

# ARA-DAC Weekly Analysis Result: 2009 (GFA)

## Technical Report

**GPS Week: 2009 (GFA)**

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

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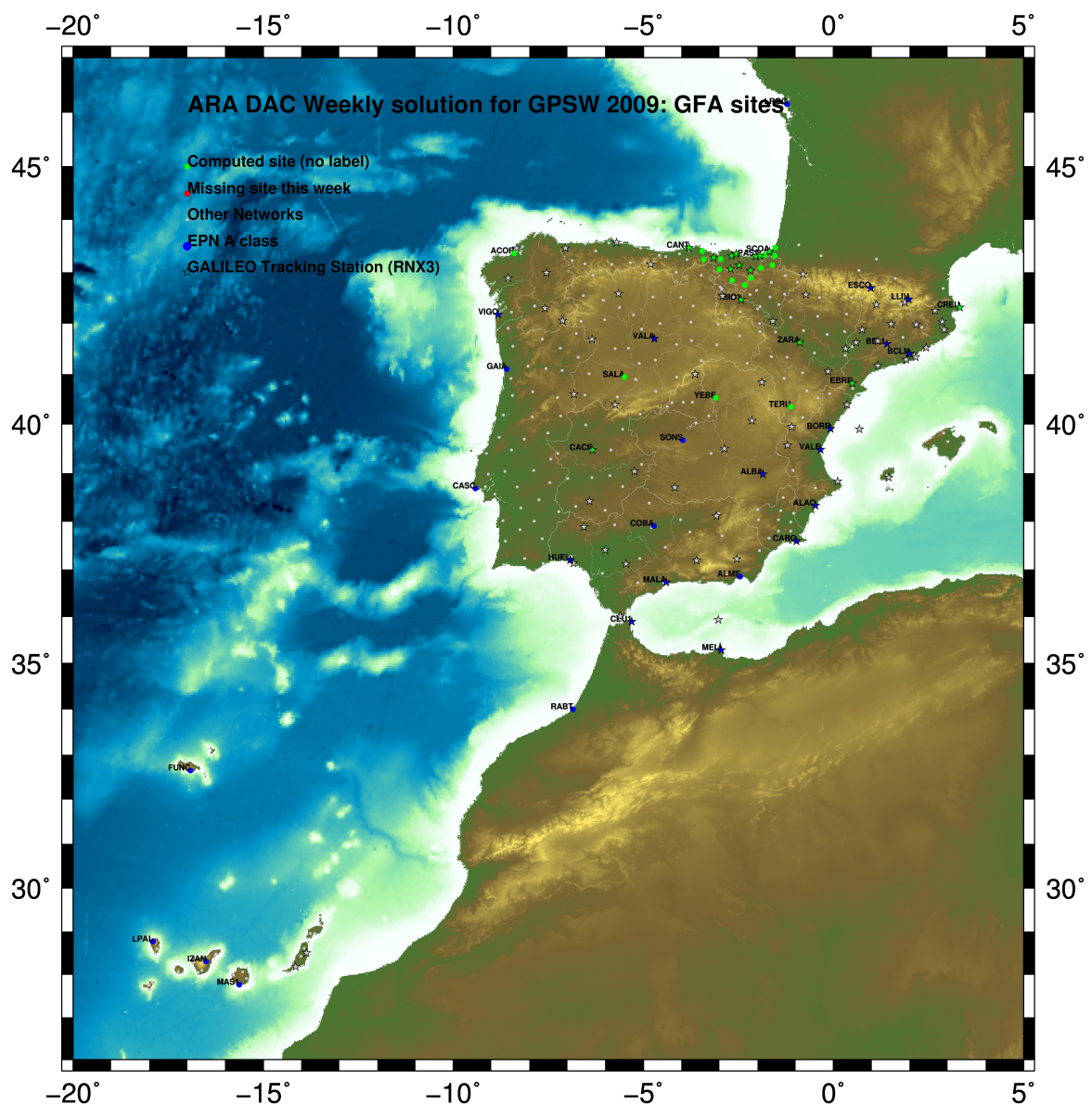
Report generated on 2018/07/31 at 15:21:31



# 1 Introduction

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

# 2 Map of Computed Sites



GM 2018 Jul 31 15:21:14

Fig.1: Computed Sites for GPS Week2009 (GFA)

### 3 Main Computation Parameters

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

- Preprocessing: Independent baselines are defined by the criterion of maximum common observations. Cycle slips are fixed with the MAUPRP program, analysing triple phase differences for each independent baseline. If MAUPRP does not fix all slips for one station, that station is edited out.
- Basic Observable : Carrier phase,  $L_1$  and  $L_2$ ; a priori sigma of single differences:0.002 m.
  - sampling (for ambiguity resolution) : 30 s
  - sampling (for final processing) : 180 s
  - Systems: GPS+GLONASS observations are used (GALILEO also used if available from GPSW 1986 on)
- Modelled observable: Double differences of carrier phase using different combinations based on the distance.
- Ground antenna phase center calibrations: Group APCV used from the PCV\_COD.I14 file and individual calibrations from EPNC\_14.ATX. EPN\_A class sites (CRD + VEL) IGS14 used to define the reference frame (from GPSW 1934). If individual calibrations, other from these, are available, they are also included in the analysis.
- Troposphere:
  - 3 deg elev. cutoff; elevation dependent weighting
  - VMF1 mapping function. ZPD parameters are estimated using the VMF1 mapping function.
  - CHENHER gradient estimation model.
- Ionosphere: no a priori model, ionospheric effect almost removed by iono free combination.
- Ocean Loading: FES2004 (Scherneck).
- Atmosph. Loading: computed from a global grid using the GRDS1S2 program of Bernese 5.2.

### 4 Estimated Parameters

- Adjustment: Least Squares
- Rejection Criteria: 3\*rms of single differences, in the weekly combination of daily normal equations (ADDNEQ)
- Station coordinates: minimum constraints (MC) to EPN A class sites (only translations).
- Troposphere: 3 deg. After having obtained coordinates valid for the entire week, tropospheric zenith delay is solved at each site at intervals of 1 hour throughout the week, holding the coordinates constrained at the weekly values.
- Ionospheric: second and third "High Order Ionosphere (HOI)" corrections used, using CODE files, to improve Ambiguity Resolution.
- Satellite clock bias: not estimated because are eliminated by double differencing the phase data.
- Receiver clock bias: not estimated because are eliminated by double differencing the phase data.
- Orbits and ERPs: CODE's orbits and ERP for both rapid and final solutions. DE405 planetary ephemeris and JGM3 Earth geopotential model is used.
- Tidal displacements: according to IERS2010 Conventions. Atmospheric loading corrections used.

- Ambiguity: an advanced ambiguity resolution (AR) scheme is included:
  - Code-Based Wideline (WL) AR for baselines shorter than 6000km, a Melbourne-Wuebbena wide-lane and narrow-lane AR is computed.
  - Phase-Based Wideline ( $L_5$ ) AR for baselines shorter than 200km, the code-based wide-lane AR is replaced by a phase-only wide-lane with a subsequent narrow-lane AR.
  - Quasi-Ionosphere-Free (QIF)AR for the remaining real-valued ambiguities for baselines shorter than 2000km.
  - Direct  $L_1/L_2$  AR for baselines shorter than 20km
- AR Verification: Each baseline is processed by introducing the resolved integer ambiguities and checking the residuals. If there is any problem, the ambiguities are re-initialized.



## 5 Computed Coordinates

In this section the adjusted coordinates are summarized. Note that the sites with an A flag are the computed ones, whereas sites flagged as W are the ones used in the Minimal Constraints condition.

### 5.1 IGS14

The Reference Frame considered in this section is IGS14, release C1980.

```
ARA LAC 2009 WEEK FINAL COMBINATION: PRECISE ORBITS          31-JUL-18 10:46
-----
LOCAL GEODETIC DATUM: IGS14          EPOCH: 2018-07-11 12:00:00
-----
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
-----
 1 ACRD 13434M001          4594489.56816          -678367.46727          4357066.27570          W
 33 ALDA 19383M001          4687280.16717          -190876.58295          4308106.94624          A
 42 ALSA 19419M001          4677250.84415          -176770.41495          4319079.86567          A
 44 AMUR 19388M001          4661499.45746          -244591.27717          4332269.87579          A
 77 BIAZ 10074M002          4634456.06224          -124344.99533          4365785.45047          A
 78 BIDA 00000M000          4644177.83277          -145778.34076          4354832.47386          A
 88 BRZR 19387M001          4662220.99996          -220769.91881          4333309.43163          A
 9 CACE 13447M001          4899866.50707          -544567.06558          4033770.19194          W
 10 CANT 13438M001          4625924.31937          -307096.25221          4365771.54518          W
 112 CHER 00000M000          4645880.32873          -125721.94405          4353624.36254          A
 15 CREU 13432M001          4715420.14848          273178.04154          4271946.83592          W
 16 EBRE 13410M001          4833520.00135          41537.37154          4147461.70861          W
 131 ELGE 19353S001          4657557.41261          -202241.49289          4338991.86079          A
 133 EMAZ 17001M001          4645924.21370          -276949.88481          4347759.56820          A
 153 GERN 19389M001          4642811.31919          -217222.95358          4353278.87670          A
 173 IGEL 19352S001          4645951.43987          -165574.52180          4352550.41070          A
 178 ISPS 19484M001          4640596.48831          -206963.79424          4356391.90358          A
 182 KAST 19499M001          4646949.08923          -240747.29627          4348014.98223          A
 185 LARE 19440M001          4632831.95667          -279026.15801          4360314.41792          A
 186 LAZK 19354S001          4666098.35181          -178186.20953          4330463.66576          A
 190 LEIT 19428M001          4663520.94387          -155858.73639          4334519.87304          A
 242 ORDN 19427M001          4659695.79733          -130864.75297          4338948.87968          A
 249 PAS2 19351S001          4644909.06403          -156645.08661          4353623.06721          A
 31 PASA 19351S001          4644909.06659          -156645.08686          4353623.06800          W
 34 RID1 13448M002          4708446.83216          -199490.30174          4284089.72653          W
 35 SALA 13469M001          4803054.48964          -462131.08710          4158379.06595          W
 36 SCDA 10088M002          4639940.50628          -136224.95834          4359552.40421          W
 298 SOPU 19386M001          4643997.91895          -255913.92481          4350063.13538          A
 40 TERU 13487M001          4867391.33051          -95523.37169          4108341.67319          W
 349 VITO 19385M001          4679397.70857          -218436.52515          4314898.35722          A
 44 YEBE 13420M001          4848724.57304          -261631.94831          4123094.31657          W
 45 ZARA 13462M001          4773803.17412          -73506.00115          4215454.08585          W
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### 5.2 ETRF2000 (ETRS89) Coordinates

European Terrestrial Reference System, 1989 (ETRS89) is realized by ETRF2000 (Boucher and Altamimi, 2011) and (Altamimi, 2017).

