	-0.08
RIDI 13448M002	U	2.81	-3.53	-0.24	-3.12	1.22	4.70	-1.20	0.16
SALA 13469M001	N	0.19			-0.28	0.23	0.08	0.09	0.05
SALA 13469M001	E	0.30			0.12	-0.02	-0.09	0.35	-0.47
SALA 13469M001	U	2.24			-1.35	-3.11	2.34	-1.08	1.43
SCDA 10088M002	N	0.68	1.29	-0.36	-0.44	-0.02	0.28	0.42	0.71
SCDA 10088M002	E	0.84	-1.21	-0.16	-1.08	-0.30	0.47	-1.06	-0.28
SCDA 10088M002	U	1.36	1.87	-1.95	0.55	0.04	-0.45	0.80	-1.62
SOPU 19386M001	N	1.17	0.02	1.04	0.60	0.13	-2.44	-0.88	0.04
SOPU 19386M001	E	1.02	0.03	-1.29	0.39	-0.38	-0.03	0.22	2.06
SOPU 19386M001	U	4.56	2.36	6.05	-7.31	1.75	-0.45	-3.92	3.23
TERU 13487M001	N	0.80			0.30	-0.41	0.77	-1.07	0.74
TERU 13487M001	E	0.40			0.19	0.43	0.11	-0.32	-0.55
TERU 13487M001	U	4.11			-1.21	-4.15	6.36	1.07	-2.69
VITO 19385M001	N	2.82	-6.07	1.12	-0.05	-0.09	2.72	-1.52	0.05
VITO 19385M001	E	3.85	8.68	0.32	-1.46	-0.51	-0.53	-0.30	-3.27
VITO 19385M001	U	5.96	-11.74	1.03	-7.22	0.97	4.30	1.29	-0.94
YEBE 13420M001	N	0.73	0.72	-0.63	-1.07	-0.63	-0.54	-0.45	-0.51
YEBE 13420M001	E	0.67	-0.12	0.03	0.56	0.51	0.79	1.10	0.49
YEBE 13420M001	U	1.69	-1.14	-0.42	-0.05	3.22	1.34	1.61	0.94
ZARA 13462M001	N	1.46	-1.98	-1.86	-0.63	-0.19	1.54	1.39	0.86
ZARA 13462M001	E	0.86	-0.04	1.22	0.54	-0.80	-0.42	-0.38	-1.31
ZARA 13462M001	U	3.69	3.60	1.60	2.08	0.07	2.10	-6.88	-3.21

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	-0.54	0.86	-0.22
12	ALAC 13433M001	I W	-0.92	-1.07	-0.94
15	ALBA 13452M001	I W	-0.87	-1.77	-1.27
21	ALME 13437M001	I W	-3.81	-1.34	3.52
47	BCLN 13412M001	I W	-0.16	-1.18	0.33
52	BELL 13431M001	I W	1.27	-1.92	1.35
71	BORR 13480M001	I W	-1.39	-1.54	-1.24
76	BRST 10004M004	I W	-1.16	-0.29	1.19
104	CACE 13447M001	I W	0.52	-0.89	3.55
116	CANT 13438M001	I W	-1.45	0.46	-2.59
117	CARG 19412M001	I W	1.48	-2.24	-3.49
122	CASE 13494M001	I W	-1.21	1.12	-2.52
128	CEU1 13449M002	I W	-0.88	-0.37	-1.26
143	COBA 13453M001	I W	0.05	0.18	-2.59
162	CREU 13432M001	I W	-1.29	-0.05	0.68
204	EBRE 13410M001	I W	-1.94	3.79	0.39
222	ESCO 13435M001	I W	-2.69	1.37	0.02
299	HUEL 13451M001	I W	-0.52	-2.07	-1.30
316	IZAN 31309M002	I W	-1.33	1.26	-2.55
385	LLIV 13436M001	I W	-0.04	1.05	3.83
390	LPAL 81701M001	I W	9.32	-1.49	6.88
392	LROC 10023M001	I W	-0.99	1.42	-1.22
421	MAS1 31303M002	I W	-0.14	0.19	-2.26
432	MELI 19379M001	I W	0.96	0.53	4.99
493	PASA 19351S001	I W	0.98	-1.25	-4.29
553	RID1 13448M002	I W	-0.62	-0.49	-2.93
558	SALA 13469M001	I W	-0.20	1.52	-5.33
566	SCOA 10088M002	I W	2.74	0.72	-3.60
574	SFER 13402M004	I W	2.20	-2.97	2.30
599	SONS 13446M001	I W	1.26	3.23	5.39
700	VALA 13463M002	I W	-0.23	2.43	2.51
704	VALE 13439M001	I W	0.92	0.65	-0.26
715	VIGO 13450M001	I W	0.91	-0.86	2.92
755	ZARA 13462M001	I W	-0.38	1.41	1.57
764	ZIMM 14001M004	I W	0.13	-0.36	-1.55
	RMS / COMPONENT		2.09	1.56	2.92
	MEAN		-0.00	-0.00	-0.00
	MIN		-3.81	-2.97	-5.33
	MAX		9.32	3.79	6.88

NUMBER OF PARAMETERS : 3
NUMBER OF COORDINATES : 105
RMS OF TRANSFORMATION : 2.26 MM

BARYCENTER COORDINATES:

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

PARAMETERS:

TRANSLATION IN N : -0.01 +- 0.38 MM
TRANSLATION IN E : -0.02 +- 0.38 MM
TRANSLATION IN U : 0.00 +- 0.38 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          17865968
NUMBER OF UNKNOWN               210040
NUMBER OF DEGREES OF FREEDOM    17655928
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)      180
VARIANCE FACTOR                  1.806146678036672

Helmert Transformation Parameters With Respect to Combined Solution:
-----
Sol  Rms (m)      Translation (m)      Rotation (")      Scale (ppm)
      X          Y          Z          X          Y          Z
-----
  1  0.00233      0.0115 -0.0180 -0.0129  0.0004  0.0005 -0.0004 -0.00021
  2  0.00202      0.0124  0.0004 -0.0137 -0.0000  0.0006 -0.0000 -0.00018
  3  0.00184      -0.0138  0.0030  0.0137 -0.0002 -0.0006 -0.0000  0.00038
  4  0.00183      -0.0025  0.0146  0.0035 -0.0003 -0.0001  0.0003 -0.00001
  5  0.00244      0.0076 -0.0114 -0.0096  0.0002  0.0004 -0.0003  0.00003
  6  0.00176      -0.0022 -0.0086 -0.0030  0.0002  0.0000 -0.0002  0.00042
  7  0.00215      0.0031  0.0067 -0.0018 -0.0001  0.0001  0.0002 -0.00004
```

