

# ARA-DAC Weekly Analysis Result: 1901 (GFA)

## Technical Report

**GPS Week: 1901 (GFA)**

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

ARA-DAC details:

Contact person: J. Zurutuza

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

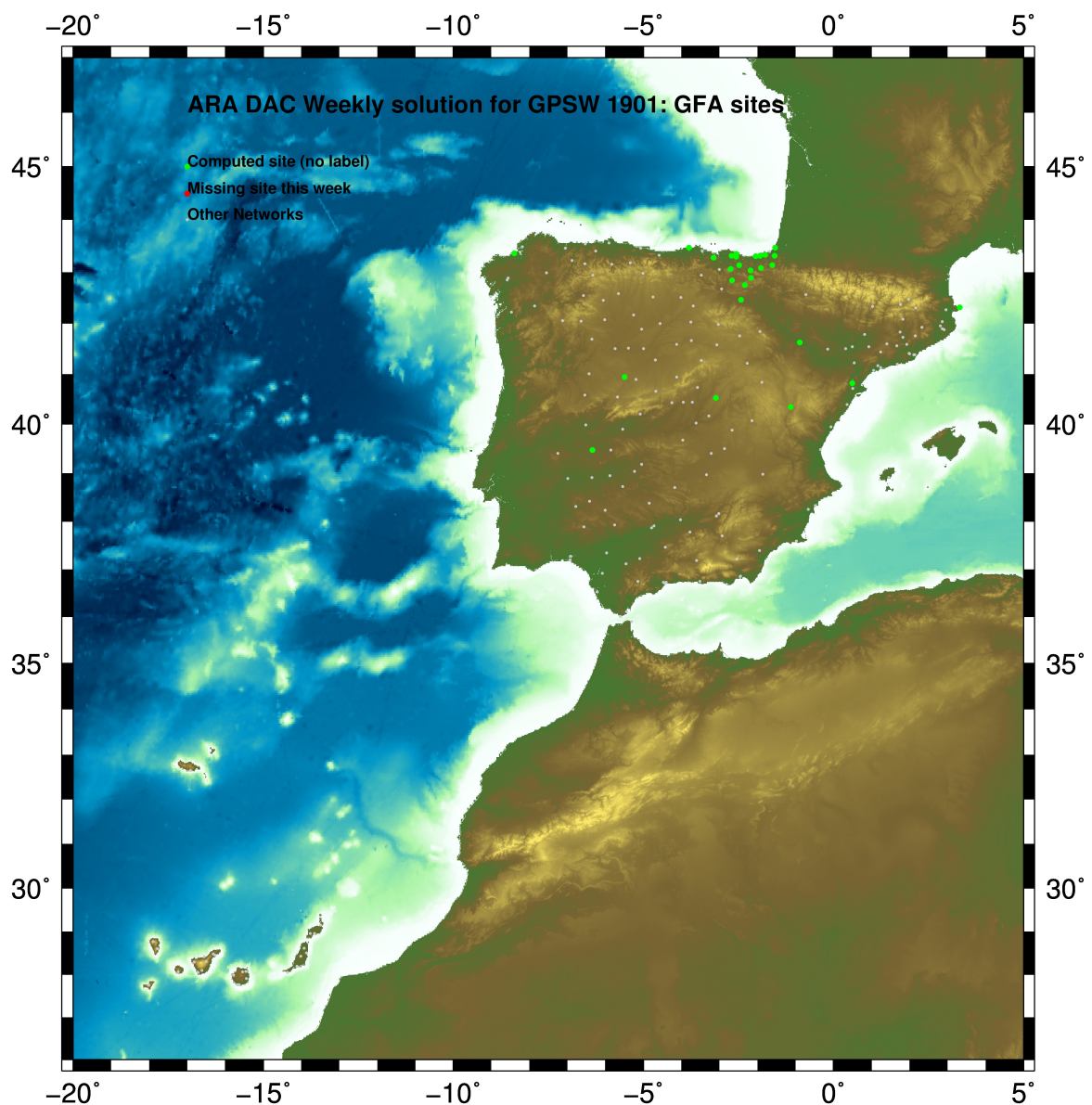
Report generated on 2016/06/26 at 13:49:14



## 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 2016 Jun 26 13:49:05

Fig.1: Computed Sites for GPS Week1901 (GFA)

### 3 Main Computation Parameters

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

- Reprocessing: 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
- Modelled observable: Double differences of carrier phase in QIF or  $L_3$  combinations (respectively for ambiguity resolution in baseline mode, and final network solution). In the final network solution the double differenced data are sampled at 180 sec. intervals.
- Ground antenna phase center calibrations: Group APCV used from the PCV\_COD.I08 file and individual calibrations from EPNC\_08.ATX. EPN\_A class sites (CRD + VEL) IGB08 used to define the reference frame. If individual calibrations, other from these, are available, they are also included in the analysis.
- Troposphere:
  - 3 deg elev. cutoff; elevation dependent weighting
  - VMF1\_DRY mapping function. ZPD parameters are estimated using WET 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:  $3\sigma$  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 IGb08

The Reference Frame considered in this section is IGb08.

ARA LAC 1901 WEEK COMBINATION: PRECISE ORBITS					26-JUN-16 12:49
LOCAL GEODETIC DATUM: IGb08					EPOCH: 2016-06-15 12:00:00
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
1	ACDR 13434M001	4594489.58931	-678367.51274	4357066.25268	W
22	ALDA 19383M001	4687280.19150	-190876.62170	4308106.92623	A
28	ALSA 19419M001	4677250.87452	-176770.45099	4319079.84247	A
40	AULE 00000M000	4644762.15972	-207777.70847	4351758.45162	A
51	BIAZ 10074M002	4634456.09894	-124345.03532	4365785.43266	A
52	BIDA 00000M000	4644177.85912	-145778.38014	4354832.45322	A
54	BRZR 19387M001	4662221.02006	-220769.95677	4333309.40383	A
7	CACE 13447M001	4899866.52995	-544567.09230	4033770.17005	W
8	CANT 13438M001	4625924.34548	-307096.28967	4365771.52452	W
69	CHER 00000M000	4645880.35634	-125721.98425	4353624.34329	A
11	CREU 13432M001	4715420.16906	273178.00338	4271946.81086	A
12	EBRE 13410M001	4833520.02184	41537.33602	4147461.68137	W
77	ELGE 19353S001	4657557.43703	-202241.52944	4338991.83918	A
87	GERN 19389M001	4642811.34217	-217222.99087	4353278.85294	A
101	IGEL 19352S001	4645951.46358	-165574.55793	4352550.38791	A
105	ISPS 19484M001	4640596.51526	-206963.83258	4356391.87850	A
108	LAZK 19354S001	4666098.37647	-178186.24777	4330463.64414	A
111	LEIT 19428M001	4663520.97424	-155858.77288	4334519.85511	A
139	ORON 19427M001	4659695.82433	-130864.79213	4338948.85798	A
144	PAS2 19351S001	4644909.09237	-156645.12385	4353623.04582	A
145	PASA 19351S001	4644909.09424	-156645.12388	4353623.04707	A
27	RI01 13448M002	4708446.85665	-199490.34018	4284089.70426	W
28	SALA 13469M001	4803054.51073	-462131.12684	4158379.04254	W
170	SOPU 19386M001	4643997.94384	-255913.96514	4350063.11140	A
31	TERU 13487M001	4867391.35210	-95523.41083	4108341.65296	W
202	VITO 19385M001	4679397.73527	-218436.56101	4314898.33325	A
35	YEBE 13420M001	4848724.59497	-261631.98745	4123094.29547	W
36	ZARA 13462M001	4773803.20256	-73506.03948	4215454.06710	W

### 5.2 ETRS89 Coordinates

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

ETRF2000 COORD. wk 1901					26-JUN-16 12:49
LOCAL GEODETIC DATUM: ETRF2000					EPOCH: 2016-06-15 12:00:00
NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
1	ACDR 13434M001	4594489.86784	-678367.99535	4357065.86914	W
22	ALDA 19383M001	4687280.51847	-190877.11227	4308106.54176	A
28	ALSA 19419M001	4677251.20367	-176770.94058	4319079.45883	A
40	AULE 00000M000	4644762.48765	-207778.19507	4351758.06986	A
51	BIAZ 10074M002	4634456.43655	-124345.52077	4365785.05251	A
52	BIDA 00000M000	4644178.19378	-145778.86655	4354832.07217	A
54	BRZR 19387M001	4662221.34546	-220770.44505	4333309.02074	A
7	CACE 13447M001	4899866.80231	-544567.60326	4033769.76717	W
8	CANT 13438M001	4625924.66380	-307096.77470	4365771.14295	W
69	CHER 00000M000	4645880.69304	-125722.47077	4353623.96234	A
11	CREU 13432M001	4715420.54267	273177.51146	4271946.42946	A
12	EBRE 13410M001	4833520.36323	41536.83238	4147461.28944	W

77	ELGE	19353S001	4657557.76474	-202242.01724	4338991.45661	A
87	GERN	19389M001	4642811.66919	-217223.47731	4353278.47121	A
101	IGEL	19352S001	4645951.79601	-165575.04456	4352550.00653	A
105	ISPS	19484M001	4640596.84356	-206964.31879	4356391.49703	A
108	LAZK	19354S001	4666098.70618	-178186.73632	4330463.26125	A
111	LEIT	19428M001	4663521.30656	-155859.26114	4334519.47264	A
139	ORON	19427M001	4659696.15957	-130865.27997	4338948.47604	A
144	PAS2	19351S001	4644909.42581	-156645.61035	4353622.66460	A
145	PASA	19351S001	4644909.42768	-156645.61038	4353622.66585	A
27	RI01	13448M002	4708447.18120	-199490.83275	4284089.31825	W
28	SALA	13469M001	4803054.79965	-462131.62872	4158378.64720	W
170	SOPU	19386M001	4643998.26658	-255914.45177	4350062.72916	A
31	TERU	13487M001	4867391.67657	-95523.91798	4108341.25724	W
202	VITO	19385M001	4679398.05976	-218437.05090	4314897.94901	A
35	YEBE	13420M001	4848724.90285	-261632.49323	4123093.89921	W
36	ZARA	13462M001	4773803.53609	-73506.53786	4215453.67801	W

### 5.3 Mean and Daily Repeatabilities

In this section, the mean and daily repeatabilities of the sites are shown. Repeatabilities refer to the IGB08 solution and are given with respect the Local fram (North-East-Up).

