

ARA-DAC Weekly Analysis Result: 2276 (GFA)

Technical Report

GPS Week: 2276 (GFA)

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

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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 is used if available starting GPS week 1986)
- 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.I20 file and individual calibrations from EPNC_20.ATX. In case no calibration values of an antenna/radome pairs are not available for a certain GNSS system at some station, the observation of this/these GNSS/GNSSs are excluded from the analysis of that station.
- EPN_A class sites (CRD + VEL) IGS20 used to define the reference frame (no EPN release is available at the time this report is generated). Following the EUREF guidelines, no other individual calibrations are included in the analysis starting GPSW 2238 (IGS20).
- Calibraciones de antena: calibraciones absolutas del IGS, incluidas en el fichero igs20.atx. A partir de la semana GPS 2238 (IGS20) No se incluyen calibraciones absolutas individuales de ninguna otra antena.
- El datum se establece con las estaciones EPN de clase A (coordenadas y velocidades) en datum IGS20 (solución PRELIMINAR, basada en IGB14). En caso de no disponer de datos de calibración de una determinada antena/radomo para cierto sistem GNSS, las observaciones de éste se omiten en el cálculo de la estación.
- Troposphere:
 - minimum elevation is 3 deg.; elevation dependent weighting.
 - VMF3 mapping function. ZPD parameters are estimated using the VMF3 mapping function.
 - CHENHER gradient estimation model.
- Ionosphere: no a priori model, ionospheric effect almost removed by iono free combination.
- Ocean Loading: FES2014b (Scherneck).
- Atmospheric loading: not corrected, following the latest recommendations for IGS20 products.
- Tidal displacements:
 - Mean pole model : IERS2010_v1.2.0
 - Subdaily pole model: DESAI2016
 - Nutation model : IAU2000R06

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. DE421 planetary ephemeris and JGM3 Earth geopotential model is used.
- Ambiguity: an advanced ambiguity resolution (AR) scheme is included:
 - Code-Based Widelane (WL) and Narrow Line (NR) 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 IGS20

The Reference Frame considered in this section is a PRELIMINARY IGS20, based on the previously used IGB14 solution.

ARA FINAL WEEKLY COMBINATION: FINAL ORBITS 11-SEP-23 23:41

LOCAL GEODETIC DATUM: IGS20 EPOCH: 2023-08-23 11:59:45

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	SYSTEM
4	ACOR 13434M001	4594489.51079	-678367.35396	4357066.32813	W	G
50	ALSA 19419M001	4677250.78674	-176770.31491	4319079.93041	A	GRE
100	BIAZ 10074M002	4634455.99662	-124344.89627	4365785.50345	A	GR
101	BIDA 00000M000	4644177.77363	-145778.24294	4354832.53295	A	GR
104	CACE 13447M001	4899866.46066	-544566.95741	4033770.25692	W	GRE
116	CANT 13438M001	4625924.26581	-307096.15798	4365771.61082	W	GRE
162	CREU 13432M001	4715420.07501	273178.14034	4271946.89269	W	GRE
204	EBRE 13410M001	4833519.93882	41537.47385	4147461.76784	A	GRE
180	ELGE 19353S001	4657557.34393	-202241.39064	4338991.93743	A	GRE
257	HOND 15012M002	4640529.27018	-145675.90606	4358761.80770	A	GRE
235	IGEL 19352S001	4645951.38031	-165574.42467	4352550.47481	A	GRE
240	ISPS 19484M001	4640596.42950	-206963.69594	4356391.96434	A	GRE
252	LARE 19440M001	4632831.90820	-279026.06658	4360314.48247	A	GRE
256	LAZK 19354S001	4666098.29062	-178186.11179	4330463.72198	A	GRE
261	LEIT 19428M001	4663520.88930	-155858.64061	4334519.93855	A	GRE
334	ORON 19427M001	4659695.73200	-130864.65440	4338948.93929	A	GRE
345	PAS2 19351S001	4644909.01232	-156644.99060	4353623.12861	A	GRE
493	PASA 19351S001	4644909.01216	-156644.99066	4353623.12869	W	GRE
553	RID1 13448M002	4708446.77872	-199490.20366	4284089.78823	W	GRE
558	SALA 13469M001	4803054.43650	-462130.98950	4158379.12635	W	GR
566	SCDA 10088M002	4639940.45606	-136224.86024	4359552.47902	A	GRE
443	TERU 13487M001	4867391.26914	-95523.26362	4108341.73315	A	GRE
752	YEBE 13420M001	4848724.52128	-261631.84756	4123094.38071	A	GRE
755	ZARA 13462M001	4773803.11767	-73505.90381	4215454.14530	W	GRE

5.2 ETRF2000 (ETRS89) Coordinates

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

CONVERT TO ETRF2000 11-SEP-23 23:41

LOCAL GEODETIC DATUM: ETRF2000 EPOCH: 2023-08-23 11:59:45

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	SYSTEM
4	ACOR 13434M001	4594489.84850	-678367.97477	4357065.85783	W	
50	ALSA 19419M001	4677251.18832	-176770.94461	4319079.46000	A	
100	BIAZ 10074M002	4634456.40888	-124345.52074	4365785.03743	A	
101	BIDA 00000M000	4644178.18216	-145778.86863	4354832.06580	A	
104	CACE 13447M001	4899866.79054	-544567.61402	4033769.76228	W	
116	CANT 13438M001	4625924.65373	-307096.78190	4365771.14301	W	
162	CREU 13432M001	4715420.53268	273177.50765	4271946.42511	W	
204	EBRE 13410M001	4833520.35581	41536.82640	4147461.28699	A	
180	ELGE 19353S001	4657557.74369	-202242.01807	4338991.46836	A	
257	HOND 15012M002	4640529.67904	-145676.53131	4358781.34087	A	
235	IGEL 19352S001	4645951.78603	-165575.05062	4352550.00724	A	
240	ISPS 19484M001	4640596.83001	-206964.32137	4356391.49666	A	
252	LARE 19440M001	4632832.29942	-279026.69126	4360314.01446	A	
256	LAZK 19354S001	4666098.69291	-178186.74016	4330463.25251	A	
261	LEIT 19428M001	4663521.29488	-155859.26862	4334519.46961	A	
334	ORON 19427M001	4659696.14126	-130865.28189	4338948.47102	A	
345	PAS2 19351S001	4644909.41931	-156645.61640	4353622.66125	A	
493	PASA 19351S001	4644909.41915	-156645.61646	4353622.66133	W	
553	RID1 13448M002	4708447.17449	-199490.83710	4284089.31484	W	
558	SALA 13469M001	4803054.78729	-462131.63466	4158378.64119	W	
566	SCDA 10088M002	4639940.86624	-136225.48540	4359552.01237	A	
443	TERU 13487M001	4867391.66479	-95523.91548	4108341.24753	A	
752	YEBE 13420M001	4848724.89599	-261632.49767	4123093.89441	A	
755	ZARA 13462M001	4773803.52476	-73506.54461	4215453.66802	W	

5.3 ETRF2014 (ETRS89) Coordinates

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

CONVERT TO ETRF2014 11-SEP-23 23:41

LOCAL GEODETIC DATUM: ETRF2014 EPOCH: 2023-08-23 11:59:45

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG	SYSTEM
4	ACDR 13434M001	4594489.80831	-678368.01183	4357065.90999	W	
50	ALSA 19419M001	4677251.14571	-176770.98315	4319079.51206	A	
100	BLAZ 10074M002	4634456.36655	-124345.55967	4365785.08965	A	
101	BIDA 00000M000	4644178.13981	-145778.90743	4354832.11798	A	
104	CACE 13447M001	4899866.74653	-544567.65021	4033769.81359	W	
116	CANT 13438M001	4625924.61211	-307096.82019	4365771.19517	W	
162	CREU 13432M001	4715420.48795	273177.46765	4271946.47738	W	
204	EBRE 13410M001	4833520.31065	41536.78776	4147461.33874	A	
180	ELGE 19353S001	4657557.70139	-202242.05661	4338991.52047	A	
257	HOND 15012M002	4640529.63673	-145676.57013	4358781.39305	A	
235	IGEL 19352S001	4645951.74373	-165575.08935	4352550.05940	A	
240	ISPS 19484M001	4640596.78791	-206964.35996	4356391.54881	A	
252	LARE 19440M001	4632832.25764	-279026.72962	4360314.06661	A	
256	LAZK 19354S001	4666098.65043	-178186.77875	4330463.30460	A	
261	LEIT 19428M001	4663521.25236	-155859.30730	4334519.52172	A	
334	ORDN 19427M001	4659696.09869	-130865.32067	4338948.52316	A	
345	PAS2 19351S001	4644909.37699	-156645.65516	4353622.71342	A	
493	PASA 19351S001	4644909.37683	-156645.65522	4353622.71350	W	
553	RI01 13448M002	4708447.13162	-199490.87543	4284089.36679	W	
558	SALA 13469M001	4803054.74418	-462131.67160	4158378.69278	W	
566	SC0A 10088M002	4639940.82390	-136225.52425	4359552.06456	A	
443	TERU 13487M001	4867391.61974	-95523.95348	4108341.29909	A	
752	YEBE 13420M001	4848724.85172	-261632.53514	4123093.94594	A	
755	ZARA 13462M001	4773803.48071	-73506.58310	4215453.71986	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 IGS20 solution and are given with respect to the Local frame (North-East-Up).

