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# Status of antenna handling within EUREF / IGS and actual conflicts

E. Brockmann



# EUREF guidelines

- Riga, 2006: relative -> absolute antennas

## Resolution 3

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

*noting* the resolution No. 1 of the EUREF 2005 symposium concerning the absolute antenna radome calibration

*and further noting* the forthcoming introduction of standards for the use of absolute antenna calibrations within the International GNSS Service (IGS) and the EUREF Permanent GPS Network (EPN)

*considering that* not all stations of the EPN use antennae for which absolute antenna radome calibration are available

*requests* EPN station managers to only use absolutely calibrated antenna types on new EPN stations or when a replacement antenna radome combination is introduced to a EPN station

*and also encourages* absolute calibration of antennae/radomes that are not already absolutely calibrated after removal from an EPN station.



EUREF 2006, Riga, 14-17 June 2006



# Collaboration with Geo++

- May, 19, 2006:

To have access to the Geo++ GNPCVDB database of absolute antenna PCV the EUREF Local Analysis centres have to buy a regular GNPCVDB license. The license costs are 125,00 € for 3 years and allows unlimited access to the database. The GNPCVDB database consists of calibration values for type specific

- Aug, 6, 2007:

The exchange of GNPCVDB type mean antenna calibrations will be executed similar to the existing procedure. Geo++ will reply on a request and will provide certain type means to be included into the IGS ANTEX file. We will also extend the use and publish for antenna types operated in the regional EUREF network.



## EUREF guidelines (2)

- TWG, Frankfurt, Nov. 2006: use individually absolutely calibrated antennas if available (maintained by the EPN CB) or group mean values of the IGS05.ATX file

GANP (GR) with TRM55971.00	NONE (37385)	not included
HOBU (G ) with TRM33429.20+GP	NONE (32683)	included
HOBU (G ) with TRM29659.00	SNOW (73802)	included
HOBU (GR) with LEIAT504GG	LEIS ( 114)	included
BORK (G ) with TRM33429.20+GP	NONE (26150)	included
BORK (G ) with TRM29659.00	SNOW (80416)	included
HOE2 (G ) with TPSCR3_GGD	CONE (70298)	included
KLOP (G ) with TRM29659.00	NONE (81795)	included
DRES (G ) with TRM29659.00	NONE (81799)	not included
SASS (G ) with TPSCR3_GGD	CONE (70155)	not included
WARN (G ) with TPSCR3_GGD	CONE (70159)	not included
BADH (G ) with TRM41249.00	NONE (79133)	included
WTZR (G ) with AOAD/M_T	NONE ( 404)	included
TUBO (G ) with LEIAT504	LEIS ( 2923)	not included
BORJ (G ) with TPSCR3_GGD	CONE (70182)	included
DRES (GR) with TPSCR3_GGD	CONE (70627)	not included
KLOP (G ) with TRM55971.00	TZGD (60441)	included
PENC (G ) with LEIAT504GG	LEIS ( 219)	included
BUTE (G ) with TRM55971.00	TZGD (36720)	not included
HOFN (G ) with TPSCR3_GGD	CONE (70218)	not included