ARA LAC 1901 WEEK COMBINATION: PRECISE ORBITS

26-JUN-16 12:49

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	7	XXXXXXX	0.86	0.47	3.56
ALDA 19383M001	7	XXXXXXX	1.41	1.14	2.12
ALSA 19419M001	7	XXXXXXX	0.75	0.87	3.30
AULE 00000M000	7	XXXXXXX	1.61	2.49	1.73
BIAZ 10074M002	7	XXXXXXX	0.93	0.72	4.43
BIDA 00000M000	6	XXXXXX	1.06	0.76	3.72
BRZR 19387M001	7	XXXXXXX	1.89	1.44	3.28
CACE 13447M001	7	XXXXXXX	0.96	0.46	2.15
CANT 13438M001	7	XXXXXXX	0.80	0.85	2.02
CHER 00000M000	7	XXXXXXX	0.56	1.49	3.00
CREU 13432M001	7	XXXXXXX	1.56	0.91	3.95
EBRE 13410M001	7	XXXXXXX	0.86	2.62	8.32
ELGE 19353S001	7	XXXXXXX	0.58	0.95	3.52
GERN 19389M001	7	XXXXXXX	0.95	1.94	2.36
IGEL 19352S001	7	XXXXXXX	1.11	0.88	2.33
ISPS 19484M001	7	XXXXXXX	1.25	1.54	2.20
LAZK 19354S001	7	XXXXXXX	1.13	0.89	1.98
LEIT 19428M001	4	XXXX	1.32	0.17	2.29
ORON 19427M001	7	XXXXXXX	0.85	0.76	3.19
PAS2 19351S001	7	XXXXXXX	0.79	0.74	2.39
PASA 19351S001	7	XXXXXXX	0.63	0.72	2.75
RI01 13448M002	7	XXXXXXX	0.73	0.53	2.18
SALA 13469M001	7	XXXXXXX	0.30	0.40	2.24
SOPU 19386M001	7	XXXXXXX	0.88	1.63	3.69
TERU 13487M001	7	XXXXXXX	1.01	1.01	2.88
VITO 19385M001	7	XXXXXXX	1.36	0.55	3.70
YEBE 13420M001	7	XXXXXXX	0.88	2.10	3.24
ZARA 13462M001	7	XXXXXXX	0.92	1.07	2.10

Comparison of individual solutions:

ACOR 13434M001	N	0.86	-0.61	-0.99	-0.45	0.57	1.11	-0.64	0.95
ACOR 13434M001	E	0.47	0.51	-0.14	0.59	-0.37	0.26	0.23	-0.65
ACOR 13434M001	U	3.56	5.93	-0.28	-2.64	-2.61	3.71	3.61	-0.03
ALDA 19383M001	N	1.41	2.20	0.17	-0.96	-1.12	0.50	-0.92	-1.96
ALDA 19383M001	E	1.14	-0.79	2.23	0.94	0.46	-0.96	0.23	-0.37
ALDA 19383M001	U	2.12	-3.11	1.67	3.15	-0.21	-0.67	-1.48	-1.33
ALSA 19419M001	N	0.75	0.54	0.72	-0.26	-0.94	-0.99	-0.62	-0.45
ALSA 19419M001	E	0.87	1.72	-0.84	0.79	-0.07	-0.03	0.40	-0.29
ALSA 19419M001	U	3.30	-4.24	5.30	1.98	-3.73	0.26	-0.55	-1.01
AULE 00000M000	N	1.61	2.13	-2.63	-1.75	-0.48	-0.15	0.84	-0.14
AULE 00000M000	E	2.49	0.54	5.31	0.44	-0.06	-0.61	-0.45	-2.83
AULE 00000M000	U	1.73	-2.99	-1.86	0.77	-1.61	1.17	-0.30	0.91

BIAZ	10074M002	N	0.93	0.44	-1.76	-1.33	0.15	-0.00	-0.02	0.32
BIAZ	10074M002	E	0.72	0.56	-0.23	1.07	-0.77	0.44	-0.07	0.88
BIAZ	10074M002	U	4.43	-4.51	-2.12	-1.16	-4.14	8.56	1.05	0.49
BIDA	00000M000	N	1.06	-0.80	1.51	-1.15	-0.63	-0.96	0.27	
BIDA	00000M000	E	0.76	1.09	-0.56	0.65	0.70	0.58	-0.35	
BIDA	00000M000	U	3.72	-0.23	3.54	-1.02	-1.05	2.62	-6.90	
BRZR	19387M001	N	1.89	1.79	2.35	-2.30	-1.60	-0.05	0.14	-2.22
BRZR	19387M001	E	1.44	1.91	-1.57	0.98	-1.49	0.29	1.73	-0.07
BRZR	19387M001	U	3.28	-1.08	-5.05	2.33	-3.60	4.39	-0.28	0.46
CACE	13447M001	N	0.96	-0.25	-1.27	1.52	-0.86	0.75	0.21	-0.36
CACE	13447M001	E	0.46	0.57	0.09	-0.44	-0.66	-0.07	0.19	0.51
CACE	13447M001	U	2.15	0.43	2.12	-2.35	1.68	3.39	-0.43	-1.74
CANT	13438M001	N	0.80	0.16	0.16	-0.20	0.75	-0.92	-1.26	-0.84
CANT	13438M001	E	0.85	-0.00	-0.19	1.77	-0.81	0.51	0.36	0.34
CANT	13438M001	U	2.02	0.41	-2.23	0.08	-2.43	-2.31	0.06	2.82
CHER	00000M000	N	0.56	-0.49	-0.14	-0.87	-0.90	-0.04	0.16	0.03
CHER	00000M000	E	1.49	2.53	-2.35	0.08	-0.01	0.82	0.81	0.22
CHER	00000M000	U	3.00	-2.51	3.16	-3.34	-0.08	1.48	-3.11	3.82
CREU	13432M001	N	1.56	-0.87	2.39	1.60	0.66	0.22	-2.16	-0.55
CREU	13432M001	E	0.91	0.03	-1.82	-0.33	1.00	0.23	-0.18	-0.72
CREU	13432M001	U	3.95	0.41	-6.29	-1.23	4.78	-5.40	-0.27	0.36
EBRE	13410M001	N	0.86	-0.78	1.06	1.44	-0.40	0.65	-0.13	-0.10
EBRE	13410M001	E	2.62	-0.55	4.31	-4.46	-0.24	-1.43	-0.00	0.55
EBRE	13410M001	U	8.32	-2.79	-14.73	-8.00	6.33	1.09	6.51	6.59
ELGE	19353S001	N	0.58	0.37	-0.26	-0.69	0.23	-0.78	-0.08	-0.84
ELGE	19353S001	E	0.95	-0.90	1.43	1.58	0.06	-0.24	-0.01	-0.14
ELGE	19353S001	U	3.52	-0.51	-7.56	1.63	-0.17	0.42	-0.26	3.71
GERN	19389M001	N	0.95	0.80	-0.70	-1.87	-0.65	0.24	-0.35	0.49
GERN	19389M001	E	1.94	0.98	-3.31	1.76	0.16	-0.85	0.54	2.55
GERN	19389M001	U	2.36	-0.39	3.26	-1.99	-2.62	-1.62	-1.61	2.56
IGEL	19352S001	N	1.11	1.43	-1.91	-1.12	0.10	-0.37	0.06	-0.57
IGEL	19352S001	E	0.88	0.24	1.39	1.28	-0.32	0.47	0.13	-0.84
IGEL	19352S001	U	2.33	-0.31	-1.19	-0.83	-3.45	1.35	-1.94	3.60
ISPS	19484M001	N	1.25	1.74	-0.49	-1.49	0.43	-1.79	-0.69	0.16
ISPS	19484M001	E	1.54	1.20	1.52	2.34	-0.90	-1.68	-1.06	0.45
ISPS	19484M001	U	2.20	0.91	-0.88	-0.95	0.20	0.66	-4.74	1.91
LAZK	19354S001	N	1.13	0.06	0.98	-2.23	-1.22	0.50	-0.05	-0.07
LAZK	19354S001	E	0.89	0.62	0.46	1.92	-0.03	-0.31	-0.33	-0.50
LAZK	19354S001	U	1.98	-3.40	0.34	-1.12	1.83	-1.99	1.71	0.55
LEIT	19428M001	N	1.32				-0.30	-0.71	1.29	-1.73
LEIT	19428M001	E	0.17				0.09	-0.11	-0.18	0.17
LEIT	19428M001	U	2.29				3.60	0.40	-0.26	-1.61
ORON	19427M001	N	0.85	-0.46	1.00	-1.67	-0.30	-0.24	-0.42	-0.15
ORON	19427M001	E	0.76	0.09	1.59	0.44	-0.54	0.12	-0.50	0.41
ORON	19427M001	U	3.19	-0.98	-4.83	-2.48	-0.34	4.59	3.04	-0.17
PAS2	19351S001	N	0.79	0.86	-1.32	-0.81	-0.61	-0.22	0.14	-0.41
PAS2	19351S001	E	0.74	0.05	0.63	0.95	0.01	1.22	0.24	-0.68
PAS2	19351S001	U	2.39	0.44	0.75	-2.53	-3.91	-0.59	-0.47	3.38
PASA	19351S001	N	0.63	0.36	-0.96	-0.99	-0.38	-0.07	0.11	-0.44
PASA	19351S001	E	0.72	0.39	0.54	1.19	0.03	0.98	0.02	-0.55
PASA	19351S001	U	2.75	1.94	-0.41	-3.51	-3.82	-0.73	-0.31	3.72
RIO1	13448M002	N	0.73	-0.11	0.70	-0.71	-0.09	-0.47	-1.39	-0.17
RIO1	13448M002	E	0.53	0.44	0.02	0.82	0.58	-0.63	0.22	-0.08
RIO1	13448M002	U	2.18	-0.44	-2.77	2.53	-1.80	2.77	-1.81	-0.33
SALA	13469M001	N	0.30	-0.37	-0.02	0.16	0.31	0.14	0.28	0.44
SALA	13469M001	E	0.40	0.32	0.24	-0.46	-0.26	0.02	0.18	-0.70
SALA	13469M001	U	2.24	-0.16	4.76	-1.08	-2.01	0.83	0.37	-1.19
SOPU	19386M001	N	0.88	1.20	-0.31	-0.92	-1.14	-0.01	-0.20	-0.94
SOPU	19386M001	E	1.63	2.52	-1.06	0.69	2.58	-0.61	-0.98	-0.33
SOPU	19386M001	U	3.69	-2.15	-1.37	2.46	4.80	-3.83	-5.04	-2.43
TERU	13487M001	N	1.01	-0.11	1.63	-1.41	0.74	0.01	0.95	0.11
TERU	13487M001	E	1.01	-0.40	-1.52	1.28	-1.30	-0.50	0.15	0.10
TERU	13487M001	U	2.88	-0.48	-3.20	-1.39	4.16	-2.98	1.16	-3.16
VITO	19385M001	N	1.36	0.65	1.40	-2.20	-1.07	0.43	-0.18	-1.56
VITO	19385M001	E	0.55	-0.11	0.30	0.83	0.32	0.45	0.82	-0.27
VITO	19385M001	U	3.70	-6.43	-1.38	1.69	5.25	1.23	-1.58	-2.09
YEBE	13420M001	N	0.88	0.10	1.70	-0.84	0.27	-0.06	-0.98	0.07
YEBE	13420M001	E	2.10	0.12	-4.48	-1.21	0.72	1.13	0.44	1.72
YEBE	13420M001	U	3.24	-2.29	-2.19	-3.36	4.57	3.17	2.71	1.82
ZARA	13462M001	N	0.92	0.29	1.47	1.25	0.03	0.44	-0.72	-0.73
ZARA	13462M001	E	1.07	-0.29	0.04	-2.50	-0.21	0.57	0.42	-0.01

