



EPN Coordination Status and Plans

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*EPN Central Bureau
Royal Observatory of Belgium*

OUTLINE

- Update on EPN Tracking Network
- EPN CB Support to LACs
- New at EPN CB
- Summary & Future Plans



EPN TRACKING NETWORK



218 permanent GNSS stations

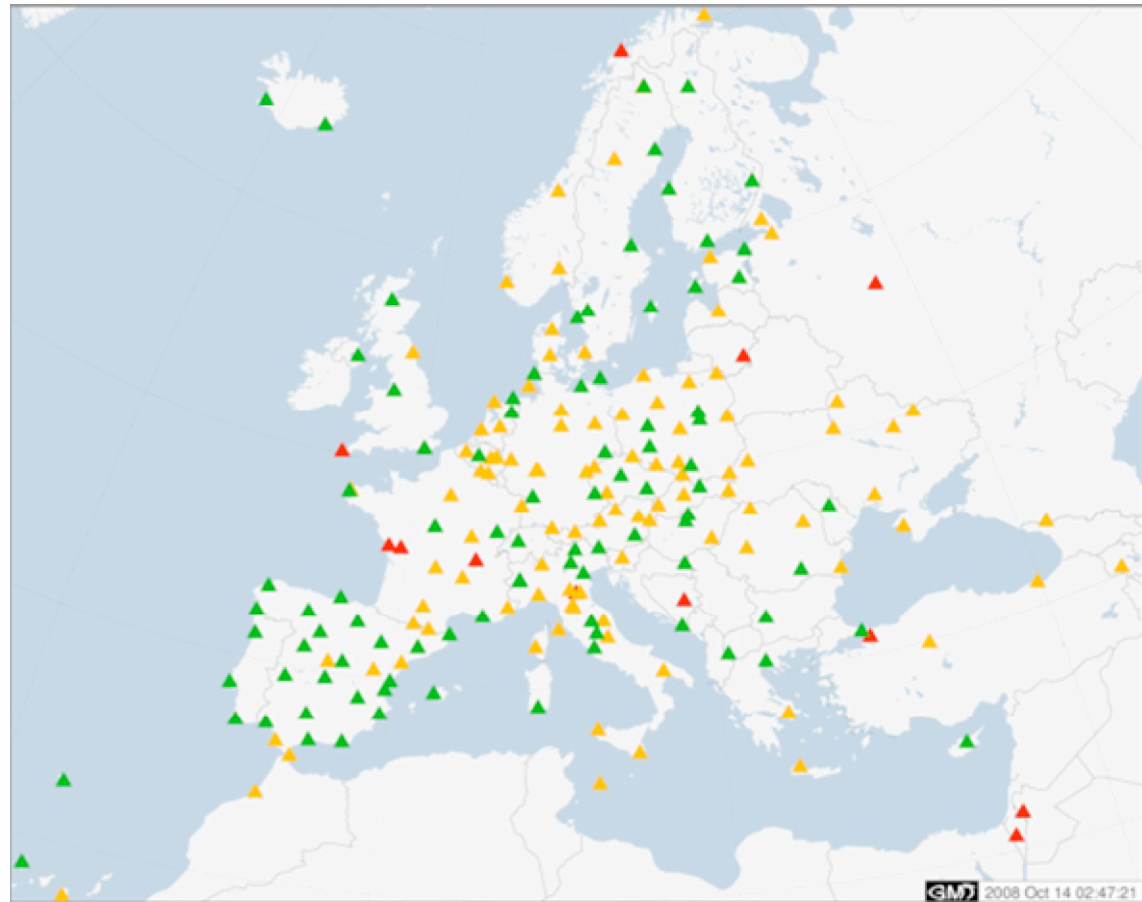
39 % GPS+GLONASS

38 % IGS

92 % hourly

42 % real-time

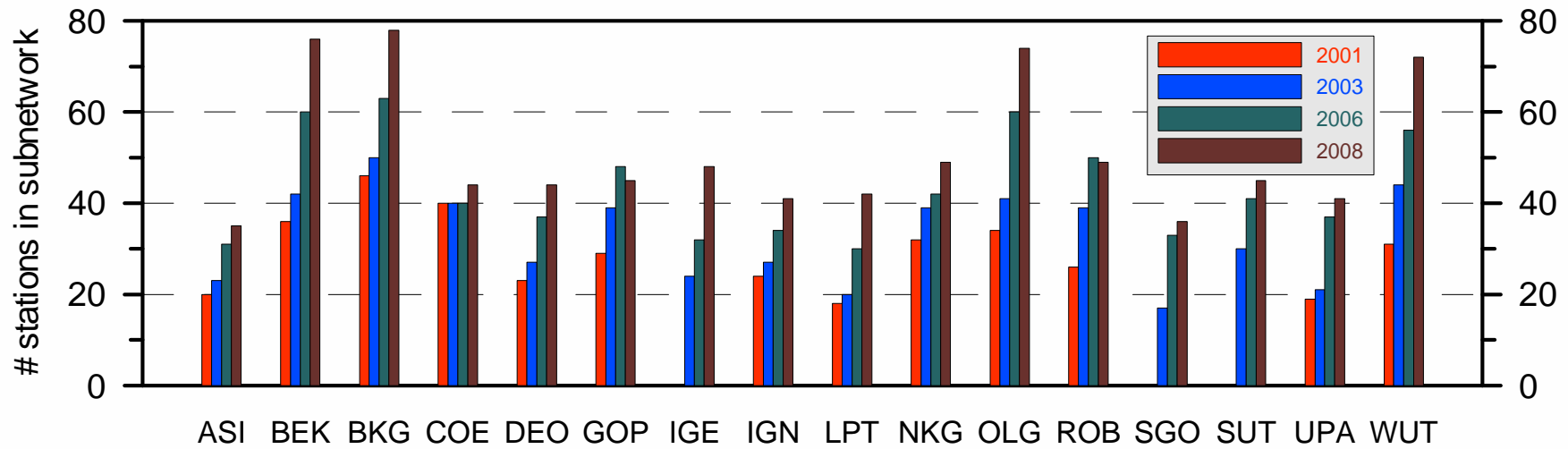
38 countries



NEW EPN STATIONS SINCE LAST LAC WORKSHOP



GROWTH OF LAC NETWORKS

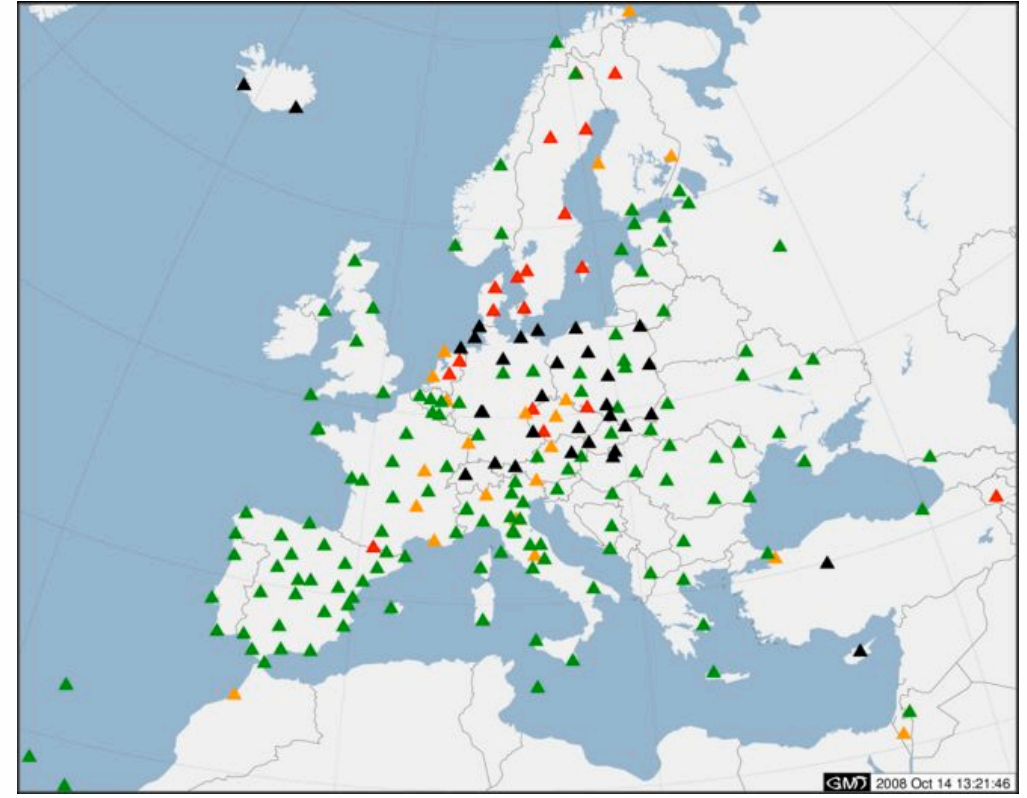
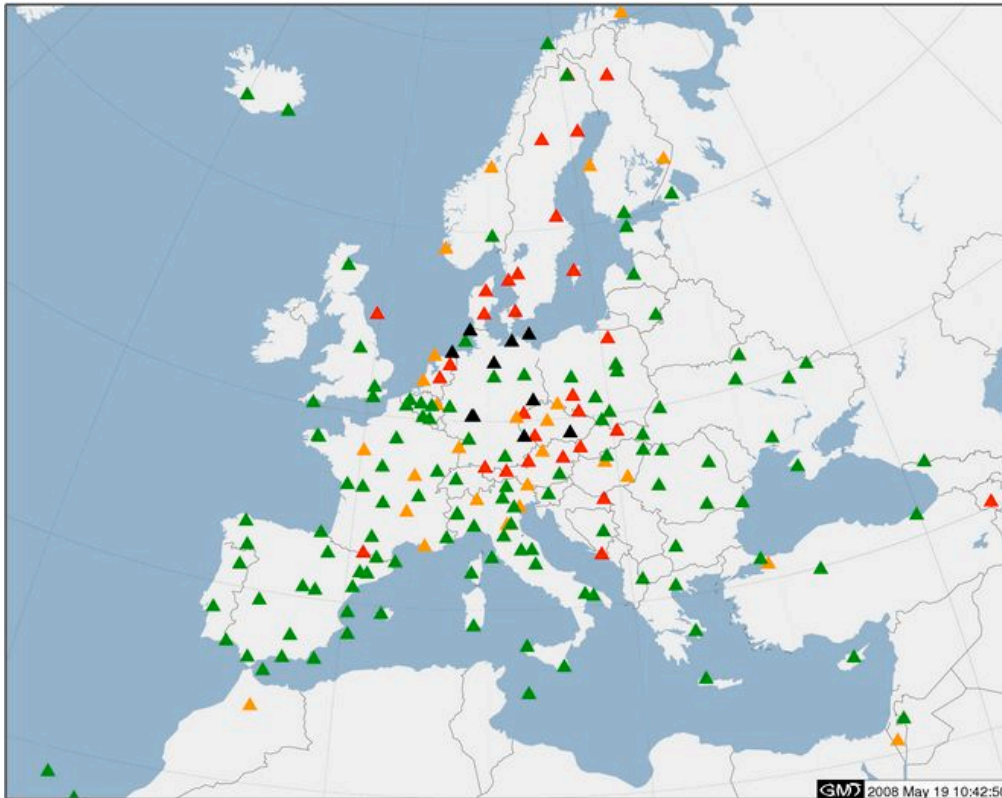


