

# ARA-DAC Weekly Analysis Result: 2001 (GFA)

## Technical Report

**GPS Week: 2001 (GFA)**

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

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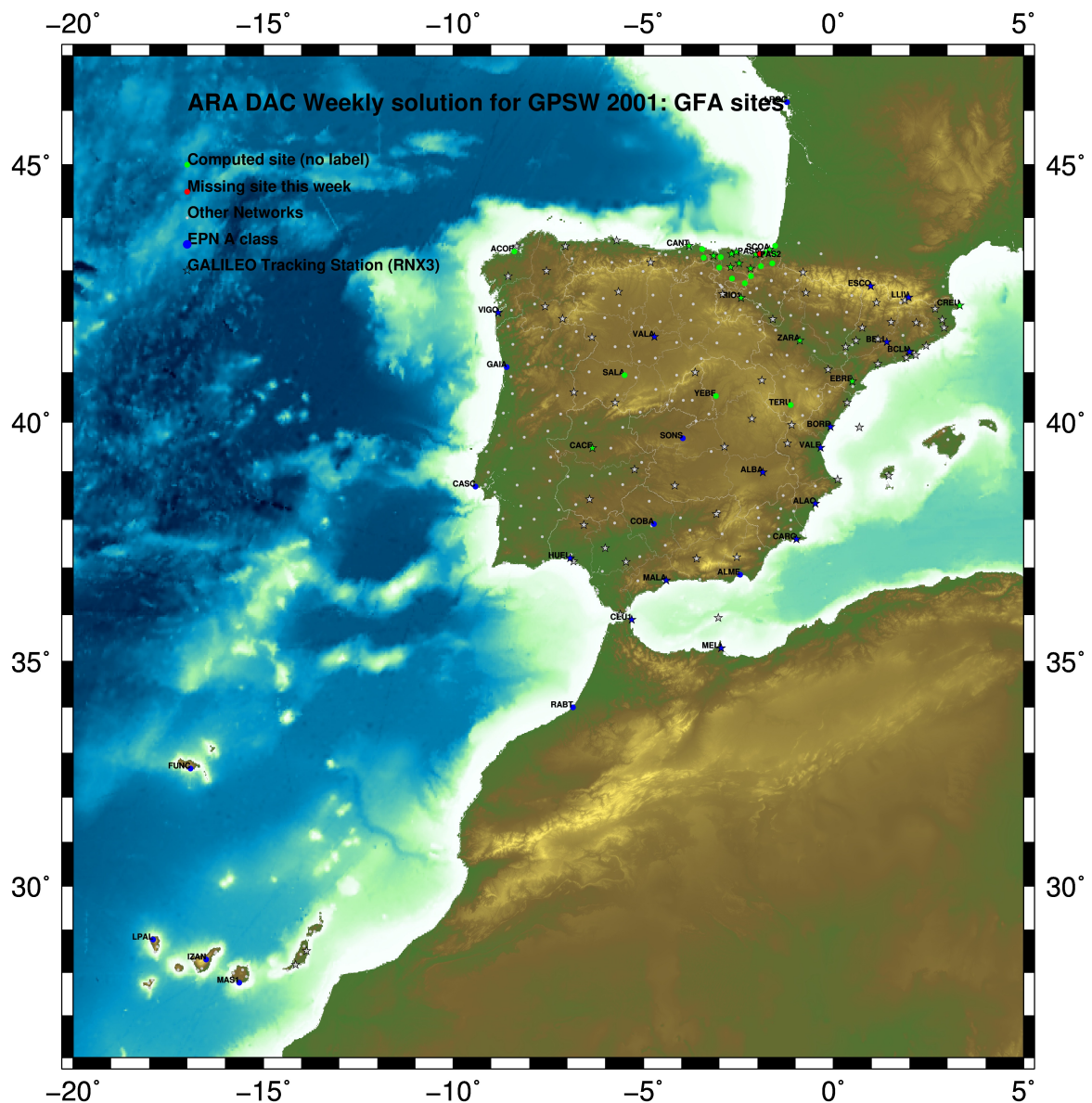
Report generated on 2018/06/03 at 23:33:12



# 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 2018 Jun 03 23:32:54

Fig.1: Computed Sites for GPS Week2001 (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 2001 WEEK FINAL COMBINATION: PRECISE ORBITS 03-JUN-18 19:40					
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LOCAL GEODETIC DATUM: IGS14		EPOCH: 2018-05-16 12:00:00			
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
1	ACOR 13434M001	4594489.56790	-678367.47182	4357066.26998	W
33	ALDA 19383M001	4687280.16458	-190876.58458	4308106.94619	A
42	ALSA 19419M001	4677250.84841	-176770.41734	4319079.86021	A
44	AMUR 19388M001	4661499.45674	-244591.28013	4332269.87093	A
77	BLAZ 10074M002	4634456.06333	-124344.99718	4365785.44720	A
78	BIDA 00000M000	4644177.83379	-145778.34442	4354832.47113	A
88	BRZR 19387M001	4662221.00147	-220769.92100	4333309.42804	A
9	CACE 13447M001	4899866.50861	-544567.05748	4033770.19050	W
10	CANT 13438M001	4625924.31950	-307096.25399	4365771.54090	W
112	CHER 00000M000	4645880.33025	-125721.94792	4353624.36019	A
15	CREU 13432M001	4715420.14381	273178.03773	4271946.83051	W
16	EBRE 13410M001	4833520.00078	41537.36711	4147461.70347	W
131	ELGE 19353S001	4657557.41363	-202241.49528	4338991.85701	A
133	EMAZ 17001M001	4645924.21639	-276949.88528	4347759.56498	A
153	GERN 19389M001	4642811.32075	-217222.95350	4353278.87082	A
173	IGEL 19352S001	4645951.43800	-165574.52451	4352550.40543	A
178	ISPS 19484M001	4640596.49079	-206963.79659	4356391.90215	A
182	KAST 19499M001	4646949.09100	-240747.29832	4348014.98027	A
185	LARE 19440M001	4632831.95887	-279026.15685	4360314.41541	A
186	LAZK 19354S001	4666098.35183	-178186.21236	4330463.66147	A
190	LEIT 19428M001	4663520.94814	-155858.73841	4334519.87162	A
242	ORON 19427M001	4659695.79969	-130864.75726	4338948.87662	A
31	PASA 19351S001	4644909.06785	-156645.08884	4353623.06542	W
34	RID1 13448M002	4708446.83346	-199490.30443	4284089.72292	W
35	SALA 13469M001	4803054.49169	-462131.09095	4158379.06444	W
36	SCDA 10088M002	4639940.50978	-136224.96155	4359552.40517	W
298	SOPU 19386M001	4643997.92175	-255913.92800	4350063.13417	A
40	TERU 13487M001	4867391.33132	-95523.37581	4108341.67109	W
349	VITO 19385M001	4679397.70955	-218436.52711	4314898.35282	A
44	YEBE 13420M001	4848724.57423	-261631.95138	4123094.31658	W
45	ZARA 13462M001	4773803.17764	-73506.00446	4215454.08597	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 2001 03-JUN-18 19:40					
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LOCAL GEODETIC DATUM: ETRF2000		EPOCH: 2018-05-16 12:00:00			
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
1	ACOR 13434M001	4594489.86579	-678367.98936	4357065.86640	W
33	ALDA 19383M001	4687280.51435	-190877.11042	4308106.54160	A
42	ALSA 19419M001	4677251.19750	-176770.94213	4319079.45652	A
44	AMUR 19388M001	4661499.80205	-244591.80351	4332269.46760	A
77	BLAZ 10074M002	4634456.42445	-124345.51750	4365785.04726	A
78	BIDA 00000M000	4644178.19176	-145778.86579	4354832.07022	A
88	BRZR 19387M001	4662221.34954	-220770.44440	4333309.02494	A
9	CACE 13447M001	4899866.80004	-544567.60529	4033769.76609	W
10	CANT 13438M001	4625924.65998	-307096.77395	4365771.13944	W
112	CHER 00000M000	4645880.69040	-125722.46940	4353623.95939	A
15	CREU 13432M001	4715420.54348	273177.51067	4271946.42919	W
16	EBRE 13410M001	4833520.36603	41536.82740	4147461.29083	W
131	ELGE 19353S001	4657557.76417	-202242.01816	4338991.45447	A
133	EMAZ 17001M001	4645924.55908	-276950.40719	4347759.16242	A
153	GERN 19389M001	4642811.67055	-217223.47493	4353278.46918	A
173	IGEL 19352S001	4645951.79358	-165575.04611	4352550.00416	A
178	ISPS 19484M001	4640596.84196	-206964.31777	4356391.50079	A
182	KAST 19499M001	4646949.43779	-240747.82023	4348014.57805	A
185	LARE 19440M001	4632832.30216	-279026.67744	4360314.01378	A
186	LAZK 19354S001	4666098.70452	-178186.73602	4330463.25858	A
190	LEIT 19428M001	4663521.30362	-155859.26176	4334519.46918	A
242	ORON 19427M001	4659696.15828	-130865.28014	4338948.47475	A
31	PASA 19351S001	4644909.42451	-156645.61031	4353622.66433	W
34	RID1 13448M002	4708447.18065	-199490.83241	4284089.31668	W
35	SALA 13469M001	4803054.80080	-462131.62901	4158378.64815	W
36	SCDA 10088M002	4639940.86914	-136225.48246	4359552.00469	W
298	SOPU 19386M001	4643998.26697	-255914.44965	4350062.73199	A
40	TERU 13487M001	4867391.67849	-95523.91934	4108341.25438	W
349	VITO 19385M001	4679398.05665	-218437.05223	4314897.94849	A
44	YEBE 13420M001	4848724.90364	-261632.49352	4123093.89930	W
45	ZARA 13462M001	4773803.53446	-73506.53860	4215453.67639	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).

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ETRF2014 FINAL COORD. wk 2001                                03-JUN-18 19:40
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LOCAL GEODETIC DATUM: ETRF2014          EPOCH: 2018-05-16 12:00:00
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
1  ACDR 13434M001         4594489.82298      -678368.02835   4357065.91435   W
33 ALDA 19383M001         4687280.46942      -190877.15069   4308106.58944   A
42 ALSA 19419M001         4677251.15262      -176770.98249   4319079.50439   A
44 AMUR 19388M001         4661499.75751      -244591.84371   4332269.51548   A
77 BIAZ 10074M002         4634456.37982      -124345.55820   4365785.09525   A
78 BIDA 00000M000         4644178.14710      -145778.90637   4354832.11819   A
88 BRZR 19387M001         4662221.30493      -220770.48467   4333309.07283   A
9  CACE 13447M001         4899866.75392      -544567.64358   4033769.81340   W
10 CANT 13438M001         4625924.61595      -307096.81407   4365771.18739   W
112 CHER 00000M000         4645880.64567      -125722.51005   4353624.00736   A
15 CREU 13432M001         4715420.49680      273177.46897   4271946.47725   W
16 EBRE 13410M001         4833520.31895      41536.78691   4147461.33848   W
131 ELGE 19353S001         4657557.71955      -202242.05851   4338991.50237   A
133 EMAZ 17001M001         4645924.51479      -276950.44734   4347759.21032   A
153 GERN 19389M001         4642811.62611      -217223.51528   4353278.51712   A
173 IGEL 19352S001         4645951.74897      -165575.08663   4352550.05211   A
178 ISPS 19484M001         4640596.79751      -206964.35817   4356391.54874   A
182 KAST 19499M001         4646949.39338      -240747.86049   4348014.62597   A
185 LARE 19440M001         4632832.25799      -279026.71763   4360314.06171   A
186 LAZK 19354S001         4666098.65975      -178186.77642   4330463.30648   A
190 LEIT 19428M001         4663521.25881      -155859.30224   4334519.51709   A
242 ORON 19427M001         4659696.11344      -130865.32072   4338948.52268   A
31 PASA 19351S001         4644909.37988      -156645.65086   4353622.71229   W
34 RIO1 13448M002         4708447.13553      -199490.87257   4284089.36447   W
35 SALA 13469M001         4803054.75546      -462131.66795   4158378.69565   W
36 SOA1 10088M002         4639940.82450      -136225.52310   4359552.05266   W
298 SOPU 19386M001         4643998.22263      -255914.48988   4350062.77991   A
40 TERU 13487M001         4867391.63151      -95523.95926   4108341.30188   W
349 VITO 19385M001         4679398.01188      -218437.09244   4314897.99633   A
44 YEBE 13420M001         4848724.85732      -261632.53296   4123093.94677   W
45 ZARA 13462M001         4773803.48834      -73506.57894   4215453.72410   W

