

# ARA-DAC Weekly Analysis Result: 2036 (GFA)

## Technical Report

**GPS Week: 2036 (GFA)**

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

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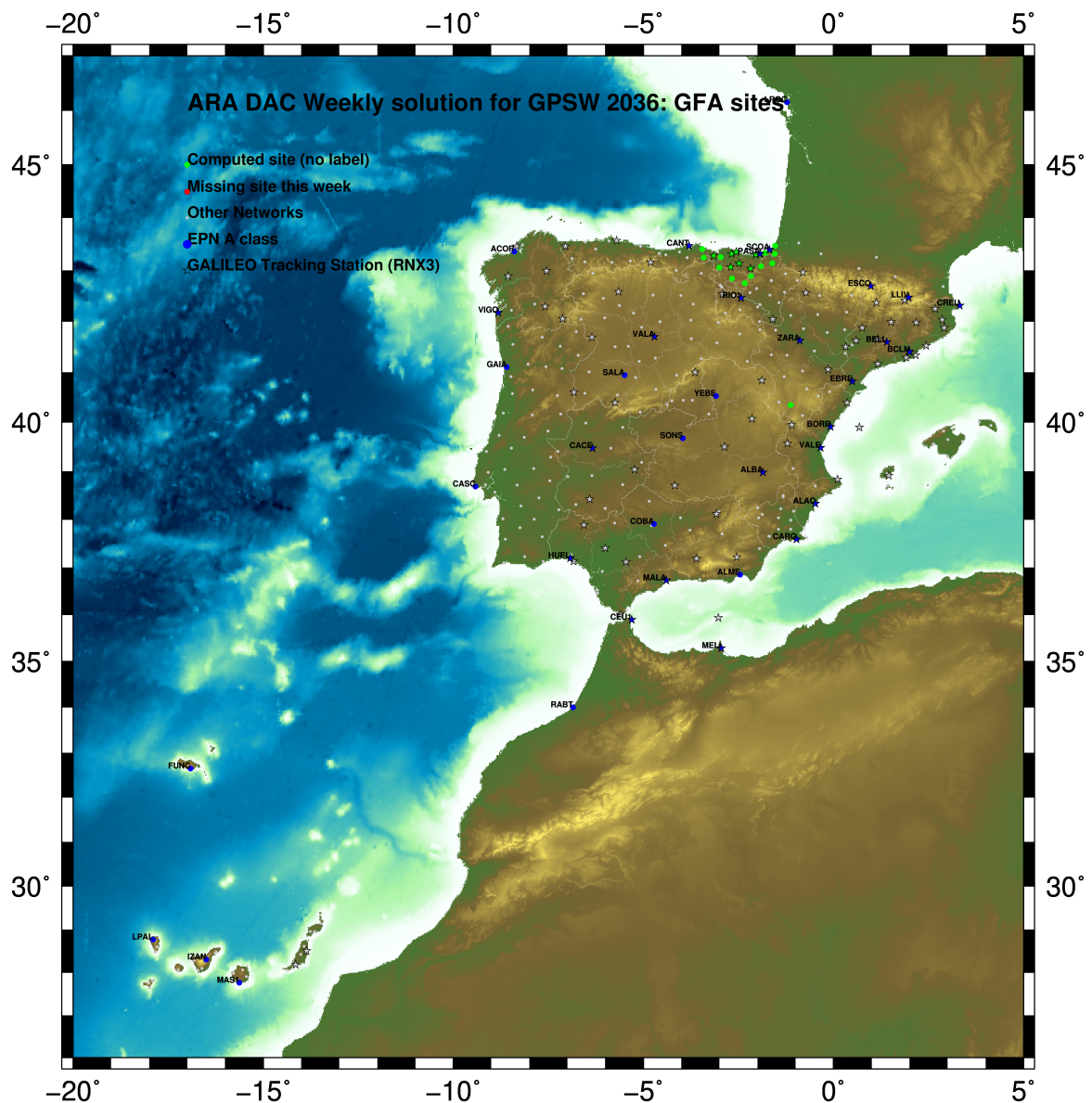
Report generated on 2019/02/06 at 14:15:26



# 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 2019 Feb 06 14:15:17

Fig.1: Computed Sites for GPS Week2036 (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 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 IGS14

The Reference Frame considered in this section is IGS14, release C2010.

ARA LAC 2036 WEEK FINAL COMBINATION: PRECISE ORBITS 06-FEB-19 10:37					
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LOCAL GEODETIC DATUM: IGS14		EPOCH: 2019-01-16 12:00:00			
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
1	ACOR 13434M001	4594489.56094	-678367.45647	4357066.27839	W
33	ALDA 19383M001	4687280.16372	-190876.57497	4308106.95145	A
42	ALSA 19419M001	4677250.83585	-176770.40207	4319079.86871	A
44	AMUR 19388M001	4661499.45218	-244591.26892	4332269.87949	A
78	BLAZ 10074M002	4634456.05655	-124344.98538	4365785.45571	A
79	BIDA 00000M000	4644177.82683	-145778.33215	4354832.48064	A
89	BRZR 19387M001	4662221.00254	-220769.90634	4333309.44692	A
9	CACE 13447M001	4899866.50339	-544567.04383	4033770.19800	W
10	CANT 13438M001	4625924.31862	-307096.24200	4365771.55376	W
114	CHER 00000M000	4645880.32899	-125721.93675	4353624.37332	A
15	CREU 13432M001	4715420.13456	273178.05075	4271946.83649	W
16	EBRE 13410M001	4833519.99458	41537.38145	4147461.71358	W
135	ELGE 19353S001	4657557.40778	-202241.48343	4338991.86707	A
137	EMAZ 17001M001	4645924.21112	-276949.87394	4347759.57667	A
157	GERN 19389M001	4642811.31532	-217222.94028	4353278.87854	A
177	IGEL 19352S001	4645951.43290	-165574.51239	4352550.41543	A
182	ISPS 19484M001	4640596.48432	-206963.78609	4356391.91127	A
187	KAST 19499M001	4646949.08528	-240747.28449	4348014.99155	A
192	LARE 19440M001	4632831.95639	-279026.14581	4360314.42503	A
193	LAZK 19354S001	4666098.34599	-178186.20070	4330463.67169	A
197	LEIT 19428M001	4663520.93856	-155858.72625	4334519.88091	A
253	ORDN 19427M001	4659695.78078	-130864.74391	4338948.87912	A
260	PAS2 19351S001	4644909.06540	-156645.07682	4353623.07747	A
30	PASA 19351S001	4644909.06313	-156645.07697	4353623.07461	W
33	RID1 13448M002	4708446.83077	-199490.29239	4284089.73426	W
34	SALA 13469M001	4803054.48343	-462131.07902	4158379.07255	W
35	SCDA 10088M002	4639940.50274	-136224.95022	4359552.40785	W
313	SOPU 19386M001	4643997.91442	-255913.91733	4350063.14473	A
333	TERU 13487M001	4867391.32345	-95523.36197	4108341.67796	A
366	VITO 19385M001	4679397.70357	-218436.51456	4314898.36116	A
43	YEBE 13420M001	4848724.56823	-261631.93874	4123094.32530	W
44	ZARA 13462M001	4773803.17084	-73505.99368	4215454.09321	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 2036 06-FEB-19 10:37					
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LOCAL GEODETIC DATUM: ETRF2000		EPOCH: 2019-01-16 12:00:00			
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
1	ACOR 13434M001	4594489.86447	-678367.98698	4357065.86639	W
33	ALDA 19383M001	4687280.52030	-190877.11396	4308106.53841	A
42	ALSA 19419M001	4677251.19481	-176770.93999	4319079.45659	A
44	AMUR 19388M001	4661499.80420	-244591.80540	4332269.46774	A
78	BLAZ 10074M002	4634456.42475	-124345.51873	4365785.04742	A
79	BIDA 00000M000	4644178.19180	-145778.86657	4354832.07137	A
89	BRZR 19387M001	4662221.35739	-220770.44484	4333309.03541	A
9	CACE 13447M001	4899866.80031	-544567.60530	4033769.76469	W
10	CANT 13438M001	4625924.66570	-307096.77499	4365771.14393	W
114	CHER 00000M000	4645880.69620	-125722.47128	4353623.96416	A
15	CREU 13432M001	4715420.54219	273177.51050	4271946.42680	W
16	EBRE 13410M001	4833520.36700	41536.82827	4147461.29231	W
135	ELGE 19353S001	4657557.76516	-202242.01940	4338991.45613	A
137	EMAZ 17001M001	4645924.56046	-276950.40892	4347759.16570	A
157	GERN 19389M001	4642811.67194	-217223.47476	4353278.46852	A
177	IGEL 19352S001	4645951.79543	-165575.04705	4352550.00579	A
182	ISPS 19484M001	4640596.84234	-206964.32032	4356391.50154	A
187	KAST 19499M001	4646949.43882	-240747.81947	4348014.58094	A
192	LARE 19440M001	4632832.30635	-279026.67943	4360314.01502	A
193	LAZK 19354S001	4666098.70556	-178186.73747	4330463.26039	A
197	LEIT 19428M001	4663521.30099	-155859.26269	4334519.47007	A
253	ORDN 19427M001	4659696.14639	-130865.27988	4338948.46887	A
260	PAS2 19351S001	4644909.42904	-156645.61135	4353622.66802	A
30	PASA 19351S001	4644909.42677	-156645.61150	4353622.66516	W
33	RID1 13448M002	4708447.18472	-199490.83357	4284089.31953	W
34	SALA 13469M001	4803054.79843	-462131.63052	4158378.64755	W
35	SCDA 10088M002	4639940.86914	-136225.48417	4359551.99901	W
313	SOPU 19386M001	4643998.26635	-255914.45204	4350062.73416	A
333	TERU 13487M001	4867391.67738	-95523.91906	4108341.25252	A
366	VITO 19385M001	4679398.05743	-218437.05282	4314897.94839	A
43	YEBE 13420M001	4848724.90399	-261632.49441	4123093.89928	W
44	ZARA 13462M001	4773803.53464	-73506.54116	4215453.67507	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 2036		06-FEB-19 10:37			
LOCAL GEODETIC DATUM: ETRF2014		EPOCH: 2019-01-16 12:00:00			
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
1	ACDR 13434M001	4594489.82185	-678368.02571	4357065.91464	W
33	ALDA 19383M001	4687280.47552	-190877.15401	4308106.58656	A
42	ALSA 19419M001	4677251.15008	-176770.98012	4319079.50477	A
44	AMUR 19388M001	4661499.75982	-244591.84537	4332269.51592	A
78	BLAZ 10074M002	4634456.38027	-124345.55921	4365785.09573	A
79	BIDA 00000M000	4644178.14730	-145778.90694	4354832.11964	A
89	BRZR 19387M001	4662221.31293	-220770.48488	4333309.08359	A
9	CACE 13447M001	4899866.75430	-544567.64332	4033769.81228	W
10	CANT 13438M001	4625924.62184	-307096.81487	4365771.19217	W
114	CHER 00000M000	4645880.65161	-125722.51171	4353624.01243	A
15	CREU 13432M001	4715420.49561	273177.46900	4271946.47516	W
16	EBRE 13410M001	4833520.32002	41536.78800	4147461.34025	W
135	ELGE 19353S001	4657557.72069	-202242.05952	4338991.50433	A
137	EMAZ 17001M001	4645924.51633	-276950.44883	4347759.21391	A
157	GERN 19389M001	4642811.62766	-217223.51489	4353278.51676	A
177	IGEL 19352S001	4645951.75097	-165575.08735	4352550.05405	A
182	ISPS 19484M001	4640596.79805	-206964.36049	4356391.54979	A
187	KAST 19499M001	4646949.39457	-240747.86950	4348014.62916	A
192	LARE 19440M001	4632832.26234	-279026.71939	4360314.06326	A
193	LAZK 19354S001	4666098.66094	-178186.77764	4330463.30859	A
197	LEIT 19428M001	4663521.25633	-155859.30295	4334519.51829	A
253	ORON 19427M001	4659696.10169	-130865.32024	4338948.51710	A
260	PAS2 19351S001	4644909.38456	-156645.65167	4353622.71628	A
30	PASA 19351S001	4644909.38229	-156645.65182	4353622.71342	W
33	RI01 13448M002	4708447.13974	-199490.87351	4284089.36762	W
34	SALA 13469M001	4803054.75322	-462131.66919	4158378.69534	W
35	SOA 10088M002	4639940.82465	-136225.52459	4359552.04729	W
313	SOPU 19386M001	4643998.22217	-255914.49204	4350062.78238	A
333	TERU 13487M001	4867391.63049	-95523.95874	4108341.30032	A
366	VITO 19385M001	4679398.01280	-218437.09280	4314897.99653	A
43	YEBE 13420M001	4848724.85778	-261632.53360	4123093.94704	W
44	ZARA 13462M001	4773803.48863	-73506.58128	4215453.72308	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 2036 WEEK FINAL COMBINATION: PRECISE ORBITS 06-FEB-19 10:37

