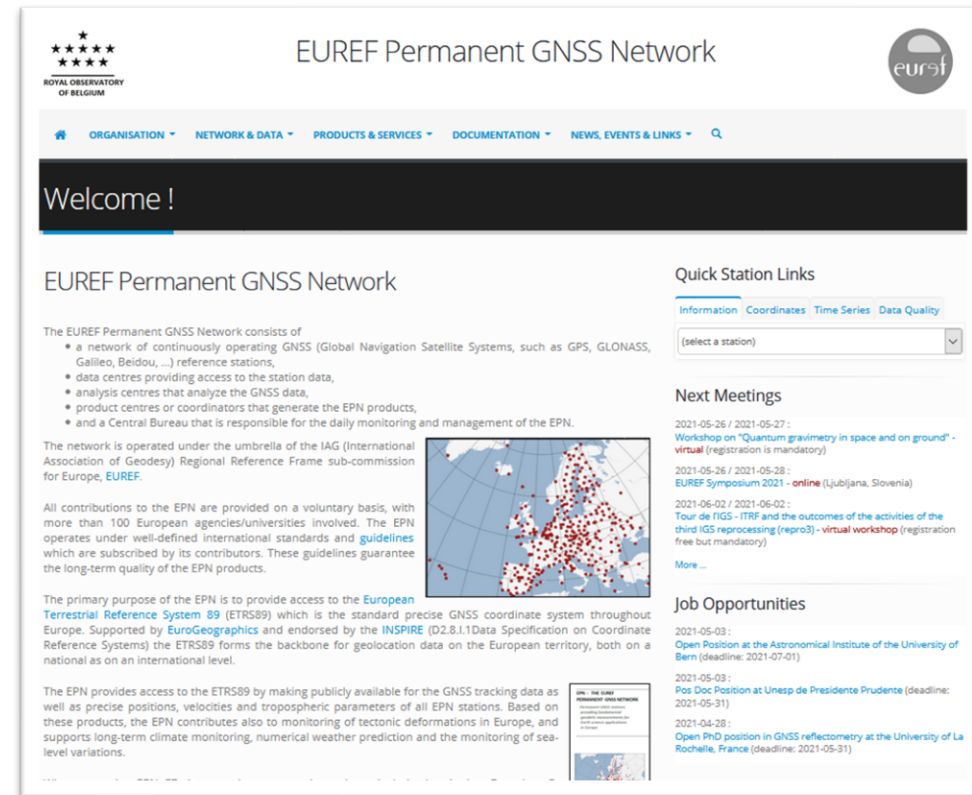


Status of the EUREF Permanent Network

Carine Bruyninx, J. Legrand, A. Fabian,
A. Miglio, F. Bamahry

Royal Observatory of Belgium

EPN Central Bureau, <https://epncb.oma.be/>



Outline

- Status of EPN tracking network
- Changes at EPN Central Bureau
- Follow-up on EUREF resolutions
- General News

Changes in EPN station network since June 2022

405 EPN stations

28 new EPN stations

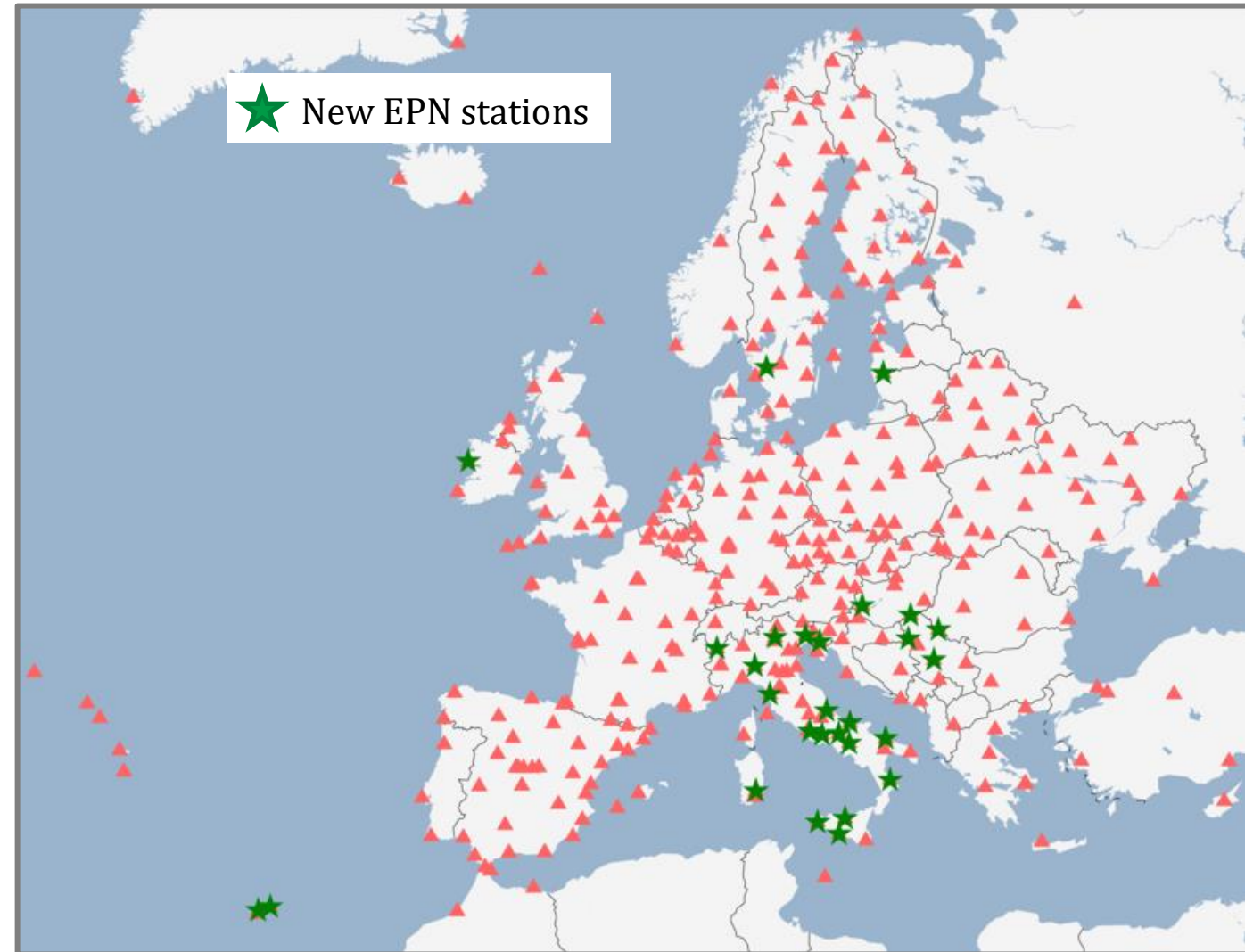
GPS GLO GAL BDS

AGRN00ITA, ASIR00ITA, BIRG00ITA, BSVZ00ITA,
ENZA00ITA, FRNE00ITA, GALH00ITA, GJML00SRB,
ISRN00ITA, LIGN00ITA, MAH100IRL, PLND00SRB,
PSTO00PRT, RIVO00ITA, SART00ITA, SID000SRB,
SNIK00ITA, SPT700SWE, STNB00PRT, SUBO00SRB,
SVLL00ITA, TEOS00ITA, TREU00ITA, TRMI00ITA,
UBEN00ITA, VAIN00LVA, VIRG00ITA, ZZON00HUN