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## 6 Quality Control

### 6.1 Mean and Daily Repeatabilities

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

ARA LAC 2001 WEEK FINAL COMBINATION: PRECISE ORBITS 03-JUN-18 19:40

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	7	XXXXXX	1.07	1.31	2.84
ALDA 19383M001	7	XXXXXX	0.68	1.61	2.83
ALSA 19419M001	7	XXXXXX	1.34	0.86	2.23
AMUR 19388M001	7	XXXXXX	0.90	1.33	5.39
BLAZ 10074M002	7	XXXXXX	0.85	1.03	2.49
BIDA 00000M000	7	XXXXXX	0.83	1.16	3.66
BRZR 19387M001	7	XXXXXX	0.83	1.53	1.39
CACE 13447M001	7	XXXXXX	0.67	2.66	4.14
CANT 13438M001	7	XXXXXX	0.68	1.18	3.81
CHER 00000M000	7	XXXXXX	0.88	1.62	1.95
CREU 13432M001	7	XXXXXX	1.04	1.74	4.16
EBRE 13410M001	7	XXXXXX	1.27	3.25	4.67
ELGE 19353S001	7	XXXXXX	0.75	1.07	2.28
EMAZ 17001M001	7	XXXXXX	1.58	2.52	3.78
GERN 19389M001	7	XXXXXX	0.51	0.38	2.54
IGEL 19352S001	7	XXXXXX	0.52	1.45	1.84
ISPS 19484M001	7	XXXXXX	0.70	0.88	3.50
KAST 19499M001	7	XXXXXX	1.14	1.10	5.65
LARE 19440M001	7	XXXXXX	0.79	1.29	3.92
LAZK 19354S001	7	XXXXXX	0.87	1.25	2.57
LEIT 19428M001	7	XXXXXX	0.49	1.53	5.91
ORON 19427M001	7	XXXXXX	0.82	1.13	1.70
PASA 19351S001	7	XXXXXX	0.64	1.39	1.55
RI01 13448M002	7	XXXXXX	0.82	1.84	1.93
SALA 13469M001	7	XXXXXX	0.87	1.72	1.77
SCOA 10088M002	7	XXXXXX	0.83	0.97	3.97
SOPU 19386M001	7	XXXXXX	1.55	1.96	4.58
TERU 13487M001	7	XXXXXX	0.64	1.37	3.46
VITO 19385M001	7	XXXXXX	1.06	1.14	3.63
YEBE 13420M001	7	XXXXXX	1.12	3.08	5.12
ZARA 13462M001	7	XXXXXX	0.89	1.30	2.56

Comparison of individual solutions:

ACOR 13434M001	N	1.07	0.82	0.04	-0.74	-1.53	0.11	0.02	1.83
ACOR 13434M001	E	1.31	2.03	1.44	1.81	-0.89	-0.11	0.13	0.07
ACOR 13434M001	U	2.84	2.86	1.89	2.60	-1.43	-4.66	1.98	1.43
ALDA 19383M001	N	0.68	1.16	-0.84	0.00	0.63	0.18	-0.23	0.47
ALDA 19383M001	E	1.61	1.50	0.57	2.92	0.19	-0.56	-0.59	-1.96
ALDA 19383M001	U	2.83	-2.29	3.37	-2.31	-4.62	2.19	0.23	0.21
ALSA 19419M001	N	1.34	1.92	-0.20	-2.07	0.43	1.19	0.57	0.90
ALSA 19419M001	E	0.86	0.30	0.35	1.95	-0.15	-0.17	-0.57	-0.22
ALSA 19419M001	U	2.23	-1.69	-1.70	-3.17	2.05	2.11	0.17	-2.34
AMUR 19388M001	N	0.90	0.79	0.07	-0.02	0.88	1.76	0.45	0.39
AMUR 19388M001	E	1.33	0.51	-0.09	3.09	0.17	0.22	-0.83	-0.13
AMUR 19388M001	U	5.39	2.67	-1.47	-2.52	-3.06	-11.38	4.33	-0.87
BLAZ 10074M002	N	0.85	0.86	-1.01	0.03	0.41	0.04	1.40	-0.68
BLAZ 10074M002	E	1.03	1.01	-0.52	2.07	-0.54	0.26	-0.45	-0.51
BLAZ 10074M002	U	2.49	-1.96	1.57	2.04	0.11	-2.04	-1.75	-4.43
BIDA 00000M000	N	0.83	0.26	0.40	0.53	1.51	-0.19	-0.26	-1.13
BIDA 00000M000	E	1.16	-1.23	-0.84	2.21	-0.36	0.18	0.59	0.68
BIDA 00000M000	U	3.66	-1.10	4.28	-6.51	-2.69	1.06	1.75	-2.67
BRZR 19387M001	N	0.83	-0.69	-1.18	0.37	0.43	1.16	0.30	0.71
BRZR 19387M001	E	1.53	-1.35	-1.83	2.67	-0.05	0.01	1.09	0.74
BRZR 19387M001	U	1.39	-0.89	-0.70	-2.64	-1.20	0.17	0.64	-1.19
CACE 13447M001	N	0.67	0.42	-0.37	0.24	-1.08	0.43	-0.79	0.59
CACE 13447M001	E	2.66	0.65	1.14	-5.90	1.48	1.01	-0.31	1.59
CACE 13447M001	U	4.14	5.97	-1.53	-7.49	0.34	-0.23	0.82	2.85
CANT 13438M001	N	0.68	-0.63	-0.50	-0.11	0.13	0.03	1.44	0.18
CANT 13438M001	E	1.18	-0.26	0.60	2.73	0.08	-0.52	-0.11	-0.41
CANT 13438M001	U	3.81	8.14	-0.20	2.02	-1.90	-0.06	-0.71	-3.58
CHER 00000M000	N	0.88	-0.02	-1.26	-0.14	0.69	0.33	1.54	-0.15
CHER 00000M000	E	1.62	-2.84	-0.70	2.34	0.65	1.00	0.51	0.30
CHER 00000M000	U	1.95	-3.88	-0.25	0.80	1.12	-1.00	-2.07	-0.76
CREU 13432M001	N	1.04	0.48	0.24	-0.36	-1.23	0.29	2.00	-0.66
CREU 13432M001	E	1.74	0.69	0.39	-3.94	-0.44	0.74	-0.22	1.15
CREU 13432M001	U	4.16	2.55	-0.87	7.36	-1.05	-2.52	-2.36	-5.42
EBRE 13410M001	N	1.27	-2.19	1.66	1.18	0.35	-0.33	0.67	-0.30
EBRE 13410M001	E	3.25	6.11	-2.97	-3.82	0.77	0.61	-0.52	-1.12
EBRE 13410M001	U	4.67	-8.48	4.89	4.61	1.43	-2.96	-0.09	1.69
ELGE 19353S001	N	0.75	-0.92	0.05	-0.53	1.06	0.71	-0.00	0.80
ELGE 19353S001	E	1.07	0.81	-1.74	1.58	-0.43	0.38	0.57	0.11
ELGE 19353S001	U	2.28	-1.17	2.35	-0.42	-1.29	-1.52	0.65	-4.46
EMAZ 17001M001	N	1.58	0.31	-1.99	-2.55	-0.85	0.75	1.09	1.41
EMAZ 17001M001	E	2.52	-2.17	0.26	4.93	-1.52	-1.81	1.46	-1.15
EMAZ 17001M001	U	3.78	1.89	5.32	-2.44	-0.32	-6.25	2.92	-0.26
GERN 19389M001	N	0.51	0.57	0.55	-0.21	-0.05	-0.47	0.02	0.81
GERN 19389M001	E	0.38	-0.12	-0.45	0.29	0.32	0.25	0.32	0.56
GERN 19389M001	U	2.54	-1.73	-4.81	2.77	-1.77	-0.59	0.80	-0.83
IGEL 19352S001	N	0.52	0.37	-0.66	0.13	0.61	-0.37	0.50	0.53
IGEL 19352S001	E	1.45	-1.12	-0.51	3.20	0.23	0.48	-0.47	-0.53
IGEL 19352S001	U	1.84	-2.53	-1.98	-2.18	-1.61	0.05	0.90	1.38
ISPS 19484M001	N	0.70	-0.96	0.95	0.12	-0.48	-0.18	0.93	0.09
ISPS 19484M001	E	0.88	0.01	0.67	1.32	0.82	-0.19	-1.33	-0.18
ISPS 19484M001	U	3.50	-6.68	2.25	-0.23	-2.20	-1.39	2.76	-3.09
KAST 19499M001	N	1.14	1.90	0.90	0.03	0.51	1.43	-0.98	0.22
KAST 19499M001	E	1.10	0.87	1.18	1.58	0.82	0.20	0.19	-1.39
KAST 19499M001	U	5.65	0.54	6.19	-2.76	-3.71	-9.72	3.22	-5.16
LARE 19440M001	N	0.79	-0.71	0.26	-0.84	0.61	0.61	-0.16	1.29
LARE 19440M001	E	1.29	-0.85	-0.71	2.47	1.07	-0.76	-0.12	-0.98
LARE 19440M001	U	3.92	-3.33	-1.04	3.39	1.50	-6.86	-1.39	-4.14
LAZK 19354S001	N	0.87	0.88	-0.80	-1.05	0.43	0.28	1.32	0.13
LAZK 19354S001	E	1.25	-1.24	-1.15	2.37	0.32	0.47	-0.20	0.70
LAZK 19354S001	U	2.57	0.44	-0.68	-5.71	1.00	1.43	-1.49	-1.01

