

ARA-DAC Weekly Analysis Result: 2052 (GFA)

Technical Report

GPS Week: 2052 (GFA)

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

ARA-DAC details:

Contact person: J. Zurutuza

Contact mail: geodesia@aranzadi.eus

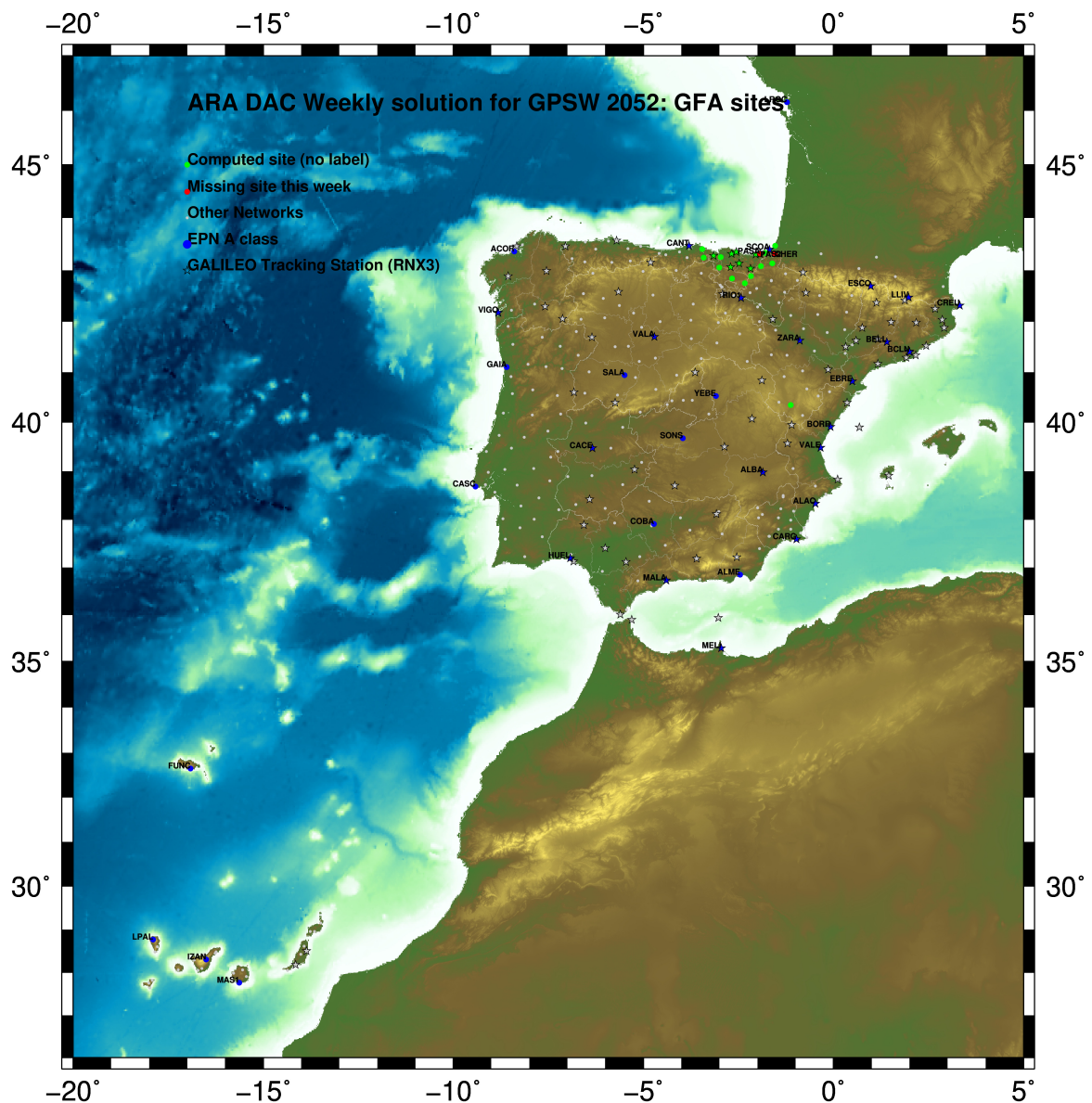
Report generated on 2019/05/27 at 10:53:15



1 Introduction

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

2 Map of Computed Sites



GM 2019 May 27 10:53:06

Fig.1: Computed Sites for GPS Week2052 (GFA)

3 Main Computation Parameters

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

- Preprocessing: Independent baselines are defined by the criterion of maximum common observations. Cycle slips are fixed with the MAUPRP program, analysing triple phase differences for each independent baseline. If MAUPRP does not fix all slips for one station, that station is edited out.
- Basic Observable : Carrier phase, L_1 and L_2 ; a priori sigma of single differences:0.002 m.
 - sampling (for ambiguity resolution) : 30 s
 - sampling (for final processing) : 180 s
 - Systems: GPS+GLONASS observations are used (Galileo also used if available from GPSW 1986 on)
- Modelled observable: Double differences of carrier phase using different combinations based on the distance.
- Ground antenna phase center calibrations: Group APCV used from the PCV_COD.I14 file and individual calibrations from EPNC_14.ATX. EPN_A class sites (CRD + VEL) IGS14 used to define the reference frame (from GPSW 1934). If individual calibrations, other from these, are available, they are also included in the analysis.
- Troposphere:
 - 3 deg elev. cutoff; elevation dependent weighting
 - VMF1 mapping function. ZPD parameters are estimated using the VMF1 mapping function.
 - CHENHER gradient estimation model.
- Ionosphere: no a priori model, ionospheric effect almost removed by iono free combination.
- Ocean Loading: FES2004 (Scherneck).
- Atmosph. Loading: computed from a global grid using the GRDS1S2 program of Bernese 5.2.

4 Estimated Parameters

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

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

5 Computed Coordinates

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

5.1 IGS14

The Reference Frame considered in this section is IGS14, release C2010.

ARA LAC 2052 WEEK FINAL COMBINATION: PRECISE ORBITS 27-MAY-19 07:43

LOCAL GEODETIC DATUM: IGS14 EPOCH: 2019-05-08 12:00:00

| NUM | STATION NAME | X (M) | Y (M) | Z (M) | FLAG |
|-----|----------------|---------------|---------------|---------------|------|
| 1 | ACOR 13434M001 | 4594489.55799 | -678367.44852 | 4357066.28224 | W |
| 33 | ALDA 19383M001 | 4687280.15776 | -190876.56757 | 4308106.95703 | A |
| 42 | ALSA 19419M001 | 4677250.82902 | -176770.39598 | 4319079.87091 | A |
| 44 | AMUR 19388M001 | 4661499.44754 | -244591.26276 | 4332269.88158 | A |
| 78 | BLAZ 10074M002 | 4634456.05074 | -124344.97961 | 4366785.45739 | A |
| 79 | BIDA 00000M000 | 4644177.82110 | -145778.32656 | 4354832.48240 | A |
| 89 | BRZR 19387M001 | 4662220.98965 | -220769.90331 | 4333309.43997 | A |
| 9 | CACE 13447M001 | 4899866.50196 | -544567.03937 | 4033770.20244 | W |
| 10 | CANT 13438M001 | 4625924.31379 | -307096.23609 | 4365771.55664 | W |
| 15 | CREU 13432M001 | 4715420.12930 | 273178.05546 | 4271946.83956 | W |
| 16 | EBRE 13410M001 | 4833519.99065 | 41537.38827 | 4147461.71449 | W |
| 135 | ELGE 19353S001 | 4657557.40320 | -202241.47787 | 4338991.86930 | A |
| 137 | EMAZ 17001M001 | 4645924.20529 | -276949.86796 | 4347759.57797 | A |
| 157 | GERN 19389M001 | 4642811.31839 | -217222.92688 | 4353278.87927 | A |
| 177 | IGEL 19352S001 | 4645951.42748 | -165574.50634 | 4352550.41712 | A |
| 182 | ISPS 19484M001 | 4640596.48154 | -206963.77993 | 4356391.91546 | A |
| 187 | KAST 19499M001 | 4646949.08039 | -240747.27867 | 4348014.99249 | A |
| 192 | LARE 19440M001 | 4632831.94843 | -279026.14033 | 4360314.42510 | A |
| 193 | LAZK 19354S001 | 4666098.34204 | -178186.19478 | 4330463.67415 | A |
| 197 | LEIT 19428M001 | 4663520.93430 | -155858.72059 | 4334519.88527 | A |
| 253 | ORON 19427M001 | 4659695.77368 | -130864.73640 | 4338948.87935 | A |
| 30 | PASA 19351S001 | 4644909.05842 | -156645.07054 | 4353623.07701 | W |
| 33 | R1D1 13448M002 | 4708446.82499 | -199490.28613 | 4284089.73653 | W |
| 34 | SALA 13469M001 | 4803054.48333 | -462131.07311 | 4158379.07809 | W |
| 35 | SCDA 10088M002 | 4639940.49708 | -136224.94298 | 4359552.41503 | W |
| 313 | SOPU 19386M001 | 4643997.90588 | -255913.90978 | 4350063.14281 | A |
| 333 | TERU 13487M001 | 4867391.32110 | -95523.35572 | 4108341.68111 | A |
| 366 | VITO 19385M001 | 4679397.69934 | -218436.51000 | 4314898.36409 | A |
| 43 | YEBE 13420M001 | 4848724.56520 | -261631.93304 | 4123094.32771 | W |
| 44 | ZARA 13462M001 | 4773803.16756 | -73505.98607 | 4215454.09655 | W |