ZARA 13462M001 U 2.10 -1.39 -0.51 -3.94 0.32 -0.77 1.76 -2.22

## 5.4 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: IGb08  
RESIDUALS IN LOCAL SYSTEM (NORTH, EAST, UP)

NUM	NAME	FLG	RESIDUALS IN MILLIMETERS		
1	ACOR 13434M001	I W	-0.44	1.58	2.38
2	ALAC 13433M001	I W	0.70	0.47	-2.40
3	ALBA 13452M001	I W	0.24	0.53	-0.07
4	ALME 13437M001	I W	-0.90	0.59	3.32
6	BRST 10004M004	I W	0.12	-2.84	-2.33
7	CACE 13447M001	I W	-0.77	0.30	2.34
8	CANT 13438M001	I W	-0.32	-0.92	-0.31
9	CEU1 13449M002	I W	0.11	1.79	14.16
10	COBA 13453M001	I W	0.86	-0.44	-6.13
12	EBRE 13410M001	I W	2.35	-1.91	2.44
14	FUNC 13911S001	I W	-0.78	-0.52	0.12
16	HUEL 13451M001	I W	0.12	0.88	-2.11
17	IZAN 31309M002	I W	-0.76	-0.37	-0.10
18	LLIV 13436M001	I W	4.66	-2.26	-4.56
19	LPAL 81701M001	I W	-1.81	-0.42	-0.80
20	LROC 10023M001	I W	1.03	-2.01	1.42
21	MALA 13443M001	I W	-3.56	2.78	-2.79
22	MALL 13444M001	I W	0.58	-2.44	0.62
25	PDEL 31906M004	I W	-1.83	-2.28	-0.06
26	RABT 35001M002	I W	-0.51	0.11	-1.46
27	RI01 13448M002	I W	-0.50	0.58	-0.63
28	SALA 13469M001	I W	0.07	0.01	3.37
29	SCOA 10088M002	I W	-0.96	-0.54	-1.01
30	SONS 13446M001	I W	-1.22	0.61	0.08
31	TERU 13487M001	I W	1.01	8.56	-5.40
32	VALE 13439M001	I W	0.09	-0.52	-1.05
33	VIGO 13450M001	I W	-0.43	-1.49	1.94
34	VILL 13406M001	I W	1.09	1.61	-6.40
35	YEBE 13420M001	I W	-0.15	1.19	5.50
36	ZARA 13462M001	I W	0.05	-0.58	-2.24
37	ZIMM 14001M004	I W	1.87	-2.03	2.17
	RMS / COMPONENT		1.43	2.11	3.84
	MEAN		0.00	-0.00	-0.00
	MIN		-3.56	-2.84	-6.40
	MAX		4.66	8.56	14.16

NUMBER OF PARAMETERS : 3  
NUMBER OF COORDINATES : 93  
RMS OF TRANSFORMATION : 2.66 MM



## 5.5 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                8498270
NUMBER OF UNKNOWNNS                    125588
NUMBER OF DEGREES OF FREEDOM           8372682
PHASE MEASUREMENTS SIGMA                0.00100
SAMPLING INTERVAL (SECONDS)             180
VARIANCE FACTOR                         2.326108126797202
```

Helmert Transformation Parameters With Respect to Combined Solution:

```
-----
                Translation (m)                Rotation (")
Sol  Rms (m)   X      Y      Z      X      Y      Z      Scale (ppm)
-----
  1   0.00191  0.0004  0.0090 -0.0035 -0.0001  0.0001  0.0003  0.00038
  2   0.00338  0.0180  0.0086 -0.0009 -0.0001  0.0004  0.0003 -0.00212
  3   0.00234  0.0060  0.0048 -0.0017 -0.0002  0.0002  0.0001 -0.00063
  4   0.00231 -0.0010 -0.0200  0.0020  0.0003 -0.0001 -0.0006 -0.00018
  5   0.00270  0.0191  0.0260 -0.0199 -0.0005  0.0009  0.0007  0.00005
  6   0.00213  0.0026  0.0137 -0.0044 -0.0002  0.0002  0.0004  0.00042
  7   0.00173 -0.0156  0.0188  0.0116 -0.0003 -0.0006  0.0005  0.00093
```

Statistics of individual solutions:

```
-----
File      RMS (m)      DOF  Chi**2/DOF  #Observations authentic / pseudo  #Parameters explicit / implicit / singular
-----
  1      0.00150     1154507      2.25      1172416      3      507      17405      0
  2      0.00166     1186295      2.75      1205283      3      531      18460      0
  3      0.00159     1203624      2.53      1222290      3      528      18141      0
  4      0.00157     1204473      2.48      1223768      3      534      18764      0
  5      0.00149     1206673      2.21      1224857      3      528      17659      0
  6      0.00141     1212975      1.99      1230829      3      531      17326      0
  7      0.00142     1201009      2.01      1218827      3      525      17296      0
```

## 6 Equipment

### 6.1 Receiver List

Serial numbers not shown.