LEIT 19428M001	N	0.49	0.02	-0.36	0.39	-0.59	0.12	0.69	0.54
LEIT 19428M001	E	1.53	-0.18	0.37	3.38	-0.64	0.27	-0.92	-1.07
LEIT 19428M001	U	5.91	8.42	6.25	-1.61	-1.44	-6.24	-4.31	-6.12
ORON 19427M001	N	0.82	0.82	-0.84	-0.71	0.58	0.85	0.92	-0.53
ORON 19427M001	E	1.13	-0.49	-0.67	2.30	-0.85	0.95	0.30	-0.21
ORON 19427M001	U	1.70	-1.57	-2.71	1.22	-0.49	-1.10	0.62	-2.05
PASA 19351S001	N	0.64	-0.21	-0.84	-0.22	0.84	0.26	0.90	0.33
PASA 19351S001	E	1.39	-0.68	-1.49	2.95	0.49	0.01	-0.04	0.02
PASA 19351S001	U	1.55	0.91	-0.75	-2.06	-2.62	0.44	-1.18	-0.62
RIO1 13448M002	N	0.82	1.60	-0.88	0.29	0.06	0.04	-0.15	0.79
RIO1 13448M002	E	1.84	-1.65	-0.75	4.00	0.82	-0.26	-0.47	0.28
RIO1 13448M002	U	1.93	1.11	0.90	-1.39	-1.12	1.44	2.47	-2.99
SALA 13469M001	N	0.87	0.26	-0.52	-0.87	-0.59	1.29	-1.18	0.27
SALA 13469M001	E	1.72	-0.18	0.39	4.04	-0.40	-0.32	-0.48	-0.91
SALA 13469M001	U	1.77	1.45	2.90	1.68	-1.04	-1.18	-0.66	-1.56
SCDA 10088M002	N	0.83	-0.49	-0.12	0.97	0.98	0.59	0.70	-1.07
SCDA 10088M002	E	0.97	-0.49	-0.92	2.01	0.41	-0.07	0.07	0.60
SCDA 10088M002	U	3.97	-8.10	-1.97	-0.65	-0.60	4.12	2.65	-0.54
SOPU 19386M001	N	1.55	-1.94	-1.75	2.22	0.85	1.05	0.44	0.85
SOPU 19386M001	E	1.96	-3.19	-1.41	2.85	0.63	1.43	0.43	0.40
SOPU 19386M001	U	4.58	1.31	-3.22	-0.33	4.17	-7.09	3.63	-5.73
TERU 13487M001	N	0.64	-0.45	0.17	1.43	0.21	-0.04	-0.31	-0.20
TERU 13487M001	E	1.37	0.51	0.46	-3.05	0.63	0.81	-0.41	0.52
TERU 13487M001	U	3.46	-1.31	-1.64	6.39	1.22	0.20	3.25	-3.80
VITO 19385M001	N	1.06	0.22	-1.30	0.44	1.46	0.30	1.20	1.04
VITO 19385M001	E	1.14	-0.13	-0.27	2.66	0.08	0.62	-0.50	-0.20
VITO 19385M001	U	3.63	3.45	1.67	-3.83	-5.96	1.34	-1.59	-3.12
YEBE 13420M001	N	1.12	-0.68	0.49	2.28	-0.31	-1.16	-0.43	-0.23
YEBE 13420M001	E	3.08	1.26	0.44	-7.00	1.74	-0.21	0.31	1.69
YEBE 13420M001	U	5.12	3.95	0.49	-10.07	-2.31	-1.26	5.61	1.16
ZARA 13462M001	N	0.89	0.65	0.30	0.60	1.28	1.10	-0.42	-0.95
ZARA 13462M001	E	1.30	-0.03	-1.85	2.54	0.16	0.43	-0.10	0.27
ZARA 13462M001	U	2.56	-1.04	1.47	0.11	-4.48	-2.96	2.30	1.37

## 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	0.18	2.21	2.27
2	ALAC 13433M001	I W	-0.96	1.65	-0.89
3	ALBA 13452M001	I W	-0.50	0.33	-1.86
4	ALME 13437M001	I W	-2.57	0.77	4.64
5	BCLN 13412M001	I W	2.77	-4.12	-3.93
6	BELL 13431M001	I W	1.15	0.77	-1.64
7	BORR 13480M001	I W	-0.54	-0.47	-3.44
8	BRST 10004M004	I W	-0.87	-0.51	-0.13
9	CACE 13447M001	I W	-0.76	1.33	3.14
10	CANT 13438M001	I W	-0.13	-0.66	4.47
11	CARG 19412M001	I W	-0.53	1.53	-0.22
12	CASC 13909S001	I W	0.18	-1.79	0.03
13	CEU1 13449M002	I W	-1.20	0.93	2.13
14	COBA 13453M001	I W	-0.08	0.89	-0.36
15	CREU 13432M001	I W	-0.16	0.90	-2.20
16	EBRE 13410M001	I W	0.60	2.36	-2.17
17	ESCO 13435M001	I W	-1.12	-4.82	2.86
18	FUNC 13911S001	I W	4.16	1.94	-6.21
19	GAIA 13902M001	I W	0.28	-1.87	4.43
21	HUEL 13451M001	I W	-0.67	-1.31	3.77
22	IZAN 31309M002	I W	-0.07	1.00	-2.16
24	LLIV 13436M001	I W	1.21	-0.27	3.40
25	LPAL 81701M001	I W	-1.73	1.91	-4.63
26	LR0C 10023M001	I W	0.25	-1.11	1.08
27	MALA 13443M001	I W	-2.42	1.57	0.28
28	MAS1 31303M002	I W	0.53	2.11	-0.76
30	MEL1 19379M001	I W	-0.90	-0.01	2.12
31	PASA 19351S001	I W	-0.69	-0.64	2.16
32	PDEL 31906M004	I W	0.35	-0.68	-3.12
33	RABT 35001M002	I W	-0.73	0.32	-1.84
34	RID1 13448M002	I W	0.17	-1.01	1.25
35	SALA 13469M001	I W	0.25	0.12	-0.36
36	SCOA 10088M002	I W	-3.73	-1.46	-2.50
38	SONS 13446M001	I W	0.37	1.73	-1.12
39	TERC 31909M001	I W	7.93	-4.17	-9.46
40	TERU 13487M001	I W	1.44	1.28	-1.93
41	VALA 13463M002	I W	-0.61	-0.51	0.72
42	VALE 13439M001	I W	-1.09	1.59	-0.92
43	VIGO 13450M001	I W	0.10	-1.52	2.75
44	YEBE 13420M001	I W	-0.04	-0.19	4.57
45	ZARA 13462M001	I W	-1.02	-0.26	-1.10
46	ZIMM 14001M004	I W	1.20	0.17	6.90
	RMS / COMPONENT		1.82	1.70	3.23
	MEAN		-0.00	-0.00	-0.00
	MIN		-3.73	-4.82	-9.46
	MAX		7.93	2.36	6.90

NUMBER OF PARAMETERS : 3  
NUMBER OF COORDINATES : 126  
RMS OF TRANSFORMATION : 2.36 MM

BARYCENTER COORDINATES:

LATITUDE : 39 41 12.90  
LONGITUDE : - 5 21 29.58  
HEIGHT : -48.657 KM

PARAMETERS:

TRANSLATION IN N : 0.00 +- 0.36 MM  
TRANSLATION IN E : -0.00 +- 0.36 MM  
TRANSLATION IN U : -0.00 +- 0.36 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          17046625
NUMBER OF UNKNOWN               227549
NUMBER OF DEGREES OF FREEDOM    16819076
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)      180
VARIANCE FACTOR                  76.896662861131347

Helmert Transformation Parameters With Respect to Combined Solution:
-----
Sol  Rms (m)      Translation (m)      Rotation (")      Scale (ppm)
      X          Y          Z          X          Y          Z
-----
 1  0.00267    -0.0089  0.0146  0.0029   -0.0002 -0.0003  0.0004   0.00098
 2  0.00198    -0.0033  0.0097 -0.0026   -0.0001 -0.0000  0.0003   0.00091
 3  0.00438     0.0423  0.0211 -0.0446   -0.0008  0.0020  0.0003  -0.00049
 4  0.00210    -0.0087 -0.0039  0.0155   0.0001 -0.0006 -0.0001  -0.00061
 5  0.00235     0.0158 -0.0021 -0.0086   0.0002  0.0005  0.0001  -0.00106
 6  0.00215    -0.0138 -0.0265  0.0151   0.0005 -0.0007 -0.0007  -0.00019
 7  0.00270     0.0033 -0.0013  0.0004   0.0001  0.0001  0.0001  -0.00047
```

```
Statistics of individual solutions:
-----
File  RMS (m)      DOF  Chi**2/DOF  #Observations authentic / pseudo  #Parameters explicit / implicit / singular
-----
 1  0.00139      2401656      1.93          2434614      3          1020      31941      0
 2  0.00153      2410020      2.34          2443913      3          1026      32870      0
 3  0.02286      2409156     522.47          2442524      3          1017      32354      0
 4  0.00137      2406880      1.87          2439299      3          1026      31396      0
 5  0.00141      2397130      1.98          2430333      3          1020      32186      0
 6  0.00146      2394709      2.13          2428554      3          1026      32822      0
 7  0.00200      2393420      4.00          2427388      3          1023      32948      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 18:133:00000 18:139:86370 LEICA GRX1200PRO -----
ALDA  A  1 P 18:133:00000 18:139:86370 LEICA GR10 -----
ALSA  A  1 P 18:133:00000 18:139:86370 LEICA GRX1200GGPRO -----
AMUR  A  1 P 18:133:00000 18:139:86370 LEICA GR10 -----
BIAZ  A  1 P 18:133:00000 18:139:86370 TRI SP90M -----
BIDA  A  1 P 18:133:00000 18:139:86370 LEICA GR10 -----
BRZR  A  1 P 18:133:00000 18:139:86370 LEICA GR10 -----
CACE  A  1 P 18:133:00000 18:139:86370 TRIMBLE NETR9 -----
CANT  A  1 P 18:133:00000 18:139:86370 LEICA GR10 -----
CHER  A  1 P 18:133:00000 18:139:86370 LEICA GRX1200+GNSS -----
CREU  A  1 P 18:133:00000 18:139:86370 LEICA GR50 -----
EBRE  A  1 P 18:133:00000 18:139:86370 LEICA GR50 -----
ELGE  A  1 P 18:133:00000 18:139:86370 LEICA GR10 -----
EMAZ  A  1 P 18:133:00000 18:139:86370 LEICA GR30 -----
GERN  A  1 P 18:133:00000 18:139:86370 LEICA GR10 -----
IGEL  A  1 P 18:133:00000 18:139:86370 LEICA GR10 -----
ISPS  A  1 P 18:133:00000 18:139:86370 TRIMBLE NETR9 -----
KAST  A  1 P 18:133:00000 18:139:86370 LEICA GR30 -----
LARE  A  1 P 18:133:00000 18:139:86370 LEICA GRX1200GGPRO -----
LAZK  A  1 P 18:133:00000 18:139:86370 LEICA GR10 -----
LEIT  A  1 P 18:133:00000 18:139:86370 LEICA GRX1200+GNSS -----
ORON  A  1 P 18:133:00000 18:139:86370 LEICA GRX1200GGPRO -----
PASA  A  1 P 18:133:00000 18:139:86370 LEICA GR10 -----
RIO1  A  1 P 18:133:00000 18:139:86370 LEICA GR25 -----
SALA  A  1 P 18:133:00000 18:139:86370 LEICA GRX1200+GNSS -----
SCOA  A  1 P 18:133:00000 18:139:86370 LEICA GR25 -----
SOPU  A  1 P 18:133:00000 18:139:86370 LEICA GR10 -----
TERU  A  1 P 18:133:00000 18:139:86370 LEICA GRX1200GGPRO -----
VITO  A  1 P 18:133:00000 18:139:86370 LEICA GR10 -----
YEBE  A  1 P 18:133:00000 18:139:86370 TRIMBLE NETR9 -----
ZARA  A  1 P 18:133:00000 18:139:86370 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 18:133:00000 18:139:86370 LEIAT504      LEIS -----
ALDA  A  1 P 18:133:00000 18:139:86370 LEIAS10       NONE -----
ALSA  A  1 P 18:133:00000 18:139:86370 LEIAX1202GG   NONE -----
AMUR  A  1 P 18:133:00000 18:139:86370 LEIAS10       NONE -----
BIAZ  A  1 P 18:133:00000 18:139:86370 LEIAR25      LEIT -----
```

