Federal Agency for
Cartography and Geodesy

EPN Special Project „Real-Time Analysis“ – Status Report

Wolfgang Söhne

Federal Agency for Cartography and Geodesy

EPN Webpage

EUREF Permanent GNSS Network > Tracking Network > Stations > Site Information > KARL_14216M001 - Windows Internet Explorer

http://www.epncb.oma.be/_trackingnetwork/siteinfo4onestation.php?station=KARL

Datei Bearbeiten Ansicht Favoriten Extras ?

Konvertieren Auswählen

EUREF Permanent GNSS Network > Tracking Network ...

Wk No	Sun	Mon	Tue	Wed	Thu	Fri	Sat
1581							01 (121)
1582	02 (122)	03 (123)	04 (124)	05 (125)	06 (126)	07 (127)	08 (128)
1583	09 (129)	10 (130)	11 (131)	12 (132)	13 (133)	14 (134)	15 (135)
1584	16 (136)	17 (137)	18 (138)	19 (139)	20 (140)	21 (141)	22 (142)
1585	23 (143)	24 (144)	25 (145)	26 (146)	27 (147)	28 (148)	29 (149)
1586	30 (150)	31 (151)					

BKGE (primary)	Online.
OLG (secondary)	Online. No data detected for KARL since 2010/146 (1 day).

META DATA ERRORS

Header of the RINEX observation files

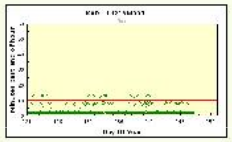
HOURLY

FORMAT : RINEX, 30 sec, Hatanaka compressed
ACCESS : free

DOWNLOAD DATA

BKGE
OLG

DATA LATENCY



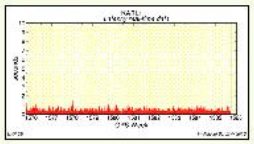
REAL-TIME

STREAM : KARL1
FORMAT : RTCM 3.0 - 1004(1),1006(10),1007(10),1012 (1),1019,1020
ACCESS : free, using Ntrip

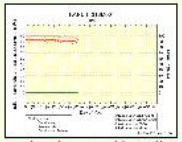
DOWNLOAD DATA

ASI (192.106.234.7:2101)
BKG (www.euref-ip.net)
ROB (www.euref-ip.be)

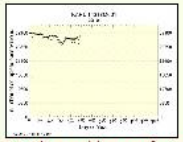
DATA LATENCY



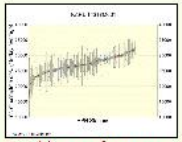
QUALITY PLOTS



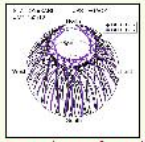
Ratio observed/predicted number of observations



Yearly tracking performance (TEQC)



Tracking performance (TEQC) compared to other EPN stations



Snapshots of satellite tracking

MORE INFORMATION

METEO DATA: none

SATELLITE SYSTEM: GPS+GLONASS

Data Processing

BY

LAC	FROM (GPSWEEK)	TO (GPSWEEK)
BKG	0973	now

Internet 100%

EPN Webpage

EUREF Permanent GNSS Network > Tracking Network > Stations > Site Information > BUCU_11401M001 - Windows Internet Explorer

http://www.epncb.oma.be/_trackingnetwork/siteinfo4onestation.php?station=BUCU

Datei Bearbeiten Ansicht Favoriten Extras ?

Konvertieren Auswählen

EUREF Permanent GNSS Network > Tracking Network ...

Seite Extras

DOWNLOAD DATA

May 2010

Wk No	Sun	Mon	Tue	Wed	Thu	Fri	Sat
1581							01 (121)
1582	02 (122)	03 (123)	04 (124)	05 (125)	06 (126)	07 (127)	08 (128)
1583	09 (129)	10 (130)	11 (131)	12 (132)	13 (133)	14 (134)	15 (135)
1584	16 (136)	17 (137)	18 (138)	19 (139)	20 (140)	21 (141)	22 (142)
1585	23 (143)	24 (144)	25 (145)	26 (146)	27 (147)	28 (148)	29 (149)
1586	30 (150)	31 (151)					

DATA CENTRES STATUS

BKGI (primary)	Online. No data detected for BUCU since 2010/145 (2 days).
IGNI	Online. No data detected for BUCU since 2010/145 (2 days).
OLG (secondary)	Online. No data detected for BUCU since 2010/145 (2 days).

META DATA ERRORS

Header of the RINEX observation files

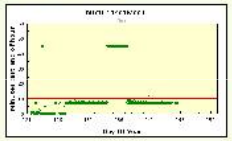
HOURLY

FORMAT : RINEX, 30 sec, Hatanaka compressed
ACCESS : free

DOWNLOAD DATA

BKGI
GOP
IGNI
OLG

DATA LATENCY



REAL-TIME

STREAM : BUCU0
FORMAT : RTCM 3.0 - 1004(1),1006(10),1008(10),1012(1),1019(120),1020(30)
ACCESS : free, using Ntrip

DOWNLOAD DATA

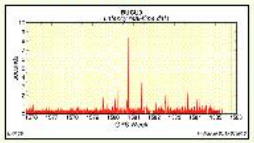
BKG (www.euref-ip.net)

WARNING*

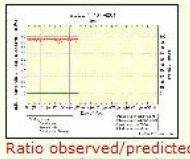
unavailable since 25/05/2010 15H48 UTC

* based on NABU messages generated by BKG

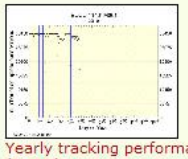
DATA LATENCY



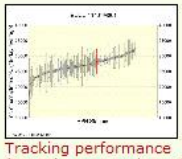
QUALITY PLOTS



Ratio observed/predicted number of observations



Yearly tracking performance (TEQC)