GLO: 97% → 97%

GAL: 88% → 89%

BDS: 76% → 78%



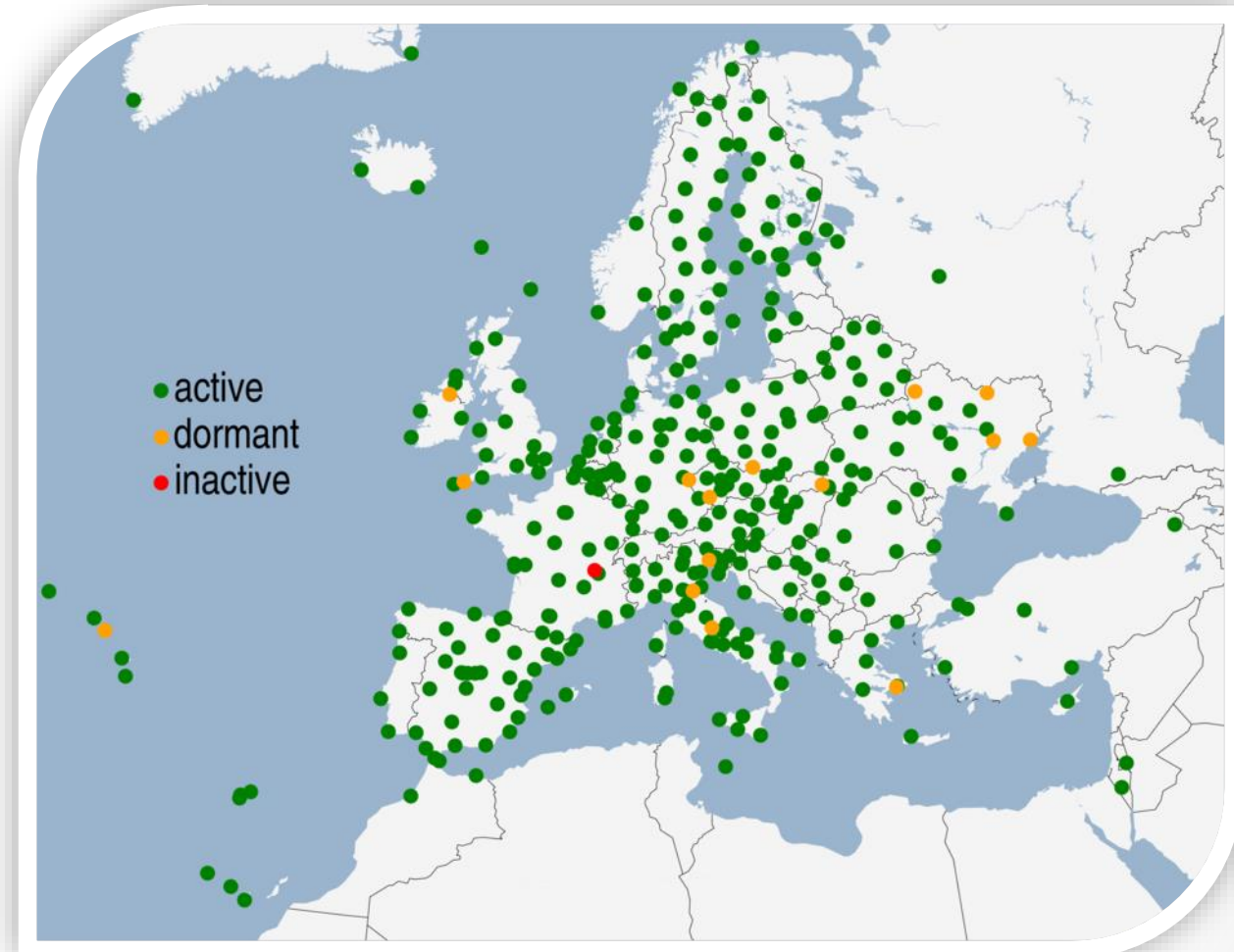
Status May 17, 2023

Commonly encountered problems

A lot of stations not providing recent data

- **405 EPN stations**
 - **dormant stations (15)**
 - No data in last 3 months
 - **Inactive stations (1)**
 - no receiver or antenna currently installed
- 76 former EPN stations

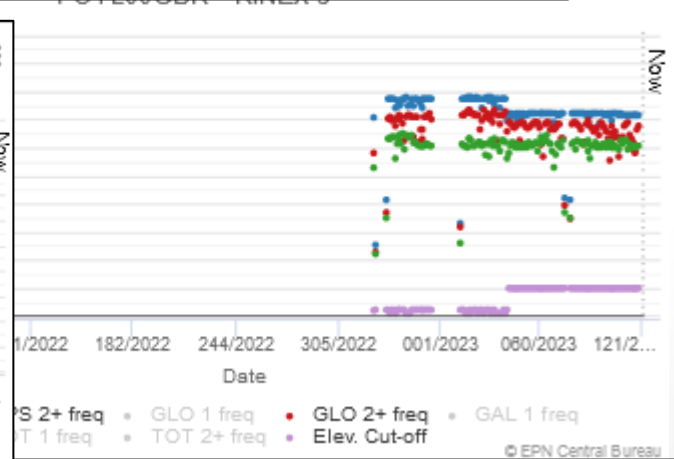
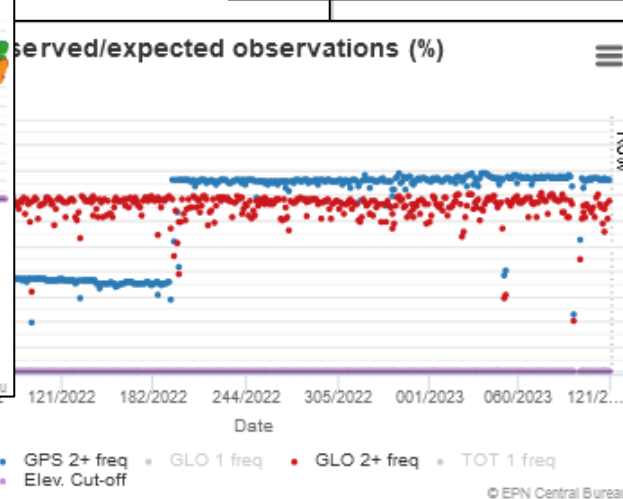
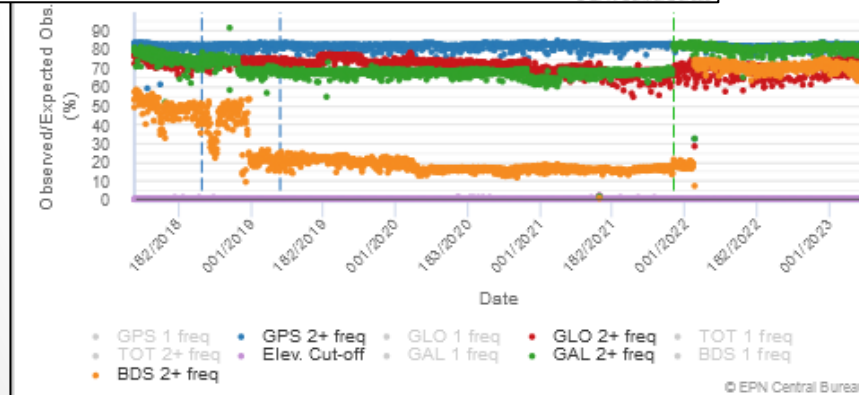
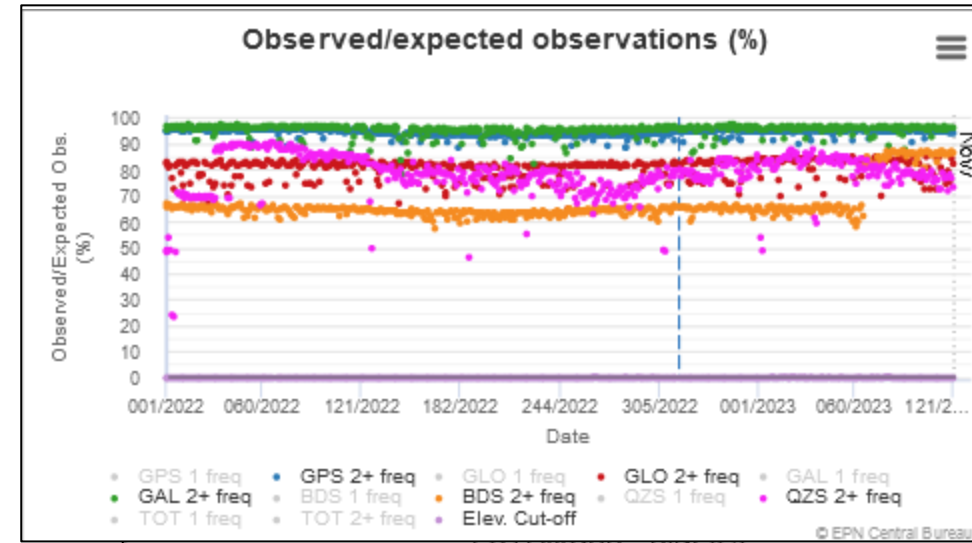
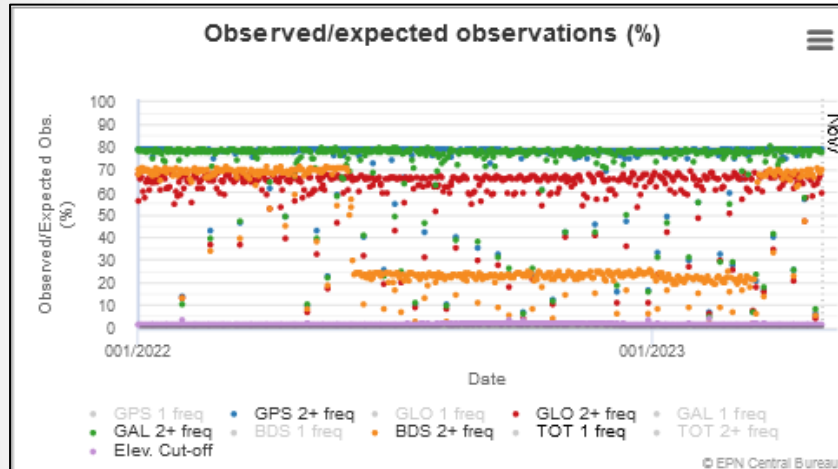
Total of 481 EPN stations to be included in EPN reprocessing



