

Preparation of the EPN multi-year solution expressed in IGS14

Position Offsets for the switch
from IGb08/epn_08.atx (igs08) to IGS14/epn_14.atx (igs14)

J. Legrand, C. Bruyninx
Royal Observatory of Belgium

Motivation

- GPS Week 1934: EPN switch from IGb08/epn_08.atx (igs08) to IGS14/epn_14.atx (igs14)
 - [IGSMail-7399]
 - [LACMAIL-2142]
- Antenna calibration model change (epn_08.atx to epn_14.atx) causes position changes
- In order to produce consistent EPN multi-year solution (positions and velocities) expressed in IGS14
 - ⇒ Corrections of the [Repro2 + Routine] SINEXs before GPS Week 1934

EPN combined daily SINEXs: Status

From	To	Type	Antenna Calibration	Offsets
0834 – 1 1996/001 1996-01-01	1773 – 2 2013/365 2013-12-31	REPRO2	epn_08.atx (igs08.atx)	Applied
1773 – 3 2014/001 2014-01-01	1933 – 6 2017/028 2017-01-29	ROUTINE	epn_08.atx (igs08.atx)	Applied
1934 – 0 2017/028 2017-01-29	1940 – 6 2017/077 2017-03-18	ROUTINE	epn_14.atx (igs14.atx)	-



Switch from epn_08.atx to epn_14.atx

Impact of position offsets in the EPN

- 830 Station/Antenna Pairs observed in the EPN since 1996 [REPRO2 + ROUTINE]:
 - 157 Station/Antenna pairs $\Rightarrow$ individual calibrations $\Rightarrow$ no position change
 - 310 Station/Antenna pairs $\Rightarrow$ no update of the calibration $\Rightarrow$ no position change
(15 uncalibrated radomes $\Rightarrow$ NONE)
 - 353 Station/Antenna pairs with calibration updates
 - 168 Station/Antenna pairs $\Rightarrow$ IGS value available (except 2 pairs with no obs. in IGS $\Rightarrow$ latitude dependent model)
used to improve the agreement of the EPN wrt IGS solution
 - 185 Station/Antenna pairs $\Rightarrow$ latitude dependent model from IGS
(27 uncalibrated radomes $\Rightarrow$ NONE)
 - 10 Station/Antenna pairs $\Rightarrow$ unknown position changes
 - type calibration $\Leftrightarrow$ individual calibration
 - individual calibration $\Leftrightarrow$ another individual calibration

[IGSMail-7399]

(<ftp://igs-rf.ign.fr/pub/IGS14>)

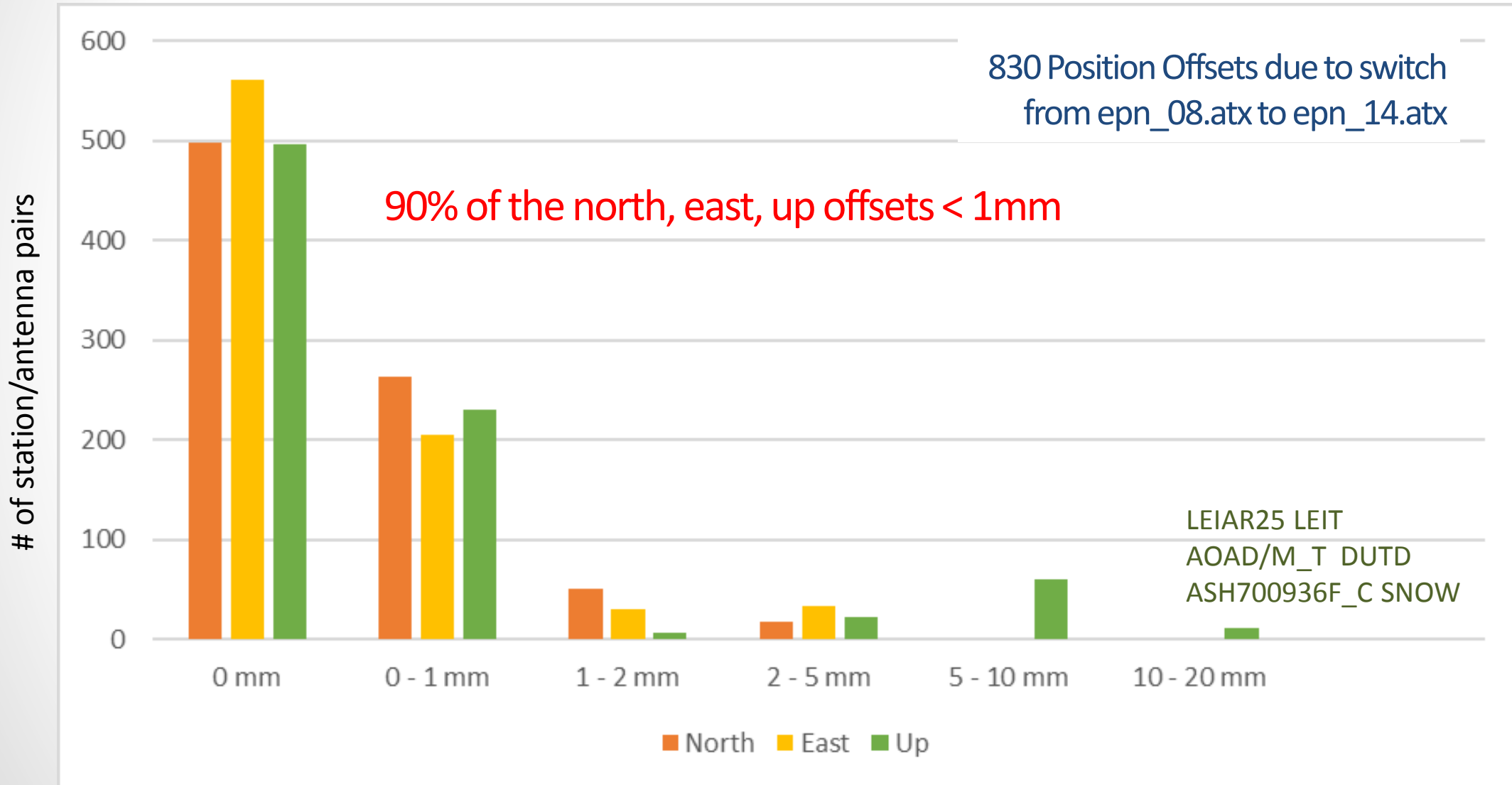
$\rightarrow$ [igs08_to_igs14_offsets.txt](#): position offsets estimated for all IGS stations affected by ground antenna calibration updates