```
Statistics of individual solutions:
-----
File  RMS (m)      DOF  Ch3**2/DOF  #Observations authentic / pseudo  #Parameters explicit / implicit / singular
-----
  1  0.00134      2115274      1.78      2141411      3      777      25363      0
  2  0.00133      2000609      1.77      2025801      3      744      24451      0
  3  0.00123      2731212      1.51      2762206      3      990      30007      0
  4  0.00135      2737455      1.81      2770549      3      987      32110      0
  5  0.00140      2761028      1.95      2795571      3      990      33556      0
  6  0.00130      2586566      1.70      2618176      3      927      30686      0
  7  0.00142      2718396      2.02      2752254      3      1002      32859      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 21:337:00000 21:338:86370 LEICA GR50 -----
ALDA  A  1 P 21:332:36000 21:338:86370 LEICA GR10 -----
ALSA  A  1 P 21:332:00000 21:338:86370 LEICA GR50 -----
AMUR  A  1 P 21:332:00000 21:338:86370 LEICA GR10 -----
BIAZ  A  1 P 21:332:00000 21:338:79170 SPECTRA SP90M -----
BIDA  A  1 P 21:332:00000 21:338:86370 LEICA GR10 -----
BRZR  A  1 P 21:332:00000 21:338:86370 LEICA GR30 -----
CACE  A  1 P 21:332:00000 21:338:86370 TRIMBLE NETR9 -----
CANT  A  1 P 21:334:00000 21:338:86370 LEICA GR10 -----
CHER  A  1 P 21:332:00000 21:338:86370 LEICA GR30 -----
CREU  A  1 P 21:332:00000 21:338:86370 LEICA GR50 -----
EBRE  A  1 P 21:332:00000 21:338:86370 LEICA GR50 -----
ELGE  A  1 P 21:332:00000 21:338:86370 LEICA GR30 -----
EMAZ  A  1 P 21:332:00000 21:338:86370 LEICA GR30 -----
GERN  A  1 P 21:332:00000 21:338:86370 LEICA GR30 -----
HOND  A  1 P 21:334:00000 21:338:86370 LEICA GR50 -----
IGEL  A  1 P 21:332:00000 21:338:86370 LEICA GR30 -----
ISPS  A  1 P 21:334:00000 21:338:86370 TRIMBLE NETR9 -----
KAST  A  1 P 21:332:00000 21:338:86370 LEICA GR30 -----
LARE  A  1 P 21:332:00000 21:338:86370 LEICA GR50 -----
LAZK  A  1 P 21:332:00000 21:338:86370 LEICA GR30 -----
LEIT  A  1 P 21:333:00000 21:338:86370 LEICA GR50 -----
ORON  A  1 P 21:332:00000 21:338:86370 LEICA GR50 -----
PAS2  A  1 P 21:332:00030 21:338:86370 STONEX SC2200 -----
PASA  A  1 P 21:332:00000 21:338:86370 LEICA GR30 -----
RIO1  A  1 P 21:332:00000 21:338:86370 LEICA GR25 -----
SALA  A  1 P 21:334:00000 21:338:86370 TRIMBLE NETR9 -----
SCOA  A  1 P 21:332:00000 21:338:86370 LEICA GR25 -----
SOPU  A  1 P 21:332:00000 21:338:86370 LEICA GR30 -----
TERU  A  1 P 21:334:00000 21:338:86370 LEICA GR50 -----
VITO  A  1 P 21:332:00000 21:338:86370 LEICA GR10 -----
YEBE  A  1 P 21:332:00000 21:338:86370 LEICA GR50 -----
ZARA  A  1 P 21:332:00000 21:338:86370 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 21:337:00000 21:338:86370 LEIAT504 LEIS -----
ALDA  A  1 P 21:332:36000 21:338:86370 LEIAS10 NONE -----
ALSA  A  1 P 21:332:00000 21:338:86370 LEIAR10 NONE -----
```

```

AMUR A 1 P 21:332:00000 21:338:86370 LEIAS10 NONE -----
BIAZ A 1 P 21:332:00000 21:338:79170 LEIAR25 LEIT -----
BIDA A 1 P 21:332:00000 21:338:86370 LEIAS10 NONE -----
BRZR A 1 P 21:332:00000 21:338:86370 LEIAS10 NONE -----
CACE A 1 P 21:332:00000 21:338:86370 TRM29659.00 NONE -----
CANT A 1 P 21:334:00000 21:338:86370 LEIAR25.R4 LEIT 25066
CHER A 1 P 21:332:00000 21:338:86370 LEIAR10 NONE -----
CREU A 1 P 21:332:00000 21:338:86370 LEIAR25.R4 NONE 26357
EBRE A 1 P 21:332:00000 21:338:86370 LEIAR25.R4 NONE 26359
ELGE A 1 P 21:332:00000 21:338:86370 LEIAR25.R4 LEIT -----
EMAZ A 1 P 21:332:00000 21:338:86370 LEIAS10 NONE -----
GERN A 1 P 21:332:00000 21:338:86370 LEIAS10 NONE -----
HOND A 1 P 21:334:00000 21:338:86370 LEIAR20 LEIM 41012
IGEL A 1 P 21:332:00000 21:338:86370 LEIAS10 NONE -----
ISPS A 1 P 21:334:00000 21:338:86370 TRM59900.00 SCIS -----
KAST A 1 P 21:332:00000 21:338:86370 LEIAS10 NONE -----
LARE A 1 P 21:332:00000 21:338:86370 LEIAR20 LEIM -----
LAZK A 1 P 21:332:00000 21:338:86370 LEIAR25.R4 LEIT -----
LEIT A 1 P 21:333:00000 21:338:86370 LEIAR10 NONE -----
ORDN A 1 P 21:332:00000 21:338:86370 LEIAR10 NONE -----
PAS2 A 1 P 21:332:00030 21:338:86370 LEIAR20 LEIM 73034
PASA A 1 P 21:332:00000 21:338:86370 LEIAR20 LEIM 73034
RIO1 A 1 P 21:332:00000 21:338:86370 LEIAR25.R4 LEIT 25138
SALA A 1 P 21:334:00000 21:338:86370 LEIAR25 NONE -----
SCDA A 1 P 21:332:00000 21:338:86370 TRM55971.00 NONE -----
SOPU A 1 P 21:332:00000 21:338:86370 LEIAS10 NONE -----
TERU A 1 P 21:334:00000 21:338:86370 LEIAR20 LEIM 49044
VITO A 1 P 21:332:00000 21:338:86370 LEIAS10 NONE -----
YEBE A 1 P 21:332:00000 21:338:86370 LEIAR20 LEIM 49016
ZARA A 1 P 21:332:00000 21:338:86370 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 21:337:00000 21:338:86370 UNE 3.0460 0.0000 0.0000
ALDA A 1 P 21:332:36000 21:338:86370 UNE 0.0000 0.0000 0.0000
ALSA A 1 P 21:332:00000 21:338:86370 UNE 0.0000 0.0000 0.0000
AMUR A 1 P 21:332:00000 21:338:86370 UNE 0.0000 0.0000 0.0000
BIAZ A 1 P 21:332:00000 21:338:79170 UNE 0.0000 0.0000 0.0000
BIDA A 1 P 21:332:00000 21:338:86370 UNE 0.0000 0.0000 0.0000
BRZR A 1 P 21:332:00000 21:338:86370 UNE 0.0771 0.0000 0.0000
CACE A 1 P 21:332:00000 21:338:86370 UNE 0.0600 0.0000 0.0000
CANT A 1 P 21:334:00000 21:338:86370 UNE 3.0490 0.0000 0.0000
CHER A 1 P 21:332:00000 21:338:86370 UNE 0.0000 0.0000 0.0000
CREU A 1 P 21:332:00000 21:338:86370 UNE 0.0770 0.0000 0.0000
EBRE A 1 P 21:332:00000 21:338:86370 UNE 0.0770 0.0000 0.0000
ELGE A 1 P 21:332:00000 21:338:86370 UNE 0.0000 0.0000 0.0000
EMAZ A 1 P 21:332:00000 21:338:86370 UNE 0.0350 0.0000 0.0000
GERN A 1 P 21:332:00000 21:338:86370 UNE 0.0771 0.0000 0.0000
HOND A 1 P 21:334:00000 21:338:86370 UNE 0.0771 0.0000 0.0000
IGEL A 1 P 21:332:00000 21:338:86370 UNE 0.0000 0.0000 0.0000
ISPS A 1 P 21:334:00000 21:338:86370 UNE 0.0350 0.0000 0.0000
KAST A 1 P 21:332:00000 21:338:86370 UNE 0.0350 0.0000 0.0000
LARE A 1 P 21:332:00000 21:338:86370 UNE 0.0000 0.0000 0.0000
LAZK A 1 P 21:332:00000 21:338:86370 UNE 0.0000 0.0000 0.0000
LEIT A 1 P 21:333:00000 21:338:86370 UNE 0.0000 0.0000 0.0000
ORDN A 1 P 21:332:00000 21:338:86370 UNE 0.0000 0.0000 0.0000
PAS2 A 1 P 21:332:00030 21:338:86370 UNE 0.0000 0.0000 0.0000
PASA A 1 P 21:332:00000 21:338:86370 UNE 0.0000 0.0000 0.0000
RIO1 A 1 P 21:332:00000 21:338:86370 UNE 0.0606 0.0000 0.0000
SALA A 1 P 21:334:00000 21:338:86370 UNE 0.0600 0.0000 0.0000
SCDA A 1 P 21:332:00000 21:338:86370 UNE 0.0000 0.0000 0.0000
SOPU A 1 P 21:332:00000 21:338:86370 UNE 0.0771 0.0000 0.0000
TERU A 1 P 21:334:00000 21:338:86370 UNE 0.0600 0.0000 0.0000
VITO A 1 P 21:332:00000 21:338:86370 UNE 0.0000 0.0000 0.0000
YEBE A 1 P 21:332:00000 21:338:86370 UNE 0.0000 0.0000 0.0000
ZARA A 1 P 21:332:00000 21:338:86370 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:

```

2021-12-13 00:02 UTC | MUL13320.210 | ANTENNA TYPE | LEIATS04GG | LEIS -> LEIAR25 | LEIT
2021-12-13 22:51 UTC | MUL13330.210 | ANTENNA TYPE | LEIATS04GG | LEIS -> LEIAR25 | LEIT
2021-12-14 23:34 UTC | MUL13340.210 | ANTENNA TYPE | LEIATS04GG | LEIS -> LEIAR25 | LEIT
2021-12-15 23:24 UTC | MUL13350.210 | ANTENNA TYPE | LEIATS04GG | LEIS -> LEIAR25 | LEIT
2021-12-16 23:26 UTC | MUL13360.210 | ANTENNA TYPE | LEIATS04GG | LEIS -> LEIAR25 | LEIT
2021-12-19 13:50 UTC | MUL13370.210 | ANTENNA TYPE | LEIATS04GG | LEIS -> LEIAR25 | LEIT
2021-12-18 23:37 UTC | MUL13380.210 | ANTENNA TYPE | LEIATS04GG | LEIS -> LEIAR25 | LEIT