```
*SITE PT SOLN T DATA_START__ DATA_END____ DESCRIPTION_____ S/N__ FIRMWARE____
ACOR  A   1 P 16:164:00000 16:170:86370 LEICA GRX1200PRO -----
ALDA  A   1 P 16:164:00000 16:170:86370 LEICA GR10 -----
ALSA  A   1 P 16:164:00000 16:170:86370 LEICA GRX1200GGPRO -----
AULE  A   1 P 16:164:00000 16:170:86370 LEICA GRX1200+GNSS -----
BIAZ  A   1 P 16:164:00000 16:170:86370 LEICA GRX1200GGPRO -----
BIDA  A   1 P 16:164:00000 16:169:86370 LEICA GR10 -----
BRZR  A   1 P 16:164:00000 16:170:86370 LEICA GR10 -----
CACE  A   1 P 16:164:00000 16:170:86370 TRIMBLE NETR9 -----
CANT  A   1 P 16:164:00000 16:170:86370 LEICA GR10 -----
CHER  A   1 P 16:164:00000 16:170:86370 LEICA GRX1200+GNSS -----
CREU  A   1 P 16:164:00000 16:170:86370 LEICA GR25 -----
EBRE  A   1 P 16:164:00000 16:170:86370 TRIMBLE NETR9 -----
ELGE  A   1 P 16:164:00000 16:170:86370 LEICA GR10 -----
GERN  A   1 P 16:164:00000 16:170:86370 LEICA GR10 -----
IGEL  A   1 P 16:164:00000 16:170:86370 LEICA GR10 -----
ISPS  A   1 P 16:164:00000 16:170:86370 TRIMBLE NETR9 -----
LAZK  A   1 P 16:164:00000 16:170:86370 LEICA GR10 -----
```

LEIT	A	1	P	16:167:20820	16:170:86370	LEICA GRX1200+GNSS	-----	-----
ORON	A	1	P	16:164:00000	16:170:86370	LEICA GRX1200GGPRO	-----	-----
PAS2	A	1	P	16:164:00000	16:170:86370	TPS NET-G3A	-----	-----
PASA	A	1	P	16:164:00000	16:170:86370	LEICA GR10	-----	-----
RIO1	A	1	P	16:164:00000	16:170:86370	LEICA GR25	-----	-----