5.2 ETRF2000 (ETRS89) Coordinates

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

ETRF2000 FINAL COORD. wk 2052 27-MAY-19 07:43

LOCAL GEODETIC DATUM: ETRF2000 EPOCH: 2019-05-08 12:00:00

| NUM | STATION NAME | X (M) | Y (M) | Z (M) | FLAG |
|-----|----------------|---------------|---------------|---------------|------|
| 1 | ACOR 13434M001 | 4594489.86409 | -678367.98496 | 4357065.86639 | W |
| 33 | ALDA 19383M001 | 4687280.51746 | -190877.11258 | 4308106.54013 | A |
| 42 | ALSA 19419M001 | 4677251.19112 | -176770.93990 | 4319079.45494 | A |
| 44 | AMUR 19388M001 | 4661499.80263 | -244591.80523 | 4332269.46598 | A |
| 78 | BLAZ 10074M002 | 4634456.42217 | -124345.51892 | 4366785.04529 | A |
| 79 | BIDA 00000M000 | 4644178.18928 | -145778.86695 | 4354832.06931 | A |
| 89 | BRZR 19387M001 | 4662221.34760 | -220770.44580 | 4333309.02461 | A |
| 9 | CACE 13447M001 | 4899866.80139 | -544567.60709 | 4033769.76506 | W |
| 10 | CANT 13438M001 | 4625924.66389 | -307096.77503 | 4365771.14198 | W |
| 15 | CREU 13432M001 | 4715420.54057 | 273177.50919 | 4271946.42604 | W |
| 16 | EBRE 13410M001 | 4833520.36635 | 41536.82893 | 4147461.28927 | W |
| 135 | ELGE 19353S001 | 4657557.76370 | -202242.01982 | 4338991.45452 | A |
| 137 | EMAZ 17001M001 | 4645924.55768 | -276950.40891 | 4347759.16316 | A |
| 157 | GERN 19389M001 | 4642811.67812 | -217223.46733 | 4353278.46542 | A |
| 177 | IGEL 19352S001 | 4645951.79319 | -165575.04697 | 4352550.00366 | A |
| 182 | ISPS 19484M001 | 4640596.84269 | -206964.32013 | 4356391.50190 | A |
| 187 | KAST 19499M001 | 4646949.43702 | -240747.81962 | 4348014.57804 | A |
| 192 | LARE 19440M001 | 4632832.30144 | -279026.67991 | 4360314.01126 | A |
| 193 | LAZK 19354S001 | 4666098.70476 | -178186.73754 | 4330463.25901 | A |
| 197 | LEIT 19428M001 | 4663521.29990 | -155859.26302 | 4334519.47059 | A |
| 253 | ORON 19427M001 | 4659696.14250 | -130865.27835 | 4338948.46526 | A |
| 30 | PASA 19351S001 | 4644909.42525 | -156645.61103 | 4353622.66373 | W |
| 33 | R1D1 13448M002 | 4708447.18203 | -199490.83335 | 4284089.31792 | W |
| 34 | SALA 13469M001 | 4803054.80102 | -462131.63075 | 4158378.64910 | W |
| 35 | SCDA 10088M002 | 4639940.86670 | -136225.48290 | 4359552.00237 | W |
| 313 | SOPU 19386M001 | 4643998.26088 | -255914.45046 | 4350062.72840 | A |
| 333 | TERU 13487M001 | 4867391.67812 | -95523.91901 | 4108341.25168 | A |
| 366 | VITO 19385M001 | 4679398.05629 | -218437.05426 | 4314897.94746 | A |
| 43 | YEBE 13420M001 | 4848724.90387 | -261632.49490 | 4123093.89770 | W |
| 44 | ZARA 13462M001 | 4773803.53455 | -73506.53965 | 4215453.67450 | W |

5.3 ETRF2014 (ETRS89) Coordinates

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

```

ETRF2014 FINAL COORD. wk 2052                                27-MAY-19 07:43
-----
LOCAL GEODETIC DATUM: ETRF2014          EPOCH: 2019-05-08 12:00:00
NUM STATION NAME          X (M)          Y (M)          Z (M)          FLAG
1  ACDR 13434M001        4594489.82156      -678368.02357    4357065.91477    W
33 ALDA 19383M001        4687280.47274      -190877.15252    4308106.58841    A
42 ALSA 19419M001        4677251.14645      -176770.97993    4319079.50325    A
44 AMUR 19388M001        4661499.75832      -244591.84509    4332269.51430    A
78 BIAZ 10074M002        4634456.37776      -124345.55930    4365785.09373    A
79 BIDA 00000M000        4644178.14484      -145778.90721    4354832.11771    A
89 BRZR 19387M001        4662221.30321      -220770.48574    4333309.07294    A
9  CACE 13447M001        4899866.75543      -544567.64498    4033769.81279    W
10 CANT 13438M001        4625924.62011      -307096.81481    4365771.19036    W
15 CREU 13432M001        4715420.49403      273177.46777     4271946.47455    W
16 EBRE 13410M001        4833520.31941      41536.78876     4147461.33735    W
135 ELGE 19353S001        4657557.71930      -202242.05984    4338991.50286    A
137 EMAZ 17001M001        4645924.51361      -276950.44872    4347759.21151    A
157 GERN 19389M001        4642811.63391      -217223.50736    4353278.51380    A
177 IGEL 19352S001        4645951.74880      -165575.08717    4352550.05205    A
182 ISPS 19484M001        4640596.79847      -206964.36020    4356391.55029    A
187 KAST 19499M001        4646949.39284      -240747.85955    4348014.62640    A
192 LARE 19440M001        4632832.25750      -279026.71977    4360314.05963    A
193 LAZK 19354S001        4666098.66020      -178186.77761    4330463.30735    A
197 LEIT 19428M001        4663521.25531      -155859.30318    4334519.51895    A
253 ORON 19427M001        4659696.09787      -130865.31861    4338948.51364    A
30 PASA 19351S001        4644909.38083      -156645.65126    4353622.71213    W
33 RIO1 13448M002        4708447.13712      -199490.87318    4284089.36615    W
34 SALA 13469M001        4803054.75588      -462131.66931    4158378.69703    W
35 SOCA 10088M002        4639940.82227      -136225.52321    4359552.05079    W
313 SOPU 19386M001        4643998.21677      -255914.49035    4350062.77676    A
333 TERU 13487M001        4867391.63127      -95523.95858    4108341.29961    A
366 VITO 19385M001        4679398.01173      -218437.09414    4314897.99574    A
43 YEBE 13420M001        4848724.85771      -261632.53397    4123093.94559    W
44 ZARA 13462M001        4773803.48860      -73506.57967     4215453.72264    W

```

6 Quality Control

6.1 Mean and Daily Repeatabilities

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

ARA LAC 2052 WEEK FINAL COMBINATION: PRECISE ORBITS 27-MAY-19 07:43

| Station | #Days | Weekday 0123456 | Repeatability (mm) | | |
|----------------|-------|--------------------|--------------------|------|------|
| | | | N | E | U |
| ACOR 13434M001 | 7 | XXXXXX | 0.95 | 0.83 | 2.97 |
| ALDA 19383M001 | 7 | XXXXXX | 0.78 | 0.87 | 3.24 |
| ALSA 19419M001 | 7 | XXXXXX | 0.64 | 1.75 | 3.45 |
| AMUR 19388M001 | 7 | XXXXXX | 2.98 | 2.46 | 3.18 |
| BLAZ 10074M002 | 7 | XXXXXX | 0.73 | 0.76 | 2.28 |
| BIDA 00000M000 | 7 | XXXXXX | 0.96 | 1.02 | 2.04 |
| BRZR 19387M001 | 7 | XXXXXX | 1.06 | 2.44 | 4.94 |
| CACE 13447M001 | 7 | XXXXXX | 0.61 | 1.01 | 2.78 |
| CANT 13438M001 | 7 | XXXXXX | 0.93 | 0.55 | 1.44 |
| CREU 13432M001 | 7 | XXXXXX | 1.41 | 1.09 | 1.63 |
| EBRE 13410M001 | 7 | XXXXXX | 1.24 | 1.54 | 2.50 |
| ELGE 19353S001 | 7 | XXXXXX | 0.60 | 1.06 | 1.14 |
| EMAZ 17001M001 | 7 | XXXXXX | 1.14 | 1.70 | 1.92 |
| GERN 19389M001 | 7 | XXXXXX | 0.55 | 0.78 | 3.12 |
| IGEL 19352S001 | 7 | XXXXXX | 1.55 | 0.78 | 1.62 |
| ISPS 19484M001 | 7 | XXXXXX | 0.88 | 1.06 | 2.60 |
| KAST 19499M001 | 7 | XXXXXX | 1.05 | 0.78 | 3.45 |
| LARE 19440M001 | 7 | XXXXXX | 0.96 | 1.38 | 3.21 |
| LAZK 19354S001 | 7 | XXXXXX | 0.86 | 1.21 | 3.15 |
| LEIT 19428M001 | 7 | XXXXXX | 0.90 | 0.28 | 4.21 |
| ORDN 19427M001 | 7 | XXXXXX | 0.61 | 0.75 | 2.64 |
| PASA 19351S001 | 7 | XXXXXX | 0.49 | 0.62 | 1.92 |
| RI01 13448M002 | 7 | XXXXXX | 0.69 | 1.22 | 3.84 |
| SALA 13469M001 | 7 | XXXXXX | 0.26 | 0.94 | 2.21 |
| SCDA 10088M002 | 7 | XXXXXX | 0.61 | 0.39 | 2.06 |
| SOPU 19386M001 | 7 | XXXXXX | 0.73 | 1.04 | 4.46 |
| TERU 13487M001 | 7 | XXXXXX | 0.43 | 0.34 | 2.17 |
| VITD 19385M001 | 7 | XXXXXX | 1.75 | 0.92 | 4.29 |
| YEBE 13420M001 | 7 | XXXXXX | 0.63 | 1.10 | 3.54 |
| ZARA 13462M001 | 7 | XXXXXX | 0.52 | 0.64 | 3.63 |

Comparison of individual solutions:

| | | | | | | | | | |
|----------------|---|------|-------|-------|-------|-------|-------|-------|-------|
| ACOR 13434M001 | N | 0.95 | 0.56 | 1.27 | 0.69 | 0.95 | -1.15 | -0.52 | -0.71 |
| ACOR 13434M001 | E | 0.83 | 0.90 | 0.66 | -0.59 | -0.12 | -0.06 | -1.21 | 1.05 |
| ACOR 13434M001 | U | 2.97 | 0.05 | -0.06 | 0.92 | -1.68 | 5.15 | 0.40 | 4.77 |
| ALDA 19383M001 | N | 0.78 | -0.76 | -0.15 | 0.87 | 0.31 | 0.95 | -0.82 | -0.80 |
| ALDA 19383M001 | E | 0.87 | -0.34 | -0.79 | 0.05 | -0.27 | -0.25 | -0.87 | -1.71 |
| ALDA 19383M001 | U | 3.24 | -0.19 | -5.89 | -2.32 | 1.37 | 1.03 | -3.96 | 2.02 |
| ALSA 19419M001 | N | 0.64 | 0.10 | -0.56 | -0.26 | 0.17 | 0.92 | 1.08 | 0.26 |
| ALSA 19419M001 | E | 1.75 | -0.48 | 0.53 | -1.73 | -2.44 | -0.20 | 2.98 | 0.12 |
| ALSA 19419M001 | U | 3.45 | 3.71 | -0.91 | -0.80 | -4.72 | -1.09 | -5.22 | 2.32 |
| AMUR 19388M001 | N | 2.98 | 0.76 | 0.84 | -0.00 | -4.06 | 4.12 | 4.05 | 1.42 |
| AMUR 19388M001 | E | 2.46 | 0.81 | -0.24 | -1.46 | -3.99 | 0.76 | 3.73 | 1.77 |
| AMUR 19388M001 | U | 3.18 | -1.58 | -1.10 | -5.07 | 0.78 | 4.56 | 2.33 | -2.14 |
| BLAZ 10074M002 | N | 0.73 | -0.02 | -0.29 | -0.12 | 1.30 | 1.14 | -0.07 | -0.39 |
| BLAZ 10074M002 | E | 0.76 | -0.48 | -0.48 | -0.06 | -0.00 | 0.15 | -1.10 | 1.32 |
| BLAZ 10074M002 | U | 2.28 | -1.61 | 0.99 | -1.93 | 3.63 | 1.30 | -2.55 | 1.57 |
| BIDA 00000M000 | N | 0.96 | -0.82 | -1.04 | -0.23 | 1.01 | 0.47 | 0.79 | 1.35 |
| BIDA 00000M000 | E | 1.02 | -0.31 | 0.01 | -0.72 | 0.43 | 1.69 | 0.05 | -1.61 |
| BIDA 00000M000 | U | 2.04 | 0.78 | 1.45 | 0.57 | 1.18 | 1.54 | -1.64 | -3.94 |
| BRZR 19387M001 | N | 1.06 | 0.25 | 0.38 | -0.27 | -1.73 | 1.41 | 1.22 | 0.05 |
| BRZR 19387M001 | E | 2.44 | 0.87 | 1.18 | -2.87 | -4.22 | -0.08 | 1.14 | 2.48 |
| BRZR 19387M001 | U | 4.94 | 1.42 | -1.58 | -4.81 | -2.62 | 3.80 | -4.59 | 8.76 |
| CACE 13447M001 | N | 0.61 | 0.64 | -0.05 | 0.05 | -1.11 | -0.71 | -0.22 | -0.11 |
| CACE 13447M001 | E | 1.01 | 0.71 | 1.23 | -0.66 | -0.95 | -1.29 | 0.57 | 0.91 |
| CACE 13447M001 | U | 2.78 | 0.04 | 3.81 | -0.22 | 0.08 | -4.57 | -2.34 | 2.33 |
| CANT 13438M001 | N | 0.93 | -0.88 | -0.16 | 1.11 | 1.17 | 0.25 | -1.32 | 0.06 |
| CANT 13438M001 | E | 0.55 | -0.17 | 0.13 | -1.29 | 0.28 | 0.02 | 0.08 | 0.02 |
| CANT 13438M001 | U | 1.44 | -0.05 | -2.66 | -1.34 | 1.75 | 0.03 | -0.21 | -0.63 |
| CREU 13432M001 | N | 1.41 | 2.38 | 0.26 | -0.83 | -0.31 | 0.43 | -0.17 | -2.28 |
| CREU 13432M001 | E | 1.09 | -1.69 | 0.29 | 0.20 | -0.87 | 0.00 | 0.35 | 1.81 |
| CREU 13432M001 | U | 1.63 | 1.60 | 1.47 | 0.36 | -2.18 | 1.83 | 1.16 | -1.29 |
| EBRE 13410M001 | N | 1.24 | -1.43 | 1.09 | 0.55 | 1.88 | -0.58 | -0.11 | -1.33 |
| EBRE 13410M001 | E | 1.54 | 0.33 | -0.87 | -1.04 | -2.17 | 0.20 | 0.86 | 2.61 |
| EBRE 13410M001 | U | 2.50 | -0.59 | 2.80 | 0.41 | -2.48 | -1.95 | 1.04 | 4.27 |
| ELGE 19353S001 | N | 0.60 | 0.85 | 0.41 | -0.83 | -0.05 | 0.50 | -0.20 | 0.51 |
| ELGE 19353S001 | E | 1.06 | -0.60 | 0.01 | -1.82 | -0.91 | 0.86 | -0.16 | 1.22 |
| ELGE 19353S001 | U | 1.14 | -0.09 | -0.69 | -0.89 | 1.35 | -0.01 | 1.98 | -0.87 |
| EMAZ 17001M001 | N | 1.14 | 0.34 | -0.28 | 0.98 | 0.52 | -0.34 | 1.25 | -2.18 |
| EMAZ 17001M001 | E | 1.70 | -1.56 | -0.64 | 1.29 | -0.02 | -1.37 | -1.60 | 2.91 |
| EMAZ 17001M001 | U | 1.92 | 0.05 | 1.90 | 0.80 | 0.08 | -1.76 | 1.92 | 3.34 |
| GERN 19389M001 | N | 0.55 | -0.02 | 0.03 | 1.12 | 0.64 | 0.18 | -0.22 | -0.24 |
| GERN 19389M001 | E | 0.78 | 0.41 | 0.78 | -0.75 | -1.17 | -0.01 | 0.40 | -0.87 |
| GERN 19389M001 | U | 3.12 | -3.28 | -0.54 | -2.70 | 4.48 | 4.06 | -1.69 | 0.80 |
| IGEL 19352S001 | N | 1.55 | -0.51 | 0.38 | 1.52 | 2.19 | 0.00 | -0.25 | -2.62 |
| IGEL 19352S001 | E | 0.78 | -0.76 | 0.59 | -0.73 | -0.83 | 0.34 | -0.64 | 0.98 |
| IGEL 19352S001 | U | 1.62 | -1.37 | -0.38 | 0.13 | 1.62 | 2.04 | -2.61 | 0.12 |
| ISPS 19484M001 | N | 0.88 | -0.26 | 0.15 | 1.75 | 0.81 | -0.28 | 0.20 | -0.87 |
| ISPS 19484M001 | E | 1.06 | 0.02 | 0.02 | -0.78 | -0.44 | -0.66 | -1.89 | 1.41 |
| ISPS 19484M001 | U | 2.60 | 3.06 | 1.16 | 0.13 | 2.35 | -1.98 | -4.48 | -0.63 |
| KAST 19499M001 | N | 1.05 | -0.42 | 0.09 | 0.04 | 2.10 | -1.12 | -0.87 | 0.14 |
| KAST 19499M001 | E | 0.78 | -0.80 | -0.52 | -0.08 | -0.39 | -1.41 | -0.60 | 0.52 |
| KAST 19499M001 | U | 3.45 | -3.60 | -2.27 | -6.64 | 2.87 | 0.83 | -0.53 | -0.08 |
| LARE 19440M001 | N | 0.96 | -0.90 | 1.30 | -1.10 | 1.13 | 0.20 | -0.62 | -0.26 |
| LARE 19440M001 | E | 1.38 | -1.50 | -0.23 | 0.18 | -2.26 | -0.03 | 1.41 | 1.43 |
| LARE 19440M001 | U | 3.21 | 1.23 | -4.15 | 0.60 | -1.46 | 1.23 | -0.01 | 6.27 |
| LAZK 19354S001 | N | 0.86 | 0.30 | -0.79 | 1.34 | 0.82 | 0.73 | -0.65 | -0.53 |
| LAZK 19354S001 | E | 1.21 | -1.27 | 0.25 | -0.03 | -1.51 | 1.25 | -1.32 | 1.24 |
| LAZK 19354S001 | U | 3.15 | 1.08 | 0.95 | -4.63 | 1.18 | -1.87 | 5.41 | -1.34 |
| LEIT 19428M001 | N | 0.90 | 0.68 | -0.87 | 0.22 | 1.46 | -0.78 | -0.30 | 0.90 |
| LEIT 19428M001 | E | 0.28 | 0.07 | -0.08 | -0.23 | 0.10 | -0.59 | -0.00 | -0.26 |
| LEIT 19428M001 | U | 4.21 | -1.27 | -2.28 | 2.93 | 7.31 | -5.24 | -3.08 | -0.88 |
| ORDN 19427M001 | N | 0.61 | 0.30 | -0.56 | 0.71 | 0.61 | 0.68 | -0.32 | 0.60 |

| | | | | | | | | | |
|----------------|---|------|-------|-------|-------|-------|-------|-------|-------|
| ORDN 19427M001 | E | 0.75 | -0.56 | -1.12 | -0.17 | -0.61 | -0.35 | 0.77 | 0.81 |
| ORDN 19427M001 | U | 2.64 | 2.36 | -2.78 | 0.16 | 2.51 | 0.37 | -4.70 | 0.23 |
| PASA 19351S001 | N | 0.49 | 0.20 | -0.09 | 0.55 | 0.93 | -0.42 | -0.08 | 0.24 |
| PASA 19351S001 | E | 0.62 | -0.50 | -0.37 | -0.50 | 0.18 | 0.09 | -0.96 | 0.82 |
| PASA 19351S001 | U | 1.92 | -0.46 | -2.30 | -0.58 | 2.82 | 1.55 | -1.51 | 1.91 |
| RIO1 13448M002 | N | 0.69 | 0.04 | -0.68 | 0.60 | 1.24 | 0.34 | 0.56 | -0.28 |
| RIO1 13448M002 | E | 1.22 | -0.20 | -0.64 | -1.02 | -2.18 | 1.10 | 0.99 | 0.66 |
| RIO1 13448M002 | U | 3.84 | 1.08 | -4.76 | -0.10 | 3.17 | 1.09 | -6.87 | 2.52 |
| SALA 13469M001 | N | 0.26 | -0.14 | -0.15 | 0.12 | -0.39 | 0.36 | 0.16 | 0.22 |
| SALA 13469M001 | E | 0.94 | -0.08 | 0.43 | 0.57 | 0.45 | -0.70 | -2.02 | 0.18 |
| SALA 13469M001 | U | 2.21 | -1.04 | 3.63 | 1.90 | -2.04 | -2.00 | -1.30 | 1.24 |
| SCDA 10088M002 | N | 0.61 | 0.58 | -0.08 | 0.09 | 1.02 | 0.30 | -0.87 | 0.13 |
| SCDA 10088M002 | E | 0.39 | -0.47 | -0.03 | -0.34 | -0.36 | 0.28 | -0.46 | 0.37 |
| SCDA 10088M002 | U | 2.06 | 2.48 | 1.44 | 1.21 | -1.69 | 0.60 | -0.35 | -3.53 |
| SOPU 19386M001 | N | 0.73 | -0.82 | -0.62 | 0.25 | 0.83 | 0.38 | 0.41 | 1.02 |
| SOPU 19386M001 | E | 1.04 | 0.14 | 0.01 | 0.23 | -1.09 | 1.44 | -0.11 | -1.79 |
| SOPU 19386M001 | U | 4.46 | -2.54 | 2.13 | -2.42 | 3.30 | 4.01 | 3.84 | -7.80 |
| TERU 13487M001 | N | 0.43 | 0.43 | -0.48 | -0.17 | -0.25 | 0.28 | 0.71 | -0.07 |
| TERU 13487M001 | E | 0.34 | -0.02 | 0.25 | 0.05 | -0.32 | 0.06 | 0.71 | 0.19 |
| TERU 13487M001 | U | 2.17 | -0.76 | -1.20 | 0.41 | 4.41 | -0.70 | 0.74 | -2.35 |
| VITO 19385M001 | N | 1.75 | 1.99 | 0.86 | -0.68 | -2.46 | 1.69 | 1.02 | 1.79 |
| VITO 19385M001 | E | 0.92 | 0.60 | 0.19 | 0.08 | -1.09 | 0.42 | -1.40 | 1.15 |
| VITO 19385M001 | U | 4.29 | -1.40 | -2.62 | -3.64 | -6.11 | 3.48 | 0.16 | 6.24 |
| YEBE 13420M001 | N | 0.63 | -0.53 | 0.28 | -0.67 | -0.37 | 0.82 | -0.33 | -0.80 |
| YEBE 13420M001 | E | 1.10 | -0.49 | 1.14 | -0.07 | -1.74 | -0.96 | 1.31 | 0.32 |
| YEBE 13420M001 | U | 3.54 | -2.60 | 0.61 | 1.51 | -3.63 | -3.27 | 6.41 | 0.95 |
| ZARA 13462M001 | N | 0.52 | 0.16 | 0.79 | 0.23 | 0.02 | 0.12 | -0.91 | 0.22 |
| ZARA 13462M001 | E | 0.64 | -1.01 | -0.35 | -0.42 | 0.79 | -0.31 | 0.21 | -0.64 |
| ZARA 13462M001 | U | 3.63 | -5.18 | -5.05 | 1.12 | 3.99 | 1.43 | -2.70 | 0.39 |

