ARA-DAC Weekly Analysis Result: 1987 (GFA)

Technical Report

GPS Week: 1987 (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

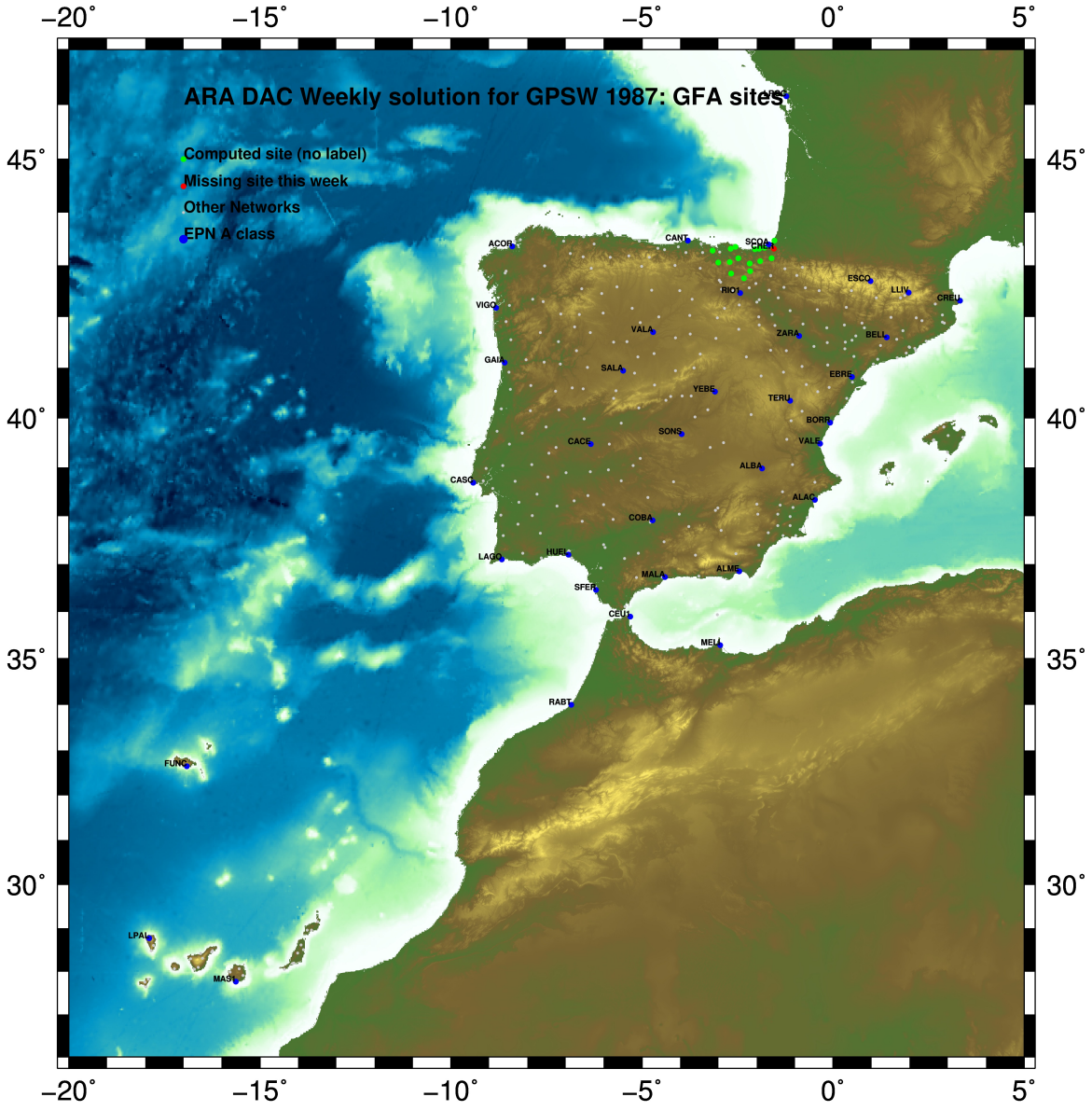

Fig.1: Computed Sites for GPS Week1987 (GFA)

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 avalaible 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 C1950.

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ARA LAC 1987 WEEK FINAL COMBINATION: PRECISE ORBITS             18-FEB-18 16:08
------------------------------------------------------------------------------
LOCAL GEODETIC DATUM: IGS14             EPOCH: 2018-02-07 12:00:00

NUM  STATION NAME          X (M)          Y (M)          Z (M)     FLAG

  3  ACOR 13434M001    4594489.57215  -678367.47741  4357066.26902    W
 24  ALDA 19383M001    4687280.16879  -190876.59191  4308106.94598    A
 30  ALSA 19419M001    4677250.84513  -176770.42200  4319079.85679    A
 31  AMUR 19388M001    4661499.46273  -244591.28530  4332269.86844    A
 54  BIAZ 10074M002    4634456.06629  -124345.00333  4365785.44389    A
 55  BIDA 00000M000    4644177.84002  -145778.35029  4354832.47136    A
 58  BRZR 19387M001    4662220.99982  -220769.92336  4333309.41826    A
 95  CACE 13447M001    4899866.51470  -544567.06221  4033770.18739    W
106  CANT 13438M001    4625924.32476  -307096.25934  4365771.53901    W
150  CREU 13432M001    4715420.14671   273178.03303  4271946.82772    W
186  EBRE 13410M001    4833520.00489    41537.36163  4147461.70107    W
 85  ELGE 19353S001    4657557.41476  -202241.50063  4338991.85191    A
 98  GERN 19389M001    4642811.32149  -217222.95675  4353278.86382    A
115  IGEL 19352S001    4645951.44121  -165574.52971  4352550.40253    A
119  ISPS 19484M001    4640596.48791  -206963.80209  4356391.89480    A
126  LAZK 19354S001    4666098.35341  -178186.21834  4330463.65720    A
129  LEIT 19428M001    4663520.95435  -155858.74290  4334519.87451    A
158  ORON 19427M001    4659695.80097  -130864.76380  4338948.87327    A
165  PAS2 19351S001    4644909.07429  -156645.09468  4353623.06365    A
173  PASA 19351S001    4644909.07236  -156645.09420  4353623.06225    A
491  RIO1 13448M002    4708446.83873  -199490.30967  4284089.72129    W
496  SALA 13469M001    4803054.49437  -462131.09712  4158379.06208    W
504  SCOA 10088M002    4639940.51495  -136224.96769  4359552.39828    W
200  SOPU 19386M001    4643997.92556  -255913.93393  4350063.12867    A
569  TERU 13487M001    4867391.33759   -95523.37880  4108341.66873    W
232  VITO 19385M001    4679397.71395  -218436.52972  4314898.34856    A
671  YEBE 13420M001    4848724.58221  -261631.95689  4123094.31515    W
674  ZARA 13462M001    4773803.18112   -73506.01163  4215454.08229    W
```

5.2 ETRF2000 (ETRS89) Coordinates

European **T**errestrial **R**eference **S**ystem, **1989** (**ETRS89**) is realized by ETRF2000 (Boucher and Altamimi, 2011) and (Altamimi, 2017).

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ETRF2000 FINAL COORD. wk 1987                                   18-FEB-18 16:08
------------------------------------------------------------------------------
LOCAL GEODETIC DATUM: ETRF2000          EPOCH: 2018-02-07 12:00:00

NUM  STATION NAME          X (M)          Y (M)          Z (M)     FLAG

  3  ACOR 13434M001    4594489.86779  -678367.98976  4357065.86881    W
 24  ALDA 19383M001    4687280.51583  -190877.11248  4308106.54477    A
 30  ALSA 19419M001    4677251.19447  -176770.94153  4319079.45647    A
 31  AMUR 19388M001    4661499.80535  -244591.80344  4332269.46848    A
 54  BIAZ 10074M002    4634456.42458  -124345.51844  4365785.04728    A
 55  BIDA 00000M000    4644178.19519  -145778.86643  4354832.07380    A
 58  BRZR 19387M001    4662221.34518  -220770.44152  4333309.01852    A
 95  CACE 13447M001    4899866.80394  -544567.60456  4033769.76654    W
106  CANT 13438M001    4625924.66260  -307096.77410  4365771.14090    W
150  CREU 13432M001    4715420.54320   273177.51124  4271946.42975    W
186  EBRE 13410M001    4833520.36727    41536.82731  4147461.29188    W
 85  ELGE 19353S001    4657557.76257  -202242.01827  4338991.45273    A
 98  GERN 19389M001    4642811.66856  -217223.47296  4353278.46553    A
115  IGEL 19352S001    4645951.79401  -165575.04609  4352550.00461    A
119  ISPS 19484M001    4640596.83634  -206964.31805  4356391.49679    A
126  LAZK 19354S001    4666098.70334  -178186.73676  4330463.25767    A
129  LEIT 19428M001    4663521.30705  -155859.26101  4334519.47543    A
158  ORON 19427M001    4659696.15676  -130865.28145  4338948.47475    A
165  PAS2 19351S001    4644909.42816  -156645.61093  4353622.66591    A
173  PASA 19351S001    4644909.42623  -156645.61045  4353622.66451    A
491  RIO1 13448M002    4708447.18321  -199490.83236  4284089.31844    W
496  SALA 13469M001    4803054.80112  -462131.62981  4158378.64928    W
504  SCOA 10088M002    4639940.87150  -136225.48338  4359552.00114    W
200  SOPU 19386M001    4643998.26809  -255914.45036  4350062.72985    A
569  TERU 13487M001    4867391.68206   -95523.91691  4108341.25551    W
232  VITO 19385M001    4679398.05835  -218437.04958  4314897.94760    A
671  YEBE 13420M001    4848724.90908  -261632.49362  4123093.90137    W
674  ZARA 13462M001    4773803.53515   -73506.54043  4215453.67614    W
```

5.3 ETRF2014 (ETRS89) Coordinates

European **T**errestrial **R**eference **S**ystem, **1989** (**ETRS89**) is realized by ETRF2014 (Boucher and Altamimi, 2011) and (Altamimi, 2017) (Altamimi, 2017).