```
ETRF2000 FINAL COORD. wk 2009          31-JUL-18 10:46
-----
LOCAL GEODETIC DATUM: ETRF2000        EPOCH: 2018-07-11 12:00:00
-----
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
-----
 1 ACRD 13434M001          4594489.86734          -678367.98778          4357065.87020          W
 33 ALDA 19383M001          4687280.51849          -190877.11179          4308106.53972          A
 42 ALSA 19419M001          4677251.19781          -176770.94274          4319079.46005          A
 44 AMUR 19388M001          4661499.80430          -244591.80355          4332269.47054          A
 77 BIAZ 10074M002          4634456.42498          -124345.51863          4365785.04862          A
 78 BIDA 00000M000          4644178.19234          -145778.86511          4354832.07104          A
 88 BRZR 19387M001          4662221.34958          -220770.44520          4333309.02661          A
 9 CACE 13447M001          4899866.79976          -544567.60652          4033769.76550          W
 10 CANT 13438M001          4625924.66136          -307096.77515          4365771.14181          W
 112 CHER 00000M000          4645880.69050          -125722.46851          4353623.95983          A
 15 CREU 13432M001          4715420.54697          273177.51146          4271946.43269          W
 16 EBRE 13410M001          4833520.36824          41536.82875          4147461.29400          W
 131 ELGE 19353S001          4657557.76471          -202242.01876          4338991.45633          A
 133 EMAZ 17001M001          4645924.55791          -276950.40971          4347759.16372          A
 153 GERN 19389M001          4642811.67055          -217223.47799          4353278.47314          A
 173 IGEL 19352S001          4645951.79704          -165575.04639          4352550.00752          A
 178 ISPS 19484M001          4640596.84104          -206964.31840          4356391.50031          A
 182 KAST 19499M001          4646949.43757          -240747.82117          4348014.57809          A
 185 LARE 19440M001          4632832.30448          -279026.68158          4360314.01437          A
 186 LAZK 19354S001          4666098.70607          -178186.73619          4330463.26095          A
 190 LEIT 19428M001          4663521.30094          -155859.26273          4334519.46868          A
 242 ORDN 19427M001          4659696.15753          -130865.27884          4338948.47589          A
 249 PAS2 19351S001          4644909.42229          -156645.61106          4353622.66421          A
 31 PASA 19351S001          4644909.42485          -156645.61131          4353622.66500          W
 34 RID1 13448M002          4708447.18089          -199490.83273          4284089.31835          W
 35 SALA 13469M001          4803054.80009          -462131.62823          4158378.64767          W
 36 SCDA 10088M002          4639940.86725          -136225.48223          4359552.00182          W
 298 SOPU 19386M001          4643998.26570          -255914.44945          4350062.73128          A
 40 TERU 13487M001          4867391.67923          -95523.91832          4108341.25448          W
 349 VITO 19385M001          4679398.05722          -218437.05327          4314897.95096          A
 44 YEBE 13420M001          4848724.90390          -261632.49355          4123093.89729          W
 45 ZARA 13462M001          4773803.53254          -73506.53834          4215453.67432          W
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### 5.3 ETRF2014 (ETRS89) Coordinates

European Terrestrial Reference System, 1989 (ETRS89) is realized by ETRF2014 (Boucher and Altamimi, 2011) and (Altamimi, 2017) (Altamimi, 2017).

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ETRF2014 FINAL COORD. wk 2009                               31-JUL-18 10:46
-----
LOCAL GEODETIC DATUM: ETRF2014          EPOCH: 2018-07-11 12:00:00
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
1  ACRD 13434M001        4594489.82457      -678368.02671    4357065.91821    W
33 ALDA 19383M001        4687280.47360      -190877.15202    4308106.58763    A
42 ALSA 19419M001        4677251.15297      -176770.98305    4319079.50799    A
44 AMUR 19388M001        4661499.75980      -244591.84369    4332269.51849    A
77 BIAZ 10074M002        4634456.38038      -124345.55928    4365785.09669    A
78 BIDA 00000M000        4644178.14772      -145778.90565    4354832.11908    A
88 BRZR 19387M001        4662221.30501      -220770.48542    4333309.07456    A
9  CACE 13447M001        4899866.75366      -544567.64474    4033769.81287    W
10 CANT 13438M001        4625924.61737      -307096.81522    4365771.18982    W
112 CHER 00000M000        4645880.64580      -125722.50911    4353624.00787    A
15 CREU 13432M001        4715420.50031      273177.46981    4271946.48082    W
16 EBRE 13410M001        4833520.32118      41536.78831    4147461.34171    W
131 ELGE 19353S001        4657557.72013      -202242.05906    4338991.50430    A
133 EMAZ 17001M001        4645924.51365      -276950.44980    4347759.21169    A
153 GERN 19389M001        4642811.62615      -217223.51830    4353278.52115    A
173 IGEL 19352S001        4645951.75246      -165575.08685    4352550.05554    A
178 ISPS 19484M001        4640596.79663      -206964.35875    4356391.54832    A
182 KAST 19499M001        4646949.39319      -240747.86138    4348014.62608    A
185 LARE 19440M001        4632832.26035      -279026.72171    4360314.06238    A
186 LAZK 19354S001        4666098.66133      -178186.77654    4330463.30891    A
190 LEIT 19428M001        4663521.25616      -155859.30316    4334519.51666    A
242 ORDN 19427M001        4659696.11272      -130865.31937    4338948.52390    A
249 PAS2 19351S001        4644909.37769      -156645.65156    4353622.71224    A
31 PASA 19351S001        4644909.38025      -156645.65181    4353622.71303    W
34 RIO1 13448M002        4708447.13581      -199490.87285    4284089.36621    W
35 SALA 13469M001        4803054.75479      -462131.66711    4158378.69524    W
36 SOA 10088M002        4639940.82264      -136225.52282    4359552.04986    W
298 SOPU 19386M001        4643998.22140      -255914.48962    4350062.77927    A
40 TERU 13487M001        4867391.63226      -95523.95818    4108341.30205    W
349 VITO 19385M001        4679398.01247      -218437.09343    4314897.99887    A
44 YEBE 13420M001        4848724.85760      -261632.53292    4123093.94483    W
45 ZARA 13462M001        4773803.48644      -73506.57863    4215453.72209    W

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## 6 Quality Control

### 6.1 Mean and Daily Repeatabilities

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

ARA LAC 2009 WEEK FINAL COMBINATION: PRECISE ORBITS 31-JUL-18 10:46

Station	#Days	Weekday 0123456	Repeatability (mm)		
			N	E	U
ACOR 13434M001	7	XXXXXX	0.79	0.73	4.84
ALDA 19383M001	7	XXXXXX	1.10	1.63	1.98
ALSA 19419M001	7	XXXXXX	1.21	1.25	2.16
AMUR 19388M001	7	XXXXXX	1.43	1.56	4.42
BLAZ 10074M002	7	XXXXXX	1.57	1.03	4.13
BIDA 00000M000	7	XXXXXX	0.97	1.74	3.73
BRZR 19387M001	7	XXXXXX	1.45	1.93	4.21
CACE 13447M001	7	XXXXXX	1.10	1.01	4.09
CANT 13438M001	7	XXXXXX	0.98	1.01	3.89
CHER 00000M000	7	XXXXXX	1.31	1.34	5.45
CREU 13432M001	7	XXXXXX	1.80	1.25	4.20
EBRE 13410M001	7	XXXXXX	1.37	0.89	4.28
ELGE 19353S001	7	XXXXXX	1.41	1.06	3.45
EMAZ 17001M001	7	XXXXXX	1.42	0.54	4.10
GERN 19389M001	7	XXXXXX	1.66	1.23	3.29
IGEL 19352S001	6	XXXXXX	0.93	1.60	4.33
ISPS 19484M001	7	XXXXXX	1.80	1.05	5.45
KAST 19499M001	7	XXXXXX	1.42	1.61	3.97
LARE 19440M001	7	XXXXXX	1.21	0.78	3.49
LAZK 19354S001	7	XXXXXX	1.56	1.41	6.39
LEIT 19428M001	7	XXXXXX	2.16	0.83	4.35
ORON 19427M001	7	XXXXXX	0.88	1.05	5.17
PAS2 19351S001	7	XXXXXX	1.85	1.49	7.69
PASA 19351S001	7	XXXXXX	1.09	1.23	5.24
RI01 13448M002	7	XXXXXX	1.05	1.32	2.76
SALA 13469M001	7	XXXXXX	1.92	1.91	6.06
SCDA 10088M002	7	XXXXXX	0.68	1.33	4.18
SOPU 19386M001	7	XXXXXX	1.17	2.07	5.79
TERU 13487M001	7	XXXXXX	1.00	1.42	4.44
VITD 19385M001	7	XXXXXX	1.79	1.36	2.31
YEBE 13420M001	7	XXXXXX	0.53	0.74	4.70
ZARA 13462M001	7	XXXXXX	0.51	1.28	3.56

Comparison of individual solutions:

ACOR 13434M001	N	0.79	0.72	-0.56	-0.55	-0.80	-0.86	0.49	0.98
ACOR 13434M001	E	0.73	1.07	0.27	0.65	0.84	-0.86	-0.12	0.29
ACOR 13434M001	U	4.84	1.52	1.14	-1.63	-8.11	0.73	-2.19	7.96
ALDA 19383M001	N	1.10	0.18	-0.78	1.45	0.09	0.78	0.74	1.82
ALDA 19383M001	E	1.63	2.58	-0.00	0.48	-1.59	-1.28	-1.00	1.96
ALDA 19383M001	U	1.98	-0.61	0.26	-0.28	-1.26	-4.02	-0.86	2.10
ALSA 19419M001	N	1.21	-0.16	2.22	-0.62	0.31	0.06	-1.81	-0.32
ALSA 19419M001	E	1.25	0.23	-1.91	-1.52	-1.41	-0.06	1.05	0.52
ALSA 19419M001	U	2.16	3.54	-0.82	-0.00	0.19	1.63	-2.35	2.59
AMUR 19388M001	N	1.43	0.60	2.25	0.06	1.16	2.10	-0.98	0.44
AMUR 19388M001	E	1.56	1.87	-0.03	1.52	1.21	1.87	0.88	1.76
AMUR 19388M001	U	4.42	1.08	-6.88	1.79	-3.31	-0.67	-4.38	5.89
BLAZ 10074M002	N	1.57	0.37	0.35	-0.66	0.53	1.68	-1.68	2.86
BLAZ 10074M002	E	1.03	0.49	0.01	0.69	0.57	1.78	-1.44	0.32
BLAZ 10074M002	U	4.13	-3.59	-0.04	-4.86	-2.47	-1.38	5.56	-5.19
BIDA 00000M000	N	0.97	0.17	-0.17	-0.22	1.43	1.43	-0.42	1.13
BIDA 00000M000	E	1.74	-0.23	-0.99	-0.09	2.57	1.36	-2.20	1.96
BIDA 00000M000	U	3.73	1.12	-1.39	-6.99	-4.27	-0.03	2.93	-2.14
BRZR 19387M001	N	1.45	0.30	-0.41	-0.79	2.28	1.60	-0.59	1.88
BRZR 19387M001	E	1.93	1.18	1.23	-0.75	1.50	-1.86	-3.08	1.93
BRZR 19387M001	U	4.21	-1.37	-1.67	0.30	-1.95	-1.51	0.95	-9.73
CACE 13447M001	N	1.10	0.11	1.66	0.37	-0.65	-1.23	-1.12	-1.06
CACE 13447M001	E	1.01	-0.10	0.44	-0.63	0.48	0.24	-1.30	1.87
CACE 13447M001	U	4.09	3.40	3.17	-5.27	4.38	0.61	-1.80	5.31
CANT 13438M001	N	0.98	1.08	-1.37	-0.45	0.23	1.20	-0.08	0.99
CANT 13438M001	E	1.01	1.08	-1.30	0.09	0.12	0.92	1.48	0.41
CANT 13438M001	U	3.89	4.91	-2.00	-4.25	-1.33	4.35	-3.81	-3.04
CHER 00000M000	N	1.31	0.64	0.49	-0.42	1.11	1.52	-1.70	1.76
CHER 00000M000	E	1.34	0.82	-0.44	0.36	2.48	1.13	-1.35	-0.76
CHER 00000M000	U	5.45	-2.61	0.86	-1.73	-7.62	-4.04	8.54	-4.52
CREU 13432M001	N	1.80	-1.65	-0.37	0.51	2.29	-3.29	0.41	0.23
CREU 13432M001	E	1.25	-1.70	-1.58	0.80	-1.24	1.29	0.22	-0.28
CREU 13432M001	U	4.20	4.08	-1.13	1.21	6.72	-2.96	-3.41	-4.58
EBRE 13410M001	N	1.37	1.10	1.45	-2.58	-0.65	0.14	-0.79	0.42
EBRE 13410M001	E	0.89	-1.41	0.20	0.84	-0.95	-0.36	-0.36	-0.92
EBRE 13410M001	U	4.28	1.07	2.98	0.22	6.00	-7.84	-0.94	1.31
ELGE 19353S001	N	1.41	-1.09	-0.34	0.10	1.39	2.48	-0.01	1.57
ELGE 19353S001	E	1.06	0.84	0.07	1.45	-0.68	-1.07	-1.52	0.28
ELGE 19353S001	U	3.45	-1.82	-5.01	-1.19	-0.87	-1.74	2.69	-5.53
EMAZ 17001M001	N	1.42	1.25	-2.47	-0.00	1.20	-0.01	1.73	0.26
EMAZ 17001M001	E	0.54	0.07	-0.47	0.32	0.28	0.37	-1.06	0.33
EMAZ 17001M001	U	4.10	-7.10	1.57	-2.35	-2.65	5.33	2.24	1.49
GERN 19389M001	N	1.66	-0.75	-0.62	-0.79	0.97	1.20	0.53	3.50
GERN 19389M001	E	1.23	0.40	-1.07	1.13	1.84	-0.60	-1.50	-0.75
GERN 19389M001	U	3.29	-1.84	-0.32	-7.21	1.13	-1.32	-2.33	-1.01
IGEL 19352S001	N	0.93	1.27	-0.20	0.21	1.31	-0.80	-0.53	
IGEL 19352S001	E	1.60	-0.45	-0.53	-0.01	1.08	3.18	-0.99	
IGEL 19352S001	U	4.33	-0.40	-1.54	-2.41	-6.74	6.30	0.51	
ISPS 19484M001	N	1.80	0.54	0.58	-1.44	0.97	0.21	-1.05	3.82
ISPS 19484M001	E	1.05	-0.29	0.20	1.36	-0.21	-0.88	0.83	-1.77
ISPS 19484M001	U	5.45	-3.27	-2.99	1.79	-9.71	-0.74	5.69	-5.30
KAST 19499M001	N	1.42	1.22	0.49	-0.46	0.67	2.44	-1.04	1.63
KAST 19499M001	E	1.61	1.95	0.90	1.50	-0.51	2.40	1.50	0.58
KAST 19499M001	U	3.97	-4.00	-4.13	1.44	-4.16	4.21	-3.05	3.91
LARE 19440M001	N	1.21	0.64	-0.95	0.04	0.99	-0.87	2.38	-0.23
LARE 19440M001	E	0.78	0.60	1.37	-0.83	-0.52	-0.58	-0.36	0.08
LARE 19440M001	U	3.49	-4.54	3.43	-3.71	-2.75	-0.57	3.16	2.98
LAZK 19354S001	N	1.56	-1.03	0.55	-0.48	2.09	0.74	-0.75	2.73
LAZK 19354S001	E	1.41	1.26	1.15	-1.68	1.34	-0.01	-0.83	-1.93