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	7	XXXXXX	0.81	0.53	3.28
ALDA 19383M001	7	XXXXXX	0.90	0.59	2.89
ALSA 19419M001	7	XXXXXX	0.68	0.55	2.34
AMUR 19388M001	7	XXXXXX	0.40	0.70	3.27
BIAZ 10074M002	7	XXXXXX	0.81	0.59	1.79
BIDA 00000M000	7	XXXXXX	1.23	0.91	4.09
BRZR 19387M001	7	XXXXXX	0.93	1.11	6.97
CACE 13447M001	7	XXXXXX	0.35	0.41	2.88
CANT 13438M001	7	XXXXXX	0.49	0.27	2.93
CHER 00000M000	7	XXXXXX	0.92	0.78	1.81
CREU 13432M001	7	XXXXXX	1.79	1.12	6.80
EBRE 13410M001	7	XXXXXX	0.94	0.62	2.52
ELGE 19353S001	7	XXXXXX	0.48	0.70	2.08
EMAZ 17001M001	7	XXXXXX	0.64	0.53	3.64
GERN 19389M001	6	XX XXX	0.75	0.34	3.72
IGEL 19352S001	7	XXXXXX	0.79	0.82	2.12
ISPS 19484M001	7	XXXXXX	0.63	0.86	2.64
KAST 19499M001	7	XXXXXX	1.27	1.23	4.65
LARE 19440M001	7	XXXXXX	0.70	0.73	3.61
LAZK 19354S001	7	XXXXXX	0.40	0.57	3.07
LEIT 19428M001	7	XXXXXX	1.37	0.68	1.89
ORON 19427M001	7	XXXXXX	0.92	0.58	3.50
PAS2 19351S001	7	XXXXXX	0.68	0.65	2.91
PASA 19351S001	7	XXXXXX	0.55	0.64	1.79
RI01 13448M002	7	XXXXXX	0.42	0.44	2.32
SALA 13469M001	7	XXXXXX	0.42	0.30	1.20
SCDA 10088M002	7	XXXXXX	0.71	0.21	2.37
SOPU 19386M001	7	XXXXXX	2.22	1.81	6.00
TERU 13487M001	7	XXXXXX	0.98	0.61	1.49
VITD 19385M001	7	XXXXXX	0.37	0.49	2.71
YEBE 13420M001	7	XXXXXX	0.78	0.40	0.83
ZARA 13462M001	7	XXXXXX	0.50	0.68	1.74

Comparison of individual solutions:

ACOR 13434M001	N	0.81	-0.95	-0.85	-0.44	0.42	1.37	-0.25	-0.18
ACOR 13434M001	E	0.53	0.11	-1.16	0.12	0.44	-0.29	0.10	-0.05
ACOR 13434M001	U	3.28	1.19	5.19	5.10	-0.86	-2.63	0.90	-1.34
ALDA 19383M001	N	0.90	1.54	-0.66	0.86	-0.23	-1.04	0.40	-0.16
ALDA 19383M001	E	0.59	-0.26	-0.33	1.06	0.06	0.49	0.70	0.27
ALDA 19383M001	U	2.89	0.70	-2.62	-2.64	-4.01	-0.63	-2.75	-3.40
ALSA 19419M001	N	0.68	-0.33	-0.54	0.20	0.21	1.33	0.12	-0.71
ALSA 19419M001	E	0.55	-0.77	-0.29	0.33	0.40	0.65	0.56	-0.40
ALSA 19419M001	U	2.34	-0.68	-1.41	0.85	-3.93	-1.60	-1.26	-3.18
AMUR 19388M001	N	0.40	-0.56	0.14	0.39	0.48	-0.25	0.43	-0.12
AMUR 19388M001	E	0.70	0.38	0.56	0.88	-0.32	0.69	-0.33	-1.02
AMUR 19388M001	U	3.27	-5.35	-4.78	-2.47	-1.20	1.00	-0.07	-2.06
BIAZ 10074M002	N	0.81	-0.33	0.82	0.27	1.21	-0.65	0.86	0.66
BIAZ 10074M002	E	0.59	0.20	0.57	-0.44	-0.63	0.71	-0.78	0.21
BIAZ 10074M002	U	1.79	-1.40	-1.54	-0.65	-2.35	-0.59	-2.45	1.61
BIDA 00000M000	N	1.23	0.56	2.44	-0.28	-1.33	0.68	-0.60	0.46
BIDA 00000M000	E	0.91	0.25	-0.38	0.29	-1.08	1.01	-1.58	0.17
BIDA 00000M000	U	4.09	-3.05	3.23	-1.78	-2.11	0.98	-8.43	0.92
BRZR 19387M001	N	0.93	0.94	0.68	0.23	-0.58	-1.33	1.21	0.39
BRZR 19387M001	E	1.11	-0.92	0.22	-1.62	0.89	1.09	1.27	0.53
BRZR 19387M001	U	6.97	5.44	0.73	-3.88	-14.35	1.84	4.76	-3.78
CACE 13447M001	N	0.35	0.59	0.14	0.06	0.27	0.50	-0.13	-0.08
CACE 13447M001	E	0.41	0.44	-0.29	0.26	-0.71	-0.10	0.37	-0.01
CACE 13447M001	U	2.88	-5.41	1.95	-1.99	0.67	1.88	-0.47	-2.93
CANT 13438M001	N	0.49	-0.19	-0.17	0.43	0.89	0.11	-0.27	0.54
CANT 13438M001	E	0.27	0.19	0.17	0.23	0.05	-0.53	0.12	-0.18
CANT 13438M001	U	2.93	-2.22	-2.57	-1.30	-3.48	-2.69	-1.27	-4.17
CHER 00000M000	N	0.92	-0.59	1.69	-0.04	0.74	0.21	0.87	0.70
CHER 00000M000	E	0.78	-0.35	-1.32	0.48	-0.37	0.34	-0.93	0.70
CHER 00000M000	U	1.81	-1.61	0.02	-2.31	-1.07	-0.67	-2.74	1.61
CREU 13432M001	N	1.79	-3.01	-2.22	1.35	0.93	0.82	-0.71	1.20
CREU 13432M001	E	1.12	-0.60	2.38	-0.53	-0.43	0.74	-0.22	-0.67
CREU 13432M001	U	6.80	12.19	-9.47	4.50	2.17	0.11	-2.67	-2.70
EBRE 13410M001	N	0.94	-1.37	-1.12	0.72	0.92	0.04	-0.70	0.52
EBRE 13410M001	E	0.62	-0.68	-0.07	-0.73	-0.32	0.77	0.55	0.55
EBRE 13410M001	U	2.52	4.99	-0.44	-0.01	-0.14	2.37	0.72	-2.64
ELGE 19353S001	N	0.48	0.56	-0.17	0.29	0.42	-0.50	0.68	0.23
ELGE 19353S001	E	0.70	0.39	1.52	0.32	-0.57	0.10	-0.27	0.03
ELGE 19353S001	U	2.08	-0.79	-3.26	-2.35	-2.86	0.26	-0.78	0.56
EMAZ 17001M001	N	0.64	0.46	-1.29	-0.07	-0.06	-0.56	0.47	-0.04
EMAZ 17001M001	E	0.53	-0.37	0.71	-0.31	0.40	0.46	-0.62	-0.45
EMAZ 17001M001	U	3.64	-3.44	-4.17	0.44	-3.17	2.99	1.79	-5.27
GERN 19389M001	N	0.75	0.13	-0.53	-0.44		0.78	0.55	1.18
GERN 19389M001	E	0.34	0.34	0.21	-0.07		0.42	0.17	0.44
GERN 19389M001	U	3.72	-4.41	-6.05	-0.25		3.53	-0.42	0.67
IGEL 19352S001	N	0.79	-0.49	-0.96	1.06	-0.12	0.63	0.74	0.70
IGEL 19352S001	E	0.82	0.25	0.99	0.57	-0.49	1.34	-0.33	-0.72
IGEL 19352S001	U	2.12	-4.09	-1.33	-1.43	0.68	-0.37	-2.41	0.16
ISPS 19484M001	N	0.63	0.33	0.28	1.43	0.13	-0.12	-0.08	-0.35
ISPS 19484M001	E	0.86	0.94	1.21	1.04	-0.48	-0.36	0.01	-0.81
ISPS 19484M001	U	2.64	-0.94	-5.82	0.87	-1.71	0.08	-0.55	-1.72
KAST 19499M001	N	1.27	-0.66	-0.49	2.80	-0.19	0.10	-0.92	-0.59
KAST 19499M001	E	1.23	-0.34	0.62	2.60	-0.26	-0.37	-0.34	-1.22
KAST 19499M001	U	4.65	-5.38	-0.44	1.37	-7.19	-0.53	2.29	-6.46
LARE 19440M001	N	0.70	-0.44	0.24	0.48	0.74	-0.11	-1.37	0.22
LARE 19440M001	E	0.73	0.11	0.60	0.32	-1.51	-0.39	0.22	-0.47
LARE 19440M001	U	3.61	-5.26	-4.55	0.43	-1.57	-0.64	1.67	-4.89
LAZK 19354S001	N	0.40	0.29	0.25	-0.39	0.61	0.28	0.43	-0.17
LAZK 19354S001	E	0.57	0.30	1.01	0.25	-0.03	-0.61	-0.01	0.63