ETRF2014 FINAL COORD. wk 1987 18-FEB-18 16:08

LOCAL GEODETIC DATUM: ETRF2014 EPOCH: 2018-02-07 12:00:00

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
3	ACOR 13434M001	4594489.82490	-678368.02886	4357065.91664	W
24	ALDA 19383M001	4687280.47084	-190877.15285	4308106.59249	A
30	ALSA 19419M001	4677251.14954	-176770.98198	4319079.50422	A
31	AMUR 19388M001	4661499.76076	-244591.84373	4332269.51624	A
54	BIAZ 10074M002	4634456.37989	-124345.55923	4365785.09516	A
55	BIDA 00000M000	4644178.15047	-145778.90711	4354832.12164	A
58	BRZR 19387M001	4662221.30051	-220770.48188	4333309.06629	A
95	CACE 13447M001	4899866.75777	-544567.64296	4033769.81373	W
106	CANT 13438M001	4625924.61850	-307096.81431	4365771.18872	W
150	CREU 13432M001	4715420.49647	273177.46946	4271946.47769	W
186	EBRE 13410M001	4833520.32016	41536.78672	4147461.33941	W
85	ELGE 19353S001	4657557.71789	-202242.05871	4338991.50051	A
98	GERN 19389M001	4642811.62406	-217223.51340	4353278.51335	A
115	IGEL 19352S001	4645951.74934	-165575.08670	4352550.05244	A
119	ISPS 19484M001	4640596.79183	-206964.35854	4356391.54462	A
126	LAZK 19354S001	4666098.65851	-178186.77725	4330463.30545	A
129	LEIT 19428M001	4663521.26218	-155859.30158	4334519.52322	A
158	ORON 19427M001	4659696.11185	-130865.32212	4338948.52257	A
165	PAS2 19351S001	4644909.38347	-156645.65157	4353622.71375	A
173	PASA 19351S001	4644909.38154	-156645.65109	4353622.71235	A
491	RIO1 13448M002	4708447.13805	-199490.87262	4284089.36611	W
496	SALA 13469M001	4803054.75573	-462131.66885	4158378.69666	W
504	SCOA 10088M002	4639940.82679	-136225.52411	4359552.04899	W
200	SOPU 19386M001	4643998.22369	-255914.49067	4350062.77764	A
569	TERU 13487M001	4867391.63503	-95523.95692	4108341.30289	W
232	VITO 19385M001	4679398.01352	-218437.08989	4314897.99533	A
671	YEBE 13420M001	4848724.86271	-261632.53315	4123093.94872	W
674	ZARA 13462M001	4773803.48898	-73506.58086	4215453.72373	W

6 Quality Control

6.1 Mean and Daily Repeatabilities

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

ARA LAC 1987 WEEK FINAL COMBINATION: PRECISE ORBITS 18-FEB-18 16:08

Station	#Days	Weekday 0123456	Repeatability (mm) N	E	U
ACOR 13434M001	7	XXXXXXX	0.70	0.55	1.11
ALDA 19383M001	7	XXXXXXX	0.79	1.09	2.31
ALSA 19419M001	7	XXXXXXX	2.08	0.84	1.79
AMUR 19388M001	7	XXXXXXX	4.05	1.36	3.26
BIAZ 10074M002	7	XXXXXXX	0.76	0.70	2.17
BIDA 00000M000	7	XXXXXXX	1.00	1.25	4.13
BRZR 19387M001	7	XXXXXXX	6.29	4.44	4.72
CACE 13447M001	7	XXXXXXX	0.67	0.76	2.61
CANT 13438M001	7	XXXXXXX	0.75	0.49	3.04
CREU 13432M001	7	XXXXXXX	0.99	0.68	2.24
EBRE 13410M001	7	XXXXXXX	0.85	1.55	2.43
ELGE 19353S001	7	XXXXXXX	1.23	0.95	3.69
GERN 19389M001	7	XXXXXXX	0.98	0.57	2.06
IGEL 19352S001	6	XXXX XX	0.65	0.60	1.03
ISPS 19484M001	7	XXXXXXX	1.19	1.08	7.06
LAZK 19354S001	7	XXXXXXX	0.67	0.66	6.39
LEIT 19428M001	7	XXXXXXX	3.87	2.18	5.20
ORON 19427M001	7	XXXXXXX	0.83	1.33	4.26
PAS2 19351S001	5	XXX XX	1.02	1.32	2.87
PASA 19351S001	7	XXXXXXX	0.82	0.69	2.02
RIO1 13448M002	7	XXXXXXX	1.87	0.87	2.54
SALA 13469M001	7	XXXXXXX	0.30	0.52	1.76
SCOA 10088M002	7	XXXXXXX	0.75	0.61	1.20
SOPU 19386M001	7	XXXXXXX	0.95	1.14	2.22
TERU 13487M001	7	XXXXXXX	1.99	1.20	1.45
VITO 19385M001	7	XXXXXXX	1.46	1.18	3.37
YEBE 13420M001	7	XXXXXXX	3.98	1.64	2.38
ZARA 13462M001	7	XXXXXXX	1.10	1.29	0.79

Comparison of individual solutions:

ACOR 13434M001	N	0.70	0.03	-0.60	1.05	0.05	0.61	-0.53	0.91
ACOR 13434M001	E	0.55	-0.13	0.52	0.19	-0.19	-0.72	-0.90	0.34
ACOR 13434M001	U	1.11	-0.01	0.79	1.53	1.52	-0.54	-0.91	-0.97
ALDA 19383M001	N	0.79	0.14	0.91	0.12	-0.73	-1.03	-1.11	0.09
ALDA 19383M001	E	1.09	-1.90	-1.33	0.00	-0.87	-0.28	-0.89	-0.40
ALDA 19383M001	U	2.31	3.40	1.72	-3.08	0.17	1.22	-1.67	-1.94
ALSA 19419M001	N	2.08	-0.75	-1.67	-0.85	-0.11	-1.62	2.55	3.58
ALSA 19419M001	E	0.84	-0.21	-0.82	-0.91	-0.51	0.50	-1.25	0.80
ALSA 19419M001	U	1.79	1.27	-0.30	-1.25	-1.95	-1.59	1.17	2.89
AMUR 19388M001	N	4.05	2.35	2.96	2.78	-2.45	-8.26	1.13	0.94
AMUR 19388M001	E	1.36	-0.82	0.68	0.30	2.00	-0.92	-2.15	-0.61
AMUR 19388M001	U	3.26	-1.50	-1.88	-4.92	0.18	5.74	-0.75	-0.45
BIAZ 10074M002	N	0.76	0.38	0.60	-0.38	-0.31	-0.61	-1.07	-1.09
BIAZ 10074M002	E	0.70	-0.38	-0.78	0.69	0.69	0.41	-1.03	0.07
BIAZ 10074M002	U	2.17	-1.05	-1.68	-3.31	-0.28	-0.18	-0.29	3.64
BIDA 00000M000	N	1.00	0.96	0.48	-0.50	0.09	-0.69	-1.56	-1.30
BIDA 00000M000	E	1.25	1.64	-1.15	-0.29	0.84	-0.10	-2.02	0.64
BIDA 00000M000	U	4.13	-4.58	2.71	-3.99	5.89	-2.76	-3.03	2.57
BRZR 19387M001	N	6.29	5.59	7.61	1.82	-3.59	-11.41	0.41	-1.29
BRZR 19387M001	E	4.44	-1.50	3.59	7.79	-0.90	1.00	-4.21	-4.80
BRZR 19387M001	U	4.72	2.50	-3.57	-5.51	4.74	-4.81	-0.41	6.21
CACE 13447M001	N	0.67	-0.17	-0.36	-0.13	0.18	0.45	1.03	1.12
CACE 13447M001	E	0.76	0.80	0.16	0.34	-0.39	0.36	1.53	-0.29
CACE 13447M001	U	2.61	-0.25	2.94	0.58	-1.12	1.31	-5.10	-1.67
CANT 13438M001	N	0.75	0.29	0.34	0.86	0.17	0.40	-0.39	-1.44
CANT 13438M001	E	0.49	-0.73	-0.35	0.15	-0.05	-0.11	-0.85	0.03
CANT 13438M001	U	3.04	-4.36	-0.07	0.07	3.54	-2.13	0.40	4.39
CREU 13432M001	N	0.99	0.22	0.75	-0.99	1.05	0.30	-0.57	-1.67
CREU 13432M001	E	0.68	-0.05	-0.36	1.15	-0.54	0.03	-0.90	0.50
CREU 13432M001	U	2.24	-2.33	1.50	0.44	1.93	-1.49	4.03	0.09
EBRE 13410M001	N	0.85	-0.34	0.24	-0.46	-1.44	0.83	-0.77	0.75
EBRE 13410M001	E	1.55	1.42	1.03	1.72	-2.00	0.40	0.07	-2.04
EBRE 13410M001	U	2.43	1.79	1.09	0.78	-0.83	0.01	4.10	-3.58
ELGE 19353S001	N	1.23	1.26	0.81	0.36	-0.54	-1.30	-1.81	-1.20
ELGE 19353S001	E	0.95	-0.65	-0.88	-0.75	1.18	0.89	-1.12	0.45
ELGE 19353S001	U	3.69	0.02	-0.88	-3.85	-5.03	0.24	2.22	6.00
GERN 19389M001	N	0.98	0.68	0.87	0.20	0.58	0.52	-1.55	-1.22
GERN 19389M001	E	0.57	-0.07	0.01	0.20	-0.21	0.24	-1.27	-0.41
GERN 19389M001	U	2.06	-1.39	2.10	-3.60	-0.36	-1.73	0.96	-1.41
IGEL 19352S001	N	0.65	0.13	0.26	0.51	0.32		-0.19	-1.26
IGEL 19352S001	E	0.60	-0.06	-0.52	0.92	-0.21		-0.76	-0.25
IGEL 19352S001	U	1.03	-0.61	-1.45	0.45	-0.14		1.60	0.30
ISPS 19484M001	N	1.19	2.05	-0.35	0.22	0.94	-1.40	-0.38	-1.05
ISPS 19484M001	E	1.08	-0.87	0.04	0.79	-0.30	-1.88	-1.25	0.62
ISPS 19484M001	U	7.06	-0.77	-5.70	2.23	-1.21	-15.63	2.51	2.97
LAZK 19354S001	N	0.67	-0.36	-0.13	0.23	-0.60	-0.92	1.14	-0.02
LAZK 19354S001	E	0.66	0.17	-0.27	0.03	0.37	0.47	-1.43	0.29
LAZK 19354S001	U	6.39	3.34	1.25	-4.11	2.59	-13.65	3.01	3.64
LEIT 19428M001	N	3.87	6.99	-1.62	-1.78	-4.21	3.09	-2.27	-1.71
LEIT 19428M001	E	2.18	4.35	-0.76	-0.41	0.28	-1.55	-2.49	-0.34
LEIT 19428M001	U	5.20	-3.19	10.71	-5.14	-2.53	-1.74	-1.09	-0.03
ORON 19427M001	N	0.83	0.33	0.01	-0.01	0.31	0.40	-0.27	-1.91
ORON 19427M001	E	1.33	-0.38	-1.08	0.20	-0.07	1.96	-2.33	-0.19
ORON 19427M001	U	4.26	-2.48	7.44	2.81	-3.40	-3.29	0.68	4.10
PAS2 19351S001	N	1.02		-0.83	-1.32	0.45		-0.89	0.87
PAS2 19351S001	E	1.32		-2.10	-0.40	1.08		-0.69	0.89
PAS2 19351S001	U	2.87		2.28	2.09	0.20		0.47	-4.82
PASA 19351S001	N	0.82	0.22	0.57	-0.06	-0.30	0.04	-1.23	-1.42
PASA 19351S001	E	0.69	0.10	-0.78	0.61	0.40	0.51	-1.20	-0.05
PASA 19351S001	U	2.02	-0.86	-2.45	-2.99	1.67	-1.28	0.84	1.92
RIO1 13448M002	N	1.87	0.01	0.82	1.25	1.00	-2.45	0.13	-3.43
RIO1 13448M002	E	0.87	0.07	-0.15	-0.09	-0.24	1.38	-1.46	-0.62
RIO1 13448M002	U	2.54	1.19	0.02	-1.99	-0.62	5.47	1.01	1.39

