



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

armasuisse
Bundesamt für Landestopografie swisstopo

wissen wohin
savoir où
sapere dove
knowing where

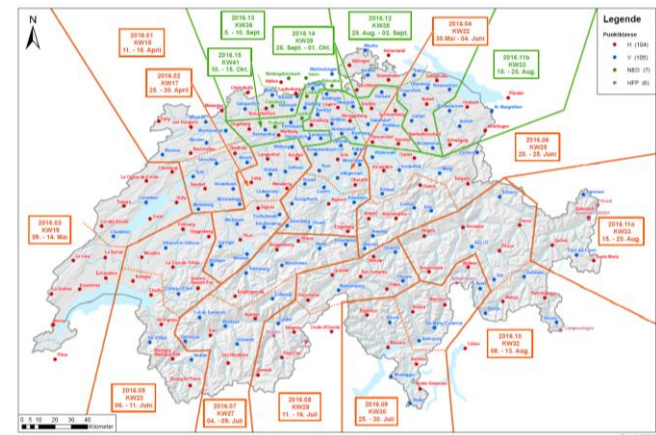


swisstopo Report for EGVAP 2017

E. Brockmann



-
- A topographic map of Switzerland with 30 meteorological stations marked by red dots. The stations are labeled with codes: AIGE, EPFL, SAAN, MAR3, MAR2, ZERM, HOHT, HOH2, JULO, SAA2, STCX, PAYE, NEUC, ZIMM, ZIM2, BOUR, BOU2, FHEB, FRIC, FRI3, ETHZ, ETH2, HUTT, LUZE, KALT, SAK2, STGA, SCHA, KREU, FALE, DAVO, DAV2, ARDE, ARD2, SAME, SANB, GALP, LOMD, STAB, and STA2. The map shows the Swiss Alps and major lakes like Geneva, Constance, and Zurich.





Operational aspects

- Degradation in CPU time (cluster busy from other processes + backups at midnight)

Processing time

System problems

Minute of successful finishing/delivering AMET solution

Virtual server moved to different physical server (Mid 2017)

Backups

16-Nov-2017 08:33:23

stations

Number of stations

Minute of successful finishing/delivering AMET solution

16-Nov-2017 08:43:05

Number of stations



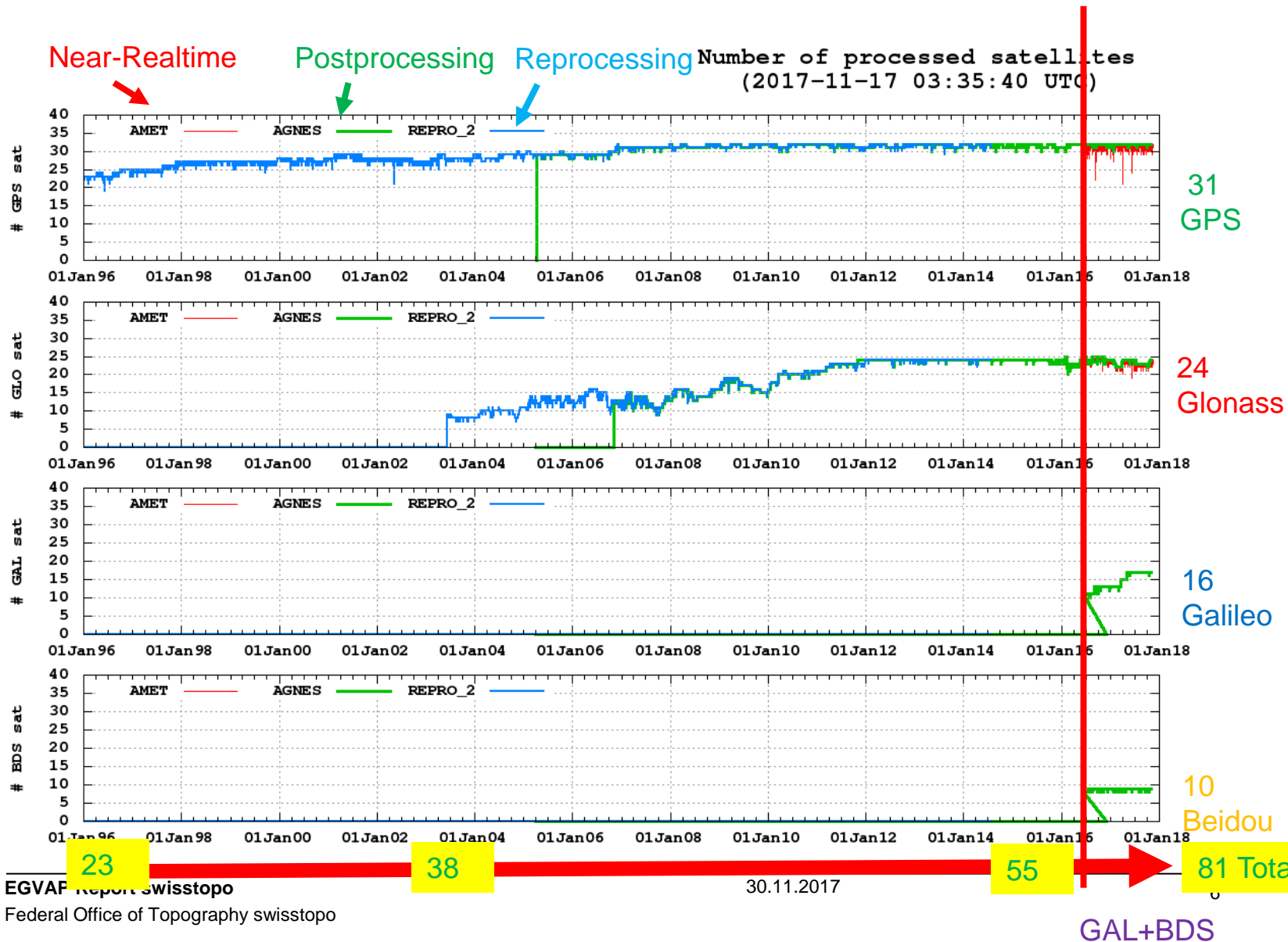
Availability

http://pnac.swisstopo.admin.ch/restxt/cost_data_statistic.txt

```
# search 52 weeks from 1923 till 1974
# Statistic of produced NRT und RRT Costfiles
# -----
# Overall summary:
# Numb. of Files: LPT: 8640 LPTR: 8292 files in 52 weeks
# Availability: LPT: 98.90 % LPTR: 94.91 %
```