```

BIDA A 1 P 18:133:00000 18:139:86370 LEIAS10 NONE -----
BRZR A 1 P 18:133:00000 18:139:86370 LEIAS10 NONE -----
CACE A 1 P 18:133:00000 18:139:86370 TRM29659.00 NONE -----
CANT A 1 P 18:133:00000 18:139:86370 LEIAR25_R4 LEIT 25066
CHER A 1 P 18:133:00000 18:139:86370 LEIAX1203+GNSS NONE -----
CREU A 1 P 18:133:00000 18:139:86370 LEIAR25_R4 NONE 26357
EBRE A 1 P 18:133:00000 18:139:86370 LEIAR25_R4 NONE 26359
ELGE A 1 P 18:133:00000 18:139:86370 LEIAR25_R4 LEIT -----
EMAZ A 1 P 18:133:00000 18:139:86370 LEIAS10 NONE -----
GERN A 1 P 18:133:00000 18:139:86370 LEIAS10 NONE -----
IGEL A 1 P 18:133:00000 18:139:86370 LEIAR20 LEIM -----
ISPS A 1 P 18:133:00000 18:139:86370 TRM59900.00 SCIS -----
KAST A 1 P 18:133:00000 18:139:86370 LEIAS10 NONE -----
LARE A 1 P 18:133:00000 18:139:86370 LEIAT504 NONE -----
LAZK A 1 P 18:133:00000 18:139:86370 LEIAR25_R4 LEIT -----
LEIT A 1 P 18:133:00000 18:139:86370 LEIAX1203+GNSS NONE -----
ORDN A 1 P 18:133:00000 18:139:86370 LEIAX1202GG NONE -----
PASA A 1 P 18:133:00000 18:139:86370 LEIAR20 LEIM 73034
RIO1 A 1 P 18:133:00000 18:139:86370 LEIAR25_R4 LEIT 25138
SALA A 1 P 18:133:00000 18:139:86370 LEIAR25 NONE -----
SCDA A 1 P 18:133:00000 18:139:86370 TRM55971.00 NONE -----
SOPU A 1 P 18:133:00000 18:139:86370 LEIAS10 NONE -----
TERU A 1 P 18:133:00000 18:139:86370 LEIAT504GG LEIS -----
VITO A 1 P 18:133:00000 18:139:86370 LEIAS10 NONE -----
YEBE A 1 P 18:133:00000 18:139:86370 TRM29659.00 NONE -----
ZARA A 1 P 18:133:00000 18:139:86370 TRM29659.00 NONE -----

```

### 7.3 Eccentricities

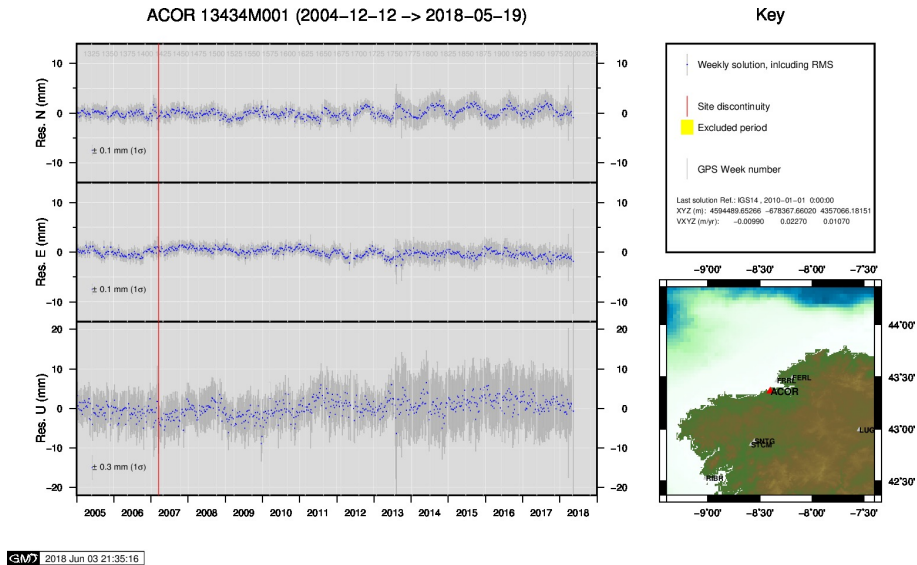
```

*
*SITE PT SOLN T DATA_START_ DATA_END_ AXE ARP->BENCHMARK(M) UP_ NORTH_ EAST_
ACOR A 1 P 18:133:00000 18:139:86370 UNE 3.0460 0.0000 0.0000
ALDA A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
ALSA A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
AMUR A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
BIAZ A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
BIDA A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
BRZR A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
CACE A 1 P 18:133:00000 18:139:86370 UNE 0.0600 0.0000 0.0000
CANT A 1 P 18:133:00000 18:139:86370 UNE 3.0490 0.0000 0.0000
CHER A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
CREU A 1 P 18:133:00000 18:139:86370 UNE 0.0770 0.0000 0.0000
EBRE A 1 P 18:133:00000 18:139:86370 UNE 0.0770 0.0000 0.0000
ELGE A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
EMAZ A 1 P 18:133:00000 18:139:86370 UNE 0.0350 0.0000 0.0000
GERN A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
IGEL A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
ISPS A 1 P 18:133:00000 18:139:86370 UNE 0.0350 0.0000 0.0000
KAST A 1 P 18:133:00000 18:139:86370 UNE 0.0350 0.0000 0.0000
LARE A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
LAZK A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
LEIT A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
ORDN A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
PASA A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
RIO1 A 1 P 18:133:00000 18:139:86370 UNE 0.0606 0.0000 0.0000
SALA A 1 P 18:133:00000 18:139:86370 UNE 0.0600 0.0000 0.0000
SCDA A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
SOPU A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
TERU A 1 P 18:133:00000 18:139:86370 UNE 0.0600 0.0000 0.0000
VITO A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
YEBE A 1 P 18:133:00000 18:139:86370 UNE 0.0000 0.0000 0.0000
ZARA A 1 P 18:133:00000 18:139:86370 UNE 3.2590 0.0000 0.0000