SALA	13469M001	N	0.30	-0.23	-0.32	0.31	0.29	0.05	0.11	-0.45
SALA	13469M001	E	0.52	-0.63	0.31	-0.42	0.12	-0.15	-0.74	-0.60
SALA	13469M001	U	1.76	0.29	-0.29	3.88	-0.26	-0.56	-1.59	0.59
SCOA	10088M002	N	0.75	0.45	0.46	0.22	-0.15	-0.17	-0.69	-1.54
SCOA	10088M002	E	0.61	-0.06	-0.62	0.67	0.24	0.05	-1.03	-0.54
SCOA	10088M002	U	1.20	-2.30	0.84	-0.64	0.54	-0.40	1.23	0.43
SOPU	19386M001	N	0.95	0.54	-0.18	1.90	0.44	0.77	-0.64	-0.54
SOPU	19386M001	E	1.14	0.56	0.39	1.11	0.83	1.25	-1.89	-0.52
SOPU	19386M001	U	2.22	-4.13	-0.98	-2.35	1.24	1.38	1.59	0.07
TERU	13487M001	N	1.99	0.47	-0.21	-2.98	-2.13	0.22	0.74	3.09
TERU	13487M001	E	1.20	-1.21	0.82	2.11	0.78	-0.46	-0.93	-0.62
TERU	13487M001	U	1.45	-2.63	0.06	-0.35	1.04	1.70	0.22	-1.23
VITO	19385M001	N	1.46	0.31	0.65	0.21	-2.79	-1.07	1.09	1.46
VITO	19385M001	E	1.18	-1.60	-0.21	-0.59	1.41	-0.24	-1.55	0.94
VITO	19385M001	U	3.37	-1.34	2.01	-4.74	-1.99	-1.65	-0.32	5.75
YEBE	13420M001	N	3.98	-8.84	0.89	1.82	1.44	2.68	1.00	1.62
YEBE	13420M001	E	1.64	3.48	0.88	-0.42	-1.11	-0.86	-0.89	0.62
YEBE	13420M001	U	2.38	-3.47	-1.82	1.80	1.86	-1.45	2.01	-2.39
ZARA	13462M001	N	1.10	0.10	0.90	0.13	0.11	-0.10	-2.39	-0.79
ZARA	13462M001	E	1.29	-0.31	-0.74	-0.29	-0.59	0.31	2.90	-0.65
ZARA	13462M001	U	0.79	-0.19	-0.62	1.00	0.27	0.57	0.21	1.36

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			
3	ACOR 13434M001	I W	-1.29	1.29	0.19	
10	ALAC 13433M001	I W	-0.34	0.39	-3.71	
13	ALBA 13452M001	I W	-0.51	-0.18	3.51	
18	ALME 13437M001	I W	-1.72	-0.02	1.53	
43	BELL 13431M001	I W	1.12	0.89	-0.50	
61	BORR 13480M001	I W	-1.26	-2.74	-3.45	
65	BRST 10004M004	I W	-0.73	-0.20	0.72	
95	CACE 13447M001	I W	0.97	0.87	0.72	
106	CANT 13438M001	I W	-0.36	-1.02	2.75	
110	CASC 13909S001	I W	-0.09	0.79	6.50	
117	CEU1 13449M002	I W	1.43	0.18	-0.56	
131	COBA 13453M001	I W	0.52	1.11	-4.94	
150	CREU 13432M001	I W	-1.30	-1.20	-1.32	
186	EBRE 13410M001	I W	0.70	2.38	-3.31	
203	ESCO 13435M001	I W	-0.80	0.71	2.39	
213	FUNC 13911S001	I W	-3.89	-4.12	20.96	*
215	GAIA 13902M001	I W	-0.66	0.74	3.74	
271	HUEL 13451M001	I W	0.24	0.71	2.15	
317	LAGO 13903M001	I W	-2.68	-3.61	3.55	
337	LLIV 13436M001	I W	-0.29	-5.09	-4.60	
341	LPAL 81701M001	I W	0.28	1.66	4.60	
344	LROC 10023M001	I W	-0.84	-0.65	0.10	
353	MALA 13443M001	I W	-1.59	2.42	-2.13	
371	MAS1 31303M002	I W	0.59	1.95	1.14	
381	MELI 19379M001	I W	-0.76	0.95	2.60	
442	PDEL 31906M004	I W	0.02	-0.83	5.47	
475	RABT 35001M002	I W	1.51	1.12	-0.82	
491	RIO1 13448M002	I W	-0.59	-1.01	-1.81	
496	SALA 13469M001	I W	-0.84	-0.25	-1.09	
504	SCOA 10088M002	I W	0.52	-0.65	-1.43	
511	SFER 13402M004	I W	-4.57	-0.79	-7.54	
532	SONS 13446M001	I W	1.27	1.18	-1.13	
562	TERC 31909M001	I W	6.46	-3.58	-0.41	
569	TERU 13487M001	I W	4.03	-1.70	-4.55	
629	VALA 13463M002	I W	-1.43	0.62	-0.01	
633	VALE 13439M001	I W	0.21	0.90	-3.85	
643	VIGO 13450M001	I W	0.12	0.65	1.96	
671	YEBE 13420M001	I W	1.95	0.59	-0.47	
674	ZARA 13462M001	I W	0.29	1.59	-1.00	
683	ZIMM 14001M004	I W	0.43	-0.18	5.04	
	RMS / COMPONENT		1.75	1.63	3.17	
	MEAN		-0.00	-0.00	-0.00	
	MIN		-4.57	-5.09	-7.54	
	MAX		6.46	2.42	6.50	

```
NUMBER OF PARAMETERS  :     3
NUMBER OF COORDINATES :   117
RMS OF TRANSFORMATION :    2.29 MM

BARYCENTER COORDINATES:

LATITUDE              :    39 43 11.32
LONGITUDE             :  -  5 31 23.99
HEIGHT                :         -44.859 KM


PARAMETERS:

TRANSLATION IN  N     :           0.10     +-  0.37    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                       16050358
 NUMBER OF UNKNOWNS                             214148
 NUMBER OF DEGREES OF FREEDOM                 15836210
 PHASE MEASUREMENTS SIGMA                      0.00100
 SAMPLING INTERVAL (SECONDS)                       180
 VARIANCE FACTOR                    2.146052289137201
```

Helmert Transformation Parameters With Respect to Combined Solution:

		Translation (m)			Rotation (")			
Sol	Rms (m)	X	Y	Z	X	Y	Z	Scale (ppm)
1	0.00258	0.0037	-0.0121	-0.0092	0.0002	0.0003	-0.0003	0.00027
2	0.00383	-0.0329	-0.0150	0.0434	0.0000	-0.0017	-0.0006	-0.00057
3	0.00246	0.0122	0.0009	-0.0182	0.0001	0.0007	0.0001	0.00032
4	0.00244	0.0047	-0.0141	-0.0091	0.0003	0.0003	-0.0003	0.00015
5	0.00267	0.0113	0.0043	-0.0208	-0.0001	0.0008	0.0001	0.00085
6	0.00399	-0.0077	0.0095	0.0223	-0.0002	-0.0007	0.0003	-0.00101
7	0.00275	0.0106	0.0161	-0.0150	-0.0002	0.0006	0.0005	0.00033

Statistics of individual solutions:

File	RMS (m)	DOF	Chi**2/DOF	#Observations authentic	/ pseudo	#Parameters explicit	/ implicit	/ singular
1	0.00133	2283492	1.77	2315268	3	972	30807	0
2	0.00134	2336552	1.80	2368655	3	981	31125	0
3	0.00135	2346635	1.83	2378266	3	981	30653	0
4	0.00133	2301683	1.76	2333236	3	981	30575	0
5	0.00159	2262426	2.52	2294501	3	972	31106	0
6	0.00189	2049322	3.55	2079390	3	984	29087	0
7	0.00133	2250259	1.77	2281042	3	981	29805	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 18:035:00000 18:041:86370 LEICA GRX1200PRO     ----- -----------
 ALDA  A    1 P 18:035:00000 18:041:86370 LEICA GR10           ----- -----------
 ALSA  A    1 P 18:035:00000 18:041:86370 LEICA GRX1200GGPRO   ----- -----------
 AMUR  A    1 P 18:035:00000 18:041:86370 LEICA GR10           ----- -----------
 BIAZ  A    1 P 18:035:00000 18:041:86370 TRI SP90M            ----- -----------
 BIDA  A    1 P 18:035:00000 18:041:86370 LEICA GR10           ----- -----------
 BRZR  A    1 P 18:035:00000 18:041:86370 LEICA GR10           ----- -----------
 CACE  A    1 P 18:035:00000 18:041:86370 TRIMBLE NETR9        ----- -----------
 CANT  A    1 P 18:035:00000 18:041:86370 LEICA GR10           ----- -----------
 CREU  A    1 P 18:035:00000 18:041:86370 LEICA GR50           ----- -----------
 EBRE  A    1 P 18:035:00000 18:041:86370 LEICA GR50           ----- -----------
 ELGE  A    1 P 18:035:00000 18:041:86370 LEICA GR10           ----- -----------
 GERN  A    1 P 18:035:00000 18:041:86370 LEICA GR10           ----- -----------
 IGEL  A    1 P 18:035:00000 18:041:86370 LEICA GR10           ----- -----------
 ISPS  A    1 P 18:035:00030 18:041:86370 TRIMBLE NETR9        ----- -----------
 LAZK  A    1 P 18:035:00000 18:041:86370 LEICA GR10           ----- -----------
 LEIT  A    1 P 18:035:00000 18:041:86370 LEICA GRX1200+GNSS   ----- -----------
 ORON  A    1 P 18:035:00000 18:041:86370 LEICA GRX1200GGPRO   ----- -----------
 PAS2  A    1 P 18:036:00000 18:041:86370 TPS NET-G3A          ----- -----------
 PASA  A    1 P 18:035:00000 18:041:86370 LEICA GR10           ----- -----------
 RIO1  A    1 P 18:035:00000 18:041:86370 LEICA GR25           ----- -----------
 SALA  A    1 P 18:035:00000 18:041:86370 LEICA GRX1200+GNSS   ----- -----------
 SCOA  A    1 P 18:035:00000 18:041:86370 LEICA GR25           ----- -----------
 SOPU  A    1 P 18:035:00000 18:041:86370 LEICA GR10           ----- -----------
 TERU  A    1 P 18:035:00000 18:041:86370 LEICA GRX1200GGPRO   ----- -----------
 VITO  A    1 P 18:035:00000 18:041:86370 LEICA GR10           ----- -----------
 YEBE  A    1 P 18:035:00000 18:041:86370 TRIMBLE NETRS        ----- -----------
 ZARA  A    1 P 18:035:00000 18:041:86370 TRIMBLE NETR9        ----- -----------
```

7.2 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 18:035:00000 18:041:86370 LEIAT504        LEIS -----
 ALDA  A    1 P 18:035:00000 18:041:86370 LEIAS10         NONE -----
 ALSA  A    1 P 18:035:00000 18:041:86370 LEIAX1202GG     NONE -----
 AMUR  A    1 P 18:035:00000 18:041:86370 LEIAS10         NONE -----
 BIAZ  A    1 P 18:035:00000 18:041:86370 LEIAR25         LEIT -----
 BIDA  A    1 P 18:035:00000 18:041:86370 LEIAS10         NONE -----
 BRZR  A    1 P 18:035:00000 18:041:86370 LEIAS10         NONE -----
 CACE  A    1 P 18:035:00000 18:041:86370 TRM29659.00     NONE -----
```

```
 CANT  A    1 P 18:035:00000 18:041:86370 LEIAR25.R4      LEIT 25066
 CREU  A    1 P 18:035:00000 18:041:86370 LEIAR25.R4      NONE 26357
 EBRE  A    1 P 18:035:00000 18:041:86370 LEIAR25.R4      NONE 26359
 ELGE  A    1 P 18:035:00000 18:041:86370 LEIAR25.R4      LEIT -----
 GERN  A    1 P 18:035:00000 18:041:86370 LEIAS10         NONE -----
 IGEL  A    1 P 18:035:00000 18:041:86370 LEIAR20         LEIM -----
 ISPS  A    1 P 18:035:00030 18:041:86370 TRM59900.00     SCIS -----
 LAZK  A    1 P 18:035:00000 18:041:86370 LEIAR25.R4      LEIT -----
 LEIT  A    1 P 18:035:00000 18:041:86370 LEIAX1203+GNSS  NONE -----
 ORON  A    1 P 18:035:00000 18:041:86370 LEIAX1202GG     NONE -----
 PAS2  A    1 P 18:036:00000 18:041:86370 LEIAR20         LEIM 73034
 PASA  A    1 P 18:035:00000 18:041:86370 LEIAR20         LEIM 73034
 RIO1  A    1 P 18:035:00000 18:041:86370 LEIAR25.R4      LEIT 25138
 SALA  A    1 P 18:035:00000 18:041:86370 LEIAR25         NONE -----
 SCOA  A    1 P 18:035:00000 18:041:86370 TRM55971.00     NONE -----
 SOPU  A    1 P 18:035:00000 18:041:86370 LEIAS10         NONE -----
 TERU  A    1 P 18:035:00000 18:041:86370 LEIAT504GG      LEIS -----
 VITO  A    1 P 18:035:00000 18:041:86370 LEIAS10         NONE -----
 YEBE  A    1 P 18:035:00000 18:041:86370 TRM29659.00     NONE -----
 ZARA  A    1 P 18:035:00000 18:041:86370 TRM29659.00     NONE -----
```

7.3 Eccentrities

```
*                                          UP______ NORTH___ EAST____
*SITE PT SOLN T DATA_START__ DATA_END____ AXE ARP->BENCHMARK(M)_________
 ACOR  A    1 P 18:035:00000 18:041:86370 UNE   3.0460   0.0000   0.0000
 ALDA  A    1 P 18:035:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 ALSA  A    1 P 18:035:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 AMUR  A    1 P 18:035:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 BIAZ  A    1 P 18:035:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 BIDA  A    1 P 18:035:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 BRZR  A    1 P 18:035:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 CACE  A    1 P 18:035:00000 18:041:86370 UNE   0.0600   0.0000   0.0000
 CANT  A    1 P 18:035:00000 18:041:86370 UNE   3.0490   0.0000   0.0000
 CREU  A    1 P 18:035:00000 18:041:86370 UNE   0.0770   0.0000   0.0000
 EBRE  A    1 P 18:035:00000 18:041:86370 UNE   0.0770   0.0000   0.0000
 ELGE  A    1 P 18:035:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 GERN  A    1 P 18:035:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 IGEL  A    1 P 18:035:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 ISPS  A    1 P 18:035:00030 18:041:86370 UNE   0.0350   0.0000   0.0000
 LAZK  A    1 P 18:035:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 LEIT  A    1 P 18:035:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 ORON  A    1 P 18:035:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 PAS2  A    1 P 18:036:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 PASA  A    1 P 18:035:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 RIO1  A    1 P 18:035:00000 18:041:86370 UNE   0.0606   0.0000   0.0000
 SALA  A    1 P 18:035:00000 18:041:86370 UNE   0.0600   0.0000   0.0000
 SCOA  A    1 P 18:035:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 SOPU  A    1 P 18:035:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 TERU  A    1 P 18:035:00000 18:041:86370 UNE   0.0600   0.0000   0.0000
 VITO  A    1 P 18:035:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 YEBE  A    1 P 18:035:00000 18:041:86370 UNE   0.0000   0.0000   0.0000
 ZARA  A    1 P 18:035:00000 18:041:86370 UNE   3.2590   0.0000   0.0000
```

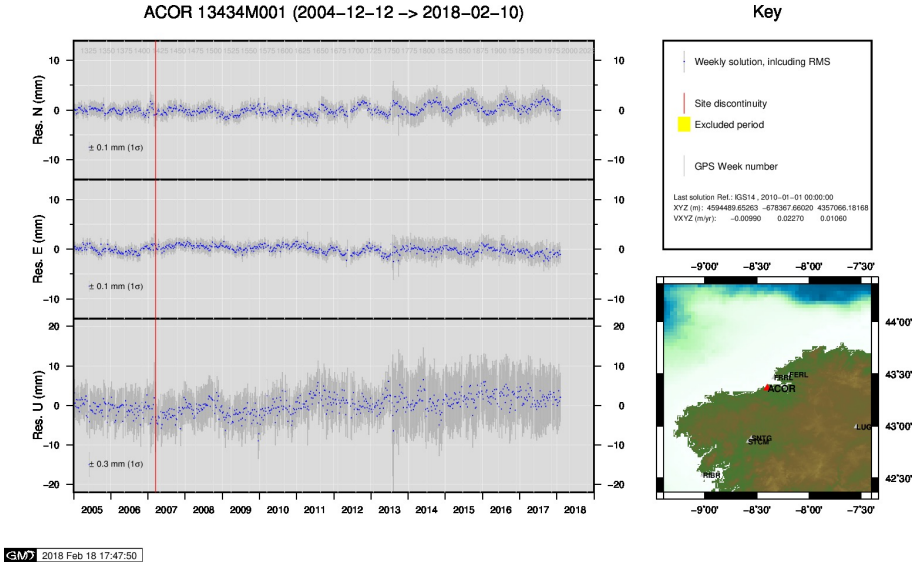
8 Inconsistencies (logsheet-RINEX metadata)

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

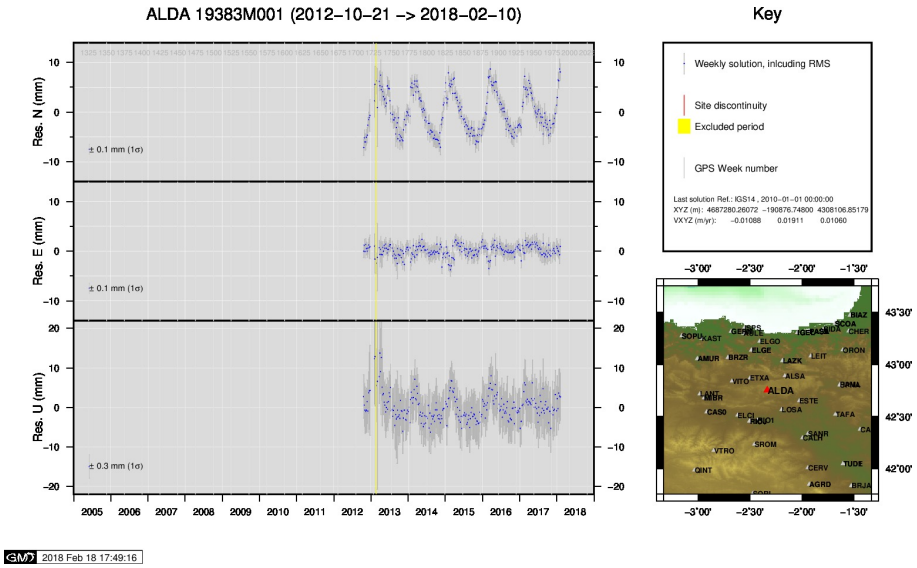
```
2018-02-18 10:59 UTC | ISPS0370.18O | RECEIVER FIRM. VERS. |  4.93 -> 5.14
2018-02-18 06:34 UTC | ISPS0380.18O | RECEIVER FIRM. VERS. |  4.93 -> 5.14
2018-02-18 09:33 UTC | ISPS0390.18O | RECEIVER FIRM. VERS. |  4.93 -> 5.14
2018-02-18 12:15 UTC | ISPS0400.18O | RECEIVER FIRM. VERS. |  4.93 -> 5.14
2018-02-18 15:14 UTC | ISPS0410.18O | RECEIVER FIRM. VERS. |  4.93 -> 5.14
```

9 Cumulative Time Series

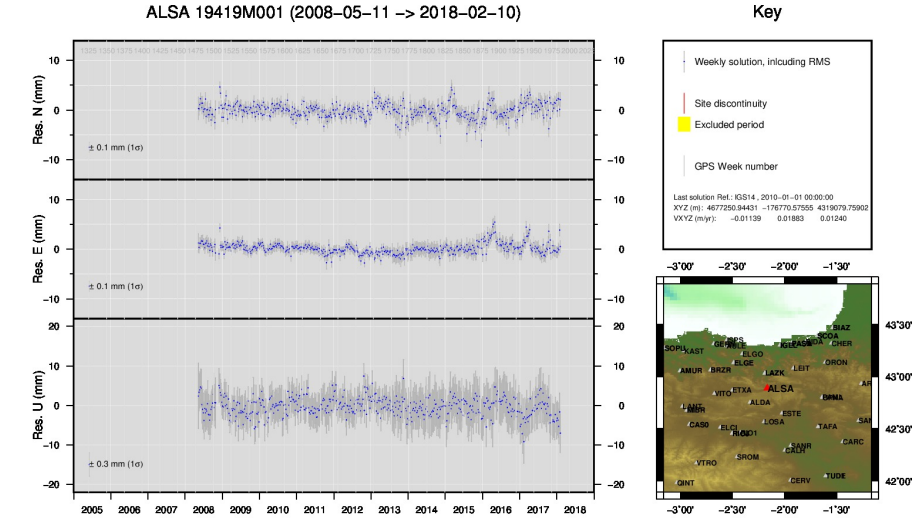
Time series of stations. Latest plots at: http://geolabpasaia.org/gnss/ARA-net/TSeries/, or click on the caption of each image.