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 | -1.41 | 0.07 | 1.51 |
| 2 | ALAC 13433M001 | I W | 0.81 | -0.00 | -2.19 |
| 3 | ALBA 13452M001 | I W | 0.27 | -0.08 | -0.68 |
| 4 | ALME 13437M001 | I W | -1.86 | -0.33 | 4.11 |
| 5 | BCLN 13412M001 | I W | 0.72 | 1.13 | -1.96 |
| 6 | BELL 13431M001 | I W | 1.48 | 2.14 | -0.84 |
| 7 | BORR 13480M001 | I W | -0.29 | -1.55 | -0.29 |
| 8 | BRST 10004M004 | I W | -0.97 | 0.54 | -0.18 |
| 9 | CACE 13447M001 | I W | 1.06 | 1.56 | 2.15 |
| 10 | CANT 13438M001 | I W | 0.47 | -0.18 | -0.65 |
| 11 | CARG 19412M001 | I W | 1.19 | 0.13 | 1.66 |
| 12 | CASC 13909S001 | I W | 1.21 | -1.53 | -1.30 |
| 14 | COBA 13453M001 | I W | 1.31 | 0.38 | -3.10 |
| 15 | CREU 13432M001 | I W | 0.15 | 2.45 | 1.14 |
| 16 | EBRE 13410M001 | I W | 1.16 | 0.25 | -1.87 |
| 17 | ESCO 13435M001 | I W | 0.45 | -0.59 | 0.03 |
| 18 | FUNC 13911S001 | I W | 0.54 | -2.99 | 2.56 |
| 19 | GAI A 13902M001 | I W | -0.71 | -0.89 | 1.22 |
| 21 | HUEL 13451M001 | I W | 0.47 | -0.60 | 0.22 |
| 22 | IZAN 31309M002 | I W | -1.18 | -2.17 | -0.71 |
| 23 | LLIV 13436M001 | I W | -1.34 | 0.91 | 1.62 |
| 24 | LPAL 81701M001 | I W | -2.86 | -1.73 | -2.26 |
| 25 | LROC 10023M001 | I W | 1.03 | -0.08 | 2.07 |
| 26 | MALA 13443M001 | I W | 0.41 | -1.02 | -1.50 |
| 27 | MAS1 31303M002 | I W | -0.43 | -2.02 | 2.33 |
| 29 | MELI 19379M001 | I W | 0.60 | -0.82 | 0.50 |
| 30 | PASA 19351S001 | I W | 0.12 | 0.18 | 0.17 |
| 31 | PDEL 31906M004 | I W | -0.42 | 0.91 | -2.83 |
| 33 | RIO1 13448M002 | I W | -0.92 | 0.09 | -1.36 |
| 34 | SALA 13469M001 | I W | 0.55 | 1.27 | -2.79 |
| 35 | SCOA 10088M002 | I W | -3.51 | -0.57 | -1.51 |
| 38 | SONS 13446M001 | I W | 0.22 | 1.97 | -4.90 |
| 40 | VALA 13463M002 | I W | -0.84 | 0.80 | -0.50 |
| 41 | VALE 13439M001 | I W | 0.53 | 2.10 | -0.53 |
| 42 | VIGO 13450M001 | I W | -0.53 | -0.01 | 6.07 |
| 43 | YEBE 13420M001 | I W | 1.10 | 0.26 | 4.89 |
| 44 | ZARA 13462M001 | I W | 0.18 | 0.26 | -1.05 |
| 45 | ZIMM 14001M004 | I W | 1.22 | -0.24 | 0.80 |
| | | | | | |
| | RMS / COMPONENT | | 1.15 | 1.23 | 2.26 |
| | MEAN | | 0.00 | 0.00 | -0.00 |
| | MIN | | -3.51 | -2.99 | -4.90 |
| | MAX | | 1.48 | 2.45 | 6.07 |

NUMBER OF PARAMETERS : 3
NUMBER OF COORDINATES : 114
RMS OF TRANSFORMATION : 1.63 MM

BARYCENTER COORDINATES:

LATITUDE : 39 53 17.56
LONGITUDE : - 4 51 17.75
HEIGHT : -44.890 KM

PARAMETERS:

TRANSLATION IN N : -0.00 +- 0.26 MM
TRANSLATION IN E : -0.01 +- 0.26 MM
TRANSLATION IN U : 0.00 +- 0.26 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          17674349
NUMBER OF UNKNOWN              221975
NUMBER OF DEGREES OF FREEDOM    17452374
PHASE MEASUREMENTS SIGMA        0.00100
SAMPLING INTERVAL (SECONDS)      180
VARIANCE FACTOR                  2.153022832445523

Helmert Transformation Parameters With Respect to Combined Solution:
-----
Sol  Rms (m)      Translation (m)      Rotation (")      Scale (ppm)
      X          Y          Z          X          Y          Z
-----
  1  0.00180    -0.0142 -0.0014  0.0155  -0.0000 -0.0007 -0.0001  0.00015
  2  0.00177     0.0033  0.0037 -0.0106  -0.0000  0.0003  0.0001  0.00068
  3  0.00170     0.0230  0.0117 -0.0352  -0.0000  0.0013  0.0005  0.00080
  4  0.00225    -0.0030 -0.0039  0.0057  0.0001 -0.0002 -0.0000 -0.00017
  5  0.00210     0.0114 -0.0032 -0.0054  0.0002  0.0004  0.0000 -0.00093
  6  0.00210     0.0043 -0.0055  0.0022  0.0002  0.0000 -0.0001 -0.00084
  7  0.00199    -0.0041  0.0079  0.0057  -0.0002 -0.0002  0.0002  0.00017
```

```
Statistics of individual solutions:
-----
File  RMS (m)      DOF  Chi**2/DOF  #Observations authentic / pseudo  #Parameters explicit / implicit / singular
-----
  1  0.00136    2486969    1.85          2517417      3          972      29479      0
  2  0.00141    2500267    1.99          2532697      3          984      31449      0
  3  0.00144    2506992    2.09          2539497      3          987      31521      0
  4  0.00158    2480338    2.49          2515174      3          987      33852      0
  5  0.00143    2506235    2.04          2538921      3          987      31702      0
  6  0.00152    2453529    2.32          2486162      3          975      31661      0
  7  0.00149    2512185    2.22          2544481      3          981      31318      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 19:125:00000 19:131:86370 LEICA GR10      -----
ALDA  A   1 P 19:125:00000 19:131:86370 LEICA GR10      -----
ALSA  A   1 P 19:125:00000 19:131:86370 LEICA GR50      -----
AMUR  A   1 P 19:125:00000 19:131:86370 LEICA GR10      -----
BIAZ  A   1 P 19:125:00000 19:131:86370 TRI SP90M      -----
BIDA  A   1 P 19:125:00000 19:131:86370 LEICA GR10      -----
BRZR  A   1 P 19:125:00000 19:131:86370 LEICA GR30      -----
CACE  A   1 P 19:125:00000 19:131:86370 TRIMBLE NETR9  -----
CANT  A   1 P 19:125:00000 19:131:86370 LEICA GR10      -----
CREU  A   1 P 19:125:00000 19:131:86370 LEICA GR50      -----
EBRE  A   1 P 19:125:00000 19:131:86370 LEICA GR50      -----
ELGE  A   1 P 19:125:00000 19:131:86370 LEICA GR10      -----
EMAZ  A   1 P 19:125:00000 19:131:86370 LEICA GR30      -----
GERN  A   1 P 19:125:00000 19:131:86370 LEICA GR30      -----
IGEL  A   1 P 19:125:00000 19:131:86370 LEICA GR30      -----
ISPS  A   1 P 19:125:00000 19:131:86370 TRIMBLE NETR9  -----
KAST  A   1 P 19:125:00000 19:131:86370 LEICA GR30      -----
LARE  A   1 P 19:125:00000 19:131:86370 LEICA GRX1200GGPRO -----
LAZK  A   1 P 19:125:00000 19:131:86370 LEICA GR10      -----
LEIT  A   1 P 19:125:00000 19:131:86370 LEICA GR50      -----
ORON  A   1 P 19:125:00000 19:131:86370 LEICA GR50      -----
PASA  A   1 P 19:125:00000 19:131:86370 LEICA GR10      -----
RIO1  A   1 P 19:125:00000 19:131:86370 LEICA GR25      -----
SALA  A   1 P 19:125:00000 19:131:86370 LEICA GRX1200+GNSS -----
SCOA  A   1 P 19:125:00000 19:131:86370 LEICA GR25      -----
SOPU  A   1 P 19:125:00000 19:131:86370 LEICA GR30      -----
TERU  A   1 P 19:125:00000 19:131:86370 LEICA GRX1200GGPRO -----
VITO  A   1 P 19:125:00000 19:131:86370 LEICA GR10      -----
YEBE  A   1 P 19:125:00000 19:131:86370 TRIMBLE NETR9  -----
ZARA  A   1 P 19:125:00000 19:131:86370 TRIMBLE NETR9  -----
```

7.2 Antennas

Serial number ONLY provided in case individual calibrations are available.

```
*SITE PT SOLN T DATA_START__ DATA_END____ DESCRIPTION_____ S/N__
ACOR  A   1 P 19:125:00000 19:131:86370 LEIAT504      LEIS -----
ALDA  A   1 P 19:125:00000 19:131:86370 LEIAS10      NONE -----
ALSA  A   1 P 19:125:00000 19:131:86370 LEIAR10      NONE -----
AMUR  A   1 P 19:125:00000 19:131:86370 LEIAS10      NONE -----
BIAZ  A   1 P 19:125:00000 19:131:86370 LEIAR25      LEIT -----
BIDA  A   1 P 19:125:00000 19:131:86370 LEIAS10      NONE -----
```

```

BRZR A 1 P 19:125:00000 19:131:86370 LEIAS10 NONE -----
CACE A 1 P 19:125:00000 19:131:86370 TRM29659.00 NONE -----
CANT A 1 P 19:125:00000 19:131:86370 LEIAR25_R4 LEIT 25066
CREU A 1 P 19:125:00000 19:131:86370 LEIAR25_R4 NONE 26357
EBRE A 1 P 19:125:00000 19:131:86370 LEIAR25_R4 NONE 26359
ELGE A 1 P 19:125:00000 19:131:86370 LEIAR25_R4 LEIT -----
EMAZ A 1 P 19:125:00000 19:131:86370 LEIAS10 NONE -----
GERN A 1 P 19:125:00000 19:131:86370 LEIAS10 NONE -----
IGEL A 1 P 19:125:00000 19:131:86370 LEIAR20 LEIM -----
ISPS A 1 P 19:125:00000 19:131:86370 TRM59900.00 SCIS -----
KAST A 1 P 19:125:00000 19:131:86370 LEIAS10 NONE -----
LARE A 1 P 19:125:00000 19:131:86370 LEIAT504 NONE -----
LAZK A 1 P 19:125:00000 19:131:86370 LEIAR25_R4 LEIT -----
LEIT A 1 P 19:125:00000 19:131:86370 LEIAR10 NONE -----
ORDN A 1 P 19:125:00000 19:131:86370 LEIAR10 NONE -----
PASA A 1 P 19:125:00000 19:131:86370 LEIAR20 LEIM 73034
RID1 A 1 P 19:125:00000 19:131:86370 LEIAR25_R4 LEIT 25138
SALA A 1 P 19:125:00000 19:131:86370 LEIAR25 NONE -----
SCOA A 1 P 19:125:00000 19:131:86370 TRM55971.00 NONE -----
SOPU A 1 P 19:125:00000 19:131:86370 LEIAS10 NONE -----
TERU A 1 P 19:125:00000 19:131:86370 LEIAT504GG LEIS -----
VITO A 1 P 19:125:00000 19:131:86370 LEIAS10 NONE -----
YEBE A 1 P 19:125:00000 19:131:86370 TRM29659.00 NONE -----
ZARA A 1 P 19:125:00000 19:131:86370 TRM29659.00 NONE -----

```

7.3 Eccentricities

