

# ARA-DAC Weekly Analysis Result: 2013 (GFA)

## Technical Report

**GPS Week: 2013 (GFA)**

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

### **ARA-DAC details:**

Contact person: J. Zurutuza

Contact mail: [geodesia@aranzadi.eus](mailto:geodesia@aranzadi.eus)

Report generated on 2018/08/29 at 14:18:08



## 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

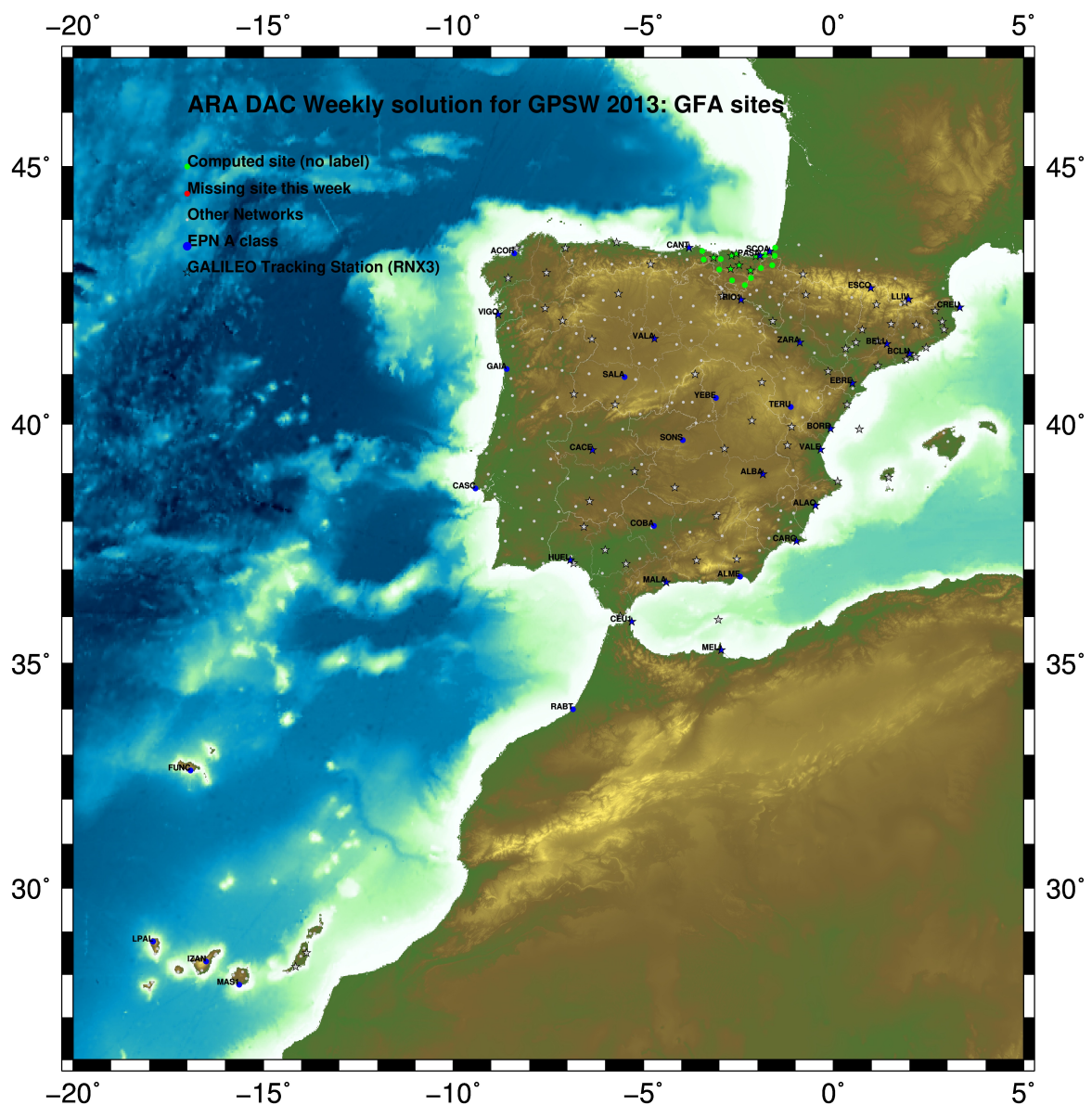


Fig.1: Computed Sites for GPS Week2013 (GFA)

### 3 Main Computation Parameters

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

- Preprocessing: Independent baselines are defined by the criterion of maximum common observations. Cycle slips are fixed with the MAUPRP program, analysing triple phase differences for each independent baseline. If MAUPRP does not fix all slips for one station, that station is edited out.
- Basic Observable : Carrier phase,  $L_1$  and  $L_2$ ; a priori sigma of single differences: 0.002 m.
  - sampling (for ambiguity resolution) : 30 s
  - sampling (for final processing) : 180 s
  - Systems: GPS+GLONASS observations are used (GALILEO also used if available from GPSW 1986 on)
- Modelled observable: Double differences of carrier phase using different combinations based on the distance.
- Ground antenna phase center calibrations: Group APCV used from the PCV\_COD.I14 file and individual calibrations from EPNC\_14.ATX. EPN\_A class sites (CRD + VEL) IGS14 used to define the reference frame (from GPSW 1934). If individual calibrations, other from these, are available, they are also included in the analysis.
- Troposphere:
  - 3 deg elev. cutoff; elevation dependent weighting
  - VMF1 mapping function. ZPD parameters are estimated using the VMF1 mapping function.
  - CHENHER gradient estimation model.
- Ionosphere: no a priori model, ionospheric effect almost removed by iono free combination.
- Ocean Loading: FES2004 (Scherneck).
- Atmosph. Loading: computed from a global grid using the GRDS1S2 program of Bernese 5.2.

### 4 Estimated Parameters

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

- Ambiguity: an advanced ambiguity resolution (AR) scheme is included:
  - Code-Based Widelane (WL) AR for baselines shorter than 6000km, a Melbourne-Wuebbena wide-lane and narrow-lane AR is computed.
  - Phase-Based Widelane ( $L_5$ ) AR for baselines shorter than 200km, the code-based wide-lane AR is replaced by a phase-only wide-lane with a subsequent narrow-lane AR.
  - Quasi-Ionosphere-Free (QIF)AR for the remaining real-valued ambiguities for baselines shorter than 2000km.
  - Direct  $L_1/L_2$  AR for baselines shorter than 20km
- AR Verification: Each baseline is processed by introducing the resolved integer ambiguities and checking the residuals. If there is any problem, the ambiguities are re-initialized.



## 5 Computed Coordinates

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

### 5.1 IGS14

The Reference Frame considered in this section is IGS14, release C1980.

ARA LAC 2013 WEEK FINAL COMBINATION: PRECISE ORBITS					29-AUG-18 09:59
LOCAL GEODETIC DATUM: IGS14					EPOCH: 2018-08-08 12:00:00
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
1	ACOR 13434M001	4594489.56514	-678367.46645	4357066.27562	W
33	ALDA 19383M001	4687280.16569	-190876.58169	4308106.94492	A
42	ALSA 19419M001	4677250.84369	-176770.41410	4319079.86661	A
44	AMUR 19388M001	4661499.45518	-244591.27560	4332269.87563	A
77	BIAZ 10074M002	4634456.05924	-124344.99360	4365785.44635	A
78	BIDA 00000M000	4644177.83027	-145778.33886	4354832.47241	A
88	BRZR 19387M001	4662220.99977	-220769.91863	4333309.43427	A
9	CACE 13447M001	4899866.50742	-544567.05414	4033770.19378	W
10	CANT 13438M001	4625924.31875	-307096.25086	4365771.54694	W
112	CHER 00000M000	4645880.32881	-125721.94231	4353624.36385	A
15	CREU 13432M001	4715420.14011	273178.04312	4271946.83218	W
16	EBRE 13410M001	4833520.00058	41537.37460	4147461.70899	W
131	ELGE 19353S001	4657557.41167	-202241.49187	4338991.86230	A
133	EMAZ 17001M001	4645924.21325	-276949.88271	4347759.57005	A
153	GERN 19389M001	4642811.31673	-217222.95254	4353278.87747	A
173	IGEL 19352S001	4645951.43634	-165574.52038	4352550.40921	A
178	ISPS 19484M001	4640596.48776	-206963.79397	4356391.90477	A
182	KAST 19499M001	4646949.08820	-240747.29451	4348014.98273	A
185	LARE 19440M001	4632831.95974	-279026.15615	4360314.41913	A
186	LAZK 19354S001	4666098.34913	-178186.20841	4330463.66505	A
190	LEIT 19428M001	4663520.94200	-155858.73500	4334519.87090	A
242	ORON 19427M001	4659695.79512	-130864.75233	4338948.87791	A
249	PAS2 19351S001	4644909.06365	-156645.08514	4353623.06642	A
31	PASA 19351S001	4644909.06495	-156645.08489	4353623.06728	W
34	RID1 13448M002	4708446.83349	-199490.30032	4284089.72825	W
35	SALA 13469M001	4803054.48860	-462131.08606	4158379.06739	W
36	SCDA 10088M002	4639940.50527	-136224.95763	4359552.40444	W
298	SOPU 19386M001	4643997.91945	-255913.92348	4350063.13834	A
40	TERU 13487M001	4867391.32993	-95523.36991	4108341.67323	W
349	VITO 19385M001	4679397.70744	-218436.52410	4314898.35848	A
44	YEBE 13420M001	4848724.57350	-261631.94695	4123094.31882	W
45	ZARA 13462M001	4773803.17198	-73506.00056	4215454.08546	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 2013					29-AUG-18 09:59
LOCAL GEODETIC DATUM: ETRF2000					EPOCH: 2018-08-08 12:00:00
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
1	ACOR 13434M001	4594489.86497	-678367.98844	4357065.86916	W
33	ALDA 19383M001	4687280.51779	-190877.11204	4308106.53744	A
42	ALSA 19419M001	4677251.19813	-176770.94339	4319079.46003	A
44	AMUR 19388M001	4661499.80279	-244591.80348	4332269.46941	A
77	BIAZ 10074M002	4634456.42279	-124345.51839	4365785.04555	A
78	BIDA 00000M000	4644178.19064	-145778.86470	4354832.06864	A
88	BRZR 19387M001	4662221.35016	-220770.44652	4333309.02828	A
9	CACE 13447M001	4899866.80073	-544567.60664	4033769.76632	W
10	CANT 13438M001	4625924.66149	-307096.77529	4365771.14261	W
112	CHER 00000M000	4645880.69138	-125722.46826	4353623.96019	A
15	CREU 13432M001	4715420.54251	273177.51154	4271946.42799	W
16	EBRE 13410M001	4833520.36829	41536.83027	4147461.29339	W
131	ELGE 19353S001	4657557.76455	-202242.01924	4338991.45688	A
133	EMAZ 17001M001	4645924.55822	-276950.40910	4347759.16461	A
153	GERN 19389M001	4642811.66887	-217223.47844	4353278.47296	A
173	IGEL 19352S001	4645951.79431	-165575.04646	4352550.00507	A
178	ISPS 19484M001	4640596.84127	-206964.31963	4356391.50054	A
182	KAST 19499M001	4646949.43731	-240747.82090	4348014.57763	A
185	LARE 19440M001	4632832.30531	-279026.68121	4360314.01462	A
186	LAZK 19354S001	4666098.70418	-178186.73657	4330463.25928	A
190	LEIT 19428M001	4663521.29986	-155859.26284	4334519.46558	A
242	ORON 19427M001	4659696.15612	-130865.27970	4338948.47317	A
249	PAS2 19351S001	4644909.42270	-156645.61109	4353622.66246	A
31	PASA 19351S001	4644909.42400	-156645.61084	4353622.66332	W
34	RID1 13448M002	4708447.18299	-199490.83282	4284089.31910	W
35	SALA 13469M001	4803054.79973	-462131.62873	4158378.64811	W
36	SCDA 10088M002	4639940.86705	-136225.48301	4359552.00109	W
298	SOPU 19386M001	4643998.26697	-255914.44961	4350062.73328	A
40	TERU 13487M001	4867391.67942	-95523.91809	4108341.25352	W
349	VITO 19385M001	4679398.05686	-218437.05372	4314897.95125	A
44	YEBE 13420M001	4848724.90509	-261632.49373	4123093.89854	W
45	ZARA 13462M001	4773803.53120	-73506.53927	4215453.67295	W