LAZK 19354S001	U	6.39	-7.65	0.80	3.39	-1.74	1.53	0.89	-12.97
LEIT 19428M001	N	2.16	-2.15	1.62	2.15	3.32	0.42	-2.14	-0.60
LEIT 19428M001	E	0.83	0.47	1.17	1.23	-0.02	0.36	0.02	-0.93
LEIT 19428M001	U	4.35	-3.38	-1.13	-4.23	-7.34	4.06	3.57	-0.24
ORDN 19427M001	N	0.88	-0.29	0.73	1.02	1.53	0.11	-0.51	0.57
ORDN 19427M001	E	1.05	-0.10	-1.10	0.88	0.74	1.88	-0.48	0.57
ORDN 19427M001	U	5.17	-8.01	3.87	-1.22	-4.78	1.43	4.17	-6.13
PAS2 19351S001	N	1.85	2.39	0.49	-1.48	0.44	-1.51	-0.33	3.13
PAS2 19351S001	E	1.49	-0.51	-1.21	0.28	-0.24	2.82	-0.29	1.83
PAS2 19351S001	U	7.69	-4.32	-5.08	0.99	0.34	8.42	3.15	-15.11
PASA 19351S001	N	1.09	0.63	-0.30	-0.05	1.50	-0.72	0.15	1.97
PASA 19351S001	E	1.23	0.18	-0.42	0.72	-0.25	2.72	-0.80	0.51
PASA 19351S001	U	5.24	-1.47	-2.86	-2.76	-2.66	4.52	3.97	-10.16
RID1 13448M002	N	1.05	-0.11	-1.01	-0.43	0.80	-0.05	1.76	1.28
RID1 13448M002	E	1.32	0.44	-0.68	1.10	-0.93	1.90	1.73	1.08
RID1 13448M002	U	2.76	5.39	0.06	-1.52	-0.98	-0.85	-2.46	-2.56
SALA 13469M001	N	1.92	2.25	-1.57	0.63	0.87	-0.52	3.21	-1.72
SALA 13469M001	E	1.91	-0.99	3.42	-2.49	-1.36	0.19	1.01	-0.30
SALA 13469M001	U	6.06	6.31	-7.17	0.72	3.05	-6.54	6.46	5.92
SCDA 10088M002	N	0.68	0.30	0.71	-0.25	0.02	0.97	0.27	1.07
SCDA 10088M002	E	1.33	-0.49	0.40	1.63	0.96	1.30	-2.05	0.87
SCDA 10088M002	U	4.18	0.16	0.06	-6.62	-7.18	0.71	2.95	-0.19
SOPU 19386M001	N	1.17	0.48	1.42	-0.80	2.16	0.19	0.65	0.47
SOPU 19386M001	E	2.07	-0.29	2.68	-2.59	2.31	0.09	-2.52	-0.02
SOPU 19386M001	U	5.79	-4.52	-3.11	-9.35	0.17	2.29	6.20	-6.29
TERU 13487M001	N	1.00	-0.20	1.21	0.45	-0.48	0.31	0.53	-1.92
TERU 13487M001	E	1.42	-1.51	-1.38	-1.69	0.11	2.21	-0.32	-0.18
TERU 13487M001	U	4.44	-0.40	-1.31	3.07	-6.63	1.72	7.23	-2.75
VITO 19385M001	N	1.79	2.33	0.44	-0.80	1.25	3.26	-0.70	-0.45
VITO 19385M001	E	1.36	1.35	1.31	1.84	0.62	-0.03	1.66	0.99
VITO 19385M001	U	2.31	1.32	-1.09	1.29	-3.10	-0.89	-0.44	-4.11
YEBE 13420M001	N	0.53	0.10	-0.80	-0.52	-0.17	-0.19	-0.48	-0.70
YEBE 13420M001	E	0.74	0.12	0.02	1.32	-0.89	-0.23	0.83	0.20
YEBE 13420M001	U	4.70	-1.86	-5.05	-1.51	1.66	5.19	-8.35	-1.43
ZARA 13462M001	N	0.51	-0.20	-0.09	-0.67	0.40	0.26	0.78	-0.46
ZARA 13462M001	E	1.28	0.73	-1.16	0.36	-1.76	-0.44	-0.65	2.02
ZARA 13462M001	U	3.56	-4.79	3.89	-1.89	1.75	-1.72	1.31	5.18

## 6.2 Datum verification

In this section, the datum verification is shown. A 3 parameter Helmert 3D (3 translations) is computed to the minimally constrained sites.

LOCAL GEODETIC DATUM: IGS14  
RESIDUALS IN LOCAL SYSTEM (NORTH, EAST, UP)

NUM	NAME	FLG	RESIDUALS IN MILLIMETERS		
1	ACOR 13434M001	I W	-1.89	0.97	-1.62
2	ALAC 13433M001	I W	0.44	-0.57	-1.39
3	ALBA 13452M001	I W	0.15	-0.24	-3.43
4	ALME 13437M001	I W	-1.26	1.14	6.24
5	BCLN 13412M001	I W	-0.80	0.91	-10.01
6	BELL 13431M001	I W	-0.51	1.00	-4.40
7	BORR 13480M001	I W	0.10	-1.19	-1.34
8	BRST 10004M004	I W	-2.10	0.14	-0.38
9	CACE 13447M001	I W	-0.36	2.44	3.53
10	CANT 13438M001	I W	-1.01	0.36	1.70
11	CARG 19412M001	I W	-0.38	1.69	1.50
12	CASC 13909S001	I W	-0.02	-0.53	1.65
13	CEU1 13449M002	I W	-0.24	-0.30	0.91
14	COBA 13453M001	I W	0.83	0.44	-0.19
15	CREU 13432M001	I W	-0.74	-0.24	-7.14
16	EBRE 13410M001	I W	-0.60	0.76	-5.89
17	ESCO 13435M001	I W	-0.74	2.25	-8.84
18	FUNC 13911S001	I W	3.31	1.64	-0.68
19	GAIA 13902M001	I W	0.14	-1.00	5.27
21	HUEL 13451M001	I W	0.47	-0.99	3.79
22	IZAN 31309M002	I W	0.95	0.49	3.13
24	LLIV 13436M001	I W	-0.03	-0.42	3.12
25	LPAL 81701M001	I W	-1.37	1.45	-0.85
26	LR0C 10023M001	I W	1.07	-1.17	-1.31
27	MALA 13443M001	I W	-1.21	0.61	7.86
28	MAS1 31303M002	I W	0.23	1.86	5.02
30	MELI 19379M001	I W	0.85	-1.49	1.03
31	PASA 19351S001	I W	-0.89	0.27	1.30
32	PDEL 31906M004	I W	-1.27	-3.03	4.10
33	RABT 35001M002	I W	0.01	0.10	-0.36
34	RID1 13448M002	I W	-1.01	-0.80	-0.10
35	SALA 13469M001	I W	0.15	-0.66	0.37
36	SCOA 10088M002	I W	-2.83	-1.60	0.51
38	SONS 13446M001	I W	-0.16	1.33	-2.31
39	TERC 31909M001	I W	8.03	-3.96	-9.92
40	TERU 13487M001	I W	1.71	0.13	-2.60
41	VALA 13463M002	I W	-0.18	-1.08	0.36
42	VALE 13439M001	I W	-0.74	-0.35	-2.80
43	VIGO 13450M001	I W	0.70	-0.91	2.63
44	YEBE 13420M001	I W	1.63	-0.32	5.60
45	ZARA 13462M001	I W	-0.73	-0.43	1.56
46	ZIMM 14001M004	I W	0.29	1.29	4.40
	RMS / COMPONENT		1.67	1.31	4.17
	MEAN		0.00	-0.00	0.00
	MIN		-2.83	-3.96	-10.01
	MAX		8.03	2.44	7.86

NUMBER OF PARAMETERS : 3  
NUMBER OF COORDINATES : 126  
RMS OF TRANSFORMATION : 2.70 MM

BARYCENTER COORDINATES:

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

PARAMETERS:

TRANSLATION IN N : 0.00 +- 0.42 MM  
TRANSLATION IN E : 0.00 +- 0.42 MM  
TRANSLATION IN U : 0.00 +- 0.42 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          17199547
NUMBER OF UNKNOWN               246604
NUMBER OF DEGREES OF FREEDOM    16952943
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)      180
VARIANCE FACTOR                  2.916799538238494

Helmert Transformation Parameters With Respect to Combined Solution:
-----
Sol  Rms (m)      Translation (m)      Rotation (")
      X          Y          Z          X          Y          Z      Scale (ppm)
-----
  1  0.00283      0.0069  0.0057 -0.0057 -0.0000  0.0003  0.0002  0.00001
  2  0.00307      0.0051 -0.0176 -0.0020  0.0004  0.0001 -0.0004 -0.00064
  3  0.00250      0.0227  0.0106 -0.0232 -0.0002  0.0010  0.0003 -0.00032
  4  0.00266      0.0018 -0.0041  0.0016  0.0002 -0.0000 -0.0000 -0.00039
  5  0.00247      0.0054 -0.0036 -0.0101  0.0001  0.0004 -0.0001  0.00017
  6  0.00275      0.0265  0.0027 -0.0319  0.0001  0.0013  0.0002 -0.00023
  7  0.00278      0.0031  0.0038  0.0002  0.0000  0.0001  0.0002 -0.00031
```

