Royal Observatory
of Belgium

EPN CB News

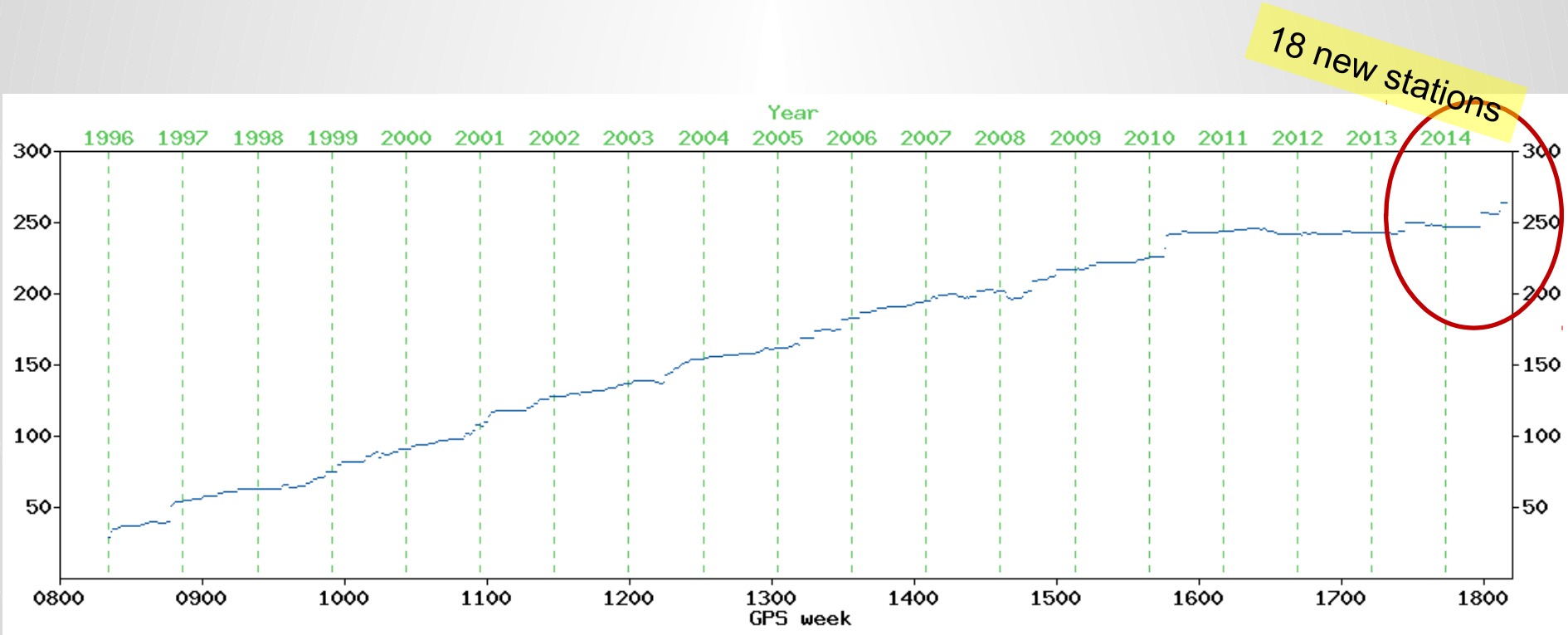
C. Bruyninx

EUREF TWG meeting

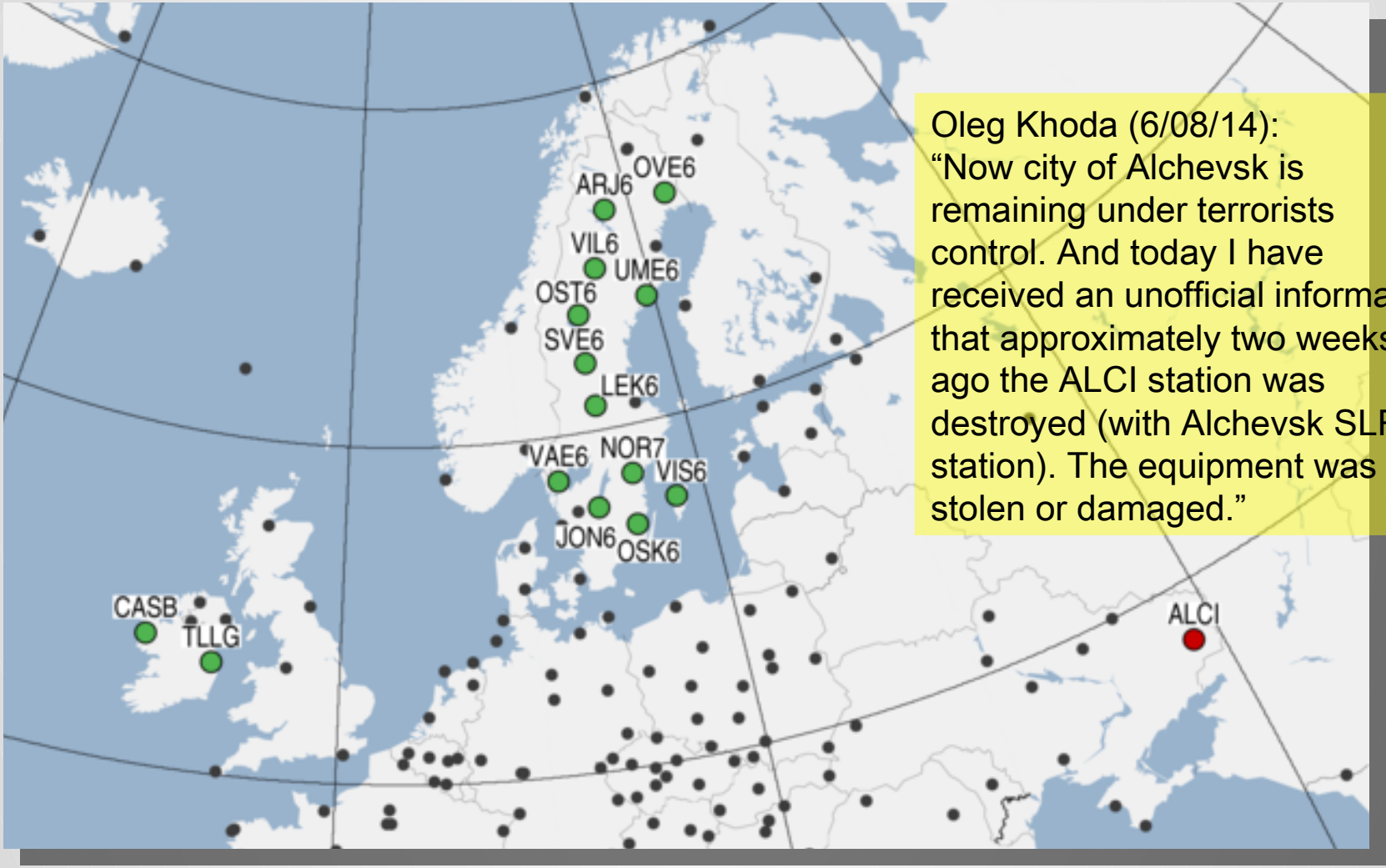
Padua, Nov. 3 2015

- Update on Tracking Network
- Associated EPN stations and Densification Analysis Centres
- EPN ‘flow chart’
- Changes at EPN CB
- Short notes

Update on Tracking Network



Update on Tracking Network



Oleg Khoda (6/08/14):
"Now city of Alchevsk is remaining under terrorists control. And today I have received an unofficial information that approximately two weeks ago the ALCI station was destroyed (with Alchevsk SLR station). The equipment was stolen or damaged."

New EPN Stations

4-CHAR ID	LOCATION	FUNCTION	CALIB	RECEIVER TYPE	# LAC'S	FROM
ARJ6	Arjeplog, Sweden	GLO	Individual	JAVAD TRE_G3TH DELTA	3	22-06-14
CASB	CastleBar, Ireland	GLO	Type	LEICA GRX1200GGPRO	2	21-09-14
HAS6	Hassleholm, Sweden	GLO	Individual	JAVAD TRE_G3TH DELTA	3	28-09-14
JON6	Jonkoping, Sweden	GLO	Individual	JAVAD TRE_G3TH DELTA	3	22-06-14
KAD6	Karlstad, Sweden	GLO	Individual	JAVAD TRE_G3TH DELTA	2	28-09-14
LEK6	Leksand, Sweden	GLO	Individual	JAVAD TRE_G3TH DELTA	2	28-09-14
LOV6	Lovo, Sweden	GLO	Individual	JAVAD TRE_G3TH DELTA	3	28-09-14
NOR7	Norrkoping, Sweden	GLO	Individual	JAVAD TRE_G3TH DELTA	3	22-06-14
OSK6	Oskarshamn, Sweden	GLO	Individual	JAVAD TRE_G3TH DELTA	3	22-06-14
OST6	Ostersund, Sweden	GLO	Individual	JAVAD TRE_G3TH DELTA	2	28-09-14
OVE6	Overkalix, Sweden	GLO	Individual	JAVAD TRE_G3TH DELTA	3	22-06-14
SKE8	Skellefteaa, Sweden	GLO	Individual	JAVAD TRE_G3TH DELTA	3	28-09-14
SVE6	Sveg, Sweden	GLO	Individual	JAVAD TRE_G3TH DELTA	3	22-06-14
TLLG	Dublin, Ireland	GLO	Type	LEICA GRX1200GGPRO	3	21-09-14
UME6	Umea, Sweden	GLO	Individual	JAVAD TRE_G3TH DELTA	3	22-06-14