SALA	A	1	P	16:164:00000	16:170:86370	LEICA GRX1200+GNSS	-----	-----
SOPU	A	1	P	16:164:00000	16:170:86370	LEICA GR10	-----	-----
TERU	A	1	P	16:164:00000	16:170:86370	LEICA GRX1200GGPRO	-----	-----
VITO	A	1	P	16:164:00000	16:170:86370	LEICA GR10	-----	-----
YEBE	A	1	P	16:164:00000	16:170:86370	TRIMBLE NETRS	-----	-----
ZARA	A	1	P	16:164:00000	16:170:86370	TRIMBLE NETR9	-----	-----

## 6.2 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	16:164:00000	16:170:86370	LEIAT504	LEIS -----
ALDA	A	1	P	16:164:00000	16:170:86370	LEIAS10	NONE -----
ALSA	A	1	P	16:164:00000	16:170:86370	LEIAX1202GG	NONE -----
AULE	A	1	P	16:164:00000	16:170:86370	LEIAS10	NONE -----
BIAZ	A	1	P	16:164:00000	16:170:86370	LEIAR25	LEIT -----
BIDA	A	1	P	16:164:00000	16:169:86370	LEIAS10	NONE -----
BRZR	A	1	P	16:164:00000	16:170:86370	LEIAS10	NONE -----
CACE	A	1	P	16:164:00000	16:170:86370	TRM29659.00	NONE -----
CANT	A	1	P	16:164:00000	16:170:86370	LEIAR25.R4	LEIT 25066
CHER	A	1	P	16:164:00000	16:170:86370	LEIAX1203+GNSS	NONE -----
CREU	A	1	P	16:164:00000	16:170:86370	LEIAR25.R4	NONE 26357
EBRE	A	1	P	16:164:00000	16:170:86370	TRM57971.00	NONE 25503
ELGE	A	1	P	16:164:00000	16:170:86370	LEIAR25.R4	LEIT -----
GERN	A	1	P	16:164:00000	16:170:86370	LEIAS10	NONE -----
IGEL	A	1	P	16:164:00000	16:170:86370	LEIAR20	LEIM -----
ISPS	A	1	P	16:164:00000	16:170:86370	TRM59900.00	SCIS -----
LAZK	A	1	P	16:164:00000	16:170:86370	LEIAR25.R4	LEIT -----
LEIT	A	1	P	16:167:20820	16:170:86370	LEIAX1203+GNSS	NONE -----