```

9 References

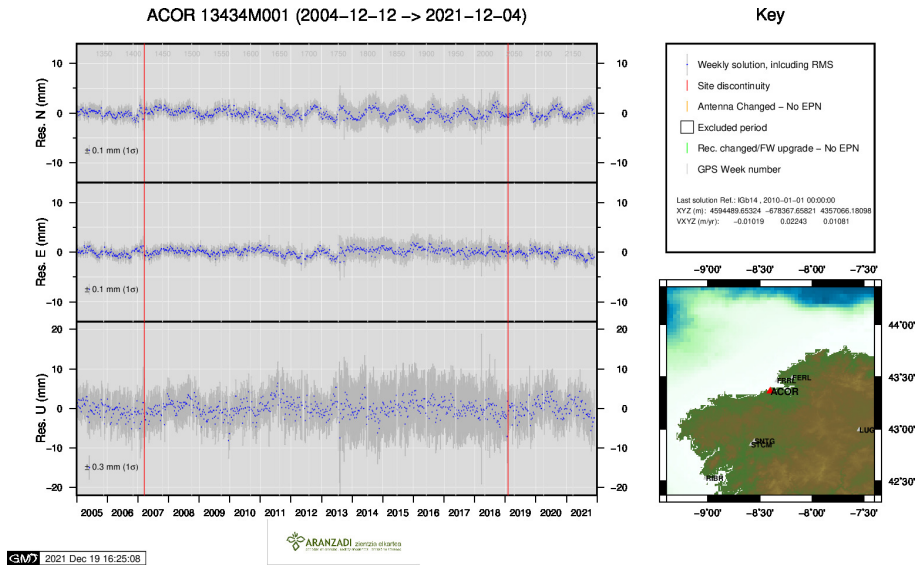
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign*. etrs89.ensg.ign.fr/memo-V8.pdf

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

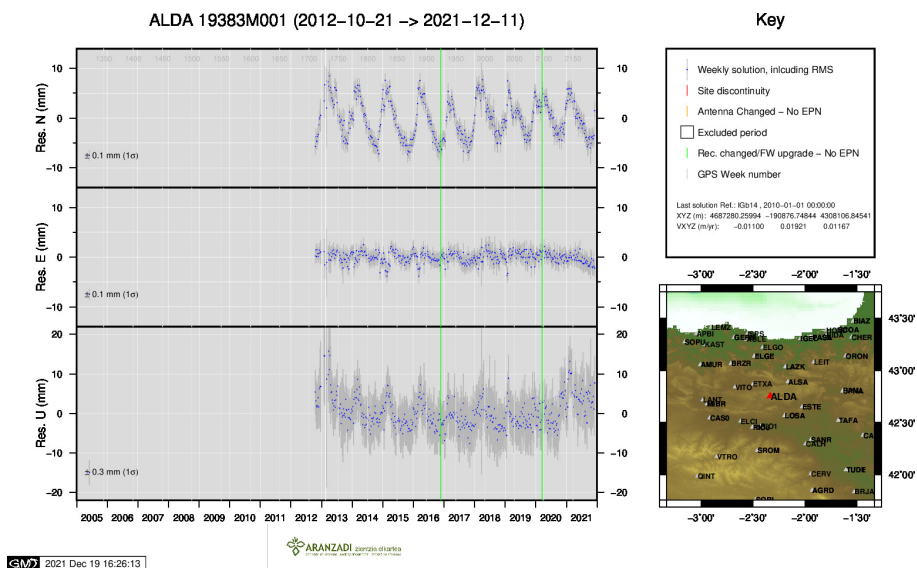
Z. Altamimi (2018): *EUREF Technical Note 1: Relationship and Transformation between the International and the European Terrestrial Reference Systems*. etrs89.ensg.ign.fr/pub/EUREF-TN-1.pdf

10 Cumulative Time Series

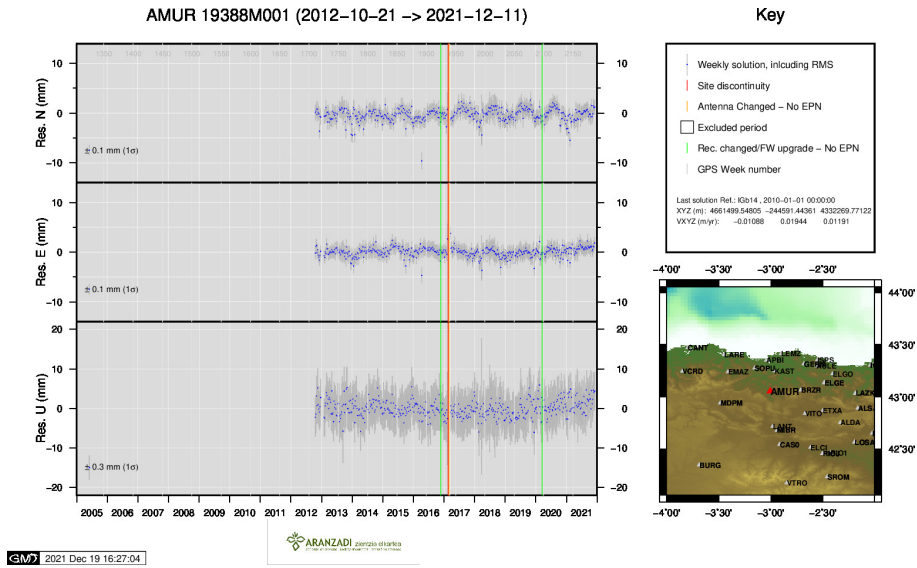
Time series of stations. Latest plots at: <http://geolabpasaia.org/gnss/ARA-net/TSeries/>, or click on the caption of each image.