VAE6	Vanersborg , Sweden	GLO	Individual	JAVAD TRE_G3TH DELTA	3	22-06-14
VIL6	Vilhelmina, Sweden	GLO	Individual	JAVAD TRE_G3TH DELTA	3	22-06-14
VIS6	Visby, Sweden	GLO	Individual	JAVAD TRE_G3TH DELTA	3	22-06-14

Station upgrades

GPS → GPS+GLO(+XXX)

```
2014-08-20T10:00Z
DENT    9    SEPT POLARX2E       GPS
DENT    10   SEPT POLARX4        GPS+GLO+GAL

2014-08-18T13:00Z
DOUR    8    ASHTECH UZ-12       GPS
DOUR    9    SEPT POLARX4        GPS+GLO+GAL

2014-09-09T14:35Z
KUNZ    3    SEPT POLARX2        GPS
KUNZ    4    TRIMBLE SPS855      GPS+GLO+GAL+BDS+SBAS

2014-10-05T20:00Z
QAQ1    3    ASHTECH UZ-12        GPS
QAQ1    4    JAVAD TRE_G3TH SIGMA GPS+GLO+GAL

2014-10-16
STAS    8    TRIMBLE NETR8       GPS
STAS    9    TRIMBLE NETR9       GPS+GLO+GAL+BDS+QZSS+SBAS

2014-09-18T12:30Z
WARE    16   SEPT POLARX2E       GPS
WARE    17   SEPT POLARX4        GPS+GLO+GAL
```

GPS+GLO → GPS+GLO+GAL

```
2014-09-09T13:00Z
BYDG    4    TRIMBLE NETR5         GPS+GLO
BYDG    5    TRIMBLE NETR9         GPS+GLO+GAL+SBAS

2014-09-09T11:00Z
HELG    7    JPS LEGACY         GPS+GLO
HELG    8    JAVAD TRE_G3TH DELTA    GPS+GLO+GAL+SBAS

2014-06-23T08:00Z
RAMO    7    JAVAD TRE_G3T DELTA    GPS+GLO
RAMO    8    JAVAD TRE_G3T DELTA    GPS+GLO+GAL

2014-08-29T11:00Z
ZYWI    7    TRIMBLE NETR5         GPS+GLO
ZYWI    8    TRIMBLE NETR9         GPS+GLO+GAL+SBAS

2014-10-28T14:10Z
USDL    4    TRIMBLE NETR5         GPS+GLO
USDL    5    TRIMBLE NETR9         GPS+GLO+GAL+SBAS

2014-10-28T09:50Z
GWWL    4    TRIMBLE NETR5         GPS+GLO
GWWL    5    TRIMBLE NETR9         GPS+GLO+GAL+SBAS

2014-10-29T11:30Z
REDZ    4    TRIMBLE NETR5         GPS+GLO
REDZ    5    TRIMBLE NETR9         GPS+GLO+GAL+SBAS
```

GPS+GLO=79% of EPN!

