ARA-DAC Weekly Analysis Result: 1913 (GFA)

Technical Report

GPS Week: 1913 (GFA)

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

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1 Introduction

In may 2015 ARA (EUREF's acronym of the ARANZADI's Department of Applied Geodesy), kicks off as a EUREF's Operational Center. In July 2015, the Densification solutions ARA computes routinely in a weekly basis start being submitted to the EUREF's EPN Densification Project.

2 Map of Computed Sites

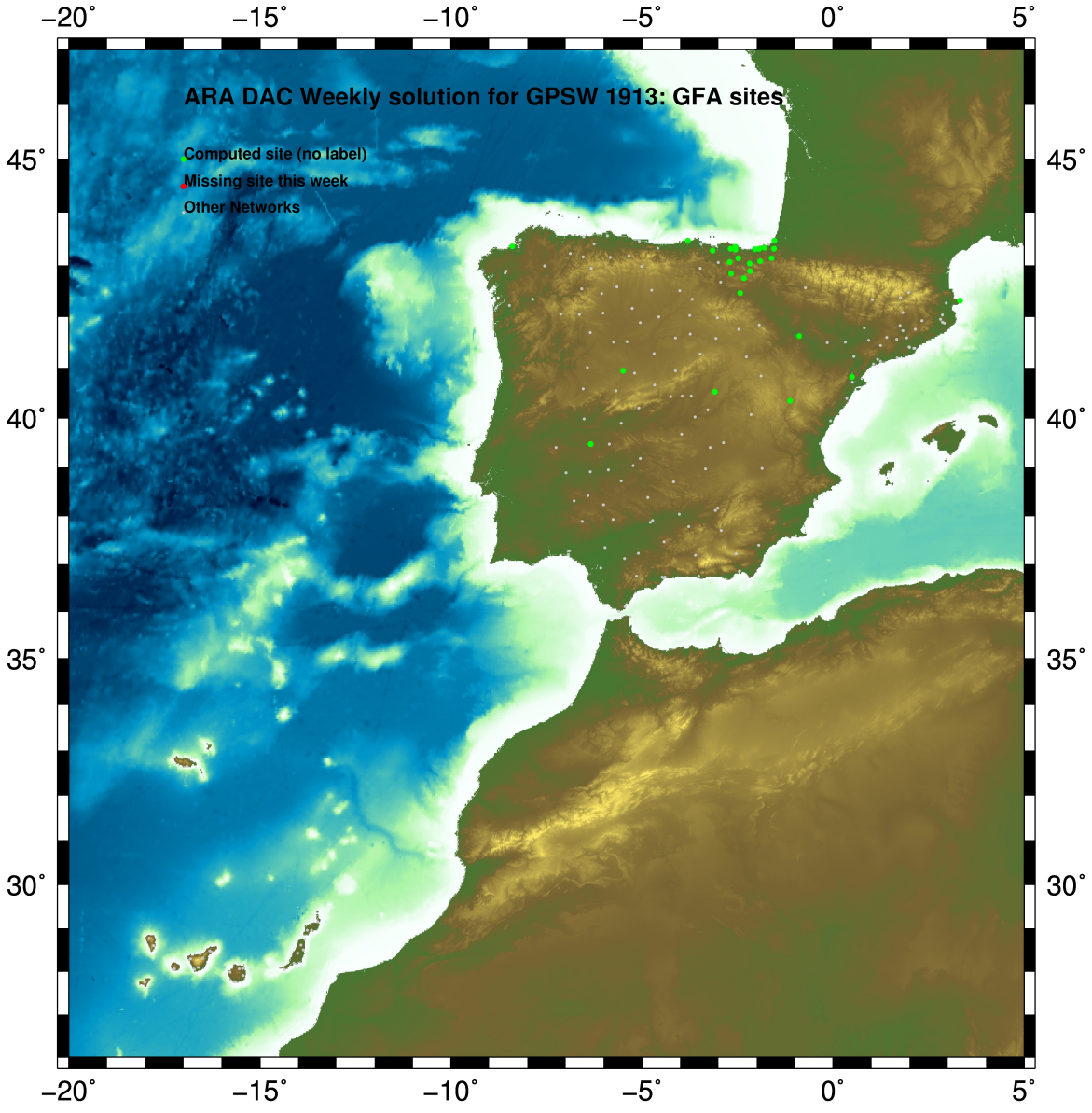

Fig.1: Computed Sites for GPS Week1913 (GFA)

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 fiel 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*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 IGb08

The Reference Frame considered in this section is IGb08, release C1890.

ARA LAC 1913 WEEK COMBINATION: PRECISE ORBITS 18-SEP-16 13:01

LOCAL GEODETIC DATUM: IGb08 EPOCH: 2016-09-07 12:00:00

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
1	ACOR 13434M001	4594489.59090	-678367.50715	4357066.26054	W
22	ALDA 19383M001	4687280.19315	-190876.61878	4308106.92650	A
28	ALSA 19419M001	4677250.87085	-176770.44741	4319079.84555	A
40	AULE 00000M000	4644762.15587	-207777.70432	4351758.45329	A
51	BIAZ 10074M002	4634456.09641	-124345.03173	4365785.43348	A
55	BIDA 00000M000	4644177.85767	-145778.37675	4354832.45594	A
54	BRZR 19387M001	4662221.02099	-220769.95184	4333309.40959	A
7	CACE 13447M001	4899866.52978	-544567.08892	4033770.17327	W
8	CANT 13438M001	4625924.34412	-307096.28600	4365771.52824	W
69	CHER 00000M000	4645880.35362	-125721.97801	4353624.34517	A
11	CREU 13432M001	4715420.16910	273178.00848	4271946.81592	A
12	EBRE 13410M001	4833520.02078	41537.33888	4147461.68658	W
77	ELGE 19353S001	4657557.43585	-202241.52602	4338991.84376	A
87	GERN 19389M001	4642811.33888	-217222.98571	4353278.85689	A
101	IGEL 19352S001	4645951.46218	-165574.55502	4352550.39267	A
105	ISPS 19484M001	4640596.51703	-206963.82831	4356391.88715	A
109	LAZK 19354S001	4666098.37547	-178186.24446	4330463.64766	A
112	LEIT 19428M001	4663520.96890	-155858.77042	4334519.85425	A
141	ORON 19427M001	4659695.82309	-130864.78803	4338948.86015	A
146	PAS2 19351S001	4644909.09039	-156645.12148	4353623.04868	A
147	PASA 19351S001	4644909.09166	-156645.12158	4353623.04934	A
27	RIO1 13448M002	4708446.85769	-199490.33678	4284089.70993	W
28	SALA 13469M001	4803054.50994	-462131.12184	4158379.04635	W
172	SOPU 19386M001	4643997.94092	-255913.95846	4350063.11577	A
31	TERU 13487M001	4867391.34916	-95523.40620	4108341.65417	W
204	VITO 19385M001	4679397.73274	-218436.55907	4314898.33645	A
35	YEBE 13420M001	4848724.59542	-261631.98255	4123094.29922	W
36	ZARA 13462M001	4773803.20061	-73506.03550	4215454.07039	W

5.2 ETRS89 Coordinates

European **T**errestrial **R**eference **S**ystem, **1989** (**ETRS89**) is realized by ETRF2000 (Boucher and Altamimi, 2011).

ETRF2000 COORD. wk 1913 18-SEP-16 13:01

LOCAL GEODETIC DATUM: ETRF2000 EPOCH: 2016-09-07 12:00:00

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
1	ACOR 13434M001	4594489.87132	-678367.99420	4357065.87409	W
22	ALDA 19383M001	4687280.52242	-190877.11386	4308106.53912	A
28	ALSA 19419M001	4677251.20231	-176770.94151	4319079.45901	A
40	AULE 00000M000	4644762.48610	-207778.19540	4351758.06864	A
51	BIAZ 10074M002	4634456.43640	-124345.52164	4365785.05045	A
55	BIDA 00000M000	4644178.19469	-145778.86764	4354832.07201	A
54	BRZR 19387M001	4662221.34867	-220770.44461	4333309.02360	A
7	CACE 13447M001	4899866.80397	-544567.60456	4033769.76732	W
8	CANT 13438M001	4625924.66466	-307096.77550	4365771.14378	W
69	CHER 00000M000	4645880.69270	-125722.46901	4353623.96134	A
11	CREU 13432M001	4715420.54540	273177.51204	4271946.43163	A
12	EBRE 13410M001	4833520.36458	41536.83062	4147461.29168	W
77	ELGE 19353S001	4657557.76586	-202242.01831	4338991.45829	A
87	GERN 19389M001	4642811.66820	-217223.47662	4353278.47227	A
101	IGEL 19352S001	4645951.79695	-165575.04612	4352550.00840	A
105	ISPS 19484M001	4640596.84764	-206964.31900	4356391.50279	A
109	LAZK 19354S001	4666098.70750	-178186.73750	4330463.26187	A
112	LEIT 19428M001	4663521.30356	-155859.26317	4334519.46888	A
141	ORON 19427M001	4659696.16069	-130865.28035	4338948.47532	A
146	PAS2 19351S001	4644909.42618	-156645.61246	4353622.66458	A
147	PASA 19351S001	4644909.42745	-156645.61256	4353622.66524	A
27	RIO1 13448M002	4708447.18452	-199490.83387	4284089.32100	W
28	SALA 13469M001	4803054.80083	-462131.62833	4158378.64800	W
172	SOPU 19386M001	4643998.26592	-255914.44957	4350062.73064	A
31	TERU 13487M001	4867391.67591	-95523.91800	4108341.25544	W
204	VITO 19385M001	4679398.05950	-218437.05346	4314897.94930	A
35	YEBE 13420M001	4848724.90543	-261632.49297	4123093.89995	W
36	ZARA 13462M001	4773803.53649	-73506.53846	4215453.67834	W

5.3 Mean and Daily Repeatabilities

In this section, the mean and daily repeatabilities of the sites are shown. Repatabilities refer to the IGb08 solution and are given with respect the Local fram (North-East-Up).