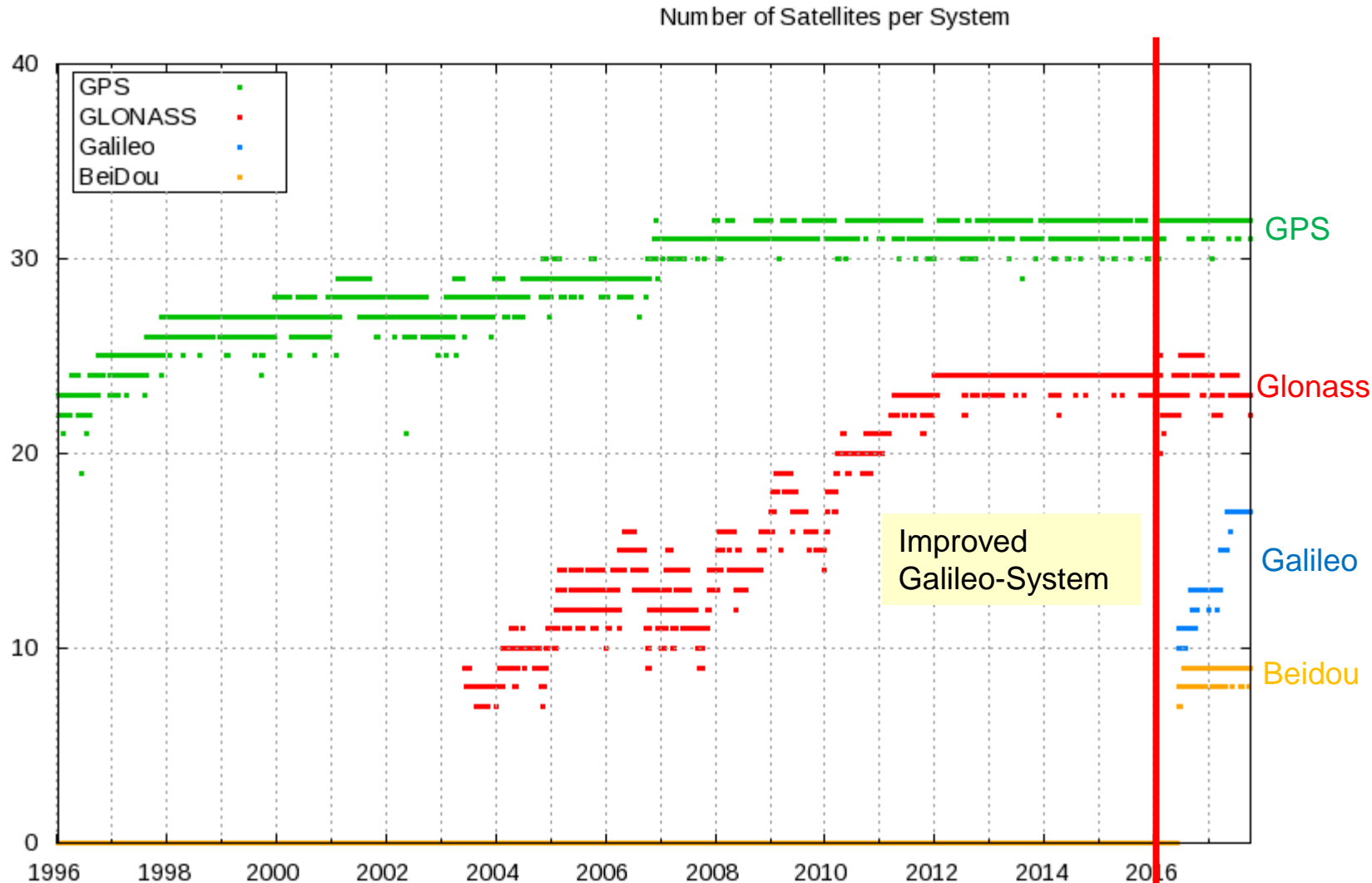


Multi-GNSS: Mid 2016



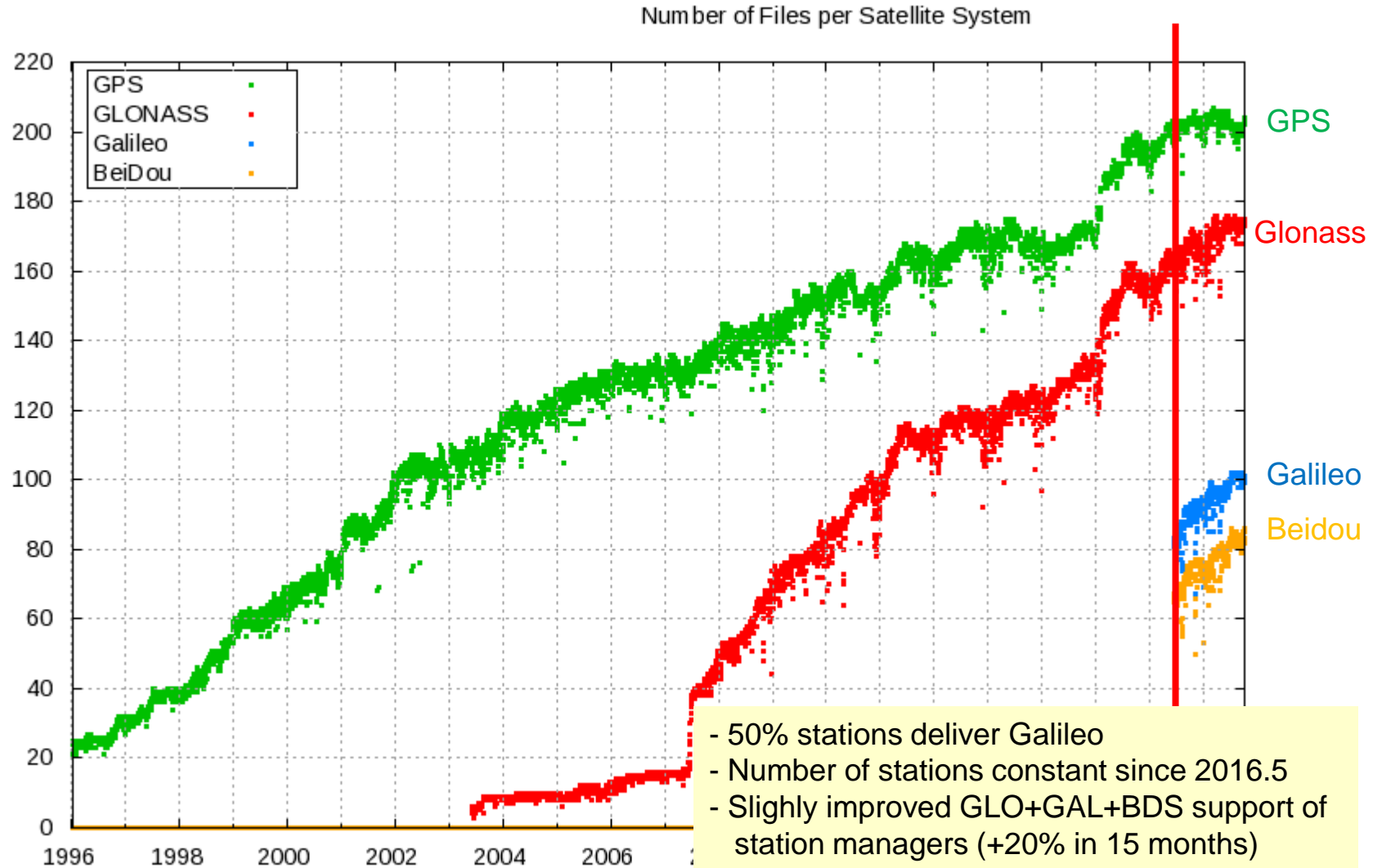


Multi-GNSS: Mid 2016





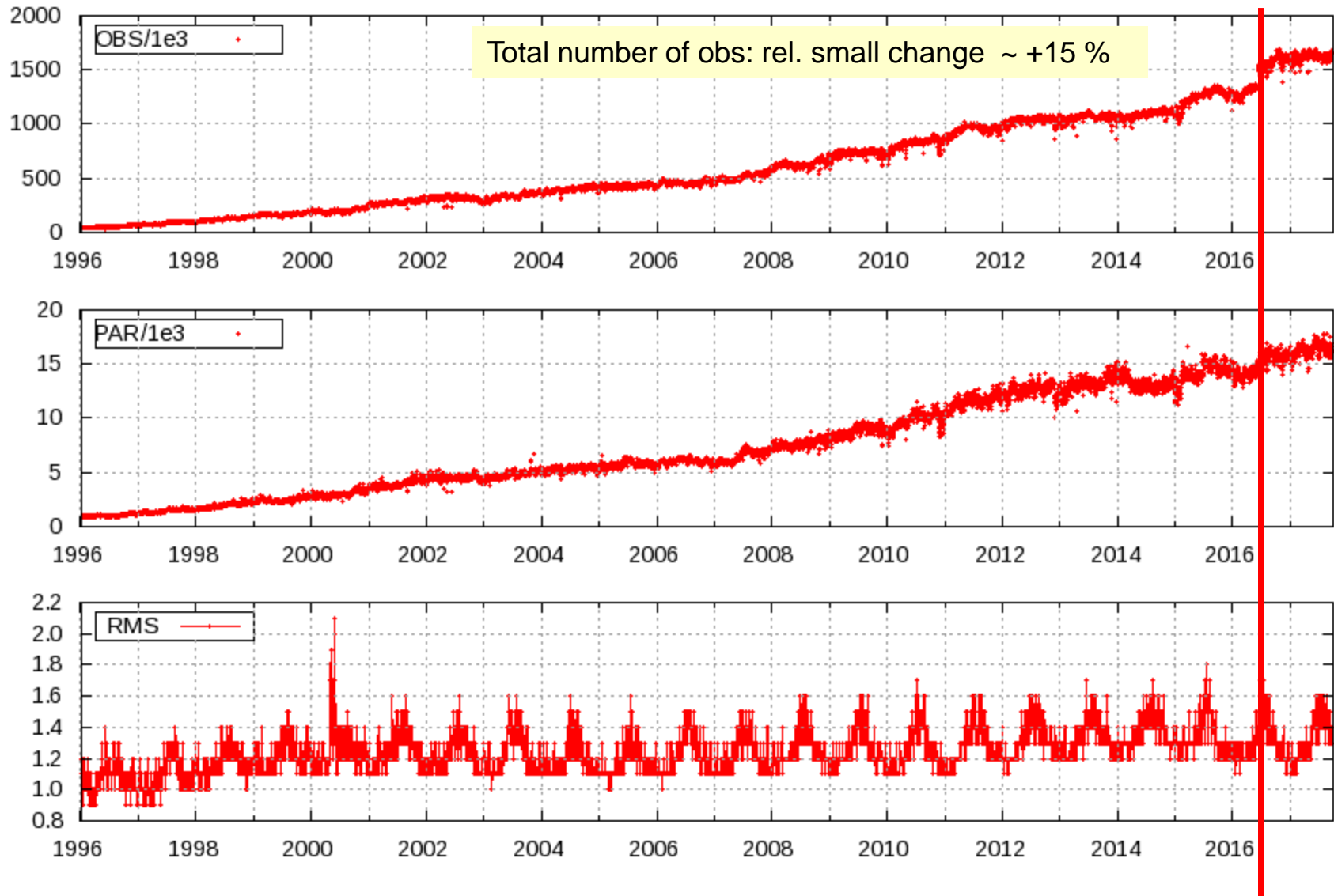
Multi-GNSS: Mid 2016





Multi-GNSS: Mid 2016

ADDNEQ (F1_)





RS comparisons

- Error detected in EUR-RS comparisons (Rosa) + differences at RS PAYE since 2017 (Beg. Aug 2017)
- RS plots operationally generated (EGVAP mail Aug. 16)

