ARA-DAC Weekly Analysis Result: 1998 (GFA)

Technical Report

GPS Week: 1998 (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

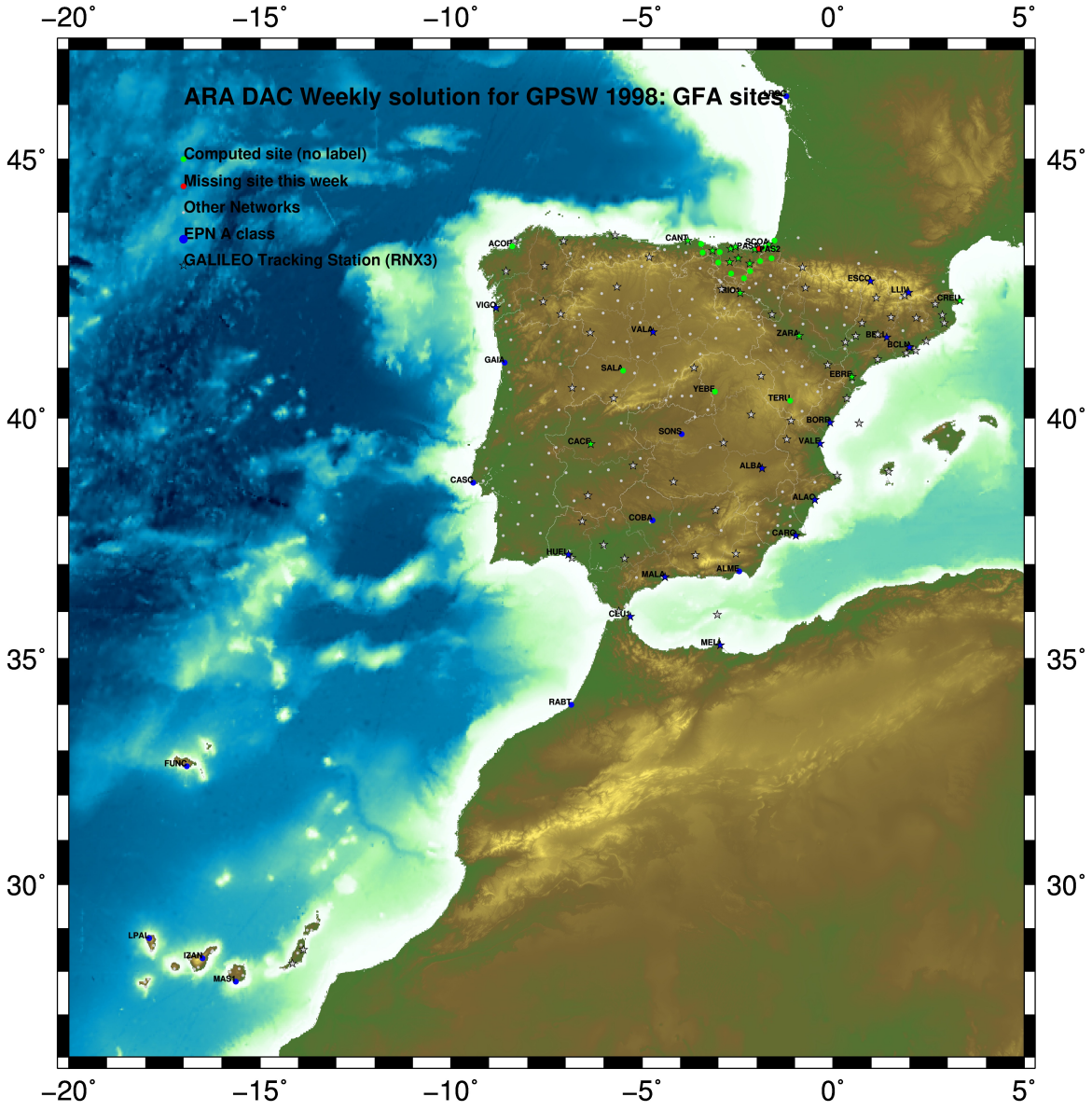

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Fig.1: Computed Sites for GPS Week1998 (GFA)

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 C1980.

```
ARA LAC 1998 WEEK FINAL COMBINATION: PRECISE ORBITS             09-MAY-18 02:44
------------------------------------------------------------------------------
LOCAL GEODETIC DATUM: IGS14             EPOCH: 2018-04-25 12:00:00

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

  1  ACOR 13434M001    4594489.56798  -678367.47225  4357066.27049    W
 33  ALDA 19383M001    4687280.16898  -190876.58801  4308106.95131    A
 42  ALSA 19419M001    4677250.84605  -176770.41859  4319079.86162    A
 44  AMUR 19388M001    4661499.45874  -244591.28097  4332269.87097    A
 77  BIAZ 10074M002    4634456.06308  -124344.99896  4365785.44603    A
 78  BIDA 00000M000    4644177.83424  -145778.34496  4354832.46918    A
 88  BRZR 19387M001    4662221.00198  -220769.92282  4333309.42573    A
  9  CACE 13447M001    4899866.50977  -544567.05748  4033770.18890    W
 10  CANT 13438M001    4625924.31994  -307096.25534  4365771.54050    W
112  CHER 00000M000    4645880.33133  -125721.94865  4353624.36030    A
 15  CREU 13432M001    4715420.14200   273178.03673  4271946.82907    W
 16  EBRE 13410M001    4833520.00060    41537.36628  4147461.70278    W
131  ELGE 19353S001    4657557.41474  -202241.49705  4338991.85643    A
133  EMAZ 17001M001    4645924.21892  -276949.88771  4347759.56633    A
153  GERN 19389M001    4642811.32072  -217222.95533  4353278.87076    A
173  IGEL 19352S001    4645951.43912  -165574.52585  4352550.40534    A
178  ISPS 19484M001    4640596.49021  -206963.79799  4356391.90036    A
182  KAST 19499M001    4646949.09750  -240747.29839  4348014.98685    A
185  LARE 19440M001    4632831.96266  -279026.15915  4360314.41379    A
186  LAZK 19354S001    4666098.35415  -178186.21391  4330463.66215    A
190  LEIT 19428M001    4663520.94759  -155858.74003  4334519.86901    A
242  ORON 19427M001    4659695.79925  -130864.75893  4338948.87526    A
 31  PASA 19351S001    4644909.06810  -156645.08965  4353623.06384    W
 34  RIO1 13448M002    4708446.83364  -199490.30610  4284089.72256    W
 35  SALA 13469M001    4803054.49182  -462131.09219  4158379.06325    W
 36  SCOA 10088M002    4639940.50791  -136224.96268  4359552.40219    W
298  SOPU 19386M001    4643997.92297  -255913.92900  4350063.13311    A
 40  TERU 13487M001    4867391.32905   -95523.37689  4108341.66899    W
349  VITO 19385M001    4679397.70816  -218436.52860  4314898.35088    A
 44  YEBE 13420M001    4848724.57593  -261631.95269  4123094.31519    W
 45  ZARA 13462M001    4773803.17743   -73506.00631  4215454.08387    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).

```
ETRF2000 FINAL COORD. wk 1998                                   09-MAY-18 02:44
------------------------------------------------------------------------------
LOCAL GEODETIC DATUM: ETRF2000          EPOCH: 2018-04-25 12:00:00

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

  1  ACOR 13434M001    4594489.86539  -678367.98868  4357065.86764    W
 33  ALDA 19383M001    4687280.51816  -190877.11272  4308106.54745    A
 42  ALSA 19419M001    4677251.19755  -176770.94225  4319079.45865    A
 44  AMUR 19388M001    4661499.80347  -244591.80323  4332269.46836    A
 77  BIAZ 10074M002    4634456.42359  -124345.51817  4365785.04680    A
 78  BIDA 00000M000    4644178.19161  -145778.86521  4354832.06899    A
 88  BRZR 19387M001    4662221.34947  -220770.44510  4333309.02335    A
  9  CACE 13447M001    4899866.80073  -544567.60412  4033769.76526    W
 10  CANT 13438M001    4625924.65985  -307096.77419  4365771.13976    W
112  CHER 00000M000    4645880.69088  -125722.46901  4353623.96022    A
 15  CREU 13432M001    4715420.54099   273177.51080  4271946.42847    W
 16  EBRE 13410M001    4833520.36524    41536.82772  4147461.29088    W
131  ELGE 19353S001    4657557.76469  -202242.01881  4338991.45461    A
133  EMAZ 17001M001    4645924.56104  -276950.40850  4347759.16449    A
153  GERN 19389M001    4642811.66993  -217223.47564  4353278.46984    A
173  IGEL 19352S001    4645951.79411  -165575.04634  4352550.00479    A
178  ISPS 19484M001    4640596.84079  -206964.31805  4356391.49972    A
182  KAST 19499M001    4646949.44371  -240747.81918  4348014.58535    A
185  LARE 19440M001    4632832.30538  -279026.67862  4360314.01287    A
186  LAZK 19354S001    4666098.70625  -178186.73645  4330463.25998    A
190  LEIT 19428M001    4663521.30247  -155859.26225  4334519.46729    A
242  ORON 19427M001    4659696.15724  -130865.28069  4338948.47411    A
 31  PASA 19351S001    4644909.42416  -156645.61000  4353622.66347    W
 34  RIO1 13448M002    4708447.18025  -199490.83294  4284089.31704    W
 35  SALA 13469M001    4803054.80042  -462131.62910  4158378.64771    W
 36  SCOA 10088M002    4639940.86667  -136225.48247  4359552.00242    W
298  SOPU 19386M001    4643998.26761  -255914.44953  4350062.73165    A
 40  TERU 13487M001    4867391.67564   -95523.91926  4108341.25302    W
349  VITO 19385M001    4679398.05469  -218437.05259  4314897.94727    A
 44  YEBE 13420M001    4848724.90479  -261632.49367  4123093.89866    W
 45  ZARA 13462M001    4773803.53365   -73506.53931  4215453.67503    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 1998 09-MAY-18 02:44