GFA FINAL WEEKLY COMBINATION: FINAL ORBITS 11-SEP-23 23:41

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	6	XXX XXX	0.63	1.28	3.96
ALSA 19419M001	7	XXXXXX	1.76	0.99	4.27
BIAZ 10074M002	7	XXXXXX	1.51	1.27	7.54
BIDA 00000M000	7	XXXXXX	0.41	0.96	5.20
CACE 13447M001	5	XX XXX	1.14	0.93	3.45
CANT 13438M001	7	XXXXXX	1.02	0.76	2.24
CREU 13432M001	7	XXXXXX	1.64	1.07	4.80
EBRE 13410M001	7	XXXXXX	0.90	0.81	5.22
ELGE 19353S001	7	XXXXXX	1.14	0.86	5.00
HOND 15012M002	7	XXXXXX	0.70	0.90	5.83
IGEL 19352S001	7	XXXXXX	0.77	0.76	3.73
ISPS 19484M001	7	XXXXXX	1.82	1.15	4.28
LARE 19440M001	7	XXXXXX	1.11	0.85	4.72
LAZK 19354S001	7	XXXXXX	0.72	1.00	7.38
LEIT 19428M001	7	XXXXXX	1.08	0.84	3.05
ORON 19427M001	7	XXXXXX	1.09	0.88	5.69
PAS2 19351S001	7	XXXXXX	0.97	0.70	5.05
PASA 19351S001	7	XXXXXX	0.63	0.66	4.43
RI01 13448M002	7	XXXXXX	0.95	0.89	4.77
SALA 13469M001	7	XXXXXX	1.53	0.78	7.59
SCDA 10088M002	7	XXXXXX	1.60	1.86	5.01
TERU 13487M001	7	XXXXXX	1.01	0.88	5.64
YEBE 13420M001	6	XX XXX	0.70	0.86	2.75
ZARA 13462M001	7	XXXXXX	0.87	1.38	2.70

Comparison of individual solutions:

ACOR 13434M001	N	0.63	-0.45	-1.01	0.29	-0.34	0.04	0.73
ACOR 13434M001	E	1.28	1.17	1.32	2.02	0.66	-0.13	0.74
ACOR 13434M001	U	3.96	6.84	1.73	-0.90	0.99	0.25	-5.16
ALSA 19419M001	N	1.76	1.04	0.05	-2.30	-1.50	-1.59	2.51
ALSA 19419M001	E	0.99	-0.70	1.72	-0.70	0.21	1.13	-0.52
ALSA 19419M001	U	4.27	-2.29	2.70	8.18	-2.39	2.84	-3.95
BIAZ 10074M002	N	1.51	0.17	0.43	-2.82	0.63	0.16	-0.68
BIAZ 10074M002	E	1.27	-0.77	1.24	-1.05	-1.66	1.00	0.70
BIAZ 10074M002	U	7.54	3.94	8.81	6.89	-8.42	-1.70	4.26
BIDA 00000M000	N	0.41	-0.08	0.39	-0.62	-0.43	0.21	0.12
BIDA 00000M000	E	0.96	0.51	1.62	-0.85	0.48	-0.91	-0.64
BIDA 00000M000	U	5.20	-1.94	2.50	1.89	8.45	3.19	-1.23
CACE 13447M001	N	1.14	-1.29	0.05			-0.96	-0.64
CACE 13447M001	E	0.93	0.90	-1.08			0.53	-1.08
CACE 13447M001	U	3.45	-3.03	-4.95			2.04	-1.22
CANT 13438M001	N	1.02	-0.11	0.26	-2.33	-0.58	0.30	0.17
CANT 13438M001	E	0.76	-0.46	0.10	1.45	-0.05	0.91	0.36
CANT 13438M001	U	2.24	2.53	-0.05	-2.30	3.91	0.40	1.29
CREU 13432M001	N	1.64	0.17	-0.46	-1.25	-0.36	1.81	1.35
CREU 13432M001	E	1.07	-0.77	0.30	-0.20	1.45	-0.58	1.79
CREU 13432M001	U	4.80	-3.81	3.70	6.03	-6.17	-1.68	-1.20
EBRE 13410M001	N	0.90	0.23	-0.29	-0.75	-0.89	1.39	0.16
EBRE 13410M001	E	0.81	-0.22	-0.36	-0.72	1.09	0.54	1.30
EBRE 13410M001	U	5.22	-3.96	9.04	-0.03	-0.91	-4.35	-3.11
ELGE 19353S001	N	1.14	-0.24	0.40	-0.36	0.75	1.39	0.05
ELGE 19353S001	E	0.86	-1.10	0.50	-0.00	0.47	0.90	0.32
ELGE 19353S001	U	5.00	-0.17	10.11	-1.18	-1.04	4.02	-2.85
HOND 15012M002	N	0.70	0.13	1.16	-0.20	-1.20	-0.00	-0.17
HOND 15012M002	E	0.90	-0.57	1.40	-1.01	0.16	-0.18	-0.10
HOND 15012M002	U	5.83	-0.17	5.12	1.90	9.51	-2.25	0.28
IGEL 19352S001	N	0.77	0.00	0.20	-0.48	0.14	1.05	0.54
IGEL 19352S001	E	0.76	0.00	0.99	-0.44	-0.97	-0.15	0.49
IGEL 19352S001	U	3.73	0.18	6.17	-0.37	-0.53	4.87	-1.75
ISPS 19484M001	N	1.82	-0.68	0.44	-1.65	-2.35	0.49	1.49
ISPS 19484M001	E	1.15	-0.67	0.80	-0.70	1.83	0.73	1.03
ISPS 19484M001	U	4.28	0.95	7.85	-4.76	2.42	3.56	-0.28
LARE 19440M001	N	1.11	-0.80	0.71	-0.19	-0.74	1.03	-1.76
LARE 19440M001	E	0.85	-0.09	-0.02	-0.05	1.73	-0.96	-0.43
LARE 19440M001	U	4.72	3.02	-1.99	-1.36	3.82	6.03	-6.92
LAZK 19354S001	N	0.72	-0.25	-0.31	-1.20	-0.62	0.80	0.32
LAZK 19354S001	E	1.00	-0.38	0.40	-0.96	0.87	-0.73	-0.34
LAZK 19354S001	U	7.38	-0.54	6.97	8.29	-2.39	7.61	-4.93
LEIT 19428M001	N	1.08	-0.42	0.45	-1.61	-1.41	0.20	0.91
LEIT 19428M001	E	0.84	-0.37	1.12	-0.89	1.34	0.30	-0.42
LEIT 19428M001	U	3.05	-1.47	3.83	4.79	-0.08	1.47	1.96
ORON 19427M001	N	1.09	-0.19	-0.68	-1.23	-0.10	1.27	0.44
ORON 19427M001	E	0.88	-0.94	1.23	-0.12	0.44	-1.25	-0.43
ORON 19427M001	U	5.69	-3.85	0.24	11.39	-5.57	0.14	-1.20
PAS2 19351S001	N	0.97	-0.11	-0.30	-1.45	-0.65	1.58	0.22
PAS2 19351S001	E	0.70	-0.23	0.91	-0.83	-0.64	0.62	0.33
PAS2 19351S001	U	5.05	1.73	7.36	-1.34	4.56	0.48	0.67
PASA 19351S001	N	0.63	0.17	0.40	-0.86	-0.70	0.96	-0.03
PASA 19351S001	E	0.66	-0.14	0.87	-0.49	-0.88	0.56	0.46
PASA 19351S001	U	4.43	1.50	6.43	0.18	4.82	-0.66	-0.71
RI01 13448M002	N	0.95	0.55	0.63	0.28	-1.01	0.78	-0.21
RI01 13448M002	E	0.89	-0.63	-0.33	1.34	0.50	0.76	0.15
RI01 13448M002	U	4.77	-5.59	1.99	6.03	-1.16	7.52	-1.74
SALA 13469M001	N	1.53	-0.64	0.16	-0.89	-3.43	0.64	-0.60
SALA 13469M001	E	0.78	1.24	0.99	0.81	-0.12	0.02	0.65
SALA 13469M001	U	7.59	2.47	-6.24	-3.23	13.83	5.12	8.24
SCDA 10088M002	N	1.60	1.25	1.71	0.04	-1.12	-0.30	1.30
SCDA 10088M002	E	1.86	0.68	1.64	0.68	0.44	0.82	1.29
SCDA 10088M002	U	5.01	-1.59	3.85	-0.20	3.54	3.59	3.90
TERU 13487M001	N	1.01	-1.85	0.09	-1.13	-1.16	-0.15	0.22
TERU 13487M001	E	0.88	0.04	-0.26	-1.75	0.91	-0.42	0.03
TERU 13487M001	U	5.64	-7.09	4.55	2.91	-7.48	-2.53	6.21
YEBE 13420M001	N	0.70	-0.41	-0.46	-0.45	-0.14	0.28	1.34

YEBE	13420M001	E	0.86	0.41	0.79	1.45		0.85	0.05	-0.33
YEBE	13420M001	U	2.75	4.74	2.14	1.48		-1.39	2.39	-1.00
ZARA	13462M001	N	0.87	0.62	0.54	0.42	-0.12	0.26	-0.51	-1.84
ZARA	13462M001	E	1.38	0.96	1.35	0.37	1.28	-0.11	-2.02	-1.68
ZARA	13462M001	U	2.70	-1.06	2.98	5.01	-0.13	-0.35	-2.62	1.25

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.