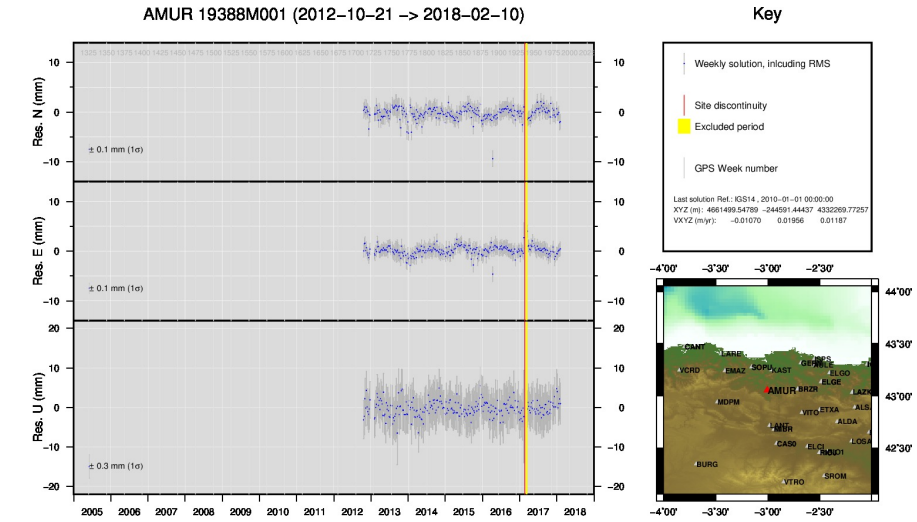
1) ACOR



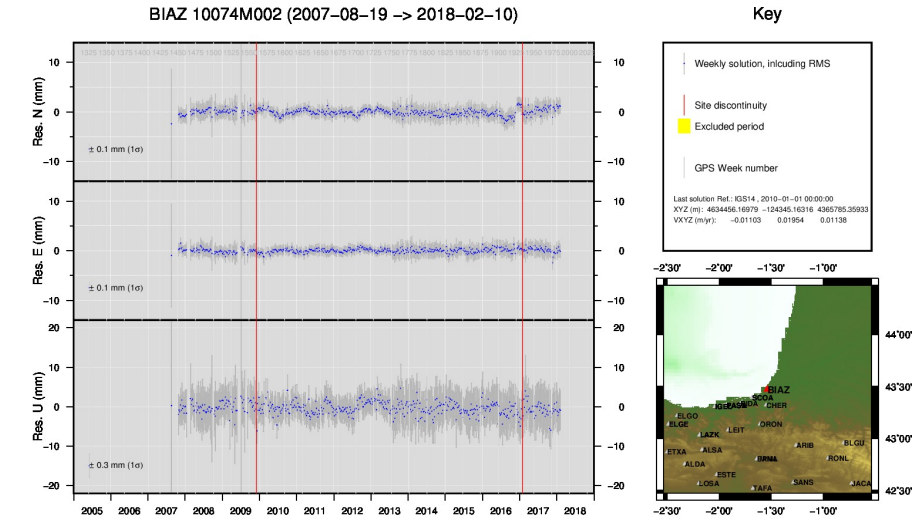
2) ALDA



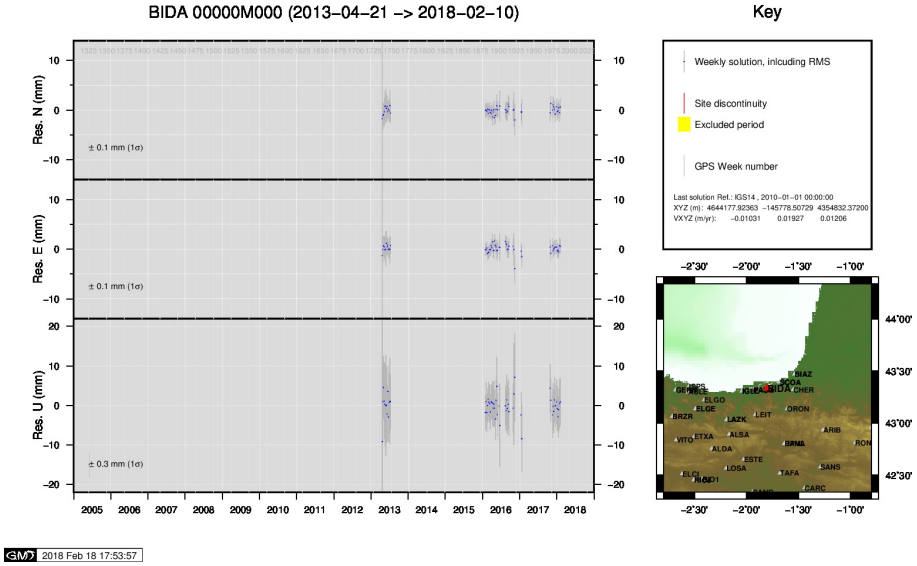
3) ALSA



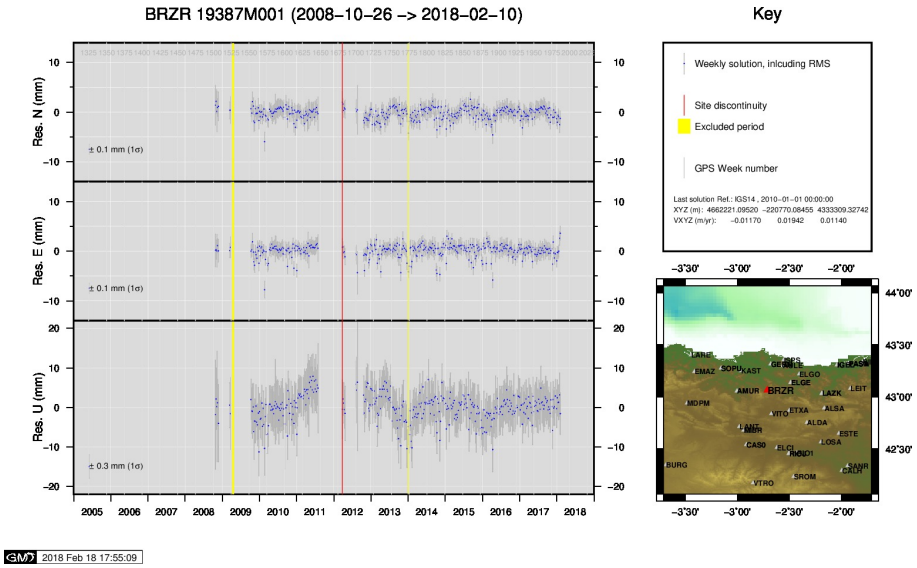
4) AMUR



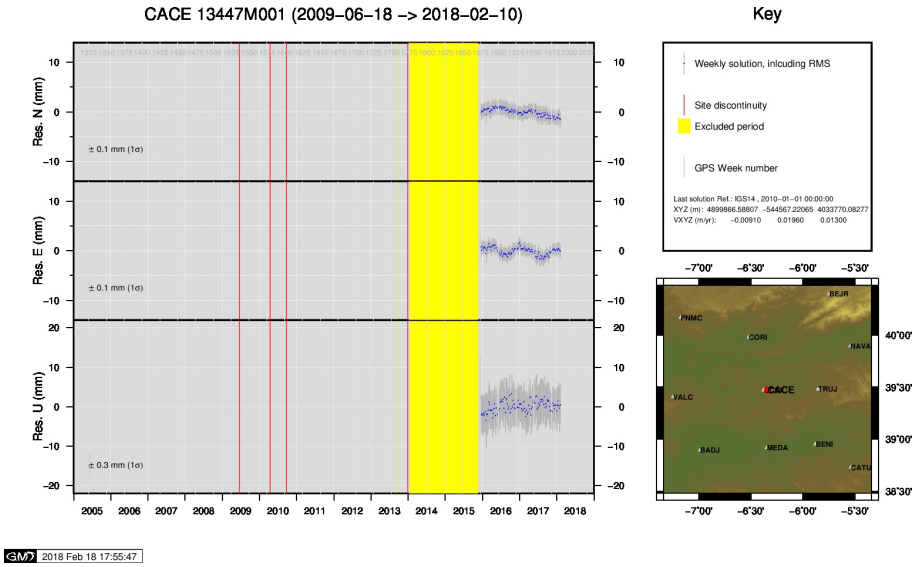
5) BIAZ



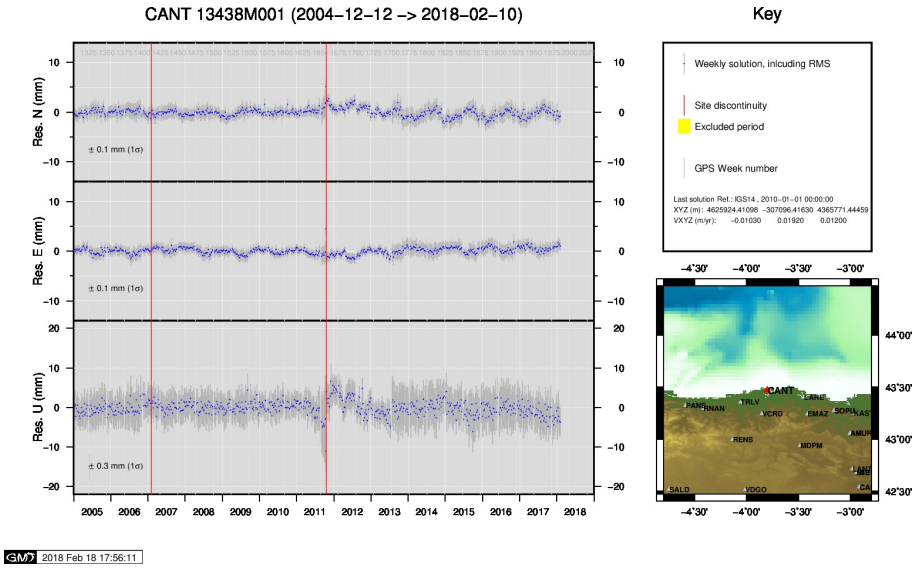
6) BIDA



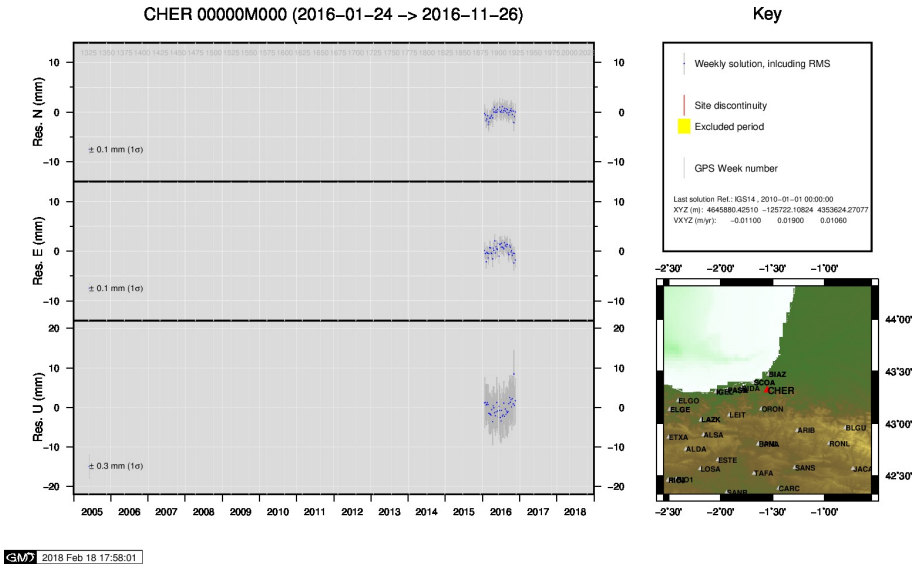