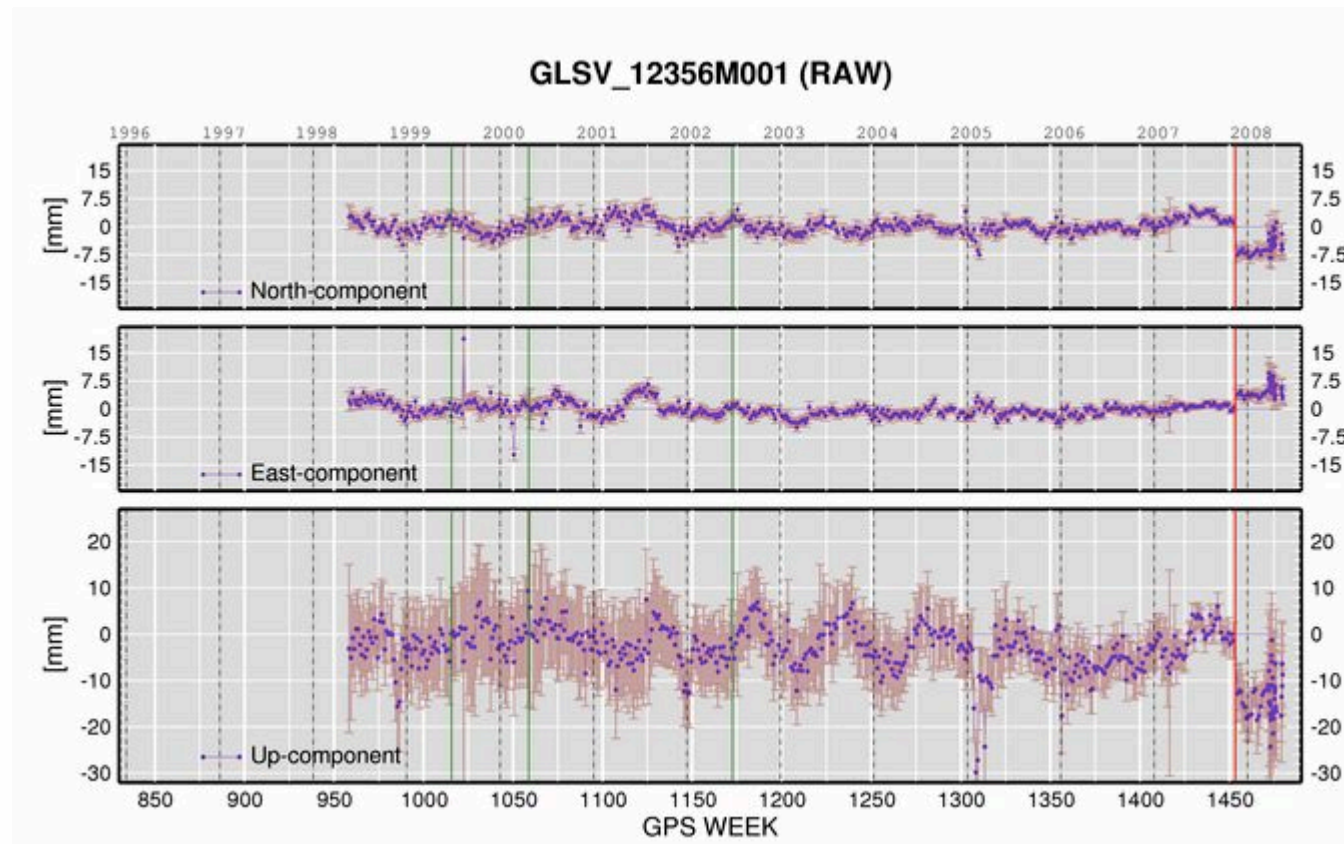
Dec. 2006

Indiv. abs. calib.	5%	
True abs.calib	64%	69%
Calib. from field	14%	
No calib.	17%	

Oct. 2008

Indiv. abs. calib	15%	
True abs. calib	65 %	80%
Calib. from field	10%	
No calib.	10%	





Recommendations IGS Workshop Miami, June 6, 2008

If a new station is set up or an old antenna is replaced, station operators are asked to choose an antenna type that shows a robot calibration (or the consistent results of a different calibration procedure of comparable quality) within the IGS antenna calibration file or to provide an absolute calibration.

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EPN SUPPORT TO LAC



Web

- Analysis Centres web page
 - subnetwork descriptions, processing options
 - archive of all LAC Mails sent to euref_ac@ifag.de
- Station web pages
 - Data quality plots (teqc, azimuth/elevation graphs)
 - Coordinate time series

Ftp

- Ocean loading table (BLQ format)
- Antenna calibrations (type+individual)
- meta-data files based on site logs: euref.snx (SINEX), EUREF.STA (Bernese)
- stations to be excluded from weekly submission [excluded.www](#) 
- station coordinates in Bernese format (weekly) and SSC format (4x/year) 



FTP directory /pub/station/general/exc

To view this FTP site in Windows Explorer, click **Page**, and then c

[Up to higher level directory](#)

```
02/28/2007 12:00      172 excluded.1362
02/28/2007 12:00      248 excluded.1363
02/28/2007 12:00      172 excluded.1364
02/28/2007 12:00      248 excluded.1365
02/28/2007 12:00      291 excluded.1366
02/28/2007 12:00      253 excluded.1367
02/28/2007 12:00      253 excluded.1368
02/28/2007 12:00      253 excluded.1369
02/28/2007 12:00      215 excluded.1370
02/28/2007 12:00      291 excluded.1371
02/28/2007 12:00      296 excluded.1372
02/28/2007 12:00      258 excluded.1373
02/28/2007 12:00      301 excluded.1374
02/28/2007 12:00      301 excluded.1375
02/28/2007 12:00      339 excluded.1376
02/28/2007 12:00      377 excluded.1377
02/28/2007 12:00      339 excluded.1378
02/28/2007 12:00      339 excluded.1379
02/28/2007 12:00      420 excluded.1380
02/28/2007 12:00      382 excluded.1381
02/28/2007 12:00      344 excluded.1382
02/28/2007 12:00      382 excluded.1383
02/28/2007 12:00      496 excluded.1384
02/28/2007 12:00      420 excluded.1385
02/28/2007 12:00      420 excluded.1386
02/28/2007 12:00      344 excluded.1387
```

```
MDVJ 12309M005 station inactive since 1489
BUDP 10101M003 equipment change (REC)
GSR1 14501M001 equipment change (REC)
GSR1 14501M001 equipment change (ANT)
TERS 13534M001 equipment change (REC)
```





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FTP directory /pub/station/coord/EPN/ at epncb.oma

To view this FTP site in Windows Explorer, click **Page**, and then click **Open FTP Site**

[Up to higher level directory](#)

04/14/2008 12:00	119,819	EPN_ETRF_XYZ.SSC
04/14/2008 12:00	119,819	EPN_ITRF_XYZ.SSC
10/09/2008 12:08	63,966	EPNsoln.snx
10/11/2008 05:01	14	IGS05.CRD
11/26/2007 12:00	17,495	IGS05_1455.CRD
02/28/2008 12:00	17,705	IGS05_1468.CRD
03/08/2008 12:00	17,921	IGS05_1469.CRD
03/15/2008 12:00	17,925	IGS05_1470.CRD
03/22/2008 12:00	18,931	IGS05_1471.CRD
03/29/2008 12:00	18,931	IGS05_1472.CRD
04/05/2008 12:00	19,003	IGS05_1473.CRD
04/12/2008 12:00	19,005	IGS05_1474.CRD
04/19/2008 05:00	19,005	IGS05_1475.CRD
04/26/2008 05:01	20,226	IGS05_1476.CRD
05/03/2008 05:01	20,226	IGS05_1477.CRD
05/10/2008 05:01	20,226	IGS05_1478.CRD
05/17/2008 05:01	20,226	IGS05_1479.CRD
05/24/2008 05:01	20,303	IGS05_1480.CRD
05/31/2008 05:01	20,303	IGS05_1481.CRD
06/07/2008 05:01	20,303	IGS05_1482.CRD
06/14/2008 05:01	20,303	IGS05_1483.CRD
06/21/2008 05:01	20,303	IGS05_1484.CRD
06/28/2008 05:01	20,303	IGS05_1485.CRD
07/05/2008 05:01	20,749	IGS05_1486.CRD
07/12/2008 05:02	20,749	IGS05_1487.CRD
07/19/2008 05:02	20,826	IGS05_1488.CRD
07/26/2008 05:01	20,826	IGS05_1489.CRD
08/02/2008 05:01	20,826	IGS05_1490.CRD
08/09/2008 05:01	20,826	IGS05_1491.CRD
08/16/2008 05:01	20,836	IGS05_1492.CRD
08/23/2008 05:01	20,852	IGS05_1493.CRD
08/30/2008 05:01	20,852	IGS05_1494.CRD
09/06/2008 05:01	20,929	IGS05_1495.CRD
09/13/2008 05:01	21,006	IGS05_1496.CRD
09/20/2008 05:01	21,010	IGS05_1497.CRD
09/27/2008 05:01	21,012	IGS05_1498.CRD
10/04/2008 05:01	21,012	IGS05_1499.CRD
10/11/2008 05:01	21,012	IGS05_1500.CRD
10/13/2008 08:22	18,801	RTCM.CRD