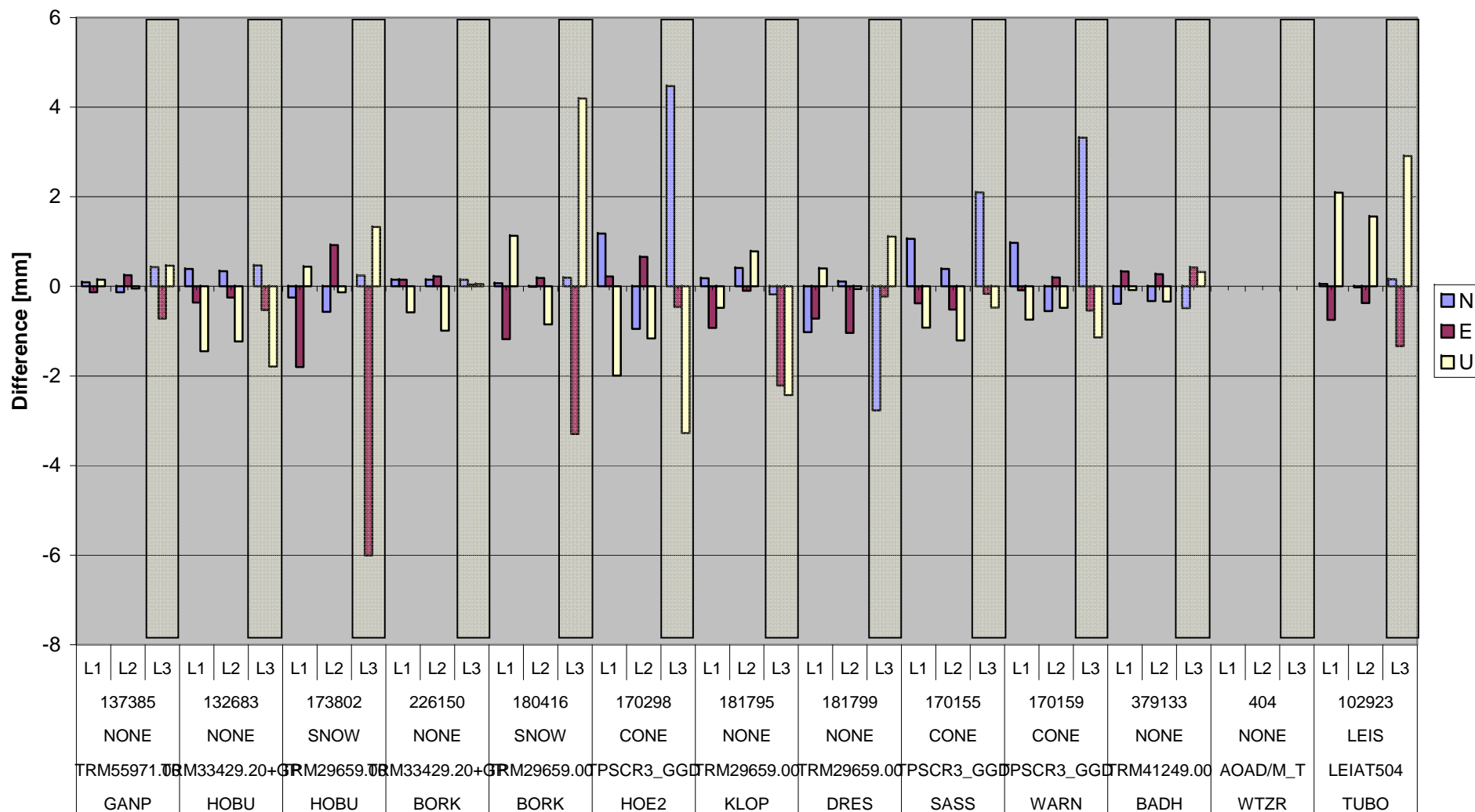
20 absolute  
individual  
antenna PCVs  
maintained by  
epncb;

S/N: 5 digits



# Influence of individual absolute PCVs

Type - Individual Calibrations





# Absolute PCVs

- IGS and EUREF switched to absolute PCVs in November 2006 (week 1400) for all processing products
- Antenna models directly influence the coordinate estimates → jumps in the time series after week 1400
- IGS05.ATX
  - contains PCVs also from the satellite antennas (-> updates if new satellites visible)
  - contains PCVs for the ground antennas from the robot calibration, but also converted from relative -> absolute
- EUREF procedure (individual PCVs) slightly inconsistent with IGS procedure (-> slightly other coordinate estimates -> important for EPN densification)



# Problems in updating IGS05.ATX

- Case 1: Geo++ is ready to provide absolute robot calibrations also for those antenna types that are contained in the EUREF network, but not in the IGS network: unfortunately already „rel.-> abs. converted“ PCV values are in the IGS05.ATX file and are used by the EPN ACs. IGS could update the file without consistency problems.

Decision: No update of the IGS files, because otherwise „jumps“ in the coordinate time series of EPN. Accepted by R. Schmid and also by IGS.

LEIAT303	NONE
TRM29659.00	SNOW

OK for EUREF/EPN?