$\rightarrow$ [lat_models.txt](#): latitude-dependent models of position offsets expected from ground antenna calibration updates (input antenna/radome type and latitude of the station)

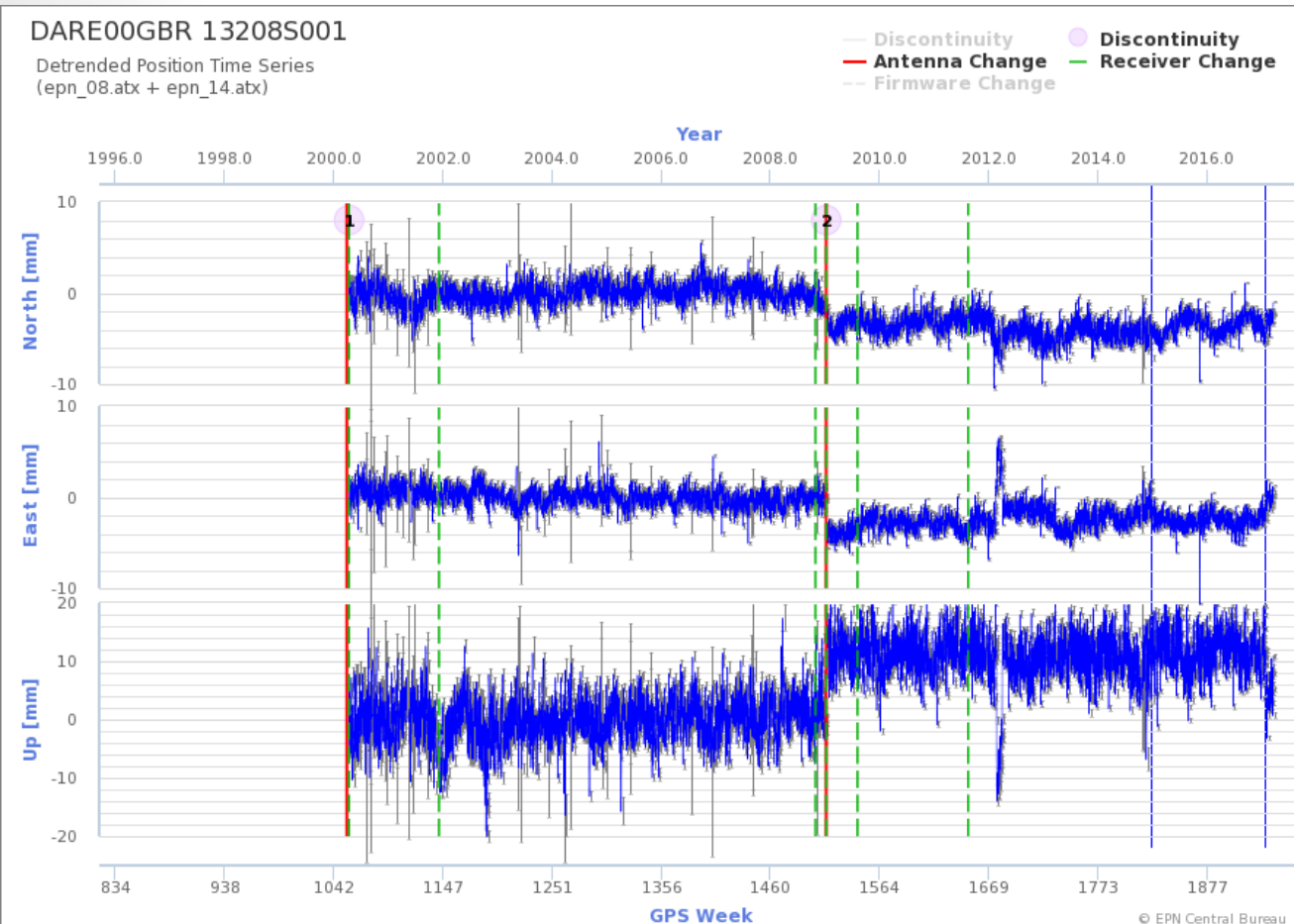


Switch from epn_08.atx to epn_14.atx

Applied Position offsets for EPN stations



DARE00GBR (Detrended Position Time Series)