Bestand Bewerken Beeld Geschiedenis Bladvijzers Extra Help

ftp://epncb.oma.be/pub/station/coord/EPN/EPN_ITRF_XYZ.SSC

EPN ITRF2005 STATION POSITIONS (EPOCH 2000.0) AND VELOCITIES
CUMULATIVE SOLUTION OF GPSWEEKS [0860 - 1494]
CREATED WITH CATREF

DOMES NB.	SITE NAME	TECH. ID.	X/Vx	Y/Vy	Z/Vz	Sigmas		
						-----m/m/Y-----		
13434M001	ACOR	GPS ACOR	4594489.749	-678367.887	4357066.068	0.001	0.000	0.001
13434M001			-0.0106	0.0228	0.0103	0.0003	0.0001	0.0002
13434M001	ACOR	GPS ACOR	4594489.749	-678367.884	4357066.075	0.001	0.000	0.001
13434M001			-0.0106	0.0228	0.0103	0.0003	0.0001	0.0002
13434M001	ACOR	GPS ACOR	4594489.738	-678367.880	4357066.061	0.001	0.000	0.001
13434M001			-0.0106	0.0228	0.0103	0.0003	0.0001	0.0002
13434M001	ACOR	GPS ACOR	4594489.753	-678367.884	4357066.074	0.001	0.000	0.001
13434M001			-0.0106	0.0228	0.0103	0.0003	0.0001	0.0002
13434M001	ACOR	GPS ACOR	4594489.763	-678367.886	4357066.086	0.002	0.001	0.002
13434M001			-0.0106	0.0228	0.0103	0.0003	0.0001	0.0002
13434M001	ACOR	GPS ACOR	4594489.762	-678367.888	4357066.081	0.002	0.001	0.002
13434M001			-0.0106	0.0228	0.0103	0.0003	0.0001	0.0002
10077M005	AJAC	GPS AJAC	4696989.507	723994.380	4239678.482	0.000	0.000	0.000
10077M005			-0.0144	0.0187	0.0113	0.0001	0.0000	0.0001
10077M005	AJAC	GPS AJAC	4696989.508	723994.381	4239678.482	0.001	0.000	0.001
10077M005			-0.0144	0.0187	0.0113	0.0001	0.0000	0.0001
13433M001	ALAC	GPS ALAC	5009051.243	-42072.294	3935057.672	0.001	0.000	0.000
13433M001			-0.0114	0.0195	0.0122	0.0001	0.0000	0.0001
13433M001	ALAC	GPS ALAC	5009051.244	-42072.298	3935057.673	0.001	0.000	0.001
13433M001			-0.0114	0.0195	0.0122	0.0001	0.0000	0.0001
13433M001	ALAC	GPS ALAC	5009051.247	-42072.297	3935057.678	0.001	0.000	0.001
13433M001			-0.0114	0.0195	0.0122	0.0001	0.0000	0.0001
13437M001	ALME	GPS ALME	5105220.139	-219278.615	3804387.061	0.001	0.000	0.001
13437M001			-0.0091	0.0185	0.0123	0.0001	0.0000	0.0001
13437M001	ALME	GPS ALME	5105220.145	-219278.615	3804387.069	0.001	0.000	0.001
13437M001			-0.0091	0.0185	0.0124	0.0001	0.0000	0.0001
13437M001	ALME	GPS ALME	5105220.142	-219278.614	3804387.067	0.001	0.000	0.001
13437M001			-0.0091	0.0185	0.0124	0.0001	0.0000	0.0001
20805M002	ANKR	GPS ANKR	4121948.561	2652187.938	4069023.700	0.001	0.000	0.001
20805M002			-0.0087	-0.0048	0.0076	0.0001	0.0001	0.0001
20805M002	ANKR	GPS ANKR	4121948.556	2652187.940	4069023.700	0.001	0.001	0.001
20805M002			-0.0087	-0.0048	0.0076	0.0001	0.0001	0.0001
20805M002	ANKR	GPS ANKR	4121948.579	2652187.930	4069023.724	0.001	0.000	0.001
20805M002			-0.0087	-0.0048	0.0076	0.0001	0.0001	0.0001
20805M002	ANKR	GPS ANKR	4121948.579	2652187.937	4069023.725	0.001	0.001	0.001
20805M002			-0.0087	-0.0048	0.0076	0.0001	0.0001	0.0001
20805M002	ANKR	GPS ANKR	4121948.570	2652187.932	4069023.721	0.001	0.001	0.001
20805M002			-0.0087	-0.0048	0.0076	0.0001	0.0001	0.0001
12757M001	AQUI	GPS AQUI	4592507.656	1089876.271	4276392.929	0.001	0.000	0.001
12757M001			-0.0178	0.0185	0.0125	0.0001	0.0001	0.0001



VERIFICATION OF SINEX FILES



Weekly verification of LAC SINEX files

- Antenna/radome type + serial number
- Antenna calibration values – offsets only
- Station list (missing EPN stations, non-EPN stations)
- Emails to LAC (copy to AAC)

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NEW AT EPN CB



- ✓ Raw time series:
 - ✓ Error bars
 - ✓ Daily rapid solutions

- ✓ Interactive web-page for checking hourly data latency

- ✓ EPN Network Performance

ORGANISATION

Creation, Management, Structure, Relation to IGS, Projects, Guidelines, FAQ

TRACKING NETWORK

Maps, **Stations**, Equipment and calibration, Station coordinates, Site log submission & test

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News, Mails, Calendar, Papers, Workshops, Web site history

FTP & WEB ACCESS

Anonymous FTP, Web site index, Related links

[TRACKING NETWORK](#) > [STATIONS](#)

STATIONS

Site information



Through a clickable european map you have access to a complete description of each individual EPN station: log file, data availability, RINEX errors, coordinate repeatabilities, tracking performance, related EUREF mails, collocation info, ...

Proposed



The EPN tracking network is permanently growing. Browse the list of candidate stations (including map and preliminary log files) and follow their inclusion status.

Inconsistency reports



For each EPN station, there needs to be full agreement between the site configuration info, extracted from the header of its data files, and the site log file. If not, this inconsistency can confuse the analysis centres and lead to erroneous station coordinates. The inconsistency reports, archived here, are distributed weekly through EUREFmail.