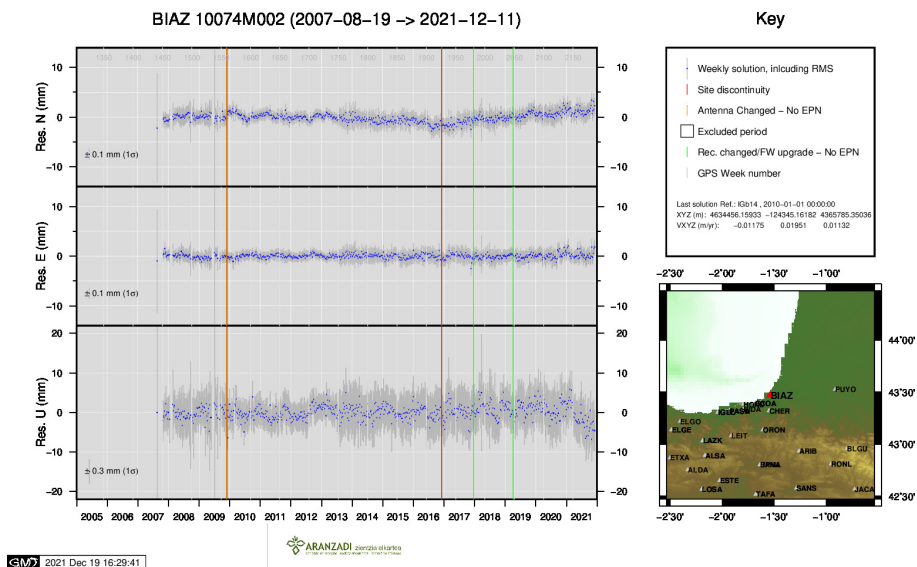
1) ACOR



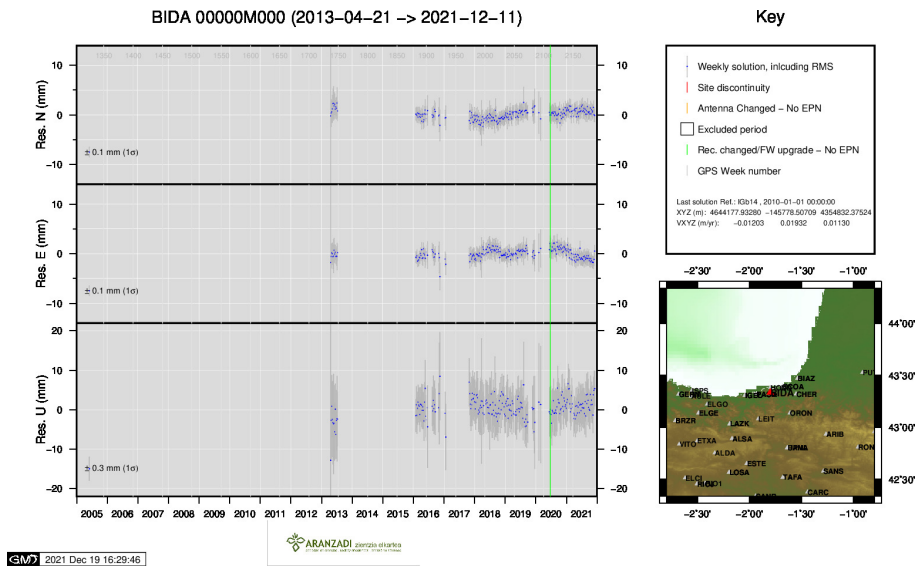
2) ALDA



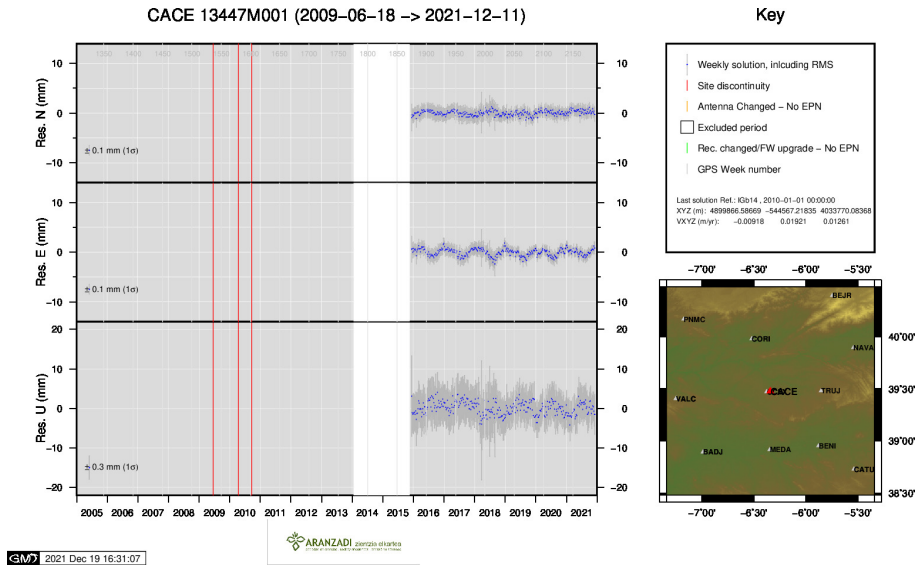
3) AMUR



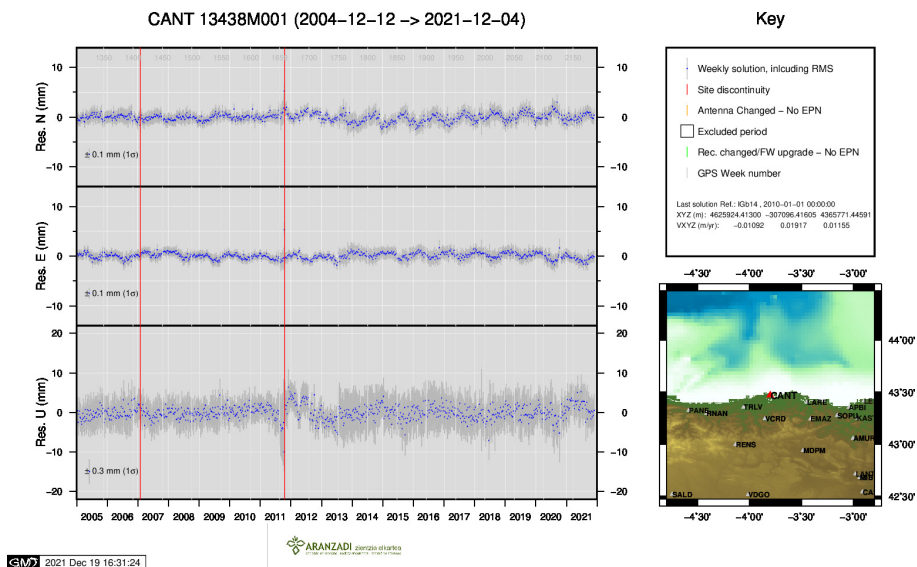
4) BIAZ



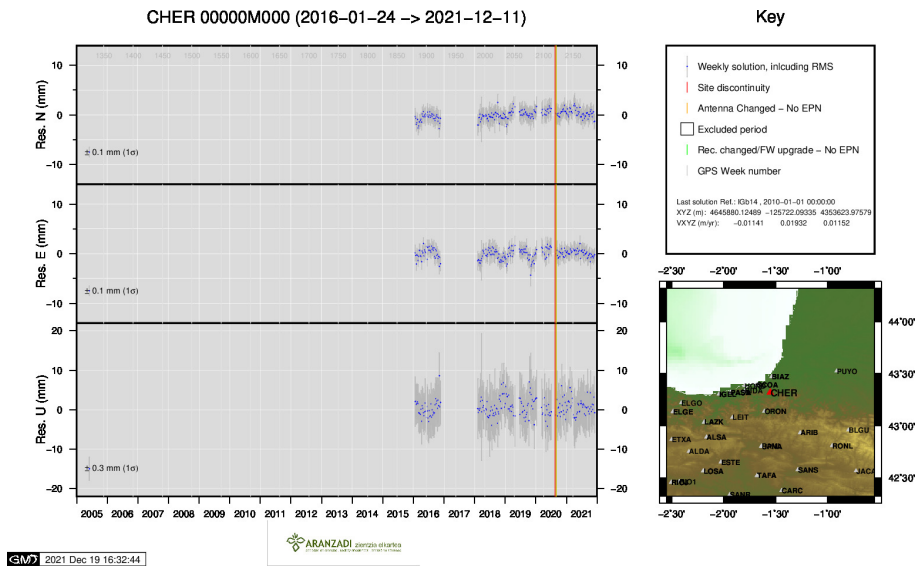