LOCAL GEODETIC DATUM: ETRF2014 EPOCH: 2018-04-25 12:00:00

NUM	STATION NAME	X (M)	Y (M)	Z (M)	FLAG
1	ACOR 13434M001	4594489.82256	-678368.02769	4357065.91555	W
33	ALDA 19383M001	4687280.47322	-190877.15302	4308106.59526	A
42	ALSA 19419M001	4677251.15266	-176770.98263	4319079.50650	A
44	AMUR 19388M001	4661499.75892	-244591.84345	4332269.51622	A
77	BIAZ 10074M002	4634456.37895	-124345.55888	4365785.09477	A
78	BIDA 00000M000	4644178.14694	-145778.90581	4354832.11693	A
88	BRZR 19387M001	4662221.30485	-220770.48539	4333309.07121	A
9	CACE 13447M001	4899866.75460	-544567.64244	4033769.81253	W
10	CANT 13438M001	4625924.61581	-307096.81433	4365771.18768	W
112	CHER 00000M000	4645880.64613	-125722.50968	4353624.00816	A
15	CREU 13432M001	4715420.49429	273177.46908	4271946.47650	W
16	EBRE 13410M001	4833520.31815	41536.78721	4147461.33850	W
131	ELGE 19353S001	4657557.72007	-202242.05918	4338991.50249	A
133	EMAZ 17001M001	4645924.51673	-276950.44867	4347759.21236	A
153	GERN 19389M001	4642811.62548	-217223.51602	4353278.51775	A
173	IGEL 19352S001	4645951.74948	-165575.08687	4352550.05272	A
178	ISPS 19484M001	4640596.79633	-206964.35847	4356391.54764	A
182	KAST 19499M001	4646949.39929	-240747.85946	4348014.63324	A
185	LARE 19440M001	4632832.26119	-279026.71883	4360314.06079	A
186	LAZK 19354S001	4666098.66146	-178186.77687	4330463.30785	A
190	LEIT 19428M001	4663521.25765	-155859.30275	4334519.51518	A
242	ORON 19427M001	4659696.11238	-130865.32129	4338948.52202	A
31	PASA 19351S001	4644909.37952	-156645.65057	4353622.71140	W
34	RIO1 13448M002	4708447.13512	-199490.87313	4284089.36481	W
35	SALA 13469M001	4803054.75507	-462131.66806	4158378.69519	W
36	SCOA 10088M002	4639940.82201	-136225.52313	4359552.05037	W
298	SOPU 19386M001	4643998.22326	-255914.48978	4350062.77954	A
40	TERU 13487M001	4867391.62865	-95523.95919	4108341.30050	W
349	VITO 19385M001	4679398.00990	-218437.09283	4314897.99509	A
44	YEBE 13420M001	4848724.85846	-261632.53313	4123093.94610	W
45	ZARA 13462M001	4773803.48752	-73506.57967	4215453.72271	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 1998 WEEK FINAL COMBINATION: PRECISE ORBITS              09-MAY-18 02:44
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                     Weekday     Repeatability (mm)
Station        #Days 0123456      N      E      U
-------------------------------------------------------
ACOR 13434M001     7 XXXXXXX     1.08   1.32   5.08
ALDA 19383M001     7 XXXXXXX     1.20   0.81   1.90
ALSA 19419M001     7 XXXXXXX     1.10   0.58   3.08
AMUR 19388M001     7 XXXXXXX     0.94   0.43   2.56
BIAZ 10074M002     7 XXXXXXX     0.42   0.61   2.81
BIDA 00000M000     7 XXXXXXX     0.89   0.89   4.44
BRZR 19387M001     6 XXX XXX     0.58   0.66   4.05
CACE 13447M001     6 X XXXXX     0.31   0.50   4.43
CANT 13438M001     6 X XXXXX     0.52   1.84   3.01
CHER 00000M000     6 X XXXXX     0.93   0.80   3.01
CREU 13432M001     7 XXXXXXX     0.63   0.57   2.40
EBRE 13410M001     7 XXXXXXX     0.44   0.71   3.96
ELGE 19353S001     5 X XXXX      0.63   0.96   2.74
EMAZ 17001M001     7 XXXXXXX     1.03   1.03   4.92
GERN 19389M001     6 XXX XXX     0.90   0.42   3.30
IGEL 19352S001     7 XXXXXXX     1.01   0.66   2.53
ISPS 19484M001     7 XXXXXXX     1.03   1.17   5.54
KAST 19499M001     7 XXXXXXX     1.65   1.86   8.05
LARE 19440M001     6 XXXXX X     1.11   2.54   4.19
LAZK 19354S001     7 XXXXXXX     0.54   0.49   3.08
LEIT 19428M001     7 XXXXXXX     0.66   0.81   4.00
ORON 19427M001     7 XXXXXXX     0.35   0.46   2.55
PASA 19351S001     4  X  XXX     0.83   0.46   1.56
RIO1 13448M002     6 XXX XXX     0.53   0.61   2.21
SALA 13469M001     7 XXXXXXX     0.48   0.71   4.14
SCOA 10088M002     7 XXXXXXX     0.72   0.37   2.27
SOPU 19386M001     6 XXX XXX     0.95   0.35   4.46
TERU 13487M001     7 XXXXXXX     0.59   1.23   2.03
VITO 19385M001     7 XXXXXXX     0.63   0.59   3.13
YEBE 13420M001     7 XXXXXXX     0.52   0.49   3.84
ZARA 13462M001     7 XXXXXXX     0.46   0.89   3.28

Comparison of individual solutions:
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ACOR 13434M001   N    1.08    -1.10   -1.86   -0.47    0.08   -0.14    1.24    0.72
ACOR 13434M001   E    1.32    -0.64   -0.02   -0.92   -0.35    1.07   -2.70   -0.80
ACOR 13434M001   U    5.08    -9.01    6.58   -2.33    2.88    3.28   -2.39   -0.62
ALDA 19383M001   N    1.20     0.32    0.95   -1.95    0.15    0.66    1.67   -0.76
ALDA 19383M001   E    0.81    -0.75   -0.72    1.22   -0.64    0.08    0.88    0.38
ALDA 19383M001   U    1.90    -1.90   -0.55    0.60    0.43   -0.98    0.31   -4.02
ALSA 19419M001   N    1.10    -0.57    1.30   -1.97    0.07    0.55    0.97    0.32
ALSA 19419M001   E    0.58     0.50    0.56    0.71   -0.34   -0.04   -0.16   -0.90
ALSA 19419M001   U    3.08    -4.73    1.13   -3.49   -1.87    2.25    2.78   -2.20
AMUR 19388M001   N    0.94     0.79    0.32    0.51    0.46   -1.36   -0.64    1.37
AMUR 19388M001   E    0.43    -0.24   -0.08   -0.58    0.78    0.33   -0.03    0.07
AMUR 19388M001   U    2.56    -2.45   -1.29   -1.69   -4.54   -0.49   -2.76    0.42
BIAZ 10074M002   N    0.42     0.53    0.07    0.09   -0.28   -0.48    0.07    0.67
BIAZ 10074M002   E    0.61    -1.12   -0.10    0.86    0.31    0.21   -0.19    0.30
BIAZ 10074M002   U    2.81     1.33    3.89   -1.85    0.18   -2.77   -4.28   -1.02
BIDA 00000M000   N    0.89     0.21    0.67   -0.44   -0.86   -0.65   -0.07    1.69
BIDA 00000M000   E    0.89    -1.27    1.12    0.43    0.63   -0.66   -0.69    0.62
BIDA 00000M000   U    4.44    -0.47    3.20   -3.06   -2.26   -1.43   -6.81    6.70
BRZR 19387M001   N    0.58     0.48   -0.78    0.31            0.68    0.50   -0.12
BRZR 19387M001   E    0.66    -0.36   -1.02    0.60            0.77    0.20    0.01
BRZR 19387M001   U    4.05     0.28    3.59   -8.02            0.24   -0.50    2.12
CACE 13447M001   N    0.31     0.11           -0.35    0.09    0.57    0.13    0.10
CACE 13447M001   E    0.50    -0.05           -0.09    0.26   -0.58   -0.92    0.02
CACE 13447M001   U    4.43     3.15            4.14    0.92   -5.57   -4.28   -4.57
CANT 13438M001   N    0.52     0.47           -0.66   -0.34   -0.55    0.14    0.51
CANT 13438M001   E    1.84    -0.92           -0.08    3.94   -0.27   -0.66    0.16
CANT 13438M001   U    3.01    -1.50            2.10    1.42    3.75    3.62   -3.09
CHER 00000M000   N    0.93     1.47            0.32   -1.37   -0.23    0.22   -0.36
CHER 00000M000   E    0.80    -0.89            1.44   -0.21   -0.23    0.41   -0.23
CHER 00000M000   U    3.01     0.06           -4.96   -0.24   -2.90    3.14   -1.57
CREU 13432M001   N    0.63    -0.29    0.45   -0.97    0.19   -1.01    0.26    0.08
CREU 13432M001   E    0.57    -1.09   -0.24    0.11   -0.35   -0.19    0.61    0.40
CREU 13432M001   U    2.40     0.61   -0.80   -4.82    1.05   -0.01    1.18    2.79
EBRE 13410M001   N    0.44    -0.25    0.70   -0.61   -0.12   -0.20    0.31   -0.31
EBRE 13410M001   E    0.71    -0.30   -1.01   -0.19    0.23   -0.32   -0.40    1.25
EBRE 13410M001   U    3.96     1.15   -2.32   -5.72    3.50   -2.24    2.45    5.59
ELGE 19353S001   N    0.63     0.26            0.45   -1.08    0.33   -0.23
ELGE 19353S001   E    0.96    -1.48            1.12    0.04    0.21    0.48
ELGE 19353S001   U    2.74    -1.66           -2.99   -3.39   -2.32    1.17
EMAZ 17001M001   N    1.03    -1.10    0.80    0.82    1.69   -0.32   -0.52    0.79
EMAZ 17001M001   E    1.03    -1.36   -0.26   -0.73   -0.11   -0.44    1.82    0.64
EMAZ 17001M001   U    4.92     2.39   -0.83   -3.52    3.81    7.55   -1.65   -7.23
GERN 19389M001   N    0.90     0.39    1.39    0.68            -0.59   -1.03    0.24
GERN 19389M001   E    0.42     0.40    0.03    0.02            0.36   -0.77   -0.03
GERN 19389M001   U    3.30    -1.80    5.51   -1.98           -4.09    0.12   -0.27
IGEL 19352S001   N    1.01     1.66    0.09    0.25   -1.60   -0.50    0.16    0.61
IGEL 19352S001   E    0.66    -1.35    0.04    0.51    0.72    0.11    0.01    0.17
IGEL 19352S001   U    2.53    -0.45    1.14   -4.41   -2.84   -0.40   -0.36    3.02
ISPS 19484M001   N    1.03     0.16    1.64   -1.07   -0.05   -1.00   -0.46    1.13
ISPS 19484M001   E    1.17    -1.64   -1.55    0.88    0.28    0.31    1.48    0.10
ISPS 19484M001   U    5.54    -3.34    7.69   -2.02   -1.07   -3.95   -8.12    5.19
KAST 19499M001   N    1.65    -0.01    1.36   -1.00    2.62   -0.85   -2.08    1.21
KAST 19499M001   E    1.86    -1.86    2.87    1.37   -0.14   -1.40   -1.87    1.27
KAST 19499M001   U    8.05    -7.10   11.19   -4.67    3.89   -2.98  -12.93    0.14
LARE 19440M001   N    1.11     0.11   -0.50   -0.25   -1.26    0.85            1.89
LARE 19440M001   E    2.54    -3.03    0.46   -0.01    4.02    2.45            0.87
LARE 19440M001   U    4.19     6.15   -3.16    1.76    3.92   -3.95           -2.41
LAZK 19354S001   N    0.54    -0.59    0.41    0.54   -0.23   -0.68    0.30    0.58
LAZK 19354S001   E    0.49    -0.60    0.45    0.78   -0.07   -0.14   -0.44    0.25
LAZK 19354S001   U    3.08     0.93   -2.55   -5.45   -1.03   -1.04    2.09    3.63
```

LEIT	19428M001	N	0.66	0.35	0.80	-0.48	-0.45	0.08	1.04	-0.61
LEIT	19428M001	E	0.81	-0.77	-1.09	1.06	-0.25	0.19	0.32	0.90
LEIT	19428M001	U	4.00	-4.13	4.70	-4.85	0.90	2.22	-4.77	2.21
ORON	19427M001	N	0.35	0.21	0.59	0.02	-0.48	0.25	0.18	-0.09
ORON	19427M001	E	0.46	-0.79	-0.25	0.68	0.13	0.24	-0.03	0.23
ORON	19427M001	U	2.55	2.18	2.69	-0.20	-2.02	-3.02	0.20	-3.71
PASA	19351S001	N	0.83		1.37			-0.33	-0.10	-0.25
PASA	19351S001	E	0.46		-0.48			-0.19	0.58	0.21
PASA	19351S001	U	1.56		0.00			-0.19	-0.72	2.60
RIO1	13448M002	N	0.53	-0.13	-0.57	0.07		-0.21	0.95	0.32
RIO1	13448M002	E	0.61	-0.54	0.57	0.96		-0.24	-0.53	0.12
RIO1	13448M002	U	2.21	-1.08	-3.32	-0.66		2.85	1.90	-0.17
SALA	13469M001	N	0.48	-0.40	-0.15	0.58	0.24	0.41	0.80	0.05
SALA	13469M001	E	0.71	-0.84	0.92	-0.62	0.36	0.68	0.53	0.47
SALA	13469M001	U	4.14	2.49	1.38	0.81	0.24	9.28	-2.60	-1.13
SCOA	10088M002	N	0.72	-1.07	0.27	0.47	-0.79	0.00	0.69	0.77
SCOA	10088M002	E	0.37	-0.33	0.44	-0.03	0.24	0.39	-0.53	-0.11
SCOA	10088M002	U	2.27	1.12	1.93	0.45	-0.20	-0.22	-4.17	-2.89
SOPU	19386M001	N	0.95	1.13	-0.60	1.13		-1.02	0.05	0.71
SOPU	19386M001	E	0.35	-0.29	-0.40	0.10		0.31	0.45	0.23
SOPU	19386M001	U	4.46	1.02	7.50	-3.68		0.82	-4.69	-2.40
TERU	13487M001	N	0.59	0.41	-0.02	-0.25	0.68	-0.50	0.42	-0.97
TERU	13487M001	E	1.23	-1.12	-0.11	-0.82	-0.25	-0.25	-0.04	2.66
TERU	13487M001	U	2.03	-0.52	1.80	0.50	-3.66	-1.16	-0.09	2.49
VITO	19385M001	N	0.63	1.16	-0.51	0.14	0.12	-0.38	0.78	-0.11
VITO	19385M001	E	0.59	-1.15	0.70	0.15	-0.01	0.07	0.10	0.45
VITO	19385M001	U	3.13	-6.49	-0.10	-0.73	-2.85	1.90	0.92	-1.88
YEBE	13420M001	N	0.52	-0.08	0.74	-0.11	-0.20	0.02	-0.68	0.75
YEBE	13420M001	E	0.49	-0.41	-0.25	-0.93	-0.08	0.16	0.05	-0.54
YEBE	13420M001	U	3.84	-2.21	-2.52	1.57	4.86	-6.83	1.98	-0.70
ZARA	13462M001	N	0.46	0.13	-0.32	-0.33	0.56	0.02	0.75	0.37
ZARA	13462M001	E	0.89	-0.57	-1.44	0.96	0.21	-0.20	1.00	0.60
ZARA	13462M001	U	3.28	-0.98	3.91	-4.93	-4.61	-1.22	-0.94	0.66

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	-1.05	1.38	1.99
2	ALAC 13433M001	I W	-0.15	0.01	-2.97
3	ALBA 13452M001	I W	0.12	-0.56	-3.16
4	ALME 13437M001	I W	-0.62	0.17	-2.71
5	BCLN 13412M001	I W	-2.08	1.25	0.27
6	BELL 13431M001	I W	0.51	1.67	-2.79
7	BORR 13480M001	I W	-1.32	-1.09	-2.40
8	BRST 10004M004	I W	-2.29	-0.36	-2.02
9	CACE 13447M001	I W	0.24	0.15	3.28
10	CANT 13438M001	I W	-0.44	-0.40	4.38
11	CARG 19412M001	I W	0.90	-0.56	-1.24
12	CASC 13909S001	I W	-0.78	-1.83	0.84
13	CEU1 13449M002	I W	0.83	-0.41	-2.02
14	COBA 13453M001	I W	1.03	0.07	0.36
15	CREU 13432M001	I W	-1.18	1.01	0.21
16	EBRE 13410M001	I W	0.07	2.13	-1.53
17	ESCO 13435M001	I W	-0.34	-3.37	5.87
18	FUNC 13911S001	I W	0.02	-1.83	-2.12
19	GAIA 13902M001	I W	0.08	-1.47	6.37
21	HUEL 13451M001	I W	-0.90	2.80	3.06
22	IZAN 31309M002	I W	2.21	0.34	-4.28
24	LLIV 13436M001	I W	-1.57	0.40	3.79
25	LPAL 81701M001	I W	-0.37	2.97	-5.27
26	LROC 10023M001	I W	-0.43	-1.44	-1.83
27	MALA 13443M001	I W	-1.08	1.90	-0.82
28	MAS1 31303M002	I W	1.86	1.47	-5.18
30	MELI 19379M001	I W	-0.10	0.46	-1.32
31	PASA 19351S001	I W	-0.29	-0.90	3.03
32	PDEL 31906M004	I W	0.34	-0.28	0.11
33	RABT 35001M002	I W	0.39	-0.71	-1.58
34	RIO1 13448M002	I W	-0.31	-0.40	1.31
35	SALA 13469M001	I W	0.35	0.27	0.27
36	SCOA 10088M002	I W	-3.52	-1.19	0.95
38	SONS 13446M001	I W	1.71	1.79	1.61
39	TERC 31909M001	I W	7.07	-2.75	-4.85
40	TERU 13487M001	I W	0.68	1.48	1.16
41	VALA 13463M002	I W	-0.21	-0.96	2.15
42	VALE 13439M001	I W	-0.42	0.57	-5.50
43	VIGO 13450M001	I W	-0.34	-1.54	4.76
44	YEBE 13420M001	I W	1.22	-0.10	4.10
45	ZARA 13462M001	I W	-0.42	0.55	0.40
46	ZIMM 14001M004	I W	0.54	-0.70	3.32
	RMS / COMPONENT		1.56	1.39	3.11
	MEAN		-0.00	-0.00	0.00
	MIN		-3.52	-3.37	-5.50
	MAX		7.07	2.97	6.37