Lists extracted from log files



Historical, summary or user-defined lists (machine-readable) of the configuration of the EPN stations. It includes the station location, the receiver/antenna names, the antenna height and much more.

Network performance



Overview of the performance of all EPN stations. Metrics include :

- data availability and latency
- %tage of data received compared to the amount expected



Last 4 weeks

basis for new weekly
data latency emails

Site	Location	Availability (%)					Latency			DQ (%)	
		Daily BKG	Daily OLG	Hourly BKG	Hourly OLG	RT	Hourly(%) BKG	Hourly(%) OLG	RT (s)	0°	15°
ACOR	A Coruna, Spain	100	100	86	99	100	82	97	1.9	90	99
AJAC	Ajaccio, France	0	0	0	0	—	0	0	—	—	—
ALAC	Alicante, Spain	100	100	86	93	99	81	89	1.9	91	100
ALBA	Albacete, Spain	100	96	85	99	100	80	95	2.9	88	99
ALME	Almeria, Spain	100	100	86	92	100	81	89	1.9	88	100
ANKR	Ankara, Turkey	100	100	69	69	—	58	0	—	94	100
AQUI	L'Aquila, Italy	100	100	99	100	—	96	88	—	83	99
AUT1	Thessaloniki, Greece	100	100	99	100	100	95	97	1.1	86	99
AUTN	Autun, France	100	100	96	93	—	95	74	—	84	99
BACA	Bacau, Romania	100	79	94	95	—	77	91	—	87	100
BADH	Bad Homburg, Germany	100	100	100	100	—	99	0	—	77	97
BAIA	Baia Mare, Romania	100	96	98	99	—	83	76	—	81	97
BBYS	Banska Bystrica, Slovak Republic	89	57	55	69	—	53	67	—	82	96
BELF	Belfast, United Kingdom	100	100	100	100	99	32	82	0.6	86	99
BELL	Bellmunt de Segarra, Spain	89	100	79	74	100	75	58	3.6	80	96
BISK	Zlate Hory, Czech Republic	100	100	100	100	—	96	51	—	67	83
BOGI	Borowa Gora, Poland	96	96	89	98	93	89	88	3.6	81	100
BOGO	Borowa Gora, Poland	100	96	89	98	—	89	87	—	82	100
BOLG	Bologna, Italy	46	43	—	—	—	—	—	—	85	100
BOR1	Borowiec, Poland	100	100	86	100	100	82	0	1.5	83	100
BORJ	Borkum (Island of Borkum), Germany	100	0	86	0	100	82	0	0.6	91	97
BORR	Borriana, Spain	100	100	83	98	99	78	92	1.8	87	100
BPDL	Biala Podlaska, Poland	100	100	89	100	—	84	95	—	98	100
BRST	Brest, France	100	100	98	82	97	92	16	0.7	86	97
BRUS	Brussels, Belgium	100	100	86	100	99	82	96	1.8	80	100
BSCN	Besançon, France	100	100	99	95	99	95	73	1.7	74	98
BUCU	Bucuresti, Romania	100	100	88	88	—	87	0	1.4	82	100
BUDP	Kobenhavn, Denmark	100	68	81	95	—	77	93	—	95	98
BUTE	Budapest, Hungary	100	61	70	68	99	66	62	0.4	91	100
BYDG	Bydgoszcz, Poland	100	100	89	100	—	84	95	—	97	100
BZRG	Bolzano - Bozen, Italy	100	100	97	99	99	88	79	1.8	77	100
CACE	Caceres, Spain	100	100	85	100	62	81	95	2.8	87	100
CAGL	Cagliari, Italy	100	100	97	98	—	95	86	—	84	99
CAGZ	Capoterra, Italy	79	82	71	69	99	19	19	1.8	81	97



NEW AT EPN CB



- ✓ Raw time series:
 - ✓ Error bars
 - ✓ Daily rapid solutions

- ✓ Interactive web-page for checking hourly data latency

- ✓ EPN Network Performance

- ✓ Pilot Projects included in routine EPN operations:
 - Monitoring of real-time data and high rate data provision



EUREF HOME

EUREF Permanent Network



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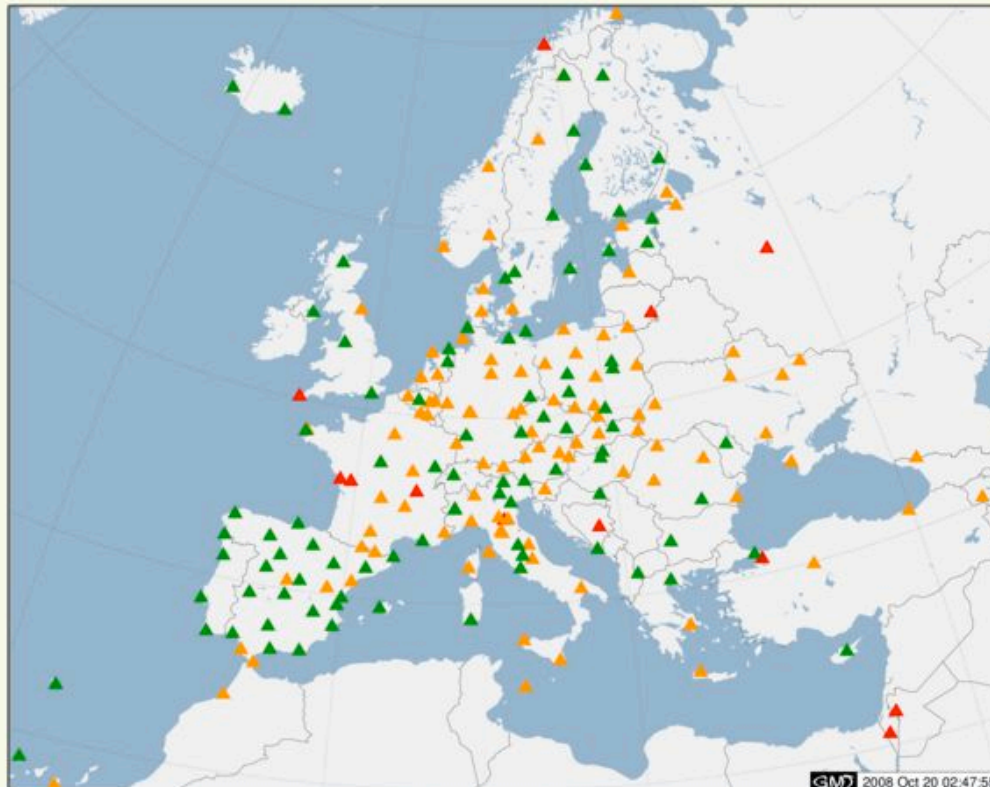
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FTP & WEB ACCESS

Anonymous FTP, Web site index, Related links

[DATA & PRODUCTS](#) > [DATA ACCESS](#)

DATA ACCESS



The GNSS data from the EPN stations are freely available through the internet. Depending on the station data policy, [daily](#) (mandatory), [hourly RINEX](#) (92.2% of the EPN stations), [15min high-rate RINEX](#) (from real-time streams) and [real-time](#) (42.2% of the EPN stations) data are made available (see map).