7) BRZR



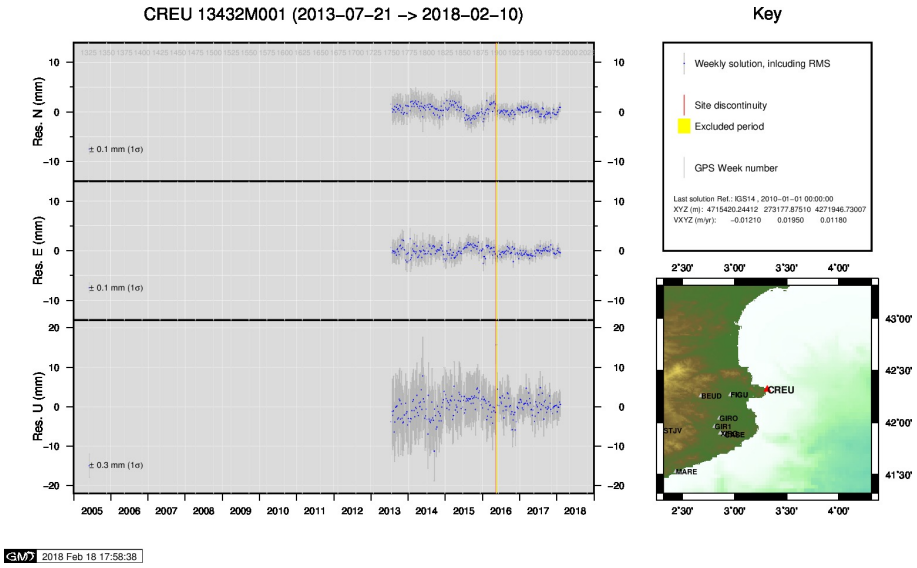
8) CACE



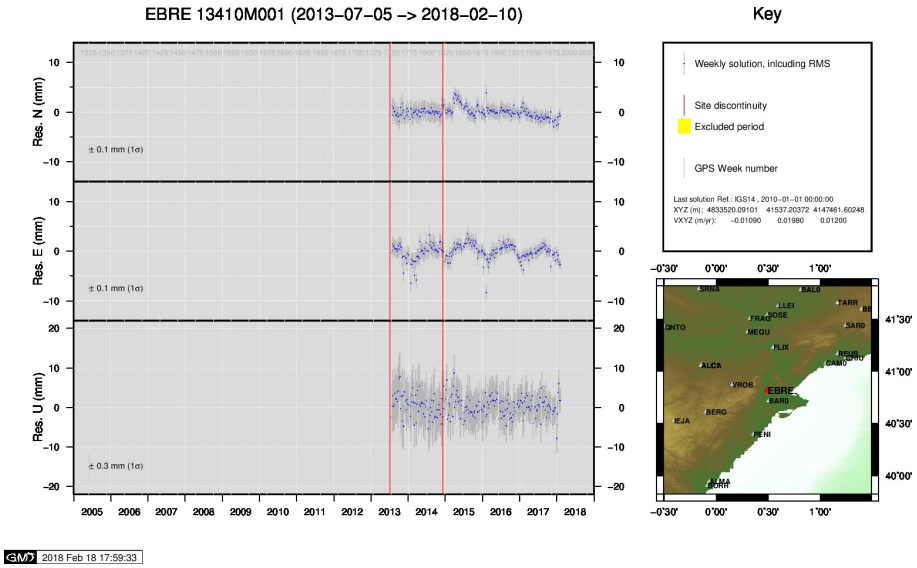
9) CANT



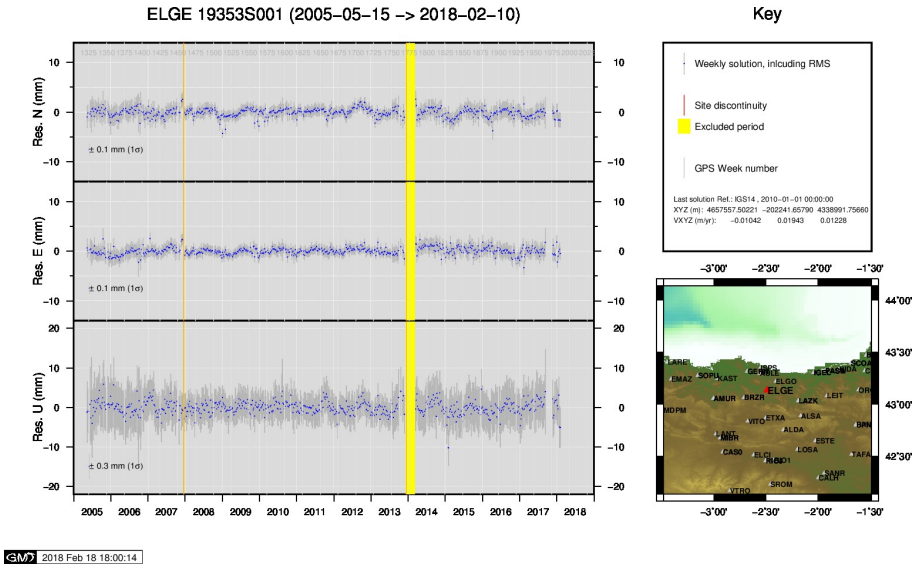
10) CHER



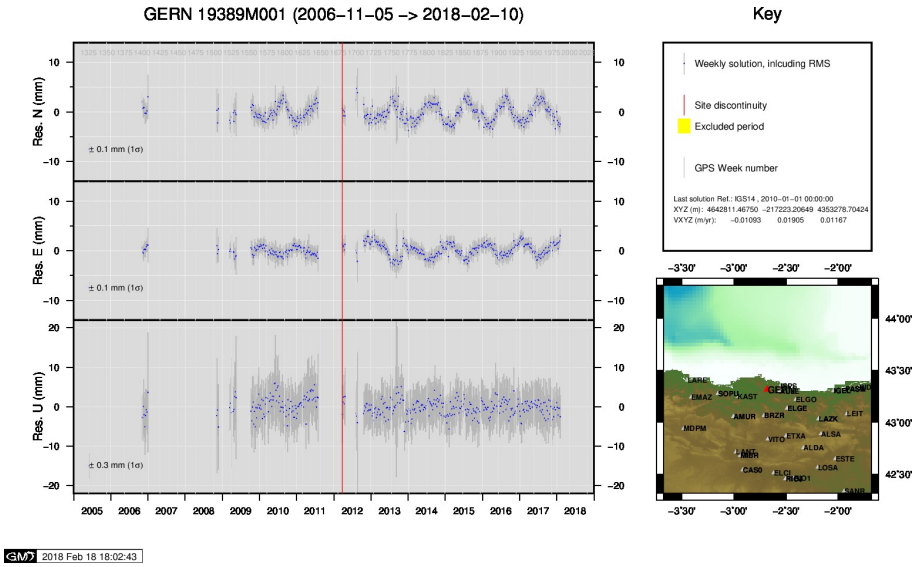
11) CREU



12) EBRE



13) ELGE



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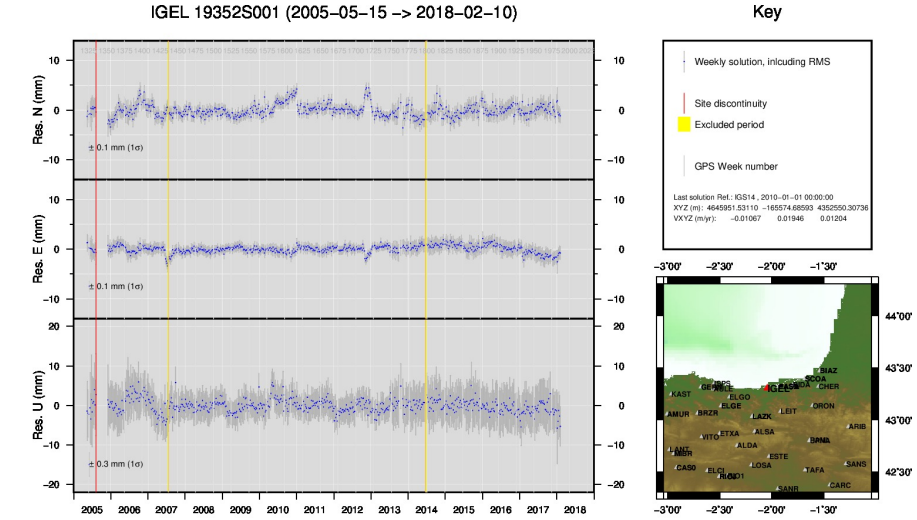