Tracking performance (TEQC) compared to other EPN stations

Snapshots of satellite tracking

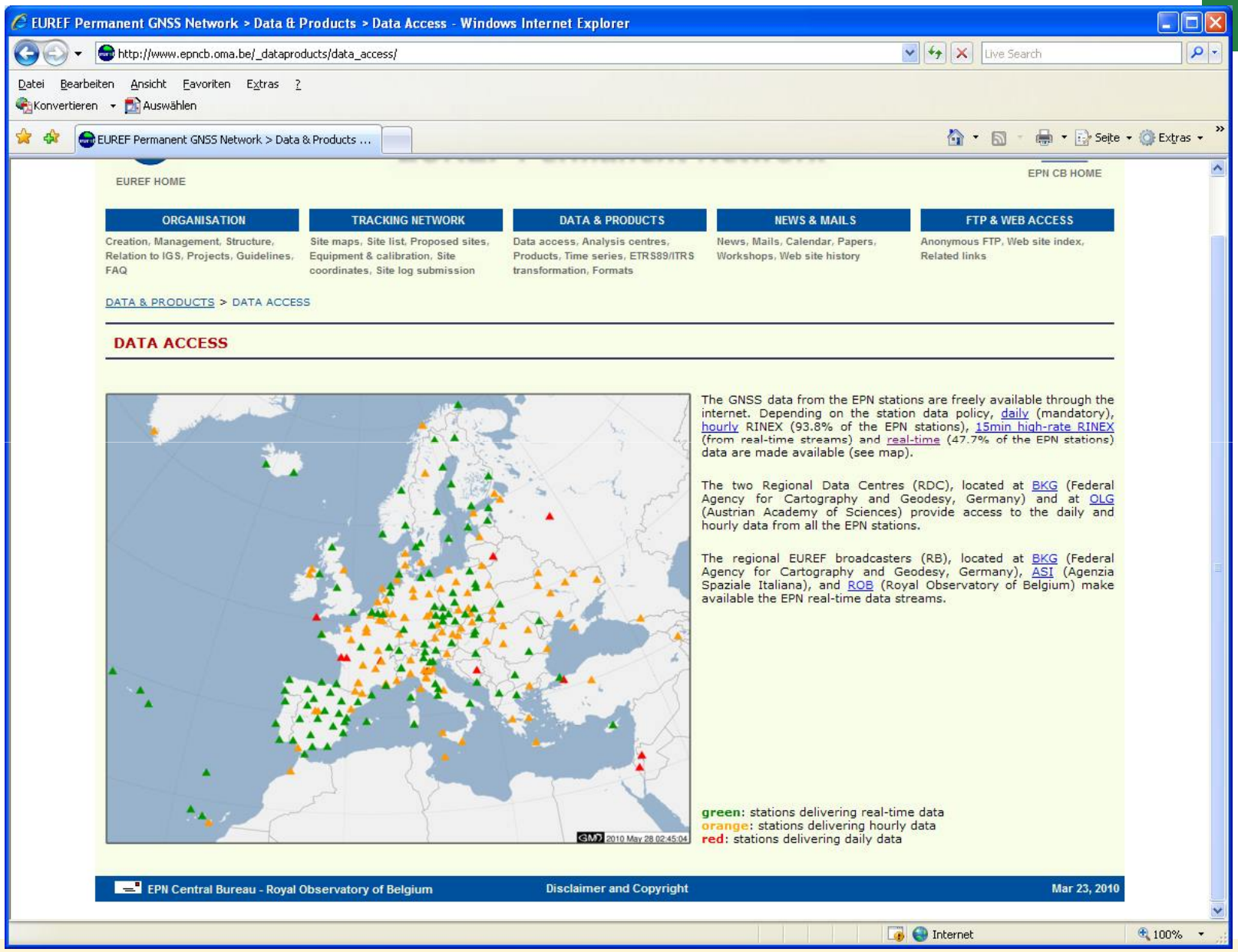
MORE INFORMATION

METEO DATA: none

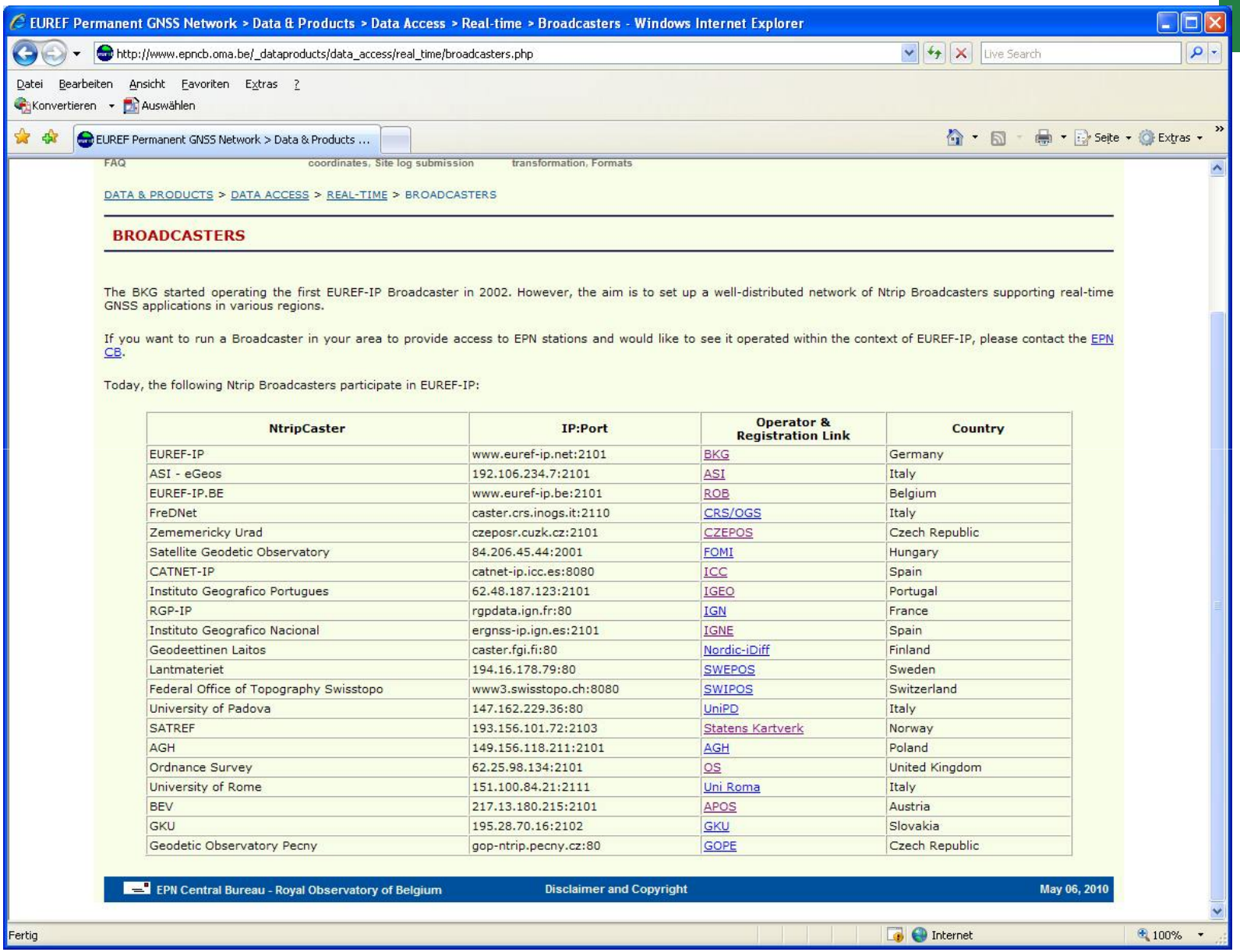
SATELLITE SYSTEM: GPS+GLONASS

Internet 100%

EPN Webpage


EUREF Permanent GNSS Network > Data & Products > Data Access - Windows Internet Explorer
http://www.epncb.oma.be/_dataproducts/data_access/
Live Search
Datei Bearbeiten Ansicht Favoriten Extras ?
Konvertieren Auswählen
EUREF Permanent GNSS Network > Data & Products ...
Seite Extras
EUREF HOME
EPN CB HOME
ORGANISATION
Creation, Management, Structure, Relation to IGS, Projects, Guidelines, FAQ
TRACKING NETWORK
Site maps, Site list, Proposed sites, Equipment & calibration, Site coordinates, Site log submission
DATA & PRODUCTS
Data access, Analysis centres, Products, Time series, ETRS89/ITRS transformation, Formats
NEWS & MAILS
News, Mails, Calendar, Papers, Workshops, Web site history
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 (93.8% of the EPN stations), 15min high-rate RINEX (from real-time streams) and real-time (47.7% of the EPN stations) data are made available (see map).
The two Regional Data Centres (RDC), located at BKG (Federal Agency for 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 broadcasters (RB), located at BKG (Federal Agency for Cartography and Geodesy, Germany), ASI (Agenzia Spaziale Italiana), and ROB (Royal Observatory of Belgium) make available the EPN real-time data streams.
GMT 2010 May 28 02:45:04
green: stations delivering real-time data
orange: stations delivering hourly data
red: stations delivering daily data
EPN Central Bureau - Royal Observatory of Belgium
Disclaimer and Copyright
Mar 23, 2010
Internet
100%

EPN Webpage



NtripCaster	IP:Port	Operator & Registration Link	Country
EUREF-IP	www.euref-ip.net:2101	BKG	Germany
ASI - eGeos	192.106.234.7:2101	ASI	Italy
EUREF-IP.BE	www.euref-ip.be:2101	ROB	Belgium
FreDNet	caster.crs.inogs.it:2110	CRS/OGS	Italy
Zememericky Urad	czeposr.cuzk.cz:2101	CZEPOS	Czech Republic
Satellite Geodetic Observatory	84.206.45.44:2001	FOMI	Hungary
CATNET-IP	catnet-ip.icc.es:8080	ICC	Spain
Instituto Geografico Portugues	62.48.187.123:2101	IGEO	Portugal
RGP-IP	rgpdata.ign.fr:80	IGN	France
Instituto Geografico Nacional	ergnss-ip.ign.es:2101	IGNE	Spain
Geodeettinen Laitos	caster.fgi.fi:80	Nordic-iDiff	Finland
Lantmateriet	194.16.178.79:80	SWEPOS	Sweden
Federal Office of Topography Swisstopo	www3.swisstopo.ch:8080	SWIPOS	Switzerland
University of Padova	147.162.229.36:80	UniPD	Italy
SATREF	193.156.101.72:2103	Statens Kartverk	Norway
AGH	149.156.118.211:2101	AGH	Poland
Ordnance Survey	62.25.98.134:2101	OS	United Kingdom
University of Rome	151.100.84.21:2111	Uni Roma	Italy
BEV	217.13.180.215:2101	APOS	Austria
GKU	195.28.70.16:2102	GKU	Slovakia
Geodetic Observatory Pecny	gop-ntrip.pecny.cz:80	GOPE	Czech Republic