Proposed EPN Stations

NOT YET READY TO BE INCLUDED INTO THE EPN

Marker Name	Proposed at	City	Country	DQ (%)		Availability (%)					Latency			Documentation				Meta-data		Rele-vance to EPN	Data		Interested analysis centres
				0°	15°	Daily		Hourly		RT	Hourly(%)		RT (s)	CL	SL	SP	NC	Daily	RT		AC	DQ	
						BKG	OLG	BKG	OLG		BKG	OLG											
CAG1	2014-02-13	CAGLIARI	Italy	_	_	0	0	0	0	_	0	0	_	✔	✔	✔	__	✘	__	R, E	T	✘	IGE
KIR8	2013-09-20	Kiruna	Sweden	_	_	0	0	50	0	_	0	0	_	✔	✔	✔	__	✘	__	R, E	I	✘	NKG
KNJA	2012-03-14	Knjazevac	Serbia	_	_	0	0	0	0	_	0	0	_	✘	✔	✔	__	✔	__		T	✔	RGA
MAR7	2013-09-20	Gavle	Sweden	_	_	0	0	0	0	_	0	0	_	✔	✔	✔	__	✘	__	R, E	I	✘	BKG, NKG
NPAZ	2011-05-04	Novi Pazar	Serbia	_	_	0	0	0	0	_	0	0	_	✔	✔	✔	✔	✔	__	R	T	✔	OLG, RGA, SGO, SUT, WUT
OBE4	2012-11-14	Oberpfaffenhofen	Germany	95	97	96	32	99	99	_	95	95	2.0	✔	✔	✔	__	✔	✔	R, E	I	✔	BKG, ROB
ONS1	2013-09-20	Onsala	Sweden	_	_	0	0	0	0	_	0	0	_	✔	✔	✔	__	✘	__	R, E	I	✘	BKG, NKG, ROB
PLND	2011-05-04	Plandiste	Serbia	_	_	0	0	0	0	_	0	0	_	✔	✔	✔	✔	✔	__	R	T	✘	BKG, OLG, RGA, SGO, SUT
RANT	2014-05-14	Rantum / Island Sylt	Germany	96	98	100	100	100	94	84	91	42	1.2	✔	✔	✔	__	✔	✔	R, E, C	I	✘	BKG, LPT, ROB
SABA	2011-05-04	Sabac	Serbia	_	_	0	0	0	0	_	0	0	_	✔	✔	✔	✔	✔	__	R	T	✘	OLG, RGA, SGO, SUT
SELV	2012-03-05	Selvagem Grande Island	Portugal	_	_	0	0	0	0	_	0	0	_	✔	✔	✔	__	✔	__	R	T	✔	BEK
SUN6	2013-09-20	Sundsvall	Sweden	94	98	100	100	100	100	_	99	99	_	✔	✔	✔	__	✔	__	R	I	✔	NKG, ROB
YLDZ	2014-08-07	Yildiz	Turkey	_	_	0	0	0	0	_	0	0	_	✔	✘	✔	__	✘	__		✘	✘	

Move with the mouse over the red cross for more information.

Duplicate Antenna SN (Reported TWG 10/2013)

Station	Antenna/Radome	Full Serial number	Part used of SN	Indiv. Calib.
SUN6	LEIAR25.R3 LEIT	08490012	90012	YES
VALE	LEIAR25.R3 LEIT	10190012	90012	YES

Individual calibration file: ftp://epncb.oma.be/pub/station/general/epnc_08.atx

```
LEIAR25.R3       LEIT90012                                  START OF ANTENNA
ROBOT                  Geo++ GmbH              1    2010-08-11METH / BY / # / DATE
     5.0                                                    DAZI
     0.0  90.0    5.0                                      ZEN1 / ZEN2 / DZEN
     4                                                      # OF FREQUENCIES
EPNC                                                        SINEX CODE
INDIVIDUAL ANTENNA CALIBRATION                              COMMENT
Miguel Angel Cano Villaverde                                COMMENT
STATION: VALE                                               COMMENT
     Date Installed           : 2010-09-16T00:00Z           COMMENT
     Date Removed             : CCYY-MM-DDThh:mmZ           COMMENT
```

→ Cannot be handled by Bernese 5.2

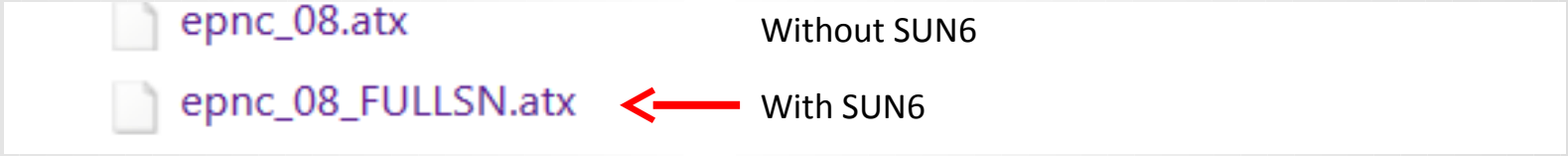
End 2013:

Proposal by Bernese group: change SN of SUN6 antenna to artificial number

Solution available

with help of T. Liwosz and L. Jivall

1) Change Bernese code (ATX2PCV.f90 and SINSTORE.f90) + documentation
2) Create and maintain at EPN CB :
   - Additional individual calibration file with FULL SN info



   - Additional Bernese STA file with FULL SN info

2) Implementation done at ROB (backwards compatible) → OK
3) Proposal sent to Bernese group on 30/07/14 for inclusion in bug updates (or future release)
4) Used for operational EPN solution at ROB.

