ARA-DAC Weekly Analysis Result: 1928 (GFA)

Technical Report

GPS Week: 1928 (GFA)

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

ARA-DAC details:
Contact person: J. Zurutuza
Contact mail: geodesia@aranzadi.eus

Report generated on 2017/01/05 at 14:00:13

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

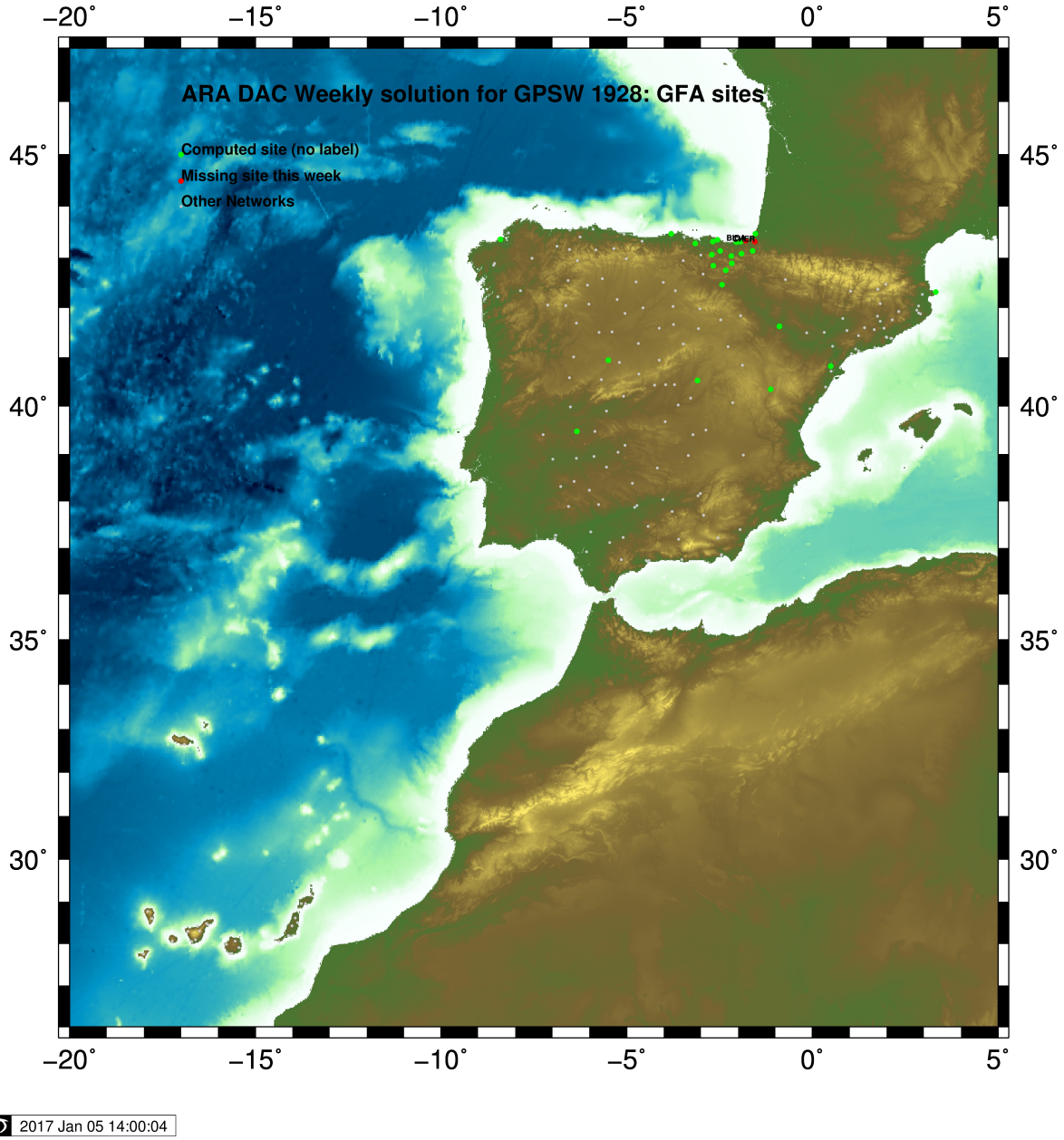


Fig.1: Computed Sites for GPS Week1928 (GFA)

3 Main Computation Parameters

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

- Reprocessing: Independent baselines are defined by the criterion of maximum common observations. Cycle slips are fixed with the MAUPRP program, analysing triple phase differences for each independent baseline. If MAUPRP does not fix all slips for one station, that station is edited out.
- Basic Observable : Carrier phase, L_1 and L_2; a priori sigma of single differences:0.002 m.
  - sampling (for ambiguity resolution) : 30 s
  - sampling (for final processing) : 180 s
  - Systems: GPS+GLONASS observations are used
- Modelled observable: Double differences of carrier phase in QIF or L_3 combinations (respectively for ambiguity resolution in baseline mode, and final network solution). In the final network solution the double differenced data are sampled at 180 sec. intervals.
- Ground antenna phase center calibrations: Group APCV used from the PCV_COD.I08 fiel and individual calibrations from EPNC_08.ATX. EPN_A class sites (CRD + VEL) IGb08 used to define the reference frame. If individual calibrations, other from these, are available, they are also included in the analysis.
- Troposphere:
  - 3 deg elev. cutoff; elevation dependent weighting
  - VMF1_DRY mapping function. ZPD parameters are estimated using WET VMF1 mapping function.
  - CHENHER gradient estimation model.
- Ionosphere: no a priori model, ionospheric effect almost removed by iono free combination.
- Ocean Loading: FES2004 (Scherneck).
- Atmosph. Loading: computed from a global grid using the GRDS1S2 program of Bernese 5.2.

4 Estimated Parameters

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

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

5 Computed Coordinates

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

5.1 IGb08

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

```
ARA LAC 1928 WEEK COMBINATION: PRECISE ORBITS                    05-JAN-17 12:36
------------------------------------------------------------------------------
LOCAL GEODETIC DATUM: IGb08             EPOCH: 2016-12-21 12:00:00

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

  1  ACOR 13434M001    4594489.58853  -678367.49918  4357066.26039    W
 22  ALDA 19383M001    4687280.18860  -190876.61185  4308106.92620    A
 28  ALSA 19419M001    4677250.86580  -176770.44178  4319079.84781    A
 51  BIAZ 10074M002    4634456.09093  -124345.02528  4365785.43841    A
 54  BRZR 19387M001    4662221.01815  -220769.94673  4333309.41188    A
  7  CACE 13447M001    4899866.52785  -544567.08067  4033770.17756    W
  8  CANT 13438M001    4625924.34347  -307096.27878  4365771.53151    W
 11  CREU 13432M001    4715420.16181   273178.01192  4271946.81568    A
 12  EBRE 13410M001    4833520.01897    41537.34268  4147461.69033    W
 77  ELGE 19353S001    4657557.43126  -202241.52110  4338991.84454    A
 87  GERN 19389M001    4642811.33965  -217222.97768  4353278.85649    A
101  IGEL 19352S001    4645951.45871  -165574.54848  4352550.39456    A
105  ISPS 19484M001    4640596.51096  -206963.82213  4356391.88846    A
109  LAZK 19354S001    4666098.37165  -178186.23870  4330463.64974    A
112  LEIT 19428M001    4663520.97108  -155858.76310  4334519.86316    A
141  ORON 19427M001    4659695.81869  -130864.78411  4338948.86143    A
146  PAS2 19351S001    4644909.09184  -156645.11425  4353623.05469    A
147  PASA 19351S001    4644909.08997  -156645.11455  4353623.05379    A
 27  RIO1 13448M002    4708446.85443  -199490.32904  4284089.71149    W
 28  SALA 13469M001    4803054.50436  -462131.11612  4158379.04767    W
172  SOPU 19386M001    4643997.94189  -255913.95331  4350063.12040    A
 31  TERU 13487M001    4867391.34604   -95523.40096  4108341.65753    W
204  VITO 19385M001    4679397.72943  -218436.55032  4314898.33685    A
 35  YEBE 13420M001    4848724.59126  -261631.97645  4123094.30215    W
 36  ZARA 13462M001    4773803.19515   -73506.03126  4215454.07170    W
```

5.2 ETRS89 Coordinates

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

```
ETRF2000 COORD. wk 1928                                          05-JAN-17 12:36
------------------------------------------------------------------------------
LOCAL GEODETIC DATUM: ETRF2000          EPOCH: 2016-12-21 12:00:00

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

  1  ACOR 13434M001    4594489.87131  -678367.99178  4357065.87031    W
 22  ALDA 19383M001    4687280.52074  -190877.11257  4308106.53518    A
 28  ALSA 19419M001    4677251.20015  -176770.94150  4319079.45764    A
 51  BIAZ 10074M002    4634456.43390  -124345.52078  4365785.05178    A
 54  BRZR 19387M001    4662221.34868  -220770.44511  4333309.02226    A
  7  CACE 13447M001    4899866.80434  -544567.60216  4033769.76778    W
  8  CANT 13438M001    4625924.66679  -307096.77385  4365771.14344    W
 11  CREU 13432M001    4715420.54146   273177.50983  4271946.42779    A
 12  EBRE 13410M001    4833520.36579    41536.82865  4147461.29171    W
 77  ELGE 19353S001    4657557.76415  -202242.01899  4338991.45545    A
 87  GERN 19389M001    4642811.67184  -217223.47419  4353278.46825    A
101  IGEL 19352S001    4645951.79641  -165575.04518  4352550.00668    A
105  ISPS 19484M001    4640596.84445  -206964.31841  4356391.50049    A
109  LAZK 19354S001    4666098.70658  -178186.73735  4330463.26032    A
112  LEIT 19428M001    4663521.30867  -155859.26146  4334519.47417    A
141  ORON 19427M001    4659696.15925  -130865.28204  4338948.47298    A
146  PAS2 19351S001    4644909.43056  -156645.61082  4353622.66698    A
147  PASA 19351S001    4644909.42869  -156645.61112  4353622.66608    A
 27  RIO1 13448M002    4708447.18410  -199490.83179  4284089.31890    W
 28  SALA 13469M001    4803054.79772  -462131.62836  4158378.64557    W
172  SOPU 19386M001    4643998.26971  -255914.45001  4350062.73165    A
 31  TERU 13487M001    4867391.67563   -95523.91857  4108341.25504    W
204  VITO 19385M001    4679398.05904  -218437.05034  4314897.94606    A
 35  YEBE 13420M001    4848724.90394  -261632.49267  4123093.89912    W
 36  ZARA 13462M001    4773803.53397   -73506.53994  4215453.67596    W
```