ORON	A	1	P	16:164:00000	16:170:86370	LEIAX1202GG	NONE -----
PAS2	A	1	P	16:164:00000	16:170:86370	LEIAR20	LEIM 73034
PASA	A	1	P	16:164:00000	16:170:86370	LEIAR20	LEIM 73034
RIO1	A	1	P	16:164:00000	16:170:86370	LEIAR25.R4	LEIT 25138
SALA	A	1	P	16:164:00000	16:170:86370	LEIAR25	NONE -----
SOPU	A	1	P	16:164:00000	16:170:86370	LEIAS10	NONE -----
TERU	A	1	P	16:164:00000	16:170:86370	LEIAT504GG	LEIS -----
VITO	A	1	P	16:164:00000	16:170:86370	LEIAS10	NONE -----
YEBE	A	1	P	16:164:00000	16:170:86370	TRM29659.00	NONE -----
ZARA	A	1	P	16:164:00000	16:170:86370	TRM29659.00	NONE -----

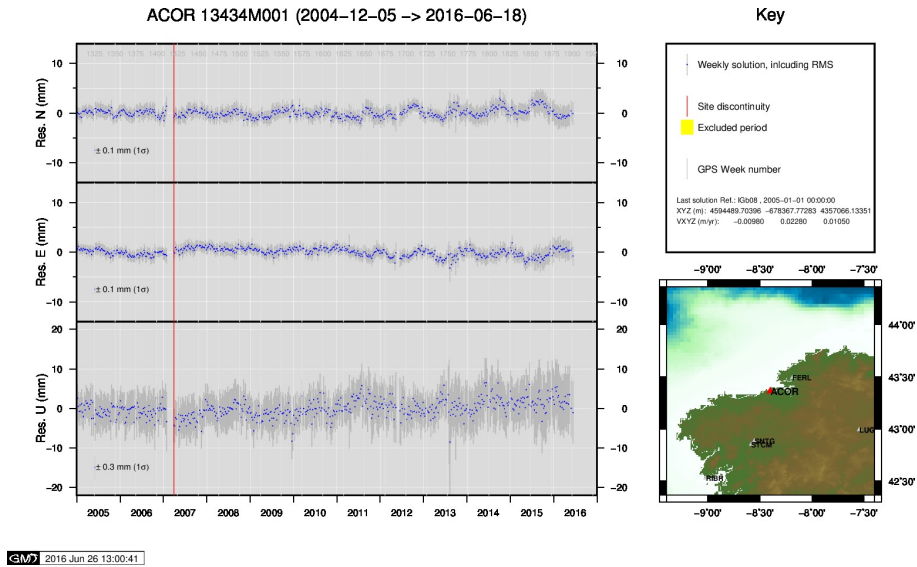
## 6.3 Eccentricities

*SITE	PT	SOLN	T	DATA_START__	DATA_END_____	AXE	UP_____	NORTH__	EAST_____
						ARP->	BENCHMARK (M)		
ACOR	A	1	P	16:164:00000	16:170:86370	UNE	3.0460	0.0000	0.0000
ALDA	A	1	P	16:164:00000	16:170:86370	UNE	0.0000	0.0000	0.0000
ALSA	A	1	P	16:164:00000	16:170:86370	UNE	0.0000	0.0000	0.0000
AULE	A	1	P	16:164:00000	16:170:86370	UNE	0.0000	0.0000	0.0000
BIAZ	A	1	P	16:164:00000	16:170:86370	UNE	0.0000	0.0000	0.0000
BIDA	A	1	P	16:164:00000	16:169:86370	UNE	0.0000	0.0000	0.0000
BRZR	A	1	P	16:164:00000	16:170:86370	UNE	0.0000	0.0000	0.0000
CACE	A	1	P	16:164:00000	16:170:86370	UNE	0.0600	0.0000	0.0000
CANT	A	1	P	16:164:00000	16:170:86370	UNE	3.0490	0.0000	0.0000
CHER	A	1	P	16:164:00000	16:170:86370	UNE	0.0000	0.0000	0.0000
CREU	A	1	P	16:164:00000	16:170:86370	UNE	0.0770	0.0000	0.0000