- Update on Tracking Network
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EUREF Strategic Plan

- Prepared in order to define EUREF position wrt EPOS
- Latest version Feb.12, 2014
- Discussed at EUREF TWG meeting in Gävle (March 2014)

EUREF Strategic Plan

Associated EPN stations

EUREF can give a more official status to the non-EPN GNSS stations included in the **densification of the EPN and make them** 'associated EPN stations'.

- operate following EPN standards
- agree to maintain station configuration
  meta-data (site log) themselves (or through an associated center or the EPN CB) and make them available for public use.
- (no RINEX data distributed/checked in the frame of EUREF)

Densification Analysis Centers

The associated EPN stations are typically analyzed by a national Analysis Center (AC) operating following EPN guidelines. EUREF propose to give a more official status to the AC by giving them the status of **EPN Densification Analysis Centers** (DAC)

- analyzing the data from a national network of associate EPN stations (complemented with some EPN stations) and submit weekly positions solutions (SINEX format) to the EPN Reference Frame Coordinator.
- The DAC analyze the GNSS data for their network following the same EPN guidelines as the EPN LAC.

In addition

Need to improve visibility of

- EPN densification activity

  Dedicated web pages required at EPN CB

- EPN Analysis Centres

  Discussion amongst little core group at EUREF symp. in Vilnius

  → Reorganise AC! LAC → AC

PRODUCTS & SERVICES > **DATA ANALYSIS**

ANALYSIS CENTRES	EPN STATIONS						EPN DENSIFICATION STATIONS
	Positions				Tropospheric parameters		Positions
	Final (weekly/daily)	Rapid	Ultra Rapid	Repro 1 - 2	Final	Repro 1 - 2	
ASG-EUPOS				/			x
ASI	x	x	x	x/			
BAS				/			x
BEK	x	x		x/			
BKG	x	x	x	x/			x
COE	x	x		/			
DEO	x			x/			
GKU				/			x
GOP	x			x/			
HEPOS				/			x
IGE	x	x		x/			
IGN	x	x		x/			x
K				/			x
LPT	x	x	x	x/			
LS				/			x
MAAAMET				/			x
MUT	x	x		x/			
NGI				/			x
NKG	x	x		x/			
OLG	x	x		x/			x
RGA	x	x		/			
ROB	x	x		x/			
SGO	x	x		x/			x
SUT	x	x		x/			
TU				/			x
UPA	x	x		x/			x
WUT	x	x		x/			

Discussions at Budapest symposium → no distinquishing between AC

Example web page (DRAFT!)

Based on info provided by Ambrus

Example web page (DRAFT!)