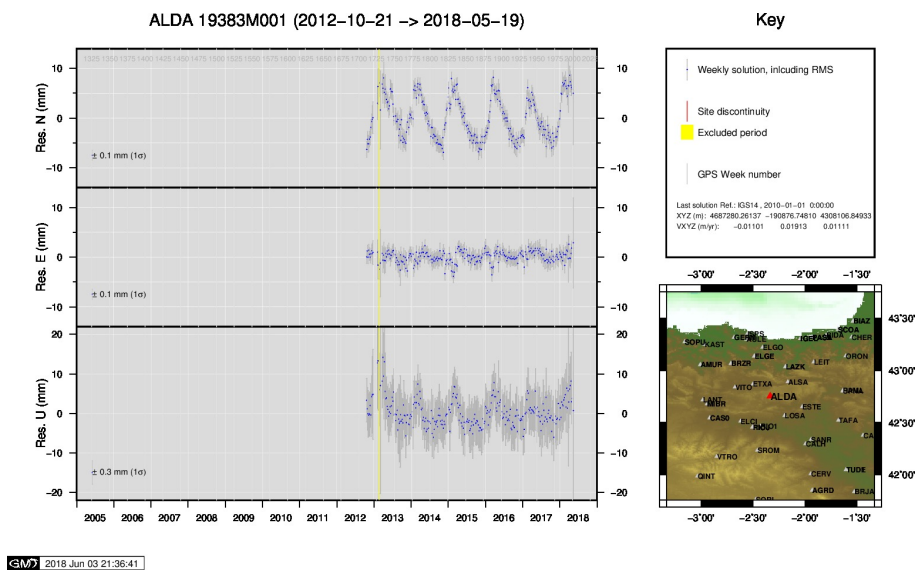
```

## 8 Cumulative Time Series

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

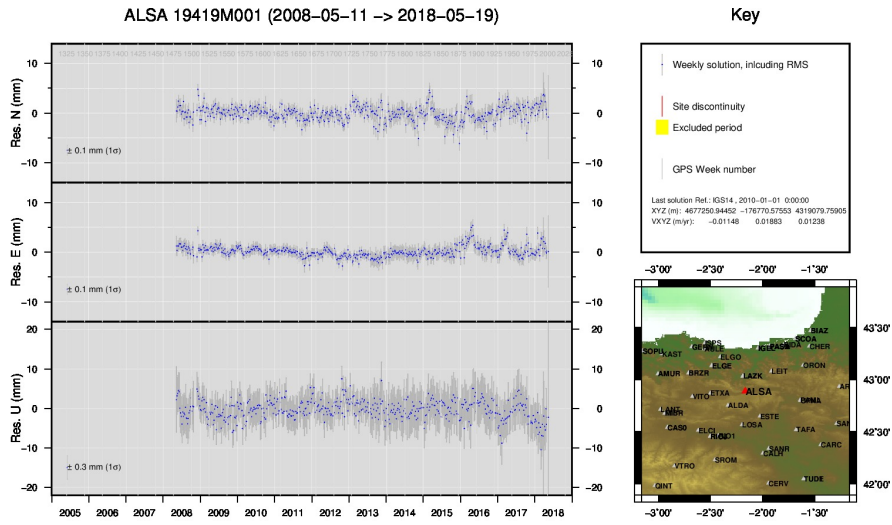


1 ) ACOR



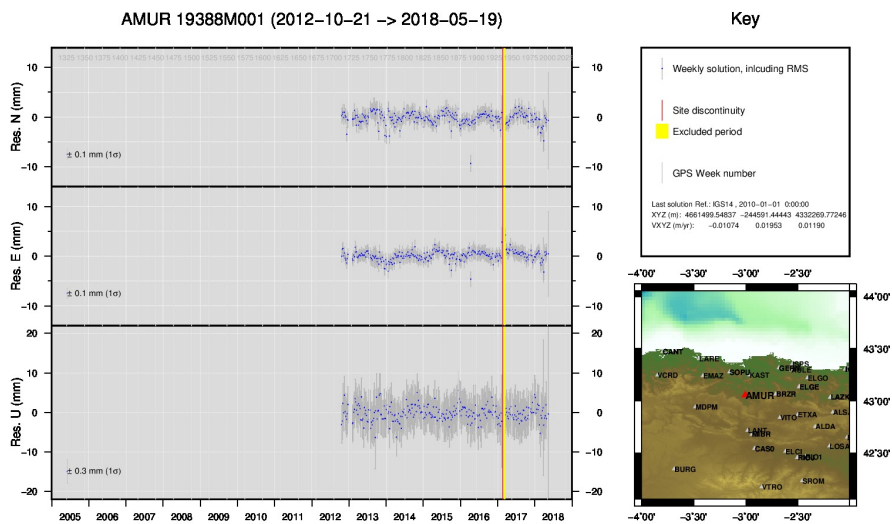
2 ) ALDA





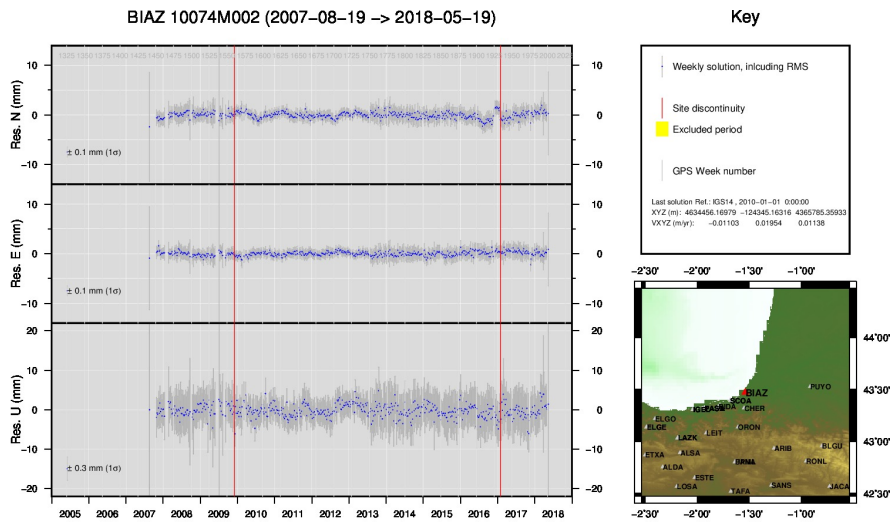
GMW 2018 Jun 03 21:37:42

3 ) ALSA



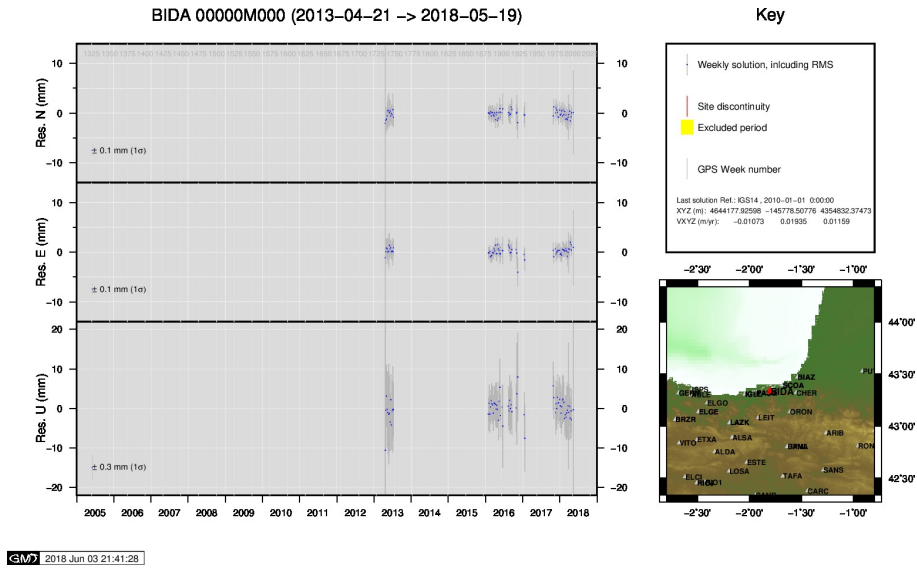
GMW 2018 Jun 03 21:37:54

4 ) AMUR

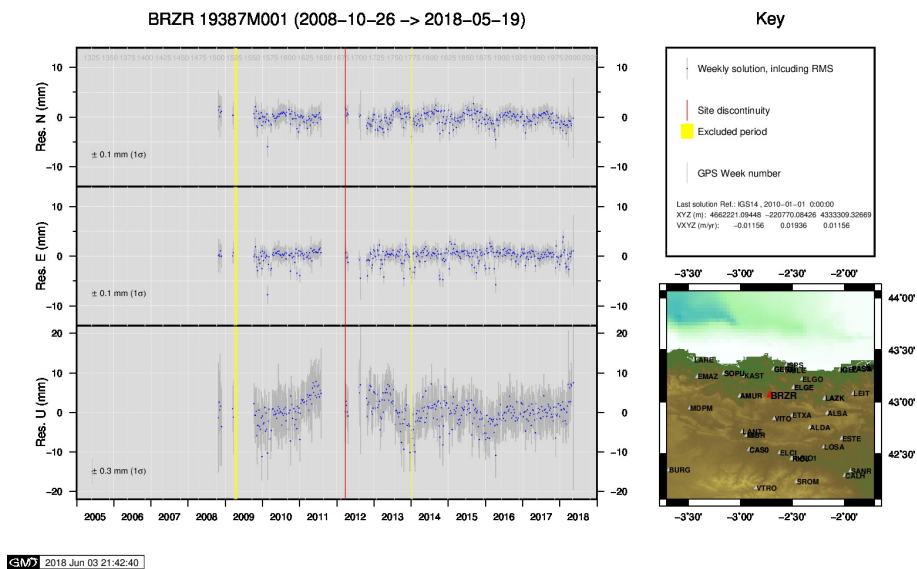


GMW 2018 Jun 03 21:41:22

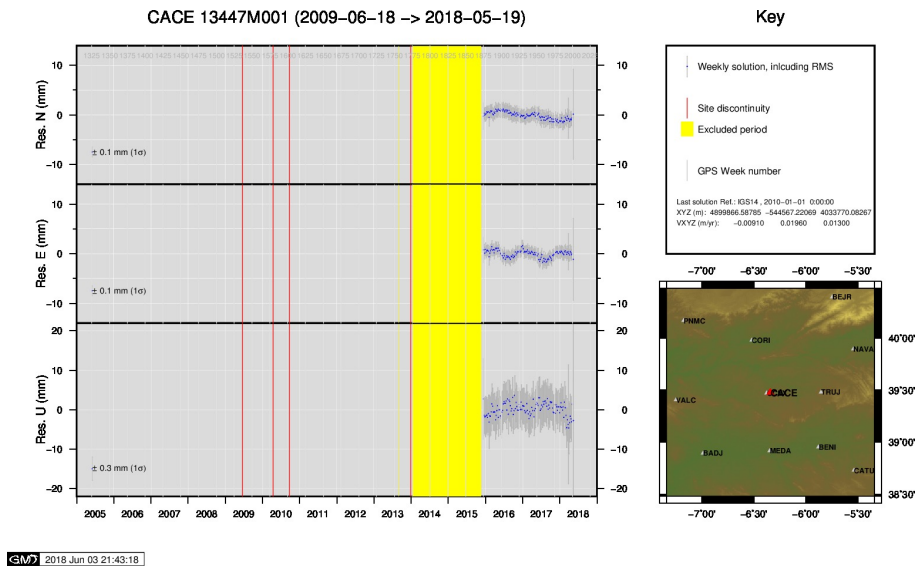
5 ) BIAZ



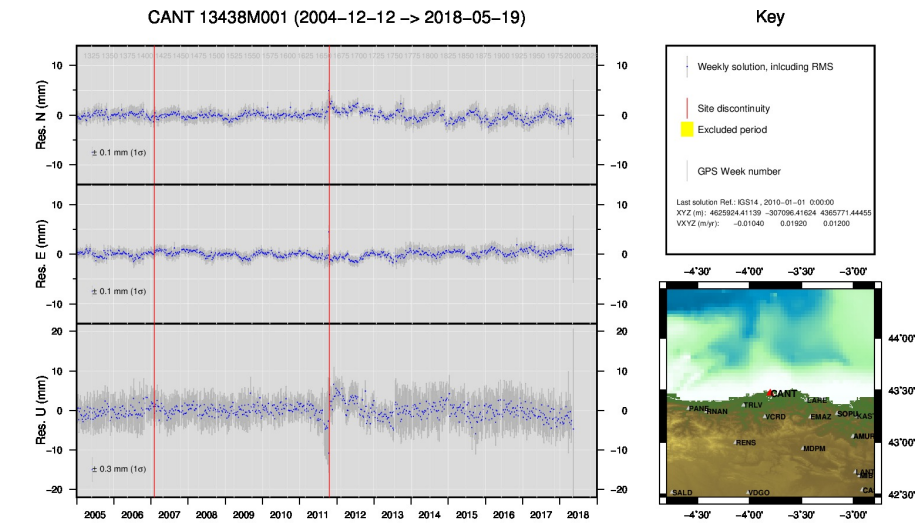
6 ) BIDA