```

*
*SITE PT SOLN T DATA_START_ DATA_END_ AXE ARP->BENCHMARK(M)
UP_ NORTH_ EAST_
-----
ACOR A 1 P 19:125:00000 19:131:86370 UNE 3.0460 0.0000 0.0000
ALDA A 1 P 19:125:00000 19:131:86370 UNE 0.0000 0.0000 0.0000
ALSA A 1 P 19:125:00000 19:131:86370 UNE 0.0000 0.0000 0.0000
AMUR A 1 P 19:125:00000 19:131:86370 UNE 0.0000 0.0000 0.0000
BIAZ A 1 P 19:125:00000 19:131:86370 UNE 0.0000 0.0000 0.0000
BIDA A 1 P 19:125:00000 19:131:86370 UNE 0.0000 0.0000 0.0000
BRZR A 1 P 19:125:00000 19:131:86370 UNE 0.0771 0.0000 0.0000
CACE A 1 P 19:125:00000 19:131:86370 UNE 0.0600 0.0000 0.0000
CANT A 1 P 19:125:00000 19:131:86370 UNE 3.0490 0.0000 0.0000
CREU A 1 P 19:125:00000 19:131:86370 UNE 0.0770 0.0000 0.0000
EBRE A 1 P 19:125:00000 19:131:86370 UNE 0.0770 0.0000 0.0000
ELGE A 1 P 19:125:00000 19:131:86370 UNE 0.0000 0.0000 0.0000
EMAZ A 1 P 19:125:00000 19:131:86370 UNE 0.0350 0.0000 0.0000
GERN A 1 P 19:125:00000 19:131:86370 UNE 0.0771 0.0000 0.0000