NETWORK & DATA > **ASSOCIATED STATIONS MAP**

INTERACTIVE MAP

Legend

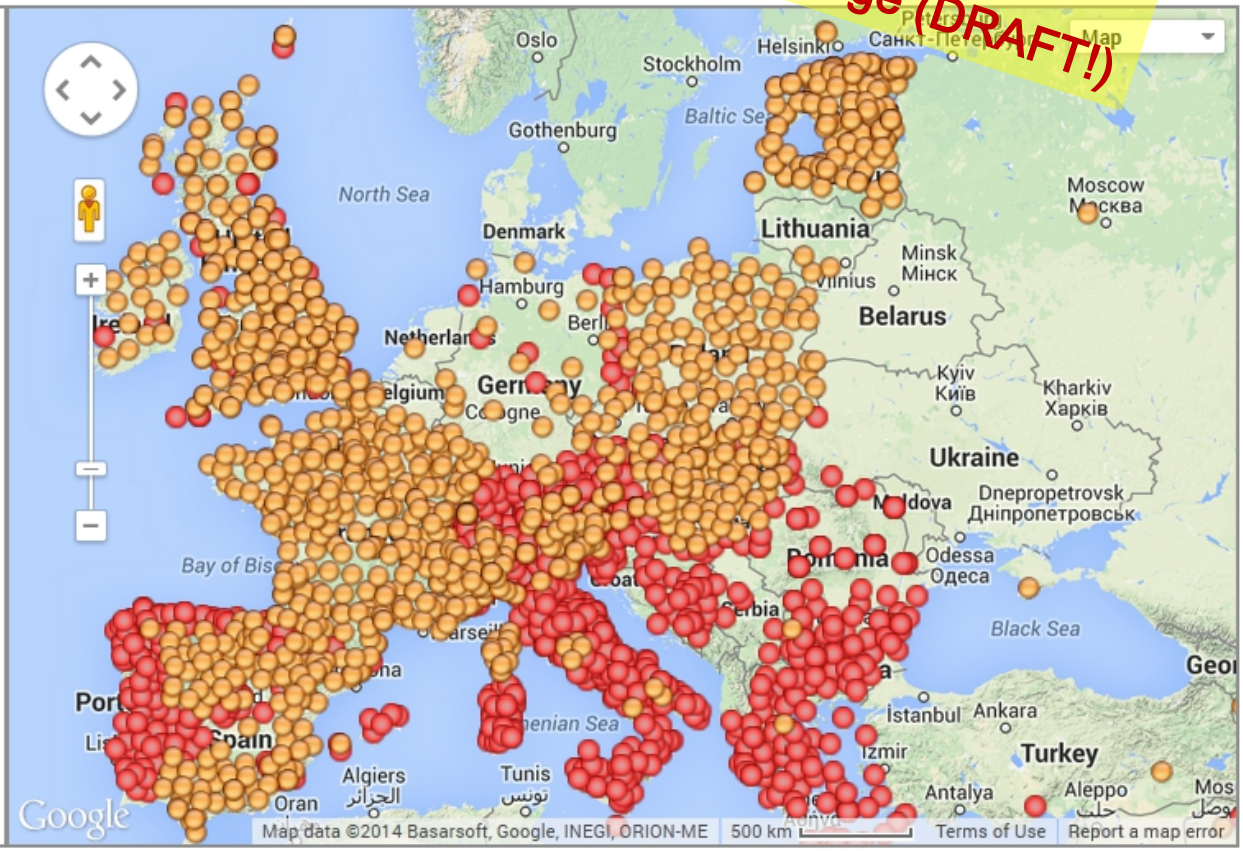
EPN stations

stations with official DOMES Nb

stations with virtual DOMES Nb

Locate station on map

- Select a station -



Future developments

- Allow associated EPN stations to maintain and store meta data at EPN CB
  - Step 1: allow inclusion of non EPN stations in OC form → internal software developments done
  - Step 2: adapt site log submission to accept meta data for associated EPN stations → internal software developments in progress
  - Step 3: start inviting OC&'DAC' to submit OC form → contacts with ICGC (Anna Baron) as a first test case
  - Step 4: adapt EPN CB web pages to distinguish between associated and core EPN stations → nothing done, only ideas and discussions with Ambrus

Future developments

- Improve visibility of EPN densification activity
  - Dedicated web pages for EPN densification
  - Implement associated EPN stations (see previous slide)
  - Re-organise LAC web pages → AC web pages with all categories of AC → in progress (collecting meta-data: AC info)

If OK on the principle, then

FIRST: update some of our guidelines

- Stations & operation centers
- Analysis centres

- Update on Tracking Network
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Background

- EUREF symp. in Vilnius:
  - Request from J. Dousa to review EPN CB content related to “Organisaton”
    - → Provide EPN info in a nutshell for ‘outsiders’
    - → Increase visibility of AC

EPN ‘Organisation’

Need for ‘flow chart’ explaining relations between EPN components reflecting recent (and future) activities related to EPN

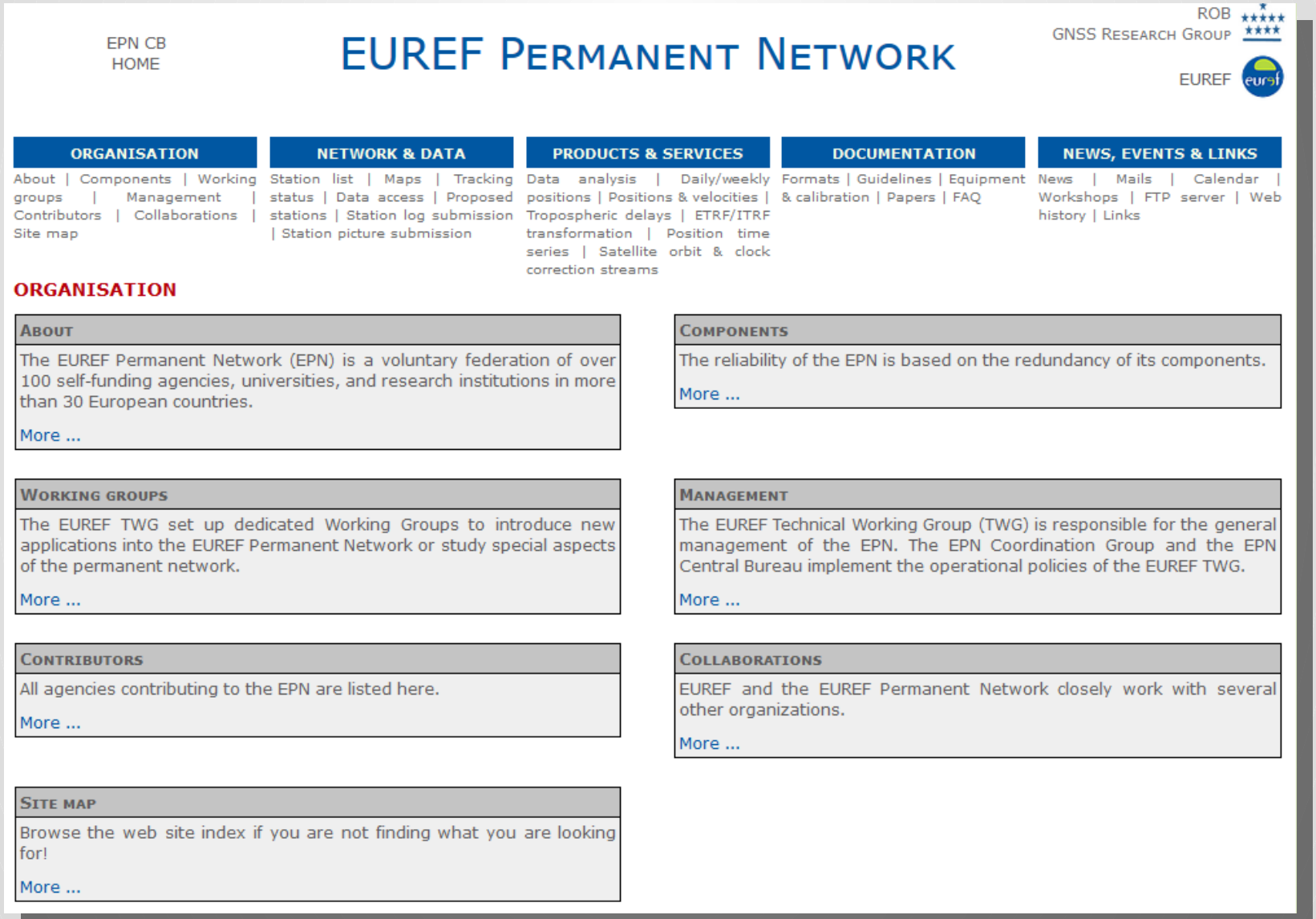
Discussion started within TWG

June → Sept. 2014

Final decision on flow chart postponed to fall TWG

‘Organisation’ updated without flow chart

EPN ‘Organisation’