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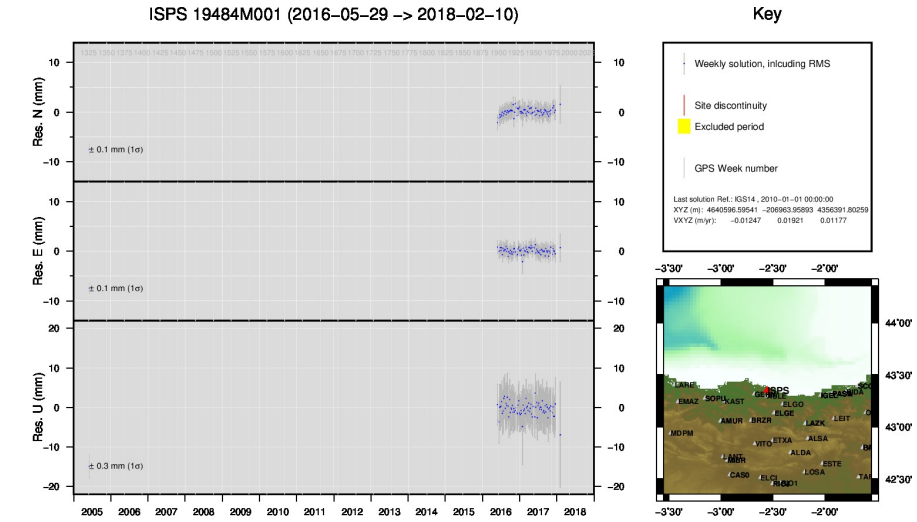

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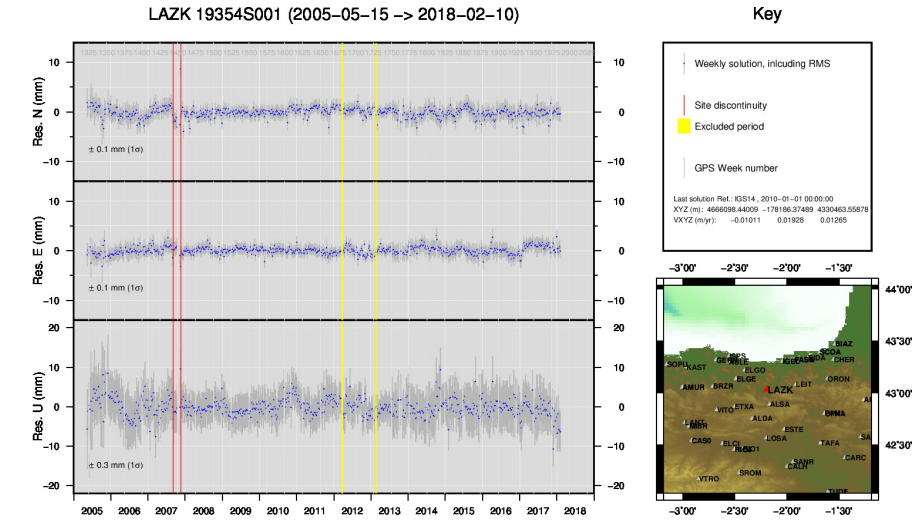

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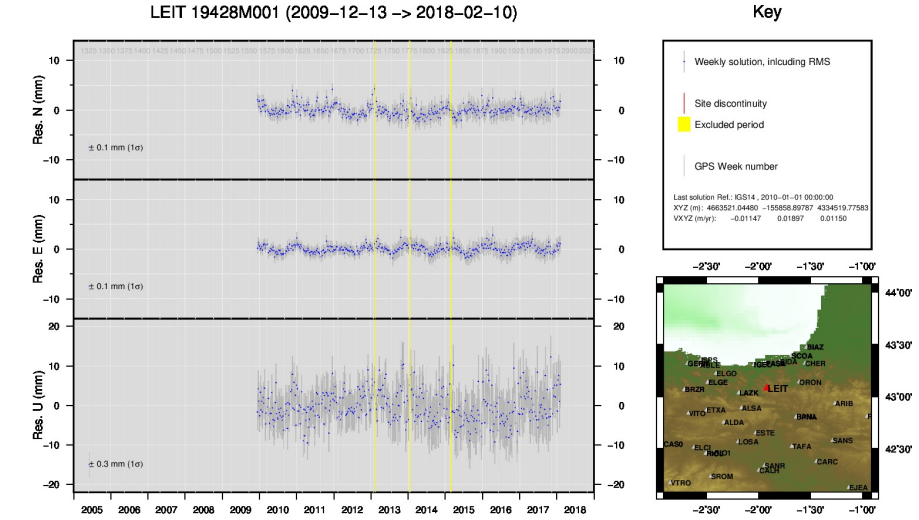

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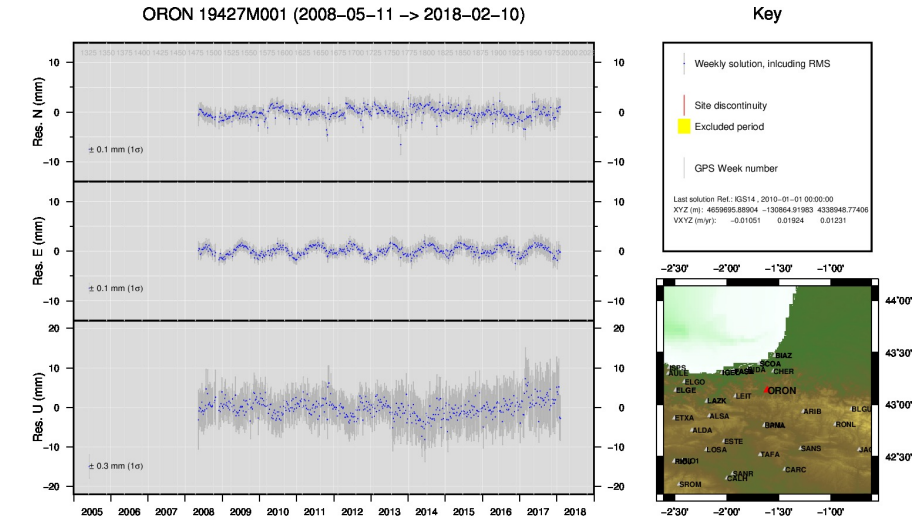

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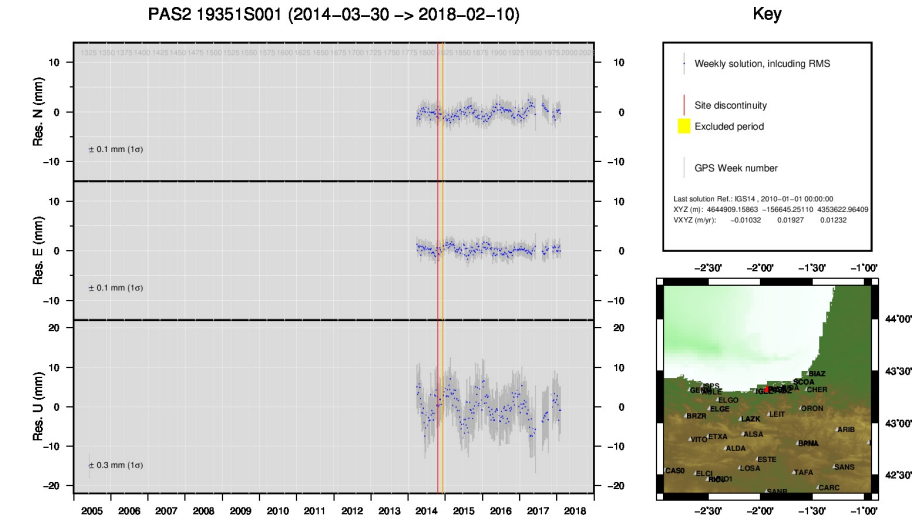

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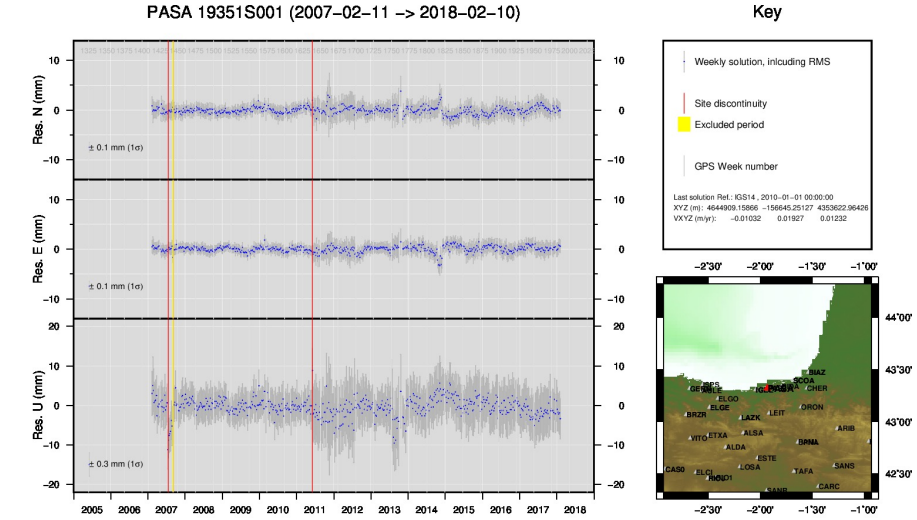

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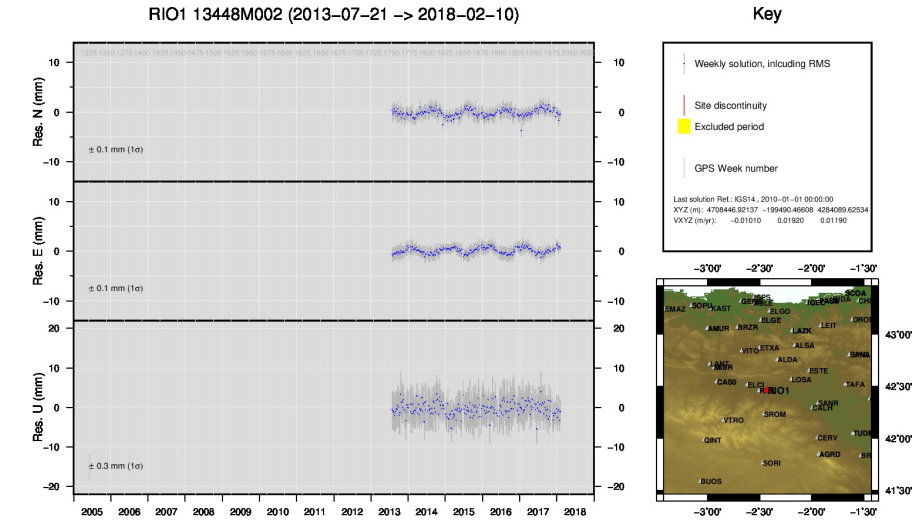
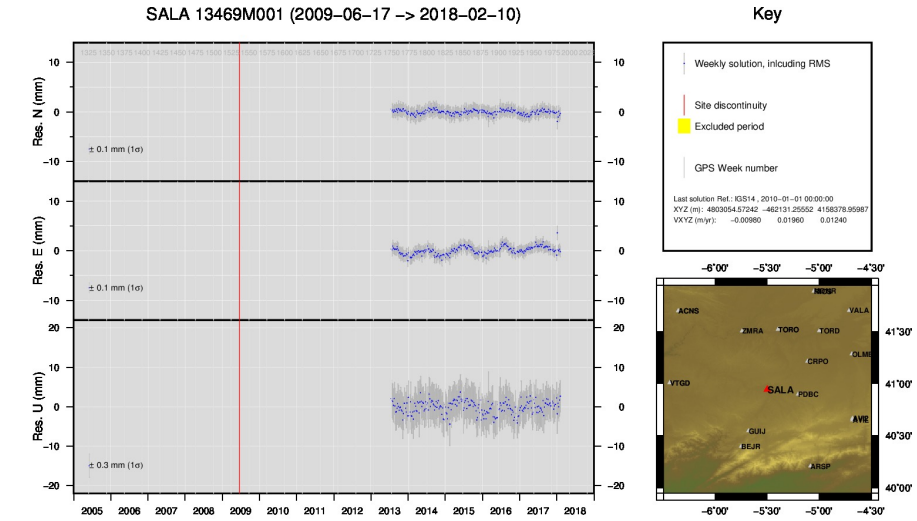