Status May 17, 2023

Commonly encountered problems

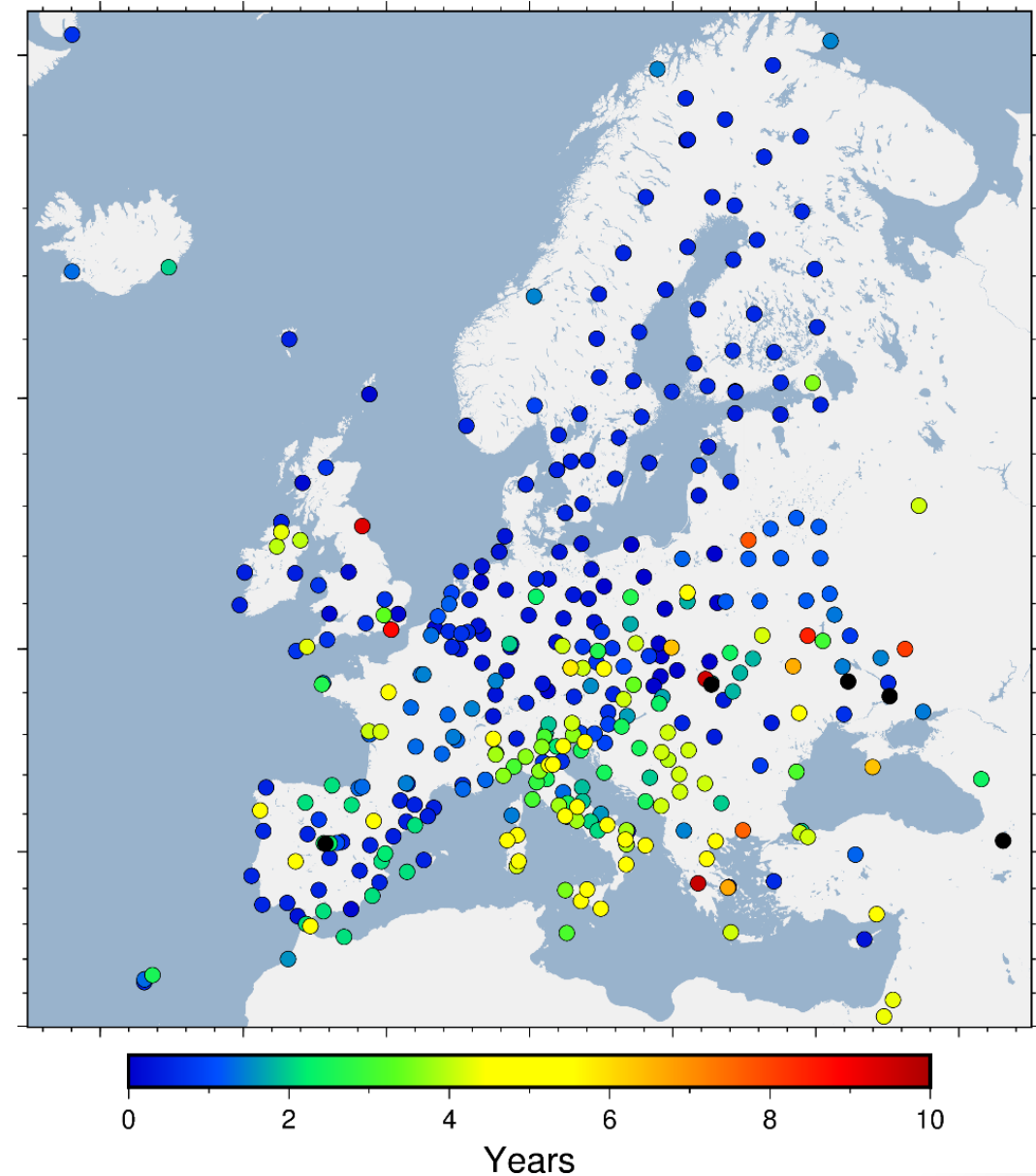
Changes at receiver not documented in site log



Commonly encountered problems

Number of years since last
firmware/receiver update?

Only showing presently active EPN stations



Commonly encountered problems

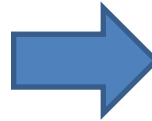
Historical info lost when updating site log

```
3.14 Receiver Type      : SEPT POLARX4
   Satellite System    : GPS+GLO+GAL
   Serial Number       : 3009592
   Firmware Version    : 2.9.6
   Elevation Cutoff Setting : 0 deg
   Date Installed      : 2018-03-30T09:00Z
   Date Removed        : (CCYY-MM-DDThh:mmZ)
   Temperature Stabiliz. : none
   Additional Information : (multiple lines)
```

Commonly encountered problems

Historical info lost when updating site log

3.14 Receiver Type : SEPT POLARX4
 Satellite System : GPS+GLO+GAL
 Serial Number : 3009592
 Firmware Version : **2.9.6**
 Elevation Cutoff Setting : 0 deg
 Date Installed : **2018-03-30T09:00Z**
 Date Removed : (CCYY-MM-DDThh:mmZ)
 Temperature Stabiliz. : none
 Additional Information : (multiple lines)

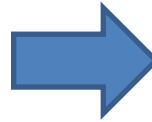


3.14 Receiver Type : SEPT POLARX4
 Satellite System : GPS+GLO+GAL
 Serial Number : 3009592
 Firmware Version : **2.9.6patch2**
 Elevation Cutoff Setting : 0 deg
 Date Installed : **2018-11-12T09:35Z**
 Date Removed : (CCYY-MM-DDThh:mmZ)
 Temperature Stabiliz. : none
 Additional Information : (multiple lines)

Commonly encountered problems

Historical info lost when updating site log

3.14 Receiver Type : SEPT POLARX4
Satellite System : GPS+GLO+GAL
Serial Number : 3009592
Firmware Version : **2.9.6**
Elevation Cutoff Setting : 0 deg
Date Installed : **2018-03-30T09:00Z**
Date Removed : (CCYY-MM-DDThh:mmZ)
Temperature Stabiliz. : none
Additional Information : (multiple lines)



3.14 Receiver Type : SEPT POLARX4
Satellite System : GPS+GLO+GAL
Serial Number : 3009592
Firmware Version : **2.9.6patch2**
Elevation Cutoff Setting : 0 deg
Date Installed : **2018-11-12T09:35Z**
Date Removed : (CCYY-MM-DDThh:mmZ)
Temperature Stabiliz. : none
Additional Information : (multiple lines)