5.3 Mean and Daily Repeatabilities

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

```
ARA LAC 1928 WEEK COMBINATION: PRECISE ORBITS                    05-JAN-17 12:36
------------------------------------------------------------------------------
                      Weekday     Repeatability (mm)
Station        #Days  0123456      N      E      U
------------------------------------------------------
ACOR 13434M001     7  XXXXXXX     0.53   0.52   4.07
ALDA 19383M001     7  XXXXXXX     1.25   0.98   1.50
ALSA 19419M001     7  XXXXXXX     1.40   0.67   2.15
```

```
BIAZ 10074M002     7  XXXXXXX     0.65   0.60   1.81
BRZR 19387M001     7  XXXXXXX     0.82   0.69   2.10
CACE 13447M001     7  XXXXXXX     0.63   0.39   1.30
CANT 13438M001     7  XXXXXXX     0.56   0.36   2.28
CREU 13432M001     7  XXXXXXX     0.90   0.60   3.41
EBRE 13410M001     7  XXXXXXX     0.65   0.51   2.97
ELGE 19353S001     5  X  XXXX     0.33   0.39   2.33
GERN 19389M001     7  XXXXXXX     0.93   0.87   2.28
IGEL 19352S001     5  X  XXXX     0.45   0.71   1.66
ISPS 19484M001     7  XXXXXXX     0.68   0.29   1.70
LAZK 19354S001     5  X  XXXX     0.54   0.67   1.78
LEIT 19428M001     7  XXXXXXX     0.98   0.74   4.28
ORON 19427M001     7  XXXXXXX     0.54   0.88   2.33
PAS2 19351S001     5  X  XXXX     0.72   1.14   2.70
PASA 19351S001     5  X  XXXX     0.41   0.53   1.74
RIO1 13448M002     7  XXXXXXX     0.54   0.42   2.34
SALA 13469M001     7  XXXXXXX     0.35   0.54   1.62
SOPU 19386M001     7  XXXXXXX     1.15   0.77   2.20
TERU 13487M001     7  XXXXXXX     0.84   0.48   1.93
VITO 19385M001     7  XXXXXXX     0.83   0.99   1.75
YEBE 13420M001     7  XXXXXXX     0.33   0.57   1.11
ZARA 13462M001     7  XXXXXXX     0.49   0.67   3.36

Comparison of individual solutions:
---------------------------------
ACOR 13434M001   N    0.53     -0.02    0.04   -0.14    1.02   -0.73   -0.31   -0.01
ACOR 13434M001   E    0.52      0.69    0.45    0.82   -0.48   -0.05    0.09   -0.14
ACOR 13434M001   U    4.07     -2.31   -2.00    3.74   -5.84    1.61    4.15    4.69
ALDA 19383M001   N    1.25     -1.45    2.39    0.84    0.19   -0.71   -0.13   -0.46
ALDA 19383M001   E    0.98     -1.59   -0.58   -0.07    0.18    1.55    0.20   -0.67
ALDA 19383M001   U    1.50     -0.66   -2.53    0.45   -1.66   -1.54   -1.00    0.60
ALSA 19419M001   N    1.40      0.47    2.83   -0.23   -1.26   -0.77    1.11    0.14
ALSA 19419M001   E    0.67     -0.57    0.03   -0.44   -0.43    1.02    0.93   -0.24
ALSA 19419M001   U    2.15     -2.31    0.70   -4.00   -0.44   -2.04   -0.57    1.13
BIAZ 10074M002   N    0.65      0.24    0.67    1.31   -0.20    0.19   -0.29    0.33
BIAZ 10074M002   E    0.60     -0.64   -0.60    0.17   -0.38    0.65    0.78    0.41
BIAZ 10074M002   U    1.81     -2.91   -0.89   -0.27   -0.72   -3.06   -0.46    0.59
BRZR 19387M001   N    0.82      1.47    0.20    0.39   -0.94    0.24    0.84   -0.10
BRZR 19387M001   E    0.69      0.14   -0.19   -0.16   -1.07    1.15    0.53   -0.18
BRZR 19387M001   U    2.10     -2.16    1.03   -1.02   -1.73   -4.10   -0.09    0.15
CACE 13447M001   N    0.63     -0.36   -0.47   -0.74    0.83    0.15   -0.49    0.70
CACE 13447M001   E    0.39     -0.14    0.19    0.84    0.12    0.16   -0.08   -0.34
CACE 13447M001   U    1.30      2.47    0.44   -0.98   -0.92   -0.54    1.11    0.70
CANT 13438M001   N    0.56     -0.26    1.22   -0.01    0.16   -0.13    0.18    0.50
CANT 13438M001   E    0.36      0.05   -0.20    0.62   -0.35    0.39   -0.28   -0.15
CANT 13438M001   U    2.28     -3.71   -0.95   -1.09   -3.42    1.51   -0.25   -1.16
CREU 13432M001   N    0.90      0.50   -0.97   -0.98   -1.44    0.76   -0.09    0.21
CREU 13432M001   E    0.60     -0.25    0.17    0.46    0.52   -0.69   -1.06    0.06
CREU 13432M001   U    3.41      0.11   -4.41    0.79   -3.92    2.35    4.12    3.46
EBRE 13410M001   N    0.65     -1.37   -0.73   -0.06   -0.04    0.29   -0.07   -0.14
EBRE 13410M001   E    0.51      0.15    0.44   -0.61    0.76   -0.58   -0.17   -0.18
EBRE 13410M001   U    2.97     -1.63    6.68    0.50   -1.75    0.42   -0.66   -1.32
ELGE 19353S001   N    0.33      0.46                    -0.33    0.02    0.28    0.21
ELGE 19353S001   E    0.39     -0.16                    -0.03    0.71    0.25    0.02
ELGE 19353S001   U    2.33     -1.59                    -2.54   -3.46    0.65    0.59
GERN 19389M001   N    0.93      0.23    1.78    0.86    0.20    0.50   -0.42   -0.86
GERN 19389M001   E    0.87     -0.65   -0.71    1.12    0.79    0.99   -0.14   -0.85
GERN 19389M001   U    2.28     -0.06   -2.05    1.01    1.34   -3.92   -2.24   -1.95
IGEL 19352S001   N    0.45      0.66                     0.27    0.05   -0.54    0.17
IGEL 19352S001   E    0.71     -0.16                    -0.66    0.84    0.92   -0.09
IGEL 19352S001   U    1.66     -1.17                    -2.37   -1.57   -1.25    0.28
ISPS 19484M001   N    0.68      0.34    0.95    1.15   -0.18   -0.53    0.25    0.15
ISPS 19484M001   E    0.29      0.27   -0.31    0.19   -0.46    0.25    0.17    0.13
ISPS 19484M001   U    1.70     -3.30   -0.70   -0.33   -2.29   -0.73   -0.27   -0.24
LAZK 19354S001   N    0.54      0.13                    -0.45    0.33   -0.34    0.84
LAZK 19354S001   E    0.67     -0.26                    -0.03    0.82    0.86   -0.55
LAZK 19354S001   U    1.78     -1.63                    -0.79   -2.75   -1.28    0.42
LEIT 19428M001   N    0.98      0.14    1.83    1.24   -0.70    0.23   -0.58    0.12
LEIT 19428M001   E    0.74     -0.96   -0.72   -0.11    0.08    0.61    0.42    1.12
LEIT 19428M001   U    4.28     -7.73   -3.11   -0.53   -3.49    2.34    0.02    4.73
ORON 19427M001   N    0.54     -0.16    0.72    0.64    0.02   -0.23    0.53    0.70
ORON 19427M001   E    0.88     -0.05   -0.78    0.07   -1.36    1.13    0.82    0.51
ORON 19427M001   U    2.33     -0.69    0.33   -1.91   -3.92   -2.93    2.01   -0.52
PAS2 19351S001   N    0.72      0.63                    -0.64   -0.50    0.14    1.00
PAS2 19351S001   E    1.14     -0.43                     0.20    1.35    1.12   -1.38
PAS2 19351S001   U    2.70     -1.65                     2.27   -0.32   -2.27   -4.01
PASA 19351S001   N    0.41      0.72                     0.07   -0.34    0.15    0.02
PASA 19351S001   E    0.53      0.25                    -0.49    0.37    0.83   -0.10
PASA 19351S001   U    1.74     -0.22                    -0.60   -2.40   -2.36   -0.57
RIO1 13448M002   N    0.54     -0.54    0.58    0.62    0.14    0.34    0.51    0.55
RIO1 13448M002   E    0.42     -0.17    0.25    0.38   -0.64    0.57    0.25   -0.21
RIO1 13448M002   U    2.34     -4.02   -1.91   -0.96    1.76   -2.43   -1.03   -1.45
SALA 13469M001   N    0.35      0.08    0.14    0.19    0.24   -0.70   -0.33    0.01
SALA 13469M001   E    0.54      0.74   -0.32    0.49   -0.69    0.16   -0.45   -0.38
SALA 13469M001   U    1.62      1.50    2.51    0.37   -0.47   -0.59   -0.68   -2.46
SOPU 19386M001   N    1.15      0.77    1.66   -0.52   -1.11   -0.20    1.72    0.17
SOPU 19386M001   E    0.77      0.68    0.01   -0.17   -0.86    0.76    1.04   -0.84
SOPU 19386M001   U    2.20     -3.62   -3.63    0.50   -0.88    0.12   -1.28    0.06
TERU 13487M001   N    0.84      1.39   -0.93   -0.86   -0.72   -0.26   -0.37   -0.12
TERU 13487M001   E    0.48      0.91    0.11    0.06    0.20   -0.36   -0.63   -0.10
TERU 13487M001   U    1.93     -1.04    3.51   -0.68   -2.46    1.05    1.13    0.23
VITO 19385M001   N    0.83      0.14    1.77    0.37   -0.66   -0.22    0.29    0.52
VITO 19385M001   E    0.99      0.25   -1.62    0.21   -0.14    1.69    0.33   -0.41
VITO 19385M001   U    1.75     -1.44   -1.32   -2.12    0.49   -1.35   -2.75   -0.61
YEBE 13420M001   N    0.33     -0.20    0.35   -0.44   -0.10   -0.05   -0.54   -0.00
YEBE 13420M001   E    0.57      0.11    1.13   -0.04    0.08   -0.73    0.23   -0.32
YEBE 13420M001   U    1.11     -1.05   -0.96    1.28    1.32    0.38    1.30    0.40
ZARA 13462M001   N    0.49     -0.11   -0.14    0.04   -0.32   -0.82   -0.79    0.05
ZARA 13462M001   E    0.67     -0.40   -0.58    0.90    0.93   -0.59    0.14   -0.42
ZARA 13462M001   U    3.36     -0.98   -1.58    1.63   -5.76    2.65    4.33    1.61
```