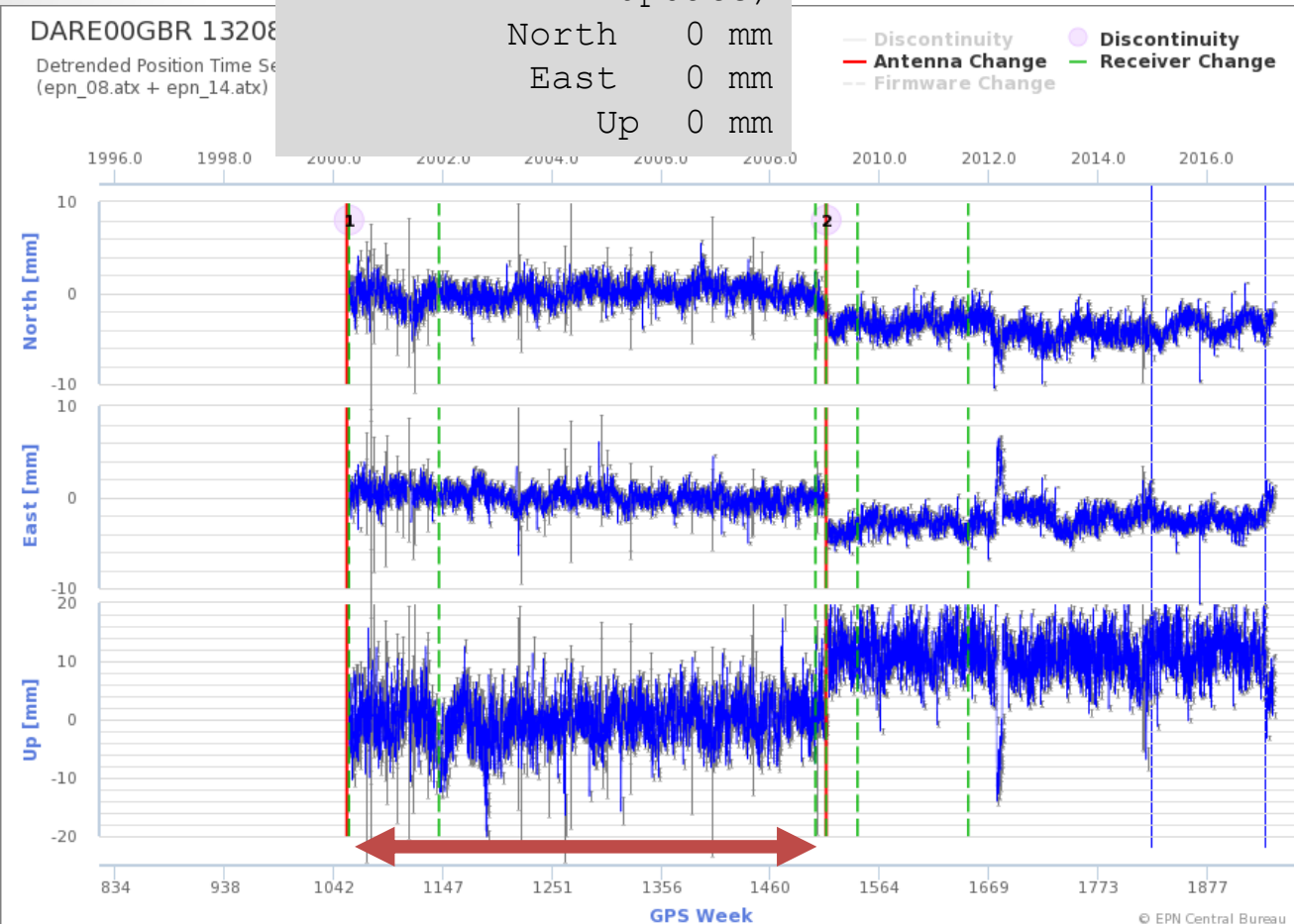


DARE00GBR (Detrended Position Time Series)

LEIAT504 LEIS
(No calibration
update)

North 0 mm
East 0 mm
Up 0 mm

— Discontinuity
— Antenna Change
— Firmware Change
● Discontinuity
— Receiver Change



DARE00GBR (Detrended Position Time Series)