Commonly encountered problems

Historical info lost when updating site log

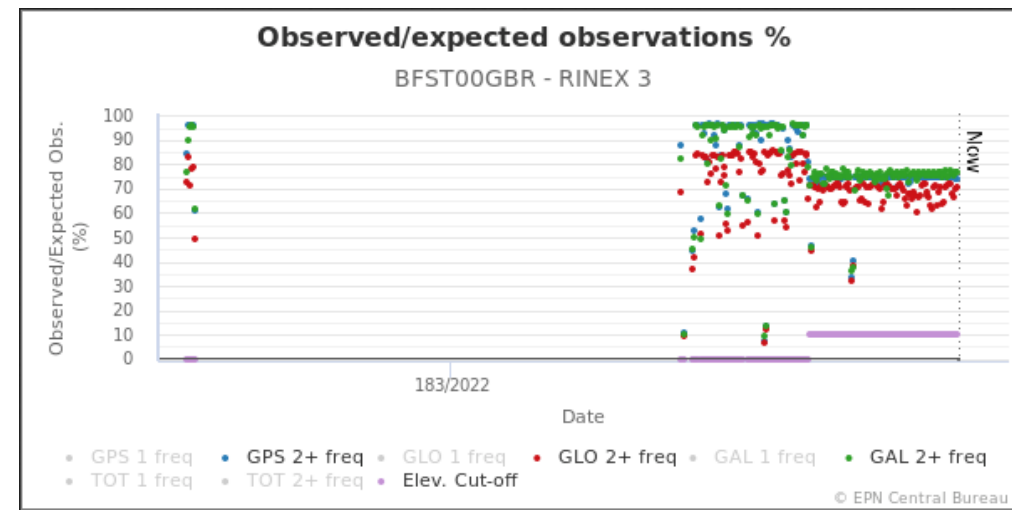
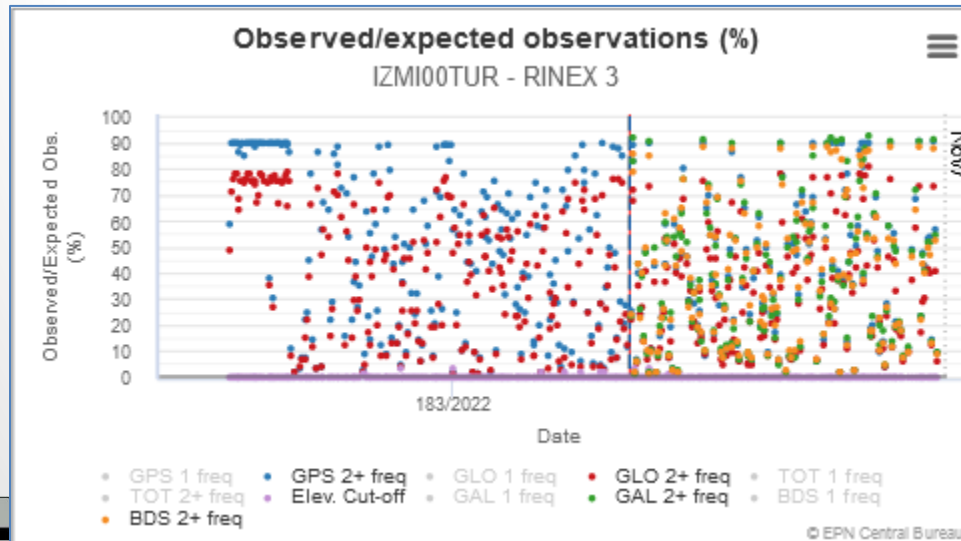
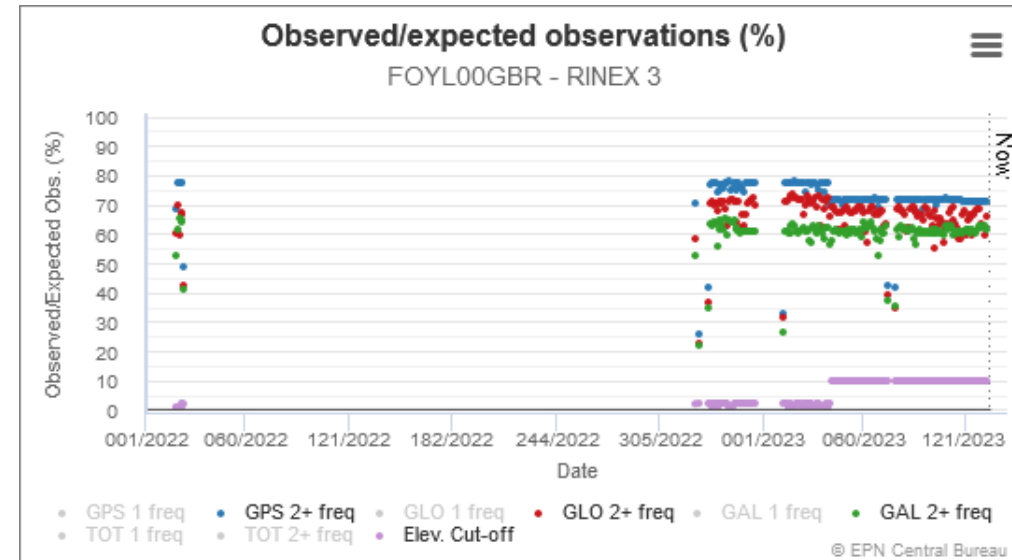
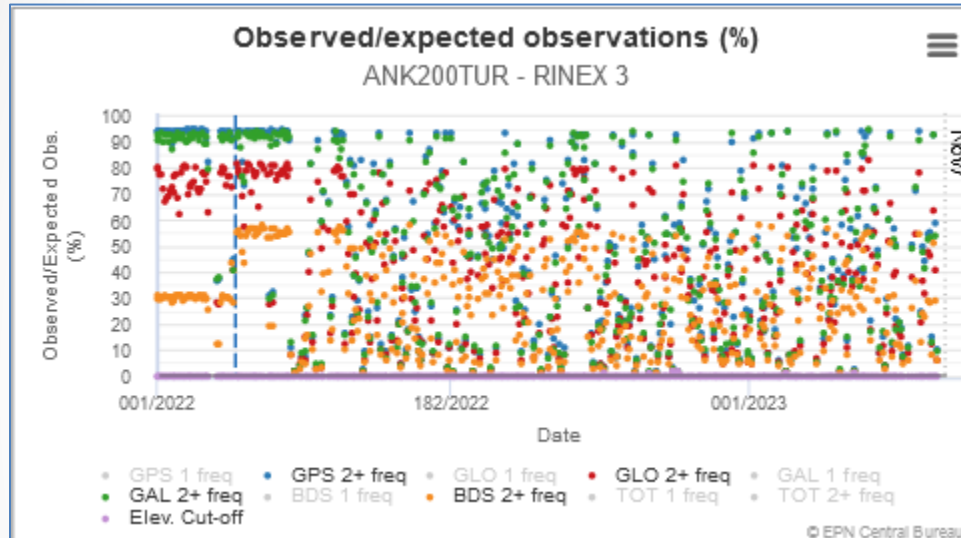
```
3.14 Receiver Type      : SEPT POLARX4
    Satellite System    : GPS+GLO+GAL
    Serial Number       : 3009592
    Firmware Version    : 2.9.6
    Elevation Cutoff Setting : 0 deg
    Date Installed      : 2018-03-30T09:00Z
    Date Removed        : 2018-11-12T09:30Z
    Temperature Stabiliz. : none
    Additional Information : (multiple lines)
```

```
3.15 Receiver Type      : SEPT POLARX4
    Satellite System    : GPS+GLO+GAL
    Serial Number       : 3009592
    Firmware Version    : 2.9.6-patch2
    Elevation Cutoff Setting : 0 deg
    Date Installed      : 2018-11-12T09:35Z
    Date Removed        : (CCYY-MM-DDThh:mmZ)
    Temperature Stabiliz. : none
    Additional Information : (multiple lines)
```

Keeping historical information is
important for EPN reprocessing !

Commonly encountered problems

Tracking problems - Incorrect elevation cut off



Commonly encountered problems

SNR missing in RINEX files

10/05/2023: EUREF mail 11391 (<https://epncb.oma.be/ftp/mail/EUREF/eurefmail.11391>)

In 2002 (21 years ago): general request from IGS to add SNR in RINEX obs. files

C	20	C1X C2X C5X C6X C7X D1X D2X D5X D6X D7X L1X L2X L5X	SYS / # / OBS TYPES
		L6X L7X S1X S2X S5X S6X S7X	SYS / # / OBS TYPES
E	16	C1X C5X C7X C8X D1X D5X D7X D8X L1X L5X L7X L8X S1X	SYS / # / OBS TYPES
		S5X S7X S8X	SYS / # / OBS TYPES
G	16	C1C C2W C2X C5X D1C D2W D2X D5X L1C L2W L2X L5X S1C	SYS / # / OBS TYPES
		S2W S2X S5X	SYS / # / OBS TYPES
J	20	C1C C1X C1Z C2X C5X D1C D1X D1Z D2X D5X L1C L1X L1Z	SYS / # / OBS TYPES
		L2X L5X S1C S1X S1Z S2X S5X	SYS / # / OBS TYPES
R	16	C1C C1P C2C C2P D1C D1P D2C D2P L1C L1P L2C L2P S1C	SYS / # / OBS TYPES
		S1P S2C S2P	

Today: SNR observables are missing in the RINEX files of 2% of the EPN stations

Outline

- Status of EPN tracking network
- **Changes at EPN Central Bureau**
- Follow-up on EUREF resolutions
- General News

Update of M³G

M³G Metadata Management and Distribution
System for Multiple GNSS Networks

Welcome!

Welcome to the new version of M³G. Check out the [change log](#) for more information.

2929 GNSS stations with metadata in M³G

Updates

- VAE000SWE** today
Station site log has changed.
- UME000SWE** today
Station site log has changed.
- SVE000SWE** today
Station site log has changed.
- SUN000SWE** today
Station site log has changed.
- OVE000SWE** today
Station site log has changed.
- OST000SWE** today
Station site log has changed.
- OSK000SWE** today
Station site log has changed.
- NOR000SWE** today
Station site log has changed.
- LEK000SWE** today
Station site log has changed.

Map labels: North America, NORTH ATLANTIC OCEAN, NORTH PACIFIC OCEAN, South America, Africa, As.

Map scale: 2000 km, 1000 mi. Map tiles by Stamen Design, CC BY 3.0 - Map data © OpenStreetMap.