EBRE	A	1	P	16:164:00000	16:170:86370	UNE	0.0770	0.0000	0.0000
ELGE	A	1	P	16:164:00000	16:170:86370	UNE	0.0000	0.0000	0.0000
GERN	A	1	P	16:164:00000	16:170:86370	UNE	0.0000	0.0000	0.0000
IGEL	A	1	P	16:164:00000	16:170:86370	UNE	0.0000	0.0000	0.0000
ISPS	A	1	P	16:164:00000	16:170:86370	UNE	0.0350	0.0000	0.0000
LAZK	A	1	P	16:164:00000	16:170:86370	UNE	0.0000	0.0000	0.0000
LEIT	A	1	P	16:167:20820	16:170:86370	UNE	0.0000	0.0000	0.0000

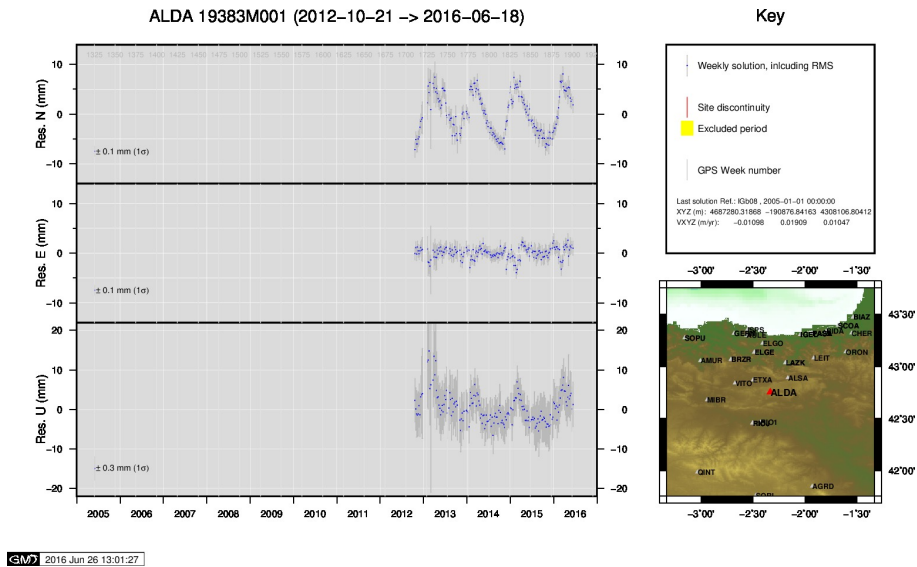
ORON	A	1	P	16:164:00000	16:170:86370	UNE	0.0000	0.0000	0.0000
PAS2	A	1	P	16:164:00000	16:170:86370	UNE	0.0000	0.0000	0.0000
PASA	A	1	P	16:164:00000	16:170:86370	UNE	0.0000	0.0000	0.0000
RI01	A	1	P	16:164:00000	16:170:86370	UNE	0.0606	0.0000	0.0000
SALA	A	1	P	16:164:00000	16:170:86370	UNE	0.0600	0.0000	0.0000
SOPU	A	1	P	16:164:00000	16:170:86370	UNE	0.0000	0.0000	0.0000
TERU	A	1	P	16:164:00000	16:170:86370	UNE	0.0600	0.0000	0.0000
VITO	A	1	P	16:164:00000	16:170:86370	UNE	0.0000	0.0000	0.0000
YEBE	A	1	P	16:164:00000	16:170:86370	UNE	0.0000	0.0000	0.0000
ZARA	A	1	P	16:164:00000	16:170:86370	UNE	3.2590	0.0000	0.0000

## 7 Cumulative Time Series

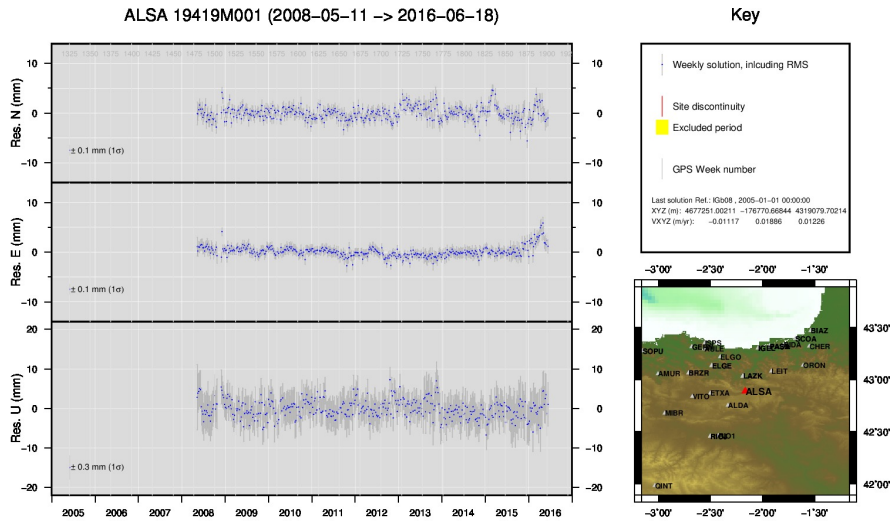
Time series of stations. Latest plots at: <http://geolabpasaia.org/gnss/ARA-net/TSeries/>, or click on the caption of each image.



1 ) ACOR

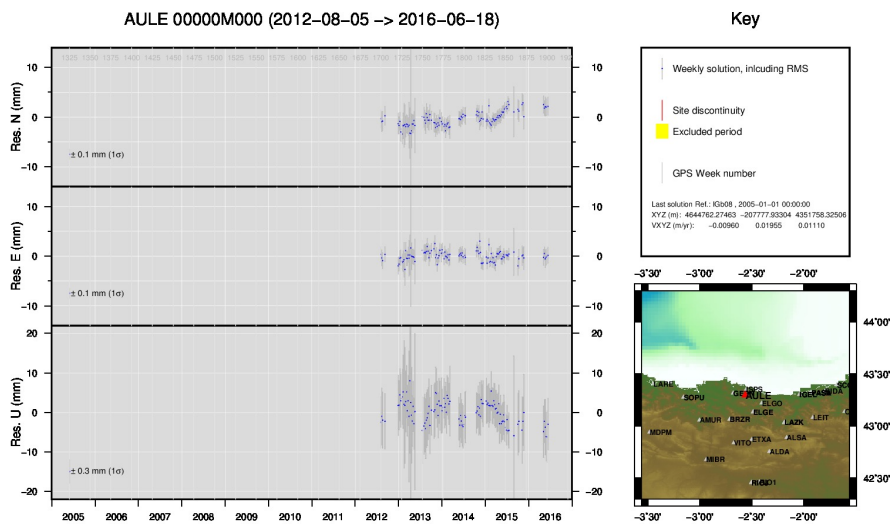


2 ) ALDA



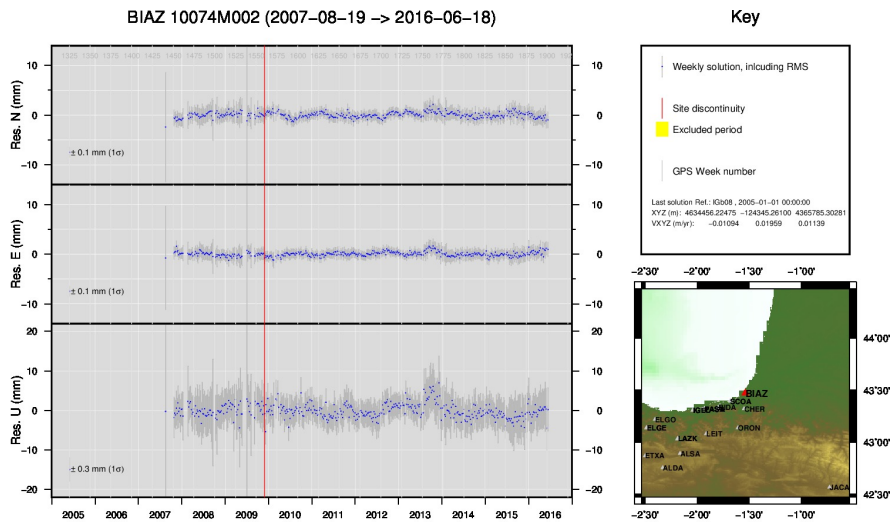
GMW 2016 Jun 26 13:02:07

3 ) ALSA