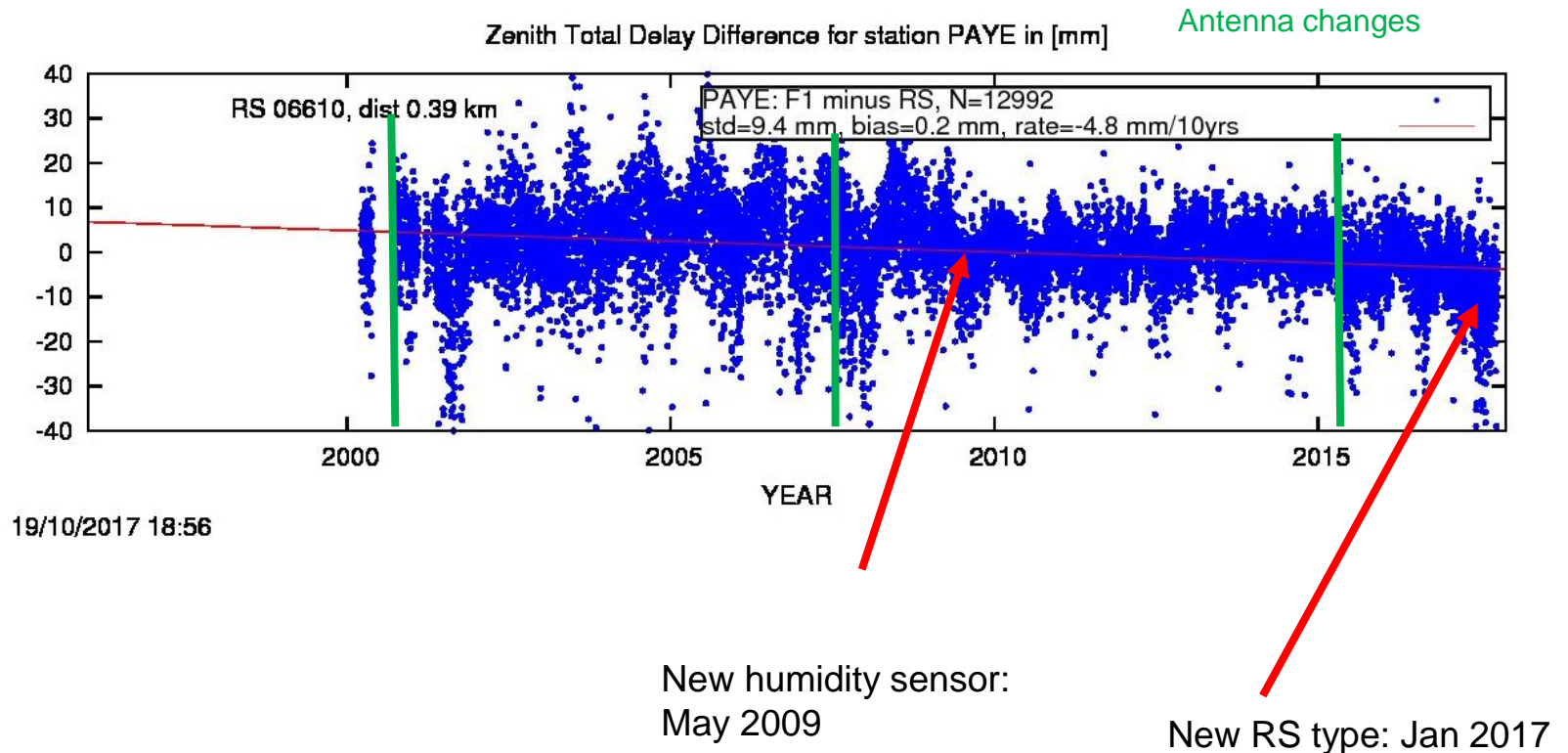
Totally, 60 stations are available (replace the corresponding station in the link name paye -> station name you like to check):

AJAC BORJ BRST BRUX CABW CAG1 CASC COMO DYNG EPFL EXWI GOP6 GOP7
GOPE GRAZ GSR1 GUIP HERS HERT HOBU JOZ2 JOZE KOS1 LDB2 LINZ LLAG M0SE
MDVJ MEDI MLVL NEUC NICO NYA1 NYA2 OBE4 ONS1 ONSA PAYE PEN2 PENC REDZ
REYK SAA2 SAAN SMNE SOFI STCX SUR4 UCAG USAL VILL WAB1 WAB2 WARE WROC
YEBE ZIM2 ZIM3 ZIMJ ZIMM

- Error also detected at RS generation (Henrik)
- Rosa plot correction (Oct.)
- Meeting CH with RS – positive sign that GNSS detects offsets



Radio sonde comparisons (GNSS repro+operational – RS)

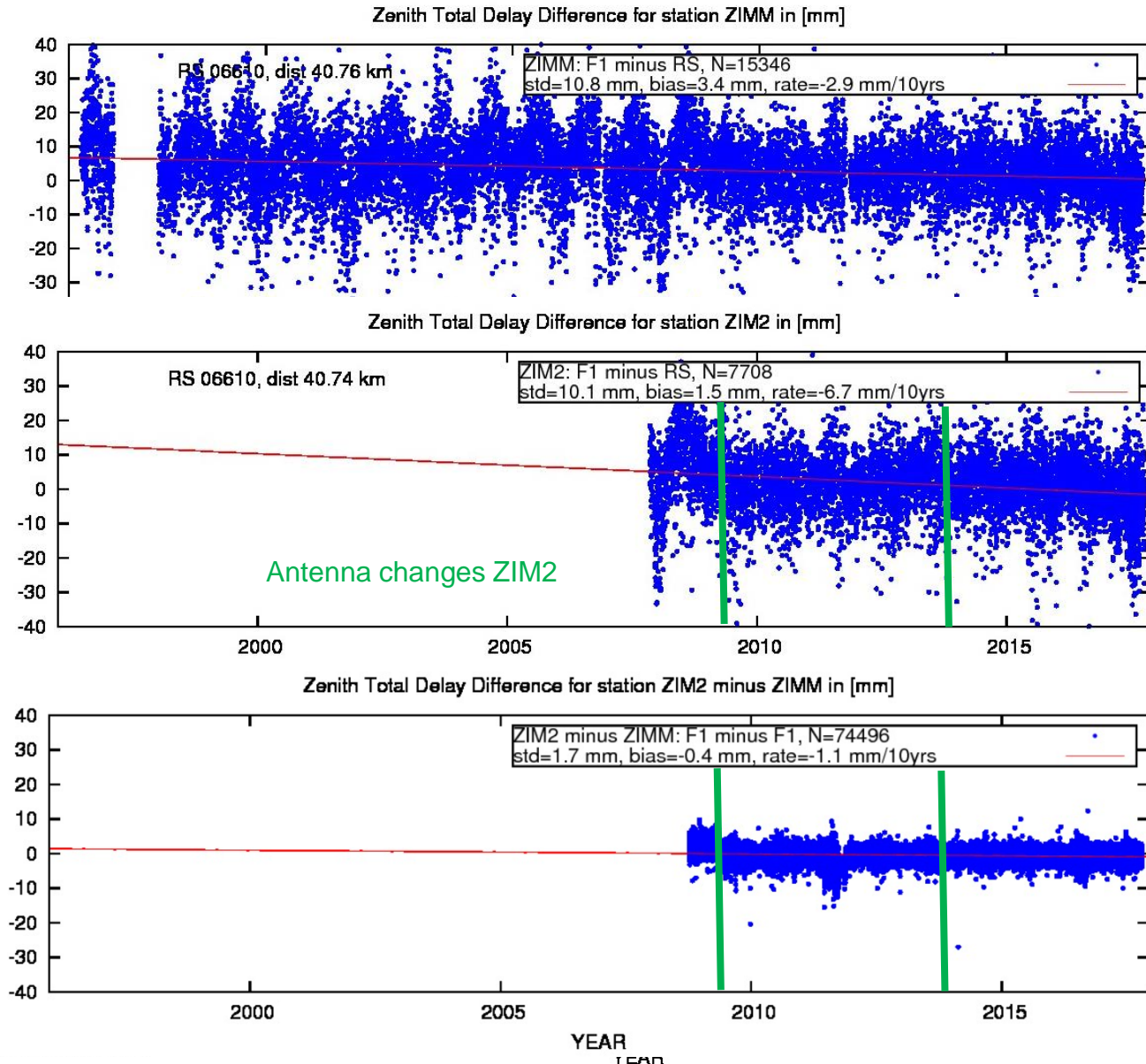


e.g. PAYE: (one out of 60 stations)