### 5.3 ETRF2014 (ETRS89) Coordinates

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

ETRF2014 FINAL COORD. wk 2013					29-AUG-18 09:59
LOCAL GEODETIC DATUM: ETRF2014					EPOCH: 2018-08-08 12:00:00
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
1	ACOR 13434M001	4594489.82222	-678368.02734	4357065.91720	W
33	ALDA 19383M001	4687280.47291	-190877.15224	4308106.58538	A
42	ALSA 19419M001	4677251.15331	-176770.98367	4319079.50801	A
44	AMUR 19388M001	4661499.75831	-244591.84359	4332269.51740	A
77	BIAZ 10074M002	4634456.37821	-124345.55901	4365785.09365	A
78	BIDA 00000M000	4644178.14604	-145778.90521	4354832.11670	A
88	BRZR 19387M001	4662221.30561	-220770.48671	4333309.07627	A
9	CACE 13447M001	4899866.75465	-544567.64483	4033769.81372	W
10	CANT 13438M001	4625924.61752	-307096.81533	4365771.19066	W
112	CHER 00000M000	4645880.64670	-125722.50884	4353624.00826	A
15	CREU 13432M001	4715420.49686	273177.46990	4271946.47616	W
16	EBRE 13410M001	4833520.32124	41536.78985	4147461.34114	W
131	ELGE 19353S001	4657557.71999	-202242.05951	4338991.50489	A
133	EMAZ 17001M001	4645924.51398	-276950.44917	4347759.21261	A
153	GERN 19389M001	4642811.62448	-217223.51872	4353278.52100	A
173	IGEL 19352S001	4645951.74975	-165575.08690	4352550.05313	A
178	ISPS 19484M001	4640596.79688	-206964.35995	4356391.54859	A
182	KAST 19499M001	4646949.39295	-240747.86109	4348014.62565	A
185	LARE 19440M001	4632832.26120	-279026.72132	4360314.06266	A
186	LAZK 19354S001	4666098.65946	-178186.77689	4330463.30728	A
190	LEIT 19428M001	4663521.25510	-155859.30324	4334519.51360	A
242	ORON 19427M001	4659696.11132	-130865.32020	4338948.52120	A
249	PAS2 19351S001	4644909.37812	-156645.65156	4353622.71053	A
31	PASA 19351S001	4644909.37942	-156645.65131	4353622.71139	W
34	RI01 13448M002	4708447.13793	-199490.87291	4284089.36699	W
35	SALA 13469M001	4803054.75444	-462131.66757	4158378.69572	W
36	SC0A 10088M002	4639940.82245	-136225.52357	4359552.04917	W
298	SOPU 19386M001	4643998.22268	-255914.48976	4350062.78130	A
40	TERU 13487M001	4867391.63247	-95523.95792	4108341.30113	W
349	VITO 19385M001	4679398.01213	-218437.09386	4314897.99920	A
44	YEBE 13420M001	4848724.85880	-261632.53308	4123093.94611	W
45	ZARA 13462M001	4773803.48511	-73506.57954	4215453.72076	W

## 6 Quality Control

### 6.1 Mean and Daily Repeatabilities

In this section, the mean and daily repeatabilities of the sites are shown. Repeatabilities refer to the IGS14 solution and are given with respect the Local frame (North-East-Up).

ARA LAC 2013 WEEK FINAL COMBINATION: PRECISE ORBITS 29-AUG-18 09:59

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	7	XXXXXX	1.09	0.82	2.54
ALDA 19383M001	7	XXXXXX	2.10	1.04	3.72
ALSA 19419M001	7	XXXXXX	0.92	1.04	4.51
AMUR 19388M001	7	XXXXXX	1.19	1.68	3.07
BLAZ 10074M002	7	XXXXXX	0.72	1.63	4.16
BIDA 00000M000	7	XXXXXX	0.80	1.43	3.59
BRZR 19387M001	6	XXXXX	1.66	1.31	5.28
CACE 13447M001	7	XXXXXX	0.74	1.59	4.21
CANT 13438M001	6	XXXXX	0.72	1.55	3.98
CHER 00000M000	7	XXXXXX	0.87	1.51	4.42
CREU 13432M001	6	XXXXX	1.96	0.88	3.06
EBRE 13410M001	7	XXXXXX	1.38	0.32	7.37
ELGE 19353S001	7	XXXXXX	0.71	1.50	3.50
EMAZ 17001M001	7	XXXXXX	0.78	0.84	3.35
GERN 19389M001	6	X XXXX	1.05	1.05	2.25
IGEL 19352S001	7	XXXXXX	1.11	1.10	5.10
ISPS 19484M001	7	XXXXXX	1.12	2.30	7.75
KAST 19499M001	7	XXXXXX	0.90	1.19	4.73
LARE 19440M001	7	XXXXXX	1.11	1.23	2.54
LAZK 19354S001	7	XXXXXX	1.03	2.21	7.04
LEIT 19428M001	7	XXXXXX	0.99	1.58	3.61
ORON 19427M001	7	XXXXXX	0.88	1.64	3.34
PAS2 19351S001	6	XXXXX	0.72	1.32	6.56
PASA 19351S001	7	XXXXXX	0.67	1.44	4.73
RI01 13448M002	6	XXXXX	1.01	1.06	3.64
SALA 13469M001	7	XXXXXX	0.56	0.66	5.17
SCOA 10088M002	7	XXXXXX	0.76	1.70	5.40
SOPU 19386M001	7	XXXXXX	0.84	1.57	4.14
TERU 13487M001	7	XXXXXX	1.31	1.08	3.65
VITO 19385M001	7	XXXXXX	0.85	1.21	3.01
YEBE 13420M001	7	XXXXXX	0.59	1.43	6.96
ZARA 13462M001	6	XXXXX	0.80	0.77	3.14

Comparison of individual solutions:

ACOR 13434M001	N	1.09	0.35	-0.50	0.74	2.02	0.03	-1.44	-0.09
ACOR 13434M001	E	0.82	-0.63	-0.41	0.07	-0.51	-0.23	1.39	1.08
ACOR 13434M001	U	2.54	1.78	0.90	-4.61	-1.55	1.65	2.70	0.98
ALDA 19383M001	N	2.10	3.22	-0.34	-3.57	-1.48	0.39	-0.85	-0.19
ALDA 19383M001	E	1.04	0.63	-1.12	0.23	0.95	-1.35	-1.26	0.73
ALDA 19383M001	U	3.72	2.07	-4.27	3.08	-0.78	0.82	6.75	-2.02
ALSA 19419M001	N	0.92	1.14	0.75	0.76	0.86	-0.24	-1.21	-0.60
ALSA 19419M001	E	1.04	0.81	-0.10	-1.83	1.08	0.85	0.01	0.79
ALSA 19419M001	U	4.51	2.24	-8.29	6.13	1.43	1.36	0.06	-2.63
AMUR 19388M001	N	1.19	-0.10	0.29	0.84	1.70	2.09	-0.44	-0.47
AMUR 19388M001	E	1.68	-1.75	0.66	3.47	-0.14	0.51	-0.66	0.79
AMUR 19388M001	U	3.07	4.98	-3.60	-1.62	2.59	-1.84	-1.99	-1.42
BLAZ 10074M002	N	0.72	-0.20	1.04	-0.76	0.64	0.86	0.45	-0.18
BLAZ 10074M002	E	1.63	-1.56	-0.07	2.85	0.24	-1.28	-1.85	0.56
BLAZ 10074M002	U	4.16	0.10	-6.53	-0.55	1.04	5.83	-0.48	-5.06
BIDA 00000M000	N	0.80	0.06	0.63	1.65	-0.02	0.34	-0.17	-0.77
BIDA 00000M000	E	1.43	0.48	0.11	1.60	0.57	-2.25	-1.99	0.36
BIDA 00000M000	U	3.59	0.73	-7.14	-0.40	2.69	2.67	-0.72	-3.30
BRZR 19387M001	N	1.66	-0.75	3.14	0.24	0.44	-1.03	-1.45	
BRZR 19387M001	E	1.31	1.28	-2.22	-0.67	1.19	0.02	0.28	
BRZR 19387M001	U	5.28	1.73	-9.37	-1.24	-3.12	3.89	4.74	
CACE 13447M001	N	0.74	0.21	-0.58	-0.22	-0.01	-0.82	1.39	0.50
CACE 13447M001	E	1.59	-1.35	2.71	-1.54	1.06	-1.09	1.14	0.14
CACE 13447M001	U	4.21	-1.52	4.63	-1.21	-6.40	1.49	-0.61	-6.15
CANT 13438M001	N	0.72		1.13	0.38	-0.24	0.04	0.67	-0.84
CANT 13438M001	E	1.55		-0.32	3.12	-0.90	0.24	-1.15	-0.17
CANT 13438M001	U	3.98		-1.38	-6.79	0.10	2.00	5.21	0.15
CHER 00000M000	N	0.87	-0.01	0.66	0.29	0.82	-0.70	-0.89	1.46
CHER 00000M000	E	1.51	-1.59	0.32	2.60	-1.55	0.28	-1.33	0.19
CHER 00000M000	U	4.42	-3.75	-4.63	-3.97	1.19	7.60	0.69	-2.52
CREU 13432M001	N	1.96		-0.04	-2.20	-1.19	-1.87	0.51	3.04
CREU 13432M001	E	0.88		0.57	-0.59	0.88	-0.67	-1.31	0.52
CREU 13432M001	U	3.06		4.89	2.37	-0.29	-1.73	-3.58	1.14
EBRE 13410M001	N	1.38	-0.10	-1.00	0.47	-0.80	0.69	-2.04	2.23
EBRE 13410M001	E	0.32	-0.16	0.18	-0.07	0.03	-0.74	-0.10	-0.06
EBRE 13410M001	U	7.37	-2.36	-4.38	-2.83	11.69	9.37	0.58	-8.25
ELGE 19353S001	N	0.71	-0.60	1.23	-0.36	-0.48	-0.38	-0.16	0.81
ELGE 19353S001	E	1.50	-0.23	-2.77	0.64	-0.17	0.70	1.48	1.64
ELGE 19353S001	U	3.50	0.57	-7.47	0.74	-0.55	3.98	0.80	0.00
EMAZ 17001M001	N	0.78	-0.97	-0.14	-0.01	1.20	-1.05	-0.02	0.42
EMAZ 17001M001	E	0.84	-0.67	-1.53	0.93	-0.43	-0.20	-0.02	0.57
EMAZ 17001M001	U	3.35	-5.09	2.03	3.79	2.69	-3.47	1.47	-1.15
GERN 19389M001	N	1.05	-0.74		1.62	0.24	-0.16	-1.37	-0.62
GERN 19389M001	E	1.05	-0.72		-0.32	0.76	1.26	1.51	0.68
GERN 19389M001	U	2.25	2.54		0.18	-0.65	0.00	0.17	4.29
IGEL 19352S001	N	1.11	-1.03	1.61	-1.32	0.43	0.57	0.34	1.18
IGEL 19352S001	E	1.10	-0.62	-0.96	2.02	0.16	-0.23	-1.17	-0.66
IGEL 19352S001	U	5.10	-2.65	-9.47	-3.47	2.12	5.96	-0.62	2.55
ISPS 19484M001	N	1.12	-0.80	1.55	1.48	-1.00	-1.07	0.10	-0.32
ISPS 19484M001	E	2.30	0.99	-3.99	-0.38	2.36	-1.46	1.71	2.00
ISPS 19484M001	U	7.75	-4.19	-14.73	9.05	-1.95	4.54	0.98	4.32
KAST 19499M001	N	0.90	-0.07	1.31	0.40	0.40	1.60	0.40	-0.34
KAST 19499M001	E	1.19	-0.35	0.03	2.31	-0.07	1.23	-1.17	0.47
KAST 19499M001	U	4.73	2.91	-6.72	-6.84	2.95	0.19	-0.90	4.93
LARE 19440M001	N	1.11	-0.35	1.52	-0.60	0.37	-1.78	-0.72	0.88
LARE 19440M001	E	1.23	-0.13	-1.37	-0.01	-2.16	0.03	1.15	1.07
LARE 19440M001	U	2.54	-3.82	4.18	0.64	0.56	-0.58	-1.85	1.46
LAZK 19354S001	N	1.03	-1.75	1.68	0.59	-0.14	0.08	-0.36	-0.06
LAZK 19354S001	E	2.21	0.13	-4.19	0.78	2.82	-0.44	1.23	1.25