ARA LAC 1913 WEEK COMBINATION: PRECISE ORBITS 18-SEP-16 13:01

Station	#Days	Weekday 0123456	Repeatability (mm) N	E	U
ACOR 13434M001	7	XXXXXXX	1.06	1.06	4.88
ALDA 19383M001	6	XXX XXX	1.07	1.19	9.66
ALSA 19419M001	7	XXXXXXX	1.27	1.49	4.86
AULE 00000M000	7	XXXXXXX	1.04	1.47	4.66
BIAZ 10074M002	7	XXXXXXX	0.53	1.01	2.84
BIDA 00000M000	7	XXXXXXX	1.52	1.32	2.15
BRZR 19387M001	7	XXXXXXX	0.56	1.03	3.05
CACE 13447M001	7	XXXXXXX	0.54	0.64	2.13
CANT 13438M001	7	XXXXXXX	0.81	0.52	3.93
CHER 00000M000	7	XXXXXXX	0.91	1.33	2.15
CREU 13432M001	7	XXXXXXX	1.17	1.47	4.95
EBRE 13410M001	7	XXXXXXX	0.97	1.31	6.18
ELGE 19353S001	7	XXXXXXX	0.55	1.23	5.42
GERN 19389M001	7	XXXXXXX	0.97	1.60	4.55
IGEL 19352S001	7	XXXXXXX	0.27	0.97	1.91
ISPS 19484M001	7	XXXXXXX	0.64	1.11	3.28
LAZK 19354S001	7	XXXXXXX	1.04	1.28	4.42
LEIT 19428M001	7	XXXXXXX	1.22	1.18	3.22
ORON 19427M001	7	XXXXXXX	0.95	1.42	2.92
PAS2 19351S001	7	XXXXXXX	1.14	1.12	4.03
PASA 19351S001	7	XXXXXXX	0.79	1.21	3.29
RIO1 13448M002	7	XXXXXXX	0.69	0.77	5.02
SALA 13469M001	7	XXXXXXX	0.50	0.43	2.19
SOPU 19386M001	7	XXXXXXX	1.12	1.46	4.34
TERU 13487M001	7	XXXXXXX	0.77	1.11	2.79
VITO 19385M001	7	XXXXXXX	0.72	0.64	5.27
YEBE 13420M001	7	XXXXXXX	0.76	0.89	4.08
ZARA 13462M001	7	XXXXXXX	1.06	0.82	2.51

Comparison of individual solutions:

ACOR 13434M001	N	1.06	0.80	-1.67	-0.43	1.23	0.90	0.26	0.88
ACOR 13434M001	E	1.06	-1.57	0.08	-0.85	1.08	-0.33	1.26	0.78
ACOR 13434M001	U	4.88	-0.10	-7.59	0.42	-0.01	-8.05	-1.39	4.28
ALDA 19383M001	N	1.07	-1.70	1.10	-0.14		0.10	-1.08	0.69
ALDA 19383M001	E	1.19	1.03	1.31	-0.70		-0.26	1.03	-1.62
ALDA 19383M001	U	9.66	-4.96	1.73	18.69		-5.60	1.01	-7.55
ALSA 19419M001	N	1.27	1.06	0.73	-0.01	0.51	0.20	-2.69	-0.65
ALSA 19419M001	E	1.49	-0.33	0.84	2.66	-1.24	-1.57	0.91	-0.71
ALSA 19419M001	U	4.86	-1.04	2.18	1.57	-5.23	-0.24	8.63	-5.61
AULE 00000M000	N	1.04	-0.60	-1.20	-0.90	1.93	-0.22	-0.27	0.31
AULE 00000M000	E	1.47	1.13	2.65	0.46	-1.26	-1.22	-0.24	-1.16
AULE 00000M000	U	4.66	-1.19	4.52	7.32	-3.09	-1.33	1.44	-6.43
BIAZ 10074M002	N	0.53	-0.35	-0.20	-0.13	-0.50	-0.21	-0.48	1.00
BIAZ 10074M002	E	1.01	0.47	1.46	0.58	-1.06	-1.48	0.26	-0.11
BIAZ 10074M002	U	2.84	-3.63	3.03	1.38	-1.93	-1.22	-1.33	4.13
BIDA 00000M000	N	1.52	-1.32	-1.17	-2.05	-0.87	1.74	0.53	1.56
BIDA 00000M000	E	1.32	1.05	2.44	-0.91	-0.66	-0.56	-0.22	-1.36
BIDA 00000M000	U	2.15	-0.77	1.69	1.13	-0.52	-0.53	1.66	-4.45
BRZR 19387M001	N	0.56	0.01	0.36	-0.67	0.36	-1.07	0.12	0.01
BRZR 19387M001	E	1.03	1.04	0.93	1.02	-1.12	-1.26	-0.63	0.43
BRZR 19387M001	U	3.05	-1.60	-1.59	6.43	0.10	0.97	-1.02	-2.73
CACE 13447M001	N	0.54	-0.91	-0.01	-0.54	0.18	0.22	0.73	-0.13
CACE 13447M001	E	0.64	0.33	-0.11	0.15	-0.86	-0.94	0.15	0.80
CACE 13447M001	U	2.13	3.05	1.93	0.51	-1.73	1.43	2.44	-1.72
CANT 13438M001	N	0.81	1.12	0.05	-0.05	0.47	-0.18	-1.44	0.59
CANT 13438M001	E	0.52	0.38	-0.29	-0.51	0.52	-0.80	-0.01	0.45
CANT 13438M001	U	3.93	2.47	-7.99	-0.61	0.70	1.13	2.00	4.04
CHER 00000M000	N	0.91	-0.24	-0.73	0.28	0.93	-0.91	-1.17	1.11
CHER 00000M000	E	1.33	0.66	1.15	1.72	0.53	-1.95	-1.24	-0.53
CHER 00000M000	U	2.15	-2.01	-0.46	2.07	-1.93	1.48	-2.04	3.04
CREU 13432M001	N	1.17	1.19	0.69	-0.27	-0.83	-1.44	1.83	-0.34
CREU 13432M001	E	1.47	-1.48	-2.04	0.77	1.95	1.19	-0.90	-0.12
CREU 13432M001	U	4.95	-0.38	0.68	-6.85	5.40	-4.39	-0.77	7.10
EBRE 13410M001	N	0.97	0.77	0.78	1.36	-0.36	-1.24	0.04	-0.94
EBRE 13410M001	E	1.31	0.36	-2.40	0.68	0.61	1.11	1.48	0.37
EBRE 13410M001	U	6.18	-1.75	5.74	-10.03	1.28	-2.45	2.24	8.91
ELGE 19353S001	N	0.55	-0.34	0.50	-0.33	-1.07	-0.25	0.11	0.34
ELGE 19353S001	E	1.23	-0.12	1.91	1.61	-0.79	-0.14	-0.79	-1.24
ELGE 19353S001	U	5.42	-4.43	3.52	9.98	-3.85	-1.18	1.91	-5.01
GERN 19389M001	N	0.97	-0.93	-1.00	-1.51	0.68	0.80	0.31	0.53
GERN 19389M001	E	1.60	0.07	1.68	2.35	-2.55	-0.40	-0.23	-0.58
GERN 19389M001	U	4.55	-4.43	2.69	8.70	-1.37	1.23	-1.85	-3.85
IGEL 19352S001	N	0.27	0.20	-0.36	-0.15	0.07	-0.12	-0.49	-0.08
IGEL 19352S001	E	0.97	0.90	1.41	0.43	-1.47	-0.03	-0.53	-0.48
IGEL 19352S001	U	1.91	-1.41	0.47	1.42	-1.36	2.51	1.71	-2.57
ISPS 19484M001	N	0.64	-0.96	-0.26	0.64	-0.91	0.46	0.11	-0.06
ISPS 19484M001	E	1.11	0.16	1.81	1.30	-1.09	-0.45	-0.59	-0.84
ISPS 19484M001	U	3.28	-1.02	4.03	1.32	2.43	-4.86	2.00	-3.46
LAZK 19354S001	N	1.04	-0.32	1.13	-1.26	0.53	0.70	-1.67	-0.01
LAZK 19354S001	E	1.28	1.00	2.08	0.76	-1.40	-1.19	-0.65	-0.26
LAZK 19354S001	U	4.42	-4.81	4.96	-1.95	0.44	-1.98	7.22	-3.10
LEIT 19428M001	N	1.22	-0.00	2.03	-0.56	-0.63	-0.17	-1.97	0.40
LEIT 19428M001	E	1.18	0.64	1.12	0.95	0.60	-1.33	0.42	-1.87
LEIT 19428M001	U	3.22	-2.96	3.09	1.32	-3.76	-1.22	4.81	-1.90
ORON 19427M001	N	0.95	-0.07	-0.54	-1.75	-0.15	1.31	-0.25	0.48
ORON 19427M001	E	1.42	0.94	2.01	1.54	-0.86	-1.62	-0.93	-0.74
ORON 19427M001	U	2.92	-3.22	2.14	5.42	-1.51	-2.15	-0.33	0.17
PAS2 19351S001	N	1.14	1.36	-0.64	-1.94	0.82	0.56	-0.85	-0.16
PAS2 19351S001	E	1.12	1.02	1.99	-0.27	-0.48	-0.62	-1.36	-0.07
PAS2 19351S001	U	4.03	-4.81	-1.02	6.33	-0.89	0.36	4.34	-3.64
PASA 19351S001	N	0.79	0.28	-0.59	-1.44	0.87	0.26	-0.57	0.28
PASA 19351S001	E	1.21	1.44	1.85	0.41	-1.16	-0.35	-1.21	-0.37
PASA 19351S001	U	3.29	-2.64	-2.82	6.02	-1.06	-0.54	2.85	-2.12
RIO1 13448M002	N	0.69	-0.33	-0.54	-1.27	0.71	0.09	-0.33	0.48
RIO1 13448M002	E	0.77	0.76	1.20	-0.33	0.08	-0.78	0.08	0.88
RIO1 13448M002	U	5.02	0.13	-3.86	9.91	-2.83	-3.83	3.81	-0.81
SALA 13469M001	N	0.50	-0.44	-0.73	0.18	0.20	0.27	-0.39	0.69
SALA 13469M001	E	0.43	-0.03	-0.54	-0.36	-0.32	0.22	0.72	-0.09
SALA 13469M001	U	2.19	-0.78	-0.92	2.24	1.79	-1.66	-3.76	-1.51
SOPU 19386M001	N	1.12	0.12	0.55	0.20	0.63	-0.72	-2.22	1.18
SOPU 19386M001	E	1.46	1.23	2.19	0.48	-0.22	-2.27	-1.06	0.01
SOPU 19386M001	U	4.34	2.98	-5.06	5.15	2.51	2.11	-4.35	4.75
TERU 13487M001	N	0.77	-0.20	0.34	0.38	-0.46	1.27	-1.15	0.31
TERU 13487M001	E	1.11	-1.02	-1.07	-0.42	1.26	1.77	0.53	0.29
TERU 13487M001	U	2.79	2.62	-3.42	-0.64	-0.61	2.72	-1.47	4.21
VITO 19385M001	N	0.72	-0.40	-0.41	-1.15	0.43	0.43	-0.42	0.93
VITO 19385M001	E	0.64	0.29	0.51	-0.69	-0.46	-0.47	-0.44	1.00
VITO 19385M001	U	5.27	-4.84	-4.28	5.87	-3.69	-2.66	8.23	-1.39
YEBE 13420M001	N	0.76	0.60	0.34	0.76	-1.28	-0.15	-0.26	0.79

```
YEBE 13420M001   E    0.89      0.17   -1.40    0.37    0.36    1.54   -0.12   -0.29
YEBE 13420M001   U    4.08     -2.01   -4.73    6.39   -3.15    3.24   -1.99    2.86
ZARA 13462M001   N    1.06     -0.03   -0.61    1.44    0.34   -0.57    1.25   -1.53
ZARA 13462M001   E    0.82      0.11   -0.67   -0.31    0.60    1.52    0.48   -0.79
ZARA 13462M001   U    2.51     -1.57    0.28   -3.48    3.01    0.83    2.34    2.81
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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.

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LOCAL GEODETIC DATUM: IGb08
RESIDUALS IN LOCAL SYSTEM (NORTH, EAST, UP)
```