7 ) BRZR

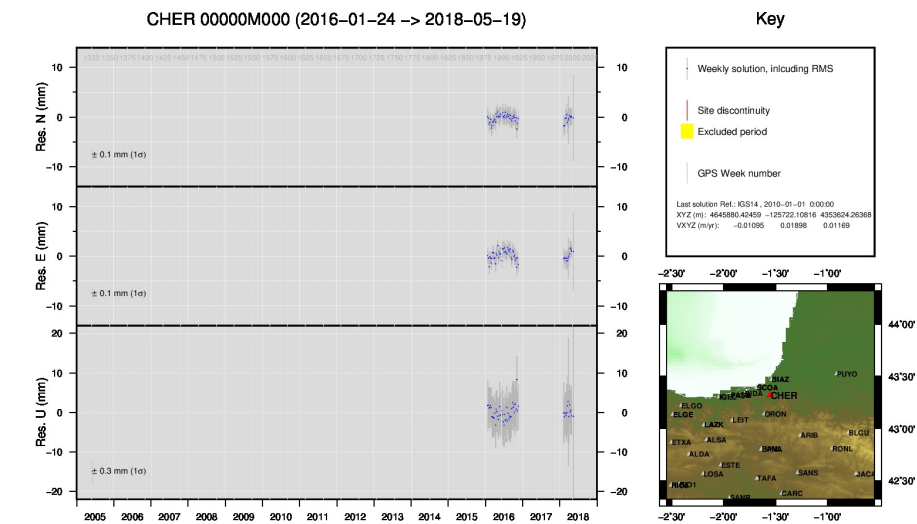


8 ) CACE



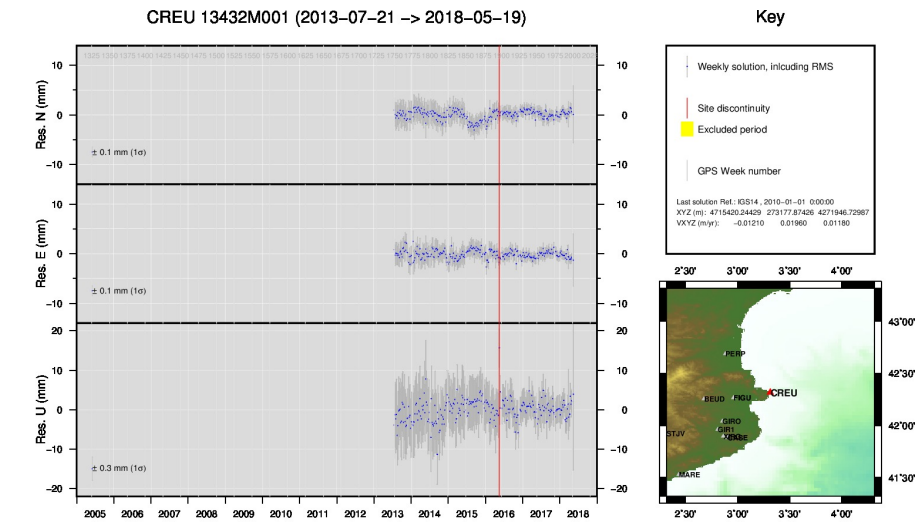
GMW 2018 Jun 03 21:43:42

9 ) CANT



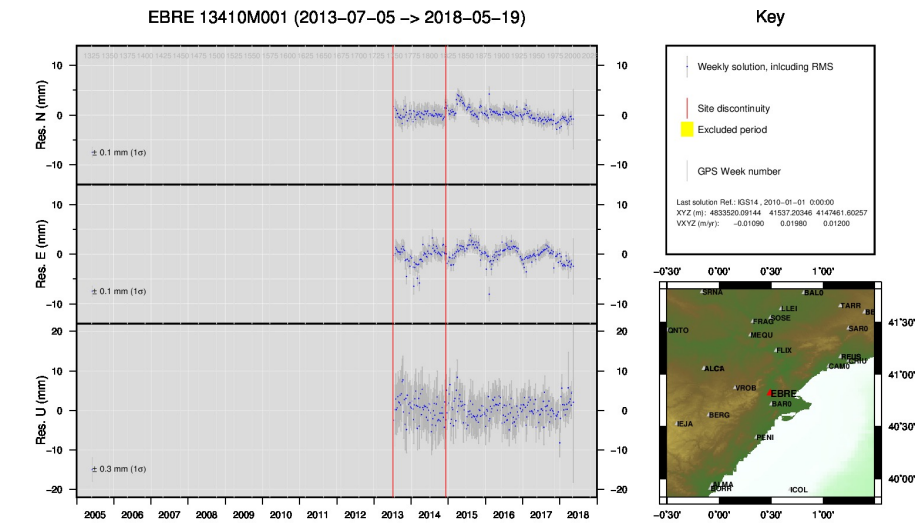
GMW 2018 Jun 03 21:45:32

10 ) CHER



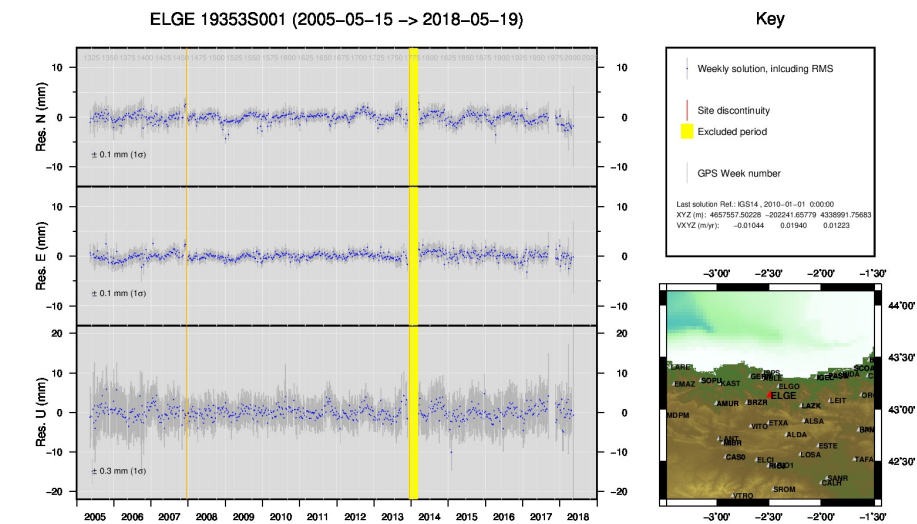
GMW 2018 Jun 03 21:46:08

11 ) CREU



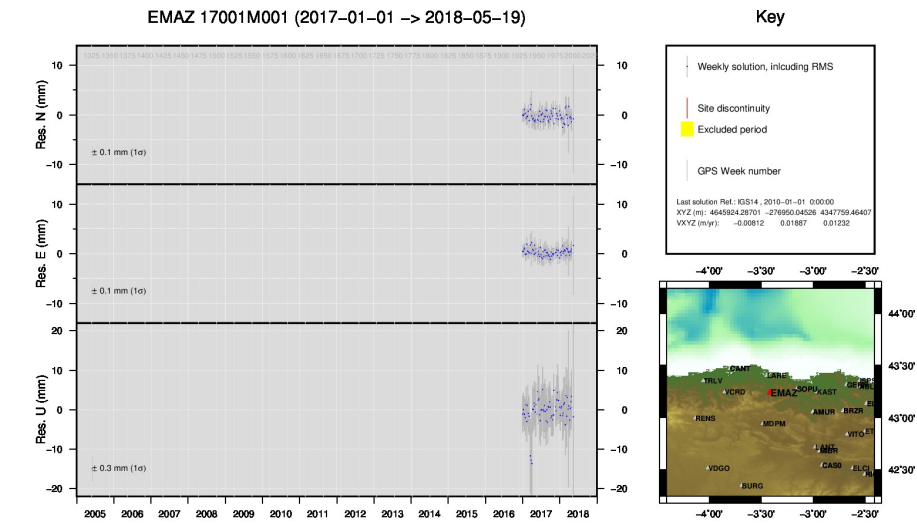
GMW 2018 Jun 03 21:47:02

12 ) EBRE



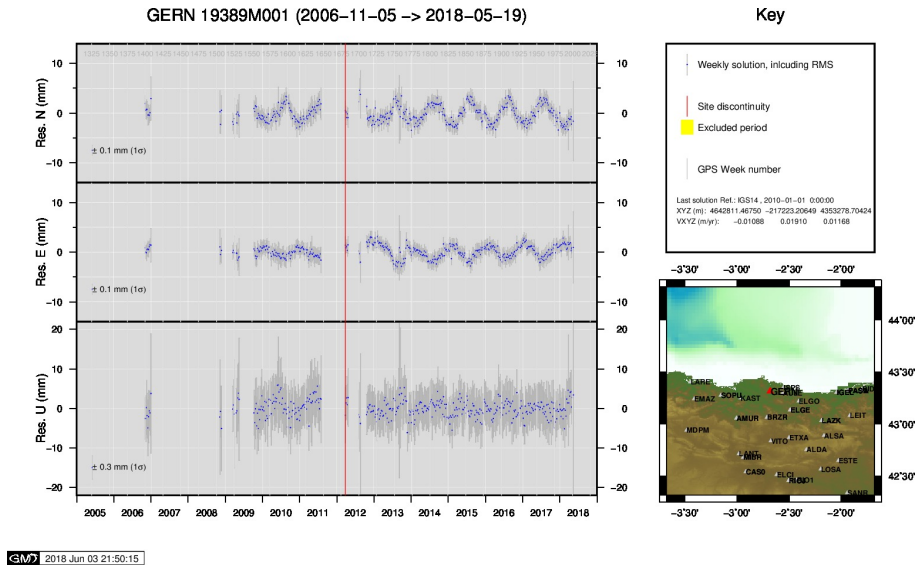
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13 ) ELGE

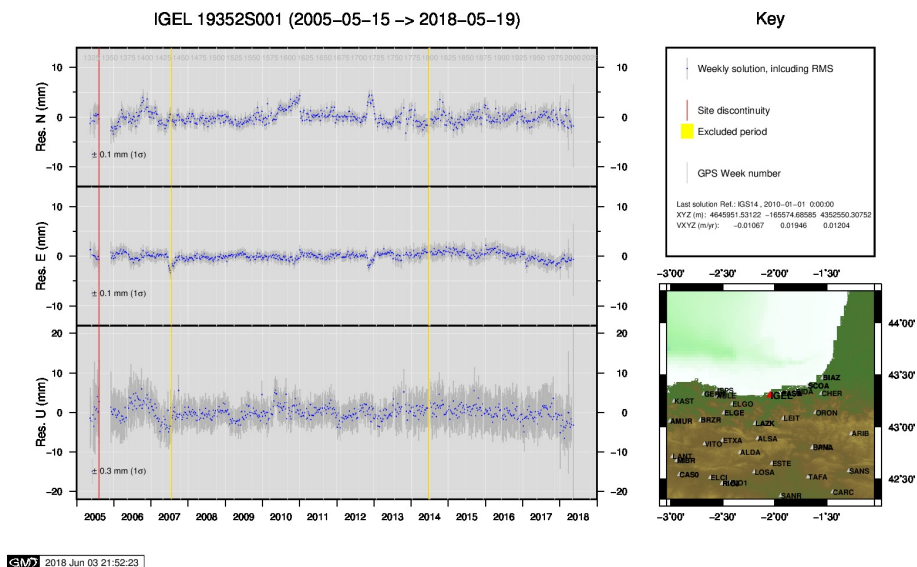