```
NUMBER OF PARAMETERS  :     3
NUMBER OF COORDINATES :   126
RMS OF TRANSFORMATION :    2.16 MM

BARYCENTER COORDINATES:

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


PARAMETERS:

TRANSLATION IN  N     :          -0.00     +-  0.33    MM
TRANSLATION IN  E     :          -0.00     +-  0.33    MM
TRANSLATION IN  U     :           0.00     +-  0.33    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                        16458250
 NUMBER OF UNKNOWNS                              222080
 NUMBER OF DEGREES OF FREEDOM                  16236170
 PHASE MEASUREMENTS SIGMA                       0.00100
 SAMPLING INTERVAL (SECONDS)                        180
 VARIANCE FACTOR                    2.389868297654539
```

Helmert Transformation Parameters With Respect to Combined Solution:

		Translation (m)			Rotation (")			
Sol	Rms (m)	X	Y	Z	X	Y	Z	Scale (ppm)
1	0.00284	0.0193	0.0084	-0.0185	-0.0001	0.0009	0.0003	-0.00056
2	0.00373	-0.0146	-0.0160	0.0112	0.0002	-0.0006	-0.0005	0.00043
3	0.00290	0.0081	0.0087	-0.0168	-0.0002	0.0006	0.0002	0.00096
4	0.00232	0.0065	0.0075	0.0017	-0.0001	0.0001	0.0002	-0.00078
5	0.00347	0.0183	0.0261	-0.0134	-0.0005	0.0007	0.0007	-0.00074
6	0.00274	0.0166	0.0036	-0.0191	0.0000	0.0008	0.0002	-0.00003
7	0.00260	0.0018	-0.0201	-0.0041	0.0004	0.0001	-0.0005	-0.00018

Statistics of individual solutions:

File	RMS (m)	DOF	Chi**2/DOF	#Observations authentic	/ pseudo	#Parameters explicit	/ implicit	/ singular
1	0.00154	2295664	2.37	2328460	3	981	31818	0
2	0.00155	2311400	2.40	2343011	3	978	30636	0
3	0.00151	2340334	2.27	2372979	3	999	31649	0
4	0.00156	2298453	2.44	2330731	3	990	31291	0
5	0.00156	2338175	2.42	2371303	3	1005	32126	0
6	0.00155	2347747	2.40	2381147	3	1008	32395	0
7	0.00151	2298505	2.28	2330619	3	978	31139	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 18:112:00000 18:118:86370 LEICA GRX1200PRO     ----- -----------
 ALDA  A    1 P 18:112:00000 18:118:86370 LEICA GR10           ----- -----------
 ALSA  A    1 P 18:112:00000 18:118:86370 LEICA GRX1200GGPRO   ----- -----------
 AMUR  A    1 P 18:112:00000 18:118:86370 LEICA GR10           ----- -----------
 BIAZ  A    1 P 18:112:00000 18:118:86370 TRI SP90M            ----- -----------
 BIDA  A    1 P 18:112:00000 18:118:86370 LEICA GR10           ----- -----------
 BRZR  A    1 P 18:112:00000 18:118:86370 LEICA GR10           ----- -----------
 CACE  A    1 P 18:112:00000 18:118:86370 TRIMBLE NETR9        ----- -----------
 CANT  A    1 P 18:112:00000 18:118:86370 LEICA GR10           ----- -----------
 CHER  A    1 P 18:112:00000 18:118:86370 LEICA GRX1200+GNSS   ----- -----------
 CREU  A    1 P 18:112:00000 18:118:86370 LEICA GR50           ----- -----------
 EBRE  A    1 P 18:112:00000 18:118:86370 LEICA GR50           ----- -----------
 ELGE  A    1 P 18:112:00000 18:117:86370 LEICA GR10           ----- -----------
 EMAZ  A    1 P 18:112:00000 18:118:86370 LEICA GR30           ----- -----------
 GERN  A    1 P 18:112:00000 18:118:86370 LEICA GR10           ----- -----------
 IGEL  A    1 P 18:112:00000 18:118:86370 LEICA GR10           ----- -----------
 ISPS  A    1 P 18:112:00000 18:118:86370 TRIMBLE NETR9        ----- -----------
 KAST  A    1 P 18:112:00000 18:118:86370 LEICA GR30           ----- -----------
 LARE  A    1 P 18:112:00000 18:118:86370 LEICA GRX1200GGPRO   ----- -----------
 LAZK  A    1 P 18:112:00000 18:118:86370 LEICA GR10           ----- -----------
 LEIT  A    1 P 18:112:00000 18:118:86370 LEICA GRX1200+GNSS   ----- -----------
 ORON  A    1 P 18:112:00000 18:118:86370 LEICA GRX1200GGPRO   ----- -----------
 PASA  A    1 P 18:113:00000 18:118:86370 LEICA GR10           ----- -----------
 RIO1  A    1 P 18:112:00000 18:118:86370 LEICA GR25           ----- -----------
 SALA  A    1 P 18:112:00000 18:118:86370 LEICA GRX1200+GNSS   ----- -----------
 SCOA  A    1 P 18:112:00000 18:118:86370 LEICA GR25           ----- -----------
 SOPU  A    1 P 18:112:00000 18:118:86370 LEICA GR10           ----- -----------
 TERU  A    1 P 18:112:00000 18:118:86370 LEICA GRX1200GGPRO   ----- -----------
 VITO  A    1 P 18:112:00000 18:118:86370 LEICA GR10           ----- -----------
 YEBE  A    1 P 18:112:00000 18:118:86370 TRIMBLE NETRS        ----- -----------
 ZARA  A    1 P 18:112:00000 18:118:86370 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 18:112:00000 18:118:86370 LEIAT504        LEIS -----
 ALDA  A    1 P 18:112:00000 18:118:86370 LEIAS10         NONE -----
 ALSA  A    1 P 18:112:00000 18:118:86370 LEIAX1202GG     NONE -----
 AMUR  A    1 P 18:112:00000 18:118:86370 LEIAS10         NONE -----
 BIAZ  A    1 P 18:112:00000 18:118:86370 LEIAR25         LEIT -----
```