LAZK 19354S001	U	7.04	3.89	-15.04	0.58	1.13	6.82	-1.54	2.28
LEIT 19428M001	N	0.99	0.71	-1.58	-0.16	0.39	1.27	0.89	0.51
LEIT 19428M001	E	1.58	-0.90	-0.55	3.22	-1.39	-0.71	-1.09	-0.06
LEIT 19428M001	U	3.61	-4.27	-6.85	0.23	-0.63	1.43	1.38	2.97
ORON 19427M001	N	0.88	0.22	1.62	1.06	-0.50	0.25	-0.59	-0.45
ORON 19427M001	E	1.64	-0.57	0.98	2.23	-1.58	-0.75	-2.53	0.71
ORON 19427M001	U	3.34	1.29	-6.27	-2.62	-0.97	3.61	1.42	-1.73
PAS2 19351S001	N	0.72		-0.62	0.38	-0.22	0.90	0.88	0.68
PAS2 19351S001	E	1.32		0.61	1.69	0.09	-1.29	-1.88	-0.50
PAS2 19351S001	U	6.56		-8.60	-5.76	1.68	10.03	-2.14	0.07
PASA 19351S001	N	0.67	0.73	0.87	0.16	-0.89	0.30	0.29	0.62
PASA 19351S001	E	1.44	0.44	-1.40	2.47	0.11	-0.83	-1.82	-0.31
PASA 19351S001	U	4.73	-3.35	-4.74	-6.24	-0.19	7.39	-1.19	2.38
RI01 13448M002	N	1.01		0.49	0.81	-0.95	1.67	-0.47	-0.51
RI01 13448M002	E	1.06		-0.17	2.07	-0.03	0.16	-1.12	0.01
RI01 13448M002	U	3.64		-6.99	2.80	-0.14	0.19	2.89	-1.14
SALA 13469M001	N	0.56	-0.05	0.68	0.77	0.44	-0.36	-0.64	-0.29
SALA 13469M001	E	0.66	-0.22	-0.17	-0.37	0.69	-1.18	-0.37	0.62
SALA 13469M001	U	5.17	1.32	10.57	-0.93	-4.72	-4.23	2.02	-1.40
SCDA 10088M002	N	0.76	-1.15	1.17	0.36	-0.25	0.58	0.40	0.30
SCDA 10088M002	E	1.70	-0.85	-0.60	2.89	0.21	0.29	-2.71	0.67
SCDA 10088M002	U	5.40	0.30	-9.18	-3.84	6.45	5.00	-2.98	-0.48
SOPU 19386M001	N	0.84	-0.81	0.47	-0.19	-1.08	-0.25	0.30	1.42
SOPU 19386M001	E	1.57	1.14	0.12	-2.31	1.80	-1.61	1.19	0.94
SOPU 19386M001	U	4.14	0.97	-3.90	-1.19	-1.84	7.21	2.96	-4.60
TERU 13487M001	N	1.31	-1.14	-0.11	1.46	-0.56	1.04	2.30	-0.31
TERU 13487M001	E	1.08	0.22	2.42	-1.00	0.19	0.11	-0.01	0.18
TERU 13487M001	U	3.65	-1.95	2.39	-3.42	5.77	2.60	2.28	-3.65
VITO 19385M001	N	0.85	-0.44	1.51	0.08	0.76	0.97	-0.54	-0.08
VITO 19385M001	E	1.21	0.62	-0.13	2.14	-0.47	-0.58	-0.98	1.51
VITO 19385M001	U	3.01	3.80	-4.74	-0.22	2.86	-2.22	-1.65	-1.20
YEBE 13420M001	N	0.59	-0.13	-0.40	-0.14	-0.07	1.04	-0.00	-0.88
YEBE 13420M001	E	1.43	1.19	-2.32	0.25	0.05	-1.52	1.60	0.69
YEBE 13420M001	U	6.96	-9.84	-5.61	-3.05	-7.66	0.03	2.78	9.31
ZARA 13462M001	N	0.80		0.30	0.41	-0.34	-0.44	-0.47	1.54
ZARA 13462M001	E	0.77		0.99	-0.99	-0.06	0.29	0.26	0.92
ZARA 13462M001	U	3.14		2.93	2.55	0.29	1.64	1.72	-5.34

## 6.2 Datum verification

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

LOCAL GEODETIC DATUM: IGS14  
RESIDUALS IN LOCAL SYSTEM (NORTH, EAST, UP)

NUM	NAME	FLG	RESIDUALS IN MILLIMETERS		
1	ACOR 13434M001	I W	-2.57	2.11	0.62
2	ALAC 13433M001	I W	0.77	0.02	-0.94
3	ALBA 13452M001	I W	0.03	-1.12	-1.05
4	ALME 13437M001	I W	-1.71	1.69	5.19
5	BCLN 13412M001	I W	-0.36	-0.66	-2.40
6	BELL 13431M001	I W	-0.96	0.27	-0.35
7	BORR 13480M001	I W	-0.07	-1.57	-3.15
8	BRST 10004M004	I W	-2.05	1.50	0.71
9	CACE 13447M001	I W	-0.32	2.42	2.18
10	CANT 13438M001	I W	-1.52	0.48	1.02
11	CARG 19412M001	I W	-0.48	1.69	0.82
12	CASC 13909S001	I W	1.05	-0.04	3.31
13	CEU1 13449M002	I W	-0.25	-0.62	0.78
14	COBA 13453M001	I W	1.21	0.20	0.11
15	CREU 13432M001	I W	0.01	0.11	-0.77
16	EBRE 13410M001	I W	-0.24	-0.78	-5.48
17	ESCO 13435M001	I W	0.12	1.73	-9.90
18	FUNC 13911S001	I W	3.02	0.93	-3.46
19	GAIA 13902M001	I W	0.26	0.91	4.44
21	HUEL 13451M001	I W	0.57	-2.46	3.52
22	IZAN 31309M002	I W	0.80	0.28	-1.57
24	LLIV 13436M001	I W	-0.39	0.62	3.09
25	LPAL 81701M001	I W	-0.97	1.45	-1.21
27	MALA 13443M001	I W	-2.09	0.01	2.64
28	MAS1 31303M002	I W	0.52	1.83	2.00
30	MELI 19379M001	I W	1.20	-1.96	-0.64
31	PASA 19351S001	I W	-0.13	-0.14	3.01
32	PDEL 31906M004	I W	1.02	0.54	3.53
33	RABT 35001M002	I W	0.53	-0.06	-0.33
34	RIO1 13448M002	I W	-0.28	-0.94	-2.23
35	SALA 13469M001	I W	-0.37	-0.15	0.24
36	SCOA 10088M002	I W	-2.39	-0.83	0.94
38	SONS 13446M001	I W	-1.19	-0.46	-2.98
39	TERC 31909M001	I W	9.18	-4.86	-4.34
40	TERU 13487M001	I W	2.53	-0.14	-2.17
41	VALA 13463M002	I W	-0.39	-2.20	-0.27
42	VALE 13439M001	I W	-1.95	-1.06	-4.13
43	VIGO 13450M001	I W	-0.56	0.53	3.70
44	YEBE 13420M001	I W	1.43	-0.29	3.85
45	ZARA 13462M001	I W	-0.48	0.60	3.31
46	ZIMM 14001M004	I W	-2.52	0.42	-1.62
	RMS / COMPONENT		1.94	1.39	3.08
	MEAN		-0.00	0.00	0.00
	MIN		-2.57	-4.86	-9.90
	MAX		9.18	2.42	5.19

NUMBER OF PARAMETERS : 3  
NUMBER OF COORDINATES : 123  
RMS OF TRANSFORMATION : 2.25 MM

BARYCENTER COORDINATES:

LATITUDE : 39 31 35.12  
LONGITUDE : - 5 26 58.28  
HEIGHT : -48.609 KM

PARAMETERS:

TRANSLATION IN N : -0.01 +- 0.35 MM  
TRANSLATION IN E : -0.01 +- 0.35 MM  
TRANSLATION IN U : 0.00 +- 0.35 MM

## 6.3 Adjustment Statistics

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

```
*.STATISTICAL PARAMETER-----VALUE(S)-----
NUMBER OF OBSERVATIONS              16527783
NUMBER OF UNKNOWN                   236148
NUMBER OF DEGREES OF FREEDOM        16291635
PHASE MEASUREMENTS SIGMA             0.00100
SAMPLING INTERVAL (SECONDS)          180
VARIANCE FACTOR                      2.832847645610437
```

Helmert Transformation Parameters With Respect to Combined Solution:

Sol	Rms (m)	Translation (m)			Rotation (")			Scale (ppm)
		X	Y	Z	X	Y	Z	
1	0.00274	0.0106	0.0182	-0.0169	-0.0003	0.0007	0.0005	0.00044
2	0.00309	-0.0007	-0.0086	0.0050	0.0002	-0.0001	-0.0002	-0.00061
3	0.00249	0.0130	0.0021	-0.0114	0.0000	0.0005	0.0001	-0.00053
4	0.00291	0.0182	-0.0170	-0.0141	0.0005	0.0007	-0.0003	-0.00093
5	0.00279	0.0006	-0.0070	0.0093	0.0002	-0.0002	-0.0001	-0.00087
6	0.00235	-0.0083	0.0051	0.0034	-0.0001	-0.0003	0.0002	0.00081
7	0.00339	0.0018	-0.0006	-0.0012	-0.0000	0.0001	-0.0000	-0.00014

Statistics of individual solutions:

File	RMS (m)	DOF	Chi**2/DOF	#Observations authentic / pseudo	#Parameters explicit / implicit / singular
1	0.00164	2147947	2.70	2179801	3 936 30921 0
2	0.00165	2334174	2.71	2369923	3 993 34759 0
3	0.00159	2394759	2.52	2429755	3 1011 33988 0
4	0.00177	2360057	3.15	2397297	3 1005 36238 0
5	0.00163	2340320	2.67	2375641	3 1005 34319 0
6	0.00189	2345134	3.57	2378490	3 996 32363 0
7	0.00156	2363346	2.43	2396876	3 999 32534 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 18:217:00000 18:223:86370 LEICA GRX1200PRO -----
ALDA A 1 P 18:217:00000 18:223:86370 LEICA GR10 -----
ALSA A 1 P 18:217:00000 18:223:86370 LEICA GRX1200GGPRO -----
AMUR A 1 P 18:217:00000 18:223:86370 LEICA GR10 -----
BIAZ A 1 P 18:217:00000 18:223:86370 TRI SP90M -----
BIDA A 1 P 18:217:00000 18:223:86370 LEICA GR10 -----
BRZR A 1 P 18:217:00000 18:223:86370 LEICA GR10 -----
CACE A 1 P 18:217:00000 18:223:86370 TRIMBLE NETR9 -----
CANT A 1 P 18:218:00000 18:223:86370 LEICA GR10 -----
CHER A 1 P 18:217:00000 18:223:86370 LEICA GRX1200+GNSS -----
CREU A 1 P 18:218:00000 18:223:86370 LEICA GR50 -----
EBRE A 1 P 18:217:00000 18:223:86370 LEICA GR50 -----
ELGE A 1 P 18:217:00000 18:223:86370 LEICA GR10 -----
EMAZ A 1 P 18:217:00000 18:223:86370 LEICA GR30 -----
GERN A 1 P 18:217:00000 18:223:86370 LEICA GR10 -----
IGEL A 1 P 18:217:00000 18:223:86370 LEICA GR10 -----
ISPS A 1 P 18:217:00000 18:223:86370 TRIMBLE NETR9 -----
KAST A 1 P 18:217:00000 18:223:86370 LEICA GR30 -----
LARE A 1 P 18:217:00000 18:223:86370 LEICA GRX1200GGPRO -----
LAZK A 1 P 18:217:00000 18:223:86370 LEICA GR10 -----
LEIT A 1 P 18:217:00000 18:223:86370 LEICA GRX1200+GNSS -----
ORON A 1 P 18:217:00000 18:223:86370 LEICA GRX1200GGPRO -----
PAS2 A 1 P 18:218:00000 18:223:86370 TPS NET-G3A -----