http://pnac.swisstopo.admin.ch/pages/en/qsumpaye.html#TRP_RS



ZIMM and ZIMM-ZIM2 difference



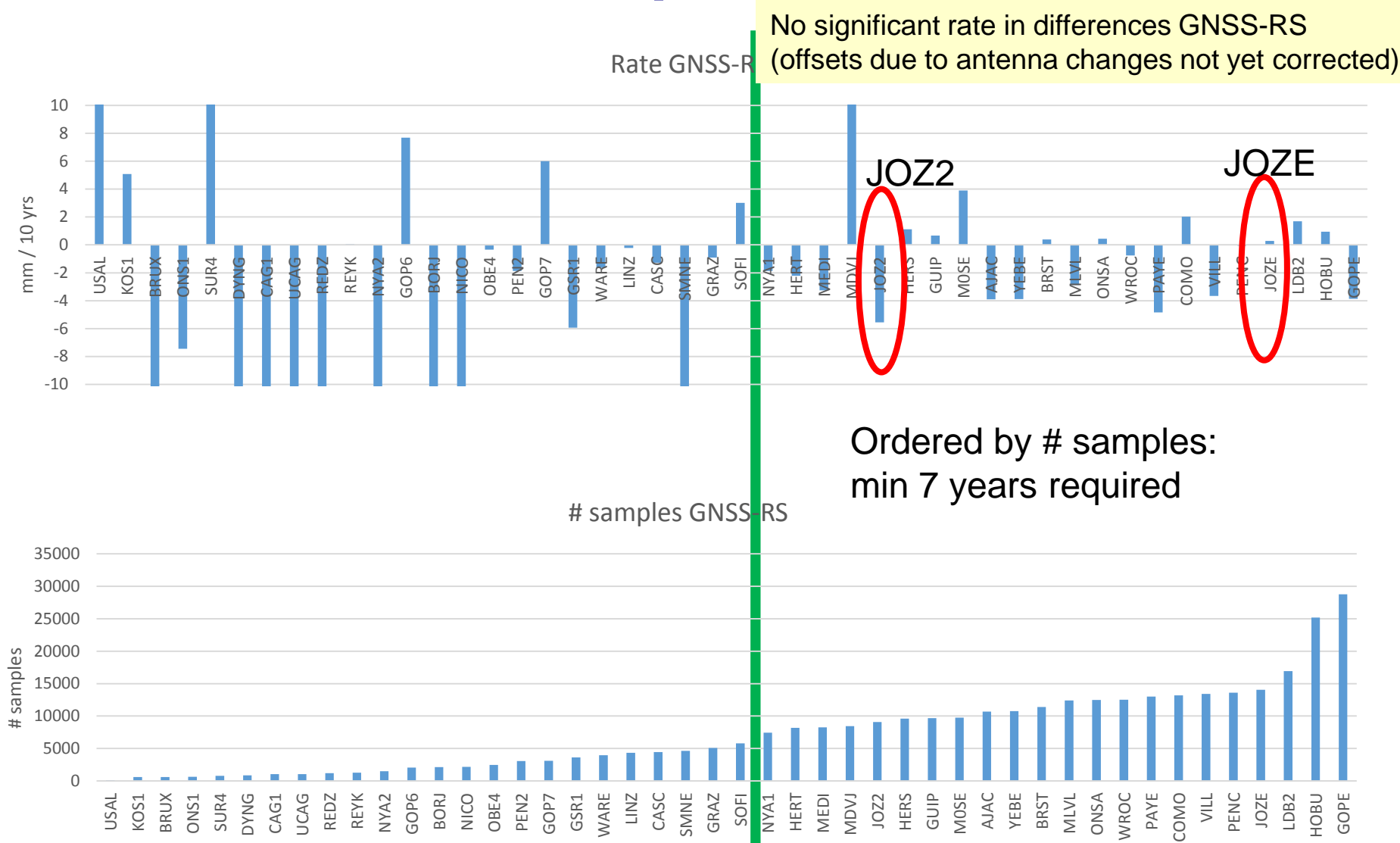
ZIMM -RS

ZIM2 -RS

ZIM2 -ZIMM

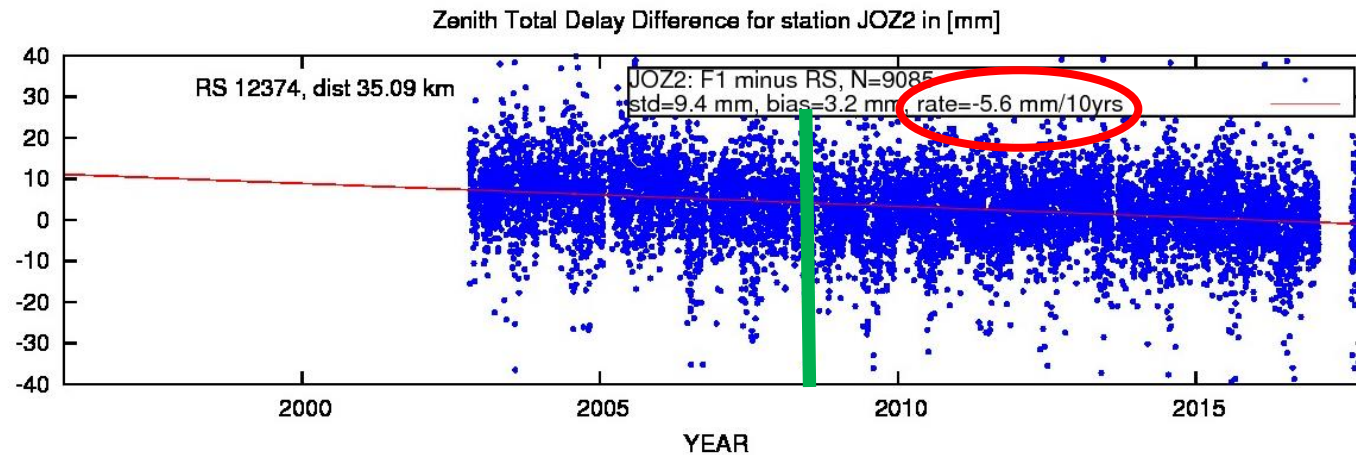


GNSS – RS comparisons: rate



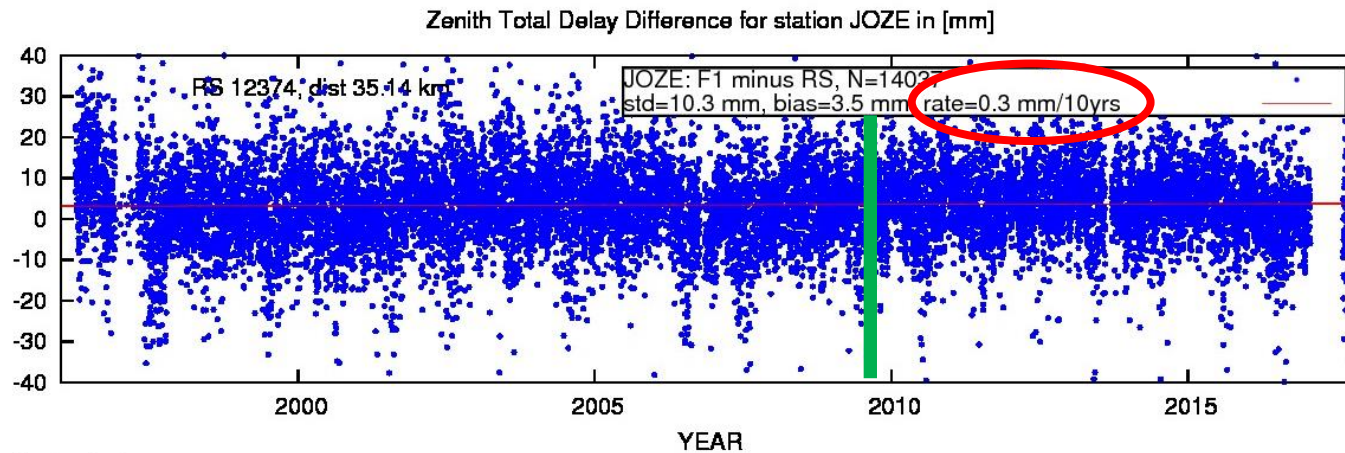


JOZE – JOZ2



19/10/2017 17:13

Antenna changes

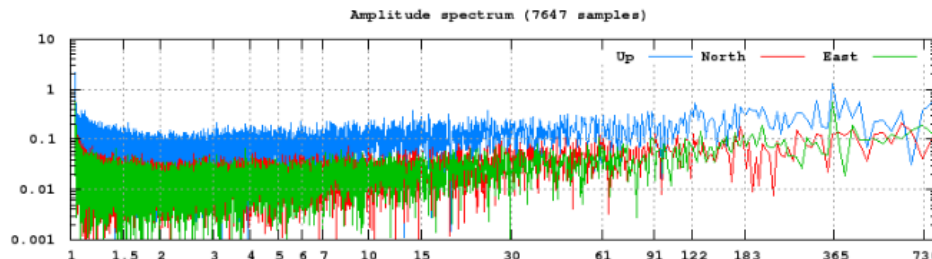
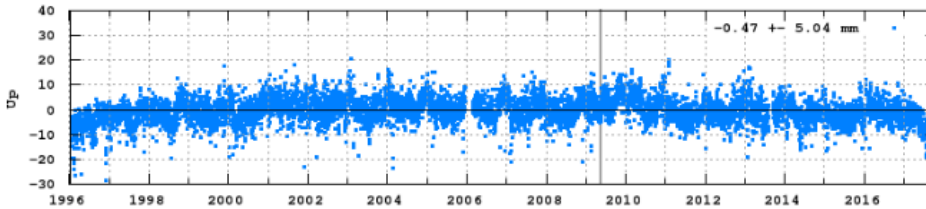
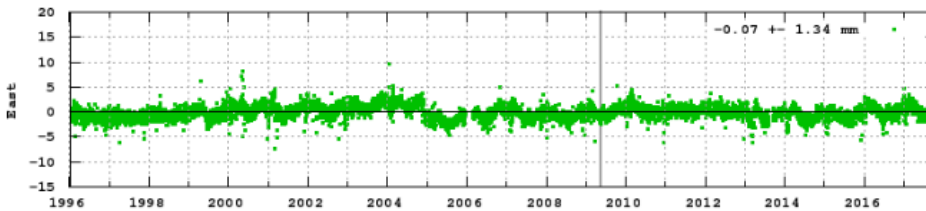
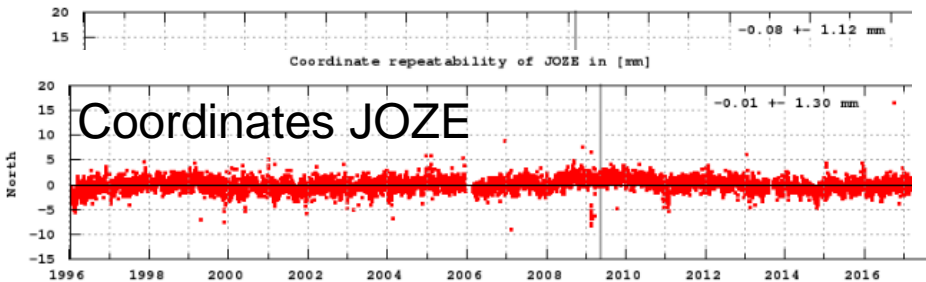
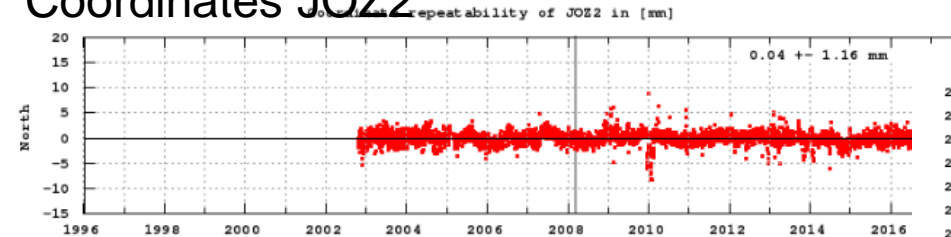