5) BIDA



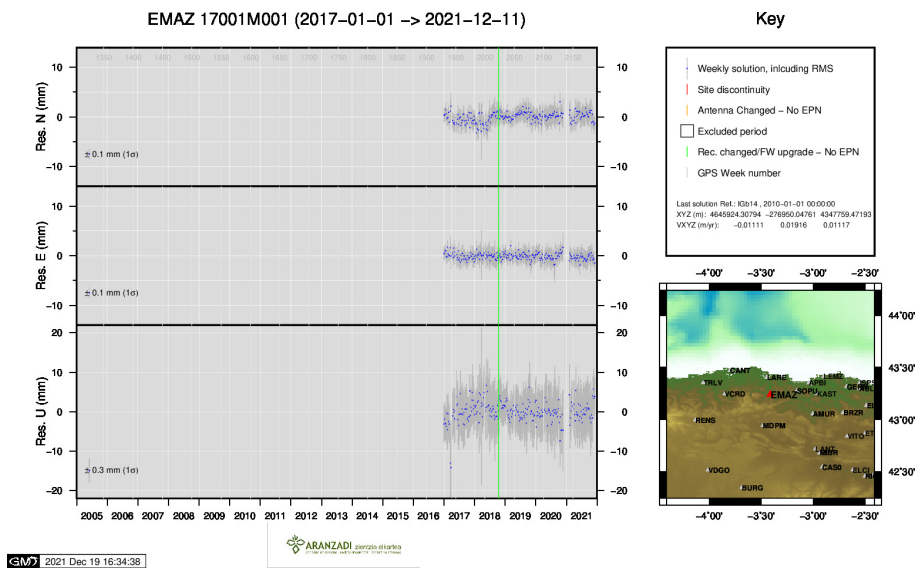
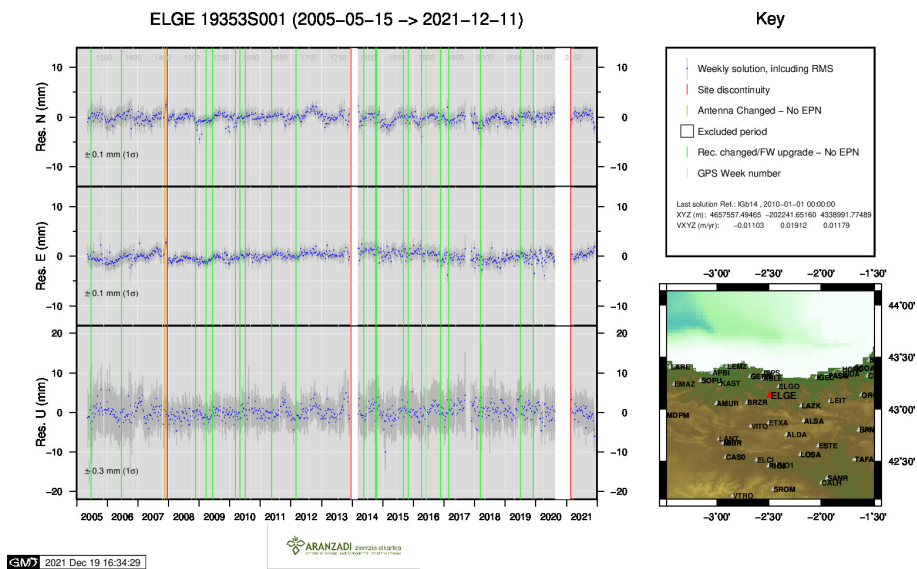
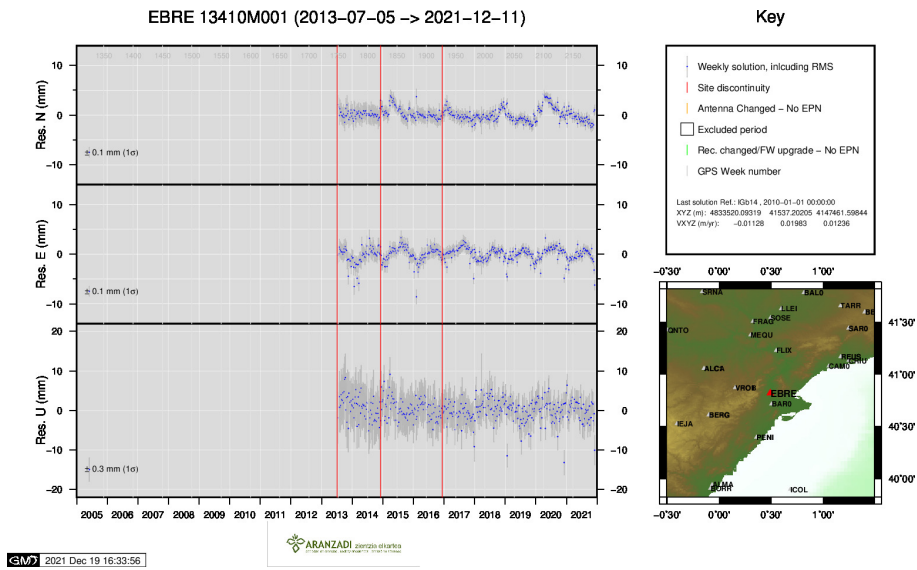
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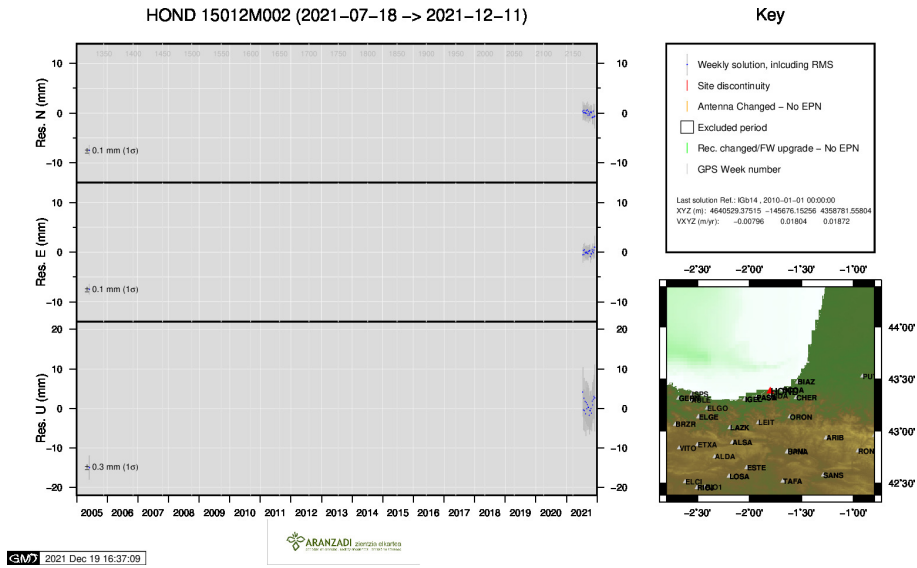