PASA A 1 P 18:217:00000 18:223:86370 LEICA GR10 -----
RIO1 A 1 P 18:218:00000 18:223:86370 LEICA GR25 -----
SALA A 1 P 18:217:00000 18:223:86370 LEICA GRX1200+GNSS -----
SCOA A 1 P 18:217:00000 18:223:86370 LEICA GR25 -----
SOPU A 1 P 18:217:00000 18:223:86370 LEICA GR10 -----
TERU A 1 P 18:217:00000 18:223:86370 LEICA GRX1200GGPRO -----
VITO A 1 P 18:217:00000 18:223:86370 LEICA GR10 -----
YEBE A 1 P 18:217:00000 18:223:86370 TRIMBLE NETR9 -----
ZARA A 1 P 18:218:00000 18:223:86370 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 18:217:00000 18:223:86370 LEIAT504 LEIS -----
ALDA A 1 P 18:217:00000 18:223:86370 LEIAS10 NONE -----
ALSA A 1 P 18:217:00000 18:223:86370 LEIAX1202GG NONE -----
AMUR A 1 P 18:217:00000 18:223:86370 LEIAS10 NONE -----
```

BIAZ	A	1	P	18:217:00000	18:223:86370	LEIAR25	LEIT	----
BIDA	A	1	P	18:217:00000	18:223:86370	LEIAS10	NONE	----
BRZR	A	1	P	18:217:00000	18:222:86370	LEIAS10	NONE	----
CACE	A	1	P	18:217:00000	18:223:86370	TRM29659.00	NONE	----
CANT	A	1	P	18:218:00000	18:223:86370	LEIAR25.R4	LEIT	25066
CHER	A	1	P	18:217:00000	18:223:86370	LEIAX1203+GNSS	NONE	----
CREU	A	1	P	18:218:00000	18:223:86370	LEIAR25.R4	NONE	26357
EBRE	A	1	P	18:217:00000	18:223:86370	LEIAR25.R4	NONE	26359
ELGE	A	1	P	18:217:00000	18:223:86370	LEIAR25.R4	LEIT	----
EMAZ	A	1	P	18:217:00000	18:223:86370	LEIAS10	NONE	----
GERN	A	1	P	18:217:00000	18:223:86370	LEIAS10	NONE	----
IGEL	A	1	P	18:217:00000	18:223:86370	LEIAR20	LEIM	----
ISPS	A	1	P	18:217:00000	18:223:86370	TRM59900.00	SCIS	----
KAST	A	1	P	18:217:00000	18:223:86370	LEIAS10	NONE	----
LARE	A	1	P	18:217:00000	18:223:86370	LEIAT504	NONE	----
LAZK	A	1	P	18:217:00000	18:223:86370	LEIAR25.R4	LEIT	----
LEIT	A	1	P	18:217:00000	18:223:86370	LEIAX1203+GNSS	NONE	----