22) RIO1



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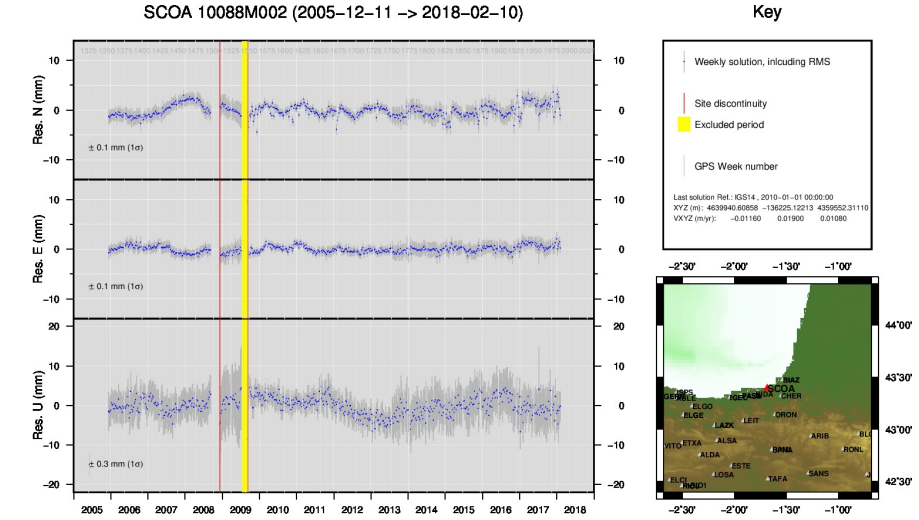
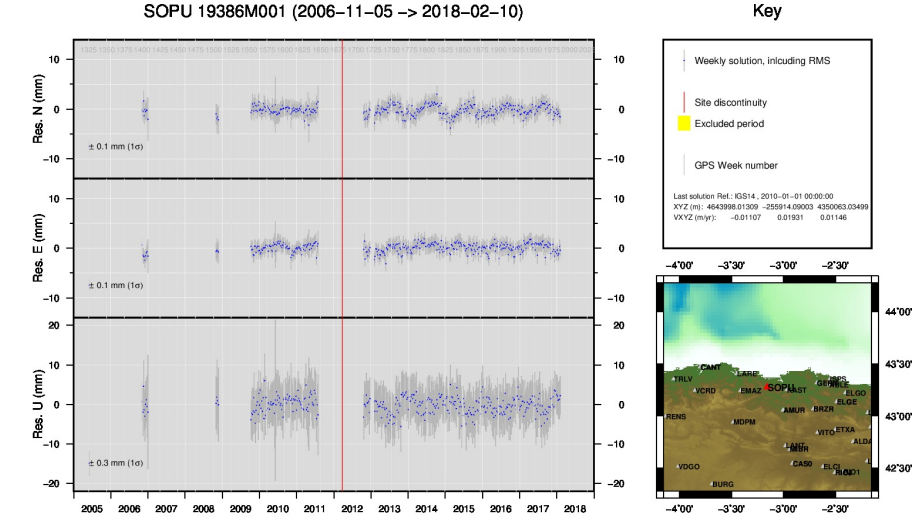


24) SCOA



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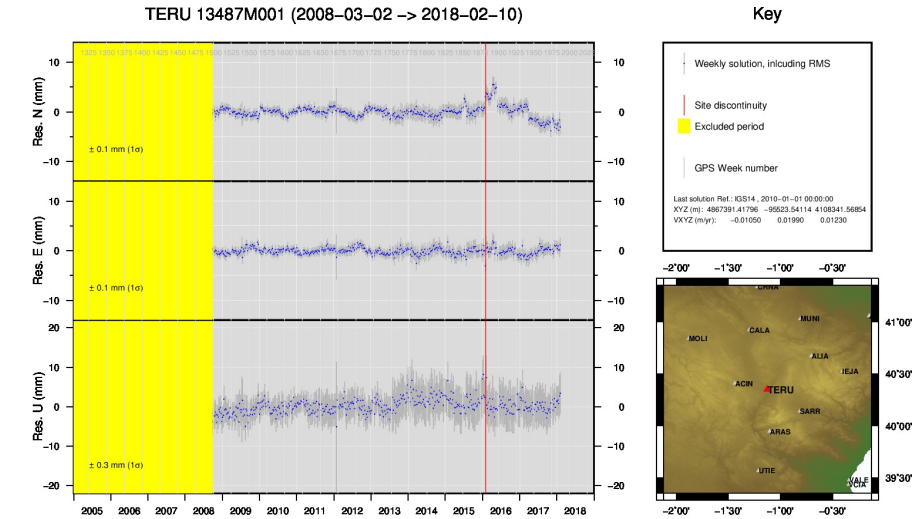

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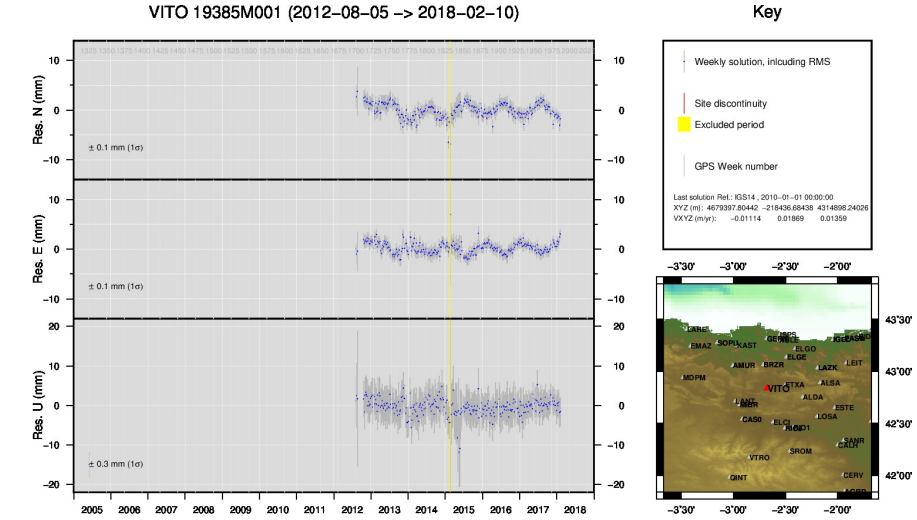
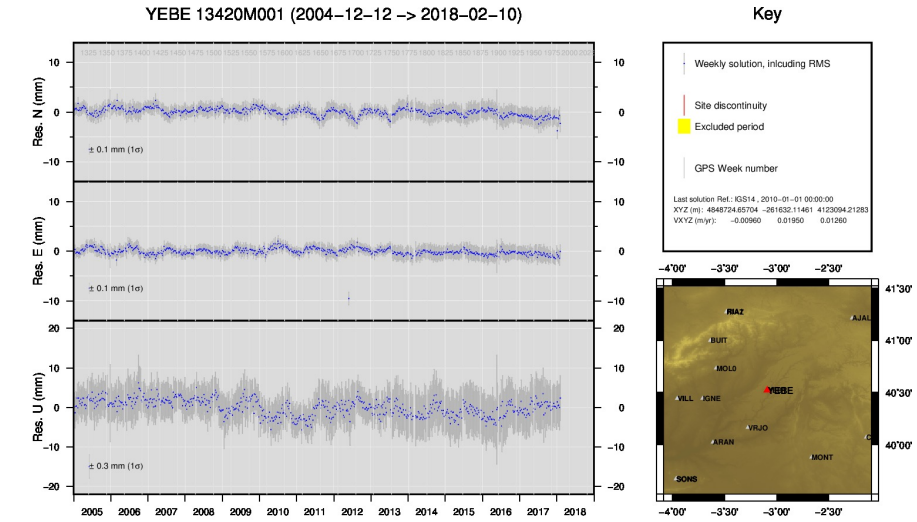
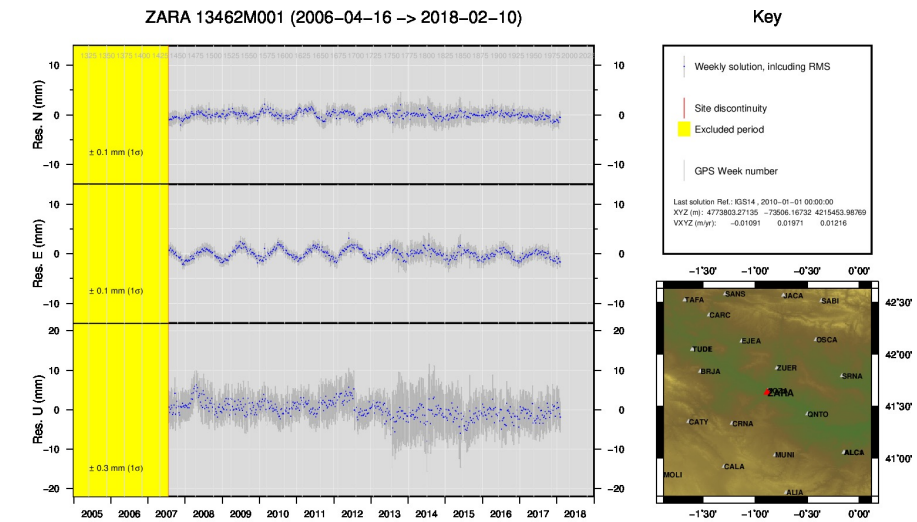


27) VITO



28) YEBE



29) ZARA