# ARA-DAC Weekly Analysis Result: 1903 (GFA)

## Technical Report

**GPS Week: 1903 (GFA)**

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

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# 1 Introduction

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

# 2 Map of Computed Sites

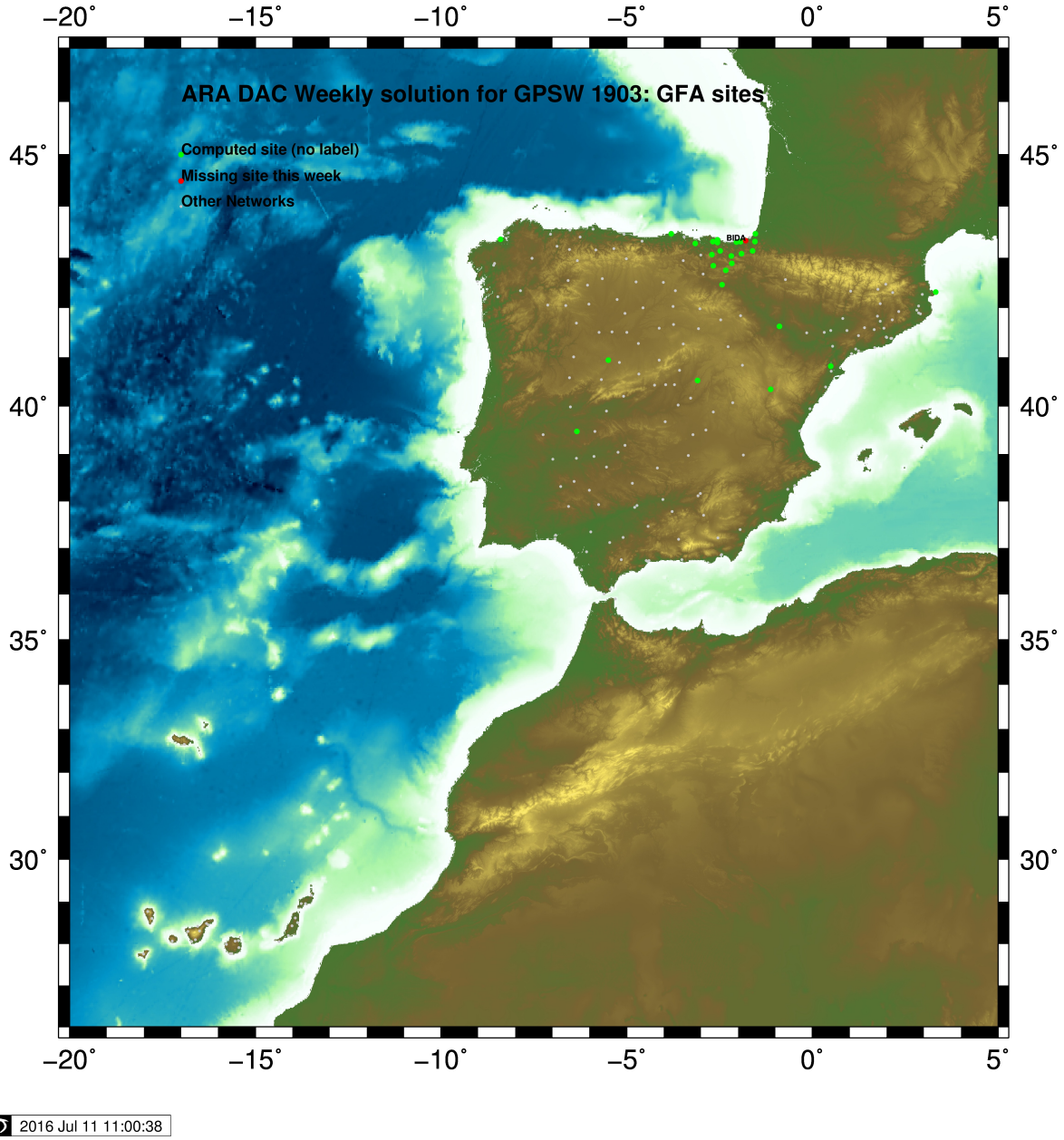



**Fig.1: Computed Sites for GPS Week1903 (GFA)**

# 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 1903 WEEK COMBINATION: PRECISE ORBITS                    11-JUL-16 10:01
------------------------------------------------------------------------------
LOCAL GEODETIC DATUM: IGb08             EPOCH: 2016-06-29 12:00:00

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

  1  ACOR 13434M001    4594489.59031  -678367.51107  4357066.25486    W
 22  ALDA 19383M001    4687280.18932  -190876.62075  4308106.92376    A
 28  ALSA 19419M001    4677250.87258  -176770.45026  4319079.84166    A
 40  AULE 00000M000    4644762.15553  -207777.70755  4351758.44860    A
 51  BIAZ 10074M002    4634456.09545  -124345.03472  4365785.42986    A
 54  BRZR 19387M001    4662221.01909  -220769.95496  4333309.40295    A
  7  CACE 13447M001    4899866.53104  -544567.09228  4033770.17178    W
  8  CANT 13438M001    4625924.34504  -307096.28946  4365771.52415    W
 69  CHER 00000M000    4645880.35258  -125721.98117  4353624.33985    A
 11  CREU 13432M001    4715420.16828   273178.00329  4271946.81005    A
 12  EBRE 13410M001    4833520.02090    41537.33490  4147461.68244    W
 77  ELGE 19353S001    4657557.43218  -202241.52898  4338991.83558    A
 87  GERN 19389M001    4642811.33994  -217222.98885  4353278.85067    A
101  IGEL 19352S001    4645951.46127  -165574.55721  4352550.38696    A
105  ISPS 19484M001    4640596.51603  -206963.83134  4356391.88033    A
109  LAZK 19354S001    4666098.37535  -178186.24726  4330463.64255    A
112  LEIT 19428M001    4663520.96789  -155858.77300  4334519.84933    A
141  ORON 19427M001    4659695.82128  -130864.79147  4338948.85525    A
146  PAS2 19351S001    4644909.08939  -156645.12365  4353623.04381    A
147  PASA 19351S001    4644909.09105  -156645.12354  4353623.04508    A
 27  RIO1 13448M002    4708446.85743  -199490.33955  4284089.70491    W
 28  SALA 13469M001    4803054.51058  -462131.12564  4158379.04425    W
172  SOPU 19386M001    4643997.94187  -255913.96190  4350063.11091    A
 31  TERU 13487M001    4867391.35133   -95523.41026  4108341.65207    W
204  VITO 19385M001    4679397.73080  -218436.56117  4314898.32988    A
 35  YEBE 13420M001    4848724.59488  -261631.98610  4123094.29500    W
 36  ZARA 13462M001    4773803.20115   -73506.03874  4215454.06682    W
```

## 5.2 ETRS89 Coordinates

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

```
ETRF2000 COORD. wk 1903                                          11-JUL-16 10:01
------------------------------------------------------------------------------
LOCAL GEODETIC DATUM: ETRF2000          EPOCH: 2016-06-29 12:00:00

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

  1  ACOR 13434M001    4594489.86915  -678367.99442  4357065.87083    W
 22  ALDA 19383M001    4687280.51668  -190877.11207  4308106.53880    A
 28  ALSA 19419M001    4677251.20211  -176770.94060  4319079.45754    A
 40  AULE 00000M000    4644762.48384  -207778.19490  4351758.06635    A
 51  BIAZ 10074M002    4634456.43346  -124345.52091  4365785.04923    A
 54  BRZR 19387M001    4662221.34487  -220770.44399  4333309.01937    A
  7  CACE 13447M001    4899866.80370  -544567.60402  4033769.76839    W
  8  CANT 13438M001    4625924.66373  -307096.77524  4365771.14210    W
 69  CHER 00000M000    4645880.68968  -125722.46844  4353623.95842    A
 11  CREU 13432M001    4715420.54234   273177.51062  4271946.42817    A
 12  EBRE 13410M001    4833520.36269    41536.83049  4147461.29001    W
 77  ELGE 19353S001    4657557.76027  -202242.01753  4338991.45252    A
 87  GERN 19389M001    4642811.66735  -217223.47604  4353278.46845    A
101  IGEL 19352S001    4645951.79409  -165575.04458  4352550.00509    A
105  ISPS 19484M001    4640596.84472  -206964.31830  4356391.49838    A
109  LAZK 19354S001    4666098.70545  -178186.73655  4330463.25917    A
112  LEIT 19428M001    4663521.30060  -155859.26201  4334519.46637    A
141  ORON 19427M001    4659696.15691  -130865.28005  4338948.47283    A
146  PAS2 19351S001    4644909.42322  -156645.61090  4353622.66211    A
147  PASA 19351S001    4644909.42488  -156645.61079  4353622.66338    A
 27  RIO1 13448M002    4708447.18236  -199490.83287  4284089.31841    W
 28  SALA 13469M001    4803054.79983  -462131.62829  4158378.64840    W
172  SOPU 19386M001    4643998.26498  -255914.44928  4350062.72819    A
 31  TERU 13487M001    4867391.67618   -95523.91819  4108341.25585    W
204  VITO 19385M001    4679398.05567  -218437.05181  4314897.94516    A
 35  YEBE 13420M001    4848724.90311  -261632.49266  4123093.89824    W
 36  ZARA 13462M001    4773803.53508   -73506.53788  4215453.67723    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 1903 WEEK COMBINATION: PRECISE ORBITS                    11-JUL-16 10:01
------------------------------------------------------------------------------
                     Weekday     Repeatability (mm)
Station        #Days 0123456      N      E      U
```