LAZK	19354S001	U	3.07	-2.46	-5.72	-3.55	1.53	0.33	-0.55	1.59
LEIT	19428M001	N	1.37	0.91	1.39	-0.69	-2.51	0.24	1.13	0.66
LEIT	19428M001	E	0.68	0.83	0.58	-0.15	-0.79	0.53	-0.21	0.86
LEIT	19428M001	U	1.89	-2.28	-2.59	-1.19	0.13	-1.41	1.17	-2.18
ORDN	19427M001	N	0.92	-0.61	0.32	0.04	1.43	-0.75	1.34	0.39
ORDN	19427M001	E	0.58	0.38	0.27	-0.18	0.33	-0.13	-1.03	-0.77
ORDN	19427M001	U	3.50	-4.88	2.11	-3.19	-2.26	-0.93	-0.81	5.34
PAS2	19351S001	N	0.68	0.64	-0.78	0.98	0.24	-0.23	0.78	-0.33
PAS2	19351S001	E	0.65	0.44	0.76	0.60	-0.81	0.57	-0.37	0.55
PAS2	19351S001	U	2.91	-6.04	1.23	-2.10	-1.51	1.63	-1.86	-0.10
PASA	19351S001	N	0.55	0.70	0.43	0.13	0.09	-0.83	0.37	0.53
PASA	19351S001	E	0.64	0.51	1.20	0.40	-0.06	-0.50	-0.32	0.50
PASA	19351S001	U	1.79	-2.65	-2.49	-1.01	-0.98	0.76	-0.81	-1.66
RID1	13448M002	N	0.42	0.81	-0.27	0.37	0.00	0.13	-0.06	-0.42
RID1	13448M002	E	0.44	-0.15	0.81	0.50	-0.23	0.14	-0.06	-0.39
RID1	13448M002	U	2.32	-2.14	-0.82	-2.47	-0.12	-3.34	-2.37	-2.06
SALA	13469M001	N	0.42	-0.30	-0.65	0.09	-0.16	-0.33	0.04	-0.61
SALA	13469M001	E	0.30	0.11	-0.47	0.32	-0.17	-0.41	0.01	0.11
SALA	13469M001	U	1.20	1.61	-0.04	-0.72	1.70	0.56	1.31	0.74
SCDA	10088M002	N	0.71	-0.23	0.16	-0.23	0.42	0.92	1.29	0.43
SCDA	10088M002	E	0.21	-0.26	-0.04	0.06	-0.31	0.29	-0.07	-0.06
SCDA	10088M002	U	2.37	0.04	-1.57	4.49	-1.83	-2.04	-1.61	-0.95
SOPU	19386M001	N	2.22	-2.35	-1.31	-1.20	0.19	2.05	4.03	0.57
SOPU	19386M001	E	1.81	0.59	1.75	2.14	1.59	-2.08	-1.98	-0.93
SOPU	19386M001	U	6.00	-2.40	-9.69	-4.99	-4.06	2.36	8.32	0.31
TERU	13487M001	N	0.98	0.55	0.74	0.23	1.10	0.47	0.68	1.73
TERU	13487M001	E	0.61	0.18	0.10	0.14	0.31	-0.13	0.91	1.12
TERU	13487M001	U	1.49	-1.26	-1.37	1.52	0.70	-0.09	0.85	-2.51
VITO	19385M001	N	0.37	0.74	0.20	0.19	0.15	-0.41	-0.16	-0.04
VITO	19385M001	E	0.49	0.04	0.17	-0.18	0.77	0.29	-0.61	0.57
VITO	19385M001	U	2.71	-1.02	-5.08	-2.25	-2.11	0.44	-2.05	-1.85
YEBE	13420M001	N	0.78	1.07	1.09	0.05	-0.97	-0.09	0.61	0.07
YEBE	13420M001	E	0.40	0.38	-0.19	0.02	-0.44	0.15	0.54	0.54
YEBE	13420M001	U	0.83	-1.04	0.16	-0.37	0.37	-1.46	-0.46	0.65
ZARA	13462M001	N	0.50	0.43	0.53	0.38	-0.57	-0.58	-0.28	-0.40
ZARA	13462M001	E	0.68	0.24	1.05	0.45	-0.68	0.58	-0.52	-0.60
ZARA	13462M001	U	1.74	-0.70	-2.49	0.54	-0.27	-1.02	-2.70	-1.65

## 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	-0.96	1.11	1.87
2	ALAC 13433M001	I W	-0.26	-0.41	-2.39
3	ALBA 13452M001	I W	-0.26	-1.06	-0.97
4	ALME 13437M001	I W	-2.16	-1.31	3.29
5	BCLN 13412M001	I W	0.03	0.67	-1.10
6	BELL 13431M001	I W	1.98	1.24	-1.40
7	BORR 13480M001	I W	-1.16	-2.20	-1.30
8	BRST 10004M004	I W	-0.78	0.03	-1.50
9	CACE 13447M001	I W	0.48	0.17	3.56
10	CANT 13438M001	I W	0.12	-0.33	-3.06
11	CARG 19412M001	I W	0.65	-1.34	-1.12
12	CASC 13909S001	I W	-0.12	-0.21	1.39
13	CEU1 13449M002	I W	-0.65	0.20	-0.38
14	COBA 13453M001	I W	0.65	0.61	-2.64
15	CREU 13432M001	I W	0.66	1.01	-0.32
16	EBRE 13410M001	I W	-0.56	0.91	-4.15
17	ESCO 13435M001	I W	0.72	1.35	-2.15
18	FUNC 13911S001	I W	0.09	-3.23	6.60
19	GAIA 13902M001	I W	-0.48	-0.75	5.50
21	HUEL 13451M001	I W	-1.46	0.71	3.69
22	IZAN 31309M002	I W	4.04	-1.13	0.12
23	LLIV 13436M001	I W	0.41	-0.61	1.23
24	LPAL 81701M001	I W	-4.21	0.44	-0.86
25	LROC 10023M001	I W	-0.01	-0.42	0.42
26	MALA 13443M001	I W	-0.73	0.11	0.85
27	MAS1 31303M002	I W	-1.52	-0.49	2.32
29	MELI 19379M001	I W	-0.94	1.40	0.64
30	PASA 19351S001	I W	-0.04	0.56	-1.55
31	PDEL 31906M004	I W	-0.31	-0.23	1.94
32	RABT 35001M002	I W	-0.57	0.23	-3.78
33	RID1 13448M002	I W	-0.29	0.19	-4.30
34	SALA 13469M001	I W	0.01	1.39	0.56
35	SCOA 10088M002	I W	0.85	0.61	-0.71
38	SONS 13446M001	I W	1.19	1.52	-1.33
39	TERC 31909M001	I W	5.71	-5.58	-5.00
40	VALA 13463M002	I W	-1.00	1.43	0.44
41	VALE 13439M001	I W	-0.47	1.19	-1.37
42	VIGO 13450M001	I W	-0.24	0.53	5.13
43	YEBE 13420M001	I W	0.04	0.03	3.91
44	ZARA 13462M001	I W	-0.00	1.90	-1.28
45	ZIMM 14001M004	I W	1.55	-0.26	-0.82
	RMS / COMPONENT		1.53	1.38	2.70
	MEAN		0.00	-0.00	-0.00
	MIN		-4.21	-5.58	-5.00
	MAX		5.71	1.90	6.60

NUMBER OF PARAMETERS : 3  
NUMBER OF COORDINATES : 123  
RMS OF TRANSFORMATION : 1.96 MM

BARYCENTER COORDINATES:

LATITUDE : 39 40 7.24  
LONGITUDE : - 5 27 40.26  
HEIGHT : -49.601 KM

PARAMETERS:

TRANSLATION IN N : 0.00 +- 0.31 MM  
TRANSLATION IN E : 0.00 +- 0.31 MM  
TRANSLATION IN U : 0.00 +- 0.31 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          17827580
NUMBER OF UNKNOWN(S)           212126
NUMBER OF DEGREES OF FREEDOM    17615454
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)      180
VARIANCE FACTOR                  1.682524466559768

Helmert Transformation Parameters With Respect to Combined Solution:
-----
Sol  Rms (m)      Translation (m)      Rotation (")      Scale (ppm)
      X          Y          Z          X          Y          Z
-----
  1  0.00214      0.0141  0.0008 -0.0192  0.0001  0.0008  0.0001  0.00038
  2  0.00182      -0.0109 -0.0279  0.0018  0.0006 -0.0003 -0.0007  0.00079
  3  0.00152      -0.0058  0.0215  0.0107 -0.0004 -0.0004  0.0005 -0.00006
  4  0.00156       0.0121  0.0257 -0.0129 -0.0004  0.0006  0.0007  0.00009
  5  0.00182       0.0082 -0.0030 -0.0218  0.0002  0.0007  0.0000  0.00110
  6  0.00210       0.0067  0.0034 -0.0024 -0.0001  0.0002  0.0001 -0.00046
  7  0.00271       0.0104  0.0097 -0.0060 -0.0001  0.0004  0.0004 -0.00072
```

```
Statistics of individual solutions:
-----
File  RMS (m)      DOF  Chi**2/DOF  #Observations authentic / pseudo  #Parameters explicit / implicit / singular
-----
  1  0.00127      2580156      1.62      2611502      3      1023      30326      0
  2  0.00128      2572317      1.64      2604825      3      1023      31488      0
  3  0.00127      2579723      1.60      2611041      3      1023      30298      0
  4  0.00126      2510937      1.59      2542561      3      1020      30607      0
  5  0.00134      2508161      1.79      2540225      3      1023      31044      0
  6  0.00129      2390635      1.68      2419530      3      981      27917      0
  7  0.00135      2467477      1.82      2497896      3      1008      29414      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 19:013:00000 19:019:86370 LEICA GRX1200PRO -----
ALDA  A  1 P 19:013:00000 19:019:86370 LEICA GR10 -----
ALSA  A  1 P 19:013:00000 19:019:86370 LEICA GR50 -----
AMUR  A  1 P 19:013:00000 19:019:86370 LEICA GR10 -----
BIAZ  A  1 P 19:013:00000 19:019:86370 TRI SP90M -----
BIDA  A  1 P 19:013:00000 19:019:86370 LEICA GR10 -----
BRZR  A  1 P 19:013:00000 19:019:86370 LEICA GR30 -----
CACE  A  1 P 19:013:00000 19:019:86370 TRIMBLE NETR9 -----
CANT  A  1 P 19:013:00000 19:019:86370 LEICA GR10 -----
CHER  A  1 P 19:013:00000 19:019:86370 LEICA GRX1200+GNSS -----
CREU  A  1 P 19:013:00000 19:019:86370 LEICA GR50 -----
EBRE  A  1 P 19:013:00000 19:019:86370 LEICA GR50 -----
ELGE  A  1 P 19:013:00000 19:019:86370 LEICA GR10 -----
EMAZ  A  1 P 19:013:00000 19:019:86370 LEICA GR30 -----
GERN  A  1 P 19:013:00000 19:019:86370 LEICA GR10 -----
IGEL  A  1 P 19:013:00000 19:019:86370 LEICA GR30 -----
ISPS  A  1 P 19:013:00000 19:019:86370 TRIMBLE NETR9 -----
KAST  A  1 P 19:013:00000 19:019:86370 LEICA GR30 -----
LARE  A  1 P 19:013:00000 19:019:86370 LEICA GRX1200GGPRO -----
LAZK  A  1 P 19:013:00000 19:019:86370 LEICA GR10 -----
LEIT  A  1 P 19:013:00000 19:019:86370 LEICA GR50 -----
ORON  A  1 P 19:013:00000 19:019:86370 LEICA GR50 -----
PAS2  A  1 P 19:013:00000 19:019:86370 TPS NET-G3A -----
PASA  A  1 P 19:013:00000 19:019:86370 LEICA GR10 -----
RIO1  A  1 P 19:013:00000 19:019:86370 LEICA GR25 -----
SALA  A  1 P 19:013:00000 19:019:86370 LEICA GRX1200+GNSS -----
SCOA  A  1 P 19:013:00000 19:019:86370 LEICA GR25 -----
SOPU  A  1 P 19:013:00000 19:019:86370 LEICA GR30 -----
TERU  A  1 P 19:013:00000 19:019:86370 LEICA GRX1200GGPRO -----
VITO  A  1 P 19:013:00000 19:019:86370 LEICA GR10 -----
YEBE  A  1 P 19:013:00000 19:019:86370 TRIMBLE NETR9 -----
ZARA  A  1 P 19:013:00000 19:019:86370 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 19:013:00000 19:019:86370 LEIAS04      LEIS -----
ALDA  A  1 P 19:013:00000 19:019:86370 LEIAS10      NONE -----
ALSA  A  1 P 19:013:00000 19:019:86370 LEIAS10      NONE -----
AMUR  A  1 P 19:013:00000 19:019:86370 LEIAS10      NONE -----
```