7) CANT

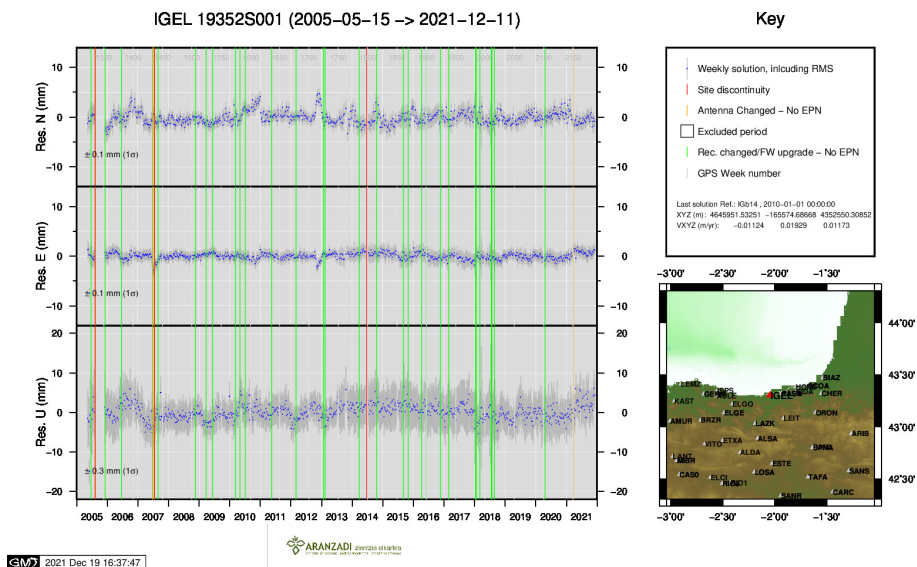


8) CHER

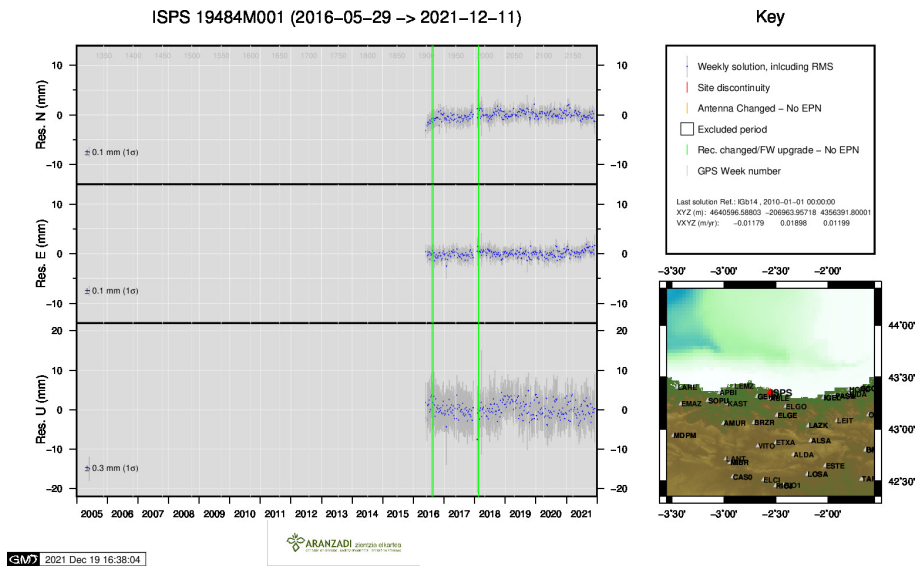




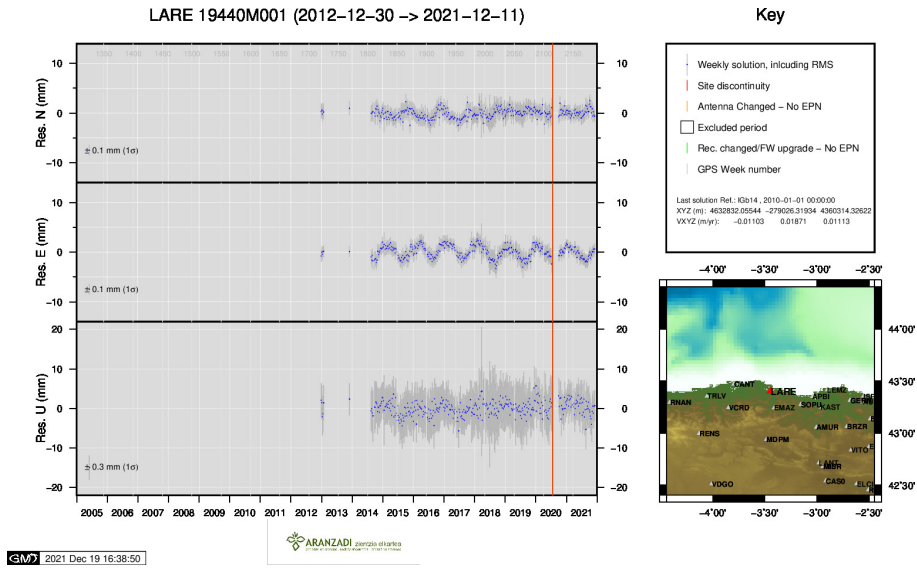
12) HOND



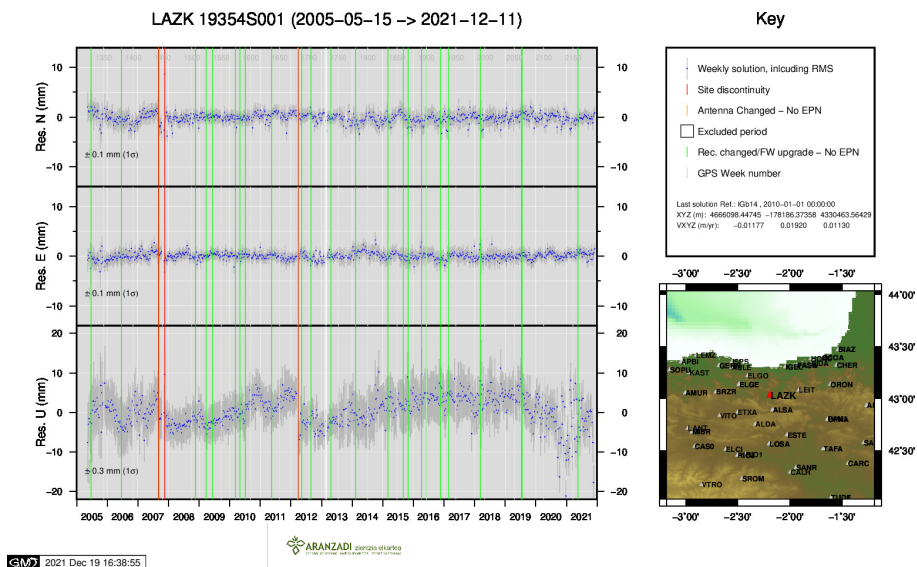
13) IGEL



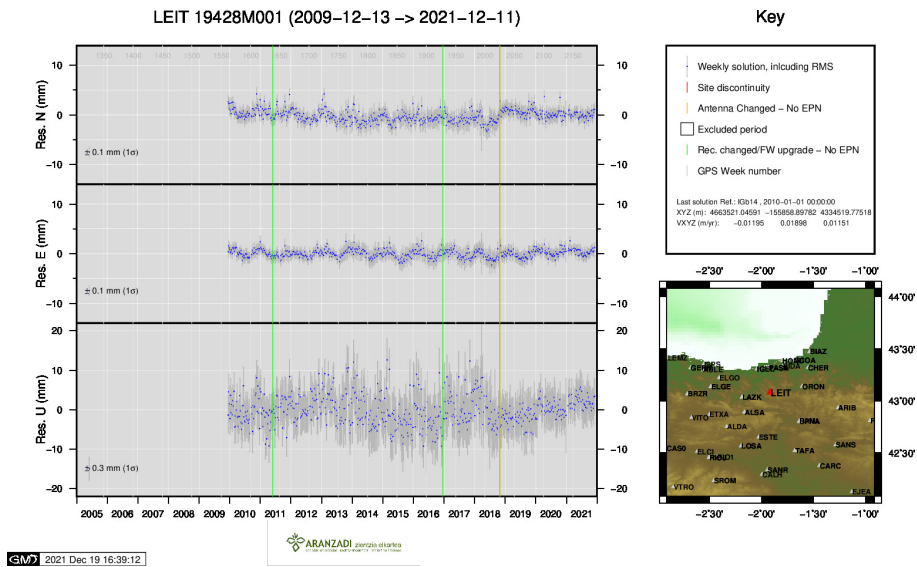
14) ISPS