NUM	NAME	FLG	RESIDUALS IN MILLIMETERS		
1	ACOR 13434M001	I W	-2.21	0.89	-4.01
2	ALAC 13433M001	I W	0.66	1.11	1.48
3	ALBA 13452M001	I W	-0.26	1.91	1.50
4	ALME 13437M001	I W	-1.12	0.83	3.59
6	BRST 10004M004	I W	-0.93	0.01	-2.09
7	CACE 13447M001	I W	1.13	1.07	0.12
8	CANT 13438M001	I W	-1.11	-0.46	-2.11
9	CEU1 13449M002	I W	1.91	2.61	10.84
10	COBA 13453M001	I W	1.74	-0.24	-1.54
12	EBRE 13410M001	I W	1.25	-0.83	-0.17
14	FUNC 13911S001	I W	0.40	0.45	3.55
16	HUEL 13451M001	I W	0.39	-0.44	-0.28
17	IZAN 31309M002	I W	-1.68	-0.12	4.85
18	LLIV 13436M001	I W	3.93	-2.06	-7.88
19	LPAL 81701M001	I W	-1.66	-0.98	2.75
20	LROC 10023M001	I W	1.14	-1.54	-2.29
21	MALA 13443M001	I W	-2.97	1.51	2.18
22	MALL 13444M001	I W	0.24	-1.45	-0.68
24	MELI 19379M001	I W	-0.42	-1.02	1.90
25	PDEL 31906M004	I W	-3.76	-3.95	5.13
26	RABT 35001M002	I W	0.10	1.11	2.07
27	RIO1 13448M002	I W	-0.33	1.42	-5.57
28	SALA 13469M001	I W	0.07	-0.46	0.52
29	SCOA 10088M002	I W	-0.14	-0.42	-6.51
30	SONS 13446M001	I W	-1.38	-1.36	-3.09
31	TERU 13487M001	I W	2.92	0.86	0.18
32	VALE 13439M001	I W	-0.09	0.43	-2.10
33	VIGO 13450M001	I W	-0.42	-0.04	1.27
34	VILL 13406M001	I W	0.59	1.95	-1.60
35	YEBE 13420M001	I W	1.65	0.44	2.12
36	ZARA 13462M001	I W	-0.09	-1.11	-3.02
37	ZIMM 14001M004	I W	0.45	-0.15	-1.10
	RMS / COMPONENT		1.59	1.34	3.68
	MEAN		-0.00	0.00	-0.00
	MIN		-3.76	-3.95	-7.88
	MAX		3.93	2.61	10.84

```
NUMBER OF PARAMETERS  :     3
NUMBER OF COORDINATES :    96
RMS OF TRANSFORMATION :    2.44 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                        8866767
 NUMBER OF UNKNOWNS                             134890
 NUMBER OF DEGREES OF FREEDOM                  8731877
 PHASE MEASUREMENTS SIGMA                      0.00100
 SAMPLING INTERVAL (SECONDS)                       180
 VARIANCE FACTOR                    2.248774548470344
```

Helmert Transformation Parameters With Respect to Combined Solution:

		Translation (m)			Rotation (")			
Sol	Rms (m)	X	Y	Z	X	Y	Z	Scale (ppm)
1	0.00195	-0.0297	-0.0043	0.0290	0.0000	-0.0013	-0.0002	0.00083
2	0.00233	-0.0312	-0.0008	0.0342	-0.0002	-0.0015	-0.0002	0.00043
3	0.00286	0.0187	0.0190	-0.0208	-0.0004	0.0009	0.0005	-0.00017
4	0.00230	0.0142	-0.0232	-0.0111	0.0005	0.0006	-0.0006	-0.00086
5	0.00209	0.0019	-0.0204	0.0018	0.0003	-0.0000	-0.0006	-0.00070
6	0.00215	0.0039	-0.0106	0.0015	0.0002	0.0000	-0.0003	-0.00070
7	0.00198	-0.0085	0.0091	0.0104	-0.0001	-0.0005	0.0003	0.00033

Statistics of individual solutions:

File	RMS (m)	DOF	Chi**2/DOF	#Observations authentic	/ pseudo	#Parameters explicit	/ implicit	/ singular
1	0.00141	1243700	1.98	1263310	3	579	19034	0
2	0.00145	1167374	2.10	1185645	3	540	17734	0
3	0.00154	1216497	2.37	1235738	3	591	18653	0
4	0.00152	1255861	2.32	1275451	3	597	18996	0
5	0.00151	1279290	2.27	1299965	3	597	20081	0
6	0.00154	1258122	2.37	1277829	3	600	19110	0
7	0.00151	1307559	2.27	1328829	3	594	20679	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 16:248:00000 16:254:86370 LEICA GRX1200PRO     ----- -----------
 ALDA  A    1 P 16:248:00000 16:254:86370 LEICA GR10           ----- -----------
 ALSA  A    1 P 16:248:00000 16:254:86370 LEICA GRX1200GGPRO   ----- -----------
 AULE  A    1 P 16:248:00000 16:254:86370 LEICA GRX1200+GNSS   ----- -----------
 AULE  A    1 P 16:248:00000 16:254:86370 LEICA GRX1200+GNSS   ----- -----------
 BIAZ  A    1 P 16:248:00000 16:254:86370 LEICA GRX1200GGPRO   ----- -----------
 BIDA  A    1 P 16:248:00000 16:254:32370 LEICA GR10           ----- -----------
 BIDA  A    1 P 16:248:00000 16:254:32370 LEICA GR10           ----- -----------
 BRZR  A    1 P 16:248:00000 16:254:86370 LEICA GR10           ----- -----------
 CACE  A    1 P 16:248:00000 16:254:86370 TRIMBLE NETR9        ----- -----------
 CANT  A    1 P 16:248:00000 16:254:86370 LEICA GR10           ----- -----------
 CHER  A    1 P 16:248:00000 16:254:86370 LEICA GRX1200+GNSS   ----- -----------
 CREU  A    1 P 16:248:00000 16:254:86370 LEICA GR25           ----- -----------
 EBRE  A    1 P 16:248:00000 16:254:86370 TRIMBLE NETR9        ----- -----------
 ELGE  A    1 P 16:248:00000 16:254:86370 LEICA GR10           ----- -----------
 GERN  A    1 P 16:248:00000 16:254:86370 LEICA GR10           ----- -----------
 IGEL  A    1 P 16:248:00000 16:254:86370 LEICA GR10           ----- -----------
 ISPS  A    1 P 16:248:00000 16:254:86370 TRIMBLE NETR9        ----- -----------
 LAZK  A    1 P 16:248:00000 16:254:86370 LEICA GR10           ----- -----------
 LEIT  A    1 P 16:248:00000 16:254:86370 LEICA GRX1200+GNSS   ----- -----------
 ORON  A    1 P 16:248:00000 16:254:86370 LEICA GRX1200GGPRO   ----- -----------
 PAS2  A    1 P 16:248:00000 16:254:86370 TPS NET-G3A          ----- -----------
 PASA  A    1 P 16:248:00000 16:254:86370 LEICA GR10           ----- -----------
 RIO1  A    1 P 16:248:00000 16:254:86370 LEICA GR25           ----- -----------
 SALA  A    1 P 16:248:00000 16:254:86370 LEICA GRX1200+GNSS   ----- -----------
 SOPU  A    1 P 16:248:00000 16:254:86370 LEICA GR10           ----- -----------
 TERU  A    1 P 16:248:00000 16:254:86370 LEICA GRX1200GGPRO   ----- -----------
 VITO  A    1 P 16:248:00000 16:254:86370 LEICA GR10           ----- -----------
 YEBE  A    1 P 16:248:00000 16:254:86370 TRIMBLE NETRS        ----- -----------
 ZARA  A    1 P 16:248:00000 16:254:86370 TRIMBLE NETR9        ----- -----------
```

6.2 Antennas

Serial number ONLY provided in case individual calibrations are vailable.

```
*SITE PT SOLN T DATA_START__ DATA_END____ DESCRIPTION_________ S/N__
 ACOR  A    1 P 16:248:00000 16:254:86370 LEIAT504        LEIS -----
 ALDA  A    1 P 16:248:00000 16:254:86370 LEIAS10         NONE -----
 ALSA  A    1 P 16:248:00000 16:254:86370 LEIAX1202GG     NONE -----
 AULE  A    1 P 16:248:00000 16:254:86370 LEIAS10         NONE -----
 AULE  A    1 P 16:248:00000 16:254:86370 LEIAS10         NONE -----
 BIAZ  A    1 P 16:248:00000 16:254:86370 LEIAR25         LEIT -----
```

```
 BIDA  A    1 P 16:248:00000 16:254:32370 LEIAS10         NONE -----
 BIDA  A    1 P 16:248:00000 16:254:32370 LEIAS10         NONE -----
 BRZR  A    1 P 16:248:00000 16:254:86370 LEIAS10         NONE -----
 CACE  A    1 P 16:248:00000 16:254:86370 TRM29659.00     NONE -----
 CANT  A    1 P 16:248:00000 16:254:86370 LEIAR25.R4      LEIT 25066
 CHER  A    1 P 16:248:00000 16:254:86370 LEIAX1203+GNSS  NONE -----
 CREU  A    1 P 16:248:00000 16:254:86370 LEIAR25.R4      NONE 26357
 EBRE  A    1 P 16:248:00000 16:254:86370 TRM57971.00     NONE 25503
 ELGE  A    1 P 16:248:00000 16:254:86370 LEIAR25.R4      LEIT -----
 GERN  A    1 P 16:248:00000 16:254:86370 LEIAS10         NONE -----
 IGEL  A    1 P 16:248:00000 16:254:86370 LEIAR20         LEIM -----
 ISPS  A    1 P 16:248:00000 16:254:86370 TRM59900.00     SCIS -----
 LAZK  A    1 P 16:248:00000 16:254:86370 LEIAR25.R4      LEIT -----
 LEIT  A    1 P 16:248:00000 16:254:86370 LEIAX1203+GNSS  NONE -----
 ORON  A    1 P 16:248:00000 16:254:86370 LEIAX1202GG     NONE -----
 PAS2  A    1 P 16:248:00000 16:254:86370 LEIAR20         LEIM 73034
 PASA  A    1 P 16:248:00000 16:254:86370 LEIAR20         LEIM 73034
 RIO1  A    1 P 16:248:00000 16:254:86370 LEIAR25.R4      LEIT 25138
 SALA  A    1 P 16:248:00000 16:254:86370 LEIAR25         NONE -----
 SOPU  A    1 P 16:248:00000 16:254:86370 LEIAS10         NONE -----
 TERU  A    1 P 16:248:00000 16:254:86370 LEIAT504GG      LEIS -----
 VITO  A    1 P 16:248:00000 16:254:86370 LEIAS10         NONE -----
 YEBE  A    1 P 16:248:00000 16:254:86370 TRM29659.00     NONE -----
 ZARA  A    1 P 16:248:00000 16:254:86370 TRM29659.00     NONE -----
```

6.3 Eccentrities