5.4 Datum verification

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

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

NUM	NAME	FLG	RESIDUALS IN MILLIMETERS		
1	ACOR 13434M001	I W	0.47	-0.52	-2.24
2	ALAC 13433M001	I W	-0.43	1.37	-1.02
3	ALBA 13452M001	I W	-0.95	1.04	2.76
4	ALME 13437M001	I W	-1.26	-0.57	2.13
6	BRST 10004M004	I W	0.79	-0.97	2.91
7	CACE 13447M001	I W	0.98	-1.58	-0.59
8	CANT 13438M001	I W	0.46	-2.30	-3.58
9	CEU1 13449M002	I W	0.79	2.10	8.10
10	COBA 13453M001	I W	0.23	-0.45	-4.15
12	EBRE 13410M001	I W	1.98	0.98	-1.38
16	HUEL 13451M001	I W	-2.58	3.46	1.18
17	IZAN 31309M002	I W	-3.29	-0.51	-1.08
18	LLIV 13436M001	I W	3.30	-2.65	-3.02
20	LROC 10023M001	I W	0.11	-1.53	-0.43
21	MALA 13443M001	I W	-4.70	2.51	-1.66
22	MALL 13444M001	I W	-0.10	0.74	-2.64
24	MELI 19379M001	I W	-2.28	1.53	2.27
25	PDEL 31906M004	I W	-3.66	-4.81	3.37
27	RIO1 13448M002	I W	0.77	-0.68	-4.18
28	SALA 13469M001	I W	-0.03	-0.34	3.87
29	SCOA 10088M002	I W	0.94	-1.35	0.57
30	SONS 13446M001	I W	1.56	0.29	-1.72
31	TERU 13487M001	I W	2.98	1.37	0.38
32	VALE 13439M001	I W	0.11	2.53	-0.32
33	VIGO 13450M001	I W	0.04	-1.50	-1.08
34	VILL 13406M001	I W	0.65	1.04	-4.17
35	YEBE 13420M001	I W	1.20	0.03	3.67
36	ZARA 13462M001	I W	0.09	0.40	-0.01
37	ZIMM 14001M004	I W	1.83	0.38	2.04
	RMS / COMPONENT		1.85	1.75	2.90
	MEAN		-0.00	0.00	-0.00
	MIN		-4.70	-4.81	-4.18
	MAX		3.30	3.46	8.10

NUMBER OF PARAMETERS : 3
NUMBER OF COORDINATES : 87
RMS OF TRANSFORMATION : 2.23 MM

5.5 Adjustment Statistics

In this section, the summary of the global adjustment and not subnetworks are shown. Also, the Helmert parameters of the combined solution with respect the daily solutions are shown.

```
*_STATISTICAL PARAMETER________ __VALUE(S)____________
 NUMBER OF OBSERVATIONS                        6442173
 NUMBER OF UNKNOWNS                              91793
 NUMBER OF DEGREES OF FREEDOM                  6350380
 PHASE MEASUREMENTS SIGMA                      0.00100
 SAMPLING INTERVAL (SECONDS)                       180
 VARIANCE FACTOR                    1.663187532953512
```

Helmert Transformation Parameters With Respect to Combined Solution:

		Translation (m)			Rotation (")			
Sol	Rms (m)	X	Y	Z	X	Y	Z	Scale (ppm)
1	0.00165	-0.0184	0.0030	0.0292	-0.0001	-0.0011	0.0000	-0.00076
2	0.00193	-0.0056	-0.0009	0.0148	-0.0000	-0.0005	-0.0001	-0.00093
3	0.00180	0.0036	0.0040	0.0038	-0.0001	-0.0000	0.0001	-0.00086
4	0.00913	0.0471	0.0275	-0.0474	-0.0003	0.0021	0.0009	-0.00081
5	0.00156	0.0010	0.0017	-0.0034	0.0000	0.0001	0.0001	0.00039
6	0.00155	-0.0129	-0.0053	0.0054	0.0000	-0.0004	-0.0002	0.00108
7	0.00160	-0.0093	0.0040	-0.0021	-0.0002	-0.0001	0.0000	0.00144

Statistics of individual solutions:

File	RMS (m)	DOF	Chi**2/DOF	#Observations authentic	/ pseudo	#Parameters explicit	/ implicit	/ singular
1	0.00133	926179	1.76	939616	3	393	13047	0
2	0.00132	901371	1.75	914327	3	384	12575	0
3	0.00127	902432	1.62	915987	3	384	13174	0
4	0.00129	841931	1.67	854984	3	399	12657	0
5	0.00127	923731	1.62	937685	3	393	13564	0
6	0.00126	925341	1.60	938979	3	396	13245	0
7	0.00126	927073	1.59	940595	3	396	13129	0

6 Equipment

6.1 Receiver List

Serial numbers not shown.

```
*SITE PT SOLN T DATA_START__ DATA_END____ DESCRIPTION_________ S/N__ FIRMWARE___
 ACOR  A    1 P 16:353:00000 16:359:86370 LEICA GRX1200PRO     ----- -----------
 ALDA  A    1 P 16:353:00000 16:359:86370 LEICA GR10           ----- -----------
 ALSA  A    1 P 16:353:00000 16:359:86370 LEICA GRX1200GGPRO   ----- -----------
 BIAZ  A    1 P 16:353:00000 16:359:86370 LEICA GRX1200GGPRO   ----- -----------
 BRZR  A    1 P 16:353:00000 16:359:86370 LEICA GR10           ----- -----------
 CACE  A    1 P 16:353:00000 16:359:86370 TRIMBLE NETR9        ----- -----------
 CANT  A    1 P 16:353:00000 16:359:86370 LEICA GR10           ----- -----------
 CREU  A    1 P 16:353:00000 16:359:86370 LEICA GR50           ----- -----------
 EBRE  A    1 P 16:353:00000 16:359:86370 LEICA GR50           ----- -----------
 ELGE  A    1 P 16:353:00000 16:359:86370 LEICA GR10           ----- -----------
 GERN  A    1 P 16:353:00000 16:359:86370 LEICA GR10           ----- -----------
 IGEL  A    1 P 16:353:00000 16:359:86370 LEICA GR10           ----- -----------
 ISPS  A    1 P 16:353:00000 16:359:86370 TRIMBLE NETR9        ----- -----------
 LAZK  A    1 P 16:353:00000 16:359:86370 LEICA GR10           ----- -----------
 LEIT  A    1 P 16:353:00000 16:359:86370 LEICA GRX1200+GNSS   ----- -----------
 ORON  A    1 P 16:353:00000 16:359:86370 LEICA GRX1200GGPRO   ----- -----------
 PAS2  A    1 P 16:353:00000 16:359:86370 TPS NET-G3A          ----- -----------
 PASA  A    1 P 16:353:00000 16:359:86370 LEICA GR10           ----- -----------
 RIO1  A    1 P 16:353:00000 16:359:86370 LEICA GR25           ----- -----------
 SALA  A    1 P 16:353:00000 16:359:86370 LEICA GRX1200+GNSS   ----- -----------
 SOPU  A    1 P 16:353:00000 16:359:86370 LEICA GR10           ----- -----------
 TERU  A    1 P 16:353:00000 16:359:86370 LEICA GRX1200GGPRO   ----- -----------
 VITO  A    1 P 16:353:00000 16:359:86370 LEICA GR10           ----- -----------
 YEBE  A    1 P 16:353:00000 16:359:86370 TRIMBLE NETRS        ----- -----------
 ZARA  A    1 P 16:353:00000 16:359:86370 TRIMBLE NETR9        ----- -----------
```

6.2 Antennas

Serial number ONLY provided in case individual calibrations are vailable.

```
*SITE PT SOLN T DATA_START__ DATA_END____ DESCRIPTION_________ S/N__
 ACOR  A    1 P 16:353:00000 16:359:86370 LEIAT504        LEIS -----
 ALDA  A    1 P 16:353:00000 16:359:86370 LEIAS10         NONE -----
 ALSA  A    1 P 16:353:00000 16:359:86370 LEIAX1202GG     NONE -----
 BIAZ  A    1 P 16:353:00000 16:359:86370 LEIAR25         LEIT -----
 BRZR  A    1 P 16:353:00000 16:359:86370 LEIAS10         NONE -----
 CACE  A    1 P 16:353:00000 16:359:86370 TRM29659.00     NONE -----
 CANT  A    1 P 16:353:00000 16:359:86370 LEIAR25.R4      LEIT 25066
 CREU  A    1 P 16:353:00000 16:359:86370 LEIAR25.R4      NONE 26357
 EBRE  A    1 P 16:353:00000 16:359:86370 LEIAR25.R4      NONE 26359
 ELGE  A    1 P 16:353:00000 16:359:86370 LEIAR25.R4      LEIT -----
 GERN  A    1 P 16:353:00000 16:359:86370 LEIAS10         NONE -----
```

```
 IGEL  A    1 P 16:353:00000 16:359:86370 LEIAR20         LEIM -----
 ISPS  A    1 P 16:353:00000 16:359:86370 TRM59900.00     SCIS -----
 LAZK  A    1 P 16:353:00000 16:359:86370 LEIAR25.R4      LEIT -----
 LEIT  A    1 P 16:353:00000 16:359:86370 LEIAX1203+GNSS  NONE -----
 ORON  A    1 P 16:353:00000 16:359:86370 LEIAX1202GG     NONE -----
 PAS2  A    1 P 16:353:00000 16:359:86370 LEIAR20         LEIM 73034
 PASA  A    1 P 16:353:00000 16:359:86370 LEIAR20         LEIM 73034
 RIO1  A    1 P 16:353:00000 16:359:86370 LEIAR25.R4      LEIT 25138
 SALA  A    1 P 16:353:00000 16:359:86370 LEIAR25         NONE -----
 SOPU  A    1 P 16:353:00000 16:359:86370 LEIAS10         NONE -----
 TERU  A    1 P 16:353:00000 16:359:86370 LEIAT504GG      LEIS -----
 VITO  A    1 P 16:353:00000 16:359:86370 LEIAS10         NONE -----
 YEBE  A    1 P 16:353:00000 16:359:86370 TRM29659.00     NONE -----
 ZARA  A    1 P 16:353:00000 16:359:86370 TRM29659.00     NONE -----
```