IGEL A 1 P 19:125:00000 19:131:86370 UNE 0.0000 0.0000 0.0000
ISPS A 1 P 19:125:00000 19:131:86370 UNE 0.0350 0.0000 0.0000
KAST A 1 P 19:125:00000 19:131:86370 UNE 0.0350 0.0000 0.0000
LARE A 1 P 19:125:00000 19:131:86370 UNE 0.0000 0.0000 0.0000
LAZK A 1 P 19:125:00000 19:131:86370 UNE 0.0000 0.0000 0.0000
LEIT A 1 P 19:125:00000 19:131:86370 UNE 0.0000 0.0000 0.0000
ORDN A 1 P 19:125:00000 19:131:86370 UNE 0.0000 0.0000 0.0000
PASA A 1 P 19:125:00000 19:131:86370 UNE 0.0000 0.0000 0.0000
RID1 A 1 P 19:125:00000 19:131:86370 UNE 0.0606 0.0000 0.0000
SALA A 1 P 19:125:00000 19:131:86370 UNE 0.0600 0.0000 0.0000
SCOA A 1 P 19:125:00000 19:131:86370 UNE 0.0000 0.0000 0.0000
SOPU A 1 P 19:125:00000 19:131:86370 UNE 0.0771 0.0000 0.0000
TERU A 1 P 19:125:00000 19:131:86370 UNE 0.0600 0.0000 0.0000
VITO A 1 P 19:125:00000 19:131:86370 UNE 0.0000 0.0000 0.0000
YEBE A 1 P 19:125:00000 19:131:86370 UNE 0.0000 0.0000 0.0000
ZARA A 1 P 19:125:00000 19:131:86370 UNE 3.2590 0.0000 0.0000