The two Regional Data Centres (RDC), located at [BKG](#) (Federal Office of Cartography and Geodesy, Germany) and at [OLG](#) (Austrian Academy of Sciences) provide access to the daily and hourly data from all the EPN stations.

The regional EUREF broadcaster www.euref-ip.net makes available the EPN real-time data streams.

green: stations delivering real-time data

orange: stations delivering hourly data

red: stations delivering daily data





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 - Time series analysis



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PRODUCTS

Weekly EPN Solutions

The core product of the EUREF Permanent Network is the weekly coordinate estimates for the EPN tracking stations and their covariance information in the SINEX format. These coordinates are outcome from the so-called "combined EPN solution" which is based on the subnetwork solutions submitted by the EPN Analysis Centres.

Station Coordinates and Velocities

The coordinates and velocities of the EPN tracking sites are available with an accuracy of a cm or better in the different realizations of the ITRS and ETRS89. In addition, regularly updated coordinates using the latest tracking data as well as coordinates for recent sites not yet included in the ITRS are also given.

Time Series Analysis

NEW

By stacking the weekly EPN solutions (available since the start of the EPN until today), precise station coordinates/velocities, as well as information on the non-linear behaviour of the coordinates and their noise type is obtained.

The raw and cleaned coordinate times series show how the site coordinates change with time.

Site Zenith Path Delays

NEW

Within the routine analysis of a network of ground-based GPS receivers, such as the EPN, the tropospheric parameters are a by-product of the parameter estimation. The EPN makes available the tropospheric zenith path delays at all of its stations based on the estimates of all its Local Analysis Centres.

TIME SERIES ANALYSIS

The main target of the EPN coordinate time series analysis and monitoring is to strengthen the EPN as a geodetic reference network and to offer various products for geodesists and geophysicists.

Using the CATREF software (Altamimi et al, IGN, France), regularly updated EPN cumulative solutions are created based on the [weekly combined EPN SINEX solutions](#).

During the time series analysis all station specific events (coordinate outliers and discontinuities) are identified and taken into account. This regular monitoring and correction allows to keep the EPN time series products up-to-date.

Within the EPN, this analysis is done by [A. Kenyeres](#) (FÖMI, Hungary).

Products

The time series analysis provides regularly (4 times per year) an updated cleaned cumulative EPN SINEX solution together with the following products:

- The [EPN cumulative solution](#) in SINEX format (zipped, >50 Mbyte!), is available on request from [A. Kenyeres](#). It is tied to the [ITRF2005](#) reference frame using [minimum constraints](#).
- [EPN station coordinates and velocities](#) are the most accurate and up-to-date solutions for the EPN sites. They are used for the maintenance of the [regional densification of the ITRF](#) between two releases and also for the maintenance of the ETRS89.
- An up-to-date list of station discontinuities ([EPNsoln.snz](#)) fully harmonized with the [IGS/ITRF discontinuity table](#).
- [Residual coordinate time series](#) as the Helmert difference between the coordinates in the cumulative solution and the ones in the weekly input SINEX solutions.
- [Harmonic analysis](#) of the time series to detect seasonal coordinate variations
- [Noise analysis](#) to estimate reliable velocity uncertainties and station-specific noise characteristics
- Miscellaneous plots:
 - [Helmert transformation parameters](#) between the cumulative and the weekly input SINEX solutions
 - [Weighted weekly rms](#) of the input SINEX solutions
 - [Length of the observation series](#) used in the combination
 - [Case studies](#) showing specific cases

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- [Residual coordinate time series](#) as the Helmert difference between the coordinates in the cumulative solution and the ones in the weekly input SINEX solutions.
- [Harmonic analysis](#) of the time series to detect seasonal coordinate variations
- [Noise analysis](#) to estimate reliable velocity uncertainties and station-specific noise characteristics
- Miscellaneous plots:
 - [Helmert transformation parameters](#) between the cumulative and the weekly input SINEX solutions
 - [Weighted weekly rms](#) of the input SINEX solutions
 - [Length of the observation series](#) used in the combination
 - [Case studies](#) showing specific cases

TIME SERIES ANALYSIS

The main target of the EPN coordinate time series analysis and monitoring is to strengthen the EPN as a geodetic reference network and to offer various products for geodesists and geophysicists.

Using the CATREF software (Altamimi et al, IGN, France), regularly updated EPN cumulative solutions are created based on the [weekly combined EPN SINEX solutions](#).

During the time series analysis all station specific events (coordinate outliers and discontinuities) are identified and taken into account. This regular monitoring and correction allows to keep the EPN time series products up-to-date.

Within the EPN, this analysis is done by [A. Kenyeres](#) (FÖMI, Hungary).

Products

The time series analysis provides regularly (4 times per year) an updated cleaned cumulative EPN SINEX solution together with the following products:

- The [EPN cumulative solution](#) in SINEX format (zipped, >50 Mbyte!), is available on request from [A. Kenyeres](#). It is tied to the [ITRF2005](#) reference frame using minimum constraints.
- [EPN station coordinates and velocities](#) are the most accurate and up-to-date solutions for the EPN sites. They are used for the maintenance of the regional densification of the ITRF between two releases and also for the maintenance of the ETRS89.
- An up-to-date list of station discontinuities ([EPNsoln.snz](#)) fully harmonized with the [IGS/ITRF discontinuity table](#).
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RESIDUAL COORDINATE TIME SERIES

Residual coordinate time series displaying the Helmert difference between a cumulative coordinate/velocity solution based on the weekly combined EPN solutions and each of the weekly combined EPN solutions:

- raw time series: coordinate outliers are not eliminated, one coordinate/velocity set for each stations
- cleaned time series: coordinate outliers are eliminated, a new coordinate/velocity is estimated if necessary

RAW time series	CLEANED time series
Residuals of cumulative coordinate/velocity solution based on the weekly and rapid combined EPN solutions (no corrections) prepared for monitoring the quality of the estimated station coordinates.	Residuals of cumulative coordinate/velocity solution based on weekly EPN combined solution (outliers eliminated and discontinuities corrected) prepared for geokinematic interpretation.
Updated daily (select a station) <input type="text"/>	Updated periodically (select a station) <input type="text"/>
Purpose : <ul style="list-style-type: none"> • Detect coordinate outliers & coordinate jumps (+ correlation with equipment changes) 	Purpose : <ul style="list-style-type: none"> • Elimination of outliers and introduction of offsets indicated in the "RAW" time series. • Velocity estimation based on the cleaned time series.
Procedure	Procedure



EUREF HOME

EUREF Permanent Network



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PRODUCTS

Weekly EPN Solutions

The core product of the EUREF Permanent Network is the weekly coordinate estimates for the EPN tracking stations and their covariance information in the SINEX format. These coordinates are outcome from the so-called "combined EPN solution" which is based on the subnetwork solutions submitted by the EPN Analysis Centres.