ORON	A	1	P	18:217:00000	18:223:86370	LEIAX1202GG	NONE	----
PAS2	A	1	P	18:218:00000	18:223:86370	LEIAR20	LEIM	73034
PASA	A	1	P	18:217:00000	18:223:86370	LEIAR20	LEIM	73034
RI01	A	1	P	18:218:00000	18:223:86370	LEIAR25.R4	LEIT	25138
SALA	A	1	P	18:217:00000	18:223:86370	LEIAR25	NONE	----
SCOA	A	1	P	18:217:00000	18:223:86370	TRM55971.00	NONE	----
SOPU	A	1	P	18:217:00000	18:223:86370	LEIAS10	NONE	----
TERU	A	1	P	18:217:00000	18:223:86370	LEIAT504GG	LEIS	----
VITO	A	1	P	18:217:00000	18:223:86370	LEIAS10	NONE	----
YEBE	A	1	P	18:217:00000	18:223:86370	TRM29659.00	NONE	----
ZARA	A	1	P	18:218:00000	18:223:86370	TRM29659.00	NONE	----

### 7.3 Eccentricities

* SITE	PT	SOLN	T	DATA_START_	DATA_END_	AXE	UP_	NORTH_	EAST_
							ARP->BENCHMARK(M)		
ACOR	A	1	P	18:217:00000	18:223:86370	UNE	3.0460	0.0000	0.0000
ALDA	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
ALSA	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
AMUR	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
BIAZ	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
BIDA	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
BRZR	A	1	P	18:217:00000	18:222:86370	UNE	0.0000	0.0000	0.0000
CACE	A	1	P	18:217:00000	18:223:86370	UNE	0.0600	0.0000	0.0000
CANT	A	1	P	18:218:00000	18:223:86370	UNE	3.0490	0.0000	0.0000
CHER	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
CREU	A	1	P	18:218:00000	18:223:86370	UNE	0.0770	0.0000	0.0000
EBRE	A	1	P	18:217:00000	18:223:86370	UNE	0.0770	0.0000	0.0000
ELGE	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
EMAZ	A	1	P	18:217:00000	18:223:86370	UNE	0.0350	0.0000	0.0000
GERN	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
IGEL	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