19/10/2017 17:20



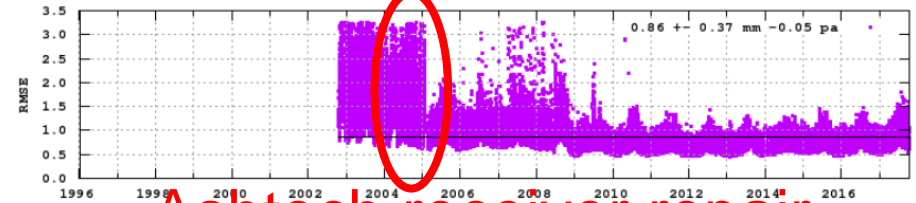
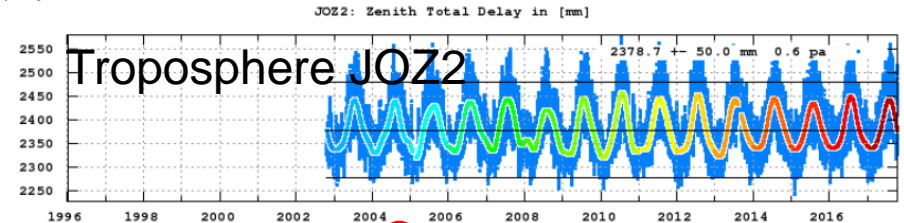
JOZE/JOZ2

Coordinates JOZ2

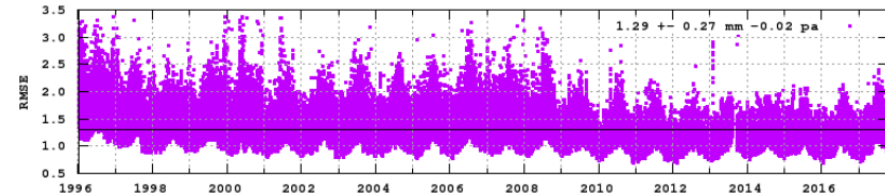
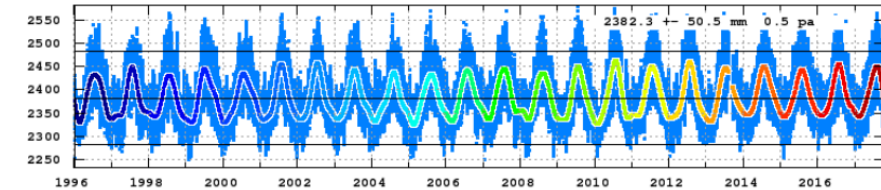


No change 2002 - 2008

joz2_20080318.log
joz2_20021015.log



Ashtech receiver repair



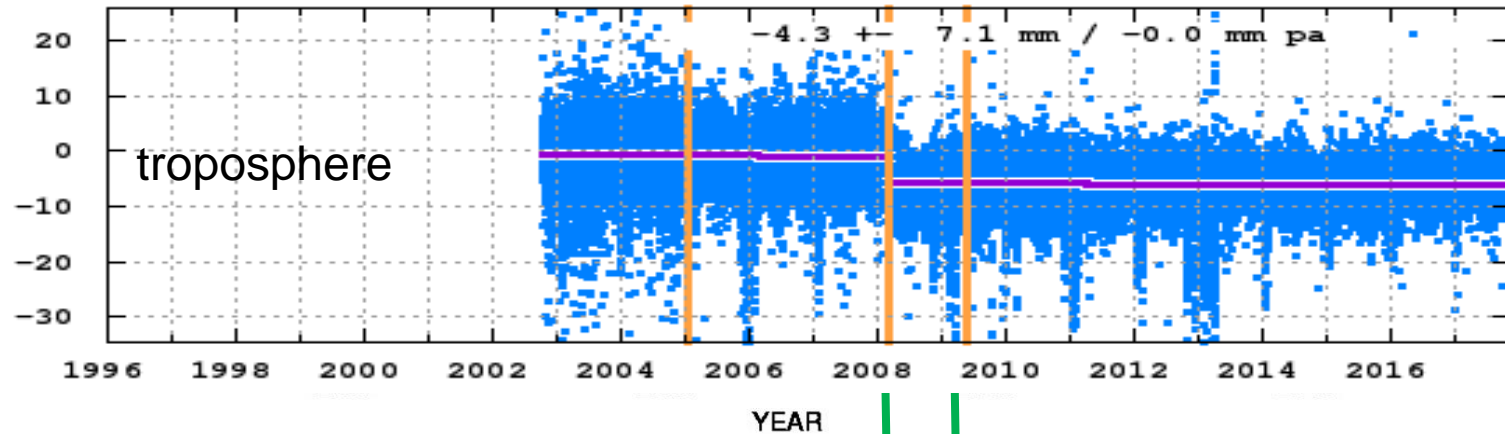
Troposphere JOZE



JOZE – JOZ2: short baselines

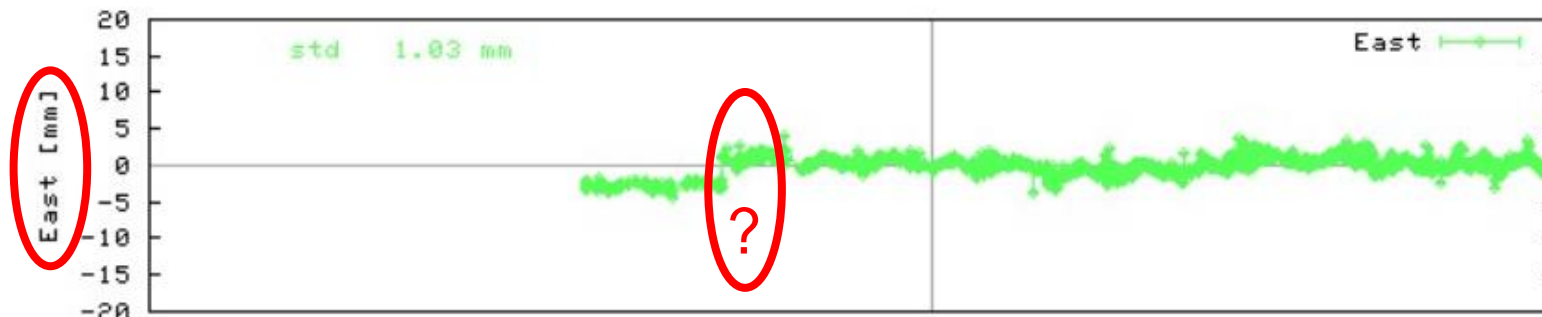
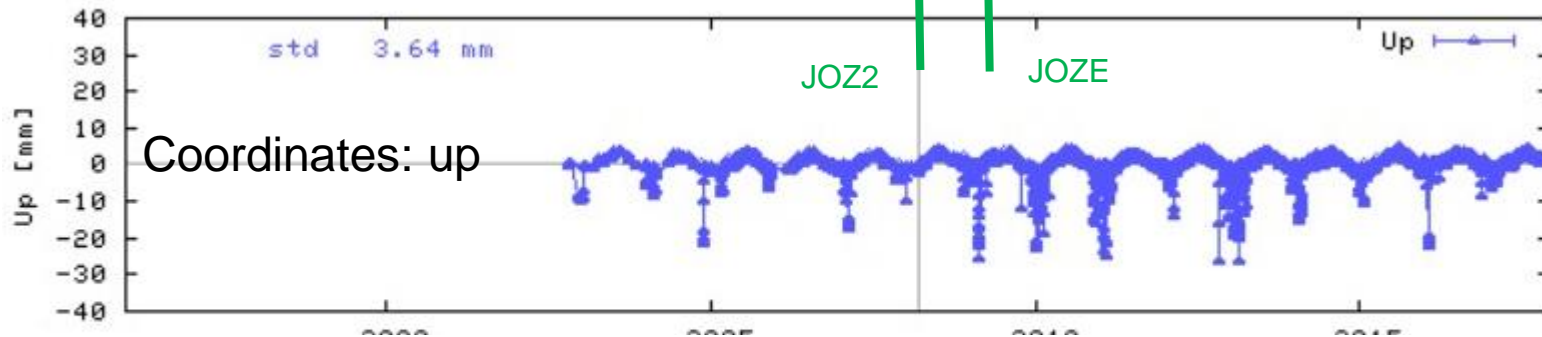
Offset JOZ2 ! estimate rates after offset removal

Zenith Total Delay Difference for station JOZ2 minus JOZE in [mm]