```
Statistics of individual solutions:
-----
File  RMS (m)      DOF  Chi**2/DOF  #Observations authentic / pseudo  #Parameters explicit / implicit / singular
-----
  1  0.00182      2423285      3.30      2458497      3      1011      34204      0
  2  0.00183      2423429      3.34      2458886      3      1011      34449      0
  3  0.00158      2400765      2.48      2435661      3      1014      33885      0
  4  0.00168      2418787      2.82      2455132      3      1017      35331      0
  5  0.00166      2463796      2.77      2500222      3      1023      35406      0
  6  0.00170      2441060      2.89      2478918      3      1029      36832      0
  7  0.00164      2375767      2.69      2412231      3      1008      35459      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 18:189:00000 18:195:86370 LEICA GRX1200PRO -----
ALDA  A  1 P 18:189:00000 18:195:86370 LEICA GR10 -----
ALSA  A  1 P 18:189:00000 18:195:86370 LEICA GRX1200GGPRO -----
AMUR  A  1 P 18:189:00000 18:195:86370 LEICA GR10 -----
BIAZ  A  1 P 18:189:00000 18:195:86370 TRI SP90M -----
BIDA  A  1 P 18:189:00000 18:195:86370 LEICA GR10 -----
BRZR  A  1 P 18:189:00000 18:195:66090 LEICA GR10 -----
CACE  A  1 P 18:189:00000 18:195:86370 TRIMBLE NETR9 -----
CANT  A  1 P 18:189:00000 18:195:86370 LEICA GR10 -----
CHER  A  1 P 18:189:00000 18:195:86370 LEICA GRX1200+GNSS -----
CREU  A  1 P 18:189:00000 18:195:86370 LEICA GR50 -----
EBRE  A  1 P 18:189:00000 18:195:86370 LEICA GR50 -----
ELGE  A  1 P 18:189:00000 18:195:86370 LEICA GR10 -----
EMAZ  A  1 P 18:189:00000 18:195:86370 LEICA GR30 -----
GERN  A  1 P 18:189:00000 18:195:86370 LEICA GR10 -----
IGEL  A  1 P 18:189:00000 18:194:86370 LEICA GR10 -----
ISPS  A  1 P 18:189:00000 18:195:86370 TRIMBLE NETR9 -----
KAST  A  1 P 18:189:00000 18:195:86370 LEICA GR30 -----
LARE  A  1 P 18:189:00000 18:195:86370 LEICA GRX1200GGPRO -----
LAZK  A  1 P 18:189:00000 18:195:86370 LEICA GR10 -----
LEIT  A  1 P 18:189:00000 18:195:86370 LEICA GRX1200+GNSS -----
ORON  A  1 P 18:189:00000 18:195:86370 LEICA GRX1200GGPRO -----
PAS2  A  1 P 18:189:00000 18:195:86370 TPS NET-G3A -----
PASA  A  1 P 18:189:00000 18:195:86370 LEICA GR10 -----
RIO1  A  1 P 18:189:00000 18:195:86370 LEICA GR25 -----
SALA  A  1 P 18:189:00000 18:195:86370 LEICA GRX1200+GNSS -----
SCOA  A  1 P 18:189:00000 18:195:86370 LEICA GR25 -----
SOPU  A  1 P 18:189:00000 18:195:86370 LEICA GR10 -----
TERU  A  1 P 18:189:00000 18:195:86370 LEICA GRX1200GGPRO -----
VITO  A  1 P 18:189:00000 18:195:86370 LEICA GR10 -----
YEBE  A  1 P 18:189:00000 18:195:86370 TRIMBLE NETR9 -----
ZARA  A  1 P 18:189:00000 18:195:86370 TRIMBLE NETR9 -----
```

### 7.2 Antennas

Serial number ONLY provided in case individual calibrations are available.