ROYAL
OBSERVATORY
OF BELGIUM

Switch from epn_08.atx
to epn_14.atx



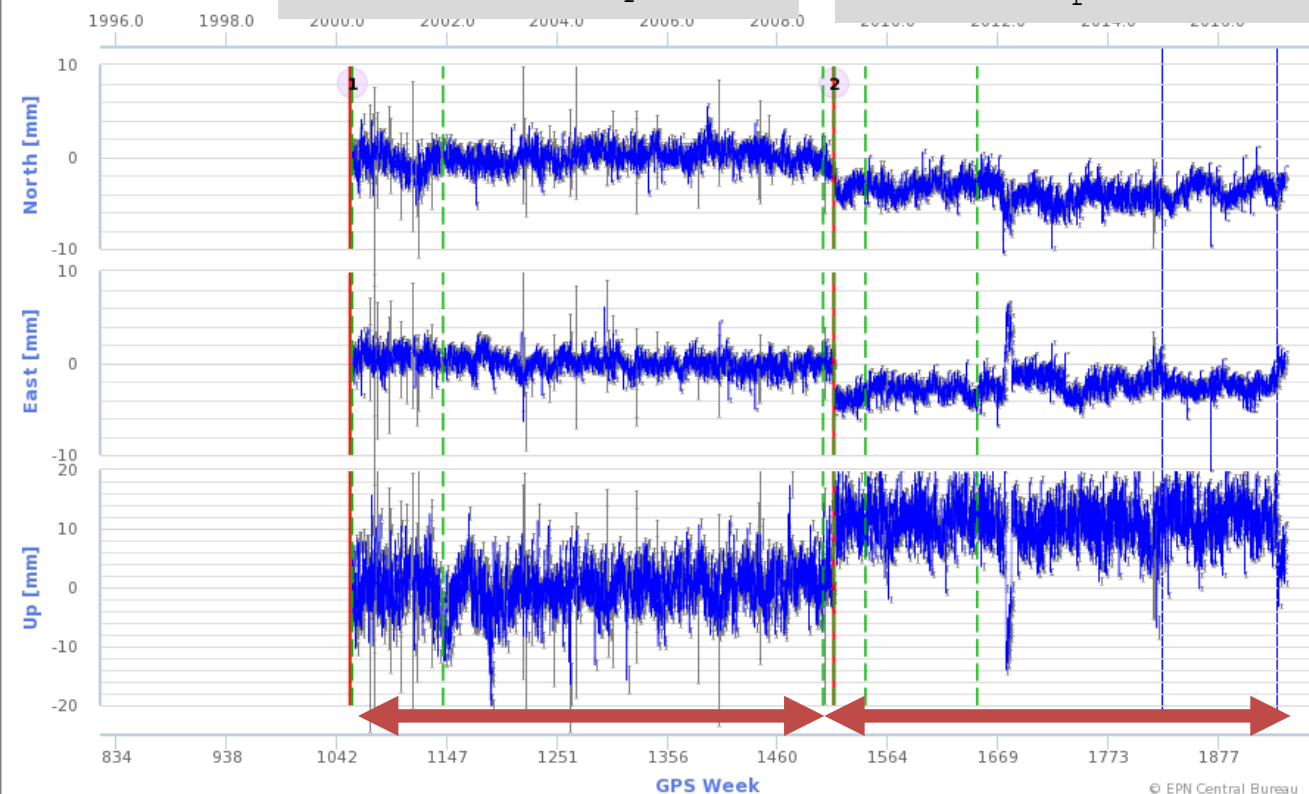
LEIAT504 LEIS
(No calibration
update)

North 0 mm
East 0 mm
Up 0 mm

LEIAR25 LEIT
(values from IGS
Latitude Model)

North 1.4 mm
East 1.0 mm
Up -11.4 mm

DARE00GBR 13208
Detrended Position Time Series
(epn_08.atx + epn_14.atx)



DARE00GBR (Detrended Position Time Series)

LEIAT504 LEIS
(No calibration
update)

North 0 mm
East 0 mm
Up 0 mm

LEIAR25 LEIT
(values from IGS
Latitude Model)