TRANSFORMATION IN EQUATORIAL SYSTEM (X, Y, Z):
RESIDUALS IN LOCAL SYSTEM (NORTH, EAST, UP)

LIST OF REMOVED STATIONS:

OUTLIER CRITERIA: 15.00 15.00 20.00

NUM	NAME	FLG	RESIDUALS IN MILLIMETERS		
1	ACOR 13434M001	I W	-2.43	2.93	3.78
2	ALAC 13433M001	I W	-1.39	1.59	1.93
3	ALBA 13452M001	I W	4.57	-1.37	-7.90
4	ALME 13437M001	I W	-0.71	0.75	2.60
5	BCLN 13412M001	I W	2.03	-2.32	1.71
6	BELL 13431M001	I W	0.96	-1.78	-2.23
7	BORR 13480M001	I W	-0.69	1.88	-2.23
8	BRST 10004M004	I W	-3.24	1.00	1.44
9	CACE 13447M001	I W	0.52	2.44	4.74
10	CANT 13438M001	I W	-4.53	3.84	-5.71
11	CARG 19412M001	I W	0.86	2.60	-4.74
12	CASE 13494M001	I W	-3.75	-0.68	3.17
13	CEU1 13449M002	I W	1.65	-1.42	-1.64
14	COBA 13453M001	I W	1.65	0.97	-6.65
15	CREU 13432M001	I W	-2.36	0.58	0.03
17	ESCO 13435M001	I W	-2.93	1.50	-3.97
18	HUEL 13451M001	I W	10.95	-7.38	7.02
20	IZAN 31309M002	I W	3.67	4.23	3.35
21	LLIV 13436M001	I W	0.60	-0.15	2.88
23	LROC 10023M001	I W	0.83	1.20	7.08
25	MAS1 31303M002	I W	1.43	0.25	2.32
26	PASA 19351S001	I W	1.39	1.37	-7.17
27	RABT 35001M002	I W	0.42	0.20	-9.83
28	RIO1 13448M002	I W	-2.71	-0.77	-1.87
29	SALA 13469M001	I W	1.84	0.88	1.60
31	SFER 13402M004	I W	-3.11	-11.84	-1.49
32	SONS 13446M001	I W	-2.48	0.59	-0.47
33	VALA 13463M002	I W	0.71	-0.73	2.36
34	VALE 13439M001	I W	-5.04	1.97	-7.80
35	VIGO 13450M001	I W	2.35	0.23	8.76
38	ZARA 13462M001	I W	-0.38	0.10	0.88
39	ZIMM 14001M004	I W	-1.81	-2.75	4.99
RMS / COMPONENT			3.11	3.06	4.76
IQR			3.99	2.29	6.13
MEAN			-0.04	-0.00	-0.10
MEDIAN			0.47	0.58	1.16
MIN			-5.04	-11.84	-9.83
MAX			10.95	4.23	8.76
OVERALL RMS/IQR/MAX(3D)			3.73	3.96	14.96
					HUEL 13451M001 #SUM
ALL	RMS / COMPONENT		3.11	3.06	4.76
ALL	IQR		3.99	2.29	6.13
ALL	MEAN		-0.04	-0.00	-0.10
ALL	MEDIAN		0.47	0.58	1.16
ALL	MIN		-5.04	-11.84	-9.83
ALL	MAX		10.95	4.23	8.76
ALL	OVERALL RMS/IQR/MAX(3D)		3.73	3.96	14.96
					HUEL 13451M001 #SUM_ALL

NUMBER OF PARAMETERS : 3
NUMBER OF STATIONS : 32
NUMBER OF COORDINATES : 96
RMS OF TRANSFORMATION : 3.73 MM

PARAMETERS:

TRANSLATION IN X : -0.00 +- 0.66 MM
TRANSLATION IN Y : -0.00 +- 0.66 MM
TRANSLATION IN Z : 0.00 +- 0.66 MM

NUMBER OF ITERATIONS : 1

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                14764114
NUMBER OF UNKNOWNNS                   162390
NUMBER OF DEGREES OF FREEDOM          14601724
PHASE MEASUREMENTS SIGMA              0.00100
SAMPLING INTERVAL (SECONDS)           180
VARIANCE FACTOR                       5330.517930784622877
```

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 23:232:00000 23:238:86370 LEICA GR50 -----
ALSA A 1 P 23:232:00000 23:238:86370 LEICA GR50 -----
BIAZ A 1 P 23:232:00000 23:238:86370 SPECTRA SP90M -----
BIDA A 1 P 23:232:00000 23:238:86370 LEICA GR10 -----
CACE A 1 P 23:232:00000 23:238:86370 TRIMBLE NETR9 -----
CANT A 1 P 23:232:00000 23:238:86370 LEICA GR10 -----
CREU A 1 P 23:232:00000 23:238:86370 LEICA GR50 -----
EBRE A 1 P 23:232:00000 23:238:86370 LEICA GR50 -----
ELGE A 1 P 23:232:00000 23:238:86370 LEICA GR30 -----
HOND A 1 P 23:232:00000 23:238:86370 LEICA GR50 -----
IGEL A 1 P 23:232:00000 23:238:86370 LEICA GR30 -----
ISPS A 1 P 23:232:00000 23:238:86370 TRIMBLE NETR9 -----
LARE A 1 P 23:232:00000 23:238:86370 LEICA GR50 -----
LAZK A 1 P 23:232:00000 23:238:86370 LEICA GR30 -----
LEIT A 1 P 23:232:00000 23:238:86370 LEICA GR50 -----
ORON A 1 P 23:232:00000 23:238:86370 LEICA GR50 -----
PAS2 A 1 P 23:232:00000 23:238:86370 STONEX SC2200 -----
PASA A 1 P 23:232:00000 23:238:86370 LEICA GR30 -----
RI01 A 1 P 23:232:00000 23:238:86370 LEICA GR25 -----
SALA A 1 P 23:232:00000 23:238:86370 LEICA GR50 -----
SCDA A 1 P 23:232:00000 23:238:86370 LEICA GR50 -----
TERU A 1 P 23:232:00000 23:238:86370 LEICA GR50 -----
YEBE A 1 P 23:232:00000 23:238:86370 LEICA GR50 -----
ZARA A 1 P 23:232:00000 23:238:86370 TRIMBLE NETR9 -----
```

7.2 Antennas

Serial number ONLY provided in case individual calibrations are used.

```
*SITE PT SOLN T DATA_START__ DATA_END_____ DESCRIPTION_____ S/N__ DAZI
ACOR A 1 P 23:232:00000 23:238:86370 LEIAT504 LEIS -----
ALSA A 1 P 23:232:00000 23:238:86370 LEIAR10 NONE -----
BIAZ A 1 P 23:232:00000 23:238:86370 LEIAR25 LEIT -----
BIDA A 1 P 23:232:00000 23:238:86370 LEIAS10 NONE -----
CACE A 1 P 23:232:00000 23:238:86370 TRM29659.00 NONE -----
CANT A 1 P 23:232:00000 23:238:86370 LEIAR25_R4 LEIT -----
CREU A 1 P 23:232:00000 23:238:86370 LEIAR25_R4 NONE -----
EBRE A 1 P 23:232:00000 23:238:86370 LEIAR25_R4 NONE -----
ELGE A 1 P 23:232:00000 23:238:86370 LEIAR25_R4 LEIT -----
HOND A 1 P 23:232:00000 23:238:86370 LEIAR20 LEIM -----
IGEL A 1 P 23:232:00000 23:238:86370 LEIAR20 LEIM -----
ISPS A 1 P 23:232:00000 23:238:86370 TRM59900.00 SCIS -----
LARE A 1 P 23:232:00000 23:238:86370 LEIAR20 LEIM -----
LAZK A 1 P 23:232:00000 23:238:86370 LEIAR25_R4 LEIT -----
LEIT A 1 P 23:232:00000 23:238:86370 LEIAR10 NONE -----
ORON A 1 P 23:232:00000 23:238:86370 LEIAR10 NONE -----
PAS2 A 1 P 23:232:00000 23:238:86370 LEIAR20 LEIM -----
PASA A 1 P 23:232:00000 23:238:86370 LEIAR20 LEIM -----
RI01 A 1 P 23:232:00000 23:238:86370 LEIAR25_R4 LEIT -----
SALA A 1 P 23:232:00000 23:238:86370 LEIAR25 NONE -----
SCDA A 1 P 23:232:00000 23:238:86370 TRM55971.00 NONE -----
TERU A 1 P 23:232:00000 23:238:86370 LEIAR20 LEIM -----
YEBE A 1 P 23:232:00000 23:238:86370 LEIAR20 LEIM -----
ZARA A 1 P 23:232:00000 23:238:86370 TRM29659.00 NONE -----
```

7.3 Eccentricities

```
*_SITE PT SOLN T DATA_START__ DATA_END_____ UP_____ NORTH_____ EAST_____
*_SITE PT SOLN T DATA_START__ DATA_END_____ AXE ARP-->BENCHMARK(M)-----
ACOR A 1 P 23:232:00000 23:238:86370 UNE 3.0460 0.0000 0.0000
ALSA A 1 P 23:232:00000 23:238:86370 UNE 0.0000 0.0000 0.0000
BIAZ A 1 P 23:232:00000 23:238:86370 UNE 0.0000 0.0000 0.0000
BIDA A 1 P 23:232:00000 23:238:86370 UNE 0.0000 0.0000 0.0000
CACE A 1 P 23:232:00000 23:238:86370 UNE 0.0600 0.0000 0.0000
CANT A 1 P 23:232:00000 23:238:86370 UNE 3.0490 0.0000 0.0000
CREU A 1 P 23:232:00000 23:238:86370 UNE 0.0770 0.0000 0.0000
```