NEW

V5.0 released on March 9, 2023

One year of development

Update announced through
EUREF mail

<https://gnss-metadata.eu/>

Update of M³G

Extended "Edit all metadata" page

Home / ROB / Station Metadata

Edit all Station Metadata



9-CHAR ID	ALERT(S)	NETWORK(S)	STATUS	METADATA	LAST UPDATE OF SITE LOG	RESPONSIBLE AGENCY	DATA LICENSE	DATA EMBARGO PERIOD	DOI	STATION PICTURE(S)	UPDATE SITE LOG
(all)		(all)	(all) ▾	(all) ▾	(from-to)	(all) ▾	(all) ▾	(all) ▾			
AARS00BEL	2	EPOS(P), FLEPOS	A	I	2022-10-05	DV	CC0 1.0	no embargo period	not set		
ANTW00BEL	2	EPOS(P), FLEPOS	D	I	2021-09-10	DV	CC0 1.0	no embargo period	not set		
ARLO00BEL	2	EPOS(P), WALCORS	A	I	2022-11-17	SPW	CC BY 4.0	no embargo period	not set		
ATWR00BEL	2	EPOS(P), FLEPOS	A	I	2022-10-05	DV	CC0 1.0	no embargo period	not set		
BATT00BEL	2	EPOS(P), WALCORS	A	I	2022-11-17	SPW	CC BY 4.0	no embargo period	not set		
BERL00BEL	2	EPOS(P), WALCORS	A	I	2022-11-17	SPW	CC BY 4.0	no embargo period	not set		
BERT00BEL	2	EPOS(P), FLEPOS	A	I	2022-09-13	DV	CC0 1.0	no embargo period	not set		
BEZA00BEL	2	EPOS(P), FLEPOS	A	I	2022-10-05	DV	CC0 1.0	no embargo period	not set		



























Update of M³G

New alert messages

Home / ROB / Station Metadata

Edit all Station Metadata

9-CHAR ID 	ALERT(S)	NETWORK(S)	STATUS	METADATA	LAST UPDATE OF SITE LOG	RESPONSIBLE AGENCY	DATA LICENSE	DATA EMBARGO PERIOD	DOI	STATION PICTURE(S)	UPDATE SITE LOG
(all)		(all)	(all) v	(all) v	(from-to)	(all) v	(all) v	(all) v			
AARS00BEL	2	EPOS(P), FLEPOS	A	I	2022-10-05	DV	CC0 1.0 	no embargo period 	not set 	 	
<p>SITE PICTURE Missing site pictures: Upload pictures (Click on  in column STATION PICTURE(S)) of the antenna surroundings in the 4 cardinal directions at least.</p>											
<p>DOI Missing DOI. It is recommended to insert in this table (column DOI) the Digital Object Identifier (DOI) of the station's RINEX data set.</p>											
ANTW00BEL	2	EPOS(P), FLEPOS	D	I	2021-09-10	DV	CC0 1.0 	no embargo period 	not set 	 	
ARLO00BEL	2	EPOS(P), WALCORS	A	I	2022-11-17	SPW	CC BY 4.0 	no embargo period 	not set 	 	
ATWR00BEL	2	EPOS(P), FLEPOS	A	I	2022-10-05	DV	CC0 1.0 	no embargo period 	not set 	 	

Update of M³G

Updated layout for site log editor

Home / ROB / Station Metadata / All Metadata

Update BRUX00BEL

Edit BRUX00BEL(A) site log
published version: 2023-01-24

[Import site log](#)
[Export last saved version](#)
[Restore published](#)
[Save all to draft](#)
[Submit saved draft for publication](#)

- AARS00BEL
- ANTW00BEL ^D
- ARLO00BEL
- ATWR00BEL
- BATT00BEL
- BERL00BEL
- BERT00BEL
- BEZA00BEL
- BGGN00BEL
- BLIG00BEL
- BRCT00BEL
- BREE00BEL ^I
- BRGG00BEL

Sections

Prepared By

GNSSatROB (gnss@oma.be) #5

Date

2023-05-17

- Alert(s)
- Identification
- Location
- Receiver
- Antenna**
- Local Ties
- Frequency Standard

Antenna

2006-07-07 - 2008-03-19 ✓	2008-03-19 - 2008-06-17 ✓
2008-06-17 - 2008-09-02 ✓	2008-09-02 - 2008-09-22 ✓
2008-09-22 - 2008-10-02 ✓	2008-10-02 - 2008-10-20 ✓
2008-10-20 - 2011-03-07 ✓	2011-03-07 - 2018-02-01 ✓
2018-02-01 - 2021-04-20 ✓	2021-04-20 - CCYY-MM-DD ✓

Show/Hide previous GNSS Antenna Information

Antenna * JAVRINGANT_DM

Serial Number * 00464

Antenna Reference Point * BPA: bottom of preamplifier (IGS conventional ARP for "JAVRINGANT_DM" an

Marker->ARP Up Ecc. (m) * 0.4689 m

Marker->ARP North Ecc(m) * 0.0010 m

Marker->ARP East Ecc(m) * 0.0000 m

Update of M³G

GDPR-related changes

Already announced at previous symposium, but now in use
M³G version 5.0 released in March 2023

- Site Log Section 0 → no personal contact information allowed
- Site Log Section 11, 12 → primary contact: no personal contact information allowed
- Not only because of GDPR, but also because contact info is easier to maintain

Possible to register multiple central personal contacts

Impossible to update site logs if your agency has not set up
at least one public central email

Still 179 EPN site logs that are not OK!

BRUX00BEL Site Information Form (site log)
International GNSS Service
See Instructions at:

https://files.igsb.org/pub/station/general/sitelog_instr.txt

0. Form

Prepared by (full name) : GNSS team (gnss@oma.be)
Date Prepared : 2022-04-05
Report Type : UPDATE
If Update:
Previous Site Log : brux00bel_20210420.log
Modified/Added Sections : 6.11, 6.12, 11

11. On-Site, Point of Contact Agency Information

Agency : Royal Observatory of Belgium
Preferred Abbreviation : ROB
Mailing Address : Av. Circulaire 3
: 1180 Brussels
: Belgium

Primary Contact
Contact Name : GNSSatROB
Telephone (primary) :
Telephone (secondary) :
Fax :
E-mail : gnss@oma.be

(Upcoming) Changes to EPN CB web and ftp portal

Monitoring availability of products

Taking new long product names into account

https://epncb.oma.be/ftp/product/availability/CHECK_DAILY_BKG_2023.SNXX

```

***** A B B B C G I I L M N R R S S U W E
BKG SNX S E E K O F G G P U K G O G U P U U
***** I K V G D Z E N T T G A B O T A T R
R = RAPID; F = FINAL
0 = 0-6days; 1 = 7-13days; 2 = 14-20days; 3 = 21-27days...
***** Last Update : 12-MAY-23 10:40 (DOY 132)
2261-0 - R0 R0 . R0 . . R0 R0 R0 R0 R0 . R0 . R0 R0 R0 R0
2260-6 - R0 R0 . R0 . . R0 R0 R0 R0 R0 . R0 . R0 R0 R0 R0
2260-5 - R0 R0 . R0 . . R0 R0 R0 R0 R0 . R0 . R0 R0 R0 R0
2260-4 - R0 R0 . R0 . . R0 R0 R0 R0 R0 . R0 . R0 R0 R0 R0
2260-3 - R0 R0 . R0 . . R0 R0 R0 R0 R0 . R0 . R0 R0 R0 R0
2260-2 - R0 R0 . R0 . . R0 R0 R0 R0 R0 . R0 . R0 R0 R0 R0
2260-1 - R0 R0 . R0 . . R0 R0 R0 R1 R0 . R0 . R0 R0 R0 R0
2260-0 - R0 R0 . R0 . . R0 R0 R0 R1 R0 . R0 . R0 R0 R0 R0
2259-6 - R0 F1 . R0 F1 . R0 R0 F1 R0 F1 . F1 . R0 R0 R0 R0
2259-5 - R0 R0 . R0 F1 . R0 R0 F1 R1 F1 . F1 . R0 R0 R0 R0
2259-4 - R0 R0 . R0 F2 . R0 R0 F1 R1 F1 . F1 . R0 R0 R0 R0
2259-3 - R0 R0 . R0 F2 . R0 R0 F1 R1 F1 . F1 . R0 R0 R0 R0
2259-2 - R0 R0 . R0 F2 . R0 R0 F1 R1 F1 . F1 . R0 R0 R0 R0
2259-1 - R0 R0 . R0 F2 . R0 R0 F2 R1 F2 . F2 . R0 R0 R0 R0
2259-0 - R0 R0 . R0 F2 . R0 . F2 R1 F2 . F2 . R0 R0 R0 R0
2258-6 - F2 F2 F1 R0 F1 . F2 R0 F1 F2 F1 . F1 . R0 F2 R0 R0
2258-5 - F2 . F1 R0 F2 . F2 R0 F1 F2 F1 . F1 . R0 F2 R0 R0
2258-4 - F2 . F1 R0 F2 . F2 R0 F1 F2 F2 . F1 . R0 F2 R0 R0
2258-3 - F2 . F1 R0 F2 . F2 R0 F1 F2 F2 . F1 . R0 F2 R0 R0
2258-2 - F2 . F2 R0 F2 . F3 R0 F2 F2 F2 . F2 . R0 F2 R0 R0
2258-1 - F3 . F2 R0 F2 . F3 R0 F2 F3 F2 . F2 . R0 F2 R0 R0
2258-0 - F3 . F2 R0 F2 . F3 R0 F2 F3 F2 . F2 . R0 F3 R0 R0
2257-6 - F2 F2 F2 R0 F1 . F2 R0 F0 F3 F1 . F1 . R0 F2 R0 R0
2257-5 - F2 . F2 R0 F2 . F2 R0 F1 F3 F1 . F1 . R0 F2 R0 R0
2257-4 - F2 . F2 R0 F2 . F2 R0 F1 F3 F1 . F1 . R0 F2 R0 R0
2257-3 - F2 R1 F2 R0 F2 . F3 R0 F1 F3 F1 . F2 . . F2 R0 R0
2257-2 - F3 R0 F3 R0 F2 . F3 R0 F1 F4 F1 . F2 . . F2 R0 R0
2257-1 - F3 R0 F3 R0 F2 . F3 R0 F1 F4 F2 . F2 . R0 F2 R0 R0
2257-0 - F3 R0 F3 R0 F2 . F3 R0 F1 F4 F2 . F2 . R0 F3 R0 R0