```
-------------------------------------------------
ACOR 13434M001     7  XXXXXXX     0.76   0.99   1.92
ALDA 19383M001     7  XXXXXXX     0.84   1.27   2.47
ALSA 19419M001     7  XXXXXXX     0.99   0.92   3.03
AULE 00000M000     7  XXXXXXX     0.97   1.08   3.09
BIAZ 10074M002     7  XXXXXXX     0.92   0.87   2.55
BRZR 19387M001     7  XXXXXXX     0.96   1.53   2.61
CACE 13447M001     7  XXXXXXX     0.67   0.94   4.89
CANT 13438M001     7  XXXXXXX     0.67   0.70   1.44
CHER 00000M000     7  XXXXXXX     0.82   1.29   3.10
CREU 13432M001     7  XXXXXXX     1.33   1.09   2.18
EBRE 13410M001     7  XXXXXXX     0.72   0.70   2.61
ELGE 19353S001     7  XXXXXXX     0.95   0.96   3.34
GERN 19389M001     7  XXXXXXX     0.87   0.94   2.29
IGEL 19352S001     7  XXXXXXX     0.92   0.92   2.37
ISPS 19484M001     7  XXXXXXX     0.92   1.05   2.61
LAZK 19354S001     7  XXXXXXX     0.92   1.19   3.87
LEIT 19428M001     7  XXXXXXX     0.88   0.98   3.62
ORON 19427M001     7  XXXXXXX     0.79   1.02   3.57
PAS2 19351S001     7  XXXXXXX     0.91   0.94   2.26
PASA 19351S001     7  XXXXXXX     0.65   0.89   3.07
RIO1 13448M002     7  XXXXXXX     0.76   0.94   4.34
SALA 13469M001     3      XXX     0.63   1.15   4.86
SOPU 19386M001     7  XXXXXXX     1.22   1.20   4.70
TERU 13487M001     7  XXXXXXX     1.64   1.05   3.52
VITO 19385M001     7  XXXXXXX     0.77   1.07   2.79
YEBE 13420M001     7  XXXXXXX     1.38   0.79   3.72
ZARA 13462M001     7  XXXXXXX     0.86   0.90   4.33

Comparison of individual solutions:
-----------------------------------
ACOR 13434M001   N    0.76      0.54    0.85    1.02    0.10   -0.38   -0.35   -1.08
ACOR 13434M001   E    0.99     -0.58   -1.24    0.07   -1.64    0.56   -0.76    0.69
ACOR 13434M001   U    1.92      2.50    1.32   -1.65   -1.79   -0.81   -2.06    1.84
ALDA 19383M001   N    0.84      0.49   -0.16   -0.64   -1.64   -0.72   -0.54   -0.15
ALDA 19383M001   E    1.27      0.16    1.12    0.19    1.89    1.27    1.51   -0.98
ALDA 19383M001   U    2.47     -4.45    1.29   -3.66    0.53    1.03   -0.29   -0.64
ALSA 19419M001   N    0.99     -0.20   -0.16   -0.21   -1.51    0.70   -1.70   -0.25
ALSA 19419M001   E    0.92      1.02    0.13   -0.03    0.99    0.83    1.31    0.80
ALSA 19419M001   U    3.03      1.95   -5.50    0.78   -1.47   -3.41   -1.16    2.24
AULE 00000M000   N    0.97      1.36   -1.02   -0.85   -0.78   -0.57   -0.37   -0.96
AULE 00000M000   E    1.08      0.07    0.61    0.23    1.73    1.51    1.14   -0.25
AULE 00000M000   U    3.09     -5.99   -3.99    0.39    0.23    0.82    1.46    1.55
BIAZ 10074M002   N    0.92      0.69   -0.19   -1.38   -1.23    0.26   -0.99   -0.41
BIAZ 10074M002   E    0.87      1.09    1.11    0.22    0.97    0.75    0.71    0.15
BIAZ 10074M002   U    2.55     -0.51   -2.57   -2.47   -1.14    1.22    2.85   -3.90
BRZR 19387M001   N    0.96     -0.14   -0.84    0.82   -1.60   -0.01   -1.21   -0.41
BRZR 19387M001   E    1.53      1.12    1.98    1.46    1.58    0.27    0.65   -1.92
BRZR 19387M001   U    2.61     -2.82   -1.27    0.71   -4.45    1.29    2.57   -1.66
CACE 13447M001   N    0.67      0.77   -0.48    0.74    0.47    0.17   -0.52   -0.91
CACE 13447M001   E    0.94      0.21   -1.13   -0.76    0.21    0.24   -0.66    1.69
CACE 13447M001   U    4.89      1.15   10.10   -2.26   -3.16    4.80    0.92   -1.19
CANT 13438M001   N    0.67      0.43   -0.10    1.05   -0.50    0.15   -0.27   -1.02
CANT 13438M001   E    0.70      0.49   -0.23    0.05    1.62   -0.06   -0.05   -0.18
CANT 13438M001   U    1.44     -1.81    1.52   -1.25   -1.80    1.08   -0.57    0.73
CHER 00000M000   N    0.82     -0.17   -1.11    0.17   -1.53    0.05   -0.16   -0.59
CHER 00000M000   E    1.29      0.38    1.85    0.83    1.01    2.01   -0.22   -0.81
CHER 00000M000   U    3.10     -2.41   -1.27   -1.03   -2.48   -4.81    4.22    1.50
CREU 13432M001   N    1.33     -1.16   -0.47    0.18    1.58    2.33   -0.23    1.01
CREU 13432M001   E    1.09      0.80    1.27   -1.24   -0.90    0.53    0.73   -1.33
CREU 13432M001   U    2.18     -2.35    1.93   -3.34    0.43    1.67    2.17   -0.57
EBRE 13410M001   N    0.72      0.27   -0.29    0.12    0.72   -0.46   -0.04    1.48
EBRE 13410M001   E    0.70     -0.22    0.99    0.38   -0.81   -0.31    0.64   -0.79
EBRE 13410M001   U    2.61      2.02    4.57   -0.65   -0.93    0.80   -1.69   -3.31
ELGE 19353S001   N    0.95     -0.11    0.51   -0.19   -1.99   -0.18   -1.01   -0.40
ELGE 19353S001   E    0.96      1.27    1.13    0.59    1.37    0.20    0.65   -0.11
ELGE 19353S001   U    3.34     -1.51   -4.93    1.67   -4.92    0.75    3.56   -0.55
GERN 19389M001   N    0.87      0.43   -0.86   -1.03   -0.96    0.69   -0.84   -0.66
GERN 19389M001   E    0.94      0.76    1.37    0.50    1.54    0.28    0.34    0.27
GERN 19389M001   U    2.29     -4.83   -2.14    0.87    1.62   -0.17   -0.43   -0.10
IGEL 19352S001   N    0.92     -0.02    0.06    0.15   -1.79    0.05   -1.23   -0.52
IGEL 19352S001   E    0.92      1.50    0.59    0.34    1.20    0.60    0.76    0.07
IGEL 19352S001   U    2.37     -3.25   -1.65    0.27   -3.09    2.63    0.98   -1.70
ISPS 19484M001   N    0.92      0.85   -0.99   -0.48   -1.66   -0.47   -0.05   -0.45
ISPS 19484M001   E    1.05      1.27    1.22    0.40    0.93    1.55    0.07   -0.34
ISPS 19484M001   U    2.61     -2.89   -1.62    2.33   -1.60    2.93   -0.30   -3.64
LAZK 19354S001   N    0.92      0.73    0.19   -0.69   -1.21   -0.28   -1.49   -0.53
LAZK 19354S001   E    1.19     -0.06    0.99   -0.06    1.89    1.70    0.93   -0.35
LAZK 19354S001   U    3.87      0.03   -1.85    0.01   -8.42    1.02   -0.92    3.70
LEIT 19428M001   N    0.88      0.86   -0.14   -1.06   -1.14    0.07   -0.92   -0.82
LEIT 19428M001   E    0.98      1.06    0.90    0.52    1.33    1.03    0.69   -0.46
LEIT 19428M001   U    3.62     -5.14   -3.14    2.77   -4.74    1.21    3.20   -0.80
ORON 19427M001   N    0.79     -0.58   -0.72    0.16   -0.61    0.09   -1.56    0.04
ORON 19427M001   E    1.02      0.94    1.25    0.84    0.80    1.08    0.86   -0.74
ORON 19427M001   U    3.57      1.58   -1.81    2.80   -7.78    0.51   -0.71   -1.28
PAS2 19351S001   N    0.91      0.55   -0.63   -0.36   -1.74    0.11   -1.04   -0.22
PAS2 19351S001   E    0.94      0.56    0.99   -0.10    1.47    0.63    1.15    0.33
PAS2 19351S001   U    2.26     -3.80   -2.25   -0.62   -1.71    1.91    1.54   -1.40
PASA 19351S001   N    0.65      0.09   -0.64   -0.77   -0.82   -0.26   -0.87   -0.08
PASA 19351S001   E    0.89      0.90    1.23    0.30    0.42    1.12    0.94    0.07
PASA 19351S001   U    3.07     -2.30   -1.83    1.17   -5.85    2.98    1.11   -1.49
RIO1 13448M002   N    0.76      0.01   -0.93   -0.71   -1.30   -0.50    0.07   -0.35
RIO1 13448M002   E    0.94      1.31    1.25    0.45    1.07    0.17    0.69    0.46
RIO1 13448M002   U    4.34      2.83   -4.85   -5.79   -1.63    6.39   -1.50   -1.53
SALA 13469M001   N    0.63                                    0.61    0.24   -0.61
SALA 13469M001   E    1.15                                    1.53   -0.40    0.39
SALA 13469M001   U    4.86                                    6.60   -0.62   -1.80
SOPU 19386M001   N    1.22      0.95   -0.71    0.90   -2.34   -0.43   -0.96   -0.34
SOPU 19386M001   E    1.20      0.47    1.99   -0.00    1.43    0.65    0.61   -1.28
SOPU 19386M001   U    4.70     -8.76   -4.30   -2.16    4.65    1.72    1.26    2.49
TERU 13487M001   N    1.64     -0.24    0.03   -2.63    1.12    1.84   -0.45    2.08
TERU 13487M001   E    1.05      0.37    1.07    0.30    0.37   -0.89    0.81   -1.91
TERU 13487M001   U    3.52     -3.49   -4.55    3.09    3.21   -0.86    0.62    4.54
VITO 19385M001   N    0.77      0.20   -0.02   -0.86   -1.61    0.05   -0.46   -0.03
VITO 19385M001   E    1.07      0.94    0.73    1.06    1.59    0.76    0.67   -0.88
VITO 19385M001   U    2.79     -2.65    0.03    2.48   -5.74    0.28    0.37   -0.56
YEBE 13420M001   N    1.38      0.79   -2.35    1.70    1.00   -0.67   -0.71    0.67
YEBE 13420M001   E    0.79     -1.25   -0.39   -0.13   -0.77    0.42   -0.18    1.07
YEBE 13420M001   U    3.72      5.33    2.45   -1.38   -6.23    1.25    0.48   -2.44
ZARA 13462M001   N    0.86     -0.73   -1.27    0.33   -0.34    0.49    1.29    0.46
ZARA 13462M001   E    0.90     -0.46    1.07    1.34   -0.25   -0.31    0.41   -1.19
ZARA 13462M001   U    4.33     -2.46   -8.51    2.48    1.44    4.90   -0.80   -1.05
```

## 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 | -0.97 | 0.67 | 0.25 | |
| 2 | ALAC 13433M001 | I W | 0.71 | 0.25 | 0.39 | |
| 3 | ALBA 13452M001 | I W | 0.07 | 1.13 | -0.87 | |
| 4 | ALME 13437M001 | I W | -0.15 | -0.08 | 3.87 | |
| 6 | BRST 10004M004 | I W | 0.18 | -1.35 | -0.19 | |
| 7 | CACE 13447M001 | I W | 0.06 | 0.72 | -0.12 | |
| 8 | CANT 13438M001 | I W | -0.40 | -0.58 | -0.22 | |
| 9 | CEU1 13449M002 | I W | 1.33 | 2.84 | 8.56 | |
| 10 | COBA 13453M001 | I W | 1.10 | -0.78 | -1.97 | |
| 12 | EBRE 13410M001 | I W | 1.43 | -0.47 | 2.45 | |
| 14 | FUNC 13911S001 | I W | 0.30 | 0.79 | -3.18 | |
| 16 | HUEL 13451M001 | I W | -0.92 | 0.49 | -0.43 | |
| 17 | IZAN 31309M002 | I W | -1.97 | 1.25 | -3.04 | |
| 18 | LLIV 13436M001 | I W | 2.93 | -1.40 | -0.41 | |
| 19 | LPAL 81701M001 | I W | -1.90 | 0.62 | -5.08 | |
| 20 | LROC 10023M001 | I W | 1.69 | -2.07 | 1.11 | |
| 21 | MALA 13443M001 | I W | -4.70 | 1.91 | -0.91 | |
| 22 | MALL 13444M001 | I W | 0.47 | -1.05 | 1.54 | |
| 24 | MELI 19379M001 | I W | -1.45 | -0.59 | -2.89 | |
| 25 | PDEL 31906M004 | I W | -2.51 | -2.56 | 0.38 | |
| 26 | RABT 35001M002 | I W | -0.53 | 0.82 | -4.59 | |
| 27 | RIO1 13448M002 | I W | 0.36 | 0.70 | -1.93 | |
| 28 | SALA 13469M001 | I W | -0.91 | -0.31 | 1.43 | |
| 29 | SCOA 10088M002 | I W | -0.31 | -1.25 | -1.70 | |
| 30 | SONS 13446M001 | I W | -0.55 | -1.00 | -2.54 | |
| 31 | TERU 13487M001 | I W | 2.86 | 1.09 | -0.11 | |
| 32 | VALE 13439M001 | I W | 0.29 | 0.85 | 0.72 | |
| 33 | VIGO 13450M001 | I W | 0.03 | -0.75 | 1.24 | |
| 34 | VILL 13406M001 | I W | -0.16 | 0.78 | -1.13 | |
| 35 | YEBE 13420M001 | I W | 1.54 | 0.46 | 5.12 | |
| 36 | ZARA 13462M001 | I W | -0.07 | -1.43 | -0.95 | |
| 37 | ZIMM 14001M004 | I W | 2.15 | 0.29 | 5.21 | |
| | | | | | | |
| | RMS / COMPONENT | | 1.55 | 1.18 | 2.85 | |
| | MEAN | | 0.00 | 0.00 | -0.00 | |
| | MIN | | -4.70 | -2.56 | -5.08 | |
| | MAX | | 2.93 | 2.84 | 8.56 | |

NUMBER OF PARAMETERS : 3
NUMBER OF COORDINATES : 96
RMS OF TRANSFORMATION : 1.99 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                       8471330
 NUMBER OF UNKNOWNS                           123322
 NUMBER OF DEGREES OF FREEDOM                 8348008
 PHASE MEASUREMENTS SIGMA                     0.00100
 SAMPLING INTERVAL (SECONDS)                  180
 VARIANCE FACTOR                  2.207338800454589
```