Station Coordinates and Velocities

The coordinates and velocities of the EPN tracking sites are available with an accuracy of a cm or better in the different realizations of the ITRS and ETRS89. In addition, regularly updated coordinates using the latest tracking data as well as coordinates for recent sites not yet included in the ITRS are also given.

Time Series Analysis



By stacking the weekly EPN solutions (available since the start of the EPN until today), precise station coordinates/velocities, as well as information on the non-linear behaviour of the coordinates and their noise type is obtained.

The raw and cleaned coordinate times series show how the site coordinates change with time.

Site Zenith Path Delays



Within the routine analysis of a network of ground-based GPS receivers, such as the EPN, the tropospheric parameters are a by-product of the parameter estimation. The EPN makes available the tropospheric zenith path delays at all of its stations based on the estimates of all its Local Analysis Centres.



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COMBINED EPN SOLUTION

Description

The core product of the EUREF Permanent Network is the weekly estimates of the coordinates of the EPN tracking stations and their covariance information. These coordinates are outcome from the so-called "combined EPN solution" which is based on the subnetwork solutions submitted by the [EPN Analysis Centres](#) (LAC).

[Coordinate time series](#) display the time evolution of the coordinates included in the weekly combined EPN solutions:

- ITRS time series: coordinates in ITRS extracted from weekly solution
- ETRS time series: coordinates in ITRS extracted from weekly solution and transformed to ETRS89

Reference Frame

The weekly combined EPN solution is created after removing the constraints from the subnetwork solutions from the individual Analysis Centres. The weekly EPN solutions are given in the successive reference frames of the [International Terrestrial Reference System](#) through a set of "reference stations" (called fiducial stations).

Period (GPS week)	Reference Frame	Fiducial stations	Alignment method
Jul 1996 - Feb 1998 (0860 - 0946)	ITRF94	BRUS, GRAZ, KOSG, MATE, METS, ONSA, WTZR, ZIMM	Heavy constraints on the fiducial stations
Mar 1998 - Oct 1998 (0947 - 0981)	ITRF96	BOR1, GRAZ, KOSG, MATE, ONSA, POTS, REYK, VILL, WTZR, ZIMM, ZWEN	Heavy constraints on the fiducial stations

TIME SERIES

Coordinate time series displaying the time evolution of the coordinates included in the weekly combined EPN solutions:

- ITRS time series: coordinates in ITRS extracted from weekly solution as is
- ETRS time series: coordinates in ITRS extracted from weekly solution and transformed to ETRS89

ITRS time series	ETRS89 time series
Coordinate Time Series in ITRS extracted from weekly EPN combined solution.	Coordinate Time Series in ETRS89 extracted from weekly EPN combined solution.
<p>Updated weekly</p> <p>(select a station) ▼</p> <p>Purpose :</p> <ul style="list-style-type: none"> • Evaluate influence of the different ITRS realisations on the station coordinates • Visualise large periodic signals in EPN combined solution • Easily distinguish between constrained and non-constrained stations in EPN combined solution <p>Procedure :</p> <ul style="list-style-type: none"> • Extract for each station the weekly estimated (X,Y,Z) coordinates, as is, from the weekly EPN combined solutions. These solutions are linked to the successive realisations of the ITRS at the epoch of observation. • Then, these weekly station coordinates are then converted to a local reference system (N,E,U) with respect to the mean coordinates of that station. • The resulting coordinate time series display for each EPN station the so-called 'ITRS' time series. 	<p>Updated weekly</p> <p>(select a station) ▼</p> <p>Purpose :</p> <ul style="list-style-type: none"> • Evaluate influence of the different ETRS89 realisations on the station coordinates • Visualise common signatures in EPN combined solution • Easily distinguish between constrained and non-constrained stations in EPN combined solution <p>Procedure :</p> <ul style="list-style-type: none"> • Extract for each station the weekly estimated (X,Y,Z) coordinates, as is, from the weekly EPN combined solution. This solution is linked to the successive realisations of the ITRS at the epoch of observation. • Then, the extracted weekly coordinate solutions are converted into the European Terrestrial Reference System (ETRS89) by applying the transformation formula published by Boucher and Altamimi. • In a last step the weekly ETRS89 (X,Y,Z) coordinates are then converted to a local reference system (N,E,U) with respect to the mean coordinates of that station.



NEW AT EPN CB



- ✓ Raw time series:
 - ✓ Error bars
 - ✓ Daily rapid solutions

- ✓ Interactive web-page for checking hourly data latency

- ✓ EPN Network Performance

- ✓ Pilot Projects included in routine EPN operations:
 - Monitoring of real-time data and high rate data provision
 - Time series analysis
 - Zenith Path Delay estimations



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PRODUCTS

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Site Zenith Path Delays



Within the routine analysis of a network of ground-based GPS receivers, such as the EPN, the tropospheric parameters are a by-product of the parameter estimation. The EPN makes available the tropospheric zenith path delays at all of its stations based on the estimates of all its Local Analysis Centres.

SITE ZENITH PATH DELAYS

Introduction

Since June 2001 (GPS week 1110) Zenith Path Delay (ZPD) parameters are estimated for all EPN stations. A combined EPN solution is produced on a weekly basis using the daily SINEX TRO files of the EPN Local Analysis Centres (LACs). Starting with GPS week 1185 all current 16 LACs are contributing to this product.

As the result of the combination two files for each week 'www' are produced:

- a summary file (EURwww7.TSU) with some statistics about, e.g., frequencies of the analyzed sites and accuracies of a single AC solution, providing the feedback to the contributing LACs, and
- the output file (EURwww7.TRO) containing the combined troposphere estimates with a two hours sampling rate. The coordinates as a necessary part of this file, are taken from EUREF's official combined SINEX file. Hence, stations without estimated coordinates in the weekly SINEX file are not included in the combined troposphere solutions.

The troposphere-related files can be downloaded from the [EUREF product directory](#) at BKG since GPS week 1110.