6.3 Eccentrities

```
*                                          UP______ NORTH___ EAST____
*SITE PT SOLN T DATA_START__ DATA_END____ AXE ARP->BENCHMARK(M)_________
 ACOR  A    1 P 16:353:00000 16:359:86370 UNE   3.0460   0.0000   0.0000
 ALDA  A    1 P 16:353:00000 16:359:86370 UNE   0.0000   0.0000   0.0000
 ALSA  A    1 P 16:353:00000 16:359:86370 UNE   0.0000   0.0000   0.0000
 BIAZ  A    1 P 16:353:00000 16:359:86370 UNE   0.0000   0.0000   0.0000
 BRZR  A    1 P 16:353:00000 16:359:86370 UNE   0.0000   0.0000   0.0000
 CACE  A    1 P 16:353:00000 16:359:86370 UNE   0.0600   0.0000   0.0000
 CANT  A    1 P 16:353:00000 16:359:86370 UNE   3.0490   0.0000   0.0000
 CREU  A    1 P 16:353:00000 16:359:86370 UNE   0.0770   0.0000   0.0000
 EBRE  A    1 P 16:353:00000 16:359:86370 UNE   0.0770   0.0000   0.0000
 ELGE  A    1 P 16:353:00000 16:359:86370 UNE   0.0000   0.0000   0.0000
 GERN  A    1 P 16:353:00000 16:359:86370 UNE   0.0000   0.0000   0.0000
 IGEL  A    1 P 16:353:00000 16:359:86370 UNE   0.0000   0.0000   0.0000
 ISPS  A    1 P 16:353:00000 16:359:86370 UNE   0.0350   0.0000   0.0000
 LAZK  A    1 P 16:353:00000 16:359:86370 UNE   0.0000   0.0000   0.0000
 LEIT  A    1 P 16:353:00000 16:359:86370 UNE   0.0000   0.0000   0.0000
 ORON  A    1 P 16:353:00000 16:359:86370 UNE   0.0000   0.0000   0.0000
 PAS2  A    1 P 16:353:00000 16:359:86370 UNE   0.0000   0.0000   0.0000
 PASA  A    1 P 16:353:00000 16:359:86370 UNE   0.0000   0.0000   0.0000
 RIO1  A    1 P 16:353:00000 16:359:86370 UNE   0.0606   0.0000   0.0000
 SALA  A    1 P 16:353:00000 16:359:86370 UNE   0.0600   0.0000   0.0000
 SOPU  A    1 P 16:353:00000 16:359:86370 UNE   0.0000   0.0000   0.0000
 TERU  A    1 P 16:353:00000 16:359:86370 UNE   0.0600   0.0000   0.0000
 VITO  A    1 P 16:353:00000 16:359:86370 UNE   0.0000   0.0000   0.0000
 YEBE  A    1 P 16:353:00000 16:359:86370 UNE   0.0000   0.0000   0.0000
 ZARA  A    1 P 16:353:00000 16:359:86370 UNE   3.2590   0.0000   0.0000
```

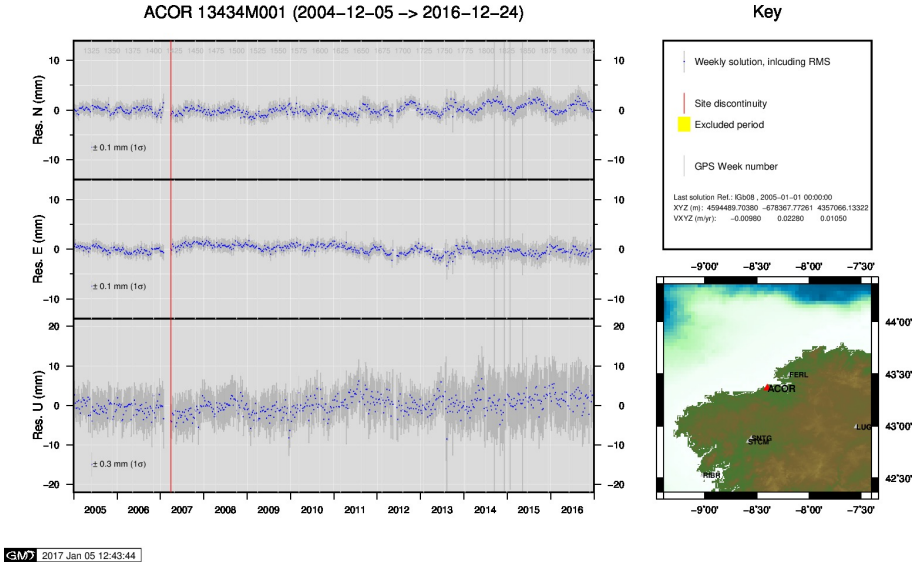
7 Inconsistencies (logsheet-RINEX metadata)

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

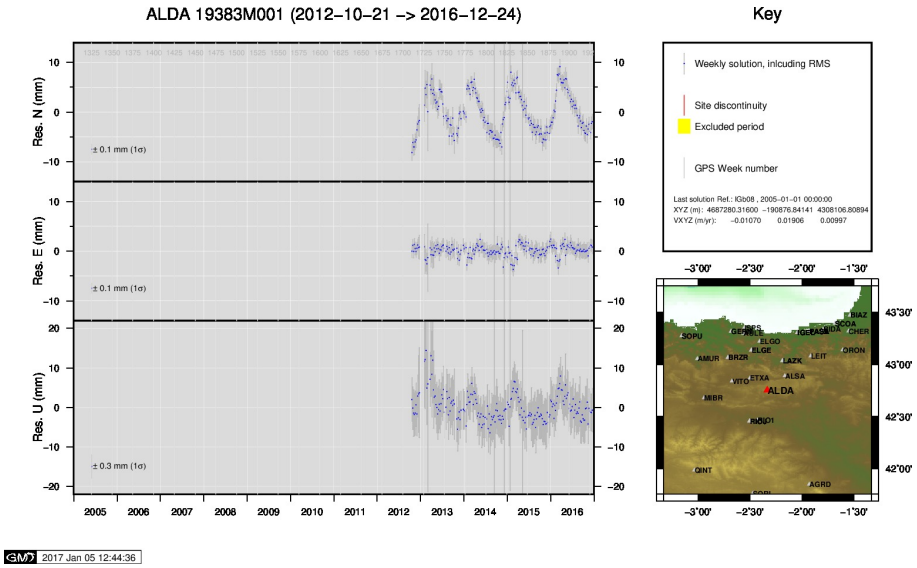
```
2017-01-05 12:05 UTC | BIAZ3530.16O | RECEIVER TYPE        |  LEICA GRX1200+GNSS -> LEICA GRX1200GGPRO
2017-01-05 12:05 UTC | BIAZ3530.16O | RECEIVER FIRM. VERS. |  8.51 -> 7.5
2017-01-05 02:54 UTC | BIAZ3540.16O | RECEIVER TYPE        |  LEICA GRX1200+GNSS -> LEICA GRX1200GGPRO
2017-01-05 02:54 UTC | BIAZ3540.16O | RECEIVER FIRM. VERS. |  8.51 -> 7.5
2017-01-05 03:56 UTC | BIAZ3550.16O | RECEIVER TYPE        |  LEICA GRX1200+GNSS -> LEICA GRX1200GGPRO
2017-01-05 03:56 UTC | BIAZ3550.16O | RECEIVER FIRM. VERS. |  8.51 -> 7.5
2017-01-05 03:56 UTC | LEIT3550.16O | RECEIVER FIRM. VERS. |  8.20/6.112 -> 8.20/4.007
2017-01-05 04:51 UTC | BIAZ3560.16O | RECEIVER TYPE        |  LEICA GRX1200+GNSS -> LEICA GRX1200GGPRO
2017-01-05 04:51 UTC | BIAZ3560.16O | RECEIVER FIRM. VERS. |  8.51 -> 7.5
2017-01-05 04:51 UTC | LEIT3560.16O | RECEIVER FIRM. VERS. |  8.20/6.112 -> 8.20/4.007
2017-01-05 05:56 UTC | BIAZ3570.16O | RECEIVER TYPE        |  LEICA GRX1200+GNSS -> LEICA GRX1200GGPRO
2017-01-05 05:56 UTC | BIAZ3570.16O | RECEIVER FIRM. VERS. |  8.51 -> 7.5
2017-01-05 05:56 UTC | LEIT3570.16O | RECEIVER FIRM. VERS. |  8.20/6.112 -> 8.20/4.007
2017-01-05 06:57 UTC | BIAZ3580.16O | RECEIVER TYPE        |  LEICA GRX1200+GNSS -> LEICA GRX1200GGPRO
2017-01-05 06:57 UTC | BIAZ3580.16O | RECEIVER FIRM. VERS. |  8.51 -> 7.5
2017-01-05 06:57 UTC | LEIT3580.16O | RECEIVER FIRM. VERS. |  8.20/6.112 -> 8.20/4.007
2017-01-05 08:11 UTC | BIAZ3590.16O | RECEIVER TYPE        |  LEICA GRX1200+GNSS -> LEICA GRX1200GGPRO
2017-01-05 08:11 UTC | BIAZ3590.16O | RECEIVER FIRM. VERS. |  8.51 -> 7.5
2017-01-05 08:11 UTC | LEIT3590.16O | RECEIVER FIRM. VERS. |  8.20/6.112 -> 8.20/4.007
```

8 Cumulative Time Series

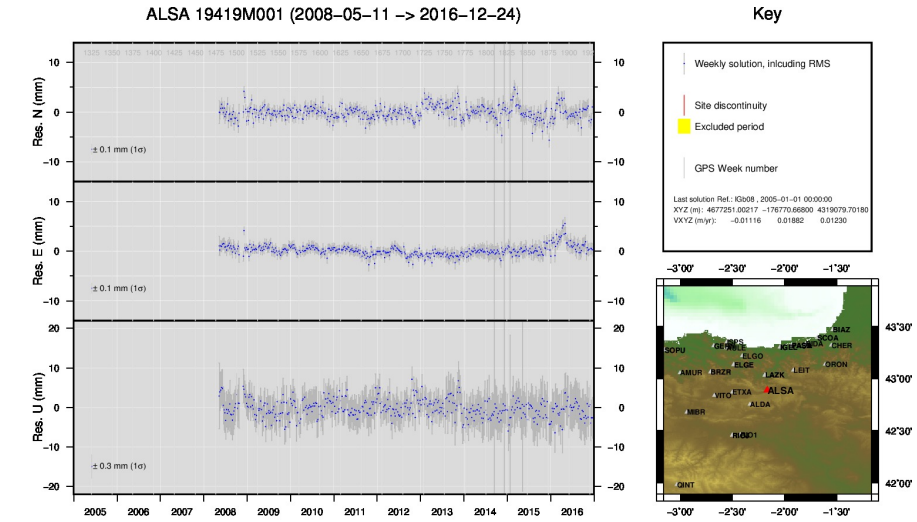
Time series of stations. Latest plots at: http://geolabpasaia.org/gnss/ARA-net/TSeries/, or click on the caption of each image.