```

(Upcoming) Changes to EPN CB web and ftp portal

Dedicated metadata files for EPN REPRO3

EPN 3rd reprocessing will start soon

Need to have ATX and site log information that does not change during the reprocessing

→ to avoid coordinate jumps caused by ATX and changes of historical content in site logs

Snapshot taken on May 11, 2023

NEW

- ✓ ATX files: https://epncb.oma.be/ftp/station/general/epnc_20_r3.atx
https://epncb.oma.be/ftp/station/general/epn_20_r3.atx
- ✓ Site log files: https://epncb.oma.be/ftp/station/log_9char_R3
- ✓ Bernese “STA file”: https://epncb.oma.be/ftp/station/general/EUREF54_R3.STA

(Upcoming) Changes to EPN CB web and ftp portal

Replacement of files on ftp by API

```
*****
EPN LAC Electronic Mail      02-May-2023 13:55:08 UTC      Message Number 2904
*****

Author: EPN CB/C. Bruyninx
Subject: Removal of station exclusion lists from EPN CB server

Dear colleagues,

On July 01, 2023, the EPN Central Bureau will remove (from its FTP server) the
directory https://epncb.oma.be/ftp/station/general/excluded/ containing the
files excluded.WWWW (weekly station exclusion lists) and excluded.WWWWd (daily
station exclusion lists).

The information given by these files will still be available using the API
https://epncb.oma.be/api/production/ExcludedStations/ which is also usable from
the following Swagger tool https://epncb.oma.be/api/.

By doing so, the station exclusion lists will be generated dynamically taking
the most recent EPN information, also for historical data, into account.

Please adapt your procedures and scripts accordingly.

Best regards,

Dominique and Carine
EUREF Permanent Network (EPN) Central Bureau
Royal Observatory of Belgium
https://epncb.oma.be/
epncb@oma.be

EPN LAC Mailing list maintained by the EPN Central Bureau (epncb@oma.be)
```

Static list of stations to be excluded
 excluded.wwww
 excluded.wwwwd

API currently under test by EPN AC

More info:

(Upcoming) Changes to EPN CB web and ftp portal

CHANGES AT THE EPN CB



ROYAL
OBSERVATORY
OF BELGIUM

EUREF Symposium, 23-26 May 2023, Gothenburg, Sweden



EUREF2023

The screenshot shows the EUREF Permanent GNSS Network website. The header includes the EUREF logo and the text 'EUREF Permanent GNSS Network'. The navigation bar has tabs for 'ORGANISATION', 'NETWORK & DATA', 'PRODUCTS & SERVICES' (which is active), 'DOCUMENTATION', and 'NEWS, EVENTS & LINKS'. Under 'PRODUCTS & SERVICES', there are five main categories: 'ANALYSIS CENTRES', 'POST-PROCESSED PRODUCTS', 'REFERENCE FRAME', 'REAL-TIME PRODUCTS', and 'SERVICES'. The 'SERVICES' category is expanded, showing 'ETRF/ITRF Coordinate Transformation' and 'Web services (API)' with a blue 'NEW' badge. A large red arrow points from the text 'API documentation' to the 'Web services (API)' link. Below the navigation bar, there is a map of Europe with red dots representing GNSS stations. To the right of the map, there is a section for 'EUREF symposium 2023' with dates and locations. At the bottom, there is a 'Job Opportunities' section with a link to 'Two openings for PhD students in space geodesy and geodynamics at Chalmers University of Technology'.

API documentation

NEW

Presently 2 APIs :

- Stations with configuration changes
- Stations to be included in EPN AC processing
- Several other API under internal testing

(Upcoming) Changes to EPN CB web and ftp portal

ECTT V2.0

https://epncb.oma.be/_productsservices/coord_trans/

29 Aug. 2022:

Release of V2.0 of
on-line ETRF/ITRF
Coordinate
Transformation Tool
(ECTT) including
transformations from
and to **ITRF2020**

+ API

Home / Products & Services / Services / ETRF/ITRF Coordinate Transformation Tool (ECTT)

ETRF/ITRF Coordinate Transformation Tool (ECTT)

On-line coordinate transformation between coordinates (position and velocity) expressed in any ETRFxx realisations of the [European Terrestrial Reference System \(ETRS89\)](#) and any ITRFyy realizations of the [International Terrestrial Reference System \(ITRS\)](#).
In case output coordinates are requested at a different epoch than the provided input coordinates, it is mandatory to also input station velocities.

For transformations to and from the Galileo Terrestrial Reference Frame (GTRF), use ITRF. GTRF is aligned to current versions of the ITRF.

Explanation and examples are available from the following [tutorial](#). However, note that with the introduction of the most recent transformation tool (August 2022), this tutorial has become slightly outdated.
If you use the ECTT tool, please cite [doi:10.24414/ROB-EUREF-ECTT](https://doi.org/10.24414/ROB-EUREF-ECTT).

Change epoch format:

INPUT

Frame: Epoch:

```
# Lines starting by # are treated as comments
# Fields (in decimal format) should be separated by at
# least one space
#
# --> Example without velocity <--
# Stationname (no space character) X[m] Y[m] Z[m] :
Station_1 4027894.006 307045.600 4919474.910
#
# --> Example with velocity <--
# Stationname (no space ch.) X[m] Y[m] Z[m] VX[m/yr]
VY[m/yr] VZ[m/yr] :
Station_2 4027894.006 307045.600 4919474.910 0.01 0.02 0.03
```

TRANSFORM TO

Frame: Epoch:

(Upcoming) Changes to EPN CB web and ftp portal

Discontinuation of http (fall 2023)

http://epncb.oma.be → <https://epncb.oma.be>

- Automatic redirection from web browsers
- API → no automatic adjustment

Outline

- Status of EPN tracking network
- Changes at EPN Central Bureau
- **Follow-up on EUREF resolutions**
- General News

Follow up on EUREF resolutions: EPOS

Encourage contribution to the European Plate Observing System

Tallinn, 22-24/05/2019

Resolution No. 2.

The IAG Reference Frame Sub-commission for Europe (EUREF)

recognising that that the European Plate Observing System (EPOS) will maintain a sustainable European infrastructure for solid Earth studies from 2020 onwards, including a GNSS infrastructure and related GNSS-based products

and noting the efforts of the EUREF community towards the derivation of a European deformation model in order to improve cross-boundary positioning

and considering that many European countries active in EUREF are a member (or planning to become a member) of the EPOS European Research Infrastructure Consortium (ERIC)

encourages the EUREF community to also contribute to EPOS especially to its GNSS component

Follow up on EUREF resolutions: EPOS

Encourage contribution to the European Plate Observing System



EPOS-EUREF MoU signed on 12/09/2022



Follow up on EUREF resolutions: EPOS

New on-line form to create commitment letter for new EPN stations

Propose a new EPN station

Interested in providing a station for the EPN?

To initiate the application, review the [EUREF guidelines listed on Guidelines for EPN Stations and Operational Centres](#).

If your station(s) can comply with these guidelines, then follow the [Procedure for Becoming an EPN Station](#) by first completing the online form below which will generate the EPN commitment letter(s) for one or multiple GNSS station(s) proposed for inclusion into the EPN.