```

BIAZ A 1 P 19:013:00000 19:019:86370 LEIAR25 LEIT -----
BIDA A 1 P 19:013:00000 19:019:86370 LEIAS10 NONE -----
BRZR A 1 P 19:013:00000 19:019:86370 LEIAS10 NONE -----
CACE A 1 P 19:013:00000 19:019:86370 TRM29659.00 NONE -----
CANT A 1 P 19:013:00000 19:019:86370 LEIAR25.R4 LEIT 25066
CHER A 1 P 19:013:00000 19:019:86370 LEIAX1203+GNSS NONE -----
CREU A 1 P 19:013:00000 19:019:86370 LEIAR25.R4 NONE 26357
EBRE A 1 P 19:013:00000 19:019:86370 LEIAR25.R4 NONE 26359
ELGE A 1 P 19:013:00000 19:019:86370 LEIAR25.R4 LEIT -----
EMAZ A 1 P 19:013:00000 19:019:86370 LEIAS10 NONE -----
GERN A 1 P 19:013:00000 19:019:86370 LEIAS10 NONE -----
IGEL A 1 P 19:013:00000 19:019:86370 LEIAR20 LEIM -----
ISPS A 1 P 19:013:00000 19:019:86370 TRM59900.00 SCIS -----
KAST A 1 P 19:013:00000 19:019:86370 LEIAS10 NONE -----
LARE A 1 P 19:013:00000 19:019:86370 LEIAT504 NONE -----
LAZK A 1 P 19:013:00000 19:019:86370 LEIAR25.R4 LEIT -----
LEIT A 1 P 19:013:00000 19:019:86370 LEIAR10 NONE -----
ORDN A 1 P 19:013:00000 19:019:86370 LEIAR10 NONE -----
PAS2 A 1 P 19:013:00000 19:019:86370 LEIAR20 LEIM 73034
PASA A 1 P 19:013:00000 19:019:86370 LEIAR20 LEIM 73034
RID1 A 1 P 19:013:00000 19:019:86370 LEIAR25.R4 LEIT 25138
SALA A 1 P 19:013:00000 19:019:86370 LEIAR25 NONE -----
SCDA A 1 P 19:013:00000 19:019:86370 TRM55971.00 NONE -----
SOPU A 1 P 19:013:00000 19:019:86370 LEIAS10 NONE -----
TERU A 1 P 19:013:00000 19:019:86370 LEIAT504GG LEIS -----
VITO A 1 P 19:013:00000 19:019:86370 LEIAS10 NONE -----
YEBE A 1 P 19:013:00000 19:019:86370 TRM29659.00 NONE -----
ZARA A 1 P 19:013:00000 19:019:86370 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 19:013:00000 19:019:86370 UNE 3.0460 0.0000 0.0000
ALDA A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
ALSA A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
AMUR A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
BIAZ A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
BIDA A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
BRZR A 1 P 19:013:00000 19:019:86370 UNE 0.0771 0.0000 0.0000
CACE A 1 P 19:013:00000 19:019:86370 UNE 0.0600 0.0000 0.0000
CANT A 1 P 19:013:00000 19:019:86370 UNE 3.0490 0.0000 0.0000
CHER A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
CREU A 1 P 19:013:00000 19:019:86370 UNE 0.0770 0.0000 0.0000
EBRE A 1 P 19:013:00000 19:019:86370 UNE 0.0770 0.0000 0.0000
ELGE A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
EMAZ A 1 P 19:013:00000 19:019:86370 UNE 0.0350 0.0000 0.0000
GERN A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
IGEL A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
ISPS A 1 P 19:013:00000 19:019:86370 UNE 0.0350 0.0000 0.0000
KAST A 1 P 19:013:00000 19:019:86370 UNE 0.0350 0.0000 0.0000
LARE A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
LAZK A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
LEIT A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
ORDN A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
PAS2 A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
PASA A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
RID1 A 1 P 19:013:00000 19:019:86370 UNE 0.0606 0.0000 0.0000
SALA A 1 P 19:013:00000 19:019:86370 UNE 0.0600 0.0000 0.0000
SCDA A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
SOPU A 1 P 19:013:00000 19:019:86370 UNE 0.0771 0.0000 0.0000
TERU A 1 P 19:013:00000 19:019:86370 UNE 0.0600 0.0000 0.0000
VITO A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
YEBE A 1 P 19:013:00000 19:019:86370 UNE 0.0000 0.0000 0.0000
ZARA A 1 P 19:013:00000 19:019:86370 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:

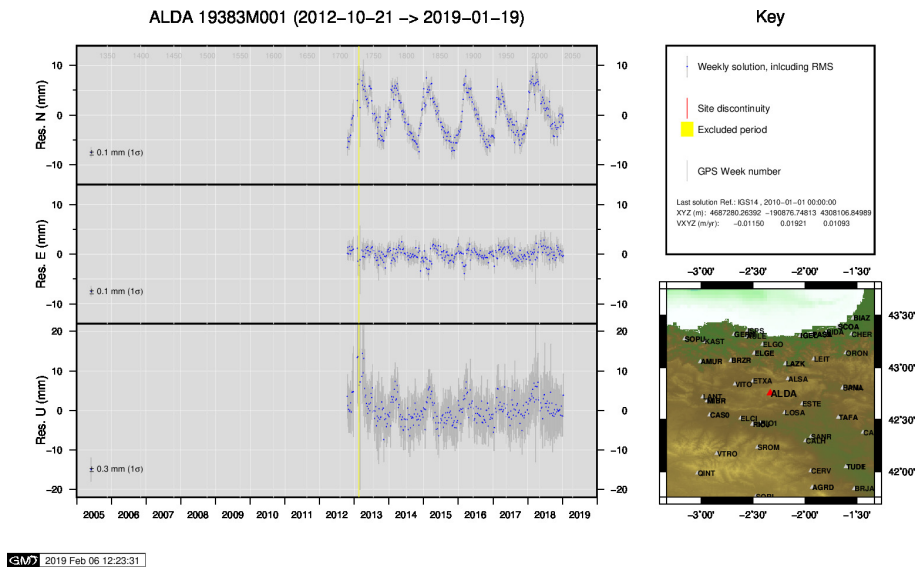
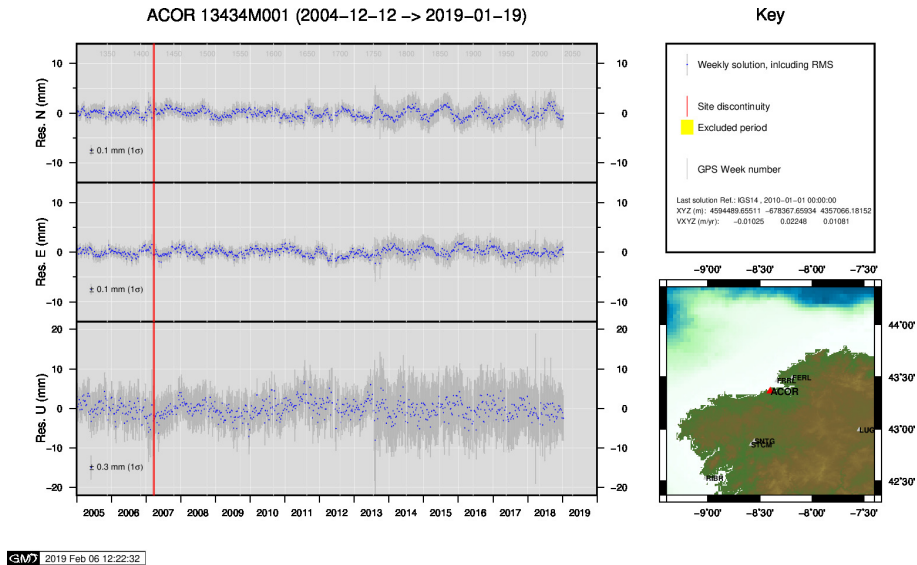
```

2019-02-03 20:14 UTC | GERNO130.190 | RECEIVER FIRM. VERS. | 4.10 -> 4.10/6.523
2019-01-28 23:22 UTC | GERNO140.190 | RECEIVER FIRM. VERS. | 4.10 -> 4.10/6.523
2019-01-29 23:20 UTC | GERNO150.190 | RECEIVER FIRM. VERS. | 4.10 -> 4.10/6.523
2019-01-30 23:17 UTC | GERNO160.190 | RECEIVER FIRM. VERS. | 4.10 -> 4.10/6.523
2019-01-31 23:20 UTC | GERNO170.190 | RECEIVER FIRM. VERS. | 4.10 -> 4.10/6.523
2019-02-04 12:54 UTC | GERNO180.190 | RECEIVER FIRM. VERS. | 4.10 -> 4.10/6.523
2019-02-03 13:05 UTC | GERNO190.190 | RECEIVER FIRM. VERS. | 4.10 -> 4.10/6.523

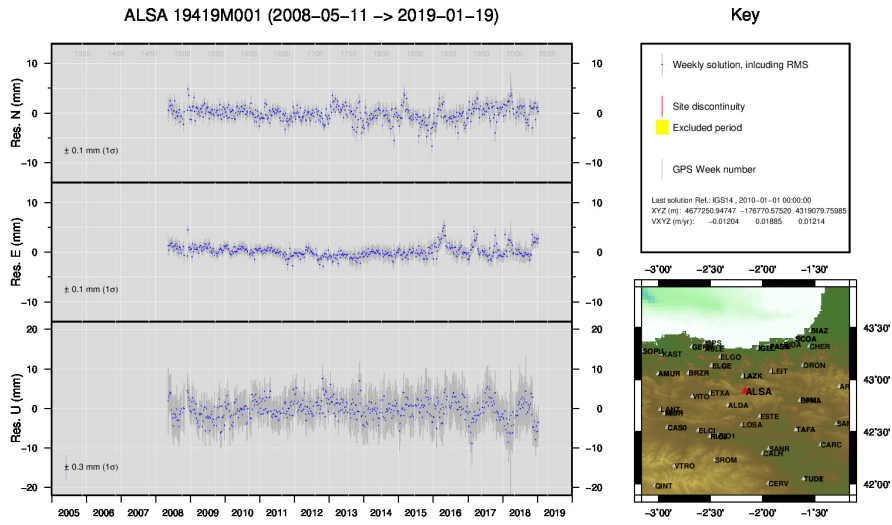
```