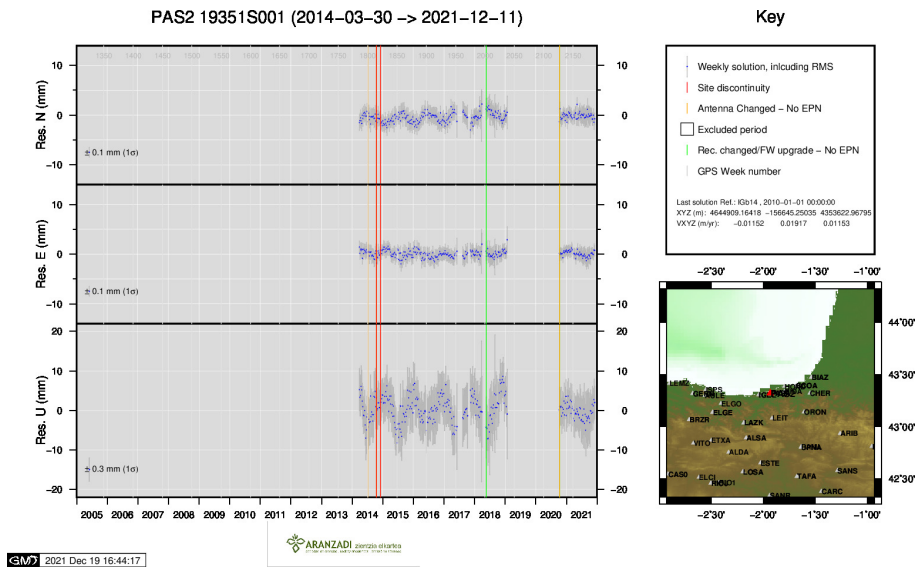
15) LARE



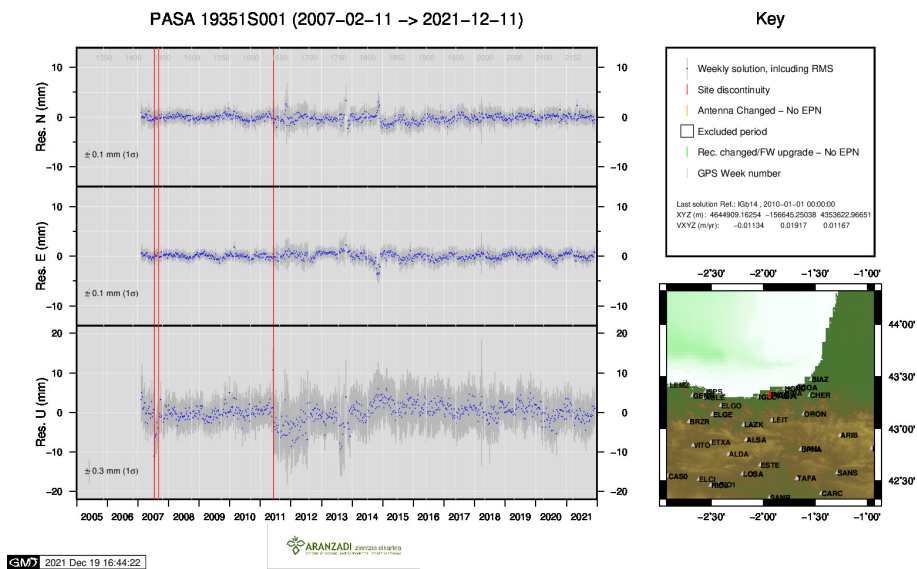
16) LAZK



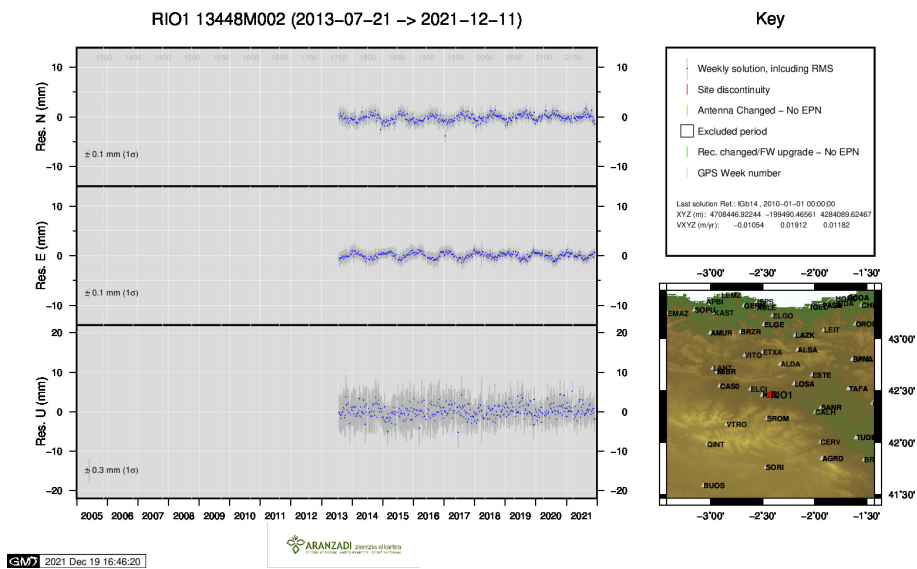
17) LEIT



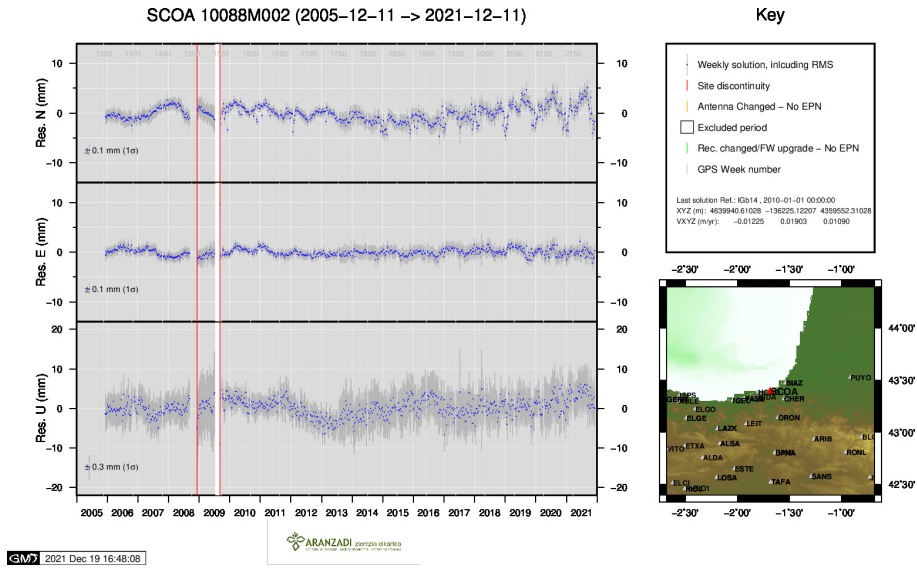
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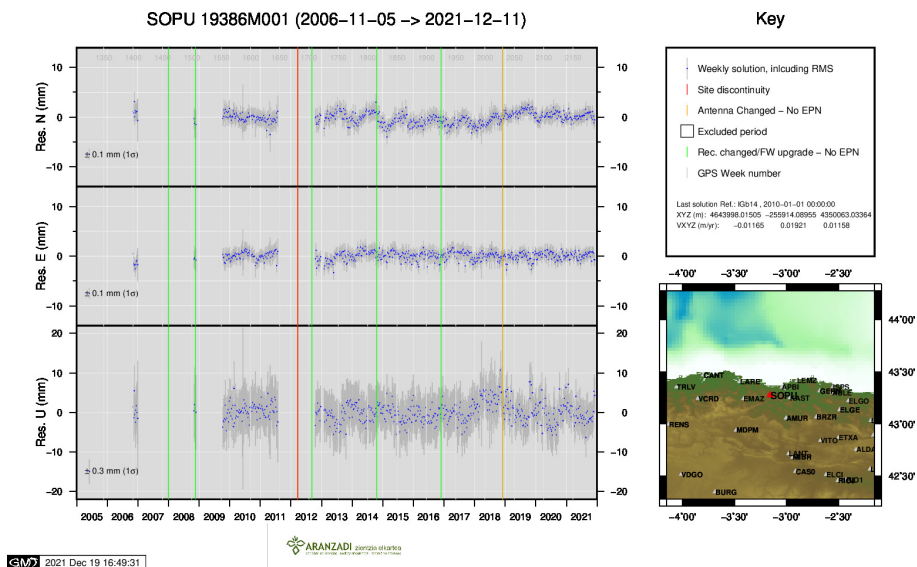