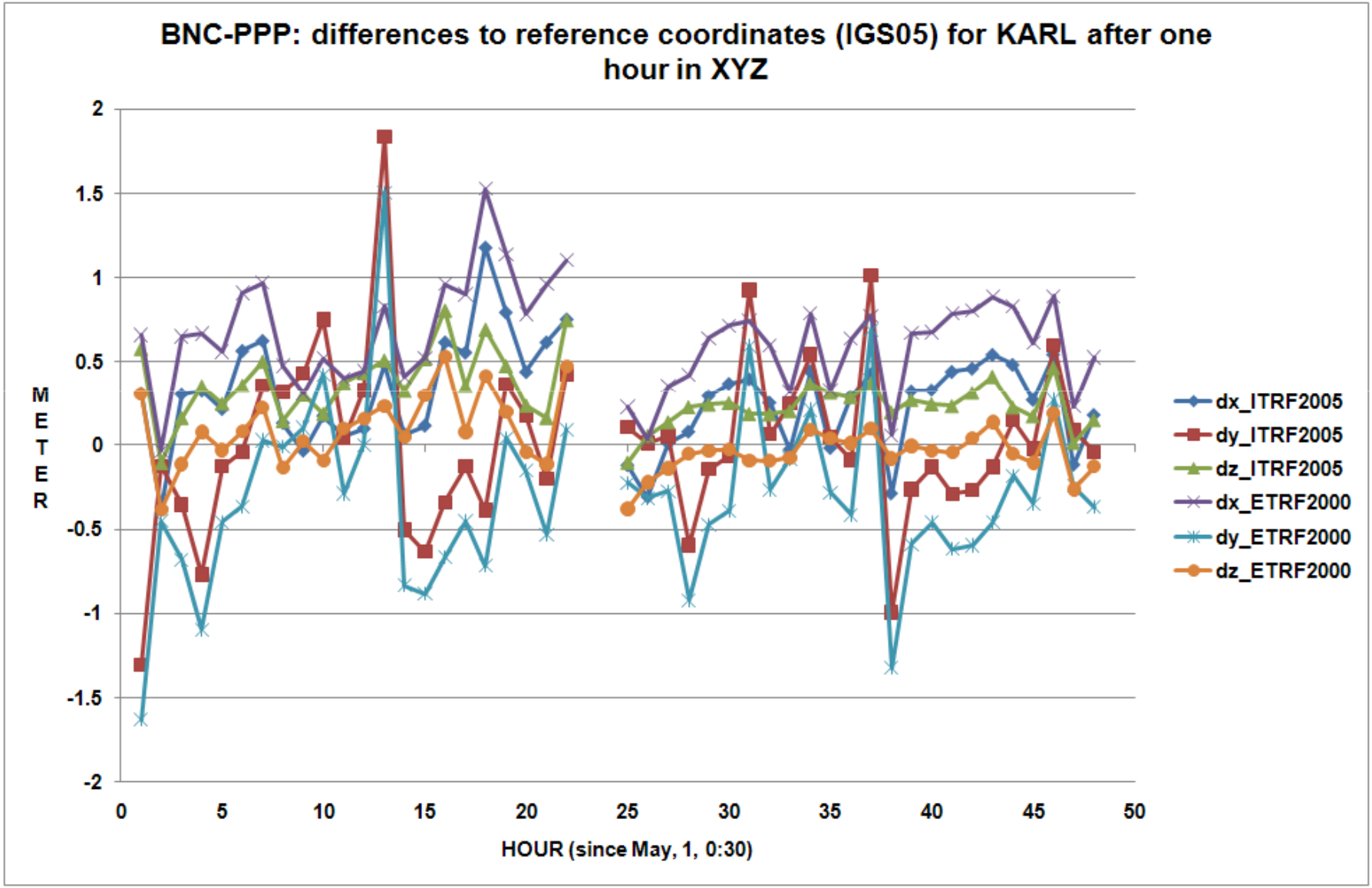
BKG Ntrip Server (BNS)

- **Motivation: user should have advantage of using orbit and clock corrections directly in its specific reference frame**
- **Solution:**
  - **implementation of transformation formulae (14 parameters transformation) and parameters in BNS**
  - **transformation of the satellite positions**
- **Currently, available (hard-coded) for ETRS89, GDA94, NAD83, and SIRGAS2000 (input of individual – max. 14 – parameters possible)**

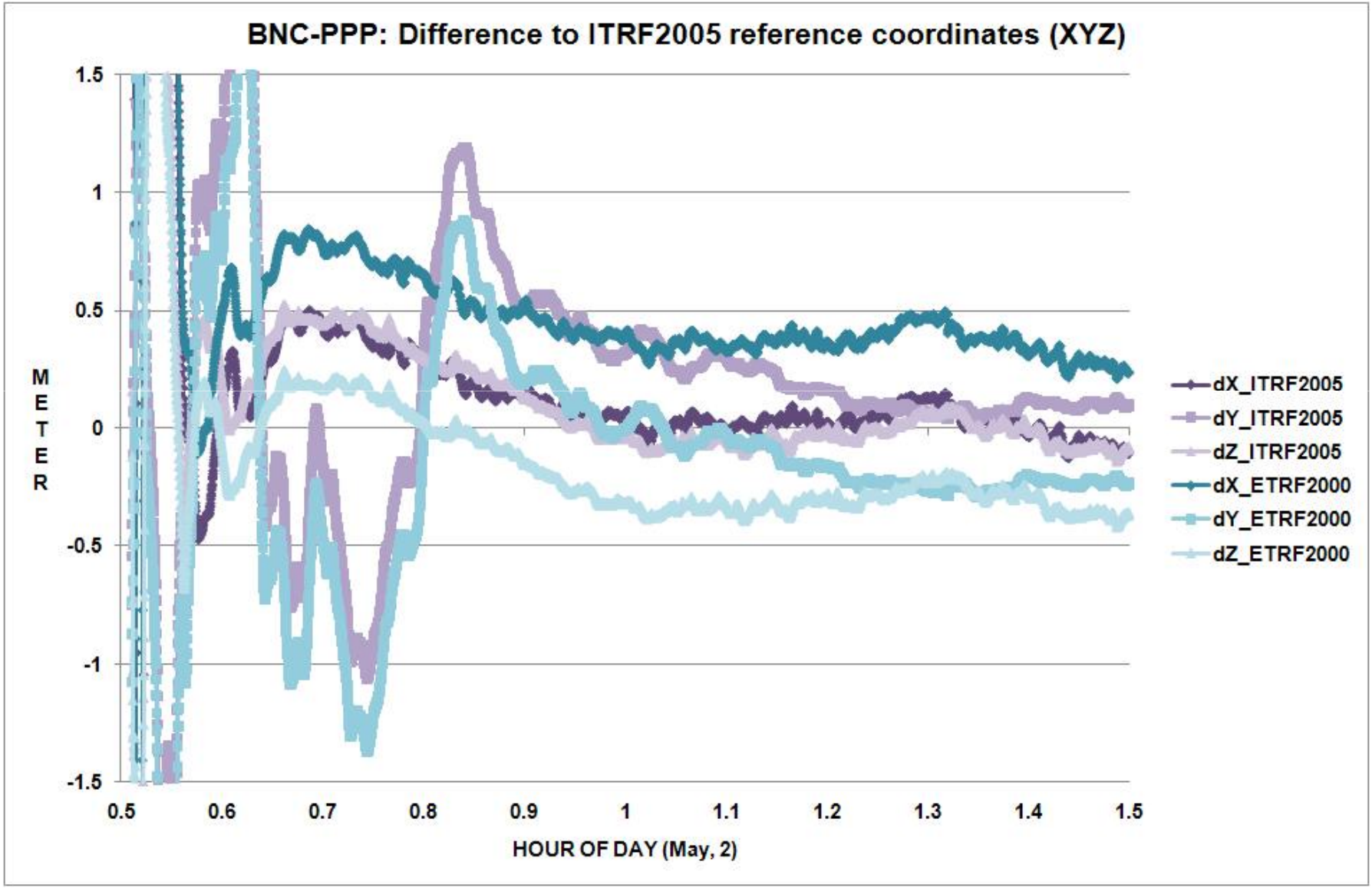
BKG Ntrip Client (BNC)

- **Proof: using of orbit & clock correction streams within the BKG Ntrip Client (BNC)**
- **Starting with version 2.0 PPP option implemented (→ G. Weber et al.)**
- **Test: running two (three) BNC jobs in parallel with the different corrections (ITRF2005 vs. ETRF2000)**
  - **May, 1, 00:30 – May 3, 2010 (48 hours)**
    May, 8, 13:00 – May 10, 2010 (60 hours)
  - **Duration of each BNC job: 1 hour**
  - **EPN mountpoint used: KARL1 (GPS part only)**
  - **Clock correction streams used:**
    CLK11 (ITRF2005) vs. CLK41 (ETRF2000)
    CLK11 (ITRF2005) vs. CLK41 (ETRF2000) vs. CLK10 (ITRF2005)