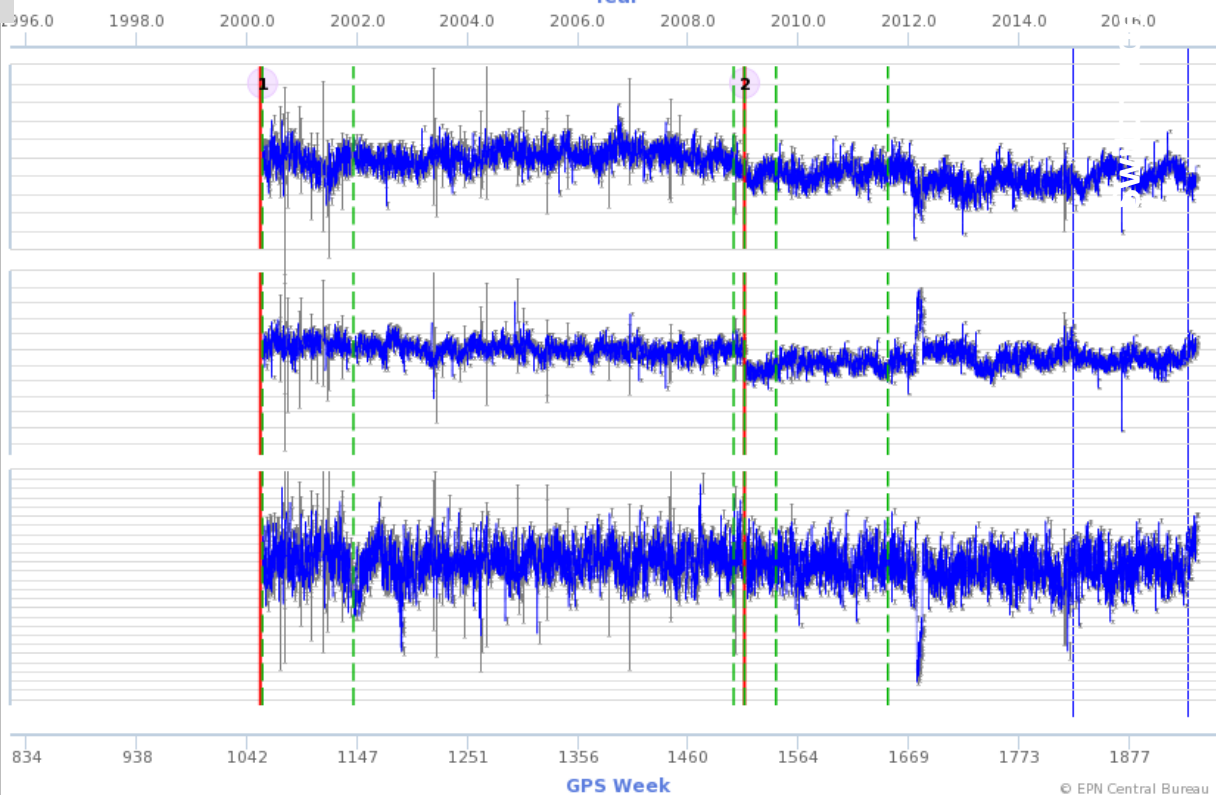
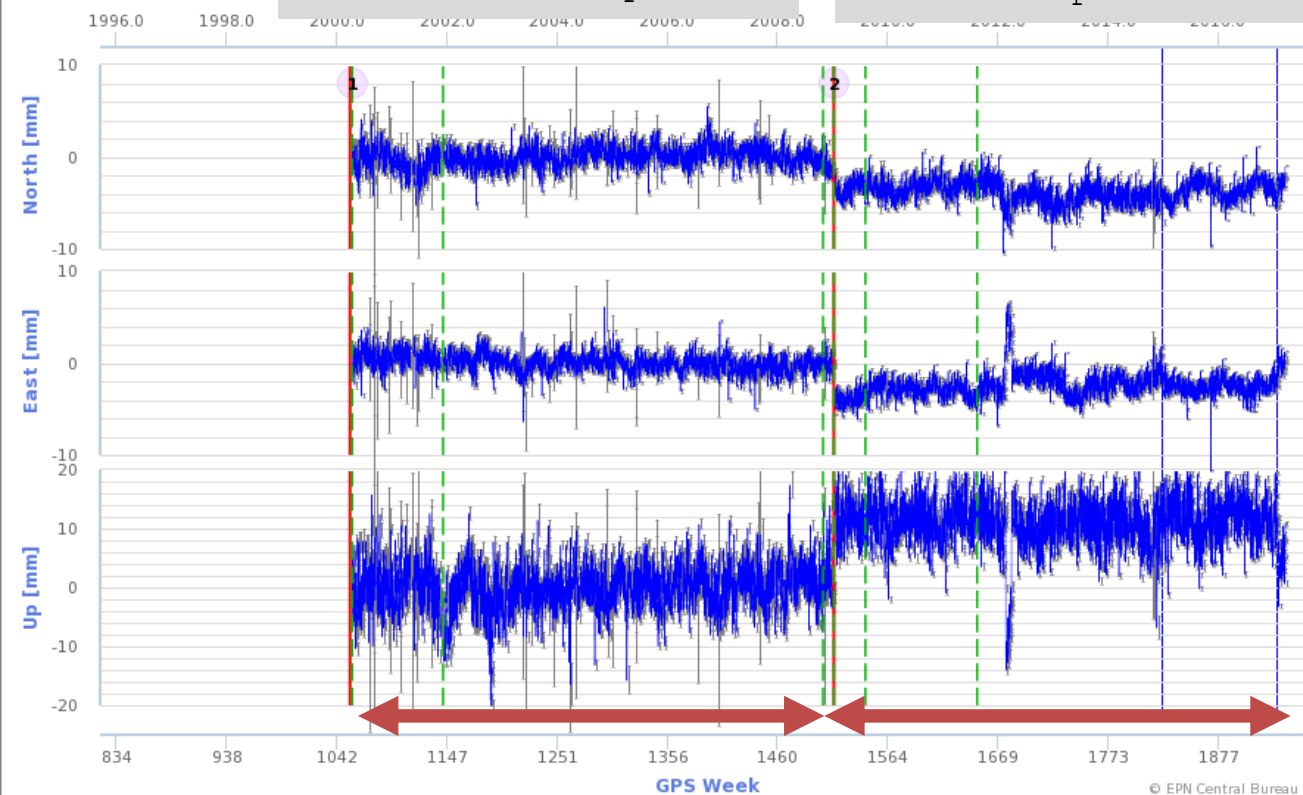
North 1.4 mm
East 1.0 mm
Up -11.4 mm

DARE00GBR 13208
Detrended Position Time Series
(epn_08.atx + epn_14.atx)

00GBR 13208S001
Detrended Position Time Series
(epn_08.atx compatible)