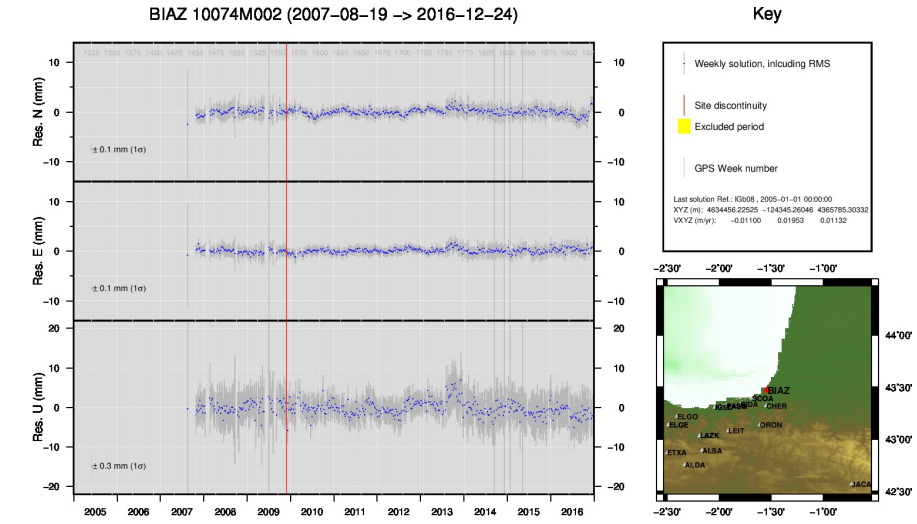
1) ACOR



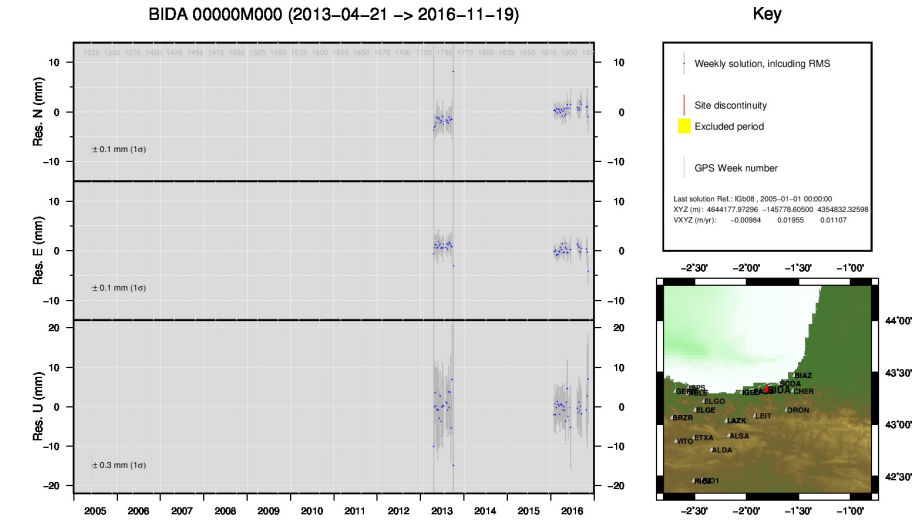
2) ALDA



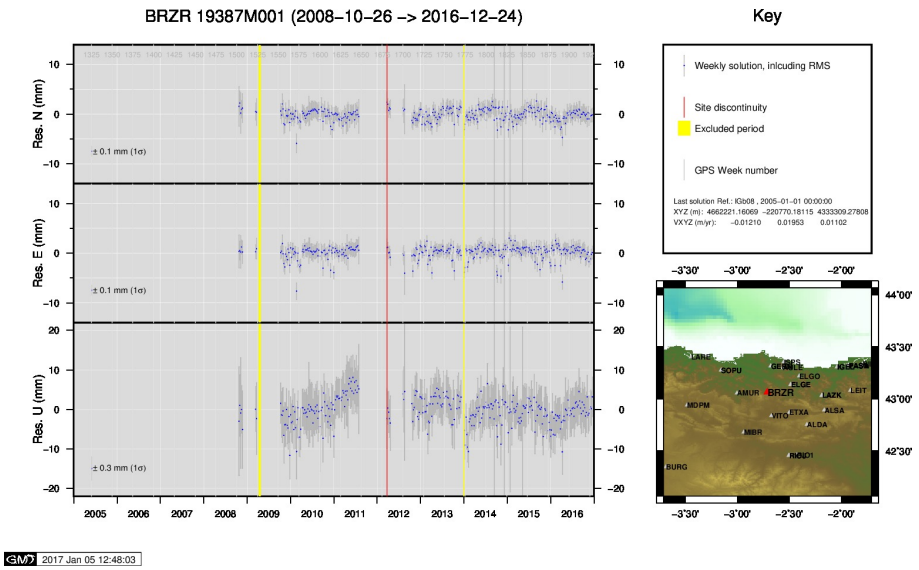
3) ALSA



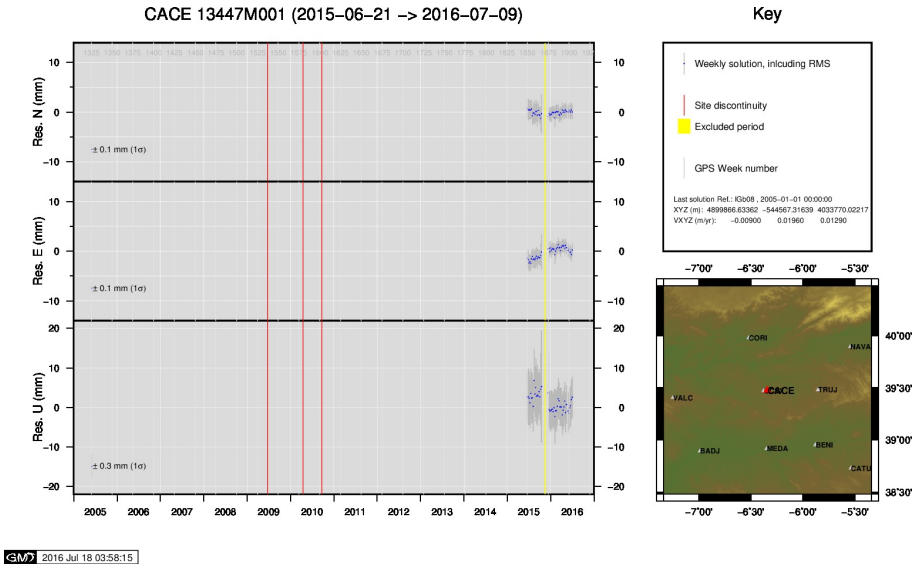
4) BIAZ



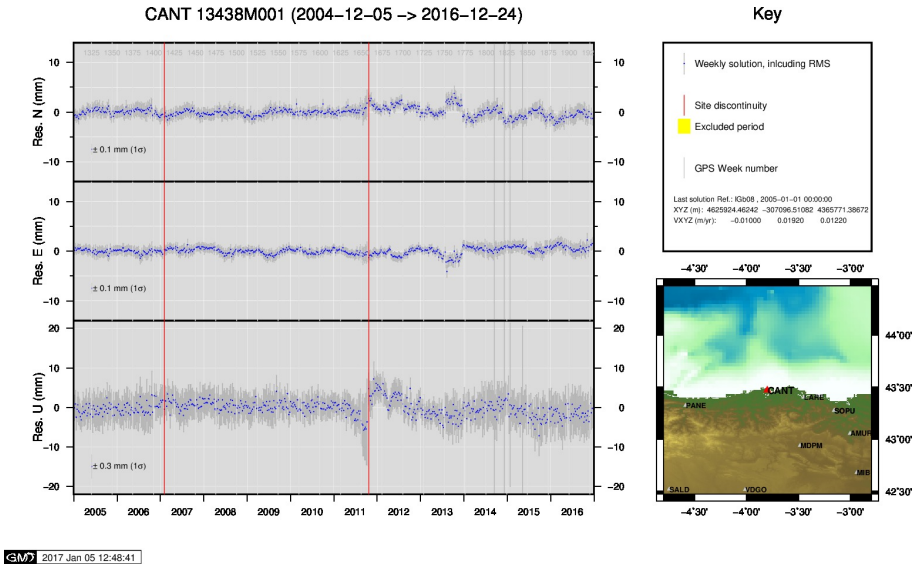
5) BIDA



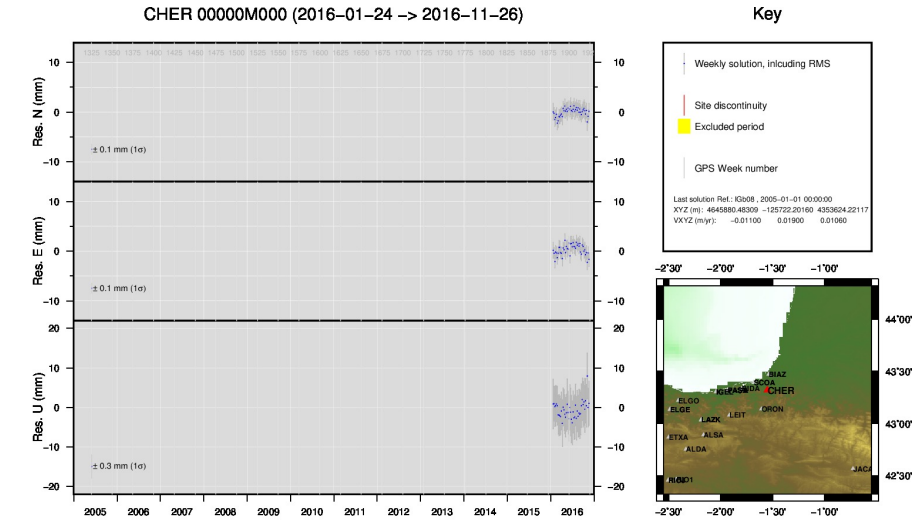
6) BRZR



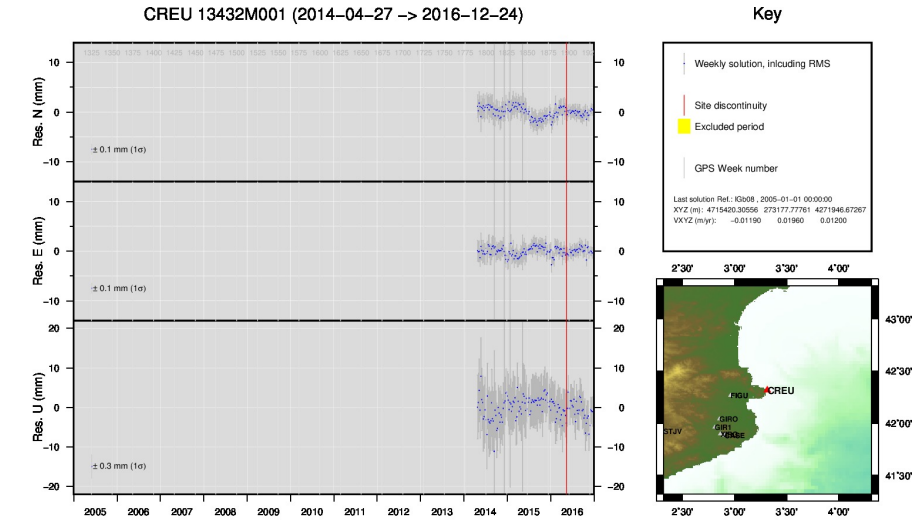
7) CACE



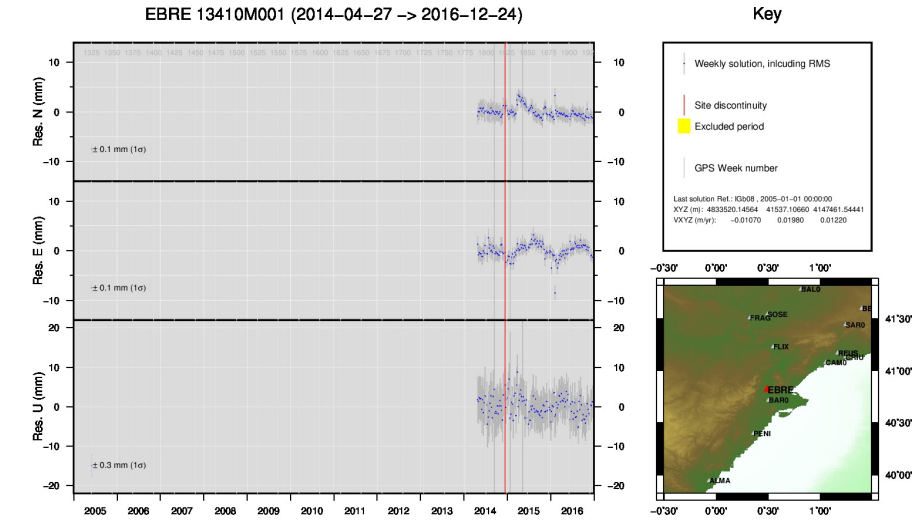
8) CANT



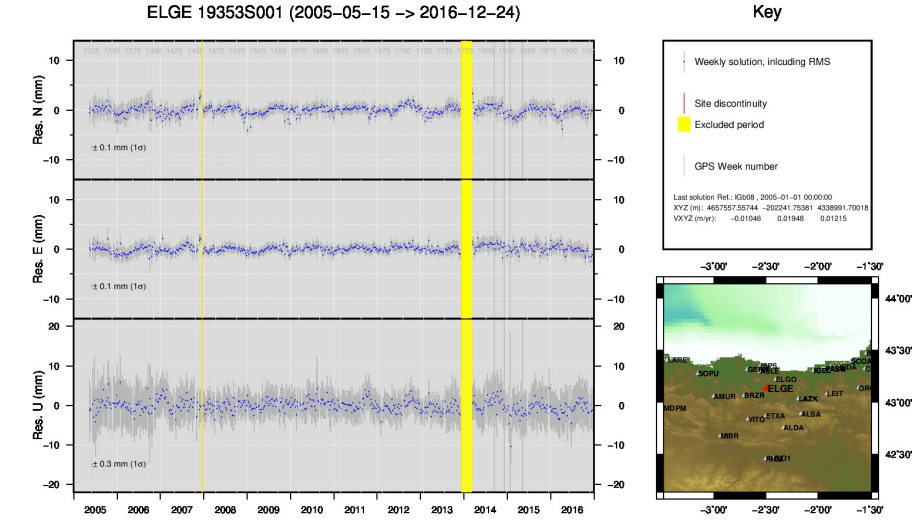