Helmert Transformation Parameters With Respect to Combined Solution:

| | | Translation (m) | | | Rotation (") | | | |
|---|---|---|---|---|---|---|---|---|
| Sol | Rms (m) | X | Y | Z | X | Y | Z | Scale (ppm) |
| 1 | 0.00221 | -0.0027 | -0.0088 | -0.0062 | 0.0002 | 0.0001 | -0.0002 | 0.00087 |
| 2 | 0.00495 | -0.0139 | -0.0155 | -0.0057 | 0.0006 | -0.0002 | -0.0002 | 0.00219 |
| 3 | 0.00207 | -0.0056 | 0.0051 | 0.0165 | -0.0002 | -0.0005 | 0.0000 | -0.00081 |
| 4 | 0.00228 | -0.0229 | -0.0279 | 0.0373 | 0.0004 | -0.0014 | -0.0009 | -0.00122 |
| 5 | 0.00285 | 0.0029 | 0.0235 | 0.0019 | -0.0004 | 0.0000 | 0.0006 | -0.00015 |
| 6 | 0.00190 | 0.0081 | 0.0064 | -0.0183 | -0.0001 | 0.0006 | 0.0002 | 0.00083 |
| 7 | 0.01148 | 0.0163 | -0.0417 | -0.0054 | 0.0006 | 0.0005 | -0.0012 | -0.00167 |

Statistics of individual solutions:

| File | RMS (m) | DOF | Chi**2/DOF | #Observations authentic | / pseudo | #Parameters explicit | / implicit | / singular |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.00146 | 1177524 | 2.14 | 1195467 | 3 | 522 | 17424 | 0 |
| 2 | 0.00144 | 1192911 | 2.08 | 1211044 | 3 | 525 | 17611 | 0 |
| 3 | 0.00149 | 1196631 | 2.23 | 1215093 | 3 | 519 | 17946 | 0 |
| 4 | 0.00154 | 1191049 | 2.37 | 1209851 | 3 | 522 | 18283 | 0 |
| 5 | 0.00150 | 1203814 | 2.24 | 1221956 | 3 | 525 | 17620 | 0 |
| 6 | 0.00148 | 1193188 | 2.20 | 1210874 | 3 | 519 | 17170 | 0 |
| 7 | 0.00146 | 1189792 | 2.14 | 1207045 | 3 | 516 | 16740 | 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 16:178:00000 16:184:86370 LEICA GRX1200PRO     ----- -----------
 ALDA  A    1 P 16:178:00000 16:184:86370 LEICA GR10           ----- -----------
 ALSA  A    1 P 16:178:00000 16:184:86370 LEICA GRX1200GGPRO   ----- -----------
 AULE  A    1 P 16:178:00000 16:184:86370 LEICA GRX1200+GNSS   ----- -----------
 BIAZ  A    1 P 16:178:00000 16:184:86370 LEICA GRX1200GGPRO   ----- -----------
 BRZR  A    1 P 16:178:00000 16:184:86370 LEICA GR10           ----- -----------
 CACE  A    1 P 16:178:00000 16:184:86370 TRIMBLE NETR9        ----- -----------
 CANT  A    1 P 16:178:00000 16:184:86370 LEICA GR10           ----- -----------
 CHER  A    1 P 16:178:00000 16:184:86370 LEICA GRX1200+GNSS   ----- -----------
 CREU  A    1 P 16:178:00000 16:184:86370 LEICA GR25           ----- -----------
 EBRE  A    1 P 16:178:00000 16:184:86370 TRIMBLE NETR9        ----- -----------
 ELGE  A    1 P 16:178:00000 16:184:86370 LEICA GR10           ----- -----------
 GERN  A    1 P 16:178:00000 16:184:86370 LEICA GR10           ----- -----------