```
*                                          UP______ NORTH___ EAST____
*SITE PT SOLN T DATA_START__ DATA_END____ AXE ARP->BENCHMARK(M)_________
 ACOR  A    1 P 16:248:00000 16:254:86370 UNE   3.0460   0.0000   0.0000
 ALDA  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 ALSA  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 AULE  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 AULE  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 BIAZ  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 BIDA  A    1 P 16:248:00000 16:254:32370 UNE   0.0000   0.0000   0.0000
 BIDA  A    1 P 16:248:00000 16:254:32370 UNE   0.0000   0.0000   0.0000
 BRZR  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 CACE  A    1 P 16:248:00000 16:254:86370 UNE   0.0600   0.0000   0.0000
 CANT  A    1 P 16:248:00000 16:254:86370 UNE   3.0490   0.0000   0.0000
 CHER  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 CREU  A    1 P 16:248:00000 16:254:86370 UNE   0.0770   0.0000   0.0000
 EBRE  A    1 P 16:248:00000 16:254:86370 UNE   0.0770   0.0000   0.0000
 ELGE  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 GERN  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 IGEL  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 ISPS  A    1 P 16:248:00000 16:254:86370 UNE   0.0350   0.0000   0.0000
 LAZK  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 LEIT  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 ORON  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 PAS2  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 PASA  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 RIO1  A    1 P 16:248:00000 16:254:86370 UNE   0.0606   0.0000   0.0000
 SALA  A    1 P 16:248:00000 16:254:86370 UNE   0.0600   0.0000   0.0000
 SOPU  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 TERU  A    1 P 16:248:00000 16:254:86370 UNE   0.0600   0.0000   0.0000
 VITO  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 YEBE  A    1 P 16:248:00000 16:254:86370 UNE   0.0000   0.0000   0.0000