## 9 Cumulative Time Series

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

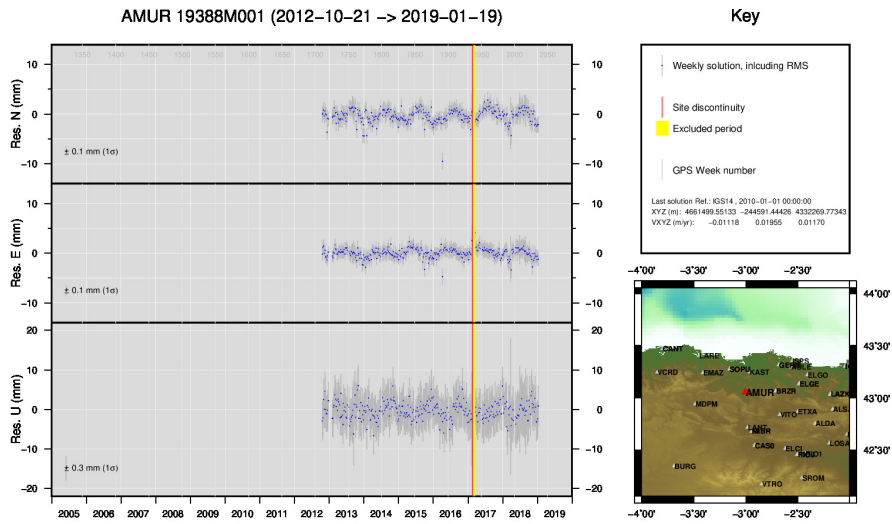






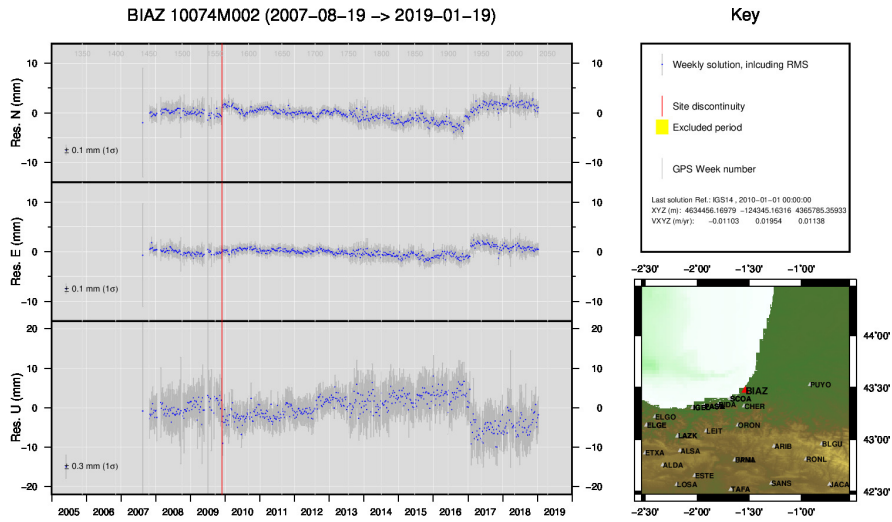
GMW 2019 Feb 06 12:24:13

3 ) ALSA



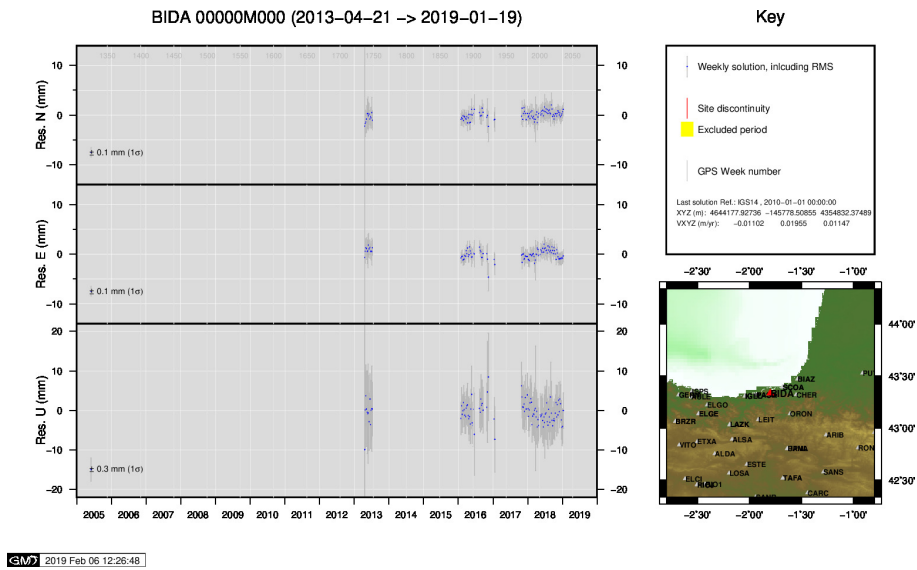
GMW 2019 Feb 06 12:24:22

4 ) AMUR

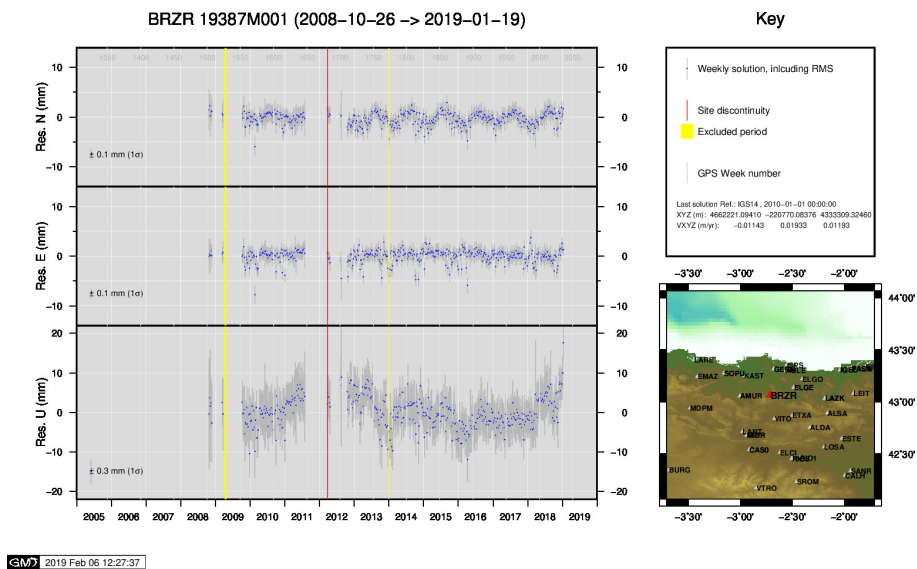


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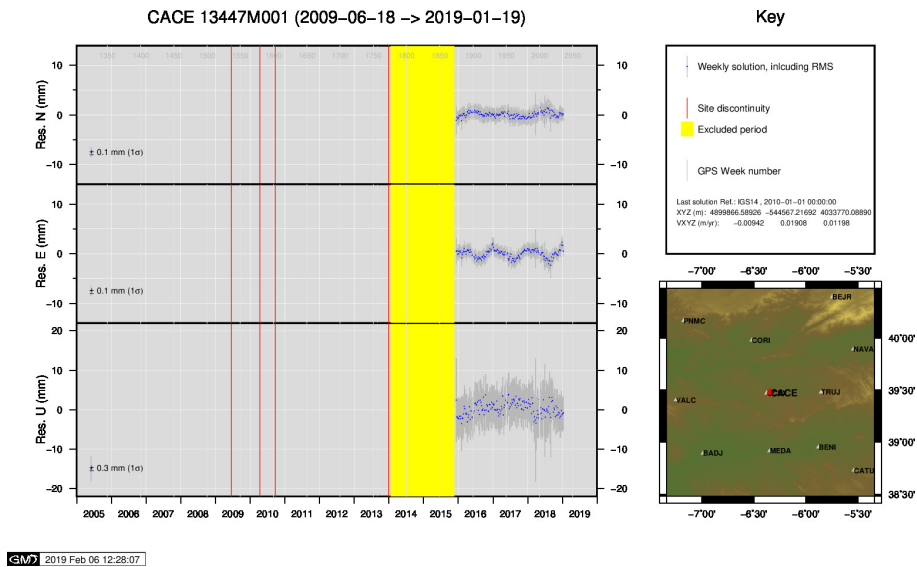
5 ) BLAZ