 IGEL  A    1 P 16:178:00000 16:184:86370 LEICA GR10           ----- -----------
 ISPS  A    1 P 16:178:00000 16:184:86370 TRIMBLE NETR9        ----- -----------
 LAZK  A    1 P 16:178:00000 16:184:86370 LEICA GR10           ----- -----------
 LEIT  A    1 P 16:178:00000 16:184:86370 LEICA GRX1200+GNSS   ----- -----------
 ORON  A    1 P 16:178:00000 16:184:86370 LEICA GRX1200GGPRO   ----- -----------
 PAS2  A    1 P 16:178:00000 16:184:86370 TPS NET-G3A          ----- -----------
 PASA  A    1 P 16:178:00000 16:184:86370 LEICA GR10           ----- -----------
 RIO1  A    1 P 16:178:00000 16:184:86370 LEICA GR25           ----- -----------
 SALA  A    1 P 16:182:46800 16:184:79170 LEICA GRX1200+GNSS   ----- -----------
 SOPU  A    1 P 16:178:00000 16:184:86370 LEICA GR10           ----- -----------
 TERU  A    1 P 16:178:00000 16:184:86370 LEICA GRX1200GGPRO   ----- -----------
 VITO  A    1 P 16:178:00000 16:184:86370 LEICA GR10           ----- -----------
 YEBE  A    1 P 16:178:00000 16:184:86370 TRIMBLE NETRS        ----- -----------
 ZARA  A    1 P 16:178:00000 16:184:86370 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 16:178:00000 16:184:86370 LEIAT504          LEIS -----
 ALDA  A    1 P 16:178:00000 16:184:86370 LEIAS10           NONE -----
 ALSA  A    1 P 16:178:00000 16:184:86370 LEIAX1202GG       NONE -----
 AULE  A    1 P 16:178:00000 16:184:86370 LEIAS10           NONE -----
 BIAZ  A    1 P 16:178:00000 16:184:86370 LEIAR25           LEIT -----
 BRZR  A    1 P 16:178:00000 16:184:86370 LEIAS10           NONE -----
 CACE  A    1 P 16:178:00000 16:184:86370 TRM29659.00       NONE -----
 CANT  A    1 P 16:178:00000 16:184:86370 LEIAR25.R4        LEIT 25066
 CHER  A    1 P 16:178:00000 16:184:86370 LEIAX1203+GNSS    NONE -----
```