 ZARA  A    1 P 16:248:00000 16:254:86370 UNE   3.2590   0.0000   0.0000
```

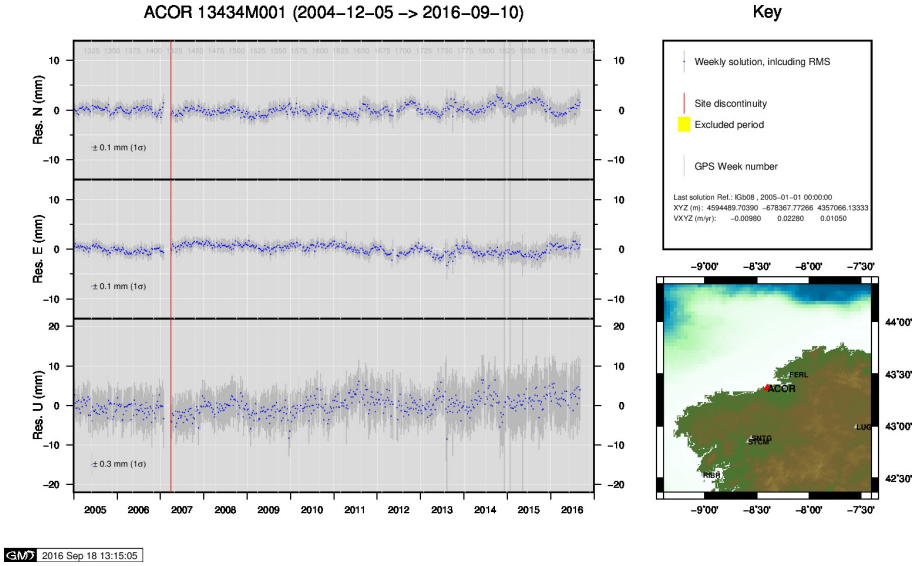
7 Inconsistencies (logsheet-RINEX metadata)

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

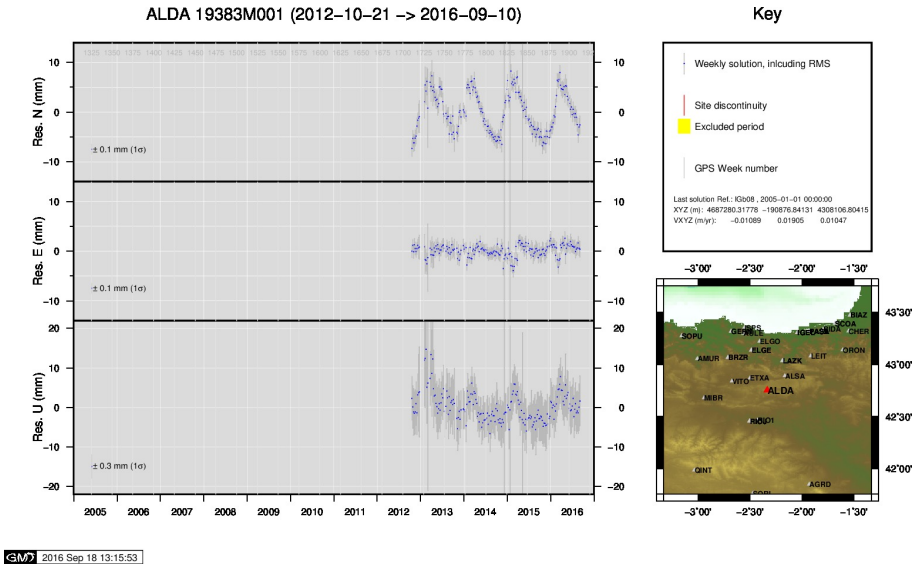
```
2016-09-18 04:30 UTC | ISPS2480.16O | RECEIVER FIRM. VERS. |  5.14 -> NP 5.10 / SP 5.10
2016-09-18 05:42 UTC | ISPS2490.16O | RECEIVER FIRM. VERS. |  5.14 -> NP 5.10 / SP 5.10
2016-09-18 06:56 UTC | ISPS2500.16O | RECEIVER FIRM. VERS. |  5.14 -> NP 5.10 / SP 5.10
2016-09-18 08:11 UTC | ISPS2510.16O | RECEIVER FIRM. VERS. |  5.14 -> NP 5.10 / SP 5.10
2016-09-18 10:02 UTC | ISPS2520.16O | RECEIVER FIRM. VERS. |  5.14 -> NP 5.10 / SP 5.10
2016-09-18 11:22 UTC | ISPS2530.16O | RECEIVER FIRM. VERS. |  5.14 -> NP 5.10 / SP 5.10
2016-09-18 13:00 UTC | ISPS2540.16O | RECEIVER FIRM. VERS. |  5.14 -> NP 5.10 / SP 5.10
```

8 Cumulative Time Series

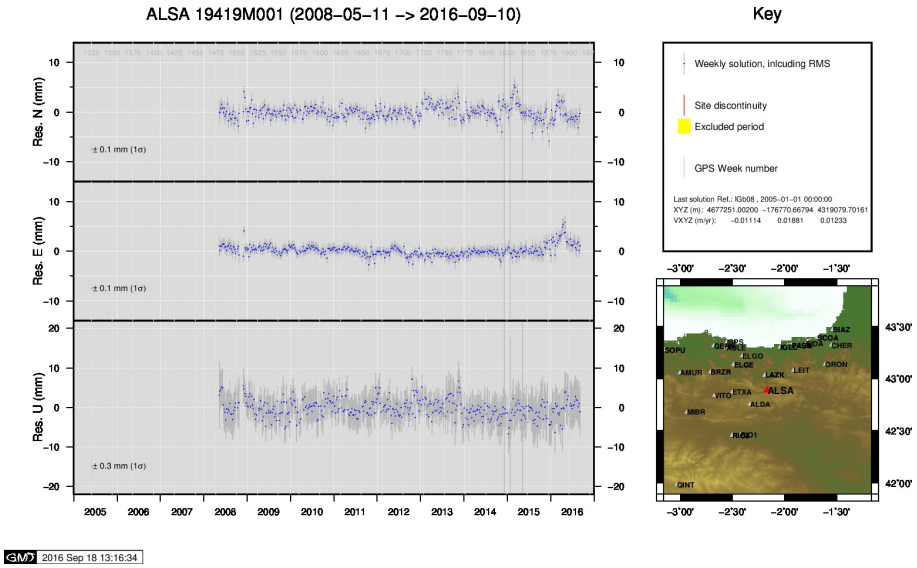
Time series of stations. Latest plots at: http://geolabpasaia.org/gnss/ARA-net/TSeries/, or click on the caption of each image.