— Discontinuity
— Antenna Change
— Firmware Change

● Discontinuity
● Receiver Change



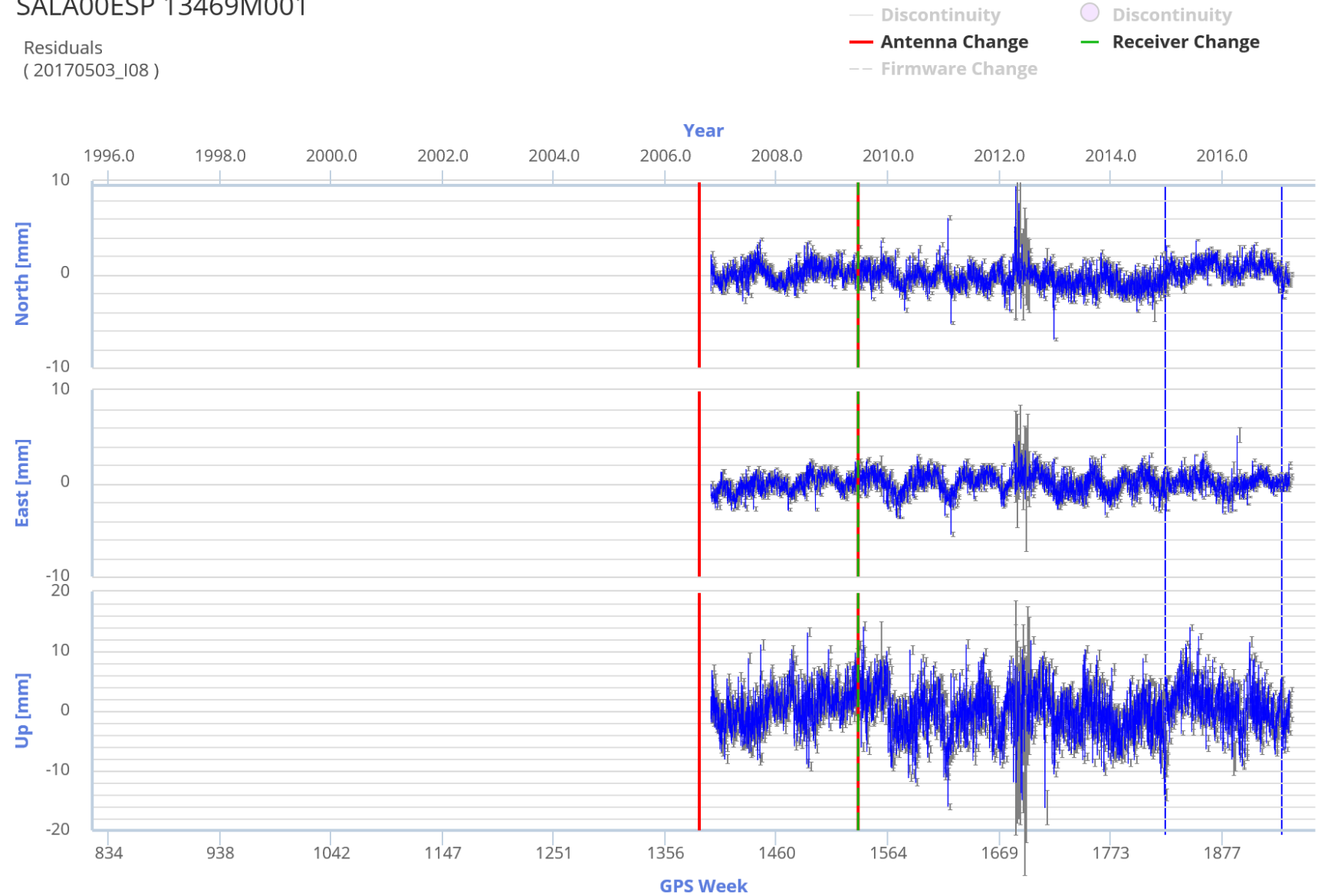
Future Work

- Revise the discontinuities of the EPN multi year solution
 - Investigate differences wrt ITRF2014 or IGS14 discontinuities
 - Investigate the impact of applying the position changes due to the antenna model switch on existing and new discontinuities
- Cleaning of the position time series
 - Smart cleaning using the RINEX data quality checks available at EPN CB

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SALA00ESP 13469M001

Residuals
(20170503_I08)



SALA00ESP

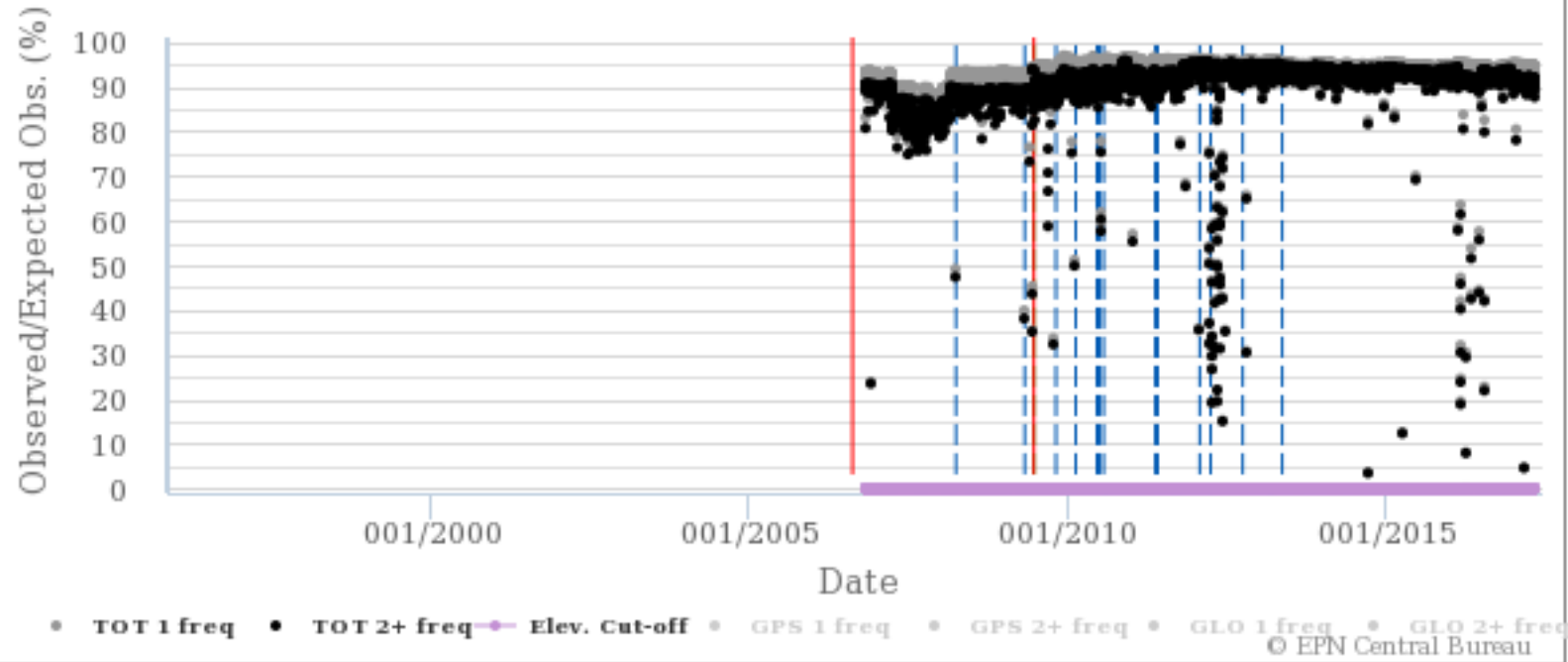
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Residuals
(20170503_I08)