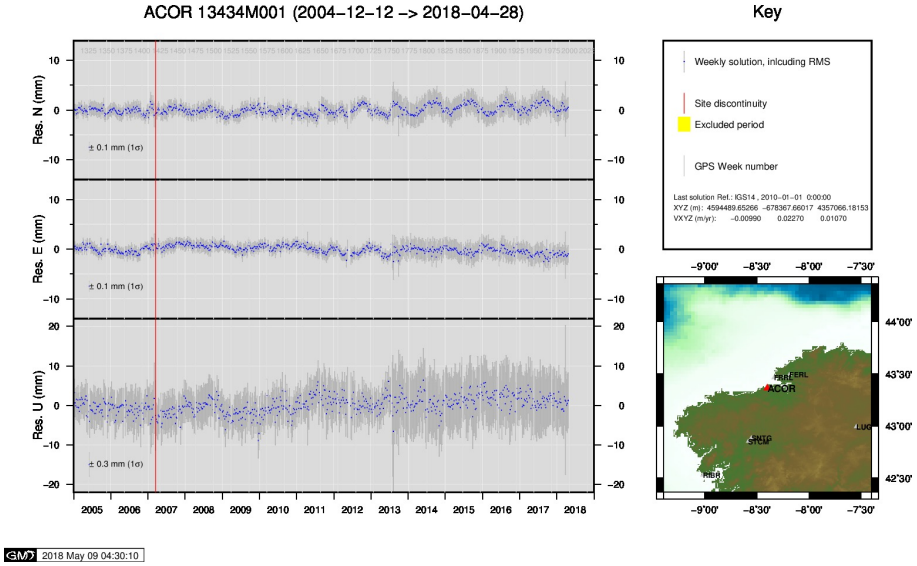
```
 BIDA  A    1 P 18:112:00000 18:118:86370 LEIAS10         NONE -----
 BRZR  A    1 P 18:112:00000 18:118:86370 LEIAS10         NONE -----
 CACE  A    1 P 18:112:00000 18:118:86370 TRM29659.00     NONE -----
 CANT  A    1 P 18:112:00000 18:118:86370 LEIAR25.R4      LEIT 25066
 CHER  A    1 P 18:112:00000 18:118:86370 LEIAX1203+GNSS  NONE -----
 CREU  A    1 P 18:112:00000 18:118:86370 LEIAR25.R4      NONE 26357
 EBRE  A    1 P 18:112:00000 18:118:86370 LEIAR25.R4      NONE 26359
 ELGE  A    1 P 18:112:00000 18:117:86370 LEIAR25.R4      LEIT -----
 EMAZ  A    1 P 18:112:00000 18:118:86370 LEIAS10         NONE -----
 GERN  A    1 P 18:112:00000 18:118:86370 LEIAS10         NONE -----
 IGEL  A    1 P 18:112:00000 18:118:86370 LEIAR20         LEIM -----
 ISPS  A    1 P 18:112:00000 18:118:86370 TRM59900.00     SCIS -----
 KAST  A    1 P 18:112:00000 18:118:86370 LEIAS10         NONE -----
 LARE  A    1 P 18:112:00000 18:118:86370 LEIAT504        NONE -----
 LAZK  A    1 P 18:112:00000 18:118:86370 LEIAR25.R4      LEIT -----
 LEIT  A    1 P 18:112:00000 18:118:86370 LEIAX1203+GNSS  NONE -----
 ORON  A    1 P 18:112:00000 18:118:86370 LEIAX1202GG     NONE -----
 PASA  A    1 P 18:113:00000 18:118:86370 LEIAR20         LEIM 73034
 RIO1  A    1 P 18:112:00000 18:118:86370 LEIAR25.R4      LEIT 25138
 SALA  A    1 P 18:112:00000 18:118:86370 LEIAR25         NONE -----
 SCOA  A    1 P 18:112:00000 18:118:86370 TRM55971.00     NONE -----
 SOPU  A    1 P 18:112:00000 18:118:86370 LEIAS10         NONE -----
 TERU  A    1 P 18:112:00000 18:118:86370 LEIAT504GG      LEIS -----
 VITO  A    1 P 18:112:00000 18:118:86370 LEIAS10         NONE -----
 YEBE  A    1 P 18:112:00000 18:118:86370 TRM29659.00     NONE -----
 ZARA  A    1 P 18:112:00000 18:118:86370 TRM29659.00     NONE -----
```

7.3 Eccentricities

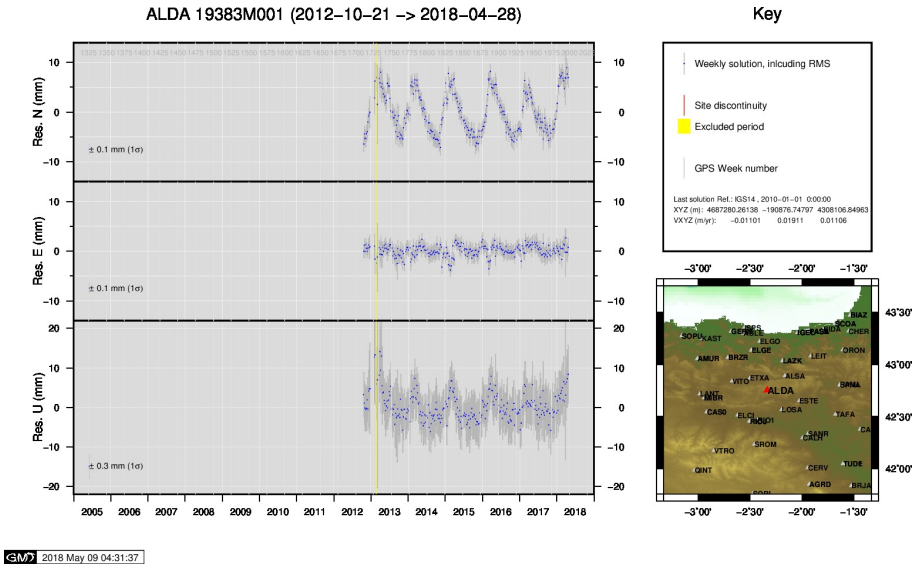
```
*                                          UP______ NORTH___ EAST____
*SITE PT SOLN T DATA_START__ DATA_END____ AXE ARP->BENCHMARK(M)_________
 ACOR  A    1 P 18:112:00000 18:118:86370 UNE   3.0460   0.0000   0.0000
 ALDA  A    1 P 18:112:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 ALSA  A    1 P 18:112:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 AMUR  A    1 P 18:112:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 BIAZ  A    1 P 18:112:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 BIDA  A    1 P 18:112:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 BRZR  A    1 P 18:112:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 CACE  A    1 P 18:112:00000 18:118:86370 UNE   0.0600   0.0000   0.0000
 CANT  A    1 P 18:112:00000 18:118:86370 UNE   3.0490   0.0000   0.0000
 CHER  A    1 P 18:112:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 CREU  A    1 P 18:112:00000 18:118:86370 UNE   0.0770   0.0000   0.0000
 EBRE  A    1 P 18:112:00000 18:118:86370 UNE   0.0770   0.0000   0.0000
 ELGE  A    1 P 18:112:00000 18:117:86370 UNE   0.0000   0.0000   0.0000
 EMAZ  A    1 P 18:112:00000 18:118:86370 UNE   0.0350   0.0000   0.0000
 GERN  A    1 P 18:112:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 IGEL  A    1 P 18:112:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 ISPS  A    1 P 18:112:00000 18:118:86370 UNE   0.0350   0.0000   0.0000
 KAST  A    1 P 18:112:00000 18:118:86370 UNE   0.0350   0.0000   0.0000
 LARE  A    1 P 18:112:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 LAZK  A    1 P 18:112:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 LEIT  A    1 P 18:112:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 ORON  A    1 P 18:112:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 PASA  A    1 P 18:113:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 RIO1  A    1 P 18:112:00000 18:118:86370 UNE   0.0606   0.0000   0.0000
 SALA  A    1 P 18:112:00000 18:118:86370 UNE   0.0600   0.0000   0.0000
 SCOA  A    1 P 18:112:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 SOPU  A    1 P 18:112:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 TERU  A    1 P 18:112:00000 18:118:86370 UNE   0.0600   0.0000   0.0000
 VITO  A    1 P 18:112:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 YEBE  A    1 P 18:112:00000 18:118:86370 UNE   0.0000   0.0000   0.0000
 ZARA  A    1 P 18:112:00000 18:118:86370 UNE   3.2590   0.0000   0.0000
```

8 Cumulative Time Series

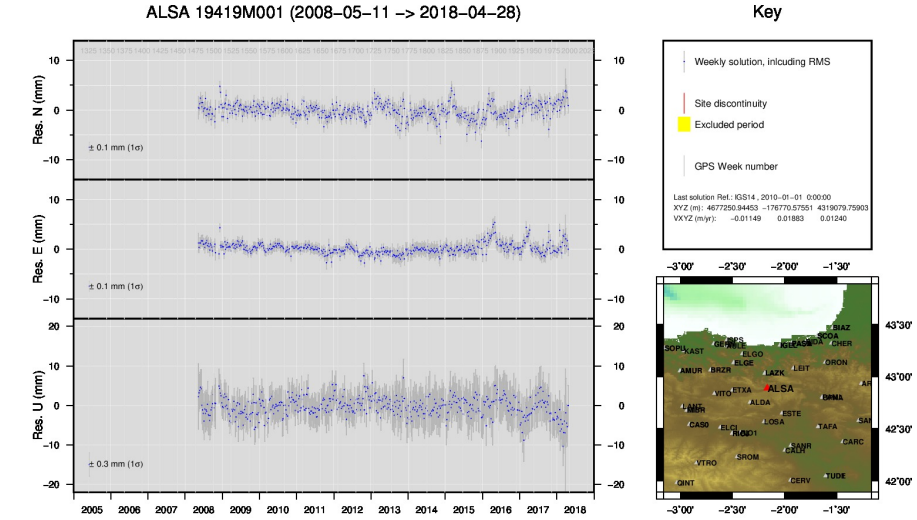
Time series of stations. Latest plots at: http://geolabpasaia.org/gnss/ARA-net/TSeries/, or click on the caption of each image.