```
*SITE PT SOLN T DATA_START__ DATA_END____ DESCRIPTION_____ S/N__
ACOR  A  1 P 18:189:00000 18:195:86370 LEIAT504      LEIS -----
ALDA  A  1 P 18:189:00000 18:195:86370 LEIAS10       NONE -----
ALSA  A  1 P 18:189:00000 18:195:86370 LEIAX1202GG  NONE -----
AMUR  A  1 P 18:189:00000 18:195:86370 LEIAS10       NONE -----
```

BLAZ	A	1	P	18:189:00000	18:195:86370	LEIAR25	LEIT	----
BIDA	A	1	P	18:189:00000	18:195:86370	LEIAS10	NONE	----
BRZR	A	1	P	18:189:00000	18:195:66090	LEIAS10	NONE	----
CACE	A	1	P	18:189:00000	18:195:86370	TRM29659.00	NONE	----
CANT	A	1	P	18:189:00000	18:195:86370	LEIAR25.R4	LEIT	25066
CHER	A	1	P	18:189:00000	18:195:86370	LEIAX1203+GNSS	NONE	----
CREU	A	1	P	18:189:00000	18:195:86370	LEIAR25.R4	NONE	26357
EBRE	A	1	P	18:189:00000	18:195:86370	LEIAR25.R4	NONE	26359
ELGE	A	1	P	18:189:00000	18:195:86370	LEIAR25.R4	LEIT	----
EMAZ	A	1	P	18:189:00000	18:195:86370	LEIAS10	NONE	----
GERN	A	1	P	18:189:00000	18:195:86370	LEIAS10	NONE	----
IGEL	A	1	P	18:189:00000	18:194:86370	LEIAR20	LEIM	----
ISPS	A	1	P	18:189:00000	18:195:86370	TRM59900.00	SCIS	----
KAST	A	1	P	18:189:00000	18:195:86370	LEIAS10	NONE	----
LARE	A	1	P	18:189:00000	18:195:86370	LEIAT504	NONE	----
LAZK	A	1	P	18:189:00000	18:195:86370	LEIAR25.R4	LEIT	----
LEIT	A	1	P	18:189:00000	18:195:86370	LEIAX1203+GNSS	NONE	----
ORDN	A	1	P	18:189:00000	18:195:86370	LEIAX1202GG	NONE	----
PAS2	A	1	P	18:189:00000	18:195:86370	LEIAR20	LEIM	73034
PASA	A	1	P	18:189:00000	18:195:86370	LEIAR20	LEIM	73034
RIO1	A	1	P	18:189:00000	18:195:86370	LEIAR25.R4	LEIT	25138
SALA	A	1	P	18:189:00000	18:195:86370	LEIAR25	NONE	----
SCOA	A	1	P	18:189:00000	18:195:86370	TRM55971.00	NONE	----