EBRE	A	1	P	23:232:00000	23:238:86370	UNE	0.0770	0.0000	0.0000
ELGE	A	1	P	23:232:00000	23:238:86370	UNE	0.0000	0.0000	0.0000
HOND	A	1	P	23:232:00000	23:238:86370	UNE	0.0771	0.0000	0.0000
IGEL	A	1	P	23:232:00000	23:238:86370	UNE	0.0000	0.0000	0.0000
ISPS	A	1	P	23:232:00000	23:238:86370	UNE	0.0350	0.0000	0.0000
LARE	A	1	P	23:232:00000	23:238:86370	UNE	0.0000	0.0000	0.0000
LAZK	A	1	P	23:232:00000	23:238:86370	UNE	0.0000	0.0000	0.0000
LEIT	A	1	P	23:232:00000	23:238:86370	UNE	0.0000	0.0000	0.0000
ORON	A	1	P	23:232:00000	23:238:86370	UNE	0.0000	0.0000	0.0000
PAS2	A	1	P	23:232:00000	23:238:86370	UNE	0.0000	0.0000	0.0000
PASA	A	1	P	23:232:00000	23:238:86370	UNE	0.0000	0.0000	0.0000
RI01	A	1	P	23:232:00000	23:238:86370	UNE	0.0606	0.0000	0.0000
SALA	A	1	P	23:232:00000	23:238:86370	UNE	0.0600	0.0000	0.0000
SCDA	A	1	P	23:232:00000	23:238:86370	UNE	0.0000	0.0000	0.0000
TERU	A	1	P	23:232:00000	23:238:86370	UNE	0.0600	0.0000	0.0000
YEBE	A	1	P	23:232:00000	23:238:86370	UNE	0.0600	0.0000	0.0000
ZARA	A	1	P	23:232:00000	23:238:86370	UNE	3.2590	0.0000	0.0000

8 Inconsistencies (logsheets-RINEX metadata)

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

```

2023-09-11 20:50 UTC | ISPS2320.230 | RECEIVER FIRM. VERS. | 5.30 -> 5.22 (source: isps00esp_20220907.log
2023-09-10 09:52 UTC | ISPS2340.230 | RECEIVER FIRM. VERS. | 5.30 -> 5.22 (source: isps00esp_20220907.log
2023-09-10 12:41 UTC | ISPS2350.230 | RECEIVER FIRM. VERS. | 5.30 -> 5.22 (source: isps00esp_20220907.log
2023-09-10 16:55 UTC | ISPS2360.230 | RECEIVER FIRM. VERS. | 5.30 -> 5.22 (source: isps00esp_20220907.log
2023-09-10 19:56 UTC | ISPS2370.230 | RECEIVER FIRM. VERS. | 5.30 -> 5.22 (source: isps00esp_20220907.log
2023-09-11 12:07 UTC | ISPS2380.230 | RECEIVER FIRM. VERS. | 5.30 -> 5.22 (source: isps00esp_20220907.log

```

9 References

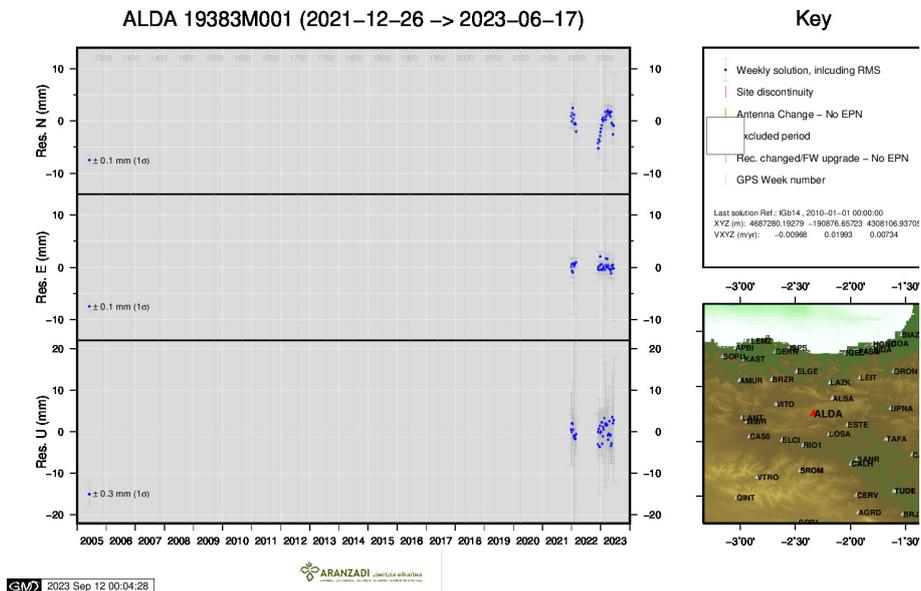
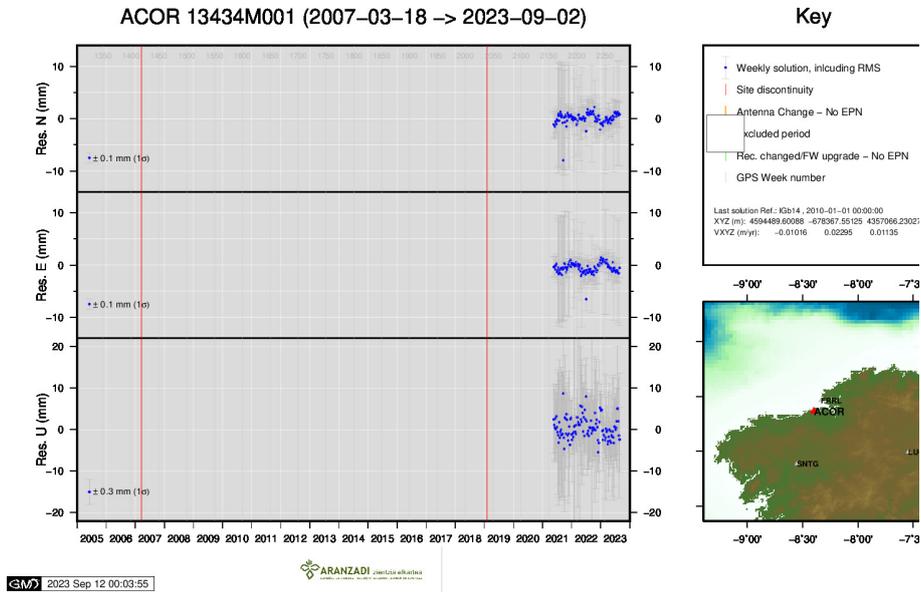
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign*. etrs89.ensg.ign.fr/memo-V8.pdf

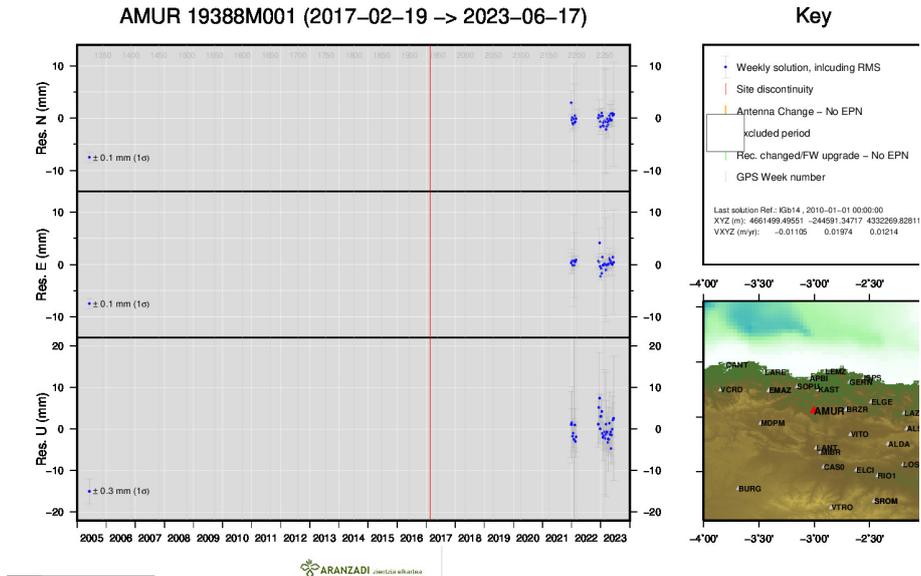
EPN Coordination Group and the EPN Central Bureau (2018): *Guidelines for the EPN Analysis Centres*. epncb.oma.be/documentation/guidelines/guidelines_analysis_centres.pdf