## Problems in updating IGS05.ATX (2)

- Case 2: converted NGS calibrations for new antenna types are available and some persons within IGS (J. Ray) like to add them to the IGS05.ATX file as soon as possible (independently if the site is in the IGS network; no check, if absolute values exist)

Decision: Not yet. Antenna working group (head U. Hugentobler, xx persons) build to discuss the Pro and Cons. Carine is appointed for EPN to guarantee close collaboration also with the IGS CB

TPSCR.G3	NONE
TPSCR.G3	TPSH
TPSG3_A1	NONE
TPSG3_A1	TPSD
TPSPG_A1	TPSD





## **Pro (adding as much NGS calibrations as possible to the IGS ANTEX file):**

- service for regional networks and users outside the IGS (e.g., in order to avoid that relative and absolute corrections might be mixed up)
- appreciation of the work of the NGS colleagues
- fewer problems when new antenna types are added to the network (correction values are already there)



## **Contras (adding NGS calibrations only for those antenna types contained in the IGS network)**

- fewer consistency problems caused by the replacement of calibrations
- It should be easier to restrict the number of different antenna types (Station operators possibly prefer to buy an antenna for which calibration values are already available.)
- If a new antenna type is added to the network and converted values are already there, no one might think of the possibility to get robot calibration results at that time.



## Geo++ - related issues

- Robot was not in operation for ~2 months – but is repaired since October 2007 (30 swisstopo antennas successfully calibrated)
- Current database not updated by all antenna types. Currently missing mainly the radome types: SCIS, SCIT sowie GRAZ und PFAN. Furthermore TPSCR.G3, SEIGGSSE (GPS, Galileo antenna) and TRM55971.00 TZGD
- Expression of Dr. Schmitz to also calibrate special antennas if necessary (no official commitment, only via e-mail)



# Antenna handling is complicated

Antenna file involved in the swisstopo processing

File	Modell name	source	processes	remark
\$X/REF/I01.ATX	IGS_01	AIUB	get_gendata.pl	
\$X/REF/I01_LPT.ATX	IGS_01		get_gendata.pl	Derivat
\$X/REF/C01_LPT.ATX	IGS_01		get_gendata.pl	Derivat
\$X/REF/I05.ATX	IGS05_www	AIUB	get_gendata.pl	
\$X/REF/E05.ATX	EPN05	EPN CB	get_antex.com	
\$X/REF/ZIMM.ATX				Hilfsdatei
\$X/REF/ABS2REL.ATX				Hilfsdatei
\$X/REF/igs05_WWWW.atx	IGS05_www	IGS CB	get_antex.com	
\$X/REF/igs05.atx	IGS05_www	IGS CB	get_antex.com	
\$X/REF/epnc_05.atx	EPN05	EPN CB	get_antex.com	
\$X/REF/PNAC.STA				Stationsliste
\$X/GEN/SATELLIT.I01	IGS_01	AIUB	get_gendata.pl	
\$X/GEN/SATELLIT.C01	IGS_01		get_gendata.pl	Kopie
\$X/GEN/SATELLIT.I05	IGS05_www	AIUB	get_gendata.pl	
\$X/GEN/SATELLIT.C05	IGS05_www		get_gendata.pl	Kopie
\$X/GEN/SATELLIT.E05	IGS05_www		get_gendata.pl	Kopie
\$X/GEN/PHAS_LPT.I01	IGS_01		PCV_REL	
\$X/GEN/PHAS_LPT.C01	CAL_01	*.atx	PCV_REL/PCV_CAL	2 Prozesse
\$X/GEN/PHAS_LPT.I05	IGS05_www		PCV_ABS	
\$X/GEN/PHAS_LPT.C05	CAL05	*.atx	PCV_ABS/PCV_CAL	2 Prozesse
\$X/GEN/PHAS_LPT.E05	EPN05_www		PCV_EPN	
\$X/GEN/PHAS_LPT.B05	CAL05	*.atx	PCV_CAL	GLONASS
\$X/GEN/PHAS_COD.I01	IGS_01	AIUB	get_gendata.pl	
\$X/GEN/PHAS_COD.I05	IGS05_www	AIUB	get_gendata.pl	



## ... and challenging





# Conclusions / Decisions

- EPN uses a slightly different approach as IGS (absolute PCVs from robot / converted from relative NGS values / indiv. absolute PCVs in EPN possible)
- Decisions:
  1. For densification a close collaboration igscb / epncb is essential: Proposal to assign C. Bruyninx as responsible person in the antenna working group
  2. A decision is necessary, if also converted NGS values (or values of other organisations?) can be used for new stations in IGS/EPN. Proposal TWG: All antennas of IGS05.ATX should also be usable within EUREF.
  3. Proposal: Payment of 125€/3 Years by EPNCB for database access for EUREF