This form consists of two parts:

- The first part collects general information about the agencies involved in the operation of the station(s).
- The second part collects information specific for (one of) the proposed GNSS station(s). Additional GNSS stations can be proposed for the same agencies, by clicking on

[Add station](#)


Once all information is completed, click on [Generate the letter](#). The page will generate the commitment letter (in pdf format) including all GNSS stations entered in the form. The commitment letter **needs to be signed** by the authorizing official of the responsible agency **and sent** by email to the EPN CB.

Responsible agency

Agency name* 

Full name

Abbreviation

Agency address* 

Street no, city, country

Point of contact for further correspondence* 

First name, last name

Email address

Name of authorizing official signing this EPN commitment letter* 

Title, first name, last name

Agency maintaining the station site log

☐ Same as responsible agency 

Agency name 

Full name

Abbreviation

Agency address 

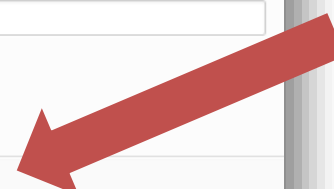
Street no, city, country

Point of contact for further correspondence 

First name, last name

Email address

Enter here below the information specific to one GNSS station. Additional GNSS stations can be proposed by clicking on [Add station](#)



Follow up on EUREF resolutions: EPOS

New on-line form to create commitment letter for new EPN stations

Proposed station No 1

Identification ⓘ

Station name* ⓘ
9-char identification (A9)

IERS DOMES number* ⓘ
IERS DOMES number (A9)

Location* ⓘ
City, country

Position ⓘ

X-coordinate*
X-coordinate

Y-coordinate*
Y-coordinate

Z-coordinate*
Z-coordinate

☐ Official national ETRS89 coordinates

Current station equipment ⓘ

Receiver type*
Receiver type

Antenna type*
Antenna type

Radome type*
Radome type (A4)

☐ Antenna + radome individually calibrated ⓘ

Tracked constellations* ⓘ

☒ GPS ☐ GLONASS ☐ Galileo ☐ BeiDou ☐ QZSS ☐ IRNSS

Data provision ⓘ

RINEX v3* ⓘ

☒ Daily ☒ Hourly ☐ Private

☐ I agree that EUREF attributes on behalf of my agency the CC BY 4.0 data license to the RINEX data of my station ⓘ

☐ I agree that EUREF makes the daily RINEX data of my station discoverable to the European Plate Observing System (EPOS) ⓘ

RTCM 3* ⓘ

☐ Real time ⓘ

Indicate which method(s) are proposed to deliver the RTCM stream of that station to the three regional EPN broadcasters (ASI, BKG and ROB):