```

8 References

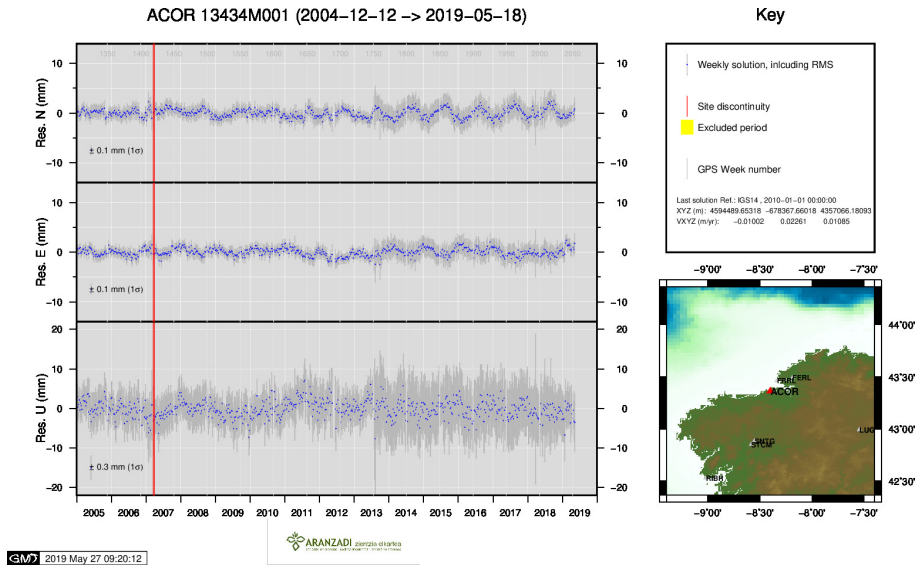
C. Boucher and Z. Altamimi (2011): *Specifications for reference frame fixing in the analysis of a EUREF GPS campaign*. etrs89.ensg.ign.fr/memo-V8.pdf

EPN Coordination Group and the EPN Central Bureau (2018): *Guidelines for the EPN Analysis Centres*. epncb.oma.be/documentation/guidelines/guidelines_analysis_centres.pdf

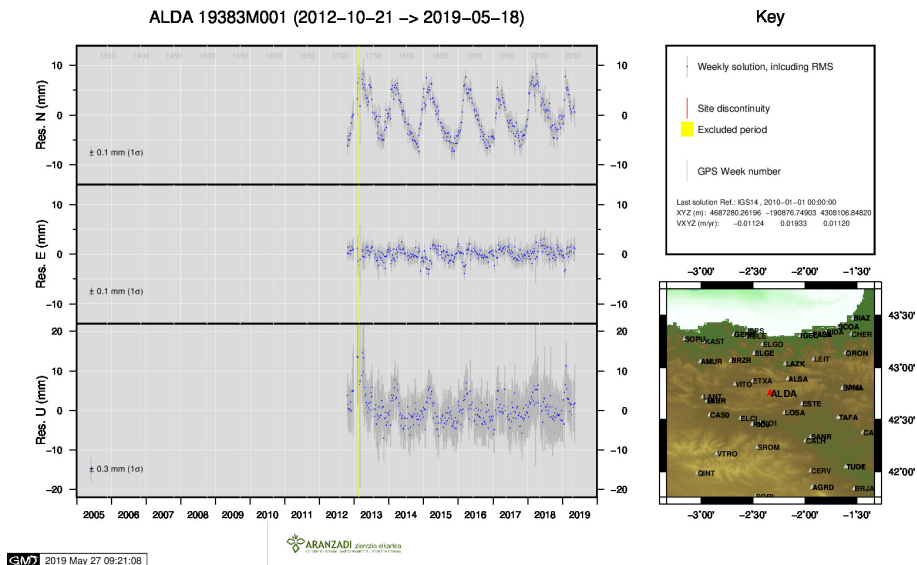
Z. Altamimi (2018): *EUREF Technical Note 1: Relationship and Transformation between the International and the European Terrestrial Reference Systems*. etrs89.ensg.ign.fr/pub/EUREF-TN-1.pdf

9 Cumulative Time Series

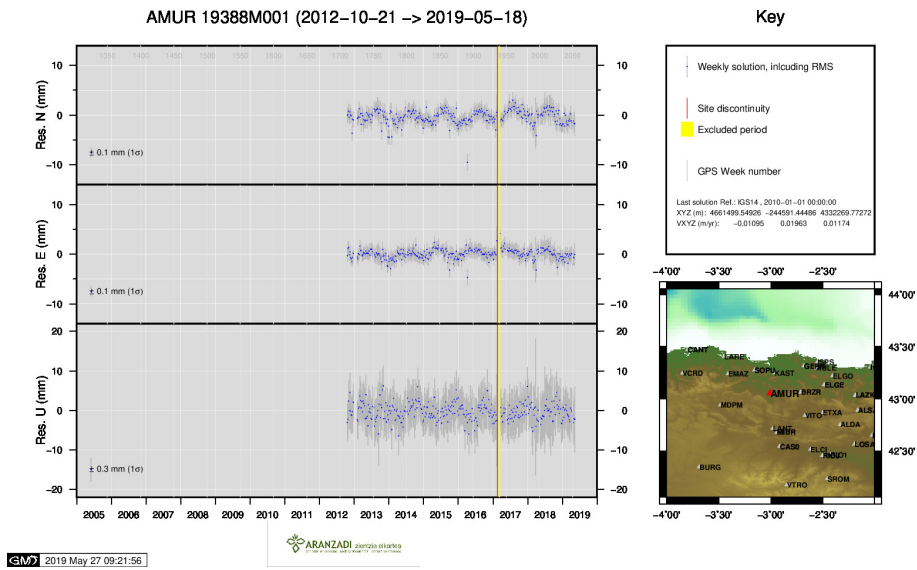
Time series of stations. Latest plots at: <http://geolabpasaia.org/gnss/ARA-net/TSeries/>, or click on the caption of each image.



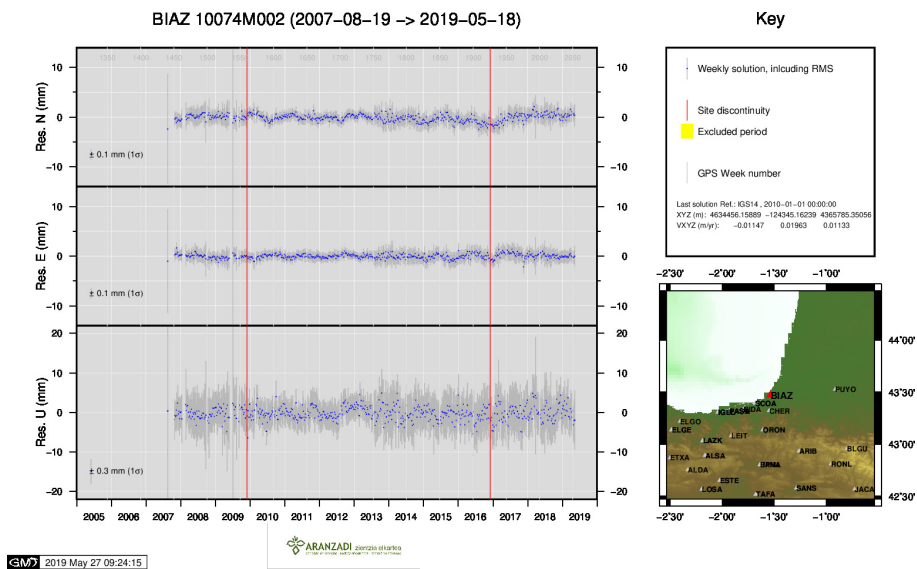
1) ACOR



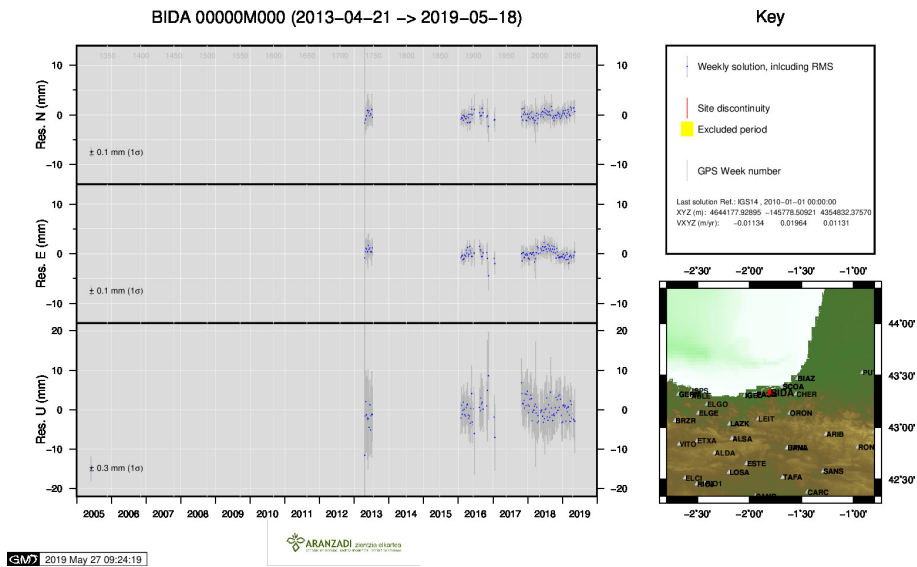
2) ALDA



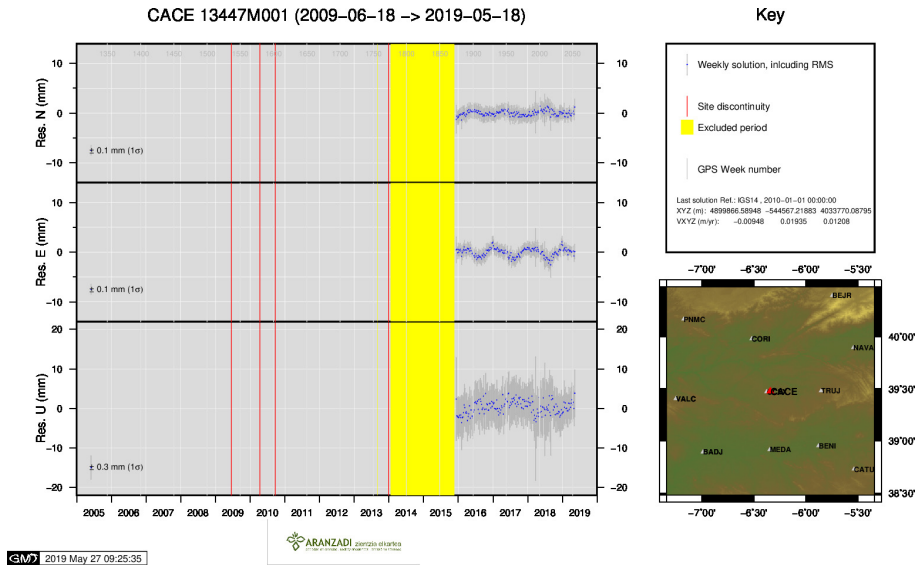
3) AMUR