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

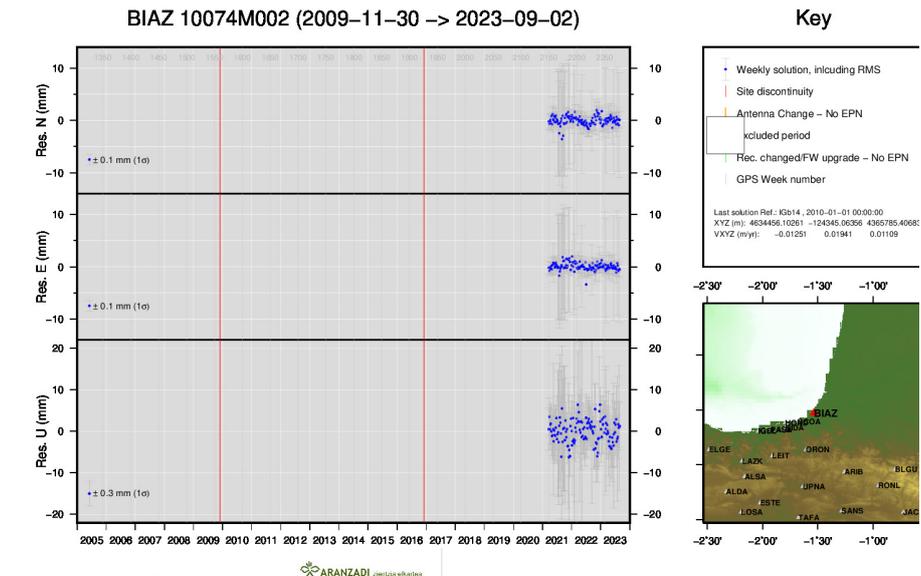
10 Cumulative Time Series

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

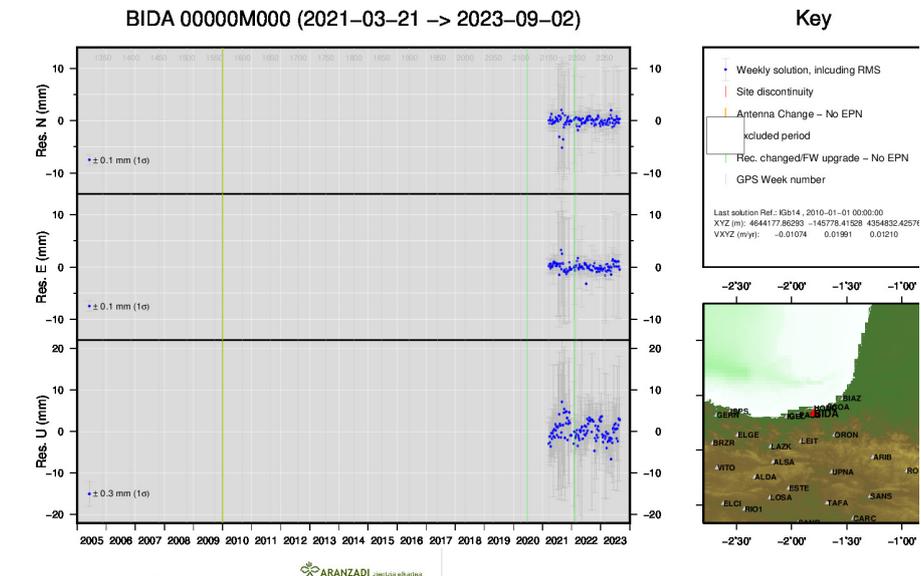




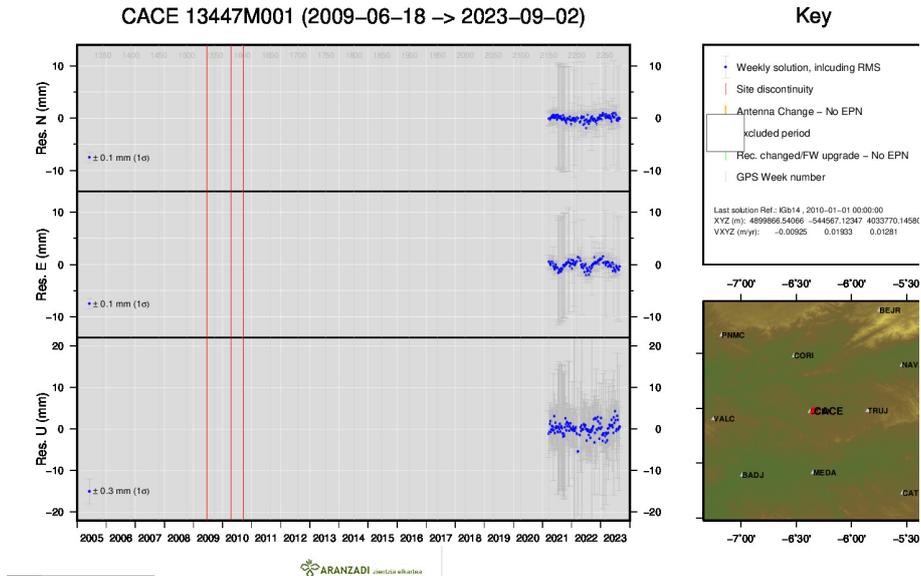
3) AMUR



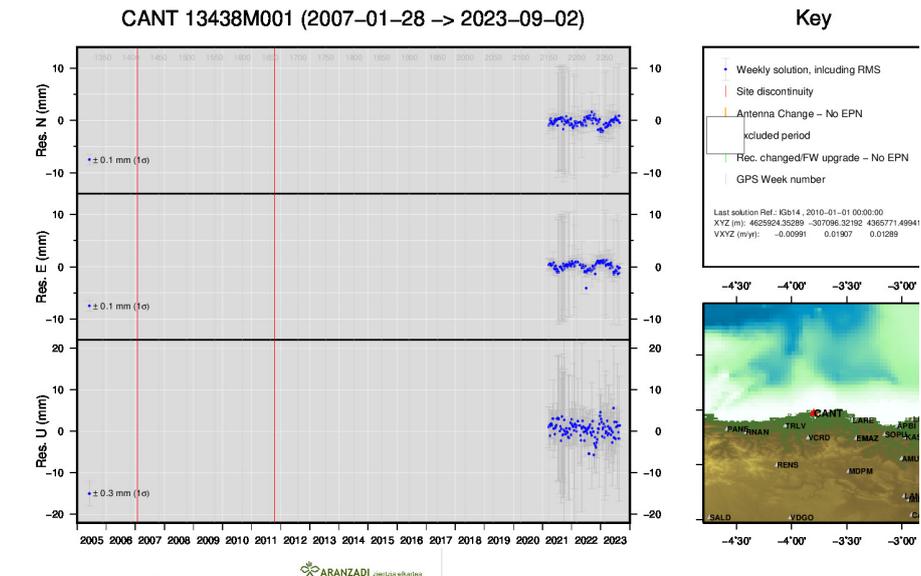
4) BIAZ