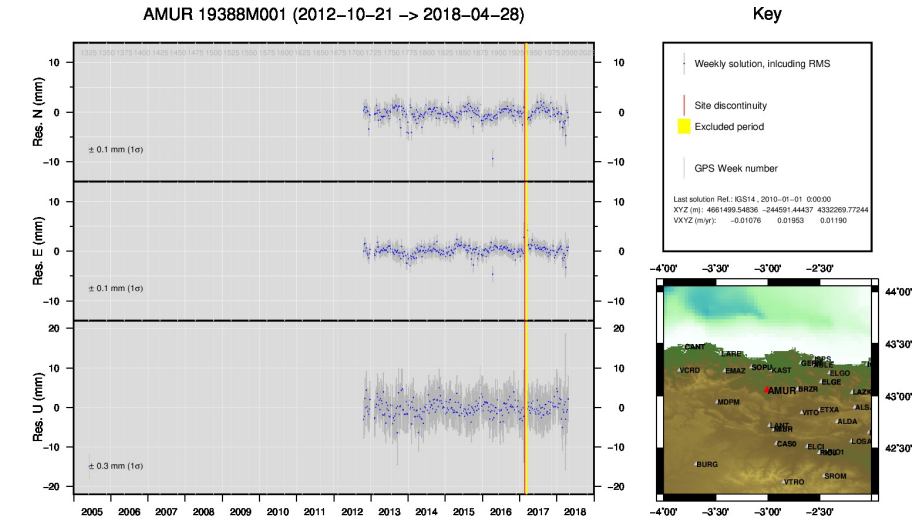
1) ACOR



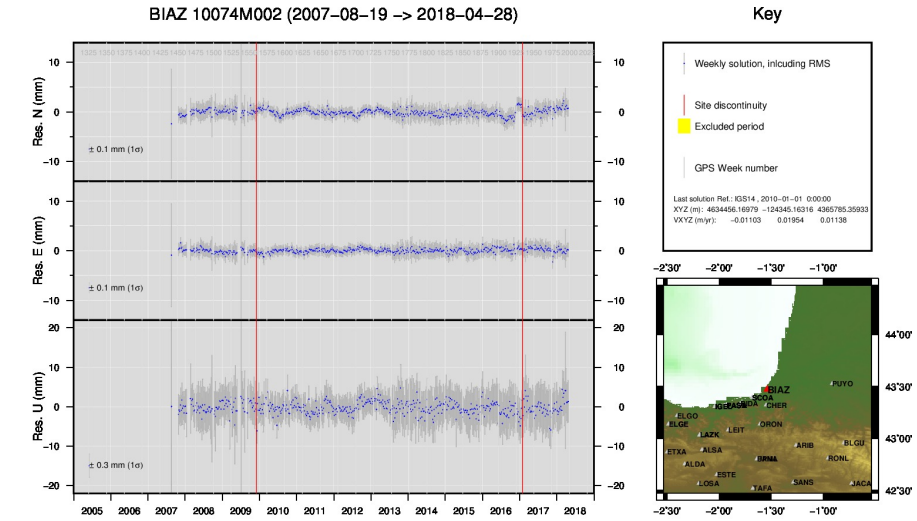
2) ALDA



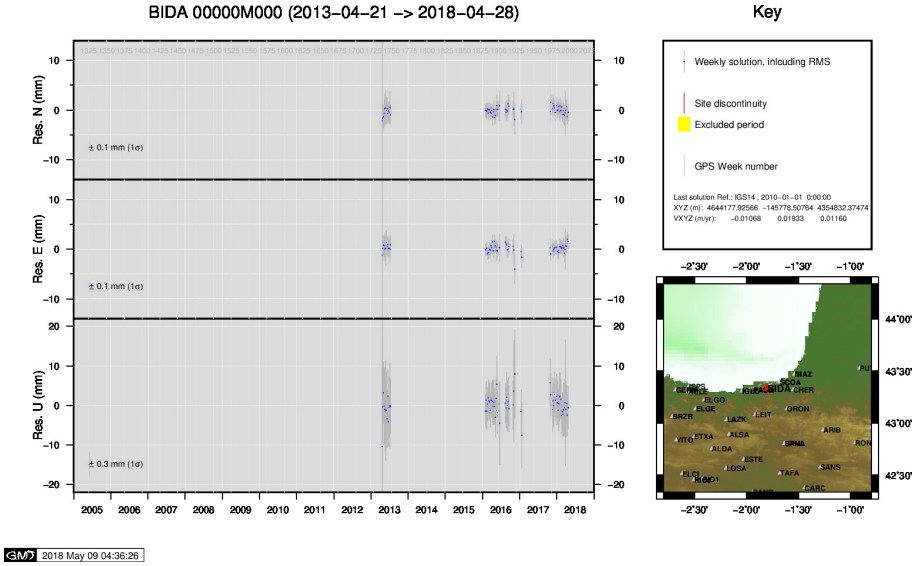
3) ALSA



4) AMUR



5) BIAZ



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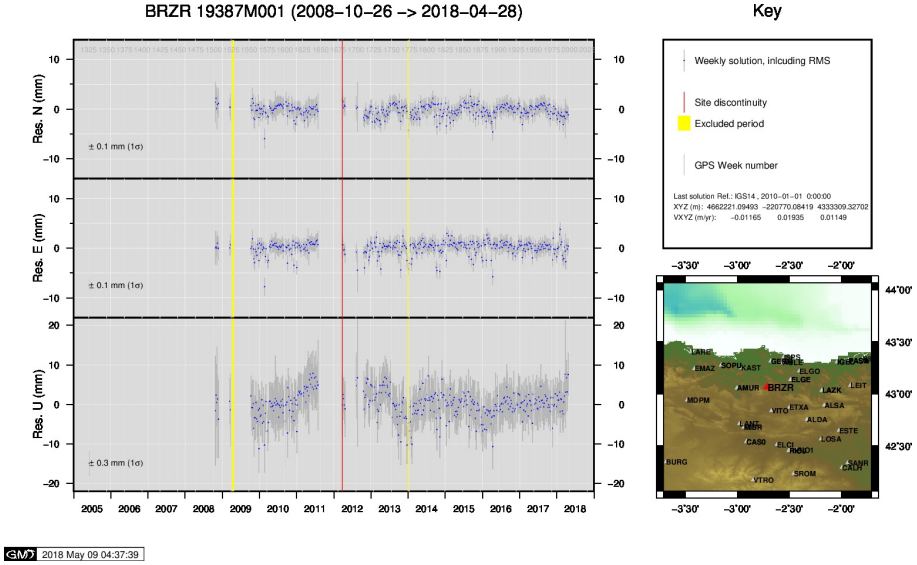
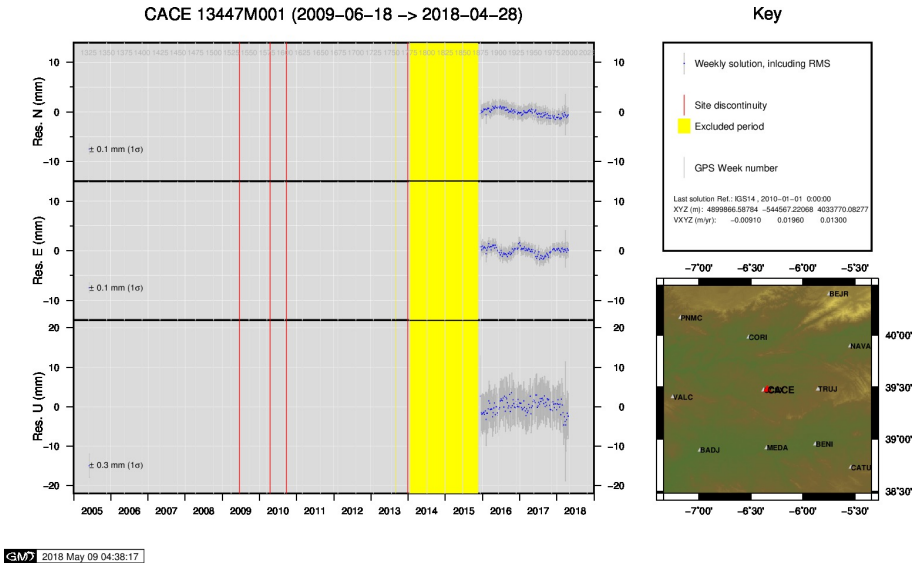
6) BIDA



GMT 2018 May 09 04:37:39

7) BRZR



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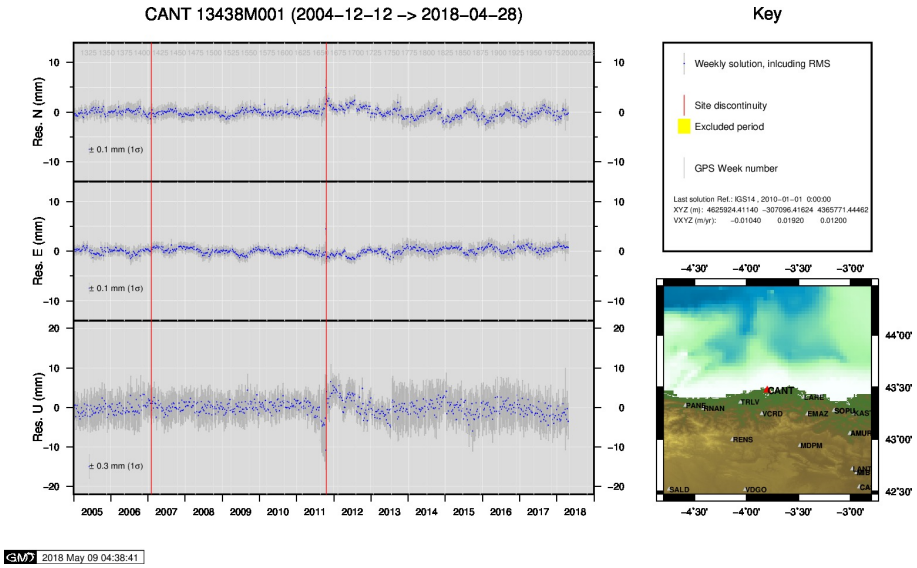
8) CACE



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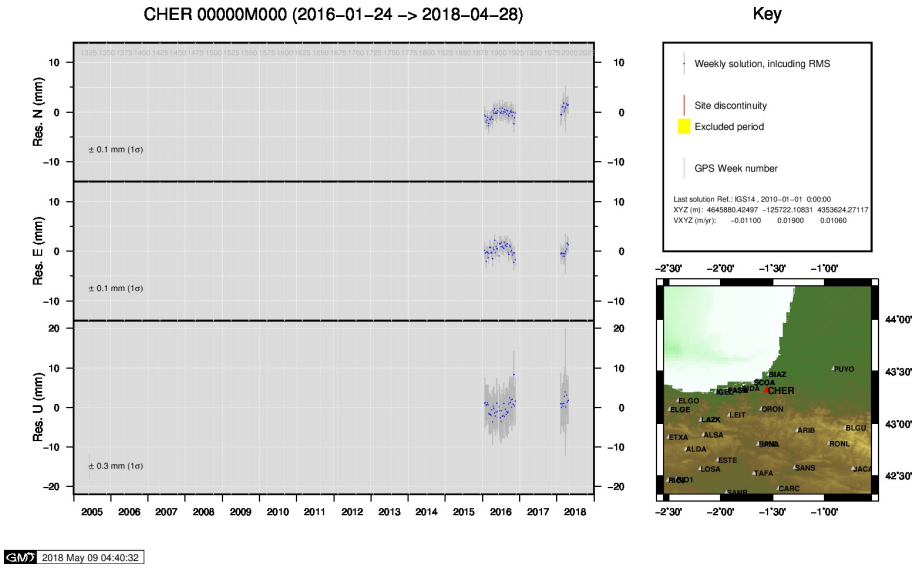
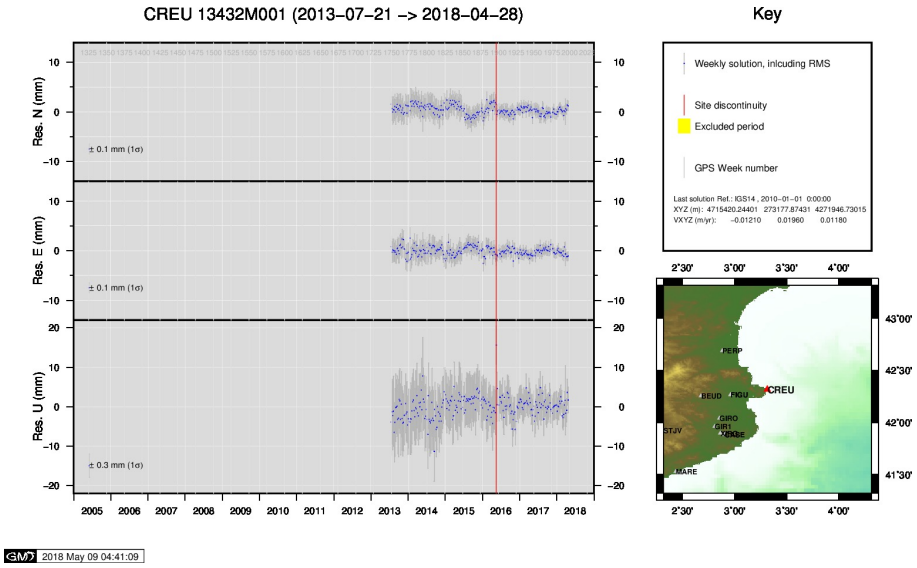
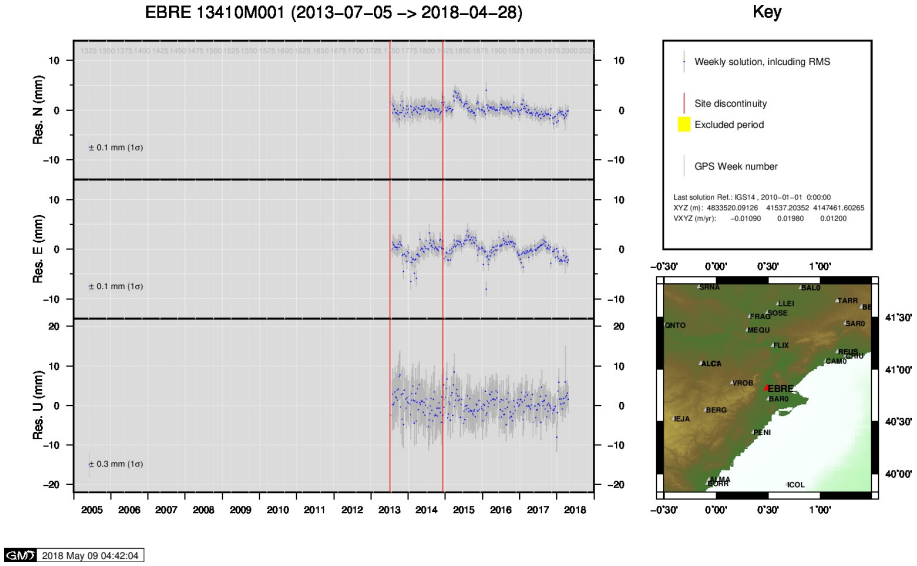