☐ By sending them directly to the regional NTRIP EPN broadcaster(s) ⓘ

☐ Using the built-in receiver NTRIP broadcaster (NTRIP server) ⓘ

☐ Through a local or a national NTRIP broadcaster ⓘ

Historical data* ⓘ

☐ Available ⓘ

Since ⓘ dd / mm / yyyy

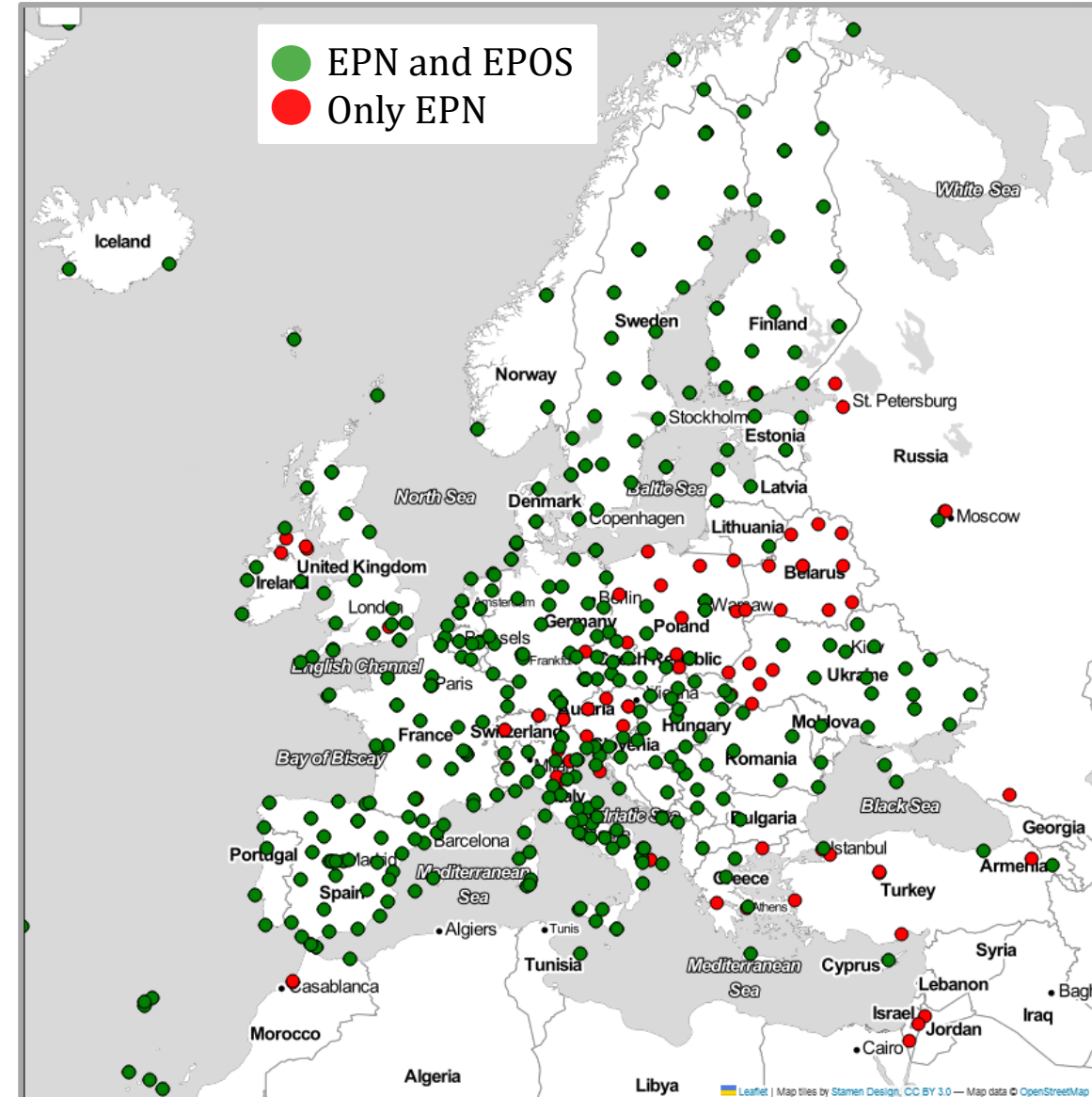
Co-located instruments ⓘ

After saving, pdf letter is created,
ready to be signed

Follow up on EUREF resolutions: EPOS

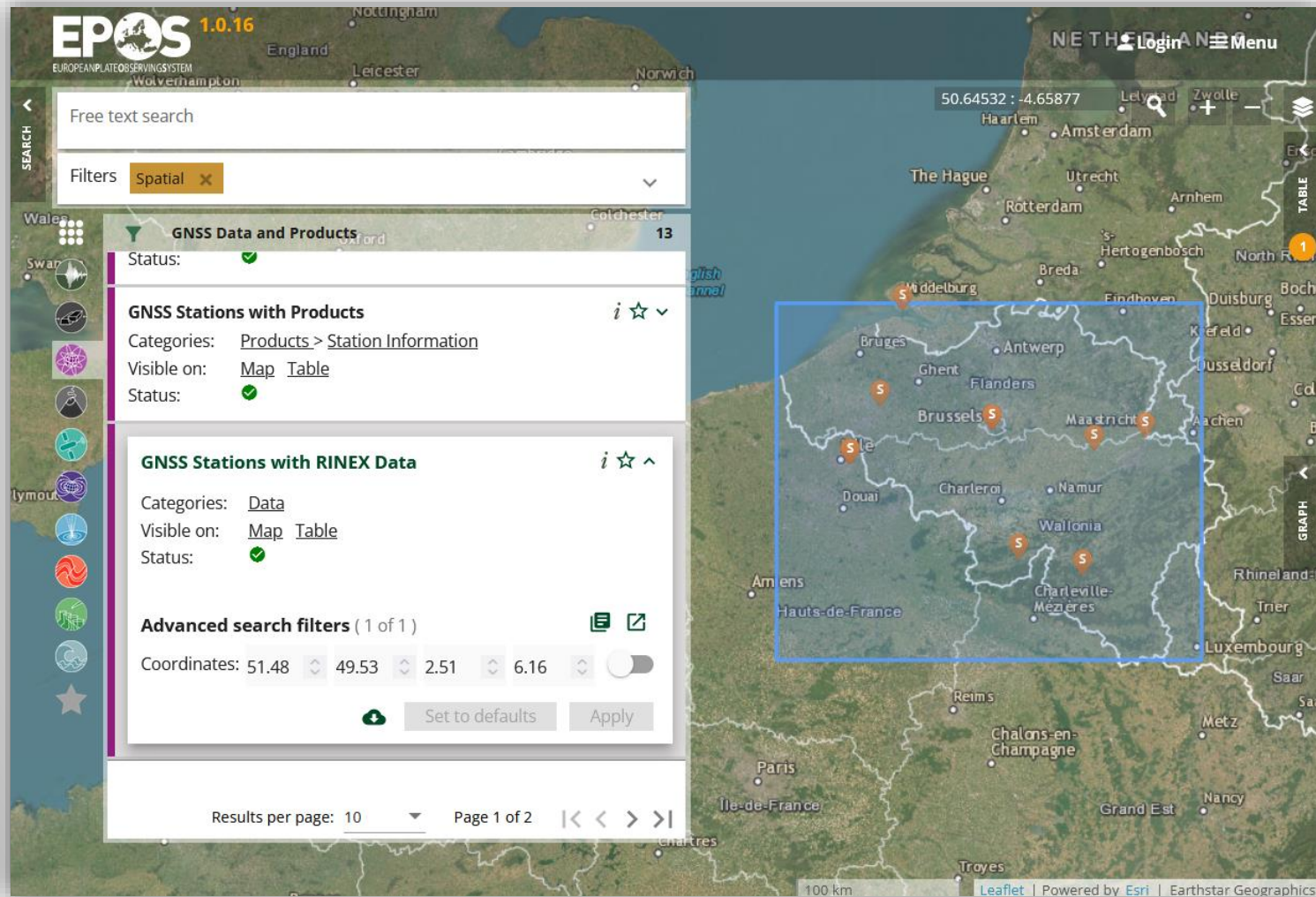
EPN stations in EPOS

81% of EPN stations in EPOS



Follow up on EUREF resolutions: EPOS

EPN data providers at EPOS data portal



<https://www.ics-c.epos-eu.org/>

Opened officially during EGU meeting (April 2023)

Follow up on EUREF resolutions: EPOS

EPN data providers at EPOS data portal site

EPOS 1.0.16
EUROPEAN PLATE OBSERVING SYSTEM

Free text search

Filters **Spatial**

GNSS Data and Products 13

Status:

GNSS Stations with Products

Categories: [Products](#) > [Station Information](#)

Visible on: [Map](#) [Table](#)

Status:

GNSS Stations with RINEX Data

Categories: [Data](#)

Visible on: [Map](#) [Table](#)

Status:

Advanced search filters (1 of 1)

Coordinates: 51.48 49.53 2.51 6.16

[Set to defaults](#) [Apply](#)

Results per page: 10 Page 1 of 2

GNSS Stations with RINEX Data 52.2208 : 1.91105 [View on Table](#)

GNSS Station ID	WARE00BEL
Country	Belgium
City	Waremmme
Latitude	50.6899
Longitude	5.2453
Installed at	1994-01-14 00:00:00
Data Providers	Royal Observatory of Belgium
Networks	EPN & ROB_GNSS
TimeSeries	TimeSeries Image

100 km [Leaflet](#) | Powered by [Esri](#) | [Earthstar Geographics](#)

Follow up on EUREF resolutions: FAIR

Encourage adoption of FAIR data principles

Ljubljana, 26-28/05/2021

Resolution No. 2.

The IAG Reference Frame Sub-commission for Europe (EUREF)

considering that major funding bodies, including the European Commission, promote and require the implementation of FAIR (Findable, Accessible, Interoperable, and Reusable) data principles

and recognising that FAIR data principles increase the value and the reuse of digital resources, by humans as well as machines

encourages the EUREF community to adopt these principles in all aspects of data management

Splinter meetings ‘Toward FAIR GNSS data ‘ at EUREF 2021 and 2022 symposia

No splinter meeting this year

Webinar "Putting the FAIR principles into practice: the journey of a GNSS data repository" on October 11th, 2022 → EPN Historical Data Center

Recordings are available from <https://fair-gnss.oma.be/webinar.php>

Follow up on EUREF resolutions: FAIR

Encourage adoption of FAIR data principles

Steps towards FAIR

A. Attach rich metadata to the GNSS data

B. Attach a PID (DOI) to the GNSS data

C. Make GNSS (meta)data available through API

First: Collection of rich metadata to be associated with RINEX data files

- 100% site log info
- 100% data quality information
- 97% of the EPN stations have assigned a **data license** to the RINEX data they distribute through EUREF
 - Missing:


```
DRAG00ISR MDVJ00RUS PADO00ITA PAT000GRC PULK00RUS RABT00MAR RAMO00ISR
ROVE00ITA SVTL00RUS TUBI00TUR UPAD00ITA YLDZ00TUR ZECK00RUS ZIM200CHE
ZIMM00CHE
```
- RINEX file provenance “where do they come from, what changes were made to the data”:
 - ✓ Historical EPN Data Center: **Since Jan. 1st 2023** collection of “provenance” of all new incoming RINEX data files
 - ✓ In support -> Update of EPN DC guidelines (April 25, 2023) to encourage EPN RDC to collect information of file provenance

Follow up on EUREF resolutions: FAIR

Encourage adoption of FAIR data principles



GGOS
Global Geodetic
Observing System

Working Group on DOI for geodetic datasets

Steps towards FAIR

A. Attach rich metadata to the GNSS data

B. Attach a PID (DOI) to the GNSS data

C. Make GNSS (meta)data available through API

DOI (Digital Object Identifier) for GNSS data

- In collaboration with GGOS
- Assign DOI to the GNSS data originating from a GNSS station (or network)
- DOI info closely linked with the information in the station site log

M³G V5.0

- Allows to insert station and network DOI
- Few DOI inserted up to now

Digital Object Identifiers (DOIs) for data

DOI is a character string (standardized by ISO) used to uniquely identify a data set, e.g

<https://doi.org/10.24414/FST8-P256> → landing page

Prefix

Suffix

Follow up on EUREF resolutions: FAIR

Encourage adoption of FAIR data principles

Steps towards FAIR

- A. Attach rich metadata to the GNSS data
- B. Attach a PID (DOI) to the GNSS data
- C. Make GNSS (meta)data available through API

Work in progress

Outline

- Status of EPN tracking network
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- Follow-up on EUREF resolutions
- **General News**

RINEX 4

- Accepted now in IGS
- No data yet

Antenna (mis)alignment in site log

```

4.9  Antenna Type           : JAVRINGANT_DM   NONE
     Serial Number         : 00464
     Antenna Reference Point : BPA
     Marker->ARP Up Ecc. (m) : 0.4689
     Marker->ARP North Ecc(m) : 0.0010
     Marker->ARP East Ecc(m) : 0.0000
     Alignment from True N   : 0 deg
     Antenna Radome Type     : NONE
     Radome Serial Number    :
     Antenna Cable Type      : ANDREW heliax LDF2-50A
     Antenna Cable Length    : 60 m
     Date Installed          : 2018-02-01T08:15Z
     Date Removed            : 2021-04-20T07:35Z
     Additional Information   :

```

EPN data analysis now takes into account the antenna alignment from true north !

When changing site log for currently installed antenna
→ jumps in time series

```

4.9  Antenna Type           : JAVRINGANT_DM   NONE
     Serial Number         : 00464
     Antenna Reference Point : BPA
     Marker->ARP Up Ecc. (m) : 0.4689
     Marker->ARP North Ecc(m) : 0.0010
     Marker->ARP East Ecc(m) : 0.0000
     Alignment from True N   : 15 deg
     Antenna Radome Type     : NONE
     Radome Serial Number    :
     Antenna Cable Type      : ANDREW heliax LDF2-50A
     Antenna Cable Length    : 60 m
     Date Installed          : 2018-02-01T08:15Z
     Date Removed            : 2021-04-20T07:35Z
     Additional Information   :

```

Summary

- ✓ 28 new EPN stations → 405 EPN stations
- ✓ 16 EPN stations not providing data since several months
- ✓ Receiver firmware updates (or other changes at receiver) not always reported in site log
- ✓ M³G v5.0 released in March 2023 : faster and (hopefully) easier to use + new functionalities
- ✓ EUREF resolution on EPOS
 - ✓ 81% of EPN stations in EPOS
 - ✓ EPN data providers properly acknowledged at EPOS data portal
- ✓ EUREF resolution on FAIR data
 - ✓ Collection of rich metadata → Nice progress: site log OK , data quality OK, 97% of EPN stations with data license
 - ✓ Collection of DOI : station DOI now accepted in M³G → Station manager can insert it (EPN CB can help to assign DOI)

Contact

Royal Observatory of Belgium

EPN Central Bureau

epncb@oma.be

<https://epncb.oma.be/>

Brussels

BELGIUM

Thank you for your attention

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