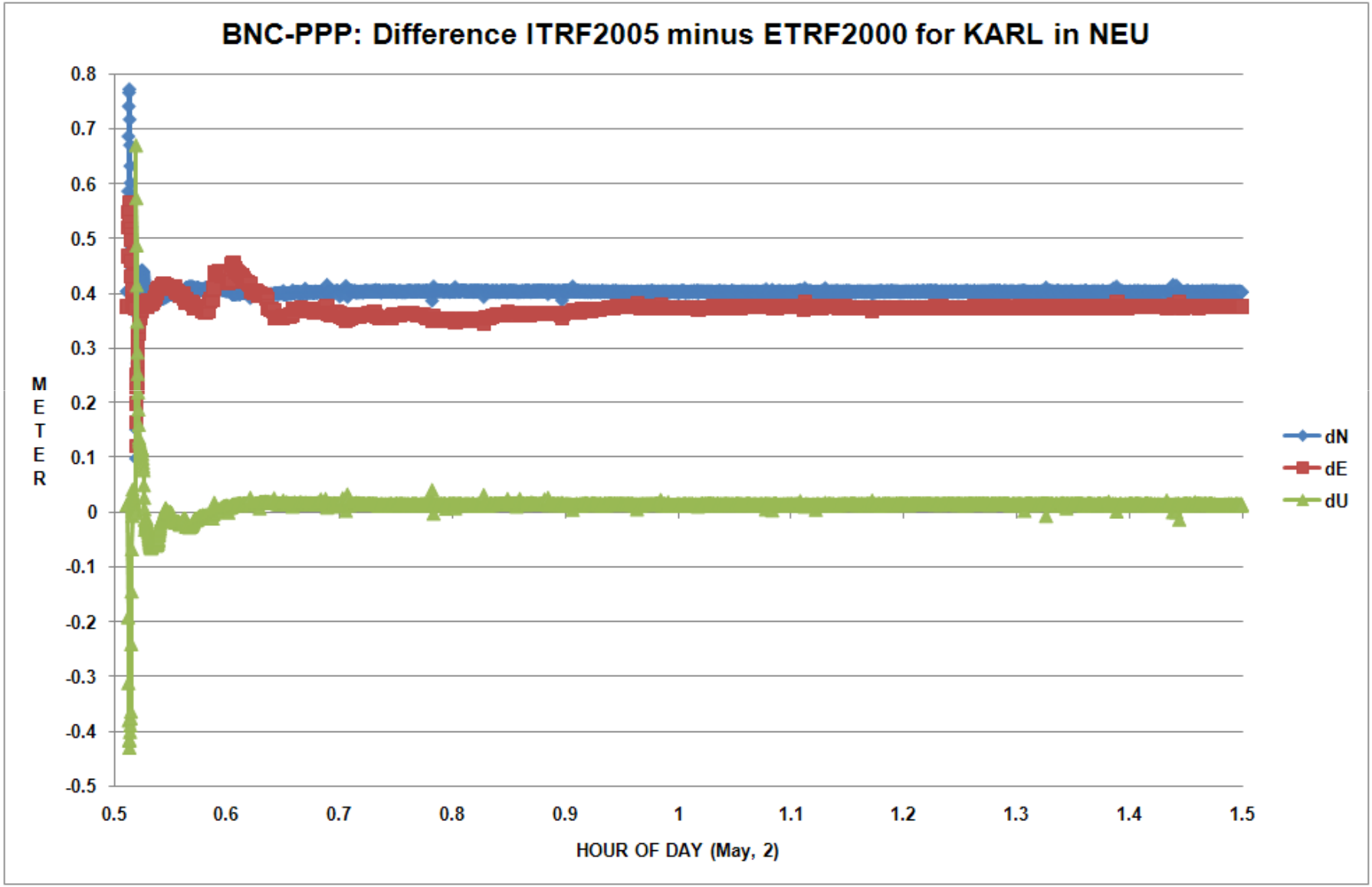
BNS & BNC – Test 1



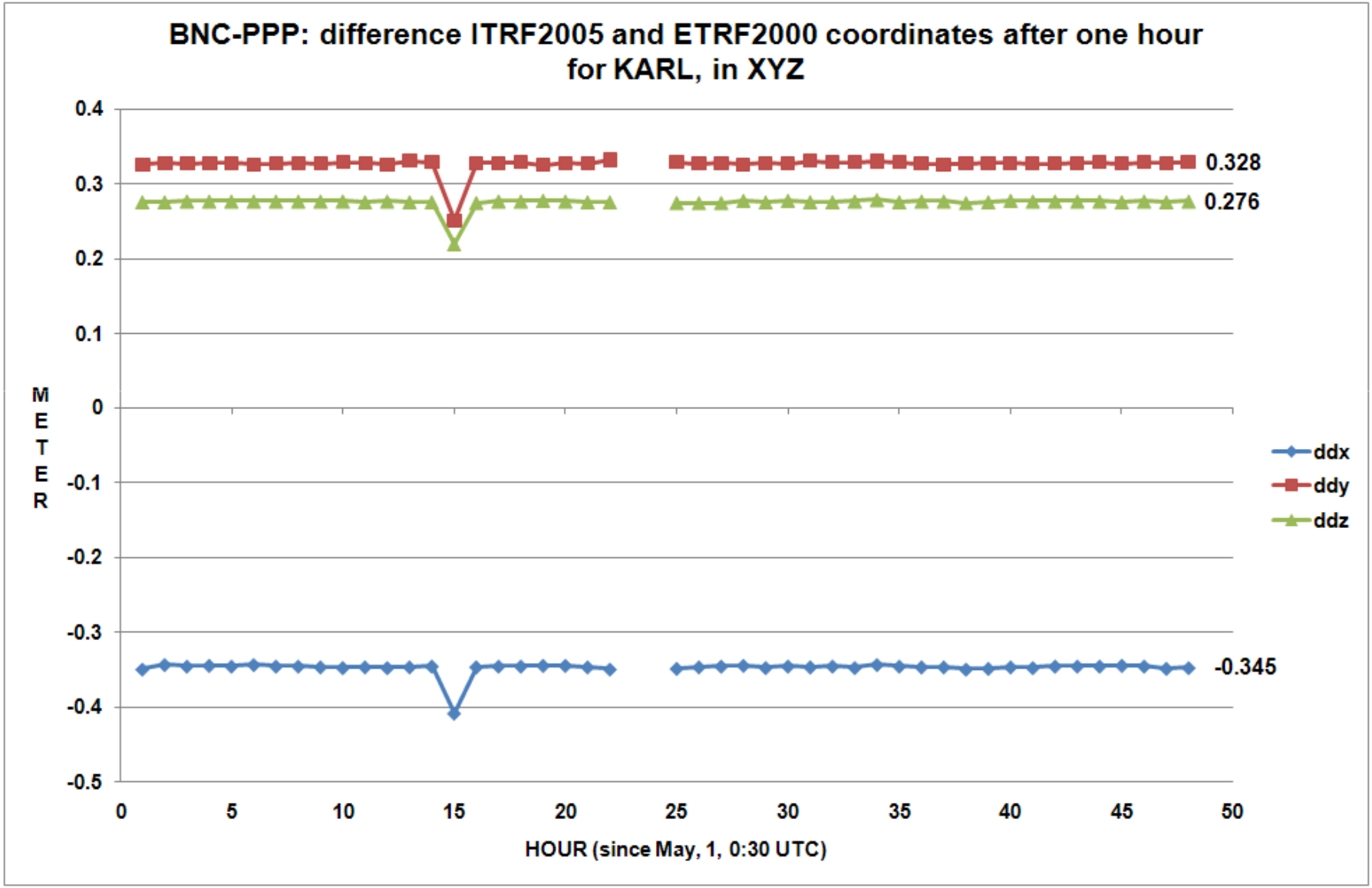
BNS & BNC – Test 1



BNS & BNC – Test 1