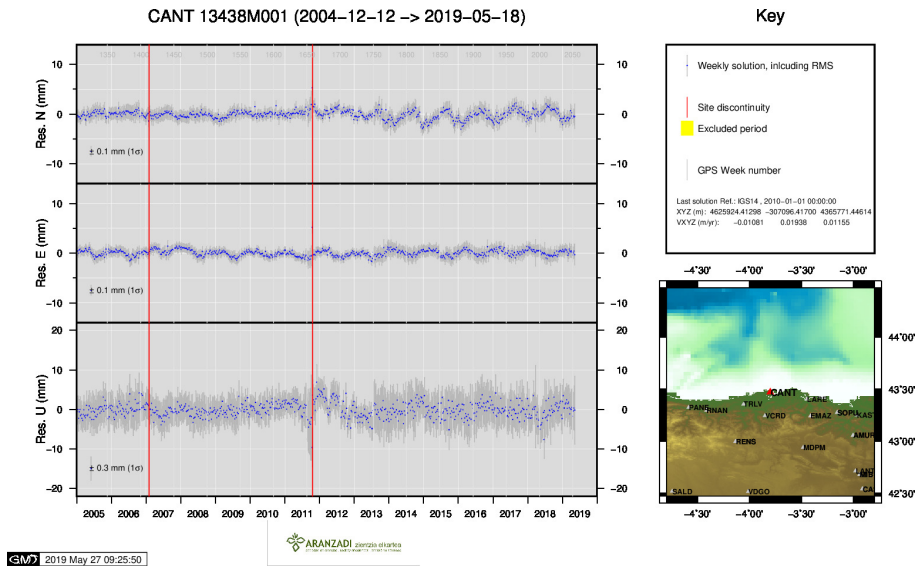
4) BLAZ



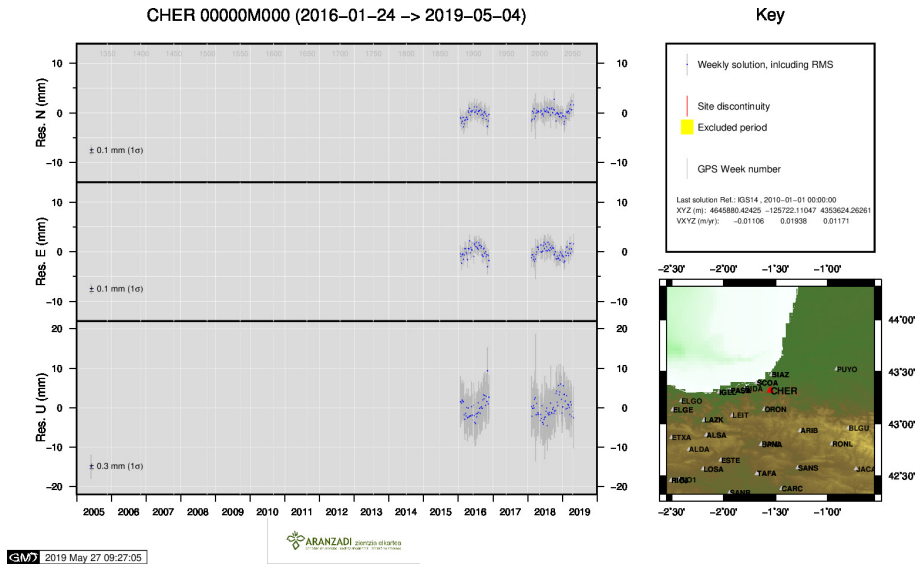
5) BIDA



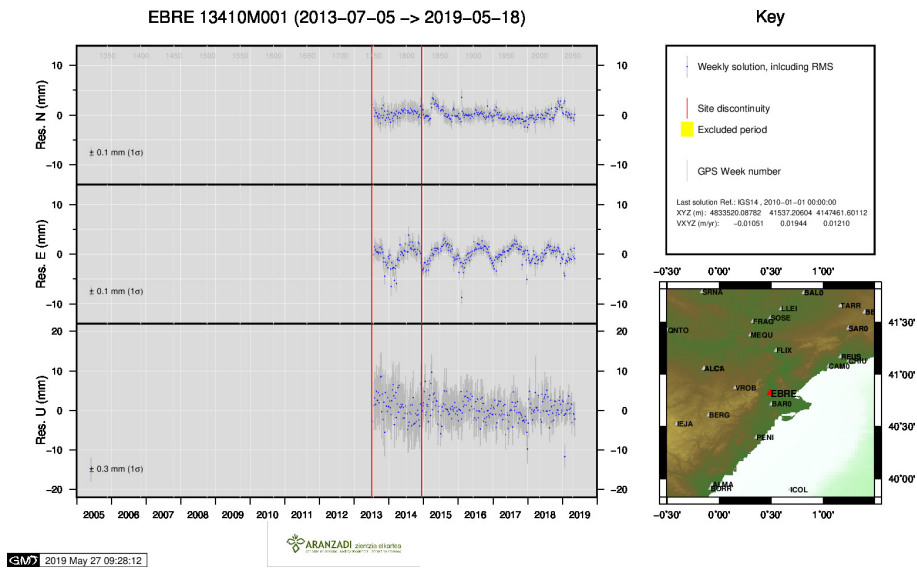
6) CACE



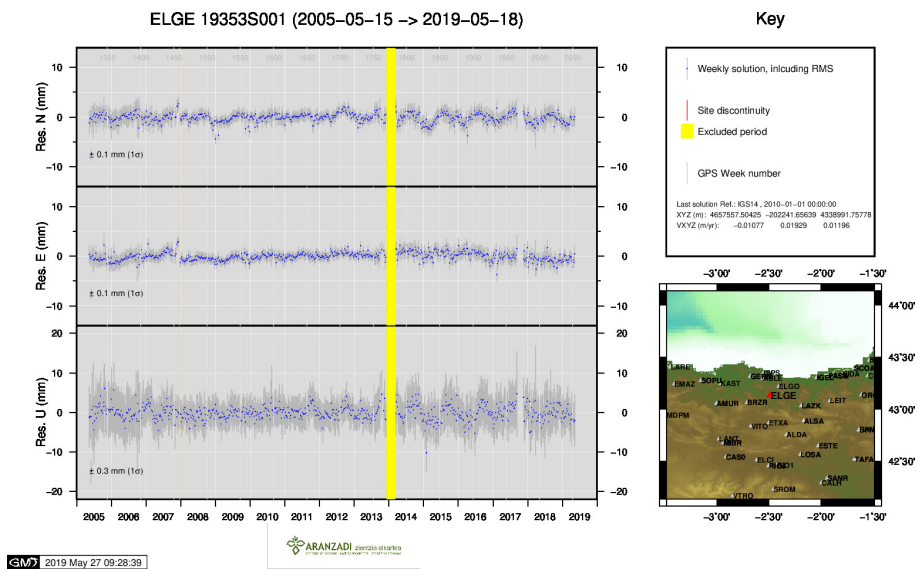
7) CANT



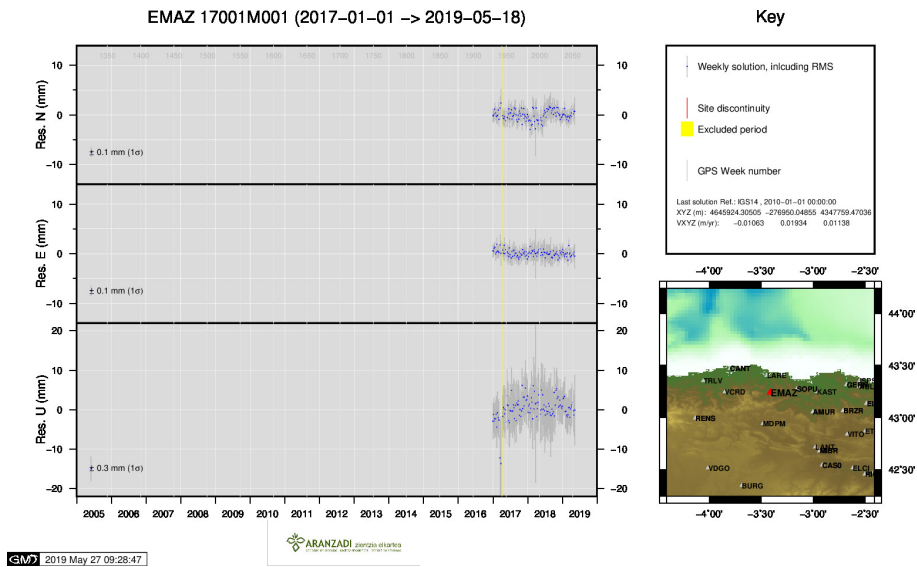
8) CHER



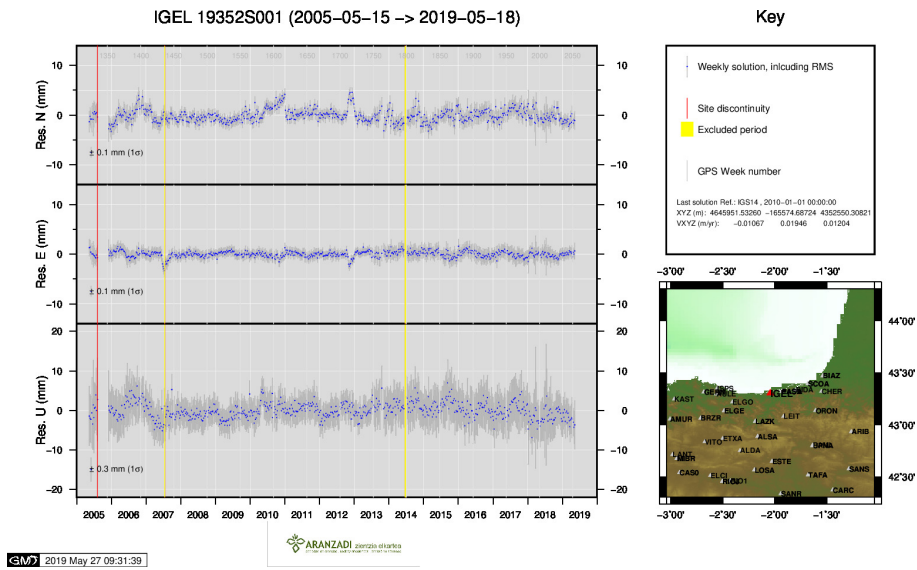
9) EBRE



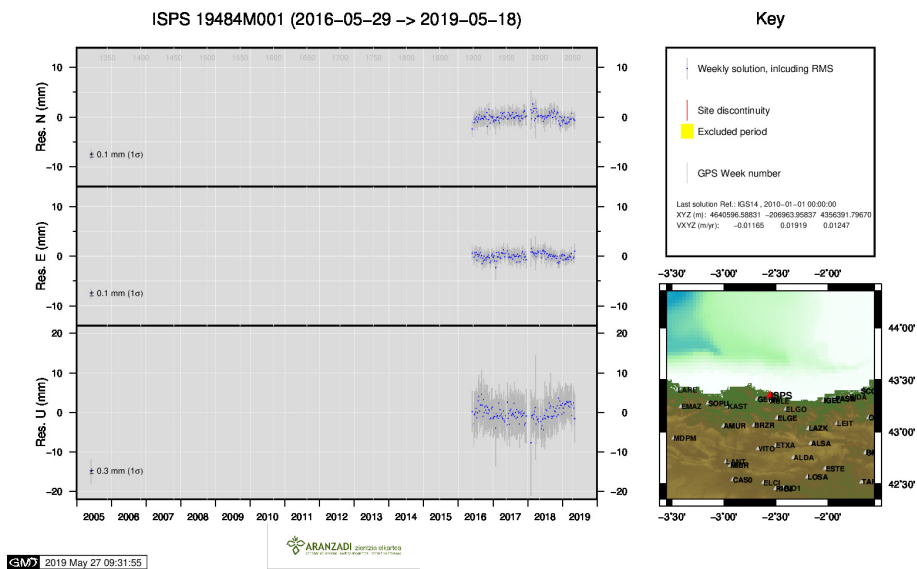
10) ELGE



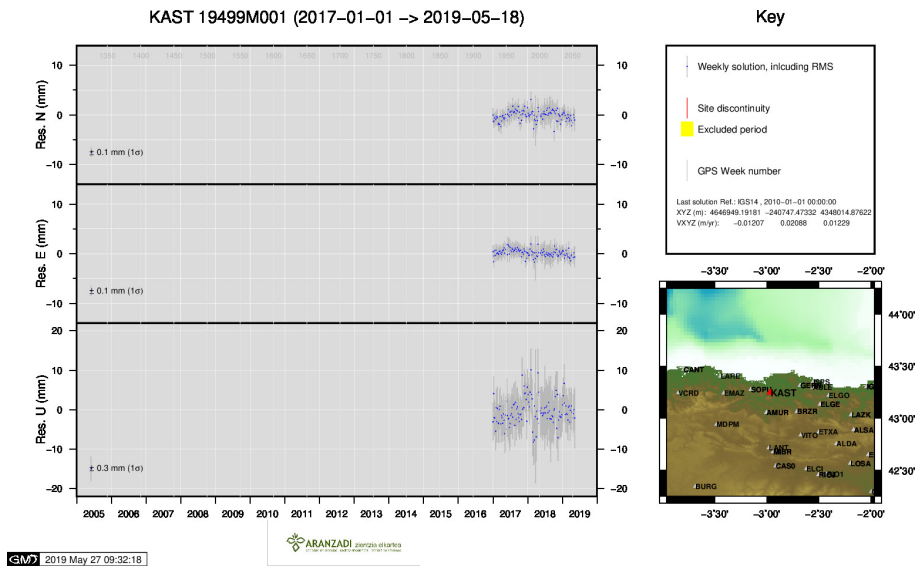
11) EMAZ



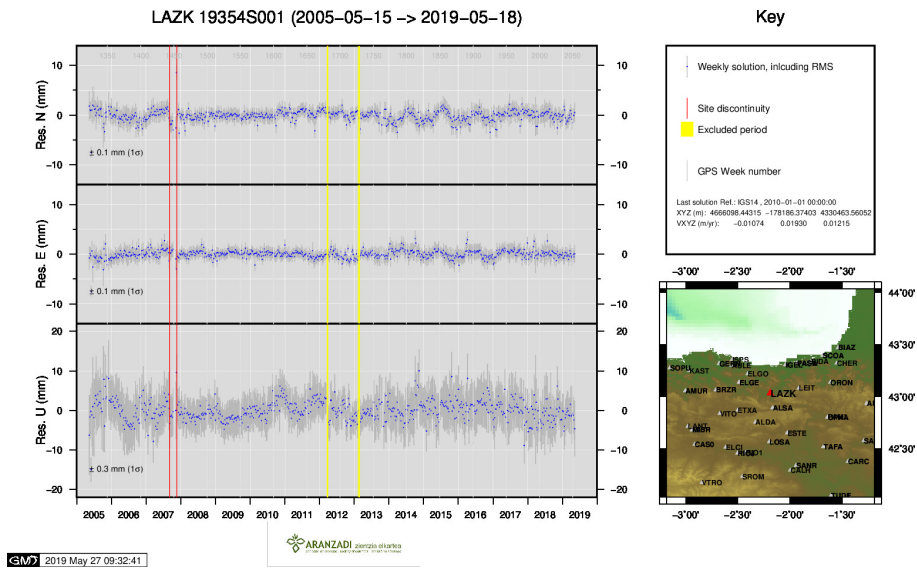
12) IGEL



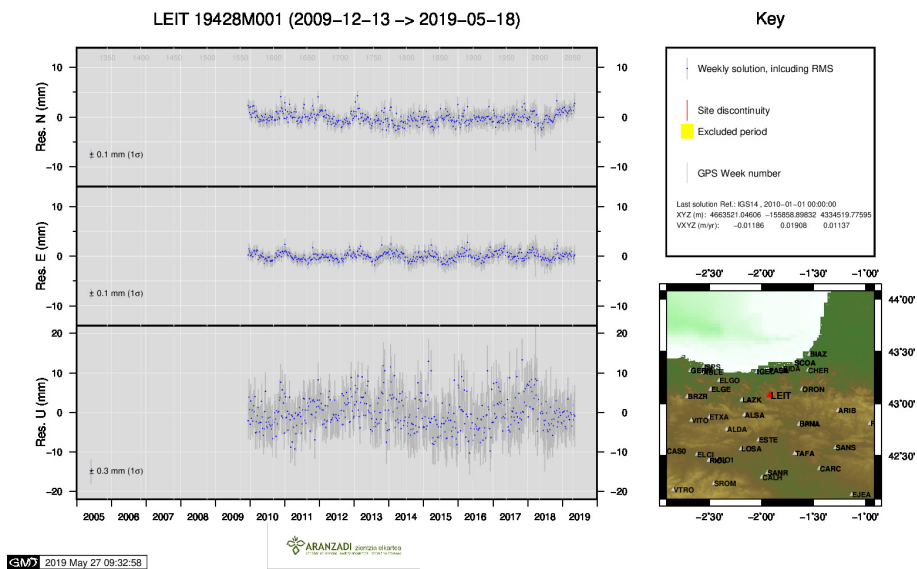
13) ISPS



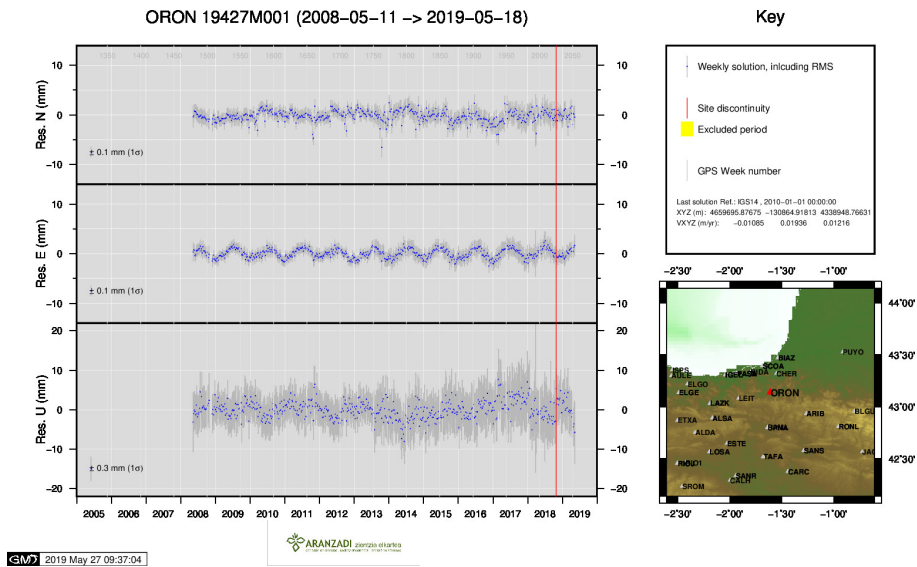
14) KAST



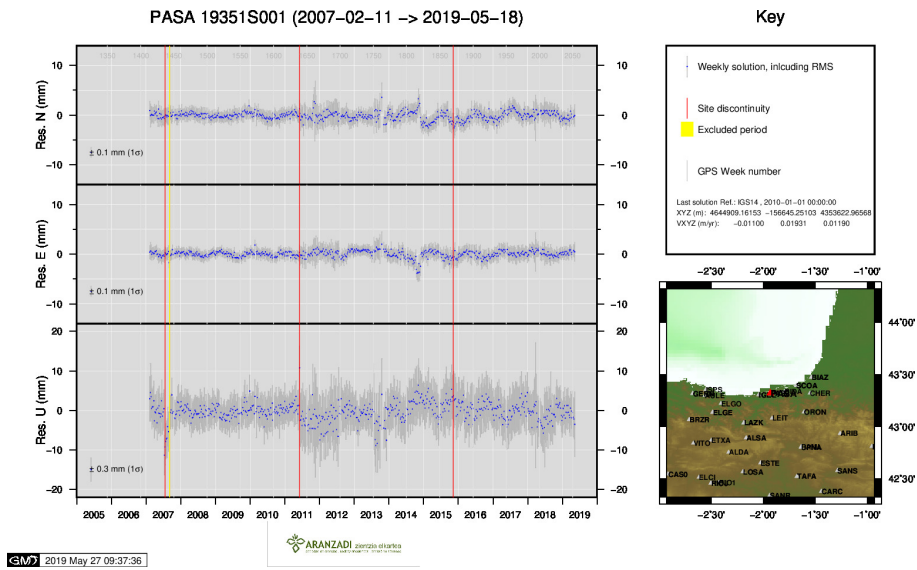
15) LAZK



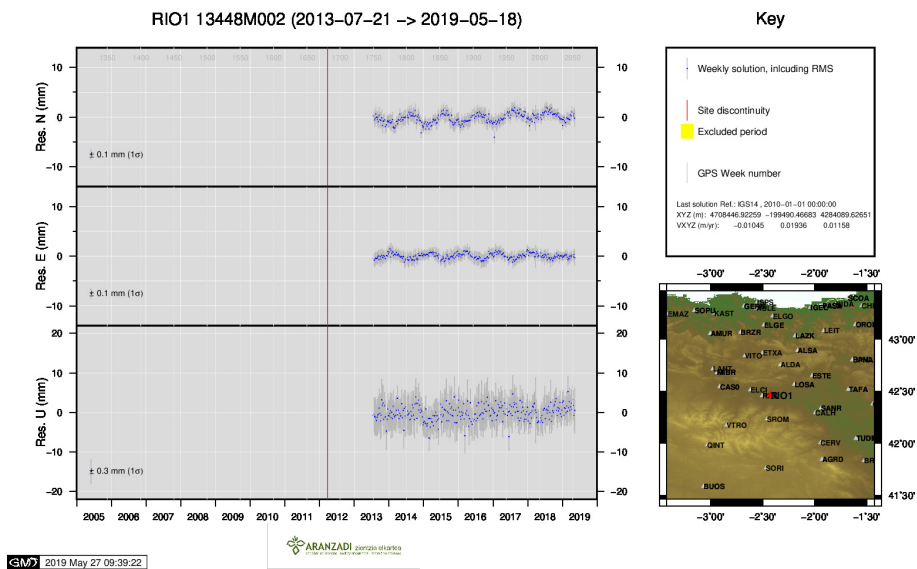
16) LEIT



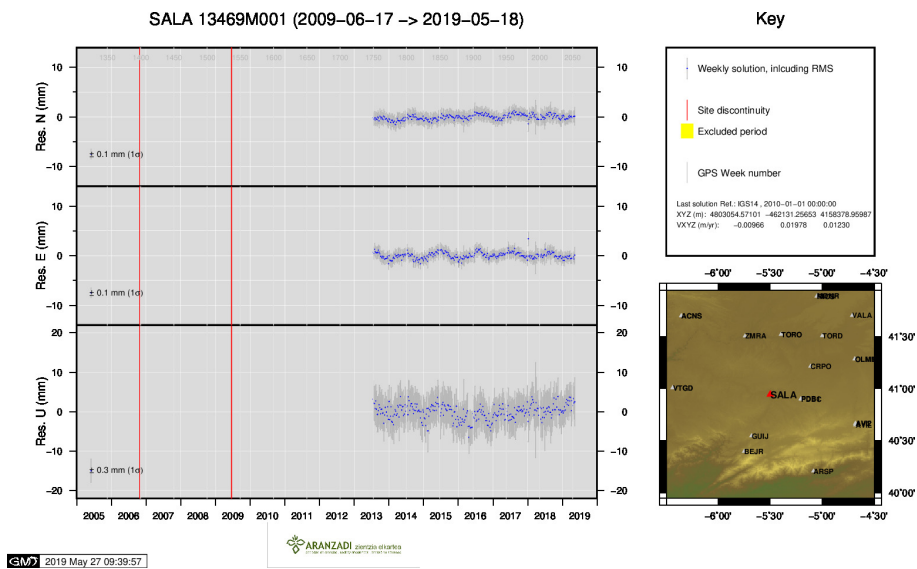
17) ORON



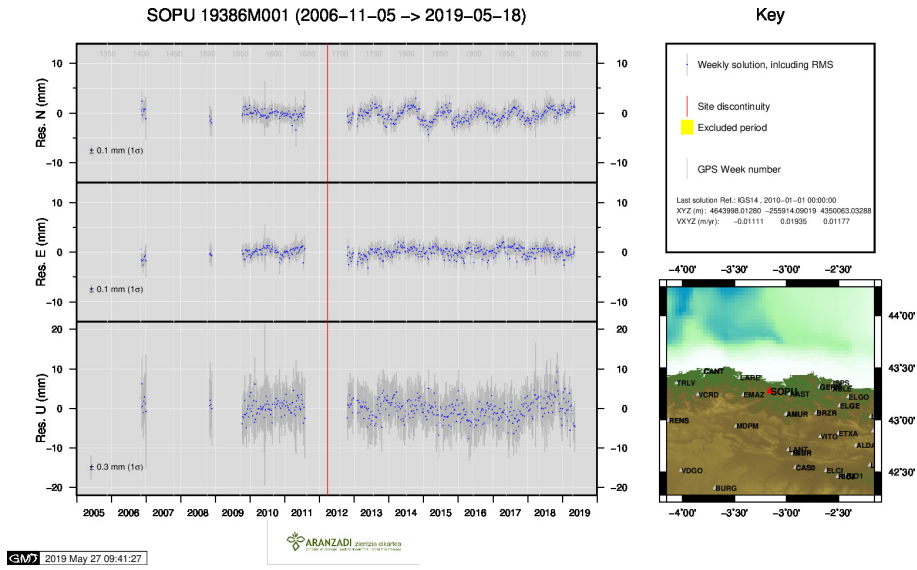
18) PASA



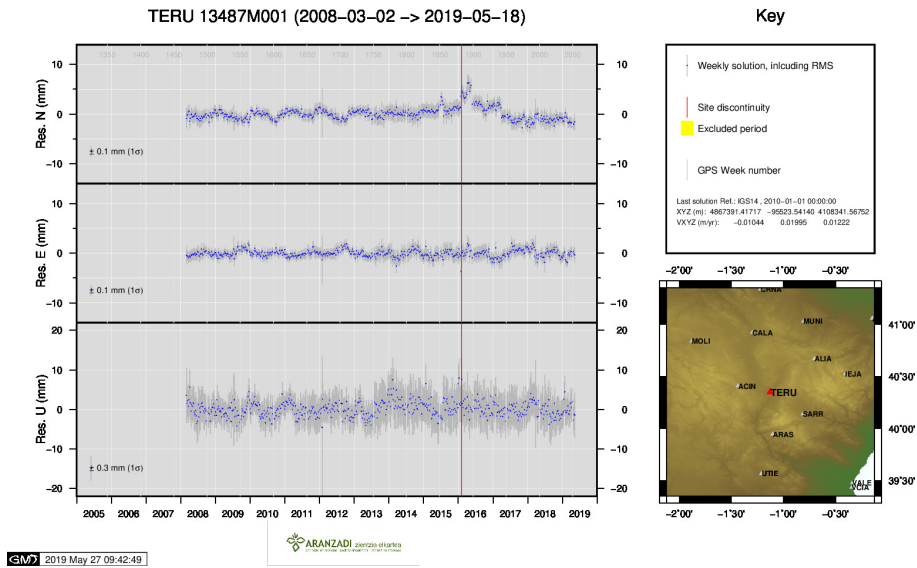
19) RIO1



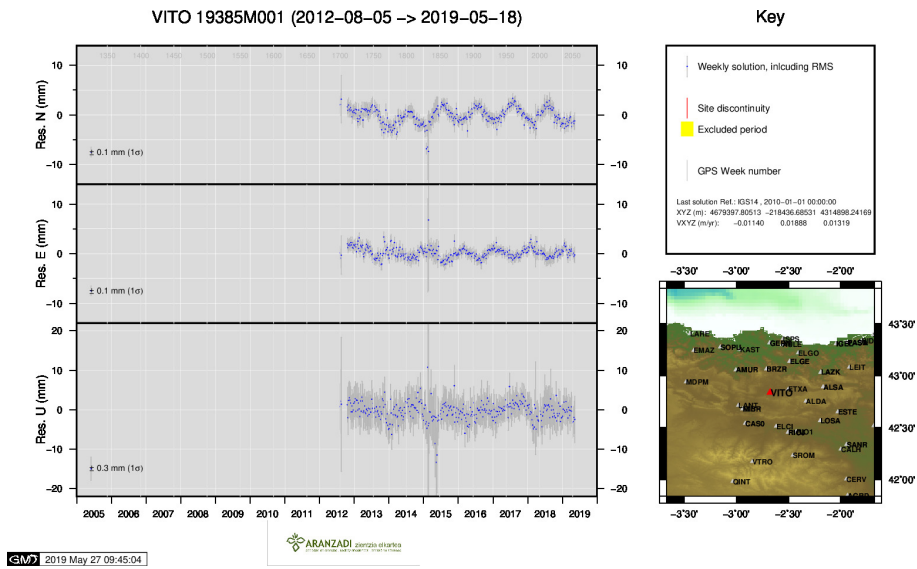
20) SALA



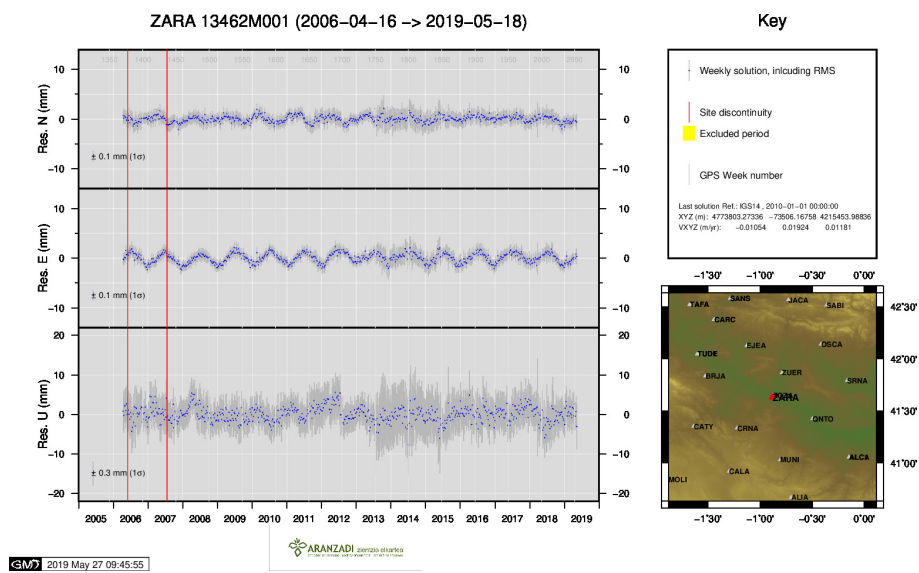
21) SOPU



22) TERU



23) VITO



24) ZARA