EPN CB HOME

EUREF PERMANENT NETWORK

ROB GNSS RESEARCH GROUP

EUREF

ORGANISATION | **NETWORK & DATA** | **PRODUCTS & SERVICES** | **DOCUMENTATION** | **NEWS, EVENTS & LINKS**

About | Components | Working groups | Management | Contributors | Collaborations | Site map

Station list | Maps | Tracking status | Data access | Proposed stations | Station log submission | Station picture submission

Data analysis | Daily/weekly positions | Positions & velocities | Tropospheric delays | ETRF/ITRF transformation | Position time series | Satellite orbit & clock correction streams

Formats | Guidelines | Equipment & calibration | Papers | FAQ

News | Mails | Calendar | Workshops | FTP server | Web history | Links

ORGANISATION

About

The EUREF Permanent Network (EPN) is a voluntary federation of over 100 self-funding agencies, universities, and research institutions in more than 30 European countries.

More ...

Components

The reliability of the EPN is based on the redundancy of its components.

More ...

Working groups

The EUREF TWG set up dedicated Working Groups to introduce new applications into the EUREF Permanent Network or study special aspects of the permanent network.

More ...

Management

The EUREF Technical Working Group (TWG) is responsible for the general management of the EPN. The EPN Coordination Group and the EPN Central Bureau implement the operational policies of the EUREF TWG.

More ...

Contributors

All agencies contributing to the EPN are listed here.

More ...

Collaborations

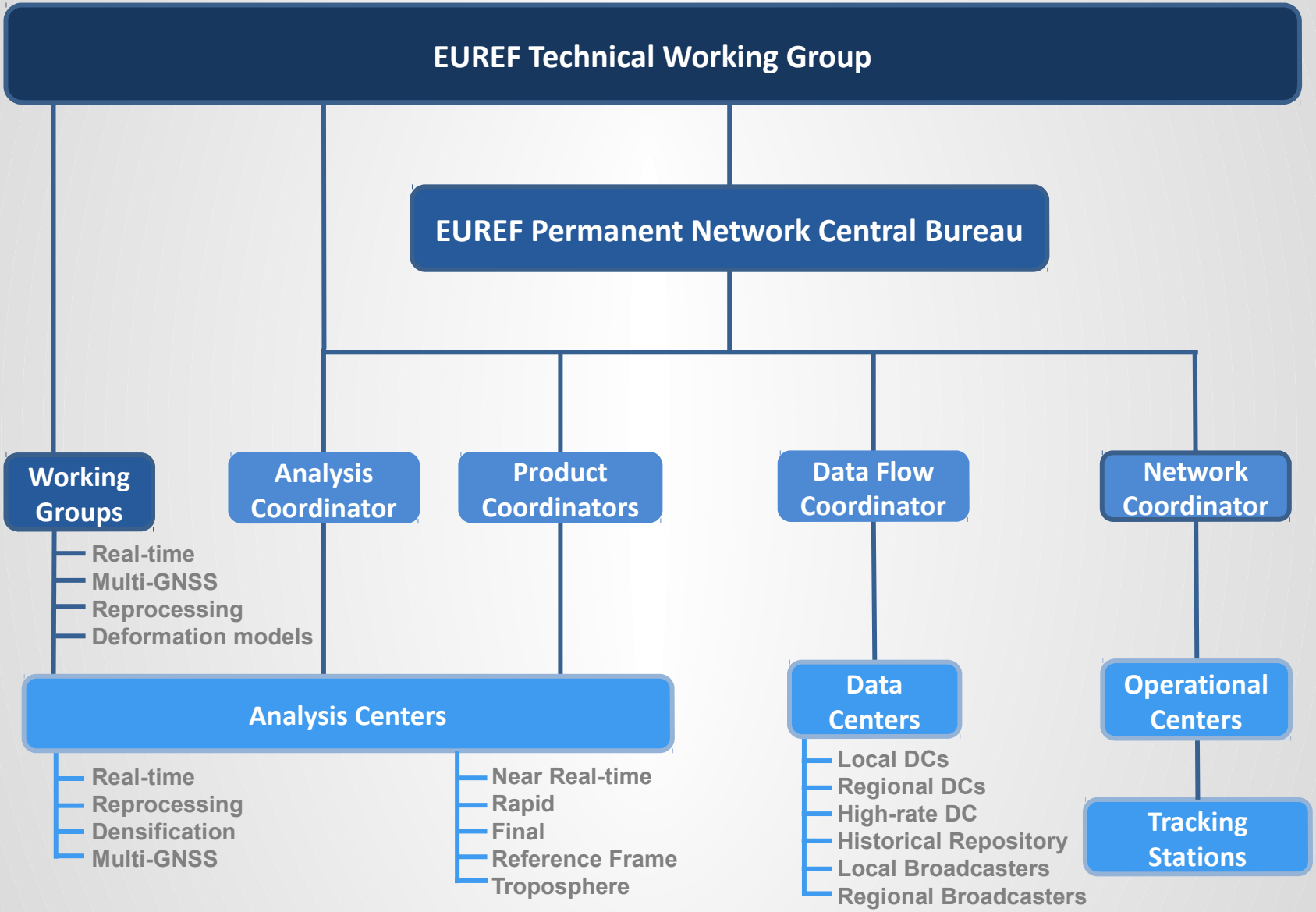
EUREF and the EUREF Permanent Network closely work with several other organizations.

More ...

Site map

Browse the web site index if you are not finding what you are looking for!

More ...