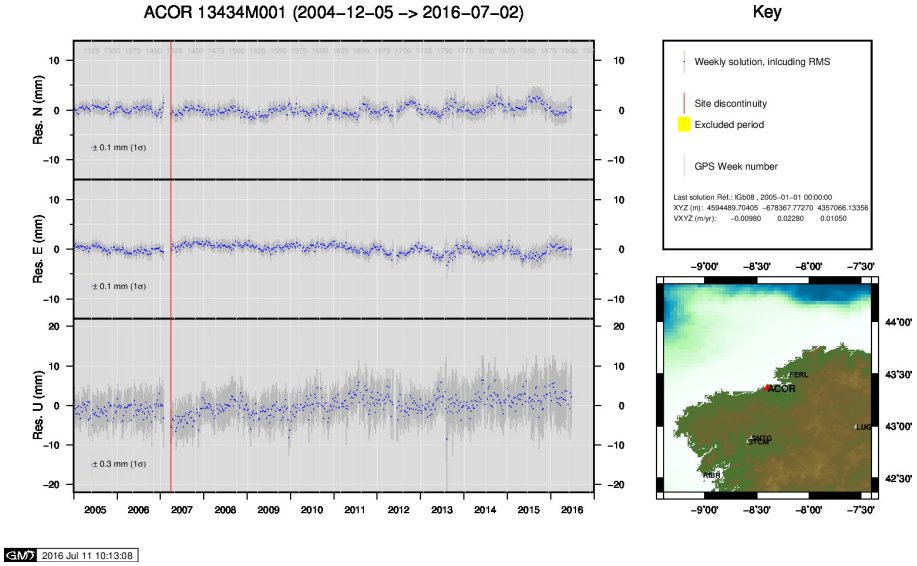
```
 CREU  A    1 P 16:178:00000 16:184:86370 LEIAR25.R4      NONE 26357
 EBRE  A    1 P 16:178:00000 16:184:86370 TRM57971.00     NONE 25503
 ELGE  A    1 P 16:178:00000 16:184:86370 LEIAR25.R4      LEIT -----
 GERN  A    1 P 16:178:00000 16:184:86370 LEIAS10         NONE -----
 IGEL  A    1 P 16:178:00000 16:184:86370 LEIAR20         LEIM -----
 ISPS  A    1 P 16:178:00000 16:184:86370 TRM59900.00     SCIS -----
 LAZK  A    1 P 16:178:00000 16:184:86370 LEIAR25.R4      LEIT -----
 LEIT  A    1 P 16:178:00000 16:184:86370 LEIAX1203+GNSS  NONE -----
 ORON  A    1 P 16:178:00000 16:184:86370 LEIAX1202GG     NONE -----
 PAS2  A    1 P 16:178:00000 16:184:86370 LEIAR20         LEIM 73034
 PASA  A    1 P 16:178:00000 16:184:86370 LEIAR20         LEIM 73034
 RIO1  A    1 P 16:178:00000 16:184:86370 LEIAR25.R4      LEIT 25138
 SALA  A    1 P 16:182:46800 16:184:79170 LEIAR25         NONE -----
 SOPU  A    1 P 16:178:00000 16:184:86370 LEIAS10         NONE -----
 TERU  A    1 P 16:178:00000 16:184:86370 LEIAT504GG      LEIS -----
 VITO  A    1 P 16:178:00000 16:184:86370 LEIAS10         NONE -----
 YEBE  A    1 P 16:178:00000 16:184:86370 TRM29659.00     NONE -----
 ZARA  A    1 P 16:178:00000 16:184:86370 TRM29659.00     NONE -----
```

## 6.3 Eccentrities

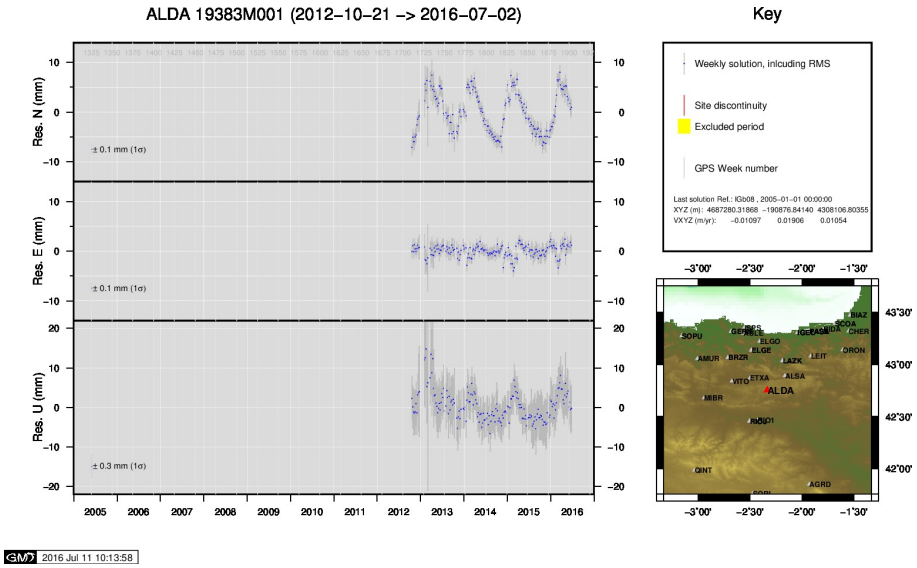
```
*                                          UP______ NORTH___ EAST____
*SITE PT SOLN T DATA_START__ DATA_END____ AXE ARP->BENCHMARK(M)_________
 ACOR  A    1 P 16:178:00000 16:184:86370 UNE   3.0460   0.0000   0.0000
 ALDA  A    1 P 16:178:00000 16:184:86370 UNE   0.0000   0.0000   0.0000
 ALSA  A    1 P 16:178:00000 16:184:86370 UNE   0.0000   0.0000   0.0000