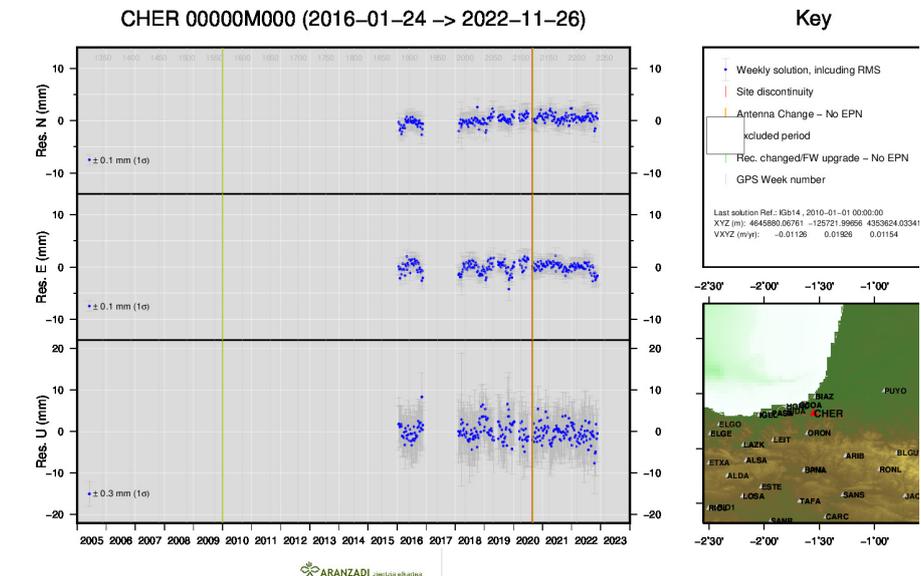
5) BIDA



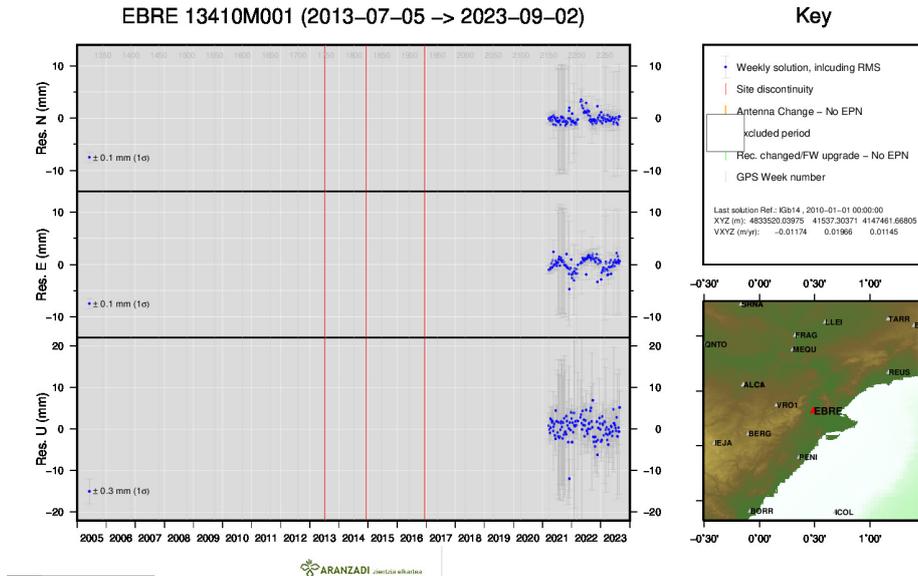
6) CACE



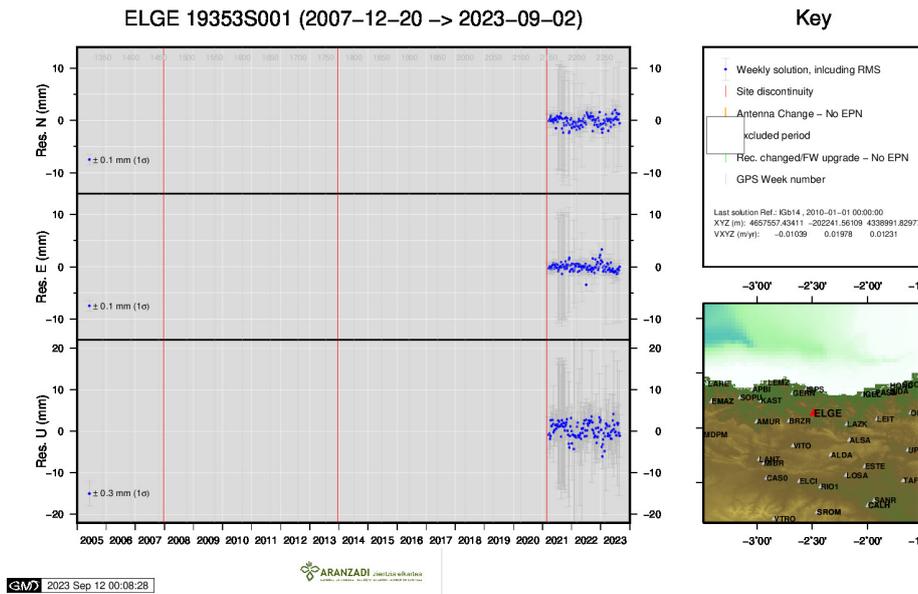
7) CANT



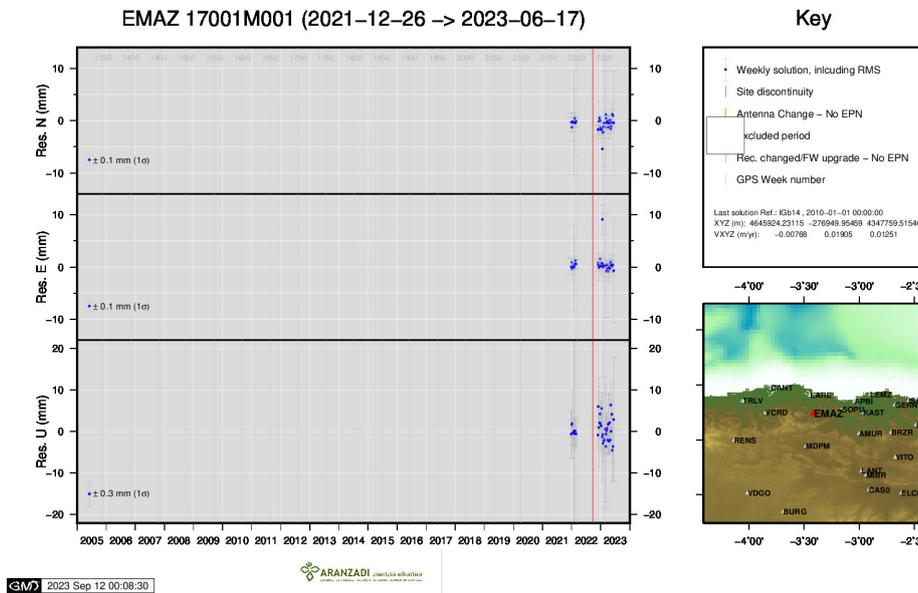
8) CHER



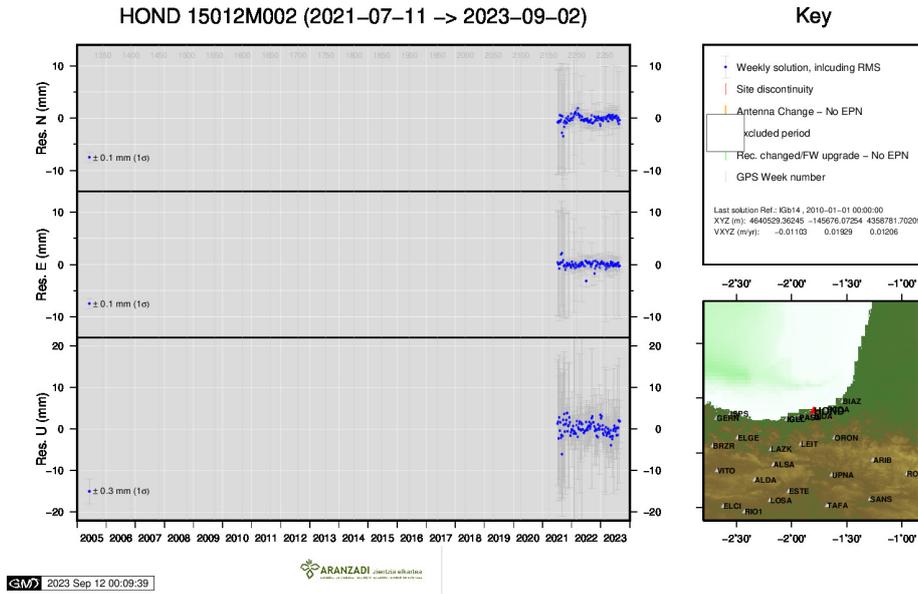
9) EBRE



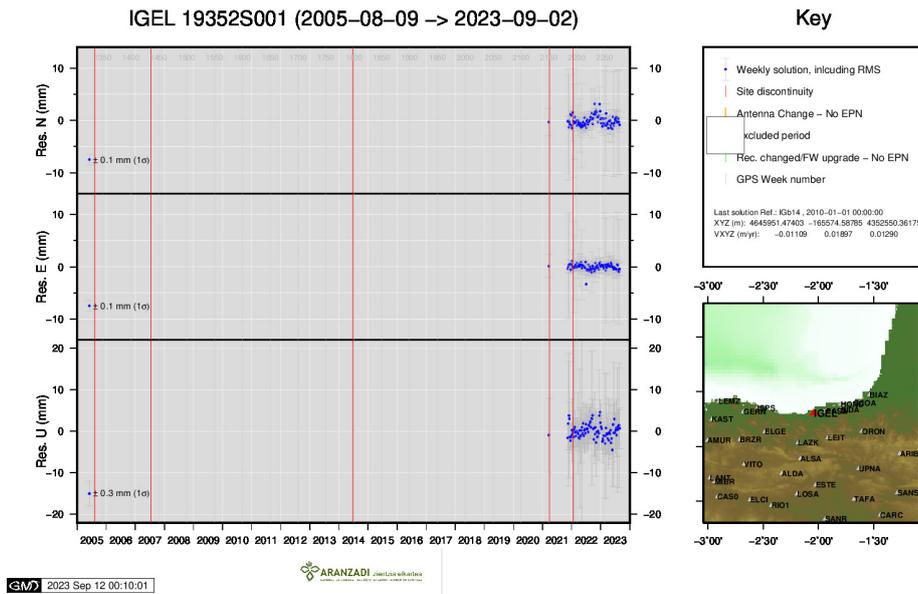
10) ELGE