Products

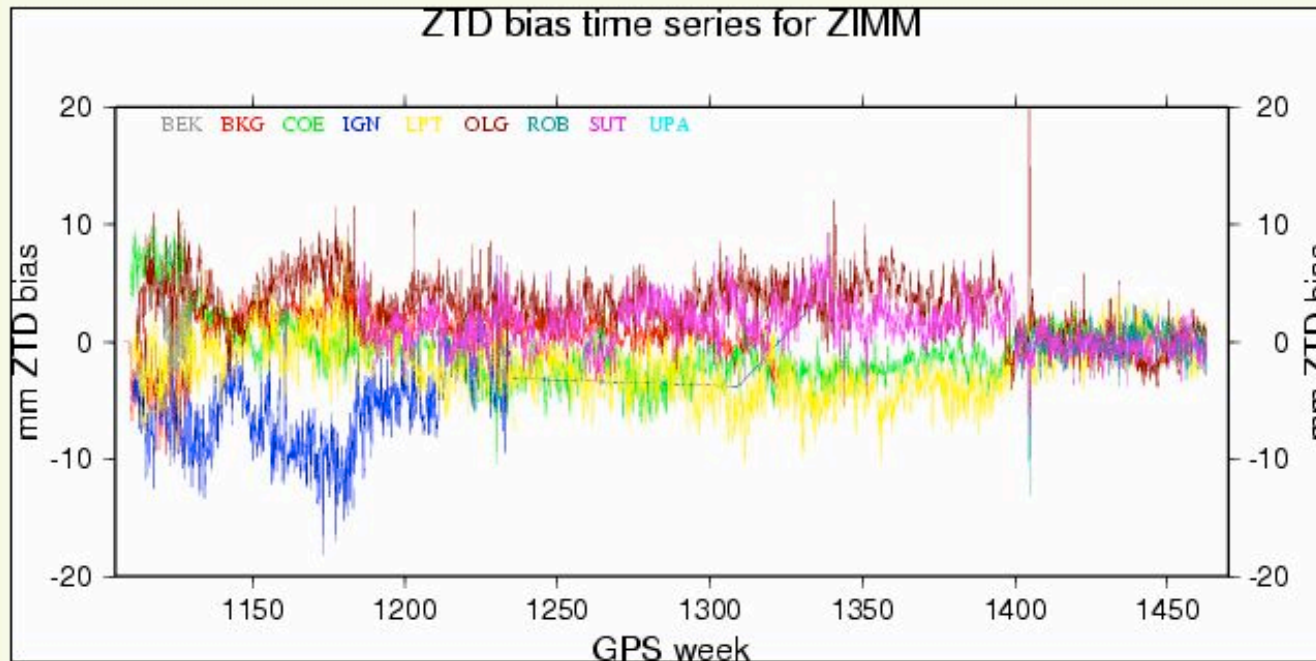
ZPD time series	ZPD biases time series
Zenith Path Delay time series extracted from weekly EPN troposphere combined solution.	Time series of Zenith Path Delay biases for the participating LACs.
Updated weekly <input type="text" value="(select a station)"/> Purpose : <ul style="list-style-type: none"> • Show time series of ZPD parameters derived from the EPN combined solution Procedure : <ul style="list-style-type: none"> • Combination of daily SINEX TRO files of the individual LACs solutions 	Updated weekly <input type="text" value="(select a station)"/> Purpose : <ul style="list-style-type: none"> • Show the agreement of the individual EPN LACs ZPD solutions • Visualize potential periodic signals • Reflect changes in, e.g. used options, analysis procedures etc. Procedure : <ul style="list-style-type: none"> • EPN LACs are delivering estimated ZPD parameters on a daily basis



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DAILY ZTD BIASES FROM EUREF COMBINATION



Explanations

Purpose

- Show the agreement of the individual EPN Local Analysis Centres (LACs) zenith total delay (ZTD) solutions
- Visualize potential periodic signals
- Reflect changes in, e.g. used options, analysis procedures etc.

Procedure

- EPN Local Analysis Centres (LACs) are delivering estimated zenith total delay (ZTD) parameters on a daily basis
- These solutions are combined to the EPN combined (mean) solution considering the biases between the individual solutions
- The resulting daily biases show the agreement of the LACs individual solutions to each other and to the mean



SUMMARY & FUTURE PLANS



- A lot of new things at EPN CB web site, check http://epncb.oma.be/newsmails/web_site_history.php

Future

- Need for more statistics on GLONASS tracking
- Improvement of coordinates web page
- Interactive time series
- On-line site log creation/validation/submission under development

GNSS SITE LOG VALIDATION AND SUBMISSION

This on-line site log validation and submission allows to:


- Create a new site log conform the IGS/EPN [site log format](#)
- Upload, update, validate and save a site log on your local disk
- Upload, validate and save a site log in the EPN data base*

*Only for registered users

Not yet registered ?

- Users wishing to update a site log in the [EPN data base](#) should register.
- Agencies with an [Operational Centre \(OC\) form](#) in the EPN data base are automatically registered.
- Users not wishing to include a site log in the EPN data base, can use the guest login account (Operational Centre=*guest*, password=*guest*)

LOGIN

Operational centre :	<input type="text" value="ROB (Belgium)"/>
Password:	<input type="password" value="..."/>
Forgot your password ?	
Security code:	<input type="text" value="R6CB8"/>
	
Select station from ROB OC form:	<input type="text" value="DENT"/>
Send updated ROB.OC to EPN CB for missing stations	
<input checked="" type="checkbox"/> Upload the log from EPN CB (blank if does not yet exists)	
<input type="checkbox"/> Upload site log from disk	<input type="text"/> <input type="button" value="Browse..."/>
<input type="button" value="Submit"/>	

NOT REGISTERED ?

To open an account and benefit from the EPN Central Bureau on-line site log validation and submission, please complete the [Operational Centre form](#) and send it to the [EPN CB](#).

4. GNSS Antenna Information

4.1

Antenna Type	AOAD/M_T
Serial Number	292
Antenna Reference Point	BPA
Marker->ARP Up Ecc.	0.7540 m
Marker->ARP North Ecc.	0.0000 m
Marker->ARP East Ecc.	0.0000 m
Alignment from True N (+ is clockwise/east)	0 deg
Antenna Radome Type	NONE
Radome Serial Number	 Warning : missing input. Please fill the radome SN
Antenna Cable Type	RGB233
Antenna Cable Length	23 m
Date Installed	1994-01-06
Date Removed	2000-01-25T14:30Z
Additional Information	(multiple lines)

4.2

Antenna Type	AOAD/M_T
Serial Number	327
Antenna Reference Point	BPA
Marker->ARP Up Ecc.	0.7540 m
Marker->ARP North Ecc.	0.0000 m

SITE LOG

Test (Validate)

Submit to EPN CB

Save on disk

ADD SUB-SECTION TO SITE LOG

- 3.6 GNSS Receiver Information ▲
- 4.5 GNSS Antenna Information (E)
- 5.3 Local Surveyed Ties
- 6.3 Frequency Standard ▼

Add



SUMMARY & FUTURE PLANS



Proposals?