 AULE  A    1 P 16:178:00000 16:184:86370 UNE   0.0000   0.0000   0.0000
 BIAZ  A    1 P 16:178:00000 16:184:86370 UNE   0.0000   0.0000   0.0000
 BRZR  A    1 P 16:178:00000 16:184:86370 UNE   0.0000   0.0000   0.0000
 CACE  A    1 P 16:178:00000 16:184:86370 UNE   0.0600   0.0000   0.0000
 CANT  A    1 P 16:178:00000 16:184:86370 UNE   3.0490   0.0000   0.0000
 CHER  A    1 P 16:178:00000 16:184:86370 UNE   0.0000   0.0000   0.0000
 CREU  A    1 P 16:178:00000 16:184:86370 UNE   0.0770   0.0000   0.0000
 EBRE  A    1 P 16:178:00000 16:184:86370 UNE   0.0770   0.0000   0.0000
 ELGE  A    1 P 16:178:00000 16:184:86370 UNE   0.0000   0.0000   0.0000
 GERN  A    1 P 16:178:00000 16:184:86370 UNE   0.0000   0.0000   0.0000
 IGEL  A    1 P 16:178:00000 16:184:86370 UNE   0.0000   0.0000   0.0000
 ISPS  A    1 P 16:178:00000 16:184:86370 UNE   0.0350   0.0000   0.0000
 LAZK  A    1 P 16:178:00000 16:184:86370 UNE   0.0000   0.0000   0.0000
 LEIT  A    1 P 16:178:00000 16:184:86370 UNE   0.0000   0.0000   0.0000
 ORON  A    1 P 16:178:00000 16:184:86370 UNE   0.0000   0.0000   0.0000
 PAS2  A    1 P 16:178:00000 16:184:86370 UNE   0.0000   0.0000   0.0000
 PASA  A    1 P 16:178:00000 16:184:86370 UNE   0.0000   0.0000   0.0000
 RIO1  A    1 P 16:178:00000 16:184:86370 UNE   0.0606   0.0000   0.0000
 SALA  A    1 P 16:182:46800 16:184:79170 UNE   0.0600   0.0000   0.0000
 SOPU  A    1 P 16:178:00000 16:184:86370 UNE   0.0000   0.0000   0.0000
 TERU  A    1 P 16:178:00000 16:184:86370 UNE   0.0600   0.0000   0.0000
 VITO  A    1 P 16:178:00000 16:184:86370 UNE   0.0000   0.0000   0.0000
 YEBE  A    1 P 16:178:00000 16:184:86370 UNE   0.0000   0.0000   0.0000
 ZARA  A    1 P 16:178:00000 16:184:86370 UNE   3.2590   0.0000   0.0000
```