BNS & BNC – Test 1



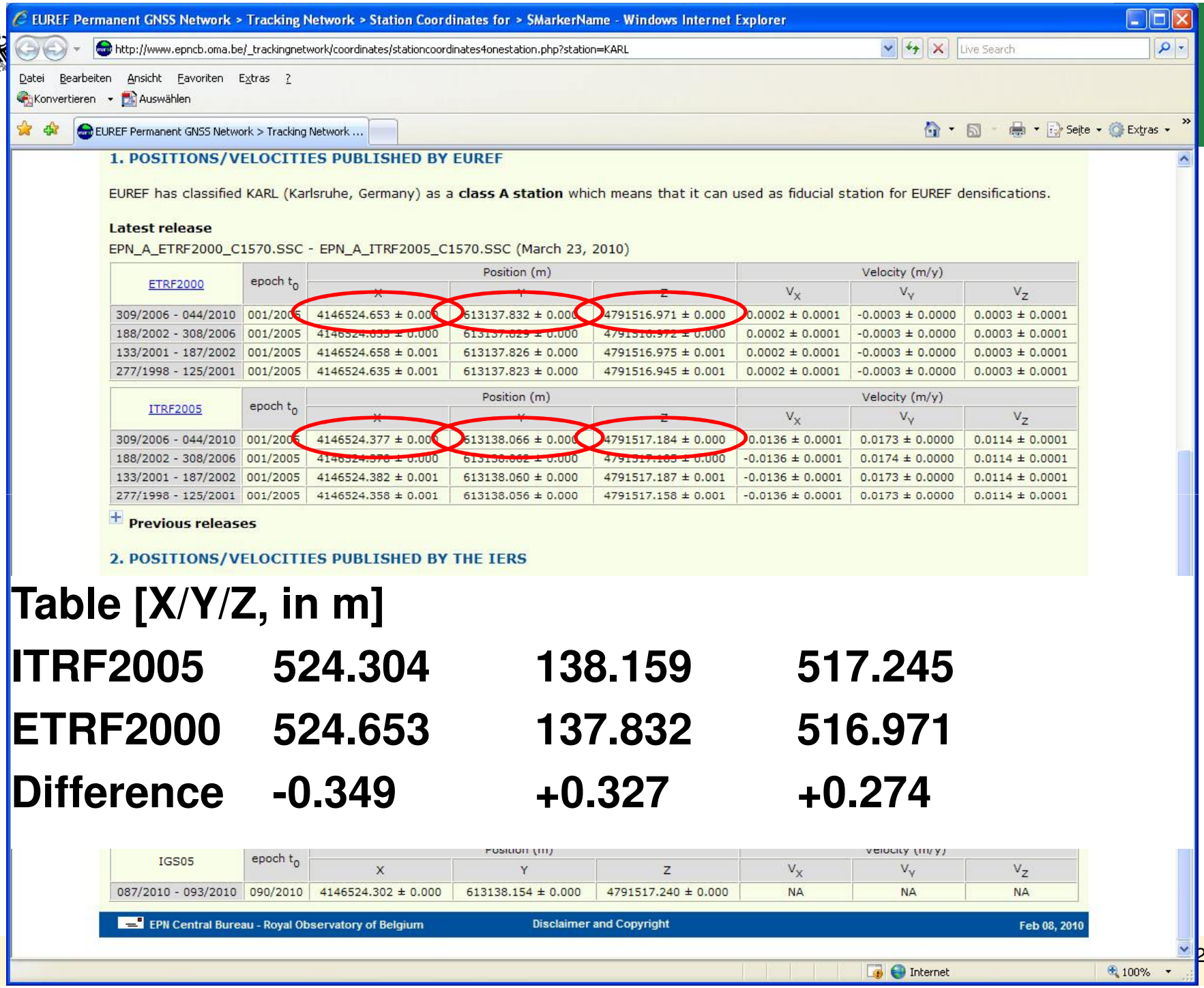
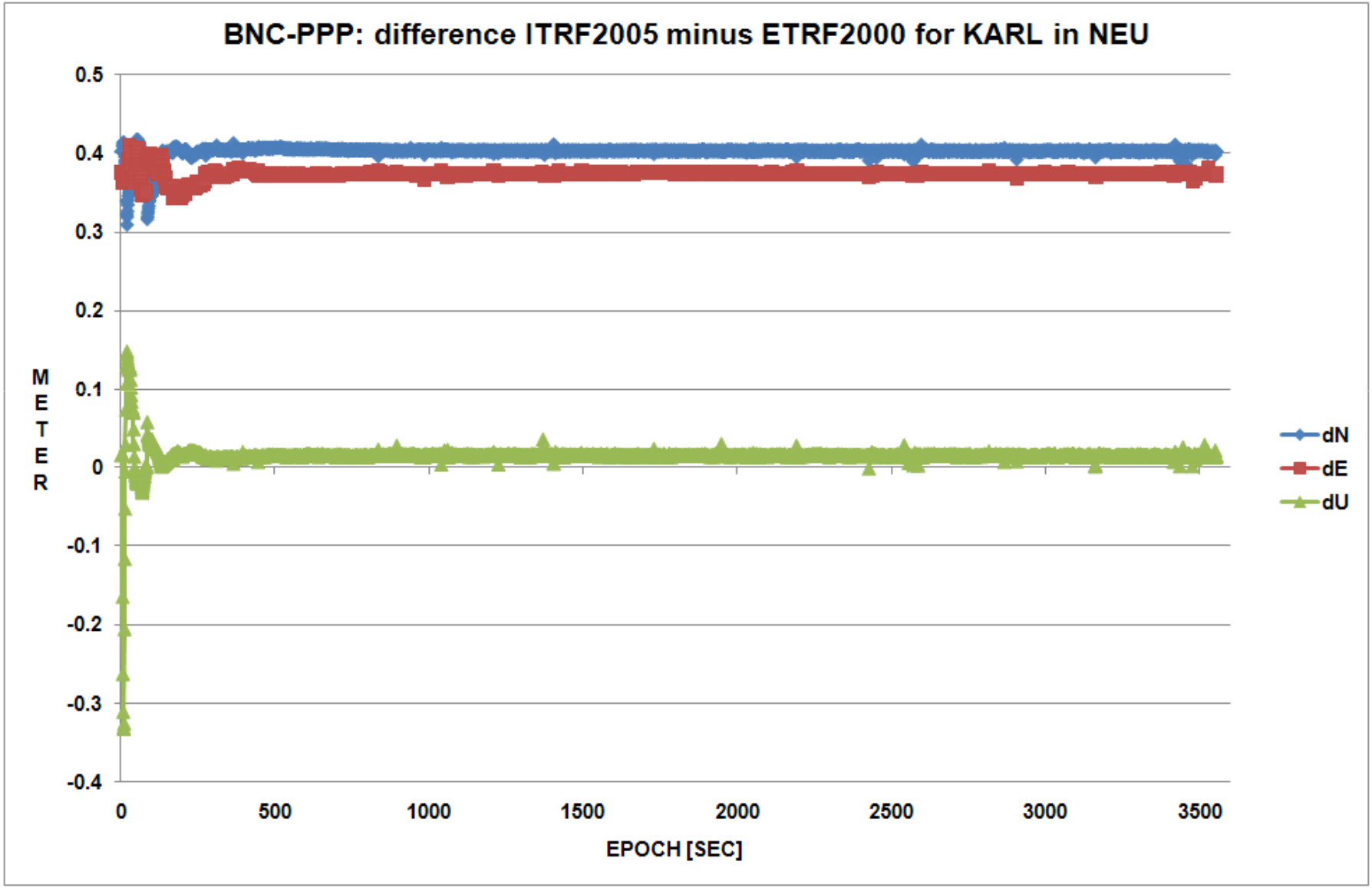


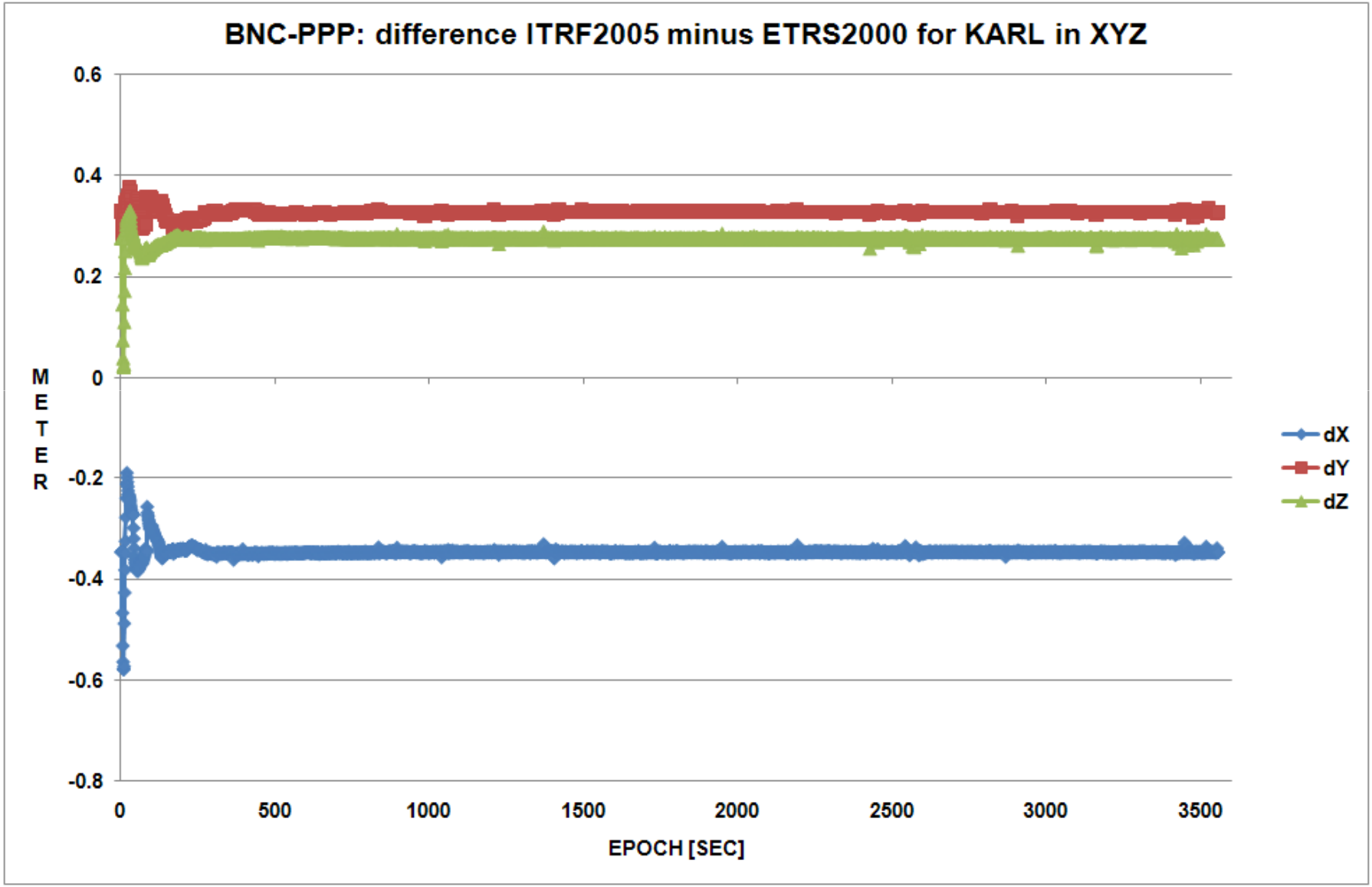
Table [X/Y/Z, in m]