26/10/2017 13:06

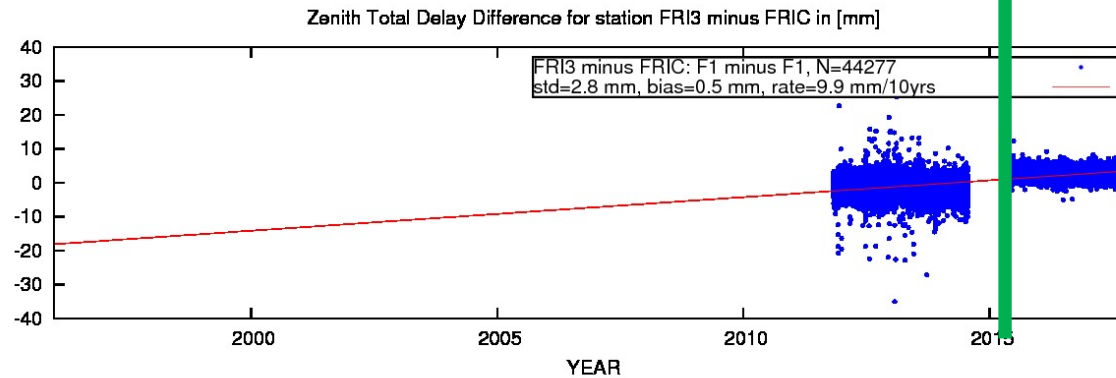
Antenna changes





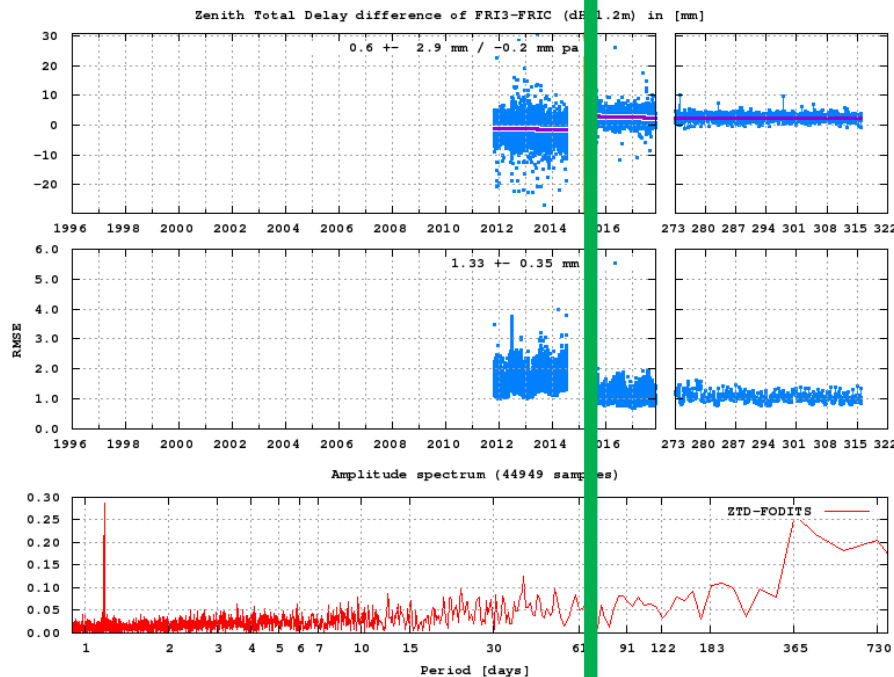
FRI3 - FRIC

Coordinates: 5 cm jump UP



Rate estimate not appropriate

26/10/2017 12:44



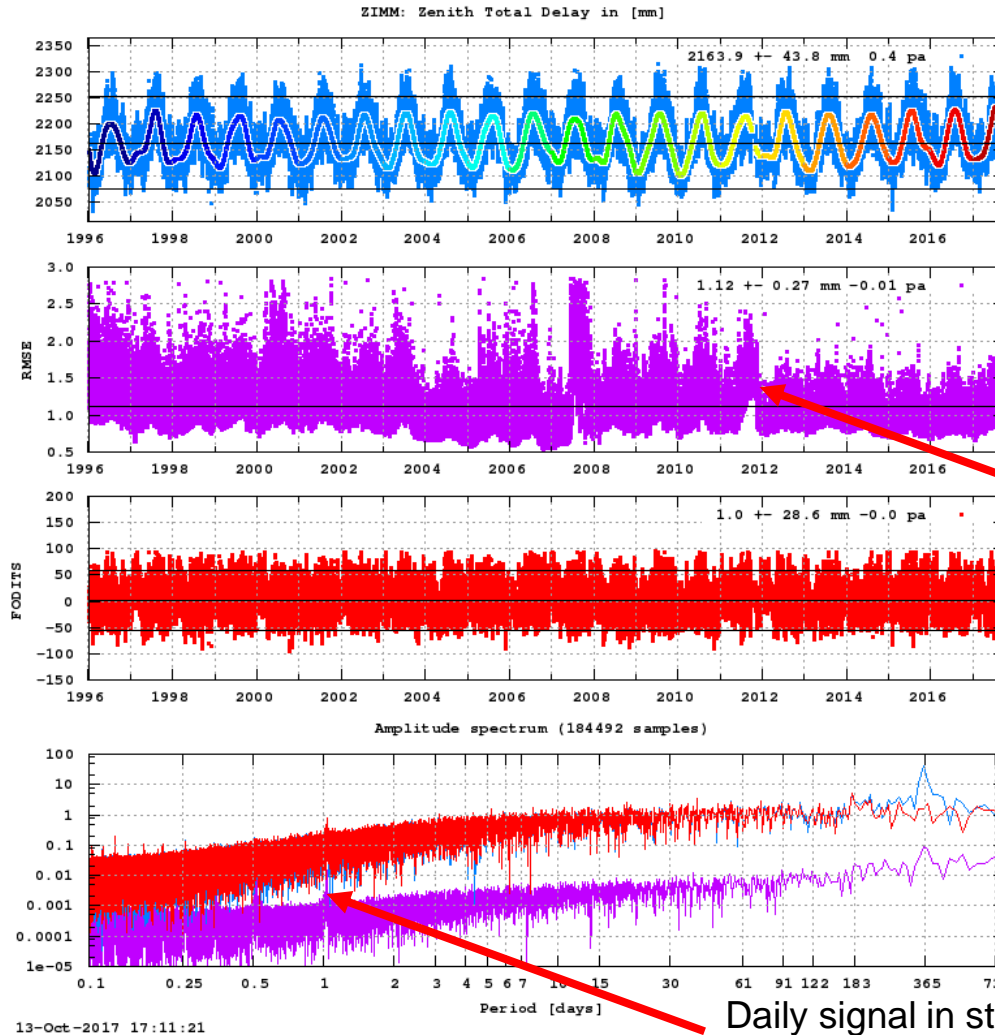
Offsets to be eliminated first

Then, rate may be estimated



Long-term Tropo Plots

since Oct. 2017 !



Fourier Fits

sensitive ZTDs indicate
analysis/equipment
problems

Antenna pre-amplifier
problems

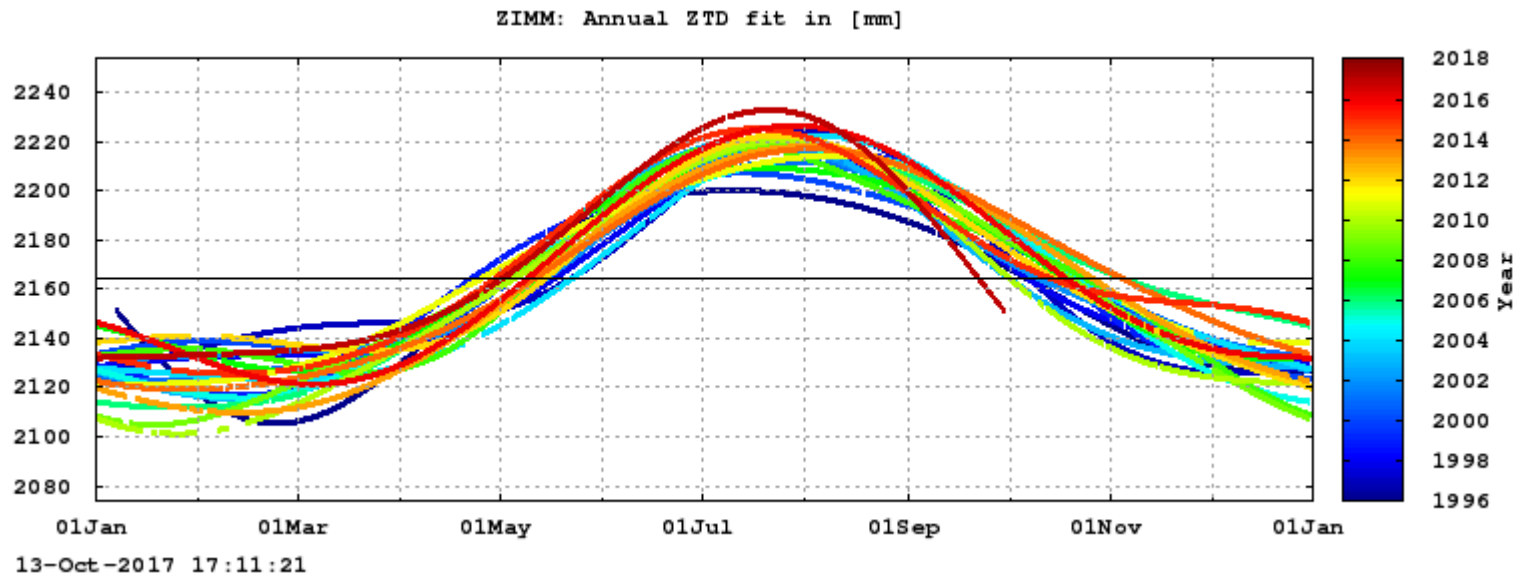
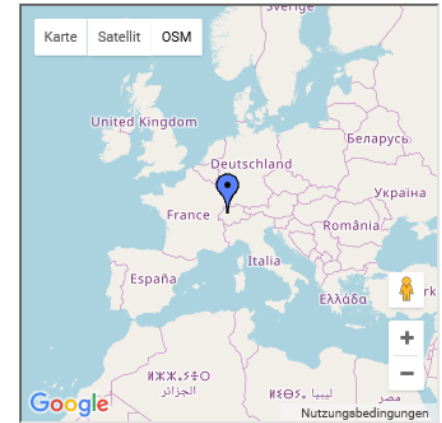
Daily signal in standard deviation
(midnight values are weaker)