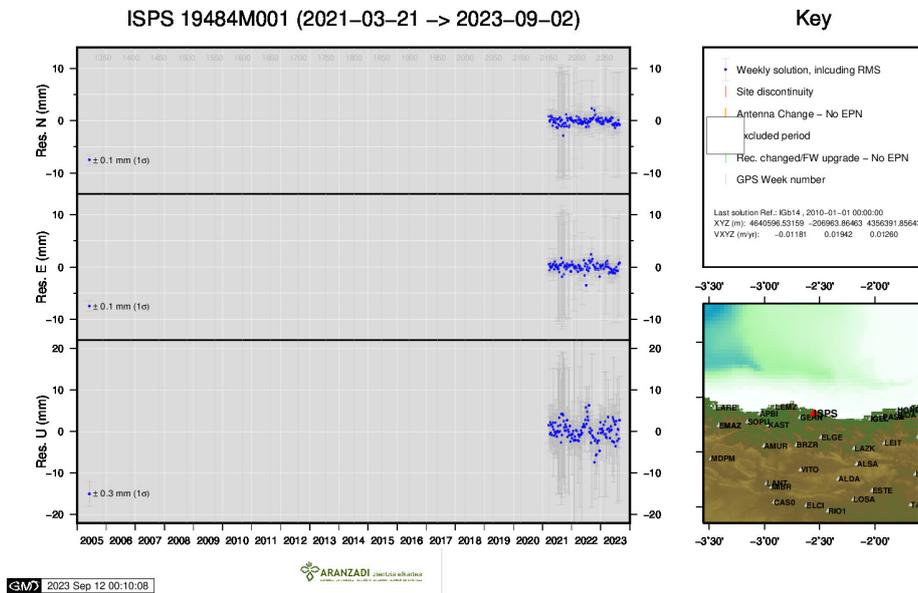
11) EMAZ



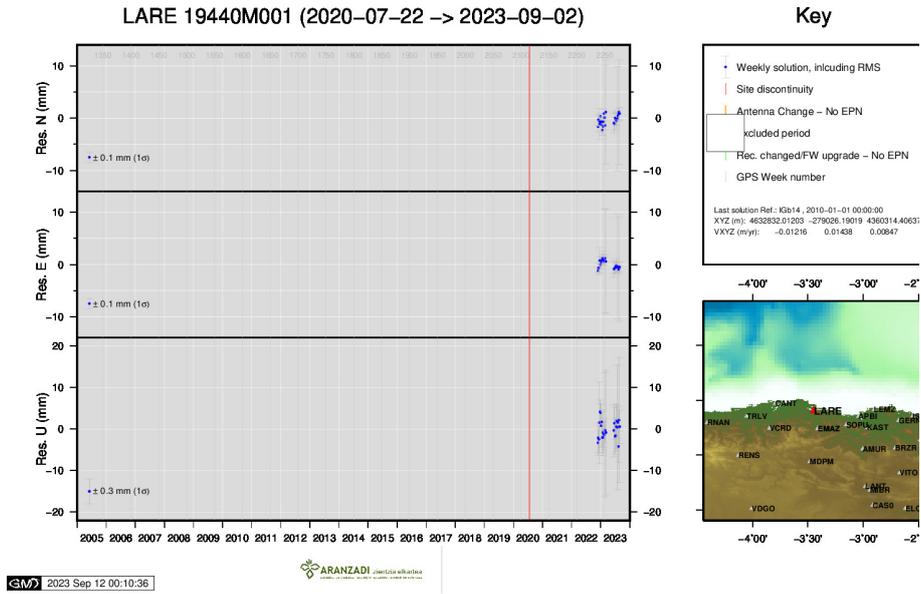
12) HOND



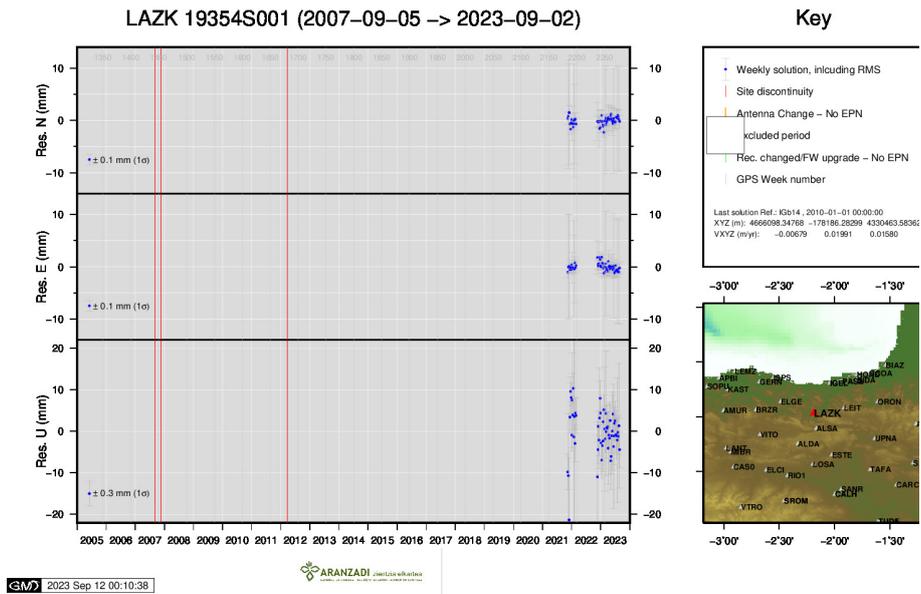
13) IGEL



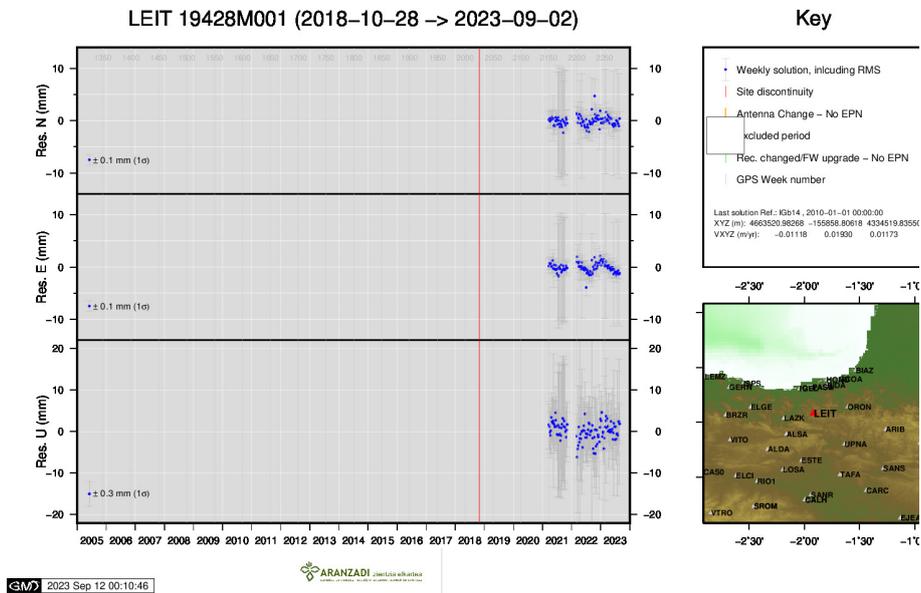
14) ISPS



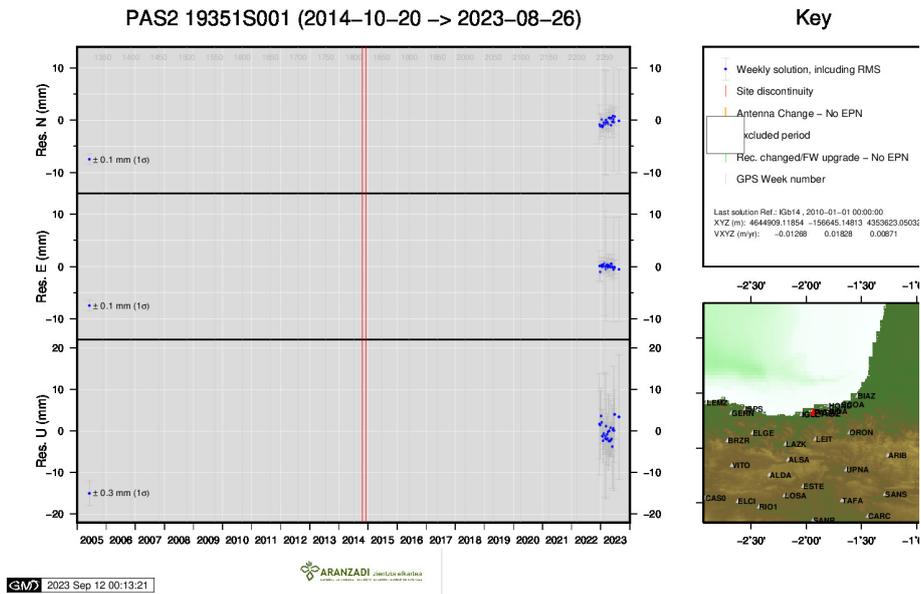
15) LARE



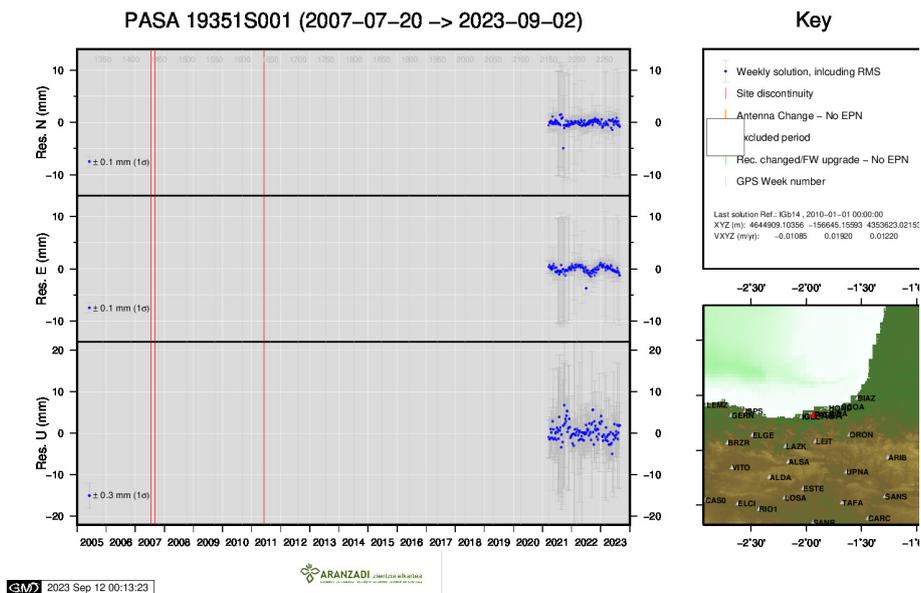
16) LAZK



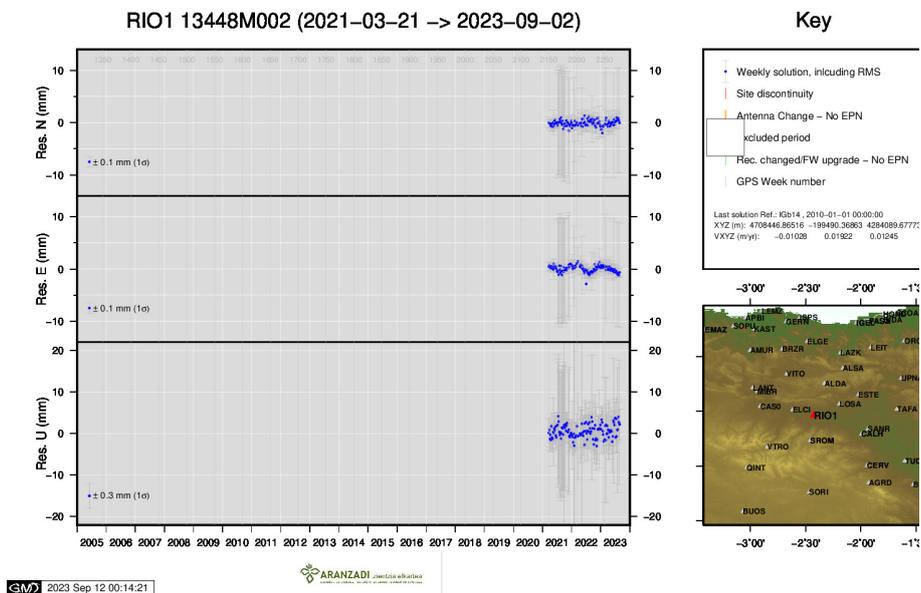