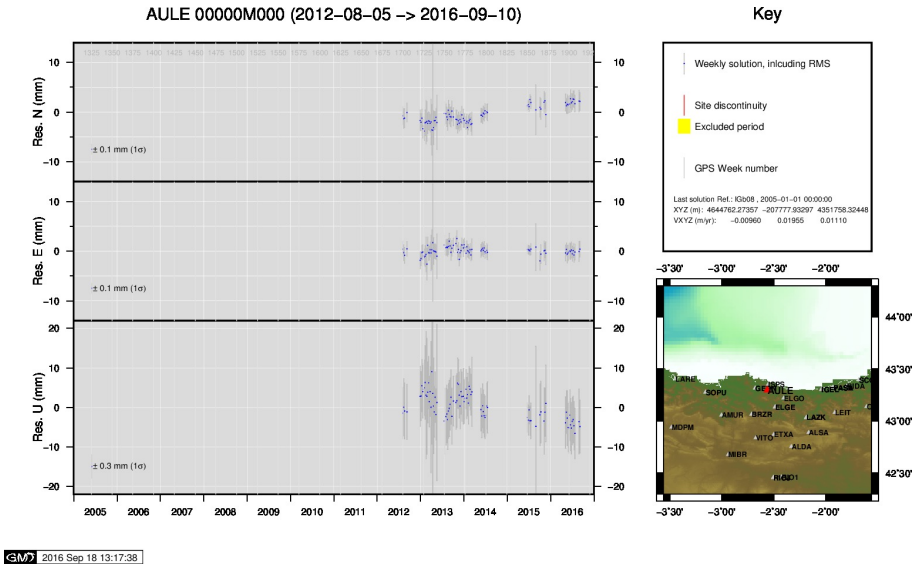
1) ACOR



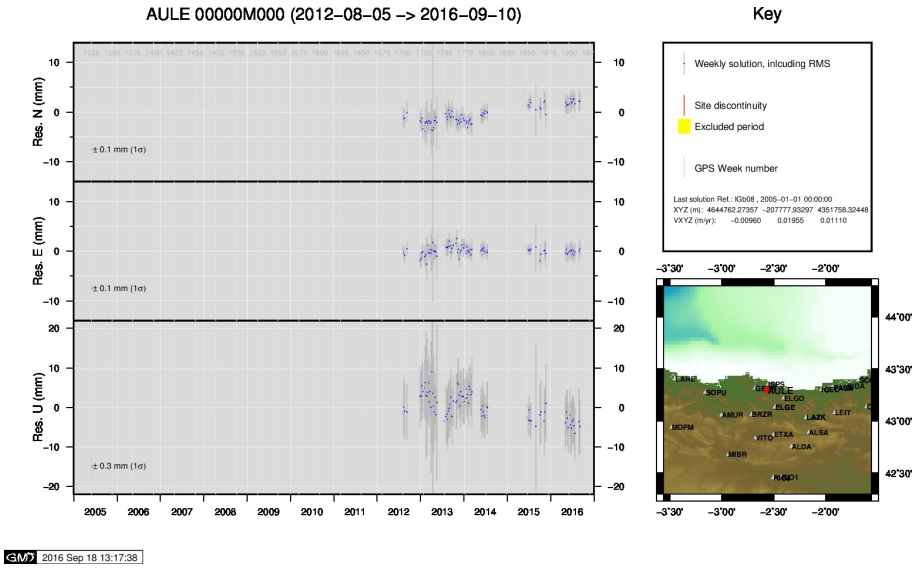
2) ALDA



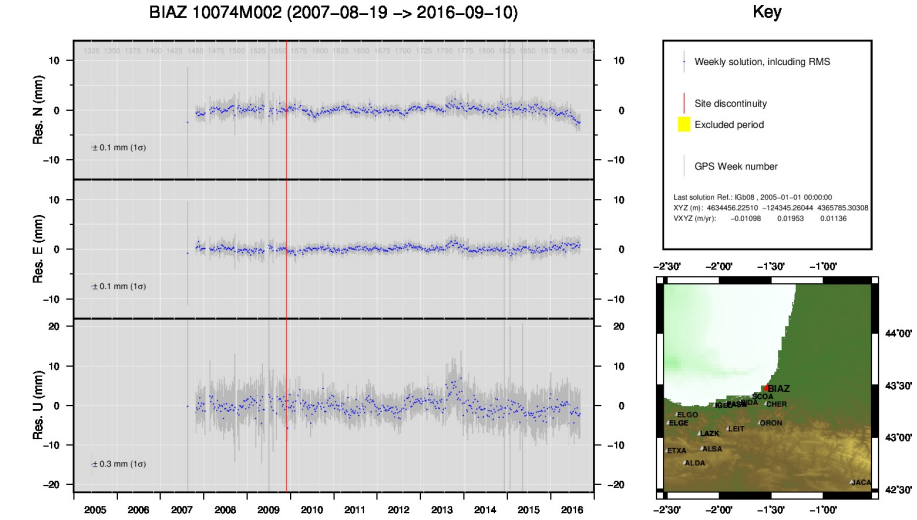
3) ALSA



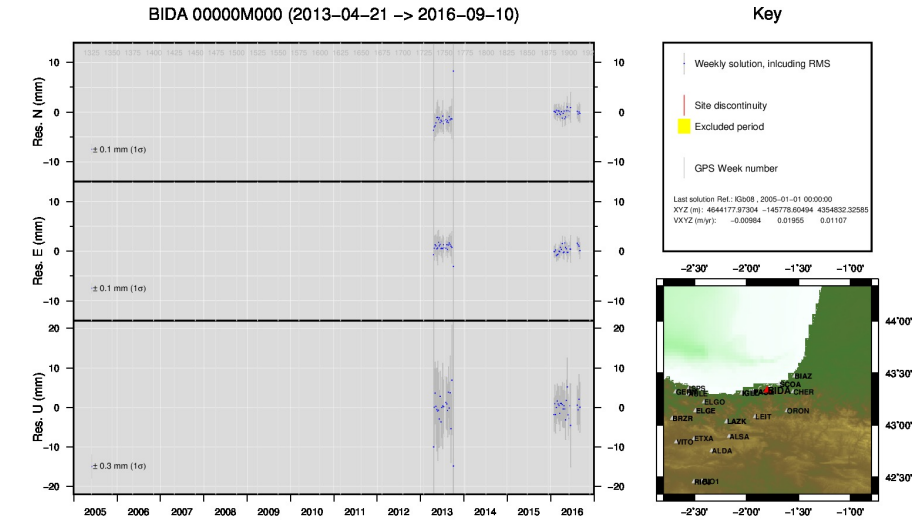
4) AULE



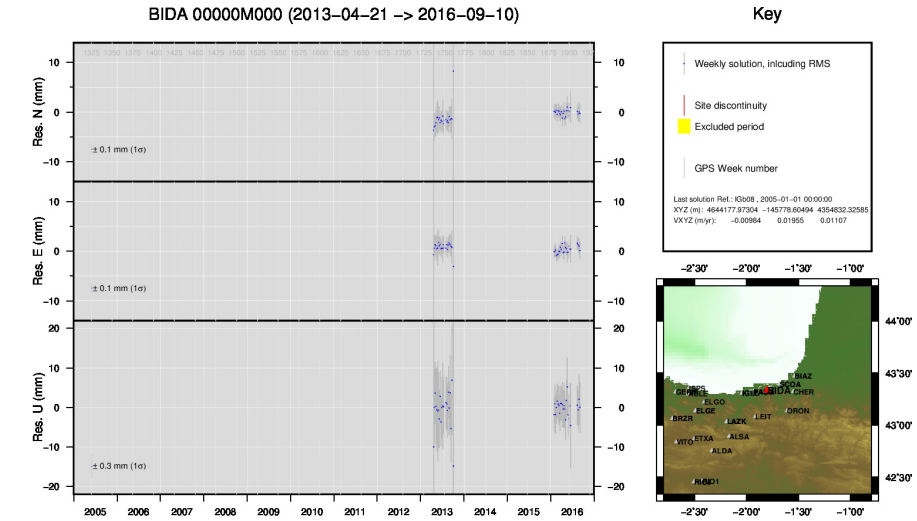
5) AULE



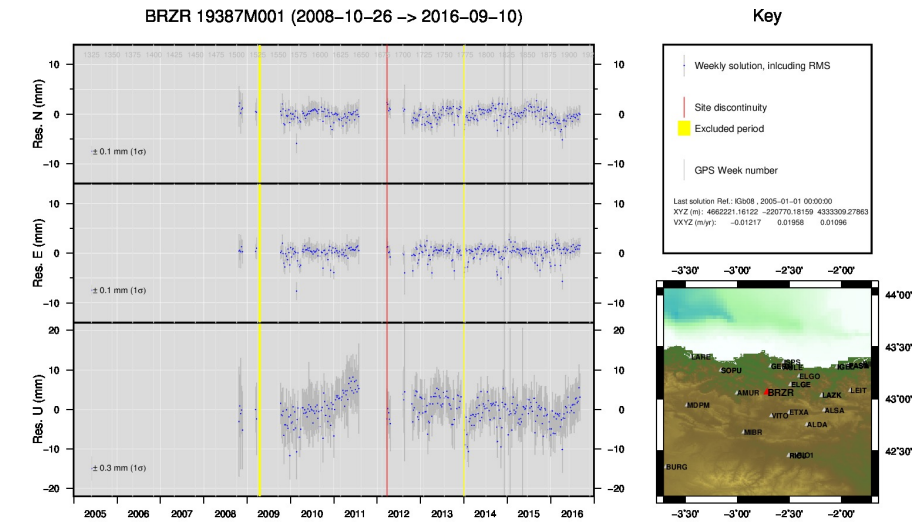
6) BIAZ



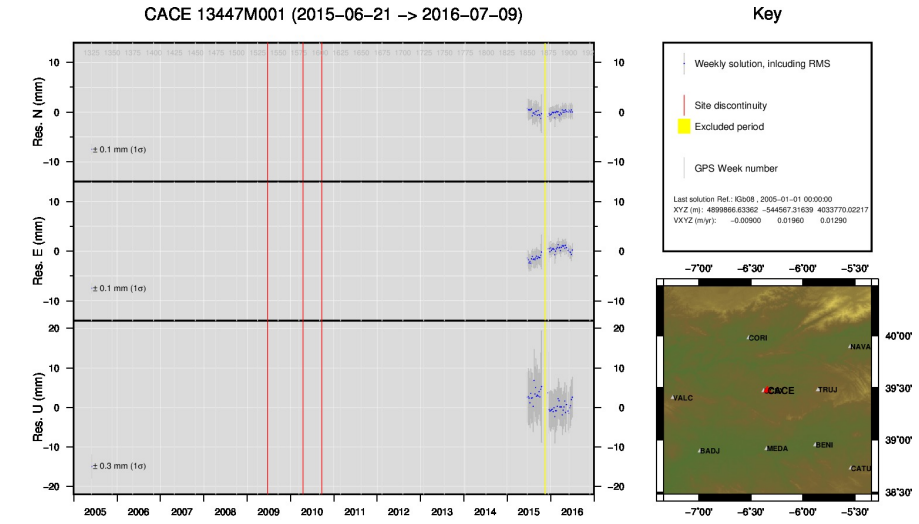
7) BIDA



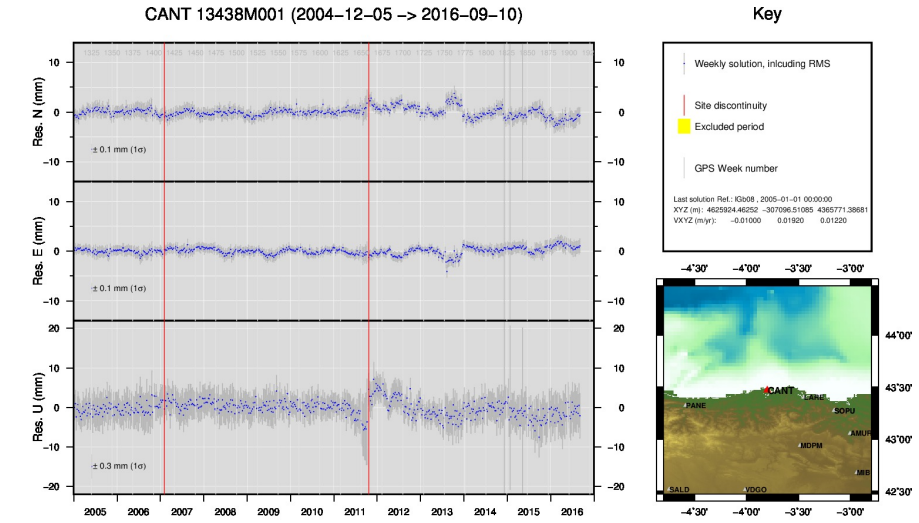
8) BIDA



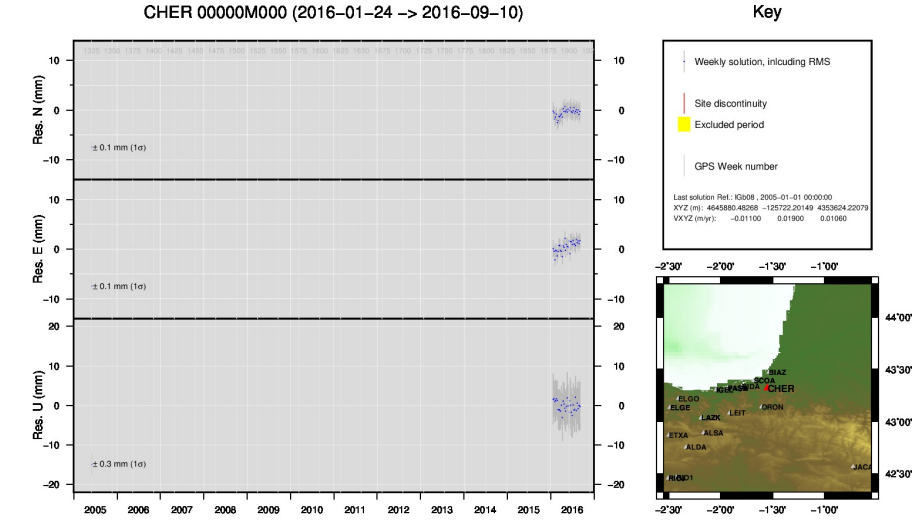
9) BRZR



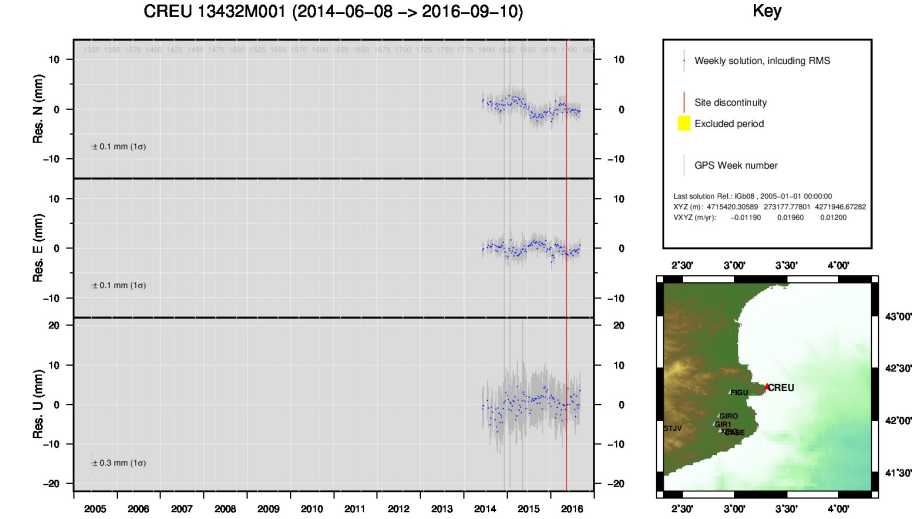
10) CACE



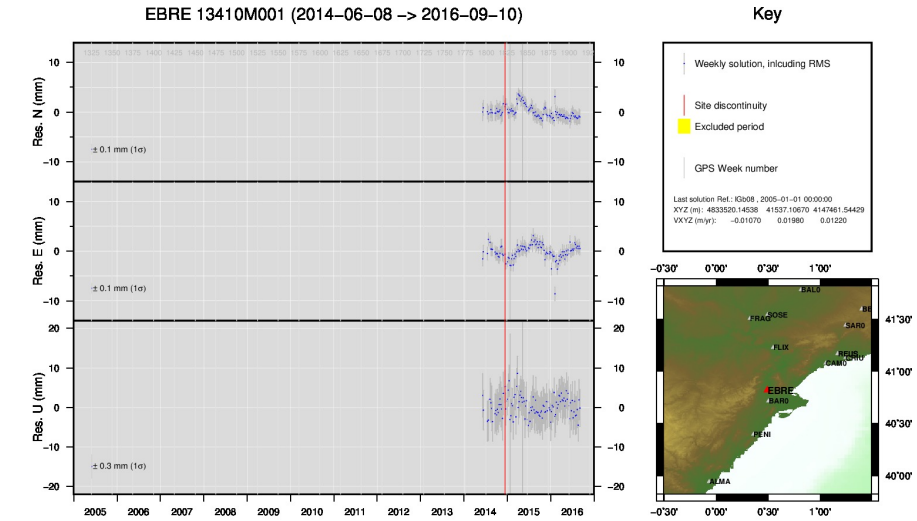
11) CANT



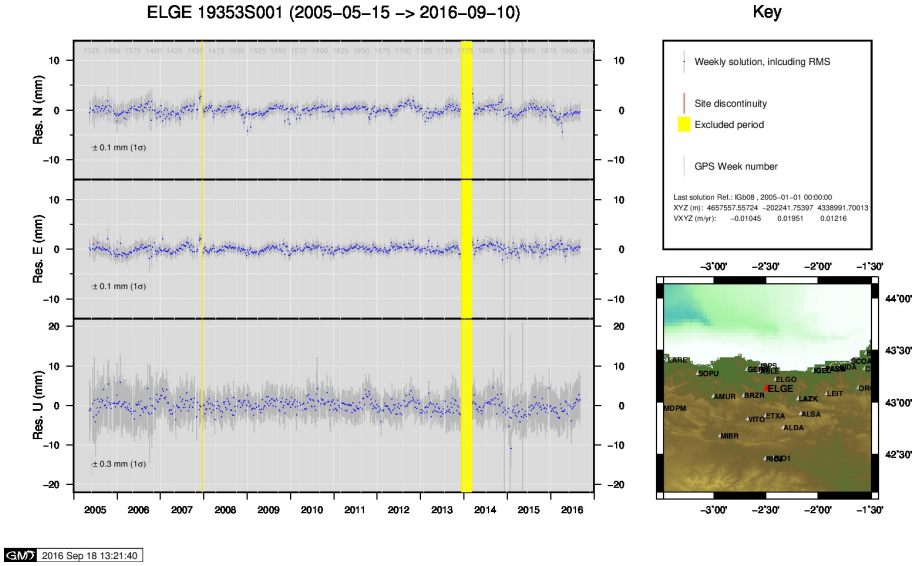
12) CHER



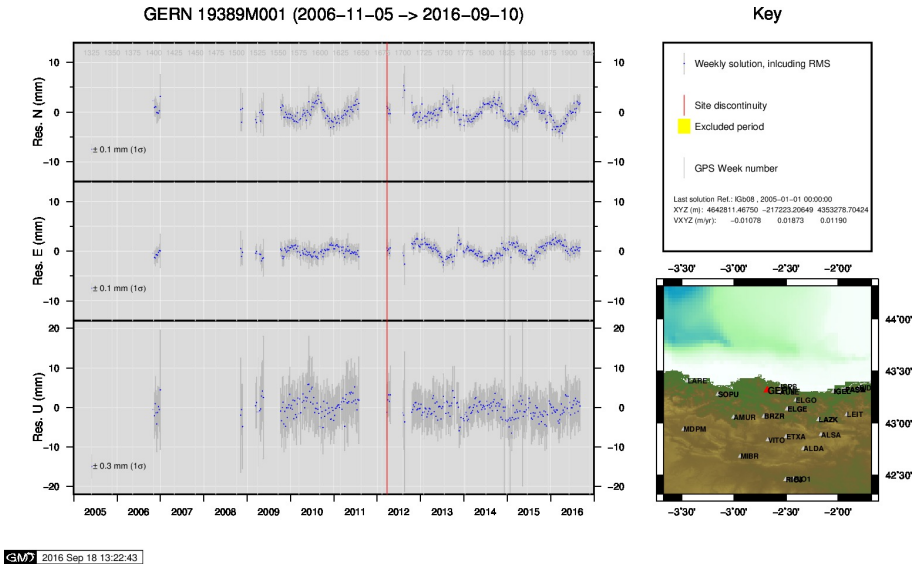
13) CREU



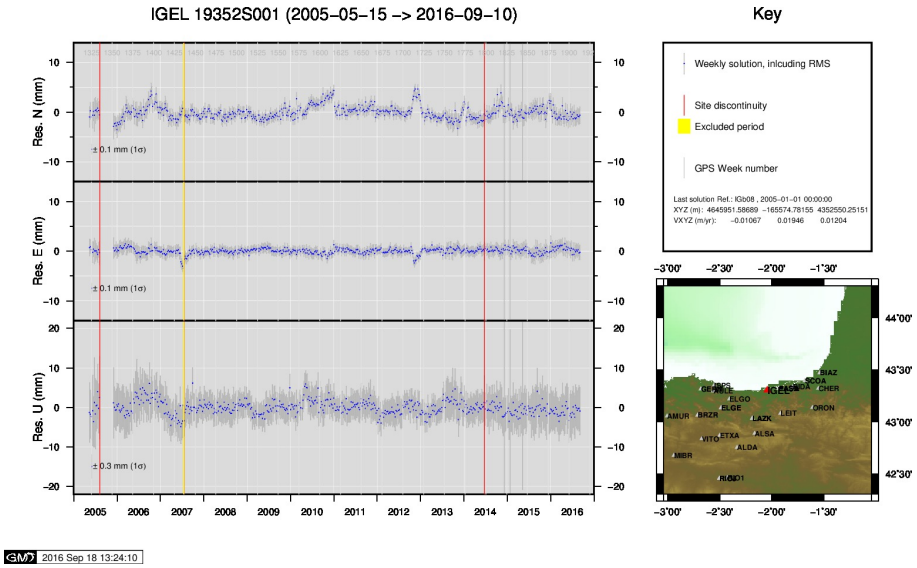
14) EBRE



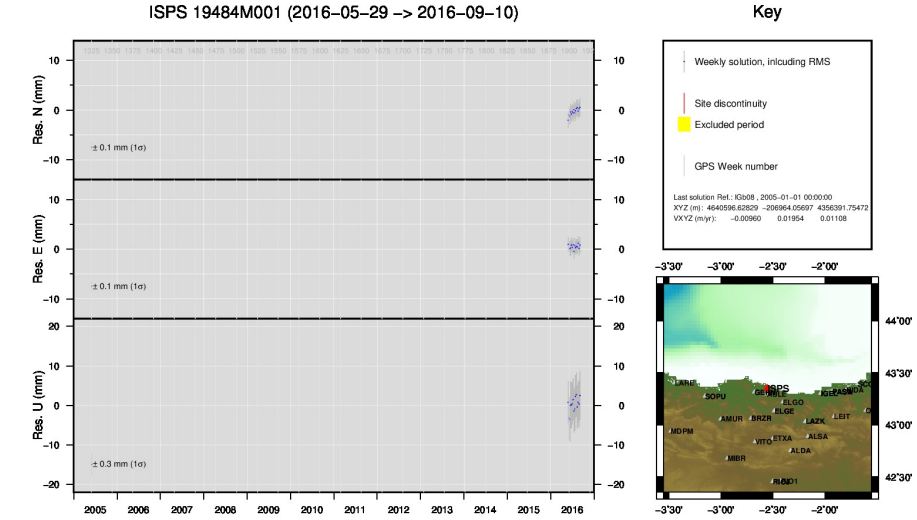
15) ELGE



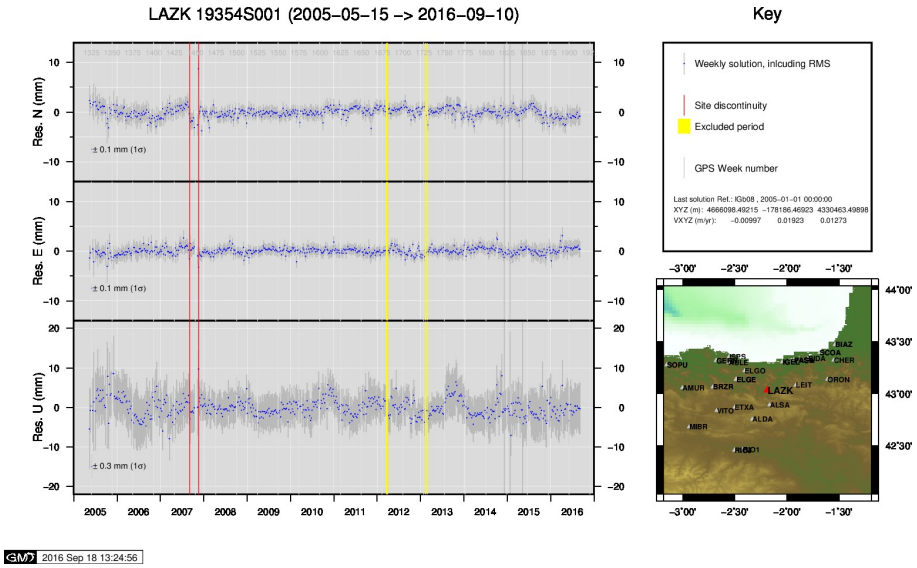
16) GERN



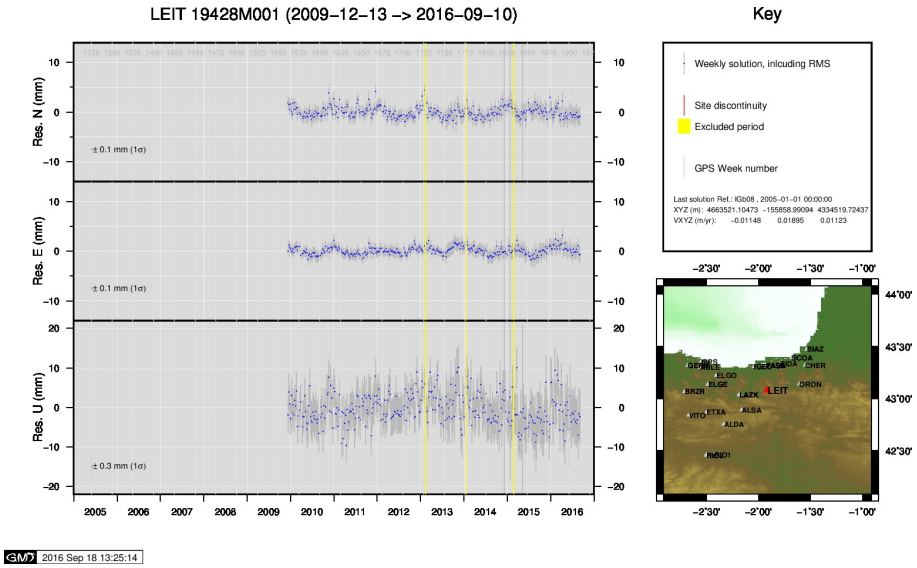
17) IGEL



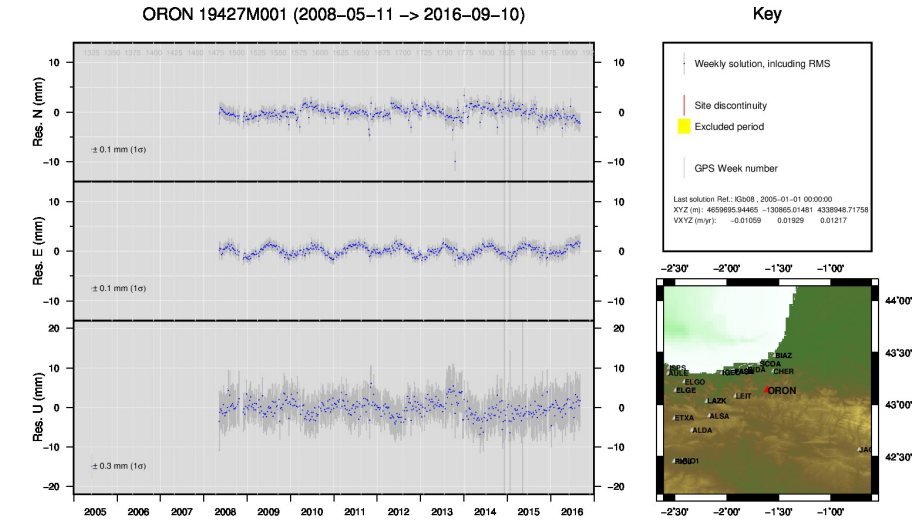
18) ISPS



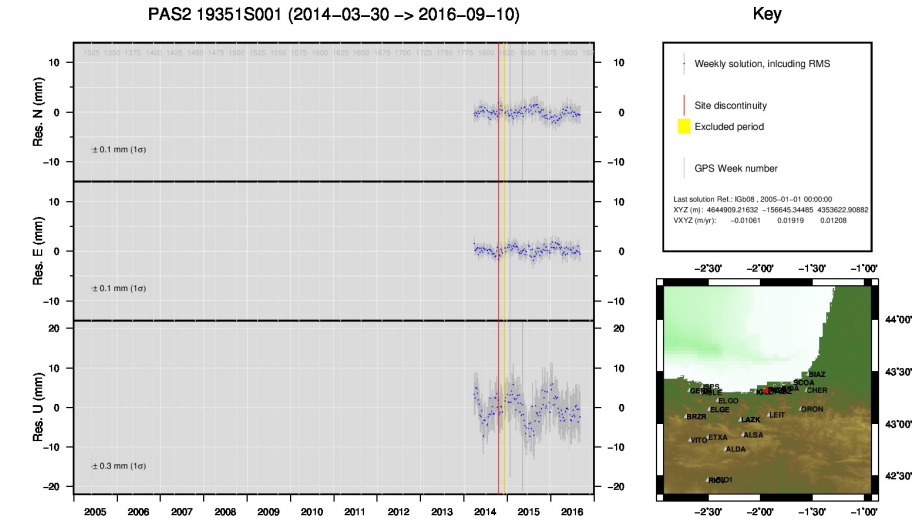
19) LAZK



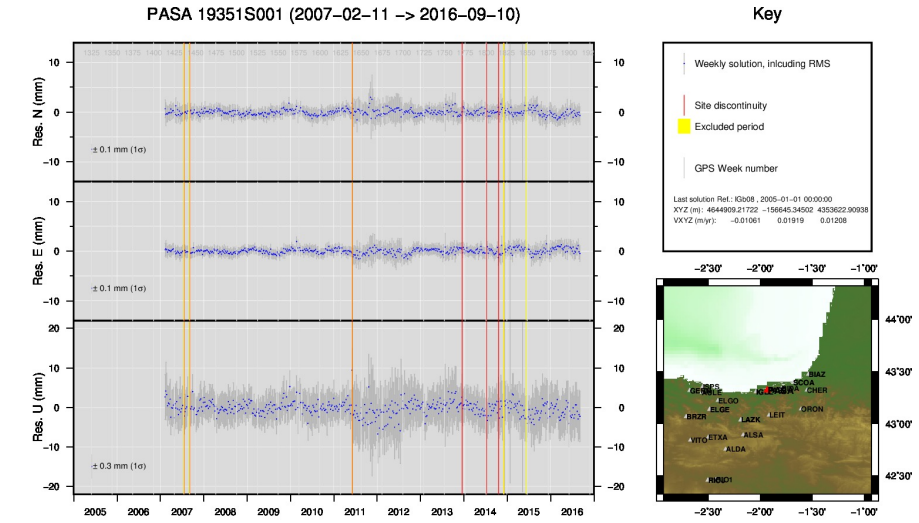