ISPS	A	1	P	18:217:00000	18:223:86370	UNE	0.0350	0.0000	0.0000
KAST	A	1	P	18:217:00000	18:223:86370	UNE	0.0350	0.0000	0.0000
LARE	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
LAZK	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
LEIT	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
ORON	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
PAS2	A	1	P	18:218:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
PASA	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
RI01	A	1	P	18:218:00000	18:223:86370	UNE	0.0606	0.0000	0.0000
SALA	A	1	P	18:217:00000	18:223:86370	UNE	0.0600	0.0000	0.0000
SCOA	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
SOPU	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
TERU	A	1	P	18:217:00000	18:223:86370	UNE	0.0600	0.0000	0.0000
VITO	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
YEBE	A	1	P	18:217:00000	18:223:86370	UNE	0.0000	0.0000	0.0000
ZARA	A	1	P	18:218:00000	18:223:86370	UNE	3.2590	0.0000	0.0000

## 8 Inconsistencies (logsheets-RINEX metadata)

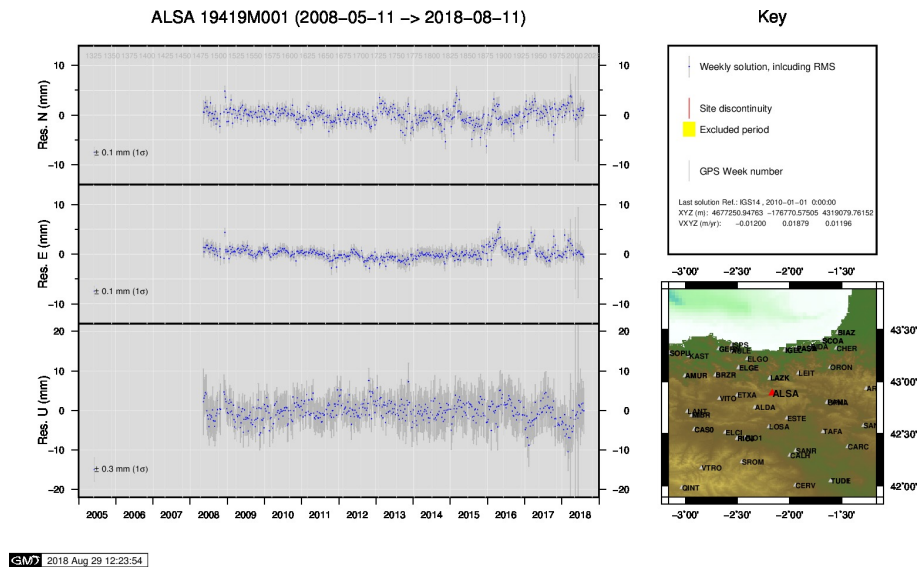
The following inconsistencies were found comparing the data available in the logsheets and the RINEX headers:

2018-08-28	21:09	UTC		PAS22170.180		RECEIVER TYPE		NET-G3A -> TPS NET-G3A
2018-08-29	01:52	UTC		PAS22180.180		RECEIVER TYPE		NET-G3A -> TPS NET-G3A
2018-08-22	00:27	UTC		PAS22190.180		RECEIVER TYPE		NET-G3A -> TPS NET-G3A
2018-08-23	00:40	UTC		PAS22200.180		RECEIVER TYPE		NET-G3A -> TPS NET-G3A
2018-08-24	00:29	UTC		PAS22210.180		RECEIVER TYPE		NET-G3A -> TPS NET-G3A
2018-08-25	00:24	UTC		PAS22220.180		RECEIVER TYPE		NET-G3A -> TPS NET-G3A
2018-08-26	00:39	UTC		PAS22230.180		RECEIVER TYPE		NET-G3A -> TPS NET-G3A

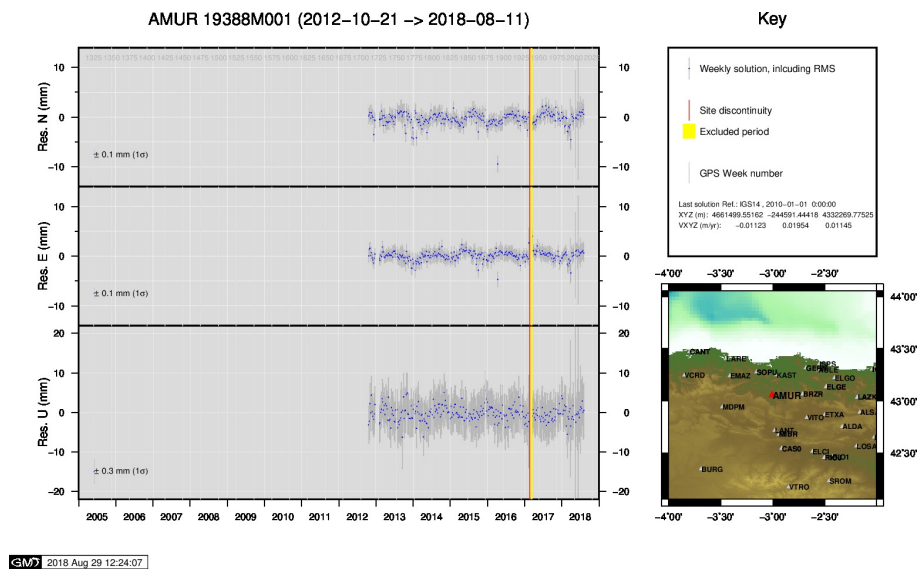