SOPU	A	1	P	18:189:00000	18:195:86370	LEIAS10	NONE	----
TERU	A	1	P	18:189:00000	18:195:86370	LEIAT504GG	LEIS	----
VITO	A	1	P	18:189:00000	18:195:86370	LEIAS10	NONE	----
YEBE	A	1	P	18:189:00000	18:195:86370	TRM29659.00	NONE	----
ZARA	A	1	P	18:189:00000	18:195:86370	TRM29659.00	NONE	----

### 7.3 Eccentricities

*S	PT	SOLN	T	DATA_START_	DATA_END_	AXE	ARP->BENCHMARK(M)	UP	NORTH	EAST
ACOR	A	1	P	18:189:00000	18:195:86370	UNE	3.0460	0.0000	0.0000	0.0000
ALDA	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
ALSA	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
AMUR	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
BLAZ	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
BIDA	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
BRZR	A	1	P	18:189:00000	18:195:66090	UNE	0.0000	0.0000	0.0000	0.0000
CACE	A	1	P	18:189:00000	18:195:86370	UNE	0.0600	0.0000	0.0000	0.0000
CANT	A	1	P	18:189:00000	18:195:86370	UNE	3.0490	0.0000	0.0000	0.0000
CHER	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
CREU	A	1	P	18:189:00000	18:195:86370	UNE	0.0770	0.0000	0.0000	0.0000
EBRE	A	1	P	18:189:00000	18:195:86370	UNE	0.0770	0.0000	0.0000	0.0000
ELGE	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
EMAZ	A	1	P	18:189:00000	18:195:86370	UNE	0.0350	0.0000	0.0000	0.0000
GERN	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
IGEL	A	1	P	18:189:00000	18:194:86370	UNE	0.0000	0.0000	0.0000	0.0000
ISPS	A	1	P	18:189:00000	18:195:86370	UNE	0.0350	0.0000	0.0000	0.0000
KAST	A	1	P	18:189:00000	18:195:86370	UNE	0.0350	0.0000	0.0000	0.0000
LARE	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
LAZK	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
LEIT	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