9) CHER



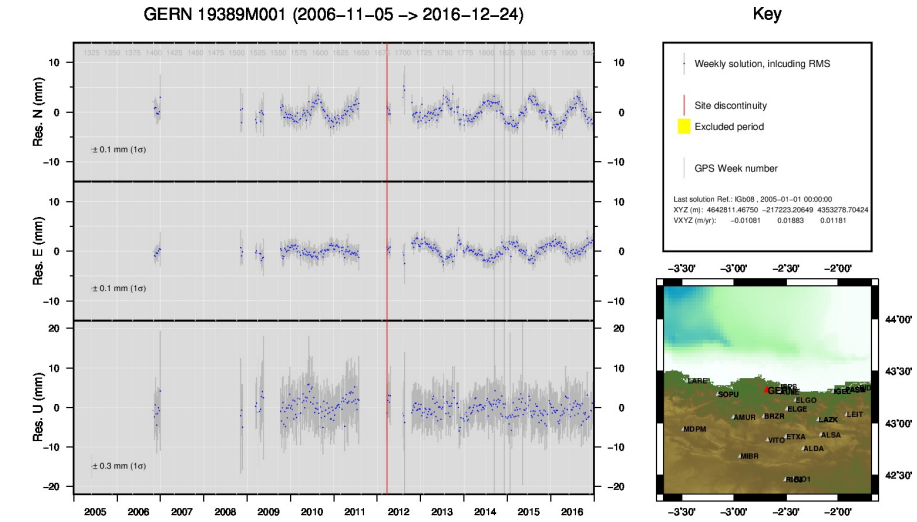
10) CREU



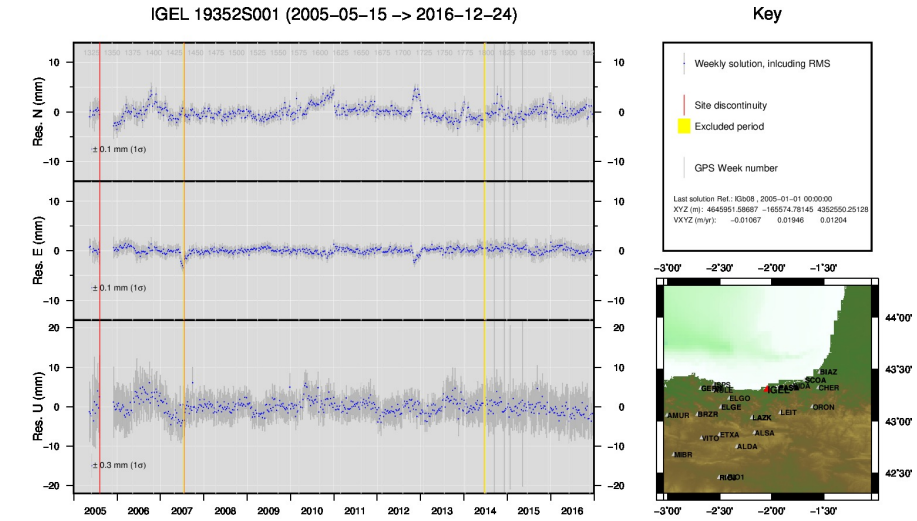
11) EBRE



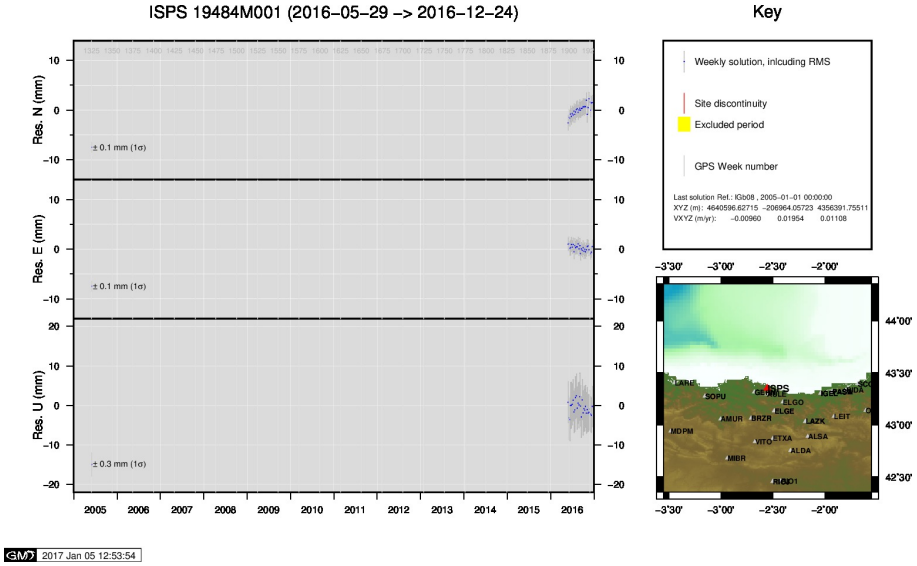
12) ELGE



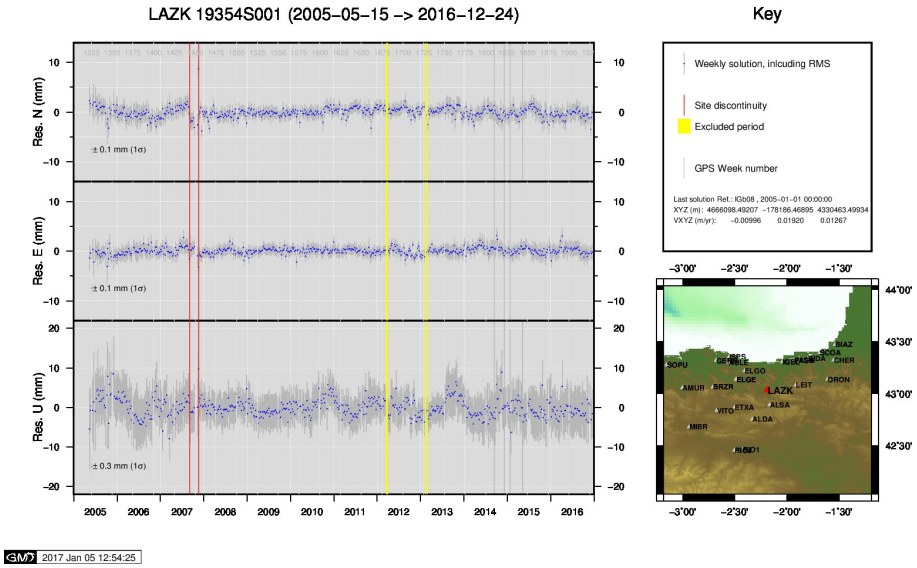
13) GERN



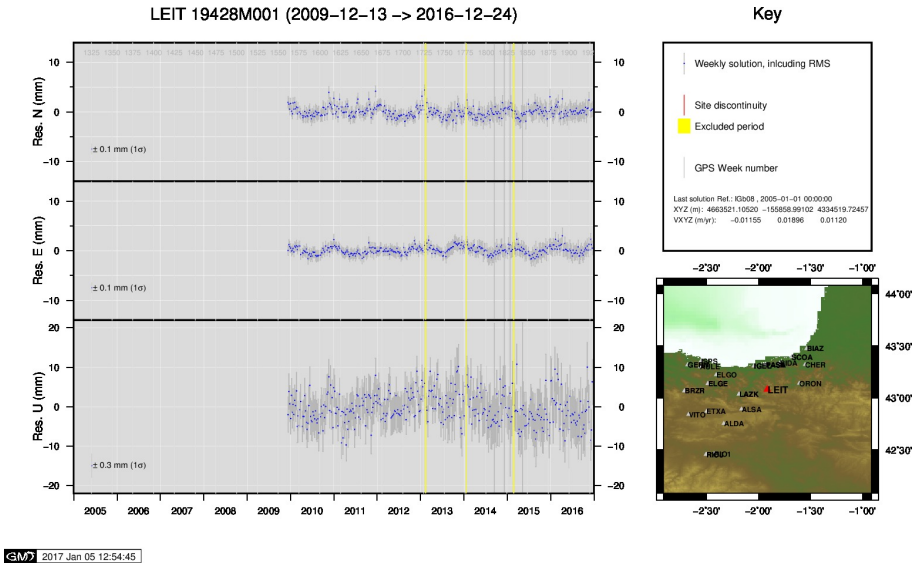
14) IGEL



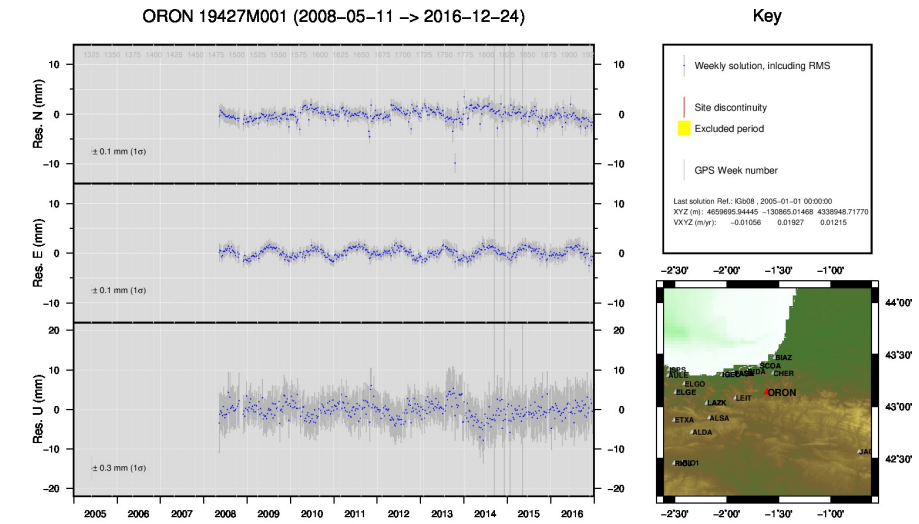
15) ISPS



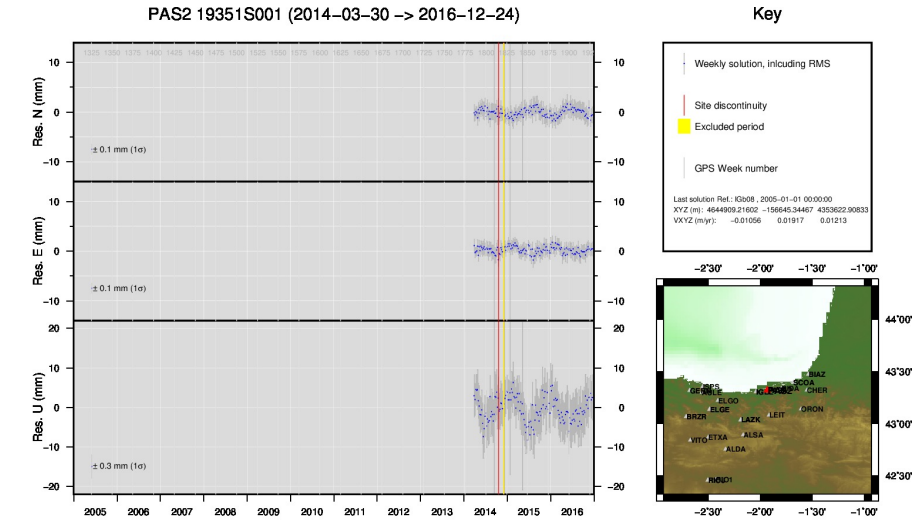
16) LAZK



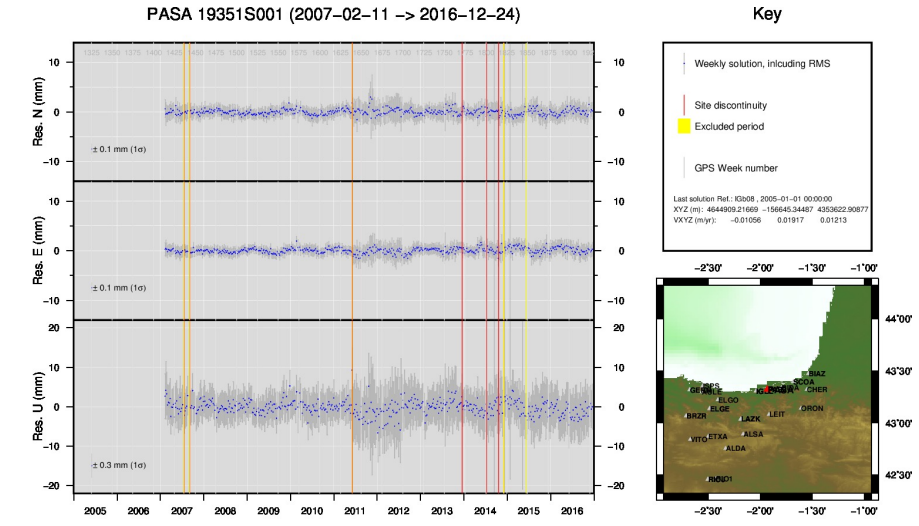
17) LEIT