EUREF Technical Working Group
EUREF Permanent Network Central Bureau
Working Groups
Real-time
Multi-GNSS
Reprocessing
Deformation models
Analysis Coordinator
Product Coordinators
Data Flow Coordinator
Network Coordinator
Analysis Centers
Real-time
Reprocessing
Densification
Multi-GNSS
Near Real-time
Rapid
Final
Reference Frame
Troposphere
Data Centers
Local DCs
Regional DCs
High-rate DC
Historical Repository
Local Broadcasters
Regional Broadcasters
Operational Centers
Tracking Stations

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Position Time Series

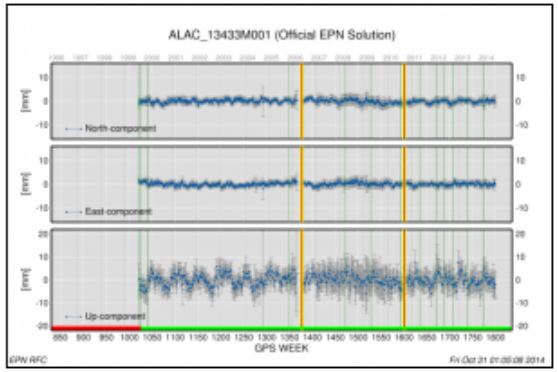
PRODUCTS & SERVICES > POSITION TIME SERIES > **ALAC_13433M001 (Alicante, Spain)**

EPN station position time series:
(select a station)

Other residual position time series: ITRF2008

MULTI-YEAR EPN SOLUTION

Official, solutions included up to July 06, 2014 (GPS wk 1800)



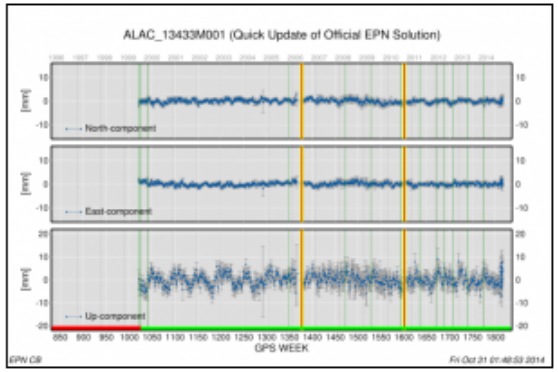
Residual position time series of the cumulative EPN solution (tied to IGS08) with as input:

1. the reprocessed weekly EPN solutions up to GPS week 1408 (corrected to be in accordance with the epn_08.atx antenna calibration model)
2. the weekly (routine) EPN solutions from GPS week 1409 till 1631 (corrected to be in accordance with the epn_08.atx antenna calibration model)
3. the weekly (routine) EPN solutions from GPS week 1632 till 1800

The North, East, Up-components are the position residuals with respect to the estimated station positions and velocities. During the estimation, position outliers have been eliminated and discontinuities have been introduced.

Display outliers eliminated from combination: 1275-1275
Display estimated position shifts
Download residual time series data

Extended, solutions included up to October 29, 2014 (GPS wk 1816 dow 3)



Residual position time series of the cumulative EPN solution with as input:

1. the reprocessed weekly EPN solutions up to GPS week 1408 (corrected to be in accordance with the epn_08.atx antenna calibration model)
2. the weekly (routine) EPN solutions from GPS week 1409 till 1631 (corrected to be in accordance with the epn_08.atx antenna calibration model)
3. the weekly (routine) EPN solutions, from GPS week 1632 till 1680
4. the weekly (routine) EPN solutions, from GPS week 1681 till 1811
5. the daily (routine) EPN solutions, from GPS week 1812 dow 0 till GPS week 1816 dow 3

The North, East, Up-components are the position residuals of each weekly (or daily) solution with respect to the estimated station positions and velocities.
Parts 1), 2) and 3) correspond to the latest official EPN solution and have been corrected for outliers and discontinuities.

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IGS infrastructure Committee

Release of RINEX 3.02 transition plan for discussion.

(see multi-GNSS …)

EPN CB activities wrt RINEX3

March 2014

- Check meta data in header of RINEX 3 data (crosscheck with site log, RINEX 2) → station manager notifications

May 2014

- Actively push station managers to submit RINEX 3.02 instead of RINEX 3.01

Aug. 2014

- Check validity of RINEX 3.02 format → station manager notifications ready in Nov. 2014

Details in report of Multi-GNSS WG

Trimble Dorne Margolin Antenna

Received from Unavco on Oct. 24, 2014

PRODUCT BULLETIN

INFRASTRUCTURE

February 2014

Choke Ring Antenna: Inspection

Summary

Trimble has identified that a small number of choke ring antennas (P/Ns 29487-xx/59800-xx, 29587-xx/59900-xx) shipped between 3 December 2007 and 13 December 2013 may be prone to experiencing a premature L2 LNA failure. Affected units are not able to track the L2 frequency/signal.

Trimble recommends that all users who are planning to deploy or have already deployed choke ring antennas shipped during this period verify the antenna operation with respect to L2 tracking. If the antenna does not track the L2 frequency / signal it is considered "affected". If you require assistance on how to perform this verification, contact Trimble Infrastructure Support by sending an email to infrastructure_support@trimble.com.