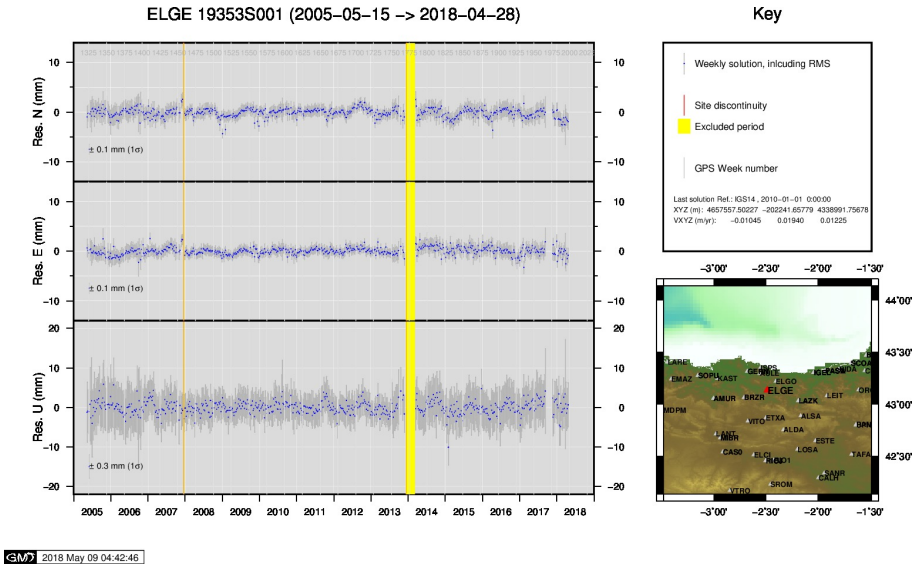
10) CHER



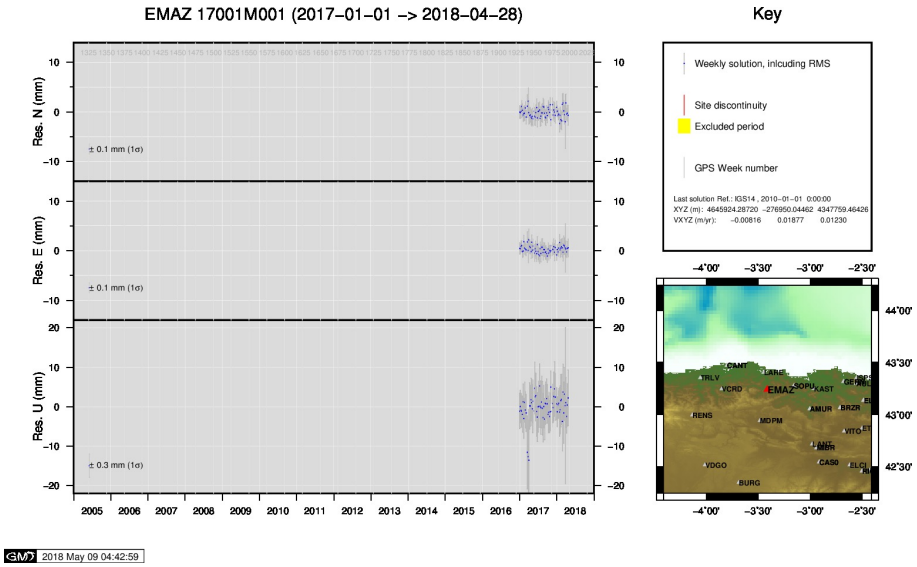
11) CREU



12) EBRE



13) ELGE



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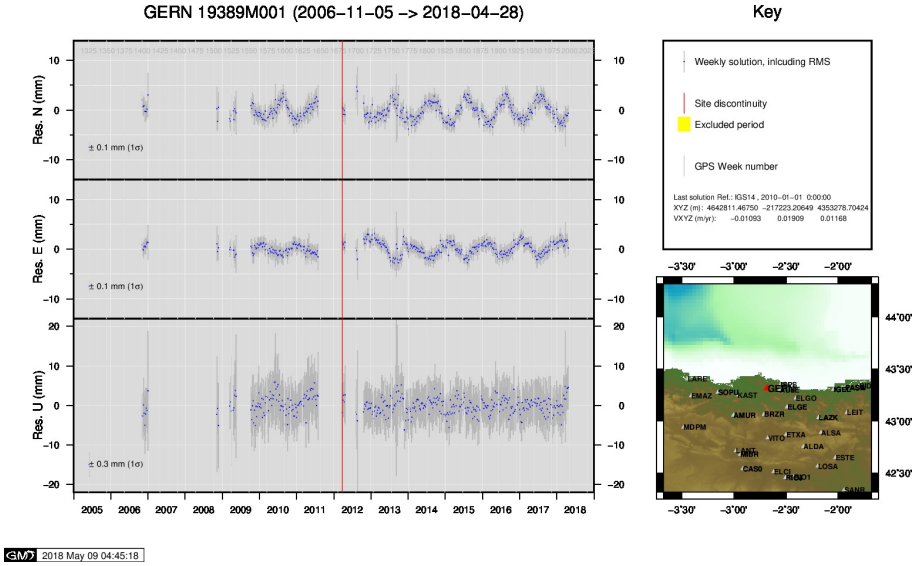
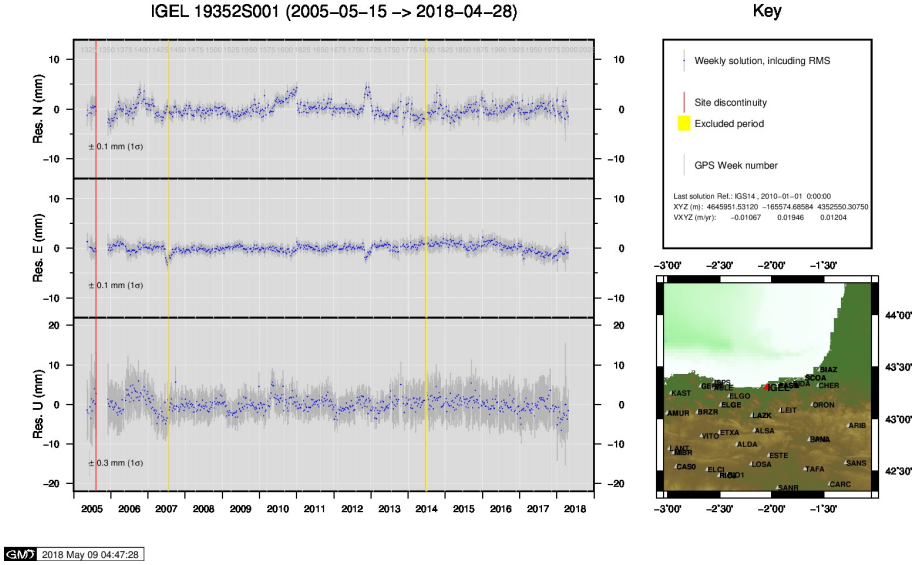
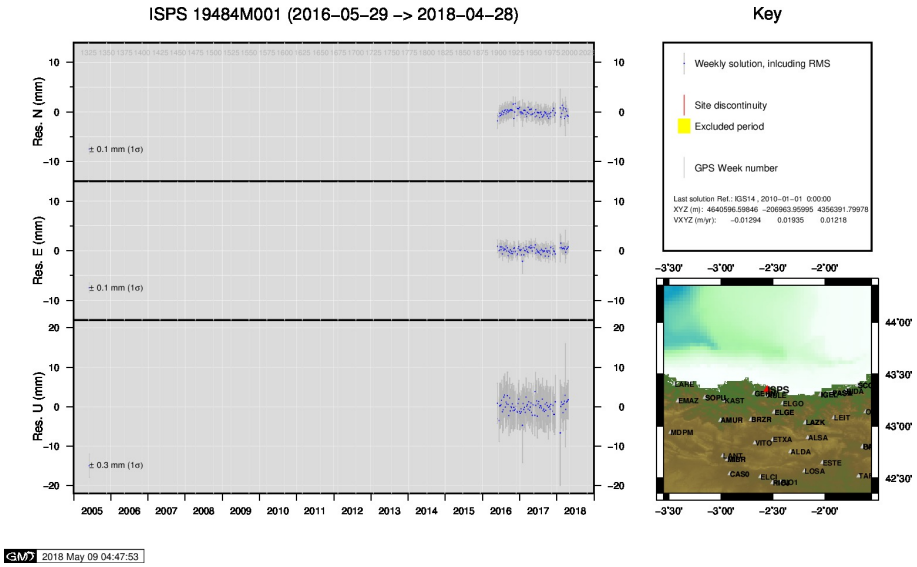