ITRF2005	**524.304**	**138.159**	**517.245**
ETRF2000	**524.653**	**137.832**	**516.971**
Difference	**-0.349**	**+0.327**	**+0.274**

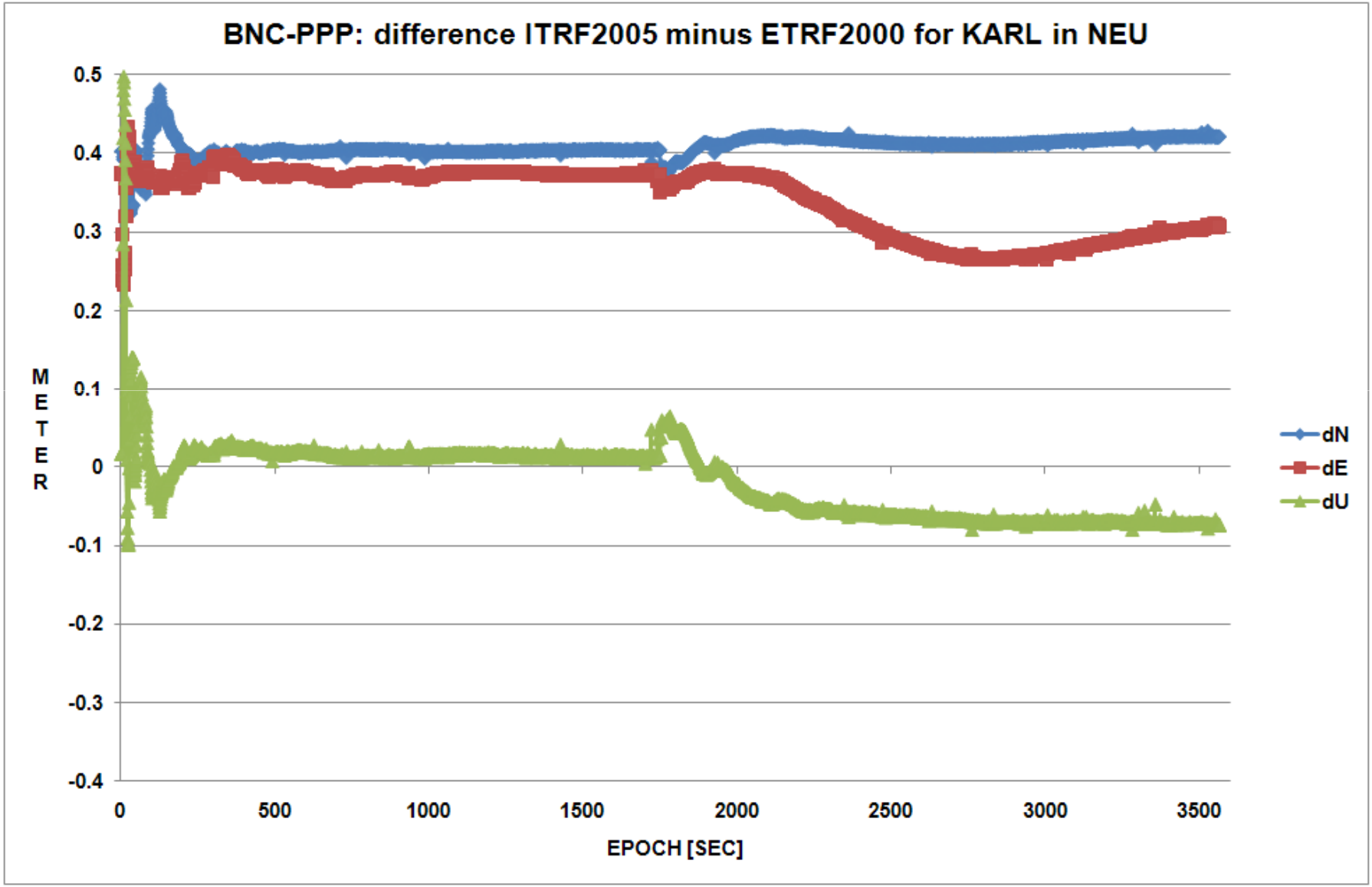
BNS & BNC – Test 1



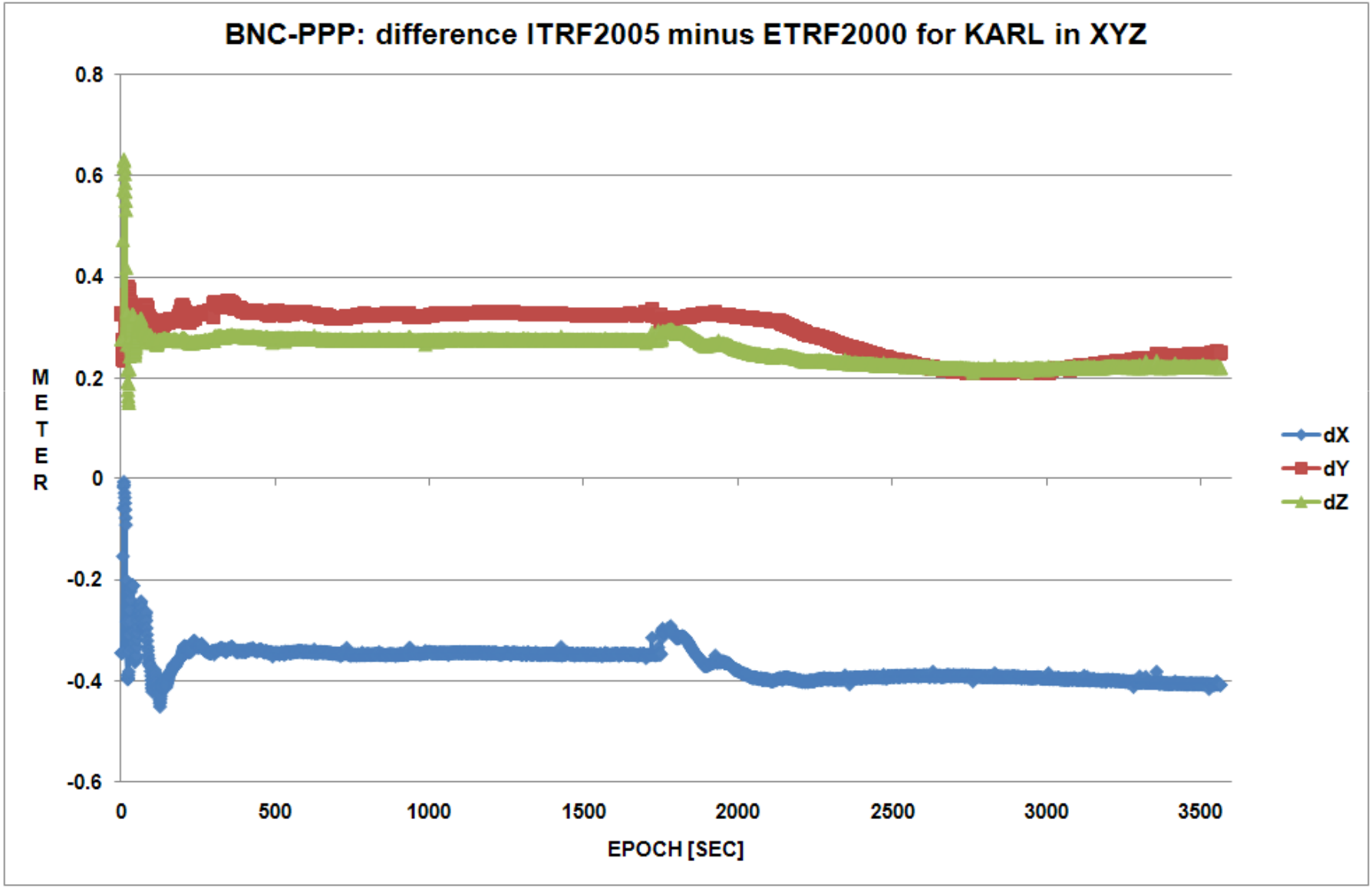
BNS & BNC – Test 1



BNS & BNC – Test 1



BNS & BNC – Test 1



BNS & BNC – Test 1

soehne@fs073:~/Decoder/BNC21A - Shell - Konsole

Session Edit View Bookmarks Settings Help

```
10-05-01 14:59:50 KARL1: NEU 14:59:49.0 7    0.941   -0.817   -0.641
10-05-01 14:59:51 KARL1: Received message type 1004
10-05-01 14:59:51 KARL1: Received message type 1012
10-05-01 14:59:51 KARL1: Received message type 1006
10-05-01 14:59:51 KARL1: Received message type 1007
10-05-01 14:59:51 KARL1: Antenna descriptor TRM29659.00     NONE
10-05-01 14:59:51 KARL1: ARP (ITRF) X 4146524.7412 m
10-05-01 14:59:51 KARL1: ARP (ITRF) Y 613137.8452 m
10-05-01 14:59:51 KARL1: ARP (ITRF) Z 4791517.0670 m
10-05-01 14:59:51 KARL1: Antenna height above marker 0.0649 m
10-05-01 14:59:51 KARL1: PPP 14:59:50.0 7    4146523.300 +-  0.050     613137.187 +-  0.040    4791517.367 +-  0.032
10-05-01 14:59:51
residuals code  -2.161 9.999 7.002 1.162 -0.155 -1.648 0.512
residuals phase 0.014 0.011 -0.008 -0.009 -0.009 0.011 -0.010

    clk = 23109.890 +-  0.188
    amb G05 =  5.673 +-  0.185
    amb G10 =  0.050 +-  0.185
    amb G15 = -4.815 +-  0.186
    amb G27 = -1.349 +-  0.188
    amb G28 =  6.813 +-  0.186
    amb G08 = 11.592 +-  0.187
    amb G09 = 12.356 +-  0.189

10-05-01 14:59:51 KARL1: NEU 14:59:50.0 7    0.943   -0.816   -0.651
10-05-01 14:59:52 KARL1: Received message type 1004
10-05-01 14:59:53 KARL1: Received message type 1012
10-05-01 14:59:53 KARL1: PPP 14:59:51.0 7    4146523.290 +-  0.050     613137.188 +-  0.040    4791517.373 +-  0.032
10-05-01 14:59:53
residuals code  -2.913 9.850 5.773 1.224 -0.133 -1.289 0.521
residuals phase 0.012 0.008 -0.006 -0.011 -0.014 0.014 -0.003

    clk = 23098.206 +-  0.188
    amb G05 =  5.672 +-  0.185
    amb G10 =  0.049 +-  0.185
    amb G15 = -4.817 +-  0.185
    amb G27 = -1.352 +-  0.188
    amb G28 =  6.812 +-  0.186
    amb G08 = 11.591 +-  0.187
    amb G09 = 12.353 +-  0.189

10-05-01 14:59:53 KARL1: NEU 14:59:51.0 7    0.954   -0.813   -0.652
10-05-01 14:59:53 KARL1: Received message type 1004
10-05-01 14:59:53 KARL1: Received message type 1012
10-05-01 14:59:53 KARL1: PPP 14:59:52.0 7    4146523.291 +-  0.050     613137.189 +-  0.040    4791517.374 +-  0.032