ORDN	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
PAS2	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
PASA	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
RIO1	A	1	P	18:189:00000	18:195:86370	UNE	0.0606	0.0000	0.0000	0.0000
SALA	A	1	P	18:189:00000	18:195:86370	UNE	0.0600	0.0000	0.0000	0.0000
SCOA	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
SOPU	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
TERU	A	1	P	18:189:00000	18:195:86370	UNE	0.0600	0.0000	0.0000	0.0000
VITO	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
YEBE	A	1	P	18:189:00000	18:195:86370	UNE	0.0000	0.0000	0.0000	0.0000
ZARA	A	1	P	18:189:00000	18:195:86370	UNE	3.2590	0.0000	0.0000	0.0000

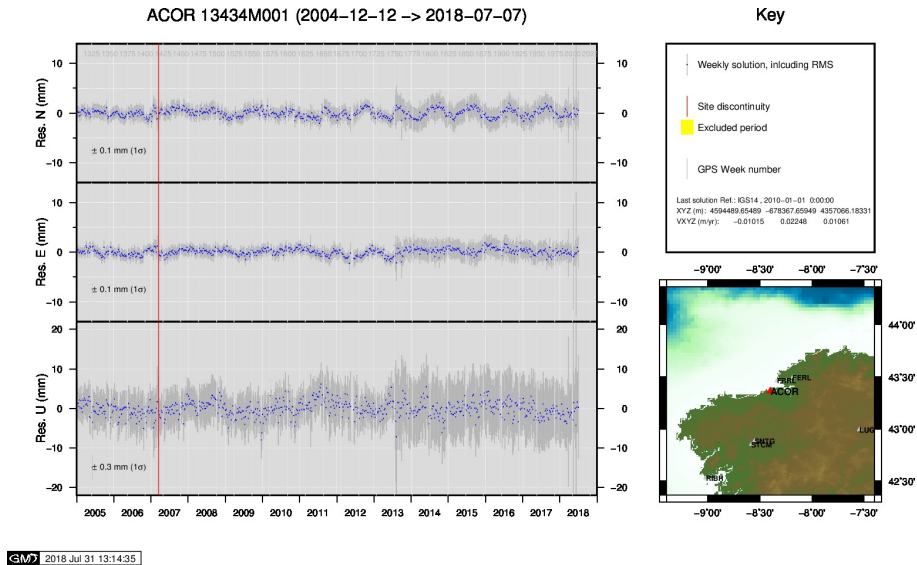
## 8 Inconsistencies (logsheet-RINEX metadata)

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

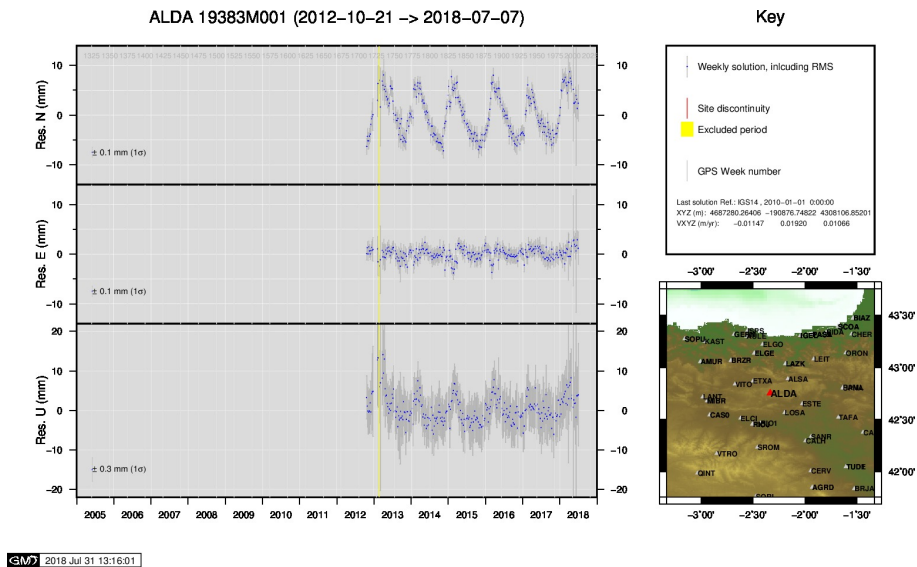
2018-07-30	12:09	UTC		PAS21890.180		RECEIVER TYPE		NET-G3A	->	TPS NET-G3A
2018-07-29	22:30	UTC		PAS21900.180		RECEIVER TYPE		NET-G3A	->	TPS NET-G3A
2018-07-30	20:48	UTC		PAS21910.180		RECEIVER TYPE		NET-G3A	->	TPS NET-G3A
2018-07-31	04:40	UTC		PAS21920.180		RECEIVER TYPE		NET-G3A	->	TPS NET-G3A
2018-07-27	00:48	UTC		PAS21930.180		RECEIVER TYPE		NET-G3A	->	TPS NET-G3A
2018-07-28	00:52	UTC		PAS21940.180		RECEIVER TYPE		NET-G3A	->	TPS NET-G3A
2018-07-29	00:37	UTC		PAS21950.180		RECEIVER TYPE		NET-G3A	->	TPS NET-G3A

## 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.

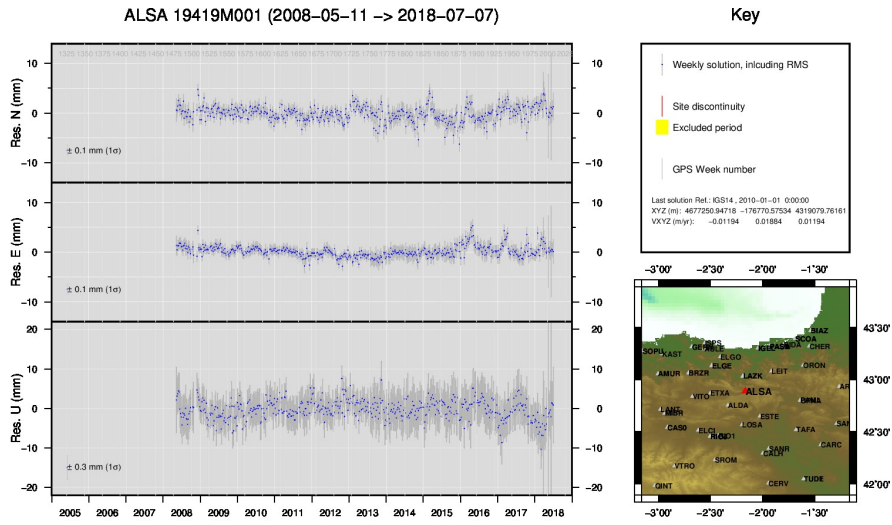


1 ) ACOR



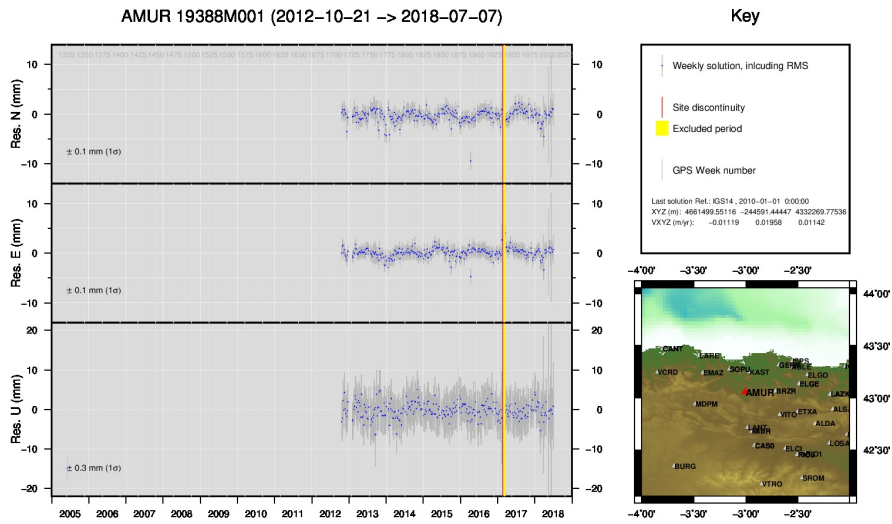
2 ) ALDA





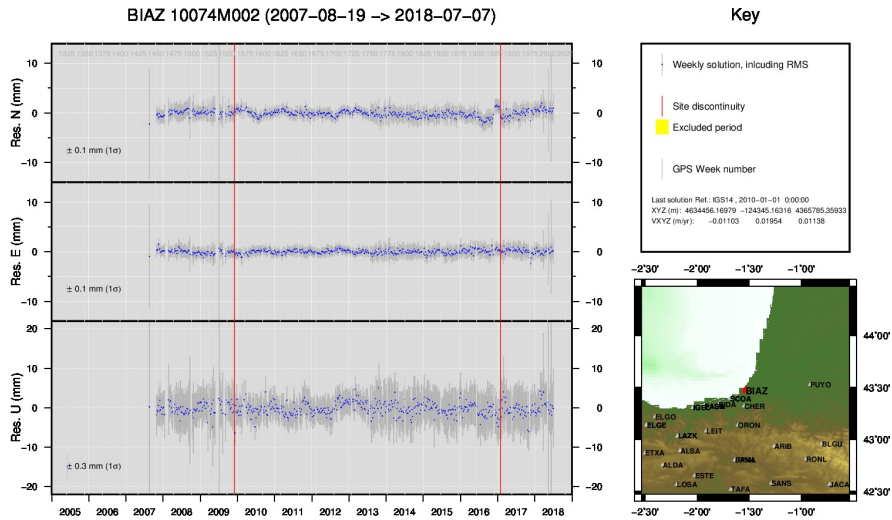
GMW 2018 Jul 31 13:17:01