Seasonal Effects: ZIMM

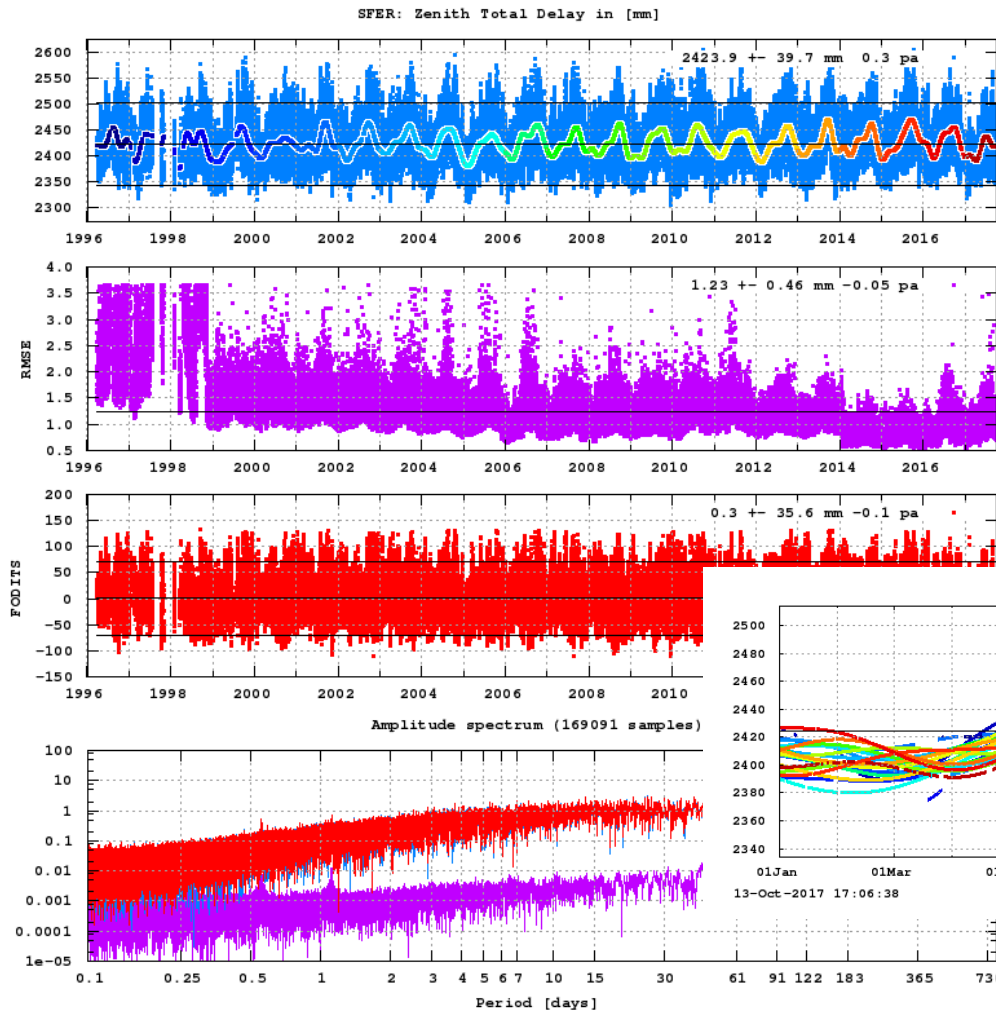
- Recent years (red) seem «wet» compared to older years (blue) in summer