                                                                                                30793,1       47%
```

BNS & BNC – Test 1

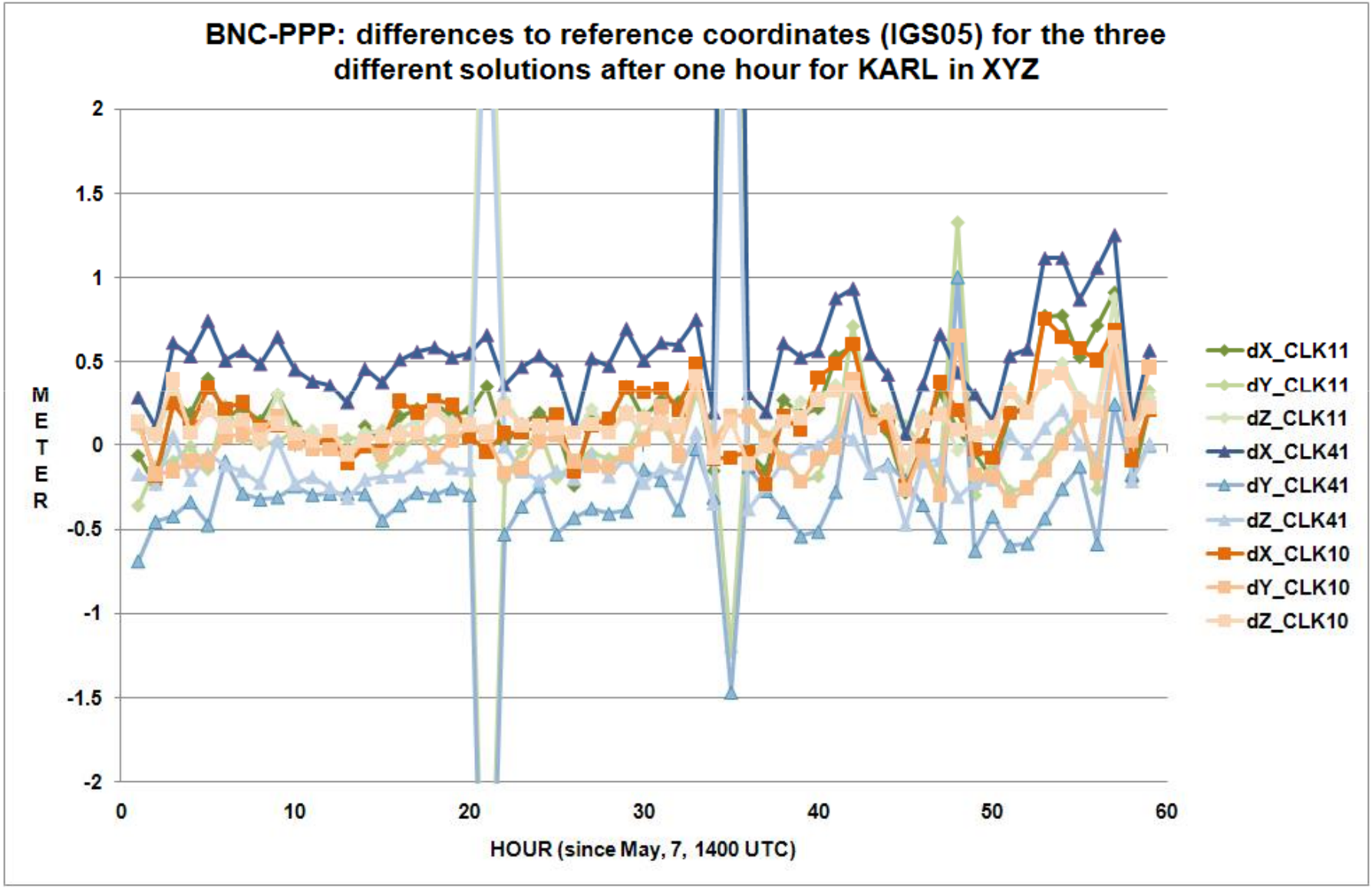
soehne@fs073:~/Decoder/BNC21B - Shell - Konsole

Session Edit View Bookmarks Settings Help

```
10-05-01 14:59:50 KARL1: NEU 14:59:49.0 7    0.537   -1.190   -0.655
10-05-01 14:59:51 KARL1: Received message type 1004
10-05-01 14:59:51 KARL1: Received message type 1012
10-05-01 14:59:51 KARL1: Received message type 1006
10-05-01 14:59:51 KARL1: Received message type 1007
10-05-01 14:59:51 KARL1: Antenna descriptor TRM29659.00     NONE
10-05-01 14:59:51 KARL1: ARP (ITRF) X 4146524.7412 m
10-05-01 14:59:51 KARL1: ARP (ITRF) Y 613137.8452 m
10-05-01 14:59:51 KARL1: ARP (ITRF) Z 4791517.0670 m
10-05-01 14:59:51 KARL1: Antenna height above marker 0.0649 m
10-05-01 14:59:51 KARL1: PPP 14:59:50.0 6    4146523.610 +-  0.072     613136.878 +-  0.042    4791517.090 +-  0.036
10-05-01 14:59:51
residuals code  -2.131 10.000 0.999 1.162 -0.156 -1.650 0.514
residuals phase 0.014 0.011 -0.008 -0.009 -0.009 0.011 -0.010

Outlier Code G08 10.000
residuals code  -2.142 7.007 1.168 -0.154 -1.654 0.529
residuals phase 0.001 -0.001 -0.005 -0.008 0.007 0.004

    clk = 23109.840 +-  0.193
    amb G05 =  5.674 +-  0.185
    amb G10 =  0.051 +-  0.185
    amb G15 = -4.815 +-  0.186
    amb G27 = -1.351 +-  0.188
    amb G28 =  6.815 +-  0.186
    amb G09 = 12.354 +-  0.189

10-05-01 14:59:51 KARL1: NEU 14:59:50.0 6    0.564   -1.167   -0.688
10-05-01 14:59:52 KARL1: Received message type 1004
10-05-01 14:59:53 KARL1: Received message type 1012
10-05-01 14:59:53 KARL1: PPP 14:59:51.0 7    4146523.594 +-  0.072     613136.874 +-  0.042    4791517.084 +-  0.036
10-05-01 14:59:53
residuals code  -2.921 9.881 5.776 1.228 -0.133 -1.292 0.533
residuals phase 0.003 0.000 -0.002 -0.008 -0.014 0.013 0.008

    clk = 23098.140 +-  0.193
    amb G05 =  5.672 +-  0.185
    amb G10 =  0.050 +-  0.185
    amb G15 = -4.817 +-  0.185
    amb G27 = -1.353 +-  0.188
    amb G28 =  6.814 +-  0.186
    amb G09 = 12.352 +-  0.189
    amb G08 = 11.631 +-  0.192

10-05-01 14:59:53 KARL1: NEU 14:59:51.0 7    0.572   -1.169   -0.704
10-05-01 14:59:53 KARL1: Received message type 1004
                                                                                30794,4       47%
```