Time series of stations. Latest plots at: <http://geolabpasaia.org/gnss/ARA-net/TSeries/>, or click on the caption of each image.



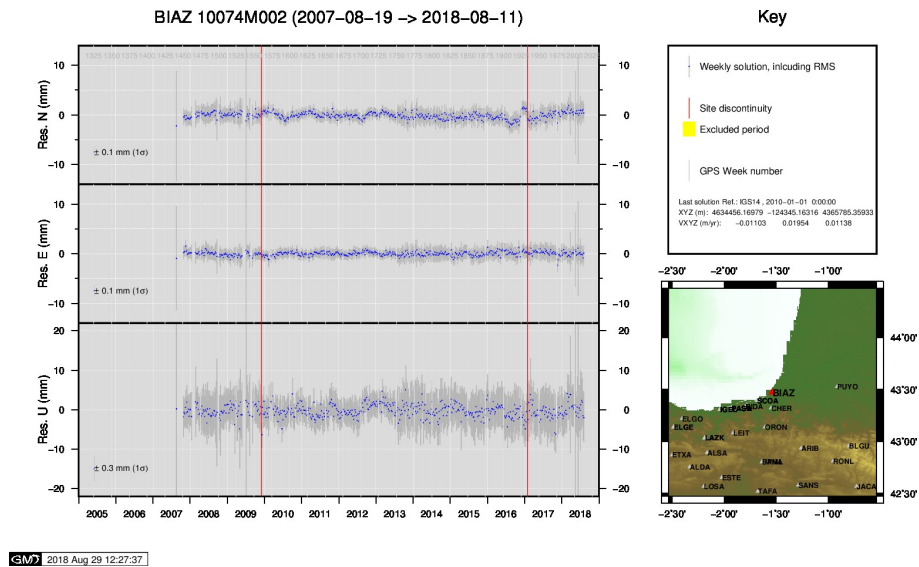




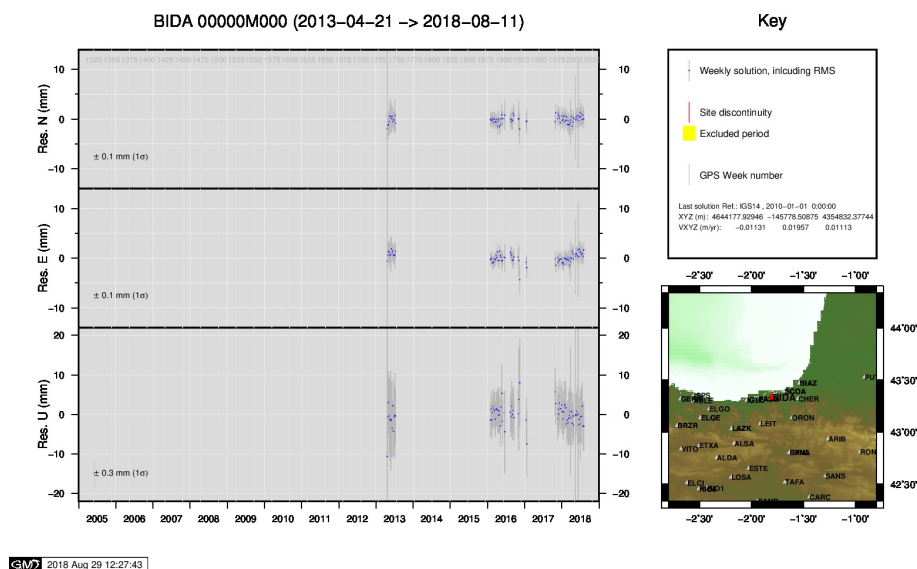
## 3 ) ALSA



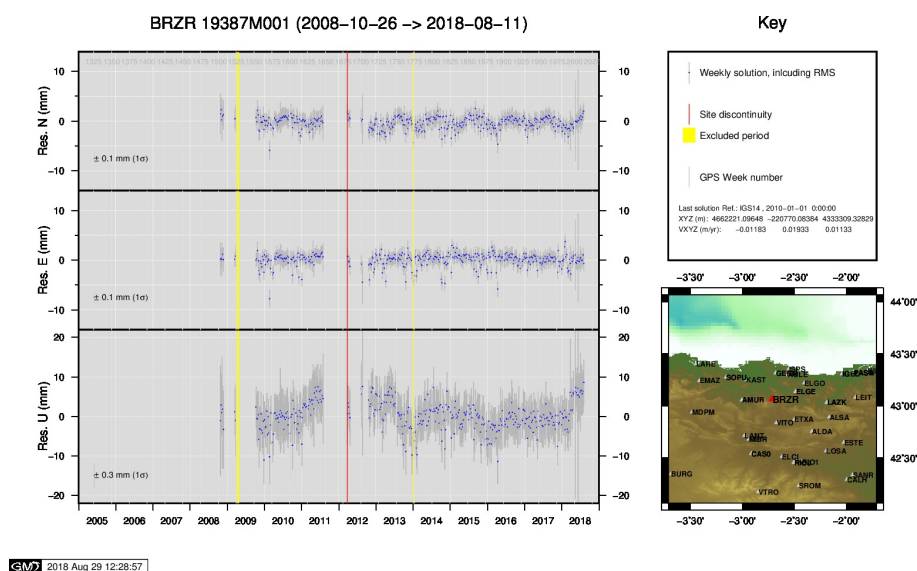
## 4 ) AMUR



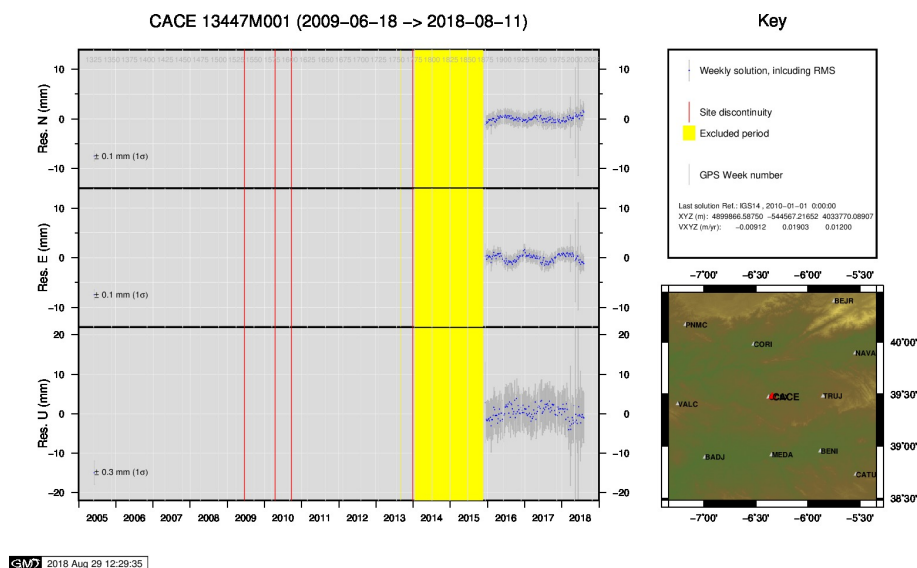
## 5 ) BLAZ



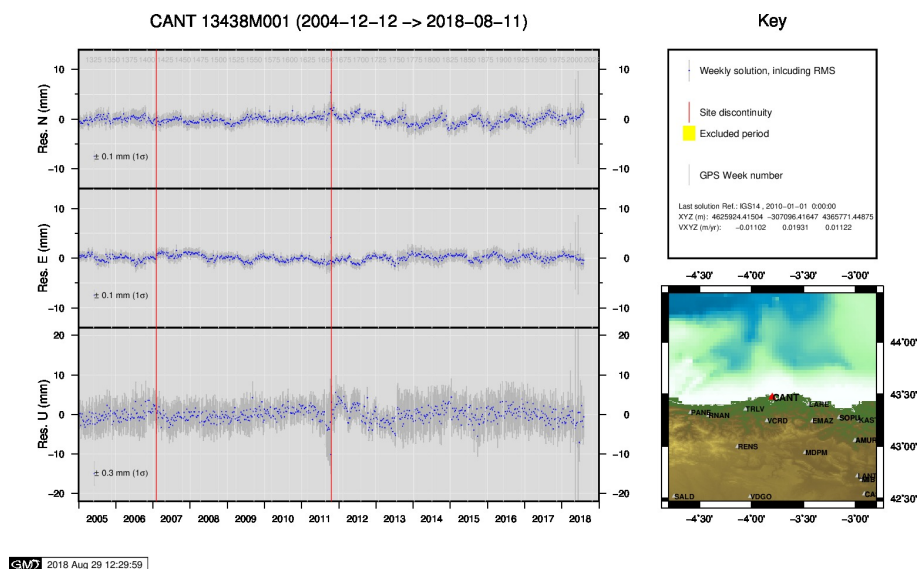
## 6 ) BIDA



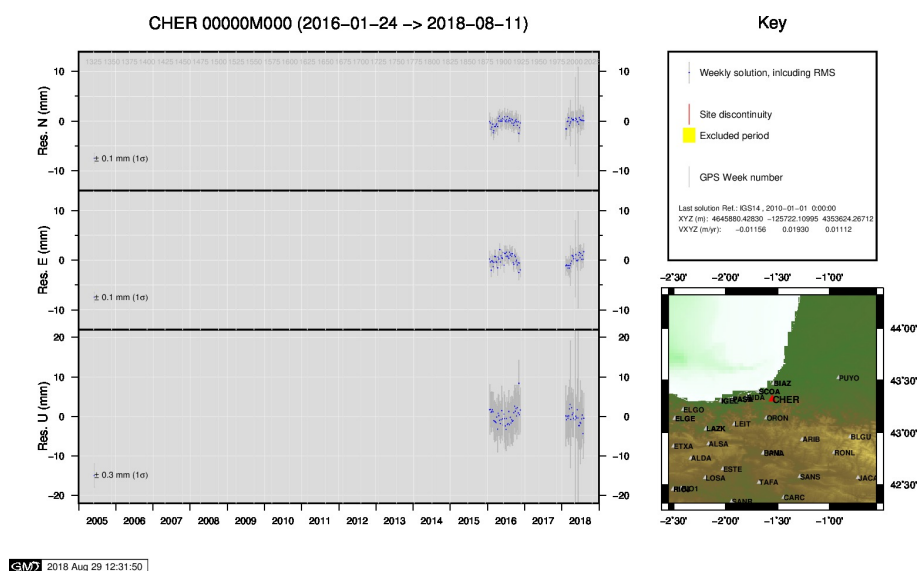
## 7 ) BRZR



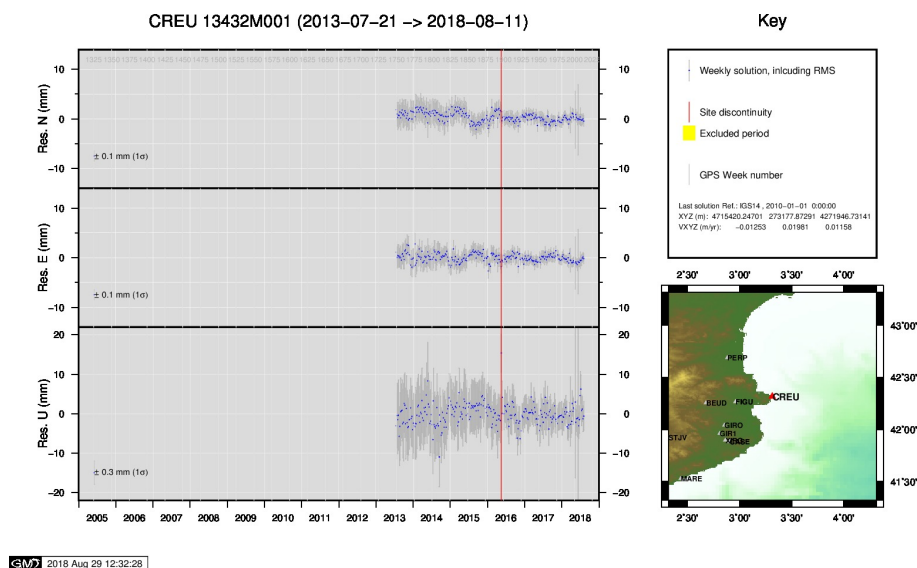
## 8 ) CACE



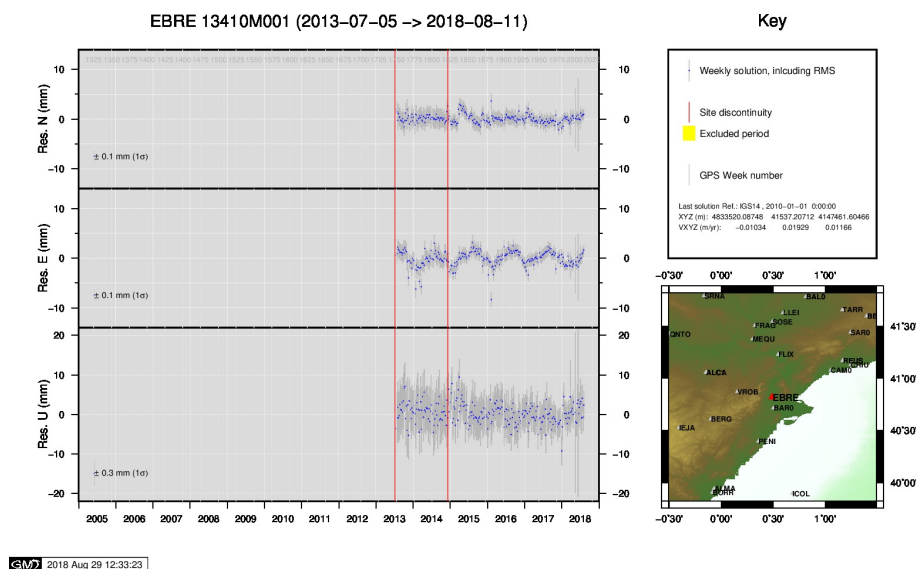
## 9 ) CANT



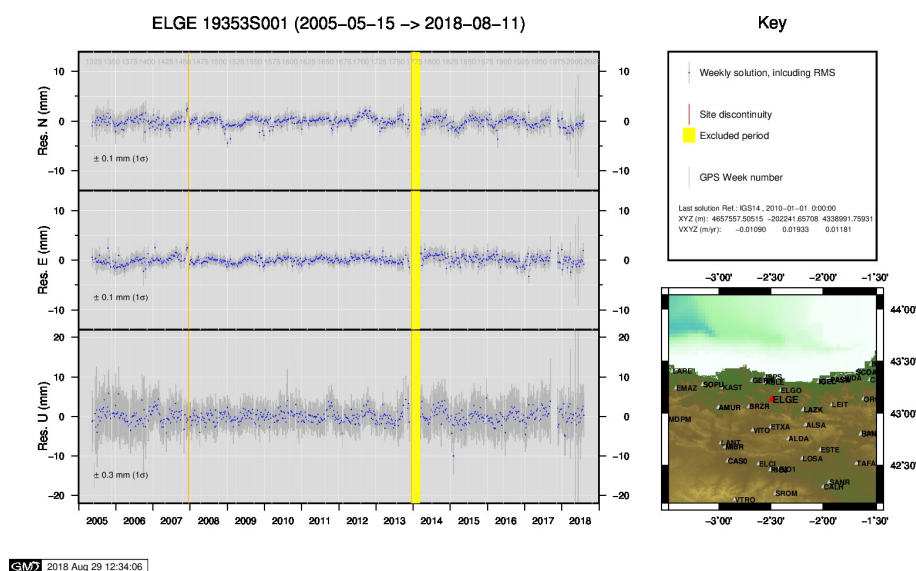
## 10 ) CHER



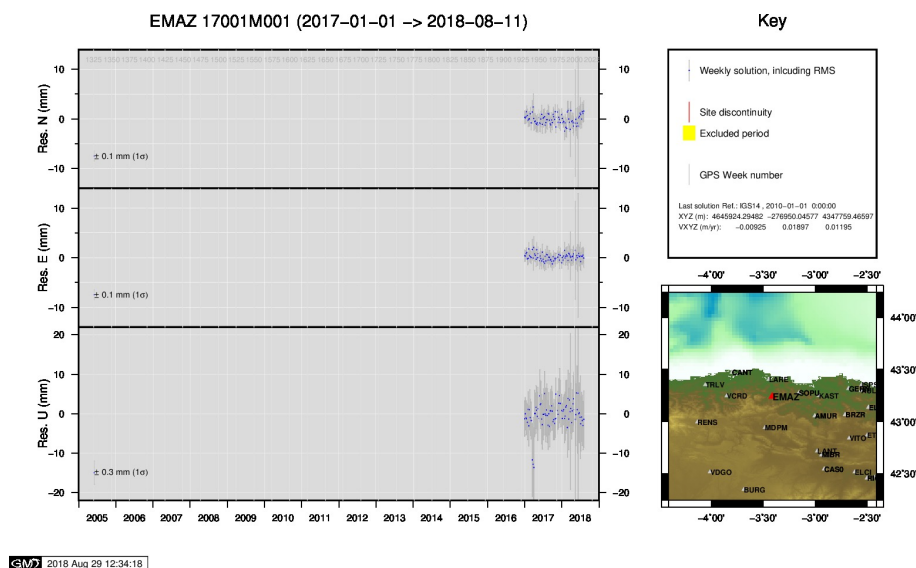
## 11 ) CREU



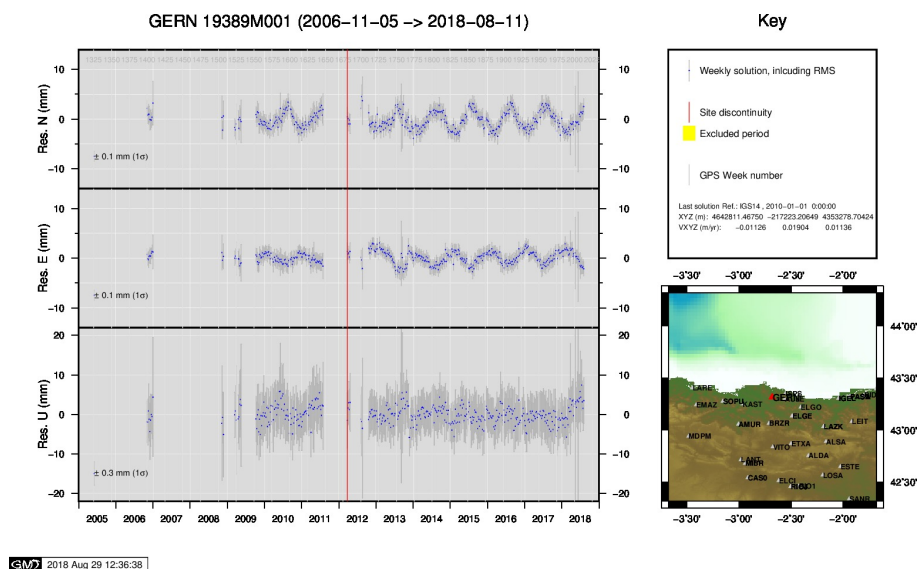
## 12 ) EBRE



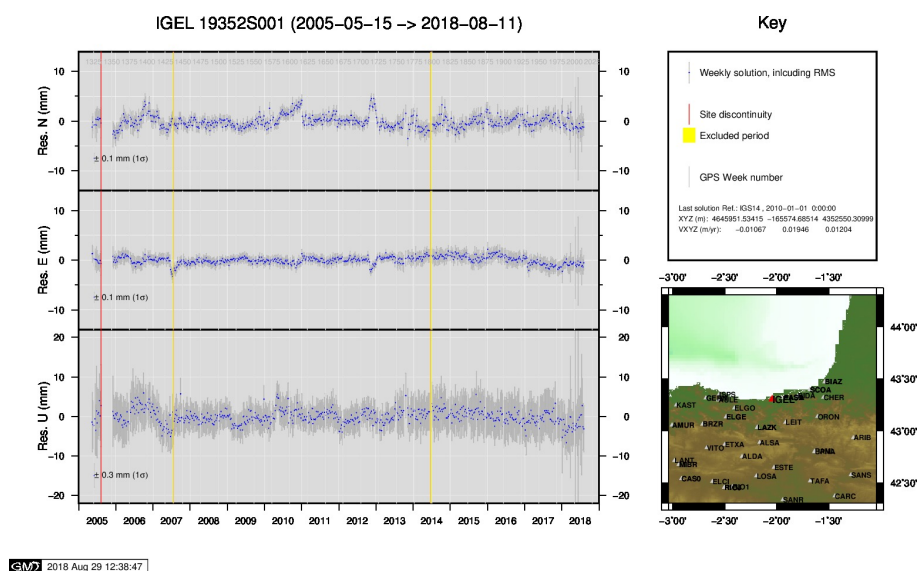
## 13 ) ELGE



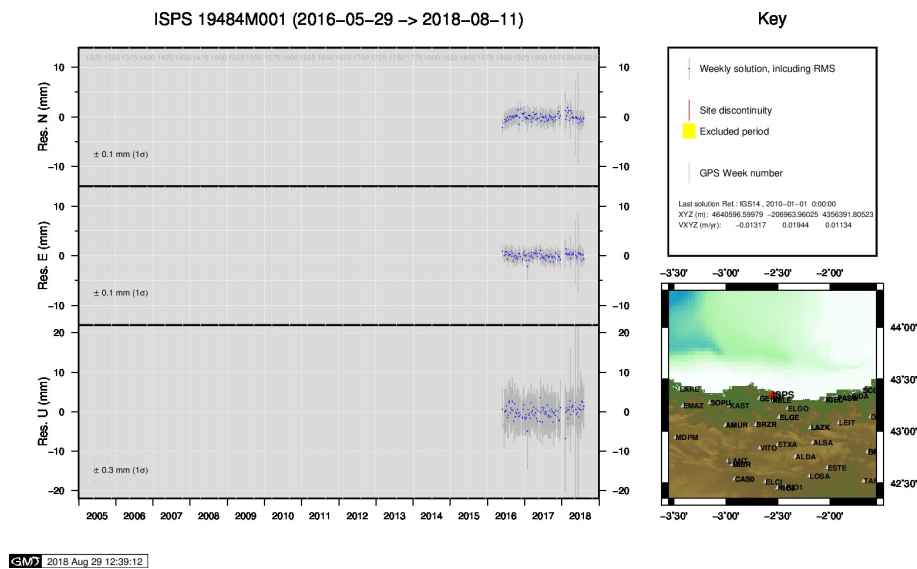
## 14 ) EMAZ



## 15 ) GERN

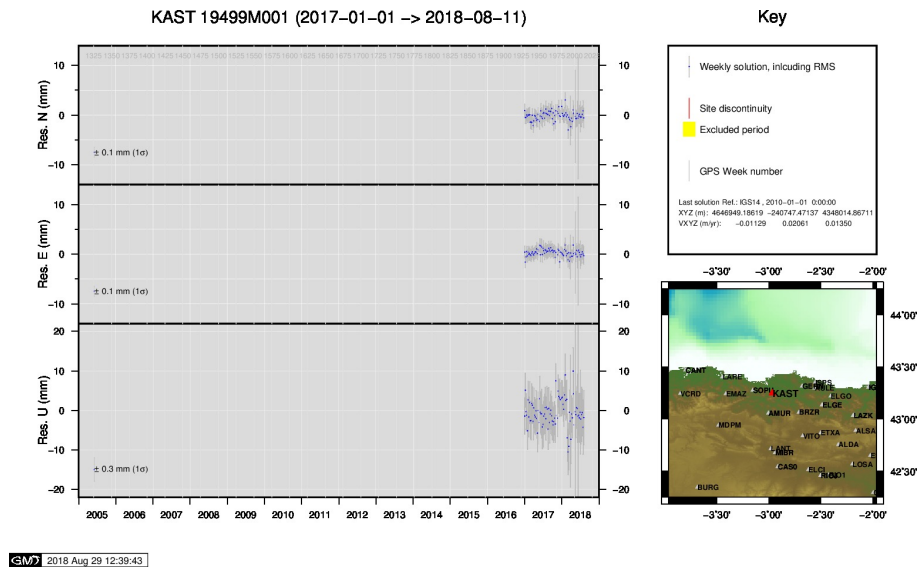


## 16 ) IGEL

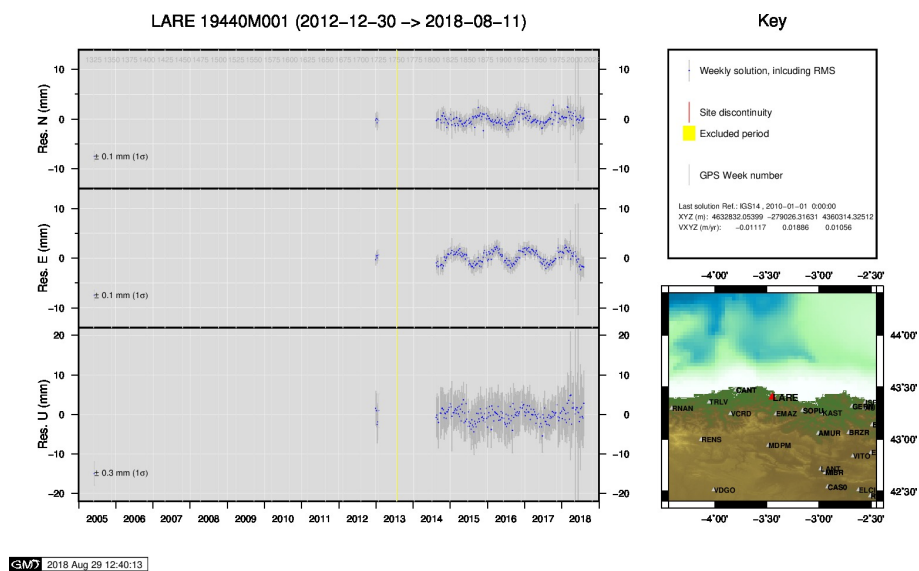


## 17 ) ISPS

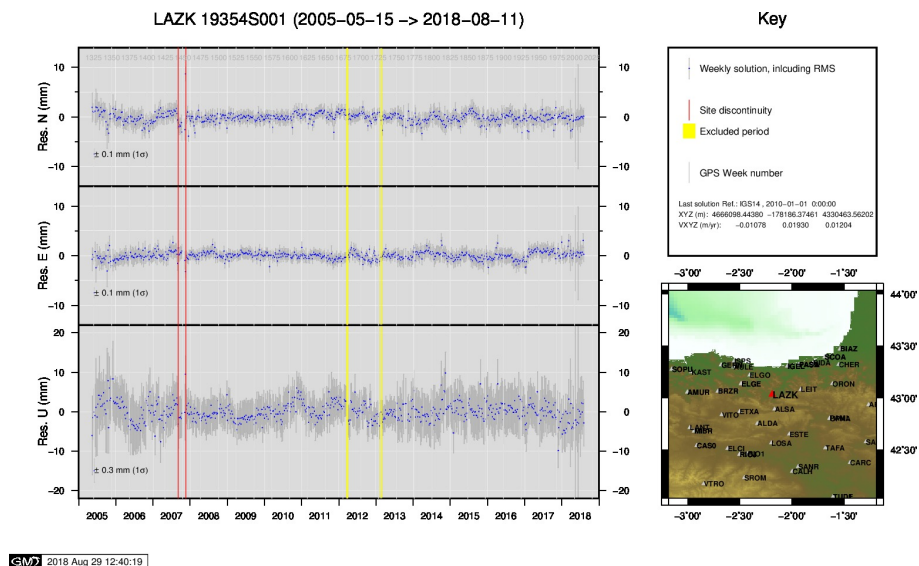




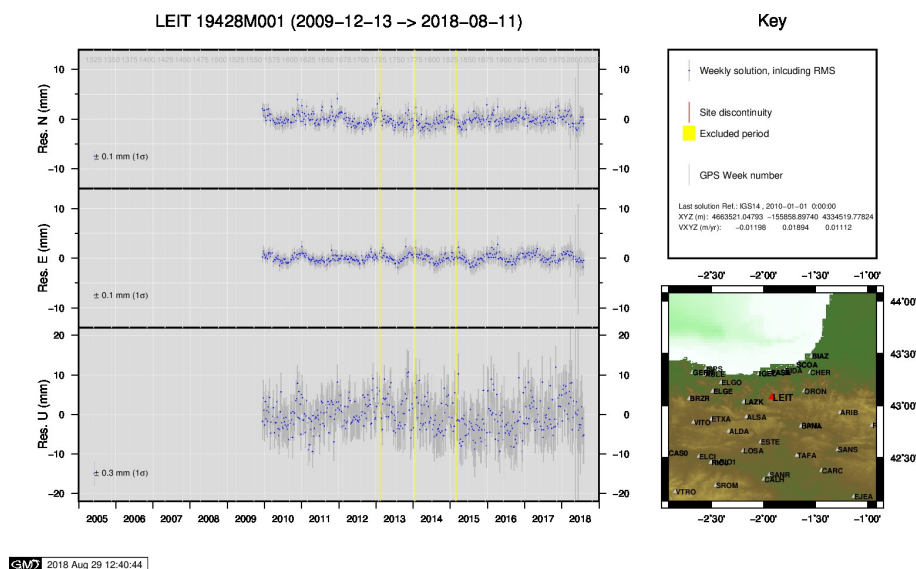
## 18 ) KAST



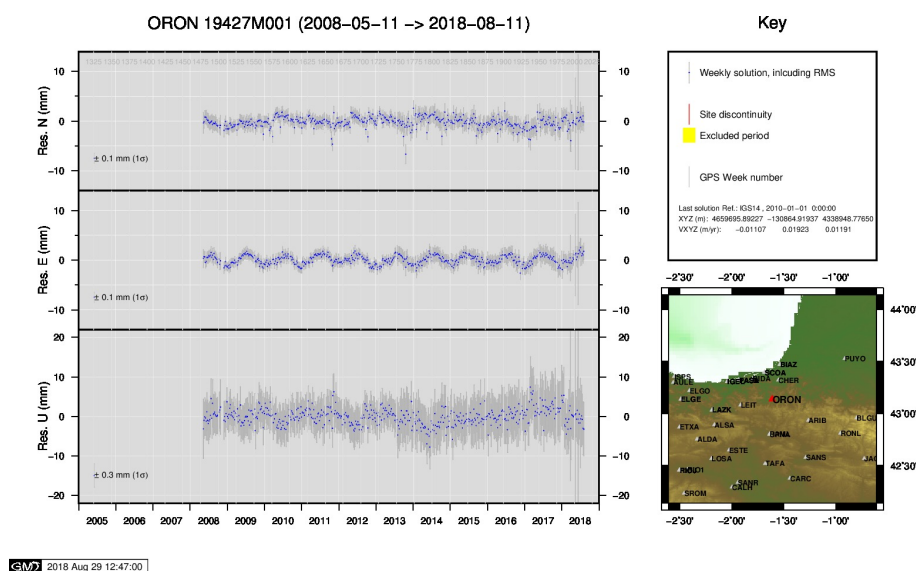
## 19 ) LARE



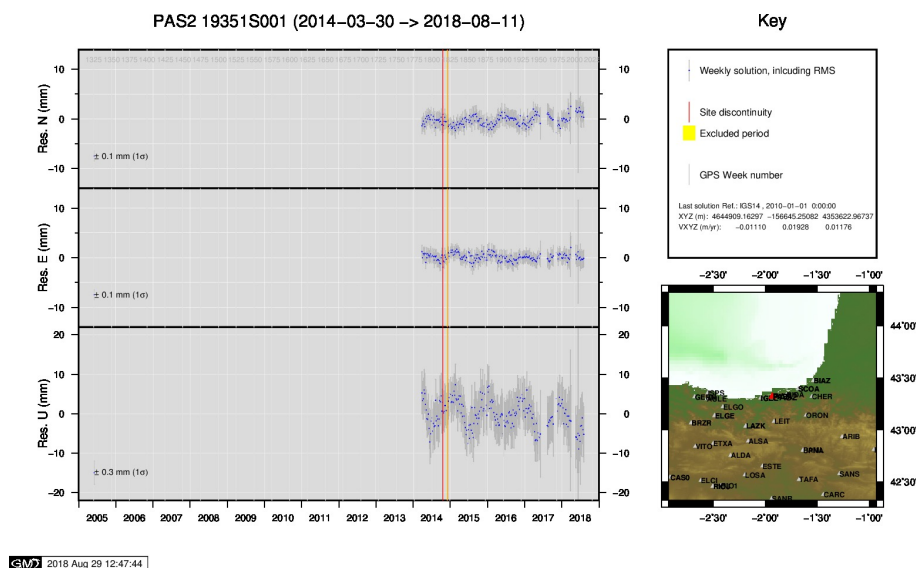
## 20 ) LAZK



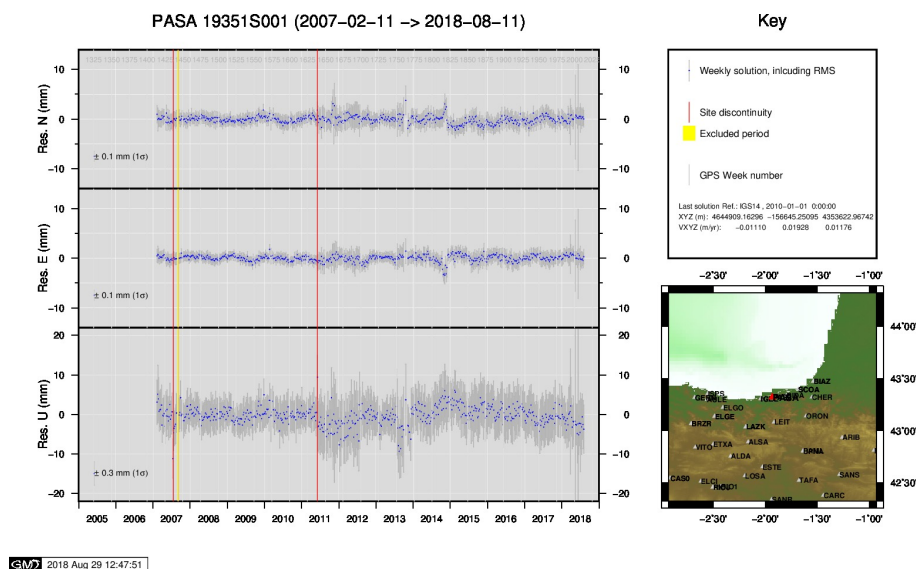
## 21 ) LEIT



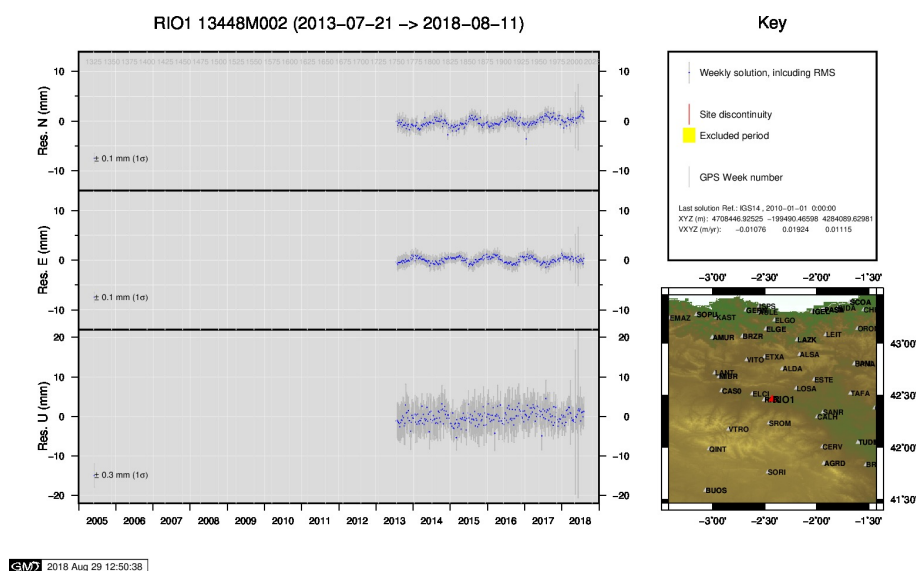
## 22 ) ORON



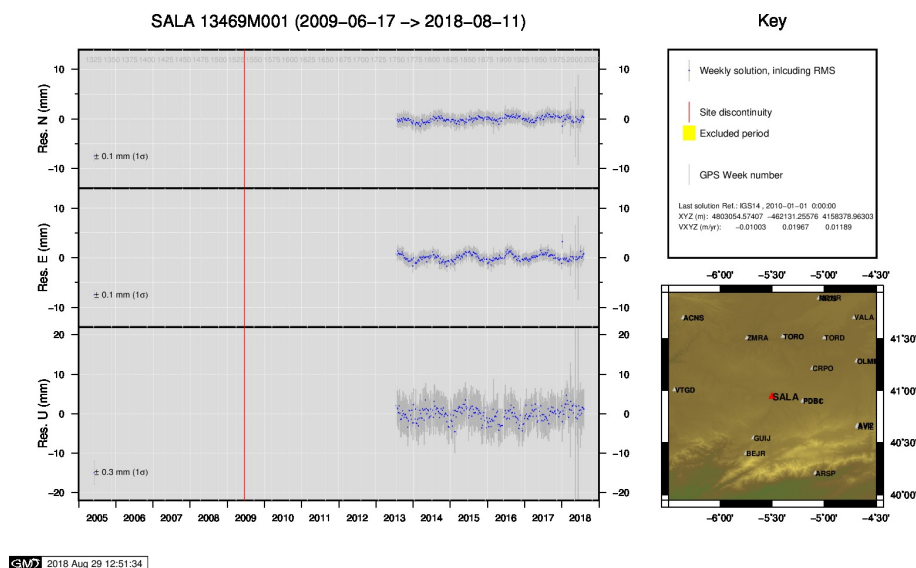
## 23 ) PAS2



24 ) PASA

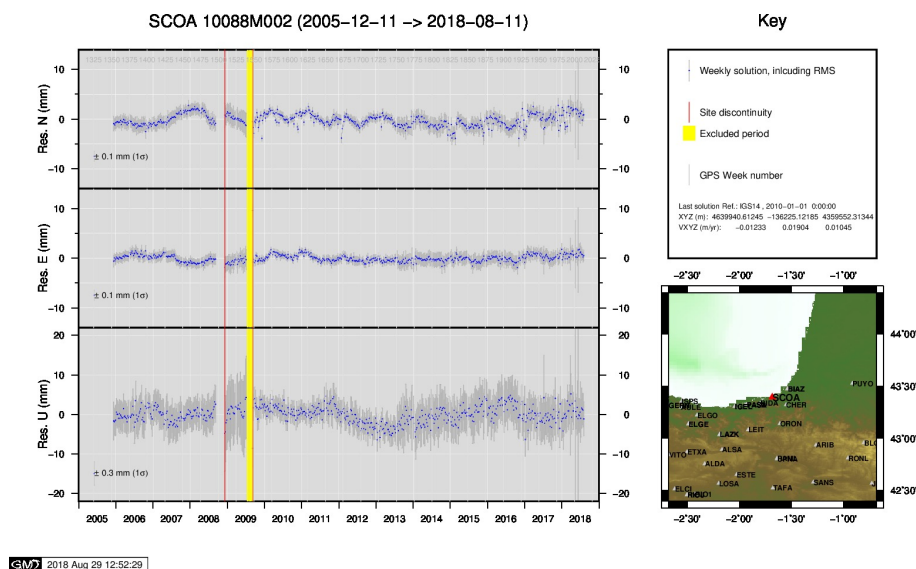


25 ) RIO1

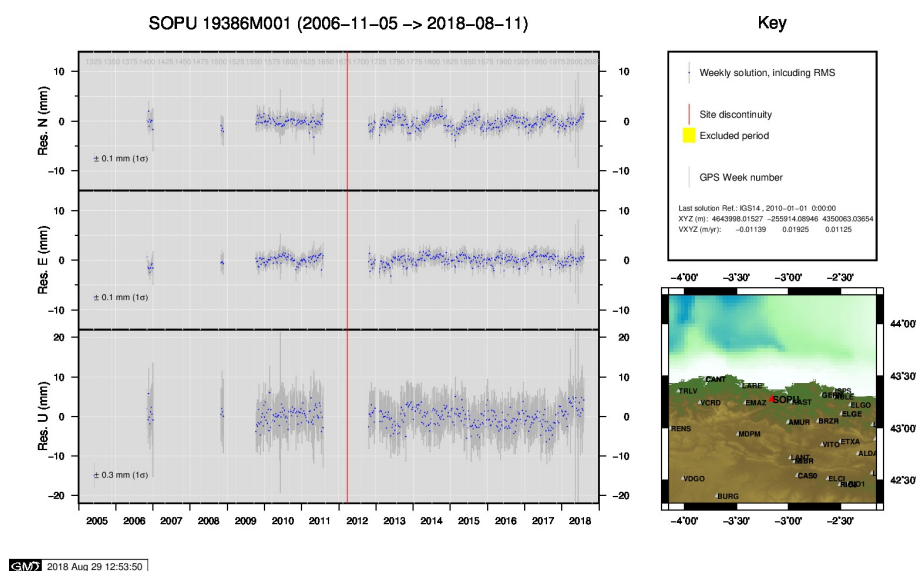


26 ) SALA

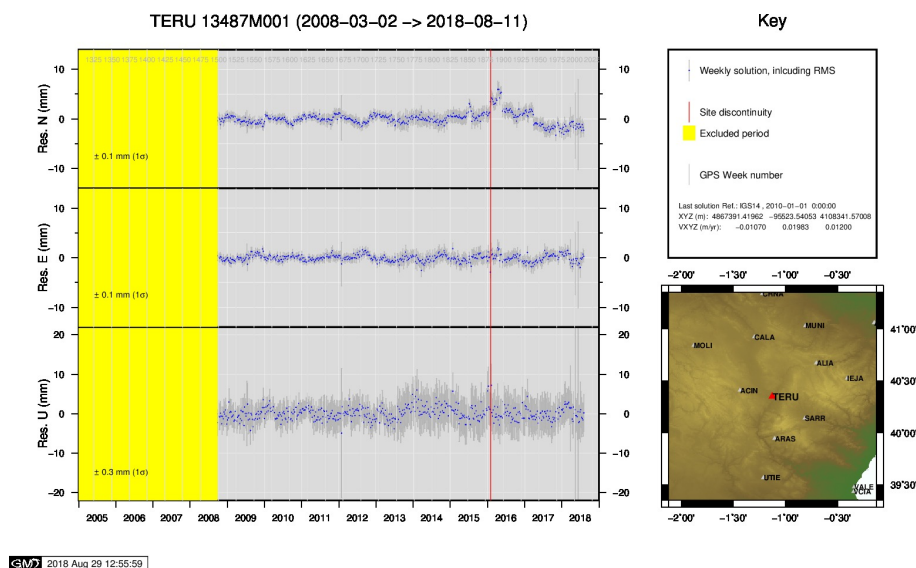




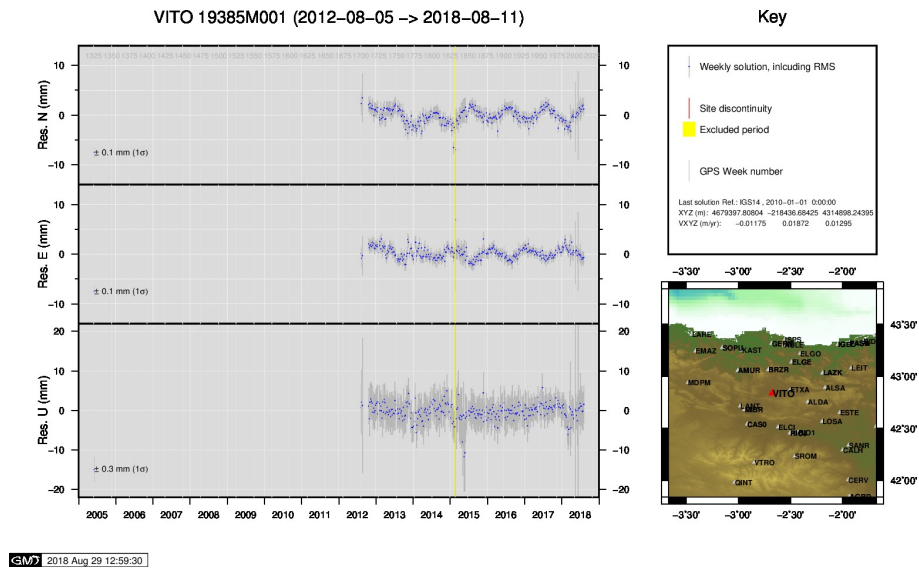
## 27 ) SCOA



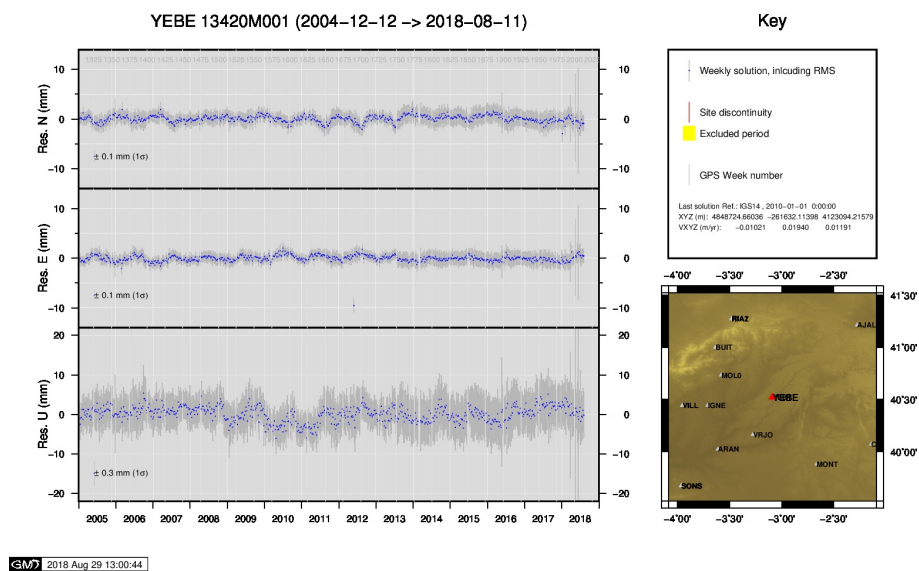
## 28 ) SOPU



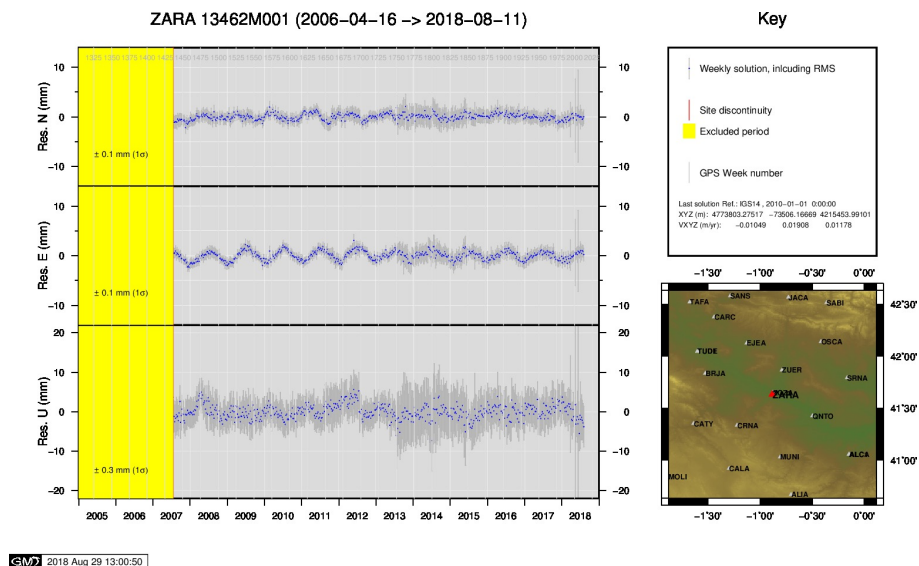
## 29 ) TERU



30 ) VITO



31 ) YEBE



32 ) ZARA