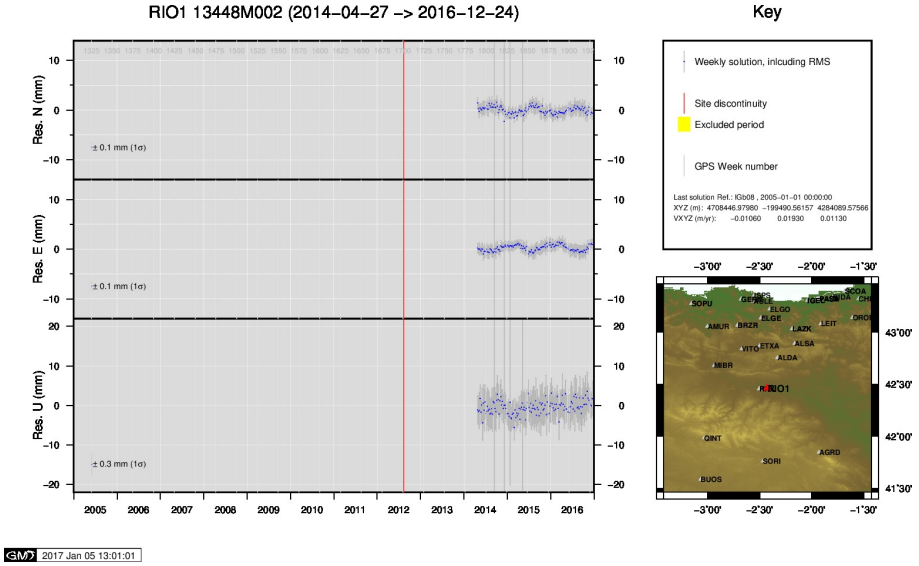
18) ORON



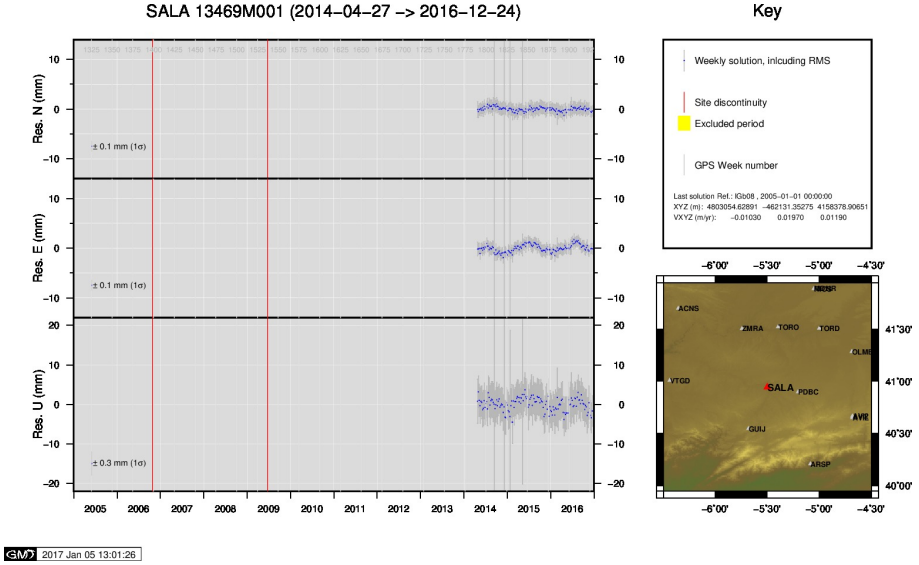
19) PAS2



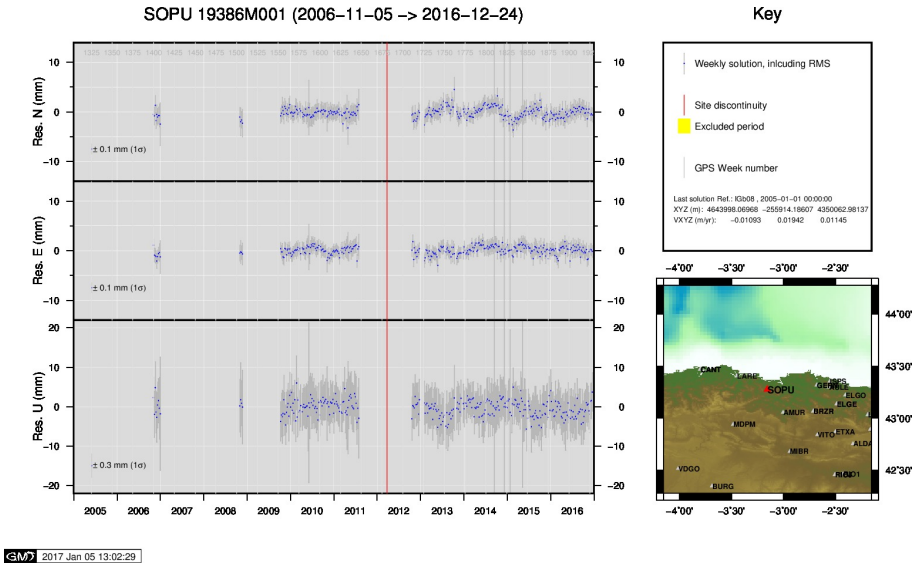
20) PASA



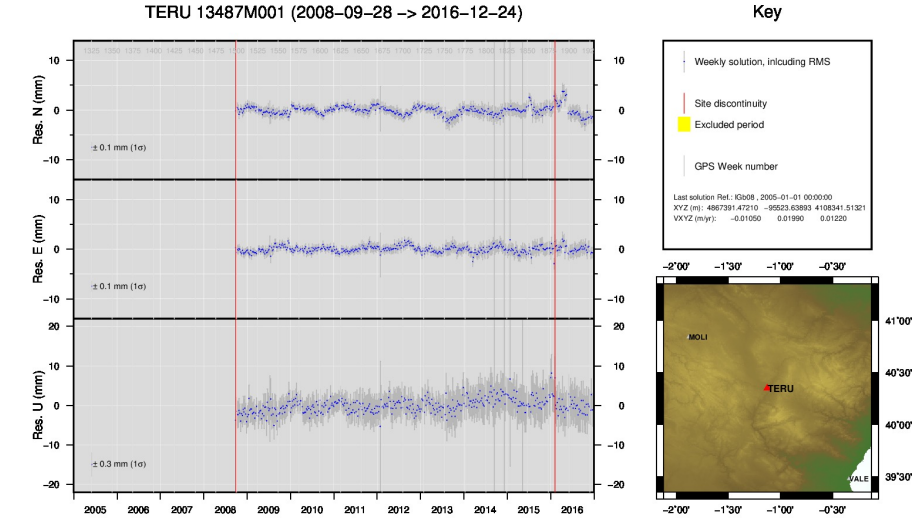
21) RIO1



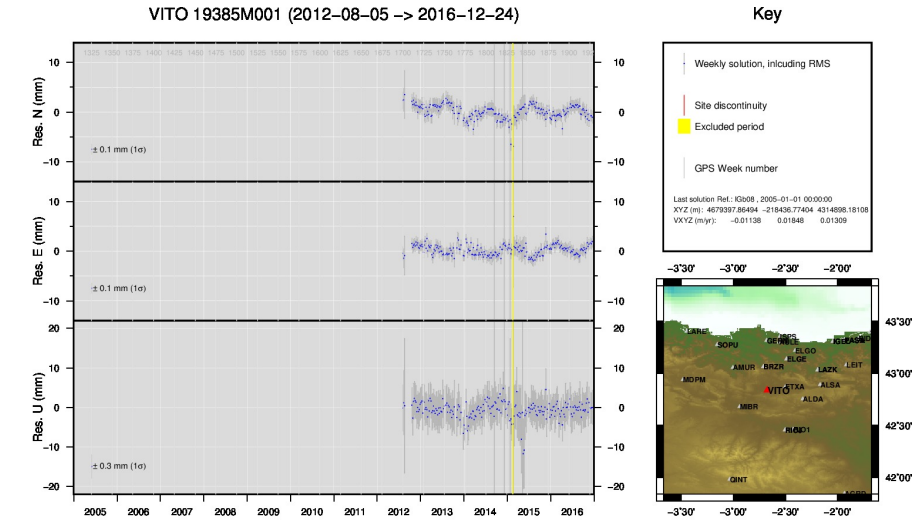
22) SALA



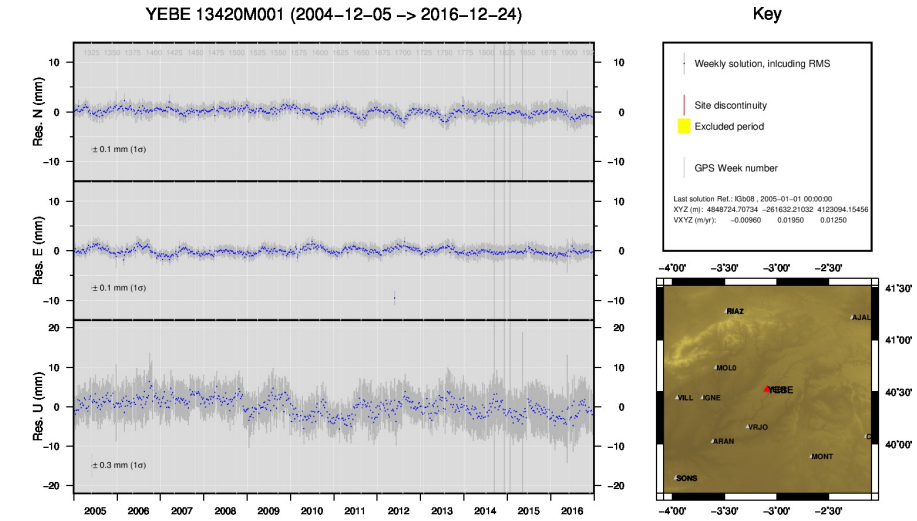
23) SOPU



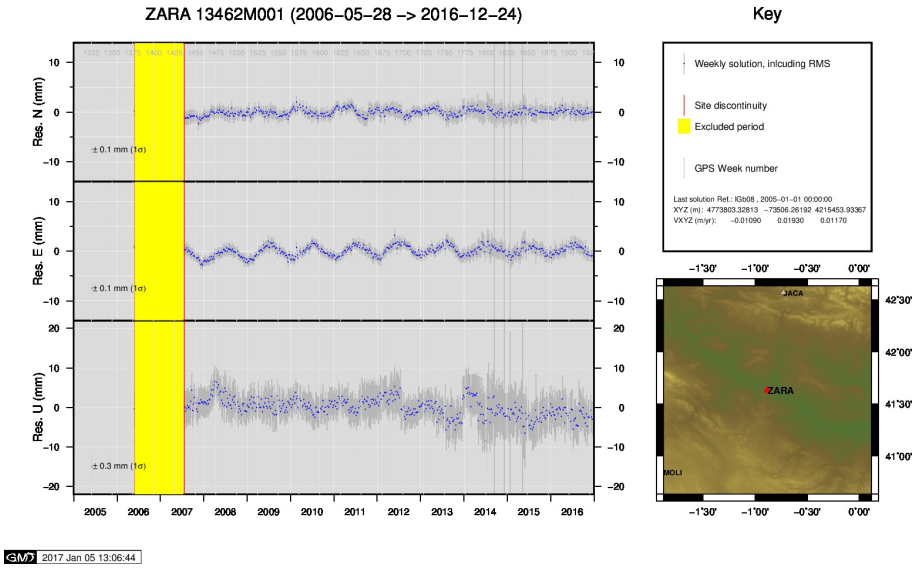
24) TERU



25) VITO



26) YEBE


ZARA 13462M001 (2006–05–28 –> 2016–12–24)
Key
Res. N (mm)
Res. E (mm)
Res. U (mm)
±0.1 mm (1σ)
±0.1 mm (1σ)
±0.3 mm (1σ)
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Weekly solution, inlcuding RMS
Site discontinuity
Excluded period
GPS Week number
Last solution Ref.: IGb08 , 2005–01–01 00:00:00
XYZ (m): 4773803.32813 −73506.26192 4215453.93367
VXYZ (m/yr): −0.01090 0.01930 0.01170
−1°30'
−1°00'
−0°30'
0°00'
42°30'
42°00'
41°30'
41°00'
JACA
ZARA
MOLI
2017 Jan 05 13:06:44

27) ZARA