3 ) ALSA



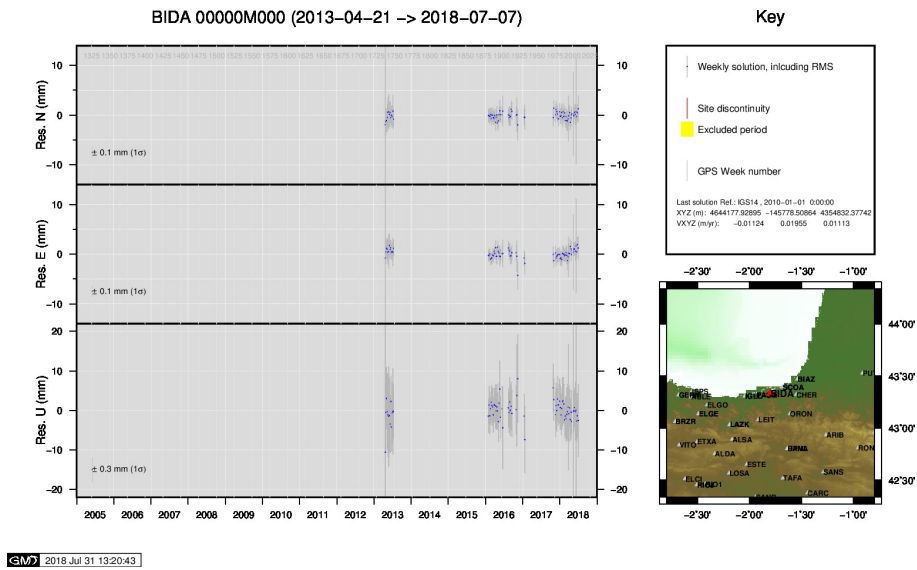
GMW 2018 Jul 31 13:17:13

4 ) AMUR

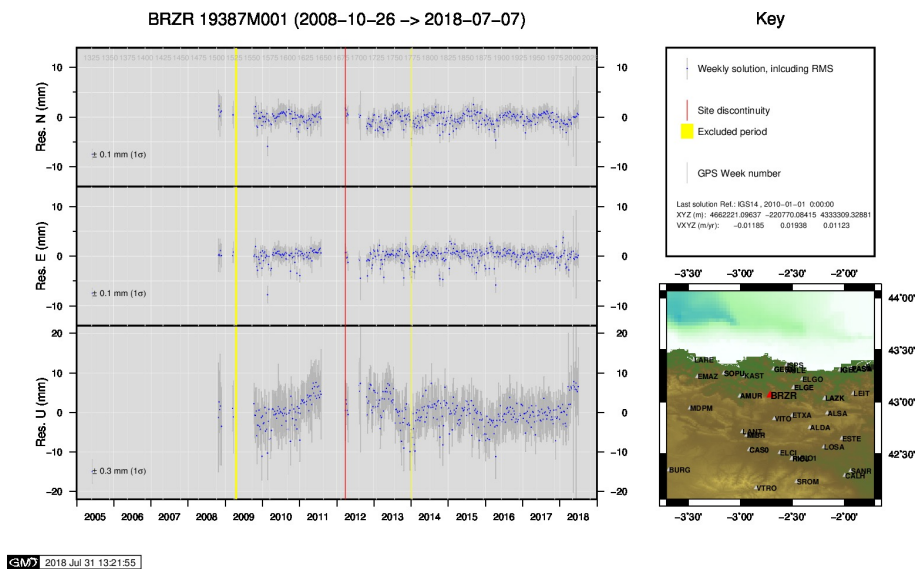


GMW 2018 Jul 31 13:20:37

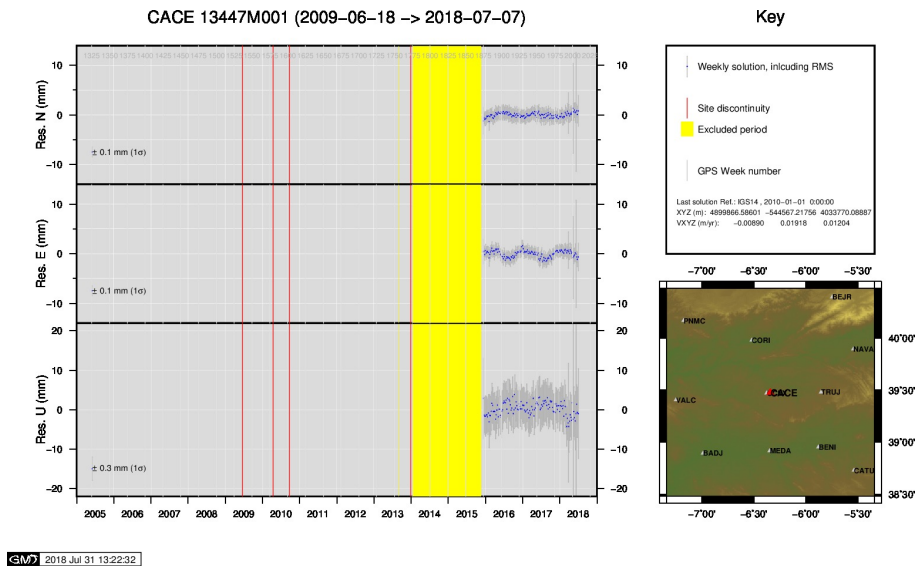
5 ) BIAZ



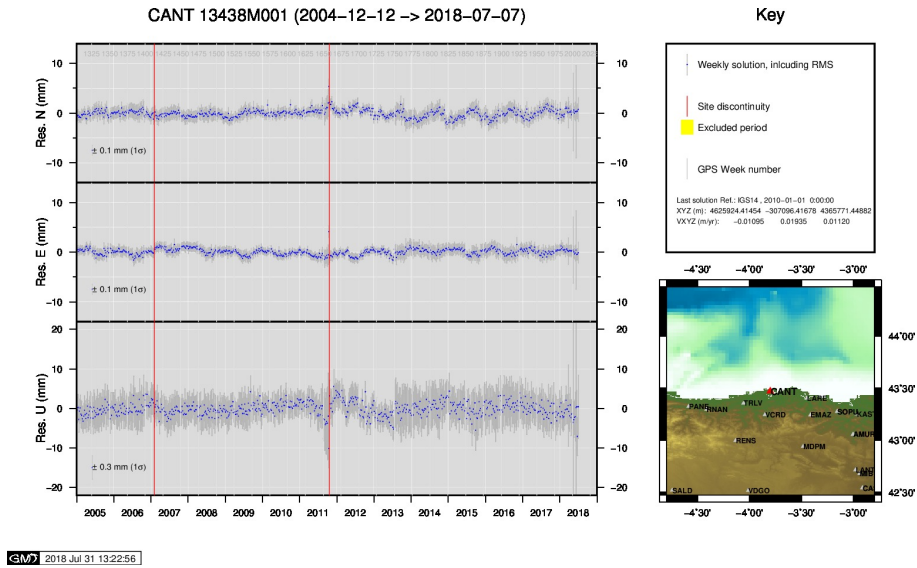
6 ) BIDA



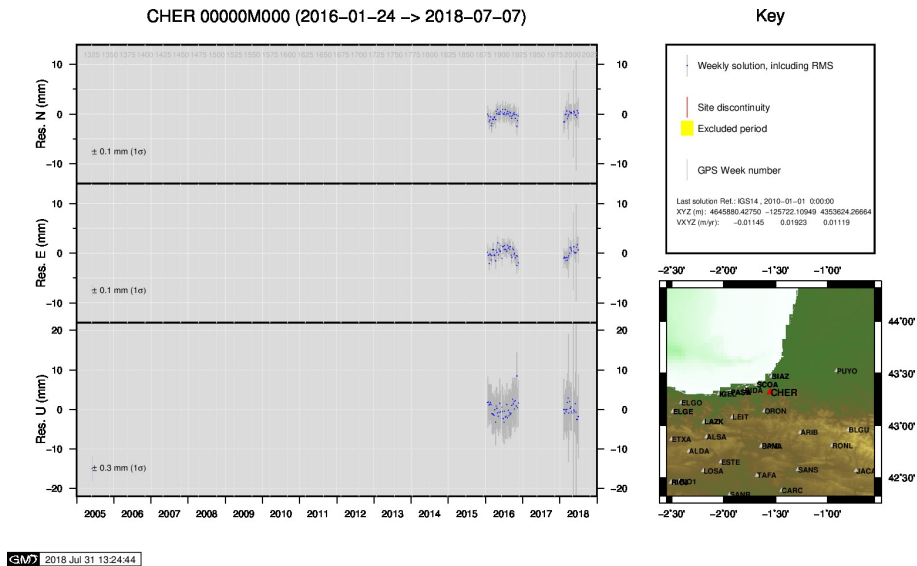
7 ) BRZR



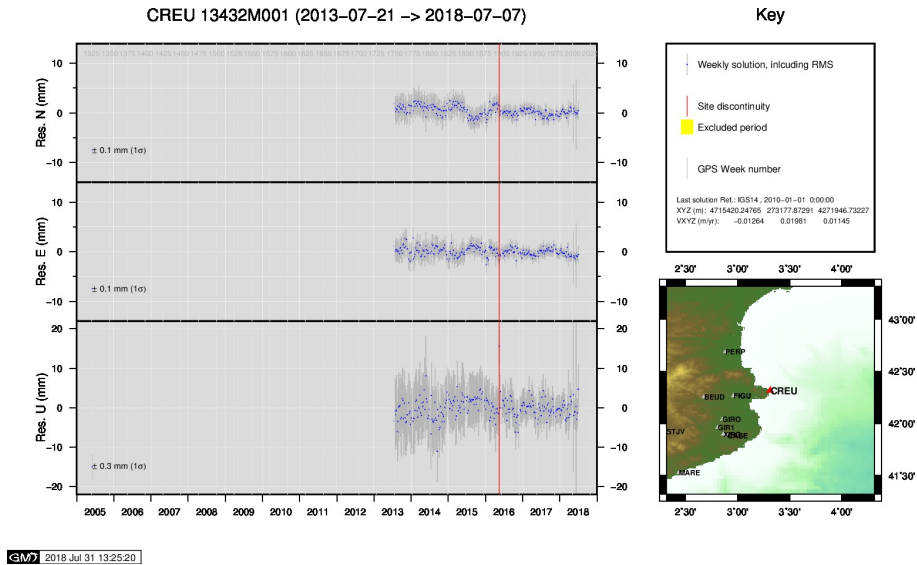
8 ) CACE



9 ) CANT

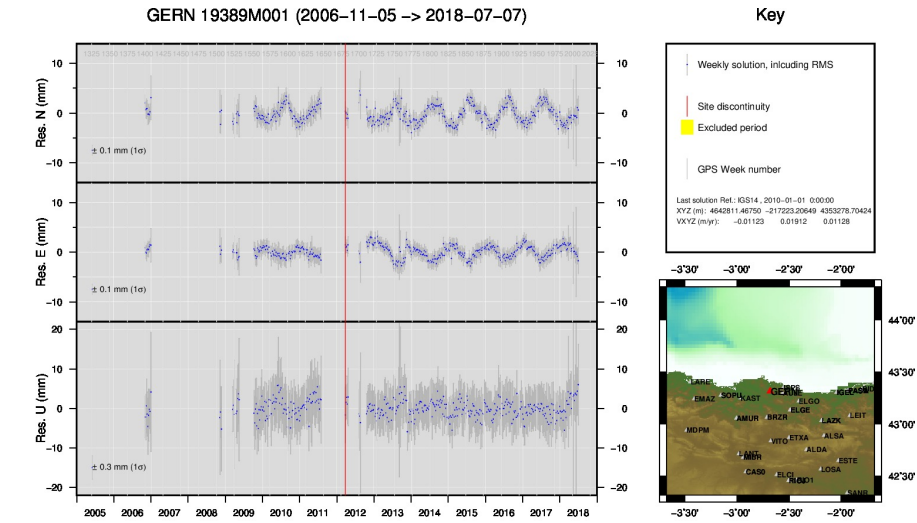


10 ) CHER



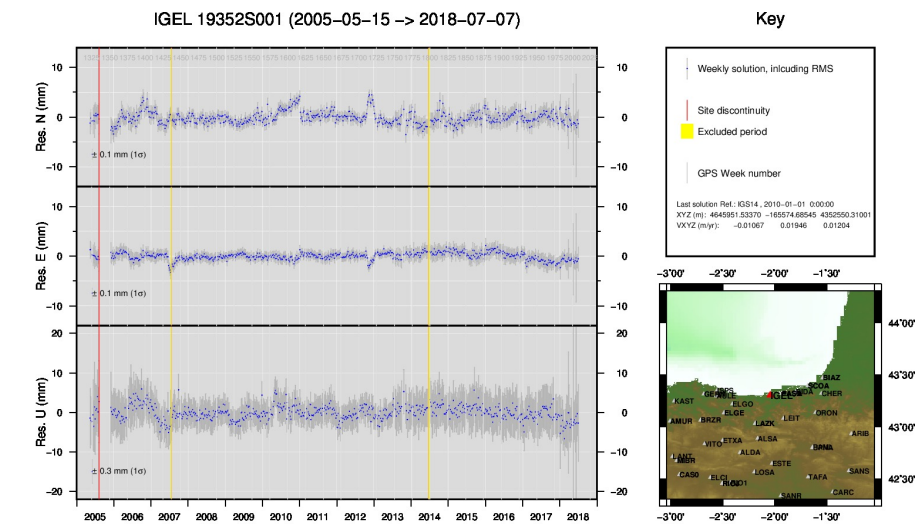
11 ) CREU





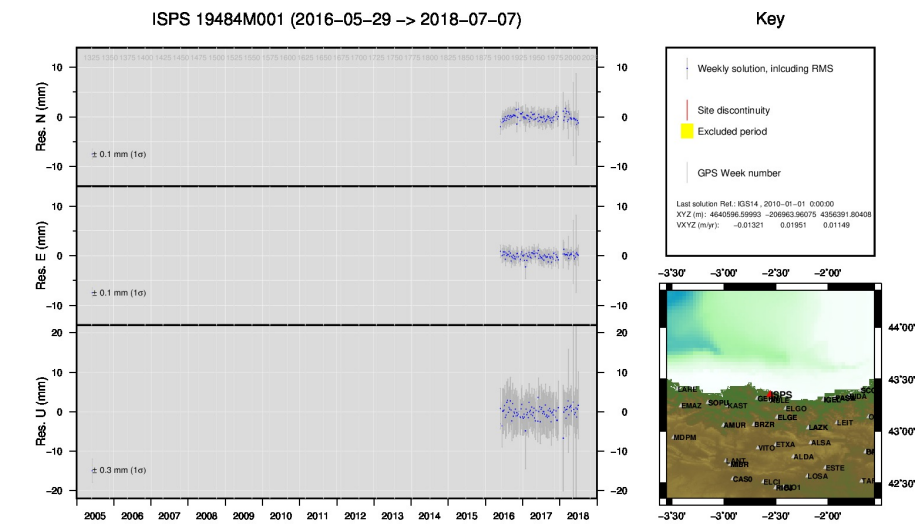
GMW 2018 Jul 31 13:29:23

15 ) GERN



GMW 2018 Jul 31 13:31:30

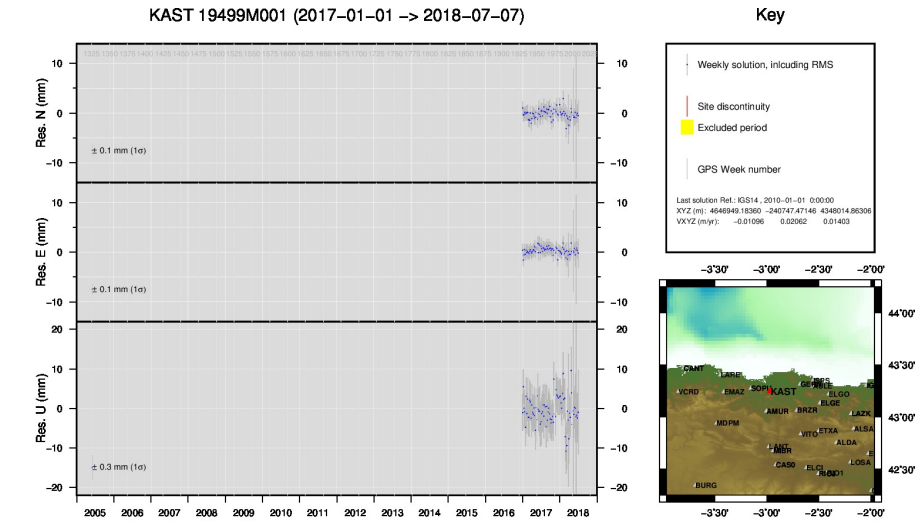
16 ) IGEL



GMW 2018 Jul 31 13:31:54

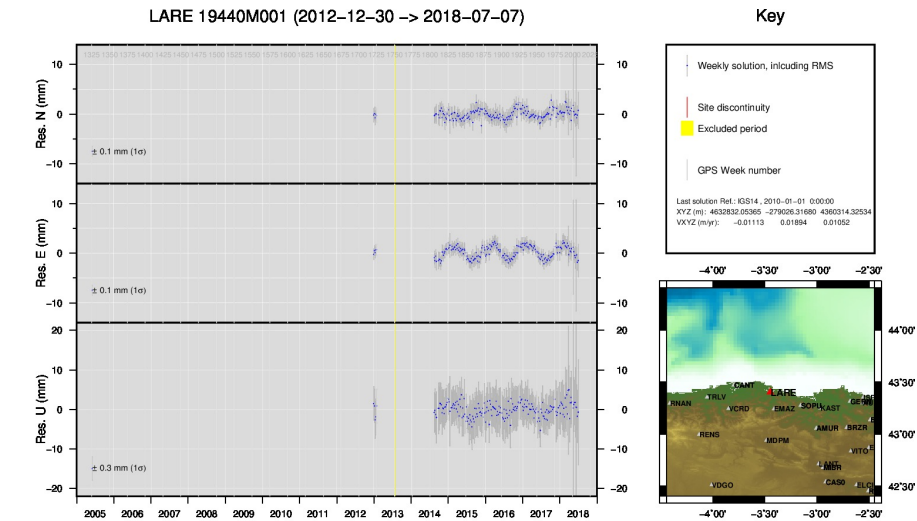
17 ) ISPS





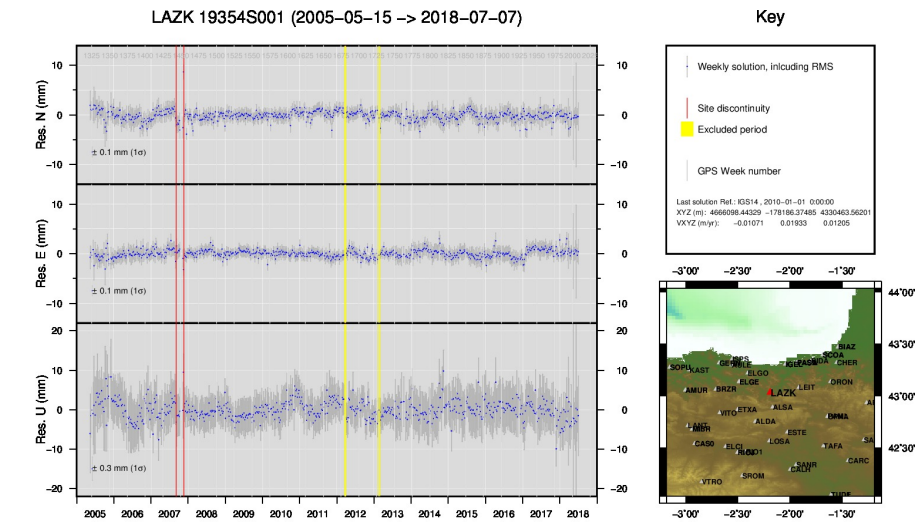
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18 ) KAST



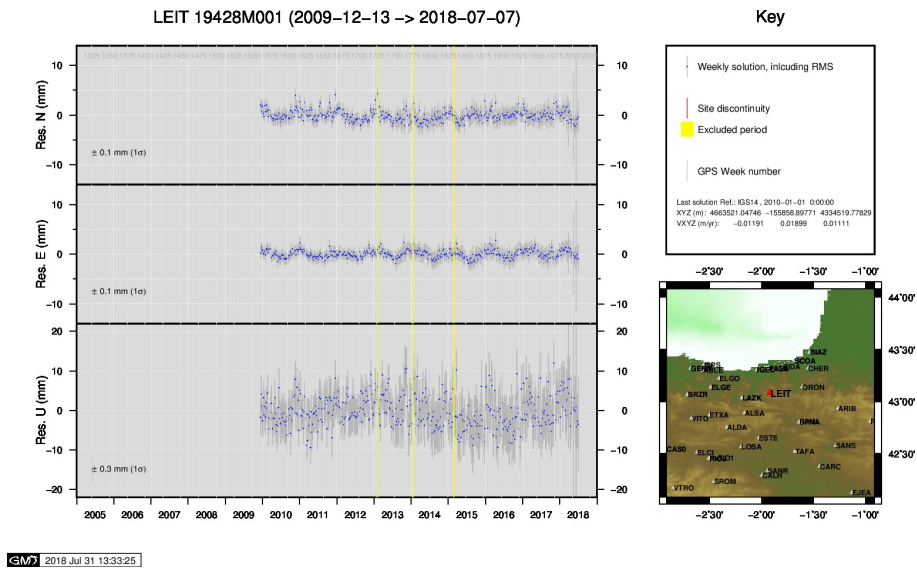
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19 ) LARE

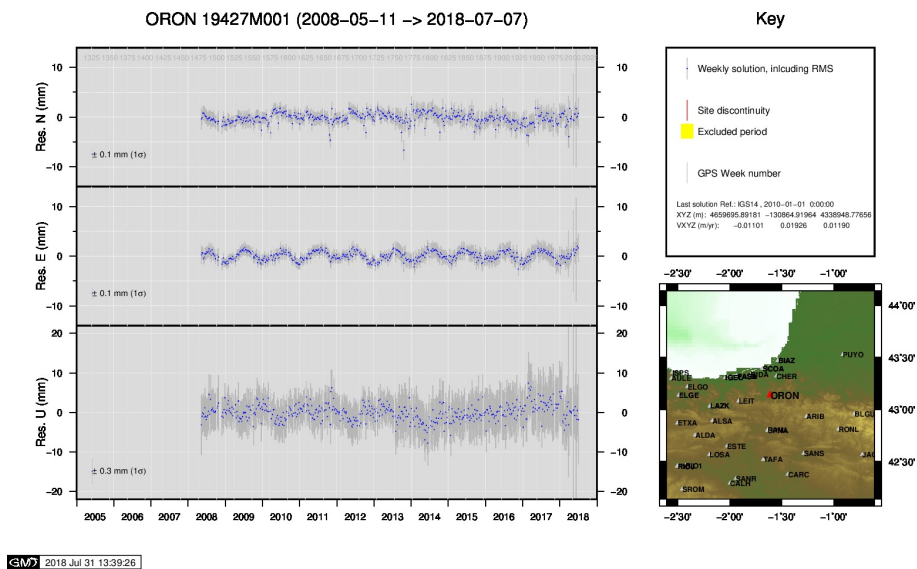


GMW 2018 Jul 31 13:33:00

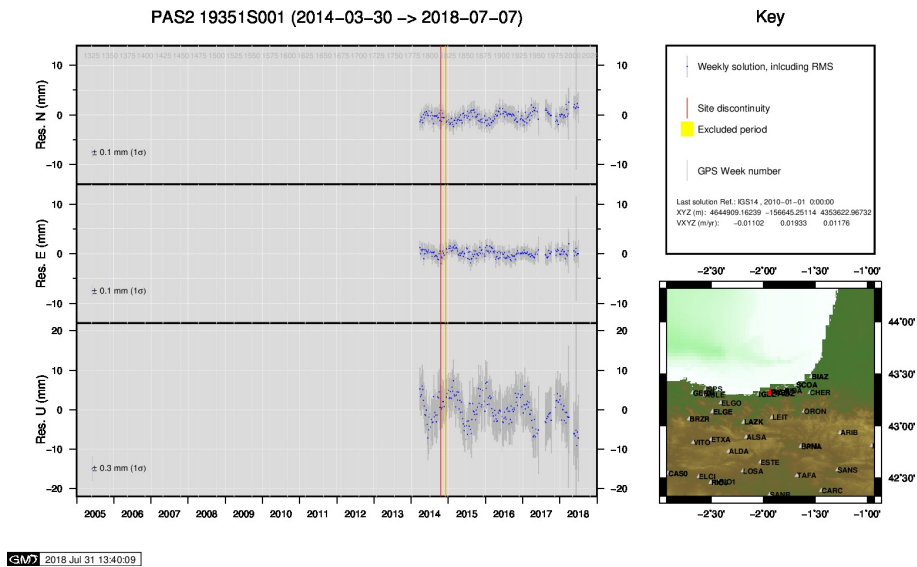
20 ) LAZK



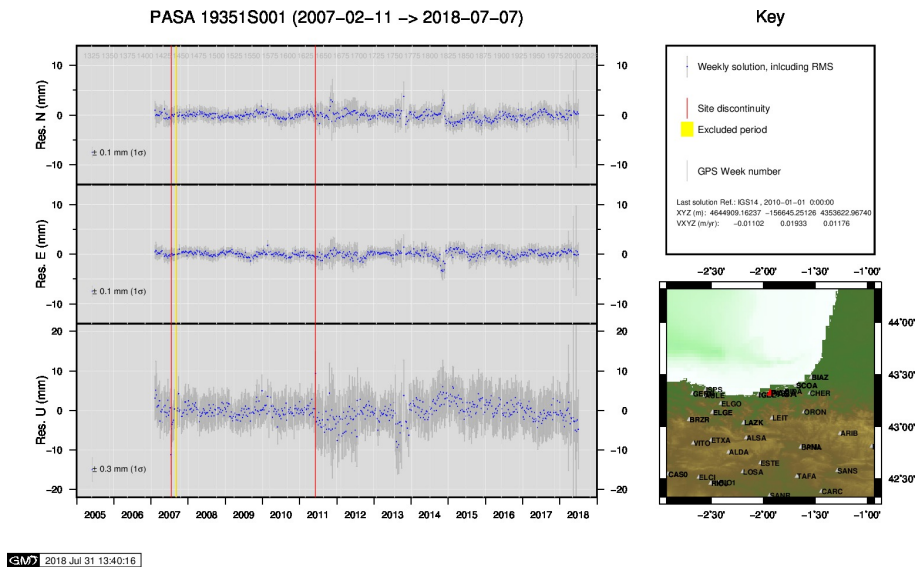
21 ) LEIT



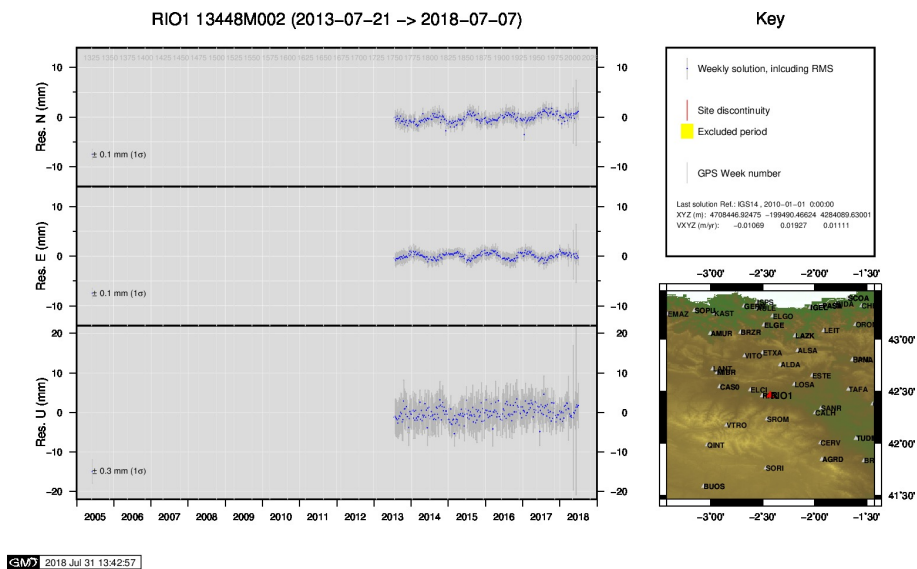
22 ) ORON



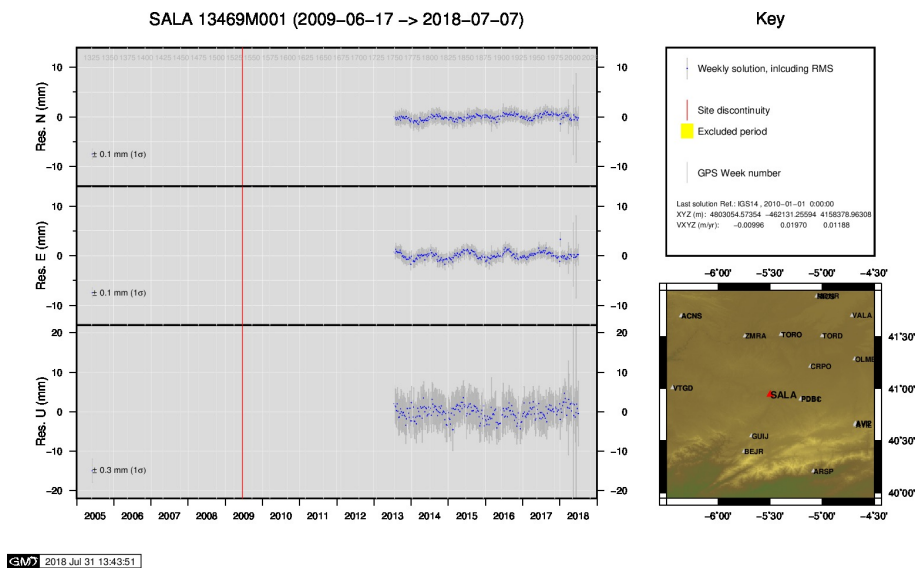
23 ) PAS2



24 ) PASA

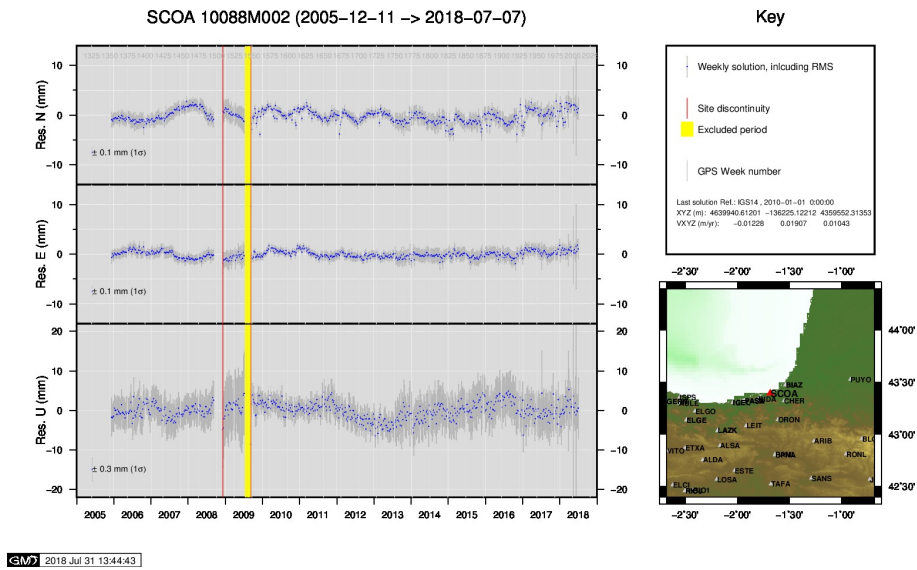


25 ) RIO1

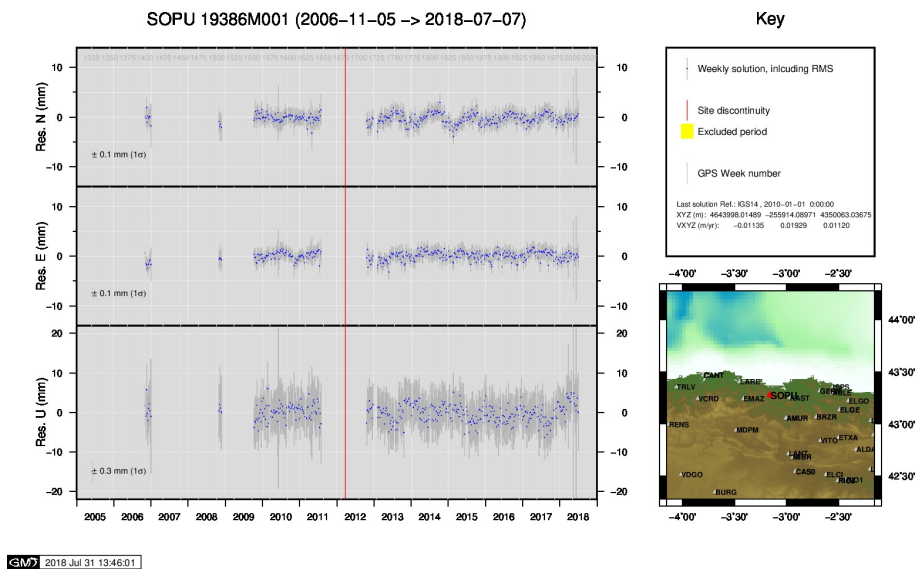


26 ) SALA

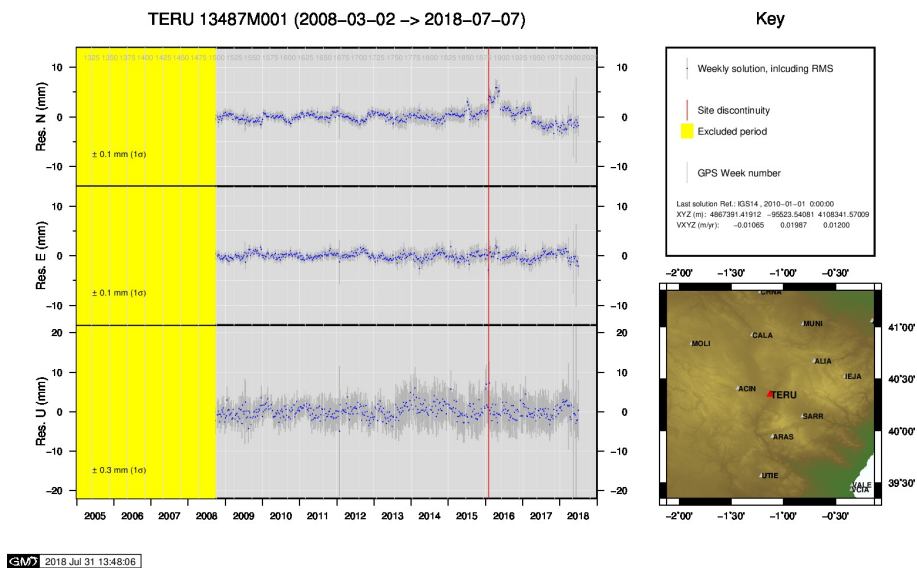




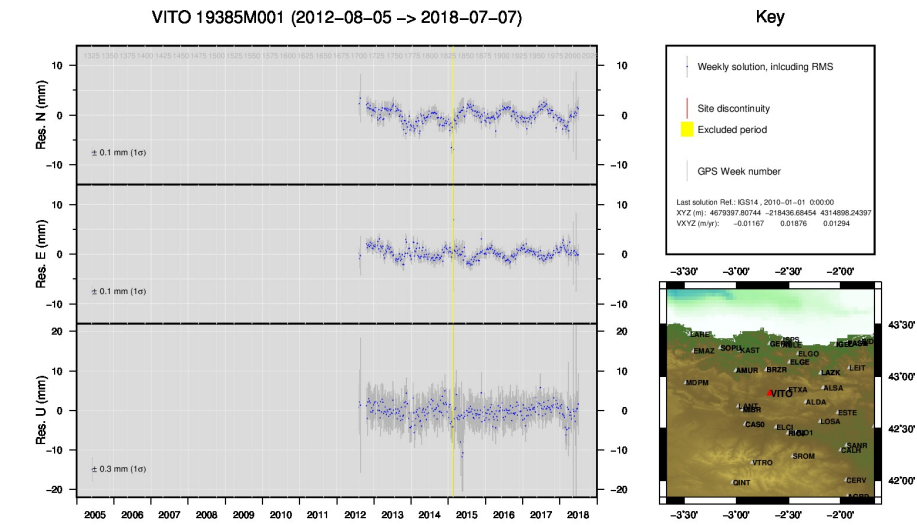
27 ) SCOA



28 ) SOPU

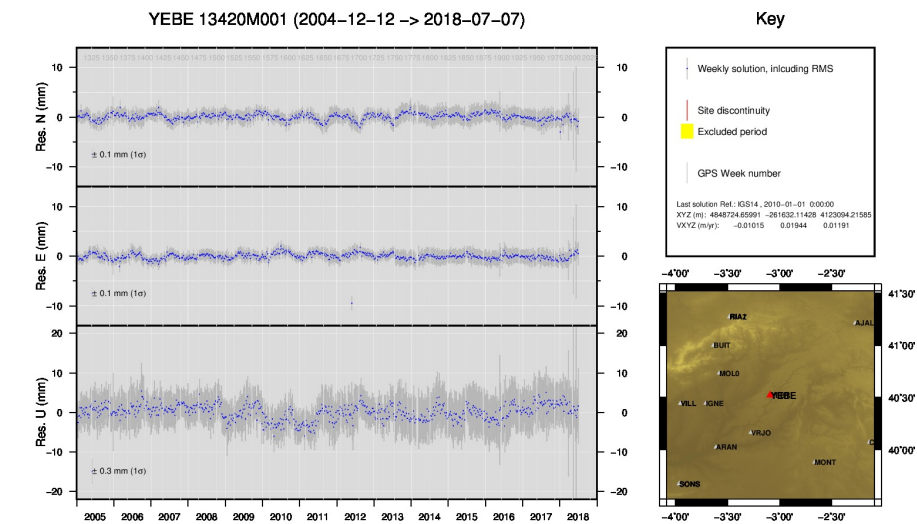


29 ) TERU



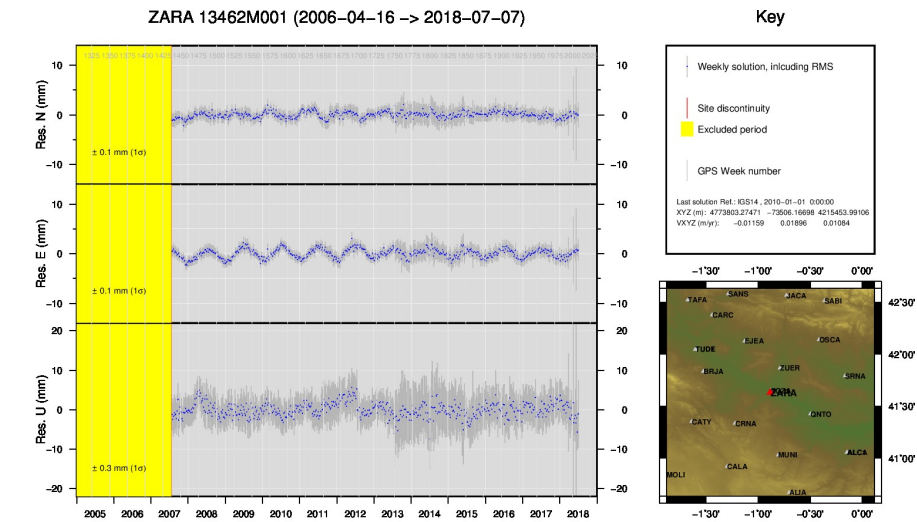
GMW 2018 Jul 31 13:51:32

30 ) VITO



GMW 2018 Jul 31 13:52:44

31 ) YEBE



GMW 2018 Jul 31 13:52:51

32 ) ZARA