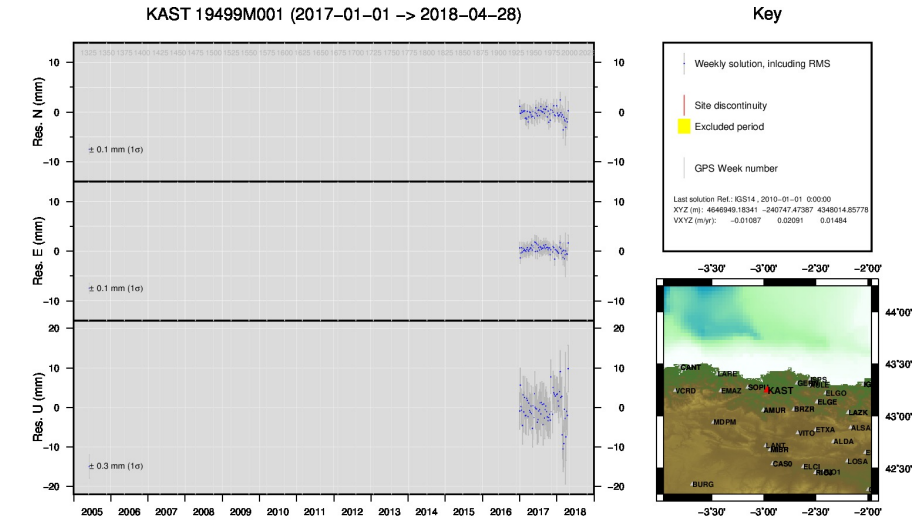
15) GERN



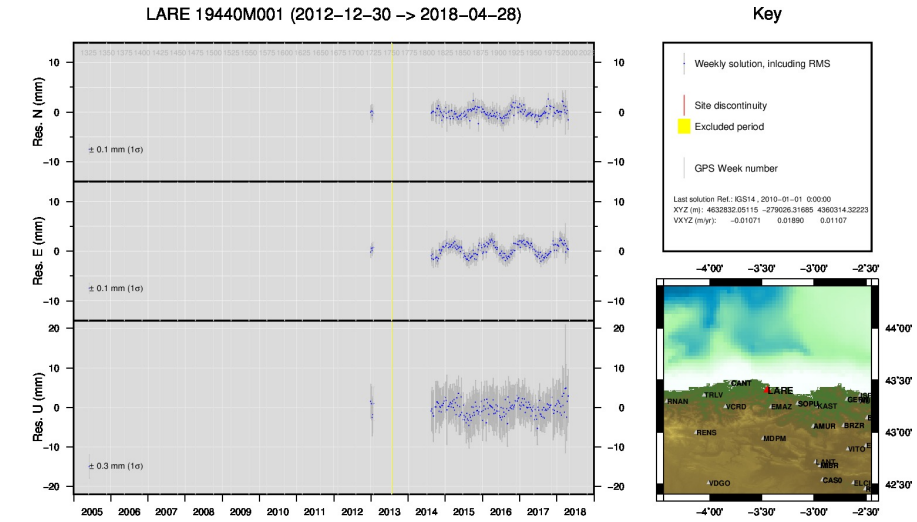
16) IGEL



17) ISPS



18) KAST



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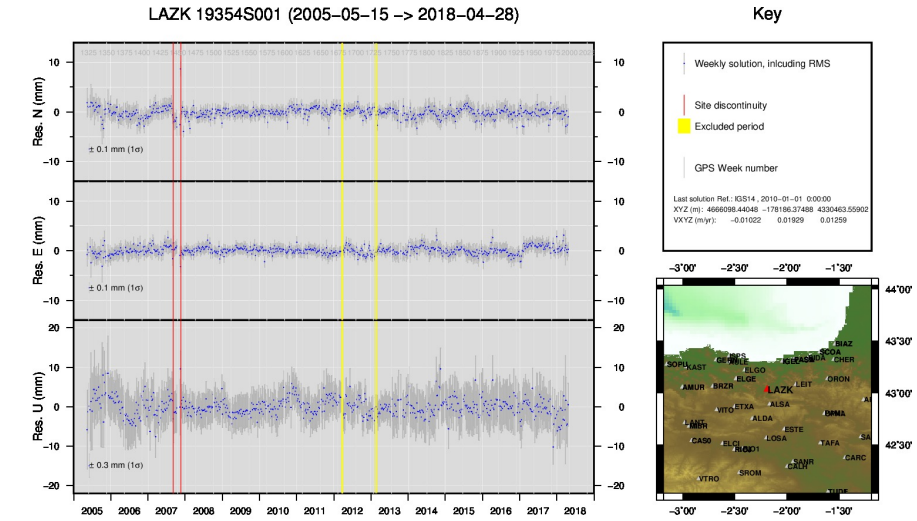

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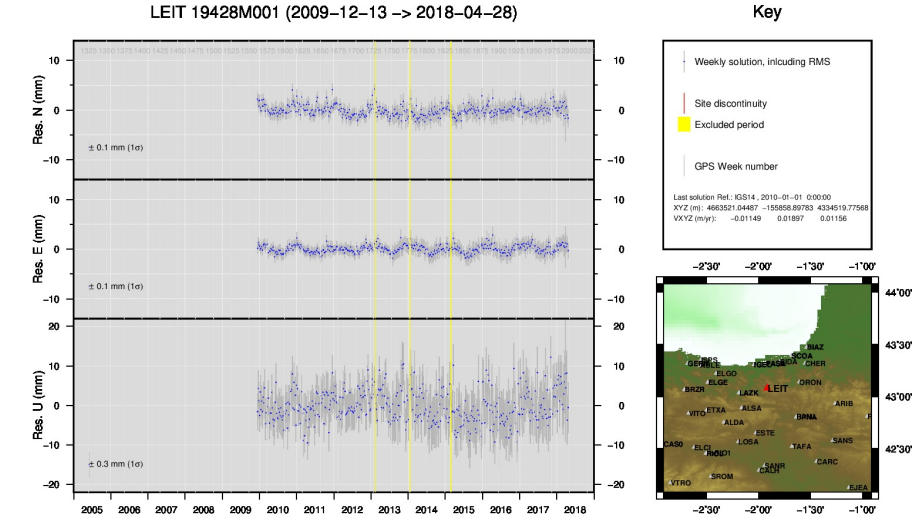

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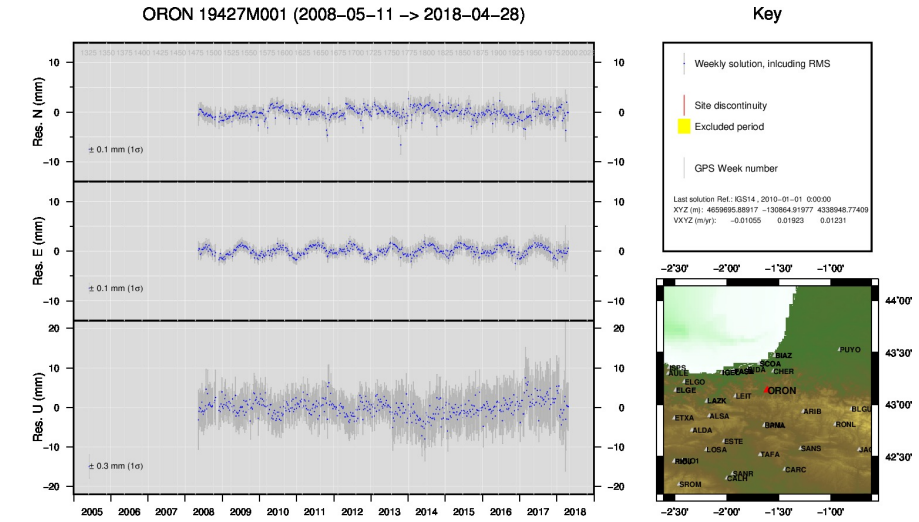
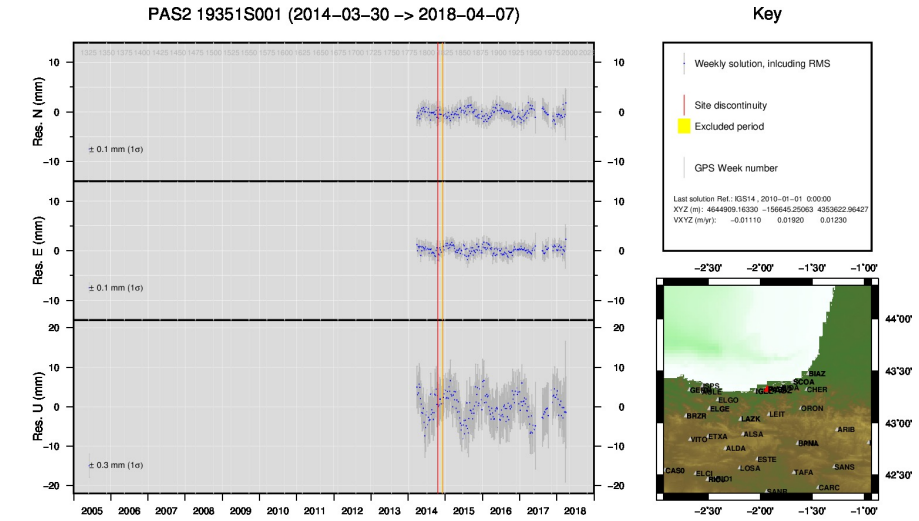
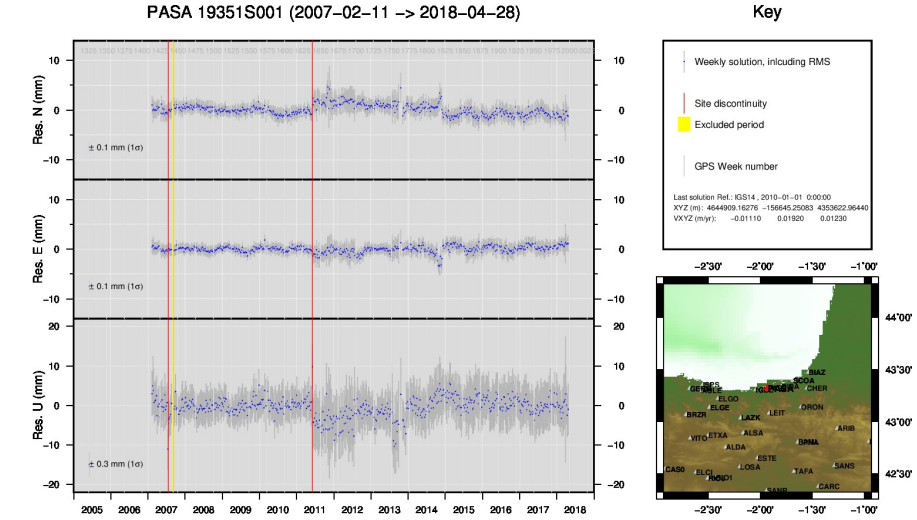


22) ORON



23) PAS2



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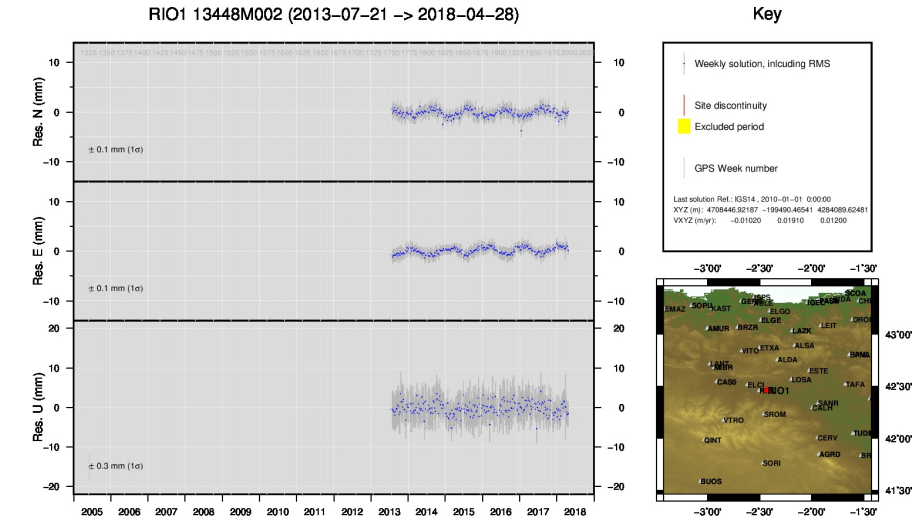
24) PASA