17) LEIT



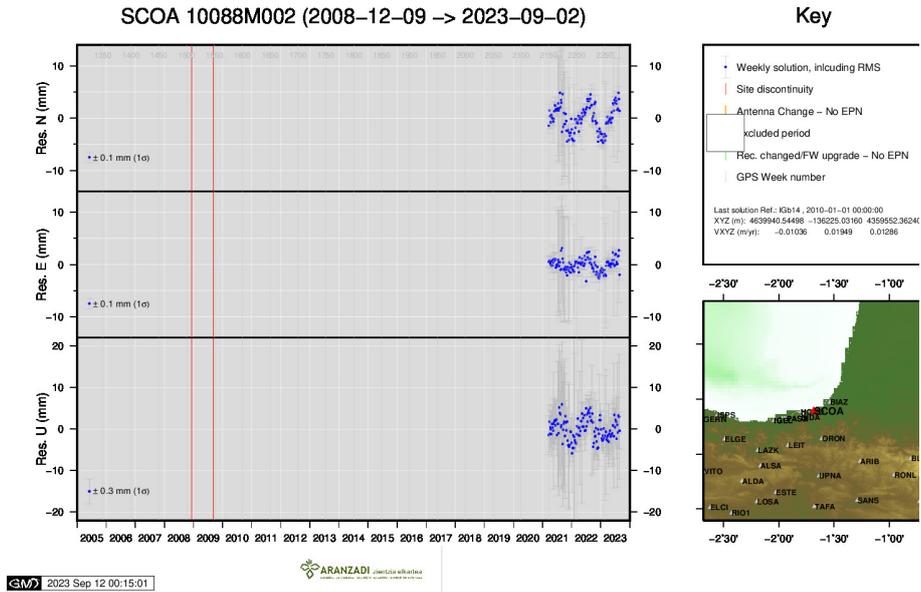
18) PAS2



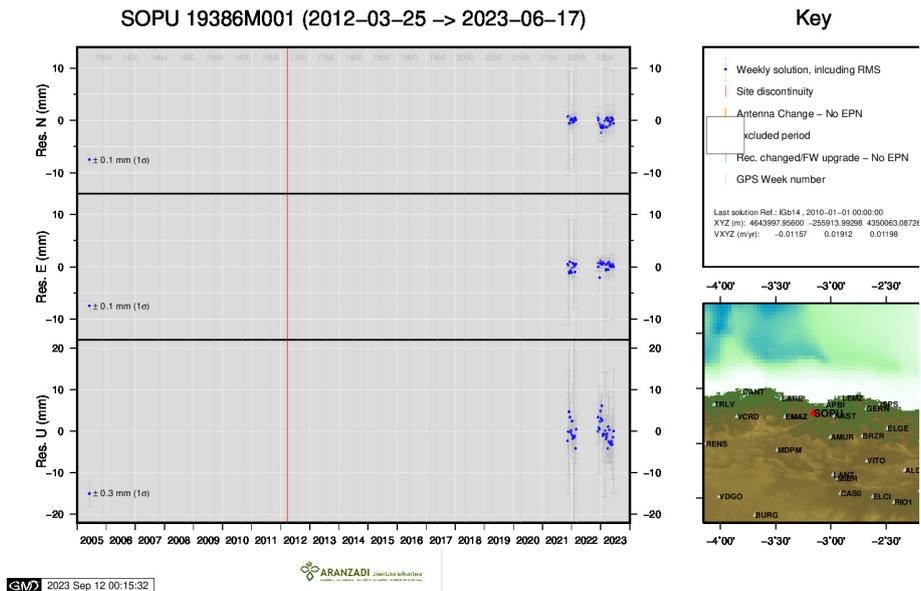
19) PASA



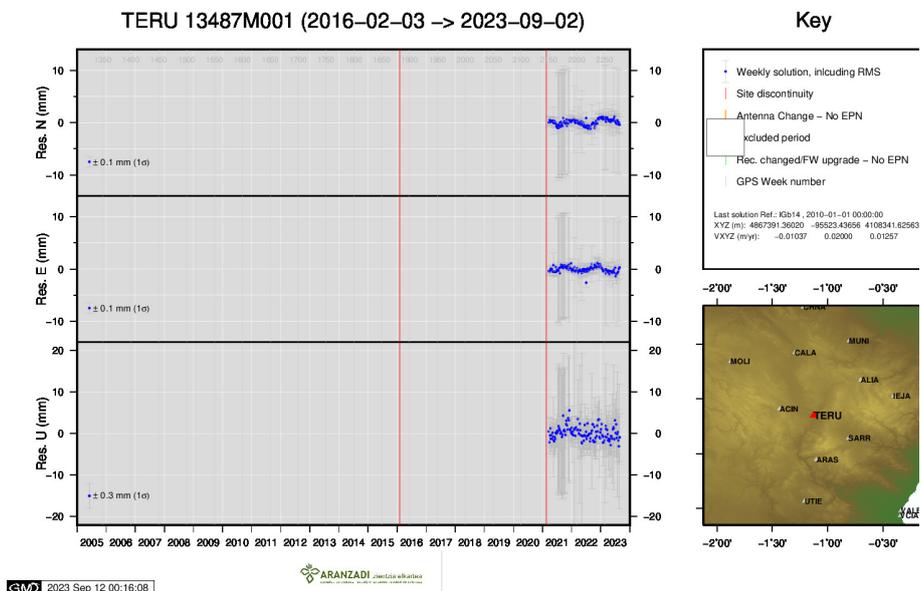
20) RIO1



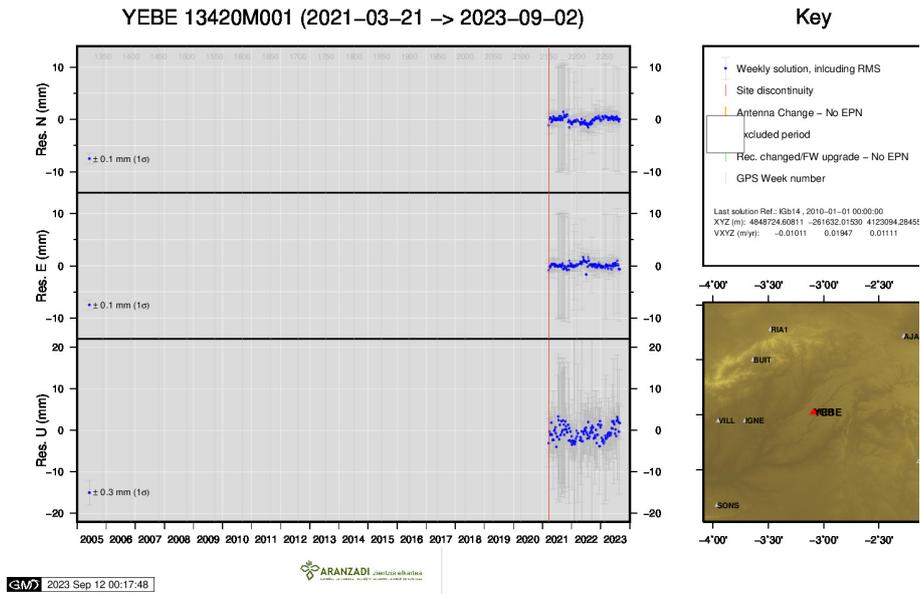
21) SCOA



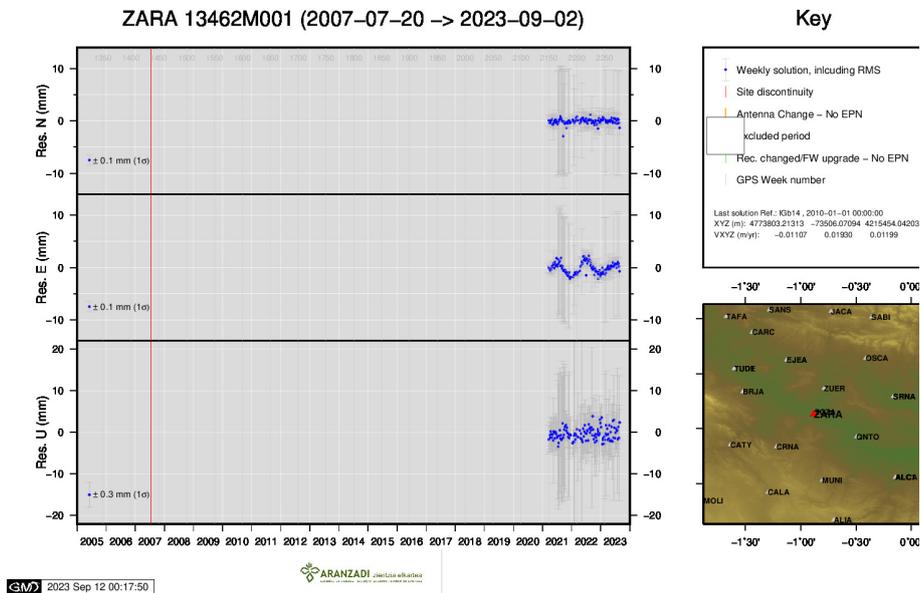
22) SOPU



23) TERU



24) YEBE



25) ZARA