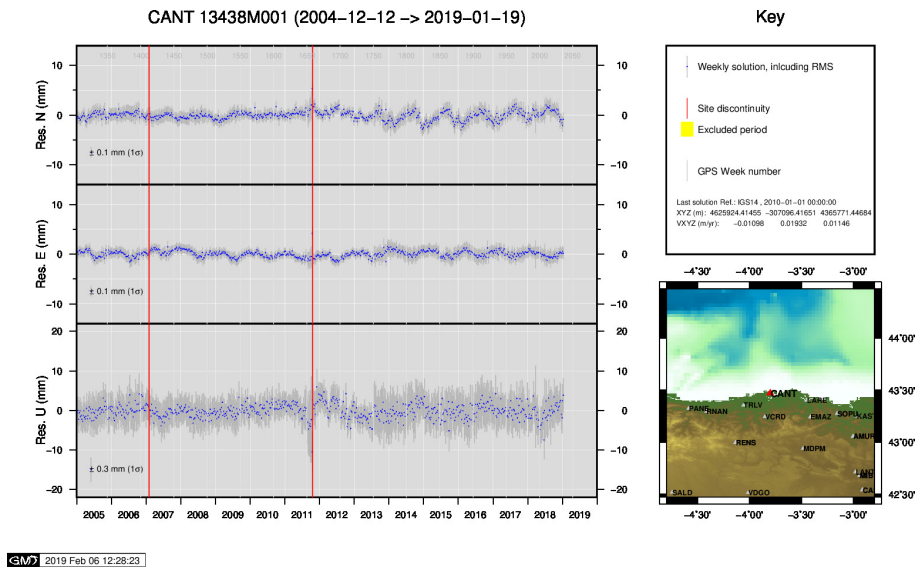
6 ) BIDA



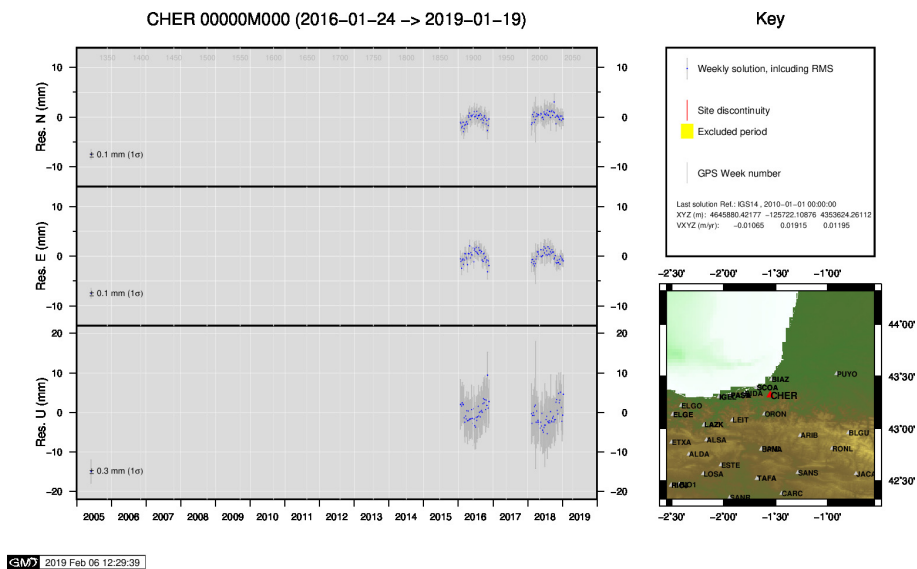
7 ) BRZR



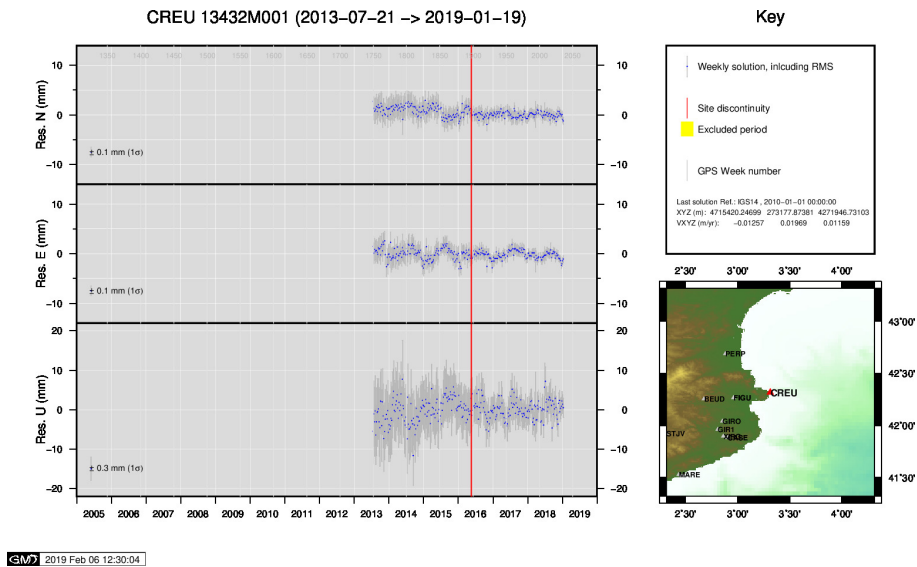
8 ) CACE



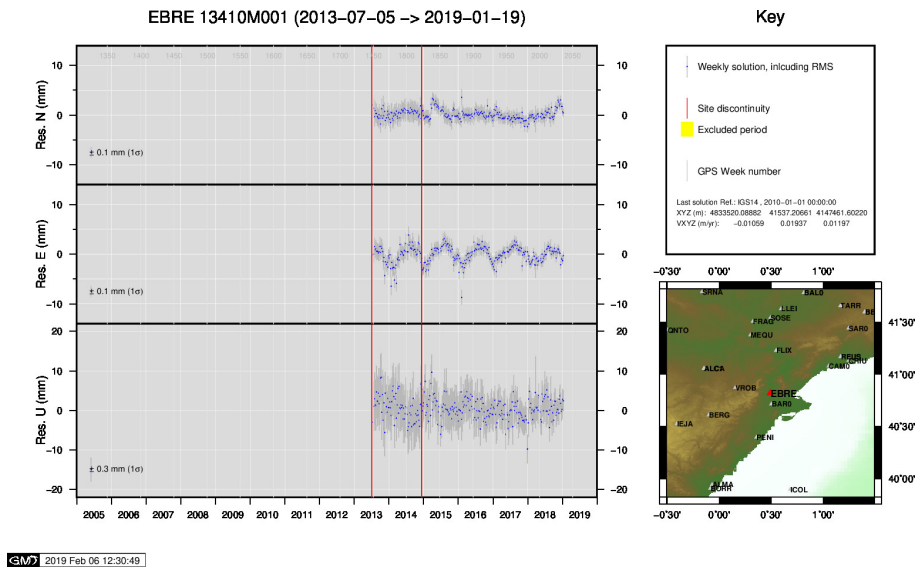
9 ) CANT



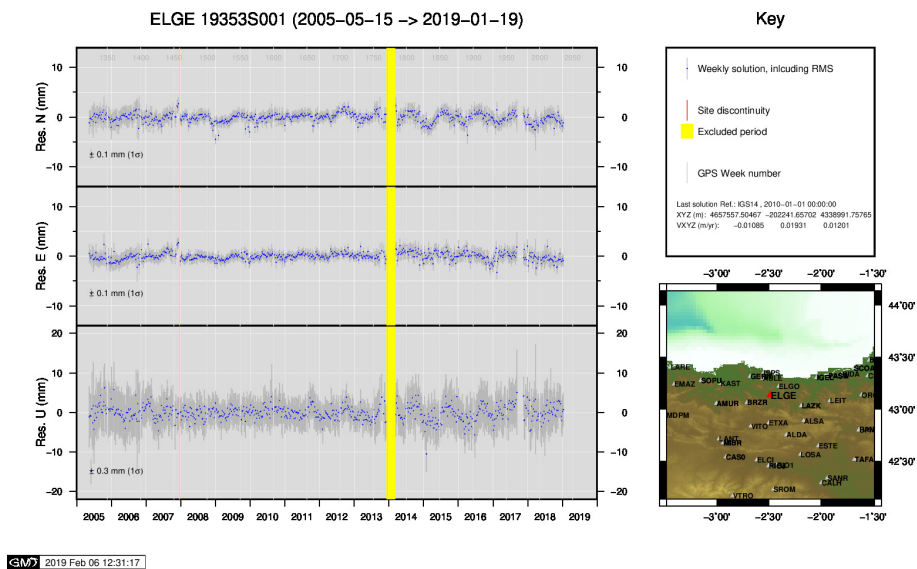
10 ) CHER



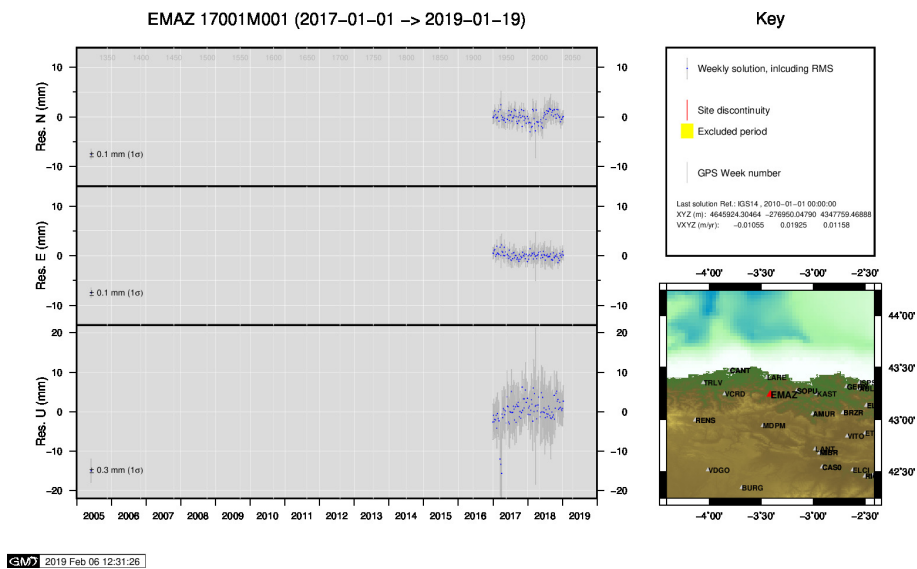
11 ) CREU



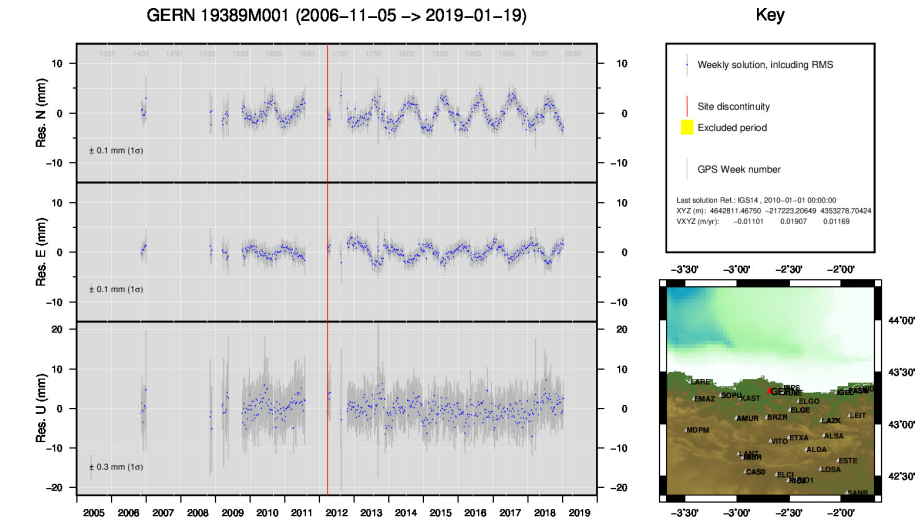
12 ) EBRE



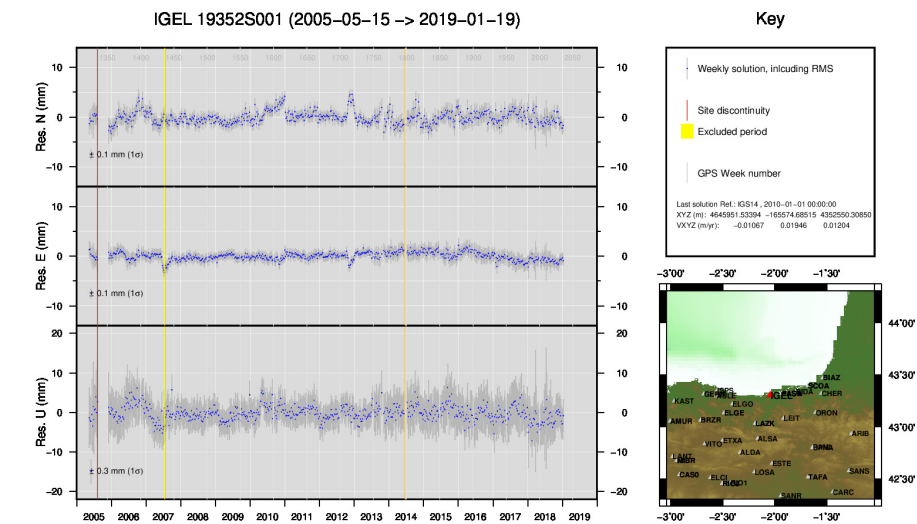
13 ) ELGE



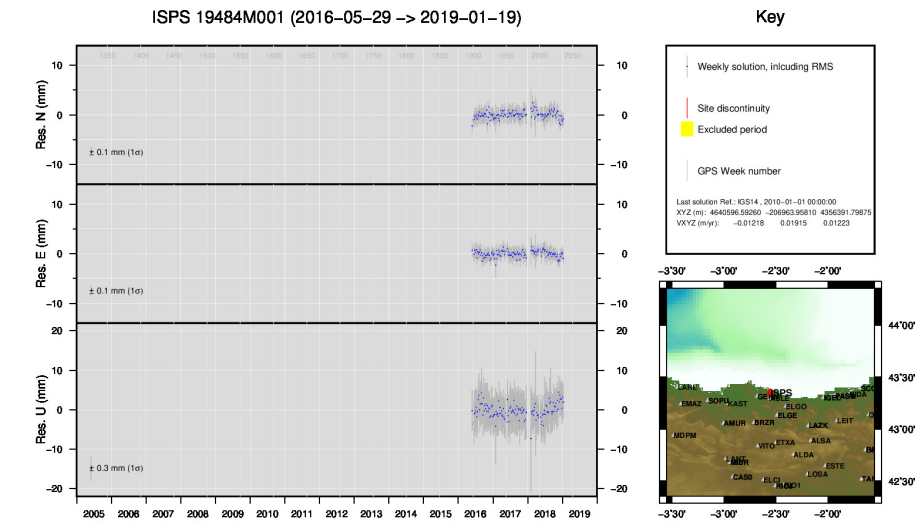
14 ) EMAZ



15 ) GERN

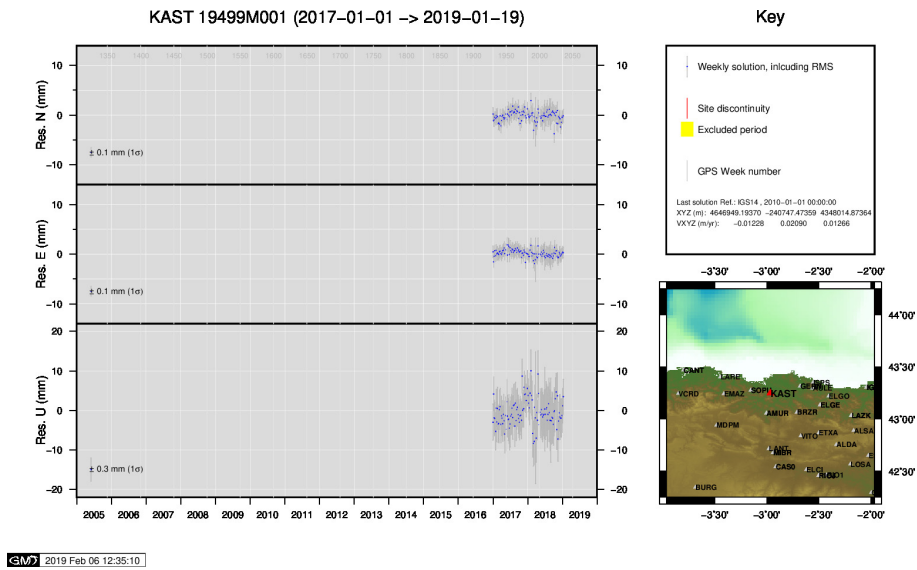


16 ) IGEL