# 7 Cumulative Time Series

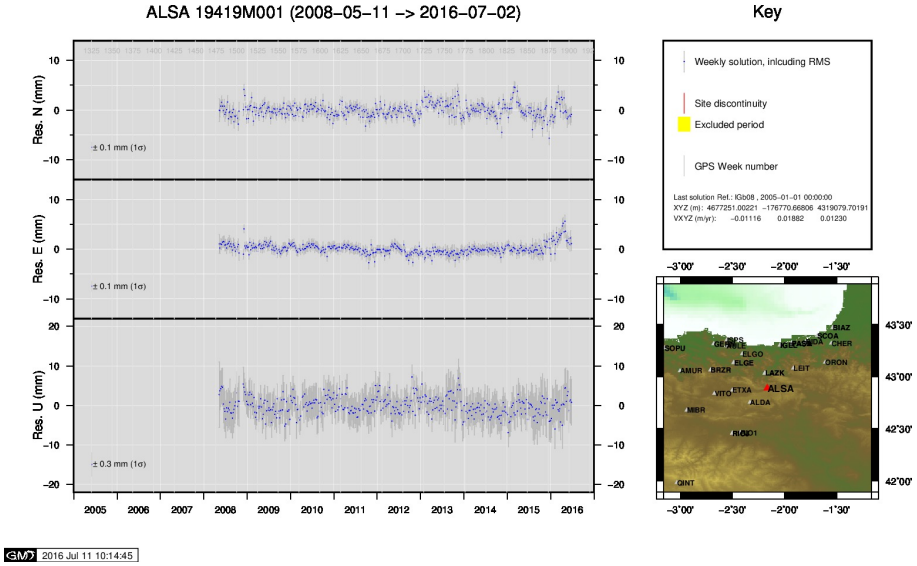
Time series of stations. Latest plots at: http://geolabpasaia.org/gnss/ARA-net/TSeries/, or click on the caption of each image.




1 ) ACOR

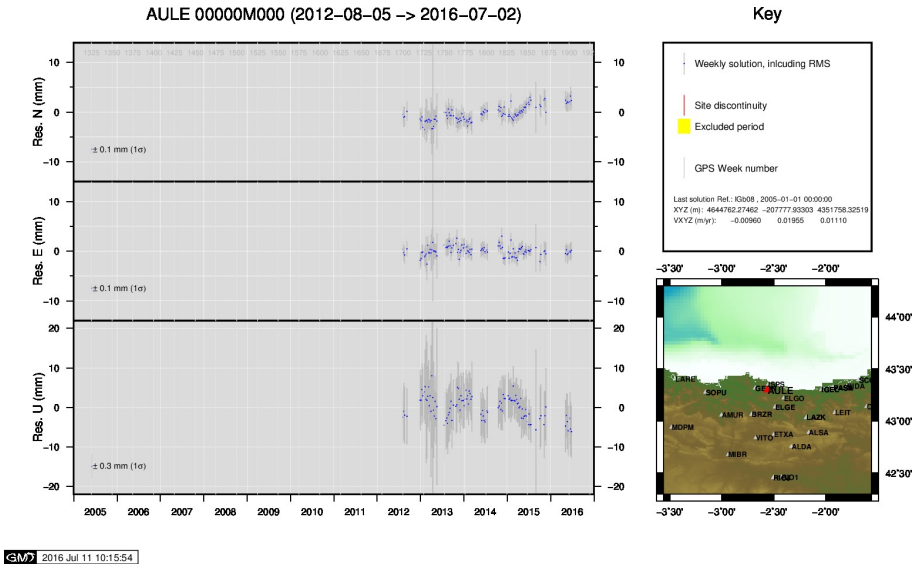



2 ) ALDA



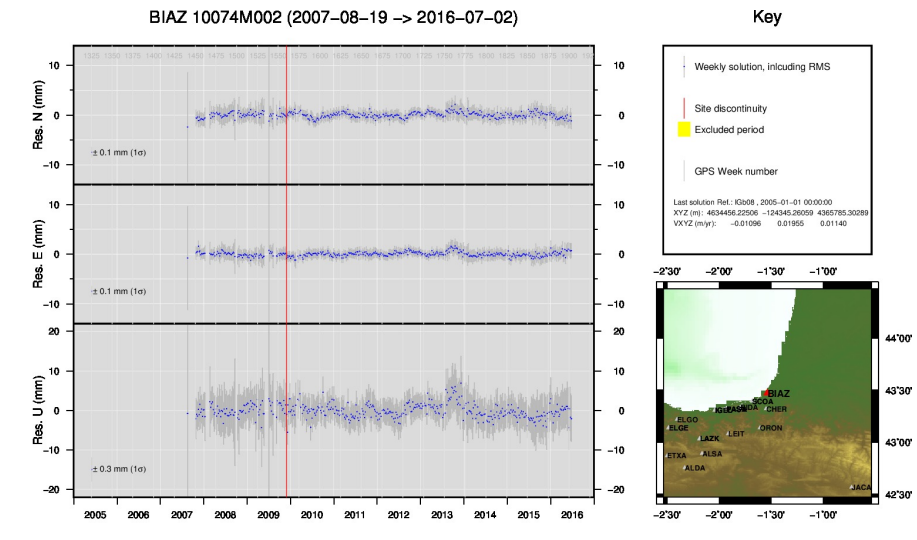

2016 Jul 11 10:14:45

3 ) ALSA



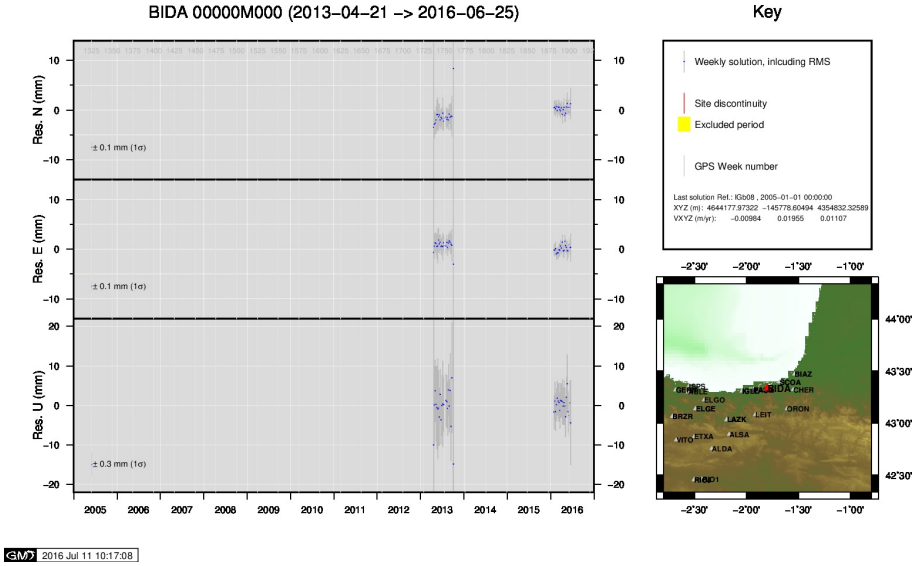

2016 Jul 11 10:15:54

4 ) AULE

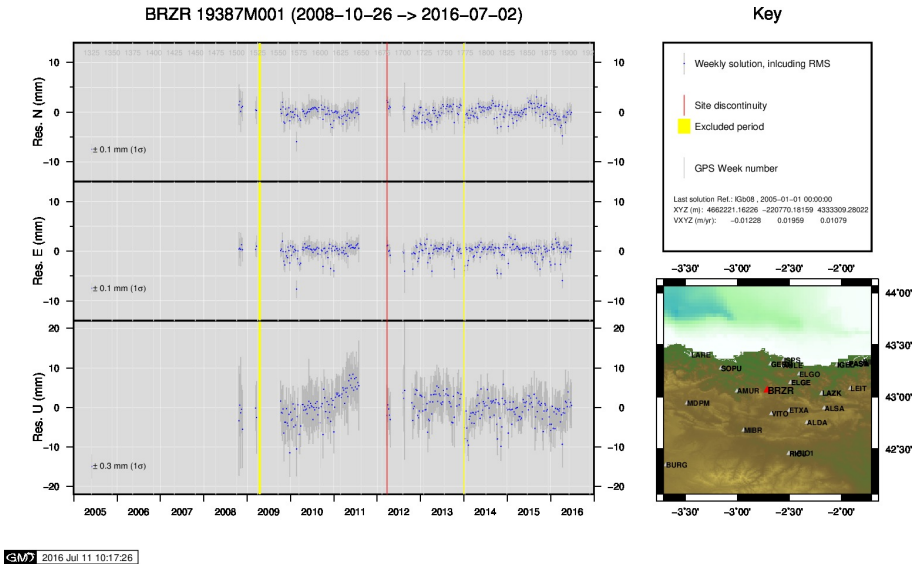



2016 Jul 11 10:17:01

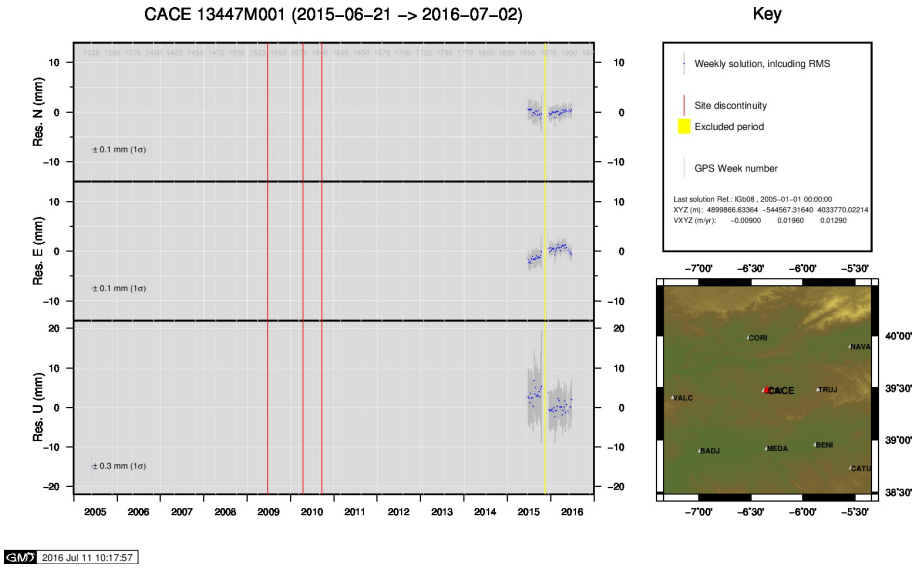
5 ) BIAZ



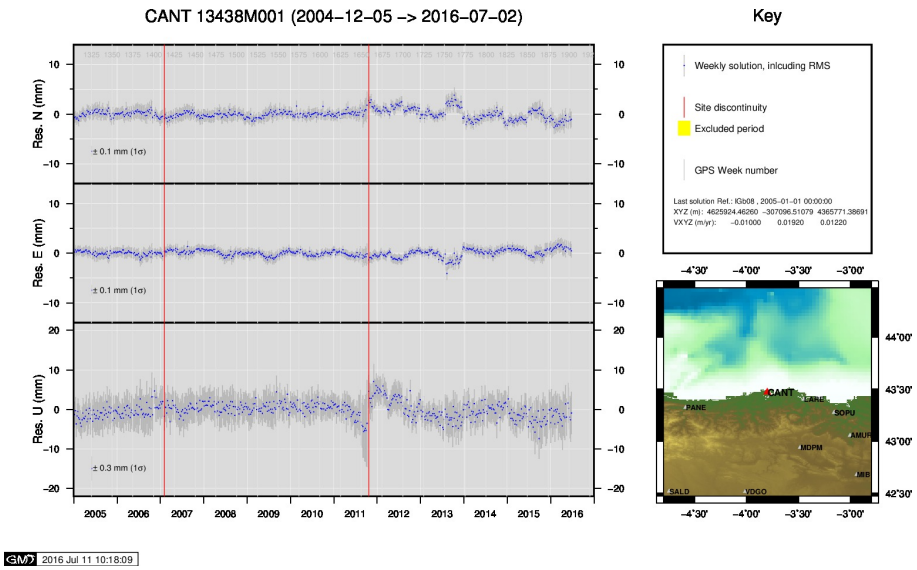

6 ) BIDA



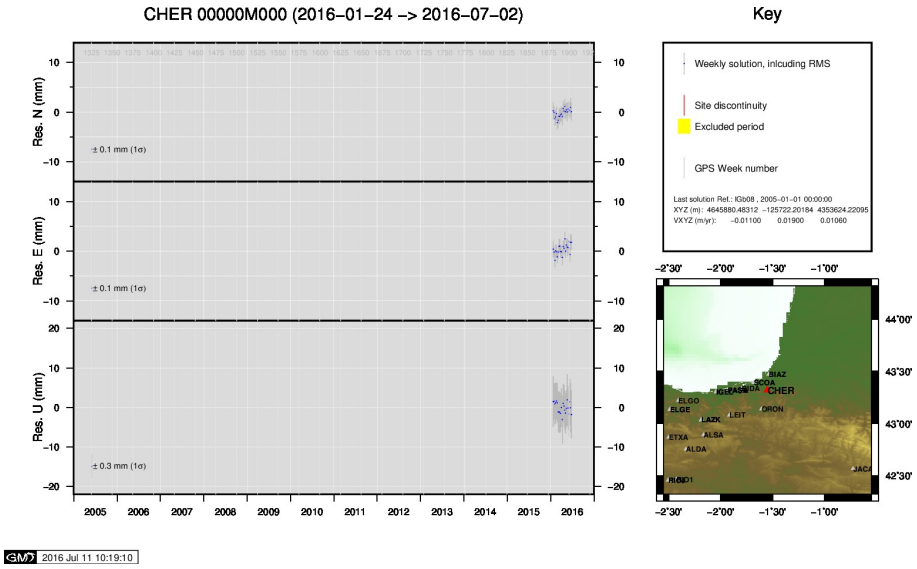

7 ) BRZR



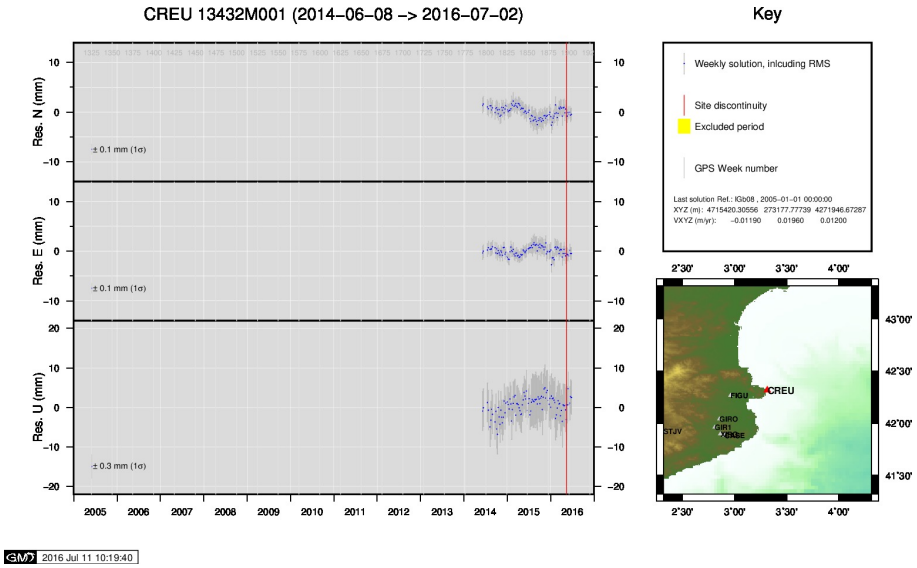

8 ) CACE



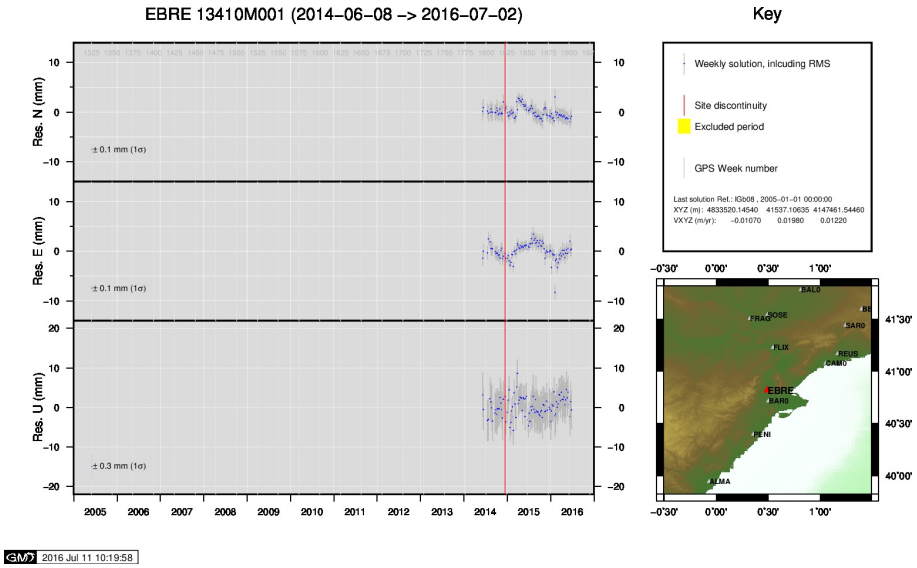

9 ) CANT



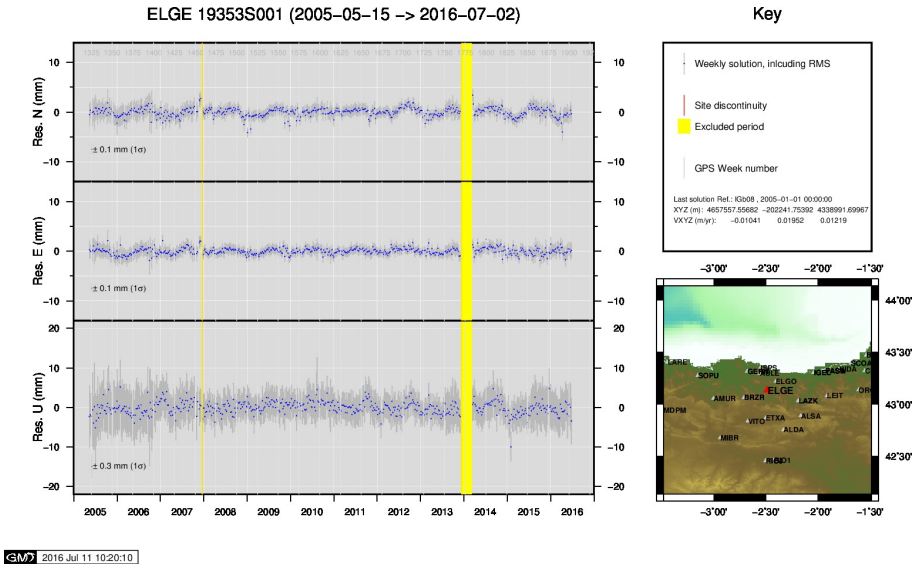

10 ) CHER



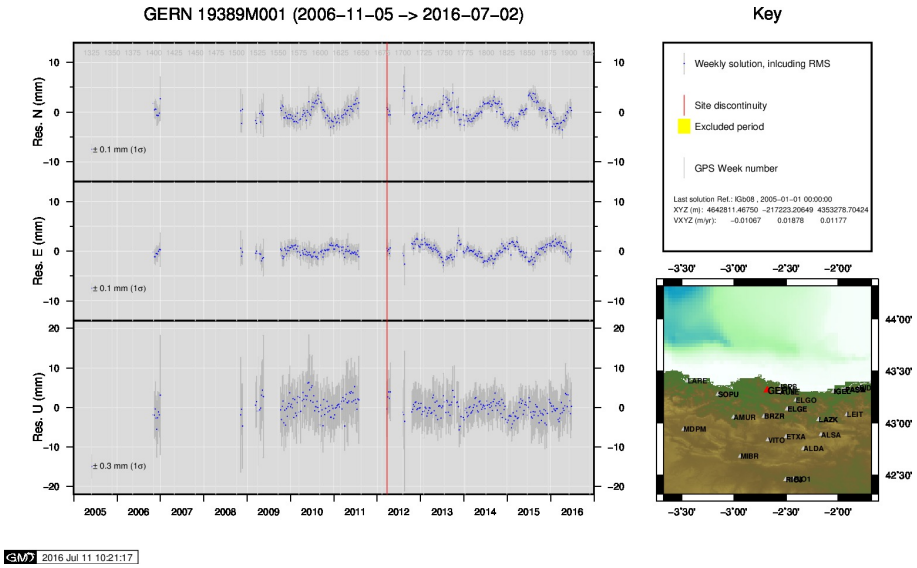

11 ) CREU



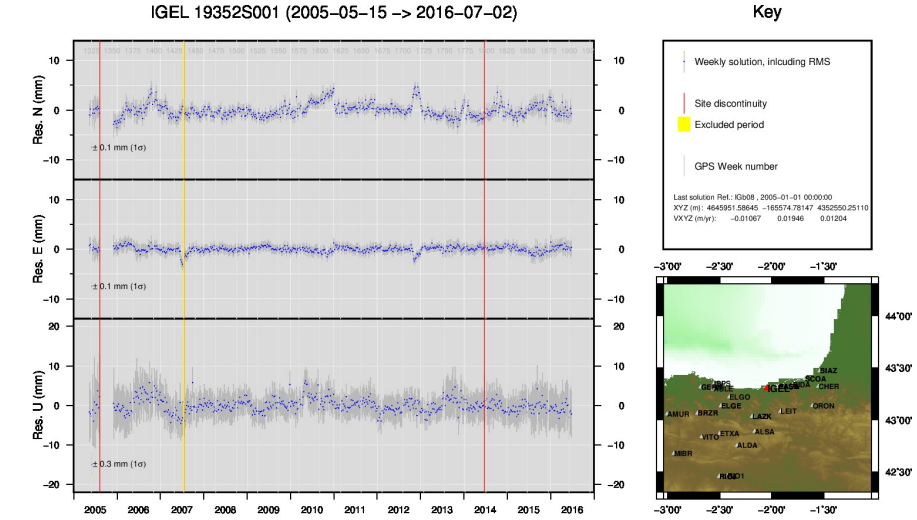

12 ) EBRE



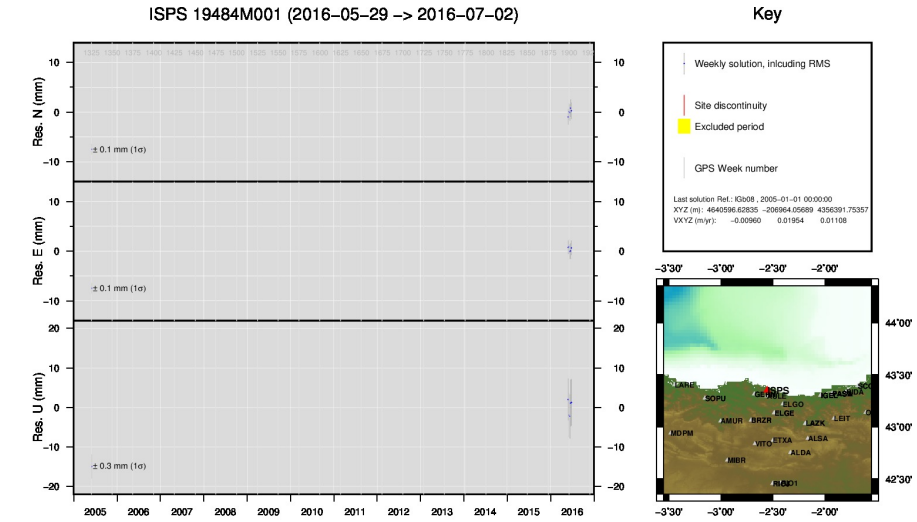

13 ) ELGE



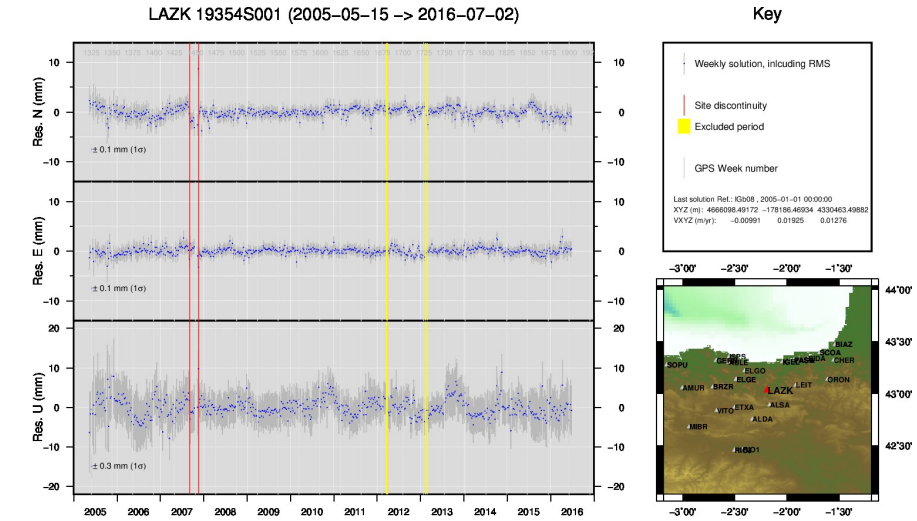

14 ) GERN



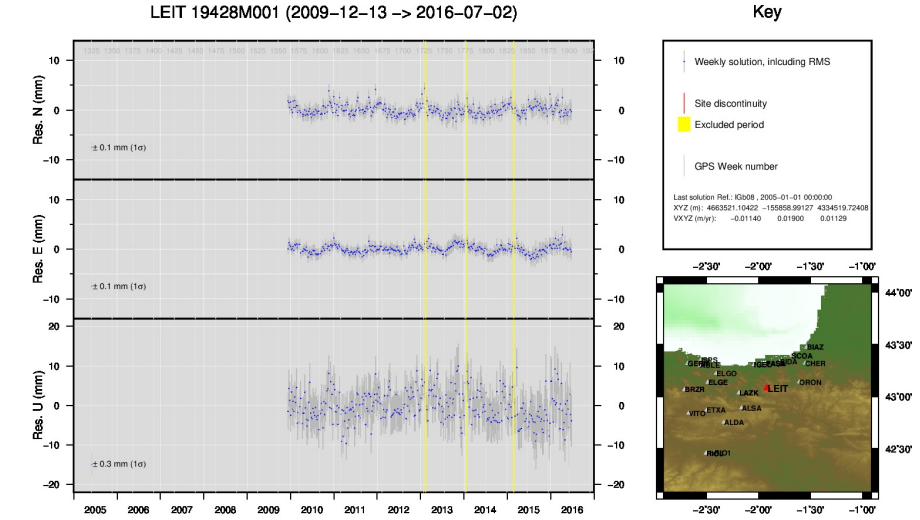

15 ) IGEL



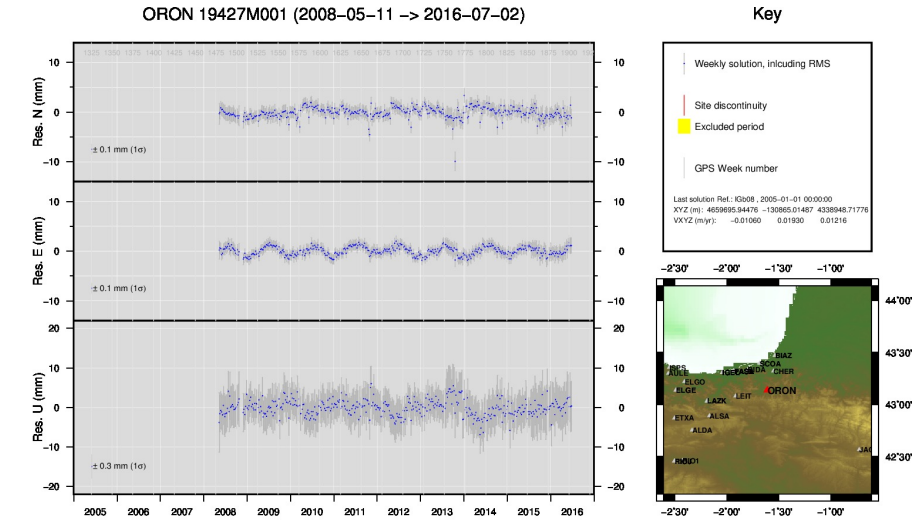

16 ) ISPS



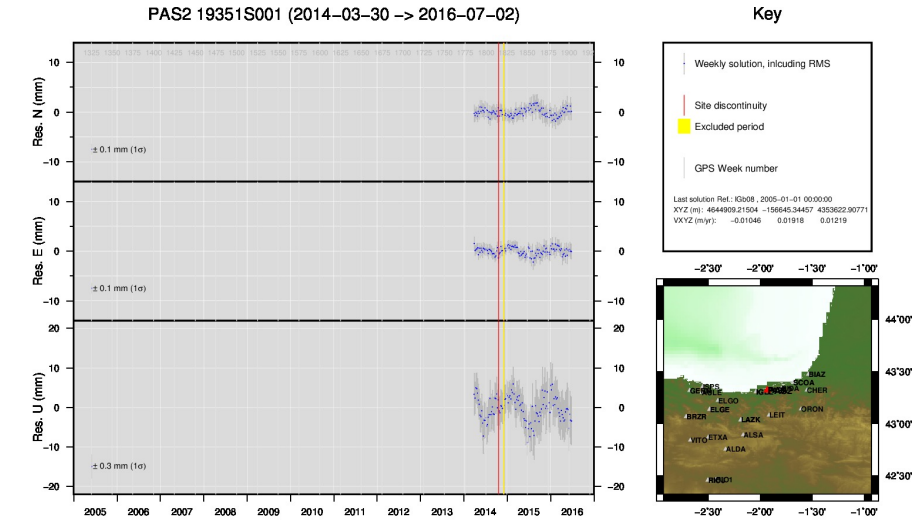

17 ) LAZK



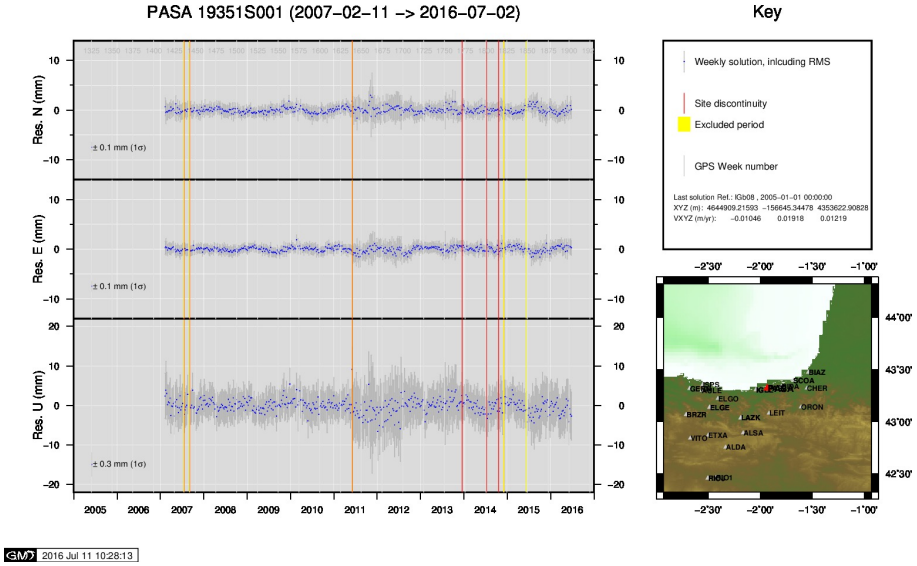

18 ) LEIT



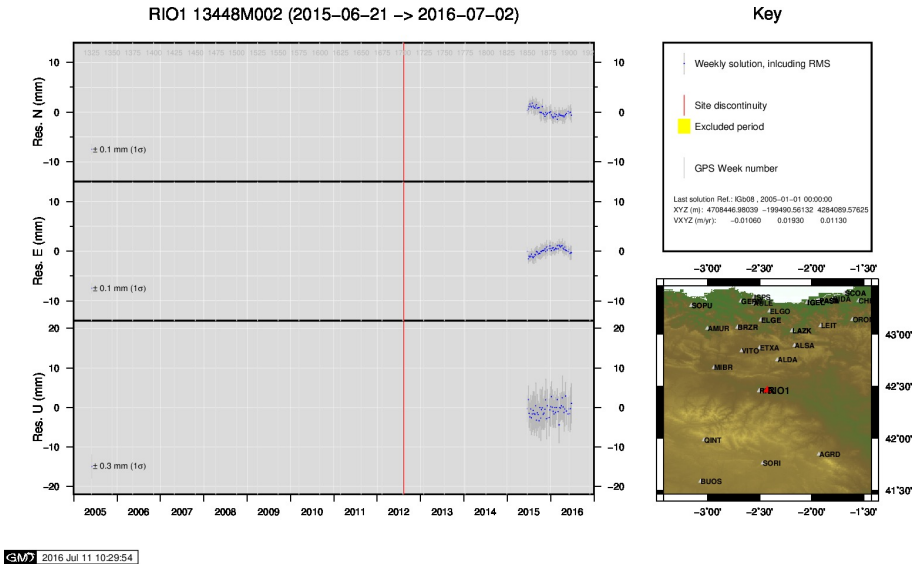

19 ) ORON



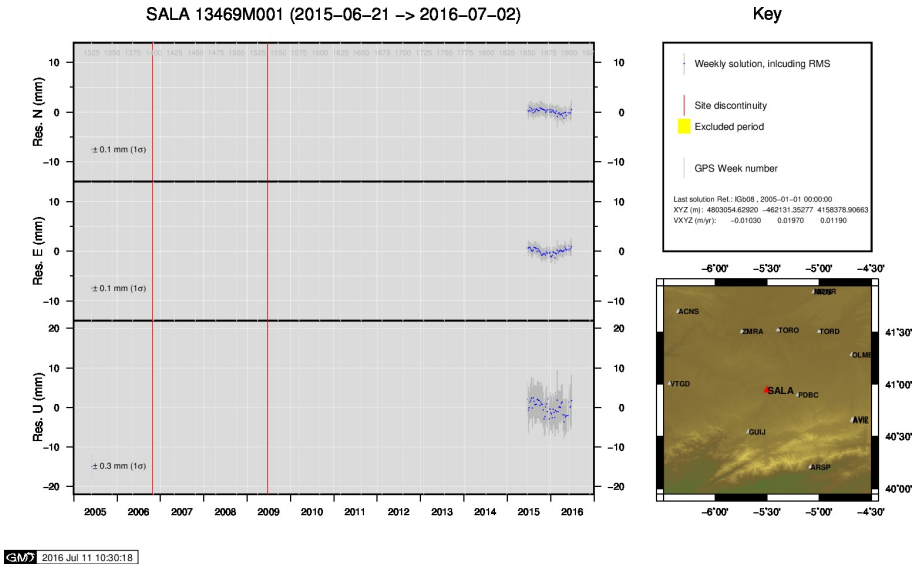

20 ) PAS2



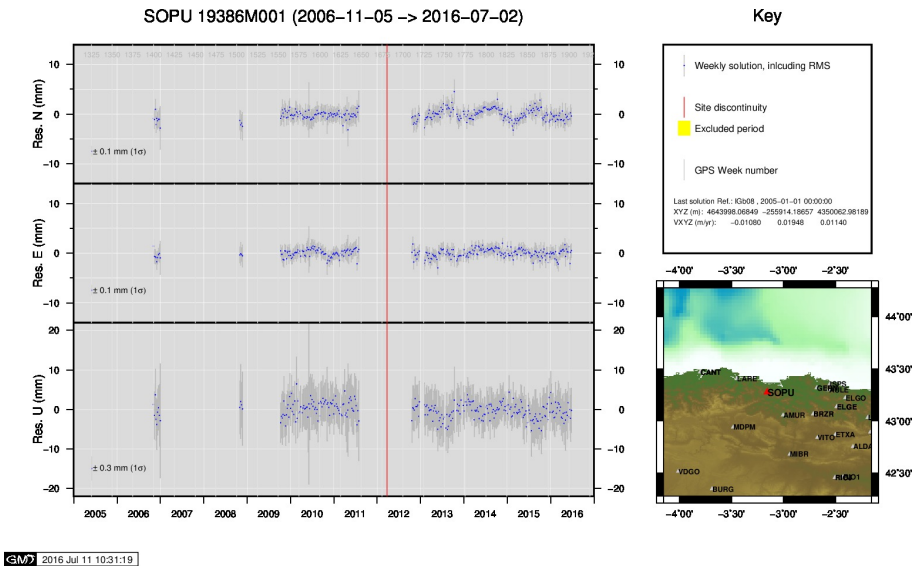

21 ) PASA



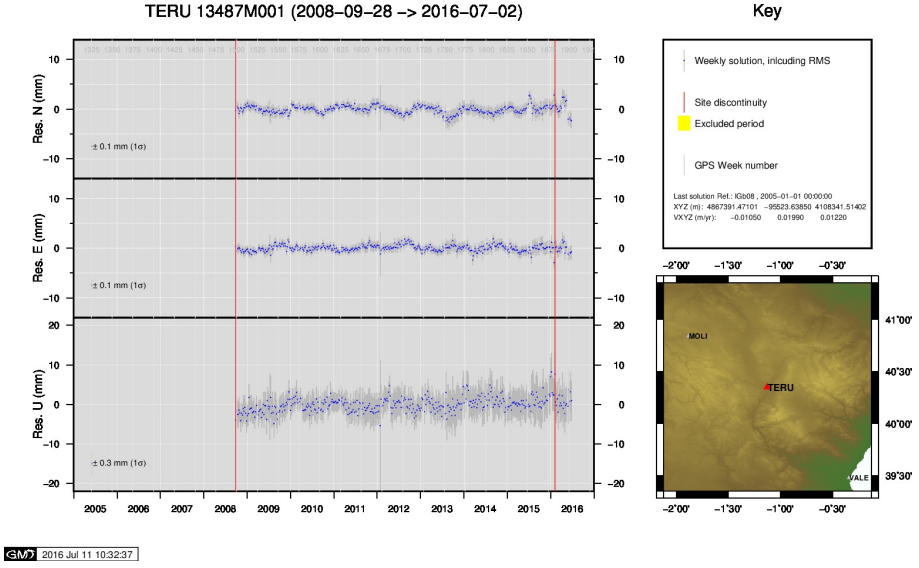

22 ) RIO1



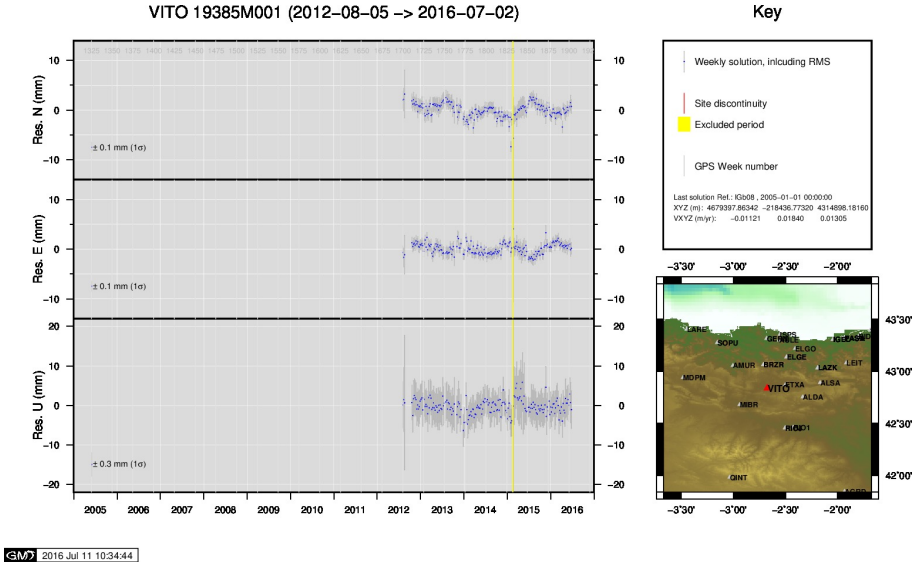

23 ) SALA



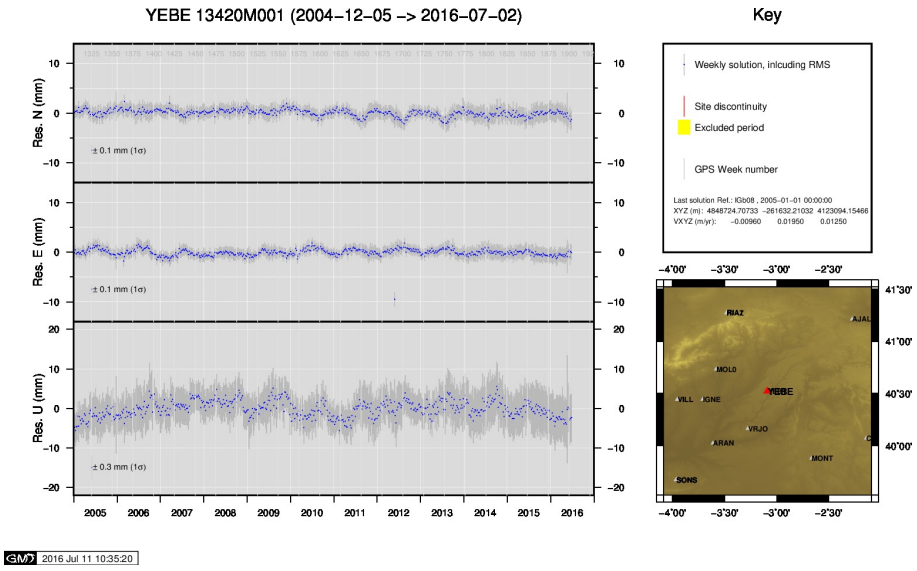

24 ) SOPU




25 ) TERU




26 ) VITO

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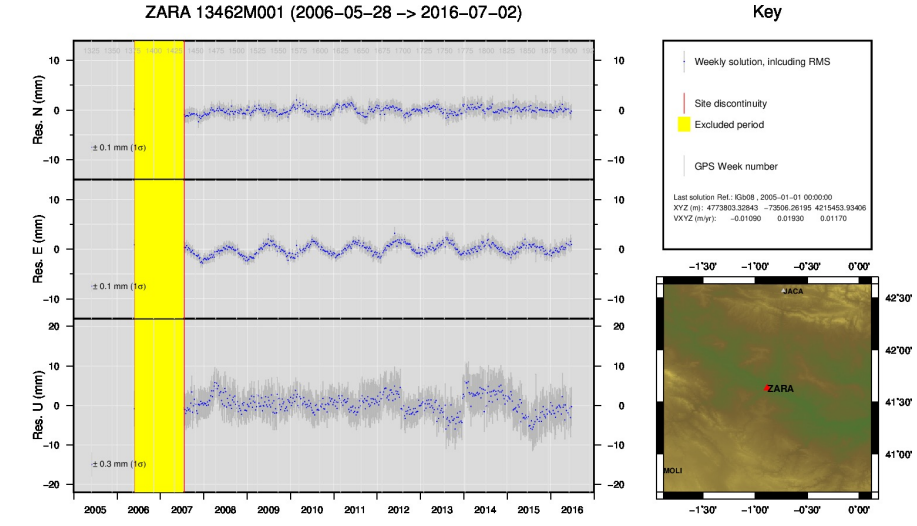
27 ) YEBE

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28 ) ZARA