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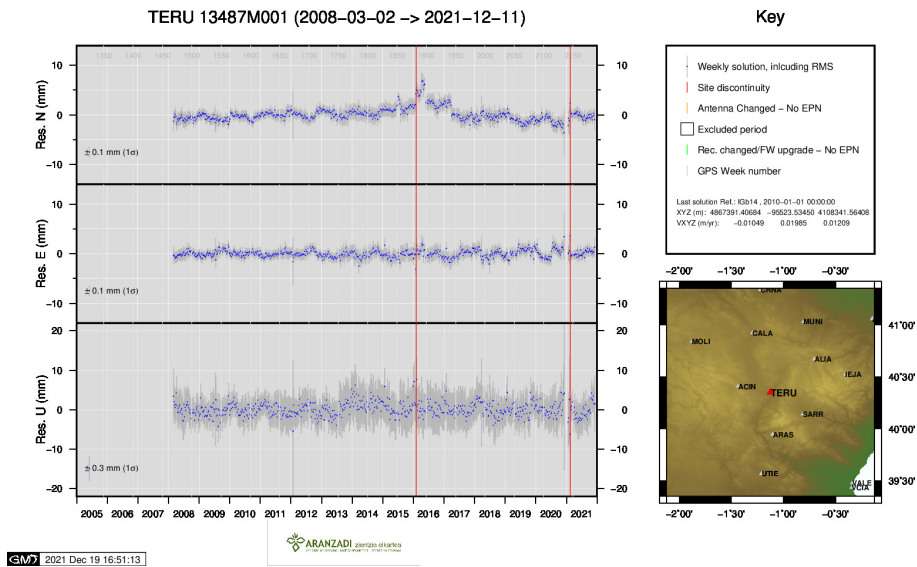
20) RIO1



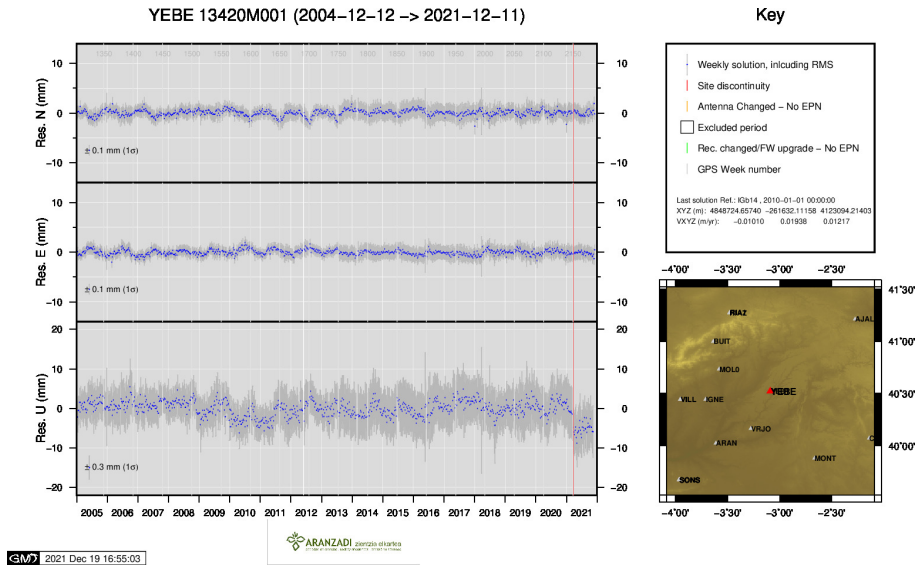
21) SCOA



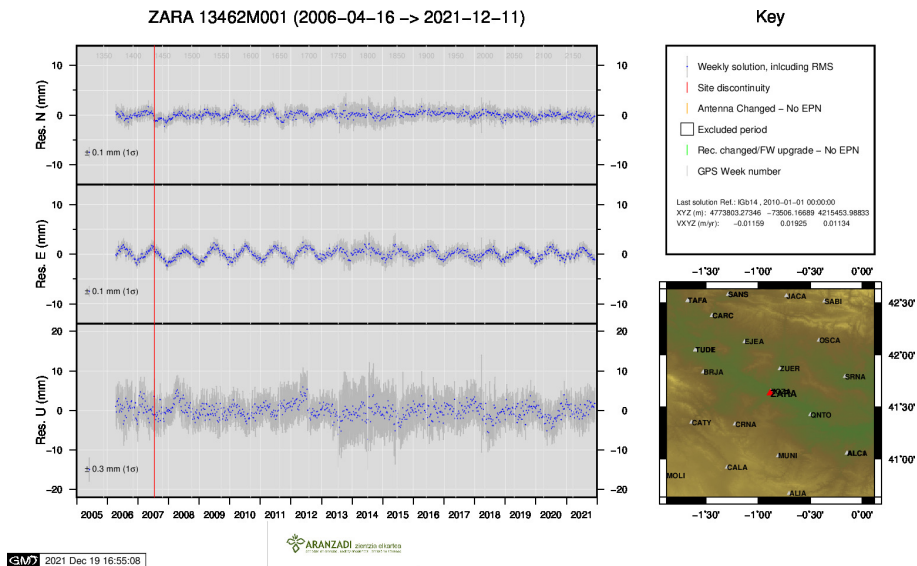
22) SOPU



23) TERU



24) YEBE



25) ZARA