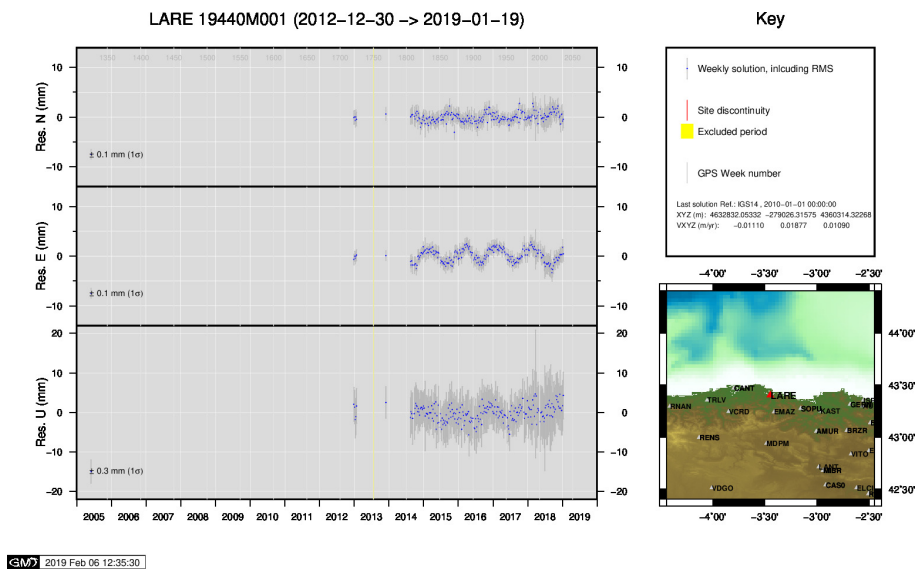


17 ) ISPS

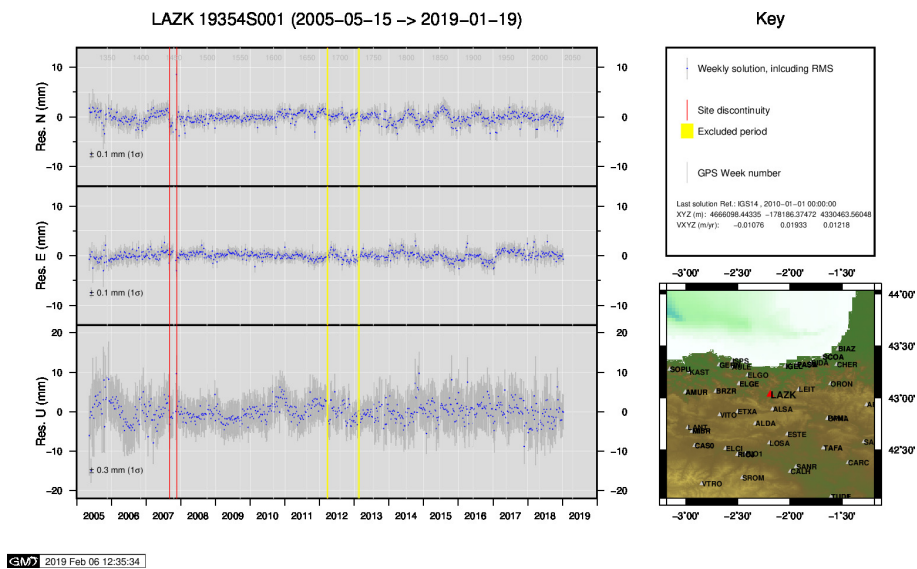




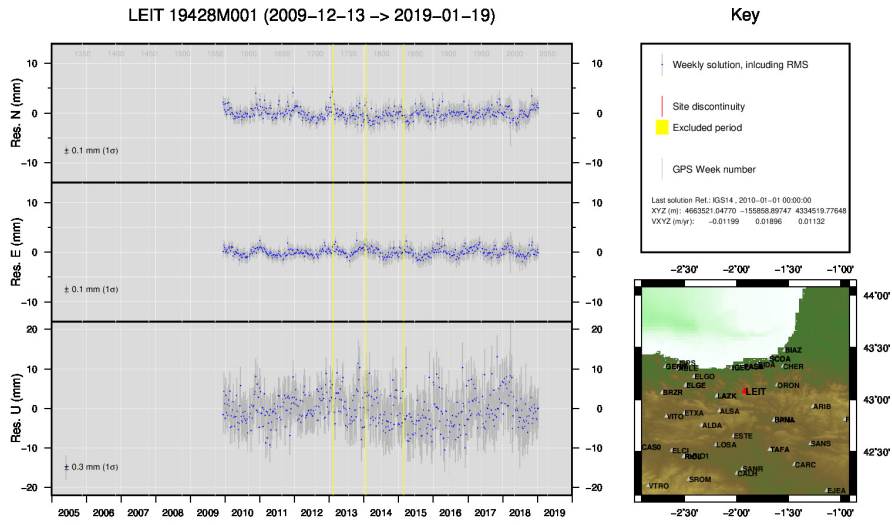
18 ) KAST



19 ) LARE

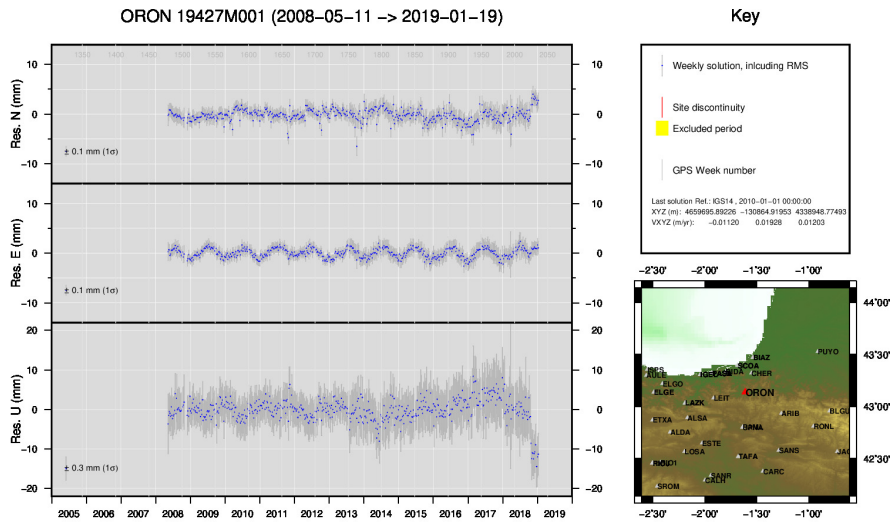


20 ) LAZK



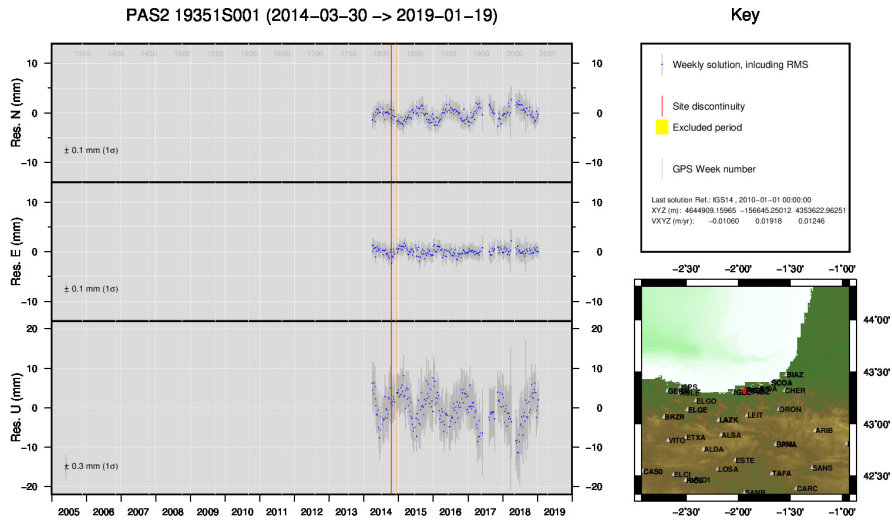
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21 ) LEIT



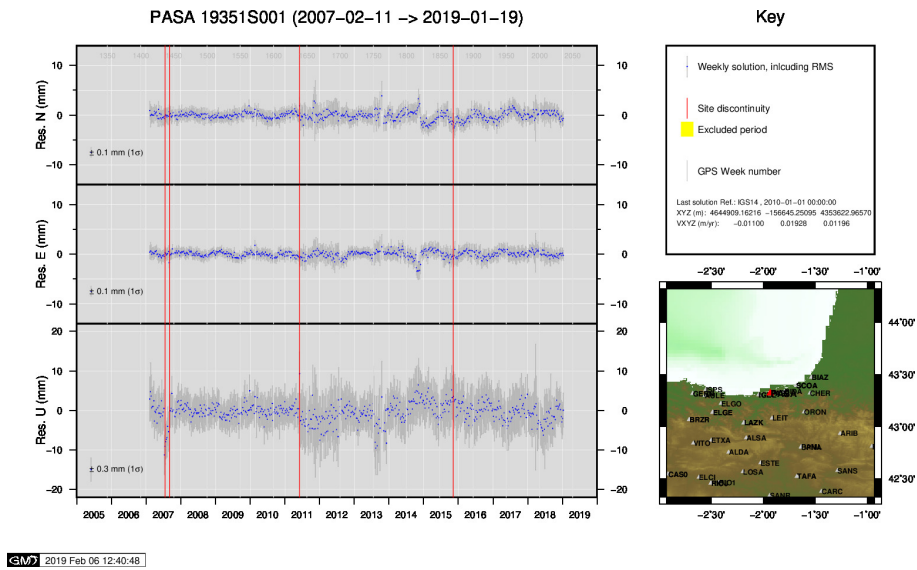
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22 ) ORON

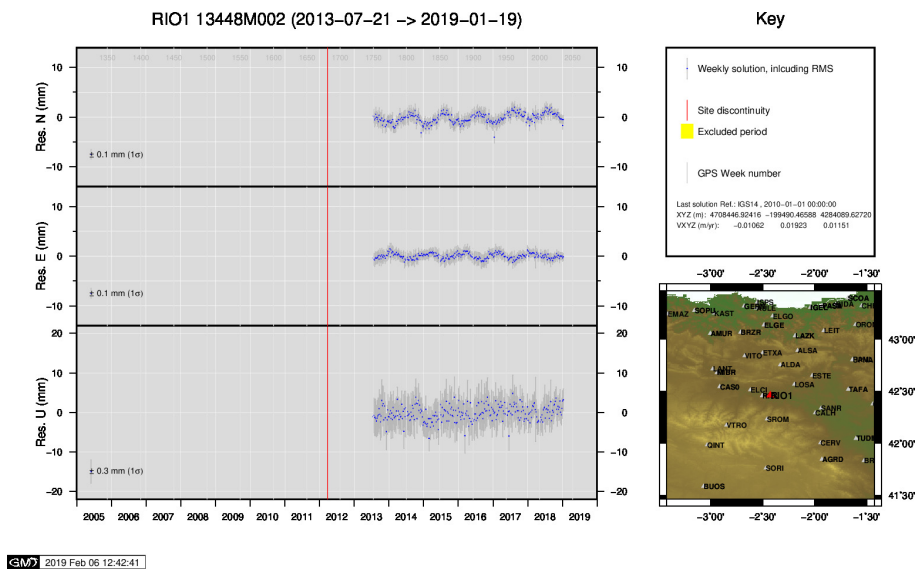


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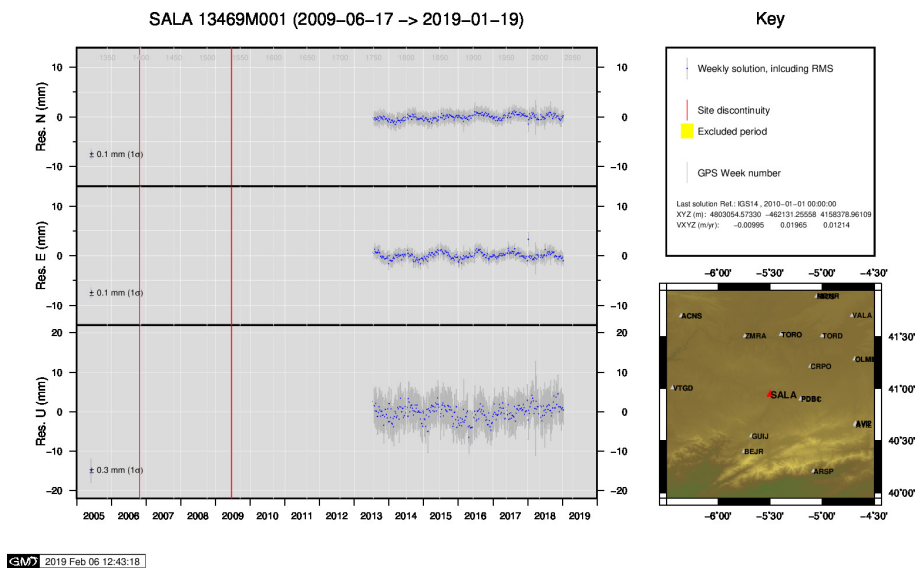
23 ) PAS2