Solution

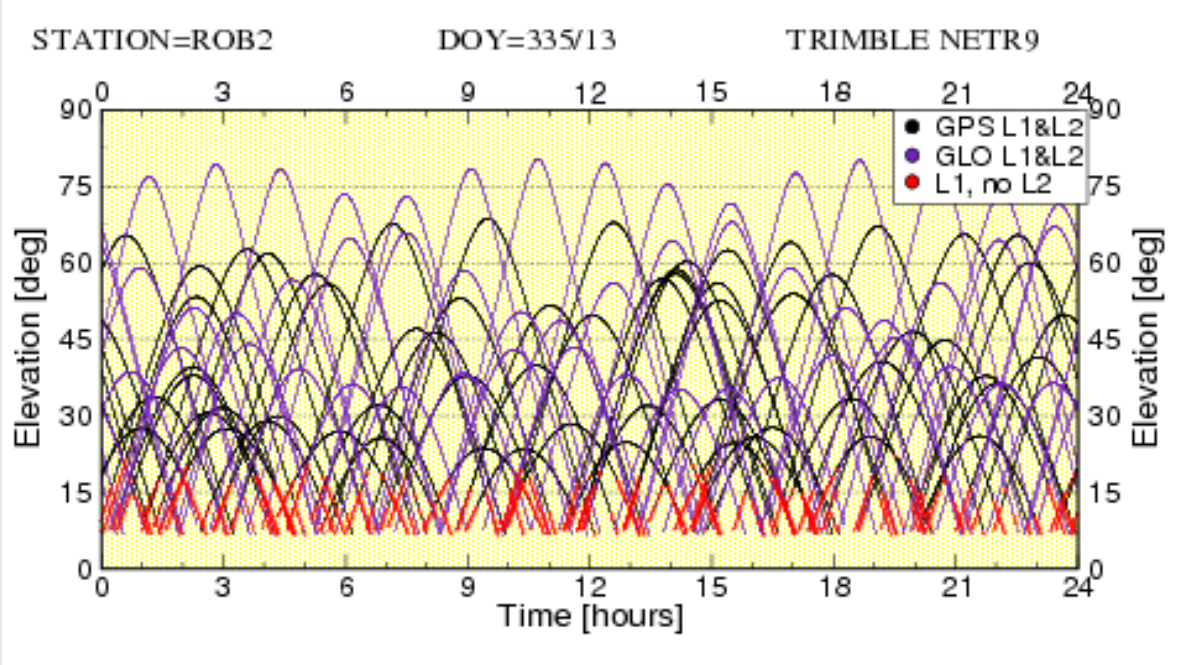
If your choke ring antenna is affected, return it to Trimble for repair. Trimble will treat this repair as if the unit is under warranty. To return the antenna:

1. Send an email to Trimble Global Services at repair_services@trimble.com:
   - In the subject line, enter *Unit to be evaluated for L2 Tracking Performance.*
   - Include the sales order number, date of shipment, and serial number of the affected unit.

   Trimble Global Services will generate Service Work Order (SWO) number for the unit. This generates an automated email providing the customer with the exact shipping address of the nearest service center to

Trimble Dorne Margolin Antenna

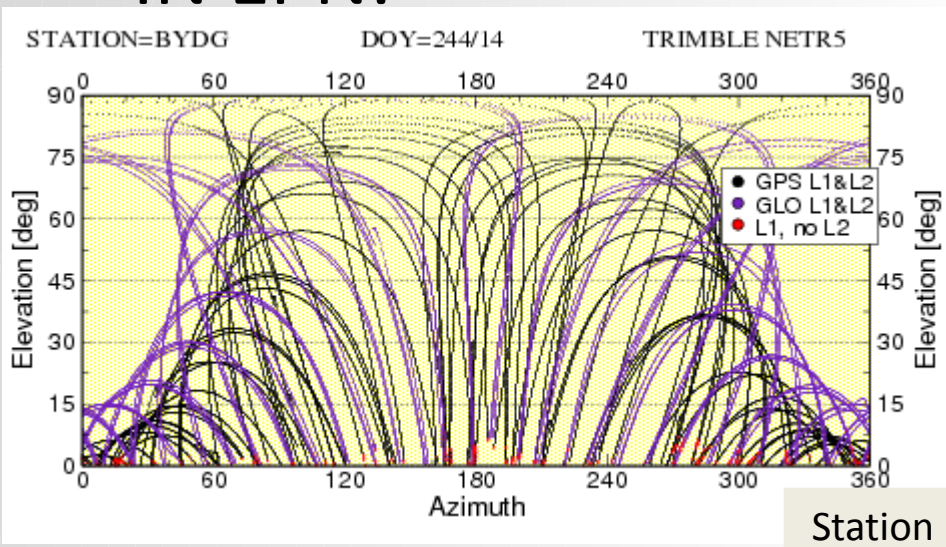
- TRM59800.00 TRM59800.80 TRM59900.00
- Example of affected station:

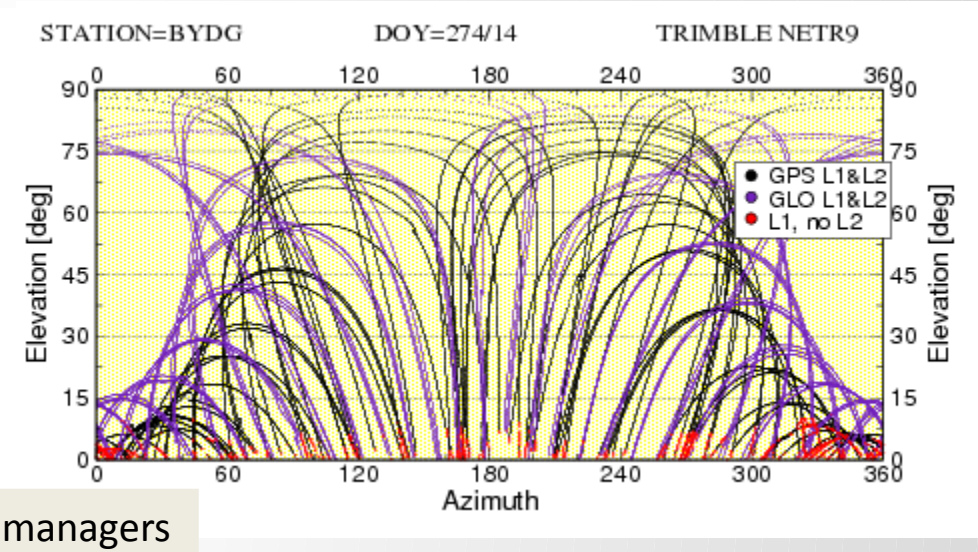


- Slow degradation of L2 tracking over time
- Replacement of LNA will influence antenna calibration…

Trimble Dorne Margolin Antenna

IN EPN:





Station managers will be notified