Location

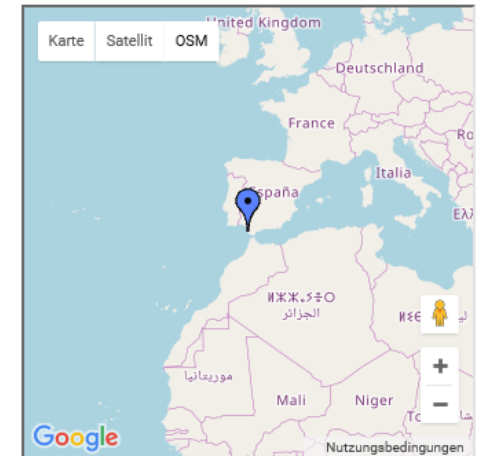




Seasonal Effects: SFER

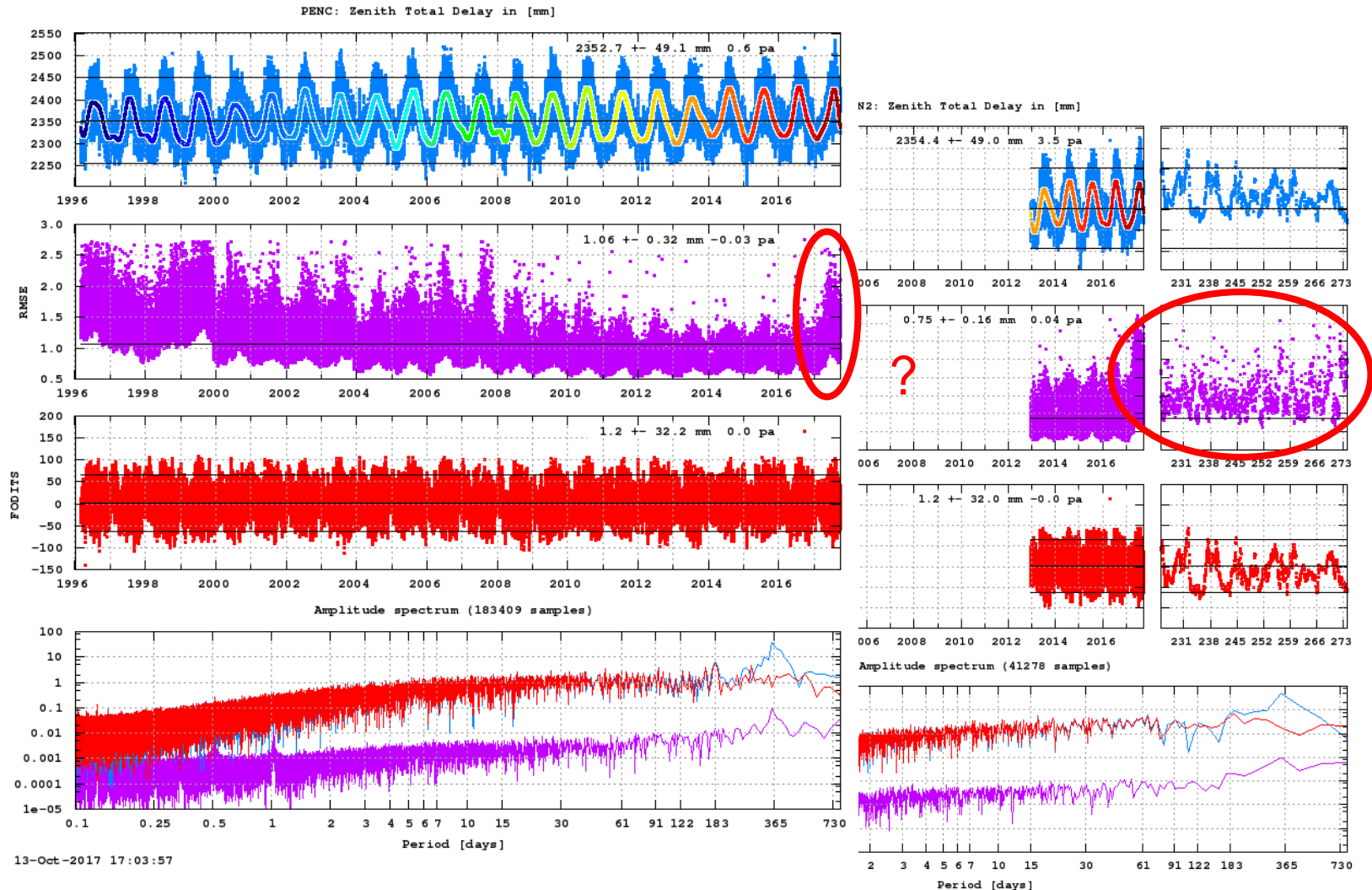


Location





ZTDs with std degradation: PENC/PEN2



13-Oct-2017 17:03:57

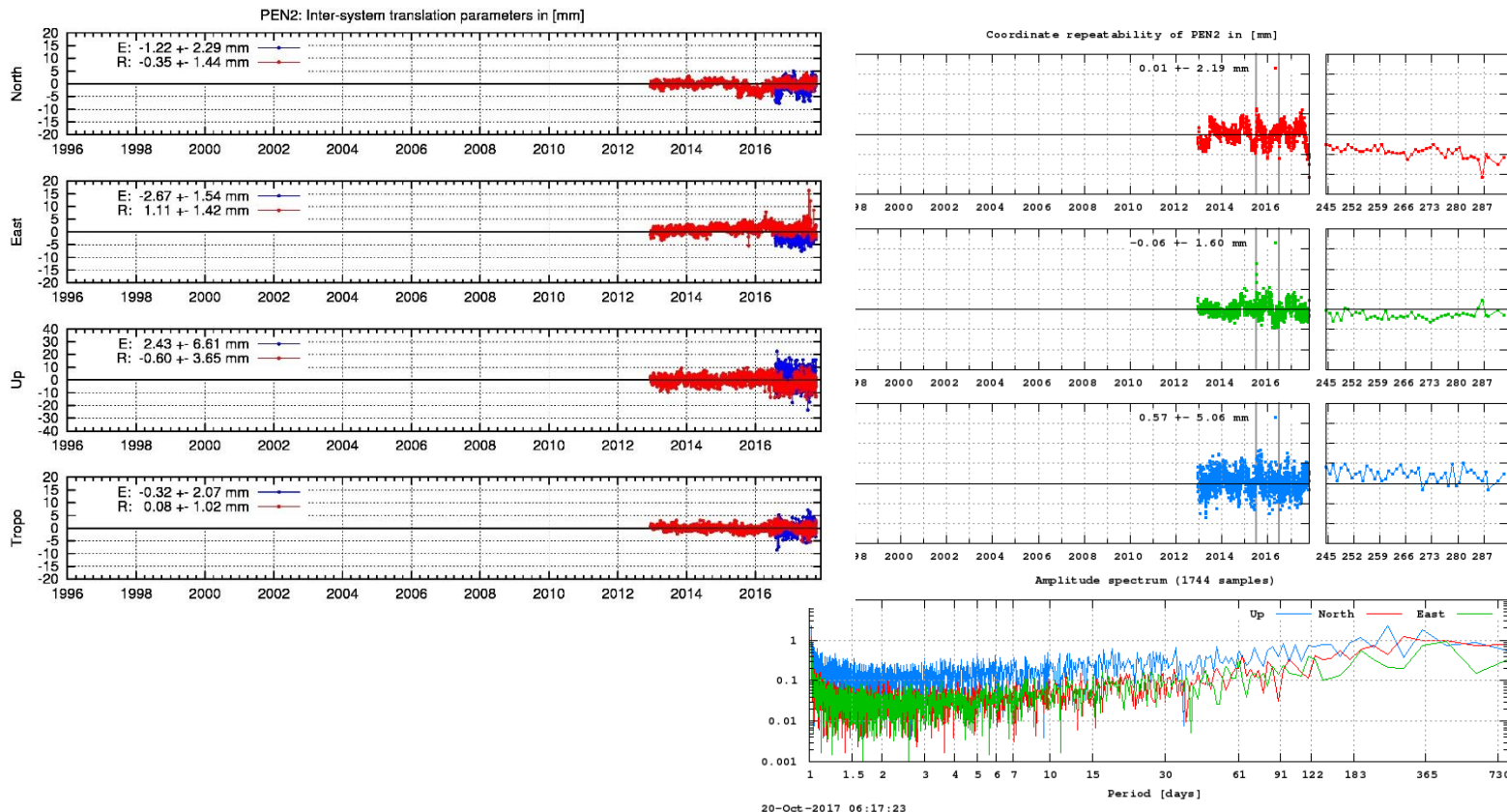
13-Oct-2017 17:29:42



ZTDs with std degradation: PENC/PEN2

Coordinate degradation

- PEN2: 2 (3) events with changes but no indication of equipment changes: Galileo since Mid 2016





Other operational issues: Multi-GNSS

<http://pnac.swisstopo.admin.ch/pages/en/qsumpen2.html#MP>

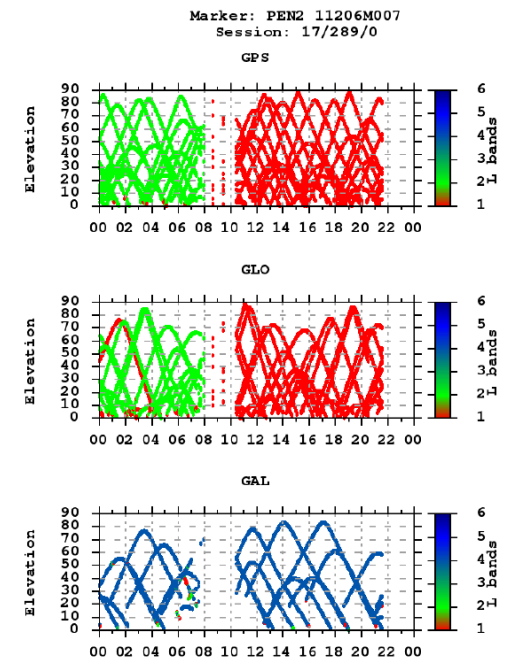
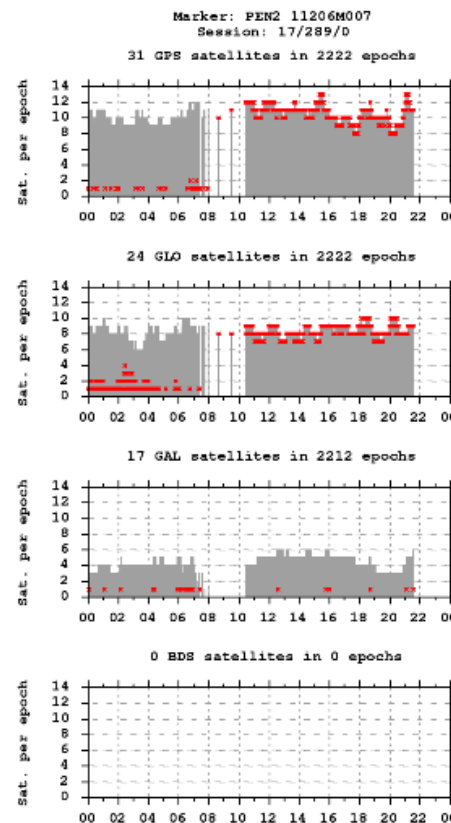
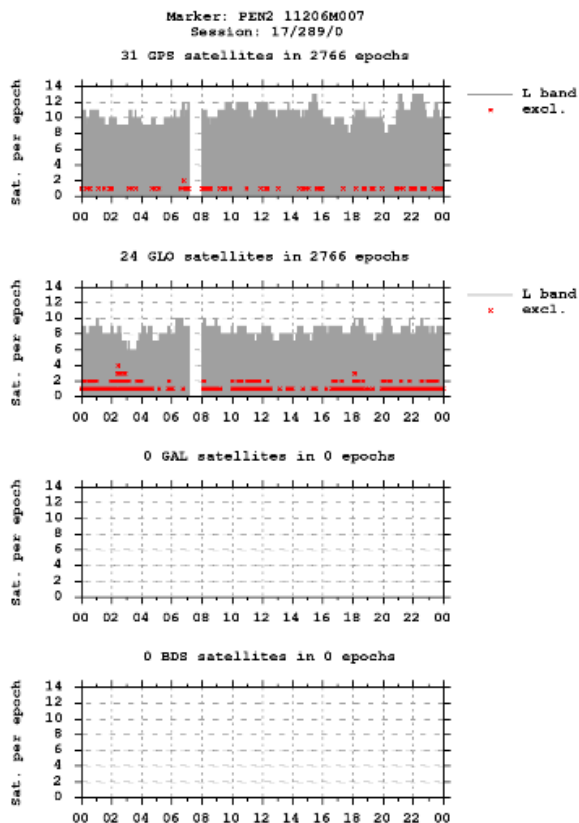


RINEX2



RINEX3

Number of observations (RINEX 2/3) last day





EPN: rapid combination residuals

[illegible][illegible]

RINEX3

Daily data availability (RINEX 2/3)

RINEX3 hourly

- Since Sep 18, 2017: Hourly RINEX3 prior to RINEX2

Hourly R2

[illegible]

```

-----+-----
--<0min;1=0-5min;2=5-10min;3=10-15min;...;+>=45min;

```

Hourly R3

[illegible]

```
-----+-----  
--<0min;1=0-5min;2=5-10min;3=10-15min;...;+>=45min;
```

- Hourly: Last 2 months (1. Oct – 23. Oct): 208 stations
111 stations **R3 (53.4 %)**;
97 stations **R2 (46.6%)**



- # Daily R2

[illegible]
$$- = < 0h; 1 = 0-6h; 2 = 6-12h; 3 = 12-18h; \dots; + = > 2d6h;$$

- AJAC, CAG1, CASC, GUIP, IRBE, LAMP, LFNB, MELI, NOT1, NAY2, OBE4, PADO, SMNE, TLSG, **WAB2**, WROC

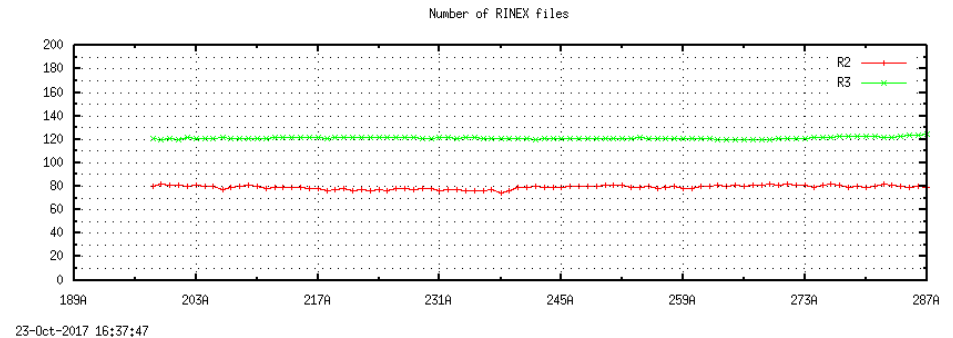


Rinex3 in operational processing

- AGNES (daily):
210 stations

57% Rinex3

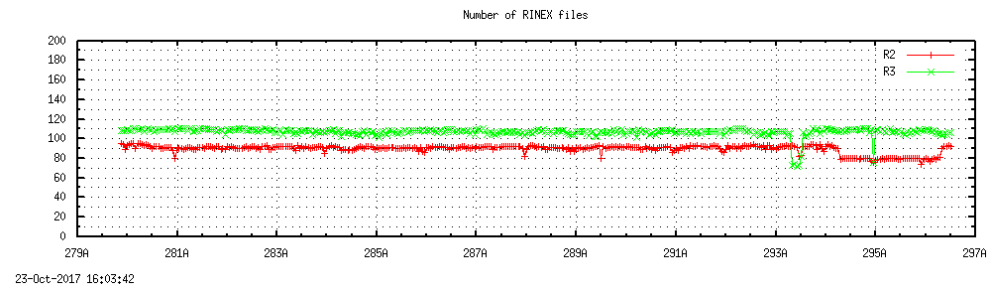
43% Rinex2



- AMET (hourly):
208 stations

53% Rinex3

47% Rinex2





Status / Summary

- ✓ • Multi-GNSS is operational and running (daily since 2016.5)
- ✓ • hourly RINEX3 used for stations if available (hourly processing; since Sep. 2017)
- ✓ • Operational comparisons with RS (60 stations)
- ✓ • Operational long term Tropo evaluations (including short baselines) including jump elimination + annual plots + std plots -> more reliable estimation of ZTD changes in time (“climate”) + detection of possible station problems
please visit: <http://pnac.swisstopo.admin.ch/>
- ✓ • Hourly products: available from GFZ / CODE used for real Multi-GNSS analysis