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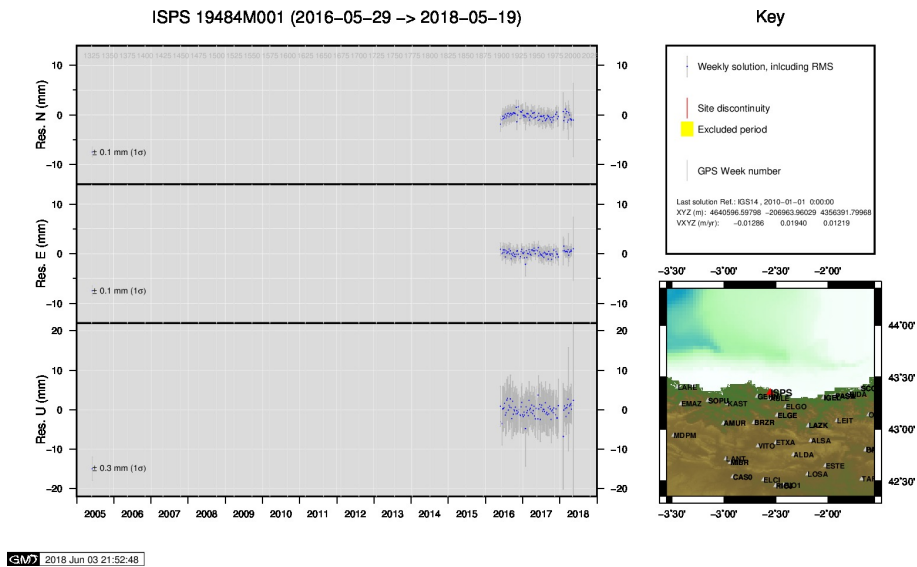
14 ) EMAZ



15 ) GERN

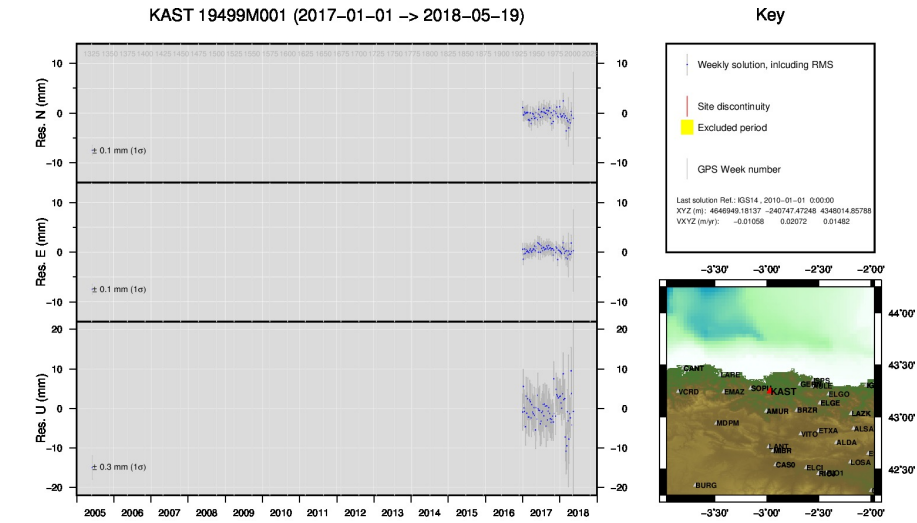


16 ) IGEL



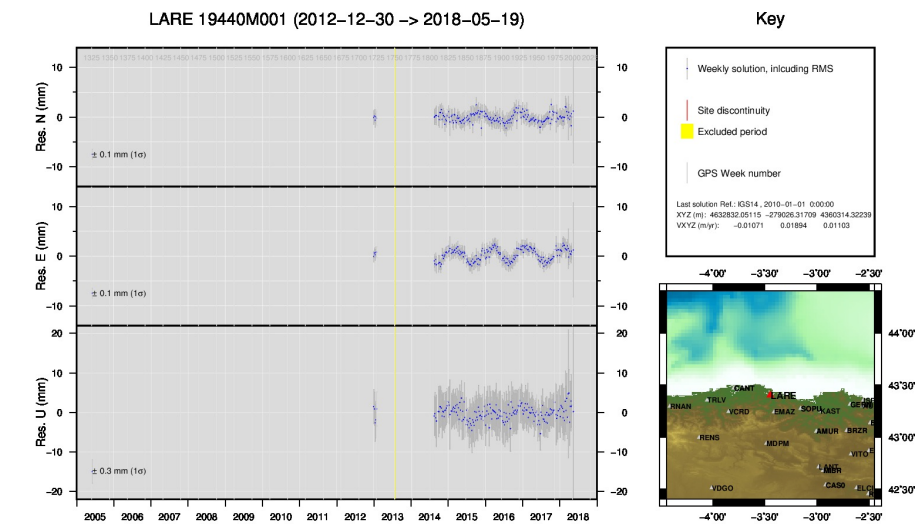
17 ) ISPS





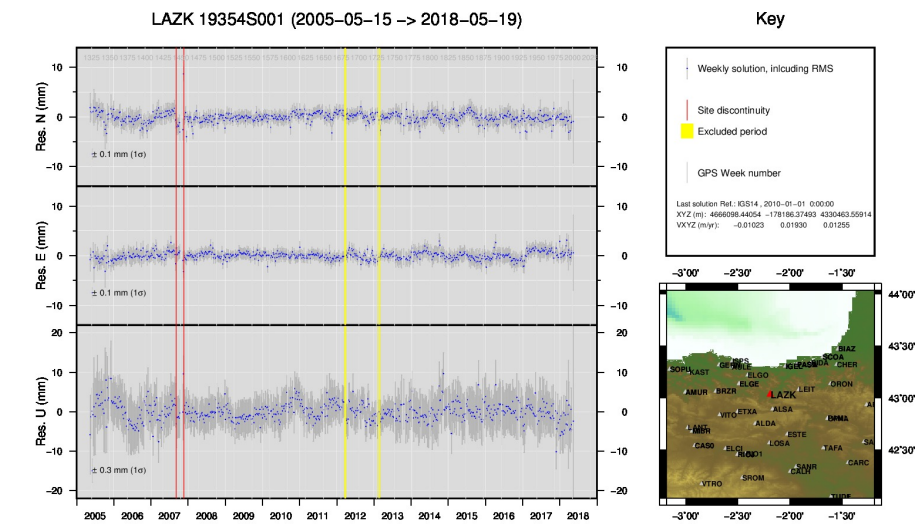
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18 ) KAST



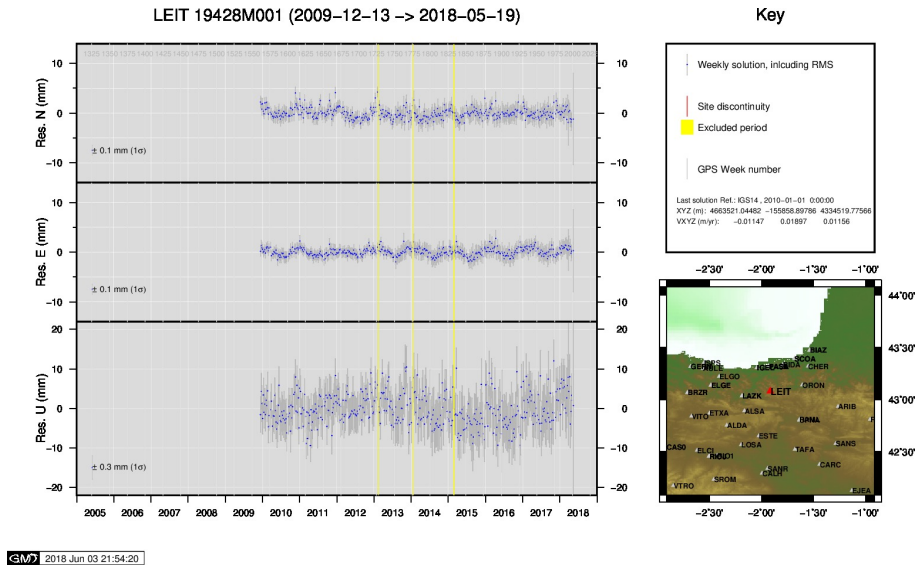
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19 ) LARE

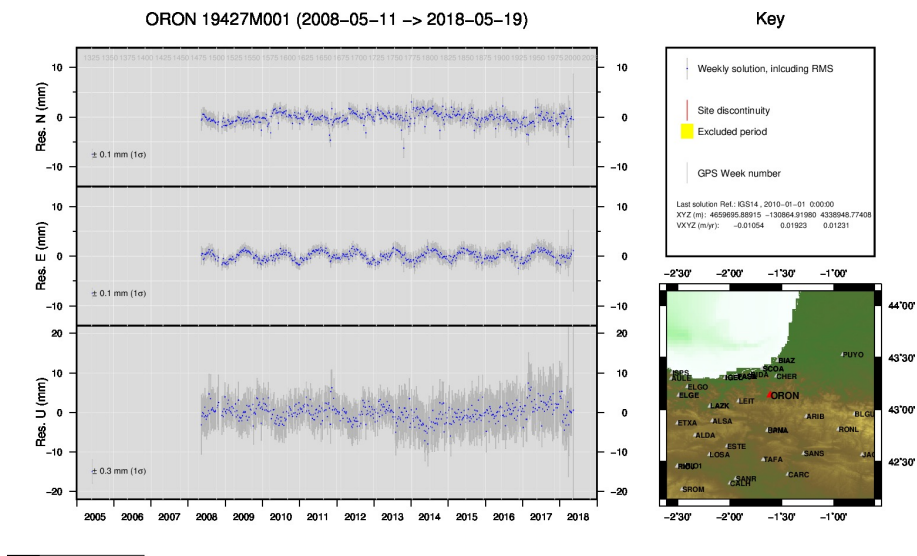


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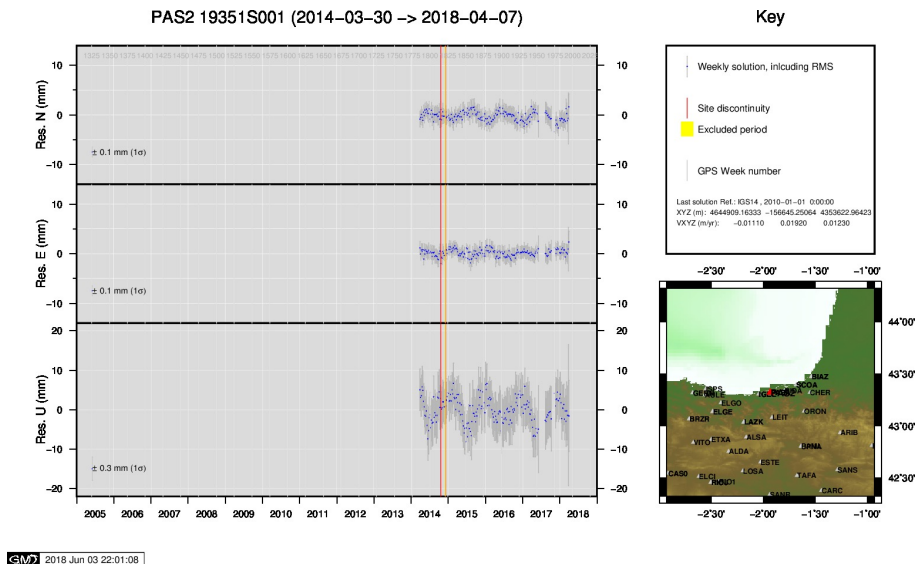
20 ) LAZK



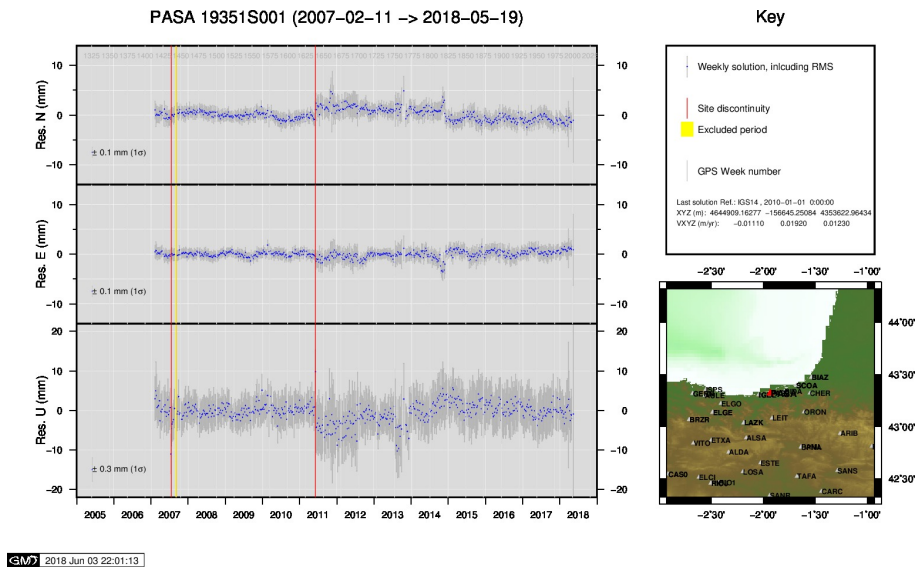