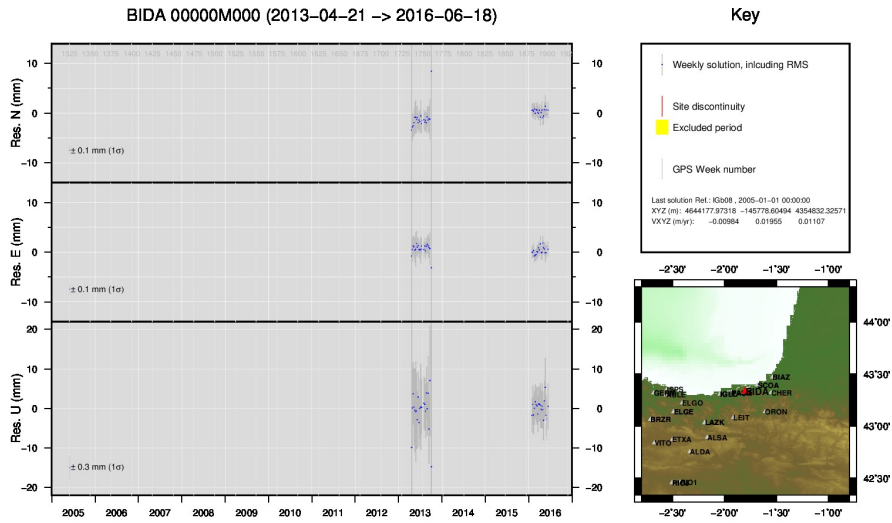
GMW 2016 Jun 26 13:03:09

4 ) AULE



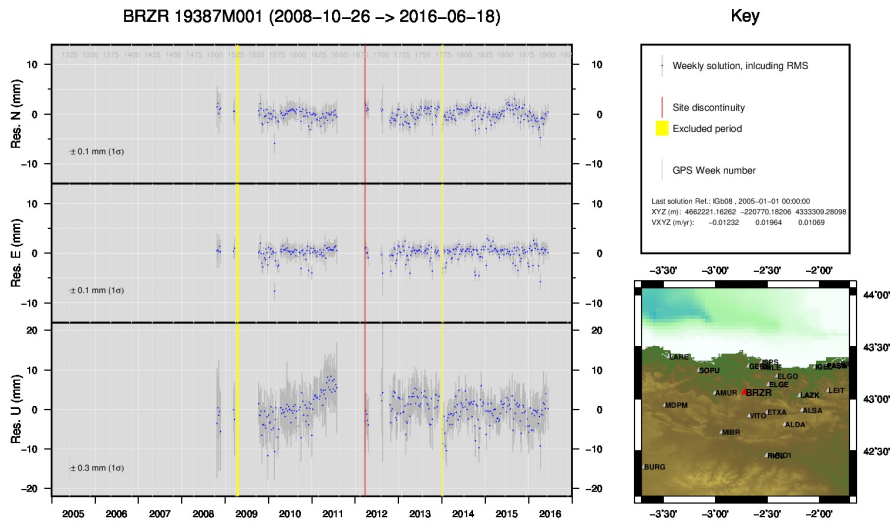
GMW 2016 Jun 26 13:04:10

5 ) BIAZ



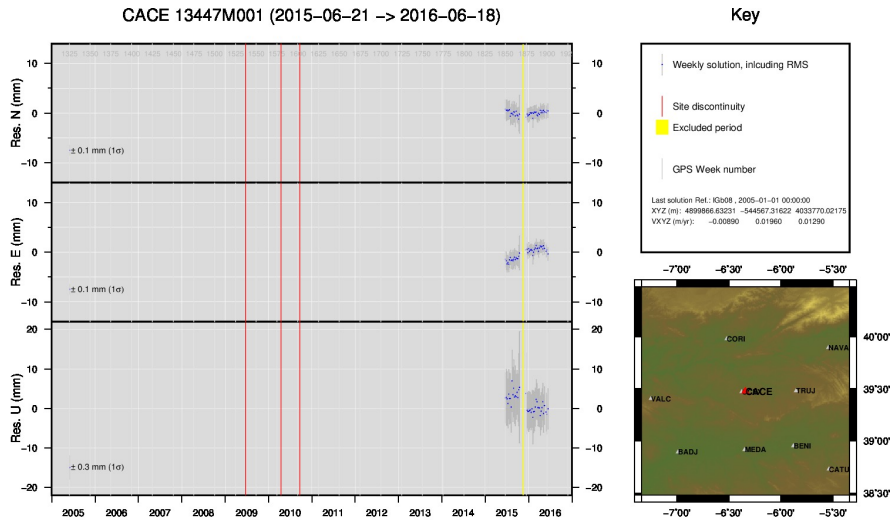
GMW 2016 Jun 26 13:04:16

6 ) BIDA



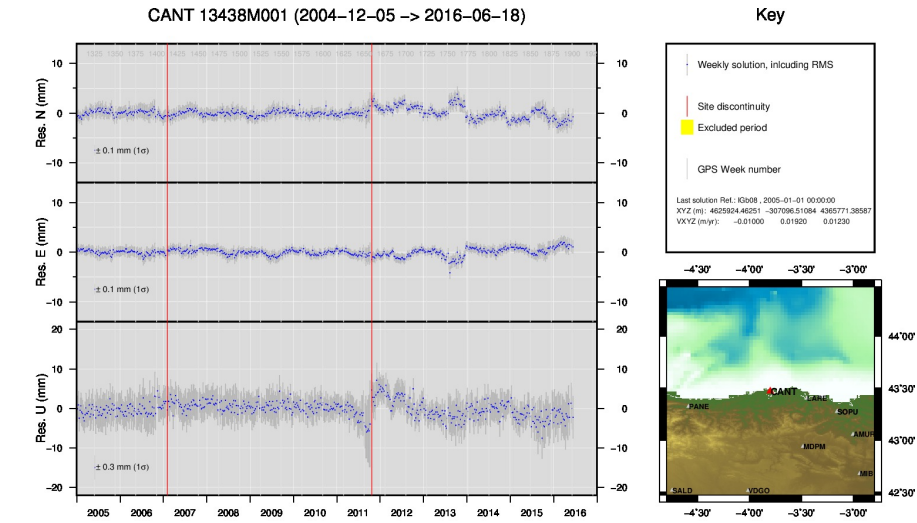
GMW 2016 Jun 26 13:04:34

7 ) BRZR



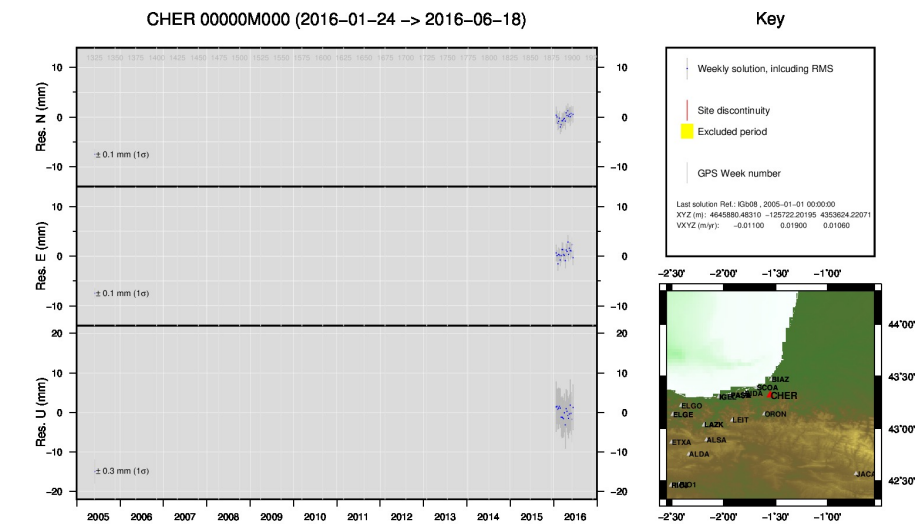
GMW 2016 Jun 26 13:05:02

8 ) CACE



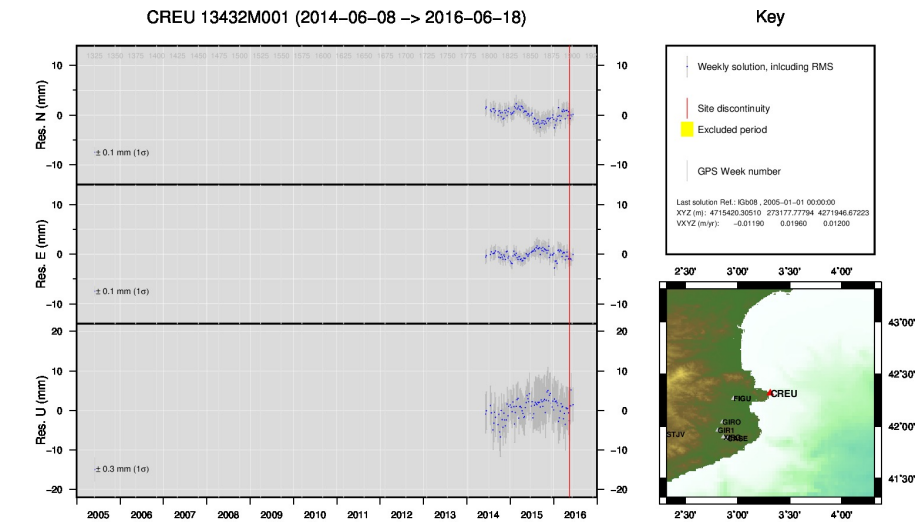
GMW 2016 Jun 26 13:05:13

9 ) CANT



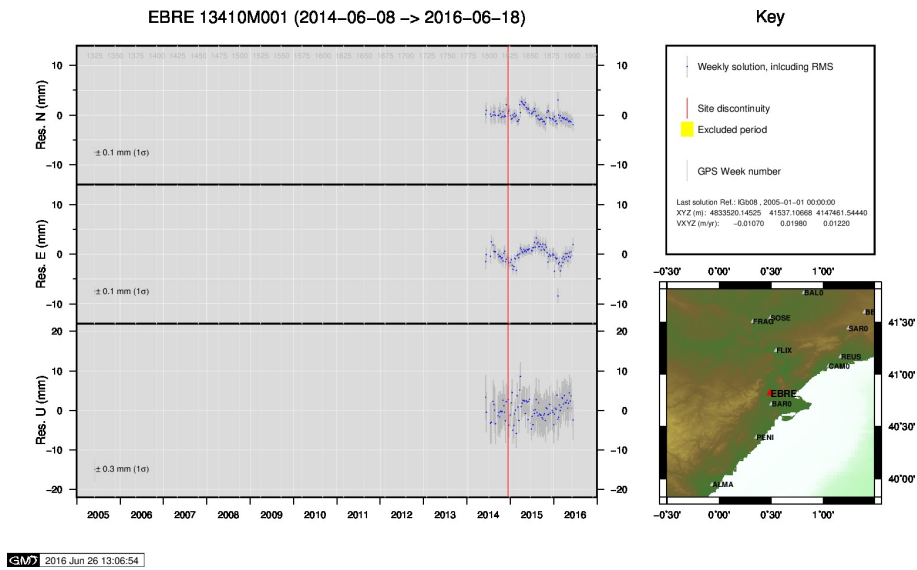
GMW 2016 Jun 26 13:06:10

10 ) CHER

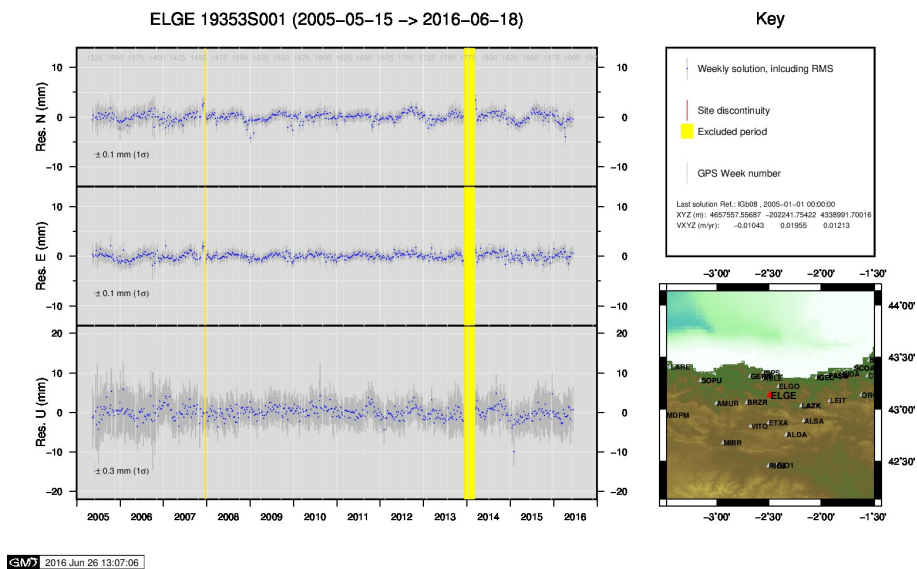


GMW 2016 Jun 26 13:06:38

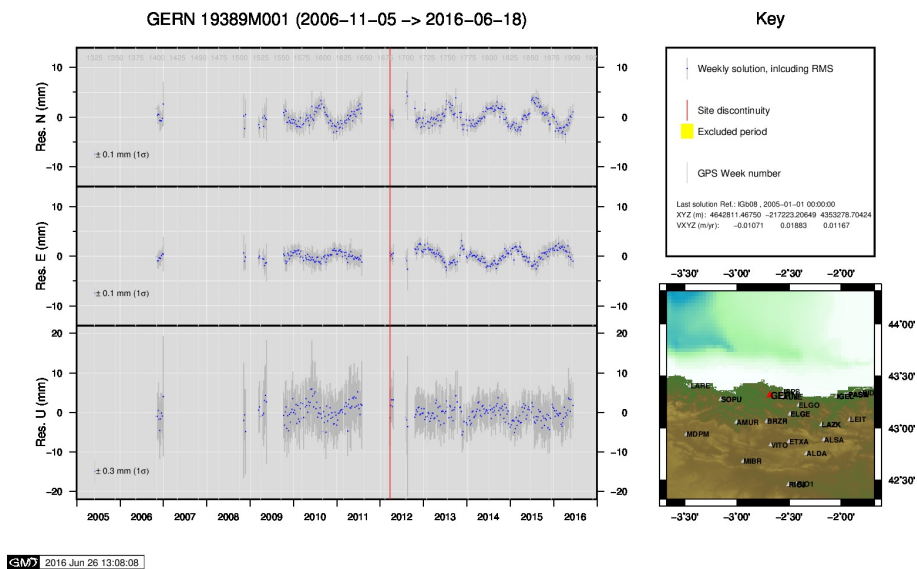
11 ) CREU



12 ) EBRE

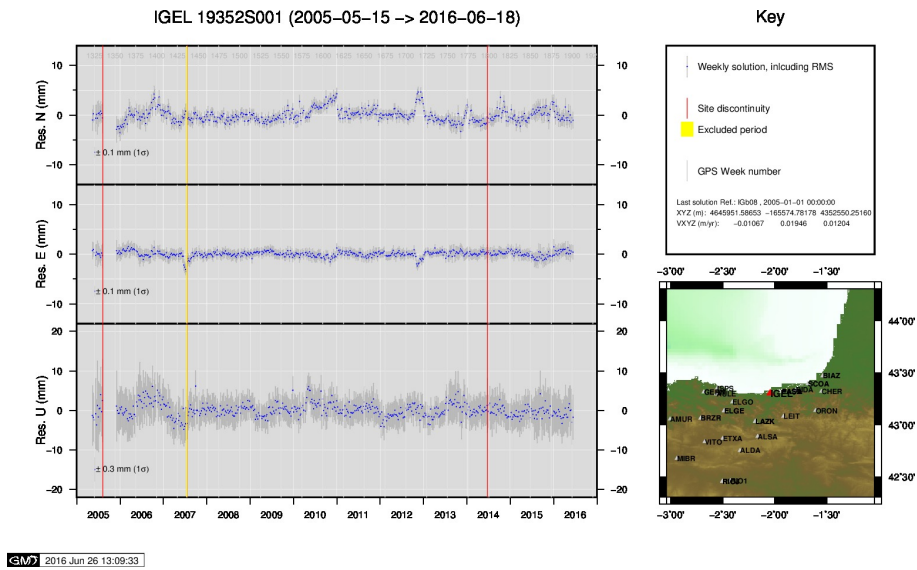


13 ) ELGE

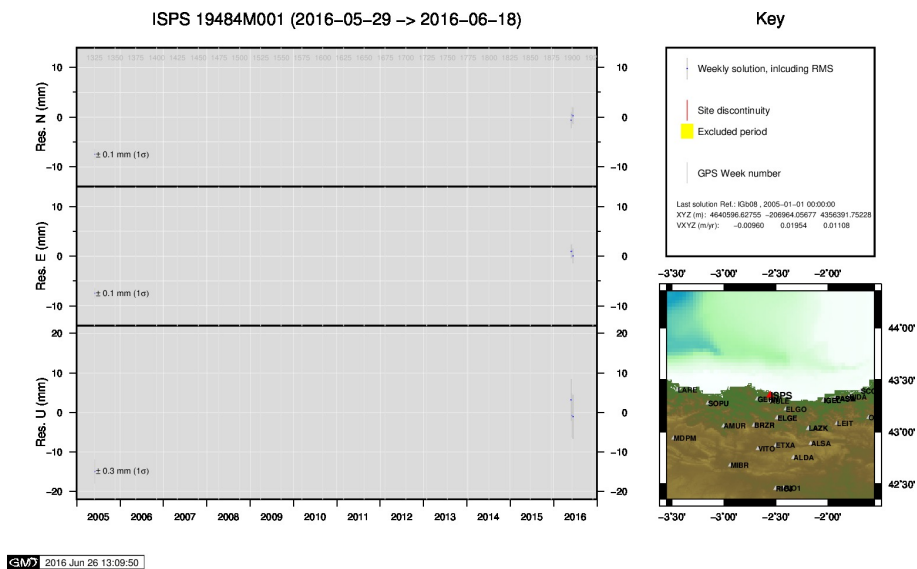


14 ) GERN

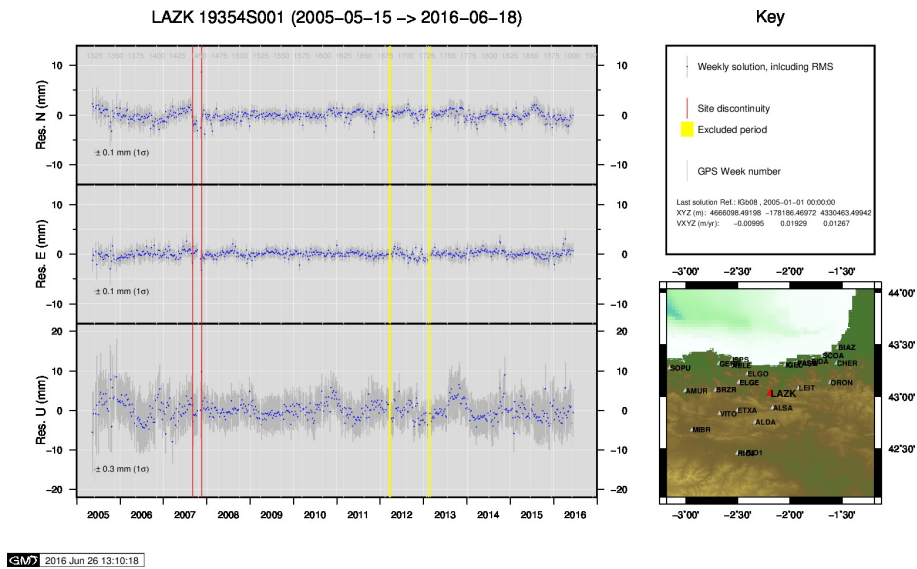




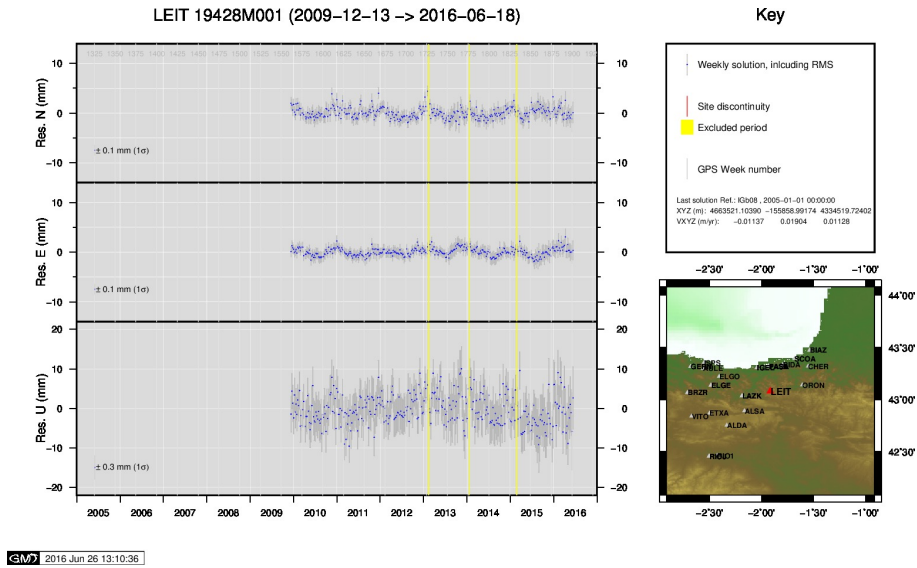
15 ) IGEL



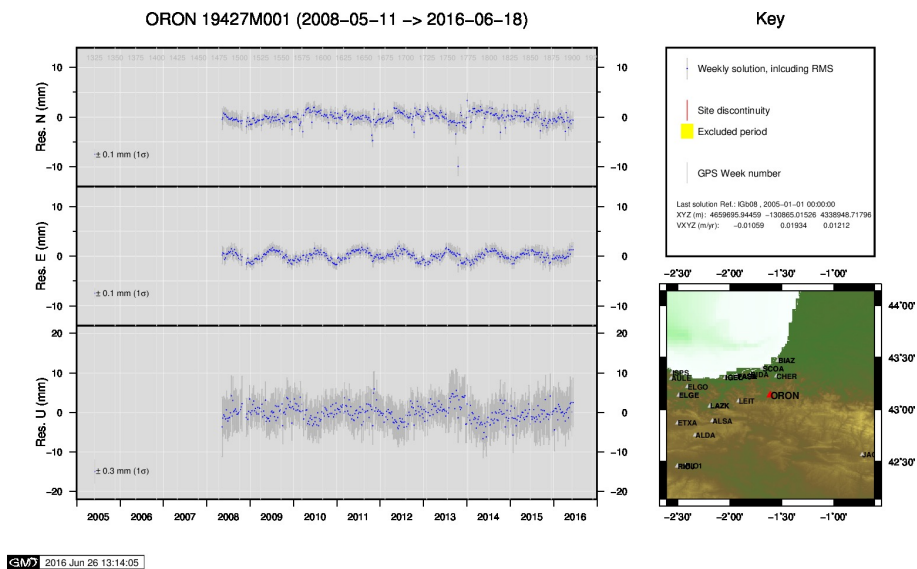
16 ) ISPS



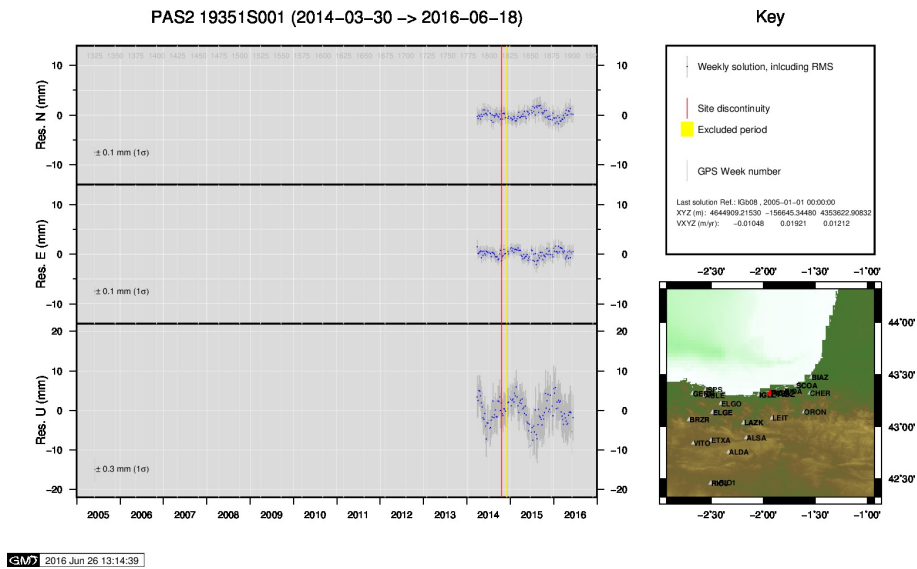
17 ) LAZK



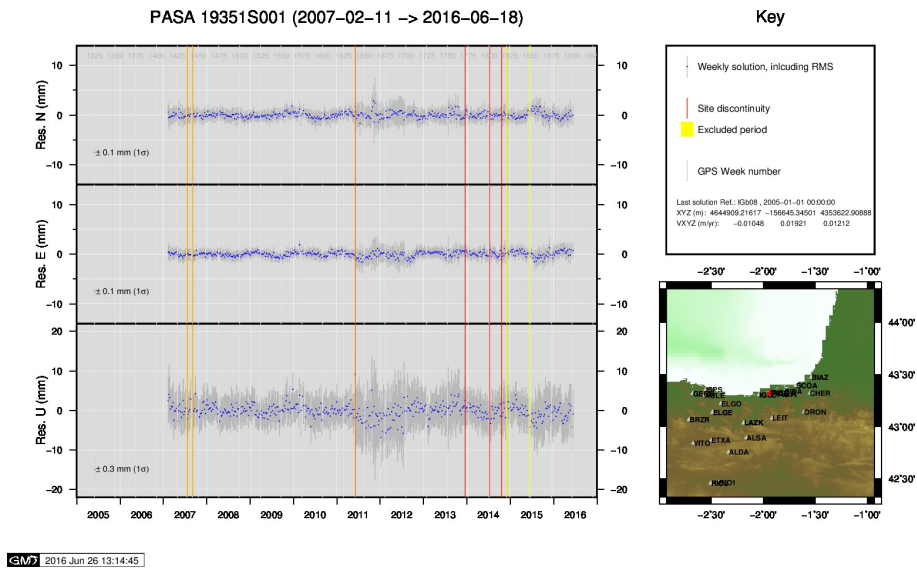
18 ) LEIT



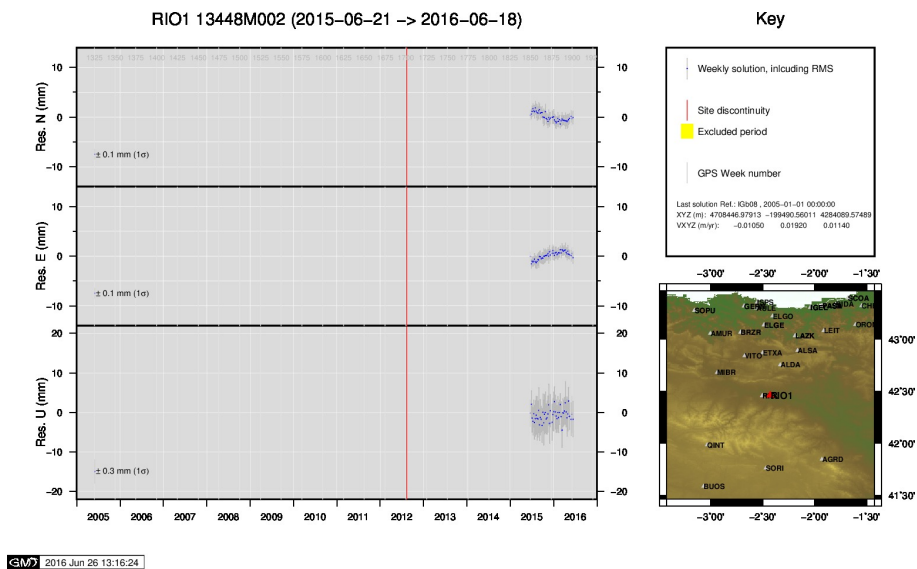
19 ) ORON



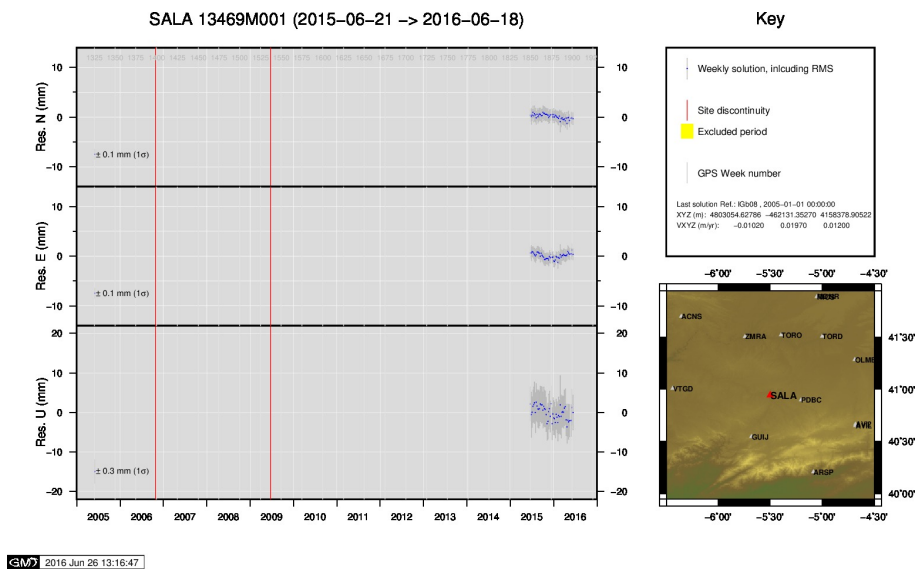
20 ) PAS2



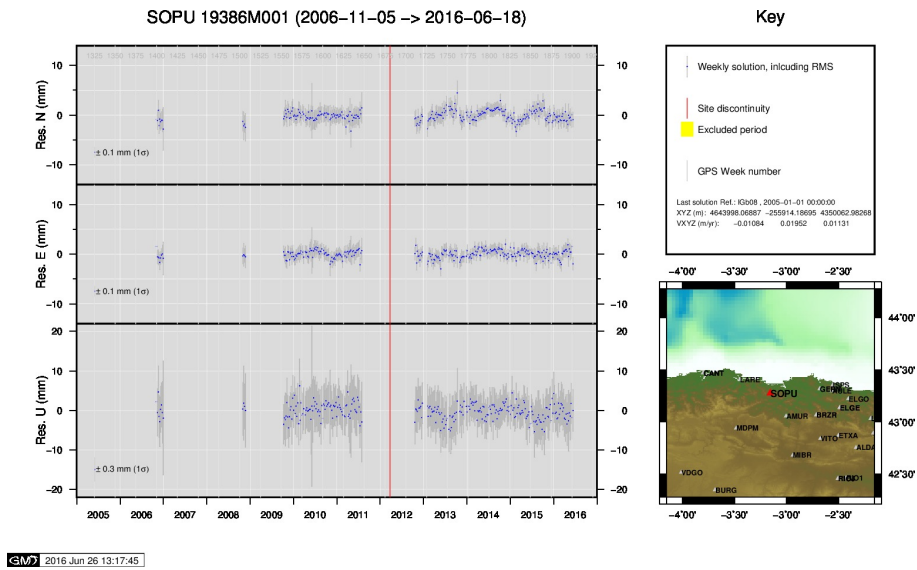
21 ) PASA



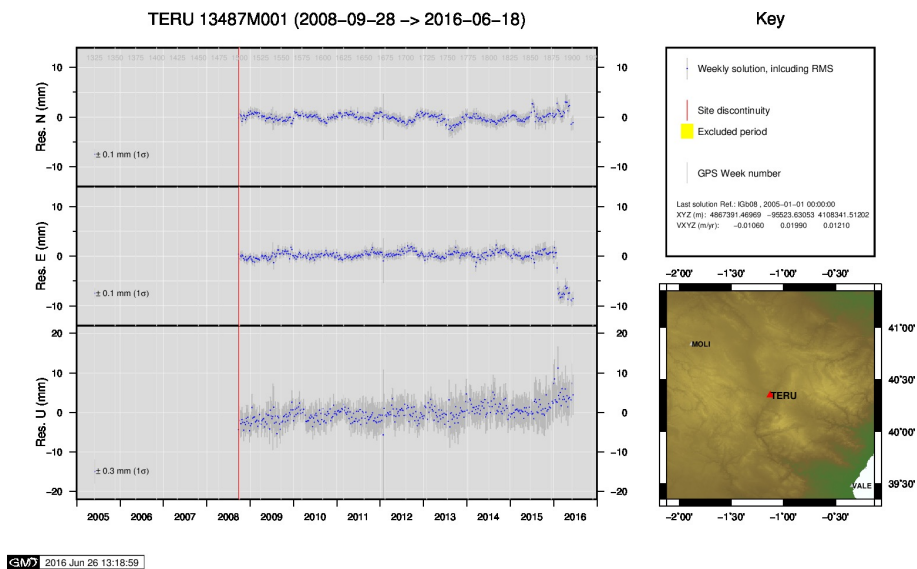
22 ) RIO1



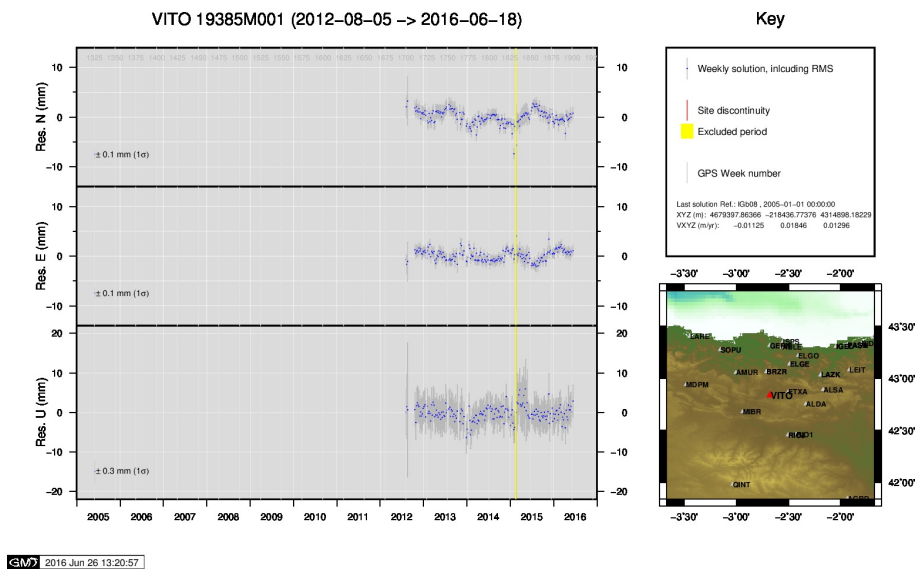
23 ) SALA



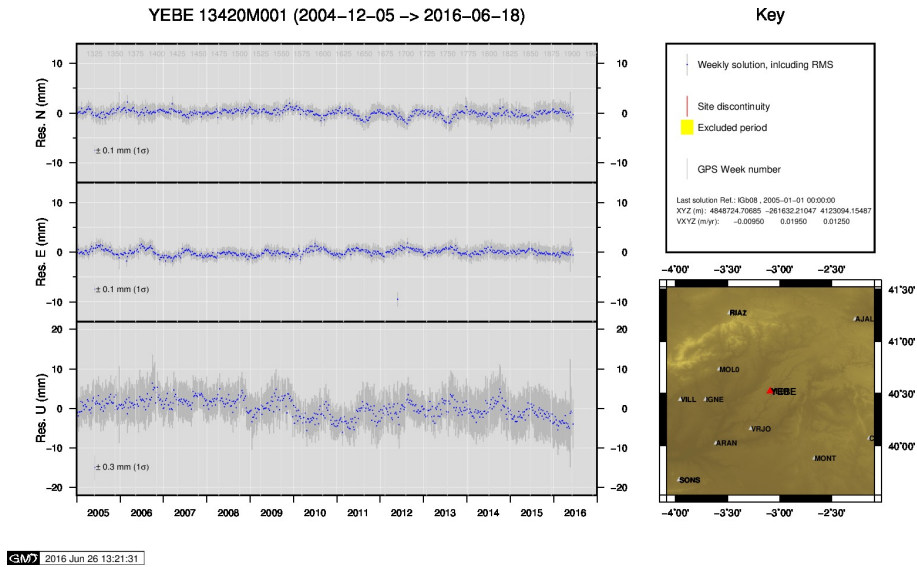
24 ) SOPU



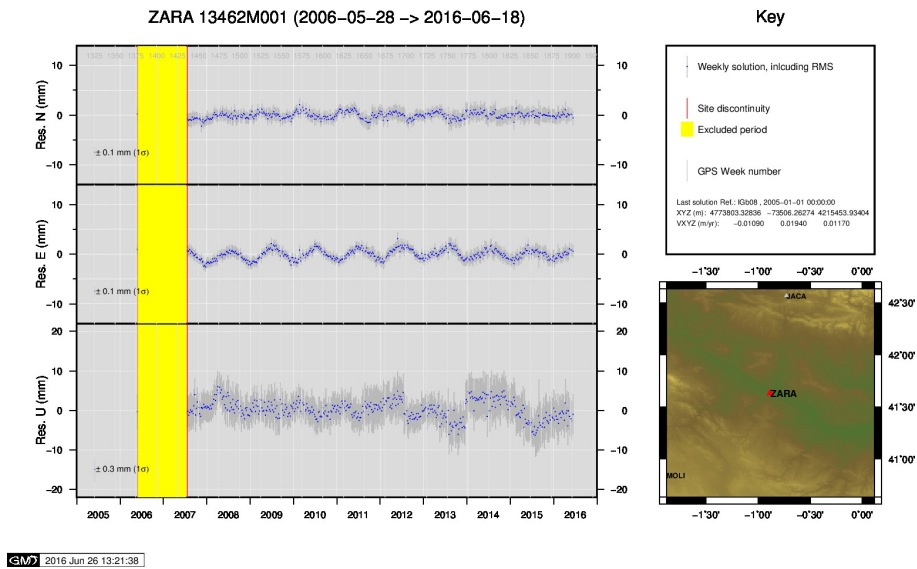
25 ) TERU



26 ) VITO



27 ) YEBE



28 ) ZARA