— Discontinuity
— Antenna Change
— Firmware Change
● Discontinuity
— Receiver Change

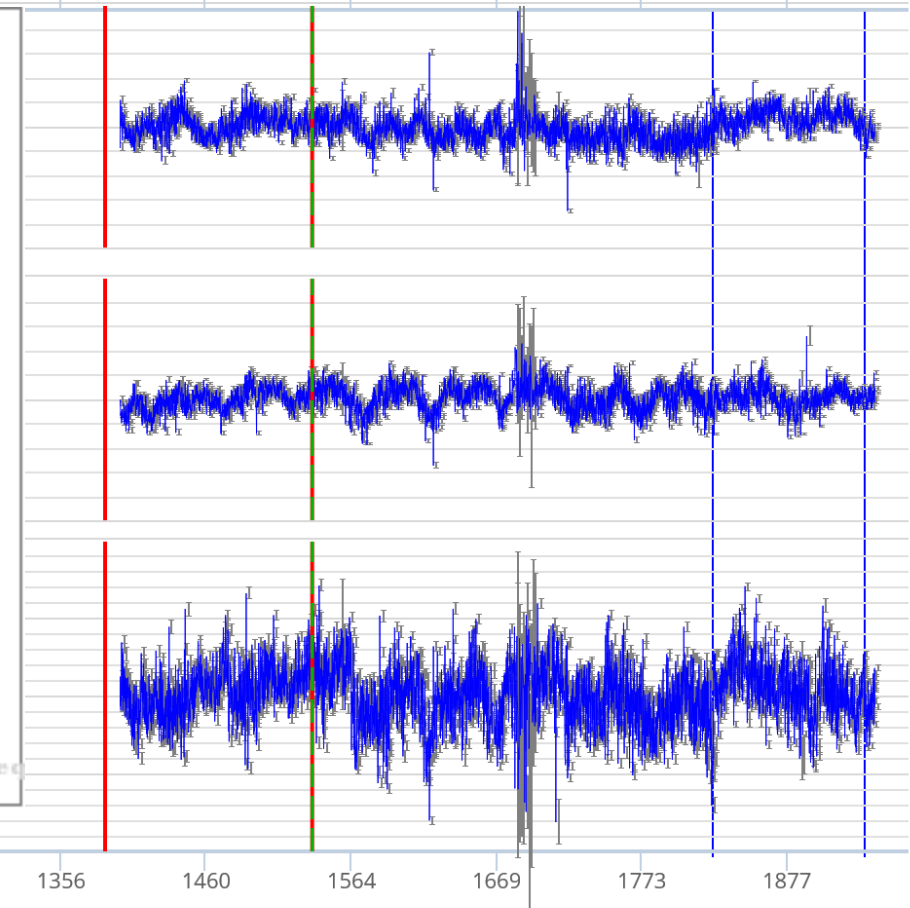
Ratio observed/expected observations

SALA00ESP - RINEX 2



Year

1996.0 1998.0 2000.0 2002.0 2004.0 2006.0 2008.0 2010.0 2012.0 2014.0 2016.0



GPS Week

-20 834 938 1042 1147 1251 1356 1460 1564 1669 1773 1877

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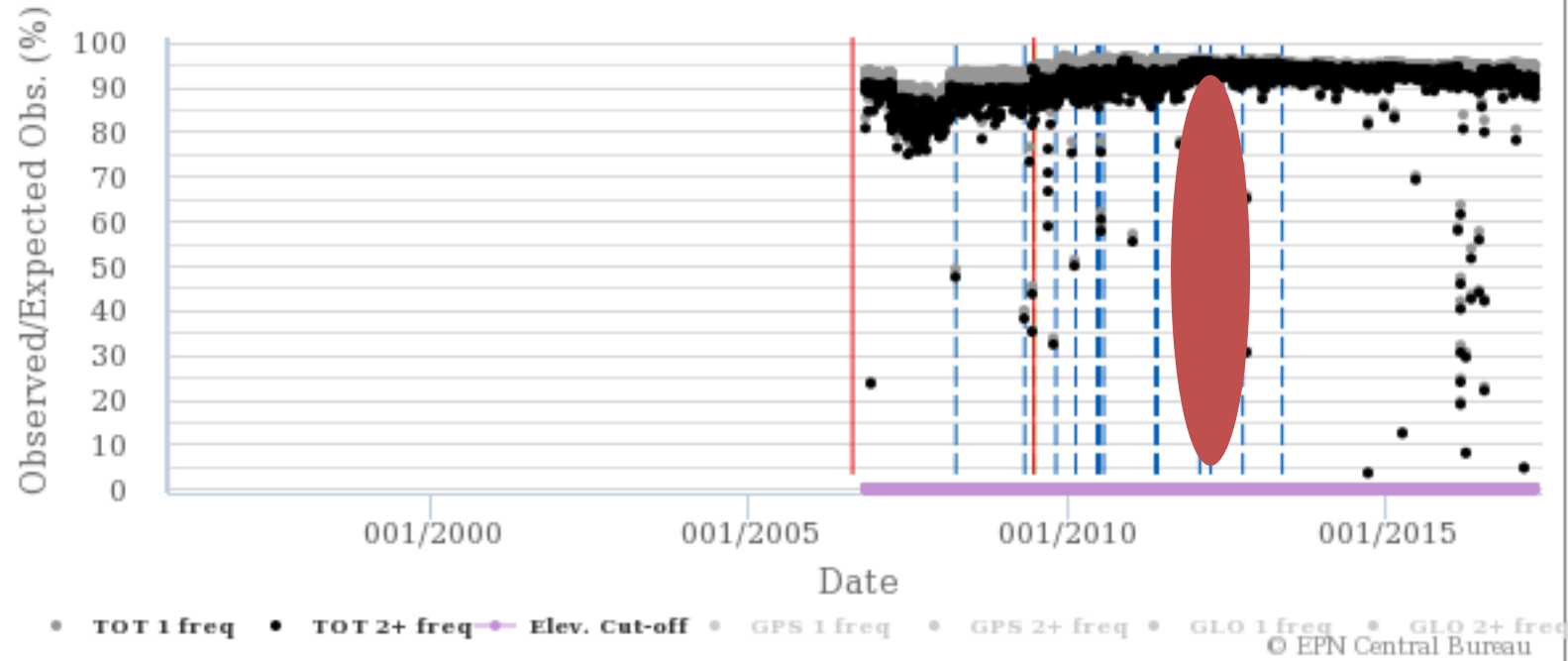