21 ) LEIT



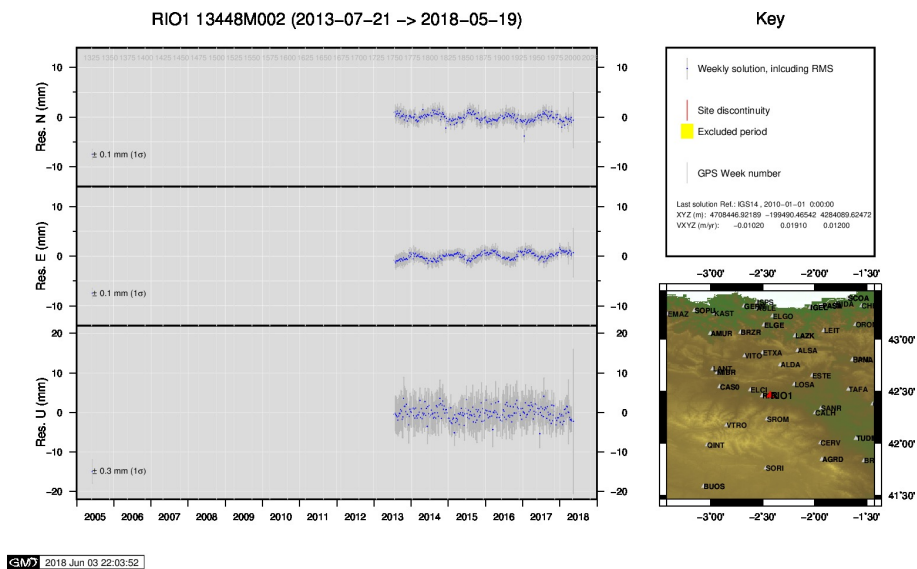
22 ) ORON



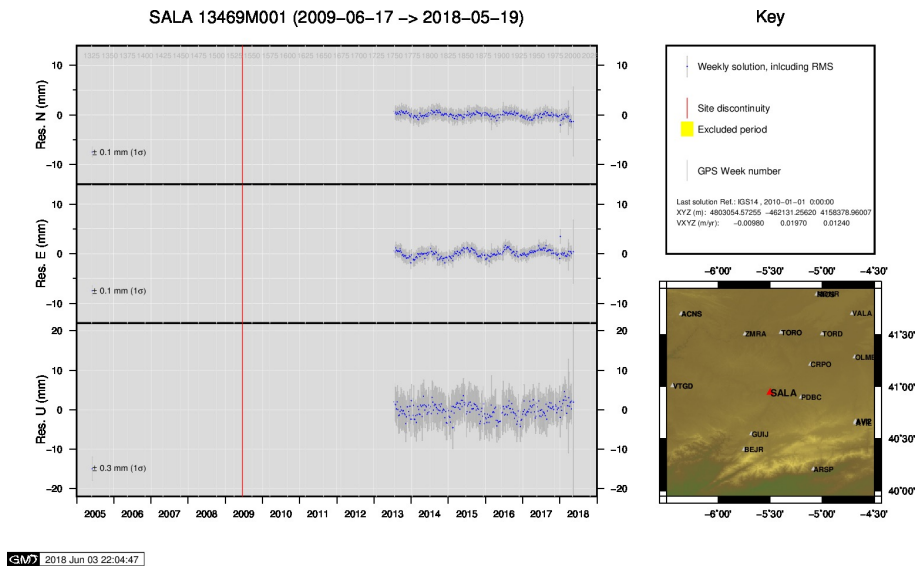
23 ) PAS2



24 ) PASA

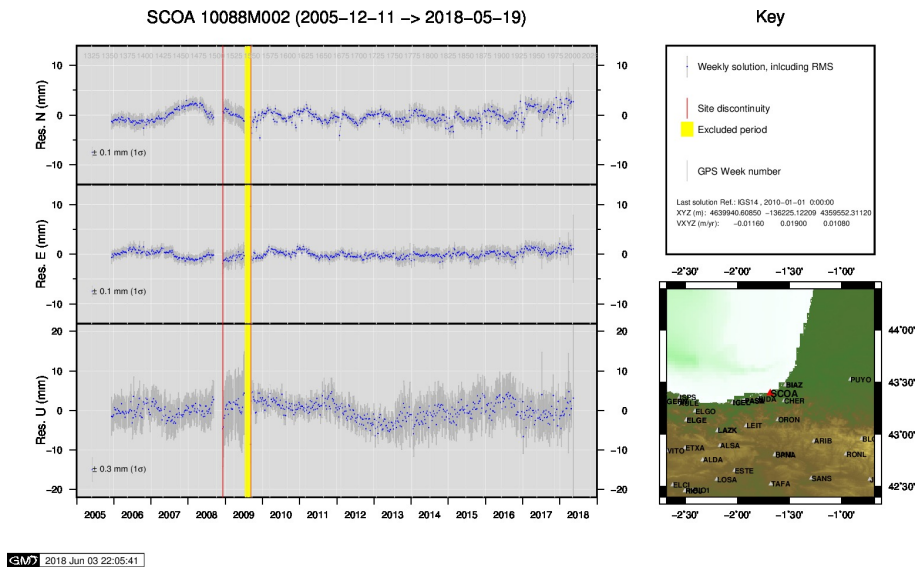


25 ) RIO1

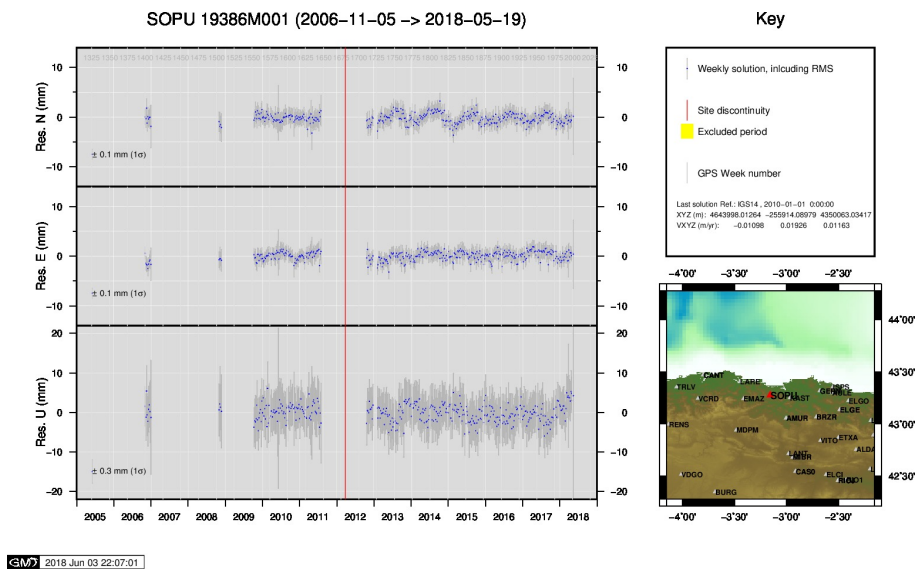


26 ) SALA

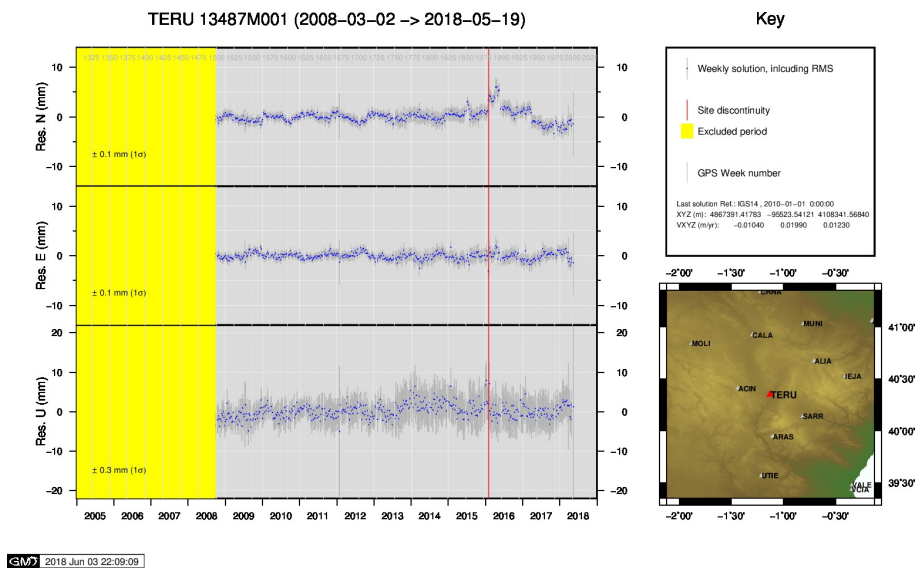




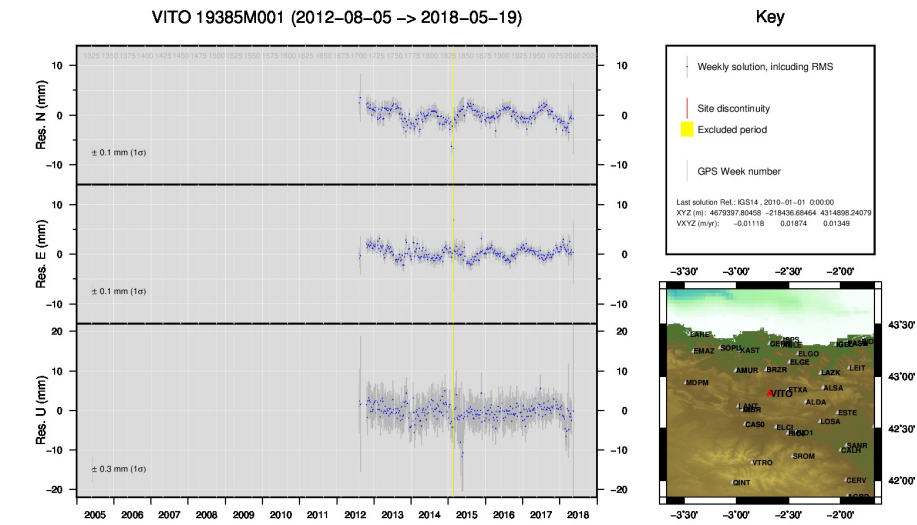
27 ) SCOA



28 ) SOPU

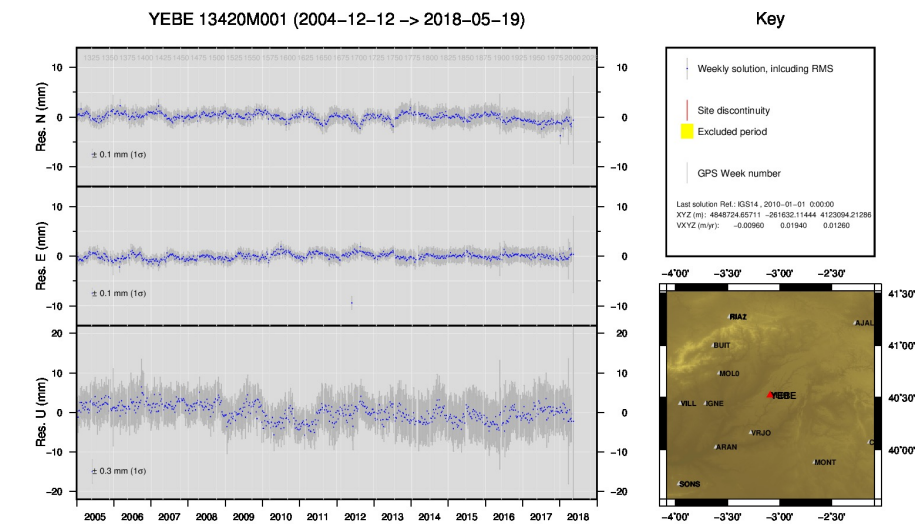


29 ) TERU



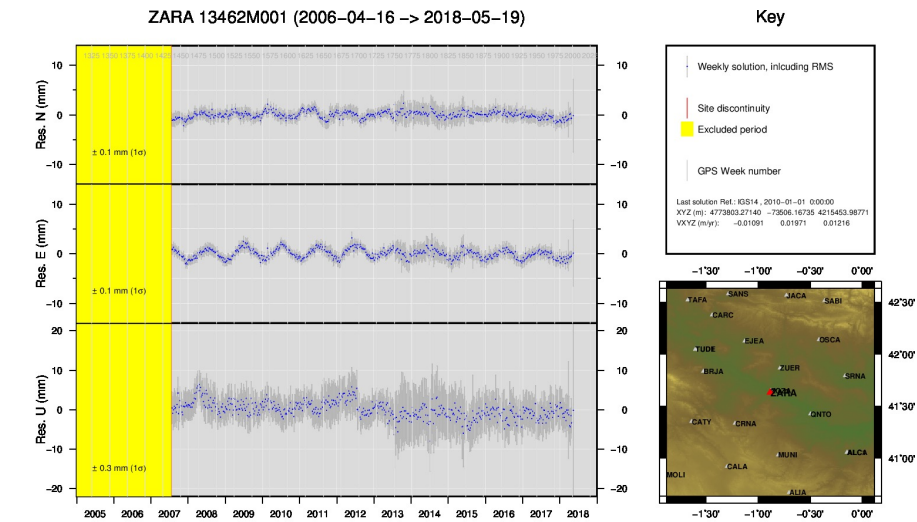
GMW 2018 Jun 03 22:12:35

30 ) VITO



GMW 2018 Jun 03 22:13:46

31 ) YEBE



GMW 2018 Jun 03 22:13:53

32 ) ZARA