20) LEIT



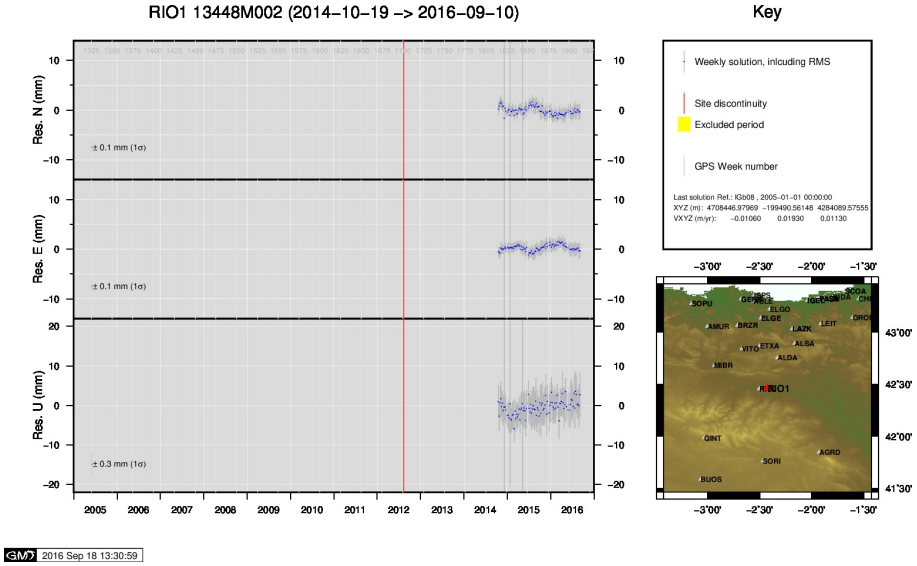
21) ORON



22) PAS2

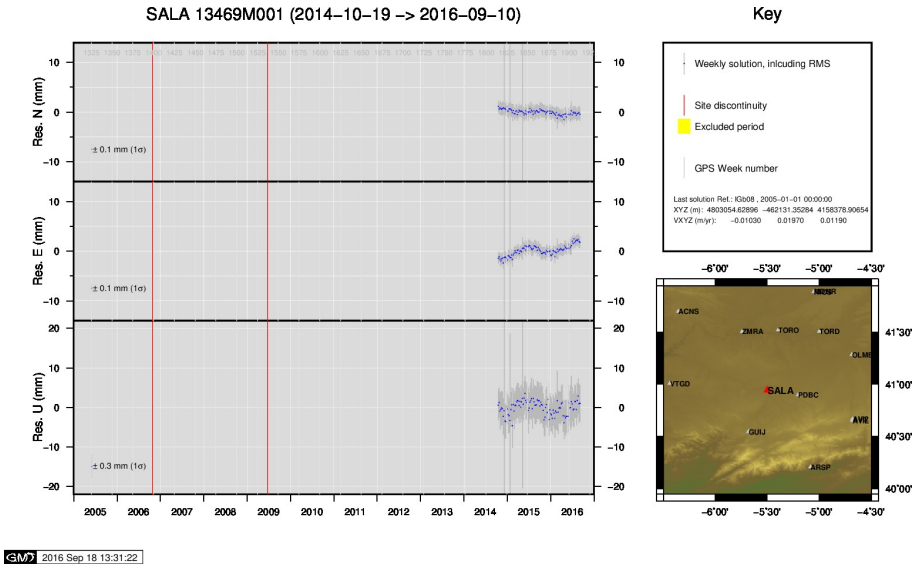


23) PASA



GMT 2016 Sep 18 13:30:59

24) RIO1



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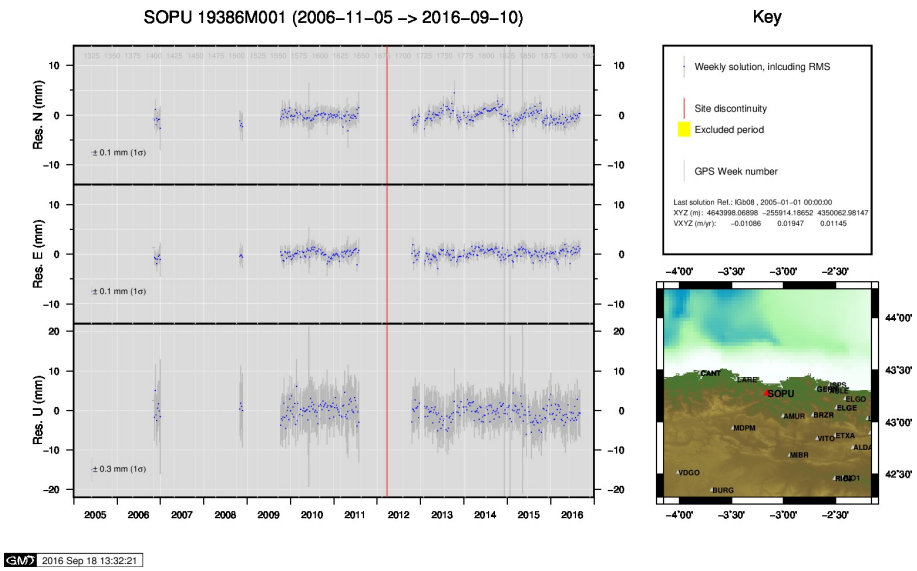
25) SALA



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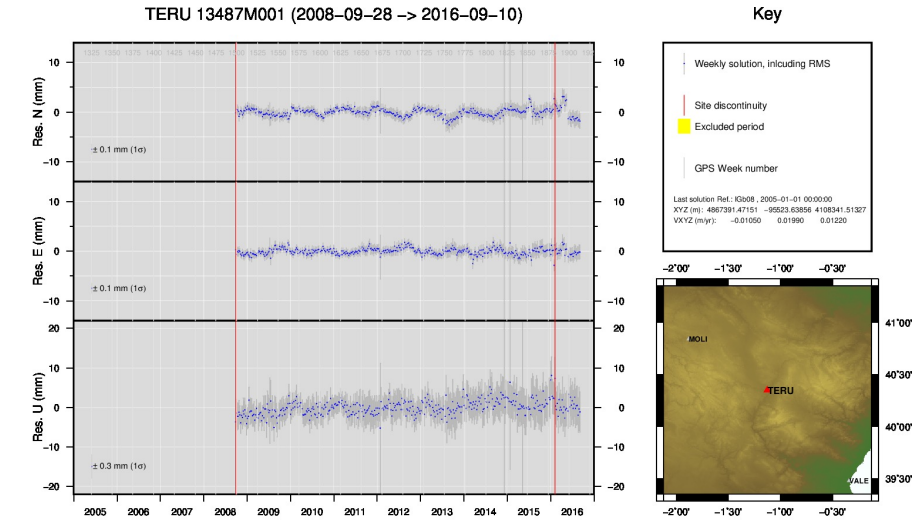
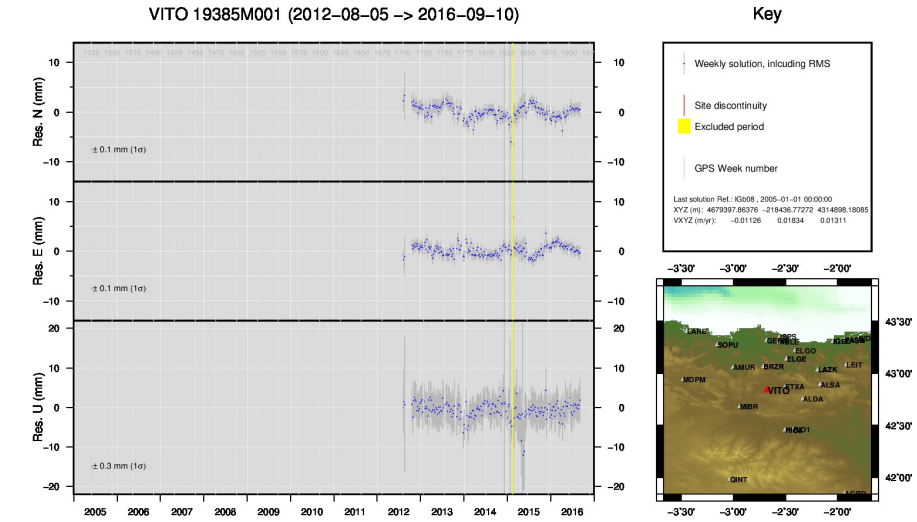
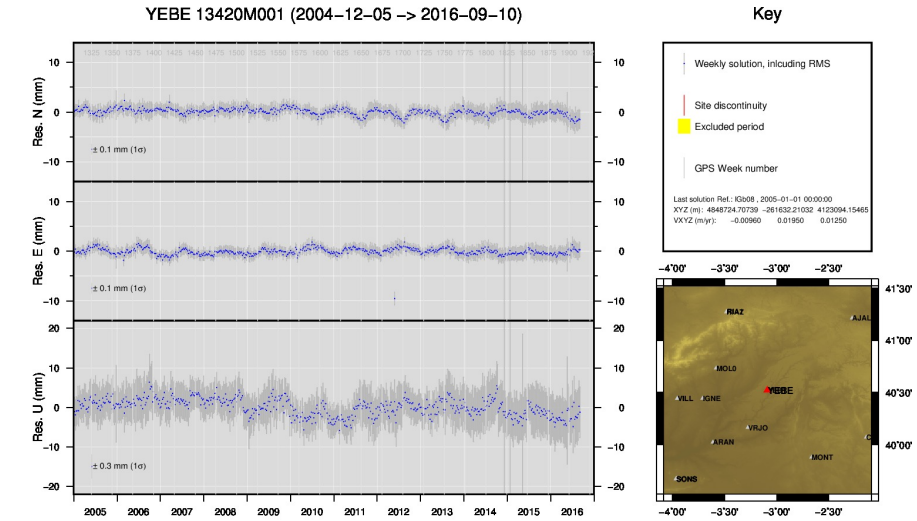
26) SOPU



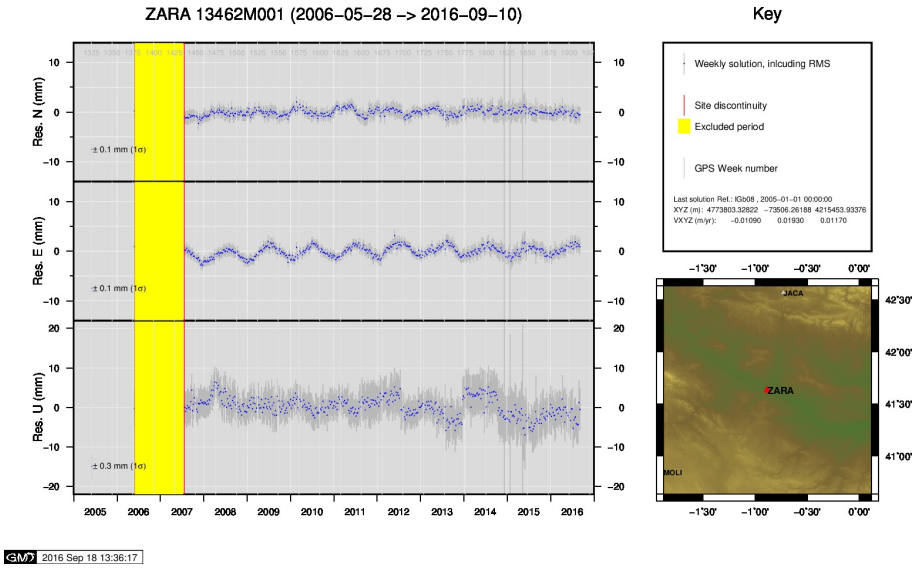
27) TERU



28) VITO



29) YEBE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Res. U (mm)
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±0.1 mm (1σ)
±0.3 mm (1σ)
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Weekly solution, inlcuding RMS
Site discontinuity
Excluded period
GPS Week number
Last solution Ref.: IGb08 , 2005–01–01 00:00:00
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41°30'
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JACA
ZARA
MOLI
2016 Sep 18 13:36:17

30) ZARA