SALA00ESP 13469M001

Residuals
(20170503_I08)

— Discontinuity
— Antenna Change
— Firmware Change
● Discontinuity
— Receiver Change

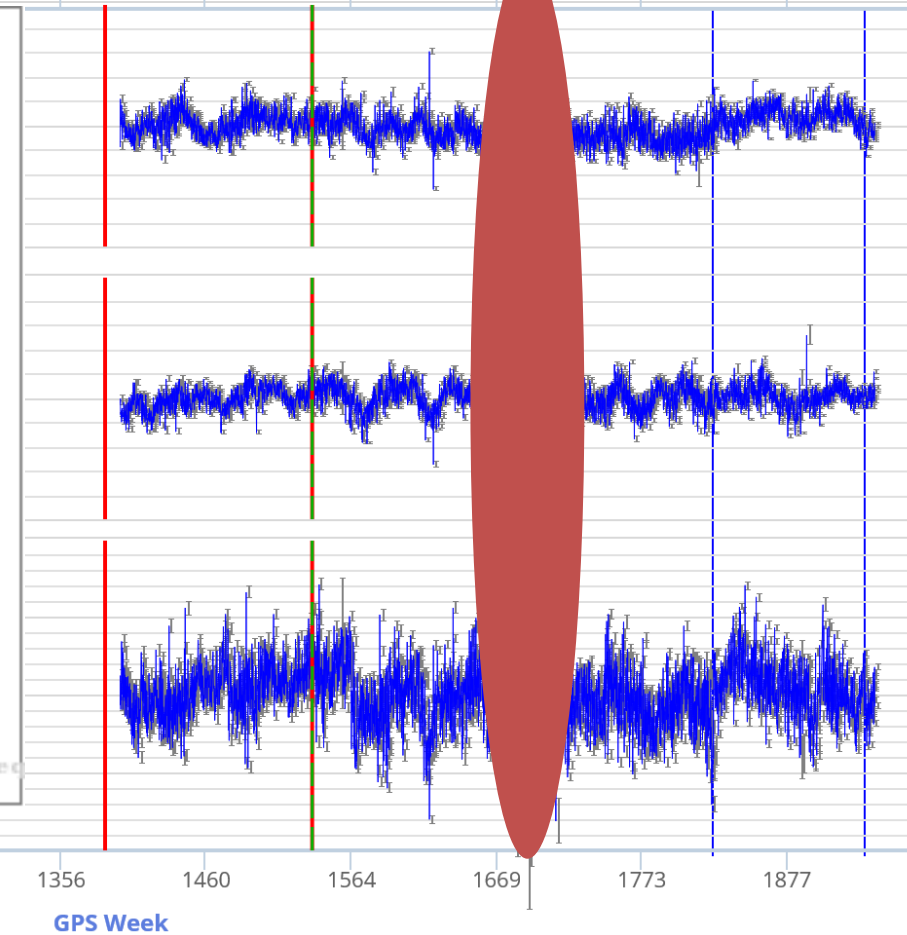
Ratio observed/expected observations

SALA00ESP - RINEX 2



Year

1996.0 1998.0 2000.0 2002.0 2004.0 2006.0 2008.0 2010.0 2012.0 2014.0 2016.0



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Thank you for your attention !