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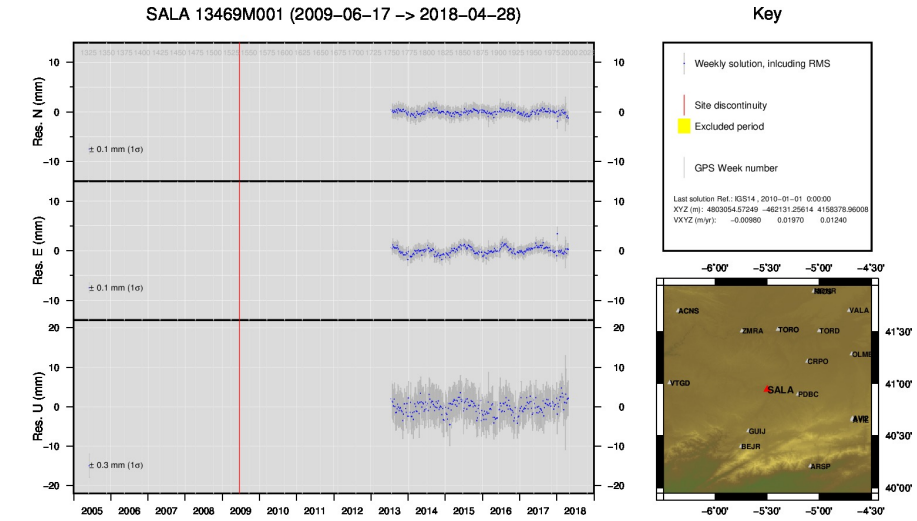
25) RIO1



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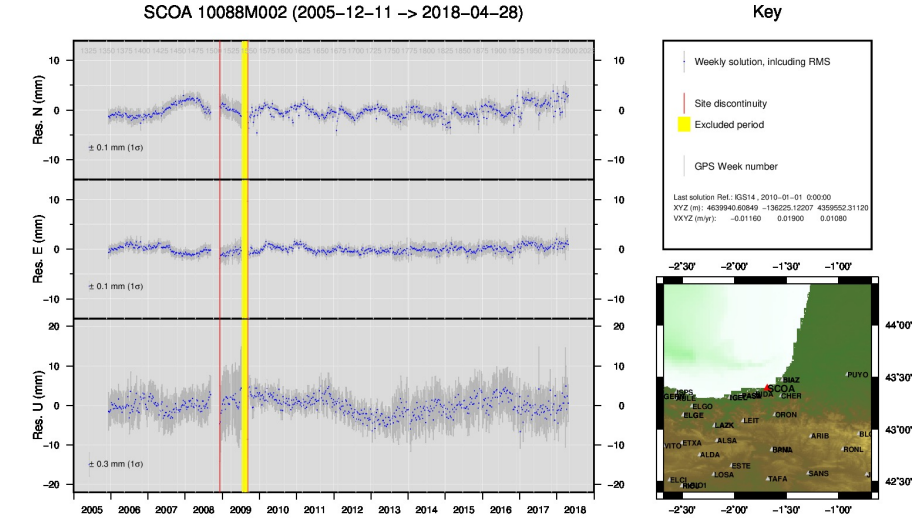
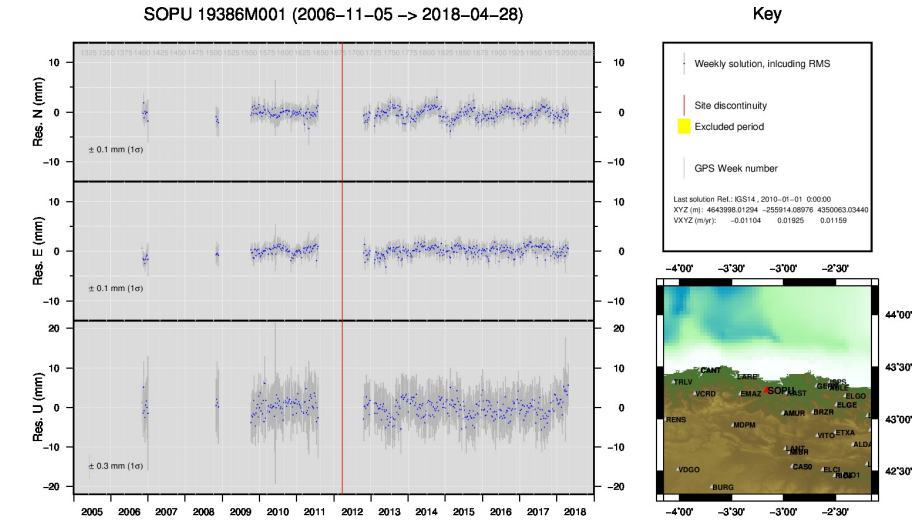
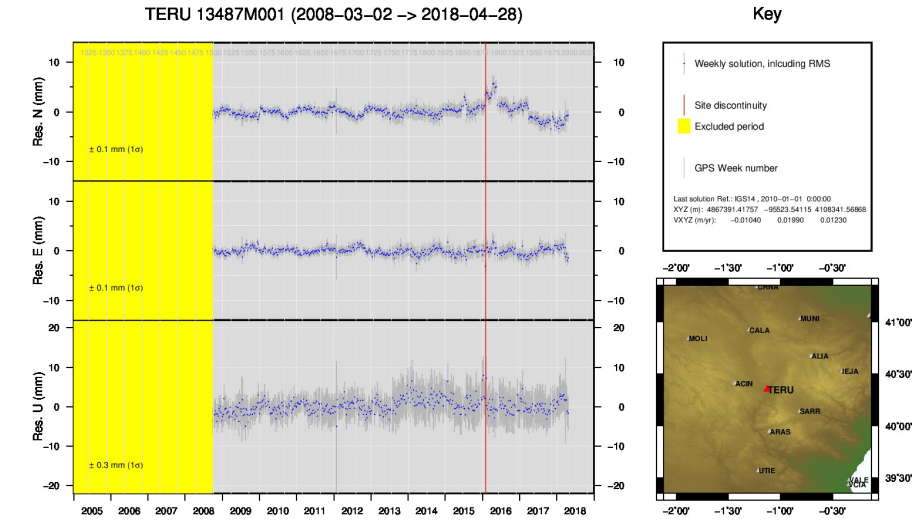
26) SALA



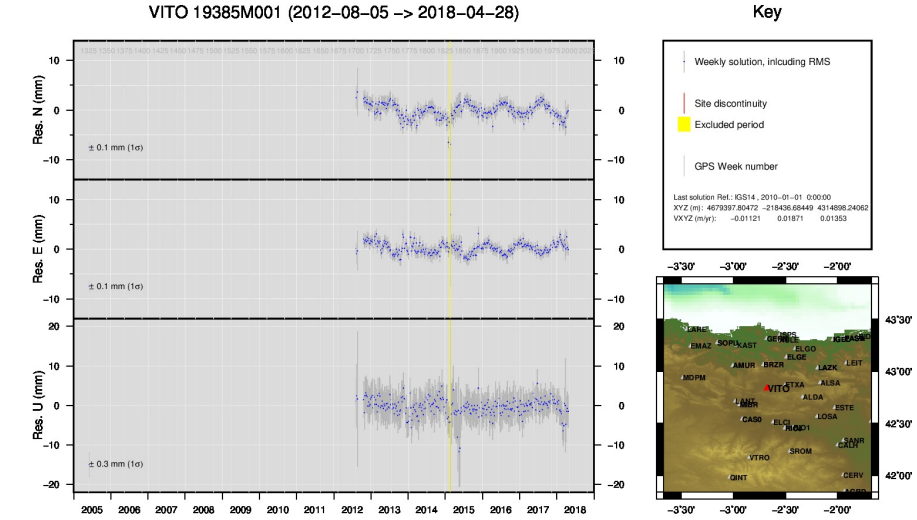
27) SCOA



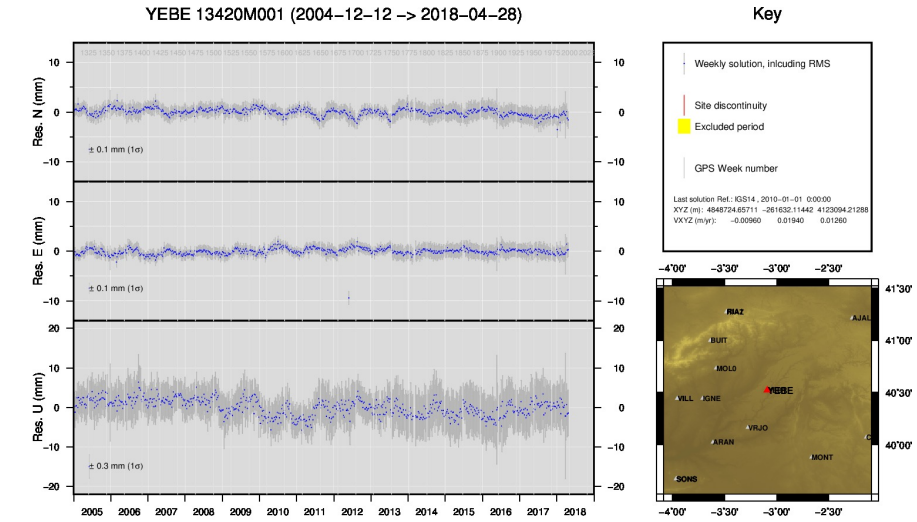
28) SOPU



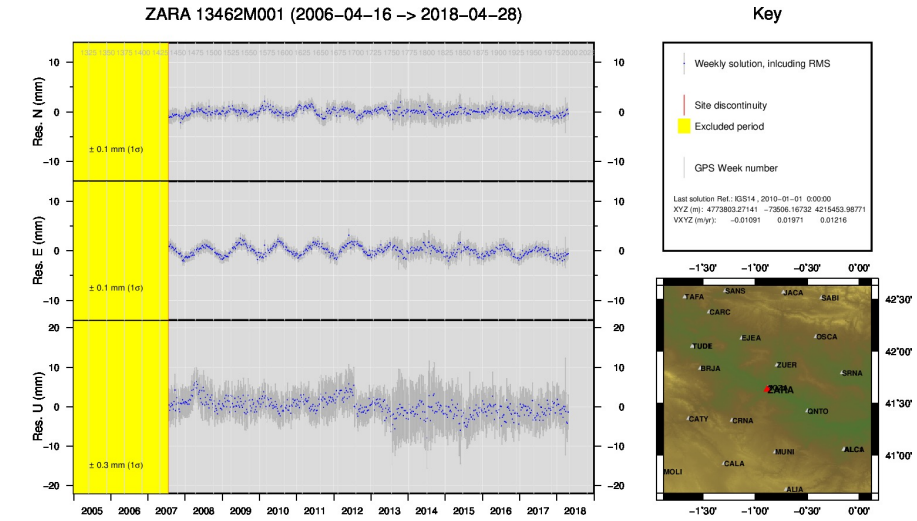
29) TERU



30) VITO



31) YEBE



32) ZARA