24 ) PASA

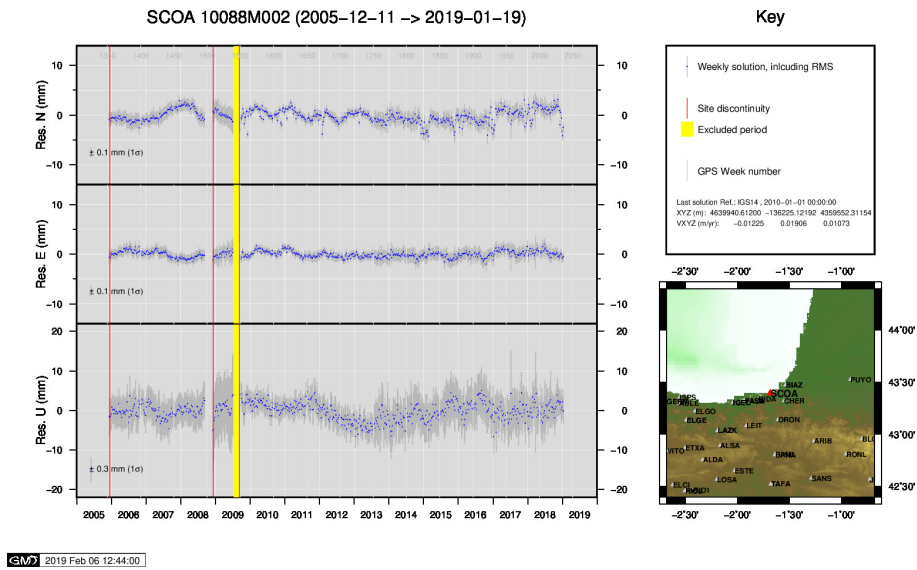


25 ) RIO1

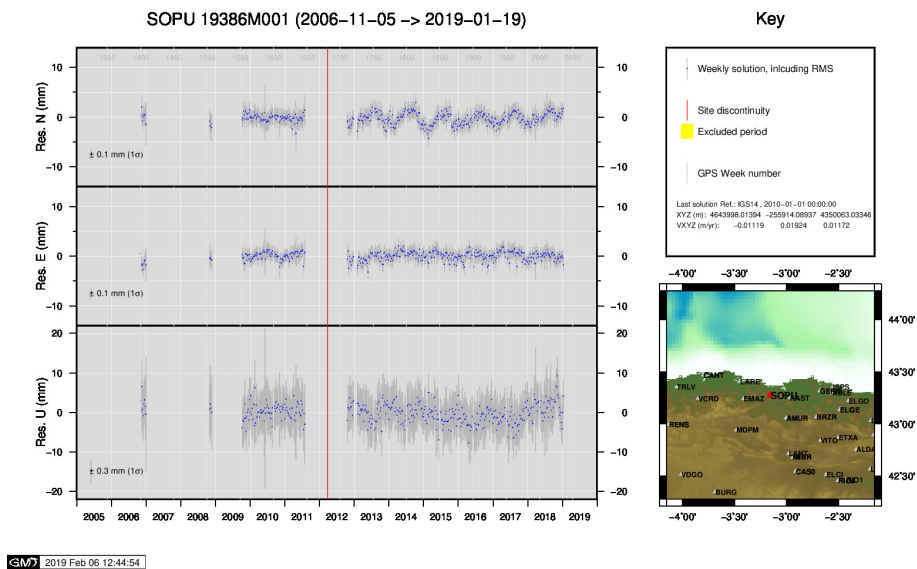


26 ) SALA

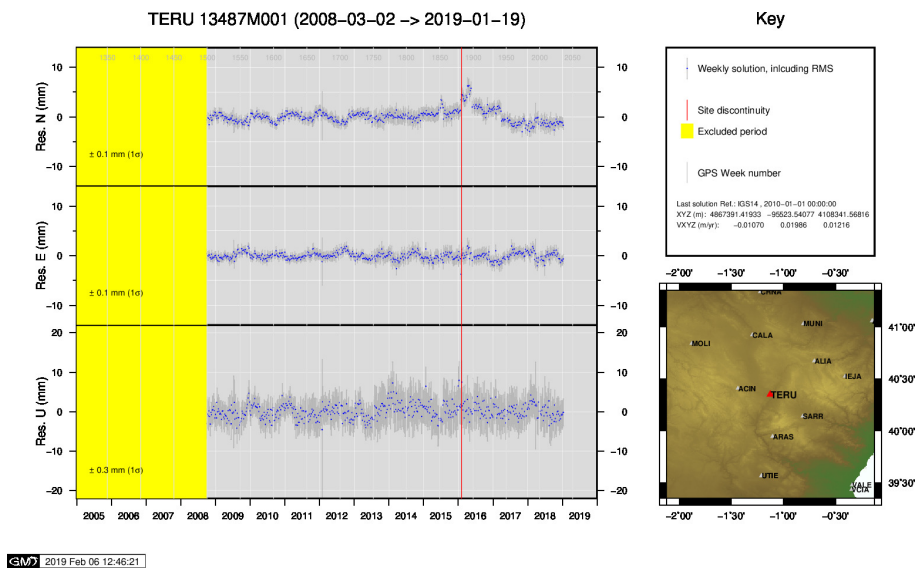




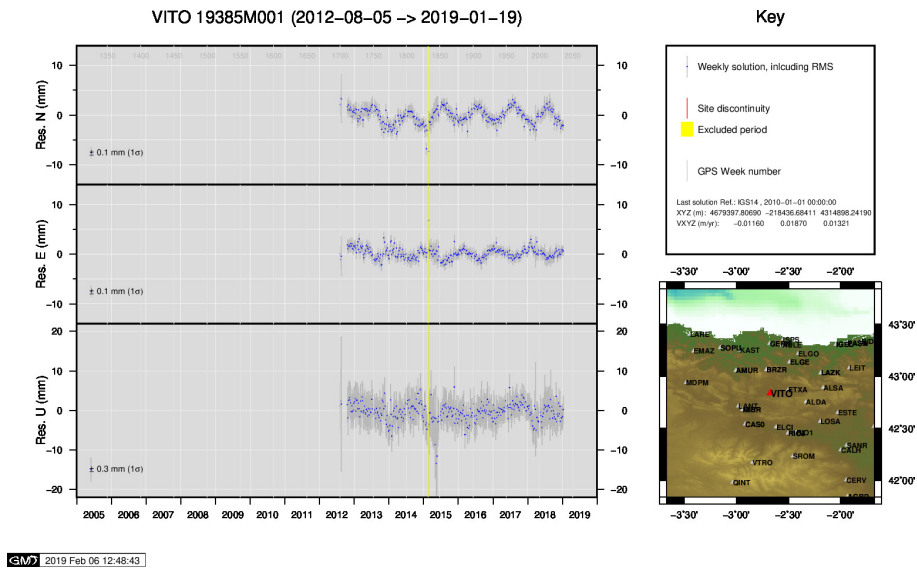
27 ) SCOA



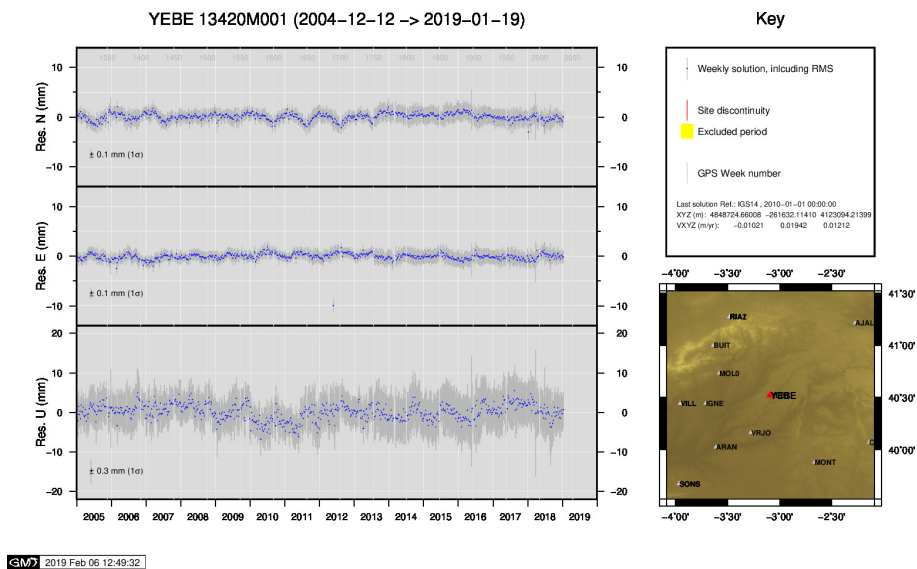
28 ) SOPU



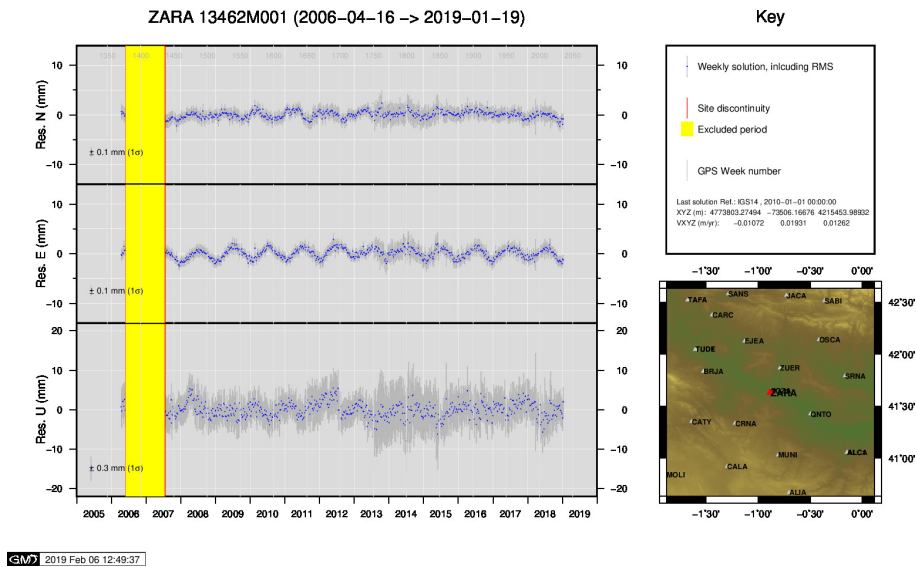
29 ) TERU



30 ) VITO



31 ) YEBE



32 ) ZARA