Shell

BNS & BNC – Test 2



BNS & BNC – Test 2

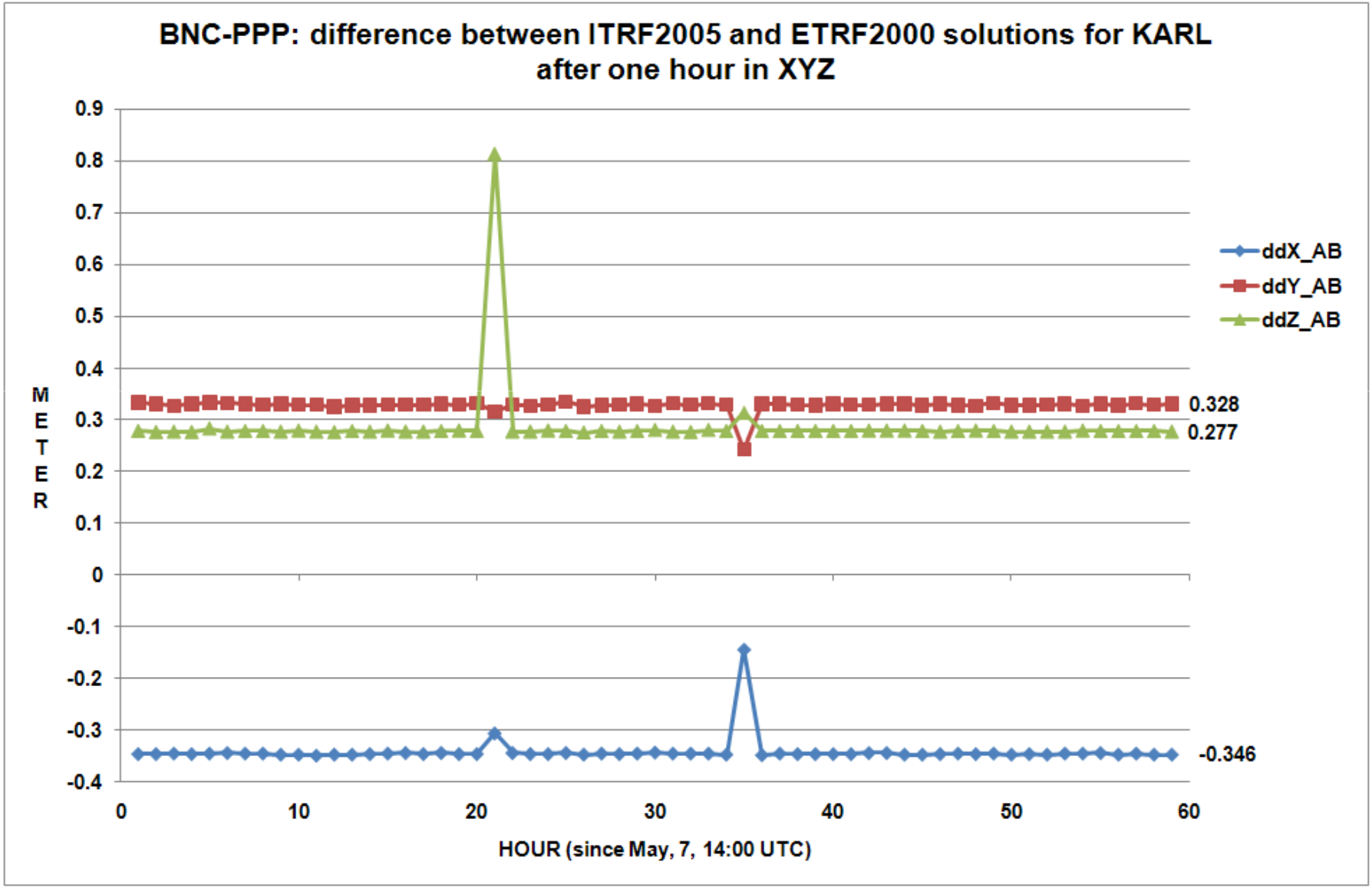
Mean differences w.r.t. ITRF2005 coordinates [N/E/U, in m]

CLK11 (ITRF2005) -0.03 ± 0.13 / +0.00 ± 0.25 / +0.24 ± 0.28

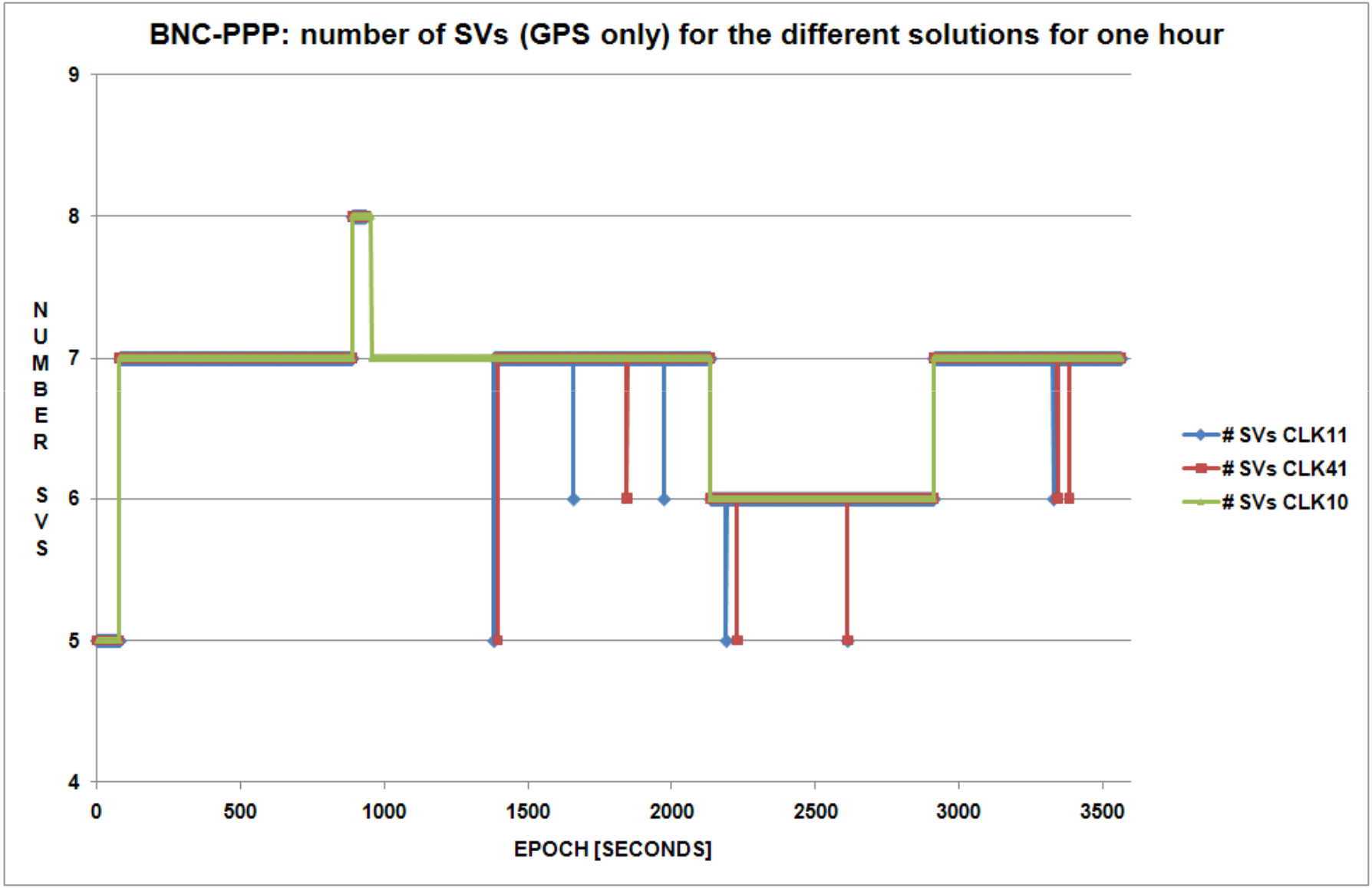
CLK41 (ETRF2000)-0.43 ± 0.13 / -0.37 ± 0.25 / +0.22 ± 0.28

CLK10 (ITRF2005) -0.03 ± 0.12 / -0.02 ± 0.19 / +0.23 ± 0.24

BNS & BNC – Test 2



BNS & BNC – Test 2



BNS & BNC – Test 2